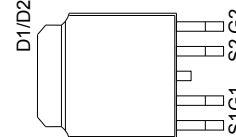
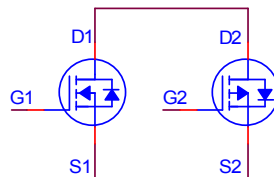


**PRODUCT SUMMARY**

	$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$
N-Channel	40	30mΩ	12A
P-Channel	-40	55mΩ	-8.8A



G : GATE  
D : DRAIN  
S : SOURCE

**100% Rg tested**  
**100% UIS tested**

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

PARAMETERS/TEST CONDITIONS		SYMBOL	N-Channel	P-Channel	UNITS
Drain-Source Voltage		$V_{DS}$	40	-40	V
Gate-Source Voltage		$V_{GS}$	±20	±20	V
Continuous Drain Current	$T_C = 25\text{ }^\circ\text{C}$	$I_D$	12	-8.8	A
	$T_C = 70\text{ }^\circ\text{C}$		8	-5.8	
Pulsed Drain Current <sup>1</sup>		$I_{DM}$	50	-50	
Avalanche Current		$I_{AS}$	19	-18	
Avalanche Energy		$E_{AS}$	20	19	mJ
Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$	$P_D$	3		W
	$T_C = 70\text{ }^\circ\text{C}$		2.1		
Junction & Storage Temperature Range		$T_j, T_{stg}$	-55 to 150		$^\circ\text{C}$
Lead Temperature ( <sup>1</sup> / <sub>16</sub> " from case for 10 sec.)		$T_L$	275		

**THERMAL RESISTANCE RATINGS**

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	$R_{\theta JC}$		6	$^\circ\text{C} / \text{W}$
Junction-to-Ambient	$R_{\theta JA}$		42	$^\circ\text{C} / \text{W}$

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

<sup>2</sup>Duty cycle ≤ 1%

**ELECTRICAL CHARACTERISTICS ( $T_J = 25\text{ }^\circ\text{C}$ , Unless Otherwise Noted)**

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
<b>STATIC</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	N-Ch	40		V
		$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$	P-Ch	-40		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	N-Ch	1.7	2.0	3.0
		$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	P-Ch	-1.7	-2.0	-3.0

Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 20V$	N-Ch			$\pm 100$	nA
		$V_{DS} = 0V, V_{GS} = \pm 20V$	P-Ch			$\pm 100$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 32V, V_{GS} = 0V$	N-Ch			1	$\mu A$
		$V_{DS} = -32V, V_{GS} = 0V$	P-Ch			-1	
		$V_{DS} = 30V, V_{GS} = 0V, T_J = 55^\circ C$	N-Ch			10	
		$V_{DS} = -30V, V_{GS} = 0V, T_J = 55^\circ C$	P-Ch			-10	
On-State Drain Current <sup>1</sup>	$I_{D(ON)}$	$V_{DS} = 5V, V_{GS} = 10V$	N-Ch	50			A
		$V_{DS} = -5V, V_{GS} = -10V$	P-Ch	-50			
Drain-Source Resistance <sup>1</sup>	On-State $R_{DS(ON)}$	$V_{GS} = 5V, I_D = 6A$	N-Ch		39	50	m $\Omega$
		$V_{GS} = -5V, I_D = -4.5A$	P-Ch		76	99	
		$V_{GS} = 10V, I_D = 7A$	N-Ch		26	30	
		$V_{GS} = -10V, I_D = -5.5A$	P-Ch		47	55	
Forward Transconductance <sup>1</sup>	$g_{fs}$	$V_{DS} = 10V, I_D = 7A$	N-Ch		18		S
		$V_{DS} = -10V, I_D = -5.5A$	P-Ch		10		

