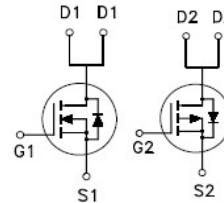


**PRODUCT SUMMARY**

	$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$
Q2	-30V	24mΩ	-25A
Q1	30V	9.9mΩ	48A

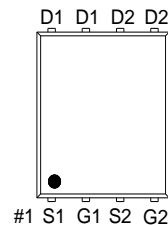


**Features**

- 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		$V_{DS}$	-30	30	V
Gate-Source Voltage		$V_{GS}$	±25	±20	V
Continuous Drain Current	$T_C = 25\text{ °C}$	$I_D$	-25	48	A
	$T_C = 100\text{ °C}$		-16	30	
Pulsed Drain Current <sup>1</sup>		$I_{DM}$	-100	130	
Continuous Drain Current <sup>3</sup>	$T_A = 25\text{ °C}$	$I_D$	-8	12	
	$T_A = 70\text{ °C}$		-6.4	10	
Avalanche Current		$I_{AS}$	-24	22	
Avalanche Energy	$L = 0.1\text{mH}$	$E_{AS}$	29	24	mJ
Power Dissipation	$T_C = 25\text{ °C}$	$P_D$	26	42	W
	$T_C = 100\text{ °C}$		10	17	
Power Dissipation <sup>3</sup>	$T_A = 25\text{ °C}$	$P_D$	2.7	2.8	W
	$T_A = 70\text{ °C}$		1.7	1.8	
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 <sup>2</sup>	t ≤ 10s	R <sub>θJA</sub>	Q2		47	°C / W
			Q1		44	
Junction-to-Ambient <sup>2</sup>	Steady-State	R <sub>θJA</sub>	Q2		75	
			Q1		72	
Junction-to-Case		R <sub>θJC</sub>	Q2		4.9	
			Q1		3	

<sup>1</sup>Pulse width limited by maximum junction temperature T<sub>J(MAX)</sub>=150°C.

<sup>2</sup>The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub> =25°C. The value in any given application depends on the user's specific board design.

<sup>3</sup>The Power dissipation is based on R<sub>θJA</sub> t ≤ 10s value.

**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	-30		V	
		V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	Q1	30			
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	Q2	-1.3	-1.7	-2.3	V
		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	Q1	1.47	1.8	2.35	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	Q2			±100	nA
		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> = -30V, V <sub>GS</sub> = 0V	Q2			-1	μA
		V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V	Q1			1	
		V <sub>DS</sub> = -30V, 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> = -7A	Q2		28.1	40	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 13A	Q1		10.1	14	
		V <sub>GS</sub> = -10V, I <sub>D</sub> = -7A	Q2		18.7	24	
		V <sub>GS</sub> = 10V, I <sub>D</sub> = 13A	Q1		7.6	9.9	
Forward Transconductance <sup>1</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -5V, I <sub>D</sub> = -7A	Q2		50		S
		V <sub>DS</sub> = 5V, I <sub>D</sub> = 13A	Q1		28		

