MILITARY SPECIFICATION

MICROCIRCUITS, LINEAR, PRECISION TIMERS,
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, CMOS, precision timers. Two product assurance classes and a choice of case outlines and lead finishes are provided and are reflected in the complete Part or Identifying Number (PIN) (see 6.6).

1.2 Classification.

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

Device type	Circuit
01	CMOS, precision timer, single
02	CMOS, precision timer, dual
03	CMOS, low power precision timer, single
04	CMOS, low power precision timer, dual
05	CMOS, low operating voltage, low power precision timer, single

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

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

Outline letter	Case outline (see MIL-M-38510, appendix C)
C	D-1 (14-lead, .785" x .310" x.200"), dual-in-line package
G	A-1 (8-lead, .370" x .185"), can
P	D-4 (8-lead, .405" x .310" x .200"), dual-in-line package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum rating.

Supply voltage (V_{DD}) (01-04)	18 V dc
Supply voltage (V_{DD}) (05)	15 V dc
Input voltage range	-0.3 V to V_{DD} (+0.3 V)
Output sink current (01-02)	150 mA
Output sink current (03-04)	20 mA
Output sink current (05)	50 mA
Output source current (01-02)	15 mA
Output source current (03-04)	0.8 mA
Output source current (05)	50 mA
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 60 seconds)	+300°C
Junction temperature (T_J)	+175°C

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 1462) appearing at the end of this document or by letter.

1.4 Recommended operating conditions.

Supply voltage range (V_{DD}) (01-04) - - - - - - - - -	+5.0 to +18.0 V dc
Supply voltage range (V_{DD}) (05)- - - - - - - - - - -	+1.5 to +12.0 V dc 1/
Ambient operating temperature range (T_A) - - - - - -	-55°C to +125°C

1.5 Power and thermal characteristics.

Package	Case outline	Maximum allowable power dissipation	Maximum θ_{JC}	Maximum θ_{JA}
14-lead dual-in-line	C	550 mW at T_A = 125°C	28°C/W	91°C/W
8-lead metal can	G	330 mW at T_A = 125°C	70°C/W	150°C/W
8-lead dual-in-line	P	420 mW at T_A = 125°C	28°C/W	119°C/W
20-term. sq. chip carrier	2	550 mW at T_A = 125°C	20°C/W	91°C/W

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Detail specification. The individual item requirements shall be in accordance with MIL-M-38510 and 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.

1/ If reset pin is used, the supply voltages shall be +2.0 to +12.0 V dc.

3.2.2 Block diagram and circuit operation table. The block diagram and circuit operation table shall be as specified on figure 2.

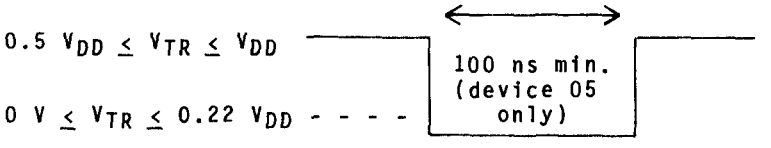
3.2.3 Schematic circuits. The schematic circuit shall be submitted to the preparing activity prior to the inclusion of a manufacturer's device in this specification and shall be submitted to the qualifying activity (DESC-EQM) as a prerequisite for qualification. All qualified manufacturers' schematics shall be maintained by the agent activity (DESC-ECS) and will be available upon request.

3.2.4 Case outline. The case outline 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 6.4).

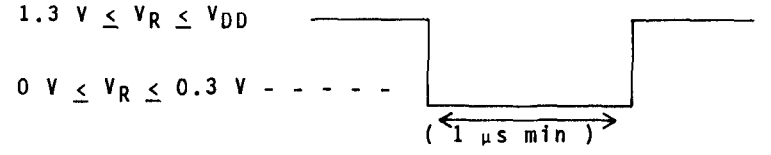
3.4 Electrical performance characteristics. The following electrical performance characteristic apply over the full ambient operating temperature range of -55°C to +125°C and for the recommended supply range (see 1.4), unless otherwise specified (see table I). See figure 2 for circuit operation table.

3.4.1 Triggering. In the monostable mode, the device is triggered on the negative slope of a trigger pulse. The trigger pulse must be of shorter duration than the "RC" time interval.



3.4.2 Reset. In the monostable mode, the device may be reset (from V_{OH} to V_{OL}) on the negative slope of a reset pulse. Once the reset is returned to high, the output will remain low only if the trigger is high. If the trigger is low when the reset is returned high, the output will go high.

Device types 01-04.



Device type 05

TABLE I. Electrical performance characteristics.

Characteristic	Symbol	Conditions figure 5, $-55°C \leq T_A \leq +125°C$ unless otherwise specified	Device types	Limits 1/		Unit
				Min	Max	
Power supply current	I_{DD} 2/	V_{DD} = 5.0 V	01		0.35	mA
		V_{DD} = 15.0 V	01		0.60	mA
		V_{DD} = 18.0 V	01		0.60	mA
		V_{DD} = 5.0 V	02		1.4	mA
		V_{DD} = 15.0 V	02		2.0	mA
		V_{DD} = 18.0 V	02		2.0	mA
		V_{DD} = 5.0 V	03		300	µA
		V_{DD} = 15.0 V	03		300	µA
		V_{DD} = 18.0 V	03		350	µA
		V_{DD} = 5.0 V	04		400	µA
		V_{DD} = 15.0 V	04		600	µA
		V_{DD} = 18.0 V	04		700	µA
		V_{DD} = 1.5 V	05		100	µA
		V_{DD} = 5.0 V	05		300	µA
		V_{DD} = 12.0 V	05		400	µA

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55°C \le T_A \le +125°C$ unless otherwise specified	Device types	Limits 1/ Min	Limits 1/ Max	Unit
Trigger voltage	V_{TR}	V_{DD} = 5.0 V	01-04	1.26	2.06	V
		V_{DD} = 15.0 V	01-04	4.05	5.50	V
		V_{DD} = 18.0 V	01-04	4.70	6.85	V
		V_{DD} = 1.5 V	05	0.40	0.60	V
		V_{DD} = 5.0 V	05	1.26	2.06	V
		V_{DD} = 12.0 V	05	3.70	4.30	V
Trigger current	I_{TR} 2/	V_{DD} = 5.0 V, $+25°C \le T_A \le +125°C$	01-04	-50	+50	nA
		V_{DD} = 15.0 V, $+25°C \le T_A \le +125°C$	01-04	-50	+50	nA
		V_{DD} = 18.0 V, $+25°C \le T_A \le +125°C$	01-04	-50	+50	nA
		V_{DD} = 1.5 V, $+25°C \le T_A \le +125°C$	05	-50	+50	nA
		V_{DD} = 5.0 V, $+25°C \le T_A \le +125°C$	05	-50	+50	nA
		V_{DD} = 12.0 V, $+25°C \le T_A \le +125°C$	05	-50	+50	nA
Threshold voltage	V_{TH}	V_{DD} = 5.0 V	01-04	2.70	3.90	V
		V_{DD} = 15.0 V	01-04	9.15	10.80	V
		V_{DD} = 18.0 V	01-04	10.90	13.15	V
		V_{DD} = 1.5 V	05	0.80	1.20	V
		V_{DD} = 5.0 V	05	2.70	3.90	V
		V_{DD} = 12.0 V	05	7.40	8.60	V

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55°C \leq T_A \leq +125°C$ unless otherwise specified	Device types	Limits 1/		Unit
				Min	Max	
Threshold current	I_{TH} 2/	V_{DD} = 5.0 V, $+25°C \leq T_A \leq +125°C$	01-04	-50	+50	nA
		V_{DD} = 15.0 V, $+25°C \leq T_A \leq +125°C$	01-04	-50	+50	nA
		V_{DD} = 18.0 V, $+25°C \leq T_A \leq +125°C$	01-04	-50	+50	nA
		V_{DD} = 1.5 V, $+25°C \leq T_A \leq +125°C$	05	-50	+50	nA
		V_{DD} = 5.0 V, $+25°C \leq T_A \leq +125°C$	05	-50	+50	nA
		V_{DD} = 12.0 V, $+25°C \leq T_A \leq +125°C$	05	-50	+50	nA
High level output voltage	V_{OH}	V_{DD} = 5.0 V, I_{OH} = -1 mA	01,02	4.10		V
		V_{DD} = 15.0 V, I_{OH} = -10 mA	01,02	12.50		V
		V_{DD} = 15.0 V, I_{OH} = -5 mA	01,02	13.50		V
		V_{DD} = 15.0 V, I_{OH} = -1 mA	01,02	14.20		V
		V_{DD} = 18.0 V, I_{OH} = -1 mA	01,02	17.30		V
		V_{DD} = 5.0 V, I_{OH} = -0.8 mA	03,04	3.80		V
		V_{DD} = 15.0 V, I_{OH} = -0.8 mA	03,04	14.20		V
		V_{DD} = 18.0 V, I_{OH} = -0.8 mA	03,04	17.30		V
		V_{DD} = 1.5 V, I_{OH} = -0.25 mA	05	1.00		V
		V_{DD} = 5.0 V, I_{OH} = -2.0 mA	05	3.80		V
		V_{DD} = 12.0 V, I_{OH} = -10.0 mA	05	10.50		V

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified	Device types	Limits 1/		Unit
				Min	Max	
Low level output voltage	V_{OL}	V_{DD} = 5.0 V, I_{OL} = 8.0 mA	01,02		0.60	V
		V_{DD} = 5.0 V, I_{OL} = 5.0 mA	01,02		0.45	V
		V_{DD} = 5.0 V, I_{OL} = 3.2 mA	01,02		0.40	V
		V_{DD} = 15.0 V, I_{OL} = 100.0 mA	01,02		3.80	V
		V_{DD} = 15.0 V, I_{OL} = 50.0 mA	01,02		1.50	V
		V_{DD} = 15.0 V, I_{OL} = 10.0 mA	01,02		0.45	V
		V_{DD} = 18.0 V, I_{OL} = 3.2 mA	01,02		0.40	V
		V_{DD} = 5.0 V, I_{OL} = 3.2 mA	03,04		0.50	V
		V_{DD} = 15.0 V, I_{OL} = 20.0 mA	03,04		1.25	V
		V_{DD} = 18.0 V, I_{OL} = 3.2 mA	03,04		0.50	V
		V_{DD} = 1.5 V, I_{OL} = 1.0 mA	05		0.40	V
		V_{DD} = 5.0 V, I_{OL} = 8.0 mA	05		0.55	V
		V_{DD} = 12.0 V, I_{OL} = 50.0 mA	05		2.40	V
Discharge transistor leakage current	I_{CEX}	V_{DD} = 5.0 V, $+25^{\circ}C \leq T_A \leq +125^{\circ}C$	01,02		2	µA
		V_{DD} = 15.0 V, $+25^{\circ}C \leq T_A \leq +125^{\circ}C$	01,02		2	µA
		V_{DD} = 18.0 V, $+25^{\circ}C \leq T_A \leq +125^{\circ}C$	01,02		2	µA

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55°C \leq T_A \leq +125°C$ unless otherwise specified	Device types	Limits 1/ Min	Limits 1/ Max	Unit
Discharge transistor leakage current	I_{CEX}	V_{DD} = 5.0 V, $+25°C \leq T_A \leq +125°C$	03,04		300	nA
		V_{DD} = 15.0 V, $+25°C \leq T_A \leq +125°C$	03,04		300	nA
		V_{DD} = 18.0 V, $+25°C \leq T_A \leq +125°C$	03,04		300	nA
		V_{DD} = 1.5 V, $+25°C \leq T_A \leq +125°C$	05		300	nA
		V_{DD} = 5.0 V, $+25°C \leq T_A \leq +125°C$	05		300	nA
		V_{DD} = 12.0 V, $+25°C \leq T_A \leq +125°C$	05		300	nA
Discharge transistor saturation voltage	V_{SAT}	V_{DD} = 5.0 V, I_{OL} = 10 mA	01,02		0.60	V
		V_{DD} = 15.0 V, I_{OL} = 100 mA	01,02		1.80	V
		V_{DD} = 18.0 V, I_{OL} = 100 mA	01,02		1.60	V
		V_{DD} = 5.0 V, I_{OL} = 10 mA	03,04		0.60	V
		V_{DD} = 15.0 V, I_{OL} = 10 mA	03,04		0.60	V
		V_{DD} = 18.0 V, I_{OL} = 10 mA	03,04		0.60	V
		V_{DD} = 1.5 V, I_{OL} = 1 mA	05		0.15	V
		V_{DD} = 5.0 V, I_{OL} = 10 mA	05		0.60	V
		V_{DD} = 12.0 V, I_{OL} = 50 mA	05		0.80	V

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55°C \le T_A \le +125°C$ unless otherwise specified		Device types	Limits 1/ Min	Limits 1/ Max	Unit
Reset current	I_R 2/	V_{DD} = 5.0 V, $+25°C \le T_A \le +125°C$		01-04	-50	+50	nA
		V_{DD} = 15.0 V, $+25°C \le T_A \le +125°C$		01-04	-50	+50	nA
		V_{DD} = 18.0 V, $+25°C \le T_A \le +125°C$		01-04	-50	+50	nA
		V_{DD} = 2.0 V, $+25°C \le T_A \le +125°C$		05	-50	+50	nA
		V_{DD} = 5.0 V, $+25°C \le T_A \le +125°C$		05	-50	+50	nA
		V_{DD} = 12.0 V, $+25°C \le T_A \le +125°C$		05	-50	+50	nA
Propagation delay time, low to high level output (monostable)	t_{PLH}	$5.0 V \le V_{DD} \le 15.0 V$, R_T = 640Ω, C_T = 1,000 pF (see figures 5 and 6)	$T_A = -55°C, +25°C$	01,02	5	125	ns
			$T_A = +125°C$		5	150	ns
		$5.0 V \le V_{DD} \le 15.0 V$, R_T = 1.28 kΩ, C_T = 10,000 pF (see figures 5 and 6)	$T_A = -55°C, +25°C$	03,04	100	400	ns
			$T_A = +125°C$		200	550	ns
		R_T = 642Ω, C_T = 1,000 pF (see figures 5 and 6)	$5.0 V \le V_{DD} \le 12.0 V$	05	10	120	ns
			V_{DD} = 1.5 V		50	400	ns
Propagation delay time, high to low level output (monostable)	t_{PHL}	$5.0 V \le V_{DD} \le 15.0 V$, R_T = 640Ω, C_T = 1,000 pF (see figures 5 and 7)	$T_A = -55°C, +25°C$	01,02	5	200	ns
			$T_A = +125°C$		5	300	ns
		$5.0 V \le V_{DD} \le 15.0 V$, R_T = 1.28 kΩ, C_T = 10,000 pF (see figures 5 and 7)	$T_A = -55°C, +25°C$	03,04	100	550	ns
			$T_A = +125°C$		200	850	ns
		R_T = 642Ω, C_T = 1,000 pF (see figures 5 and 7)	$5.0 V \le V_{DD} \le 12.0 V$	05	20	200	ns
			V_{DD} = 1.5 V		50	600	ns

