

REVISIONS														
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED											
A	Add case outline 2, and data that applies. Add figure 4. Add footnote 2/ to table I. Change t_{H3} and testing conditions for ac parameters. Change terminal connections. Add VSPN for case outline 2. Editorial changes throughout. Add subgroup 8 to table II. Technical changes to table I and 1.4. Add 3/ to table I.	89 FEB 24	<i>M.A. Lyle</i>											
REV														
SHEET														
REV														
SHEET														
REV STATUS OF SHEETS	REV SHEET	A	A	A	A	A	A	A	A	A	A	A	A	A
		1	2	3	4	5	6	7	8	9	10	11	12	13
PMIC N/A	PREPARED BY <i>Thomas L. Poelking</i>	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444												
STANDARDIZED MILITARY DRAWING	CHECKED BY <i>Ray Morrin</i>													
	APPROVED BY <i>M.A. Lyle</i>													
	DRAWING APPROVAL DATE 12 JUNE 1987													
THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE	REVISION LEVEL A	SIZE A	CAGE CODE 67268	5962-87001										
AMSC N/A		SHEET		1	OF		14							

DESC FORM 193
SEP 87

U.S. GOVERNMENT PRINTING OFFICE: 1987 - 748-129/60911
5962-E1098-1

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

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 tables. The truth tables shall be as specified on figure 2.

3.2.3 Logic diagram. The logic diagram shall be as specified on figure 3.

3.2.4 Test circuit and switching waveforms. The test circuit and switching waveforms shall be as specified on figure 4.

3.2.5 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 ambient 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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87001
	REVISION LEVEL A	SHEET 3

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Limits		Unit		
				Min	Max			
Cases E, F, and 2		Quiescent tests <u>1/</u>						
High level output voltage	V _{OH}	Outputs terminated through 100Ω to -2.0 V V _{EE} = -5.2 V V _{CC} = 0.0 V <u>2/</u>	V _{IH}	V _{IL}				
			-0.780	-1.950	1	-1.010	-0.780	V
			-0.650	-1.950	2	-0.860	-0.650	
Low level output voltage	V _{OL}							
			-0.840	-1.950	3	-1.060	-0.840	
			-0.780	-1.950	1	-1.950	-1.580	V
High level threshold output voltage	V _{OHA}							
			-0.650	-1.950	2	-1.950	-1.565	
			-0.840	-1.950	3	-1.950	-1.610	
Low level threshold output voltage	V _{OLA}							
			-1.110	-1.480	1	-1.010	-0.780	V
			-0.960	-1.465	2	-0.860	-0.650	
Power supply drain current <u>3/</u>	I _{EE}	V _{EE} = -5.46 V V _{CC} = 0.0 V V _{IH} = -0.780 V at +25°C -0.650 V at +125°C 0.840 V at -55°C						
					1	-150		mA
					2,3	-165		
High level input current	I _{IH}		Carry in		1,2		240	μA
					3		380	
			D ₀ , D ₁ , D ₂ , D ₃ , C _{lock}		1,2		275	μA
					3		430	
			S ₂		1,2		335	μA
					3		535	
			S ₁		1,2		420	μA
					3		670	
Low level input current	I _{IL}	V _{EE} = -4.94 V V _{IL} = -1.950 V <u>3/</u> V _{CC} = 0.0 V			1,3	0.5		μA
					2	0.3		
Functional tests		See 4.3.1c			7,8			

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-87001
		REVISION LEVEL A	SHEET 4

