

## FEATURES

- Up to 1.25Gbps operation
- 25mA peak drive current
- Separate modulation control
- Separate output enable for laser safety
- Differential inputs for data
- 75K $\Omega$  input pulldown resistor
- Single power supply
- Designed for use with SY88903 and SY88904
- Available in a tiny 10-pin (3mm) MSOP

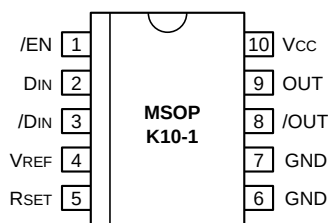
## DESCRIPTION

The SY88902 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  $\overline{OUT}$  and  $V_{CC}$  to dissipate the worst case power.  $R_{SER}$  is recommended to compensate for laser diode matching issues.

The SY88902 utilizes the high performance bipolar ASSET™ technology.

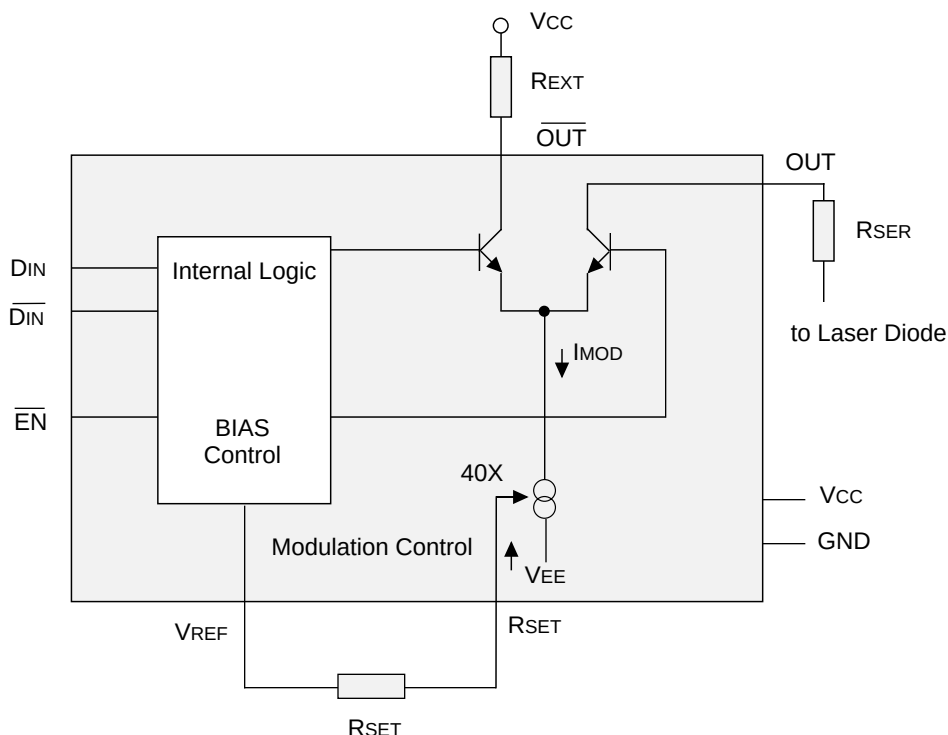
## PIN CONFIGURATIONS



## APPLICATIONS

- 1.25Gbps Gigabit Ethernet
- 531Mbps and 1062Mbps Fibre Channel
- 622Mbps SONET
- Gigabit Interface Converter

## BLOCK DIAGRAM



**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 $I_{mod}$ .                                |

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

| D | $\bar{D}$ | /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 =  $I_{OUT} = 0\text{mA}$

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

| Symbol             | Rating                      | Value       | Unit |
|--------------------|-----------------------------|-------------|------|
| VCC                | Power Supply Voltage        | 0 to +7.0   | V    |
| V <sub>I</sub>     | Input Voltage               | 0 to VCC    | V    |
| I <sub>O</sub>     | Output Current              | 25          | mA   |
| T <sub>A</sub>     | Operating Temperature Range | 0 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.

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

| Symbol           | Rating                                                  | Value          | Unit     |
|------------------|---------------------------------------------------------|----------------|----------|
| VCC              | Power Supply Voltage                                    | +4.5 to +5.5   | V        |
| R <sub>EXT</sub> | Resistor to Dissipate Power                             | 10 to 50       | $\Omega$ |
| R <sub>SER</sub> | Laser Diode Serial Resistor                             | 0 to 50        | $\Omega$ |
| R <sub>SET</sub> | Resistor to Adjust Current                              | 1500 to 50,000 | $\Omega$ |
| $\Theta_{JA}$    | Thermal Resistance of Package to Ambient <sup>(2)</sup> | 206            | °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 2V.
2. Still air without heatsink.

