General Description

The WSP4616 is the highest performance trench N-ch and P-ch MOSFET with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The WSP4616 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

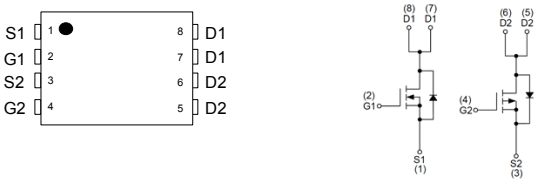
Product Summery

BVDSS	RDSON	ID
30V	15mΩ	16A
-30V	15mΩ	-16A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- CCFL Back-light Inverter

DFN5X6-8 Pin Configuration



Absolute Maximum Ratings (T_A= 25°C unless otherwise noted)

Symbol	Parameter		N Channl	P Channl	Unit
V_{DSS}	Drain-Source Voltage		30	-30	V
V_{GSS}	Gate-Source Voltage		±20	±20	
I_D	Continuous Drain Current G	Tc=25°C	16	-16	A
		Tc=100°C	10.5	-12.5	
I_{DM}	Pulsed Drain Current C		35	-65	A
I_{DSM}	Continuous Drain Current	T_A=25°C	9.5	-11	A
		T_A=70°C	7.5	-8.5	
P_D	Maximum Power Dissipation B	T_C=25°C	10	20	W
		T_C=100°C	4	8	
P_{DSM}	Maximum Power Dissipation A	Tc=25°C	3.1	4.1	W
		Tc=100°C	2	2.6	
I_S	Diode Continuous Forward Current	Tc=25°C	10	-16	A
E_{AS}	Single pulsed avalanlce energy C	L=0.5mH	7	-36	mJ
I_{AS}	Single pulsed avalanlce Current	L=0.5mH	12	-27	A
T_j	Maximum Junction Temperature		150	150	°C
T_{STG}	Storage Temperature Range		-55 to 150	-55 to 150	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient AD	t≤10S	40	30	°C/W
		Steady StateC	70	65	°C/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		21	6	°C/W

N-Channl Electrical Characteristics (T_J= 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =24V, V_{GS}=0V	-	-	1	μA
		T_j=55°C	-	-	5	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_{DS}=250μA	1	1.5	2	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=10A	-	15	19.5	mΩ
		V_{GS}=4.5V, I_{DS}=5A	-	18	24	
R_G	Gate Resistance	F=1MHz, V_{GS}=0V, V_{DS}=0V	-	-	2.8	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS} =15V, Frequency=1.0MHz	-	373	-	pF
C_{oss}	Output Capacitance		-	67	-	
C_{rss}	Reverse transfer capacitance		-	41	-	
$t_{d(ON)}$	Turn-on delay Time	V_{GEN}=10V ,V_{DD}=15V R_G=3Ω, RL=1.5Ω	-	4.3	-	nS
t_r	Turn-on rise Time		-	2.8	-	
$t_{d(OFF)}$	Turn-off delay Time		-	15.8	-	
t_f	Turn-off rise Time		-	3	-	
Q_g	Total Gate Charge (10V)	V_{DS} =15V, V_{GS}=10V, I_{DS}=10A	-	7.1	-	nC
Q_g	Total Gate Charge (4.5V)		-	3.5	-	
Q_{gs}	Gate-Source Charge		-	1.2	-	
Q_{gd}	Gate-Drain Charge		-	1.6	-	
V_{SD}	Diode Forward Voltage	I_{SD}=1A, V_{GS}=0V	-	0.75	1	V
t_{rr}	Reverse Recovery Time	I_{DS}=10A, dI_{SD}/dt=500A/μs	-	6	-	ns
Qrr	Reverse Recovery Charge		-	6.6	-	nC

A. 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. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ t≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(MAX)}$=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Single pulse width limited by junction temperature $T_{J(MAX)}$=150° C.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink,rating. assuming a maximum junction temperature of TJ(MAX)=150°C. The SOA curve provides a single pulse

