



# 5V/3A Ultra Low-Dropout Voltage Linear Regulator ICR0630QP

## General Description

The ICR0630QP is a 3A low dropout linear regulator designed for low dropout and high current applications. This device works with dual supplies, a control input for the control circuitry and a power input as low as 1.0V for providing current to output. It features 3A output current and ultra-low-drop output voltage as well as full protection functions.  $V_{OUT}$  can be as low as 0.8V.

The other features include soft start, under voltage protection, current limit protection, Power-On-Reset function, and over temperature protection. The ICR0630QP is available in PSOP-8 package.

## Features

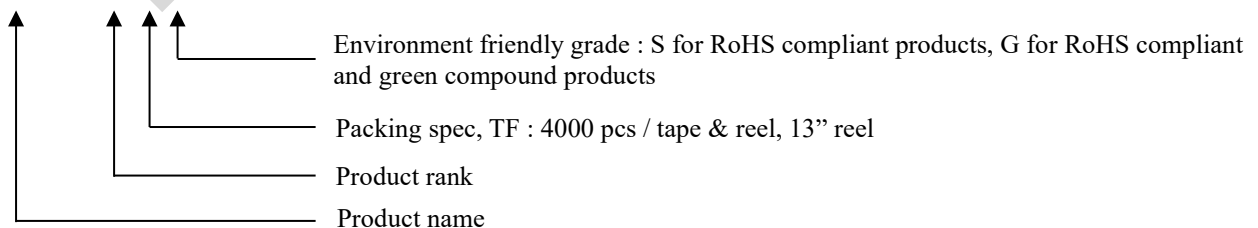
- $V_{IN}$  Range 1.0V to 6.0V
- $V_{OUT}$  is Adjustable (0.8V Min)
- Excellent Line Regulation (0.01%/V typ.)
- Excellent Load Regulation(0.1%/A typ.)
- RoHS compliant, Pb-free package
- Dropout Voltage Typically 250 mV at  $I_{OUT} = 3A$
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- $V_{OUT}$  Under Voltage Protection
- Ceramic Capacitor Stable

## Applications

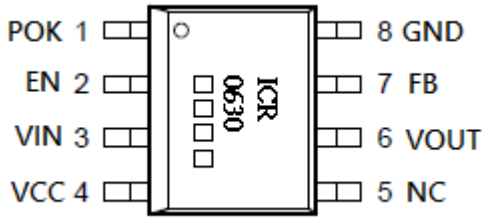
- Notebook, Netbook, Graphic Cards
- Low Voltage Logic Supplies
- Chipset Supplies
- Server System
- SMPS Post Regulators

## Ordering Information

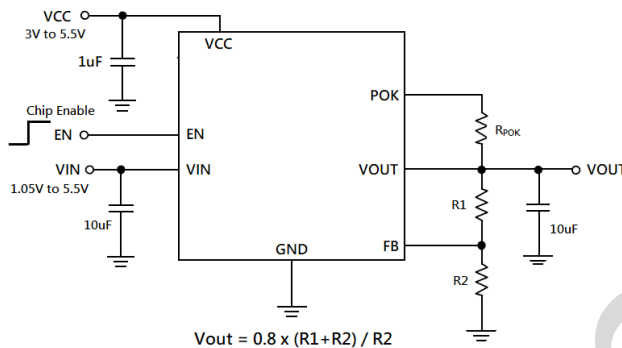
Part Number	Marking	Package	Shipping
ICR0630QP-0-TF-G	ICR0630	PSOP-8 (RoHS compliant and Pb-free package)	4000 pcs / Tape & Reel



## Pin Configuration



## Typical Application Circuit



## Pin Assignment

Pin Name	Pin No.	Pin Function
POK	1	Power OK indication, open drain output.
FB	7	Feedback
VOUT	6	Output Voltage pin, the Source of power device.
VIN	3	Input Voltage pin, the Drain of power device.
EN	2	Enable pin. Internal pull high to VCC
VCC	4	Supply input of control circuit.
GND	8&(Exposed PAD)	Ground
NC	5	Non connect

