

FMOSTHAC96P5N15-H

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FMOSTHAC96P5N15-H

96.5A 150V N-Channel Trench
Enhancement Mode Power MOSFET

Features

- $V_{DS} = 150V$, $I_D = 96.5A$.
- $R_{DS(ON)} \leq 8.8\text{ m}\Omega$, @ $V_{GS} = 10V$, $I_D = 20A$.
- Excellent gate charge x on-resistance product (FOM.).
- Very low on-resistance.
- 100% UIS and ΔV_{DS} tested.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

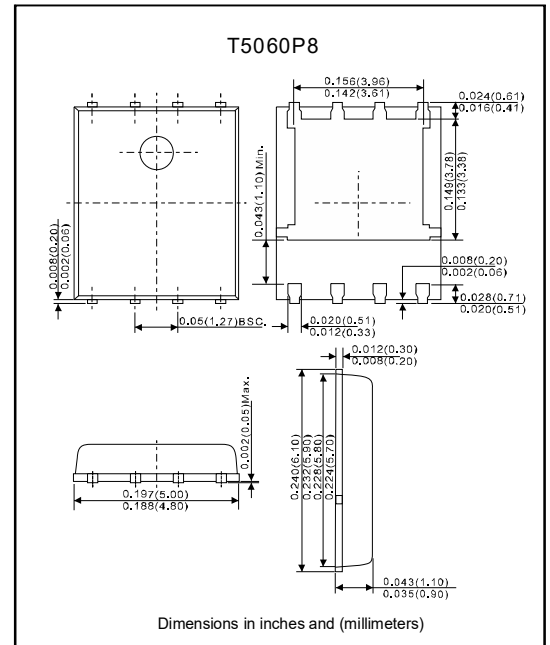
Application

- 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}	150	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current ($T_c = 100^\circ\text{C}$)	I_D	96.5	A
		60.5	
Pulsed drain current tested	I_{DM}	386	A
Single pulse avalanche energy (Note 1)	E_{AS}	501	mJ
Derating factor	-	1.44	W/ $^\circ\text{C}$
Power dissipation	P_D	180	W
Thermal resistance, junction to case	$R_{\theta JC}$	0.70	$^\circ\text{C}/\text{W}$
Operating junction temperature	T_J	+150	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^\circ\text{C}$

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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}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	150			V
Drain-source leakage current	I_{DSS}	$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$			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	$V_{GS(TH)}$	$V_{GS}=V_{DS}$, $I_D=250\mu\text{A}$	2.5	3.3	4.5	V
Static drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=20\text{A}$		7.8	8.8	m Ω
Forward trans conductance	g_{FS}	$V_{DS}=10\text{V}$, $I_D=40\text{A}$		30		S

Dynamic parameters

Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=75\text{V}$, $f=1.0\text{MHz}$		2738		pF
Out capacitance	C_{oss}			932		
Reverse transfer capacitance	C_{rss}			30		

Switching parameters (Note2)

Total gate charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=75\text{V}$, $I_D=20\text{A}$		48		nC
Gate to source charge	Q_{gs}			15		
Gate to drain charge	Q_{gd}			14.5		
Turn-on delay time	$t_{d(on)}$	$V_{DD}=75\text{V}$, $V_{GS}=10\text{V}$, $R_G=4.7\Omega$, $I_D=40\text{A}$		15		ns
Rise time	t_r			70		
Turn-off delay time	$t_{d(off)}$			30		
Fall time	t_f			10		

Source-drain diode ratings and characteristics

Diode forward voltage	V_{SD}	$I_F=20\text{A}$, $V_{GS}=0\text{V}$			1.2	V
Diode forward current	I_S				96.5	A
Body diode reverse recovery time	t_{rr}	$I_F=40\text{A}$, $T_J=25^\circ\text{C}$, $di/dt=100\text{A}/\mu\text{s}$		88		nS
Body diode reverse recovery charge	Q_{rr}			222		nC

