FMOS0098N02E

List

FMOS0098N02E

0.98A 20V N-Channel Enhancement Mode MOSFET ESD Protection

Features

- V_{DS} = 20V, I_D = 0.98A.
- $R_{DS(ON)}$ < 230mΩ @V_{GS}=4.5V, I_D=0.55A.
- $R_{DS(ON)}$ < 330mΩ @V_{GS}=2.5V, I_D=0.45A.
- $R_{DS(ON)}$ < 550mΩ @V_{GS}=1.8V, I_D=0.35A.
- Reliable and rugged.
- ESD protection.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.FMOS0098N02E-H.

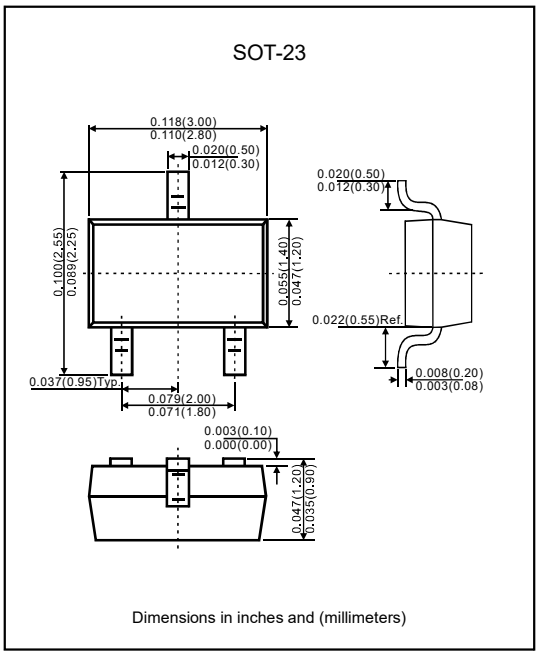
Applications

- Power management in DC/DC converters.
- Power load switch.
- Notebook battery management.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Mounting Position : Any.

Package outline



Maximum ratings (T_J=25°C unless otherwise noted)

Parameter			Symbol	Ratings	Unit
Drain-source voltage			V_{DS}	20	V
Gate-source voltage			V_{GS}	±12	V
Continuous drain current	(Note 1)	(T_A=25°C)	I_D	0.98	A
		(T_A=70°C)		0.78	
Pulse drain current tested	(Note 1)	(T_A=25°C)	I_{DM}	1.8	A
Power dissipation		(T_A=25°C)	P_D	0.36	W
		(T_A=70°C)		0.23	
Thermal resistance, junction to ambient	(Note 3)	(steady state)	$R_{\theta JA}$	350	°C/W
Operating Junction temperature			T_J	+150	°C
Storage temperature range			T_{STG}	-55 to +150	°C

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Electrical characteristics (At T_j=25°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	20			V
Drain-source leakage current	I_{DSS}	V_{DS}=16V, V_{GS}=0V			1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±12V, V_{DS}=0V			±10	μA
On characteristics						
Gate threshold voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	0.5	0.75	1	V
Forward transconductance	g_{FS}	V_{DS}=5V, I_D=0.55A		1.8		S
Static drain-source on-resistance (Note 4)	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=0.55A		190	230	mΩ
		V_{GS}=2.5V, I_D=0.45A		255	330	
		V_{GS}=1.8V, I_D=0.35A		365	550	
Dynamic Parameters (Note 5)						
Gate resistance	R_G	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		198		Ω
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=10V, f=1.0MHz		41		pF
Output capacitance	C_{oss}			17		
Reverse transfer capacitance	C_{rss}			10		
Switching parameters						
Total gate charge	Q_g	V_{GS}=2.5V, V_{DS}=10V, I_D=1A, V_T=0.8V		0.54		nC
		V_{GS}=4.5V, V_{DS}=10V, I_D=1A, V_T=0.8V		1		
Gate to source charge	Q_{gs}			0.3		
Gate to Drain charge	Q_{gd}			0.1		
Turn-on delay time	$t_{d(on)}$	V_{DS}=10V, V_{GS}=4.5V, I_D=2A, R_G=6Ω		1.2		ns
Rise time	t_r			24.7		
Turn-off delay time	$t_{d(off)}$			13.6		
Fall time	t_f			14.8		
Source-drain diode ratings and characteristics						
Reverse recovery time	t_{rr}	I_F=1A, V_R=10V, dI_F/dt=100A/μs		9.2		ns
Reverse recovery charge	Q_{rr}			0.8		nC
Drain - source diode forward voltage (Note 4)	V_{SD}	V_{GS}=0V, I_{SD}=1A		0.85	1.1	V

