

**REVISIONS**

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

REV																							
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REV STATUS OF SHEETS	REV SHEET	1	2	3	4	5	6	7	8	9	10	11	12										

PMIC N/A	PREPARED BY <i>Steve Duncan</i>	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444		
<b>STANDARDIZED MILITARY DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A	CHECKED BY <i>Larry Zabi</i>	MICROCIRCUIT, DIGITAL, SINGLE CHANNEL DRIVER/RECEIVER, HYBRID		
	APPROVED BY <i>William K. Beckma</i>	SIZE <b>A</b>	CAGE CODE <b>67268</b>	<b>5962-89799</b>
	DRAWING APPROVAL DATE <b>91-06-26</b>	SHEET <b>1</b>		
	REVISION LEVEL			

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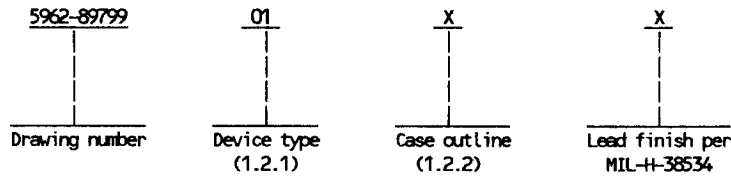
• U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911  
5962-E1434

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class H hybrid microcircuits to be processed in accordance with MIL-H-38534.

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:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>	<u>Coupling transformer</u> <u>Transformer</u>	<u>Turns ratio</u> <u>Direct</u>
01	FC 155391	Low power, driver-receiver <u>1</u> /	0.67:1	0.47:1
02	FC 155392	Low power, driver-receiver <u>2</u> /	0.67:1	0.47:1

1.2.2 Case outline(s). The case outline(s) shall be as designated in appendix C of MIL-M-38510, and as follows:

<u>Outline letter</u>	<u>Case outline</u>
X	See figure 1 (1.300" x 0.790" x 0.190"), dual-in-Line package

1.3 Absolute maximum ratings.

V <sub>CC</sub> -----	-0.3 V dc to +7 V dc
Logic input voltage -----	-0.3 V dc to V <sub>CC</sub>
Receiver differential voltage -----	40 V <sub>p-p</sub>
Receiver common mode voltage -----	-10 V dc to +10 V dc
Driver peak output current -----	200 mA
Power dissipation (P <sub>D</sub> ) at T <sub>C</sub> = +125°C -----	1.4 W
Storage temperature-----	-65°C to +150°C
Lead temperature (soldering, 10 seconds) -----	+300°C
Junction temperature (T <sub>J</sub> )-----	+160°C
Thermal resistance, junction-to-case (θ <sub>JC</sub> ) -----	18°C/W
Thermal resistance, junction-to-ambient (θ <sub>JA</sub> )-----	35°C/W

1.4 Recommended operating conditions.

V <sub>CC</sub> -----	+4.5 V dc to +5.5 V dc
Logic input voltage -----	0 V dc to +5 V dc
Receiver differential voltage -----	30 V <sub>p-p</sub>
Receiver common mode voltage -----	-10 V dc to +10 V dc
Driver peak output current -----	220 mA
Serial data rate -----	1.0 MHz maximum
Junction temperature (T <sub>J</sub> ) -----	+150°C
Case operating temperature range (T <sub>C</sub> ) -----	-55°C to +125°C

1/ Interfaces with the Harris Manchester encoder/decoder.  
2/ Interfaces with the Smith's Manchester encoder/decoder.

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2. APPLICABLE DOCUMENTS

2.1 Government specifications and standard. Unless otherwise specified, the following specifications and standard 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.

SPECIFICATIONS

MILITARY

- MIL-M-38510 - Microcircuits, General Specification for.
- MIL-H-38534 - Hybrid Microcircuits, General Specification for.

STANDARD

MILITARY

- MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specifications and standard 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 MIL-H-38534 and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-H-38534 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 2.