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

P-Channl Electrical Characteristics (T_J= 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=-250A	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =-24V, V_{GS}=0V	-	-	-1	μA
		T_j=55°C	-	-	-5	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_{DS}=-250A	1	1.5	2	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	V_{GS}=-10V, I_{DS}=-9.7A	-	15	20	mΩ
		V_{GS}=-4.5V, I_{DS}=-7A	-	20	27	
R_G	Gate Resistance	F=1MHz, V_{GS}=0V,V_{DS}=0V	-	4	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, Frequency=1.0MHz	-	1040	-	pF
C_{oss}	Output Capacitance		-	180	-	
C_{rss}	Reverse transfer capacitance		-	125	-	
$t_{d(ON)}$	Turn-on delay Time	V_{GEN}=-10V ,V_{DD}=-15V R_G=3Ω, RL=1.5Ω	-	10	-	nS
t_r	Turn-on rise Time		-	5.5	-	
$t_{d(OFF)}$	Turn-off delay Time		-	26	-	
t_f	Turn-off rise Time		-	9	-	
Q_g	Total Gate Charge	V_{DS}=-15V, V_{GS}=-10V, I_{DS}=-9.7A	-	19	-	nC
Q_g	Total Gate Charge		-	9.6	-	
Q_{gs}	Gate-Source Charge		-	3.6	-	
Q_{gd}	Gate-Drain Charge		-	4.6	-	
V_{SD}	Diode Forward Voltage	I_{SD}=-1A, V_{GS}=0V	-	-0.75	-1.1	V
t_{rr}	Reverse Recovery Time	I_{DS}=-9.7A, dI_{SD}/dt=500A/μs	-	11.5	-	ns
Qrr	Reverse Recovery Charge		-	25	-	nC

N-Channl TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

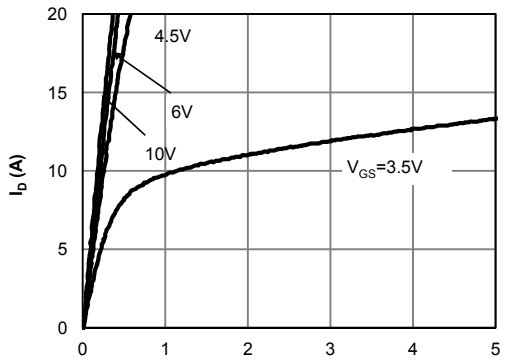


Figure 1: On-Region Characteristics (Note E)

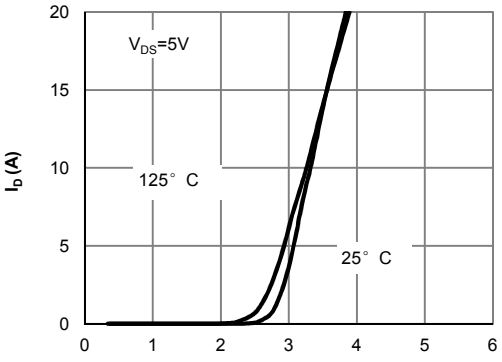


Figure 2: Transfer Characteristics (Note E)

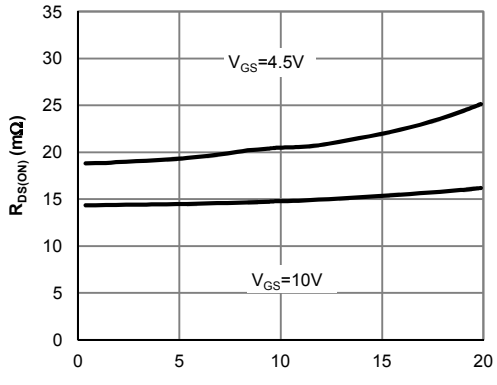


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

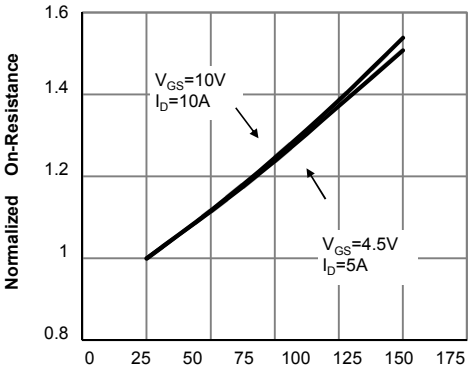


Figure 4: On-Resistance vs. Junction Temperature (Note E)

