UNIKC Semiconductor

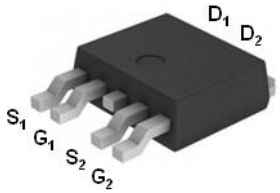
RoHS Compliant

P3004ND5G

N&P-Channel Enhancement Mode MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D	Channel
40V	30mΩ @V_{GS} = 10V	12A	N
-40V	55mΩ @V_{GS} = -10V	-8.8A	P



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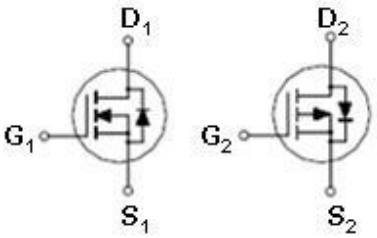

100% Rg tested
100% UIS tested

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS		SYMBOL	CH.	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	N	40	V
			P	-40	
Gate-Source Voltage		V_{GS}	N	±20	
			P	±20	
Continuous Drain Current	T_C = 25 °C	I_D	N	12	A
			P	-8.8	
	T_C = 70 °C		N	8	
			P	-5.8	
Pulsed Drain Current[1]		I_{DM}	N	50	
			P	-50	
Avalanche Current		I_{AS}	N	19	
			P	-18	
Avalanche Energy	L = 0.1mH	E_{AS}	N	20	mJ
			P	19	
Power Dissipation	T_C = 25 °C	P_D	N	3	W
			P	3	
	T_C = 70 °C		N	2.1	
			P	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	

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THERMAL RESISTANCE RATINGS

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

[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	40			V
		V_{GS} = 0V, I_D = -250μA	P	-40			
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	N	1.7	2.0	3.0	
		V_{DS} = V_{GS}, I_D = -250μA	P	-1.7	-2.0	-3.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	N			±100	nA
		V_{DS} = 0V, V_{GS} = ±20V	P			±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 32V, V_{GS} = 0V	N			1	μA
		V_{DS} = -32V, V_{GS} = 0V	P			-1	
		V_{DS} = 30V, V_{GS} = 0V, T_J = 55 °C	N			10	
		V_{DS} = -30V, V_{GS} = 0V, T_J = 55 °C	P			-10	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 5V, V_{GS} = 10V	N	50			A
		V_{DS} = -5V, V_{GS} = -10V	P	-50			
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 5V, I_D = 6A	N		39	50	mΩ
		V_{GS} = -5V, I_D = -4.5A	P		76	99	
		V_{GS} = 10V, I_D = 7A	N		26	30	
		V_{GS} = -10V, I_D = -5.5A	P		47	55	
Forward Transconductance[1]	g_{fs}	V_{DS} = 10V, I_D = 7A	N		18		S
		V_{DS} = -10V, I_D = -5.5A	P		10		
DYNAMIC							
Input Capacitance	C_{iss}	N-Channel V_{GS} = 0V, V_{DS} = 10V, f = 1MHz	N		495	643	pF
			P		558	725	
Output Capacitance	C_{oss}		N		110	143	
			P		250	325	
Reverse Transfer Capacitance	C_{rss}	P-Channel V_{GS} = 0V, V_{DS} = -10V, f = 1MHz	N		41	53	
			P		60	78	

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DYNAMIC							
Gate Resistance	R_g	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz	N		1.8		Ω
			P		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		12		nC
			P		11		
Gate-Source Charge[2]	Q_{gs}		N		1.8		
			P		1.7		
Gate-Drain Charge[2]	Q_{gd}		N		1.6		
			P		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 P-Channel V_{DS} = -20V $I_D \cong$ -1A, V_{GS} = -10V, R_{GEN} = 6Ω	N		1.7	3.2	nS
			P		5.4	12	
Rise Time[2]	t_r		N		5.6	10	
			P		7.8	16.5	
Turn-Off Delay Time[2]	$t_{d(off)}$		N		7.6	14	
			P		16	30	
Fall Time[2]	t_f		N		2.8	5.5	
			P		10	18	
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)							
Forward Voltage[1]	V_{SD}	I_F = 7A, V_{GS} = 0V	N			1.2	V
		I_F = -5.5A, V_{GS} = 0V	P			-1.2	
Reverse Recovery Time	t_{rr}	I_F = 7A, dI_F/dt = 100A / μS	N		40		nS
		I_F = -5.5A, dI_F/dt = 100A / μS	P		50		
Reverse Recovery Charge	Q_{rr}		N		28		nC
			P		50		

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

[2]Independent of operating temperature.

