

FMOSTHU95P04-Q1-H

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FMOSTHU95P04-Q1-H**-95A -40V P-Channel Trench Enhancement
Mode Power MOSFET****Features**

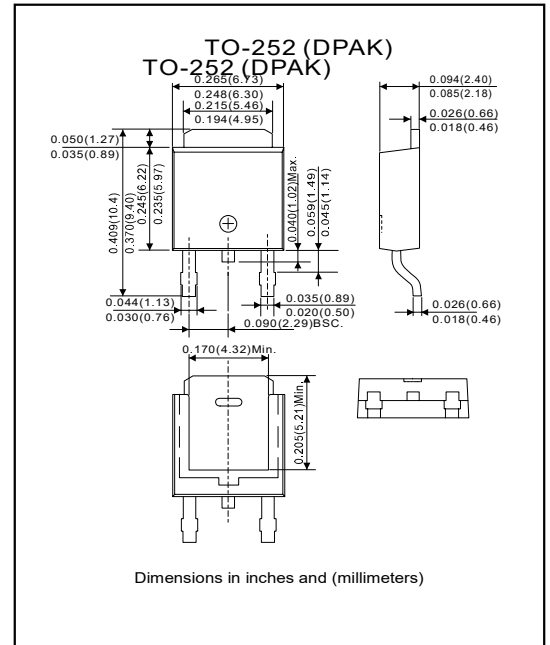
- $-V_{DS} = 40V$, $-I_D = 95A$.
- $R_{DS(ON)} \leq 8.8m\Omega$, @ $-V_{GS} = 10V$, $-I_D = 20A$.
- $R_{DS(ON)} \leq 14m\Omega$, @ $-V_{GS} = 4.5V$, $-I_D = 20A$.
- Very low on-resistance.
- Excellent gate charge on-resistance product (FOM.).
- 100% UIS tested and ΔV_{as} tested.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

Applications

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

Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case: Molded plastic, TO-252(DPAK).
- Mounting Position: Any.

Package outline**Maximum ratings** (At $T_c = 25^\circ C$ unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Drain to source voltage	$-V_{DS}$	40	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current	$-I_D$	95	A
Continuous drain current ($T_c = 100^\circ C$)		67	
Pulsed drain current	$-I_{DM}$	360	A
Single pulsed, avalanche energy (Note 1)	E_{AS}	500	mJ
Derating factor	-	1	W/ $^\circ C$
Power dissipation	P_D	150	W
Thermal resistance, junction-case	$R_{\theta JC}$	1	$^\circ C/W$
Junction temperature	T_J	+175	$^\circ C$
Storage temperature range	T_{STG}	-55 to +175	$^\circ C$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	$-BV_{DSS}$	$-I_D=250\mu A, V_{GS}=0V$	40			V
Drain-source leakage current	I_{DSS}	$-V_{DS}=40V, V_{GS}=0V$			1	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
On characteristics (note3)						
Gate threshold voltage	$-V_{GS(TH)}$	$V_{DS}=V_{GS}, -I_D=250\mu A$	0.8	1.4	2.2	V
Static drain-source on-state resistance	$R_{DS(ON)}$	$-V_{GS}=10V, -I_D=20A$		7.2	8.8	m Ω
		$-V_{GS}=4.5V, -I_D=20A$		11	14	
Forward transconductance	g_{FS}	$-V_{DS}=5V, -I_D=20A$		30		S
Dynamic parameters						
Input capacitance	C_{iss}	$V_{GS}=0V, -V_{DS}=20V, f=1.0MHz$		3700		pF
Out capacitance	C_{oss}			880		
Reverse transfer capacitance	C_{rss}			20		
Switching parameters (Note2)						
Total gate charge	Q_g	$-V_{GS}=10V, -V_{DS}=20V, -I_D=20A$		57		nC
Gate to source charge	Q_{gs}			9.8		
Gate to drain charge	Q_{gd}			7.3		
Turn-on delay time	$t_{d(ON)}$	$-V_{GS}=10V, -V_{DD}=20V, -I_D=20A, R_G=1.6\Omega$		10.5		ns
Rise time	t_r			4		
Turn-off delay time	$t_{d(off)}$			35		
Fall time	t_f			5		
Source-drain diode ratings and characteristics						
Drain-source diode forward voltage	$-V_{SD}$	$-I_S=20A, V_{GS}=0V$			1.2	V
Continuous source current	$-I_S$				95	A
Reverse recovery time (Note6)	t_{rr}	$-I_F=20A, dI/dt=100A/\mu s, T_J=25^{\circ}C$			24	ns
Reverse recovery charge	Q_{rr}				68	nC

