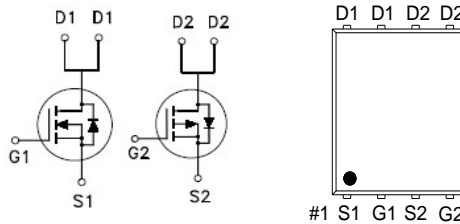


PRODUCT SUMMARY

	$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
Q2	-40V	60mΩ	-14A
Q1	40V	25mΩ	19.5A



G. GATE
D. DRAIN
S. SOURCE

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °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 ⁴	T _C = 25 °C	I_D	-14	19.5	A
	T _C = 100 °C		-8.8	12.3	
Pulsed Drain Current ¹		I_{DM}	-54	63	
Continuous Drain Current ³	T _A = 25 °C	I_D	-5.3	7.7	
	T _A = 70 °C		-4.2	6.1	
Avalanche Current		I_{AS}	-21	14	
Avalanche Energy	L = 0.1mH	E_{AS}	22	10	mJ
Power Dissipation	T _C = 25 °C	P_D	21	20	W
	T _C = 100 °C		8.6	8	
Power Dissipation ³	T _A = 25 °C	P_D	3.1	3.1	W
	T _A = 70 °C		2	2	
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 ²	t ≤ 10s	$R_{\theta JA}$	Q2	40	°C / W
			Q1	40	
Junction-to-Ambient ²	Steady-State	$R_{\theta JA}$	Q2	74	
			Q1	76	
Junction-to-Case		$R_{\theta JC}$	Q2	5.8	
			Q1	6.2	

¹Pulse width limited by maximum junction temperature T_{J(MAX)}=150°C.

²The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design.

³The Power dissipation is based on R_{θJA} t ≤ 10s value.

⁴Package limitation current :Q1=15A,Q2=-16A.

ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT	
			MIN	TYP	MAX		
STATIC							
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	Q2	-40		V	
		V _{GS} = 0V, I _D = 250μA	Q1	40			
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	Q2	-1.3	-1.87	-2.3	V
		V _{DS} = V _{GS} , I _D = 250μA	Q1	1.3	1.7	2.3	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	Q2			±100	nA
		V _{DS} = 0V, V _{GS} = ±20V	Q1			±100	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -32V, V _{GS} = 0V	Q2			-1	μA
		V _{DS} = 32V, V _{GS} = 0V	Q1			1	
		V _{DS} = -30V, V _{GS} = 0V, T _J = 55 °C	Q2			-10	
		V _{DS} = 30V, V _{GS} = 0V, T _J = 55 °C	Q1			10	
Drain-Source On-State Resistance ¹	R _{DS(ON)}	V _{GS} = -4.5V, I _D = -4A	Q2		55.3	90	mΩ
		V _{GS} = 4.5V, I _D = 6A	Q1		20.6	35	
		V _{GS} = -10V, I _D = -4A	Q2		34.7	60	
		V _{GS} = 10V, I _D = 6A	Q1		17.2	25	
Forward Transconductance ¹	g _{fs}	V _{DS} = -5V, I _D = -4A	Q2		16.6		S
		V _{DS} = 5V, I _D = 6A	Q1		26		
DYNAMIC							
Input Capacitance	C _{iss}	Q2 V _{GS} = 0V, V _{DS} = -20V, f = 1MHz Q1 V _{GS} = 0V, V _{DS} = 20V, f = 1MHz	Q2		538		pF
			Q1		452		
Output Capacitance	C _{oss}		Q2		127		
			Q1		63		
Reverse Transfer Capacitance	C _{riss}		Q2		74		
			Q1		38		
Gate Resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	Q2		13		Ω
			Q1		4.4		
Total Gate Charge ²	Q _g	Q2 V _{DS} = -20V, V _{GS} = -10V, I _D = -4A Q1 V _{DS} = 20V, V _{GS} = 10V, I _D = 6A	V _{GS} = 10V	Q2		11.6	nC
			V _{GS} = 10V	Q1		9.8	
			V _{GS} = 4.5V	Q2		6.5	
			V _{GS} = 4.5V	Q1		5.4	
Gate-Source Charge ²	Q _{gs}		Q2		1.4		
			Q1		1.2		
Gate-Drain Charge ²	Q _{gd}		Q2		3.3		
			Q1		2.7		

