Rochester Electronics

Datasheet

PART NUMBER

4013BBCA-ROCV

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All re-creations are done with the approval of the Original Component Manufacturer. (OCM)

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
    - Class Q Military
    - Class V Space Level

Qualified Suppliers List of Distributors (QSLD)

- Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OCM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

INCH-POUND
MIL-M-38510/51F
8 October 2004

SUPERSEDING
MIL-M-38510/51E
30 April 1984

MILITARY SPECIFICATION
MICROCIRCUITS, DIGITAL, CMOS, FLIP-FLOPS AND LATCHES,
MONOLITHIC SILICON

Reactivated after 8 Oct. 2004 and may be used for new and existing designs and acquisitions.

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

The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF 38535

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, CMOS, logic microcircuits. Two product assurance classes and a choice of case outlines, lead finishes, and radiation hardness assurance (RHA) are provided and are reflected in the complete Part or Identifying Number (PIN). For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535 (see 6.3).

1.2 Part or identifying number (PIN). The PIN is in accordance with MIL-PRF-38535 and as specified herein.

1.2.1 Device types. The device types are as follows:

Device type	Circuit
01	Dual D-type edge triggered flip-flop
02	Dual J-K master slave flip-flop
03	Quad three-state R/S latch
51	Dual D-type edge triggered flip-flop
52	Dual J-K master slave flip-flop
53	Quad three-state R/S latch

1.2.2 Device class. The device class is the product assurance level as defined in MIL-PRF-38535.

1.2.3 Case outlines. The case outlines are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
A	GDFP5-F14 or CDFP6-F14	14	Flat pack
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
D	GDFP1-F14 or CDFP2-F14	14	Flat pack
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	Flat pack
N	CDFP4-T16	16	Flat pack
T	CDFP3-F14	14	Flat pack
X 1/ 2/	GDFP5-F14 or CDFP6-F14	14	Flat pack, except A dimension equals 0.1” (2.54 mm) max
Y 1/ 2/	GDFP1-F14 or CDFP2-F14	14	Flat pack, except A dimension equals 0.1” (2.54 mm) max
Z 1/ 2/	GDFP2-F16 or CDFP3-F16	16	Flat pack, except A dimension equals 0.1” (2.54 mm) max

1/ As an exception to MIL-PRF-38535, appendix A, for case outlines X, Y, and Z only, the leads of bottom brazed ceramic packages (i.e., configuration 2 of case outlines A, D, or F) may have electroless nickel undercoating which is 50 to 200 microinches (1.27 to 5.08 μm) thick provided the lead finish is hot solder dip (i.e., finish letter A) and provided that, after any lead forming, an additional hot solder dip coating is applied which extends from the outer tip of the lead to no more than 0.015 inch (0.38 mm) from the package edge.

2/ For bottom or side brazed packages, case outlines X, Y, and Z only, the S_1 dimension may go to .000 inch (.00 mm) minimum.

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990, or email CMOS@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil.

1.3 Absolute maximum ratings.

Supply voltage range (V_{DD} - V_{SS}):	
Device types 01, 02, 03	-0.5 V dc to +15.5 V dc
Device types 51, 52, 53	-0.5 V dc to +18.0 V dc
Input current (each input)	±10 mA
Input voltage range	(V_{SS} - 0.5 V) ≤ V_I ≤ (V_{DD} + 0.5 V)
Storage temperature range (T_{STG})	-65° to +175°C
Maximum power dissipation (P_D)	200 mW
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction to case (θ_{JC})	See MIL-STD-1835
Junction temperature (T_J)	175°C

1.4 Recommended operating conditions.

Device types 01, 02, 03:	
Supply voltage range (V_{DD} - V_{SS})	4.5 V dc to 12.5 V dc
Input low voltage range (V_{IL})	0.0 V to 0.85 V dc @ V_{DD} = 5.0 V dc
	0.0 V to 2.0 V dc @ V_{DD} = 10.0 V dc
	0.0 V to 2.1 V dc @ V_{DD} = 12.5 V dc
Input high voltage range (V_{IH})	3.95 V to 5.0 V dc @ V_{DD} = 5.0 V dc
	8.0 V to 10.0 V dc @ V_{DD} = 10.0 V dc
	10 V to 12.5 V dc @ V_{DD} = 12.5 V dc
Device types 51, 52, 53:	
Supply voltage range (V_{DD} - V_{SS})	4.5 V dc to 15.0 V dc
Input low voltage range (V_{IL})	V_{OL} = 10% V_{DD}, V_{OH} = 90% V_{DD}
	0.0 V to 1.5 V dc @ V_{DD} = 5.0 V dc
	0.0 V to 2.0 V dc @ V_{DD} = 10.0 V dc
	0.0 V to 4.0 V dc @ V_{DD} = 15.0 V dc
Input high voltage range (V_{IH})	V_{OL} = 10% V_{DD}, V_{OH} = 90% V_{DD}
	3.5 V to 5.0 V dc @ V_{DD} = 5.0 V dc
	8.0 V to 10.0 V dc @ V_{DD} = 10.0 V dc
	11.0 V to 15.0 V dc @ V_{DD} = 15.0 V dc
Load capacitance	50 pF maximum
Ambient operating temperature range (T_A)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and Standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or www.dodssp.daps.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, 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 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.4).

3.2 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535 and as specified herein or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein. Although eutectic die bonding is preferred, epoxy die bonding may be performed. However, the resin used shall be Dupont 5504 Conductive Silver Paste, or equivalent, which is cured at 200°C ±10°C for a minimum of 2 hours. The use of equivalent epoxies or cure cycles shall be approved by the qualifying activity. Equivalency shall be demonstrated in data submitted to the qualifying activity for verification.

3.3.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.3.2 Logic diagram. The logic diagram shall be as specified on figure 2.

3.3.3 Truth tables. The truth tables shall be as specified on figure 3.

3.3.4 Switching waveforms and test circuits. The switching waveforms and test circuits shall be as specified on figures 4 through 16.

3.3.5 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity or preparing activity upon request.

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

3.4 Lead material and finish. The lead material and finish shall be in accordance with MIL-PRF-38535 (see 6.6).

3.5 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I, and apply over the full recommended ambient operating temperature range.

3.6 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.

3.7 Marking. Marking shall be in accordance with MIL-PRF-38535.

3.7.1 Radiation hardness assurance identifier. The radiation hardness assurance identifier shall be in accordance with MIL-PRF-38535 and 4.5.4 herein.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 38 (see MIL-PRF-38535, appendix A).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ V_{SS} = 0 V -55°C ≤ T_A ≤ +125°C Unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Positive clamping input to V_{DD}	$V_{IC\ (POS)}$	T_A = +25°C, V_{DD} = GND V_{SS} = Open, Output = Open I_{IN} = 1 mA	All		1.5	V dc
Negative clamping input to V_{SS}	$V_{IC\ (NEG)}$	T_A = +25°C, V_{DD} = Open V_{SS} = GND, Output = Open I_{IN} = -1 mA	All		-6.0	V dc
Quiescent supply current	I_{SS}	Any combination of inputs; V_{DD} = 15 V dc	01, 02, 03		-2.5	µA
		Any combination of inputs; V_{DD} = 18 V dc	51, 52, 53		-2.5	
High level output voltage (SET-RESET input)	V_{OH1}	V_{DD} = 5 V dc, I_{OH} = -175 µA (see table III)	01, 02, 03	4.5		V dc
	V_{OH2}	V_{DD} = 5 V dc, I_{OH} = 0.0 A (see table III)	01, 02, 03	4.95		
	V_{OH3}	V_{DD} = 12.5 V dc, I_{OH} = 0.0 A (see table III)	01, 02, 03	11.25		
High level output voltage (DATA input)	V_{OH4}	V_{DD} = 5 V dc, I_{OH} = 0.0 A Any one input = V_{IL}, (see table III)	01, 02	4.95		V dc
	V_{OH5}	V_{DD} = 15 V dc, I_{OH} = 0.0 A (see table III)	51, 52, 53	14.95		
	V_{OH6}	V_{DD} = 15 V dc, I_{OH} = 0.0 A (see table III)	51, 52	14.95		
Low level output voltage (SET-RESET input)	V_{OL1}	V_{DD} = 5 V dc, I_{OL} = 0.33 mA (see table III)	01, 02, 03		0.50	V dc
	V_{OL2}	V_{DD} = 5 V dc, I_{OL} = 0.0 A (See table III)	01, 02, 03		0.05	
	V_{OL3}	V_{DD} = 12.5 V dc, I_{OL} = 0.0 A (See table III)	01, 02, 03		1.25	
Low level output voltage (DATA input)	V_{OL4}	V_{DD} = 5 V dc, I_{OL} = 0.0 A (See table III)	01, 02		0.05	
	V_{OL5}	V_{DD} = 15 V dc, I_{OL} = 0.0 A (See table III)	51, 52, 53		0.05	
	V_{OL6}	V_{DD} = 15 V dc, I_{OL} = 0.0 A (See table III)	51, 52		0.05	
Input high voltage	V_{IH1}	V_{DD} = 5 V dc V_O = 4.5 V $\lvert I_O \rvert \leq 1\mu A$	51, 52, 53	3.5		V dc
	V_{IH2}	V_{DD} = 10 V dc V_O = 9.0 V $\lvert I_O \rvert \leq 1\mu A$	51, 52, 53	7.0		V dc
	V_{IH3}	V_{DD} = 15 V dc V_O = 13.5 V $\lvert I_O \rvert \leq 1\mu A$	51, 52, 53	11.0		V dc

See footnotes at end of the table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ V_{SS} = 0 V -55°C ≤ T_A ≤ +125°C Unless otherwise specified		Device type	Limits		Unit
					Min	Max	
Input low voltage	V_{IL1}	V_{DD} = 5 V dc V_O = 0.5 V dc $\lvert I_O \rvert \leq 1\mu A$		51, 52, 53		1.5	V dc
	V_{IL2}	V_{DD} = 10 V dc V_O = 1.0 V dc $\lvert I_O \rvert \leq 1\mu A$		51, 52, 53		3.0	V dc
	V_{IL3}	V_{DD} = 15 V dc V_O = 1.5 V dc $\lvert I_O \rvert \leq 1\mu A$		51, 52, 53		4.0	V dc
Output low (sink) current	I_{OL1}	V_{DD} = 5 V dc V_{OL} = 0.4 V dc		51, 52, 53	0.36		mA
	I_{OL2}	V_{DD} = 15 V dc V_{OL} = 1.5 V dc		51, 52, 53	2.4		mA
Output high (source) current	I_{OH1}	V_{DD} = 5 V dc V_{OH} = 4.6 V dc		51, 52, 53	-0.36		mA
	I_{OH2}	V_{DD} = 15 V dc V_{OH} = 13.5 V dc		51, 52, 53	-2.4		mA
Input leakage current, high	I_{IH} 2/	Measure inputs sequentially	V_{DD} = 15 V dc	01, 02		100	nA
				03		45	
			V_{DD} = 18 V dc	51, 52		100	
				53		45	
Input leakage current, low	I_{IL} 2/	Measure inputs sequentially	V_{DD} = 15 V dc	01, 02		-100	nA
				03		-45	
			V_{DD} = 18 V dc	51, 52		-100	
				53		-45	
Input capacitance	C_i	V_{DD} = 0 V dc, f = 1 MHz, T_A = 25°C		All		12	pF
Propagation delay times, high level to low level	t_{PHL}	V_{DD} = 5 V dc, C_L = 50 pF		01	13	750	ns
				02	13	865	
				03	10	370	
				52	13	865	
				51	13	750	
				53	10	370	
Propagation delay times, low level to high level	t_{PLH}			01	13	825	ns
				02	13	940	
				03	10	245	
				52	13	940	
				51	13	825	
				53	10	245	

See footnotes at end of table.

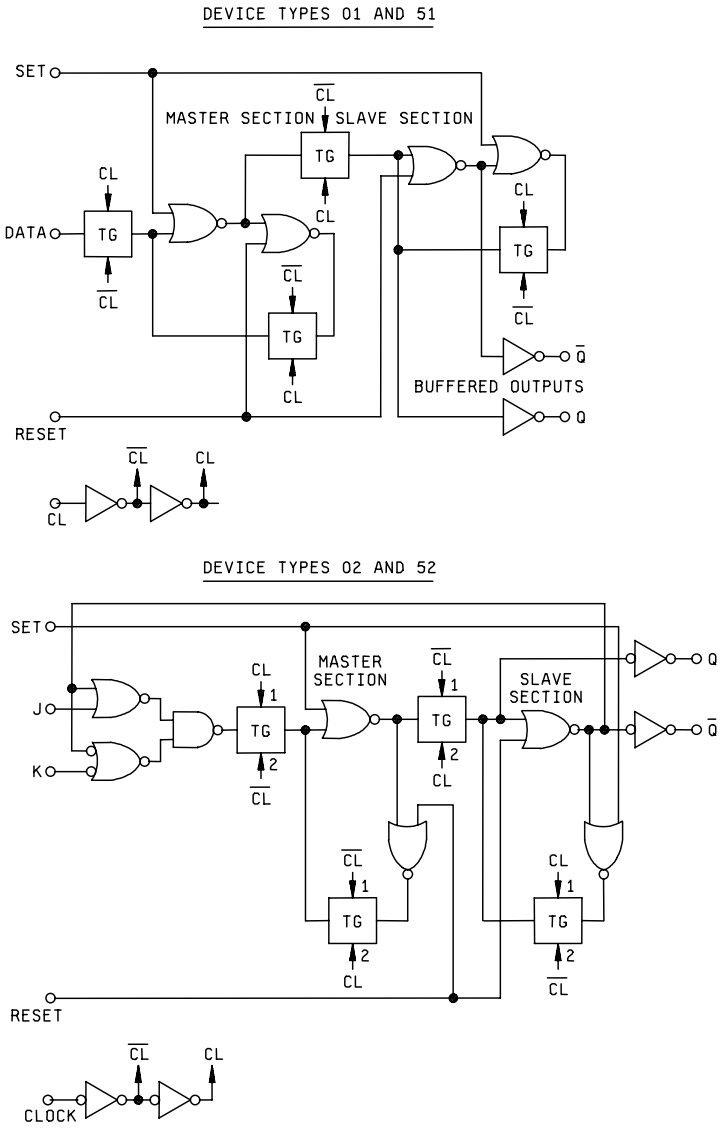
TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ V_{SS} = 0 V -55°C ≤ T_A ≤ +125°C Unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Propagation delay high to low level (Set or reset)	t_{PHL} (R) or (S)	V_{DD} = 5.0 V dc, C_L = 50 pF	01	13	825	ns
			02	13	900	
			03	10	370	
			51	13	825	
			52	13	900	
			53	10	370	
Propagation delay low to high level (Set or reset)	t_{PLH} (R) or (S)	V_{DD} = 5.0 V dc, C_L = 50 pF	01	13	630	ns
			02	13	600	
			03	10	245	
			51	13	630	
			52	13	600	
			53	10	245	
Transition time high to low levels	t_{THL}	V_{DD} = 5.0 V dc, C_L = 50 pF	01	10	450	ns
			02	10	490	
			03	10	245	
			51	10	450	
			52	10	490	
			53	10	245	
Transition time low to high levels	t_{TLH}	V_{DD} = 5.0 V dc, C_L = 50 pF	01	10	525	ns
			02	10	490	
			03	10	360	
			51	10	525	
			52	10	490	
			53	10	360	
Maximum clock frequency	$f_{CL(max)}$	V_{DD} = 5.0 V dc, C_L = 50 pF	01		1	MHz
			02		700	KHz
			51		1	MHz
			52		700	KHz
Maximum clock transition times	t_{TLHCL}	V_{DD} = 5.0 V dc C_L = 50 pF	01		10	µs
			02			
			51			
			52			
Minimum clock pulse width	t_p	V_{DD} = 5.0 V dc C_L = 50 pF	01	300		ns
			02			
			51			
			52			
Set-up times	t_{SHL}, t_{SLH}	V_{DD} = 5.0 V dc C_L = 50 pF	01	225		ns
			02			
			51			
			52			
Hold times	t_{HLH}, t_{HHL}	V_{DD} = 5.0 V dc C_L = 50 pF	01	225		ns
			02			
			51			
			52			
Output enable time	t_{PZH}, t_{PZL}	V_{DD} = 5.0 V dc C_L = 50 pF	03		340	ns
			53		240	
Output disable time	t_{PHZ}, t_{PLZ}	V_{DD} = 5.0 V dc C_L = 50 pF	03		340	ns
			53		240	

1/ Complete terminal conditions shall be a specified in table III.
2/ Input current at one input node.

Device types	01, 51	02, 52	03, 53
Case outlines	A, C, D, T, X, Y	E, F, N, Z	E, F, N, Z
Terminal number	Terminal symbol	Terminal symbol	Terminal symbol
1	Q1	$\overline{Q2}$	Q4
2	$\overline{Q1}$	$\overline{Q2}$	Q1
3	CL1	CL2	R1
4	R1	R2	S1
5	D1	K2	EN
6	S1	J2	S2
7	V_{SS}	S2	R2
8	S2	V_{SS}	V_{SS}
9	D2	S1	Q2
10	R2	J1	Q3
11	$\overline{CL2}$	K1	R3
12	$\overline{Q2}$	R1	S3
13	Q2	$\overline{CL1}$	NC
14	V_{DD}	$\overline{Q1}$	S4
15	- - -	Q1	R4
16	- - -	V_{DD}	V_{DD}

FIGURE 1. Terminal connections.



NOTE: One of two identical flip flops shown.

FIGURE 2. Logic diagram.

DEVICE TYPES 03 AND 53

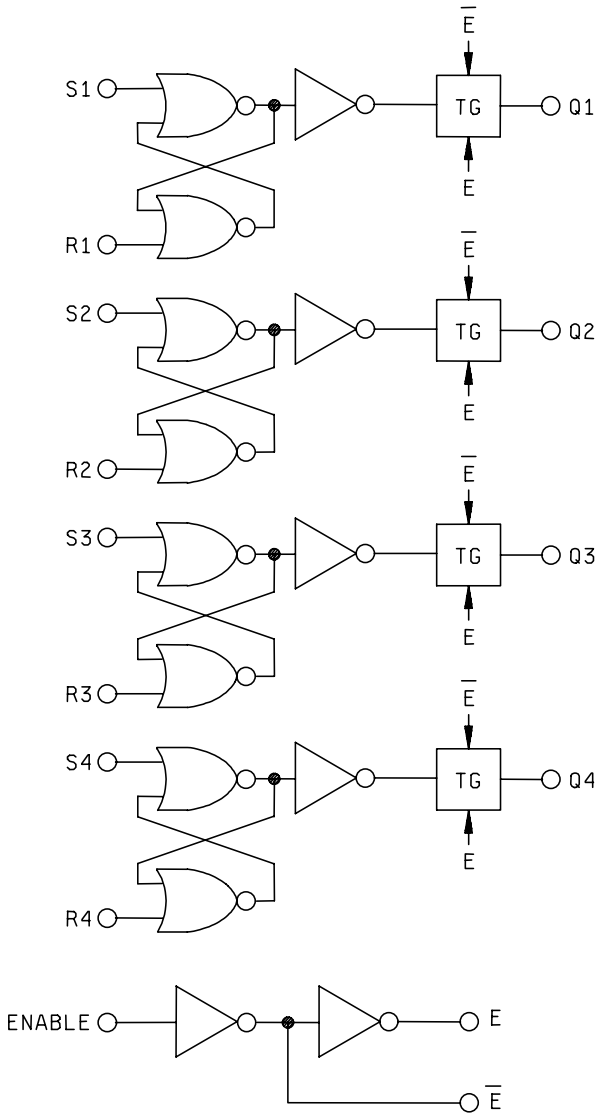


FIGURE 2. Logic diagram – Continued.

Device types 01 and 51

Inputs				Outputs		
CL	D	R	S	Q	$\overline{Q}$	
↑	L	L	L	L	H	
↑	H	L	L	H	L	
↓	X	L	L	Q	$\overline{Q}$	No Change
X	X	H	L	L	H	
X	X	L	H	H	L	
X	X	H	H	H	H	

H = High level voltage
L = Low level voltage
X = Irrelevant
↑ = Low to high transition of the clock
↓ = High to low transition of the clock

Device types 02 and 52

*tn Inputs						** tn+1 Outputs		
CL	J	K	S	R	Q	Q	$\overline{Q}$	
↑	H	X	L	L	L	H	L	
↑	X	L	L	L	H	H	L	
↑	L	X	L	L	L	L	H	
↑	X	H	L	L	H	L	H	
↓	X	X	L	L	X	Q	$\overline{Q}$	No Change
X	X	X	H	L	X	H	L	
X	X	X	L	H	X	L	H	
X	X	X	H	H	X	H	H	

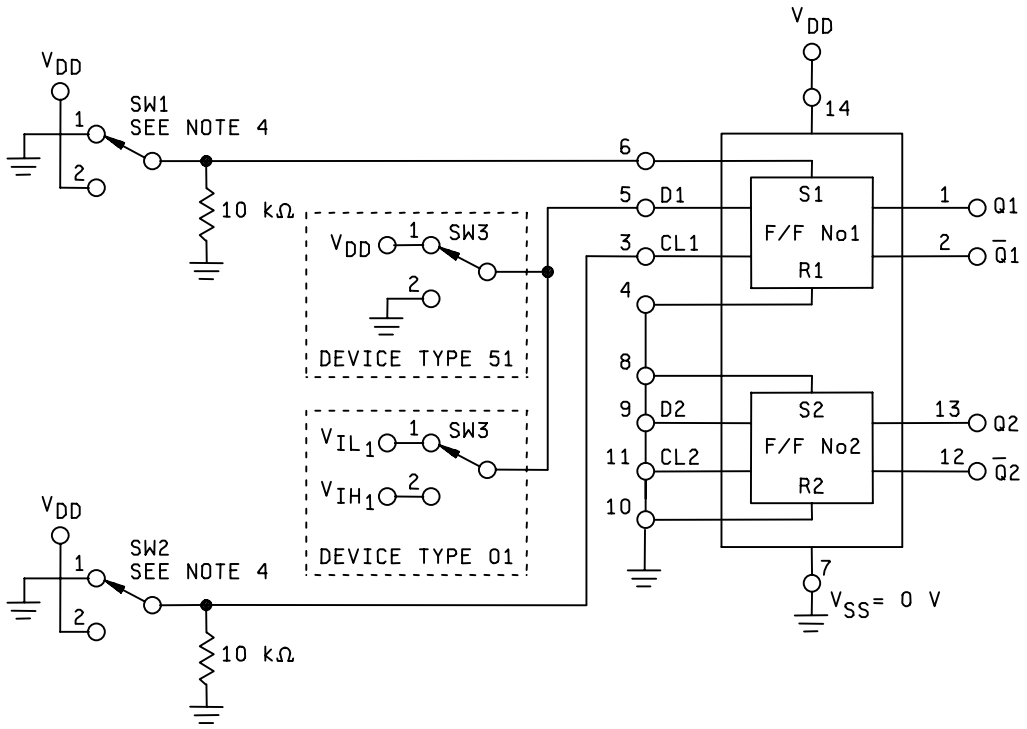
H = High level voltage
L = Low level voltage
X = Irrelevant
↑ = Low to high transition of the clock
↓ = High to low transition of the clock
* = tn refers to the time interval before the positive clock pulse transition.
** = tn+1 refers to the interval after the positive clock pulse transition.

