MIL-M-38510/305B
9 August 1983
SUPERSEDING
MIL-M-38510/305A
14 February 1978

MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, SCHOTTKY, TTL, LOW-POWER OR GATES, MONOLITHIC SILICON

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, Schottky, TTL, low-power OR gate microcircuits. Two product assurance classes and a choice of case outlines and lead finishes are provided for each type and are reflected in the complete part number.

1.2 Part number. The part number shall be in accordance with MIL-M-38510.

1.2.1 Device type. The device type shall be as follows:

Device type	Circuit
01	Quadruple 2-input OR gate
02	Quadruple 2-input excusive OR gate

1.2.2 Device class. The device class shall be the product assurance level as defined in MIL-M-38510.

1.2.3 Case outline. The case outline shall be designated as follows:

Outline letter	Case outline (see MIL-M-38510, appendix C)
A	F-1 (14-lead, 1/4" x 1/4"), flat package
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
X	C-2 (20-terminal, .350" x .350"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc to +7.0 V dc
Input voltage range	-1.5 V dc at -18 mA to +5.5 V dc
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D) 1/	55 mW dc
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC}):	
Cases A, B, D	70°C/W
Case C	50°C/W
Case X	60°C/W
Junction temperature (T_J)	+175°C

1/ Must withstand the added P_D due to short circuit conditions (e.g., I_{OS}).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Rome Air Development Center (RBE-2), Griffiss AFB, NY 13441, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

1.4 Recommended operating conditions.

Supply voltage (V_{CC}) - - - - - - - - - - - -	+4.5 V dc minimum to +5.5 V dc maximum
Minimum high-level input voltage (V_{IH}) - -	+2.0 V dc
Maximum low-level input voltage (V_{IL}) - -	+0.7 V dc
Case operating temperature range (T_C) - - -	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specifications and standards. Unless otherwise specified, the following specifications and standards, 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 specification 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 specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Detail specification. The individual item requirements shall be in accordance with MIL-M-38510, 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 Logic diagrams and terminal connections. The logic diagrams and 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 Schematic circuits. The schematic circuits shall be submitted to the preparing activity prior to inclusion of a manufacturer's device in this specification and shall be submitted to the qualifying activity as a prerequisite for qualification. All manufacturers' schematics shall be maintained and available upon request.

3.2.4 Case outlines. The case outlines shall be as specified in 1.2.3.

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-M-38510 (see 6.5).

3.4 Electrical performance characteristics. The electrical performance characteristics are as specified in table I, and apply over the full recommended case operating temperature range, unless otherwise specified.

3.5 Electrical test requirements. The electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^\circ C \leq T_C \leq +125^\circ C$	Device type	Limits Min	Limits Max	Unit
High-level output voltage	V_{OH}	V_{CC} = +4.5 V; V_{IH} = +2.0 V; I_{OH} = -400 µA; V_{IL} = +0.7 V 1/	All	2.5		V
Low-level output voltage	V_{OL}	V_{CC} = +4.5 V; I_{OL} = +4 mA; V_{IH} = +2.0 V; V_{IL} = +0.7 V 1/	All		0.4	V
Input clamp voltage	V_{IC}	V_{CC} = +4.5 V; I_{IN} = -18 mA; T_C = +25°C	All		-1.5	V
High-level input current	I_{IH1}	V_{CC} = +5.5 V; V_{IN} = +2.7 V 2/	01		20	µA
			02		40	
High-level input current	I_{IH2}	V_{CC} = +5.5 V; V_{IN} = +5.5 V 2/	01		100	µA
			02		200	
Low-level input current	I_{IL}	V_{CC} = +5.5 V; V_{IN} = +0.4 V 1/	01	-0.03	-.40	mA
			02	-0.20	-0.76	
Short-circuit output current	I_{OS}	V_{CC} = +5.5 V 1/, 3/	All	-15	-110	mA
High-level supply current	I_{CCH}	V_{CC} = +5.5 V; 1/ V_{IN} = +5.5 V	01		6.2	mA
Low-level supply current	I_{CCL}	V_{CC} = +5.5 V; V_{IN} = +0 V	01		9.8	mA
Supply current	I_{CC}	V_{CC} = +5.5 V 4/	02		10	mA
Propagation delay time, high to low level	t_{PHL}	C_L = 50 pF ±5%; R_L = 2 kΩ ±5%	01	2	35	ns
Propagation delay time, low to high level	t_{PLH}		01	2	35	ns

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^{\circ}C \leq T_C \leq +125^{\circ}C$	Device type	Limits Min	Limits Max	Unit
Propagation delay time, high to low level (other input low)	t_{PHL1}	C_L = 50 pF ±5%; R_L = 2 kΩ ±5%	02	2	29	ns
Propagation delay time, high to low level (other input high)	t_{PHL2}		02	2	35	ns
Propagation delay time, low to high level (other input low)	t_{PLH1}		02	2	37	ns
Propagation delay time, low to high level (other input high)	t_{PLH2}		02	2	40	ns

1/ All unspecified inputs at 5.5 volts.

