

FMOSTHAV3020NP03-H

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FMOSTHAV3020NP03-H

30V N-Channel And P-Channel Trench Enhancement Mode Power MOSFET

Features

N-Channel :

- $V_{DS} = 30V$, $I_D = 30A$.
- $R_{DS(ON)} \leq 13m\Omega$, @ $V_{GS} = 10V$, $I_D = 8A$.
- $R_{DS(ON)} \leq 22m\Omega$, @ $V_{GS} = 4.5V$, $I_D = 6A$.

P-Channel :

- $-V_{DS} = 30V$, $-I_D = 20A$.
- $R_{DS(ON)} \leq 34m\Omega$, @ $-V_{GS} = 10V$, $-I_D = 8A$.
- $R_{DS(ON)} \leq 52m\Omega$, @ $-V_{GS} = 4.5V$, $-I_D = 6A$.
- 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.
- Special process technology for high ESD capability.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC 61249-2-21).

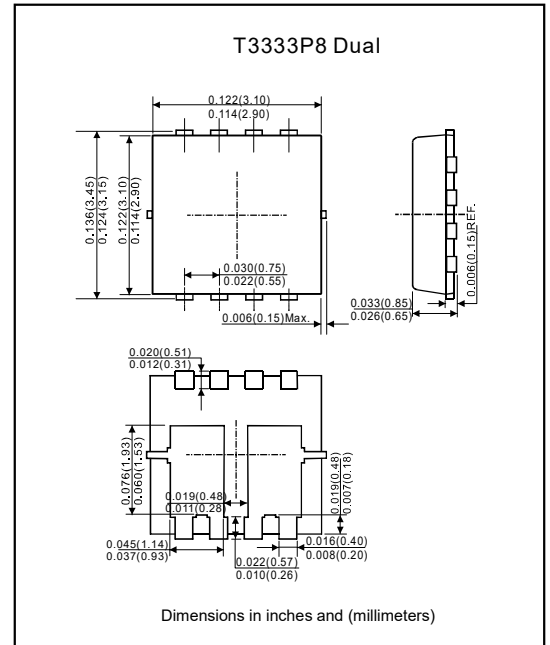
Applications

- Battery switch.
- Load switch.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, T3333P8 Dual (DFN3333-8 Dual).
- Weight : Approximated 25mg.

Package outline

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

Parameter	Symbol	Ratings		Unit
		N-Channel	P-Channel	
Drain-Source voltage	V_{DS}	30	-30	V
Gate-Source voltage	V_{GS}	± 20	± 20	V
Continuous drain current (Note1)	I_D	30	-20	A
Pulsed drain current (Note2)	I_{DM}	100	-80	A
Avalanche energy, single pulse	E_{AS}	80(Note3)	45(Note4)	mJ
Power dissipation (Note1)	P_D	30	25	W
Thermal resistance, Junction to ambient (Note7)	$R_{\theta JA}$	83.3		$^\circ C/W$
Thermal resistance, Junction to case (Note1)	$R_{\theta JC}$	4.17	5.0	
Operating junction temperature range	T_J	-55 to +150		$^\circ C$
Storage temperature range	T_{STG}	-55 to +150		$^\circ C$

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Electrical characteristics (N-Channel) (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	30			V
Drain-Source leakage current	I _{DSS}	V _{DS} =24V, V _{GS} =0V	T _J =25°C		1	μA
			T _J =125°C		100	
Gate-Source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
On characteristics (Note5)						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.8	2.5	V
Static drain-source on-resistance	R _{DS(ON)}	V _{GS} =10V, I _D =8A			13	mΩ
		V _{GS} =4.5V, I _D =6A			22	
Dynamic characteristics (Note 5,6)						
Input capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, f=1.0MHz		1000		pF
Output capacitance	C _{oss}			143		
Reverse transfer capacitance	C _{rss}			130		
Gate resistance	R _g	f=1.0MHz		6		Ω
Switching characteristics (Note 5,6)						
Total gate charge	Q _g	V _{GS} =10V, V _{DS} =15V, I _D =8A		22		nC
Gate-Source charge	Q _{gs}			2.8		
Gate-Drain Charge	Q _{gd}			5.2		
Turn-on delay time	t _{d(on)}	V _{GS} =10V, V _{DD} =15V, R _G =10Ω, R _L =5Ω		25		ns
Turn-on rise time	t _r			40		
Turn-off delay time	t _{d(off)}			140		
Turn-off fall time	t _f			80		
Drain-Source diode characteristics and maximum ratings						
Drain-Source diode forward voltage (Note5)	V _{SD}	I _S =8A, V _{GS} =0V			1.2	V
Body diode reverse recovery time (Note1)	I _S				30	A
Body diode reverse recovery charge (Note2)	I _{SM}				100	A