Device types 03 and 53

Inputs			Output
S	R	E	Q
X	X	L	Open circuit high impedance
L	L	H	No change
H	L	H	H
L	H	H	L
H	H	H	Δ High

H = High level voltage
L = Low level voltage
X = Don't care
Δ = Dominated by S = 1 input (high)

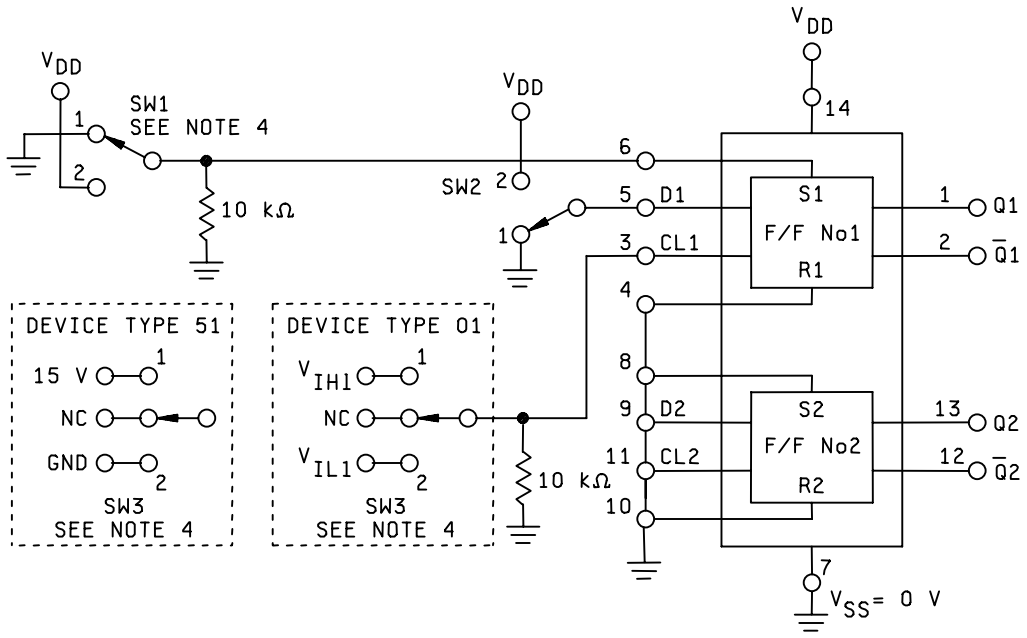
FIGURE 3. Truth tables.



NOTES:

1. To implement test numbers 63, 64, 65, and 66 (device type 01), and 47, 48, 49, and 50 (device type 51), place SW3 in the V_{IL1} position. Set the flip-flop by momentarily placing SW1 in position 2. Following the return of SW1 to position 1, momentarily place SW2 in position 2. Measure the output levels at Q and $\overline{Q}$ to insure compliance with table III limits.
2. To implement test numbers 67, 68, 69, and 70 (device type 01), and 51, 52, 53, and 54 (device type 51), set the flip-flop as described in note 1. Place SW3 in the V_{IH1} position. Momentarily place SW2 in position 2. Following the return of SW2 to position 1, measure the output level at Q and $\overline{Q}$ to insure compliance with table III limits.
3. Identical measurements are obtained from either flip-flop number 1 or flip-flop number 2.
4. SW1 and SW2 are momentary contact switches.

FIGURE 4. Data input high and low test circuit for device types 01 and 51.



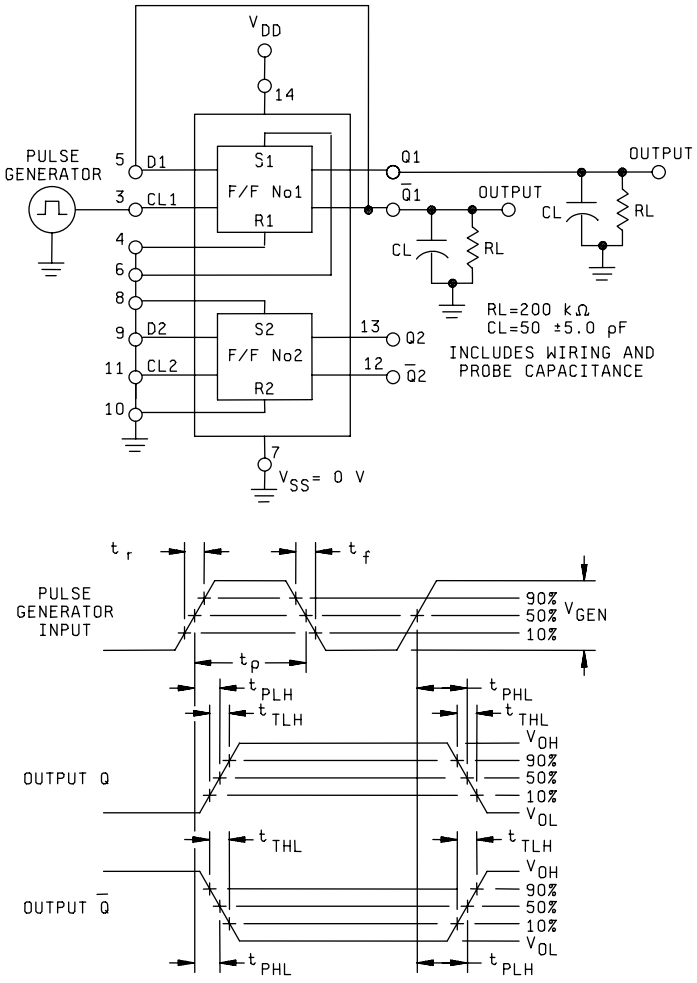
NOTES:

1. Test numbers 71 thru 74 (device type 01) and 55 thru 58 (device type 51) implemented by the following step by step sequence:

		SW1 POS	SW2 POS	SW3 POS	Q OUT	$\overline{Q}$ OUT	
STEP	1	2*	1	-	“1”	“0”	
	2	1	1	1*	“0”	“1”	* Denotes momentary contact
	3	1	2	1*	“1”	“0”	
	4	1	1	1*	“0”	“1”	
	5	1	2	2*	“0”	“1”	
	6	1	2	2*	“0”	“1”	
	7	1	2	1*	“1”	“0”	
STEP	8	1	1	1*	“0”	“1”	

   Monitor either Q or $\overline{Q}$ of the flip-flop under test. Compliance with table III limits is established by a change of logic levels at the Q or $\overline{Q}$ output in going from step 1 to step 2, step 2 to step 3, step 3 to step 4, step 6 to step 7, and step 7 to step 8, while no change shall occur in going from step 4 to step 5 or step 5 to step 6.
2. Identical measurements are obtained from flip-flop number 1 and flip-flop number 2.
3. V_{OH} = 1 and V_{OL} = 0.
4. SW1 and SW3 are momentary contact switches.

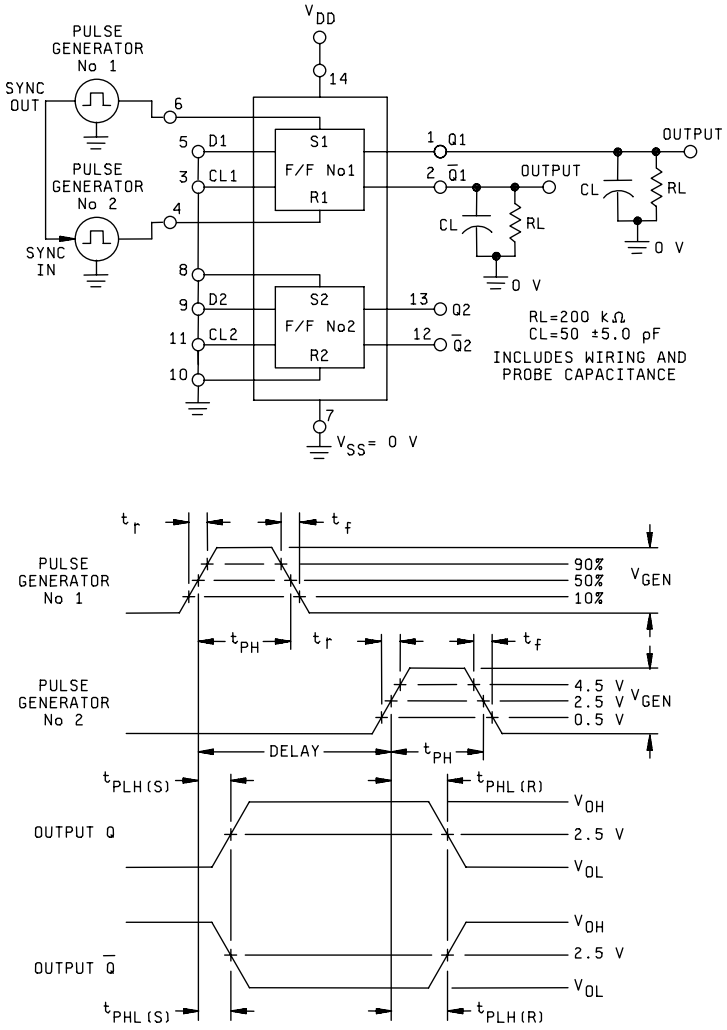
FIGURE 5. Clock input high and low test circuit for device types 01 and 51.



NOTES:

1. The pulse generator has the following characteristics: $V_{gen} = V_{DD} \pm 1\%$, duty cycle = 50% t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = 5.0 ± 0.5 µs.
2. Identical switching measurements are obtained from flip-flop number 1 and flip-flop number 2.
3. For f_{CL} and t_p, the pulse repetition period is variable.
4. Requirements for max clock frequency (f_{CL}), max clock rise time and minimum clock pulse width are established by setting the parameter to the limits given in table III and observing proper output state changes.

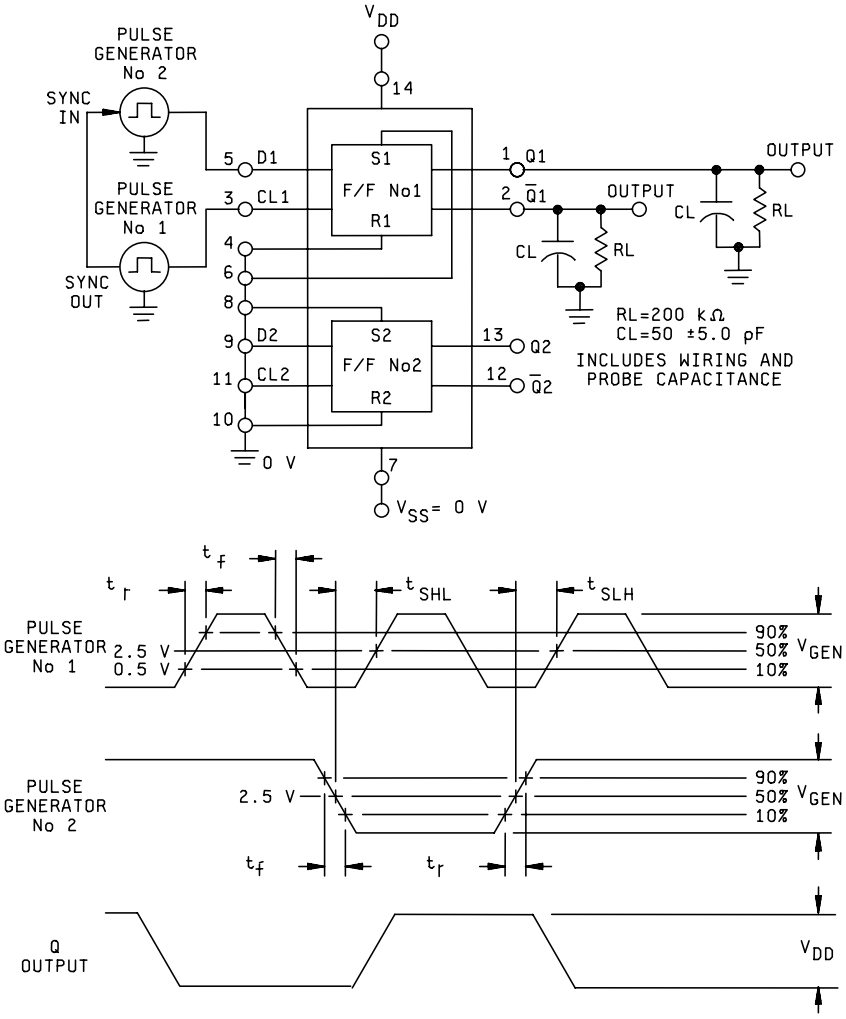
FIGURE 6. Switching time test circuit and waveforms for device types 01 and 51.



NOTES:

1. The pulse generators have the following characteristics: $V_{gen} = V_{DD} \pm 1\%$, $t_{PH} = 1.0 \pm 0.1\mu s$, t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = 5.0 ± 0.5 μs.
2. The reset pulse delay is 2.5 ± 0.25 μs.
3. Identical switching measurements are obtained from flip-flop number 1 and flip-flop number 2.

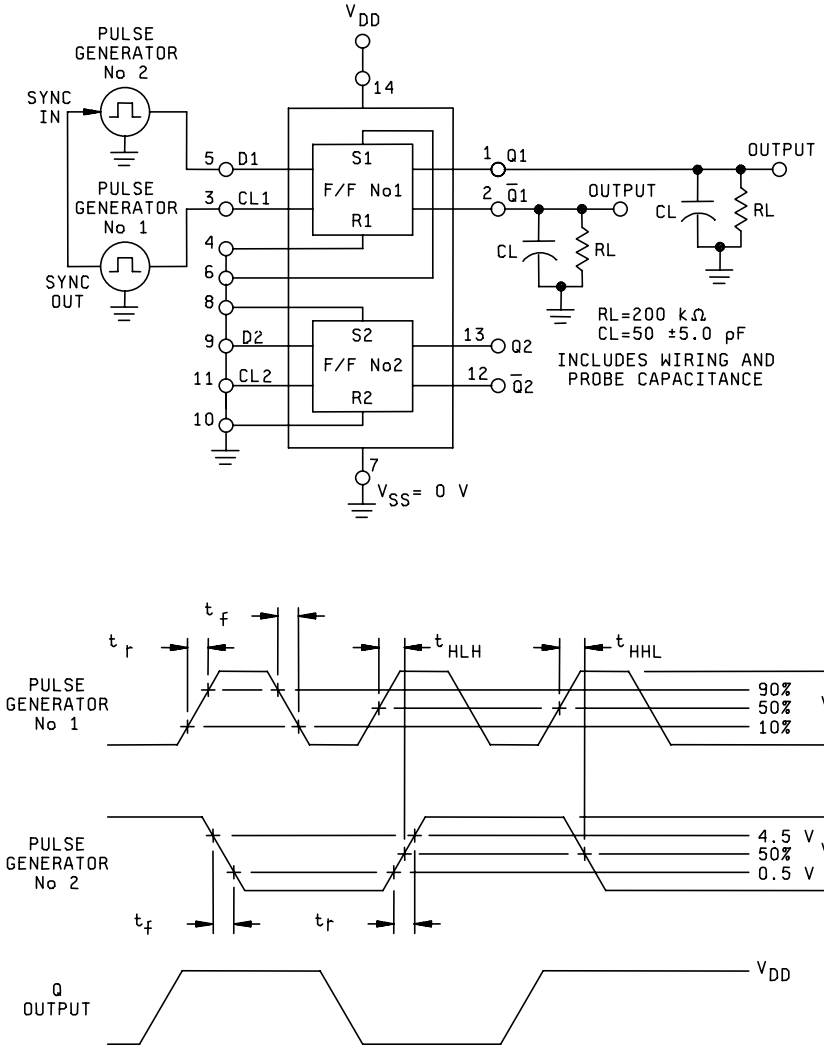
FIGURE 7. Set-reset switching test circuit and waveforms for device types 01 and 51.



NOTES:

1. Pulse generator number 1 has the following characteristics: $V_{gen} = V_{DD} \pm 1\%$, duty cycle = 50%, t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = 5.0 ± 0.5 µs.
2. Pulse generator number 2 has the following characteristics: $V_{gen} = V_{DD} \pm 1\%$, duty cycle = variable, t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = twice that of pulse generator number 1.
3. Identical switching measurements are obtained from flip-flop number 1 and flip-flop number 2.
4. Requirements for setup times are considered met if proper output state changes occur with t_{SETUP} set to that given in the limits column of table III.

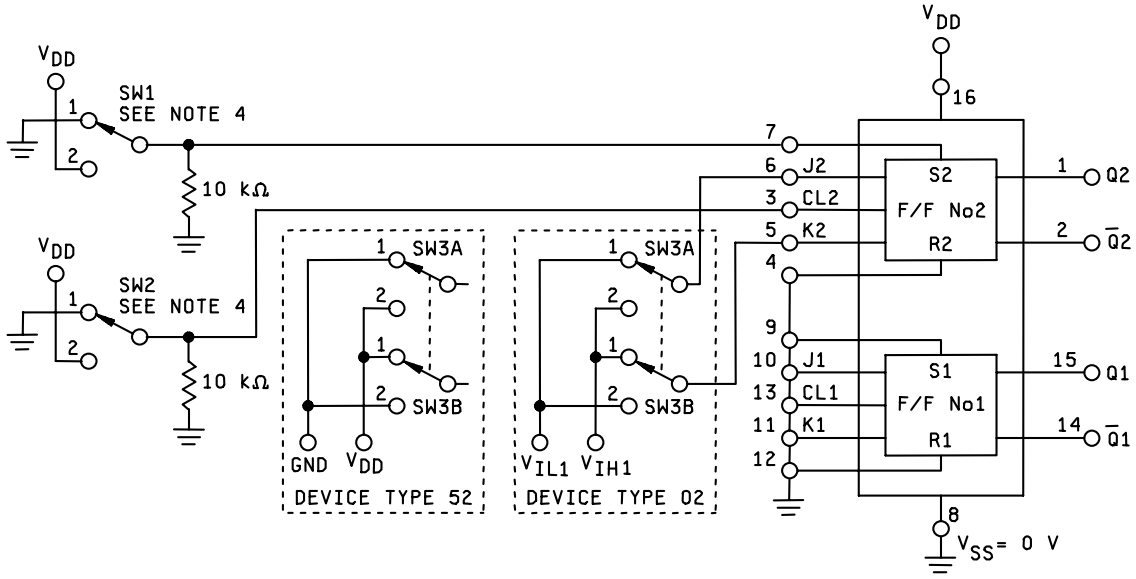
FIGURE 8. Setup time test circuit and waveforms for device types 01 and 51.



NOTES:

1. Pulse generator number 1 has the following characteristics: $V_{gen} = V_{DD} \pm 1\%$, duty cycle = 50%, t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = 5.0 ± 0.5 µs.
2. Pulse generator number 2 has the following characteristics: $V_{gen} = V_{DD} \pm 1\%$, duty cycle = variable, t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = twice that of pulse generator number 1.
3. Identical switching measurements are obtained from either flip-flop number 1 or flip-flop number 2.
4. Requirements for hold times are considered met if proper output state changes occur with t_{HOLD} set to that given in the limits column of table III.

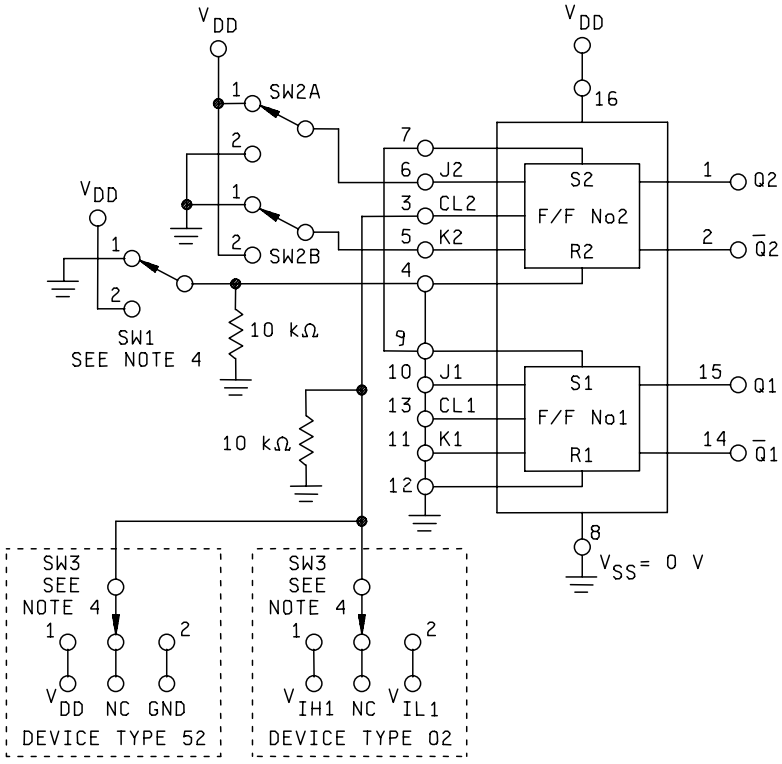
FIGURE 9. Hold time test circuit and waveforms for device types 01 and 51.



NOTES:

1. To implement test numbers 59 thru 62 (device type 02) and 43 thru 46(device type 52), place SW3 in position 1. Set the flip-flop by momentarily placing SW1 in position 2. Following the return of SW1 to position 1, momentarily place SW2 in position 2. Measure the output levels at Q and $\overline{Q}$ to insure compliance with table III limits.
2. To implement test numbers 63 thru 66 (device type 02) and 47 thru 50 (device type 52), set the flip-flop as described in note 1. Place SW3 in position 2. Momentarily place SW2 in position 2. Following the return of SW2 to position 1, measure the output levels at Q and $\overline{Q}$ to insure compliance with table III limits.
3. Identical measurements are obtained from either flip-flop number 1 or flip-flop number 2.
4. SW1 and SW2 are momentary contact switches.

FIGURE 10. J and K input voltage high and low test circuit for device types 02 and 52.



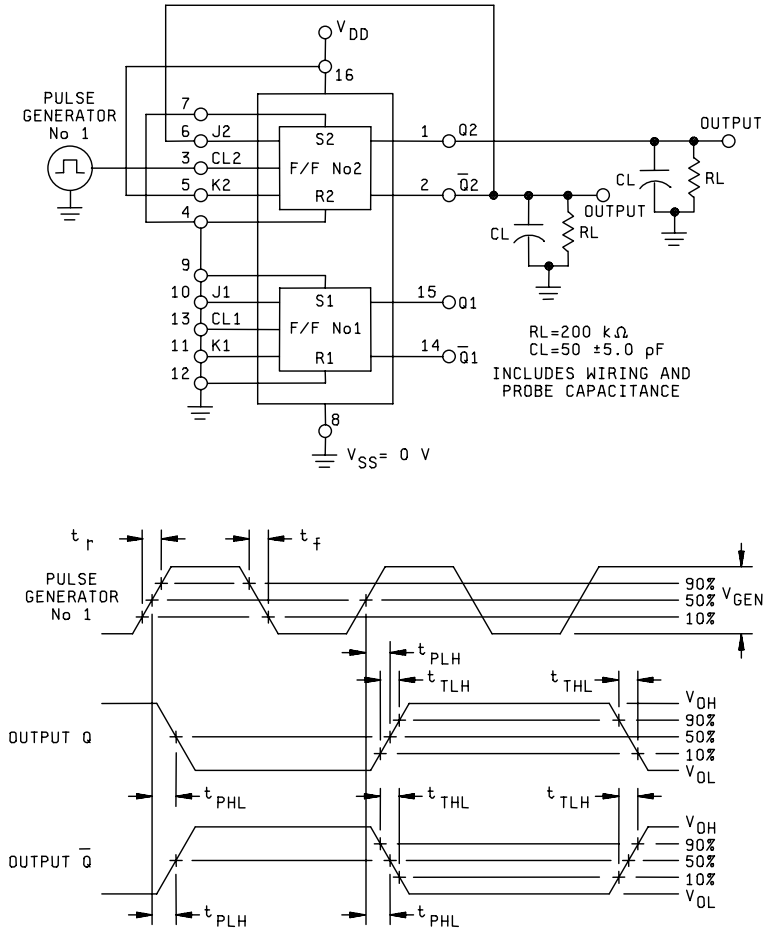
NOTES:`

1. Test numbers 67 thru 70 (device type 02) and 51 thru 54 (device type 52) are implemented by the following step by step sequence:

		SW1 POS	SW2 POS	SW3 POS	Q OUT	$\overline{Q}$ OUT
STEP	1	2	1	-	“0”	“1”
	2	1	1	1	“1”	“0”
	3	1	2	1	“0”	“1”
	4	1	1	2	“0”	“1”
	5	1	2	2	“0”	“1”
	6	1	1	1	“1”	“0”
STEP	7	1	2	1	“0”	“1”

   Monitor either Q or $\overline{Q}$ of the flip-flop under test. Compliance with table III limits is established by a change of logic levels at the Q or $\overline{Q}$ output in going from step 1 to step 2, step 2 to step 3, step 5 to step 6, and step 6 to step 7, while no change shall occur in going from step 3 to step 4 or step 4 to step 5.
2. Identical measurements are obtained from either flip-flop number 1 or flip-flop number 2.
3. V_{OH} = “1” and V_{OL} = “0”.
4. SW1 and SW3 are momentary contact switches.

