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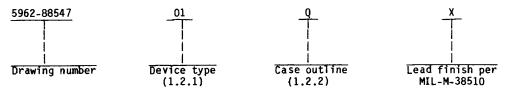
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DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1. $\overline{2.1}$  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 types	Generic number	Circuit function	Clock speed
01	8087-2	Numeric data processor (NDP)	8 MHz
02	8087	Numeric data processor (NDP)	5 MHz

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

Outline letter

Q
D-5 (40-lead, 2.096" x .620" x .225"), dual-in-line package

1.3 Absolute maximum ratings.

1.4 Recommended operating conditions.

STANDARDIZED

MILITARY DRAWING

DEFENSE ELECTRONICS SUPPLY CENTER

DAYTON, OHIO 45444

SIZE A 5962-88547

REVISION LEVEL SHEET 2

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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 Functional block diagram. The functional block diagram shall be as specified on figure 2.
  - 3.2.3 Case outline. The case outline 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 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table 11. The electrical tests for each subgroup are described in table 1.
- 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 6.7 herein).

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Test	Symbol	Cond	litions	Group A	Device	Lim	its	   Unit
		-55°C < 1   4.75 V <   unless other	C < +125°C V <sub>CC</sub> < 5.25 V wise specified	subgroups   		Min	Max	-   
Input low voltage	VIL	 		1,2,3	All	$\frac{-0.5}{1}$	.8     .8   	٧
Input high voltage	v <sub>IH</sub>			 		2.0	V <sub>CC</sub> +0.5	-   
Output low voltage Status lines All others	V <sub>OL</sub>	I <sub>OL</sub> = 2.0 mA		†   	_		.60	[     
Output high voltage	V <sub>ОН</sub>	I <sub>OH</sub> = -400 μA	<b>\</b>	   		2.4	1   1 	   
Power supply current	ICC	V <sub>CC</sub> = 5.25 V		3		 	   600   	mA
Input leakage current	ILI	VIN = 0.0 A C	or 5.5 V	1,2,3	_		±10	l ΙμΑ Ι
Output leakage current	ILO	V <sub>OUT</sub> = 0.45 \	/ or 5.5 V	<u> </u>			±10	   
Clock input low voltage	I I V <sub>CL</sub> I			1		5 1/	.6	V   
Clock input high voltage	V <sub>CH</sub>			T ! !	     	3.9	V <sub>CC</sub> +1.0	Γ   
Capacitance of inputs	C <sub>IN</sub>	See 4.3.1c	2/	4	T 1 1		10	l pF
Capacitance I/O buffer	c <sup>I</sup> \0						15	)   <b> </b>
Capacitance of outputs	Ic <sub>out</sub>				 		10	1
Functional tests		  See 4.3.1d		7,8				<u> </u>
Functional tests  See footnotes at end	d of tabl			1 7,8				
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Test   	Symbol	Conditions   -55°C < TC < +125°C   4.75 V < V <sub>CC</sub> < 5.25 V  unless otherwise specified	Group A     Isubgroups	Device types	Limi	ts Max	Un
	<u> </u>				<u>                                     </u>		1
CLK cycle period	tCLCL	See figures 3 and 4	9,10,11	01	125	500	∦ ns
CLK low time	t <sub>clc</sub> h	<u> </u>		02	200 68 <u>1</u> /	500	+
	  -  -  -			02	2/3    (t <sub>CLCL</sub> )     -15		+
CLK high time	  t <sub>CHCL</sub>			01	44		<u> </u>
   	! ! !			02	1/3    (t <sub>CLCL</sub> )    +2		 
CLK rise time 1/	  tcH1CH2	⊤   <u> </u>		A11		10	T   
CLK fall time <u>1</u> /	  tcl2CL1	T   	1 !		     	10	T I I
Data in setup time	t <sub>DVCL</sub>		[ ]	01	20		Ţ ↓
	İ	1	 	02	30		<u> </u>
Data in hold time	t <sub>CLDX</sub>			A11	10		
READY setup time	t <sub>RYHCH</sub>			01	68		<u> </u>
	 			02	2/3    (t <sub>CLCL</sub> )     -15		
READY hold time	I CHRYX		 	01	20		<u> </u>
	] 	 		02	30		<u> </u>
READY inactive to   CLK	tRYLCL	<u> </u>		A11	-8   		
रए/GT setup time	t <sub>GVCH</sub>		T	01	15		Ţ
į				02	30		1

