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PMIC N/A			PREPARED BY <i>Larry T. Gaudin</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>Jim M. Nish</i>																		
			APPROVED BY <i>William K. Heckman</i>																		
						DRAWING APPROVAL DATE 15 MAY 1990								SIZE A		CAGE CODE 67268			5962-90616		
			REVISION LEVEL								SHEET 1										

DESC FORM 193
SEP 87

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

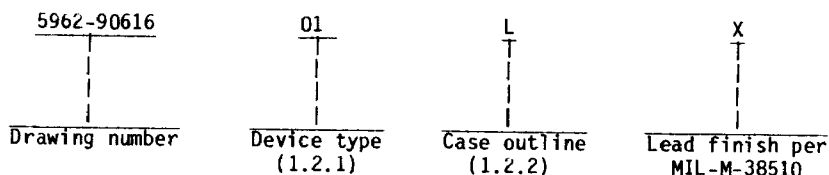
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5962-E1618

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:



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

Device type	Generic number	Circuit function
01	54ALS29821	10-bit bus interface flip-flops with 3-State outputs

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

Outline letter	Case outline
L	D-9 (24-lead, 1.280" x .310" x .200") dual-in-line package

1.3 Absolute maximum ratings.

Supply voltage V_{CC} - - - - -	-0.5 V dc to +7.0 V dc
Input voltage range - - - - -	-1.2 V dc at -18 mA to +5.5 V dc
Voltage applied to a disabled 3-state output - - - - -	-0.5 V dc to +5.5 V dc
Storage temperature range - - - - -	-65°C to +150°C
Continuous power dissipation P_d 1/ - - - - -	632.5 mW
Lead temperature (soldering, 10 seconds) - - - - -	+300°C
Junction temperature (T_J) - - - - -	+175°C
Thermal resistance, junction-to-case (θ_{JC}) - - - - -	See MIL-M-38510 appendix C

1.4 Recommended operating conditions.

Supply voltage range (V_{CC}) - - - - -	4.5 V dc minimum to 5.5 V dc maximum
Maximum high level input voltage (V_{IH}) - - - - -	2.0 V dc
Maximum low level input voltage (V_{IL}) - - - - -	0.8 V dc
Maximum high level output current (I_{OH}) - - - - -	-18 mA
Maximum low level output current (I_{OL}) - - - - -	32 mA
Operating temperature range (T_C) - - - - -	-55°C to +125°C

1/ Continuous power dissipation is defined as $V_{CC} \times I_{CC}$. Device 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, standard, and bulletin. Unless otherwise specified, the following specification, standard, 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.

STANDARD

MILITARY

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

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

(Copies of the specification, standard, 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 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 Test circuit and switching waveforms. The test circuit and switching waveforms shall be as specified on figure 3.

3.2.4 Case outline. The case outline shall be in accordance with 1.2.2 herein.

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 recommended case 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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T _C < +125°C unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
High level output voltage	V _{OH}	V _{CC} = 4.5 V	I _{OH} = -12 mA	1,2,3	2.4		V
			I _{OH} = -18 mA		2.0		
Low level output voltage	V _{OL}	V _{CC} = 4.5 V	I _{OL} = 32 mA	1,2,3		0.5	V
Input clamp voltage	V _{IC}	V _{CC} = 4.5 V	I _I = -18 mA	1,2,3		-1.2	V
Short circuit output current	I _{OS}	V _{CC} = 5.5 V <u>1/</u>	V _O = 0 V	1,2,3	-75	-250	mA
Off state output current	I _{OZH}	V _{CC} = 5.5 V	V _O = 2.4 V	1,2,3		50	μA
	I _{OZL}	V _{CC} = 5.5 V	V _O = 0.4 V			-50	
High level input current	I _{IH1}	V _{CC} = 5.5 V	V _I = 5.5 V	1,2,3		0.1	mA
	I _{IH2}	V _{CC} = 5.5 V	V _I = 2.7 V	1,2,3		20	μA
Low level input current	I _{IL}	V _{CC} = 5.5 V	V _I = 0.4 V	1,2,3		-0.5	mA
Supply current	I _{CC}	V _{CC} = 5.5 V	Outputs high	1,2,3		100	mA
			Outputs low			105	
			Outputs disabled			115	
Functional tests		See 4.3.1c. <u>2/</u>		7,8			
Pulse duration, CLK high or low	t _w	V _{CC} = 4.5 to 5.5 V dc		9,10,11	8		ns
Setup time, data before CLK ^Δ	t _{su}			9,10,11	4		ns
Hold time, data after CLK ^Δ	t _h			9,10,11	4		ns

