

MC10SX1190

Fibre Channel Coaxial Cable Driver and Loop Resiliency Circuit

The MC10SX1190 is a differential receiver, differential transmitter specifically designed to drive coaxial cables. It incorporates the output cable drive capability of the MC10EP89 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 MC10SX1190 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 EP89 style drive circuitry produces swings approximately 70% larger than a standard PECL output. When driving a coaxial cable, proper termination is required at both ends of the line to minimize reflections. The 1.4V 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 50Ω to $V_{CC} - 3.0V$ instead of 50Ω to $V_{CC} - 2.0V$.

- 2.5 Gbps Operation
- 425ps Propagation Delay
- 1.4V Output Swing on the Cable Driving Output
- PECL Mode: 3.0V to 5.5V V_{CC} , with $V_{EE} = 0V$
- ECL Mode: 0V V_{CC} , with $V_{EE} = -3.0V$ to $-5.5V$
- 75kΩ Internal Input Pull Down Resistors
- 2000 V H.B.M. ESD Protection, >100 V mm

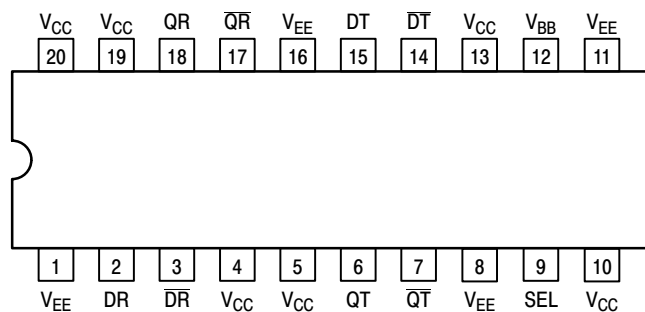
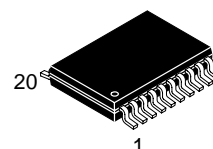


Figure 1. 20-Lead TSSOP Pinout: (Top View)

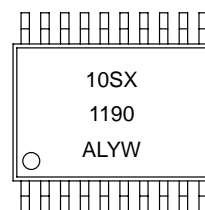


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TSSOP-20
DT SUFFIX
CASE 948E

MARKING DIAGRAM



A = Assembly Location
 L = Wafer Lot
 Y = Year
 W = Work Week

*For additional information, see Application Note AND8002/D

PIN DESCRIPTION

| PIN | FUNCTION |
|---------------------|--|
| DR/ \overline{DR} | ECL Diff. Inputs from Receive Cable |
| QR/ \overline{QR} | ECL Buffered Differential Outputs from Receive Cable |
| DT/ \overline{DT} | ECL Differential Input to Transmit Cable |
| QT/ \overline{QT} | ECL Buffered Differential Output to Transmit Cable |
| SEL | TTL Multiplexer Control Signal |
| V_{BB} | Reference Voltage Output |
| V_{CC} | ECL Positive Supply |
| V_{EE} | ECL Negative, 0 Supply |

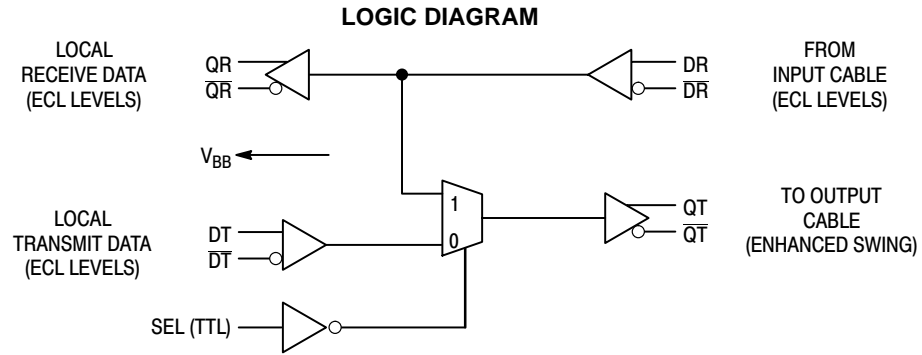
TRUTH TABLE

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

ORDERING INFORMATION

| Device | Package | Shipping |
|--------------|----------|---------------|
| MC10SX1190DT | TSSOP-20 | 75 Units/Rail |

