

## Features

- Trench LV MOSFET Technology
- ESD Protected Up To 2KV (HBM)
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

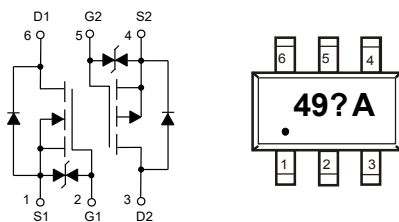
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 385°C/W Junction to Ambient (Note 2)

Parameter	Symbol	Rating	Unit
Total Power Dissipation (Note 4)	$P_D$	325	mW
<b>N-Channel MOSFET</b>			
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	±12	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	0.75
		$T_A=100^\circ\text{C}$	0.47
Pulsed Drain Current (Note 3)	$I_{DM}$	3	A
<b>P-Channel MOSFET</b>			
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	±12	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	-0.6
		$T_A=100^\circ\text{C}$	-0.38
Pulsed Drain Current (Note 3)	$I_{DM}$	-2.4	A

Note:

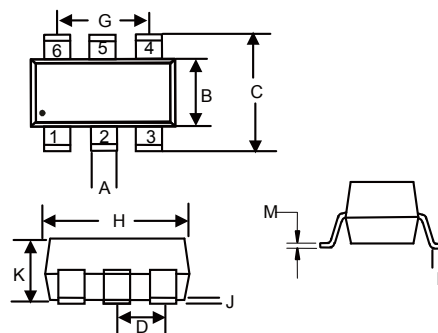
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment 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-ambient thermal resistance.

## Internal Structure and Marking Code



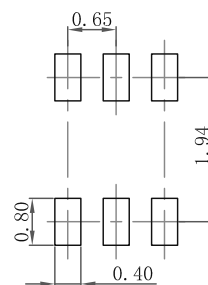
# Dual N&P-Channel MOSFET

## SOT-363



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.006	0.014	0.15	0.35	
B	0.045	0.053	1.15	1.35	
C	0.079	0.096	2.00	2.45	
D	0.026		0.65		TYP.
G	0.047	0.055	1.20	1.40	
H	0.071	0.087	1.80	2.20	
J	-----	0.004	-----	0.10	
K	0.031	0.043	0.80	1.10	
L	0.010	0.018	0.26	0.46	
M	0.003	0.006	0.08	0.15	

### Suggested Solder Pad Layout



**N-Channel ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)**

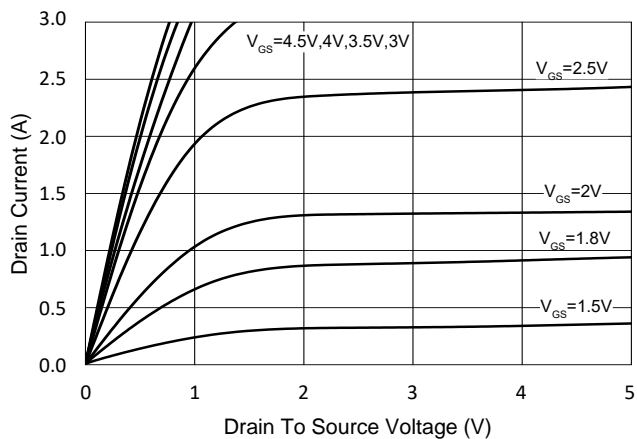
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.35	0.7	1.1	V
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$			$\pm 10$	$\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V$			1	$\mu A$
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=500mA$		185	300	m $\Omega$
		$V_{GS}=2.5V, I_D=400mA$		268	400	
		$V_{GS}=1.8V, I_D=200mA$		440	700	
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=0.75A$		1.6		S
Gate Resistance	$R_g$	f=1 MHz, Open drain		37		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				0.75	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=500mA$			1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=0.5A, dI_F/dt=100A/\mu s$		12		ns
Reverse Recovery Charge	$Q_{rr}$			0.6		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=16V, V_{GS}=0V, f=1MHz$		28		pF
Output Capacitance	$C_{oss}$			9.5		
Reverse Transfer Capacitance	$C_{rss}$			4.6		
Total Gate Charge	$Q_g$	$V_{DS}=10V, V_{GS}=4.5V, I_D=0.5A$		1.2		nC
Gate-Source Charge	$Q_{gs}$			0.26		
Gate-Drain Charge	$Q_{gd}$			0.23		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=10V, V_{GS}=10V, R_G=3\Omega, I_D=0.5A$		2		ns
Turn-On Rise Time	$t_r$			17		
Turn-Off Delay Time	$t_{d(off)}$			14		
Turn-Off Fall Time	$t_f$			26		

