



**THE DATASHEET OF
MCQ4503B-TP**



Features

- Trench Power LV MOSFET Technology
- High Density Cell Design For Low $R_{DS(on)}$
- High Speed Switching
- Moisture Sensitivity Level 1
- 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

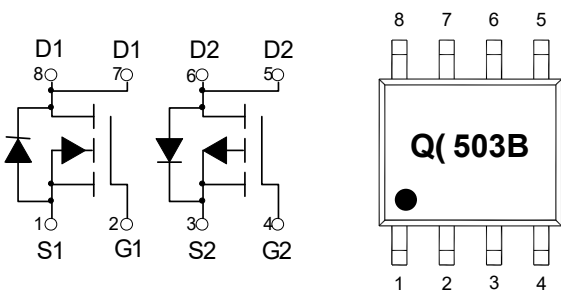
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 62.5°C/W Junction to Ambient (Note2)

Parameter	Symbol	Rating	Unit
Total Power Dissipation ^(Note3)	P_D	2	W
N-Channel			
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current	I_D	$T_A=25^\circ\text{C}$	5.6
		$T_A=70^\circ\text{C}$	4.5
Pulsed Drain Current ^(Note4)	I_{DM}	23	A
P-Channel			
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current	I_D	$T_A=25^\circ\text{C}$	-4.4
		$T_A=70^\circ\text{C}$	-3.5
Pulsed Drain Current ^(Note4)	I_{DM}	-18	A

Note:

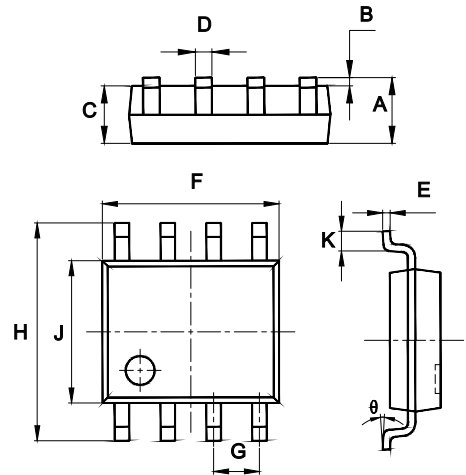
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of R_{thJA} is measured with the device mounted on 1 in2 FR-4 board with 2oz. copper, in a still air environment with $T_A=25^\circ\text{C}$
3. P_D is based on max. junction temperature, using junction-ambient thermal resistance.
4. Repetitive rating; pulse width limited by max. junction temperature.

Internal Structure and Marking Code



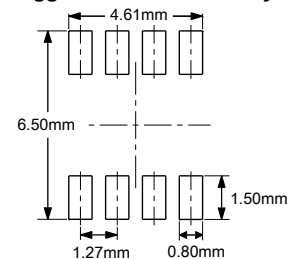
**Dual
N&P-Channel
MOSFET**

SOP-8



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.053	0.069	1.35	1.75	
B	0.004	0.010	0.10	0.25	
C	0.053	0.061	1.35	1.55	
D	0.013	0.020	0.33	0.51	
E	0.007	0.010	0.17	0.25	
F	0.185	0.200	4.70	5.10	
G	0.050		1.270		TYP.
H	0.228	0.244	5.80	6.20	
J	0.150	0.157	3.80	4.00	
K	0.016	0.050	0.40	1.27	
θ	0°	8°	0°	8°	

Suggested Solder Pad Layout



N-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}	$V_{DS}=0V, V_{GS}=\pm 12V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$			1	μA
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.65	0.9	1.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=5.6A$		18	25	m Ω
		$V_{GS}=4.5V, I_D=5A$		20	31	
Gate Resistance	R_G	f=1MHz, Open drain		1.7		Ω
Diode Characteristics						
Continuous Body Diode Current	I_S				5.6	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=5.6A$		0.8	1.2	V
Reverse Recovery Time	t_{rr}	$I_F=5.6A, dI_F/dt=100A/\mu s$		10		ns
Reverse Recovery Charge	Q_{rr}			3.9		nC
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V, f=1MHz$		573		pF
Output Capacitance	C_{oss}			60		
Reverse Transfer Capacitance	C_{rss}			50		
Total Gate Charge	Q_g	$V_{DS}=15V, V_{GS}=4.5V, I_D=5.6A$		7.2		nC
Gate-Source Charge	Q_{gs}			0.8		
Gate-Drain Charge	Q_{gd}			2		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=15V, V_{GS}=4.5V, R_G=2.8\Omega, I_D=1A$		6.2		ns
Turn-On Rise Time	t_r			4.2		
Turn-Off Delay Time	$t_{d(off)}$			20		
Turn-Off Fall Time	t_f			4		

