

FMOSGTAC92N04-H

List

List.....1

Package outline.....2

Features.....2

Application.....2

Mechanical data.....2

Maximum ratings2

Electrical characteristics.....3

Rating and characteristic curves.....4~6

Pinning information.....6

Marking.....6

Suggested solder pad layout.....6

Packing information.....7

Reel packing.....8

Suggested thermal profiles for soldering processes.....8

FMOSGTAC92N04-H

92A 40V N-Channel Shield Gate Trench
Enhancement Mode Power MOSFET

Features

- $V_{DS}=40V$, $I_D=92A$.
- $R_{DS(ON)} \leq 4.7m\Omega$ @ $V_{GS}=10V$, $I_D=20A$.
- Low on-resistance.
- Excellent FOM (figure of merit).
- 100% UIS and R_g tested.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

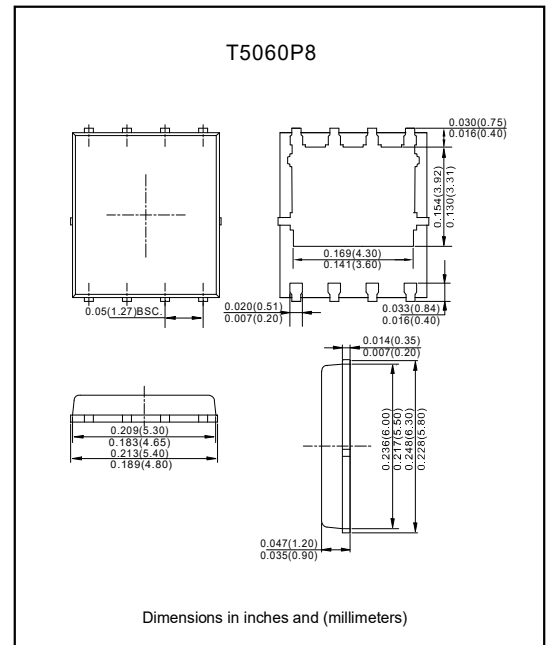
Application

- Load switching.
- Motor driver.
- High frequency switching, synchronous rectification.

Mechanical data

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

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 ($V_{GS}=10V$) (Note 1)	I_D	92	A
($T_c=25^\circ C$) ($T_c=100^\circ C$)		53	
Pulsed drain current (Note 2)	I_{DM}	326	A
Single pulse avalanche current ($L=0.1mH$)	I_{AS}	28	A
Single pulse avalanche energy (Note 3)	E_{AS}	116	mJ
Power dissipation ($T_c=25^\circ C$)	P_D	54	W
($T_c=100^\circ C$)		22	
Thermal resistance, junction to ambient (Note 4)	$R_{\theta JA}$	50	$^\circ C/W$
Thermal resistance Junction to case (Note 5)	$R_{\theta JC}$	2.3	$^\circ C/W$
Operating junction temperature	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 to +150	$^\circ C$

FMOSGTAC92N04-H

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics (Note6)						
Drain-source breakdown voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	40			V
Drain-source leakage current	I _{DSS}	V _{DS} =40V, V _{GS} =0V			1	μA
		V _{DS} =40V, V _{GS} =0V, T _J =125°C			100	
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
On characteristics (Note6)						
Gate threshold voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250μA	2	3	4	V
Drain-Source on-state resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A		3.9	4.7	mΩ
Foward transconductance	g _{FS}	V _{DS} =5V, I _D =20A		15		S
Dynamic parameters (Note7)						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =20V, f=1.0MHZ		982		pF
Out capacitance	C _{oss}			593		
Reverse transfer capacitance	C _{rss}			25		
Gate resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		4.2		Ω
Switching parameters (Note7)						
Total gate charge	Q _g	V _{GS} =6V, V _{DS} =20V, I _D =20A		8.7		nC
		V _{GS} =10V, V _{DS} =20V, I _D =20A		14		
Q _{gs}			4.6			
Q _{gd}			2.9			
Gate plateau voltage	V _{plateau}				5.2	
Turn-on delay time	t _{d(on)}	V _{DS} =20V, V _{GS} =10V, R _G =3Ω, I _D =20A		5.7		ns
Rise time	t _r			11		
Turn-off delay time	t _{d(off)}			14		
Fall time	t _f			8		
Source-drain diode ratings and characteristics (Note7)						
Drain-source diode forward voltage	V _{SD}	I _S =2A, V _{GS} =0V		0.7	1.2	V
Continuous source current	I _S	T _C =25°C			78	A
Reverse recovery time	t _{rr}	I _F =20A, T _J =25°C , dI/dt=100A/μs		30		ns
Reverse recovery charge	Q _{rr}			13		nC

