

**SCOPE: IMPROVED 16-CHANNEL/DUAL 8-CHANNEL,  
HIGH PERFORMANCE CMOS ANALOG MULTIPLEXER**

<u>Device Type</u>	<u>Generic Number</u>	<u>Circuit Function</u>
01	DG406A(x)/883B	16-Channel Analog Multiplexer
02	DG407A(x)/883B	Dual 8-Channel Analog Multiplexer

**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-T28 or CDIP2-T28	28 LEAD CERDIP	J28
Z	CQCC1-N28	28-Pin Ceramic LCC	L28

**Absolute Maximum Ratings**

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

V <sup>+</sup> to V <sup>-</sup> .....	-0.3V, 44V
V <sup>+</sup> to GND .....	-0.3V, 25V
Digital Inputs, S, D <u>1</u> / .....	(V <sup>-</sup> ) -2V to (V <sup>+</sup> ) +2V or 30mA whichever occurs first
Continuous Current, Any terminal .....	30mA
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 +160°C

Continuous Power Dissipation .....	T <sub>A</sub> =+70°C
28 lead CERDIP(derate 16.7mW/°C above +70°C) .....	1333mW
28 lead LCC (derate 10.2mW/°C above +70°C) .....	816mW
Junction Temperature T <sub>J</sub> .....	+150°C
Thermal Resistance, Junction to Case, $\theta_{JC}$ :	
Case Outline 28 lead CERDIP .....	25°C/W
Case Outline 28 lead LCC .....	15°C/W
Thermal Resistance, Junction to Ambient, $\theta_{JA}$ :	
Case Outline 28 lead CERDIP .....	60°C/W
Case Outline 28 lead LCC .....	98°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>AL</sub> (max) .....	0.8V
V <sub>AH</sub> (min) .....	2.4V

1/ Signals on Sx, Dx, A0, A1, A2, A3 or EN exceeding V<sup>+</sup> or V<sup>-</sup> are clamped by internal diodes.  
Limit 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: DUAL SUPPLIES**

TEST	Symbol	CONDITIONS		Limits Min 2/	Limits Max 2/	Units	
		-55 °C ≤ T <sub>A</sub> ≤ +125 °C V <sub>+</sub> =+15V, V <sub>-</sub> =-15V, GND=0V V <sub>AH</sub> =+2.4V, V <sub>AL</sub> =+0.8V Unless otherwise specified	Group A Subgroup				Device type
<b>SWITCH</b>							
Analog-Signal Range	V <sub>ANALOG</sub>	NOTE 3	1,2,3	All	-15	15 V	
Drain-Source ON Resistance	r <sub>DS(ON)</sub>	I <sub>S</sub> = -1.0mA, V <sub>D</sub> = ±10V	1 2,3	All		100 125 Ω	
r <sub>DS(ON)</sub> Matching between Channels	Δr <sub>DS(ON)</sub>	V <sub>D</sub> = ±10V NOTE 4	1 2,3	All		8 10 Ω	
On-resistance Flatness	r <sub>FLAT</sub>	I <sub>S</sub> = -1.0mA, V <sub>D</sub> = ±5V or 0V	1 2,3	All		9 12 Ω	
Source-OFF Leakage Current	I <sub>S(OFF)</sub>	V <sub>S</sub> = ±10V, V <sub>D</sub> = ±10V, V <sub>EN</sub> = 0V	1 2,3	All	-0.5 -50	0.5 50 nA	
Drain-OFF Leakage Current	I <sub>D(OFF)</sub>	V <sub>S</sub> = ±10V, V <sub>D</sub> = ±10V, V <sub>EN</sub> = 0V	1 2,3	01	-1.0 -200	1.0 200	nA
			1 2,3	02	-1.0 -100	1.0 100	
Drain-ON Leakage Current	I <sub>D(ON)</sub> + I <sub>S(ON)</sub>	V <sub>D</sub> = V <sub>S</sub> = ±10V, sequence each switch on	1 2,3	01	-1.0 -200	1.0 200	nA
			1 2,3	02	-1.0 -100	1.0 100	
<b>INPUT</b>							
Input Current/Voltage High	I <sub>AH</sub>	V <sub>IN</sub> = 2.4V, 15V	1,2,3	All	-1.0	1.0 μA	
Input Current/Voltage Low	I <sub>AL</sub>	V <sub>EN</sub> = 0V, 2.4V; V <sub>A</sub> = 0V	1,2,3	All	-1.0	1.0 μA	
<b>SUPPLY</b>							
Power Supply Range			1,2,3	All	±4.5	±20 V	
Positive Supply Current	I+	V <sub>EN</sub> = V <sub>A</sub> = 0V or 4.5V	1 2,3	All		30 75 μA	
		V <sub>EN</sub> = 2.4V, V <sub>A(ALL)</sub> = 0V or 2.4V	1 2,3	All		0.5 1.0 mA	
Negative Supply Current	I-	V <sub>EN</sub> = 2.4V, V <sub>A(ALL)</sub> = 0V or 2.4V	1 2,3	All	-1 -10	1 10 μA	
<b>DYNAMIC</b>							
Transition Time	t <sub>TRANS</sub>	Figure 2	9 10,11	All		300 400 ns	
Break-Before-Make interval	t <sub>OPEN</sub>	Figure 4	9	All	10	ns	

