



Ultra-Precision 1:8 LVDS and LVPECL Fanout w/ Three $\div 1/\div 2/\div 4$ Clock Divider Output Banks

SY89200/202U Evaluation Board

General Description

The SY89200U and SY89202U evaluation boards are designed for convenient setup and quick evaluation of the respective devices. They allow the user to evaluate the part over the full voltage-range without requiring any modifications to the board.

The evaluation board standard configuration is AC-coupled for direct interface to a 50 Ω compatible oscilloscope without split supplies. For applications that require a DC-coupled configuration, step-by-step instructions for modifying the board are included.

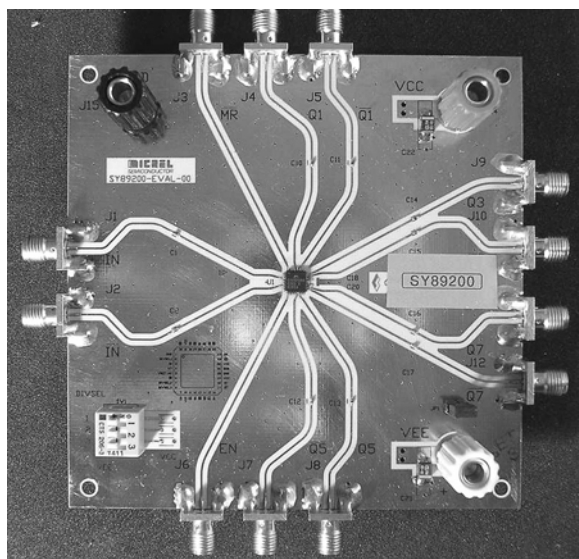
Features

- SY89200U LVDS outputs
- SY89202U LVPECL outputs
- Single +2.5V power supply (SY89200U)
- Single +2.5V or +3.3V power supply (SY89202U)
- AC-coupled configuration for ease-of-use
- I/O interface includes on-board termination
- Fully assembled and tested
- Reconfigurable for DC-coupled operation

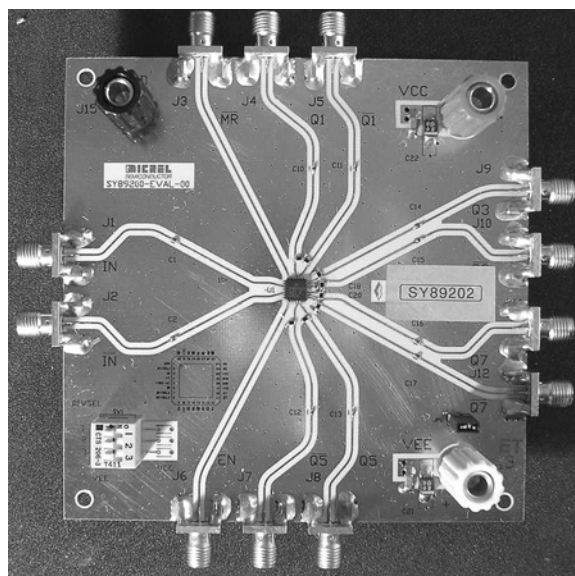
Related Documentation

- SY89200U, Ultra-Precision 1:8 LVDS Fanout with Three $\div 1/\div 2/\div 4$ Clock Divider Output Banks Data Sheet
- SY89202U, Ultra-Precision 1:8 LVPECL Fanout with Three $\div 1/\div 2/\div 4$ Clock Divider Output Banks Data Sheet

Evaluation Board



SY89200U AC-Coupled Evaluation Board



SY89202U AC-Coupled Evaluation Board

Evaluation Board Description

The SY89200U and SY89202U share a common evaluation board. The individual evaluation boards are labeled to identify the specific device and the configuration, either AC- or DC-coupled configuration, for that board. The SY89200U is an LVDS-output evaluation board and the SY89202U is an LVPECL-output evaluation board.

The default configuration for the boards is the AC-coupled configuration and all boards are shipped with this configuration. The choice between two configurations offers the user flexibility in selecting the board that is right for his particular application.

AC-Coupled Evaluation Board

The AC-coupled configuration is suited to most customer applications and is preferred by the majority of users because of its ease-of-use. It requires only a single power supply of either +2.5V $\pm 5\%$ for the SY89200U and +2.5V $\pm 5\%$ or +3.3V $\pm 10\%$ for the SY89202U and offers the most flexibility in interfacing to a variety of signal sources.

