

FMOSTHAB68N06-Q1-H

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FMOSTHAB68N06-Q1-H

68A 60V N-Channel Trench
Enhancement Mode Power MOSFET

Features

- $V_{DS}=60V$, $I_D=68A$.
- $R_{DS(ON)} \leq 7.5m\Omega$, @ $V_{GS}=10V$, $I_D=20A$.
- $R_{DS(ON)} \leq 8.8m\Omega$, @ $V_{GS}=4.5V$, $I_D=20A$.
- Excellent gate charge x on-resistance product (FOM.).
- Very low on-resistance.
- 100% UIS and ΔV_{ds} tested.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

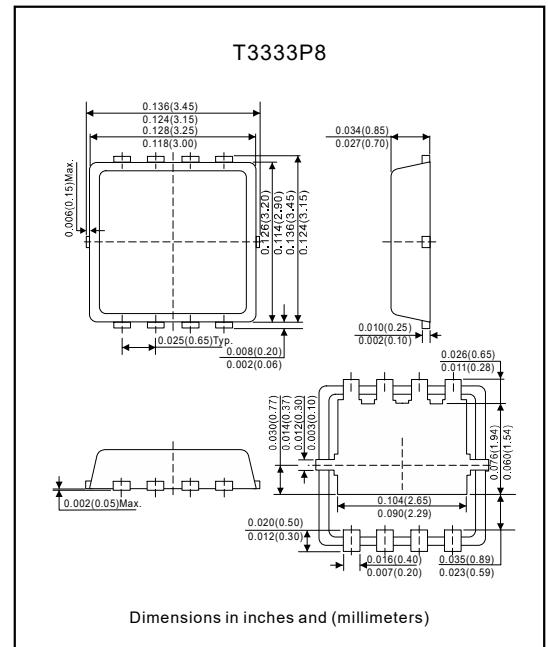
Applications

- Automotive application.
- DC/DC converters.
- Ideal for high-frequency switching and synchronous rectification.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, T3333P8 (DFN3333-8).
- Weight : Approximated 25mg.

Package outline

Maximum ratings (At $T_c=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current ($T_c=25^\circ C$) ($T_c=100^\circ C$)	I_D	68	A
		48	
Pulsed drain current	I_{DM}	200	A
Single pulse avalanche energy (Note1)	E_{AS}	288	mJ
Derating factor		0.48	W/ $^\circ C$
Power dissipation	P_D	71	W
Thermal resistance, junction to ambient (note4)	$R_{\theta JA}$	60	$^\circ C/W$
Thermal resistance, junction to case	$R_{\theta JC}$	2.1	$^\circ C/W$
Operating junction temperature	T_J	+175	$^\circ C$
Storage temperature range	T_{STG}	-55 to +175	$^\circ C$

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Electrical characteristics (At $T_c=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
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Off characteristics

Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	60			V
Drain-source leakage current	I_{DSS}	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 100	nA

On characteristics

Gate threshold voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}$, $I_D=250\mu\text{A}$	1.2	1.8	2.4	V
Drain-Source on-state resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=20\text{A}$		6.5	7.5	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=20\text{A}$		7.7	8.8	
Foward transconductance	g_{FS}	$V_{DS}=10\text{V}$, $I_D=20\text{A}$		40		S

Dynamic parameters

Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=30\text{V}$, $f=1.0\text{MHz}$		1892		pF
Out capacitance	C_{oss}			356		
Reverse transfer capacitance	C_{rss}			37		

Switching parameters (Note2)

Total gate charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=30\text{V}$, $I_D=20\text{A}$		34.8		nC
Gate to source charge	Q_{gs}			7.0		
Gate to drain charge	Q_{gd}			5.3		
Turn-on delay time	$t_{d(on)}$	$V_{DD}=30\text{V}$, $V_{GS}=10\text{V}$, $R_G=3\Omega$, $I_D=20\text{A}$		10		ns
Rise time	t_r			30		
Turn-off delay time	$t_{d(off)}$			36		
Fall time	t_f			8		

Source-drain diode ratings and characteristics

Drain-source diode forward voltage	V_{SD}	$I_S=20\text{A}$, $V_{GS}=0\text{V}$			1.2	V
Continuous source current	I_S				68	A
Reverse recovery time	t_{rr}	$I_F=40\text{A}$, $T_J=25^\circ\text{C}$, $di/dt=100\text{A}/\mu\text{s}$		42		ns
Reverse recovery charge	Q_{rr}			48		nC

Note : 1. Defined by design, not subject to production test.