Note: 1. Max. current is limited by bonding wire.
2. UIS tested and pulse width are limited by maximum junction temperature 150°C.
3. Surface mounted on 1in² FR-4 board with 1oz.
4. Pulse test (pulse width ≤ 300μs, duty cycle ≤ 2%).
5. Guaranteed by design, not subject to production testing.

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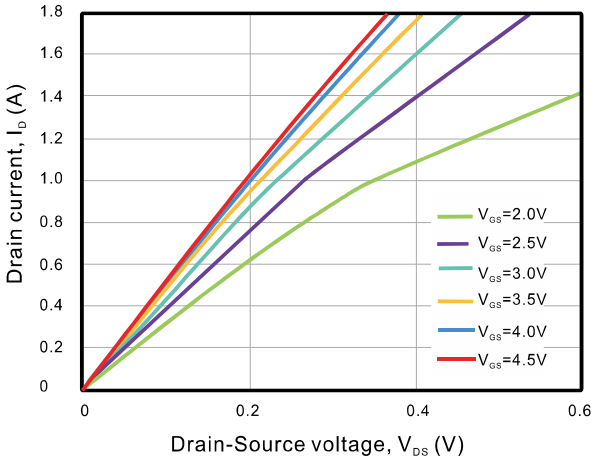
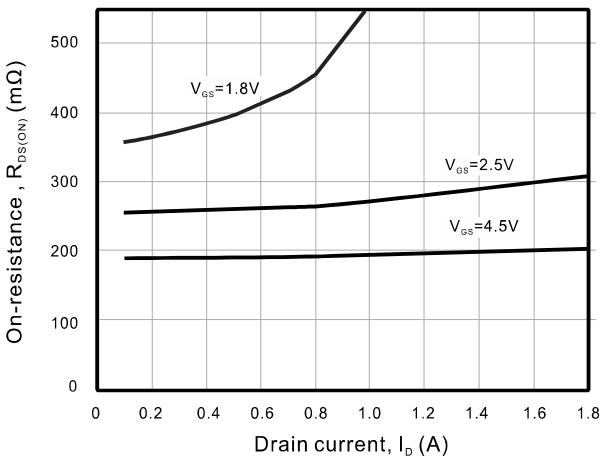
Rating and characteristic curves