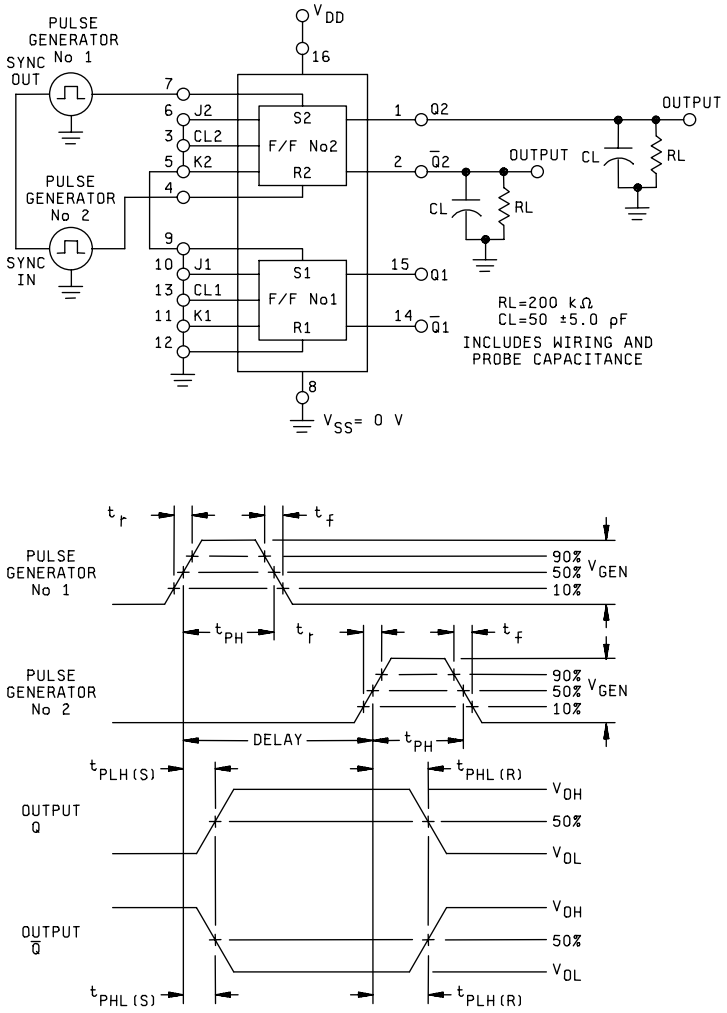
FIGURE 11. Clock input high and low test circuit for device types 02 and 52.



NOTES:

1. The pulse generator has the following characteristics: $V_{gen} = V_{DD} \pm 1.0\%$, duty cycle = 50%, t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = 5.0 ± 0.5 µs.
2. Identical switching measurements are obtained from flip-flop number 1 and flip-flop number 2.
3. For K input test, connect terminal 6 to terminal 16 and terminal 5 to terminal 1. Similar connection are required for measurements on flip-flop number 2.
4. For f_{CL} and t_p, the pulse repetition period is variable.
5. Requirements for max clock frequency (f_{CL}), max clock rise time and minimum clock pulse width are established by setting the parameter to the limit given in table III and observing proper output state changes.

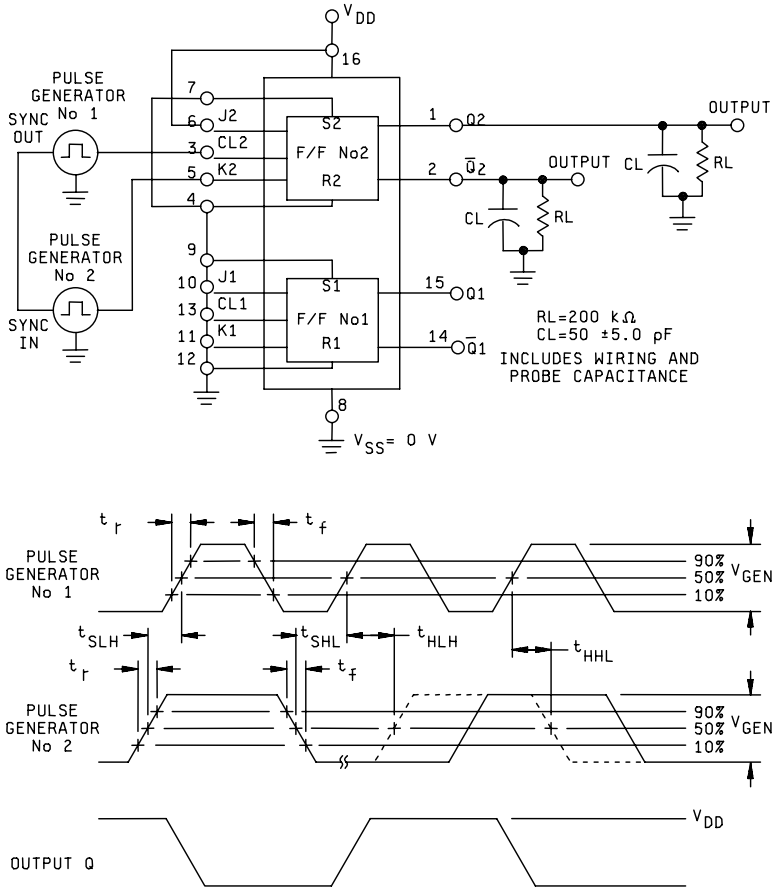
FIGURE 12. Switching time test circuit and waveforms for device types 02 and 52.



NOTES:

1. The pulse generators have the following characteristics: $V_{GEN} = V_{DD} \pm 1.0$ %, $t_{PH} = 1.0 \pm 0.1$ µs, t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = 5.0 ± 0.5 µs.
2. The reset pulse delay is 2.5 ± 0.25 µs.
3. Identical switching measurements are obtained from flip-flop number 1 and flip-flop number 2.

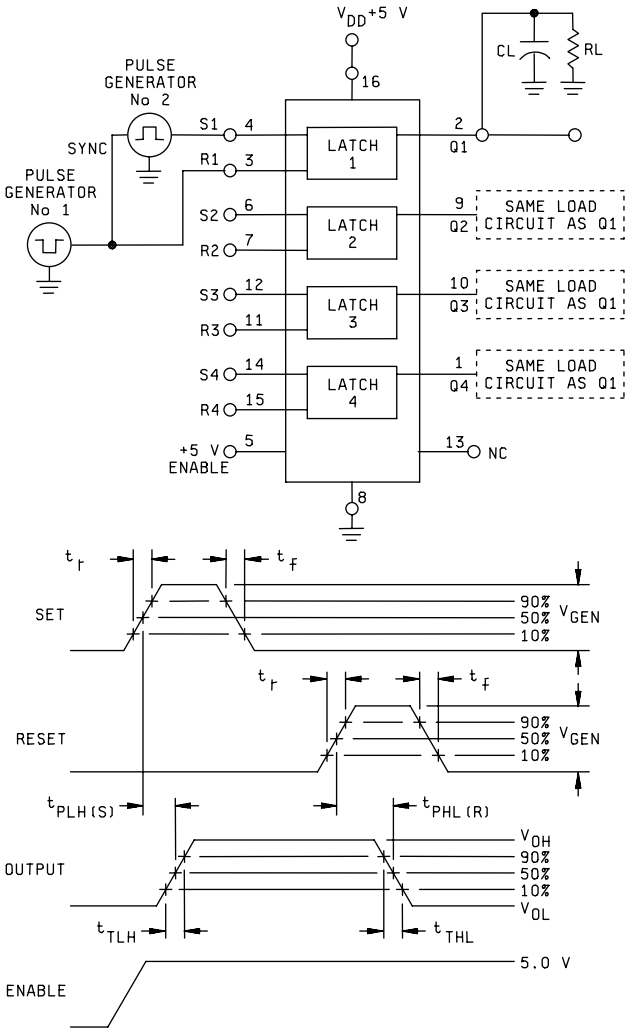
FIGURE 13. Set-reset switching test circuit and waveforms for device types 02 and 52.



NOTES:

1. Pulse generator number 1 has the following characteristics: $V_{gen} = V_{DD} \pm 1\%$, duty cycle = 50%, t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = 5.0 ± 0.5 µs.
2. Pulse generator number 2 has the following characteristics: $V_{gen} = V_{DD} \pm 1\%$, duty cycle = variable, t_r and $t_f = 20 \pm 2.0$ ns and pulse repetition period = 5.0 ± 0.5 µs.
3. Identical switching measurements are obtained from flip-flop number 1 and flip-flop number 2.
4. For J input test, connect terminal 5 to terminal 16 and terminal 6 to pulse generator number 2. Similar terminal connections are required for measurement on flip-flop number 2.
5. Requirements for setup times and hold times are established by setting the parameter to the limit given in table III and observing proper output state changes.

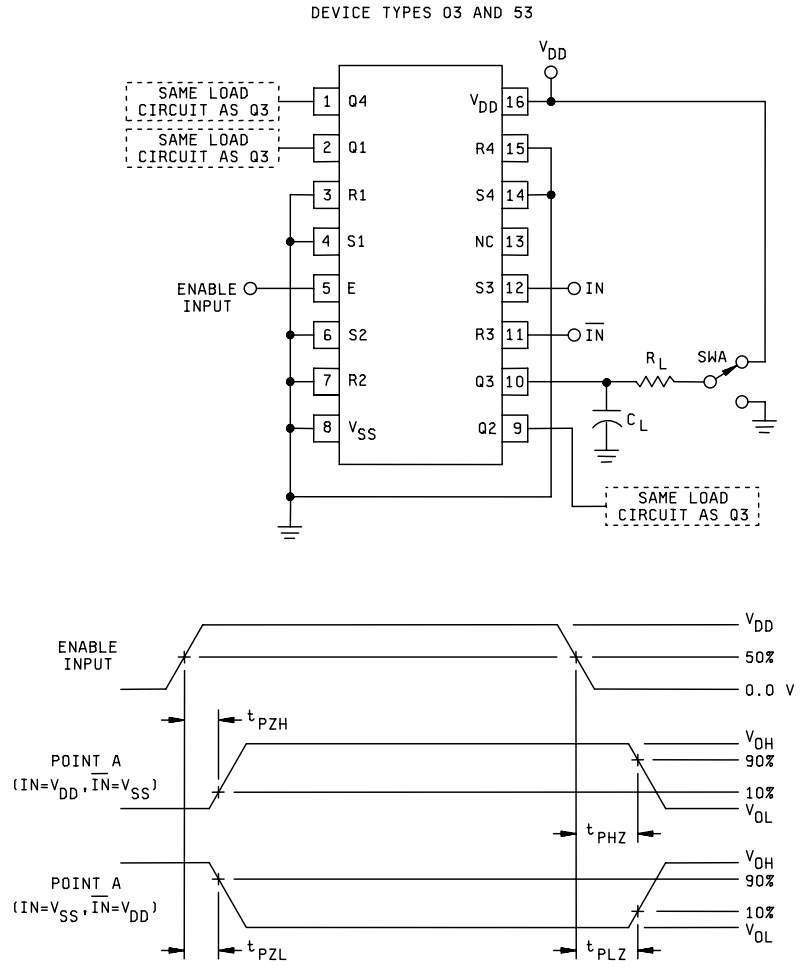
FIGURE 14. Setup and hold time test circuit and waveforms for device types 02 and 52.



NOTES:

1. Pulse generator number 1 characteristics: t_r and $t_f \leq 20$ ns, $t_P = 1.0$ µs, $V_{GEN} = 0$ to 5 V, PRR = 200 kHz.
2. Pulse generator number 2 characteristics: t_r and $t_f \leq 20$ ns, $t_P = 1.0$ µs, delayed 2.0 µs after pulse number 1, $V_{GEN} = 0$ to 5 V, PRR = 200 kHz.
3. Load conditions: $C_L = 50$ pF, $R_L = 200$ kΩ (includes probe and jig impedances).
4. Identical switching measurements are obtained from latch 2, latch 3, and latch 4.

FIGURE 15. Switching time test circuit and waveforms for device types 03 and 53.



TEST	IN	$\overline{IN}$	SWA
t_{PHZ}	V_{DD}	V_{SS}	V_{SS}
t_{PLZ}	V_{SS}	V_{DD}	V_{DD}
t_{PZH}	V_{DD}	V_{SS}	V_{SS}
t_{PZL}	V_{SS}	V_{DD}	V_{DD}

NOTES:
1. Identical switching measurements are obtained from latch 1, latch 2, latch 3, and latch 4.
2. Load conditions: C_L = 50 pF and R_L = 1 kΩ (includes probe and jig impedances).

FIGURE 16. Enable propagation delay time test circuit and waveforms for device types 03 and 53.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38535 and shall be conducted on all devices prior to qualification and conformance inspection. The following additional criteria shall apply:

a. The burn-in test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

b. Delete the sequence specified as interim (pre-burn-in) electrical parameters through interim (post-burn-in) electrical parameters of table IA of MIL-PRF-38535 and substitute lines 1 through 7 of table II herein.

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

(1) Unless otherwise specified in the manufacturers QM plan for static tests (test condition A), ambient temperature (T_A) shall be +125°C minimum. Test duration for each static test shall be 24 hours minimum for class S devices and in accordance with table I of method 1015 for class B devices.

i. For static burn-in I, all inputs shall be connected to 0.0 V.

ii. For static burn-in II, all inputs shall be connected to V_{DD}.

iii. Except for V_{DD} and V_{SS}, each terminal shall be connected through a resistor whose value is 2 kΩ to 47 kΩ. The actual measured value of the resistor selected shall not exceed ±20% of its branded value due to use, heat or age.

iv. Output may be open or connected to $V_{DD}/2$.

v. V_{DD} = 12.5 V minimum, 15 V maximum for device types 01, 02, 03.
V_{DD} = 15 V minimum, 18 V maximum for device types 51, 52, 53.
$V_{DD}/2 = V_{DD}/2$ ±1.0 %.
V_{SS} = 0.0 V.

(2) Unless otherwise specified in the manufacturers QM plan for dynamic test (test condition D), ambient temperature shall be +125°C minimum. Test duration shall be in accordance with table I of method 1015.

i. Except for V_{DD} and V_{SS}, the terminals shall be connected through a resistor whose value is 2 kΩ to 47 kΩ. The actual measured value of the resistor selected shall not exceed ±20% of its branded value due to use, heat or age.

ii. Input signal requirements: Square wave, 50% duty cycle; 25 kHz < PRR < 1 MHz; t_{TLH} and t_{THL} < 1 µs. Voltage level: Minimum = V_{SS} – 0.5 V, +10% V_{DD}; Maximum = V_{DD} + 0.5 V, -10% V_{DD}.

iii. V_{DD} = 12.5 V minimum, 15 V maximum for device types 01, 02, 03.
V_{DD} = 15 V minimum, 18 V maximum for device types 51, 52, 53.
$V_{DD}/2 = V_{DD}/2$ ±1.0 V for all devices.
V_{SS} = 0.0 V.

d. Interim and final electrical test parameters shall be as specified in table II.

e. For class S devices, post dynamic burn-in, or class B devices, post static burn-in, electrical parameter measurements may, at the manufacturer's option, be performed separately or included in the final electrical parameter requirements.

TABLE II. Electrical test requirements.

Line no.	MIL-PRF-38535 test requirements	Class S device 1/			Class B device 1/		
		Ref. par.	Table III Subgroups 2/	Table IV delta limits 3/	Ref. par.	Table III subgroups 2/	Table IV delta limits 3/
1	Interim electrical parameters		1			1	
2	Static burn-in I (method 1015)	4.2c 4.5.2					
3	Same as line 1		1	Δ			
4	Static burn-in II (method 1015)	4.2c 4.5.2			4.2c 4.5.2	4/	
5	Same as line 1		1*	Δ	4.2e	1*	Δ
6	Dynamic burn-in (method 1015)	4.2c 4.5.2					
7	Same as line 1	4.2e	1*	Δ			
8	Final electrical parameters (method 5004)		1*, 2, 3, 7, 9			1*, 2, 3, 7, 9	
9	Group A test requirements (method 5005)	4.4.1	1, 2, 3, 4, 7, 8, 9, 10, 11		4.4.1	1, 2, 3, 4, 7, 9, 10, 11	
10	Group B test when using method 5005 QCI option	4.4.2	1, 2, 3, 7, 8, 9, 10, 11	Δ			
11	Group C end-point electrical parameters (method 5005)				4.4.3	1, 2,3	Δ
12	Group D end-point electrical parameters (method 5005)	4.4.4	1, 2, 3		4.4.4	1, 2, 3	

1/ Blank spaces indicate tests are not applicable.

2/ * indicates PDA applies to subgroup 1 (see 4.2.1).

3/ Δ indicates delta limits shall be required only on table III subgroup 1, where specified, and the delta values shall be computed with reference to the previous interim electrical parameters.

4/ The device manufacturer may at his option either perform delta measurements or within 24 hours after burn-in (or removal of bias) perform the final electrical parameter measurements.

4.2.1 Percent defective allowable (PDA).

a. The PDA for class S devices shall be 5 percent for static burn-in and 5 percent for dynamic burn-in, based on the exact number of devices submitted to each separate burn-in.

b. Static burn-in I and II failure shall be cumulative for determining the PDA.

c. The PDA for class B devices shall be in accordance with MIL-PRF-38535 for static burn-in. Dynamic burn-in is not required.

d. Those devices whose measured characteristics, after burn-in, exceed the specified delta (Δ) limits or electrical parameter limits specified in table III, subgroup 1, are defective and shall be removed from the lot. The verified failures divided by the total number of devices in the lot initially submitted to burn-in shall be used to determine the percent defective for the lot and the lot shall be accepted or rejected based on the specified PDA.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535.

4.3.1 Qualification extension. When authorized by the qualifying activity, if a manufacturer qualifies to a 51, 52, or 53 device type which is manufactured identically to a 01, 02, or 03 device type on this specification, then the 01, 02, or 03 device type may be part I qualified by conducting only group A electrical tests and any electrical tests specified as additional group C subgroups and submitting data in accordance with MIL-PRF-38535.

4.4 Technology Conformance inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.5).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table III of MIL-PRF-38535 and as follows:

a. Tests shall be performed in accordance with table II herein.

b. Subgroups 5, 6, and 8 of MIL-STD-883, method 5005 shall be omitted.

c. Subgroup 4 (C_I measurement) shall be measured only for initial qualification and after process or design changes that may affect input capacitance. Capacitance shall be measured between the designated terminal and V_{SS} at a frequency of 1 MHz.

d. Subgroups 9 and 11 shall be measured only for initial qualification and after process or design changes which may affect dynamic performance.

e. When device types 01 through 03 are qualified by extension (see 4.3.1), these device types will be inspected (QCI) according to the requirements for device types 51 through 53, respectively.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of MIL-PRF-38535.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table IV of MIL-PRF-38535 and as follows:

a. End-point electrical parameters shall be as specified in table II herein. Delta limits shall apply only to subgroup 1 of group C inspection and shall consist of tests specified in table IV herein.

b. The steady-state life test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

c. When device types 01 through 03 are qualified by extension (see 4.3.1), these device types will be inspected (QCI) according to the requirements for device types 51 through 53, respectively.

TABLE III. Group A inspection for device type 01.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
$V_{IC(pos)}$	1	2			1mA	1mA	1mA	1mA		1mA	1mA	1mA	1mA			GND	SET1	1.5	"					V
		3														"	RS1		"					"
		4														"	D1		"					"
		5														"	CLK1		"					"
		6														"	SET2		"					"
		7														"	RS2		"					"
		8														"	D2		"					"
																	CLK2		"					"
$V_{IC(neg)}$	9	10			-1mA	-1mA	-1mA	-1mA	GND	-1mA		-1mA					SET1	-6	"					"
		11							"								RS1		"					"
		12							"								D1		"					"
		13							"								CLK1		"					"
		14							"								SET2		"					"
		15							"								RS2		"					"
		16							"								D2		"					"
																	CLK2		"					"
I_{SS} 2/	3005	17			15V	GND	GND	GND	"	GND	GND	GND	GND			15V	None	-.25	"	-2.5	"			μA
	"	18			GND	"	"	"	"	"	"	"	"			"	None		"		"			"
	"	19			15V	"	"	"	"	"	"	"	"			"	None		"		"			"
	"	20			15V	"	15V	"	"	"	"	"	"			"	V_{SS}		"		"			"
	"	21			GND	"	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
	"	22			15V	"	"	"	"	"	"	"	"			"	None		"		"			"
	"	23			15V	"	GND	"	"	"	"	"	"			"	None		"		"			"
	"	24			GND	"	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
	"	25			15V	"	"	"	"	"	"	"	"			"	None		"		"			"
	"	26			15V	15V	15V	15V	"	"	"	"	"			"	V_{SS}		"		"			"
	"	27			GND	15V	15V	15V	"	"	"	"	"			"	V_{SS}		"		"			"
	"	28			"	GND	GND	GND	"	"	"	"	15V			"	None		"		"			"
	"	29			"	"	"	"	"	"	"	"	GND			"	None		"		"			"
	"	30			"	"	"	"	"	"	"	"	15V			"	None		"		"			"
	"	31			"	"	"	"	"	"	15V	"	15V			"	V_{SS}		"		"			"
	"	32			"	"	"	"	"	"	"	"	GND			"	V_{SS}		"		"			"
	"	33			"	"	"	"	"	"	"	"	15V			"	None		"		"			"
	"	34			"	"	"	"	"	"	GND	"	15V			"	None		"		"			"
	"	35			"	"	"	"	"	"	"	"	GND			"	V_{SS}		"		"			"
	"	36			"	"	"	"	"	"	"	"	15V			"	None		"		"			"
	"	37			"	"	"	"	"	15V	15V	15V	15V			"	V_{SS}		"		"			"
	"	38			"	"	"	"	"	15V	15V	15V	GND			"	V_{SS}		"		"			"
V_{OH1}	3006	39	I_{OH} 3/	I_{OH}	"	V_{IL1} 7/	"	V_{IH1} 4/	"	GND	GND	GND	"			5.0V	Q1	4.5							"
	"	40			"	V_{IH1}	"	V_{IL1}	"	GND	"	GND	"			"	Q1	"		"		"			"
	"	41			"	GND	"	GND	"	V_{IH1}	"	V_{IL1}	"		I_{OH}	"	Q2	"	4.5	"	4.5	"	V		"
	"	42			"	GND	"	GND	"	V_{IL1}	"	V_{IH1}	"	I_{OH}		"	Q2	"		"		"			
V_{OH2}	"	43			"	V_{IL1}	"	V_{IH1}	"	GND	"	GND	"			"	Q1	4.95							"
	"	44			"	V_{IH1}	"	V_{IL1}	"	GND	"	GND	"			"	Q1	"		"		"			"
	"	45			"	GND	"	GND	"	V_{IH1}	"	V_{IL1}	"			"	Q2	"	4.95	"	4.95	"	"		"
	"	46			"	GND	"	GND	"	V_{IL1}	"	V_{IH1}	"			"	Q2	"		"		"			
V_{OH3}	"	47			"	V_{IL2} 8/	"	V_{IH2} 5/	"	GND	"	GND	"			12.5V	Q1	11.25							"
	"	48			"	V_{IH2}	"	V_{IL2}	"	GND	"	GND	"			"	Q1	"		"		"			"
	"	49			"	GND	"	GND	"	V_{IH2}	"	V_{IL2}	"			"	Q2	"	11.25	"	11.25	"	"		"
	"	50			"	GND	"	GND	"	V_{IL2}	"	V_{IH2}	"			"	Q2	"		"		"			