MC10SX1190



ABSOLUTE MAXIMUM RATINGS*

| Symbol | Parameter | Value | Unit |
|---------------|--|-------------|---------------|
| V_{CC} | Power Supply Voltage ($V_{EE} = 0V$) | 0 to +6.0 | Vdc |
| V_{EE} | Power Supply Voltage ($V_{CC} = 0V$) | -6.0 to 0 | Vdc |
| V_{IN} | Input Voltage ($V_{EE} = 0V$, V_{IN} not more positive than V_{CC}) | 0 to +6.0 | Vdc |
| V_{IN} | Input Voltage ($V_{CC} = 0V$, V_{IN} not more negative than V_{EE}) | -6.0 to 0 | Vdc |
| I_{OUT} | Output Current | Continuous | 50 |
| | | Surge | 100 |
| θ_{JA} | Thermal Resistance (Junction-to-Ambient) | Still Air | 90 |
| | | 500 LFPM | 60 |
| θ_{JC} | Thermal Resistance (Junction-to-Case) | 30 to 35 | $^{\circ}C/W$ |
| T_A | Operating Temperature Range | -40 to +85 | $^{\circ}C$ |
| T_{STG} | Storage Temperature Range | -50 to +150 | $^{\circ}C$ |

* Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

MC10SX1190

DC CHARACTERISTICS (Note 1)

| Symbol | Characteristic | -40°C | | | 0°C | | | 25°C | | | 85°C | | | Unit |
|-----------------|--|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| V _{OH} | Output Voltage High (QR, \overline{QR}) V _{CC} = 5.0V, V _{EE} = 0V (Notes 2,3) | 3.93 | 4.03 | 4.13 | | 4.04 | | 3.98 | 4.08 | 4.18 | 4.03 | 4.13 | 4.23 | V |
| V _{OL} | Output Voltage Low (QR, \overline{QR}) V _{CC} = 5.0V, V _{EE} = 0V (Notes 2,3) | 2.92 | 3.12 | 3.32 | | 3.26 | | 2.94 | 3.14 | 3.34 | 2.96 | 3.16 | 3.36 | V |
| V _{OH} | Output Voltage High (QT, \overline{QT}) V _{CC} = 5.0V, V _{EE} = 0V (Notes 2,4) | 3.84 | 3.94 | 4.04 | | 3.98 | | 3.94 | 4.04 | 4.14 | 4.05 | 4.15 | 4.25 | V |
| V _{OL} | Output Voltage Low (QT, \overline{QT}) V _{CC} = 5.0V, V _{EE} = 0V (Notes 2,4) | 2.00 | 2.20 | 2.40 | | 2.49 | | 1.90 | 2.10 | 2.30 | 1.85 | 2.05 | 2.25 | V |
| I _{CC} | Quiescent Supply Current (Note 5) | 75 | 95 | 115 | | | | 75 | 95 | 115 | 75 | 95 | 115 | mA |
| V _{IH} | Input Voltage High (DR, \overline{DR} & DT, \overline{DT}) V _{CC} = 5.0V, V _{EE} = 0V (Note 2) | 3.77 | | 4.11 | 3.83 | | 4.16 | 3.87 | | 4.19 | 3.94 | | 4.28 | V |
| V _{IL} | Input Voltage Low (DR, \overline{DR} & DT, \overline{DT}) V _{CC} = 5.0V, V _{EE} = 0V (Note 2) | 3.05 | | 3.50 | 3.05 | | 3.52 | 3.05 | | 3.52 | 3.05 | | 3.56 | V |
| V _{IH} | Input Voltage High SEL (Note 6) | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | | | V |
| V _{IL} | Input Voltage Low SEL (Note 6) | | | 0.8 | | | 0.8 | | | 0.8 | | | 0.8 | V |
| V _{BB} | Output Reference Voltage V _{CC} = 5.0V, V _{EE} = 0V (Note 2) | 3.50 | 3.60 | 3.75 | 3.62 | 3.67 | 3.73 | 3.50 | 3.60 | 3.70 | 3.55 | 3.65 | 3.75 | V |

