

GENERAL DESCRIPTION

The XRT72L71 DS3 ATM User Network Interface (UNI)/Clear-Channel Framer is designed to function as either a DS3 ATM UNI or Clear channel framer. For ATM UNI applications, this device provides the ATM Physical Layer (Physical Medium Dependent and Transmission Convergence sub-layers) interface for both the public and private networks at DS3 rates. For Clear-Channel framer applications, this device supports the transmission and reception of "user data" via the DS3 payload bits.

The XRT72L71 incorporates Receive, Transmit, Microprocessor Interface, Performance Monitor, Test and Diagnostic and Line Interface Unit Scan Drive sections.

APPLICATIONS

- Private User Network Interfaces
- ATM Switches
- ATM Concentrators
- DSLAM Equipment
- DS3 Frame Relay Equipment

FEATURES

- Compliant with UTOPIA Level 1 and 2 with 8 or 16 Bit Interface Specification and supports UTOPIA Bus speeds of up to 50 MHz
- Contains on-chip 16 cell FIFO in both the Transmit (TxFIFO) and Receive Directions (RxFIFO)
- Contains on-chip 54 byte Transmit OAM Cell buffer and a 108 byte Receive OAM cell buffer, for transmission, reception and processing of OAM cells.
- Supports PLCP or ATM Direct Mapping modes
- Supports M13 and C-Bit Parity Framing Formats
- Supports DS3 Clear Channel Framing Applications
- Includes PRBS Generator and Receiver
- Supports Local, Remote-Line, Cell, and PLCP Loop-backs
- Interfaces to 8 or 16 Bit wide Motorola and Intel μ Ps
- Low power 3.3V, 5V input tolerant, CMOS
- 160 pin PQFP Package
- 3 and 4 Channel Version also Available

FIGURE 1. XRT72L71 SIMPLIFIED BLOCK DIAGRAM WITH SYSTEM INTERFACES

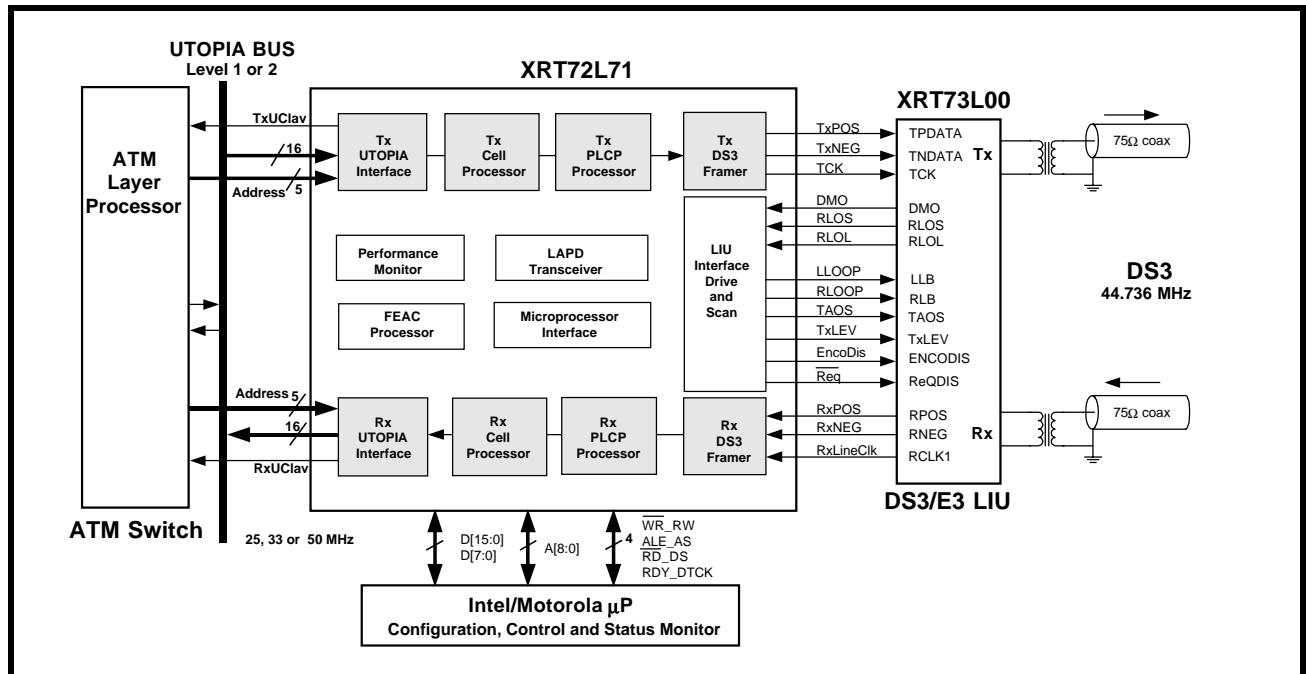


FIGURE 2. BLOCK DIAGRAM OF THE XRT72L71 DS3 UNI

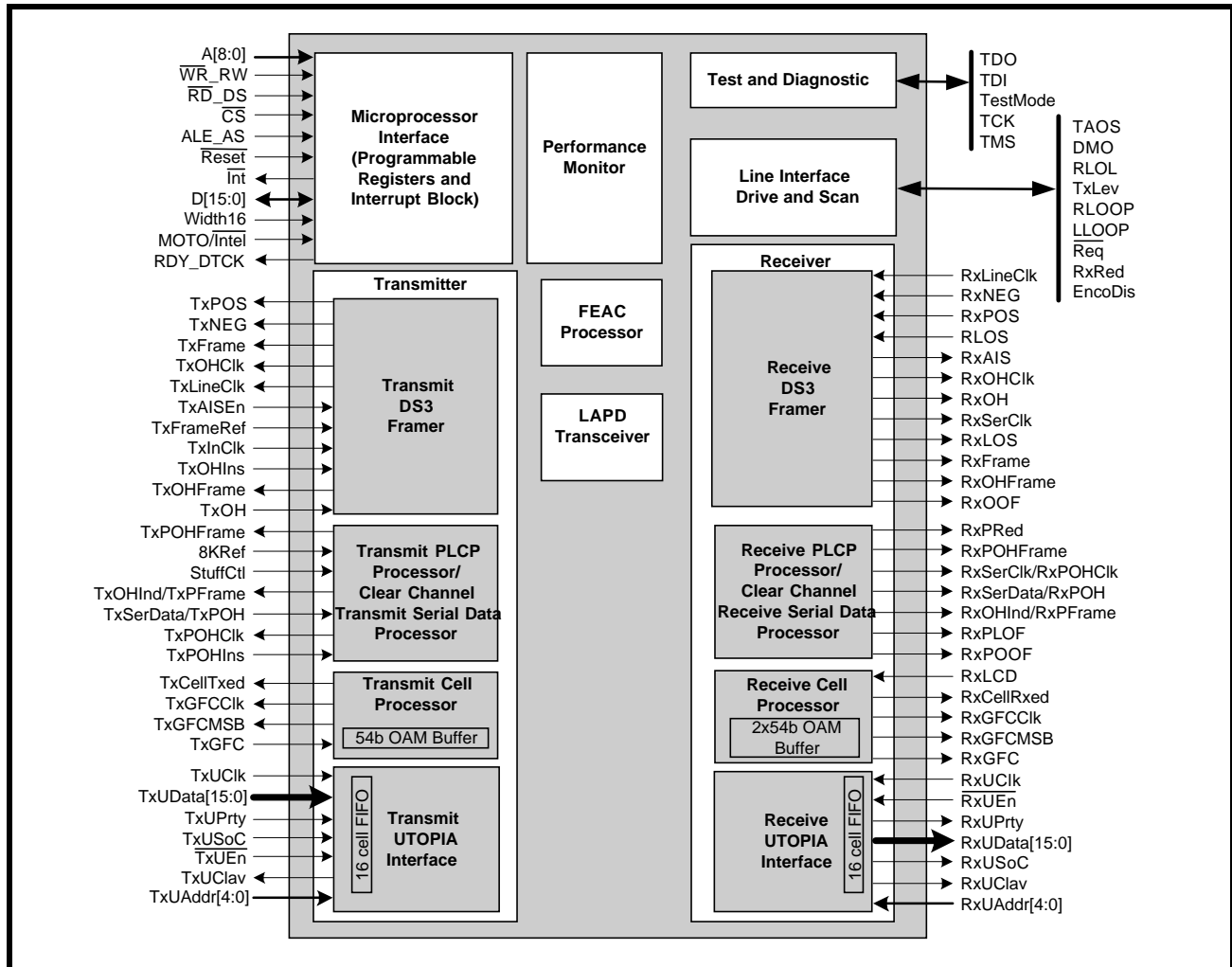
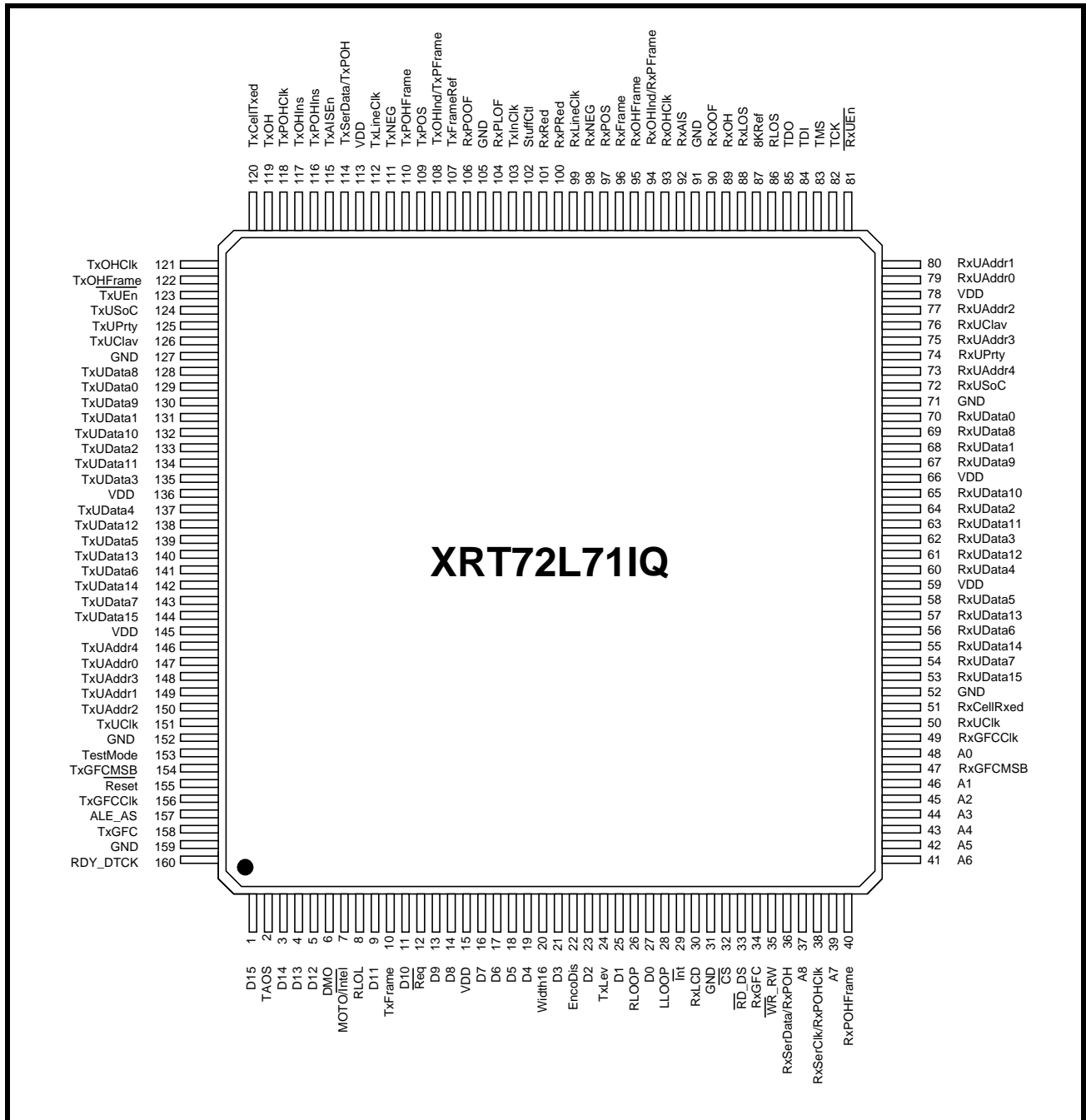


FIGURE 3. PIN OUT OF THE XRT72L71 DS3 ATM UNI



ORDERING INFORMATION

| PART NUMBER | PACKAGE | OPERATING TEMPERATURE RANGE |
|-------------|----------|-----------------------------|
| XRT72L71IQ | 160 PQFP | -40°C to +85°C |

TABLE OF CONTENTS

| | |
|---|-----------|
| GENERAL DESCRIPTION | 1 |
| APPLICATIONS | 1 |
| FEATURES | 1 |
| Figure 1. XRT72L71 Simplified Block Diagram with System Interfaces | 1 |
| Figure 2. Block Diagram of the XRT72L71 DS3 UNI | 2 |
| Figure 3. Pin Out of the XRT72L71 DS3 ATM UNI | 3 |
| ORDERING INFORMATION | 3 |
| TABLE OF CONTENTS | 1 |
| PIN DESCRIPTIONS (see Figure 3) | 4 |
| PIN DESCRIPTION | 4 |
| ABSOLUTE MAXIMUM RATINGS | 23 |
| DC ELECTRICAL CHARACTERISTICS | 23 |
| AC ELECTRICAL CHARACTERISTICS | 23 |
| TIMING DIAGRAMS | 28 |
| Figure 4. XRT72L71 Transmit UTOPIA Interface Block Timing | 28 |
| Figure 5. GFC Nibble-Field Serial Input Interface (at Transmit Cell Processor) Timing | 28 |
| Figure 6. Transmit PLCP Processor—POH Byte Serial Input Port Interface Timing | 29 |
| Figure 7. Transmit DS3 Framer—OH Bit Serial Input Port Interface Timing | 29 |
| Figure 8. Transmit DS3 Framer Line Interface Output Timing (TxPOS and TxNEG are updated on the rising edge of TxLineClk) | 30 |
| Figure 9. Transmit DS3 Framer Line Interface Output Timing (TxPOS and TxNEG are updated on the falling edge of TxLineClk) | 30 |
| Figure 10. Receive DS3 Framer—OH Bit Serial Output Port Interface Timing | 31 |
| Figure 11. Receive DS3 Framer Line Interface Input Signal Timing (RxPOS and RxNEG are sampled on rising edge of RxLineClk) | 31 |
| Figure 12. Receive DS3 Framer Line Interface Input Signal Timing (RxPOS and RxNEG are sampled on the falling edge of RxLineClk) | 32 |
| Figure 13. Receive PLCP Processor—POH Byte Serial Output Port Interface Timing | 32 |
| Figure 14. GFC Nibble-Field Serial Output Port Timing (Receive Cell Processor) | 33 |
| Figure 15. Receive UTOPIA Interface Block Timing | 33 |
| Figure 16. Microprocessor Interface Timing - Intel Type Programmed I/O Read Operations | 34 |
| Figure 17. Microprocessor Interface Timing - Intel Type Programmed I/O Write Operations | 34 |
| Figure 18. Microprocessor Interface Timing—Motorola Type Processors (Read Operations) Non-Burst Mode .. | 35 |
| Figure 19. Microprocessor Interface Timing—Motorola Type Processor (Write Operations) Non-Burst Mode ... | 35 |
| Figure 20. Microprocessor Interface Timing - Reset Pulse Width | 35 |
| FUNCTIONAL DESCRIPTION | 36 |
| THE ATM UNI MODE OF OPERATION | 36 |
| The Receive Section | 36 |
| The Transmit Section | 37 |
| Clear-channel-framing Mode of operation | 38 |
| THE RECEIVE SECTION..... | 38 |
| THE TRANSMIT SECTION..... | 38 |
| The Microprocessor Interface Section | 39 |
| Performance Monitor Section | 39 |
| Test and Diagnostic Section | 39 |
| FOR ATM UNI APPLICATIONS..... | 39 |
| FOR CLEAR-CHANNEL FRAMING APPLICATIONS..... | 39 |
| Line Interface Drive and Scan Section | 40 |

| | |
|---|-----------|
| CLEAR CHANNEL MODE OPERATION | 40 |
| Features | 41 |
| Transmit and Receive Sections | 41 |
| UTOPIA Interface Blocks | 41 |
| Transmit Cell Processor Block | 42 |
| Receive Cell Processor Block | 42 |
| Transmit PLCP Processor Block | 42 |
| Receive PLCP Processor Block | 42 |
| Transmit/Receive DS3 Framer Block | 42 |
| Microprocessor Interface Section | 42 |
| Performance Monitor Section | 43 |
| Test and Diagnostic Section | 43 |
| Line Interface Drive and Scan Section | 43 |
| LIST OF REGISTERS | 44 |
| REGISTER SUMMARY LIST | 44 |
| TABLE 1: UNI OPERATING MODE REGISTER | 46 |
| TABLE 2: UNI I/O CONTROL REGISTER | 47 |
| TABLE 3: PART NUMBER REGISTER | 47 |
| TABLE 4: VERSION NUMBER REGISTER | 47 |
| TABLE 5: UNI INTERRUPT ENABLE REGISTER | 48 |
| TABLE 6: UNI INTERRUPT STATUS REGISTER | 49 |
| TABLE 7: TEST CELL CONTROL AND STATUS REGISTER | 50 |
| TABLE 8: TEST CELL ERROR ACCUMULATOR HOLDING REGISTER | 51 |
| TABLE 9: TEST CELL HEADER BYTE-1 | 51 |
| TABLE 10: TEST CELL HEADER BYTE-2 | 51 |
| TABLE 11: TEST CELL HEADER BYTE-3 | 51 |
| TABLE 12: TEST CELL HEADER BYTE-4 | 51 |
| TABLE 13: TEST CELL ERROR ACCUMULATOR - MSB | 52 |
| TABLE 14: TEST CELL ERROR ACCUMULATOR - LSB | 52 |
| TABLE 15: RX DS3 CONFIGURATION AND STATUS REGISTER | 53 |
| TABLE 16: RXDS3 STATUS REGISTER | 54 |
| TABLE 17: RX DS3 INTERRUPT ENABLE REGISTER | 54 |
| TABLE 18: RX DS3 INTERRUPT STATUS REGISTER | 55 |
| TABLE 19: RX DS3 FEAC REGISTER | 55 |
| TABLE 20: RX DS3 FEAC INTERRUPT ENABLE/STATUS REGISTER | 56 |
| TABLE 21: RX DS3 LAPD CONTROL REGISTER | 57 |
| TABLE 22: RX DS3 LAPD STATUS REGISTER | 58 |
| TABLE 23: TX DS3 CONFIGURATION REGISTER | 59 |
| TABLE 24: TX DS3 M-BIT MASK REGISTER | 60 |
| TABLE 25: TX DS3 F-BIT MASK1 REGISTER | 60 |
| TABLE 26: TX DS3 F-BIT MASK2 REGISTER | 61 |
| TABLE 27: TX DS3 F-BIT MASK3 REGISTER | 61 |
| TABLE 28: TX DS3 F-BIT MASK4 REGISTER | 61 |
| TABLE 29: TX DS3 FEAC CONFIGURATION AND STATUS REGISTER | 62 |
| TABLE 30: TX DS3 FEAC REGISTER | 62 |
| TABLE 31: TX DS3 LAPD CONFIGURATION REGISTER | 63 |
| TABLE 32: TX DS3 LAPD STATUS/INTERRUPT REGISTER | 64 |
| TABLE 33: PMON LCV EVENT COUNT REGISTER - MSB | 64 |
| TABLE 34: PMON LCV EVENT COUNT REGISTER - LSB | 64 |
| TABLE 35: PMON FRAMING BIT ERROR EVENT COUNT REGISTER - MSB | 65 |
| TABLE 36: PMON FRAMING BIT ERROR EVENT COUNT REGISTER - LSB | 65 |
| TABLE 37: PMON P-BIT ERROR COUNT REGISTER - MSB | 65 |
| TABLE 38: PMON P-BIT ERROR COUNT REGISTER - LSB | 65 |
| TABLE 39: PMON FEBE EVENT COUNT REGISTER - MSB | 65 |

REV. 1.1.0

| | |
|---|----|
| TABLE 40: PMON FEBE EVENT COUNT REGISTER - LSB | 66 |
| TABLE 41: PMON PLCP BIP-8 ERROR COUNT REGISTER - MSB | 66 |
| TABLE 42: PMON PLCP BIP-8 ERROR COUNT REGISTER - LSB | 66 |
| TABLE 43: PMON PLCP FRAMING BYTE ERROR COUNT REGISTER - MSB | 66 |
| TABLE 44: PMON PLCP FRAMING BYTE ERROR COUNT REGISTER - LSB | 67 |
| TABLE 45: PMON PLCP FEBE COUNT REGISTER - MSB | 67 |
| TABLE 46: PMON PLCP FEBE COUNT REGISTER -LSB | 67 |
| TABLE 47: PMON SINGLE-BIT HEC ERROR COUNT - MSB | 67 |
| TABLE 48: PMON SINGLE-BIT HEC ERROR COUNT - LSB | 68 |
| TABLE 49: PMON MULTIPLE-BIT HEC ERROR COUNT - MSB | 68 |
| TABLE 50: PMON MULTIPLE-BIT HEC ERROR COUNT - LSB | 68 |
| TABLE 51: PMON RECEIVED IDLE CELL COUNT/PRBS ERROR COUNT - MSB | 68 |
| TABLE 52: PMON RECEIVED IDLE CELL COUNT/PRBS ERROR COUNT - LSB | 69 |
| TABLE 53: PMON RECEIVE VALID CELL COUNT - MSB | 69 |
| TABLE 54: PMON RECEIVE VALID CELL COUNT - LSB | 69 |
| TABLE 55: PMON DISCARDED CELL COUNT - MSB | 69 |
| TABLE 56: PMON DISCARDED CELL COUNT - LSB | 70 |
| TABLE 57: PMON TRANSMIT IDLE CELL COUNT - MSB | 70 |
| TABLE 58: PMON TRANSMIT IDLE CELL COUNT - LSB | 70 |
| TABLE 59: PMON TRANSMIT VALID CELL COUNT - MSB | 70 |
| TABLE 60: PMON TRANSMIT VALID CELL COUNT - LSB | 71 |
| TABLE 61: PMON HOLDING REGISTER | 71 |
| TABLE 62: ONE SECOND ERROR STATUS REGISTER | 71 |
| TABLE 63: LCV - ONE SECOND ACCUMULATOR REGISTER - MSB | 71 |
| TABLE 64: LCV - ONE SECOND ACCUMULATOR REGISTER - LSB | 72 |
| TABLE 65: P-BIT ERRORS - ONE SECOND ACCUMULATOR REGISTER - MSB | 72 |
| TABLE 66: P-BIT ERRORS - ONE SECOND ACCUMULATOR REGISTER - LSB | 72 |
| TABLE 67: HEC BYTE ERRORS - ONE SECOND ACCUMULATOR REGISTER - MSB | 72 |
| TABLE 68: HEC BYTE ERRORS - ONE SECOND ACCUMULATOR REGISTER -LSB | 72 |
| TABLE 69: RX PLCP CONFIGURATION/STATUS REGISTER | 73 |
| TABLE 70: RX PLCP INTERRUPT ENABLE REGISTER | 73 |
| TABLE 71: RX PLCP INTERRUPT STATUS REGISTER | 74 |
| TABLE 72: FUTURE USE | 74 |
| TABLE 73: TX PLCP FA1 BYTE ERROR MASK REGISTER | 74 |
| TABLE 74: TX PLCP FA2 BYTE ERROR MASK REGISTER | 74 |
| TABLE 75: TX PLCP BIP-8 ERROR MASK | 75 |
| TABLE 76: TX PLCP G1 BYTE REGISTER | 75 |
| TABLE 77: RX CP CONFIGURATION REGISTER | 76 |
| TABLE 78: RX CP ADDITIONAL CONFIGURATION REGISTER | 77 |
| TABLE 79: RX CP INTERRUPT ENABLE REGISTER | 78 |
| TABLE 80: RX CP INTERRUPT STATUS REGISTER | 79 |
| TABLE 81: RX CP IDLE CELL PATTERN HEADER BYTE-1 | 79 |
| TABLE 82: RX CP IDLE CELL PATTERN HEADER BYTE-2 | 80 |
| TABLE 83: RX CP IDLE CELL PATTERN HEADER BYTE-3 | 80 |
| TABLE 84: RX CP IDLE CELL PATTERN HEADER BYTE-4 | 80 |
| TABLE 85: RX CP IDLE CELL MASK HEADER BYTE-1 | 81 |
| TABLE 86: RX CP IDLE CELL MASK HEADER BYTE-2 | 81 |
| TABLE 87: RX CP IDLE CELL MASK HEADER BYTE-3 | 82 |
| TABLE 88: RX CP IDLE CELL MASK HEADER BYTE-4 | 82 |
| TABLE 89: RX CP USER CELL FILTER PATTERN HEADER BYTE-1 | 82 |
| TABLE 90: RX CP USER CELL FILTER PATTERN HEADER BYTE-2 | 83 |
| TABLE 91: RX CP USER CELL FILTER PATTERN HEADER BYTE-3 | 83 |
| TABLE 92: RX CP USER CELL FILTER PATTERN HEADER BYTE-4 | 83 |
| TABLE 93: RX CP USER CELL FILTER MASK HEADER BYTE-1 | 83 |

| | |
|--|-----------|
| TABLE 94: RX CP USER FILTER CELL MASK HEADER BYTE-2 | 84 |
| TABLE 95: RX CP USER CELL FILTER MASK HEADER BYTE-3 | 84 |
| TABLE 96: RX CP USER CELL FILTER MASK HEADER BYTE-4 | 84 |
| TABLE 97: TX CP CONTROL REGISTER | 85 |
| TABLE 98: TX CP OAM REGISTER | 86 |
| TABLE 99: TX CP HEC ERROR MASK REGISTER | 86 |
| TABLE 100: FUTURE USE | 86 |
| TABLE 101: TX CP IDLE CELL PATTERN HEADER BYTE-1 | 86 |
| TABLE 102: TX CP IDLE CELL PATTERN HEADER BYTE-2 | 87 |
| TABLE 103: TX CP IDLE CELL PATTERN HEADER BYTE-3 | 87 |
| TABLE 104: TX CP IDLE CELL PATTERN HEADER BYTE-4 | 87 |
| TABLE 105: TX CP IDLE CELL PATTERN HEADER BYTE-5 | 87 |
| TABLE 106: TX CP IDLE CELL PAYLOAD REGISTER | 87 |
| TABLE 107: UTOPIA CONFIGURATION REGISTER | 88 |
| TABLE 108: RX UTOPIA INTERRUPT ENABLE/STATUS REGISTER | 89 |
| TABLE 109: RX UTOPIA ADDRESS | 89 |
| TABLE 110: RX UTOPIA FIFO STATUS REGISTER | 90 |
| TABLE 111: TX UTOPIA INTERRUPT/STATUS REGISTER | 91 |
| TABLE 112: FUTURE USE | 91 |
| TABLE 113: TX UTOPIA ADDRESS | 92 |
| TABLE 114: TX UTOPIA STATUS REGISTER | 92 |
| TABLE 115: LINE INTERFACE DRIVE REGISTER | 93 |
| TABLE 116: LINE INTERFACE SCAN REGISTER | 95 |
| TABLE 117: PMON CP-BIT ERROR EVENT COUNT REGISTER - MSB | 96 |
| TABLE 118: PMON CP-BIT ERROR EVENT COUNT REGISTER - LSB | 96 |
| TABLE 119: FRAME CP-BIT ERRORS - ONE SECOND ACCUMULATOR REGISTER - MSB | 96 |
| TABLE 120: FRAME CP-BIT ERRORS - ONE SECOND ACCUMULATOR REGISTER - LSB | 96 |
| TABLE 121: UNUSED | 96 |
| PACKAGE DIMENSIONS | 97 |
| REVISION HISTORY | 98 |

PIN DESCRIPTIONS (SEE FIGURE 3)