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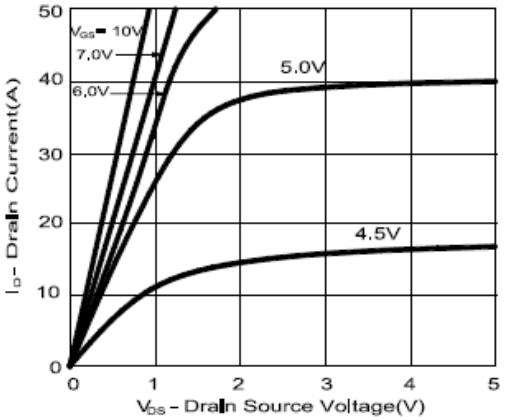
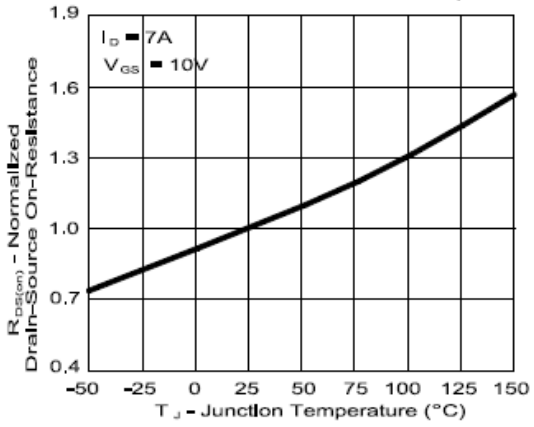
N-CHANNEL

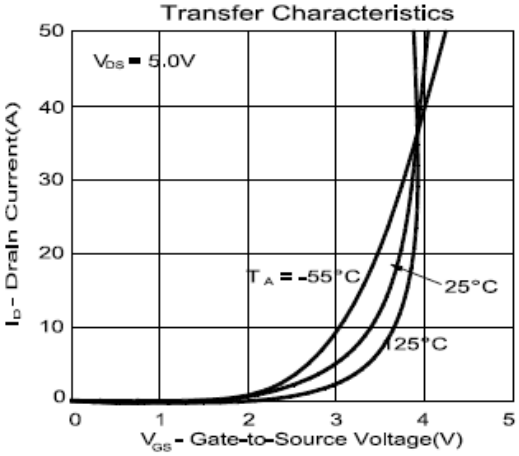
On-Region Characteristics



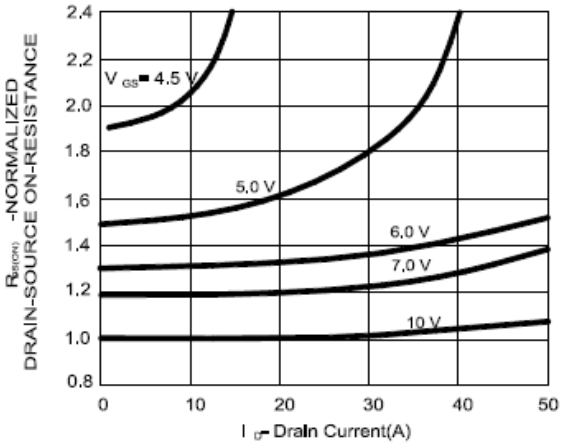
On-Resistance Variation with Temperature



