

FMOSGTAC59N04-H

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FMOSGTAC59N04-H

59A 40V N-Channel Shield Gate Trench Enhancement Mode Power MOSFET

Features

- $V_{DS}=40V$, $I_D=59A$.
- $R_{DS(ON)} \leq 6.5m\Omega$, @ $V_{GS}=10V$, $I_D=15A$.
- $R_{DS(ON)} \leq 10.5m\Omega$, @ $V_{GS}=4.5V$, $I_D=15A$.
- Low gate charge.
- 100% E_{AS} guaranteed.
- Advanced trench MOS technology.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

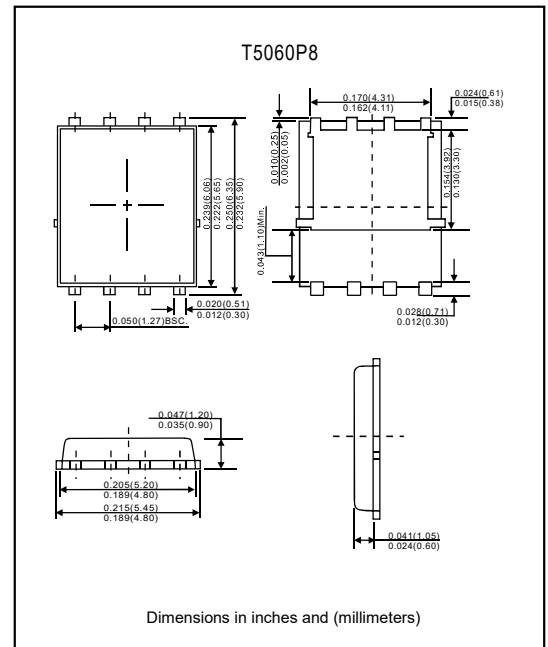
Applications

- SMPS synchronous rectification.
- DC/DC converters.
- Or-ing.

Mechanical data

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

Package outline

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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	40	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current, $V_{GS}@10V$ (Note1)	I_D	($T_c=25^\circ C$) 59	A
		($T_c=100^\circ C$) 37	
		($T_A=25^\circ C$) 13.9	
		($T_A=70^\circ C$) 11	
Pulsed drain current (Note2)	I_{DM}	120	A
Avalanche current	I_{AS}	37	A
Single pulse avalanche energy (Note3)	E_{AS}	68	mJ
Power dissipation (Note4)	P_D	($T_c=25^\circ C$) 34.7	W
		($T_A=25^\circ C$) 1.9	
Thermal resistance Junction to ambient (Note1)	$R_{\theta JA}$	65	$^\circ C/W$
Thermal resistance Junction to case (Note1)	$R_{\theta JC}$	3.6	$^\circ C/W$
Operating Junction temperature	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 to +150	$^\circ C$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	40			V
Drain-source leakage current	I _{DSS}	V _{DS} =32V, V _{GS} =0V			1	μA
		V _{DS} =32V, V _{GS} =0V, T _J =55°C			5	
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	1.2	1.9	2.2	V
Static drain-source on-resistance (Note 2)	R _{DS(ON)}	V _{GS} =10V, I _D =15A		4.7	6.5	mΩ
		V _{GS} =4.5V, I _D =15A		7.5	10.5	
Dynamic parameters						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =20V, f=1.0MHz		1078		pF
Out capacitance	C _{oss}			483		
Reverse transfer capacitance	C _{rss}			49		
Gate resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1.0MHz		1.9		Ω
Switching parameters						
Total gate charge	Q _g	V _{GS} =10V, V _{DS} =20V, I _D =15A		19.8		nC
Gate to source charge	Q _{gs}			3.9		
Gate to drain charge	Q _{gd}			4.7		
Turn-on delay time	t _{d(on)}	V _{DD} =20V, V _{GS} =10V, R _G =3Ω, I _D =15A		11.5		ns
Rise time	t _r			9.2		
Turn-off delay time	t _{d(off)}			23.8		
Fall time	t _f			15.4		
Source-drain diode ratings and characteristics						
Drain-source diode forward voltage (Note 2)	V _{SD}	I _s =1A, V _{GS} =0V, T _J =25°C			1.2	V
Continuous source current (Note 1)	I _s	V _G =V _D =0V, Force current			59	A

Note: 1. The data tested by surface mounted on a 1 inch² FR-4 board with 2oz copper.

2. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

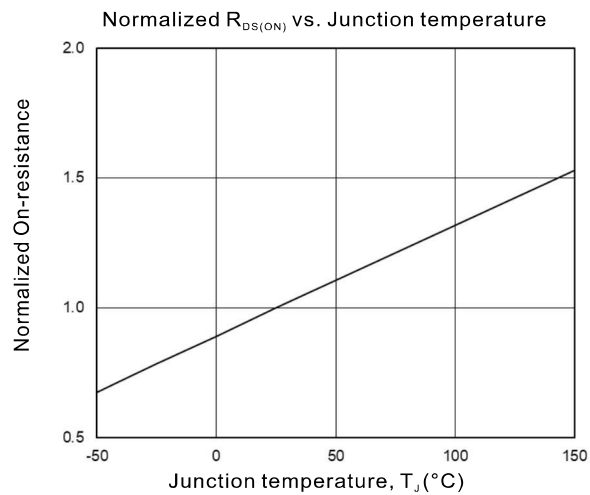
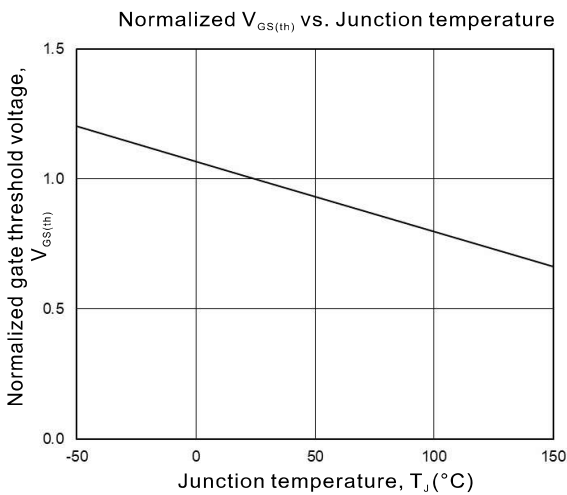
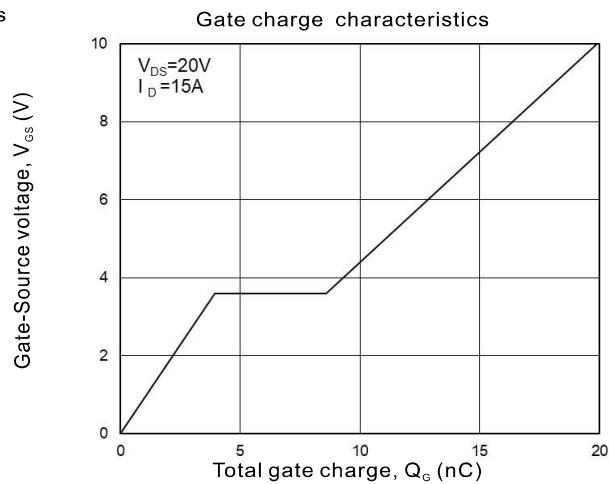
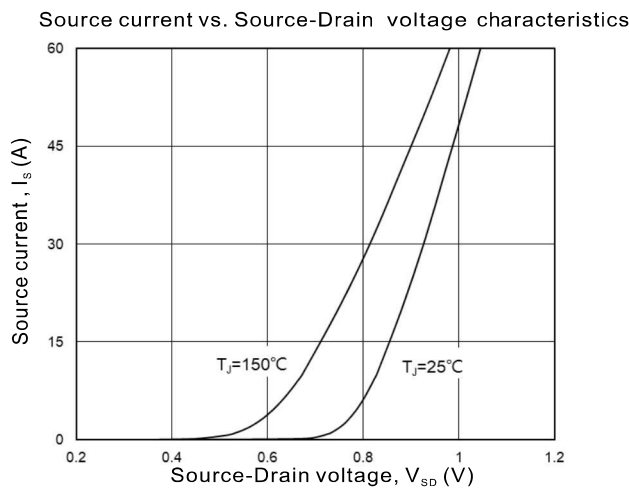
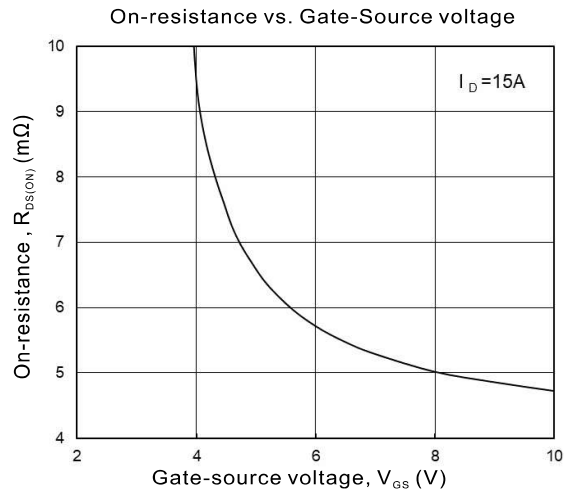
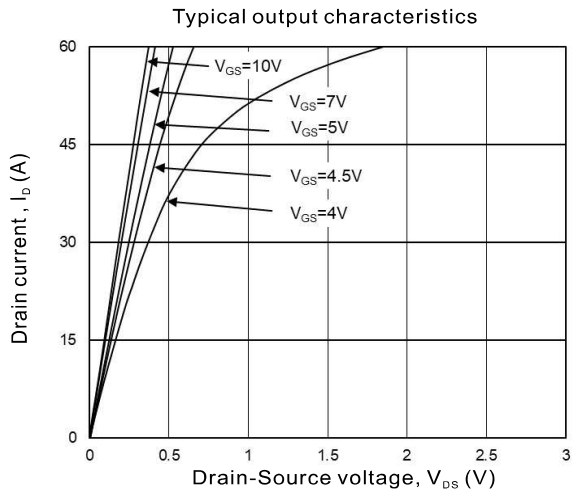
3. The E_{AS} data shows maximum rating. the test condition is $V_{DD}=25\text{V}$, $V_{GS}=10\text{V}$, $L=0.1\text{mH}$, $I_{AS}=37\text{A}$.

