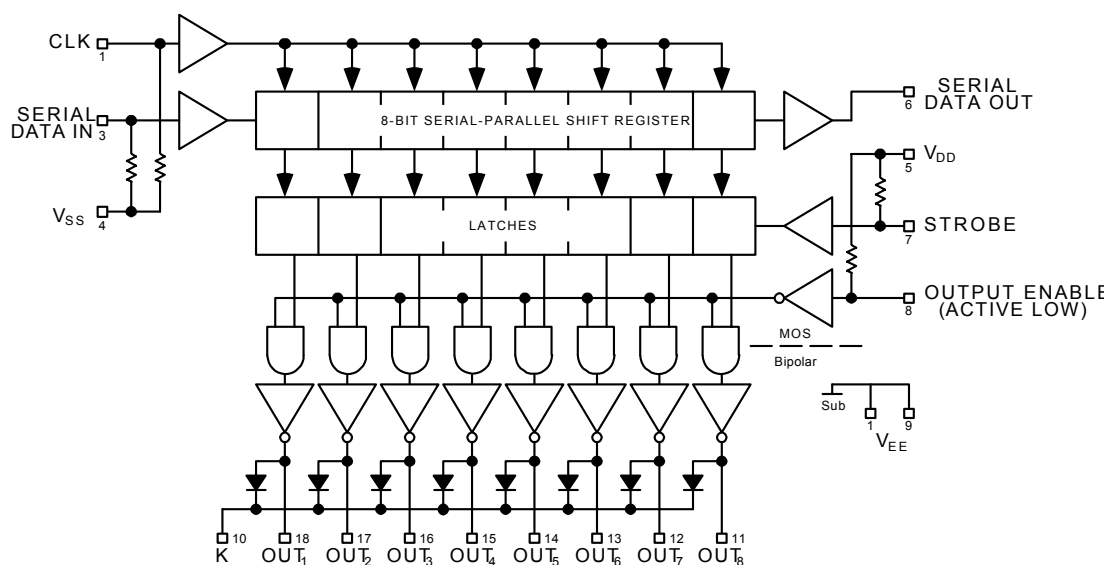
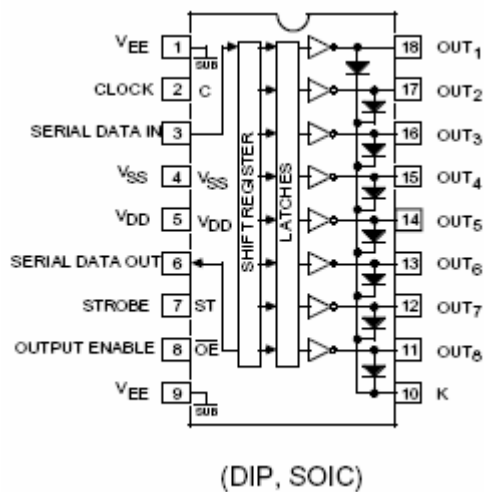
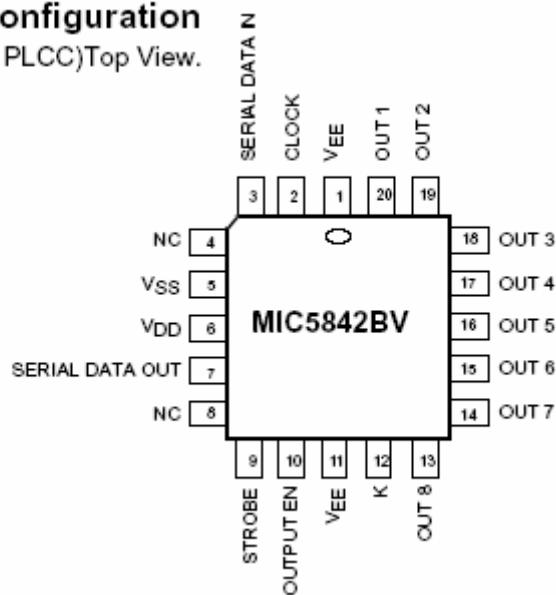


## Functional Diagram



## Pin Configuration

(20-Pin PLCC) Top View.