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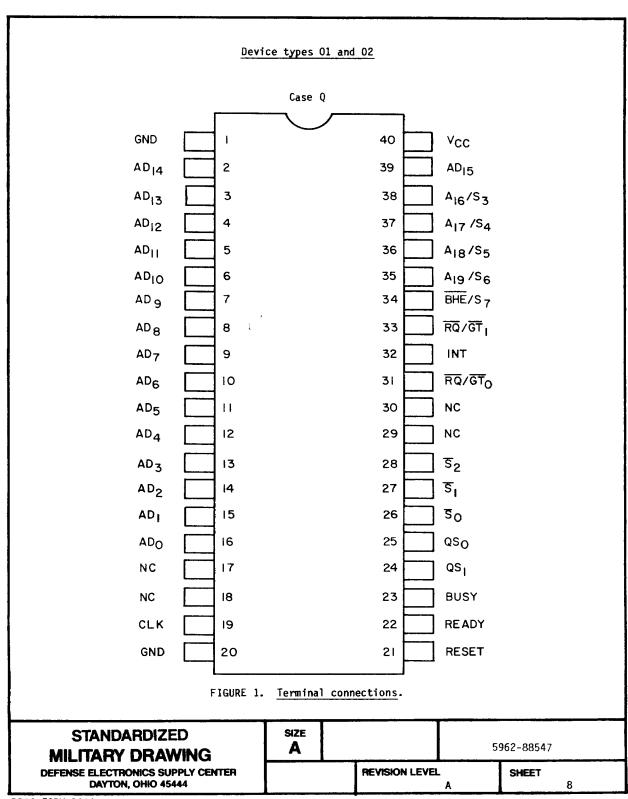
Test	Symbol	Conditions	Group A		Limi	ts	Unit
	    -	$-55^{\circ}C \le T_C \le +125^{\circ}C$   $4.75^{\circ}V \le V_{CC} \le 5.25^{\circ}V$   unless otherwise specified	subgroups    	types	Min     Min	Max	T   
Address float delay <u>l</u> /	tclaz	See figures 3 and 4	9,10,11	01	tCLAX	50	ns
		 		02	t <sub>CLAX</sub>	80	<u> </u>
Data valid delay	tCLDV		) 	01	10 <u>1</u> /	60	<u> </u> 
		<u> </u>  -		02	10 <u>1</u> /	110	<u> </u>  -
Data hold time	t <sub>CHDX</sub>	<u> </u>		A11	10		
BUSY and INT valid delay	  tchbv 			01	10 <u>1</u> /	85	T    -
	 	<u> </u>  -	 	02	10 <u>1</u> /	150	 
RQ/GT active delay	tclgl		 	01	0 <u>1</u> /	50	 
		<u> </u>  -		02	0 <u>1</u> /	85	   <u> </u>
RQ/GT inactive delay	tсьвн		i   	01	0 <u>1</u> /	50	<u> </u>
		 		02	0 <u>1</u> /	85	<u> </u>
Output rise time	  t <sub>OLOH</sub> 	   		All		20	
Output fall time	<sup>t</sup> ohoL		Ī	All		12	Ţ

 $<sup>\</sup>underline{1}/$  Guaranteed to the limits specified herein if not tested.

