

+SCOPE: **TTL COMPATIBLE CMOS ANALOG SWITCHES**

<u>Device Type</u>	<u>Generic Number</u>
01	DG300A(x)/883B
02	DG301A(x)/883B
03	DG302A(x)/883B
04	DG303A(x)/883B

Case Outline(s). The case outlines shall be designated in Mil-Std-1835 and as follows:

<u>Outline Letter</u>	<u>Mil-Std-1835</u>	<u>Case Outline</u>	<u>Package Code</u>
AA	MACY1-X10	10 LEAD CAN	10 TO 100
AK	GDIP1-T14 or CDIP2-T14	14 LEAD CERDIP	J14
AZ	CQCC1-N20	20-Pin Ceramic LCC	L20

Absolute Maximum Ratings

Voltage Referenced to V-

V+.....	44V
GND .....	25V
V <sub>L</sub> .....	(GND -0.3V) to (V <sub>+</sub> )+0.3V
Digital Inputs, V <sub>S</sub> , V <sub>D</sub> (Note 1) .....	-4V to (V <sub>+</sub> +4V) or 30mA, whichever occurs first
Current, Any terminal except S or D .....	30mA
Continuous Current, S or D .....	30mA
(Pulsed at 1ms, 10% duty cycle max) .....	100mA
Lead Temperature (soldering, 10 seconds) .....	+300°C
Storage Temperature .....	-65°C to +150°C

Continuous Power Dissipation .....	T <sub>A</sub> =+70°C
10 lead Can (derate 6.67mW/°C above +70°C) .....	533mW
14 lead CERDIP(derate 9.09mW/°C above +70°C) .....	727mW
20-Pin LCC (derate 9.09mW/°C above +70°C) .....	727mW
Junction Temperature T <sub>J</sub> .....	+150°C
Thermal Resistance, Junction to Case, Θ <sub>JC</sub> :	
Case Outline 10 lead Can .....	45°C/W
Case Outline 14 lead CERDIP.....	55°C/W
Case Outline 20-Pin LCC .....	20°C/W
Thermal Resistance, Junction to Ambient, Θ <sub>JA</sub> :	
Case Outline 10 lead Can .....	150°C/W
Case Outline 14 lead CERDIP.....	110°C/W
Case Outline 20-Pin LCC .....	110°C/W

Recommended Operating Conditions.

Ambient Operating Range (T <sub>A</sub> ) .....	-55°C to +125°C
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NOTE 1: Signals on S<sub>x</sub>, D<sub>x</sub>, or IN<sub>x</sub> exceeding V<sub>+</sub> or V<sub>-</sub> are clamped by internal diodes.  
Limit diode forward current to maximum current ratings.

