

### FEATURES

- DC bias current adjustable to 25mA
- Buffered Loss-of-Signal output when used with SY88903
- Monitor Diode power control circuit
- Designed for use with SY88902 and SY88903
- Single power supply
- Available in 10-pin (3mm) MSOP

### APPLICATIONS

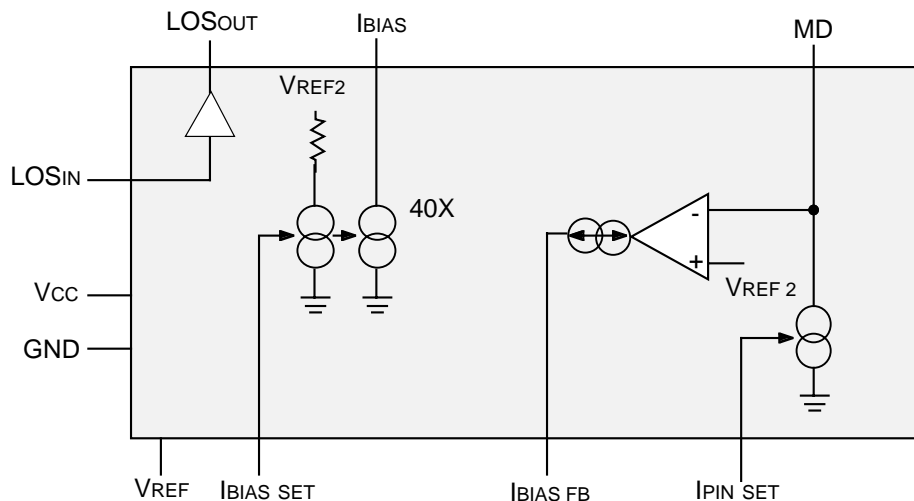
- Controller for High Speed Optical Data Transmission
- 1.25Gbps Gigabit Ethernet
- 531 Mbps and 1062Mbps Fibre Channel
- 622Mbps SONET
- Gigabit Interface Converter

### DESCRIPTION

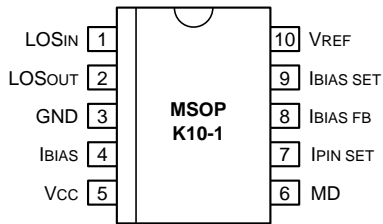
The SY88905 is an integrated Laser Diode controller for the SY88902 Laser Driver and SY88903 Laser Receiver that provides power control functions for a complete module solution. The SY88905 is designed to provide the laser diode with an independent DC threshold current (IBIAS) source to assure optimum laser diode performance. The SY88905 also provides buffered Loss-of-Signal (LOS) output in PECL level. The device is designed for fast and accurate calibration of the laser diode.

Once the optimal operating point is determined and set for a specific laser diode, the threshold current (IBIAS) is designed to automatically compensate for laser diode aging and module temperature.

### BLOCK DIAGRAM



**PACKAGE/ORDERING INFORMATION**



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

**Ordering Information**

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY88905KC	K10-1	Commercial	905	Sn-Pb
SY88905KCTR <sup>(1)</sup>	K10-1	Commercial	905	Sn-Pb
SY88905KH	K10-1	Commercial	905 with Pb-Free bar-line indicator	Pb-Free NiPdAu
SY88905KHTR <sup>(1)</sup>	K10-1	Commercial	905 with Pb-Free bar-line indicator	Pb-Free NiPdAu

**Note:**

- 1. Tape and Reel.

**PIN NAMES**

Pin	Type	Description
VCC	Power	Positive Power supply
GND	Power	Ground
LOSIN	TTL Input	Loss-of-Signal Input from SY88903
VREF	Analog Output	Reference Voltage
IPIN SET	Analog Input	Adjustable, Resistor to VREF sets Monitor Diode Photo Current Reference
LOSOUT	PECL Output	Loss-of-Signal PECL output
IBIASFB	Analog Output	Monitor Diode Feedback
IBIASSET	Analog Input	Adjustable, Resistor to VREF sets the DC bias current for the Laser Diode
MD	Analog Input	Monitor Diode Connection
IBIAS	Analog Input	DC bias current for the Laser Diode