**P-Channel ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)**

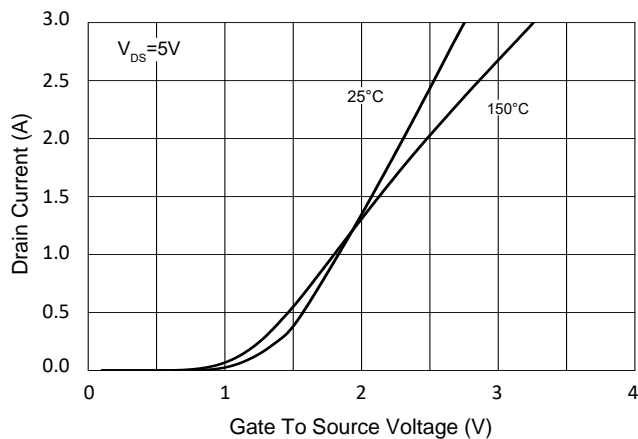
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.35	-0.64	-1.1	V
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$			$\pm 10$	$\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-20V, V_{GS}=0V$			-1	$\mu A$
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-500mA$		0.63	0.85	$\Omega$
		$V_{GS}=-2.5V, I_D=-300mA$		0.85	1.2	
		$V_{GS}=-1.8V, I_D=-200mA$		1.37	2	
Forward Transconductance	$g_{FS}$	$V_{DS}=-10V, I_D=-500mA$		1		S
Gate Resistance	$R_g$	f=1 MHz, Open drain		31		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				-0.6	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-500mA$			-1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=-0.3A, dI_F/dt=100A/\mu s$		9		ns
Reverse Recovery Charge	$Q_{rr}$			2.6		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-16V, V_{GS}=0V, f=1MHz$		36		pF
Output Capacitance	$C_{oss}$			12		
Reverse Transfer Capacitance	$C_{rss}$			6.6		
Total Gate Charge	$Q_g$	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-0.3A$		1.24		nC
Gate-Source Charge	$Q_{gs}$			0.28		
Gate-Drain Charge	$Q_{gd}$			0.23		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=10\Omega, I_D=-300mA$		4		ns
Turn-On Rise Time	$t_r$			5		
Turn-Off Delay Time	$t_{d(off)}$			9		
Turn-Off Fall Time	$t_f$			5		

## Curve Characteristics (N-Channel)

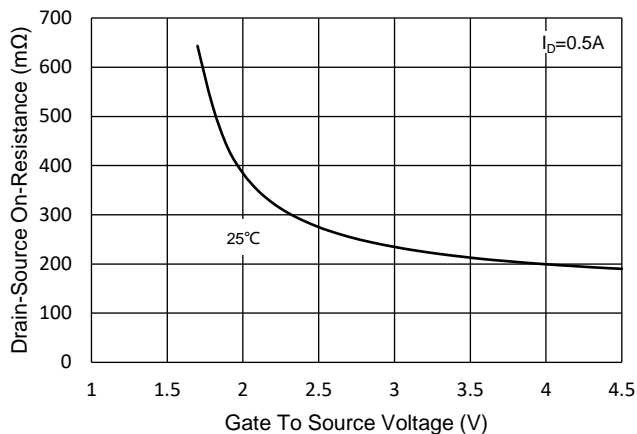
**Fig.1 - Typical Output Characteristics**



