REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

REV																								
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	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14									

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

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DRAWING APPROVAL DATE
12 JULY 1988

REVISION LEVEL

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, DIGITAL, ECL, ONE SHOT MULTIVIBRATOR, MONOLITHIC SILICON

SIZE	CAGE CODE	5962-87773
A	67268	

SHEET 1 OF 14

DESC FORM 193
SEP 87

* U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911

5962-E754

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 number. The complete part number shall be as shown in the following example:

5962-87773	01	E	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	10598	Monostable multivibrator

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

Outline letter	Case outline
E	D-2 (16-lead, .840" x .310" x .200"), dual-in-line package
F	F-5 (16-lead, .440" x .285" x .085"), flat package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range (V_{CC} = 0.0 V)	-8.0 V dc to 0.0 V dc
Input voltage range (V_{CC} = 0.0 V)	0.0 V dc to -5.2 V dc
Storage temperature range	-65°C to +165°C
Lead temperature (soldering, 10 seconds)	+300°C
Junction temperature (T_J)	+165°C
Maximum power dissipation (P_D)	440 mW
Thermal resistance, junction-to-case (θ_{JC})	See MIL-M-38510, appendix C

1.4 Recommended operating conditions.

Supply voltage (V_{EE})	-4.94 V dc minimum to -5.46 V dc maximum
Ambient operating temperature range (T_A)	-55°C to +125°C
Minimum high level input voltage (V_{IH}):	
T_A = +25°C	-0.780 V dc
T_A = +125°C	-0.630 V dc
T_A = -55°C	-0.880 V dc
Maximum low level input voltage (V_{IL}):	
T_A = +25°C	-1.850 V dc
T_A = +125°C	-1.820 V dc
T_A = -55°C	-1.920 V dc

2. APPLICABLE DOCUMENTS

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

SPECIFICATION

MILITARY

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

STANDARD

MILITARY

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

(Copies of the specification 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 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 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Truth table. The truth table shall be as specified on figure 2.

3.2.3 Precondition sequence. The precondition sequence is specified on figure 3A.

3.2.4 Conditions for testing output levels. The conditions for testing output levels is specified on figure 3B.

3.2.5 Switching waveforms and test circuit. The switching waveforms and test circuit shall be as specified on figure 4.

3.2.6 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

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

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified			Group A subgroups	Limits		Unit
						Min	Max	
Cases E, F, and 2		Quiescent tests 1/ 2/						
High level output voltage	V_{OH}	Outputs terminated through 100Ω to -2 V V_{CC} = 0.0 V V_{EE} = -5.2 V 3/	V_{IH}	V_{IL}				
			-0.780	-1.850	1	-0.930	-0.780	V
			-0.630	-1.820	2	-0.825	-0.630	
			-0.880	-1.920	3	-1.080	-0.880	
Low level output voltage	V_{OL}		-0.780	-1.850	1	-1.850	-1.620	V
			-0.630	-1.820	2	-1.820	-1.545	
			-0.880	-1.920	3	-1.920	-1.665	
High level threshold output voltage	V_{OHA}		-1.475	-1.105	1	-0.950	-0.780	V
			-1.400	-1.000	2	-0.845	-0.630	
			-1.510	-1.255	3	-1.100	-0.880	
Low level threshold output voltage	V_{OLA}		-1.475	-1.105	1	-1.850	-1.600	V
			-1.400	-1.000	2	-1.820	-1.525	
			-1.510	-1.255	3	-1.920	-1.635	
Power supply drain current	I_{EE}	V_{EE} = -5.46 V V_{CC} = 0.0 V V_{IH} = -0.780 V at +25°C -0.630 V at +125°C -0.880 V at -55°C			1		-100	mA
					2,3		-111	
High level input current	I_{IH1}		Trigger input		1		220	µA
					2,3		375	
	I_{IH2}		$\overline{E}_{POS}$		1		260	µA
					2,3		450	
	I_{IH3}		High-speed input		1		350	µA
					2,3		595	
Low level input current	I_{IL}	V_{EE} = -4.94 V V_{CC} = 0.0 V V_{IL} = -0.780 V at +25°C V_{IL} = -0.630 V at +125°C V_{IL} = -0.880 V at -55°C			1,3		0.5	µA
					2		0.3	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^{\circ}C \le T_A \le +125^{\circ}C$ unless otherwise specified	Group A subgroups	Limits Min	Limits Max	Unit
Cases E, F, and 2		AC tests				
Transition time	t_r t_f	V_{EE} = -3.2 V V_{CC} = +2.0 V $C_L \le 5$ pF $R_L = 100\Omega$ See figure 4	9	1.5	3.5	ns
			10,11	1.0	4.5	
Propagation delay time, trigger delay to output	t_{PHH1} t_{PLL} t_{PHL1} t_{PLH}		9	2.5	5.5	ns
			10,11	2.0	7.0	
Propagation delay time, high-speed to output	t_{PHL2} t_{PHH2}		9	1.5	2.8	ns
			10,11	1.0	4.0	
Setup time, hold time	t_S t_H		9	1.0		ns