PIN DESCRIPTION

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|-------------|-------------------|------|---|
| 1 | D15 | I/O | MSB of Bi-Directional Data Bus (Microprocessor Interface Section): This pin, along with pins D0 - D14, function as the Microprocessor Interface bi-directional data bus, and is intended to be interfaced to the "local" microprocessor. This pin is inactive if the Microprocessor Interface block is configured to operate over an 8 bit data bus. |
| 2 | TAOS | O | "Transmit All Ones Signal" (TAOS) Command (for the XRT7300 LIU IC). This output pin is intended to be connected to the TAOS input pin of the XR-T7300 LIU IC. The user can control the state of this output pin by writing a '0' or '1' to Bit 4 (TAOS) within the Line Interface Drive Register (Address = 0x72). If the user commands this signal to toggle "High" then it will force the XRT7300 DS3 Line Transmitter IC to transmit an "All Ones" pattern onto the line. Conversely, if the user commands this output signal to toggle "Low" then the XRT7300 DS3 Line Transmitter IC will proceed to transmit data based upon the pattern that it receives via the TxPOS and TxNEG output pins. Writing a "1" to Bit 4 of the Line Interface Drive Register (Address = 0x72) will cause this output pin to toggle "High". Writing a "0" to this bit-field will cause this output pin to toggle "Low". <i>NOTE: If the designer is not using the XRT7300 DS3/E3/STS-1 LIU IC, then this output pin can be used for other purposes.</i> |
| 3 4 5 | D14 D13 D12 | I/O | Bi-directional Data bus (Microprocessor Interface Section): This pin is inactive if the Microprocessor Interface block is configured to operate over an 8 bit data bus. Please see description for D15, pin 1. |
| 6 | DMO | I | "Drive Monitor Output" Input (from the XRT7300 LIU IC): This input pin is intended to be tied to the DMO output pin of the XRT7300 E3/DS3/STS-1 LIU IC. The user can determine the state of this input pin by reading Bit 2 (DMO) within the Line Interface Scan Register (Address = 0x73). If this input signal is "High", then it means that the drive monitor circuitry (within the XRT7300 LIU IC) has not detected any bipolar signals at the MTIP and MRING inputs within the last 128 ± 32 bit-periods. If this input signal is "Low", then it means that bipolar signals are being detected at the MTIP and MRING input pins of the XRT7300. <i>NOTE: If the designer is not using the XRT7300 E3/DS3/STS-1 LIU IC, then this input pin can be used for other purposes.</i> |
| 7 | MOTO/Intel | I | Motorola/Intel Processor Interface Select Mode: This input pin allows the user to configure the Microprocessor Interface to interface with either a "Motorola-type" or "Intel-type" microprocessor/microcontroller. Tying this input pin to VDD, configures the microprocessor interface to operate in the Motorola mode (e.g., the UNI/Framer can be readily interfaced to a "Motorola type" local microprocessor). Tying this input pin to GND configures the microprocessor interface to operate in the Intel Mode (e.g., the UNI/Framer can be readily interfaced to an "Intel type" local microprocessor). |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|-------------------------|------|--|
| 8 | RLOL | I | <p>Receive Loss of Lock Indicator—from the XRT7300 E3/DS3/STS-1 LIU IC: This input pin is intended to be connected to the RLOL (Receive Loss of Lock) output pin of the XRT7300 LIU IC. The user can monitor the state of this pin by reading the state of Bit 1 (RLOL) within the Line Interface Scan Register (Address = 0x73). If this input pin is “Low”, then it means that the phase-locked-loop circuitry, within the XRT7300 is properly locked onto the incoming DS3 data-stream; and is properly recovering clock and data from this DS3 data-stream. However, if this input pin is “High”, then it means that the phase-locked-loop circuitry, within the XRT7300 has lost lock with the incoming DS3 data-stream, and is not properly recovering clock and data. For more information on the operation of the XRT7300 E3/DS3/STS-1 LIU IC, please consult the "XRT7300 E3/DS3/STS-1 LIU IC" data sheet.</p> <p>NOTE: <i>If the designer is not using the XRT7300 DS3/E3/STS-1 LIU IC, this input pin can be used for other purposes.</i></p> |
| 9 | D11 | I/O | <p>Bi-Directional Data bus (Microprocessor Interface Section): This pin is inactive if the Microprocessor Interface block is configured to operate over an 8-bit wide data bus. Please see description for D15, pin 1.</p> |
| 10 | TxFrame | O | <p>Transmit End of DS3 Frame Indicator: The function of this pin is same in both Clear Channel and ATM UNI modes of the XRT72L71. This pin marks the end of each DS3 frame.</p> <p>ATM UNI Mode This pin is pulsed for one DS3 clock period when the transmit input interface is processing the last bit of the given DS3 frame. This just serves as an indication to terminal equipment in the ATM UNI mode.</p> <p>Clear Channel Mode When the XRT72L71 is configured to operate in the “Clear-Channel Framing” mode, then the Transmit DS3 Framing block will pulse this output pin “High” (for one bit period) when the “Transmit Payload Data Input Interface” block is processing the last bit of a given DS3 frame. The purpose of this output pin is to alert the Terminal Equipment that it needs to begin transmission of a new DS3 frame to the XRT72L71 (e.g., to permit the XRT72L71 to maintain Transmit DS3 framing alignment control over the Terminal Equipment).</p> |
| 11 | D10 | I/O | <p>Bi-Directional Data bus (Microprocessor Interface Section): This pin is inactive if the Microprocessor Interface block is configured to operate over an 8 bit data bus. (Please see description for D15, pin 1)</p> |
| 12 | $\overline{\text{Req}}$ | O | <p>Receive Equalization Bypass Control Output Pin—(to be connected to the XRT7300 E3/DS3/STS-1 LIU IC): This output pin is intended to be connected to the $\overline{\text{Req}}$ input pin of the XRT7300 E3/DS3/STS-1 LIU IC. The user can control the state of this output pin by writing a ‘0’ or ‘1’ to Bit 5 ($\overline{\text{Req}}$) of the Line Interface Driver Register (Address = 0x72). If the user commands this signal to toggle “High” then it will cause the incoming DS3 line signal to “bypass” equalization circuitry, within the XRT7300. Conversely, if the user commands this output signal to toggle “Low”, then the incoming DS3 line signal will be routed through the equalization circuitry. For information on the criteria that should be used when deciding whether to bypass the equalization circuitry or not, please consult the “XRT7300 E3/DS3/STS-1 LIU IC” data sheet. Writing a “1” to Bit 5 of the Line Interface Drive Register (Address = 0x72) will cause this output pin to toggle “High”. Writing a “0” to this bit-field will cause this output pin to toggle “Low”.</p> <p>NOTE: <i>If the designer is not using the XRT7300 E3/DS3/STS-1 LIU IC, then this output pin can be used for other purposes.</i></p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|----------------------|----------------------|------|---|
| 13 | D9 | I/O | Bi-Directional Data bus (Microprocessor Interface Section): This pin is inactive if the Microprocessor Interface block is configured to operate over an 8 bit data bus. Please see description for D15, pin1. |
| 14 | D8 | I/O | Bi-Directional Data bus (Microprocessor Interface Section): This pin is inactive if the Microprocessor Interface block is configured to operate over an 8 bit data bus. Please see description for D15, pin1. |
| 15 | VDD | *** | Power Supply Pin |
| 16 17 18 19 | D7 D6 D5 D4 | I/O | Bi-Directional Data bus (Microprocessor Interface Section): Please see description for D15, pin 1. |
| 20 | Width16 | I | Microprocessor Interface Block Data Bus Width Selector: This input pin permits the user to configure the microprocessor interface of the UNI/Framer, to operate over either an 8 or 16 bit wide bi-directional data bus. Tying this pin to VDD configures the Microprocessor Interface Data Bus width to be 16 bits. Tying this pin to GND configures the Microprocessor Interface Data Bus width to be 8 bits. |
| 21 | D3 | I/O | Bi-Directional Data bus (Microprocessor Interface Section): Please see description for D15, pin 1. |
| 22 | EncoDis | O | Encoder (B3ZS) Disable Output pin (intended to be connected to the XRT7300 E3/DS3/STS-1 LIU IC): This output pin is intended to be connected to the EncoDis input pin of the XRT7300 LIU IC. The user can control the state of this output pin by writing a “0” or “1” to Bit 3 (EncoDis) of the Line Interface Driver Register (Address = 0x72). If the user commands this signal to toggle “High” then it will disable the B3ZS encoder circuitry within the XRT7300 IC. Conversely, if the user commands this output signal to toggle “Low”, then the B3ZS Encoder circuitry, within the XRT7300 IC will be enabled. Writing a “1” to Bit 3 of the Line Interface Driver Register (Address = 0x72) will cause this output pin to toggle “High”. Writing a “0” to this bit-field will cause this output pin to toggle “Low”. NOTES: <ol style="list-style-type: none"> <i>The user is advised to disable the B3ZS encoder (within the XRT7300 IC) if the Transmit and Receive DS3 Framers (within the UNI) are configured to operate in the B3ZS line code.</i> <i>If the designer is not using the XRT7300 DS3/E3/STS-1 Line Transmitter IC, then output pin can be used for other purposes.</i> |
| 23 | D2 | I/O | Bi-Directional Data bus (Microprocessor Interface Section): Please see description for D15, pin1. |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|--------|------|---|
| 24 | TxLev | O | <p>Transmit Line Build Enable/Disable Select (to be connected to the TxLev input pin of the XRT7300 E3/DS3/STS-1 LIU IC): This output pin is intended to be connected to the TxLev input pin of the XRT7300 E3/DS3/STS-1 LIU IC. The user can control the state of this output pin by writing a “0” or a “1” to Bit 2 (TxLev) within the Line Interface Driver Register (Address = 0x72).</p> <p>If the user commands this signal to toggle “High” then it will disable the “Transmit Line Build-Out” circuitry within the XRT7300. In this case, the XRT7300 will output unshaped (square-wave) pulses onto the “Transmit Line Signal”. In order to insure that the XRT7300 generates a line signal that is compliant with the Bellcore GR-499-CORE Pulse Template requirements (at the DSX-3 Cross-Connect), the user is advised to set this output pin “High”, if the cable length (between the Transmit Output of the XRT7300 and the DSX-3 Cross-Connect) is greater than 225 feet.</p> <p>Conversely, if the user commands this signal to toggle “High”, then it will enable the “Transmit Line Build-Out” circuitry within the XRT7300. In this case, the XRT7300 will output shaped pulses onto the “Transmit Line Signal”. In order to ensure that the XRT7300 generates a line signal that is compliant with the Bellcore GR-499-CORE Pulse Template requirements (at the DSX-3 Cross-Connect), the user is advised to set this output pin “Low”, if the cable length (between the Transmit Output of the XRT7300 and the DSX-3 Cross-Connect) is less than 225 ft. of cable.</p> <p>Writing a “1” to Bit 2 of the Line Interface Drive Register (Address = 0x72) will cause this output pin to toggle “High”. Writing a “0” to this bit-field will cause this output pin to toggle “Low”.</p> <p>NOTE: <i>If the customer is not using the XRT7300 DS3/E3/STS-1 LIU IC, then this output pin can be used for other purposes.</i></p> |
| 25 | D1 | I/O | <p>Bi-Directional Data bus (Microprocessor Interface Section): Please see description for D15, pin1.</p> |
| 26 | RLOOP | O | <p>Remote Loop-back Output Pin (to the XRT7300 DS3/E3/STS-1 LIU IC): This output pin is intended to be connected to the RLOOP input pin of the XRT7300 LIU IC. This output pin, along with the LLOOP input pin (pin 28) permits the user to configure the XRT7300 to operate in either of the following three (3) loop-back modes.</p> <ul style="list-style-type: none"> • Analog Local Loop-back Mode • Digital Local Loop-back Mode • Remote Loop-back Mode. <p>Writing a “1” to bit 1 of the “Line Interface Drive Register (Address = 0x72) will cause this output pin to toggle “High”. Writing a “0” to this bit-field will cause the RLOOP output to toggle “Low”.</p> <p>NOTE: <i>If the customer is not using the XRT7300 DS3/E3/STS-1 IC, then this output pin can be used for other purposes.</i></p> |
| 27 | D0 | I/O | <p>Bi-Directional Data bus (Microprocessor Interface Section): Please see description for D15, pin1.</p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|------------------------------------|------|---|
| 28 | LLOOP | O | <p>Local Loop-back Output Pin (to the XRT7300 E3/DS3/STS-1 LIU IC): This output pin is intended to be connected to the LLOOP input pin of the XRT7300 LIU IC. This input pin, along with "RLOOP" (pin 26) permits the user to configure the XRT7300 LIU IC to operate in either of the following three (3) loop-back modes.</p> <ul style="list-style-type: none"> • Analog Local Loop-Back Mode • Digital Local Loop-Back Mode • Remote Loop-Back Mode. <p>Writing a "1" to bit 1 of the "Line Interface Drive Register" (Address = 0x72) will cause this output pin to toggle "High". Writing a "0" to this bit-field will cause the RLOOP output to toggle "Low".</p> <p>NOTE: If the user is not using the XRT7300 DS3/E3/STS-1 LIU IC, then this output pin can be used for other purposes.</p> |
| 29 | $\overline{\text{Int}}$ | O | <p>Interrupt Request Output: This open-drain, active-"Low" output signal will be asserted when the UNI/Framer is requesting interrupt service from the local microprocessor. This output pin should typically be connected to the "Interrupt Request" input of the local microprocessor.</p> |
| 30 | RxLCD | O | <p>Loss of Cell Delineation Indicator: This active-"High" output pin will be asserted whenever the Receive Cell Processor has experienced a "Loss of Cell Delineation". This pin will return "Low" once the Receive Cell Processor has regained Cell Delineation.</p> <p>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode.</p> |
| 31 | GND | *** | Ground Pin Signal |
| 32 | $\overline{\text{CS}}$ | I | <p>Chip Select Input: This active-"Low" input signal selects the Microprocessor Interface Section of the UNI/Framer and enables Read/Write operations between the "local" microprocessor and the UNI/Framer on-chip registers and RAM locations.</p> |
| 33 | $\overline{\text{RD}}_{\text{DS}}$ | I | <p>Read Data Strobe (Intel Mode): If the microprocessor interface is operating in the Intel Mode, then this input will function as the $\overline{\text{RD}}$ (READ STROBE) input signal from the local μP. Once this active-"Low" signal is asserted, then the UNI/Framer will place the contents of the addressed registers (within the UNI/Framer IC) on the Microprocessor Data Bus (D[15:0]). When this signal is negated, the Data Bus will be tri-stated.</p> <p>Data Strobe (Motorola Mode): If the microprocessor interface is operating in the Motorola mode, then this pin will function as the active-"Low" Data Strobe signal.</p> |
| 34 | RxGFC | O | <p>Receive GFC Nibble Field Serial Output pin: This pin, along with the RxGFCClk and the RxGFCMSB pins form the "Receive GFC Nibble-Field" serial output port. This pin will serially output the contents of the GFC Nibble field of each cell that is processed through the Receive Cell Processor. This data is serially clocked out of this pin on the rising edge of the RxGFCClk signal. The Most Significant Bit (MSB) of each GFC value is designated by a pulse at the RxGFCMSB output pin.</p> <p>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode.</p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|-----------------------|------|--|
| 35 | WR _{RW} | I | <p>Write Data Strobe (Intel Mode): If the microprocessor interface is operating in the Intel Mode, then this active-"Low" input pin functions as the WR (Write Strobe) input signal from the μP. Once this active-"Low" signal is asserted, then the UNI will latch the contents of the μP Data Bus, into the addressed register (or RAM location) within the UNI/Framer IC.</p> <p>R/W Input Pin (Motorola Mode): When the Microprocessor Interface Section is operating in the "Motorola Mode", then this pin is functionally equivalent to the "R/W*" pin. In the Motorola Mode, a "READ" operation occurs if this pin is at a logic "1". Similarly, a WRITE operation occurs if this pin is at a logic "0".</p> |
| 36 | RxSerData/ RxPOH | O | <p>Receive Serial Output/Receive PLCP Frame Path Overhead (POH) Byte Serial Output Port—Output Pin: The exact functionality of this output pin depends upon whether the XRT72L71 Framer IC is operating in the Clear Channel or ATM UNI Mode.</p> <p>Clear Channel Mode: In clear channel mode, all DS3 data which is received by XRT72L71 will be output as a serial data stream via this pin. The XRT72L71 will output data (via this pin) upon the falling edge of "RxSerClk". As a consequence, this data should be sampled with the rising edge of RxSerClk.</p> <p>ATM UNI Mode: This output pin, along with RxPOHClk, RxPOHFrame, and RxPOHIns pins comprise the "Receive PLCP Frame POH Byte" serial output port. For each PLCP frame that is received by the Receive PLCP Processor, this serial output port will output the contents of all 12 POH (Path Overhead) bytes. The data that is output via this pin, is updated on the rising edge of the RxPOHClk output clock signal. The RxPOHFrame pin will pulse "High" when the first bit of the Z6 byte is being output on this output pin.</p> |
| 37 | A8 | I | <p>Address Bus Input (Microprocessor Interface)—MSB (Most Significant Bit): This input pin, along with inputs A0 - A7 are used to select the on-chip UNI register and RAM space for READ/WRITE operations with the "local" micro-processor.</p> |
| 38 | RxSerClk/ RxPOHClk | O | <p>Clear Channel Mode Receive Clock Output Signal for Serial Data Interface/ Receive PLCP Frame Path Overhead (POH) Byte Serial Output Port—Output Clock Signal: The exact functionality of this output pin depends upon whether the XRT72L71 Framer IC is operating in the Clear Channel or ATM UNI Mode.</p> <p>Clear Channel Mode - RxSerClk: In clear channel mode, this pin can be used by the external interface to sample the clear channel serial data stream on RxSer pin. The Receive Section of the XRT72L71 will output all "inbound" DS3 data, via the "RxSerData" output pin, upon the rising edge of this output pin. Hence, the user should be sampling the data (on the "RxSerData" output pin) upon the rising edge of this clock.</p> <p>ATM UNI MODE - RxPOHClk: In the ATM UNI mode of operation, this pin serves as RxPOHClk. This output clock pin, along with RxPOH, RxPOHframe pins comprise the 'Receive PLCP OH serial output' interface.</p> |
| 39 | A7 | I | <p>Address Bus Input (Microprocessor Interface): Please see description for A8, pin 37.</p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|----------------------------------|----------------------------------|------|--|
| 40 | RxPOHFrame | O | Receive PLCP Frame Path Overhead (POH) Byte Serial Output Port—Beginning of Frame Signal Pin: This output pin, along with RxPOH, RxPO-HClk, and RxPOHIns pins comprise the “Receive PLCP Frame POH Byte” serial output port. This output pin provides framing information to external circuitry receiving and processing this POH (Path Overhead) data, by pulsing “High” when the first bit of the Z6 byte is output via the RxPOH output pin. This pin is “Low” at all other times during this PLCP POH framing cycle. <i>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</i> |
| 41 42 43 44 45 46 | A6 A5 A4 A3 A2 A1 | I | Address Bus Input (Microprocessor Interface): Please see description for A8, pin 37. |
| 47 | RxGFCMSB | O | Received GFC Nibble Field—MSB Indicator: This output pin functions as a part of the “Receive GFC-Nibble Field” Serial Output port; which also consists of the RxGFC and RxGFCClk pins. This pin pulses “High” the instant that the MSB (Most Significant Bit) of a GFC Nibble is being output on the RxGFC pin. <i>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</i> |
| 48 | A0 | I | Address Bus Input (Microprocessor Interface)—LSB (Least Significant Bit): Please see description for A8, pin 37. |
| 49 | RxGFCClk | O | Received GFC Nibble Serial Output Port Clock Signal: This output pin functions as a part of the “Receive GFC Nibble-Field” Serial Output Port; also consisting of the RxGFC and RxGFCMSB pins. This pin provides a clock pulse which allows external circuitry to latch in the GFC Nibble-Data via the RxGFC output pin. <i>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</i> |
| 50 | RxUCIk | I | Receive UTOPIA Interface Clock Input: The byte (or word) data, on the Receive UTOPIA Data bus is updated on the rising edge of this signal. The Receive UTOPIA Interface can be clocked at rates up to 50 MHz. <i>NOTE: The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in the “Clear-Channel-Framer” Mode.</i> |
| 51 | RxCeIRxed | O | Receive Cell Processor—Cell Received Indicator: This output pin pulses “High” each time the Receive Cell Processor receives a new cell from the Receive PLCP Processor or the Receive DS3 Framer. <i>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</i> |
| 52 | GND | *** | Ground Pin Signal |
| 53 | RxUDData15 | O | Receive UTOPIA Data Bus Output (MSB): This output pin, along with RxUDData14 through RxUDData0 functions as the Receive UTOPIA Data Bus. ATM cell data that has been received from the “Remote Terminal Equipment” is output on the Receive UTOPIA Data Bus, where it can be read and processed by the ATM Layer Processor. <i>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</i> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|----------------------------------|---|------|---|
| 54 55 56 57 58 | RxUData7 RxUData14 RxUData6 RxUData13 RxUData5 | O | Receive UTOPIA Data Bus Output: Please see description of RxUData15, pin 53. NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |
| 59 | VDD | *** | Power Supply Pin |
| 60 61 62 63 64 65 | RxUData4 RxUData12 RxUData3 RxUData11 RxUData2 RxUData10 | O | Receive UTOPIA Data Bus Output: Please see description of RxUData15, pin 53. NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |
| 66 | VDD | *** | Power Supply Pin |
| 67 68 69 | RxUData9 RxUData1 RxUData8 | O | Receive UTOPIA Data Bus Output: Please see description of RxUData15, pin 53. NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |
| 70 | RxUData0 | O | Receive UTOPIA Data Bus Output - LSB: Please see description of RxUData15, pin 53. NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |
| 71 | GND | *** | Ground Signal Pin |
| 72 | RxUSoC | O | Receive UTOPIA Interface—Start of Cell Indicator: This output pin allows the ATM Layer Processor to determine the boundaries or the ATM cells that are output via the Receive UTOPIA Data bus. The Receive UTOPIA Interface block will assert this signal when the first byte (or word) of a new cell is present on the Receive UTOPIA Data Bus; RxUData[15:0]. NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |
| 73 | RxUAddr4 | I | Receive UTOPIA Address Bus input (MSB): This input pin, along with RxUAddr3 through RxUAddr0 functions as the Receive UTOPIA Address bus inputs. These input pins are only active when the UNI is operating in the Multi-PHY Mode. The Receive UTOPIA Address Bus input is sampled on the rising edge of the RxUClk signal. The contents of this address bus are compared with the value stored in the "Rx UT Address Register (Address = 6Ch). If these two values match, then the UNI will inform the ATM Layer Processor on whether or not it has any new ATM cells to be read from the RxFIFO; by driving the RxUClav output to the appropriate level. If these two address values do not match, then the UNI will not respond to the ATM Layer Processor; and will keep its RxUClav output signal tri-stated. NOTE: The user should tie this pin to "GND", whenever the XRT72L71 has been configured to operate in the "Clear-Channel-Framer" Mode. |
| 74 | RxUPrty | O | Receive UTOPIA Interface—Parity Output pin: The Receive UTOPIA interface block will compute the odd-parity of each byte (or word) that will place in the Receive UTOPIA Data Bus. This odd-parity value will be output on this pin, while the corresponding byte (or word) is present on the Receive UTOPIA Data Bus. NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|---------------------------|------|---|
| 75 | RxUAddr3 | I | <p>Receive UTOPIA Address Bus input: Please see description for RxUAddr4, pin 73. <i>NOTE: The user should tie this pin to "GND" whenever the XRT72L71 has been configured to operate in the "Clear-Channel-Framer" Mode.</i></p> |
| 76 | RxUClav | O | <p>Receive UTOPIA—Cell Available: The Receive UTOPIA Interface block will assert this output pin in order to indicate that the Rx FIFO has some ATM cell data that needs to be read by the ATM Layer Processor. The exact functionality of this pin depends upon whether the UNI is operating in the "Octet Level" or "Cell Level" handshake mode.</p> <p>Octet Level Handshaking Mode When the Receive UTOPIA Interface block is operating in the "octet-level handshaking" mode; this signal is asserted (toggles "High") when at least one byte of cell data exists within the RxFIFO (within the Receive UTOPIA Interface block). This output pin will toggle "Low" if the RxFIFO is depleted of ATM cell data.</p> <p>Cell Level Handshaking Mode When the Receive UTOPIA Interface block is operating in the "cell-level handshaking" mode; this signal is asserted if the RxFIFO contains at least one full cell of data. This signal will toggle "Low" if the RxFIFO is depleted of data, or if it contains less than one full cell of data.</p> <p>Multi-PHY Operation: When the UNI chip is operating in the Multi-PHY mode, this signal will be tri-stated until the RxUClk cycle following the assertion of a valid address on the Receive UTOPIA Address bus input pins (e.g., if the contents on the Receive UTOPIA Address bus pins match that with the Receive UTOPIA Address Register). Afterwards, this output pin will behave in accordance with the cell-level handshake mode.</p> <p><i>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode.</i></p> |
| 77 | RxUAddr2 | I | <p>Receive UTOPIA Address Bus input: Please see description for RxUAddr4, pin 73. <i>NOTE: The user should tie this pin to "GND" whenever the XRT72L71 has been configured to operate in the "Clear-Channel-Framer" Mode.</i></p> |
| 78 | VDD | **** | Power Supply Pin |
| 79 | RxUAddr0 | I | <p>Receive UTOPIA Address Bus input - LSB: Please see description for RxUAddr4, pin 73. <i>NOTE: The user should tie this pin to "GND" whenever the XRT72L71 has been configured to operate in the "Clear-Channel Framer" Mode.</i></p> |
| 80 | RxUAddr1 | I | <p>Receive UTOPIA Address Bus input: Please see description for RxUAddr4, pin 73. <i>NOTE: The user should tie this pin to "GND" whenever the XRT72L71 has been configured to operate in the "Clear-Channel Framer" Mode.</i></p> |
| 81 | $\overline{\text{RxUEn}}$ | I | <p>Receive UTOPIA Interface—Output Enable: This active-"Low" input signal is used to control the drivers of the Receive UTOPIA Data Bus. When this signal is "High" (negated) then the Receive UTOPIA Data Bus is tri-stated. When this signal is asserted, then the contents of the byte or word that is at the "front of the RxFIFO" will be "popped" and placed on the Receive UTOPIA Data bus on the very next rising edge of RxUClk.</p> <p><i>NOTE: The user should tie this pin to "GND" whenever the XRT72L71 has been configured to operate in the "Clear-Channel-Framer" Mode.</i></p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|--------|------|--|
| 82 | TCK | I | Test Clock: Boundry Scan clock input. <i>NOTE: This input pin should be pulled "Low" for normal operation.</i> |
| 83 | TMS | I | Test Mode Select: Boundry Scan Mode Select input. <i>NOTE: This input pin should be pulled "Low" for normal operation.</i> |
| 84 | TDI | I | Test Data In: Boundry Scan Test data input. <i>NOTE: This input pin should be pulled "Low" for normal operation.</i> |
| 85 | TDO | O | Test Data Out: Boundry Scan test data output. |
| 86 | RLOS | I | Receive LOS (Loss of Signal) Indicator Input (from XRT7300 E3/DS3/STS-1 Line Interface Unit). This input pin is intended to be connected to the RLOS (Receive Loss of Signal) output pin of the XRT7300 E3/DS3 /STS-1 Line Interface IC. The user can monitor the state of this pin by reading the state of Bit 0 (RLOS) within the Line Interface Scan Register (Address = 73h). If this input pin is "Low", then it means that the XRT7300 is detecting a sufficient amount of signal energy on the line, due to the incoming DS3 data-stream. However, if this input pin is "High", then it means that the XRT7300 is not detecting a sufficient amount of signal energy on the line, due to the incoming DS3 data-stream, and may be experiencing a "Loss of Signal" condition. For more information on the operation of the XRT7300 E3/DS3/STS-1 Line Interface Unit IC, please consult the "XRT7300 " data sheet. <i>NOTE: Asserting the RLOS input pin will cause the XRT72L71 DS3 UNI to declare an "LOS" (Loss of Signal) condition. Therefore, this input pin should not be used as a general purpose input.</i> |
| 87 | 8KRef | I | 8 kHz Reference Clock Input for the PLCP Processors: The Transmit PLCP processor can be configured to synchronize its PLCP frame processing to this clock signal. The Transmit PLCP Processor will also use this signal to compute the trailer nibble stuff opportunities. NOTES: <ol style="list-style-type: none"> 1. This input signal is active only if the user has configured the PLCP Processors to use this signal as their "master clock" signal. The user can configure the UNI to use this signal by setting TimRefSel[1,0] (within the UNI Operating Mode Register) to 01. 2. The user should tie this pin to "GND" whenever the XRT72L71 has been configured to operate in the "Clear-Channel-Framer" Mode. |
| 88 | RxLOS | O | Receive DS3 Framer—Loss of Signal Output Indicator: This pin is asserted when the Receive DS3 Framer encounters 180 consecutive 0's via the RxPOS and RxNEG pins. This pin will be negated once the Receive DS3 Framer has detected at least 60 "1s" out of 180 consecutive bits. |
| 89 | RxOH | O | Receive Overhead Output Port All overhead bits, which are received via the "Receive Section" of the Framer IC; will be output via this output pin, upon the rising edge of RxOHClk. |
| 90 | RxOOF | O | Receiver DS3 Framer—"Out of Frame" Indicator: The Receive DS3 Framer-block will assert this output signal (e.g., pull it "High") whenever it has declared an "Out of Frame" (OOF) condition with the incoming DS3 frames. This signal is negated when the framer correctly locates the F- and M-bits and regains synchronization with the DS3 frame. |
| 91 | GND | *** | Ground Signal Pin |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|----------------------|------|--|
| 92 | RxAIS | O | Receive “Alarm Indication Signal” Output pin: The UNI/Framer IC will assert this pin to indicate that the Alarm Indication Signal (AIS) has been identified in the Receive DS3 data stream. An “AIS” is detected if the payload consists of the recurring pattern of 1010... and this pattern persists for 63 M-frames. An additional requirement for AIS indication is that the C-bits are set to 0, and the X-bits are set to 1. This pin will be negated when a sufficient number of frames, not exhibiting the “1010...” pattern in the payload has been detected. |
| 93 | RxOHClk | O | Receive Overhead Output Clock Signal: This pin serves as the clock signal for external device to sample the Overhead data on the RxOH pin. The external interface should use the rising edge of this clock to sample the OH data on RxOH pin. |
| 94 | RxOHInd/ RxPFrame | O | Receive Overhead Bit Indicator/PLCP Frame Boundary Indicator Output—Receive PLCP Processor. The exact functionality of this output pin depends upon whether the XRT72L71 UNI/Framer IC is operating in the Clear Channel or ATM Uni Mode. Clear Channel Mode - RxOHInd: In clear channel mode, this pin is pulsed “High” for one bit period whenever an over-head bit is being output via the RxSerData output pin. In other words, the “RxSerData” output pin will contain an over-head if this pin is sampled “High”. ATM UNI Mode: This output pin pulses “High” when the Receive PLCP Processor is receiving the last bit of a given PLCP frame. |
| 95 | RxOHFrame | O | Receive Overhead Frame Boundary Indicator: This pin is pulsed “High” for one RxOHClk period whenever the first 'X' bit is output on RxOH pin. If external device samples this pin “High” on the rising edge of RxOHClk, the data on RxOH is 'X' bit (first OH bit in the received DS3 frame). |
| 96 | RxFrame | O | Receive Boundary of DS3 Frame Output Indicator: The exact functionality of this output pin depends upon whether the XRT72L71 UNI/Framer IC is operating in the Clear Channel or ATM UNI Mode. Clear Channel Mode: In clear channel mode this pin is pulsed “High” for one DS3 clock period whenever the 'X' bit (first OH bit in the DS3 frame) of the frame is being output on the RxSer pin. RxSer will contain 'X' bit (first OH bit of DS3 frame) if this pin is sampled “High”. ATM UNI Mode: In the ATM UNI mode, this signal indicates the start of the received DS3 frame and is “High” for one DS3 clock period. |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|-----------|------|---|
| 97 | RxPOS | I | <p>Receive Positive Data Input: The exact role of this input pin depends upon whether the UNI is operating in the Unipolar or Bipolar Mode.</p> <p>Unipolar Mode: This input pin functions as the “Single-Rail” input for the “incoming” DS3 data stream. The signal at this input pin will be sampled and latched (into the Receive DS3 Framer) on the “user-selected” edge of the RxLineClk signal.</p> <p>Bipolar Mode: This input functions as one of the dual rail inputs for the incoming AMI/B3ZS encoded DS3 data that has been received from an external Line Interface Unit (LIU) IC. RxNEG functions as the other dual rail input for the UNI. When this input pin is asserted, it means that the LIU has received a “positive polarity” pulse from the line.</p> |
| 98 | RxNEG | I | <p>Receive Negative Data Input: The exact role of this input pin depends upon whether the UNI is operating in the Unipolar or Bipolar Mode.</p> <p>Unipolar Mode: This input pin is inactive, and should be pulled (“Low” or “High”) when the UNI is operating in the Unipolar Mode.</p> <p>Bipolar Mode: This input pin functions as one of the dual rail inputs for the incoming AMI/B3ZS encoded DS3 data that has been received from an external Line Interface Unit (LIU) IC. RxPOS functions as the other dual rail input for the UNI. When this input pin is asserted, it means that the LIU has received a “negative polarity” pulse from the line.</p> |
| 99 | RxLineClk | I | <p>Receive LIU (Recovered) Clock Input: This input signal serves three purposes:</p> <ol style="list-style-type: none"> 1. The Receive DS3 Framer uses it to sample and “latch” the signals at the RxPOS and RxNEG input pins (into the Receive DS3 Framer circuitry). 2. This input signal functions as the timing reference for the Receive Framer block. 3. The Transmit DS3 Framer block can be configured to use this input signal as its timing reference. <p>NOTE: Note: This signal is the recovered clock from the external DS3 LIU (Line Interface Unit) IC, which is derived from the incoming DS3 data.</p> |
| 100 | RxPRed | O | <p>Receiver Red Alarm Indicator—Receive PLCP Processor: The UNI asserts this output pin to denote that one of the following events has been detected by the Receive PLCP Processor:</p> <ul style="list-style-type: none"> • OOF—Out of Frame Condition • LOF—Loss of Frame Condition <p>NOTE: This output pin is only active whenever the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</p> |
| 101 | RxRed | O | <p>Receiver Red Alarm Indicator—Receive DS3 Framer: The UNI asserts this output pin to denote that one of the following conditions is currently being declared by the Receive DS3 Framer block:</p> <ul style="list-style-type: none"> • LOS—Loss of Signal Condition • OOF—Out of Frame Condition • AIS—Alarm Indication Signal Detection <p>NOTE: This output pin is effectively, the “Wired-OR” of the “RxLOS”, the “RxOOF” and the “RxAIS” output pins.</p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|-------------|------|--|
| 102 | StuffCtl | I | <p>External PLCP Frame Stuff Control: This input allows the user to externally exercise or forego trailer nibble stuffing opportunities by the Transmit PLCP Processor. PLCP trailer nibble stuff opportunities occur in periods of three PLCP frames (375µs). The first PLCP frame (first within a “stuff opportunity” period) will have 13 trailer nibbles appended to it. The second PLCP frame (second within a “stuff opportunity” period) will have 14 trailer nibbles appended to it. The third PLCP frame (the location of the stuff opportunity) will contain 13 trailer nibbles if the StuffCtl input is “Low” and 14 trailer nibbles if the StuffCtl input is “High”.</p> <p>NOTE: The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in the “Clear-Channel-Framer” Mode.</p> |
| 103 | TxInClk | I | <p>Transmit DS3 Framer Block—Clock Signal: The Transmit DS3 Framer can be configured to use this input signal as the timing reference. If this input pin is chosen to be the timing reference, then the user must supply a “High” quality 44.736 MHz signal to this input pin. In this configuration, frame generation, by the Transmit DS3 Framer, will be asynchronous (with any other timing signals within the UNI). However, frame timing will be based upon this clock signal.</p> <p>NOTE: This input pin should be tied to “GND” if it is not used as the Transmit DS3 Framer timing reference.</p> |
| 104 | RxPLOF | O | <p>Receive PLCP—“Loss of Frame” Output Indicator: The Receive PLCP Processor will assert this pin, when it declares a “Loss of Frame” condition. This output will be negated when the Receive PLCP Processor reaches the “In Frame” Condition.</p> <p>NOTE: This output pin is only active if the user has configured the XRT72L71 to operate in the “ATM UNI” Mode.</p> |
| 105 | GND | *** | Ground Signal Pin |
| 106 | RxPOOF | O | <p>Receive PLCP “Out of Frame” Indicator: The Receive PLCP Processor will assert this pin, when it declares an “Out of Frame” condition. This output will be negated when the Receive PLCP Processor reaches the “In Frame” Condition.</p> <p>NOTE: This output pin is only active if the user has configured the XRT72L71 to operate in the “ATM UNI” Mode.</p> |
| 107 | TxFramerRef | I | <p>Transmit DS3 Framer—Frame Reference Input Pin: The Transmit DS3 Framer can be configured to use this input signal as the “framing” reference for the Transmit DS3 Framer block. If this input pin is chosen to be the timing reference, then any rising edge at this input will cause the Transmit DS3 Framer to begin its creation a new DS3 M-frame. Consequently, the user must supply a clock signal that is equivalent to the DS3 Frame rate (or 9398.3 Hz). Further, the signal which is driving this input pin, must be synchronized with the 44.736MHz clock signal, which is applied to the “TxInClk” input pin.</p> <p>NOTE: This input pin should be tied to “GND” if it is not used as the Transmit DS3 Framer frame reference signal.</p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|----------------------|------|---|
| 108 | TxOHInd/ TxPFrame | O | <p>Transmit Overhead Data Indicator/Transmit PLCP Frame Boundary Indicator—Output: The exact functionality of this output pin depends upon whether the XRT72L71 Framer IC is operating in the Clear Channel or ATM Uni Mode.</p> <p>Clear Channel Mode: In the Clear Channel Mode, this pin serves as the transmit OH Indication for the external interface. This pin is pulsed for one bit period of DS3 clock to indicate to the external device that the transmit input interface is going to process OH data at the rising edge of next clock. When the external interface samples TxOHInd as “High” With the rising edge of DS3 Clk; it is expected NOT to provide useful payload data bit on TxSer pin. Instead it can provide corresponding OH data bit on TxSer input. However, in that case the user has to program a register bit to configure XRT72L71 to accept the OH data from the TxSer input. Otherwise, the OH data will be generated internally or be taken from the TxOH pin if TxOHIns is “High”. This pin is pulsed “High” for one bit period prior to all DS3 OH bit positions.</p> <p>ATM UNI Mode: In ATM UNI mode of operation, this pin functions as Transmit PLCP Frame signal which pulses “High” once for each outbound PLCP frame, when the last nibble is being routed.</p> |
| 109 | TxPOS | O | <p>Transmit Positive Polarity Pulse: The exact role of this output pin depends upon whether the UNI is operating in the Unipolar or Bipolar Mode.</p> <p>Unipolar Mode: This output pin functions as the “Single-Rail” output signal for the “outbound” DS3 data stream. The signal, at this output pin, will be updated on the “user-selected” edge of the TxLineClk signal.</p> <p>Bipolar Mode: This output pin functions as one of the two dual rail output signals that commands the sequence of pulses to be driven on the line. TxNEG is the other output pin. This input is typically connected to the TPDATA input of the external DS3 Line Interface Unit IC. When this output is asserted, it will command the LIU to generate a positive polarity pulse on the line.</p> |
| 110 | TxPOHFrame | O | <p>Transmit PLCP Frame Path Overhead Byte Serial Input Port—Beginning of Frame indicator. This output pin, along with the TxPOH, TxPOHClk, and TxPOHIns pins comprise the “Transmit PLCP Frame POH Byte Insertion” serial input port. This particular pin will pulse “High” when the “Transmit PLCP POH Byte Insertion” serial input port is expecting the first bit of the Z6 byte at the TxPOH input pin.</p> <p>NOTE: <i>This output pin is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</i></p> |
| 111 | TxNEG | O | <p>Transmit Negative Polarity Pulse: The exact role of this output pin depends upon whether the UNI is operating in the Unipolar or Bipolar Mode.</p> <p>Unipolar Mode: This output signal pulses “High” for one bit period, at the end of each “outbound” DS3 frame. This output signal is at a logic “Low” for all of the remaining bit-periods of the “outbound” DS3 frames.</p> <p>Bipolar Mode: This output pin functions as one of the two dual-rail output signals that commands the sequence of pulses to be driven on the line. TxPOS is the other output pin. This input is typically connected to the TNDATA input of the external DS3 Line Interface Unit IC. When this output is asserted, it will command the LIU to generate a negative polarity pulse on the line.</p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|---------------------|------|--|
| 112 | TxLineClk | O | Transmit Line Interface Clock: This clock signal is output to the Line Interface Unit, along with the TxPOS and TxNEG signals. The purpose of this output clock signal is to provide the LIU with timing information that it can use to generate the AMI pulses and deliver them over the transmission medium to the Far-End Receiver. The user can configure the source of this clock to be either the RxLineClk (from the Receiver portion of the UNI) or the TxlineClk input. The nominal frequency of this clock signal is 44.736 MHz. |
| 113 | VDD | *** | Power Supply Pin |
| 114 | TxSerData/ TxPOH | I | Transmit Serial Payload Data Input/Transmit PLCP Frame POH Byte Insertion Serial Input: The exact functionality of this output pin depends upon whether the XRT72L71 Framer IC is operating in the Clear Channel or ATM Uni Mode. Clear Channel Mode: In clear channel mode, this pin can be used by the external interface to provide the serial input data (payload and OH) that has to be mapped in outgoing DS3 frame. If user want to insert OH data on TxSer pin then the user should configure the XRT72L71 accordingly. ATM UNI Mode: This input pin becomes active when the user asserts the TxPOHIns input pin. When this happens the user will be permitted to serially input their own value for PLCP POH bytes into the “outbound” PLCP frame. This data will be clocked into the UNI Framer via the TxPOHClk output signal. This UNI will also assert the TxPOHMSB output pin when it expects the MSB (Most significant bit) of the Z6 Byte (within the PLCP frame). |
| 115 | TxAISEn | I | Transmit AIS Pattern input: When this input pin is pulled “High” then the Transmit DS3 Framer block will insert the AIS pattern into the DS3 output data stream. |
| 116 | TxPOHIns | I | Transmit PLCP Frame POH Data Insert Enable: This input can be asserted to allow the user to input his/her own value for the PLCP POH bytes via the TxPOH input pin, in each PLCP frame, prior to transmission. If this input pin is not asserted, then the UNI will generate its own PLCP POH bytes. NOTE: The user should tie this input pin to “GND” if the XRT72L71 is going to be configured to operate in either the “Clear-Channel-Framer” Mode or in the “Direct-Mapped ATM” Mode. |
| 117 | TxOHIns | I | Transmit Overhead Data Insert Input: The function of this pin is the same in both Clear Channel and ATM UNI Modes of the XRT72L71. This pin is used to indicate if the OH bit should be taken from the external interface. The OH data on TxOH will be considered by the only if this pin is "High" during OH positions. |
| 118 | TxPOHClk | O | Transmit PLCP Frame POH Byte Insertion Clock: This pin, along with the TxPOH and the TxPOHMSB input pins, function as the “Transmit PLCP Frame POH Byte” serial input port. This output pin functions as a clock output signal that is used to sample the user’s POH data at the TxPOH input pin. This output pin is always active, independent of the state of the “TxPOHIns” pin. NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode. |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|---------------------------|------|---|
| 119 | TxOH | I | <p>Transmit Overhead Input Pin The Transmit Overhead Data Input Interface accepts the overhead data via this input pin, and inserts into the "overhead" bit position within the very next "outbound" DS3 frame. If the "TxOHIns" pin is pulled "High", the Transmit Overhead Data Input Interface will sample the data at this input pin (TxOH), on the falling edge of the "TxOHClk" output pin. Conversely, if the "TxOHIns" pin is pulled "Low", then the Transmit Overhead Data Input Interface will NOT sample the data at this input pin (TxOH). Consequently, this data will be ignored.</p> |
| 120 | TxCellTxed | O | <p>Transmit Cell Processor—Cell Transmitted Indicator: This output pin pulses "High" each time the Transmit Cell Processor transmits a cell to the Transmit PLCP Processor (or Transmit DS3 Framer). <i>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode.</i></p> |
| 121 | TxOHClk | O | <p>Transmit Overhead Clock: The function of this pin is the same in both Clear Channel and ATM UNI Modes of the XRT72L71. This pin serves as the clock signal for the external interface to insert the OH data on the TxOH pin. The user can insert OH data on the TxOH pin at the rising edge of this clock signal.</p> |
| 122 | TxOHFrame | O | <p>Transmit Overhead Framing Pulse: The function of this pin is same in both Clear Channel and ATM UNI modes of XRT72L71. When the external interface samples this pin "High" at the rising edge of TxOHClk, it should provide 'X' bit (first OH bit within DS3 frame) on the TxOH pin. This signal is "High" for one TxOHClk duration and repeats once for each DS3 frame.</p> |
| 123 | $\overline{\text{TxUEn}}$ | I | <p>Transmit UTOPIA Interface Block—Write Enable: This active-"Low" signal, from the ATM Layer processor enables the data on the Transmit UTOPIA Data Bus to be written into the TxFIFO on the rising edge of TxUCIk. When this signal is asserted, then the contents of the byte or word that is present, on the Transmit UTOPIA Data Bus, will be latched into the Transmit UTOPIA Interface block, on the rising edge of TxUCIk. When this signal is negated, then the Transmit UTOPIA Data bus inputs will be tri-stated. <i>NOTE: The user should tie this input pin to "GND" whenever the XRT72L71 has been configured to operate in the "Clear-Channel-Framer" Mode.</i></p> |
| 124 | TxUSoC | I | <p>Transmitter—Start of Cell (SoC) Indicator Input: This input pin is driven by the ATM Layer processor and is used to indicate the start of an ATM cell that is being transmitted from the ATM layer processor. This input pin must be pulsed "High" when the first byte (or word) of a new cell is present on the Transmit UTOPIA Data Bus. This input pin must remain "Low" at all other times. <i>NOTE: The user should tie this input pin to "GND" whenever the XRT72L71 has been configured to operate in the "Clear-Channel-Framer" Mode.</i></p> |
| 125 | TxUPrty | I | <p>Transmit UTOPIA Data Bus—Parity Input: The ATM Layer processor will apply the parity value of the byte or word which is being applied to the Transmit UTOPIA Data Bus (e.g., TxJData[7:0] or TxJData[15:0]) inputs of the UNI, respectively. Note: this parity value should be computed based upon the odd-parity of the data applied at the Transmit UTOPIA Data Bus. The Transmit UTOPIA Interface block (within the UNI) will independently compute an odd-parity value of each byte (or word) that it receives from the ATM Layer processor and will compare it with the logic level of this input pin. <i>NOTE: The user should tie this input pin to "GND" whenever the XRT72L71 has been configured to operate in the "Clear-Channel-Framer" Mode.</i></p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|--|--|------|---|
| 126 | TxUClav | O | <p>Transmit UTOPIA Interface—Cell Available Output Pin: This output pin supports data flow control between the ATM Layer processor and the Transmit UTOPIA Interface block. The exact functionality of this pin depends upon whether the UNI is operating in the “Octet Level” or “Cell Level” handshaking mode.</p> <p>Octet Level Handshaking: When the Transmit UTOPIA Interface block is operating in the octet-level handshaking mode, this signal is negated (toggles “Low”) when the TxFIFO is not capable of handling four more write operations; by the ATM Layer processor to the Transmit UTOPIA Interface block. This signal will be asserted when the TxFIFO is capable of receiving four or more write operations of ATM cell data.</p> <p>Cell Level Handshaking: When the Transmit UTOPIA Interface block is operating the cell-level handshaking mode, this signal is asserted (toggles “High”) when the TxFIFO is capable of receiving at least one more full cell of data from the ATM Layer processor. This signal is negated, if the TxFIFO is not capable of receiving one more full cell of data from the ATM Layer processor.</p> <p>Multi-PHY Operation: When the UNI chip is operating in the Multi-PHY mode, this signal will be tri-stated until the TxUClk cycle following the assertion of a valid address on the Transmit UTOPIA Address bus input pins (e.g., when the contents on the Transmit UTOPIA Address bus pins match that within the Transmit UTOPIA Address Register). Afterwards, this output pin will behave in accordance with the cell-level handshake mode.</p> <p>NOTE: This output pin is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</p> |
| 127 | GND | *** | Ground Signal Pin. |
| 128 129 130 131 132 133 134 135 | TxUData8 TxUData0 TxUData9 TxUData1 TxUData10 TxUData2 TxUData11 TxUData3 | I | <p>Transmit UTOPIA Data Bus Input: Please see description for TxUData15, pin 144.</p> <p>NOTES:The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in the “Clear-Channel-Framer” Mode. TxUData0 - Transmit UTOPIA Data Bus Input - LSB.</p> |
| 136 | VDD | *** | Power Supply Pin |
| 137 138 139 140 141 142 143 | TxUData4 TxUData12 TxUData5 TxUData13 TxUData6 TxUData14 TxUData7 | I | <p>Transmit UTOPIA Data Bus Input: Please see description for TxUData15 pin 144.</p> <p>NOTE: The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in the “Clear-Channel-Framer” Mode.</p> |
| 144 | TxUData15 | I | <p>Transmit UTOPIA Data Bus Input—MSB: This input pin, along with TxUData14 through TxUData0 comprise the Transmit UTOPIA Data Bus input pins. When the ATM Layer Processor wishes to transmit ATM cell data through the XRT72L71 DS3 UNI, it must place this data on these pins. The data, on the Transmit UTOPIA Data Bus is latched into the Transmit UTOPIA Interface block on the rising edge of TxUClk.</p> <p>NOTE: The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in the “Clear-Channel-Framer” Mode.</p> |
| 145 | VDD | *** | Power Supply Pin |