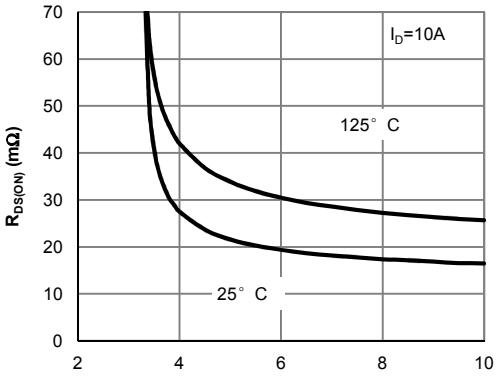


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

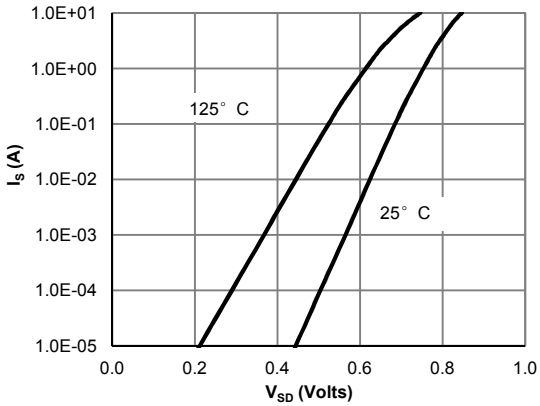


Figure 6: Body-Diode Characteristics (Note E)