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 unless otherwise specified	Group A subgroups	Limits		Unit	
				Min	Max		
Propagation delay time, from CLK to any Q	t _{PLH1}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 50 pF	9	2	8.5	ns
				10, 11	2	11.5	
	t _{PHL1}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 50 pF	9	2	8.5	ns
				10, 11	2	11.5	
Enable time, from \overline{OC} to any Q	t _{PLH2}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 300 pF	9	2	14	ns
				10, 11	2	21	
	t _{PHL2}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 300 pF	9	2	17.5	ns
				10, 11	2	21	
Disable time, from \overline{OC} to any Q	t _{PZH1}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 50 pF	9	1	12	ns
				10, 11	1	17	
	t _{PZL1}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 50 pF	9	1	12.5	ns
				10, 11	1	17	
Enable time, from \overline{OC} to any Q	t _{PZH2}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 300 pF	9	1	17	ns
				10, 11	1	25	
	t _{PZL2}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 300 pF	9	1	23	ns
				10, 11	1	29.5	
Disable time, from \overline{OC} to any Q	t _{PHZ1}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 50 pF	9	1	11	ns
				10, 11	1	16	
	t _{PLZ1}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 50 pF	9	1	9	ns
				10, 11	1	14	
t _{PHZ2}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 5 pF	9	1	9	ns	
			10, 11	1	12		
t _{PLZ2}	V _{CC} = 5.0 V V _{CC} = 4.5 V to 5.5 V	C _L = 5 pF	9	1	8	ns	
			10, 11	1	11		

1/ Not more than one output should be shorted at one time and the duration of the short should not exceed one second.
 2/ Functional test shall be conducted at input test conditions of $GND \leq V_{IL} \leq V_{OL}$ and $V_{OH} \leq V_{IH} \leq V_{CC}$.

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Device type	01
Case outline	L
Terminal number	Terminal symbols
1	0C
2	1D
3	2D
4	3D
5	4D
6	5D
7	6D
8	7D
9	8D
10	9D
11	10D
12	GND
13	CLK
14	10Q
15	9Q
16	8Q
17	7Q
18	6Q
19	5Q
20	4Q
21	3Q
22	2Q
23	1Q
24	VCC

FIGURE 1. Terminal connections.

