N & P-Channel 60-V (D-S) MOSFET

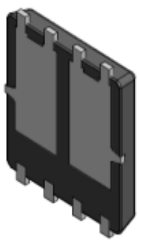
PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (mΩ)	I_D (A)
60	22 @ V_{GS} = 10V	33[c]
	26 @ V_{GS} = 4.5V	30[c]
-60	42 @ V_{GS} = 10V	24[c]
	52 @ V_{GS} = 4.5V	21[c]

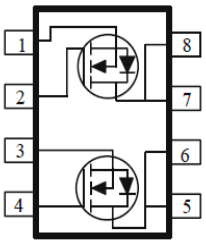
Key Features:
- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed

Typical Applications:
- Automotive Systems
- DC/DC Conversion Circuits
- Motor Drives

Pb-free
RoHS COMPLIANT
HALOGEN FREE

DFN5X6-8L





ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)					
Parameter		**Symbol**	**Nch Limit**	**Pch Limit**	**Units**
Drain-Source Voltage		V_{DS}	60	-60	V
Gate-Source Voltage		V_{GS}	±20	±20	
Continuous Drain Current	T_A=25°C	I_D	8.7[a]	6.3[a]	A
	T_A=70°C		7.0[a]	-5.0[a]	
	T_C=25°C		33[c]	24[c]	
	T_C=70°C		26[c]	19[c]	
Pulsed Drain Current [b]		I_{DM}	35	-25	
Continuous Source Current (Diode Conduction) [a]		I_S	3.3	-3.1	
Power Dissipation	T_A=25°C	P_D	2.5[a]	2.5[a]	W
	T_A=70°C		1.6[a]	1.6[a]	
	T_C=25°C		36	36	
	T_C=70°C		23	23	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150		°C

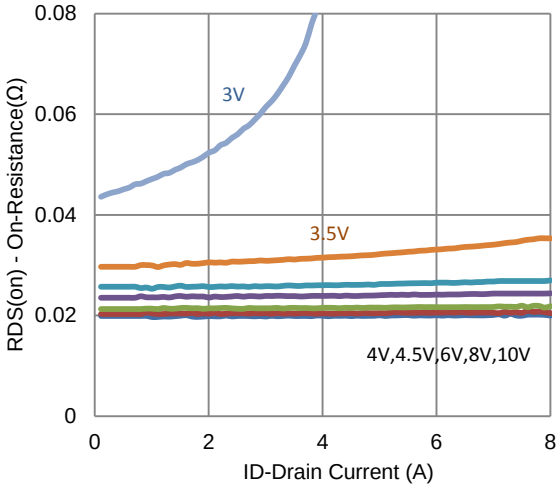
THERMAL RESISTANCE RATINGS				
Parameter		**Symbol**	**Maximum**	**Units**
Maximum Junction-to-Ambient [a]	t <= 10 sec	$R_{\theta JA}$	50	°C/W
	Steady State		70	
Maximum Junction-to-Case	Steady State	$R_{\theta JC}$	3.5	

Notes
a. Surface Mounted on 1” x 1” FR4 Board
b. Pulse width limited by maximum junction temperature
c. Package limited

