
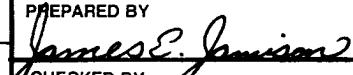
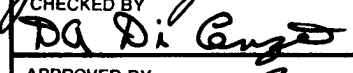



REVISIONS																			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED																
B	Convert to military drawing format. Added vendor CAGE no. 27014 to case 2. Clarification in table I, with a change on figure 3. Editorial changes throughout. Change code ident. no. to 67268.	1988 JAN 26																	

CURRENT CAGE CODE 67268

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

PMIC N/A <h3 style="text-align: center;">STANDARDIZED MILITARY DRAWING</h3> <p style="text-align: center; font-size: small;">THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE</p> <p style="text-align: center;">AMSC N/A</p>	PREPARED BY  CHECKED BY  APPROVED BY  DRAWING APPROVAL DATE 1 October 1984 REVISION LEVEL B	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444 MICROCIRCUITS, DIGITAL, HIGH-SPEED CMOS QUAD THREE-STATE BIDIRECTIONAL TRANSCEIVER, MONOLITHIC SILICON <table style="width: 100%;"> <tr> <td style="width: 10%;">SIZE</td> <td style="width: 40%;">CAGE CODE</td> <td style="width: 50%;"></td> </tr> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">14933</td> <td style="text-align: center;">84090</td> </tr> </table>	SIZE	CAGE CODE		A	14933	84090
SIZE	CAGE CODE							
A	14933	84090						
		SHEET 1 OF 12						

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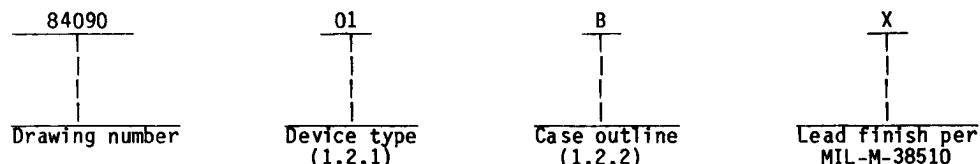
* U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60912
5962-E768

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:



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

Device type	Generic number	Circuit function
01	54HC243	Quad three-state bidirectional transceiver

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
B	F-3 (14-lead, 3/16" x 1/4"), flat package
C	D-1 (14-lead, 1/4" x 3/4"), dual-in-line package
D	F-2 (14-lead, 1/4" x 3/8"), flat package
2	C-2 (20-terminal, .350" x .350"), square chip carrier package

1.3 Absolute maximum ratings. 1/

Supply voltage range	-0.5 V dc to +7.0 V dc
DC input voltage	-0.5 V dc to $V_{CC} + 0.5$ V dc
DC output voltage	-0.5 V dc to $V_{CC} + 0.5$ V dc
Clamp diode current	± 20 mA
DC output current (per pin)	± 35 mA
DC, V_{CC} or GND current (per pin)	± 70 mA
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D)	500 mW 2/
Lead temperature (soldering, 10 seconds)	+260°C
Thermal resistance, junction-to-case (θ_{JC}):	
Case outlines B, C, D, and 2	See MIL-M-38510, appendix C
Junction temperature (T_J)	+175°C

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	+2.0 V dc to +6.0 V dc
Case operating temperature range (T_C)	-55°C to +125°C
Input rise or fall time:	
$V_{CC} = 2.0$ V	0 to 1,000 ns
$V_{CC} = 4.5$ V	0 to 500 ns
$V_{CC} = 6.0$ V	0 to 400 ns

1/ Unless otherwise specified all voltages are referenced to ground.

2/ For $T_C = +100^\circ\text{C}$ to +125°C, derate linearly at 12 mW/°C.

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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 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 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 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 ^{1/} -55°C < T _C < +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
High level output voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL} I _O ≤ 20 μA	1, 2, 3	V _{CC} = 2.0 V	1.9	V
				V _{CC} = 4.5 V	4.4	
				V _{CC} = 6.0 V	5.9	
		I _O ≤ 6.0 mA		V _{CC} = 4.5 V	3.7	
		I _O ≤ 7.8 mA		V _{CC} = 6.0 V	5.2	
Low level output voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL} I _O ≤ 20 μA	1, 2, 3	V _{CC} = 2.0 V	0.1	V
				V _{CC} = 4.5 V	0.1	
				V _{CC} = 6.0 V	0.1	
		I _O ≤ 6.0 mA		V _{CC} = 4.5 V	0.4	
		I _O ≤ 7.8 mA		V _{CC} = 6.0 V	0.4	
High level input voltage ^{2/}	V _{IH}		1, 2, 3	V _{CC} = 2.0 V	1.5	V
				V _{CC} = 4.5 V	3.15	
				V _{CC} = 6.0 V	4.2	
Low level input voltage ^{2/}	V _{IL}		1, 2, 3	V _{CC} = 2.0 V	0.3	V
				V _{CC} = 4.5 V	0.9	
				V _{CC} = 6.0 V	1.2	
Output capacitance	C _{OUT}	V _{OUT} = 0 V T _C = +25°C See 4.3.1c	4		20	pF
Input capacitance	C _{IN}	V _{IN} = 0 V T _C = +25°C See 4.3.1c	4		10	pF
Quiescent current	I _{CC}	V _{CC} = 6.0 V V _{IN} = V _{CC} or GND	1, 2, 3		160	μA
Input leakage current	I _{IN}	V _{CC} = 6.0 V V _{IN} = V _{CC} or GND	1, 2, 3		±1	μA
Off-state output current	I _{OZ}	Output enables = V _{IH} or V _{IL} Data = V _{CC} or GND	1, 2, 3		±10	μA