The AC-coupling capacitors are supplied on-board for each input, making it unnecessary to vary the offset voltage or change any components on the board as the power supply voltage varies. The user needs only to supply a minimum input voltage swing and the bias voltage will automatically adjust the input to the correct level as the power supply voltage varies.

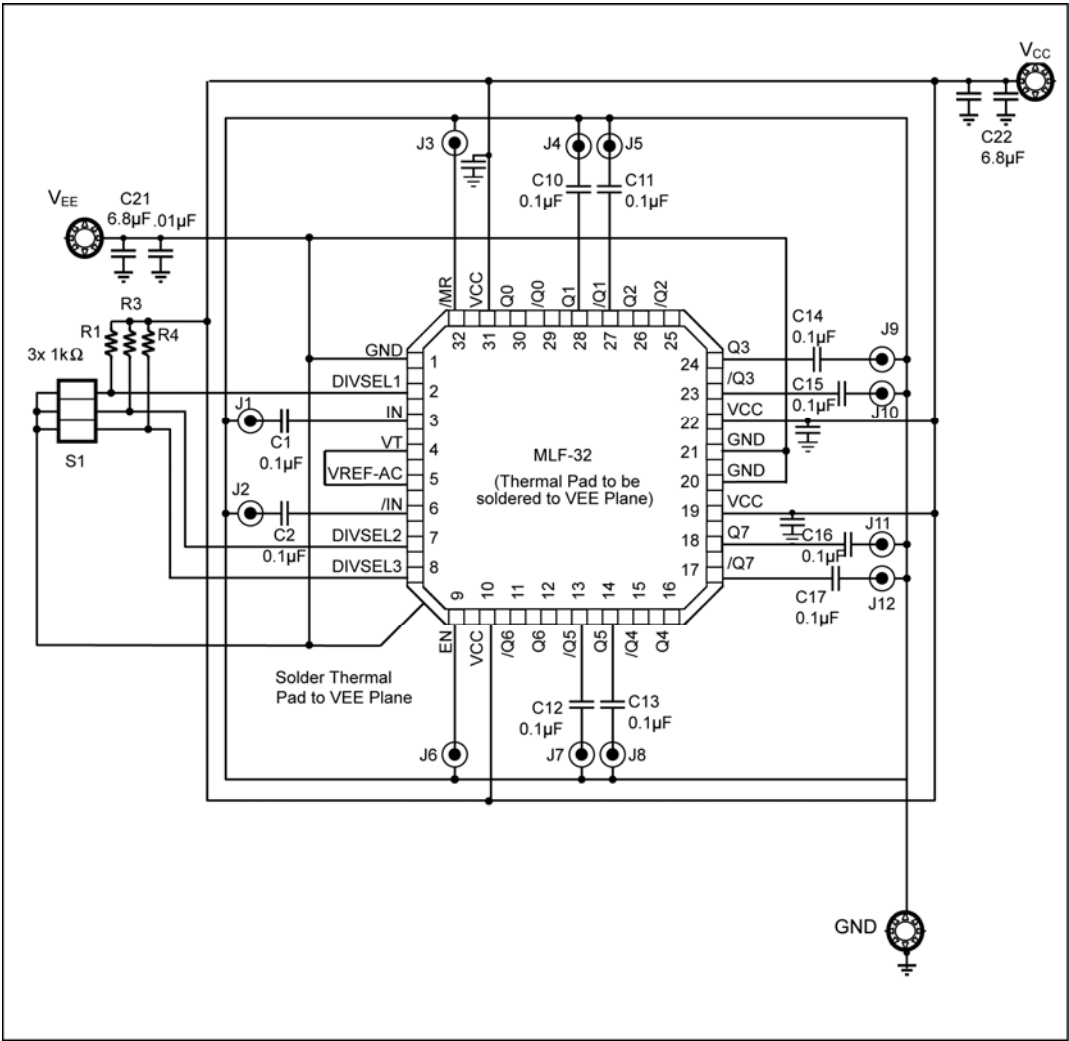
SY89200U DC-Coupled Evaluation Boards

For DC-coupled operation, the board can be modified to use two power supplies in a “split-supply configuration.” The term split-supply simply means the +2.5V supply that is split into a +1.2V and $-1.3V$ power supply configuration. This effectively offsets the board by +1.2V. The +1.2V offset in this two-power supply configuration then provides the correct terminations for the device by setting the ground potential on the board to be exactly 1.2 volts below the V_{CC} supply. The V_{EE} voltage is then set to $-1.3V$ so the device power pins still see a full 2.5V potential between V_{CC} and V_{EE} .