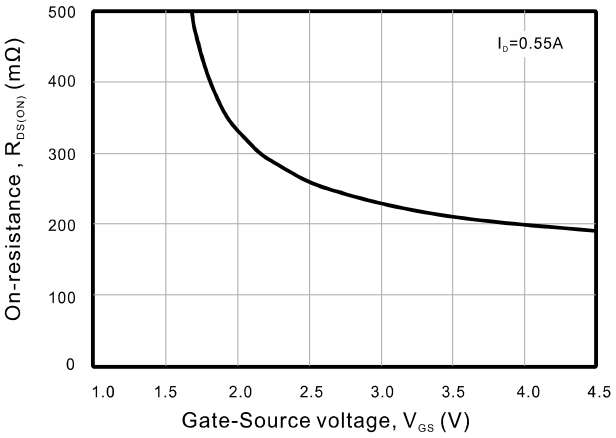
Output characteristics



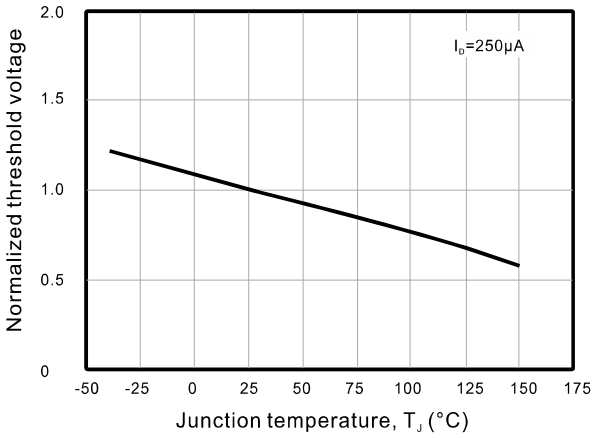
On-resistance vs. Drain current



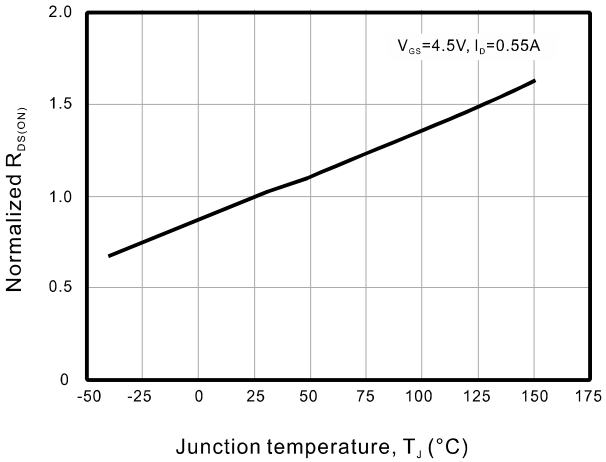
On-resistance vs. Gate-Source voltage



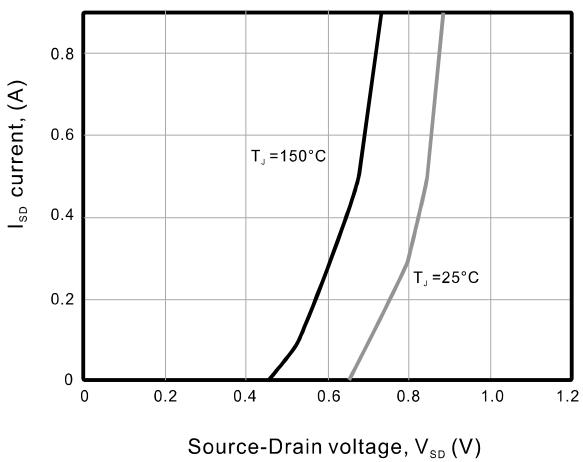
Gate threshold voltage



Drain-Source on-resistance



Source-Drain diode forward



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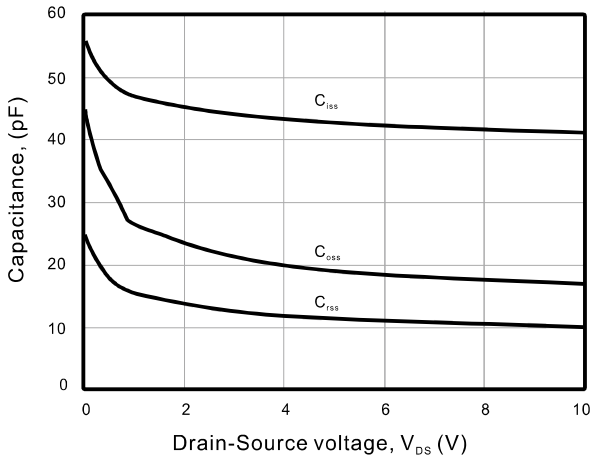
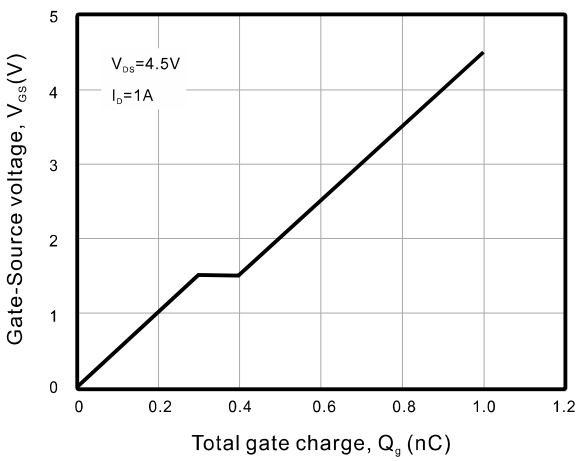
Rating and characteristic curves

