



Universal High Brightness LED Driver

HV9910Q8

Features

- >90% efficiency
- 10V to 600V input range
- Constant current LED driver
- Applications from a few mA to more than 1A output
- LED string from one to hundreds of diodes
- Linear and PWM dimming capability
- Input voltage surge ratings up to 600V
- Over temperature protection

Applications

- DC/DC or AC/DC LED driver applications
- RGB backlighting LED driver
- Backlighting of flat panel displays
- General-purpose constant current source
- Signage and decorative LED lighting
- Automotive
- Chargers

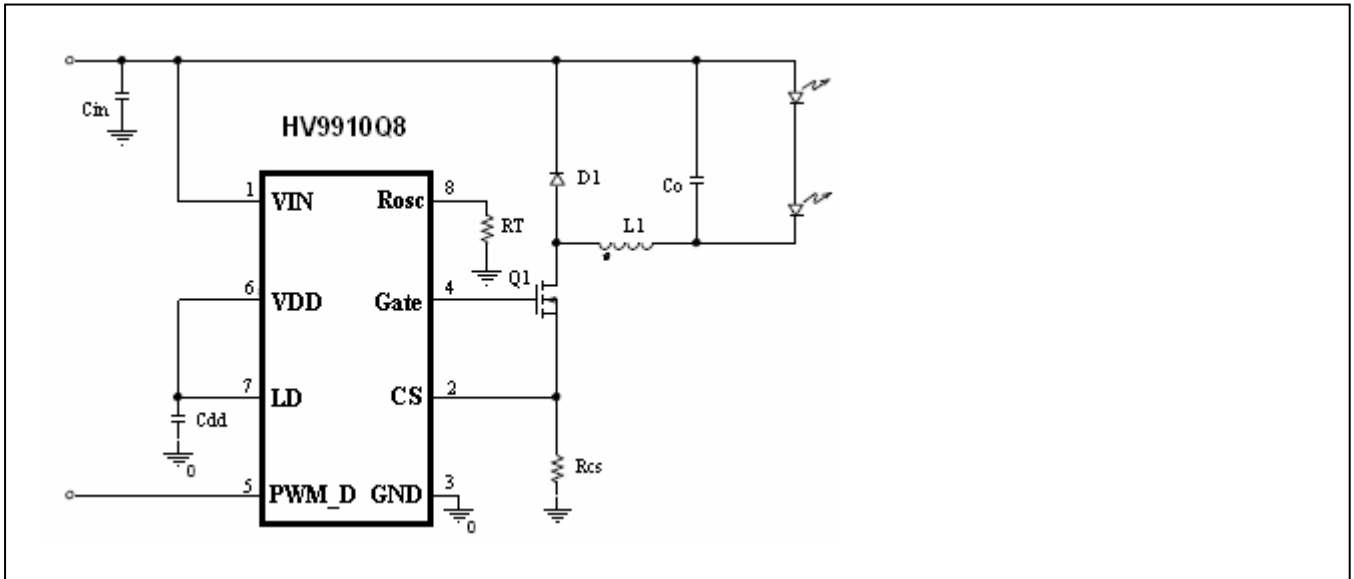
Description

The HV9910Q8 is a PWM high-efficiency LED driver control IC. It allows efficient operation of high-brightness (HB) LEDs from voltage sources ranging from 10VDC up to 600VDC. The HV9910Q8 controls an external MOSFET at fixed switching frequencies up to 300kHz. The frequency can be programmed using a single resistor. The LED string is driven at a constant current rather than a constant voltage, thus providing a constant light output and an enhanced reliability. The output current can be programmed between a few milliamps and up to more than 1A. The HV9910Q8 uses a rugged high-voltage junction isolated process that can withstand an input voltage surge up to 600V. The output current to a LED string can be programmed to any value between zero and its maximum value by applying an external control voltage at the linear dimming control input of the HV9910Q8. The HV9910Q8 provides a low-frequency PWM dimming input that can accept an external control signal with a duty ratio of 0-100% and a frequency of up to a few kilohertz.