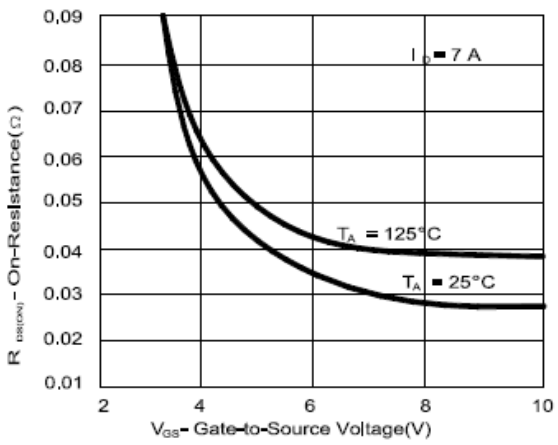
Transfer Characteristics



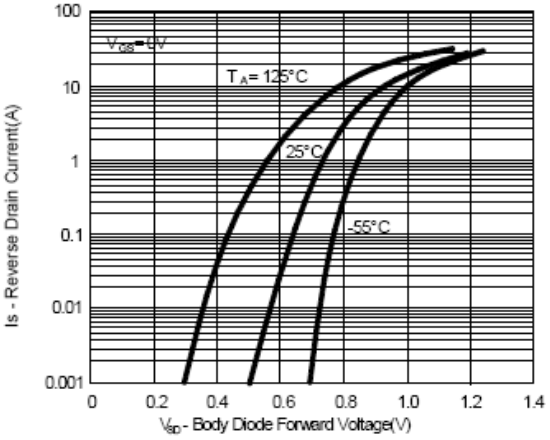
On-Resistance Variation with Drain Current and Gate Voltage



On-Resistance Variation with Gate-to-Source Voltage



Body Diode Forward Voltage Variation with Source Current and Temperature



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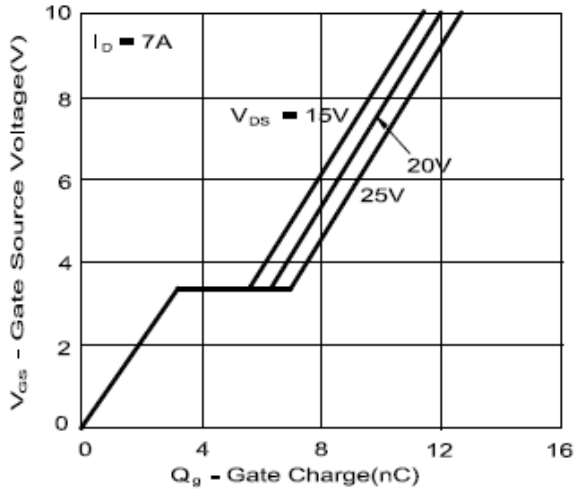
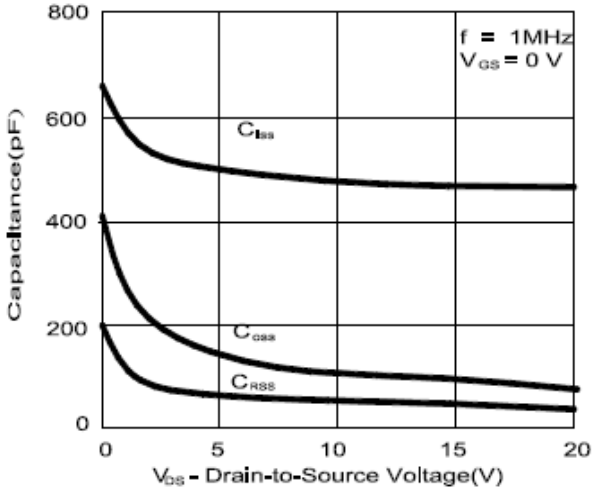
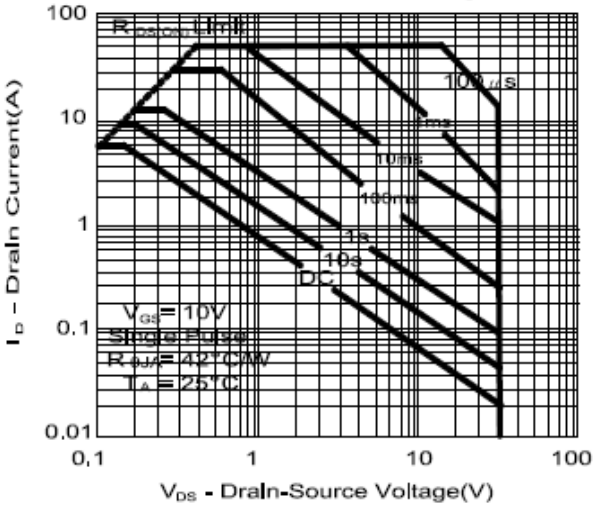
Gate Charge Characteristics



