High Power Factor & Accuracy Constant Current LED Driver

Features

- Built-in 600V Power MOSFET
- High Power Factor by One Cycle Control
- Accuracy Constant Current
- Low BOM Cost
- Average Current / Fixed Frequency Control
- LED Open Protection (OVP)
- LED Short Protection (SCP)
- Over Current Protection (OCP)
- Internal OTP Protection

Application

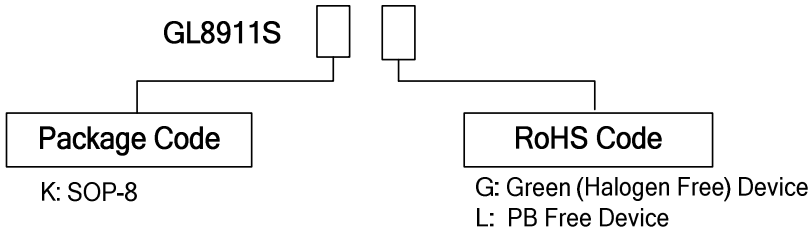
- E26/27, T5/T8 LED Lamp
- Others LED Lighting Applications

Description

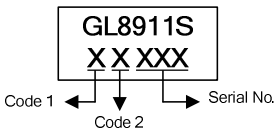
The GL8911S integrated a 600V power MOSFET and a highly-integrated, low startup current, average current mode, one cycle control PFC and fixed switching frequency PWM controller. These functions enable the LED driver to easily meet the accuracy average LED current and high power factor requirements. The integrated functions also include the LED short protection, open protection, and internal over temperature protection. The COMP pin controls the duty by connected an RC compensation network to ground and forming the closed loop feedback control. To protect the external power MOSFET from being damaged by supply over voltage.

The GL8911S improves the performance and reduces the cost of the LED driver. It is a 8-pin SOP-8 package.

Ordering and Marking Information



SOP-8



Code 1	8	9	A	B	...	G	H	I	J
Year	2008	2009	2010	2011		2016	2017	2018	2019
Code 2	1	2	3	4		9	A	B	C
Month	Jan.	Feb.	Mar.	Apr.		Sep.	Oct.	Nov.	Dec.

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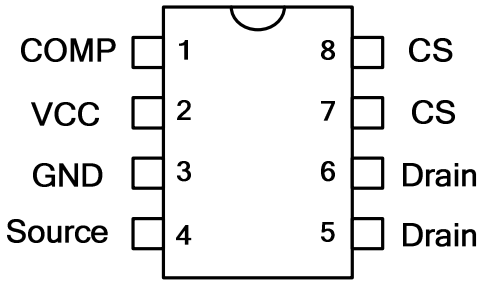
Pin Configuration



Pin Description

Pin No.	Name	Function
1	COMP	Feedback Compensation Network
2	VCC	Power Supply Pin
3	GND	Ground Pin
4	Source	MOSFET Source Pin
5	Drain	Drain of Internal HV MOS
6	Drain	Drain of Internal HV MOS
7	CS	Current Sense Pin, Connect to Sense The MOSFET Current
8	CS	Current Sense Pin, Connect to Sense The MOSFET Current

