| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE (YR-MO-DA) | APPROVED |
| A | Add vendor CAGE 27014. Add case outline I (metal can). Add terminal connections for case H. Delete testing for $R_{OUT}$, $V_N$, $C_{IN}$, $B_{W1}$, $B_{W2}$, $B_{W3}$, $t_{PD-1}$, $t_{PD-3}$, $t_{R-1}$, $t_{R-3}$. Editorial changes throughout. | 86-05-12 | M. A. FRYE |
| B | Add vendor CAGE 18324. Add device 02, generic part number 592. Delete vendor CAGE 27014 for device 01IX. Change to military drawing format. Make changes to table I. Editorial changes throughout. Delete vendor CAGE 01295 for device 01IX. Inactivate device 01HX for new design. | 89-05-09 | M. A. FRYE |
| C | Add device 03 for generic part number TL027. Add outline letter 2. Make changes to $t_{PD}$ and $t_{R2}$. Inactivate device types 02HX and 02IX for new design. | 93-11-30 | M. A. FRYE |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| REV | | | | | | | | | | | | | | | | | | | |
| SHEET | | | | | | | | | | | | | | | | | | | |
| REV | | | | | | | | | | | | | | | | | | | |
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| REV STATUS OF SHEETS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| REV | C | C | C | C | C | C | C | C | C | | | | | | |
| SHEET | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | | | | |

PMIC N/A

**STANDARDIZED MILITARY DRAWING**

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

PREPARED BY
RICK C. OFFICER

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APPROVED BY
MICHAEL A. FRYE

DRAWING APPROVAL DATE
85-10-04

REVISION LEVEL
C

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, LINEAR, TWO-STAGE DIFFERENTIAL VIDEO AMPLIFIER, MONOLITHIC SILICON

| SIZE | CAGE CODE | |
|---|---|---|
| A | 67268 | 84185 |

SHEET 1 OF 9

DESC FORM 193
JUL 91

5962-E443-93



9004708 0010589 404

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:


1.2.1 Device type(s). The device type(s) shall identify the circuit function as follows:

| Device type | Generic number | Circuit function |
|---|---|---|
| 01 | 733 | Two-stage, differential input, differential output video amplifier |
| 02 | 592 | Two-stage, differential input, differential output video amplifier |
| 03 | TL027 | Two-stage, differential input, differential output video amplifier |

1.2.2 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835 and as follows:

| Outline letter | Descriptive designator | Terminals | Package style |
|---|---|---|---|
| C | GDIP1-T14 or CDIP2-T14 | 14 | Dual-in-line |
| H | GDFP1-F10 or CDFP2-F10 | 10 | Flat pack |
| I | MACY1-X10 | 10 | Can |
| 2 | CQCC1-N20 | 20 | Square leadless chip carrier |

1.2.3 Lead finish. The lead finish shall be as specified in MIL-M-38510. Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

1.3 Absolute maximum ratings.

Positive supply voltage ($+V_{CC}$) . . . . . +8 V dc
Negative supply voltage ($-V_{CC}$) . . . . . -8 V dc
Differential input voltage . . . . . ±5 V dc
Common mode input voltage . . . . . ±6 V dc
Output current . . . . . 10 mA
Power dissipation ($P_D$) . . . . . 500 mW 1/
Junction temperature ($T_J$) . . . . . +150°C
Storage temperature range . . . . . -65°C to +150°C
Lead temperature (soldering, 10 seconds) . . . . . +300°C
Thermal resistance, junction-to-ambient ($\Theta_{JC}$) . . . . . See MIL-STD-1835

1.4 Recommended operating conditions.

Ambient operating temperature range ($T_A$) . . . . . -55°C to +125°C

1/ With $T_A$ above +105°C, derate linearly 11 mW/°C for cases C and 2. With $T_A$ above +57°C, derate linearly 5.5 mW/°C for case H. With $T_A$ above +75°C, derate linearly 6.5 mW/°C for case I.