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C < T _C < +125°C unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
Functional tests		See 4.3.1d		7			
Propagation delay 3/	tp _{HL} , tp _{LH}	T _C = +25°C C _L = 50 pF ±10% See figure 3	V _{CC} = 2.0 V	9		110	ns
			V _{CC} = 4.5 V			22	
			V _{CC} = 6.0 V			19	
		T _C = -55°C, +125°C C _L = 50 pF ±10% See figure 3	V _{CC} = 2.0 V	10, 11		165	ns
			V _{CC} = 4.5 V			33	
			V _{CC} = 6.0 V			28	
Output enable time to active output 3/	tp _{ZH} , tp _{ZL}	T _C = +25°C C _L = 50 pF ±10% R _L = 1 kΩ See figure 3	V _{CC} = 2.0 V	9		175	ns
			V _{CC} = 4.5 V			35	
			V _{CC} = 6.0 V			30	
		T _C = -55°C, +125°C C _L = 50 pF ±10% R _L = 1 kΩ See figure 3	V _{CC} = 2.0 V	10, 11		265	ns
			V _{CC} = 4.5 V			53	
			V _{CC} = 6.0 V			45	
Output disable time from active output 3/	tp _{HZ} , tp _{LZ}	T _C = +25°C C _L = 50 pF ±10% R _L = 1 kΩ See figure 3	V _{CC} = 2.0 V	9		200	ns
			V _{CC} = 4.5 V			40	
			V _{CC} = 6.0 V			34	
		T _C = -55°C, +125°C C _L = 50 pF ±10% R _L = 1 kΩ See figure 3	V _{CC} = 2.0 V	10, 11		300	ns
			V _{CC} = 4.5 V			60	
			V _{CC} = 6.0 V			51	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C < T _C < +125°C unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
Transition time 4/	t _{THL}	T _C = +25°C C _L = 50 pF ±10% See figure 3	V _{CC} = 2.0 V	9		60	ns
			V _{CC} = 4.5 V			12	
			V _{CC} = 6.0 V			10	
	t _{TLH}	T _C = -55°C, +125°C C _L = 50 pF ±10% See figure 3	V _{CC} = 2.0 V	10, 11		90	ns
			V _{CC} = 4.5 V			18	
			V _{CC} = 6.0 V			15	

1/ For a power supply of 5 V ±10%, the worst case output voltages (V_{OH} and V_{OL}) occur for HC at 4.5 V. Thus, the 4.5 V values should be used when designing with this supply. Worst case V_{IH} and V_{IL} occur at V_{CC} = 5.5 V and 4.5 V, respectively. (The V_{IH} value at 5.5 V is 3.85 V.) The worst case leakage current (I_{IN}, I_{CC}, and I_{OZ}) occur for CMOS at the higher voltage and so the 6.0 V values should be used. Power dissipation capacitance (C_{PD}), typically 50 pF, determines the no load dynamic power consumption, P_D = C_{PD} V_{CC}²f + I_{CC} V_{CC}, and the no load dynamic current consumption, I_S = C_{PD} V_{CC} f + I_{CC}.

2/ Testing not required if applied as forcing function for V_{OH} or V_{OL}.

3/ Propagation delay times, when V_{CC} = 2.0 V and 6.0 V, if not tested shall be guaranteed to the specified parameters.

4/ Transition time (t_{TLH}, t_{THL}), if not tested, shall be guaranteed to the specified parameters.

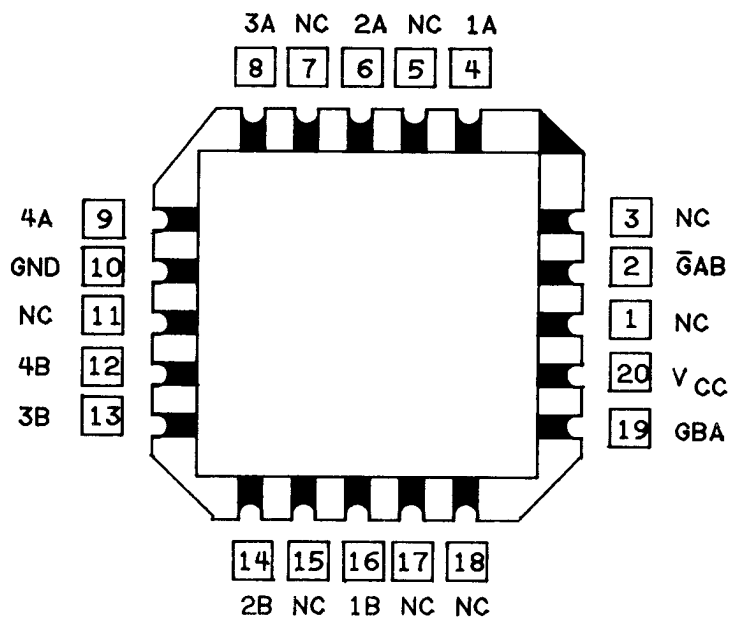
3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

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.

