

FEATURES

- Guaranteed AC performance over temperature and voltage:
 - DC to 5Gbps data throughput
 - DC to > 4GHz f_{MAX} (clock)
 - < 260ps propagation delay
 - < 110ps t_r / t_f times
- Ultra-low crosstalk-induced jitter: 0.7ps_{RMS}
- Ultra-low jitter design:
 - < 1ps_{RMS} random jitter
 - < 10ps_{PP} deterministic jitter
 - < 10ps_{PP} total jitter (clock)
- Unique input termination and V_T pin accepts DC- and AC-coupled inputs (CML, PECL, LVDS)
- 800mV (100k) LVPECL output swing
- Power supply 2.5V ±5% or 3.3V ±10%
- –40°C to +85°C temperature range
- Available in 16-pin (3mm × 3mm) MLF® package



Precision Edge®

DESCRIPTION

The SY58018U is a 2.5V/3.3V precision, high-speed, 2:1 differential MUX capable of handling clocks up to 4GHz and data up to 5Gbps.

The differential input includes Micrel's unique, 3-pin input termination architecture that allows customers to interface to any differential signal (AC- or DC-coupled) as small as 100mV without any level shifting or termination resistor networks in the signal path. The outputs are 800mV, 100k compatible, LVPECL, with extremely fast rise/fall times guaranteed to be less than 110ps.

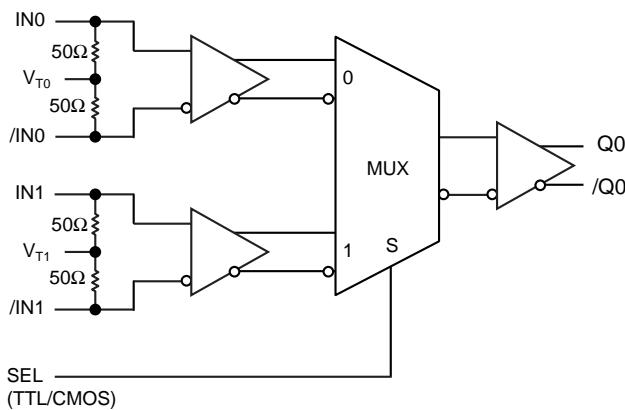
The SY58018U operates from a 2.5V ±5% supply or a 3.3V ±10% supply and is guaranteed over the full industrial temperature range of –40°C to +85°C. For applications that require CML outputs, consider the SY58017U or for 400mV LVPECL outputs the SY58019U. The SY58018U is part of Micrel's high-speed, Precision Edge® product line.

All support documentation can be found on Micrel's web site at www.micrel.com.

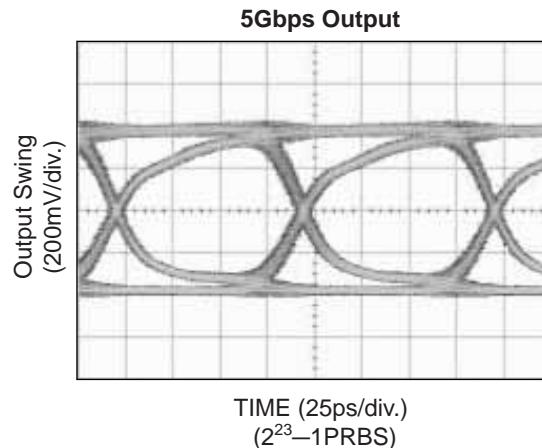
APPLICATIONS

- Redundant clock distribution
- SONET/SDH clock/data distribution
- Loopback
- Fibre Channel distribution

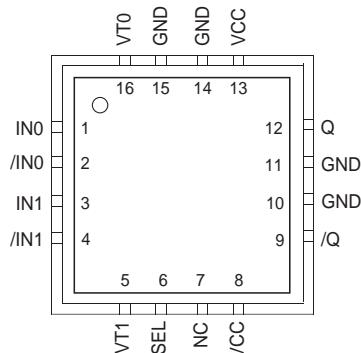
FUNCTIONAL BLOCK DIAGRAM



TYPICAL PERFORMANCE



PACKAGE/ORDERING INFORMATION

Ordering Information⁽¹⁾

16-Pin MLF®

| Part Number | Package Type | Operating Range | Package Marking | Lead Finish |
|--------------------------------|--------------|-----------------|--------------------------------------|----------------|
| SY58018UMI | MLF-16 | Industrial | 018U | Sn-Pb |
| SY58018UMITR ⁽²⁾ | MLF-16 | Industrial | 018U | Sn-Pb |
| SY58018UMG ⁽³⁾ | MLF-16 | Industrial | 018U with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY58018UMGTR ^(2, 3) | MLF-16 | Industrial | 018U with Pb-Free bar-line indicator | Pb-Free NiPdAu |

