Preliminary Product Information

NEC

MOS Integrated Circuit

78K0R / Kx3-C

16-BIT SINGLE-CHIP MICROCONTROLLER

The 78K0R/Kx3-C products are 16-bit single-chip microcontrollers of the 78K0R series.
These microcontrollers feature Single-voltage Self-programming Flash memory and many peripherals.

FEATURES

- 78K0R 16-bit CPU core
- Flash Memory and RAM sizes

Item / Product Number		Flash Memory	RAM
78K0R/KF3-C (80-pin)	μPD78F1846	96K bytes	6K bytes
	μPD78F1847	128K bytes	8K bytes
78K0R/KG3-C (100-pin)	μPD78F1848	96K bytes	6K bytes
	μPD78F1849	128K bytes	8K bytes

Minimum instruction cycle

0.05μs (20MHz@2.7V to 5.5V)

Clock

- HIGH SPEED CLOCK
  - High-speed internal oscillator
    8MHz, 20MHz (Typ.)
  - Ceramic/Crystal Oscillator/External CLK
    2MHz to 20MHz
- LOW SPEED CLOCK
  - Low-speed internal oscillator for WDT
    Clock speed : 30KHz(Typ.)
- SUB CLOCK Crystal Oscillator 32.768KHz

Function

- Self-programming
- On-Chip debugging
- HDMI-CEC transmittion controller/ reception circuit
- Remote controller reception circuit
- On-Chip Power-On-Clear (POC) circuit
- Low-Voltage Detector (LVI) circuit
- On-Chip multiplier(16 bits x 16 bits)
- On-Chip divider (32 bits ÷ 32 bits)
- On-Chip key interrupt function
- On-Chip clock output/buzzer output controller
- On-Chip BCD adjustment
- DMA
- Timer
  - 16bit Timer 11ch
  - Watchdog Timer
  - Real-time Counter
- Serial Interface
  - CSI: 2 channels/UART: 1 channel
  - CSI: 1 channel/UART: 1 channel/simplified I2C: 1 channel
  - CSI: 1 channel/UART: 1 channel/simplified I2C: 1 channel
  - I2C: 1channel
- A/D CONVERTER
  -10-bit resolution A/D converter
  12ch(KF3-C), 16ch(KG3-C)
- I/O PORT
  - CMOS I/O : 62 (KF3-C), 80 (KG3-C)
  - CMOS Output : 1
  - CMOS Input : 4
  - N-ch Open Drain I/O : 4

Operation Voltage

2.7V to 5.5V

Operating ambient temperature

T_A = - 40 to +85°C

Package

80-pin LQFP (12mm x 12mm) (KF3-C)
100-pin LQFP (14mm x 14mm) (KG3-C)

This information contained in this document is being issued in advance of the production cycle for the product. The parameters for the product may change before final production or NEC Electronics Corporation, at its own discretion, may withdraw the product prior to its production. Not all products and/ or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.

