MICREL®

SDH/SONET 2.5Gbps LASER DIODE DRIVER

SY88922

FEATURES

- **Up to 2.5Gbps operation**
- **25mA peak drive current**
- **Separate modulation control**
- **Separate output enable for laser safety**
- **Differential inputs for data**
- **75KΩ input pulldown resistor**
- **Designed for use with SY88923, SY88904 or SY88905**
- **Available in a tiny 10-pin (3mm) MSOP**

DESCRIPTION

The SY88922 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.
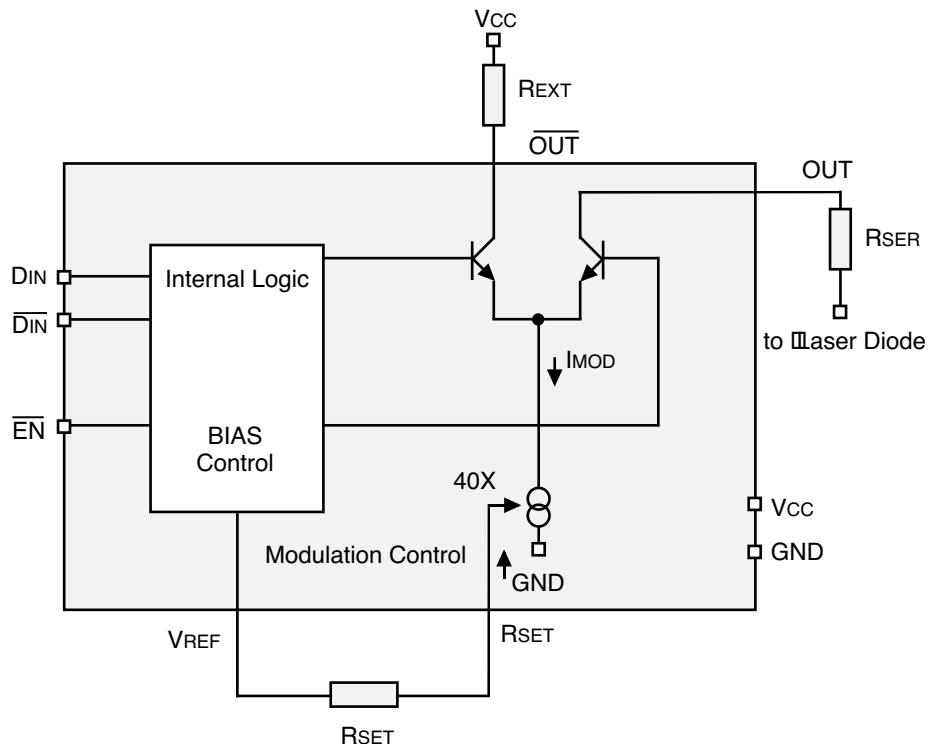
The device incorporates complementary open collector outputs with a capability of driving peak current of 25mA. The resistor R_{EXT} must be placed between /OUT and V_{CC} to dissipate the worst case power. R_{SER} is recommended to compensate for laser diode matching issues.

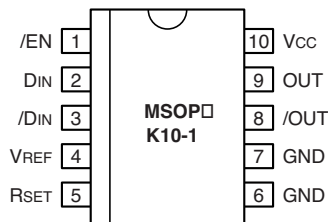The SY88922 utilizes the high performance bipolar ASSET™ technology.

APPLICATIONS

- **1.25Gbps Gigabit Ethernet**
- **531Mbps and 1062Mbps Fibre Channel**
- **622Mbps SONET**
- **Gigabit Interface Converter**
- **2.5Gb/s SDH/SONET**

BLOCK DIAGRAM

PACKAGE/ORDERING INFORMATION

```
        ┌───────┐
 /EN  1 │       │ 10  Vcc
 DIN  2 │       │  9  OUT
/DIN  3 │ MSOP  │  8  /OUT
       │ K10-1 │
VREF  4 │       │  7  GND
RSET  5 │       │  6  GND
        └───────┘
```