## Absolute Maximum Ratings

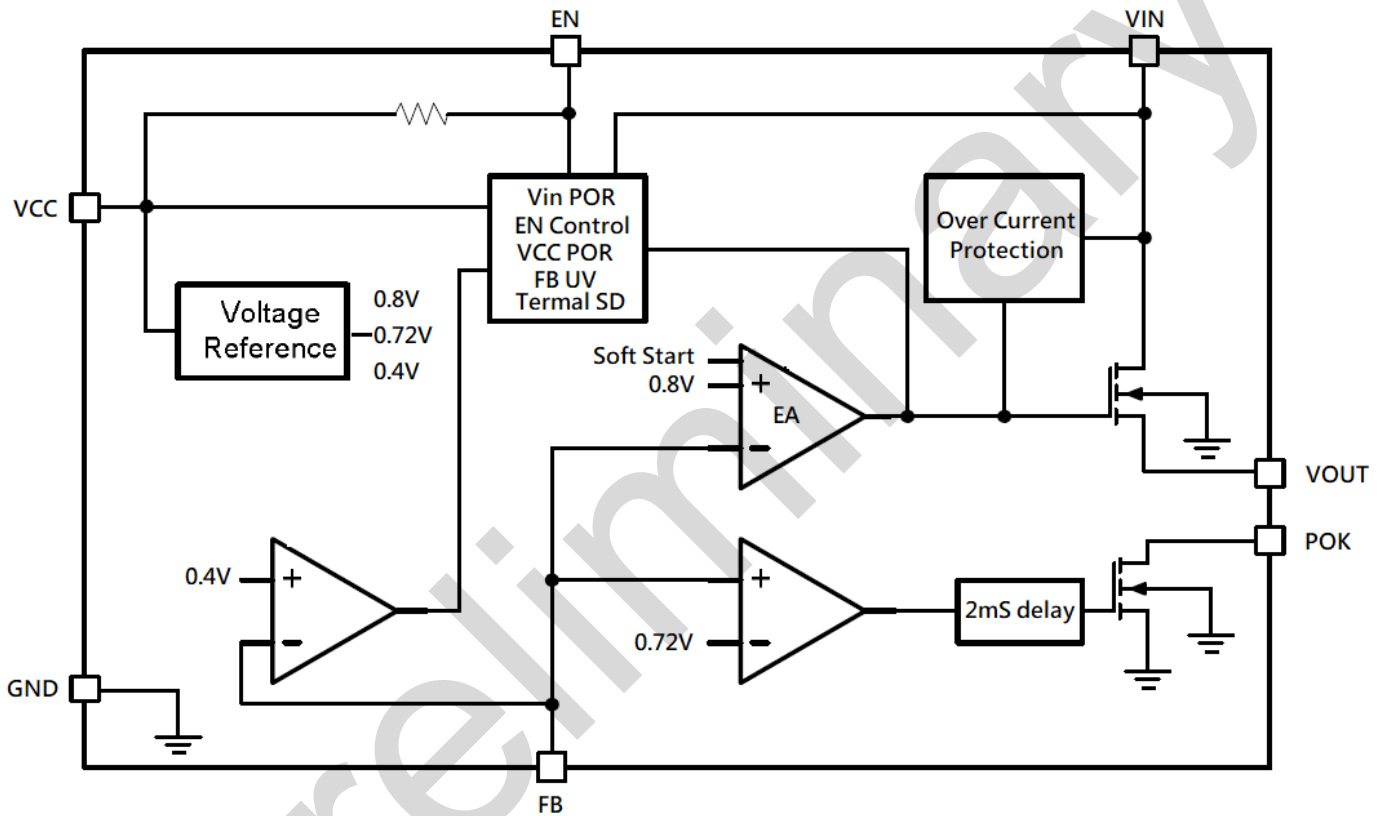
Parameter	Symbol	Ratings	Units
Input Voltage	V <sub>IN</sub>	-0.3~+6.0	V
Supply Voltage	V <sub>CC</sub>	-0.3~+6.0	V
Other pins	-	-0.3~V <sub>CC</sub> +0.3	V
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	75 (Note)	°C/W
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	15 (Note)	°C/W
Lead Temperature(Soldering, 10 sec)	T <sub>s</sub>	300	°C
Continuous Total Power Dissipation	P <sub>D</sub>	250	mW
Storage Temperature Range	T <sub>stg</sub>	-65~+150	°C