PIN DESCRIPTION (CONTINUED)

| PIN NO. | SYMBOL | TYPE | DESCRIPTION |
|-------------------|----------------------------------|------|---|
| 146 | TxUAddr4 | I | <p>Transmit UTOPIA Address Bus—MSB Input: This input pin, along with TxUAddr3 through TxUAddr0 comprise the Transmit UTOPIA Address Bus input pins. The Transmit UTOPIA Address Bus is only in use when the UNI is operating in the M-PHY mode. When the ATM Layer processor wishes to write data to a particular UNI device, it will provide the address of the “intended UNI” on the Transmit UTOPIA Address Bus. The contents of the Transmit UTOPIA Address Bus input pins are sampled on the rising edge of TxUCIk. The DS3 UNI will compare the data on the Transmit UTOPIA Address Bus with the pre-programmed contents of the TxUT Address Register (Address = 70h). If these two values are identical and the TxUEN pin is asserted, then the TxU-Clav pin will be driven to the appropriate state (based upon the TxFIFO fill level) for the Cell Level handshake mode of operation.</p> <p>NOTE: The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in either the “Clear-Channel-Framer” Mode or in the “Single-PHY” Mode.</p> |
| 147 | TxUAddr0 | I | <p>Transmit UTOPIA Address Bus Input—LSB: (See Description for TxUAddr4 pin 146).</p> <p>NOTE: The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in either the “Clear-Channel-Framer” Mode or in the “Single-PHY” Mode.</p> |
| 148 149 150 | TxUAddr3 TxUAddr1 TxUAddr2 | I | <p>Transmit UTOPIA Address Bus Input: Please see description for TxUAddr4, pin 146.</p> <p>NOTE: The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in either the “Clear-Channel-Framer” Mode or in the “Single-PHY” Mode.</p> |
| 151 | TxUCIk | I | <p>Transmit UTOPIA Interface Clock: The Transmit UTOPIA Interface clock is used to latch the data on the Transmit UTOPIA Data bus, into the Transmit UTOPIA Interface block. This clock signal is also used as the timing source for circuitry used to process the ATM cell data into and through the TxFIFO. During Multi-PHY operation, the data on the Transmit UTOPIA Address bus pins is sampled on the rising edge of TxUCIk.</p> <p>NOTE: The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in the “Clear-Channel-Framer” Mode.</p> |
| 152 | GND | *** | Ground Signal Pin |
| 153 | TestMode | *** | <p>Factory Test Mode Pin</p> <p>NOTE: The user should tie this pin to ground.</p> |
| 154 | TxGFCMSB | O | <p>Transmit GFC Nibble-Field Serial Input Port—MSB Indicator: This signal, along with TxGFC and TxGFCCIk combine to function as the “Transmit GFC Nibble Field” serial input port. This output signal will pulse “High” when the MSB (most significant bit) of the GFC Nibble (for a given cell) is expected at the TxGFC input pin.</p> <p>NOTE: This output pin is only active whenever the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</p> |
| 155 | Reset | I | <p>Reset Input: When this active-“Low” signal is asserted, the UNI Framer will be asynchronously reset. Additionally, all outputs will be “tri-stated”, and all on-chip registers will be reset to their default values.</p> |

PIN DESCRIPTION (CONTINUED)

| PIN No. | SYMBOL | TYPE | DESCRIPTION |
|---------|----------|------|--|
| 156 | TxGFCClk | O | <p>Transmit GFC Nibble Field Serial Input Port Clock: This signal, along with TxGFC, and TxGFCMSB combine to function as the “Transmit GFC Nibble-field” serial input port. The “Transmit GFC Nibble-field” serial input port uses this output clock signal to sample the values applied to the TxGFC pin, on its rising edge. This pin will provide four rising edges for each cell being transmitted.</p> <p><i>NOTE: This output pin is only active whenever the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</i></p> |
| 157 | ALE_AS | I | <p>Address Latch Enable/Address Strobe: This input is used to latch the address (present at the Microprocessor Interface Address Bus, A[8:0]) into the UNI Microprocessor Interface circuitry and to indicate the start of a READ/ WRITE cycle. This input is active-“High” in the Intel Mode (MOTO = “Low”) and active-“Low” in the Motorola Mode (MOTO = “High”).</p> |
| 158 | TxGFC | I | <p>Transmit GFC Nibble-Field Serial Input Port: This signal, along with TxGFCClk and TxGFCMSB combine to function as the “Transmit GFC Nibble-field” serial input port. The user will specify the value of the GFC field, within a given ATM cell, by serial transmitting its four bit value into this input. Each of these four bits will be clocked into the UNI via rising edge of the TxGFCClk clock output signal.</p> <p><i>NOTE: The user should tie this input pin to “GND” whenever the XRT72L71 has been configured to operate in the “Clear-Channel-Framer” Mode.</i></p> |
| 159 | GND | *** | <p>Ground Signal Pin</p> |
| 160 | RDY_DTCK | O | <p>READY or DTACK: This active-“Low” output pin will function as the READY output, when the microprocessor interface is running in the “Intel” Mode; and will function as the DTACK output, when the microprocessor interface is running in the “Motorola” Mode.</p> <p>“Intel” Mode—READY Output. When the UNI negates this output pin (e.g., toggles it “Low”), it indicates (to the μP) that the current READ or WRITE cycle is to be extended until this signal is asserted (e.g., toggled “High”).</p> <p>“Motorola” Mode—DTACK (Data Transfer Acknowledge) Output. The UNI Framer will assert this pin in order to inform the local microprocessor that the present READ or WRITE cycle is nearly complete. If the UNI Framer requires that the current READ or WRITE cycle be extended, then the UNI will delay its assertion of this signal. The 68000 family of μPs requires this signal from its peripheral devices, in order to quickly and properly complete a READ or WRITE cycle.</p> |

ABSOLUTE MAXIMUM RATINGS

| | |
|---|---|
| Power Supply.....-0.5V to +3.6V | Power Dissipation TQFP Package1.2W |
| Storage Temperature.....-65°C to 150°C | Input Voltage (Any Pin).....-0.5V to VDD + 5V |
| Voltage at Any Pin.....-0.5V to VDD + 5 V | Input Current (Any Pin).....±100mA |

DC ELECTRICAL CHARACTERISTICS

Test Conditions: T_A = 25°C, VDD = 3.3V ± 5% unless otherwise specified

| SYMBOL | PARAMETER | MIN. | TYP. | MAX. | UNITS | CONDITIONS |
|-----------------|----------------------------|------|------|------|-------|--|
| I _{CC} | Power Supply Current | | 120 | | mA | TxUClk and RxUCIk are operating at 25MHz |
| V _{IL} | Input Low Voltage | | | 0.8 | V | |
| V _{IH} | Input High Voltage | 2.0 | | VDD | V | |
| V _{OL} | Output Low Voltage | 0.0 | | 0.4 | V | |
| V _{OH} | Output High Voltage | 2.4 | | VDD | V | I _{OC} = 1.6mA |
| I _{IH} | Input High Voltage Current | -10 | | 10 | µA | V _{IH} = VDD |
| I _{IL} | Input Low Voltage Current | -10 | | 10 | µA | V _{IL} = GND |

AC ELECTRICAL CHARACTERISTICS

Test Conditions: T_A = 25°C, VDD = 3.3V ± 5% unless otherwise specified

| SYMBOL | PARAMETER | MIN. | TYP. | MAX. | UNITS | CONDITIONS |
|---|--|------|------|------|-------|------------|
| Transmit UTOPIA Interface Block (See Figure 4) | | | | | | |
| t ₁ | TxUData[15:0] to rising edge of TxUCIk Setup Time | 4 | | | ns | |
| t ₂ | TxUData[15:0] Hold Time from rising edge of TxUCIk | 1 | | | ns | |
| t ₃ | TxUTOPIA Write Enable Setup Time to rising edge of TxUCIk | 4 | | | ns | |
| t ₄ | TxUTOPIA Write Enable Hold Time from rising edge of TxUCIk | 1 | | | ns | |
| t ₅ | TxUPrty Setup Time to rising edge of TxUCIk | 4 | | | ns | |
| t ₆ | TxUPrty Hold Time from rising edge of TxUCIk | 1 | | | ns | |
| t ₇ | TxUSoC Setup Time to rising edge of TxUCIk | 4 | | | ns | |
| t ₈ | TxUSoC Hold Time from rising edge of TxUCIk | 1 | | | ns | |

AC ELECTRICAL CHARACTERISTICS (CONTINUED)

Test Conditions: $T_A = 25^{\circ}\text{C}$, $V_{DD} = 3.3\text{V} \pm 5\%$ unless otherwise specified

| SYMBOL | PARAMETER | MIN. | TYP. | MAX. | UNITS | CONDITIONS |
|---|---|------|-------|------|-------|--|
| t_9 | TxUAddr[4:0] Setup Time to rising edge of TxUClk | 4 | | | ns | |
| t_{10} | TxUAddr[4:0] Hold Time from rising edge of TxUClk | 1 | | | ns | |
| t_{11} | TxUClav signal valid (not Hi-Z) from first TxUClk rising edge of valid and correct TxUAddr[4:0] | | 6 | 16 | ns | |
| t_{12} | TxUClav signal Hi-Z from first TxUClk rising edge of different TxUAddr[4:0] | | 9 | 19 | ns | |
| Transmit Cell Processor (GFC Serial Input Port)—See Figure 5 | | | | | | |
| t_{13} | Clock Period of TxGFCClk | | 232 | | ns | There will be a periodic clock gap every six clocks. |
| fTxGFCClk | Frequency of TxGFCClk | | 5.592 | | MHz | |
| t_{14} | Delay from rising edge of TxGFCClk to rising edge of TxGFCMSB pin | | 1.43 | | ns | |
| t_{15} | Pulse width of TxGFCMSB signal | | 232 | | ns | |
| t_{16} | TxGFC Data Setup time to rising edge of TxGFCClk | 7 | | | ns | |
| t_{17} | TxGFC Data Hold time from rising edge of TxGFCClk | 3 | | | ns | |
| Transmit PLCP Processor (Serial Input Port)—See Figure 6 | | | | | | |
| t_{18} | Clock Period of TxPOHClk signal | | 232 | | ns | periodically gapped |
| t_{19} | Delay from rising edge of TxPOHFrame signal to rising edge of TxPOHClk signal | 90 | | 113 | ns | $>0.5 t_{18}$ |
| t_{20} | TxPOH setup time to rising edge of TxPOHClk signal | 11 | | | ns | |
| t_{21} | TxPOH signal hold time from rising edge of TxPOHClk signal | 3 | | | ns | |
| t_{22} | TxPOHIns signal setup time to rising edge of TxPOHClk | 11 | | | ns | |
| t_{23} | TxPOHIns signal hold time from rising edge of TxPOHClk | 3 | | | ns | |
| Transmit DS3 Frammer (Serial Input Port)—See Figure 7 | | | | | | |
| fTxOHClk | Frequency of TxOHClk signal | | 526.3 | | kHz | |
| t_{24} | Period of TxOHClk clock signal | | 1900 | | ns | 44.736MHz/85 |
| t_{25} | Delay from rising edge of TxOHFrame signal to rising edge of TxOHClk signal | 950 | | 970 | ns | $>0.5 t_{24}$ |
| t_{26} | TxOH Data Setup time to rising edge of TxOHClk signal | 11 | | | ns | |

AC ELECTRICAL CHARACTERISTICS (CONTINUED)

Test Conditions: $T_A = 25^\circ\text{C}$, $V_{DD} = 3.3\text{V} \pm 5\%$ unless otherwise specified

| SYMBOL | PARAMETER | MIN. | TYP. | MAX. | UNITS | CONDITIONS |
|--|--|------|--------|------|-------|---|
| t_{27} | TxOH Data Hold time from rising edge of TxOHClk signal | 0 | | | ns | |
| t_{28} | TxOHIns signal setup time to rising edge of TxOHClk | 11 | | | ns | |
| t_{29} | TxOHIns signal hold time from rising edge of TxOHClk | 0 | | | ns | |
| Transmit DS3 Framer (LIU Interface Port)—See Figure 8 and Figure 9 | | | | | | |
| t_{30} | Delay time of data on TxPOS or TxNEG, following the rising edge of the TxLineClk | 0.7 | | 2.0 | ns | Transmit DS3 Framer is configured to update TxPOS and TxNEG on the rising edge of TxLineClk. |
| t_{31} | Delay time of data on TxPOS or TxNEG following the falling edge of the TxLineClk | 0.7 | | 1.5 | ns | Transmit DS3 Framer is configured to update TxPOS and TxNEG on the falling edge of TxLineClk. |
| fTxLineClk | Clock frequency of TxLineClk | | 44.736 | | MHz | |
| t_{32} | Period of TxLineClk clock signal | 10 | | | ns | |
| t_{33} | Bit Period of data on TxPOS or TxNEG pins | 10 | | | ns | |
| Receive DS3 Framer (Serial Output Port)—See Figure 10 | | | | | | |
| fRxOHClk | Frequency of RxOHClk signal | | 526.3 | | kHz | |
| t_{34} | Period of RxOHClk clock signal | | 1900 | | ns | |
| t_{35} | Delay Time from rising edge of RxOHClk to RxOHFrame signal | 950 | | 970 | ns | $>0.5 t_{34}$ |
| t_{36} | Delay Time from rising edge of RxOHClk to valid data at RxOH | 950 | | 970 | ns | $>0.5 t_{34}$ |
| t_{37} | Bit Period of data at RxOH | | 1900 | | ns | |
| Receive DS3 Framer (LIU Interface Port)—See Figure 11 and Figure 12 | | | | | | |
| t_{38} | RxPOS/RxNEG data Setup Time to rising edge of RxLineClk | 6 | | | ns | Receive DS3 Framer is configured to sample RxPOS and RxNEG on the rising edge of RxLineClk. |
| t_{39} | RxPOS/RxNEG data Hold Time from rising edge of RxLineClk | 3 | | | ns | Receive DS3 Framer is configured to sample RxPOS and RxNEG on the rising edge of RxLineClk. |
| t_{40} | RxPOS/RxNEG data Setup Time to falling edge of RxLineClk | 6 | | | ns | Receive DS3 Framer is configured to sample RxPOS and RxNEG on the falling edge of RxLineClk. |
| t_{41} | RxPOS/RxNEG data Hold Time from falling edge of RxLineClk | 3 | | | ns | Receive DS3 Framer is configured to sample RxPOS and RxNEG on the falling edge of RxLineClk. |
| fRxLineClk | Clock frequency of RxLineClk | | 44.736 | | MHz | |
| t_{42} | Period of RxLineClk clock signal | 10 | | | ns | |

AC ELECTRICAL CHARACTERISTICS (CONTINUED)

Test Conditions: $T_A = 25^{\circ}\text{C}$, $V_{DD} = 3.3\text{V} \pm 5\%$ unless otherwise specified

| SYMBOL | PARAMETER | MIN. | TYP. | MAX. | UNITS | CONDITIONS |
|--|---|------|------|------|-------|------------------------|
| Receive PLCP Processor (Serial Output Port)—See Figure 13 | | | | | | |
| t ₄₃ | Clock Period of RxPOHCik signal | | 232 | | ns | |
| t ₄₄ | Delay from rising edge of RxPOHCik signal to rising edge of RxPOHFrame signal. | 6 | | 1.4 | ns | |
| t ₄₅ | Delay from rising edge of RxPOHCik to Data valid at RxPOH output | 3 | | 10 | ns | |
| t ₄₆ | Bit period of data at RxPOH output signal | | 232 | | ns | 1 RxPOHCik pulse width |
| Receive Cell Processor (GFC Serial Output Port)—See Figure 14 | | | | | | |
| t ₄₇ | Clock Period of RxGFCCik | | 232 | | ns | |
| t ₄₈ | Delay from rising edge of RxGFCCik to rising edge of RxGFCMSB pin. | 0.06 | | 1.4 | ns | |
| t ₄₉ | Pulse width of RxGFCMSB signal | | 232 | | ns | |
| t ₅₀ | Delay from rising edge of RxGFCMSB signal to first valid bit at RxGFC. | | 0 | | ns | |
| t ₅₁ | Delay from rising edge of RxGFCCik to valid bit at RxGFC. | 0.9 | | 2.4 | ns | |
| t ₅₂ | Pulse width of Bit at RxGFC output. | | 232 | | ns | |
| Receive UTOPIA Interface Block -- See Figure 15 | | | | | | |
| t ₅₃ | Delay time from rising edge of RxUCIk to Data Valid at RxUDData[15:0] | 1 | 9.9 | 16 | ns | |
| t ₅₄ | Rx UTOPIA Read Enable setup time to rising edge of RxUCIk | 4 | | | ns | |
| t ₅₅ | Delay time from rising edge of RxUCIk to valid RxUPrty bit | 1 | 10 | 16 | ns | |
| t ₅₆ | Delay time from rising edge of RxUCIk to valid RxUSoC bit | 1 | 9.9 | 16 | ns | |
| t ₅₇ | Delay time from Read Enable false to Data Bus being tri-stated | 1 | 11.5 | 16 | ns | |
| t ₅₈ | Delay time from Read Enable false to RxUPrty bit being tri-stated | 1 | 12 | 16 | ns | |
| t ₅₉ | Delay time from Read Enable false to RxUSoC bit being tri-stated | 1 | 11.5 | 16 | ns | |
| t ₆₀ | RxUAddr[4:0] Setup Time to rising edge of RxUCIk | 4 | | | ns | |
| t ₆₁ | RxUAddr[4:0] Hold Time from rising edge of RxUCIk | 1 | | | ns | |
| t ₆₂ | RxUCIav signal valid (not Hi-Z) from first RxUCIk rising edge of valid and correct TxUAddr[4:0] | 1 | 7.8 | 16 | ns | |

AC ELECTRICAL CHARACTERISTICS (CONTINUED)

