

Features

- Trench LV MOSFET Technology
- Moisture Sensitivity Level 3
- Halogen Free. "Green" Device^(Note1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Maximum Ratings

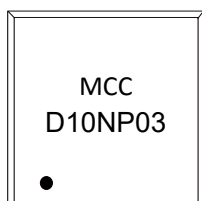
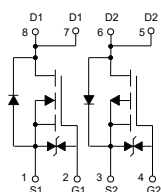
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 75°C/W Junction to Ambient^(Note2)
- Thermal Resistance: 6°C/W Junction to Case

Parameter	Symbol	Rating	Unit
N-Channel MOSFET			
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	10
		$T_C=100^\circ\text{C}$	6.3
Pulsed Drain Current ^(Note 3)	I_{DM}	40	A
Total Power Dissipation ^(Note4)	P_D	21	W
Single Pulsed Avalanche Energy ^(Note5)	E_{AS}	20	mJ
P-Channel MOSFET			
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	-10
		$T_C=100^\circ\text{C}$	-6.3
Pulsed Drain Current ^(Note 3)	I_{DM}	-40	A
Total Power Dissipation ^(Note4)	P_D	21	W
Single Pulsed Avalanche Energy ^(Note5)	E_{AS}	24	mJ

Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.
3. Repetitive rating; pulse width limited by max. junction temperature.
4. P_D is based on max. junction temperature, using junction-case thermal resistance.
5. NMOS: $T_J=25^\circ\text{C}$, $V_{DD}=25\text{V}$, $V_{GS}=10\text{V}$, $R_G=25\Omega$, $L=0.5\text{mH}$. PMOS: $T_J=25^\circ\text{C}$, $V_{DD}=-25\text{V}$, $V_{GS}=-10\text{V}$, $R_G=25\Omega$, $L=0.5\text{mH}$.

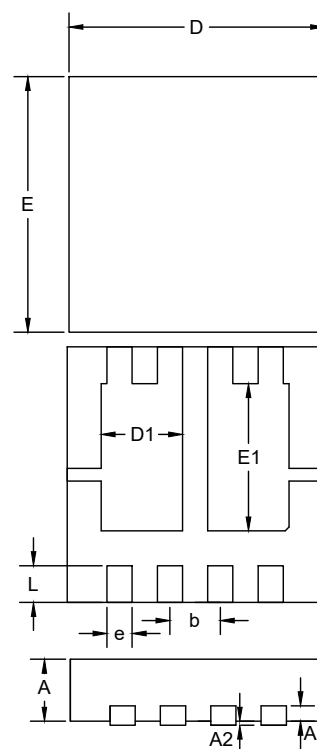
Internal Structure and Marking Code



pin1

Dual N&P-CHANNEL MOSFET

DFN3333-D



DIMENSIONS

DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.030	0.033	0.750	0.850	
A1	0.008		0.200		TYP
A2	-	0.002	-	0.050	
D	0.128	0.132	3.250	3.350	
E	0.128	0.132	3.250	3.350	
D1	0.039	0.043	1.000	1.100	
E1	0.073	0.077	1.850	1.950	
b	0.026		0.650		BSC
e	0.012	0.014	0.300	0.350	
L	0.017	0.021	0.425	0.525	

N-Channel MOSFE Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 10	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$			1	μA
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.5	1.8	2.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$		13	17	m Ω
		$V_{GS}=4.5V, I_D=5A$		22	29	
Gate Resistance	R_g	f=1 MHz, Open drain		6		Ω
Diode Characteristics						
Continuous Body Diode Current	I_S				10	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=10A$			1.2	V
Reverse Recovery Time	t_{rr}	$I_F=10A, dI_F/dt=100A/\mu s$		12		ns
Reverse Recovery Charge	Q_{rr}			7		nC
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V, f=1MHz$		873		pF
Output Capacitance	C_{oss}			77		
Reverse Transfer Capacitance	C_{rss}			65		
Total Gate Charge	Q_g	$V_{DS}=15V, V_{GS}=10V, I_D=10A$		15		nC
Gate-Source Charge	Q_{gs}			2.4		
Gate-Drain Charge	Q_{gd}			2		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=15V, V_{GS}=10V, R_G=5.6\Omega, I_D=10A$		9		ns
Turn-On Rise Time	t_r			42		
Turn-Off Delay Time	$t_{d(off)}$			24		
Turn-Off Fall Time	t_f			7		