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-Source breakdown voltage	$-BV_{DSS}$	$-I_D=250\mu A$, $V_{GS}=0V$	30			V
Drain-Source leakage current	$-I_{DSS}$	$-V_{DS}=24V$, $V_{GS}=0V$	$T_J=25^{\circ}C$		1	μA
			$T_J=125^{\circ}C$		100	
Gate-Source leakage current	I_{GSS}	$V_{GS}=\pm 20V$, $V_{DS}=0V$			± 100	nA
On characteristics (Note5)						
Gate threshold voltage	$-V_{GS(th)}$	$V_{DS}=V_{GS}$, $-I_D=250\mu A$	1.0	1.5	2.5	V
Static drain-source on-resistance	$R_{DS(ON)}$	$-V_{GS}=10V$, $-I_D=8A$		26	34	m Ω
		$-V_{GS}=4.5V$, $-I_D=6A$		40	52	
Dynamic characteristics (Note 5,6)						
Input capacitance	C_{iss}	$-V_{DS}=15V$, $V_{GS}=0V$, $f=1.0MHz$		943		pF
Output capacitance	C_{oss}			107		
Reverse transfer capacitance	C_{rss}			90		
Gate resistance	R_g	$f=1.0MHz$		22		Ω
Switching characteristics (Note 5,6)						
Total gate charge	Q_g	$-V_{GS}=10V$, $-V_{DS}=15V$, $-I_D=8A$		28		nC
Gate-Source charge	Q_{gs}			3.2		
Gate-Drain Charge	Q_{gd}			8.5		
Turn-on delay time	$t_{d(on)}$	$V_{GS}=10V$, $V_{DD}=15V$, $R_G=10\Omega$, $R_L=5\Omega$		32		ns
Turn-on rise time	t_r			55		
Turn-off delay time	$t_{d(off)}$			150		
Turn-off fall time	t_f			60		
Drain-Source diode characteristics and maximum ratings						
Drain-Source diode forward voltage (Note5)	$-V_{SD}$	$-I_S=5A$, $V_{GS}=0V$			1.2	V
Body diode reverse recovery time (Note1)	$-I_S$				20	A
Body diode reverse recovery charge (Note2)	$-I_{SM}$				80	A

Note : 1. $T_C=25^\circ\text{C}$ limited only by maximum temperature allowed.

2. $P_w \leq 10\mu\text{s}$, duty cycle $\leq 1\%$.

3. E_{AS} condition: $V_{DD}=15\text{V}$, $V_{GS}=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$, starting $T_J=25^\circ\text{C}$.

4. E_{AS} condition: $-V_{DS}=15\text{V}$, $-V_{GS}=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$, starting $T_J=25^\circ\text{C}$.

