

FMOSTHAC60N10-H

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60A 100V N-Channel Trench Enhancement Mode Power MOSFET

- $V_{DS} = 100V$, $I_D = 60A$.
- $R_{DS(ON)} \leq 9.5\text{ m}\Omega$, @ $V_{GS} = 10V$, $I_D = 30A$.
- $R_{DS(ON)} \leq 12.0\text{ m}\Omega$, @ $V_{GS} = 4.5V$, $I_D = 30A$.
- Excellent gate charge x on-resistance product (FOM).
- Very low on-resistance.
- 100% UIS and ΔV_{DS} tested.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

- DC/DC converter.
- Ideal for high-frequency switching and synchronous rectification.

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, T5060P8 (DFN5060-8) .
- Mounting Position : Any.

T5060P8

Technical drawing showing three views of the T5060P8 connector with dimensions in inches and millimeters.

Top View:

- Overall width: 0.024(0.61)
- Overall height: 0.015(0.38)
- Pin pitch (BSC): 0.156(3.96)
- Pin width: 0.142(3.61)
- Pin spacing from edge: 0.149(3.78)
- Pin diameter: $\varnothing 1.00$ Ref.
- Pin spacing from center: 0.030(0.75)
- Pin spacing from edge: 0.015(0.38)

Side View:

- Pin height: 0.043(1.10) Min.
- Pin width: 0.020(0.51)
- Pin spacing from edge: 0.010(0.25)
- Pin spacing from center: 0.030(0.75)
- Pin spacing from edge: 0.015(0.38)

Detail View:

- Overall width: 0.008(0.20)
- Overall height: 0.002(0.06)
- Pin pitch (BSC): 0.05(1.27)
- Pin width: 0.047(1.2)
- Pin spacing from edge: 0.035(0.9)
- Pin spacing from center: 0.197(5.00)
- Pin spacing from edge: 0.189(4.80)

Dimensions in inches and (millimeters)

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	100	V
Gate-source voltage	V_{GS}	±20	V
Continuous drain current	I_D	($T_c=25^{\circ}C$) 60	A
		($T_c=100^{\circ}C$) 43	
	I_D	($T_A=25^{\circ}C$) 11	
		($T_A=100^{\circ}C$) 9	
Pulsed drain current tested	I_{DM}	240	A
Single pulse avalanche energy (Note 1)	E_{AS}	260	mJ
Derating factor	-	0.64	W/°C
Power dissipation	P_D	($T_c=25^{\circ}C$) 80	W
		($T_A=25^{\circ}C$) 2.5	
Thermal resistance junction to ambient (Note 4)	$R_{\theta JA}$	50	°C/W
Thermal resistance Junction to case	$R_{\theta JC}$	1.56	°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 $T_c=25^\circ\text{C}$ unless otherwise noted)

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

On characteristics

Gate threshold voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}$, $I_D=250\mu\text{A}$	1.1	1.7	2.5	V
Static drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=30\text{A}$		8.5	9.5	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=30\text{A}$		10.5	12	
Forward trans conductance	g_{FS}	$V_{DS}=5\text{V}$, $I_D=30\text{A}$		45		S

Dynamic parameters

Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=50\text{V}$, $f=1.0\text{MHz}$		2600		pF
Out capacitance	C_{oss}			230		
Reverse transfer capacitance	C_{rss}			27		

Switching parameters (Note2)

Total gate charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=50\text{V}$, $I_D=30\text{A}$		54		nC
Gate to source charge	Q_{gs}			10		
Gate to drain charge	Q_{gd}			14		
Turn-on delay time	$t_{d(on)}$	$V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, $R_g=1.6\Omega$, $I_D=30\text{A}$		13		ns
Rise time	t_r			10		
Turn-off delay time	$t_{d(off)}$			30		
Fall time	t_f			8		

Source-drain diode ratings and characteristics

Diode forward voltage (Note3)	V_{SD}	$I_S=30\text{A}$, $V_{GS}=0\text{V}$			1.2	V
Diode forward current (Note2)	I_S				60	A
Body diode reverse recovery time	t_{rr}	$I_F=30\text{A}$, $T_J=25^\circ\text{C}$, $di/dt=100\text{A}/\mu\text{s}$ (Note3)		55		nS
Body diode reverse recovery charge	Q_{rr}			98		nC

Note: 1. E_{AS} condition: $T_J=25^\circ\text{C}$, $V_{DD}=30\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$.

