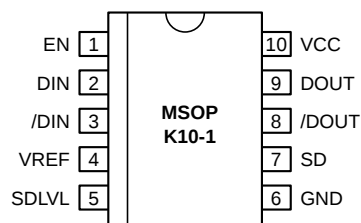


PACKAGE/ORDERING INFORMATION



Ordering Information

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY88943VKC	K10-1	Commercial	943V	Sn-Pb
SY88943VKCTR ⁽¹⁾	K10-1	Commercial	943V	Sn-Pb
SY88943VKG	K10-1	Commercial	943V with Pb-Free bar-line indicator	Pb-Free NiPdAu
SY88943VKGTR ⁽¹⁾	K10-1	Commercial	943V with Pb-Free bar-line indicator	Pb-Free NiPdAu

Note:

1. Tape and Reel.

PIN NAMES

Pin	Type	Function
D _{IN}	Data Input	Data Input
/D _{IN}	Data Input	Inverting Data Input
SD _{LVL}	Input	SD Level Set
EN	TTL Input	Output Enable (Active High)
SD	TTL Output (Open Collector)	Signal Detect
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 SD Level Set (see Fig. 3)

GENERAL DESCRIPTION

General

The SY88943V 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 SY88943V 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
SD _{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 CHARACTERISTICS
 $V_{CC} = +5V \pm 10\%$, $R_{LOAD} = 50\Omega$ to $V_{CC} - 2V$

Symbol	Parameter	$T_A = -40^\circ C$		$T_A = 0^\circ C$		$T_A = +25^\circ C$			$T_A = +85^\circ C$		Unit
		Min.	Max.	Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
I_{CC}	Power Supply Current ⁽¹⁾ 5V 3.3V	—	40	—	40	—	33	40	—	45	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⁾ 100 ⁽⁵⁾	—	20 ⁽⁴⁾ 100 ⁽⁵⁾	—	—	20 ⁽⁴⁾ 100 ⁽⁵⁾	—	20 ⁽⁴⁾ 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	—	± 17	± 100	—	± 100	mV
SD_{LVL}	SD_{LVL} Level	V_{REF}	V_{CC}	V_{REF}	V_{CC}	V_{REF}	—	V_{CC}	V_{REF}	V_{CC}	V
V_{OL}	SD Output Low Level ⁽²⁾	—	0.5	—	0.5	—	—	0.5	—	0.5	V
I_{OH}	SD Output Leakage ⁽³⁾	—	100	—	100	—	—	100	—	100	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}	D_{OUT} and $/D_{OUT}$ 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 CHARACTERISTICS**
 $V_{CC} = +5V \pm 10\%$, $R_{LOAD} = 50\Omega$ to $V_{CC} - 2V$

Symbol	Parameter	$T_A = -40^\circ C$		$T_A = 0^\circ C$		$T_A = +25^\circ C$			$T_A = +85^\circ C$		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	mV _{PP}	
V_{OD}	Differential Output Voltage Swing ⁽²⁾	—	—	—	—	—	700 300	—	—	—	mV mV	$V_{ID} = 15mV_{PP}$ $V_{ID} = 5mV_{PP}$
t_{ONL}	SD Release Time ⁽³⁾ Minimum Input	—	0.5	—	0.5	—	0.2	0.5	—	0.5	μs	
t_{ONH}	SD Release Time ⁽⁴⁾ Maximum Input	—	0.5	—	0.5	—	0.2	0.5	—	0.5	μs	
t_{OFFL}	SD Assert Time ⁽³⁾	—	0.5	—	0.5	—	0.1	0.5	—	0.5	μs	
V_{SR}	SD Sensitivity Range	5	50	5	50	5	—	50	5	50	mV _{PP}	2 ²³ -1 pattern
HYS	SD Hysteresis	2	8	2	8	2	4.6	8	2	8	dB	2 ²³ -1 pattern
t_r, t_f	Output Rise/Fall Time	—	175	—	175	—	150 t_{rin}, t_{fin}	175	—	175	ps	$V_{ID} > 100mV_{PP}$ $V_{ID} < 100mV_{PP}$

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, $t_r < 300ps$, $8mV_{PP}$.4. Input is a 200MHz square wave, $t_r < 300ps$, $1.8V_{PP}$.

DESIGN PROCEDURE

Output Termination

The SY88943V outputs must be terminated with a 50Ω load to $V_{CC} - 2V$ (or Thevenin equivalent).

Layout and PCB Design

Since the SY88943V is a high-frequency component, performance can be largely determined by the board layout and design. A common problem with high-gain amplifiers is the feedback from the large swing outputs to the input via the power supply.

The SY88943V 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.