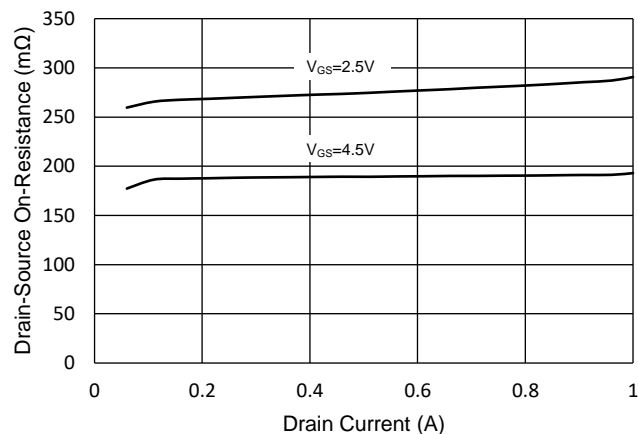
**Fig.2 - Transfer Characteristic**



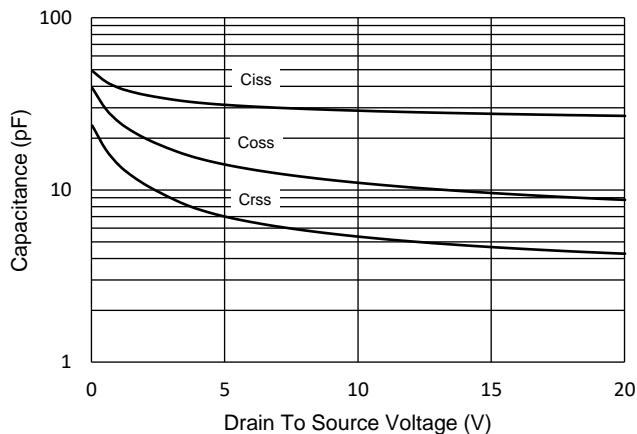
**Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$**



