

**SCOPE: IMPROVED, DUAL, HIGH-SPEED CHANNEL ANALOG SWITCHES**

<u>Device Type</u>	<u>Generic Number</u>
01	DG401A(x)/883B
02	DG403A(x)/883B
03	DG405A(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>
K	GDIP1-T16 or CDIP2-T16	16 LEAD CERDIP	J16
Z	CQCC1-N20	20-Pin Ceramic LCC	L20

**Absolute Maximum Ratings**

Voltage Referenced to V<sup>-</sup>

V <sup>+</sup> to V <sup>-</sup> .....	44V
V <sup>+</sup> to GND .....	25V
V <sub>L</sub> .....	(GND-0.3V) to (V <sup>+</sup> +0.3V)
Digital Inputs, V <sub>S</sub> , V <sub>D</sub> <u>1/</u> .....	(V <sup>-</sup> -2V) to (V <sup>+</sup> +2V) or 20mA whichever occurs first.
Continuous Current, Any terminal except S or D .....	30mA
Continuous Current, S or D .....	20mA
Peak Current, S or D (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
16 lead CERDIP(derate 10.0mW/°C above +70°C) .....	800mW
20 lead LCC (derate 9.1 mW/°C above +70°C) .....	727mW
Junction Temperature T <sub>J</sub> .....	+150°C
Thermal Resistance, Junction to Case, Θ <sub>JC</sub> :	
Case Outline 16 lead CERDIP.....	50°C/W
Case Outline 20 lead LCC .....	20°C/W
Thermal Resistance, Junction to Ambient, Θ <sub>JA</sub> :	
Case Outline 16 lead CERDIP.....	100°C/W
Case Outline 20 lead LCC .....	110°C/W

**Recommended Operating Conditions**

Ambient Operating Range (T <sub>A</sub> ) .....	-55°C to +125°C
Positive Supply Voltage (V <sup>+</sup> ) .....	+15V
Negative Supply Voltage (V <sup>-</sup> ) .....	-15V
V <sub>INL</sub> (max) .....	0.8V
V <sub>INH</sub> (min) .....	2.4V
Logic Supply Voltage (V <sub>L</sub> ) .....	+5V
Low Charge Injection .....	15pC
Crosstalk (channel-to-channel) <u>2/</u> .....	90dB

1/ Signals on S<sub>X</sub>, D<sub>X</sub> or IN<sub>X</sub> exceeding V<sup>+</sup> or V<sup>-</sup> are clamped by internal diodes. Limit forward current to maximum current ratings.

2/ Crosstalk performance is improved with case outline for 20LCC.

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	Group A Subgroup	Device type	Limits	Limits	Units
		-55 °C ≤ T <sub>A</sub> ≤ +125°C V <sup>+</sup> =+15V, V <sup>-</sup> =-15V, GND=0V V <sub>INH</sub> =2.4V, V <sub>INL</sub> =0.8V, V <sub>L</sub> =5V Unless otherwise specified			Min 3/	Max 3/	
<b>SWITCH</b>							
Analog-Signal Range	V <sub>ANALOG</sub>	4/	1,2,3	All	-15	15	V
Drain-Source ON Resistance	r <sub>DS(ON)</sub>	V <sup>+</sup> =+13.5V, V <sup>-</sup> =-13.5V, I <sub>S</sub> =-10mA, V <sub>D</sub> =±10V, V <sub>INH</sub> =2.4V, V <sub>INL</sub> =0.8V	1 2,3	All		30 45	Ω
Drain-Source ON Resistance Matching between Channels 5/	Δr <sub>DS</sub> (ON)	V <sup>+</sup> =+15V, V <sup>-</sup> =-15V, I <sub>S</sub> =-10mA, V <sub>D</sub> =±10V	1 2,3	All		2.0 3.0	Ω
On-Resistance Flatness 5/	r <sub>FLAT(ON)</sub>	V <sup>+</sup> =+15V, V <sup>-</sup> =-15V, I <sub>S</sub> =-10mA, V <sub>D</sub> =±5V, 0V	1 2,3	All		3.0 6.0	Ω
Source-OFF Leakage Current	I <sub>S(OFF)</sub>	V <sup>+</sup> =+16.5V, V <sup>-</sup> =-16.5V, V <sub>D</sub> =±15.5V, V <sub>S</sub> =±15.5V	1 2	All	-0.25 -10	0.25 10	nA
Drain-OFF Leakage Current	I <sub>D(OFF)</sub>	V <sup>+</sup> =+16.5V, V <sup>-</sup> =-16.5V, V <sub>D</sub> =±15.5V, V <sub>S</sub> =±15.5V	1 2,3	All	-0.25 -10	0.25 10	nA
Drain-ON Leakage Current	I <sub>D(ON)</sub> or I <sub>S(ON)</sub>	V <sup>+</sup> =+16.5V, V <sup>-</sup> =-16.5V, V <sub>D</sub> =±15.5V, V <sub>S</sub> =±15.5V	1 2,3	All	-0.4 -20	0.4 20	nA
<b>INPUT</b>							
Input Current/Voltage High	I <sub>INH</sub>	V <sub>IN</sub> = 2.4V, all others = 0.8V	1,2,3	All	-1.0	1.0	μA
Input Current/Voltage Low	I <sub>INL</sub>	V <sub>IN</sub> = 0.8V, all others = 2.4V	1,2,3	All	-1.0	1.0	μA
<b>SUPPLY</b>							
Power-Supply Range					±4.5	±20	V
Positive Supply Current	I <sub>+</sub>	All channels on or off, V <sup>+</sup> =+16.5V, V <sup>-</sup> =-16.5V, V <sub>IN</sub> =0V or 5V	1 2,3	All	-1.0 -5.0	1.0 5.0	μA
Negative Supply Current	I <sub>-</sub>	All channels on or off, V <sup>+</sup> =+16.5V, V <sup>-</sup> =-16.5V, V <sub>IN</sub> =0V or 5V	1 2,3	All	-1.0 -5.0	1.0 5.0	μA
Logic Supply Current	I <sub>L</sub>	All channels on or off, V <sup>+</sup> =+16.5V, V <sup>-</sup> =-16.5V, V <sub>IN</sub> =0V or 5V	1 2,3	All	-1.0 -5.0	1.0 5.0	μA
Ground Current	I <sub>GND</sub>	All channels on or off, V <sup>+</sup> =+16.5V, V <sup>-</sup> =-16.5V, V <sub>IN</sub> =0V or 5V	1 2,3	All	-1.0 -5.0	1.0 5.0	μA