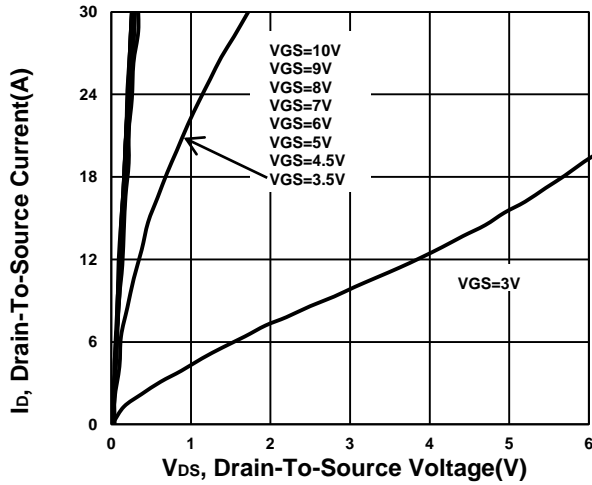
DYNAMIC								
Input Capacitance	$C_{iss}$	Q2 $V_{GS} = 0V, V_{DS} = -15V, f = 1MHz$ Q1 $V_{GS} = 0V, V_{DS} = 15V, f = 1MHz$	Q2		1002		pF	
Output Capacitance	$C_{oss}$		Q1		840			
Reverse Transfer Capacitance	$C_{rss}$		Q2		167			
		Q1		150				
Gate Resistance	$R_g$	$V_{GS} = 0V, V_{DS} = 0V, f = 1MHz$	Q2		7.5			$\Omega$
			Q1		0.65			
Total Gate Charge <sup>2</sup>	$Q_g$	Q2 $V_{DS} = -15V, V_{GS} = -10V,$ $I_D = -7A$ Q1 $V_{DS} = 15V, V_{GS} = 10V,$ $I_D = 13A$	Q2	$V_{GS} = 10V$	20		nC	
			Q1		18			
Gate-Source Charge <sup>2</sup>	$Q_{gs}$		Q2	$V_{GS} = 4.5V$	10			
			Q1		9.9			
Gate-Drain Charge <sup>2</sup>	$Q_{gd}$		Q2		2.4			
			Q1		2.1			
Turn-On Delay Time <sup>2</sup>	$t_{d(on)}$	Q2, $V_{DS} = -15V$ $I_D \cong -7A, V_{GS} = -10V,$ $R_{GEN} = 6\Omega$  Q1, $V_{DS} = 15V$ $I_D \cong 13A, V_{GS} = 10V,$ $R_{GEN} = 6\Omega$	Q2		7.4		nS	
			Q1		9			
Rise Time <sup>2</sup>	$t_r$		Q2		40			
			Q1		73			
Turn-Off Delay Time <sup>2</sup>	$t_{d(off)}$		Q2		47			
			Q1		24			
Fall Time <sup>2</sup>	$t_f$		Q2		63			
			Q1		105			
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ( $T_J = 25^\circ C$ )								
Continuous Current	$I_S$		Q2			-20	A	
			Q1			35		
Forward Voltage <sup>1</sup>	$V_{SD}$		Q2	$I_F = -7A, V_{GS} = 0V$		-1.3	V	
			Q1	$I_F = 13A, V_{GS} = 0V$		1.2		
Reverse Recovery Time	$t_{rr}$	Q2 $I_F = -7A, dl_F/dt = 100A / \mu S$ Q1 $I_F = 13A, dl_F/dt = 100A / \mu S$	Q2		8.6		nS	
			Q1		7.7			
Reverse Recovery Charge	$Q_{rr}$		Q2		2.1		nC	
			Q1		1.6			

<sup>1</sup>Pulse test : Pulse Width  $\leq 300 \mu sec$ , Duty Cycle  $\leq 2\%$ .

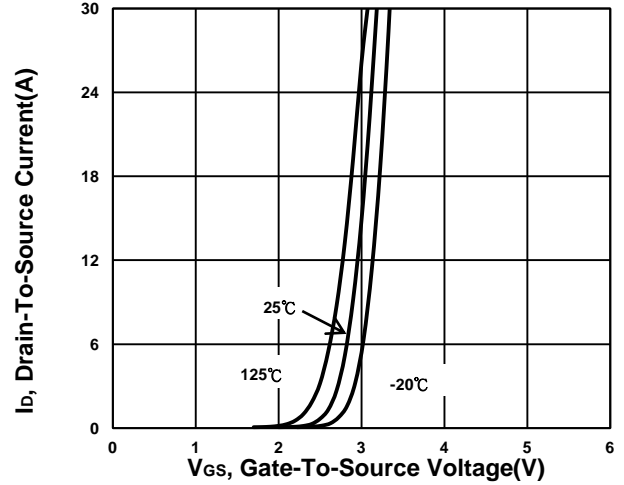
<sup>2</sup>Independent of operating temperature.