2. E_{AS} condition: $T_J=25^\circ\text{C}$, $V_{DD}=30\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_G=25\Omega$.

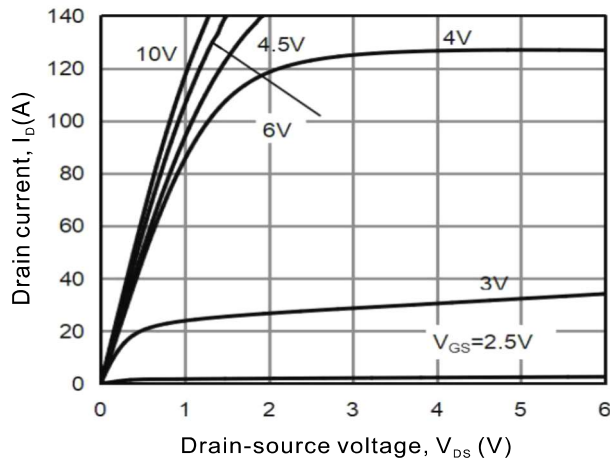
3. These curves are based on the junction to case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=175^\circ\text{C}$. The SOA curve provides a single pulse rating.

4. These value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. copper, in a still air environment with $T_A=25^\circ\text{C}$. The maximum allowed junction temperature of 175°C . The value in any given application depends on the user's specific board design.

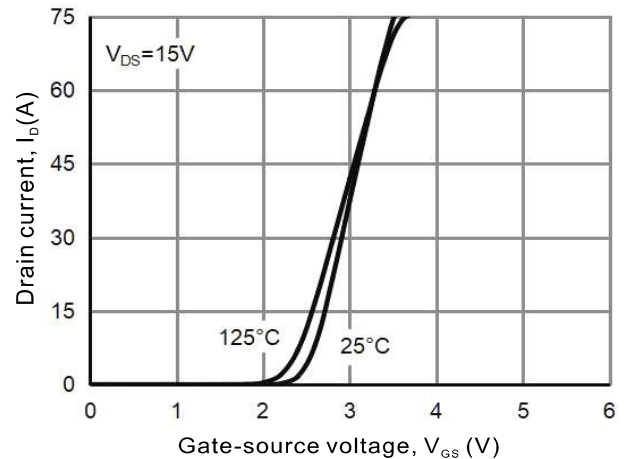
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Rating and characteristic curves

