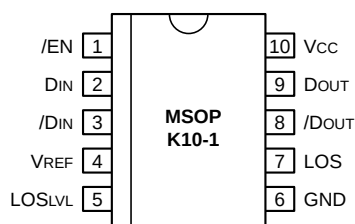


FEATURES

- 3.3V and 5V power supply option
- Up to 1.5Gbps operation
- Low noise
- Chatter-Free LOS Generation
- Open Collector TTL LOS Output
- TTL /EN Input
- Differential PECL inputs for data
- Single power supply
- Designed for use with (Micrel-Synergy laser diode driver and controller)
- Available in a tiny 10-pin (3mm) MSOP

PIN CONFIGURATION



DESCRIPTION

The SY88903V limiting post amplifier with its high gain and wide bandwidth is ideal for use as a post amplifier in fiber-optic receivers with data rates up to 1.5Gbps. Signals as small as 5mVp-p can be amplified to drive devices with PECL inputs. The SY88903V generates a chatter-free Loss of Signal (LOS) open collector TTL output.

The SY88903V incorporates a programmable level detect function to identify when the input signal has been lost. This information can be fed back to the /EN input of the device to maintain stability under loss of signal condition. The sensitivity of the level detection can be adjusted using LOSLVL. The LOSLVL voltage can be set by connecting a resistor divider between VCC and VREF as shown in Figure 3. Figure 4 and 5 show the relationship between input level sensitivity and the voltage set on LOSLVL.

The LOS output is a TTL open collector output that requires a pull-up resistor for proper operation, Figure 1.

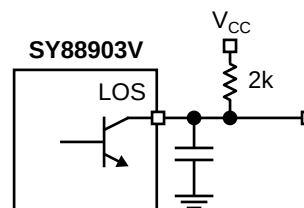
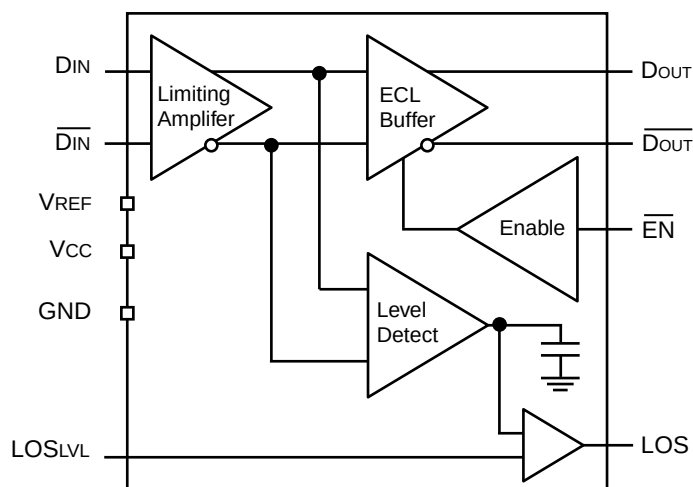


Figure 1. LOS Output with Desired Rise Time

APPLICATIONS

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

BLOCK DIAGRAM



PIN NAMES

Pin	Type	Function
D _{IN}	Data Input	Data Input
/D _{IN}	Data Input	Inverting Data Input
LOS _{LVL}	Input	LOS Limit Set
/EN	TTL Input	Output Enable (Active Low)
LOS	TTL Output (Open Collector)	Loss of Signal Indicator (Active High)
GND	Ground	Ground
/D _{OUT}	PECL Output	Inverting Data Output
D _{OUT}	PECL Output	Data Output
V _{CC}	Power Supply	Positive Power Supply
V _{REF}	Output	Reference Voltage Output for LOS Level Set (see Fig. 3)

GENERAL DESCRIPTION**General**

The SY88903V is an integrated limiting amplifier intended for high-frequency fiber-optic applications. The circuit connects to typical transimpedance amplifiers found within a fiber-optics link. The linear signal output from a transimpedance amplifier can contain significant amounts of noise, and may vary in amplitude over time. The SY88903V limiting amplifier quantizes the signal and outputs a voltage-limited waveform.