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01 – Continued.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
V_{OL1}	3007	51	I_{OL} 6/		GND	V_{IH1}	GND	V_{IL1}	GND	GND	GND	GND	GND			5.0V	Q1							V
	"	52		I_{OL}	"	V_{IL1}	"	V_{IH1}	"	GND	"	GND	"			"	Q1		"		"		"	"
	"	53			"	GND	"	GND	"	V_{IL1}	"	V_{IH1}	"		I_{OL}	"	Q2	0.5	"	0.5	"	0.5	"	"
	"	54			"	GND	"	GND	"	V_{IH1}	"	V_{IL1}	"	I_{OL}		"	Q2		"		"		"	"
V_{OL2}	"	55			"	V_{IH1}	"	V_{IL1}	"	GND	"	GND	"			"	Q1							"
	"	56			"	V_{IL1}	"	V_{IH1}	"	GND	"	GND	"			"	Q1		"		"		"	"
	"	57			"	GND	"	GND	"	V_{IL1}	"	V_{IH1}	"			"	Q2	.05	"	.05	"	.05	"	"
	"	58			"	GND	"	GND	"	V_{IH1}	"	V_{IL1}	"			"	Q2		"		"		"	"
V_{OL3}	"	59			"	V_{IH2}	"	V_{IL2}	"	GND	"	GND	"			12.5V	Q1							"
	"	60			"	V_{IL2}	"	V_{IH2}	"	GND	"	GND	"			"	Q1		"		"		"	"
	"	61			"	GND	"	GND	"	V_{IL2}	"	V_{IH2}	"			"	Q2	1.25	"	1.25	"	1.25	"	"
	"	62			"	GND	"	GND	"	V_{IH2}	"	V_{IL2}	"			"	Q2		"		"		"	"
V_{OH4}	3006	63			9/	"	V_{IL1}	9/	"	GND	"	GND	"			5.0V	$\overline{Q1}$	4.95		4.95				"
V_{OL4}	3007	64			9/	"	V_{IL1}	9/	"	GND	"	"	"			"	Q1				0.05		0.05	"
V_{OH4}	3006	65				"	GND	GND	"	9/	V_{IL1}	"	9/			"	$\overline{Q2}$	4.95		4.95	4.95			"
V_{OL4}	3007	66			GND	"	GND	GND	"	9/	V_{IL1}	"	9/			"	Q2	0.05						"
V_{OL4}	3007	67		GND	9/	"	V_{IH1}	9/	"	GND	GND	"	GND			"	Q1		0.05		0.05	4.95	0.05	"
V_{OH4}	3006	68			9/	"	V_{IH1}	9/	"	GND	GND	"	GND			"	Q1	4.95		4.95				"
V_{OL4}	3007	69				"	GND	GND	"	9/	V_{IH1}	"	9/			"	$\overline{Q2}$				0.05		0.05	"
V_{OH4}	3006	70				"	GND	GND	"	9/	V_{IH1}	"	9/			"	Q2	4.95		4.95	4.95			"
V_{ICL1}				GND	10/	"	10/	10/	"	GND	GND	"	GND			"	CLK1, 10/	0.05	V_{IH1}		V_{IH1}		V_{IH1}	"
V_{ICL1}		72		GND	10/	"	10/	10/	"	GND	GND	"	GND			"	CLK1, 10/	V_{IL1}		V_{IL1}	4.95	V_{IL1}		"
V_{ICL2}					GND	"	GND	GND	"	10/	10/	"	10/			"	CLK2, 10/		V_{IH1}		V_{IH1}		V_{IH1}	"
V_{ICL2}	71	74			GND	"	GND	GND	"	10/	10/	"	10/			"	CLK2, 10/	V_{IL1}		V_{IL1}		V_{IL1}		"
I_{IH1}	3010	75			15.0V	15.0V	15.0V	15.0V	"	15.0V	15.0V	15.0V	15.0V			15.0V	All inputs together		800					nA
I_{IH2} 11/	73																							
	"	76			"	"	"	"	"	"	"	"	"			"	CLK1							"
	"	77			"	"	"	"	"	"	"	"	"			"	RS1		"		"			"
	"	78			"	"	"	"	"	"	"	"	"			"	D1	100.0	"	100.0	"			"
	"	79			"	"	"	"	"	"	"	"	"			"	SET1		"		"			"
	"	80			"	"	"	"	"	"	"	"	"			"	SET2		"		"			"
	"	81			"	"	"	"	"	"	"	"	"			"	D2		"		"			"
	"	82			"	"	"	"	"	"	"	"	"			"	RS2		"		"			"
	"	83			"	"	"	"	"	"	"	"	"			"	CLK2		"		"			"

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01 – Continued.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
I_{IL1} 11/	3009	84			GND	GND	GND	GND	GND	GND	GND	GND	GND			15.0V	All inputs together							nA
I_{IL2}	"	85			"	"	"	"	"	"	"	"	"			"	CLK1	-800	"					"
	"	86			"	"	"	"	"	"	"	"	"			"	RS1		"		"			"
	"	87			"	"	"	"	"	"	"	"	"			"	D1	-100.0	"	-100.0	"			"
	"	88			"	"	"	"	"	"	"	"	"			"	SET1		"		"			"
	"	89			"	"	"	"	"	"	"	"	"			"	SET2		"		"			"
	"	90			"	"	"	"	"	"	"	"	"			"	D2		"		"			"
	"	91			"	"	"	"	"	"	"	"	"			"	RS2		"		"			"
	"	92			"	"	"	"	"	"	"	"	"			"	CLK2		"		"			"
																		Subgroup 4 T_A = 25°C						
																		Min	Max					
C_i	3012	93			12/				GND							GND	CLK1							pF
	"	94				12/			"							"	RS1		"					"
	"	95					12/		"							"	D1		"					"
	"	96						12/	"							"	SET1	12	"					"
	"	97							"	12/						"	SET2		"					"
	"	98							"		12/					"	D2		"					"
	"	99							"			12/				"	RS2		"					"
	"	100							"				12/			"	CLK2		"					"
																		Subgroup 7 T_A = 25°C		Subgroup 8 T_A = 125°C		T_A = -55°C		
																		Min	Max	Min	Max	Min	Max	
Truth table test	3014	101			5.0V	GND	GND	GND	GND	GND	GND	GND	5.0V			5.0V	None	See notes 13/ and 14/						
	"	102			GND	"	"	"	"	"	"	"	GND			"	None							
	"	103	L	H	5.0V	"	"	"	"	"	"	"	5.0V	H	L	"	All							
	"	104	"	"	5.0V	"	5.0V	"	"	"	5.0V	"	5.0V	"	"	"	outputs							
	"	105	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	106	H	L	5.0V	"	"	"	"	"	"	"	5.0V	L	H	"	"							
	"	107	L	H	5.0V	5.0V	"	"	"	"	"	5.0V	5.0V	H	L	"	"							
	"	108	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	109	"	"	5.0V	"	"	"	"	"	"	"	5.0V	"	"	"	"							
	"	110	H	L	5.0V	GND	GND	5.0V	"	5.0V	GND	GND	5.0V	L	H	"	"							
	"	111	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	112	"	"	5.0V	"	"	"	"	"	"	"	5.0V	"	"	"	"							
	"	113	"	"	5.0V	"	"	GND	"	GND	"	"	5.0V	"	"	"	"							
	"	114	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	115	L	H	5.0V	"	"	"	"	"	"	"	5.0V	H	L	"	"							
	"	116	H	"	5.0V	5.0V	"	5.0V	"	5.0V	"	5.0V	5.0V	"	H	"	"							
	"	117	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	118	"	"	5.0V	"	"	"	"	"	"	"	5.0V	"	"	"	"							

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01 – Continued.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
t_{PHL}	3003 (Fig. 6)	119	OUT		IN				GND							5.0V	CLK1 to Q1	13	500	18	750	13	500	ns
	"	120		OUT	IN				"							"	CLK1 to $\overline{Q1}$	"	"	"	"	"	"	"
	"	121							"				IN		OUT	"	CLK 2 to Q2	"	"	"	"	"	"	"
	"	122							"				IN	OUT		"	CLK 2 to $\overline{Q2}$	"	"	"	"	"	"	"
t_{PHL} R or S	3003 (Fig. 7)	123		OUT		IN		IN	"							"	SET1 to $\overline{Q1}$	"	550	"	825	"	550	"
	"	124	OUT						"							"	RS1 to Q1	"	"	"	"	"	"	"
	"	125							"	IN				OUT		"	SET2 to $\overline{Q2}$	"	"	"	"	"	"	"
	"	126							"			IN			OUT	"	RS2 to Q2	"	"	"	"	"	"	"
t_{PLH}	3003 (Fig. 6)	127	OUT		IN				"							"	CLK1 to Q1	"	"	"	"	"	"	"
	"	128		OUT	IN				"							"	CLK1 to $\overline{Q1}$	"	"	"	"	"	"	"
	"	129							"				IN		OUT	"	CLK 2 to Q2	"	"	"	"	"	"	"
	"	130							"				IN	OUT		"	CLK 2 to $\overline{Q2}$	"	"	"	"	"	"	"
t_{PLH} R or S	3003 (Fig. 7)	131	OUT						"							"	SET1 to Q1	"	420	"	630	"	420	"
	"	132		OUT		IN		IN	"							"	RS1 to $\overline{Q1}$	"	"	"	"	"	"	"
	"	133							"	IN				OUT		"	SET2 to $\overline{Q2}$	"	"	"	"	"	"	"
	"	134							"			IN			OUT	"	RS2 to $\overline{Q2}$	"	"	"	"	"	"	"
t_{THL}	3004 (Fig. 6)	135	OUT		IN				"							"	Q1	10	300	14	450	10	300	"
	"	136		OUT	IN				"							"	$\overline{Q1}$	"	"	"	"	"	"	"
	"	137							"				IN		OUT	"	Q2	"	"	"	"	"	"	"
	"	138							"				IN	OUT		"	$\overline{Q2}$	"	"	"	"	"	"	"
t_{TLH}	3004 (Fig. 6)	139		OUT	IN				"							"	$\overline{Q1}$	"	350	"	525	"	350	"
	"	140	OUT		IN				"							"	Q1	"	"	"	"	"	"	"
	"	141							"				IN	OUT		"	$\overline{Q2}$	"	"	"	"	"	"	"
	"	142							"				IN		OUT	"	Q2	"	"	"	"	"	"	"
$f_{CL(max)}$ 15/	(Fig. 6)	143	OUT		IN				"							"	CLK1							µs
	"	144							"				IN		OUT	"	CLK2		0.67		1.0		0.67	"
t_{TLHCL} (Max) 16/	(Fig. 6)	145	OUT		IN				"							"	CLK1	10		15		10		
	"	146							"				IN		OUT	"	CLK2	15		15		10		"
t_p 17/	(Fig. 6)	147	OUT		IN				"							"	CLK1							ns
	"	148							"				IN		OUT	"	CLK2		300		450		300	"
t_{SHL}	(Fig. 8)	149			IN				"							"	D1 to CLK1	300	165	450		300		"
t_{SHL}	"	150							"		IN		IN			"	D2 to CLK2		"		"		"	"
t_{SLH}	"	151			IN				"							"	D1 to CLK1		"	225		165		"
t_{SLH}	"	152				IN			"		IN		IN			"	D2 to CLK2		"		"		"	"
						IN														"		"		

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01 – Continued.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
t_{HHL}	(Fig. 9)	153			IN				GND							5.0V	D1 to CLK1		150					ns
t_{HHL}	"	154							"		IN		IN			"	D2 to CLK2		"		"		"	"
t_{HLH}	"	155			IN				"							"	D1 to CLK1			225		150		"
t_{HLH}	"	156				IN			"		IN		IN			"	D2 to CLK2		"		"		"	"

IN " " "

1/ Pins not designated may be "high" level logic, "low" level logic, or open. Exceptions are as follows: $V_{IC(pos)}$ tests, the V_{SS} terminal shall be open; $V_{IC(neg)}$ tests, the V_{DD} terminal shall be open; I_{SS} tests, the output terminals shall be open.

2/ Test numbers 17 thru 38 shall be run in sequence.

3/ I_{OH} = -0.25 mA at 25°C, -0.175 mA at 125°C, -0.31 mA at -55°C.

4/ V_{IH1} = 3.8 V at 25°C, 3.6 V at 125°C, 3.95 V at -55°C.

5/ V_{IH2} = 9.5 V at 25°C, 9.25 V at 125°C, 9.75 V at -55°C.

6/ I_{OL} = 0.5 mA at 25°C, 0.35 mA at 125°C, 0.65 mA at -55°C.

7/ V_{IL1} = 1.1 V at 25°C, 0.85 V at 125°C, 1.35 V at -55°C.

8/ V_{IL2} = 2.8 V at 25°C, 2.55 V at 125°C, 3.0 V at -55°C.

9/ For input conditions, see figure 4.

10/ For input voltage conditions, see figure 5.

11/ The device manufacturer may, at his option, measure I_{IL} and I_{IH} at 25°C for each individual input or measure all inputs together.

12/ See 4.4.1c.

13/ Test numbers 101 thru 118 shall be run in sequence and the functional tests shall be performed with V_{IH} and $V_{DD} \leq 5.0$ V and ≥ 15.0 V.

14/ L = V_{SS} + 0.5 V maximum and H = V_{DD} – 0.5 V minimum.

15/ The maximum clock frequency (f_{CL}) requirement is considered met if proper output state changes occur with the pulse repetition period set to that given in the limits column.

16/ Pulse repetition period = 100 μs, 50 percent duty cycle. The maximum clock transition time (t_{TLHCL}) requirement is considered met if proper output state changes occur with the rise time set to that given in the limits column.

17/ The minimum clock pulse width (t_p) requirement is considered met if proper output state changes occur with the pulse width set to that given in the limits column.

TABLE III. Group A inspection for device type 02.

Symbol	MIL-STD-883 test method	Cases E,F,N, and Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
$V_{IC(pos)}$		1				1mA			1mA									GND	SET2							V
		2																"	RS2		"					"
		3						1mA										"	J2	1.5	"					"
		4					1mA											"	K2		"					"
		5			1mA													"	CLK2		"					"
		6									1mA							"	SET1		"					"
		7												1mA				"	RS1		"					"
		8										1mA						"	J1		"					"
		9											1mA					"	K1		"					"
		10													1mA			"	CLK1		"					"
$V_{IC(neg)}$		11				-1mA			-1mA	GND									SET2							"
		12								"									RS2		"					"
		13						-1mA		"									J2	-6	"					"
		14					-1mA			"									K2		"					"
		15			-1mA					"									CLK2		"					"
		16								"	-1mA								SET1		"					"
		17								"				-1mA					RS1		"					"
		18								"		-1mA							J1		"					"
		19								"			-1mA						K1		"					"
		20								"					-1mA				CLK1		"					"
I_{SS} 2/		21			GND	15.0V	15.0V	15.0V	GND	"	GND	GND	GND	GND	GND			15.0V	V_{SS}							µA
		22			15.0V	15.0V	"	"	"	"	"	"	"	"	"			"	None	-0.25	"	-2.5	"			"
		23			15.0V	GND	"	"	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
		24			GND	"	"	"	"	"	"	"	"	"	"			"	None		"		"			"
		25			15.0V	"	"	"	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
		26			"	"	GND	GND	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
		27			"	15.0V	"	"	15.0V	"	"	"	"	"	"			"	V_{SS}		"		"			"
		28			GND	GND	"	"	GND	"	"	15.0V	15.0V	15.0V	"			"	V_{SS}		"		"			"
		29			"	"	"	"	"	"	"	"	"	15.0V	15.0V			"	None		"		"			"
		30			"	"	"	"	"	"	"	"	"	GND	15.0V			"	V_{SS}		"		"			"
		31			"	"	"	"	"	"	"	"	"	"	GND			"	None		"		"			"
		32			"	"	"	"	"	"	"	"	"	"	15.0V			"	V_{SS}		"		"			"
		33			"	"	"	"	"	"	"	GND	GND	"	"			"	V_{SS}		"		"			"
		34			"	"	"	"	"	"	15.0V	"	"	15.0V	"			"	V_{SS}		"		"			"
V_{OH1}	3006	35	I_{OH} 3/		"	V_{IL1} 7/	"	"	V_{IH1} 4/	"	GND	"	"	GND	GND			5.0V	$\overline{Q2}$	4.5						"
	"	36		I_{OH}	"	V_{IH1}	"	"	V_{IL1}	"	GND	"	"	GND	"			"	Q2	"		"		"		"
	"	37			"	GND	"	"	GND	"	V_{IH1}	"	"	V_{IL1}	"		I_{OH}	"	$\overline{Q1}$	"	4.5	"	4.5	"	V	"
	"	38			"	GND	"	"	GND	"	V_{IL1}	"	"	V_{IH1}	"	I_{OH}		"	Q1	"		"		"		
V_{OH2}	"	39			"	V_{IL1}	"	"	V_{IH1}	"	GND	"	"	GND	"			"	$\overline{Q2}$	4.95						"
	"	40			"	V_{IH1}	"	"	V_{IL1}	"	GND	"	"	GND	"			"	Q2	"		"		"		"
	"	41			"	GND	"	"	GND	"	V_{IH1}	"	"	V_{IL1}	"			"	$\overline{Q1}$	"	4.95	"	4.95	"	"	"
	"	42			"	GND	"	"	GND	"	V_{IL1}	"	"	V_{IH1}	"			"	Q1	"		"		"		
V_{OH3}	"	43			"	V_{IL2} 8/	"	"	V_{IH2} 5/	"	GND	"	"	GND	"			12.5V	$\overline{Q2}$	11.25						"
	"	44			"	V_{IH2}	"	"	V_{IL2}	"	GND	"	"	GND	"			"	Q2	"		"		"		"
	"	45			"	GND	"	"	GND	"	V_{IH2}	"	"	V_{IL2}	"			"	$\overline{Q1}$	"	11.25	"	11.25	"	"	"
	"	46			"	GND	"	"	GND	"	V_{IL2}	"	"	V_{IH2}	"			"	Q1	"		"		"		

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, and Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{OL1}	3007	47	I_{OL} 6/		GND	V_{IH1}	GND	GND	V_{IL1}	GND	GND	GND	GND	GND	GND			5.0V	Q2							V
	"	48			"	V_{IL1}	"	"	V_{IH1}	"	GND	"	"	GND	"			"	Q2		"		"		"	"
	"	49		I_{OL}	"	GND	"	"	GND	"	V_{IL1}	"	"	V_{IH1}	"		I_{OL}	"	Q1	0.5	"	0.5	"	0.5	"	"
	"	50			"	GND	"	"	GND	"	V_{IH1}	"	"	V_{IL1}	"	I_{OL}		"	Q1		"		"		"	"
V_{OL2}	"	51			"	V_{IH1}	"	"	V_{IL1}	"	GND	"	"	GND	"			"	Q2							"
	"	52			"	V_{IL1}	"	"	V_{IH1}	"	GND	"	"	GND	"			"	Q2		"		"		"	"
	"	53			"	GND	"	"	GND	"	V_{IL1}	"	"	V_{IH1}	"			"	Q1	0.05	"	0.05	"	0.05	"	"
	"	54			"	GND	"	"	GND	"	V_{IH1}	"	"	V_{IL1}	"		"	"	Q1		"		"		"	"
V_{OL3}	"	55			"	V_{IH2}	"	"	V_{IL2}	"	GND	"	"	GND	"			"	Q2							"
	"	56			"	V_{IL2}	"	"	V_{IH2}	"	GND	"	"	GND	"			"	Q2		"		"		"	"
	"	57			"	GND	"	"	GND	"	V_{IL2}	"	"	V_{IH2}	"		12.5V	"	Q1	1.25	"	1.25	"	1.25	"	"
	"	58			"	GND	"	"	GND	"	V_{IH2}	"	"	V_{IL2}	"			"	Q1		"		"		"	"
V_{OH4}	3006	59			9/	"	V_{IH1}	$_{IL1}$	9/	"	GND	"	"	GND	"			5.0V	$\overline{Q2}$	4.95		4.95		4.95		"
V_{OL4}	3007	60			9/	"	V_{IH1} V	$_{IL1}$	9/	"	GND	"	"	"	"			"	Q2		.05		.05		.05	"
V_{OH4}	3006	61			GND	"	GND V	GND	GND	"	9/	V_{IL1}	V_{IH1}	"	9/			"	$\overline{Q1}$	4.95		4.95		4.95		"
V_{OL4}	3007	62			GND	"	GND	GND	GND	"	9/	V_{IL1}	V_{IH1}	"	9/			"	Q1							"
V_{OL4}	3007	63			9/	"	V_{IL1}	V_{IH1}	9/	"	GND	GND	GND	"	GND			"	Q2		.05		.05		.05	"
V_{OH4}	3006	64			9/	"	V_{IL1}	V_{IH1}	_/	"	GND	GND	GND	"	GND			"	Q2	4.95		4.95		4.95		"
V_{OL4}	3007	65			GND	"	GND	GND_9	GND	"	9/	V_{IH1}	V_{IL1}	"	9/			"	$\overline{Q1}$		.05		.05		.05	"
V_{OH4}	3006	66			GND	"	GND	GND	"	"	9/	V_{IH1}	V_{IL1}	"	9/			"	Q1	4.95		4.95		4.95		"
V_{ICL1}					10/	10/	10/	10/	"	"	GND	GND	GND	"	GND			"	CLK2		V_{IH1}		V_{IH1}		V_{IH1}	"
V_{ICL1}		68			10/	10/	10/	10/	"	"	"	GND	GND	"	GND			"	CLK2	V_{IL1}		V_{IL1}		V_{IL1}		"
V_{ICL2}					GND	GND	GND	GND	"	"	"	10/	10/	10/	10/			"	CLK1		V_{IH1}		V_{IH1}		V_{IH1}	"
V_{ICL2}		70			GND	GND	GND	GND	"	"	"	10/	10/	10/	10/			"	CLK1	V_{IL1}		V_{IL1}		V_{IL1}		"
I_{IH1} 11/	3010	71			15.0V	15.0V	15.0V	15.0V	15.0V	"	15.0V	15.0V	15.0V	15.0V	15.0V			15.0V	All inputs together		1000					nA
I_{IH2}	"	72			"	"	"	"	"	"	"	"	"	"	"			"	CLK2							"
	"	73			"	"	"	"	"	"	"	"	"	"	"			"	RS2	100.0	"	100.0	"			"
	"	74			"	"	"	"	"	"	"	"	"	"	"			"	K2		"		"			"
	"	75			"	"	"	"	"	"	"	"	"	"	"			"	J2		"		"			"
	"	76			"	"	"	"	"	"	"	"	"	"	"			"	SET2		"		"			"
	"	77			"	"	"	"	"	"	"	"	"	"	"			"	SET1		"		"			"
	"	78			"	"	"	"	"	"	"	"	"	"	"			"	J1		"		"			"
	"	79			"	"	"	"	"	"	"	"	"	"	"			"	K1		"		"			"
	"	80			"	"	"	"	"	"	"	"	"	"	"			"	RS1		"		"			"
	"	81			"	"	"	"	"	"	"	"	"	"	"			"	CLK1		"		"			"