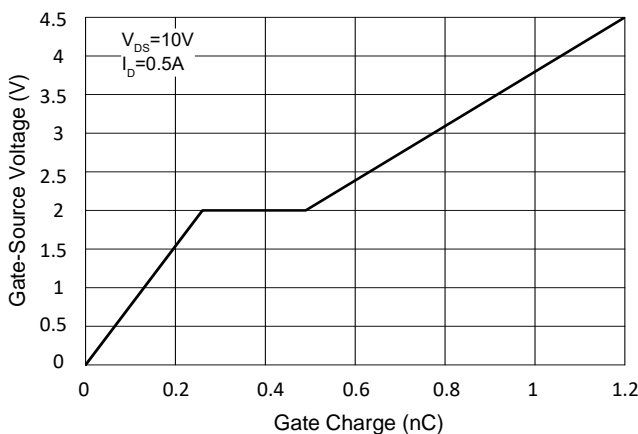
**Fig.4 -  $R_{DS(ON)}$  -  $I_D$**



**Fig.5 - Capacitance Characteristics**

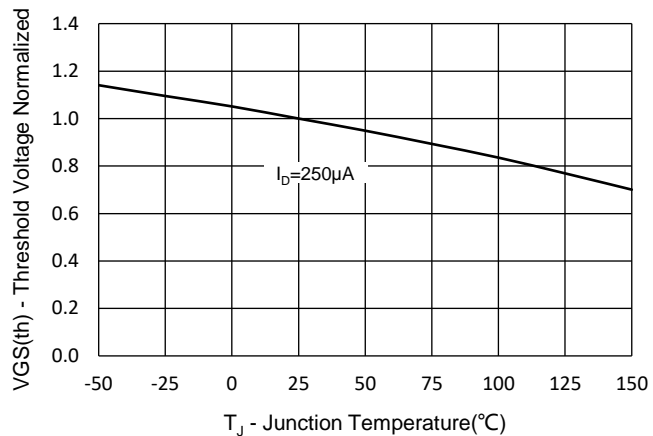


**Fig.6 - Gate Charge**

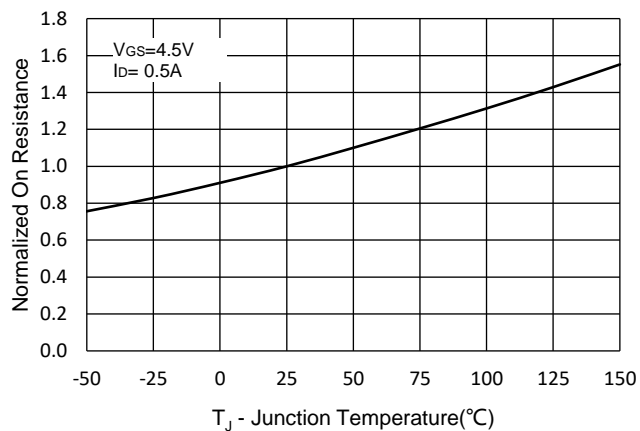


## Curve Characteristics (N-Channel)

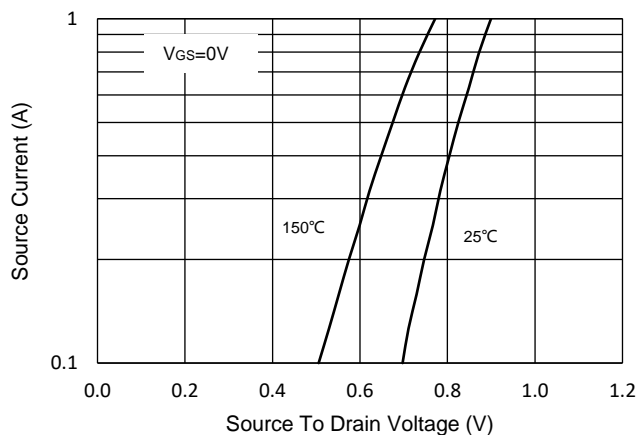
**Fig.7 - Normalized Threshold Voltage**



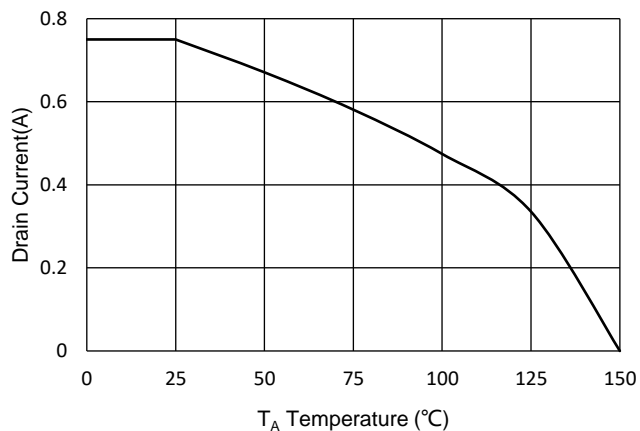
**Fig.8 - Normalized On Resistance Characteristics**



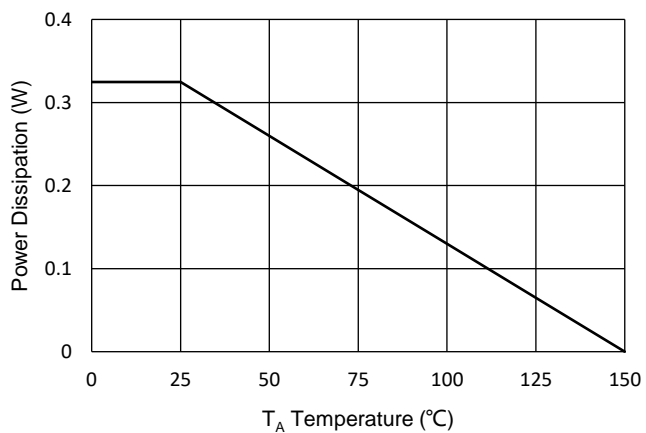
**Fig.9 - I<sub>S</sub> - V<sub>SD</sub>**



