UNIKC Semiconductor

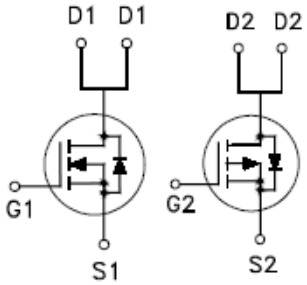
P6003QEA

N&P-Channel Enhancement Mode MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D	Channel
30V	24mΩ @V_{GS} = 10V	20A	N
-30V	60mΩ @V_{GS} = -10V	-12A	P

PDFN 3x3P



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

PARAMETERS/TEST CONDITIONS		SYMBOL	CH.	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	N	30	V
			P	-30	
Gate-Source Voltage		V_{GS}	N	±20	
			P	±20	
Continuous Drain Current[2]	T_C = 25 °C	I_D	N	20	A
			P	-12	
	T_C = 100 °C		N	13	
			P	-8	
	T_A = 25 °C		N	7.3	
			P	-4.3	
	T_A = 70 °C		N	5.8	
			P	-3.4	
Pulsed Drain Current[1]		I_{DM}	N	60	
			P	-30	
Avalanche Current		I_{AS}	N	17.4	
			P	-18	
Avalanche Energy	L = 0.1mH	E_{AS}	N	15	mJ
			P	16.2	
Power Dissipation	T_C = 25 °C	P_D	N	16	W
			P	15	
	T_C = 100 °C		N	6	
			P	6	

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PARAMETERS/TEST CONDITIONS		SYMBOL	CH.	LIMITS	UNITS
Power Dissipation	T_A = 25 °C	P_D	N	2	W
			P	1.7	
	T_A = 70 °C		N	1.3	
			P	1.1	
Junction & Storage Temperature Range		T_J, T_{STG}		-55 to 150	°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	CH.	MAXIMUM	UNITS
Junction-to-Case	$R_{\theta JC}$	N	7.5	°C / W
		P	8	
Junction-to-Ambient[3]	$R_{\theta JA}$	N	61	
		P	70	

[1]Pulse width limited by maximum junction temperature.

[2]Package limitation current is 30A.

[3]The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C.

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	30			V
		V_{GS} = 0V, I_D = -250μA	P	-30			
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	N	1.0	1.5	2.5	
		V_{DS} = V_{GS}, I_D = -250μA	P	-1.0	-1.5	-2.5	
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} = 24V, V_{GS} = 0V	N			1	μA
		V_{DS} = -24V, V_{GS} = 0V	P			-1	
		V_{DS} = 20V, V_{GS} = 0V, T_J = 55 °C	N			10	
		V_{DS} = -20V, V_{GS} = 0V, T_J = 55 °C	P			-10	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 5V, V_{GS} = 10V	N	60			A
		V_{DS} = -5V, V_{GS} = -10V	P	-30			
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 6A	N		25	38	mΩ
		V_{GS} = -4.5V, I_D = -3.5A	P		54	85	
		V_{GS} = 10V, I_D = 8A	N		17	24	
		V_{GS} = -10V, I_D = -4.5A	P		38	60	

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PARAMETER	SYMBOL	TEST CONDITIONS		LIMITS MIN	LIMITS TYP	LIMITS MAX	UNIT
STATIC							
Forward Transconductance[1]	g_{fs}	V_{DS} = 10V, I_D = 8A	N		22		S
		V_{DS} = -10V, I_D = -4.5A	P		11		
DYNAMIC							
Input Capacitance	C_{iss}	N-Channel V_{GS} = 0V, V_{DS} = 15V, f = 1MHz	N		591		pF
			P		548		
Output Capacitance	C_{oss}		N		77		
		P-Channel V_{GS} = 0V, V_{DS} = -15V, f = 1MHz	P		87		
Reverse Transfer Capacitance	C_{rss}		N		65		
			P		86		
Gate Resistance	R_g	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz	N		3.5		Ω
			P		12		
Total Gate Charge[2]	Q_g	N-Channel V_{DS} = 0.5$V_{(BR)DSS}$, V_{GS} = 10V, I_D = 8A	N		13		nC
			P		14		
Gate-Source Charge[2]	Q_{gs}		N		2.5		
		P-Channel V_{DS} = 0.5$V_{(BR)DSS}$, V_{GS} = -10V, I_D = -4.5A	P		2		
Gate-Drain Charge[2]	Q_{gd}		N		3.4		
			P		3.5		
Turn-On Delay Time[2]	$t_{d(on)}$	N-Channel V_{DS} = 15V $I_D \cong$ 1A, V_{GS} = 10V, R_G = 6Ω	N		14		nS
			P		16		
Rise Time[2]	t_r		N		10		
			P		13		
Turn-Off Delay Time[2]	$t_{d(off)}$	P-Channel V_{DS} = -15V $I_D \cong$ -1A, V_{GS} = -10V, R_G = 6Ω	N		30		
			P		35		
Fall Time[2]	t_f		N		10		
			P		14		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)							
Forward Voltage[1]	V_{SD}	I_F = 8A, V_{GS} = 0V	N			1	V
		I_F = -4.5A, V_{GS} = 0V	P			-1.1	
Reverse Recovery Time	t_{rr}	I_F = 8A, dI_F/dt = 100A / μS	N		12.4		nS
			P		16.7		
Reverse Recovery Charge	Q_{rr}	I_F = -4.5A, dI_F/dt = 100A / μS	N		3.2		nC
			P		4.5		