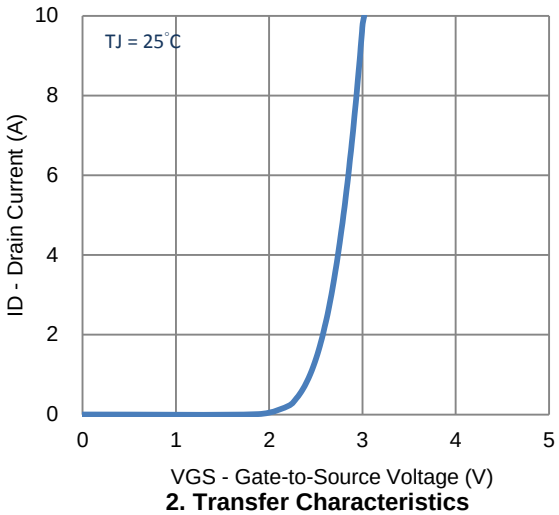
Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 uA **(Nch)**	1			V
		V_{DS} = V_{GS}, I_D = -250 uA **(Pch)**	-1			V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 48 V, V_{GS} = 0 V **(Nch)**			1	uA
		V_{DS} = -48 V, V_{GS} = 0 V **(Pch)**			-1	
On-State Drain Current [a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V **(Nch)**	10			A
		V_{DS} = -5 V, V_{GS} = 10 V **(Pch)**	-7.5			A
Drain-Source On-Resistance [a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 7 A **(Nch)**			22	mΩ
		V_{GS} = 4.5 V, I_D = 5.6 A **(Nch)**			26	
		V_{GS} = -10 V, I_D = -5 A **(Pch)**			42	mΩ
		V_{GS} = -4.5 V, I_D = -4 A **(Pch)**			52	
Forward Transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 7 A **(Nch)**		8		S
		V_{DS} = -15 V, I_D = -5 A **(Pch)**		7		S
Diode Forward Voltage [a]	V_{SD}	I_S = 1.7 A, V_{GS} = 0 V **(Nch)**		0.72		V
		I_S = -1.6 A, V_{GS} = 0 V **(Pch)**		-0.76		V
Dynamic [b]						
Total Gate Charge	Q_g	N - Channel V_{DS} = 30 V, V_{GS} = 4.5 V, I_D = 7 A		16		nC
Gate-Source Charge	Q_{gs}			4		
Gate-Drain Charge	Q_{gd}			8		
Turn-On Delay Time	$t_{d(on)}$	N - Channel V_{DS} = 30 V, R_L = 4.3 Ω, I_D = 7 A, V_{GEN} = 10 V, R_{GEN} = 6 Ω		8		ns
Rise Time	t_r			11		
Turn-Off Delay Time	$t_{d(off)}$			48		
Fall Time	t_f			14		
Input Capacitance	C_{iss}	N - Channel V_{DS} = 15 V, V_{GS} = 0 V, f = 1 Mhz		1465		pF
Output Capacitance	C_{oss}			126		
Reverse Transfer Capacitance	C_{rss}			114		
Total Gate Charge	Q_g	P - Channel V_{DS} = -30 V, V_{GS} = -4.5 V, I_D = -5 A		20		nC
Gate-Source Charge	Q_{gs}			6		
Gate-Drain Charge	Q_{gd}			8		
Turn-On Delay Time	$t_{d(on)}$	P - Channel V_{DS} = -30 V, R_L = 6 Ω, I_D = -5 A, V_{GEN} = -10 V, R_{GEN} = 6 Ω		6		ns
Rise Time	t_r			14		
Turn-Off Delay Time	$t_{d(off)}$			73		
Fall Time	t_f			27		
Input Capacitance	C_{iss}	P - Channel V_{DS} = -15 V, V_{GS} = 0 V, f = 1 Mhz		1817		pF
Output Capacitance	C_{oss}			129		
Reverse Transfer Capacitance	C_{rss}			111		

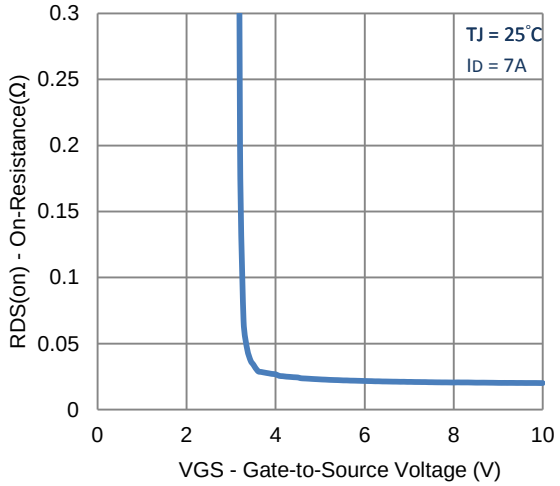
Typical Electrical Characteristics - N-channel



