



SP1821

Four Channels Constant Current LED Driver

DESCRIPTION

The SP1821 is a linear constant current driver designed to drive multiple LEDs in series from a high input voltage rail. The driver acts as a high current matched, four-channel current source ensuring constant LED current for a range of input voltages. The device can drive up to 25mA load current per string with an external resistor. The SP1821 can provide lowest cost for various applications. Internal thermal protection automatically turns off LED current to prevent overheating. The dimming can be achieved by controlling the I_{SET} input or by feeding a PWM signal to the EN pin. The device can be shut down by setting Enable low.

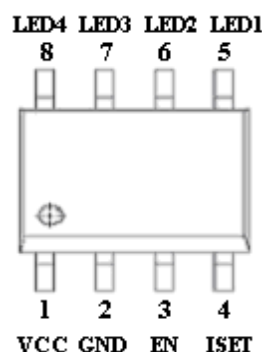
APPLICATIONS

- MR16 and other decoration light source
- General reading lighting
- Display Backlight
- 12V Battery powered devices

FEATURES

- Low Cost LED Driver
- Constant Current Output
- Four Channels LED Driver Provides Matching LED Current
- Low Quiescent Current
- Disconnects LEDs in Shutdown Mode
- Thermal Shut Down Protection
- Current Adjustable via external resistor
- Dimming Control thru either Enable or Iset

PIN CONFIGURATION(SOP – 8P)



PART MARKING

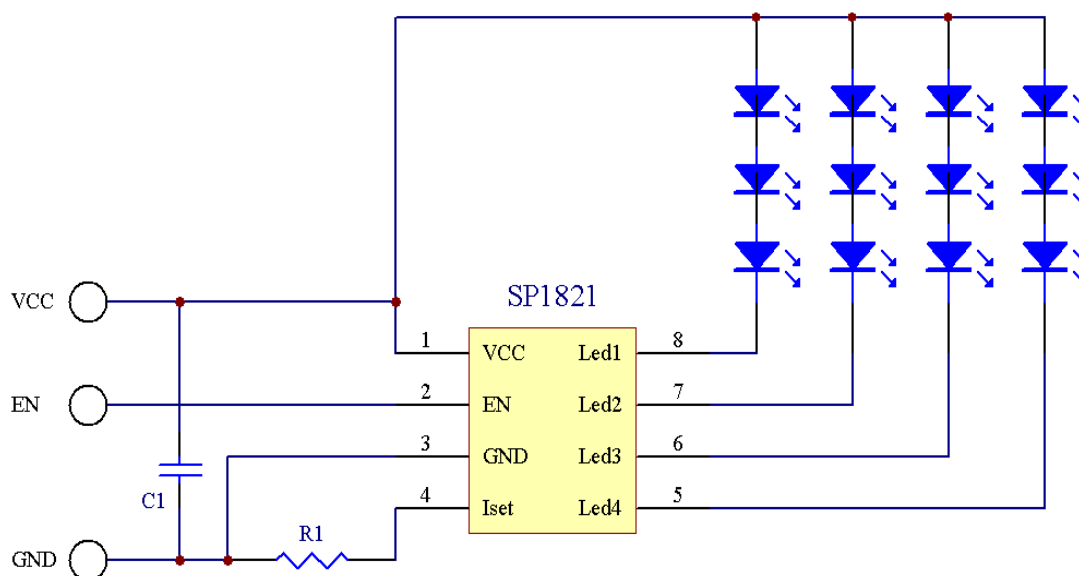




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TYPICAL APPLICATION CIRCUIT



PIN DESCRIPTION

Pin	Symbol	Description
1	VCC	Supply Voltage Input
2	GND	Ground
3	EN	High Enable Pin
4	I _{SET}	Current Set Input
5	LED1	LED 1
6	LED2	LED 2
7	LED3	LED 3
8	LED4	LED 4