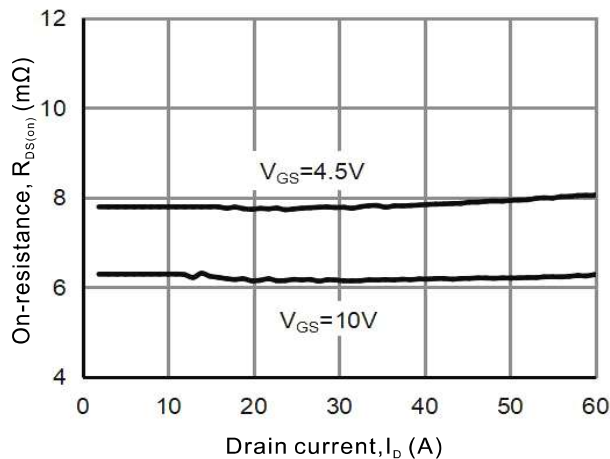
Output characteristics



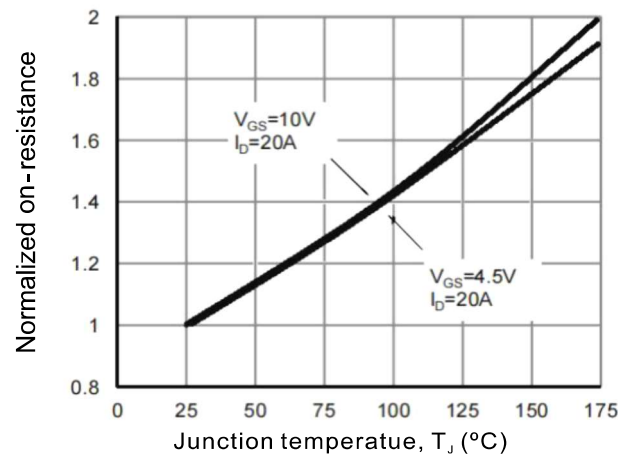
Transfer characteristics



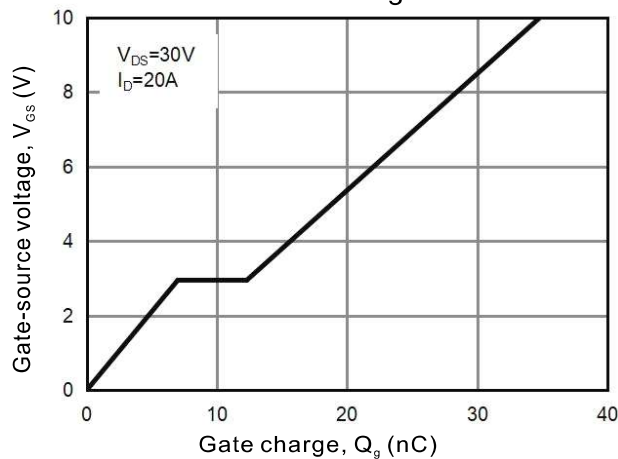
On-resistance vs. Drain current



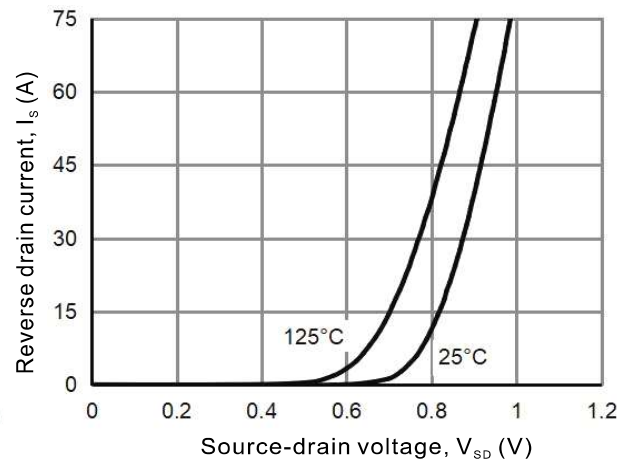
On-resistance vs. Junction temperature



