

FMOS2301D

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FMOS2301D

-3.0A -20V P-Channel Enhancement Mode Power MOSFET

Features

- $-V_{DS} = 20V$, $-I_D = 3A$.
- $R_{DS(ON)} < 68m\Omega$, $-V_{GS} = 4.5V$, $-I_D = 2A$.
- $R_{DS(ON)} < 98m\Omega$, $-V_{GS} = 2.5V$, $-I_D = 1A$.
- Very low on-resistance and low reverse transfer capacitance.
- Fast switching.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" for Halogen-free part, ex. FMOS2301D-H.

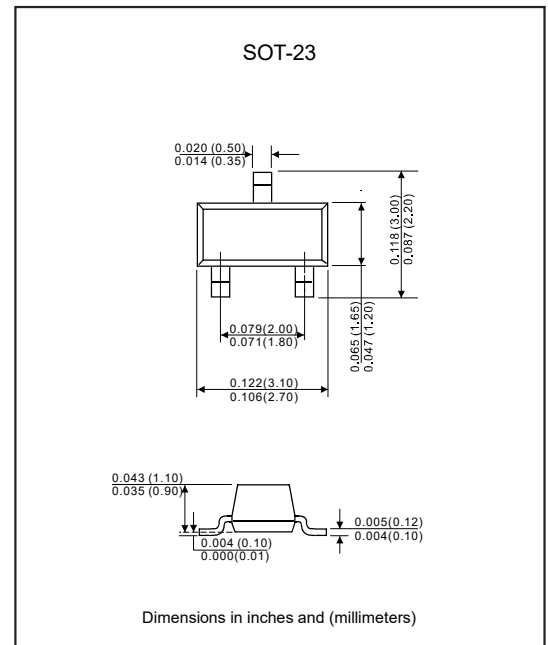
Applications

- Load switch.
- PWM application.
- Power management.
- Video monitor.

Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Mounting Position : Any.

Package outline



Maximum Ratings (At $T_A = 25^\circ C$ Unless otherwise noted)

Parameter	Symbol	Rating	Unit
Drain source voltage	$-V_{DS}$	20	V
Gate source voltage	V_{GS}	± 12	V
Drain current continuous	$-I_D$	3	A
		1.9	
Pulsed drain current (Note 1)	$-I_{DM}$	12	A
Power dissipation	P_D	1.1	W
Thermal resistance, junction to ambient	$R_{\theta JA}$	105	$^\circ C/W$
Lead temperature for soldering purposes 1/8" from case for 5 seconds (Note2)	T_L	300	$^\circ C$
Operating junction temperature range	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	Conditions	Symbol	Min.	Typ.	Max.	Unit
Static parameters						
Drain-source breakdown voltage	$-I_D=250\mu A, V_{GS}=0V$	$-BV_{DSS}$	20			V
Drain-source leakage current	$-V_{DS}=20V, V_{GS}=0V$	$-I_{DSS}$			1	μA
Gate-source leakage current	$V_{GS}=\pm 12V, V_{DS}=0V$	I_{GSS}			± 100	nA
Gate threshold voltage	$V_{DS}=V_{GS}, -I_D=250\mu A$	$-V_{GS(TH)}$	0.45	0.5	1.1	V
Static drain-source on-state resistance	$-V_{GS}=4.5V, -I_D=2A$	$R_{DS(ON)}$		54	68	m Ω
	$-V_{GS}=2.5V, -I_D=1A$			69	98	
Dynamic parameters						
Input capacitance	$V_{GS}=0V, -V_{DS}=10V, f=1.0MHz$	C_{iss}		533		pF
Out capacitance		C_{oss}		72		
Reverse transfer capacitance		C_{rss}		67		
Gate resistance	$f=1.0MHz$	R_G		6.5		Ω
Switching parameters						
Total gate charge	$-V_{GS}=4.5V, -V_{DS}=10V, -I_D=3A$ (Note3)	Q_g		8.3		nC
Gate to source charge		Q_{gs}		1.2		
Gate to drain charge		Q_{gd}		1.6		
Turn-on delay time	$-V_{DS}=10V, -V_{GS}=4.5V, R_G=10\Omega, -I_D=1A$ (Note3)	$t_{d(on)}$		12		ns
Rise time		t_r		35		
Turn-off delay time		$t_{d(off)}$		30		
Fall time		t_f		10		
Source-drain diode ratings and characteristics						
Diode continuous current		$-I_S$			3	A
Pulsed drain-source diode forward current		$-I_{SM}$			12	A
Drain-source diode forward voltage	$-I_{SD}=3A, V_{GS}=0V, T_J=25^{\circ}C$	$-V_{SD}$			1.2	V

