

FMOST04P06

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**-4A -60V P-Channel Enhancement
Mode Power MOSFET****Features**

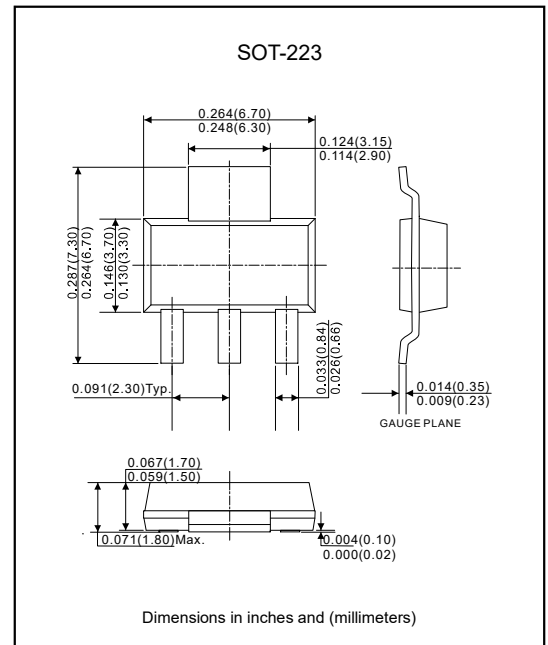
- $-V_{DS}=60V$, $-I_D=4A$.
- $R_{DS(ON)} < 114m\Omega$, @ $-V_{GS}=10V$, $-I_D=3A$.
- $R_{DS(ON)} < 130m\Omega$, @ $-V_{GS}=4.5V$, $-I_D=2A$.
- Fast switching speed.
- Reliable and rugged.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" dinicates Halogen-free part, ex.FMOST04P06-H.

Applications

- Motor driver.
- Power tools.
- LED lighting.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-223
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Mounting Position : Any.

Package outline**Maximum ratings** (At $T_J=25^\circ C$ unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Drain to source voltage	$-V_{DS}$	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain Current	$-I_D$	($T_A=25^\circ C$) 4	A
		($T_A=70^\circ C$) 3.2	
Pulsed drain current (Note 1)	$-I_{DM}$	($T_A=25^\circ C$) 9.9	A
Diode continuous forward current	$-I_S$	($T_A=25^\circ C$) 1.6	A
Power dissipation	P_D	($T_A=25^\circ C$) 1.8	W
		($T_A=70^\circ C$) 1.1	
Avalanche current, Single pulse (Note 2)	$-I_{AS}$	($L=0.1mH$) 6	A
Avalanche energy, Single pulse (Note 2)	E_{AS}	($L=0.1mH$) 1.8	mJ
Thermal resistance, junction to ambient (Note 3)	$R_{\theta JA}$	($t \leq 10s$) 35	$^\circ C/W$
		(Steady state) 70	$^\circ C/W$
Junction temperature	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 to +150	$^\circ C$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static parameters						
Drain-source breakdown voltage	$-BV_{\text{DSS}}$	$-I_{\text{D}}=250\mu\text{A}$, $V_{\text{GS}}=0\text{V}$	60			V
Drain-source leakage current	$-I_{\text{DSS}}$	$-V_{\text{DS}}=48\text{V}$, $V_{\text{GS}}=0\text{V}$			1	μA
Gate-source leakage current	I_{GSS}	$V_{\text{GS}}=\pm 20\text{V}$, $V_{\text{DS}}=0\text{V}$			± 100	nA

On characteristics

Gate threshold voltage	$-V_{\text{GS(TH)}}$	$V_{\text{DS}}=V_{\text{GS}}$, $-I_{\text{D}}=250\mu\text{A}$	1	1.8	3	V
Static drain-source on-state resistance (Note4)	$R_{\text{DS(ON)}}$	$-V_{\text{GS}}=10\text{V}$, $-I_{\text{D}}=3\text{A}$		95	114	m Ω
		$-V_{\text{GS}}=4.5\text{V}$, $-I_{\text{D}}=2\text{A}$		100	130	
Forward transconductance	g_{FS}	$-V_{\text{DS}}=10\text{V}$, $-I_{\text{D}}=3\text{A}$		8		S

Dynamic parameters (Note 5)

