MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, LOW-POWER SCHOTTKY TTL, 4 BY 4
REGISTER FILE, CASCADABLE, MONOLITHIC SILICON

Inactive for new design after 18 April 1997.

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

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, Schottky TTL, low-power, 4 by 4 register file microcircuits. Two product assurance classes and a choice of case outlines and lead finishes are provided for each type and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3).

1.2 Part number. The part number should be in accordance with MIL-PRF-38535, and as specified herein.

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

Device type	Circuit
01	4 by 4 register file with 3-state outputs, cascadable
02	4 by 4 register file with open collector outputs, cascadable

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

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

Outline letter	Descriptive designator	Terminals	Package style
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	Flat pack
2	CQCC1-N20	20	Square leadless chip carrier

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, P. O. Box 3990, Columbus, OH 43216-5000, by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1.3 Absolute maximum ratings.

Supply voltage range .... -0.5 V dc to 7.0 V dc
Input voltage range .... -1.5 V at -18 mA to 5.5 V
Storage temperature range .... -65° to +150°C
Maximum power dissipation (P_D) 1/
    Device type 01 .... 275 mW
    Device type 02 .... 220 mW
Lead temperature (soldering, 10 seconds) .... 300°C
Thermal resistance, junction to case (θ_{JC}):
 Cases E, F, and 2 .... (See MIL-STD-1835)
Junction temperature (T_J) 2/.. +175°C

1.4 Recommended operating conditions.

Supply voltage (V_{CC}) .... 4.5 V minimum to 5.5 V maximum
Minimum high level input voltage (V_{IH}) .... 2.0 V
Maximum low level input voltage (V_{IL}) .... 0.7 V
Case operating temperature range (T_C) .... -55°C to +125°C
Minimum width of write enable or read enable pulse .... 25 ns
Minimum setup time (data) .... 10 ns
Minimum setup time (write select) .... 15 ns
Minimum hold time (data) .... 15 ns (with respect to GW)
Minimum hold time (write select) .... 5 ns
Minimum latch time for new data .... 25 ns

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 shall be those listed in the issue of the Departments of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

  DEPARTMENT OF DEFENSE

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

STANDARDS

  DEPARTMENT OF DEFENSE

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

(Unless otherwise indicated, copies of the above specifications and standards are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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1/ Must withstand the added P_D due to short-circuit test (e.g., I_{OS}).
2/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening
    conditions in accordance with MIL-PRF-38535.

3. REQUIREMENTS

3.1 <u>Qualification.</u> 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 <u>Item requirements</u>. 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 <u>Design, construction, and physical dimensions.</u> The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

3.3.1 <u>Terminal connections</u>. The terminal connections shall be as specified on figure 1.

3.3.2 <u>Truth table.</u> The truth table shall be as specified on figure 2.

3.3.3 <u>Logic diagram.</u> The logic diagram shall be as specified on figure 3.

3.3.4 <u>Schematic circuits.</u> The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity and the preparing activity upon request.

3.3.5 <u>Case outlines.</u> The case outlines shall be as specified in 1.2.3.

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

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

3.6 <u>Electrical test requirements.</u> 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 <u>Marking.</u> Marking shall be in accordance with MIL-PRF-38535.

3.8 <u>Microcircuit group assignment.</u> The devices covered by this specification shall be in microcircuit group number 12 (see MIL-PRF-38535, appendix A).

4. VERIFICATION

4.1 <u>Sampling and inspection.</u> 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 effect the form, fit, or function as described herein.

4.2 <u>Screening.</u> Screening shall be in accordance with, MIL-PRF-38535 and shall be conducted on all devices prior to qualification and quality 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. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.

   c. Additional screening for space level product shall be as specified in MIL-PRF-38535, appendix B.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T_C ≤ +125°C	Device type	Limits Min	Limits Max	Unit
High level output voltage	V_{OH}	V_{CC} = 4.5 V, V_{IN} = 2.0 V I_{OH} = -1 mA	01	2.4		V
Collector cutoff current	I_{CEX}	V_{CC} = 4.5 V, V_{OH} = 5.5 V	02		20	µA
Low level output voltage	V_{OL}	V_{CC} = 4.5 V, V_{IN} = 0.7 V I_{OL} = 4 mA	01, 02		0.4	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN} = -18 mA, T_C = +25°C	01, 02		-1.5	V
High level input current all inputs except GR and GW	I_{IH1}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	01, 02		20	µA
High level input current at GR	I_{IH2}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	01		60	µA
			02		40	
High level input current at GW	I_{IH3}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	01, 02		40	µA
High level input current all inputs except GR and GW	I_{IH4}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	01, 02		100	µA
High level input current at GR	I_{IH5}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	01		300	µA
			02		200	
High level input current at GW	I_{IH6}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	01, 02		200	µA
Off state output current, high level voltage applied	I_{OZH}	V_{CC} = 5.5 V, V_O = 2.7 V	01		20	µA
Off state output current: low level voltage applied	I_{OZL}	V_{CC} = 5.5 V, V_O = 0.4 V	01		-20	µA
Low level input current at data, read select, and write select	I_{IL1}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	01, 02	-0.5	-460	µA
Low level input current at read enable	I_{IL2}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	01	-90	-1300	µA
			02	-90	-900	
Low level input current at write enable	I_{IL3}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	01, 02	-60	-840	µA
Short circuit output current	I_{OS}	V_{CC} = 5.5 V 1/	01	-15	-130	mA
Supply current	I_{CC}	V_{CC} = 5.5 V	01		50	mA
			02		40	

See footnote at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T_C ≤ +125°C	Device type	Limits		Unit
				Min	Max	
Propagation delay time, low to high level from data	t_{PLH1}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 316 Ω ±5% for device type 01, R_L = 2 kΩ ±5% for device type 02	01	2	65	ns
			02	2	65	
Propagation delay time, low to high level from read select	t_{PLH2}		01	2	58	ns
			02	2	58	
Propagation delay time, high to low level from data	t_{PHL1}		01	2	58	ns
			02	2	52	
Propagation delay time, low to high level from read select	t_{PHL2}		01	2	65	ns
			02	2	58	
Propagation delay time, low to high level from write enable	t_{PLH3}		01	2	65	ns
			02	2	65	
Propagation delay time, low to high level from read enable	t_{PLH4}		02	2	46	ns
Propagation delay time, high to low level from write enable	t_{PHL3}		01	2	72	ns
			02	2	58	
Propagation delay time, high to low level from read enable	t_{PHL4}		02	2	46	ns
Output enable time to low level	t_{PZL}		01	2	58	ns
Output enable time to high level	t_{PZH}		01	2	52	ns
Output disable time to low level	t_{PLZ}		01	2	52	ns
Output disable time to high level	t_{PHZ}		01	2	72	ns

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

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TABLE II. Electrical test requirements.

