# MC10SX1189

# Fibre Channel Coaxial Cable Driver and Loop Resiliency Circuit

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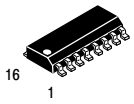
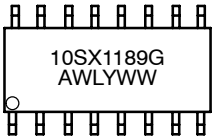
## FIBRE CHANNEL COAXIAL CABLE DRIVER AND LOOP RESILIENCY CIRCUIT




**SOIC**
**CASE 751B**

10SX1189 = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

### Description

The MC10SX1189 is a differential receiver, differential transmitter specifically designed to drive coaxial cables. It incorporates the output cable drive capability of the MC10EL89 Coaxial Cable Driver with additional circuitry to multiplex the output cable drive source between the cable receiver or the local transmitter inputs. The multiplexer control circuitry is TTL compatible for ease of operation.

The MC10SX1189 is useful as a bypass element for Fibre Channel-Arbitrated Loop (FC-AL) or Serial Storage Architecture (SSA) applications, to create loop style interconnects with fault tolerant, active switches at each device node. This device is particularly useful for back panel applications where small size is desirable.

The EL89 style drive circuitry produces swings twice as large as a standard PECL output. When driving a coaxial cable, proper termination is required at both ends of the line to minimize reflections. The 1.6 V output swings allow for proper termination at both ends of the cable, while maintaining the required swing at the receiving end of the cable. Because of the larger output swings, the QT, $\overline{QT}$ outputs are terminated into the thevenin equivalent of 50 Ω to $V_{CC}$ − 3.0 V instead of 50 Ω to $V_{CC}$ − 2.0 V.

### Features

- 425 ps Propagation Delay
- 1.6 V Output Swing on the Cable Driving Output
- Operation Range: $V_{CC}$ = 4.5 V to 5.5 V
- 75 kΩ Internal Input Pull Down Resistors
- >1000 V ESD Protection
- Transistor Count = 102
- Pb−Free Packages are Available*

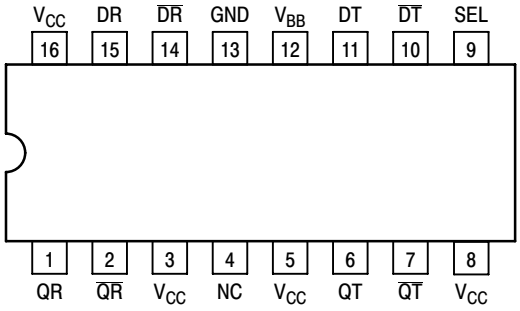



**Figure 1. Pinout: 16-Lead SOIC** (Top View)

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

### TRUTH TABLE

| SEL | Function |
|---|---|
| L | DR → QT |
| H | DT → QT |

### PIN NAMES

| Pins | Function |
|---|---|
| DR/$\overline{DR}$ | Differential Input from Receive Cable |
| QR/$\overline{QR}$ | Buffered Differential Output from Receive Cable |
| DT/$\overline{DT}$ | Differential Input to Transmit Cable |
| QT/$\overline{QT}$ | Buffered Differential Output to Transmit Cable |
| SEL | Multiplexer Control Signal (TTL) |
| $V_{CC}$ | Positive Power Supply |
| GND | Ground |
| $V_{BB}$ | Reference Voltage Output |

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

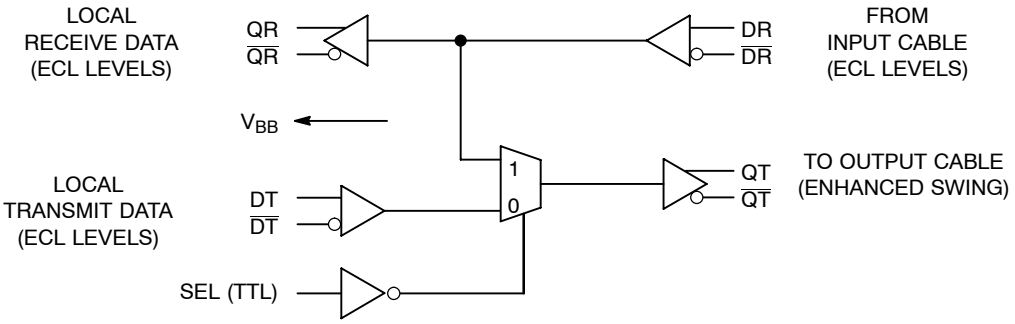



**Figure 2. LOGIC DIAGRAM**

**Table 1. ABSOLUTE MAXIMUM RATINGS**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CC}$ | Power Supply Voltage (Referenced to GND) | 0 to +7.0 | Vdc |
| $V_{IN}$ | Input Voltage (Referenced to GND) | 0 to +6.0 | Vdc |
| $I_{OUT}$ | Output Current Continuous<br>Surge | 50<br>100 | mA |
| $T_A$ | Operating Temperature Range | −40 to +85 | °C |
| $T_{STG}$ | Storage Temperature Range | −50 to +150 | °C |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

