

REVISIONS																			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED																
A	Add device type 02. Add case outline F. Technical changes in table I and table II. Editorial changes throughout. Technical changes in 4.3.1c. Editorial changes in Figure 4.	89 FEB 06	<i>M.R. Jx</i>																

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

PMIC N/A	PREPARED BY <i>Marcia B Kelleher</i>	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 <i>Ray Monnin</i>			MICROCIRCUIT, DIGITAL, FAST CMOS, 1 OF 8 DECODER, MONOLITHIC SILICON
	APPROVED BY <i>[Signature]</i>			
	DRAWING APPROVAL DATE 30 NOVEMBER 1987	SIZE A	CAGE CODE 67268	
	REVISION LEVEL A	SHEET 1 OF 12		

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• U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911
5962-E1160

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

5962-87654	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	54FCT138	1-of-8 decoder, TTL compatible
02	54FCT138A	1-of-8 decoder, TTL compatible

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. 1/

Supply voltage (V_{CC})	- - - - -	-0.5 V dc to +6.0 V dc
Input voltage range	- - - - -	-0.5 V dc to $V_{CC} + 0.5$ V dc
Output voltage range	- - - - -	-0.5 V dc to $V_{CC} + 0.5$ V dc
DC input diode current (I_{IK})	- - - - -	-20 mA
DC output diode current (I_{OK})	- - - - -	-50 mA
DC output current	- - - - -	± 100 mA
Maximum power dissipation (P_D)	2/ - - - - -	500 mW
Thermal resistance junction-to-case (θ_{JC})	- - - - -	See MIL-M-38510, appendix C
Storage temperature range	- - - - -	-65°C to +150°C
Junction temperature (T_J)	- - - - -	+175°C
Lead temperature (soldering, 10 seconds)	- - - - -	+300°C

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	- - - - -	+4.5 V dc to +5.5 V dc
Maximum low level input voltage (V_{IL})	- - - - -	0.8 V dc
Minimum high level input voltage (V_{IH})	- - - - -	2.0 V dc
Case operating temperature (T_C)	- - - - -	-55°C to +125°C

1/ All voltages referenced to GND.

2/ Must withstand the added P_D due to short circuit test, e.g., I_{OS} .

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

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

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

3.2.4 Logic diagram. The logic diagram shall be as specified on figure 3.

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

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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T _C < +125°C V _{CC} = 5.0 V _{dc} ±10% unless otherwise specified	Device types	Group A subgroups	Limits		Unit
					Min	Max	
High level output voltage	V _{OH}	V _{CC} = 4.5 V V _{IL} = 0.8 V V _{IH} = 2.0 V	I _O = -300 μA	A11	1, 2, 3	4.3	V
			I _O = -12 mA	A11	1, 2, 3	2.4	V
Low level output voltage	V _{OL}	V _{CC} = 3.0 V V _{IL} = 0.8 V V _{IH} = 2.0 V	I _O = 300 μA	A11	1, 2, 3	0.2	V
			I _O = 32 mA	A11	1, 2, 3	0.5	V
Input clamp voltage	V _{IK}	V _{CC} = 4.5 V, I _{IN} = -18 mA		A11	1	-1.2	V
High level input current	I _{IH}	V _{CC} = 5.5 V, V _{IN} = 5.5 V		A11	1, 2, 3	5.0	μA
Low level input current	I _{IL}	V _{CC} = 5.5 V, V _{IN} = GND		A11	1, 2, 3	-5.0	μA
Short circuit output current	I _{OS}	V _{CC} = 5.5 V <u>1/</u>		A11	1, 2, 3	-60	mA
Quiescent power supply current (CMOS inputs)	I _{CCQ}	V _{IN} ≤ 0.2 V or V _{IN} > 5.3 V V _{CC} = 5.5 V, f _I = 0 MHz		A11	1, 2, 3	1.5	mA
Quiescent power supply current (TTL inputs)	ΔI _{CC}	V _{CC} = 5.5 V, V _{IN} = 3.4 V <u>2/</u>		A11	1, 2, 3	2.0	mA
Dynamic power supply current	I _{CCD}	V _{CC} = 5.5 V, Outputs open, One input toggling 50% duty cycle V _{IN} ≥ 5.3 V or V _{IN} ≤ 0.2 V		A11	<u>3/</u>	0.3	mA/MHz

