

**SCOPE: 8-CHANNEL/DUAL 4-CHANNEL CMOS, ANALOG SWITCHES**

| <u>Device Type</u> | <u>Generic Number</u> | <u>SMD Number</u> |
|--------------------|-----------------------|-------------------|
| 01                 | DG408A(x)/883B        | 5962-9204201      |
| 02                 | DG409A(x)/883B        | 5962-9204202      |

**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> |
|-----------------------|------------------------|---------------------|---------------------|
| Maxim SMD             |                        |                     |                     |
| K E                   | GDIP1-T16 or CDIP2-T16 | 16 LEAD CERDIP      | J16                 |
| L X                   | CDFP3-F16              | 16 LEAD FLATPACK    | F16                 |
| Z 2                   | 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   |
| Digital Inputs Overvoltage Range <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  |
| Current, S or D (Pulsed at 1ms, 10% duty cycle max) .....  | 40mA  |
| 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   |
| 16 lead FLATPACK(derate 6.1mW/°C above +70°C) .....        | 485mW   |
| 20 lead LCC(derate 9.1mW/°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 16 lead FLATPACK .....                        | 65°C/W  |
| Case Outline 20 lead LCC .....                             | 55°C/W  |
| Thermal Resistance, Junction to Ambient, Θ <sub>JA</sub> : |   |
| Case Outline 16 lead CERDIP.....                           | 100°C/W   |
| Case Outline 16 lead FLATPACK .....                        | 165°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            |

1/ Signals on S, D or IN 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:**

| TEST  | Symbol                                    | CONDITIONS   |             |                 | Limits Min          | Limits Max       | Units |
|---|---|--|-------------|-----------------|---------------------|------------------|-------|
|   |   | -55 °C ≤ T <sub>A</sub> ≤ +125 °C<br>V <sup>+</sup> =+15V, V <sup>-</sup> =-15V, GND=0V<br>V <sub>AH</sub> =2.4V, V <sub>AL</sub> =0.8V, V <sub>EN</sub> =2.4V<br>Unless otherwise specified |             |                 |                     |                  |       |
| <b>SWITCH</b>                                 |   |  |             |                 |                     |                  |       |
| Analog-Signal Range                           | V <sub>ANALOG</sub>                       | NOTE 2   | 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  | 1,3<br>2    | All             |                     | 100<br>125       | Ω     |
| r <sub>DS(ON)</sub> Matching Between Channels | Δr <sub>DS(ON)</sub>                      | I <sub>S</sub> =-10mA, V <sub>D</sub> =±10V, NOTE 3  | 1           | All             |                     | 15               | 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<br>2      | All             | -0.5<br>-50         | 0.5<br>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<br>2<br>2 | All<br>01<br>02 | -1.0<br>-100<br>-50 | 1.0<br>100<br>50 | nA    |
| Drain-ON Leakage Current                      | I <sub>D(ON)+</sub><br>I <sub>S(ON)</sub> | V <sub>S</sub> =±10V, V <sub>D</sub> =±10V, sequence each switch on  | 1<br>2<br>2 | All<br>01<br>02 | -1.0<br>-100<br>-50 | 1.0<br>100<br>50 | nA    |
| <b>INPUT</b>                                  |   |  |             |                 |                     |                  |       |
| Input Current/Voltage High                    | I <sub>AH</sub>                           | V <sub>A</sub> = 2.4V, 15V   | 1,2,3       | All             | -10                 | 10               | μA    |
| Input Current/Voltage Low                     | I <sub>AL</sub>                           | V <sub>A</sub> =0V, V <sub>EN</sub> = 0V, 2.4V   | 1,2,3       | All             | -10                 | 10               | μA    |
| Standby Positive Supply Current               | +I <sub>SBY</sub>                         | V <sub>A</sub> =0V, V <sub>EN</sub> = 0V   | 1,2,3       | All             |                     | 75               | μA    |
| Standby Negative Supply Current               | -I <sub>SBY</sub>                         | V <sub>A</sub> =0V, V <sub>EN</sub> = 0V   | 1,2,3       | All             | -75                 |                  | μA    |
| <b>SUPPLY</b>                                 |   |  |             |                 |                     |                  |       |
| Positive Supply Current                       | I <sub>+</sub>                            | V <sub>A</sub> =0V, V <sub>EN</sub> = 2.4V   | 1,3<br>2    | All             |                     | 0.5<br>2.0       | mA    |
| Negative Supply Current                       | I <sub>-</sub>                            | V <sub>A</sub> =0V, V <sub>EN</sub> = 2.4V   | 1,2,3       | All             | -0.5                |                  | mA    |
| <b>DYNAMIC</b>                                |   |  |             |                 |                     |                  |       |
| Transition Time                               | t <sub>TRANS</sub>                        | Figure 2   | 9,10,11     | All             |                     | 250              | ns    |
| Break Before Make Time                        | t <sub>OPEN</sub>                         | Figure 4   | 9           | All             | 10                  |                  | ns    |
| Enable Turn-On Time                           | t <sub>ON(EN)</sub>                       | Figure 3   | 9,11<br>10  | All             |                     | 150<br>225       | ns    |
| Enable Turn-Off Time                          | t <sub>OFF(EN)</sub>                      | Figure 3   | 9,10,11     | All             |                     | 150              | ns    |