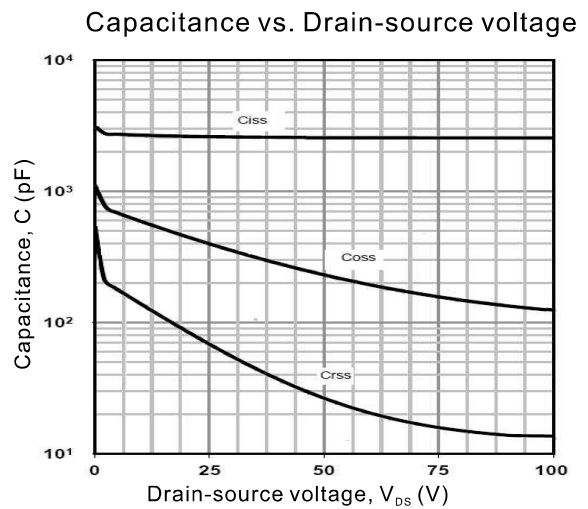
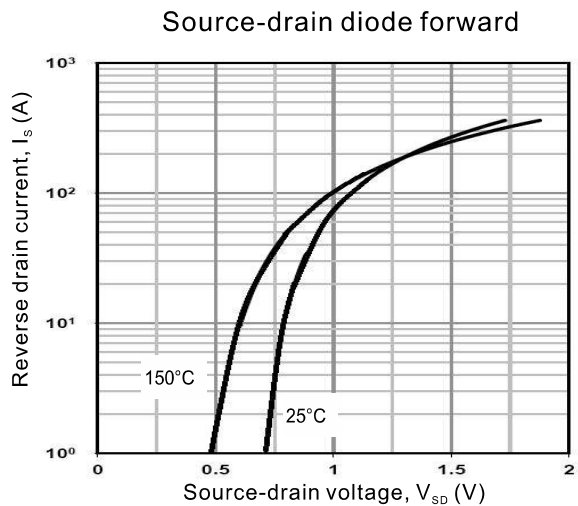
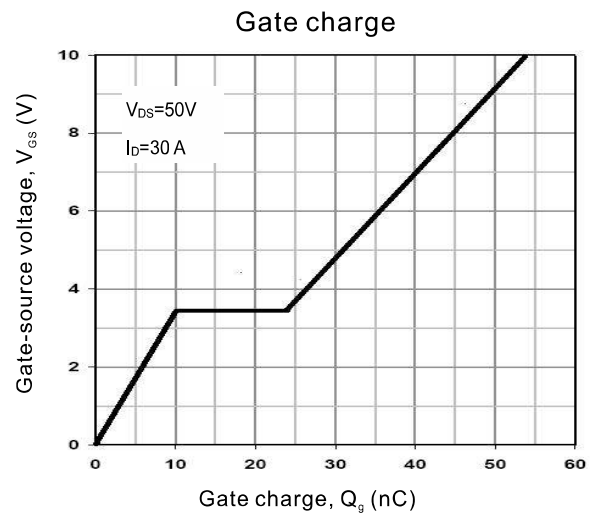
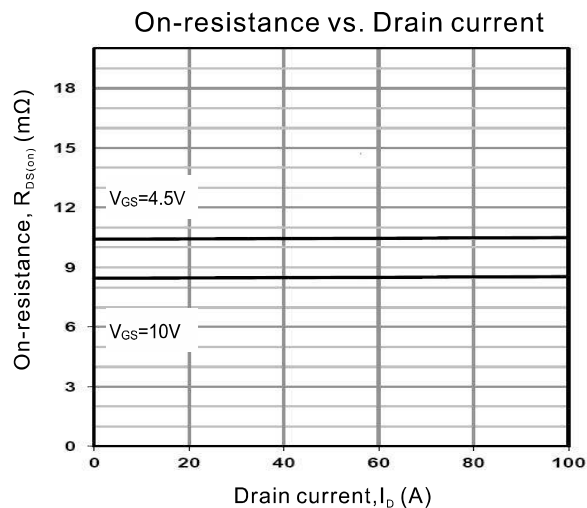
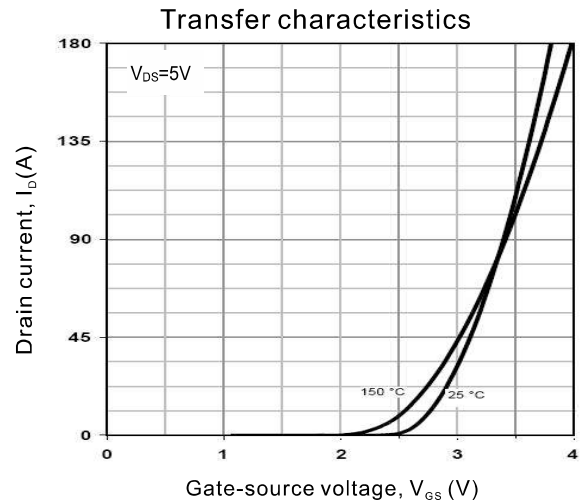
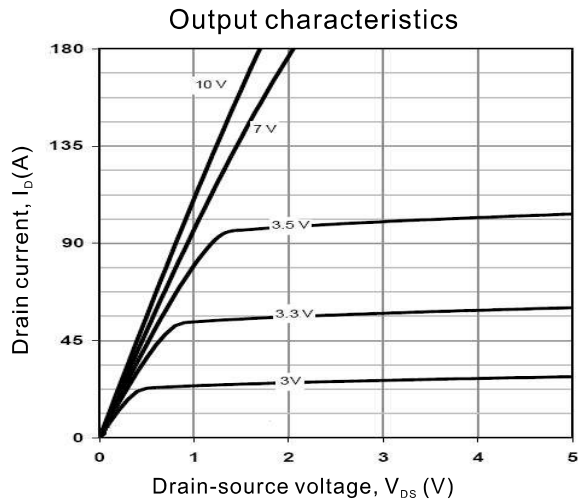
2. Guaranteed by design, not subject to production.