**Table 2. DC CHARACTERISTICS** ($V_{CC}$ = 5.0 V, $V_{EE}$ = 0 V)

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $V_{OH}$ | Output Voltage High (QR,$\overline{QR}$) $V_{CC}$ =5.0 V, GND = 0 V (Notes 1, 2) | 3.92 | 4.05 | 4.22 | 3.97 | 4.11 | 4.27 | 4.00 | 4.16 | 4.30 | V |
| $V_{OL}$ | Output Voltage Low (QR,$\overline{QR}$) $V_{CC}$ =5.0 V, GND = 0 V (Notes 1, 2) | 3.05 | 3.23 | 3.35 | 3.07 | 3.24 | 3.37 | 3.10 | 3.25 | 3.41 | V |
| $V_{OH}$ | Output Voltage High (QT,$\overline{QT}$) $V_{CC}$ =5.0 V, GND = 0 V (Notes 1, 3) | 3.83 | 3.95 | 4.10 | 3.88 | 4.02 | 4.15 | 3.90 | 4.09 | 4.17 | V |
| $V_{OL}$ | Output Voltage Low (QT,$\overline{QT}$) $V_{CC}$ =5.0 V, GND = 0 V (Notes 1, 3) | 1.90 | 2.33 | 2.50 | 1.85 | 2.26 | 2.45 | 1.85 | 2.23 | 2.45 | V |
| $I_{CC}$ | Quiescent Supply Current (Note 4) | 20 | 25 | 42 | 23 | 27 | 47 | 25 | 28 | 47 | mA |
| $V_{IH}$ | Input Voltage High (DR,$\overline{DR}$ & DT,$\overline{DT}$) $V_{CC}$ = 5.0 V, GND = 0 V (Note 1) | 3.77 | | 4.11 | 3.87 | | 4.19 | 3.94 | | 4.28 | V |
| $V_{IL}$ | Input Voltage Low (DR,$\overline{DR}$ & DT,$\overline{DT}$) $V_{CC}$ = 5.0 V, GND = 0 V (Note 1) | 3.05 | | 3.50 | 3.05 | | 3.52 | 3.05 | | 3.56 | V |
| $V_{IH}$ | Input Voltage High SEL | 2.0 | | | 2.0 | | | 2.0 | | | V |
| $V_{IL}$ | Input Voltage Low SEL | | | 0.8 | | | 0.8 | | | 0.8 | V |
| $V_{BB}$ | Output Reference Voltage $V_{CC}$ = 5.0 V, GND = 0 V (Note 1) | 3.57 | 3.63 | 3.70 | 3.65 | 3.70 | 3.75 | 3.69 | 3.75 | 3.81 | V |
| $I_{IH}$ | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| $I_{IL}$ | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. Values will track 1:1 with the $V_{CC}$ supply. $V_{EE}$ can vary +0.5 V to −0.5 V.
2. Outputs loaded with 50 Ω to $V_{CC}$ − 2.0 V.
3. Outputs loaded with 50 Ω to $V_{CC}$ − 3.0 V.
4. Outputs open circuited.

