

## FEATURES

- Up to 2.5Gbps operation
- 30mA modulation current
- Separate modulation control
- Separate output enable for laser safety
- Differential inputs for data
- 75K $\Omega$  input pull-down resistor
- 3.3V and 5V power supply options
- Available in a tiny 10-pin (3mm x 3mm) MSOP

## APPLICATIONS

- 1.25Gbps and 2.5Gbps Gigabit Ethernet
- 531Mbps, 1062Mbps and 2.12Gbps Fibre Channel
- 622Mbps SONET
- Gigabit Interface Converter
- 2.5Gbps SDH/SONET
- 2.5Gbps Proprietary Links

## DESCRIPTION

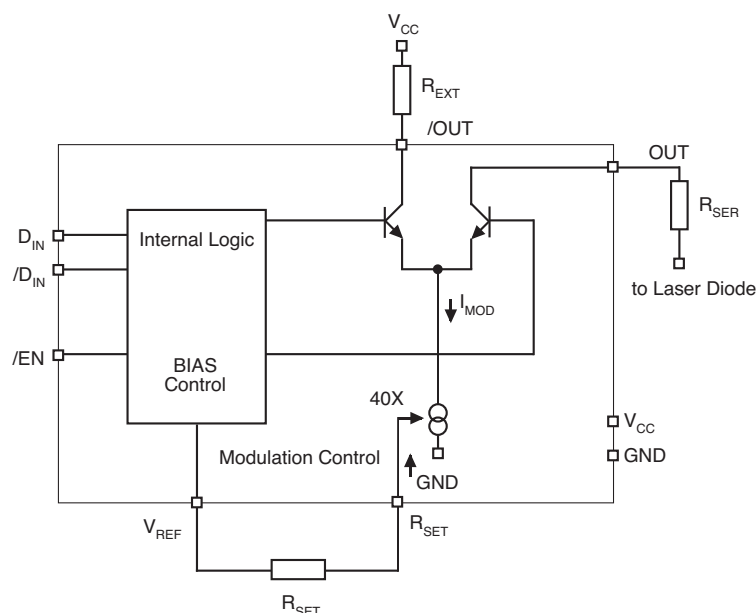
The SY88922V is a high-speed current switch for driving a semiconductor laser diode in optical transmission applications. The modulation current ( $I_{OUT}$ ) is controlled by the current ( $I_{RSET}$ ) through the external resistor  $R_{SET}$ . The output OUT is HIGH when output enable is HIGH.

The device incorporates complementary open collector outputs with a capability of driving peak current of 30mA. The resistor  $R_{EXT}$  must be placed between /OUT and  $V_{CC}$  to dissipate the worst case power.  $R_{SER}$  is recommended to compensate for laser diode matching issues. Pin 9 and pin 10 should be connected to achieve better performance.

The SY88922V utilizes the high-performance bipolar ASSET™ technology.

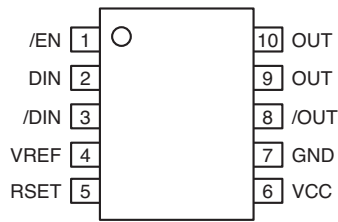
All support documentation can be found on Micrel's web site at [www.micrel.com](http://www.micrel.com).

## BLOCK DIAGRAM



**PACKAGE/ORDERING INFORMATION**

**Ordering Information<sup>(1)</sup>**



**10-Pin MSOP (K10-1)**

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY88922VKC	K10-1	Commercial	SY88922V	Sn-Pb
SY88922VKCTR <sup>(2)</sup>	K10-1	Commercial	SY88922V	Sn-Pb
SY88922VKG	K10-1	Industrial	SY88922V with Pb-Free bar-line indicator	Pb-Free NiPdAu
SY88922VKGTR <sup>(2)</sup>	K10-1	Industrial	SY88922V with Pb-Free bar-line indicator	Pb-Free NiPdAu

**Notes:**

1. Contact factory for die availability. Die is guaranteed at T<sub>A</sub> = 25°C, DC electricals only.
2. Tape and Reel.