DYNAMIC							
Input Capacitance	$C_{iss}$	N-Channel	N-Ch		495	643	
			P-Ch		558	725	
Output Capacitance	$C_{oss}$	$V_{GS} = 0V, V_{DS} = 10V, f = 1MHz$	N-Ch		110	143	pF
		P-Channel	P-Ch		250	325	
Reverse Transfer Capacitance	$C_{rss}$	$V_{GS} = 0V, V_{DS} = -10V, f = 1MHz$	N-Ch		41	53	
			P-Ch		60	78	
Gate Resistance	$R_g$	$V_{GS} = 0V, V_{DS} = 0V, f = 1MHz$	N-Ch		1.8		$\Omega$
			P-Ch		7		
Total Gate Charge <sup>2</sup>	$Q_g$	N-Channel $V_{DS} = 0.5V_{(BR)DSS}, V_{GS} = 10V,$ $I_D = 7A$	N-Ch		12		nC
			P-Channel	P-Ch		11	
Gate-Source Charge <sup>2</sup>	$Q_{gs}$	P-Channel $V_{DS} = 0.5V_{(BR)DSS}, V_{GS} = -10V,$ $I_D = -5.5A$	N-Ch		1.8		
			P-Ch	P-Ch		1.7	
Gate-Drain Charge <sup>2</sup>	$Q_{gd}$		N-Ch		1.6		
			P-Ch		1.5		

Turn-On Delay Time <sup>2</sup>	$t_{d(on)}$	N-Channel	N-Ch		1.7	3.2	nS
			P-Ch		5.4	12	
Rise Time <sup>2</sup>	$t_r$	$V_{DS} = 20V$	N-Ch		5.6	10	
		$I_D \cong 1A, V_{GS} = 10V, R_{GEN} = 6\Omega$	P-Ch		7.8	16.5	
Turn-Off Delay Time <sup>2</sup>	$t_{d(off)}$	P-Channel	N-Ch		7.6	14	
			P-Ch		16	30	
Fall Time <sup>2</sup>	$t_f$	$V_{DS} = -20V$	N-Ch		2.8	5.5	
		$I_D \cong -1A, V_{GS} = -10V, R_{GEN} = 6\Omega$	P-Ch		10	18	

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T<sub>J</sub> = 25 °C)**

Forward Voltage <sup>1</sup>	$V_{SD}$	$I_F = 7A, V_{GS} = 0V$	N-Ch			1.2	V
		$I_F = -5.5A, V_{GS} = 0V$	P-Ch			-1.2	
Reverse Recovery Time	$t_{rr}$	$I_F = 7A, di_F/dt = 100A / \mu S$	N-Ch		40		nS
		$I_F = -5.5A, di_F/dt = 100A / \mu S$	P-Ch		50		
Reverse Recovery Charge	$Q_{rr}$		N-Ch		28		nC
			P-Ch		50		

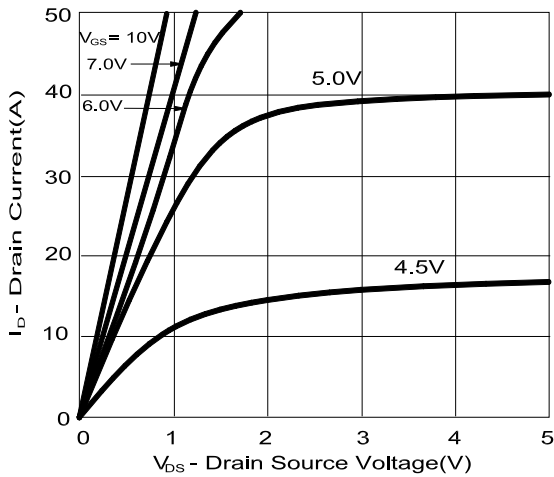
<sup>1</sup>Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