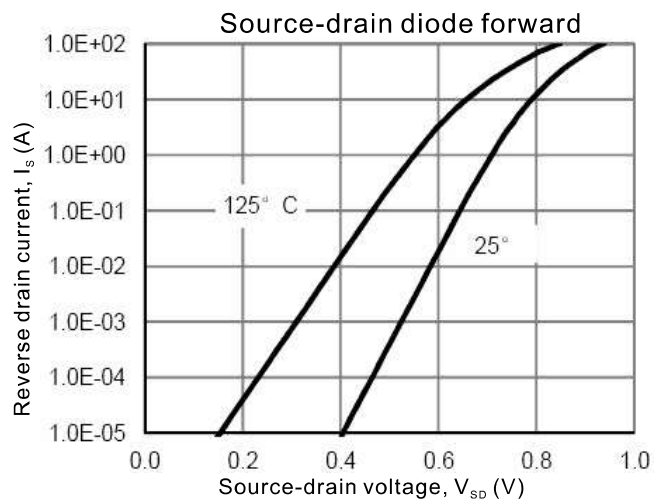
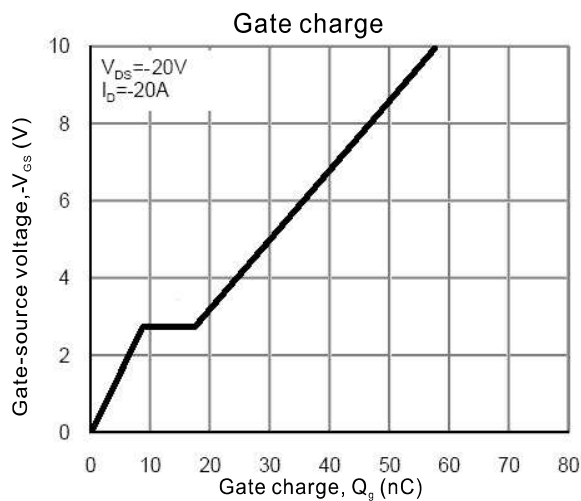
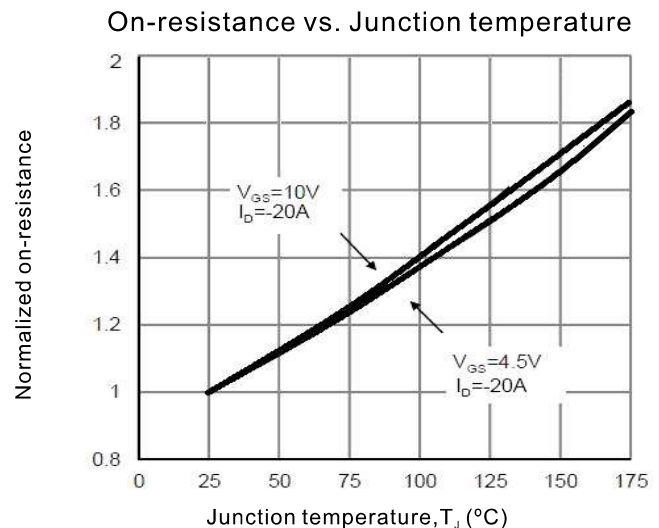
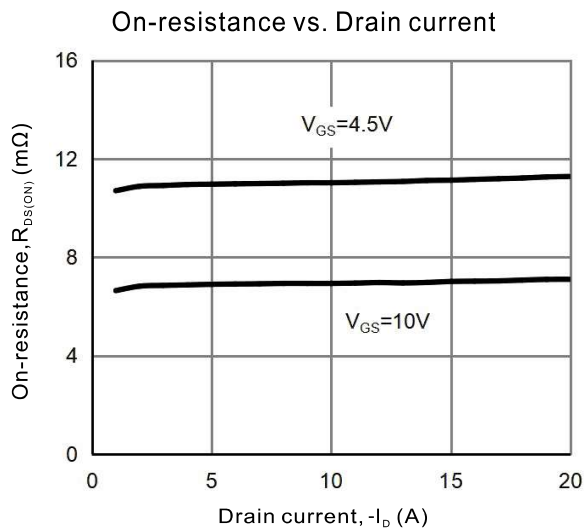
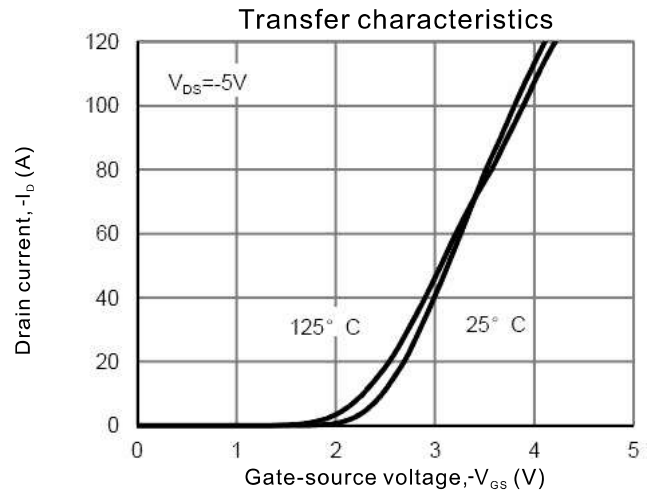
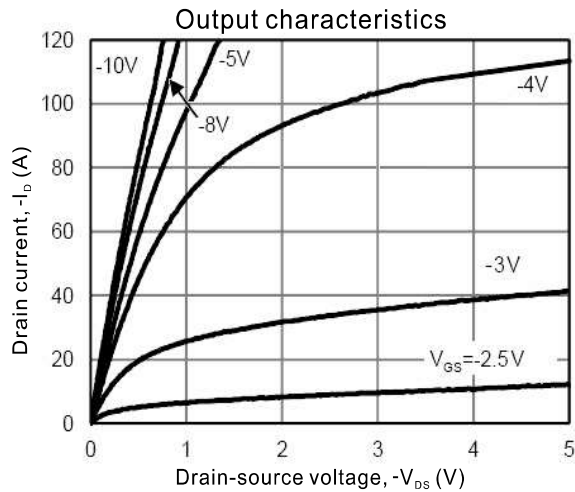
Note : 1. E_{AS} condition: $T_J=25^\circ\text{C}$, $-V_{DS}=20\text{V}$, $-V_G=10\text{V}$, $L=0.5\text{mH}$, $R_G=25\Omega$.