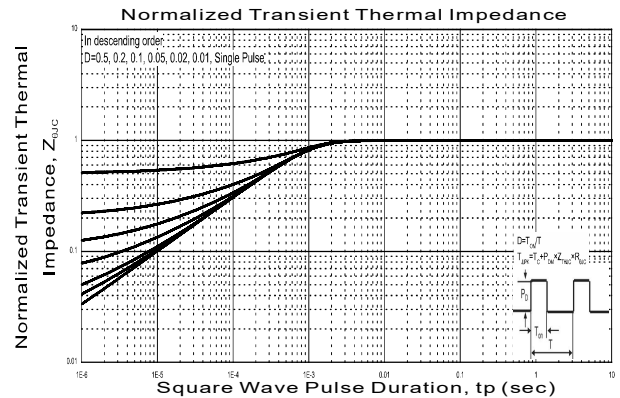
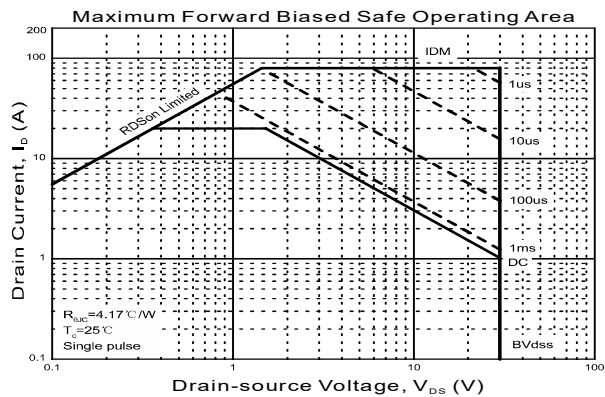
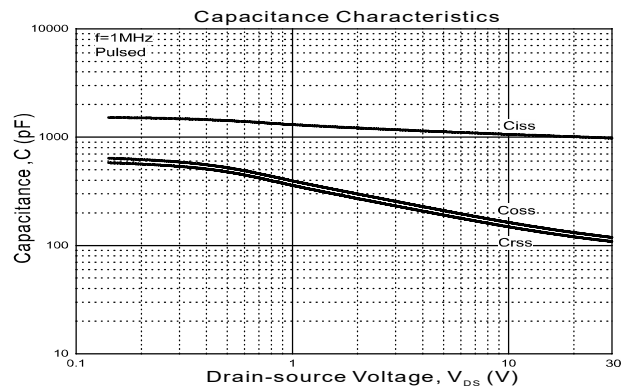
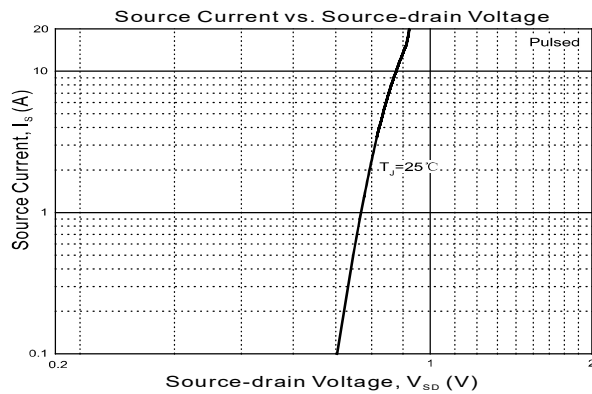
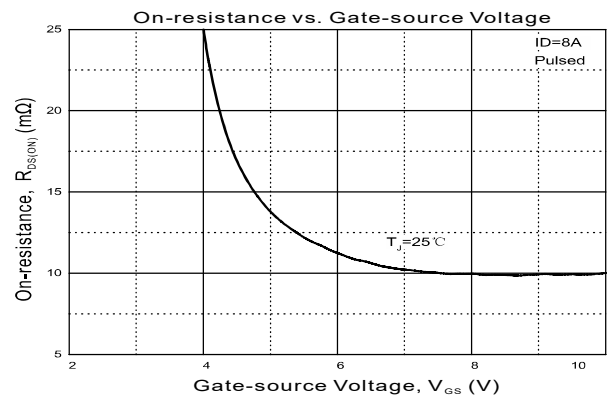
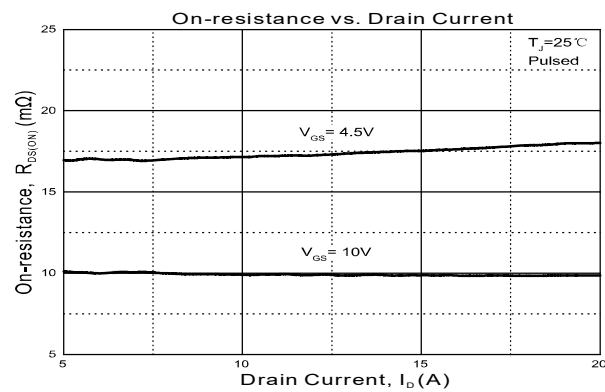
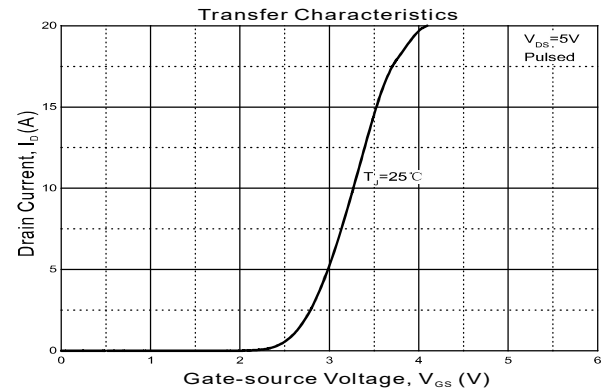
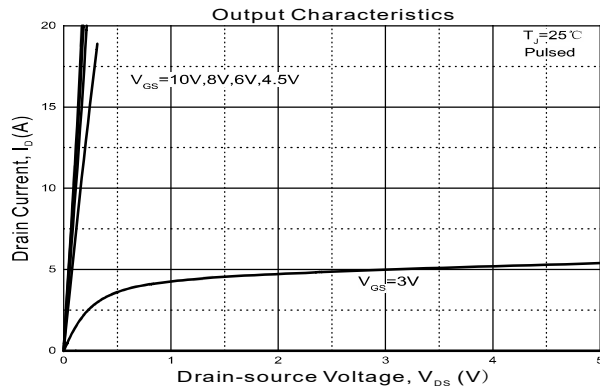
5. Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

