

MAXIM

CMOS, TTL-Compatible Analog Switches

1.0 SCOPE

- 1.1** This specification covers the detail requirements for four CMOS switches with three switch configurations (SPST, SPDT, and DPST). These circuits are processed in accordance with MIL-STD-883 and are fully compliant to paragraph 1.2.1.

It is highly recommended that this data sheet be used as a baseline for new military or aerospace source control drawings.

For typical applications and operating characteristics, consult Maxim's data books.

1.2 Part Numbers

Device	Part Number
-1	DG300AA(X)/883B
-2	DG301AA(X)/883B
-3	DG302AA(X)/883B
-4	DG303AA(X)/883B

1.3 Package

(X)	Package	Description
A	A-10	10-Pin TO-100
K	K-14	14-Pin Ceramic Dual-In-Line Package (CERDIP)
Z	L-20	20-Pin Ceramic Leadless Chip Carrier (LCC)

Note: See *Package Information* section for package drawings and dimensions.

1.4 Absolute Maximum Ratings

($T_A = +25^\circ\text{C}$, unless otherwise noted.)

V_+ to V_-	44V
V_+ to GND	25V
Digital Input Overvoltage Range	($V_- - 2V$) to ($V_+ + 2V$) or 30mA whichever occurs first
Current (any terminal except S or D)	30mA
Continuous Current (S or D)	30mA
Peak Current (pulsed at 1ms, 10% duty cycle max)	100mA
Power Dissipation ($T_A = +70^\circ\text{C}$, $T_j = +150^\circ\text{C}$)	
10-Pin TO-100 (derate 6.00mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$)	533mW
14-Pin CERDIP (derate 9.09mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$)	727mW
20-Pin LCC (derate 9.09mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$)	727mW
Operating Temperature Range	-55°C to $+125^\circ\text{C}$
Storage Temperature Range	-65°C to $+150^\circ\text{C}$
Lead Temperature (soldering, 10 sec)	$+300^\circ\text{C}$

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- 1.5 Thermal Resistance** $\Theta_{JC} = 45^{\circ}\text{C/W}$ for A-10
 $\Theta_{JC} = 55^{\circ}\text{C/W}$ for K-14 and L-20
 $\Theta_{JA} = 150^{\circ}\text{C/W}$ for A-10
 $\Theta_{JA} = 110^{\circ}\text{C/W}$ for K-14 and L-20

2.0 REQUIREMENTS

- 2.1** Electrical performance characteristics are specified in Table 1 and apply over the full ambient operating temperature range, unless otherwise specified.

TABLE 1. ELECTRICAL PERFORMANCE CHARACTERISTICS (Note 1)

CHARACTERISTICS	SYMBOL	CONDITIONS		DEVICE TYPES	GROUP A SUB-GROUPS	LIMITS		UNITS
						MIN	MAX	
Analog-Signal Range	V _{ANALOG}	V _S = ±15V		All	1, 2, 3	-15	15	V
Drain-Source On Resistance	r _{DS(ON)}	V _{IN} = 0.8V or V _{IN} = 4.0V	I _S = -10mA, V _D = 10V	All	1, 3		50	Ω
			I _S = 10mA, V _D = -10V		2		75	
					1, 3		50	
					2		75	
Source-Off Leakage Current	I _{S(OFF)}	V _{IN} = 0.8V or V _{IN} = 4.0V	V _S = 14V, V _D = -14V	All	1	-1	1	nA
			V _S = -14V, V _D = 14V		2	-100	100	
					1	-1	1	
					2	-100	100	
Drain-Off Leakage Current	I _{D(OFF)}	V _{IN} = 0.8V or V _{IN} = 4.0V	V _S = 14V, V _D = -14V	All	1	-1	1	nA
			V _S = -14V, V _D = 14V		2	-100	100	
					1	-1	1	
					2	-100	100	
Drain-On Leakage Current	I _{D(ON)}	V _{IN} = 0.8V or V _{IN} = 4.0V	V _S = V _D = 14V	All	1	-2	2	nA
			V _S = V _D = -14V		2	-200	200	
					1	-2	2	
					2	-200	200	
Input Current with Input Voltage High	I _{INH}	V _{IN} = 5.0V		All	1, 2, 3	-1		μA
V _{IN} = 15V			1					
Input Current with Input Voltage Low	I _{INL}	V _{IN} = 0V		All	1, 2, 3	-1		μA
Positive Supply Current	I ₊	V _{IN} = 4V, one input; all others = 0V		All	1, 3		0.5	mA
					2		1	
		V _{IN} = 0.8V, all inputs			1, 3		10	μA
					2		100	
Negative Supply Current	I ₋	V _{IN} = 4V, one input; all others = 0V		All	1, 3	-10		μA
					2	-100		
		V _{IN} = 0.8V, all inputs			1, 3	-10		
					2	-100		

