

FMOSTHAC196N06-Q1-H

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FMOSTHAC196N06-Q1-H

196A 60V N-Channel Trench
Enhancement Mode Power MOSFET

Features

- $V_{DS} = 60V$, $I_D = 196A$.
- $R_{DS(ON)} \leq 3.1\text{ m}\Omega$, @ $V_{GS} = 10V$, $I_D = 20A$.
- Excellent gate charge x on-resistance product (FOM.).
- Very low on-resistance.
- 100% UIS and ΔV_{DS} tested.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

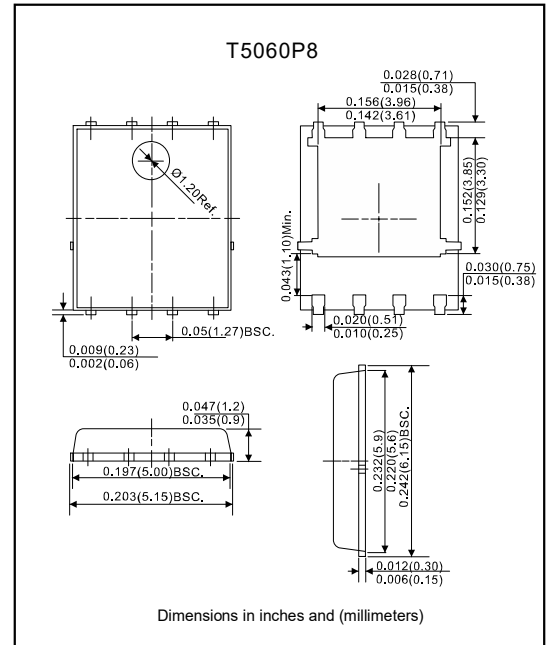
Application

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

Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case : Molded plastic, T5060P8 (DFN5060-8) .
- Weight : Approximated 105mg.

Package outline

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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current	I_D	(Silicon limited) 196	A
		($T_c = 100^\circ\text{C}$) 139	
		(Package limited) 120	
Pulsed drain current tested	I_{DM}	480	A
Single pulse avalanche energy (Note 1)	E_{AS}	973	mJ
Derating factor	-	1.6	W/ $^\circ\text{C}$
Power dissipation	P_D	240	W
Thermal resistance Junction to case (Note 2)	$R_{\theta JC}$	0.625	$^\circ\text{C}/\text{W}$
Operating Junction temperature	T_J	+175	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +175	$^\circ\text{C}$

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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 =250μA, V _{GS} =0V	60			V
Drain-source leakage current	I _{DSS}	V _{DS} =60V, V _{GS} =0V			1	μA
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
On characteristics						
Gate threshold voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250μA	2.0	2.8	4.0	V
Static drain-source on-resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A		2.8	3.1	mΩ
Forward trans conductance	g _{FS}	V _{DS} =10V, I _D =20A		50		S
Dynamic parameters						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =30V, f=1.0MHz		4500		pF
Out capacitance	C _{oss}			965		
Reverse transfer capacitance	C _{rss}			24		
Switching parameters (Note2)						
Total gate charge	Q _g	V _{GS} =10V, V _{DS} =30V, I _D =20A		70		nC
Gate to source charge	Q _{gs}			19		
Gate to drain charge	Q _{gd}			15.3		
Turn-on delay time	t _{d(on)}	V _{DD} =30V, V _{GS} =10V, R _G =4.7Ω, I _D =20A		10		ns
Rise time	t _r			22		
Turn-off delay time	t _{d(off)}			35		
Fall time	t _f			10		
Source-drain diode ratings and characteristics						
Diode forward voltage	V _{SD}	I _S =20A, V _{GS} =0V			1.2	V
Diode forward current	I _S				120	A
Body diode reverse recovery time	t _{rr}	I _F =100A, T _J =25°C, di/dt=100A/μs		56		nS
Body diode reverse recovery charge	Q _{rr}			80		nC