ORDERING INFORMATION

Part Number	Package	Part Marking
SP1821S8RGB	SOP- 8P	SP1821

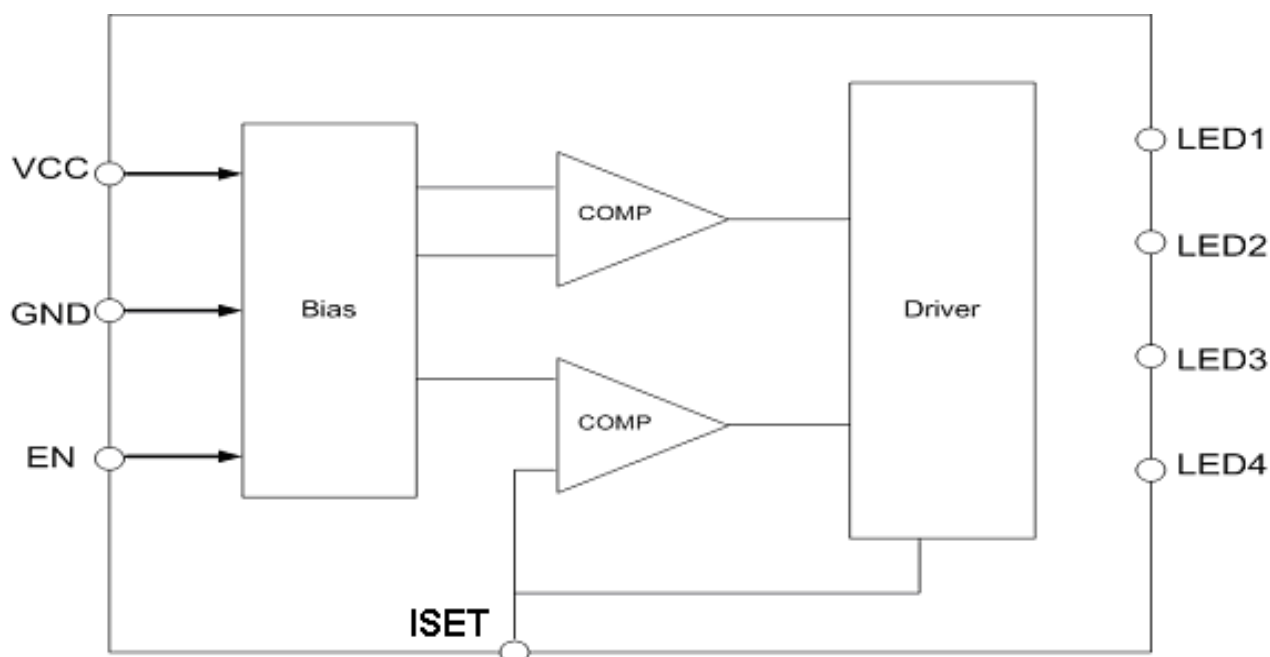
※ SP1821S8RGB : 13" Tape Reel ; Pb – Free ; Halogen – Free



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BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

(T_A=25°C Unless otherwise specified)

Parameter	Symbol	Value	Unit
DC Supply Voltage	V _{cc}	12	V
Output LED Current	I _{LED}	25	mA
Operating Temperature	T _{OPR}	-40~85	°C
Maximum Junction Temperature	T _{J(Max)}	125	°C
Storage Temperature	T _s	-65~150	°C

The IC has a protection circuit against static electricity. Do not apply high static electricity or high voltage that exceeds the performance of the protection circuit to the IC.



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ELECTRICAL CHARACTERISTICS

($T_A=25^{\circ}\text{C}$, $V_{IN}=12\text{V}$, $R_{SET}=31.6\text{K}\Omega$, $V_{LED}=12\text{V}$, Unless otherwise specified)

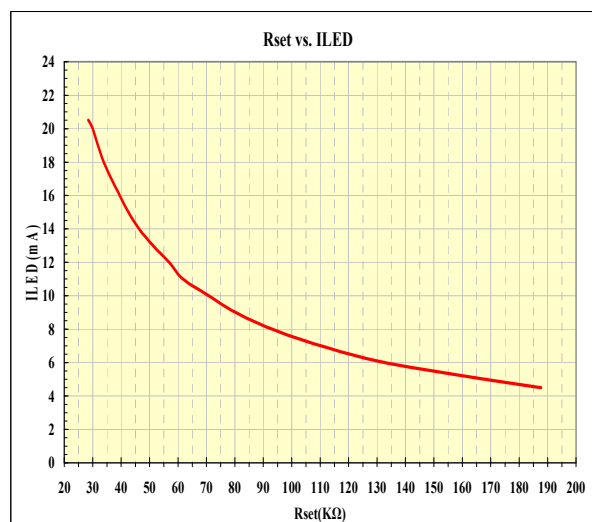
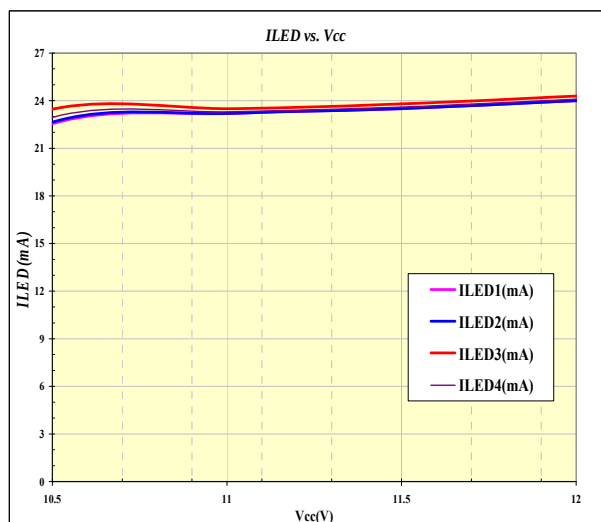
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Voltage		10.5		12	V
LED Current		22.5	25	27.5	mA
Current Matching CH to CH			+/-1.5	+/-3.5	%
Quiescent Current	$I_{LED} = 0\text{A}$, $R_{set} = \text{Open}$	700	800	900	μA
Line Regulation	I_{LED} change per volt V_{cc} change		5	6	%/V
IS _{ET} Voltage			1.5		V
Enable Voltage High	$10.5\text{V} \leq V_{in} \leq 12\text{V}$	4.5	5	5.5	V
Enable Voltage Low	$10.5\text{V} \leq V_{in} \leq 12\text{V}$			0.4	V
Thermal Shutdown Threshold			130		$^{\circ}\text{C}$
Thermal Shutdown Hysteresis			20		$^{\circ}\text{C}$
Current Off Mode		600	700	800	μA