N-Channl TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

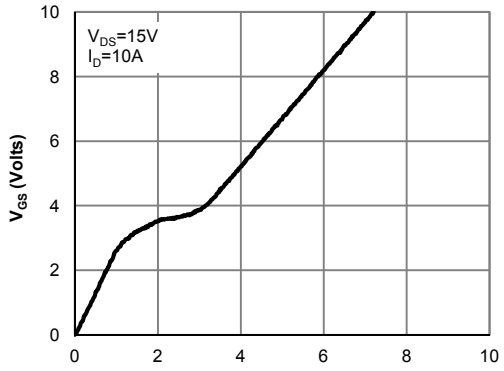


Figure 7: Gate-Charge Characteristics

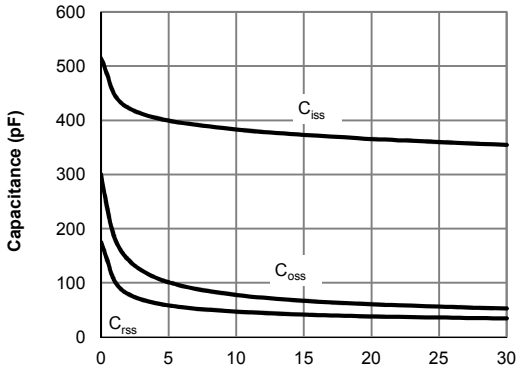


Figure 8: Capacitance Characteristics

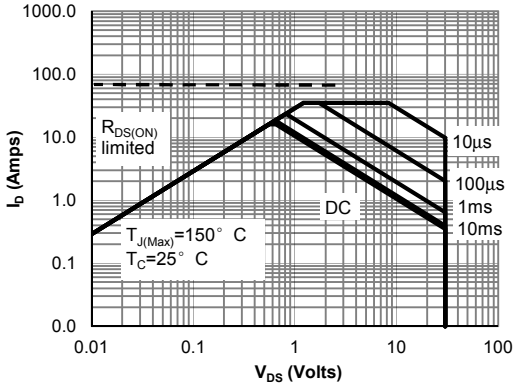


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

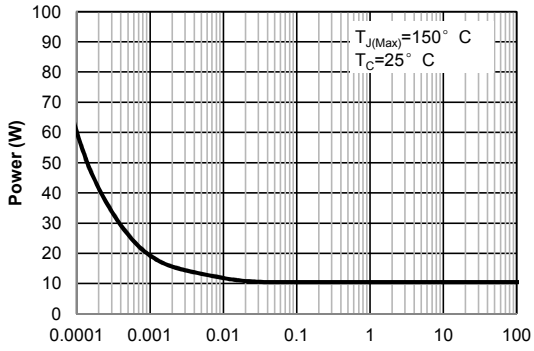


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

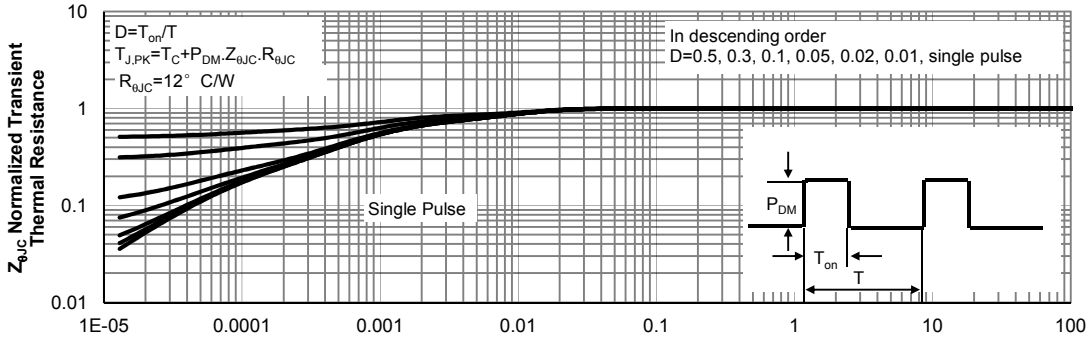


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

N-Channl TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

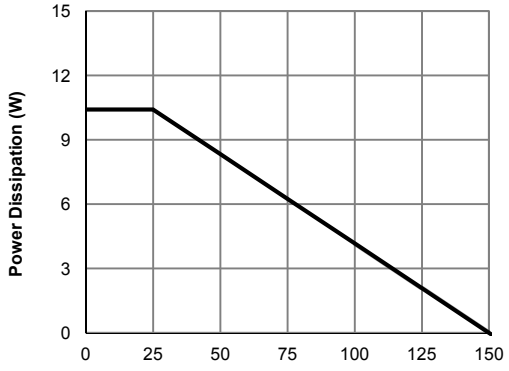


Figure 12: Power De-rating (Note F)

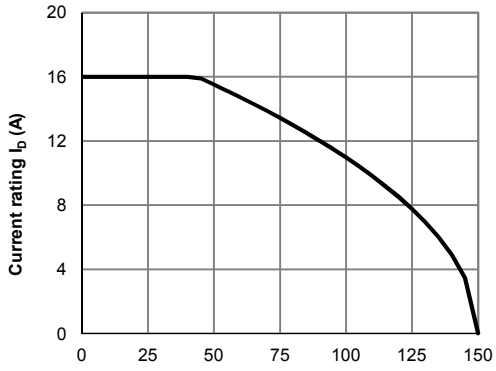


Figure 13: Current De-rating (Note F)