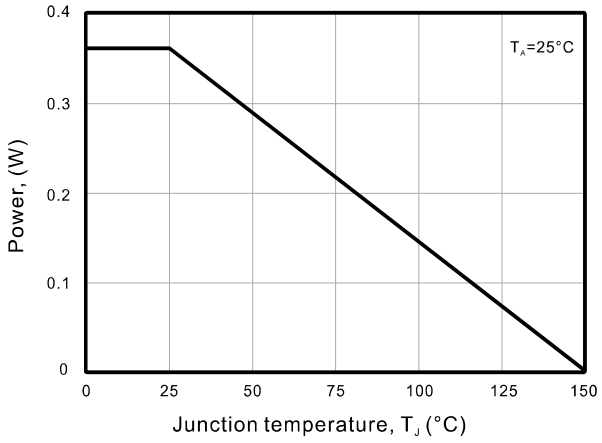
Capacitance



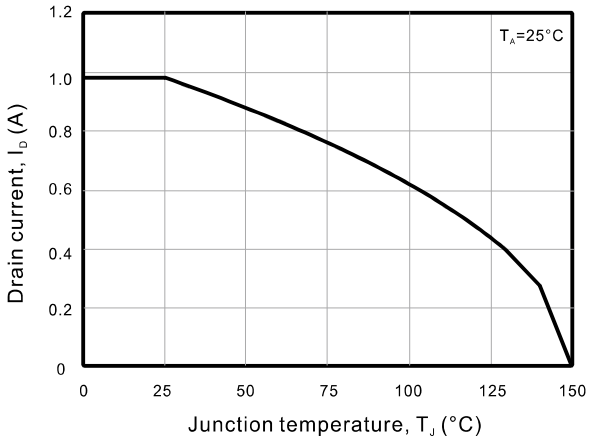
Gate charge characteristics



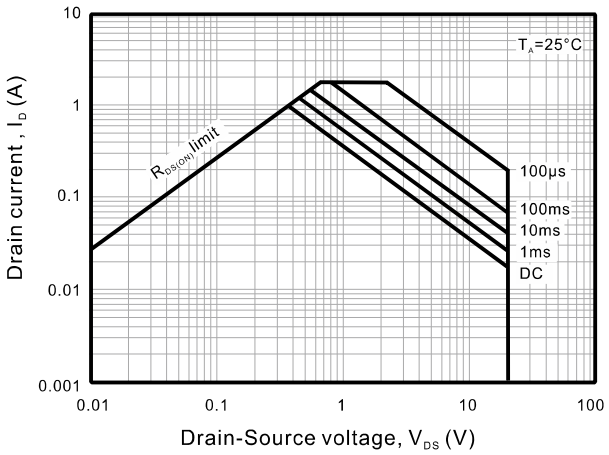
Power dissipation



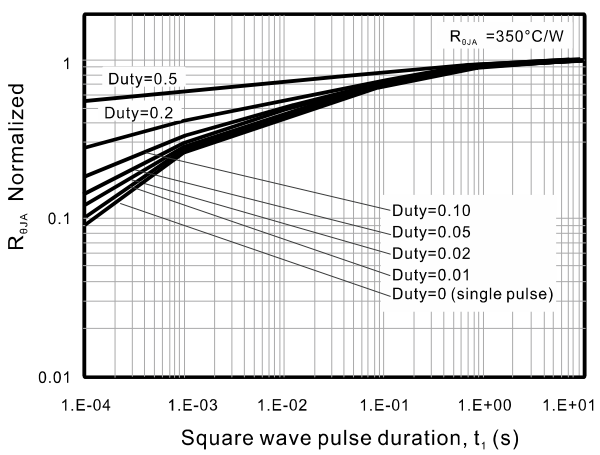
Drain current



Safe operating area



$R_{\theta JA}$ transient thermal impedance



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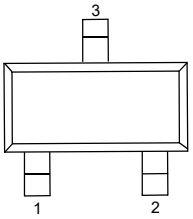
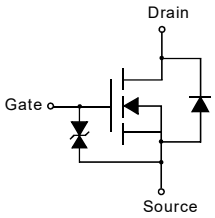
Pinning information

Pin	Simplified outline	Symbol
Pin1 Gate Pin2 Source Pin3 Drain		