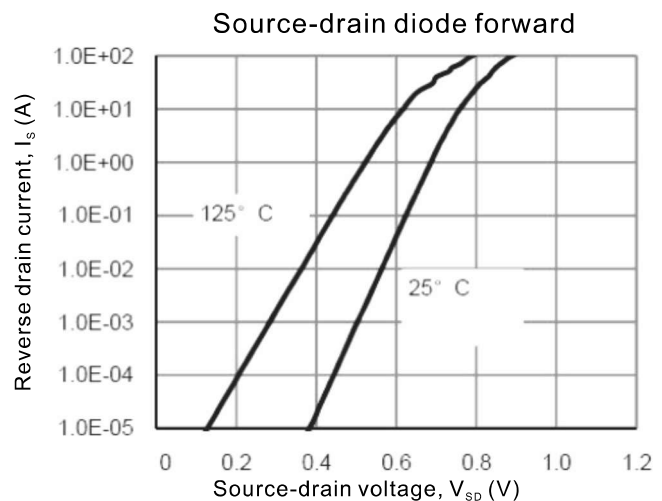
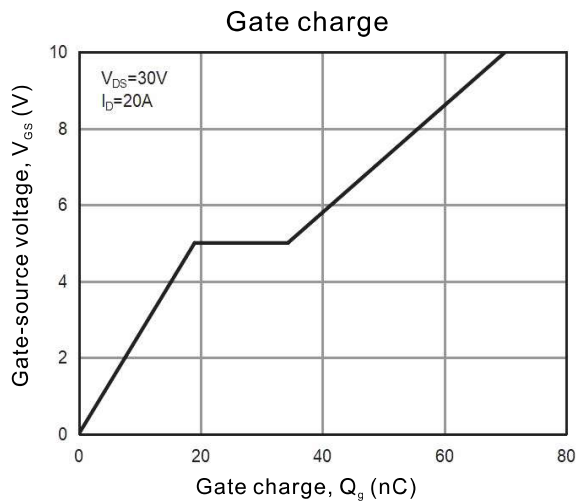
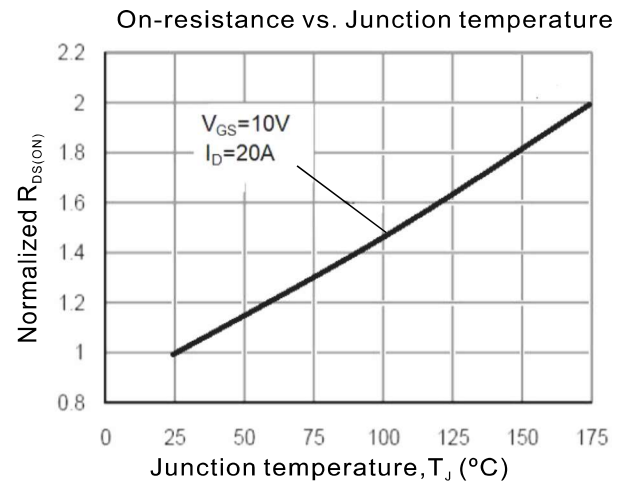
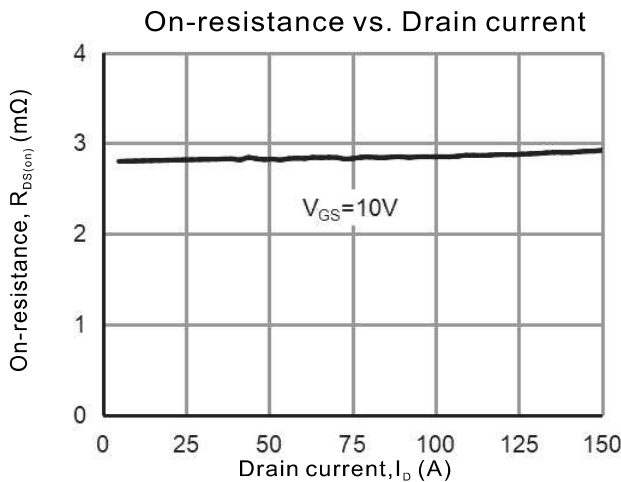