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55°C \le T_A \le +125°C$ unless otherwise specified		Device types	Limits 1/ Min	Limits 1/ Max	Unit
Transition time, low to high level output (monostable)	t_{TLH}	$5.0\ V \le V_{DD} \le 15.0\ V$ $R_T = 640\Omega$ $C_T = 1{,}000\ pF$ (see figures 5 and 6)	T_A -55°C, +25°C	01,02	5	80	ns
			$T_A = +125°C$		5	80	ns
		$5.0\ V \le V_{DD} \le 15.0\ V$ $R_T = 1.28\ k\Omega$ $C_T = 10{,}000\ pF$ (see figures 5 and 6)	$T_A = -55°C$, +25°C	03,04	100	450	ns
			$T_A = +125°C$		150	600	ns
		$R_T = 642\ k\Omega$ $C_T = 1{,}000\ pF$ (see figures 5 and 6)	$5.0\ V \le V_{DD} \le 12.0\ V$	05	5	60	ns
			$V_{DD} = 1.5\ V$		20	200	ns
Transition time, high to low level output (monostable)	t_{THL}	$5.0\ V \le V_{DD} \le 15.0\ V$ $R_T = 640\Omega$ $C_T = 1{,}000\ pF$ (see figures 5 and 7)	$T_A = -55°C$, +25°C	01,02	5	30	ns
			$T_A = +125°C$		5	35	ns
		$5.0\ V \le V_{DD} \le 15.0\ V$ $R_T = 1.28\ k\Omega$ $C_T = 10{,}000\ pF$ (see figures 5 and 7)	$T_A = -55°C$, +25°C	03,04	25	90	ns
			$T_A = +125°C$		40	120	ns
		$R_T = 642\ k\Omega$ $C_T = 1{,}000\ pF$ Device 05 (see figures 5 and 7)	$5.0\ V \le V_{DD} \le 12.0\ V$	05	5	50	ns
			$V_{DD} = 1.5\ V$		15	150	ns
Time delay, output high (monostable)	$t_{D(OH)}$	$R_T = 640\Omega$ $C_T = 1{,}000\ pF$ (see figures 5 and 6)	$T_A = +25°C$ $5.0\ V \le V_{DD} \le 15.0\ V$	01,02	200	825	ns
			$T_A = +125°C$ $V_{DD} = 5.0\ V$		200	900	ns
			$T_A = -55°C$ $V_{DD} = 5.0\ V$		200	825	ns

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified		Device types	Limits 1/ Min	Limits 1/ Max	Unit
Time delay, output high (monostable)	$t_{D(OH)}$	R_T = 1.28 kΩ C_T = 1,000 pF (see figures 5 and 6)	T_A = +25°C 5.0 V ≤ V_{DD} ≤ 15.0 V	01,02	0.5	1.8	µs
			T_A = +125°C V_{DD} = 5.0 V		0.5	1.9	µs
			T_A = -55°C V_{DD} = 5.0 V		0.5	1.8	µs
		R_T = 1.28 kΩ C_T = 10,000 pF (see figures 5 and 6)	T_A = +25°C 5.0 V ≤ V_{DD} ≤ 15.0 V	03,04	12.0	14.7	µs
			T_A = +125°C V_{DD} = 5.0 V		11.3	15.4	µs
			T_A = -55°C V_{DD} = 5.0 V		11.3	15.4	µs
		R_T = 2.56 kΩ C_T = 10,000 pF (see figures 5 and 6)	T_A = +25°C 5.0 V ≤ V_{DD} ≤ 15.0 V		24.0	29.4	µs
			T_A = +125°C V_{DD} = 5.0 V		22.6	30.8	µs
			T_A = -55°C V_{DD} = 5.0 V		22.6	30.8	µs
		R_T = 642Ω C_T = 1,000 pF (see figures 5 and 6)	1.5 V ≤ V_{DD} ≤ 12.0 V	05	600	1000	µs
		R_T = 100 kΩ C_T = 1,000 pF (see figures 5 and 6)	1.5 V ≤ V_{DD} ≤ 12.0 V		90	140	µs

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55°C \le T_A \le +125°C$ unless otherwise specified	Device types	Limits 1/		Unit
				Min	Max	
Drift in time delay vs change in supply voltage (monostable)	$\frac{\Delta t_{D(OH)}}{\Delta V_{DD}}$	5.0 V $\le V_{DD} \le$ 15.0 V C_T = 1,000 pF R_T = 640Ω T_A = +25°C (see figures 5 and 6)	01,02	-8	+8	ns/V
		5.0 V $\le V_{DD} \le$ 15.0 V C_T = 1,000 pF R_T = 1.28 kΩ T_A = +25°C (see figures 5 and 6)		-18	+18	ns/V
		5.0 V $\le V_{DD} \le$ 15.0 V C_T = 10,000 pF R_T = 1.28 kΩ T_A = +25°C (see figures 5 and 6)	03,04	-250	+250	ns/V
		5.0 V $\le V_{DD} \le$ 15.0 V C_T = 10,000 pF R_T = 2.56 kΩ T_A = +25°C (see figures 5 and 6)		-500	+500	ns/V
		1.5 V $\le V_{DD} \le$ 12.0 V C_T = 1,000 pF R_T = 1.28 kΩ (see figures 5 and 6)	05	-20	+20	ns/V
		1.5 V $\le V_{DD} \le$ 12.0 V C_T = 1,000 pF R_T = 100 kΩ T_A = +25°C (see figures 5 and 6)		-900	+900	ns/V

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified		Device types	Limits 1/ Min	Limits 1/ Max	Unit
Capacitor charge time (astable)	t_{ch}	$R_{TA} = R_{TB} = 640\Omega$ $C_T = 1{,}000$ pF (see figures 5 and 8)	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$	01,02	0.5	1.7	µs
			$T_A = +125^{\circ}C$ $V_{DD} = 5.0\ V$		0.5	1.8	µs
			$T_A = -55^{\circ}C$ $V_{DD} = 5.0\ V$		0.5	1.7	µs
		$R_{TA} = R_{TB} = 1.28\ k\Omega$ $C_T = 1{,}000$ pF (see figures 5 and 8)	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$		0.5	2.7	µs
			$T_A = +125^{\circ}C$ $V_{DD} = 5.0\ V$		0.5	2.8	µs
			$T_A = -55^{\circ}C$ $V_{DD} = 5.0\ V$		0.5	2.7	µs
		$R_{TA} = R_{TB} = 1.28\ k\Omega$ $C_T = 10{,}000$ pF (see figures 5 and 8)	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$	03,04	15.9	19.5	µs
			$T_A = +125^{\circ}C$ $V_{DD} = 5.0\ V$		15.0	20.5	µs
			$T_A = -55^{\circ}C$ $V_{DD} = 5.0\ V$		15.0	20.5	µs
		$R_{TA} = R_{TB} = 2.56\ k\Omega$ $C_T = 10{,}000$ pF (see figures 5 and 8)	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$		32.0	39.2	µs
			$T_A = +125^{\circ}C$ $V_{DD} = 5.0\ V$		30.2	41.0	µs
			$T_A = -55^{\circ}C$ $V_{DD} = 5.0\ V$		30.2	41.0	µs
		$R_{TA} = R_{TB} = 642\Omega$ $C_T = 1{,}000$ pF (see figures 5 and 8)	$1.5\ V \leq V_{DD} \leq 12.0\ V$	05	0.6	1.8	µs
		$R_{TA} = R_{TB} = 100\ k\Omega$ $C_T = 1{,}000$ pF (see figures 5 and 8)	$1.5\ V \leq V_{DD} \leq 12.0\ V$		110	170	µs

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified		Device types	Limits 1/		Unit
					Min	Max	
Capacitor discharge time (astable)	t_{dis}	$R_{TA} = R_{TB} = 640\Omega$ $C_T = 1{,}000$ pF (see figures 5 and 8)	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$	01,02	0.5	0.9	µs
			$T_A = +125^{\circ}C$ $V_{DD} = 5.0\ V$		0.5	1.0	µs
			$T_A = -55^{\circ}C$ $V_{DD} = 5.0\ V$		0.5	0.9	µs
		$R_{TA} = R_{TB} = 1.28\ k\Omega$ $C_T = 1{,}000$ pF (see figures 5 and 8)	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$		0.5	1.5	µs
			$T_A = +125^{\circ}C$ $V_{DD} = 5.0\ V$		0.5	1.65	µs
			$T_A = -55^{\circ}C$ $V_{DD} = 5.0\ V$		0.5	1.5	µs
		$R_{TA} = R_{TB} = 1.28\ k\Omega$ $C_T = 10{,}000$ pF (see figures 5 and 8)	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$	03,04	8.8	10.8	µs
			$T_A = +125^{\circ}C$ $V_{DD} = 5.0\ V$		8.3	11.3	µs
			$T_A = -55^{\circ}C$ $V_{DD} = 5.0\ V$		8.3	11.3	µs
		$R_{TA} = R_{TB} = 2.56\ k\Omega$ $C_T = 10{,}000$ pF (see figures 5 and 8)	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$		17.7	21.7	µs
			$T_A = +125^{\circ}C$ $V_{DD} = 5.0\ V$		16.7	22.7	µs
			$T_A = -55^{\circ}C$ $V_{DD} = 5.0\ V$		16.7	22.7	µs

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified		Device types	Limits 1/ Min	Limits 1/ Max	Unit
Capacitor discharge time (astable)	t_{dis}	$R_{TA} = R_{TB} = 642\Omega$ $C_T = 1{,}000$ pF (see figures 5 and 8)	$5.0\ V \leq V_{DD} \leq 12.0\ V$	05	0.3	1.0	µs
			$V_{DD} = 1.5\ V$		0.4	1.6	µs
		$R_{TA} = R_{TB} = 100\ k\Omega$ $C_T = 1{,}000$ pF (see figures 5 and 8)	$1.5\ V \leq V_{DD} \leq 12.0\ V$		50	90	µs
Drift in capacitor charge time vs change in supply voltage (astable)	$\frac{\Delta t_{ch}}{\Delta V_{DD}}$	$\Delta V_{DD} = 10.0\ V$ $R_{TA} = R_{TB} = 640\Omega$ $C_T = 1{,}000$ pF $T_A = +25^{\circ}C$ (see figures 5 and 8)		01,02	-5	+5	ns/V
		$\Delta V_{DD} = 10.0\ V$ $R_{TA} = R_{TB} = 1.28\ k\Omega$ $C_T = 1{,}000$ pF $T_A = +25^{\circ}C$ (see figures 5 and 8)			-30	+30	ns/V
		$\Delta V_{DD} = 10.0\ V$ $R_{TA} = R_{TB} = 1.28\ k\Omega$ $C_T = 10{,}000$ pF $T_A = +25^{\circ}C$ (see figures 5 and 8)		03,04	-350	+350	ns/V
		$\Delta V_{DD} = 10.0\ V$ $R_{TA} = R_{TB} = 2.56\ k\Omega$ $C_T = 10{,}000$ pF $T_A = +25^{\circ}C$ (see figures 5 and 8)			-700	+700	ns/V
		$\Delta V_{DD} = 10.5\ V$ $R_{TA} = R_{TB} = 642\Omega$ $C_T = 1{,}000$ pF $T_A = +25^{\circ}C$ (see figures 5 and 8)		05	-50	+50	ns/V
		$\Delta V_{DD} = 10.5\ V$ $R_{TA} = R_{TB} = 100\ k\Omega$ $C_T = 1{,}000$ pF $T_A = +25^{\circ}C$ (see figures 5 and 8)			-1500	+1500	ns/V

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified		Device types	Limits 1/ Min	Limits 1/ Max	Unit
Reset time	t_{res}	$5.0\ V \leq V_{DD} \leq 15.0\ V$ $R_T = 1.28\ k\Omega$ $C_T = 1{,}000\ pF$ (see figures 5 and 9)	$-55^{\circ}C \leq T_A \leq +25^{\circ}C$	01,02	50	350	ns
			$T_A = +125^{\circ}C$		50	450	ns
		$5.0\ V \leq V_{DD} \leq 15.0\ V$ $R_T = 1.28\ k\Omega$ $C_T = 10{,}000\ pF$ (see figures 5 and 9)	$-55^{\circ}C \leq T_A \leq +25^{\circ}C$	03,04	300	1200	ns
			$T_A = +125^{\circ}C$		450	1600	ns
		$2.0\ V \leq V_{DD} \leq 12.0\ V$ $R_T = 100\ k\Omega$ $C_T = 1{,}000\ pF$ (see figures 5 and 9)		05	100	1200	ns
Matching time delay, output high (monostable)	$\Delta t_{D(OH)M}$ 3/	$R_T = 640\Omega$ $C_T = 1{,}000\ pF$ (see figures 5 and 6) 4/	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$	02	-35	+35	ns
			$-55^{\circ}C \leq T_A \leq +125^{\circ}C$ $V_{DD} = 5.0\ V$		-30	+30	ns
		$R_T = 1.28\ k\Omega$ $C_T = 1{,}000\ pF$ (see figures 5 and 6) 4/	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$		-35	+45	ns
			$-55^{\circ}C \leq T_A \leq +125^{\circ}C$ $V_{DD} = 5.0\ V$		-30	+30	ns
		$R_T = 1.28\ k\Omega$ $C_T = 10{,}000\ pF$ (see figures 5 and 6) 4/	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$	04	-150	+150	ns
			$-55^{\circ}C \leq T_A \leq +125^{\circ}C$ $V_{DD} = 5.0\ V$		-200	+200	ns
		$R_T = 2.56\ k\Omega$ $C_T = 10{,}000\ pF$ (see figures 5 and 6) 4/	$T_A = +25^{\circ}C$ $5.0\ V \leq V_{DD} \leq 15.0\ V$		-300	+300	ns
			$-55^{\circ}C \leq T_A \leq +125^{\circ}C$ $V_{DD} = 5.0\ V$		-350	+350	ns