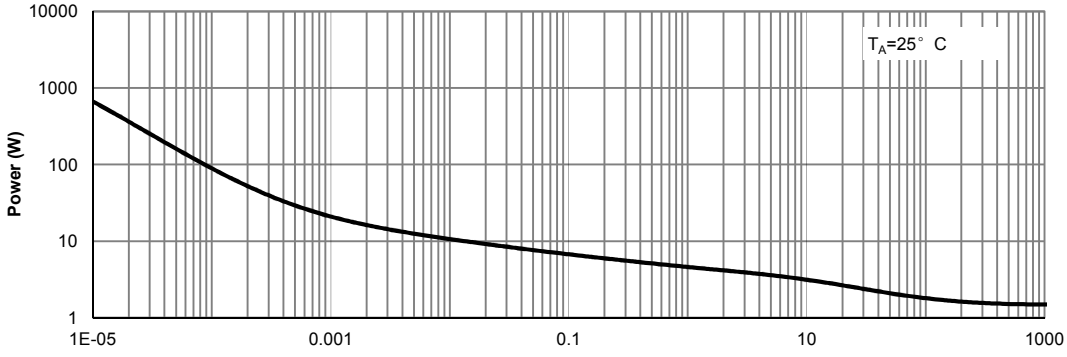


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

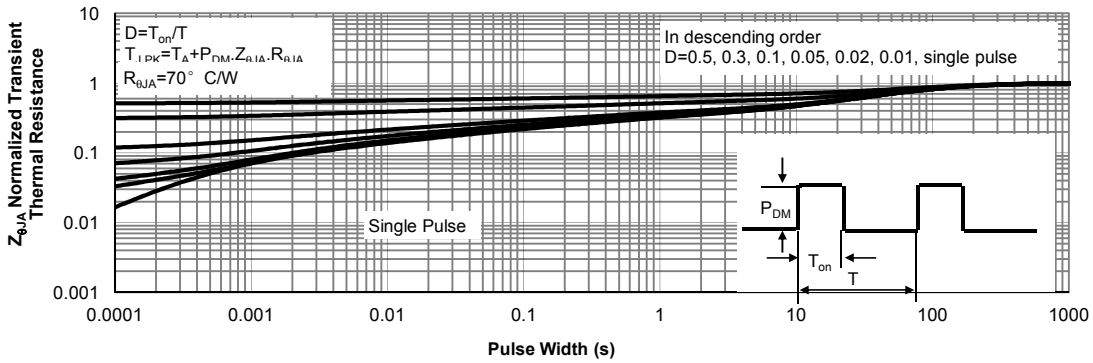


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

P-Channl TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

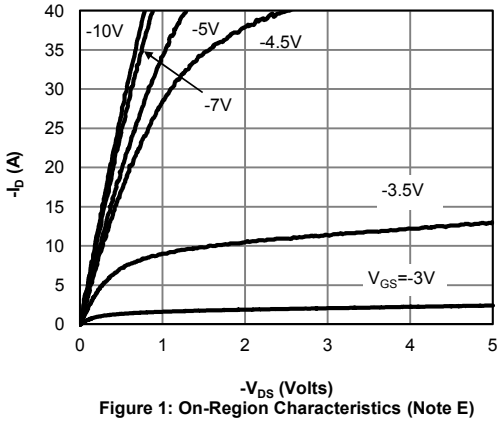


Figure 1: On-Region Characteristics (Note E)

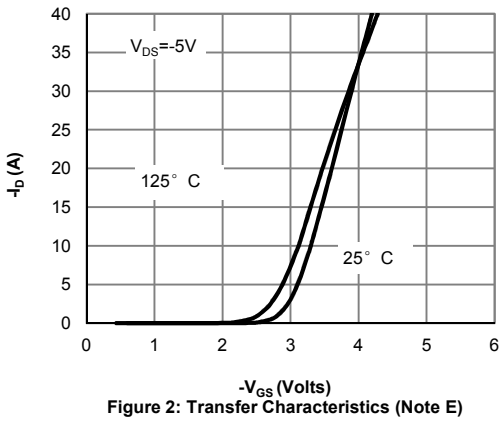


Figure 2: Transfer Characteristics (Note E)