Test Conditions: $T_A = 25^\circ\text{C}$, $V_{DD} = 3.3\text{V} \pm 5\%$ unless otherwise specified

| SYMBOL | PARAMETER | MIN. | TYP. | MAX. | UNITS | CONDITIONS |
|--|--|------|------|------|-------|------------|
| t_{63} | RxUClav signal Hi-Z from first RxUClk rising edge of different RxUAddr[4:0]. | 1 | 9.2 | 16 | ns | |
| Microprocessor Interface—Intel -- See Figure 16 and Figure 17 | | | | | | |
| t_{64} | A8—A0 Setup Time to ALE_AS Low | 3 | | | ns | |
| t_{65} | A8—A0 Hold Time from ALE_AS Low. | 2 | | | ns | |
| t_{66} | $\overline{\text{RD}}_{\text{DS}}$, $\overline{\text{WR}}_{\text{RW}}$ Pulse Width | 30 | | | ns | |
| Intel Type Read Operations -- See Figure 16 | | | | | | |
| t_{67} | Data Valid from $\overline{\text{RD}}_{\text{DS}}$ Low. | 6 | | 11 | ns | |
| t_{68} | Data Bus Floating from $\overline{\text{RD}}_{\text{DS}}$ High. | | | 10 | ns | |
| t_{69} | ALE to $\overline{\text{RD}}$ Time | 4 | | | ns | |
| t_{70} | $\overline{\text{RD}}$ Time to :NOT READY (e.g., RDY_DTCK toggling "Low") | 15 | | 23 | ns | |
| Intel Type Write Operations -- See Figure 17 | | | | | | |
| t_{71} | Data Setup Time to $\overline{\text{WR}}_{\text{RW}}$ High | 4 | | | ns | |
| t_{72} | Data Hold Time from $\overline{\text{WR}}_{\text{RW}}$ High | 2 | | | ns | |
| t_{73} | High Time between Reads and/or Writes | 20 | | | ns | |
| t_{74} | ALE to $\overline{\text{WR}}$ Time | 4 | | | ns | |
| t_{770} | $\overline{\text{CS}}$ Assertion to falling edge of $\overline{\text{WR}}_{\text{RW}}$ | 20 | | | ns | |
| Microprocessor Interface—Motorola Read Operations -- See Figure 18 | | | | | | |
| t_{78} | A8—A0 Setup Time to falling edge of ALE_AS | 5 | | | ns | |
| t_{79} | A8—A0 Rising edge of $\overline{\text{RD}}_{\text{DS}}$ to rising edge of RDY_DTCK | 0 | | | ns | |
| t_{80} | Rising edge of RDY_DTCK to tri-state of D[7:0] | 0 | | | ns | |
| Microprocessor Interface—Write Operations -- See Figure 19 | | | | | | |
| t_{78} | A8—A0 Setup Time to falling edge of ALE_AS | 5 | | | ns | |
| t_{81} | D[7:0] Setup Time to falling edge of $\overline{\text{RD}}_{\text{DS}}$ | 10 | | | ns | |
| t_{82} | Rising edge of $\overline{\text{RD}}_{\text{DS}}$ to rising edge of RDY_DTCK delay | 0 | | | ns | |
| Reset Pulse Width—Both Motorola and Intel Operations -- See Figure 20 | | | | | | |
| t_{90} | $\overline{\text{Reset}}$ pulse width | 30 | | | | |

TIMING DIAGRAMS

FIGURE 4. XRT72L71 TRANSMIT UTOPIA INTERFACE BLOCK TIMING

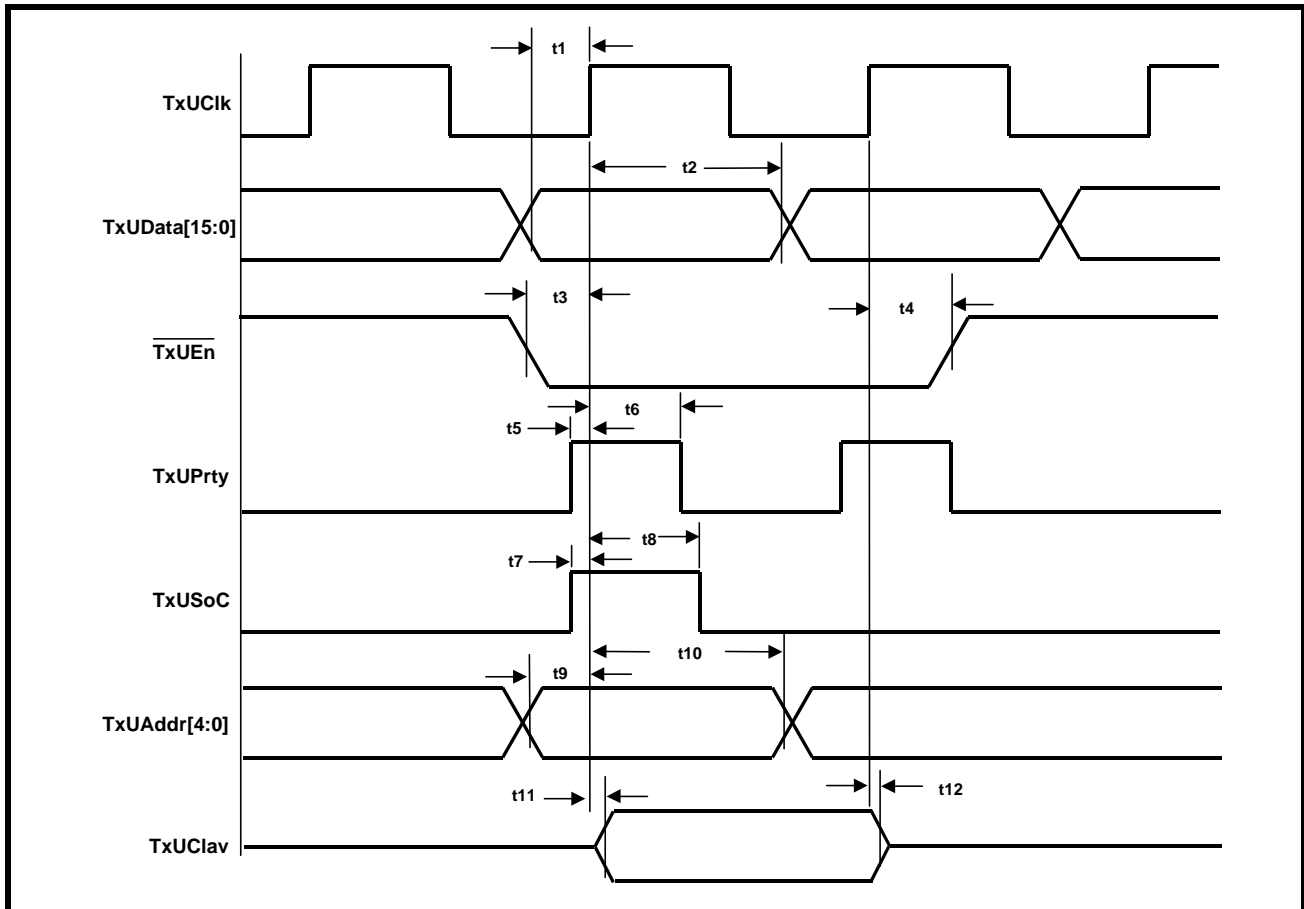


FIGURE 5. GFC NIBBLE-FIELD SERIAL INPUT INTERFACE (AT TRANSMIT CELL PROCESSOR) TIMING

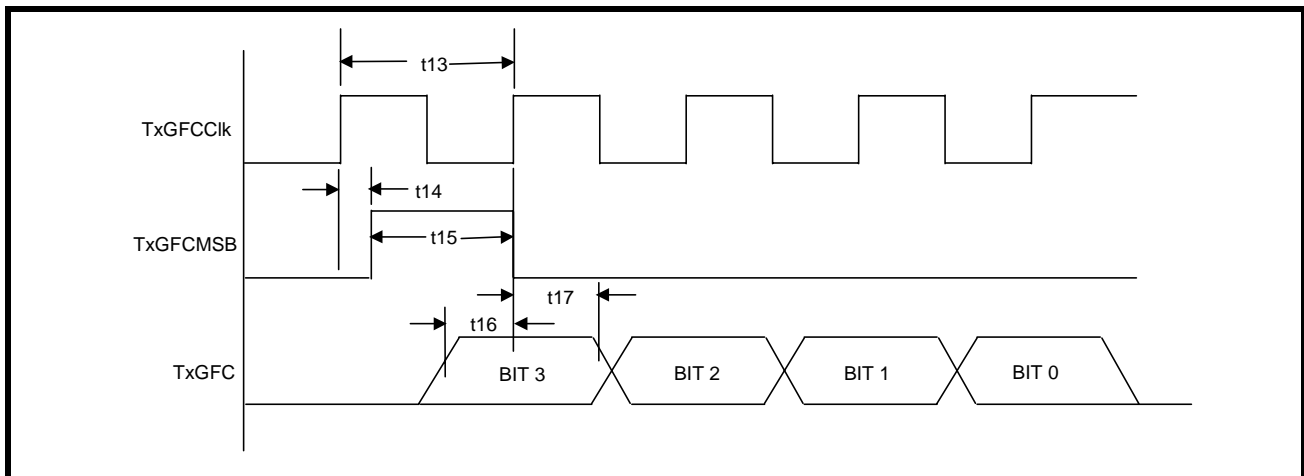


FIGURE 6. TRANSMIT PLCP PROCESSOR—POH BYTE SERIAL INPUT PORT INTERFACE TIMING

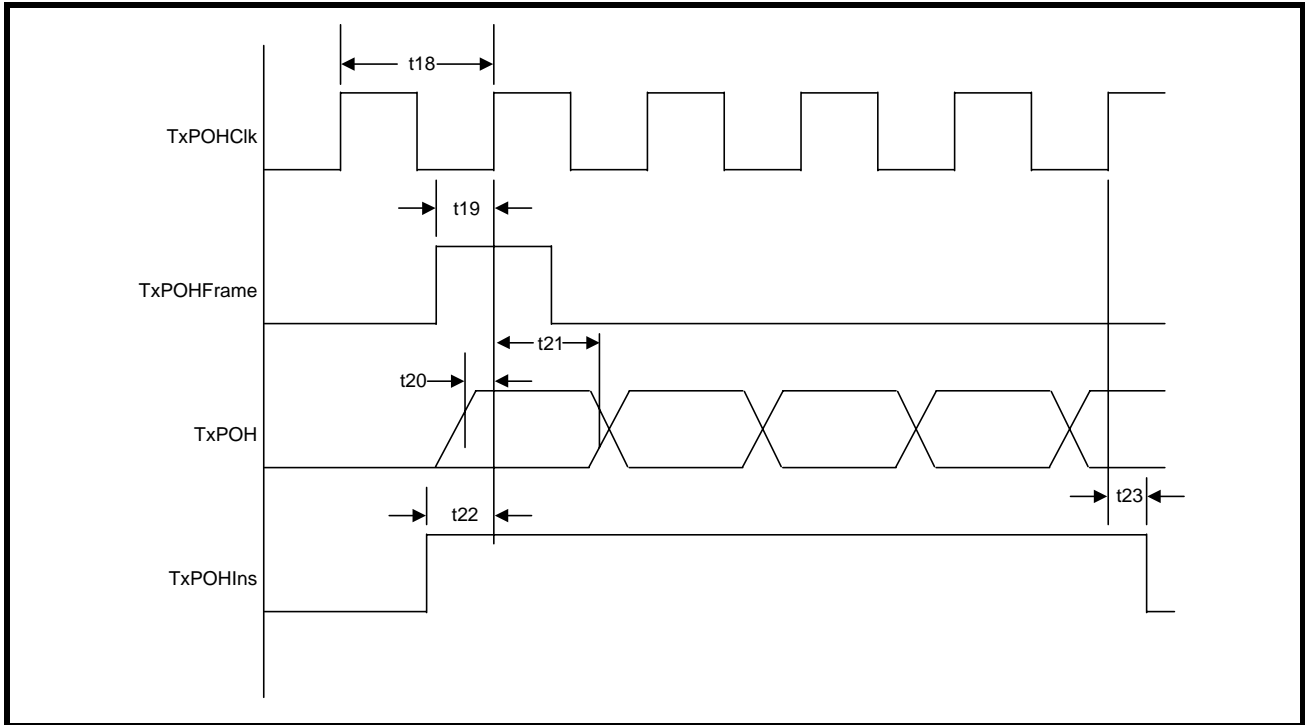


FIGURE 7. TRANSMIT DS3 FRAMER—OH BIT SERIAL INPUT PORT INTERFACE TIMING

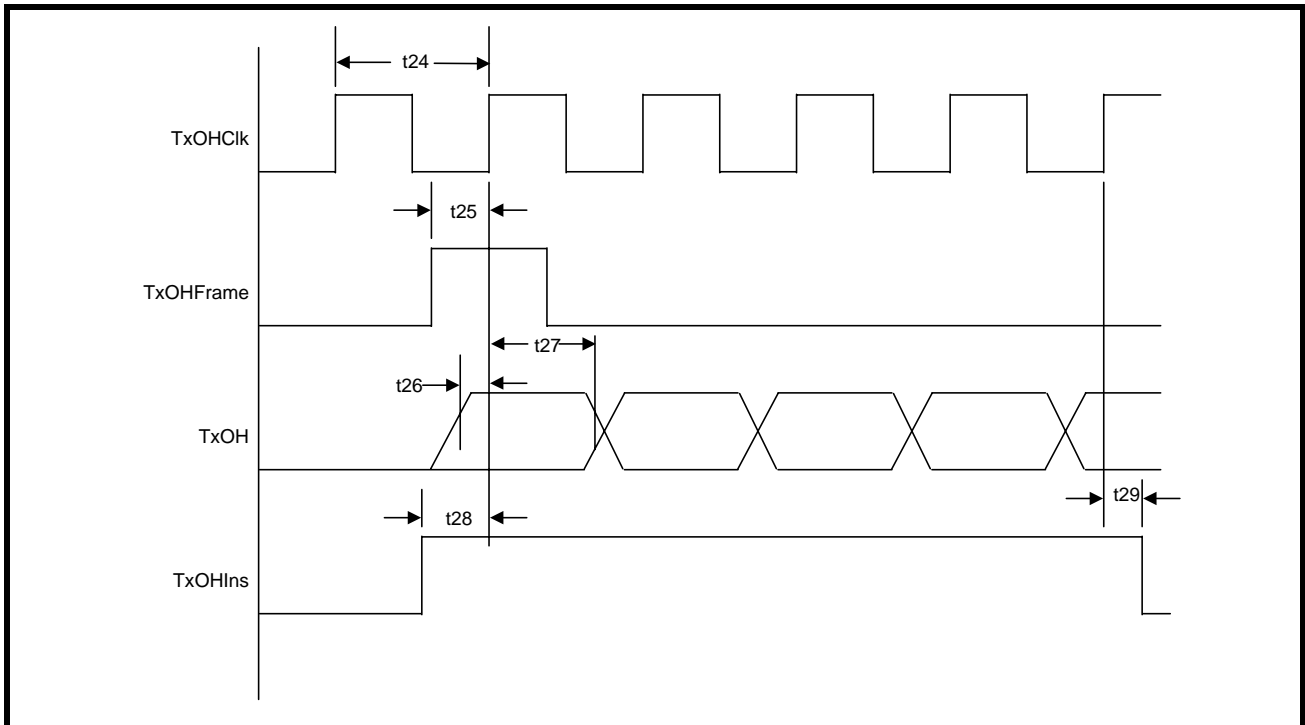


FIGURE 8. TRANSMIT DS3 FRAMER LINE INTERFACE OUTPUT TIMING (TxPOS AND TxNEG ARE UPDATED ON THE RISING EDGE OF TxLINECLK)

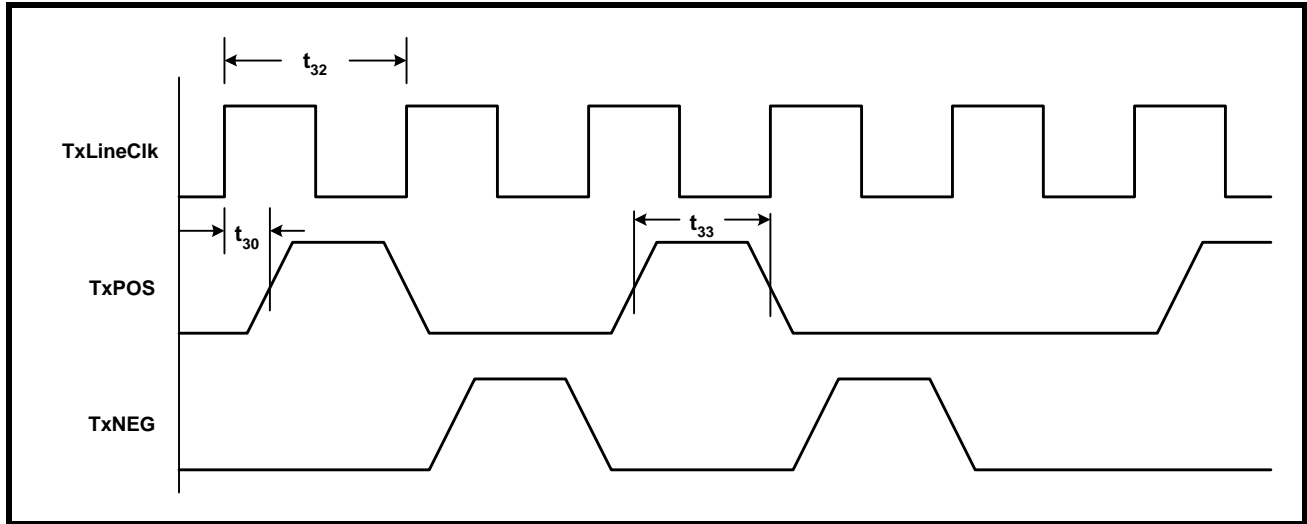


FIGURE 9. TRANSMIT DS3 FRAMER LINE INTERFACE OUTPUT TIMING (TxPOS AND TxNEG ARE UPDATED ON THE FALLING EDGE OF TxLINECLK)

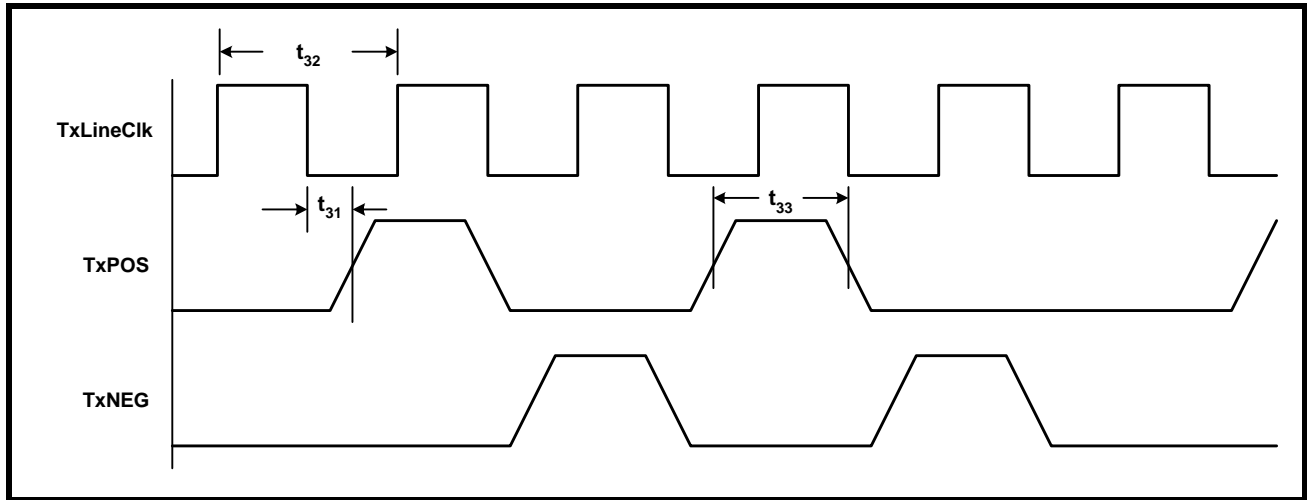


FIGURE 10. RECEIVE DS3 FRAMER—OH BIT SERIAL OUTPUT PORT INTERFACE TIMING

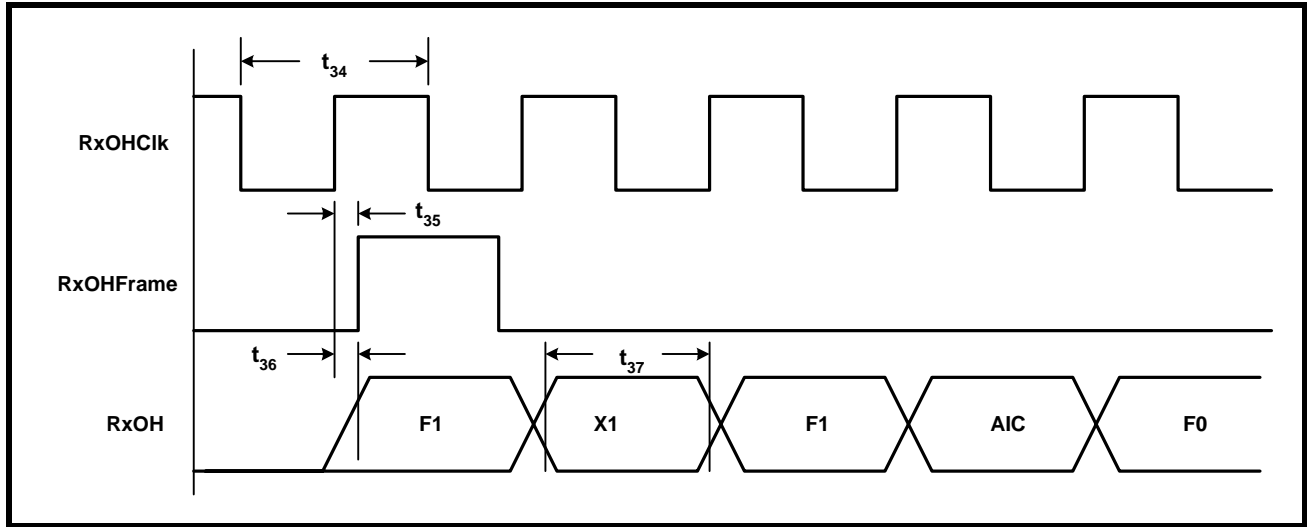


FIGURE 11. RECEIVE DS3 FRAMER LINE INTERFACE INPUT SIGNAL TIMING (RxPOS AND RxNEG ARE SAMPLED ON RISING EDGE OF RxLINECLK)

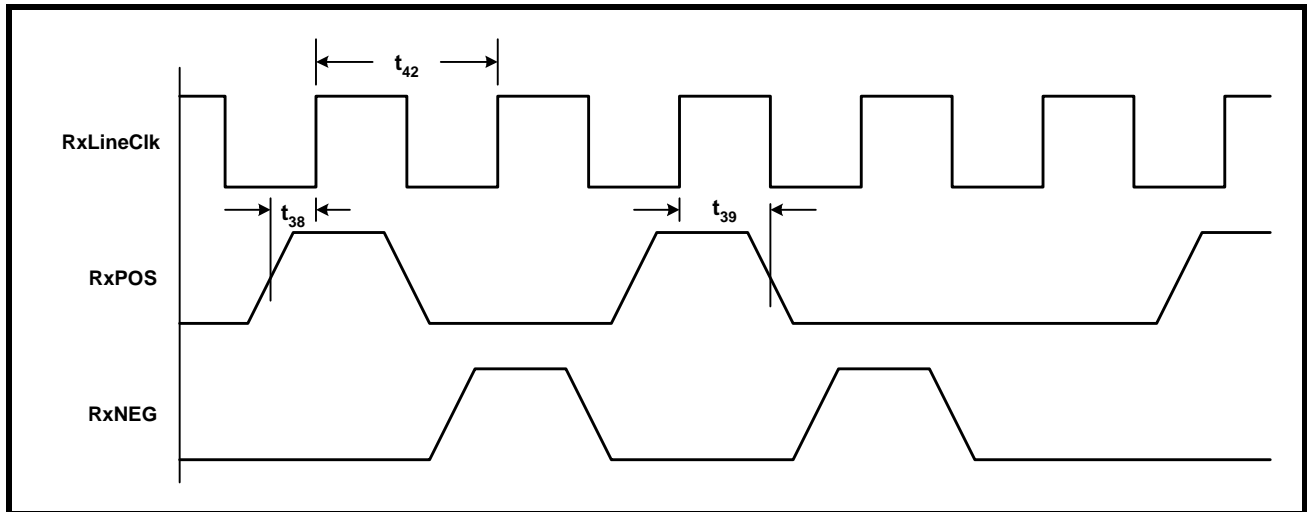


FIGURE 12. RECEIVE DS3 FRAMER LINE INTERFACE INPUT SIGNAL TIMING (RxPOS AND RxNEG ARE SAMPLED ON THE FALLING EDGE OF RxLINECLK)

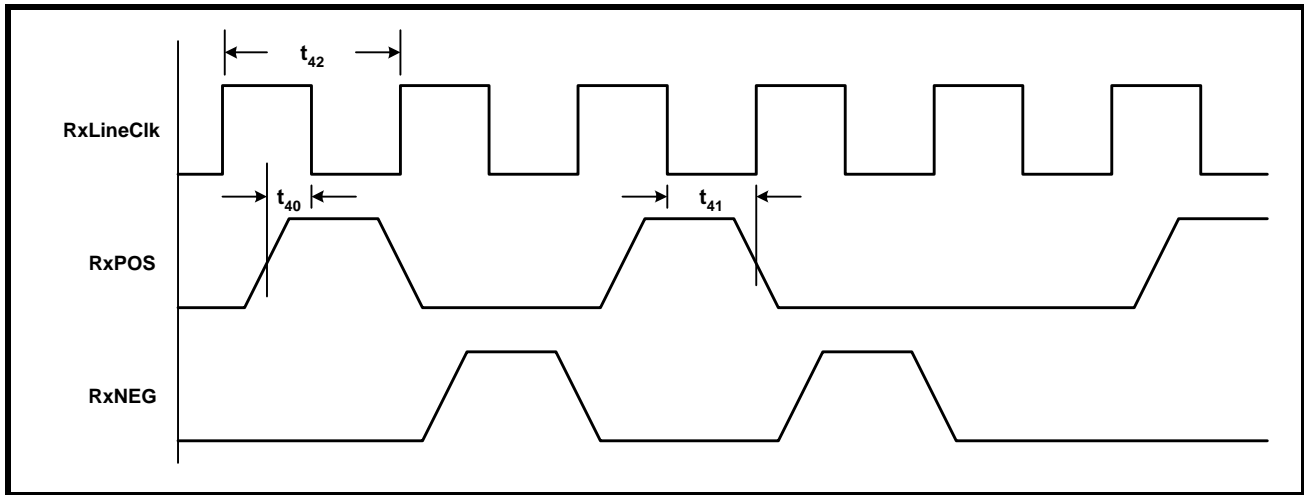


FIGURE 13. RECEIVE PLCP PROCESSOR—POH BYTE SERIAL OUTPUT PORT INTERFACE TIMING

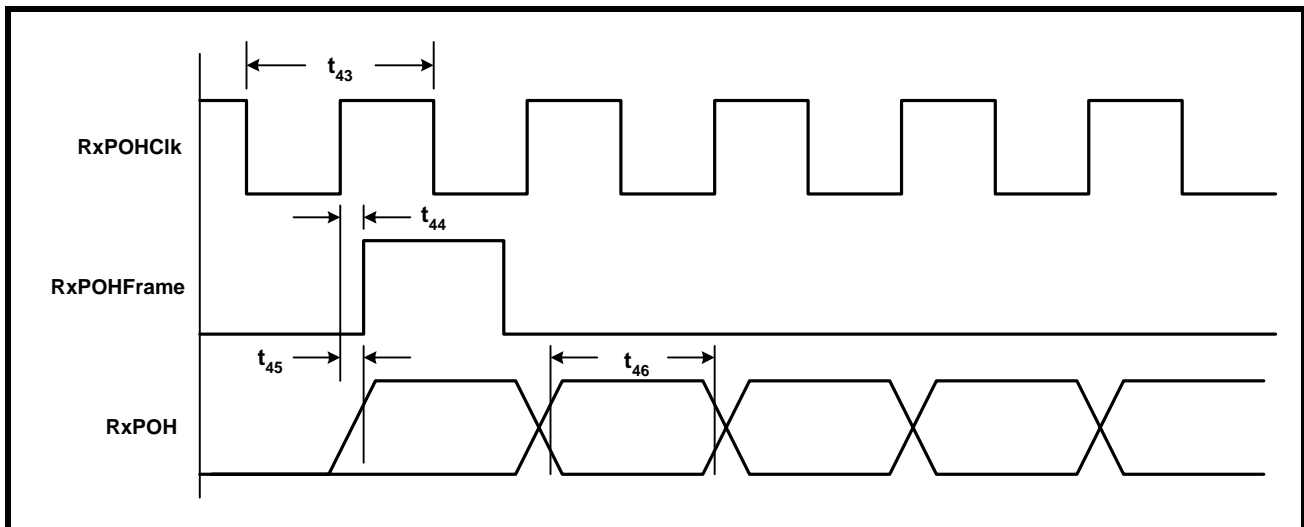


FIGURE 14. GFC NIBBLE-FIELD SERIAL OUTPUT PORT TIMING (RECEIVE CELL PROCESSOR)