Turn-On Delay Time ²	$t_{d(on)}$	<p>Q2 , $V_{DS} = -20V$, $I_D \cong -4A$, $V_{GS} = -10V$, $R_{GEN} = 6\Omega$</p> <p>Q1 , $V_{DS} = 20V$, $I_D \cong 6A$, $V_{GS} = 10V$, $R_{GEN} = 6\Omega$</p>	Q2		11.4		nS
			Q1		9.9		
Rise Time ²	t_r		Q2		21.5		
			Q1		31		
Turn-Off Delay Time ²	$t_{d(off)}$		Q2		58.1		
			Q1		25		
Fall Time ²	t_f	Q2		46.7			
		Q1		39.3			
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$)							
Continuous Current ³	I_S		Q2			-14	A
			Q1			16	
Forward Voltage ¹	V_{SD}	$I_F = -4A$, $V_{GS} = 0V$	Q2			-1.2	V
		$I_F = 6A$, $V_{GS} = 0V$	Q1			1.2	
Reverse Recovery Time	t_{rr}	Q2	Q2		13.5		nS
		$I_F = -4A$, $di_F/dt = 100A / \mu S$	Q1		11.2		
Reverse Recovery Charge	Q_{rr}	Q1	Q2		6.2		nC
		$I_F = 6A$, $di_F/dt = 100A / \mu S$	Q1		5.5		

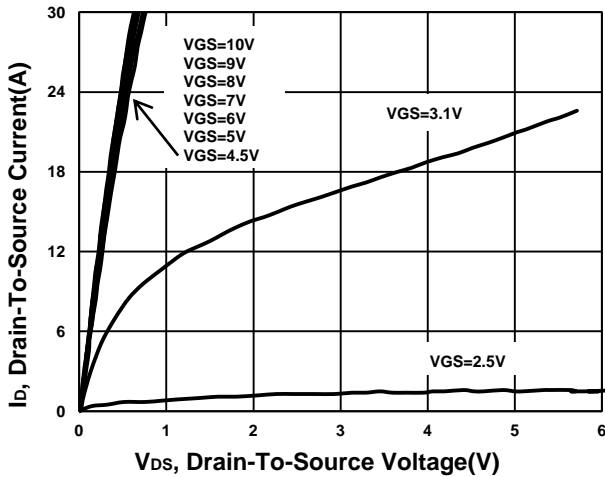
¹Pulse test : Pulse Width $\leq 300\ \mu\text{sec}$, Duty Cycle $\leq 2\%$.

²Independent of operating temperature.

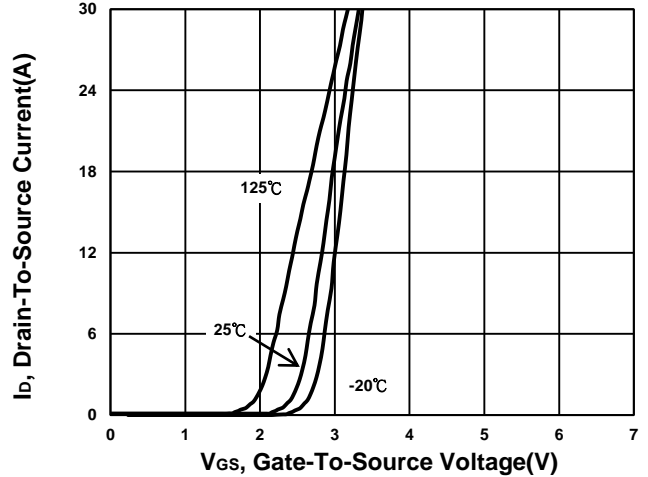
³Package limitation current : Q1=15A, Q2=-16A.