1/ The quiescent limits are determined after a device has reached thermal equilibrium. This is defined as the reading taken with the device in a socket with $\ge$ 500 LFPM of +25°C, +125°C or -55°C (as applicable) air blowing on the unit in a transverse direction with power applied for at least 4 minutes before the reading is taken. This method was used for theoretical limit establishment only.

2/ The ΔT test method creates the limits and test conditions to be used after an increased ambient temperature has been stabilized by external thermal sources. This adjusted temperature simulates the quiescent method by increasing the specified case temperature (+25°C, +125°C, -55°C) with a ΔT. The ΔT is theoretically determined based on the power dissipation and thermal characteristics of the device and package used.

3/ The high and low level output current varies with temperature, and can be calculated using the following formula: $I_{OH} = (V_{OH} - 2\ V)/100\Omega$; $I_{OL} = (V_{OL} - 2\ V)/100\Omega$.

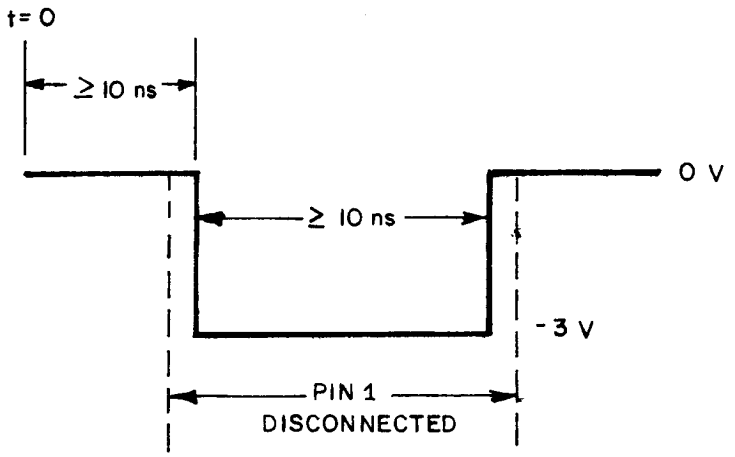
Terminal number	Terminal symbol		
	Case E	Case F	Case 2
1	V_{CC1}	TRIG IN	NC
2	$\overline{Q}$	NC	V_{CC1}
3	Q	HI-SPD	$\overline{Q}$
4	C_{EXT}	V_{CC2}	Q
5	$\overline{E}_{POS}$	V_{CC1}	C_{EXT}
6	R_{EXT}	$\overline{Q}$	NC
7	EXT PUL	Q	$\overline{E}_{POS}$
8	V_{EE}	C_{EXT}	R_{EXT}
9	NC	$\overline{E}_{POS}$	EXT PUL
10	$\overline{E}_{NEG}$	R_{EXT}	V_{EE}
11	NC	EXT PUL	NC
12	NC	V_{EE}	NC
13	TRIG IN	NC	$\overline{E}_{NEG}$
14	NC	$\overline{E}_{NEG}$	NC
15	HI-SPD	NC	NC
16	V_{CC2}	NC	NC
17	---	---	TRIG IN
18	---	---	NC
19	---	---	HI-SPD
20	---	---	V_{CC2}

NC = No connection.

FIGURE 1. Terminal connections.