Note : R<sub>θJA</sub> is measured in the natural convection at T<sub>A</sub>=25°C on a 4-layers high effective thermal conductivity test board with minimum copper area of JEDEC 51-7 thermal measurement standard. The case point of R<sub>θJC</sub> is on the expose pad for PSOP-8 package.

**Recommended Operating Condition**

Parameter	Symbol	Ratings	Units
Input Voltage	$V_{IN}$	+1.05~ $V_{CC}$	V
Supply Voltage	$V_{CC}$	+3.0~+5.5	V
Junction Temperature Range	$T_j$	-40~+125	°C

**Function Block Diagram**





## Electrical Characteristics

@  $T_J=25^{\circ}\text{C}$ ,  $V_{CC}=5\text{V}$ , unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Control Input Voltage VCC	VCC	VOUT= VREF	3.0	--	6.0	V
VCC POR Threshold	VCCPOR		2.2	--	2.9	V
VCC POR Hysteresis	VCCHY		--	0.4	--	V
Power Input Voltage VIN	VIN	VOUT= VREF	1.05	--	VCC	V
VIN POR Threshold	VINPOR		0.8	--	1.0	V
VIN POR Hysteresis	VINHY		--	0.35	--	V
VIN POR Deglitch Time	TDEG		--	100	--	$\mu\text{s}$
Control Input Current in Shutdown	IVCCSD	VIN=VCC=5V, VEN=0V	--	10	30	$\mu\text{A}$
Quiescent Current	IQ	VIN=VCC= VEN =5V, IOUT=0A	--	0.9	1.5	mA
Reference Voltage	VREF	VIN=VCC= VEN =5V, IOUT=0A, VOUT=VREF	0.785	0.8	0.815	V
VIN Line Regulation	VREFLINE	1.05V<VIN<5V, VCC= VEN =5V	--	0.01	0.1	%/V
Load Regulation	VREFLOAD	0A<IOUT<3A, VCC= VEN =5V	--	0.1	0.5	%/A
Dropout Voltage	VDROP	IOUT=3A, VCC=5V, VOUT=1.2V	--	250	360	mV
VOUT Pull Low Resistance	RPULL	VCC= 5V, VEN =0V, Sink =5mA	--	--	150	ohm
Enable High Level	VEN		1.1	--	--	V
Disable Low Level	VSD		--	--	0.3	V
Enable Source Current	IEN	VCC= 5V, VEN =0V	--	5	10	$\mu\text{A}$
Enable pull high resistor	REN		500K	--	--	ohm
Output Voltage Ramp Up Time	TSS		0.6	1	2	mS
POK Threshold	VPOKH	VFB Rising		92		%
	VPOKL	VFB falling		82		%
POK Sink Voltage	VPOK	Sinking Current = 5mA	--	--	0.4	V
POK Delay Time	TPOKDE	From VOUT>92% to POK rising	1	2	4	mS
OCP Threshold Level	IOCP		3.2	4.5	--	A
Under Voltage Threshold	VUVP	VFB Falling	--	0.15	--	V
Thermal Shutdown Temperature	TSD		--	165	--	$^{\circ}\text{C}$
Thermal Shutdown Hysteresis	TSDHY		--	30	--	$^{\circ}\text{C}$