**TYPICAL PERFORMANCE CHARACTERISTICS
N-CHANNEL**

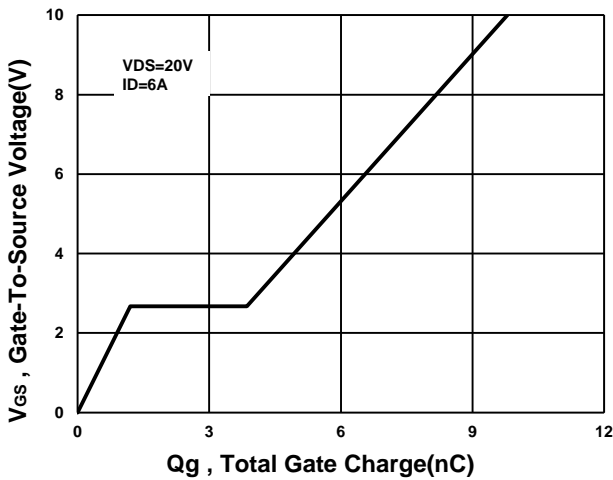
Output Characteristics



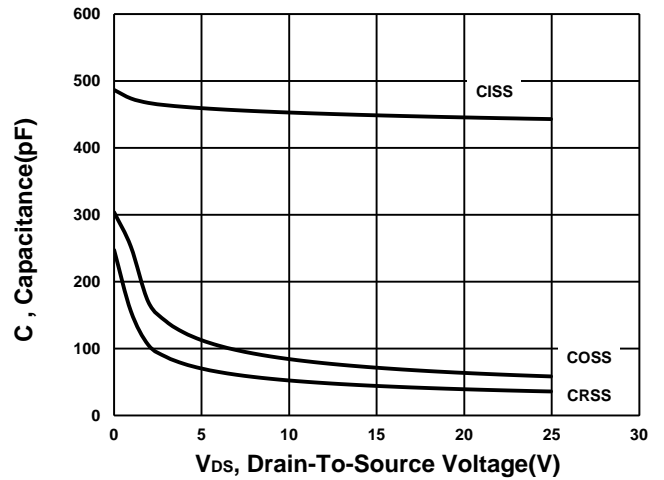
Transfer Characteristics



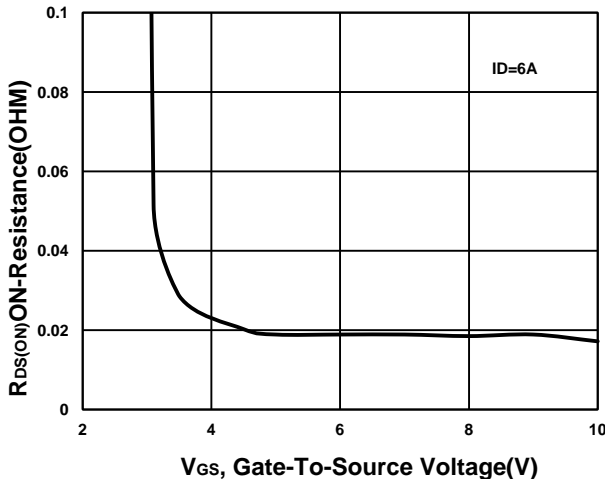
Gate charge Characteristics



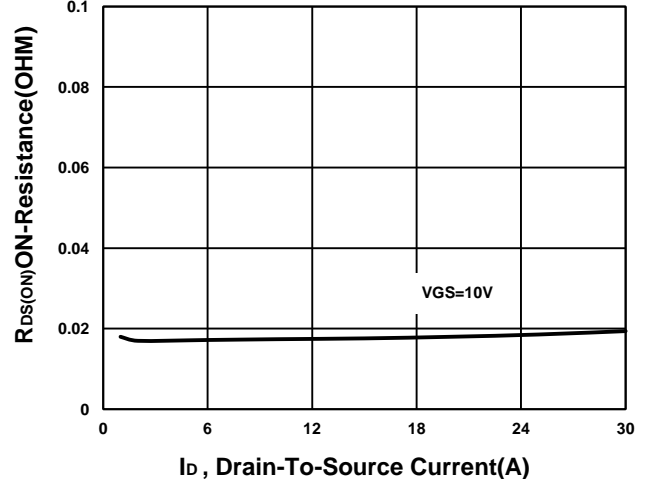
Capacitance Characteristic



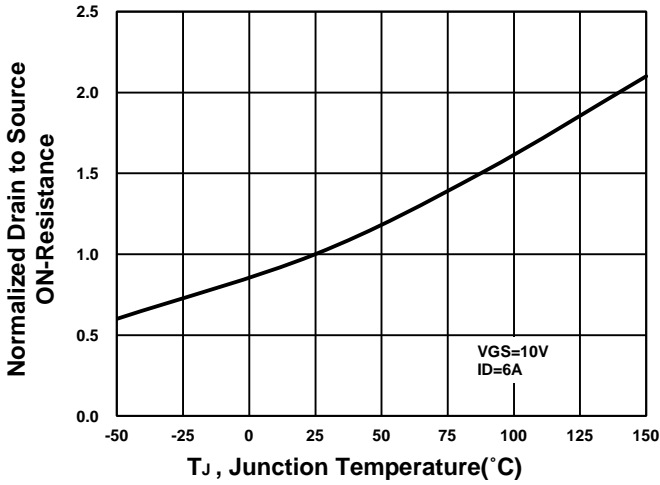
On-Resistance VS Gate-To-Source Voltage



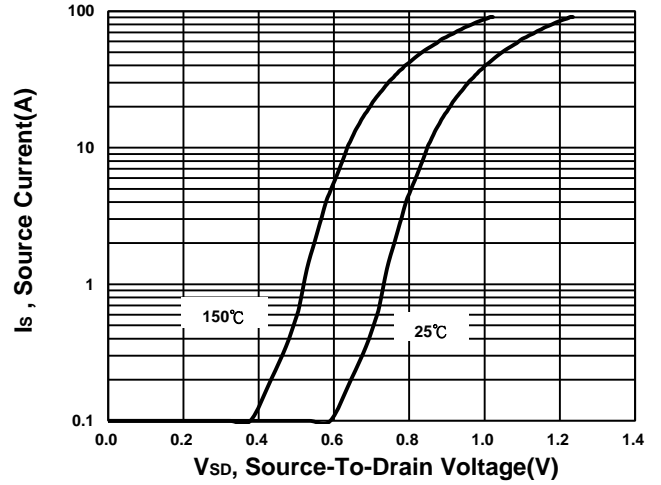
On-Resistance VS Drain-To-Source Current