2/ All unspecified inputs grounded.

3/ Not more than one output should be shorted at a time.

4/ I_{CC} is measured with the inputs grounded and the outputs open.

3.6 Marking. Marking shall be in accordance with MIL-M-38510. At the option of the manufacturer, marking of the country of origin may be omitted from the body of the microcircuit, but shall be retained on the initial container.

3.7 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 8 (see MIL-M-38510, appendix E).

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Interim electrical parameters (pre burn-in) (method 5004)	1	1
Final electrical test parameters (method 5004)	1*,2,3,9, 10,11	1*,2,3,9
Group A test requirements (method 5005)	1,2,3,9, 10,11	1,2,3,9
Group B test requirements (method 5005) subgroup 5	1,2,3,9,10, 11	N/A
Group C end-point electrical parameters (method 5005)	N/A	1,2,3
Additional electrical subgroups for group C periodic inspections	N/A	10,11
Group D end-point electrical parameters (method 5005)	1,2,3	1,2,3

*PDA applies to subgroup 1 (see 4.2c).

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 and methods 5005 and 5007, as applicable, of MIL-STD-883, except as modified 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 qualification and quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test (method 1015 of MIL-STD-883).

(1) Test condition D or E, using the circuit shown on figure 3, or equivalent.

(2) T_A = +125°C minimum.

b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.

c. The percent defective allowable (PDA) for class S devices shall be as specified in MIL-M-38510. The PDA for class B devices shall be 10 percent based on failures from group A, subgroup 1 test after cooldown as final electrical test in accordance with method 5004 of MIL-STD-883, and with no intervening electrical measurements. If interim electrical parameter tests are performed prior to burn-in, failures resulting from pre burn-in screening may be excluded from the PDA. If interim electrical parameter tests prior to burn-in are omitted, then all screening failures shall be included in the PDA. The verified failures of group A, subgroup 1, after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent defective for that lot, and the lot shall be accepted or rejected based on the PDA for the applicable device class.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-M-38510. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table I of method 5005 of MIL-STD-883 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroups 4, 5, 6, 7, and 8 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of method 5005 of MIL-STD-883. Electrical parameters shall be as specified in table II herein.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table III of method 5005 of MIL-STD-883 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Subgroups 3 and 4 shall be added to the group C inspection requirements for class B devices and shall consist of the tests, conditions, and limits specified for subgroups 10 and 11 of group A.

c. Steady-state life test (method 1005 of MIL-STD-883) conditions:

(1) Test condition D or E, using the circuit shown on figure 3, or equivalent.

(2) T_A = +125°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.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table IV of method 5005 of MIL-STD-883. End-point electrical parameters shall be as specified in table II herein.

4.5 Methods of inspection. Methods of inspection shall be specified as follows.

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the referenced terminal.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

