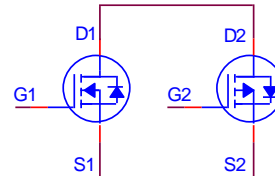


**PRODUCT SUMMARY**

	$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$
Q2	-40V	60mΩ	-17A
Q1	40V	25mΩ	22.5A

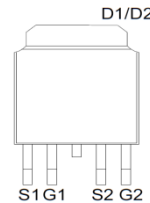


**Features**

- Pb-Free, Halogen Free and RoHS compliant.
- Low  $R_{DS(on)}$  to Minimize Conduction Losses.
- Ohmic Region Good  $R_{DS(on)}$  Ratio.
- Optimized Gate Charge to Minimize Switching Losses.

**Applications**

- Protection Circuits Applications.
- Logic/Load Switch Circuits Applications.
- DC Motor for BLDC Applications.



G. GATE  
D. DRAIN  
S. SOURCE

100% UIS Tested  
100% Rg Tested

**ABSOLUTE MAXIMUM RATINGS ( $T_A = 25\text{ °C}$  Unless Otherwise Noted)**

PARAMETERS/TEST CONDITIONS		SYMBOL	Q2	Q1	UNITS
Drain-Source Voltage		$V_{DS}$	-40	40	V
Gate-Source Voltage		$V_{GS}$	±20	±20	V
Continuous Drain Current <sup>2</sup>	$T_C = 25\text{ °C}$	$I_D$	-17	22.5	A
	$T_C = 100\text{ °C}$		-11	14	
Pulsed Drain Current <sup>1</sup>		$I_{DM}$	-56	60	
Avalanche Current		$I_{AS}$	-21	14	
Avalanche Energy	$L = 0.1\text{mH}$	$E_{AS}$	22	9.8	mJ
Power Dissipation	$T_C = 25\text{ °C}$	$P_D$	34	26.5	W
	$T_C = 100\text{ °C}$		13.8	10.6	
Operating Junction & Storage Temperature Range		$T_j, T_{stg}$	-55 to 150		°C

**THERMAL RESISTANCE RATINGS**

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Ambient	R <sub>θJA</sub>	Q2	62.5	°C / W
		Q1	62.5	
Junction-to-Case	R <sub>θJC</sub>	Q2	3.6	
		Q1	4.7	

<sup>1</sup>Pulse width limited by maximum junction temperature.

<sup>2</sup>Package limitation current :Q1=15A,Q2=-15A

**ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25 °C, Unless Otherwise Noted)**

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT	
			MIN	TYP	MAX		
<b>STATIC</b>							
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	Q2	-40		V	
		V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	Q1	40			
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	Q2	-1.3	-1.85		-2.3
		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	Q1	1.3	1.6		2.3
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	Q2			±100	
		V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	Q1			±100	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -32V, V <sub>GS</sub> = 0V	Q2			-1	
		V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V	Q1			1	
		V <sub>DS</sub> = -30, V <sub>GS</sub> = 0V, T <sub>J</sub> = 55 °C	Q2				-10
		V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 55 °C	Q1				10
Drain-Source On-State Resistance <sup>1</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A	Q2		57	90	
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A	Q1		21	35	
		V <sub>GS</sub> = -10V, I <sub>D</sub> = -4A	Q2		36	60	
		V <sub>GS</sub> = 10V, I <sub>D</sub> = 6A	Q1		18	25	
Forward Transconductance <sup>1</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -5V, I <sub>D</sub> = -4A	Q2		10		
		V <sub>DS</sub> = 5V, I <sub>D</sub> = 6A	Q1		27		
<b>DYNAMIC</b>							
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = -20V, f = 1MHz Q1 V <sub>GS</sub> = 0V, V <sub>DS</sub> = 20V, f = 1MHz	Q2		538		
			Q1		460		
Output Capacitance	C <sub>oss</sub>		Q2		127		
			Q1		66		
Reverse Transfer Capacitance	C <sub>rss</sub>		Q2		73		
			Q1		39		
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz	Q2		14		
			Q1		4.6		

Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	V <sub>GS</sub> = 10V	Q2 V <sub>DS</sub> = -20V , V <sub>GS</sub> = -10V, I <sub>D</sub> = -4A Q1 V <sub>DS</sub> = 20V , V <sub>GS</sub> = 10V, I <sub>D</sub> = 6A	Q2	11.6	nC	
		V <sub>GS</sub> = 4.5V		Q1	9.9		
Gate-Source Charge <sup>2</sup>	Q <sub>gs</sub>			Q2	6.5		
				Q1	5.6		
Gate-Drain Charge <sup>2</sup>	Q <sub>gd</sub>			Q2	1.5		
				Q1	1.3		
Turn-On Delay Time <sup>2</sup>	t <sub>d(on)</sub>			Q2	11		nS
				Q1	9.5		
Rise Time <sup>2</sup>	t <sub>r</sub>		Q2	26			
			Q1	37			
Turn-Off Delay Time <sup>2</sup>	t <sub>d(off)</sub>		Q2	54			
			Q1	24			
Fall Time <sup>2</sup>	t <sub>f</sub>		Q2	47			
			Q1	63			
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T<sub>J</sub> = 25 °C)</b>							
Continuous Current <sup>3</sup>	I <sub>S</sub>		Q2	-17	A		
			Q1	22			
Forward Voltage <sup>1</sup>	V <sub>SD</sub>	I <sub>F</sub> = -4A, V <sub>GS</sub> = 0V	Q2	-1.2	V		
		I <sub>F</sub> = 6A, V <sub>GS</sub> = 0V	Q1	1.2			
Reverse Recovery Time	t <sub>rr</sub>	Q2 I <sub>F</sub> = -4A, di <sub>F</sub> /dt = 100A / μS	Q2	12	nS		
			Q1	10			
Reverse Recovery Charge	Q <sub>rr</sub>	Q1 I <sub>F</sub> = 6A, di <sub>F</sub> /dt = 100A / μS	Q2	6	nC		
			Q1	5			

<sup>1</sup>Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

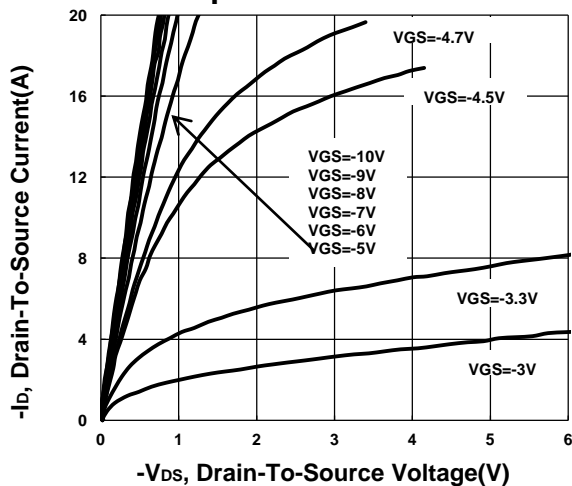
<sup>2</sup>Independent of operating temperature.