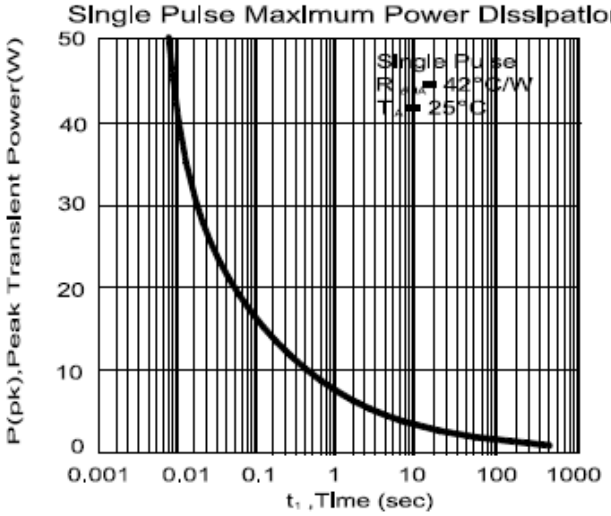
Capacitance Characteristics



Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation



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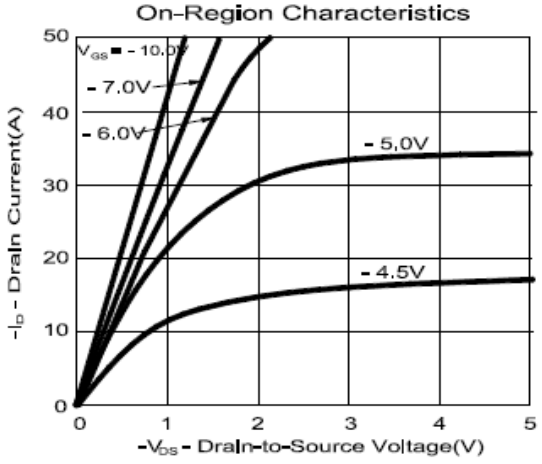
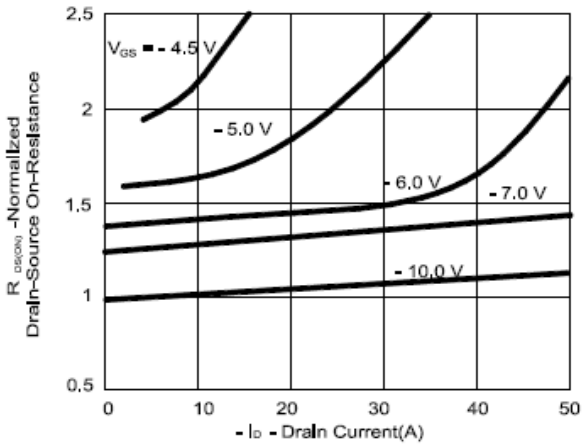
P-CHANNEL

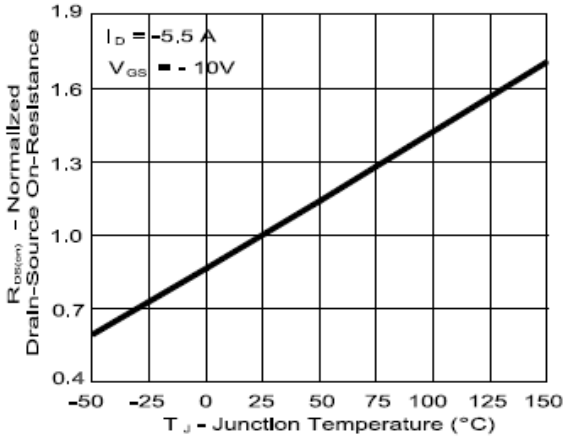
On-Region Characteristics



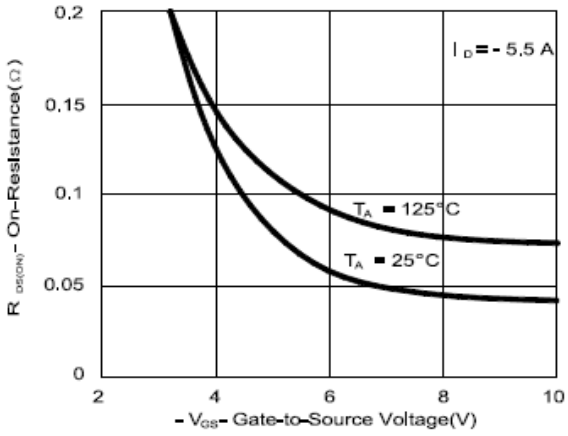
On-Resistance Variation with Drain Current and Gate Voltage