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristic	Symbol	Conditions figure 5, $-55°C \leq T_A \leq +125°C$ unless otherwise specified	Device types	Limits 1/		Unit
				Min	Max	
Matching drift in time delay vs supply voltage (monostable)	$\frac{\Delta t_{D(OH)M}}{\Delta V_{DD}}$ 5/	$5.0\ V \leq V_{DD} \leq 15.0\ V$ $R_T = 640\Omega$ $C_T = 1{,}000\ pF$ $T_A = +25°C$ (see figures 5 and 6) 4/	02	-3	+3	ns/V
		$5.0\ V \leq V_{DD} \leq 15.0\ V$ $R_T = 1.28\ k\Omega$ $C_T = 1{,}000\ pF$ $T_A = +25°C$ 4/ (see figures 5 and 6)		-4	+4	ns/V
		$5.0\ V \leq V_{DD} \leq 15.0\ V$ $R_T = 1.28\ k\Omega$ $C_T = 10{,}000\ pF$ $T_A = +25°C$ (see figures 5 and 6) 4/	04	-50	+50	ns/V
		$5.0\ V \leq V_{DD} \leq 15.0\ V$ $R_T = 2.56\ k\Omega$ $C_T = 10{,}000\ pF$ $T_A = +25°C$ (see figures 5 and 6) 4/		-100	+100	ns/V

1/ Limits apply to both device types unless otherwise specified. Each side of device type 02 tested separately.

2/ $1/3\ V_{DD} \leq V_{IN} \leq 2/3\ V_{DD}$

3/ $\Delta t_{D(OH)M}$ = ($t_{D(OH)}$ side "A") - ($t_{D(OH)}$ side "B").

4/ Device type 02 only - Matching between side "A" and side "B".

5/ $$\frac{\Delta t_{D(OH)M}}{\Delta V_{DD}} = \frac{(\Delta t_{D(OH)M} \text{ at } 15.0\ V) - (\Delta t_{D(OH)M} \text{ at } 5.0\ V)}{15.0\ V - 5.0\ V}$$

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 II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Interim electrical parameters (method 5004)	1	1
Final electrical test parameters (method 5004) 1/	1,2,3,9	1,2,3,9
Group A test requirements (method 5005)	1,2,3,9,10,11	1,2,3,9,10,11
Group C end-point and group B class S, electrical parameters (method 5005)	1,2,3 and table IV delta limits	1 and table IV delta limits
Group D end-point electrical parameters (method 5005)	1,2,3	1

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

3.6 Marking. Marking shall be in accordance with MIL-M-38510.

3.6.1 Serialization. All class S devices shall be serialized in accordance with MIL-M-38510.

3.6.2 Correctness of indexing and markings. All devices shall be subjected to the final electrical test specified in table II after part marking to verify that they are correctly indexed and identified by Part or Identifying Number. Optionally, an approved electrical test may be devised especially for this requirement.

3.7 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 78 (see MIL-M-38510, appendix E).

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) For class S devices, static test (test condition A or B) using the circuit shown on figure 3 or 4; test duration shall be for 240 hours minimum.

(2) For class B devices, static test (test condition A or B) using the circuit shown on figure 3 or 4; test duration shall be for 160 hours 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 and class B devices shall be as specified in MIL-M-38510, 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 preformed 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. Subgroups 4, 5, 6, 7, and 8 in table I of method 5005 of MIL-STD-883 shall be omitted.

b. Electrical test requirements shall be as specified in table II herein.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of method 5005 of MIL-STD-883 and as follows:

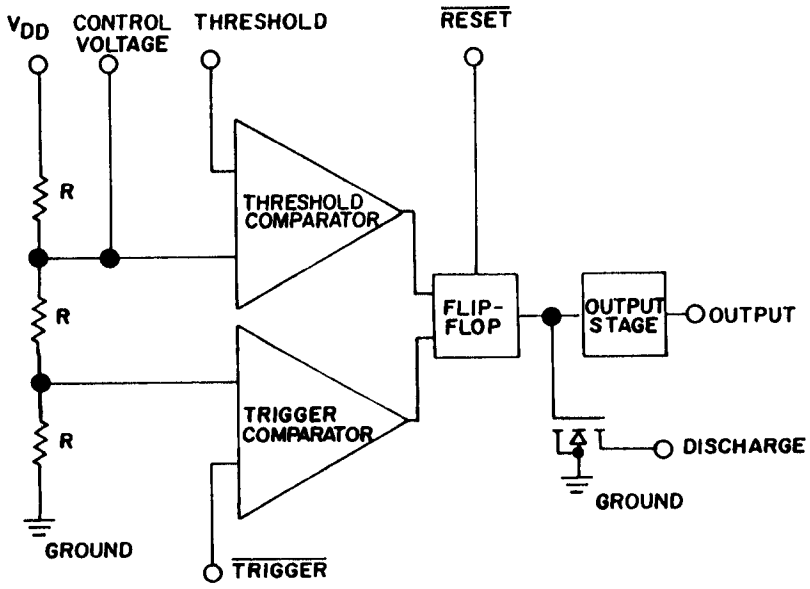
a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test for class S devices shall be in accordance with table IIa of method 5005 of MIL-STD-883, using the circuits shown on figure 4. If the alternate burn-in conditions are used, the circuits on figure 3 shall be used.

Device types	01 and 03			02 and 04 See note 1		03 and 05
Case outlines	C	P	2	C	2	G See note 2
Terminal number	Terminal symbol					
1	GND	GND	NC	DSCH	NC	GND
2	NC	$\overline{TRIG}$	GND	THRES	DSCH	$\overline{TRIG}$
3	$\overline{TRIG}$	OUT	NC	CONT	THRES	OUT
4	OUT	$\overline{RESET}$	NC	$\overline{RESET}$	CONT	$\overline{RESET}$
5	NC	CONT	$\overline{TRIG}$	OUT	NC	CONT
6	$\overline{RESET}$	THRES	NC	$\overline{TRIG}$	$\overline{RESET}$	THRES
7	NC	DSCH	OUT	GND	NC	DSCH
8	CONT	V_{DD}	NC	$\overline{TRIG}$	OUT	V_{DD}
9	NC		NC	OUT	$\overline{TRIG}$	
10	THRES		$\overline{RESET}$	$\overline{RESET}$	GND	
11	NC		NC	CONT	NC	
12	DSCH		CONT	THRES	$\overline{TRIG}$	
13	NC		NC	DSCH	OUT	
14	V_{DD}		NC	V_{DD}	$\overline{RESET}$	
15			THRES		NC	
16			NC		CONT	
17			DSCH		NC	
18			NC		THRES	
19			NC		DSCH	
20			V_{DD}		V_{DD}	

NOTES:
1. V_{DD} and GND are common to both sides.
2. V_{DD} and case are connected.

FIGURE 1. Terminal connections.



Device types 01, 02, and 05

Input			Output
Reset	Treshold	Trigger	
⊓	L	H	⌐
⊓	H	H	L
⊓	L	L	⊓
⊓	H	L	⊓
H	⊓	H	⌐
H	⊓	L	H
L	⊓	H	L
L	⊓	L	L
H	L	⊓	⌐
H	H	⊓	⊓
L	L	⊓	L
L	H	⊓	L

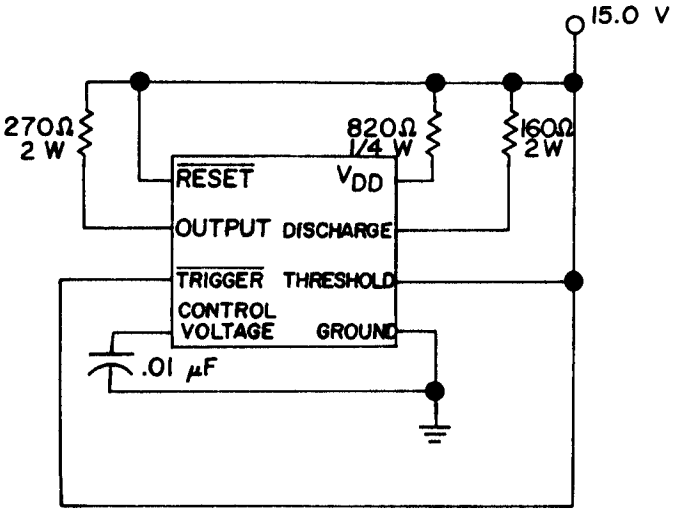
NOTES:
1. Discharge transistor follows the output as follows
   Output high = discharge transistor off
   Output low = discharge transistor on

Device types 03 and 04

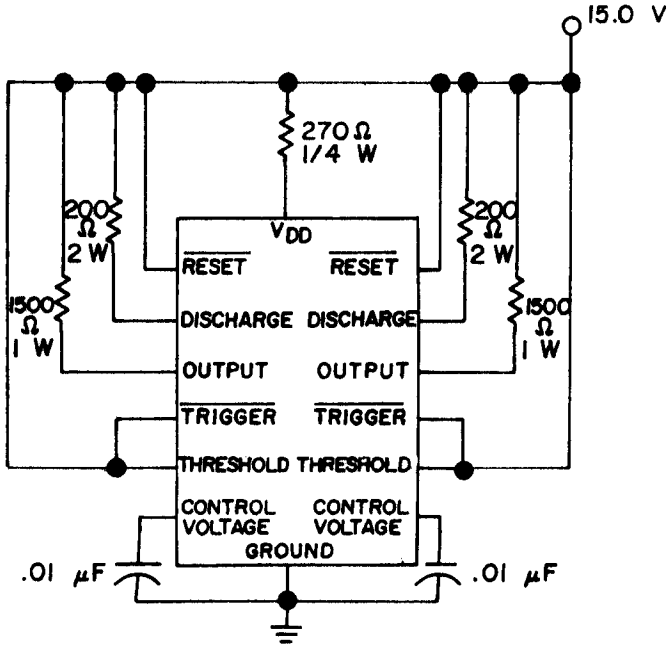
Threshold voltage	Trigger voltage	$\overline{\text{Reset}}$	Output	Discharge switch
Don't care	Don't care	Low	Low	On
> 2/3 (+V)	> 2/3 (+V)	High	Low	On
< 2/3 (+V)	> 2/3 (+V)	High	Stable	Stable
Don't care	< 2/3 (+V)	High	High	Off

FIGURE 2. Block diagram and circuit operation table.

Device type 01



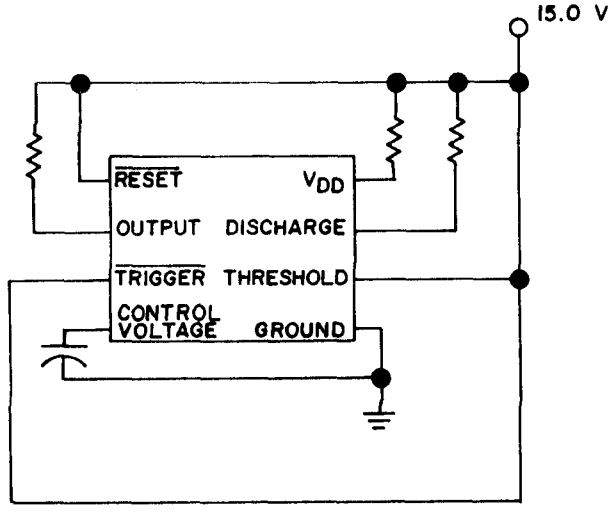
Device type 02



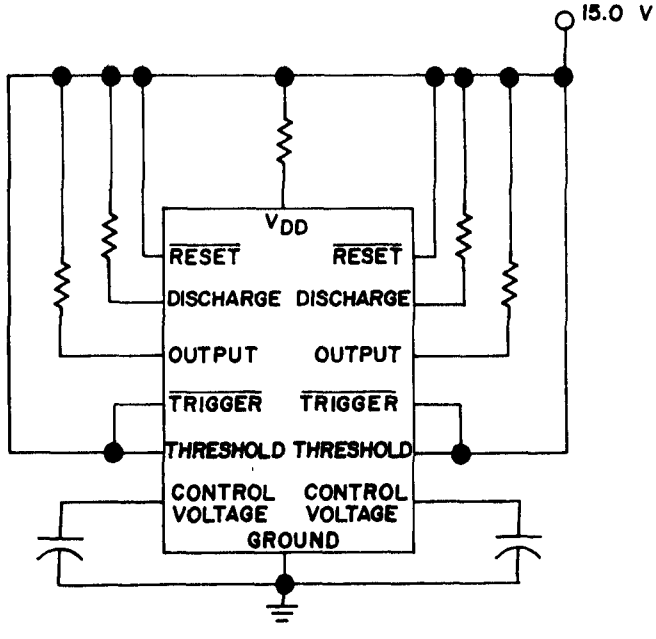
NOTES:
1. All resistors in ohms, tolerance ±5%.
2. All capacitors .01 μF tolerance ±10%.

FIGURE 3. Test circuit burn-in (forward bias) and steady-state life test.