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}	$V_{DS}=0V, V_{GS}=\pm 12V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-30V, V_{GS}=0V$			1	μA
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.6	-0.9	-1.4	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-4.4A$		38	55	m Ω
		$V_{GS}=-4.5V, I_D=-4A$		45	66	
Gate Resistance	R_G	f=1MHz, Open drain		10		Ω
Diode Characteristics						
Continuous Body Diode Current	I_S				-4.4	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-4.4A$		-0.8	-1.2	V
Reverse Recovery Time	t_{rr}	$I_F=-4.4A, di_F/dt=100A/\mu s$		14		ns
Reverse Recovery Charge	Q_{rr}			4.5		nC
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=-15V, V_{GS}=0V, f=1MHz$		831		pF
Output Capacitance	C_{oss}			67		
Reverse Transfer Capacitance	C_{rss}			56		
Total Gate Charge	Q_g	$V_{DS}=-15V, V_{GS}=-10V, I_D=-4.4A$		18		nC
Gate-Source Charge	Q_{gs}			1.6		
Gate-Drain Charge	Q_{gd}			2.1		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=-15V, V_{GS}=-10V, R_G=2.5\Omega, I_D=-1A$		6		ns
Turn-On Rise Time	t_r			3.5		
Turn-Off Delay Time	$t_{d(off)}$			40		
Turn-Off Fall Time	t_f			12		