<sup>3</sup>Package limitation current :Q1=15A,Q2=-15A

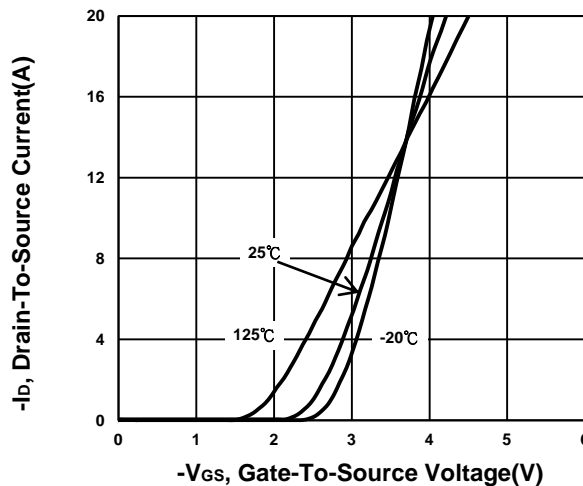
**Typical performance characteristics**

**Q2 P-Channel**

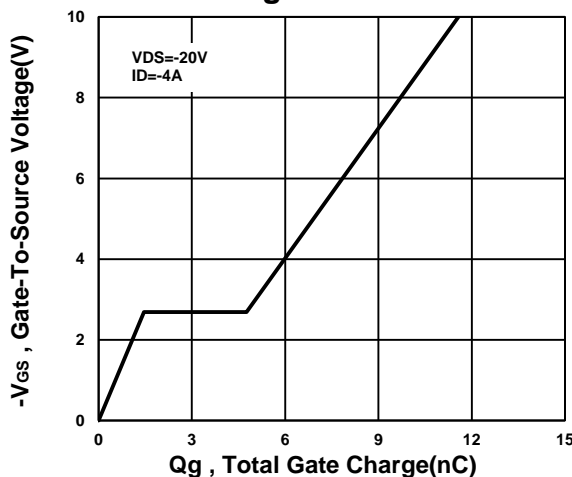
**Output Characteristics**



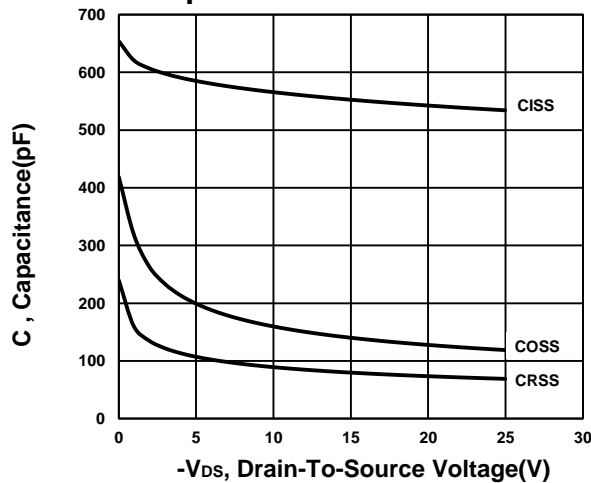
**Transfer Characteristics**



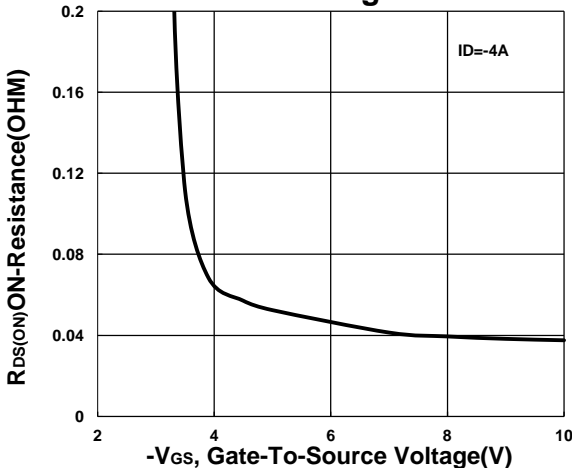
**Gate charge Characteristics**



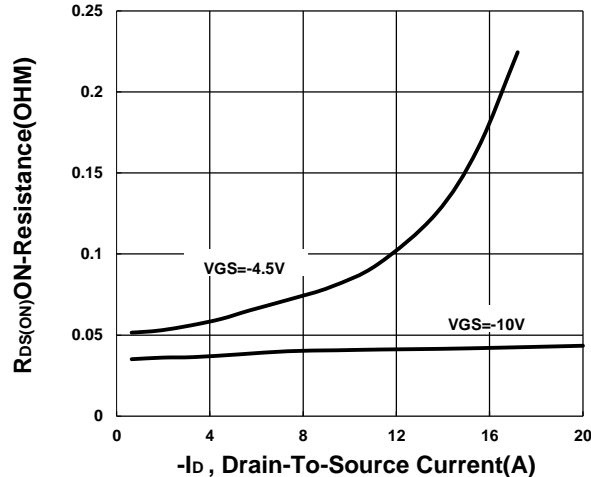
**Capacitance Characteristic**



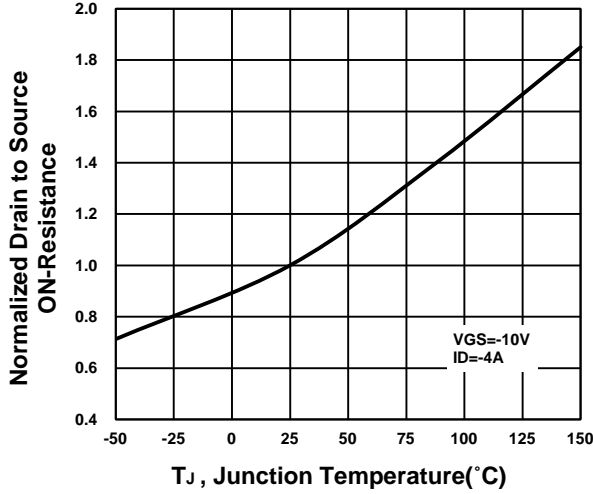
**On-Resistance VS Gate-To-Source Voltage**