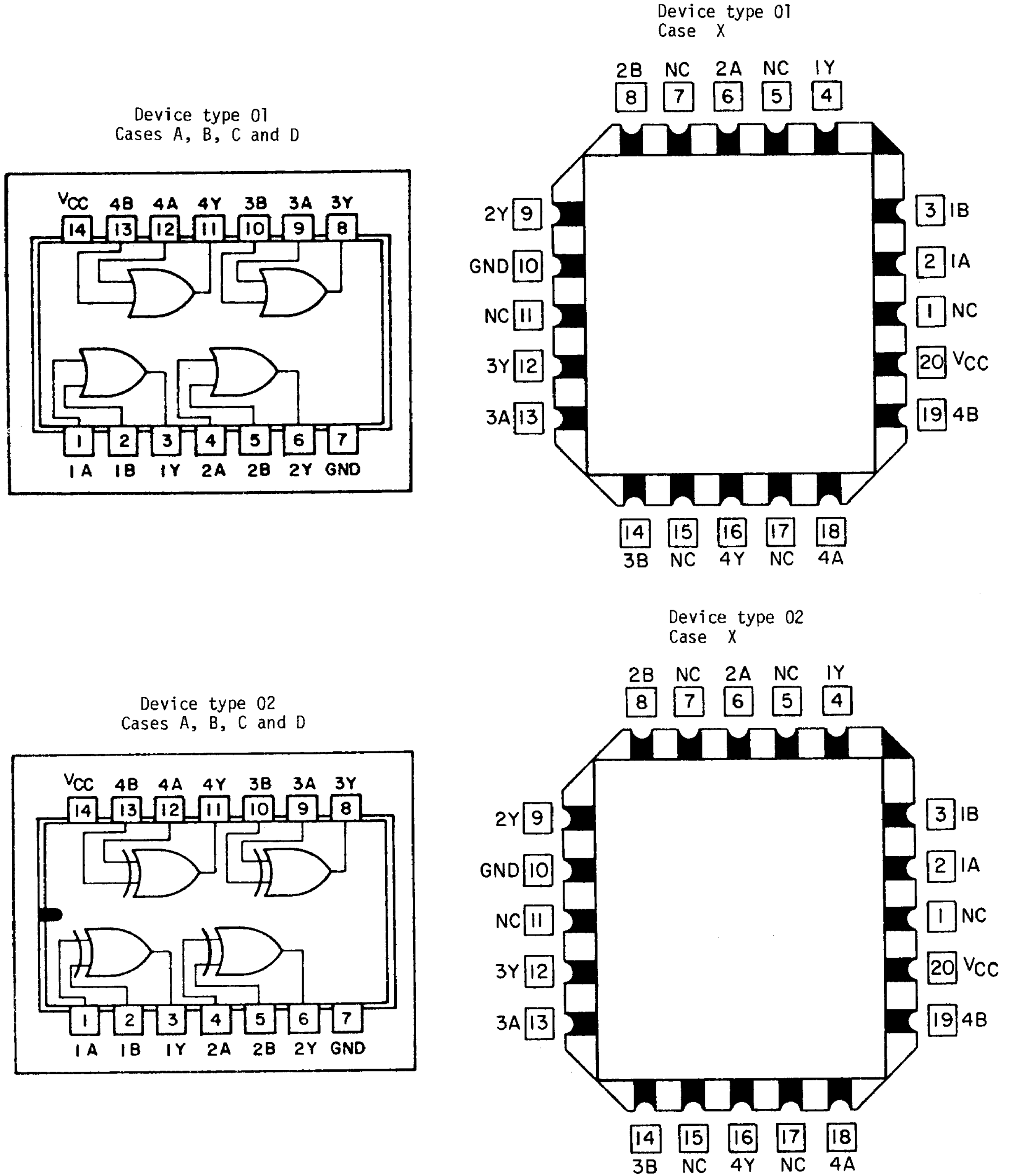


FIGURE 1. Logic diagram and terminal connections.

Device type 01

Truth table (each gate)		
Inputs		Outputs
A	B	Y
H	X	H
X	H	H
L	L	L

X = Irrelevant

Positive logic: Y = A+B

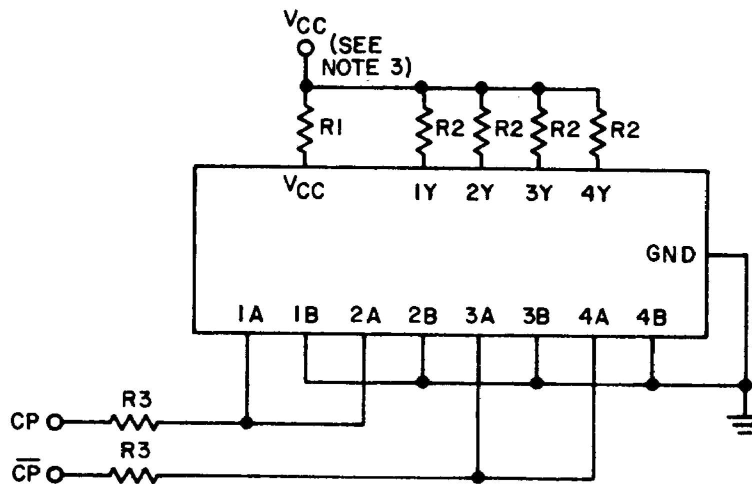
Device type 02

Truth table (each gate)		
Inputs		Outputs
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

Positive logic: Y = A+B

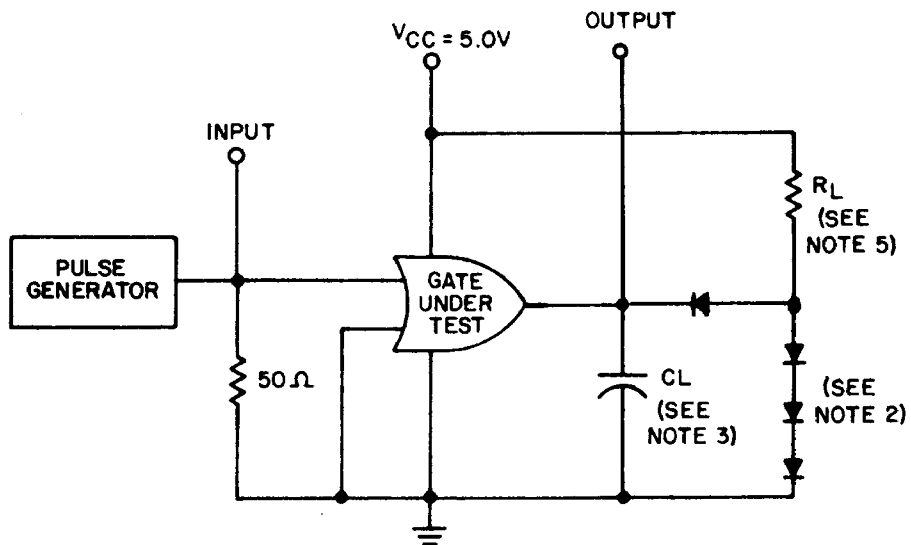
FIGURE 2. Truth tables.