4. The power dissipation is limited by 150°C junction temperature.

5. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

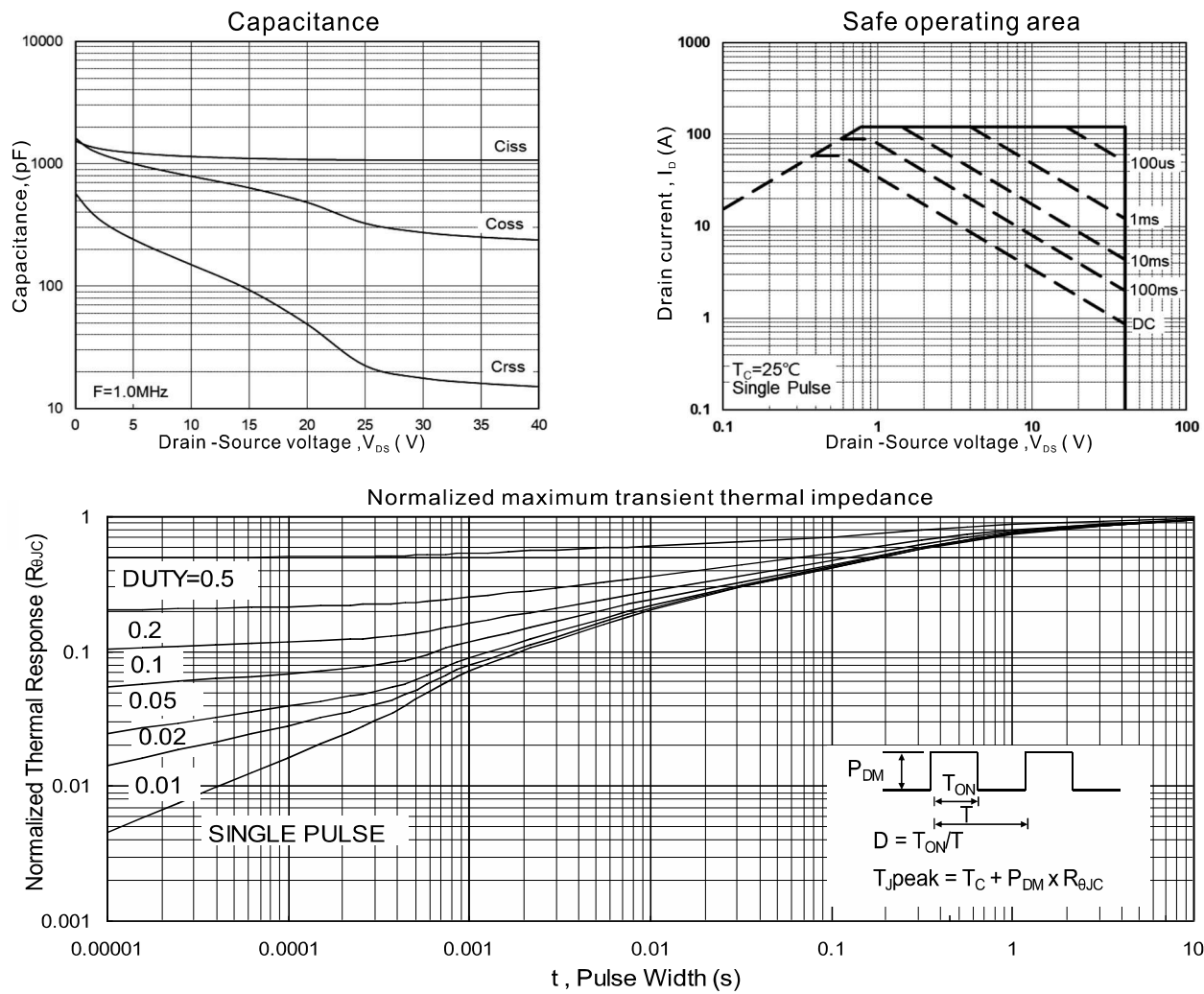
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Rating and characteristic curves