SY89202U DC-Coupled Boards

For DC-coupled operation, the boards can be modified to use two power supplies in a “split-supply configuration”. The term split-supply simply means the +3.3V supply is split into a +2V and $-1.3V$, or for a +2.5V supply it is split into a +2V and $-0.5V$ power supply configuration. This effectively offsets the board by +2V. The +2V offset in this two-power supply configuration then provides the correct terminations for the device by setting the Ground potential on the board to be exactly 2 volts below the V_{CC} supply. The V_{EE} voltage is then set to $-1.3V$ for 3.3V devices or $-0.5V$ for 2.5V devices so the device power pins still see a full 3.3V or 2.5V potential between V_{CC} and V_{EE} . Step-by-step instructions for modifying an AC-coupled evaluation board for DC-coupled operation are supplied in the section “Modifying your AC-Coupled Board for DC-Coupled Operation.”

Evaluation Board

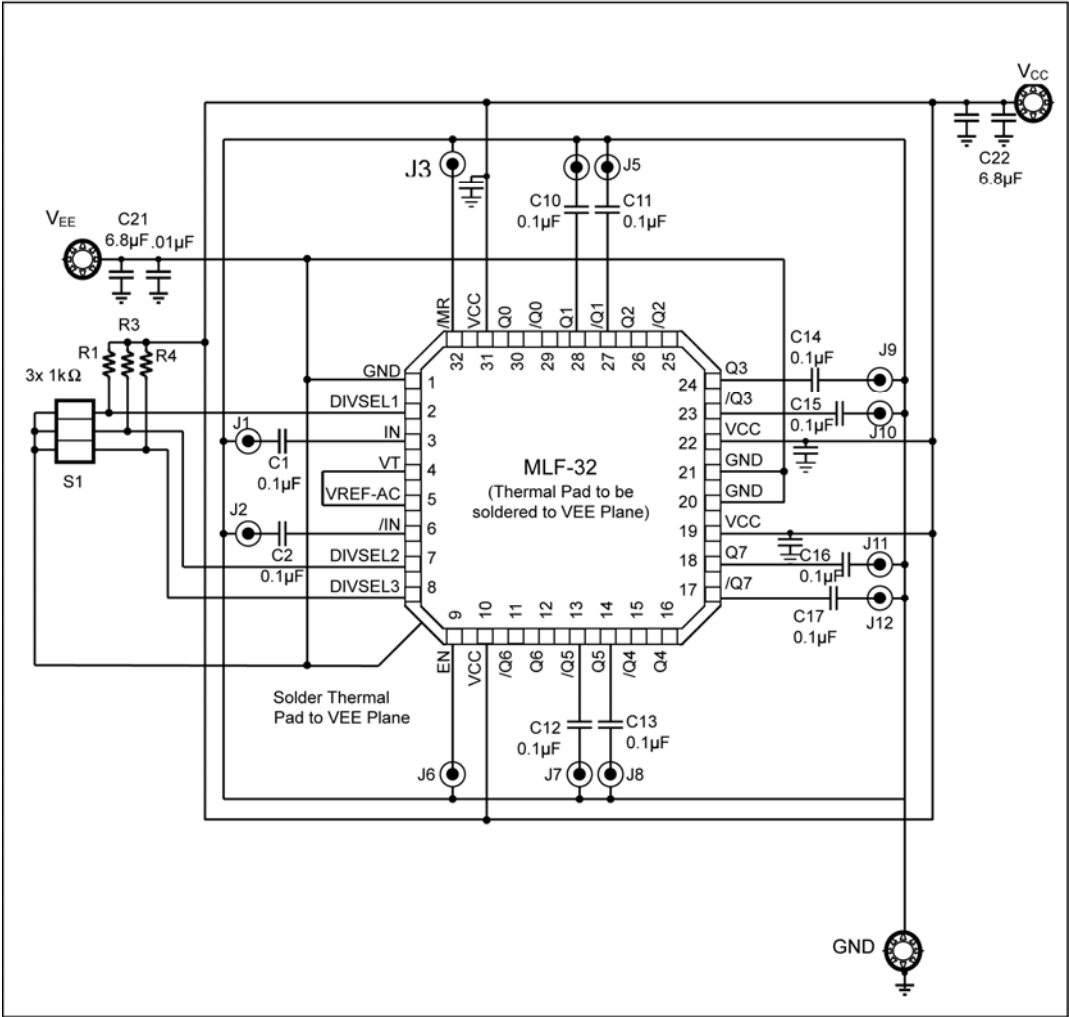


SY89200U AC-Coupled Evaluation Board

Power Supply	V _{CC}	GND	V _{EE}	I/O
2.5 Volt System	+2.5V	0V	0V	AC-Coupled Input/AC-Coupled Output

Table 1. SY89200U AC-Coupled Evaluation Board Power Supply Connections

Evaluation Board



SY89202U AC-Coupled Evaluation Board

Power Supply	V _{CC}	GND	V _{EE}	I/O
2.5 Volt System	+2.5V	0V	0V	AC-Coupled Input/AC-Coupled Output
3.3 Volt System	+3.3V	0V	0V	AC-Coupled Input/AC-Coupled Output

Table 2. SY89202U AC-Coupled Evaluation Board Power Supply Connection

AC-Coupled Evaluation Board Setup

Setting up the SY89200U AC-Coupled Evaluation Board

The following steps describe the procedure for setting up the LVDS output evaluation board:

1. Set the voltage setting for a DC supply to be 2.5V and turn off the supply.
2. On the evaluation board short the GND terminal to the V_{EE} terminal and connect them to the negative side of the DC power supply.
3. Connect the V_{CC} terminal to the positive side of the DC power supply.
4. Turn on the power supply and verify that the power supply current is <300mA.
5. Turn off the power supply.