Notes:

1. Contact factory for die availability. Dice are guaranteed at $T_A = 25^\circ\text{C}$, DC electricals only.
2. Tape and Reel.
3. Pb-Free package recommended for new designs.

PIN DESCRIPTION

| Pin Number | Pin Name | Pin Function |
|----------------|------------------------|---|
| 1, 2 3, 4 | IN0, /IN0 IN1, /IN1 | Differential Input: These input pairs are the differential signal inputs to the device. They accept differential AC- or DC-coupled signals as small as 100mV. Each pin of a pair internally terminates to a V_T pin through 50Ω. Note that these inputs will default to an indeterminate state if left open. Please refer to the "Input Interface Applications" section for more details. |
| 16, 5 | VT0, VT1 | Input Termination Center-Tap: Each side of the differential input pair terminates to a V_T pin. The V_{T0} and V_{T1} pins provide a center-tap to a termination network for maximum interface flexibility. See "Input Interface Applications" section for more details. |
| 6 | SEL | This single-ended TTL/CMOS compatible input selects the inputs to the multiplexer. Note that this input is internally connected to a 25kΩ pull-up resistor and will default to a logic HIGH state if left open. |
| 7 | NC | No connect. |
| 8, 13 | VCC | Positive Power Supply: Bypass with 0.1μF/0.01μF low ESR capacitors. 0.01μF capacitor should be as close to V_{CC} pin as possible. |
| 12, 9 | Q, /Q | Differential Outputs: This 100k compatible LVPECL output pair is the output of the device. Normally terminate with 50Ω to $V_{CC} - 2V$. See "Output Interface Applications" section. It is a logic function of the IN0, IN1, and SEL inputs. Please refer to the "Truth Table" for details. |
| 10, 11, 14, 15 | GND, Exposed Pad | Ground. Ground pins and exposed pad must be connected to the same ground plane. |

TRUTH TABLE

| SEL | Output |
|-----|--------------------|
| 0 | CH0 Input Selected |
| 1 | CH1 Input Selected |

Absolute Maximum Ratings⁽¹⁾

| | |
|---|-------------------|
| Power Supply Voltage (V_{CC}) | -0.5V to +4.0V |
| Input Voltage (V_{IN}) | -0.5V to V_{CC} |
| LVPECL Output Current (I_{OUT}) | |
| Continuous | 50mA |
| Surge | 100mA |
| Termination Current ⁽³⁾ | |
| Source or Sink Current on V_T pin | ± 100 mA |
| Input Current | |
| Source or Sink Current on IN, /IN pin | ± 50 mA |
| Lead Temperature (soldering, 20 sec.) | 260°C |
| Storage Temperature Range (T_S) | -65°C to +150°C |

Operating Ratings⁽²⁾

| | |
|---|--------------------|
| Power Supply Voltage (V_{CC}) | +2.375V to +2.625V |
| | +3.0V to +3.6V |
| Ambient Temperature Range (T_A) | -40°C to +85°C |
| Package Thermal Resistance ⁽⁴⁾ | |
| MLF® (θ_{JA}) | 60°C/W |
| Still-Air | |
| MLF® (ψ_{JB}) | |
| Junction-to-Board | 38°C/W |

DC ELECTRICAL CHARACTERISTICS⁽⁵⁾

$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, unless otherwise stated.