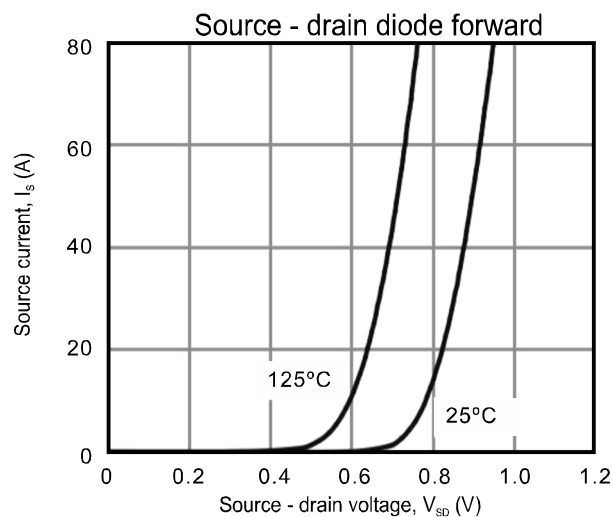
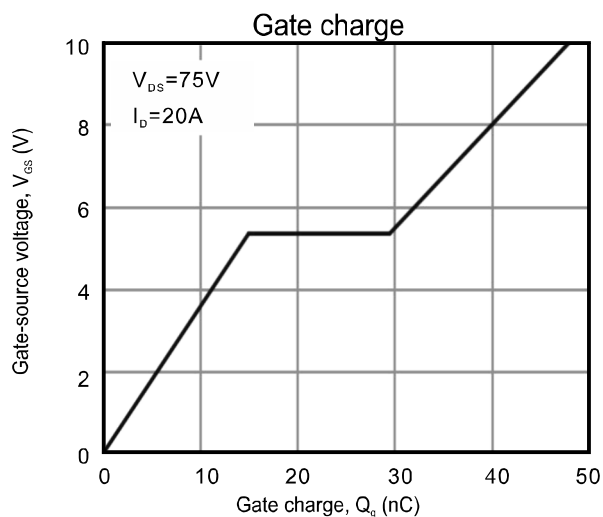
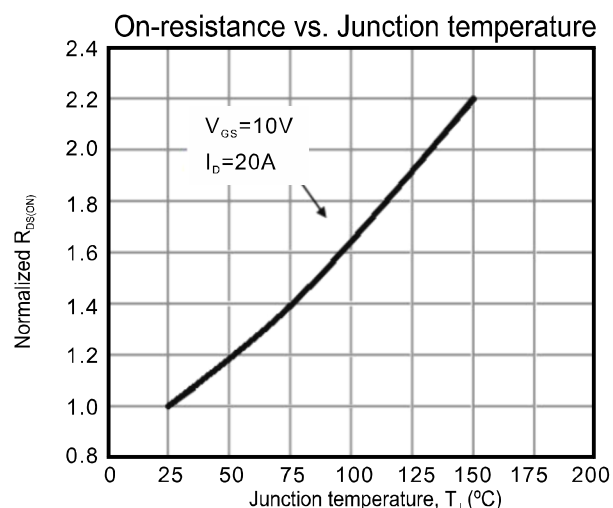
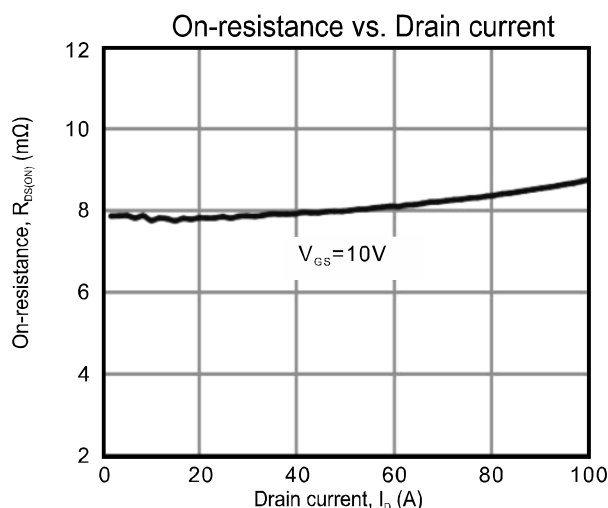
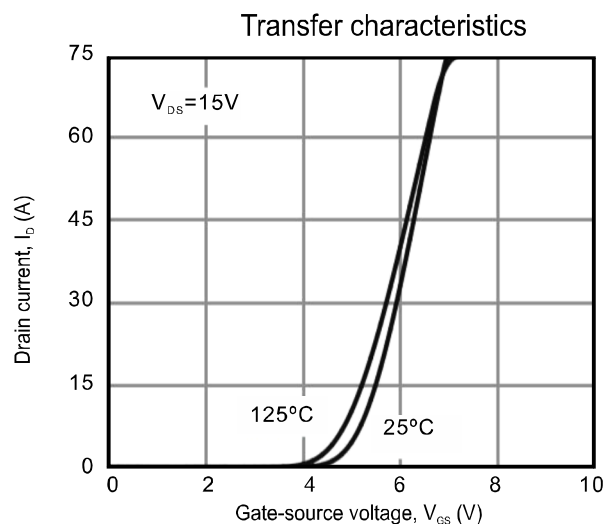
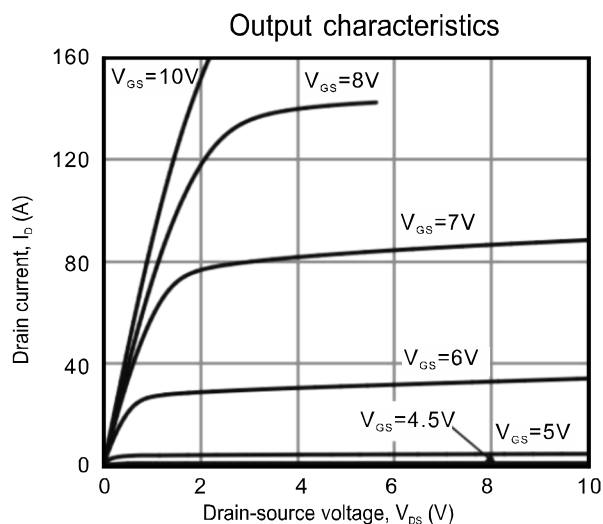
Note: 1. E_{AS} condition: $T_J=25^\circ\text{C}$, $V_{DD}=50\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_G=25\Omega$.