**TABLE 1. ELECTRICAL TESTS: DUAL SUPPLIES**

TEST	Symbol	CONDITIONS	Group A Subgroup	Device type	Limits Min 2/	Limits Max 2/	Units
		-55 °C ≤ T <sub>A</sub> ≤ +125°C V <sub>+</sub> =+15V, V <sub>-</sub> =-15V, GND=0V V <sub>AH</sub> =2.4V, V <sub>AL</sub> =0.8V Unless otherwise specified					
<b>DYNAMIC</b>							
Enable Turn-On Time	t <sub>ON(EN)</sub>	Figure 3	9 10,11	All		200 400	ns
Enable Turn-Off Time	t <sub>OFF(EN)</sub>	Figure 3	9 10,11	All		150 300	ns
Charge Injection	Q	C <sub>L</sub> =1.0nF, V <sub>S</sub> =0V, R <sub>S</sub> =0Ω, Figure 5, NOTE 3	9	All		15	pC

**TABLE 1. ELECTRICAL TESTS: SINGLE SUPPLY**

TEST	Symbol	CONDITIONS	Group A Subgroup	Device type	Limits Min 2/	Limits Max 2/	Units
		-55 °C ≤ T <sub>A</sub> ≤ +125°C V <sub>+</sub> =+12V, V <sub>-</sub> =0V, GND=0V V <sub>AH</sub> =+2.4V, V <sub>AL</sub> =+0.8V Unless otherwise specified					
<b>SWITCH</b>							
Analog-Signal Range	V <sub>ANALOG</sub>	NOTE 3	1,2,3	All	0	12	V
Drain-Source ON Resistance	r <sub>DS(ON)</sub>	I <sub>S</sub> =-1.0mA, V <sub>D</sub> =3V or 10V	1	All		175	Ω
<b>DYNAMIC</b>							
Transition Time	t <sub>TRANS</sub>	V <sub>S1</sub> =8V, V <sub>S16</sub> =0V, V <sub>A</sub> =0V Figure 2	9	All		450	ns
Enable Turn-On Time	t <sub>ON(EN)</sub>	V <sub>AL</sub> =0V, V <sub>S1</sub> =5V, Figure 3	9	All		600	ns
Enable Turn-Off Time	t <sub>OFF(EN)</sub>	Figure 3	9	All		300	ns
Charge Injection	Q	C <sub>L</sub> =1.0nF, V <sub>S1</sub> =0V, R <sub>S</sub> =0Ω, Figure 5, NOTE 3	9	All		10	pC

NOTE 2: The algebraic convention where the most negative value is a minimum and the most positive value a maximum is used in this datasheet.

NOTE 3: Guaranteed by design.

NOTE 4: Δr<sub>ON</sub>=Δr<sub>ON(max)</sub>-Δr<sub>ON(min)</sub>. On-resistance match between channels and flatness are guarantee 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 2: TRANSITION TIME TEST CIRCUIT:** See Commercial Data Sheet

**FIGURE 3: ENABLE SWITCHING TIME TEST CIRCUIT:** See Commercial Data Sheet

**FIGURE 4: BREAK-BEFORE-MAKE INTERVAL:** See Commercial Data Sheet

**FIGURE 5: CHARGE INJECTION:** See Commercial Data Sheet

<b>ORDERING INFORMATION:</b>			
DG406AK/883B	28 CDIP	DG407AK/883B	28 CDIP
DG406AZ/883B	28 LCC	DG407AZ/883B	28 LCC

**TRUTH TABLE**

**TERMINAL CONNECTION**

A3	A2	A1	A0	EN	DG406A ON SWITCH	TERMINAL NUMBER	01 DG406A	02 DG407A
X	X	X	X	0	None		J28, L28	J28 & L28
0	0	0	0	1	1	1	V+	V+
0	0	0	1	1	2	2	NC	DB
0	0	1	0	1	3	3	NC	NC
0	0	1	1	1	4	4	S16	S8B
0	1	0	0	1	5	5	S15	S7B
0	1	0	1	1	6	6	S14	S6B
0	1	1	0	1	7	7	S13	S5B
0	1	1	1	1	8	8	S12	S4B
1	0	0	0	1	9	9	S11	S3B
1	0	0	1	1	10	10	S10	S2B
1	0	1	0	1	11	11	S9	S1B
1	0	1	1	1	12	12	GND	GND
1	1	0	0	1	13	13	NC	NC
1	1	0	1	1	14	14	A3	NC
1	1	1	0	1	15	15	A2	A2
1	1	1	1	1	16	16	A1	A1
						17	A0	A0
					<b>DG407A</b>	18	EN	EN
	<b>A2</b>	<b>A1</b>	<b>A0</b>	<b>EN</b>	<b>On Switch</b>	19	S1	S1A
	X	X	X	0	None	20	S2	S2A
	0	0	0	1	1	21	S3	S3A
	0	0	1	1	2	22	S4	S4A
	0	1	0	1	3	23	S5	S5A
	0	1	1	1	4	24	S6	S6A
	1	0	0	1	5	25	S7	S7A
	1	0	1	1	6	26	S8	S8A
	1	1	0	1	7	27	V-	V-
	1	1	1	1	8	28	D	DA

Logic "0"  $V_{AL} \leq 0.8V$

Logic "1"  $V_{AH} \geq 2.4V$

## 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.