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|-------------------|---|--|----------------|------------|----------------|--------|
| V_{CC} | Power Supply Voltage | $V_{CC} = 2.5\text{V}$ $V_{CC} = 3.3\text{V}$ | 2.375 3.0 | 2.5 3.3 | 2.625 3.6 | V V |
| I_{CC} | Power Supply Current | No load, max. V_{CC} | | 50 | 65 | mA |
| R_{DIFF_IN} | Differential Input Resistance (IN0-to-/IN0, IN1-to-/IN1) | | 80 | 100 | 120 | Ω |
| R_{IN} | Input Resistance (IN0-to- V_{T0} , /IN0-to- V_{T0} , IN1-to- V_{T1} , /IN1-to- V_{T1}) | | 40 | 50 | 60 | Ω |
| V_{IH} | Input HIGH Voltage (IN0, /IN0, IN1, /IN1) | Note 6 | $V_{CC} - 1.6$ | | V_{CC} | V |
| V_{IL} | Input LOW Voltage (IN0, /IN0, IN1, /IN1) | | 0 | | $V_{IH} - 0.1$ | V |
| V_{IN} | Input Voltage Swing (IN0, /IN0, IN1, /IN1) | See Figure 1a | 0.1 | | 1.7 | V |
| V_{DIFF_IN} | Differential Input Voltage Swing IN0, /IN0 , IN1, /IN1 | See Figure 1b | 0.2 | | | V |
| $V_{T\text{ IN}}$ | IN to V_T (IN0, /IN0, IN1, /IN1) | | | | 1.28 | V |

Notes:

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 ratings conditions for extended periods may affect device reliability.
2. The data sheet limits are not guaranteed if the device is operated beyond the operating ratings.
3. Due to the limited drive capability, use for input of the same package only.
4. Package thermal resistance assumes exposed pad is soldered (or equivalent) to the device's most negative potential (GND) on the PCB. ψ_{JB} uses 4-layer θ_{JA} in still-air number, unless otherwise stated.
5. The circuit is designed to meet the DC specifications shown in the above table after thermal equilibrium has been established.
6. V_{IH} (min) not lower than 1.2V.

LVPECL OUTPUT DC ELECTRICAL CHARACTERISTICS⁽⁷⁾

$V_{CC} = 2.5V \pm 5\%$ or $3.3V \pm 10\%$; $T_A = -40^\circ C$ to $+85^\circ C$; $R_L = 50\Omega$ to $V_{CC}-2V$, unless otherwise stated.

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|-----------------|--|---------------|----------------|------|----------------|-------|
| V_{OH} | Output HIGH Voltage $Q, /Q$ | | $V_{CC}-1.145$ | | $V_{CC}-0.895$ | V |
| V_{OL} | Output LOW Voltage $Q, /Q$ | | $V_{CC}-1.945$ | | $V_{CC}-1.695$ | V |
| V_{OUT} | Output Differential Swing $Q, /Q$ | See Figure 1a | 550 | 800 | | mV |
| V_{DIFF_OUT} | Differential Output Voltage Swing $Q, /Q$ | See Figure 1b | 1100 | 1600 | | mV |

LVTTL/CMOS DC ELECTRICAL CHARACTERISTICS⁽⁷⁾

$V_{CC} = 2.5V \pm 5\%$ or $3.3V \pm 10\%$; $T_A = -40^\circ C$ to $85^\circ C$

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|----------|--------------------|-----------|------|-----|-----|---------|
| V_{IH} | Input HIGH Voltage | | 2.0 | | | V |
| V_{IL} | Input LOW Voltage | | | | 0.8 | V |
| I_{IH} | Input HIGH Current | | | | 40 | μA |
| I_{IL} | Input LOW Current | | -300 | | | μA |

Note:

7. The circuit is designed to meet the DC specifications shown in the above table after thermal equilibrium has been established.

AC ELECTRICAL CHARACTERISTICS⁽⁸⁾

$V_{CC} = 2.5V \pm 5\%$ or $3.3V \pm 10\%$; $T_A = -40^\circ C$ to $85^\circ C$, $R_L = 50\Omega$ to $V_{CC} - 2V$, unless otherwise stated.