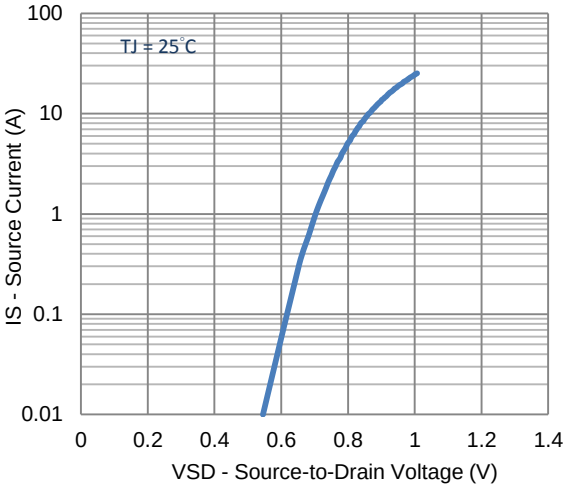
1. On-Resistance vs. Drain Current



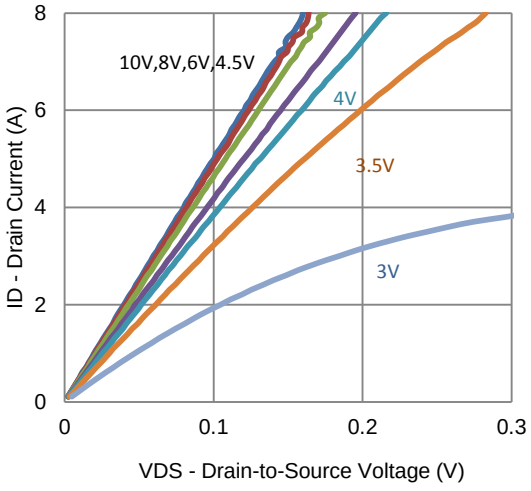
2. Transfer Characteristics



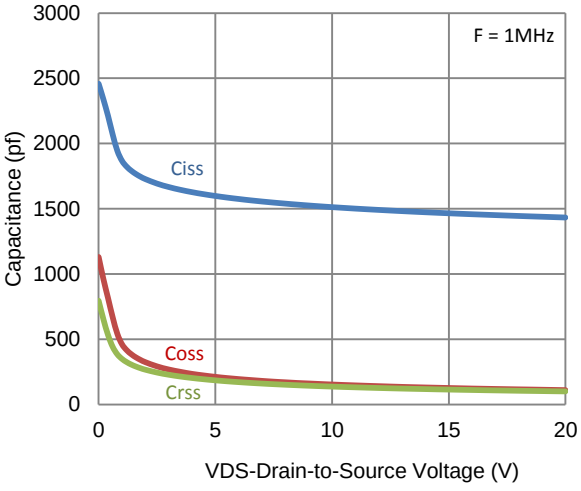
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