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, and Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
I_{IL1} 11/	3009	82			GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND			15.0V	All inputs together		-1000					nA
I_{IL2}	"	83			"	"	"	"	"	"	"	"	"	"	"			"	CLK2	-100.0	"	-100.0	"			"
	"	84			"	"	"	"	"	"	"	"	"	"	"			"	RS2							"
	"	85			"	"	"	"	"	"	"	"	"	"	"			"	K2							"
	"	86			"	"	"	"	"	"	"	"	"	"	"			"	J2							"
	"	87			"	"	"	"	"	"	"	"	"	"	"			"	SET2							"
	"	88			"	"	"	"	"	"	"	"	"	"	"			"	SET1							"
	"	89			"	"	"	"	"	"	"	"	"	"	"			"	J1							"
	"	90			"	"	"	"	"	"	"	"	"	"	"			"	K1							"
	"	91			"	"	"	"	"	"	"	"	"	"	"			"	RS1							"
	"	92			"	"	"	"	"	"	"	"	"	"	"			"	CLK1							"
																				Subgroup 4 T_A = 25°C						
																				Min	Max					
C_i	3012	93			12/					GND									CLK2	12						pF
	"	94				12/				"								"	RS2		"					"
	"	95					12/			"								"	K2		"					"
	"	96						12/		"							GND	"	J2		"					"
	"	97							12/	"								"	SET2		"					"
	"	98								"	12/							"	SET1		"					"
	"	99								"		12/						"	J1		"					"
	"	100								"			12/					"	K1		"					"
	"	101								"				12/				"	RS1		"					"
	"	102													12/			"	CLK1		"					"
																				Subgroup 7 T_A = 25°C		Subgroup 8 T_A = 125°C		T_A = -55°C		
																				Min	Max	Min	Max	Min	Max	
Truth table test	3014	103			5.0V	GND	5.0V	GND	GND	GND	GND	GND	5.0V	GND	5.0V			5.0V	None	See 13/ and 14/						
	"	104			GND	"	"	"	"	"	"	"	"	"	GND			"	None							
	"	105	L	H	5.0V	"	"	"	"	"	"	"	"	"	5.0V	H	L	"	All							
	"	106	"	"	5.0V	"	GND	"	"	"	"	"	GND	"	5.0V	"	"	"	outputs							
	"	107	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	108	"	"	5.0V	"	"	"	"	"	"	"	"	"	5.0V	"	"	"	"							
	"	109	"	"	5.0V	"	"	5.0V	"	"	"	5.0V	"	"	5.0V	"	"	"	"							
	"	110	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	111	H	L	5.0V	"	"	"	"	"	"	"	"	"	5.0V	L	H	"	"							
	"	112	"	"	5.0V	"	"	GND	"	"	"	GND	"	"	5.0V	"	"	"	"							
	"	113	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	114	"	"	5.0V	"	"	"	"	"	"	"	"	"	5.0V	"	"	"	"							
	"	115	"	"	5.0V	"	5.0V	5.0V	"	"	"	5.0V	5.0V	"	5.0V	"	"	"	"							
	"	116	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	117	L	H	5.0V	"	"	"	"	"	"	"	"	"	5.0V	H	L	"	"							
	"	118	H	L	5.0V	"	"	GND	5.0V	"	5.0V	GND	"	"	5.0V	L	H	"	"							
	"	119	H	L	GND	"	"	"	5.0V	"	5.0V	"	"	"	GND	L	H	"	"							
	"	120	L	H	GND	5.0V	GND	"	GND	"	GND	"	GND	5.0V	GND	H	L	"	"							
	"	121	L	H	5.0V	5.0V	GND	"	GND	"	GND	"	GND	5.0V	5.0V	H	L	"	"							

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, and Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 7 T_A = 25°C		Subgroup 8 T_A = 125°C		T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
Truth table test	3014	122	H	L	5.0V	GND	GND	GND	5.0V	GND	5.0V	GND	GND	GND	5.0V	L	H	5.0V	All outputs	See 13/ and 14/						
	"	123	"	"	5.0V	"	5.0V	"	GND	"	GND	"	5.0V	"	5.0V	"	"	"								
	"	124	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"								
	"	125	L	H	5.0V	"	"	"	"	"	"	"	"	"	5.0V	H	L	"								
	"	126	"	"	5.0V	"	"	5.0V	"	"	"	5.0V	"	"	5.0V	"	"	"								
	"	127	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"								
	"	128	H	L	5.0V	"	"	"	"	"	"	"	"	"	5.0V	L	H	"								
	"	129	L	H	5.0V	5.0V	"	"	"	"	"	"	"	5.0V	5.0V	H	L	"								
	"	130	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"								
	"	131	"	"	5.0V	"	"	"	"	"	"	"	"	"	5.0V	"	"	"								
	"	132	H	"	5.0V	"	GND	GND	5.0V	"	5.0V	GND	GND	"	5.0V	"	H	"								
	"	133	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"								
	"	134	"	"	5.0V	"	"	"	"	"	"	"	"	"	5.0V	"	"	"								
																				Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
																				Min	Max	Min	Max	Min	Max	
t_{PHL}	3003	135	OUT		IN					GND								5.0V	CLK2 to Q2	13	575	18	865	13	575	ns
	Fig.	136		OUT	IN					"								"	CLK2 to Q2	"	"	"	"	"	"	"
	12	137								"					IN		OUT	"	CLK1 to Q1	"	"	"	"	"	"	"
	"	138								"					IN	OUT		"	CLK1 to Q1	"	"	"	"	"	"	"
t_{PHL}	3003	139	OUT							"								"	RS2 to Q2	"	600	"	900	"	600	"
R or S	Fig.	140		OUT					IN	"								"	SET2 to Q2	"	"	"	"	"	"	"
	13	141			IN					"				IN			OUT	"	RS1 to Q1	"	"	"	"	"	"	"
	"	142								"	IN					OUT		"	SET1 to Q1	"	"	"	"	"	"	"
t_{PLH}	3003	143	OUT		IN					"								"	CLK2 to Q2	"	625	"	940	"	625	"
	Fig.	144		OUT	IN					"								"	CLK2 to Q2	"	"	"	"	"	"	"
	12	145								"					IN		OUT	"	CLK1 to Q1	"	"	"	"	"	"	"
	"	146								"					IN	OUT		"	CLK1 to Q1	"	"	"	"	"	"	"
t_{PLH}	3003	147	OUT						IN	"								"	SET2 to Q2	"	400	"	600	"	400	"
R or S	Fig.	148		OUT		IN				"								"	RS2 to Q2	"	"	"	"	"	"	"
	13	149								"	IN						OUT	"	SET1 to Q1	"	"	"	"	"	"	"
	"	150								"				IN		OUT		"	RS1 to Q1	"	"	"	"	"	"	"
t_{THL}	3004	151	OUT		IN					"								"	Q2	10	325	14	490	10	325	"
	Fig.	152		OUT	IN					"								"	Q2	"	"	"	"	"	"	"
	12	153								"					IN		OUT	"	Q1	"	"	"	"	"	"	"
	"	154								"					IN	OUT		"	Q1	"	"	"	"	"	"	"
t_{TLH}	"	155	OUT		IN					"								"	Q2	"	"	"	"	"	"	"
	"	156		OUT	IN					"								"	Q2	"	"	"	"	"	"	"
	"	157								"					IN		OUT	"	Q1	"	"	"	"	"	"	"
	"	158								"					IN	OUT		"	Q1	"	"	"	"	"	"	"
$f_{CL(max)}$ 15/	"	159	OUT		IN					"								"	CLK2		1.0		1.4		1.0	µs
	"	160								"					IN		OUT	"	CLK1	1.0		1.4		1.0		"

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, and Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
t_{TLHCL} 16/	Fig. 12	161 162	OUT “		IN “					GND “					IN “		OUT “	5.0V “	CLK2 CLK1	15 15		15 “		10 “		µs µs
t_p 17/	“	163 164	OUT “		IN “					“ “					IN “		OUT “	“ “	CLK2 CLK1		15 300		450 450		300 “	ns “
t_{SHL}	Fig. 14 “ “	165 166 167 168	OUT OUT	 IN 	IN “ “ “		IN “ “ “	IN “ “ “		“ “ “ “		 IN	 IN 		 IN IN		 OUT OUT	“ “ “ “	K2 to CLK2 J2 to CLK2 K1 to CLK1 J1 to CLK1		165 “ “ “	 225 	 “ “ “	300 “ 165 “	 “ “ “	“ “ “ “
t_{SLH}	“ “ “ “	169 170 171 172	OUT OUT	 IN 	IN “ “ “		IN “ “ “	IN “ “ “		“ “ “ “		 IN	 IN 		 IN IN		 OUT OUT	“ “ “ “	K2 to CLK2 J2 to CLK2 K1 to CLK1 J1 to CLK1		“ “ “ “	 “ 	 “ “ “	 “ 	 “ “ “	“ “ “ “
t_{HLH}	“ “ “ “	173 174 175 176	OUT OUT	 IN 	IN “ “ “		IN “ “ “	IN “ “ “		“ “ “ “		 IN	 IN 		 IN IN		 OUT OUT	“ “ “ “	K2 to CLK2 J2 to CLK2 K1 to CLK1 J1 to CLK1		150 “ “ “	 “ 	 “ “ “	 150 	 “ “ “	“ “ “ “
t_{HHL}	“ “ “ “	177 178 179 180	OUT OUT	 IN 	IN “ “ “		IN “ “ “	IN “ “ “		“ “ “ “		 IN	 IN 		 IN IN		 OUT OUT	“ “ “ “	K2 to CLK2 J2 to CLK2 K1 to CLK1 J1 to CLK1		“ “ “ “	 “ 	 “ “ “	 “ 	 “ “ “	“ “ “ “

1/ Pins not designated may be “high” level logic, “low” level logic, or open. Exceptions are as follows: $V_{IC(pos)}$ tests, the V_{SS} terminal shall be open; $V_{IC(neg)}$ tests, the V_{DD} terminal shall be open; I_{SS} tests, the output terminals shall be open.

2/ Test numbers 21 thru 34 shall be run in sequence.

3/ I_{OH} = -0.25 mA at 25°C, -0.175 mA at 125°C, -0.31 mA at -55°C.

4/ V_{IH1} = 3.8 V at 25°C, 3.6 V at 125°C, 3.95 V at -55°C.

5/ V_{IH2} = 9.5 V at 25°C, 9.25 V at 125°C, 9.75 V at -55°C.

6/ I_{OL} = 0.5 mA at 25°C, 0.35 mA at 125°C, 0.65 mA at -55°C.

7/ V_{IL1} = 1.1 V at 25°C, 0.85 V at 125°C, 1.35 V at -55°C.

8/ V_{IL2} = 2.8 V at 25°C, 2.55 V at 125°C, 3.05 V at -55°C.

9/ For input voltage conditions, see figure 10.

10/ For input voltage conditions, see figure 11.

11/ The device manufacturer may, at his option, measure I_{IL} and I_{IH} at 25°C for each individual input or measure all inputs together.

12/ See 4.4.1c.

13/ Test numbers 103 thru 134 shall be run in sequence and the functional tests shall be performed with V_{IH} and $V_{DD} \leq 5.0$ V and ≥ 15.0 V.

__/ L = V_{SS} + 0.5 V maximum and H = V_{DD} – 0.5 V minimum.

__/ The maximum clock frequency (f_{CL}) requirement is considered met if proper output state changes occur with the pulse repetition period set to that given in the limits column.

__/ Pulse repetition period = 100 µs, 50 percent duty cycle. The maximum clock transition time (t_{TLHCL}) requirement is considered met if proper output state changes occur with the rise time set to that given in the limits column.

17/ The minimum clock pulse width (t_p) requirement is considered met if proper output state changes occur with the pulse width set to that given in the limits column.

TABLE III. Group A inspection for device type 03.

Symbol	MIL-STD-883 test method	Cases E,F,N,Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q4	Q1	R1	S1	E	S2	R2	V_{SS}	Q2	Q3	R3	S3	NC	S4	R4	V_{DD}		Min	Max	Min	Max	Min	Max	
$V_{IC(pos)}$	1	2 3 4 5 6 7 8 9			1mA	1mA	1mA	1mA	1mA				1mA	1mA		1mA	1mA	GND “ “ “ “ “ “ “ “	R1 S1 E S2 R2 R3 S3 S4 R4	1.5	“ “ “ “ “ “ “ “ “					V “ “ “ “ “ “ “ “
$V_{IC(neg)}$	10	11 12 13 14 15 16 17 18			-1mA	-1mA	-1mA	-1mA	-1mA	GND “ “ “ “ “ “ “			-1mA	-1mA		-1mA	-1mA	R1	S1 E S2 R2 R3 S3 S4 R4	-6	“ “ “ “ “ “ “ “					“ “ “ “ “ “ “ “
I_{SS} 2/	3005 “ “ “ “	19 20 21 22 23 24			GND GND 15.0V GND 15.0V GND	15.0V GND “ “ 15.0V GND	15.0V “ “ “ GND	15.0V GND “ “ 15.0V GND	15.0V GND 15.0V GND 15.0V GND	“ “ “ “ “ “			GND GND 15.0V GND 15.0V GND	15.0V GND “ “ 15.0V GND	15.0V	GND “ “ “ 15.0V GND	GND GND 15.0V GND 15.0V GND	15.0V “ “ “ “ “	V_{SS} “ “ “ “ “	-1.0	“ “ “ “ “	-2.5	“ “ “ “ “			µA “ “ “ “ “
V_{OH1}	3006 “ “ “	25 26 27 28	I_{OH}	I_{OH} 3/	V_{IL1} 7/ “ “ “	V_{IH1} 4/ V_{IL1} V_{IL1} V_{IL1}	V_{IH1} “ “ “	V_{IL1} V_{IH1} V_{IL1} V_{IL1}	V_{IL1} “ “ “	“ “ “ “	I_{OH}	I_{OH}	V_{IL1} “ “ “	V_{IL1} V_{IL1} V_{IH1} V_{IL1}	V	IL1 V_{IL1} V_{IL1} V_{IH1}	V_{IL1} “ “ “	5.0V “ “ “	Q1 Q2 Q3 Q4	4.5 “ “ “	4.5	“ “ “	4.5	“ “ “	V	“ “ “
V_{OH2}	“ “ “ “	29 30 31 32			“ “ “ “	V_{IH1} V_{IL1} V_{IL1} V_{IL1}	“ “ “ “	V_{IL1} V_{IH1} V_{IL1} V_{IL1}	“ “ “ “	“ “ “ “			“ “ “ “	V_{IL1} V_{IL1} V_{IH1} V_{IL1}	V	IL1 V_{IL1} V_{IL1} V_{IH1}	“ “ “ “	“ “ “ “	Q1 Q2 Q3 Q4	4.95 “ “ “	4.95	“ “ “	4.95	“ “ “	“	“ “ “
V_{OH3}	“ “ “ “	33 34 35 36			V_{IL2} 8/ “ “ “	V_{IH2} 5/ V_{IL2} V_{IL2} V_{IL2}	V_{IH2} “ “ “	V_{IL2} V_{IH2} V_{IL2} V_{IL2}	V_{IL2} “ “ “	“ “ “ “			V_{IL2} “ “ “	V_{IL2} V_{IL2} V_{IH2} V_{IL2}	V	IL2 V_{IL2} V_{IL2} V_{IH2}	V_{IL2} “ “ “	12.5V “ “ “	Q1 Q2 Q3 Q4	11.25 “ “ “	11.25	“ “ “	11.25	“ “ “	“	“ “ “
V_{OL1}	3007 “ “ “	37 38 39 40	I_{OL}	I_{OL} 6/	V_{IH1} “ “ “	V_{IL1} V_{IH1} V_{IH1} V_{IH1}	V_{IH1} “ “ “	V_{IH1} V_{IL1} V_{IH1} V_{IH1}	V_{IH1} “ “ “	“ “ “ “	I_{OL}	I_{OL}	V_{IH1} “ “ “	V_{IH1} V_{IH1} V_{IL1} V_{IH1}	V	IH1 V_{IH1} V_{IH1} V_{IL1}	V_{IH1} “ “ “	5.0V “ “ “	Q1 Q2 Q3 Q4	.5	“ “ “	.5	“ “ “	.5	“ “ “	“ “ “ “
V_{OL2}	“ “ “ “	41 42 43 44			“ “ “ “	V_{IL1} V_{IH1} V_{IH1} V_{IH1}	“ “ “ “	V_{IH1} V_{IL1} V_{IH1} V_{IH1}	“ “ “ “	“ “ “ “			“ “ “ “	V_{IH1} V_{IH1} V_{IL1} V_{IH1}	V	IH1 V_{IH1} V_{IH1} V_{IL1}	“ “ “ “	“ “ “ “	Q1 Q2 Q3 Q4	.05	“ “ “	.05	“ “ “	.05	“ “ “	“ “ “ “

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q4	Q1	R1	S1	E	S2	R2	V_{SS}	Q2	Q3	R3	S3	NC	S4	R4	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{OL3}	3007	45			V_{IH2}	V_{IL2}	V_{IH2}	V_{IH2}	V_{IH2}	GND			V_{IH2}	V_{IH2}		V_{IH2}	V_{IH2}	12.5V	Q1							V
	"	46			"	V_{IH2}	"	V_{IL2}	"	"			"	V_{IH2}		V_{IH2}	"	"	Q2		"		"		"	"
	"	47			"	V_{IH2}	"	V_{IH2}	"	"			"	V_{IL2}	V	V_{IH2}	"	"	Q3	1.25	"	1.25	"	1.25	"	"
	"	48			"	V_{IH2}	"	V_{IH2}	"	"			"	V_{IL2}		V_{IL2}	"	"	Q4		"		"		"	"
I_{IH1} 9/	3010	49			15.0V	15.0V	15.0V	15.0V	15.0V	"			15.0V	15.0V		15.0V	15.0V	15.0V	All inputs together		9					nA
I_{IH2}	"	50			"	"	"	"	"	"			"	"			"	"	R1							"
	"	51			"	"	"	"	"	"			"	"		"	"	"	S1		"		"			"
	"	52			"	"	"	"	"	"			"	"		"	"	"	E	1.0	"	45	"			"
	"	53			"	"	"	"	"	"			"	"	"	"	"	"	S2		"		"			"
	"	54			"	"	"	"	"	"			"	"		"	"	"	R2		"		"			"
	"	55			"	"	"	"	"	"			"	"		"	"	"	R3		"		"			"
	"	56			"	"	"	"	"	"			"	"		"	"	"	S3		"		"			"
	"	57			"	"	"	"	"	"			"	"		"	"	"	S4		"		"			"
	"	58			"	"	"	"	"	"			"	"		"	"	"	R4		"		"			"
I_{IL1} 9/	3009	59			GND	GND	GND	GND	GND	"			GND	GND		GND	GND	"	All inputs together		-9					"
I_{IL2}	"	60			"	"	"	"	"	"			"	"			"	"	R1							"
	"	61			"	"	"	"	"	"			"	"		"	"	"	S1		"		"			"
	"	62			"	"	"	"	"	"			"	"		"	"	"	E	-1.0	"	-45	"			"
	"	63			"	"	"	"	"	"			"	"	"	"	"	"	S2		"		"			"
	"	64			"	"	"	"	"	"			"	"		"	"	"	R2		"		"			"
	"	65			"	"	"	"	"	"			"	"		"	"	"	R3		"		"			"
	"	66			"	"	"	"	"	"			"	"		"	"	"	S3		"		"			"
	"	67			"	"	"	"	"	"			"	"		"	"	"	S4		"		"			"
	"	68			"	"	"	"	"	"			"	"		"	"	"	R4		"		"			"
																				Subgroup 4 T_A = 25°C						
																				Min	Max					
C_i	3012	69			10/					GND								GND	R1							
	"	70				10/				"								"	S1	12	"					"
	"	71					10/			"								"	E		"					"
	"	72						10/		"								"	S2		"					"
	"	73							10/	"								"	R2		"					"
	"	74								"			10/					"	R3		"					"
	"	75								"				10/				"	S3		"					"
	"	76								"						10/		"	S4		"					"
	"	77								"							10/	"	R4		"					"

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 7 T_A = 25°C		Subgroup 8 T_A = 125°C		Subgroup 8 T_A = -55°C		
		Test no.	Q4	Q1	R1	S1	E	S2	R2	V_{SS}	Q2	Q3	R3	S3	NC	S4	R4	V_{DD}		Min	Max	Min	Max	Min	Max	
Truth table test	3014	78	L	H	L	H	5.0V	L	H	GND	L	H	L	H		L	H	5.0V	All outputs	See 11/ and 12/						
	"	79	L	H	L	L	"	L	L	"	L	H	L	L		L	L	"	"							
	"	80	H	L	H	L	"	H	L	"	H	L	H	L		H	L	"	"							
	"	81	H	L	L	L	"	L	L	"	H	L	L	L		L	L	"	"							
	"	82	L	H	H	H	"	L	H	"	L	H	H	H		L	H	"	"							
	"	83	H	L	H	L	"	H	H	"	H	L	H	L		H	H	"	"							
																				Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
																				Min	Max	Min	Max	Min	Max	
t_{PHL}	3003	84		OUT	IN		5.0V			GND								5.0V	R1 to Q1	10	320	14	370	10	270	ns
R	Fig.	85					"		IN	"	OUT							"	R2 to Q2	"	"	"	"	"	"	"
	15	86					"			"		OUT	IN					"	R3 to Q3	"	"	"	"	"	"	"
	"	87	OUT				"			"							IN	"	R4 to Q4	"	"	"	"	"	"	"
t_{PLH}	"	88		OUT		IN	"			"								"	S1 to Q1	10	200	14	245	9	185	"
	"	89					"	IN		"	OUT							"	S2 to Q2	"	"	"	"	"	"	"
	"	90					"			"		OUT		IN				"	S3 to Q3	"	"	"	"	"	"	"
	"	91	OUT				"			"						IN		"	S4 to Q4	"	"	"	"	"	"	"
t_{PZH}	Fig. 16	92		OUT	GND	5.0V	IN	GND	GND	"			GND	GND		GND	GND	"	E to Q1		230				230	"
t_{PHZ}	"	93				GND	"	5.0V	"	"	OUT		"	GND			"	"	E to Q2			340				"
	"	94			"	"	"	GND	"	"		OUT	"	5.0V		"	"	"	E to Q3		"		"			"
	"	95	OUT		"	"	"	"	"	"			"	GND		5.0V	"	"	E to Q4		"		"			"
t_{PZL}	"	96		OUT	5.0V	"	"	"	"	"			"	"	"	GND	"	"	E to Q1	"	180	"		"	180	"
t_{PLZ}	"	97				"	"	"	5.0V	"	OUT		"	"			"	"	E to Q2							"
	"	98			"	"	"	"	GND	"		OUT	5.0V	"		"	"	"	E to Q3		"	240	"		"	"
	"	99	OUT	GND	"	"	"	"	GND	"			GND	"		"	5.0V	"	E to Q4	"	"	"	"	"	"	"
t_{THL}	3004	100		OUT		IN	5.0V			"								"	Q1	10	200	14	245	9	185	"
	Fig.	101					"	IN		"	OUT							"	Q2	"	"	"	"	"	"	"
	15	102					"			"		OUT		IN				"	Q3	"	"	"	"	"	"	"
	"	103	OUT				"			"						IN		"	Q4	"	"	"	"	"	"	"
t_{TLH}	"	104		OUT		IN	"			"								"	Q1	10	300	18	360	10	250	"
	"	105					"	IN		"	OUT							"	Q2	"	"	"	"	"	"	"
	"	106					"			"		OUT		IN				"	Q3	"	"	"	"	"	"	"
	"	107	OUT				"			"						IN		"	Q4	"	"	"	"	"	"	"

See footnotes on next page.

TABLE III. Group A inspection for device type 03 – Continued.

1/ Pins not designated may be “high” level logic, “low” level logic, or open. Exceptions are as follows: $V_{IC(pos)}$ tests, the V_{SS} terminal shall be open; $V_{IC(neg)}$ tests, the V_{DD} terminal shall be open; I_{SS} tests, the output terminals shall be open.

2/ Test numbers 19 thru 24 shall be run in sequence.

3/ I_{OH} = -0.175 mA at 25°C, -0.12 mA at 125°C, -0.22 mA at -55°C.

4/ V_{IH1} = 3.8 V at 25°C, 3.6 V at 125°C, 3.95 V at -55°C.

5/ V_{IH2} = 9.5 V at 25°C, 9.25 V at 125°C, 9.75 V at -55°C.

6/ I_{OL} = 0.20 mA at 25°C, 0.14 mA at 125°C, 0.25 mA at -55°C.

7/ V_{IL1} = 1.10 V at 25°C, 0.8 V at 125°C, 1.35 V at -55°C.

8/ V_{IL2} = 2.8 V at 25°C, 2.55 V at 125°C, 3.0 V at -55°C.

9/ The device manufacturer may, at his option, measure I_{IL} and I_{IH} at 25°C for each individual input or measure all inputs together.

10/ See 4.4.1c.

11/ Test numbers 78 thru 83 shall be run in sequence and the functional tests shall be performed with V_{IH} and $V_{DD} \leq 5.0$ V and ≥ 15.0 V.