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TABLE 1. ELECTRICAL PERFORMANCE CHARACTERISTICS (continued)

CHARACTERISTICS	SYMBOL	CONDITIONS	DEVICE TYPES	GROUP A SUB-GROUPS	LIMITS		UNITS
					MIN	MAX	
DYNAMIC							
Turn-On Time	t _{ON}	Figure 1	All	9	300	ns	
				10, 11	500		
Turn-Off Time	t _{OFF}	Figure 1	All	9	250	ns	
				10, 11	450		

Note 1: $V_+ = 15V$, $V_- = -15V$, $GND = 0V$, $V_{INH} = 4.0V$, $V_{INL} = 0.8V$, unless otherwise noted.

3.0 QUALITY ASSURANCE

- 3.1** Sampling and inspection procedures shall be in accordance with MIL-M-38510 and, to the extent specified, with MIL-STD-883.
- 3.2** Screening shall be in accordance with Method 5004 of MIL-STD-883. Burn-in test (Method 1015):
- (1) Test condition A, B, C, or D.
 - (2) $T_A = +125^\circ C$, minimum.
 - (3) Interim and final electrical test requirements shall be as specified in Table 2.
- 3.3** Quality conformance inspection shall be in accordance with Method 5005 of MIL-STD-883 including Groups A, B, C, and D inspection.
- Group A inspection:
- (1) Tests as specified in Table 2.
 - (2) Selected subgroups in Table 1, Method 5005 of MIL-STD-883 shall be omitted.
- 3.4** Groups C and D inspections:
- a. End-point electrical parameters shall be specified in Table 1.
 - b. Steady-state life test (Method 1005 of MIL-STD-883):
 - (1) Test condition A, B, C, or D.
 - (2) $T_A = +125^\circ C$, minimum.
 - (3) Test duration, 1000 hours, except as permitted by Method 1005 of MIL-STD-883.

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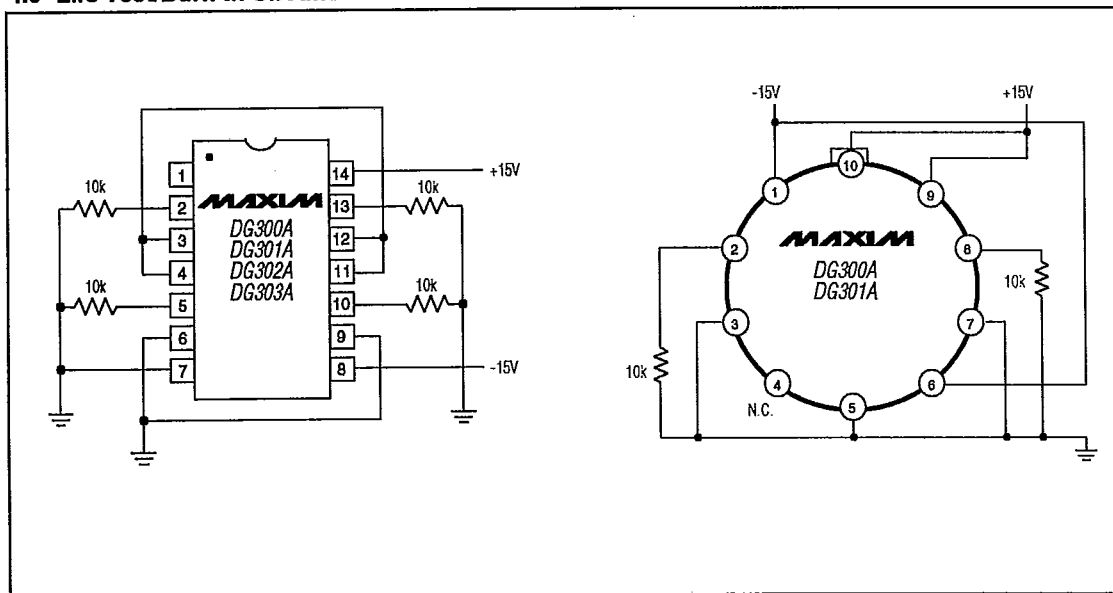
TABLE 2. ELECTRICAL TEST REQUIREMENTS

MIL-STD-883 Test Requirements	Subgroups (per Method 5005, Table 1)
Interim Electrical Parameters (Method 5004)	1
Final Electrical Parameters (Method 5004)	1, * 2, 3, 9
Group A Test Requirements (Method 5005)	1, 2, 3, 9, 10, ** 11**
Groups C and D End-Point Electrical Parameters (Method 5005)	1

* PDA applies to Subgroup 1 only.