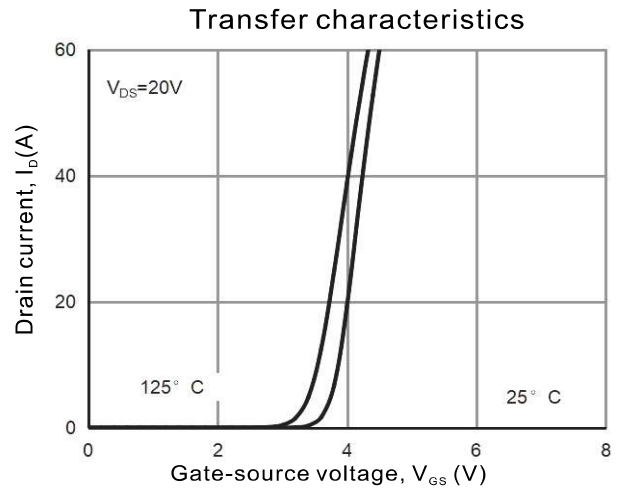
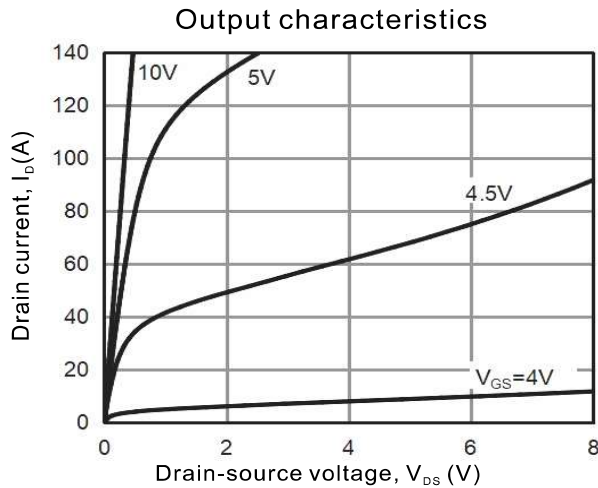
Note: 1. E_{AS} condition: $T_J=25^\circ\text{C}$, $V_{DD}=30\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$.