**PIN DESCRIPTION**

Pin Number	Pin Name	Pin Function
1	/EN	Enable. This PECL 100k compatible input enables Laser Driver. Modulation current goes to zero when asserted HIGH.
2, 3	DIN, /DIN	Differential PECL 100k compatible inputs which receive NRZ data.
4	VREF	Voltage reference for use with R <sub>SET</sub> .
5	RSET	An external resistor sets up the source current for modulation I <sub>MOD</sub> .
6	VCC	Most positive power supply input.
7	GND	Ground.
8, 9, 10	/OUT, OUT	Open collector outputs from the modulation buffer drive these differential current outputs.

**TRUTH TABLE<sup>(1)</sup>**

D	/D	/EN	OUT <sup>(2)</sup>	/OUT
L	H	L	H	L
H	L	L	L	H
X	X	H	H	L

**Notes:**

1. L = LOW, H = HIGH, X = don't care.
2. H = I<sub>OUT</sub> = 0mA.

### Absolute Maximum Ratings<sup>(1)</sup>

Supply Voltage ( $V_{CC}$ )	+0V to +7.0V
Input Voltage ( $V_{IN}$ )	0 to $V_{CC}$
Output Current ( $V_{OUT}$ )	30mA
Power Dissipation ( $P_D$ )	250mW
Lead Temperature (soldering, 20 sec.)	260°C
Maximum Operating Junction Temperature ( $T_J$ )	+125°C
Storage Temperature ( $T_S$ )	-55°C to +125°C

### Operating Ratings<sup>(2)</sup>

Supply Voltage ( $V_{CC}$ )	+4.5V to +5.5V or +3.0V to +3.6V
Ambient Temperature ( $T_A$ )	-40°C to +85°C
Capacitance on OUT + /OUT ( $C_{OUT}$ )	2.5pF (typ.)
Resistor to Dissipate Power ( $R_{EXT}$ )	10 to 50Ω
Laser Diode Serial Resistor ( $R_{SER}$ )	0 to 50Ω
Resistor to Adjust Current ( $R_{SET}$ ) <sup>(4)</sup>	700 to 20,000Ω
Package Thermal Resistance <sup>(3)</sup>	
MSOP ( $\theta_{JA}$ ) Still-air	113°C/W
MSOP ( $\Psi_{JB}$ )	74°C/W

## DC ELECTRICAL CHARACTERISTICS

GND = 0V;  $V_{CC} = +5.0V \pm 10\%$  or  $V_{CC} = +3.3V \pm 10\%$ ;  $T_A = -40^\circ C$  to  $+85^\circ C$ ; unless noted.

Symbol	Parameter	Condition	Min	Typ	Max	Units
$V_{IH}$	Input HIGH Voltage ( $D_{IN}$ , $/D_{IN}$ , $/EN$ )		$V_{CC} - 1165$		$V_{CC} - 880$	mV
$V_{IL}$	Input LOW Voltage ( $D_{IN}$ , $/D_{IN}$ , $/EN$ )		$V_{CC} - 1810$		$V_{CC} - 1475$	mV
$V_{REF}$	Reference Voltage		1.7	2.0	2.3	V
$I_{IL}$	Input LOW Current ( $D_{IN}$ , $/D_{IN}$ , $/EN$ ) <sup>(5)</sup>		0.5			μA
$I_{IH}$	Input HIGH Current ( $D_{IN}$ , $/D_{IN}$ , $/EN$ )				100	μA
$I_{CC}$	Supply Current <sup>(6)</sup>				25	mA
$I_{OL}$	Output LOW Current ( $/EN = HIGH$ )			450	1000	μA
$I_{OUT}$	Modulation Current				30	mA
$I_{RSET}$	Modulation Control		0.125		0.625	mA
$A_{RSET}$	$= I_{OUT} / I_{RSET}$		30	38	44	—

**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 voltage drop across  $R_{EXT}$  and  $R_{SER}$  plus Laser Diode should not be greater than 1V.
3. Still-air without heatsink.
4.  $R_{SET}$  minimum 430Ω.
5.  $V_{IN} = V_{IL}$  (min).
6.  $I_{MOD} = 25mA$ .