Gate resistance	R_{G}	$V_{\text{GS}}=0\text{V}$, $V_{\text{DS}}=0\text{V}$, $f=1.0\text{MHz}$		15.4		Ω
Input capacitance	C_{iss}	$V_{\text{GS}}=0\text{V}$, $-V_{\text{DS}}=30\text{V}$, $f=1.0\text{MHz}$		930		pF
Out capacitance	C_{oss}			40		
Reverse transfer capacitance	C_{rss}			30		

Switching parameters

Total gate charge	Q_{g}	$-V_{\text{GS}}=4.5\text{V}$, $-V_{\text{DS}}=30\text{V}$, $-I_{\text{D}}=3\text{A}$		8.5		nC
Gate to source charge	Q_{gs}	$-V_{\text{GS}}=10\text{V}$, $-V_{\text{DS}}=30\text{V}$, $-I_{\text{D}}=3\text{A}$		18.5		
Gate to drain charge	Q_{gd}			3.65		
Turn-on delay time	$t_{\text{d(on)}}$	$-V_{\text{DS}}=15\text{V}$, $-I_{\text{D}}=1\text{A}$, $-V_{\text{GS}}=10\text{V}$, $R_{\text{GEN}}=6\Omega$		2.15		nS
Rise time	t_{r}			4.4		
Turn-off delay time	$t_{\text{d(off)}}$			17.8		
Fall time	t_{f}			78.8		
				32.8		

Source-drain diode ratings and characteristics

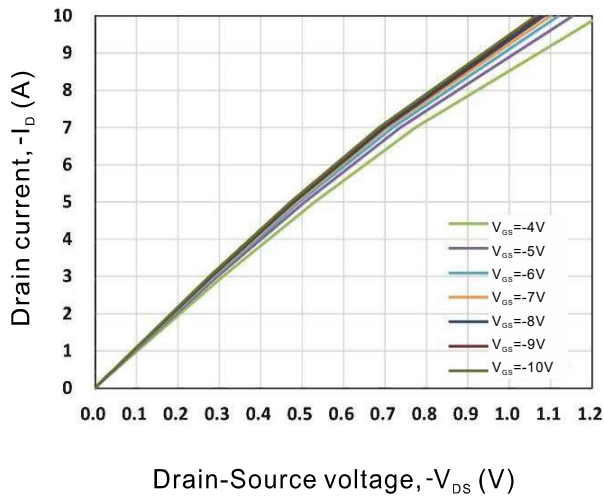
Body Diode Voltage (Note 4)	$-V_{\text{SD}}$	$-I_{\text{S}}=1\text{A}$, $V_{\text{GS}}=0\text{V}$		0.75	1.1	V
Body diode reverse recovery time	t_{rr}	$-I_{\text{F}}=1\text{A}$, $-V_{\text{R}}=30\text{V}$, $dI_{\text{F}}/dt=100\text{A}/\mu\text{s}$		11		nS
Body diode reverse recovery charge	Q_{rr}			5.4		nC

- Note : 1. Max. current is limited by junction temperature.
 2. UIS tested and pulse width are limited by maximum junction temperature 150°C .
 3. Surface mounted on 1in^2 FR-4 board with 1oz.
 4. Pulse test(pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$).
 5. Guaranteed by design, not subject to production testing.

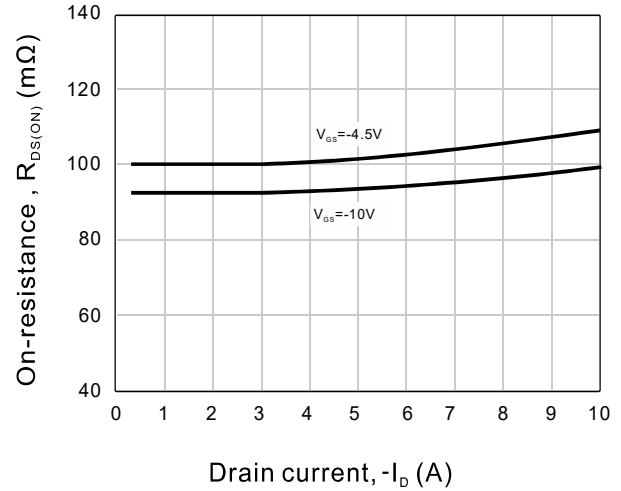
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Rating and characteristic curve