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

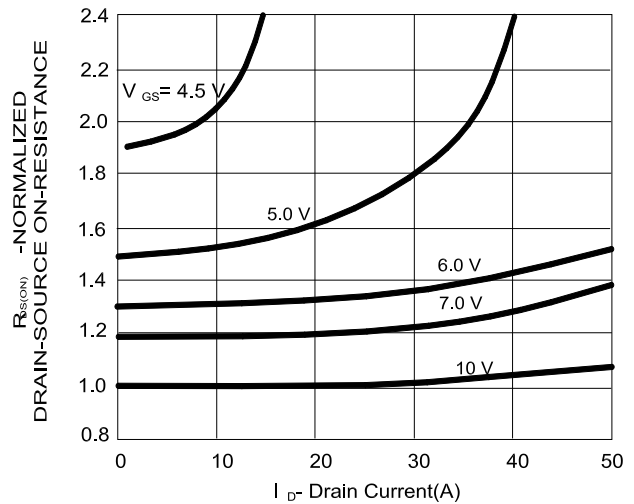
**REMARK: THE PRODUCT MARKED WITH “P3004ND5G”, DATE CODE or LOT #**

**N-CHANNEL**

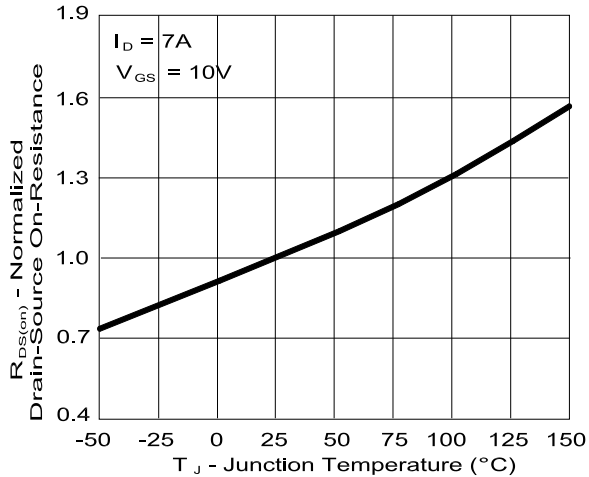
On-Region Characteristics



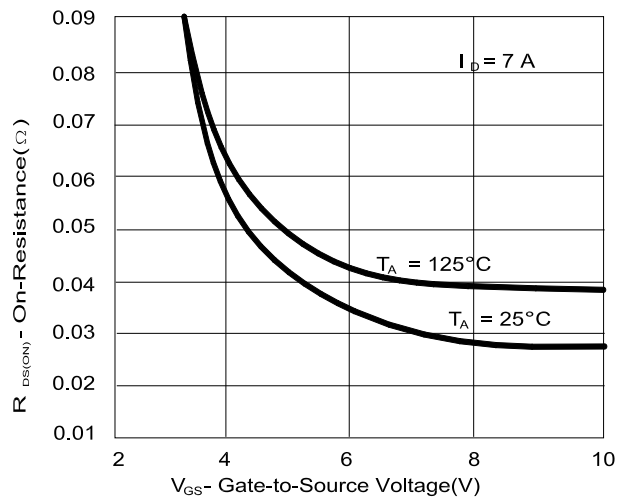
On-Resistance Variation with Drain Current and Gate Voltage



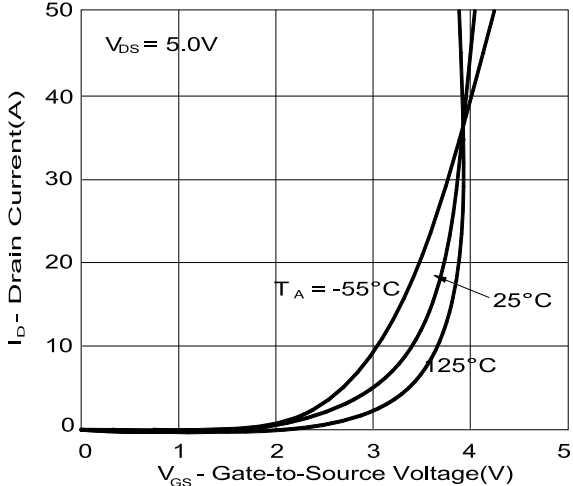
On-Resistance Variation with Temperature



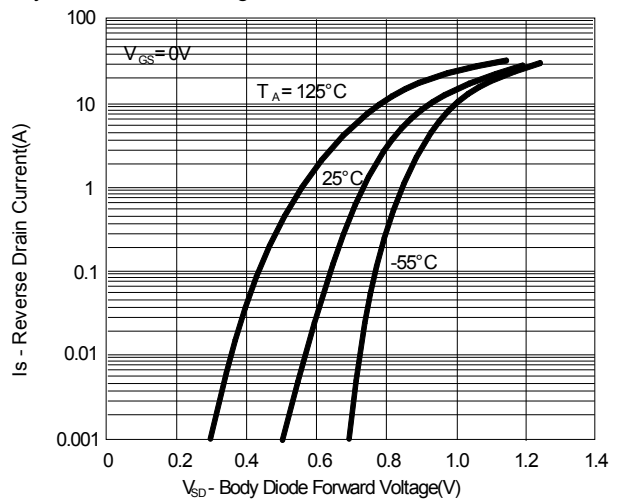
On-Resistance Variation with Gate-to-Source Voltage



