

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
F	Add peak current to absolute maximum ratings. Editorial changes throughout.	92-11-24	M. A. Frye

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

CURRENT CAGE CODE 67268

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REV STATUS OF SHEETS	REV	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13				
PMIC N/A	PREPARED BY Donald Osborne				DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444													
STANDARDIZED MILITARY DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	CHECKED BY D. A. DiCenzo				MICROCIRCUIT, LINEAR, CMOS, HIGH LEVEL ANALOG SWITCHES WITH DRIVERS, MONOLITHIC SILICON													
	APPROVED BY N. A. Hauck																	
	DRAWING APPROVAL DATE 81-10-01				SIZE A	CAGE CODE 14933	81006											
	REVISION LEVEL F				SHEET	1	OF	13	1									

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5962-E663-92

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

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:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	IH5040, DG5140	One-channel, 75 ohms, SPST switch
02	IH5041, DG5141	Two-channel, 75 ohms, SPST switch
03	IH5042, DG5142	One-channel, 75 ohms, SPDT switch
04	IH5043, DG5143	Two-channel, 75 ohms, SPDT switch
05	IH5044, DG5144	One-channel, 75 ohms, DPST switch
06	IH5045, DG5145	Two-channel, 75 ohms, DPST switch
07	IH5046	One-channel, 75 ohms, DPDT switch
08	IH5047	One-channel, 75 ohms, 4PST switch
09	IH5140, HI5040	One-channel, 75 ohms, SPST switch
10	IH5141, HI5041	Two-channel, 75 ohms, SPDT switch
11	IH5142, HI5042	One-channel, 75 ohms, SPDT switch
12	IH5143, HI5043	Two-channel, 30 ohms, SPDT switch
13	IH5144, HI5044	One-channel, 30 ohms, DPST switch
14	IH5145, HI5045	Two-channel, 75 ohms, DPST switch
15	HI5046	One-channel, 75 ohms, DPDT switch
16	IH5047, HI5047	One-channel, 75 ohms, 4PST switch
17	HI5046A	One-channel, 30 ohms, DPDT switch
18	HI5047A	One-channel, 30 ohms, 4PST switch
19	IH5148, HI5048	Two-channel, 30 ohms, SPST switch
20	IH5149, HI5049	Two-channel, 30 ohms, DPST switch
21	IH5150, HI5050	One-channel, 30 ohms, SPDT switch
22	IH5151, HI5051	Two-channel, 30 ohms, SPDT switch

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

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
A	GD FP5-F14 or CD FP6-F14	14	Flat pack
E	GD IP1-T16 or CD IP2-T16	16	Dual-in-line
I	MAC Y1-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.

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1.3 Absolute maximum ratings.

V+ - V-	33 V dc
V+ - V _D	30 V dc
V _D - V-	30 V dc
V _D - V _S	±22 V dc
V _L - V-	33 V dc
V _L - V _{IN}	30 V dc
V _L - V _R	20 V dc
V _{IN} - V _R	20 V dc
V _R - V-	33 V dc
V _R - V _{IN}	2 V dc
Current (any terminal except S or D)	30 mA
Peak current (source to drain) ^{1/}	80 mA
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Junction temperature (T _J)	+175°C
Power dissipation, (P _D) ^{2/} :	
Case A at T _A = +125°C	350 mW
Case E at T _A = +125°C	400 mW
Case I at T _A = +125°C	350 mW
Case 2 at T _A = +125°C	350 mW

1.4 Recommended operating conditions.

+V _{CC}	+15 V dc
-V _{CC}	-15 V dc
V _R	0 V dc
V _L	5 V dc
Ambient operating temperature range (T _A)	-55°C to +125°C
Thermal resistance, junction-to-case (θ _{JC})	See MIL-STD-1835

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.)

^{1/} Pulse at 1 ms, 10 percent duty cycle maximum.
^{2/} For T_C = +100°C to +125°C, derate linearly at 12 mW/°C.

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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.