**TYPICAL PERFORMANCE CHARACTERISTICS  
N-CHANNEL**

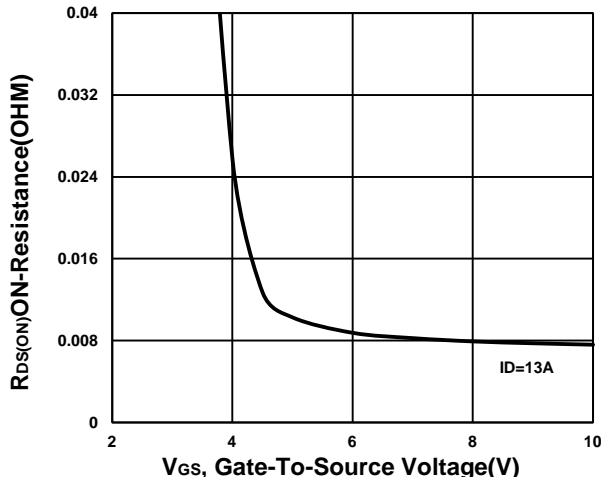
**Output Characteristics**



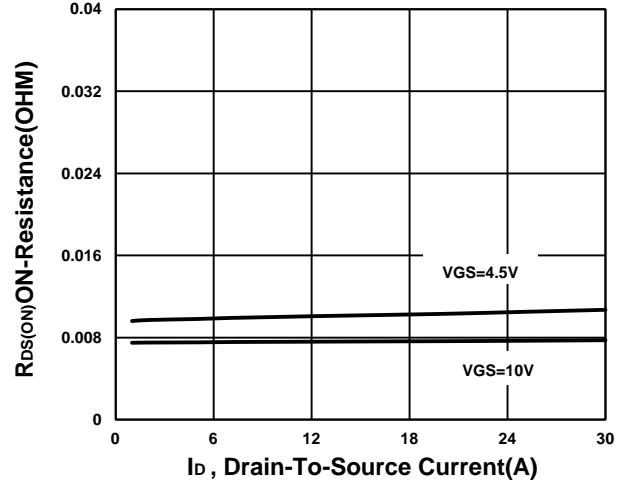
**Transfer Characteristics**



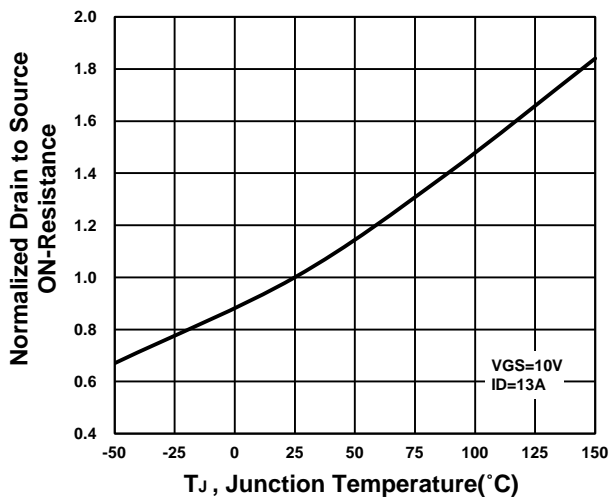
**On-Resistance VS Gate-To-Source Voltage**