Curve Characteristics
N-Channel

Fig. 1 Typical Output Characteristics

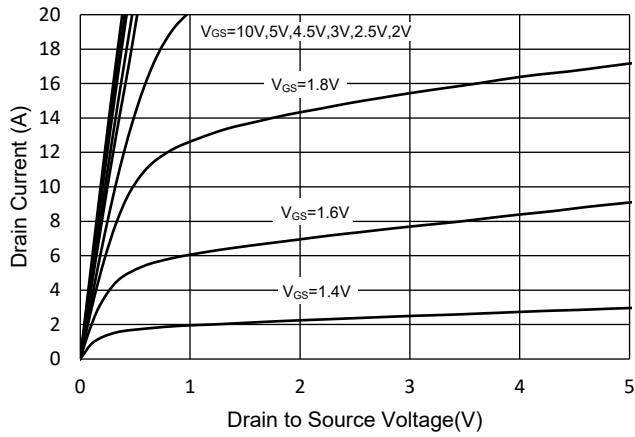


Fig.2 Transfer Characteristic

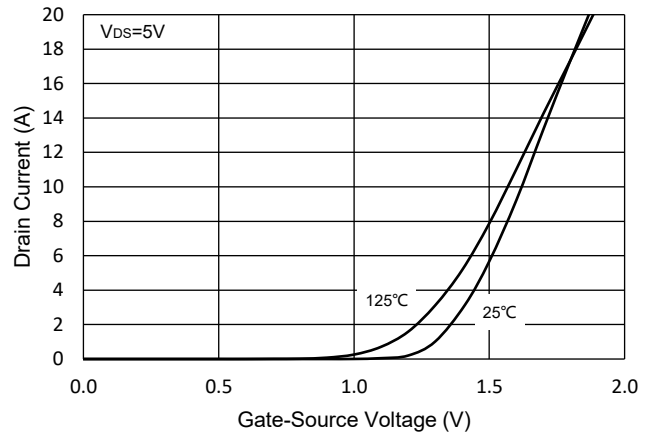


Fig.3 Rds(on)-Vgs

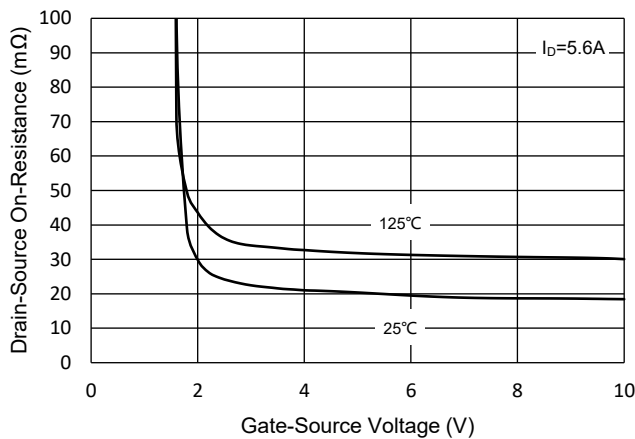


Fig.4 Rds(on)-Id

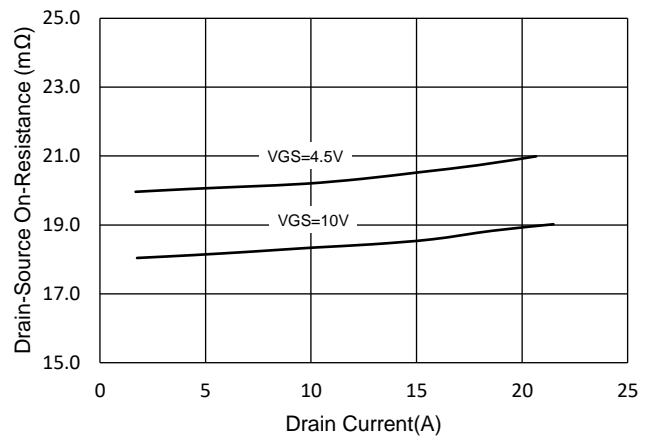


Fig.5 Capacitance Characteristics

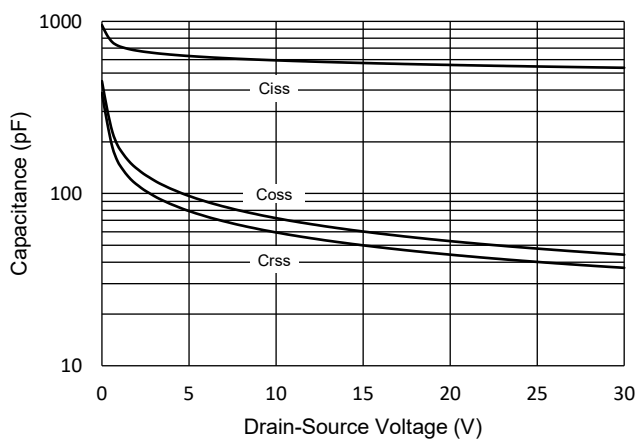
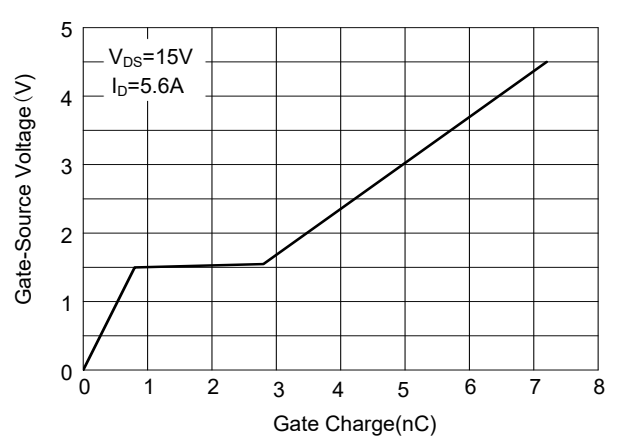