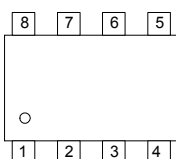
Ordering Information

Device	Package	Shipping
HV9910Q8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	2500 pcs / tape & reel

Typical Application Circuit



Pin Description

	Pin1: VIN	Pin5: PWM_D
	Pin2: CS	Pin6: VDD
	Pin3: Ground	Pin7: LD
	Pin4: Gate	Pin8: RosC

Absolute Maximum Ratings

Vin to GN.....	-0.5~+600V
CS, LD, PWM_D, GATE to GND	-0.3 V ~ VDD+0.3V
Continuous power dissipation (TA=25 °C).....	630mW
Operating temperature range	- 40~+85 °C
Junction temperature	+125 °C
Storage temperature range	-65 ~ +150 °C

*Stress beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

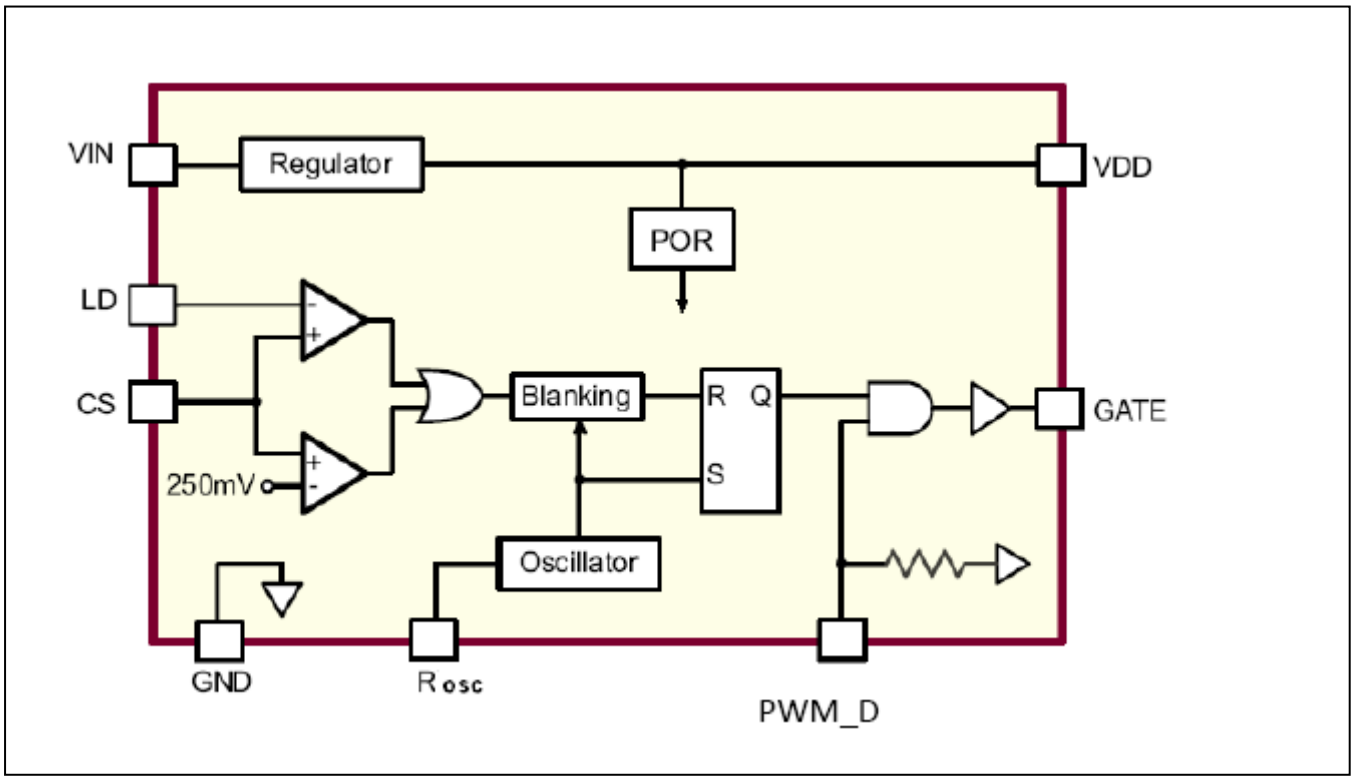


Electrical Characteristics (TA=25°C, unless otherwise noted)