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|-----------------|---|---------------------------|-----------|------------|------------|-------------------|
| f_{MAX} | Maximum Operating Frequency | NRZ Data | 5 | | | Gbps |
| | | $V_{OUT} \geq 400mV$ | Clock | 4 | | GHz |
| t_{pd} | Differential Propagation Delay (IN0 or IN1-to-Q) (SEL-to-Q) | | 110 50 | 190 180 | 240 350 | ps ps |
| t_{pd} Tempco | Differential Propagation Delay Temperature Coefficient | | | 75 | | fs/°C |
| t_{SKEW} | Input-to-Input Skew | Note 9 | | 4 | 15 | ps |
| | Part-to-Part Skew | Note 10 | | | 100 | ps |
| t_{JITTER} | Data Random Jitter | Note 11 | | | 1 | ps _{RMS} |
| | Deterministic Jitter | Note 12 | | | 10 | ps _{PP} |
| | Clock Cycle-to-Cycle Jitter | Note 13 | | | 1 | ps _{RMS} |
| | Total Jitter | Note 14 | | | 10 | ps _{PP} |
| | Crosstalk-Induced Jitter | Note 15 | | | 0.7 | ps _{RMS} |
| t_r, t_f | Output Rise/Fall Time | 20% to 80%, at full swing | 35 | 75 | 110 | ps |

Notes:

8. High frequency AC parameters are guaranteed by design and characterization.
9. Input-to-input skew is the difference in time from and input-to-output in comparison to any other input-to-output. In addition, the input-to-input skew does not include the output skew.
10. Part-to-part skew is defined for two parts with identical power supply voltages at the same temperature and with no skew of the edges at the respective inputs.
11. RJ is measured with a K28.7 comma detect character pattern, measured at 10.7Gbps and 2.5Gbps/3.2Gbps.
12. DJ is measured at 2.5Gbps/3.2Gbps, with both K28.5 and $2^{23} - 1$ PRBS pattern.
13. Cycle-to-cycle jitter definition: the variation of periods between adjacent cycles, $T_n - T_{n-1}$ where T is the time between rising edges of the output signal.
14. Total jitter definition: with an ideal clock input of frequency - f_{MAX} no more than one output edge in 10^{12} output edges will deviate by more than the specified peak-to-peak jitter value.
15. Crosstalk is measured at the output while applying two similar frequencies that are asynchronous with respect to each other at the inputs.

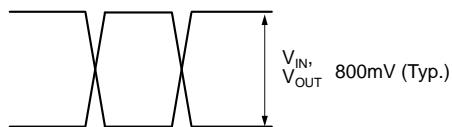
SINGLE-ENDED AND DIFFERENTIAL SWINGS

Figure 1a. Single-Ended Voltage Swing

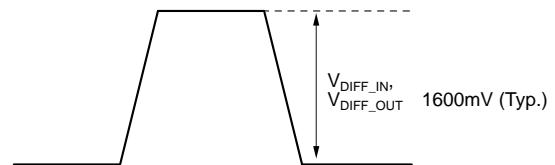
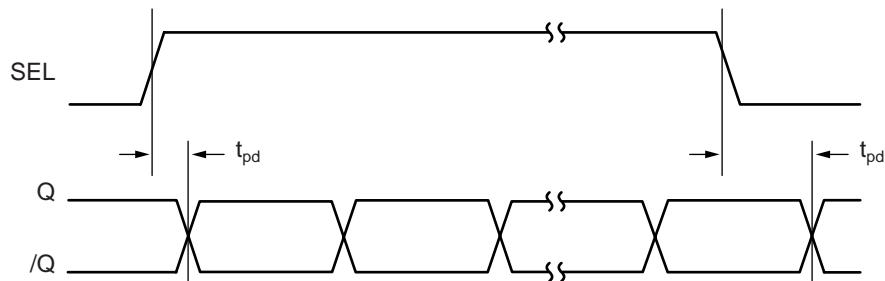
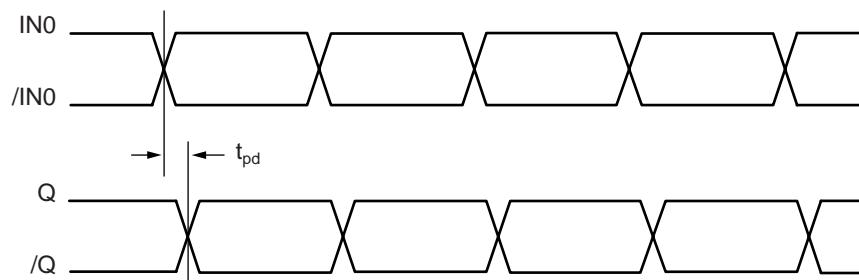
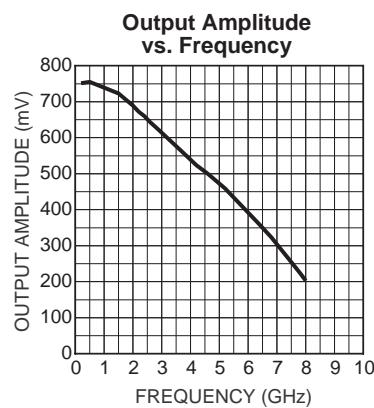
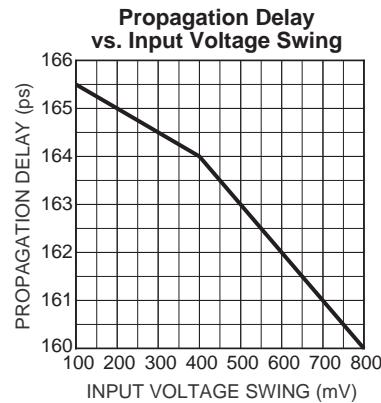
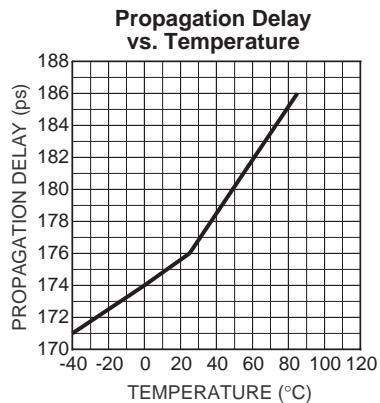