Device type 03



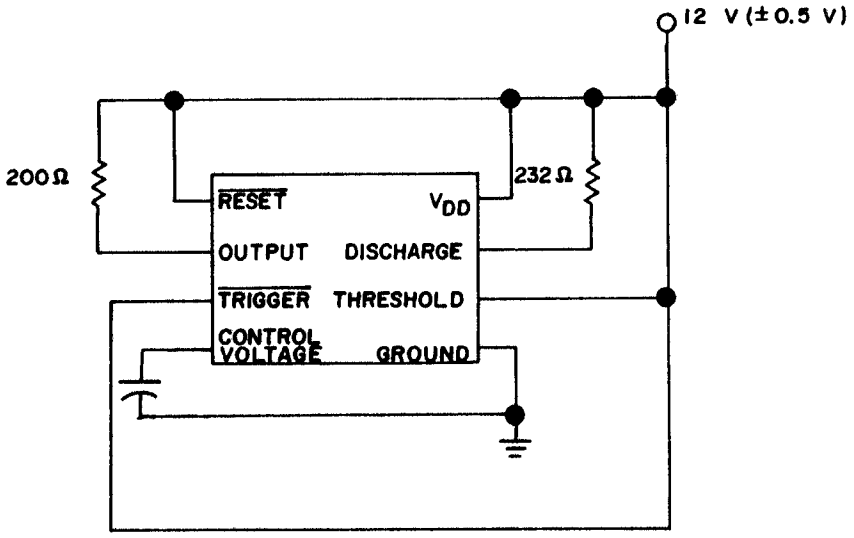
Device type 04



NOTES:
1. All resistors are 4.74 kΩ, 1/2 watt, tolerance ±5%.
2. All capacitors .01 μF tolerance ±10%.

FIGURE 3. Test circuit burn-in (forward bias) and steady-state life test - Continued.

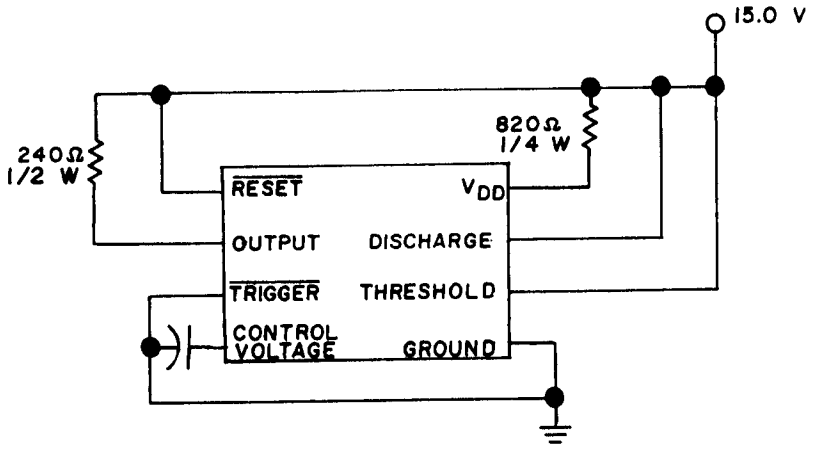
Device type 05



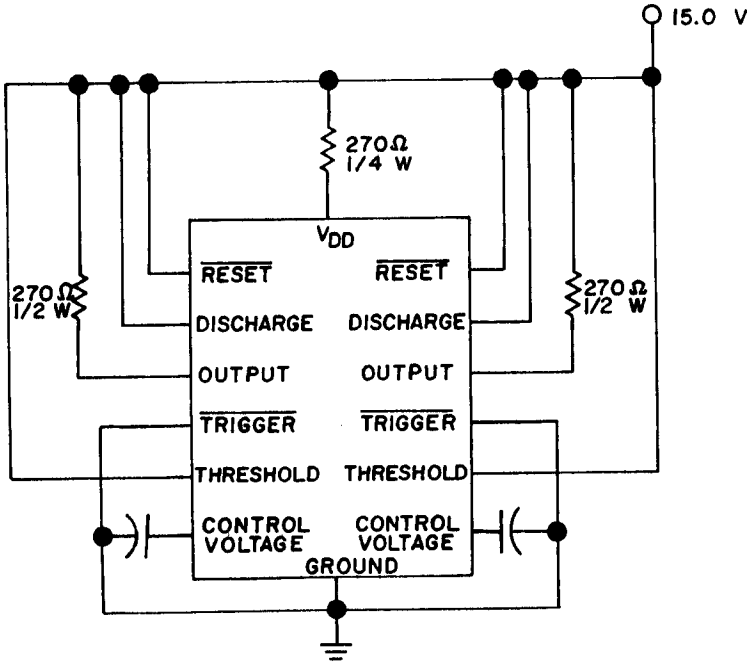
NOTES:
1. All resistors are 3 watt, tolerance ±5%.
2. The capacitor is .01 µF, tolerance ±10%.

FIGURE 3. Test circuit burn-in (forward bias) and steady-state life test - Continued.

Device type 01



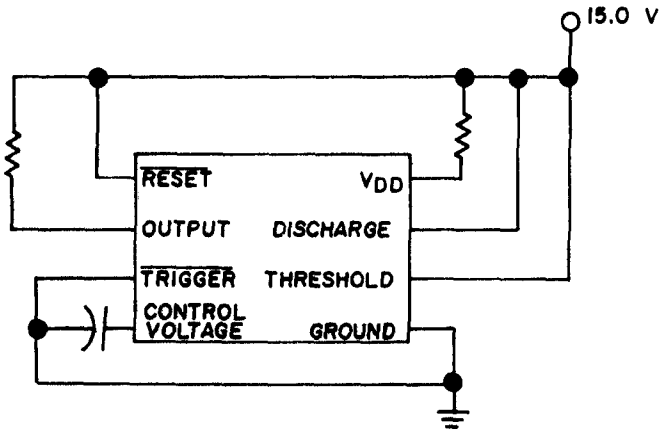
Device type 02



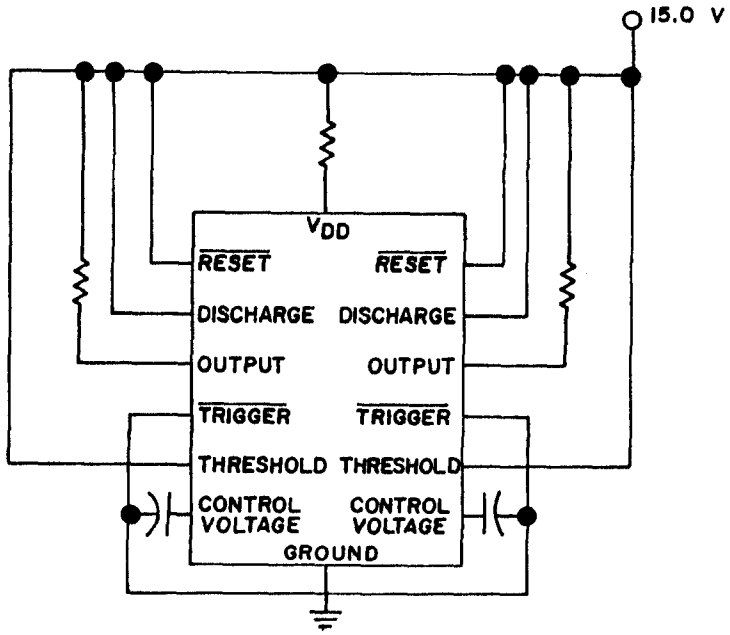
NOTES:
1. All resistors are in ohms, tolerance ±5%.
2. All capacitors are .01 µF, tolerance ±10%.

FIGURE 4. Test circuit burn-in (reverse bias) and steady-state life test.

Device type 03



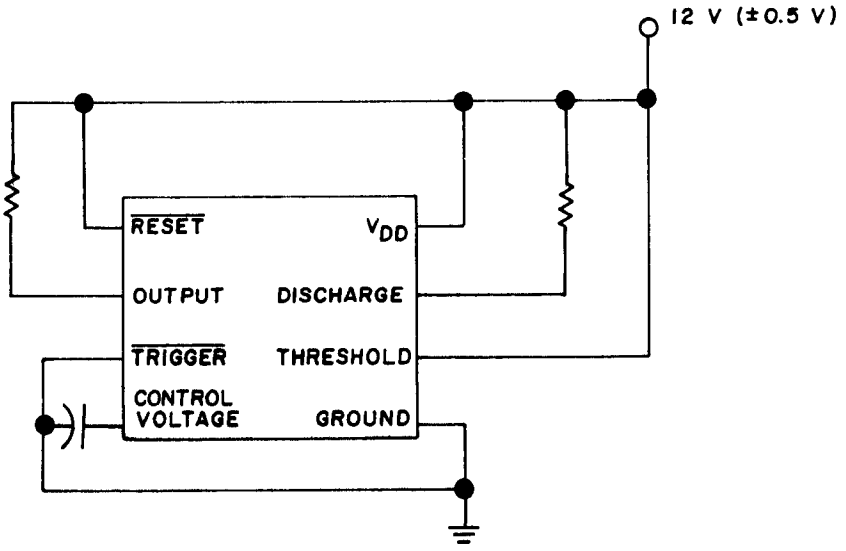
Device type 04



NOTES:
1. All resistors are 4.74 kΩ, 1/2 watt, tolerance ±5%.
2. All capacitors .01 μF tolerance ±10%.

FIGURE 4. Test circuit burn-in (reverse bias) and steady-state life test - Continued.

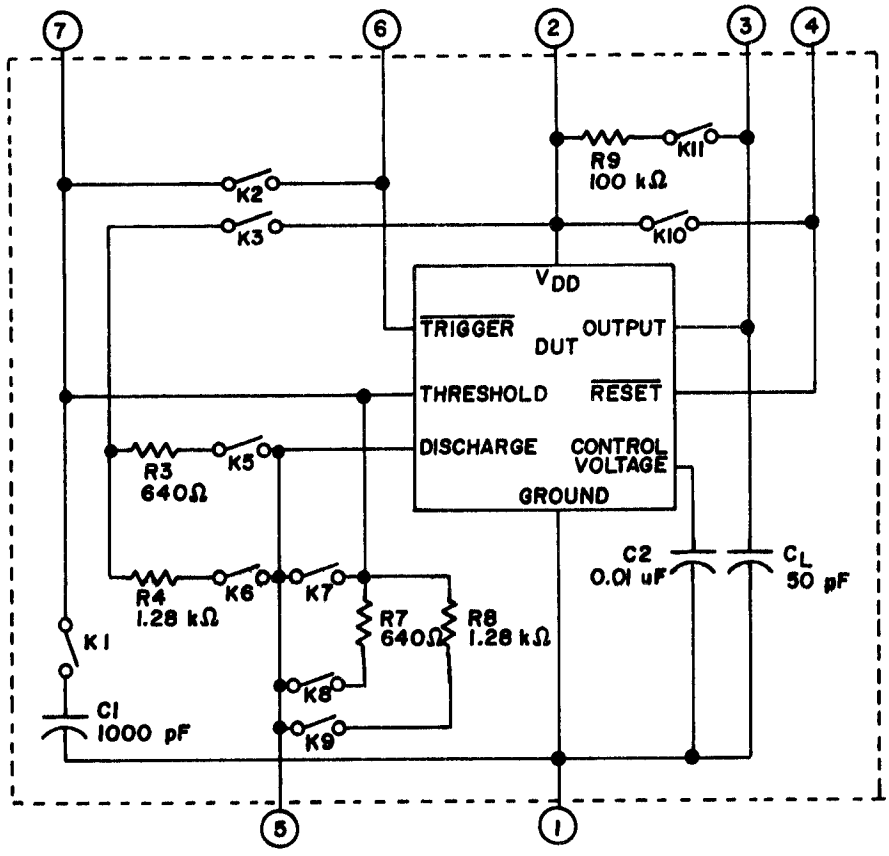
Device type 05



NOTES:
1. All resistors are 1.24 kΩ, 1/2 watt, ±5%.
2. The capacitor is .01 μF, tolerance ±10%.

FIGURE 4. Test circuit burn-in (reverse bias) and steady-state life test - Continued.

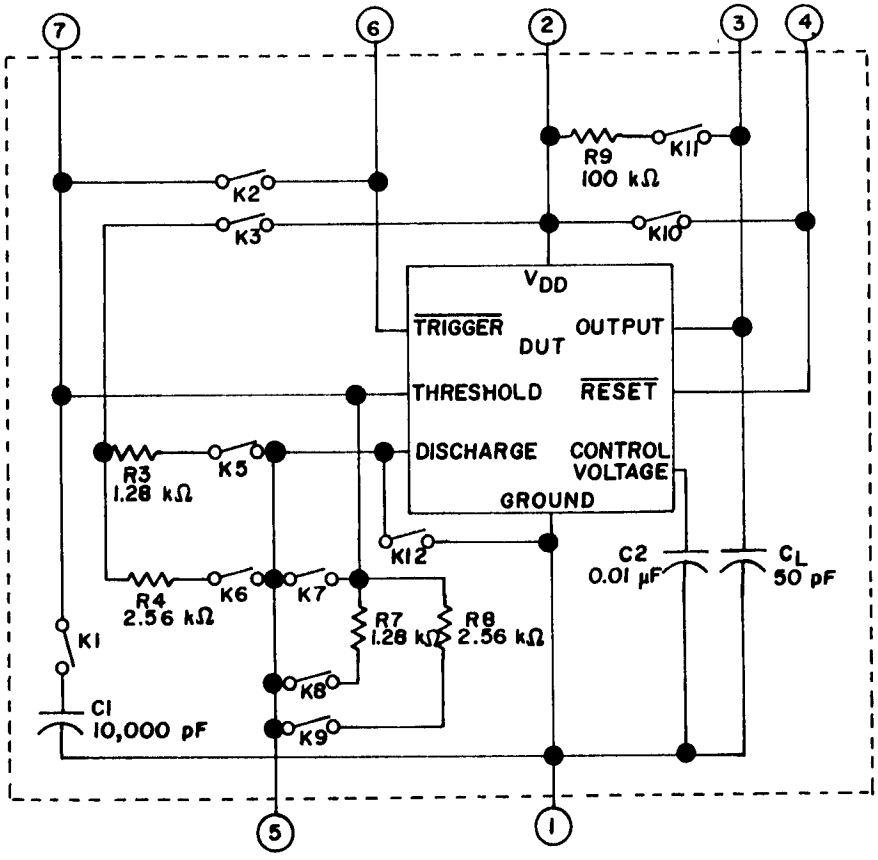
Device types 01 and 02



NOTES:
1. Test circuit pin conditions and test temperature shall be as specified in table III.
2. Precautions shall be taken to prevent damage to the D.U.T during insertion into the socket and during the changing of relay switching poisitions (e.g. disable voltage/current supplies current limit V_{DD} etc.)
3. The resistor and capacitor values and tolerances or as follows:
   R3 and R7 are 640Ω, 1/4 watt ±0.1%
   R4 and R8 are 1.28 kΩ, 1/4 watt ±0.1%
   R9 is 100 kΩ, 1/4 watt ±5%
   C1 is 1,000 pF (including jig and probe capacitance) ±5%, and for device types 02 and 04 each side shall be within ±1%. C2 is 0.01 µF ±10%.
   C_L is 50 pF (including all jig and probe capacitance) ±10%.