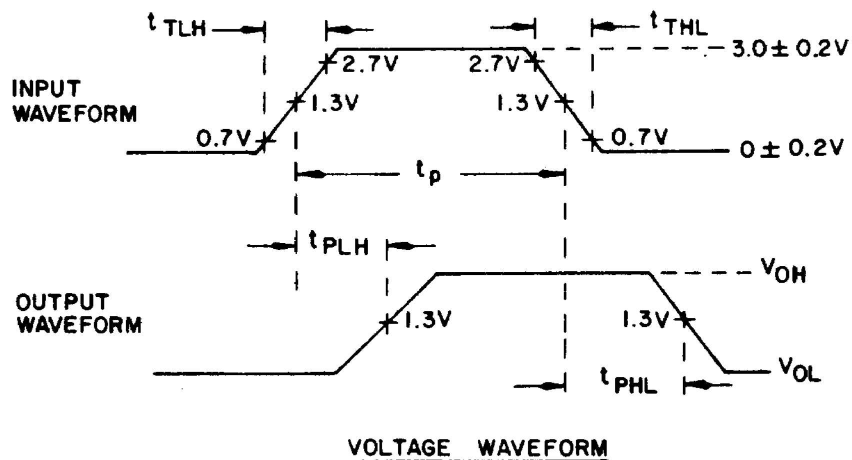
Device types 01 and 02



NOTES:
1. CP or $\overline{CP}$ = 100 kHz ±50% square wave; duty cycle = 50 ±15%; V_{IH} = 2.0 minimum to 5.5 V maximum; V_{IL} = -0.5 V minimum to 0.7 V maximum.
2. R1 = 10Ω ±5%, R2 = 1 kΩ ±5%, R3 = 27Ω ±5%.
3. V_{CC} shall be high enough to insure that 5.0 V is present at device V_{CC} terminal.

FIGURE 3. Burn-in and life test circuit for device types 01 and 02.



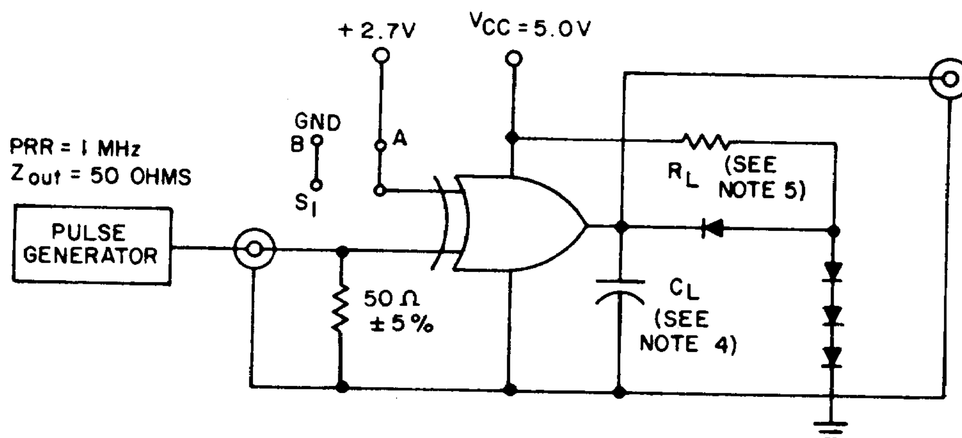


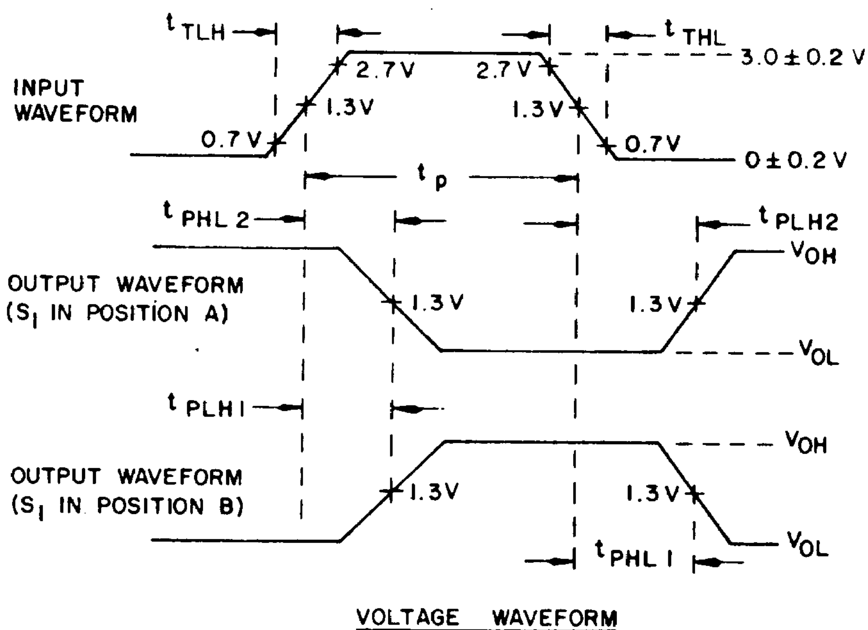
VOLTAGE WAVEFORM

NOTES:

1. The generator has the following characteristics: V_{gen} = 3.0 ±0.2 V, $t_{THL} \leq 6$ ns, $t_{TLH} \leq 15$ ns, t_p = .5 µs, PRR ≤ 1 MHz, Z_{out} = 50Ω.
2. All diodes are 1N3064, or equivalent.
3. C_L = 50 pF ±5% (C_L includes probe and jig capacitance).
4. Each gate tested separately.
5. R_L = 2 kΩ ±5%.

FIGURE 4. Switching time test circuit for device type 01.





VOLTAGE WAVEFORM

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2. All diodes are 1N3064, or equivalent.
3. C_L = 50 pF ±5% (C_L includes probe and jig capacitance).
4. Each gate tested separately.
5. R_L = 2 kΩ ±5%.

FIGURE 4. Switching time test circuit for device type 02 - Continued.

TABLE III. Group A inspection for device type 01.
Terminal conditions (pins not designated may be high ≥2.0 V, low ≤0.7 V, or open.

Subgroup	Symbol	MIL-STD-883 method	Cases A, B, C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits Min	Limits Max	Unit
			Case X 1/	2	3	4	6	8	9	10	12	13	14	16	18	19	20				
			Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V_{CC}				
1 T_C = +25°C	V_{OH}	3006	1	2.0 V	0.7 V	-400 µA	5.5 V	5.5 V		GND		5.5 V	5.5 V		5.5 V	5.5 V	4.5 V	1Y	2.5		V
		"	2	0.7 V	2.0 V	"	"	"		"		"	"		"	"	"	1Y	"		"
		"	3	2.0 V	2.0 V	"	"	"		"		"	"		"	"	"	1Y	"		"
		"	4	5.5 V	5.5 V		2.0 V	0.7 V	-400 µA	"		"	"		"	"	"	2Y	"		"
		"	5	"	"		0.7 V	2.0 V	"	"		"	"		"	"	"	2Y	"		"
		"	6	"	"		2.0 V	2.0 V	"	"		"	"		"	"	"	2Y	"		"
		"	7	"	"		5.5 V	5.5 V		"	-400 µA	2.0 V	0.7 V		"	"	"	3Y	"		"
		"	8	"	"		"	"		"	"	0.7 V	2.0 V		"	"	"	3Y	"		"
		"	9	"	"		"	"		"	"	2.0 V	2.0 V		"	"	"	3Y	"		"
		"	10	"	"		"	"		"		5.5 V	5.5 V	-400 µA	2.0 V	0.7 V	"	4Y	"		"
		"	11	"	"		"	"		"		"	"	"	0.7 V	2.0 V	"	4Y	"		"
		"	12	"	"		"	"		"		"	"	"	2.0 V	2.0 V	"	4Y	"		"
	V_{OL}	3007	13	0.7 V	0.7 V	4 mA	"	"		"		"	"		5.5 V	5.5 V	"	1Y		0.4	"
		"	14	5.5 V	5.5 V		0.7 V	0.7 V	4 mA	"		"	"		"	"	"	2Y		"	"
		"	15	"	"		5.5 V	5.5 V		"	4 mA	0.7 V	0.7 V				"	3Y		"	"
		"	16	"	"		5.5 V	5.5 V		"		5.5 V	5.5 V	4 mA	0.7 V	0.7 V	"	4Y			"
	V_{IC}		17	-18 mA						"							"	1A		-1.5	"
			18		-18 mA					"							"	1B		"	"
			19				-18 mA			"							"	2A		"	"
			20					-18 mA		"							"	2B		"	"
			21							"		-18 mA					"	3A		"	"
			22							"			-18 mA				"	3B		"	"
			23							"					-18 mA		"	4A		"	"
			24							"						-18 mA	"	4B		"	"
	I_{OS}	3011	25 2/	5.5 V	5.5 V	GND				"							5.5 V	1Y	-15	-100	mA
		"	26				5.5 V	5.5 V	GND	"							"	2Y	"	"	"
		"	27							"	GND	5.5 V	5.5 V				"	3Y	"	"	"
		"	28							"				GND	5.5 V	5.5 V		4Y			"
	I_{IH1}	3010	29	2.7 V	GND		GND	GND		"		GND	GND		GND	GND	"	1A		20	µA
		"	30	GND	2.7 V		GND	"		"		"	"		"	"	"	1B		"	"
		"	31	"	GND		2.7 V	"		"		"	"		"	"	"	2A		"	"
		"	32	"	"		GND	2.7 V		"		"	"		"	"	"	2B		"	"
		"	33	"	"		"	GND		"		2.7 V	"		"	"	"	3A		"	"
		"	34	"	"		"	"		"		GND	2.7 V		"	"	"	3B		"	"
		"	35	"	"		"	"		"		"	GND		2.7 V	"	"	4A		"	"
		"	36	"	"		"	"		"			"		GND	2.7 V	"	4B		"	"
	I_{IH2}	"	37	5.5 V	"		"	"		"		"	"		"	GND	"	1A		100	"
		"	38	GND	5.5 V		"	"		"		"	"		"	"	"	1B		"	"
		"	39	"	GND		5.5 V	"		"		"	"		"	"	"	2A		"	"
		"	40	"	"		GND	5.5 V		"		"	"		"	"	"	2B		"	"
		"	41	"	"		"	GND		"		5.5 V	"		"	"	"	3A		"	"
		"	42	"	"		"			"		GND	5.5 V		"	"	"	3B		"	"
		"	43	"	"		"			"		"	GND		5.5 V	"	"	4A		"	"
		"	44	"	"		"			"			GND		GND	5.5 V	"	4B		"	"
	I_{IL}	3009	45	0.4 V	5.5 V		5.5 V	5.5 V		"		5.5 V	5.5 V		5.5 V	"	"	1A	3/	3/	mA
		"	46	5.5 V	0.4 V		5.5 V	"		"		"	"		"	"	"	1B	"	"	"
		"	47	"	5.5 V		0.4 V	"		"		"	"		"	"	"	2A	"	"	"
		"	48	"	"		5.5 V	0.4 V		"		"	"		"	"	"	2B	"	"	"
		"	49	"	"		"	5.5 V		"		0.4 V	"		"	"	"	3A	"	"	"
		"	50	"	"		"	"		"		5.5 V	0.4 V		"	"	"	3B	"	"	"
		"	51	"	"		"	"		"		"	5.5 V		0.4 V	"	"	4A	"	"	"
		"	52	"	"		"	"		"			"		5.5 V	0.4 V	"	4B		"	"
	I_{CCH}	3005	53	"	"		"	"		"		"	"		5.5 V	5.5 V	"	V_{CC}		6.2	"
	I_{CCL}	3005	54	GND	GND		GND	GND		"		GND	GND		GND	GND	"	V_{CC}		9.8	"