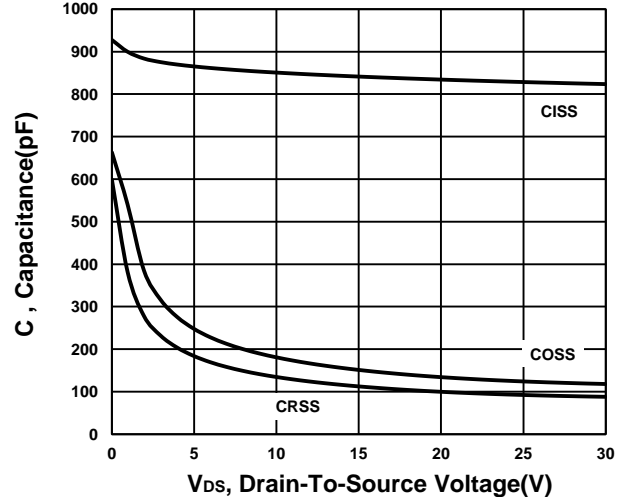
**On-Resistance VS Drain Current**



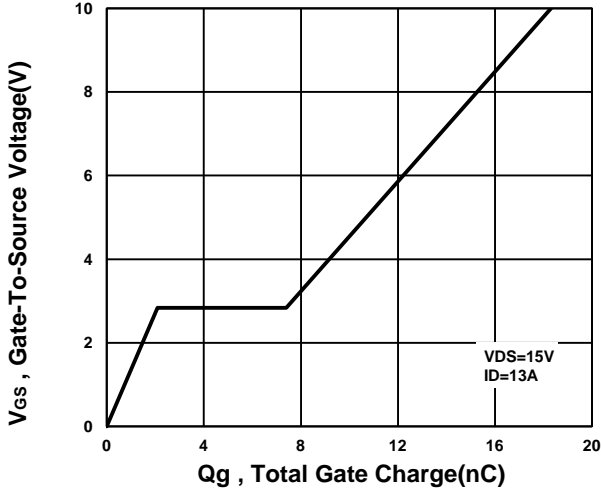
**On-Resistance VS Temperature**



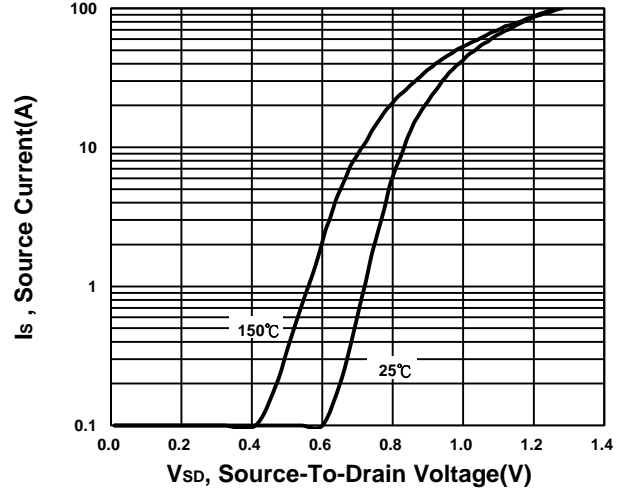
**Capacitance Characteristic**



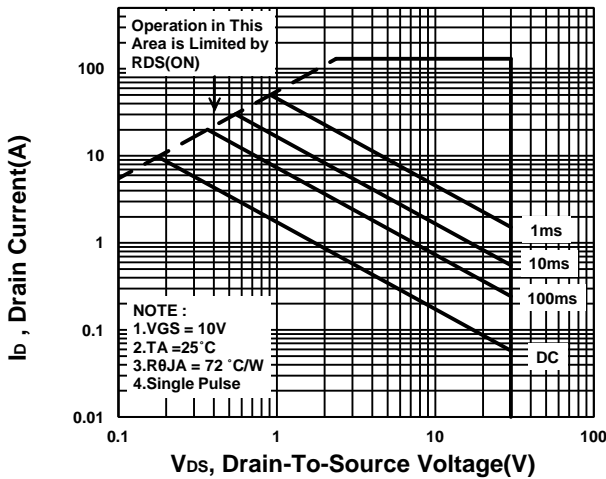
**Gate charge Characteristics**



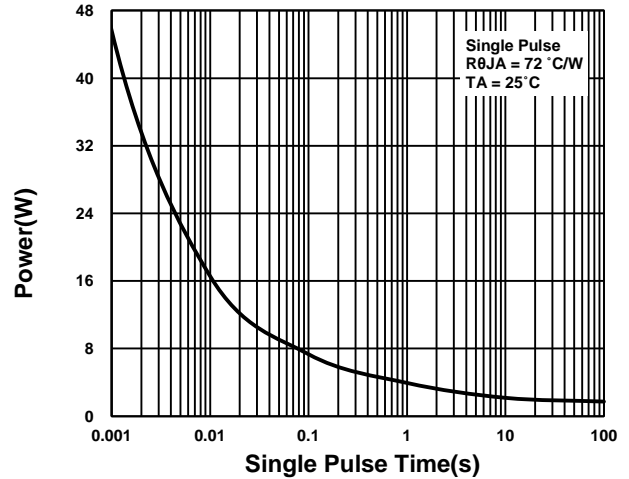
**Source-Drain Diode Forward Voltage**



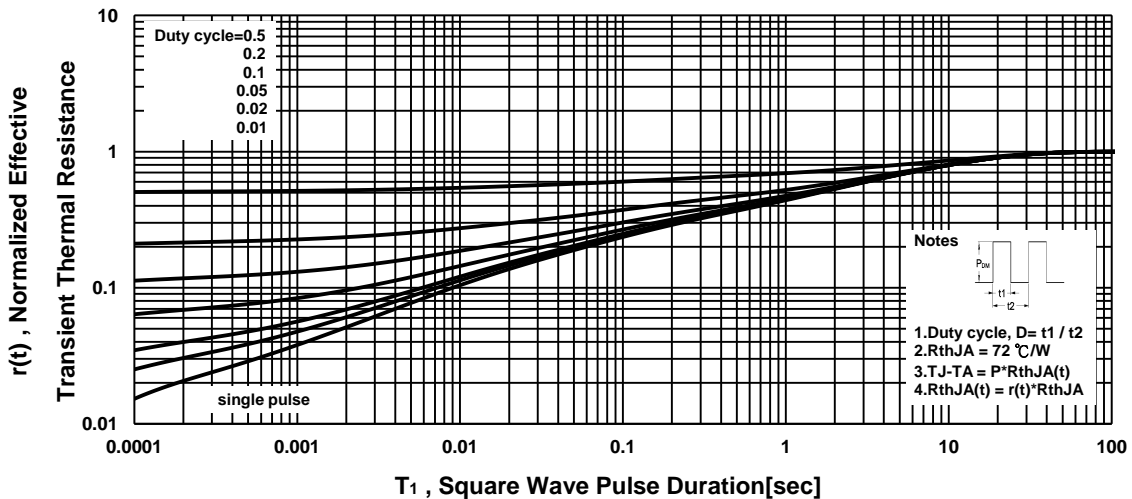
**Safe Operating Area**



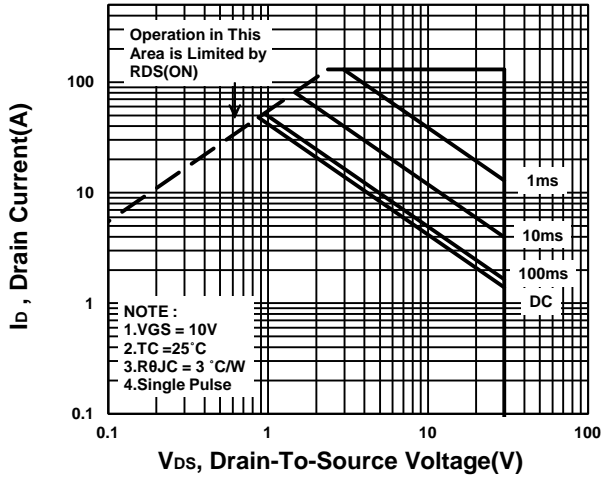
**Single Pulse Maximum Power Dissipation**