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

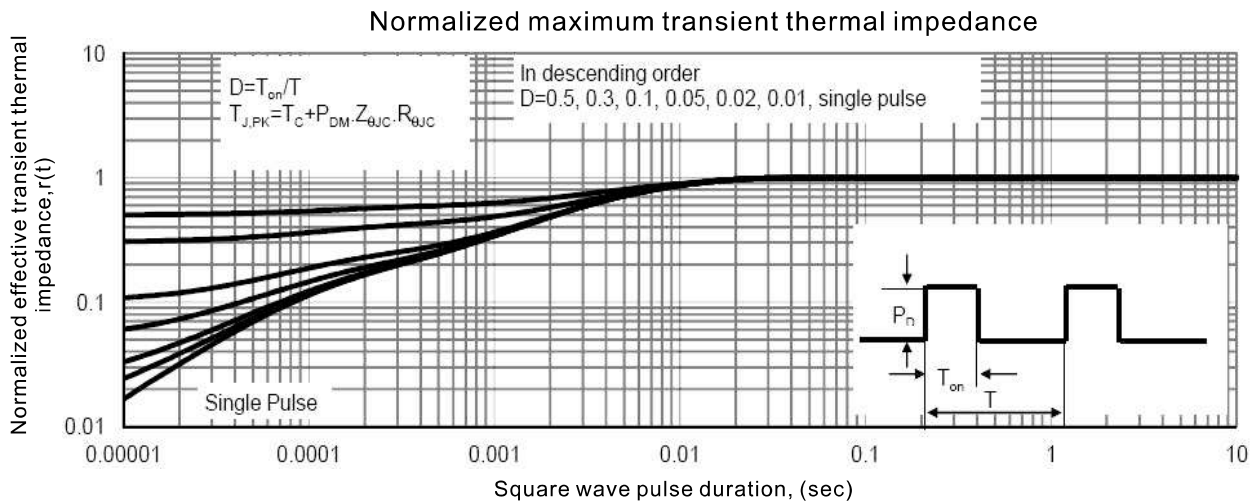
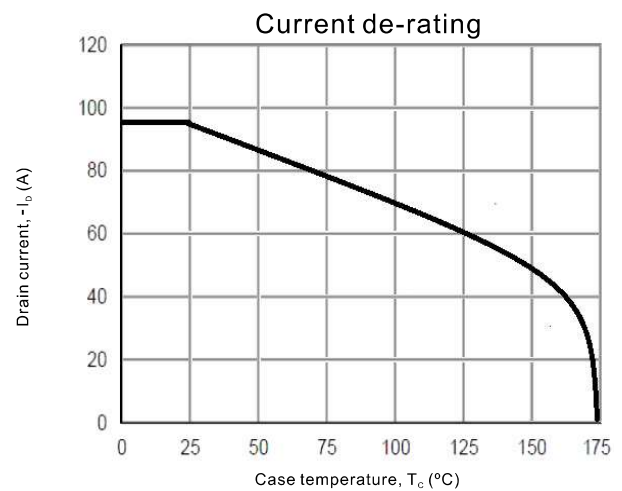
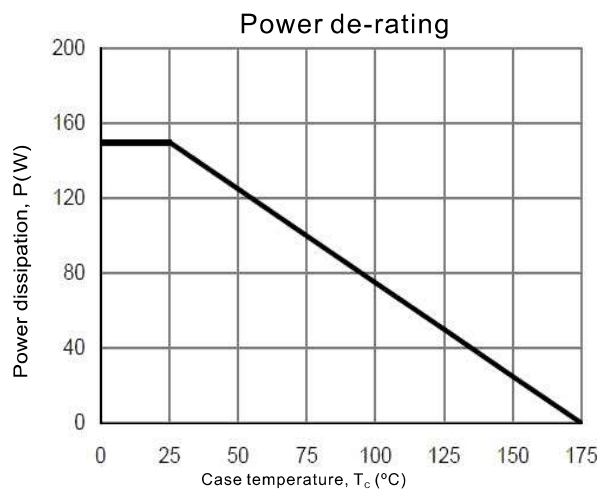
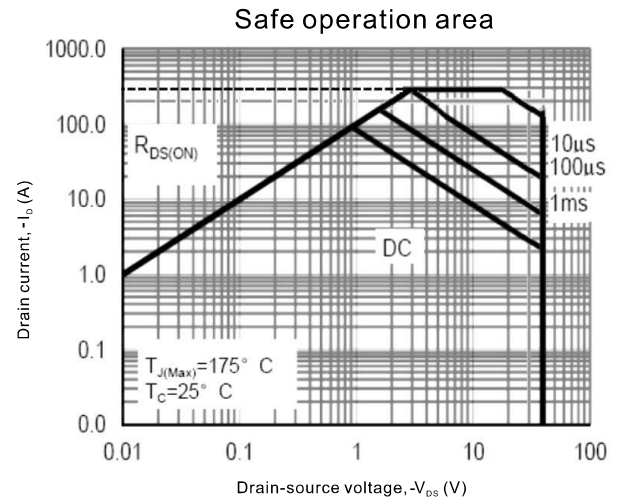
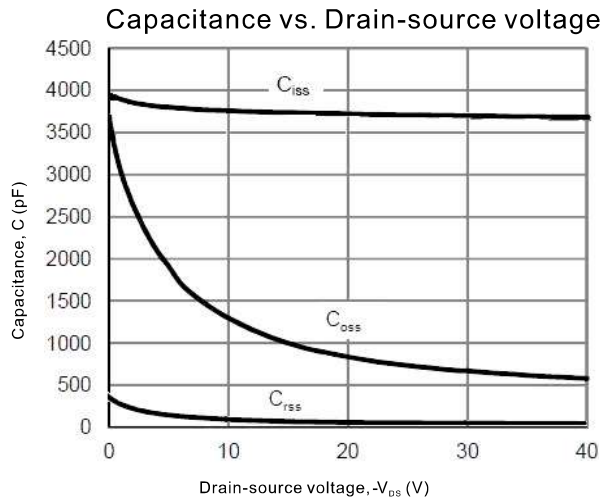
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Rating and characteristics curves



