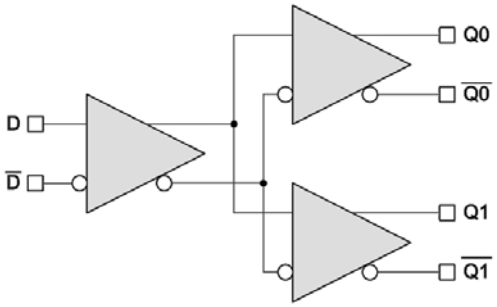
# PECL/ECL Coaxial Cable Driver

***SOIC8***

## FEATURES

- Direct Replacement for ON Semi MC10EL89
- 1.6V Output Swing
- 375ps Propagation Delay
- Internal Input Pull-down Resistors
- RoHS Compliant Pb Free Packages

## BLOCK DIAGRAM




## DESCRIPTION

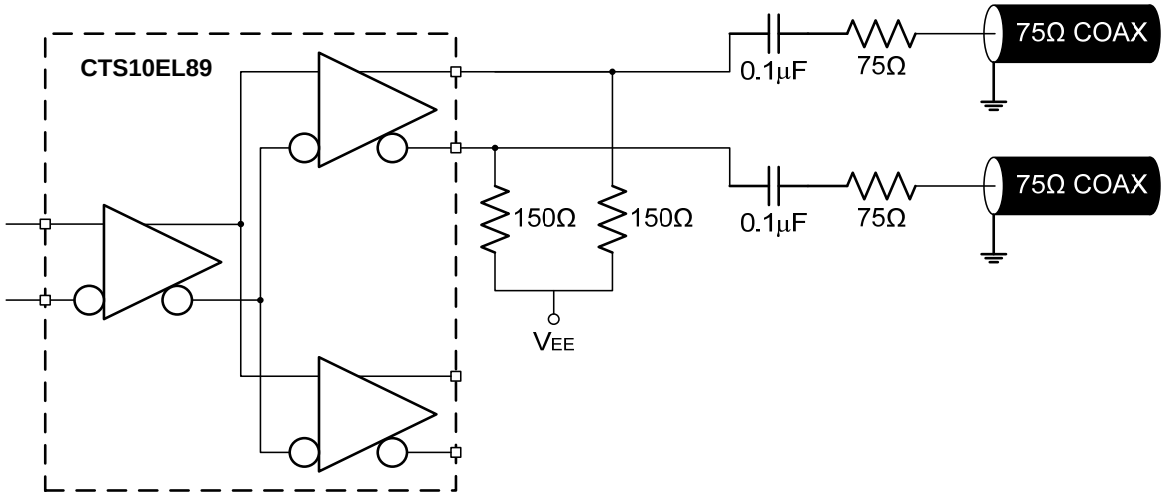
The CTS10EL89 is a differential fan-out gate specifically designed to drive coaxial cables. The device is especially useful in digital video applications. In such applications, each output can be used as an independent driver since the system is polarity free.

The driver has a voltage gain of approximately 40 and produces an output swing twice as large as standard ECL output. The driver accepts a standard differential ECL input and can run off of the Digital Video Broadcast standard -5.0V supply.

The CTS10EL89 is a direct replacement for the ON Semi MC10EL89.

## ENGINEERING NOTES

When driving a coaxial cable, proper termination is required at both ends of the line to minimize signal loss. The 1.6V output swing allows for termination at both ends of the cable, while maintaining the required 800mV swing at the receiving end of the cable. Because of the larger output swings, the device cannot be terminated into the standard $V_{CC}$ -2.0V. All of the DC parameters are tested with a 50Ω to $V_{CC}$ -3.0V load. The driver accepts a standard differential ECL input and can run off of the Digital Video Broadcast standard -5.0V supply. Under open input conditions (pulled to $V_{EE}$) internal input clamps will force the Q outputs LOW.



## ELECTRICAL SPECIFICATIONS

### Absolute Maximum Ratings

**Absolute Maximum Ratings are those values beyond which device life may be impaired.**

| Symbol | Characteristic | Condition | Rating | Unit |
|---|---|---|---|---|
| $V_{CC}$ | PECL Power Supply | ($V_{EE}$ = 0V) | 0 to +8.0 | V |
| $V_I$ | PECL Input Voltage | ($V_{EE}$ = 0V) | 0 to +6.0 | V |
| $V_{EE}$ | ECL Power Supply | ($V_{CC}$ = 0V) | -8.0 to 0 | V |
| $V_I$ | ECL Input Voltage | ($V_{CC}$ = 0V) | -6.0 to 0 | V |
| $I_{OUT}$ | Output Current | Continuous | 50 | mA |
| | | Surge | 100 | |
| $T_A$ | Operating Temperature Range | | -40 to +85 | °C |
| $T_{STG}$ | Storage Temperature Range | | -65 to +150 | °C |
| $ESD_{HBM}$ | Human Body Model | | 2500 | V |
| $ESD_{MM}$ | Machine Model | | 200 | V |
| $ESD_{CDM}$ | Charged Device Model | | 2500 | V |