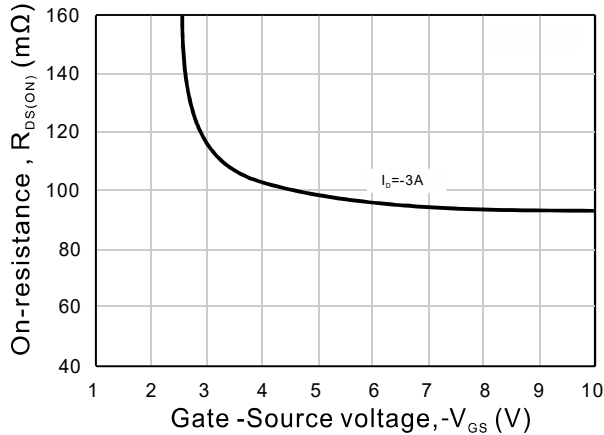
Output characteristics



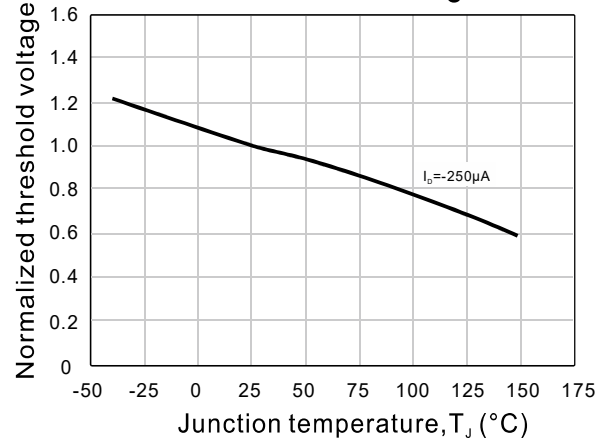
On-resistance vs. Drain current



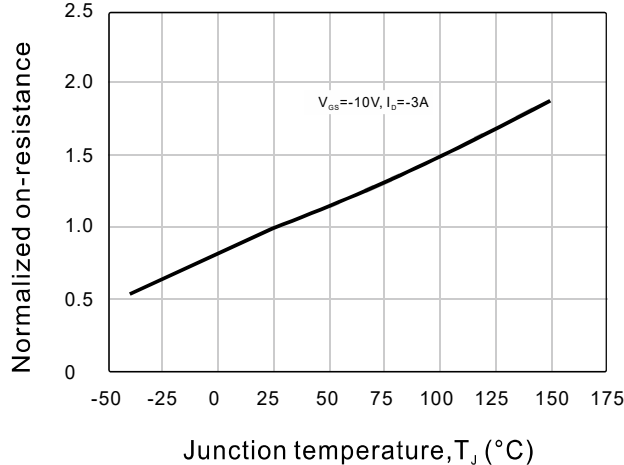
On-resistance vs. Gate-Source voltage



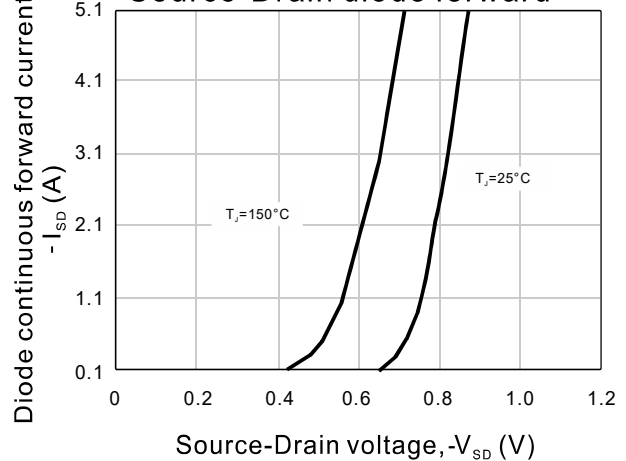
Gate threshold voltage