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

[2]Independent of operating temperature.

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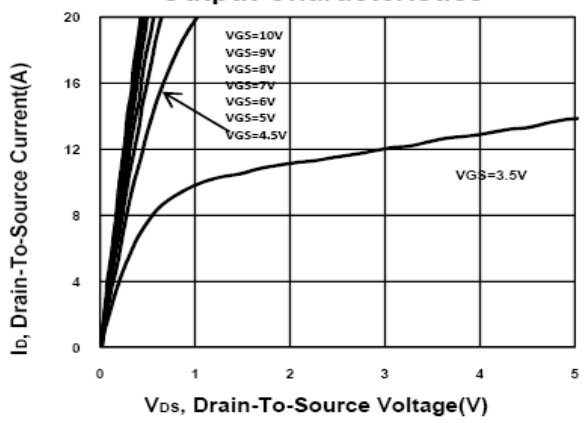
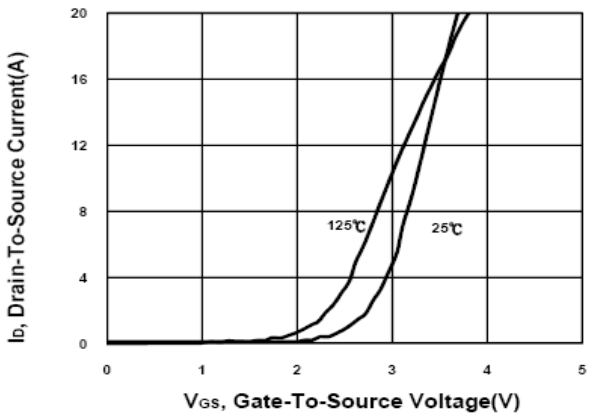
TYPICAL PERFORMANCE CHARACTERISTICS
N-CHANNEL