Absolute Maximum Ratings

Drain Voltage ---------- -0.3V ~ 600V

Supply Voltage VCC ---------- 30V

COMP, CS ---------- -0.3V ~ 7V

Junction Temperature ---------- 150℃

Operating Ambient Temperature ---------- -20℃ ~ 85℃

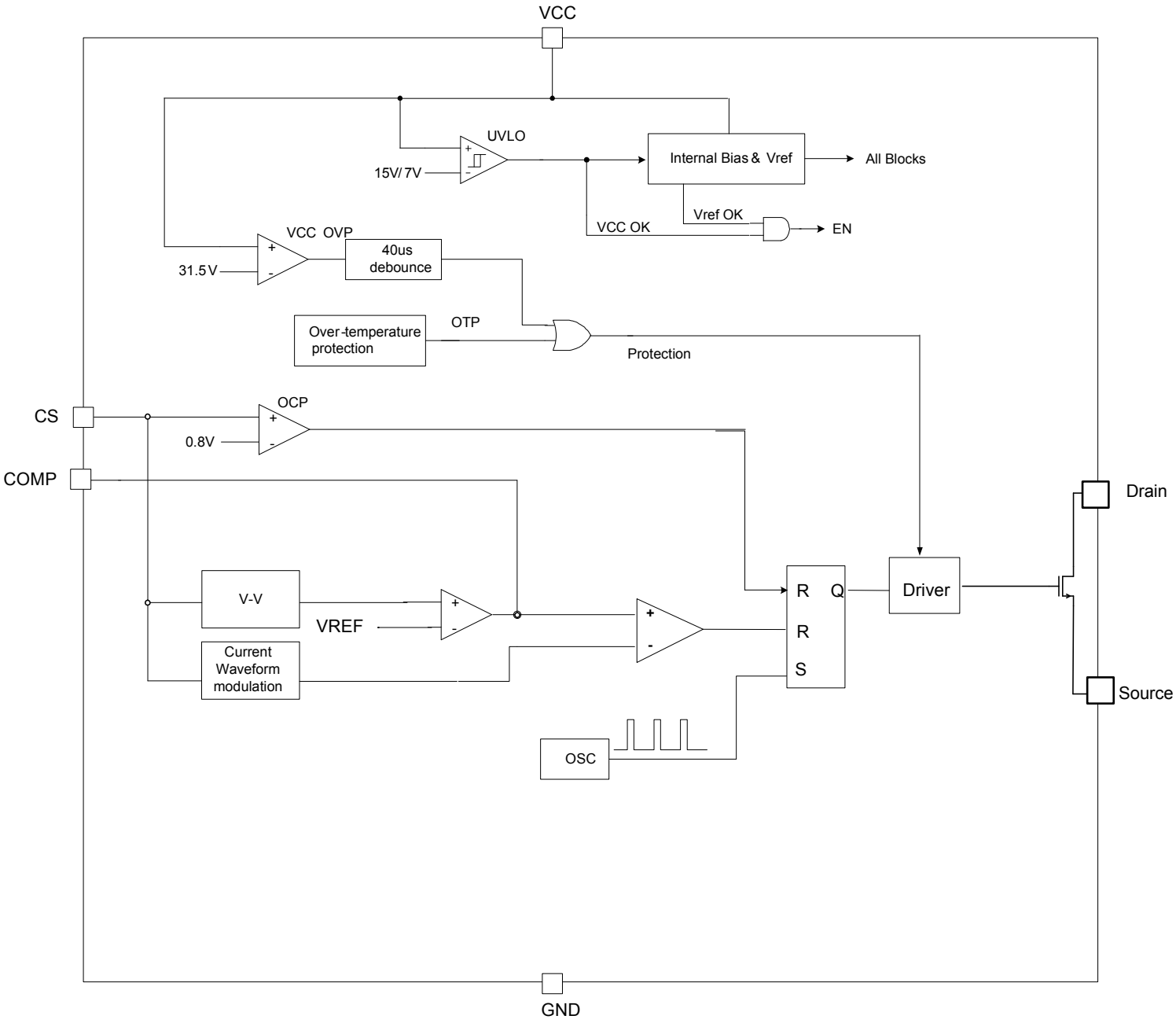
Storage Temperature Range ---------- -65℃ ~ 150 ℃

