

FMOSTHAV2015NP03-H

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

Features

N-Channel :

- $V_{DS} = 30V$, $I_D = 20A$.
- $R_{DS(ON)} \leq 25m\Omega$, @ $V_{GS} = 10V$, $I_D = 5.8A$.
- $R_{DS(ON)} \leq 32m\Omega$, @ $V_{GS} = 4.5V$, $I_D = 5A$.

P-Channel :

- $-V_{DS} = 30V$, $-I_D = 15A$.
- $R_{DS(ON)} \leq 55m\Omega$, @ $-V_{GS} = 10V$, $-I_D = 4.2A$.
- $R_{DS(ON)} \leq 75m\Omega$, @ $-V_{GS} = 4.5V$, $-I_D = 2A$.
- High density cell design for ultra-low on-resistance.
- 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

- SMPS and general purpose applications.
- Hard switched and high frequency circuits.
- Uninterruptible power supply.

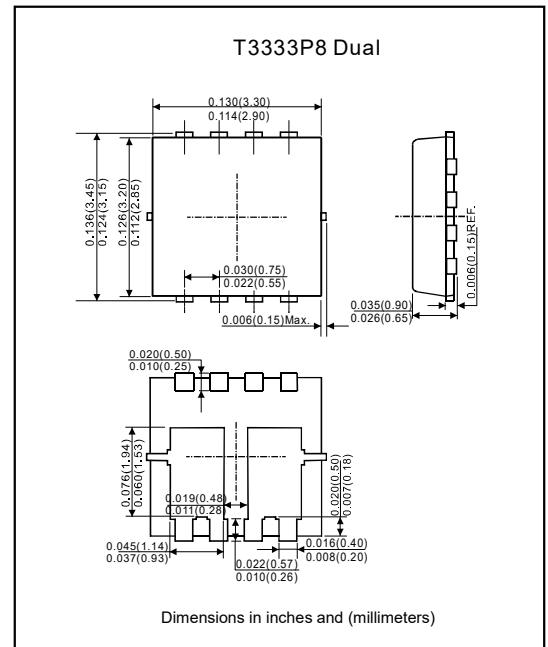
Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, T3333P8 Dual (DFN3333-8 Dual).
- Mounting Position : Any.

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	20	-15	A
Pulsed drain current (Note2)	I _{DM}	80	-60	A
Avalanche energy, single pulse	E _{AS}	21(Note3)	18(Note4)	mJ
Power dissipation (Note1)	P _D	25		W
Thermal resistance,Junction to ambient (Note7)	R _{θJA}	130		°C/W
Thermal resistance,Junction to case (Note1)	R _{θJC}	5		
Operating junction temperature	T _J	+150		°C
Storage temperature range	T _{STG}	-55 to +150		°C

Package outline



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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}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	30			V
Drain-Source leakage current	I_{DSS}	$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate-Source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 100	nA

On characteristics (Note5)

Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	0.7	0.9	1.4	V
Static drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}$, $I_D=5.8\text{A}$		20	25	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=5\text{A}$		22	32	

Dynamic characteristics (Note 6)

Input capacitance	C_{iss}	$V_{DS}=15\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		572		pF
Output capacitance	C_{oss}			60		
Reverse transfer capacitance	C_{rss}			49		
Gate resistance	R_g	$f=1.0\text{MHz}$		4		Ω

Switching characteristics (Note 6)

Total gate charge	Q_g	$V_{GS}=4.5\text{V}$, $V_{DS}=20\text{V}$, $I_D=20\text{A}$		6.3		nC
		$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $I_D=20\text{A}$		14		
Gate-Source charge	Q_{gs}			1		
Gate-Drain Charge	Q_{gd}			4.1		
Turn-on delay time	$t_{d(on)}$	$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $R_G=10\Omega$, $R_L=1\Omega$		5		ns
Turn-on rise time	t_r			56		
Turn-off delay time	$t_{d(off)}$			31		
Turn-off fall time	t_f			62		

Drain-Source diode characteristics and maximum ratings

Drain-Source diode forward voltage (Note5)	V_{SD}	$I_S=4\text{A}$, $V_{GS}=0\text{V}$			1.2	V
Body diode reverse recovery time (Note1)	I_S				20	A
Body diode reverse recovery charge (Note2)	I_{SM}				80	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	$-BV_{DSS}$	$-I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	30			V
Drain-Source leakage current	$-I_{DSS}$	$-V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate-Source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 100	nA