2. Guaranteed by design, not subject to production.

3. These curves are based on the junction to 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.

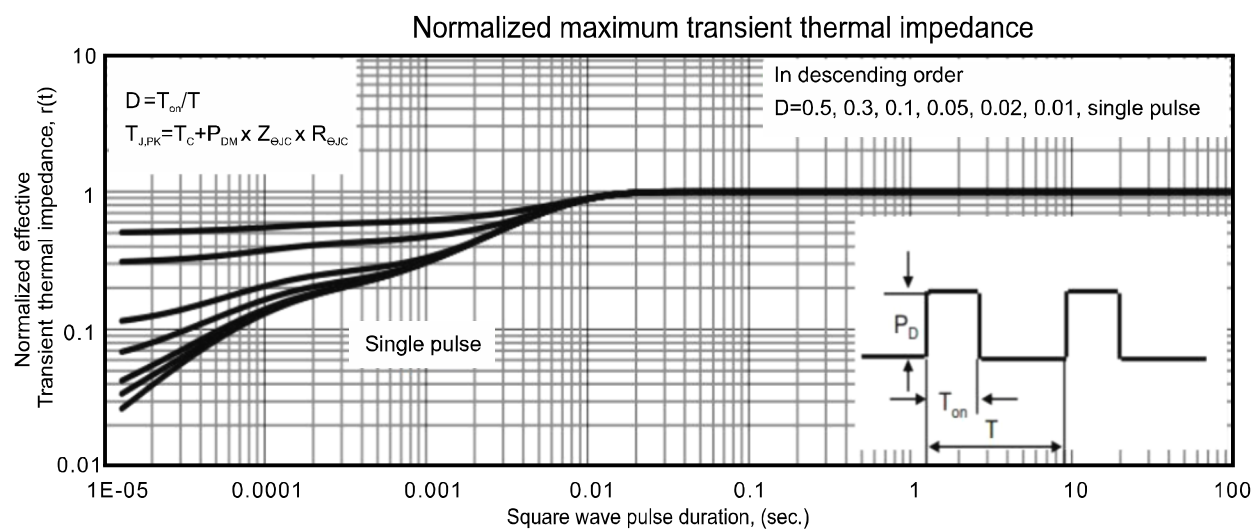
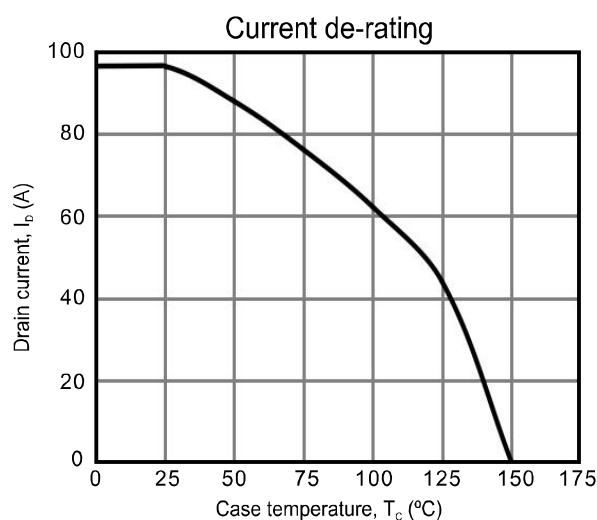