Lead Temperature (All Pb free packages, soldering, 10 sec) ---------- 260℃

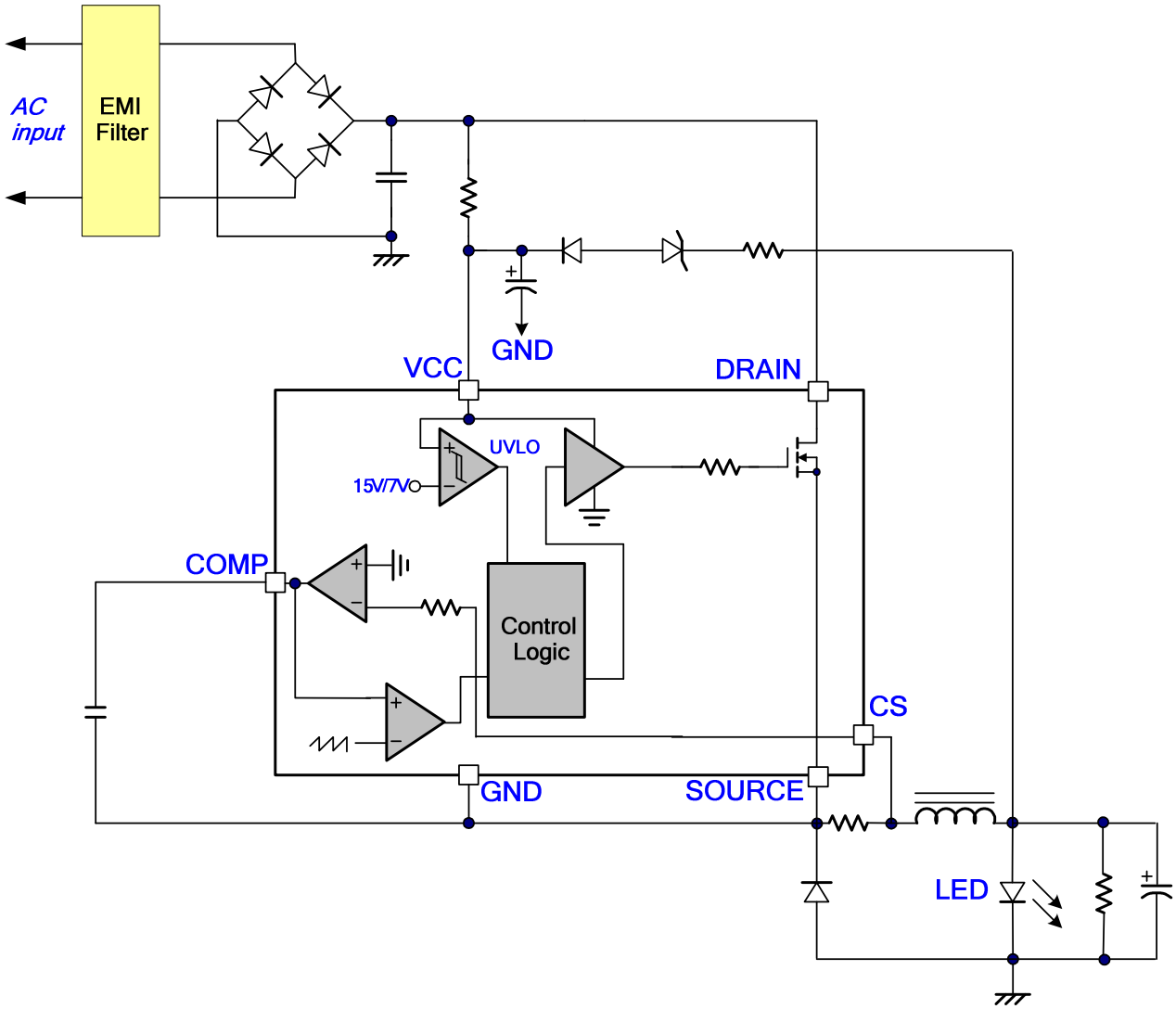
ESD Voltage Protection, Human Body Model ---------- 2KV

ESD Voltage Protection, Machine Model ---------- 200V

Function Block



Application Circuit



Electrical Characteristics (VCC = 15.0V & TA = +25℃, unless otherwise specified.)