3.3.1 Switch operation. The analog switches listed below are guaranteed to turn "on" with either a "Low" input ($V_R \leq V_{IL} \leq 0.8 \text{ V}$) or "high" input ($2.4 \text{ V} \leq V_{IH} \leq V_{IL}$) as specified below (see figure 1).

Device types	V_{IN}	Channels ON	Channels OFF
01, 09	2.4 V dc 0.8 V dc	1	1
02, 10,	2.4 V dc 0.8 V dc	1, 2	1, 2
03, 05, 11, 13, 17, 18	2.4 V dc 0.8 V dc	1 2	2 1
04, 12, 19	2.4 V dc 0.8 V dc	1, 2 3, 4	3, 4 1, 2
07, 15, 21	2.4 V dc 0.8 V dc	2, 3 1, 4	1, 4 2, 3
06, 08, 14, 16, 20, 22	2.4 V dc 0.8 V dc	1, 2, 3, 4	1, 2, 3, 4

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.

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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C, V _{CC} = ±15 V unless otherwise specified		Group A subgroups	Device type	Limits		Unit
						Min	Max	
Drain source "ON" resistance	R _{DS}	V _D = -10 V I _S = 10 mA	1, 3	1 through 16		75	Ω 1/	
					2			150
			1, 3	17 through 22				45
					2			50
			V _D = 10 V I _S = -10 mA	1, 3		1 through 16		
					2			
		1, 3		17 through 22				45
					2			50
		V _{CC} = ±10 V 2/	V _D = -7.5 V I _S = 10 mA	1, 3		ALL		
				2				150
			V _D = 7.5 V I _S = -10 mA	1, 3	ALL			75
		2		150				
Channel "ON" leakage current	I _{D(ON)}	(See 3.3.1 for V _{IN})	V _S = V _D = 10 V	2, 3	ALL	-200	200	nA
				1			-2	
			V _S = V _D = -10 V	2, 3	ALL	-200	200	
				1			-2	
Drain "OFF" leakage current	I _{D(OFF)}	(See 3.3.1 for V _{IN})	V _S = -10 V V _D = 10 V	2, 3	ALL	-100	100	
				1			-1	1
			V _S = 10 V V _D = -10 V	2, 3	ALL	-100	100	
				1			-1	1
Source "OFF" leakage current	I _{S(OFF)}	(See 3.3.1 for V _{IN})	V _S = 10 V V _D = -10 V	2, 3	ALL	-100	100	
				1			-1	1
			V _S = -10 V V _D = 10 V	2, 3	ALL	-100	100	
				1			-1	1

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C, V _{CC} = ±15 V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input current, input voltage low	I _{IL}	V _{IN} = 0 V	1, 3	ALL	-1	1	μA
			2		-10	1	
Input current, input voltage high	I _{IH}	V _{IN} = 2.4 V, 5 V	1, 3	ALL	-1	1	μA
			2		-1	10	
Positive supply current	+I _{CC}	V _{IN} = 0 V, 5 V	1, 3	1 through 8		10	μA
			2			100	
			1	9 through 22		200	
			2, 3			300	
Negative supply current	-I _{CC}	V _{IN} = 0 V, 5 V	1, 3	1 through 8	-10		μA
			2		-100		
			1	9 through 22	-200		
			2, 3		-300		
Logic supply current	+I _L	V _{IN} = 0 V, 5 V	1, 3	1 through 8		10	μA
			2			100	
			1	9 through 22		-200	
			2, 3			-300	
Reference supply current	+I _R	V _{IN} = 0 V, 5 V	1, 3	1 through 8	-10		μA
			2		-100		
			1	9 through 22	-200		
			2, 3		-300		
Turn-on time	t _{on}		11	1 through 8		375	ns
			9			450	
			10			550	
			11	9 through 22		450	
			9			500	
			10			800	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C, V _{CC} = ±15 V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Turn-off time	t _{off}		11	1 through 8		250	ns
			9			250	
			10			400	
			11	9 through 22		350	
			9			450	
			10			600	
Single channel isolation <u>2/</u>	V _{ISO}	R _L = 100Ω, f = 100 kHz, V _{IN} = 2 V _{p-p} , C _L = 5 pF, T _A = +25°C,	9	ALL	60		dB
Crosstalk between channels <u>2/</u>	V _{CT}	R _L = 100Ω, C _L = 5 pF, f = 100 kHz, V _{IN} = 2 V _{p-p} , T _A = +25°C	9	ALL	60		dB
Charge transfer <u>2/</u> error	V _{CTE}	V _{IN} = 0 V, C _L = 10 nF, T _A = +25°C	9	ALL		30	mV
Break before make <u>2/</u> time delay	t _D	T _A = +25°C	9	03,04, 07	5		ns
Driver input <u>2/</u> capacitance	C _A	V _{IN} = 0 V, T _A = +25°C	9	ALL		45	pF
Switch input <u>2/</u> capacitance	C _{IS}	Switch off, T _A = +25°C	9	ALL		60	pF
Switch output <u>2/</u> capacitance	C _{OS}	Switch off, T _A = +25°C	9	ALL		60	pF

