

FMOSAB40N04

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FMOSAB40N04**40A, 40V, N-Channel MOSFET****Features**

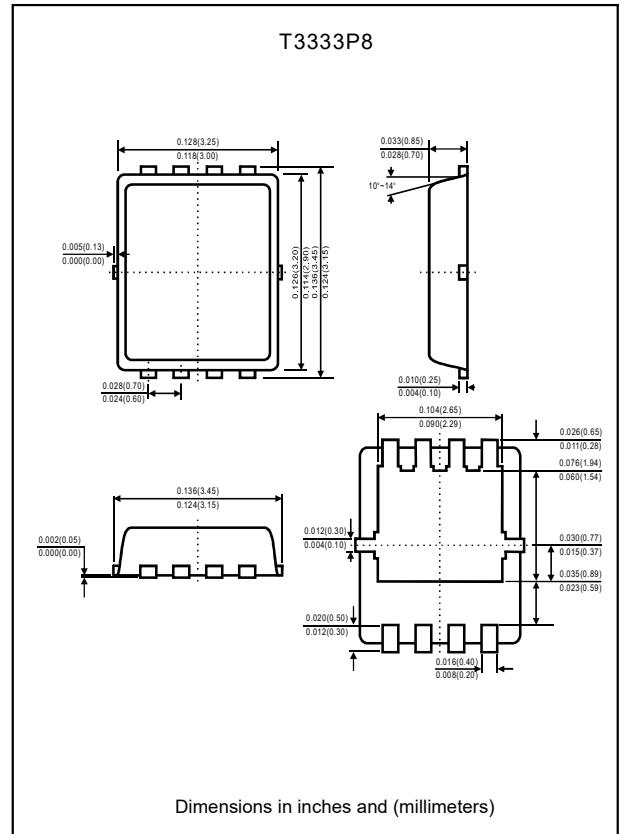
- $V_{DS}=40V$, $I_D=40A$
- $R_{DS(ON)} = 5.7m\Omega(Typ.) @ V_{GS}=10V$.
- $R_{DS(ON)} = 10m\Omega(Typ.) @ V_{GS}=4.5V$.
- High density cell design for ultra low $R_{DS(ON)}$.
- Fully characterized avalanche voltage and current.
- Good stability and uniformity with high E_{AS} .
- Excellent package for good heat dissipation.
- Green device available.
- Excellent package for good heat dissipation.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.FMOSAB40N04-H.

Application

- Load Switch.
- Hard switched and high frequency circuits.
- Uninterruptible power supply.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, T3333P8
- Mounting Position : Any
- Weight : Approximated 0.02 gram

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 - Continuous ($T_c=25^\circ C$) - Continuous ($T_c=100^\circ C$)	I_D	40	A
		27	
Pulsed drain current (Note 1)	I_{DM}	160	A
Single pulse avalanche energy	E_{AS}	196	mJ
Power dissipation	P_D	27	W
Operating Junction temperature range	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 to +150	$^\circ C$
Thermal resistance Junction to case	$R\theta_{JC}$	4.5	$^\circ C/W$

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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} =40V, V _{GS} =0V			1.0	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	1.0	1.5	2.5	V
Forward trans conductance	g _{FS}	V _{DS} =5V, I _D =15A	10	27		S
Static drain-source on-resistance (Note 3)	R _{DS(ON)}	V _{GS} =10V, I _D =30A		5.7	7.5	mΩ
		V _{GS} =4.5V, I _D =20A		10	14	
Dynamic parameters						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =20V, f=1.0MHZ		2229		pF
Out capacitance	C _{oss}			187		
Reverse transfer capacitance	C _{rss}			167		
Switching parameters						
Total gate charge	Q _g	V _{GS} =10V, V _{DS} =20V, I _D =30A		48		nC
Gate to source charge	Q _{gs}			6		
Gate to drain charge	Q _{gd}			13		
Turn-on delay time	t _{d(on)}	V _{DS} =20V, V _{GS} =10V, R _G =3Ω, I _D =30A R _L =1Ω		13		ns
Rise time	t _r			37		
Turn-off delay time	t _{d(off)}			46		
Fall time	t _f			15		
Source-drain diode ratings and characteristics						
Maximum body-diode continuous current	I _S	V _G =V _D =0V			40	A
Maximum Source current pulsed	I _{SM}				160	
Drain-source diode forward voltage	V _{SD}	I _S =30A, V _{GS} =0V			1.2	V
Body diode reverse recovery time	t _{rr}	I _F =20A, dI/dt = 100A/μs, T _J =25°C		15		ns
Body diode reverse recovery charge	Q _{rr}			6		nC

Notes :

1.Repetitive rating : Pulsed width limited by maximum junction temperature.