Parameter	Min.	Typ.	Max.	Unit
SUPPLY VOLTAGE				
Startup Current (VCC=UVLO on - 1V)		8	15	uA
Operating Current (with 1nF load on OUT pin), Vcomp = 2.5V		2	3	mA
Operating Current (with 1nF load on OUT pin), Protection Tripped (OCP, OVP, SCP, OTP)		0.7	1.1	mA
UVLO(off)	6	7	8	V
UVLO(on)	14	15	16	V
OVP Level on VCC Pin	29.5	31.5	33.5	V
OVP De-Bounce Time		40		us
VOLTAGE FEEDBACK				
Feedback Reference Voltage	0.195	0.200	0.205	V
Tran-Conductance		120		uS
Output Sink Current		12		uA
Output Source Current		12		uA
CURRENT SENSING				
Input Over Voltage Protection	0.75	0.80	0.85	V
Open Loop Voltage, CS Pin Open		5		V
Leading-Edge Blanking Time		410		nS
Delay to Output		100	220	nS
SWITCHING FREQUENCY				
Switching Frequency	42	45	48	KHz
Maximum Duty	90			%
Frequency Jitter Range		+/-4		%
Temp. Stability （-40℃ ~ 125℃)			6	%
Voltage Stability (VCC = 11V~25V)			1	%
OTP SECTION				
OTP Trip Point		150		℃
OTP Release Point		130		℃
OTP Threshold Level		20		℃
OTP De-Bounce Time		80		uS
MOSFET SECTION				
BVdss Vgs=0	600			V
Rds (on)		1.7		Ω

Application Information

Start-up Current

The typical start-up current is around 8uA. Very low start-up current allows the PWM controller to increase the value of start-up resistor and then reduce the power dissipation on it.

UVLO (Under Voltage Lockout)

A hysteresis UVLO comparator is implemented in GL8911S, then the turn-on and turn-off thresholds level are fixed at 15V and 7V respectively. This hysteresis shown in Fig.11 ensures that the start-up capacitor will be adequate to supply the chip during start-up. For quickly startup the LED driver, the start-up resistor should be matched with the startup capacitor. Due to the low UVLO on level, so the turn-on delay time will also never greater than the general PWM IC.

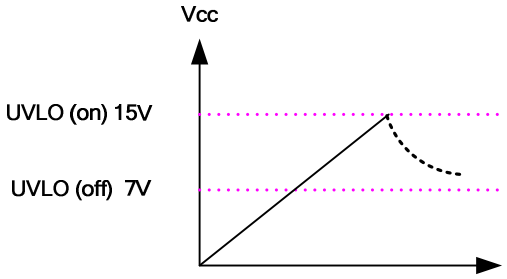


Fig.11

Oscillator

The maximum duty-cycle of internal oscillator is up to 90% for driving high LED voltage string. The frequency of the oscillator is fixed to 45KHz by internal setting.

LEB (Leading-Edge Blanking)

Each time the power MOSFET is switched on, a turn-on spike will inevitably occur at the sense resistor. To avoid fault trigger, a 410nS leading-edge blanking time is built in. Conventional RC filtering can therefore be omitted. During this blanking period, the current-limit comparator is disabled and can not switch off the gate driver.

OCP (Over Current Protection)

The GL8911S has an over current protection function on CS pin. An internal circuit detects the current level, when the current is larger than a threshold level, the gate output will keep on low level. Then VCC decreases below UVLO off level, the controller resets again.

OVP (Over Voltage Protection) on VCC

To prevent the LED driver from being damaged, the GL8911S is implemented an OVP function on VCC. When the VCC voltage is higher than the OVP threshold voltage 31.5V, the output gate driver circuit will be shut down immediately to stop the switching of power MOSFET. The VCC pin OVP function is an auto recovery type protection (latch off type optional). If the OVP condition happens, the pulses will be stopped and never recovery unless the VCC pin voltage is down to the UVLO off level. The GL8911S is working in an auto-recovery mode as shown in Fig. 12.