MIL-PRF-38535 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Interim electrical parameters	1	1
Final electrical test parameters	1*, 2, 3, 7, 9, 10, 11	1*, 2, 3, 7, 9
Group A test requirements	1, 2, 3, 7, 8, 9, 10, 11	1, 2, 3, 7, 8, 9, 10, 11
Group B electrical test parameters when using method 5005 QCI option	1, 2, 3, 7, 8 9, 10, 11	N/A
Group C end-point electrical parameters	1, 2, 3, 7, 8 9, 10, 11	1, 2, 3
Group D end-point electrical parameters	1, 2, 3	1, 2, 3

*PDA applies to subgroup 1.

4.3 Qualification inspection. Qualification inspection shall be 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, and D inspections (see 4.4.1 through 4.4.4).

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

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

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

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II 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.

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.

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.

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

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

Pin number	Pin identification Device types 01 and 02	
	Case 2	Case E, F
1	NC	Data D2
2	Data D2	Data D3
3	Data D3	Data D4
4	Data D4	Read Select RB
5	Read Select RB	Read Select RA
6	NC	Output Q4
7	Read Select RA	Output Q3
8	Output Q4	GND
9	Output Q3	Output Q2
10	GND	Output Q1
11	NC	Read Enable GR
12	Output Q2	Write Enable GW
13	Output Q1	Write Select WB
14	Read Enable GR	Write Select WA
15	Write Enable GW	Data D1
16	NC	V_{CC}
17	Write Select WB	
18	Write Select WA	
19	Data D1	
20	V_{CC}	

FIGURE 1. Terminal connections.

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Device type 01

Write function table (see notes A, B, and C)   Read function table (see notes A and D)

Write inputs			Word			
WB	WA	GW	Q	1	2	3
L	L	L	Q = D	Q_0	Q_0	Q_0
L	H	L	Q_0	Q = D	Q_0	Q_0
H	L	L	Q_0	Q_0	Q = D	Q_0
H	H	L	Q_0	Q_0	Q_0	Q = D
X	X	H	Q_0	Q_0	Q_0	Q_0

Read inputs			Outputs			
RB	RA	GR	Q1	Q2	Q3	Q4
L	L	L	W0B1	W0B2	W0B3	W0B4
L	H	L	W1B1	W1B2	W1B3	W1B4
H	L	L	W2B1	W2B2	W2B3	W2B4
H	H	L	W3B1	W3B2	W3B3	W3B4
X	X	H	Z	Z	Z	Z

NOTES:
A. H = high level, L = low level, X = irrelevant, Z = high impedance (off)
B. (Q = D) - The four selected internal flip-flop outputs will assume the states applied to the four external data inputs.
C. Q_0 = the level of Q before the indicated input conditions were established.
D. W0B1 = The first bit of word 0, etc.

Device type 02

Write function table (see notes A, B, and C)   Read function table (see notes A and D)

Write inputs			Word			
WB	WA	GW	Q	1	2	3
L	L	L	Q = D	Q_0	Q_0	Q_0
L	H	L	Q_0	Q = D	Q_0	Q_0
H	L	L	Q_0	Q_0	Q = D	Q_0
H	H	L	Q_0	Q_0	Q_0	Q = D
X	X	H	Q_0	Q_0	Q_0	Q_0

Read inputs			Outputs			
RB	RA	GR	Q1	Q2	Q3	Q4
L	L	L	W0B1	W0B2	W0B3	W0B4
L	H	L	W1B1	W1B2	W1B3	W1B4
H	L	L	W2B1	W2B2	W2B3	W2B4
H	H	L	W3B1	W3B2	W3B3	W3B4
X	X	H	H	H	H	H

NOTES:
A. H = high level, L = low level, X = irrelevant
B. (Q = D) - The four selected internal flip-flop outputs will assume the states applied to the four external data inputs.
C. Q_0 = the level of Q before the indicated input conditions were established.
D. W0B1 = The first bit of word 0, etc.

FIGURE 2. Truth tables.

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DEVICE TYPE 01

FIGURE 3 Logic diagram.