### 10K ECL DC Characteristics ($V_{EE}$ = -4.2V to -5.7V, $V_{CC}$ = GND)

| 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 HIGH Voltage[1] | -1230 | | -980 | -1180 | | -940 | -1130 | | -900 | -1060 | | -810 | mV |
| $V_{OL}$ | Output LOW Voltage[1] | -2900 | | -2580 | -2950 | | -2570 | -3000 | | -2560 | -3050 | | -2510 | mV |
| $V_{IH}$ | Input HIGH Voltage | -1230 | | -890 | -1170 | | -840 | -1130 | | -810 | -1060 | | -720 | mV |
| $V_{IL}$ | Input LOW Voltage | -1950 | | -1500 | -1950 | | -1480 | -1950 | | -1480 | -1950 | | -1445 | mV |
| $I_{IL}$ | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | 0.5 | | | µA |
| $I_{IH}$ | Input HIGH Current | | | 150 | | | 150 | | | 150 | | | 150 | µA |
| $I_{EE}$ | Power Supply Current | | 23 | 28 | | 23 | 28 | | 23 | 28 | | 23 | 28 | mA |

[1] Each output is terminated through a 50Ω resistor to $V_{CC}$ -3V.

## 10K PECL DC Characteristics ($V_{EE}$ = GND, $V_{CC}$ = +5.0V)

| 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 HIGH Voltage[1, 2] | 3770 | | 4020 | 3820 | | 4060 | 3870 | | 4100 | 3940 | | 4190 | mV |
| $V_{OL}$ | Output LOW Voltage[1, 2] | 2100 | | 2420 | 2050 | | 2430 | 2000 | | 2440 | 1950 | | 2490 | mV |
| $V_{IH}$ | Input HIGH Voltage[1] | 3770 | | 4110 | 3830 | | 4160 | 3870 | | 4190 | 3940 | | 4280 | mV |
| $V_{IL}$ | Input LOW Voltage[1] | 3050 | | 3500 | 3050 | | 3520 | 3050 | | 3520 | 3050 | | 3555 | mV |
| $I_{IL}$ | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | 0.5 | | | µA |
| $I_{IH}$ | Input HIGH Current | | | 150 | | | 150 | | | 150 | | | 150 | µA |
| $I_{EE}$ | Power Supply Current | | 23 | 28 | | 23 | 28 | | 23 | 28 | | 23 | 28 | mA |

1 For supply voltages other that 5.0V, use the ECL table values and ADD supply voltage value.
2 Each output is terminated through a 50Ω resistor to $V_{CC}$ -3V.

## AC Characteristics ($V_{EE}$ = -4.2V to -5.7V, $V_{CC}$ = GND or $V_{EE}$ = GND, $V_{CC}$ = +4.2V to +5.7V)

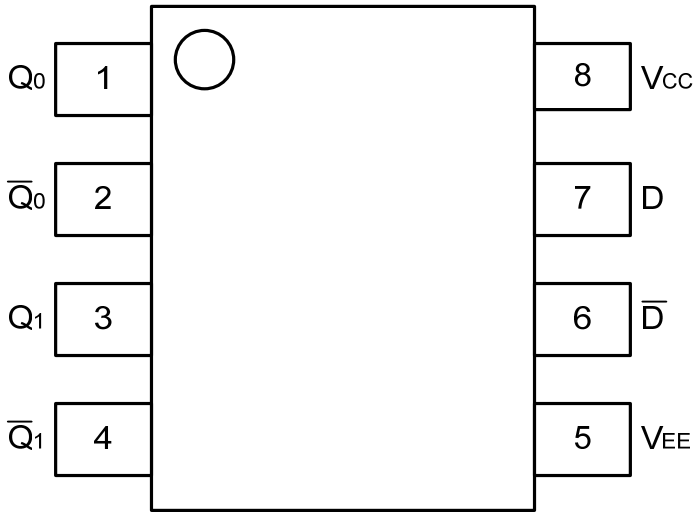
| Symbol | Characteristic | -40 °C | | | 0 °C | | | 25 °C | | | 85 °C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $t_{MAX}$ | Maximum Toggle Rate | | | | | | | | 1.5 | | | | | Gb/s |
| $t_{PLH}/t_{PHL}$ | Propagation Delay to Output | 200 | 340 | 480 | 250 | 340 | 430 | 260 | 350 | 440 | 310 | 400 | 490 | ps |
| $t_{SKEW}$ | Within-Device Skew[1] Duty Cycle Skew[2] | | 5 | 20 | | 5 | 20 | | 5 | 20 | | 5 | 20 | ps |
| $V_{PP}$ | Minimum Input Swing[3] | 150 | | | 150 | | | 150 | | | 150 | | | mV |
| $V_{CMR}$ | Common Mode Range[4] | $V_{EE}$ +2.5 | | $V_{CC}$ -0.4 | $V_{EE}$ +2.5 | | $V_{CC}$ -0.4 | $V_{EE}$ +2.5 | | $V_{CC}$ -0.4 | $V_{EE}$ +2.5 | | $V_{CC}$ -0.4 | V |
| $t_R/t_F$ | Output Rise/Fall Times Q (20%-80%) | 205 | | 455 | 205 | | 455 | 205 | | 455 | 205 | | 455 | ps |

1 Within-device skew defined as identical transitions on similar paths through a device.
2 Duty cycle skew is the difference between a $t_{PLH}$ and $t_{PHL}$ propagation delay through a device.
3 $V_{PP}$ is the minimum peak-to-peak differential input swing for which AC parameters guaranteed. The device has a DC gain of ~40.
4 The VCMR 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 1V.

