3.3V 10Gbps DIFFERENTIAL CML LINE DRIVER/RECEIVER WITH INTERNAL TERMINATION

FEATURES

- **Accepts up to 10.7Gbps data**
- **< 45ps edge rate**
- **Gain ≥ 4V/V**
- **CML/PECL differential inputs**
- **CML outputs**
- **Internal 50Ω input termination**
- **Internal 50Ω output load resistors**
- **Available in die or 16-pin (3mm × 3mm) MLF package**

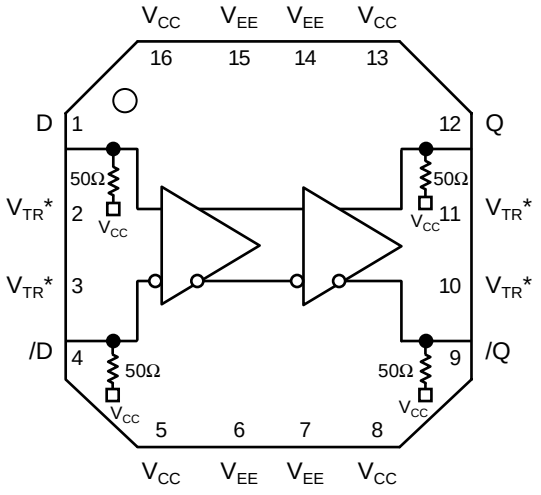
DESCRIPTION

The SY58016L is a high-speed, current mode logic (CML) differential receiver. It is ideal for interfacing with high frequency sources. It can be used as Line Receiver, Line Driver and Limiting Amplifier. The device can be operated from DC to 10Gbps. The input incorporates internal temination resistors, and directly interfaces to a CML logic signal. The output is CML compatible, and includes 50Ω load resistors.

APPLICATIONS

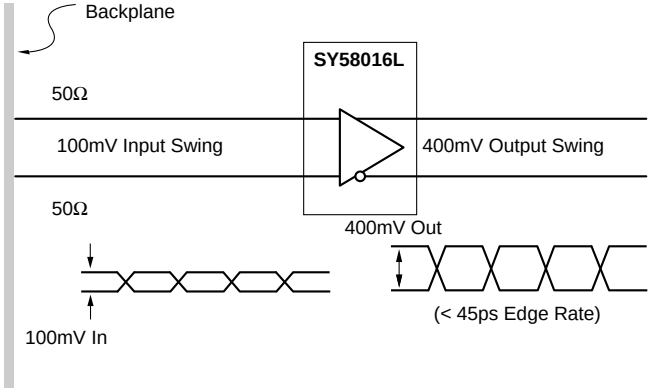
- **Backplane buffering**
- **OC-3/OC-192 SONET clock or data distribution/driver**
- **All GigE clock or data distribution/driver**
- **Fibre Channel distribution/driver**

FUNCTIONAL BLOCK DIAGRAM



*V_{TR} is not connected to the DIE.

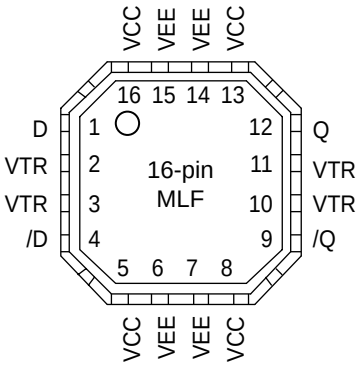
TYPICAL PERFORMANCE



MLF and *Micro*LeadFrame are trademarks of Amkor Technology, Inc.

Rev.: A Amendment: /0
Issue Date: September 2002

PACKAGE/ORDERING INFORMATION



16-Pin MLF
(MLF-16)

Ordering Information

Part Number	Package Type	Operating Range	Package Marking
SY58016LXC	DIE	25°C	—
SY58016LMI	MLF-16	Industrial	016L
SY58016LMITR*	MLF-16	Industrial	016L

*Tape and Reel

PIN DESCRIPTION

Pin Number	Pin Name	Pin Function
1, 4	D, /D	CML, PECL Differential Inputs with internal 50Ω pull-up resistors.
2, 3, 10, 11	VTR	Transmission Line Return: Normally connected to the most positive supply.
6, 7, 14, 15 Exposed pad	VEE	Most Negative Supply. Exposed pad to be at the same electrical potential as VEE pins.
12, 9	Q, /Q	CML Differential Outputs with internal 50Ω pull-up resistors.
5, 8, 13, 16	VCC	Positive Power Supply: +3.3V nominal.