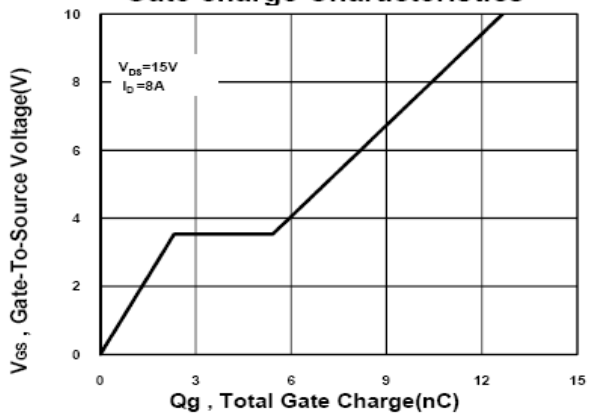
Output Characteristics



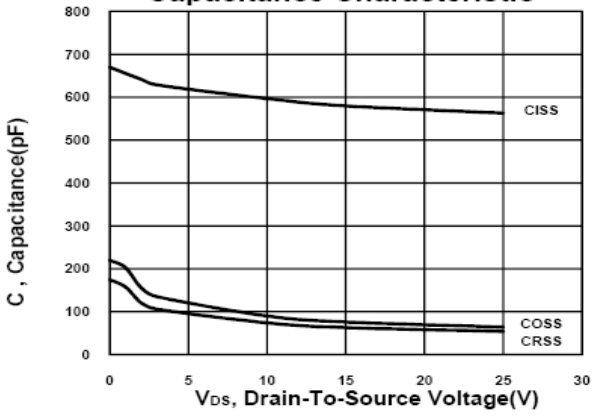
Transfer Characteristics



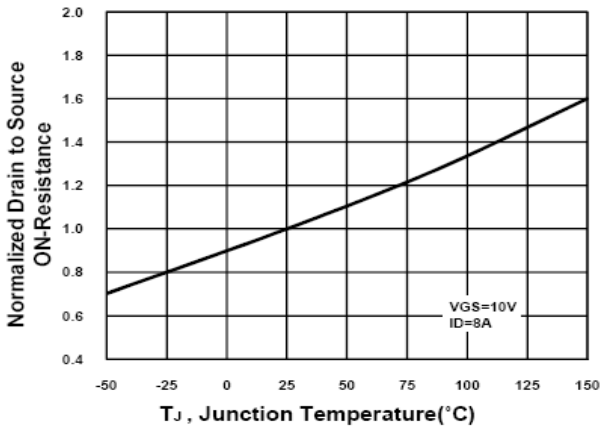
Gate charge Characteristics



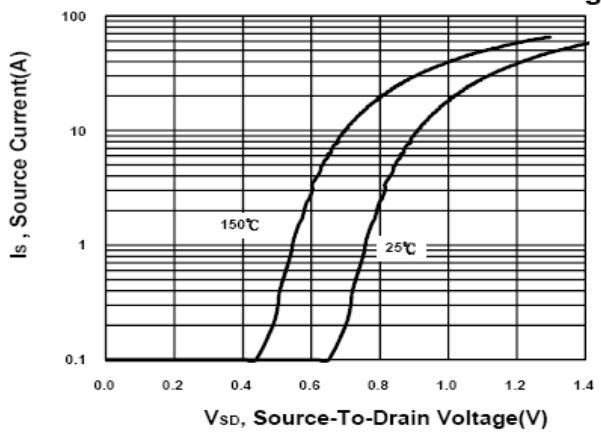
Capacitance Characteristic



On-Resistance VS Temperature



Source-Drain Diode Forward Voltage



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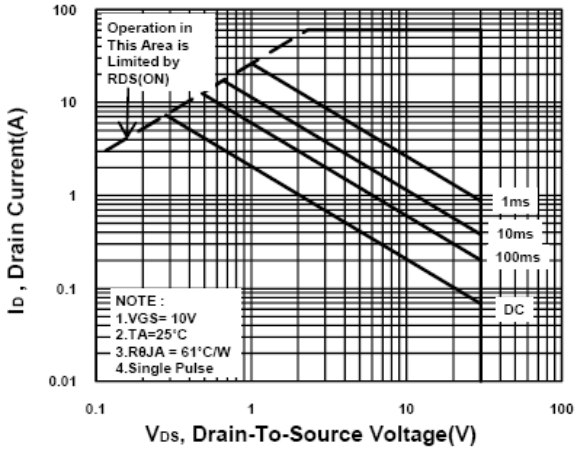
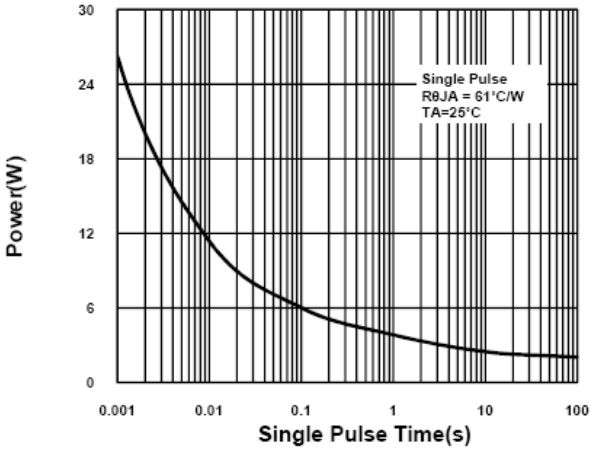
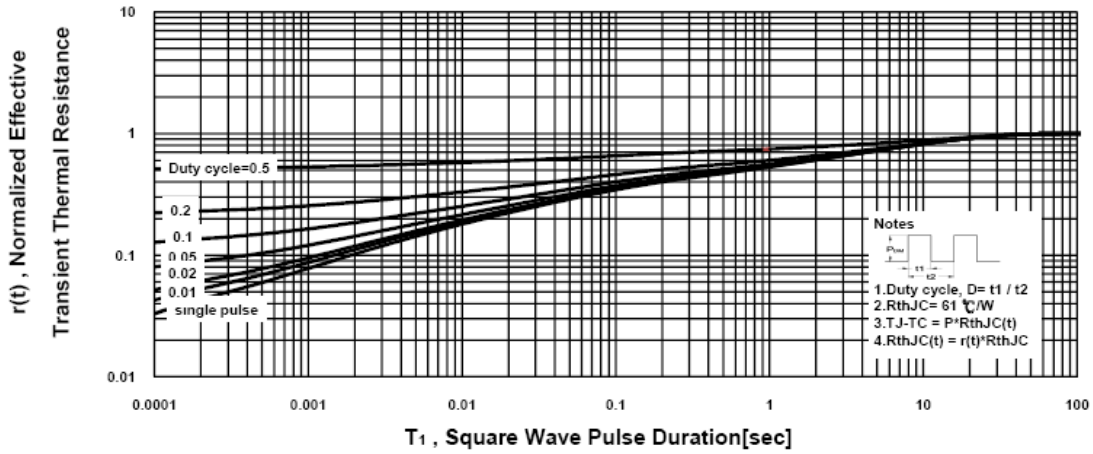
Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve



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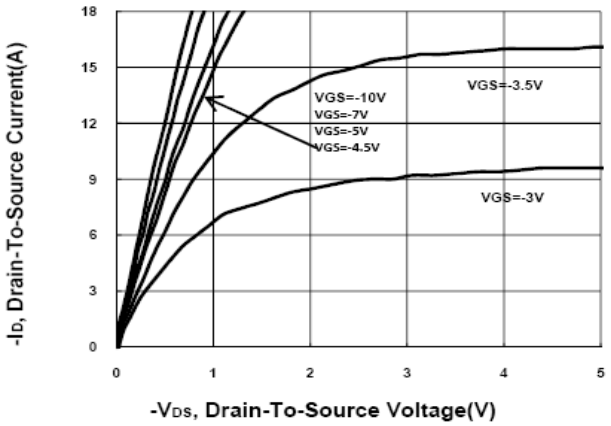
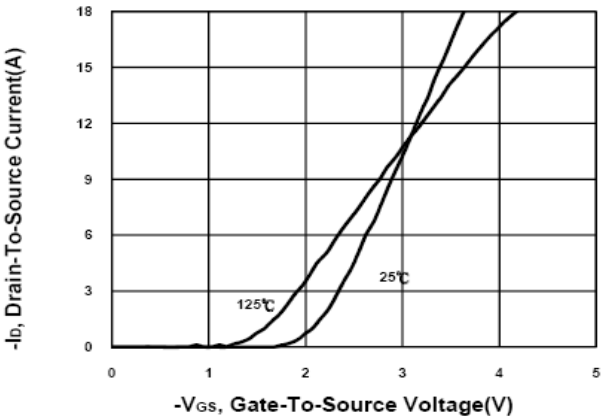
P-CHANNEL