1/ The listed resistance limits correspond to the following voltage values:

45Ω and 75Ω - ±9.25 V, ±6.75 V

50Ω and 150Ω - ±8.50 V, ±6.0 V

2/ If not tested shall be guaranteed at the specified limits.

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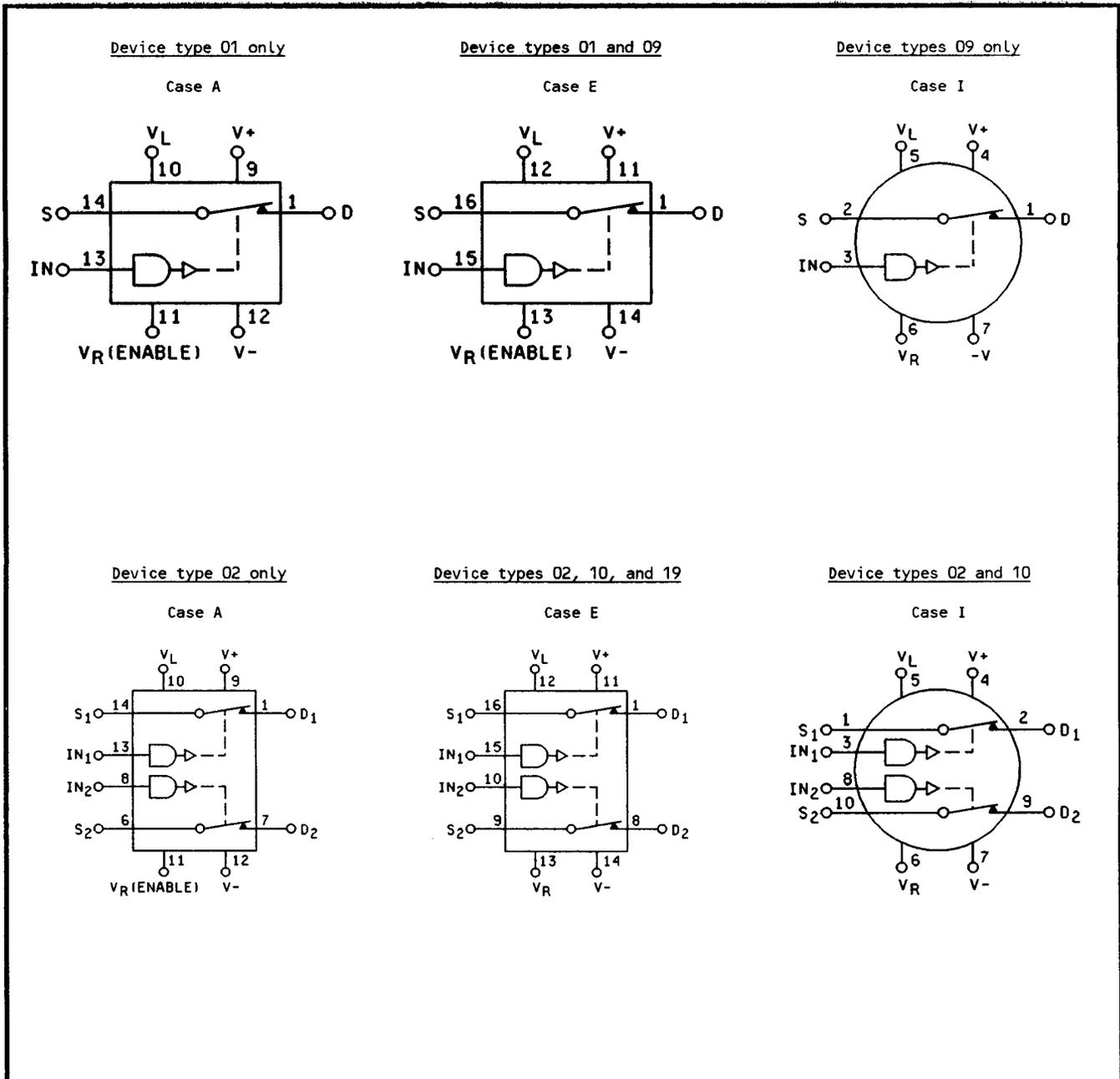


