THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

CURRENT CAGE CODE 67268

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REV STATUS OF SHEETS	REV	E	E	E	E	E	E	E	E	E	E	E	E	E
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13

PMIC N/A	PREPARED BY Marcia B. Kelleher	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444

CHECKED BY	Ray Monnin
APPROVED BY	Michael A. Frye
DRAWING APPROVAL DATE	82-02-24
REVISION LEVEL	E

MICROCIRCUIT, DIGITAL, CMOS, MONOSTABLE/ASTABLE MULTIVIBRATOR, MONOLITHIC SILICON

SIZE A	CAGE CODE 14933	81020
SHEET	1 OF 13	

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5962-E414-94

9004708 0003412 629

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:

81020	01	C	X
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish (see 1.2.3)

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

Device type	Generic number	Circuit function
01	4047B	Monostable/Astable multivibrator
02	4047B	Monostable/Astable multivibrator

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 package
D	GDFP1-F14 or CDFP2-F14	14	Flat package

1.2.3 **Lead finish.** The lead finish shall be as specified in MIL-STD-883 (see 3.1 herein). 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.**

Supply voltage range (V_{DD}):
    Device type 01 -0.5 V dc to +20 V dc
    Device type 02 -0.5 V dc to +18 V dc
Input voltage range -0.5 V dc to V_{DD} + 0.5 V dc
Storage temperature range -65°C to +150°C
Maximum power dissipation (P_D) - 500 mW dc 1/
Lead temperature (soldering, 10 seconds) - - - - - - - - - - - - - - - +300°C
Thermal resistance, junction to case (Θ_{JC}) - - - - - - - - - - - - - - See MIL-STD-1835
Junction temperature (T_J) - +175°C

1.4 **Recommended operating conditions.**

Supply voltage (V_{DD}):
    Device type 01 - +3.0 V dc to +18 V dc
    Device type 02 - +3.0 V dc to +15 V dc
Case operating temperature range (T_C) - - - - - - - - - - - - - - - - - - -55°C to +125°C

1/ For T_C = +100°C to +125°C, derate linearly at 12 mW/°C to 200 mW.

					81020
STANDARD **MICROCIRCUIT DRAWING** **DEFENSE ELECTRONICS SUPPLY CENTER** **DAYTON, OHIO 45444**	**SIZE** **A**				
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2. APPLICABLE DOCUMENTS

2.1 <u>Government specification, standards, and bulletin</u>. 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-I-38535 - Integrated Circuits (Microcircuits) Manufacturing, 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 <u>Order of precedence</u>. 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 <u>Item requirements</u>. 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. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-I-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-I-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-I-38535 is required to identify when the QML flow option is used.

3.2 <u>Design, construction, and physical dimensions</u>. The design, construction, and physical dimensions shall be as specified in MIL-STD-883 (see 3.1 herein) and herein.

  3.2.1 <u>Case outlines</u>. The case outlines shall be in accordance with 1.2.2 herein.

  3.2.2 <u>Terminal connections</u>. The terminal connections shall be as specified on figure 1.

  3.2.3 <u>Truth table</u>. The truth table shall be as specified on figure 2.

  3.2.4 <u>Logic diagram</u>. The logic diagram shall be as specified on figure 3.

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

3.4 <u>Electrical test requirements</u>. 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 <u>Marking</u>. 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).

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■ 9004708 0003414 4T1 ■

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T_C ≤ +125°C, unless otherwise specified		Device type	Group A subgroups	Limits		Unit
						Min	Max	
Quiescent supply current	I_{DD}	V_{DD} = 5 V 1/ V_{IN} = 0.0 V or V_{DD}		01	1, 3		1	μA
					2		30	
				02	1, 3		5	
					2		150	
		V_{DD} = 10 V 1/ V_{IN} = 0.0 V or V_{DD}		01	1, 3		2	
					2		60	
				02	1, 3		10	
					2		300	
		V_{DD} = 15 V 1/ V_{IN} = 0.0 V or V_{DD}		01	1, 3		4	
					2		120	
				02	1, 3		20	
					2		600	
		V_{DD} = 20 V 2/ V_{IN} = 0.0 V or V_{DD}		01	1, 3		20	
					2		600	
				02	1, 3		100	
					2		3000	
Low level output voltage	V_{OL}	V_{IN} = 0.0 V or V_{DD} $|I_O|$ < 1 μA	V_{DD} = 5 V 1/	All	1, 2, 3		0.05	V
			V_{DD} = 10 V 1/	All	1, 2, 3		0.05	
			V_{DD} = 15 V	All	1, 2, 3		0.05	
High level output voltage	V_{OH}	V_{IN} = 0.0 V or V_{DD} $|I_O|$ < 1 μA	V_{DD} = 5 V 1/	All	1, 2, 3	4.95		
			V_{DD} = 10 V 1/	All	1, 2, 3	9.95		
			V_{DD} = 15 V	All	1, 2, 3	14.95		