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 - Continued.
Terminal conditions (pins not designated may be high ≥2.0 V, low ≤0.7 V, or open.

Subgroup	Symbol	MIL-STD-883 method	Cases A, B, C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ X	2	3	4	6	8	9	10	12	13	14	16	18	19	20				
			Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V_{CC}		Min	Max	
2	Same tests, terminal conditions, and limits as for subgroup 1, except T_C = +125°C and V_{IC} tests are omitted.																				
3	Same tests, terminal conditions, and limits as for subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																				
9 T_C = +25°C	t_{PHL}	3003 Fig. 4	55	IN	GND	OUT	IN	GND	OUT	GND	OUT	IN	GND	OUT	IN	GND	5.0 V	1A to 1Y	2	20	ns
		"	56							"							"	2A to 2Y	"	"	"
		"	57							"							"	3A to 3Y	"	"	"
			58							"							"	4A to 4Y	"	"	"
	t_{PLH}	"	59	IN	GND	OUT	IN	GND	OUT	"	OUT	IN	GND	OUT	IN	GND	"	1A to 1Y	"	"	"
		"	60							"							"	2A to 2Y	"	"	"
		"	61							"							"	3A to 3Y	"	"	"
		"	62							"							"	4A to 4Y	"	"	"
10	t_{PHL}	"	63 to 66	Same tests and terminal conditions as for subgroup 9, except T_C = +125°C.																	
	t_{PLH}	"	67 to 70																"	35	"
11	Same tests, terminal conditions, and limits as for subgroup 10, except T_C = -55°C.																		"	35	"

1/ Case X pins not referenced are NC.

2/ I_{OS} limits for CKT B are -15/-110 mA.

3/ I_{IL} limits in mA are as follows:

Test	Circuit					
	A	B	C	D	E	F
I_{IL}	-.12/-.36	-.03/-.30	-.15/-.38	-.16/-.40	-.15/-.38	-.10/-.34

TABLE III. Group A inspection for device type 02.
Terminal conditions (pins not designated may be high ≥2.0 V, low ≤0.7 V, or open.