3. These curves are based on the junction-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(Max)}=150^\circ\text{C}$. The SOA curve provides a single pulse rating.

4. The value of R_{gJA} is measured with the device mounted on 1in2 FR-4 board with 2oz. copper, in a still air environment with $T_A=25^\circ\text{C}$. The maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specified board design.

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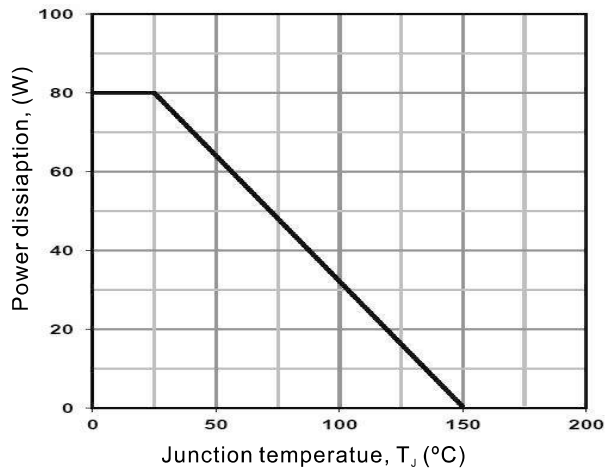
Rating and characteristic curves