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 specified 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-H-38534. 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 QML-38534 (see 6.6 herein).

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TABLE I. Electrical performance characteristics.

	Test	Symbol	Conditions 1/ -55°C ≤ T <sub>c</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
						Min	Max	
Receiver	Input level 2/	V <sub>I</sub>	Differential input, pin 15 to pin 16	4, 5, 6	ALL	40		V <sub>P-P</sub>
	Input common mode voltage 2/ range	V <sub>ICH</sub>	Independent of xfmr or in accordance with MIL-HDBK-1553 section 5.1.2.2	4, 5, 6	ALL	-10	+10	V(pk)
	Output low voltage	V <sub>OL</sub>	I <sub>OL</sub> = 16 mA	1, 2, 3	ALL		0.5	V
	Output high voltage	V <sub>OH</sub>	I <sub>OH</sub> = -0.4 mA	1, 2, 3	ALL	2.5		V
Transmitter	Input low voltage	V <sub>IL</sub>		1, 2, 3	ALL		0.7	V
	Input high voltage	V <sub>IH</sub>		1, 2, 3	ALL	2.0		V
	Input low current	I <sub>IL</sub>	V <sub>IL</sub> = 0.4 V	1, 2, 3	ALL		-1.6	mA
	Input high current	I <sub>IH</sub>	V <sub>IH</sub> = 2.7 V	1, 2, 3	ALL		0.04	mA
	Output voltage	V <sub>O</sub>	Across 35Ω load	1, 2, 3	ALL	6.0	9.0	V(pk)
	Output noise voltage	V <sub>ON</sub>	Across 35Ω load	4, 5, 6	ALL		10	mV <sub>P-P</sub>
Receiver strobe	Input low voltage	V <sub>SIL</sub>		1, 2, 3	ALL		0.7	V
	Input high voltage	V <sub>SIH</sub>		1, 2, 3	ALL	2.0		V
	Input low current	I <sub>SIL</sub>	V <sub>SIL</sub> = 0.4 V	1, 2, 3	ALL		-1.6	mA
	Input high current	I <sub>SIH</sub>	V <sub>SIH</sub> = 2.7 V	1, 2, 3	ALL		0.04	mA

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

	Test	Symbol	Conditions <sup>1/</sup> -55°C ≤ T <sub>c</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device types	Limits		Unit
						Min	Max	
Transmitter inhibit	Input low voltage	V <sub>IIL</sub>		1, 2, 3	ALL	0.7		V
	Input high voltage	V <sub>IIH</sub>		1, 2, 3	ALL		2.0	V
	Input low current	I <sub>IIL</sub>	V <sub>SIL</sub> = 0.4 V	1, 2, 3	ALL		-1.6	mA
	Input high current	I <sub>IIH</sub>	V <sub>SIH</sub> = 2.7 V	1, 2, 3	ALL	0.04		mA
Power supply	Total Current	I <sub>CC-SB</sub>	Standby mode V <sub>CC</sub> = 5.5 V dc	1, 2, 3	ALL		35	mA
		I <sub>CC-25</sub>	25% duty cycle <sup>2/</sup> into 70Ω load V <sub>CC</sub> = 5.5 V dc	4, 5, 6	ALL		170	mA
		I <sub>CC-50</sub>	50% duty cycle into 70Ω load V <sub>CC</sub> = 5.5 V dc	4, 5, 6	ALL		350	mA
		I <sub>CC-100</sub>	100% duty cycle <sup>2/</sup> into 70Ω load V <sub>CC</sub> = 5.5 V dc	1, 2, 3	ALL		700	mA
Receiver	Input resistance	R <sub>IN</sub>	1 MHz sine wave <sup>2/</sup>	4, 5, 6	ALL	1.6		kΩ
	Input capacitance	C <sub>IN</sub>	1 MHz sine wave <sup>2/</sup>	4	ALL		2.0	pF
	Threshold voltage <sup>3/</sup>	V <sub>TH</sub>		1, 2, 3	ALL	0.56	1.0	V <sub>P-P</sub>
			Group C, end-point electricals			0.56	1.1	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