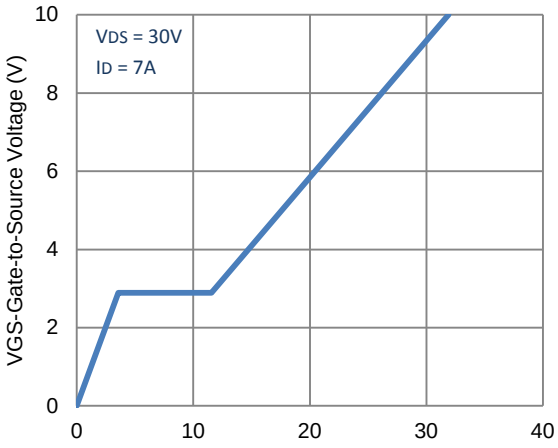


5. Output Characteristics

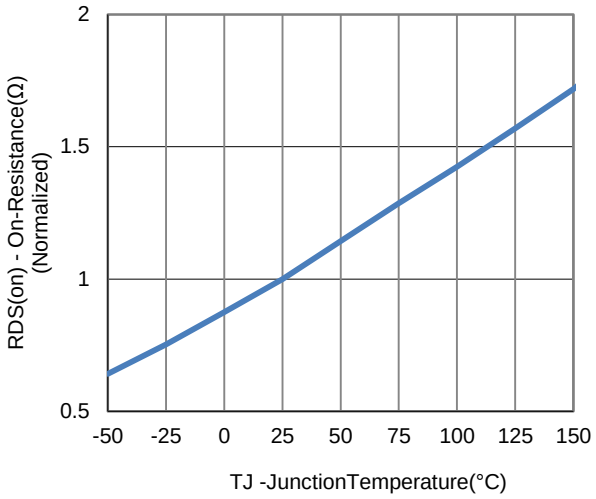


6. Capacitance

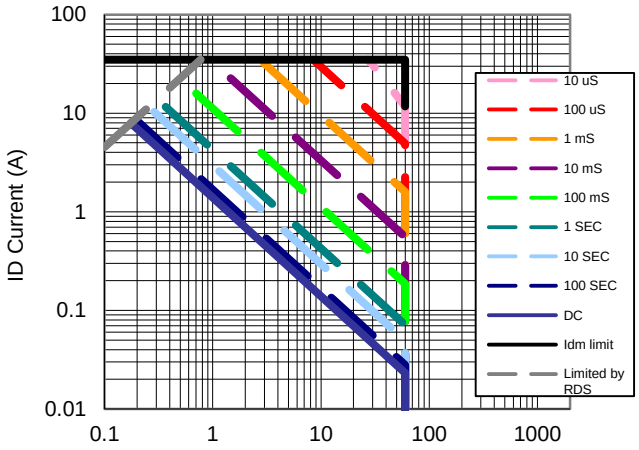
Typical Electrical Characteristics - N-channel



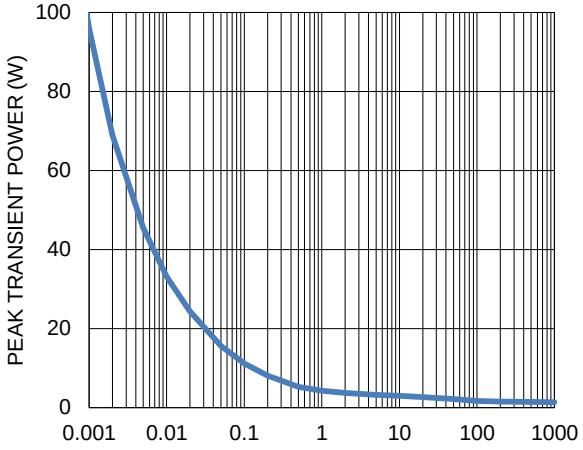
7. Gate Charge



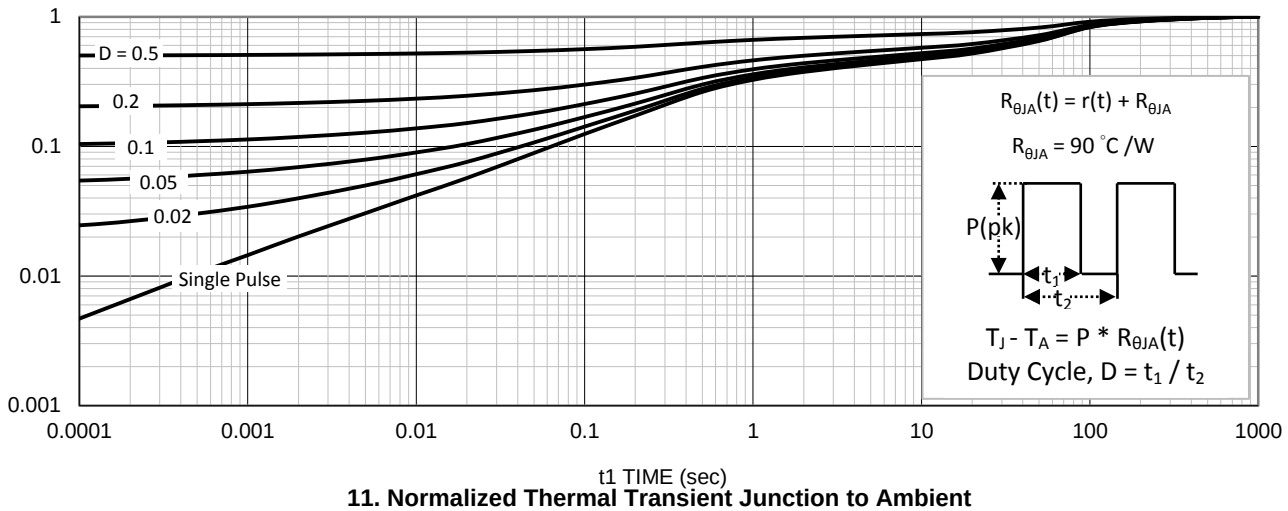
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

