

SCOPE: PRECISION DUAL HIGH SPEED ANALOG SWITCHES

| <u>Device Type</u> | <u>Generic Number</u> |
|--------------------|-----------------------|
| 01 | MAX301M(x)/883B |
| 02 | MAX303M(x)/883B |
| 03 | MAX305M(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> |
|-----------------------|------------------------|---------------------|---------------------|
| JE | GDIP1-T16 or CDIP2-T16 | 16 LEAD CERDIP | J16 |
| LP | QCCC1-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 |
| NO_,NC_,IN_,COM_ | (V- -2.0V) to (V+ +2.0V) or 30mA, whichever occurs first |
| Continuous Current, COM_, NO_,NC_ | 30mA |
| Peak Current, COM_,NO_,NC_(pulsed at 1ms, 10% duty cycle max) | 100mA |
| Lead Temperature (soldering, 10 seconds) | +300°C |
| Storage Temperature | -65°C to +150°C |

Continuous Power DissipationT_A=+70°C

16 lead CERDIP(derate 10.0mW/°C above +70°C) 800mW

20-Pin LCC (derate 9.09mW/°C above +70°C) 727mW

Junction Temperature T_J

Thermal Resistance, Junction to Case, Θ_{JC}:

Case Outline 16 lead CERDIP..... 50°C/W

Case Outline 20-Pin LCC See Mil-Std-1835

Thermal Resistance, Junction to Ambient, Θ_{JA}:

Case Outline 16 lead CERDIP..... 100°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 NO_, NC_, or COM_ beyond V+ or V- are clamped by internal diodes.

Limit forward current to maximum current rating.

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 <u>2/</u> -55 °C ≤ T _A ≤ +125°C Unless otherwise specified | Group A Subgroup | Device type | Limits <u>3/</u> Min | Limits Max | Units |
|--|--|--|---------------------|----------------|----------------------------|---------------|-------|
| SWITCH | | | | | | | |
| Analog-Signal Range | V _{ANA} | <u>4/</u> | | | V- | V+ | V |
| ON Resistance | R _{ON} | I _(NC or NO) = -10mA, V _{INH} = 2.4V, V _{COM-} = +/-10V, V _{INL} = 0.8V | 1 2,3 | All | | 30 45 | Ω |
| ON Resistance Match Between Channels <u>5/</u> | R _{ON} | I _(NC or NO) = -10mA, V _{COM-} = +/-10V, V ₊ = 15V, V ₋ = -15V | 1 2,3 | All | | 2 3 | Ω |
| ON Resistance Flatness <u>5/</u> | R _{ON} | I _S = -10mA, V _{COM-} = +/-5V V ₊ = 15V, V ₋ = -15V | 1 2,3 | All | | 3 5 | Ω |
| NC or NO Off Leakage Current | NC _(OFF) or NO _(OFF) | V _{COM-} = +/-15.5V V _{NC_or NO-} = +/-15.5V V ₊ = 16.5V, V ₋ = -16.5V | 1 2,3 | All | -0.25 -20.0 | 0.25 20.0 | nA |
| COM Off Leakage Current | COM _{OFF} | V _{COM-} = +/-15.5V V _{NC_or NO-} = +/-15.5V V ₊ = 16.5V, V ₋ = -16.5V | 1 2,3 | All | -0.25 -20.0 | 0.25 20.0 | nA |
| COM On Leakage Current | COM _{ON} | V _{COM-} = +/-15.5V V _{NC_or NO-} = +/-15.5V V ₊ = 16.5V, V ₋ = -16.5V | 1 2,3 | All | -0.4 -40.0 | 0.4 40.0 | nA |
| INPUT | | | | | | | |
| Input current with V _{IN} low | I _{INL} | V _{IN-} = 0.8V all others = 2.4V | 1,2,3 | All | -1.0 | +1.0 | μA |
| Input current with V _{IN} high | I _{INH} | V _{IN-} = 2.4V all others = 0.8V | 1,2,3 | All | -1.0 | +1.0 | μA |
| 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} = 0V or 5.0V | 1 2,3 | All | -1.0 -5.0 | +1.0 +5.0 | μA |
| Negative Supply Current | I ₋ | All channels on or off, V ₊ = 16.5V, V ₋ = -16.5V, V _{IN} = 0V or 5.0V | 1 2,3 | All | -1.0 -5.0 | +1.0 +5.0 | μA |
| Logic Supply Current | I _L | All channels on or off, V ₊ = 16.5V, V ₋ = -16.5V, V _{IN} = 0V or 5.0V | 1 2,3 | All | -1.0 -5.0 | +1.0 +5.0 | μA |
| Ground Current | I _{GND} | All channels on or off, V ₊ = 16.5V, V ₋ = -16.5V, V _{IN} = 0V or 5.0V | 1 2,3 | All | -1.0 -5.0 | +1.0 +5.0 | μA |
| DYNAMIC | | | | | | | |
| Turn ON time | t _{ON} | Figure 3 | 9 | All | | 150 | ns |
| Turn OFF time | t _{OFF} | Figure 3 | 9 | All | | 100 | ns |
| Charge Injection | Q | Figure 5, V _{GEN} = 0V, R _{GEN} = 0Ω, C _L = 10nF <u>4/</u> | 9 | All | | 15 | pC |
| Break-Before-Make Time Delay | t _D | Figure 4 MAX303 only <u>4/</u> | 9 | All | 10 | | ns |