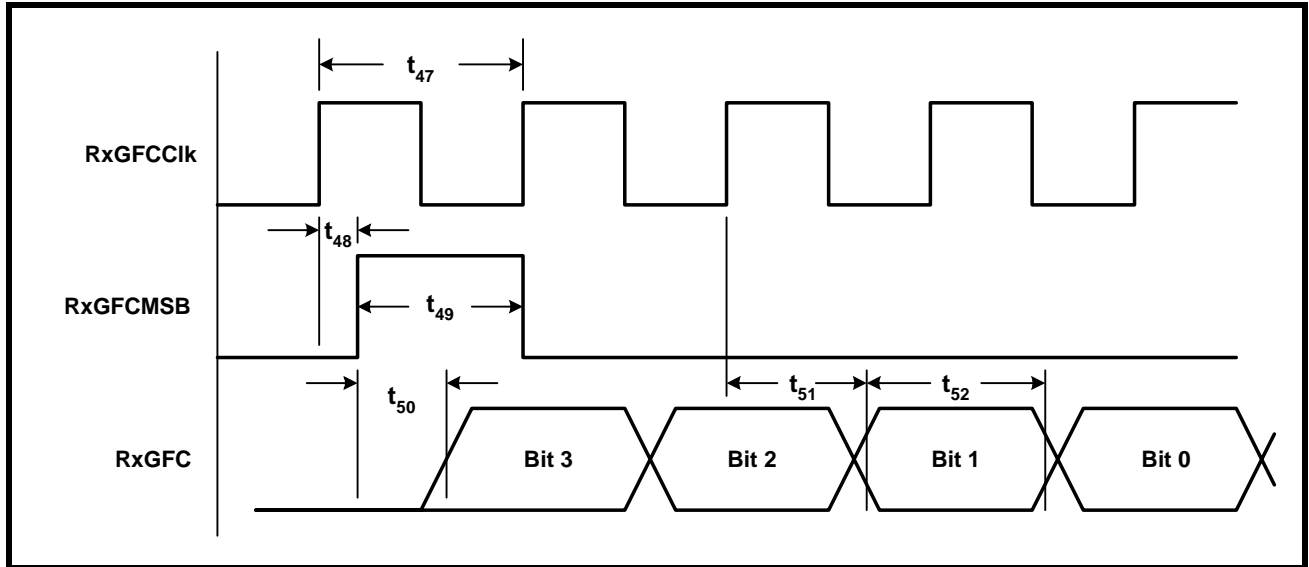


FIGURE 15. RECEIVE UTOPIA INTERFACE BLOCK TIMING

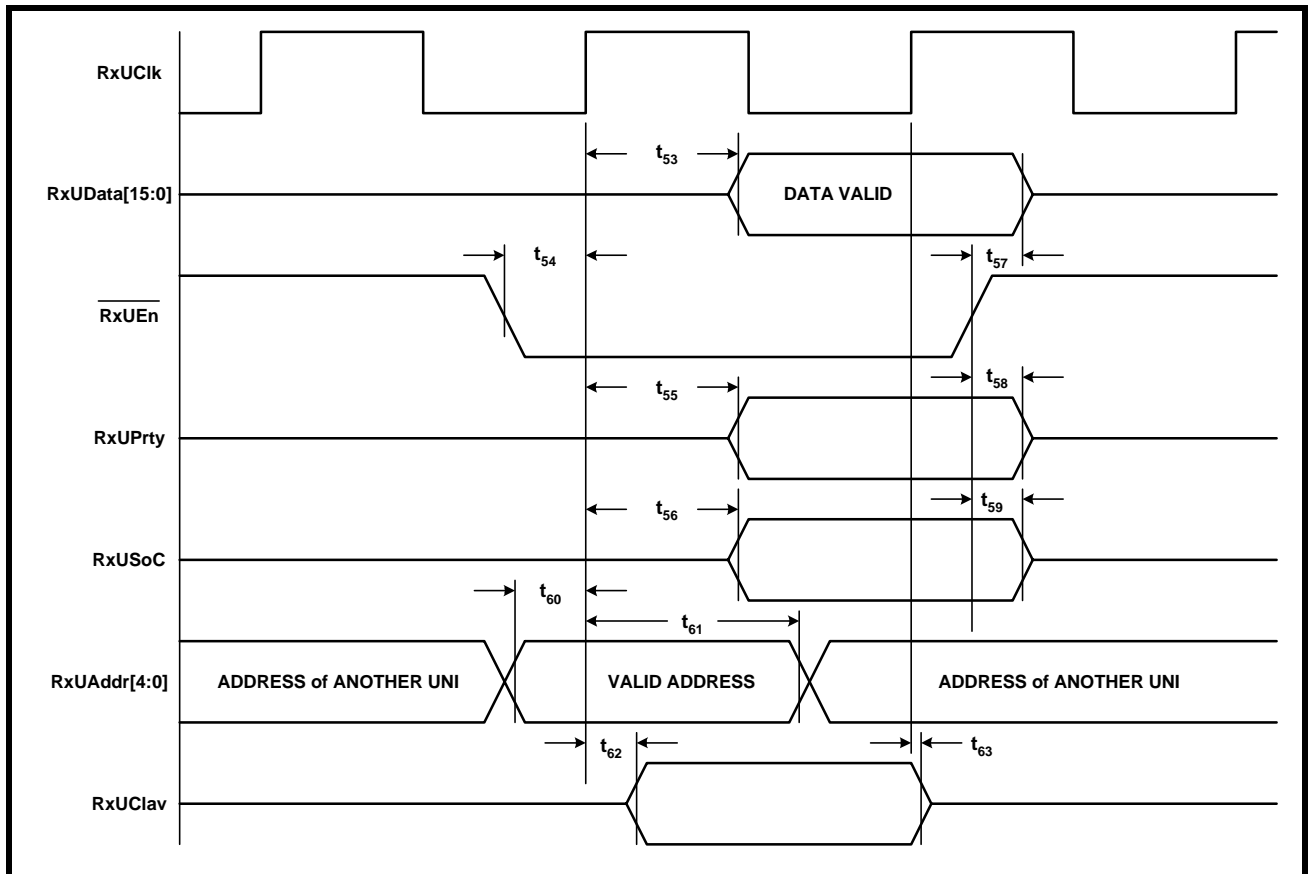


FIGURE 16. MICROPROCESSOR INTERFACE TIMING - INTEL TYPE PROGRAMMED I/O READ OPERATIONS

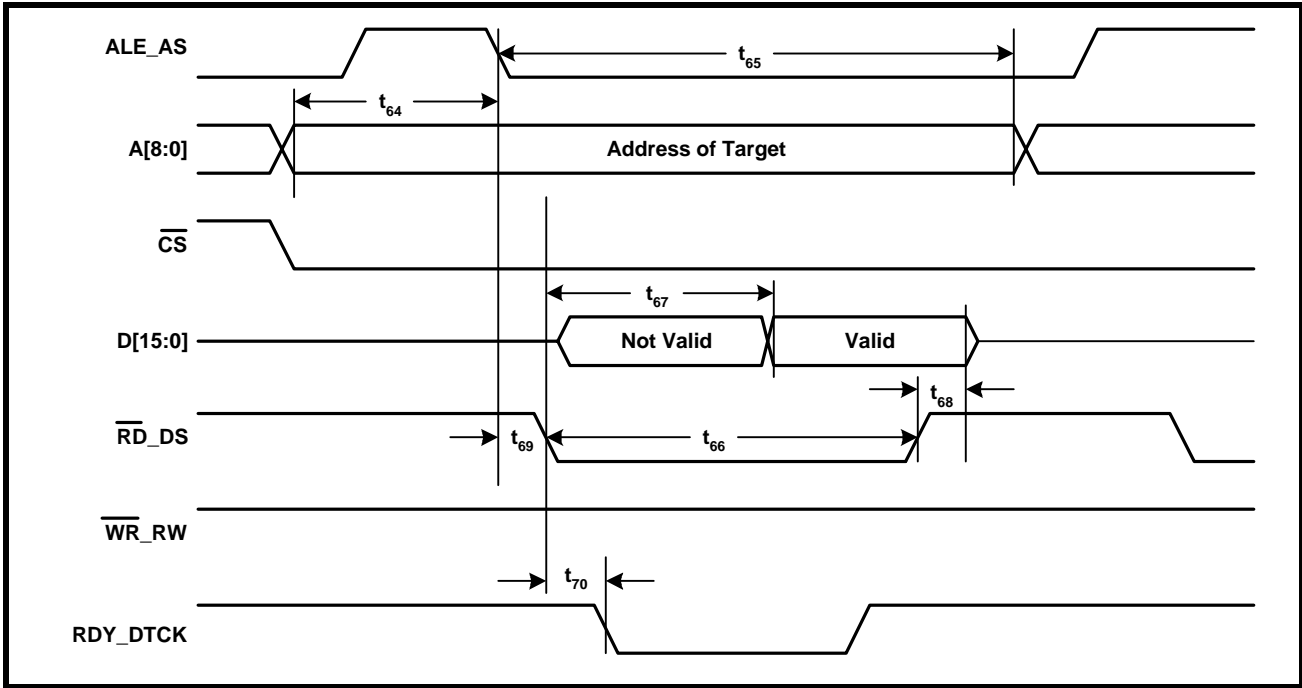


FIGURE 17. MICROPROCESSOR INTERFACE TIMING - INTEL TYPE PROGRAMMED I/O WRITE OPERATIONS

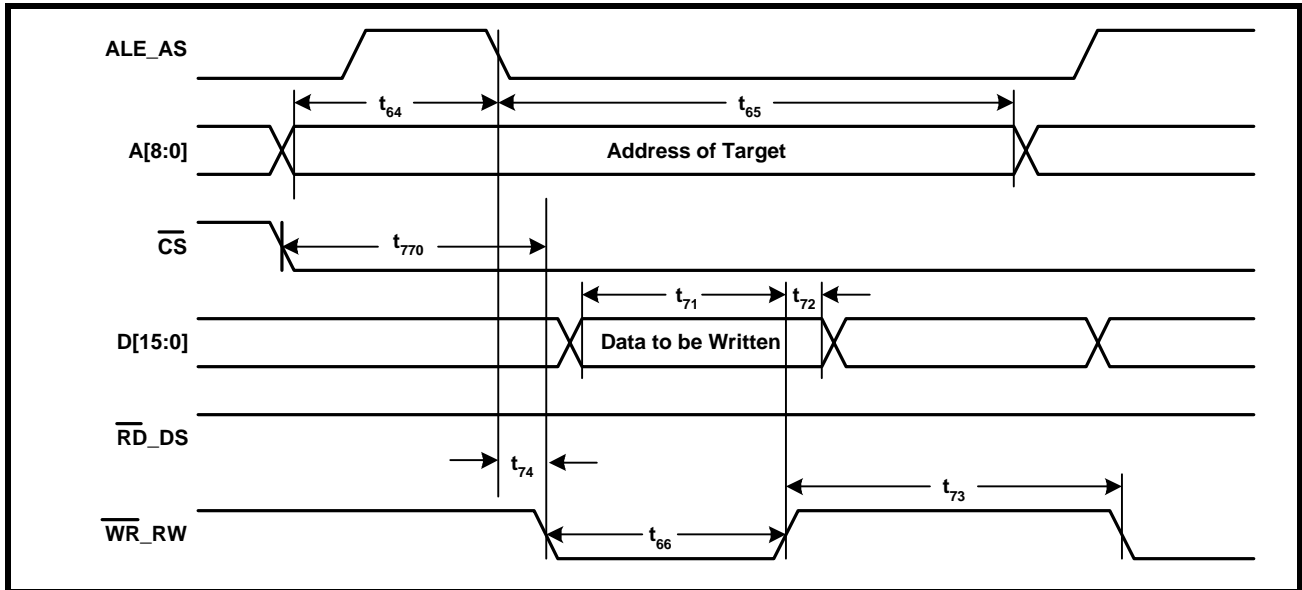


FIGURE 18. MICROPROCESSOR INTERFACE TIMING—MOTOROLA TYPE PROCESSORS (READ OPERATIONS) NON-BURST MODE

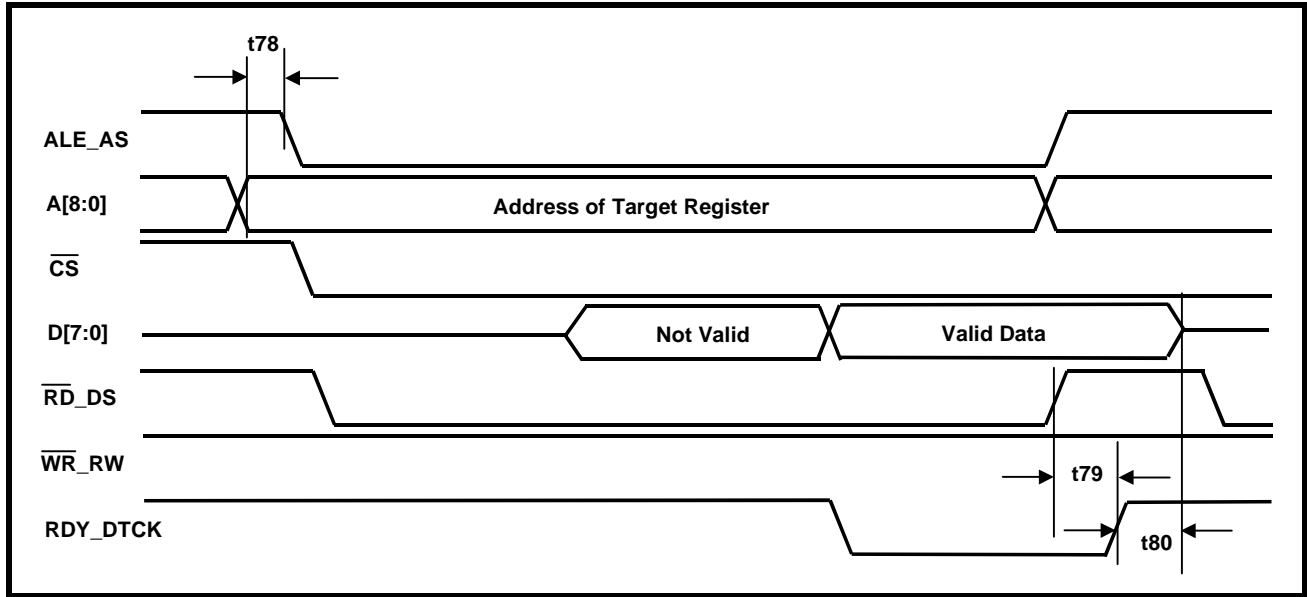


FIGURE 19. MICROPROCESSOR INTERFACE TIMING—MOTOROLA TYPE PROCESSOR (WRITE OPERATIONS) NON-BURST MODE

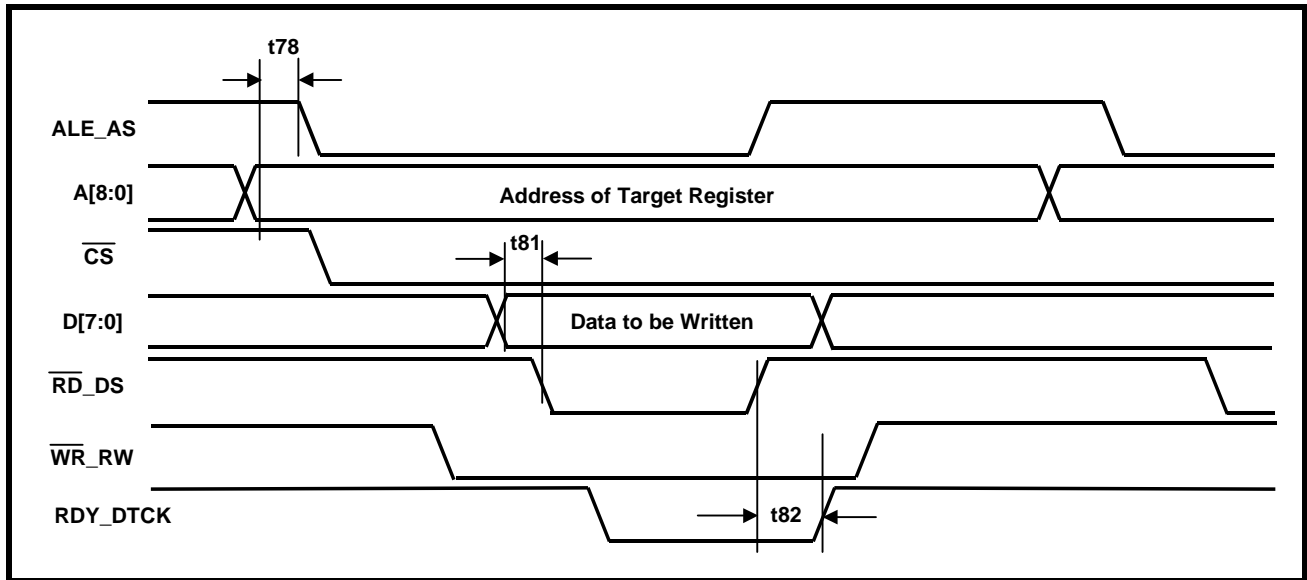
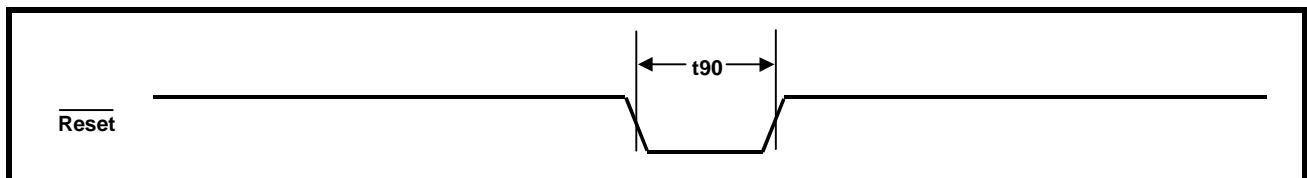


FIGURE 20. MICROPROCESSOR INTERFACE TIMING - $\overline{\text{Reset}}$ PULSE WIDTH



FUNCTIONAL DESCRIPTION

The XRT72L71 DS3 ATM UNI/Framer IC can be configured to operate in either the “ATM UNI” or in the “Clear-Channel-Framer” Mode.

A brief listing of the features and description for each of these operating modes is presented below.

THE ATM UNI MODE OF OPERATION

When the XRT72L71 UNI/Framer has been configured to operate in the “ATM UNI” Mode, it can functionally be subdivided into 6 different sections, as shown in Figure 2.

- Receive Section
- Transmit Section
- Microprocessor Interface Section
- Performance Monitor Section
- Test and Diagnostic Section
- Line Interface Unit Scan Drive Section

The features of each of these functional sections are briefly outlined below.

THE RECEIVE SECTION

The purpose of the Receive Section of the XRT72L71 DS3 ATM UNI is to allow a local ATM Layer (or ATM Adaptation Layer) processor to receive ATM cell data from a remote piece of equipment via a public or leased DS3 transport medium.

The Receive Section of the XRT72L71 DS3 UNI consists of the following functional blocks.

- Receive DS3 Framer Block
- Receive PLCP (Physical Layer Convergence Protocol) Processor Block
- Receive Cell Processor Block
- Receive UTOPIA Interface Block

Each of these functional blocks, within the Receive Section of the UNI Framer will do the following:

The Rx DS3 Framer Block

- Capable of receiving data, from the LIU IC, in either the “Single-Rail” or “Dual-Rail” mode.
- Capable of “sampling” the “inbound” DS3 data (at the “RxPOS” and “RxNEG” input pins) upon either the rising or falling edge of the “RxLineCik” signal.
- The Receive DS3 Framer will synchronize to the incoming DS3 data stream and remove or process the DS3 Framing/Overhead Bits. This procedure

will result in either extracting PLCP frame data or “Direct-Mapped” ATM Cell data, from the payload portion of the incoming DS3 data stream.

- The Receive DS3 Framer can be used to receive FEAC (Far End Alarm & Control) messages via an on-chip FEAC Transceiver.
- The Receive DS3 Framer includes an on-chip LAPD Receiver along with 88 bytes of on-chip RAM that can receive incoming path maintenance data link messages from the Remote Terminal Equipment.
- Detects and generates interrupts upon “Detection of P and CP-bit Errors”, “Change of State in LOS, AIS, OOF and FERF”, “Receipt of New LAPD (PMDL) Message”, “Validation and Removal of FEAC Message”.

NOTE: The Receive DS3 Framer supports both M13 and C-bit Parity Frame Formats.

The Rx PLCP Processor Block

- The Receive PLCP Processor will identify the frame boundary of each incoming PLCP frame, extract and process the overhead bytes of these PLCP frames (applies only if the UNI is operating in the PLCP Mode). The Receive PLCP Processor will also perform some error checking on the incoming PLCP frames. The Receive PLCP Processor will inform the Remote Terminal Equipment of the results of this error-checking by internally routing these results to the “Near-End” Transmit PLCP Processor, for transmission back out to the Remote Terminal Equipment.

The Rx Cell Processor Block

- The Receive Cell Processor will perform the following functions:
 - Cell Delineation
 - HEC Byte Verification of incoming cells (optional)
 - Cell-payload de-scrambling (optional)
 - Idle cell detection and removal (optional)
 - User and OAM Cell Filtering (optional)
 - OAM Cell Processing (optional)
- The UNI provides 108 bytes of on-chip RAM that allows for the reception and processing of selected OAM cells.
- The Receive Cell Processor block will also verify the CRC-10 value within all received OAM cells, per ITU-T I.610.

- Detects and generates interrupts upon “Detection of HEC Byte errors”, “Change in LCD (Loss of Cell Delineation) condition” and “Receipt of OAM Cell”.

The Receive UTOPIA Interface Block

- Provides a “UTOPIA Level -2” compliant interface to either the ATM or the ATM Adaptation Layer.
- Can be configured to operate in either the “Single-PHY” or “Multi-PHY” Modes.
- Supports either “Cell-Level” or “Octet-Level” Handshaking.
- Receive UTOPIA Data Bus can be configured to be either 8 or 16-bits wide.
- The RxFIFO, within the Receive UTOPIA Interface block will temporarily hold any ATM cells that pass through the Receive Cell Processor, where they can be read out by the ATM Layer processor, over the Receive UTOPIA Data Bus.
- The size of the “RxFIFO” is 16 cells.
- Supports read operations (from the ATM Layer device) at rates upto 50MHz.
- Detects and generates interrupts upon “Detection of RUNT cells” and “Overrun of RxFIFO”.

THE TRANSMIT SECTION

The purpose of the Transmit section of the XRT72L71 DS3 ATM UNI is to allow a local ATM Layer (or ATM Adaptation Layer) processor to transmit ATM Cell data to a remote piece of equipment via a public or leased DS3 transport medium.

The Transmit Section of the XRT72L71 DS3 UNI consists of the following functional blocks.

- Transmit UTOPIA Interface Block
- Transmit Cell Processor Block
- Transmit PLCP Processor Block
- Transmit DS3 Frammer Block

Each of these functional blocks, within the Transmit Section (of the UNI/Framer) will do the following:

Transmit UTOPIA Interface Block

- Can be configured to operate in either the “Single-PHY” or Multi-PHY” Mode.
- Supports either the “Cell-Level” or “Octet-Level” Handshaking Mode.
- Transmit UTOPIA Data Bus can be configured to be either 8 or 16-bits wide.
- Allow the ATM Layer processor to write ATM cells into the Transmit FIFO (within the Transmit UTOPIA Interface block) via a standard UTOPIA Level 2 interface.

- The size of the “TxFIFO” is 16 cells. However, the operating depth can be configured to be 4, 8, 12 or 16 cells.
- Supports write operations (from the ATM Layer device) at rates upto 50MHz.
- Detects and generates interrupts upon “Detection of Parity Errors”, “Detection of RUNT cells” and “Overrun of TxFIFO”.

Transmit Cell Processor Block

- The Transmit Cell Processor will read in ATM cells from the Transmit FIFO (if available) for further processing.
- If no cell is available within the Transmit FIFO, then the Transmit Cell Processor will automatically generate an Idle cell. The UNI is equipped with on-chip registers to allow for the generation of customized Idle cells.
- The UNI provides 54 bytes of on-chip RAM that allows for the generation and transmission of “user-specified” OAM cells. The Transmit Cell Processor will generate and transmit these OAM cells upon software command.
- The Transmit Cell Processor block will also compute and insert a CRC-10 value into each “out-bound” OAM cell, per ITU-T I.610.
- The Transmit Cell Processor will (optionally) scramble the Cell Payload bytes and (optionally) compute and insert the HEC (Header Error Check) byte. This HEC byte will be inserted into the fifth octet of each cell prior to being transferred to the Transmit PLCP Processor (or the Transmit DS3 Frammer).

Transmit PLCP Processor Block

- The Transmit PLCP Processor will pack 12 ATM cells into each PLCP frame and automatically determine the nibble-stuffing option of the current PLCP frame. These PLCP frames will also include an overhead byte that reflect BIP-8 (Bit Interleaved Parity) calculation results, a byte that reflects the current stuffing option status of the current PLCP frame, Path Overhead and Identifier bytes, and diagnostic-related bytes reflecting any detected BIP-8 errors and alarm conditions detected in the Receive section of the UNI chip.

Transmit DS3 Frammer Block

- These PLCP frames (or “Direct Mapped” ATM cells) will be inserted into the payload of an outgoing DS3 frame, for transmission to the “Remote” Terminal, by the Transmit DS3 Frammer.
- The Transmit DS3 Frammer will transmit FEAC (Far End Alarm & Control) messages to the Remote Terminal Equipment via an on-chip FEAC Transceiver.

- Additionally, the Transmit DS3 Framer can transmit path maintenance data link messages to the Remote Terminal Equipment via the on-chip LAPD Transmitter.
- Generates interrupts upon “Completion of Transmission of LAPD and FEAC” Messages.

Note: The Transmit DS3 Framer will support either M13 or C-bit Parity Framing Formats.

CLEAR-CHANNEL-FRAMING MODE OF OPERATION

When the XRT72L71 has been configured to operate in the “Clear-Channel Framer” mode, it can be functionally subdivided into 6 different sections.

- Receive Section
- Transmit Section
- Microprocessor Interface Section
- Performance Monitor Section
- Test and Diagnostic Section
- Line Interface Unit Scan/Drive Section.

The features of each of the “Receive” and “Transmit” Section (for Clear-Channel Framer applications) are listed below.

THE RECEIVE SECTION

The purpose of the Receive Section of the XRT72L71 Clear-Channel DS3 Framer is to allow a given Terminal to receive data from a remote terminal, which is being transported over a DS3 data stream.

The Receive Section of the XRT72L71 Clear-Channel DS3 Framer IC consists of the following functional blocks.

- Receive DS3 Framer block
- Receive Overhead Data Output Interface block
- Receive Payload Data Output Interface block

It should be noted that the “Receive DS3 Framer” block is also active, when the XRT72L71 has been configured to operate in the “ATM UNI” Mode.

Each of these functional blocks, within the Receive Section of the Framer will do the following.

- The Receive DS3 Framer block will synchronize to the incoming DS3 data stream. All “inbound” DS3 data will be routed to the “Receive Payload Data Output Interface” block. All overhead bits (which are extracted from each “inbound” DS3 frame) will be routed to the “Receive Overhead Data Output Interface” block.
- The Receive DS3 Framer block can also be used to receive FEAC (Far-End-Alarm & Control) messages and PMDL (Path Maintenance Data Link)

messages via the “on-chip” Receive HDLC Controller block.

- The Receive Overhead Output Interface block outputs all overhead bits, which have been received via the “inbound” DS3 data stream. The purpose of the “Receive Overhead Output Interface” block is to permit external circuitry (within the local terminal equipment) to have access to these overhead bits, for additional processing.
- The Receive Payload Data Output Interface block outputs all data bits which have been received via the XRT72L71, to the local terminal equipment. Since the “Receive Payload Data Output Interface” block outputs both “payload” and “overhead” data bits, to the local terminal equipment; the “Receive Payload Data Output Interface” block also includes an “Overhead Indicator” output pin. This output pin pulses “High” whenever an overhead bit is being output via the “Receive Payload Data Output Interface” block.

THE TRANSMIT SECTION

The purpose of the Transmit Section of the XRT72L71 Clear-Channel DS3 Framer is to allow a local terminal to transmit data to a remote terminal equipment, via a DS3 transport medium.

The Transmit Section of the XRT72L71 Clear-Channel DS3 Framer consists of the following functional blocks.

- Transmit Payload Data Input Interface block
- Transmit Overhead Data Input Interface block
- Transmit DS3 Framer block

It should be noted that the “Transmit DS3 Framer” block is also active, whenever the XRT72L71 has been configured to operate in the “ATM UNI” Mode.

The Transmit Section of the Clear-Channel DS3 Framer will:

- Accept all “user” data, (which is required to be transported to the Remote Terminal Equipment via a DS3 data stream) via the “Transmit Payload Data Input Interface block.
- Optionally accepts and insert overhead bits (into the “outbound” DS3 data-stream) via the “Transmit Overhead Input Interface block.
- The Transmit DS3 Framer block will accept payload data (from the Transmit Payload Data Input Interface block) and overhead data (from the Transmit Overhead Data Input Interface block) and will create a DS3 data stream. If no overhead data is inserted via the “Transmit Overhead Data Input interface” block, then the “Transmit DS3 Framer” block will insert its own values for the overhead bits.

- The Transmit DS3 Framer block will transmit FEAC (Far-End-Alarm & Control) messages to the remote terminal equipment via an “on-chip” FEAC Transmitter.
- The Transmit DS3 Framer block will also transmit PMDL (Path Maintenance Data Link) Messages to the remote terminal equipment via an “on-chip” LAPD Transmitter.

THE MICROPROCESSOR INTERFACE SECTION

The Microprocessor Interface Section allows a user (or a local “housekeeping” processor) to do the following:

- To configure the UNI/Framer IC into a wide variety of operating modes; by writing data into any one of a large number of “read/write” registers.
- To monitor many aspects of the UNI/Framer's performance by reading data from any one of a large number of “read/write” and “read-only” registers.
- To run in a “polling” or “interrupt-driven” environment. The UNI/Framer IC contains an extensive interrupt structure consisting of a wide range of interrupt enable and interrupt status registers.
- To command the UNI/Framer IC to transmit OAM cells, FEAC messages and/or LAPD Messages frames, upon software command.
- To read in and process received OAM cells, FEAC messages and/or Path Maintenance Data Link Messages from the UNI/Framer IC.
- The Microprocessor Interface allows the user to interface the XRT72L71 DS3 UNI/Framer to either an Intel type or Motorola type processor. Additionally, the Microprocessor Interface can be configured to operate over an 8-bit or 16-bit data bus.
- The Microprocessor Interface section includes a “Loss of Clock Signal” protection feature that automatically completes (or terminates) a “Read/Write” operation, should a “Loss of Clock Signal” event occur.

PERFORMANCE MONITOR SECTION

The Performance Monitor Section of the XRT72L71 DS3 UNI/Framer consists of a large number of “Reset-upon-Read” and “Read-Only” registers that contains cumulative and “one-second” statistics that reflect the performance/health of the UNI/Framer chip/system. These cumulative and “one-second” statistics are kept on the following parameters.

- Number of Line Code Violation events detected by the Receive DS3 Framer
- Number of Framing Bit (F- and M-bit) errors detected by the Receive DS3 Framer

- Number of P-bit Errors detected by the Receive DS3 Framer
- Number of CP-bit Errors detected by the Receive DS3 Framer.
- Number of FEBE Events detected by the Receive DS3 Framer
- Cumulative number of BIP-8 errors, detected by the Receive PLCP Processor
- Number of PLCP framing errors, detected by the Receive PLCP Processor
- Cumulative sum of the FEBE value, in the incoming G1 bytes (within each PLCP frame), received by the Receive PLCP Processor
- Number of Single-bit HEC byte Errors detected
- Number of Multi-bit HEC byte Errors detected
- Number of Received Idle Cells
- Number of Received Valid (User and OAM) cells discarded
- Number of Discarded Cells
- Number of Transmitted Idle Cells
- Number of Transmitted Valid Cells

TEST AND DIAGNOSTIC SECTION

The Test and Diagnostic Section allows the user to perform a series of tests in order to verify proper functionality of the UNI/Framer chip and/or the user's system. The “Test and Diagnostic” section provides the UNI IC with the following capabilities.

- Allows the UNI/Framer to operate in the Line, Cell, and PLCP Loop-back Modes.

FOR ATM UNI APPLICATIONS

- Contains an internal Test Cell Generator and an internal Test Cell Receiver. The Test Cell Generator will generate Test Cells with “user-defined” header byte patterns. The Test Cell Generator will also fill the payload portion of these test cells with bytes from an on-chip PRBS generator.
- The Test Cell Generator can generate test cells in “One Shot” Mode (e.g., a burst of 1024 test cells) or in “Continuous” Mode (e.g., a continuous stream of test cells).
- The Test Cell Receiver will identify and collect the Test Cells for further analyses, based upon the “user-defined” header byte patterns. Additionally, the Test Cell Receiver will report the occurrence of any errors by incrementing an on-chip register.

FOR CLEAR-CHANNEL FRAMING APPLICATIONS

- Contains an internal PRBS pattern generator and receiver. The PRBS pattern generator will generate

and insert a PRBS pattern into the DS3 payload bits.

- The PRBS receiver will receive these DS3 frames, and will attempt to acquire “PRBS Lock” with this DS3 frame data. Additionally, the PRBS Receiver will report the occurrence of any errors by incrementing an on-chip register.

LINE INTERFACE DRIVE AND SCAN SECTION

The Line Interface Drive and Scan Section allows the user to monitor and control many aspects of the

XRT7300 E3/DS3/STS-1 Line Interface Unit, via on-chip registers, within the UNI IC. This feature eliminates the need for glue logic to interface the XRT72L71 DS3 UNI/Framer to the XRT7300 DS3 Line Interface Unit IC.

- The On-Chip Line Interface Drive register allows the user to control the state of 6 output pins. The function of these output pins, when asserted, are tabulated below.

