

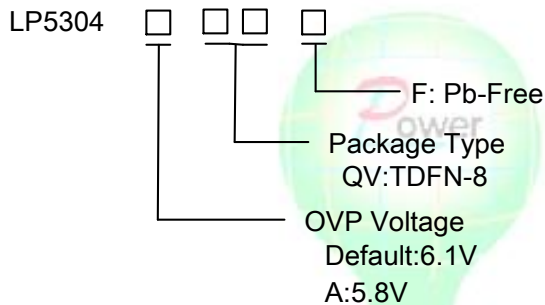
36V/5A Over Voltage Protection IC

General Description

The LP5304 is an Over-Voltage-Protection(OVP) device. The device will switch off internal MOSFET to disconnect IN to OUT to protect load when any of input voltage over the threshold. The Over temperature protection (OTP) function monitors chip temperature to protect the device.

The LP5304 is available in DFN-8 package. Standard products are Pb-free and Halogen-free.

Order Information



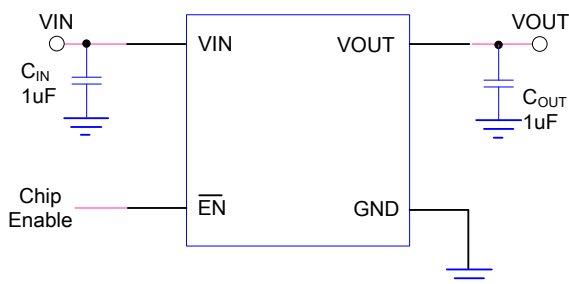
Features

- ◆ Input Voltage Range: 3.5V to 36V
- ◆ Typical Output Power on Time: 9mS
- ◆ OVP Threshold: 6.1V/5.8V
- ◆ OVP Threshold Time Less Than 1uS
- ◆ Output current:5A
- ◆ Low $R_{(DS(ON))}$ Internal Switches:30mΩ @ 5V
- ◆ Output Discharge
- ◆ Thermal Fault Protection
- ◆ DFN-8 3*3mm Package
- ◆ RoHS Compliant and 100% Lead (Pb)-Free

Applications

- ◇ GPS
- ◇ PMP
- ◇ PAD
- ◇ MID
- ◇ Digital cameras, Digital Videos

Typical Application Circuit



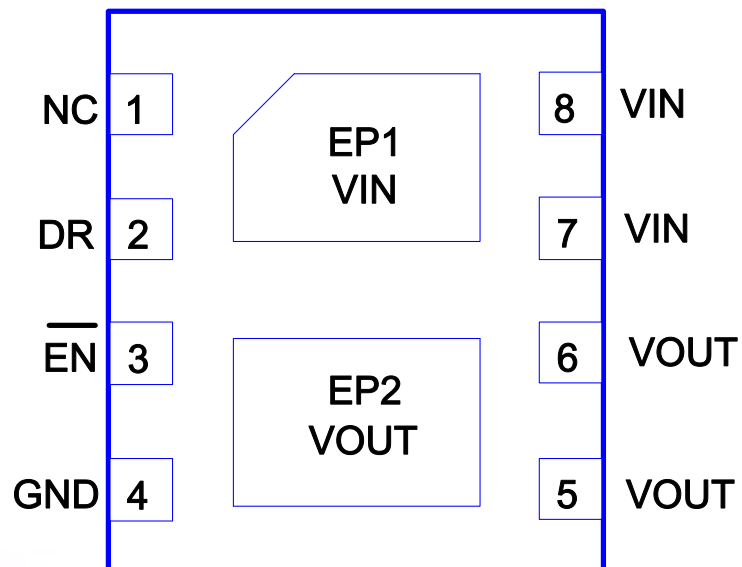
Marking Information

Device	Marking	Package	Shipping
LP5304QVF	LPS LP5304 YWX	DFN-8	5K/REEL
LP5304AQVF	LPS LP5304A YWX	DFN-8	5K/REEL

Y: Year code. W: Week code. X: Batch numbers.