Subgroup	Symbol	MIL-STD-883 method	Cases A, B, C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ X	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	
			Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V_{CC}				
1 T_C = +25°C	V_{OL}	3007	1	0.7 V	0.7 V	4 mA	5.5 V	5.5 V		GND		5.5 V	5.5 V		5.5 V	5.5 V	4.5 V	1Y		0.4	V
		"	2	2.0 V	2.0 V	4 mA	5.5 V	5.5 V		"		"	"		"	"	"	1Y		"	"
		"	3	5.5 V	5.5 V		0.7 V	0.7 V	4 mA	"		"	"		"	"	"	2Y		"	"
		"	4	"	"		2.0 V	2.0 V	4 mA	"		"	"		"	"	"	2Y		"	"
		"	5	"	"		5.5 V	5.5 V		"	4 mA	0.7 V	0.7 V		"	"	"	3Y		"	"
		"	6	"	"		"	"		"	4 mA	2.0 V	2.0 V		"	"	"	3Y		"	"
		"	7	"	"		"	"		"		5.5 V	5.5 V	4 mA	0.7 V	0.7 V	"	4Y		"	"
		"	8	"	"		"	"		"		"	"	4 mA	2.0 V	2.0 V	"	4Y		"	"
	V_{OH}	3006	9	2.0 V	0.7 V	-400 µA	"	"		"		"	"		5.5 V	5.5 V	"	1Y	2.5		"
		"	10	0.7 V	2.0 V	-400 µA	"	"		"		"	"		"	"	"	1Y	"		"
		"	11	5.5 V	5.5 V		2.0 V	0.7 V	-400 µA	"		"	"		"	"	"	2Y	"		"
		"	12	"	"		0.7 V	2.0 V	-400 µA	"		"	"		"	"	"	2Y	"		"
		"	13	"	"		5.5 V	5.5 V		"	-400 µA	2.0 V	0.7 V		"	"	"	3Y	"		"
		"	14	"	"		"	"		"	-400 µA	0.7 V	2.0 V		"	"	"	3Y	"		"
		"	15	"	"		"	"		"		5.5 V	5.5 V	-400 µA	2.0 V	0.7 V	"	4Y	"		"
		"	16	"	"		"	"		"		5.5 V	5.5 V	-400 µA	0.7 V	2.0 V	"	4Y	"		"
	V_{IC}		17	-18 mA						"							"	1A		-1.5	"
			18		-18 mA					"							"	1B		"	"
			19				-18 mA			"							"	2A		"	"
			20					-18 mA		"							"	2B		"	"
			21							"		-18 mA					"	3A		"	"
			22							"			-18 mA				"	3B		"	"
			23							"					-18 mA		"	4A		"	"
			24							"						-18 mA	"	4B		"	"
	I_{IH1}	3010	25	2.7 V	GND		GND	GND		"		GND	GND		GND	GND	5.5 V	1A		40	µA
		"	26	GND	2.7 V		GND	"		"		"	"		"	"	"	1B		"	"
		"	27	"	GND		2.7 V	"		"		"	"		"	"	"	2A		"	"
		"	28	"	"		GND	2.7 V		"		"	"		"	"	"	2B		"	"
		"	29	"	"		"	GND		"		2.7 V	"		"	"	"	3A		"	"
		"	30	"	"		"	"		"		GND	2.7 V		"	"	"	3B		"	"
		"	31	"	"		"	"		"		"	GND		2.7 V	"	"	4A		"	"
		"	32	"	"		"	"		"		"	"		GND	2.7 V	"	4B		"	"
	I_{IH2}	"	33	5.5 V	"		"	"		"		"	"		"	GND	"	1A		200	"
		"	34	GND	5.5 V		"	"		"		"	"		"	"	"	1B		"	"
		"	35	"	GND		5.5 V	"		"		"	"		"	"	"	2A		"	"
		"	36	"	"		GND	5.5 V		"		"	"		"	"	"	2B		"	"
		"	37	"	"		"	GND		"		5.5 V	"		"	"	"	3A		"	"
		"	38	"	"		"	"		"		GND	5.5 V		"	"	"	3B		"	"
		"	39	"	"		"	"		"		"	GND		5.5 V	"	"	4A		"	"
		"	40	"	"		"	"		"		"	GND		GND	5.5 V	"	4B		"	"
	I_{IL} 2/	3009	41	0.4 V	5.5 V		5.5 V	5.5 V		"		5.5 V	5.5 V		5.5 V	"	"	1A	2/	2/	mA
		"	42	5.5 V	0.4 V		5.5 V	"		"		"	"		"	"	"	1B	"	"	"
		"	43	"	5.5 V		0.4 V	"		"		"	"		"	"	"	2A	"	"	"
		"	44	"	"		5.5 V	0.4 V		"		"	"		"	"	"	2B	"	"	"
		"	45	"	"		"	5.5 V		"		0.4 V	"		"	"	"	3A	"	"	"
		"	46	"	"		"	"		"		5.5 V	0.4 V		"	"	"	3B	"	"	"
		"	47	"	"		"	"		"		"	5.5 V		0.4 V	"	"	4A	"	"	"
		"	48	"	"		"	"		"		"	"		5.5 V	0.4 V	"	4B	"	"	"
	I_{OS}	3011	49 3/	5.5 V	GND	GND	GND	GND		"		GND	GND		GND	GND	"	1Y	-15	-100	"
		"	50	GND	"		"	5.5 V	GND	"		GND	"		"	"	"	2Y	"	"	"
		"	51	"	"		"	GND		"	GND	5.5 V	"		"	"	"	3Y	"	"	"
		"	52	"	"		"	"		"		GND	"	GND	"	5.5 V	"	4Y	"	"	"
	I_{CC}	3005	53	"	"		"	"		"		GND	"		"	GND	"	V_{CC}		10	"

See footnotes at end of table.