## Absolute Maximum Ratings<sup>(1,2,3)</sup>

At 25°C Free-Air Temperature and $V_{SS}$ .....	0V
Output Voltage, $V_{CE}$ (MIC5841) .....	50V
(MIC5842) .....	80V
Output Voltage, $V_{CE(SUS)}$ (MIC5841) <sup>(1)</sup> .....	35V
(MIC5842) .....	50V
Logic Supply Voltage, $V_{DD}$ .....	15V
VDD with Reference to $V_{EE}$ .....	25V

Emitter Supply Voltage, $V_{EE}$ .....	–20V
Input Voltage Range, $V_{IN}$ .....	–0.3V to $V_{DD} + 0.3V$
Continuous Output Current, $I_{OUT}$ .....	500mA
Package Power Dissipation, $P_D$ <sup>(2)</sup> .....	1.82W
Operating Temperature Range, $T_A$ .....	–55°C to +85°C
Storage Temperature Range, $T_S$ .....	–65°C to +150°C

## Electrical Characteristics

At  $T_A = 25^\circ\text{C}$   $V_{DD} = 5V$ ,  $V_{SS} = V_{EE} = 0V$  (unless otherwise noted)

Characteristic	Symbol	Applicable Devices	Test Conditions	Limits		
				Min	Max	Unit
Output Leakage Current	$I_{CEX}$	MIC5841	$V_{OUT} = 50V$		50	$\mu\text{A}$
			$V_{OUT} = 50V$ , $T_A = +70^\circ\text{C}$		100	
		MIC5842	$V_{OUT} = 80V$		50	
			$V_{OUT} = 80V$ , $T_A = +70^\circ\text{C}$		100	
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	Both	$I_{OUT} = 100\text{mA}$		1.1	V
			$I_{OUT} = 200\text{mA}$		1.3	
			$I_{OUT} = 350\text{mA}$ , $V_{DD} = 7.0V$		1.6	
Collector-Emitter Saturation Voltage	$V_{CE(SUS)}^{(5)}$	MIC5841	$I_{OUT} = 350\text{mA}$ , $L = 2\text{mH}$	35		V
		MIC5842	$I_{OUT} = 350\text{mA}$ , $L = 2\text{mH}$	50		
Input Voltage	$V_{IN(0)}$	Both			0.8	V
	$V_{IN(1)}$	Both	$V_{DD} = 12V$	10.5		
			$V_{DD} = 10V$	8.5		
			$V_{DD} = 5.0V^{(4)}$	3.5		
Input Resistance	$R_{IN}$	Both	$V_{DD} = 12V$	50		$k\Omega$
			$V_{DD} = 10V$	50		
			$V_{DD} = 5.0V$	50		
Supply Current	$I_{DD(ON)}$	Both	All Drivers ON, $V_{DD} = 12V$		16	1.6
			All Drivers ON, $V_{DD} = 10V$		14	
			All Drivers ON, $V_{DD} = 5.0V$		8.0	
	$I_{DD(OFF)}$	Both	All Drivers OFF, $V_{DD} = 12V$		2.9	
			All Drivers OFF, $V_{DD} = 10V$		2.5	
			All Drivers OFF, $V_{DD} = 5.0V$		1.6	
Clamp Diode Leakage Current	$I_R$	MIC5841	$V_R = 50V$		50	$\mu\text{A}$
		MIC5842	$V_R = 80V$		50	
Clamp Diode Forward Voltage	$V_F$	Both	$I_F = 350\text{mA}$		2.0	V

## Electrical Characteristics

At  $T_A = -55^\circ\text{C}$   $V_{DD} = 5\text{V}$ ,  $V_{SS} = V_{EE} = 0\text{V}$  (unless otherwise noted)