## DC ELECTRICAL CHARACTERISTICS

GND = 0V; VCC = +5.0V  $\pm 10\%$ ; TA = 0°C to + 85°C

| Symbol            | Parameter                                                                      | TA = 0°C              |      |                       | TA = +25°C            |      |                       | TA = +85°C            |      |                       | Unit |
|-------------------|--------------------------------------------------------------------------------|-----------------------|------|-----------------------|-----------------------|------|-----------------------|-----------------------|------|-----------------------|------|
|                   |                                                                                | Min.                  | Typ. | Max.                  | Min.                  | Typ. | Max.                  | Min.                  | Typ. | Max.                  |      |
| V <sub>IH</sub>   | Input HIGH Voltage<br>(D <sub>IN</sub> , /D <sub>IN</sub> , /EN)               | V <sub>CC</sub> -1165 | —    | V <sub>CC</sub> -880  | V <sub>CC</sub> -1165 | —    | V <sub>CC</sub> -880  | V <sub>CC</sub> -1165 | —    | V <sub>CC</sub> -880  | mV   |
| V <sub>IL</sub>   | Input LOW Voltage<br>(D <sub>IN</sub> , /D <sub>IN</sub> , /EN)                | V <sub>CC</sub> -1810 | —    | V <sub>CC</sub> -1475 | V <sub>CC</sub> -1810 | —    | V <sub>CC</sub> -1475 | V <sub>CC</sub> -1810 | —    | V <sub>CC</sub> -1475 | mV   |
| V <sub>REF</sub>  | Reference Voltage                                                              | —                     | 3.12 | —                     | —                     | 3.00 | —                     | —                     | 2.80 | —                     | V    |
| I <sub>IL</sub>   | Input LOW Current <sup>(1)</sup><br>(D <sub>IN</sub> , /D <sub>IN</sub> , /EN) | 0.5                   | —    | —                     | 0.5                   | —    | —                     | 0.5                   | —    | —                     | uA   |
| I <sub>IH</sub>   | Input HIGH Current<br>(D <sub>IN</sub> , /D <sub>IN</sub> , /EN)               | —                     | —    | 100                   | —                     | —    | 100                   | —                     | —    | 100                   | uA   |
| I <sub>CC</sub>   | Supply Current <sup>(2)</sup>                                                  | —                     | 16   | 25                    | —                     | 16   | 25                    | —                     | 16   | 25                    | mA   |
| I <sub>OL</sub>   | Output LOW Current<br>(/EN = HIGH)                                             | —                     | —    | 500                   | —                     | —    | 500                   | —                     | —    | 500                   | uA   |
| I <sub>OUT</sub>  | Modulation Current                                                             | 5                     | 15   | 25                    | 5                     | 15   | 25                    | 5                     | 15   | 25                    | mA   |
| I <sub>RSET</sub> | Modulation Control                                                             | 0.125                 | —    | 0.625                 | 0.125                 | —    | 0.625                 | 0.125                 | —    | 0.625                 | mA   |
| A <sub>RSET</sub> | =I <sub>OUT</sub> /I <sub>RSET</sub>                                           | 30                    | 38   | 44                    | 30                    | 38   | 44                    | 30                    | 38   | 44                    | —    |