TABLE III. Group A inspection for device type 02 - Continued.
Terminal conditions (pins not designated may be high ≥2.0 V, low ≤0.7 V, or open.

Subgroup	Symbol	MIL-STD-883 method	Cases A, B, C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ X	2	3	4	6	8	9	10	12	13	14	16	18	19	20				
			Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V_{CC}		Min	Max	
2	Same tests, terminal conditions, and limits as for subgroup 1, except T_C = +125°C and V_{IC} tests are omitted.																				
3	Same tests, terminal conditions, and limits as for subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																				
9 T_C = +25°C	t_{PHL1}	3003	54	IN	GND	OUT				GND							5.0 V	1A to 1Y	2	22	ns
		Fig. 4	55				IN	GND	OUT	"							"	2A to 2Y	"	"	"
		"	56							"	OUT	IN	GND				"	3A to 3Y	"	"	"
		"	57							"				OUT	IN	GND	"	4A to 4Y	"	"	"
	t_{PHL2}	"	58	IN	2.7 V	OUT				"							"	1A to 1Y	"	27	"
		"	59				IN	2.7 V	OUT	"							"	2A to 2Y	"	"	"
		"	60							"	OUT	IN	2.7 V				"	3A to 3Y	"	"	"
		"	61							"				OUT	IN	2.7 V	"	4A to 4Y	"	"	"
	t_{PLH1}	"	62	IN	GND	OUT				GND							"	1A to 1Y	"	28	"
		"	63				IN	GND	OUT	"							"	2A to 2Y	"	"	"
		"	64							"	OUT	IN	GND				"	3A to 3Y	"	"	"
		"	65							"				OUT	IN	GND	"	4A to 4Y	"	"	"
	t_{PLH2}	"	66	IN	2.7 V	OUT				"							"	1A to 1Y	"	32	"
		"	67				IN	2.7 V	OUT	"							"	2A to 2Y	"	"	"
		"	68							"	OUT	IN	2.7 V				"	3A to 3Y	"	"	"
		"	69							"				OUT	IN	2.7 V	"	4A to 4Y	"	"	"
10	t_{PHL1}	"	70 to 73	Same tests and terminal conditions as for subgroup 9, except T_C = +125°C.															"	29	"
	t_{PHL2}	"	74 to 77																"	35	"
	t_{PLH1}	"	78 to 81																"	37	"
	t_{PLH2}	"	82 to 85																"	40	"
11	Same tests, terminal conditions, and limits as for subgroup 10, except T_C = -55°C.																				

1/ Case X pins not referenced are NC.

2/ I_{IL} limits in mA are as follows:

Test	Circuit					
	A	B	C	D	E	F
I_{IL}	-.2/-.68	-.2/-.68	-.275/-.600	-.2/-.68	-.225/-.705	-.240/-.720

3/ I_{OS} limits for CKT B are -15/-110 mA.

6. NOTES

6.1 Notes. The notes specified in MIL-M-38510 are applicable to this specification.

6.2 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.3 Ordering data. The acquisition document should specify the following:

a. Complete part number (see 1.2).

b. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.

c. Requirements for certificate of compliance, if applicable.

d. Requirements for notification of change of product or process to the contracting activity in addition to notification to the qualifying activity, if applicable.

e. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.

f. Requirements for product assurance options.

g. Requirements for special carriers, lead lengths, or lead forming, if applicable, these requirements shall not affect the part number. Unless otherwise specified, these requirements shall not apply to direct purchase by or direct shipment to the Government.

h. Requirements for "JAN" marking.

6.4 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-M-38510, MIL-STD-1331, and as follows:

GND- - - - - - - - - - - - - - Ground zero voltage potential.
I_{IN}- - - - - - - - - - - - - - Current flowing into an input terminal.

V_{IN}- - - - - - - - - - - - - - Voltage level at an input terminal.

6.5 Logistic support. Lead materials and finishes (see 3.3) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2) and lead material and finish C (see 3.3). Longer length leads and lead forming shall not affect the part number.

6.6 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information shall not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-M-38510.

Military device type	Generic-industry type
01	54LS32
02	54LS86

6.7 Manufacturers' designation. Manufacturers' circuits which form a part of this specification are designated by an "X" as shown in table IV herein.

TABLE IV. Manufacturers' designation.

Device type	Circuits					
	A Texas Instruments	B Signetics Corp.	C National Semiconductor Corp.	D Raytheon Co.	E Motorola Inc.	F Fairchild Semi-conductor
01	X	X	X	X	X	X
02	X	X	X	X	X	X

6.8 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
Army - ER
Navy - EC
Air Force - 17

Review activities:
Army - AR, MI
Navy - SH, OS
Air Force - 11, 19, 85, 99
DLA - ES

User activities:
Army - SM
Navy - AS, CG, MC

Agent:
DLA - ES

Preparing activity:
Air Force - 17

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