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		81020
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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \leq T_C \leq +125°C$, unless otherwise specified	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Low level input voltage	V_{IL}	$V_{DD} = 5$ V $V_O = 0.5$ V or 4.5 V	All	1, 2, 3		1.5	V
		$V_{DD} = 10$ V $V_O = 1.0$ V or 9.0 V 1/	All	1, 2, 3		3.0	
		$V_{DD} = 15$ V $V_O = 1.5$ V or 13.5 V	All	1, 2, 3		4.0	
High level input voltage	V_{IH}	$V_{DD} = 5$ V $V_O = 0.5$ V or 4.5 V	All	1, 2, 3	3.5		V
		$V_{DD} = 10$ V $V_O = 1.0$ V or 9.0 V 1/	All	1, 2, 3	7.0		
		$V_{DD} = 15$ V $V_O = 1.5$ V or 13.5 V	All	1, 2, 3	11		
Low level output current 3/	I_{OL}	$V_{DD} = 5$ V $V_O = 0.4$ V	All	1	0.51		mA
				2	0.36		
				3	0.64		
		$V_{DD} = 10$ V $V_O = 0.5$ V	All	1	1.3		
				2	0.9		
				3	1.6		
		$V_{DD} = 15$ V $V_O = 1.5$ V	All	1	3.4		
				2	2.4		
				3	4.2		
High level output current 3/	I_{OH}	$V_{DD} = 5$ V $V_O = 4.6$ V	All	1	-0.51		mA
				2	-0.36		
				3	-0.64		
		$V_{DD} = 5$ V $V_O = 2.5$ V	01	1	-1.6		
				2	-1.15		
				3	-2.0		

See footnotes at end of table.

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TABLE I. <u>Electrical performance characteristics</u> - Continued.

Test	Symbol	Conditions -55°C $\leq T_C \leq$ +125°C, unless otherwise specified		Device type	Group A subgroups	Limits		Unit
						Min	Max	
High level output current 3/	I_{OH}	V_{DD} = 10 V V_O = 9.5 V		All	1	-1.3		mA
					2	-0.9		
					3	-1.60		
		V_{DD} = 15 V V_O = 13.5 V		All	1	-3.4		
					2	-2.4		
					3	-4.2		
Input current 2/	I_{IN}	V_{DD} = 20 V V_{IN} = 0.0 V or V_{DD}		All	1, 3		±0.1	µA
					2		±1.0	
Input capacitance	C_{IN}	V_{IN} = 0 V T_C = +25°C See 4.3.1c		01	4		7.7	pF
				02			7.5	
Functional test		See 4.3.1d		All	7, 8			
Pulse width (any input)	t_w	R_L = 200 kΩ C_L = 50 pF minimum $t_r = t_f$ = 20 ns	V_{DD} = 5 V 1/	01	9	1000		ns
					10, 11	1500		
				02	9	1000		
					10, 11	1500		
			V_{DD} = 10 V 1/	01	9	230		
					10, 11	311		
				02	9	400		
					10, 11	400		
			V_{DD} = 15 V 1/	01	9	160		
					10, 11	225		
				02	9	320		
					10, 11	320		
Transition time	t_{THL}, t_{TLH}		V_{DD} = 5 V	01	9	10	200	
					10, 11	15	300	
				02	9	10	200	
					10, 11	15	300	

See footnotes at end of table.