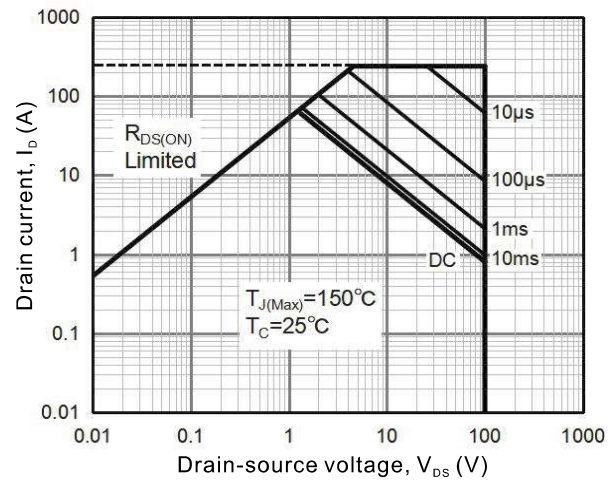
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Rating and characteristic curves

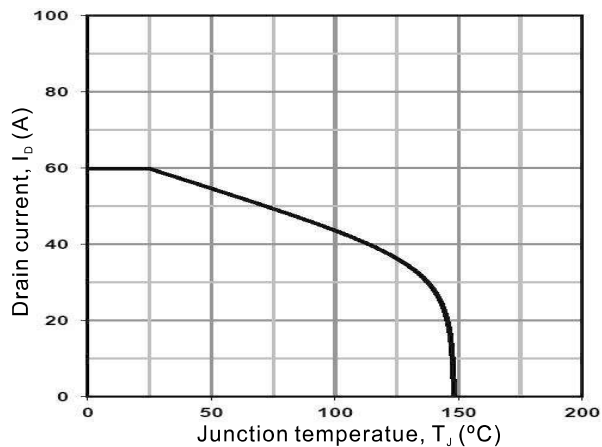
Power de-rating



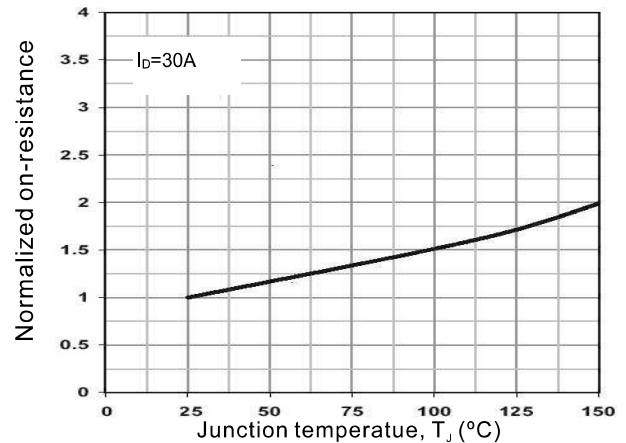
Safe operation area



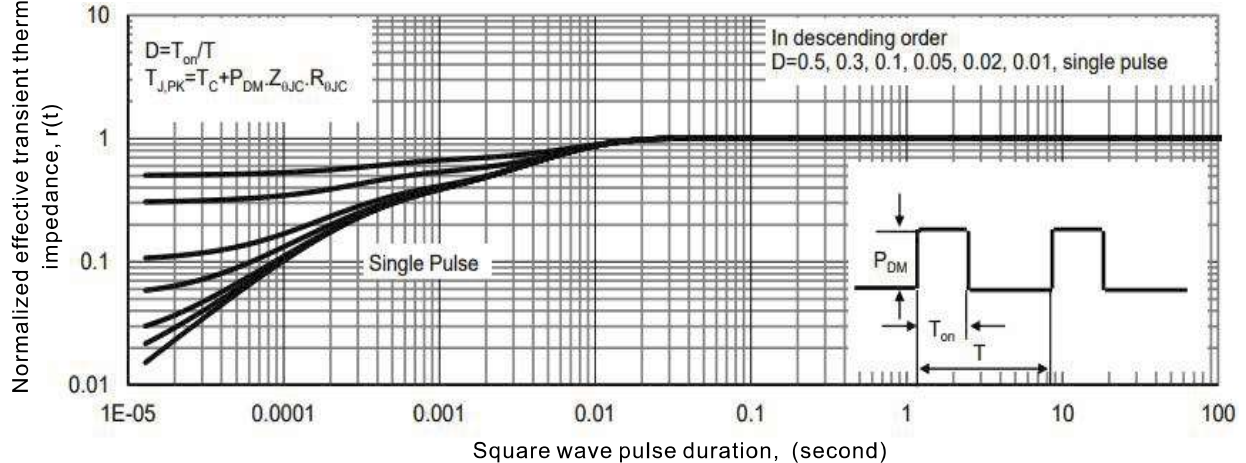
Current de-rating



On-resistance vs. Junction temperature



Normalized maximum transient thermal impedance



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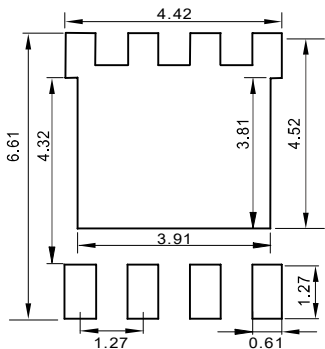
Pinning information

Pin	Simplified outline	Symbol
Pin 1, 2, 3 Source Pin 4 Gate Pin 5, 6, 7, 8 Drain	Top view: A square package with pins 1, 2, 3, 4 at the bottom and 8, 7, 6, 5 at the top. A circular mark is at the top center. Bottom view: A square package with pins 4, 3, 2, 1 at the bottom and 5, 6, 7, 8 at the top.	The symbol shows a MOSFET with source (S) at the bottom, gate (G) on the right, and drain (D) at the top. Pins are numbered 1 to 4 at the bottom and 5 to 8 at the top.