P-Channel Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 10	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-30V, V_{GS}=0V$			-1	μA
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.5	-1.8	-2.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-10A$		30	40	m Ω
		$V_{GS}=-4.5V, I_D=-5A$		52	73	
Gate Resistance	R_g	f=1 MHz, Open drain		39		Ω
Diode Characteristics						
Continuous Body Diode Current	I_S				-10	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-10A$			-1.2	V
Reverse Recovery Time	t_{rr}	$I_F=-10A, di_F/dt=100A/\mu s$		15		ns
Reverse Recovery Charge	Q_{rr}			10		nC
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=-15V, V_{GS}=0V, f=1MHz$		888		pF
Output Capacitance	C_{oss}			92		
Reverse Transfer Capacitance	C_{rss}			73		
Total Gate Charge	Q_g	$V_{DS}=-15V, V_{GS}=-10V, I_D=-10A$		16		nC
Gate-Source Charge	Q_{gs}			1.9		
Gate-Drain Charge	Q_{gd}			3		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=-15V, V_{GS}=-10V, R_G=5.6\Omega, I_D=-10A$		6		ns
Turn-On Rise Time	t_r			3		
Turn-Off Delay Time	$t_{d(off)}$			79		
Turn-Off Fall Time	t_f			43		

N-MOSFET Curve Characteristics

Fig.1 - Typical Output Characteristics

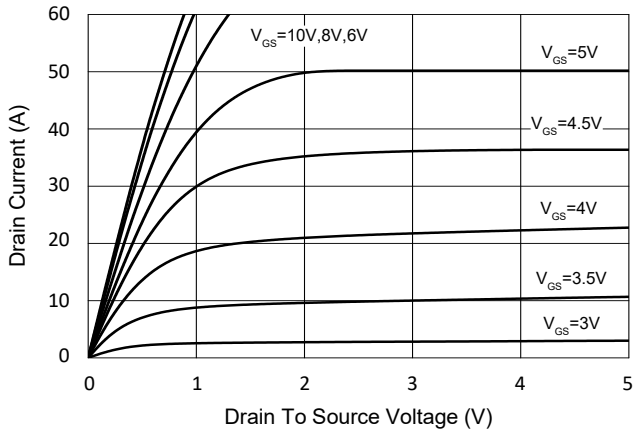


Fig.2 - Transfer Characteristic

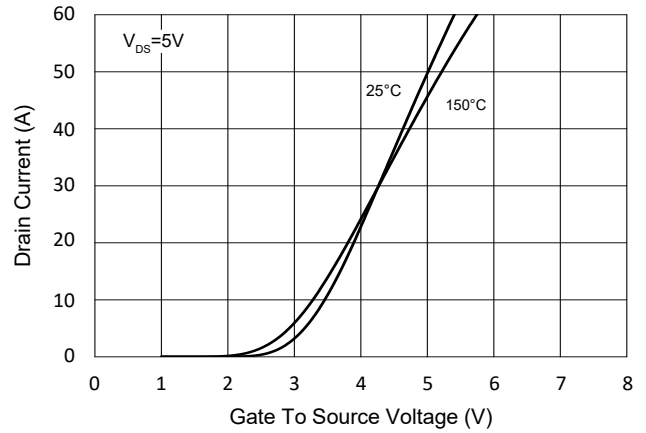


Fig.3 - $R_{DS(ON)}$ - V_{GS}

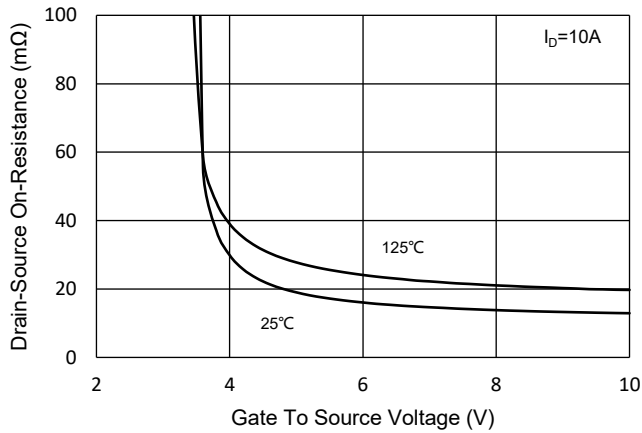


Fig.4 - $R_{DS(ON)}$ - I_D

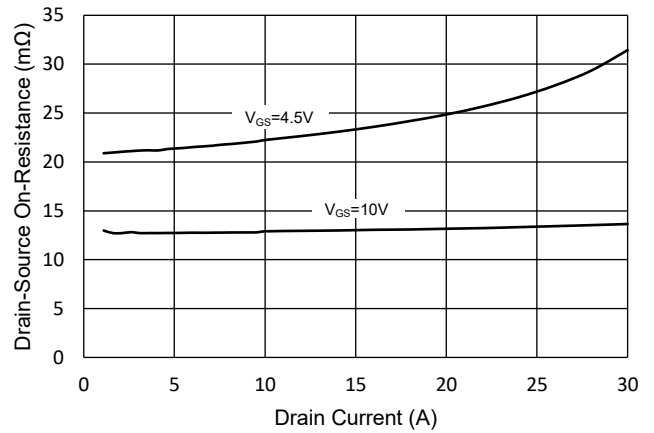


Fig.5 - Capacitance Characteristics

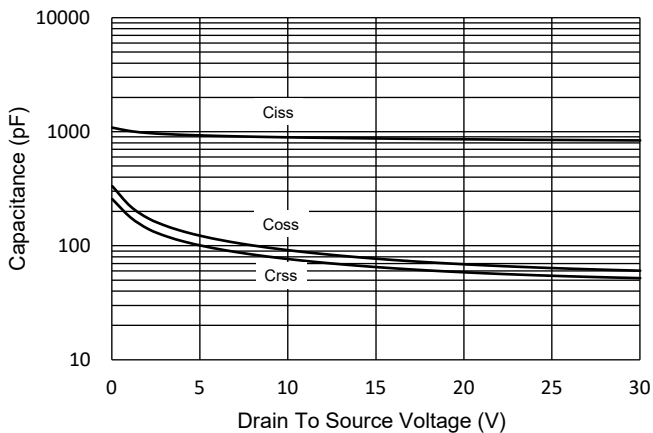
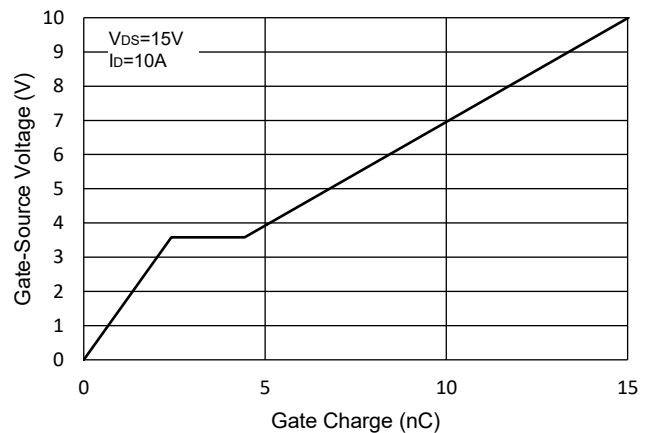