**Typical Characteristics**

Fig 1. Start Up from EN

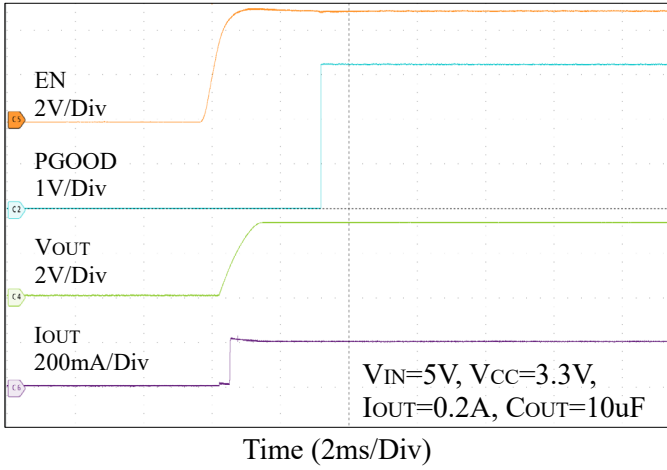


Fig 2. Start Up from VIN

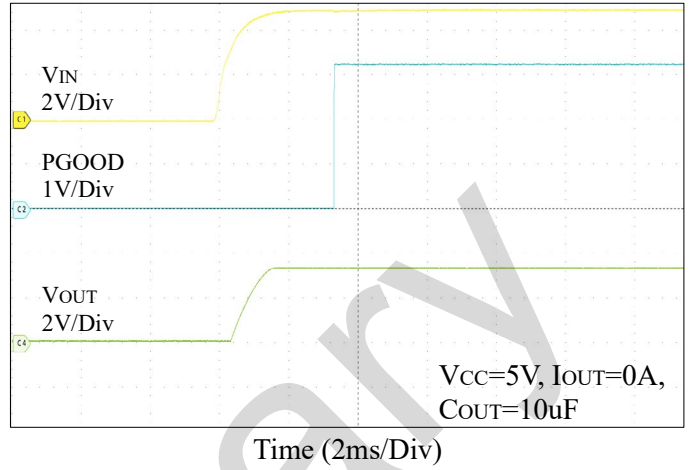


Fig 3. Start Up from VCC

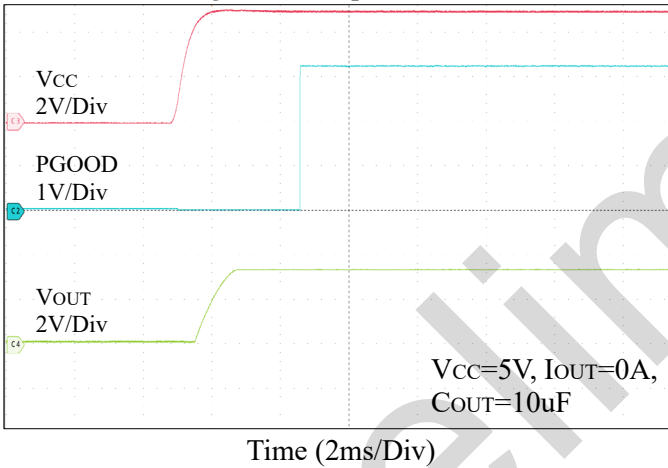