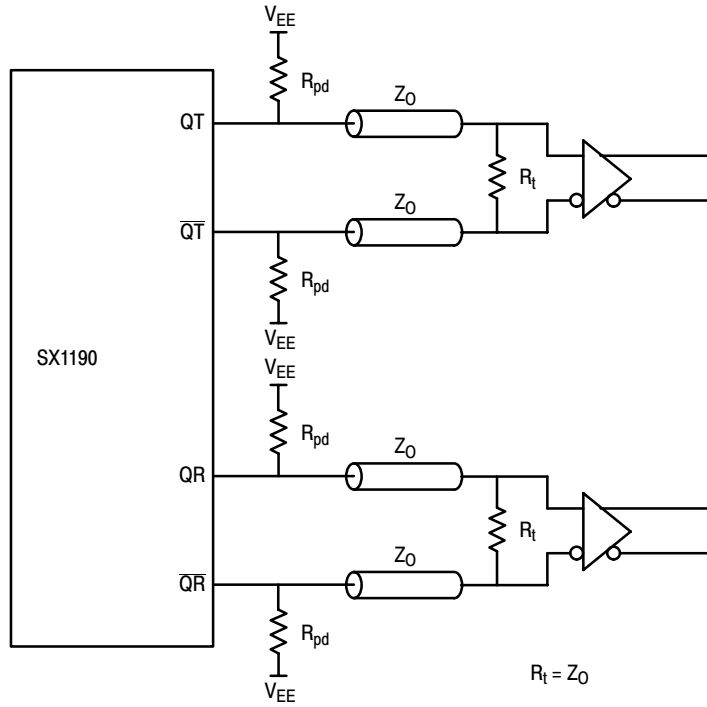
- 10SX circuits are designed to meet the DC specifications shown in the table after thermal equilibrium has been established. The circuit is mounted in a test socket or mounted on a printed circuit board and transverse air greater than 500lfm is maintained.
- Values will track 1:1 with the V_{CC} supply.
- Outputs loaded with 50Ω to V_{CC} -3 V
- Outputs loaded with 50Ω to V_{CC} -2 V
- Outputs open circuited.
- TTL signal threshold is 1.5V above V_{EE}.

AC CHARACTERISTICS (Note 1 & 7)

| Symbol | Characteristic | -40°C | | | 25°C to 85°C | | | Unit | Condition |
|-------------------------------------|---|-------|-----|------|--------------|------------|------|------|--------------------------|
| | | Min | Typ | Max | Min | Typ | Max | | |
| t _{pd} | Propagation Delay DR → QR (Diff) to Output | 140 | 240 | 340 | 180 | 280 | 380 | ps | Note 2 Note 3 |
| | DR → QT (Diff) | 300 | 400 | 500 | 350 | 470 | 650 | | |
| | DT → QT (Diff) | 280 | 380 | 480 | 350 | 440 | 650 | | |
| t _{PLH} , t _{PHL} | Propagation Delay SEL → QT, \overline{QT} | 400 | 700 | 1000 | 400 | 700 | 1000 | ps | 1.5V to 50% Pt |
| t _r , t _f | Rise Time Fall Time | 70 | 140 | 200 | 90 | 155 | 250 | ps | 20% to 80% 80% to 20% |
| t _r , t _f | Rise Time Fall Time | 150 | 200 | 280 | 150 | 230 230 | 500 | ps | 20% to 80% 80% to 20% |
| t _{skew} | Within Device Skew | | 15 | | | 15 | | ps | Note 4 |
| V _{PP} | Minimum Input Swing | 200 | | | 200 | | | mV | Note 5 |
| V _{CMR} | Common Mode Range | 3.0 | | 4.35 | 3.0 | | 4.35 | V | Note 6 |
| f _{max} | Maximum Operation Frequency | 2.5 | | | 2.5 | | | Gb/s | |

- 10SX circuits are designed to meet the AC specifications shown in the table after thermal equilibrium has been established. The circuit is mounted in a test socket or mounted on a printed circuit board and transverse air greater than 500lfm is maintained.
- 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.
- 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.
- Duty cycle skew is the difference between t_{PLH} and t_{PHL} propagation delay through a device.
- Minimum input swing for which AC parameters are guaranteed.
- 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 1.0V.
- Data taken at V_{CC, nom} = 3.3V.

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Typical value for R_{pd} is 160Ω to 260Ω , depending on the application. The minimum value of R_{pd} should not be less than 50Ω .