Fig.6 - Gate Charge



N-MOSFET Curve Characteristics

Fig.7 - Normalized Threshold Voltage

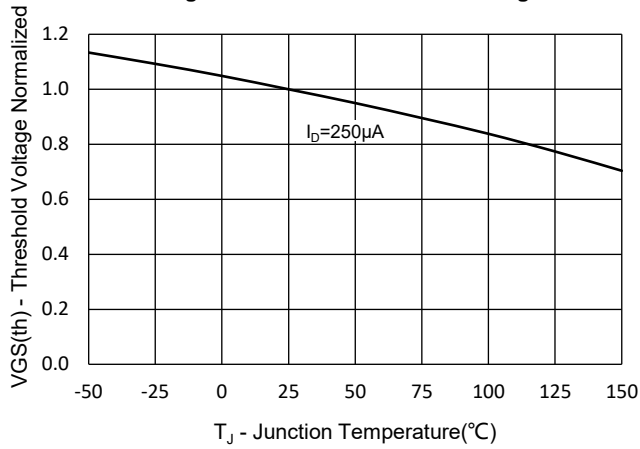


Fig.8 - Normalized On Resistance Characteristics

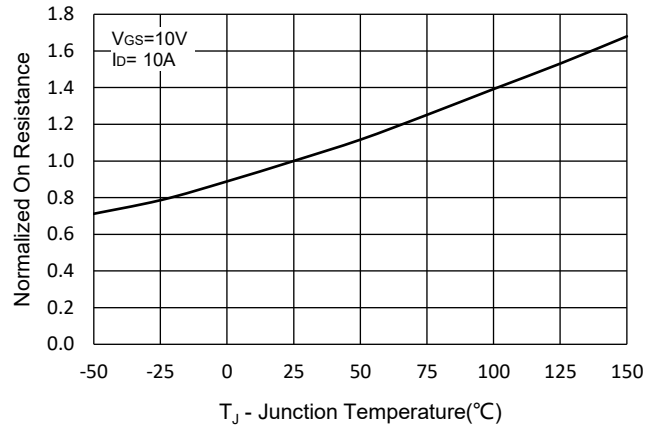


Fig.9 - $I_S - V_{SD}$

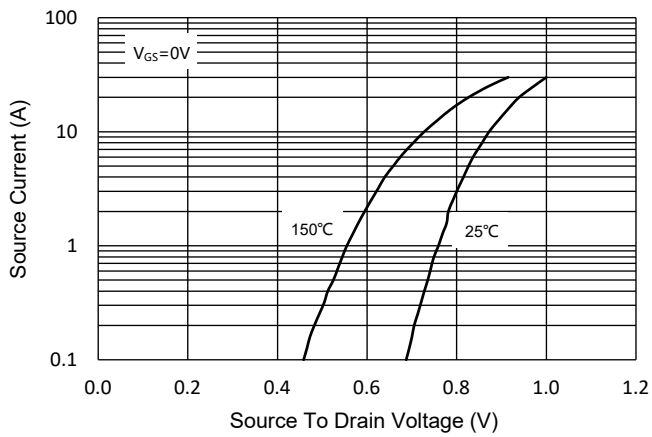


Fig.10 - Drain Current

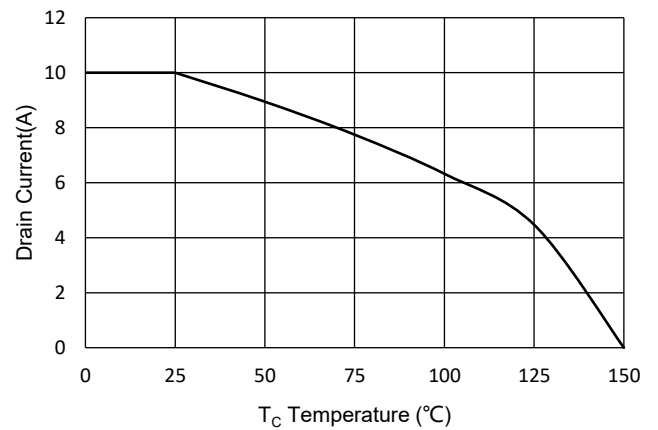
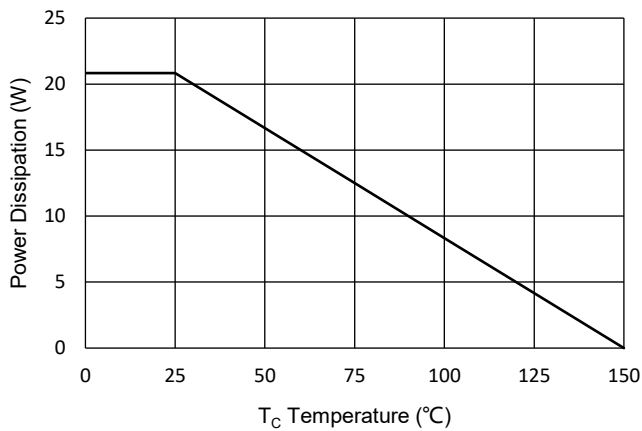


