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**
- **75KΩ 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.
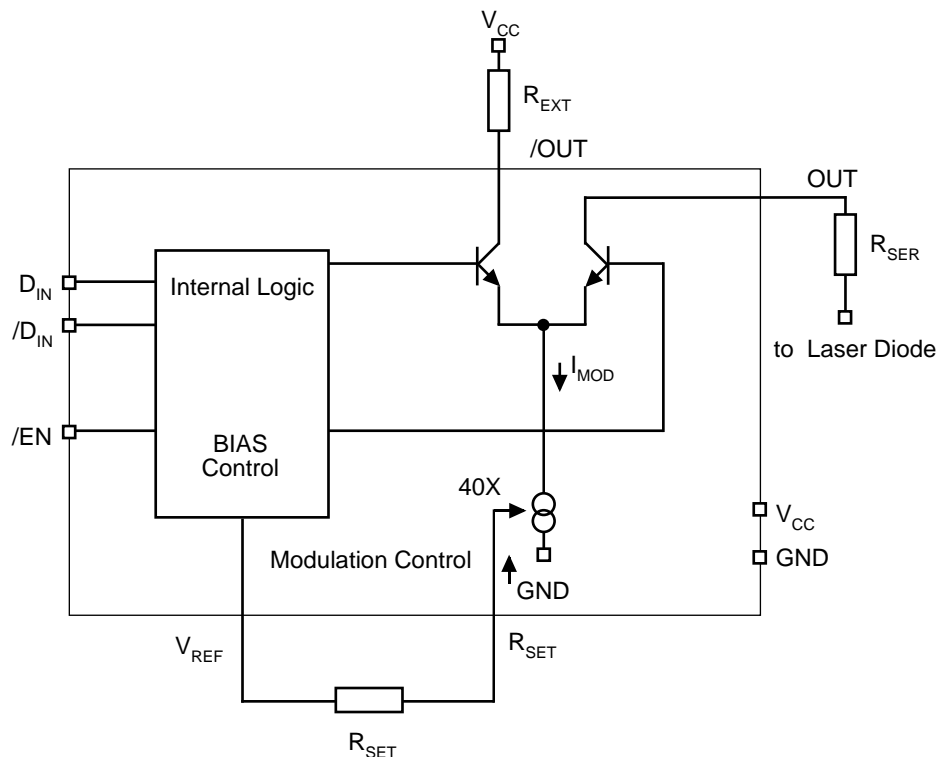
PIN CONFIGURATIONS

/EN	1		10	OUT
DIN	2		9	OUT
/DIN	3	**MSOP K10-1**	8	/OUT
VREF	4		7	GND
RSET	5		6	VCC
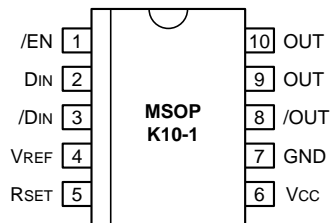
APPLICATIONS

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

BLOCK DIAGRAM

Rev.: B   Amendment: /0
Issue Date: August 2000

PIN NAMES

Pin	Function
V_{CC}	Most positive power supply input.
GND	Ground
D_{IN}, $/D_{IN}$	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_{REF}	Voltage reference for use with R_{SET}.
R_{SET}	An external resistor sets up the source current for modulation I_{MOD}.

TRUTH TABLE[1]

D	/D	/EN	OUT [2]	/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_{OUT} = 0mA

ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Rating	Value	Unit
V_{CC}	Power Supply Voltage	0 to +7.0	V
V_I	Input Voltage	0 to V_{CC}	V
I_O	Output Current	25	mA
T_A	Operating Temperature Range	−40 to +85	°C
T_{store}	Storage Temperature Range	−55 to +125	°C
P_{tot}	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[1]

Symbol	Rating	Value	Unit
V_{CC}	Power Supply Voltage	+4.5 to +5.5 (or) +3.0 to +3.6	V
R_{EXT}	Resistor to Dissipate Power	10 to 50	Ω
R_{SER}	Laser Diode Serial Resistor	0 to 50	Ω
R_{SET}[3]	Resistor to Adjust Current	700 to 20,000	Ω
θ_{JA}	Thermal Resistance of Package to Ambient[2]	113	°C/W
C_{OUT}	Capacitance on OUT + /OUT	2.5 typical	pF

NOTES:

1. The voltage drop across R_{EXT} and R_{SER} plus Laser Diode should not be greater than 1V.

2. Still air without heatsink.

3. R_{SET} minimum 430Ω.

DC ELECTRICAL CHARACTERISTICS

GND = 0V; V_{CC} = +5.0V ±10% or V_{CC} = +3.3V ±10%

Symbol	Parameter	$T_A = -40°C$		$T_A = 0°C$		$T_A = +25°C$			$T_A = +85°C$		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[1] (D_{IN}, /D_{IN}, /EN)	0.5 −300	— —	0.5 −300	— —	0.5 −300	— —	— —	0.5 −300	— —	uA
I_{IH}	Input HIGH Current (D_{IN}, /D_{IN}, /EN)	—	100	—	100	—	—	100	—	100	uA
I_{CC}	Supply Current[2]	—	25	—	25	—	—	25	—	25	mA
I_{OL}	Output LOW Current (/EN = HIGH)	—	1000	—	1000	—	450	1000	—	1000	uA
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[3] (RMS)	—	—	—	—	—	7	—	—	—	ps

NOTES:

1. $V_I = V_{IL}$ (Min.)