On characteristics (Note5)

Gate threshold voltage	$-V_{GS(th)}$	$V_{DS}=V_{GS}$, $-I_D=250\mu\text{A}$	0.7	0.9	1.4	V
Static drain-source on-resistance	$R_{DS(ON)}$	$-V_{GS}=10\text{V}$, $-I_D=4.2\text{A}$		39	55	m Ω
		$-V_{GS}=4.5\text{V}$, $-I_D=2\text{A}$		43	75	

Dynamic characteristics (Note 6)

Input capacitance	C_{iss}	$-V_{DS}=15\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		677		pF
Output capacitance	C_{oss}			62		
Reverse transfer capacitance	C_{rss}			43		
Gate resistance	R_g	$f=1.0\text{MHz}$		13		Ω

Switching characteristics (Note 6)

Total gate charge	Q_g	$-V_{GS}=4.5\text{V}$, $-V_{DS}=20\text{V}$, $-I_D=10\text{A}$		5.9		nC
				13		
Gate-Source charge	Q_{gs}	$-V_{GS}=10\text{V}$, $-V_{DS}=20\text{V}$, $-I_D=10\text{A}$		2.3		
Gate-Drain Charge	Q_{gd}			1.8		

Drain-Source diode characteristics and maximum ratings

Drain-Source diode forward voltage (Note5)	$-V_{SD}$	$-I_S=1\text{A}$, $V_{GS}=0\text{V}$			1.2	V
Body diode reverse recovery time (Note1)	$-I_S$				15	A
Body diode reverse recovery charge (Note2)	$-I_{SM}$				20	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: $V_{DS}=15\text{V}$, $V_{GS}=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$, starting $T_J=25^\circ\text{C}$.