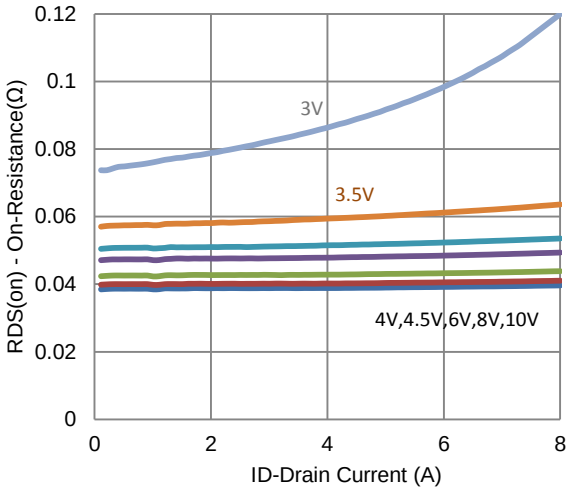


10. Single Pulse Maximum Power Dissipation

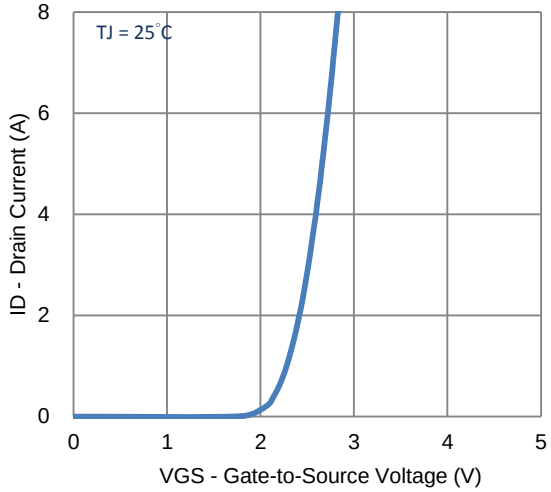


11. Normalized Thermal Transient Junction to Ambient

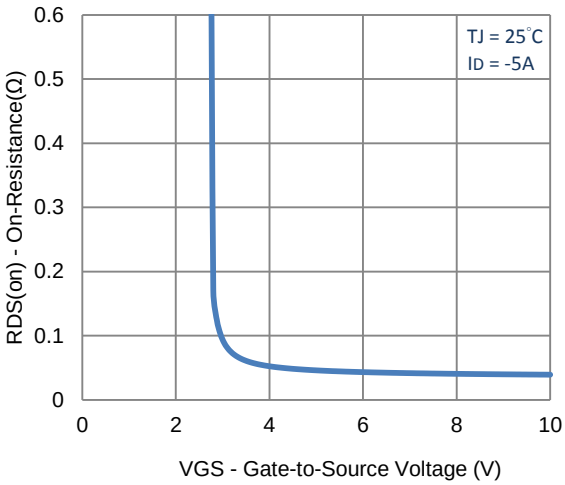
Typical Electrical Characteristics - P-channel