DESC FORM 193A
SEP 87

* U. S. GOVERNMENT PRINTING OFFICE: 1968-549-904

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Limits		Unit			
				Min	Max				
Cases E and F		DC rapid tests 4/							
High level output voltage	V _{OH}	Outputs terminated through 100Ω to -2 V V _{CC} = 0.0 V V _{EE} = -5.2 V 2/	V _{IH}	V _{IL}					
			-0.819	-1.950	1	-1.046	-0.819	V	
			-0.692	-1.950	2	-0.899	-0.692		
Low level output voltage	V _{OL}	V _{CC} = 0.0 V V _{EE} = -5.2 V 2/	-0.882	-1.950	3	-1.099	-0.882		
			-0.819	-1.950	1	-1.950	-1.592	V	
			-0.692	-1.950	2	-1.950	-1.578		
High level threshold output voltage	V _{OHA}	V _{CC} = 0.0 V V _{EE} = -5.2 V 2/	-0.882	-1.950	3	-1.950	-1.623		
			-1.146	-1.492	1	-1.046	-0.819	V	
			-0.999	-1.478	2	-0.899	-0.692		
Low level threshold output voltage	V _{OLA}	V _{CC} = 0.0 V V _{EE} = -5.2 V 2/	-1.199	-1.523	3	-1.099	-0.822		
			-1.146	-1.492	1	-1.950	-1.592	V	
			-0.999	-1.478	2	-1.950	-1.578		
Power supply drain current 3/	I _{EE}	V _{EE} = -5.46 V V _{CC} = 0.0 V V _{IH} = -0.780 V at +25°C -0.650 V at +125°C -0.840 V at -55°C			1 2,3	-149 -164		mA	
			High level input current	I _{IH}	Carry in	1,2 3		225 365	μA
					D ₀ , D ₁ , D ₂ , D ₃ , C _{lock}	1,2 3		260 415	μA
S ₂	1,2 3				320 520	μA			
S ₁	1,2 3				405 655	μA			
Low level input current	I _{IL}	V _{EE} = -4.94 V V _{IL} = -1.950 V 3/ V _{CC} = 0.0 V			1,3 2	0.5 0.3		μA	
Functional tests		See 4.3.1c			7,8				

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87001
	REVISION LEVEL A	SHEET 5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Limits		Unit					
				Min	Max						
Case 2		DC rapid tests 4/									
High level output voltage	V _{OH}	Outputs terminated through 100Ω to -2 V V _{CC} = 0.0 V V _{EE} = -5.2 V 27	V _{IH}	V _{IL}							
			-0.818	-1.950	1	-1.045	-0.818	V			
			-0.692	-1.950	2	-0.898	-0.692				
Low level output voltage	V _{OL}	V _{CC} = 0.0 V V _{EE} = -5.2 V 27	-0.882	-1.950	3	-1.098	-0.882				
			-0.818	-1.950	1	-1.950	-1.592	V			
			-0.692	-1.950	2	-1.950	-1.578				
High level threshold output voltage	V _{OHA}		-0.882	-1.950	3	-1.950	-1.623				
			-1.145	-1.492	1	-1.045	-0.818	V			
			-0.998	-1.478	2	-0.898	-0.692				
Low level threshold output voltage	V _{OLA}		-1.198	-1.523	3	-1.098	-0.882				
			-1.145	-1.492	1	-1.950	-1.592	V			
			-0.998	-1.478	2	-1.950	-1.578				
Power supply drain current 3/	I _{EE}	V _{EE} = -5.46 V V _{CC} = 0.0 V V _{IH} = -0.780 V at +25°C -0.650 V at +125°C -0.840 V at -55°C			1 2,3	-149 -164		mA			
			High level input current	I _{IH}				Carry in	1,2 3	225 365	μA
								D ₀ , D ₁ , D ₂ , D ₃ , Clock	1,2 3	260 415	μA
S ₂	1,2 3	320 520						μA			
S ₁	1,2 3	405 655						μA			
Low level input current	I _{IL}	V _{EE} = -4.94 V V _{IL} = -1.950 V 3/ V _{CC} = 0.0 V			1,3 2	0.5 0.3		μA			
Functional tests		See 4.3.1c			7,8						
See footnotes at end of table.											
STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444			SIZE		5962-87001						
			A		REVISION LEVEL	A	SHEET	6			