FIGURE 5. Test circuit pin out.

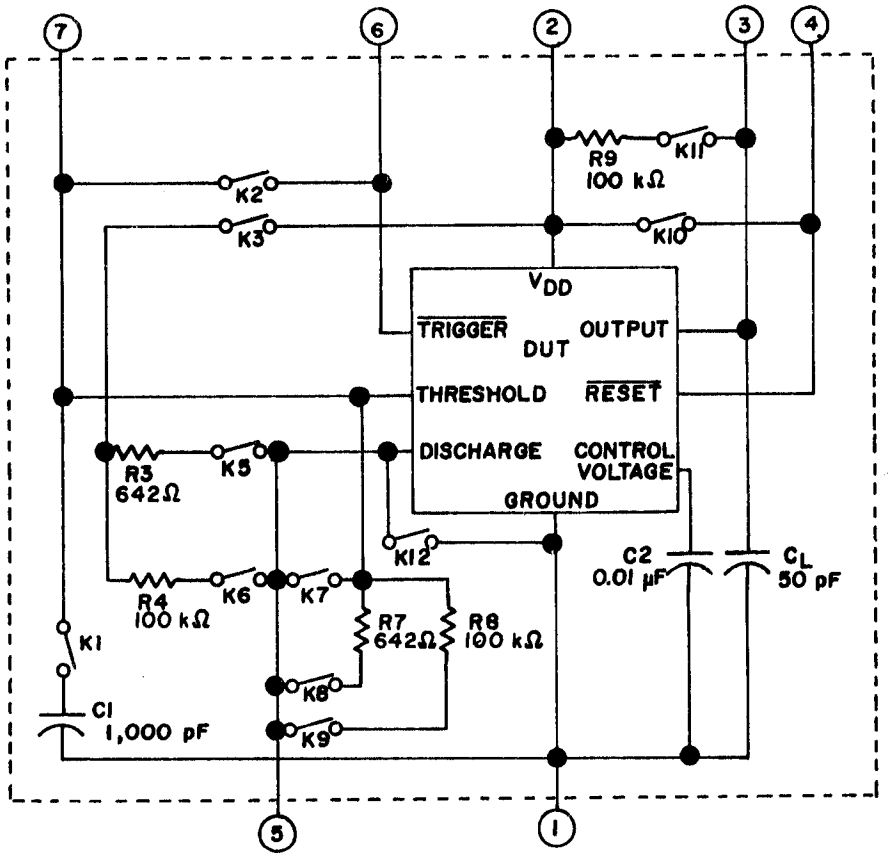
Device types 03 and 04



NOTES:
1. Test circuit pin conditions and test temperature shall be as specified in table III.
2. Precautions shall be taken to prevent damage to the D.U.T during insertion into the socket and during the changing of relay switching poisitions (e.g. disable voltage/current supplies current limit V_{DD} etc.)
3. The resistor and capacitor values and tolerances are as follows:
   R3 and R7 are 1.28 kΩ, 1/4 watt ±0.1%
   R4 and R8 are 2.56 kΩ, 1/4 watt ±0.1%
   R9 is 100 kΩ, 1/4 watt ±5%
   C1 is 10,000 pF (including jig and probe capacitance) ±5%, and for device type 04 each side shall be within ±1%.
   C2 is 0.01 μF ±10%.
   C_L is 50 pF (including all jig and probe capacitance) ±10%.

FIGURE 5. Test circuit pin out - Continued.

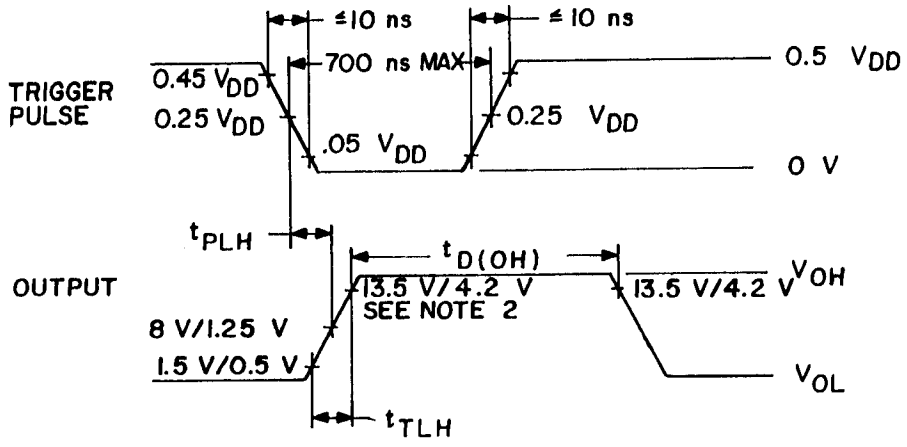
Device type 05



NOTES:
1. Test circuit pin conditions and test temperature shall be as specified in table III.
2. Precautions shall be taken to prevent damage to the D.U.T during insertion into the socket and during the changing of relay switching poisitions (e.g. disable voltage/current supplies current limit V_{DD}, etc.)
3. The resistor and capacitor values and tolerances are as follows:
   - R3 and R7 are 642Ω, 1/4 watt ±0.1%
   - R4 and R8 are 100 kΩ, 1/4 watt ±0.1%
   - R9 is 100 kΩ, 1/4 watt ±5%
   - C1 is 1,000 pF (including jig and probe capacitance) ±2%.
   - C2 is 0.01 μF ±10%.
   - C_L is 50 pF (including all jig and probe capacitance) ±10%.

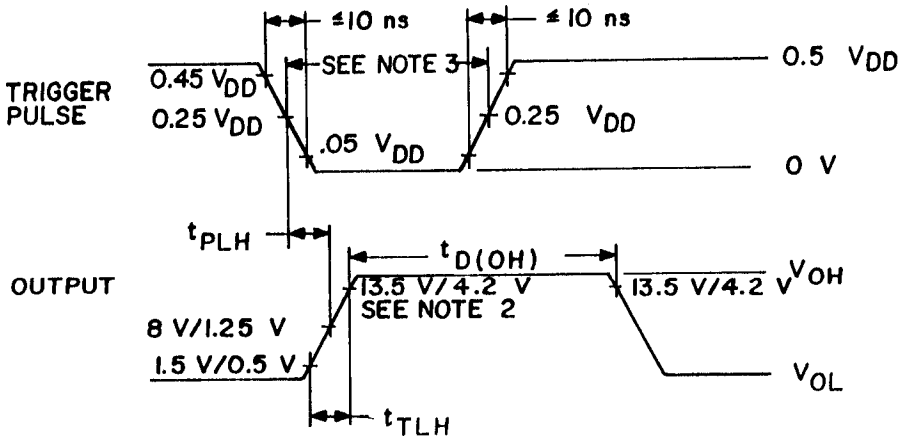
FIGURE 5. Test circuit pin out - Continued.

Device types 01 and 02



NOTES:
1. This limit applies only during tests for t_{PLH}, t_{TLH}, and $t_{D(OH)}$.
2. A/B means value 'A' for V_{DD} = 15 V and 'B' for V_{DD} = 5 V.

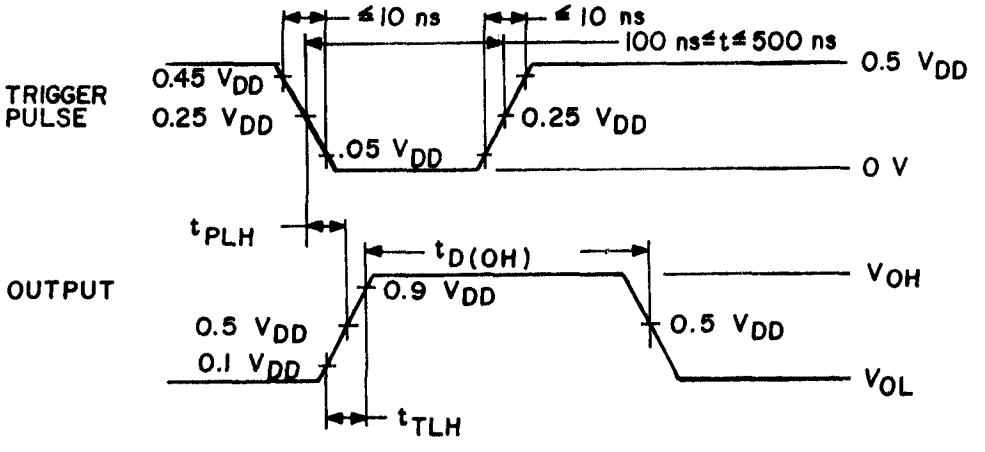
Device types 03 and 04



NOTES:
1. This limit applies only during tests for t_{PLH}, t_{TLH}, and $t_{D(OH)}$.
2. A/B means value 'A' for V_{DD} = 15 V and 'B' for V_{DD} = 5 V.
3. Trigger pulse is 10 µs for R_T = 1.28 kΩ and 20 µs for R_T = 2.56 kΩ.

FIGURE 6. Waveforms for switching and timing parameters (monostable).

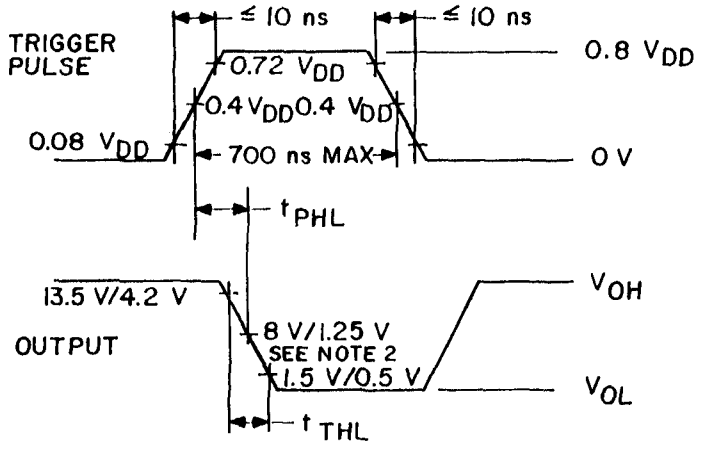
Device type 05



NOTE: This limit applies only during tests for t_{PLH}, t_{TLH}, and $t_{D(OH)}$.

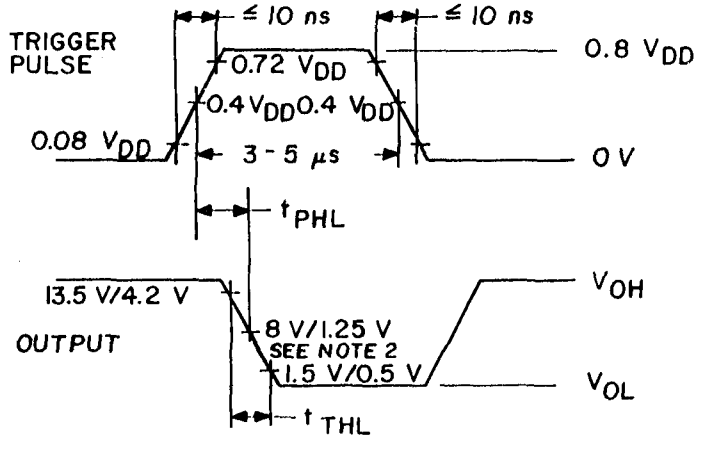
FIGURE 6. Waveforms for switching and timing parameters (monostable) - Continued.

Device types 01 and 02



NOTES:
1. This limit applies only during the t_{PHL} and t_{THL} tests.
2. A/B means value 'A' for V_{DD} = 15 V and 'B' for V_{DD} = 5 V.

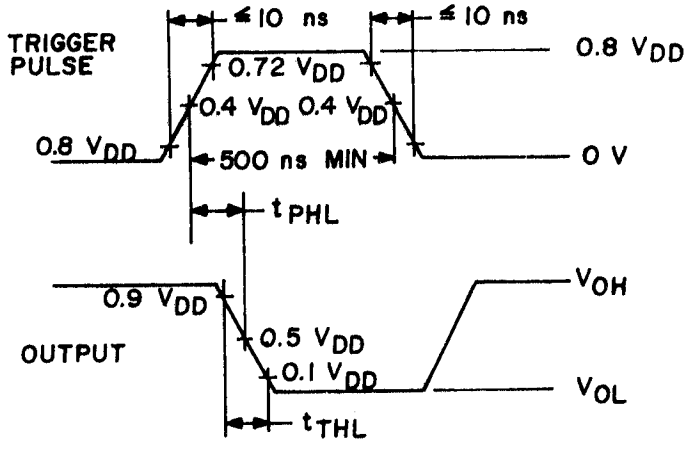
Device types 03 and 04



NOTES:
1. This limit applies only during the t_{PHL} and t_{THL} tests.
2. A/B means value 'A' for V_{DD} = 15 V and 'B' for V_{DD} = 5 V.

FIGURE 7. Waveforms for switching and timing parameters (monostable).

