

**MC2046 Family: 1Gb/s Post Amplifier - Last Time Buy Notice**

Mindspeed Technologies is committed to providing its valued customers with cost-effective products that meet high quality standards. To ensure that commitment, Mindspeed from time to time must evaluate the features and cost-effectiveness of its current product lines to ensure that the above goals can be met. It has been determined that the MC2046, 1Gb/s Post Amplifier family, will be discontinued effective immediately. The M02046-14 (3.3V, with CMOS status outputs) and M02046-24 (3.3V, with PECL status outputs) are offered as replacements. An application note with recommendations on how to migrate a MC2046 based design to the M02046-14 is attached.

Mindspeed Part numbers to be discontinued:

M02046-2B01-T	M02046-2B06A-T	M02046-2B-WP-T
M02046-2B03C-T	M02046-2B06-T	M02046-2EVM-P
M02046-2B03-T	M02046-2B-SPBG	M02046-TPEVM

The Mindspeed Americas Distribution Coded part numbers affected are:

MC2046-2CT20	MC2046-2B16AMP	M02046-2EVMP
MC2046-2T20	MC2046-2B16	MC2046-TPEVM
MC2046-2CQ16	M02046-2WAFERSPBG	
MC2046-2Q16	MC2046-2WPDIE	

Mindspeed intends to honor the standard warranty obligation for this product when ordered and delivered in accordance with the following dates:

**Distributor Final Return Date– April 15, 2005**

This is the last day for distributors to return inventory. Inventory purchased on or after **4/15/2005** cannot be returned. Orders are non-cancelable and non-returnable.

**Last Order Date– April 15, 2005**

**Please assess your product needs and place a Last Time Buy order no later than 4/15/2005.**

All orders for the above-mentioned product are non-cancelable and non-returnable. Factory orders are not accepted after this date. All orders will require full manufacturing lead-time and last order date may be accelerated due to inventory constraints.

**Final Ship Date – June 15, 2005**

This is the final ship date. Orders placed in compliance with the above dates must be scheduled for delivery from Mindspeed prior to **6/15/2005**.

**Replacement Devices**

The M02046-14 (3.3V, with CMOS status outputs) and M02046-24 (3.3V, with PECL status outputs) are offered as replacements. An application note with recommendations on how to migrate a MC2046 based design to the M02046 is attached.

Please sign and return the Customer Notification Acknowledgement form to confirm receipt of this notice.

Mindspeed appreciates and values our business relationship and looks forward to your continued interest in its products. While we regret any inconvenience this announcement may cause, we are eager to supply your future product requirements with our world-class quality product lines. If you should have any questions, please call your nearest Mindspeed sales or representative office.

Customer Last Time Buy Notification  
**Acknowledgement Form**  
MC2046: 1Gb/s Post Amplifier

The Customer Last Time Buy Notification letter was received and acknowledged by the undersigned authority.

Name:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print

Title:

\_\_\_\_\_

Company:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Location

Date:

\_\_\_\_\_

Comments/additional requests: \_\_\_\_\_  
\_\_\_\_\_

Thank you for your attention on this matter.  
Please return this form to your Mindspeed sales office or:

Mindspeed Technologies  
Attn: **Roy Schultz**  
Business Operations  
4000 McArthur Blvd M/S E08-812  
Newport Beach, CA 92660

US Fax Number: (949) 579-3330

## M02046

### Application Note: Using the M02046 to Replace the MC2046-2 in an Existing Design

This application note provides recommendations on how to modify the components in an existing design to replace the MC2046-2 with the M02046 in the QSOP package.

The M02046 limiting amplifier was specifically designed to provide an upgrade to existing MC2046 designs. It has better performance and requires lower supply current. Like the MC2046 the M02046 comes in two versions: one with CMOS status and LOS outputs and one with PECL status and LOS outputs. [Table 1](#) provides the cross-reference information for the M02046 versions.

**Table 1. Cross Reference Information**

Status Outputs	MC2046 Part Number	M02046 Part Number
PECL Status Outputs in QSOP16 Package	MC2046-2Q16	M02046-xx
CMOS Status Outputs in QSOP16 Package	MC2046-2CQ16	M02046C-xx
<b>Note:</b> xx represents the revision number. Please contact your local sales office for correct digits.		