**Fig.10 - Drain Current**

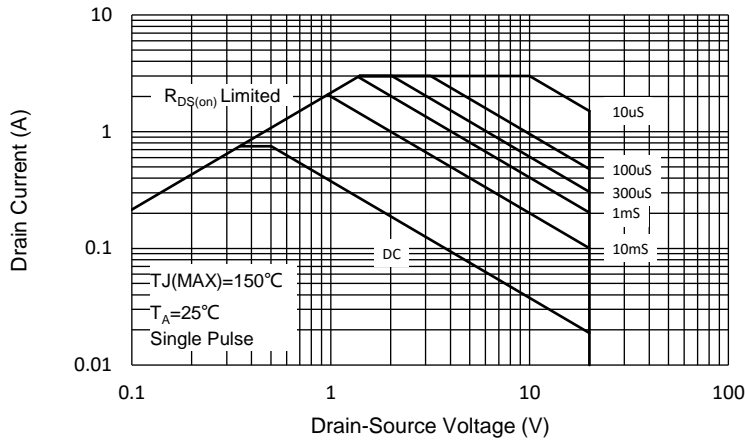


**Fig.11 - PD Dissipation**

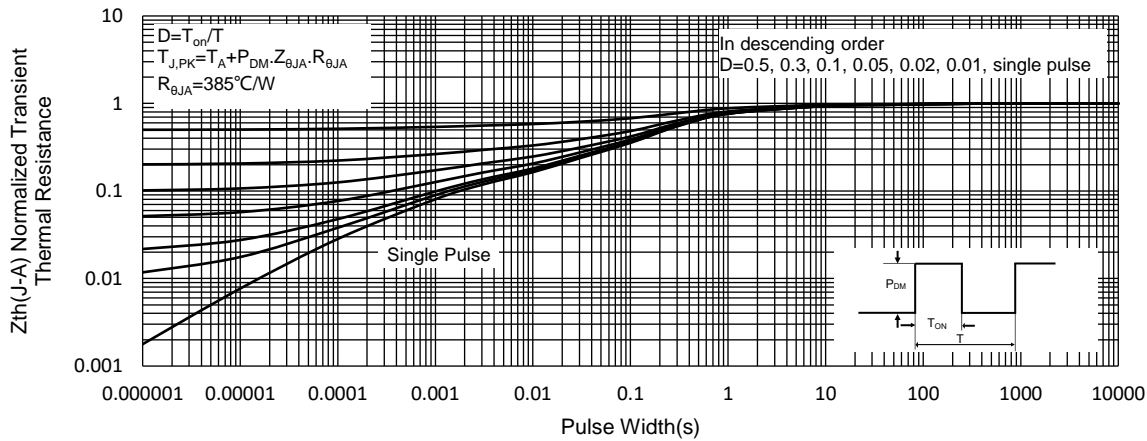


## Curve Characteristics (N-Channel)

**Fig.12 - Safe Operation Area**



**Fig.13 - Normalized Transient Thermal Impedance**



## Curve Characteristics (P-Channel)

Fig.1 - Typical Output Characteristics

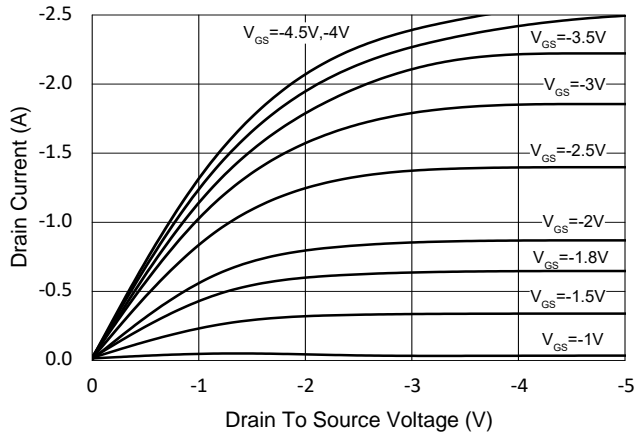


