

+SCOPE: **TTL COMPATIBLE CMOS ANALOG SWITCHES**

| <u>Device Type</u> | <u>Generic Number</u> |
|--------------------|-----------------------|
| 01 | DG300A(x)/883B |
| 02 | DG301A(x)/883B |
| 03 | DG302A(x)/883B |
| 04 | DG303A(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> |
|-----------------------|------------------------|---------------------|---------------------|
| AA | MACY1-X10 | 10 LEAD CAN | 10 TO 100 |
| AK | GDIP1-T14 or CDIP2-T14 | 14 LEAD CERDIP | J14 |
| AZ | CQCC1-N20 | 20-Pin Ceramic LCC | L20 |

Absolute Maximum Ratings

Voltage Referenced to V-

| | |
|--|--|
| V+..... | 44V |
| GND | 25V |
| V _L | (GND -0.3V) to (V ₊)+0.3V |
| Digital Inputs, V _S , V _D (Note 1) | -4V to (V ₊ +4V) or 30mA, whichever occurs first |
| Current, Any terminal except S or D | 30mA |
| Continuous Current, S or D | 30mA |
| (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 |
| 10 lead Can (derate 6.67mW/°C above +70°C) | 533mW |
| 14 lead CERDIP(derate 9.09mW/°C above +70°C) | 727mW |
| 20-Pin LCC (derate 9.09mW/°C above +70°C) | 727mW |
| Junction Temperature T _J | +150°C |
| Thermal Resistance, Junction to Case, Θ _{JC} : | |
| Case Outline 10 lead Can | 45°C/W |
| Case Outline 14 lead CERDIP..... | 55°C/W |
| Case Outline 20-Pin LCC | 20°C/W |
| Thermal Resistance, Junction to Ambient, Θ _{JA} : | |
| Case Outline 10 lead Can | 150°C/W |
| Case Outline 14 lead CERDIP..... | 110°C/W |
| Case Outline 20-Pin LCC | 110°C/W |

Recommended Operating Conditions.

| | |
|---|-----------------|
| Ambient Operating Range (T _A) | -55°C to +125°C |
|---|-----------------|

NOTE 1: Signals on S_x, D_x, or IN_x exceeding V₊ or V₋ are clamped by internal diodes.
Limit diode 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 -55 °C ≤ T _A ≤ +125 °C V ₊ =+15V, V ₋ =-15V, GND=0V Unless otherwise specified | Group A Subgroup | Device type | Limits 2/ Min | Limits Max | Units |
|----------------------------|---------------------|---|---------------------|----------------|---------------------|---------------|-------|
| SWITCH | | | | | | | |
| Analog-Signal Range | V _{ANALOG} | I _S =10mA, V _{IN} =0.8V or 4.0V | 1,2,3 | All | -15 | 15 | V |
| Drain-Source ON Resistance | r _{DS(ON)} | I _S = -10mA, V _D =10V, V _{IN} =4.0V or V _{IN} =0.8V | 1 2,3 | All | | 50 75 | Ω |
| Drain-Source ON Resistance | r _{DS(ON)} | I _S = 10mA, V _D =-10V V _{IN} =4.0V or V _{IN} =0.8V | 1 2,3 | All | | 50 75 | Ω |
| Source OFF Leakage Current | I _{S(OFF)} | V _S = 14V, V _D =-14V V _{IN} =4.0V or V _{IN} =0.8V | 1 2,3 | All | | 1 100 | nA |
| Source OFF Leakage Current | I _{S(OFF)} | V _S = -14V, V _D =14V V _{IN} =4.0V or V _{IN} =0.8V | 1 2,3 | All | -1 -100 | | nA |
| Drain OFF Leakage Current | I _{D(OFF)} | V _S = -14V, V _D =14V V _{IN} =4.0V or V _{IN} =0.8V | 1 2,3 | All | | 1 100 | nA |
| Drain OFF Leakage Current | I _{D(OFF)} | V _S = 14V, V _D =-14V V _{IN} =4.0V or V _{IN} =0.8V | 1 2,3 | All | -1 -100 | | nA |
| Drain ON Leakage Current | I _{D(ON)} | V _D =V _S =14V V _{IN} =4.0V or V _{IN} =0.8V | 1 2,3 | All | | 2 200 | nA |
| Drain ON Leakage Current | I _{D(ON)} | V _D =V _S =-14V V _{IN} =4.0V or V _{IN} =0.8V | 1 2,3 | All | -2 -200 | | nA |
| INPUT | | | | | | | |
| Input Current/Voltage High | I _{INH} | V _{IN} = 5.0V V _{IN} =15V | 1,2,3 | All | -1 | 1 | μA |
| Input Current/Voltage Low | I _{INL} | V _{IN} =0V | 1,2,3 | All | -1 | | μA |
| SUPPLY | | | | | | | |
| Positive Supply Current | I+ | V _{IN} =4V (One Input) (All others =0) | 1 2,3 | All | | 0.5 1.0 | mA |
| Negative Supply Current | I- | V _{IN} =4V (One Input) (All others =0) | 1 2,3 | All | -10 -100 | | μA |
| Positive Supply Current | I+ | V _{IN} =0.8V (All Inputs) | 1 2,3 | All | | 10 100 | μA |
| Negative Supply Current | I- | V _{IN} =0.8V (All Inputs) | 1 2,3 | All | -10 -100 | | μA |
| DYNAMIC | | | | | | | |
| Turn ON time | t _{ON} | Figure 3 | 9 10,11 | All | | 300 500 | ns |
| Turn OFF time | t _{OFF} | Figure 3 | 9 10,11 | All | | 250 450 | ns |

NOTE 2: The algebraic convention, where the most negative value is a minimum and the most positive value a maximum, is used on this data sheet.

