NIKO-SEM

N- & P-Channel Enhancement Mode Field Effect Transistor

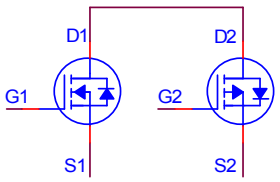
P3004ND5G

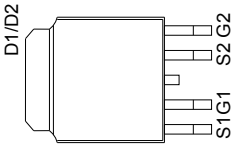
TO-252-5

Halogen-Free & Lead-Free

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 °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 °C	I_D	12	-8.8	A
	T_C = 70 °C		8	-5.8	
Pulsed Drain Current[1]		I_{DM}	50	-50	
Avalanche Current		I_{AS}	19	-18	
Avalanche Energy	L = 0.1mH	E_{AS}	20	19	mJ
Power Dissipation	T_C = 25 °C	P_D	3		W
	T_C = 70 °C		2.1		
Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150		°C
Lead Temperature ($^1/_{16}$" from case for 10 sec.)		T_L	275		

THERMAL RESISTANCE RATINGS

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

[1]Pulse width limited by maximum junction temperature.
[2]Duty cycle ≤ 1%

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

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

Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	N-Ch			±100	nA
		V_{DS} = 0V, V_{GS} = ±20V	P-Ch			±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 32V, V_{GS} = 0V	N-Ch			1	µA
		V_{DS} = -32V, V_{GS} = 0V	P-Ch			-1	
		V_{DS} = 30V, V_{GS} = 0V, T_J = 55 °C	N-Ch			10	
		V_{DS} = -30V, V_{GS} = 0V, T_J = 55 °C	P-Ch			-10	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 5V, V_{GS} = 10V	N-Ch	50			A
		V_{DS} =-5V, V_{GS} = -10V	P-Ch	-50			
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 5V, I_D = 6A	N-Ch		39	50	mΩ
		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[1]	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 V_{GS} = 0V, V_{DS} = 10V, f = 1MHz P-Channel V_{GS} = 0V, V_{DS} = -10V, f = 1MHz	N-Ch		495	643	pF
			P-Ch		558	725	
Output Capacitance	C_{oss}		N-Ch		110	143	
			P-Ch		250	325	
Reverse Transfer Capacitance	C_{rss}		N-Ch		41	53	
			P-Ch		60	78	
Gate Resistance	Rg	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz	N-Ch		1.8		Ω
			P-Ch		7		
Total Gate Charge[2]	Q_g	N-Channel V_{DS} = 0.5$V_{(BR)DSS}$, V_{GS} = 10V, I_D = 7A P-Channel V_{DS} = 0.5$V_{(BR)DSS}$, V_{GS} = -10V, I_D = -5.5A	N-Ch		12		nC
			P-Ch		11		
Gate-Source Charge[2]	Q_{gs}		N-Ch		1.8		
			P-Ch		1.7		
Gate-Drain Charge[2]	Q_{gd}		N-Ch		1.6		
			P-Ch		1.5		