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 $T_{J(Max)}=175^\circ\text{C}$. The SOA curve provides a single pulse rating.

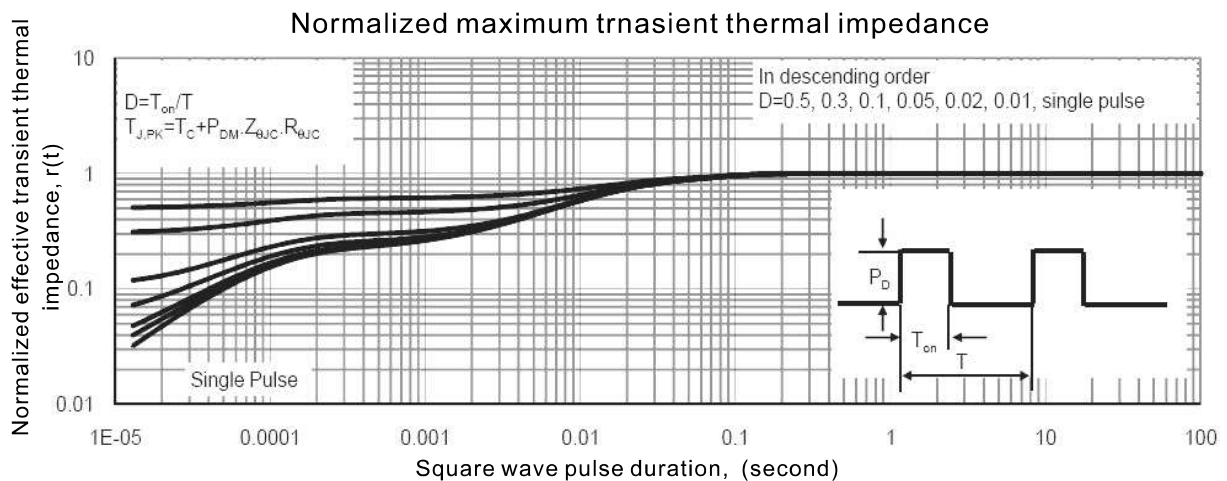
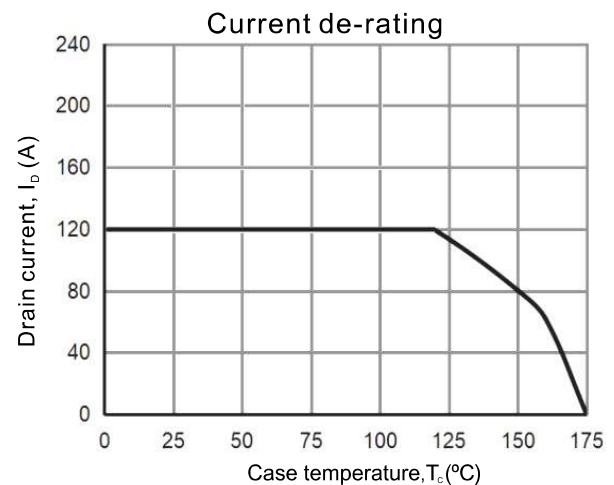
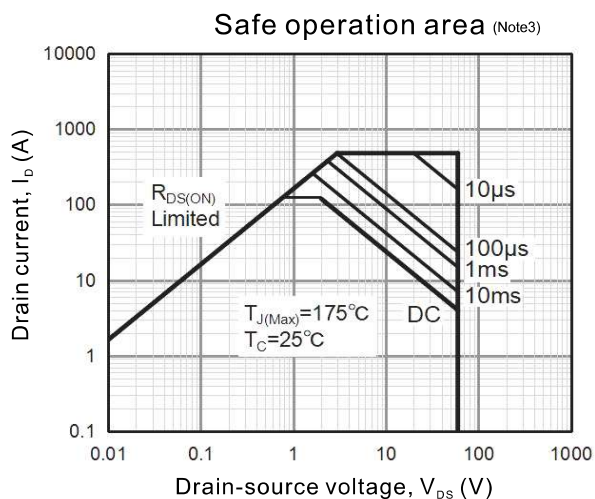
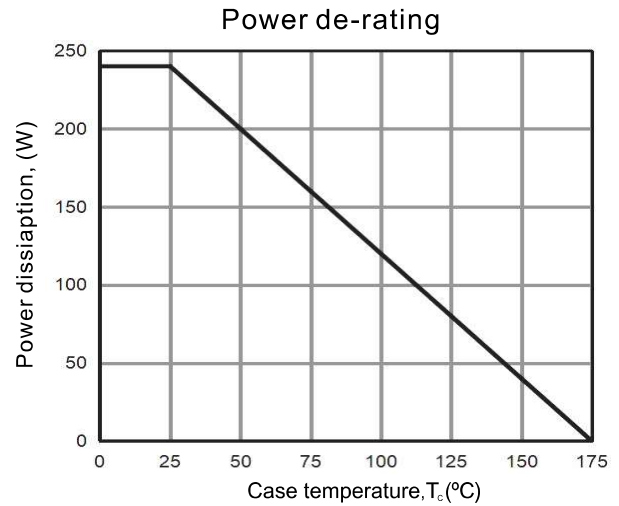
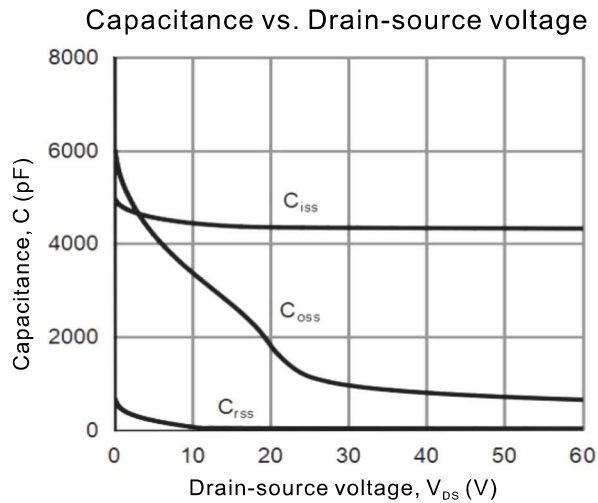
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Rating and characteristic curves