Characteristic	Symbol	Test Conditions	Limits		
			Min	Max	Unit
Output Leakage Current	$I_{CEX}$	$V_{OUT} = 80\text{V}$		50	$\mu\text{A}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_{OUT} = 100\text{mA}$		1.3	V
		$I_{OUT} = 200\text{mA}$		1.5	
		$I_{OUT} = 350\text{mA}$ , $V_{DD} = 7.0\text{V}$		1.8	
Input Voltage	$V_{IN(0)}$			0.8	V
	$V_{IN(1)}$	$V_{DD} = 12\text{V}$	10.5		
		$V_{DD} = 5.0\text{V}$	3.5		
Input Resistance	$R_{IN}$	$V_{DD} = 12\text{V}$	35		$\text{k}\Omega$
		$V_{DD} = 10\text{V}$	35		
		$V_{DD} = 5.0\text{V}$	35		
Supply Current	$I_{DD(ON)}$	All Drivers ON, $V_{DD} = 12\text{V}$		16	mA
		All Drivers ON, $V_{DD} = 10\text{V}$		14	
		All Drivers ON, $V_{DD} = 5.0\text{V}$		10	
	$I_{DD(OFF)}$	All Drivers OFF, $V_{DD} = 12\text{V}$		3.5	
		All Drivers OFF, $V_{DD} = 5.0\text{V}$		2.0	

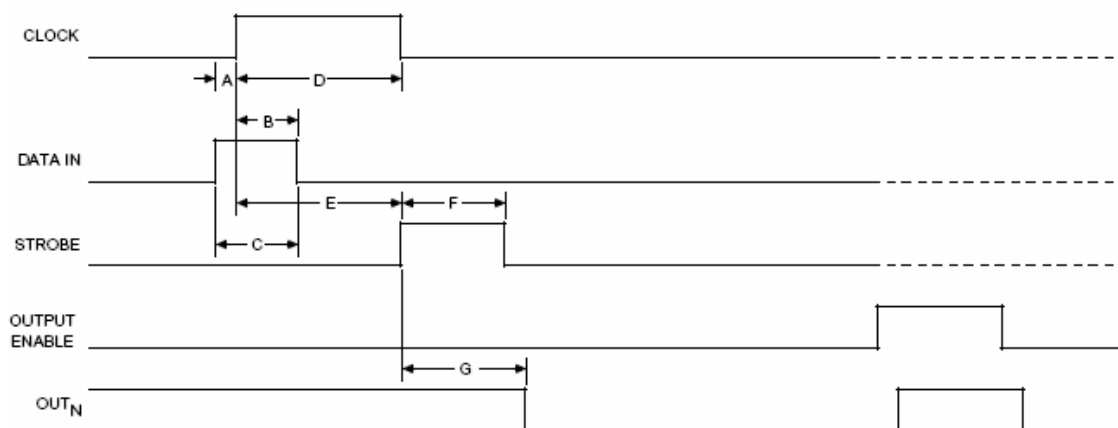
## Electrical Characteristics

At  $T_A = +125^\circ\text{C}$   $V_{DD} = 5\text{V}$ ,  $V_{SS} = V_{EE} = 0\text{V}$  (unless otherwise noted)

Characteristic	Symbol	Test Conditions	Limits		
			Min	Max	Unit
Output Leakage Current	$I_{CEX}$	$V_{OUT} = 80\text{V}$		500	$\mu\text{A}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_{OUT} = 100\text{mA}$		1.3	V
		$I_{OUT} = 200\text{mA}$		1.5	
		$I_{OUT} = 350\text{mA}$ , $V_{DD} = 7.0\text{V}$		1.8	
Input Voltage	$V_{IN(0)}$			0.8	V
	$V_{IN(1)}$	$V_{DD} = 12\text{V}$	10.5		
		$V_{DD} = 5.0\text{V}$	3.5		
Input Resistance	$R_{IN}$	$V_{DD} = 12\text{V}$	50		$\text{k}\Omega$
		$V_{DD} = 10\text{V}$	50		
		$V_{DD} = 5.0\text{V}$	50		
Supply Current	$I_{DD(ON)}$	All Drivers ON, $V_{DD} = 12\text{V}$		16	mA
		All Drivers ON, $V_{DD} = 10\text{V}$		14	
		All Drivers ON, $V_{DD} = 5.0\text{V}$		8	
	$I_{DD(OFF)}$	All Drivers OFF, $V_{DD} = 12\text{V}$		2.9	
		All Drivers OFF, $V_{DD} = 5.0\text{V}$		2.1.6	
Clamp Diode Leakage Current	$I_R$	MIC5841A $V_R = 50\text{V}$		1.6	$\mu\text{A}$
		MIC5842A $V_R = 80\text{V}$		100	

### Notes:

1. For Inductive load applications.
2. Derate at the rate of  $18.2\text{mW}/^\circ\text{C}$  above  $T_A = 25^\circ\text{C}$  (Plastic DIP)
3. CMOS devices have input-static protection but are susceptible to damage when exposed to extremely high static electrical charges.
4. Operation of these devices with standard TTL may require the use of appropriate pull-up resistors to insure an input logic HIGH.
5. Not 100% tested. Guaranteed by design.