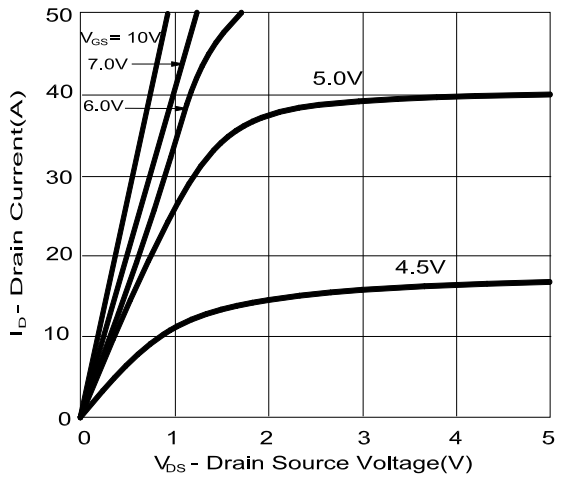
Turn-On Delay Time[2]	$t_{d(on)}$	N-Channel V_{DS} = 20V $I_D \cong$ 1A, V_{GS} = 10V, R_{GEN} = 6Ω	N-Ch P-Ch		1.7 5.4	3.2 12	nS
Rise Time[2]	t_r		N-Ch P-Ch		5.6 7.8	10 16.5	
Turn-Off Delay Time[2]	$t_{d(off)}$	P-Channel V_{DS} = -20V $I_D \cong$ -1A, V_{GS} = -10V, R_{GEN} = 6Ω	N-Ch P-Ch		7.6 16	14 30	
Fall Time[2]	t_f		N-Ch P-Ch		2.8 10	5.5 18	
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)							
Forward Voltage[1]	V_{SD}	I_F = 7A, V_{GS} = 0V I_F = -5.5A, V_{GS} = 0V	N-Ch P-Ch			1.2 -1.2	V
Reverse Recovery Time	t_{rr}	I_F = 7A, dI_F/dt = 100A / μS I_F = -5.5A, dI_F/dt = 100A / μS	N-Ch P-Ch		40 50		nS
Reverse Recovery Charge	Q_{rr}		N-Ch P-Ch		28 50		nC

[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.
[2]Independent of operating temperature.