Absolute Maximum Ratings(Note 1)

Supply Voltage $|V_{CC} - V_{EE}|$ ..... +4.0V
Output Voltage (V_{OUT}) ..... Max. V_{CC} +0.5V
..... Min. V_{CC} –1.0V
Maximum Input Current (I_{IN}) .....±25mA
Maximum Output Current (I_{OUT}) .....±25mA
Lead Temperature (Soldering, 10 sec.) ..... 220°C

Operating Ratings(Note 2)

Supply Voltage (V_{IN})
Input Voltage (V_{CC} = 0V) ..... –1.0V to +0.5V
Input Voltage (V_{EE} = 0V) ..... V_{CC} –1.0V to V_{CC} +0.5V
Ambient Temperature (T_A) ..... –40°C to +85°C
Storage Temperature (T_S) ..... –65°C to +150°C
Package Thermal Resistance
MLF (θ_{JA})
Still Air ..... 60°C/W
500lfpm ..... 54°C/W
MLF (Ψ_{JB})(Note 4) ..... 32°C/W

Note 1. Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to ABSOLUTE MAXIMUM RATING conditions for extended periods may affect device reliability.

Note 2. The data sheet limits are not guaranteed if the device is operated beyond the operating ratings.

Note 3. The device is guaranteed to meet the DC specifications, shown in the table above, after thermal equilibrium has been established. The device is tested in a socket such that transverse airflow of ≥500lfpm is maintained.

Note 4. Junction-to-board resistance assumes exposed pad is soldered (or equivalent) to the devices most negative potential on the PCB.

DC ELECTRICAL CHARACTERISTICS

V_{EE} = GND, V_{CC} = +3.3V ±10%

Symbol	Parameter	Condition	Min	Typ	Max	Units
I_{EE}	Power Supply Current		—	50	75	mA
R_{IN}	Input Resistance		40	50	60	Ω
R_{OUT}	Output Source Impedance		40	50	60	Ω
V_{IH}	Input HIGH Voltage		V_{CC}–0.9	—	V_{CC}	V
V_{IL}	Input LOW Voltage		V_{CC}–1.0	—	V_{CC}–0.1	V
V_{OH}	Output HIGH Voltage	**Note 1**	V_{CC}–0.040	V_{CC}–0.010	V_{CC}	V
V_{OL}	Outuput LOW Voltage	**Note 1**	—	V_{CC}–0.400	V_{CC}–0.325	V
$V_{OUT(swing)}$	Output Voltage Swing	**Note 1**	325	400	—	mVp-p

Note 1. 50Ω output load and input swing is more than 100mVp-p. See Figure 1 for Output Swing definition.

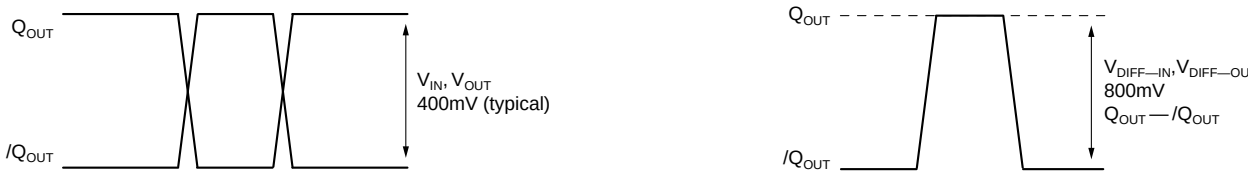


Figure 1. Input/Output Swing

AC ELECTRICAL CHARACTERISTICS

V_{EE} = GND, V_{CC} = +3.3V ±10%

Symbol	Parameter	Condition	Min	Typ	Max	Units
f_{MAX}	Maximum Data Rate		10.7	—	—	Gbps
t_{PLH} t_{PHL}	Propagation Delay		—	100	150	ps
t_{JITTER}	Random Jitter	**Note 1**	—	—	1.5	ps(rms)
	Deterministic Jitter	**Note 2**	—	—	15	ps(pk-pk)
V_{IN}	Minimum Input Swing	**Note 3**	100	—	—	mVp-p
t_r, t_f	Output Rise/Fall Times (20% to 80%)	**Note 4**	—	30	45	ps

Note 1. Measured with a K28.7 comma detect character pattern, measured at 10Gbps. See “Figure 2. Eye Diagram.”