### NOTES:

1. V<sub>I</sub> = V<sub>IL</sub>(Min.)
2. I<sub>MOD</sub> = 25mA.

## AC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>

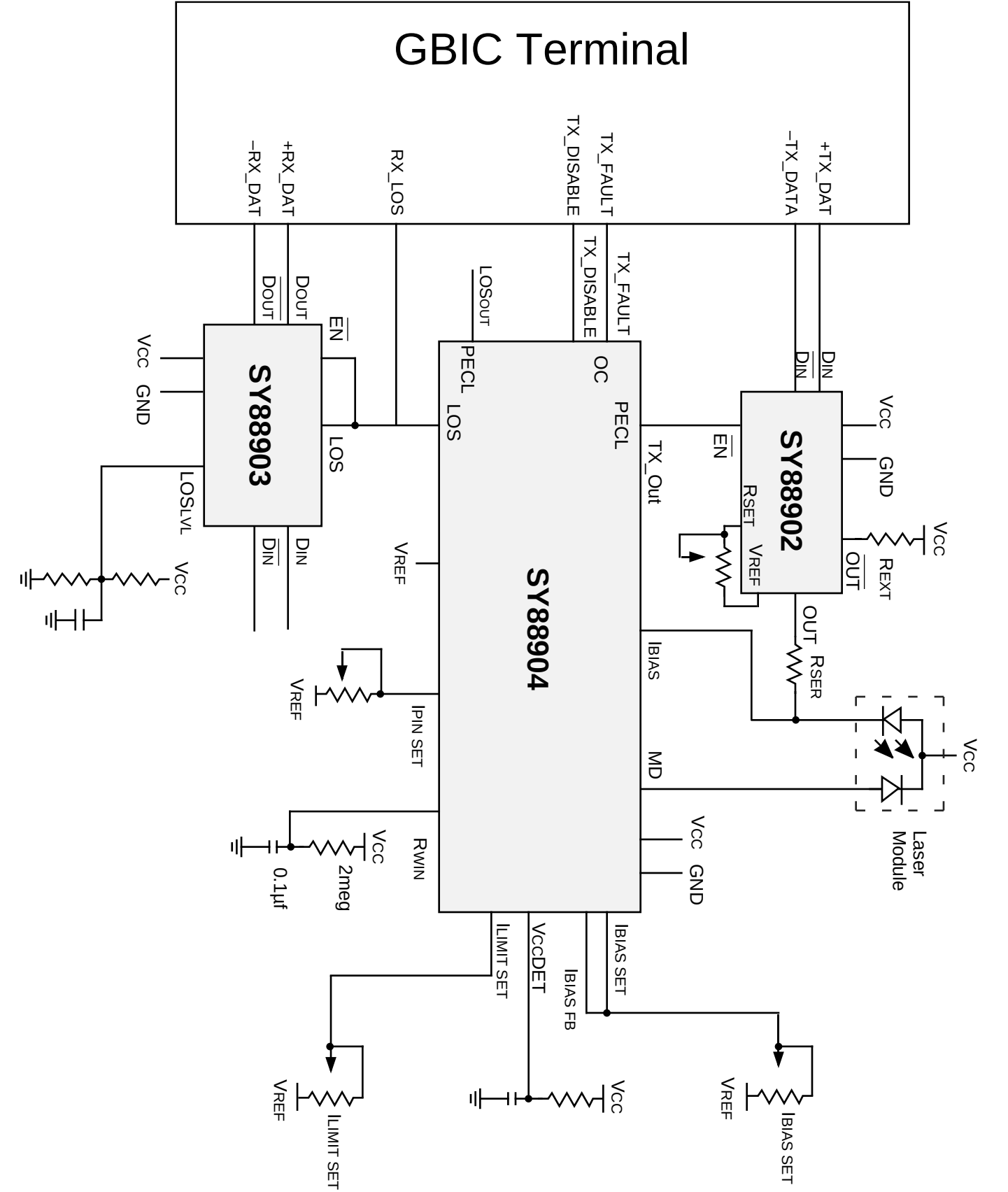
I<sub>MOD</sub> = 10mA; GND = 0V; VCC = +5V  $\pm 10\%$ ; TA = 0°C to + 85°C

| Symbol                           | Parameter                                  | TA = 0°C |      |      | TA = +25°C |      |      | TA = +85°C |      |      | Unit | Conditions              |
|----------------------------------|--------------------------------------------|----------|------|------|------------|------|------|------------|------|------|------|-------------------------|
|                                  |                                            | Min.     | Typ. | Max. | Min.       | Typ. | Max. | Min.       | Typ. | Max. |      |                         |
| t <sub>pd</sub> D                | Propagation Delay<br>D <sub>IN</sub> - OUT | —        | —    | 1000 | —          | 500  | 1000 | —          | —    | 1000 | ps   | I <sub>MOD</sub> = 10mA |
| t <sub>pd</sub> EN               | Propagation Delay<br>/EN - OUT             | —        | —    | 1000 | —          | 450  | 1000 | —          | —    | 1000 | ps   | I <sub>MOD</sub> = 10mA |
| t <sub>r</sub><br>t <sub>f</sub> | Rise/Fall Time<br>(20% to 80%)             | —        | 200  | —    | —          | 200  | —    | —          | 200  | —    | ps   |                         |
| I <sub>OR</sub>                  | Output Current Ringing <sup>(2)</sup>      | —        | —    | 10   | —          | —    | 10   | —          | —    | 10   | %    |                         |

