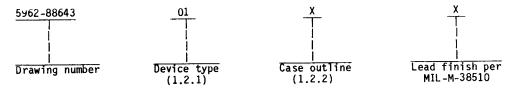
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THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENT AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	DRAWING 1 AUGU: REVISION	ST 1988	AL DAT					ZE A SHE			268	5962-8864			64			

DESC FORM 193 SEP 87

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

- 1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1. $\overline{2.1}$ 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 types. The device types shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	49C410	16-bit CMOS microprogram sequencer with 33 deep stack
02	49C410A	16-bit CMOS microprogram sequencer with 33 deep stack

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

Outline letter

Case outline

X D-14, (48-lead, 2.435" x .620" x .225"), dual-in-line package

Y See figure 1, (48-terminal, .565" x .565" x .120"), square chip carrier package

1.3 Absolute maximum ratings. 1/

1.4 Recommended operating conditions.

Supply voltage (V _{CC})	+4.5 V dc to +5.5 V dc
Case operating temperature (T _C)	-55°C to +125°C
Minimum logic high voltage (VIH)	2.0 V dc
Maximum logic low voltage (VII)	0.8 V dc

 $\overline{1/}$ ATT voltage referenced to GND Z/ Must withstand the added PD due to short circuit test, e.g., IOS.

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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.

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 2 herein.
 - 3.2.2 <u>Instruction set</u>. The instruction set shall be as specified on figure 3 herein.
 - 3.2.3 Logic diagram. The logic diagram shall be as specified on figure 4 herein.
 - 3.2.4 Case outlines. The case outlines 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 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.
- 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).

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Test	l Symbol	 	itions - +125°C	 Group A subgroups		ı Limi 	its	Unit
	 	l V _{CC =} 5.0	V dc ±10% rwise specified		 	Min	Max	
High level output	I V _{OH}	$ V_{T1} = 0.8 V $		1,2,3	A11 	4.3		٧
	 	I Vtu - 2.0 V I	$I_{OH} = -12 \text{ mA}$! 	2.4]
Low level output	I V _{OL}	V _{CC} = 4.5 V V _{IL} = 0.8 V	I _{OL} = 300 μA	1,2,3	! A11 	1	 0.2 	 V <u> </u>
		VIH = 2.0 V	I _{OL} = 20 mA	- - 	 		0.5	
High level input current	I IH	V _{CC} = 5.5 V,	V _{IN} = 5.5 V	1,2,3	 A11 		 5.0 	μ Α
Low level input current	IIIL	V _{CC} = 5.5 V,	V _{IN} = GND	1,2,3	 All	 	 -5.0 	 μ Α
Short circuit output current	Ios	V _{CC} = 4.5 V,	$V_{OUT} = GND$ $1/$	1,2,3	A11	 -30 	 	l mA l
Off state high impedance output	IIOZ	V _{CC} = 5.5 V	V _{OUT} = 0 V	1,2,3	A11		-10 	 μ A
current		 	V _{OUT} = 5.5 V	- 			10	
Quiesecent power supply current (CMOS inputs)	ICCQH	V _{CC} = 5.5 V, V _{IH} > 5.3 V, CP = H	$V_{IL} \leq 0.2 \text{ V},$ $f_{CP} = 0,$	1,2,3	A11 		50	mA
Quiesecent power supply current (CMOS inputs)	ICCQL	V _{CC} = 5.5 V, V _{IH} > 5.3 V, CP = L	V _{IL} ≤ 0.2 V, f _{CP} = 0,	1,2,3	A11 		50 	
Quiesecent power supply current (TTL inputs) 2/	ICCT	V _{CC} = 5.5 V, f _{CP} = 0	V _{IN} = 3.4 V,	1,2,3	All		0.5	mA/ inpu