	Test	Symbol	Conditions <sup>1/</sup> -55°C ≤ T <sub>C</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
						Min	Max	
Transmitter	Output resistance transmitter off	R <sub>OUT</sub>	1 MHz sine wave <sup>2/</sup>	4, 5, 6	All	10		kΩ
	Output capacitance transmitter off	C <sub>OUT</sub>	1 MHz sine wave <sup>2/</sup>	4	All		18	pF
	Output offset voltage	V <sub>OS</sub>	V <sub>CC</sub> = 5.5 V dc <sup>2/ 4/</sup>	4, 5, 6	All	-90	+90	mV(pk)
	Peak amplitude variation	A <sub>V</sub>	V <sub>CC</sub> = 4.5 V dc <sup>2/ 5/</sup>	4, 5, 6	All	-15	+15	%
Receiver	Delay time, input to output <sup>2/</sup>	t <sub>DR</sub>	Delay time from dif- ferential input zero crossing to DATA or DATA, see figure 3	9,10,11	All		300	ns
	Strobe delay <sup>2/</sup>	t <sub>DS</sub>	Delay time from strobe rising or falling edge to DATA or DATA, see figure 3	9,10,11	All		200	ns
Transmitter	Rise time	t <sub>R</sub>	Output load = 70Ω, see figure 3	9,10,11	All	100	300	ns
	Fall time	t <sub>F</sub>		9,10,11	All	100	300	ns
	Delay time	t <sub>DT</sub>	See figure 3 <sup>2/</sup>	9,10,11	All		250	ns
	Inhibit delay inhibiting	t <sub>D1-H</sub>	See figure 3 <sup>2/</sup>	9,10,11	All		500	ns
	Inhibit delay active	t <sub>D1-L</sub>	See figure 3 <sup>2/</sup>	9,10,11	All		450	ns

<sup>1/</sup> Unless otherwise specified, 4.5 V dc ≤ V<sub>CC</sub> ≤ 5.5 V dc.

<sup>2/</sup> Parameter shall be tested as part of device initial characterization and after design and process changes. Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.

<sup>3/</sup> Threshold is measured in direct coupled mode including the transformer. Threshold is the maximum level on the BUS at which there are no pulses on either receiver output. Divide by 1.4 to obtain threshold in transformer coupled mode. Add 0.14 V in direct coupled mode or 0.10 V in transformer coupled mode to obtain threshold at which no errors are observed when receiver is used with 15530 CMOS Manchester encoder-decoder.

<sup>4/</sup> Measured across 70Ω load, 2.5 μs after parity bit mid-bit zero crossing of a 660 μs message.

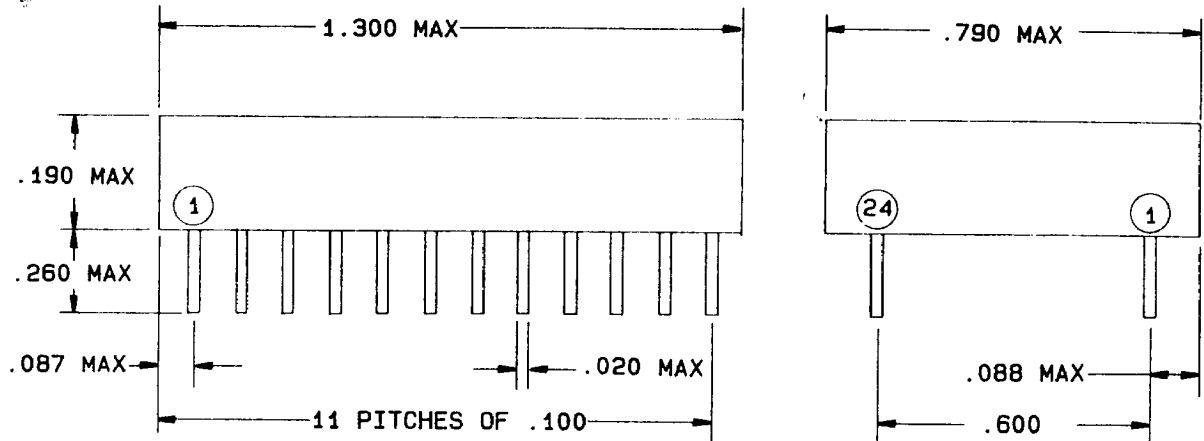
<sup>5/</sup> Measured across 70Ω load, variation of average peak amplitude.