Fig.2 - Transfer Characteristic

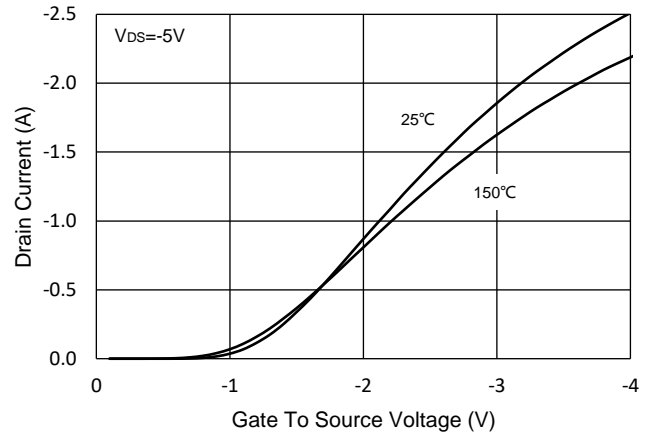


Fig.3 -  $R_{DS(ON)} - V_{GS}$

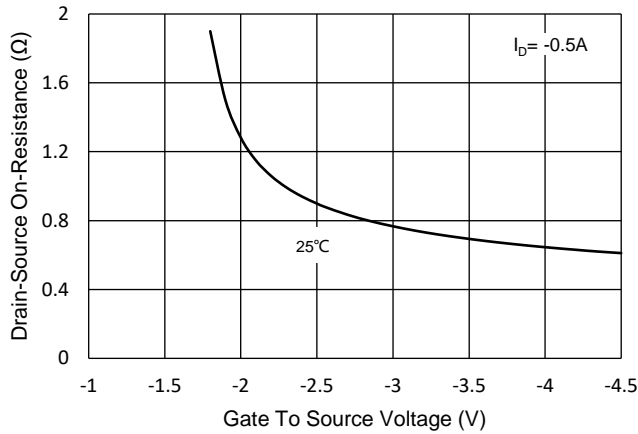


Fig.4 -  $R_{DS(ON)} - I_D$

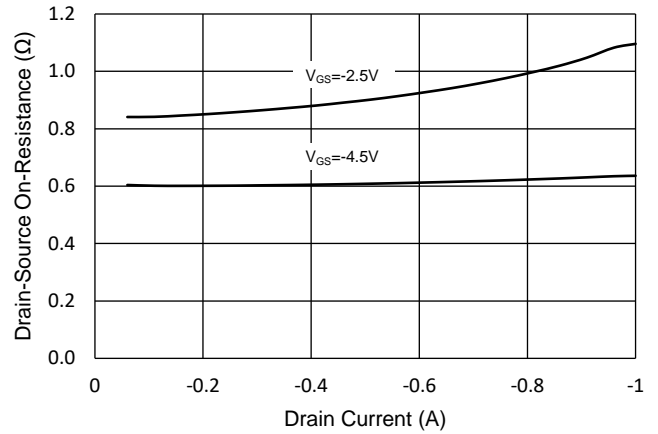


Fig.5 - Capacitance Characteristics

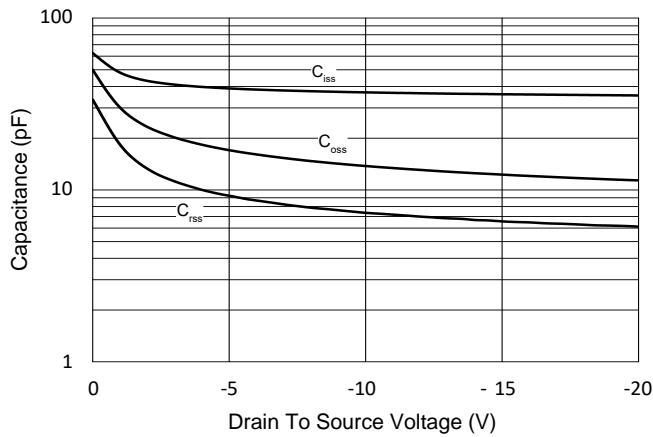
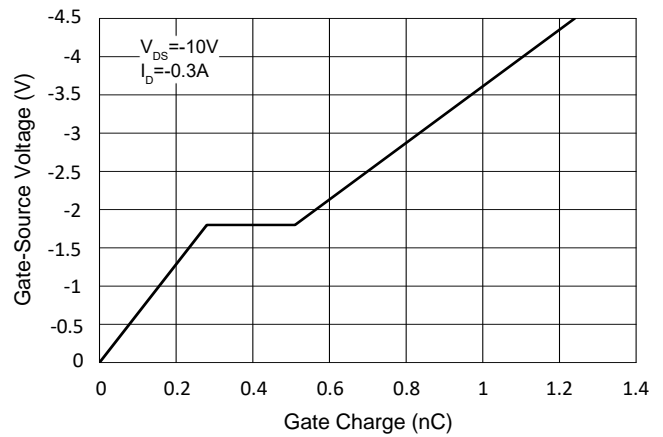
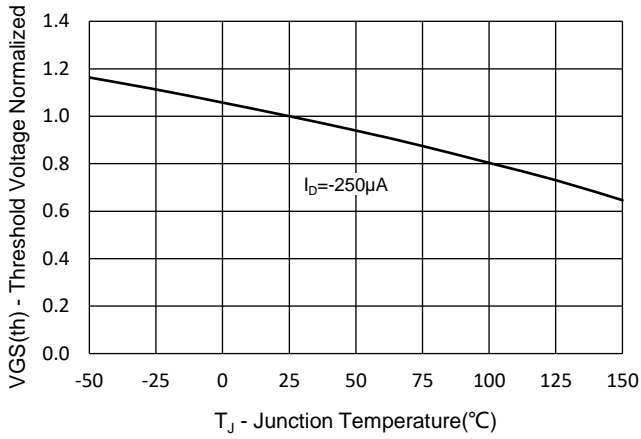