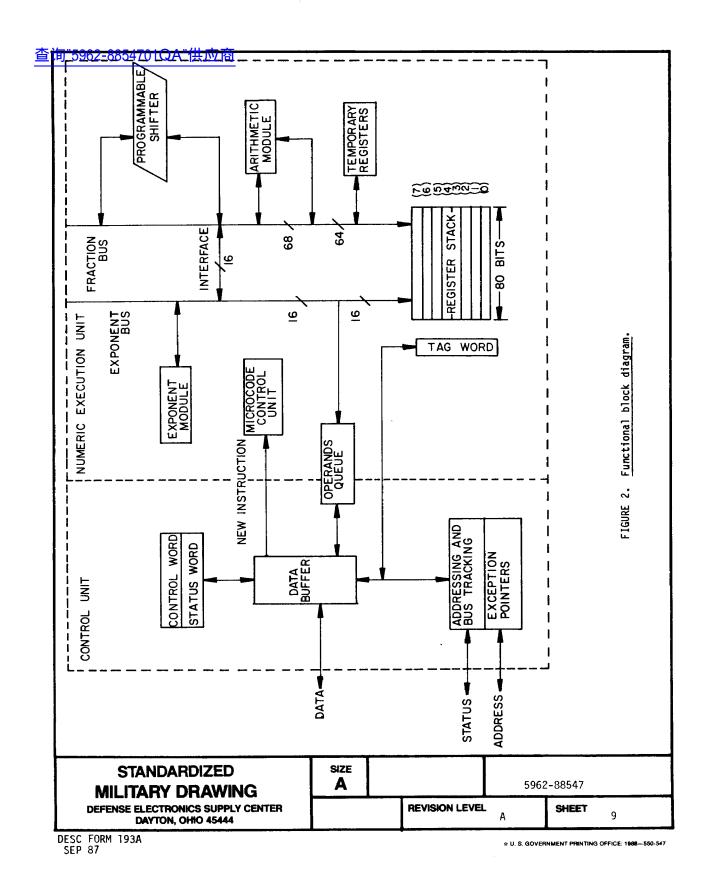
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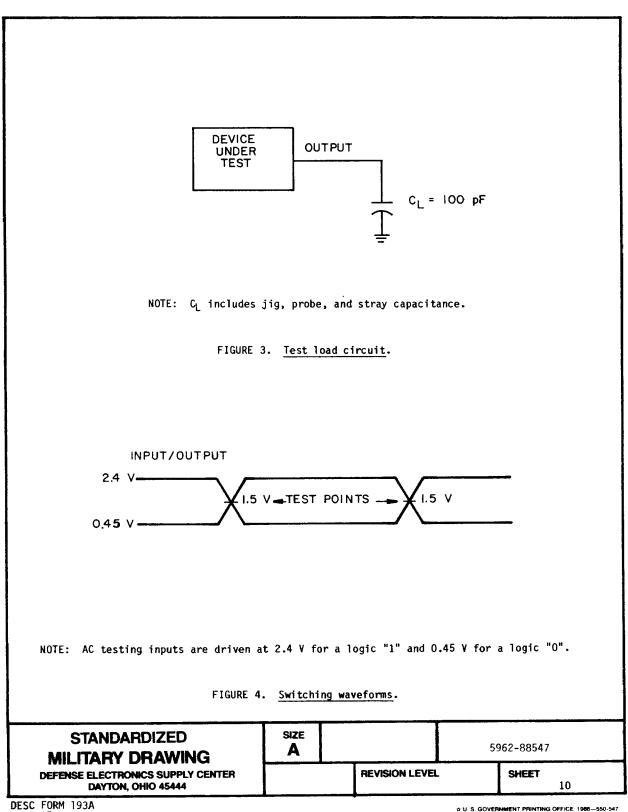
<sup>2/</sup> The capacitance measurements shall be made between the indicated terminal and ground at a frequency of 1 MHz at  $T_C$  of +25 $^{\circ}$ C. The dc bias of the measuring instrument shall be less than  $\pm 0.1$  V. The ac signal amplitude shall be less than 50 mV rms.