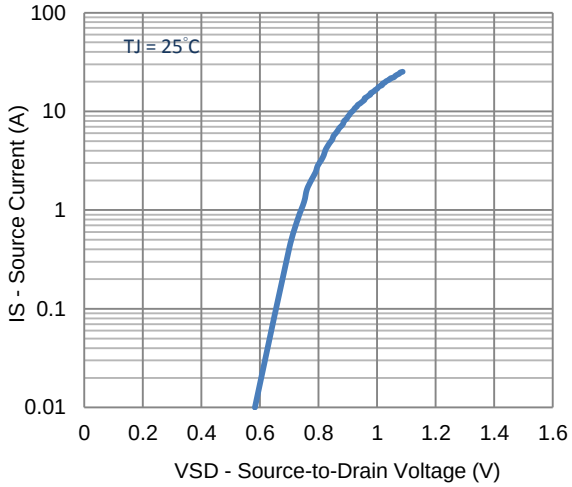
1. On-Resistance vs. Drain Current



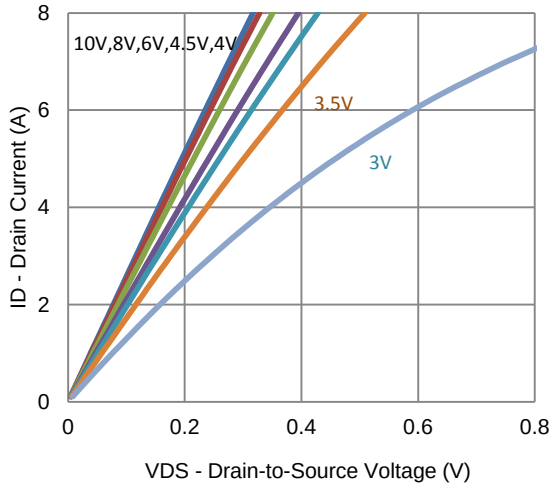
2. Transfer Characteristics



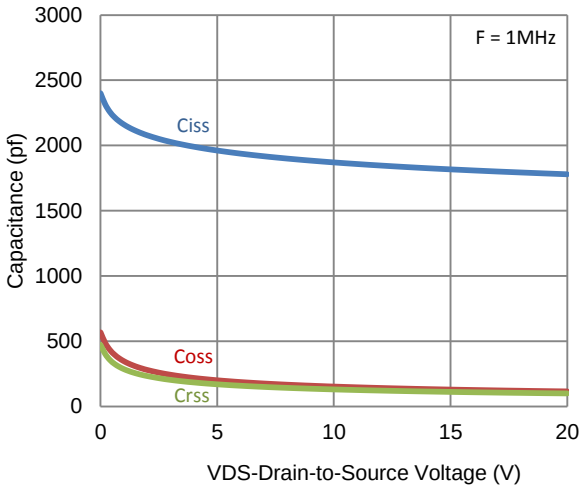
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