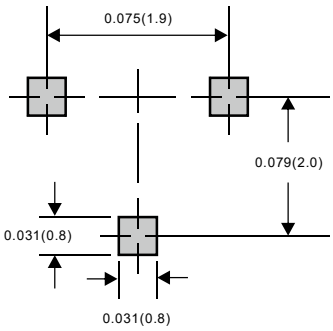
Marking

Type number	Marking code
FMOS0098N02E	06YWS

*06 : fixed code.
YWS: Wafer lot code.
Y: Year
W: Weekly
S:Sequence

Suggested solder pad layout

SOT-23



Dimensions in inches and (millimeters)

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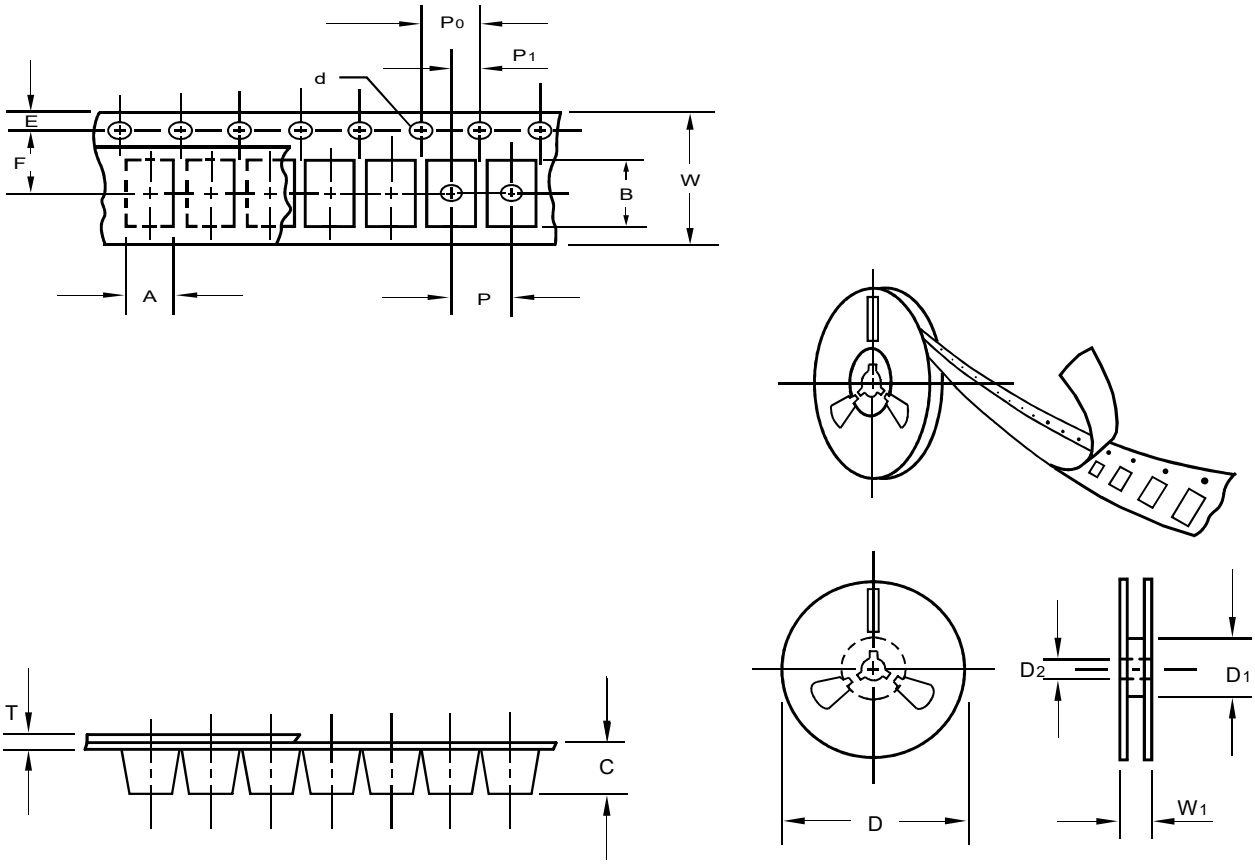
Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	54.40
Feed hole diameter	D_2	0.5	13.00
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	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W_1	1.0	11.40