TABLE 2: **TYPICAL ELECTRICAL CHARACTERISTICS (NOTE 3)**

| TEST | Symbol | CONDITIONS -55 °C <=T _A <= +125°C V ₊ =+15V, V ₋ =-15V, GND=0V Unless otherwise specified | Group A Subgroup | Device type | TYPICAL Limits <u>3/</u> | Units |
|--------------------------------|--|---|---------------------|----------------|--------------------------------|-------|
| Break-Before-Make Interval | t _{ON} -t _{OFF} | See Break-Before-Make Time Test Circuit DG301A, DG303A only | | 02, 04 | 50 | ns |
| Charge Injection | Q | C _L =10nF, R _{gen} =0Ω, V _{gen} =0V | | All | 12 | pC |
| Source OFF Capacitance | C _{S(off)} | f=1MHz, V _{IN} =0.8V or 4.0V, V _S and V _D = 0V | | All | 14 | pF |
| Drain OFF Capacitance | C _{D(off)} | f=1MHz, V _{IN} =0.8V or 4.0V, V _S and V _D = 0V | | All | 14 | pF |
| Channel ON Capacitance | C _{D(on)} + C _{S(on)} | f=1MHz, V _{IN} =0.8V or 4.0V, V _S + V _D = 0V | | All | 40 | pF |
| Input Capacitance | C _{IN} | f=1MHz, V _{IN} =0V | | All | 6 | pF |
| Input Capacitance | C _{IN} | f=1MHz, V _{IN} =15V | | All | 7 | pF |
| Off Isolation <u>4/</u> | | V _{IN} =0V, R _L =1kΩ, V _S =1V _{RMS} , f=500kHz | | All | 62 | dB |
| Crosstalk (Channel to Channel) | | V _{IN} =0V, R _L =1kΩ, V _S =1V _{RMS} , f=500kHz | | All | 74 | dB |

NOTE 3: Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

NOTE 4: OFF Isolation=20 log V_S/V_D, V_S= input to OFF switch, V_D= Output.

TERMINAL CONNECTION DEVICE TYPES 01, 02, 03, 04

| TERMINAL NUMBER | DG300A 10 Lead CAN | DG300A 14 Lead CERDIP | DG301A 10 Lead CAN | DG301A 14 Lead CERDIP | DG302A 14 Lead CERDIP | DG302A 20 Pin LCC | DG303A 14 Lead CERDIP | DG303A 20 Pin LCC |
|-----------------|--------------------------|-----------------------------|--------------------------|-----------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|
| 1 | D ₁ | NC | D ₁ | NC | NC | NC | NC | NC |
| 2 | S ₁ | D ₁ | S ₁ | D ₁ | S ₃ | NC | S ₃ | NC |
| 3 | IN | NC | IN | NC | D ₃ | S ₃ | D ₃ | S ₃ |
| 4 | NC | S ₁ | NC | S ₁ | D ₁ | D ₃ | D ₁ | D ₃ |
| 5 | GND | NC | GND | NC | S ₁ | NC | S ₁ | NC |
| 6 | V- | IN ₁ | V- | IN | IN ₁ | D ₁ | IN ₁ | D ₁ |
| 7 | IN ₂ | GND | NC | GND | GND | NC | GND | NC |
| 8 | S ₂ | V- | S ₂ | V- | V- | S ₁ | V- | S ₁ |
| 9 | D ₂ | IN ₂ | D ₂ | NC | IN ₂ | IN ₁ | IN ₂ | IN ₁ |
| 10 | | NC | | NC | S ₂ | GND | S ₂ | GND |
| 11 | | S ₂ | | S ₂ | D ₂ | NC | D ₂ | NC |
| 12 | | NC | | NC | D ₄ | V- | D ₄ | V- |
| 13 | | D ₂ | | D ₂ | S ₄ | IN ₂ | S ₄ | IN ₂ |
| 14 | | V+ | | V+ | V+ | S ₂ | V+ | S ₂ |
| 15 | | | | | | NC | | NC |
| 16 | | | | | | D ₂ | | D ₂ |
| 17 | | | | | | NC | | NC |
| 18 | | | | | | D ₄ | | D ₄ |
| 19 | | | | | | S ₄ | | S ₄ |
| 20 | | | | | | V+ | | V+ |

TRUTH TABLES

| | DG300/302 | DG301 | DG301 | DG303 | DG303 |
|--------|-----------|-------|-------|-------|-------|
| SWITCH | | 1 | 2 | 1,3 | 2,4 |
| LOGIC | | | | | |
| 0 | OFF | OFF | ON | OFF | ON |
| 1 | ON | ON | OFF | ON | OFF |

FIGURE 2: BREAK-BEFORE-MAKE TIME TEST CIRCUIT: See Commercial Data Sheet
 FIGURE 3: SWITCHING TIME TEST CIRCUIT: See Commercial Data Sheet

| <u>ORDERING INFORMATION.</u> | | PKG.Code |
|-------------------------------------|---------------|-----------|
| 01 | DG300AAA/883B | 10 TO 100 |
| 01 | DG300AAK/883B | J14 |
| 02 | DG301AAA/883B | 10 TO 100 |
| 02 | DG301AAK/883B | J14 |
| 02 | DG301AAZ/883B | L20 |
| 03 | DG302AAK/883B | J14 |
| 04 | DG303AAK/883B | J14 |
| 04 | DG303AAZ/883B | L20 |

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.

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