

FMOS1013T-Q1

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FMOS1013T-Q1

-20V, -0.46A P-Channel MOSFET

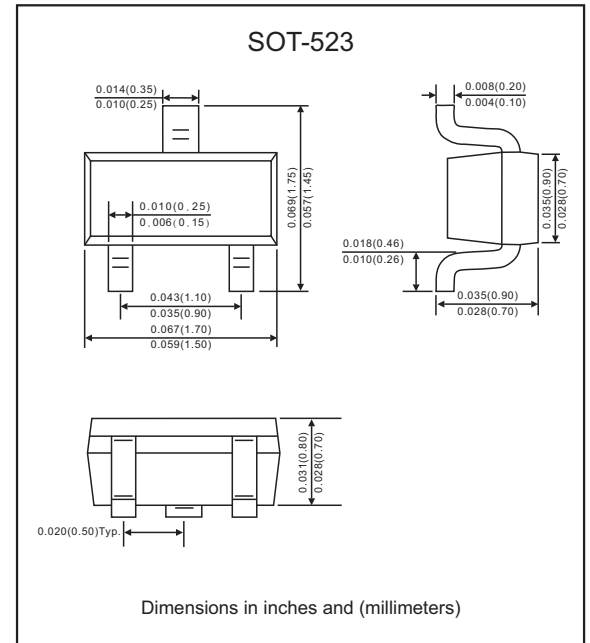
Features

- Low On-Resistance.
- Low gate threshold Voltage.
- Low input capacitance.
- Fast switching speed.
- Low Input / output leakage.
- ESD protected up to 3KV.
- Lead-free parts meet RoHS requirements.
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" dinicates Halogen-free part, ex.FMOS1013T-Q1-H.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-523
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.003 gram

Package outline



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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	$-V_{DS}$	20	V
Gate-source voltage	V_{GS}	± 6	V
Continuous drain Current (Note 1)	$-I_D$	0.46	A
Pulsed drain current	$-I_{DM}$	6	A
Power dissipation (Note 1)	P_D	0.27	W
Operating Junction temperature range	T_j	+150	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^\circ\text{C}$
Thermal resistance Junction to ambient	$R_{\theta JA}$	461	$^\circ\text{C/W}$

Notes :