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TABLE 1 ELECTRICAL TESTS

TEST	Symbol	CONDITIONS -55 °C ≤ T <sub>A</sub> ≤ +125 °C V <sub>+</sub> =+15V, V <sub>-</sub> =-15V, GND=0V Unless otherwise specified	Group A Subgroup	Device type	Limits 2/ Min	Limits Max	Units
<b>SWITCH</b>							
Analog-Signal Range	V <sub>ANALOG</sub>	I <sub>S</sub> =10mA, V <sub>IN</sub> =0.8V or 4.0V	1,2,3	All	-15	15	V
Drain-Source ON Resistance	r <sub>DS(ON)</sub>	I <sub>S</sub> = -10mA, V <sub>D</sub> =10V, V <sub>IN</sub> =4.0V or V <sub>IN</sub> =0.8V	1 2,3	All		50 75	Ω
Drain-Source ON Resistance	r <sub>DS(ON)</sub>	I <sub>S</sub> = 10mA, V <sub>D</sub> =-10V V <sub>IN</sub> =4.0V or V <sub>IN</sub> =0.8V	1 2,3	All		50 75	Ω
Source OFF Leakage Current	I <sub>S(OFF)</sub>	V <sub>S</sub> = 14V, V <sub>D</sub> =-14V V <sub>IN</sub> =4.0V or V <sub>IN</sub> =0.8V	1 2,3	All		1 100	nA
Source OFF Leakage Current	I <sub>S(OFF)</sub>	V <sub>S</sub> = -14V, V <sub>D</sub> =14V V <sub>IN</sub> =4.0V or V <sub>IN</sub> =0.8V	1 2,3	All	-1 -100		nA
Drain OFF Leakage Current	I <sub>D(OFF)</sub>	V <sub>S</sub> = -14V, V <sub>D</sub> =14V V <sub>IN</sub> =4.0V or V <sub>IN</sub> =0.8V	1 2,3	All		1 100	nA
Drain OFF Leakage Current	I <sub>D(OFF)</sub>	V <sub>S</sub> = 14V, V <sub>D</sub> =-14V V <sub>IN</sub> =4.0V or V <sub>IN</sub> =0.8V	1 2,3	All	-1 -100		nA
Drain ON Leakage Current	I <sub>D(ON)</sub>	V <sub>D</sub> =V <sub>S</sub> =14V V <sub>IN</sub> =4.0V or V <sub>IN</sub> =0.8V	1 2,3	All		2 200	nA
Drain ON Leakage Current	I <sub>D(ON)</sub>	V <sub>D</sub> =V <sub>S</sub> =-14V V <sub>IN</sub> =4.0V or V <sub>IN</sub> =0.8V	1 2,3	All	-2 -200		nA
<b>INPUT</b>							
Input Current/Voltage High	I <sub>INH</sub>	V <sub>IN</sub> = 5.0V V <sub>IN</sub> =15V	1,2,3	All	-1	1	μA
Input Current/Voltage Low	I <sub>INL</sub>	V <sub>IN</sub> =0V	1,2,3	All	-1		μA
<b>SUPPLY</b>							
Positive Supply Current	I+	V <sub>IN</sub> =4V (One Input) (All others =0)	1 2,3	All		0.5 1.0	mA
Negative Supply Current	I-	V <sub>IN</sub> =4V (One Input) (All others =0)	1 2,3	All	-10 -100		μA
Positive Supply Current	I+	V <sub>IN</sub> =0.8V (All Inputs)	1 2,3	All		10 100	μA
Negative Supply Current	I-	V <sub>IN</sub> =0.8V (All Inputs)	1 2,3	All	-10 -100		μA
<b>DYNAMIC</b>							
Turn ON time	t <sub>ON</sub>	Figure 3	9 10,11	All		300 500	ns
Turn OFF time	t <sub>OFF</sub>	Figure 3	9 10,11	All		250 450	ns

NOTE 2: The algebraic convention, where the most negative value is a minimum and the most positive value a maximum, is used on this data sheet.

TABLE 2: **TYPICAL ELECTRICAL CHARACTERISTICS (NOTE 3)**

TEST	Symbol	CONDITIONS -55 °C <=T <sub>A</sub> <= +125°C V <sub>+</sub> =+15V, V <sub>-</sub> =-15V, GND=0V Unless otherwise specified	Group A Subgroup	Device type	TYPICAL Limits <u>3/</u>	Units
Break-Before-Make Interval	t <sub>ON</sub> -t <sub>OFF</sub>	See Break-Before-Make Time Test Circuit DG301A, DG303A only		02, 04	50	ns
Charge Injection	Q	C <sub>L</sub> =10nF, R <sub>gen</sub> =0Ω, V <sub>gen</sub> =0V		All	12	pC
Source OFF Capacitance	C <sub>S(off)</sub>	f=1MHz, V <sub>IN</sub> =0.8V or 4.0V, V <sub>S</sub> and V <sub>D</sub> = 0V		All	14	pF
Drain OFF Capacitance	C <sub>D(off)</sub>	f=1MHz, V <sub>IN</sub> =0.8V or 4.0V, V <sub>S</sub> and V <sub>D</sub> = 0V		All	14	pF
Channel ON Capacitance	C <sub>D(on)</sub> + C <sub>S(on)</sub>	f=1MHz, V <sub>IN</sub> =0.8V or 4.0V, V <sub>S</sub> + V <sub>D</sub> = 0V		All	40	pF
Input Capacitance	C <sub>IN</sub>	f=1MHz, V <sub>IN</sub> =0V		All	6	pF
Input Capacitance	C <sub>IN</sub>	f=1MHz, V <sub>IN</sub> =15V		All	7	pF
Off Isolation <u>4/</u>		V <sub>IN</sub> =0V, R <sub>L</sub> =1kΩ, V <sub>S</sub> =1V <sub>RMS</sub> , f=500kHz		All	62	dB
Crosstalk (Channel to Channel)		V <sub>IN</sub> =0V, R <sub>L</sub> =1kΩ, V <sub>S</sub> =1V <sub>RMS</sub> , f=500kHz		All	74	dB

NOTE 3: Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

NOTE 4: OFF Isolation=20 log V<sub>S</sub>/V<sub>D</sub>, V<sub>S</sub>= input to OFF switch, V<sub>D</sub>= Output.

