

SCOPE: IMPROVED, QUAD, SPST, CMOS ANALOG MULTIPLEXER

<u>Device Type</u>	<u>Generic Number</u>
01	DG441A(x)/883B
02	DG442A(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⁻

V ⁺ to V ⁻	44V
V ⁻ to GND	25V
V _L	(GND-0.3V) to V ⁺ +0.3V)
Digital Inputs, V _S , V _D <u>I</u> /	(V ⁻) -2V to (V ⁺) +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 +150°C

Continuous Power Dissipation	T _A =+70°C
16 lead CERDIP(derate 10.0mW/°C above +70°C)	800mW
20 lead LCC (derate 9.1mW/°C above +70°C)	727mW
Junction Temperature T _J	+150°C
Thermal Resistance, Junction to Case, θ_{JC} :	
Case Outline 16 lead CERDIP	50°C/W
Case Outline 20 lead LCC	20°C/W
Thermal Resistance, Junction to Ambient, θ_{JA} :	
Case Outline 16 lead CERDIP	100°C/W
Case Outline 20 lead LCC	110°C/W

Recommended Operating Conditions

Ambient Operating Range (T _A)	-55°C to +125°C
Positive Supply Voltage (V ⁺)	+15V
Negative Supply Voltage (V ⁻)	-15V
V _{AL} (max)	0.8V
V _{AH} (min)	2.4V

NOTE 1: Signals on S, D, or IN exceeding V⁺ or V⁻ 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 SUPPLY

TEST	Symbol	CONDITIONS		Limits Min	Limits Max	Units
		-55 °C ≤ T _A ≤ +125 °C V ⁺ =+15V, V ⁻ =-15V, GND=0V V _{AH} =2.4V, V _{AL} =0.8V Unless otherwise specified	Group A Subgroup			
SWITCH						
Analog-Signal Range	V _{ANALOG}	NOTE 3	1,2,3	All	-15	15 V
Drain-Source ON Resistance	r _{DS(ON)}	I _S =-10mA, V _D =±8.5V, V ⁺ =13.5V, V ⁻ =-13.5V	1 2,3	All		85 100 Ω
On-Resistance Match Between Channels <u>4/</u>	Δr _{DS(ON)}	I _S =-10mA, V _D =±10V, V ⁺ =15V, V ⁻ =-15V	1 2,3	All		4 5 Ω
On-Resistance Flatness <u>4/</u>	r _{FLAT(ON)}	I _S =-10mA, V _D =5V or -5V, V ⁺ =15V, V ⁻ =-15V	1 2,3	All		9 15 Ω
Source- OFF Leakage Current	I _{S(OFF)}	V ⁺ =16.5V, V ⁻ =-16.5V, V _{IN} =2.4V V _S =±15.5V V _D =±15.5V	1 2,3	All	-0.5 -20	0.5 20 nA
Drain- OFF Leakage Current	I _{D(OFF)}	V ⁺ =16.5V, V ⁻ =-16.5V, V _S =±15.5V V _D =±15.5V	1 2,3	All	-0.5 -20	0.5 20 nA
Channel-On Leakage Current	I _{D(ON)} + I _{S(ON)}	V ⁺ =16.5V, V ⁻ =-16.5V, V _S =±15.5V V _D =±15.5V	1 2,3	01	-0.5 -20	0.5 20 nA
INPUT						
Input Current/Voltage High	I _{INH}	V _{IN} =2.4V	1,2,3	All	-500	500 nA
Input Current/Voltage Low	I _{INL}	V _{IN} = 0.8V	1,2,3	All	-500	500 nA
SUPPLY						
Power Supply Range			1,2,3	All	±4.5	±20 V
Positive Supply Current	I ₊	All channels on or off, V ⁺ =16.5V, V ⁻ =-16.5V, V _{IN} =0 or 5V	1,2,3	All		100 μA
Negative Supply Current	I ₋	All channels on or off, V ⁺ =16.5V, V ⁻ =-16.5V, V _{IN} =0 or 5V	1 2,3	All	-1 -5	1 5 μA
Ground Current	I _{GND}	All channels on or off, V ⁺ =16.5V, V ⁻ =-16.5V, V _{IN} =0 or 5V	1,2,3	All	-100	μA
DYNAMIC						
Turn-On Time	t _{ON}	V _S =±10V, R _L =1kΩ, Figure 2	9	All		250 ns
Turn-Off Time	t _{OFF}	V _D =±10V, R _L =1kΩ, Figure 2	9	01 02		120 170 ns
Charge Injection NOTE 2	Q	C _L =1nF, V _{GEN} =0V, R _{GEN} =0Ω, Figure 3	9	All		10 pC