Fig.6 Gate Charge



Curve Characteristics

N-Channel

Fig.7 Normalized Threshold Voltage

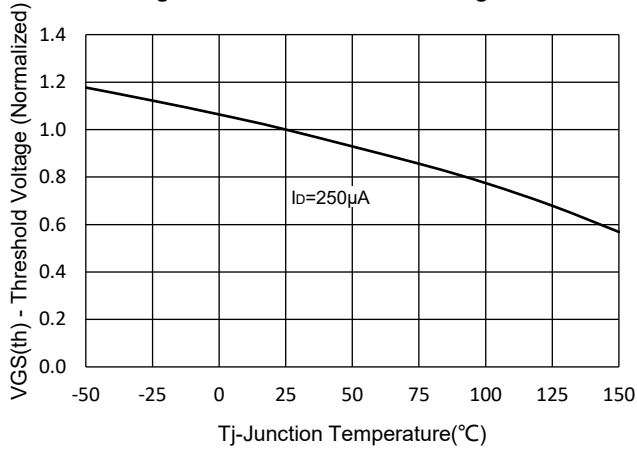


Fig.8 Normalized On Resistance Characteristics

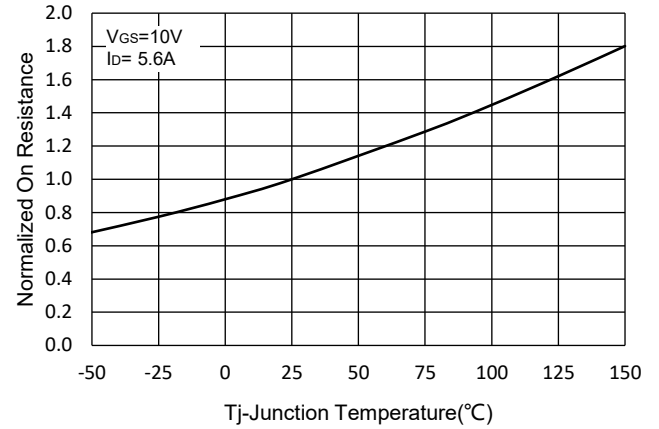


Fig.9 IS-VSD

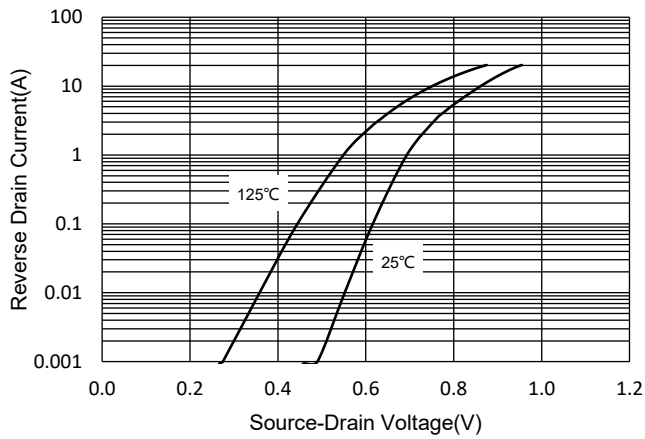


Fig.10 Drain Current

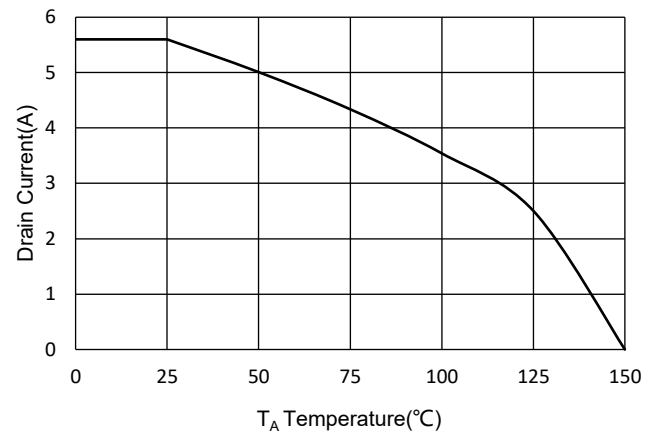
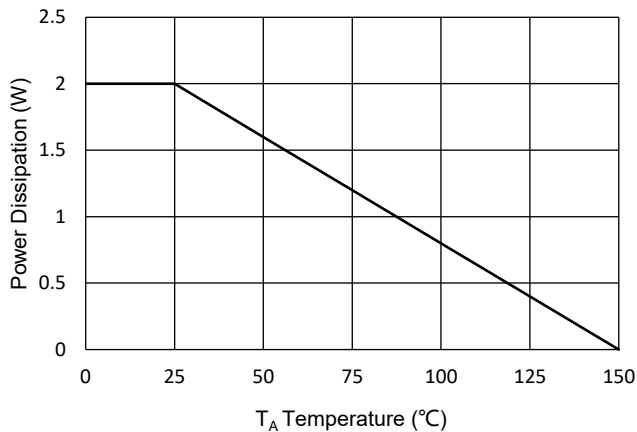