Fig 4. Load Transient

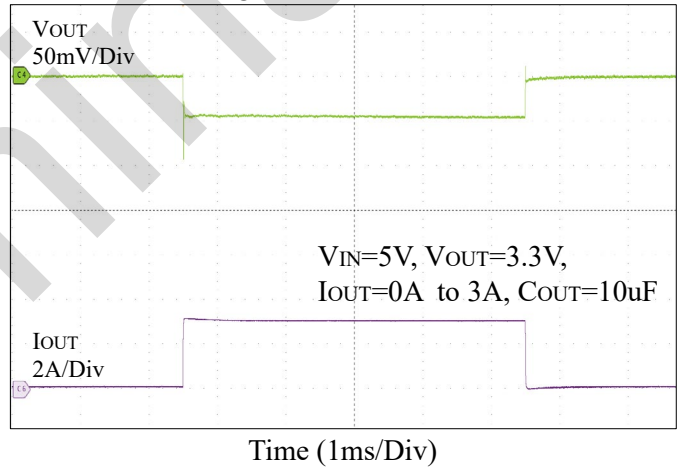


Fig 5. Vdrop vs Load Current

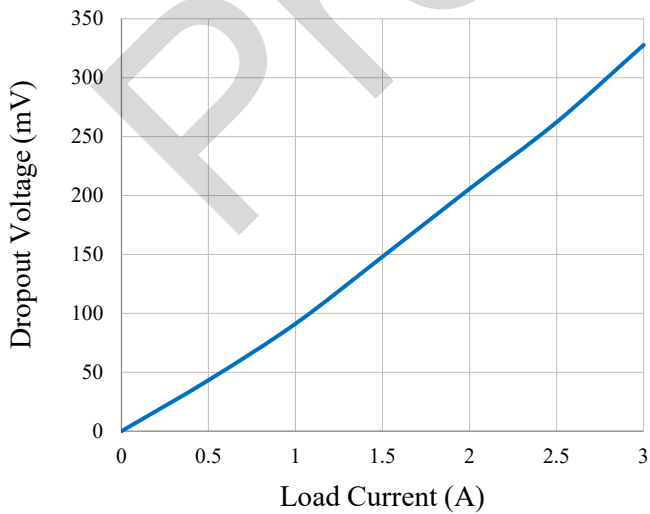
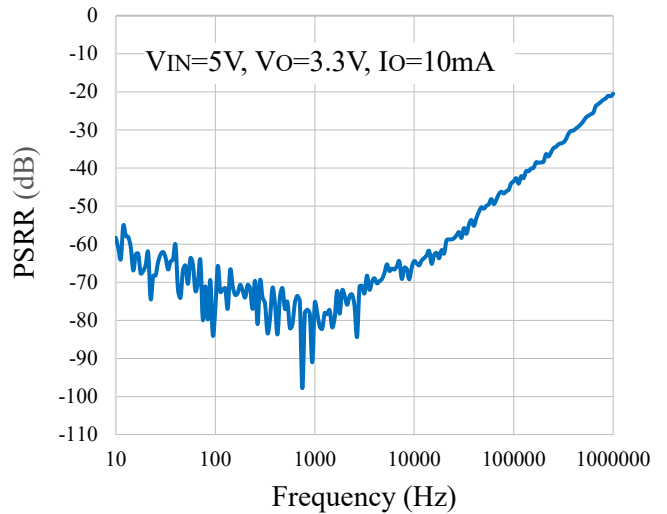
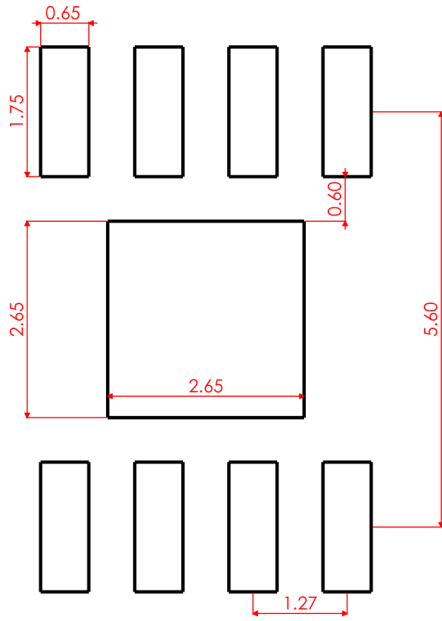