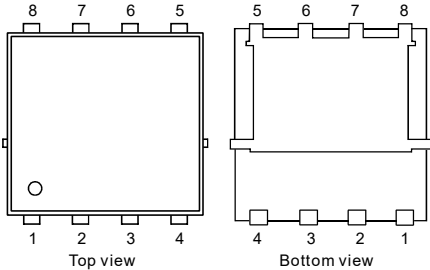
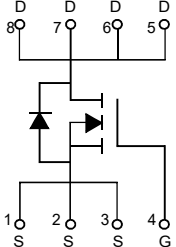
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Rating and characteristic curves



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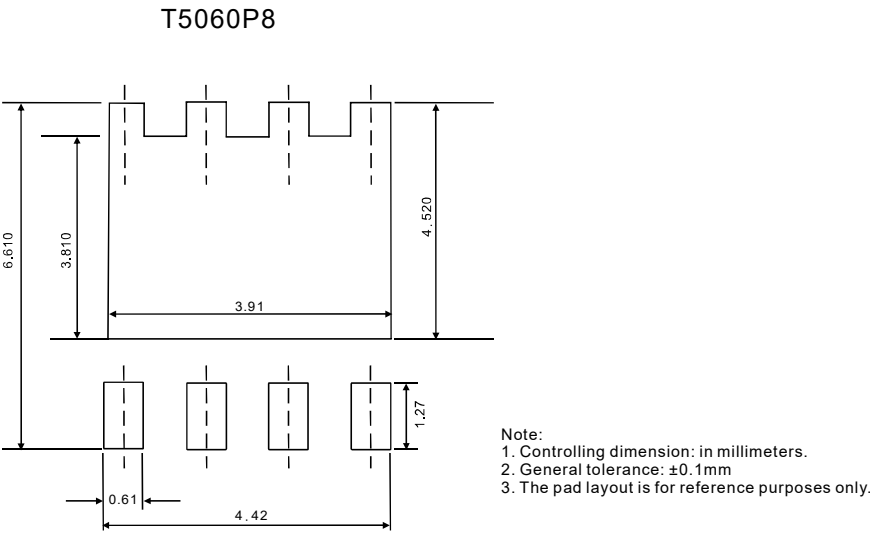
Pinning information