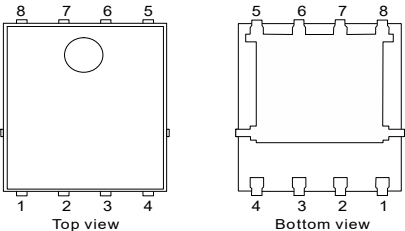
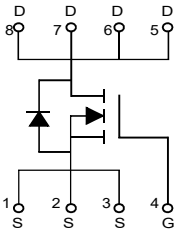
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Rating and characteristic curves



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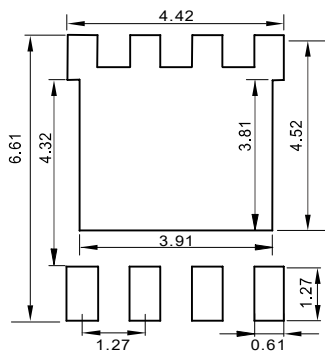
Pinning information

Pin	Simplified outline	Symbol
Pin 1, 2, 3 Source Pin 4 Gate Pin 5, 6, 7, 8 Drain		

Marking

Type number	Marking code
FMOSTHAC196N06-Q1-H	AP60T15G

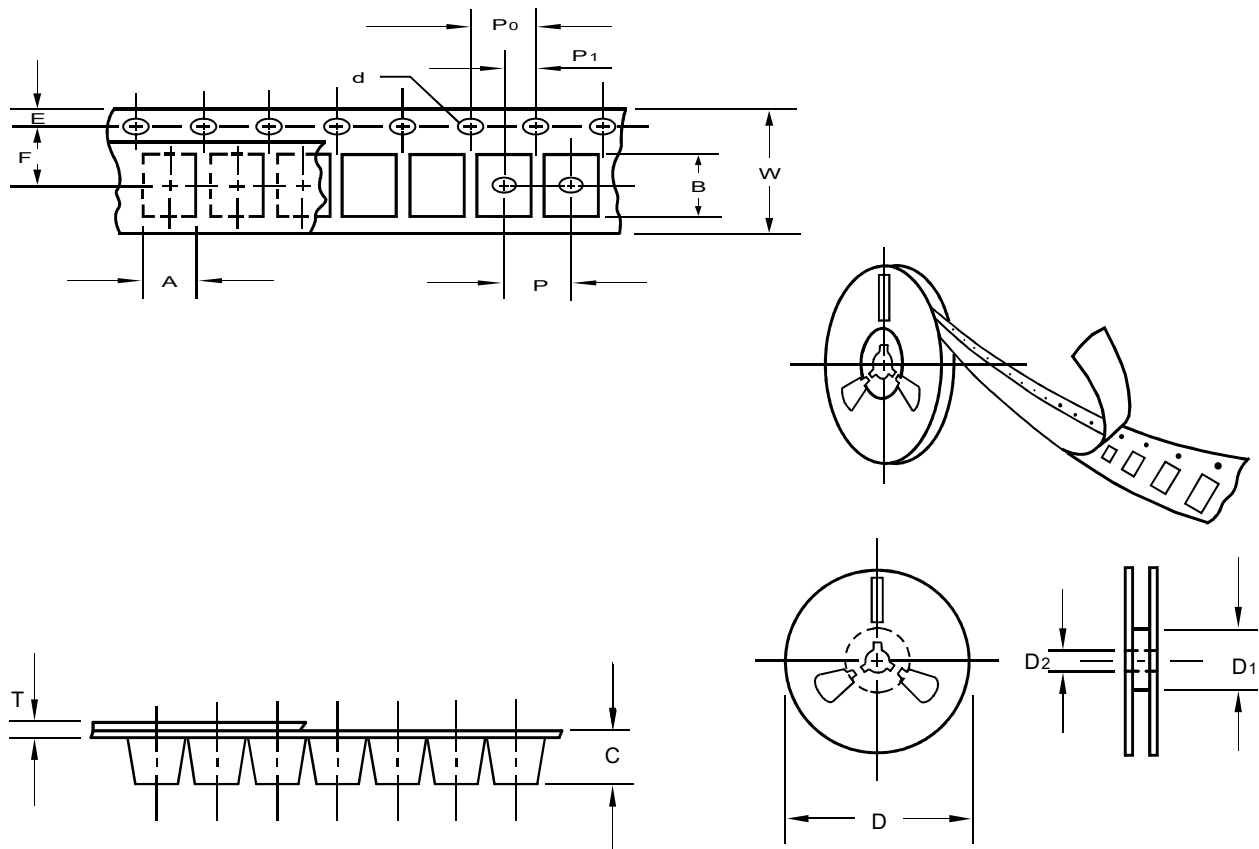
Suggested solder pad layout



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.

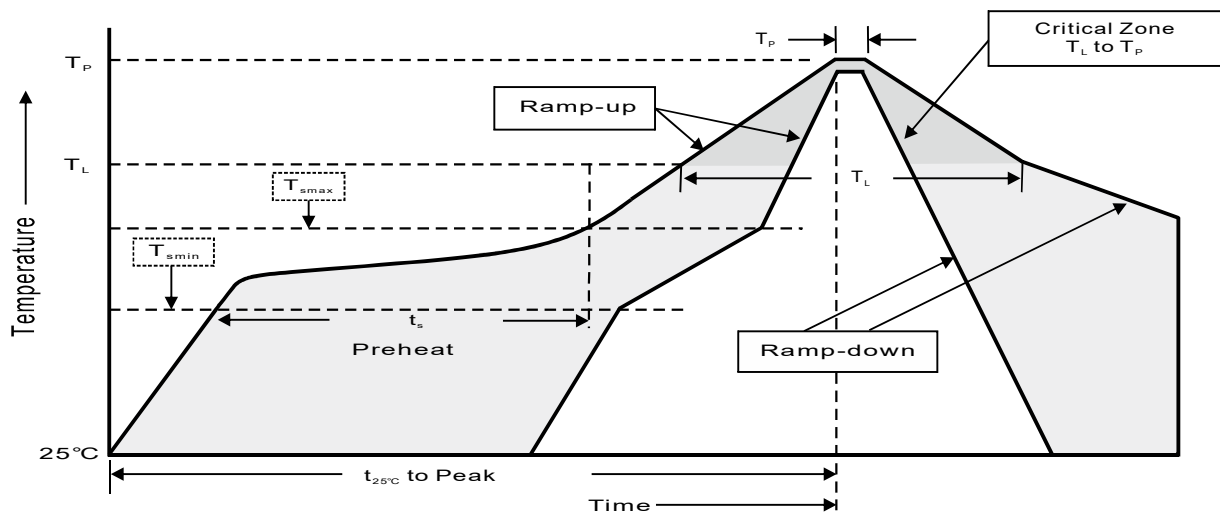
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Reel packing

Device	Outline	Device Package	Reel Size
FMOSTHAC196N06-Q1-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_{min}) - Temperature Max (T_{max}) - 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