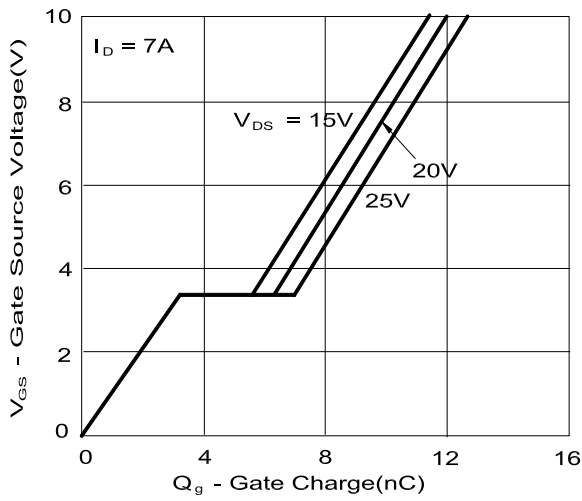
Transfer Characteristics



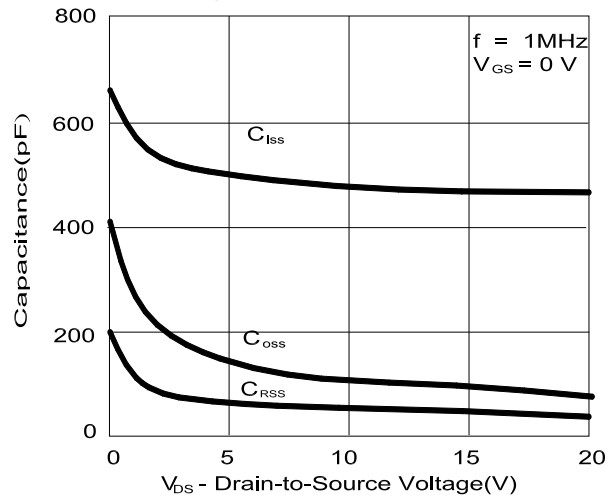
Body Diode Forward Voltage Variation with Source Current and Temperature