Note:1. This current is chip limited, which is calculated base on $R_{\theta JC}$.2. This current is calculated on single pulse width 10 μs pulse and duty cycle=1%.3. Defined by design, not subject to production test, E_{AS} condition: $T_J=25^{\circ}\text{C}$, $V_{DS}=20\text{V}$, $V_{GS}=10\text{V}$, $L=1.0\text{mH}$.

4. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.

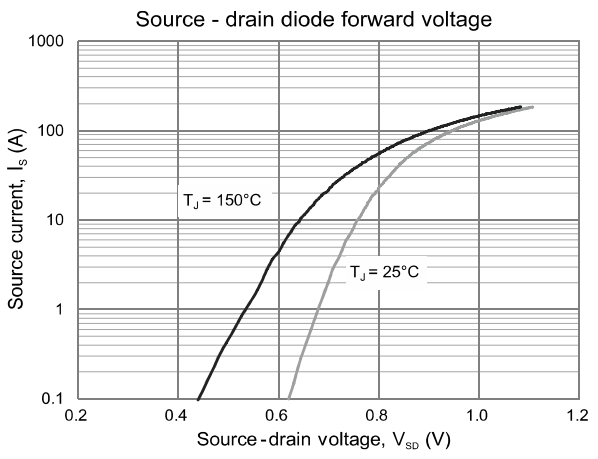
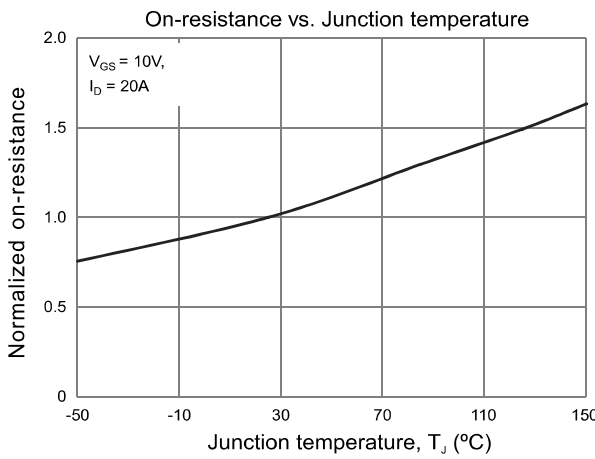
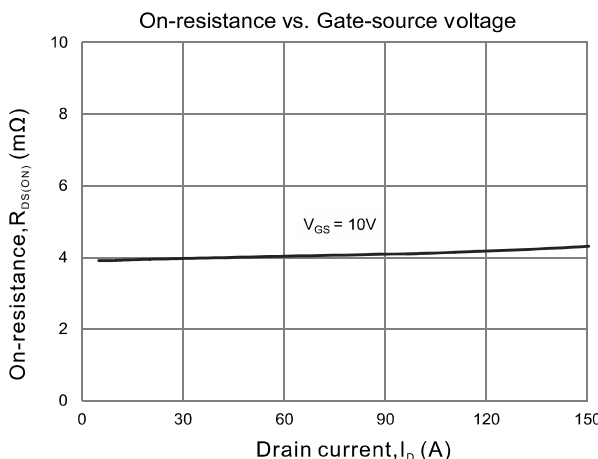
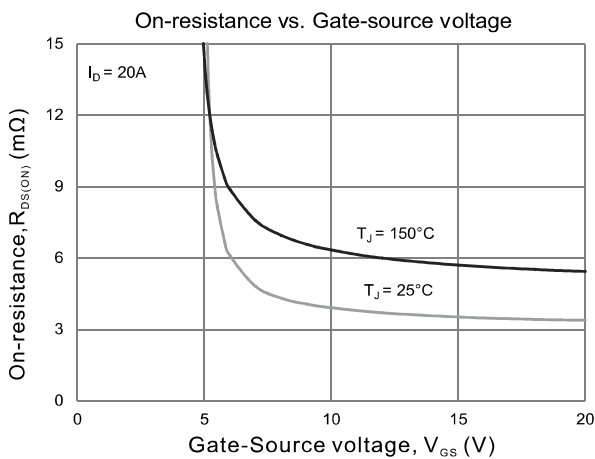
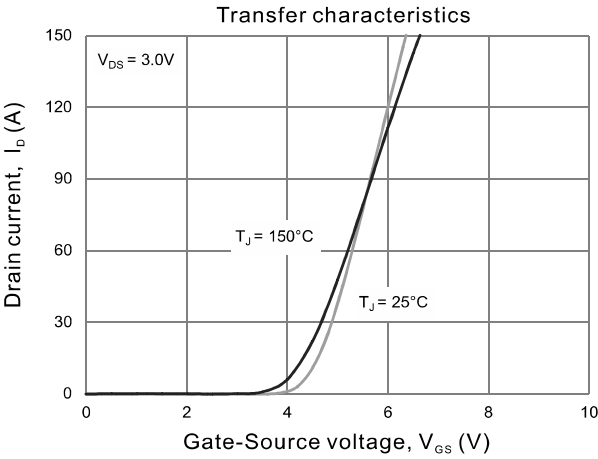
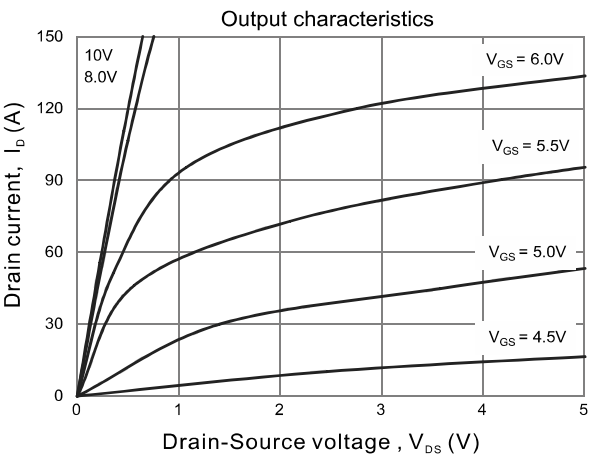
5. Thermal resistance from junction to soldering point. (on the exposed drain pad)