Marking

Type number	Marking code
FMOSTHAC60N10-H	P095N10AG

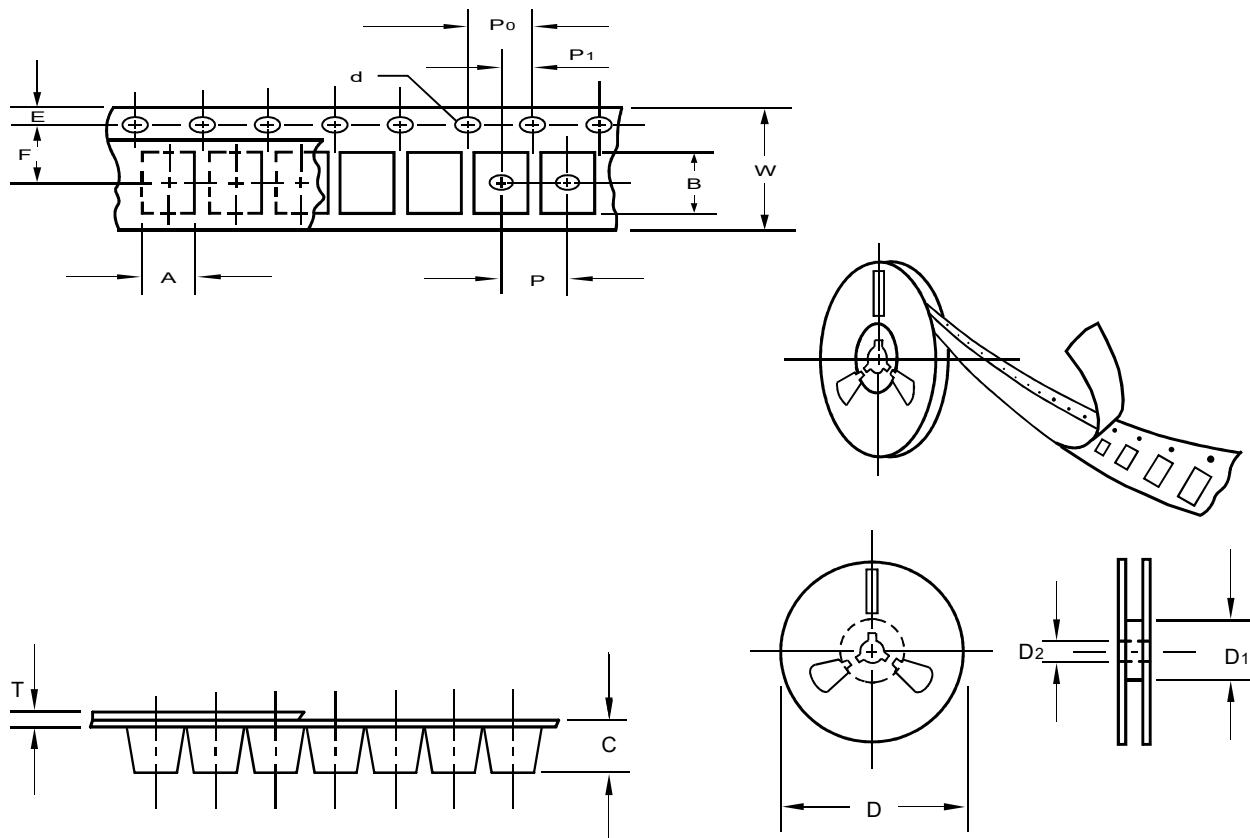
Suggested solder pad layout



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

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Packing information



unit:mm

Item	Symbol	Tolerance	T5060P8
Carrier width	A	0.1	6.40
Carrier length	B	0.1	5.40
Carrier depth	C	0.1	1.20
Sprocket hole	d	0.1	1.55
13" Reel outside diameter	D	2.0	330.00