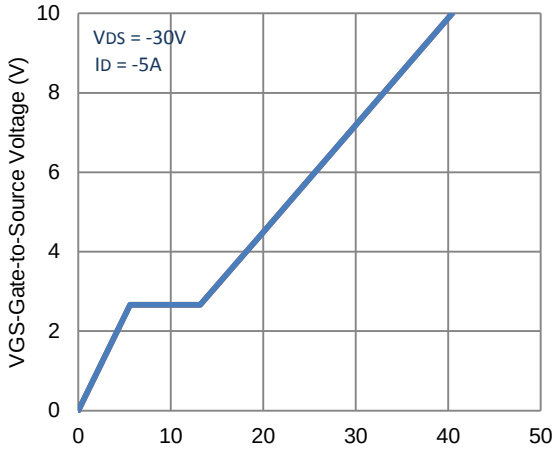


5. Output Characteristics

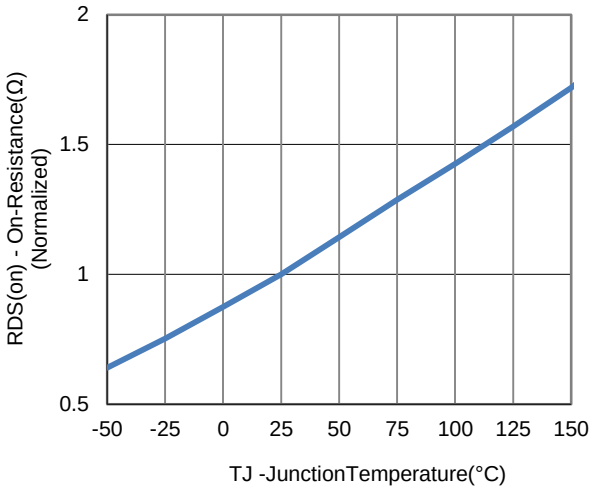


6. Capacitance

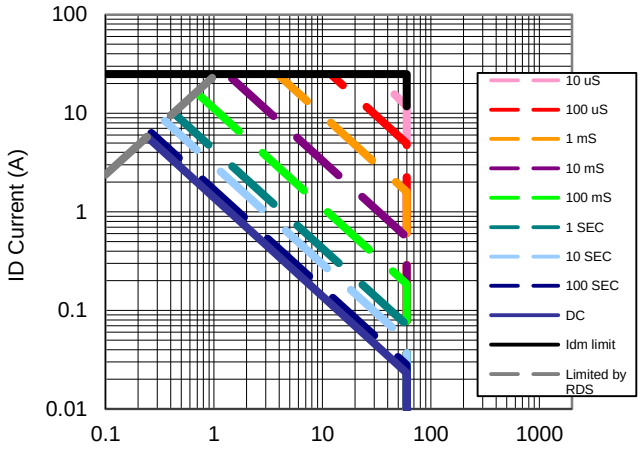
Typical Electrical Characteristics - P-channel



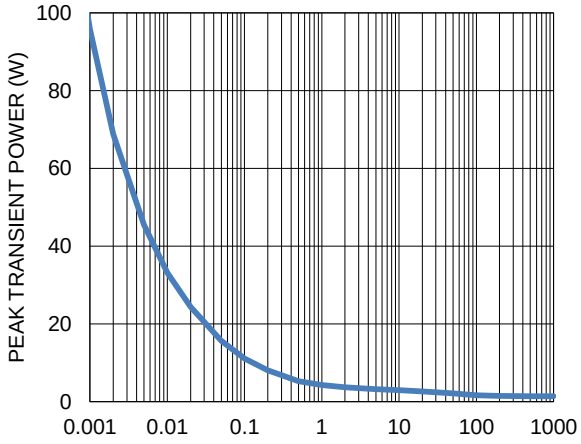
7. Gate Charge



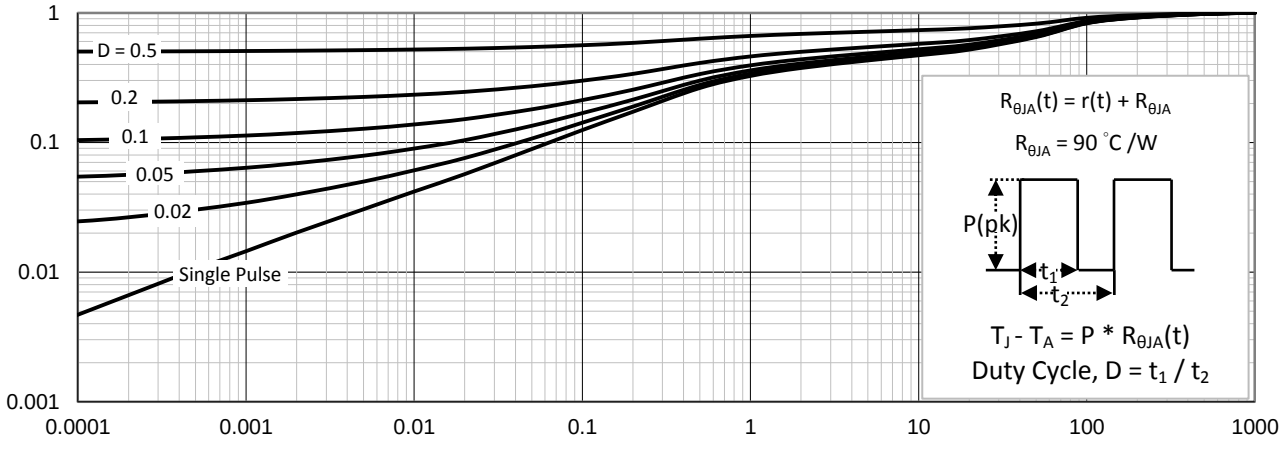
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