Input		Output
$\overline{E}_{POS}$	$\overline{E}_{NEG}$	
L	L	Triggers on both positive and negative input slopes
L	H	Triggers on the positive input slope
H	L	Triggers on the negative input slope
H	H	Trigger is disabled

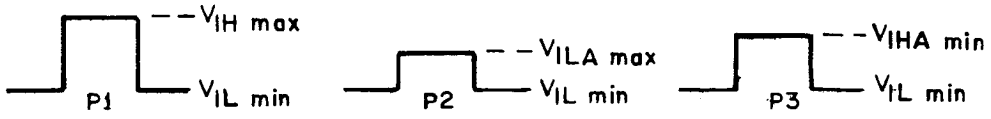
FIGURE 2. Truth table.



NOTES:

1. At t = 0
   a. Apply $V_{IH\ max}$ to pins 5 and 10.
   b. Apply $V_{IL\ min}$ to pin 15.
   c. Ground pin 4.
2. At t ≥ 10 ns
   a. Open pin 1.
   b. Apply -3.0 V dc to pin 4.
   Hold test conditions for ≥ 10 ns.
3. Return pin 4 to ground and perform test as indicated on figure 3B.

FIGURE 3A. Precondition sequence.



Pins 1 and 16 = V_{CC} = Ground.
Pins 6 and 8 = V_{EE} = -5.2 V dc.
Outputs loaded 50Ω to -2.0 V dc.
See figure 3A for precondition sequence.
All pin references on figure 3 are for E package.

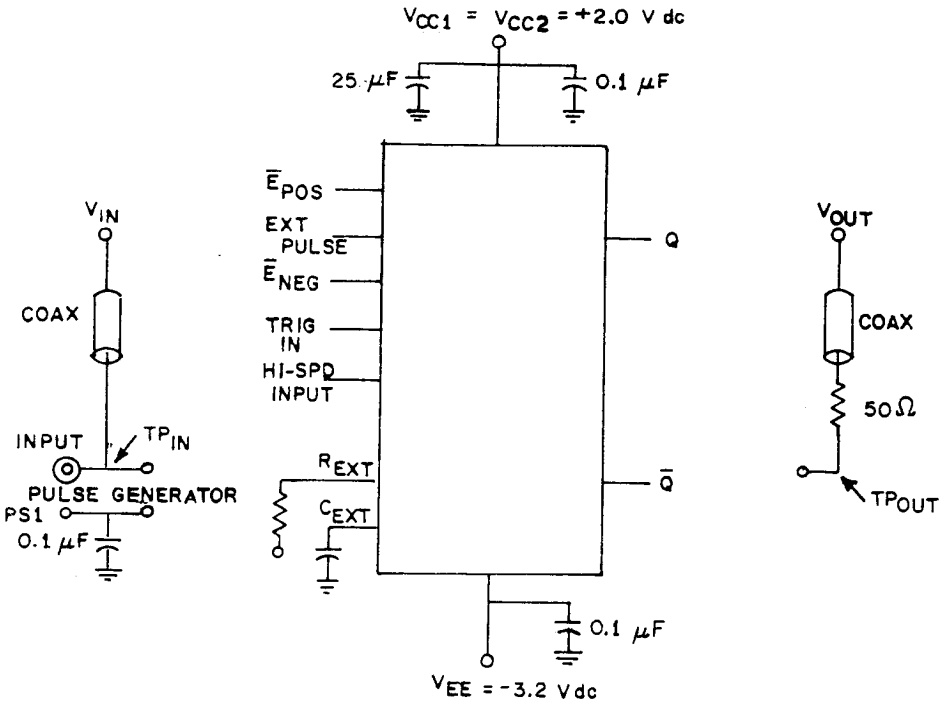
FIGURE 3B. Conditions for testing output levels.