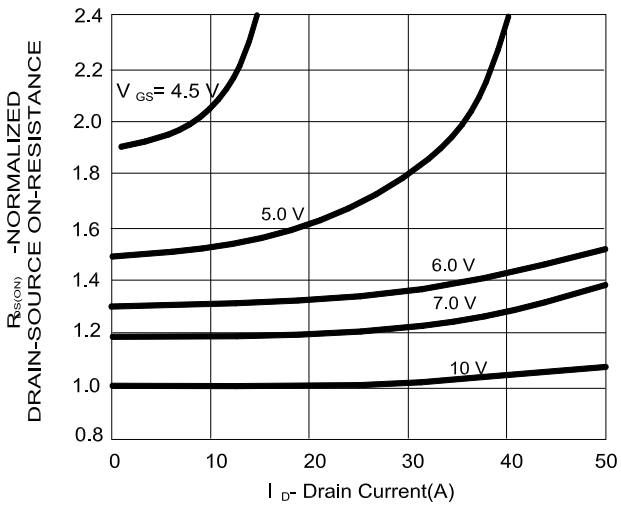
REMARK: THE PRODUCT MARKED WITH "P3004ND5G", DATE CODE or LOT #

N-CHANNEL

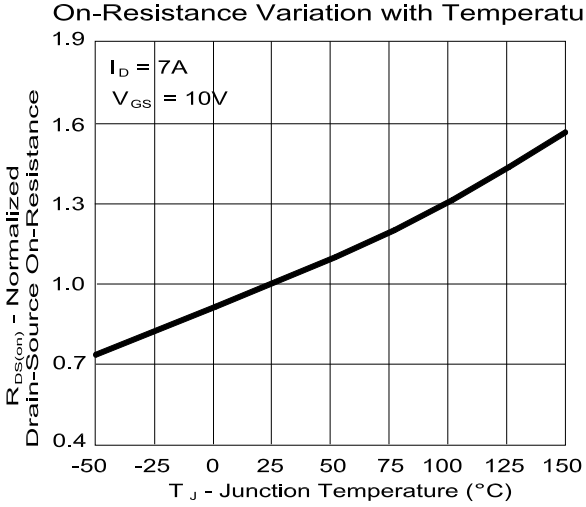
On-Region Characteristics



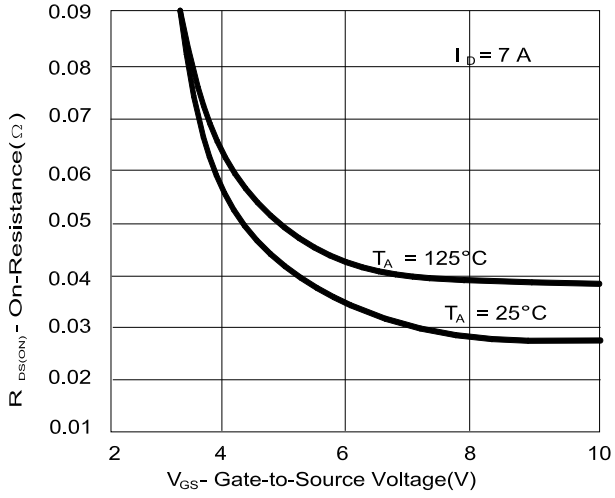
On-Resistance Variation with Drain Current and Gate Voltage



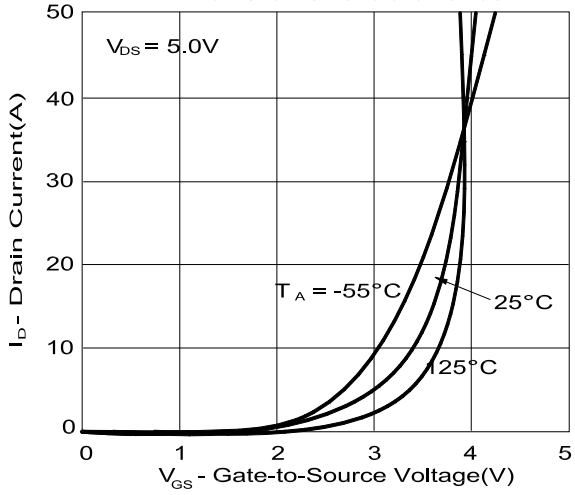
On-Resistance Variation with Temperature



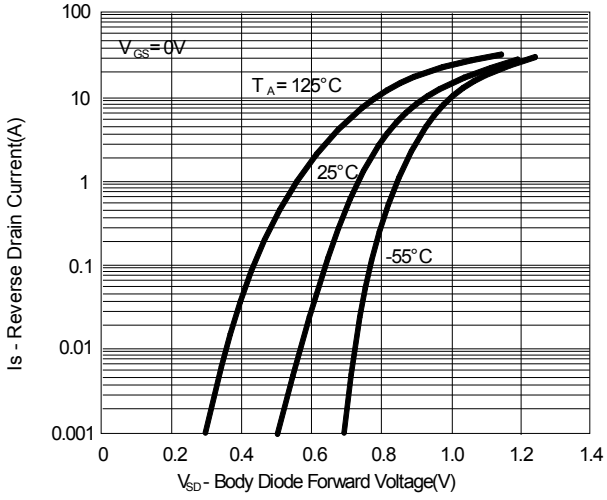
On-Resistance Variation with Gate-to-Source Voltage