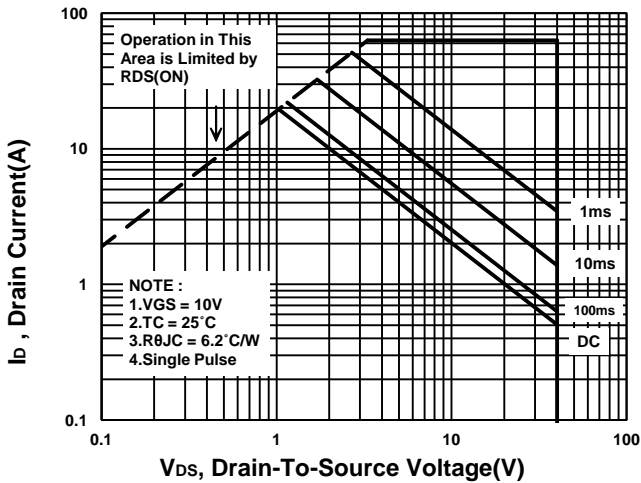
On-Resistance VS Temperature



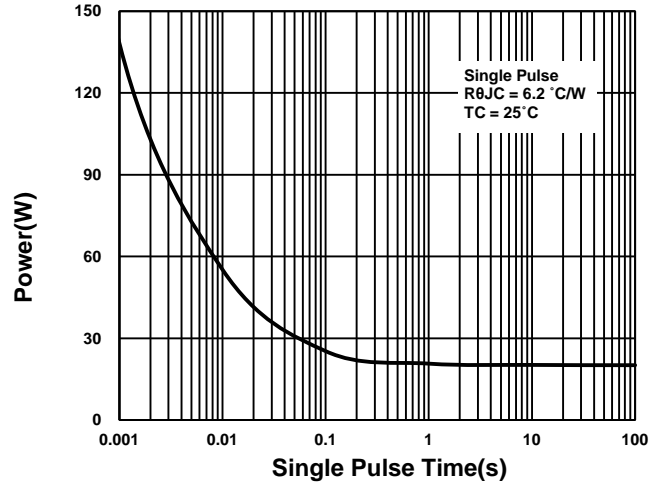
Source-Drain Diode Forward Voltage



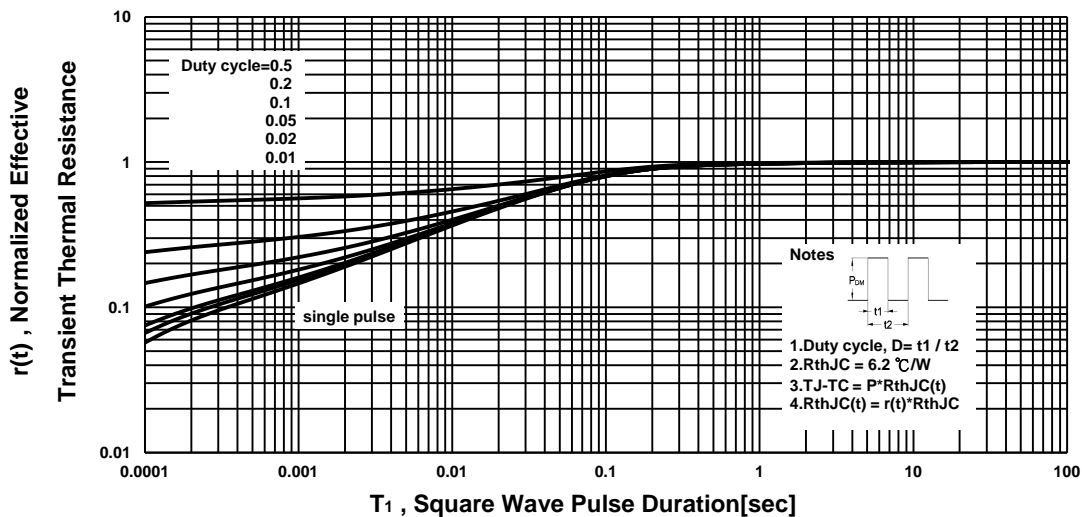
Safe Operating Area



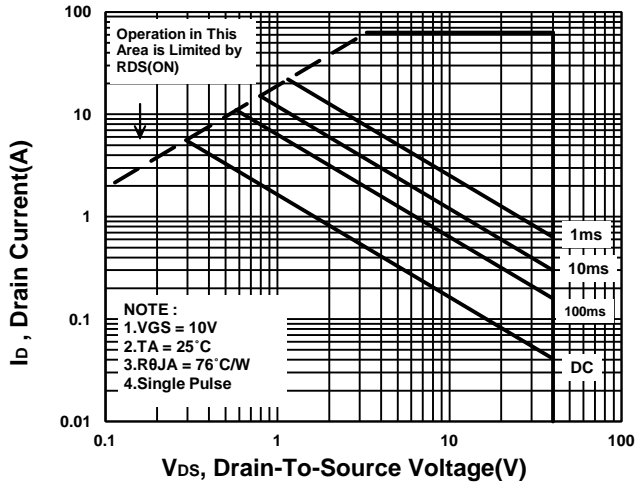
Single Pulse Maximum Power Dissipation