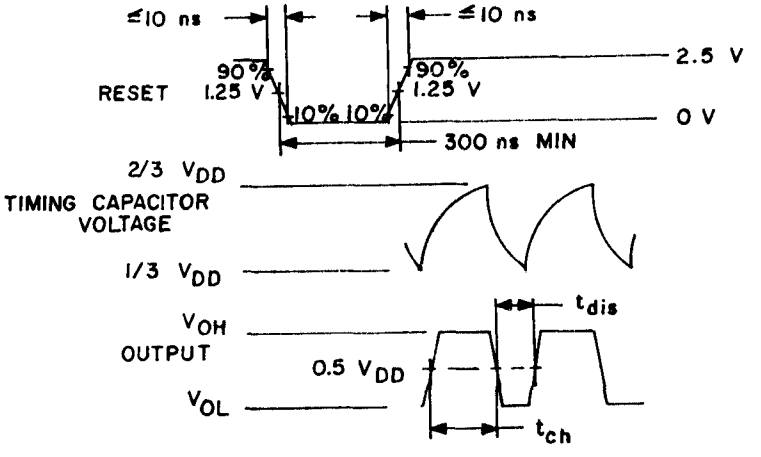
Device type 05



NOTE: This limit applies only during the t_{PHL} and t_{THL} tests.

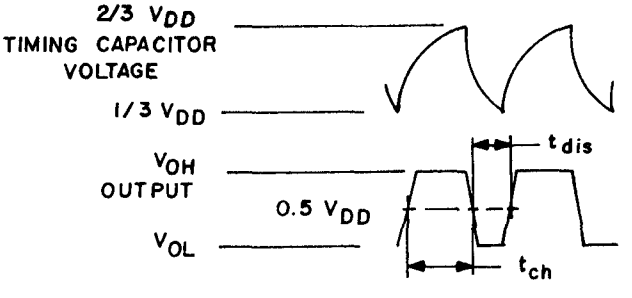
FIGURE 7. Waveforms for switching and timing parameters (monostable) - Continued.

Device types 01, 02, 03, and 04



NOTES:
1. This limit only applies during tests t_{dis} and t_{ch}.
2. The reset pulse may be used to reference the time measurements from.

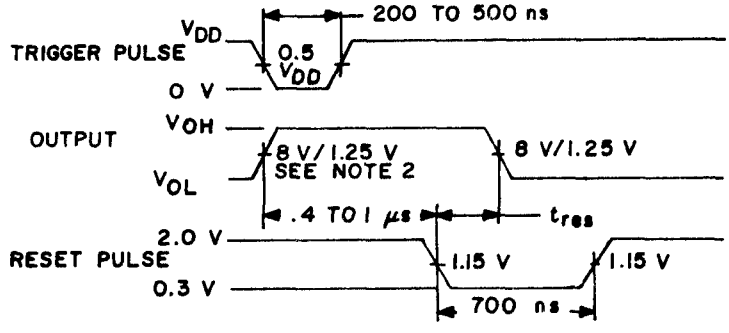
Device type 05



NOTE: This limit only applies during tests t_{dis} and t_{ch}.

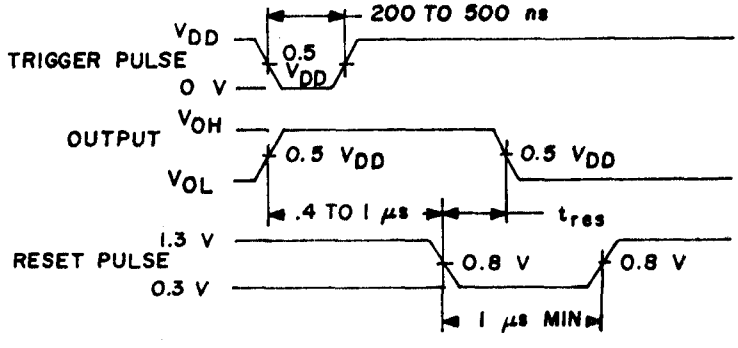
FIGURE 8. Waveforms for timing parameters (astable).

Device types 01, 02, 03, and 04



NOTES:
1. Reset pulse rise and fall times shall be $\leq$ 10 ns.
2. A/B means valve 'A' for V_{DD} = 15 V and 'B' for V_{DD} = 5 V.
3. This limit only applies during tests for t_{res}.

Device type 05



NOTES:
1. Reset pulse rise and fall times shall be $\leq$ 10 ns.
2. This limit only applies during tests for t_{res}.

FIGURE 9. Waveforms for reset tests.

TABLE III. Group A inspection for device types 01 and 02.

Subgroup	Symbol	MIL-STD-883 method	Test no.	Adapter PIN numbers 1/ 1	2	3	4	5	6	7	Relays closed	Measured terminal	Test limits Device 01 Min	Test limits Device 01 Max	Test limits Device 02 Min	Test limits Device 02 Max	Unit
1 T_A = +25°C	I_{DD}	3005	1	GND	5.0 V				3.83 V		2, 10	2		0.35		1.40	mA
			2	"	15.0 V				11.50 V		"	"		0.60		2.00	"
			3	"	18.0 V				13.80 V		"	"		0.60		2.00	"
	V_{TR}		4	"	5.0 V	2/			2/		2, 3, 5, 10		1.26	2.06	1.26	2.06	V
			5	"	15.0 V	"			"		"		4.05	5.50	4.05	5.50	"
			6	"	18.0 V	"			"		"		4.70	6.85	4.70	6.85	"
	I_{TR}		7	"	5.0 V				1.66 V	1.66 V	3, 5, 10	6	-50	+50	-50	+50	nA
			8	"	15.0 V				5.00 V	5.00 V	"	"	"	"	"	"	"
			9	"	18.0 V				6.00 V	6.00 V	"	"	"	"	"	"	"
			10	"	5.0 V				3.33 V	3.33 V	"	"	"	"	"	"	"
			11	"	15.0 V				10.00 V	10.00 V	"	"	"	"	"	"	"
			12	"	18.0 V				12.00 V	12.00 V	"	"	"	"	"	"	"
	V_{TH}		13	"	5.0 V	3/			3/		2, 3, 5, 10		2.70	3.90	2.70	3.90	V
			14	"	15.0 V	"			"		"		9.15	10.80	9.15	10.80	"
			15	"	18.0 V	"			"		"		10.90	13.15	10.90	13.15	"
	I_{TH}		16	"	5.0 V				1.66 V	1.66 V	3, 5, 10	7	-50	+50	-50	+50	nA
			17	"	15.0 V				5.00 V	5.00 V	"	"	"	"	"	"	"
			18	"	18.0 V				6.00 V	6.00 V	"	"	"	"	"	"	"
			19	"	5.0 V				3.33 V	3.33 V	"	"	"	"	"	"	"
			20	"	15.0 V				10.00 V	10.00 V	"	"	"	"	"	"	"
			21	"	18.0 V				12.00 V	12.00 V	"	"	"	"	"	"	"
	V_{OH}	3006	22	"	5.0 V	-1 mA			1.17 V		2, 3, 5, 10	3	4.10		4.10		V
			23	"	15.0 V	-10 mA			3.50 V		"	"	12.50		12.50		"
			24	"	15.0 V	-5 mA			3.50 V		"	"	13.50		13.50		"
			25	"	15.0 V	-1 mA			3.50 V		"	"	14.20		14.20		"
			26	"	18.0 V	-1 mA			4.20 V		"	"	17.30		17.30		"
	V_{OL}	3007	27	"	5.0 V	8.0 mA			3.83 V		"	3 4/		0.60		0.60	"
			28	"	5.0 V	5.0 mA			3.83 V		"	"		0.45		0.45	"
			29	"	5.0 V	3.2 mA			3.83 V		"	"		0.40		0.40	"
			30	"	15.0 V	100 mA			11.50 V		"	"		3.80		3.80	"
			31	"	15.0 V	50 mA			11.50 V		"	"		1.50		1.50	"
			32	"	15.0 V	10 mA			11.50 V		"	"		0.45		0.45	"
			33	"	18.0 V	3.2 mA			13.80 V		"	"		0.40		0.40	"
	I_{CEX}		34	"	5.0 V			5.0 V	1.17 V		2, 10	5		2		2	µA
			35	"	15.0 V			15.0 V	3.50 V		"	"		"		"	"
			36	"	18.0 V			18.0 V	4.20 V		"	"		"		"	"
	V_{SAT}		37	"	5.0 V			10 mA	3.83 V		"	"		0.60		0.60	V
			38	"	15.0 V			100 mA	11.50 V		"	"		1.80		1.80	"
			39	"	18.0 V			100 mA	13.80 V		"	"		1.60		1.60	"

See footnotes at end of table.

TABLE III. Group A inspection for device types 01 and 02 - Continued.

Subgroup	Symbol	MIL-STD-883 method	Test no.	Adapter PIN numbers 1/ 1	2	3	4	5	6	7	Relays closed	Measured terminal	Test limits Device 01 Min	Test limits Device 01 Max	Test limits Device 02 Min	Test limits Device 02 Max	Unit
1 T_A = +25°C	I_R		40	GND	5.0 V		1.66 V				2, 3, 5	4	-50	+50	-50	+50	mA
			41	"	15.0 V		5.00 V				"	"	"	"	"	"	"
			42	"	18.0 V		6.00 V				"	"	"	"	"	"	"
			43	"	5.0 V		3.33 V				"	"	"	"	"	"	"
			44	"	15.0 V		10.00 V				"	"	"	"	"	"	"
			45	"	18.0 V		12.00 V				"	"	"	"	"	"	"
2	Same tests, terminal conditions and limits as subgroup 1, except T_A = +125°C. Test numbers 46 through 90.																
3	Same tests, terminal conditions and limits as subgroup 1, except T_A = -55°C and I_{TR}, I_{TH}, I_{CEX}, I_R tests are omitted. Test numbers 91 through 114.																
9 T_A = +25°C	t_{PLH}		115	GND	5.0 V	See			See		1,3,5,7,10,11	3	5	125	5	125	ns
			116	"	15.0 V	fig. 6			fig. 6		1,3,5,7,10,11	"	"	125	"	125	"
	t_{PHL}		117	"	5.0 V	See			See		2,3,5,10,11	"	"	200	"	200	"
			118	"	15.0 V	fig. 7			fig. 7		2,3,5,10,11	"	"	200	"	200	"
	t_{TLH}		119	"	5.0 V	See			See		1,3,5,7,10,11	"	"	80	"	80	"
			120	"	15.0 V	fig. 6			fig. 6		"	"	"	80	"	80	"
	t_{THL}		121	"	5.0 V	See			See		"	"	"	30	"	30	"
			122	"	15.0 V	fig. 7			fig. 7		"	"	"	30	"	30	"
	$t_{D(OH)}$		123	"	5.0 V	See			See		"	"	200	825	200	825	"
			124	"	15.0 V	fig. 6			fig. 6		"	"	200	825	200	825	"
			125	"	5.0 V	"			"		1,3,6,7,10,11	"	0.5	1.8	0.5	1.8	"
			126	"	15.0 V	"			"		1,3,6,7,10,11	"	0.5	1.8	0.5	1.8	"
	$\Delta t_{D(OH)M}$		127	Test no. 123 side A - Test no. 123 side B 5/											-35	+35	ns/V
			128	Test no. 124 side A - Test no. 124 side B											"	+35	"
			129	Test no. 125 side A - Test no. 125 side B											"	+45	"
			130	Test no. 126 side A - Test no. 126 side B											"	+45	"
	$\frac{\Delta t_{D(OH)}}{\Delta V_{DD}}$		131	(Test no. 124 - Test no. 123) / 10 V 6/									-8	+8	-8	+8	"
	$\frac{\Delta t_{D(OH)M}}{\Delta V_{DD}}$		132	(Test no. 126 - Test no. 125) / 10 V									-18	+18	-18	+18	"
			133	(Test no. 128 side A - Test no. 127 side B) / 10 V 7/											-3	+3	"
			134	(Test no. 130 side A - Test no. 129 side B) / 10 V											-4	+4	"
	t_{ch}		135	GND	5.0 V	See			See		1,2,3,5,8,10	3	0.5	1.7	0.5	1.7	µs
			136	"	15.0 V	fig. 8			fig. 8		1,2,3,5,8,10	"	"	1.7	"	1.7	"
			137	"	5.0 V	"			"		1,2,3,6,9,10	"	"	2.7	"	2.7	"
			138	"	15.0 V	"			"		1,2,3,6,9,10	"	"	2.7	"	2.7	"

See footnotes at end of table.

TABLE III. Group A inspection for device types 01 and 02 - Continued.

Subgroup	Symbol	MIL-STD-883 method	Test no.	Adapter PIN numbers 1/ 1	2	3	4	5	6	7	Relays closed	Measured terminal	Test limits Device 01 Min	Test limits Device 01 Max	Test limits Device 02 Min	Test limits Device 02 Max	Unit
9 T_A = +25°C	Δt_{ch}		139	(Test no. 136 - Test no. 135) / 10 V 8/									-5	+5	-5	+5	ns/V
	ΔV_{DD}		140	(Test no. 138 - Test no. 137) / 10 V									-30	+30	-30	+30	ns/V
	t_{dis}		141	GND	5.0 V	See			See		1,2,3,5,8,10	3	0.5	0.9	0.5	0.9	µs
			142	"	15.0 V	fig. 8			fig. 8		1,2,3,5,8,10	"	"	0.9	"	0.9	"
			143	"	5.0 V	"			"		1,2,3,6,9,10	"	"	1.5	"	1.5	"
			144	"	15.0 V	"			"		1,2,3,6,9,10	"	"	1.5	"	1.5	"
	t_{res}		145	"	5.0 V	See			See		1,3,6,7,11	"	50	350	50	350	ns
			146	"	15.0 V	fig. 9			fig. 9		1,3,6,7,11	"	50	350	50	350	"
10 T_A = +125°C	t_{PLH}		147	"	5.0 V	See			See		1,3,5,7,10,11	"	5	150	5	150	"
			148	"	15.0 V	fig. 6			fig. 6		1,3,5,7,10,11	"	"	150	"	150	"
	t_{PHL}		149	"	5.0 V	See			See		2,3,5,10,11	"	"	300	"	300	"
			150	"	15.0 V	fig. 7			fig. 7		2,3,5,10,11	"	"	300	"	300	"
	t_{TLH}		151	"	5.0 V	See			See		1,3,5,7,10,11	"	"	80	"	80	"
			152	"	15.0 V	fig. 6			fig. 6		"	"	"	80	"	80	"
	t_{THL}		153	"	5.0 V	See			See		"	"	"	35	"	35	"
			154	"	15.0 V	fig. 7			fig. 7		"	"	"	35	"	35	"
	$t_{D(OH)}$		155	"	5.0 V	See			See		"	"	0.2	0.9	0.2	0.9	µs
			156	"	5.0 V	fig. 6			fig. 6		1,3,6,7,10,11	"	0.5	1.9	0.5	1.9	µs
	$\Delta t_{D(OH)M}$		157	Test no. 155 side A - Test no. 155 side B 5/											-30	+30	ns/V
			158	Test no. 156 side A - Test no. 156 side B											-30	+30	ns/V
	t_{ch}		159	GND	5.0 V	See			See		1,2,3,5,8,10	3	0.5	1.8	0.5	1.8	µs
			160	"	"	fig. 8			fig. 8		1,2,3,6,9,10	"	"	2.8	"	2.8	"
	t_{dis}		161	"	"	See			See		1,2,3,5,8,10	"	"	1.0	"	1.0	"
			162	"	"	fig. 8			fig. 8		1,2,3,6,9,10	"	"	1.65	"	1.65	"
	t_{res}		163	"	"	See			See		1,3,6,7,11	"	50	450	50	450	ns
			164	"	15.0 V	fig. 9			fig. 9		1,3,6,7,11	"	50	450	50	450	ns
11	Same tests, terminal conditions as subgroup 10, same limits as subgroup 9 except T_A = -55°C. Test numbers 165 through 196.																