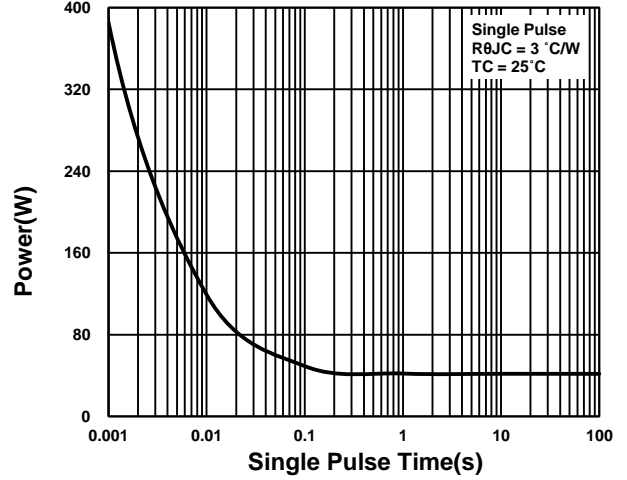
**Transient Thermal Response Curve**



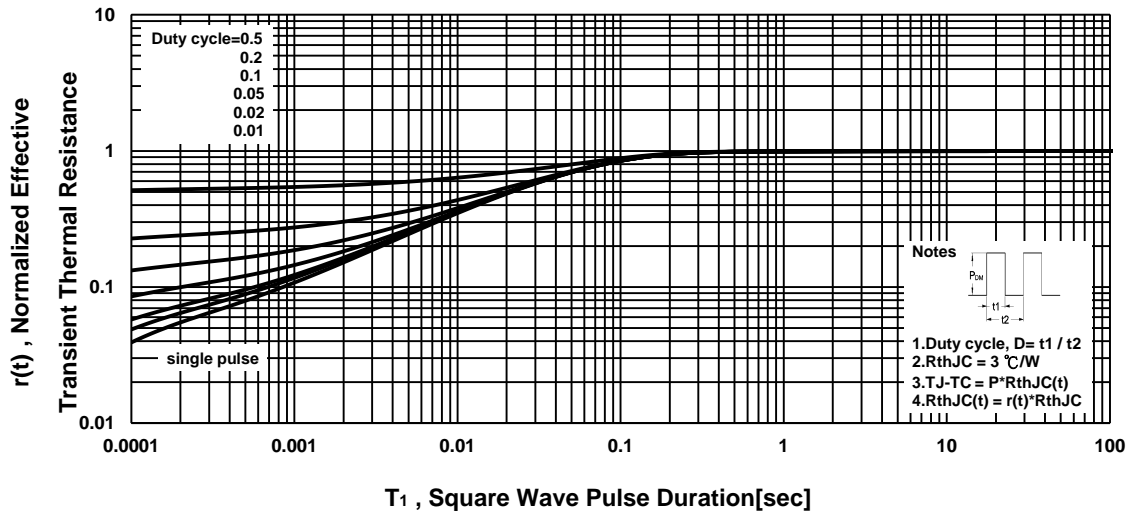
**Safe Operating Area**



**Single Pulse Maximum Power Dissipation**

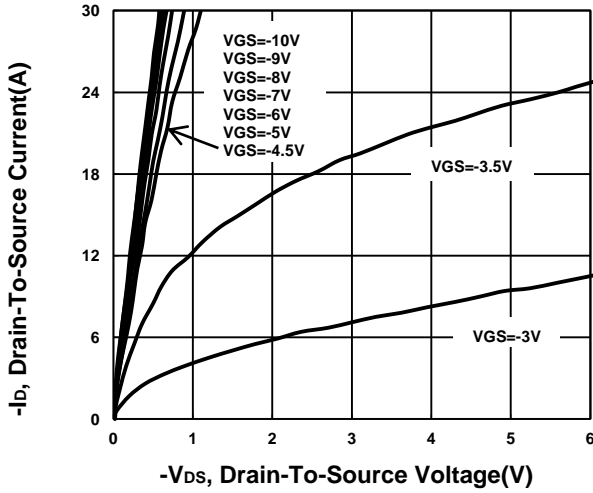


**Transient Thermal Response Curve**

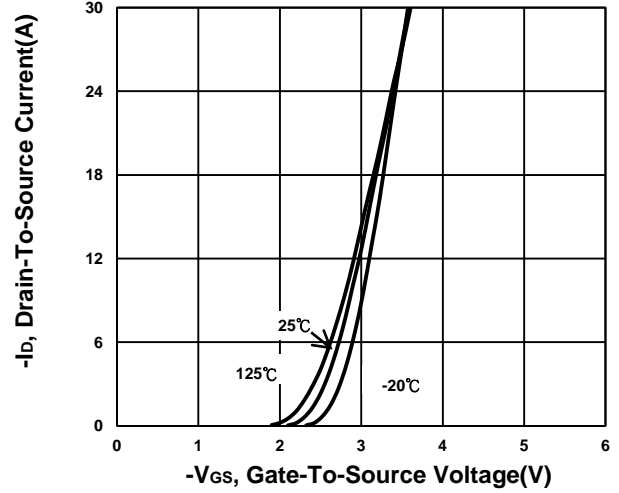