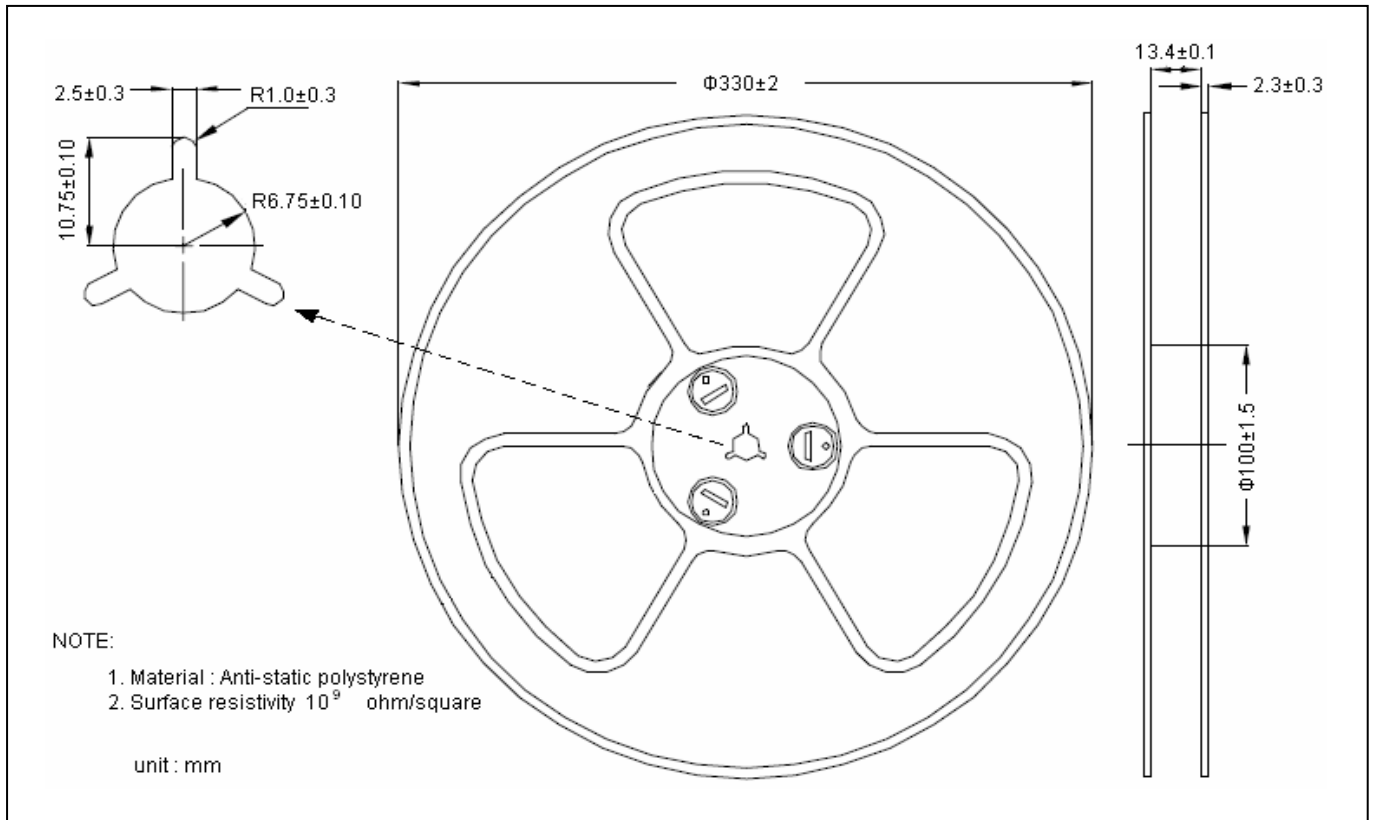
Parameter	Test Condition	Symbol	Min.	Typ.	Max.	Unit
Input DC supply voltage range	DC input voltage	V _{INDC} *	10	-	600	V
Shut down mode supply current	Pin PWM_D to GND, V _{IN} =8V	I _{NSD}	0.5	-	1	mA
Internally regulated voltage	V _{IN} =10 to 600V, I _{DD(ext)} =0, pin Gate open	V _{DD}	7	7.5	8	V
Load regulation of V _{DD}	I _{DD(ext)} =0 to 1mA, 500pF at GATE, R _{OSC} =226k Ω, PWM_D=V _{DD}	ΔV _{DD, load}	0	-	100	mV
Maximum pin V _{DD} voltage	When an external voltage is applied to pin V _{DD}	V _{DD, max}	-	-	10	V
V _{DD} current available for external circuitry	V _{IN} =10 to 100V	I _{DD(ext)}	-	-	0.7	mA
V _{DD} under voltage lockout threshold	V _{IN} rising	UVLO	6.45	6.7	6.95	V
V _{DD} under voltage lockout hysteresis	V _{IN} falling	ΔUVLO	-	500	-	mV
Pin PWM_D input low voltage	V _{IN} =10 to 600V	V _{EN(lo)}	-	-	0.8	V
Pin PWM_D input high voltage	V _{IN} =10 to 600V	V _{EN(hi)}	2	-	-	V
Pin PWM_D pull down resistance	V _{EN} =5V	R _{EN}	50	100	150	kΩ
Current sense pull-in threshold voltage	T _A =-40°C ~ +85°C	V _{CS(hi)}	225	250	275	mV
GATE high output voltage	I _{OUT} =10mA	V _{GATE(hi)}	V _{DD} -0.3	-	V _{DD}	V
GATE low output voltage	I _{OUT} =-10mA	V _{GATE(lo)}	0	-	0.3	V
Oscillator frequency	R _{OSC} =1MΩ R _{OSC} =226kΩ	f _{OSC}	20 80	25 100	30 120	kHz
Maximum oscillator PWM duty cycle	F _{PWMhf} =25kHz, at GATE, CS to GND	D _{MAXhf}	-	-	100	%
Pin LD(Linear Dimming) voltage range	T _A <85°C, V _{IN} =12V	V _{LD}	0	-	250	mV
Current sense blanking interval	V _{CS} =0.55V _{LD} , V _{LD} =V _{DD}	T _{BLANK}	150	215	280	ns
Delay from CS to GATE lo	V _{IN} =12V, V _{LD} =0.15V, V _{CS} =0 to 0.22V after T _{BLANK}	t _{DELAY}	-	-	300	ns
GATE output rise time	C _{GATE} =500pF, V _{DD} =7.5V	t _{RISE}	30	-	50	ns
GATE output fall time	C _{GATE} =500pF, V _{DD} =7.5V	t _{FALL}	30	-	50	ns