6. Guaranteed by design, not subject to production.

7. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. $t \leq 10\text{sec}$.

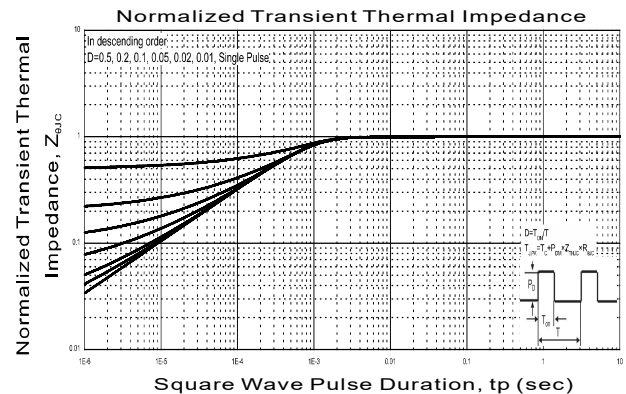
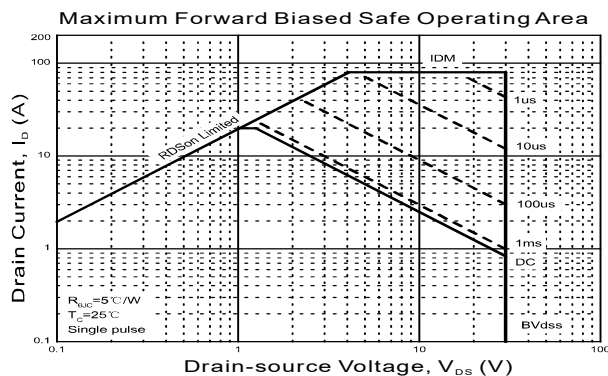
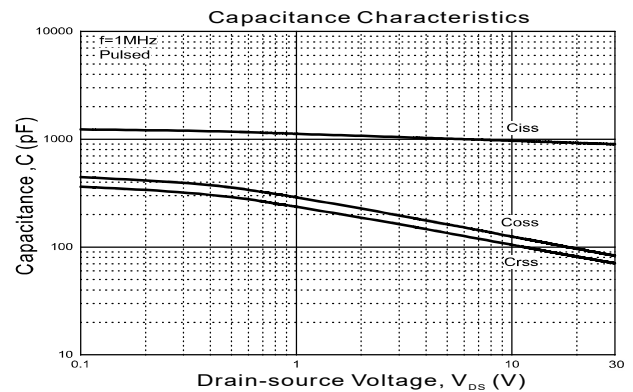
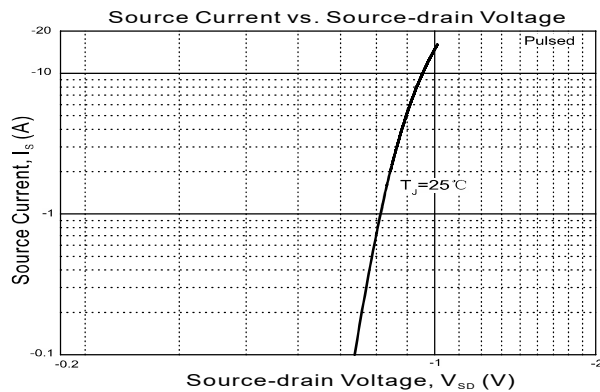
