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, $\overline{\text{QT}}$ 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:
 - $V_{CC} = 4.5 \text{ V}$ to 5.5 V
- 75 kΩ 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 CodeA= Assembly LocationWL= Wafer LotY= YearWW= Work WeekG= Pb-Free Package

(Note: Microdot may be in either location)

*For additional marking information, refer to Application Note <u>AND8002/D</u>.

ORDERING INFORMATION

	Device	Package	Shipping
MC10S	X1189DG	SOIC-16 (Pb-Free)	48 Units/Tube



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

וחד	ITU	TAE	
IRV	лп	IAC	

SEL	Function
L H	$\begin{array}{c} DR \to QT \\ DT \to QT \end{array}$

PIN NAMES

-	
Pins	Function
DR/ <u>DR</u> QR/ <u>QR</u>	Differential Input from Receive Cable Buffered Differential Output from Re- ceive Cable
DT/DT	Differential Input to Transmit Cable
QT/QT	Buffered Differential Output to
	Transmit Cable
SEL	Multiplexer Control Signal (TTL)
V _{CC}	Positive Power Supply
GND	Ground
V _{BB}	Reference Voltage Output



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
Ι _{ΟυΤ}	Output Current Continuous Surge	50 100	mA
T _A	Operating Temperature Range	-40 to +85	°C
T _{STG}	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.

		-40°C				25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
V _{OH}	Output Voltage High (QR, 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,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, 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,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,DR & DT,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,DR & DT,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	μΑ
IIL	Input LOW Current	0.5			0.5			0.5			μΑ

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

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.

		-40°C		0 to 85°C					
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Unit	Condition
t _{PLH} , t _{PHL}	$\begin{array}{l} \mbox{Propagation Delay to Output} \\ \mbox{DR} \rightarrow \mbox{QR (Diff)} \\ (SE) \\ \mbox{DR} \rightarrow \mbox{QT (Diff)} \\ (SE) \\ \mbox{DT} \rightarrow \mbox{QT (Diff)} \\ (SE) \end{array}$	175 150 250 225 225 200	300 300 425 425 400 400	450 500 650 700 650 725	225 175 300 250 275 225	325 325 450 450 425 425	500 550 650 700 650 725	ps	Note 2 Note 3
	Propagation Delay SEL \rightarrow QT,QT	450	600	850	500	650	800		1.5V to 50% Pt
t _r , t _f	Rise TimeQR,QR Fall Time	100 100	275 275	400 400	125 125	275 275	400 400	ps	20% to 80% 80% to 20%
t _r , t _f	Rise TimeQT,QT Fall Time	150 150	300 300	550 550	150 150	300 300	550 550	ps	20% to 80% 80% to 20%
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 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. 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.

 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.

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