Drain-Source on-resistance

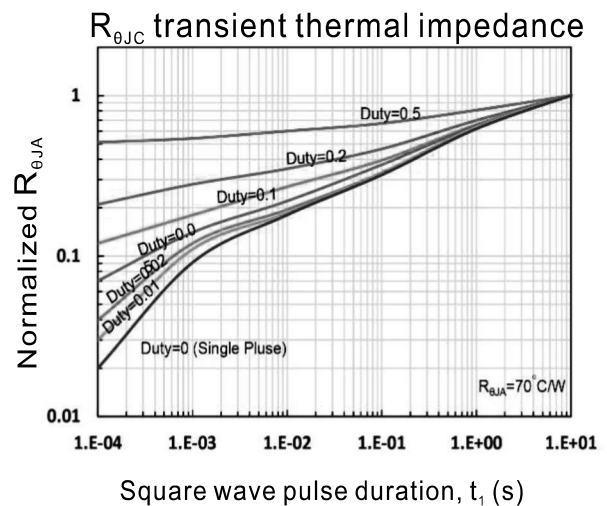
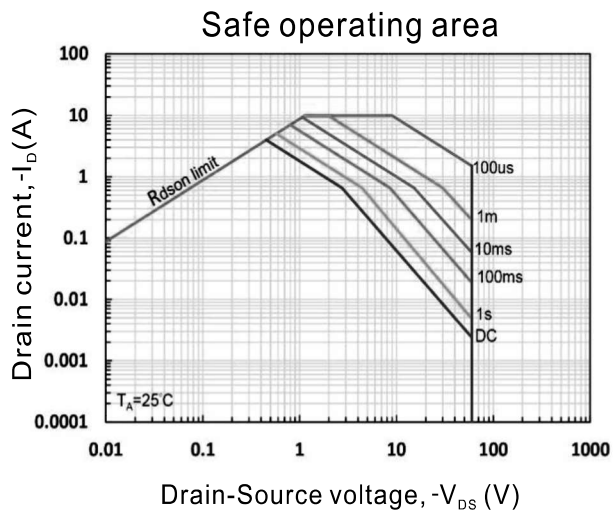
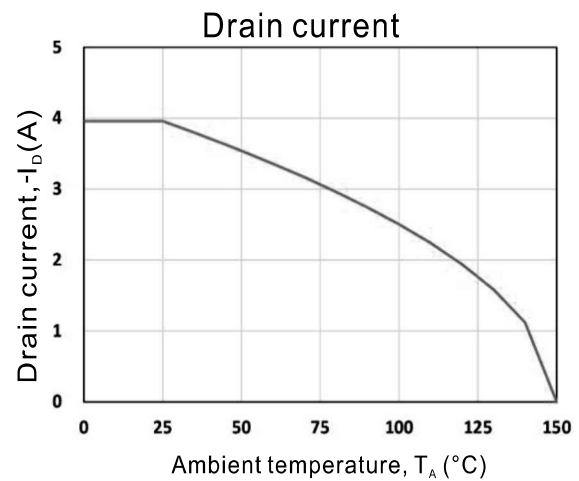
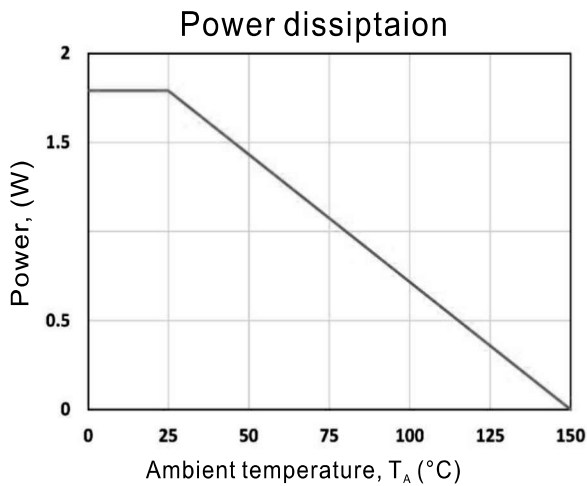
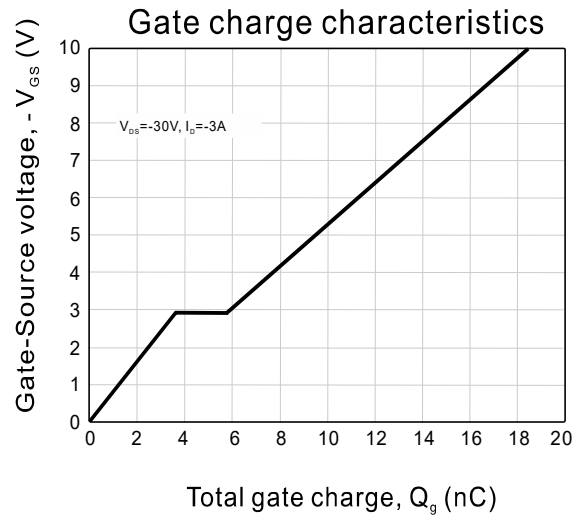
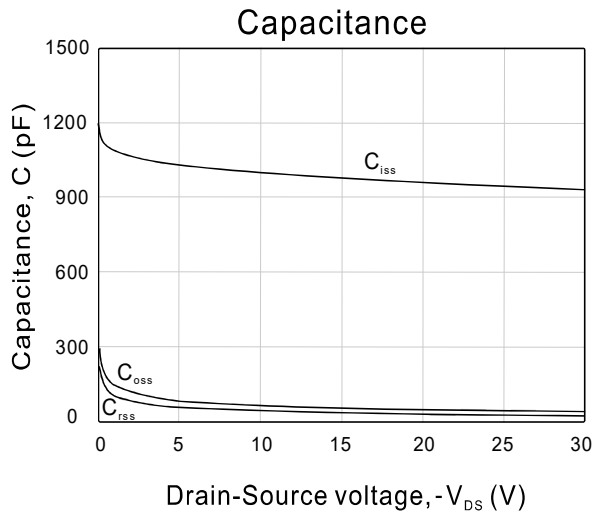