10-Pin MSOP (K10-1)

Ordering Information

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY88922KC	K10-1	Commercial	922	Sn-Pb
SY88922KCTR[1]	K10-1	Commercial	922	Sn-Pb
SY88922KG	K10-1	Commercial	922 with Pb-Free bar-line indicator	Pb-Free NiPdAu
SY88922KGTR[1]	K10-1	Commercial	922 with Pb-Free bar-line indicator	Pb-Free NiPdAu

Note:

1. Tape and Reel.

PIN NAMES

Pin	Function
Vcc	Most positive power supply input, +5V for PECL operation.
GND	Ground
DIN, /DIN	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.
VREF	Voltage reference for use with RSET.
RSET	An external resistor sets up the source current for modulation Imod.

TRUTH TABLE[1]

D	$\overline{D}$	/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	0 to +85	°C
T_{store}	Storage Temperature Range	−55 to +125	°C
T_J	Maximum Operating Junction Temperature	+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 ratlng conditions for extended periods may affect device reliability.

OPERATIONING CONDITIONS[1]

Symbol	Rating	Value	Unit
V_{CC}	Power Supply Voltage	+4.5 to +5.5	V
R_{EXT}	Resistor to Dissipate Power	10 to 50	Ω
R_{SER}	Laser Diode Serial Resistor	0 to 50	Ω
R_{SET}	Resistor to Adjust Current	1500 to 50,000	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 2V.

2. Still air without heatsink.

DC ELECTRICAL CHARACTERISTICS

GND = 0V; V_{CC} = +5.0V ±10%; T_A = 0°C to + 85°C

Symbol	Parameter	$T_A = 0°C$			$T_A = +25°C$			$T_A = +85°C$			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{IH}	Input HIGH Voltage (DIN, /DIN, /EN)	V_{CC}–1165	—	V_{CC}–880	V_{CC}–1165	—	V_{CC}–880	V_{CC}–1165	—	V_{CC}–880	mV
V_{IL}	Input LOW Voltage (DIN, /DIN, /EN)	V_{CC}–1810	—	V_{CC}–1475	V_{CC}–1810	—	V_{CC}–1475	V_{CC}–1810	—	V_{CC}–1475	mV
V_{REF}	Reference Voltage	—	3.12	—	—	3.00	—	—	2.80	—	V
I_{IL}	Input LOW Current[1] (DIN, /DIN, /EN)	0.5	—	—	0.5	—	—	0.5	—	—	uA
I_{IH}	Input HIGH Current (DIN, /DIN, /EN)	—	—	100	—	—	100	—	—	100	uA
I_{CC}	Supply Current[2]	—	16	25	—	16	25	—	16	25	mA
I_{OL}	Output LOW Current (/EN = HIGH)	—	—	500	—	—	500	—	—	500	uA
I_{OUT}	Modulation Current	5	15	25	5	15	25	5	15	25	mA
I_{RSET}	Modulation Control	0.125	—	0.625	0.125	—	0.625	0.125	—	0.625	mA
A_{RSET}	=I_{OUT}/I_{RSET}	30	38	44	30	38	44	30	38	44	—

Notes:

1. $V_I = V_{IL}$(Min.)
2. I_{MOD} = 25mA.

AC ELECTRICAL CHARACTERISTICS[1]

I_{MOD} =10mA; GND = 0V; V_{CC} = +5V ±10%; T_A = 0°C to + 85°C.