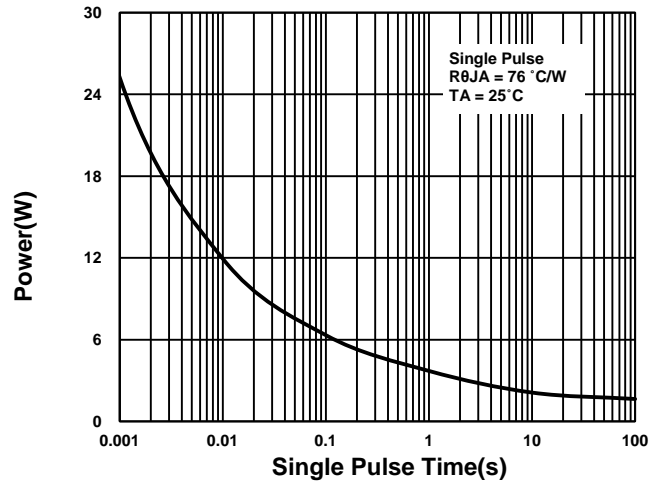
Transient Thermal Response Curve



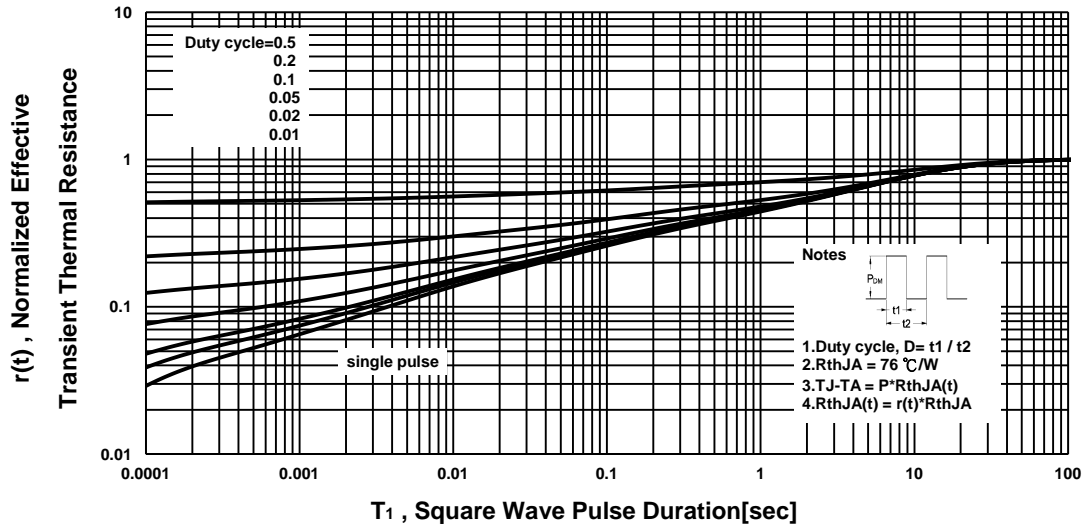
Safe Operating Area



Single Pulse Maximum Power Dissipation

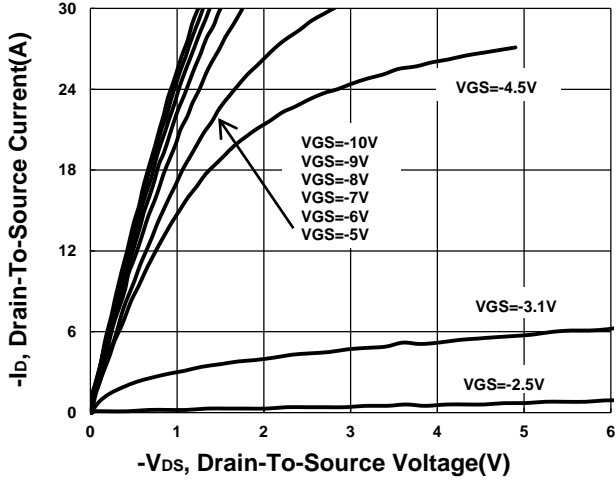


Transient Thermal Response Curve

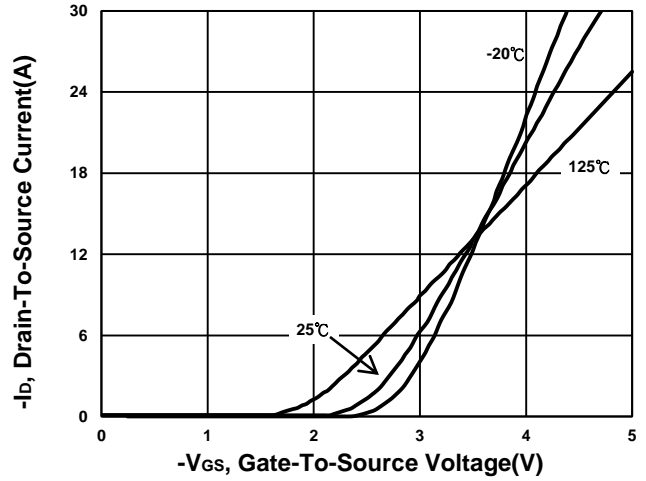


P-CHANNEL