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

Symbol	Rating	Value	Unit
V <sub>CC</sub>	Power Supply Voltage	0 to +7.0	V
LOS <sub>IN</sub>	Input Voltage	0 to V <sub>CC</sub>	V
LOS <sub>OUT</sub> , I <sub>PIN SET</sub> I <sub>BIASFB</sub> , I <sub>BIAS SET</sub>	Others; I/O Voltage	-0.3, V <sub>CC</sub> +0.3	V
T <sub>A</sub>	Operating Temperature Range	0 to +85	°C
T <sub>store</sub>	Storage Temperature Range	-55 to +125	°C
I <sub>PIN SET</sub> , I <sub>BIAS SET</sub> , I <sub>MD</sub>	Max. Sink Current	1	mA
I <sub>BIASFB</sub>	Max. Source Current	1	mA
I <sub>BIAS</sub>	Max. Sink Current	30	mA
I <sub>VREF</sub>	Max. Source Current	2	mA

**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.

**100H ECL DC ELECTRICAL<sup>(1)</sup>**V<sub>CC</sub> = +5V ±10%

Symbol	Parameter	T <sub>A</sub> = 0°C		T <sub>A</sub> = +25°C		T <sub>A</sub> = +85°C		Unit	Condition
		Min.	Max.	Min.	Max.	Min.	Max.		
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> - 1025	V <sub>CC</sub> - 880	V <sub>CC</sub> - 1025	V <sub>CC</sub> - 880	V <sub>CC</sub> - 1025	V <sub>CC</sub> - 880	mV	50Ω to V <sub>CC</sub> -2V
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> - 1810	V <sub>CC</sub> - 1620	V <sub>CC</sub> - 1810	V <sub>CC</sub> - 1620	V <sub>CC</sub> - 1810	V <sub>CC</sub> - 1620	mV	50Ω to V <sub>CC</sub> -2V

**Note:**

1. 100H circuits are designed to meet the DC specifications shown in the table where transverse airflow greater than 500lfpm is maintained.

## DC ELECTRICAL CHARACTERISTICS

VCC = +5V ±10%

Symbol	Parameter	TA = 0°C			TA = +25°C			TA = +85°C			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
ICC	Power Supply Current	—	—	40	—	28	40	—	—	40	mA	No output load
IBIAS SET	IBIAS SET Input Current	—	—	0.9	—	—	0.9	—	—	0.9	mA	
IBIAS	IBIAS Output Current	0.5	—	25	0.5	—	25	0.5	—	25	mA	
ABIAS	IBIAS Current Gain	28	—	44	28	37	44	28	—	44		=IBIAS / IBIAS SET
VREF	Reference Voltage	2.30	—	3.30	2.30	2.75	3.30	2.30	—	3.30	V	IREF = -100µA
ΔVPIN SET	VPIN SET Voltage Tracking	0.95	—	1.35	0.95	1.13	1.35	0.95	—	1.35	V	=VREF - VPIN SET
ΔVBIAS SET	VBIAS Voltage Tracking	0.8	—	1.20	0.8	1.0	1.20	0.8	—	1.20	V	=VREF - VBIAS SET
VCOMP BIAS	Compliance Voltage	0.1	—	1.0	0.1	0.4	1.0	0.1	—	1.0	V	IBIAS = 15mA
IBIAS FB	Feedback Current <sup>(1)</sup>	350	—	—	350	500	—	350	—	—	µA	
ABIAS FB	Feedback Gain <sup>(2)</sup>	4	—	14	4	—	14	4	—	14		