Source-Drain diode forward



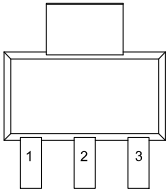
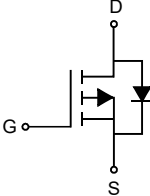
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Rating and characteristic curve



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Pinning information

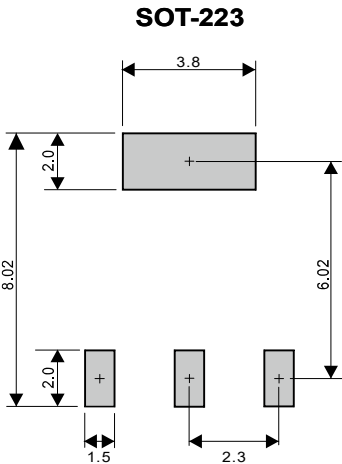
Pin	Simplified outline	Symbol
Pin G Gate Pin D Drain Pin S Source		

Marking

Type number	Marking code
FMOST04P06	01 YWW

YWW : Wafer lot code
Y : Year
WW : Week

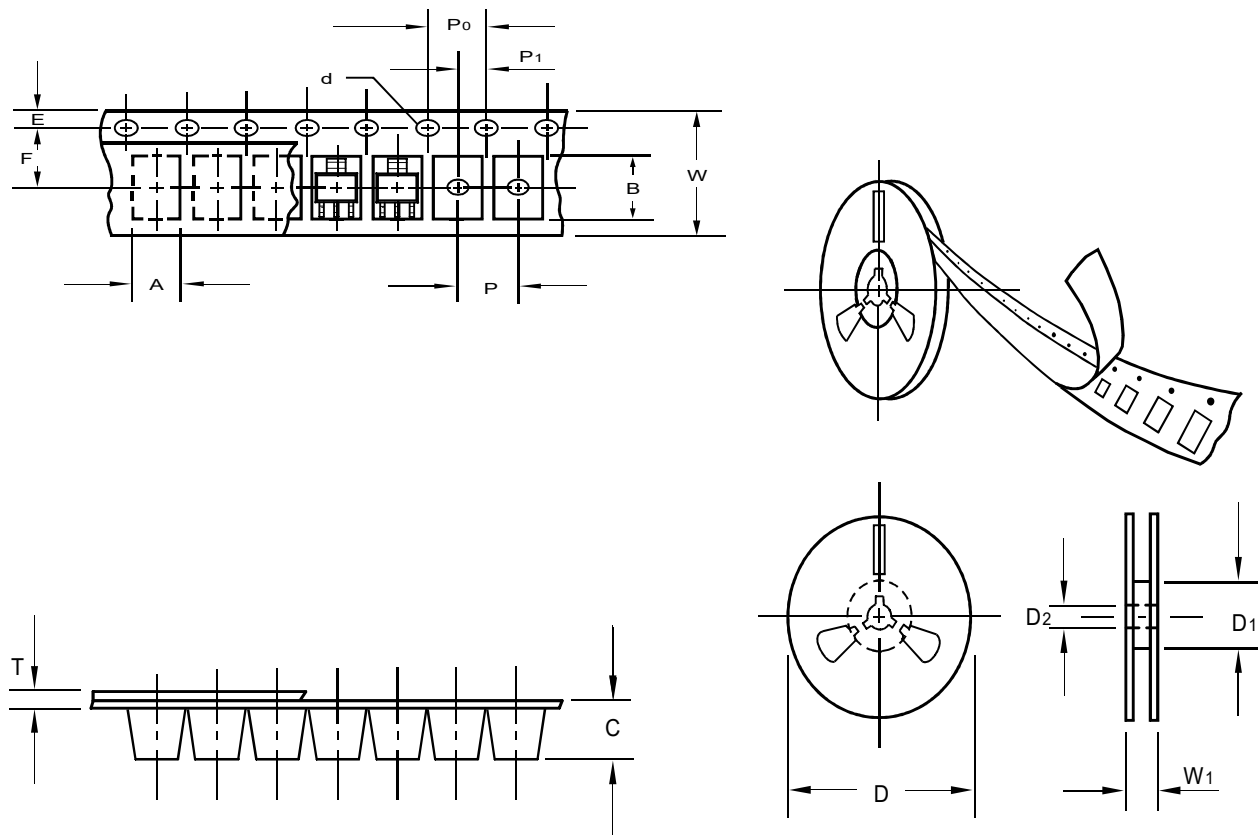
Suggested solder pad layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.050mm.
3.The pad layout is for reference purposes only