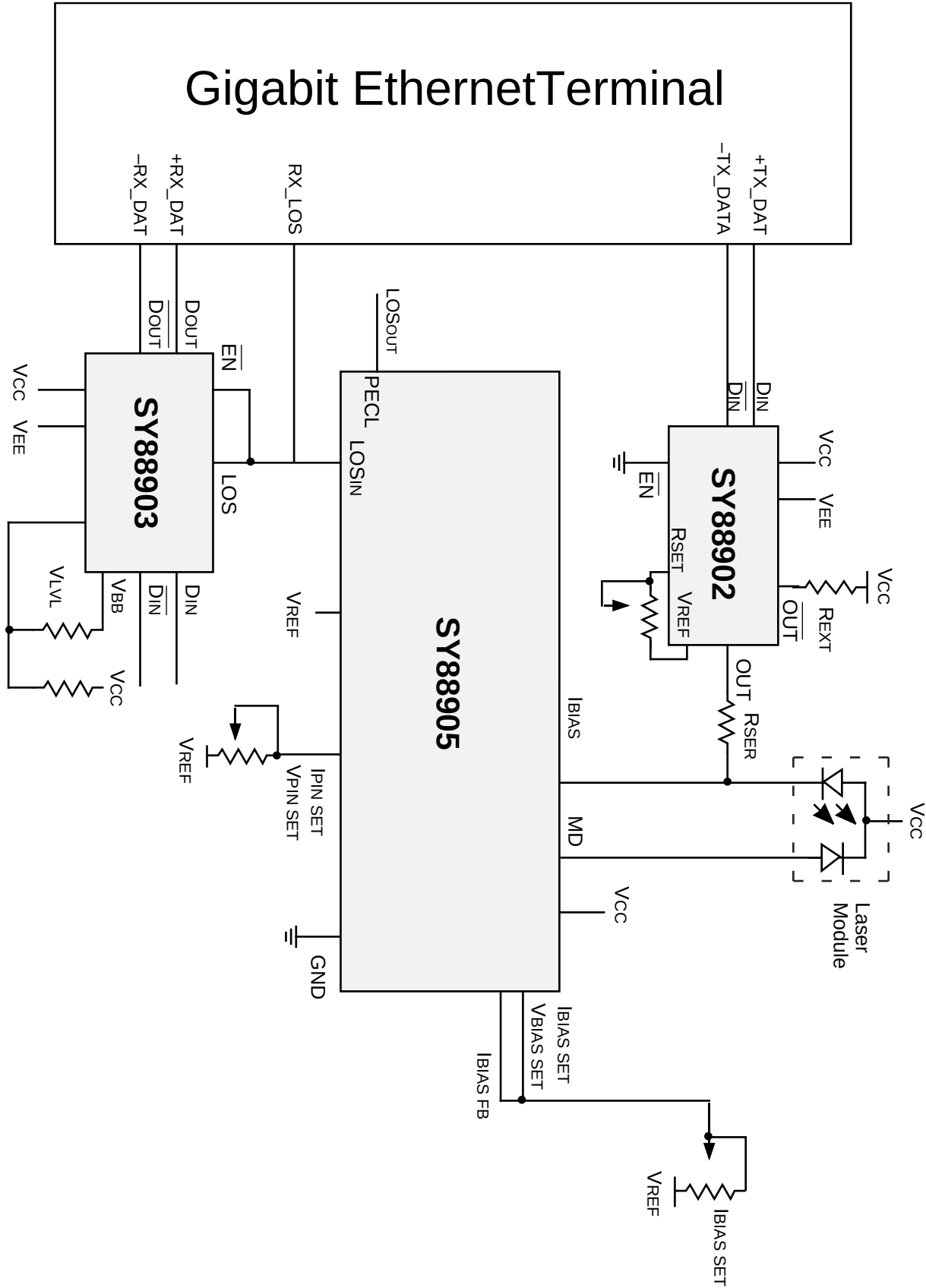
### NOTES:

1. R<sub>EXT</sub> = R<sub>SER</sub> = 50Ω  $\pm 1\%$ , R<sub>SER</sub> connects to VCC directly without Laser Diode.
2. I<sub>OH</sub> = 5 to 25mA