### AC ELECTRICAL CHARACTERISTICS<sup>(7)</sup>

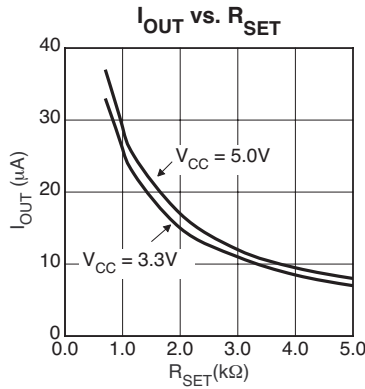
$I_{MOD} = 10\text{mA}$ ;  $GND = 0\text{V}$ ;  $V_{CC} = +5\text{V} \pm 10\%$  or  $V_{CC} = +3.3\text{V} \pm 10\%$ ;  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ; unless noted.

Symbol	Parameter	Condition	Min	Typ	Max	Units
$t_{pd\ D}$	Propagation Delay (D <sub>IN</sub> – OUT)			400		ps
$t_{pd\ EN}$	Propagation Delay (/EN – OUT)			400		ps
$t_r, t_f$	Rise/Fall Time <sup>(8)</sup> (20% to 80%)			74	130	ps
$I_{OR}$	Output Current Ringing <sup>(9)</sup>				10	%
$D_J$	Deterministic Jitter <sup>(10)</sup>			7		ps <sub>rms</sub>

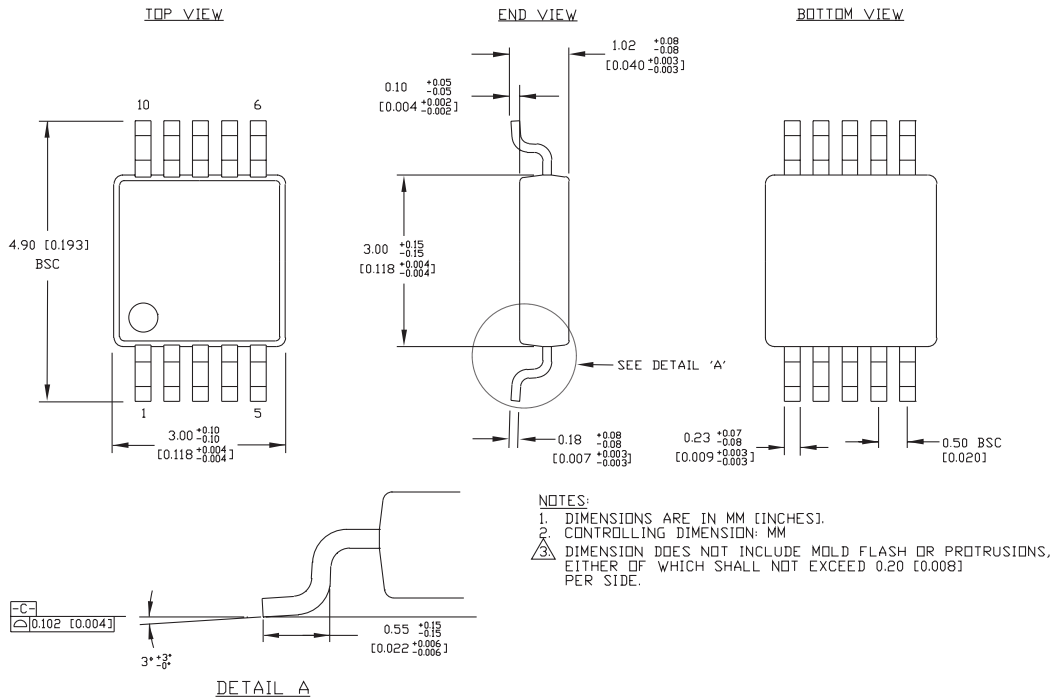
**Notes:**

7.  $R_{EXT} = R_{SER} = 25\Omega \pm 1\%$ ;  $R_{SER}$  connects to  $V_{CC}$  directly without Laser Diode.
8.  $I_{MOD} = 10\text{mA}$ .
9.  $I_{OH} = 5$  to  $25\text{mA}$ .
10.  $I_{MOD} = 10\text{mA}$ , 2.5Gbps,  $2^{23}-1$  pattern.

### TYPICAL CHARACTERISTICS



**10-PIN MSOP (K10-1)**



Rev. 00

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