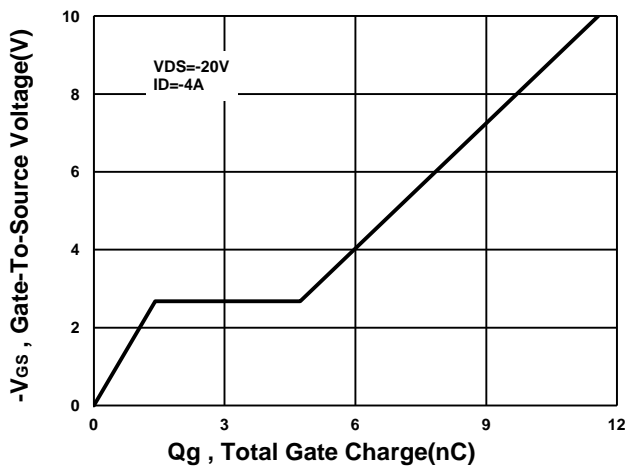
Output Characteristics



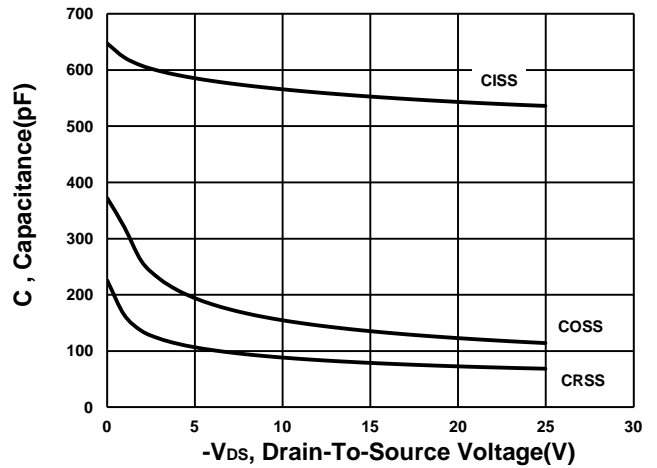
Transfer Characteristics



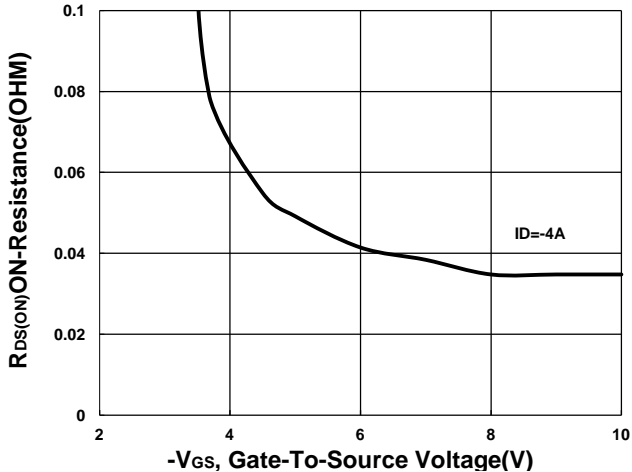
Gate charge Characteristics



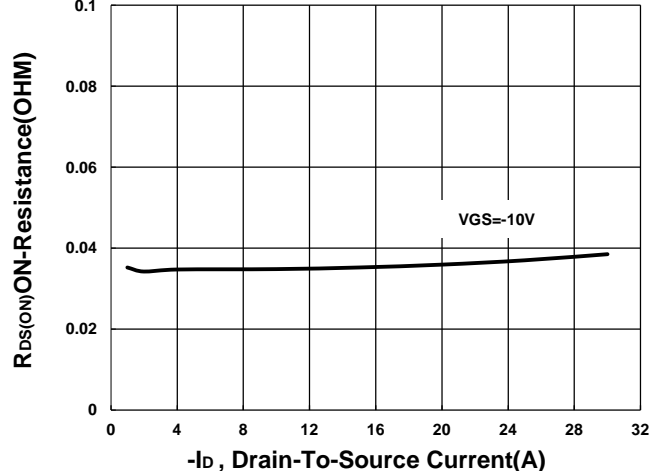
Capacitance Characteristic



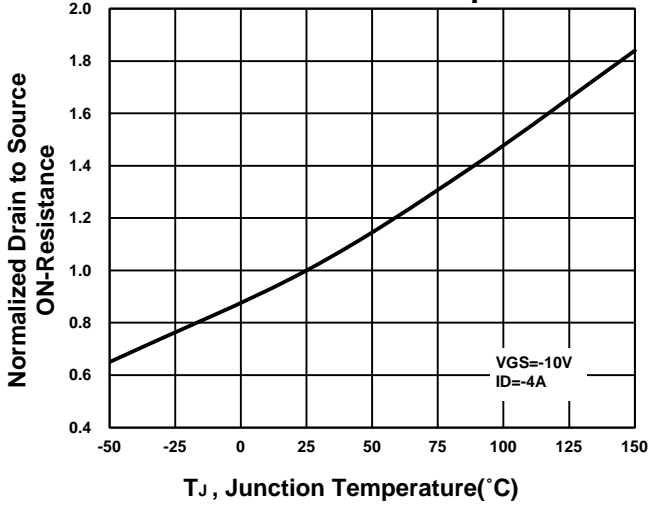