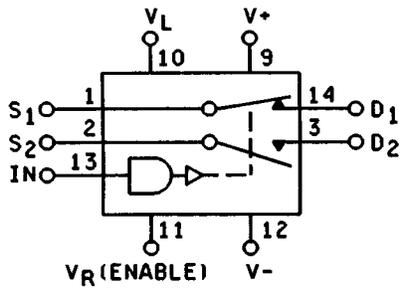
FIGURE 1. Terminal connections.

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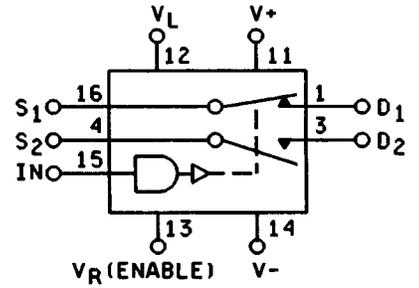
Device type 03 only

Case A



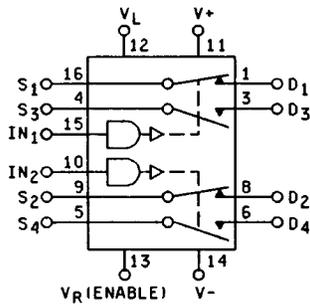
Device types 03, 11, and 21

Case E



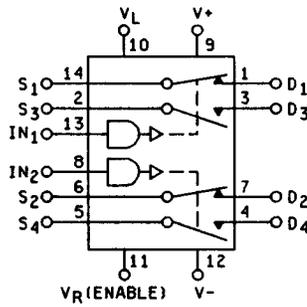
Device type 04 only

Case A



Device types 12 and 22

Case E



Case 2

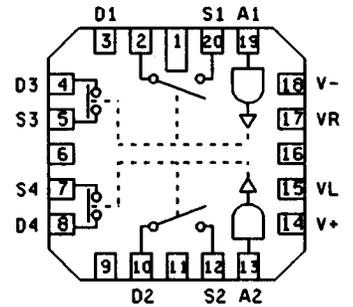


FIGURE 1. Terminal connections - Continued.

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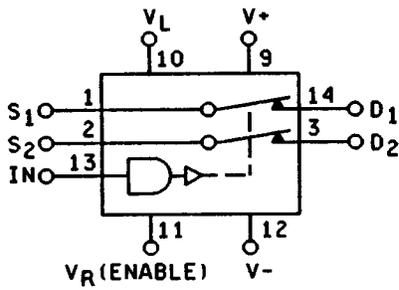
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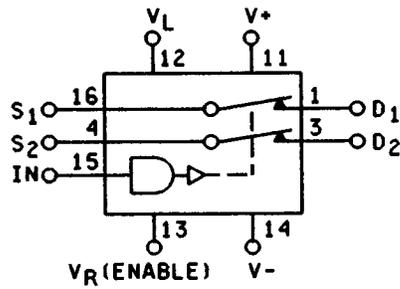
Device type 05 only