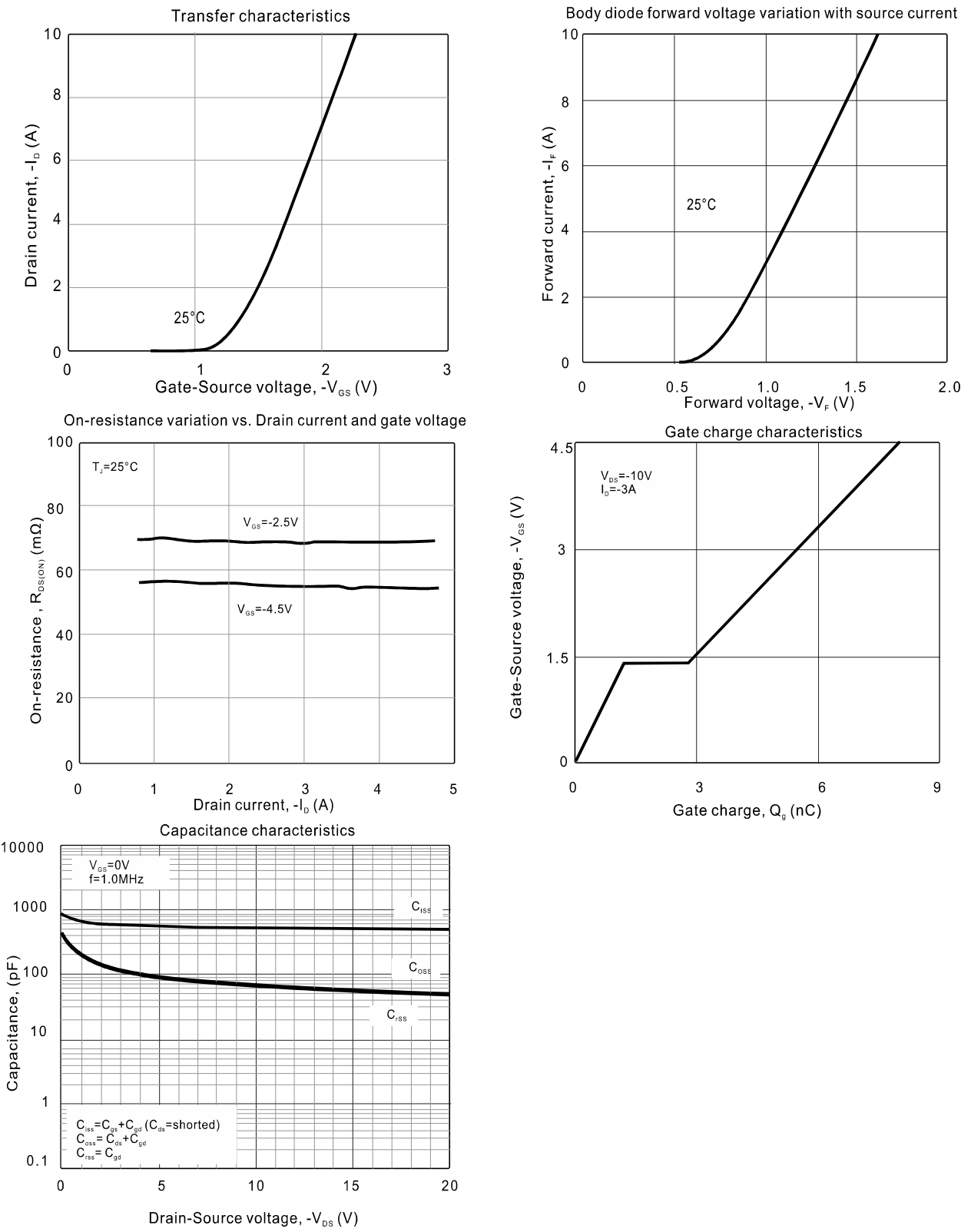
Note: 1.Repetitive rating: pulse width limited by maximum junction temperature.