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■■ 9004708 0003417 100 ■■

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \leq T_C \leq +125°C$, unless otherwise specified		Device type	Group A subgroups	Limits		Unit
						Min	Max	
Transition time	t_{THL}, t_{TLH}	R_L = 200 kΩ C_L = 50 Pf minimum $t_r = t_f$ = 20 ns	V_{DD} = 10 V 1/	01	9	2.0	100	ns
					10, 11	2.0	150	
				02	9	2.0	100	
					10, 11	2.0	150	
			V_{DD} = 15 V 1/	01	9	2.0	80	
					10, 11	2.0	120	
				02	9	2.0	80	
					10, 11	2.0	120	
Propagation delay time, Astable to OSC out, Astable to OSC out	t_{PHL1}, t_{PLH1}		V_{DD} = 5 V	01	9	20	400	
					10, 11	30	600	
				02	9	20	400	
					10, 11	30	600	
			V_{DD} = 10 V 1/	01	9	2.0	200	
					10, 11	2.0	270	
				02	9	2.0	200	
					10, 11	2.0	280	
			V_{DD} = 15 V 1/	01	9	2.0	160	
					10, 11	2.0	216	
				02	9	2.0	160	
					10, 11	2.0	225	
Propagation delay time, Astable to Q, Astable to Q̄, Astable to Q̄, Astable to Q	t_{PHL2}, t_{PLH2}		V_{DD} = 5 V	01	9	45	900	
					10, 11	68	1350	
				02	9	45	900	
					10, 11	68	1350	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C $\leq T_C \leq$ +125°C, unless otherwise specified		Device type	Group A subgroups	Limits		Unit
						Min	Max	
Propagation delay time, Astable to $\overline{Q}$, Astable to Q, Astable to $\overline{Q}$, Astable to Q	t_{PHL2}, t_{PLH2}	R_L = 200 kΩ C_L = 50 pF minimum $t_r = t_f$ = 20 ns	V_{DD} = 10 V 1/	01	9	2.0	350	ns
					10, 11	2.0	473	
				02	9	2.0	500	
					10, 11	2.0	700	
			V_{DD} = 15 V 1/	01	9	2.0	250	
					10, 11	2.0	338	
				02	9	2.0	400	
					10, 11	2.0	560	
Propagation delay time, + Trig to $\overline{Q}$, + Trig to Q, - Trig to $\overline{Q}$, - Trig to Q	t_{PHL3}, t_{PLH3}		V_{DD} = 5 V	01	9	60	1200	
					10, 11	90	1800	
				02	9	60	1200	
					10, 11	90	1800	
			V_{DD} = 10 V 1/	01	9	2.0	450	
					10, 11	2.0	608	
				02	9	2.0	600	
					10, 11	2.0	840	
			V_{DD} = 15 V 1/	01	9	2.0	300	
					10, 11	2.0	405	
				02	9	2.0	480	
					10, 11	2.0	670	

See footnotes at end of table.

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TABLE I. <u>Electrical performance characteristics</u> - Continued.

Test	Symbol	Conditions -55°C ≤ T$_C$ ≤ +125°C, unless otherwise specified		Device type	Group A subgroups	Limits		Unit
						Min	Max	
Propagation delay time, Retrig to Q̅, Retrig to Q	t$_{PHL4}$, t$_{PLH4}$	R$_L$ = 200 kΩ C$_L$ = 50 pF minimum t$_r$ = t$_f$ = 20 ns	V$_{DD}$ = 5 V	01	9	30	600	ns
					10, 11	45	900	
				02	9	30	600	
					10, 11	45	900	
			V$_{DD}$ = 10 V 1/	01	9	2.0	300	
					10, 11	2.0	405	
				02	9	2.0	300	
					10, 11	2.0	420	
			V$_{DD}$ = 15 V 1/	01	9	2.0	200	
					10, 11	2.0	270	
				02	9	2.0	250	
					10, 11	2.0	350	
Propagation delay time, external RESET to Q̅, external RESET to Q	t$_{PHL5}$, t$_{PLH5}$		V$_{DD}$ = 5 V	01	9	30	600	
					10, 11	45	900	
				02	9	30	600	
					10, 11	45	900	
			V$_{DD}$ = 10 V 1/	01	9	2.0	200	
					10, 11	2.0	270	
				02	9	2.0	250	
					10, 11	2.0	350	
			V$_{DD}$ = 15 V 1/	01	9	2.0	140	
					10, 11	2.0	189	
				02	9	2.0	200	
					10, 11	2.0	280	

1/ Guaranteed, if not tested, to the specified limits in table I.

2/ At T$_C$ = -55°C test is performed with V$_{DD}$ = 18 V.

3/ The I$_{OL}$ and I$_{OH}$ tests are tested 100 percent at T$_C$ = +25°C and are guaranteed if not tested for T$_C$ = -55°C and T$_C$ = +125°C.

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Device types	01 and 02
Case outlines	C and D
Terminal number	Terminal symbol
1	C
2	R
3	R C COMMON
4	$\overline{\text{ASTABLE}}$
5	ASTABLE
6	−TRIGGER
7	V_{SS}
8	+TRIGGER
9	EXT. RESET
10	Q
11	$\overline{Q}$
12	RETRIGGER
13	OSC OUT
14	V_{DD}

FIGURE 1. Terminal connections.