Gate charge

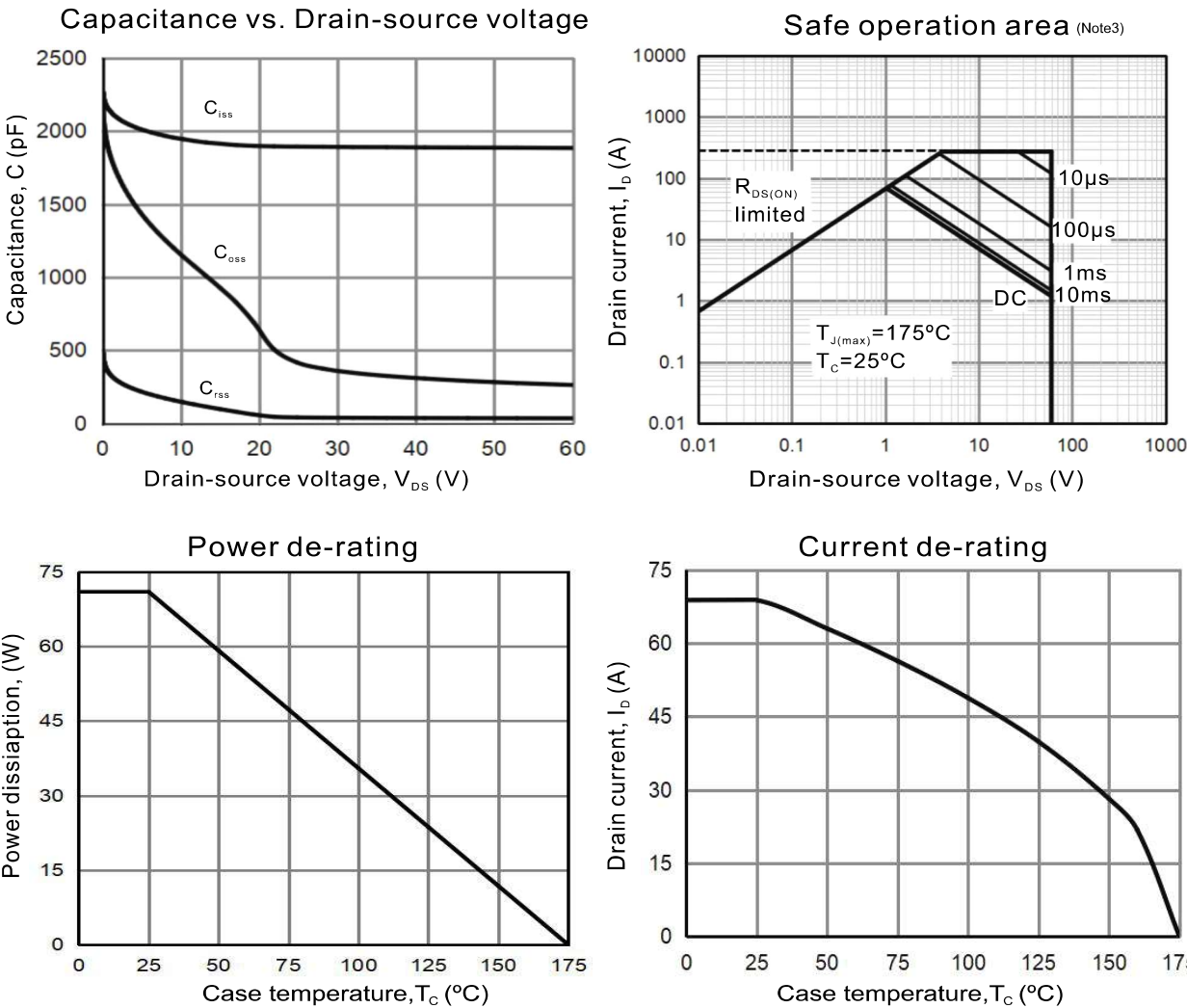


Source-drain diode forward



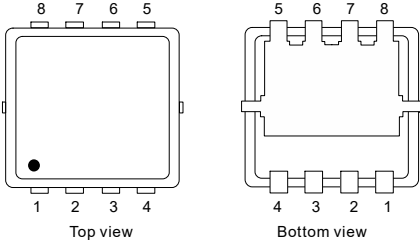
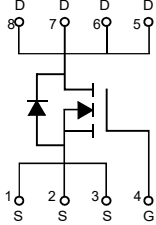
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Rating and characteristic curves