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

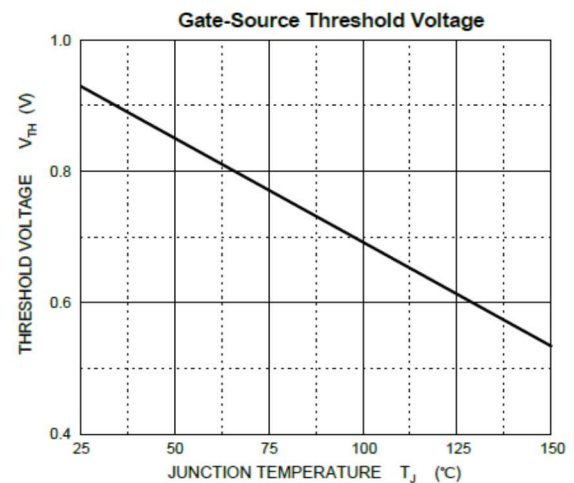
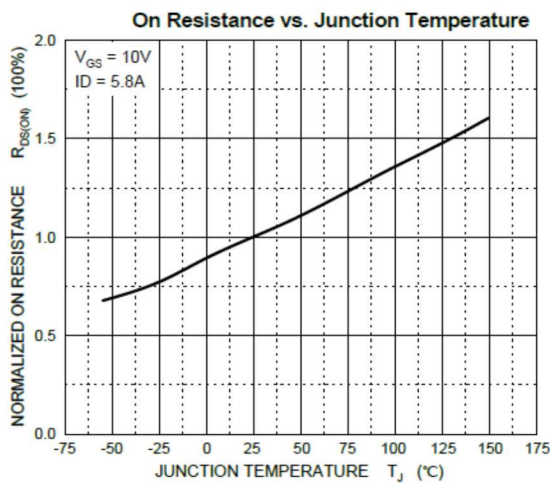
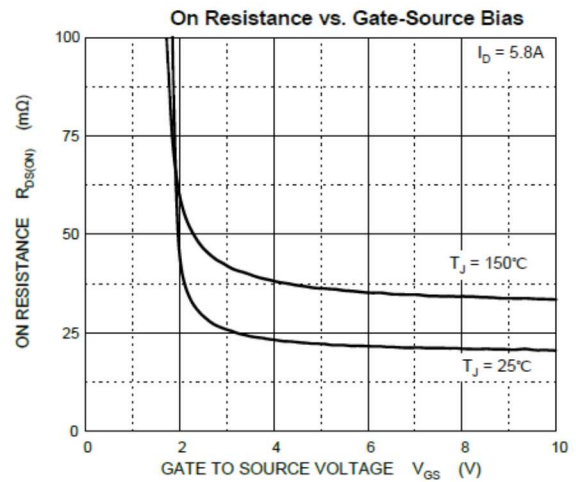
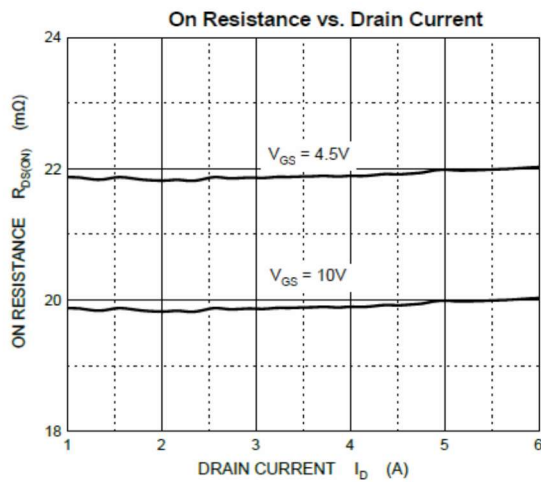
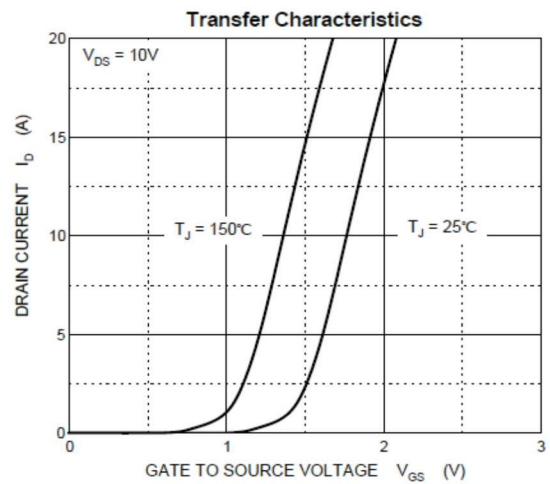
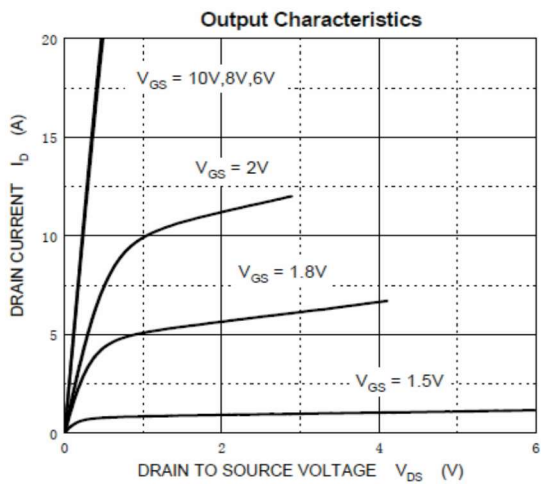
5. Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

6. Guaranteed by design, not subject to production.

7. Device mounted on 1 in² FR-4 board with 2oz. single-sided copper, in a still air environment with $T_A=25^\circ\text{C}$. single-sided active.