Case A

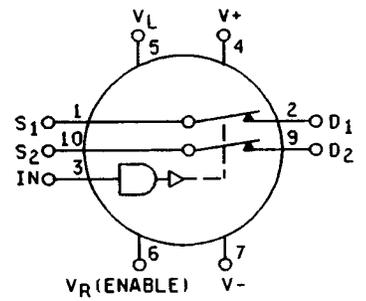


Device types 05 and 13

Case E

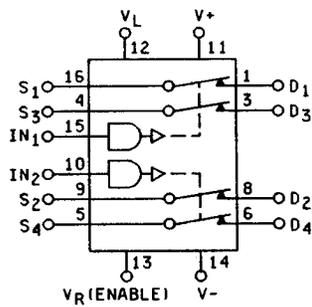


Case I



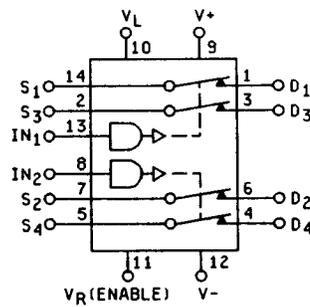
Device type 06 only

Case A



Device types 06, 14, and 20

Case E



Device types 14 and 20

Case 2

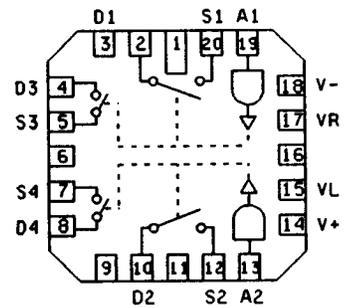


FIGURE 1. Terminal connections - Continued.

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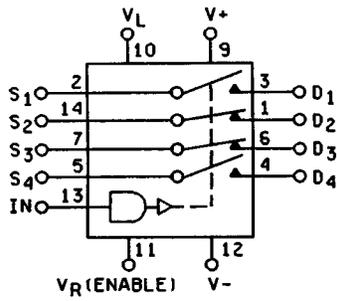
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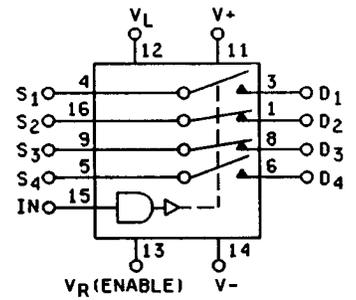
Device type 07 only

Case A



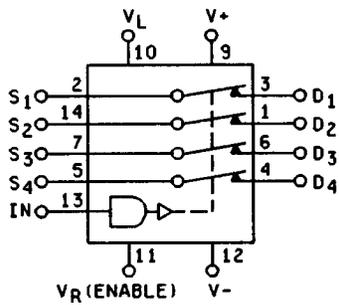
Device types 07, 15, and 17

Case E



Device type 08 only

Case A



Device types 08, 16, and 18

Case E

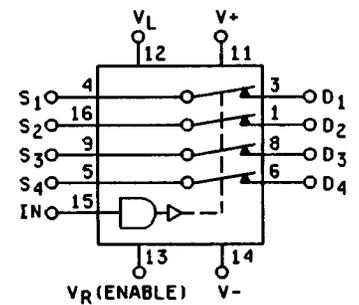


FIGURE 1. Terminal connections - Continued.

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

* PDA applies to subgroup 1.

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) $T_A = +125^{\circ}\text{C}$, 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 4, 5, 6, 7, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

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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) $T_A = +125^\circ\text{C}$, 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-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. Replaceability is determined as follows:

- a. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.
- b. When a QPL source is established, the device specified in this drawing will be replaced by the microcircuit identified as PIN M38510/10501BXX-----/10508BXX.

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.

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