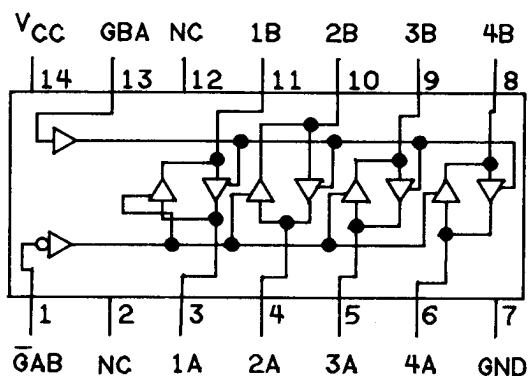
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Device type 01

Case 2



Cases B, C, and D



Top view

FIGURE 1. Terminal connections (top view).

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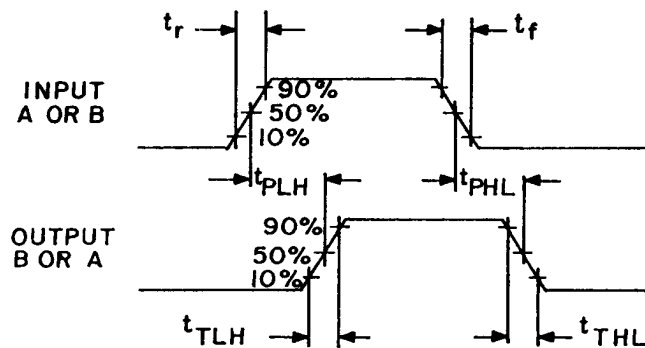
Control inputs		Data port status	
GAB	GBA	A	B
H	H	Output	Input
L	H	Isolated	Isolated
H	L	Isolated	Isolated
L	L	Input	Output

FIGURE 2. Truth table.

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t_r and $t_f \leq 6$ ns

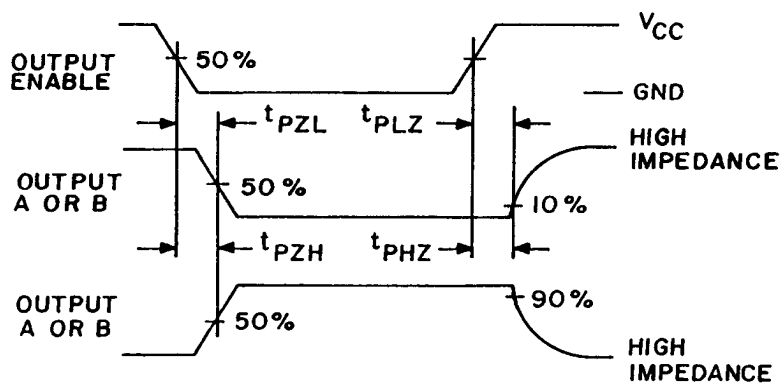


FIGURE 3. Switching waveform.

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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, 6, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 (C_{IN} and C_{OUT} measurement) shall be measured only for the initial test and after process or design changes which may affect input capacitance.
- d. Subgroup 7 test sufficient to verify the truth table.

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 (method 1005 of MIL-STD-883) conditions:
 - (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 appendix B of MIL-M-38510 and 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, 9
Group A test requirements (method 5005)	1, 2, 3, 4, 7, 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.

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. Replaceability is determined as follows:

- Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.
- When a QPL source is established, the part numbered device specified in this drawing will be replaced by the microcircuit identified as part number M38510/65502B----

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 sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. The vendors listed herein have 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/	Replacement military specification part number
8409001BX	01295	SNJ54HC243WA	M38510/65502BBX
8409001CX	01295 04713 18714 27014	SNJ54HC243J 54HC243/BCAJC CD54HC243F/3A MM54HC243J/883J	M38510/65502BCX
8409001DX	01295	SNJ54HC243W	M38510/65502BDX
84090012X	04713 27014	54HC243M/B2CJC MM54HC243E/883	M38510/65502B2X

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

01295

Texas Instruments, Inc.
P.O. Box 6448
Midland, TX 79701

04713

Motorola, Inc.
7402 S. Price Rd.
Tempe, AZ 85283

18714

RCA Corporation
Solid State Division
Route 202
Somerville, NJ 08876

27014

National Semiconductor
P.O. Box 58090
Santa Clara, CA 95052-8090

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