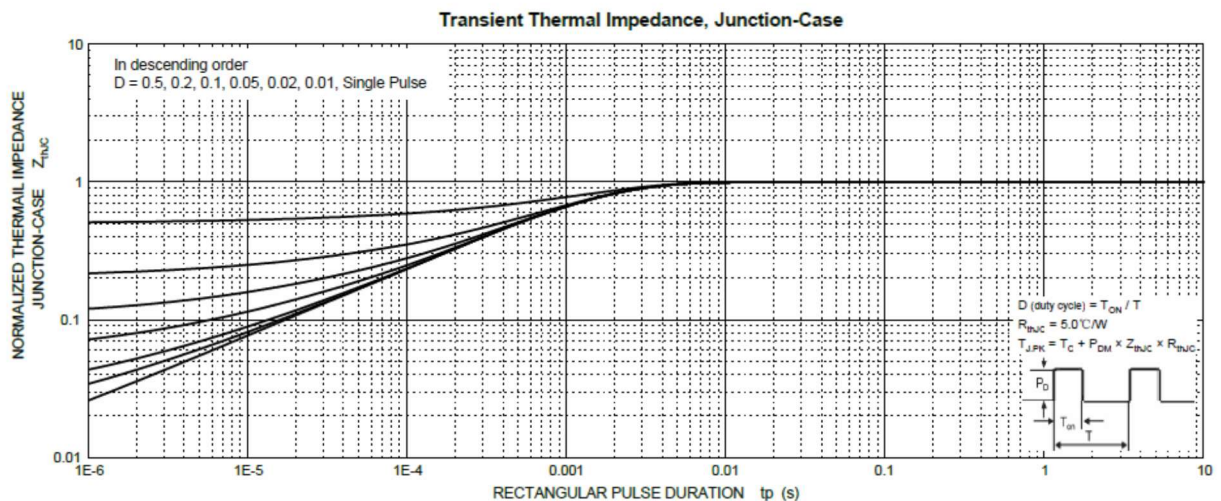
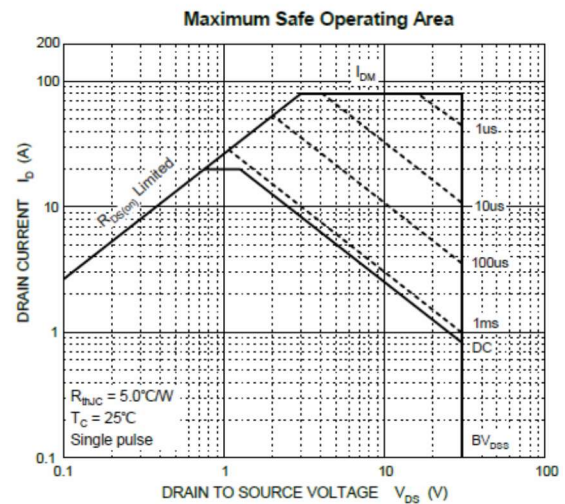
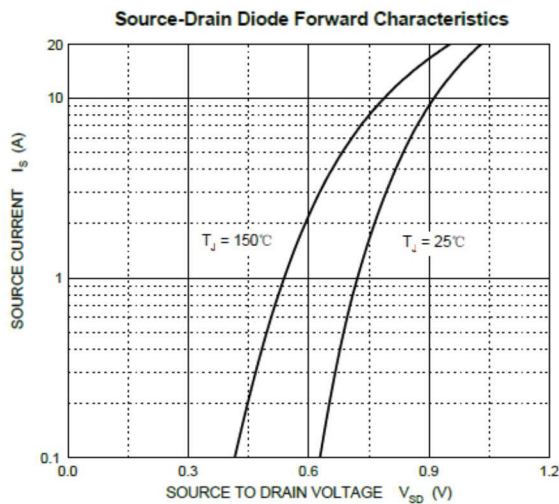
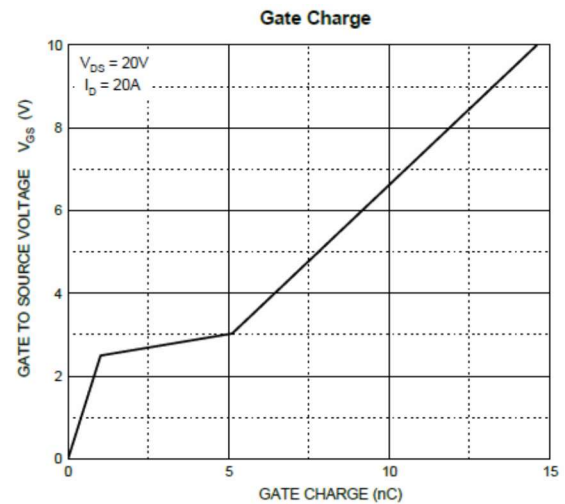
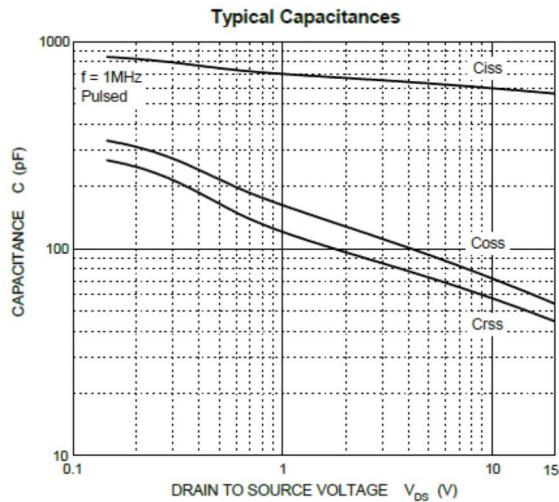
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Rating and characteristic curves (N-Channel)