** Subgroups 10 and 11, if not tested, shall be guaranteed to the limits in Table 1.

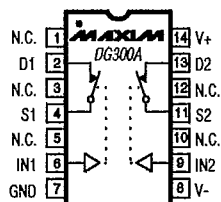
4.0 Life Test/Burn-In Circuits



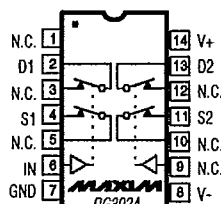
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4.1 Pin Configurations/Functional Diagrams

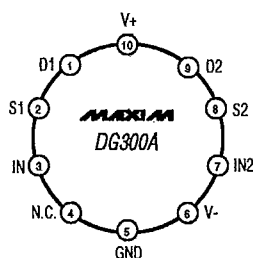
TOP VIEW



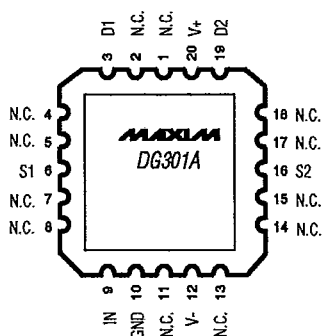
14-PIN CERDIP



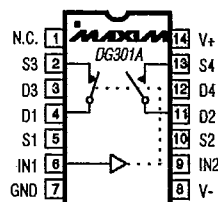
14-PIN CERDIP



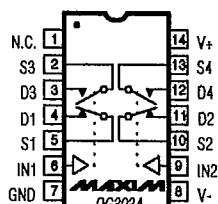
10-PIN TO-100



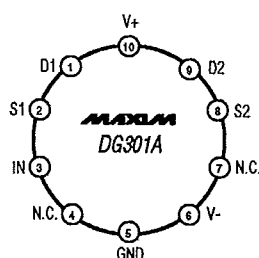
20-PIN LCC



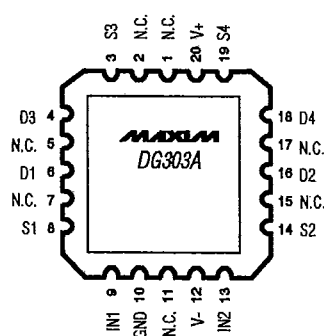
14-PIN CERDIP



14-PIN CERDIP



10-PIN TO-100



20-PIN LCC

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4.2 Truth Tables

DG300A/DG302A	
Logic	Switch
0	OFF
1	ON

DG301A		
Logic	Switch 1	Switch 2
0	OFF	ON
1	ON	OFF

DG303A		
Logic	Switch 1, Switch 2	Switch 3, Switch 4
0	OFF	ON
1	ON	OFF

4.3 Timing Diagram/Test Circuit

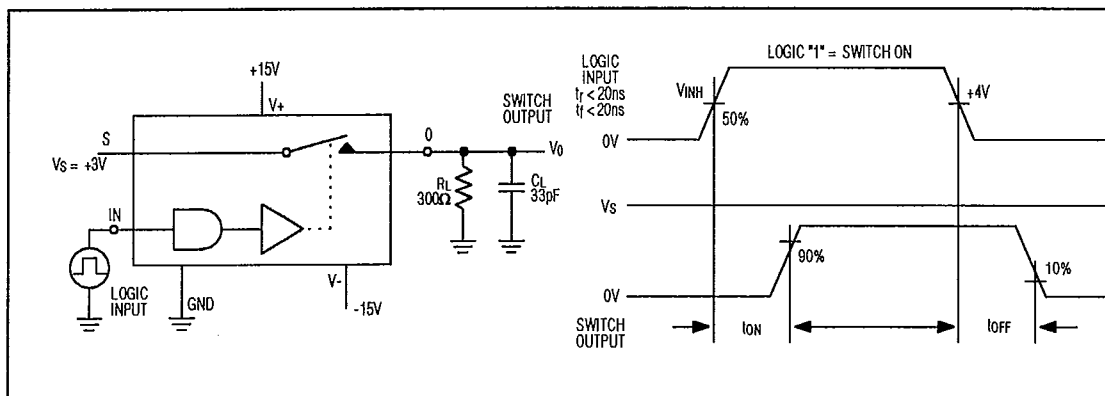


Figure 1. Switching-Time Test Circuit

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

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