STANDARDIZED MILITARY DRAWING	SIZE A			5962 -8864 3	
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Test	Symbol		 Group A subgroups		l Lim	its	Unit
	 	V _{CC} = 5.ŏ V dc ±10% unless otherwise specified	1		 Min 	 Max 	
Dynamic power supply current	I I CCD	$V_{CC} = 5.5 \text{ V}, V_{IL} \leq 0.2 \text{ V}, V_{IH} = 5.3 \text{ V}, OUTPUTS open, \overline{OE} = L$	1,2,3	A11	 	3.0	mA/MH:
Total power supply current 3/	I I _{CC}	V_{CC} = 5.5 V, f_{CP} = 10 MHz, outputs open, $V_{IH} \ge 5.3$ V, $V_{IL} \le 0.2$ V, \overline{OE} = L , CP = 50% duty cycle	1,2,3	A11	 	80 -	mA
	 	V _{CC} = 5.5 V, f _{CP} = 10 MHz, outputs open, V _{IH} = 3.4 V, V _{IL} = 0.4 V, OE = L, CP = 50% duty cycle			 	90 	-
Input capacitance	CIN	See 4.3.1c	4	All	T 	12	l pF
Output capacitance	IC _{OUT}	See 4.3.1c	4	 A11 		15	l pF
Functional test	 	 See 4.3.1d	7, 8	 A11 	1] 	
Setup time D ₁ to R	t _{S1}	 See figure 5 <u>4</u> /	9,10,11	01	16] 	ns
-1	i 	 	1	i 02	7.0	 	ns
Setup time D ₁ to PC	t _{S2}	 See figure 5 4/	9,10,11	01	30	<u> </u> 	ns
•	 	 		 02 	1 15	 	ns
Setup time	t _{S3}	 See figure 5 <u>4</u> /	9,10,11	 01 	38		ns
0-3	Ì !	 	 	02	25		l ns

See footnotes at end of table.

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DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444		REVISION LEVEL A	-	SHEET	5

		lectrical performance character	1		r		1
Test	 Symbol 	Conditions -55°C < T _C < +125°C	Group A subgroups	Device type	Limi	ts	Unit
		Conditions $\begin{array}{lll} & -55^{\circ}C < T_C < +125^{\circ}C \\ & V_{CC} = 5.0 & \text{dc} & \pm 10\% \\ & \text{unless otherwise specified} \\ & \text{l} & & \\ & & \\ & & \\ & & \\ & & \\ \end{array}$] 	 	Min	Max	
Setup time	t _{S4}	See figure 5 4/	9,10,11	01 	 35 	<u> </u>	ns
	- 	 		 02 	 18 	 	l ns
Setup time	lt _{S5}] 	9,10,11	 01 	 35 		ns
	İ		 	02	 18 		l ns
Setup time	ts6	 	9,10,11	01	 18 	 	ns
			<u> </u> 	02	7.0	 	ns
Setup time	t _{S7}	 	9,10,11	01	20] 	ns
	Ĭ 	 	 	 02 	12] 	l l ns
Hold time D ₁ to R	t _{H1}	 	9,10,11	01	 0 	 	ns
-1 00	1	<u> </u> 		02	0	 	ns
Hold time D ₁ to PC	t _{H2}	Í -	9,10,11	T 01 	 0 	 	ns
51 60 .0	i	; 	1	02	1 0	ľ	ns

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING	SIZE A	\$ 8			5962-88643	
DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444			REVISION LEVEL	-	SHEET 6	

Test	Symbol Co		nditions T _C < +125°C .0 V dc ±10% herwi se specified	Group A	 Device type	Lir	nits	Unit
		V _{CC} = 5 unless ot	.0 V dc ±10% herwise specified	 	1 1 1	 Min 	Max	
fold time I ₀₋₃	t _{H3}	See figure	5 <u>4</u> /	9,10,11	01	i 0		ns
0-0		 		 	02	0		ns
Hold time	t _{H4}	 		9,10,11	01	0		ns
	 	 			 02 	0		ns
Hold time	t _{H5}	 		9,10,11	01	0		ns
		1 1 1			02	0		ns
Hold time CI	t _{H6}	 		9,10,11	01	0		ns
	 	 			02	 0 	! 	ns
Hold_time RLD	t _{H7}	 		9,10,11	01	0		ns
] 			02	0		ns
Propagation delay D _{O-11} to Y	t _{PD1}			9,10,11	01		25	ns
		 			02	<u> </u>	15	ns
ee footnotes at end	of table.							
STANDA			SIZE A			5062	88643	
MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER				L	2302-	00043		