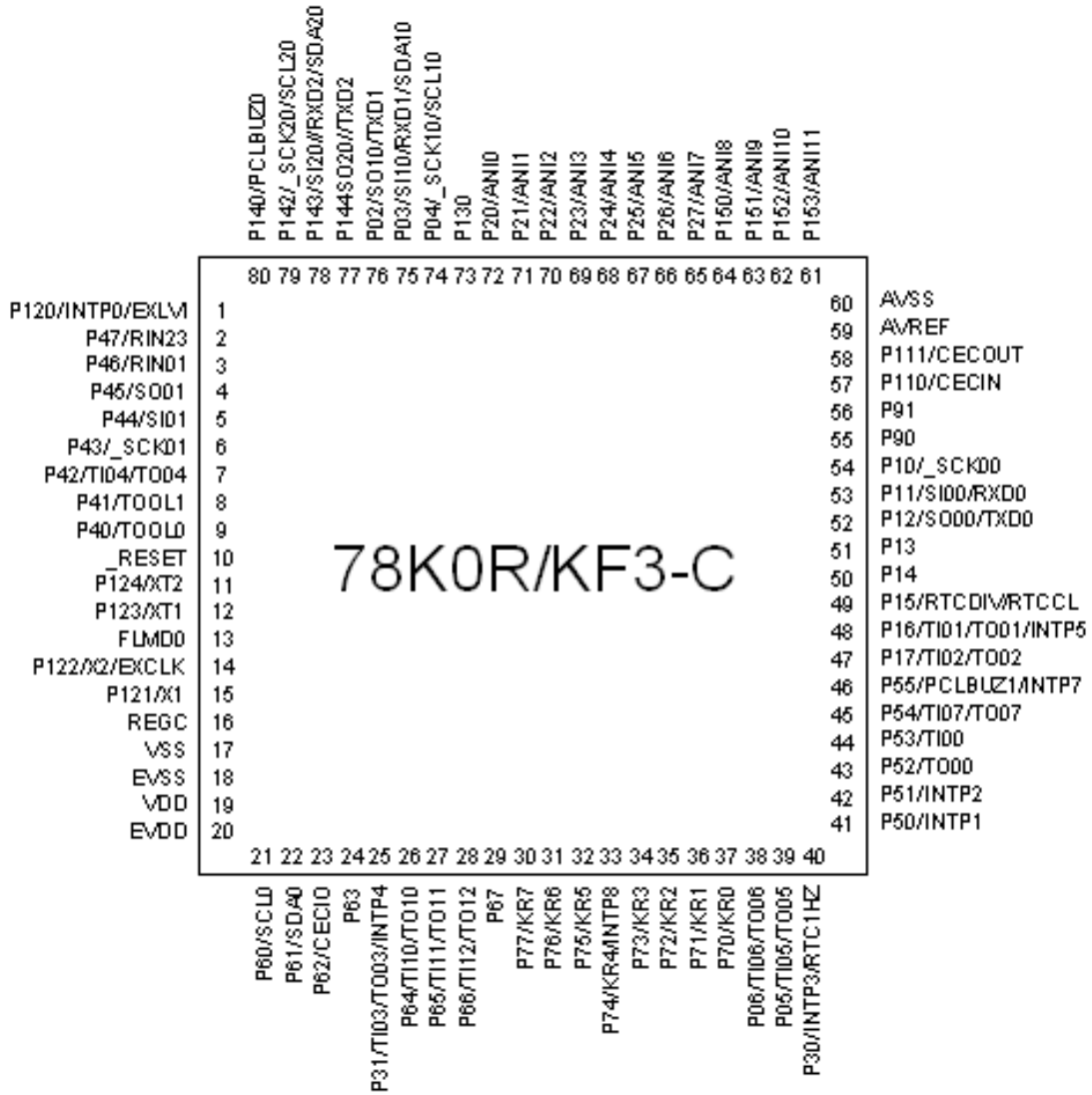
Data Published January 2008 N CP(K)
Ver 1.10