**Table 3. AC CHARACTERISTICS** ($V_{CC}$ = 4.5 V to 5.5 V) (Note 5)

| Symbol | Characteristic | | −40°C | | | 0 to 85°C | | | Unit | Condition |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | | |
| $t_{PLH}$, $t_{PHL}$ | Propagation Delay to Output | DR → QR (Diff) | 175 | 300 | 450 | 225 | 325 | 500 | ps | Note 6 |
| | | (SE) | 150 | 300 | 500 | 175 | 325 | 550 | | Note 7 |
| | | DR → QT (Diff) | 250 | 425 | 650 | 300 | 450 | 650 | | |
| | | (SE) | 225 | 425 | 700 | 250 | 450 | 700 | | |
| | | DT → QT (Diff) | 225 | 400 | 650 | 275 | 425 | 650 | | |
| | | (SE) | 200 | 400 | 725 | 225 | 425 | 725 | | |
| | Propagation Delay | SEL → QT,$\overline{QT}$ | 450 | 600 | 850 | 500 | 650 | 800 | | 1.5V to 50% Pt |
| $t_r$, $t_f$ | Rise Time<br>Fall Time | QR,$\overline{QR}$ | 100<br>100 | 275<br>275 | 400<br>400 | 125<br>125 | 275<br>275 | 400<br>400 | ps | 20% to 80%<br>80% to 20% |
| $t_r$, $t_f$ | Rise Time<br>Fall Time | QT,$\overline{QT}$ | 150<br>150 | 300<br>300 | 550<br>550 | 150<br>150 | 300<br>300 | 550<br>550 | ps | 20% to 80%<br>80% to 20% |
| $t_{skew}$ | Within Device Skew | | | 15 | | | 15 | | ps | Note 8 |
| $V_{PP}$ | Minimum Input Swing | | 200 | | 1000 | 200 | | 1000 | mV | Note 9 |
| $V_{CMR}$ | Common Mode Range | | 3.00 | | 4.35 | 3.00 | | 4.35 | V | Note 10 |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

5. $V_{EE}$ can vary +0.5 V to −0.5 V.
6. The differential propagation delay is defined as the delay from the crossing points of the differential input signals to the crossing point of the differential output signals.
7. The single-ended propagation delay is defined as the delay from the 50% point of the input signal to the 50% point of the output signal.
8. Duty cycle skew is the difference between $t_{PLH}$ and $t_{PHL}$ propagation delay through a device.
9. Minimum input swing for which AC parameters are guaranteed.
10. The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between $V_{PP\ Min}$ and 1.0 V.

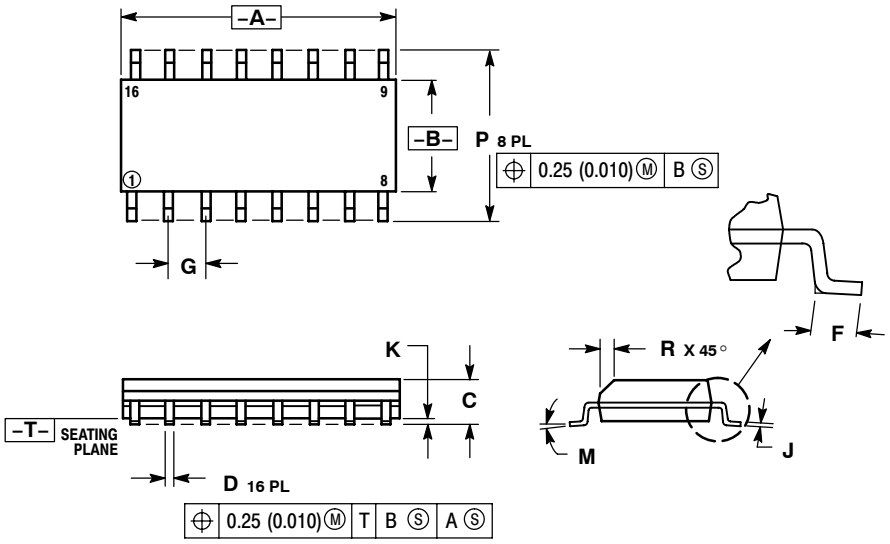
## ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| MC10SX1189D | SOIC−16 | 45 Units / Rail |
| MC10SX1189DG | SOIC−16 (Pb−Free) | 45 Units / Rail |
| MC10SX1189DR2 | SOIC−16 | 2500 / Tape & Reel |
| MC10SX1189DR2G | SOIC−16 (Pb−Free) | 2500 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

## PACKAGE DIMENSIONS

**SOIC**
CASE 751B–05
ISSUE J




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 9.80 | 10.00 | 0.386 | 0.393 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.19 | 0.25 | 0.008 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° | 7° | 0° | 7° |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |



**PUBLICATION ORDERING INFORMATION**

**LITERATURE FULFILLMENT**:
Literature Distribution Center for ON Semiconductor
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**Fax**: 480–829–7709 or 800–344–3867 Toll Free USA/Canada
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**Japan**: ON Semiconductor, Japan Customer Focus Center
2–9–1 Kamimeguro, Meguro–ku, Tokyo, Japan 153–0051
**Phone**: 81–3–5773–3850

**ON Semiconductor Website**: http://onsemi.com

**Order Literature**: http://www.onsemi.com/litorder

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**MC10SX1189/D**

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