Functional Pin Description

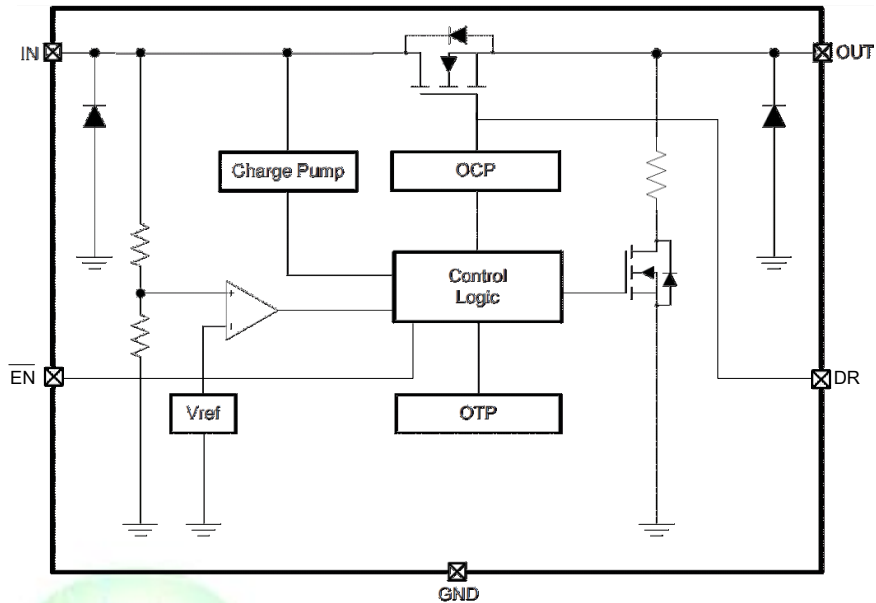


Pin Description

DFN-8	PIN	DESCRIPTION
1	NC	No connector.
2	DR	NMOS gate driver.
3	$\overline{\text{EN}}$	Chip enable pin. Active low.
4	GND	Ground.
5/6/EP2	OUT	Output pin.
7/8/EP1	VIN	Input pin. A 1uF low ESR ceramic capacitor or larger must be connected as close as to this pin. It is recommended to use 50V capacitor or according to application.



Function Block Diagram



Absolute Maximum Ratings ^{Note 1}

◇ Input to GND	-----	36V
◇ Vout to GND	-----	6.5V
◇ EN Pin to GND	-----	6.5V
◇ DR Pin to GND	-----	13V
◇ Maximum Junction Temperature	-----	150°C
◇ Maximum Soldering Temperature (at leads, 10 sec)	-----	260°C

Note 1. Stresses 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.

Thermal Information

◇ Maximum Power Dissipation (DFN-8, PD, TA=25°C)	-----	1.5W
◇ Thermal Resistance (DFN-8, JA)	-----	65°C/W