TEST	Symbol	CONDITIONS	Group A Subgroup	Device type	Limits Min	Limits Max	Units
		-55 °C ≤ T <sub>A</sub> ≤ +125 °C V <sup>+</sup> =+15V, V <sup>-</sup> =-15V, GND=0V V <sub>INH</sub> =2.4V, V <sub>INL</sub> =0.8V, V <sub>L</sub> =5V Unless otherwise specified					
<b>DYNAMIC</b>							
Turn-On Time	t <sub>ON</sub>	Figure 2	9	All		150	ns
Turn-Off Time	t <sub>OFF</sub>	Figure 2	9	All		100	ns
Break-Before-Make Delay <u>4/</u>	t <sub>D</sub>	DG403 only, Figure 3	9	02	10		ns
Charge Injection <u>4/</u>	Q	C <sub>L</sub> =1.0nF, V <sub>GEN</sub> =0V, R <sub>GEN</sub> =0Ω Figure 4	9	All		15	pC

NOTE 3: This data sheet uses the algebraic convention, where the most negative value is a minimum and the most positive value is a maximum.

NOTE 4: Guaranteed by design.

NOTE 5:  $\Delta r_{ON} = \Delta r_{ON(max)} - \Delta r_{ON(min)}$ . On-resistance match between channels and flatness are guaranteed only with specified voltages. Flatness is defined as the difference between the maximum and minimum value of on-resistance as measured at the extremes of the specified analog signal range.

**FIGURE 1: SWITCHING TIME TEST CIRCUIT:** See Commercial Data Sheet

**FIGURE 2: SWITCHING TIME TEST CIRCUIT:** See Commercial Data Sheet

**FIGURE 3: BREAK-BEFORE-MAKE INTERVAL:** See Commercial Data Sheet

**FIGURE 4: CHARGE INJECTION:** See Commercial Data Sheet

<b>ORDERING INFORMATION:</b>			
DG401AK/883B	16 CDIP	DG403AZ/883B	20 LCC
DG401AZ/883B	20 LCC	DG405AK/883B	16 CDIP
DG403AK/883B	16 CDIP	DG405AZ/883B	20 LCC

**TRUTH TABLES:**

DG401 LOGIC	DG401 SWITCH	DG403 LOGIC	DG403 SWITCHES 1, 2	DG403 SWITCHES 3, 4	DG405 LOGIC	DG405 SWITCH
0	OFF	0	OFF	ON	0	OFF
1	ON	1	ON	OFF	1	ON

**TERMINAL CONNECTIONS:**

	DG401	DG401	DG403	DG403	DG405	DG405
	J16	LCC20	J16	LCC20	J16	LCC20
1	D1	NC	D1	NC	D1	NC
2	NC	D1	NC	D1	NC	D1
3	NC	NC	D3	NC	D3	NC
4	NC	NC	S3	D3	S3	D3
5	NC	NC	S4	S3	S4	S3
6	NC	NC	D4	NC	D4	NC
7	NC	NC	NC	S4	NC	S4
8	D2	NC	D2	D4	D2	D4
9	S2	NC	S2	NC	S2	NC
10	IN2	D2	IN2	D2	IN2	D2
11	V+	NC	V+	NC	V+	NC
12	V <sub>L</sub>	S2	V <sub>L</sub>	S2	V <sub>L</sub>	S2
13	GND	IN2	GND	IN2	GND	IN2
14	V-	V+	V-	V+	V-	V+
15	IN1	V <sub>L</sub>	IN1	V <sub>L</sub>	IN1	V <sub>L</sub>
16	S1	NC	S1	NC	S1	NC
17		GND		GND		GND
18		V-		V-		V-
19		IN1		IN1		IN1
20		S1		S1		S1

**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
Group 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 of Table 1.