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and bulletin. Unless otherwise specified, the following specification, standards, and bulletin of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARDS

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-1835 - Microcircuit Case Outlines.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

(Copies of the specification, standards, and bulletin required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full ambient operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-EC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

TABLE I. Electrical performance characteristics.

| Test | Symbol | Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified | Group A subgroups | Device type | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Min | Max | |
| Input voltage range | $V_{IN}$ | | 1,2,3 | All | ±1.0 | | V |
| Input offset current | $I_{IO}$ | | 1 | 01,02 | | 3 | µA |
| | | | 2,3 | | | 5 | |
| | | | 1 | 03 | | 5 | |
| | | | 2,3 | | | 6 | |
| Input bias current | $I_{IB}$ | | 1 | 01,03 | | 30 | µA |
| | | | | 02 | | 20 | |
| | | | 2,3 | All | | 40 | |
| Input resistance | $R_{IN2}$ | 2/ 3/ | 1 | 01,02 | 20 | | kΩ |
| | | | 2,3 | | 8 | | |
| | | | 1 | 03 | 10 | | |
| | | | 2,3 | | 8 | | |
| Output offset voltage | $V_{OO1}$ | $R_L = \infty$ 4/ | 1,2,3 | All | | 2.0 | V |
| | $V_{OO2}$ | $R_L = \infty$ 2/ | 1 | 01,02 | | 1.0 | |
| | | | 2,3 | | | 1.2 | |
| | | | 1 | 03 | | 0.75 | |
| | | | 2,3 | | | 1.5 | |
| | $V_{OO3}$ | $R_L = \infty$ 5/ | 1 | 01 | | 1.0 | |
| | | | 2, 3 | | | 1.2 | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

| Test | Symbol | Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified | Group A subgroups | Device type | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Min | Max | |
| Output common mode voltage | $V_{OCM}$ | $R_L = \infty$, $T_A = +25°C$ | 1 | 01,02 | | 3.4 | V |
| | | | | 03 | | 4.25 | |
| Change in output common mode voltage | $\Delta V_{OCM}$ | $R_L = \infty$, $T_A = +25°C$, $V_{AGC}$ = 0 V to 2 V | 1 | 03 | | 300 | mV |
| Open circuit voltage at REF OUT | $V_{REF}$ | $I_{REF}$ = 1 mA to 100 $\mu$A, $T_A = +25°C$ | 1 | 03 | 1.3 | 1.5 | V |
| Output sink current | $I_{SINK}$ | | 1 | 01,02 | 2.5 | | mA |
| | | | 2,3 | | 2.2 | | |
| | | | 1 | 03 | 3 | | |
| | | | 2,3 | | 2.8 | | |
| Supply current | $I_{CC}$ | | 1 | 01,02 | | 24 | mA |
| | | | 2,3 | | | 27 | |
| | | | 1 | 03 | | 27 | |
| | | | 2,3 | | | 30 | |
| Supply voltage rejection ratio | $S_{VRR}$ | $\pm5.5$ V $\le V_{CC} \le \pm6.5$ V | 4,5,6 | All | 50 | | dB |
| Common mode rejection ratio | $C_{MRR}$ | $-1$ V $\le V_{CM} \le +1$ V, f $\le$ 100 kHz | 4 | All | 60 | | dB |
| | | | 5,6 | | 50 | | |
| Output voltage swing | $V_{OUT}$ | $R_L$ = 2 k$\Omega$ | 4 | 01,02 | 2.5 | | $V_{P-P}$ |
| | | | 5,6 | | 2.2 | | |
| | | | 4 | 03 | 3 | | |
| | | | 5,6 | | 2.8 | | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

| Test | Symbol | Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified | Group A subgroups | Device type | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Min | Max | |
| Differential voltage gain | $A_{V1}$ | $V_{OUT}$ = 3.0 $V_{P-P}$, 4/ $R_L$ = 2 kΩ | 4 | 01 | 300 | 500 | V/V |
| | | | 5,6 | | 200 | 600 | |
| | | | 4 | 02 | 300 | 500 | |
| | | | 5,6 | | 200 | 600 | |
| | | | 4 | 03 | 200 | 400 | |
| | | | 5,6 | | 150 | 450 | |
| | $A_{V2}$ | $V_{OUT}$ = 3.0 $V_{P-P}$, 2/ $R_L$ = 2 kΩ | 4 | 01 | 90 | 110 | |
| | | | 5,6 | | 80 | 120 | |
| | | | 4 | 02 | 90 | 110 | |
| | | | 5,6 | | 80 | 120 | |
| | | | 4 | 03 | 65 | 105 | |
| | | | 5,6 | | 55 | 115 | |
| | $A_{V3}$ | $V_{OUT}$ = 3.0 $V_{P-P}$, 5/ $R_L$ = 2 kΩ | 4 | 01 | 9 | 11 | |
| | | | 5,6 | | 8 | 12 | |
| Propagation delay | $t_{pd}$ | $V_{OUT}$ = 1 $V_{P-P}$, 2/ 3/ $T_A$ = +25°C | 9 | All | | 10 | ns |
| Rise time | tr2 | $V_{OUT}$ = 1 $V_{P-P}$, 2/ 3/ $T_A$ = +25°C | 9 | 01,02 | | 10 | ns |
| | | | | 03 | | 12 | |

1/ $V_S$ = ±6.0 V. Unless otherwise specified, for device type 03, AGC = 0 V, and REF OUT pin is open .