Fig.11 Power Dissipation



Curve Characteristics

N-Channel

Fig.12 Safe Operation Area

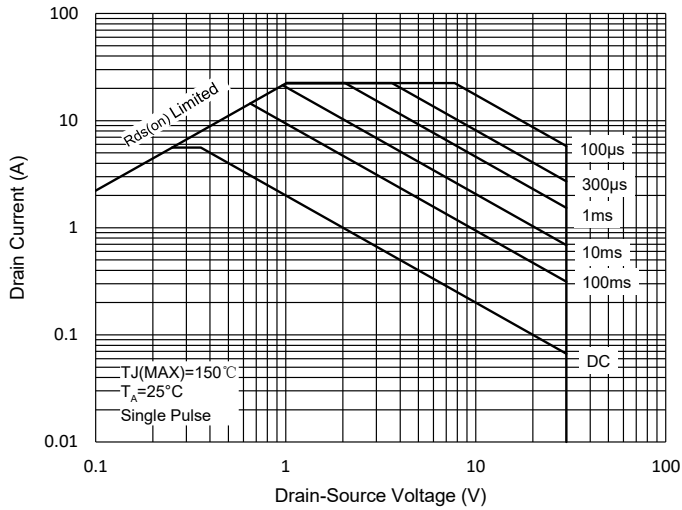
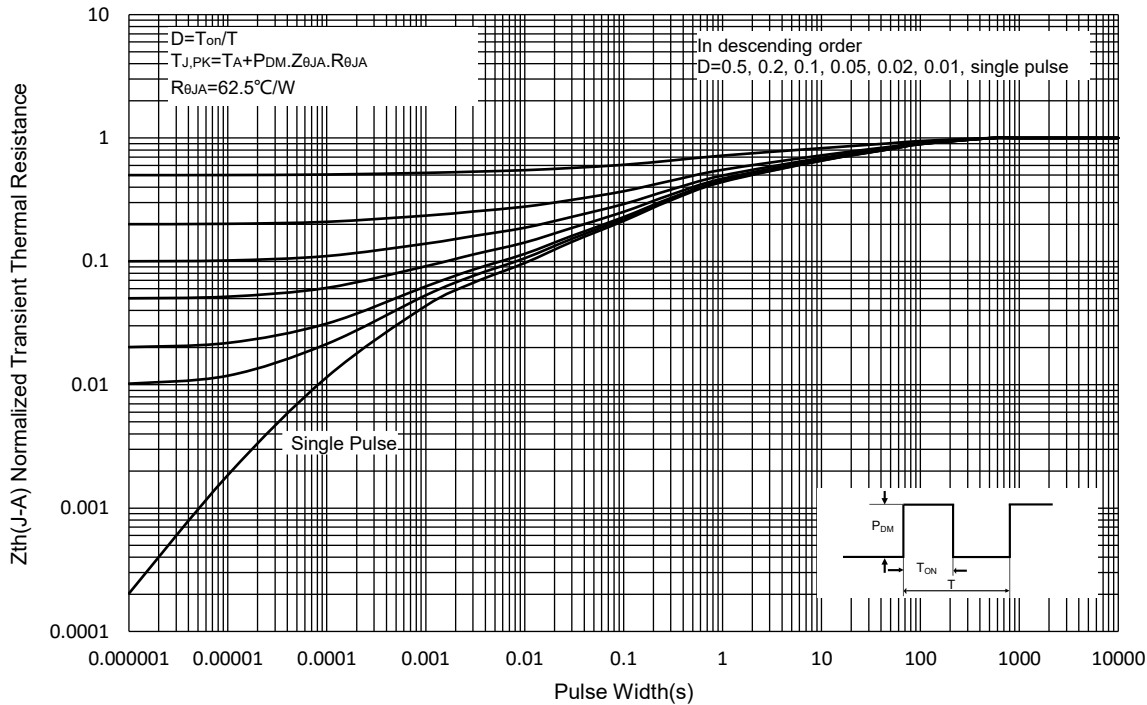