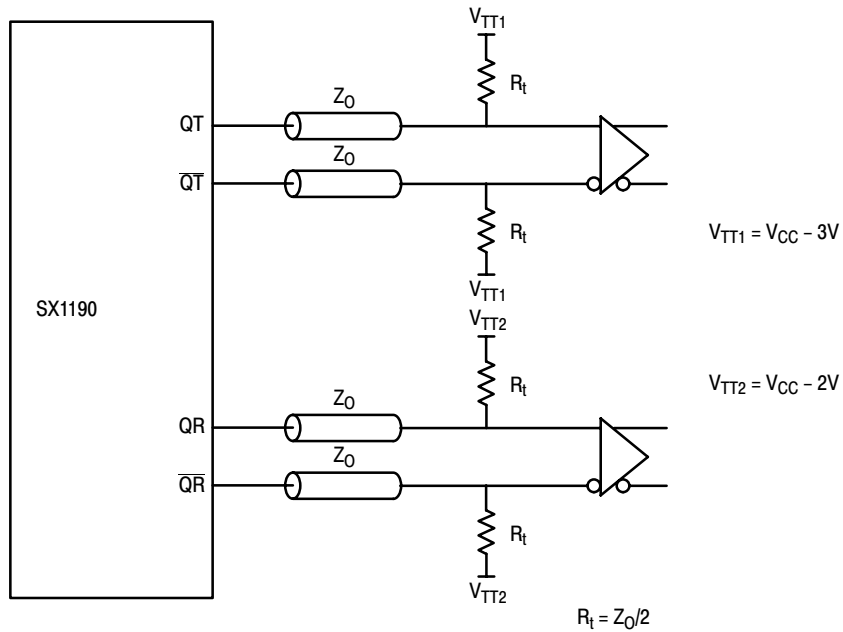
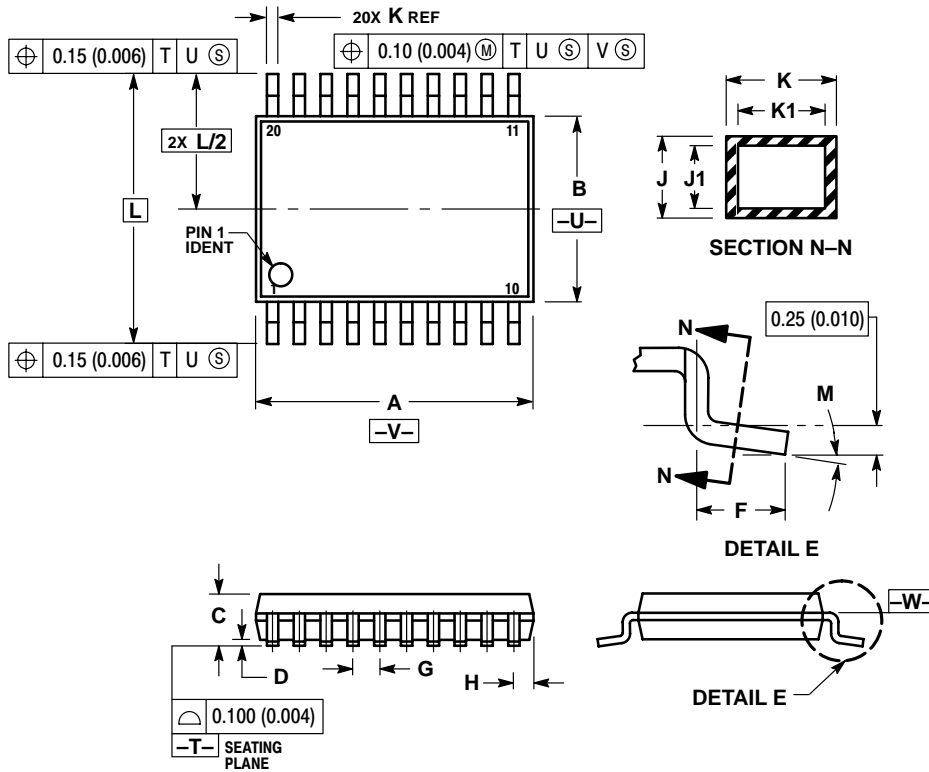


Figure 2. SX1190 Termination Configuration

MC10SX1190

PACKAGE DIMENSIONS

DT SUFFIX
 PLASTIC PACKAGE
 CASE 948E-02
 ISSUE A



NOTES:


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 6.40 | 6.60 | 0.252 | 0.260 |
| B | 4.30 | 4.50 | 0.169 | 0.177 |
| C | --- | 1.20 | --- | 0.047 |
| D | 0.05 | 0.15 | 0.002 | 0.006 |
| F | 0.50 | 0.75 | 0.020 | 0.030 |
| G | 0.65 BSC | | 0.026 BSC | |
| H | 0.27 | 0.37 | 0.011 | 0.015 |
| J | 0.09 | 0.20 | 0.004 | 0.008 |
| J1 | 0.09 | 0.16 | 0.004 | 0.006 |
| K | 0.19 | 0.30 | 0.007 | 0.012 |
| K1 | 0.19 | 0.25 | 0.007 | 0.010 |
| L | 6.40 BSC | | 0.252 BSC | |
| M | 0° | 8° | 0° | 8° |

Notes

Notes

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