6. Using a differential signal source, set the amplitude of each side of the differential pair to be 800mV (1600mV measured differentially). Set the offset to be a negative value; the value of this offset is not critical, as the AC-coupled inputs will be automatically biased to the correct offset. Turn off, or disable the outputs of the signal source.
7. Using equal length 50 Ω impedance coaxial cables, connect the signal source to the SMA inputs on the evaluation board (Pin 3 and Pin 6).
8. Using equal length 50 Ω impedance coaxial cables, connect the SMA outputs of the evaluation board (Q1, Q3, Q5, or Q7) to the oscilloscope or other measurement device that has an internal 50 Ω termination.
9. Turn on the power and verify the current is <300mA.
10. Enable the signal source and monitor the outputs.

Setting up the SY89202U AC-Coupled Evaluation Board

The following steps describe the procedure for setting up the LVPECL-output evaluation boards:

1. Set the voltage setting for a DC supply to be either 2.5V or 3.3V, depending on your application, and turn off the supply.
2. On the evaluation board short the GND terminal to the V_{EE} terminal and connect them to the negative side of the DC power supply.
3. Connect the V_{CC} terminal to the positive side of the DC power supply.
4. Turn on the power supply and verify that the power supply current is <300mA.
5. Turn off the power supply.
6. Using a differential signal source, set the amplitude of each side of the differential pair to be 800mV (1600mV measured differentially). Set the offset to be a negative value, the value of this offset is not critical, as the AC-coupled inputs will be automatically biased to the correct offset. Turn off, or disable the outputs of the signal source.
7. Using (2) equal length 50 Ω impedance coaxial cables, connect the signal source to the SMA inputs on the evaluation board (Pin 3 and Pin 6).
8. Using equal length 50 Ω impedance coaxial cables, connect the SMA outputs of the evaluation board (Q1, Q3, Q5, or Q7) to the oscilloscope or other measurement device that has an internal 50 Ω termination.
9. Turn on the power and verify the current is <300mA.
10. Enable the signal source and monitor the outputs.