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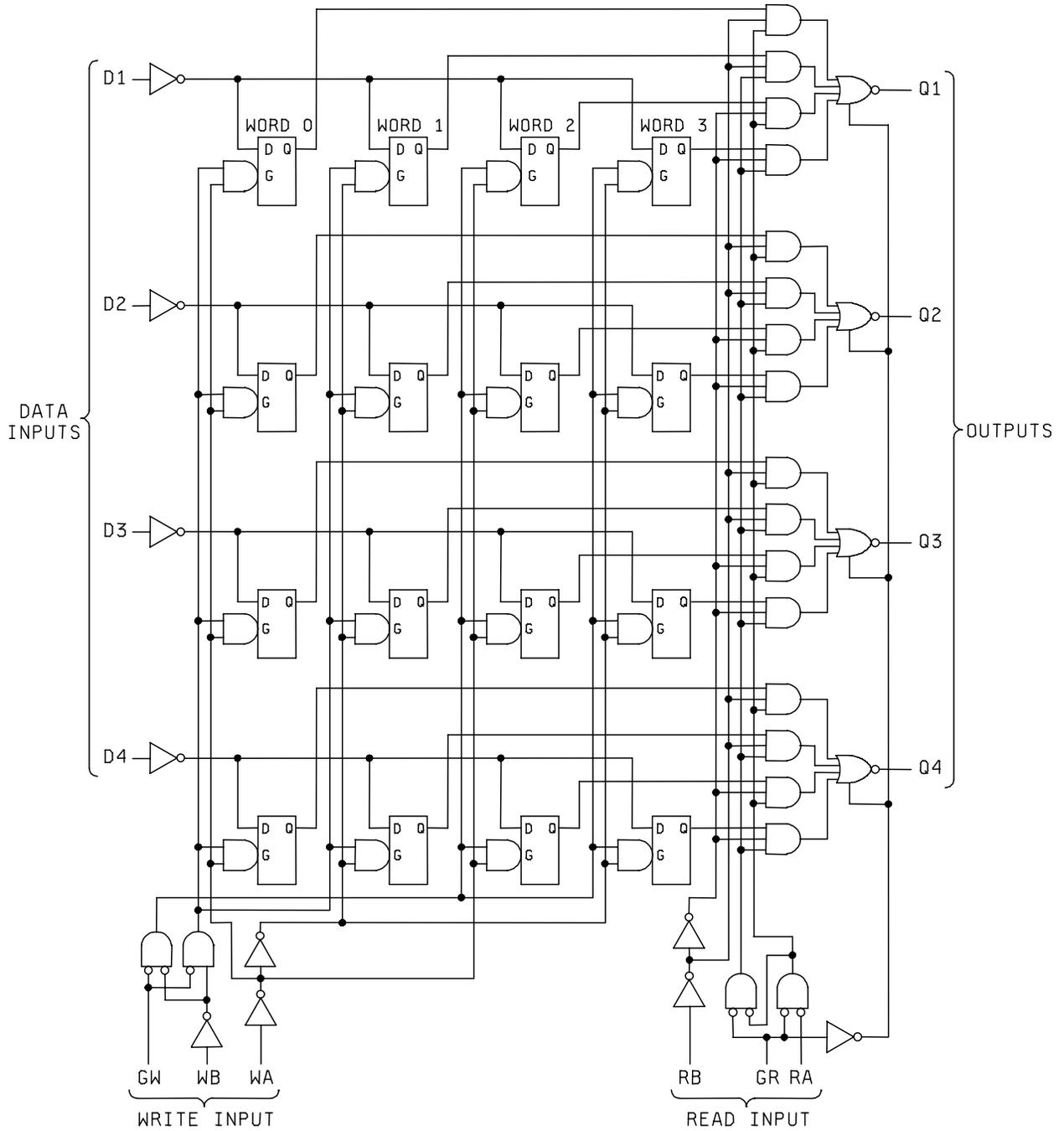
DEVICE TYPE 02
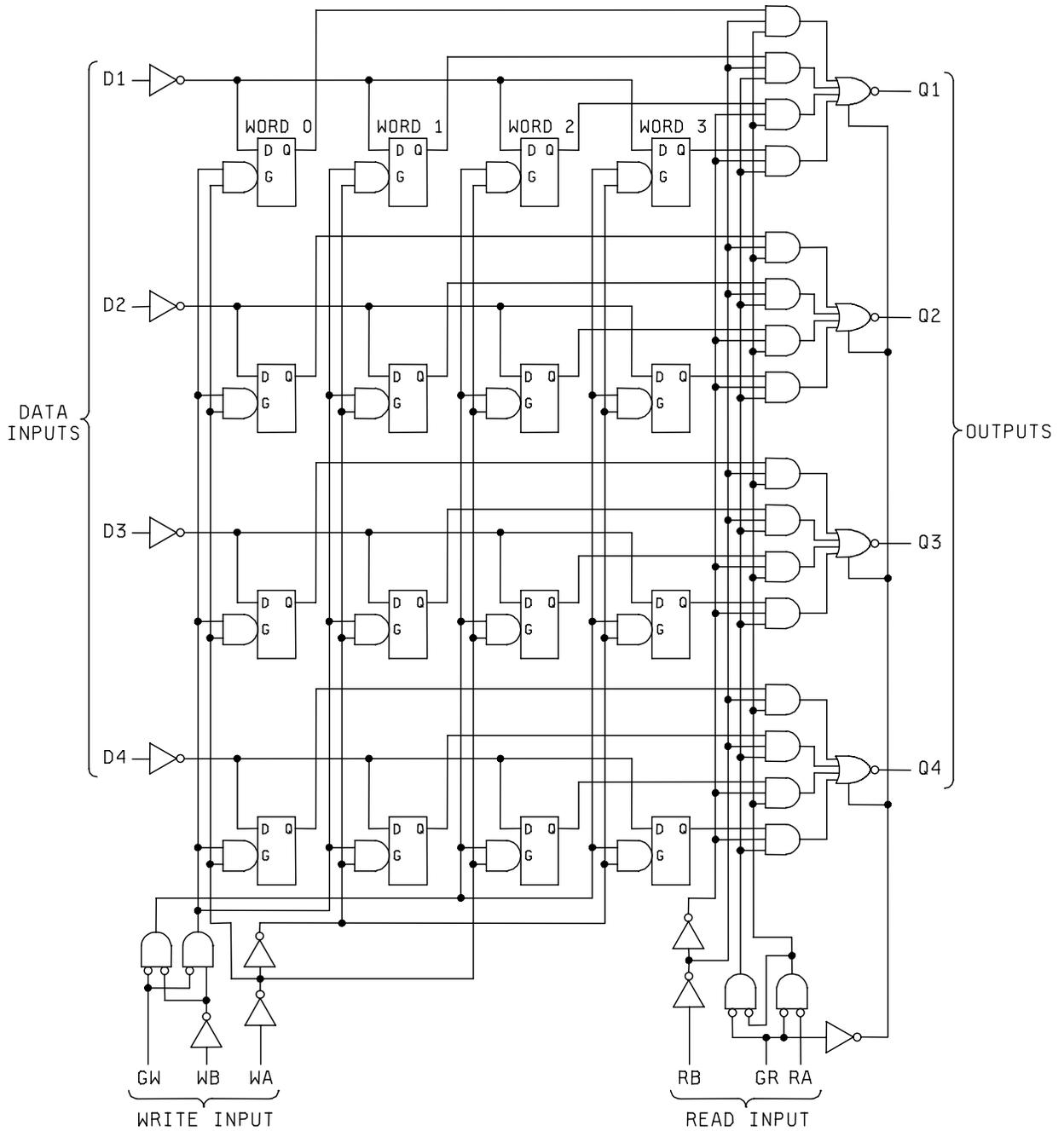
FIGURE 3 Logic diagram - Continued.

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FIGURE 4. Switching test circuit and waveforms for device types 01 and 02.
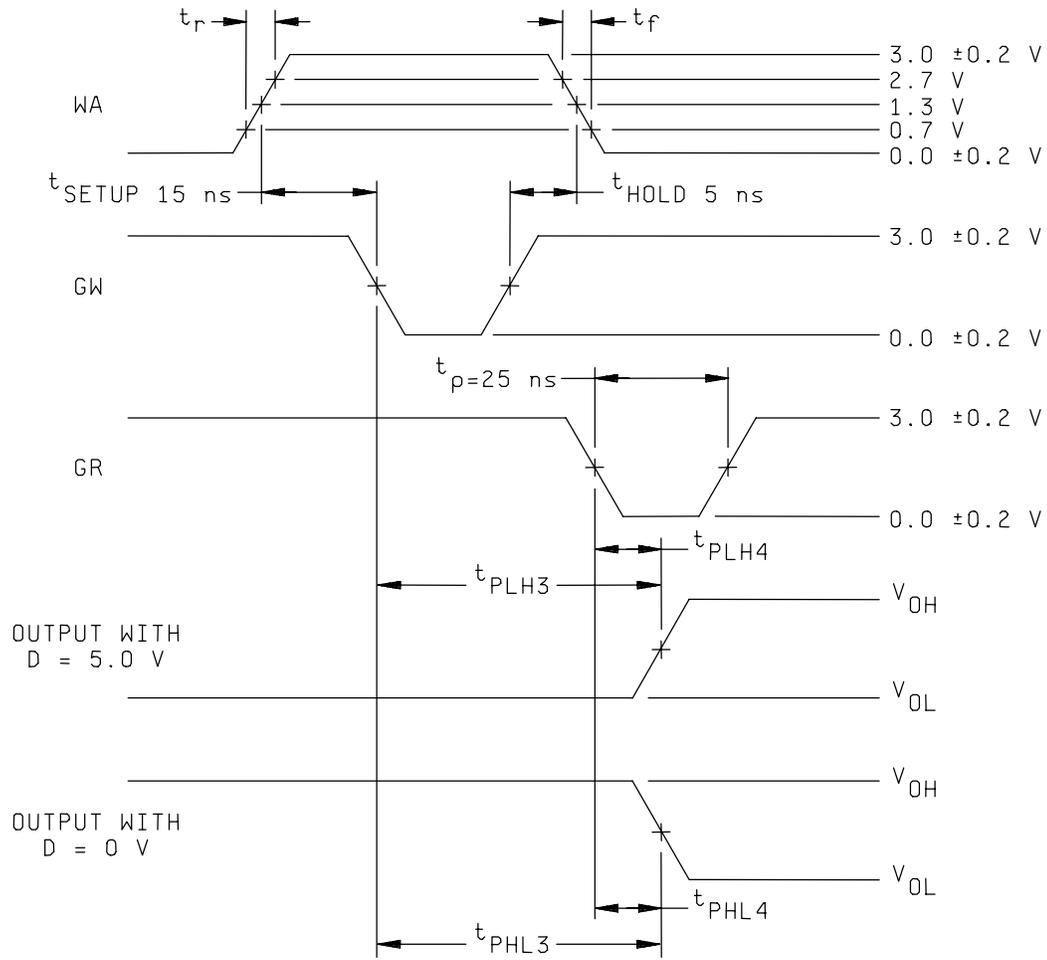
NOTES:

1. Input pulse characteristics: PRR ≤ 1.0 MHz, t_r ≤ 15 ns, t_f ≤ 6 ns, duty cycle = 50% ±15%.
2. C_L = 50 pF ±10%. C_L includes probe and jig capacitance.
3. All diodes are 1N3064 and 1N916.
4. Load circuits on a given output are required only where the specific test given in table III indicates "OUT" on that output. Load circuits may otherwise be omitted.
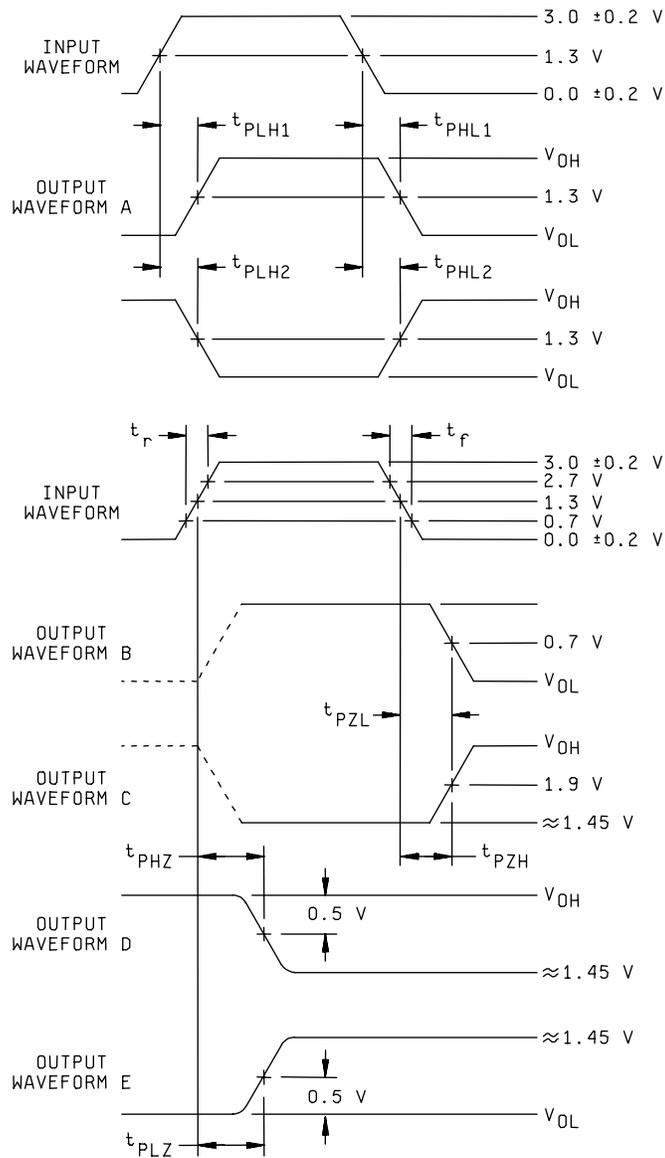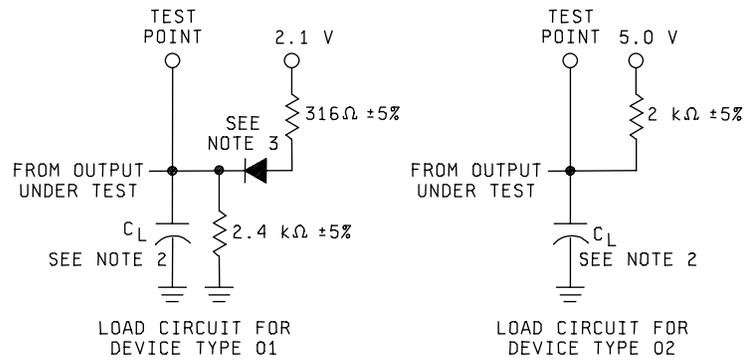
FIGURE 4. Switching test circuit and waveforms for device types 01 and 02 - Continued.