## Timing Conditions

(TA = 25°C Logic Levels are V<sub>DD</sub> and V<sub>SS</sub>)

V<sub>DD</sub> = 5V

A. Minimum Data Active Time Before Clock Pulse (Data Set-Up Time).....	75 ns
B. Minimum Data Active Time After Clock Pulse (Data Hold Time) .....	75 ns
C. Minimum Data Pulse Width .....	150 ns
D. Minimum Clock Pulse Width.....	150 ns
E. Minimum Time Between Clock Activation and Strobe .....	300 ns
F. Minimum Strobe Pulse Width.....	100 ns
G. Typical Time Between Strobe Activation and Output Transition.....	500 ns

SERIAL DATA present at the input is transferred to the shift register on the logic “0” to logic “1” transition of the CLOCK input pulse. On succeeding CLOCK pulses, the registers shift data information towards the SERIAL DATA OUTPUT. The SERIAL DATA must appear at the input prior to the rising edge of the CLOCK input waveform.

Information present at any register is transferred to its respective latch when the STROBE is high (serial-to-parallel conversion). The latches will continue to accept new data as long as the STROBE is held high. Applications where the latches are bypassed (STROBE tied high) will require that the ENABLE input be high during serial data entry.

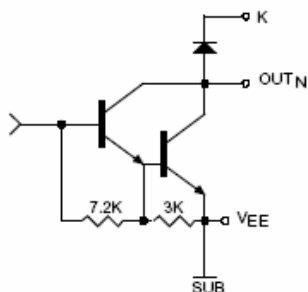
When the ENABLE input is high, all of the output buffers are disabled (OFF) without affecting information stored in the latches or shift register. With the ENABLE input low, the outputs are controlled by the state of the latches.

## MIC5840 Family Truth Table

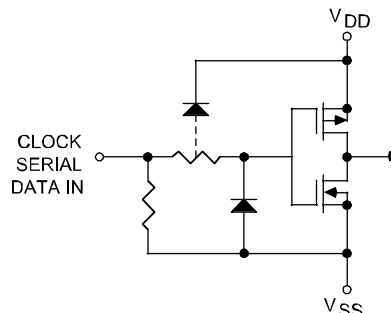
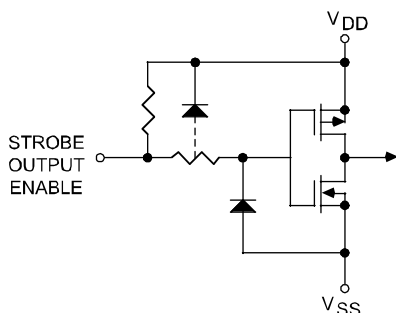
Serial Data Input	Clock Input	Shift Register Contents					Serial Data Output	Strobe Input	Latch Contents					Output Enable	Output Contents				
		I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	...	I <sub>8</sub>			I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	...	I <sub>8</sub>		O <sub>1</sub>	O <sub>2</sub>	O <sub>3</sub>	...	O <sub>8</sub>
H		H	R1	R2	...	R7	R7												
L		L	R1	R2	...	R7	R7												
X		R1	R2	R3	...	R8	R8												
		X	X	X	...	X	X	L	R1	R2	R3	...	R8	L	P1	P2	P3	...	P8
		P1	P2	P3	...	P8	P8	H	P1	P2	P3	...	P8		H	H	H	...	H
									X	X	X	...	X		H	H	H	...	H

L = Low Logic Level  
H = High Logic Level  
X = Irrelevant  
P = Present State  
R = Previous State