Outline of Functions

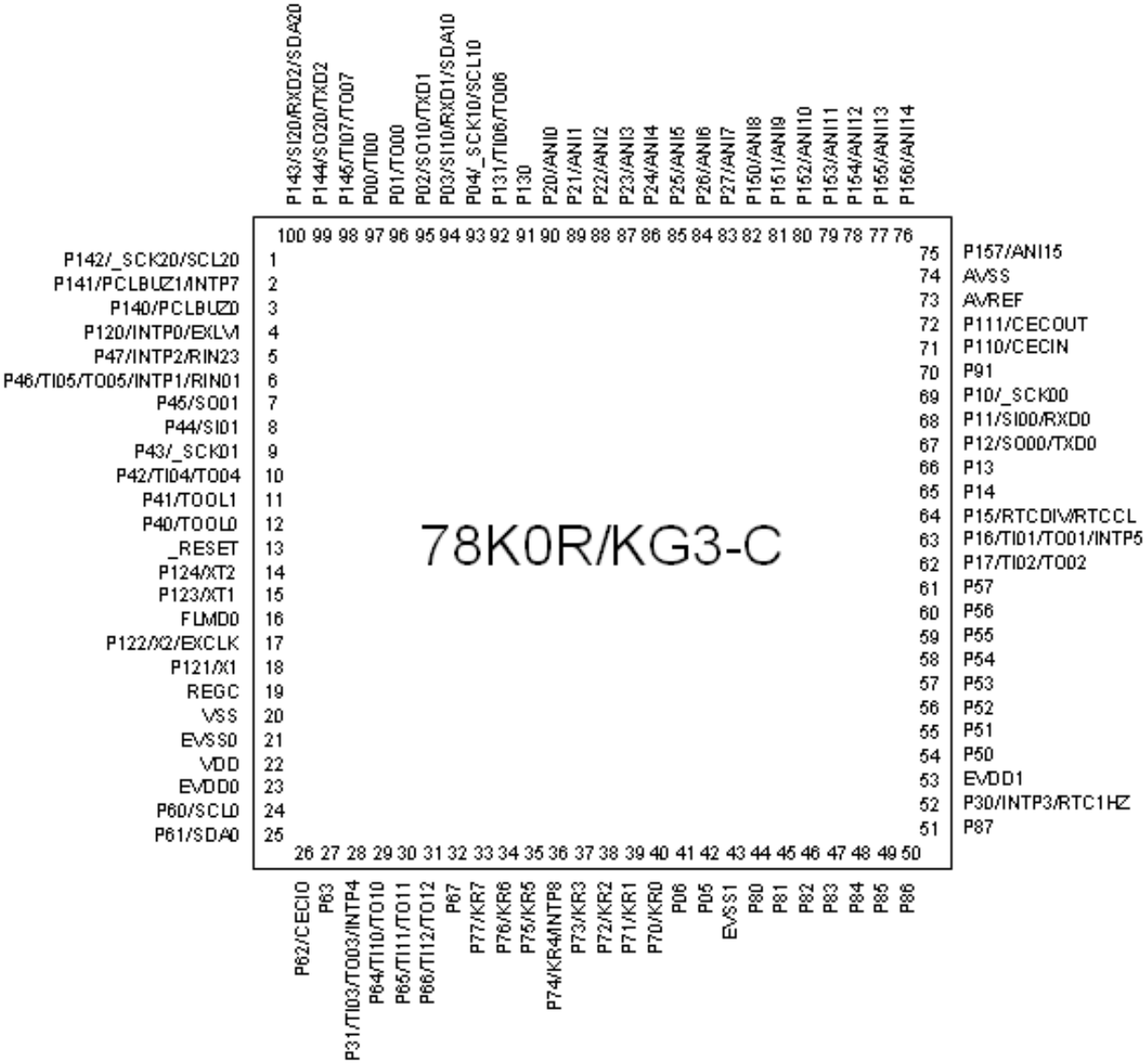
		78K0R/KF3-C			
Internal memory	Flash Memory	96 KB	128 KB	96 KB	128 KB
	RAM	6 KB	8 KB	6 KB	8 KB
Main system clock	Ceramic/Crystal/External	2 to 20 MHz (V_{DD} = 2.7 to 5.5 V)			
	Internal oscillator	8 MHz (TYP.) or 20 MHz (TYP.)			
Subsystem clock		32.768 kHz (V_{DD} = 2.7 to 5.5 V)			
Low Speed internal oscillator (For WDT)		Clock speed : 30KHz (TYP.)			
Minimum instruction cycle		0.05μs (Ceramic/ Crystal/External Operation f_{XH} = 20 MHz V_{DD} = 2.7 to 5.5 V)			
I/O	Total	71		89	
	CMOS I/O	62		80	
	CMOS Output	1		1	
	CMOS Input	4		4	
	N-ch Open Drain I/O	4		4	
Interrupt	External	9ch		9ch	
	Internal	35ch		35ch	
Timer		- 16 Bit Timer : 11ch, - Watch Dog Timer : 1ch, - Real-time Counter : 1ch			
	Timer outputs	11 (PWM outputs: timer array unit 0: 7, timer array unit 1: 2)			
	RTC outputs	2 - 1 Hz (Subsystem clock: f_{SUB} = 32.768 kHz) - 512 Hz or 16.384 kHz or 32.768 kHz (Subsystem clock: f_{SUB} = 32.768 kHz)			
Serial Interface		- CSI: 2 channels/UART: 1 channel - CSI: 1 channel/UART: 1 channel/simplified I2C: 1 channel - CSI: 1 channel/UART: 1 channel/simplified I2C: 1 channel - I2C: 1 channel			
A/D Converter		10bit x 12ch		10bit x 16ch	
CEC transmittion/reception function		Available			
Remote controller reception function		Available			
On Chip Debug Function		Available			
Voltage Range		VDD = 2.7 to 5.5 V			
Operation temperature		Ta = -40°C to +85°C			
Package		80-pin LQFP (GC) Thickness: 1.4 mm 12 mm x 12 mm Pitch: 0.5 mm		100-pin LQFP (GC) Thickness: 1.4 mm 14 mm x 14 mm Pitch: 0.5 mm	

Pin configuration (Top View)