NOTE 2: $V_{+}=15V$, $V_{-}=-15V$, $V_L=5V$ and $GND = 0V$, $V_{INH}=+2.4V$, $V_{INL}=+0.8V$ unless otherwise specified.

NOTE 3: The algebraic convention, where the most negative value is a minimum and the most positive value a maximum, is used on this data sheet.

NOTE 4: Guaranteed by design.

NOTE 5: $\Delta R_{ON}=\Delta R_{ONMAX}-\Delta R_{ONMIN}$. On resistance match between channels and flatness are guaranteed only with specified voltages.

| <u>Ordering Information.</u> | | PKG.Code |
|------------------------------|----------------|----------|
| 01 | MAX301MJE/883B | J16 |
| 01 | MAX301MLP/883B | L20 |
| 02 | MAX303MJE/883B | J16 |
| 02 | MAX303MLP/883B | L20 |
| 03 | MAX305MJE/883B | J16 |
| 03 | MAX305MLP/883B | L20 |

FIGURE 1 TERMINAL CONNECTIONS
DEVICE TYPES 01, 02, 03

| TERMINAL NUMBER | FUNCTION | MAX 301 MJE | MAX 301 MLP | MAX 303 MJE | MAX 303 MLP | MAX 305 MJE | MAX 305 MLP |
|-----------------|---|----------------|----------------|----------------|----------------|----------------|----------------|
| 1 | Drain (Analog Signal) COM1, COM2 | COM1 | N.C. | COM1 | N.C. | COM1 | N.C. |
| 2 | Not internally connected N.C. | N.C. | COM1 | N.C. | COM1 | N.C. | COM1 |
| 3 | | N.C. | N.C. | COM3 | N.C. | COM3 | N.C. |
| 4 | Source (Analog Signal) NC3, NC4 normally closed | N.C. | N.C. | NC3 | COM3 | NO3 | COM3 |
| 5 | | N.C. | N.C. | NC4 | NC3 | NO4 | NO3 |
| 6 | | N.C. | N.C. | COM4 | N.C. | COM4 | N.C. |
| 7 | | N.C. | N.C. | N.C. | NC4 | N.C. | NO4 |
| 8 | Drain (Analog Signal) COM1, COM2 | COM2 | N.C. | COM2 | COM4 | COM2 | COM4 |
| 9 | Source (Analog Signal) NO1, NO2 normally open | NO2 | N.C. | NO2 | N.C. | NO2 | N.C. |
| 10 | Digital Logic Inputs IN2, IN1 | IN2 | COM2 | IN2 | COM2 | IN2 | COM2 |
| 11 | Positive Supply-Voltage Input-connected to substrate (V+) | V+ | N.C. | V+ | N.C. | V+ | N.C. |
| 12 | Logic Supply-Voltage Input (V _L) | V _L | NO2 | V _L | NO2 | V _L | NO2 |
| 13 | Ground (GND) | GND | IN2 | GND | IN2 | GND | IN2 |
| 14 | Negative Supply Voltage Input (V-) | V- | V+ | V- | V+ | V- | V+ |
| 15 | Digital Logic Inputs | IN1 | V _L | IN1 | V _L | IN1 | V _L |
| 16 | Source (Analog Signal) | NO1 | N.C. | NO1 | N.C. | NO1 | N.C. |
| 17 | | | GND | | GND | | GND |
| 18 | | | V- | | V- | | V- |
| 19 | | | IN1 | | IN1 | | IN1 |
| 20 | | | NO1 | | NO1 | | NO1 |

FIGURE 2. TRUTH TABLES

| | MAX301 | MAX303 | MAX303 | MAX305 |
|--------|--------|--------|--------|--------|
| SWITCH | | 1,2 | 3,4 | |
| LOGIC | | | | |
| 0 | OFF | OFF | ON | OFF |
| 1 | ON | ON | OFF | ON |

FIGURE 3: Overvoltage Protection Using Blocking Diodes

See Maxim 1995 New Release Data Book, Volume IV, page 1-13.

FIGURE 4: Switching-Time Test Circuit

See Maxim 1995 New Release Data Book, Volume IV, page 1-14.

FIGURE 5: Break-Before-Make Test Circuit

See Maxim 1995 New Release Data Book, Volume IV, page 1-14.

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.