6. Short duration pulse test used to minimize self-heating effect.

7. Defined by design, not subject to production.

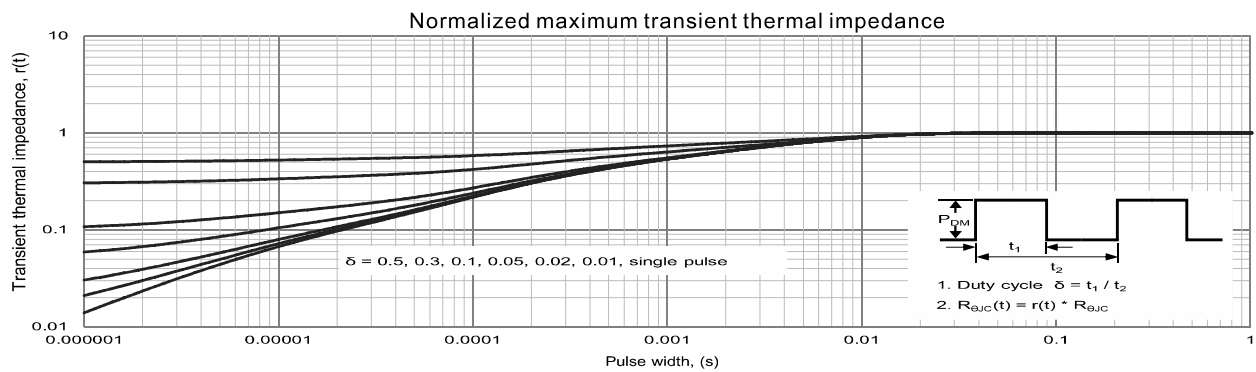
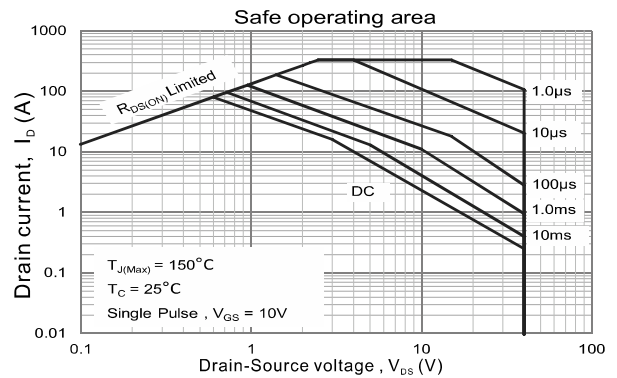