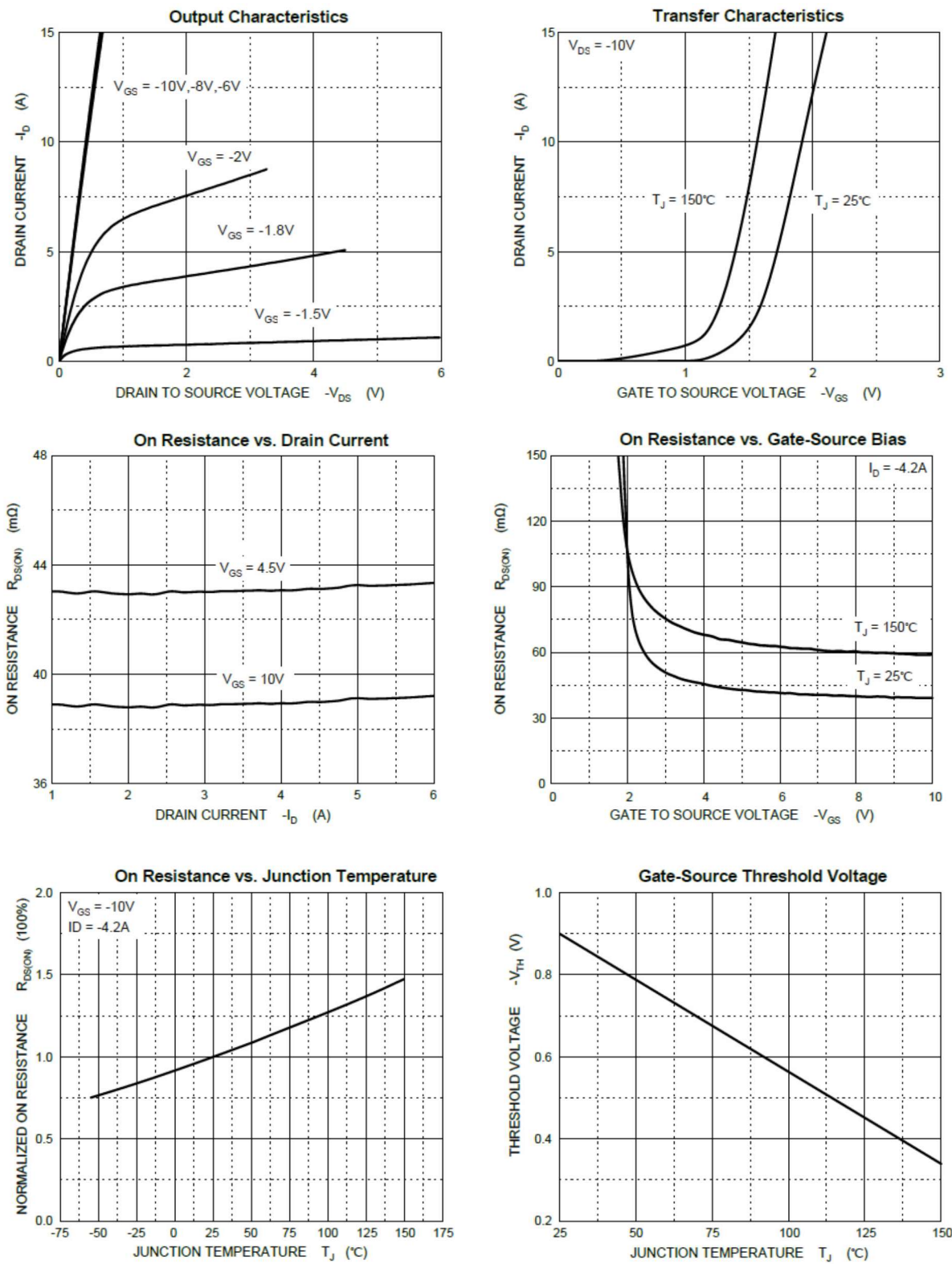
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Rating and characteristic curves (N-Channel)