CLEAR CHANNEL MODE OPERATION

| Signal Name | Function of Output Pin |
|-------------------------|---|
| $\overline{\text{Req}}$ | <p>Receive Equalizer By-Pass:</p> <p>“1” configures the XRT7300 to shut off its internal Receive Equalizer.</p> <p>“0” configures the XRT7300 to enable its internal Receive Equalizer.</p> |
| TAOS | <p>Transmit “All Ones” Pattern.</p> <p>“1” configures the XRT7300 LIU IC to overwrite the DS3 data that is output via the TxPOS and outputs, and transmit an “All Ones” pattern onto the line.</p> <p>“0” configures the XRT7300 LIU IC to transmit data, as is applied to it via the TPDATA and TNDATA input pins.</p> |
| EncoDis | <p>B3ZS Encoder Disable/Enable Select.</p> <p>“1” disables the B3ZS Encoder, within the XRT7300.</p> <p>“0” enables the B3ZS Decoder within the XRT7300.</p> |
| TxLev | <p>Transmit Output Signal Line Build Out Select.</p> <p>Setting this bit-field to “1” disables the Transmit Line Build Out circuitry within the XRT7300. In this case, the XRT7300 will generate an “unshaped” square wave signal out onto the line (via the TTIP and TRING output pins).</p> <p><i>Note: In order to configure the XRT7300 to generate a line signal that complies with the Transmit Output Pulse Template Requirements (per Bellcore GR-499-CORE), this setting is advised if the cable length between the Transmit Output of the XRT7300 and the DSX-3 Cross-Connect is greater than 225 feet.</i></p> <p>Setting this bit-field to “0” enables the Transmit Line Build Out circuitry within the XRT7300. In this case, the XRT7300 will generate a “shaped” square wave out onto the line (via the TTIP and TRING output pins).</p> <p><i>Note: In order to configure the XRT7300 to generate a line signal that complies with the Transmit Output Pulse Template Requirements (per Bellcore GR-499-CORE), this setting is advised if the cable length between the Transmit Output of the XRT7300 and the DSX-3 Cross-Connect is less than 225 feet.</i></p> |

| Signal Name | Function of Output Pin |
|-------------|--|
| RLOOP | <p>Remote Loop-Back Mode Select:</p> <p>This bit-field, along with LLOOP can be used to configure the XRT7300 into one of four different loop-back modes.</p> <p>Setting RLOOP to "1" (with LLOOP = 0) configures the XRT7300 to operate in the Remote Loop-Back Mode.</p> <p>Setting RLOOP to "1" (with LLOOP = 1) configures the XRT7300 to operate in the "Digital Local Loop-Back" Mode.</p> <p>Setting RLOOP to "0" (with LLOOP = 1) configures the XRT7300 to operate in the "Analog Local Loop-Back" Mode.</p> <p>Setting RLOOP to "0" (with LLOOP = 0) configures the XRT7300 to operate in the "Normal" (No-Loop-back) Mode.</p> |
| LLOOP | <p>Local Loop-Back Mode Select:</p> <p>This bit-field along with RLOOP can be used to configure the XRT7300 into one of four different loop-back modes.</p> <p>Setting LLOOP to "1" (with RLOOP = 0) configures the XRT7300 to operate in the "Analog Local Loop-Back" Mode.</p> <p>Setting LLOOP to "1" (with RLOOP = 1) configures the XRT7300 to operate in the "Digital Local Loop-Back" Mode.</p> <p>Setting LLOOP to "0" (with RLOOP = 0) configures the XRT7300 to operate in the "Normal" (No-Loop-Back) Mode.</p> <p>Setting LLOOP to "0" (with RLOOP = 1) configures the XRT7300 to operate in the "Remote Loop-Back" Mode.</p> |

- The On-Chip Line Interface Scan Register allows the user to monitor the state of 3 input pins. The function of these input pins, when asserted, are tabulated below.

| SIGNAL NAME | FUNCTION OF INPUT PIN IF ASSERTED |
|-------------|--|
| DMO | Indicates that the "Drive Monitor" circuitry within the XRT7300 has not detected any bipolar signals within the last 128 ± 32 bit periods. |
| RLOL | Indicates that the "Clock Recovery" circuit, within the XRT7300 has lost "lock" with the incoming DS3 line signal. |
| RLOS | Indicates that the XRT7300 is declaring an LOS (Loss of Signal) Condition. |

FEATURES

TRANSMIT AND RECEIVE SECTIONS

UTOPIA INTERFACE BLOCKS

- Compliant with UTOPIA Level 2 Interface Specification (e.g., supports Single-PHY or Multi-PHY operation).
- 8-bit or 16-bit wide UTOPIA Data Bus operation in the Transmit and Receive Directions.
- The UTOPIA Data Bus runs at clock rates of 25 MHz, 33 MHz and 50 MHz

- Supports both Octet-Level and Cell-Level Handshaking between the UNI and the ATM Layer processor.
- The Transmit UTOPIA Interface block performs parity checking of ATM cell data that is written into it, by the ATM Layer processor. Will optionally discard errored cells.
- Contains on-chip 16 cell FIFO in the Transmit Direction (TxFIFO)
- The TxFIFO can be configured to operate with depths of 4, 8, 12 or 16 cells
- Contains on-chip 16 cell FIFO in the Receive Direction (RxFIFO)

TRANSMIT CELL PROCESSOR BLOCK

- Optionally computes and inserts HEC byte into all cells (user, OAM and Idle).
- Optionally scrambles the payload of each cell.
- Idle cells are automatically generated when no user cells are available in the Tx FIFO.
- UNI contains on-chip registers that support the generation/transmission of default or custom Idle cells.
- UNI contains the on-chip "Transmit OAM Cell" buffer (54 bytes) that allows the user to write in and store the contents of OAM cells, in preparation for transmission.
- OAM cells are transmitted upon software command.
- Performs "Data Path Integrity" check on all incoming cell data, originating from the ATM Layer processor.
- Provides a serial input port to allow the user to insert the GFC (Generic Flow Control) field externally into the GFC nibble field of an outbound (e.g., Transmit direction) valid ATM Cell.

RECEIVE CELL PROCESSOR BLOCK

- Performs cell delineation on either "Direct Mapped" ATM cell data or PLCP frames.
- Verifies the HEC bytes of incoming cells and corrects most cells with single bit errors. Cells with multi-bit errors are detected and are optionally discarded.
- (Optionally) Performs filtering of Idle Cells.
- (Optionally) Performs filtering of User and OAM cells.
- UNI contains on-chip buffer space ("Receive OAM Cell" buffer) that allows for the reception and processing of selected OAM cells.
- Optionally de-scrambles the payload of each cell.
- Provides a serial output port that allows the user to read the GFC value of an incoming (e.g., Receive direction) ATM Cell.
- Inserts the "Data Path Integrity Check" patterns in all cells that are written to the Rx FIFO.

TRANSMIT PLCP PROCESSOR BLOCK

- Can be disabled to support the "Direct Mapped" ATM mode.
- Packs 12 ATM cells into each PLCP frame along with various other overhead bytes.
- The Transmit PLCP Processor will automatically determine its own stuffing options.
- Overhead bytes include those that support BIP-8 calculations (B1), indicator of stuff-option status for

current PLCP frame (C1), diagnostic byte that reflects alarms conditions that were detected in the Receive Section of the UNI (G1); and Path Overhead bytes.

- Provides a serial input port for user to insert PLCP Overhead Bytes externally.

RECEIVE PLCP PROCESSOR BLOCK

- Can be disabled to support the "Direct Mapped" ATM mode.
- Determines the frame boundaries of incoming PLCP frames (from the Receive DS3 Framer).
- Extracts and processes the PLCP frame overhead bytes.
- Provides a serial output port for user to read in the contents of the PLCP Overhead Bytes from the incoming data.

TRANSMIT/RECEIVE DS3 FRAMER BLOCK

- Supports the M13 and C-bit Parity Framing Formats.
- Transmit and Receive DS3 Framers can transmit/receive data in the Unipolar or the Bipolar (AMI or B3ZS line codes) format.
- The Transmit DS3 Framer provides a serial input port that allows the user to insert his/her own values for the overhead bits of the "outbound" DS3 frames.
- The Receive DS3 Framer provides a serial output port that allows the user access to the values of the overhead bits of the "incoming" DS3 frames.
- The Receive DS3 Framer can be configured to sample the incoming DS3 data (at the RxPOS and RxNEG input pins) via the rising edge or falling edge of the Receive Line Clock (RxLineClk) input.
- The Transmit DS3 Framer can be configured to update the "outbound" DS3 data (at the TxPOS and TxNEG output pins) at the rising edge or falling edge of the Transmit Line Clock (TxLineClk) output.
- UNI includes on-chip RAM space to support the transmission and reception of path maintenance data link messages via an on-chip LAPD Transceiver
- UNI includes on-chip registers to support the transmission and reception of FEAC (Far End Alarm & Control) messages via an on-chip FEAC Transceiver.
- Contains on-chip FEAC Transceiver.
- Contains on-chip LAPD Transceiver.

MICROPROCESSOR INTERFACE SECTION

- Can be interfaced to Motorola or Intel type of microprocessors/microcontrollers

-
- Microprocessor interface supports 8 bit wide or 16-bit wide read/write accesses.
 - Supports polled or interrupt-driven environments.
 - Supports burst mode “Read and Write” operations between the “local” microprocessor and the UNI on-chip registers and RAM locations.
 - Includes a “Loss of Clock Signal” protection feature that terminates “Read/Write” cycles with the local μ P, during a “Loss of Clock signal” event.
 - Supports Line-Side Testing
 - Contains an on-chip Test Cell Generator and an on-chip Test Cell Receiver
 - Test Cell Generator can generate a “continuous” stream of test cells, or a “one-shot” burst of 1024 test cells.
 - The Test Cell Receiver identifies, collects and evaluates Test Cells for errors.
 - The Test Cell Receiver also reports the occurrence of errors to the user.

PERFORMANCE MONITOR SECTION

Contains numerous on-chip “Read-Only” registers that allows the user to monitor the overall “health” of the system.

TEST AND DIAGNOSTIC SECTION

- Supports Line, PLCP, and Cell Loop-back Modes

LINE INTERFACE DRIVE AND SCAN SECTION

- Consists of an on-chip “Read/Write” register that allows the user to control the state of 6 output pins.
- Consists of an on-chip “Read-Only” register that allows the user to monitor the state of 3 input pins.

LIST OF REGISTERS

All even numbered registers get mapped onto the microprocessor data bus higher byte D15-D8

All Odd numbered registers get mapped onto the microprocessor data bus lower byte D7-D0

| Even Numbered Register | | | | | | | | Odd Numbered Register | | | | | | | |
|------------------------|-----|-----|-----|-----|-----|----|----|-----------------------|----|----|----|----|----|----|----|
| D15 | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |

REGISTER SUMMARY LIST

| REG. # | FUNCTION |
|--------|---|
| 0 | UNI Operating Mode Register |
| 1 | UNI I/O Control Register |
| 2 | Part Number Register |
| 3 | Version Number Register |
| 4 | UNI Interrupt Enable Register |
| 5 | UNI Interrupt Status Register |
| 6 | Test Cell Control and Status Register |
| 7 | Test Cell Error Accumulator Holding Register |
| 8 | Test Cell Header Byte-1 |
| 9 | Test Cell Header Byte-2 |
| 10 | Test Cell Header Byte-3 |
| 11 | Test Cell Header Byte-4 |
| 12 | Test Cell Error Accumulator-MSB |
| 13 | Test Cell Error Accumulator-LSB |
| 14 | Rx DS3 Configuration and Status Register |
| 15 | Rx DS3 Status Register |
| 16 | Rx DS3 Interrupt Enable Register |
| 17 | Rx DS3 Interrupt Status Register |
| 18 | Rx DS3 FEAC Register |
| 19 | Rx DS3 FEAC Interrupt Enable/Status Register |
| 20 | Rx DS3 LAPD Control Register |
| 21 | Rx DS3 LAPD Status Register |
| 22 | Tx DS3 Configuration Register |
| 23 | Tx DS3 M-Bit Mask Register |
| 24 | Tx DS3 F-Bit Mask1 Register |
| 25 | Tx DS3 F-Bit Mask2 Register |
| 26 | Tx DS3 F-Bit Mask3 Register |
| 27 | Tx DS3 F-Bit Mask4 Register |
| 28 | Tx DS3 FEAC Configuration and Status Register |

| REG. # | FUNCTION |
|--------|--|
| 29 | Tx DS3 FEAC Register |
| 30 | Tx DS3 LAPD Configuration Register |
| 31 | Tx DS3 LAPD Status/Interrupt Register |
| 32 | PMON LCV Event Count Register-MSB |
| 33 | PMON LCV Event Count Register-LSB |
| 34 | PMON Framing Bit Error Event Count Register-MSB |
| 35 | PMON Framing Bit Error Event Count Register-LSB |
| 36 | PMON P-Bit Error Count Register-MSB |
| 37 | PMON P-Bit Error Count Register-LSB |
| 38 | PMON FEBE Event Count Register-MSB |
| 39 | PMON FEBE Event Count Register-LSB |
| 40 | PMON PLCP BIP-8 Error Count Register-MSB |
| 41 | PMON PLCP BIP-8 Error Count Register-LSB |
| 42 | PMON PLCP Framing Byte Error Count Register-MSB |
| 43 | PMON PLCP Framing Byte Error Count Register-LSB |
| 44 | PMON PLCP FEBE Count Register-MSB |
| 45 | PMON PLCP FEBE Error Count Register-LSB |
| 46 | PMON Single-bit HEC Error Count-MSB |
| 47 | PMON Single-bit HEC Error Count -LSB |
| 48 | PMON Multiple-bit HEC Error Count-MSB |
| 49 | PMON Multiple-bit HEC Error Count-LSB |
| 50 | PMON Received Idle Cell Count/PRBS Error Count-MSB |
| 51 | PMON Received Idle Cell Count/PRBS Error Count-LSB |
| 52 | PMON Receive Valid Cell Count-MSB |
| 53 | PMON Receive Valid Cell Count-LSB |
| 54 | PMON Discarded Cell Count-MSB |
| 55 | PMON Discarded Cell Count-LSB |
| 56 | PMON Transmit Idle Cell Count-MSB |

| REG. # | FUNCTION |
|--------|---|
| 57 | PMON Transmit Idle Cell Count-LSB |
| 58 | PMON Transmit Valid Cell Count-MSB |
| 59 | PMON Transmit Valid Cell Count-LSB |
| 60 | PMON Holding Register |
| 61 | One Second Error Status Register |
| 62 | LCV - One Second Accumulator Register-MSB |
| 63 | LCV - One Second Accumulator Register-LSB |
| 64 | P-Bit Errors-One Second Accumulator Register-MSB |
| 65 | P-Bit Errors-One Second Accumulator Register- LSB |
| 66 | HEC Byte Errors-One Sec Accumulator Register-MSB |
| 67 | HEC Byte Errors-One Sec Accumulator Register-LSB |
| 68 | Rx PLCP Configuration/Status Register |
| 69 | Rx PLCP Interrupt Enable Register |
| 70 | Rx PLCP Interrupt Status Register |
| 71 | Future Use |
| 72 | Tx PLCP FA1 Byte Error Mask Register |
| 73 | Tx PLCP FA2 Byte Error Mask Register |
| 74 | Tx PLCP BIP-8 Error Mask |
| 75 | Tx PLCP G1 Byte Register |
| 76 | Rx CP Configuration Register |
| 77 | Rx CP Additional Configuration Register |
| 78 | Rx CP Interrupt Enable Register |
| 79 | Rx CP Interrupt Status Register |
| 80 | Rx CP Idle Cell pattern Header Byte-1 |
| 81 | Rx CP Idle Cell pattern Header Byte-2 |
| 82 | Rx CP Idle Cell pattern Header Byte-3 |
| 83 | Rx CP Idle Cell pattern Header Byte-4 |
| 84 | Rx CP Idle Cell Mask Header Byte-1 |
| 85 | Rx CP Idle Cell Mask Header Byte-2 |
| 86 | Rx CP Idle Cell Mask Header Byte-3 |
| 87 | Rx CP Idle Cell Mask Header Byte-4 |
| 88 | Rx CP User Cell Filter Pattern Header Byte-1 |
| 89 | Rx CP User Cell Filter Pattern Header Byte-2 |
| 90 | Rx CP User Cell Filter Pattern Header Byte-3 |

| REG. # | FUNCTION |
|---------|---|
| 91 | Rx CP User Cell Filter Pattern Header Byte-4 |
| 92 | Rx CP User Cell Filter Mask Header Byte-1 |
| 93 | Rx CP User Cell Filter Mask Header Byte-2 |
| 94 | Rx CP User Cell Filter Mask Header Byte-3 |
| 95 | Rx CP User Cell Filter Mask Header Byte-4 |
| 96 | Tx CP Control Register |
| 97 | Tx CP OAM Register |
| 98 | Tx CP HEC Error Mask Register |
| 99 | Future Use |
| 100 | Tx CP Idle Cell Pattern Header Byte-1 |
| 101 | Tx CP Idle Cell Pattern Header Byte-2 |
| 102 | Tx CP Idle Cell Pattern Header Byte-3 |
| 103 | Tx CP Idle Cell Pattern Header Byte-4 |
| 104 | Tx CP Idle Cell Pattern Header Byte-5 |
| 105 | Tx CP Idle Cell Payload Register |
| 106 | Utopia Configuration Register |
| 107 | Rx UTOPIA Interrupt Enable/Status Register |
| 108 | Rx UTOPIA Address |
| 109 | Rx UTOPIA FIFO Status Register |
| 110 | Tx UTOPIA Interrupt/Status Register |
| 111 | Future Use |
| 112 | Tx UTOPIA Address |
| 113 | Tx UTOPIA Status Register |
| 114 | Line Interface Drive Register |
| 115 | Line Interface Scan Register |
| 116 | PMON CP-Bit Error Event Count Register - MSB |
| 117 | PMON CP-Bit Error Event Count Register - LSB |
| 118 | Frame CP-Bit Errors-One Second Accumulator Register - MSB |
| 119 | Frame CP-Bit Errors-One Second Accumulator Register - LSB |
| 120-133 | Unused |

TABLE 1: UNI OPERATING MODE REGISTER

REGISTER 0

UNI OPERATING MODE REGISTER

HEX ADDRESS: 0x00

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------------------|------|---------|--|
| 7 | Local Loop-back | R/W | 0 | 0: Local Loop-back Mode operation is disabled 1: Local Loop-back Mode operation is enabled. The Transmit stream on TxPOS, TxNEG pins are looped back into the receive RxPOS, RxNEG pins |
| 6 | Cell Loop-back | R/W | 0 | 0: Cell Loop-back Mode operation is disabled 1: Cell Loop-back Mode operation is enabled. Cells from the Receive Cell Processor block are written into the Tx FIFO. NOTE: This bit-field is only active if the XRT72L71 is operating in the ATM UNI Mode. |
| 5 | PLCP Loop-back | R/W | 0 | 0: PLCP Loop-back Mode operation is disabled 1: PLCP Loop-back Mode operation is enabled. PLCP frames are looped from the Transmit PLCP Processor block into the Receive PLCP Processor Block. NOTE: This bit-field is only active if the XRT72L71 is operating in the ATM UNI/PLCP Mode. |
| 4 | RESET | R/W | 0 | 0: Normal Operation 1: A "0" to "1" transition causes a reset of the UNI/Framer device. |
| 3 | Direct-mapped ATM | R/W | 1 | 0: PLCP Mode is enabled. Transmit and Receive PLCP Processor blocks are enabled. 1: Direct-Mapped ATM Mode. Transmit and Receive PLCP Processor blocks are disabled. NOTE: This bit-field is only active if the XRT72L71 is operating in the ATM UNI Mode. |
| 2 | C-BIT/M13 | R/W | 0 | 0: XRT72L71 will support the "DS3/C-Bit Parity" Framing Format. 1: XRT72L71 will support the "DS3/M13" Framing Format. |
| 1 | Timing Reference Select (1) | R/W | 1 | PLCP block 00: Transmitter timings taken from the Receive PLCP Processor (Loop-Timing). 01: 8 kHz reference signal on 8kRef pin used for stuffing and framing 10: StuffCtl is used for stuffing control, framing is asynchronous on power on 11: Fixed stuffing pattern is used. Framing is asynchronous on power on |
| 0 | Timing Reference Select (0) | R/W | 1 | Framer block 00: Transmitter timings are taken from the Receive DS3 Framer (Loop-Timing) 01: Framing is asynchronous on power-on, and TxInClk is used as the transmit clock 10: Transmitter follows external pin (TxFrameRef) framing reference 11: Framin is asynchronous on power-on, and TxInClk is used as the transmit clock |

TABLE 2: UNI I/O CONTROL REGISTER

REGISTER 1 UNI I/O CONTROL REGISTER HEX ADDRESS: 0x01

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|------------------------|------|---------|--|
| 7 | Disable LOC | R/W | 1 | 0: Internal loss of clock detection circuit enabled 1: Internal loss of clock detection circuit disabled |
| 6 | LOC | RO | 0 | 0: Indicates no Loss of Clock 1: Indicates TxLnCLK or RxLineLck is not present. Bit is valid only if Disable LOC is 0 |
| 5 | INTERRUPT ENABLE RESET | R/Q | 1 | 0: Interrupt enable register bits are not reset by the chip when active interrupts are read. 1: Reading of status of an active interrupt resets the corresponding interrupt enable bit. |
| 4 | B3ZS*/AMI | R/W | 0 | 0: B3ZS Encoding and Decoding is enabled. 1: B3ZS Encoding and Decoding are disabled. NOTE: Dual-Rail data must be selected (via bit 3 of this register) if B3ZS Encoding/Decoding are enabled. |
| 3 | SINGLE-RAIL/DUAL-RAIL | R/W | 0 | 0: Dual-Rail data is transmitted and received between the XRT72L71 and the LIU IC. 1: Single-Rail data is transmitted and received between the XRT72L71 and the LIU IC. |
| 2 | Tx Clock Invert | R/W | 0 | 0: Outputs on TxPOS, TxNEG are updated on rising edge of TxClk 1: Ouputs on TxPOS, TxNEG are updated on falling edge of TxClk |
| 1 | Rx Clock Invert | R/W | 0 | 0: Inputs on RxPOS, RxNEG are sampled at rising edge of RxClk 1: Inputs on RxPOS, RxNEG are sampled at falling edge of RxClk |
| 0 | REFRAME | R/W | 0 | 0 to 1 transition forces the Receive DS3 Framer block to start frame search |

TABLE 3: PART NUMBER REGISTER

REGISTER 2 PART NUMBER REGISTER HEX ADDRESS: 0x02

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-------------|------|---------|-----------------------|
| 7-0 | Part Number | RO | 0x04 | Hex: 0x04 (0000 0100) |

TABLE 4: VERSION NUMBER REGISTER

REGISTER 3 VERSION NUMBER REGISTER HEX ADDRESS: 0x03

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------|------|---------|-----------------------|
| 0-7 | Version Number | RO | 0x01 | Hex 0x04: (0000 0001) |

TABLE 6: UNI INTERRUPT STATUS REGISTER

REGISTER 5

UNI INTERRUPT STATUS REGISTER

HEX ADDRESS: 0x05

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------|------|---------|---|
| 7 | Rx DS3 Interrupt Status | RO | 0 | 0: No pending interrupt from the Receive DS3 Framer block 1: Pending interrupt(s) from the Receive DS3 Framer block are awaiting service. |
| 6 | Rx PLCP Interupt Status | RO | 0 | 0: No pending interrupt from the Receive PLCP Processor block 1: Pending interrupt(s) from the Receive PLCP Processor block are awaiting service. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI/PLCP" Modes. |
| 5 | Rx CP Interrupt Status | RO | 0 | 0: No pending interrupt from the Receive Cell Processor block. 1: Pending interrupt(s) from the Receive Cell Processor block are awaiting service. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 4 | Rx UTOPIA Interrupt Status | RO | 0 | 0: No pending interrupt from the Receive UTOPIA Interface block. 1: Pending interrupt(s) from Receive UTOPIA Interface block are awaiting service. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 3 | Tx UTOPIA Interrupt Status | RO | 0 | 0: No pending interrupt from the Transmit UTOPIA Interface block. 1: Pending interrupt(s) from the Transmit UTOPIA Interface block are awaiting service. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 2 | Tx CP Interrupt Status | RO | 0 | 0: No pending interrupt from the Transmit Cell Processor block 1: Pending interrupt from the Transmit Cell Processor block is awaiting service. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 1 | Tx DS3 Interrupt Status | RO | 0 | 0: No pending interrupt from the Transmit DS3 Framer block 1: Pending interrupt(s) from the Transmit DS3 Framer block are awaiting service. |
| 0 | One Sec Interrupt Status | RUR | 0 | 0: No pending interrupt requests from the One Second pulse generator 1: Pending One Second interrupt is awaiting service. |

TABLE 7: TEST CELL CONTROL AND STATUS REGISTER

REGISTER 6

TEST CELL CONTROL AND STATUS REGISTER

HEX ADDRESS: 0x06

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------------|------|---------|--|
| 7 | CLEAR CHANNEL ENABLE | R/W | 0 | 0: Configures the XRT72L71 to operate in the "ATM UNI" Mode. 1: Configures the XRT72L71 to operate in the "Clear Channel Mode" |
| 6 | Tx Overhead Extracted Data Input | R/W | 0 | 0: Transmit Payload Data Interface does not accept overhead bits via the "TxSerData" input pin 1: Transmit Payload Data Input Interface block accepts overhead bits via the "TxSerData" input pin. NOTE: This register is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |
| 5 | Unused | RO | 0 | |
| 4 | TEST CELL ENABLE/ PRBS ENABLE | R/W | 0 | If the XRT72L71 has been configured to operate in the ATM UNI Mode: 0: Disables the Test Cell Generator and Receiver 1: Enables the Test Cell Generator and Receiver. The test cell Generator will begin generating an inserting "Test Cell" into the "outbound" DS3 data stream. The Test Cell Receiver will begin to "look for" Test Cells, and acquire a PRBS pattern with the "payload bytes" of these test cells. If the XRT72L71 has been configured to operate in the "Clear Channel Framers" Mode: 0: Disables the PRBS Generator and Receiver 1: Enables the PRBS Generator and Receiver. The PRBS Generator will begin to insert a "PRBS" pattern into the "outbound" DS3 data stream. The PRBS Receiver will begin to "look" for this PRBS pattern and acquire "PRBS Lock" |
| 3 | Reserved | R/W | 0 | This bit-field is unused |
| 2 | ONE-SHOT TEST | R/W | 0 | 0: Continuous Mode - Test cells are generated as long as the "TEST CELL ENABLE" bit is high 1: Burst Mode - 0 to 1 transition in the "TEST CELL ENABLE" bit results in the generation of 1024 test cells. NOTE: This register is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |
| 1 | ONE SHOT DONE | RO | 0 | 0: Test Cell Generator is currently generating its burst of 1024 Test Cells. 1: Test Cell Generator has completed generating its "latest" burst of 1024 Test Cells. This bit-field is reset when a new cycle is begun by a 0 to 1 transition within the "TEST CELL ENABLE" bit-field. NOTE: This bit-field is only active if both of the following conditions are true. 1. The XRT72L71 has been configured to operate in the "ATM UNI Mode" 2. The Test Cell Generator/Receiver has been configured to operate in the "Burst" Mode. |
| 0 | PRBS LOCK | RO | 0 | 0: The Test Cell Receiver (for "ATM UNI" Applications" or the PRBS Receiver (for "Clear-Channel Framers" applications) has not yet acquired "Pattern Lock" with the "PRBS" data being generated by the Test Cell Generator/PRBS Generator. 1: The Test Cell Receiver/PRBS Receiver has been able to acquire Pattern Lock with the PRBS data being generated by the Test Cell Generator. NOTE: Once the Test Cell Receiver/PRBS Receiver has acquired PRBS Lock, then it will begin to record "Pattern Bit Error" events within the Test Cell Error Count (or PRBS Error Count) Registers. |

TABLE 15: RX DS3 CONFIGURATION AND STATUS REGISTER

REGISTER 14

RX DS3 CONFIGURATION AND STATUS REGISTER

HEX ADDRESS: 0X0E

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------|------|---------|--|
| 7 | Rx AIS | RO | 0 | Receive AIS Alarm Indicator: 0: Indicates that the Receive DS3 Framer block is NOT detecting the "AIS" (Alarm Indication Signal) pattern, within the inbound DS3 data stream. 1: Indicates that the Receive DS3 Framer block is currently detecting the "AIS" pattern within the "inbound" DS3 data stream. |
| 6 | Rx LOS | RO | 0 | Receive LOS Alarm Indicator: 0: Indicates that the Receive DS3 Framer block is NOT currently declaring an LOS (Loss of Signal) condition. 1: Indicates that the Receive DS3 Framer block is currently declaring an LOS (Loss of Signal) condition. |
| 5 | Rx Idle | RO | 0 | Receive Idle Pattern Indicator: 0: Indicates that the Receive DS3 Framer block is NOT currently detecting the "Idle" pattern, within the inbound DS3 data stream. 1: Indicates that the Receive DS3 Framer block is currently detecting the "Idle" pattern within the inbound DS3 data stream. |
| 4 | Rx OOF | RO | 1 | Receive OOF (Out of Frame) Alarm Indicator: 0: Indicates that the Receive DS3 Framer block is NOT currently declaring the "OOF (Out of Frame) condition. 1: Indicates that the Receive DS3 Framer block is currently declaring the "OOF" (Out of Frame) condition. |
| 3 | Internal LOS Disable | R/W | 0 | 0: On chip LOS detector is disabled. The XRT72L71 will only declare LOS (Loss of Signal) if the "RLOS" input pin is pulled "high". 1: On chip LOS detector is enabled. The XRT72L71 will declare and clear LOS based upon the absence of a certain number of pulses in the incoming DS3 data stream. |
| 2 | Framing On Parity | R/W | 0 | Framing On-Parity (In-Frame Declaration Criteria): 0: Receive DS3 Framer block declares the "Inframe" condition after "F-bit" and "M-bit synchronization" have been achieved. P-bit checking is not a part of "Frame Acquisition" process. 1: Receive DS3 Framer block declares the "Inframe" condition after "F-bit" and "M-bit synchronization" process. Additionally, the Receive DS3 Framer block must also detect valid (e.g., un-erred) P-bits. |
| 1 | Fsync Algo | R/W | 0 | 0: OOF (Receive Out of Frame) condition is declared when 6 out of 16 consecutive F bits are in error 1: OOF (Receive Out of Frame) condition is declared when 3 out of 16 consecutive F bits are in error |
| 0 | Msync Algo | R/W | 0 | 0: M-bit errors do not result in declaration of OOF 1: OOF is declared when M-bits in 3 out of 4 frames are in error. |

TABLE 18: Rx DS3 INTERRUPT STATUS REGISTER

REGISTER 17 Rx DS3 INTERRUPT STATUS REGISTER HEX ADDRESS: 0x11

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-------------------------------|------|---------|--|
| 7 | CP bit Error Interrupt Status | RUR | 0 | 0: No CP-bit errors have been detected since the last read of this register. 1: Indicates that at least one CP-bit error was detected since the last time this register was read. |
| 6 | LOS Interrupt Status | RUR | 0 | 0: LOS condition has NOT changed since the last read of this register. 1: LOS condition has changed since the last read of this register. |
| 5 | AIS Interrupt Status | RUR | 0 | 0: AIS condition has NOT changed since the last read of this register. 1: AIS condition has changed since the last read of this register. |
| 4 | Idle Interrupt Status | RUR | 0 | 0: Idle Condition has NOT changed since the last read of this register. 1: Idle Condition has changed since the last read of this register. |
| 3 | FERF Interrupt Status | RUR | 0 | 0: FERF Condition has NOT changed since the last read of this register. 1: FERF Condition has changed since the last read of this register. |
| 2 | AIC Interrupt Status | RUR | 0 | 0: AIC State has NOT changed since the last read of this register. 1: Validated AIC has changed since the last read of this register. |
| 1 | OOF Interrupt Status | RUR | 0 | 0: OOF condition has NOT changed since the last read of this register. 1: OOF status has changed since the last read of this register. |
| 0 | P-Bit Error Interrupt Status | RUR | 0 | 0: No P-bit Errors have been detected since the last read of this register. 1: Indicates that at least one P-bit error was detected since the last time this register was read. |

TABLE 19: Rx DS3 FEAC REGISTER

REGISTER 18 Rx DS3 FEAC REGISTER HEX ADDRESS: 0x12

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------|------|---------|---|
| 7 | Unused | RO | 0 | RxFEAC[5:0] contains the most recently validated receive FEAC code word. NOTE: These bit-fields are only active if the XRT72L71 is configured to support the "C-bit Parity" Framing Forma |
| 6 | RxFEAC(0) | RO | 1 | |
| 5 | RxFEAC(1) | RO | 1 | |
| 4 | RxFEAC(2) | RO | 1 | |
| 3 | RxFEAC(3) | RO | 1 | |
| 2 | RxFEAC(4) | RO | 1 | |
| 1 | RxFEAC(5) | RO | 1 | |
| 0 | Unused | RO | 0 | |