80-pin plastic LQFP (12mm x 12mm), pin pitch = 0.5mm



100-pin plastic LQFP (14mm x 14mm), pin pitch = 0.5mm



Pin Identification

78K0R/KF3-C
80-pin plastic LQFP (12mm x 12mm), pin pitch = 0.5mm

ANI0-ANI11 : Analog Input
AVREF : Analog Reference Voltage
AVSS : Analog Ground
CECIN : Consumer Electronics Control Input
CECIO : Consumer Electronics Control Input/Output
CECOUT : Consumer Electronics Control Output
EVDD : Power Supply for Port
EVSS : Ground for Port
EXCLK : External Clock Input (Main System Clock)
EXLVI : External Potential Input for Low-voltage Detector
FLMD0 : Flash Programming Mode
INTP0-INTP5, INTP7, INTP8 : External Interrupt Input
KR0-KR7 : Key Return
P02-P06 : Port 0
P10-P17 : Port 1
P20-P27 : Port 2
P30, P31 : Port 3
P40-P47 : Port 4
P50-P55 : Port 5
P60-P67 : Port 6
P70-P77 : Port 7
P90-P91 : Port 9
P110, P111 : Port 11
P120-P124 : Port 12
P130 : Port 13
P140, P142-P144 : Port 14
P150-P153 : Port 15
PCLBUZ0, PCLBUZ1 : Programmable Clock Output / Buzzer Output
REGC : Regulator Capacitance
$\overline{\text{RESET}}$: Reset
RIN01 : Remote Control Input
RIN23 : Remote Control Input
RTC1HZ : Real-time Counter Correction Clock (1 Hz) Output
RTCCL : Real-time Counter Clock (32 kHz Original Oscillation) Output
RTCDIV : Real-time Counter Clock (32 kHz Divided Frequency) Output
RxD0-RxD2 : Receive Data
$\overline{\text{SCK00}}$, $\overline{\text{SCK01}}$, $\overline{\text{SCK10}}$, $\overline{\text{SCK20}}$: Serial Clock Input/Output
SCL0, SCL10, SCL20 : Serial Clock Input/Output
SDA0, SDA10, SDA20 : Serial Data Input/Output
SI00, SI01, SI10, SI20 : Serial Data Input
SO00, SO01, SO10,SO20 : Serial Data Output
TI00-TI07, TI10-TI12 : Timer Input
TO00-TO07, TO10-TO12 : Timer Output
TOOL0 : Data Input/Output for Tool
TOOL1 : Clock Output for Tool
TxD0-TxD2 : Transmit Data
VDD : Power Supply
VSS : Ground
X1, X2 : Crystal Oscillator (Main System Clock)
XT1, XT2 : Crystal Oscillator (Subsystem Clock)

78K0R/KG3-C
100-pin plastic LQFP (14mm x 14mm), pin pitch = 0.5mm

ANI0-ANI15 : Analog Input
AVREF : Analog Reference Voltage
AVSS : Analog Ground
CECIN : Consumer Electronics Control Input
CECIO : Consumer Electronics Control Input/Output
CECOUT : Consumer Electronics Control Output
EVDD0, EVDD1 : Power Supply for Port
EVSS0, EVSS1 : Ground for Port
EXCLK : External Clock Input (Main System Clock)
EXLVI : External Potential Input for Low-voltage Detector
FLMD0 : Flash Programming Mode
INTP0-INTP5, INTP7, INTP8 : External Interrupt Input
KR0-KR7 : Key Return
P00-P06 : Port 0
P10-P17 : Port 1
P20-P27 : Port 2
P30, P31 : Port 3
P40-P47 : Port 4
P50-P57 : Port 5
P60-P67 : Port 6
P70-P77 : Port 7
P80-P87 : Port 8
P91 : Port 9
P110, P111 : Port 11
P120-P124 : Port 12
P130, P131 : Port 13
P140-P145 : Port 14
P150-P157 : Port 15
PCLBUZ0, PCLBUZ1 : Programmable Clock Output / Buzzer Output
REGC : Regulator Capacitance
RESET : Reset
RIN01 : Remote Control Input
RIN23 : Remote Control Input
RTC1HZ : Real-time Counter Correction Clock (1 Hz) Output
RTCCL : Real-time Counter Clock (32 kHz Original Oscillation) Output
RTCDIV : Real-time Counter Clock (32 kHz Divided Frequency) Output
RxD0-RxD2 : Receive Data
SCK00, SCK01, SCK10, SCK20 : Serial Clock Input/Output
SCL0, SCL10, SCL20 : Serial Clock Input/Output
SDA0, SDA10, SDA20 : Serial Data Input/Output
SI00, SI01, SI10, SI20 : Serial Data Input
SO00, SO01, SO10,SO20 : Serial Data Output
TI00-TI07, TI10-TI12 : Timer Input
TO00-TO07, TO10-TO12 : Timer Output
TOOL0 : Data Input/Output for Tool
TOOL1 : Clock Output for Tool
TxD0-TxD2 : Transmit Data
VDD : Power Supply
VSS : Ground
X1, X2 : Crystal Oscillator (Main System Clock)
XT1, XT2 : Crystal Oscillator (Subsystem Clock)