**P-CHANNEL**

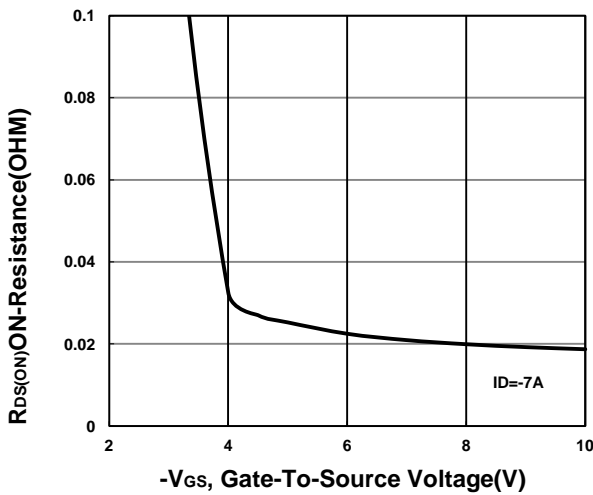
**Output Characteristics**



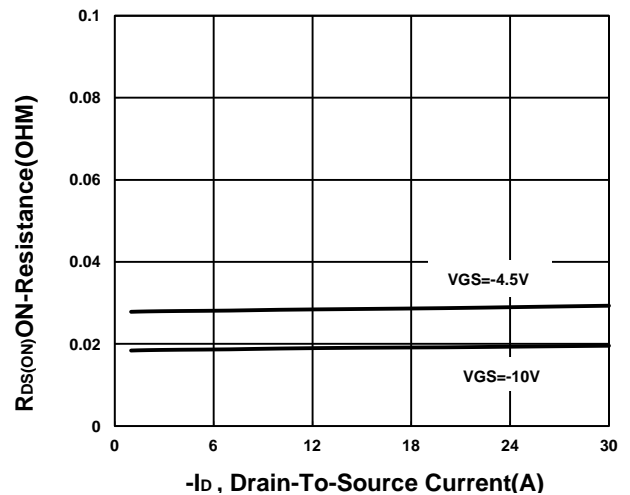
**Transfer Characteristics**



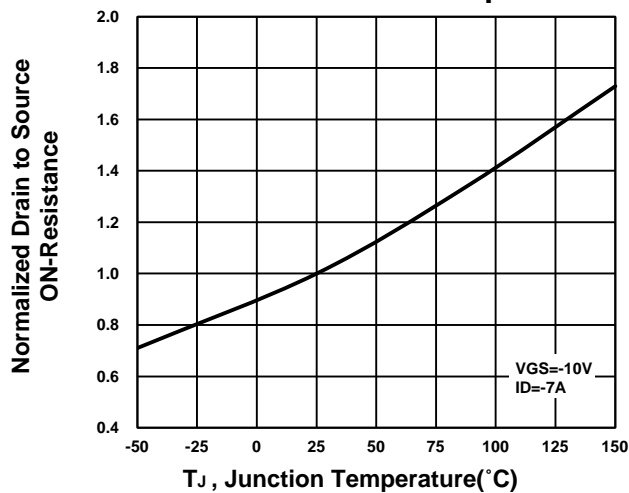
**On-Resistance VS Gate-To-Source Voltage**