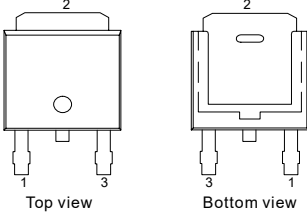
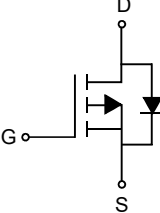
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Rating and characteristics curves



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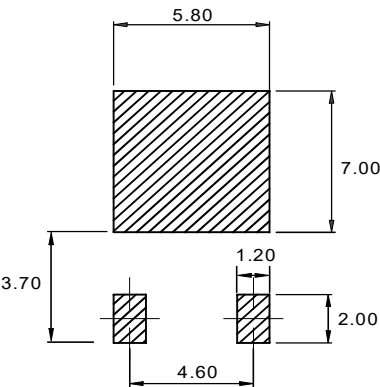
Pinning information

Pin	Simplified outline	Symbol
Pin1 Gate Pin2 Drain Pin3 Source		

Marking

Type number	Marking code
FMOSTHU95P04-Q1-H	AP40P80K XXXXXXX

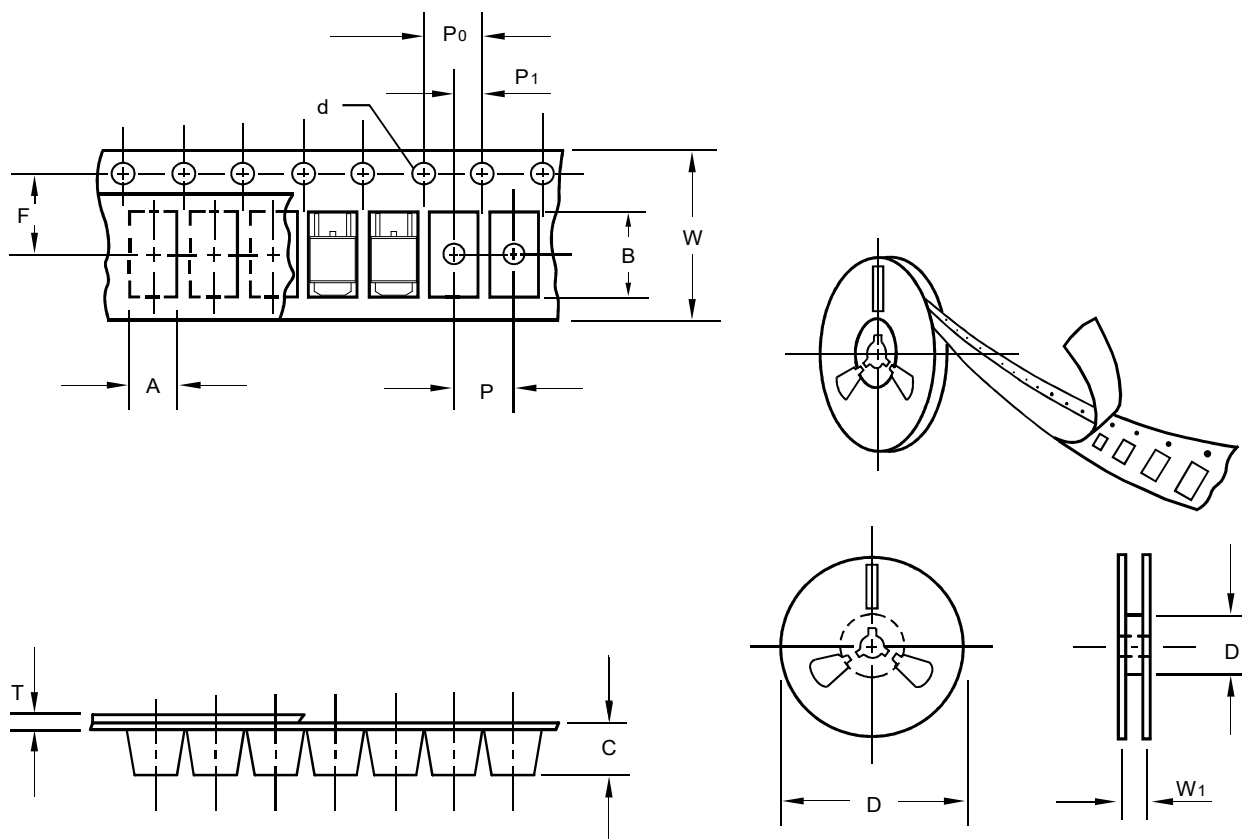
Suggested solder pad layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.1mm.
3.The pad layout is for reference purposes only.