TABLE III. Group A inspection for device type 01.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Test no.	D2	D3	D4	RB	RA	Q4	Q3	GND	Q2	Q1	GR	GW	WB	WA	D1	V_CC	Measured terminal	Min	Max	Unit
1 Tc = 25°C	V_{OL}	3007	1				0.7 V	0.7 V			GND		4 mA	0.7 V	0.7 V	0.7 V	0.7 V	0.7 V	4.5 V	Q1		0.4	V
	"	"	2	0.7 V							GND	4 mA							"	Q2		"	"
	"	"	3		0.7 V					4 mA	GND								"	Q3		"	"
	"	"	4			0.7 V			4 mA		GND								"	Q4		"	"
	V_{OH}	3006	5								GND		-1 mA					2.0 V	"	Q1	2.4		"
	"	"	6	2.0 V							GND	-1 mA							"	Q2	"		"
	"	"	7		2.0 V					-1 mA	GND								"	Q3	"		"
	"	"	8			2.0 V			-1 mA		GND								"	Q4	"		"
	V_{IC}		9	-18 mA							GND								"	D2		-1.5	"
			10		-18 mA						GND								"	D3		"	"
			11			-18 mA					GND								"	D4		"	"
			12				-18 mA				GND								"	RB		"	"
			13					-18 mA			GND								"	RA		"	"
			14								GND			-18 mA					"	GR		"	"
			15								GND				-18 mA				"	GW		"	"
			16								GND					-18 mA			"	WB		"	"
			17								GND						-18 mA		"	WA		"	"
			18								GND							-18 mA	"	D1		"	"
	I_{IL1}	3009	19	0.4 V							GND								5.5 V	D2	1/	1/	µA
	"	"	20		0.4 V						GND								"	D3		"	"
	"	"	21			0.4 V					GND								"	D4		"	"
	"	"	22				0.4 V				GND								"	RB		"	"
	"	"	23					0.4 V			GND								"	RA		"	"
	"	"	24								GND					0.4 V			"	WB		"	"
	"	"	25								GND						0.4 V		"	WA		"	"
	"	"	26								GND							0.4 V	"	D1		"	"
	I_{IL2}	"	27								GND			0.4 V					"	GR		"	"
	I_{IL3}	"	28								GND				0.4 V				"	GW		"	"
	I_{IH1}	3010	29	2.7 V							GND								"	D2		20	"
	"	"	30		2.7 V						GND								"	D3		"	"
	"	"	31			2.7 V					GND								"	D4		"	"
	"	"	32				2.7 V				GND								"	RB		"	"
	"	"	33					2.7 V			GND								"	RA		"	"
	"	"	34								GND					2.7 V			"	WB		"	"
	"	"	35								GND						2.7 V		"	WA		"	"
	"	"	36								GND							2.7 V	"	D1		"	"
	I_{IH2}	"	37								GND			2.7 V					"	GR		60	"
	I_{IH3}	"	38								GND				2.7 V				"	GW		40	"
	I_{IH4}	"	39	5.5 V							GND								"	D2		100	"
	"	"	40		5.5 V						GND								"	D3		"	"
	"	"	41			5.5 V					GND								"	D4		"	"
	"	"	42				5.5 V				GND								"	RB		"	"
	"	"	43					5.5 V			GND								"	RA		"	"
	"	"	44								GND					5.5 V			"	WB		"	"
	I_{IH5}	"	45								GND						5.5 V		"	WA		"	"
	"	"	46								GND							5.5 V	"	D1		"	"
	"	"	47								GND			5.5 V					"	GR		300	"
	I_{IH6}	"	48								GND				5.5 V				"	GW		200	"

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Test no.	D2	D3	D4	RB	RA	Q4	Q3	GND	Q2	Q1	GR	GW	WB	WA	D1	VCC	Measured terminal	Min	Max	Unit
1 Tc = 25°C	ICC	3005	49	4.5 V	4.5 V	4.5 V	GND	GND			GND			4.5 V	4.5 V	GND	GND	4.5 V	5.5 V	VCC		50	mA
	IOS 2/	3011	50										GND						5.5 V	Q1	-30	-130	"
			51	5.5 V	5.5 V						"	GND							"	Q2	"	"	"
			52			5.5 V				GND	"								"	Q3	"	"	"
			53				GND		GND		"								"	Q4	"	"	"
	IOZH		54	2.0 V			0.7 V	0.7 V			"		2.7 V	2.0 V	0.7 V	0.7 V	0.7 V	2.0 V	"	Q1		20	µA
			55		2.0 V		"	"		2.7 V	"	2.7 V		"	"	"	"		"	Q2		"	"
			56		2.0 V	2.0 V	"	"	2.7 V	"	"			"	"	"	"	2.0 V	"	Q3		"	"
			57			2.0 V	"	"	2.7 V		"			"	"	"	"		"	Q4		"	"
	IOZL		58	2.0 V			"	"			"		0.4 V	"	"	"	"	2.0 V	"	Q1		-20	"
			59		2.0 V		"	"		0.4 V	"	0.4 V		"	"	"	"		"	Q2		"	"
			60	2.0 V		2.0 V	"	"		0.4 V	"			"	"	"	"	2.0 V	"	Q3		"	"
			61		2.0 V	2.0 V	"	"	0.4 V	0.4 V	"			"	"	"	"		"	Q4		"	"

2 Same tests, terminal conditions, and limits as subgroup 1, except Tc = +125°C and VIC tests are omitted.

3 Same tests, terminal conditions, and limits as subgroup 1, except Tc = -55°C and VIC tests are omitted.

Subgroup	Symbol	MIL-STD-883 method	Test no.	D2	D3	D4	RB	RA	Q4	Q3	GND	Q2	Q1	GR	GW	WB	WA	D1	VCC	Measured terminal	Min	Max	Unit
7 3/ 4/ Tc = 25°C	Truth table tests	3014	62	B	A	B	B	B	L	H	GND	L	H	B	B	B	B	A	5.0 V		5/		
			63					A			"						A		"				
			64				A	B			"					A	B		"				
			65					A			"						A		"				
			66	A	B	A	B	B	H	L	"	H	L			B	B	B	"				
			67					A	L	H	"	L	H						"				
			68				A	B			"						A		"				
			69					A			"						A		"				
			70				B	B	H	L	"	H	L		A				"				
			71					A			"				B		A		"				
			72				A	B			"					A	A		"				
			73					A			"			A			A		"				
			74					B			"					A	B		"				
			75				B	A	H	H	"		H			B	B	A	"				
			76					B			"					A	A		"				
			77				A	A			"					B	B		"				
			78					B			"					A	B		"				
			79					A			"				A		A		"				
			80	B	B	B	B	B			"					B	B	B	"				
			81					A			"					A	A		"				
			82				A	B			"					A	B		"				
			83					A			"					A			"				

8 Same tests and terminal conditions as for subgroup 7 except Tc = +125°C and Tc = -55°C.

Subgroup	Symbol	MIL-STD-883 method	Test no.	D2	D3	D4	RB	RA	Q4	Q3	GND	Q2	Q1	GR	GW	WB	WA	D1	VCC	Measured terminal	Min	Max	Unit
9 Tc = 25°C	tPLH1	3003 Fig. 4	84				GND				GND		OUT	GND	GND	GND	GND	IN	5.0 V	D1 to Q1	2	50	ns
			85	IN							"	OUT							"	D2 to Q2	"	"	"
			86		IN					OUT	"								"	D3 to Q3	"	"	"
			87			IN			OUT		"								"	D4 to Q4	"	"	"
	tPHL1		88								"		OUT					IN	"	D1 to Q1	"	45	"
			89	IN							"	OUT							"	D2 to Q2	"	"	"
			90		IN					OUT	"								"	D3 to Q3	"	"	"
			91			IN			OUT		"								"	D4 to Q4	"	"	"
	tPLH2 7/		92								"		OUT					GND	"	RA to Q1	"	"	"
			93	GND							"	OUT							"	RA to Q2	"	"	"
			94		GND					OUT	"								"	RA to Q3	"	"	"
			95			GND			OUT		"								"	RA to Q4	"	"	"
	tPHL2 6/		96				IN				"		OUT					5.0 V	"	RB to Q1	"	50	"
			97	5.0 V							"	OUT				5.0 V			"	RB to Q2	"	"	"
			98		5.0 V					OUT	"								"	RB to Q3	"	"	"
			99			5.0 V			OUT		"								"	RB to Q4	"	"	"