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _C < +125°C V _{CC} = 5.0 V _{dc} ±10% unless otherwise specified	Device types	Group A subgroups	Limits		Unit	
					Min	Max		
Total power 4/ supply current	I _{CC}	V _{IN} > 5.3 V or V _{IN} < 0.2 V V _{CC} = 5.5 V, f _I = 10 MHz, Outputs open One bit toggling - 50% duty cycle	A11	1, 2, 3		4.5	mA	
		V _{IN} = 3.4 V or V _{IN} = GND V _{CC} = 5.5 V, f _I = 10 MHz, Outputs open One bit toggling - 50% duty cycle	01	1, 2, 3		5.3		
			02			5.5		
Functional tests		See 4.3.1d	A11	7, 8				
Input capacitance	C _{IN}	See 4.3.1c	A11	4		10	pF	
Output capacitance	C _{OUT}	See 4.3.1c	A11	4		12	pF	
Propagation delay time A ₀ to \bar{O}_n	t _{PLH1} , t _{PHL1}	C _L = 50 pF ±10% R _L = 500Ω ±5% See figure 4	01	9,10,11	1.0	12.0	ns	
			02		1.0	7.8		
Propagation delay time E ₁ or E ₂ to \bar{O}_n	t _{PLH2} , t _{PHL2}		01	9,10,11	1.0	12.5	ns	
			02		1.0	8.0		
Propagation delay time E ₃ to \bar{O}_n	t _{PLH3} , t _{PHL3}		01	9,10,11	1.0	12.5	ns	
			02		1.0	8.0		

1/ Not more than one output should be shorted at one time and the duration of the short circuit condition should not exceed 1 second.

2/ In accordance with TTL driven input (V_{IN} = 3.4 V); all other inputs at V_{CC} or GND.

3/ This parameter is not directly testable but is derived for use in total power supply calculations.

4/ $I_{CC} = I_{CCQ} + (\Delta I_{CC} \times D_H \times N_T) + I_{CCD} (f_I \times N_I)$

where D_H = Duty cycle for TTL inputs high

N_T = Number of TTL inputs at D_H

f_I = Input frequency in MHz

N_I = Number of inputs at f_I

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Inputs			Outputs							
\bar{E}_1 E_2 E_3	A_0 A_1 A_2	\bar{O}_0 \bar{O}_1 \bar{O}_2 \bar{O}_3 \bar{O}_4 \bar{O}_5 \bar{O}_6 \bar{O}_7								
H X X	X X X	H H H H H H H H								
X H X	X X X	H H H H H H H H								
X X L	X X X	H H H H H H H H								
L L H	L L L	L H H H H H H H								
L L H	H L L	H L H H H H H H								
L L H	L H L	H H L H H H H H								
L L H	H H L	H H H L H H H H								
L L H	L L H	H H H H L H H H								
L L H	H L H	H H H H H L H H								
L L H	L H H	H H H H H H L H								
L L H	H H H	H H H H H H H L								

FIGURE 2. Truth table.