Fig.11 - PD Dissipation



N-MOSFET Curve Characteristics

Fig.12 - Safe Operation Area

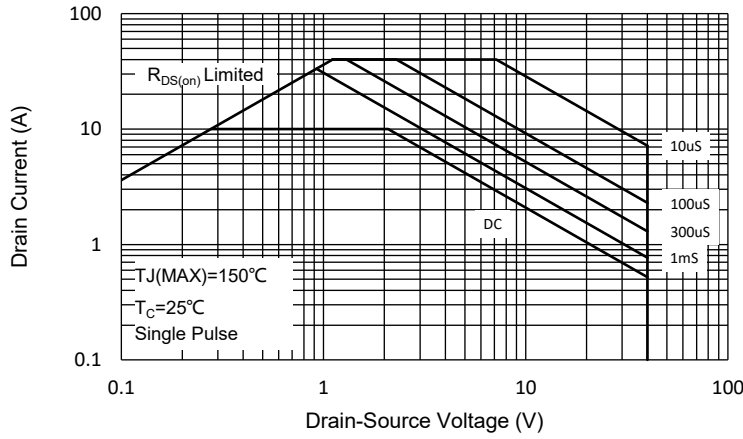
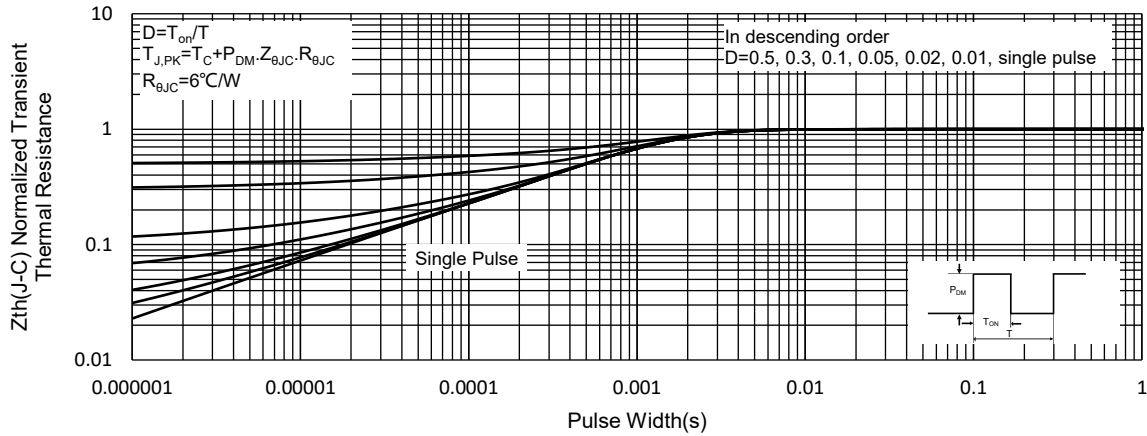