2.Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

3.Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 0.5\%$.

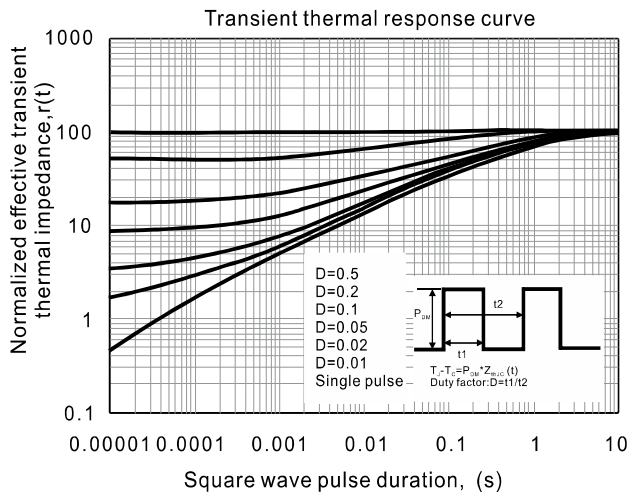
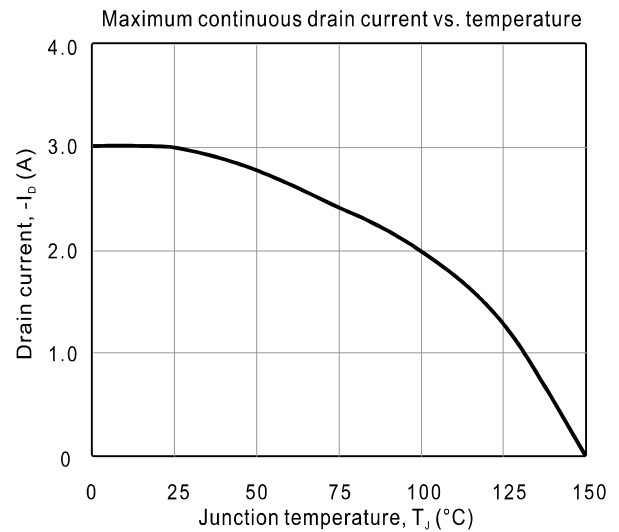
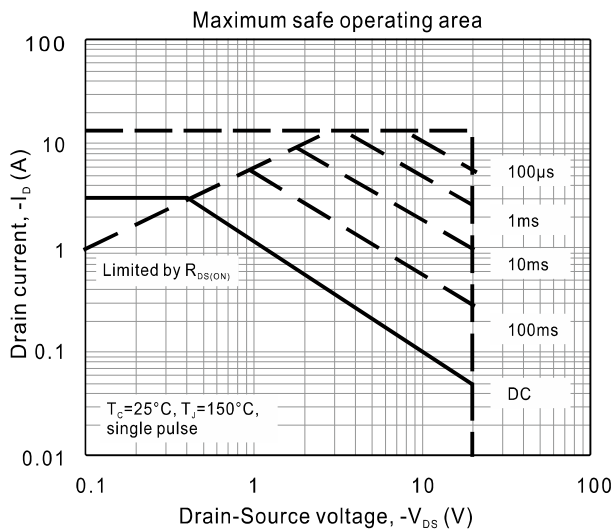
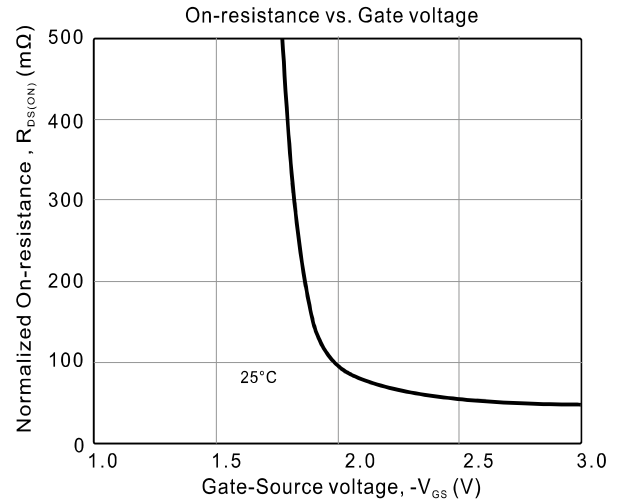
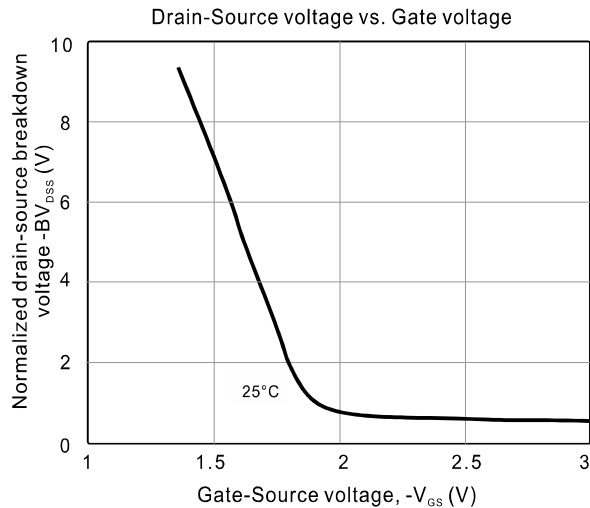
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Rating and Characteristic Curves