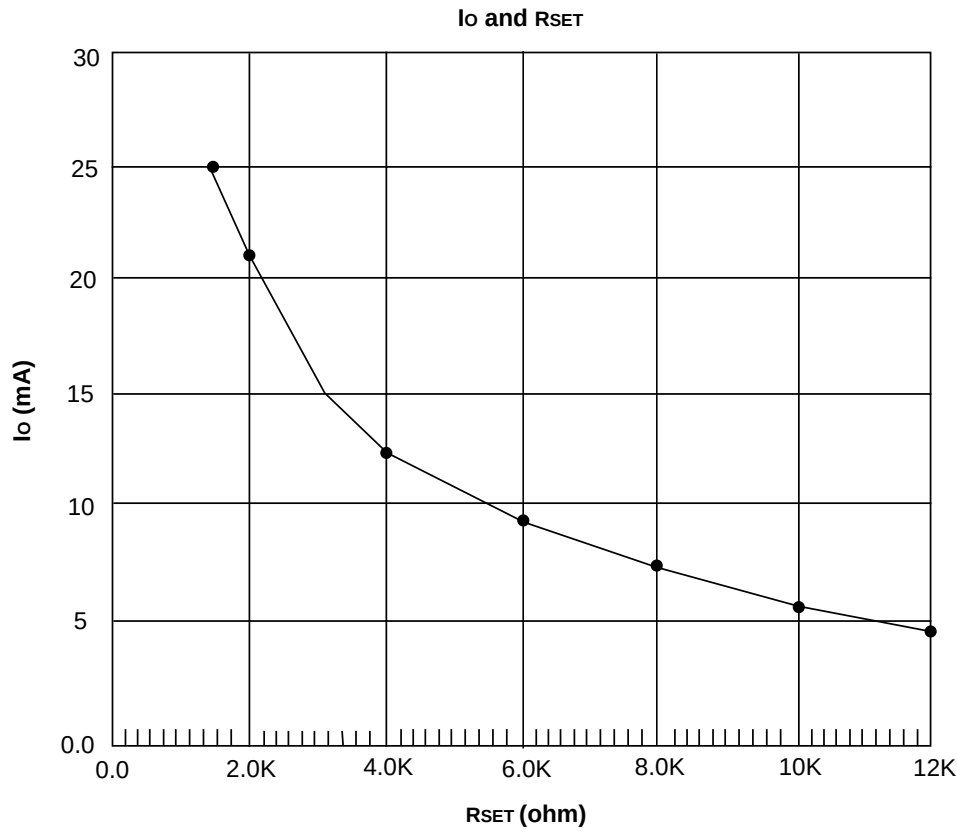
APPLICATION EXAMPLE FOR 3-CHIP SET SOLUTION



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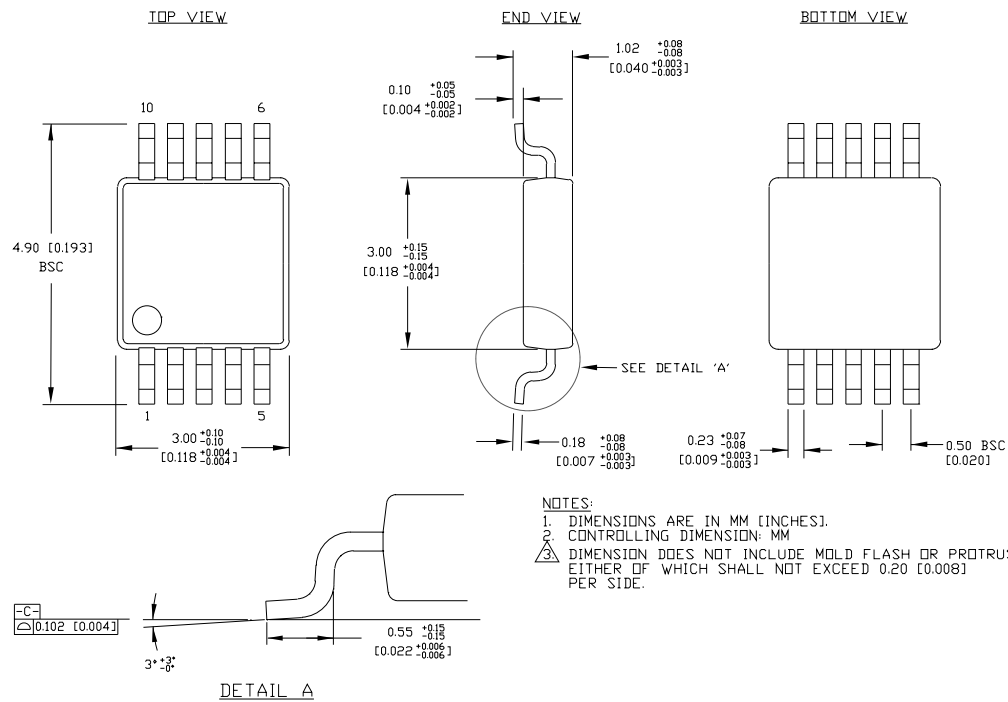
PERFORMANCE CURVES



PRODUCT ORDERING CODE

| Ordering Code | Package Type | Operating Range |
|---------------|--------------|-----------------|
| SY88902KC     | K10-1        | Commercial      |
| SY88902KCTR   | K10-1        | Commercial      |

# 10 LEAD MSOP (K10-1)



Rev. 00

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