1. Device mounted on FR-4 PCB.
2. No purposefully added lead.

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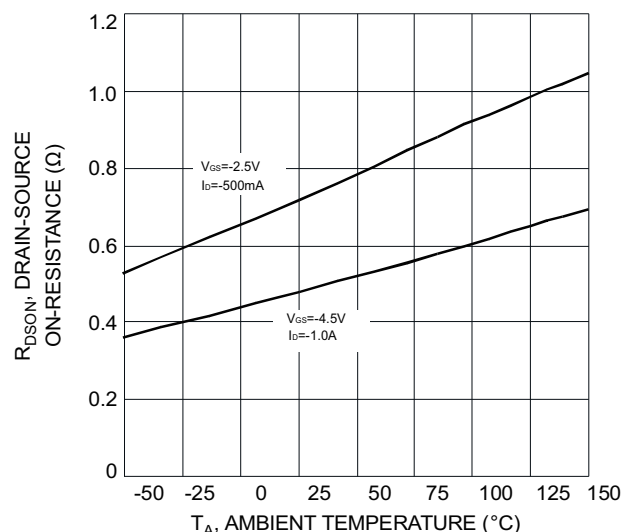
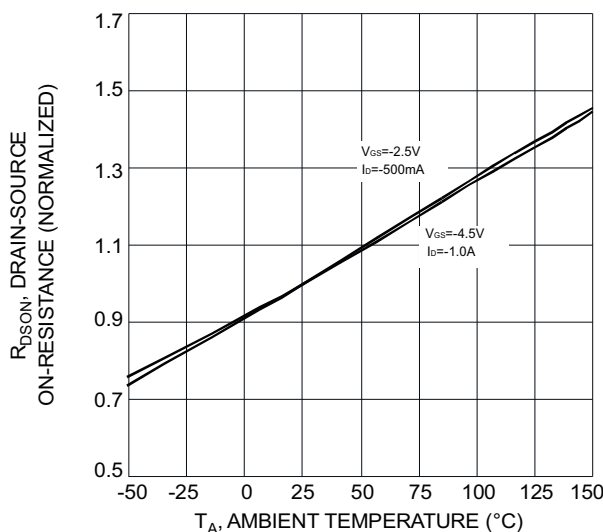
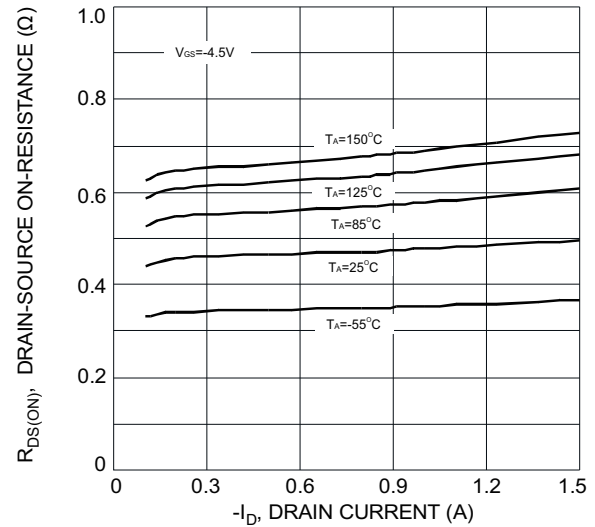
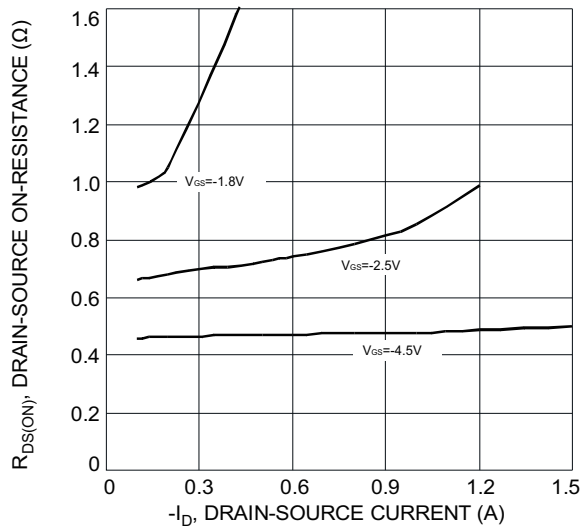
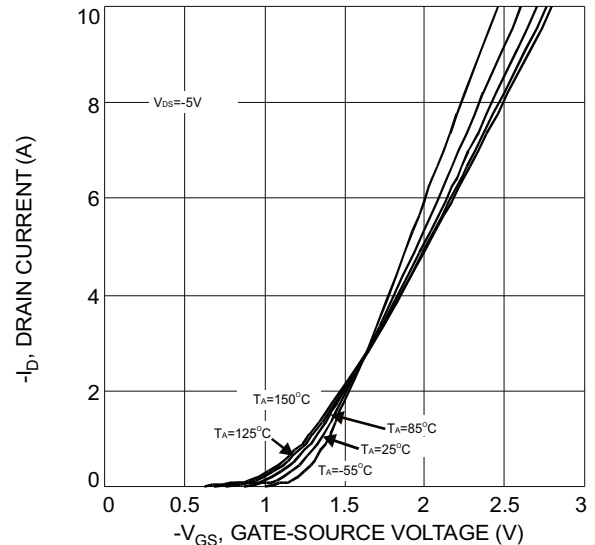
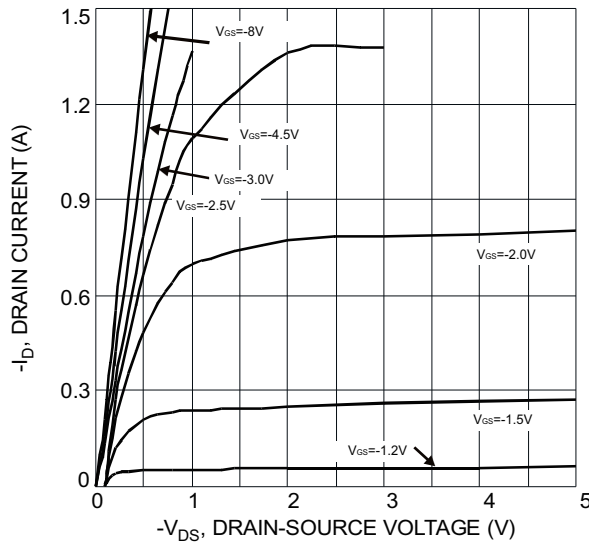
Electrical characteristics (At $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics (Note 3)						
Drain-source breakdown voltage	$-BV_{DSS}$	$V_{GS}=0V, -I_D=250\mu A$	20			V
Drain-source leakage current	$-I_{DSS}$	$-V_{DS}=20V, V_{GS}=0V$			100	nA
Gate-source leakage current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 4.5V$			± 2.0	μA
On characteristics (Note 3)						
Gate threshold voltage	$-V_{GS(TH)}$	$V_{DS}=V_{GS}, -I_D=250\mu A$	0.5		1.0	V