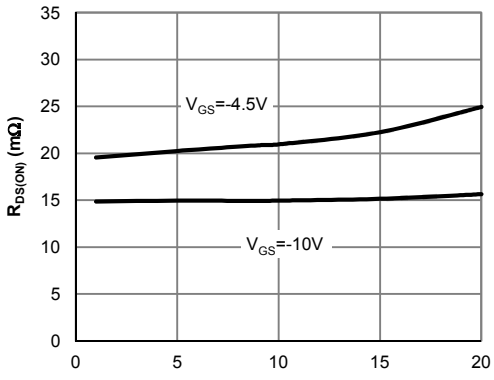


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

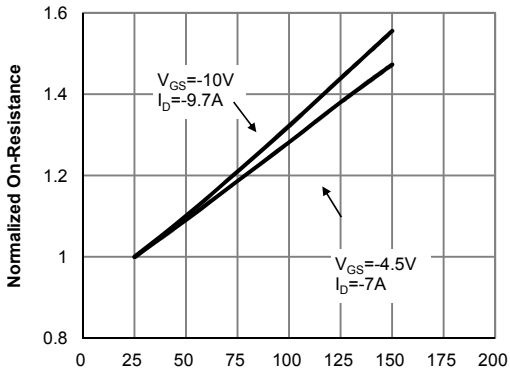


Figure 4: On-Resistance vs. Junction Temperature (Note E)

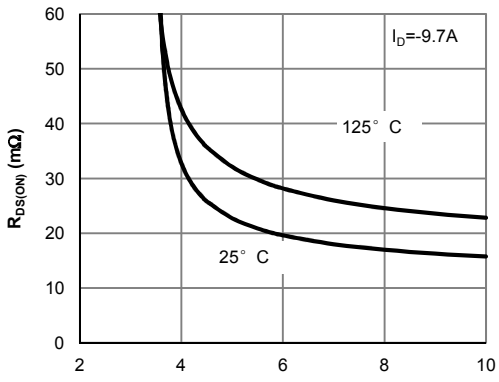


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

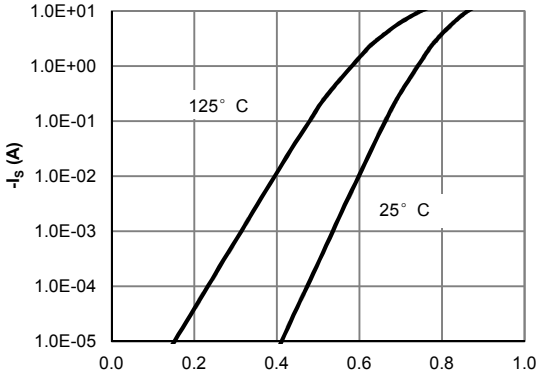


Figure 6: Body-Diode Characteristics (Note E)

P-Channl TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

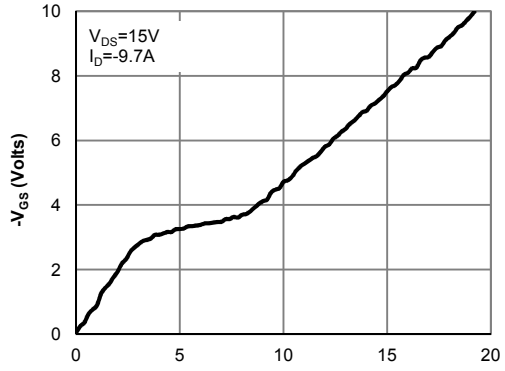


Figure 7: Gate-Charge Characteristics

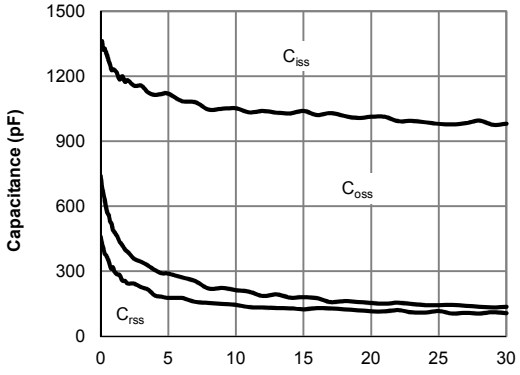
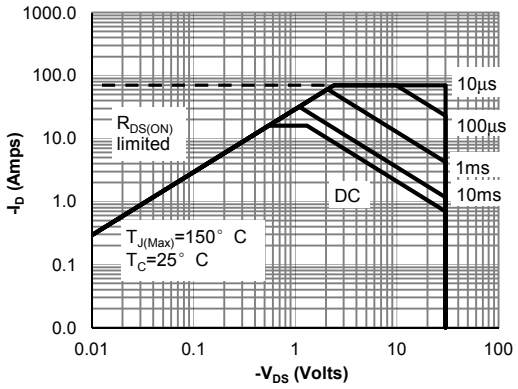