TABLE 1. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Cases E, F, and 2			AC tests			
Transition time low to high or high to low	t _{TLH} , t _{THL}	V _{EE} = -2.94 V V _{CC} = 2.0 V C _L < 5 pF Load all outputs through 100Ω to ground See figure 4	9 10,11	0.7 0.7	2.1 2.3	ns
Propagation delay time, CLOCK high to Q ₀ high or low	t _{PHH1} , t _{PHL1}		9 10,11	0.7 0.7	3.2 3.5	ns
Propagation delay time, CLOCK high to CARRY OUT high or low	t _{PHH2} , t _{PHL2}		9 10,11	0.7 0.7	7.0 7.7	ns
Propagation delay time, CARRY IN high to CARRY OUT high	t _{PHH3}		9 10,11	0.7 0.7	3.0 3.5	ns
Propagation delay time, CARRY IN low to CARRY OUT low	t _{PLL}		9 10,11	0.7 0.7	3.0 3.5	ns
Maximum count frequency	f _{MAX}		9,10,11	250		MHz
Setup time, D ₀ high or low to CLOCK high	t _{S1}		9,10,11	2.0		ns
Setup time, S ₁ or S ₂ high to CLOCK high	t _{S2}		9,10,11	3.5		ns
Setup time, CARRY IN low to CLOCK high	t _{S3}		9,10,11	2.0		ns
Setup time, CLOCK high to CARRY IN high	t _{S4}		9,10,11	0.0		ns
Hold time, CLOCK high to D ₀ high or low	t _{H1}		9,10,11	0.0		ns
Hold time, CLOCK high to S ₁ or S ₂ high	t _{H2}		9,10,11	-0.5		ns
Hold time, CLOCK high to CARRY IN low	t _{H3}		9,10,11	150		ps
Hold time, CARRY IN high to CLOCK high	t _{H4}	9 10,11	2.0 2.2		ns	

See footnotes on next page.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87001	
		REVISION LEVEL A	SHEET 7

- 1/ The quiescent limits are determined after a device has reached thermal equilibrium. This is defined as the reading taken with the device in a socket with > 500 LFPM of +25°C, +125°C or -55°C (as applicable) air blowing on the unit in a transverse direction with power applied for at least four (4) minutes before the reading is taken. This method was used for theoretical limit establishment only. All devices shall be tested to the delta V (rapid test) conditions specified herein. The rapid test method is an equivalent method of testing quiescent conditions.
- 2/ The high and low level output current varies with temperature, and shall be calculated using the following formulas:

$$I_{OH} = (V_{OH} - 2 V)/100\Omega$$

$$I_{OL} = (V_{OL} - 2 V)/100\Omega$$
- 3/ The I_{EE} and I_{IL} limits, although specified in the minimum column, shall not be exceeded in magnitude, as a maximum value.
- 4/ The dc rapid test forcing functions and limits are used for all dc testing. These limits are determined for each device type based on the power dissipation and package type. The rapid test (delta V) limits and forcing functions are skewed allowing rapid testing to be performed at standard temperatures without the addition of delta T's.

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.

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, 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:

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87001
	REVISION LEVEL A	SHEET 8

Case outlines	E	F	2
Terminal number	Terminal symbol		
1	V _{CC1}	CLOCK	NC
2	Q2	Q0	V _{CC1}
3	Q3	Q1	Q2
4	CARRY OUT	V _{CC2}	Q3
5	D3	V _{CC1}	CARRY OUT
6	D2	Q2	NC
7	S2	Q3	D3
8	V _{EE}	CARRY OUT	D2
9	S1	D3	S2
10	CARRY IN	D2	V _{EE}
11	D1	S2	NC
12	D0	V _{EE}	S1
13	CLOCK	S1	CARRY IN
14	Q0	CARRY IN	D1
15	Q1	D1	D0
16	V _{CC2}	D0	NC
17	---	---	CLOCK
18	---	---	Q0
19	---	---	Q1
20	---	---	V _{CC2}

NC = No connection

FIGURE 1. Terminal connections.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87001	
		REVISION LEVEL A	SHEET 9

CARRY IN	S ₁	S ₂	Operating mode
X	L	L	Preset (program)
L	L	H	Count up
H	L	H	Hold count
L	H	L	Count down
H	H	L	Hold count
X	H	H	Stop count