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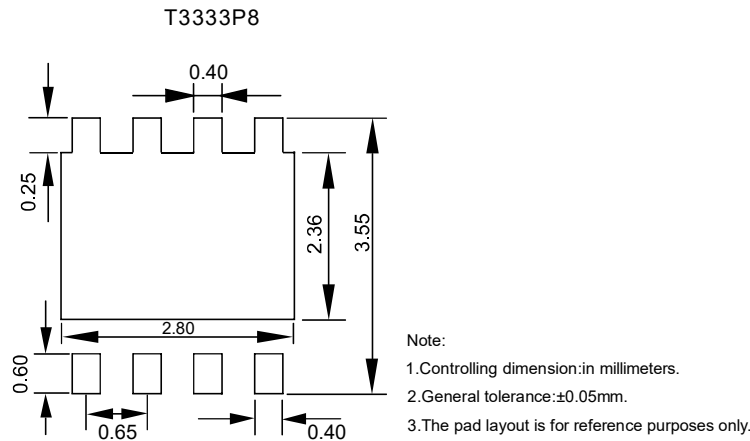
Pinning information

Pin	Simplified outline	Symbol
Pin 1, 2, 3 Source		
Pin 4 Gate		
Pin 5, 6, 7, 8 Drain		

Marking

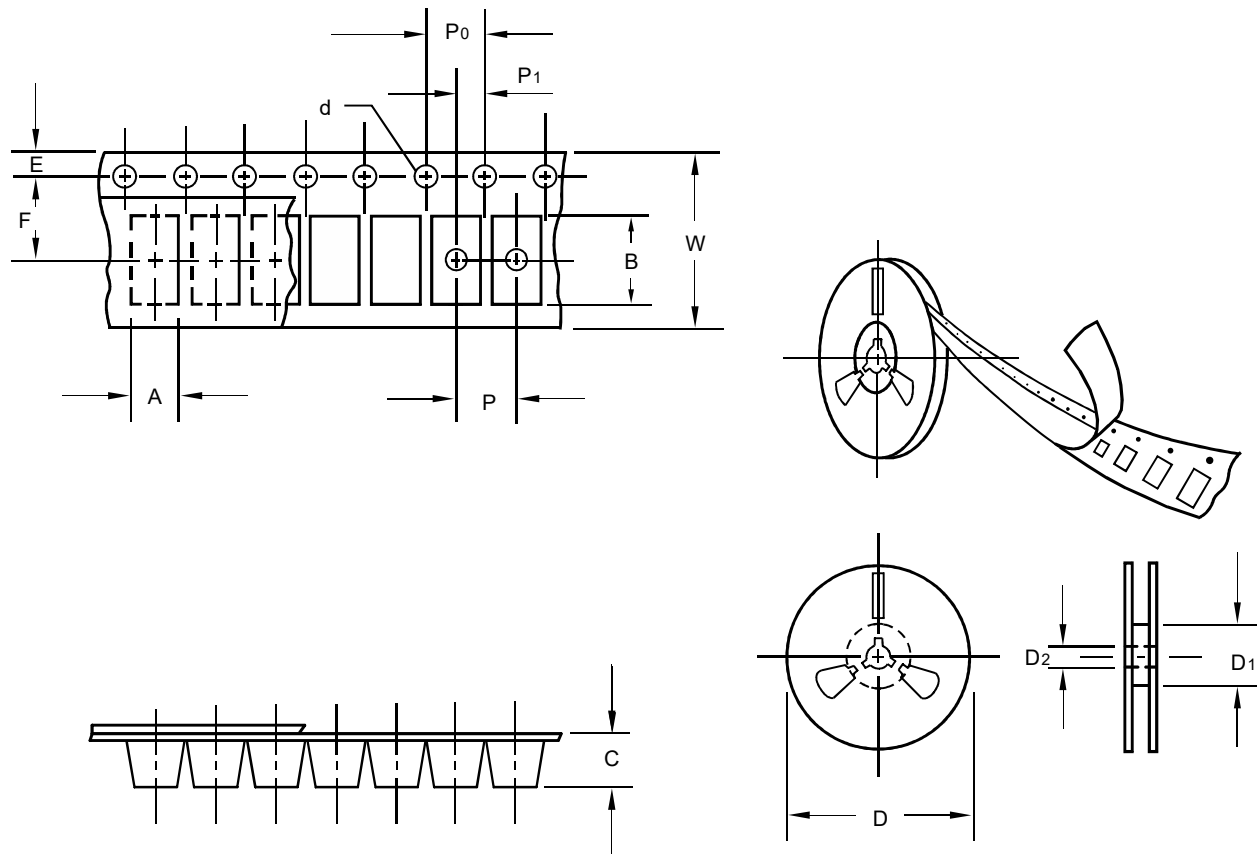
Type number	Marking code
FMOSTHAB68N06-Q1-H	AP6050AQU