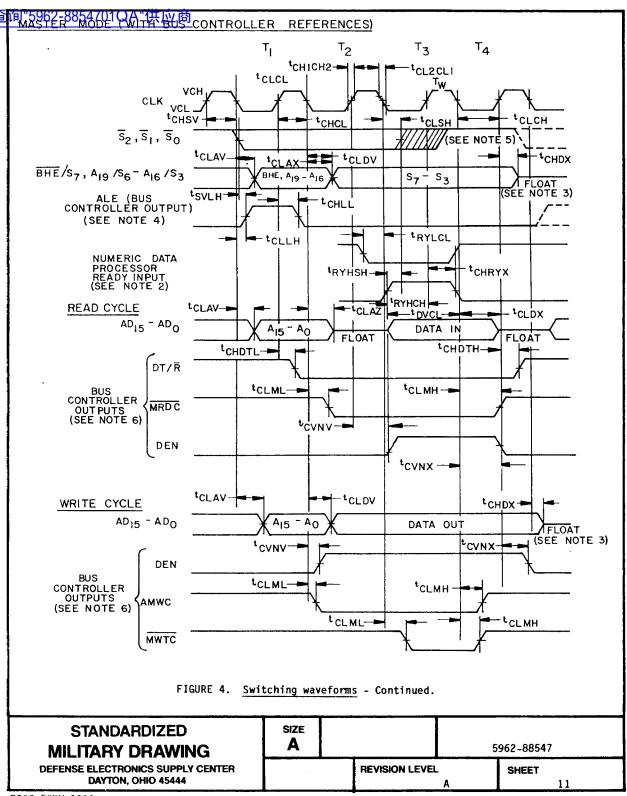


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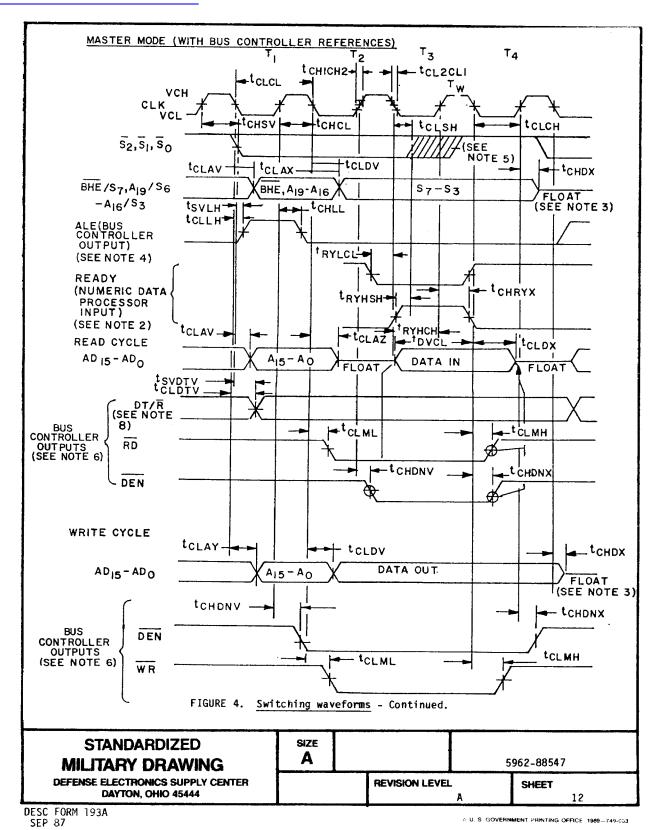