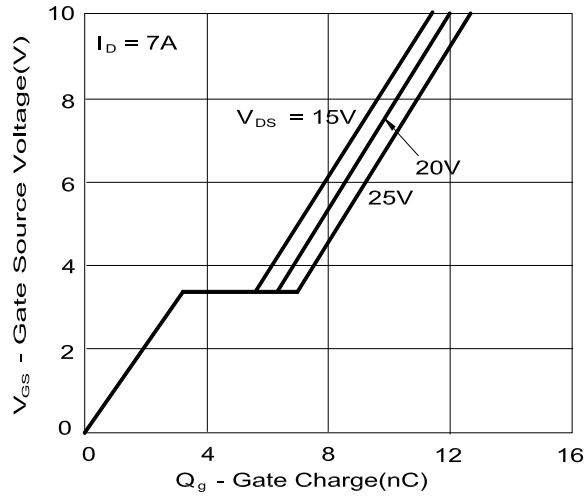
Transfer Characteristics



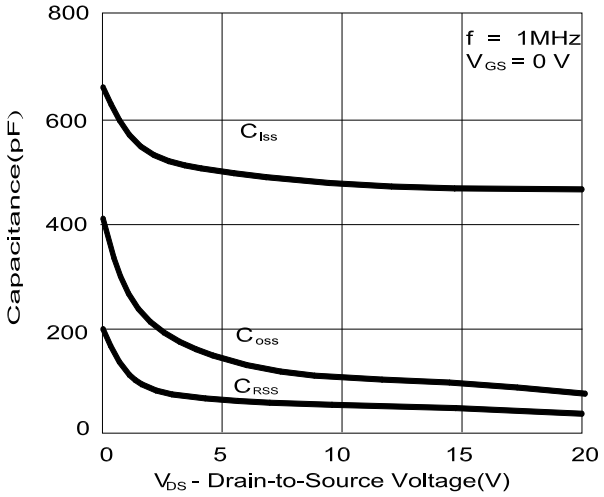
Body Diode Forward Voltage Variation with Source Current and Temperature