## Typical Output Driver



## Typical Input Circuits



## Maximum Allowable Duty Cycle (Plastic DIP)

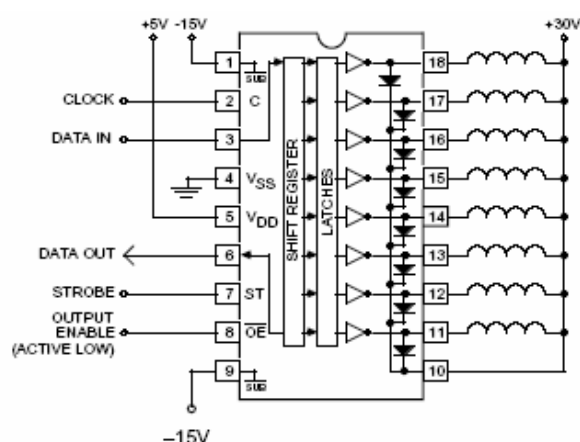
$V_{DD} = 5.0V$

Number of Outputs ON ( $I_{OUT} = 200mA$ $V_{DD} = 5.0V$ )	Max. Allowable Duty Cycle at Ambient Temperature of				
	25°C	40°C	50°C	60°C	70°C
8	85%	72%	64%	55%	46%
7	97%	82%	73%	63%	53%
6	100%	96%	85%	73%	62%
5	100%	100%	100%	88%	75%
4	100%	100%	100%	100%	93%
3	100%	100%	100%	100%	100%
2	100%	100%	100%	100%	100%
1	100%	100%	100%	100%	100%

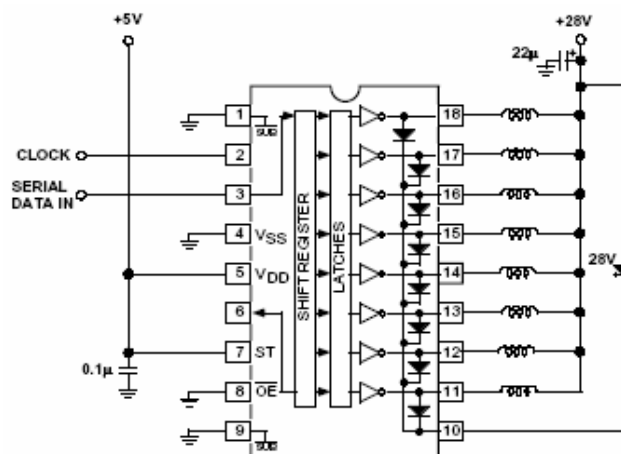
$V_{DD} = 12V$

Number of Outputs ON ( $I_{OUT} = 200mA$ $V_{DD} = 12V$ )	Max. Allowable Duty Cycle at Ambient Temperature of				
	25°C	40°C	50°C	60°C	70°C
8	80%	68%	60%	52%	44%
7	91%	77%	68%	59%	50%
6	100%	90%	79%	69%	58%
5	100%	100%	95%	82%	69%
4	100%	100%	100%	100%	86%
3	100%	100%	100%	100%	100%
2	100%	100%	100%	100%	100%
1	100%	100%	100%	100%	100%