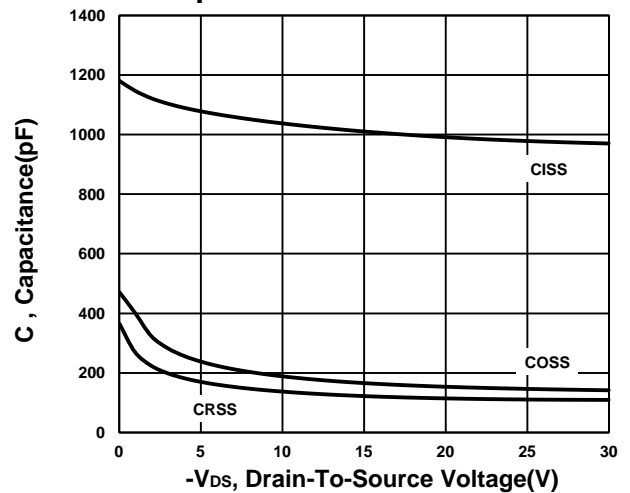
**On-Resistance VS Drain Current**

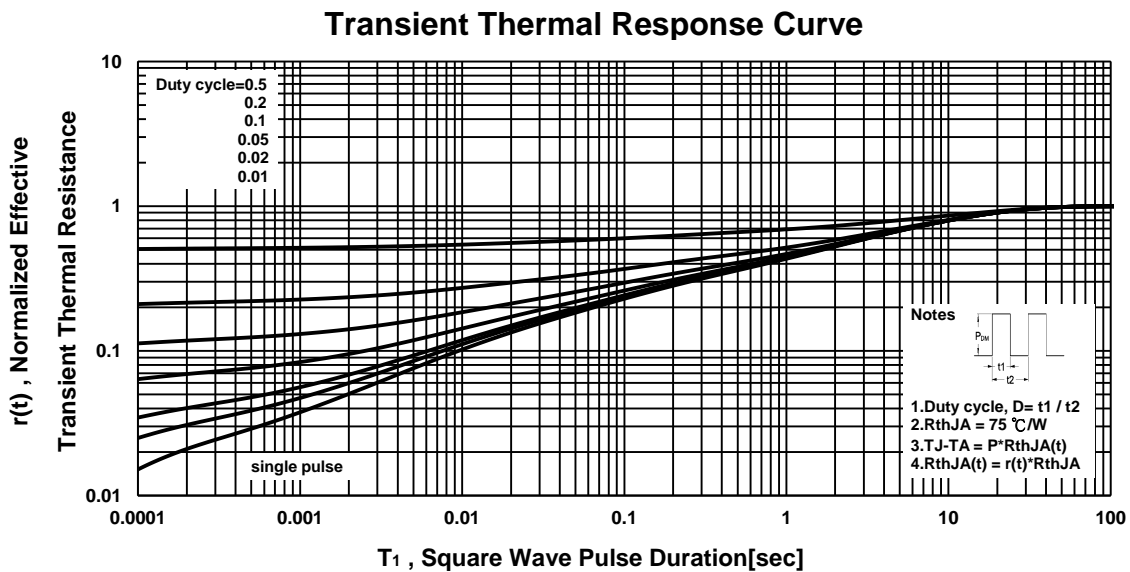
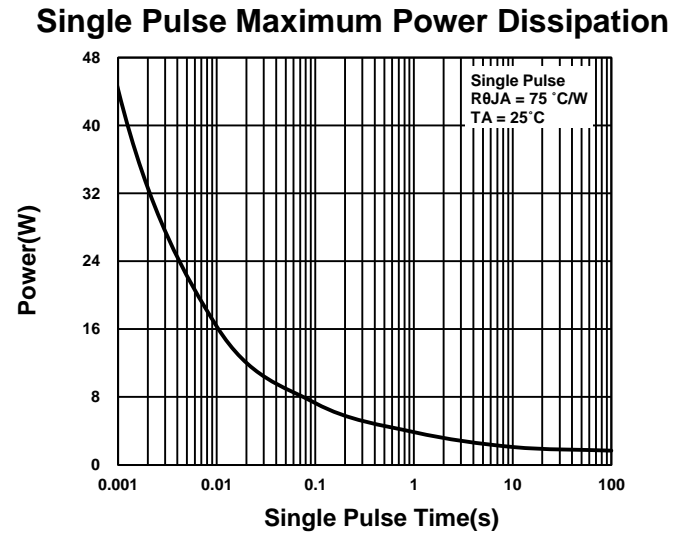
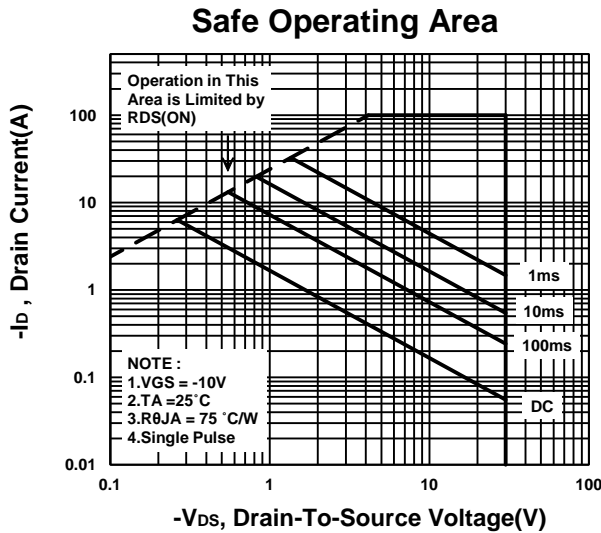
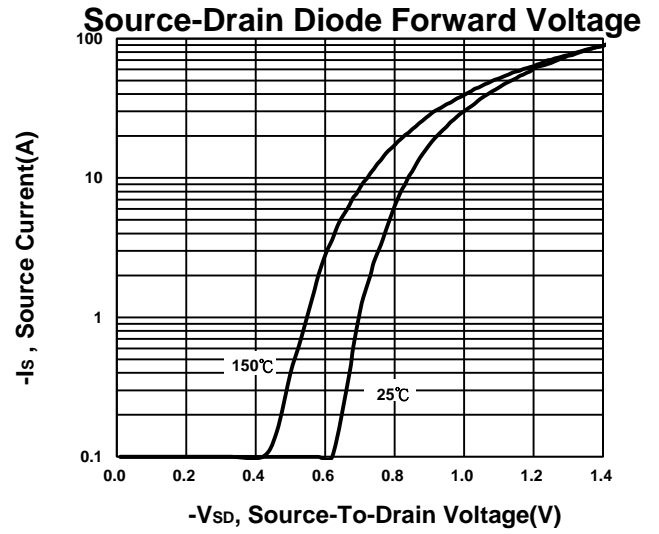
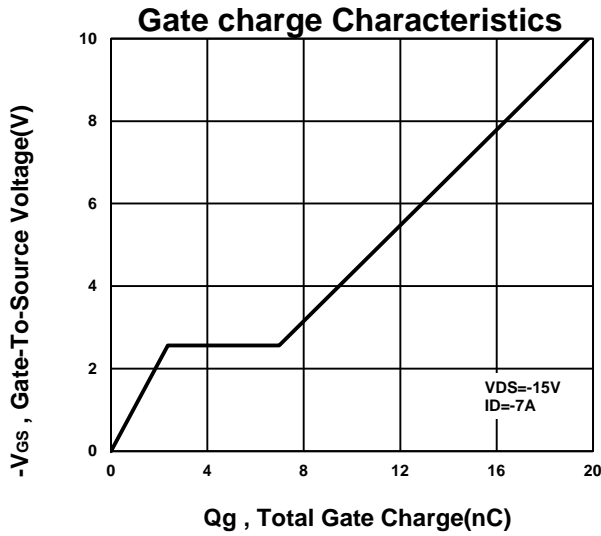