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Packing information



unit:mm

Item	Symbol	Tolerance	TO-252
Carrier width	A	0.3	6.90
Carrier length	B	0.3	10.50
Carrier depth	C	0.3	2.50
Sprocket hole	d	0.1	1.55
13" Reel outside diameter	D	2.0	330.0
13" Reel inner diameter	D1	min	99.0
7" Reel outside diameter	D	2.0	-
7" Reel inner diameter	D1	min	-
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	7.5
Punch hole pitch	P	0.1	8.0
Sprocket hole pitch	P0	0.1	4.0
Embossment center	P1	0.1	2.0
Overall tape thickness	T	0.3	0.3
Tape width	W	0.5	16.0
Reel width	W1	0.5	17.0

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

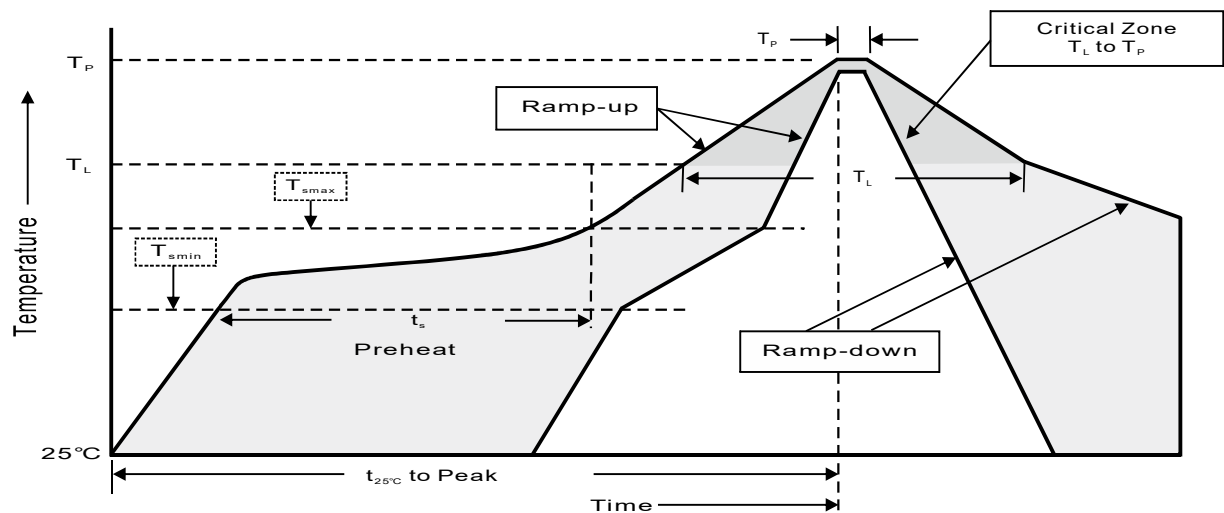
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Reel packing

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)
TO-252 (DPAK)	13"	2,500	4.0	5,000	335*335*38	178	350*350*225	25,000

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_{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

FMOSTHU95P04-Q1-H**High reliability test capabilities**

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. High Temperature Reverse Bias	$V_{DS}=V_{DS}^*80\%$ ($T_J=T_J \text{ max.}$) Test Duration:1000hrs	JESD22-A108
3. High Temperature Storage Life	$T_a=150^\circ\text{C}$ Test Duration:1000hrs	JESD22 A-103
4. Temperature Cycle	-55°C (15min) to 150°C (15min) Test Cycles:1000cycles	JESD22 A-104
5. Autoclave	$P=2\text{atm}$ $T_a=121^\circ\text{C}$ RH=100% Test Duration:96hrs	JESD22 A-102
6. Solderability	$245\pm5^\circ\text{C}$ for 5sec	J-STD-002
7. Moisture Resistance	$T_a=85^\circ\text{C}$ / 85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
8. Resistance To Solder Heat	$260\pm5^\circ\text{C}$ for 10sec	JESD22 B-106
9. High Temperature High Humidity Reverse Bias	$T_a=85^\circ\text{C}$, 85%RH, $V_{DS}=80\%$ rated V_{DS} Test Duration: 1000hrs	JESD22-A101