

# MAXIM

## CMOS, TTL-Compatible Analog Switches

**DG300A-DG303A/883B**
**1**

### 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/°C above +70°C)	533mW
14-Pin CERDIP (derate 9.09mW/°C above +70°C)	727mW
20-Pin LCC (derate 9.09mW/°C above +70°C)	727mW
Operating Temperature Range	-55°C to +125°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10 sec)	+300°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	$V_{ANALOG}$	$V_S = \pm 15V$	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	$\Omega$	
					2	75		
		$I_S = 10mA,$ $V_D = -10V$	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		$\mu A$	
		$V_{IN} = 15V$			1			
Input Current with Input Voltage Low	$I_{INL}$	$V_{IN} = 0V$	All	1, 2, 3	-1		$\mu A$	
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		$\mu A$	
				2	100			
Negative Supply Current	I-	$V_{IN} = 4V,$ one input; all others = 0V	All	1, 3	-10		$\mu A$	
				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	
<b>DYNAMIC</b>							
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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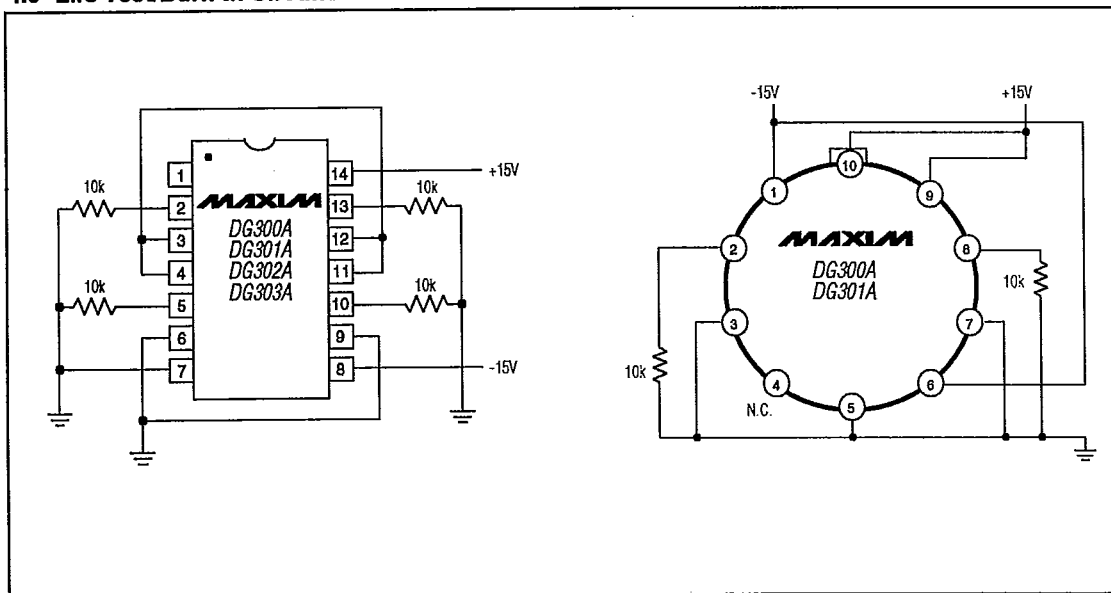
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TABLE 2. ELECTRICAL TEST REQUIREMENTS

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.

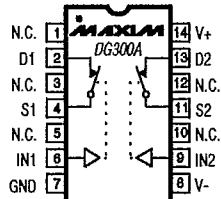
## 4.0 Life Test/Burn-In Circuits



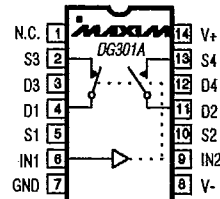
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## 4.1 Pin Configurations/Functional Diagrams

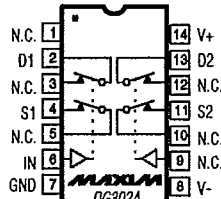
TOP VIEW



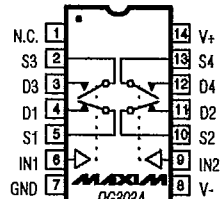
14-PIN CERDIP



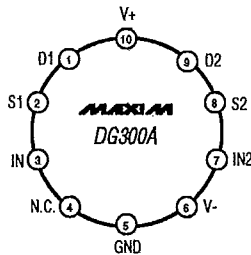
14-PIN CERDIP



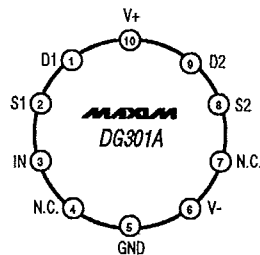
14-PIN CERDIP



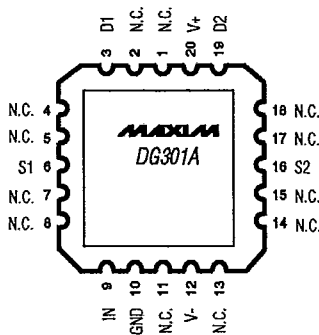
14-PIN CERDIP



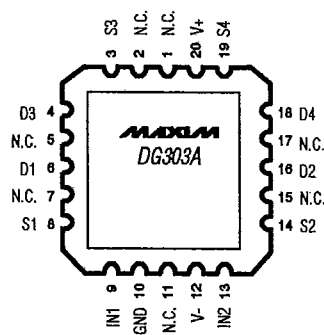
10-PIN TO-100



10-PIN TO-100



20-PIN LCC



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

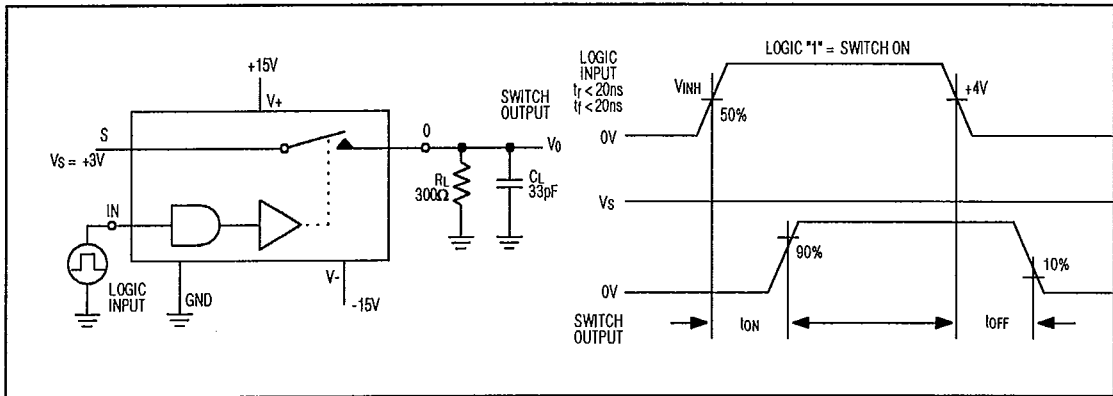


Figure 1. Switching-Time Test Circuit

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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