Fig.13 Normalized Transient Thermal Impedance



Curve Characteristics P-Channel

Fig. 1 Typical Output Characteristics

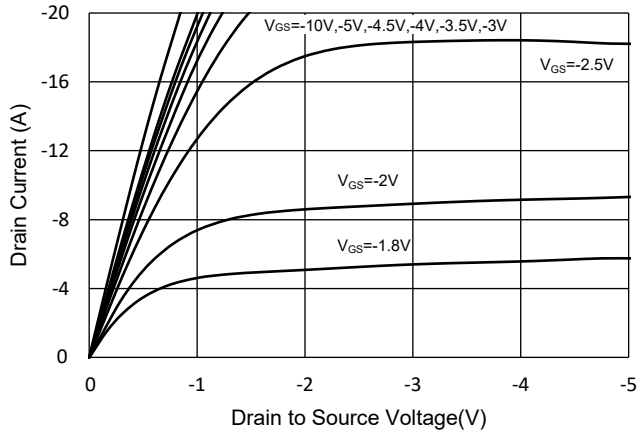


Fig.2 Transfer Characteristic

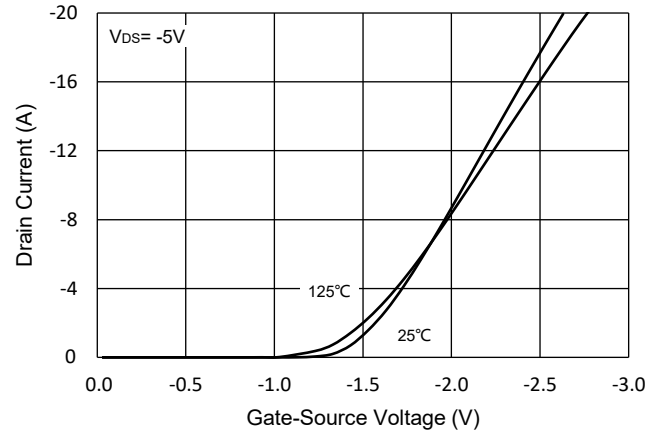


Fig.3 $R_{DS(on)}$ - V_{GS}

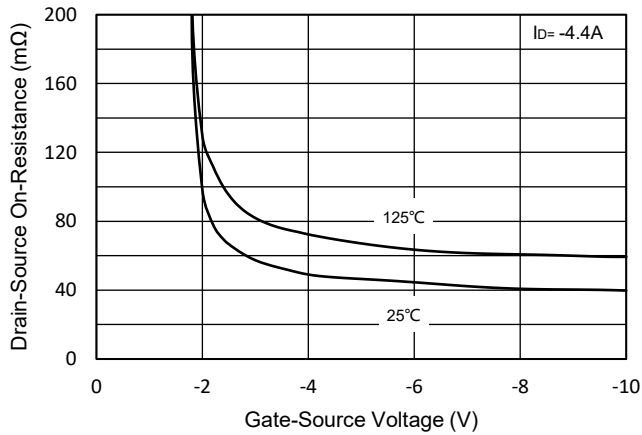


Fig.4 $R_{DS(on)}$ - I_D

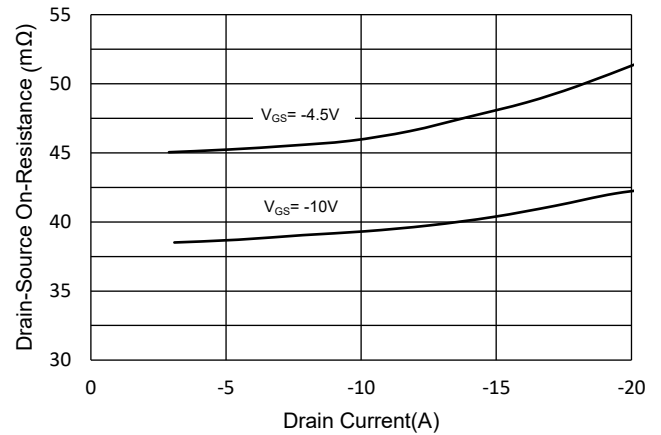


Fig.5 Capacitance Characteristics

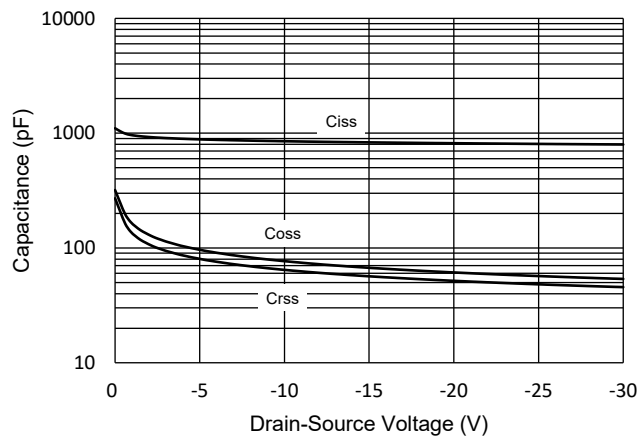
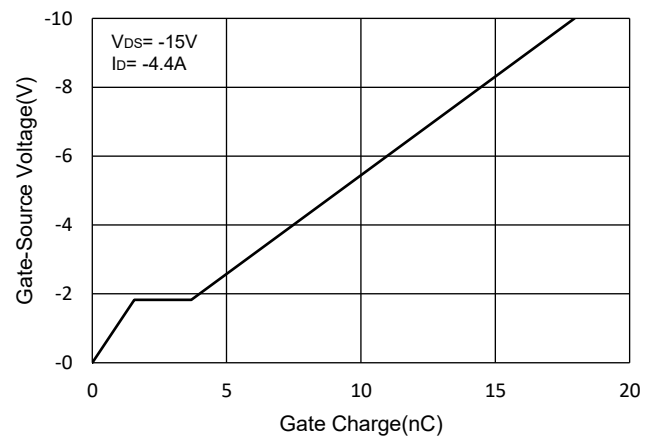