2. E_{AS} condition : $T_j=25^{\circ}\text{C}$, $V_G=10\text{V}$, $R_G=25\Omega$, $L=0.5\text{mH}$.3.Pulse test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 0.5\%$.

Rating and characteristic curves (FMOSAB40N04)

Figure1: Output Characteristics

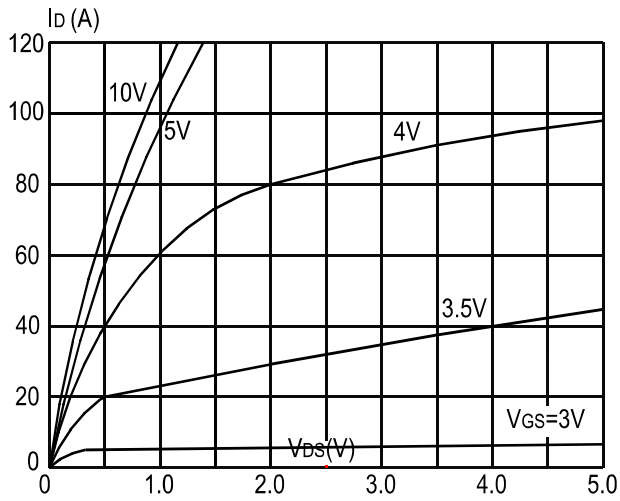


Figure 2: Typical Transfer Characteristics

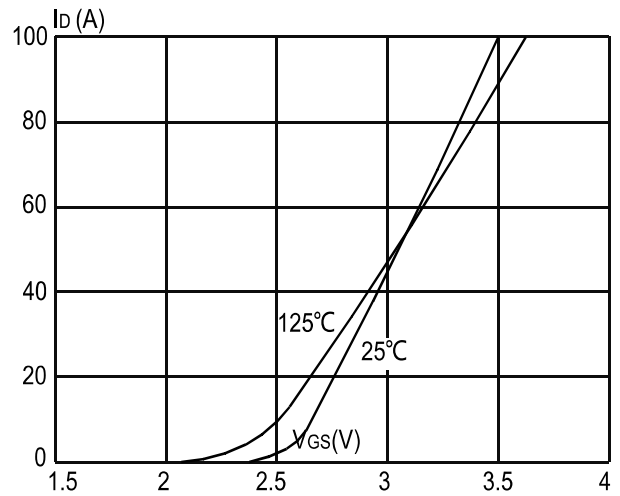