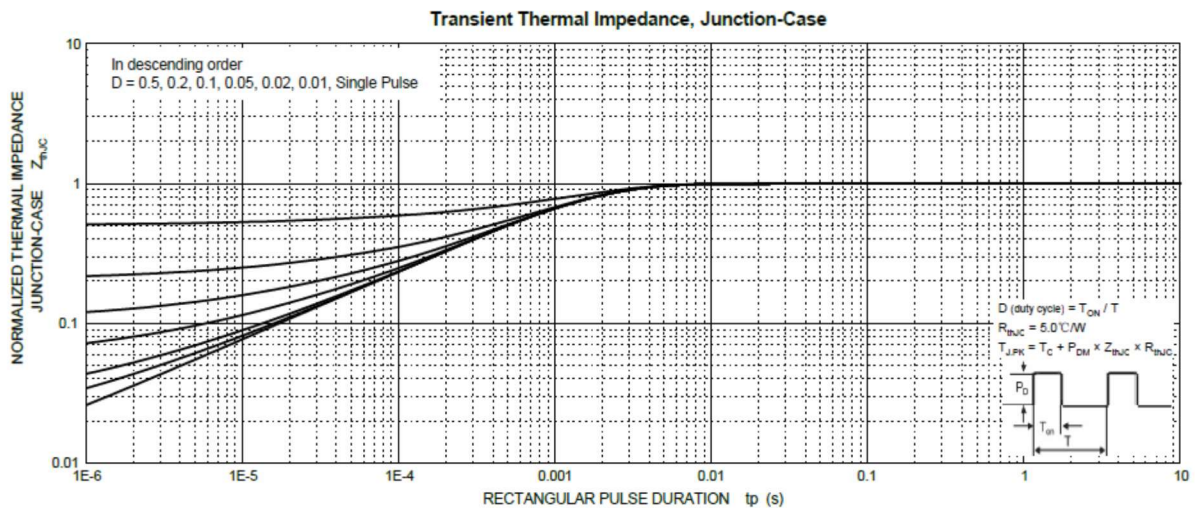
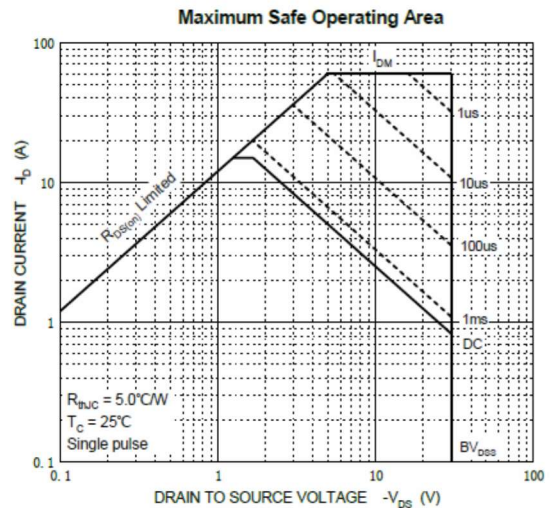
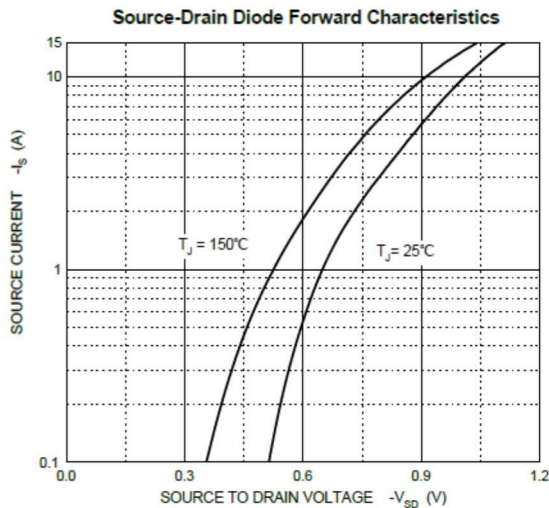
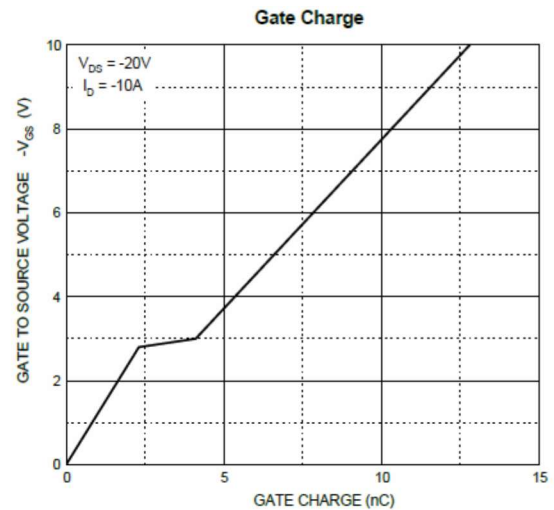
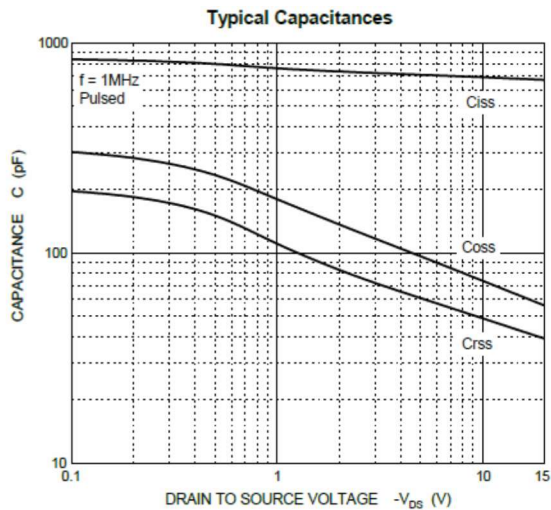
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Rating and characteristic curves (P-Channel)



