



**THE DATASHEET OF  
MC10SX1189DR2G**



# MC10SX1189

## Fibre Channel Coaxial Cable Driver and Loop Resiliency Circuit

### 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  $50\ \Omega$  to  $V_{CC} - 3.0\ V$  instead of  $50\ \Omega$  to  $V_{CC} - 2.0\ V$ .

### Features

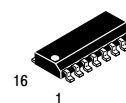
- 425 ps Propagation Delay
- 1.6 V Output Swing on the Cable Driving Output
- Operation Range:
  - ◆  $V_{CC} = 4.5\ V$  to  $5.5\ V$
- 75 k $\Omega$  Internal Input Pull Down Resistors
- >1000 V ESD Protection
- Transistor Count = 102
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



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## FIBRE CHANNEL COAXIAL CABLE DRIVER AND LOOP RESILIENCY CIRCUIT



SOIC-16  
CASE 751B-05

### MARKING DIAGRAM\*



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

(Note: Microdot may be in either location)

\*For additional marking information, refer to Application Note [AND8002/D](#).

### ORDERING INFORMATION

Device	Package	Shipping
MC10SX1189DG	SOIC-16 (Pb-Free)	48 Units/Tube

# MC10SX1189

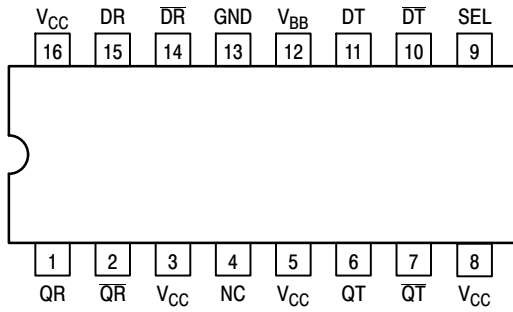


Figure 1. Pinout: SOIC-16 (Top View)

## 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 <sub>CC</sub>	Positive Power Supply
GND	Ground
V <sub>BB</sub>	Reference Voltage Output

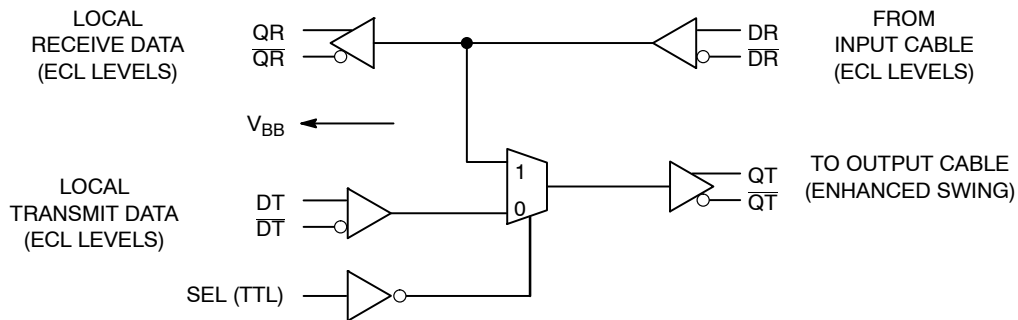


Figure 2. LOGIC DIAGRAM

Table 1. ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Power Supply Voltage (Referenced to GND)	0 to +7.0	Vdc
V <sub>IN</sub>	Input Voltage (Referenced to GND)	0 to +6.0	Vdc
I <sub>OUT</sub>	Output Current Continuous Surge	50 100	mA
T <sub>A</sub>	Operating Temperature Range	-40 to +85	°C
T <sub>STG</sub>	Storage Temperature Range	-50 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

# MC10SX1189

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

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$V_{OH}$	Output Voltage High (QR, $\overline{QR}$ ) $V_{CC} = 5.0\text{ V}$ , 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, $\overline{QR}$ ) $V_{CC} = 5.0\text{ V}$ , 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, $\overline{QT}$ ) $V_{CC} = 5.0\text{ V}$ , 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, $\overline{QT}$ ) $V_{CC} = 5.0\text{ V}$ , 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, $\overline{DT}$ ) $V_{CC} = 5.0\text{ V}$ , 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, $\overline{DT}$ ) $V_{CC} = 5.0\text{ V}$ , 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 $V_{CC} = 5.0\text{ V}$ , 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	$\mu\text{A}$
$I_{IL}$	Input LOW Current	0.5			0.5			0.5			$\mu\text{A}$

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 lfm. 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  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .
3. Outputs loaded with 50  $\Omega$  to  $V_{CC} - 3.0\text{ V}$ .
4. Outputs open circuited.