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Case outline X



Inches	mm
.020	0.51
.087	2.20
.088	2.23
.100	2.54
.190	4.82
.260	6.60
.600	15.24
.790	20.06
1.300	33.02

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are for general information only.
3. Unless otherwise specified, tolerance is  $\pm .100$ .
4. Lead identification for reference only.

FIGURE 1. Case outline.

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Device types	01 and 02
Case outline	X
Terminal number	Terminal symbol
1	TXDATAOUT
2	TXDATAOUT
3	CASE
4	NO CONNECTION
5	NO CONNECTION
6	NO CONNECTION
7	RXLOGICOUT
8	RXDISABLE
9	GND
10	RXLOGICOUT
11	NO CONNECTION
12	NO CONNECTION
13	NO CONNECTION
14	NO CONNECTION
15	RXDATAIN
16	RXDATAIN
17	NO CONNECTION
18	GND
19	NO CONNECTION
20	V <sub>CC</sub>
21	TXINHIBIT
22	TXDATAIN
23	TXDATAIN
24	THERMAL OVERRIDE

NOTE: Pin 24 is a no connection if thermal override is not employed.

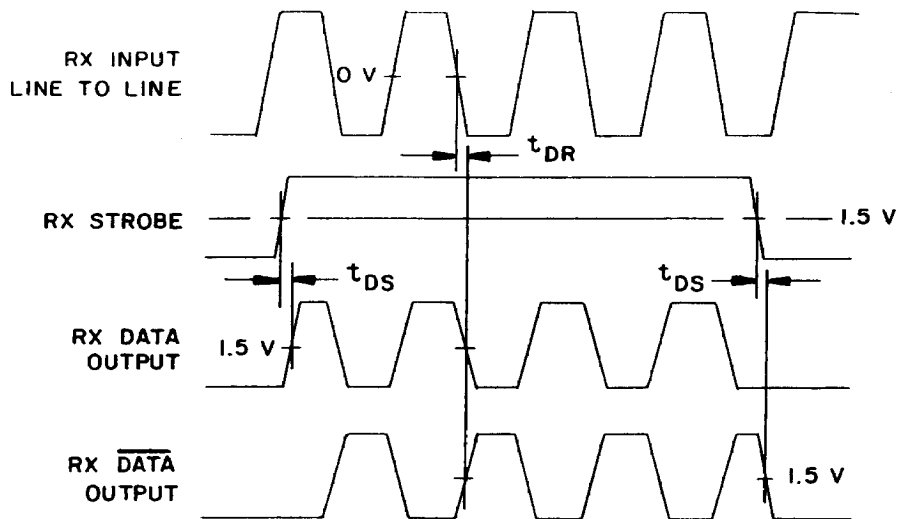
FIGURE 2. Terminal connections.

