

REVISIONS																				
LTR	DESCRIPTION														DATE (YR-MO-DA)	APPROVED				
REV																				
SHEET																				
REV																				
SHEET																				
REV STATUS OF SHEETS	REV																			
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14					
PMIC N/A	STANDARDIZED MILITARY DRAWING				PREPARED BY <i>Greg A. Fitz</i>				DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444											
THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	CHECKED BY <i>DA Di Enzo</i>				APPROVED BY <i>Michael [Signature]</i>				MICROCIRCUITS, DIGITAL, CMOS, HEX, CONTACT BOUNCE ELIMINATOR, MONOLITHIC SILICON											
	DRAWING APPROVAL DATE 3 FEBRUARY 1988				SIZE A	CAGE CODE 67268				5962 - 87646										
	REVISION LEVEL				SHEET 1 OF 14															

DESC FORM 193
SEP 87

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

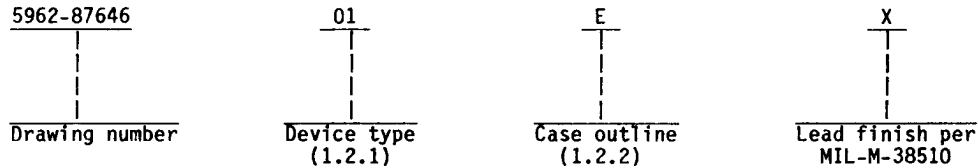
5962-E460

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	14490A	Hex contact bounce eliminator

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
E	D-2 (16-lead, 1/4" x 7/8"), dual-in-line package

1.3 Absolute maximum ratings.

Supply voltage range (V_{DD})	-0.5 V dc to +18 V dc
Input voltage range	-0.5 to V_{DD} +0.5 V dc
Input current, per pin (I_{IH})	±10 mA
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D) 1/-	500 mW
Lead temperature (soldering, 8 seconds)	+260°C
Thermal resistance, junction-to-case (θ_{JC}):	
Case E	(See MIL-M-38510, appendix C)
Junction temperature (T_J)	+175°C

1.4 Recommended operating conditions.

Supply voltage	+5 V dc to +15 V dc
Case operating temperature range (T_C)	-55°C to +125°C
Oscillator frequency (f_{OSCOUT}) at +25°C with $C_{EXT} \geq 100$ pF:	
$V_{DD} = 5$ V	1.5/ C_{EXT} (in μF) Hz
$V_{DD} = 10$ V	4.5/ C_{EXT} (in μF) Hz
$V_{DD} = 15$ V	6.5/ C_{EXT} (in μF) Hz

I/ For $T_C = +100$ to +125°C, derate linearly at 12 mW/°C to 200 mW.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 2

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 Block diagram. The 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 recommended 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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646	
		REVISION LEVEL	SHEET 3

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 _{DD} = 5.0 V V _{DD} = 10 V dc V _{DD} = 15 V dc V _{IN} = V _{DD} or 0 I _O < 1 μA	1, 2, 3	4.95 9.95 14.95		V
Low-level output voltage	V _{OL}	V _{DD} = 5.0 V dc V _{DD} = 10 V dc V _{DD} = 15 V dc V _{IN} = V _{DD} or 0 I _O < 1 μA	1, 2, 3		.05 .05 .05	V
High-level input voltage	V _{IH}	V _{DD} = 5.0 V dc V _O = 0.5 V dc or 4.5 V dc	1, 2, 3	3.5		V
		V _{DD} = 10 V dc, V _O = 1.0 V dc or 9.0 V dc		7.0		
		V _{DD} = 15 V dc I _O < 1 μA V _O = 1.5 V dc or 13.5 V dc		11.0		
Low-level input voltage	V _{IL}	V _{DD} = 5.0 V dc V _O = 0.5 V dc or 4.5 V dc	1, 2, 3		1.5	V
		V _{DD} = 10 V dc, V _O = 1.0 V dc or 9.0 V dc			3.0	
		V _{DD} = 15 V dc V _O = 1.5 V dc or 13.5 V dc I _O < 1 μA			4.0	
High-level current, oscillator output	I _{OH1}	V _{DD} = 5 V dc V _O = 4.6 V dc V _{IN} = 0 or 5 V dc T _C = -55°C T _C = +25°C T _C = +125°C	1, 2, 3	-0.12 -0.1 -0.08		mA
		V _{DD} = 10 V dc V _O = 9.5 V dc V _{IN} = 0 or 10 V dc T _C = -55°C T _C = +25°C T _C = +125°C		-0.23 -0.20 -0.16		
		V _{DD} = 15 V dc V _O = 13.5 V dc V _{IN} = 0 or 15 V dc T _C = -55°C T _C = +25°C T _C = +125°C		-1.4 -1.2 -1.0		