NOTE 2: Guaranteed by design.

NOTE 3: Δr<sub>DS(ON)</sub>= Δr<sub>DS(ON)max</sub>-Δr<sub>DS(ON)min</sub>

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

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

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

**ORDERING INFORMATION:**

|              | SMD NUMBER      | CIRCUIT FUNCTION                  | PKG CODE    |
|--------------|-----------------|-----------------------------------|-------------|
| DG408AK/883B | 5962-9204201MEA | 8-channel analog multiplexer      | 16 CERDIP   |
| DG408AL/883B | 5962-9204201MXC | 8-channel analog multiplexer      | 16 FLATPACK |
| DG408AZ/883B | 5962-9204201M2C | 8-channel analog multiplexer      | 20 LCC      |
| DG409AK/883B | 5962-9204202MEA | Dual 4-channel analog multiplexer | 16 CERDIP   |
| DG409AL/883B | 5962-9204202MXC | Dual 4-channel analog multiplexer | 16 FLATPACK |
| DG409AZ/883B | 5962-9204202M2C | Dual 4-channel analog multiplexer | 20 LCC      |

**TRUTH TABLES:**

**TERMINAL CONNECTION**

| A2 | A1 | A0 | EN | DG408A<br>ON SWITCH | Terminal<br>Number | DG408     | DG408 | DG409     | DG409 |
|----|----|----|----|---------------------|--------------------|-----------|-------|-----------|-------|
| X  | X  | X  | L  | None                |                    | J16 & F16 | LCC20 | J16 & F16 | LCC20 |
| L  | L  | L  | H  | 1                   | 1                  | A0        | NC    | A0        | NC    |
| L  | L  | H  | H  | 2                   | 2                  | EN        | A0    | EN        | A0    |
| L  | H  | L  | H  | 3                   | 3                  | V-        | EN    | V-        | EN    |
| L  | H  | H  | H  | 4                   | 4                  | S1        | V-    | S1a       | V-    |
| H  | L  | L  | H  | 5                   | 5                  | S2        | S1    | S2a       | S1a   |
| H  | L  | H  | H  | 6                   | 6                  | S3        | NC    | S3a       | NC    |
| H  | H  | L  | H  | 7                   | 7                  | S4        | S2    | S4a       | S2a   |
| H  | H  | H  | H  | 8                   | 8                  | D         | S3    | Da        | S3a   |
|    |    |    |    |                     | 9                  | S8        | S4    | Db        | S4a   |
|    |    |    |    | DG409A<br>ON SWITCH | 10                 | S7        | D     | S4b       | DA    |
|    |    |    |    | None                | 11                 | S6        | NC    | S3b       | NC    |
|    | X  | X  | X  | None                | 12                 | S5        | S8    | S2b       | DB    |
|    | L  | L  | H  | 1                   | 13                 | V+        | S7    | S1b       | S4b   |
|    | L  | H  | H  | 2                   | 14                 | GND       | S6    | V+        | S3b   |
|    | H  | L  | H  | 3                   | 15                 | A2        | S5    | GND       | S2b   |
|    | H  | H  | H  | 4                   | 16                 | A1        | NC    | A1        | NC    |
|    |    |    |    |                     | 17                 |           | V+    |           | S1b   |
|    |    |    |    |                     | 18                 |           | GND   |           | V+    |
|    |    |    |    |                     | 19                 |           | A2    |           | GND   |
|    |    |    |    |                     | 20                 |           | A1    |           | A1    |

## 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, 7, 8, 9, 10, 11             |
| Group A Test Requirements<br>Method 5005                     | 1, 2, 3, 7**, 8**, 9, 10, 11          |
| Group C and D End-Point Electrical Parameters<br>Method 5005 | 1                                     |

\* PDA applies to Subgroup 1 only.

\*\* Subgroups 7 and 8 tests shall be sufficient to verify the truth table.

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