# MC10SX1189

**Table 3. AC CHARACTERISTICS** ( $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ ) (Note 1)

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) (SE)	175	300	450	225	325	500	ps	Note 2 Note 3
	DR → QT (Diff) (SE)	150	300	500	175	325	550		
	DR → QT (Diff) (SE)	250	425	650	300	450	650		
	DT → QT (Diff) (SE)	225	425	700	250	450	700		
	DT → QT (Diff) (SE)	225	400	650	275	425	650		
	DT → QT (Diff) (SE)	200	400	725	225	425	725		
	Propagation Delay SEL → QT,QT	450	600	850	500	650	800		1.5V to 50% Pt
$t_r$ , $t_f$	Rise Time QR,QR	100	275	400	125	275	400	ps	20% to 80% 80% to 20%
	Fall Time	100	275	400	125	275	400		
$t_r$ , $t_f$	Rise Time QT,QT	150	300	550	150	300	550	ps	20% to 80% 80% to 20%
	Fall Time	150	300	550	150	300	550		
$t_{skew}$	Within Device Skew		15			15		ps	Note 4
$V_{PP}$	Minimum Input Swing	200		1000	200		1000	mV	Note 5
$V_{CMR}$	Common Mode Range	3.00		4.35	3.00		4.35	V	Note 6

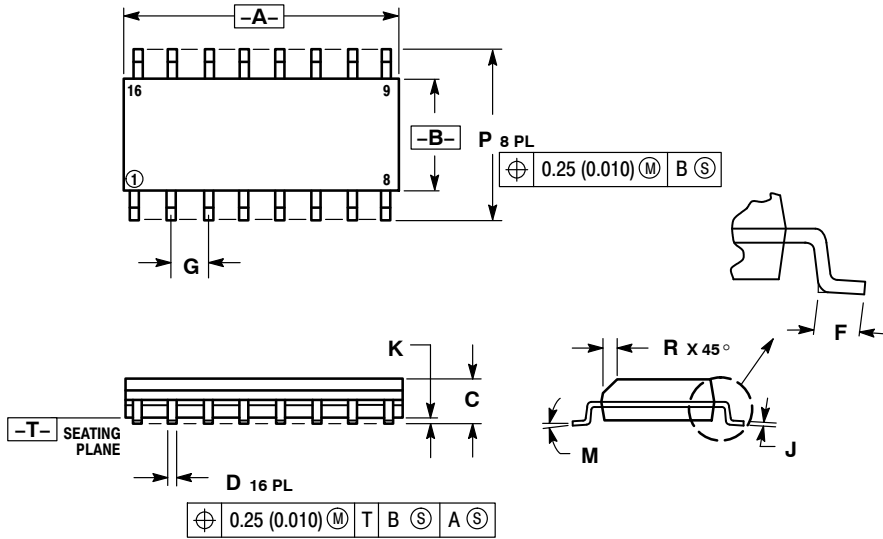
NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional 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.  $V_{EE}$  can vary +0.5 V to -0.5 V.
2. 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.
3. 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.
4. Duty cycle skew is the difference between  $t_{PLH}$  and  $t_{PHL}$  propagation delay through a device.
5. Minimum input swing for which AC parameters are guaranteed.
6. 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  $V_{PP\text{ Min}}$  and 1.0 V.

# MC10SX1189

## PACKAGE DIMENSIONS

SOIC-16  
CASE 751B-05  
ISSUE K



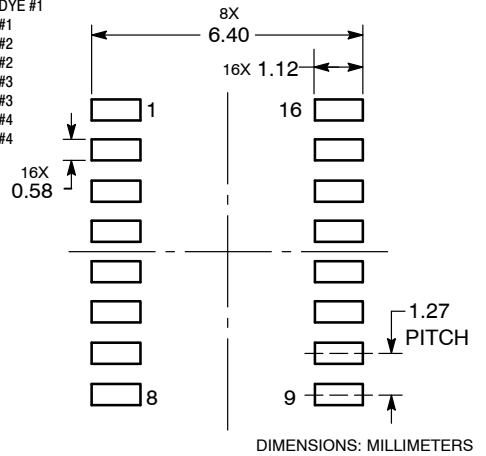
**NOTES:**

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.