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 4

TABLE 1. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _C < +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
High-level current, debounce outputs	I _{OH2}	V _{DD} = 5 V dc T _C = -55°C V _O = 4.6 V dc T _C = +25°C V _{IN} = 0 or 5 V dc T _C = +125°C	1, 2, 3	-0.19		mA
		V _{DD} = 10 V dc T _C = -55°C V _O = 9.5 V dc T _C = +25°C V _{IN} = 0 or 10 V dc T _C = +125°C		-0.60		
		V _{DD} = 15 V dc T _C = -55°C V _O = 13.5 V dc T _C = +25°C V _{IN} = 0 or 15 V dc T _C = +125°C		-1.8		
Low-level current, oscillator output	I _{OL1}	V _{DD} = 5 V dc T _C = -55°C V _O = 0.4 V dc T _C = +25°C V _{IN} = 0 or 5 V dc T _C = +125°C	1, 2, 3	0.36		mA
		V _{DD} = 10 V dc T _C = -55°C V _O = 0.5 V dc T _C = +25°C V _{IN} = 0 or 10 V dc T _C = +125°C		0.30		
		V _{DD} = 15 V dc T _C = -55°C V _O = 1.5 V dc T _C = +25°C V _{IN} = 0 or 15 V dc T _C = +125°C		0.24		
Low-level current, debounce outputs	I _{OL2}	V _{DD} = 5 V dc T _C = -55°C V _O = 0.4 V dc T _C = +25°C V _{IN} = 0 or 5 V dc T _C = +125°C	1, 2, 3	2.6		mA
		V _{DD} = 10 V dc T _C = -55°C V _O = 0.5 V dc T _C = +25°C V _{IN} = 0 or 10 V dc T _C = +125°C		2.2		
		V _{DD} = 15 V dc T _C = -55°C V _O = 1.5 V dc T _C = +25°C V _{IN} = 0 or 15 V dc T _C = +125°C		1.8		

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 5

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		
Input current, debounce inputs	I _{IH}	V _{IN} = V _{DD} V _{DD} = 15 V	T _C = -55°C T _C = +25°C	1, 3		2.0	μA
				2		11.0	
Input current, debounce inputs	I _{IL}	V _{IN} = V _{SS} V _{DD} = 5 V	T _C = -55°C T _C = +25°C T _C = +125°C	1, 2, 3	210	450	μA
					140	280	
					70	160	
Input current, debounce inputs	I _{IL}	V _{IN} = V _{SS} V _{DD} = 10 V	T _C = -55°C T _C = +25°C T _C = +125°C	1, 2, 3	415	900	μA
					280	560	
					145	320	
Input current, debounce inputs	I _{IL}	V _{IN} = V _{SS} V _{DD} = 15 V	T _C = -55°C T _C = +25°C T _C = +125°C	1, 2, 3	610	1350	μA
					415	840	
					215	480	
Input current, oscillator	I _{IN}	V _{IN} = 0 or 15 V dc,	T _C = -55°C T _C = +25°C T _C = +125°C	1, 2, 3		±620 ±400 ±250	μA
Quiescent current	I _{DD}	V _{DD} = 5 V dc V _{IN} = 0 V or V _{DD} I _O = 0 μA	T _C = -55°C T _C = +25°C T _C = +125°C	1, 2, 3		150	μA
						100	
						90	
Quiescent current	I _{DD}	V _{DD} = 10 V dc V _{IN} = 0 V or V _{DD} I _O = 0 μA	T _C = -55°C T _C = +25°C T _C = +125°C	1, 2, 3		280	μA
						225	
						180	
Quiescent current	I _{DD}	V _{DD} = 15 V dc V _{IN} = 0 V or V _{DD} I _O = 0 μA	T _C = -55°C T _C = +25°C T _C = +125°C	1, 2, 3		840	μA
						650	
						550	
Input capacitance	C _{IN}	V _{IN} = 0 V dc See 4.3.1c	T _C = +25°C	4		7.5	pF