12/ L = V_{SS} + 0.5 V maximum and H = V_{DD} – 0.5 V minimum.

TABLE III. Group A inspection for device type 51.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
$V_{IC(pos)}$		1						1mA								GND	SET1							V
		2				1mA										"	RS1		"					"
		3					1mA									"	D1	1.5	"					"
		4			1mA											"	CLK1		"					"
		5								1mA						"	SET2		"					"
		6										1mA				"	RS2		"					"
		7									1mA					"	D2		"					"
		8											1mA			"	CLK2		"					"
$V_{IC(neg)}$		9						-1mA	GND								SET1							"
		10				-1mA			"								RS1		"					"
		11					-1mA		"								D1		"					"
		12			-1mA				"								CLK1	-6	"					"
		13							"	-1mA							SET2		"					"
		14							"			-1mA					RS2		"					"
		15							"		-1mA						D2		"					"
		16							"				-1mA				CLK2		"					"
I_{SS} 2/	3005	17			18.0V	GND	GND	GND	"	GND	GND	GND	GND			18.0V	None		"		"			µA
	"	18			GND	"	"	"	"	"	"	"	"			"	None		"		"			"
	"	19			18.0V	"	"	"	"	"	"	"	"			"	None	-.25	"	-2.5	"			"
	"	20			18.0V	"	18.0V	"	"	"	"	"	"			"	V_{SS}		"		"			"
	"	21			GND	"	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
	"	22			18.0V	"	"	"	"	"	"	"	"			"	None		"		"			"
	"	23			18.0V	"	GND	"	"	"	"	"	"			"	None		"		"			"
	"	24			GND	"	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
	"	25			18.0V	"	"	"	"	"	"	"	"			"	None		"		"			"
	"	26			18.0V	18.0V	18.0V	18.0V	"	"	"	"	"			"	V_{SS}		"		"			"
	"	27			GND	18.0V	18.0V	18.0V	"	"	"	"	"			"	V_{SS}		"		"			"
	"	28			"	GND	GND	GND	"	"	"	"	18.0V			"	None		"		"			"
	"	29			"	"	"	"	"	"	"	"	GND			"	None		"		"			"
	"	30			"	"	"	"	"	"	"	"	18.0V			"	None		"		"			"
	"	31			"	"	"	"	"	"	18.0V	"	18.0V			"	V_{SS}		"		"			"
	"	32			"	"	"	"	"	"	"	"	GND			"	V_{SS}		"		"			"
	"	33			"	"	"	"	"	"	"	"	18.0V			"	None		"		"			"
	"	34			"	"	"	"	"	"	GND	"	18.0V			"	None		"		"			"
	"	35			"	"	"	"	"	"	"	"	GND			"	V_{SS}		"		"			"
	"	36			"	"	"	"	"	"	"	"	18.0V			"	None		"		"			"
	"	37			"	"	"	"	"	18.0V	18.0V	18.0V	18.0V			"	V_{SS}		"		"			"
	"	38			"	"	"	"	"	18.0V	18.0V	18.0V	GND			"	V_{SS}		"		"			"
V_{OH5}	3006	39			"	"	"	15.0V	"	GND	GND	GND	"			15.0V	$\overline{Q1}$	14.95						
	"	40			"	15.0V	"	GND	"	GND	"	"	"			"	Q1	"		"		"		"
	"	41			"	GND	"	"	"	15.0V	"	"	"			"	$\overline{Q2}$	"	14.95	"	14.95	"	V	"
	"	42			"	GND	"	"	"	GND	"	15.0V	"			"	Q2	"		"		"		"
V_{OL5}	3007	43			"	15.0V	"	"	"	"	"	GND	"			"	$\overline{Q1}$							
	"	44			"	GND	"	15.0V	"	"	"	GND	"			"	Q1		"		"		"	"
	"	45			"	"	"	GND	"	"	"	15.0V	"			"	$\overline{Q2}$	0.05	"	0.05	"	0.05	"	"
	"	46			"	"	"	GND	"	15.0V	"	GND	"			"	Q2		"		"		"	"
V_{OH6}	3006	47			3/	"	"	3/	"	GND	"	"	"			"	$\overline{Q1}$	14.95		14.95		14.95		"
V_{OL6}	3007	48			3/	"	"	3/	"	GND	"	"	"			"	Q1							"
																		0.05		0.05		0.05		

See footnotes at end of device type 51.

TABLE III. Group A inspection for device type 51 – Continued.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
V_{OH6}	3006	49			GND	GND	GND	GND	GND	3/	GND	GND	3/			15.0V	$\overline{Q2}$	14.95		14.95		14.95		V
V_{OL6}	3007	50			GND	"	GND	GND	"	3/	"	"	3/			"	Q2				0.05		0.05	"
V_{OL6}	3007	51			3/	"	15.0V	3/	"	GND	"	"	GND			"	$\overline{Q1}$				0.05		0.05	"
V_{OH6}	3006	52			3/	"	15.0V	3/	"	GND	"	"	GND			"	Q1	14.95		14.95		14.95		"
V_{OL6}	3007	53			GND	"	GND	GND	"	3/	15.0V	"	3/			"	$\overline{Q2}$	0.05			0.05		0.05	"
V_{OH6}	3006	54			GND	"	GND	GND	"	3/	15.0V	"	3/			"	Q2	14.95		14.95		14.95		"
V_{ICL1}		55			4/	"	4/	4/	"	GND	GND	"	GND			"	CLK1	0.05	4/		4/		4/	"
		56			4/	"	4/	4/	"	GND	GND	"	GND			"	CLK1	4/		4/		4/		"
V_{ICL2}					GND	"	GND	GND	"	4/	4/	"	4/			"	CLK2		4/		4/		4/	"
		58			"	"	GND	GND	"	4/	4/	"	4/			"	CLK2	4/		4/		4/		"
V_{IH1}					"	1.5V	1.5V	3.5V	"	GND	GND	"	GND			5.0V	Q1	4.5						
	57	60			"	3.5V	1.5V	1.5V	"	"	"	"	"			"	Q1	"		"		"		"
		61			5/	1.5V	3.5V	"	"	"	"	"	"			"	Q1	"		"		"		"
	59	62			5/	1.5V	1.5V	"	"	"	"	"	"			"	Q1	"	4.5	"	4.5	"	"	"
		63			GND	GND	GND	GND	"	3.5V	1.5V	1.5V	"			"	Q2	"		"		"		"
		64			"	"	"	"	"	1.5V	1.5V	3.5V	"			"	Q2	"		"		"		"
		65			"	"	"	"	"	"	3.5V	1.5V	5/			"	Q2	"		"		"		"
		66			"	"	"	"	"	"	1.5V	1.5V	5/			"	Q2	"		"		"		"
V_{IH2}					"	3.0V	3.0V	7.0V	"	GND	GND	GND	GND			10.0V	Q1	9.0						
		68			"	7.0V	3.0V	3.0V	"	"	"	"	"			"	Q1	"		"		"		"
		69			5/	3.0V	7.0V	"	"	"	"	"	"			"	Q1	"		"		"		"
	67	70			5/	3.0V	3.0V	"	"	"	"	"	"			"	Q1	"	9.0	"	9.0	"	"	"
		71			GND	GND	GND	GND	"	7.0V	3.0V	3.0V	"			"	Q2	"		"		"		"
		72			"	"	"	"	"	3.0V	3.0V	7.0V	"			"	Q2	"		"		"		"
		73			"	"	"	"	"	"	7.0V	3.0V	5/			"	Q2	"		"		"		"
		74			"	"	"	"	"	"	3.0V	3.0V	5/			"	Q2	"		"		"		"
V_{IH3}		75			"	4.0V	4.0V	11.0V	"	GND	GND	GND	GND			15.0V	Q1	13.5						
		76			"	11.0V	4.0V	4.0V	"	"	"	"	"			"	Q1	"		"		"		"
		77			5/	4.0V	11.0V	"	"	"	"	"	"			"	Q1	"	13.5	"	13.5	"	"	"
		78			5/	4.0V	4.0V	"	"	"	"	"	"			"	Q1	"		"		"		"
		79			GND	GND	GND	GND	"	11.0V	4.0V	4.0V	"			"	Q2	"		"		"		"
		80			"	"	"	"	"	4.0V	4.0V	11.0V	"			"	Q2	"		"		"		"
		81			"	"	"	"	"	"	11.0V	4.0V	5/			"	Q2	"		"		"		"
		82			"	"	"	"	"	"	4.0V	4.0V	5/			"	Q2	"		"		"		"

See footnotes at end of device type 51.

TABLE III. Group A inspection for device type 51 – Continued.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
V_{IL1}	83	84			GND	3.5V	3.5V	1.5V	GND	GND	GND	GND	GND			5.0V	Q1							V
		84			GND	1.5V	3.5V	3.5V	"	"	"	"	"			"	Q1		"		"		"	"
		85			5/	"	1.5V	1.5V	"	"	"	"	"			"	Q1	0.5	"	0.5	"	0.5	"	"
		86			5/	"	3.5V	1.5V	"	"	"	"	"			"	Q1		"		"		"	"
		87			GND	GND	GND	GND	"	1.5V	3.5V	3.5V	"			"	Q2		"		"		"	"
		88			"	"	"	"	"	3.5V	3.5V	1.5V	"			"	Q2		"		"		"	"
		89			"	"	"	"	"	1.5V	1.5V	"	5/			"	Q2		"		"		"	"
		90			"	"	"	"	"	1.5V	3.5V	"	5/			"	Q2		"		"		"	"
V_{IL2}	91	92			"	7.0V	7.0V	3.0V	"	GND	GND	GND	GND			10.0V	Q1							"
		92			"	3.0V	7.0V	7.0V	"	"	"	"	"			"	Q1		"		"		"	"
		93			5/	"	3.0V	3.0V	"	"	"	"	"			"	Q1	1.0	"	1.0	"	1.0	"	"
		94			5/	"	7.0V	3.0V	"	"	"	"	"			"	Q1		"		"		"	"
		95			GND	GND	GND	GND	"	3.0V	7.0V	7.0V	"			"	Q2		"		"		"	"
		96			"	"	"	"	"	7.0V	7.0V	3.0V	"			"	Q2		"		"		"	"
		97			"	"	"	"	"	3.0V	3.0V	"	5/			"	Q2		"		"		"	"
		98			"	"	"	"	"	3.0V	7.0V	"	5/			"	Q2		"		"		"	"
V_{IL3}	99	100			"	11.0V	11.0V	4.0V	"	GND	GND	GND	GND			15.0V	Q1							"
		100			"	4.0V	11.0V	11.0V	"	"	"	"	"			"	Q1		"		"		"	"
		101			5/	"	4.0V	4.0V	"	"	"	"	"			"	Q1	1.5	"	1.5	"	1.5	"	"
		102			5/	"	11.0V	4.0V	"	"	"	"	"			"	Q1		"		"		"	"
		103			GND	GND	GND	GND	"	4.0V	11.0V	11.0V	"			"	Q2		"		"		"	"
		104			"	"	"	"	"	11.0V	11.0V	4.0V	"			"	Q2		"		"		"	"
		105			"	"	"	"	"	4.0V	4.0V	"	5/			"	Q2		"		"		"	"
		106			"	"	"	"	"	4.0V	11.0V	"	5/			"	Q2		"		"		"	"
I_{OL1}	107	107	0.4V	0.4V	"	5.0V	"	"	"	GND	GND	GND	GND			5.0V	Q1	0.51						
		108			"	GND	"	5.0V	"	"	"	GND	"			"	Q1	"		"		"		"
		109			"	"	"	GND	"	"	"	5.0V	"		0.4V	"	Q2	"	0.36	"	0.64	"	mA	"
		110			"	"	"	"	"	5.0V	"	GND	"	0.4V		"	Q2	"		"		"		"
I_{OL2}	111	111	1.5V	1.5V	"	15.0V	"	"	"	GND	"	"	"			15.0V	Q1	3.4						
		112			"	GND	"	15.0V	"	"	"	"	"			"	Q1	"		"		"		"
		113			"	"	"	GND	"	"	"	15.0V	"		1.5V	"	Q2	"	2.4	"	4.2	"	"	"
		114			"	"	"	"	"	15.0V	"	GND	"	1.5V		"	Q2	"		"		"		"
I_{OH1}		115	4.6V	4.6V	"	"	"	5.0V	"	GND	"	"	"			5.0V	Q1	-0.51						
		116			"	5.0V	"	GND	"	"	"	"	"			"	Q1	"		"		"		"
		117			"	GND	"	"	"	5.0V	"	"	"		4.6V	"	Q2	"	-0.36	"	-0.64	"	"	"
		118			"	"	"	"	"	GND	"	5.0V	"	4.6V		"	Q2	"		"		"		"
I_{OH2}		119	13.5V	13.5V	"	"	"	15.0V	"	"	"	GND	"			15.0V	Q1	-3.4						
		120			"	15.0V	"	GND	"	"	"	"	"			"	Q1	"		"		"		"
		121			"	GND	"	"	"	15.0V	"	"	"		13.5V	"	Q2	"	-2.4	"	-4.2	"	"	"
		122			"	"	"	"	"	GND	"	15.0V	"	13.5V		"	Q2	"		"		"		"
I_{IH1} 6/	3010	123			18.0V	18.0V	18.0V	18.0V	"	18.0V	18.0V	18.0V	18.0V			18.0V	All inputs together		800.0					nA

See footnotes at end of device type 51.

TABLE III. Group A inspection for device type 51 – Continued.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
I_{IH2}	3010	124			18.0V	18.0V	18.0V	18.0V	GND	18.0V	18.0V	18.0V	18.0V			18.0V	CLK1							nA
"	"	125			"	"	"	"	"	"	"	"	"			"	RS1		"		"			"
"	"	126			"	"	"	"	"	"	"	"	"			"	D1	100.0	"	100.0	"			"
"	"	127			"	"	"	"	"	"	"	"	"			"	SET1		"		"			"
"	"	128			"	"	"	"	"	"	"	"	"			"	SET2		"		"			"
"	"	129			"	"	"	"	"	"	"	"	"			"	D2		"		"			"
"	"	130			"	"	"	"	"	"	"	"	"			"	RS2		"		"			"
"	"	131			"	"	"	"	"	"	"	"	"			"	CLK2		"		"			"
I_{IL1} 6/	3009	132			GND	GND	GND	GND	"	GND	GND	GND	GND			"	All inputs together							"
I_{IL2}	"	133			"	"	"	"	"	"	"	"	"			"	CLK1	-800.0						"
"	"	134			"	"	"	"	"	"	"	"	"			"	RS1		"		"			"
"	"	135			"	"	"	"	"	"	"	"	"			"	D1	-100.0	"	-100.0	"			"
"	"	136			"	"	"	"	"	"	"	"	"			"	SET1		"		"			"
"	"	137			"	"	"	"	"	"	"	"	"			"	SET2		"		"			"
"	"	138			"	"	"	"	"	"	"	"	"			"	D2		"		"			"
"	"	139			"	"	"	"	"	"	"	"	"			"	RS2		"		"			"
"	"	140			"	"	"	"	"	"	"	"	"			"	CLK2		"		"			"
																		Subgroup 4 T_A = 25°C						
																		Min	Max					
C_i	3012	141			7/				GND							GND	CLK1							pF
"	"	142				7/			"							"	RS1		"					"
"	"	143					7/		"							"	D1	12	"					"
"	"	144						7/	"							"	SET1		"					"
"	"	145							"	7/						"	SET2		"					"
"	"	146							"		7/					"	D2		"					"
"	"	147							"			7/				"	RS2		"					"
"	"	148							"				7/			"	CLK2		"					"
																		Subgroup 7 T_A = 25°C		Subgroup 8				
																				T_A = 125°C		T_A = -55°C		
																		Min	Max	Min	Max	Min	Max	
Truth table test	3014	149			5.0V	GND	GND	GND	GND	GND	GND	GND	5.0V			5.0V	None	See notes 8/ and 9/						
"	"	150			GND	"	"	"	"	"	"	"	GND			"	None							
"	"	151	L	H	5.0V	"	"	"	"	"	"	"	5.0V	H	L	"	All							
"	"	152	"	"	5.0V	"	5.0V	"	"	"	5.0V	"	5.0V	"	"	"	outputs							
"	"	153	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
"	"	154	H	L	5.0V	"	"	"	"	"	"	"	5.0V	L	H	"	"							
"	"	155	L	H	5.0V	5.0V	"	"	"	"	"	5.0V	5.0V	H	L	"	"							
"	"	156	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
"	"	157	"	"	5.0V	"	"	"	"	"	"	"	5.0V	"	"	"	"							
"	"	158	H	L	5.0V	GND	GND	5.0V	"	5.0V	GND	GND	5.0V	L	H	"	"							
"	"	159	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
"	"	160	"	"	5.0V	"	"	"	"	"	"	"	5.0V	"	"	"	"							
"	"	161	"	"	5.0V	"	"	GND	"	GND	"	"	5.0V	"	"	"	"							
"	"	162	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
"	"	163	L	H	5.0V	"	"	"	"	"	"	"	5.0V	H	L	"	"							
"	"	164	H	"	5.0V	5.0V	"	5.0V	"	5.0V	"	5.0V	5.0V	"	H	"	"							
"	"	165	"	"	GND	"	"	"	"	"	"	"	GND	"	"	"	"							
"	"	166	"	"	5.0V	"	"	"	"	"	"	"	5.0V	"	"	"	"							

See footnotes at end of device type 51.

TABLE III. Group A inspection for device type 51 – Continued.

Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
t_{PHL}	3003 (Fig. 6)	167	OUT		IN				GND							5.0V	CLK1 to Q1	13	500	18	750	13	500	ns
	"	168		OUT	IN				"							"	CLK1 to $\overline{Q1}$	"	"	"	"	"	"	"
	"	169							"				IN		OUT	"	CLK2 to Q2	"	"	"	"	"	"	"
	"	170							"				IN	OUT		"	CLK2 to $\overline{Q2}$	"	"	"	"	"	"	"
t_{PHL} R or S	3003 (Fig. 7)	171		OUT		IN		IN	"							"	SET1 to Q1	13	550	18	825	13	550	"
	"	172	OUT						"							"	RS1 to $\overline{Q1}$	"	"	"	"	"	"	"
	"	173							"	IN				OUT		"	SET2 to Q2	"	"	"	"	"	"	"
	"	174							"			IN			OUT	"	RS2 to Q2	"	"	"	"	"	"	"
t_{PLH}	3003 (Fig. 6)	175	OUT		IN				"							"	CLK1 to $\overline{Q1}$	"	"	"	"	"	"	"
	"	176		OUT	IN				"							"	CLK1 to Q1	"	"	"	"	"	"	"
	"	177							"				IN		OUT	"	CLK2 to $\overline{Q2}$	"	"	"	"	"	"	"
	"	178							"				IN	OUT		"	CLK2 to Q2	"	"	"	"	"	"	"
t_{PLH} R or S	3003 (Fig. 7)	179	OUT						"							"	SET1 to $\overline{Q1}$	13	420	18	630	13	420	"
	"	180		OUT		IN		IN	"							"	RS1 to Q1	"	"	"	"	"	"	"
	"	181							"	IN					OUT	"	SET2 to $\overline{Q2}$	"	"	"	"	"	"	"
	"	182							"			IN		OUT		"	RS2 to Q2	"	"	"	"	"	"	"
t_{THL}	3004 (Fig. 6)	183	OUT		IN				"							"	$\overline{Q1}$	10	300	14	450	10	300	"
	"	184		OUT	IN				"							"	Q1	"	"	"	"	"	"	"
	"	185							"				IN		OUT	"	$\overline{Q2}$	"	"	"	"	"	"	"
	"	186							"				IN	OUT		"	Q2	"	"	"	"	"	"	"
t_{TLH}	"	187		OUT	IN				"							"	$\overline{Q1}$	10	350	14	525	10	350	"
	"	188	OUT		IN				"							"	Q1	"	"	"	"	"	"	"
	"	189							"				IN	OUT		"	$\overline{Q2}$	"	"	"	"	"	"	"
	"	190							"				IN		OUT	"	Q2	"	"	"	"	"	"	"
$f_{CL(MAX)}$ 10/	(Fig. 6)	191	OUT		IN				"							"	CLK1							µs
	"	192							"				IN		OUT	"	CLK2		0.67		1.0		0.67	"
t_{TLHCL} (max) 11/	"	193	OUT		IN				"							"	CLK1	15		15		10		
	"	194							"				IN		OUT	"	CLK2	15		15		10		"
t_p 12/	"	195	OUT		IN				"							"	CLK1							ns
	"	196							"				IN		OUT	"	CLK2		300		450		300	"
t_{SHL}	(Fig.8)	197			IN		IN		"							"	D1 to CLK1	300	165	450		300		"
t_{SHL}	"	198							"		IN		IN			"	D2 to CLK2		"		"		"	"
t_{SLH}	"	199			IN		IN		"							"	D1 to CLK1		"	225		165		"
t_{SLH}	"	200							"		IN		IN			"	D2 to CLK2		"		"		"	"

See footnotes at end of device type 51.

TABLE III. Group A inspection for device type 51 – Continued.

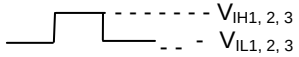
Symbol	MIL-STD-883 method	Cases A,C,D, T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			Q1	$\overline{Q1}$	CLK1	RS1	D1	SET1	V_{SS}	SET2	D2	RS2	CLK2	$\overline{Q2}$	Q2	V_{DD}		Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max	
t_{HHL}	(Fig. 9)	201			IN		IN		GND							5.0V	D1 to CLK1		150					ns
t_{HHL}	"	202							"		IN		IN			"	D2 to CLK2		"		"		"	"
t_{HLH}	"	203			IN		IN		"							"	D1 to CLK1			225		150		"
t_{HLH}	"	204							"		IN		IN			"	D2 to CLK2		"		"		"	"

1/ Pins not designated may be "high" level logic, "low" level logic, or open. Exceptions are as follows: $V_{IC(pos)}$ tests, the V_{SS} terminal shall be open; $V_{IC(neg)}$ tests, the V_{DD} terminal shall be open; I_{SS} tests, the output terminals shall be open.

2/ Test numbers 17 thru 38 shall be run in sequence.

3/ For input conditions, see figure 6.

4/ For input conditions, see figure 7.

5/ Apply a clock pulse 

6/ The device manufacturer may, at his option, measure I_{IL} and I_{IH} at 25°C for each individual input or measure all inputs together.

7/ See 4.4.1c.

8/ Test numbers 144 thru 166 shall be run in sequence and the functional tests shall be performed with V_{IH} and $V_{DD} \leq 5.0$ V and ≥ 18.0 V.

9/ L = V_{SS} + 0.5 V maximum and H = V_{DD} – 0.5 V minimum.

10/ The maximum clock frequency (f_{CL}) requirement is considered met if proper output state changes occur with the pulse repetition period set to that given in the limits column.

11/ Pulse repetition period = 100 μs, 50 percent duty cycle. The maximum clock transition time (t_{TLHCL}) requirement is considered met if proper output state changes occur with the rise time set to that given in the limits column.

12/ The minimum clock pulse width (t_p) requirement is considered met if proper output state changes occur with the pulse width set to that given in the limits column.

TABLE III. Group A inspection for device type 52.