**On-Resistance VS Temperature**



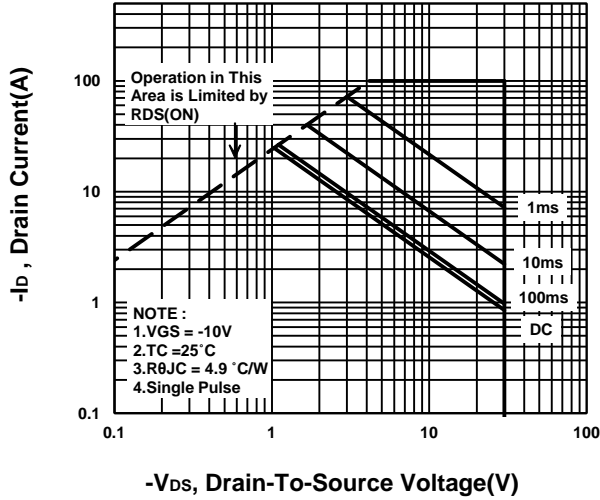
**Capacitance Characteristic**



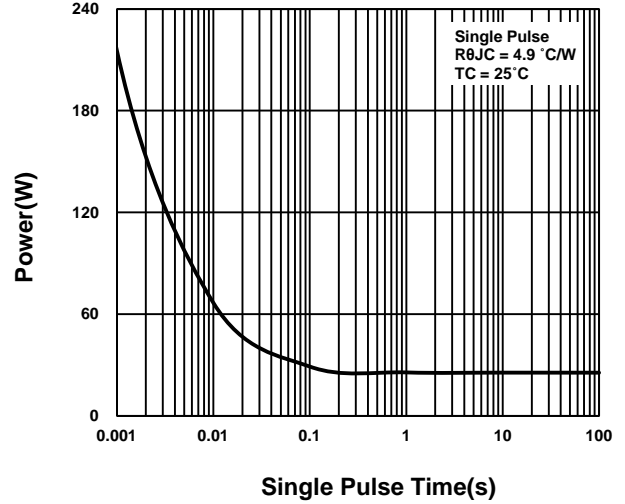




**Safe Operating Area**



**Single Pulse Maximum Power Dissipation**



**Transient Thermal Response Curve**