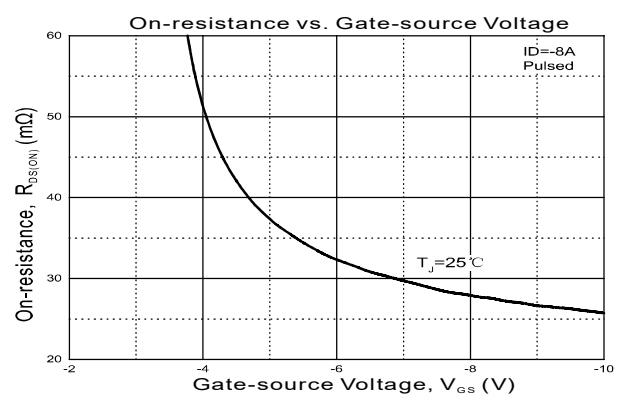
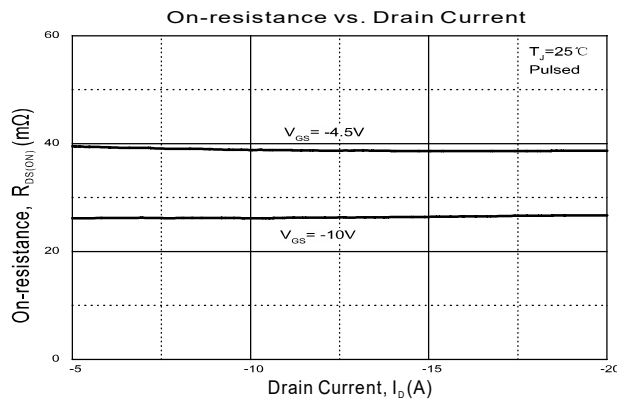
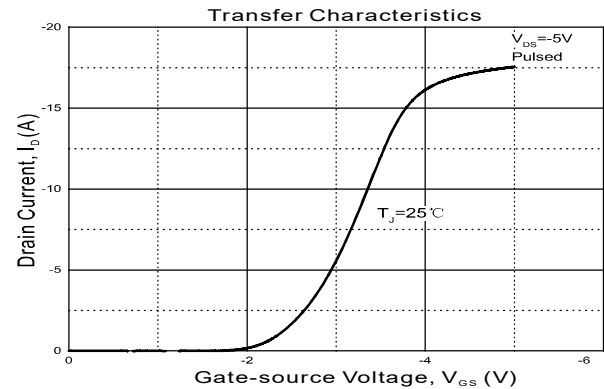
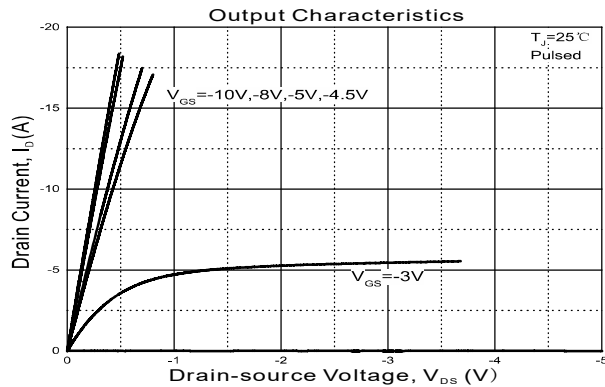
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Rating and characteristic curves (N-Channel)