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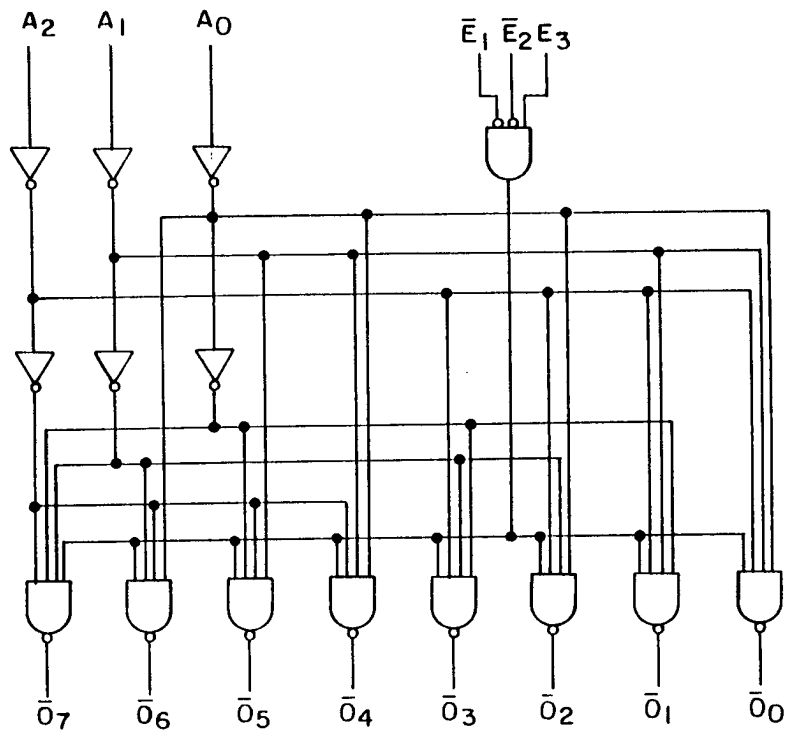
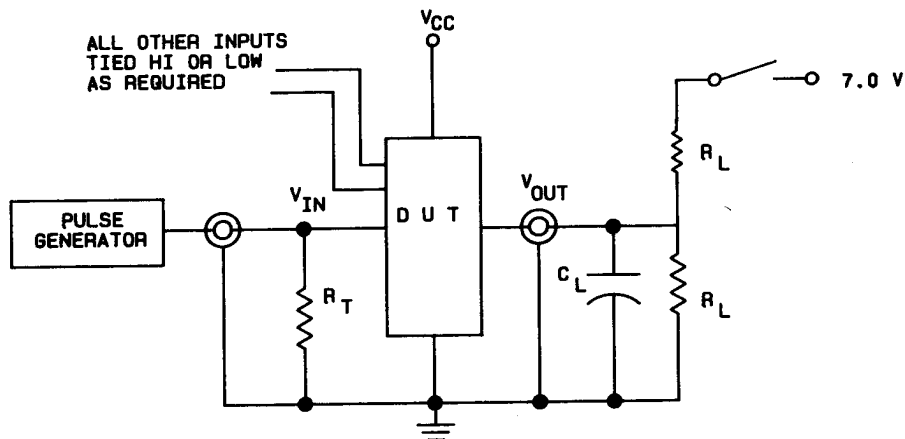
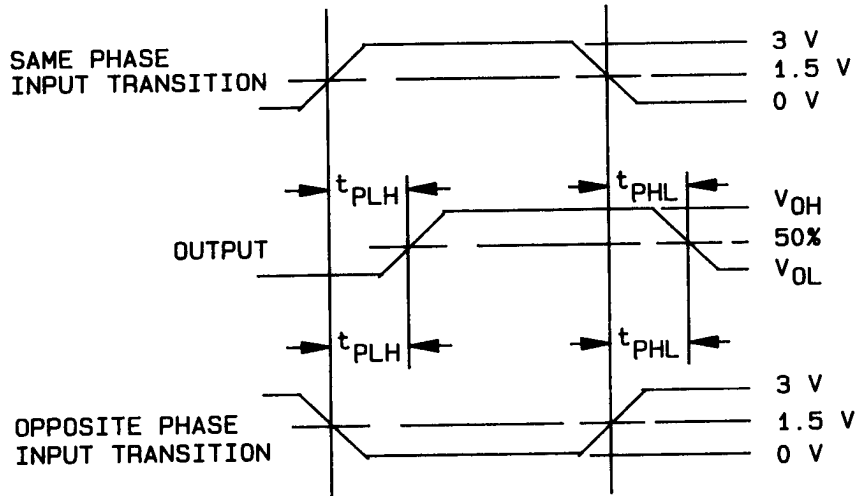


FIGURE 3. Logic diagram.

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NOTES:

1. $C_L = 50 \text{ pF}$, $R_L = 500\Omega$ or equivalent.
2. Input characteristics: $t_r = t_f = 2.5 \text{ ns}$ (10% to 90%).
3. When testing t_{PLH} and t_{PHL} parameters the switch is open.

FIGURE 4. Switching time waveforms and test circuit.

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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 A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

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

c. Subgroup 4 (C_{IN} and C_{OUT} measurements) shall be measured only for the initial test and after process or design changes which may affect capacitance. Test all applicable pins on 5 devices with zero failures.

d. Subgroups 7 and 8 tests shall verify the truth table on figure 2.

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 using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) $T_A = +125^{\circ}\text{C}$, minimum.

(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 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 7, 8, 9, 10, 11
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.

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 <u>1/</u>
5962-8765401EX	61772	IDT54FCT138DB
5962-8765401FX	61772	IDT54FCT138EB
5962-87654012X	61772	IDT54FCT138LB
5962-8765402EX	61772	IDT54FCT138ADB
5962-8765402FX	61772	IDT54FCT138AEB
5962-87654022X	61772	IDT54FCT138ALB

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

61772

Vendor name and address

Integrated Device Technology
3236 Scott Boulevard
Santa Clara, CA 95052

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