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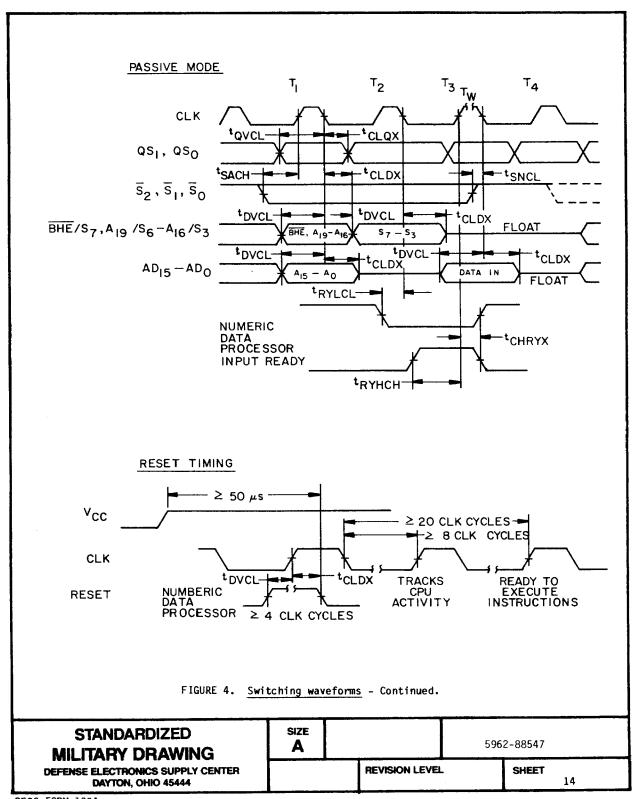


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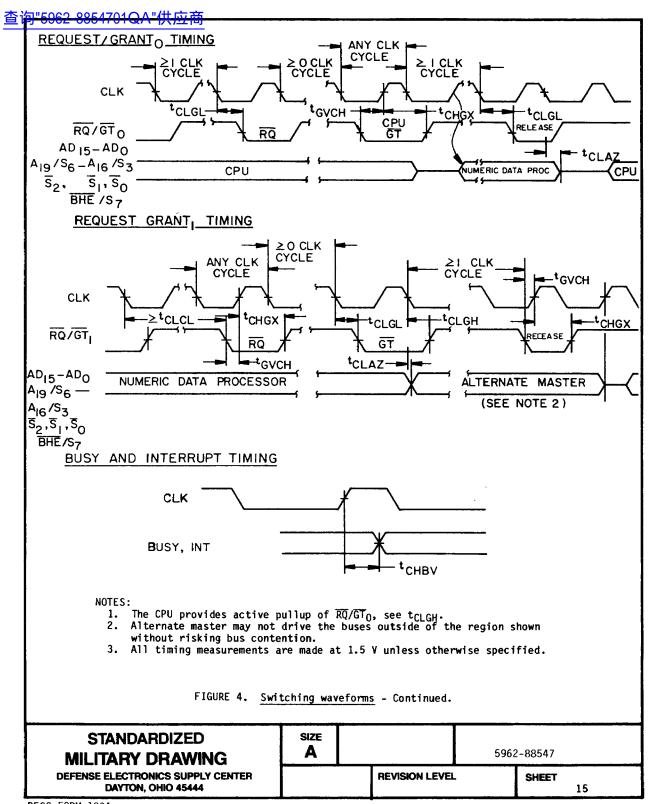


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NOTES:  1. All signals switch between 2. READY is sampled near the Tw machine states are to 1. The local bus floats only control to the CPU.  4. ALE rises at later of (ts. 5. Status inactive in state 1. The issuance of bus control AMWC, and DEN) lags the area. All timing measurements area. DT/R becomes valid at the 9. CLK rise and fall times area. 3.5 V to 1.0 V respective.	end of Tibe inserted if the new total prior of the new total prior of the new total prior made at the new measure measure measure measure measure total pre measure new tent n	2, T <sub>3</sub> , ed. umberic H). r to T <sub>4</sub> mand an h bus c t 1.5 V (tsypty	and T <sub>W</sub> to do data proces d control so ontroller Ci unless othe tCLDTy).	etermine if ssor is retu ignals (MRDU iN. erwise spec	urning C, MWTC, ified.	
FIGURE 4. <u>Swit</u>	tching wav	reforms	- Continued	•		
STANDARDIZED  MILITARY DRAWING  DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		REVISION LEV	<b>.</b>	5962-88547 SHEET	13
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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 6.7 herein). The certificate of compliance submitted to DESC-ECS 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 <u>Sampling and inspection</u>. 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 <u>Screening.</u> 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.
    - Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.6 herein).
    - (2)  $T_A = +125^{\circ}C$ , 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 ( $C_{IN}$ ,  $C_{OUT}$ , and  $C_{I/O}$  measurement) shall be measured only for the initial test and after process or design changes which may affect capacitance.
    - d. Subgroups 7 and 8 shall be sufficient to verify the functional operation of the device. These tests form a part of the manufacturer's test tape and shall be maintained and available from the approved sources of supply.