Test	 Symbol	1 -55°C / `	nditions T _C < +125°C	Group A subgroups	Device type	Lin	nits	Unit
		VCC = 5 unless ot 	.Õ V dc ±10% herwise specifi	ed	 	Min	Max	
Propagation delay	t _{PD2}	 See figure 	5 <u>4</u> /	9,10,11	01		40	ns
		1 			02 		25	ns
Propagation delay CC to Y	t _{PD3}	[9,10,11	01		36	ns
	<u> </u> 	<u> </u>			! 02 	 	20	ns
Propagation delay CCEN to Y	t _{PD4}	i 		9,10,11	01		36	ns
		 			02		20	ns
Propagation delay CP to Y	t _{PD5}	; 		9,10,11	01		46	ns
					02		33	ns
Propagation delay OE to Y (enable)	t _{PD6}			9,10,11	01		25	ns
] {			02		13	ns
Propagation delay OE to Y (disable)	t _{PD7}	· [9,10,11	01		30	ns
<u>5</u> /				1	 02 	 	1 13	ns
ee footnotes at end	of table.							
STANDA			SIZE A					
MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER		~		1	5962-88643 SHEET			

T <i>A</i>	ABLE I. E	lectrical performance character	ristics - (Continued	l .		
Test	Symbol	Conditions -55°C < T _C < +125°C V _{CC} = 5.0 V dc ±10%	 Group A subgroups		 Lim	Unit	
		V _{CC} = 5.0 V dc ±10% unless otherwise specified 	 	 	 Min 	 Max 	
Propagation delay IO-3 to PL, VECT,	t _{PD8}	See figure 5 4/	9,10,11	01	1	35	ns
мар	 	! 		02	! !	 15 	ns
Propagation delay CP to FULL	t _{PD9}	 	9,10,11	01		 35 	l ns
	 	 	 	 02]] 	 25 	 ns
Clock LOW time	tpw1	 	 9,10,11 	01	25		ns
] -	 	02	20	 	l I ns
Clock HIGH time	tpw2	 	9,10,11	01	25 	1	ns
	 	 	 	 02 	 20 		l ns
Clock period	i tp	 	9,10,11	01	 51 	 	ns
				02	40		ns

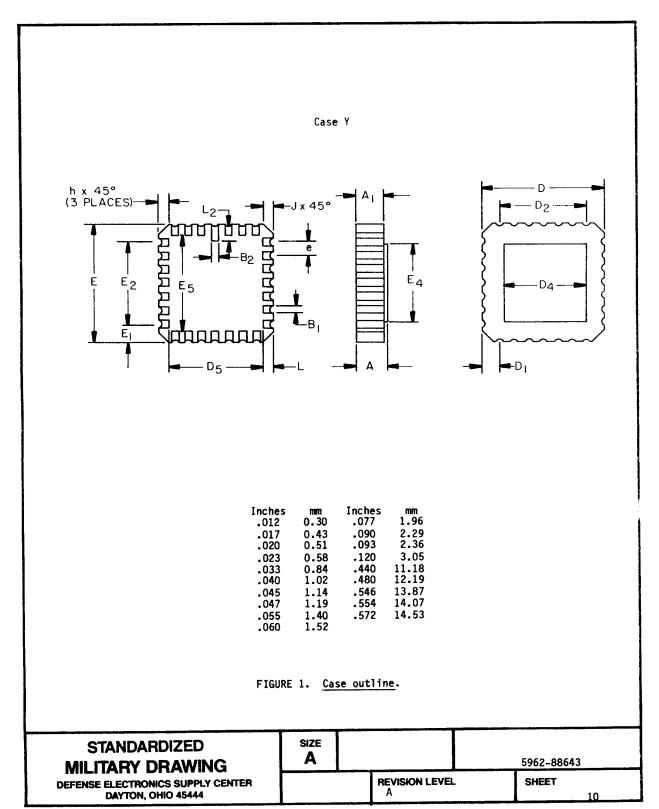
^{1/} Not more than one output should be shorted at one time. Duration of the short circuit test should not exceed one second.

- I_{CCT} is derived by measuring the total current with all the inputs tied together at 3.4 V, subtracting out I_{CCQH} , then dividing by the total number of inputs.
- $\underline{3}/$ $I_{CC} = I_{CCQH}$ (CD_H) + I_{CCQL} (1 CD_H) + I_{CCT} (N_T X D_H) + I_{CCD} (f_{CP}).

Where: CD_H = Clock duty cycle high period. D_H = Data duty cycle TTL high period (V_{IN} = 3.4 V). N_T = Number of dynamic inputs driven at TTL levels. f_{CP} = Clock input frequency.