Static drain-source on-resistance	$R_{DS(ON)}$	$-V_{GS}=4.5V, -I_D=350mA$		0.5	0.7	Ω
		$-V_{GS}=2.5V, -I_D=300mA$		0.7	0.9	
		$-V_{GS}=1.8V, -I_D=150mA$		1.0	1.3	
Forward transfer admittance	$ Y_{fs} $	$-V_{DS}=10V, -I_D=250mA$		0.9		S
Diode forward voltage (Note 3)	$-V_{SD}$	$-I_S=150mA, V_{GS}=0V$		0.8	1.2	V
Dynamic characteristics						
Input capacitance	C_{iss}	$-V_{DS}=16V, V_{GS}=0V, f=1MHz$		59.76		pF
Output capacitance	C_{oss}			12.07		
Reverse transfer capacitance	C_{rss}			6.36		
Total gate charge	Q_g	$-V_{GS}=4.5V, -V_{DS}=10V, -I_D=250mA$		622.4		nC
Gate-source charge	Q_{gs}			100.3		
Gate-drain charge	Q_{gd}			132.2		
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$-V_{GEN}=4.5V, -V_{DD}=10V$ $-I_D=200mA, R_G=10\Omega, R_L=47\Omega$		5.1		ns
Turn-on rise time	t_r			8.1		
Turn-off delay time	$t_{d(off)}$			28.4		
Turn-off fall time	t_f			20.7		