### Notes:

1.  $|I_{MD} - I_{PIN SET}| = 100\mu A$
2.  $|I_{BIAS FB}| / |I_{MD} - I_{PIN SET}|$

## TTL DC ELECTRICAL CHARACTERISTICS

VCC = +5V ±10%

Symbol	Parameter	TA = 0°C		TA = +25°C		TA = +85°C		Unit	Condition
		Min.	Max.	Min.	Max.	Min.	Max.		
V <sub>IH</sub>	Input HIGH Voltage	2.0	—	2.0	—	2.0	—	V	—
V <sub>IL</sub>	Input LOW Voltage	—	0.8	—	0.8	—	0.8	V	—
I <sub>IH</sub>	Input HIGH Current	—	20	—	20	—	20	µA	V <sub>IN</sub> = 2.7V V <sub>IN</sub> = V <sub>CC</sub>
I <sub>IL</sub>	Input LOW Current	—	-0.3	—	-0.3	—	-0.3	mA	V <sub>IN</sub> = 0.5V
V <sub>IK</sub>	Input Clamp Voltage	—	-1.2	—	-1.2	—	-1.2	V	I <sub>IN</sub> = -12mA

### Note:

1. Individual product specifications over-ride general specifications.

## DETAILED DESCRIPTION

The SY88905 is an integrated control circuit for laser diode modules intended for high-frequency fiber-optic applications. The device is designed to operate with the SY88902 laser diode driver providing Automatic Power Control (APC) which provides bias current control and monitor diode interface. The device also interfaces with the SY88903 high-speed limiting amplifier providing chatter-free Loss of Signal function.

### Laser Diode Supply Current

The SY88905 provides the adjustable drive current for the laser diode, DC bias.

### Monitor Diode

The MD pin on the SY88905 provides low frequency light intensity, laser power out feedback from the monitor diode in the laser diode package. This feedback is used to adjust the IBIAS level through the Automatic Power Control circuit to maintain a near constant power output from the laser diode.