Fig.6 - Gate Charge

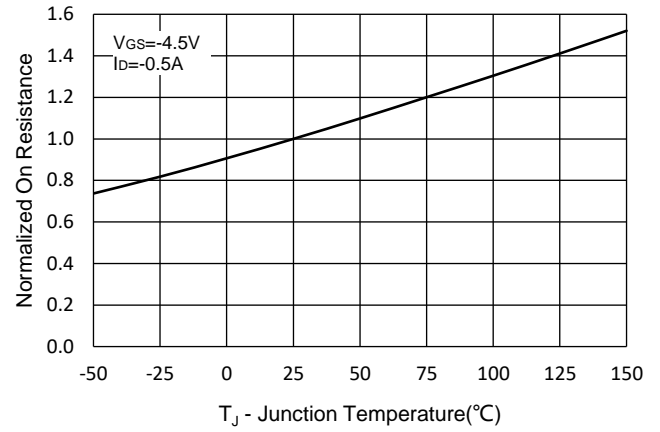


## Curve Characteristics (P-Channel)

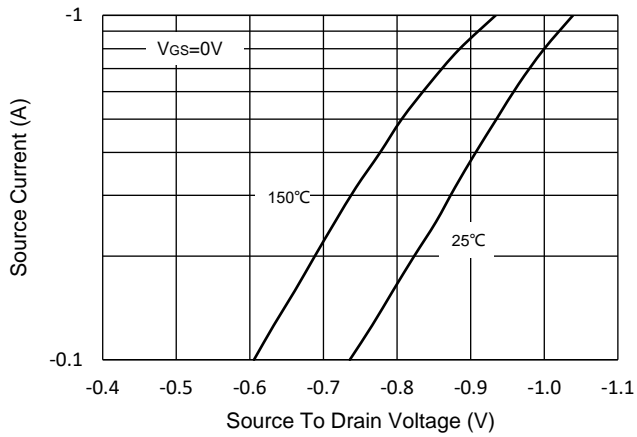
**Fig.7 - Normalized Threshold Voltage**



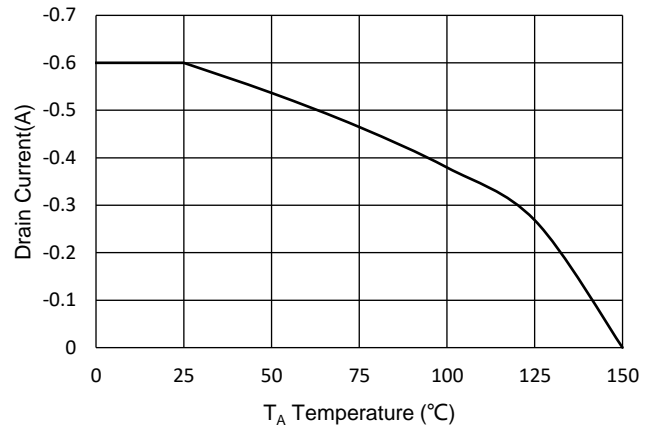
**Fig.8 - Normalized On Resistance Characteristics**