Notes :

3. Short duration pulse test used to minimize self-heating effect.

Rating and characteristic curves (FMOS1013T-Q1)



Rating and characteristic curves (FMOS1013T-Q1)

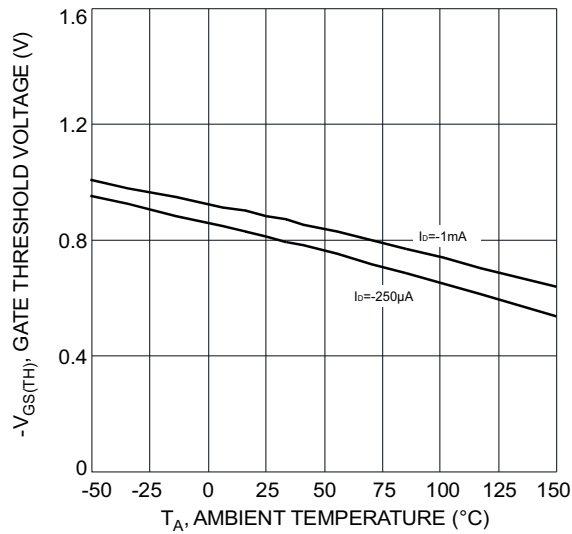


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

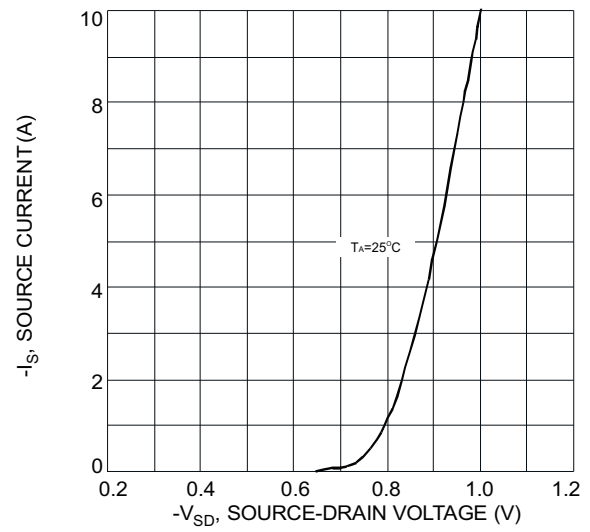


Fig. 8 Diode Forward Voltage vs. Current

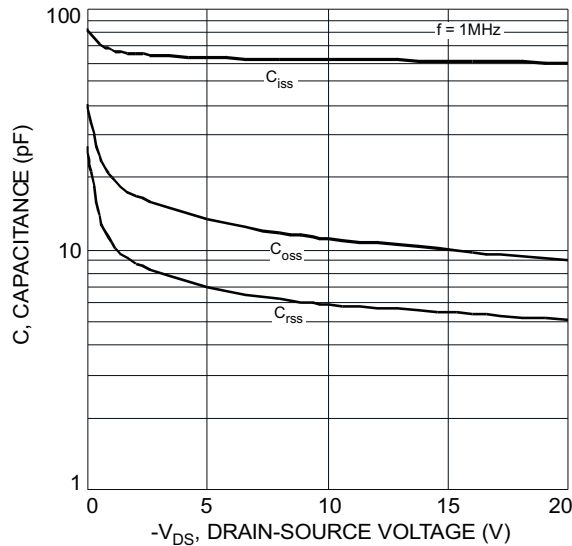


Fig. 9 Typical Total Capacitance