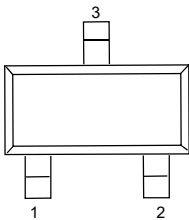
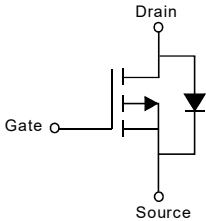
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Rating and Characteristic Curves



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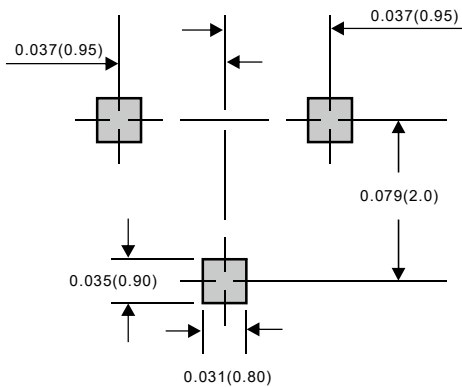
Pinning information

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

Marking

Type number	Marking code
FMOS2301D	A1SHB

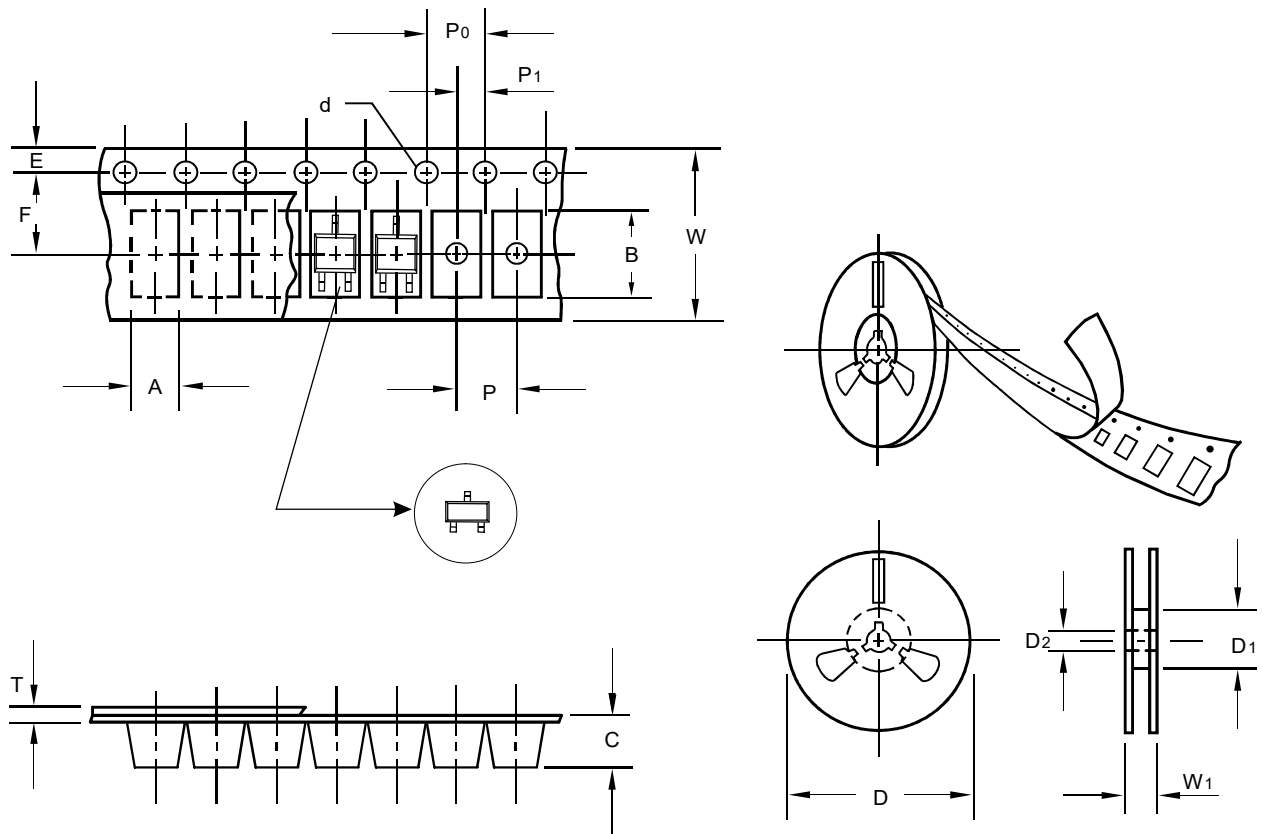
Suggested solder pad layout



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	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	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	55.00