Bill of Materials

SY89200U Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C3, C5, C7, C8, C10-C19	VJ0402Y104KXXAT	Vishay ⁽¹⁾	0.1 μ F, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	16
C4, C6, C9, C20	VJ0402Y103KXXAT	Vishay ⁽¹⁾	0.01 μ F, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	4
C21, C22	293D685X0010	Vishay ⁽¹⁾	6.8 μ F, 20V, Tantalum Electrolytic Capacitor, Size B	2
R1, R3, R4	CRCW0402102F	Vishay ⁽¹⁾	1k Ω , 1/16W, 5% Thick-film Resistor, Size 0603	3
R2	CRCW040200R0F	Vishay ⁽¹⁾	0 Ω , 1/16W, 5% Thick-film Resistor, Size 0402	1
J1 – J12	142-0701-851	Johnson Components ⁽²⁾	Jack Assembly End Launch SMA	12
J13	111-0703-001	Johnson Components ⁽²⁾	Banana Post, Black	1
J14	111-0702-001	Johnson Components ⁽²⁾	Banana Post, Red	1
J15	111-0704-001	Johnson Components ⁽²⁾	Banana Post, Green	1
U1	SY89200U	Micrel ⁽³⁾	Ultra-Precision 1:8 LVDS Divider/Fanout Buffer	1
PCB	SY89200-EVAL-00	Circuit Spectrum, Inc.	Printed Circuit Board	1

SY89202U Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C3, C5, C7, C8, C10-C19	VJ0402Y104KXXAT	Vishay ⁽¹⁾	0.1 μ F, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	16
C4, C6, C9, C20	VJ0402Y103KXXAT	Vishay ⁽¹⁾	0.01 μ F, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	4
C21, C22	293D685X0010	Vishay ⁽¹⁾	6.8 μ F, 20V, Tantalum Electrolytic Capacitor, Size B	2
R1, R3, R4	CRCW0402102F	Vishay ⁽¹⁾	1k Ω , 1/16W, 5% Thick-film Resistor, Size 0603	3
R2	CRCW040200R0F	Vishay ⁽¹⁾	0 Ω , 1/16W, 5% Thick-film Resistor, Size 0402	1
R5 – R12	CRCW0402820F	Vishay ⁽¹⁾	82 Ω , 1/16W, 5% Thick-film Resistor, Size 0603	8
J1 – J12	142-0701-851	Johnson Components ⁽²⁾	Jack Assembly End Launch SMA	12
J13	111-0703-001	Johnson Components ⁽²⁾	Banana Post, Black	1
J14	111-0702-001	Johnson Components ⁽²⁾	Banana Post, Red	1
J15	111-0704-001	Johnson Components ⁽²⁾	Banana Post, Green	1
U1	SY89202U	Micrel ⁽³⁾	Ultra-Precision 1:8 LVPECL Divider/Fanout Buffer	1
PCB	SY89200-EVAL-00	Circuit Spectrum, Inc.	Printed Circuit Board	1

Notes:

1. Vishay: www.vishay.com
2. Johnson Components: www.johnsoncomponents.com
3. Micrel, Inc.: www.micrel.com

Evaluation Board Layout

PC Board Layout

The evaluation boards are constructed with Rogers 4003 material and are coplanar in design fabricated to minimize noise, achieve high bandwidth and minimize crosstalk.

L1	Signal/GND
L2	Impedance GND
L3	V _{CC} Power/V _{EE} Power
L4	Signal/GND

Table 3. Layer Stack

When DC-Coupling is Necessary

For applications where AC-coupling is not appropriate, the board can be reconfigured for DC-coupled output operation. This configuration allows the CML output to be connected directly to a scope with the standard termination of 50Ω to ground.

SY89200U

Reconfiguring an AC-Coupled SY89200U Board into a DC-Coupled Board

The following procedure details the steps for converting an AC-coupled board to a DC-coupled board:

1. Remove JP1 if installed.
2. Replace capacitors C1, C2, C10 – C17 with 0Ω resistors.

Setting up the SY89200U DC-Coupled Evaluation Board

The follow steps describe the procedure for setting up the evaluation board:

1. Set the voltage setting for a DC supply to be +1.2V and turn off the supply.
2. Connect the negative side of the DC supply to the GND terminal on the board.
3. Set the voltage setting for a second DC supply to be 1.3V and turn off the supply. Connect the V_{EE} terminal to the negative side of this second DC power supply and connect the positive side of this supply to the negative (GND) side of the first supply. This allows the SY89200U to see +2.5V at V_{CC} with respect to V_{EE} while setting the GND to 1.2V below V_{CC}. By doing this, the 50Ω termination to GND of the scope appears as a 50Ω termination to V_{CC}–1.2V for the device, which is the desired termination for a LVDS output.