Figure 1b. Differential Voltage Swing

TIMING DIAGRAMS

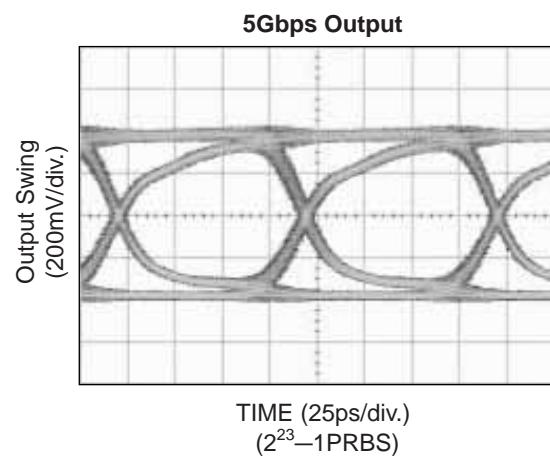
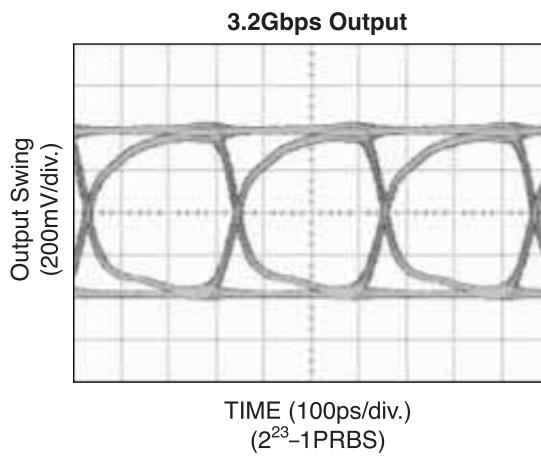
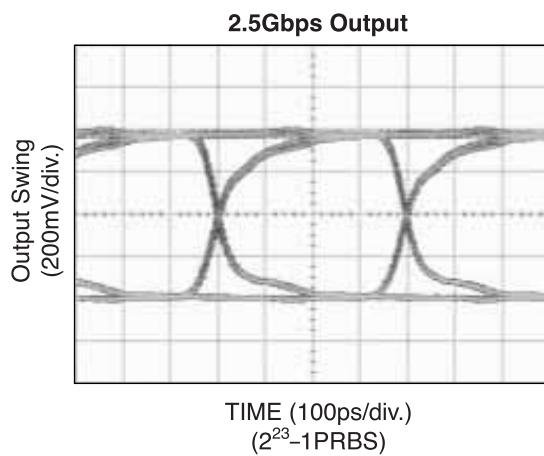
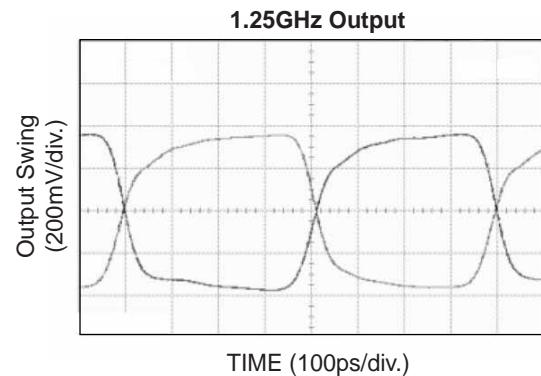
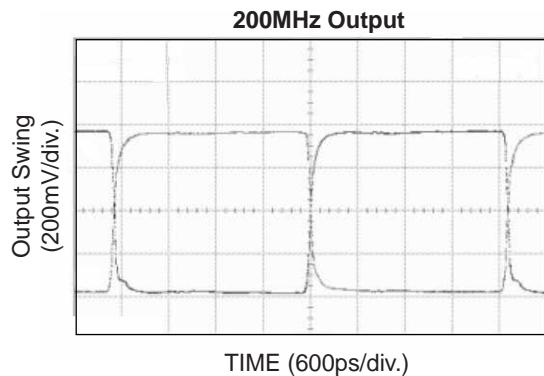
TYPICAL OPERATING CHARACTERISTICS