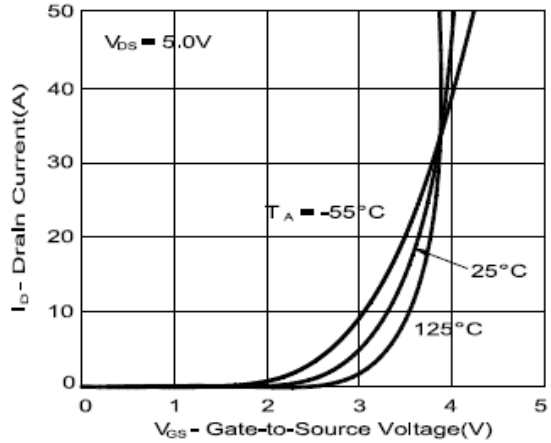
On-Resistance Variation with Temperature



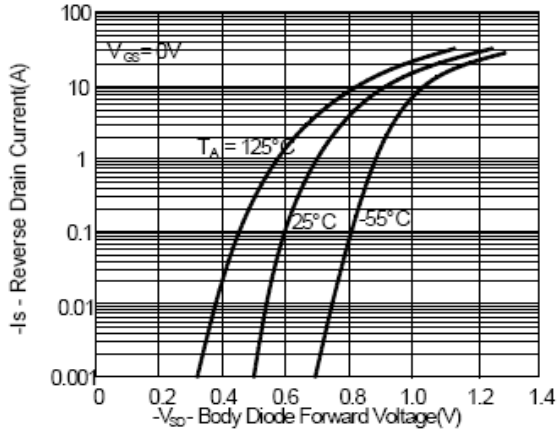
On-Resistance Variation with Gate-to-Source Voltage



Transfer Characteristics



Body Diode Forward Voltage Variation with Source Current and Temperature



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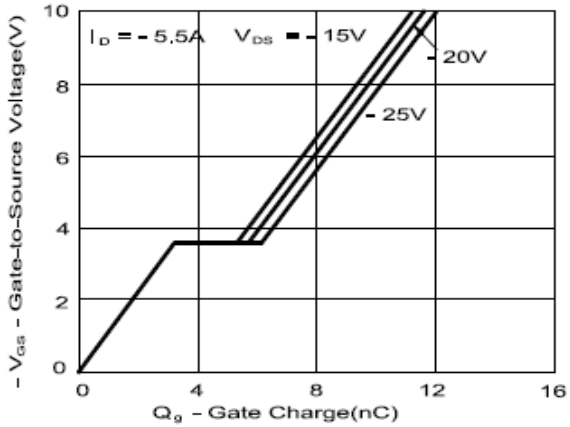
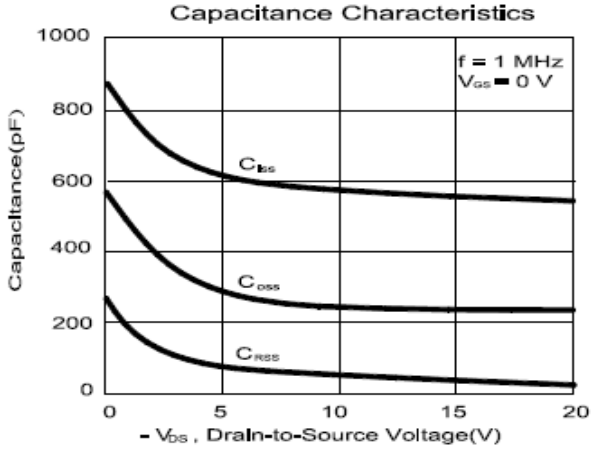
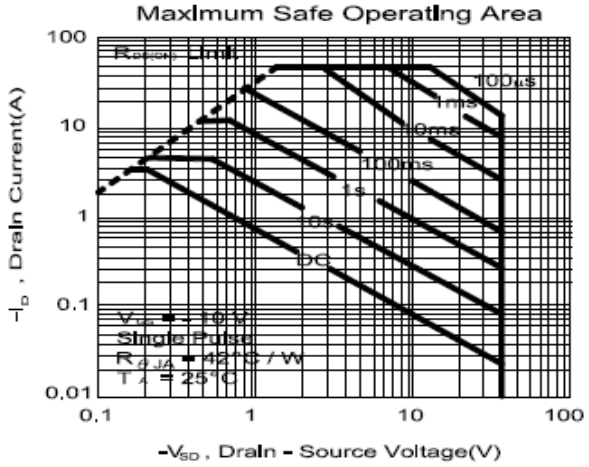
Gate Charge Characteristics