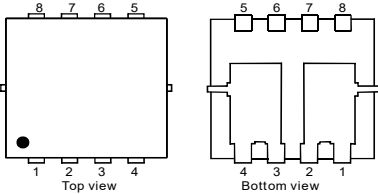
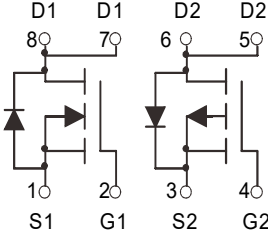
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Rating and characteristic curves (P-Channel)



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Pinning information

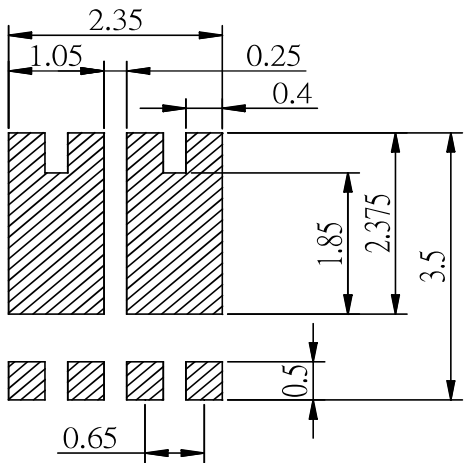
Pin	Simplified outline	Symbol
Pin 1 Source1 Pin 2 Gate1 Pin 3 Source2 Pin 4 Gate2 Pin 5,6 Drain2 Pin 7,8 Drain1		

Marking

Type number	Marking code
FMOSTHAV3020NP03-H	CJAB 2003 XX

CJAB 2003 : Part No.
XX : Date code.