Figure 3: On-resistance vs. Drain Current

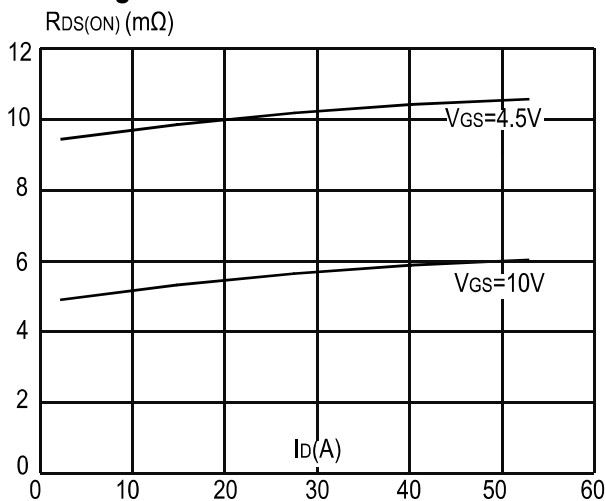


Figure 4: Body Diode Characteristics

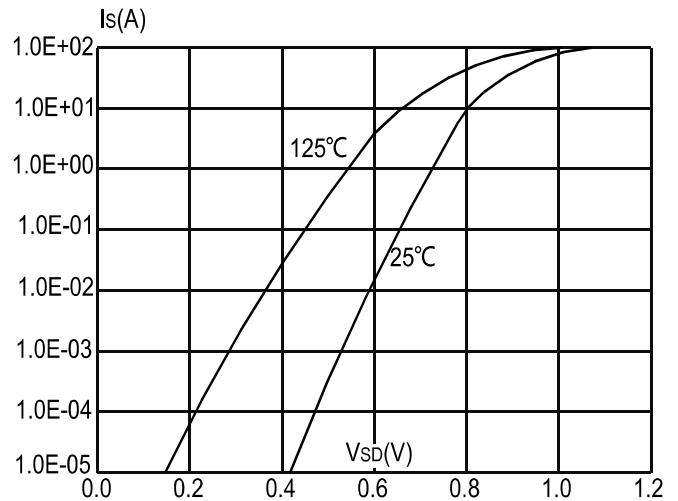


Figure 5: Gate Charge Characteristics

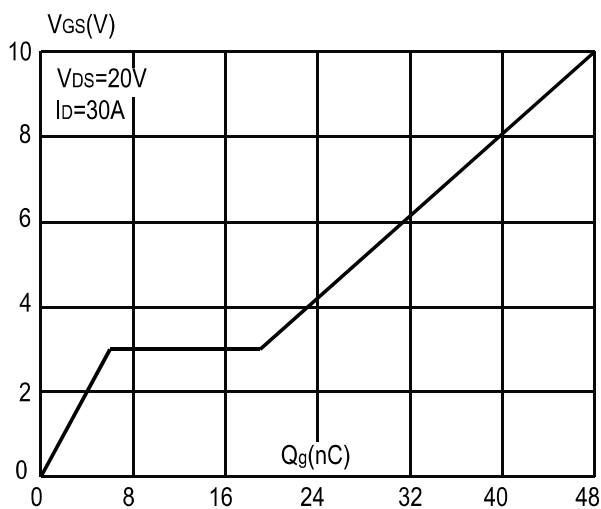
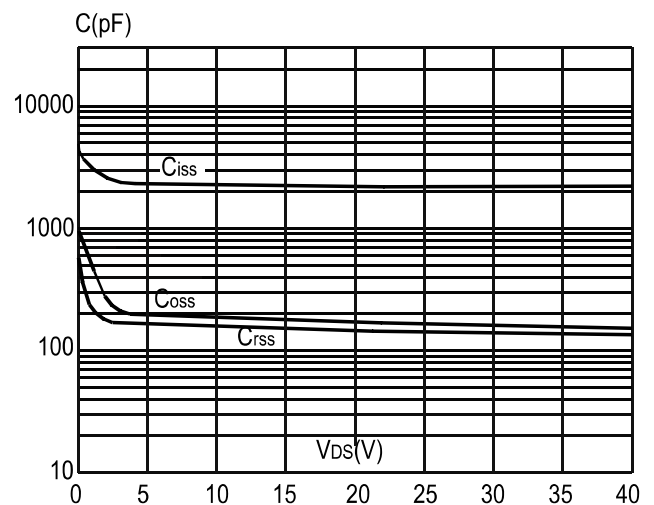


Figure 6: Capacitance Characteristics



Rating and characteristic curves (FMOSAB40N04)