Fig.13 - Normalized Transient Thermal Impedance



P-MOSFET Curve Characteristics

Fig.1 - Typical Output Characteristics

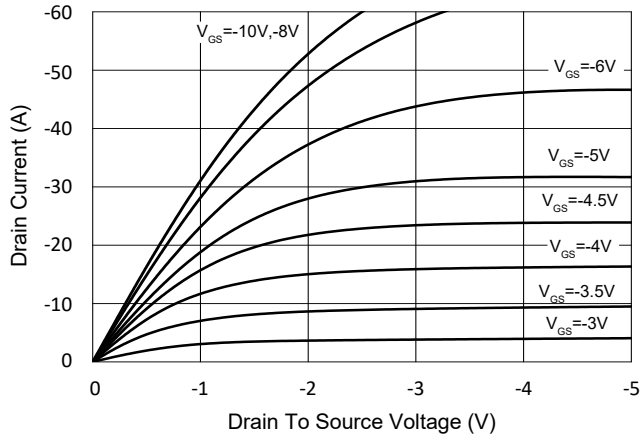


Fig.2 - Transfer Characteristic

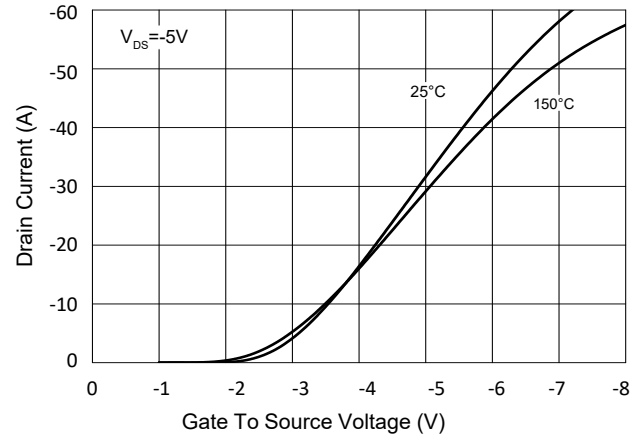


Fig.3 - $R_{DS(ON)}$ - V_{GS}

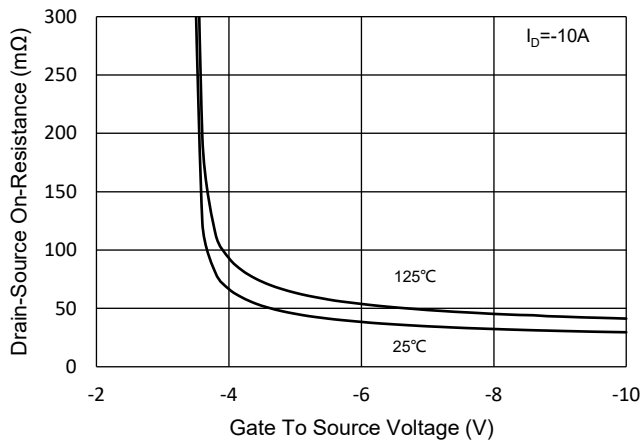


Fig.4 - $R_{DS(ON)}$ - I_D

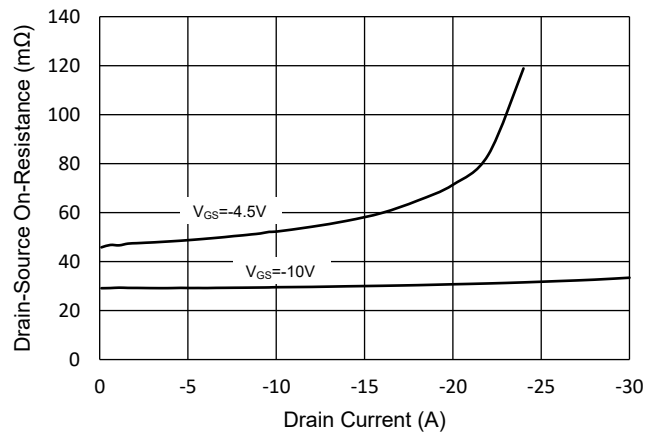


Fig.5 - Capacitance Characteristics

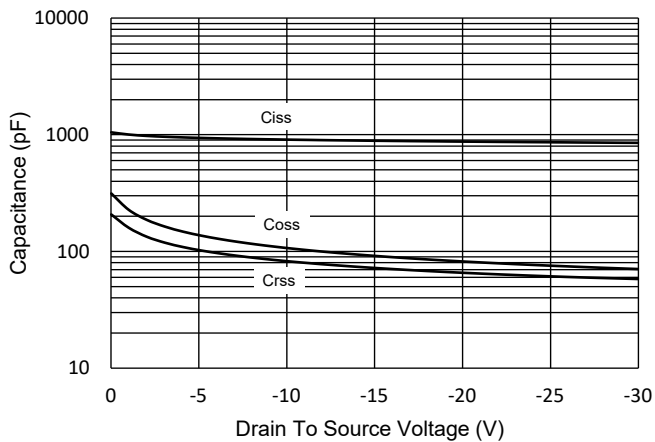
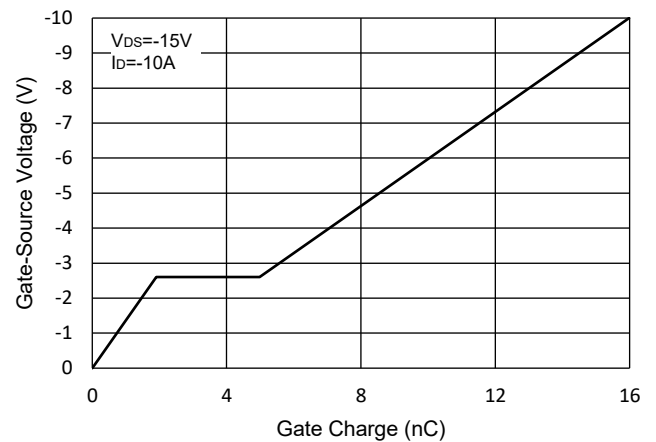