See footnotes at end of table.

TABLE III. Group A inspection for device types 03 and 04.

Subgroup	Symbol	MIL-STD-883 method	Test no.	Adapter PIN numbers 1/ 1	2	3	4	5	6	7	Relays closed	Measured terminal	Test limits Device 03 Min	Test limits Device 03 Max	Test limits Device 04 Min	Test limits Device 04 Max	Unit
1 T_A = +25°C	I_{DD}	3005	1	GND	5.0 V				3.83 V		2, 10	2		300		400	µA
			2	"	15.0 V				11.50 V		"	"		300		600	"
			3	"	18.0 V				13.80 V		"	"		350		700	"
	V_{TR}		4	"	5.0 V	2/			2/		2, 3, 5, 10		1.26	2.06	1.26	2.06	V
			5	"	15.0 V	"			"		"		4.05	5.50	4.05	5.50	"
			6	"	18.0 V	"			"		"		4.70	6.85	4.70	6.85	"
	I_{TR}		7	"	5.0 V				1.66 V	1.66 V	3, 5, 10	6	-50	+50	-50	+50	nA
			8	"	15.0 V				5.00 V	5.00 V	"	"	"	"	"	"	"
			9	"	18.0 V				6.00 V	6.00 V	"	"	"	"	"	"	"
			10	"	5.0 V				3.33 V	3.33 V	"	"	"	"	"	"	"
			11	"	15.0 V				10.00 V	10.00 V	"	"	"	"	"	"	"
			12	"	18.0 V				12.00 V	12.00 V	"	"	"	"	"	"	"
	V_{TH}		13	"	5.0 V	3/			3/		2, 3, 5, 10		2.70	3.90	2.70	3.90	V
			14	"	15.0 V	"			"		"		9.15	10.80	9.15	10.80	"
			15	"	18.0 V	"			"		"		10.90	13.15	10.90	13.15	"
	I_{TH}		16	"	5.0 V				1.66 V	1.66 V	3, 5, 10	7	-50	+50	-50	+50	nA
			17	"	15.0 V				5.00 V	5.00 V	"	"	"	"	"	"	"
			18	"	18.0 V				6.00 V	6.00 V	"	"	"	"	"	"	"
			19	"	5.0 V				3.33 V	3.33 V	"	"	"	"	"	"	"
			20	"	15.0 V				10.00 V	10.00 V	"	"	"	"	"	"	"
			21	"	18.0 V				12.00 V	12.00 V	"	"	"	"	"	"	"
	V_{OH}	3006	22	"	5.0 V	-0.8 mA			1.17 V		2, 3, 5, 10	3	3.80		3.80		V
			23	"	15.0 V	-0.8 mA			3.50 V		"	"	14.20		14.20		"
			24	"	18.0 V	-0.8 mA			4.20 V		"	"	17.30		17.30		"
	V_{OL}	3007	25	"	5.0 V	3.2 mA			3.83 V		"	3 4/		0.50		0.50	"
			26	"	15.0 V	20 mA			11.50 V		"	"		1.25		1.25	"
			27	"	18.0 V	3.2 mA			13.80 V		"	"		0.50		0.50	"
	I_{CEX}		28	"	5.0 V			5.0 V	1.17 V		2, 10	5		300		300	nA
			29	"	15.0 V			15.0 V	3.50 V		"	"		"		"	"
			30	"	18.0 V			18.0 V	4.20 V		"	"		"		"	"
	V_{SAT}		31	"	5.0 V			10 mA	3.83 V		"	"		0.60		0.60	V
			32	"	15.0 V			10 mA	11.50 V		"	"		"		"	"
			33	"	18.0 V			10 mA	13.80 V		"	"		"		"	"
	I_R		34	"	5.0 V		1.66 V				2, 3, 5	4	-50	+50	-50	+50	nA
			35	"	15.0 V		5.00 V				"	"	"	"	"	"	"
			36	"	18.0 V		6.00 V				"	"	"	"	"	"	"
			37	"	5.0 V		3.33 V				"	"	"	"	"	"	"
			38	"	15.0 V		10.00 V				"	"	"	"	"	"	"
			39	"	18.0 V		12.00 V				"	"	"	"	"	"	"

See footnotes at end of table.

TABLE III. Group A inspection for device types 03 and 04 - Continued.

Subgroup	Symbol	MIL-STD-883 method	Test no.	Adapter PIN numbers 1/ 1	2	3	4	5	6	7	Relays closed	Measured terminal	Test limits Device 03 Min	Test limits Device 03 Max	Test limits Device 04 Min	Test limits Device 04 Max	Unit
2	Same tests, terminal conditions and limits as subgroup 1, except T_A = +125°C. Test numbers 40 through 78.																
3	Same tests, terminal conditions and limits as subgroup 1, except T_A = -55°C and I_{TR}, I_{TH}, I_{CEX}, I_R tests are omitted. Test numbers 79 through 96.																
9 T_A = +25°C	t_{PLH}		97	GND	5.0 V	See			See		1,3,5,7,10,11	3	100	400	100	400	ns
			98	"	15.0 V	fig. 6			fig. 6		1,3,5,7,10,11	"	"	400	"	400	"
	t_{PHL}		99	"	5.0 V	See			See		2,3,5,10,11	"	"	550	"	550	"
			100	"	15.0 V	fig. 7			fig. 7		2,3,5,10,11	"	"	550	"	550	"
	t_{TLH}		101	"	5.0 V	See			See		1,3,5,7,10,11	"	"	450	"	450	"
			102	"	15.0 V	fig. 6			fig. 6		"	"	"	450	"	450	"
	t_{THL}		103	"	5.0 V	See			See		"	"	25	90	25	90	"
			104	"	15.0 V	fig. 7			fig. 7		"	"	25	90	25	90	"
	$t_{D(OH)}$		105	"	5.0 V	See			See		"	"	12.0	14.7	12.0	14.7	µs
			106	"	15.0 V	fig. 6			fig. 6		"	"	12.0	14.7	12.0	14.7	"
			107	"	5.0 V	"			"		1,3,6,7,10,11	"	24.0	29.4	24.0	29.4	"
			108	"	15.0 V	"			"		1,3,6,7,10,11	"	24.0	29.4	24.0	29.4	"
	$\Delta t_{D(OH)M}$		109	Test no. 105 side A - Test no. 105 side B 5/											-150	+150	ns/V
			110	Test no. 106 side A - Test no. 106 side B											-150	+150	"
			111	Test no. 107 side A - Test no. 107 side B											-300	+300	"
			112	Test no. 108 side A - Test no. 108 side B											-300	+300	"
	$\frac{\Delta t_{D(OH)}}{\Delta V_{DD}}$		113	(Test no. 106 - Test no. 106) / 10 V 6/									-250	+250	-250	+250	"
	$\frac{\Delta t_{D(OH)}}{\Delta V_{DD}}$		114	(Test no. 108 - Test no. 107) / 10 V									-500	+500	-500	+500	"
	$\frac{\Delta t_{D(OH)M}}{\Delta V_{DD}}$		115	(Test no. 110 side A - Test no. 109 side B) / 10 V 7/											-50	+50	"
			116	(Test no. 112 side A - Test no. 111 side B) / 10 V											-100	+100	"
	t_{ch}		117	GND	5.0 V	See			See		1,2,3,5,8,10	3	15.9	19.5	15.9	19.5	µs
			118	"	15.0 V	fig. 8			fig. 8		1,2,3,5,8,10	"	15.9	19.5	15.9	19.5	"
			119	"	5.0 V	"			"		1,2,3.6,9,10	"	32.0	39.2	32.0	39.2	"
			120	"	15.0 V	"			"		1,2,3,6,9,10	"	32.0	39.2	32.0	39.2	"
	$\frac{\Delta t_{ch}}{\Delta V_{DD}}$		121	(Test no. 118 - Test no. 117) / 10 V 8/									-350	+350	-350	+350	ns/V
	$\frac{\Delta t_{ch}}{\Delta V_{DD}}$		122	(Test no. 120 - Test no. 119) / 10 V									-700	+700	-700	+700	ns/V
	t_{dis}		123	GND	5.0 V	See			See		1,2,3,5,8,10	3	8.8	10.8	8.8	10.8	µs
			124	"	15.0 V	fig. 8			fig. 8		1,2,3,5,8,10	"	8.8	10.8	8.8	10.8	"
			125	"	5.0 V	"			"		1,2,3,6,9,10	"	17.7	21.7	17.7	21.7	"
			126	"	15.0 V	"			"		1,2,3,6,9,10	"	17.7	21.7	17.7	21.7	"

See footnotes at end of table.

TABLE III. Group A inspection for device types 03 and 04 - Continued.

Subgroup	Symbol	MIL-STD-883 method	Test no.	Adapter PIN numbers 1/ 1	2	3	4	5	6	7	Relays closed	Measured terminal	Test limits Device 03 Min	Test limits Device 03 Max	Test limits Device 04 Min	Test limits Device 04 Max	Unit
9 T_A = +25°C	t_{res}		127 128	GND "	5.0 V 15.0 V	See fig. 9			See fig. 9		1,3,6,7,11 1,3,6,7,11	3 "	300 300	1200 1200	300 300	1200 1200	ns "
10 T_A = +125°C	t_{PLH}		129 130	" "	5.0 V 15.0 V	See fig. 6			See fig. 6		1,3,5,7,10,11 1,3,5,7,10,11	" "	200 "	550 550	200 "	550 550	" "
	t_{PHL}		131 132	" "	5.0 V 15.0 V	See fig. 7			See fig. 7		2,3,5,10,11 2,3,5,10,11	" "	" "	850 850	" "	850 850	" "
	t_{TLH}		133 134	" "	5.0 V 15.0 V	See fig. 6			See fig. 6		1,3,5,7,10,11 "	" "	150 150	600 600	150 150	600 600	" "
	t_{THL}		135 136	" "	5.0 V 15.0 V	See fig. 7			See fig. 7		" "	" "	40 40	120 120	40 40	120 120	" "
	$t_{D(OH)}$		137 138	" "	5.0 V 5.0 V	See fig. 6			See fig. 6		" 1,3,6,7,10,11	" "	11.3 22.6	15.4 30.8	11.3 22.6	15.4 30.8	µs µs
	$\Delta t_{D(OH)M}$		139 140	Test no. 137 side A - Test no. 137 side B 5/ Test no. 138 side A - Test no. 138 side B											-200 -350	+200 +350	ns/V ns/V
	t_{ch}		141 142	GND "	5.0 V "	See fig. 8			See fig. 8		1,2,3,5,8,10 1,2,3,6,9,10	3 "	15.0 30.2	20.5 41.0	15.0 30.2	20.5 41.0	µs "
	t_{dis}		143 144	" "	" "	See fig. 8			See fig. 8		1,2,3,5,8,10 1,2,3,6,9,10	" "	8.3 16.7	11.3 22.7	8.3 16.7	11.3 22.7	" "
	t_{res}		145 146	" "	" 15.0 V	See fig. 9			See fig. 9		1,3,6,7,11 1,3,6,7,11	" "	450 450	1600 1600	450 450	1600 1600	ns ns
11	Same tests, terminal conditions as subgroup 10, same limits as subgroup 9 except T_A = -55°C. Test numbers 147 through 164.																

See footnotes at end of table.

TABLE III. Group A inspection for device type 05.