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

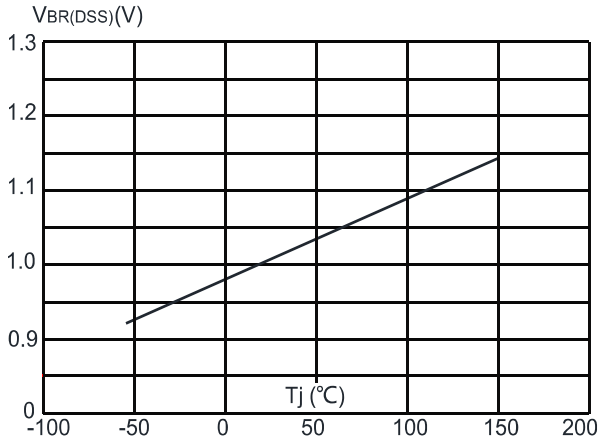


Figure 9: Maximum Safe Operating Area

Figure 8: Normalized on Resistance vs. Junction Temperature

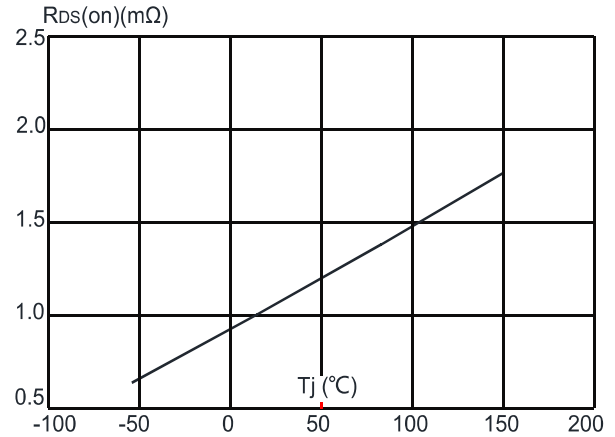


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

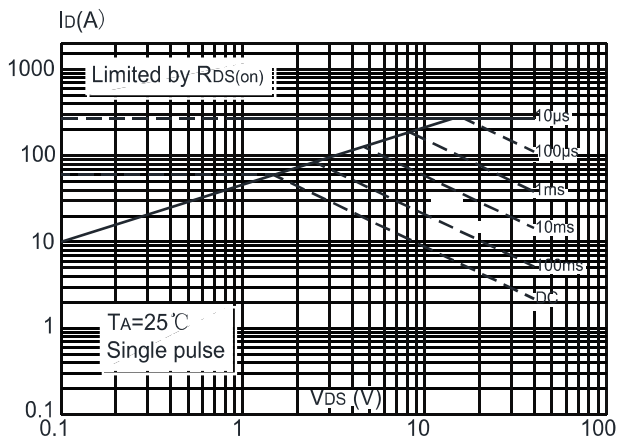
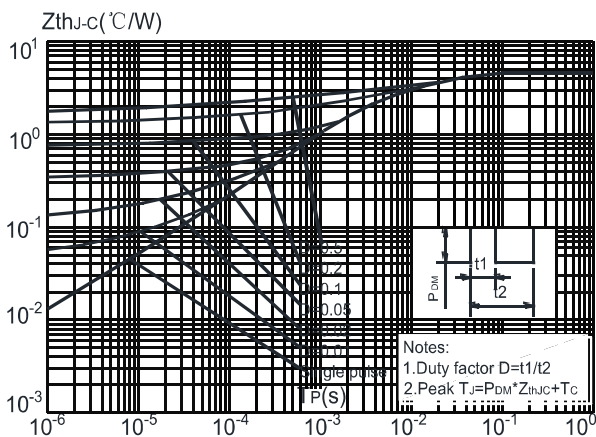
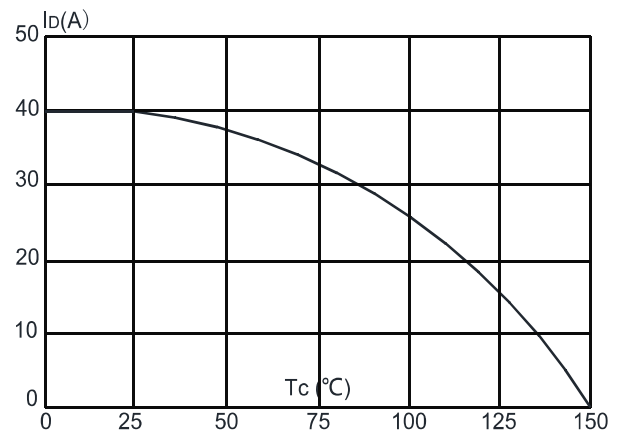
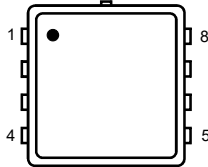
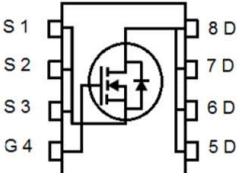