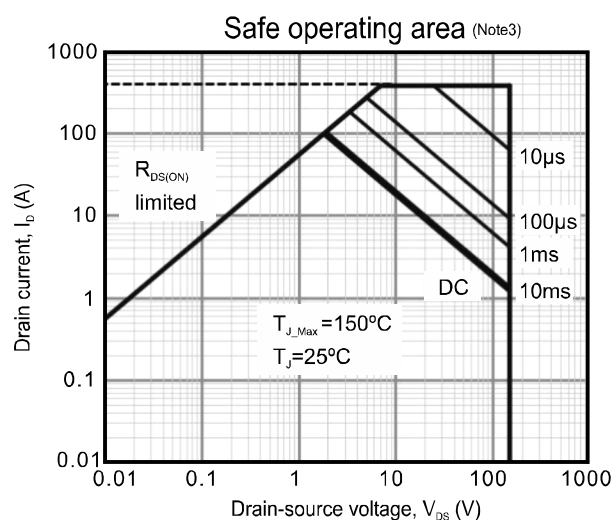
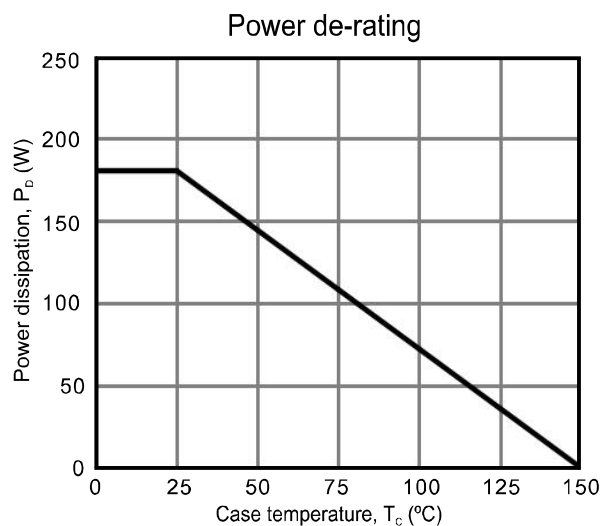
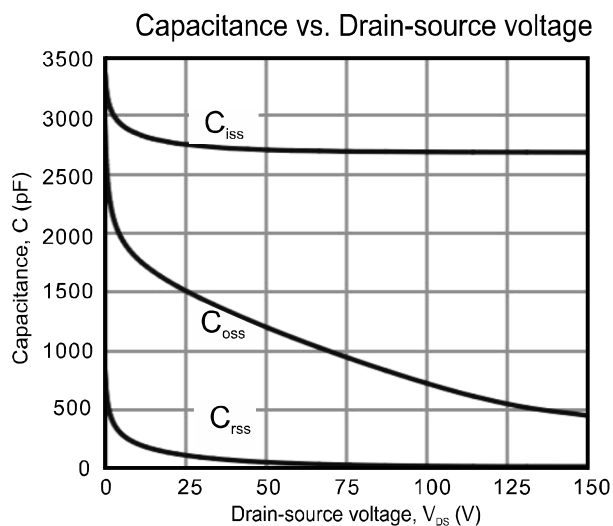
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Rating and characteristic curves