Symbol	MIL-STD-883 test method	Cases E,F,N,Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
$V_{IC(pos)}$	1	2				1mA			1mA									GND	SET2							V
		3						1mA										"	RS2		"					"
		4					1mA											"	J2	1.5	"					"
		5			1mA													"	K2		"					"
		6									1mA							"	CLK2		"					"
		7												1mA				"	SET1		"					"
		8										1mA						"	RS1		"					"
		9											1mA					"	J1		"					"
		10													1mA			"	K1		"					"
																			CLK1		"					"
$V_{IC(neg)}$	11	12				-1mA			-1mA	GND									SET2		"					"
		13						-1mA		"									RS2		"					"
		14					-1mA			"									J2	-6	"					"
		15			-1mA					"									K2		"					"
		16								"	-1mA								CLK2		"					"
		17								"		-1mA							SET1		"					"
		18								"				-1mA					RS1		"					"
		19								"			-1mA						J1		"					"
		20								"					-1mA				K1		"					"
																			CLK1		"					"
I_{SS} 2/		21			GND	18.0V	18.0V	18.0V	GND	"	GND	GND	GND	GND	GND			18.0V	V_{SS}	-0.25	"	-2.5	"			µA
		22			18.0V	18.0V	"	"	"	"	"	"	"	"	"			"	None		"		"			"
		23			18.0V	GND	"	"	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
		24			GND	"	"	"	"	"	"	"	"	"	"			"	None		"		"			"
		25			18.0V	"	"	"	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
		26			"	"	GND	GND	"	"	"	"	"	"	"			"	V_{SS}		"		"			"
		27			"	18.0V	"	"	18.0V	"	"	"	"	"	"			"	V_{SS}		"		"			"
		28			GND	GND	"	"	GND	"	"	18.0V	18.0V	18.0V	"			"	V_{SS}		"		"			"
		29			"	"	"	"	"	"	"	"	"	18.0V	18.0V			"	None		"		"			"
		30			"	"	"	"	"	"	"	"	"	GND	18.0V			"	V_{SS}		"		"			"
		31			"	"	"	"	"	"	"	"	"	"	GND			"	None		"		"			"
		32			"	"	"	"	"	"	"	"	"	"	18.0V			"	V_{SS}		"		"			"
		33			"	"	"	"	"	"	"	GND	GND	"	"			"	V_{SS}		"		"			"
		34			"	"	"	"	"	"	18.0V	"	"	18.0V	"			"	V_{SS}		"		"			"
V_{OH5}	3006	35			"	"	"	"	15.0V	"	GND	"	"	GND	GND			15.0V	Q2	14.95							"
	"	36			"	15.0V	"	"	GND	"	GND	"	"	"	"			"	Q2	"		"		"			"
	"	37			"	GND	"	"	"	"	15.0V	"	"	"	"			"	Q1	"	14.95	"	14.95	"	V		"
	"	38			"	GND	"	"	"	"	GND	"	"	15.0V	"			"	Q1	"		"		"			"
$V_{OL.5}$	3007	39			"	15.0V	"	"	"	"	"	"	"	GND	"			"	Q2								"
	"	40			"	GND	"	"	15.0V	"	"	"	"	GND	"			"	Q2		"		"				"
	"	41			"	"	"	"	GND	"	"	"	"	15.0V	"			"	Q1	0.05	"	0.05	"	0.05	"		"
	"	42			"	"	"	"	GND	"	15.0V	"	"	GND	"			"	Q1		"		"				"
V_{OH6}	3006	43			3/	"	15.0V	"	3/	"	GND	"	"	"	"			"	Q2	14.95		14.95		14.95			"
V_{OL6}	3007	44			3/	"	15.0V	"	3/	"	GND	"	"	"	"			"	Q2		0.05		0.05		0.05		"
V_{OH6}	3006	45			GND	"	GND	"	GND	"	3/	"	15.0V	"	3/			"	Q1	14.95		14.95		14.95			"

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{OL6}	3007	46			GND	GND	GND	GND	GND	GND	3/	GND	15.0V	GND	3/			15.0V	Q1							V
	3007	47			3/	"	"	15.0V	3/	"	GND	"	GND	"	GND			"	Q2		0.05		0.05		0.05	"
V_{OH6}	3006	48			3/	"	"	15.0V	3/	"	GND	"	"	"	GND			"	Q2	14.95		14.95		14.95		"
V_{OL6}	3007	49			GND	"	"	GND	GND	"	3/	15.0V	"	"	3/			"	$\overline{Q1}$		0.05		0.05		0.05	"
V_{OH6}	3006	50			GND	"	"	GND	GND	"	3/	15.0V	"	"	3/			"	Q1	14.95		14.95		14.95		"
V_{ICL3}					4/	4/	4/	4/	"	"	GND	GND						"	CLK2		4/		4/		4/	"
V_{ICL3}		52			4/	4/	4/	4/	"	"	"	GND						"	CLK2	4/		4/		4/		"
V_{ICL4}	51				GND	GND	GND	GND	"	"	"	4/	4/	4/	4/			"	CLK1		4/		4/		4/	"
V_{ICL4}		54			"	GND	"	"	"	"	"	4/	4/	4/	4/			"	CLK1	4/		4/		4/		"
V_{IH1}	53				"	1.5V	"	"	3.5V	"	"	GND	GND	GND	GND			5.0V	Q2	4.5		"		"		
		56			"	3.5V	"	"	1.5V	"	"	"	"	"	"			"	Q2	"		"		"		"
		57			5/	1.5V	1.5V	3.5V	"	"	"	"	"	"	"			"	Q2	"	4.5	"	4.5	"	"	"
	55	58			5/	1.5V	3.5V	1.5V	"	"	"	"	"	"	"			"	Q2	"		"		"	"	"
		59			GND	GND	GND	GND	GND	"	3.5V	"	"	1.5V	"			"	Q1	"		"		"		"
		60			"	"	"	"	"	"	1.5V	"	"	3.5V	"			"	Q1	"		"		"		"
		61			"	"	"	"	"	"	"	3.5V	1.5V	1.5V	5/			"	Q1	"		"		"		"
		62			"	"	"	"	"	"	"	1.5V	3.5V	1.5V	5/			"	Q1	"		"		"		"
V_{IH2}					"	3.0V	"	"	7.0V	"	GND	GND	GND	GND	GND			10.0V	Q2	9.0		"		"		
		64			"	7.0V	"	"	3.0V	"	"	"	"	"	"			"	Q2	"		"		"		"
		65			5/	3.0V	3.0V	7.0V	"	"	"	"	"	"	"			"	Q2	"	9.0	"	9.0	"	"	"
	63	66			5/	3.0V	7.0V	3.0V	"	"	"	"	"	"	"			"	Q2	"		"		"	"	"
		67			GND	GND	GND	GND	GND	"	7.0V	"	"	3.0V	"			"	Q1	"		"		"		"
		68			"	"	"	"	"	"	3.0V	"	"	7.0V	"			"	Q1	"		"		"		"
		69			"	"	"	"	"	"	"	7.0V	3.0V	3.0V	5/			"	Q1	"		"		"		"
		70			"	"	"	"	"	"	"	3.0V	7.0V	3.0V	5/			"	Q1	"		"		"		"
V_{IH3}					"	4.0V	"	"	11.0V	"	GND	GND	GND	GND	GND			15.0V	Q2	13.5		"		"		
		72			"	11.0V	"	"	4.0V	"	"	"	"	"	"			"	Q2	"		"		"		"
		73			5/	4.0V	4.0V	11.0V	"	"	"	"	"	"	"			"	Q2	"	13.5	"	13.5	"	"	"
	71	74			5/	4.0V	11.0V	4.0V	"	"	"	"	"	"	"			"	Q2	"		"		"	"	"
		75			GND	GND	GND	GND	GND	"	11.0V	"	"	4.0V	"			"	Q1	"		"		"		"
		76			"	"	"	"	"	"	4.0V	"	"	11.0V	"			"	Q1	"		"		"		"
		77			"	"	"	"	"	"	"	11.0V	4.0V	4.0V	5/			"	Q1	"		"		"		"
		78			"	"	"	"	"	"	"	4.0V	11.0V	4.0V	5/			"	Q1	"		"		"		"
V_{IL1}					"	3.5V	"	"	1.5V	"	GND	GND	GND	GND	GND			5.0V	Q2							"
		80			"	1.5V	"	"	3.5V	"	"	"	"	"	"			"	Q2		"		"		"	"
		81			5/	"	3.5V	1.5V	1.5V	"	"	"	"	"	"			"	Q2	0.05	"	0.05	"	0.05	"	"
	79	82			5/	"	1.5V	3.5V	1.5V	"	"	"	"	"	"			"	Q2		"		"		"	"
		83			GND	GND	GND	GND	GND	"	1.5V	"	"	3.5V	"			"	Q1		"		"		"	"
		84			"	"	"	"	"	"	3.5V	"	"	1.5V	"			"	Q1		"		"		"	"
		85			"	"	"	"	"	"	1.5V	1.5V	3.5V	"	5/			"	Q1		"		"		"	"
		86			"	"	"	"	"	"	1.5V	3.5V	1.5V	"	5/			"	Q1		"		"		"	"

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IL2}		87			GND	7.0V	GND	GND	3.0V	GND	GND	GND	GND	GND	GND			10.0V	Q2							V
		88			GND	3.0V	GND	GND	7.0V	"	"	"	"	"	"			"	Q2							"
		89			5/	"	7.0V	3.0V	3.0V	"	"	"	"	"	"			"	Q2	1.0	"	1.0	"	1.0	"	"
		90			5/	"	3.0V	7.0V	3.0V	"	"	"	"	"	"			"	Q2		"		"		"	"
		91			GND	GND	GND	GND	GND	"	3.0V	"	"	7.0V	"			"	Q1		"		"		"	"
		92			"	"	"	"	"	"	7.0V	"	"	3.0V	"			"	Q1		"		"		"	"
		93			"	"	"	"	"	"	3.0V	3.0V	7.0V	"	5/			"	Q1		"		"		"	"
		94			"	"	"	"	"	"	3.0V	7.0V	3.0V	"	5/			"	Q1		"		"		"	"
V_{IL3}		95			"	11.0V	"	"	4.0V	"	GND	GND	GND	GND	GND			15.0V	Q2							"
		96			"	4.0V	"	"	11.0V	"	"	"	"	"	"			"	Q2		"		"		"	"
		97			5/	"	11.0V	4.0V	4.0V	"	"	"	"	"	"			"	Q2	1.5	"	1.5	"	1.5	"	"
		98			5/	"	4.0V	11.0V	4.0V	"	"	"	"	"	"			"	Q2		"		"		"	"
		99			GND	GND	GND	GND	GND	"	4.0V	"	"	11.0V	"			"	Q1		"		"		"	"
		100			"	"	"	"	"	"	11.0V	"	"	4.0V	"			"	Q1		"		"		"	"
		101			"	"	"	"	"	"	4.0V	4.0V	11.0V	"	5/			"	Q1		"		"		"	"
		102			"	"	"	"	"	"	4.0V	11.0V	4.0V	"	5/			"	Q1		"		"		"	"
I_{OL1}			0.4V		"	5.0V	"	"	"	"	GND	GND	GND	GND	GND			5.0V	Q2	0.51		"		"		"
		104		0.4V	"	GND	"	"	5.0V	"	"	"	"	GND	"			"	Q2	"		"		"		"
		105			"	"	"	"	GND	"	"	"	"	5.0V	"		0.4V	"	Q1	"	0.36	"	0.64	"	mA	"
	103	106			"	"	"	"	"	"	5.0V	"	"	GND	"	0.4V		"	Q1	"		"		"		"
I_{OL2}			1.5V		"	15.0V	"	"	"	"	GND	"	"	"	"			15.0V	Q2	3.4		"		"		"
		108		1.5V	"	GND	"	"	15.0V	"	"	"	"	"	"			"	Q2	"		"		"		"
		109			"	"	"	"	GND	"	"	"	"	15.0V	"		1.5V	"	Q1	"	2.4	"	4.2	"	"	"
	107	110			"	"	"	"	"	"	15.0V	"	"	GND	"	1.5V		"	Q1	"		"		"		"
I_{OH1}		111	4.6V		"	"	"	"	5.0V	"	GND	"	"	"	"			5.0V	Q2	-0.51		"		"		"
		112		4.6V	"	5.0V	"	"	GND	"	GND	"	"	"	"			"	Q2	"		"		"		"
		113			"	GND	"	"	"	"	5.0V	"	"	"	"		4.6V	"	Q1	"	-0.36	"	-0.64	"	"	"
		114			"	"	"	"	"	"	GND	"	"	5.0V	"	4.6V		"	Q1	"		"		"		"
I_{OH2}		115	13.5V		"	"	"	"	15.0V	"	"	"	"	GND	"			15.0V	Q2	-3.4		"		"		"
		116		13.5V	"	15.0V	"	"	GND	"	"	"	"	"	"			"	Q2	"		"		"		"
		117			"	GND	"	"	"	"	15.0V	"	"	"	"		13.5V	"	Q1	"	-2.4	"	-4.2	"	"	"
		118			"	GND	"	"	"	"	GND	"	"	15.0V	"	13.5V		"	Q1	"		"		"		"
I_{IH1} 6/	3010	119			18.0V	18.0V	18.0V	18.0V	18.0V	"	18.0V	18.0V	18.0V	18.0V	18.0V			18.0V	All inputs together	1000.0						nA
I_{IH2}	"	120			"	"	"	"	"	"	"	"	"	"	"			"	CLK2							"
	"	121			"	"	"	"	"	"	"	"	"	"	"			"	RS2		"		"			"
	"	122			"	"	"	"	"	"	"	"	"	"	"			"	K2	100.0	"	100.0	"			"
	"	123			"	"	"	"	"	"	"	"	"	"	"			"	J2		"		"			"
	"	124			"	"	"	"	"	"	"	"	"	"	"			"	SET2		"		"			"
	"	125			"	"	"	"	"	"	"	"	"	"	"			"	SET1		"		"			"
	"	126			"	"	"	"	"	"	"	"	"	"	"			"	J1		"		"			"
	"	127			"	"	"	"	"	"	"	"	"	"	"			"	K1		"		"			"
	"	128			"	"	"	"	"	"	"	"	"	"	"			"	RS1		"		"			"
	"	129			"	"	"	"	"	"	"	"	"	"	"			"	CLK1		"		"			"

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
I_{IL1} 6/	3009	130			GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND			18.0V	All inputs together	-1000						nA
I_{IL2}	"	131			"	"	"	"	"	"	"	"	"	"	"			"	CLK2	-100	"	-100	"			"
	"	132			"	"	"	"	"	"	"	"	"	"	"			"	RS2		"		"			"
	"	133			"	"	"	"	"	"	"	"	"	"	"			"	K2		"		"			"
	"	134			"	"	"	"	"	"	"	"	"	"	"			"	J2		"		"			"
	"	135			"	"	"	"	"	"	"	"	"	"	"			"	SET2		"		"			"
	"	136			"	"	"	"	"	"	"	"	"	"	"			"	SET1		"		"			"
	"	137			"	"	"	"	"	"	"	"	"	"	"			"	J1		"		"			"
	"	138			"	"	"	"	"	"	"	"	"	"	"			"	K1		"		"			"
	"	139			"	"	"	"	"	"	"	"	"	"	"			"	RS1		"		"			"
	"	140			"	"	"	"	"	"	"	"	"	"	"			"	CLK1		"		"			"
																				Subgroup 4 T_A = 25°C						
																				Min	Max					
C_i	3012	141			7/					GND								GND	CLK2	12	"	pF				"
	"	142				7/				"								"	RS2		"					"
	"	143					7/			"								"	K2		"					"
	"	144						7/		"								"	J2		"					"
	"	145							7/	"								"	SET2		"					"
	"	146								"	7/							"	SET1		"					"
	"	147								"		7/						"	J1		"					"
	"	148								"			7/					"	K1		"					"
	"	149								"				7/				"	RS1		"					"
	"	150								"					7/			"	CLK1		"					"
																				Subgroup 7 T_A = 25°C		Subgroup 8				
																						T_A = 125°C		T_A = -55°C		
																				Min	Max	Min	Max	Min	Max	
Truth table test	3014	151			5.0V	GND	5.0V	GND	GND	GND	GND	GND	5.0V	GND	5.0V			5.0V	None	See 8/ and 9/						
	"	152			GND	"	"	"	"	"	"	"	"	"	GND			"	None							
	"	153	L	H	5.0V	"	"	"	"	"	"	"	"	"	5.0V	H	L	"	All							
	"	154	"	"	5.0V	"	GND	"	"	"	"	"	GND	"	5.0V	"	"	"	outputs							
	"	155	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	156	"	"	5.0V	"	"	"	"	"	"	"	"	"	5.0V	"	"	"	"							
	"	157	"	"	5.0V	"	"	5.0V	"	"	"	5.0V	"	"	5.0V	"	"	"	"							
	"	158	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	159	H	L	5.0V	"	"	"	"	"	"	"	"	"	5.0V	L	H	"	"							
	"	160	"	"	5.0V	"	"	GND	"	"	"	GND	"	"	5.0V	"	"	"	"							
	"	161	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	162	"	"	5.0V	"	"	"	"	"	"	"	"	"	5.0V	"	"	"	"							
	"	163	"	"	5.0V	"	5.0V	5.0V	"	"	"	5.0V	5.0V	"	5.0V	"	"	"	"							
	"	164	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	165	L	H	5.0V	"	"	"	"	"	"	"	"	"	5.0V	H	L	"	"							
	"	166	H	L	5.0V	"	"	GND	5.0V	"	5.0V	GND	"	"	5.0V	L	H	"	"							
	"	167	H	L	GND	"	"	"	5.0V	"	5.0V	"	"	"	GND	L	H	"	"							
	"	168	L	H	GND	5.0V	GND	"	GND	"	GND	"	GND	5.0V	GND	H	L	"	"							
	"	169	L	H	5.0V	5.0V	GND	"	GND	"	GND	"	GND	5.0V	5.0V	H	L	"	"							

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N,Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 7		Subgroup 8				
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		T_A = 25°C		T_A = 125°C		T_A = -55°C		
Truth table test	3014	170	H	L	5.0V	GND	GND	GND	5.0V	GND	5.0V	GND	GND	GND	5.0V	L	H	5.0V	All outputs	See 8/ and 9/						
	"	171	"	"	5.0V	"	5.0V	"	GND	"	GND	"	5.0V	"	5.0V	"	"	"	"							
	"	172	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	173	L	H	5.0V	"	"	"	"	"	"	"	"	"	5.0V	H	L	"	"							
	"	174	"	"	5.0V	"	"	5.0V	"	"	"	5.0V	"	"	5.0V	"	"	"	"							
	"	175	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	176	H	L	5.0V	"	"	"	"	"	"	"	"	"	5.0V	L	H	"	"							
	"	177	L	H	5.0V	5.0V	"	"	"	"	"	"	"	5.0V	5.0V	H	L	"	"							
	"	178	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	179	"	"	5.0V	"	"	"	"	"	"	"	"	"	5.0V	"	"	"	"							
	"	180	H	"	5.0V	"	GND	GND	5.0V	"	5.0V	GND	GND	"	5.0V	"	H	"	"							
	"	181	"	"	GND	"	"	"	"	"	"	"	"	"	GND	"	"	"	"							
	"	182	"	"	5.0V	"	"	"	"	"	"	"	"	"	5.0V	"	"	"	"							
																				Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
																				Min	Max	Min	Max	Min	Max	
t_{PHL}	3003	183	OUT		IN					GND								5.0V	CLK2 to Q2	13	575	18	865	13	575	ns
	Fig.	184		OUT	IN					"								"	CLK2 to Q2	"	"	"	"	"	"	"
	12	185								"					IN		OUT	"	CLK1 to Q1	"	"	"	"	"	"	"
	"	186								"					IN	OUT		"	CLK1 to Q1	"	"	"	"	"	"	"
t_{PHL}	3003	187	OUT							"								"	RS2 to Q2	13	600	18	900	13	600	"
R or S	Fig.	188		OUT					IN	"								"	SET2 to Q2	"	"	"	"	"	"	"
	13	189								"				IN			OUT	"	RS1 to Q1	"	"	"	"	"	"	"
	"	190			IN					"	IN					OUT		"	SET1 to Q1	"	"	"	"	"	"	"
t_{PLH}	3003	191	OUT		IN					"								"	CLK2 to Q2	13	625	18	940	13	625	"
	Fig.	192		OUT	IN					"								"	CLK2 to Q2	"	"	"	"	"	"	"
	12	193								"					IN		OUT	"	CLK1 to Q1	"	"	"	"	"	"	"
	"	194								"					IN	OUT		"	CLK1 to Q1	"	"	"	"	"	"	"
t_{PLH}	3003	195	OUT						IN	"								"	SET2 to Q2	13	400	18	600	13	400	"
R or S	Fig.	196		OUT		IN				"								"	RS2 to Q2	"	"	"	"	"	"	"
	13	197								"	IN						OUT	"	SET1 to Q1	"	"	"	"	"	"	"
	"	198								"				IN		OUT		"	RS1 to Q1	"	"	"	"	"	"	"
t_{THL}	3004	199	OUT		IN					"								"	Q2	10	325	14	490	10	325	"
	Fig.	200		OUT	IN					"								"	Q2	"	"	"	"	"	"	"
	12	201								"					IN		OUT	"	Q1	"	"	"	"	"	"	"
	"	202								"					IN	OUT		"	Q1	"	"	"	"	"	"	"
t_{TLH}	"	203	OUT		IN					"								"	Q2	"	"	"	"	"	"	"
	"	204		OUT	IN					"								"	Q2	"	"	"	"	"	"	"
	"	205								"					IN		OUT	"	Q1	"	"	"	"	"	"	"
	"	206								"					IN	OUT		"	Q1	"	"	"	"	"	"	"
$f_{CL(max)}$	"	207	OUT		IN					"								"	CLK2							µs
10/	"	208								"					IN		OUT	"	CLK1		1.0		1.4		1.0	"
																				1.0		1.4		1.0		

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 – Continued.

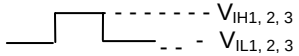
Symbol	MIL-STD-883 test method	Cases E,F,N, Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
		Test no.	Q2	$\overline{Q2}$	CLK2	RS2	K2	J2	SET2	V_{SS}	SET1	J1	K1	RS1	CLK1	$\overline{Q1}$	Q1	V_{DD}		Min	Max	Min	Max	Min	Max	
t_{TLHCL} 11/	Fig. 12	209	OUT		IN					GND								5.0V	CLK2	15						µs
	"	210								"					IN		OUT	"	CLK1	15		15		10		µs
t_p 12/	"	211	OUT		IN					"								"	CLK2		15		10			ns
	"	212								"					IN		OUT	"	CLK1		300		450		300	ns
t_{SHL}	Fig. 14	213	OUT				IN			"								"	K2 to CLK2	300		450		300		"
	"	214	OUT		IN			IN		"								"	J2 to CLK2		"		"		"	"
	"	215								"			IN		IN		OUT	"	K1 to CLK1	165	"	225	"	165	"	"
	"	216		IN						"		IN			IN		OUT	"	J1 to CLK1		"		"		"	"
t_{SLH}	"	217	OUT				IN			"								"	K2 to CLK2							"
	"	218	OUT		IN			IN		"								"	J2 to CLK2		"		"		"	"
	"	219								"			IN		IN		OUT	"	K1 to CLK1		"		"		"	"
	"	220		IN						"		IN			IN		OUT	"	J1 to CLK1	"	"	"	"	"	"	"
t_{HLH}	"	221	OUT				IN			"								"	K2 to CLK2							"
	"	222	OUT		IN			IN		"								"	J2 to CLK2		"		"		"	"
	"	223								"			IN		IN		OUT	"	K1 to CLK1	150	"	"	"	150	"	"
	"	224		IN						"		IN			IN		OUT	"	J1 to CLK1		"		"		"	"
t_{HHL}	"	225	OUT				IN			"								"	K2 to CLK2							"
	"	226	OUT		IN			IN		"								"	J2 to CLK2		"		"		"	"
	"	227								"			IN		IN		OUT	"	K1 to CLK1		"		"		"	"
	"	228		IN						"		IN			IN		OUT	"	J1 to CLK1	"	"	"	"	"	"	"

1/ Pins not designated may be "high" level logic, "low" level logic, or open. Exceptions are as follows: $V_{IC(pos)}$ tests, the V_{SS} terminal shall be open; $_{IC(neg)}$ tests, the V_{DD} terminal shall be open; I_{SS} tests, the output terminal shall be open.
V

2/ Test numbers 21 thru 34 shall be run in sequence.

3/ For input voltage conditions, see figure 10.

4/ For input voltage conditions, see figure 11.

5/ Apply a clock pulse 

6/ The device manufacturer may, at his option, measure I_{IL} and I_{IH} at °C for each individual input or measure all inputs together.

25
7/ See 4.4.1c.

8/ Test numbers 151 thru 182 shall be run in sequence and the functional tests shall be performed with V_{IH} and $V_{DD} \leq 5.0$ V and ≥ 18.0 V.