ESD Susceptibility

◇ HBM(Human Body Mode)	-----	2KV
◇ MM(Machine Mode)	-----	200V

Recommended Operating Conditions

◇ Operating Ambient Temperature Range (Ta)	-----	-40°C to 85°C
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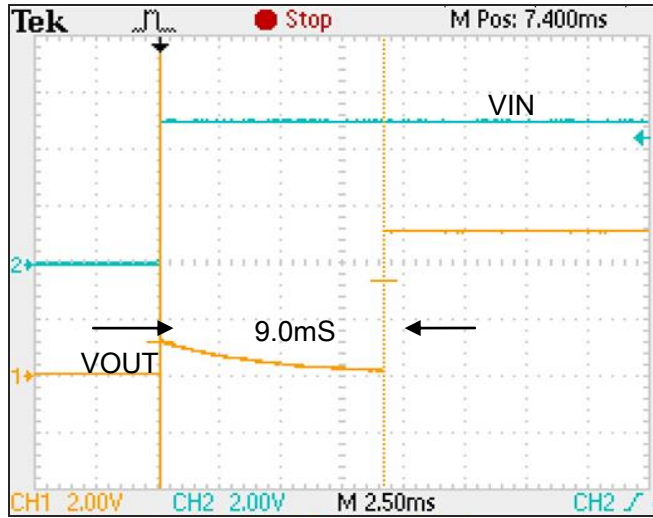
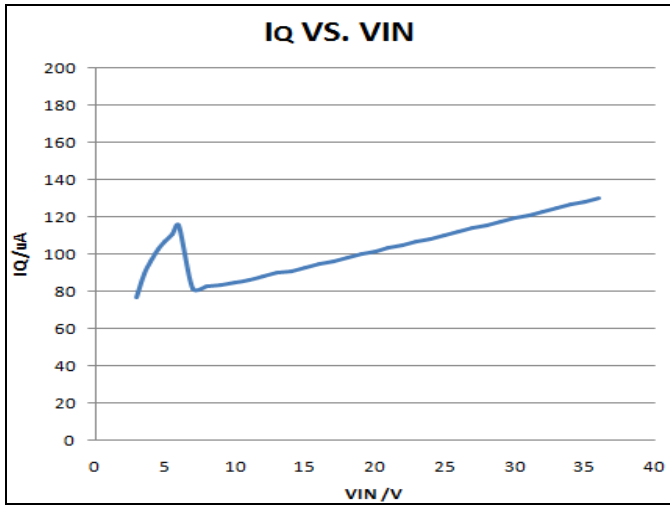
Electrical Characteristics

(Typical values are TA=25°C)

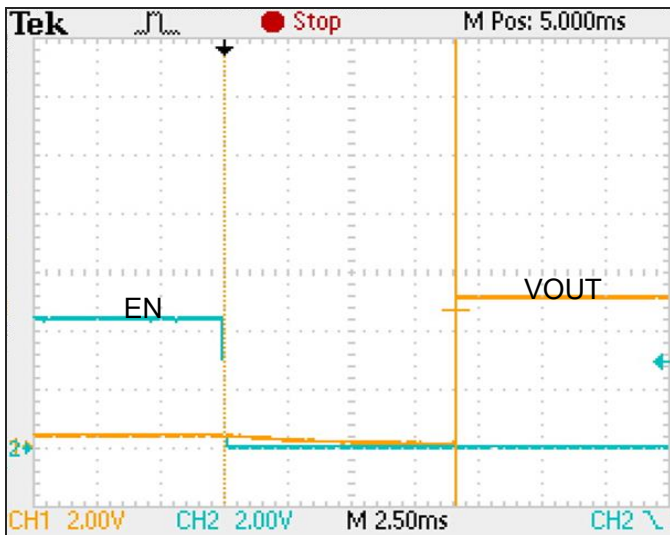
Symbol	Parameter	Conditions	LP5304			Unit	
			Min.	Typ.	Max.		
DC characteristics and Power-ON-Reset							
V _{IN}	Input Voltage		3.5		36	V	
I _Q	Input quiescent current	V _{IN} =5V, EN=LOW, I _{OUT} =0A		110		uA	
I _{SD}		V _{IN} =5V, EN=HIGH, I _{OUT} =0A			1		
R _{ON}	IN-to-OUT ON resistance	V _{IN} =5V, I _{OUT} =4A		30	35	mΩ	
R _{DISCHARGE}	Output discharge resistance			4.3		kΩ	
V _{EN(L)}	Enable Threshold Low	Chip enable			0.4	V	
V _{EN(H)}	Enable Threshold High	Chip shutdown	1.4			V	
UVLO	Under voltage lock out threshold	V _{IN} increasing from 0~5V	2.6	2.8	3	V	
V _{HYS-UVLO}	Under voltage lock out hysteresis	V _{IN} decreasing from 5~0V		500		mV	
T _{ON}	Output power-on time	EN = LOW ,		9		mS	
	Turn on through EN	EN = HIGH -> LOW,		9			
Input Over-Voltage-Protection (OVP)							
V _{OVP}	OVP threshold	V _{IN} increasing from 5~7V	LP5304QVF	5.8	6.1	6.4	V
			LP5304AQVF	5.5	5.8	6.1	V
V _{HYS-OVP}	OVP hysteresis	V _{IN} decreasing from 7~5V		300		mV	
T _{OVP}	OVP active time	V _{IN} = 5 -> 10V			1	uS	
T _{ON(OVP)}	OVP recovery time	V _{IN} = 10 -> 5V to output ON		9		mS	
I _{out}	Output current limit		5			A	
Over-Temperature-Protection (OTP)							
OTP threshold				150		°C	
OTP hysteresis				20		°C	