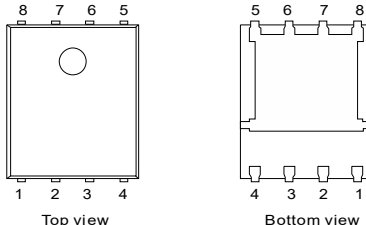
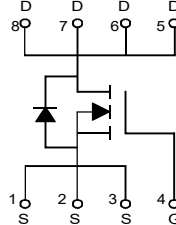
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Rating and characteristic curves



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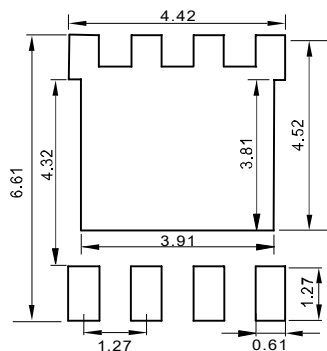
Pinning information

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

Marking

Type number	Marking code
FMOSTHAC96P5N15-H	AC96P5N15

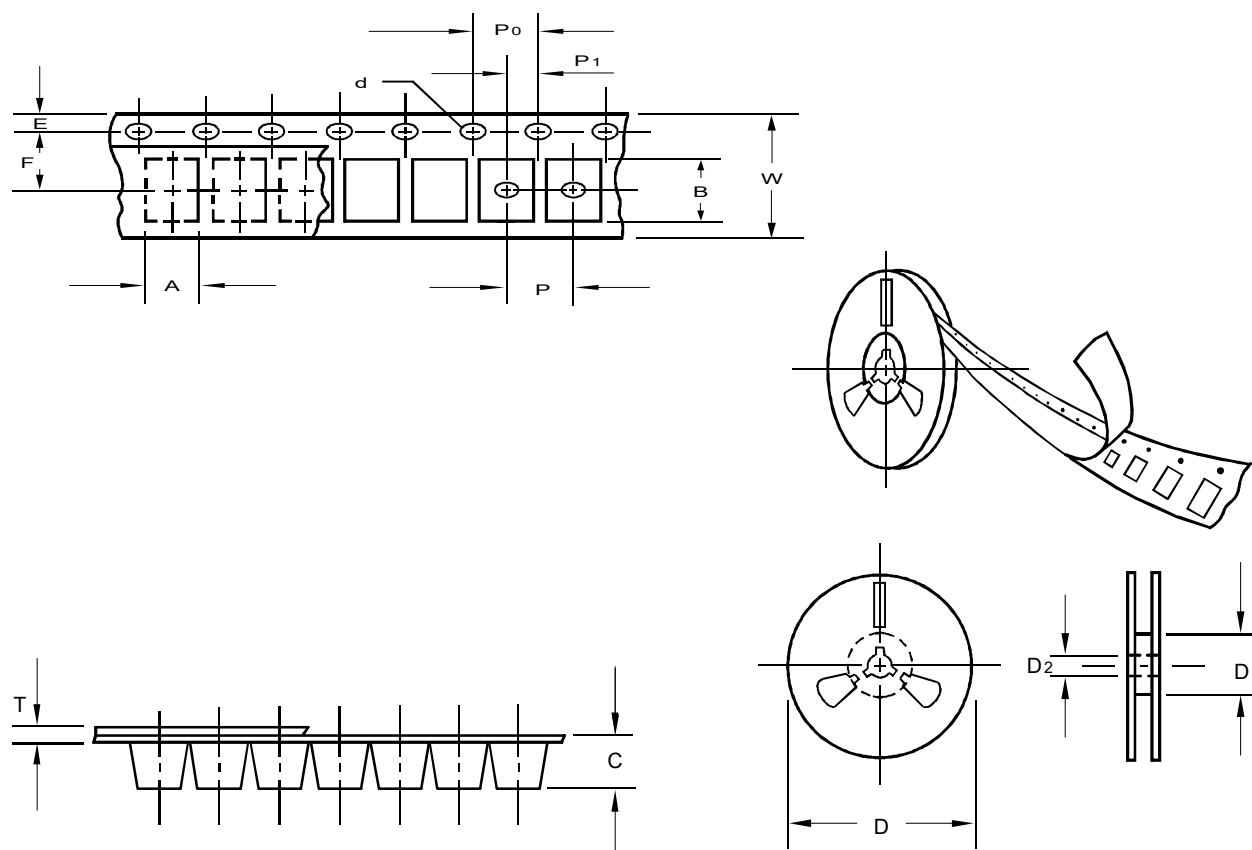
Suggested solder pad layout



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	0.5	6.40
Carrier length	B	0.5	5.40