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Case 2 Test no.	D2 (2)	D3 (3)	D4 (4)	RB (5)	RA (7)	Q4 (8)	Q3 (9)	GND (10)	Q2 (12)	Q1 (13)	GR (14)	GW (15)	WB (17)	WA (18)	D1 (19)	Vcc (20)	Measured terminal	Min	Max	Unit
9 Tc = 25°C	t_PLH3 6/	3003 Fig. 4	100				GND	5.0 V			GND		OUT	GND	IN	GND	IN	5.0 V	5.0 V	GW to Q1	2	50	ns
		"	101	5.0 V			"	"			"	OUT		"	"	"	"		"	GW to Q2	"	"	"
		"	102		5.0 V		"	"		OUT	"			"	"	"	"		"	GW to Q3	"	"	"
		"	103			5.0 V	"	"	OUT		"			"	"	"	"		"	GW to Q4	"	"	"
	t_PHL3 7/	"	104				"	"			"		OUT	"	"	"	"	GND	"	GW to Q1	"	55	"
		"	105	GND			"	"			"	OUT		"	"	"	"		"	GW to Q2	"	"	"
		"	106		GND		"	"		OUT	"			"	"	"	"		"	GW to Q3	"	"	"
		"	107			GND	"	"	OUT		"			"	"	"	"		"	GW to Q4	"	"	"
	t_PHZ	"	108				"	GND			"		OUT	IN	GND	"	"	5.0 V	"	GR to Q1	"	"	"
		"	109	5.0 V			"	"			"	OUT		"	"	"	"		"	GR to Q2	"	"	"
		"	110		5.0 V		"	"		OUT	"			"	"	"	"		"	GR to Q3	"	"	"
		"	111			5.0 V	"	"	OUT		"			"	"	"	"		"	GR to Q4	"	"	"
	t_PZH	"	112				"	"			"		OUT	"	"	"	"	5.0 V	"	GR to Q1	"	40	"
		"	113	5.0 V			"	"			"	OUT		"	"	"	"		"	GR to Q2	"	"	"
		"	114		5.0 V		"	"		OUT	"			"	"	"	"		"	GR to Q3	"	"	"
		"	115			5.0 V	"	"	OUT		"			"	"	"	"		"	GR to Q4	"	"	"
	t_PLZ	"	116				"	"			"		OUT	"	"	"	"	GND	"	GR to Q1	"	"	"
		"	117	GND			"	"			"	OUT		"	"	"	"		"	GR to Q2	"	"	"
		"	118		GND		"	"		OUT	"			"	"	"	"		"	GR to Q3	"	"	"
		"	119			GND	"	"	OUT		"			"	"	"	"		"	GR to Q4	"	"	"
	t_PZL	"	120				"	"			"		OUT	"	"	"	"	GND	"	GR to Q1	"	45	"
		"	121	GND			"	"			"	OUT		"	"	"	"		"	GR to Q2	"	"	"
		"	122		GND		"	"		OUT	"			"	"	"	"		"	GR to Q3	"	"	"
		"	123			GND	"	"	OUT		"			"	"	"	"		"	GR to Q4	"	"	"
10 Tc = 125°C	t_PLH1	"	124																		"	65	"
	t_PHL1	"	125	Same tests and terminal conditions as for subgroup 9, except Tc = +125°C and test limits as shown																	"	58	"
	t_PLH2	"	126																		"	58	"
	t_PHL2	"	127																		"	65	"
	t_PLH3	"	128																		"	65	"
	t_PHL3	"	129																		"	72	"
	t_PHZ	"	130																		"	72	"
	t_PZH	"	131																		"	52	"
	t_PLZ	"	132																		"	52	"
	t_PZL	"	133																		"	58	"
11	Same tests, terminal conditions and limits as for subgroup 10, except Tc = -55°C.																						

Min/max limits (mA)

Test	A	B	C	E	F
I_IL1	-120/-360	-30/-300	-160/-400 except -120/-360 for test 24	-120/-360 except -0.5/-360 for test 22	-135/-370 except -150/-380 for test 23; -135/-380 for tests 24, 25, 26
I_IL2	-36 mA/-1.08 mA	-90/-900	-305/-760	-.36 mA/-1.08 mA	-.48 mA/-1.20 mA
I_IL3	-240/-720	-60/-600	-305/-760	-240/-720	-320/-800

1/ Min/max limits (µA) for circuits, unless otherwise specified.

2/ I_{OS} limits for circuits B, C, and E are -15/-100 mA.
3/ Connect a 0.5 kΩ to 2 kΩ resistor from terminals, 6, 7, 9, and 10 to V_{CC} for subgroup 7 tests.
4/ A = 3.0 V min., B = 0.0 V or GND, C = pulse 3.0 V ⌐ 0.0 V, D = pulse 3.0 V ⌐ 0.0 V
5/ Output voltages shall be: H > 1.5 V, L < 1.5 V
6/ Load ground into register prior to test.
7/ Load one state into register under test prior to test.

TABLE III. Group A inspection for device type 02.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Case 2 / Test no.	D2 (2)	D3 (3)	D4 (4)	RB (5)	RA (7)	Q4 (8)	Q3 (9)	GND (10)	Q2 (12)	Q1 (13)	GR (14)	GW (15)	WB (17)	WA (18)	D1 (19)	VCC (20)	Measured terminal	Min	Max	Unit
1 Tc = 25°C	VOL	3007	1	0.7 V	0.7 V	0.7 V	0.7 V	0.7 V			GND		4 mA	0.7 V	0.7 V	0.7 V	0.7 V	0.7 V	4.5 V	Q1		0.4	V
		"	2	0.7 V	0.7 V	0.7 V	0.7 V	0.7 V			"	4 mA		0.7 V	0.7 V	0.7 V	0.7 V	0.7 V	"	Q2		"	"
		"	3	0.7 V	0.7 V	0.7 V	0.7 V	0.7 V		4 mA	"			0.7 V	0.7 V	0.7 V	0.7 V	0.7 V	"	Q3		"	"
		"	4	0.7 V	0.7 V	0.7 V	0.7 V	0.7 V	4 mA		"			0.7 V	0.7 V	0.7 V	0.7 V	0.7 V	"	Q4		"	"
	ICEX		5	2.0 V							"		5.5 V					2.0 V	5.5 V	Q1		20	µA
			6	2.0 V	2.0 V						"	5.5 V							5.5 V	Q2		"	"
			7					5.5 V		5.5 V	"								5.5 V	Q3		"	"
			8	2.0 V		2.0 V			5.5 V		"								5.5 V	Q4		"	"
	VIC		9	-18 mA							"									D2		-1.5	V
			10		-18 mA						"									D3		"	"
			11			-18 mA					"									D4		"	"
			12				-18 mA				"									RB		"	"
			13					-18 mA			"									RA		"	"
			14								"			-18 mA						GR		"	"
			15								"				-18 mA					GW		"	"
			16								"					-18 mA				WB		"	"
			17								"						-18 mA			WA		"	"
			18								"							-18 mA		D1		"	"
	IIL1	3009	19	0.4 V							"								5.5 V	D2	1/	1/	µA
		"	20		0.4 V						"								"	D3		"	"
		"	21			0.4 V					"								"	D4		"	"
		"	22				0.4 V				"								"	RB		"	"
		"	23					0.4 V			"								"	RA		"	"
		"	24								"					0.4 V			"	WB		"	"
		"	25								"						0.4 V		"	WA		"	"
		"	26								"							0.4 V	"	D1		"	"
	IIL2	"	27								"			0.4 V					"	GR		"	"
	IIL3	"	28								"				0.4 V				"	GW		"	"
	IIH1	3010	29	2.7 V							"								"	D2		20	µA
		"	30		2.7 V						"								"	D3		"	"
		"	31			2.7 V					"								"	D4		"	"
		"	32				2.7 V				"								"	RB		"	"
		"	33					2.7 V			"								"	RA		"	"
		"	34								"					2.7 V			"	WB		"	"
		"	35								"						2.7 V		"	WA		"	"
		"	36								"							2.7 V	"	D1		"	"
	IIH2	"	37								"			2.7 V					"	GR		40	"
	IIH3	"	38								"				2.7 V				"	GW		40	"
	IIH4	"	39	5.5 V							"								"	D2		100	"
		"	40		5.5 V						"								"	D3		"	"
		"	41			5.5 V					"								"	D4		"	"
		"	42				5.5 V				"								"	RB		"	"
		"	43					5.5 V			"								"	RA		"	"
		"	44								"					5.5 V			"	WB		"	"
		"	45								"						5.5 V		"	WA		"	"
		"	46								"							5.5 V	"	D1		"	"
	IIH5	"	47								"			5.5 V					"	GR		200	"
	IIH6	"	48								"				5.5 V				"	GW		200	"