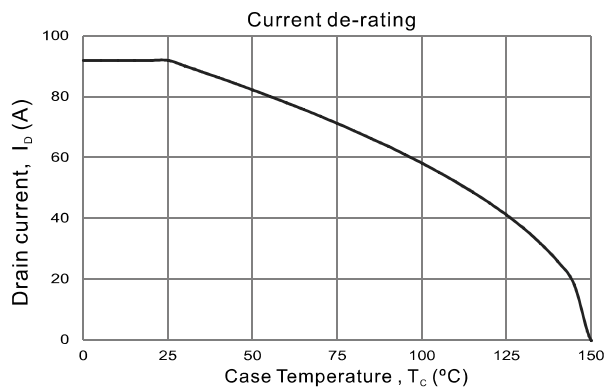
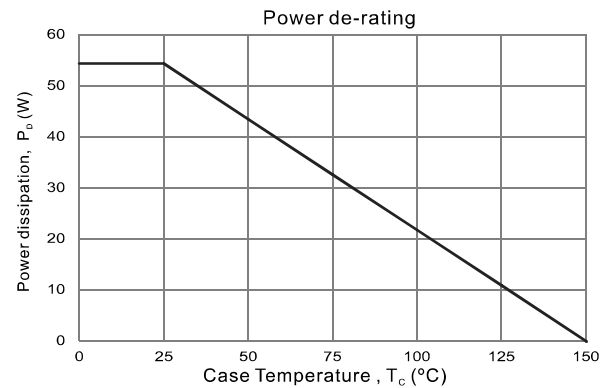
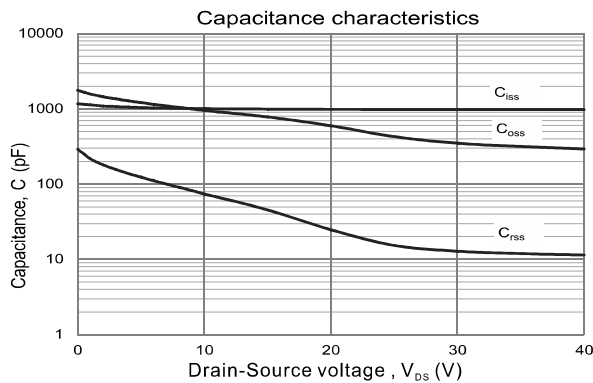
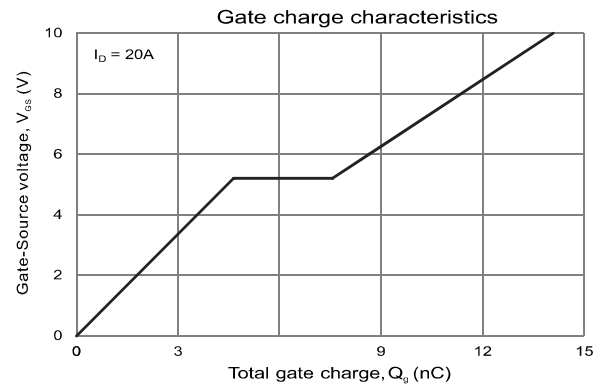
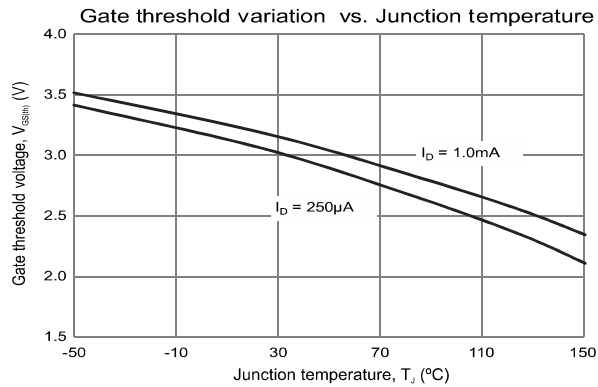
FMOSGTAC92N04-H