Note 2. Measured with a K28.5 pattern 2^{23}–1 PRBS pattern at 10Gbps.

Note 3. Minimum input swing for which AC parameters are guaranteed. See Figure 1. Reduced input swing will impact maximum data rate and the resulting eye pattern.

Note 4. 50Ω load and input swing is more than 100mVp-p.

EYE DIAGRAM

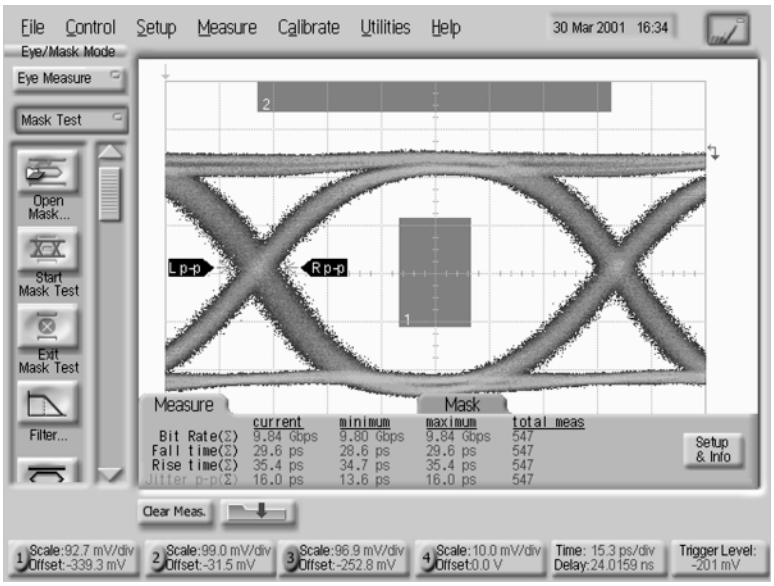
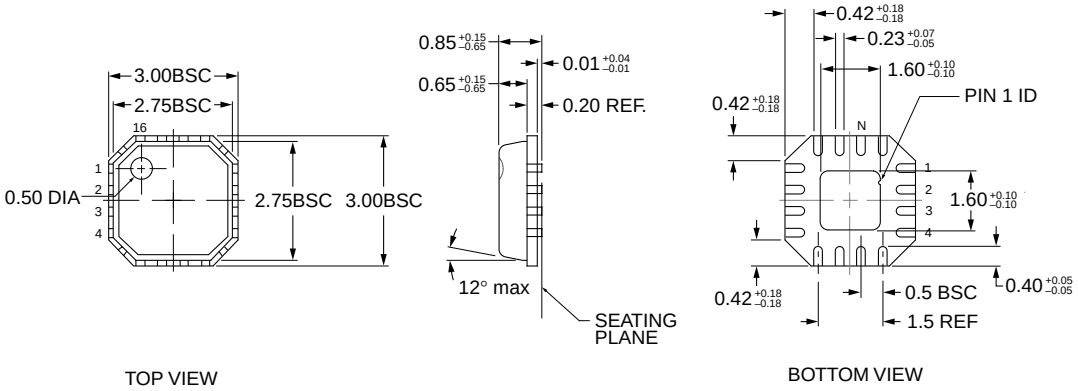


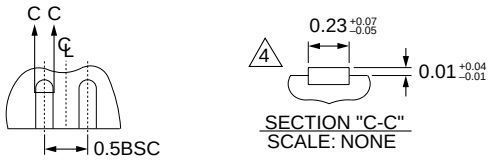
Figure 2. Eye Diagram

16 LEAD *Micro*LeadFrame™ (MLF-16)



TOP VIEW

BOTTOM VIEW



1. DIMENSIONS ARE IN mm.
2. DIE THICKNESS ALLOWABLE IS 0.305mm MAX.
3. PACKAGE WARPAGE MAX 0.05mm.
4. THIS DIMENSION APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.20mm AND 0.25mm FROM TIP.
5. APPLIES ONLY FOR TERMINALS

Package Notes:
1. Package meets Level 2 Moisture Sensitivity Classification and is shipped in Dry-pack form.
2. Expose pad must be soldered to a ground for proper thermal management.

Rev. 02

MICREL, INC. 1849 FORTUNE DRIVE SAN JOSE, CA 95131 USA

TEL + 1 (408) 944-0800 FAX + 1 (408) 944-0970 WEB http://www.micrel.com