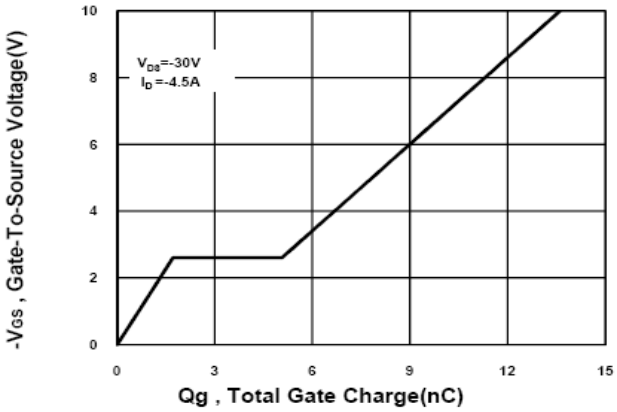
Output Characteristics



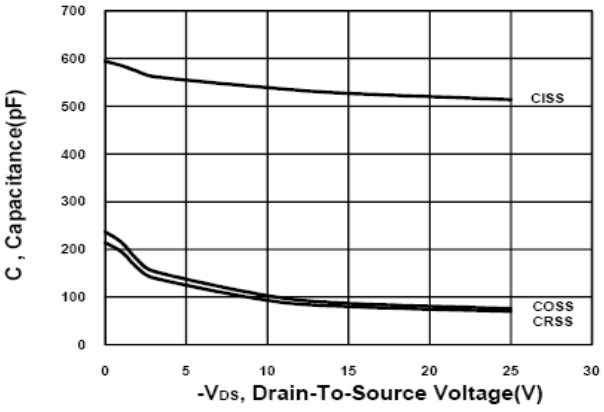
Transfer Characteristics



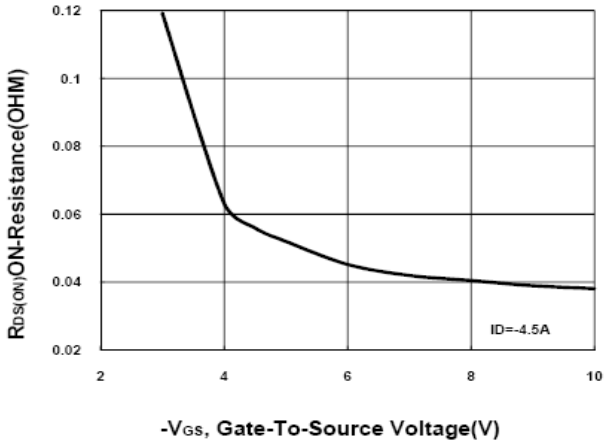
Gate charge Characteristics



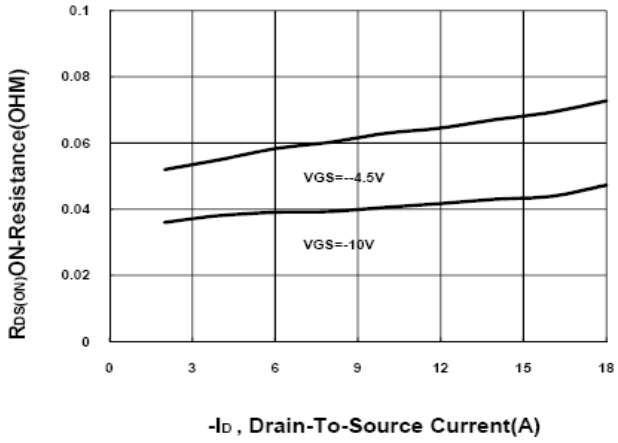
Capacitance Characteristic



On-Resistance VS Gate-To-Source



On-Resistance VS Drain Current



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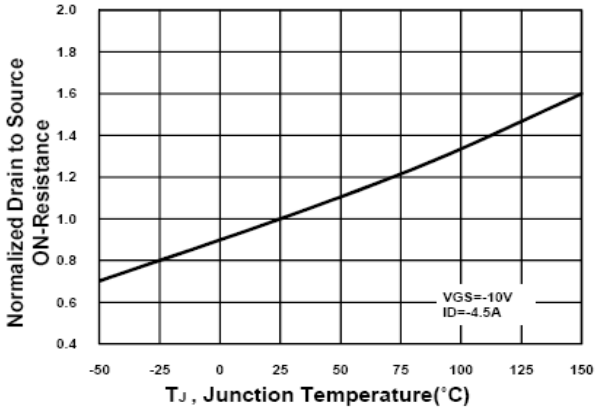
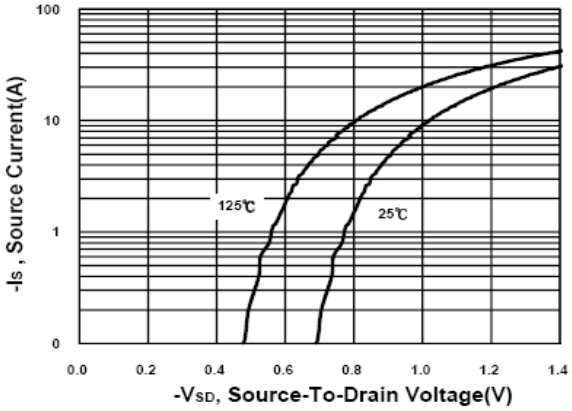
On-Resistance VS Temperature