Rating and characteristic curves



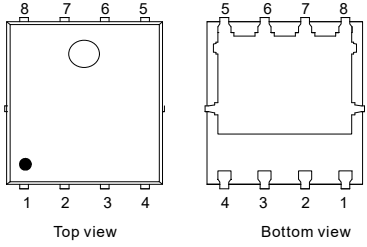
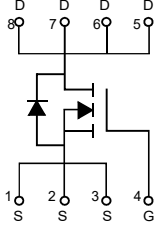
FMOSGTAC92N04-H

Rating and characteristic curves



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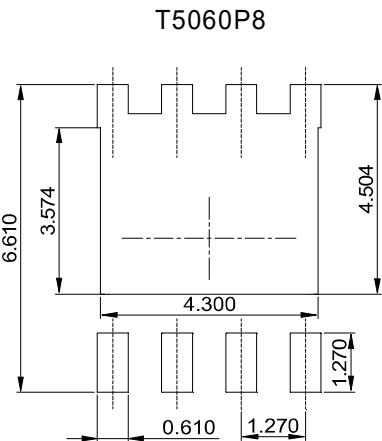
Pinning information

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
FMOSGTAC92N04-H	4005AH

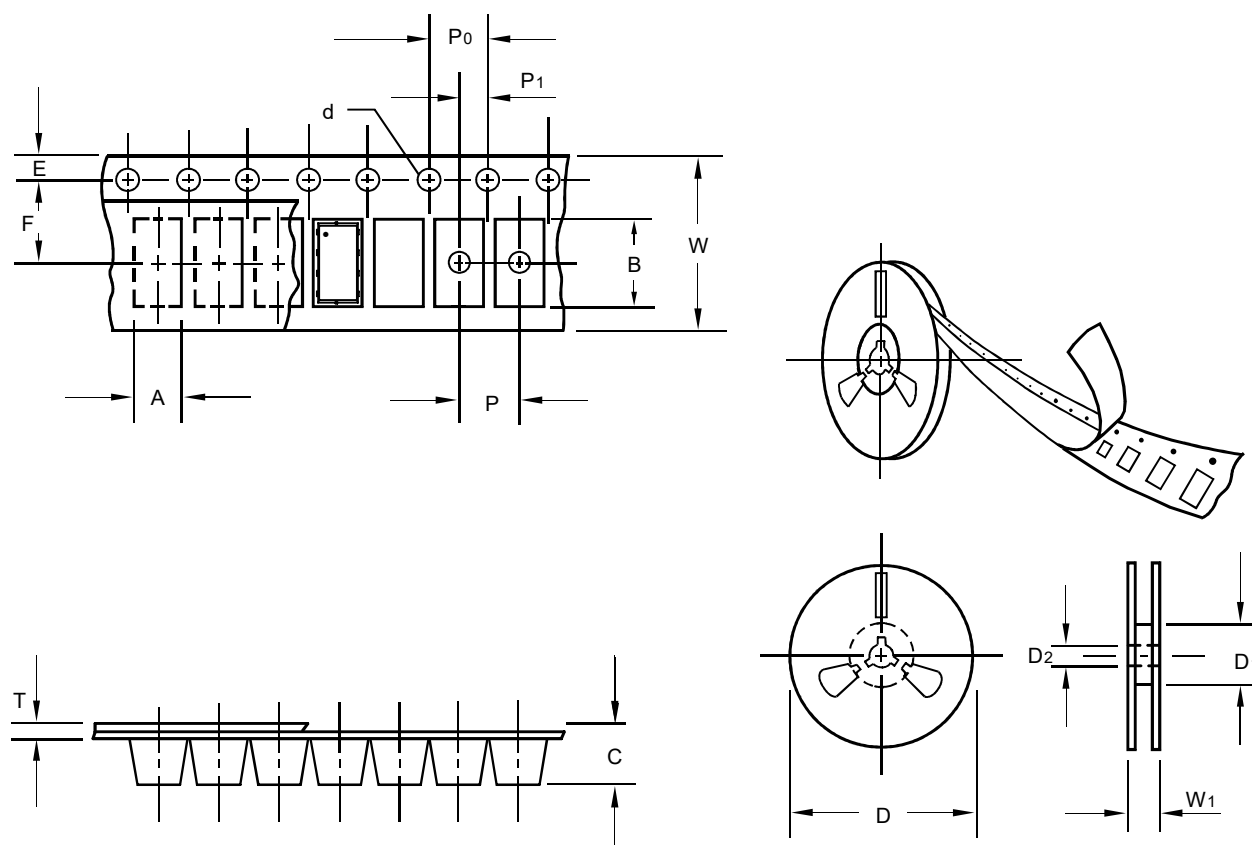
Suggested solder pad layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.05mm.
3.The pad layout is for reference purposes only.