Suggested solder pad layout



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Packing information



unit:mm

Item	Symbol	Tolerance	T3333P8
Carrier width	A	0.5	3.60
Carrier length	B	0.5	3.60
Carrier depth	C	0.5	1.20
Sprocket hole	d	0.5	1.55
13" Reel outside diameter	D	2.0	330.00
13" Reel inner diameter	D1	min	99.50
7" Reel outside diameter	D	2.0	-
7" Reel inner diameter	D1	min	-
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	5.50
Punch hole pitch	P	0.1	8.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Tape width	W	0.5	12.00

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

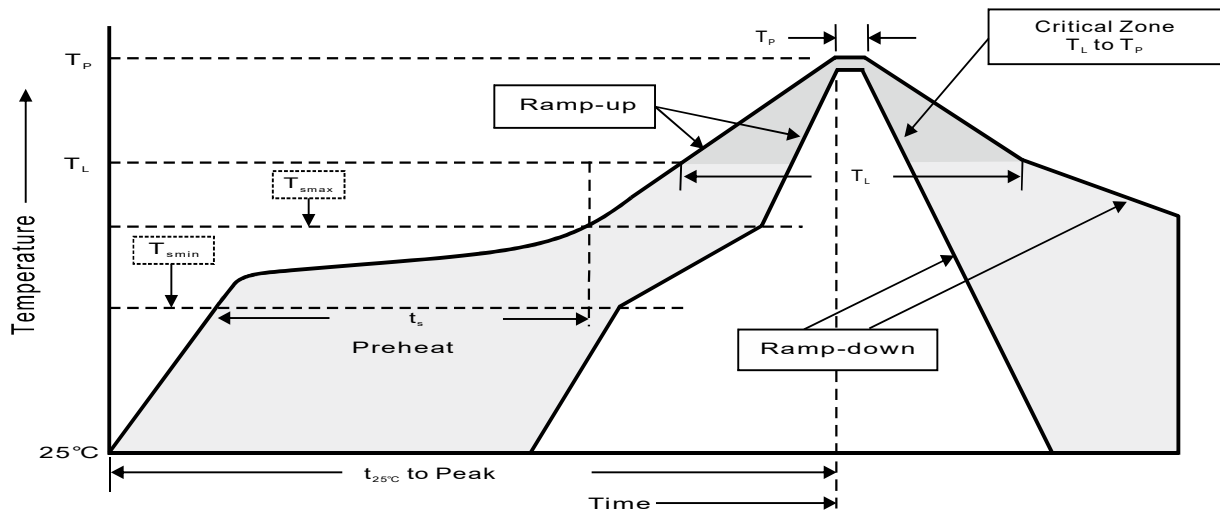
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Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)
T3333P8	13"	5,000	8.0	10,000	355*335*38	330	350*330*360	80,000

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature = 5°C ~ 40°C Humidity = 55%, ±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile feature	Soldering condition
Average ramp-up rate (T_L to T_p)	< 3 °C/sec
Preheat - Temperature Min (T_{min}) - Temperature Max (T_{max}) - Time (Min to Max) (t_s)	150°C 200°C 60 ~ 120 sec
T_{max} to T_L - Ramp-up rate	< 3 °C/sec
Time maintained above : - Temperature (T_L) - Time (T_L)	217°C 60 ~ 260 sec
Peak temperature (T_p)	255 °C -0/+5°C
Time with 5°C of actual peak temperature (T_p)	10 ~30 sec
Ramp-down rate	< 6 °C/sec
Time 25°C to peak temperature	< 6 minutes