TABLE 20: Rx DS3 FEAC INTERRUPT ENABLE/STATUS REGISTER

REGISTER 19

Rx DS3 FEAC INTERRUPT ENABLE/STATUS REGISTER

HEX ADDRESS: 0x13

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---------------------------------|------|---------|--|
| 7-5 | Unused | RO | 0 | |
| 4 | FEAC Valid | RO | 0 | 0: Received FEAC code (residing in "RxFEAC[5:0]") has been "removed". 1: Received FEAC code (residing in "RxFEAC[5:0]") has been "validated". NOTE: This bit-field is only valid if the XRT72L71 is configured to support the "C-bit Parity" Framing Format. |
| 3 | Rx FEAC Remove Interrupt Enable | R/W | 0 | 0: RxFEAC Removal Interrupt is disabled. 1: Generates an interrupt upon removal of previously validated FEAC code is enabled NOTE: This bit-field is only valid if the XRT72L71 is configured to support the "C-bit Parity" Framing Format. |
| 2 | Rx FEAC Remove Interrupt Status | RUR | 0 | 0: Indicates that no received FEAC Messages have been removed since the last read of this register. 1: Indicates that a received FEAC Message has been removed since the last read of this register. NOTE: This bit-field is only valid if the XRT72L71 is configured to support the "C-bit Parity" Framing Format. |
| 1 | Rx FEAC Valid Interrupt Enable | R/W | 0 | 0: RxFEAC Validation Interrupt is disabled. 1: Generates an interrupt upon validation of a newly received FEAC message. NOTE: This bit-field is only valid if the XRT72L71 is configured to support the "C-bit Parity" Framing Format. |
| 0 | Rx FEAC Valid Interrupt Status | RUR | 0 | 0: Indicates that no received FEAC Messages have been validated since the last read of this register. 1: Indicates that a newly received FEAC Message has been validated since the last read of this register. NOTE: This bit-field is only valid if the XRT72L71 is configured to support the "C-bit Parity" Framing Format. |

TABLE 21: Rx DS3 LAPD CONTROL REGISTER

REGISTER 20

Rx DS3 LAPD CONTROL REGISTER

HEX ADDRESS: 0x13

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|--------------------------|------------|---------|--|
| 7 | Enable 5 F(4) | R/W | 1 | 0: Particular frame f-bit search block disabled 1: Particular frame f-bit search block enabled Each bit is an "Enable" to five f0bit framer parallel search blocks |
| 6 | Enable 5 F(3) | R/W | 1 | |
| 5 | Enable 5 F(2) | R/W | 1 | |
| 4 | Enable 5 F(1) | R/W | 1 | |
| 3 | Enable 5 F(0) | R/W | 1 | |
| 2 | Rx LAPD Enable | R/W | 0 | 0: Disables the LAPD Receiver 1: Enables the LAPD Receiver NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing Format. |
| 1 | Rx LAPD Interrupt Enable | R/W | 0 | 0: Receive LAPD Interrupt is disabled. 1: Generates interrupt anytime the LAPD Receiver receives a new LAPD (PMDL) Message. NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing Format. |
| 0 | Rx LAPD Interrupt Status | RUR/ WO | 0 | 0: A new LAPD Message has NOT been received (by the LAPD Receiver) since the last read of this register. 1: A new LAPD Message has been received (by the LAPD Receiver) since the last read of this register. NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing Format. |

TABLE 22: Rx DS3 LAPD STATUS REGISTER

REGISTER 21

Rx DS3 LAPD STATUS REGISTER

HEX ADDRESS: 0x15

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-------------------|------|---------|---|
| 7 | Unused | RO | 0 | |
| 6 | Rx ABORT | RO | 0 | 0: Indicates that the LAPD Receiver is NOT currently receiving an ABORT Message. 1: Indicates that the LAPD Receiver is currently receiving an ABORT Message. NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing format. |
| 5 | Rx LAPD Type(0) | RO | 0 | 00: LAPD Message is Test Signal Identification type. (RAM Depth is 76 bytes (38 words)) |
| 4 | Rx LAPD Type(1) | RO | 0 | 01: LAPD Message is Idle Signal Identification type. (RAM Depth is 76 bytes (38 words)) 10: LAPD Message is CL Path Identification type. (RAM Depth is 76 bytes (38 words)) 11: LAPD Message is ITU-T Path Identification type. (RAM Depth is 82 bytes (41 words)) NOTE: These two bit-fields are only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing Format. |
| 3 | Rx CR Type | RO | 0 | 0: Received LAPD message originated from customer installation 1: Received LAPD message originated from terminal in the network NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing Format. |
| 2 | Rx FCS Error | RO | 0 | 0: CRC-16 Error was NOT detected within the most recently received LAPD Message. 1: CRC-16 Error was detected within the most recently received LAPD Message. NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing Format. |
| 1 | Rx End of Message | RO | 0 | 0: Indicates that either the "Receive LAPD Message" Buffer is empty, or that the LAPD Receiver is currently receiving a LAPD Message. 1: Indicates that a full LAPD Message has been received by the LAPD Receiver and that this message is residing within the "Receive LAPD Message" Buffer. NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing Format. |
| 0 | Flag Present | RO | 0 | 0: Indicates that the LAPD Receiver is NOT currently receiving the "Flag Sequence", within the LAPD Channel. 1: Indicates that the LAPD Receiver is currently receiving the "Flag Sequence" within the LAPD Channel. NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing Format. |

TABLE 23: Tx DS3 CONFIGURATION REGISTER

REGISTER 22

Tx DS3 CONFIGURATION REGISTER

HEX ADDRESS: 0x16

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------|------|---------|---|
| 7 | Tx Yellow Alarm | R/W | 0 | 0: X-bits are transmitted as conditions (detected by the "Receive DS3 Framer" block) dictate. 1: All X-bits (within each "outbound" DS3 frame) are set to "0" (forced insertion of Yellow Alarm) NOTE: This bit-field is ignored when the "TxIdle", the "TxAIS" or the "TxLOS" bits are set. |
| 6 | Tx XBit | R/W | 0 | 0: X-bits are transmitted as conditions (detected by the "Receive DS3 Framer" block) dictate. 1: All X-bits (within each "outbound" DS3 frame) are forced to "1". NOTE: This bit-field is ignored when the "TxIdle", the "TxAIS" or the "TxLOS" bits are set. |
| 5 | Tx Idle | R/W | 0 | 0: The Idle pattern is NOT transmitted into the "outbound" DS3 data stream. 1: The Idle pattern is transmitted into the "outbound" DS3 data stream. NOTE: This bit-field is ignored when the "TxAIS" or the "TxLOS" bits are set. |
| 4 | Tx AIS | R/W | 0 | 0: The "AIS" pattern is NOT transmitted into the "outbound" DS3 data stream. 1: The "AIS" pattern is transmitted into the "outbound" DS3 data stream. NOTE: This bit-field is ignored when the "TxLOS" bit is set. |
| 3 | Tx LOS | R/W | 0 | 0: The "All Zeros" pattern is NOT transmitted into the "outbound" DS3 data stream. 1: The "LOS" (e.g., "All Zeros") pattern is transmitted into the "outbound" DS3 data stream. |
| 2 | FERF on LOS | R/W | 1 | 0: FERF (Far-End Receive Failure) is NOT transmitted whenever the Receive DS3 Framer block declares an LOS (Loss of Signal) condition. 1: FERF is transmitted whenever the Receive DS3 Framer block declares an LOS condition. |
| 1 | FERF on OOF | R/W | 1 | 0: FERF (Far-End Receive Failure) is NOT transmitted whenever the Receive DS3 Framer block declares an OOF (Out of Frame) condition. 1: FERF is transmitted whenever the Receive DS3 Framer block declares an OOF condition. |
| 0 | FERF on AIS | R/W | 1 | 0: FERF is NOT transmitted whenever the Receive DS3 Framer block detects an AIS pattern in the "inbound" DS3 data stream. 1: FERF is transmitted whenever the Receive DS3 Framer block detects the AIS pattern in the "inbound" DS3 data stream. |

TABLE 24: Tx DS3 M-BIT MASK REGISTER

REGISTER 23

Tx DS3 M-BIT MASK REGISTER

HEX ADDRESS: 0x17

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------|------|---------|---|
| 7 | Tx FEBE Dat(2) | R/W | 0 | The Transmit DS3 Framer block will transmit the value "TxFEBEDat[2:0]" within the "FEBE" bit-fields, if the "FEBE Register Enable" bit-field is set to "1". NOTE: This bit-field is only active if the XRT72L71 is configured to support the "C-bit Parity" Framing Format. |
| 6 | Tx FEBE Dat(1) | R/W | 0 | |
| 5 | Tx FEBE Dat(0) | R/W | 0 | |
| 4 | FEBE Register Enable | R/W | 0 | 0: FEBE bits, for transmission, are internally generated based on conditions, as detected by the Receive DS3 Framer block. 1: Transmit FEBE bits are taken from the TxFEBEDat [2:0] register bits NOTE: This bit-field is only active if the XRT72L71 is configured to support the "C-bit Parity" Framing Format. |
| 3 | Mbit Mask(2) | R/W | 0 | The Transmit DS3 Framer block performs an XOR operation of the MBitMask bits with the corresponding "M" bit, within each outbound DS3 frame. MBitMask(2) corresponds to first M-Bit (M0) in DS3 frame, MBitMask(1) corresponds to second M-Bit (M1) in DS3 frame, MBitMask(0) corresponds to last M-Bit (M0) in DS3 frame NOTES: 1. Setting any of these bit-fields to "1", will cause an "erred" M-bit to be transmitted onto the line. 2. For normal operation, the user should set each of these bit-fields to "0". |
| 2 | Mbit Mask(1) | R/W | 0 | |
| 1 | Mbit Mask(0) | R/W | 0 | |
| 0 | TxError PBit | R/W | 0 | 0: P Bits are calculated from input payload and inserted into the P-bit fields. 1: Calculated P Bits are inverted before transmission (thereby creating a "P-Bit" Error). NOTE: For normal operation, set this bit-field to "0". |

TABLE 25: TX DS3 F-BIT MASK1 REGISTER

REGISTER 24

Tx DS3 F-BIT MASK1 REGISTER

HEX ADDRESS: 0x18

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------|------|---------|---|
| 7-4 | Unused | RO | 0 | |
| 3 | F-bit Mask (27) | R/W | 0 | The Transmit DS3 Framer block performs an XOR operation of the F-Bit Mask bits, with the corresponding "F" bits, within each outbound DS3 frame. FBitMask(0) corresponds to first F-Bit (F1) in the DS3 frame, FBitMask (1) corresponds to 2nd F-Bit (F0) in the DS3 frame,...FBitMask(27) corresponds to the last F-Bit of the M-Frame. NOTES: 1. Setting any of these bit-fields to "1" will cause an "erred" F-bit to be transmitted onto the line. 2. For normal operation, the user should set each of these bit-fields to "0". |
| 2 | F-bit Mask (26) | R/W | 0 | |
| 1 | F-bit Mask (25) | R/W | 0 | |
| 0 | F-bit Mask (24) | R/W | 0 | |

TABLE 26: Tx DS3 F-BIT MASK2 REGISTER

REGISTER 25 Tx DS3 F-BIT MASK2 REGISTER HEX ADDRESS: 0x19

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------|------|---------|---|
| 7 | F-bit Mask (23) | R/W | 0 | <p>The Transmit DS3 Framer block performs an XOR operation of the F-Bit Mask bits, with the corresponding "F" bits, within each outbound DS3 frame. FBitMask(0) corresponds to first F-Bit (F1) is the DS3 frame, FBitMask (1) corresponds to 2nd F-Bit (F0)in the DS3 frame,...FBitMask(27) corresponds to the last F-Bit of the M-Frame.</p> <p>NOTES:</p> <ol style="list-style-type: none"> Setting any of these bit-fields to "1" will cause an "erred" F-bit to be transmitted onto the line. For normal operation, set each of these bit-fields to "0". |
| 6 | F-bit Mask (22) | R/W | 0 | |
| 5 | F-bit Mask (21) | R/W | 0 | |
| 4 | F-bit Mask (20) | R/W | 0 | |
| 3 | F-bit Mask (19) | R/W | 0 | |
| 2 | F-bit Mask (18) | R/W | 0 | |
| 1 | F-bit Mask (17) | R/W | 0 | |
| 0 | F-bit Mask (16) | R/W | 0 | |

TABLE 27: TX DS3 F-BIT MASK3 REGISTER

REGISTER 26 Tx DS3 F-BIT MASK3 REGISTER HEX ADDRESS: 0x1A

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------|------|---------|---|
| 7 | F-bit Mask (15) | R/W | 0 | <p>The Transmit DS3 Framer block performs an XOR operation of the FBitMask bits, with the corresponding "F" bits, within each outbound DS3 frame. FBitMask(0) corresponds to first F-Bit (F1) is the DS3 frame, FBitMask (1) corresponds to 2nd F-Bit (F0)in the DS3 frame,...FBitMask(27) corresponds to the last F-Bit of the M-Frame.</p> <p>NOTES:</p> <ol style="list-style-type: none"> Setting any of these bit-fields to "1" will cause an "erred" F-bit to be transmitted onto the line. For normal operation, set each of these bit-fields to "0". |
| 6 | F-bit Mask (14) | R/W | 0 | |
| 5 | F-bit Mask (13) | R/W | 0 | |
| 4 | F-bit Mask (12) | R/W | 0 | |
| 3 | F-bit Mask (11) | R/W | 0 | |
| 2 | F-bit Mask (10) | R/W | 0 | |
| 1 | F-bit Mask (9) | R/W | 0 | |
| 0 | F-bit Mask (8) | R/W | 0 | |

TABLE 28: Tx DS3 F-BIT MASK4 REGISTER

REGISTER 27 Tx DS3 F-BIT MASK4 REGISTER HEX ADDRESS: 0x1B

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------|------|---------|---|
| 7 | F-bit Mask (7) | R/W | 0 | <p>The Transmit DS3 Framer block performs an XOR operation of the FBitMask bits, with the corresponding "F" bits, within each outbound DS3 frame. FBitMask(0) corresponds to first F-Bit (F1) is the DS3 frame, FBitMask (1) corresponds to 2nd F-Bit (F0)in the DS3 frame,...FBitMask(27) corresponds to the last F-Bit of the M-Frame.</p> <p>NOTES:</p> <ol style="list-style-type: none"> Setting any of these bit-fields to "1" will cause an "erred" F-bit to be transmitted onto the line. For normal operation, set each of these bit-fields to "0". |
| 6 | F-bit Mask (6) | R/W | 0 | |
| 5 | F-bit Mask (5) | R/W | 0 | |
| 4 | F-bit Mask (4) | R/W | 0 | |
| 3 | F-bit Mask (3) | R/W | 0 | |
| 2 | F-bit Mask (2) | R/W | 0 | |
| 1 | F-bit Mask (1) | R/W | 0 | |
| 0 | F-bit Mask (0) | R/W | 0 | |

TABLE 31: Tx DS3 LAPD CONFIGURATION REGISTER

REGISTER 30

Tx DS3 LAPD CONFIGURATION REGISTER

HEX ADDRESS: 0x1E

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------|------|---------|---|
| 7-5 | Unused | RO | 0 | |
| 4 | Reserved | R/W | 0 | Set bit to 0 |
| 3 | Auto Retransmit | R/W | 1 | 0: LAPD Transmitter will NOT automatically transmit a given PMDL (or LAPD Message) repeatedly at one second intervals. 1: LAPD Transmitter will transmit a given PMDL (or LAPD Message) repeatedly at one second intervals. NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing format. |
| 2 | Tx LAPD Type(1) | R/W | 0 | 00: LAPD message RAM Depth is 76 bytes (38 words) 01: LAPD message RAM Depth is 76 bytes (38 words) 10: LAPD message RAM Depth is 76 bytes (38 words) 11: LAPD message RAM Depth is 82 bytes (41 words) |
| 1 | Tx LAPD Type(0) | R/W | 0 | NOTE: These bit-fields are only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing Format. |
| 0 | Tx LAPD Enable | R/W | 0 | 0: LAPD Transmitter is Disabled. The Transmit DS3 Framer block will set each "outbound" DL bit-field to "1". 1: LAPD Transmitter is Enabled. The LAPD Transmitter will begin to transmit the Flag Sequence octet (0x7E), until a "Transmit LAPD Message" command has been invoked. NOTE: This bit-field is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing format. |

TABLE 35: PMON FRAMING BIT ERROR EVENT COUNT REGISTER - MSB

REGISTER 34 PMON FRAMING BIT ERROR EVENT COUNT REGISTER - MSB HEX ADDRESS: 0x22

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------------------|------|---------|---|
| 7-0 | F Bit Error Count High-byte | RUR | 0x00 | This "Reset-upon-Read" register, along with "PMON Framing Bit Error Count Register - LSB" contains the 16 bit value for the total number of Framing Bit (e.g., both F and M-bit) errors that have been detected since the last read of this register. This register contains the "High" byte value of this 16-bit expression. |

TABLE 36: PMON FRAMING BIT ERROR EVENT COUNT REGISTER - LSB

REGISTER 35 PMON FRAMING BIT ERROR EVENT COUNT REGISTER - LSB HEX ADDRESS: 0x23

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------|------|---------|--|
| 7-0 | F Bit Error Count low-byte | RUR | 0x00 | This "Reset-upon-Read" register, along with "PMON Framing Bit Error Count Register - MSB" contains the 16 bit value for the total number of Framing Bit (e.g., both F and M-bit) errors that have been detected since the last read of this register. This register contains the "Low" byte value of this 16-bit expression. |

TABLE 37: PMON P-BIT ERROR COUNT REGISTER - MSB

REGISTER 36 PMON P-BIT ERROR COUNT REGISTER - MSB HEX ADDRESS: 0x24

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------------------|------|---------|--|
| 7-0 | P-Bit Error Count High-byte | RUR | 0x00 | This "Reset-upon-Read" register, along with "PMON P-Bit Error Count Register - LSB" contains the 16 bit value for the total number of P Bit errors that have been detected since the last read of this register. This register contains the "High" byte value of this 16-bit expression. |

TABLE 38: PMON P-BIT ERROR COUNT REGISTER - LSB

REGISTER 37 PMON P-BIT ERROR COUNT REGISTER - LSB HEX ADDRESS: 0x25

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------|------|---------|---|
| 7-0 | P-Bit Error Count Low-byte | RUR | 0x00 | This "Reset-upon-Read" register, along with "PMON P-Bit Error Count Register - MSB" contains the 16 bit value for the total number of P Bit errors that have been detected since the last read of this register. This register contains the "Low" byte value of this 16-bit expression. |

TABLE 39: PMON FEBE EVENT COUNT REGISTER - MSB

REGISTER 38 PMON FEBE EVENT COUNT REGISTER - MSB HEX ADDRESS: 0x26

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------|------|---------|---|
| 7-0 | FEBE Event Count High-byte | RUR | 0x00 | This "Reset-upon-Read" register, along with "PMON FEBE Event Count Register - LSB" contains the 16 bit value for the total number of FEBE events that have been detected since the last read of this register. This register contains the "High" byte value of this 16-bit expression. NOTE: This register is only active if the XRT72L71 has been configured to support the "C-bit Parity" Framing format. |

TABLE 60: PMON TRANSMIT VALID CELL COUNT - LSB

REGISTER 59 **PMON TRANSMIT VALID CELL COUNT - LSB** **HEX ADDRESS: 0x3B**

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|------------------------------|------|---------|---|
| 7-0 | Tx Valid Cell Count Low-byte | RUR | 0x00 | This Reset-upon-Read register, along with PMON Transmit Valid Cell Count - MSB contains the 16 bit value for the total number of Valid cells that have been transmitted by the Transmit Cell Processor, since the last read of this register. This register contains the "Low" byte value of this 16-bit expression. NOTE: This register is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |

TABLE 61: PMON HOLDING REGISTER

REGISTER 60 **PMON HOLDING REGISTER** **HEX ADDRESS: 0x3C**

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------|------|---------|--|
| 7-0 | PMON Hold Value | RO | 0x00 | If the Bi-directional data bus (of the Microprocessor Interface) is configured to be "8-bits" wide; then this register holds the companion byte of any 16-bit PMON Count registers, 1-sec Accumulator registers, or the Test Cell Error Accumulator register, when one of these registers are read, during the previous Bus cycle. |

TABLE 62: ONE SECOND ERROR STATUS REGISTER

REGISTER 61 **ONE SECOND ERROR STATUS REGISTER** **HEX ADDRESS: 0x3D**

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------------|------|---------|--|
| 7-2 | Unused | RO | 0 | |
| 1 | Errored Second | RO | 0 | 0: No errors were detected during last one second accumulation interval 1: At least one error was detected during last one second accumulation interval |
| 0 | Severe Errored Second | RO | 0 | 0: Error rate did not exceed 1 in 10,000 in last one second interval 1: Error rate in last one second interval was greater than 1 in 10,000 |

TABLE 63: LCV - ONE SECOND ACCUMULATOR REGISTER - MSB

REGISTER 62 **LCV - ONE SECOND ACCUMULATOR REGISTER - MSB** **HEX ADDRESS: 0x3E**

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|--------------------|------|---------|--|
| 7-0 | LCV 1Sec High-byte | RO | 0x00 | This "Read-Only" register, along with "LCV - One Second Accumulator Register - LSB" contains a 16 bit value of the total number of Line Code Violations that have been detected within the last "one-second" accumulation interval. This register contains the "High" byte value of this expression. |

TABLE 69: RX PLCP CONFIGURATION/STATUS REGISTER

REGISTER 68 **RX PLCP CONFIGURATION/STATUS REGISTER** **HEX ADDRESS: 0x44**

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-------------------|------|---------|---|
| 7-4 | Unused | RO | 0 | |
| 3 | PLCP Reframe | R/W | 0 | 0 to 1 transition commands the Receive PLCP Processor block to transition into the "FA1" and "FA2" octet search state, and to reacquire PLCP Frame synchronization. NOTE: This bit-field is only active if the XRT72L71 is operating in both the "ATM UNI" and the "PLCP" Modes. |
| 2 | POOF Status | RO | 1 | 0: Indicates that the Receive PLCP Processor block is NOT currently declaring an "Out of Frame" condition 1: Indicates that the Receive PLCP Processor block is currently declaring an "Out of Frame" condition. NOTE: This bit-field is only active if the XRT72L71 is operating in both the "ATM UNI" and the "PLCP" Modes. |
| 1 | PLOF Status | RO | 1 | 0: Indicates that the Receive PLCP Processor block is NOT currently declaring a "Loss of Frame" condition. 1: Indicates that the Receive PLCP Processor block is currently declaring a "Loss of Frame" condition. NOTE: This bit-field is only active if the XRT72L71 is operating in both the "ATM UNI" and the "PLCP" Modes. |
| 0 | PLCP Yellow Alarm | RO | 0 | 0: Indicates that the Receive PLCP Processor is currently declaring a "Yellow Alarm" condition. 1: Indicates that the Receive PLCP Processor is NOT currently declaring a "Yellow Alarm" condition. NOTE: This bit-field is only active if the XRT72L71 is operating in both the "ATM UNI" and the "PLCP" Modes. |

TABLE 70: RX PLCP INTERRUPT ENABLE REGISTER

REGISTER 69 **RX PLCP INTERRUPT ENABLE REGISTER** **HEX ADDRESS: 0x45**

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------------|------|---------|--|
| 7-2 | Unused | RO | 0 | |
| 1 | POOF Interrupt Enable | R/W | 0 | 0: The "Change in PLCP OOF Condition" Interrupt is disabled. 1: The "Change in PLCP OOF Condition" Interrupt is enabled. NOTE: This bit-field is only active if the XRT72L71 is operating in both the "ATM UNI" and the "PLCP" Modes. |
| 0 | PLOF Interrupt Enable | R/W | 0 | 0: The "Change in PLCP LOF Condition" Interrupt is disabled. 1: The "Change in PLCP LOF Condition" Interrupt is enabled. NOTE: This bit-field is only active if the XRT72L71 is operating in both the "ATM UNI" and the "PLCP" Mode. |

TABLE 75: TX PLCP BIP-8 ERROR MASK

REGISTER 74

TX PLCP BIP-8 ERROR MASK

HEX ADDRESS: 0X4A

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---------------|------|---------|--|
| 7-0 | B1 Error Mask | R/W | 0x00 | <p>The Transmit PLCP Processor block always XORs contents of this register with the contents of the B1 byte (within a PLCP frame). This "XORed" value is then written back into the "B1" byte field, within each "outbound" PLCP Frame; prior to transmission. Setting any of these bit-fields to "1" introduces error in that specific bit, within each "outbound" B1 byte. Register must be set to 0x00 for normal operation.</p> <p>NOTE: This bit-field is only active if the XRT72L71 is operating in both the "ATM UNI" and the "PLCP" Modes.</p> |

TABLE 76: TX PLCP G1 BYTE REGISTER

REGISTER 75

TX PLCP G1 BYTE REGISTER

HEX ADDRESS: 0X4B

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-------------------------|------|---------|--|
| 7-5 | Unused | RO | 0 | |
| 4 | Tx PLCP FEBE Mask | R/W | 0 | <p>0: FEBE Count is transmitted, based upon B1 Byte Error conditions, as detected by the Receive PLCP Processor. 1: FEBE is transmitted as 0000</p> <p>NOTE: This bit-field is only active if the XRT72L71 is operating in both the "ATM UNI" and the "PLCP" Modes.</p> |
| 3 | Force PLCP Yellow Alarm | R/W | 0 | <p>0: PLCP Yellow Alarm generated from Receive PLCP Processor. 1: PLCP Yellow Alarm is Forced.</p> <p>NOTE: This bit-field is only active if the XRT72L71 is operating in both the "ATM UNI" and the "PLCP" Modes.</p> |
| 2 | LSS(2) | R/W | 0 | Link Status Signal may be programmed by user |
| 1 | LSS(1) | R/W | 0 | |
| 0 | LSS(0) | R/W | 0 | |

TABLE 77: Rx CP CONFIGURATION REGISTER

REGISTER 76

Rx CP CONFIGURATION REGISTER

HEX ADDRESS: 0x4C

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---------------------|------|---------|---|
| 7 | Rx LCD | RO | 1 | 0: Indicates that the Receive Cell Processor currently has cell delineation within the incoming stream of ATM cells. 1: Indicates that the Receive Cell Processor is currently declaring a "Loss of Cell Delineation". NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 6 | RDP Chk Pat | R/W | 0 | 0: Receive Cell Processor will insert an alternating "Data Path Integrity Check" value of 0x55 and 0xAA into the 5th octet position of each cell, written into the RxFIFO 1: Receive Cell Processor will insert a fixed "Data Path Integrity Check" value of 0x55 into the 5th octet position of each cell, written into the RxFIFO. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 5 | RDP Chk Pat En | R/W | 0 | 0: "Data Path Integrity Check" value is not written into ATM cells. ATM cells (with their received HEC byte value) are passed on into RxFIFO without modification. 1: "Data Path Integrity Check" value of 0x55 and 0xAA into the 5th octet position of each cell, is written into each ATM cell, which is routed to the "RxFIFO". NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 4 | IC Discard | R/W | 1 | 0: Idle cells are NOT discarded by the Receive Cell Processor block 1: Idle cells are automatically discarded by the Receive Cell Processor block. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 3 | SegOAM Pass Through | R/W | 1 | 0: Segment-Type OAM cells are not written into RxFIFO. 1: Segment-Type OAM cells are passed to receiver FIFO NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 2 | De-Scramble Enable | R/W | 1 | 0: Disables cell payload de-scrambling 1: Enables cell payload de-scrambling NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 1 | Rx Coset Enable | R/W | 1 | 0: Coset polynomial is not added to the HEC byte of each "incoming" ATM cell. 1: Coset polynomial is added to HEC byte of each "incoming" ATM Cell. The Receive Cell Processor needs to account for the Coset polynomial during HEC byte verification. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 0 | HEC Error Ignore | R/W | 0 | 0: Discards/drops cells with HEC byte errors. 1: Retains cells with HEC byte errors, for further processing. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |

TABLE 78: Rx CP ADDITIONAL CONFIGURATION REGISTER

REGISTER 77

Rx CP ADDITIONAL CONFIGURATION REGISTER

HEX ADDRESS: 0x4D

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|--------------------------|------|---------|--|
| 7 | Rx OAM FIFO Enable | R/W | 0 | 0: The Receive OAM Cell Buffer functions as one cell (54 byte) buffer 1: The Receive OAM Cell Buffer functions as two-54-byte buffers. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 6 | Rx CRC10 Enable | R/W | 0 | 0: CRC-10 Verification is NOT performed on received OAM cells. 1: CRC-10 Verification is performed on received OAM cells. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 5 | User Cell Filter Discard | R/W | 0 | 0: Incoming cells with header bytes matching the "User Cell Filtering" criteria are written to the Rx FIFO (all remaining cells are discarded). 1: Incoming cells with header bytes NOT matching the "User Cell Filtering" criteria are discarded (all remaining cells are written to Rx FIFO) NOTES: 1. This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. 2. This bit-field is only active if the "User Cell Filter" is enabled. |
| 4 | User Cell Filter Enable | R/W | 0 | 0: User cell filter is disabled. All user cells will be written to the Rx FIFO. 1: User cell filter is enabled. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 3 | Correction Thresh(1) | R/W | 1 | These two bits permit the user to specify the Correction Threshold that the Receive Cell Processor will use, during HEC Byte Verification. 00: Sets Correction Threshold to "0". 01: Sets Correction Threshold to "1". 10: Sets Correction Threshold to "3". 11: Sets Correction Threshold to "7". NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 2 | Correction Thresh(0) | R/W | 1 | |
| 1 | Correction Enable | R/W | 1 | 0: Disables header error correction. 1: Enables header error correction algorithm. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 0 | OAM Pass Through | R/W | 0 | 0: OAM cells are subject to the Idle Cell and User Cell Filtering criteria. 1: OAM cells are NOT subject to the Idle Cell and User Cell Filtering criteria. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |

TABLE 79: Rx CP INTERRUPT ENABLE REGISTER

REGISTER 78

Rx CP INTERRUPT ENABLE REGISTER

HEX ADDRESS: 0x4E

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------|------|---------|--|
| 7-3 | Unused | RO | 0 | |
| 2 | OAM Interrupt Enable | R/W | 0 | 0: "Receipt of OAM Cell" Interrupt is disabled. 1: "Receipt of OAM Cell" Interrupt is enabled. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 1 | LCD Interrupt Enable | R/W | 0 | 0: "Change in LCD (Loss of Cell Delineation) Condition" Interrupt is disabled. 1: "Change in LCD Condition" Interrupt is enabled. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 0 | HEC Error Interrupt Enable | R/W | 0 | 0: "Detection of HEC Byte Error" Interrupt is disabled. 1: "Detection of HEC Byte Error" Interrupt is enabled. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |

TABLE 80: Rx CP INTERRUPT STATUS REGISTER

REGISTER 79 Rx CP INTERRUPT STATUS REGISTER HEX ADDRESS: 0x4F

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---|--------|---------|--|
| 7 | OAM Buffer/FIFO Overflow | RUR | 0 | 0: Receive OAM Cell Buffer/FIFO has not experienced an "Overrun" event since the last read of this register. 1: Receive OAM Cell Buffer/FIFO has experienced an "Overrun" event since the last read of this register. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 6-3 | Unused | RO | 0 | |
| 2 | OAM Interrupt Status/ OAM Cell Pending | RUR/RO | 0 | OAM FIFO mode: 0: Indicates that the "Receive OAM Cell FIFO" is empty and does not contain any new OAM cell data. 1: Indicates that there at least one unread OAM cell exists within the "Receive OAM Cell FIFO". NOTE: If the "Receive OAM Cell" Buffer/FIFO is configured to operate in the "FIFO" Mode, then this bit-field is "Read-Only". OAM Buffer Mode: 0: Indicates that the "Receipt of OAM Cell" Interrupt has NOT occurred since the last read of this register. 1: Indicates that the "Receipt of OAM Cell" Interrupt has occurred since the last read of this register. |
| 1 | LCD Interrupt Status | RUR | 0 | 0: Indicates that the "Change in LCD Condition" interrupt has NOT occurred since the last read of this register. 1: Indicates that the "Change in LCD Condition" Interrupt has occurred since the last read of this register. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |
| 0 | HEC Byte Error Interrupt Status | RUR | 0 | 0: Indicates that the "Detection of HEC Byte" Error has NOT occurred since the last read of this register. 1: Indicates that the "Detection of HEC Byte" Error has occurred since the last read of this register. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |

TABLE 81: Rx CP IDLE CELL PATTERN HEADER BYTE-1

REGISTER 80 Rx CP IDLE CELL PATTERN HEADER BYTE-1 HEX ADDRESS: 0x50

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|------------------------|------|---------|--|
| 7-0 | Rx Idle Cell Pattern 1 | R/W | 0x00 | This register (along with the "Rx Idle Cell Mask 1" register) permits the user to specify the "Idle Cell Filtering" criteria for Header Byte 1. NOTES: 1. This register should be set to "0x00" when the Receive Cell Processor is receiving "ATM Forum" standard Idle Cells. 2. This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |

TABLE 85: RX CP IDLE CELL MASK HEADER BYTE-1

REGISTER 84

RX CP IDLE CELL MASK HEADER BYTE-1

HEX ADDRESS: 0x54

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---------------------|------|---------|--|
| 7-0 | Rx Idle Cell Mask 1 | R/W | 0xFF | <p>This register, along with the "Rx Idle Cell Pattern - 1" Register permits the user to define "Idle Cell Filtering" criteria for Header byte 1.</p> <p>Any "1" in this register, configures the Receive Cell Processor to make the comparison between the corresponding bit-field within Header byte 1 and the contents of the "Rx Idle Cell Pattern - 1" register.</p> <p>Any "0" in this register, configures the Receive Cell Processor to NOT perform this comparison:</p> <p>This register should be set to "0xFF" when the Receive Cell Processor is receiving the "ATM Forum" Standard Idle cells.</p> <p>NOTE: This register is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode.</p> |

TABLE 86: RX CP IDLE CELL MASK HEADER BYTE-2

REGISTER 85

RX CP IDLE CELL MASK HEADER BYTE-2

HEX ADDRESS: 0x55

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---------------------|------|---------|--|
| 7-0 | Rx Idle Cell Mask 2 | R/W | 0xFF | <p>This register, along with the "Rx Idle Cell Pattern - 2" Register permits the user to define "Idle Cell Filtering" criteria for Header byte 2.</p> <p>Any "1" in this register, configures the Receive Cell Processor to make the comparison between the corresponding bit-field within Header byte 2 and the contents of the "Rx Idle Cell Pattern - 2" register.</p> <p>Any "0" in this register, configures the Receive Cell Processor to NOT perform this comparison:</p> <p>This register should be set to "0xFF" when the Receive Cell Processor is receiving the "ATM Forum" Standard Idle cells.</p> <p>NOTE: This register is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode.</p> |

TABLE 90: RX CP USER CELL FILTER PATTERN HEADER BYTE-2

REGISTER 89 RX CP USER CELL FILTER PATTERN HEADER BYTE-2 HEX ADDRESS: 0x59

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|------------------------------|------|---------|---|
| 7-0 | RxUser Cell Filter Pattern 2 | R/W | 0x00 | This register (along with the "Rx User Cell Mask 2" register) permits the user to specify the "User Cell Filtering" criteria for Header Byte 2. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |

TABLE 91: RX CP USER CELL FILTER PATTERN HEADER BYTE-3

REGISTER 90 RX CP USER CELL FILTER PATTERN HEADER BYTE-3 HEX ADDRESS: 0x5A

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|------------------------------|------|---------|---|
| 7-0 | RxUser Cell Filter Pattern 3 | R/W | 0x00 | This register (along with the "Rx User Cell Mask 3" register) permits the user to specify the "User Cell Filtering" criteria for Header Byte 3. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |

TABLE 92: RX CP USER CELL FILTER PATTERN HEADER BYTE-4

REGISTER 91 RX CP USER CELL FILTER PATTERN HEADER BYTE-4 HEX ADDRESS: 0x5B

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|------------------------------|------|---------|---|
| 7-0 | RxUser Cell Filter Pattern 4 | R/W | 0x00 | This register (along with the "Rx User Cell Mask 4" register) permits the user to specify the "User Cell Filtering" criteria for Header Byte 4. NOTE: This bit-field is only active if the XRT72L71 is operating in the "ATM UNI" Mode. |

TABLE 93: RX CP USER CELL FILTER MASK HEADER BYTE-1

REGISTER 92 RX CP USER CELL FILTER MASK HEADER BYTE-1 HEX ADDRESS: 0x5C

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------|------|---------|--|
| 7-0 | Rx User Cell Filter Mask 1 | R/W | 0xFF | This register, along with the "Rx User Cell Pattern - 1" Register permits the user to define "User Cell Filtering" criteria for Header byte 1. Any "1" in this register, configures the Receive Cell Processor to make the comparison between the corresponding bit-field within Header byte 1 and the contents of the "Rx User Cell Pattern - 1" register. Any "0" in this register, configures the Receive Cell Processor to NOT perform this comparison: NOTE: This register is only active if the XRT72L71 has been configured to operate in the "ATM UNI" Mode. |

TABLE 94: RX CP USER FILTER CELL MASK HEADER BYTE-2

REGISTER 93 RX CP USER FILTER CELL MASK HEADER BYTE-2 HEX ADDRESS: 0X5D

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------|------|---------|---|
| 7-0 | Rx User Cell Filter Mask 2 | R/W | 0xFF | <p>This register, along with the “Rx User Cell Pattern - 2” Register permits the user to define “User Cell Filtering” criteria for Header byte 2.</p> <p>Any “1” in this register, configures the Receive Cell Processor to make the comparison between the corresponding bit-field within Header byte 2 and the contents of the “Rx User Cell Pattern - 2” register.</p> <p>Any “0” in this register, configures the Receive Cell Processor to NOT perform this comparison:</p> <p>NOTE: This register is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</p> |

TABLE 95: RX CP USER CELL FILTER MASK HEADER BYTE-3

REGISTER 94 RX CP USER CELL FILTER MASK HEADER BYTE-3 HEX ADDRESS: 0X5E

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------|------|---------|---|
| 7-0 | Rx User Cell Filter Mask 3 | R/W | 0xFF | <p>This register, along with the “Rx User Cell Pattern - 3” Register permits the user to define “User Cell Filtering” criteria for Header byte 3.</p> <p>Any “1” in this register, configures the Receive Cell Processor to make the comparison between the corresponding bit-field within Header byte 3 and the contents of the “Rx User Cell Pattern - 3” register.</p> <p>Any “0” in this register, configures the Receive Cell Processor to NOT perform this comparison:</p> <p>NOTE: This register is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</p> |

TABLE 96: RX CP USER CELL FILTER MASK HEADER BYTE-4

REGISTER 95 RX CP USER CELL FILTER MASK HEADER BYTE-4 HEX ADDRESS: 0X5F

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------------------------|------|---------|---|
| 7-0 | Rx User Cell Filter Mask 4 | R/W | 0xFF | <p>This register, along with the “Rx User Cell Pattern - 1” Register permits the user to define “User Cell Filtering” criteria for Header byte 1.</p> <p>Any “1” in this register, configures the Receive Cell Processor to make the comparison between the corresponding bit-field within Header byte 1 and the contents of the “Rx User Cell Pattern - 1” register.</p> <p>Any “0” in this register, configures the Receive Cell Processor to NOT perform this comparison:</p> <p>NOTE: This register is only active if the XRT72L71 has been configured to operate in the “ATM UNI” Mode.</p> |

TABLE 97: Tx CP CONTROL REGISTER

REGISTER 96

Tx CP CONTROL REGISTER

HEX ADDRESS: 0x60

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|------------------------------|------|---------|--|
| 7 | Scrambler Enable | R/W | 1 | 0: Disables scrambling of payload bits 1: Enables scrambling of payload bits |
| 6 | Coset Enable | R/W | 1 | 0: Disables addition of Coset Polynomial to HEC byte 1: Enables addition of Coset Polynomial to HEC byte |
| 5 | Valid Cell HEC Insert Enable | R/W | 1 | 0: HEC Byte Calculation and Insertion is disabled. Hence, no modification is performed on the 5th octet within each "outbound" valid ATM cell. 1: HEC Byte Calculation and Insertion are enabled. NOTES: 1. This register bit-field only applies to Valid (e.g., User and OAM) cells. 2. This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" mode. |
| 4 | TDP Check Pattern | R/W | 1 | 0: An Alternating 0x55/0xAA pattern is expected (as the "Data Path Integrity Check byte) in the fifth octet position, within each Valid cell that is processed by the Transmit Cell Processor. 1: A constant 0x55 pattern is expected (as the "Data Path Integrity Check" byte) in the fifth octet position, within each Valid cell that is processed by the Transmit Cell Processor. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 3 | GFC Insert Enable | R/W | 0 | 0: The "GFC Input Port" is disabled. 1: The "GFC Input Port" is enabled. Data is read via TxGFC serial input pin and is inserted into GFC nibble-field within of each "outbound" ATM cell. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 2 | TDP Error Interrupt Enable | R/w | 0 | 0: Disables the "Data Path Integrity Check" interrupt. 1: Enables the "Data Path Integrity Check" interrupt. |
| 1 | Idle Cell HEC Insert Enable | R/w | 1 | 0: HEC Byte Calculation and Insertion is disabled. Hence, no modification is performed on the 5th octet within each "outbound" Idle ATM cell. 1: HEC Byte Calculation and Insertion are enabled. NOTES: 1. This register bit-field only applies to Idle cells. 2. This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" mode. |
| 0 | TDP Error Interrupt Status | RUR | 0 | 0: Indicates that the "Data Path Integrity Check" Interrupt has not occurred since the last read of this register. 1: Indicates that the "Data Path Integrity Check" Interrupt has occurred since the last read of this register. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |

TABLE 107: UTOPIA CONFIGURATION REGISTER

REGISTER 106

UTOPIA CONFIGURATION REGISTER

HEX ADDRESS: 0x6A

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-------------------|------|---------|--|
| 7-6 | Unused | RO | 0 | |
| 5 | Handshake Mode | R/W | 0 | 0: Transmit and Receive UTOPIA Interface blocks operate in the Octet-Level handshake mode 1: Transmit and Receive UTOPIA Interfaces blocks operate in the Cell-Level handshake mode NOTE: This bit-field is ignore if the XRT72L71 is configured to operate in the "Clear-Channel Framers" Mode, or if the chip is configured to operate in the "Multi-PHY" Mode. |
| 4 | M PHY | R/W | 1 | 0: Transmit and Receive UTOPIA Interface block operates in the "Single-PHY" mode 1: Transmit and Receive UTOPIA Interface block operates in the "Multi-PHY" mode NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 3 | Cell of 52Bytes | R/W | 0 | 0: Transmit and Receive UTOPIA Interface blocks process 53 bytes/cell when the UTOPIA Data Bus width is set to 8 bits. The Transmit and Receive UTOPIA Interface blocks process 54 bytes when the UTOPIA Data Bus width is set to 16 bits. 1: Transmit and Receive UTOPIA Interface blocks process 52 bytes/cell, independent of the UTOPIA Data Bus width. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 2 | Tx FIFO Depth('1) | R/W | 0 | 00: Operating Depth of Transmit FIFO is 16 cells 01: Operating Depth of Transmit FIFO is 12 cells |
| 1 | Tx FIFO Depth(0) | R/W | 0 | 10: Operating Depth of Transmit FIFO is 8 cells 11: Operating Depth of Transmit FIFO is 4 cells NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 0 | UTOPIA Width16 | R/W | 0 | 0: Transmit and Receive UTOPIA Data Bus Width is configured to be 8 bits. 1: Transmit and Receive UTOPIA Data Bus Width is configured to be16 bits. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |

TABLE 110: Rx UTOPIA FIFO STATUS REGISTER

REGISTER 109

Rx UTOPIA FIFO STATUS REGISTER

HEX ADDRESS: 0x6D

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---------------|------|---------|--|
| 7 | Rx FIFO 16 | R/W | 0 | 0: Operating Depth of RxFIFO is 4 cells deep. 1: Operating Depth of RxFIFO is 16 cells deep. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 6 | Reserved | R/W | 0 | Set to 0 |
| 4-2 | Unused | RO | 0 | |
| 1 | Rx FIFO Full | RO | 0 | 0: RxFIFO is not full 1: RxFIFO is full and if next event is not a read operation, it may cause over-run. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 0 | Rx FIFO Empty | RO | 1 | 0: RxFIFO is not empty 1: RxFIFO is empty and any subsequent read operation may cause and under-run to occur. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |

TABLE 111: Tx UTOPIA INTERRUPT/STATUS REGISTER

REGISTER 110 **Tx UTOPIA INTERRUPT/STATUS REGISTER** **HEX ADDRESS: 0x6E**

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---|------|---------|--|
| 7 | Tx FIFO Reset | R/W | 0 | 0 to 1 transition resets internal FIFO memory and its read-write pointers. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 6 | Discard Upon PErr | R/W | 0 | 0: "Transmit UTOPIA" Parity errors do not result in cell discard 1: Cells in which a "Transmit UTOPIA" parity error is detected are discarded. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 5 | Tx Parity Error Interrupt Enable | R/W | 0 | 0: Disables the "Transmit UTOPIA Detection of Parity Error" Interrupt. 1: Enables the "Transmit UTOPIA Detection of Parity Error" Interrupt. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 4 | Tx FIFO Overrun Interrupt Enable | R/W | 0 | 0: Disables the "TxFIFO Overrun" interrupt. 1: Enables the "TxFIFO Overrun" interrupt. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 3 | TC Out of Cell Alignment Interrupt Enable | R/W | 0 | 0: Disables the "Detection of TxRUNT Cell" interrupt. 1: Enables the "Detection of TxRUNT Cell" interrupt. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 2 | TP Error Interrupt Status | RUR | 0 | 0: Indicates that the "Detection of Transmit UTOPIA - Parity Error" Interrupt has NOT occurred since the last read of this register. 1: Indicates that the "Detection of Transmit UTOPIA - Parity Error" Interrupt has occurred since the last read of this register. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 1 | Tx FIFO Interrupt Status | RUR | 0 | 0: Indicates that the "TxFIFO Overrun" Interrupt has NOT occurred since the last read of this register. 1: Indicates that the "TxFIFO Overrun" Interrupt has occurred since the last read of this register. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 0 | TC OCA Interrupt Status | RUR | 0 | 0: Indicates that the "Detection of TxRUNT Cell" Interrupt has NOT occurred since the last read of this register. 1: Indicates that the "Detection of TxRUNT Cell" Interrupt has occurred since the last read of this register. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |

TABLE 112: FUTURE USE

REGISTER 111 **FUTURE USE** **HEX ADDRESS: 0x6F**

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------|------|---------|-----------------------|
| | | | | |

TABLE 113: Tx UTOPIA ADDRESS

REGISTER 112

Tx UTOPIA ADDRESS

HEX ADDRESS: 0x70

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-------------------|------|---------|--|
| 7-5 | Unused | RO | 000 | |
| 4-0 | Tx UTOPIA Address | R/W | 00000 | Programmable Tx UTOPIA address register for device selection |

TABLE 114: TX UTOPIA STATUS REGISTER

REGISTER 113

Tx UTOPIA STATUS REGISTER

HEX ADDRESS: 0x71

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---------------|------|---------|---|
| 7-2 | Unused | RO | 0 | |
| 1 | Tx FIFO Full | RO | 0 | 0: Indicates that the Tx FIFO is not full. 1: Indicates that the Tx FIFO is full and that the next write operation may cause an overrun in the TxFIFO. NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |
| 0 | Tx FIFO Empty | RO | 1 | 0: Indicates that the Tx FIFO is not empty 1: Indicates that the Tx FIFO is Empty NOTE: This bit-field is only active if the XRT72L71 is configured to operate in the "ATM UNI" Mode. |

TABLE 115: LINE INTERFACE DRIVE REGISTER

REGISTER 114

LINE INTERFACE DRIVE REGISTER

HEX ADDRESS: 0x72

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------|------|---------|--|
| 7 | Reserved | R/W | 0 | |
| 6 | Reserved | R/W | 0 | |
| 5 | REQB | R/W | 0 | <p>This "Read/Write" bit-field permits the user to control the state of the "REQB" Output pin. The "REQB" output pin can be connected to the "REQB" input pin of the XRT7300 and XRT73L00 device.</p> <p>0: Sets the "REQB" output pin to "0". If this output pin is connected to the "REQB" input pin of the LIU IC, then this setting will enable the "Receive Equalizer" within the LIU IC.</p> <p>1: Sets the "REQB" output pin to "1". If this output pin is connected to the "REQB" input pin of the LIU IC, then this setting will disable the "Receive Equalizer" within the LIU IC.</p> <p>NOTE: For guidelines on when to enable or disable the Receive Equalizer, within the LIU IC, please consult the XRT7300 or the XRT73L00 Data Sheet.</p> |
| 4 | TAOS | R/W | 0 | <p>This "Read/Write" bit-field permits the user to control the state of the "TAOS" output pin. The "TAOS" output pin can be connected to the "TAOS" input pin of the XRT7300 and XRT73L00 devices.</p> <p>0: Sets the "TAOS" output pin to "0". If this output pin is connected to the "TAOS" input of the LIU IC, then this setting will configure the Transmit Section of the LIU IC to transmit an "All Ones" pattern.</p> <p>1: Sets the "TAOS" output pin to "1". If this output pin is connected to the "TAOS" input pin of the LIU IC, then this setting will NOT configure the Transmit Section of the LIU IC to transmit an "All Ones" pattern.</p> |
| 3 | ENCODIS | R/W | 1 | <p>This "Read/Write" bit-field permits the user to control the state of the "ENCODIS" output pin. The "ENCODIS" output pin can be connected to both the "ENCODIS" and "DECODIS" input pins of the XRT7300 device, or the "ENDECDIS" input pin of the XRT73L00 device.</p> <p>0: Sets the "ENCODIS" output pin to "0". If this output pin is connected to the (ENCODIS and DECODIS) or ENDECDIS input pins of the LIU IC, then this setting will enable the HDB3/B3ZS Encoder/Decoder blocks within the LIU IC.</p> <p>1: Sets the "ENCODIS" output pin to "1". If this output pin is connected to the (ENCODIS and DECODIS) or "ENDECDIS" input pins to the LIU IC, then this setting will disable the "HDB3/B3ZS Encoder/Decoder blocks within the LIU IC.</p> |
| 2 | Tx Lev | R/W | 0 | <p>This "Read/Write" bit-field permits the user to control the state of the "TxLEV" output pin. The "TxLEV" output pin can be connected to the "TxLEV" input pin of the XRT7300 or the XRT73L00 device.</p> <p>0: Sets the "TxLEV" output pin to "0". If this output pin is connected to the "TxLEV" input pin of the LIU IC, then this setting will enable the "Transmit Line Build-Out" circuit, within the Transmit Section of the LIU IC.</p> <p>1: Sets the "TxLEV" output pin to "1". If this output pin is connected to the "TxLEV" input of the LIU IC, then this setting will disable the "Transmit Line Build-Out" circuit, within the Transmit Section of the LIU IC.</p> <p>NOTE: For guidelines on when to enable or disable the "Transmit Line Build-Out" circuit, within the LIU IC, please consult either the "XRT7300" or the "XRT73L00" Data Sheet.</p> |

TABLE 115: LINE INTERFACE DRIVE REGISTER

REGISTER 114

LINE INTERFACE DRIVE REGISTER

HEX ADDRESS: 0x72

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------|------|---------|---|
| 1 | RLoop | R/W | 0 | <p>This "Read/Write" bit-field permits the user to control the state of the "RLOOP" output pin. The "RLOOP" output pin can be connected to the "RLOOP" input pin of the XRT7300 or the XRT73L00 device.</p> <p>0: Sets the "RLOOP" output pin to "0". If this output pin is connected to the "RLOOP" input of the LIU IC, then a variety of LIU Loop-back Modes can be configured via this register bit.</p> <p>1: Sets the "RLOOP" output pin to "1".</p> <p>NOTE: For information on the various loopback modes, which are available via the XRT7300 and XRT73L00 device, please consult the "XRT7300" or the "XRT73L00" data sheet.</p> |
| 0 | LLoop | R/W | 0 | <p>This "Read/Write" bit-field permits the user to control the state of the "LLOOP" output pin. The "RLOOP" output pin can be connected to the "LLOOP" input pin of the XRT7300 or the XRT73L00 device.</p> <p>0: Sets the "LLOOP" output pin to "0". If this output pin is connected to the "LLOOP" input of the LIU IC, then a variety of LIU Loop-back Modes can be configured via this register bit.</p> <p>1: Sets the "LLOOP" output pin to "1".</p> <p>NOTE: For information on the various loopback modes, which are available via the XRT7300 and XRT73L00 device, please consult the "XRT7300" or the "XRT73L00" data sheet.</p> |

TABLE 116: LINE INTERFACE SCAN REGISTER

REGISTER 115

LINE INTERFACE SCAN REGISTER

HEX ADDRESS: 0x73

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------|------|---------|--|
| 7-3 | Unused | RO | 0 | |
| 2 | DMO | RO | 0 | <p>This "Read-Only" bit-field permits the user to determine the current state of the "DMO" input pin. This input pin can be connected to the "DMO" output pin of either the XRT7300 or the XRT73L00 device.</p> <p>0: Indicates that the current state of the "DMO" input pin is "LOW". If this input pin is connected to the DMO output of the LIU IC, then this may indicate the occurrence of a fault condition in the "Transmit Output" line.</p> <p>1: Indicates that the current state of the "DMO" input pin is "High". If this input pin is connected to the DMO output of the LIU IC, then this may indicate the occurrence of normal operation in the "Transmit Output" line.</p> <p>NOTE: For more detailed information on the behavior of the DMO output pin (from the LIU), please consult either the "XRT7300" or the "XRT73L00" data sheet.</p> |
| 1 | RLOL | RO | 0 | <p>This "Read-Only" bit-field permits the user to determine the current state of the "RLOL" input pin. This input pin can be connected to the "RLOL" output pin of either the XRT7300 or the XRT73L00 device.</p> <p>0: Indicates that the current state of the "RLOL" input pin is "LOW". If this input pin is connected to the "RLOL" output of the LIU IC, then it indicates that the "Clock Recovery PLL" (within the LIU IC) is locked onto the "incoming" DS3 line signal.</p> <p>1: Indicates that the current state of the "RLOL" input pin is "HIGH". If this input pin is connected to the "RLOL" output of the LIU IC, then it indicates that the "Clock Recovery PLL" (within the LIU IC) is NOT locked onto the "incoming" DS3 line signal.</p> <p>NOTE: For more detailed information on the behavior of the "RLOL" output pin (from the LIU), please consult either the "XRT7300" or the "XRT73L00" data sheet.</p> |
| 0 | RLOS | RO | 0 | <p>This "Read-Only" bit-field permits the user to determine the current state of the "RLOS" input pin. This input pin can (and should be) connected to the "RLOS" output pin of either the XRT7300 or the XRT73L00 device.</p> <p>0: Indicates that the current state of the "RLOS" input pin is "LOW". If this input pin is connected to the "RLOS" output pin of the LIU IC, then it indicates that the LIU is NOT currently declaring an LOS (Loss of Signal) condition.</p> <p>1: Indicates that the current state of the "RLOS" input pin is "HIGH". If this input pin is connected to the "RLOS" output pin of the LIU IC, then it indicates that the LIU is currently declaring an LOS condition.</p> <p>NOTES:</p> <ol style="list-style-type: none"> 1. If this input pin is pulled "High", then the XRT72L71 will automatically declare an LOS condition. As a consequence, the user should not treat the the "RLOS" input pin as a General Purpose Input pin. 2. For more detailed on the "LOS Declaration Criteria" for the XRT7300 or the XRT73L00 device, please consult either the "XRT7300" or the "XRT73L00" data sheet. |

Line Interface Scan register provides DS3UNI framer chip capability to monitor status of line interface units. Configuration in this register is connected directly to the corresponding discrete I/O pins.

Note: These signals drive and scan the line interface chip XRT7300.

TABLE 117: PMON CP-BIT ERROR EVENT COUNT REGISTER - MSB

REGISTER 116 PMON CP-BIT ERROR EVENT COUNT REGISTER - MSB HEX ADDRESS: 0x74

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|------------------------------|------|---------|--|
| 7-0 | CP-bit Error Count High-byte | RUR | 0x00 | This "Reset-upon-Read" register, along with "PMON CP-Bit Error Count Register - LSB" contains the 16 bit value for the total number of CP Bit errors that have been detected since the last read of this register. This register contains the "High" byte value of this 16-bit expression. |

TABLE 118: PMON CP-BIT ERROR EVENT COUNT REGISTER - LSB

REGISTER 117 PMON CP-BIT ERROR EVENT COUNT REGISTER - LSB HEX ADDRESS: 0x75

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|-----------------------------|------|---------|---|
| 7-0 | CP-bit Error Count Low-byte | RUR | 0x00 | This "Reset-upon-Read" register, along with "PMON CP-Bit Error Count Register - MSB" contains the 16 bit value for the total number of CP Bit errors that have been detected since the last read of this register. This register contains the "Low" byte value of this 16-bit expression. |

TABLE 119: FRAME CP-BIT ERRORS - ONE SECOND ACCUMULATOR REGISTER - MSB

REGISTER 118 FRAME CP-BIT ERRORS - ONE SECOND ACCUMULATOR REGISTER - MSB HEX ADDRESS: 0x76

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---------------------|------|---------|---|
| 7-0 | CP- Bit Err 1 Sec H | RO | 0x00 | This "Read-Only" register, along with "CP-Bit Errors - One Second Accumulator Register - LSB" contains the 16-bit expression for the total number of CP-bit errors that have been detected within the last one second accumulation period. This register contains the "High" byte value of this expression. |

TABLE 120: FRAME CP-BIT ERRORS - ONE SECOND ACCUMULATOR REGISTER - LSB

REGISTER 119 FRAME CP-BIT ERRORS - ONE SECOND ACCUMULATOR REGISTER - LSB HEX ADDRESS: 0x77

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|---------------------|------|---------|--|
| 7-0 | CP- Bit Err 1 Sec L | RO | 0x00 | This "Read-Only" register, along with "CP-Bit Errors - One Second Accumulator Register - MSB" contains the 16-bit expression for the total number of CP-bit errors that have been detected within the last one second accumulation period. This register contains the "Low" byte value of this expression. |

TABLE 121: UNUSED

REGISTER 120 TO 133 UNUSED HEX ADDRESS: 0x78H TO 0x85

| BIT | FUNCTION | TYPE | DEFAULT | DESCRIPTION-OPERATION |
|-----|----------|------|---------|-----------------------|
| | | | | |

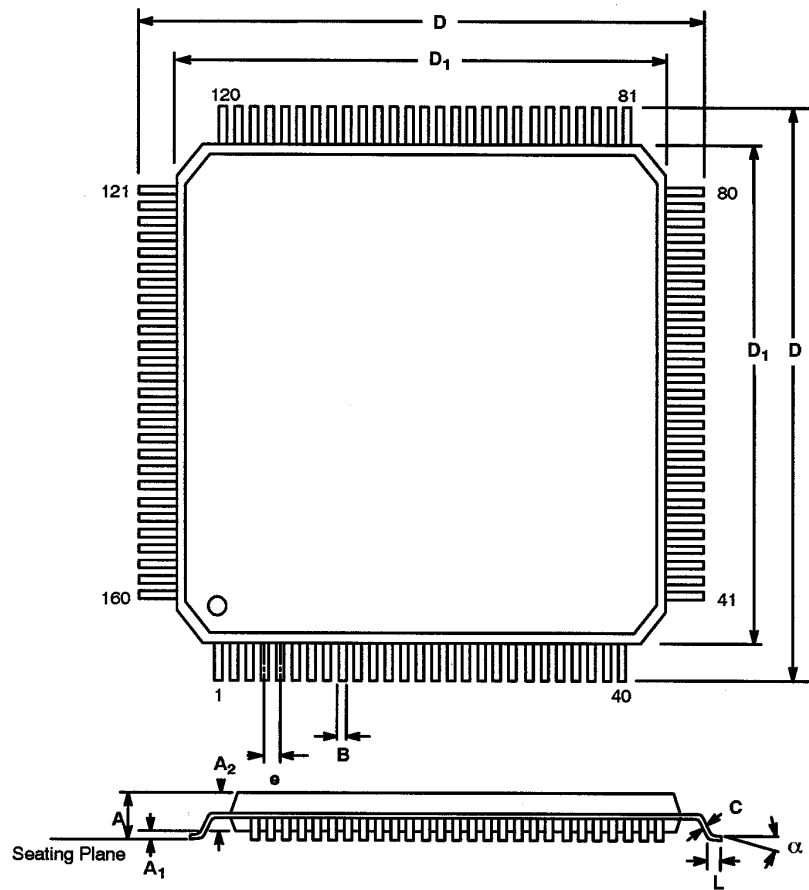
ORDERING INFORMATION

| PART NUMBER | PACKAGE | OPERATING TEMPERATURE RANGE |
|---------------|-----------------------|-----------------------------|
| XRT72L71IQ160 | 28 x28 mm Plastic QFP | -40°C to +85°C |

PACKAGE DIMENSIONS

160 LEAD PLASTIC QUAD FLAT PACK
(28 mm x 28 mm, QFP)

Rev. 1.00



| SYMBOL | INCHES | | MILLIMETERS | |
|----------------|------------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.127 | 0.160 | 3.22 | 4.07 |
| A ₁ | 0.002 | 0.016 | 0.05 | 0.40 |
| A ₂ | 0.125 | 0.144 | 3.17 | 3.67 |
| B | 0.009 | 0.015 | 0.22 | 0.38 |
| C | 0.005 | 0.009 | 0.13 | 0.23 |
| D | 1.218 | 1.238 | 30.95 | 31.45 |
| D ₁ | 1.098 | 1.106 | 27.90 | 28.10 |
| e | 0.0256 BSC | | 0.65 BSC | |
| L | 0.029 | 0.040 | 0.73 | 1.03 |
| α | 0° | 7° | 0° | 7° |

Note: The control dimension is the millimeter column

p

REVISION HISTORY

| REV. # | DATE | DESCRIPTION |
|--------|----------------|--|
| 1.0.1 | September 2000 | Made edits to device name, general information and added description for test mode pin. |
| P1.0.2 | September 2000 | Added Additional sections on Functional descriptions |
| P1.0.3 | October 2000 | Added timing diagrams, expanded block diagram and table of registers. |
| P1.0.4 | December 2000 | Created long-shortform data sheet from P1.0.3 removing sections, and adding table of registers. Changed electrical spec/definition of t78, t79, t80, t78, t81 and t82. Replaced figures 17 and 18. |
| P1.0.5 | December 2000 | Added Register Summary list, made typo corrections to text and figures. |
| 1.1.0 | August 2002 | Removed Preliminary designation. Deleted IOC and ILL from DC Electrical Characteristics. |

NOTICE

EXAR Corporation reserves the right to make changes to the products contained in this publication in order to improve design, performance or reliability. EXAR Corporation assumes no responsibility for the use of any circuits described herein, conveys no license under any patent or other right, and makes no representation that the circuits are free of patent infringement. Charts and schedules contained here in are only for illustration purposes and may vary depending upon a user's specific application. While the information in this publication has been carefully checked; no responsibility, however, is assumed for inaccuracies.

EXAR Corporation does not recommend the use of any of its products in life support applications where the failure or malfunction of the product can reasonably be expected to cause failure of the life support system or to significantly affect its safety or effectiveness. Products are not authorized for use in such applications unless EXAR Corporation receives, in writing, assurances to its satisfaction that: (a) the risk of injury or damage has been minimized; (b) the user assumes all such risks; (c) potential liability of EXAR Corporation is adequately protected under the circumstances.

Copyright 2002 EXAR Corporation

Datasheet August 2002.

Reproduction, in part or whole, without the prior written consent of EXAR Corporation is prohibited.