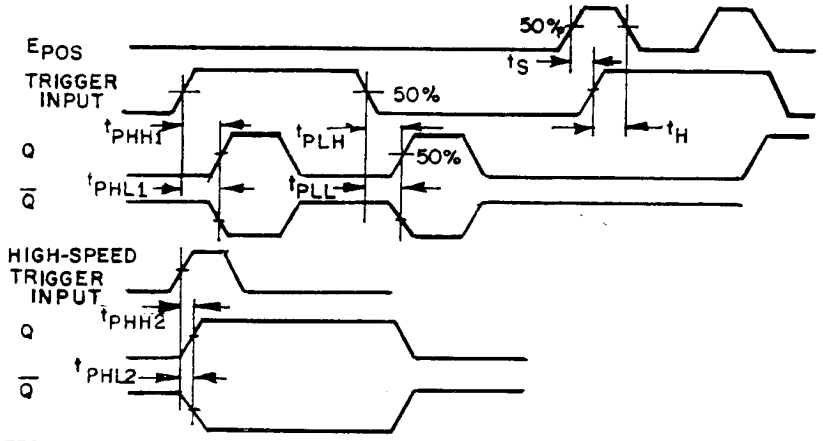
Test	Symbol	P.U.T.	Pin condition			
			$\bar{E}_{POS}$	$\bar{E}_{NEG}$	Trigger in	High-speed in
Precondition (see figure 3A)						
1 2	V_{OH} V_{OH}	Q $\overline{Q}$			P1 V_{IL} min	
Precondition (see figure 3A)						
3 4	V_{OL} V_{OL}	Q $\overline{Q}$			$V_{IL_{P1}}$ min	
Precondition (see figure 3A)						
5 6	V_{OHA} V_{OHA}	Q $\overline{Q}$				V_{IHA} min V_{ILA} max
Precondition (see figure 3A)						
7 8	V_{OHA} V_{OHA}	Q $\overline{Q}$			P3 V_{IL} min	
Precondition (see figure 3A)						
9 10	V_{OHA} V_{OHA}	Q $\overline{Q}$			P3 P2	
Precondition (see figure 3A)						
11 12	V_{OHA} V_{OHA}	Q $\overline{Q}$		V_{IH} max V_{IH} max	P3 P2	
Precondition (see figure 3A)						
13 14	V_{OHA} V_{OHA}	Q $\overline{Q}$		V_{IH} max V_{IH} max	P1 P1	

FIGURE 3B. Conditions for testing output levels - Continued.

Test	Symbol	P.U.T.	Pin condition			
			$\overline{E}_{POS}$	$\overline{E}_{NEG}$	Trigger in	High-speed in
Precondition (see figure 3A)						
15 16	V_{OHA} V_{OHA}	Q $\overline{Q}$		V_{ILA} max V_{IHA} min	P1 P1	
Precondition (see figure 3A)						
17 18	V_{OLA} V_{OLA}	Q $\overline{Q}$				V_{ILA} max V_{IHA} min
Precondition (see figure 3A)						
19 20	V_{OLA} V_{OLA}	Q $\overline{Q}$			V_{IL} min V_{IL} min	
Precondition (see figure 3A)						
21 22	V_{OLA} V_{OLA}	Q $\overline{Q}$			P2 P3	
Precondition (see figure 3A)						
23 24	V_{OLA} V_{OLA}	Q $\overline{Q}$		V_{IH} max V_{IH} max	P2 P3	
Precondition (see figure 3A)						
25 26	V_{OLA} V_{OLA}	Q $\overline{Q}$	V_{IHA} min V_{ILA} max	V_{IH} max V_{IH} max	P1 P1	
Precondition (see figure 3A)						
27 28	V_{OLA} V_{OLA}	Q $\overline{Q}$	V_{IH} max V_{IH} max	V_{IHA} min V_{ILA} max	P1 P1	

FIGURE 3B. Conditions for testing output levels - Continued.





NOTES:
1. Input pulse $t_r = t_f = 2.0 \pm 0.2$ ns.
2. Unused outputs are tied to a 100 ohm resistor to ground.
3. 50 ohm termination to ground located in each scope channel input.
4. All input and output cables to the scope are equal lengths of 50 ohm coaxial cable. Wire length should be < 1/4 inch from TP_{in} to input pin and TP_{out} to output pin.

FIGURE 4. Test circuit and switching waveforms.

3.5 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 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.6 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.

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

3.8 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 D or E using the circuit submitted with the certificate of compliance (see 3.5 herein).

(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 4, 5, and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroups 7 and 8 tests shall verify the truth table 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 D or E using the circuit submitted with the certificate of compliance (see 3.5 herein).

(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 (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*, 2, 3, 7*, 8, 9
Group A test requirements (method 5005)	1, 2, 3, 7, 8, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroups 1 and 7.

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 OEM 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 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

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6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/
5962-8777301EX	04713	10598/BEAJC
5962-8777301FX	04713	10598/BFAJC
5962-87773012X	04713	10598M/B2AJC

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE number	Vendor name and address
04713	Motorola, Incorporated 7402 South Price Road Tempe, AZ 85283

011325