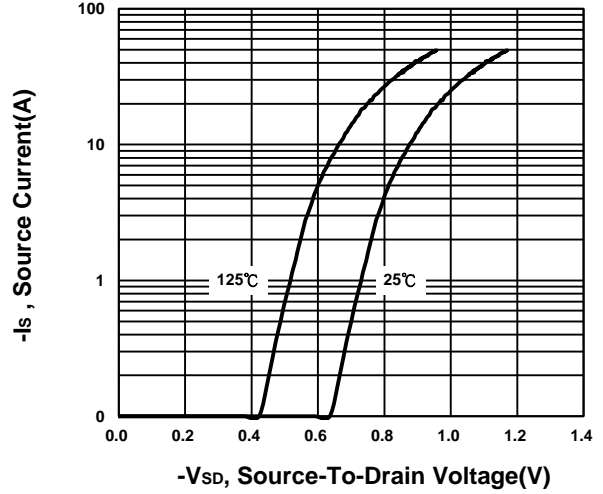
**On-Resistance VS Drain Current**



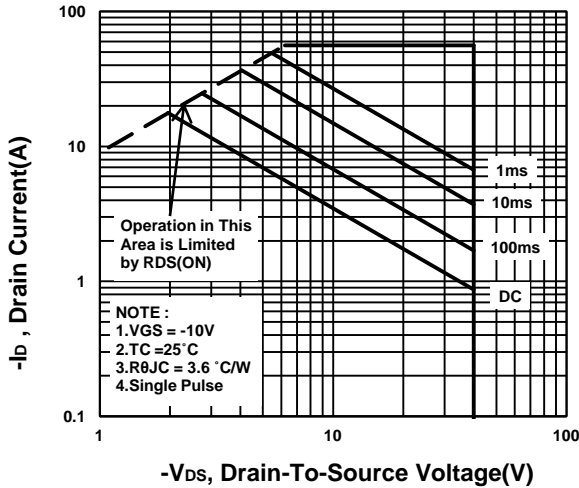
**On-Resistance VS Temperature**



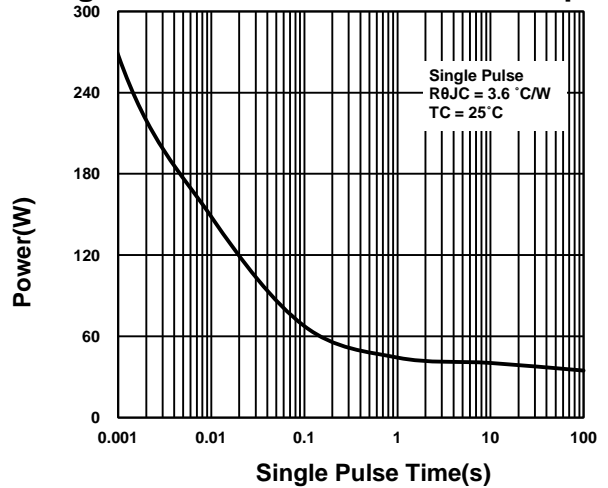
**Source-Drain Diode Forward Voltage**



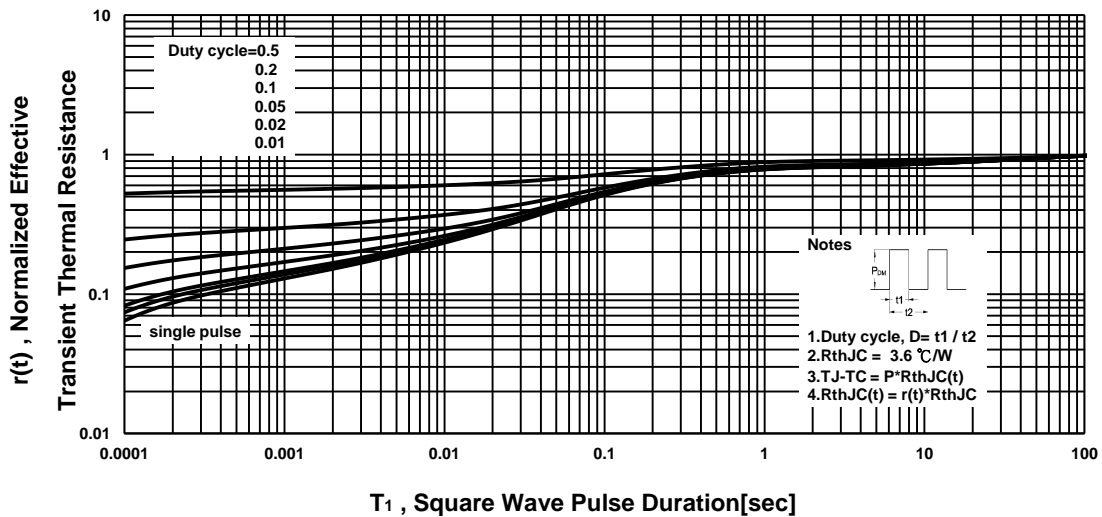