Some pin functions of the M02046 differ from the MC2046. However, in an existing layout it should be possible to use the M02046 in place of the MC2046 with only component changes as described in [Table 2](#).

**Table 2. Pin Differences Between the MC2046 and the M02046**

QSOP Pin #	MC2046 Name	M02046 Name	Replacement Strategy
1	CAZ-	ST <sub>SET</sub>	Remove capacitor CAZ and connect a 1% resistor between this pin and Pin 2 (V <sub>CC3</sub> ) to set loss of signal threshold.
2	CAZ+	V <sub>CC3</sub>	Remove capacitor CAZ and connect a 1% resistor between this pin and Pin 1 (ST <sub>SET</sub> ) to set loss of signal threshold.
3	GndA	GND	No Difference
4	D <sub>IN</sub>	D <sub>INP</sub>	MC2046 Data Inputs are high impedance, M02046 Data Inputs are internally terminated with 50Ω to V <sub>TT</sub> . Ensure the TIA driving the M02046 can drive 100Ω differential resistance (The MC2009, MC2010 and M02016 TIAs can drive 100Ω differential resistance). If using a filter between the TIA and the Limit Amp, ensure that it is appropriate when terminated in the 100Ω differential input resistance of the M02046.
5	D <sub>IN</sub>	D <sub>INN</sub>	
6	V <sub>CCA</sub>	NC	There is no bond wire to this pin in the M02046. It is acceptable to connect it to 3.3V or 5V V <sub>CC</sub> or to leave floating.

**Table 2. Pin Differences Between the MC2046 and the M02046**

QSOP Pin #	MC2046 Name	M02046 Name	Replacement Strategy
7	V <sub>REF</sub>	V <sub>CC3</sub>	In typical MC2046 designs, this pin is either resistively or capacitively connected to V <sub>CC</sub> . In 3.3V M02046 applications the resistor or capacitor must be replaced with a 0Ω resistor to the 3.3V supply. In 5V M02046 applications, the resistor or capacitor must be removed so that this pin is floating. Do NOT connect this pin to a 5V supply.
8	JAM	JAM	No difference. Connect to LOS output to disable outputs with loss of signal. It is not necessary to have a pull-down resistor on the LOS output. Leave floating or tie low to not use this feature.
9	STb	LOS	LOS is CMOS only. STb may be CMOS or PECL. To connect LOS to the JAM input, no pull-down resistor is required.
10	ST	ST	No difference, both parts offer a CMOS or PECL variant for this output.
11	GndE	GND	No Difference
12	D <sub>OUTb</sub>	PECLN	No Difference
13	D <sub>OUT</sub>	PECLP	No Difference
14	V <sub>CC</sub> E	V <sub>CC</sub>	No Difference. Power supply. Connect to either +5V or +3.3V.
15	NC	NC	No Difference. No Connect. Leave Floating.
16	V <sub>SET</sub>	I <sub>REF</sub>	In typical MC2046 designs, this pin is resistively connected to ground to set the signal detect threshold. In M02046 designs this pin must be connected to ground through a 12.1kΩ 1% resistor.

Figure 1 is the schematic with recommended component values for the M02046. In bold are the component differences from the recommended MC2046 schematic.