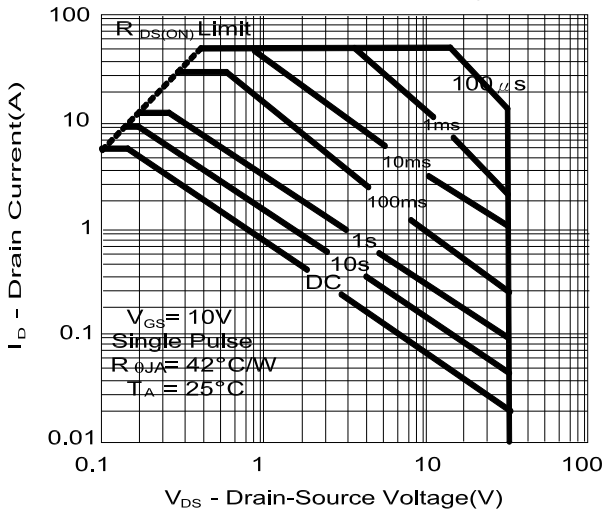
Gate Charge Characteristics



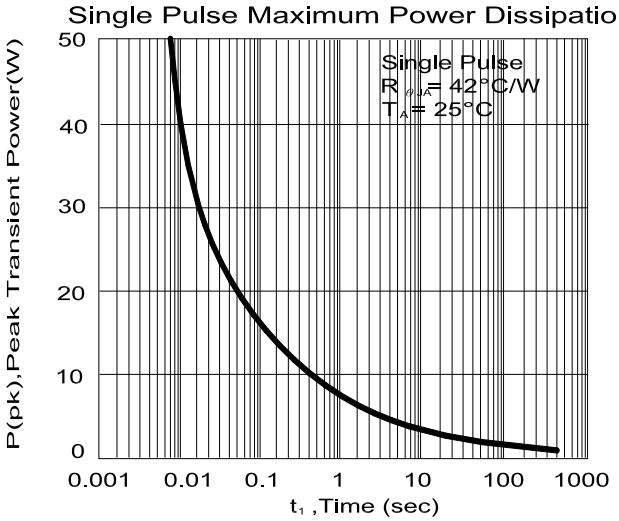
Capacitance Characteristics



Maximum Safe Operating Area

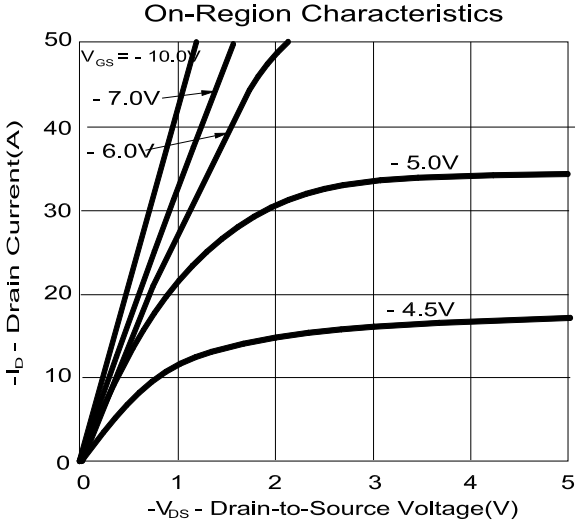


Single Pulse Maximum Power Dissipation

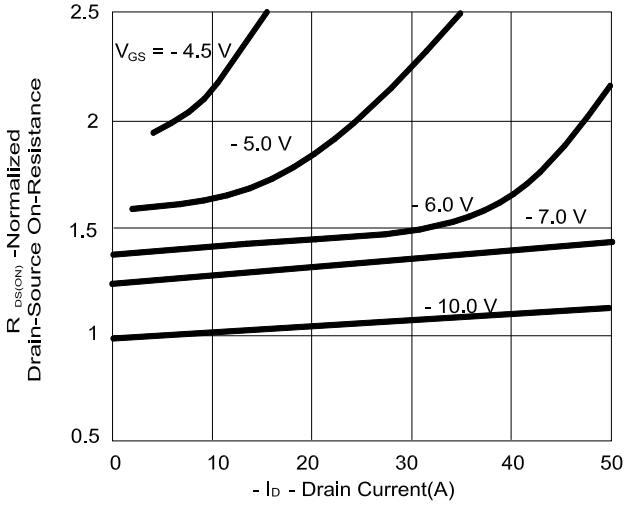


P-CHANNEL

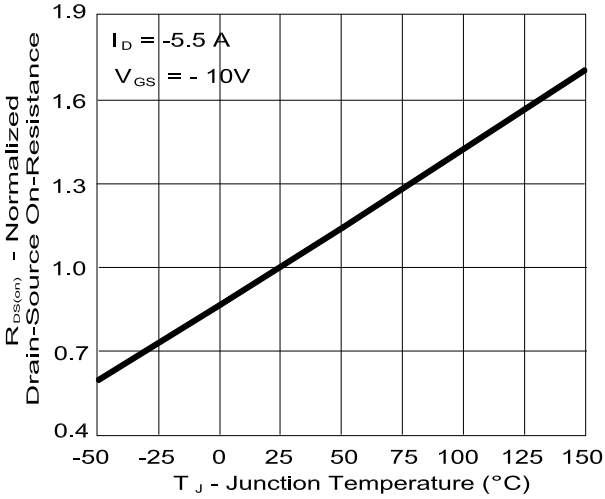
On-Region Characteristics



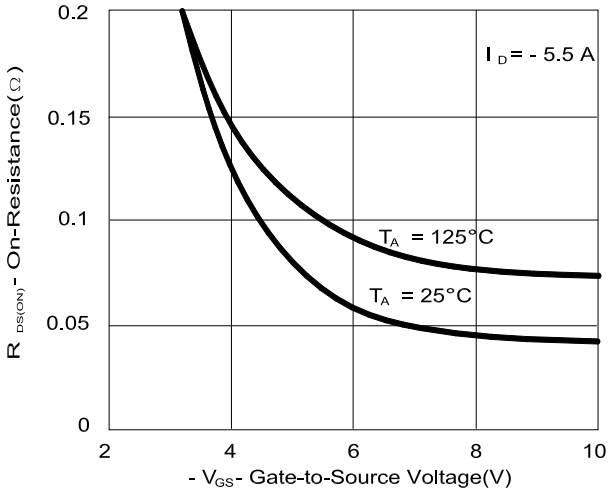
On-Resistance Variation with Drain Current and Gate Voltage