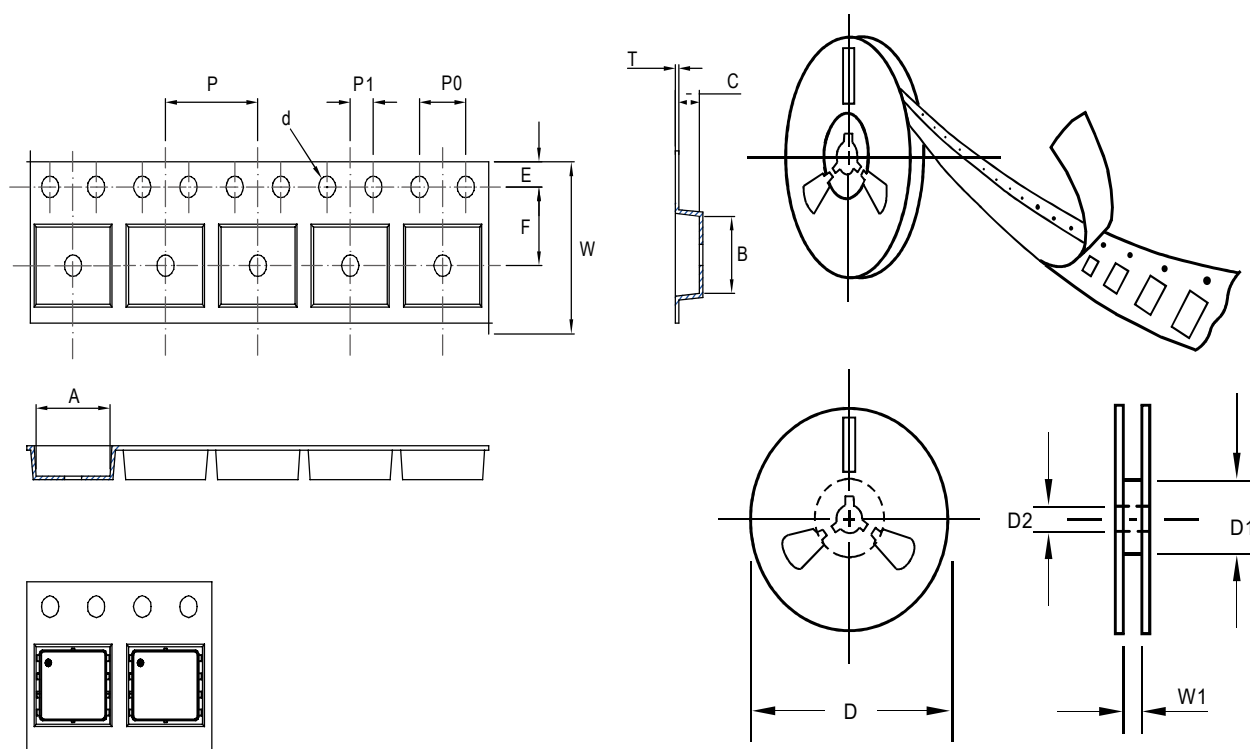
Suggested solder pad layout



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	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	±1.0	330.0
13" Reel inner diameter	D1	±0.5	100.0
Feed hole diameter	D2	±0.3	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
Over all tape thickness	T	±0.1	0.23
Tape width	W	±0.2	12.00
Reel width	W1	±0.2	17.60

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

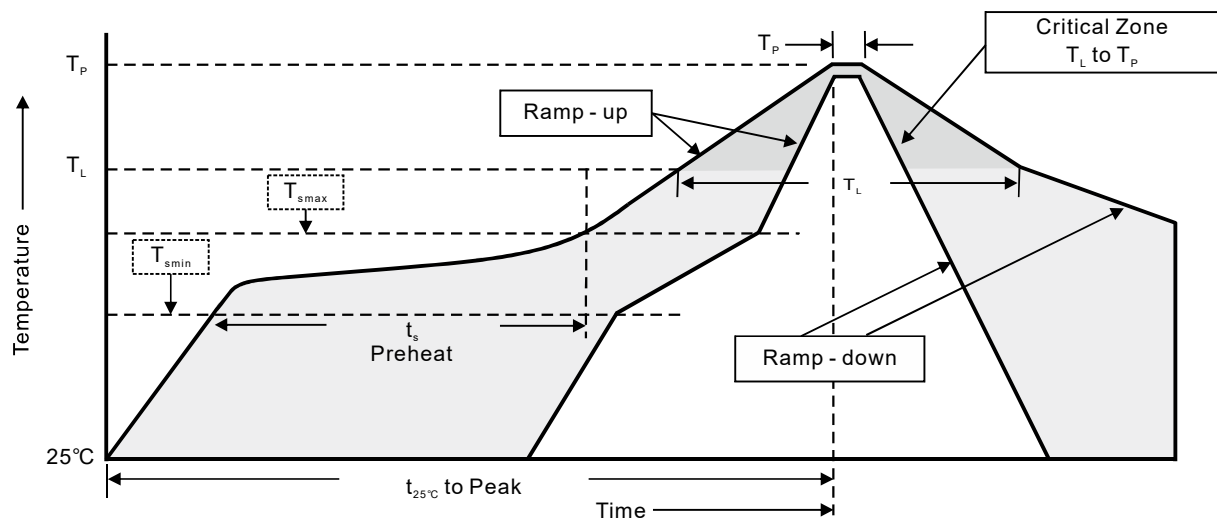
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Reel packing

Package	Units (pcs)			Dimension (Unit : mm ³)		
	Reel	Inner Box	Outer Box	Reel DIA,	Inner Box	Outer Box
T3333P8	5,000	5,000	50,000	330 (13")	360 x 360 x 50	353 x 346 x 365

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