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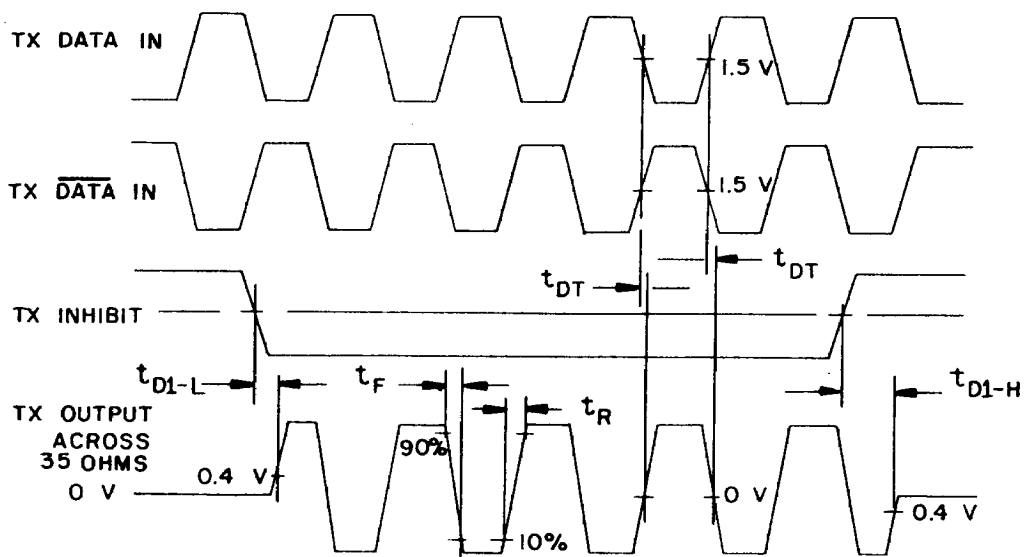
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TRANSMITTER TIMING



NOTE: Both inputs "TX DATA IN" and "TX DATA IN" must be in the same logic state during off times.

Device type 01

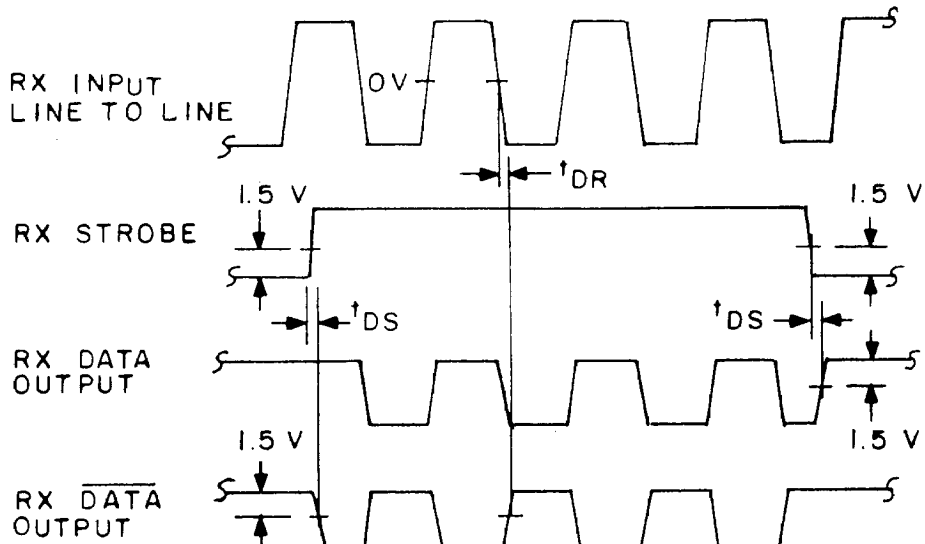
FIGURE 3. Timing waveforms.