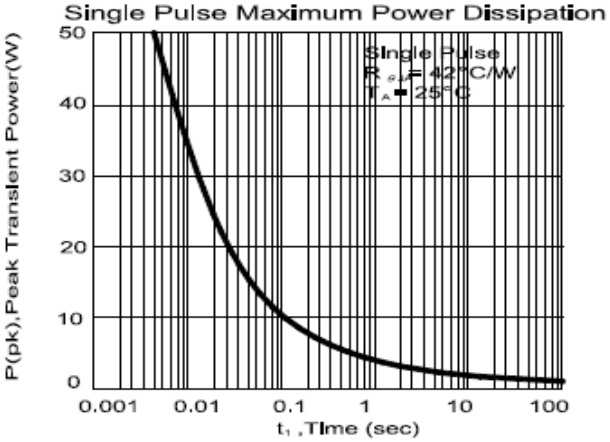
Capacitance Characteristics



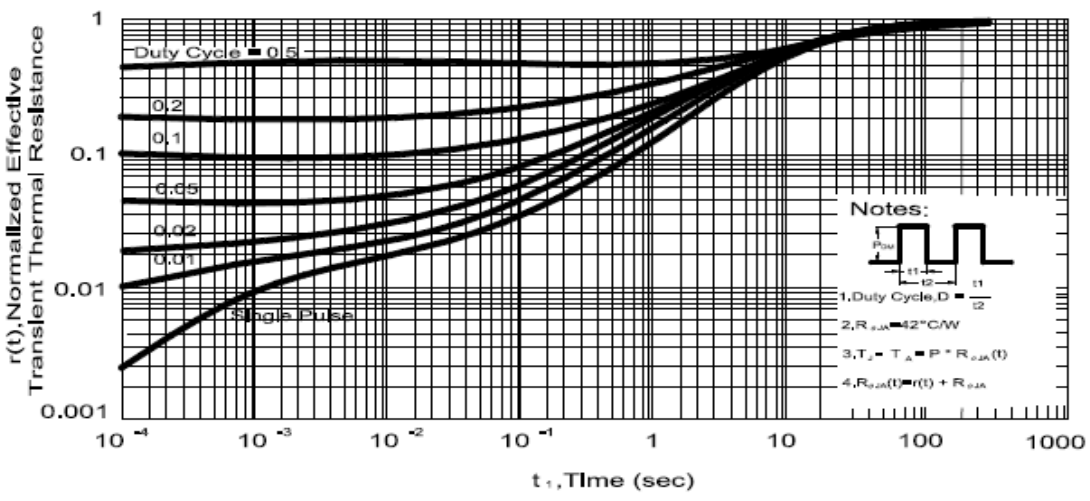
Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve



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Package Dimension

TO-252-5 MECHANICAL DATA

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	9	9.5	10.4	J	4.8	5.0	5.5
B	2.1	2.3	2.5	L	0.3	0.56	0.7
C	0.4	0.5	0.6	M	1.1	1.3	1.5
E		0.51		S	4.57	5.0	5.51
F	0	0.1	0.3	T	3.81	5.0	5.0
G	5.3	6.1	6.22	U	1.4	1.5	1.77
H	0.89	1.1	1.7	V	0.55	1.2	1.5
I	6.5	6.6	6.8