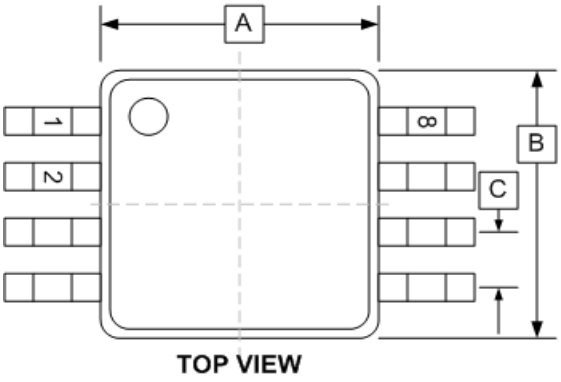
## Pin Description and Configuration

### Pin Assignments

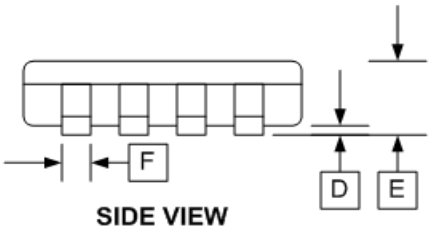
| Pin | Name | Type | Function |
|---|---|---|---|
| 1 | $Q_0$ | Output | Data Output ($1.6V_{PP}$) |
| 2 | $\Sigma\overline{Q}_0$ | Output | Data Output ($1.6V_{PP}$) |
| 3 | $Q_1$ | Output | Data Output ($1.6V_{PP}$) |
| 4 | $\Sigma\overline{Q}_1$ | Output | Data Output ($1.6V_{PP}$) |
| 5 | $V_{EE}$ | Power | Negative Supply |
| 6 | $\Sigma\overline{D}$ | Input | Data Input |
| 7 | D | Input | Data Input |
| 8 | $V_{CC}$ | Power | Positive Supply |



## PACKAGE DIMENSIONS

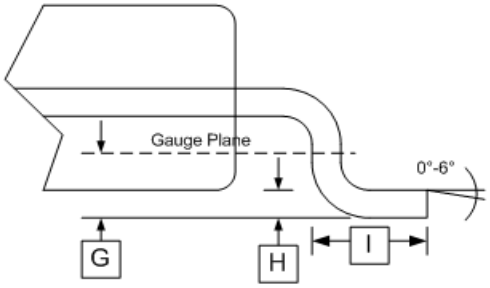



TOP VIEW




SIDE VIEW

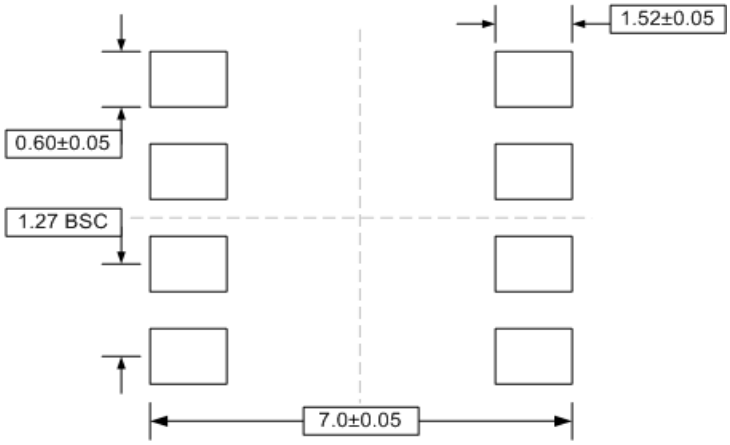
SOIC8 (D)




| | mm | |
|---|---|---|
| DIM | MIN | MAX |
| A | 3.81 | 3.99 |
| B | 4.80 | 4.98 |
| C | 1.27 BSC | |
| D | 0.10 | 0.25 |
| E | 1.37 | 1.68 |
| F | 0.36 | 0.48 |
| G | 0.25 | |
| H | 0.19 | 0.25 |
| I | 0.41 | 0.86 |

PCB LAND PATTERN/FOOTPRINT

Dimensions in mm




## PART ORDERING INFORMATION

| Part Number | Package | Marking |
|---|---|---|
| CTS10EL89DG | SOIC8 | CTS10 / EL89 / YYWW |