**SIMULATION GRAPHS**

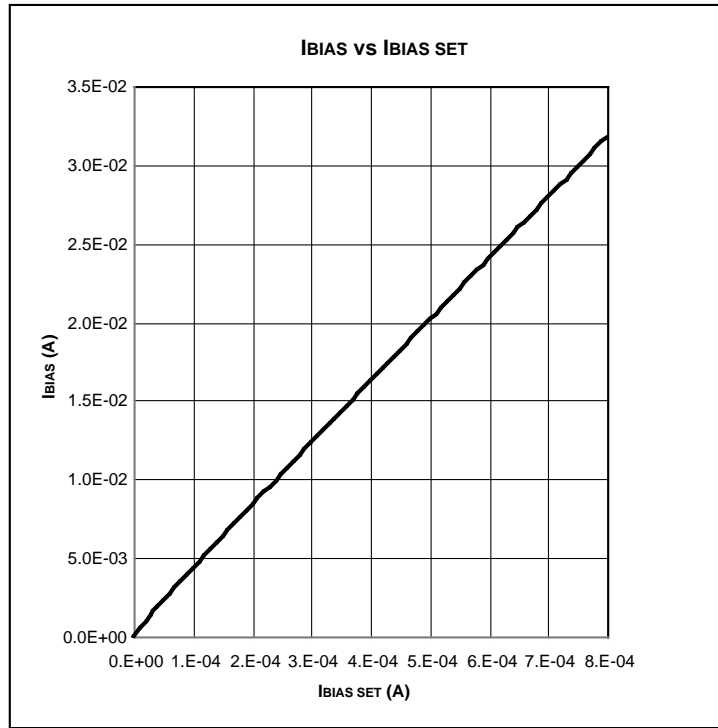


Figure 1. IBIAS v. IBIAS SET

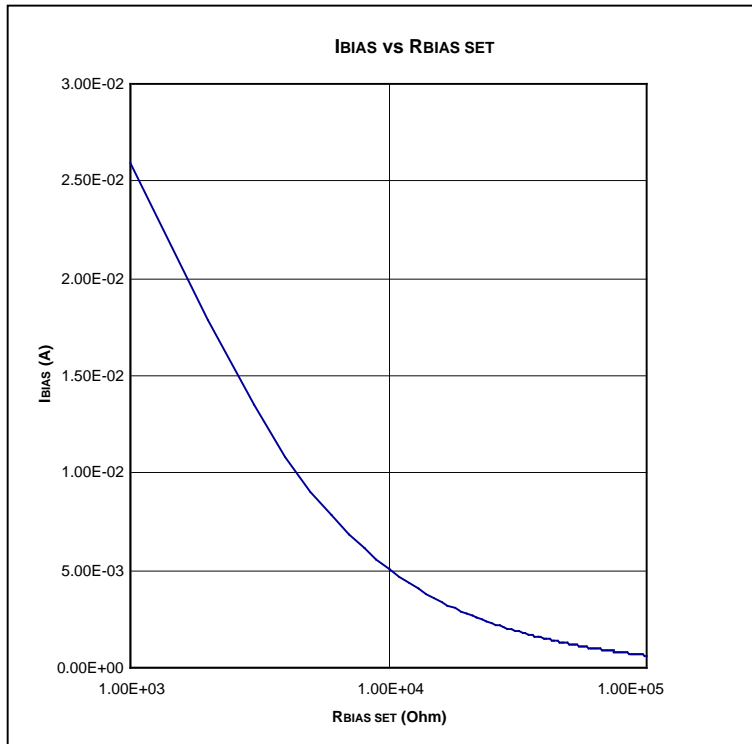


Figure 2. IBIAS v. RBIAS SET