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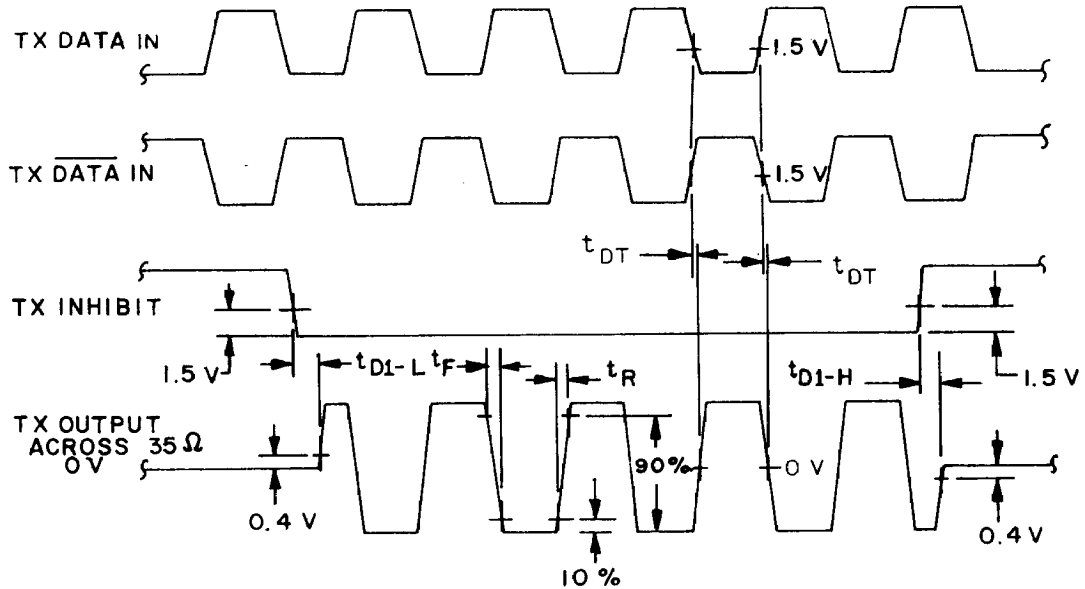
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RECEIVER TIMING



TRANSMITTER TIMING



Device type 02

FIGURE 3. Timing waveforms - Continued.

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3.6 Manufacturer eligibility. In addition to the general requirements of MIL-H-38534, the manufacturer of the part described herein shall submit for DESC-ECC review and approval electrical test data (variables format) on 22 devices from the initial quality conformance inspection group A lot sample, produced on the certified line, for each device type listed herein. The data should also include a summary of all parameters manually tested, and for those which, if any, are guaranteed.

3.7 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 QML-38534 (see 6.6 herein). The certificate of compliance submitted to DESC-ECC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-H-38534 and the requirements herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-H-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-H-38534.

4.2 Screening. Screening shall be in accordance with method MIL-H-38534. The following additional criteria shall apply:

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

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.7 herein).

(2)  $T_A$  as specified in accordance with table I of method 1015 of MIL-STD-883.

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 MIL-H-38534 and as specified herein.

4.3.1 Group A inspection. Group A inspection shall be in accordance with MIL-H-38534 and as follows:

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

b. Subgroups 7 and 8 shall be omitted.

4.3.2 Group B inspection. Group B inspection shall be in accordance with MIL-H-38534.

4.3.3 Group C inspection. Group C inspection shall be in accordance with MIL-H-38534 and as follows:

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 or C using the circuit submitted with the certificate of compliance (see 3.7 herein).

(2)  $T_A$  as specified in accordance with table I of method 1005 of MIL-STD-883.

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

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5008, group A test table)
Interim electrical parameter	
Final electrical test parameters	1*,2,3,4,5,6, 9,10,11
Group A test requirements	1,2,3,4,5,6, 9,10,11
Group C end-point electrical parameters	1,2,3

\* PDA applies to subgroup 1.

4.3.4 Group D inspection. Group D inspection shall be in accordance with MIL-H-38534.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-H-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for original equipment design applications and logistic support of existing equipment.

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-ECC, telephone (513) 296-8527.

6.5 Comments. Comments on this drawing should be directed to DESC-ECC, Dayton, Ohio 45444, or telephone (513) 296-8525.

6.6 Approved sources of supply. Approved sources of supply are listed in QML-38534. Additional sources will be added to QML-38534 as they become available. The vendors listed in QML-38534 have agreed to this drawing and a certificate of compliance (see 3.7 herein) has been submitted to and accepted by DESC-ECC.

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