**STANDARDIZED
MILITARY DRAWING**
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE A	5962-87646
REVISION LEVEL	SHEET 6

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, high-to-low level, oscillator input to debounce outputs 1/	t _{PHL}	T _C = +25°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	9	570 240 190	ns
		T _C = -55°C, +125°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	10, 11	855 360 285	
Propagation delay time, low-to-high level, oscillator input to debounce outputs 1/	t _{PLH}	T _C = +25°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	9	740 320 240	ns
		T _C = -55°C, +125°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	10, 11	1110 480 360	
Output rise time, all outputs 1/	t _{TLH}	T _C = +25°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	9	360 180 130	ns
		T _C = -55°C, +125°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	10, 11	540 270 195	
Output fall time, oscillator output 1/	t _{THL1}	T _C = +25°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	9	200 100 80	ns
		T _C = -55°C, +125°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	10, 11	300 150 120	
Output fall time, debounce outputs 1/	t _{THL2}	T _C = +25°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	9	120 60 40	ns
		T _C = -55°C, +125°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	10, 11	180 90 60	

See footnote at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 7

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	
Setup time 1/	t _{SU}	T _C = +25°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	9	155 80 60	ns
		T _C = -55°C, +125°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	10, 11	233 120 90	
Clock frequency (external clock) (50% duty cycle) 1/	f _{CL}	T _C = +25°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	9		MHz
		T _C = -55°C, +125°C C _L = 50 pF ±10%	V _{DD} = 5 V V _{DD} = 10 V V _{DD} = 15 V	10, 11	1.4 3.0 4.5	

1/ AC limits at V_{DD} = 10 V and V_{DD} = 15 V shall be guaranteed if not tested. See figure 3.

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 or D using the circuit submitted with the certificate of compliance (see 3.5 herein).
 - (2) T_A = +125°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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 8

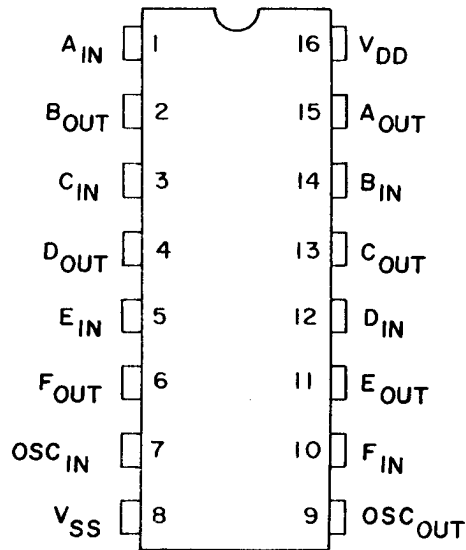


FIGURE 1. Terminal connections.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-87646
		REVISION LEVEL	SHEET 9