**TERMINAL CONNECTION DEVICE TYPES 01, 02, 03, 04**

TERMINAL NUMBER	DG300A 10 Lead CAN	DG300A 14 Lead CERDIP	DG301A 10 Lead CAN	DG301A 14 Lead CERDIP	DG302A 14 Lead CERDIP	DG302A 20 Pin LCC	DG303A 14 Lead CERDIP	DG303A 20 Pin LCC
1	D <sub>1</sub>	NC	D <sub>1</sub>	NC	NC	NC	NC	NC
2	S <sub>1</sub>	D <sub>1</sub>	S <sub>1</sub>	D <sub>1</sub>	S <sub>3</sub>	NC	S <sub>3</sub>	NC
3	IN	NC	IN	NC	D <sub>3</sub>	S <sub>3</sub>	D <sub>3</sub>	S <sub>3</sub>
4	NC	S <sub>1</sub>	NC	S <sub>1</sub>	D <sub>1</sub>	D <sub>3</sub>	D <sub>1</sub>	D <sub>3</sub>
5	GND	NC	GND	NC	S <sub>1</sub>	NC	S <sub>1</sub>	NC
6	V-	IN <sub>1</sub>	V-	IN	IN <sub>1</sub>	D <sub>1</sub>	IN <sub>1</sub>	D <sub>1</sub>
7	IN <sub>2</sub>	GND	NC	GND	GND	NC	GND	NC
8	S <sub>2</sub>	V-	S <sub>2</sub>	V-	V-	S <sub>1</sub>	V-	S <sub>1</sub>
9	D <sub>2</sub>	IN <sub>2</sub>	D <sub>2</sub>	NC	IN <sub>2</sub>	IN <sub>1</sub>	IN <sub>2</sub>	IN <sub>1</sub>
10		NC		NC	S <sub>2</sub>	GND	S <sub>2</sub>	GND
11		S <sub>2</sub>		S <sub>2</sub>	D <sub>2</sub>	NC	D <sub>2</sub>	NC
12		NC		NC	D <sub>4</sub>	V-	D <sub>4</sub>	V-
13		D <sub>2</sub>		D <sub>2</sub>	S <sub>4</sub>	IN <sub>2</sub>	S <sub>4</sub>	IN <sub>2</sub>
14		V+		V+	V+	S <sub>2</sub>	V+	S <sub>2</sub>
15						NC		NC
16						D <sub>2</sub>		D <sub>2</sub>
17						NC		NC
18						D <sub>4</sub>		D <sub>4</sub>
19						S <sub>4</sub>		S <sub>4</sub>
20						V+		V+

**TRUTH TABLES**

	DG300/302	DG301	DG301	DG303	DG303
SWITCH		1	2	1,3	2,4
LOGIC					
0	OFF	OFF	ON	OFF	ON
1	ON	ON	OFF	ON	OFF

FIGURE 2: BREAK-BEFORE-MAKE TIME TEST CIRCUIT: See Commercial Data Sheet  
 FIGURE 3: SWITCHING TIME TEST CIRCUIT: See Commercial Data Sheet

<b><u>ORDERING INFORMATION.</u></b>		PKG.Code
01	DG300AAA/883B	10 TO 100
01	DG300AAK/883B	J14
02	DG301AAA/883B	10 TO 100
02	DG301AAK/883B	J14
02	DG301AAZ/883B	L20
03	DG302AAK/883B	J14
04	DG303AAK/883B	J14
04	DG303AAZ/883B	L20

**QUALITY ASSURANCE**

Sampling and inspection procedures shall be in accordance with MIL-Prf-38535, Appendix A as specified in Mil-Std-883.

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. TA = +125°C minimum.
3. Interim and final electrical test requirements shall be specified in Table 2.

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.

Group 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, D.
  2. TA = +125°C, minimum.
  3. Test duration, 1000 hours, except as permitted by Method 1005 of Mil-Std-883.

**TABLE 2. ELECTRICAL TEST REQUIREMENTS**

Mil-Std-883 Test Requirements	Subgroups per Method 5005, Table 1
Interim Electric Parameters Method 5004	1
Final Electrical Parameters Method 5005	1*, 2, 3, 9
Group A Test Requirements Method 5005	1, 2, 3, 9,10,11
Group C and D End-Point Electrical Parameters Method 5005	1

\* PDA applies to Subgroup 1 only.

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