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

Marking

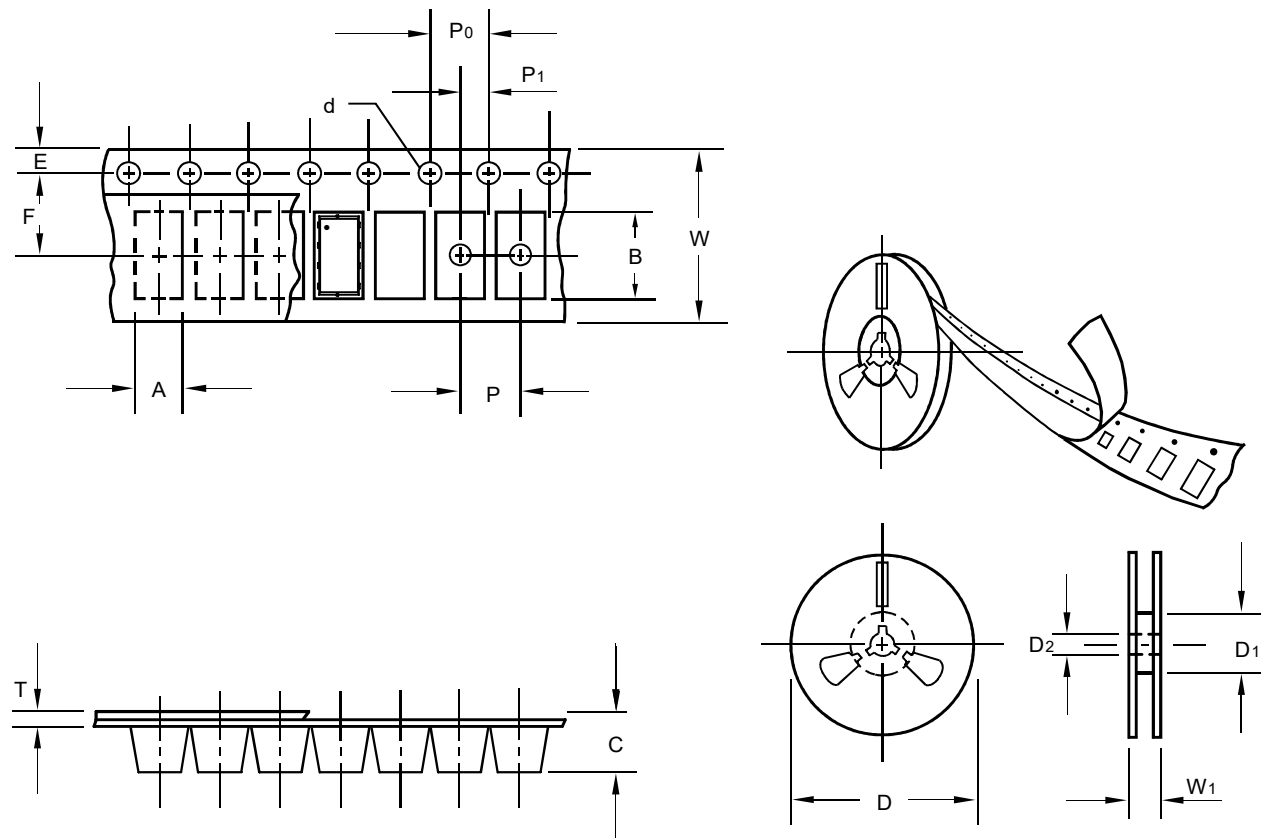
Type number	Marking code
FMOSGTAC59N04-H	AC59N04

Suggested solder pad layout



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Packing information



unit:mm

Item	Symbol	Tolerance	T5060P8
Carrier width	A	0.3	6.50
Carrier length	B	0.3	5.28
Carrier depth	C	0.3	2.00
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	330.00
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	0.30
Tape width	W	0.3	12.00
Reel width	W1	3.0	17.60

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

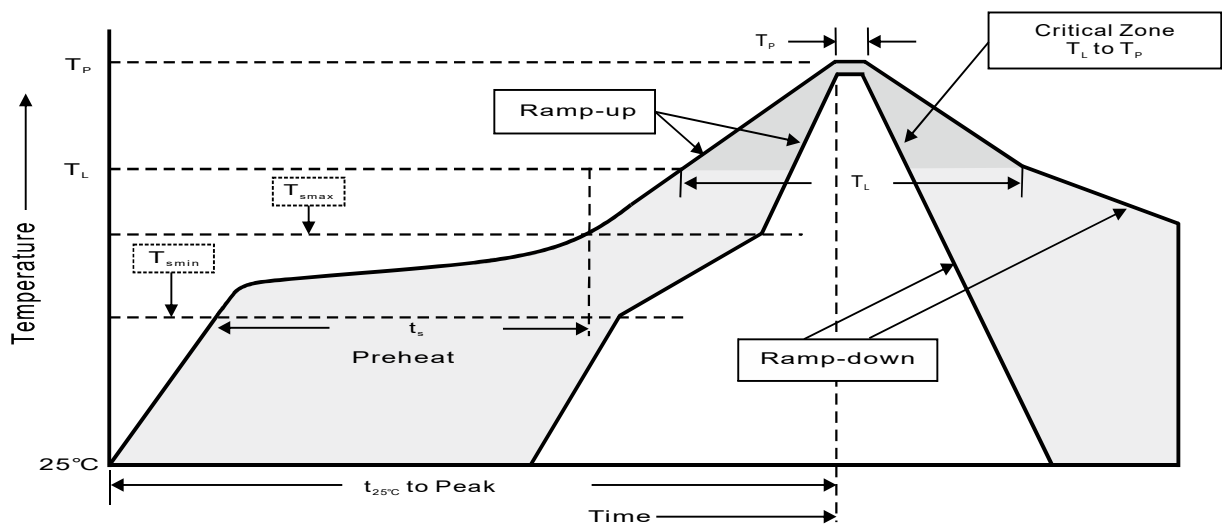
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Reel packing

Device	Outline	Device Package	Reel Size	Reel (pcs)
FMOSGTAC59N04-H	Taping	T5060P8	13 inch	3,000

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