**Safe Operating Area**



**Single Pulse Maximum Power Dissipation**

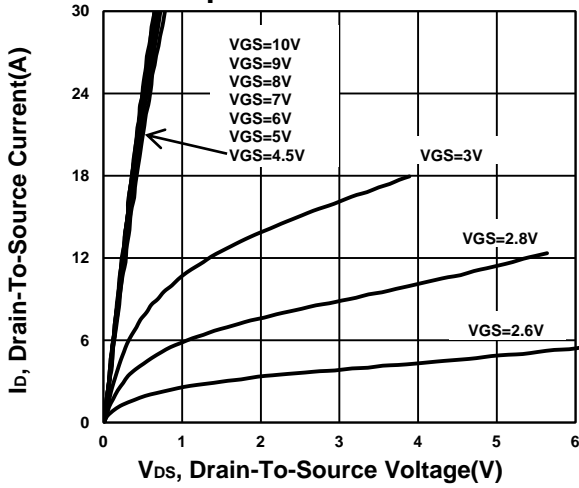


**Transient Thermal Response Curve**

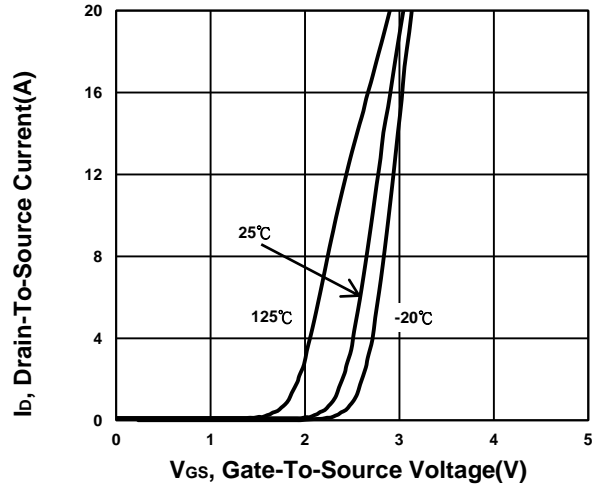


**Q1 N- Channel**

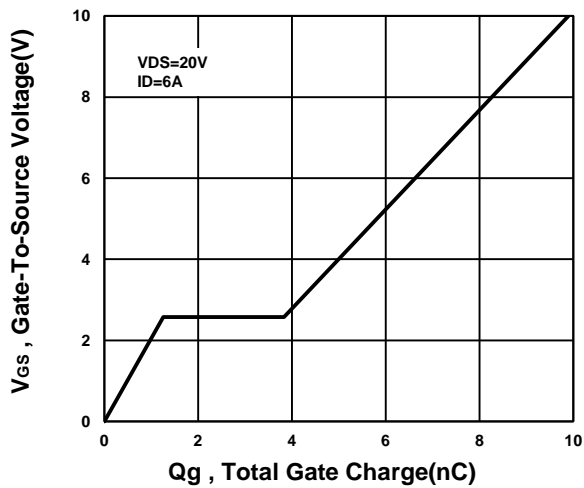
**Output Characteristics**



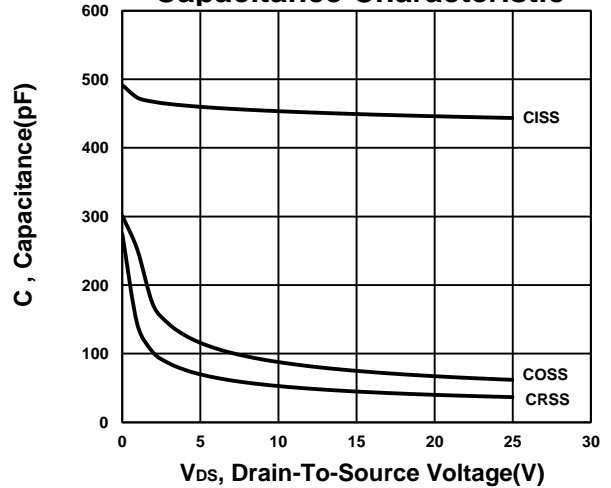