See footnotes at end of device type 02.

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TABLE III. Group A inspection for device type 02.

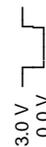Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Case 2 Test no.	D2 4.5V	D3 4.5V	D4 4.5V	RB GND	RA GND	Q4	Q3	GND GND	Q2	Q1	GR 4.5V	GW 4.5V	WB GND	WA GND	D1 4.5V	VCC 5.5V	Measured terminal	Min	Max	Unit
1 Tc=25°C	I_{CC}	3005	49	4.5V	4.5V	4.5V	GND	GND			GND			4.5V	4.5V	GND	GND	4.5V	5.5V	V_{CC}		40	mA
2				Same tests, terminal conditions, and limits as subgroup 1, except T_C = +125°C and V_{IC} tests are omitted.																		
3 Tc=25°C				Same tests, terminal conditions, and limits as subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																		

Truth table tests (Subgroup 7 2/3/, 3014), VCC column = 5.0 V, Min = 4/

Test no.	D2	D3	D4	RB	RA	Q4	Q3	Q2	Q1	GR	GW	WB	WA	D1	GND
50	B	A	B	B	B	L	H	L	H	B	B	B	B	A	GND
51	"	"	"	"	A	"	"	"	"	"	"	"	A	"	"
52	"	"	"	A	B	"	"	"	"	"	"	A	B	"	"
53	"	"	"	"	A	H	L	H	L	"	"	B	A	"	"
54	A	B	A	B	B	"	"	"	"	"	"	B	B	B	"
55	"	"	"	A	A	L	H	L	H	"	"	A	"	"	"
56	"	"	"	A	B	"	"	"	"	"	"	A	A	"	"
57	"	"	B	"	A	"	"	"	"	"	A	"	"	"	"
58	"	"	B	B	B	H	L	H	L	A	B	A	"	B	"
59	"	"	"	"	"	"	"	"	"	B	"	B	A	"	"
60	"	"	A	A	A	L	H	L	H	A	"	A	B	"	"
61	"	"	"	"	B	"	"	"	"	B	"	B	A	"	"
62	"	"	"	A	A	"	"	"	"	"	"	A	B	"	"
63	A	A	B	B	B	H	L	H	L	A	"	B	B	A	"
64	"	"	"	A	A	"	"	"	"	"	"	A	A	"	"
65	"	"	"	A	B	"	"	"	"	"	"	A	B	"	"
66	"	"	"	"	A	"	"	"	"	"	"	A	A	"	"
67	B	B	B	B	B	"	"	"	"	B	A	B	B	B	"
68	"	"	"	"	A	"	"	"	"	"	"	A	"	"	"
69	"	"	"	A	B	"	"	"	"	"	"	A	B	"	"
70	"	"	"	"	A	"	"	"	"	"	"	A	"	"	"

Switching characteristics (Subgroup 8, 9; Tc=25°C). Same tests and terminal conditions as for subgroup 7 except T_C = +125°C and T_C = -55°C.

Subgroup	Symbol	MIL-STD-883 method	Test no.	D2	D3	D4	RB	RA	Q4	Q3	GND	Q2	Q1	GR	GW	WB	WA	D1	VCC	Measured terminal	Min	Max	Unit
9 Tc=25°C	t_{PLH1}	3003 Fig. 4	71				GND	GND			GND	OUT	OUT	GND	GND	GND	GND	IN	5.0V	D1 to Q1	2	50	ns
			72	IN			"	"		OUT	"			"	"	"	"		"	D2 to Q2	"	"	"
			73		IN		"	"		OUT	"		OUT	"	"	"	"		"	D3 to Q3	"	"	"
			74			IN	"	"	OUT		"			"	"	"	"		"	D4 to Q4	"	"	"
	t_{PHL1}		75				"	"			"		OUT	"	"	"	"	IN	"	D1 to Q1		40	"
			76	IN			"	"			"	OUT		"	"	"	"		"	D2 to Q2	"	"	"
			77		IN		"	"		OUT	"		OUT	"	"	"	"		"	D3 to Q3	"	"	"
			78			IN	"	"	OUT		"			"	"	"	"		"	D4 to Q4	"	"	"
	t_{PLH2} 5/		79				"	IN			"		OUT	"	"	"	"	5.0V	"	RA to Q1		45	"
			80	5.0V			"	"			"	OUT		"	"	"	"		"	RA to Q2	"	"	"
			81		5.0V		"	"		OUT	"			"	"	"	"		"	RA to Q3	"	"	"
			82			5.0V	"	"	OUT		"			"	"	"	"		"	RA to Q4	"	"	"
	t_{PHL2} 5/		83				IN	GND			"		OUT	"	"	5.0V	GND	5.0V	"	RB to Q1			"
			84	5.0V			"	"			"	OUT		"	"	"	"		"	RB to Q2	"	"	"
			85		5.0V		"	"		OUT	"			"	"	"	"		"	RB to Q3	"	"	"
			86			5.0V	"	"	OUT		"			"	"	"	"		"	RB to Q4	"	"	"