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- 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.
  - Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.6 herein).
  - (2)  $T_A = +125^{\circ}C$ , 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) 	
  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)	2, 8A, 10

<sup>\*</sup> 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 <u>Replaceability</u>. 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) 296-8525.
- 6.5 Comments. Comments on this drawing should be directed to DESC-ECC, Dayton, Ohio 45444, or telephone (513) 296-8525.
  - 6.6 Pin description. Pin descriptions are as follows:

Mnemonic	<u>Type</u>	Description
AD15 - ADO	1/0	Address data. These are input/output lines for numeric data processor driven bus cycles and are inputs which the numeric data processor monitors when the CPU is in control of the bus.
A19/S6 A18/S5 A17/S4 A16/S3	1/0	Address memory. During $T_1$ these are the four most significant address lines for memory operations. During memory operations, status information is available during $T_2$ , $T_3$ , $T_W$ , and $T_4$ . During numeric data processor controlled bus cycles, S6, S4, and S3 are reserved and HIGH, while S5 is always LOW. These lines are inputs which the numeric data processor monitors when the CPU is in control of the bus.
BHE/S7	1/0	Bus high enable. During $T_1$ the bus high enable signal should be used to enable data into the most significant half of the data bus. The S7 status information is available during $T_2$ , $T_3$ , $T_W$ , and $T_4$ .
<u>\$2, \$1, \$0</u>	I/0	Status. These lines are driven active during T4, remain valid during T1 and T2, and are returned to the passive state during T3 or during TW when READY is HIGH. These signals are monitored by the numeric data processor when the CPU is in control of the bus.
RQ/GTO	1/0	Request/Grant_0. This line is used by the numeric data processor to gain control of the local bus from the CPU of operand transfers or on behalf of another bus master.
RQ/GT1	1/0	Request/Grant $_{\rm l}$ . This line is used by another local bus master to force the numeric data processor to request the the local bus.
QS1, QS0	I	$\ensuremath{QSO}$ and $\ensuremath{QSO}$ provide the numeric data processor with status to allow tracking of the CPU instruction queue.
INT	0	Interrupt. This line is used to indicate that an unmasked exception has occurred during a numeric instruction execution when the numeric data processor interrupts are enabled.

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Mnemonic	Туре	Description
BUSY	0	Busy. This is used to indicate that the numeric data processor is executing a numeric instruction.
READY	I	Ready. This is the acknowledgement from the addressed memory device that it will complete the data transfer.
RESET	I	Reset. This causes the numeric data processor to immediately terminate its present activity.
CLK	I	Clock. The clock provides the basic timing for the numeric data processor and the bus controller.
vcc		Power. $V_{CC}$ is the +5 V power supply pin.
GND		Ground. GND are the ground pins.

6.7 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 vendors listed in MIL-BUL-103 have 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 <u>1</u> /
5962-8854701QX	34649	MD8087-2/B
5962-8854702QX	34649	MD8087/B

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 34649

Vendor name and address

Intel Corporation 3065 Bowers Avenue Santa Clara, CA 95051 Point of contact: 500

Point of contact: 5000 W. Williams Field Road Chandler, AZ 85224

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