

## FEATURES

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

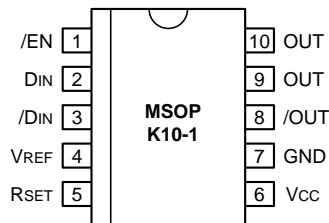
## DESCRIPTION

The SY88922V is a high speed current switch for driving a semiconductor laser diode in optical transmission applications. The output current, or modulation current  $I_{MOD}$ , is DC current controlled by  $I_{RSET}$ , current through the 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.

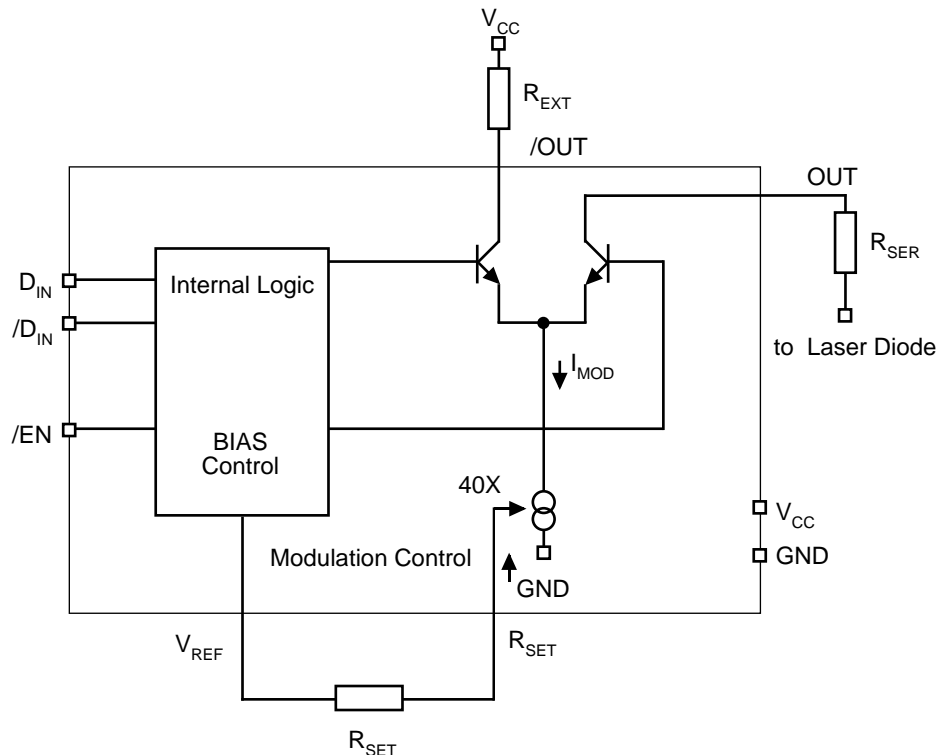
## PIN CONFIGURATIONS



## 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

## BLOCK DIAGRAM



**PIN NAMES**

Pin	Function
V <sub>CC</sub>	Most positive power supply input.
GND	Ground
D <sub>IN</sub> , /D <sub>IN</sub>	These differential PECL 100K compatible inputs receive NRZ data.
/EN	This PECL 100K compatible input enables Laser Driver. Modulation current goes to zero when asserted HIGH.
OUT, /OUT	Open collector outputs from the modulation buffer drive these differential current outputs.
V <sub>REF</sub>	Voltage reference for use with R <sub>SET</sub> .
R <sub>SET</sub>	An external resistor sets up the source current for modulation I <sub>MOD</sub> .

**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>**

Symbol	Rating	Value	Unit
V <sub>CC</sub>	Power Supply Voltage	0 to +7.0	V
V <sub>I</sub>	Input Voltage	0 to V <sub>CC</sub>	V
I <sub>O</sub>	Output Current	25	mA
T <sub>A</sub>	Operating Temperature Range	-40 to +85	°C
T <sub>store</sub>	Storage Temperature Range	-55 to +125	°C
P <sub>tot</sub>	Power Dissipation	250	mW

**NOTE:**

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 RATING conditions for extended periods may affect device reliability.