On-Resistance VS Gate-To-Source Voltage



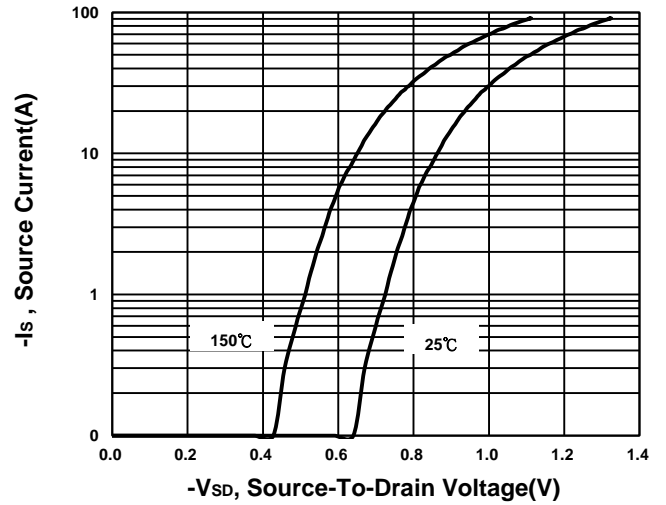
On-Resistance VS Drain-To-Source Current



On-Resistance VS Temperature

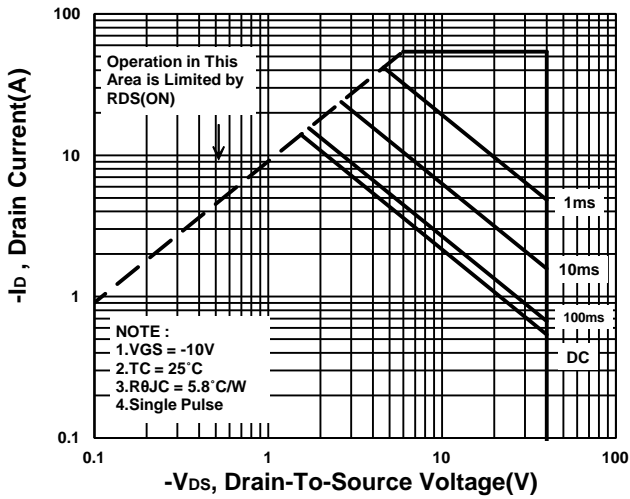


Source-Drain Diode Forward Voltage

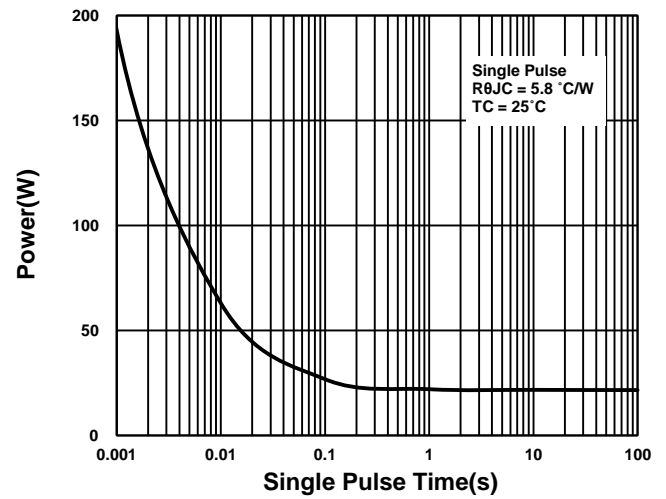


T_J, Junction Temperature(°C)