DIM	MILLIMETERS		INCHES	
	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

- |  |  |  |  |
|--|--|--|--|
| <p><b>STYLE 1:</b></p> <p>PIN 1. COLLECTOR<br/>2. BASE<br/>3. EMITTER<br/>4. NO CONNECTION<br/>5. EMITTER<br/>6. BASE<br/>7. COLLECTOR<br/>8. COLLECTOR<br/>9. BASE<br/>10. EMITTER<br/>11. NO CONNECTION<br/>12. EMITTER<br/>13. BASE<br/>14. COLLECTOR<br/>15. EMITTER<br/>16. COLLECTOR</p>                           | <p><b>STYLE 2:</b></p> <p>PIN 1. CATHODE<br/>2. ANODE<br/>3. NO CONNECTION<br/>4. CATHODE<br/>5. CATHODE<br/>6. NO CONNECTION<br/>7. ANODE<br/>8. CATHODE<br/>9. CATHODE<br/>10. ANODE<br/>11. NO CONNECTION<br/>12. CATHODE<br/>13. CATHODE<br/>14. NO CONNECTION<br/>15. ANODE<br/>16. CATHODE</p> | <p><b>STYLE 3:</b></p> <p>PIN 1. COLLECTOR, DYE #1<br/>2. BASE, #1<br/>3. EMITTER, #1<br/>4. COLLECTOR, #1<br/>5. COLLECTOR, #2<br/>6. BASE, #2<br/>7. EMITTER, #2<br/>8. COLLECTOR, #2<br/>9. COLLECTOR, #3<br/>10. BASE, #3<br/>11. EMITTER, #3<br/>12. COLLECTOR, #3<br/>13. COLLECTOR, #4<br/>14. BASE, #4<br/>15. EMITTER, #4<br/>16. COLLECTOR, #4</p>   | <p><b>STYLE 4:</b></p> <p>PIN 1. COLLECTOR, DYE #1<br/>2. COLLECTOR, #1<br/>3. COLLECTOR, #2<br/>4. COLLECTOR, #3<br/>5. COLLECTOR, #3<br/>6. COLLECTOR, #3<br/>7. COLLECTOR, #4<br/>8. COLLECTOR, #4<br/>9. BASE, #4<br/>10. EMITTER, #4<br/>11. BASE, #3<br/>12. EMITTER, #3<br/>13. BASE, #2<br/>14. EMITTER, #2<br/>15. BASE, #1<br/>16. EMITTER, #1</p> |
| <p><b>STYLE 5:</b></p> <p>PIN 1. DRAIN, DYE #1<br/>2. DRAIN, #1<br/>3. DRAIN, #2<br/>4. DRAIN, #2<br/>5. DRAIN, #3<br/>6. DRAIN, #3<br/>7. DRAIN, #4<br/>8. DRAIN, #4<br/>9. GATE, #4<br/>10. SOURCE, #4<br/>11. GATE, #3<br/>12. SOURCE, #3<br/>13. GATE, #2<br/>14. SOURCE, #2<br/>15. GATE, #1<br/>16. SOURCE, #1</p> | <p><b>STYLE 6:</b></p> <p>PIN 1. CATHODE<br/>2. CATHODE<br/>3. CATHODE<br/>4. CATHODE<br/>5. CATHODE<br/>6. CATHODE<br/>7. CATHODE<br/>8. CATHODE<br/>9. ANODE<br/>10. ANODE<br/>11. ANODE<br/>12. ANODE<br/>13. ANODE<br/>14. ANODE<br/>15. ANODE<br/>16. ANODE</p>                                 | <p><b>STYLE 7:</b></p> <p>PIN 1. SOURCE N-CH<br/>2. COMMON DRAIN (OUTPUT)<br/>3. COMMON DRAIN (OUTPUT)<br/>4. GATE P-CH<br/>5. COMMON DRAIN (OUTPUT)<br/>6. COMMON DRAIN (OUTPUT)<br/>7. COMMON DRAIN (OUTPUT)<br/>8. SOURCE P-CH<br/>9. SOURCE P-CH<br/>10. COMMON DRAIN (OUTPUT)<br/>11. COMMON DRAIN (OUTPUT)<br/>12. COMMON DRAIN (OUTPUT)<br/>13. GATE N-CH<br/>14. COMMON DRAIN (OUTPUT)<br/>15. COMMON DRAIN (OUTPUT)<br/>16. SOURCE N-CH</p> |  |


### SOLDERING FOOTPRINT



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, [SOLDDERRM/D](http://www.onsemi.com/SOLDDERRM/D).

# MC10SX1189

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