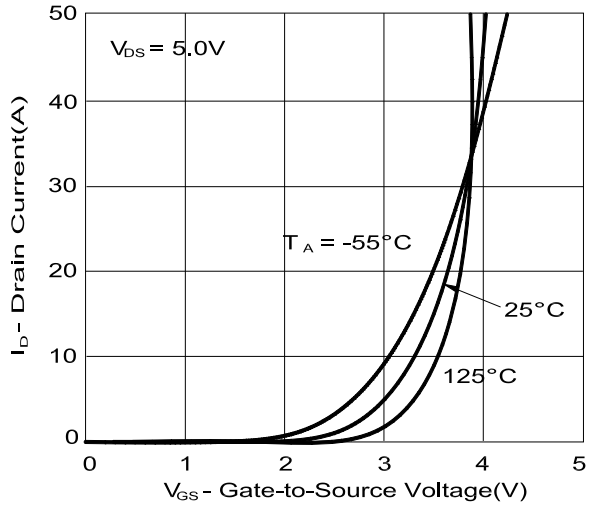
On-Resistance Variation with Temperature



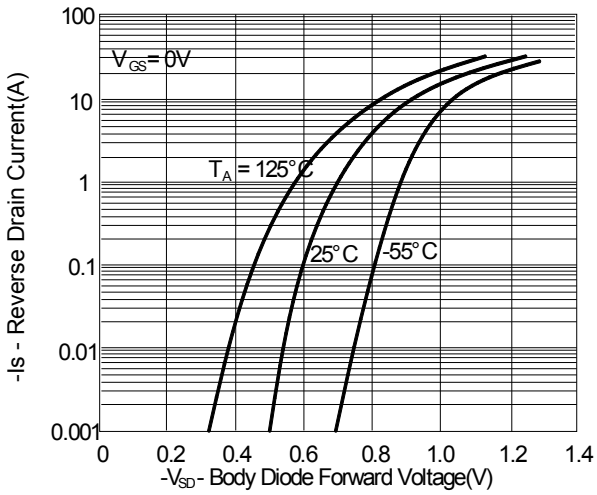
On-Resistance Variation with Gate-to-Source Voltage



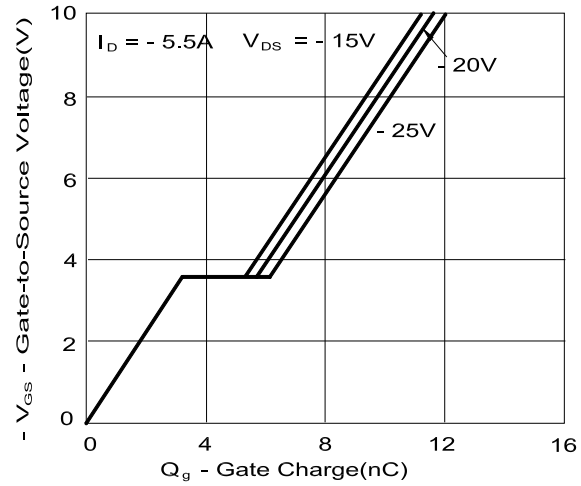
Transfer Characteristics



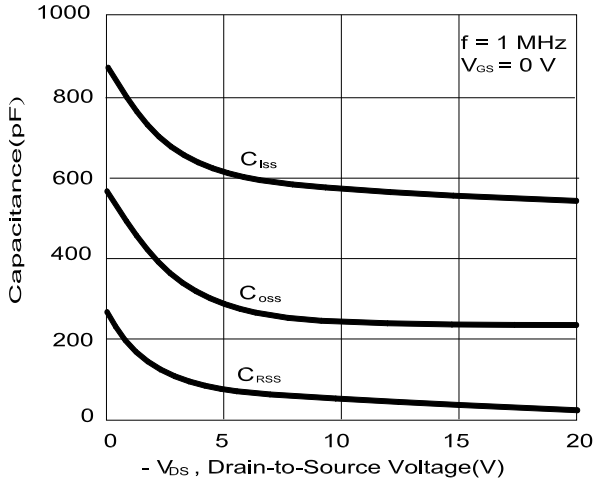
Body Diode Forward Voltage Variation with Source Current and Temperature