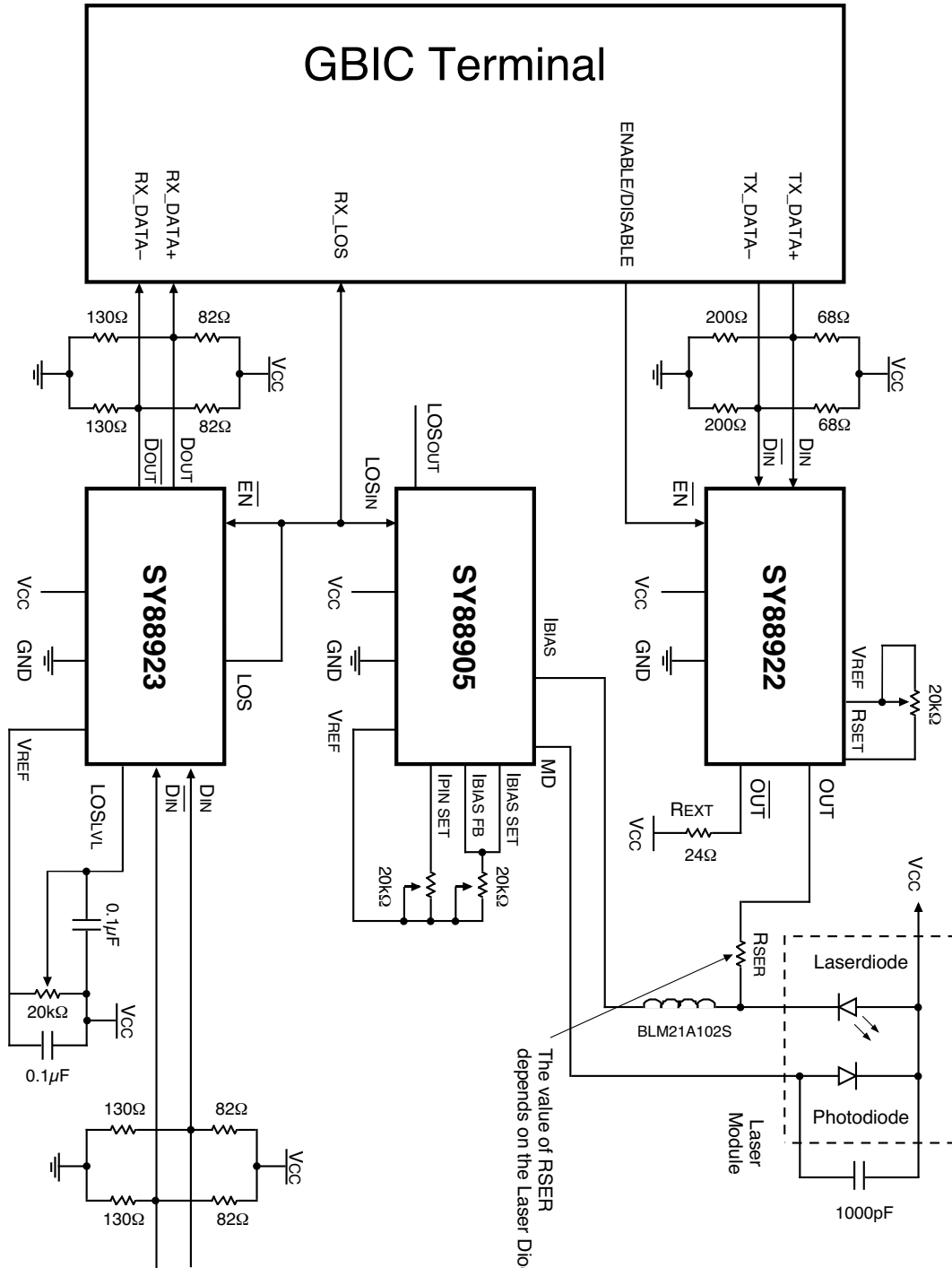| Symbol	Parameter	T_A = 0°C			T_A = +25°C			T_A = +85°C			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
t_{pd} D	Propagation Delay D_{IN} - OUT	—	—	1000	—	500	1000	—	—	1000	ps	
t_{pd} EN	Propagation Delay /EN - OUT	—	—	1000	—	450	1000	—	—	1000	ps	
t_r t_f	Rise/Fall Time (20% to 80%)	—	—	160	—	110	160	—	—	160	ps	Load = 25Ω
I_{OR}	Output Current Ringing[2]	—	—	10	—	—	10	—	—	10	%	

Notes:

1. R_{EXT} = R_{SER} = 25Ω ±1%, R_{SER} connects to V_{CC} directly without Laser Diode.
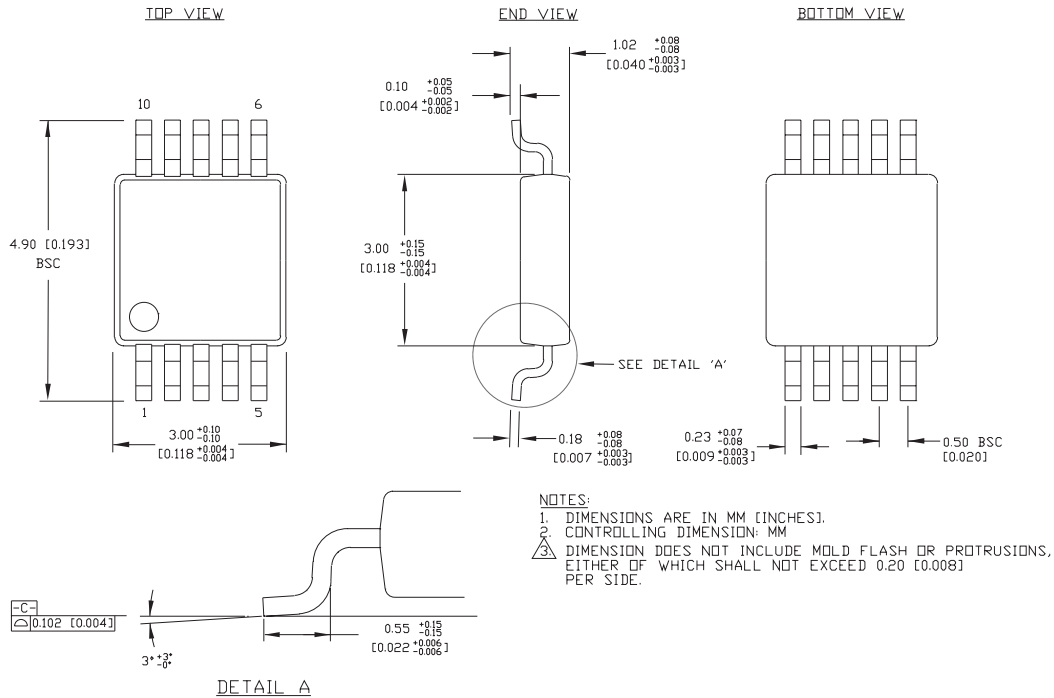
2. I_{OH} = 5 to 25mA

PERFORMANCE CURVES
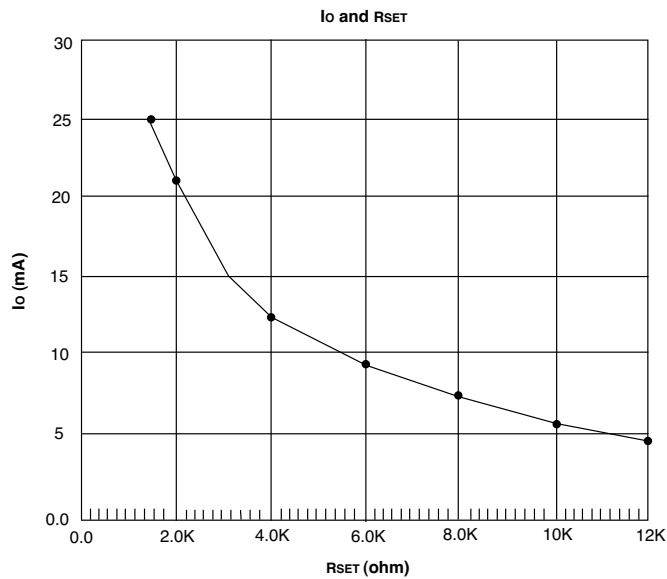
APPLICATION EXAMPLE FOR 3-CHIP SET SOLUTION

10 LEAD MSOP (K10-1)

TOP VIEW

END VIEW

BOTTOM VIEW

4.90 [0.193] BSC

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

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.