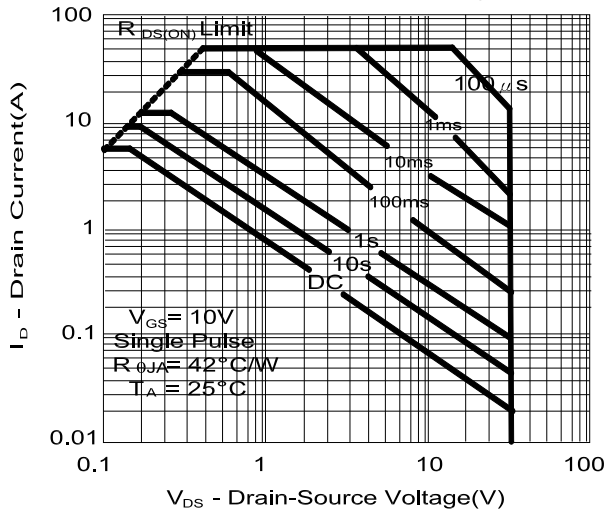
**Gate Charge Characteristics**



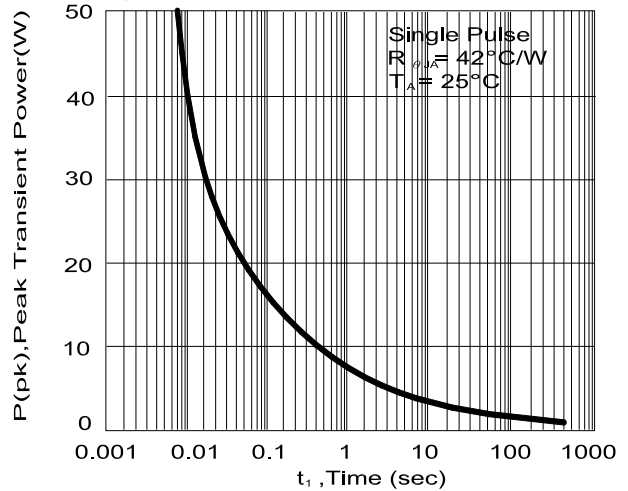
**Capacitance Characteristics**



**Maximum Safe Operating Area**

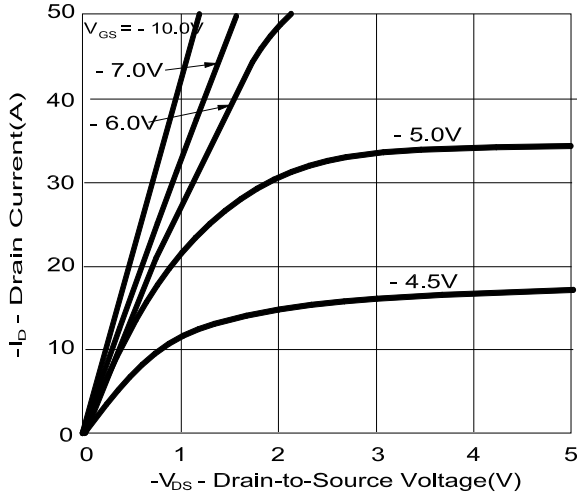


**Single Pulse Maximum Power Dissipation**

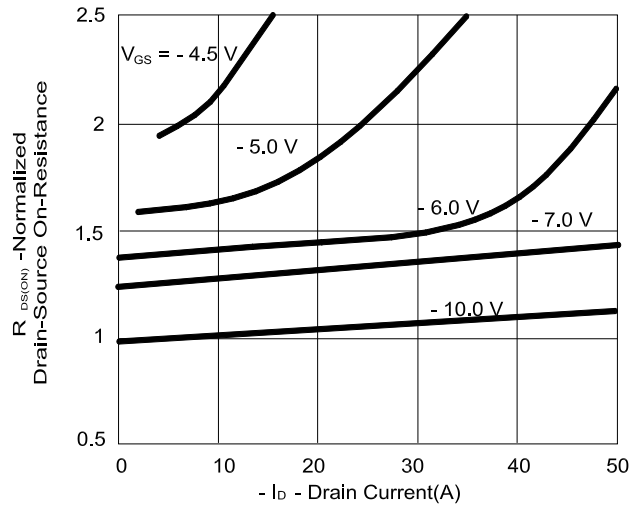


**P-CHANNEL**

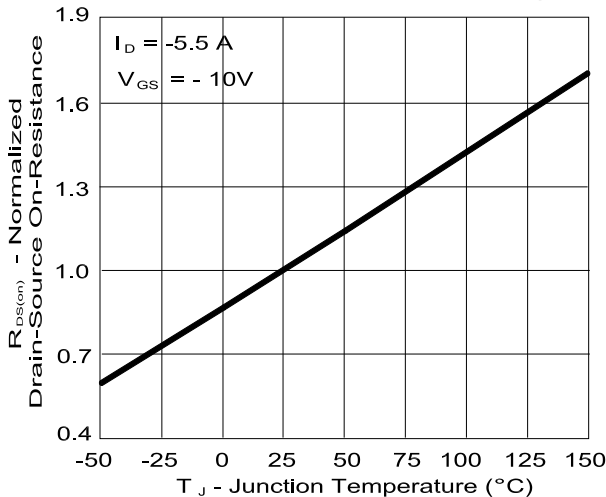
On-Region Characteristics



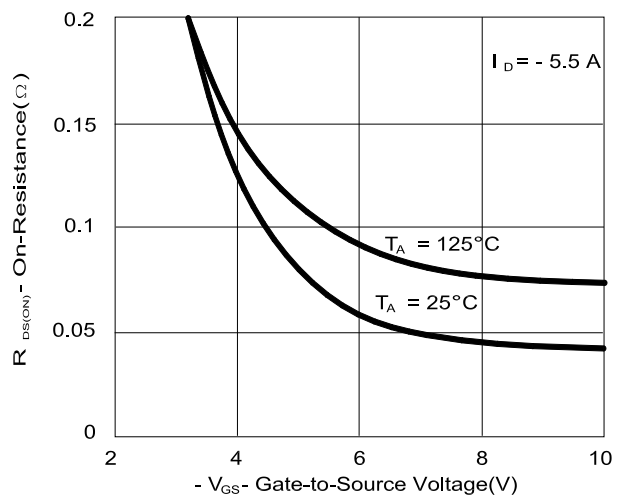
On-Resistance Variation with Drain Current and Gate Voltage