The /EN pin allows the user to disable the output signal without removing the input signal.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Rating	Value	Unit
V _{CC}	Power Supply Voltage	0 to +7.0	V
D _{IN} , /D _{IN}	Input Voltage	0 to V _{CC}	V
D _{OUT} , /D _{OUT}	Output Voltage (with 50Ω load)	V _{CC} -2.5 to V _{CC} +0.3	V
/EN	Input Voltage	0 to V _{CC}	V
LOS _{LVL}	Input Voltage	0 to V _{CC}	V
V _{REF}	Output Voltage	V _{CC} -2.0 to V _{CC}	V
T _A	Operating Temperature Range	-40 to +85	°C
T _{store}	Storage Temperature Range	-55 to +125	°C

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.

DC ELECTRICAL CHARACTERISTICSV_{CC} = +5V ±10% or +3.3V ±10%; R_{LOAD} = 50Ω to V_{CC} -2V, T_A = -40°C to +85°C

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.	
I _{CC}	Power Supply Current ⁽¹⁾	5V	—	35	—	35	—	25	35	—	40	mA
		3.3V	—	35	—	35	—	20	35	—	40	mA
I _{IL}	/EN Input LOW Current		-0.3 ⁽⁶⁾	—	-0.3 ⁽⁶⁾	—	-0.3 ⁽⁶⁾	—	—	-0.3 ⁽⁶⁾	—	mA
I _{IH}	/EN Input HIGH Current		—	20 ⁽⁴⁾	—	20 ⁽⁴⁾	—	—	20 ⁽⁴⁾	—	20 ⁽⁴⁾	μA
			—	100 ⁽⁵⁾	—	100 ⁽⁵⁾	—	—	100 ⁽⁵⁾	—	100 ⁽⁵⁾	μA
V _{CMR}	Common Mode Range		GND +2.0	V _{CC}	GND +2.0	V _{CC}	GND +2.0	—	V _{CC}	GND +2.0	V _{CC}	V
V _{offset}	Differential Output Offset		—	±100	—	±100	—	±40	±100	—	±100	mV
LOS _{LVL}	LOS _{LVL} Level		VREF	VCC	VREF	VCC	VREF	—	VCC	VREF	VCC	V
V _{OL}	LOS Output Low Level ⁽²⁾		—	0.5	—	0.5	—	—	0.5	—	0.5	V
I _{OH}	LOS Output Leakage ⁽³⁾		—	250	—	250	—	—	250	—	250	μA
V _{OH}	D _{OUT} and /D _{OUT} HIGH Output		V _{CC} -1085	V _{CC} -880	V _{CC} -1025	V _{CC} -880	V _{CC} -1025	V _{CC} -955	V _{CC} -880	V _{CC} -1025	V _{CC} -880	mV
V _{OL}	DOUT and /DOUT LOW Output		V _{CC} -1830	V _{CC} -1555	V _{CC} -1810	V _{CC} -1620	V _{CC} -1810	V _{CC} -1705	V _{CC} -1620	V _{CC} -1810	V _{CC} -1620	mV
V _{REF}	Reference Supply		V _{CC} -1.38	V _{CC} -1.26	V _{CC} -1.38	V _{CC} -1.26	V _{CC} -1.38	V _{CC} -1.32	V _{CC} -1.26	V _{CC} -1.38	V _{CC} -1.26	V
I _{REF}	V _{REF} Output Current		-0.8	0.5	-0.8	0.5	-0.8	—	0.5	-0.8	0.5	mA
V _{IH}	/EN Input HIGH Voltage		2.0	—	2.0	—	2.0	—	—	2.0	—	V
V _{IL}	/EN Input LOW Voltage		—	0.8	—	0.8	—	—	0.8	—	0.8	V

NOTES:

1. No output load
2. I_{OL} = + 2mA
3. V_{OH} = 5.5V

4. V_{IN} = 2.7V
5. V_{IN} = V_{CC}
6. V_{IN} = 0.5V

AC ELECTRICAL CHARACTERISTICSV_{CC} = +5V ±10% or +3.3V ±10%; R_{LOAD} = 50Ω to V_{CC} -2V, T_A = -40°C to +85°C

Symbol	Parameter	T _A = -40°C		T _A = 0°C		T _A = +25°C			T _A = +85°C		Unit	Conditions
		Min.	Max.	Min.	Max.	Min.	Typ.	Max.	Min.	Max.		
PSRR	Power Supply ⁽¹⁾ Rejection Ratio	—	—	—	—	—	35	—	—	—	dB	Input referred, 55MHz
V _{ID}	Input Voltage Range	5	1800	5	1800	5	—	1800	5	1800	mVp-p	
t _r , t _f	Output Rise/Fall Time	—	260	—	260	—	170	260	—	260	ps	V _{ID} > 100mVp-p V _{ID} < 100mVp-p
V _{OD}	Differential Output Voltage Swing ⁽²⁾	—	—	—	—	—	700	—	—	—	mV	V _{ID} = 15mVp-p
		200	—	200	—	200	250	—	200	—	mV	V _{ID} = 5mVp-p
t _{OFFL}	LOS Release Time ⁽³⁾ Minimum Input	—	0.5	—	0.5	—	0.1	0.5	—	0.5	μs	
t _{OFFH}	LOS Release Time ⁽⁴⁾ Maximum Input	—	0.5	—	0.5	—	0.1	0.5	—	0.5	μs	
t _{ONL}	LOS Assert Time ⁽³⁾	—	0.5	—	0.5	—	0.2	0.5	—	0.5	μs	
V _{SR}	LOS Sensitivity Range	5	50	5	50	5	—	50	5	50	mVp-p	2 ²³ -1 pattern
HYS	LOS Hysteresis	2	8	2	8	2	4.6	8	2	8	dB	2 ²³ -1 pattern

NOTES:

1. Input referred noise = RMS output noise/low frequency gain.
2. Input is a 622MHz square wave.

3. Input is a 200MHz square wave, t_r < 300ps, 8mVp-p.
4. Input is a 200MHz square wave, t_r < 300ps, 1.8Vp-p.

DESIGN PROCEDURE

Output Termination

The SY88903V outputs must be terminated with a 50Ω load to Vcc – 2V (or Thevenin equivalent).

Layout and PCB Design

Since the SY88903V is a high-frequency component, performance can largely be determined by board layout and design. A common problem with high-gain amplifiers is feedback from the large swing outputs to the input via the power supply.

The SY88903V ground pin should be connected to the circuit board ground. Use multiple PCB vias close to the part to connect to ground. Avoid long, inductive runs which can degrade performance.

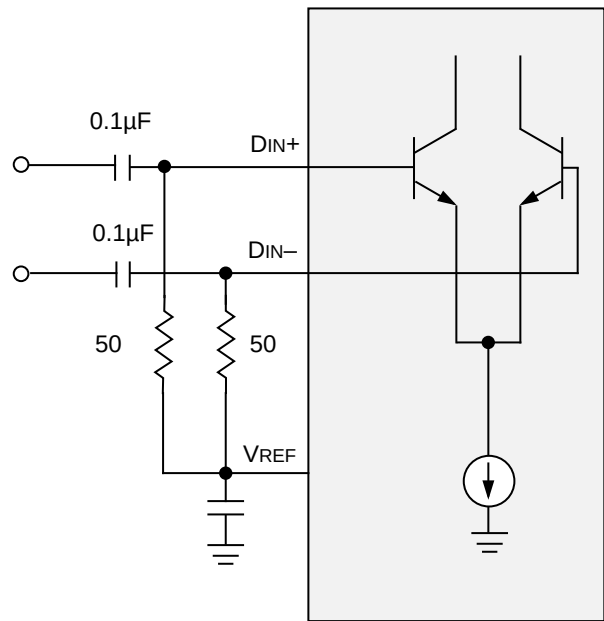
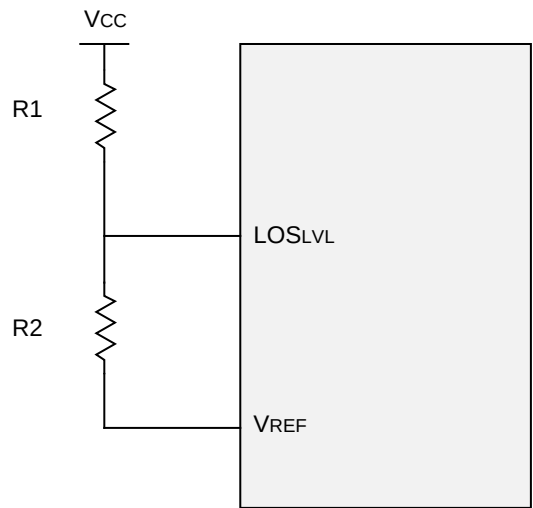