Carrier depth	C	0.5	1.20
Sprocket hole	d	0.5	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	0.5	0.25
Tape width	W	0.5	12.0

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

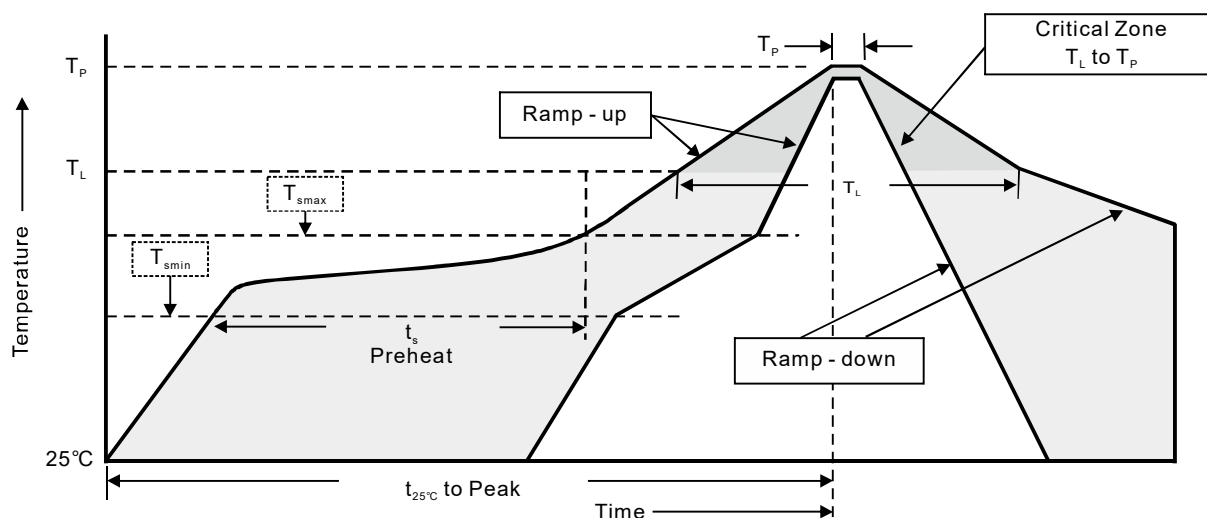
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Reel packing

Device	Outline	Device Package	Reel Size
FMOSTHAC96P5N15-H	Taping	T5060P8	13 inch

Suggested thermal profiles for soldering processes

- Storage environment : Temperature = 5°C ~ 40°C, Humidity = 55%, ±25%.
- 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