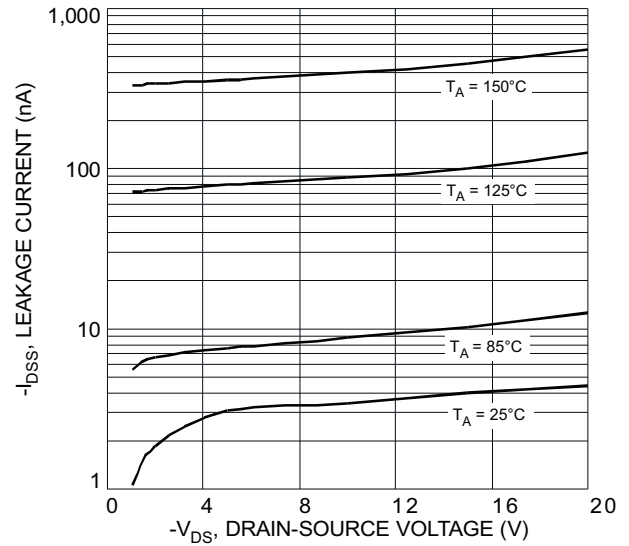


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

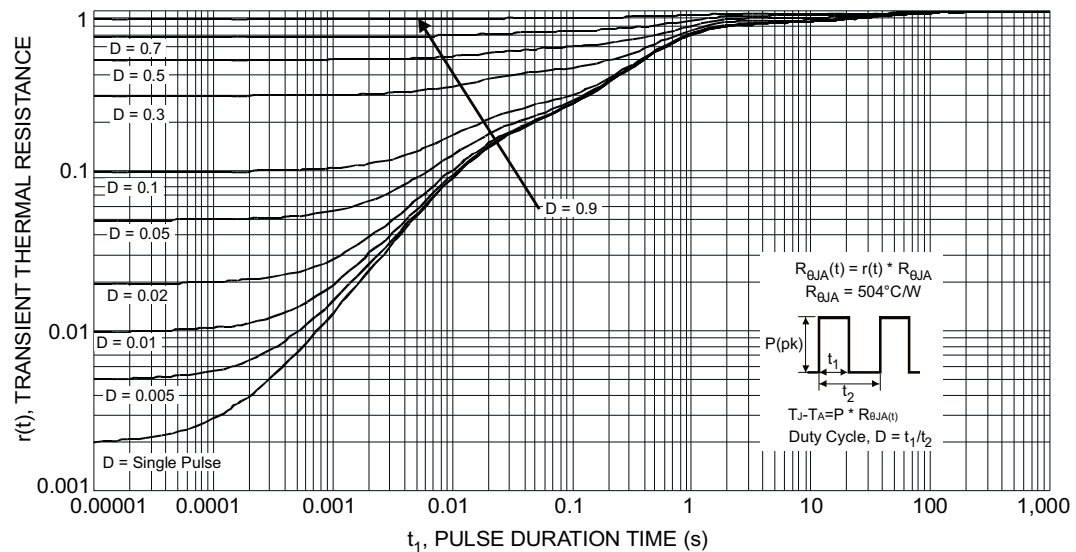
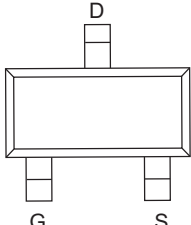
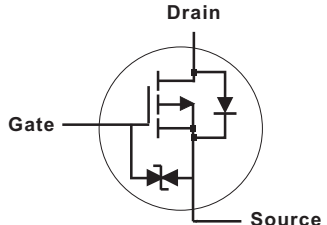


Fig. 11 Transient Thermal Response

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Pinning information

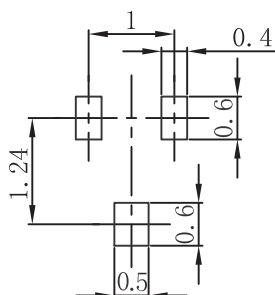
Pin	Simplified outline	Symbol
PinD Drain PinG Gate PinS Source		