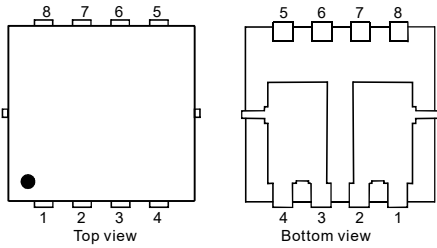
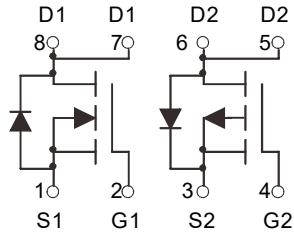
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Rating and characteristic curves (P-Channel)



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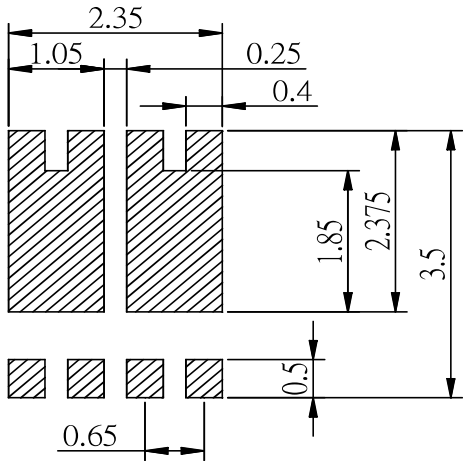
Pinning information

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
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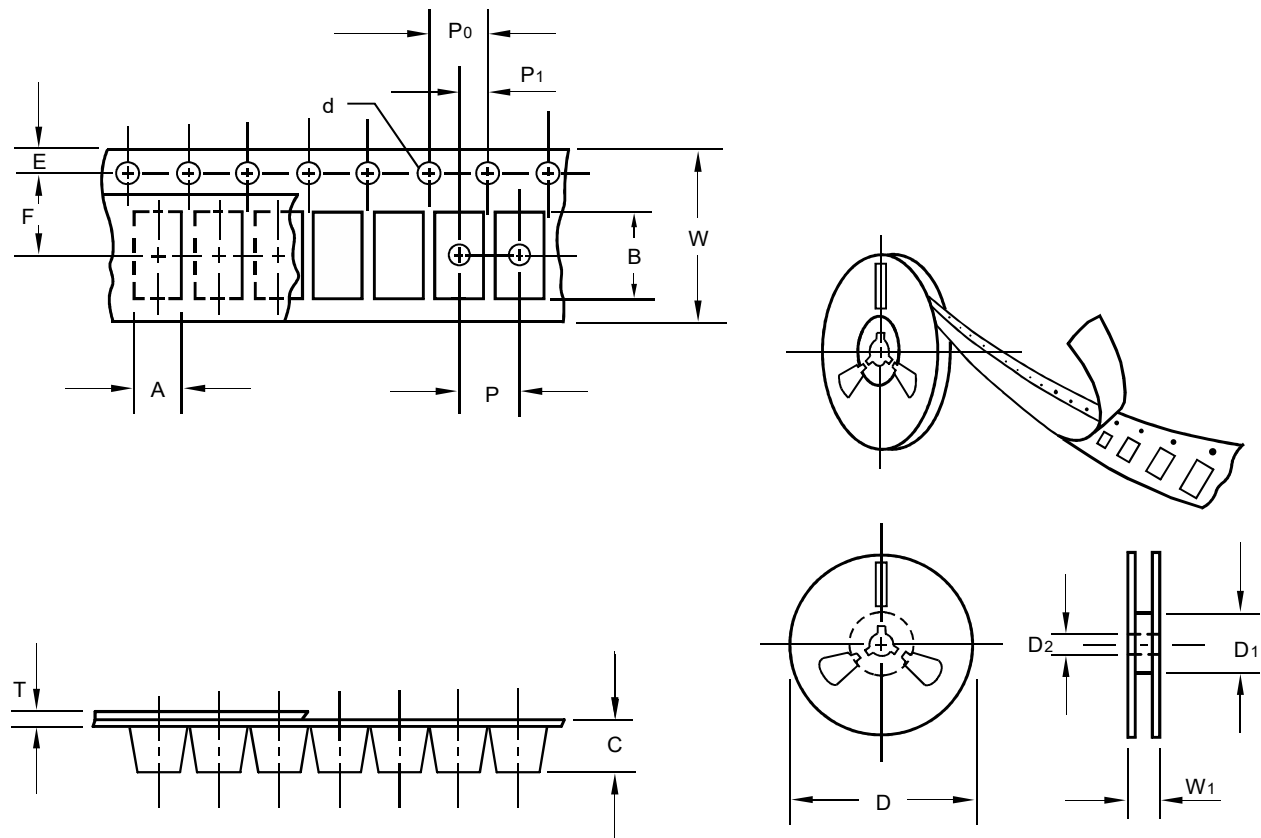
Suggested solder pad layout



