

FMNN0210-H

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2.0A 100V N-Channel Enhancement Mode Power MOSFET

Features

- $V_{DS}=100V$, $I_D=2.0A$.
- $R_{DS(on)} \leq 240m\Omega$, @ $V_{GS}=10V$, $I_D=2.0A$.
- High density cell design for ultra low $R_{DS(on)}$.
- Fully characterized avalanche voltage and current.
- Excellent package for good heat dissipation.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

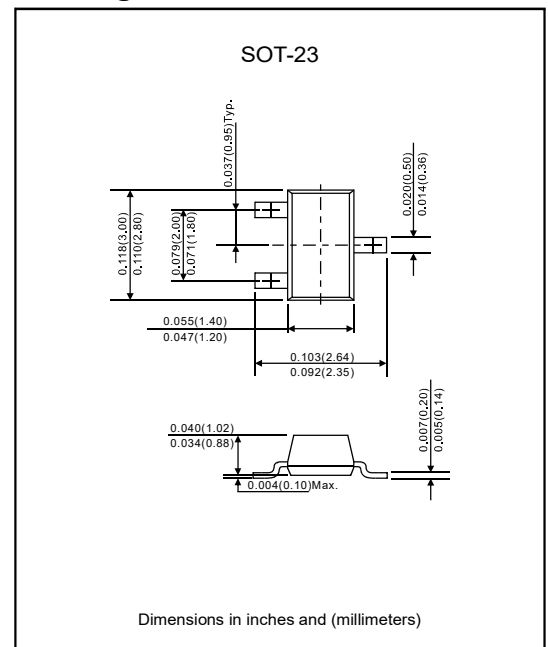
Application

- Power switching application.
- Hard switched and high frequency circuits.
- Uninterruptible power supply.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Weight : Approximated 8mg.

Package outline



Maximum ratings (At $T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	100	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current	I_D	2	A
Continuous drain current ($T_C=100^{\circ}C$)		1.4	
Pulsed drain current (Note1)	I_{DM}	8	A
Power dissipation	P_D	1.25	W
Single pulsed, avalanche energy (Note5)	E_{AS}	2.45	mJ
Avalanche Current (Note1)	I_{AR}	2	A
Thermal resistance, junction to ambient (Note2)	$R_{\theta JA}$	100	$^{\circ}C/W$
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
Off characteristics						
Drain-source breakdown voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	100			V
Drain-source leakage current	I _{DSS}	V _{DS} =100V, V _{GS} =0V			1	μA
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
On characteristics (Note 3)						
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0	2.7	3.5	V
Static drain-source on-state resistance	R _{DS(ON)}	V _{GS} =10V, I _D =2.0A		220	240	mΩ
Forward transconductance	g _{FS}	V _{DS} =5.0V, I _D =2A	1			S
Dynamic parameters (Note 4)						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		406		pF
Out capacitance	C _{oss}			19		
Reverse transfer capacitance	C _{rss}			12		
Switching parameters (Note 4)						
Total gate charge	Q _g	V _{DS} =50V, V _{GS} =10V, I _D =2.0A		13.6		nC
Gate-source charge	Q _{gs}			3.1		
Gate-drain charge	Q _{gd}			2.9		
Turn-on delay time	t _{d(on)}	V _{DD} =50V, R _L =25Ω V _{GS} =10V, R _G =1Ω		7		ns
Rise time	t _r			12		
Turn-off delay time	t _{d(off)}			13		
Fall time	t _f			9		
Source-drain diode ratings and characteristics						
Source to drain forward voltage drop (Note3)	V _{SD}	I _S =2A, V _{GS} =0V			1.2	V
Source to drain continuous current (Note2)	I _S				2	A

Note: 1.Repetitive Rating : Pulse width limited by maximum junction temperature.

2.Surface Mounted on FR4 Board, $t \leq 10$ sec.