Fig 6. PSRR

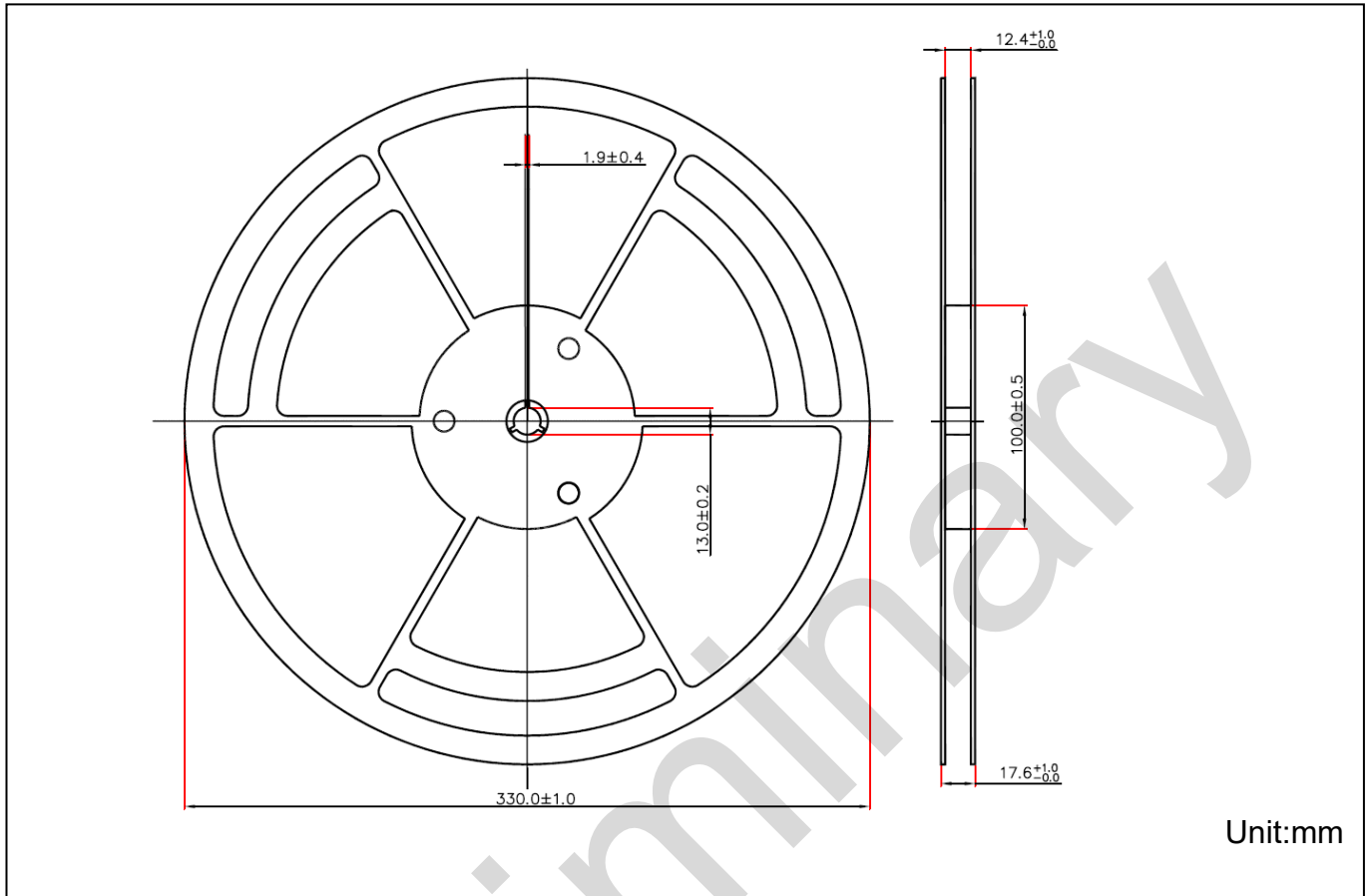


### Recommended Soldering Footprint

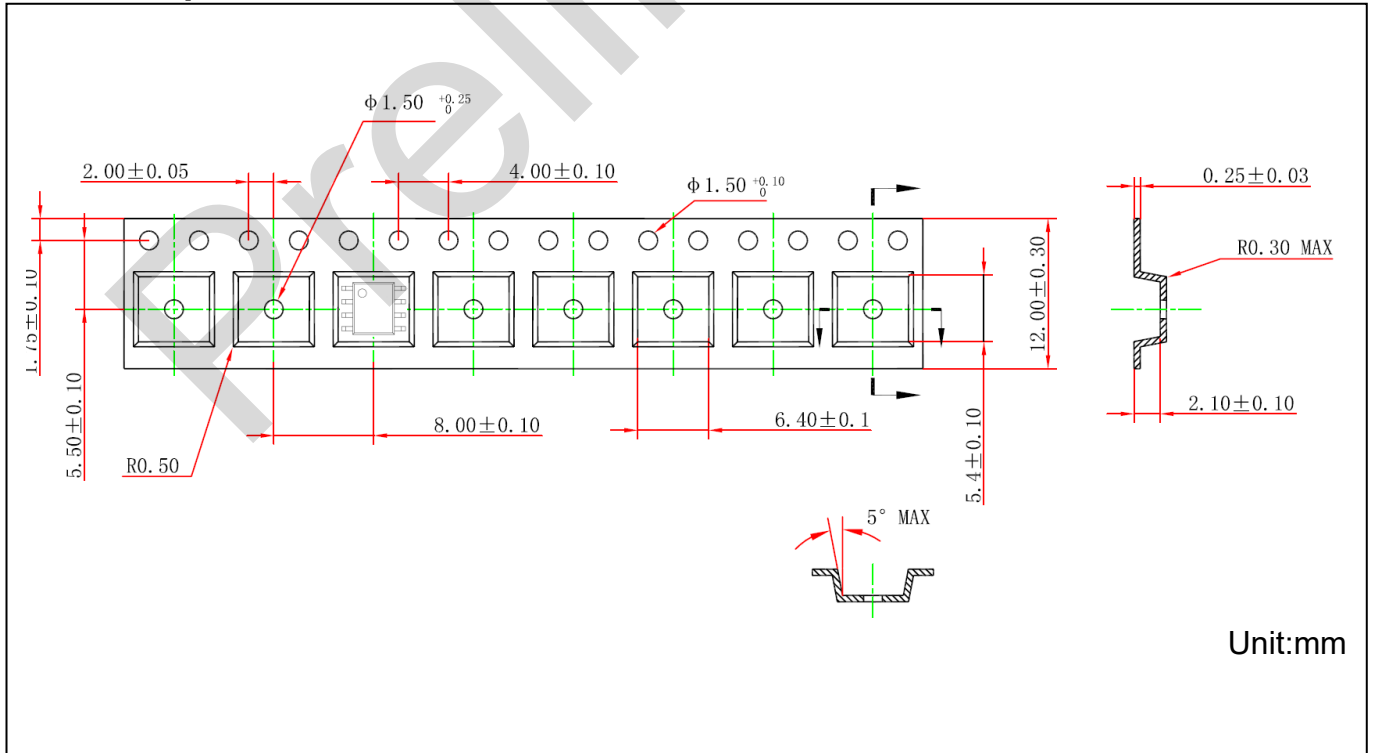


Preliminary

**Reel Dimension**



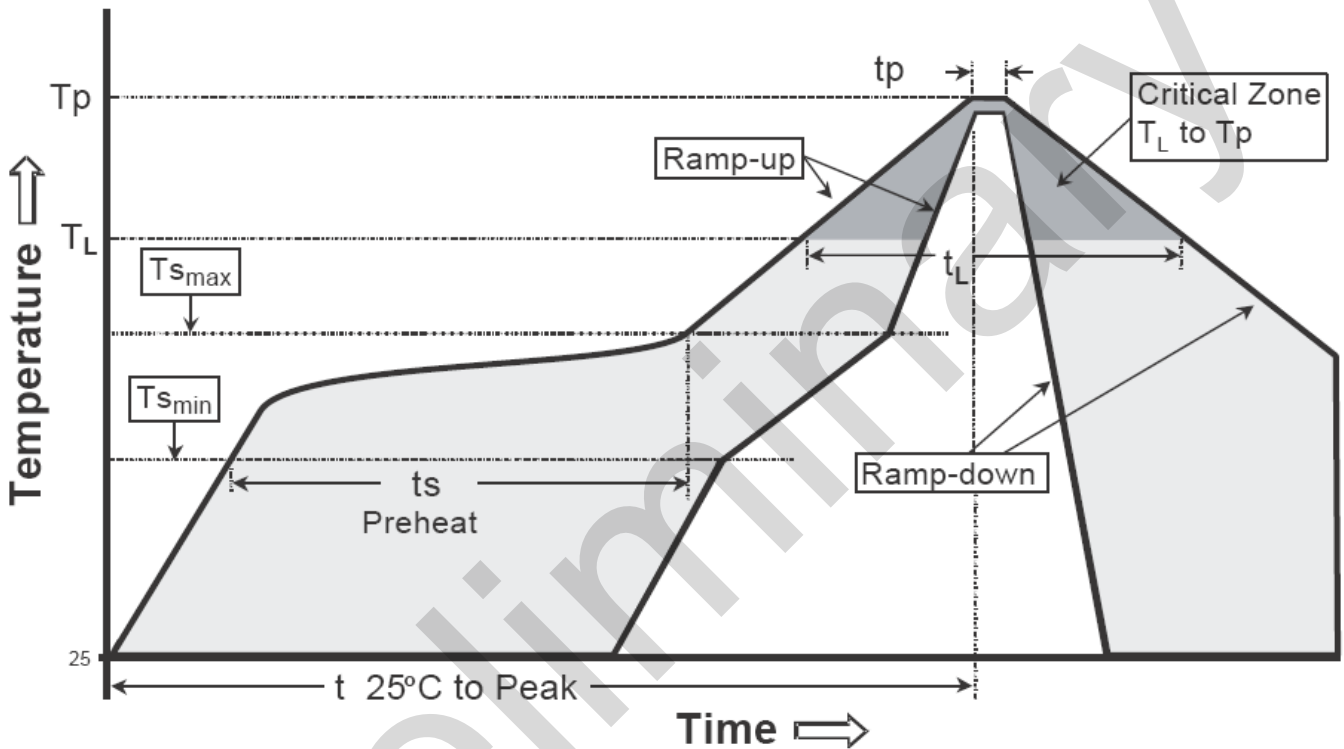
**Carrier Tape Dimension**



**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 (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak Temperature(T <sub>P</sub> )	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(t <sub>p</sub> )	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.



**PSOP-8 Dimension**

**Marking:**

Style:  