TABLE 1. ELECTRICAL TESTS: SINGLE SUPPLY

TEST	Symbol	CONDITIONS		Group A Subgroup	Device type	Limits Min	Limits Max	Units
		-55 °C ≤ T _A ≤ +125 °C V ⁺ =+12V, V ⁻ =0V, GND=0V V _{AH} =2.4V, V _{AL} =0.8V Unless otherwise specified						
SWITCH								
Analog-Signal Range	V _{ANALOG}	NOTE 3		1,2,3	All	0	12	V
Drain-Source Resistance	r _{DS(ON)}	I _S =1.0mA, V _D =3V or 8V, V ⁺ =10.8V		1,3 2	All		160 200	Ω
SUPPLY								
Power Supply Range				1,2,3	All	10	30	V
Positive Supply Current	I ⁺	All channels on or off, V _{IN} =0 or 5V		1,2,3	All		100	μA
Negative Supply Current	I ⁻	All channels on or off, V _{IN} =0 or 5V		1 2,3	All	-1 -5	1 5	μA
Ground Current	I _{GND}	All channels on or off, V _{IN} =0 or 5V		1,2,3	All	-100		μA
DYNAMIC								
Turn-On Time	t _{ON}	V _S =8V, Figure 2		9	All		400	ns
Turn-Off Time	t _{OFF}	V _S =8V, Figure 2		9	All		200	ns
Charge Injection	Q	C _L =1nF, V _{GEN} =0V 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 data sheet.

NOTE 3: Guaranteed by design.

NOTE 4: On-resistance match between channels and flatness is guaranteed only with bipolar-supply operation. Flatness is defined as the difference between the maximum and the minimum value of on-resistance as measured at the extremes of the specified analog range.

TRUTH TABLE

TERMINAL CONNECTION

LOGIC	DG441A SWITCH	TERMINAL NUMBER	01 DG441A	01 DG441A	02 DG442A	02 DG442A
0	ON		J16	20LCC	J16	20LCC
1	OFF	1	IN1	NC	IN1	NC
		2	D1	IN1	D1	IN1
		3	S1	D1	S1	D1
LOGIC	DG442A SWITCH	4	V-	S1	V-	S1
		5	GND	V-	GND	V-
0	OFF	6	S4	NC	S4	NC
1	ON	7	D4	GND	D4	GND
		8	IN4	S4	IN4	S4
		9	IN3	D4	IN3	D4
		10	D3	IN4	D3	IN4
		11	S3	NC	S3	NC
		12	NC	IN3	NC	IN3
		13	V+	D3	V+	D3
		14	S2	S3	S2	S3
		15	D2	NC	D2	NC
		16	IN2	NC	IN2	NC
		17		V+		V+
		18		S2		S2
		19		D2		D2
		20		IN2		IN2

Figure 2. Switching Time: See Commercial Data Sheet.

Figure 3. Charge Injection: See Commercial Data Sheet.

ORDERING INFORMATION:			
DG441AK/883B	16 CDIP	DG442AK/883B	16 CDIP
DG441AZ/883B	20 LCC	DG442AZ/883B	20 LCC

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.