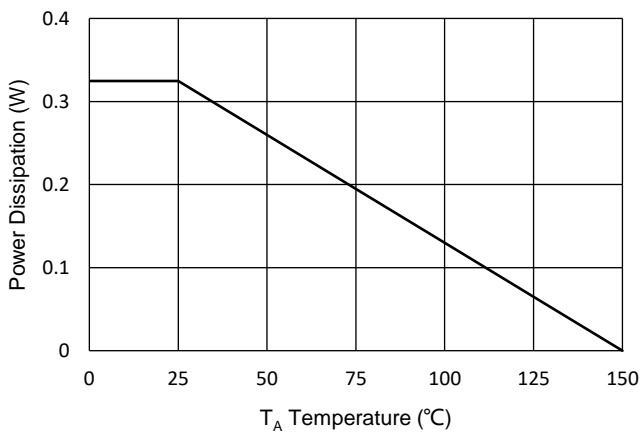
**Fig.9 -  $I_S - V_{SD}$**



**Fig.10 - Drain Current**



**Fig.11 - PD Dissipation**





## Curve Characteristics (P-Channel)

Fig.12 - Safe Operation Area

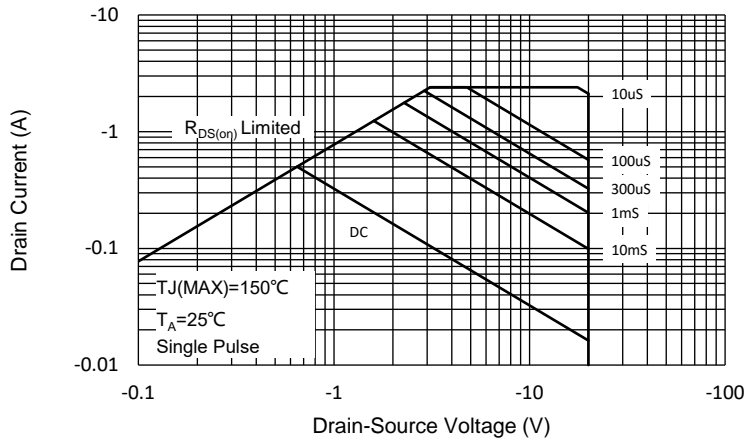
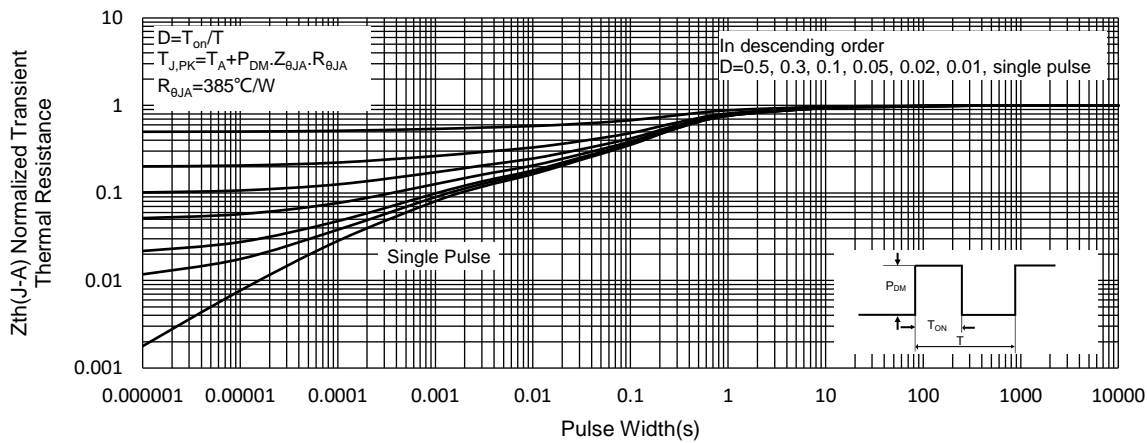


Fig.13 - Normalized Transient Thermal Impedance



## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 3Kpcs/Reel

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