DESC FORM 193A
SEP 87

☆ U.S. GOVERNMENT PRINTING OFFICE 1987-549-096

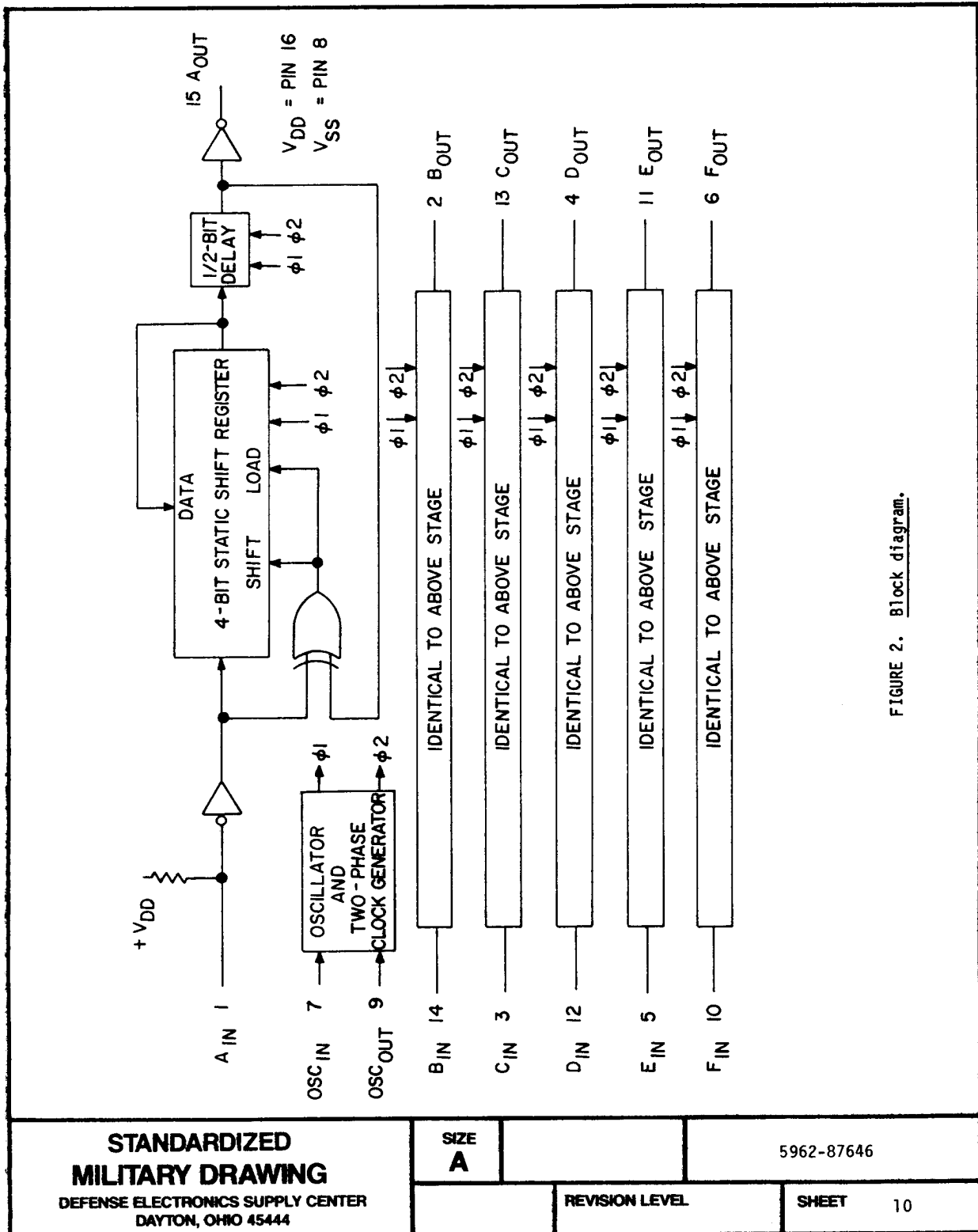


FIGURE 2. Block diagram.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 10

DESC FORM 193A
SEP 87

☆ U.S. GOVERNMENT PRINTING OFFICE 1987-549-096

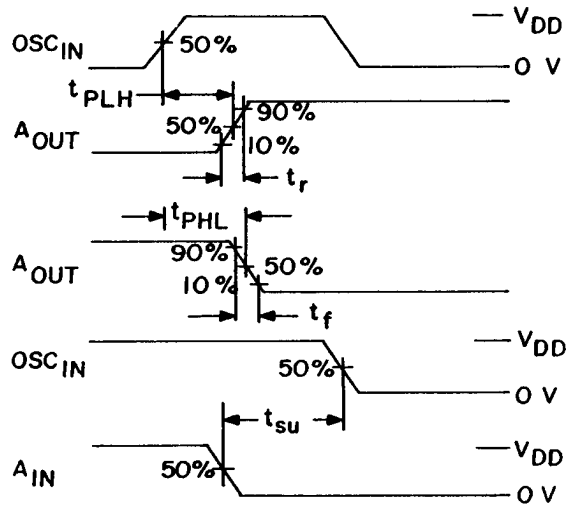


FIGURE 3. Switching waveforms and timing diagram.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 11