Fig.6 - Gate Charge



P-MOSFET Curve Characteristics

Fig.7 - Normalized Threshold Voltage

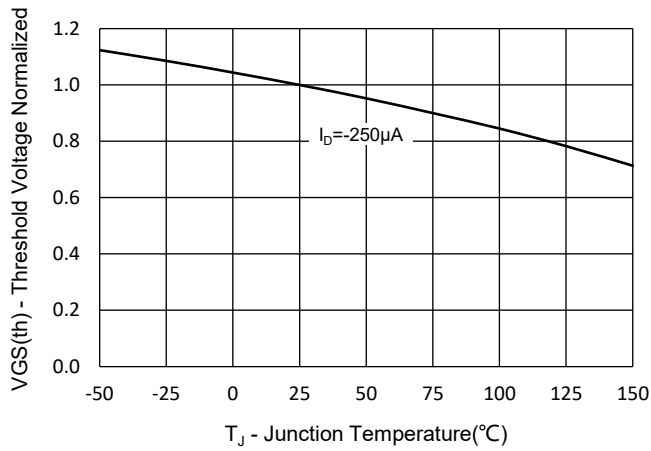


Fig.8 - Normalized On Resistance Characteristics

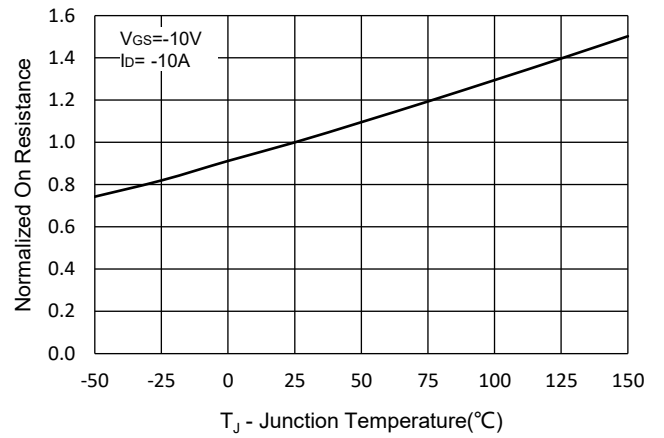


Fig.9 - $I_S - V_{SD}$

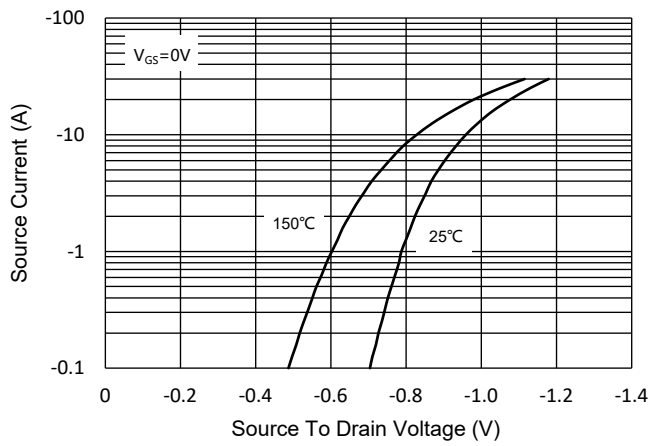


Fig.10 - Drain Current

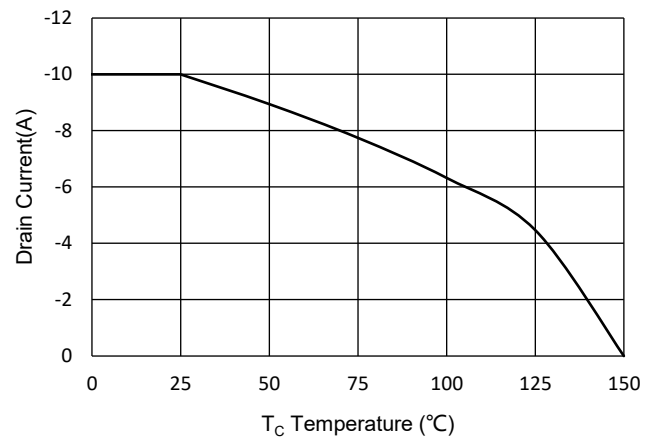