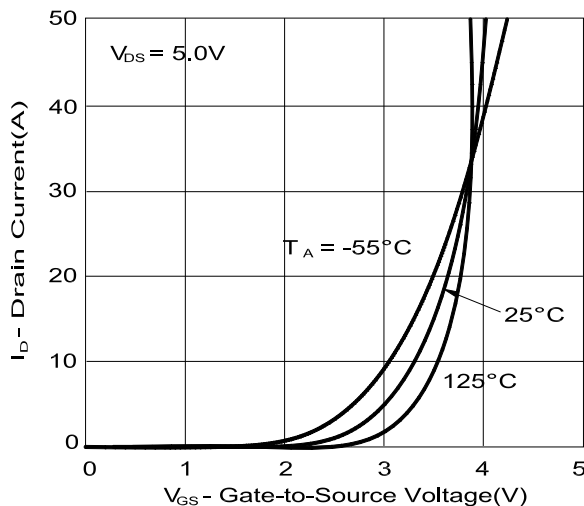
On-Resistance Variation with Temperature



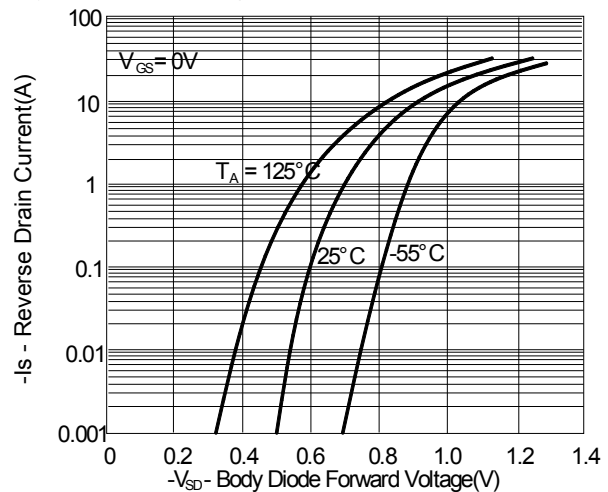
On-Resistance Variation with Gate-to-Source Voltage



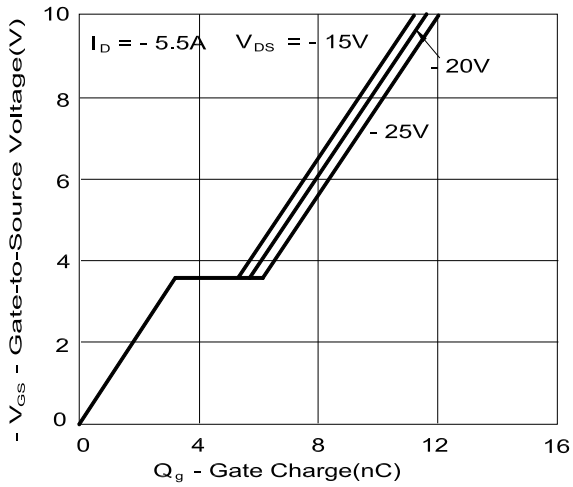
Transfer Characteristics



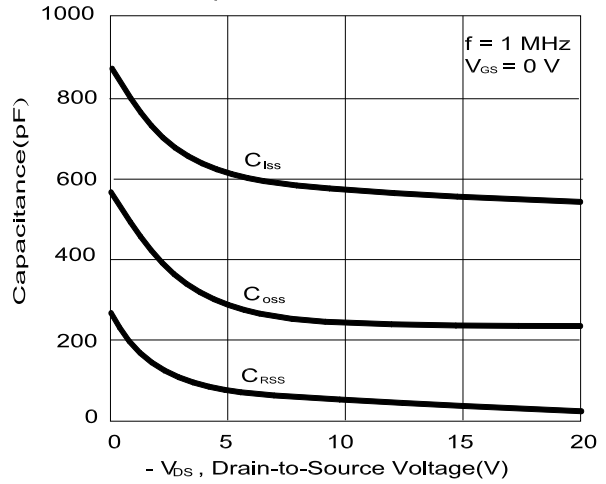
Body Diode Forward Voltage Variation with Source Current and Temperature