Fig.6 Gate Charge



Curve Characteristics

P-Channel

Fig.7 Normalized Threshold Voltage

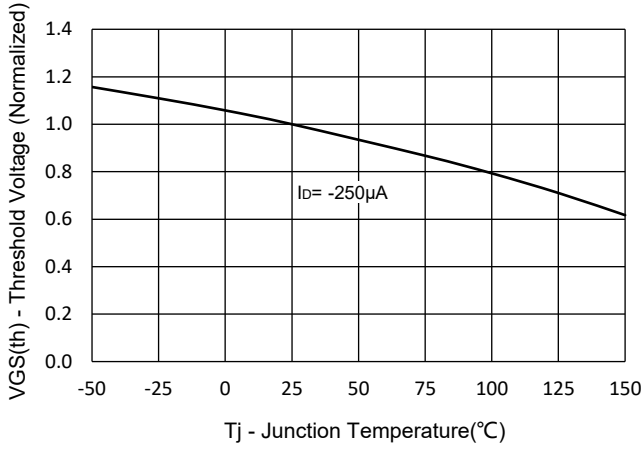


Fig.8 Normalized On Resistance Characteristics

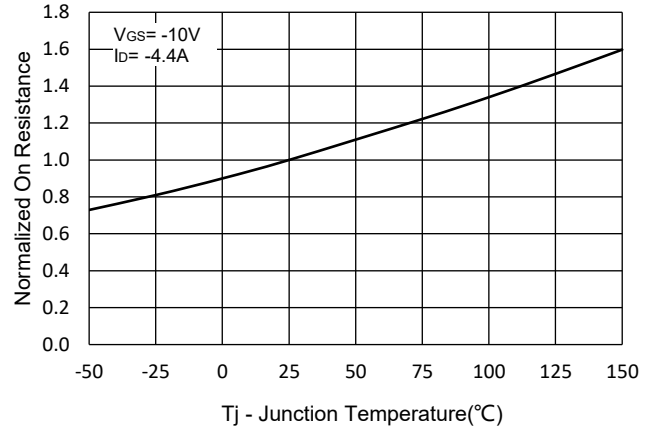


Fig.9 IS-VSD

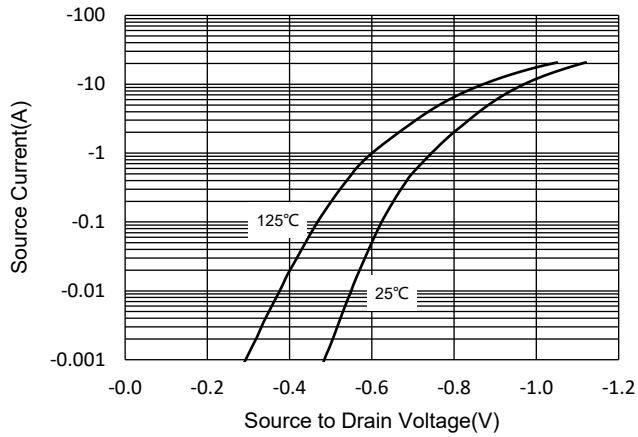


Fig.10 Drain Current

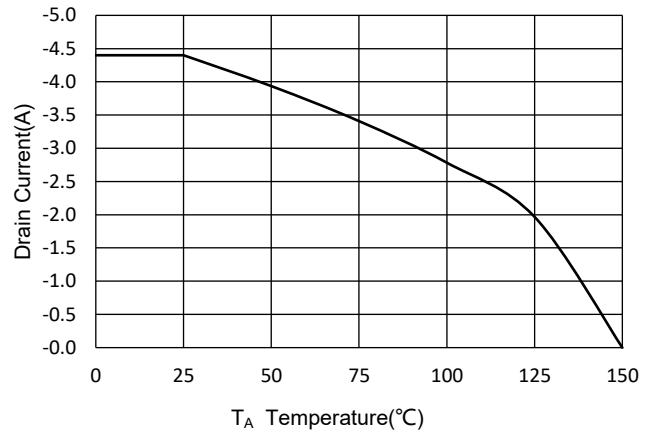
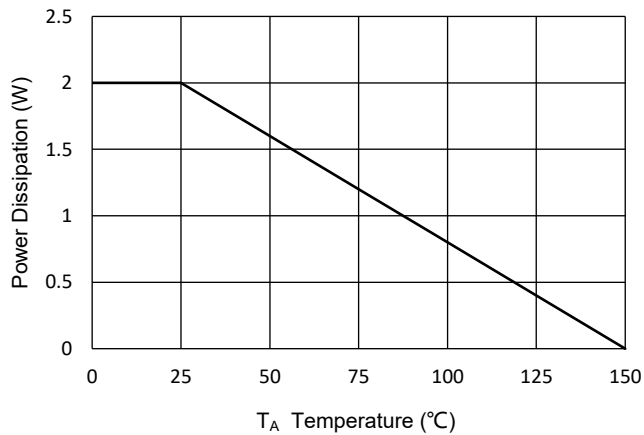