- Unless otherwise specified, the input pulse level shall be between 0 V to 3.0 V, input rise/fall times shall be 1.0 V/ns and input and output timing reference levels shall be 1.5 V.
- $\frac{3}{2}$ 5/ Disable time is measured to 0.5 V change on output voltage level with C_L = 5 pF.

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Number of leads (N)	48	3	 Number of leads (N)	4	18
	Min	Max		Min	Max
A	.055	.120	E ₁	.060	REF
A ₁	.045	.090	E ₂	.440	BSC
B ₁	.017	.023	 E4 		.546
B ₂	.017	.033	E ₅	.480	REF
D	.554	.572	e	.040	BSC
D ₁	.060	REF	h	.012	Radius
D ₂	.440	BSC	J	.020	REF
D4	 	 .546 	L L	.033 	.047
D ₅	.480	REF	L2	 .077 	.093
 E	 .554 	.572	N N	 	48
			I ND		12

ND = NE - Number of leads per side.

FIGURE 1. Case outline - Continued.

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Cases X and Y

Pin number	 Terminal connection	Pin number	Terminal connection
1	Y ₁₃	25	D ₁₅
2	D ₁₃	26	Y ₁₅
3	! ! Y4	27	D ₈
1 4	 D ₄	 28	Y ₈
1 5	! ! Y ₅	29	Dg
6	D ₅	30	Yg
7	I VECT]] 31	D ₁₀
8	PC	32	Y ₁₀
9	MAP	33	D ₁₁
10	I 13	34	Y ₁₁
11	12	35	<u>DE</u>
12	V _{3CC}	36	GND
13	Iı	37	СР
14	1 I ₀	38	CI
15	CCEN	39	Yo
16	CC	40	D _O
17	RLD	41	Y ₁
18	FULL	42	D ₁
19	D ₆	43	Y ₂
l ! 20	Y ₆	44	D ₂
21	D ₇	45	Y ₃
22	Y ₇	46	D ₃
23	D ₁₄	47	Y ₁₂
24	Y ₁₄	48	D ₁₂

FIGURE 2. Terminal connections.