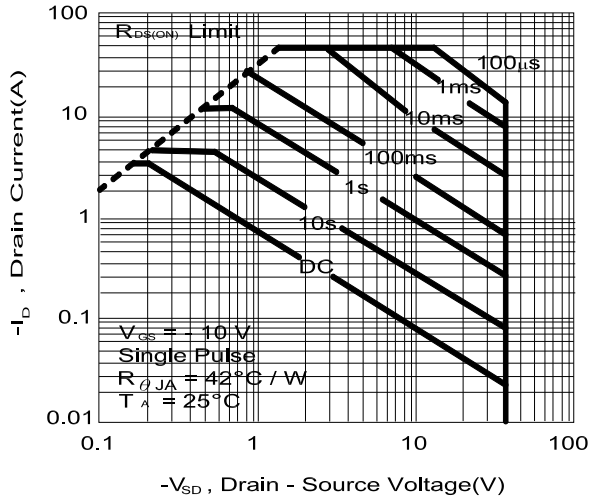
Gate Charge Characteristics



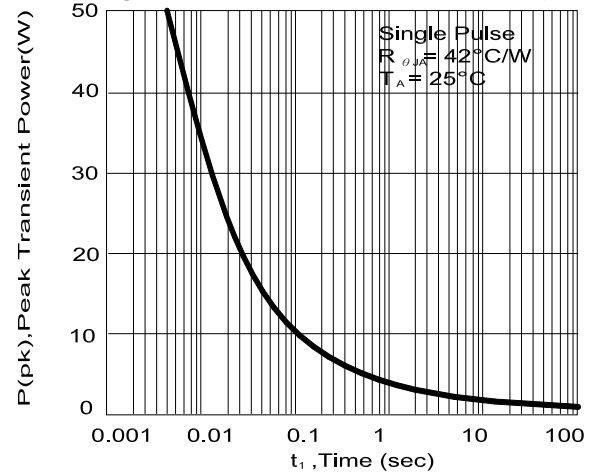
Capacitance Characteristics



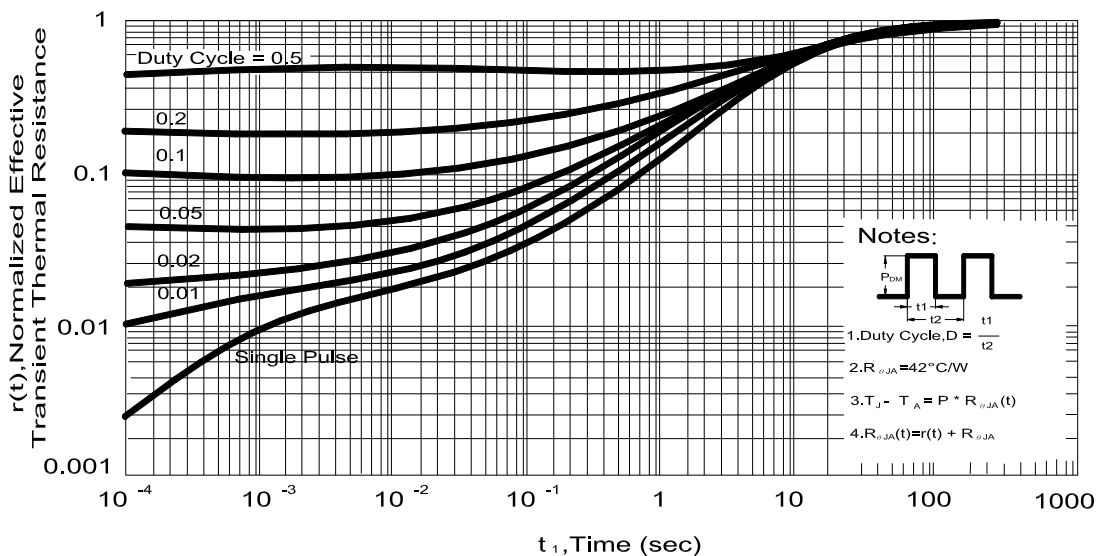
Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve



**TO-252-4 (DPAK) MECHANICAL DATA**

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	9.0	9.5	10.4	H	0.9	1.5	1.7
B	2.1	2.3	2.5	I	6.3	6.5	6.8
C	0.4	0.5	0.6	J	4.8	5.0	5.5
D	0.95	1.2	1.3	K	1.0	1.3	1.6
E	0.4	0.5	0.6	L	0.3	0.5	0.7
F	0.0		0.3	M	1.1	1.3	1.5
G	5.3	5.5	6.2	N			