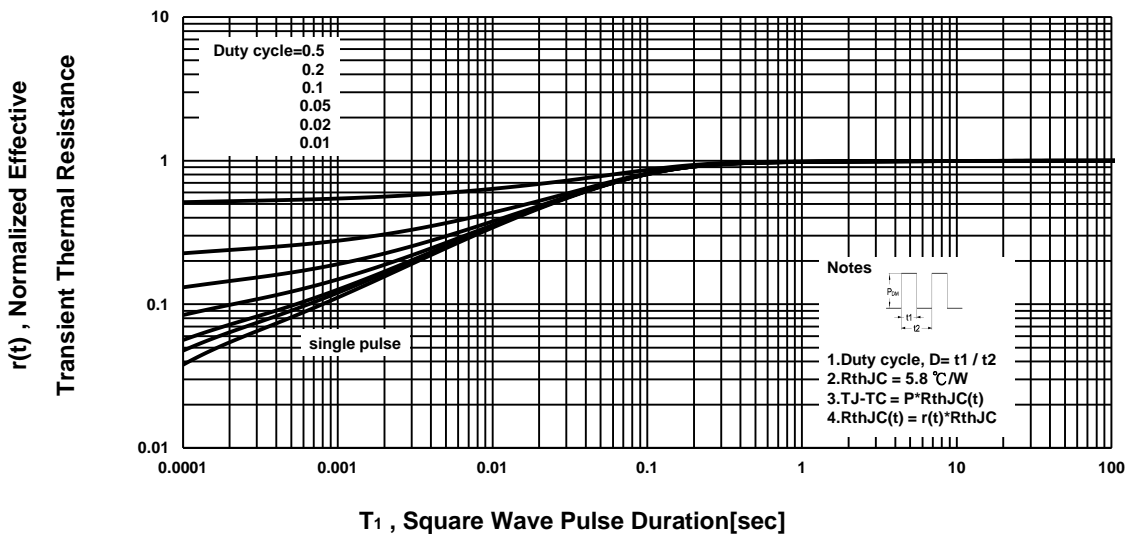
Safe Operating Area



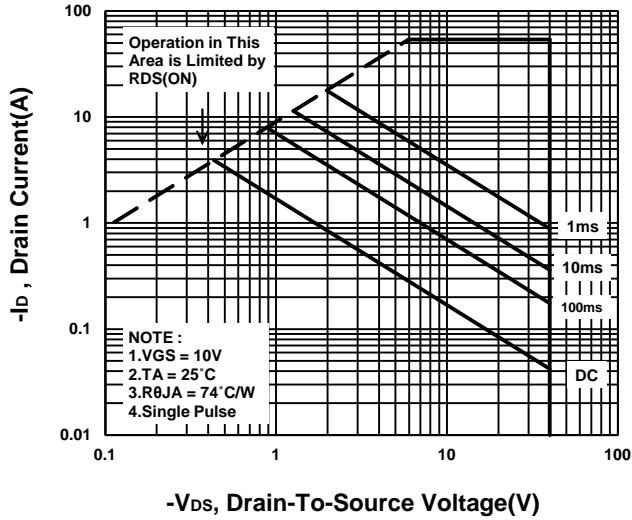
Single Pulse Maximum Power Dissipation



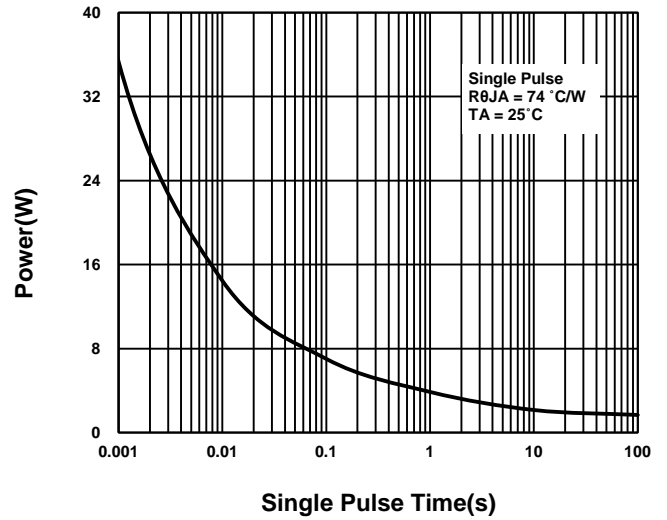
Transient Thermal Response Curve



Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve