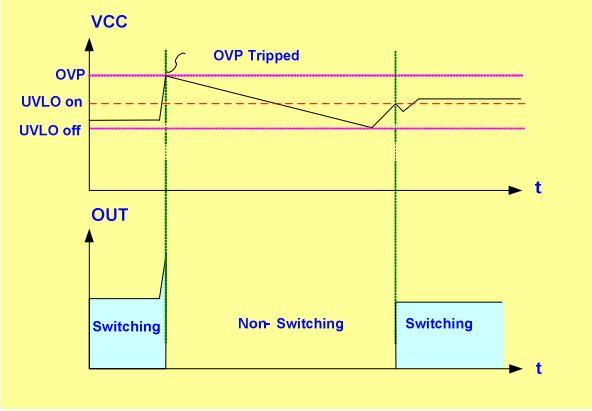
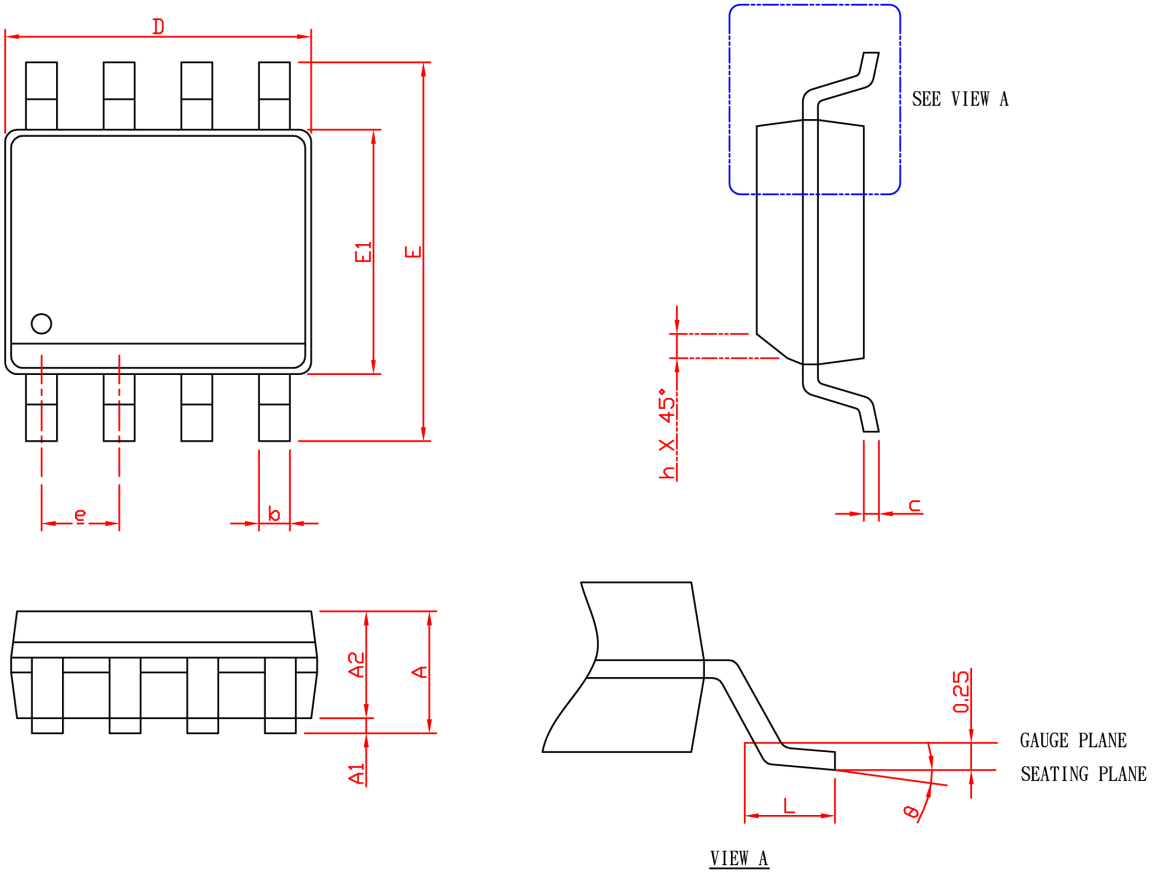


Fig. 12

Package Information

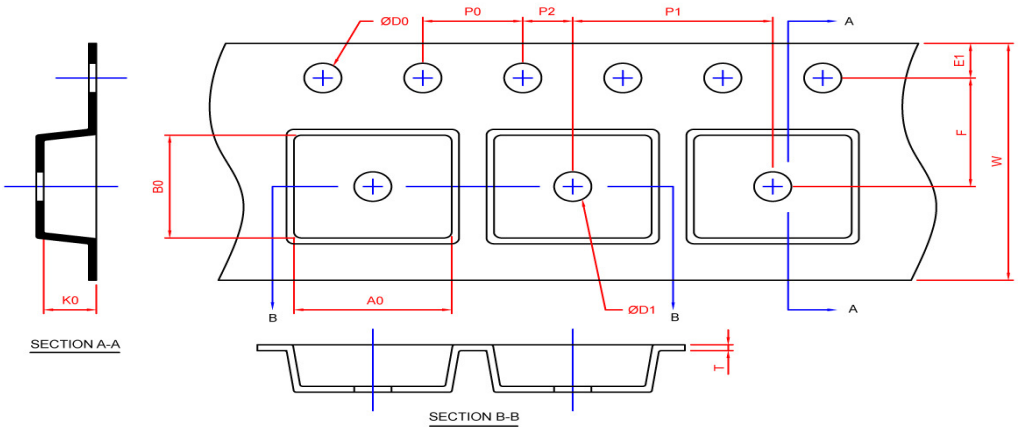
SOP-8

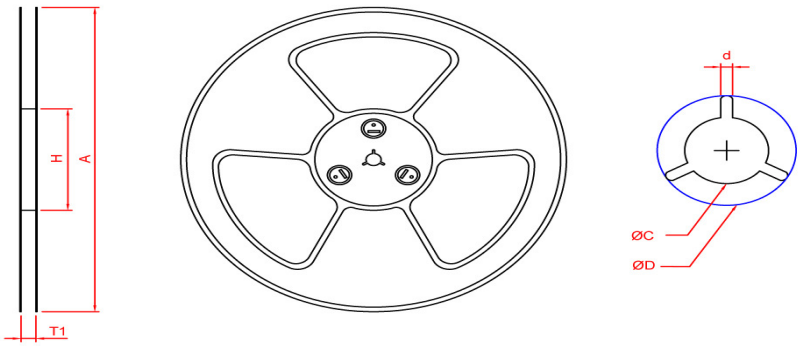


SYMBOL	SOP-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.75		0.069
A1	0.10	0.25	0.004	0.010
A2	1.25		0.049	
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0^o	8^o	0^o	8^o

Carrier Tape & Reel Dimensions

SOP-8





Application	A	H	T1	C	d	D	W	E1	F
SOP-8	330.0±2.0	50 MIN.	12.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	12.0±0.30	1.75±0.10	5.5±0.05
	P0	**P1**	**P2**	**D0**	**D1**	**T**	**A0**	**B0**	**K0**
	4.0±0.10	8.0±0.10	2.0±0.05	1.5+0.10 -0.00	1.5 MIN.	0.6+0.00 -0.40	6.40±0.20	5.20±0.20	2.10±0.20

Devices Per Unit

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOP- 8	12	-	2500