

## 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)<br>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, $\theta_{JC}$ :    |                       |
| Case Outline 16 lead Cerdip.....                         | 50°C/W                |
| Case Outline 20 lead LCC .....                           | 20°C/W                |
| Thermal Resistance, Junction to Ambient, $\theta_{JA}$ : |                       |
| 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                                   | <b>CONDITIONS</b><br>-55 °C ≤ T <sub>A</sub> ≤ +125°C<br>V <sup>+</sup> =+15V, V <sup>-</sup> =-15V, GND=0V<br>V <sub>INH</sub> =2.4V, V <sub>INL</sub> =0.8V, V <sub>L</sub> =5V<br>Unless otherwise specified | Group A Subgroup | Device type | Limits Min <u>3/</u> | Limits Max <u>3/</u> | Units |
|----------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|----------------------|----------------------|-------|
| <b>SWITCH</b>                                                  |                                          |                                                                                                                                                                                                                 |                  |             |                      |                      |       |
| Analog-Signal Range                                            | V <sub>ANALOG</sub>                      | <u>4/</u>                                                                                                                                                                                                       | 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<br>2,3         | All         |                      | 30<br>45             | Ω     |
| Drain-Source ON Resistance Matching between Channels <u>5/</u> | Δr <sub>DS</sub> (ON)                    | V <sup>+</sup> =+15V, V <sup>-</sup> =-15V, I <sub>S</sub> =-10mA, V <sub>D</sub> =±10V                                                                                                                         | 1<br>2,3         | All         |                      | 2.0<br>3.0           | Ω     |
| On-Resistance Flatness <u>5/</u>                               | 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<br>2,3         | All         |                      | 3.0<br>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<br>2           | All         | -0.25<br>-10         | 0.25<br>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<br>2,3         | All         | -0.25<br>-10         | 0.25<br>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<br>2,3         | All         | -0.4<br>-20          | 0.4<br>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 <sup>+</sup>                           | All channels on or off, V <sup>+</sup> =+16.5V, V <sup>-</sup> =-16.5V, V <sub>IN</sub> =0V or 5V                                                                                                               | 1<br>2,3         | All         | -1.0<br>-5.0         | 1.0<br>5.0           | μA    |
| Negative Supply Current                                        | I <sup>-</sup>                           | All channels on or off, V <sup>+</sup> =+16.5V, V <sup>-</sup> =-16.5V, V <sub>IN</sub> =0V or 5V                                                                                                               | 1<br>2,3         | All         | -1.0<br>-5.0         | 1.0<br>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<br>2,3         | All         | -1.0<br>-5.0         | 1.0<br>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<br>2,3         | All         | -1.0<br>-5.0         | 1.0<br>5.0           | μA    |

| TEST                               | Symbol           | <b>CONDITIONS</b><br>-55 °C ≤ T <sub>A</sub> ≤ +125 °C<br>V <sup>+</sup> =+15V, V <sup>-</sup> =-15V, GND=0V<br>V <sub>INH</sub> =2.4V, V <sub>INL</sub> =0.8V, V <sub>L</sub> =5V<br>Unless otherwise specified | Group A Subgroup | Device type | Limits Min <u>3</u> / | Limits Max <u>3</u> / | Units |
|------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-----------------------|-----------------------|-------|
|                                    |                  |                                                                                                                                                                                                                  |                  |             |                       |                       |       |
| <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<br>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

| ORDERING INFORMATION: |         |              |         |
|-----------------------|---------|--------------|---------|
| 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 | DG401  | DG403 | DG403            | DG403            | DG405 | DG405  |
| LOGIC | SWITCH | LOGIC | SWITCHES<br>1, 2 | SWITCHES<br>3, 4 | LOGIC | 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<br>per Method 5005, Table 1 |
|--------------------------------------------------------------|---------------------------------------|
| Interim Electric Parameters<br>Method 5004                   | 1                                     |
| Final Electrical Parameters<br>Method 5005                   | 1*, 2, 3, 9                           |
| Group A Test Requirements<br>Method 5005                     | 1, 2, 3, 9                            |
| Group C and D End-Point Electrical Parameters<br>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.

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

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Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)