Figure 1. M02046 Schematic Emphasizing Component Changes from a MC2046 design

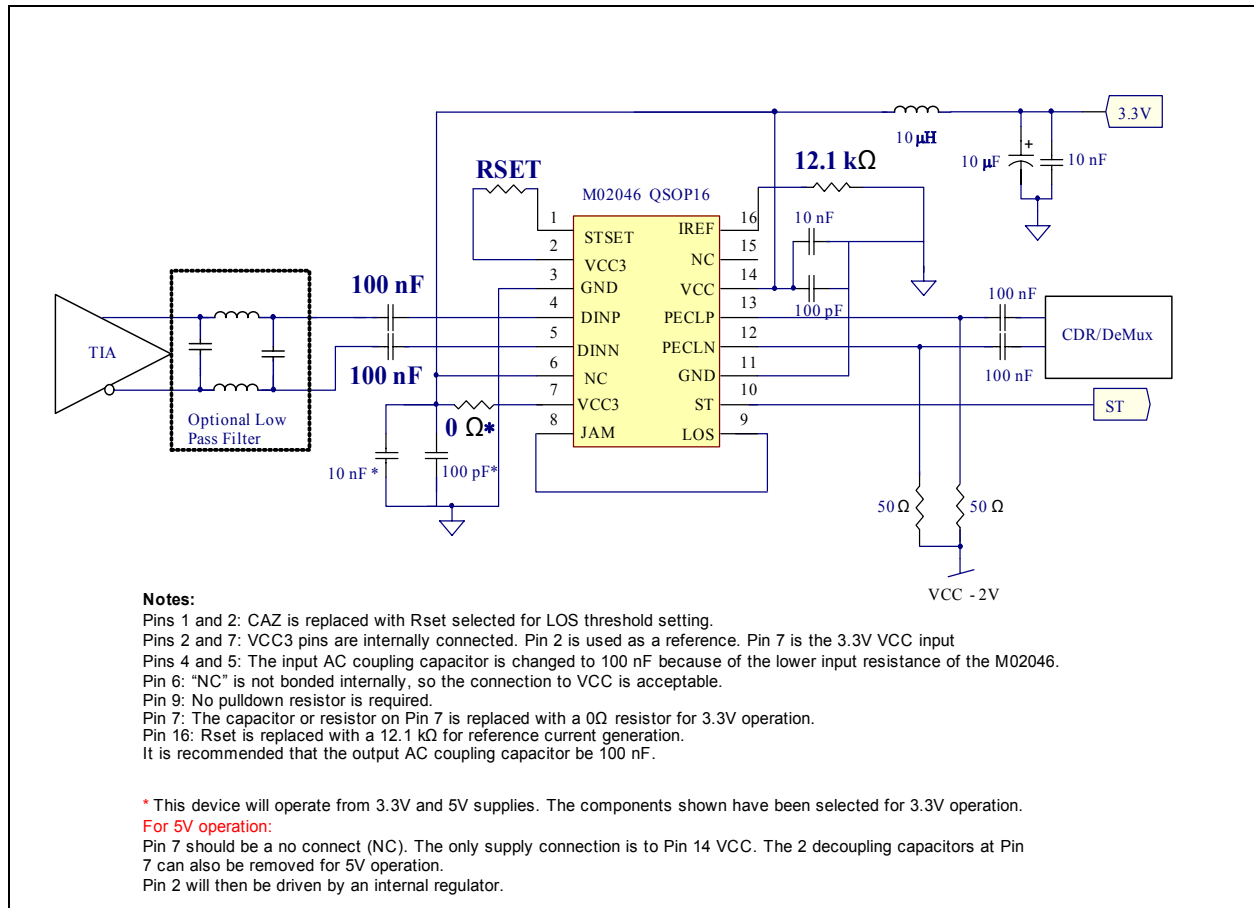
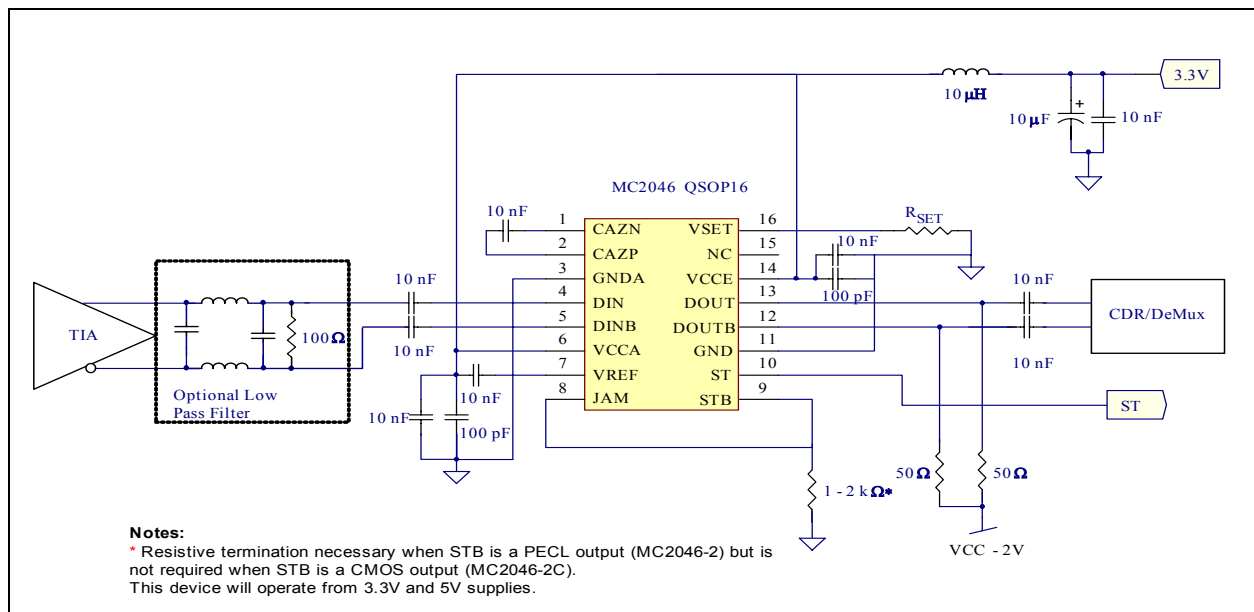