Feed hole diameter	D2	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	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	12.0

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

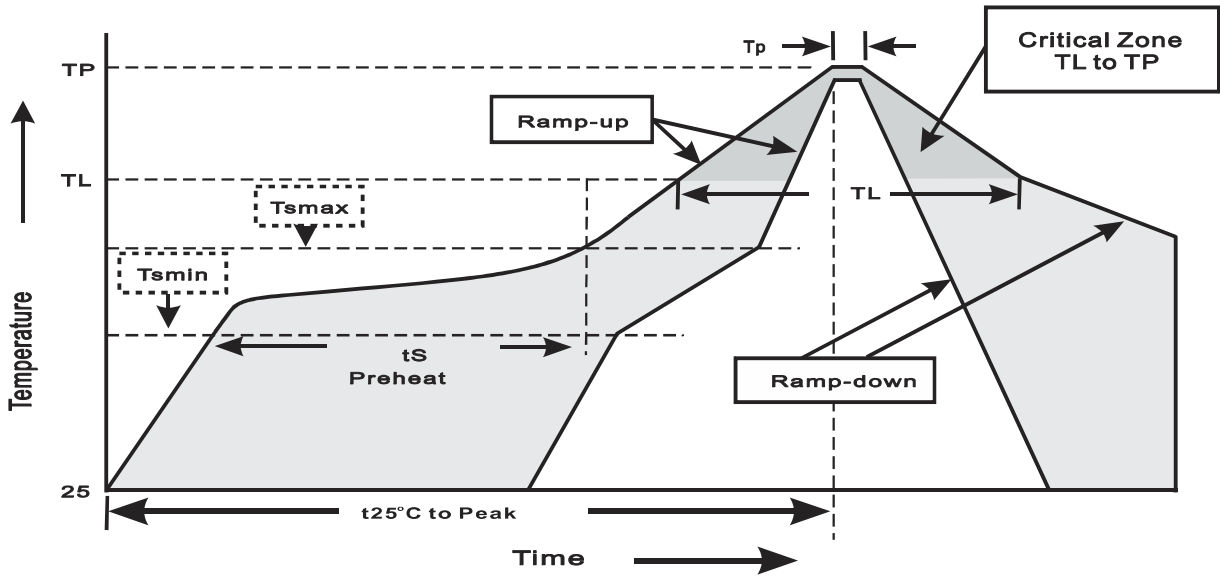
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Reel packing

DEVICE	OUTLINE	REEL (PCS)	TAPE & REEL
FMOS2301D	TAPING	3,000	7inch

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 _{smín}) -Temperature Max(T _{smáx}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smáx} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
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	<6minutes