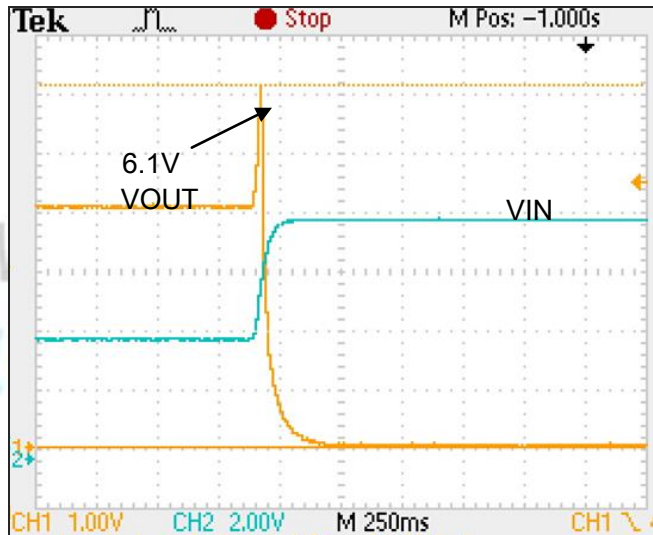
Typical Operating Characteristics



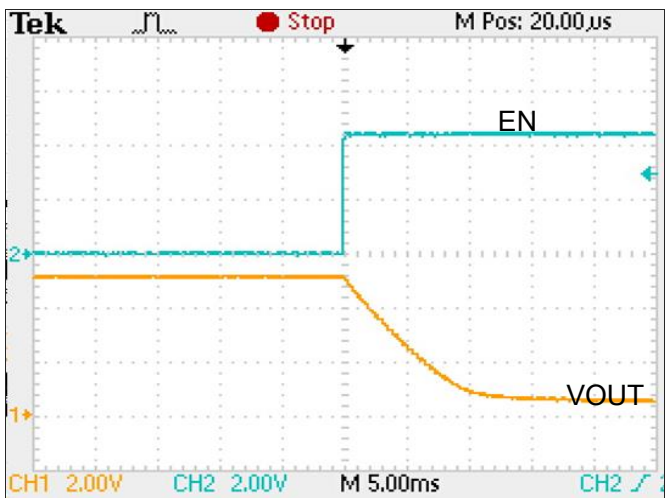
Turn on with EN=0V



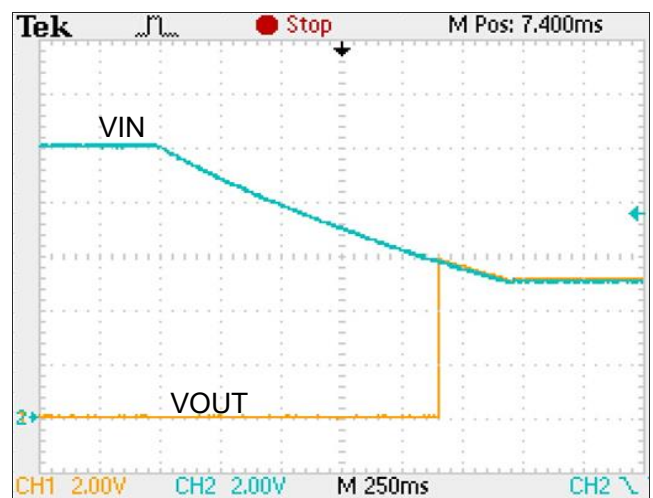
Turn on with VIN=5V



OVP waveform (LP5304QVF)