Figure 2. MC2046 Schematic for Comparison with the M02046 Schematic



**Table 3. Key Specifications of the MC2046 and the M02046**

Symbol	Parameter	Conditions	MC2046C			M02046C			Units
			Min	Typ	Max	Min	Typ	Max	
$I_{CC}$	Supply Current	Includes PECL loads	–	70	–	–	52	–	mA
$V_{OUTLpecl}$	PECL Output Low Voltage	Single ended; 50 $\Omega$ load to $V_{CC} - 2V$	$V_{CC} - 1.89$	–	$V_{CC} - 1.55$	$V_{CC} - 1.81$	–	$V_{CC} - 1.62$	V
$V_{OUTHpecl}$	PECL Output High Voltage	Single ended; 50 $\Omega$ load to $V_{CC} - 2V$	$V_{CC} - 1.05$	–	$V_{CC} - 0.88$	$V_{CC} - 1.025$	–	$V_{CC} - 0.88$	V
	Differential Input Resistance	Measured between DINP and DINN	2.8 k	–	9.7 k	85	100	115	$\Omega$
$V_{IN(MIN)}$	Differential Input Sensitivity	1.25 Gbps, BER < $10^{-12}$	–	–	4 <sup>(1)</sup>	–	–	4	mV
$V_{I(MAX)}$	Input Overload	differential input 1.25 Gbps	2000	–	–	1200	–	–	mV
		single-ended input, 1.25 Gbps	1000	–	–	600	–	–	mV
$V_{SD}$	Signal Detect Programmable Range	Differential inputs	2	–	100	4	–	100	mV
HYS	Signal Detect Hysteresis	(electrical); signal detect level set to 20 mV <sub>PP</sub>	3.5	4.5	5.5	2	4	6	dB
$BW_{LF}$	Small-Signal –3dB Low Frequency Cutoff	Excluding AC coupling capacitors	–	NA	–	–	25	–	kHz
DJ	Deterministic Jitter	K28.5 pattern at 1.25 Gbps	–	–	NA	–	–	25	ps
RJ	Random Jitter	10 mV <sub>PP</sub> input	–	NA	–	–	3	–	ps <sub>RMS</sub>
$t_r / t_f$	Data Output Rise and Fall Times	20% to 80%; outputs terminated into 50 $\Omega$ to $V_{CC} - 2V$ ; 10 mV <sub>PP</sub> input	–	200	250	–	185	300	ps
$T_{LOS\_ON}$	Time from LOS state until LOS output is asserted	LOS assert time <sup>(2)</sup>	–	–	NA	–	–	100	$\mu$ s
$T_{LOS\_OFF}$	Time from non-LOS state until LOS is deasserted	LOS deassert time <sup>(3)</sup>	–	–	NA	–	–	100	$\mu$ s

**Notes:**  
1. MC2046C uses BER <  $10^{-10}$   
2. After 1 V<sub>PP</sub> input signal is turned off; signal detect level set to 10 mV  
3. After input crosses signal detect level; signal detect set to 10 mV with applied input signal of 20 mV<sub>PP</sub>