**OPERATING CONDITIONS<sup>(1)</sup>**

Symbol	Rating	Value	Unit
V <sub>CC</sub>	Power Supply Voltage	+4.5 to +5.5 (or) +3.0 to +3.6	V
R <sub>EXT</sub>	Resistor to Dissipate Power	10 to 50	Ω
R <sub>SER</sub>	Laser Diode Serial Resistor	0 to 50	Ω
R <sub>SET</sub> <sup>(3)</sup>	Resistor to Adjust Current	700 to 20,000	Ω
θ <sub>JA</sub>	Thermal Resistance of Package to Ambient <sup>(2)</sup>	113	°C/W
C <sub>OUT</sub>	Capacitance on OUT + /OUT	2.5 typical	pF

**NOTES:**

1. The voltage drop across R<sub>EXT</sub> and R<sub>SER</sub> plus Laser Diode should not be greater than 1V.
2. Still air without heatsink.
3. R<sub>SET</sub> minimum 430Ω.

**DC ELECTRICAL CHARACTERISTICS**GND = 0V;  $V_{CC} = +5.0V \pm 10\%$  or  $V_{CC} = +3.3V \pm 10\%$ 

Symbol	Parameter	$T_A = -40^\circ\text{C}$		$T_A = 0^\circ\text{C}$		$T_A = +25^\circ\text{C}$			$T_A = +85^\circ\text{C}$		Unit
		Min.	Max.	Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
$V_{IH}$	Input HIGH Voltage ( $D_{IN}$ , $/D_{IN}$ , $/EN$ )	$V_{CC}-1165$	$V_{CC}-880$	$V_{CC}-1165$	$V_{CC}-880$	$V_{CC}-1165$	—	$V_{CC}-880$	$V_{CC}-1165$	$V_{CC}-880$	mV
$V_{IL}$	Input LOW Voltage ( $D_{IN}$ , $/D_{IN}$ , $/EN$ )	$V_{CC}-1810$	$V_{CC}-1475$	$V_{CC}-1810$	$V_{CC}-1475$	$V_{CC}-1810$	—	$V_{CC}-1475$	$V_{CC}-1810$	$V_{CC}-1475$	mV
$V_{REF}$	Reference Voltage	1.7	2.3	1.7	2.3	1.7	2.0	2.3	1.7	2.3	V
$I_{IL}$	Input LOW Current <sup>(1)</sup> ( $D_{IN}$ , $/D_{IN}$ , $/EN$ )	0.5 -300	— —	0.5 -300	— —	0.5 -300	— —	— —	0.5 -300	— —	$\mu\text{A}$
$I_{IH}$	Input HIGH Current ( $D_{IN}$ , $/D_{IN}$ , $/EN$ )	—	100	—	100	—	—	100	—	100	$\mu\text{A}$
$I_{CC}$	Supply Current <sup>(2)</sup>	—	25	—	25	—	—	25	—	25	mA
$I_{OL}$	Output LOW Current ( $/EN = \text{HIGH}$ )	—	1000	—	1000	—	450	1000	—	1000	$\mu\text{A}$
$I_{OUT}$	Modulation Current	—	30	—	30	—	—	30	—	30	mA
$I_{RSET}$	Modulation Control	0.125	0.625	0.125	0.625	0.125	—	0.125	0.125	0.625	mA
$A_{RSET}$	$=I_{OUT}/I_{RSET}$	30	44	30	44	30	38	30	30	44	—
$D_J$	Deterministic Jitter <sup>(3)</sup> (RMS)	—	—	—	—	—	7	—	—	—	ps

**NOTES:**

- $V_i = V_{IL}$  (Min.)
- $I_{MOD} = 25\text{mA}$ .
- $I_{MOD} = 10\text{mA}$ , 2.5Gbps, 2<sup>33</sup>-1 pattern.