**SIMULATION GRAPHS**

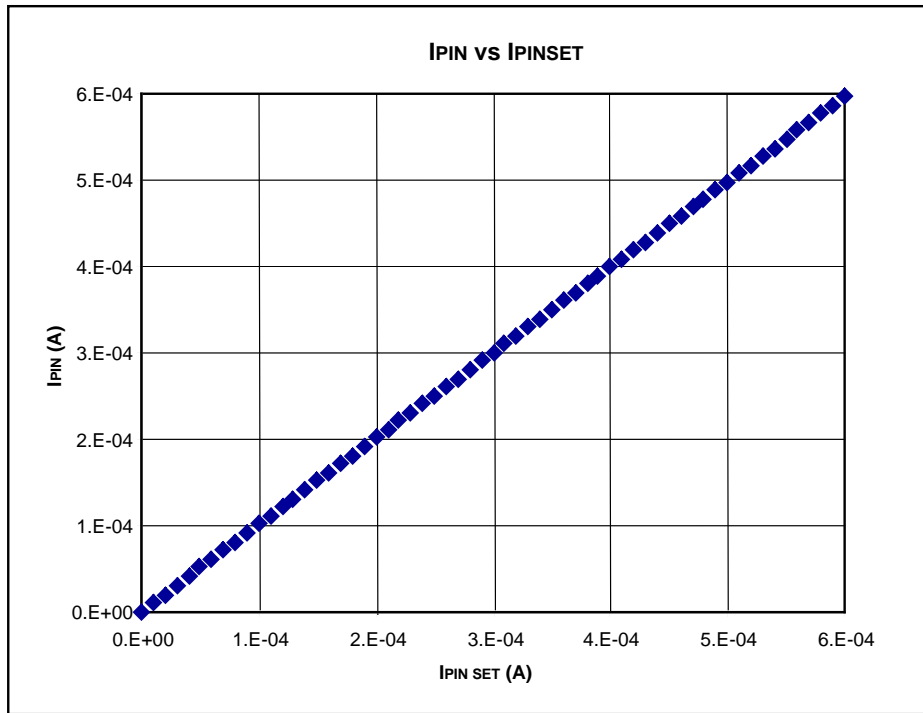


Figure 3. IPIN v. IPIN SET

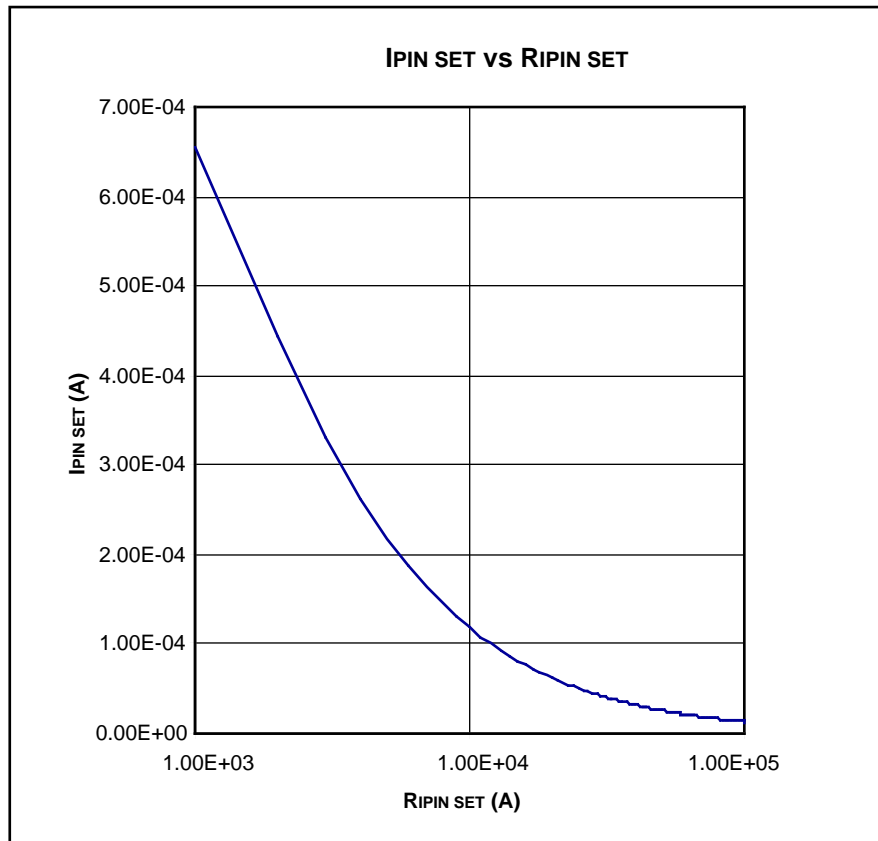


Figure 4. IPIN SET v. RIPIN SET