Inputs			Output
0C	CLK	D	Q
L	^	H	L
L	^	L	H
L	L	X	Q ₀
H	X	X	Z

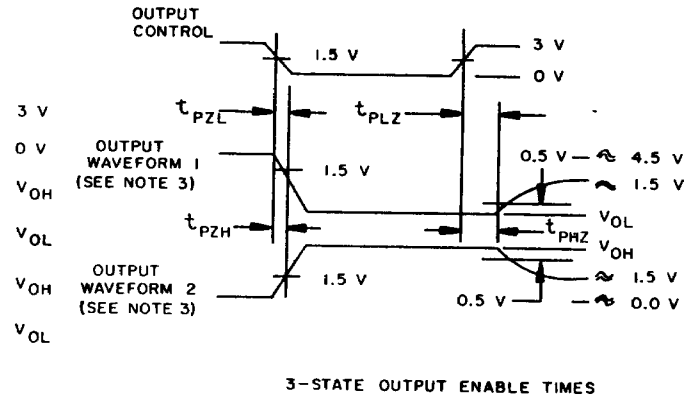
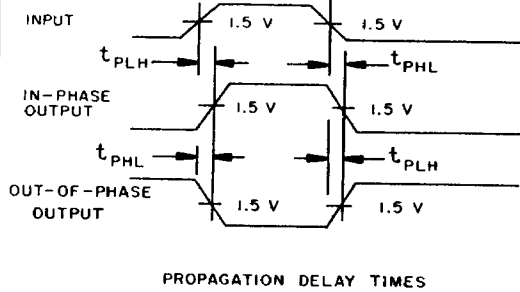
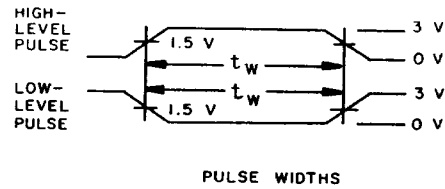
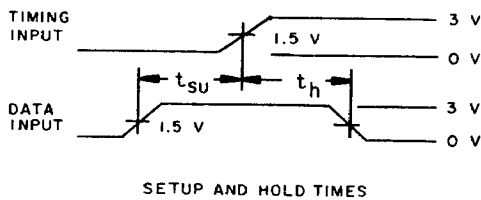
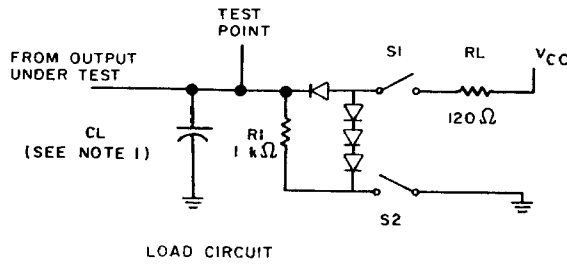
H = High voltage level
 L = Low voltage level
 ^ = Transition from low to high
 Q₀ = Level of Q before the indicated steady-state input conditions were established

FIGURE 2. Truth table.

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Switch position table

Test	S1	S2
t_{PLH}	Closed	Closed
t_{PHL}	Closed	Closed
t_{PZH}	Open	Closed
t_{PZL}	Closed	Open
t_{PHZ}	Closed	Closed
t_{PZL}	Closed	Closed



NOTES:

1. C_L includes probe and jig capacitance.
2. Input pulses are supplied by generators having the following characteristics:
 $PRR < 10 \text{ MHz}$, $Z_0 = 50 \text{ ohms}$, $t_r = t_f = 2.5 \text{ ns}$.
3. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.

FIGURE 3. Test circuit and switching waveforms.

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3.5 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 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-ECC 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-ECC 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 using the circuit submitted with the certificate of compliance (see 3.6 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 4, 5, and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroups 7 and 8 shall verify the truth table.

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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 using the circuit submitted with the certificate of compliance (see 3.6 herein).
 - (2) $T_A = +125^\circ\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by appendix B of MIL-M-38510 and 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)	---
Final electrical test parameters (method 5004)	*1, 2, 3, 7, 8, 9, 10, 11
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 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.

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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) 296-6022.

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

6.6 Approved source of supply. An approved source of supply is listed in MIL-BUL-103. Additional sources will be added to MIL-BUL-103 as they become available. The vendor listed in MIL-BUL-103 has agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECC. The approved source of supply listed below is for information purposes only and is current only to the date of the last action of this document.

Military drawing part number	Vendor CAGE number	Vendor similar part number ^{1/}
5962-9061601LX	01295	SNJ54ALS29821JT

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

<u>Vendor CAGE number</u>	<u>Vendor name and address</u>
01295	Texas Instruments, Incorporated 13500 North Central Expressway P. O. Box 655303 Dallas TX 75265 Point of contact: I-20 at FM 1788 Midland TX 79711-0448

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