Marking

Type number	Marking code
FMOS1013T-Q1	PA1

Suggested solder pad layout

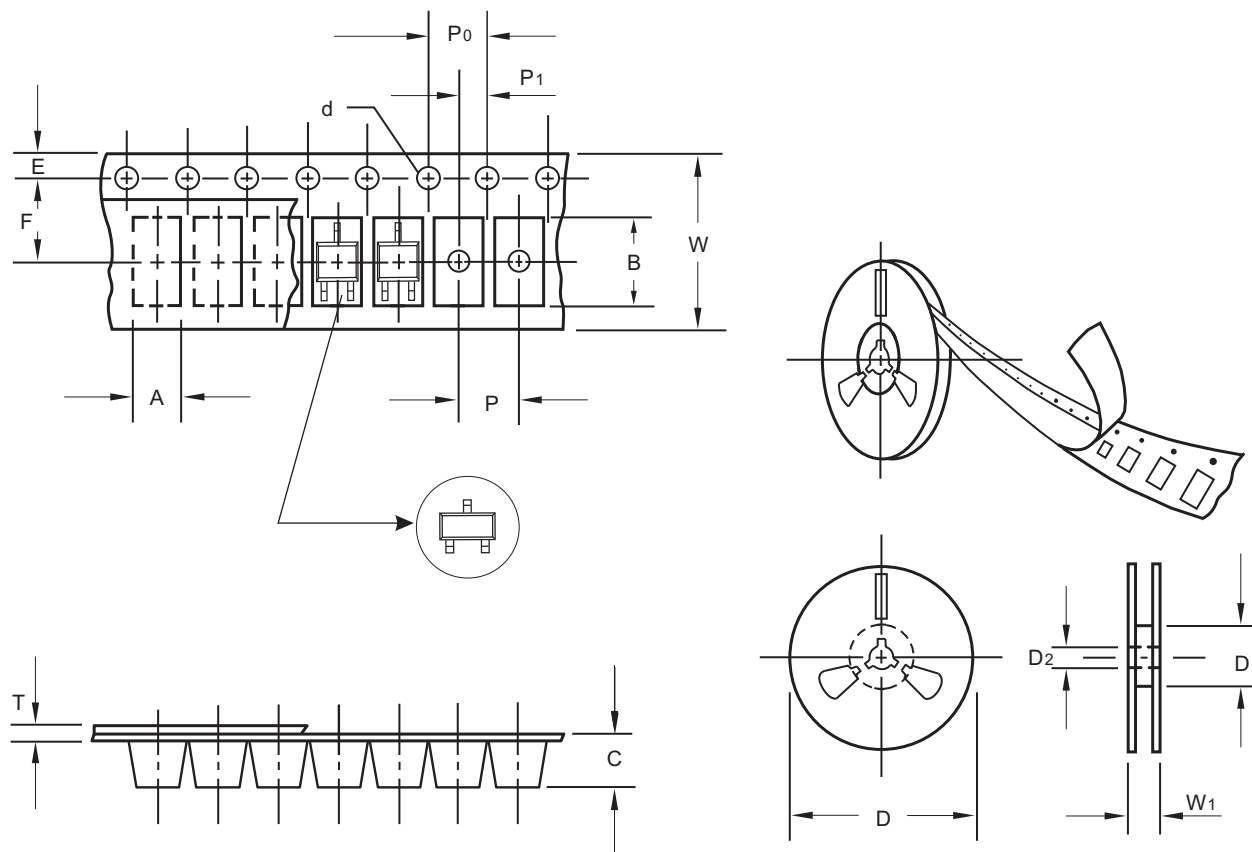
SOT-523



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

Packing information



Item	Symbol	Tolerance	SOT-523
Carrier width	A	0.1	1.85
Carrier length	B	0.1	1.85
Carrier depth	C	0.1	0.875
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	12.30



Formosa MS

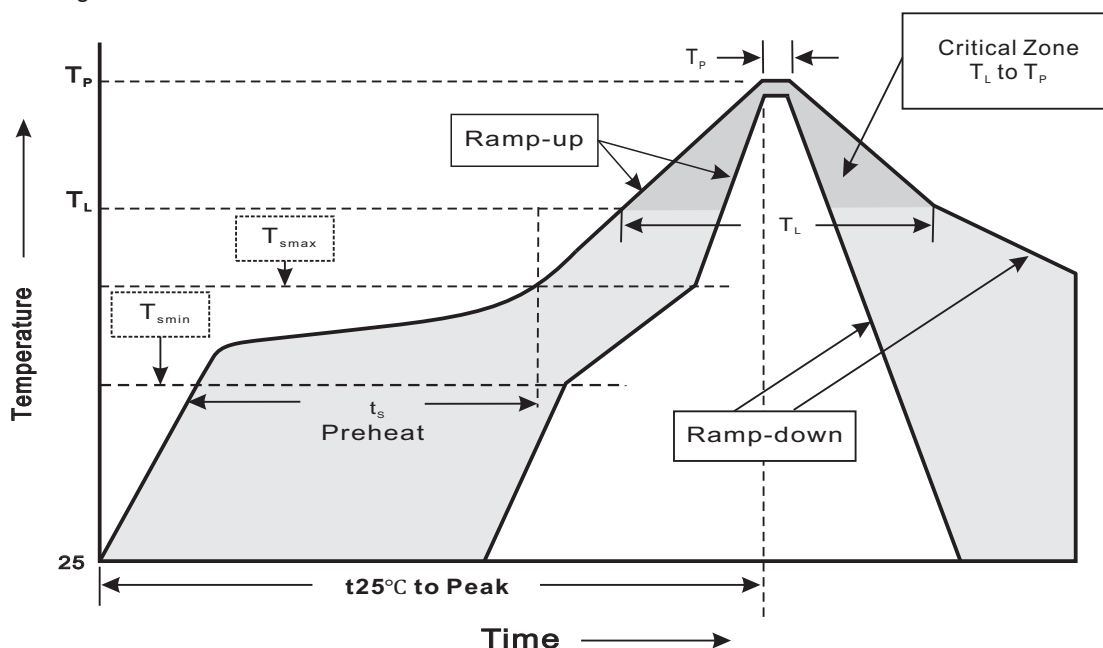
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Reel packing

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)	APPROX. GROSS WEIGHT (kg)
SOT-523	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

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 ~ 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