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PERFORMANCE CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified.)



APPLICATION INFORMATION

CIRCUIT DESCRIPTION

SP1821 is a four channels white-LED driver with matching current output. The matching current regulator has a 460:1 ratio between I_{LED} and I_{SET} . SP1821 is capable to supply 25mA for each channel with proper selection of external resistor. The design has a band gap regulator, voltage to current converter and mirror drivers.

THERMAL PROTECTION

SP1821 has a thermal comparator to shut down the device when the internal temperature reaches 150°C . It will remain shut down until the temperature drops to 130°C .

ENABLE

SP1821 has an enable pin that is designed for TTL input. The device will be active at voltage high. This pin can also be used to control the brightness of LED with a PWM signal. The brightness is proportional to the duty cycle of the PWM signal. When duty cycle is zero, LEDs are turned off. For 50% duty cycle, it will result an average ILED to be half the programmed LED current which is set by R_{SET} .

ISET

The I_{SET} Pin is a voltage input to set the current of LED. An external resistor is used to set the output current, as approximated with the following equation:

$$R_{SET} = 460 * (1.3V/I_{LED})$$

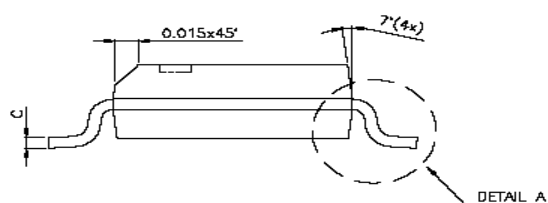
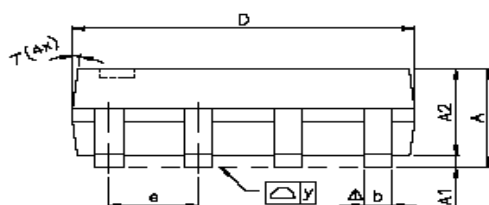
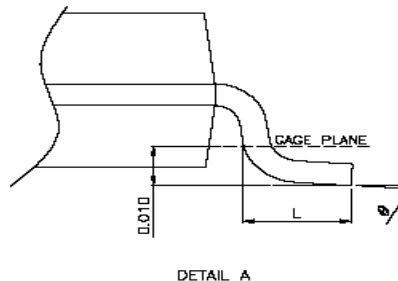
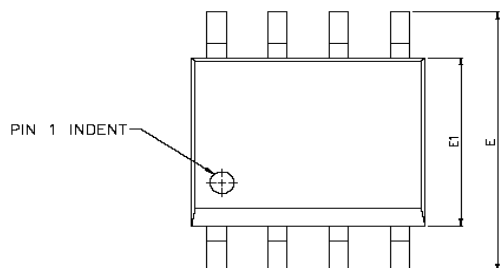
However, the R_{SET} shall not be selected to exceed the maximum current delivery capability of the device, 25mA. A PWM signal or analog signal can also be applied at I_{SET} pin to control the LED brightness.



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SOP- 8 PACKAGE OUTLINE



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
A1	0.10	—	0.25	0.004	—	0.010
A2	—	1.45	—	—	0.057	—
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.0098
D	4.80	4.85	4.95	0.189	0.191	0.195
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	—	1.27	—	—	0.050	—
L	0.38	0.71	1.27	0.015	0.028	0.050
Δy	—	—	0.076	—	—	0.003
θ	0°	—	8°	0°	—	8°



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