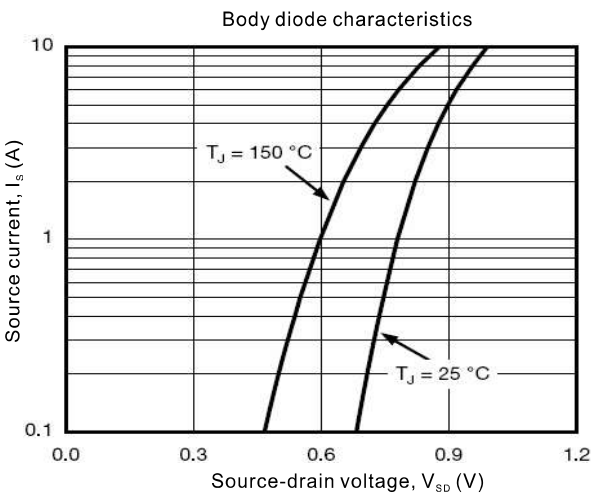
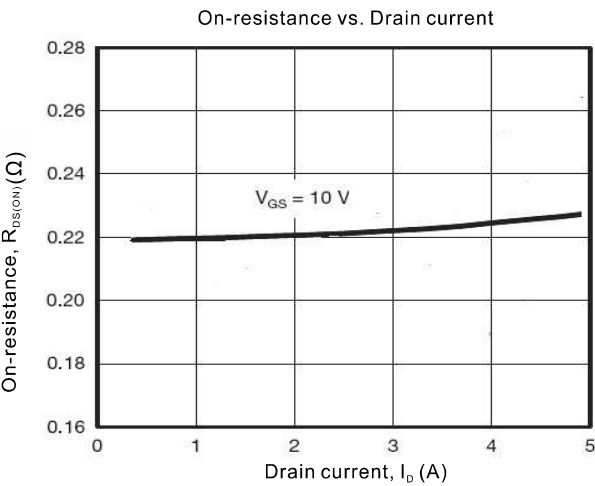
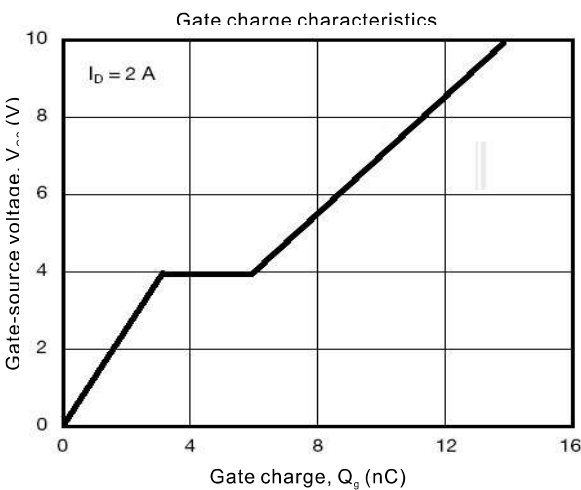
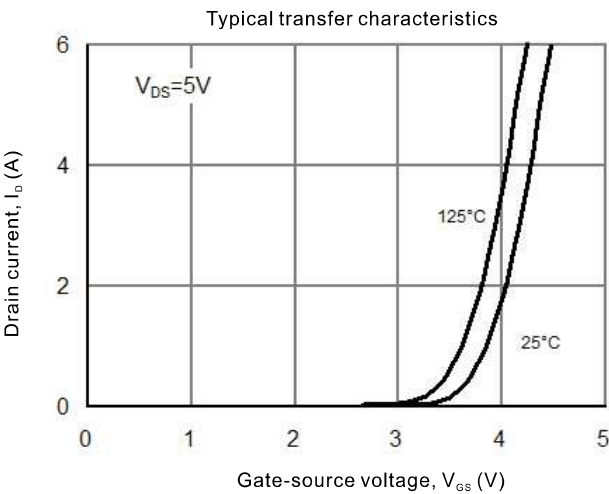
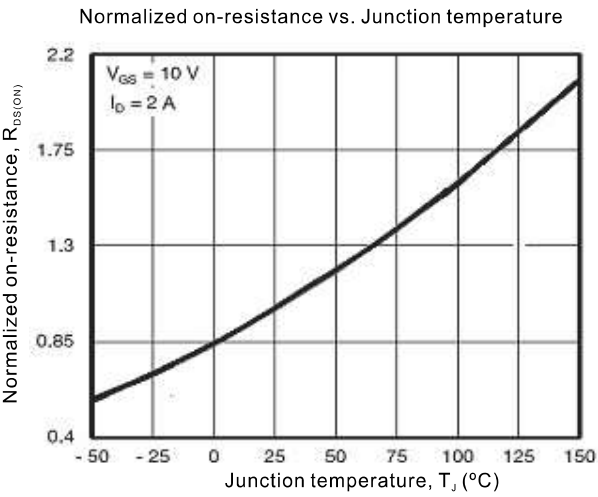
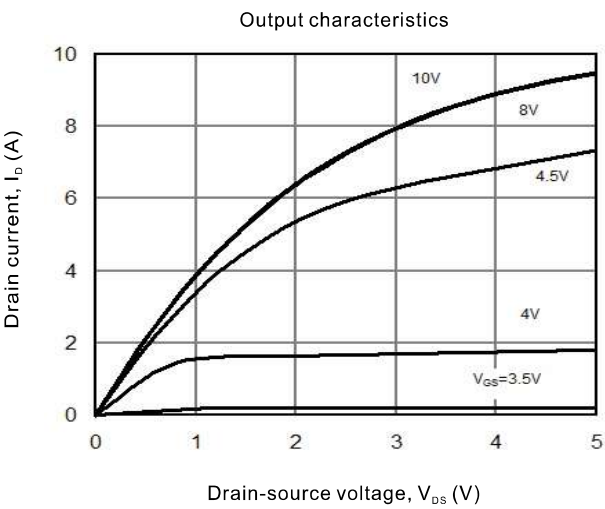
3. Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