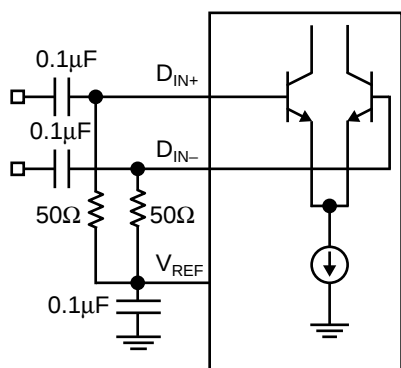


Figure 2. Differential Input Configuration

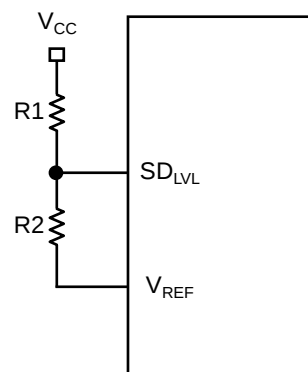


Figure 3. SD_{LVL} Circuit

Notes:

$$SD_{LVL} = V_{CC} - 1.32V + \frac{R2 \times 1.32V}{R1 + R2}$$

$$R1 + R2 \geq 2.6k\Omega$$

PERFORMANCE CURVE

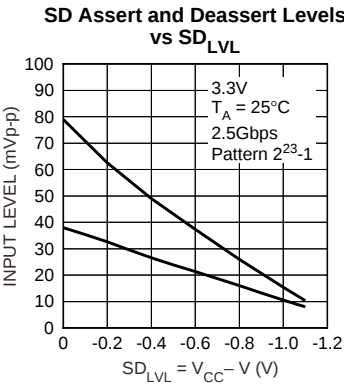


Figure 4.

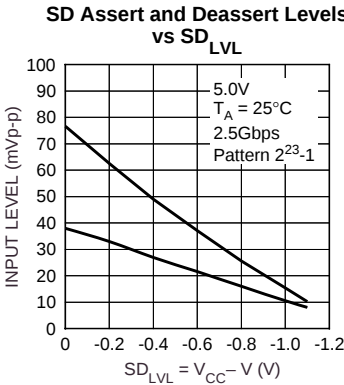


Figure 5.

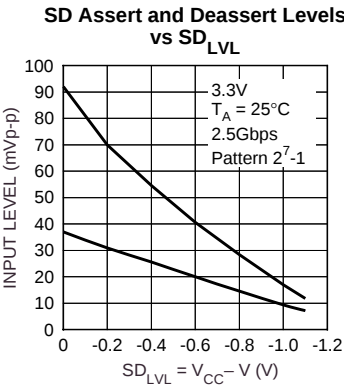


Figure 6.

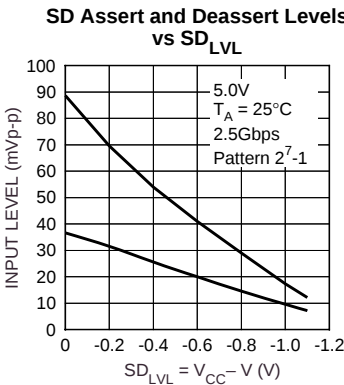
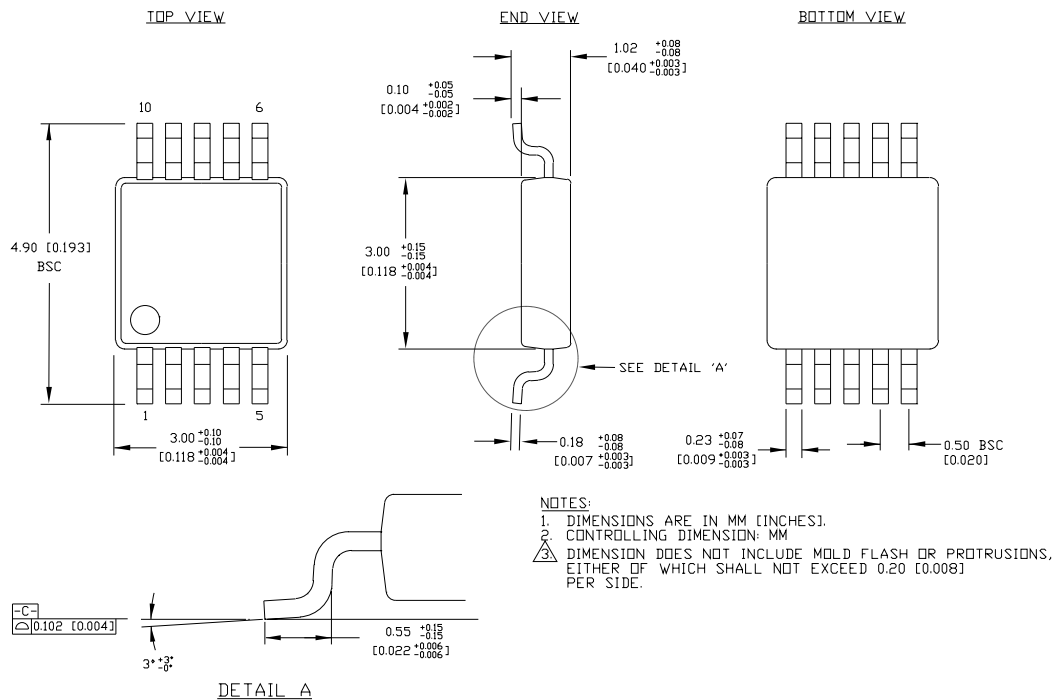


Figure 7.

10 LEAD MSOP (K10-1)

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