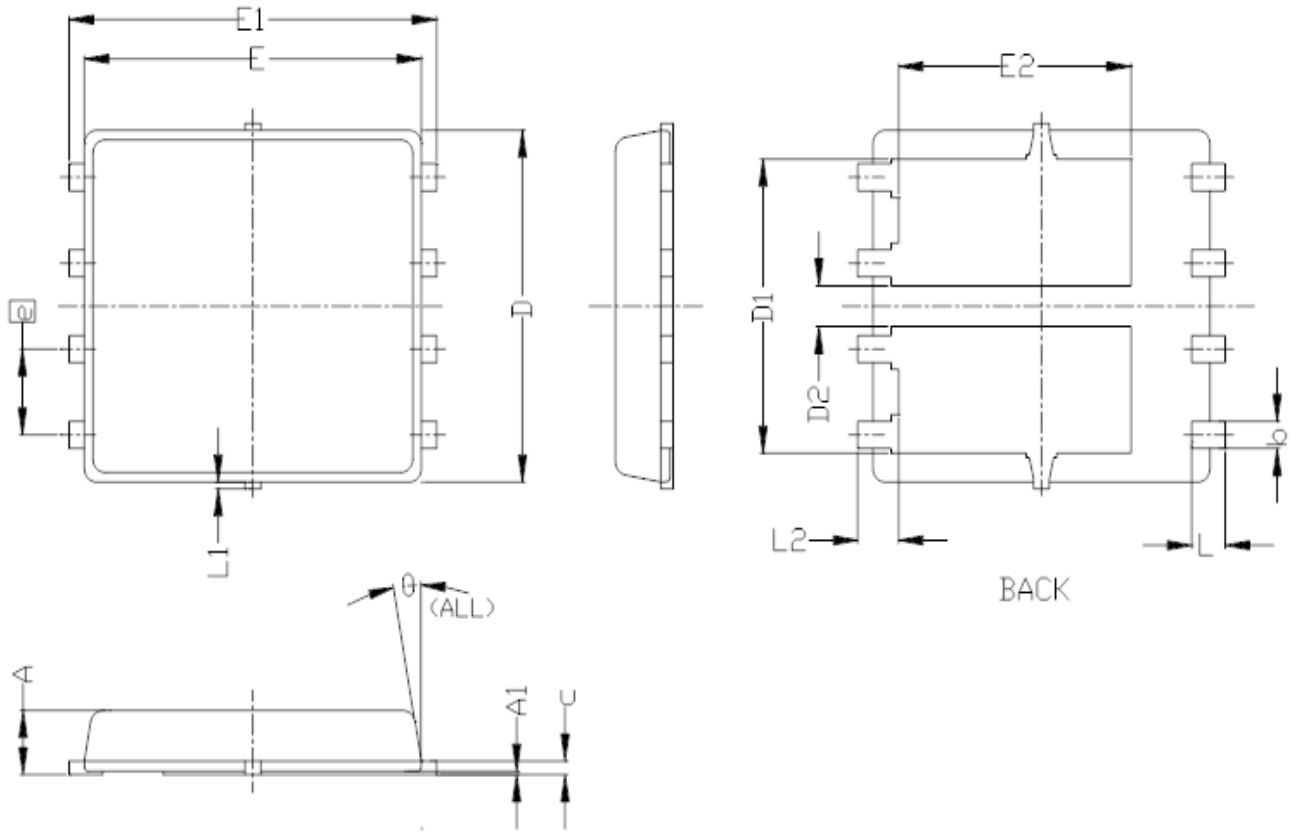


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.85	0.95	1.00	0.033	0.037	0.039
A1	0.00	——	0.05	0.000	——	0.002
b	0.30	0.40	0.50	0.012	0.016	0.020
c	0.15	0.20	0.25	0.006	0.008	0.010
D	5.20 BSC			0.205 BSC		
D1	4.35 BSC			0.171 BSC		
E	5.55 BSC			0.219 BSC		
E1	6.05 BSC			0.238 BSC		
E2	3.62 BSC			0.143 BSC		
e	1.27 BSC			0.050 BSC		
L	0.45	0.55	0.65	0.018	0.022	0.026
L1	0	---	0.15	0	---	0.006
L2	0.68 REF			0.027 REF		
θ	0°	---	10°	0°	---	10°