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

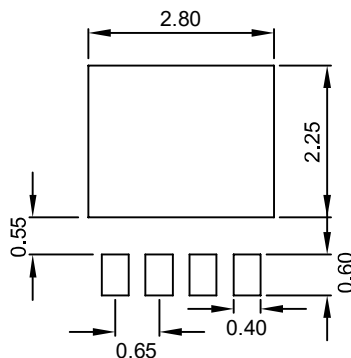


FMOSAB40N04**Pinning information**

Pin	Simplified outline	Symbol
Pin1 Source Pin2 Source Pin3 Source Pin4 Gate Pin5 Drain Pin6 Drain Pin7 Drain Pin8 Drain		

Marking

Type number	Marking code
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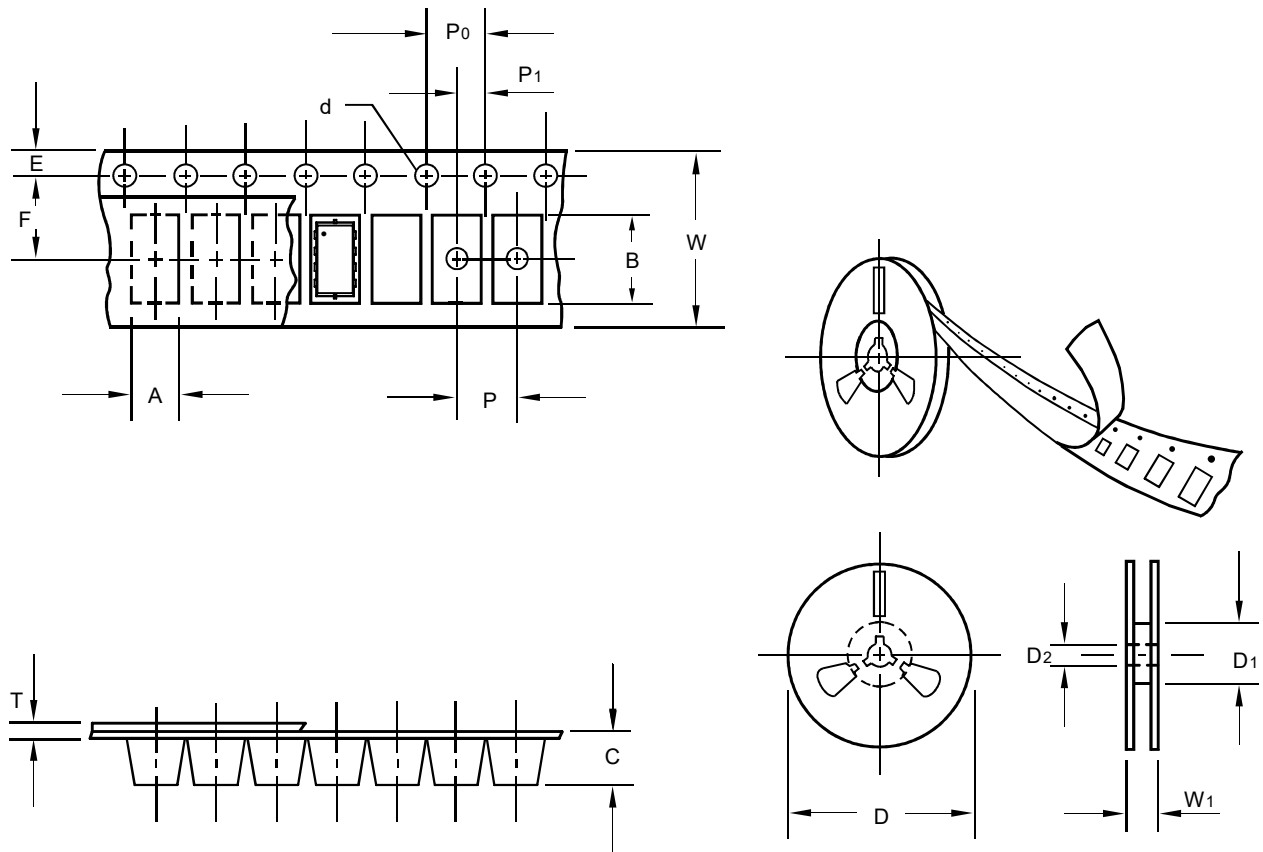
Suggested solder pad layout

Note:

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

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Packing information



unit:mm

Item	Symbol	Tolerance	T3333P8
Carrier width	A	0.1	3.55
Carrier length	B	0.1	3.55
Carrier depth	C	0.1	1.10
Sprocket hole	d	0.1	1.50
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	0.23
Tape width	W	0.3	12.00
Reel width	W1	1.0	17.60

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

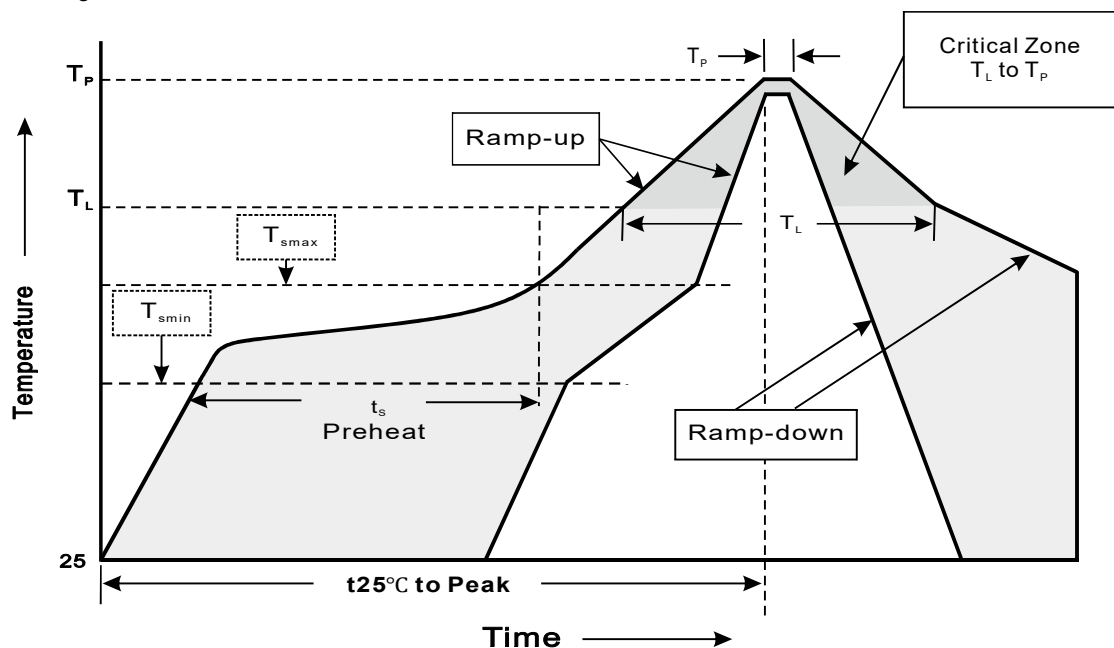
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Reel packing

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)
T3333P8	13"	5,000	8.0	10,000	355*335*38	330	350*330*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_{min}) -Temperature Max (T_{max}) -Time (min to max) (t_s)	150°C 200°C 60 ~ 120sec
T_{max} 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 within 5°C of actual peak Temperature(T_p)	10 ~ 30sec
Ramp-down rate	< 6°C/sec
Time 25°C to peak temperature	< 6 minutes

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High reliability test capabilities

Item Test	Conditions	Reference
1. Solder Resistance	at $260\pm 5^{\circ}\text{C}$ for 10 sec.	MIL-STD-750D METHOD-2031
2. Solderability	at $245\pm 5^{\circ}\text{C}$ for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_{DS}=0.8 \times BV_{DSS}$, at $T_J=150^{\circ}\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1038
4. Pressure Cooker	$15P_{SIG}$ at $T_A=121^{\circ}\text{C}$ 100%RH for 4 hrs.	JESD22-A102
5. Temperature Cycling	-55°C to $+125^{\circ}\text{C}$ dwelled for 30 min total 10 cycles.	MIL-STD-750D METHOD-1051
6. Humidity	at $T_A=85^{\circ}\text{C}$, 85%RH for 1000 hrs.	MIL-STD-750D METHOD-1021
7. High Temperature Storage Life	at $T_A=175^{\circ}\text{C}$ for 1000 hrs.	MIL-STD-750D METHOD-1031