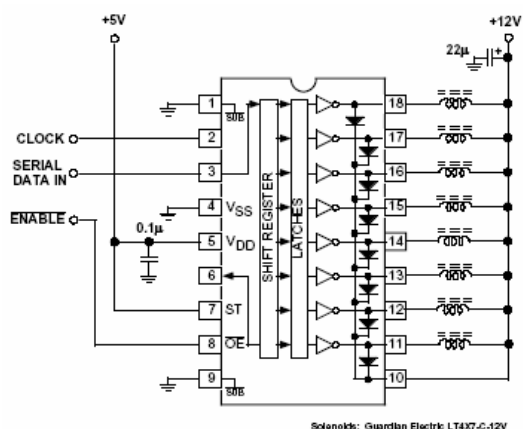
## Typical Applications



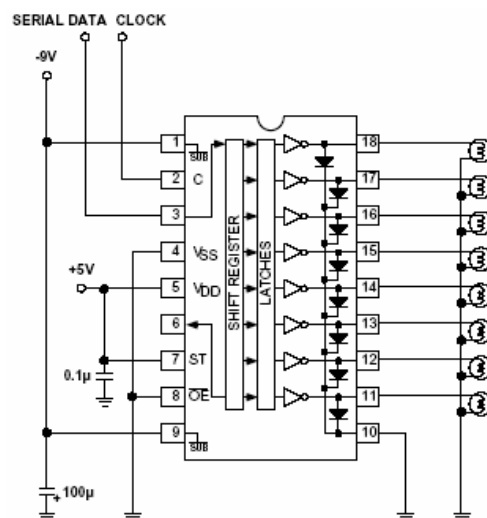
Relay/Solenoid Driver MIC5842



MIC5841 Hammer Driver

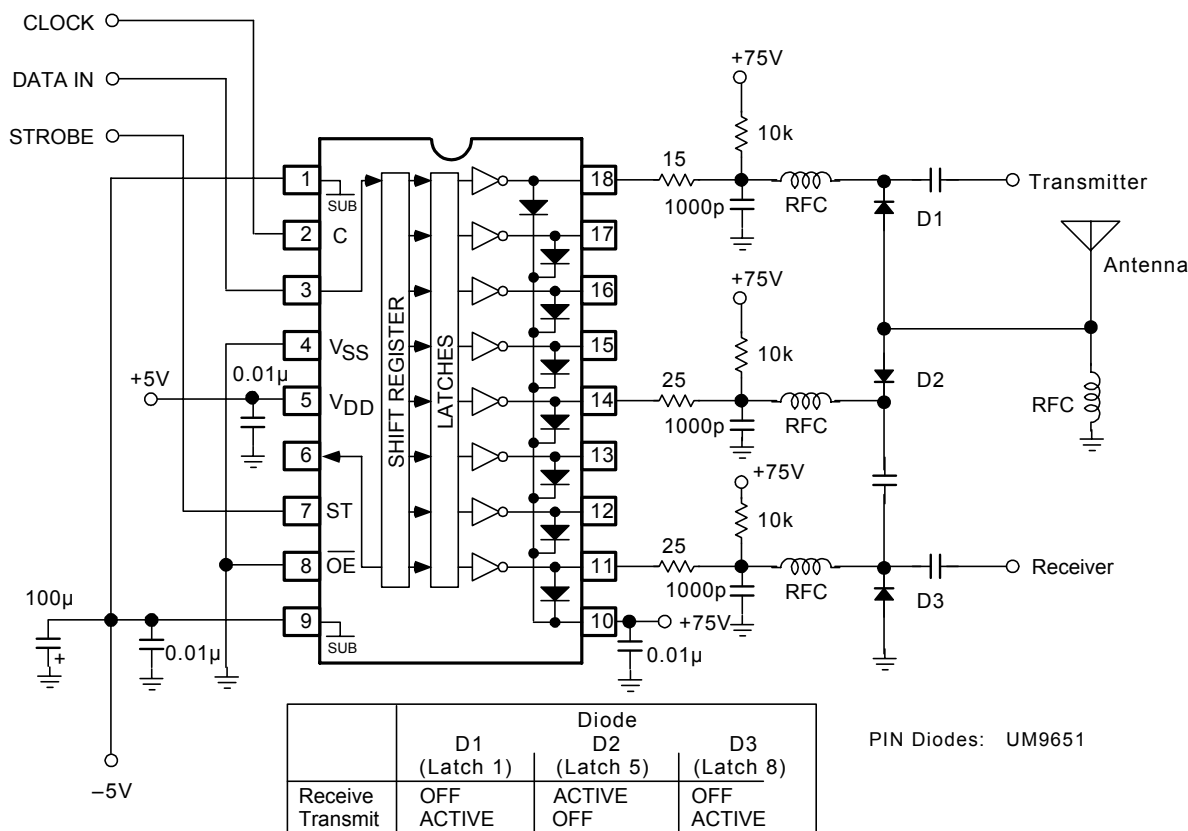


MIC5841 Solenoid Driver with Output Enable



MIC5841 Level Shifting Lamp Driver with Darlington Emitters Tied to a Negative Supply

## Typical Applications, Continued



**MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA**

TEL +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 a Purchaser's own risk and Purchaser agrees to fully indemnify Micrel for any damages resulting from such use or sale.

© 1998 Micrel, Incorporated.