**SIMULATION GRAPHS**

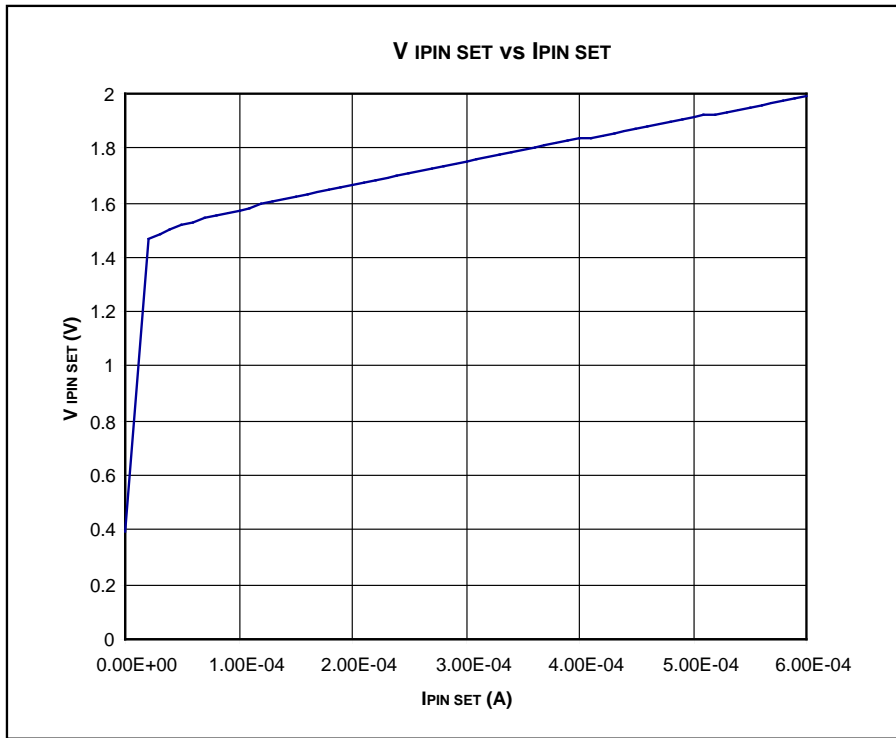


Figure 5. V IPIN SET v. IPIN SET

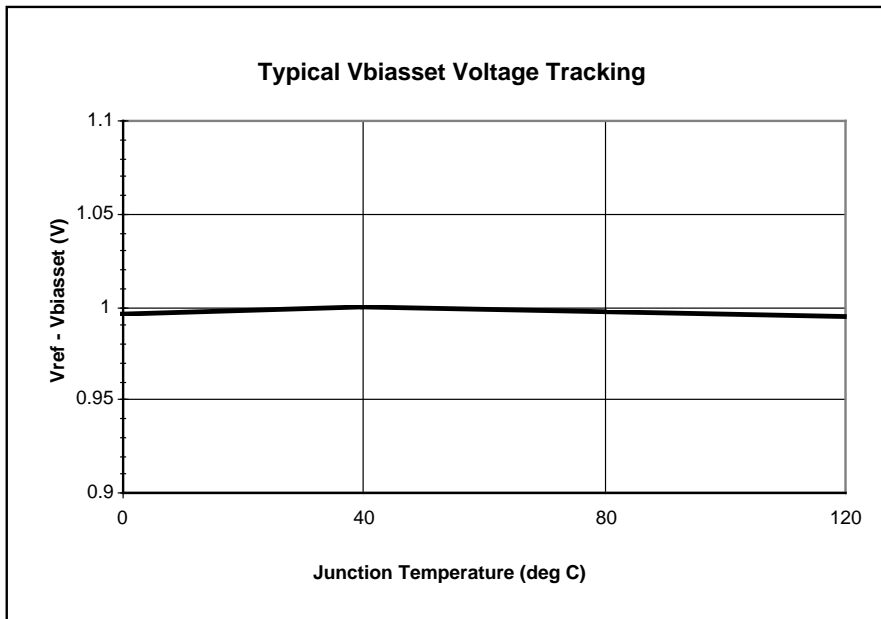


Figure 6. Typical VBIAS SET Voltage Tracking