Source-Drain Diode Forward Voltage



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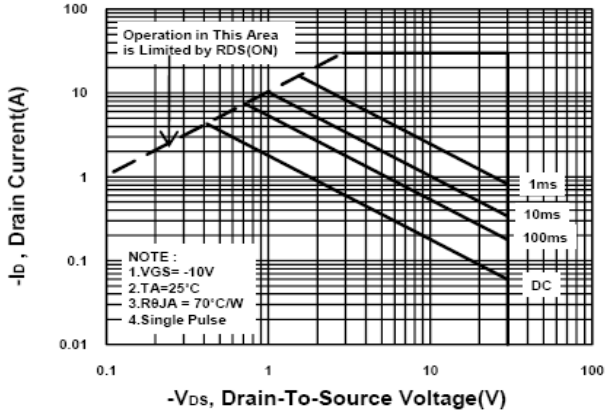
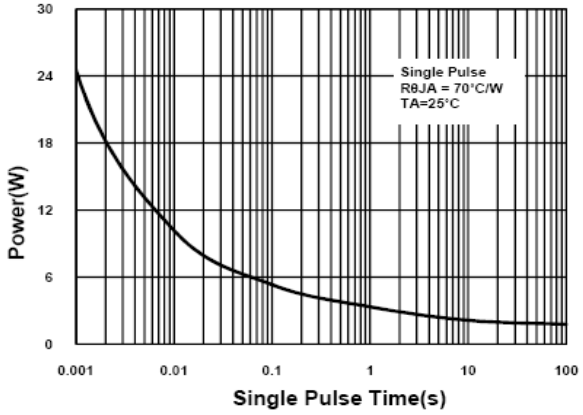


Single Pulse Maximum Power Dissipation



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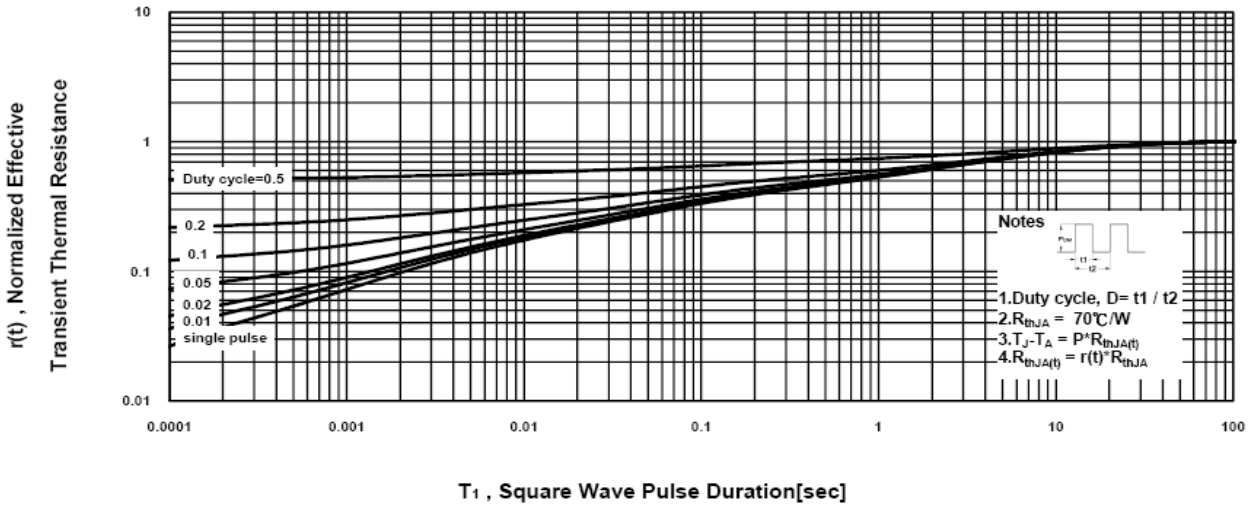

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Package Dimension

PDFN 3x3P(Dual) MECHANICAL DATA

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	3.2	3.3	3.4	I	0.7	0.75	0.8
B	2.95	3.05	3.15	J	0.1	0.15	0.25
C	2.95	3.05	3.15	K	0.35		
D		2.29		L	0°	10°	12°
E	3.2	3.3	3.4	M	0.27	0.32	0.37
F		0.13		N		0.65	
G	1.7	1.83	1.96	O		0.2	
H	0.3	0.4	0.5	P	0.06	0.13	0.2