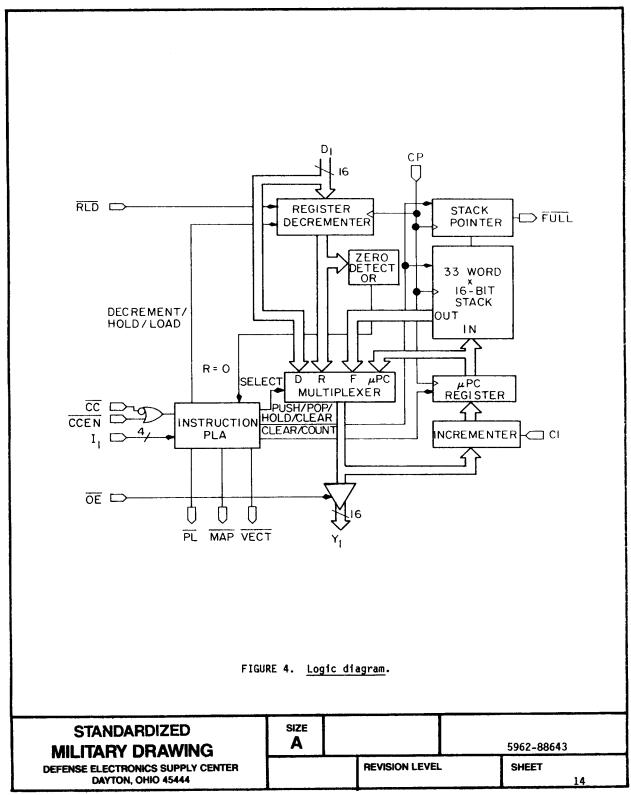
STANDARDIZED MILITARY DRAWING	SIZE A			5962-88643	
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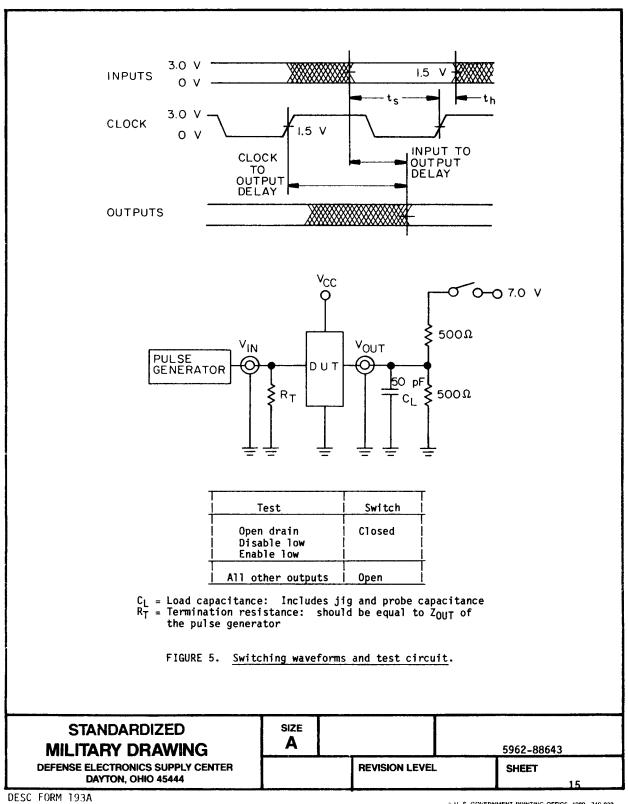
I 3-I ₀	 Mnemonic	CC	Counter test	Stack	Address source	 Register/ counter	Enable/ select
0	JZ) X	X	l Clear	0	I NC	PE
1	CJS	Pass Fail	X I X	 Push NC	l I D I Pc	NC NC	PL PL
2	JMAP	 X	X	I I NC	 D	! NC	MAP
3	CJP	 Pass Fail	I I X I X	NC NC	I D I Pc	I I NC I NC	I PC I PL
4	PUSH 	 Pass Fail	X X	 Push Push	l Pc l Pc	 Load NC	 <u>PC</u> PL
5	JSRP	 Pass Fail	I X I X	 Push Push	 D R	I I NC I NC	I PC I PC
6	CJV	 Pass Fail	X X X	I I NC I NC	D Pc	NC NC	VECT VECT
7	JRP	 Pass Fail	 X X	NC NC	D R	NC NC	PC PC
8	RFCT	 X X	 = 0 Not = 0	l Pop NC	Pc Stack	I NC I DEC	PL PL
9	RPCT	 X X	 = 0 Not = 0	I I NC I NC	Pc D	NC DEC	PL PL
10	RPCT	Pass Fail	I I X I X	 Pop NC	 Stack Pc	NC NC	PE PE
11	CJPP	 Pass Fail	 X X	 Pop NC	D Pc	NC NC	PC PL
12	LDCT	X	i X	I NC	Pc	l Load	PC
13	LOOP	Pass Fail	 X X	 Pop NC	 Pc Stack	I NC I NC	PL PL
14	CONT	l X	i X	I NC	l Pc	I NC	 <u>PL</u>
15	I TWB I	Pass Pass Fail Fail	= 0 Not = 0 = 0 Not = 0	Pop Pop Pop NC	Pc Pc D Stack	I NC I DEC I NC I DEC	 PL PL PL PL

NC = No change; DEC = Decrement

FIGURE 3. <u>Instruction set</u>.

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- 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 D using the circuit submitted with the certificate of compliance (see 3.6 herein).
 - (2) $T_A = +125^{\circ}C$, 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 ($C_{\rm IN}$ and $C_{\rm OUT}$ measurement) shall be measured only initially test and after process or design changes which may affect capacitance.
 - d. Subgroups 7 and 8 functional testing shall include the verification of instruction set.

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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 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, 7, 8

^{*} PDA applies to subgroup 1.

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 using the circuit submitted with the certificate of compliance (see $3.6 \, \text{herein}$).
 - (2) $T_A = +125^{\circ}C$, 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 <u>Intended use</u>. 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.

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- 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 sources of supply. Approved sources of supply are listed in MIL-BUL-103. Additional sources will be added as they become available. 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 DESC-ECC. The approved sources of supply listed below are for information purposes only and are current only to the date of the last action of this document.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1</u> /
5962-8864301XX	61772	IDT49C410CB
5962-8864301 YX	2/	IDT49C410LB
 5962-8864302XX 	61772	IDT49C410ACB
 5962-8864302YX 	2/	IDT49C41OALB

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

2/ Approved source of supply not available.

Vendor CAGE number Vendor name and address

61772

Integrated Device Technology Incorporated 1566 Moffett Boulevard

Salinas CA 93905

Point of contact: 3236 Scott Boulevard Santa Clara CA 95054

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