Turn off waveform with Iout=0A

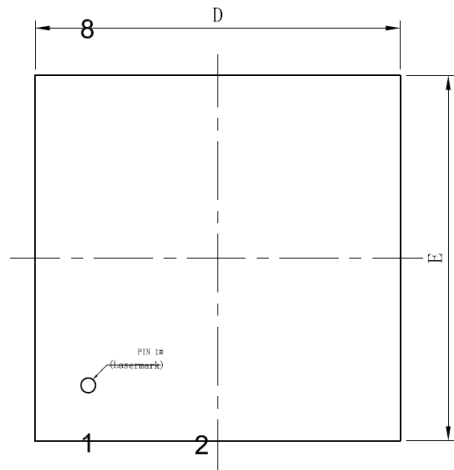


VIN falling waveform

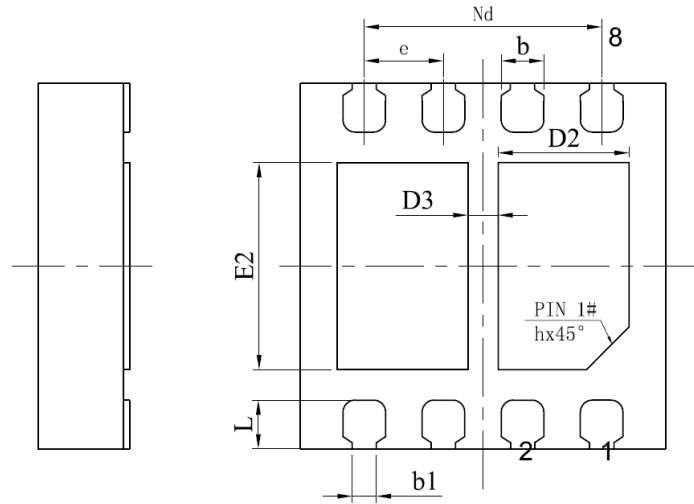


Packaging Information

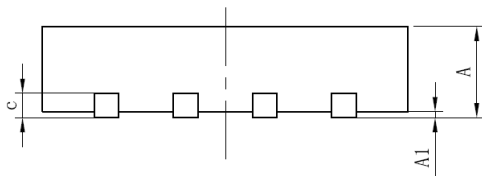
DFN-8



TOP VIEW



BOTTOM VIEW

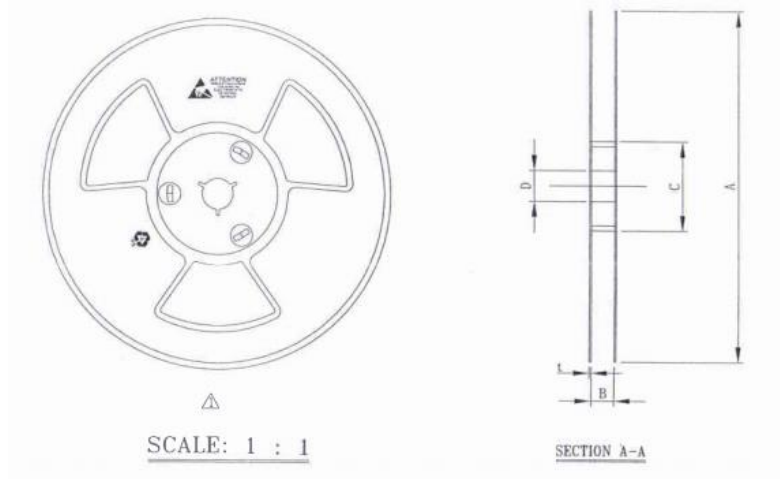


SIDE VIEW

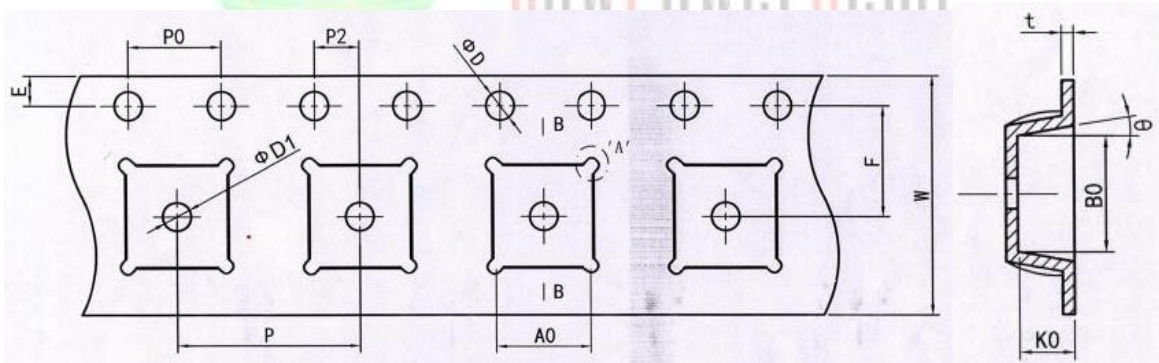
SYMBOL	MILIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.30	0.35	0.40
b1	0.20REF		
c	0.18	0.20	0.23
D	2.90	3.00	3.10
D2	0.975	1.075	1.175
D3	0.25REF		
Nd	1.90	1.95	2.00
E	2.90	3.00	3.10
E2	1.60	1.70	1.80
e	0.65BSC		
L	0.35	0.40	0.45
h	0.30	0.35	0.40



TAPE AND REEL INFORMATION



SYMBOL	MILIMETER		
	MIN	NOM	MAX
A	328	329	330
B	11.8	12.8	13.8
C	99	100	101
D	13.0	13.3	13.6
L	1.7	2.0	2.3



SYMBOL	MILIMETER		
	MIN	NOM	MAX
A0	3.2	3.3	3.4
B0	3.2	3.3	3.4
D	1.50	1.55	1.60
D1	1.50	--	--
E	1.65	1.75	1.85
F	5.40	5.50	5.60
P	7.90	8.00	8.10
P0	3.90	4.00	4.10
P2	1.95	2.00	2.05
K0	1.00	1.10	1.20
W	11.70	12.00	12.30
t	0.25	0.30	0.35
θ	--	3°	--

Classification of IR Reflow Profile

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Min(T_{SMIN})	100°C	150°C
Temperature Max(T_{SMAX})	150°C	200°C
Time(T_s) from (T_{SMIN} to T_{SMAX})	60~120 seconds	60~120 seconds
Ramp-up rate (T_L to T_P)	3°C/second max	3°C/second max
Liquidous temperature(T_L)	183°C	217°C
Time(t_L) maintained above T_L	60~150 seconds	60~150 seconds
Peak package body temperature (T_P)	For users T_P must not exceed the Classification temp in Table 1. For suppliers T_P must equal or exceed the Classification temp in Table 1.	For users T_P must not exceed the Classification temp in Table 2. For suppliers T_P must equal or exceed the Classification temp in Table 2.
Time(t_P)* within 5°C of the specified classification temperature(T_C), see Figure 1	20* seconds	30* seconds
Ramp-down rate (T_P to T_L)	6°C/second max	6°C/second max
Time 25°C to peak temperature	6 minutes max	8 minutes max
* Tolerance for peak profile temperature (T_P) is defined as a supplier minimum and a user maximum.		