Inputs								Outputs				
S ₁	S ₂	D ₀	D ₁	D ₂	D ₃	CARRY IN	CLOCK *	Q ₀	Q ₁	Q ₂	Q ₃	CARRY OUT
L	L	L	L	H	H	X	H	L	L	H	H	L
L	H	X	X	X	X	L	H	H	L	H	H	H
L	H	X	X	X	X	L	H	L	H	H	H	H
L	H	X	X	X	X	L	H	H	H	H	H	L
L	H	X	X	X	X	H	L	H	H	H	H	H
L	H	X	X	X	X	H	H	H	H	H	H	H
H	H	X	X	X	X	X	H	H	H	H	H	H
L	L	H	H	L	L	X	H	H	H	L	L	L
H	L	X	X	X	X	L	H	L	H	L	L	H
H	L	X	X	X	X	L	H	H	L	L	L	H
H	L	X	X	X	X	L	H	L	L	L	L	L
H	L	X	X	X	X	L	H	H	H	H	H	H

H = High level
 L = Low level
 X = Irrelevant
 * = A clock H is defined as a clock input from a low to a high logic level.

FIGURE 2. Truth tables.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87001
	REVISION LEVEL A	SHEET 10

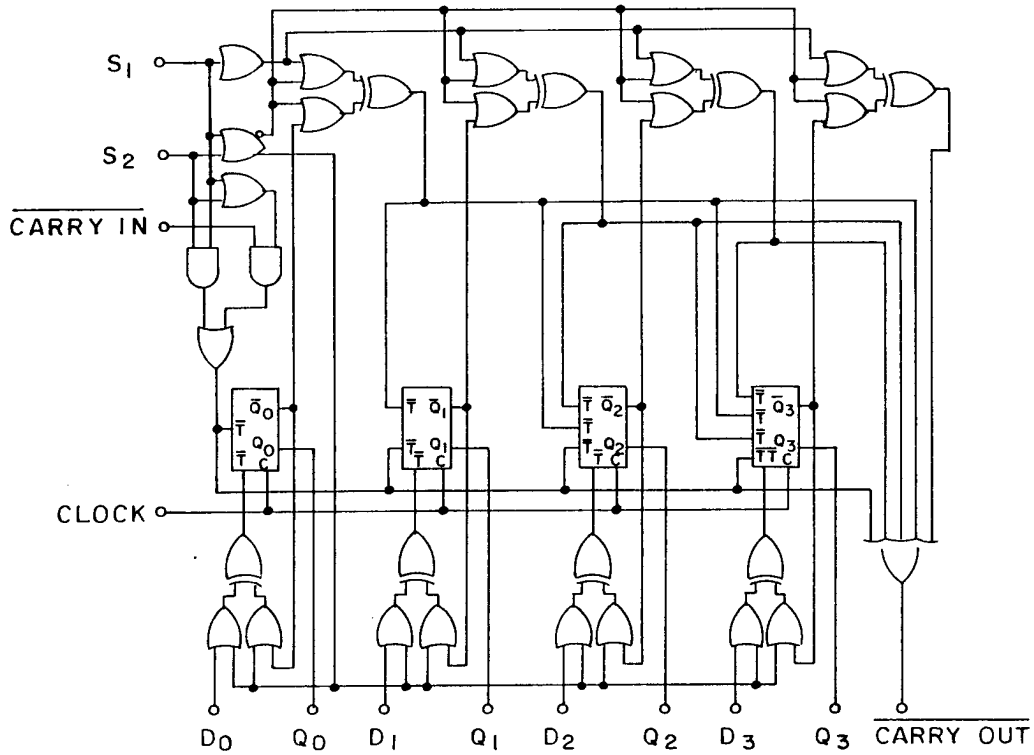


FIGURE 3. Logic diagram.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87001
	REVISION LEVEL A	SHEET 11