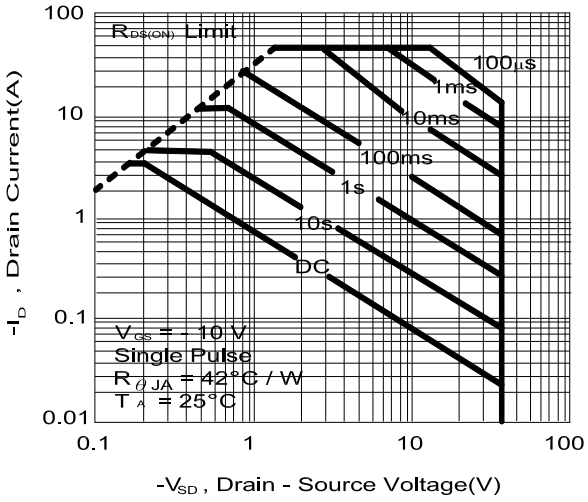
Gate Charge Characteristics



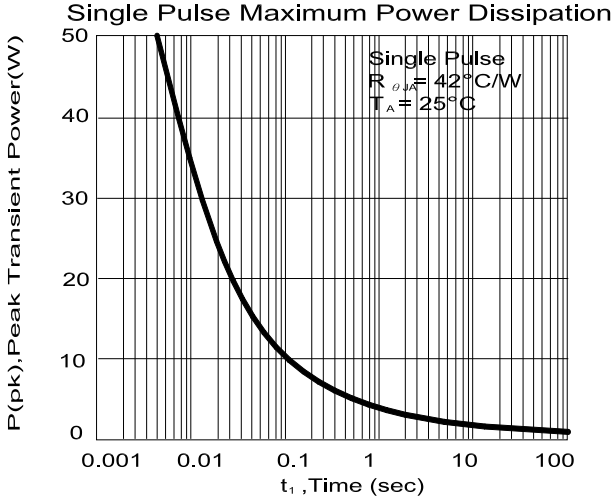
Capacitance Characteristics



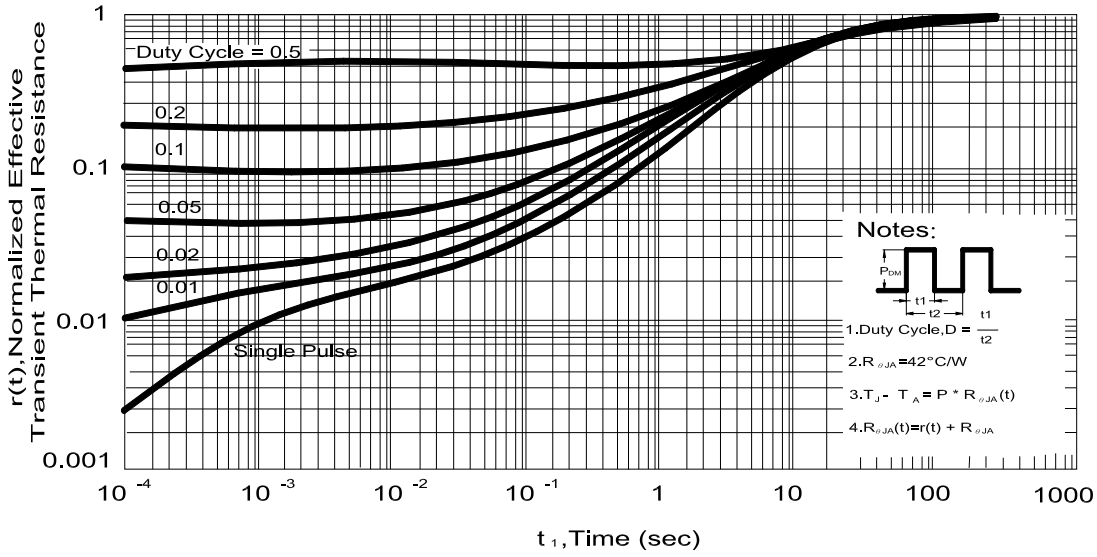
Maximum Safe Operating Area



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