**SIMULATION GRAPHS**

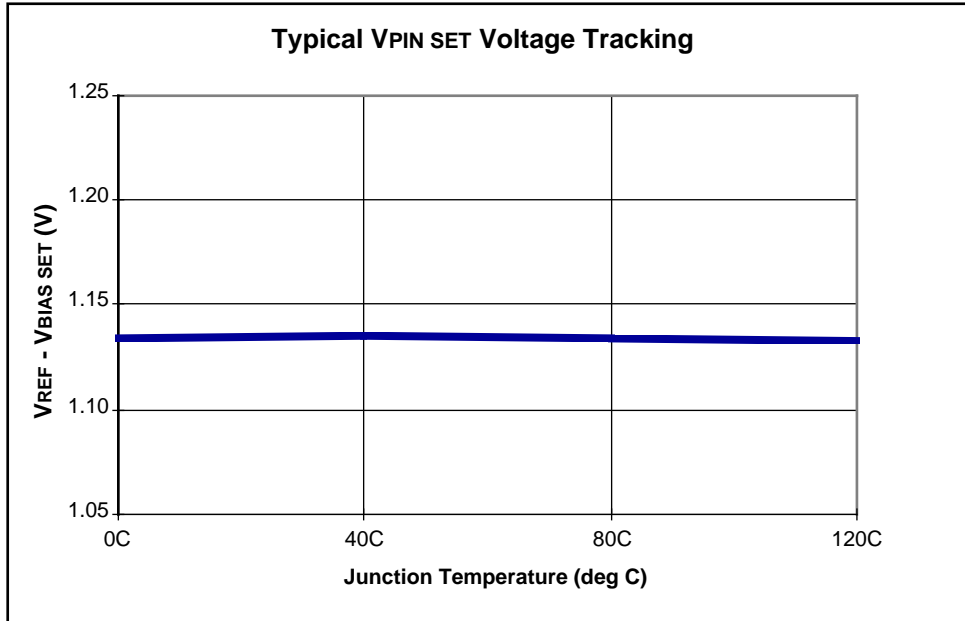


Figure 7. Typical VPIN SET Voltage Tracking

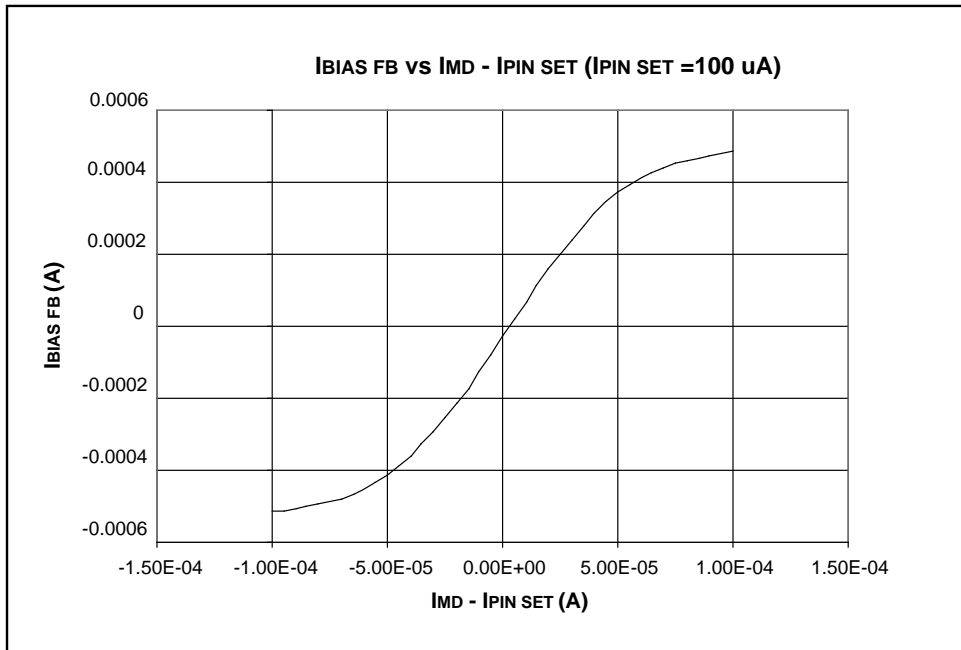
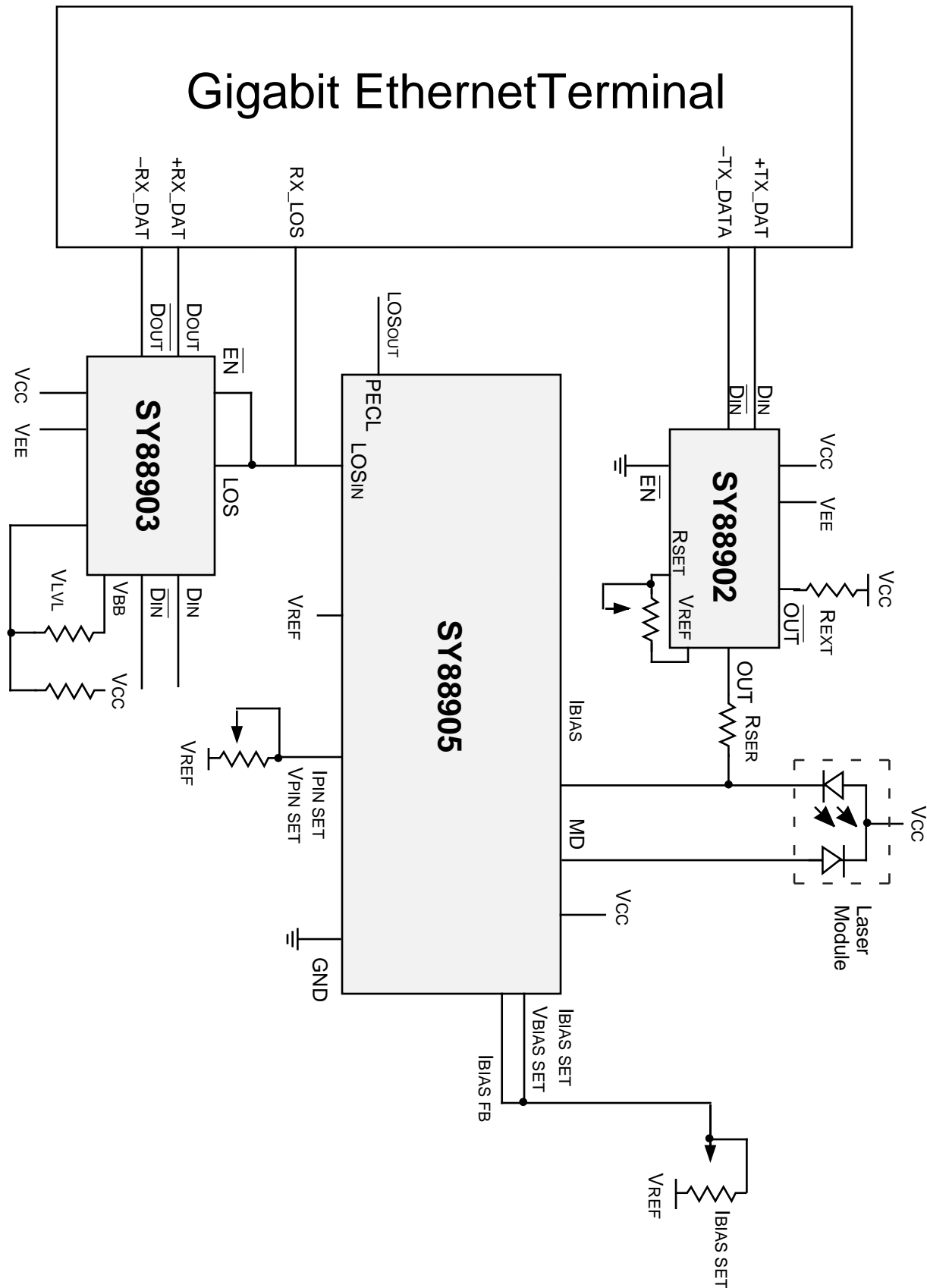