**AC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $I_{MOD} = 10\text{mA}$ ; GND = 0V;  $V_{CC} = +5V \pm 10\%$  or  $V_{CC} = +3.3V \pm 10\%$ 

Symbol	Parameter	$T_A = -40^\circ\text{C}$			$T_A = 0^\circ\text{C}$			$T_A = +25^\circ\text{C}$			$T_A = +85^\circ\text{C}$			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
$t_{pd D}$	Propagation Delay $D_{IN} - \text{OUT}$	—	—	—	—	—	—	—	400	—	—	—	—	ps
$t_{pd EN}$	Propagation Delay $/EN - \text{OUT}$	—	—	—	—	—	—	—	400	—	—	—	—	ps
$t_r$ $t_f$	Rise/Fall Time <sup>(2)</sup> (20% to 80%)	—	78	130	—	76	130	—	74	130	—	72	130	ps
$I_{OR}$	Output Current Ringing <sup>(2)</sup>	—	—	10	—	—	10	—	—	10	—	—	10	%

**NOTES:**

- $R_{EXT} = R_{SER} = 25\Omega \pm 1\%$ ,  $R_{SER}$  connects to  $V_{CC}$  directly without Laser Diode.
- $I_{MOD} = 10\text{mA}$ .
- $I_{OH} = 5$  to  $25\text{mA}$ .

**TYPICAL CHARACTERISTICS**

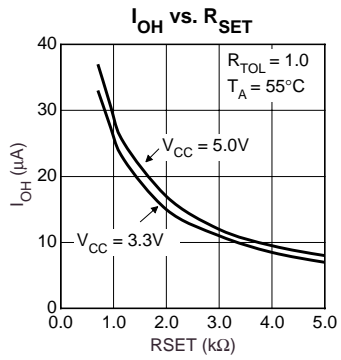
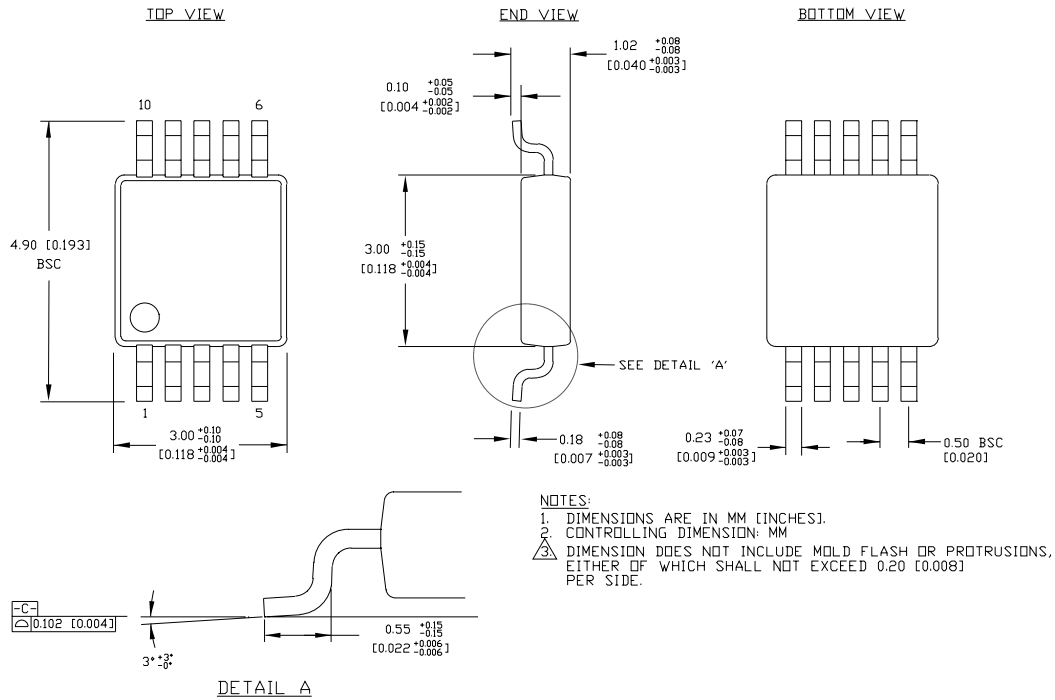


Figure 1. DC Response

**PRODUCT ORDERING CODE**

Ordering Code	Package Type	Operating Range
SY88922VKC	K10-1	Commercial
SY88922VKCTR	K10-1	Commercial

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



Rev. 00

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