13" Reel inner diameter	D1	min	100.00
7" Reel outside diameter	D	2.0	-
7" Reel inner diameter	D1	min	-
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	12.0

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

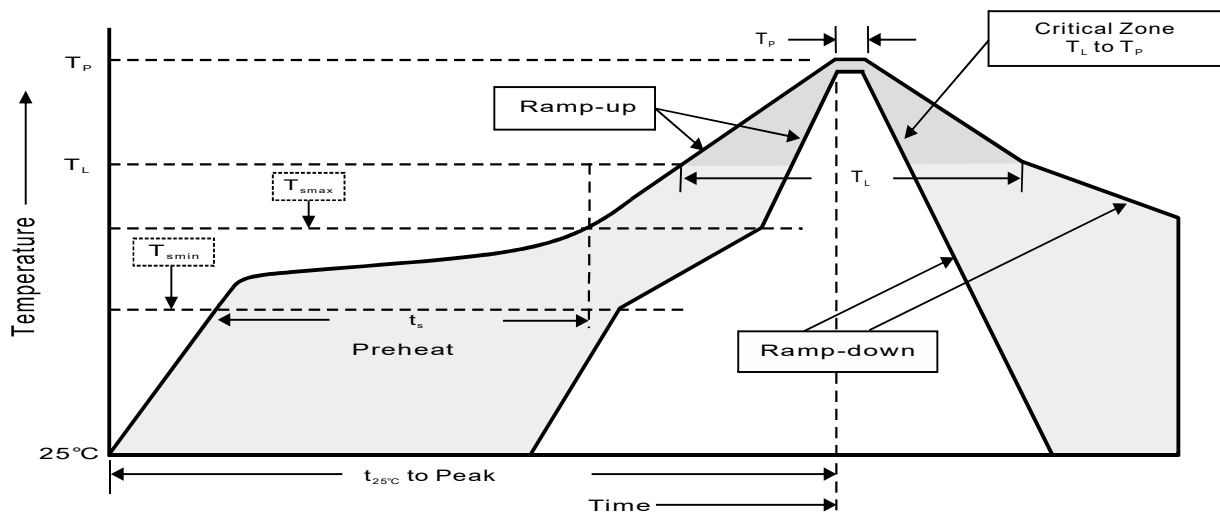
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Reel packing

Device	Outline	Device Package	Reel Size
FMOSTHAC60N10-H	Taping	T5060P8	13 inch

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