4. Guaranteed by design, not subject to production

5. E_{AS} condition : $T_J=25^{\circ}\text{C}$, $V_{DD}=50\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$.

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Rating and characteristic curves



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Rating and characteristic curves

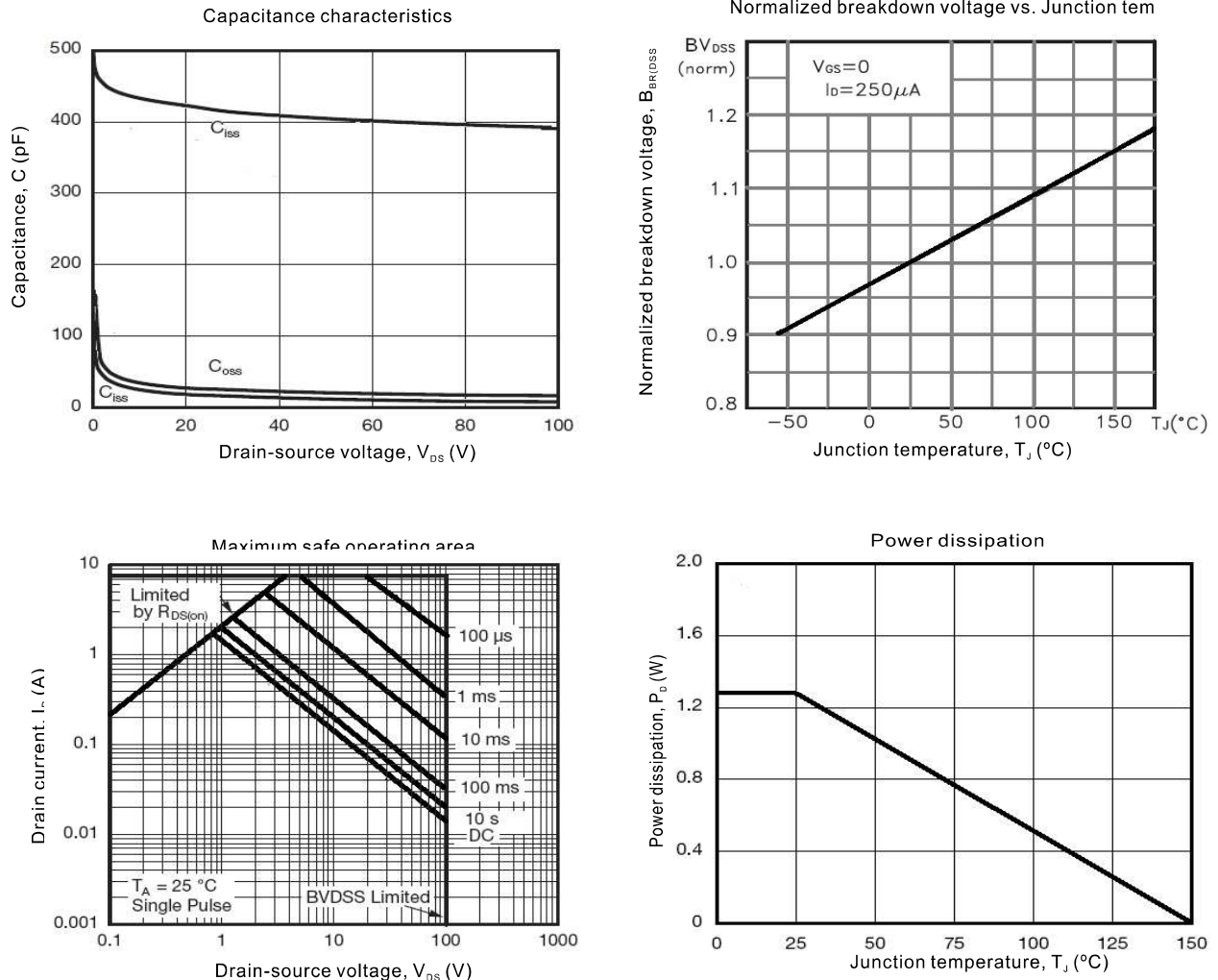
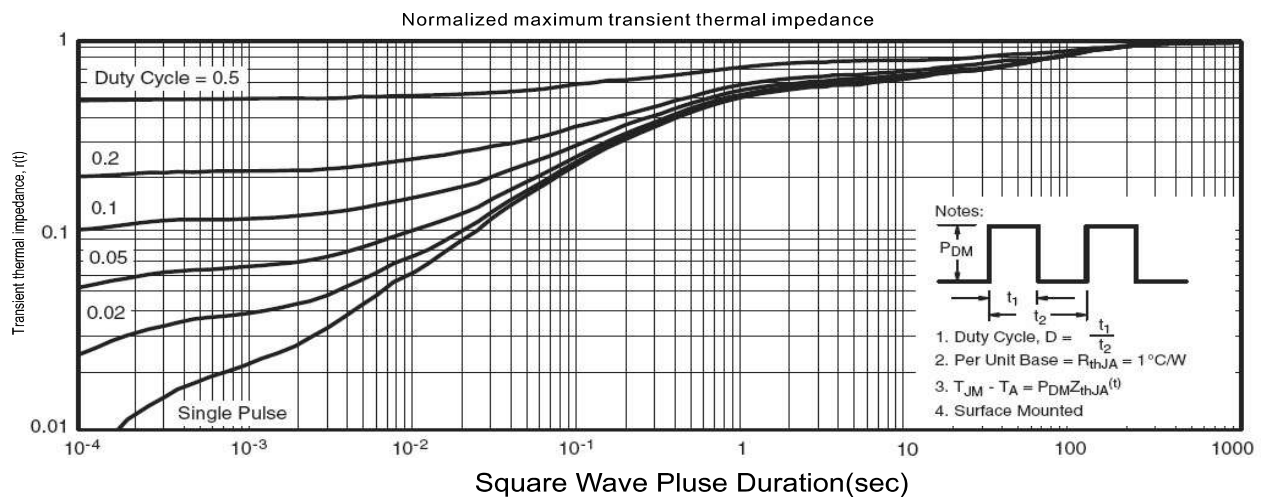
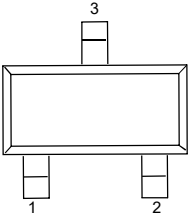
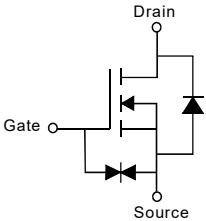