Figure 2. Differential Input Configuration



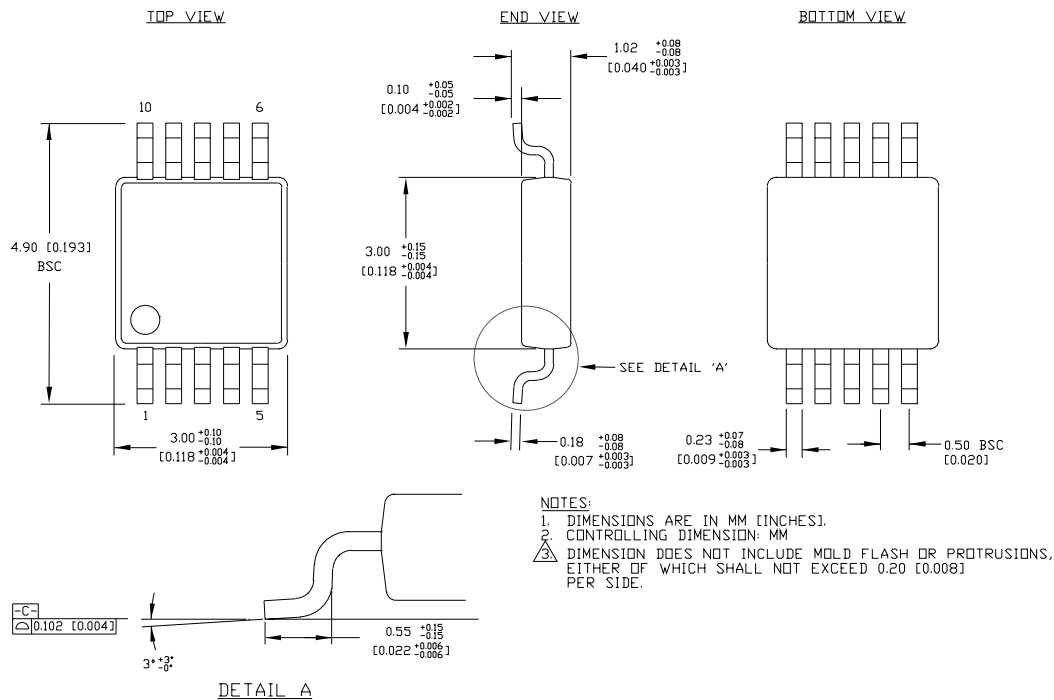
NOTES:
 $LOSLvs = Vcc - 1.32V + \frac{R2 \times 1.32V}{R1 + R2}$
 $R1 + R2 \geq 2.6k\Omega$

Figure 3. LOSLVL Circuit

PRODUCT ORDERING CODE

Ordering Code	Package Type	Operating Range
SY88903VKC	K10-1	Commercial
SY88903VKCTR	K10-1	Commercial

10 LEAD MSOP (K10-1)



Rev. 00

MICREL-SYNERGY 3250 SCOTT BOULEVARD SANTA CLARA CA 95054 USA

TEL + 1 (408) 980-9191 FAX + 1 (408) 914-7878 WEB <http://www.synergysemi.com> <http://www.micrel.com>

This information is believed to be accurate and reliable, however no responsibility is assumed by Micrel for its use nor for any infringement of patents or other rights of third parties resulting from its use. No license is granted by implication or otherwise under any patent or patent right of Micrel Inc.

© 1999 Micrel Incorporated