4. Turn on the power supply and verify that the power supply current is <300mA.
5. Turn off the power supply.
6. Using a differential signal source set the amplitude of each side of the differential pair to be 800mV (1600mV measured differentially). Set the offset to be zero, the value of this offset is not critical, as the AC-coupled inputs will be automatically biased to the correct offset. Turn off or disable the outputs of the signal source.
7. Using equal length 50Ω impedance coaxial cables, connect the signal source to the inputs on the evaluation board (IN and /IN).
8. Using equal length 50Ω impedance coaxial cables, connect the outputs of the Evaluation Board (Q1, /Q1, Q3, /Q3, Q5, /Q5, Q7 or /Q7) to the oscilloscope or other measurement device that has an internal 50Ω termination.
9. Turn on the power and verify the current is <300mA.
10. Enable the signal source and monitor the outputs.

SY89202U

Reconfiguring an AC-Coupled SY89202U Board into a DC-Coupled Board

The following procedure details the steps for converting an AC-coupled board to a DC-coupled board:

1. Remove JP1 if installed.
2. Remove output load resistors R5-R12.
3. Replace capacitors C1, C2, C10 – C17 with 0Ω resistors.

Setting up the SY89202U DC-Coupled Evaluation Board

The following steps describe the procedure for setting up the evaluation board:

1. Set the voltage setting for a DC supply to be +2V and turn off the supply.
2. Connect the negative side of the DC supply to the GND terminal on the board.
3. Set the voltage setting for a second DC supply to be 0.5V for a 2.5V configuration (or 1.3V for a 3.3V configuration) and turn off the supply. Connect the V_{EE} terminal to the negative side of this second DC power supply and connect the positive side of this supply to the negative (GND) side of the first supply. This allows the SY89202U to see either +2.5V or +3.3V at V_{CC} with respect to V_{EE} while setting the GND to be 2V below V_{CC} . By doing this, the 50 Ω termination-to-GND of the scope appears as a 50 Ω termination to V_{CC} -2V for the device, which is the desired termination for an LVPECL output.
4. Turn on the power supply and verify that the power supply current is <300mA.
5. Turn off the power supply.
6. Using a differential signal source, set the amplitude of each side of the differential pair to be 800mV (1600mV measured differentially). Set the offset to be zero, the value of this offset is not critical, as the AC-coupled inputs will be automatically biased to the correct offset. Turn off or disable the outputs of the signal source.
7. Using (2) equal length 50 Ω impedance coaxial cables, connect the signal source to the inputs on the evaluation board (IN and /IN).
8. Using equal length 50 Ω impedance coaxial cables, connect the outputs of the evaluation board (Q1, /Q1, Q3, /Q3, Q5, /Q5, Q7 or /Q7) to the oscilloscope or other measurement device that has an internal 50 Ω termination.
9. Turn on the power and verify the current is <300mA.
10. Enable the signal source and monitor the outputs.

Additional Bill of Materials for SY89200U DC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C10–C17	CRCW040200R0F	Vishay ⁽¹⁾	Replace with 0 Ω , 1/16W, 5% Thick-film Resistor, Size 0402, X7R Dielectric	10

Additional Bill of Materials for SY89202U DC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C10–C17	CRCW040200R0F	Vishay ⁽¹⁾	Replace with 0 Ω , 1/16W, 5% Thick-film Resistor, Size 0402, X7R Dielectric	10

Notes:

1. Vishay: www.vishay.com

Micrel Cross Reference

To find an equivalent Micrel part, go to Micrel's website at: <http://www.micrel.com> and follow the steps below:

1. Click on Dynamic Cross Reference
2. Enter competitor's part number in the Dynamic Cross Reference field.
3. To download a PDF version of this information, click on the Cross Reference PDF tab

HBW Support

Hotline: 408-955-1690

Email Support: HBWHelp@micrel.com

Application Hints and Notes

For application notes on high speed termination on PECL and LVPECL products, clock synthesizer products, SONET jitter measurement, and other Bandwidth product go to Micrel Inc., website at <http://www.micrel.com/>. Once in Micrel's website, follow the steps below:

1. Click on "Product Info".
2. In the Applications Information Box, choose "Application Hints and Application Notes."

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