Figure 10 Power De-ratin

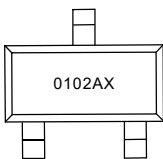


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Pinning information

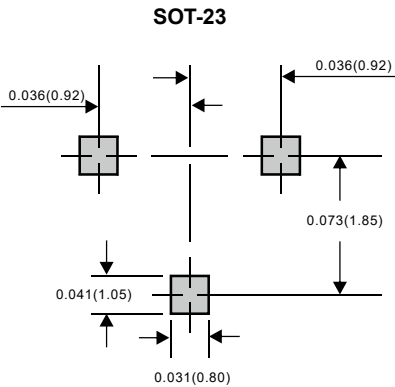
Pin	Simplified outline	Symbol
Pin 1 Gate Pin 2 Source Pin 3 Drain		

Marking

Type number	Marking code
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"0102A" : Part number code.
"X" : Wafer lot code.

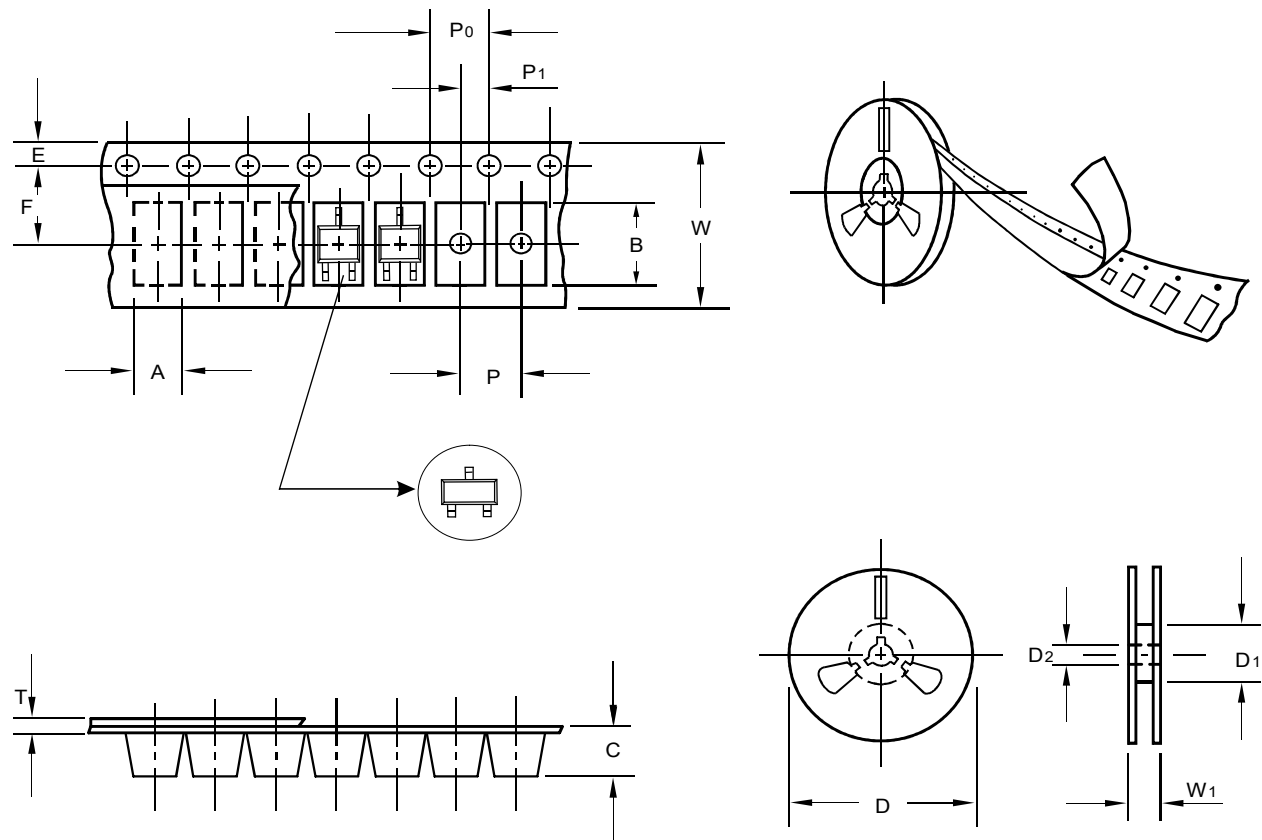
Suggested solder pad layout



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.5	3.15
Carrier length	B	0.5	2.77
Carrier depth	C	0.5	1.22
Sprocket hole	d	0.5	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	53.40