$V_{CC} = 3.3V$, $V_{IN} = 100mV$, $T_A = 25^\circ C$, unless otherwise stated.



TYPICAL OPERATING CHARACTERISTICS

$V_{CC} = 3.3V$, $V_{IN} = 100mV$, $T_A = 25^\circ C$, unless otherwise stated.



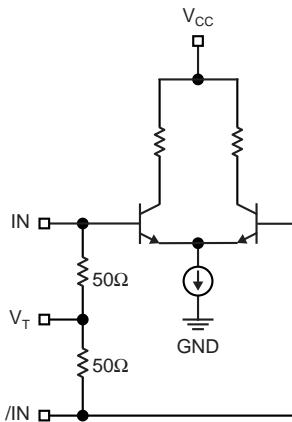
INPUT AND OUTPUT STAGES

Figure 2a. Simplified Differential Input Stage

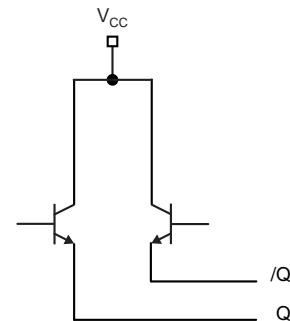


Figure 2b. Simplified LVPECL Output Stage

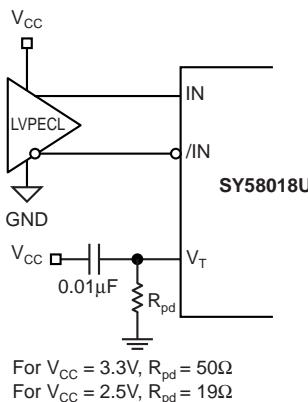
INPUT INTERFACE APPLICATIONS

Figure 3a. DC-Coupled LVPECL Interface

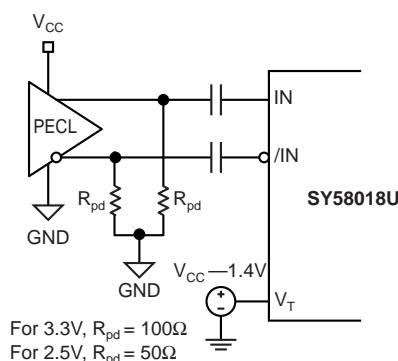