Subgroup	Symbol	MIL-STD-883 method	Test no.	Adapter PIN numbers 1/ 1	2	3	4	5	6	7	Relays closed	Measured terminal	Test limits Device 05 Min	Max	Unit
1 T_A = +25°C	I_{DD}	3005	1	GND	1.5 V				1.15 V		2, 10	2		100	µA
			2	"	5.0 V				3.83 V		"	"		300	"
			3	"	12.0 V				9.20 V		"	"		400	"
	V_{TR}		4	"	1.5 V	2/			2/		2, 3, 5, 10		0.40	0.60	V
			5	"	5.0 V	"			"		"		1.26	2.06	"
			6	"	12.0 V	"			"		"		3.70	4.30	"
	I_{TR}		7	"	1.5 V				0.50 V	0.50 V	3, 5, 10	6	-50	+50	nA
			8	"	5.0 V				1.67 V	1.67 V	"	"	"	"	"
			9	"	12.0 V				4.00 V	4.00 V	"	"	"	"	"
			10	"	1.5 V				1.00 V	1.00 V	"	"	"	"	"
			11	"	5.0 V				3.33 V	3.33 V	"	"	"	"	"
			12	"	12.0 V				8.00 V	8.00 V	"	"	"	"	"
	V_{TH}		13	"	1.5 V	3/			3/		2, 3, 5, 10		0.80	1.20	V
			14	"	5.0 V	"			"		"		2.70	3.90	"
			15	"	12.0 V	"			"		"		7.40	8.60	"
	I_{TH}		16	"	1.5 V				0.50 V	0.50 V	3, 5, 10	7	-50	+50	nA
			17	"	5.0 V				1.67 V	1.67 V	"	"	"	"	"
			18	"	12.0 V				4.00 V	4.00 V	"	"	"	"	"
			19	"	1.5 V				1.00 V	1.00 V	"	"	"	"	"
			20	"	5.0 V				3.33 V	3.33 V	"	"	"	"	"
			21	"	12.0 V				8.00 V	8.00 V	"	"	"	"	"
	V_{OH}	3006	22	"	1.5 V	-0.25 mA			0.35 V		2, 3, 5, 10	3	1.00		V
			23	"	5.0 V	-2.00 mA			1.17 V		"	"	3.80		"
			24	"	12.0 V	-10.0 mA			2.80 V		"	"	10.50		"
	V_{OL}	3007	25	"	1.5 V	1 mA			1.15 V		"	3 4/		0.40	"
			26	"	5.0 V	8 mA			3.83 V		"	"		0.55	"
			27	"	12.0 V	50 mA			9.20 V		"	"		2.40	"
	I_{CEX}		28	"	1.5 V			1.5 V	0.35 V		2, 10	5		300	nA
			29	"	5.0 V			5.0 V	1.17 V		"	"		"	"
			30	"	12.0 V			12.0 V	2.80 V		"	"		"	"
	V_{SAT}		31	"	1.5 V			1 mA	1.15 V		"	"		0.15	V
			32	"	5.0 V			10 mA	3.83 V		"	"		0.60	"
			33	"	12.0 V			50 mA	9.20 V		"	"		0.80	"
	I_R		34	"	2.0 V		GND				2, 3, 5	4	-50	+50	nA
			35	"	5.0 V		"				"	"	"	"	"
			36	"	12.0 V		"				"	"	"	"	"
			37	"	2.0 V		2.0 V				"	"	"	"	"
			38	"	5.0 V		5.0 V				"	"	"	"	"
			39	"	12.0 V		12.0 V				"	"	"	"	"

See footnotes at end of table.

TABLE III. Group A inspection for device type 05 - Continued.

Subgroup	Symbol	MIL-STD-883 method	Test no.	Adapter PIN numbers 1/ 1	2	3	4	5	6	7	Relays closed	Measured terminal	Test Limits Device 05 Min	Max	Unit
2	Same tests, terminal conditions and limits as subgroup 1, except T_A = +125°C. Test numbers 40 through 78.														
3	Same tests, terminal conditions and limits as subgroup 1, except T_A = -55°C and I_{TR}, I_{TH}, I_{CEX}, I_R tests are omitted. Test numbers 79 through 96.														
9 T_A = +25°C	t_{PLH}		97	GND	1.5 V	See			See		1,3,5,7,10,11	3	50	400	ns
			98	"	5.0 V	fig. 6			fig. 6		"	"	10	120	"
			99	"	12.0 V	"			"		"	"	10	120	"
	t_{PHL}		100	"	1.5 V	See			See		2,3,5,10,11	"	50	600	"
			101	"	5.0 V	fig. 7			fig. 7		"	"	20	200	"
			102	"	12.0 V	"			"		"	"	"	"	"
	t_{TLH}		103	"	1.5 V	See			See		1,3,5,7,10,11	"	"	"	"
			104	"	5.0 V	fig. 6			fig. 6		"	"	5	60	"
			105	"	12.0 V	"			"		"	"	5	60	"
	t_{THL}		106	"	1.5 V	See			See		2,3,5,10,11	"	15	150	"
			107	"	5.0 V	fig. 7			fig. 7		"	"	5	50	"
			108	"	12.0 V	"			"		"	"	5	50	"
	$t_{D(OH)}$		109	"	1.5 V	See			See		1,3,5,7,10,11	"	600	1000	"
			110	"	12.0 V	fig. 6			fig. 6		1,3,5,7,10,11	"	600	1000	"
			111	"	1.5 V	"			"		1,3,6,7,10,11	"	90	140	µs
			112	"	12.0 V	"			"		1,3,6,7,10,11	"	90	140	µs
	$\frac{\Delta t_{D(OH)}}{\Delta V_{DD}}$		113	(Test no. 110 - Test no. 109) / 10.5 V					6/				-20	+20	ns/V
			114	(Test no. 112 - Test no. 111) / 10.5 V									-900	+900	ns/V
	t_{ch}		115	GND	1.5 V	See			See		1,2,3,5,8,10	3	0.6	1.8	µs
			116	"	12.0 V	fig. 8			fig. 8		1,2,3,5,8,10	"	0.6	1.8	"
			117	"	1.5 V	"			"		1,2,3.6,9,10	"	110	170	"
			118	"	12.0 V	"			"		1,2,3,6,9,10	"	110	170	"
	$\frac{\Delta t_{ch}}{\Delta V_{DD}}$		119	(Test no. 116 - Test no. 115) / 10.5 V					8/				-50	+50	ns/V
			120	(Test no. 118 - Test no. 117) / 10.5 V									-1500	+1500	ns/V

See footnotes at end of table.

TABLE III. Group A inspection for device type 05 - Continued.

Subgroup	Symbol	MIL-STD-883 method	Test no.	Adapter PIN numbers 1/ 1	2	3	4	5	6	7	Relays closed	Measured terminal	Test limits Device 05 Min	Max	Unit
9 T_A = +25°C	t_{dis}		121	GND	1.5 V	See			See		1,2,3,5,8,10	3	0.4	1.6	µs
			122	"	5.0 V	fig. 8			fig. 8		"	"	0.3	1.0	"
			123	"	12.0 V	"			"		"	"	0.3	1.0	"
			124	"	1.5 V	"			"		1,2,3,6,9,10	"	50	90	"
			125	"	5.0 V	"			"		"	"	"	"	"
			126	"	12.0 V	"			"		"	"	"	"	"
	t_{res}		127	"	2.0 V	See			See		1,3,6,7,11	"	100	1200	ns
			128	"	12.0 V	fig. 9			fig. 9		1,3,6,7,11	"	100	1200	ns
10	Same tests, terminal conditions, equations, and limits as subgroup 9, except T_A = +125°C and $\Delta t_{D(OH)}/\Delta V_{DD}$ and $\Delta t_{ch}/\Delta V_{DD}$ tests are omitted. Test numbers 129 through 156.														
11	Same tests, terminal conditions, equations, and limits as subgroup 9, except T_A = -55°C.and $\Delta t_{D(OH)}/\Delta V_{DD}$ and $\Delta t_{ch}/\Delta V_{DD}$ tests are omitted. Test numbers 157 through 184.														

1/ Test circuit pin numbers and relays refer to those shown on figure 5. Figure 5 shows 1/2 the test circuit necessary to test device type 02 and 04. Each side must be tested separately.

2/ The voltage at adapter pin 6 is swept downward from a voltage > 2/3 V_{DD}. V_{TR} is measured when the output switches to the "high" state.

3/ The voltage at adapter pin 6 is swept upward from a voltage < 1/3 V_{DD}. V_{TH} is measured when the output switches to the "low" state.

4/ V_{OL} shall be measured after the output has been low for 100 µs (minimum).

5/ Device types 02 and 04 only.

$\Delta t_{D(OH)M}$ = ($t_{D(OH)M}$ side "A") - ($t_{D(OH)M}$ side "B")

6/ (Device types 01, 02, 03, and 04).

$$\frac{\Delta t_{D(OH)}}{\Delta V_{DD}} = \frac{(t_{D(OH)} \text{ at } V_{DD} = 15.0 \text{ V}) - (t_{D(OH)} \text{ at } V_{DD} = 5.0 \text{ V})}{15.0 \text{ V} - 5.0 \text{ V}}$$

(Device type 05)

$$\frac{\Delta t_{D(OH)}}{\Delta V_{DD}} = \frac{(t_{D(OH)} \text{ at } V_{DD} = 12.0 \text{ V}) - (t_{D(OH)} \text{ at } V_{DD} = 1.5 \text{ V})}{12.0 \text{ V} - 1.5 \text{ V}}$$

7/ Device types 02 and 04 only.

$$\frac{\Delta t_{D(OH)M}}{\Delta V_{DD}} = \frac{(t_{D(OH)M} \text{ at } V_{DD} = 15.0 \text{ V}) - (t_{D(OH)M} \text{ at } V_{DD} = 5.0 \text{ V})}{15.0 \text{ V} - 5.0 \text{ V}}$$

8/ (Device types 01, 02, 03, and 04).

$$\frac{\Delta t_{ch}}{\Delta V_{DD}} = \frac{(t_{ch} \text{ at } V_{DD} = 15.0 \text{ V}) - (t_{ch} \text{ at } V_{DD} = 5.0 \text{ V})}{15.0 \text{ V} - 5.0 \text{ V}}$$

(Device type 05)

$$\Delta t_{ch} \quad (t_{ch} \text{ at } V_{DD} = 12.0 \text{ V}) - (t_{ch} \text{ at } V_{DD} = 1.5 \text{ V})$$

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. For class B devices: Subgroup 1 end points shall consist of group A, subgroup 1 tests as specified in table III herein.

b. Steady-state life test (method 1005 of MIL-STD-883) conditions, or equivalent:

(1) Test condition A, using the circuit shown on figure 4; or test condition D, using the circuit shown on figure 3.

(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.

4.4.5 Inspection of packaging. Inspection of packaging shall be in accordance with the requirements of MIL-M-38510.

TABLE IV. Group C end-point electrical parameters, T_A = +25°C.
V_{DD} = +18 V dc for device types 01 through 04, +12 V dc for device type 05.

Table III test number	Device types	Test	Limit		Unit	Delta 1/		Unit
			Min	Max		Min	Max	
6	01, 02	V_{TR}	4.70	6.85	V	-50	+50	mV
6	03, 04	V_{TR}	5.50	6.85	V	-50	+50	mV
6	05	V_{TR}	3.70	4.30	V	-50	+50	mV
15	01, 02, 03, 04	V_{TH}	10.90	13.15	V	-50	+50	mV
15	05	V_{TH}	7.40	8.65	V	-50	+50	mV
33	01, 02	V_{OL}		0.40	V	-50	+50	mV
27	03, 04	V_{OL}		0.50	V	-50	+50	mV
27	05	V_{OL}		0.55	V	-75	+75	mV
36	01, 02	I_{CEX}		2	µA	-50	+50	nA
30	03, 04, 05	I_{CEX}		300	nA	-50	+50	nA

1/ Delta limits apply to the measured value (see MIL-M-38510).

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables. Electrical test circuits as prescribed herein or in the referenced test methods of MIL-STD-883 shall be acceptable. Other test circuits shall require the approval of the qualifying activity.

4.5.1 Voltage and current. All voltage values given are referenced to adapter pin number 1 ground terminal to the device under test (DUT). Current values given are for conventional current and are positive when flowing into the referenced terminal.

4.5.2 Burn-in and life test cooldown procedures. When these tests are completed and prior to removal of bias voltage, the devices under test (DUT) shall be cooled to within 10°C of their power stable condition, and the electrical parameter end-point measurements shall then be performed. Alternatively, the bias may be removed during cooling if the case temperature is reduced to 35°C maximum within 30 minutes after removal of the test conditions, and the electrical parameter end-point measurements shall then be performed.

5. PACKAGING

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

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

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

6.2 Acquisition requirements. The acquisition document must specify the following:

a. Title, number, and date of the specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

c. Complete Part or Identifying Number (see 6.6).

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

e. Requirements for certificate of compliance, if applicable.

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

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

h. Requirements for product assurance options.

i. Requirements for special lead lengths, or lead forming, if applicable. These requirements shall not affect the PIN.

j. Requirements for "JAN" marking.

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

V_{TR}: Trigger voltage. The voltage at which the output latches from the "low" state to the "high" state. This voltage is nominally 1/3 V_{DD}.

I_{TR}: Trigger current. The current flowing out of the trigger terminal while the output is in the "high" state.

V_{TH}: Threshold voltage. The voltage at which the output latches from the "high" state to the "low" state. This voltage is nominally 2/3 V_{DD}.

I_{TH}: Threshold current. The current flowing out of the threshold terminal while the output is in the "low" state.

V_{CL}: Control voltage. The control voltage is the reference voltage for the threshold comparator. It is internally generated by a voltage divider (from V_{DD} to ground) tapped at 2/3 V_{DD}.

I_R: Reset current. The current out of the reset terminal after the reset voltage has been applied and the output is latched low.

V_{ON}: Discharge transistor saturation voltage. When the output is low, the discharge terminal is sinking current. V_{ON} is defined as the source-drain voltage of the discharge transistor when sinking the specified current.

$t_{D(OH)}$: Time delay, output high. In the monostable mode of operation, the interval of time the output remains high once triggered. This delay is given by the following equation: $t_{D(OH)} = 1.1 * R_T * C_T$ (see figure 6).

t_{ch}: Capacitor charge time. In the astable mode of operation, the time interval during which the external timing capacitor (C_T) is charging from 1/3 V_{DD} to 2/3 V_{DD}. This interval is ideally given by the equation: $t_{ch} = 0.693 * (R_{TA} + R_{TB}) * C_T$ (see figure 8).

t_{dis}: Capacitor discharge time. In the astable mode of operation, the time interval during which the external timing capacitor (C_T) is discharged from 2/3 V_{DD} to 1/3 V_{DD}. This interval is ideally given by the equation: $t_{dis} = 0.693\ R_{TB} * C_T$ (see figure 8).

6.4 Logistic support. Lead material 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), lead material and finish C (see 3.3). Longer length leads and lead formimg shall not affect the PIN.

6.5 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification shall functionally replace the 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	TLC555
02	TLC556
03	7555
04	7556
05	LMC555

6.6 Part or Identifying Number (PIN). The PIN shall be in accordance with MIL-M-38510.

CONCLUDING MATERIAL

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

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

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

Preparing activity:
Air Force - 17

Agent:
DLA - ES

(Project 5962-1151)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-M-38510/149	MICROCIRCUITS, LINEAR, PRECISION TIMERS, MONOLITHIC SILICON

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
	☐ USER
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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