Feed hole diameter	D2	0.5	12.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.5	0.23
Tape width	W	0.5	8.00
Reel width	W1	5.0	12.30

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

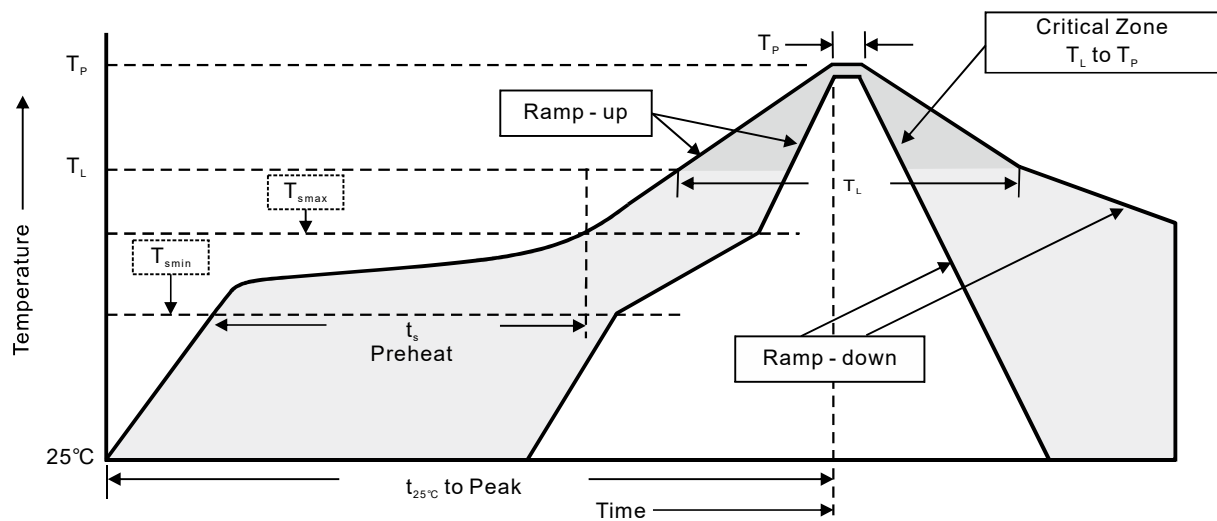
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Reel packing

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)
SOT-23	7"	3,000	4.0	30,000	183 x 123 x 183	178	382 x 257 x 387	240,000

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_{smin}) - Temperature Max (T_{smax}) - Time (Min to Max) (t_s)	150°C 200°C 60 ~ 120 sec
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 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