2/ GAIN ADJ 2A and GAIN ADJ 2B connected together. Gain = 100.

3/ If not tested, shall be guaranteed to the limits specified in table I herein.

4/ GAIN ADJ 1A and GAIN ADJ 1B connected together. Gain = 400.

5/ All gain pins open. Gain = 10.

| Device types | 01 and 02 | 03 | 01 and 02 | 01 and 02 | 01 and 02 | 03 |
|---|---|---|---|---|---|---|
| Case outlines | C | | H | I | 2 | |
| Terminal number | Terminal symbol | | | | | |
| 1 | INPUT+ | INPUT+ | INPUT- | INPUT- | NC | NC |
| 2 | NC | AGC | GAIN ADJ 2A | INPUT+ | INPUT+ | INPUT+ |
| 3 | GAIN ADJ 2A | GAIN ADJ 1A | GAIN ADJ 1A | GAIN ADJ 2A | NC | AGC |
| 4 | GAIN ADJ 1A | GAIN ADJ 2A | $-V_{CC}$ | GAIN ADJ 1A | GAIN ADJ 2A | GAIN ADJ 1A |
| 5 | $-V_{CC}$ | $-V_{CC}$ | OUTPUT+ | $-V_{CC}$ | NC | NC |
| 6 | NC | NC | OUTPUT- | OUTPUT+ | GAIN ADJ 1A | GAIN ADJ 2A |
| 7 | OUTPUT+ | OUTPUT+ | $+V_{CC}$ | OUTPUT- | NC | NC |
| 8 | OUTPUT- | OUTPUT- | GAIN ADJ 1B | $+V_{CC}$ | $-V_{CC}$ | $-V_{CC}$ |
| 9 | NC | NC | GAIN ADJ 2B | GAIN ADJ 1B | NC | NC |
| 10 | $+V_{CC}$ | $+V_{CC}$ | -INPUT | GAIN ADJ 2B | OUTPUT+ | OUTPUT+ |
| 11 | GAIN ADJ 1B | GAIN ADJ 2B | --- | --- | NC | NC |
| 12 | GAIN ADJ 2B | GAIN ADJ 1B | --- | --- | OUTPUT- | OUTPUT- |
| 13 | NC | REF OUT | --- | --- | NC | NC |
| 14 | INPUT- | INPUT- | --- | --- | $+V_{CC}$ | $+V_{CC}$ |
| 15 | --- | --- | --- | --- | NC | NC |
| 16 | --- | --- | --- | --- | GAIN ADJ 1B | GAIN ADJ 2B |
| 17 | --- | --- | --- | --- | NC | NC |
| 18 | --- | --- | --- | --- | GAIN ADJ 2B | GAIN ADJ 1B |
| 19 | --- | --- | --- | --- | NC | REF OUT |
| 20 | --- | --- | --- | --- | INPUT- | INPUT- |

NC = No connection

FIGURE 1. Terminal connections.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DESC-EC shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.9 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

(2) $T_A$ = +125°C, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 7, 8, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.

4.3.2 Groups C and D inspections.

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

(2) $T_A$ = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

TABLE II. Electrical test requirements.

| MIL-STD-883 test requirements | Subgroups (in accordance with method 5005, table I) |
|---|---|
| Interim electrical parameters (method 5004) | |
| Final electrical test parameters (method 5004) | 1*,2,3,4 |
| Group A test requirements (method 5005) | 1,2,3,4,5,6,9** |
| Groups C and D end-point electrical parameters (method 5005) | 1 |

* PDA applies to subgroup 1.
** Subgroup 9, if not tested, shall be guaranteed to the limits specified in table I.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for original equipment manufacturer application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-EC, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EC, Dayton, Ohio 45444, or telephone (513) 296-5377.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-EC.