Device types 01 and 02

Inputs						Function
Astable	$\overline{\text{Astable}}$	+Trig	−Trig	Retrig	Reset	
1	X	0	1	0	0	Astable multivibrator (free running)
X	0	0	1	0	0	Astable multivibrator (free running)
⊓⊔	1	0	1	0	0	Astable multivibrator (true gating)
0	⊔⊓	0	1	0	0	Astable multivibrator (complement gating)
0	1	⌐	0	0	0	Monostable multivibrator (positive-edge triggering)
0	1	1	⌐L	0	0	Monostable multivibrator (Negative-edge triggering)
0	1	⌐	0	⌐	0	Monostable multivibrator (retriggering) .
X	X	X	X	X	1	Reset

FIGURE 2. Truth table.

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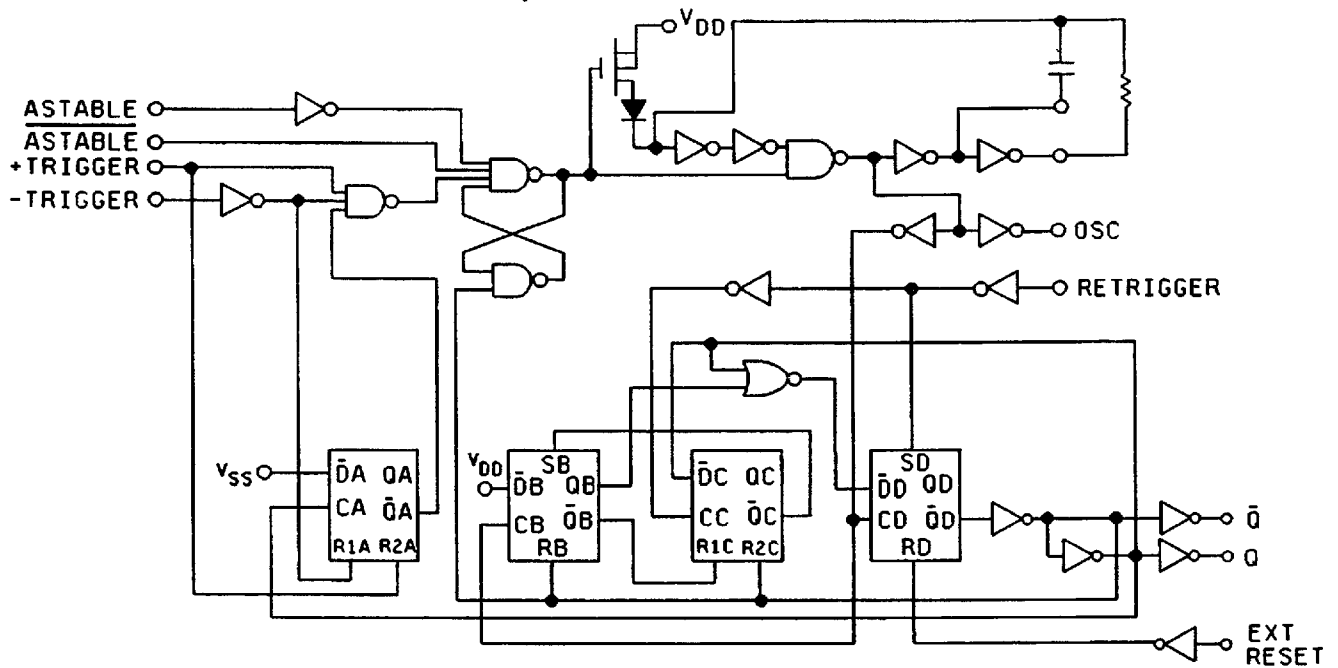
FIGURE 3. Logic diagram.

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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.

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 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.

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*,2,3,9
Group A test requirements (method 5005)	1,2,3,4,7,8 9,10**,11**
Groups C and D end-point electrical parameters (method 5005)	1,2,3

* PDA applies to subgroup 1.
** Subgroups 10 and 11, if not tested, shall be guaranteed to the specified limits in table I.

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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 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 4 (C_{IN} measurement) shall be measured only for the initial test and after process or design changes which may affect input capacitance. Capacitance shall be measured between the designated terminal and ground at a frequency of 1 MHz. Test all applicable pins on 5 devices with zero failures.

d. Subgroups 7 and 8 shall include verification of the truth table as specified on figure 2 herein.

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.

5. **PACKAGING**

5.1 **Packaging requirements.** The requirements for packaging shall be in accordance with MIL-STD-883 (see 3.1 herein).

6. **NOTES**

6.1 **Intended use.** Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

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-973 using DD Form 1692, Engineering Change Proposal.

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 45444-5270, 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.

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