* Also limited by package power dissipation limit, whichever is lower.

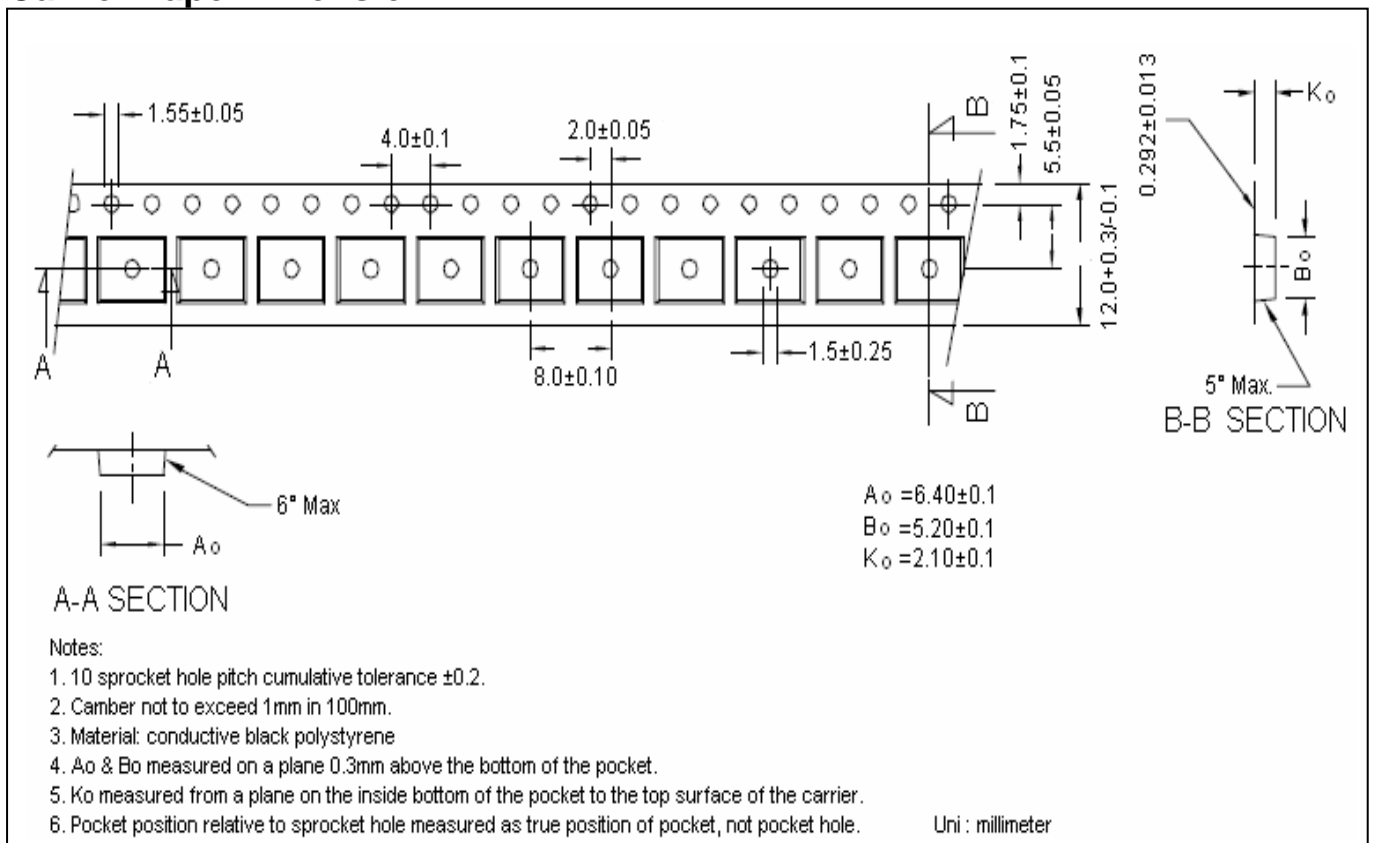
Block Diagram



Reel Dimension



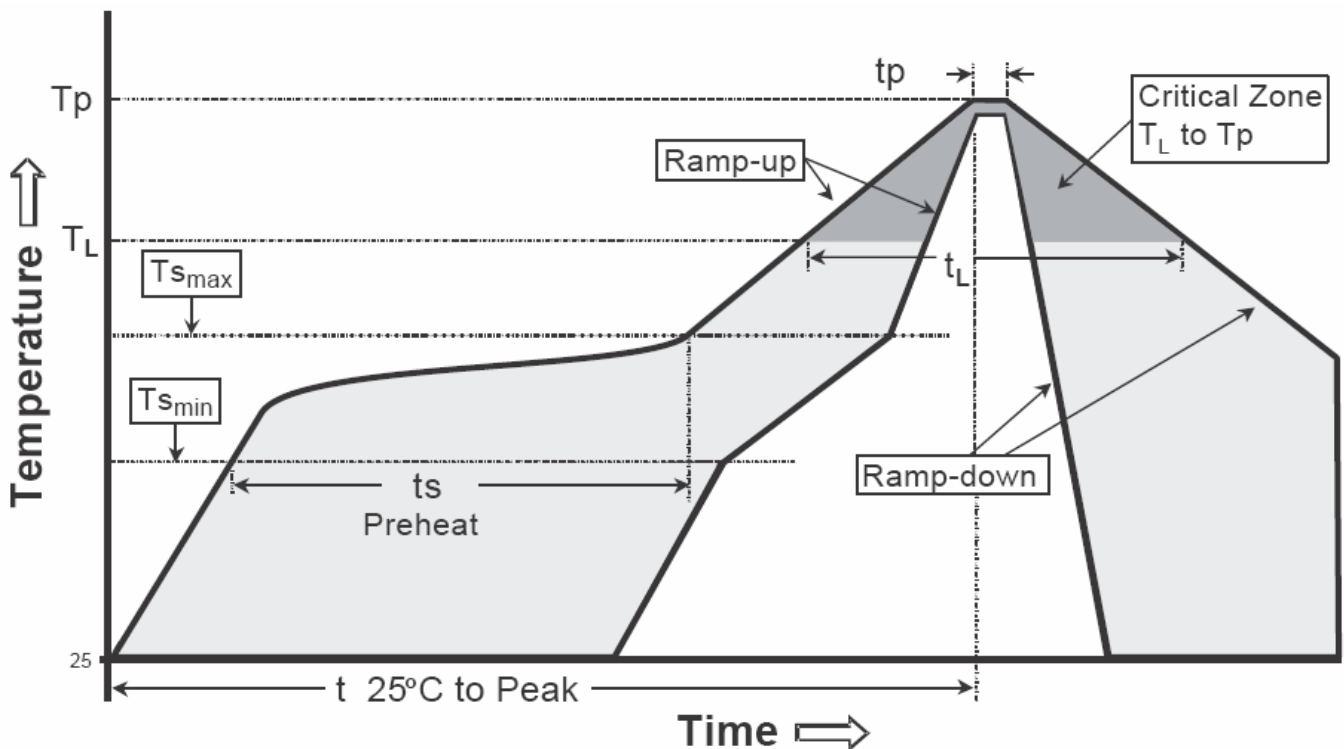
Carrier Tape Dimension



Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

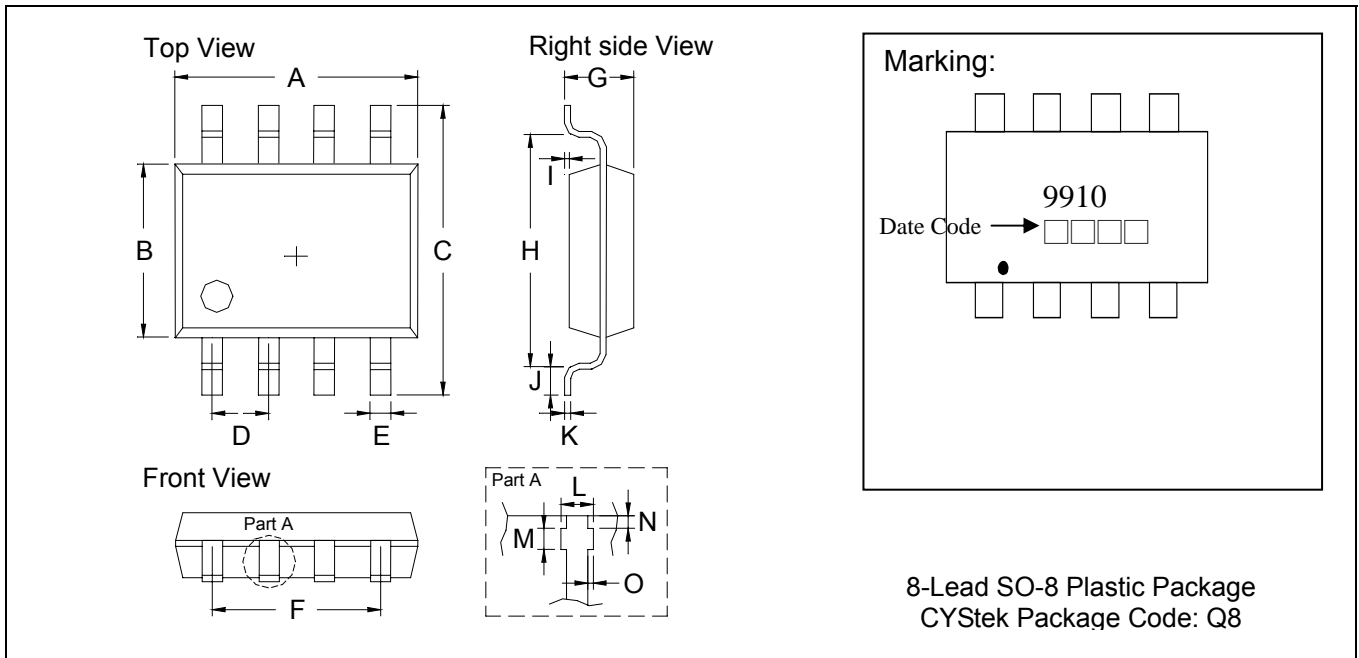
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	60-150 seconds
Peak Temperature(T _P)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

SO-8 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1909	0.2007	4.85	5.10	I	0.0019	0.0078	0.05	0.20
B	0.1515	0.1555	3.85	3.95	J	0.0118	0.0275	0.30	0.70
C	0.2283	0.2441	5.80	6.20	K	0.0074	0.0098	0.19	0.25
D	0.0480	0.0519	1.22	1.32	L	0.0145	0.0204	0.37	0.52
E	0.0145	0.0185	0.37	0.47	M	0.0118	0.0197	0.30	0.50
F	0.1472	0.1527	3.74	3.88	N	0.0031	0.0051	0.08	0.13
G	0.0570	0.0649	1.45	1.65	O	0.0000	0.0059	0.00	0.15
H	0.1889	0.2007	4.80	5.10					

Notes: 1. Controlling dimension: millimeters.
 2. Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
 3. If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

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