2. I_{MOD} = 25mA.

3. I_{MOD} = 10mA, 2.5Gbps, 2^{33}−1 pattern.

AC ELECTRICAL CHARACTERISTICS[1]

I_{MOD} =10mA; GND = 0V; V_{CC} = +5V ±10% or V_{CC} = +3.3V ±10%

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

NOTES:

1. $R_{EXT} = R_{SER}$ = 25Ω ±1%, R_{SER} connects to V_{CC} directly without Laser Diode.

2. I_{MOD} = 10mA.

3. I_{OH} = 5 to 25mA.

TYPICAL CHARACTERISTICS

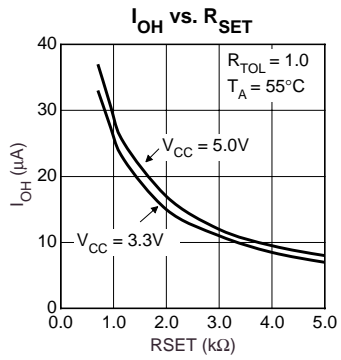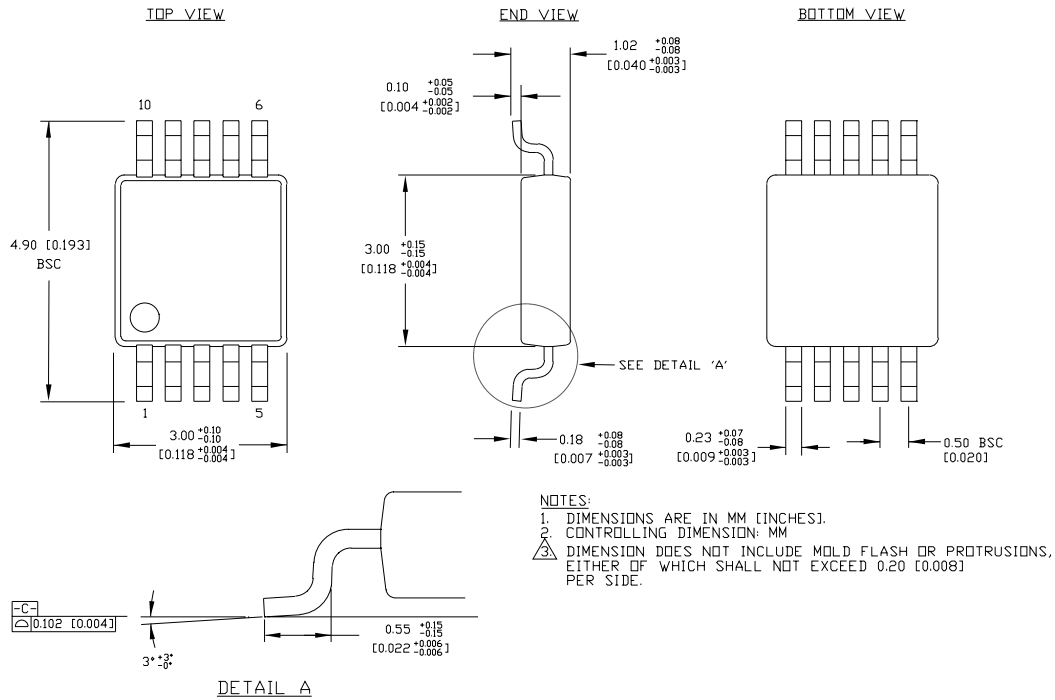**I_{OH} vs. R_{SET}**

R_TOL = 1.0
T_A = 55°C

V_{CC} = 5.0V

V_{CC} = 3.3V

I_OH (µA) vs RSET (kΩ)

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)

TOP VIEW

END VIEW

BOTTOM VIEW

10   6

4.90 [0.193]
BSC

1   5

3.00 $^{+0.10}_{-0.10}$
[0.118 $^{+0.004}_{-0.004}$]

1.02 $^{+0.08}_{-0.08}$
[0.040 $^{+0.003}_{-0.003}$]

0.10 $^{+0.05}_{-0.05}$
[0.004 $^{+0.002}_{-0.002}$]

3.00 $^{+0.15}_{-0.15}$
[0.118 $^{+0.004}_{-0.004}$]

SEE DETAIL 'A'

0.18 $^{+0.08}_{-0.08}$
[0.007 $^{+0.003}_{-0.003}$]

0.23 $^{+0.07}_{-0.08}$
[0.009 $^{+0.003}_{-0.003}$]

0.50 BSC
[0.020]

NOTES:
1. DIMENSIONS ARE IN MM [INCHES].
2. CONTROLLING DIMENSION: MM
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.20 [0.008] PER SIDE.

-C-
0.102 [0.004]

3° $^{+3°}_{-0°}$

0.55 $^{+0.15}_{-0.15}$
[0.022 $^{+0.006}_{-0.006}$]

DETAIL A

Rev. 00