**Transfer Characteristics**



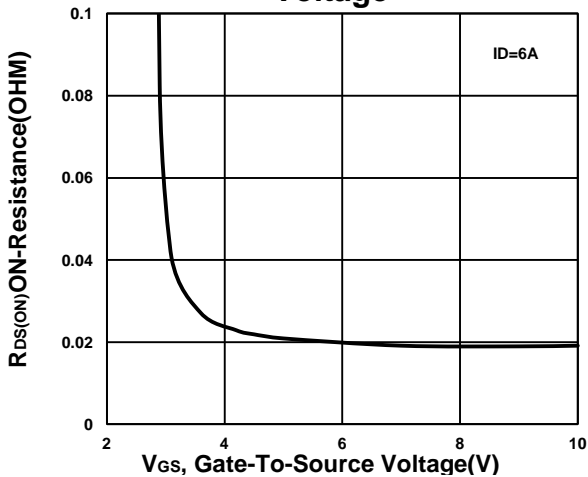
**Gate charge Characteristics**



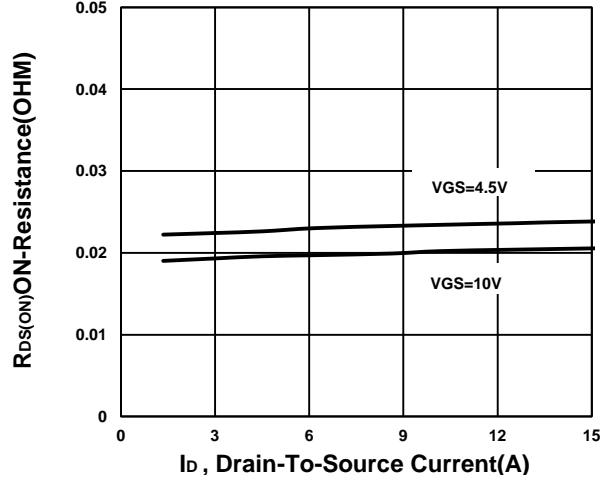
**Capacitance Characteristic**



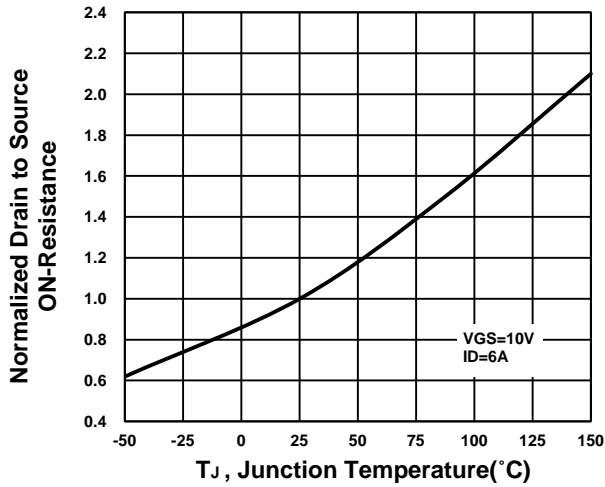
**On-Resistance VS Gate-To-Source Voltage**



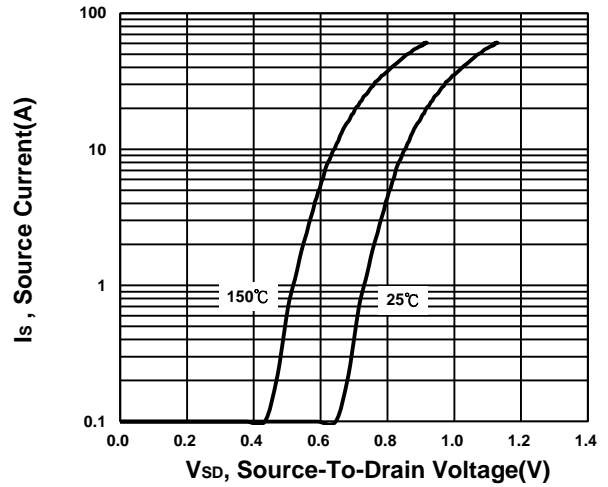
**On-Resistance VS Drain Current**



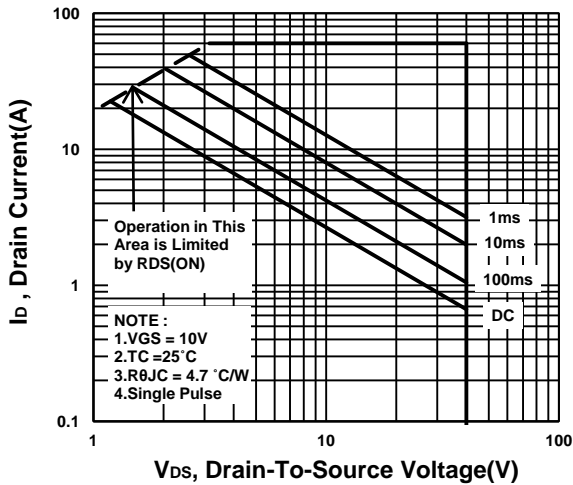
**On-Resistance VS Temperature**



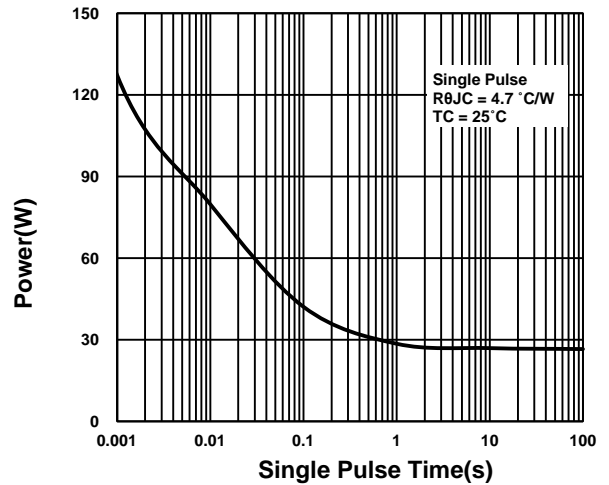
**Source-Drain Diode Forward Voltage**



**Safe Operating Area**



**Single Pulse Maximum Power Dissipation**



**Transient Thermal Response Curve**