 Pin 1: POK                      Pin 5 : NC  
 Pin 2: Enable                  Pin 6 : VOUT  
 Pin 3: VIN                        Pin 7 : FB  
 Pin 4: VCC                        Pin 8 : GND

Date Code(counting from left to right) :  
 1<sup>st</sup> code: year code, the last digit of Christian year  
 2<sup>nd</sup> code : month code, Jan→A, Feb→B, Mar→C,  
           Apr→D, May→E, Jun→F, Jul→G, Aug→H,  
           Sep→J, Oct→K, Nov→L, Dec→M  
 3<sup>rd</sup> and 4<sup>th</sup> codes : production serial number, 01~99

8-Lead PSOP-8 Plastic Surface Mounted Package  
 CYS Package Code:QP

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	1.300	1.700	0.051	0.067	E	3.800	4.000	0.150	0.157
A1	0.000	0.100	0.000	0.004	E1	5.800	6.200	0.228	0.244
A2	1.350	1.550	0.053	0.061	E2	2.034	2.234	0.080	0.088
b	0.330	0.510	0.013	0.020	e	1.270 (BSC)		0.050 (BSC)	
c	0.170	0.250	0.007	0.010	L	0.400	1.270	0.016	0.050
D	4.700	5.100	0.185	0.201	θ	0°	8°	0°	8°
D1	2.034	2.234	0.080	0.088					

**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.

**Important Notice:**

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.