9/ L = V_{SS} + 0.5 V maximum and H = V_{DD} – 0.5 V minimum.

10/ The maximum clock frequency (f_{CL}) requirement is considered met if proper output state changes occur with the pulse repetition period set to that given in the limits column.

11/ Pulse repetition period = 100 µs, 50 percent duty cycle. The maximum clock transition time (t_{TLHCL}) requirement is considered met if proper output state changes occur with the rise time set to that given in the limits column.

12/ The minimum clock pulse width (t_p) requirement is considered met if proper output state changes occur with the pulse width set to that given in the limits column.

TABLE III. Group A inspection for device type 53.

Symbol	MIL-STD-883 test method	Cases E,F,N,Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q4	Q1	R1	S1	E	S2	R2	V_{SS}	Q2	Q3	R3	S3	NC	S4	R4	V_{DD}		Min	Max	Min	Max	Min	Max	
$V_{IC(pos)}$	1	2 3 4 5 6 7 8 9			1mA	1mA	1mA	1mA	1mA				1mA	1mA		1mA	1mA	GND “ “ “ “ “ “ “ “	R1 S1 E S2 R2 R3 S3 S4 R4	1.5	“ “ “ “ “ “ “ “					V “ “ “ “ “ “ “ “
$V_{IC(neg)}$	10	11 12 13 14 15 16 17 18			-1mA	-1mA	-1mA	-1mA	-1mA	GND “ “ “ “ “ “ “			-1mA	-1mA		-1mA	-1mA	R1	S1 E S2 R2 R3 S3 S4 R4	-6	“ “ “ “ “ “ “ “					“ “ “ “ “ “ “ “
I_{SS} 2/	19	20 21 22 23 24			GND GND 18.0V GND 18.0V GND	18.0V GND “ “ 18.0V GND	18.0V “ “ “ GND	18.0V GND “ “ 18.0V GND	GND GND 18.0V GND 18.0V GND	“ “ “ “ “ “			GND GND 18.0V GND 18.0V GND	18.0V GND “ “ 18.0V GND	18.0V	GND “ “ “ 18.0V GND	GND GND 18.0V GND 18.0V GND	18V “ “ “ “ “	V_{SS} “ “ “ “ “	-1.0	“ “ “ “ “	-2.5	“ “ “ “ “			µA “ “ “ “ “
V_{OH5}	3006 “ “	25 26 27 28			“ “ “ “	15.0V GND “ “	15.0V “ “ “	GND 15.0V GND GND	“ “ “ “	“ “ “ “			“ “ “ “	“ “ 15.0V GND	“	“ “ “ 15.0V	“ “ “ “	15.0V “ “ “	Q1 Q2 Q3 Q4	14.95 “ “	14.95	“ “ “	14.95	“ “ “	V	“ “ “
V_{OL5}	3007 “ “	29 30 31 32			15.0V “ “ “	“ 15.0V “ “	“ “ “ “	15.0V GND 15.0V 15.0V	15.0V “ “ “	“ “ “ “			15.0V “ “ “	15.0V 15.0V GND 15.0V	“	“ “ “ GND	15.0V “ “ “	“ “ “ “	Q1 Q2 Q3 Q4	0.05	“ “	0.05	“ “	0.05	“ “	“ “ “ “
V_{IH1}	33	34 35 36 37 38 39 40			1.5V 3.5V GND “ “ “ “	3.5V 3.5V GND “ “ “ “	3.5V “ “ “ “ “ “	GND GND 3.5V 3.5V GND “ “	GND GND 1.5V 3.5V GND “ “	“ “ “ “ “ “ “			GND “ “ “ 1.5V 3.5V GND “	GND “ “ “ 3.5V 3.5V GND “	“	“ “ “ “ “ 3.5V 3.5V	GND “ “ “ “ 1.5V 3.5V	5.0V “ “ “ “ “ “	Q1 Q1 Q2 Q2 Q3 Q3 Q4 Q4	4.5 “ “ “ “ “ “ “	4.5	“ “ “ “ “ “ “ “	4.5	“ “ “ “ “ “ “ “	“	“ “ “ “ “ “ “ “
V_{IH2}	41	42 43 44 45 46 47 48			3.0V 7.0V GND “ “ “ “	7.0V 7.0V GND “ “ “ “	7.0V “ “ “ “ “ “	“ “ 7.0V 7.0V GND “ “	“ “ 3.0V 7.0V GND “ “	“ “ “ “ “ “ “			“ “ “ 3.0V 7.0V GND “	“ “ “ 7.0V 7.0V GND “	GND	“ “ “ “ “ 7.0V 7.0V	GND “ “ “ “ 3.0V 7.0V	10.0V “ “ “ “ “ “	Q1 Q1 Q2 Q2 Q3 Q3 Q4 Q4	9.0 “ “ “ “ “ “ “	9.0	“ “ “ “ “ “ “ “	9.0	“ “ “ “ “ “ “ “	“	“ “ “ “ “ “ “ “

See footnotes at end of device type 53.

TABLE III. Group A inspection for device type 53 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N,Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q4	Q1	R1	S1	E	S2	R2	V_{SS}	Q2	Q3	R3	S3	NC	S4	R4	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IH3}	49	50			4.0V	11.0V	11.0V	GND	GND	GND			GND	GND	GND		GND	15.0V	Q1	13.5	13.5	"	13.5	"	V	"
		51			11.0V	11.0V	"	GND	GND	"			"	"		"	"	"	Q1	"		"		"		"
		52			GND	GND	"	11.0V	4.0V	"			"	"	GND	"	"	"	Q2	"		"		"		"
		53			"	"	"	11.0V	11.0V	"			"	"		"	"	"	Q2	"		"		"		"
		54			"	"	"	GND	GND	"			4.0V	11.0V		"	"	"	Q3	"		"		"		"
		55			"	"	"	"	"	"			11.0V	11.0V		"	"	"	Q3	"		"		"		"
		56			"	"	"	"	"	"			GND	GND		11.0V	4.0V	"	Q4	"		"		"		"
																11.0V	11.0V		Q4	"		"		"		"
V_{IL1}	57	58			3.5V	1.5V	3.5V	"	"	"			"	"		GND	GND	5.0V	Q1							"
		59			GND	GND	"	1.5V	3.5V	"			"	"		"	"	"	Q2		"		"		"	"
		60			"	"	"	GND	GND	"			3.5V	1.5V		"	"	"	Q3	0.5	"	0.5	"	0.5	"	"
								"	"	"			GND	GND		1.5V	3.5V	"	Q4		"		"		"	"
V_{IL2}	61	62			7.0V	3.0V	7.0V	"	"	"			"	"		GND	GND	10.0V	Q1							"
		63			GND	GND	"	3.0V	7.0V	"			"	"		"	"	"	Q2		"		"		"	"
		64			"	"	"	GND	GND	"			7.0V	3.0V		"	"	"	Q3	1.0	"	1.0	"	1.0	"	"
								"	"	"			GND	GND		3.0V	7.0V	"	Q4		"		"		"	"
V_{IL3}		65			11.0V	4.0V	11.0V	"	"	"			"	"		GND	GND	15.0V	Q1							"
		66			GND	GND	"	4.0V	11.0V	"			"	"		"	"	"	Q2		"		"		"	"
		67			"	"	"	GND	GND	"			11.0V	4.0V		"	"	"	Q3	1.5	"	1.5	"	1.5	"	"
		68			"	"	"	"	"	"			GND	GND		4.0V	11.0V	"	Q4		"		"		"	"
I_{OL1}		69		0.4V	5.0V	"	5.0V	"	"	"			"	"			GND	5.0V	Q1	0.51						"
		70			GND	"	"	"	5.0V	"	0.4V		"	"		"	"	"	Q2	"		"		"		"
		71			"	"	"	"	GND	"		0.4V	5.0V	"	GND	"	"	"	Q3	"	0.36	"	0.64	"	mA	"
		72	0.4V		"	"	"	"	"	"			GND	"		"	5.0V	"	Q4	"		"		"		"
I_{OL2}		73		1.5V	15.0V	"	15.0V	"	"	"			"	"			GND	15.0V	Q1	3.4						"
		74			GND	"	"	"	15.0V	"	1.5V		"	"		"	"	"	Q2	"		"		"		"
		75			"	"	"	"	GND	"		1.5V	15.0V	"	"	"	"	"	Q3	"	2.4	"	4.2	"	"	"
		76	1.5V		"	"	"	"	"	"			GND	"		"	15.0V	"	Q4	"		"		"		"
I_{OH1}		77		4.6V	"	5.0V	5.0V	"	"	"			"	"			GND	5.0V	Q1	-0.51						"
		78			"	GND	"	5.0V	"	"	4.6V		"	"		"	"	"	Q2	"		"		"		"
		79			"	"	"	GND	"	"		4.6V	"	5.0V		"	"	"	Q3	"	-0.36	"	-0.64	"	"	"
		80	4.6V		"	"	"	"	"	"			"	GND		5.0V	"	"	Q4	"		"		"		"
I_{OH2}		81		13.5V	"	15.0V	15.0V	"	"	"			"	"		GND	"	15.0V	Q1	-3.4						"
		82			"	GND	"	15.0V	"	"	13.5V		"	"		"	"	"	Q2	"		"		"		"
		83			"	"	"	GND	"	"		13.5V	"	15.0V		"	"	"	Q3	"	-2.4	"	-4.2	"	"	"
		84	13.5V		"	"	"	GND	"	"			"	GND		15.0V	"	"	Q4	"		"		"		"
I_{IH1} 3/	3010	85			18.0V	18.0V	18.0V	18.0V	18.0V	"		18.0V		18.0V		18.0V	18.0V	18.0V	All inputs together		9					nA

See footnotes at end of device type 53.

TABLE III. Group A inspection for device type 53 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_A = 25°C		Subgroup 2 T_A = 125°C		Subgroup 3 T_A = -55°C		
		Test no.	Q4	Q1	R1	S1	E	S2	R2	V_{SS}	Q2	Q3	R3	S3	NC	S4	R4	V_{DD}		Min	Max	Min	Max	Min	Max	
I_{IH2}	3010	86			18.0V	18.0V	18.0V	18.0V	18.0V	GND			18.0V	18.0V			18.0V	18.0V	R1							nA
	"	87			"	"	"	"	"	"			"	"			"	"	S1		"		"			"
	"	88			"	"	"	"	"	"			"	"	18.0V	"	"	"	E	1.0	"	45	"			"
	"	89			"	"	"	"	"	"			"	"		"	"	"	S2		"		"			"
	"	90			"	"	"	"	"	"			"	"		"	"	"	R2		"		"			"
	"	91			"	"	"	"	"	"			"	"		"	"	"	R3		"		"			"
	"	92			"	"	"	"	"	"			"	"		"	"	"	S3		"		"			"
	"	93			"	"	"	"	"	"			"	"		"	"	"	S4		"		"			"
	"	94			"	"	"	"	"	"			"	"		"	"	"	R4		"		"			"
I_{IL1} 3/	3009	95		GND		GND	GND	GND	GND	"			GND	GND		GND	GND	"	All inputs together		-9					"
I_{IL2}	"	96			"	"	"	"	"	"			"	"			"	"	R1							"
	"	97			"	"	"	"	"	"			"	"		"	"	"	S1		"		"			"
	"	98			"	"	"	"	"	"			"	"	"	"	"	"	E	-1.0	"	-45	"			"
	"	99			"	"	"	"	"	"			"	"		"	"	"	S2		"		"			"
	"	100			"	"	"	"	"	"			"	"		"	"	"	R2		"		"			"
	"	101			"	"	"	"	"	"			"	"		"	"	"	R3		"		"			"
	"	102			"	"	"	"	"	"			"	"		"	"	"	S3		"		"			"
	"	103			"	"	"	"	"	"			"	"		"	"	"	S4		"		"			"
	"	104			"	"	"	"	"	"			"	"		"	"	"	R4		"		"			"
																				Subgroup 4 T_A = 25°C						
																				Min	Max					
C_i	3012	105			4/					GND								GND	R1							pF
	"	106				4/				"								"	S1		"					"
	"	107					4/			"								"	E	12	"					"
	"	108						4/		"								"	S2		"					"
	"	109							4/	"								"	R2		"					"
	"	110								"			4/					"	R3		"					"
	"	111								"				4/				"	S3		"					"
	"	112								"						4/		"	S4		"					"
	"	113								"							4/	"	R4		"					"
																				Subgroup 7 T_A = 25°C		Subgroup 8				
																						T_A = 125°C		T_A = -55°C		
																				Min	Max	Min	Max	Min	Max	
Truth table test	3014	114	L	H	L	H	5.0V	L	H	GND	L	H	L	H			H	5.0V	All outputs	See 5/ and 6/						
	"	115	L	H	L	L	"	L	L	"	L	H	L	L		L	L	"	"							
	"	116	H	L	H	L	"	H	L	"	H	L	H	L	L	H	L	"	"							
	"	117	H	L	L	L	"	L	L	"	H	L	L	L		L	L	"	"							
	"	118	L	H	H	H	"	L	H	"	L	H	H	H		L	H	"	"							
	"	119	H	L	H	L	"	H	H	"	H	L	H	L		H	H	"	"							

See footnotes at end of device type 53.

TABLE III. Group A inspection for device type 53 – Continued.

Symbol	MIL-STD-883 test method	Cases E,F,N, Z	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 9 T_A = 25°C		Subgroup 10 T_A = 125°C		Subgroup 11 T_A = -55°C		
		Test no.	Q4	Q1	R1	S1	E	S2	R2	V_{SS}	Q2	Q3	R3	S3	NC	S4	R4	V_{DD}		Min	Max	Min	Max	Min	Max	
t_{PHL} R	3003 Fig. 15 "	120 121 122 123	OUT	OUT	IN		5.0V " " "		IN	GND " " "	OUT	OUT	IN				IN	5.0V " " "	R1 to Q1 R2 to Q2 R3 to Q3 R4 to Q4	10 " " "	320 " " "	14 " " "	370 " " "	10 " " "	270 " " "	ns " " "
t_{PLH}	" " " "	124 125 126 127	OUT	OUT		IN	" " " "	IN		" " " "	OUT	OUT		IN		IN		" " " "	S1 to Q1 S2 to Q2 S3 to Q3 S4 to Q4	10 " " "	200 " " "	10 " " "	245 " " "	9 " " "	185 " " "	" " " "
t_{PZH}	Fig. 16	128		OUT	GND	5.0V	IN	GND	GND	"			GND	GND		GND	GND	"	E to Q1				340		230	"
t_{PHZ}	" " "	129 130 131	OUT		" "	GND " "	" " "	5.0V GND "	" " "	" " "	OUT	OUT	" " "	GND 5.0V GND		" " 5.0V	" " "	" " "	E to Q2 E to Q3 E to Q4	230	" "		" "		" "	" " "
t_{PZL}	"	132		OUT	5.0V	"	"	"	"	"			"	"		GND	"	"	E to Q1	"		"	240	"	180	"
t_{PLZ}	" " "	133 134 135	OUT	GND	" "	" " "	" " "	" " "	5.0V GND GND	" " "	OUT	OUT	" 5.0V GND	" " "		" " "	" " 5.0V	" " "	E to Q2 E to Q3 E to Q4	180	" "		" "		" "	" " "
t_{THL}	3004 Fig. 15 "	136 137 138 139	OUT	OUT		IN	5.0V " " "	IN		" " " "	OUT	OUT		IN	"	IN		" " " "	Q1 Q2 Q3 Q4	10 " " "	200 " " "	14 " " "	245 " " "	10 " " "	185 " " "	" " " "
t_{TLH}	" " " "	140 141 142 143	OUT	OUT		IN	" " " "	IN		" " " "	OUT	OUT		IN		IN		" " " "	Q1 Q2 Q3 Q4	10 " " "	300 " " "	18 " " "	360 " " "	10 " " "	250 " " "	" " " "

1/ Pins not designated may be "high" level logic, "low" level logic, or open. Exceptions are as follows: $V_{IC(pos)}$ tests, the V_{SS} terminal shall be open; $V_{IC(neg)}$ tests, the V_{DD} terminal shall be open; I_{SS} tests, the output terminals shall be open.

2/ Test numbers 19 thru 24 shall be run in sequence.

3/ The device manufacturer may, at his options, measure I_{IL} and I_{IH} at 25°C for each individual input or measure all inputs together.

4/ See 4.4.1c.

5/ Test numbers 114 thru 119 shall be run in sequence and the functional tests shall be performed with V_{IH} and $V_{DD} \leq 5.0$ V and ≥ 18.0 V.

6/ L = V_{SS} + 0.5 V maximum and H = V_{DD} – 0.5 V minimum.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. End-point electrical parameters shall be as specified in table II herein.

4.4.5 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.7 herein). RHA levels for device classes B and S shall be as specified in MIL-PRF-38535 and 4.5.4 herein.

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

4.5.1 Voltage and current. Unless otherwise specified, all voltages given are referenced to the microcircuit V_{SS} terminal. Currents given are conventional current and positive when flowing into the referenced terminal.

4.5.2 Burn-in and life test cool down procedures. When the burn-in and life tests are completed and prior to removal of bias voltages, the devices under test (DUT) shall be cooled to a temperature of 25°C ±3°C; then, electrical parameter end-point measurements shall be performed.

TABLE IV. Delta limits at 25°C.

Parameter 1/	Device types			
	01, 02	03	51, 52	53
I_{SS}	±75 nA	±250 nA	±75 nA	±250 nA
V_{OL1}	±0.04 V	±0.04 V		
V_{OH1}	±0.08 V	±0.08 V		
I_{OL1}			±15%	±15%
I_{OH1}			±15%	±15%

1/ Each of the above parameters shall be recorded before and after the required burn-in and life tests to determine delta (Δ).

4.5.3 Quiescent supply current (I_{SS} test). When performing quiescent supply current measurements (I_{SS}), the meter shall be placed so that all currents flow through the meter.

4.5.4 Radiation hardness assurance (RHA) testing. The RHA testing shall be performed in accordance with test procedures and sampling specified in MIL-PRF-38535 and herein.

a. Before irradiation, selected samples shall be assembled in qualified packages and pass the governing electrical parameters (group A subgroup 1 at 25°C) and also be subjected to the threshold-voltage test in table VII in order to calculate the delta threshold (ΔV_T) after irradiation.

b. The devices shall be subjected to a total radiation dose as specified in MIL-PRF-38535 for the radiation hardness assurance level being tested, and meet the end-point electrical parameters as defined in table V at 25°C, after exposure. The start and completion of the end-point electrical parameter measurements shall not exceed 2 hours following irradiation.

c. Threshold-voltage test circuit conditions shall be as specified in table VII and on figure 17. In situ and remote testing, the tests shall be performed with the devices biased in accordance with table VI and the bias may be interrupted for up to 1 minute to remove devices to the remote bias fixture.

d. After irradiation, the devices shall pass the truth table test as specified in subgroup 7 in table III or if subgroup 7 is not required, then an equivalent truth table test shall be performed.

TABLE V. Radiation hardened end-point electrical parameters at 25°C.

Parameter	All device types	V_{DD}	
		Device types	
		01, 02, 03	51, 52, 53
V_{TN}	0.3 V min	10 V	10 V
V_{TP}	2.8 V max	10 V	10 V
ΔV_T	1.4 V max	10 V	10 V
I_{SS}	100 x max limit	15 V	18 V
t_{PLH}	1.35 x max limit	5 V	5 V
t_{PHL}	1.35 x max limit	5 V	5 V

TABLE VI. Bias during exposure to radiation.

Device type	Pin connections 1/		
	V_{DD} = 10 V dc (through a 30 kΩ to 60 kΩ resistor)	V_{SS} = GND	V_{DD} = 10 V dc
01, 51	3, 4, 5, 6, 8, 9, 10, 11	7	14
02, 52	3, 4, 5, 6, 7, 9, 10, 11, 12, 13	8	16
03, 53	3, 4, 5, 6, 7, 11, 12, 14, 15	8	16

1/ Pins not designated are open, or tied to 10 V dc through a 30 kΩ to 60 kΩ resistor.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

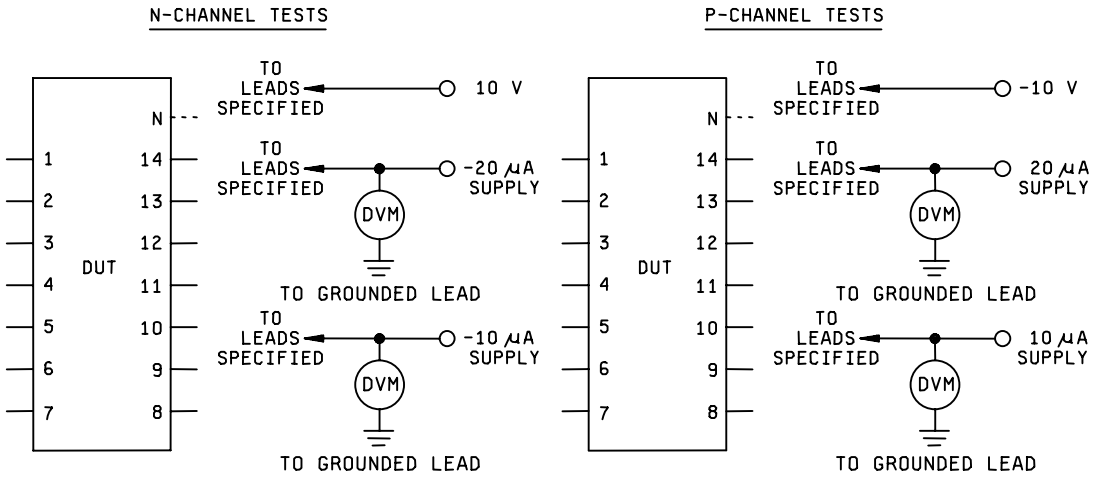


FIGURE 17. Threshold-voltage test circuit.

TABLE VII. Threshold-voltage test circuit conditions.

Device	GND	10 V	V_{TN} measured at		GND	-10 V	V_{TP} measured at	
			-20 μA supply	-10 μA supply			20 μA supply	10 μA supply
01, 51	3	14		4-11	3	4-11		14
02, 52	13	3-7, 9-12, 16		8	13	3-12		16
03, 53	5	16		3, 4, 6-8, 11, 12, 14, 15	5	3, 4, 6-8, 11, 12, 14, 15		16

6.2 Acquisition requirements. Acquisition documents should specify the following:

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

b. PIN and compliance identifier, if applicable (see 1.2).

c. 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.

d. Requirements for certificate of compliance, if applicable.

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

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

g. Requirements for product assurance and radiation hardness assurance options.

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

i. Requirements for "JAN" marking.

j. Packaging requirements. (see 5.1)

6.3 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractors parts lists.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, P.O. Box 3990, Columbus, Ohio 43218-3990.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535, MIL-HDBK-1331, and as follows:

C_I ..... Input terminal-to-GND capacitance.
GND ..... Ground zero voltage potential.
I_{SS} ..... Quiescent supply current.
T_A ..... Free air temperature.
V_{DD} ..... Positive supply voltage.
V_{SS} ..... Negative supply voltage.

6.6 Logistic support. Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class S for National Aeronautics and Space Administration or class B for Department of Defense (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 Data reporting. When specified in the purchase order or contract, a copy of the following data, as applicable, will be supplied.

a. Attributes data for all screening tests (see 4.2) and variables data for all static burn-in, dynamic burn-in, and steady-state life tests (see 3.6).

b. A copy of each radiograph.

c. The technology conformance inspection (TCI) data (see 4.4).

d. Parameter distribution data on parameters evaluated during burn-in (see 3.6).

e. Final electrical parameters data (see 4.2d).

f. RHA delta limits.

6.8 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, post irradiation performance 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 should 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-PRF-38535.

Military device type	Generic-industry type
01	4013A
02	4027A
03	4043A
51	4013B
52	4027B
53	4043B

6.9 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5962-2063)

Review activities:
Army - MI, SM
Navy - AS, CG, MC, SH, TD
Air Force – 03, 19, 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using ASSIST Online database at www.dodssp.daps.mil.