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 Dual
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.

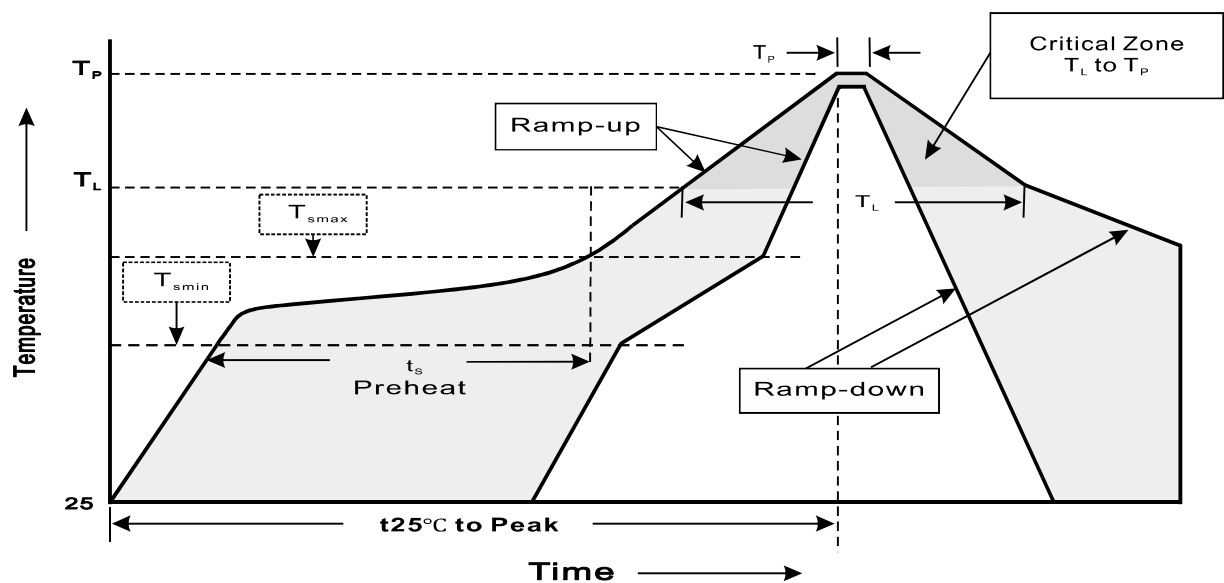
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Reel packing

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 Dual	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)	$< 3^\circ\text{C}/\text{sec}$
Preheat -Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (min to max) (t_s)	150°C 200°C 60 ~ 120sec
T_{smax} to T_L -Ramp-up rate	$< 3^\circ\text{C}/\text{sec}$
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	$< 6^\circ\text{C}/\text{sec}$
Time 25°C to peak temperature	< 6 minutes