FMOSGTAC92N04-H

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	D ₁	min	-
Feed hole diameter	D ₂	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	P ₀	0.1	4.00
Embossment center	P ₁	0.1	2.00
Overall tape thickness	T	0.1	0.30
Tape width	W	0.3	12.00
Reel width	W ₁	3.0	17.60

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

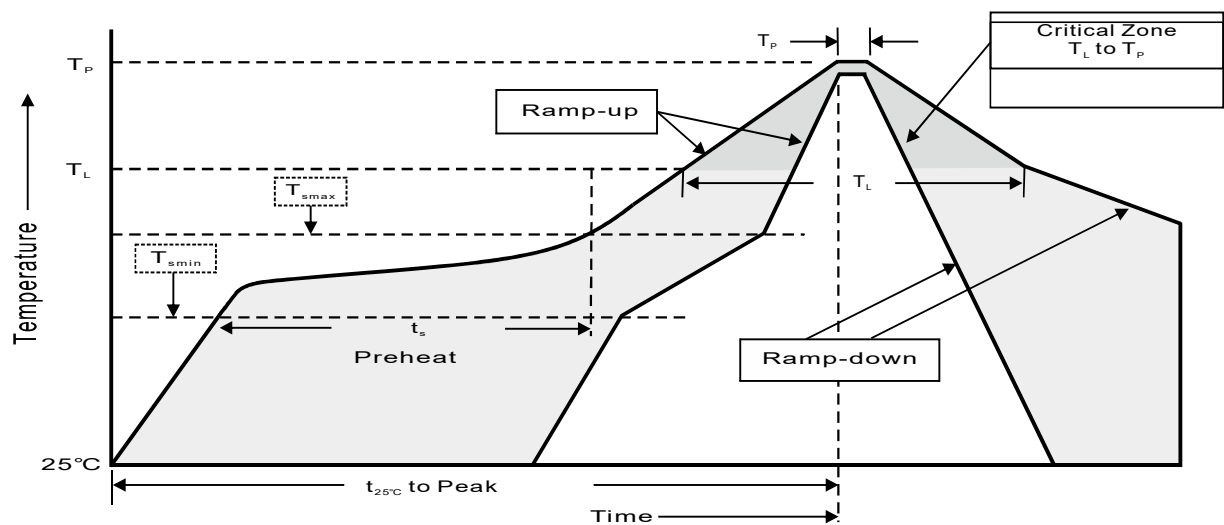
FMOSGTAC92N04-H

Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)
T5060P8	13"	5,000	4.0	10,000	335*335*38	330	350*350*360	80,000

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