Fig.11 Power Dissipation



Curve Characteristics

P-Channel

Fig.12 Safe Operation Area

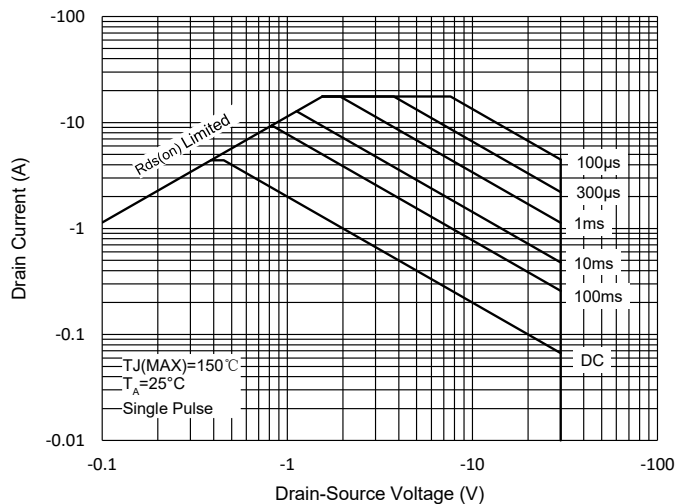
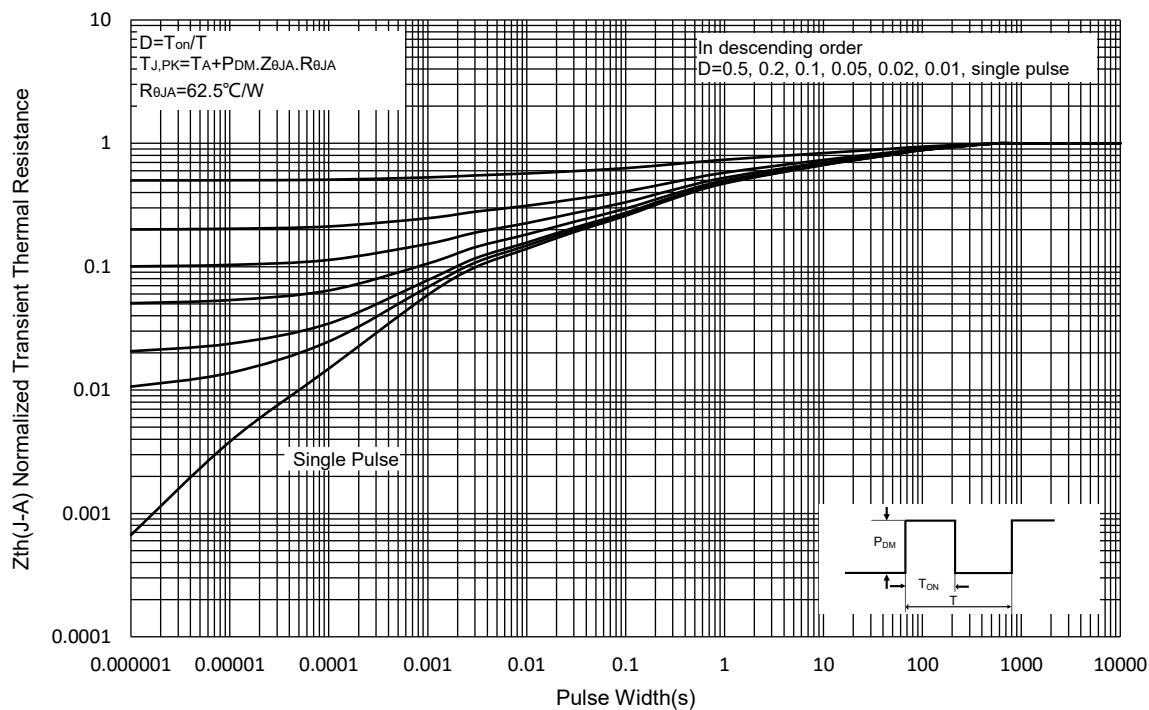


Fig.13 Normalized Transient Thermal Impedance



Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 4Kpcs/Reel

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