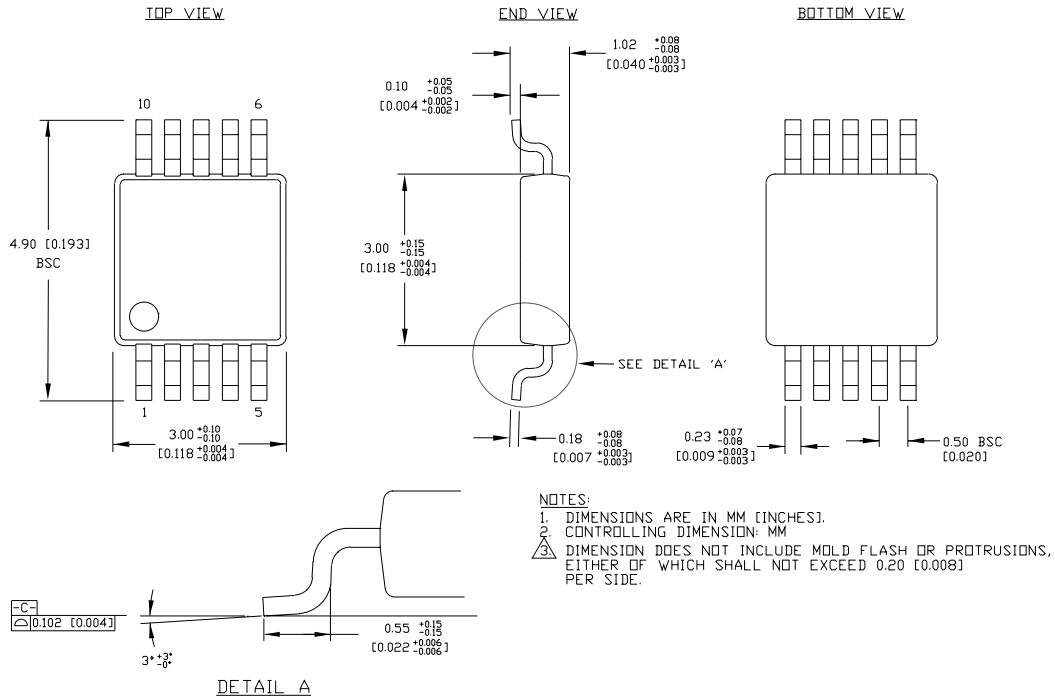
Figure 8. IBIAS FB VS. IMD - IPIN SET



**APPLICATION EXAMPLE FOR 3-CHIP SET SOLUTION**



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



Rev. 00

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