DESC FORM 193A
SEP 87

☆ U. S. GOVERNMENT PRINTING OFFICE: 1988-550-547

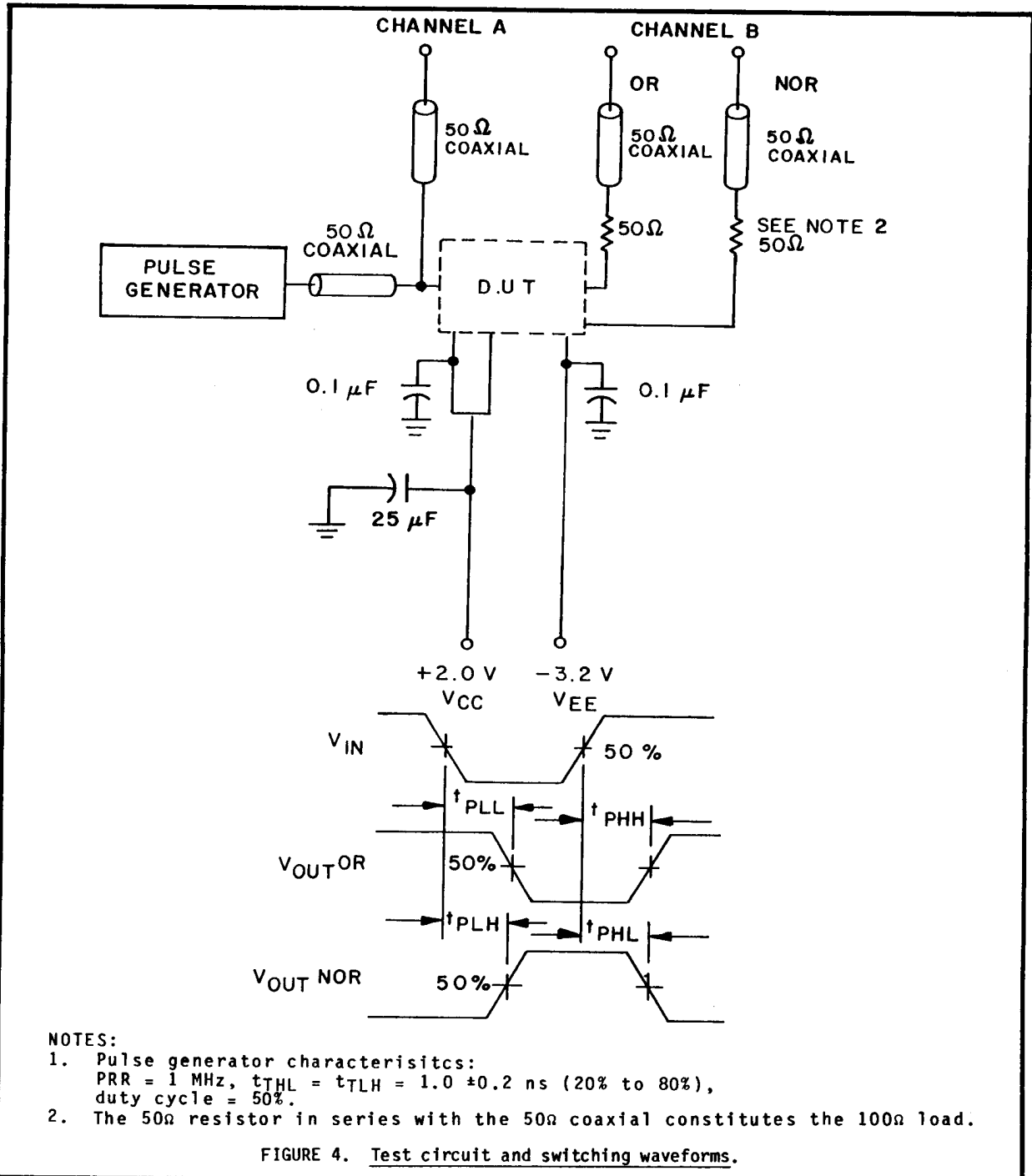


FIGURE 4. Test circuit and switching waveforms.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87001
	REVISION LEVEL A	SHEET 12

DESC FORM 193A
SEP 87

U. S. GOVERNMENT PRINTING OFFICE: 1988-550-547

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*,2,3,7*,8,9
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 subgroups 1 and 7.

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. Subgroup 7 and 8 tests shall verify the truth table as specified on figure 2 herein.

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 3.5 herein).
 - (2) $T_A = +125^{\circ}\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by and 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 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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87001
	REVISION LEVEL A	SHEET 13

查询"5962-87001012X"供应商

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has 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>
5962-8700101EX	04713	10H536/BEAJC
5962-8700101FX	04713	10H536/BFAJC
5962-87001012X	04713	10H536M/B2AJC

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		5962-87001
		REVISION LEVEL A	SHEET 14

DESC FORM 193A
SEP 87

☆ U. S. GOVERNMENT PRINTING OFFICE: 1988-550-547

011863 - - - -