Figure 3b. AC-Coupled LVPECL Interface

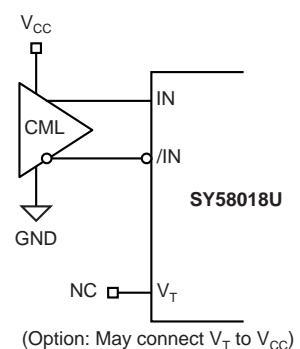


Figure 3c. DC-Coupled CML Interface

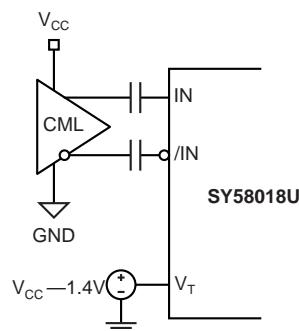


Figure 3d. AC-Coupled CML Interface

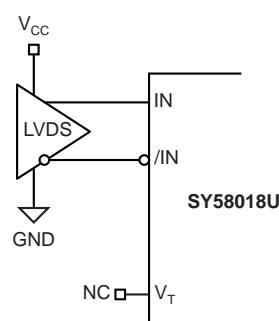


Figure 3e. LVDS Interface

OUTPUT INTERFACE APPLICATIONS

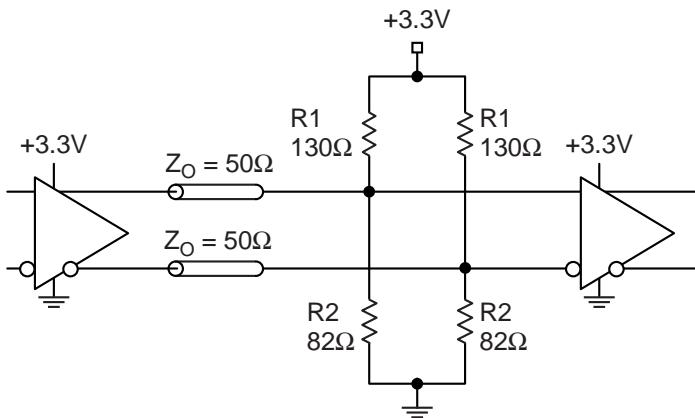


Figure 4a. Parallel Thevenin-Equivalent Termination

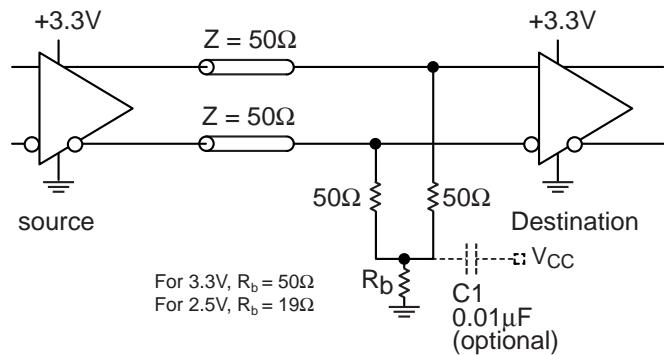


Figure 4b. Three-Resistor "Y" Termination

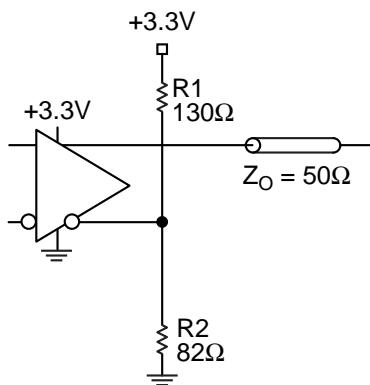
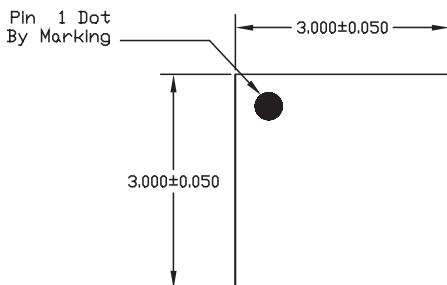