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

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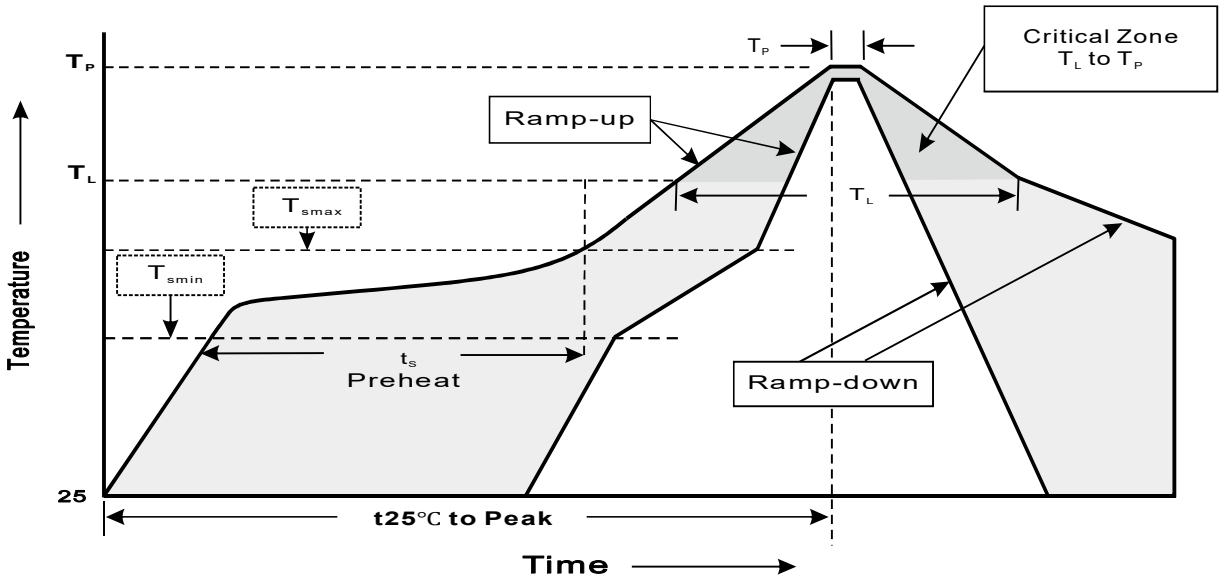
Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	REEL DIA, (m/m)	CARTON (pcs)
SOT-23	7"	3,000	4.0	30,000	178	240,000

Suggested thermal profiles for soldering processes

1.Storage environment: Temperature=5℃~40℃ 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℃/sec
Prehaeat -Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (min to max) (t_S)	 150℃ 200℃ 60 ~120sec
T_{smax} to T_L -Ramp-up rate	< 3℃/sec
Time maintained above: -Temperature (T_L) -Time(T_L)	 217℃ 60 ~ 260 sec
Peak Temperature(T_P)	255℃ -0/+5℃
Time within 5℃ of actual peak Temperature(T_P)	10 ~ 30sec
Ramp-down rate	< 6℃/sec
Time 25℃ to peak temperature	< 6 minutes