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Test no.	1/2/D2	2/3/D3	3/4/D4	4/5/RB	5/7/RA	6/8/Q4	7/9/Q3	8/10/GND	9/12/Q2	10/13/Q1	11/14/GR	12/15/GW	13/17/WB	14/18/WA	15/19/D1	16/20/Vcc	Measured terminal	Min	Max	Unit
9 Tc=25°C	tPLH3 5/	3003 Fig. 4	87				GND	5.0 V			GND		OUT	GND	IN	GND	IN	5.0 V	5.0 V	GW to Q1	2	50	ns
	"	"	88	5.0 V			"	"			"	OUT		"	"	"	"		"	GW to Q2	"	"	"
	"	"	89		5.0 V		"	"		OUT	"			"	"	"	"		"	GW to Q3	"	"	"
	"	"	90			5.0 V	"	"	OUT		"			"	"	"	"		"	GW to Q4	"	"	"
	tPHL3 6/	"	91				"	"			"		OUT	"	"	"	"	GND	"	GW to Q1	"	45	"
	"	"	92	GND			"	"			"	OUT		"	"	"	"		"	GW to Q2	"	"	"
	"	"	93		GND		"	"		OUT	"			"	"	"	"		"	GW to Q3	"	"	"
	"	"	94			GND	"	"	OUT		"			"	"	"	"		"	GW to Q4	"	"	"
	tPLH4	"	95				"	GND			"		OUT	IN	GND	"	GND	GND	"	GR to Q1	"	40	"
	"	"	96	GND			"	"			"	OUT		"	"	"	"		"	GR to Q2	"	"	"
	"	"	97		GND		"	"		OUT	"			"	"	"	"		"	GR to Q3	"	"	"
	"	"	98			GND	"	"	OUT		"			"	"	"	"		"	GR to Q4	"	"	"
	tPHL4	"	99				"	"			"		OUT	"	"	"	"	GND	"	GR to Q1	"	"	"
	"	"	100	GND			"	"			"	OUT		"	"	"	"		"	GR to Q2	"	"	"
	"	"	101		GND		"	"		OUT	"			"	"	"	"		"	GR to Q3	"	"	"
	"	"	102			GND	"	"	OUT		"			"	"	"	"		"	GR to Q4	"	"	"
10 Tc=125°C	tPLH1	"	103	Same tests and terminal conditions as for subgroup 9, except Tc = +125°C and test limits as shown																	"	65	"
	tPHL1	"	104																		"	52	"
	tPLH2	"	105																		"	58	"
	tPHL2	"	106																		"	58	"
	tPLH3	"	107																		"	65	"
	tPHL3	"	108																		"	58	"
	tPLH4	"	109																		"	46	"
	tPHL4	"	110																		"	46	"
11				Same tests, terminal conditions and limits as for subgroup 10, except Tc = -55°C.																			

1/ Min/max limits (μA) for circuits, unless otherwise specified.

2/ Connect a 0.5 kΩ to 2 kΩ resistor from terminals, 6, 7, 9, and 10 to Vcc for subgroup 7 tests.

3/ A = 3.0 V min., B = 0.0 V or GND,   C = pulse 3.0 V ⌐‾⌐ 0.0 V   3.0 V

4/ Output voltages shall be: H > 1.5 V, L < 1.5 V

5/ Load ground into register under test prior to test.

6/ Load one state into register under test prior to test.

Test	Min/max limits (mA)				
	A	B	C	E	F
I_{IL1}	-120/-360	-30/-300	-160/-400 except -120/-360 for test 24	-120/-360 except -0.5/-360 for tests 22 and 24	-135/-370 except -150/-380 for test 23
I_{IL2}	-240/-720	-90/-900	-305/-760	-240/-720	-320/-800
I_{IL3}	-240/-720	-60/-600	-305/-760	-240/-720	-320/-800

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5. PACKAGING

5.1 <u>Packaging requirements.</u> For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD 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 Department'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

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

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

6.2 <u>Acquisition requirements.</u> Acquisition documents should specify the following:

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

    b.   Complete part number (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 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.

    j.   Requirements for "JAN" marking.

6.3 <u>Superseding information.</u> 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 contractor's parts lists.

6.4 <u>Qualification.</u> 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, 3990 E. Broad Street, Columbus, Ohio 43123-1199.

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

GND	Ground zero voltage potential.
I_{IN}	Current flowing into an input terminal.
V_{IC}	Input clamp voltage.
V_{IN}	Voltage level at an input terminal.
I_{OZL}	Output current in the high impedance mode with the output voltage low.
I_{OZH}	Output current in the high impedance mode with the output voltage high.
t_{PHZ}	Output disable time from high level - The time between the specified reference points on the input and output voltage waveforms with the three state output changing from the defined high level to a high impedance (off) state.
t_{PLZ}	Output disable time from low level - The time between the specified reference points on the input and output voltage waveforms with the three state output changing from the defined low level to a high impedance (off) state.
t_{PZH}	Output enable time to high level - The time between the specified reference points on the input and output voltage waveforms with the three state output changing from a high impedance (off) state to the defined high level.
t_{PZL}	Output enable time to low level - The time between the specified reference points on the input and output voltage waveforms with the three state output changing from a high impedance (off) state to the defined low level.

6.6 <u>Logistic support.</u> Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 <u>Substitutability.</u> The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information 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	54LS670
02	54LS170

6.8 <u>Manufacturers' designation.</u> Manufacturers' circuits, which form a part of this specification, are designated with an "X" as shown in table IV herein.

TABLE IV. <u>Manufacturer's designator.</u>

	Manufacturer				
	Circuit A	Circuit B	Circuit C	Circuit E	Circuit F
Device type	Texas Instruments	Signetics Corp.	National Semiconductor	Fairchild Semiconductor	Motorola Inc.
01	X	X	X	X	X
02	X	X	X	X	X

6.9 <u>Changes from previous issue.</u> Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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

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

Preparing activity:
 DLA - CC

(Project 5962-1966)

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3. DOCUMENT TITLE

MICROCIRCUITS, DIGITAL, LOW-POWER SCHOTTKY TTL, 4 BY 4 REGISTER FILE, CASCADABLE, MONOLITHIC SILICON

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

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c. ADDRESS *(Include Zip Code)*	d. TELEPHONE *(Include Area Code)*
	(1) Commercial
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	  (If applicable)
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		  (YYYYMMDD)

8. PREPARING ACTIVITY

a. NAME Defense Supply Center, Columbus	b. TELEPHONE *(Include Area Code* (1) Commercial 614-692-0536 (2) DSN 850-0536

c. ADDRESS *(Include Zip Code)*
DSCC-VA
P. O. Box 3990
Columbus, Ohio 43216-5000
	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
	  Defense Standardization Program Office (DLSC-LM)
	  8725 John J. Kingman Road, Suite 2533
	  Fort Belvoir, Virginia 22060-6221
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