Table 1 Sn-Pb Eutectic Process - Classification Temperatures (T_C)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5mm	235°C	220°C
≥2.5mm	220°C	220°C

Table 2 Pb-Free Process - Classification Temperatures (T_C)

Package Thickness	Volume mm ³ <350	Volume mm ³ 350~2000	Volume mm ³ ≥350
<1.6mm	260°C	260°C	260°C
1.6mm~2.5mm	260°C	250°C	245°C
>2.5mm	250°C	245°C	245°C

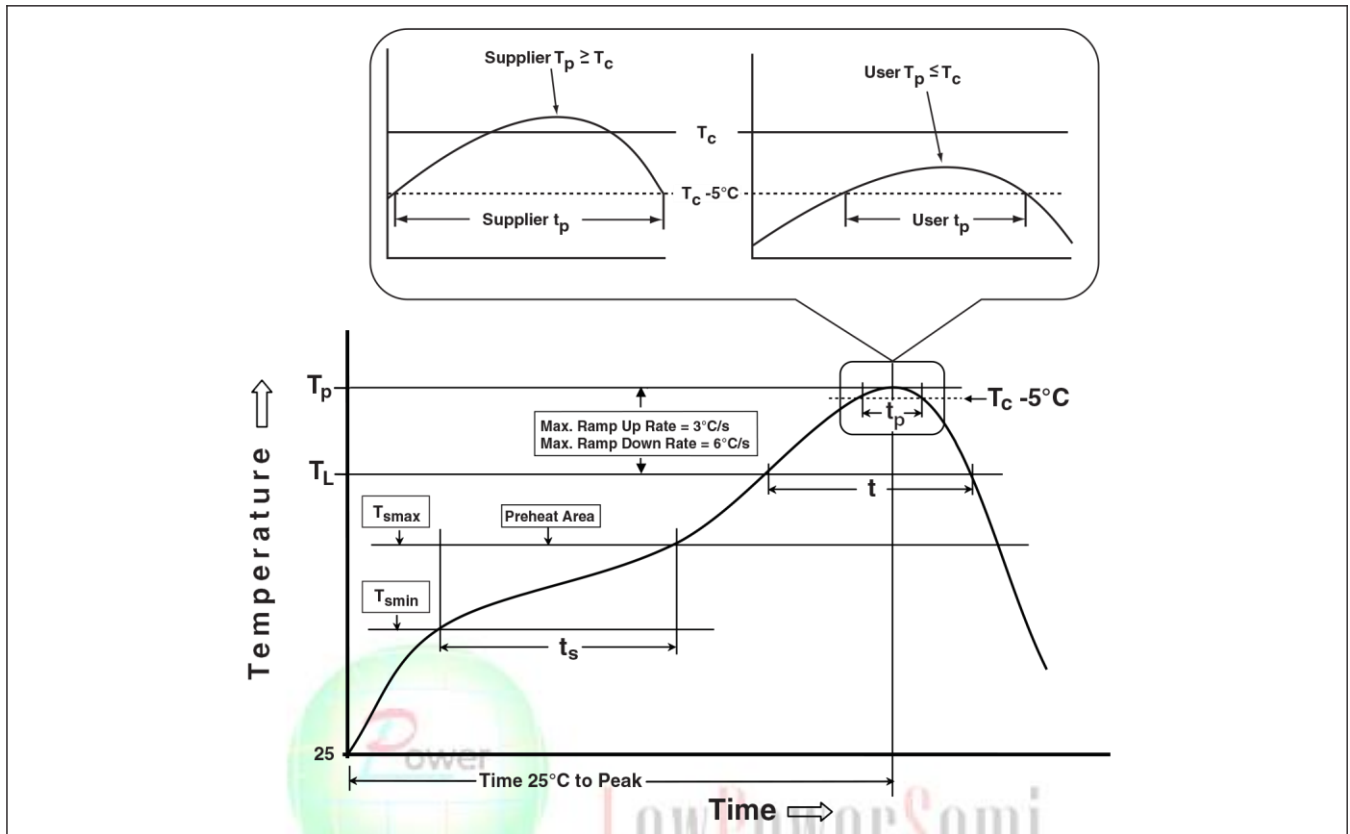


Figure1 Classification Profile (Not to scale)

Products shipped conform to “Rohs” standards;

Moisture Sensitivity Level: MSL3 (CONDITION: $\cong 30\text{ }^{\circ}\text{C}/60\%\text{RH}$ 、Time control:168 hours) ;

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