DESC FORM 193A
SEP 87

☆ U.S. GOVERNMENT PRINTING OFFICE: 1967-549-096

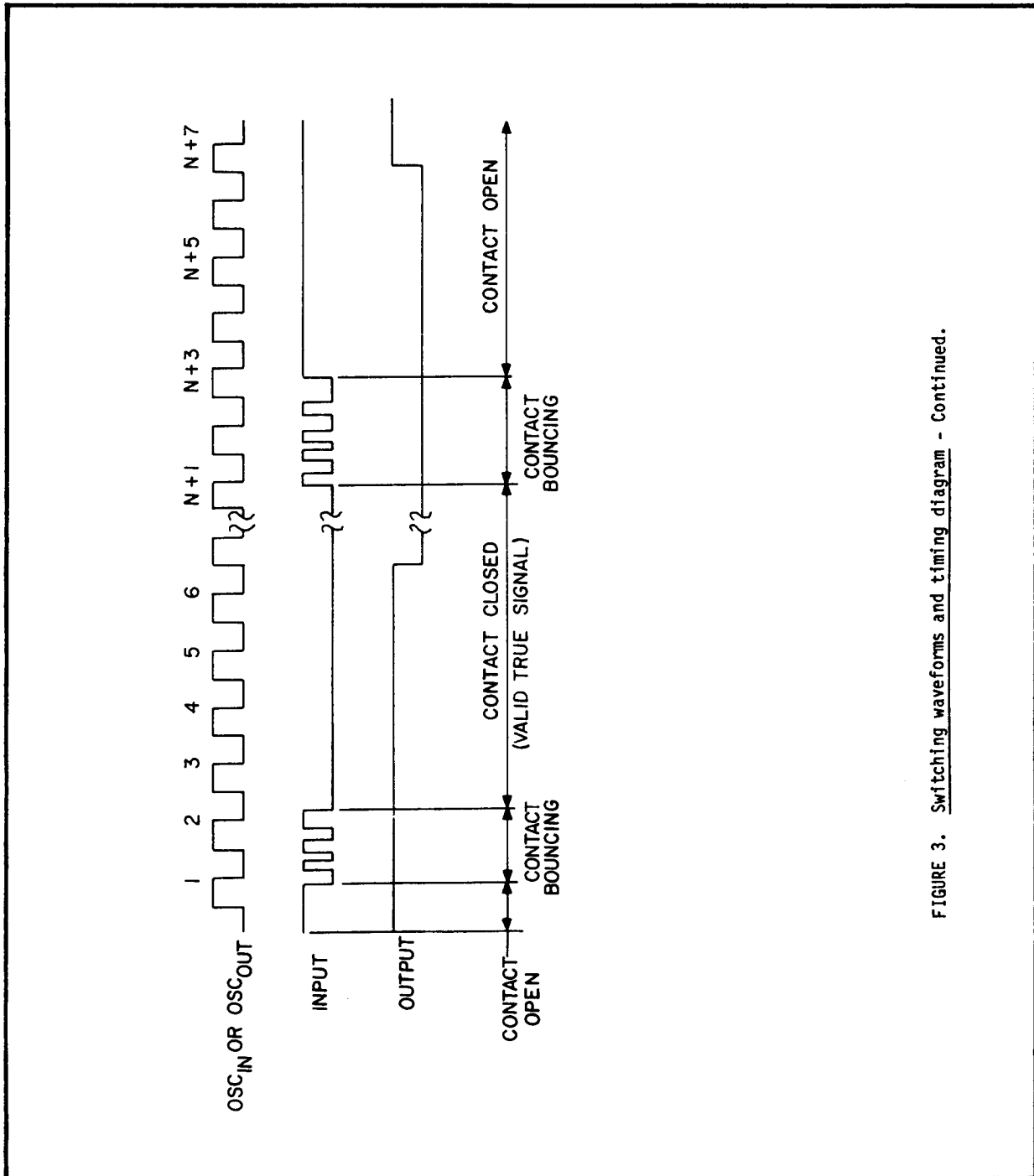


FIGURE 3. Switching waveforms and timing diagram - Continued.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 12

DESC FORM 193A
SEP 87

☆ U.S. GOVERNMENT PRINTING OFFICE: 1987-549-096

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, 9
Group A test requirements (method 5005)	1, 2, 3, 4, 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.

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

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 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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 13

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.

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 <u>1/</u>	Replacement military specification part number
5962-8764601EX	04713	14490A/BEAJC	

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

04713

Vendor name and address

Motorola, Incorporated
7402 S. Price Road
Tempe, AZ 85283

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87646
	REVISION LEVEL	SHEET 14