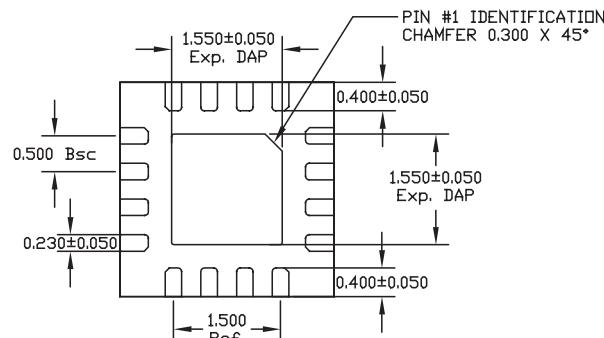
Figure 4c. Terminating Unused I/O

RELATED MICREL PRODUCTS AND SUPPORT DOCUMENTATION

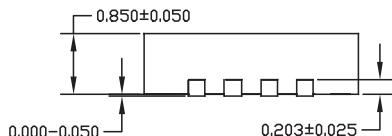
| Part Number | Function | Data Sheet Link |
|---------------|---|--|
| SY58016L | 3.3V 10Gbps Differential CML Line Driver/Receiver with Internal I/O Termination | http://www.micrel.com/product-info/products/sy58016l.shtml |
| SY58017U | Ultra Precision Differential CML 2:1 Mux with Internal I/O Termination | http://www.micrel.com/product-info/products/sy58017u.shtml |
| SY58019U | Ultra Precision Differential 400mV LVPECL 2:1 MUX with Internal Termination | http://www.micrel.com/product-info/products/sy58019u.shtml |
| SY58025U | 10.7Gbps Dual 2:1 CML MUX with Internal I/O Termination | http://www.micrel.com/product-info/products/sy58025u.shtml |
| SY58026U | 5Gbps Dual 2:1 MUX with Internal Termination | http://www.micrel.com/product-info/products/sy58026u.shtml |
| SY58027U | 10.7Gbps Dual 2:1 400mV LVPECL MUX with Internal Termination | http://www.micrel.com/product-info/products/sy58027u.shtml |
| SY58051U | 10.7Gbps AnyGate® with Internal Input and Output Termination | http://www.micrel.com/product-info/products/sy58051u.shtml |
| SY58052U | 10Gbps Clock/Data Retimer with 50Ω Input Termination | http://www.micrel.com/product-info/products/sy58052u.shtml |
| | MLF® Application Note | www.amkor.com/products/notes_papers/MLF_AppNote_0902.pdf |
| HBW Solutions | New Products and Applications | www.micrel.com/product-info/products/solutions.shtml |

16-PIN MicroLeadFrame® (MLF-16)

TOP VIEW



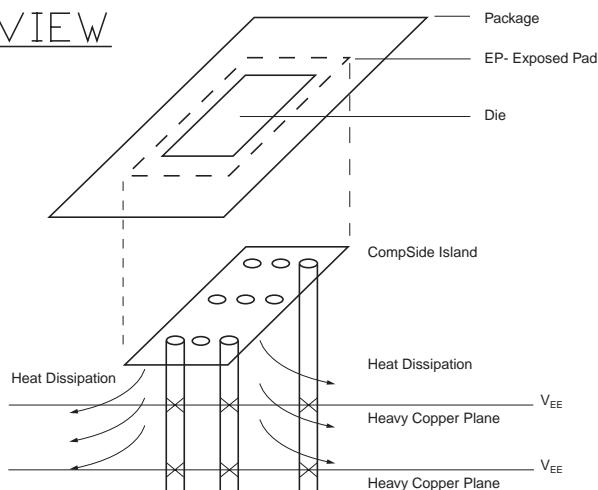
BOTTOM VIEW



SIDE VIEW

NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. MAX. PACKAGE WARPAGE IS 0.05 mm.
3. MAXIMUM ALLOWABLE BURRS IS 0.076 mm IN ALL DIRECTIONS.
4. PIN #1 ID ON TOP WILL BE LASER/INK MARKED.

**PCB Thermal Consideration for 16-Pin MLF® Package
(Always solder, or equivalent, the exposed pad to the PCB)****Package Notes:**

1. Package meets Level 2 qualification.
2. All parts are dry-packaged before shipment.
3. Exposed pads must be soldered to a ground for proper thermal management.

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USATEL + 1 (408) 944-0800 FAX + 1 (408) 474-1000 WEB <http://www.micrel.com>

The information furnished by Micrel in this data sheet is believed to be accurate and reliable. However, no responsibility is assumed by Micrel for its use. Micrel reserves the right to change circuitry and specifications at any time without notification to the customer.

Micrel Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of Micrel Products for use in life support appliances, devices or systems is at Purchaser's own risk and Purchaser agrees to fully indemnify Micrel for any damages resulting from such use or sale.

© 2005 Micrel, Incorporated.

ООО "ЛайфЭлектроникс"

"LifeElectronics" LLC

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибуторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибуторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помочь разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)
Email: org@lifeelectronics.ru