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-223
Carrier width	A	0.1	6.55
Carrier length	B	0.1	7.25
Carrier depth	C	0.1	1.90
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	330.00
13" Reel inner diameter	D1	min	100.00
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
Overall tape thickness	T	0.1	0.25
Tape width	W	0.3	12.00
Reel width	W1	0.3	17.6

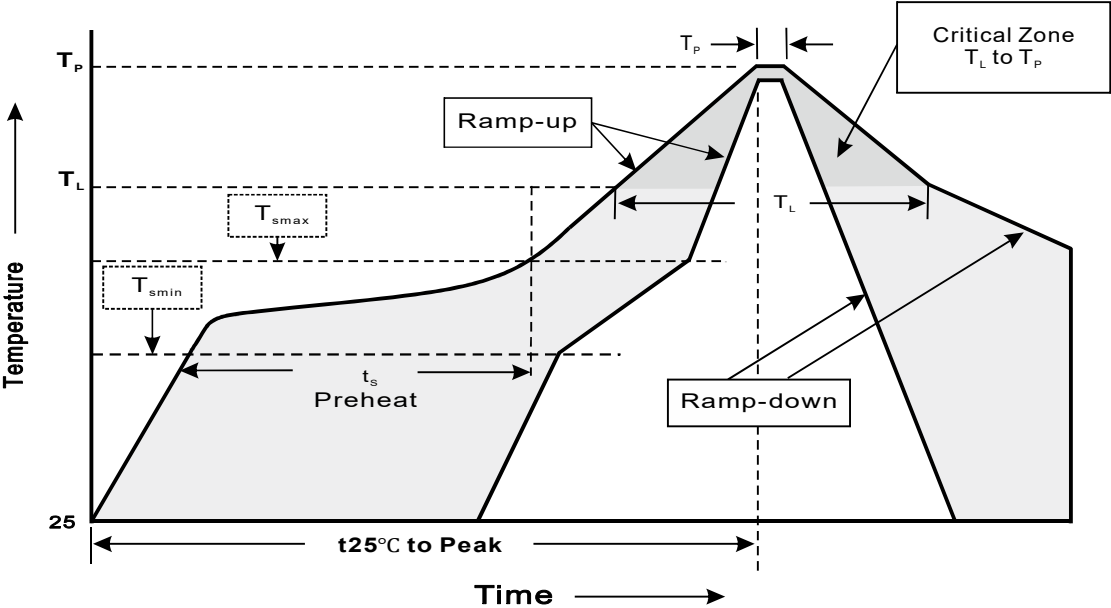
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Reel packing

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)
SOT-223	13"	2,500	8.0	5,000	335*335*38	330	350*330*360	40,000

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
Prehaeat -Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (min to max) (t_s)	150°C 200°C 60 ~120sec
T_{smax} 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 within 5°C of actual peak Temperature(T_P)	10 ~ 30sec
Ramp-down rate	< 6°C/sec
Time 25°C to peak temperature	< 6 minutes