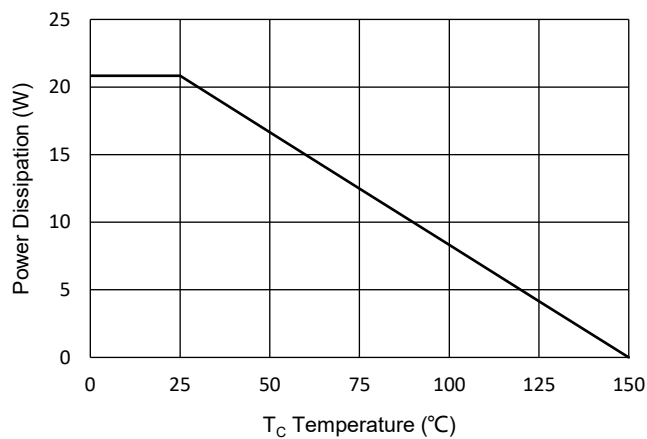


Fig.11 - PD Dissipation



P-MOSFET Curve Characteristics

Fig.12 - Safe Operation Area

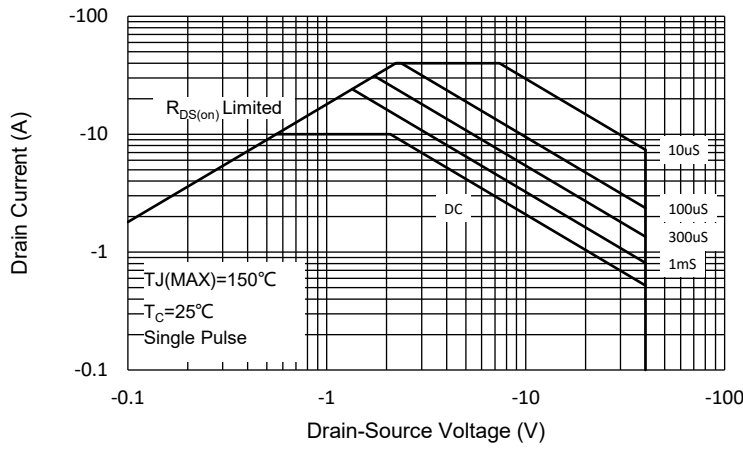
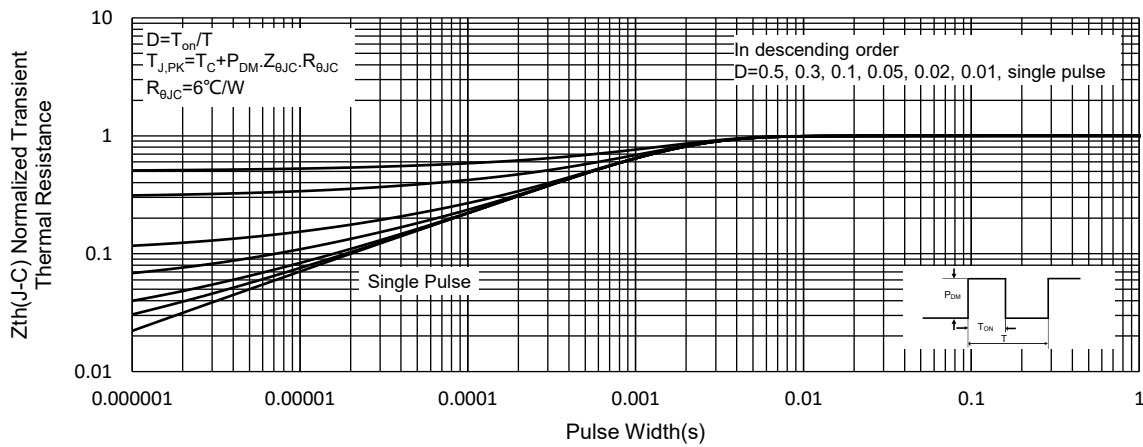


Fig.13 - Normalized Transient Thermal Impedance



Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 5Kpcs/Reel

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