Figure 8: Capacitance Characteristics



V_{GS}> or equal to 4.5V
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

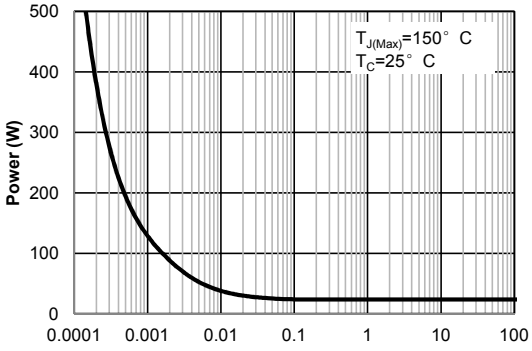


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

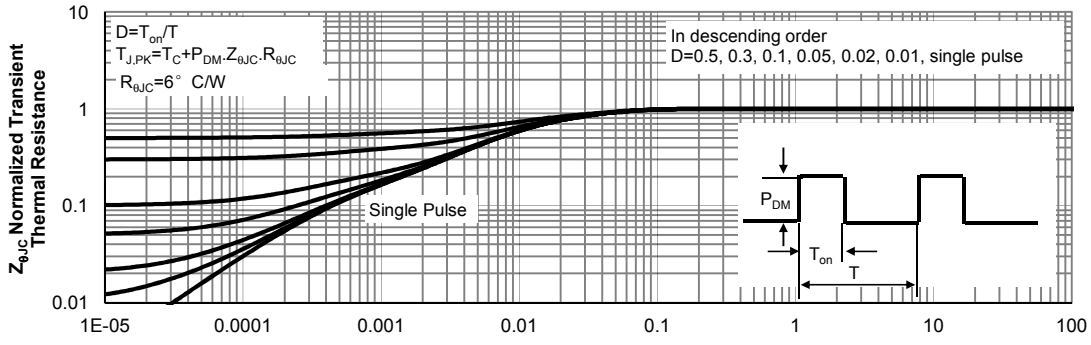


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

P-Channl TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

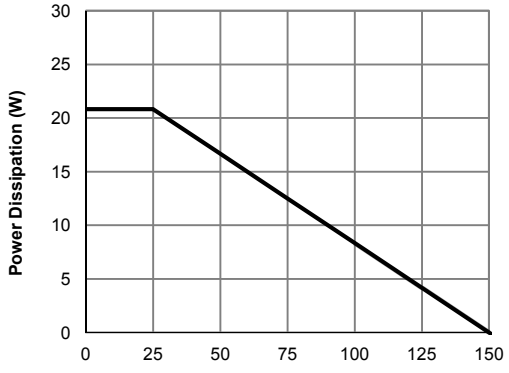


Figure 12: Power De-rating (Note F)

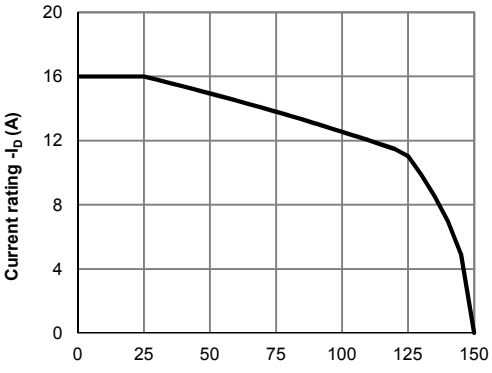


Figure 13: Current De-rating (Note F)

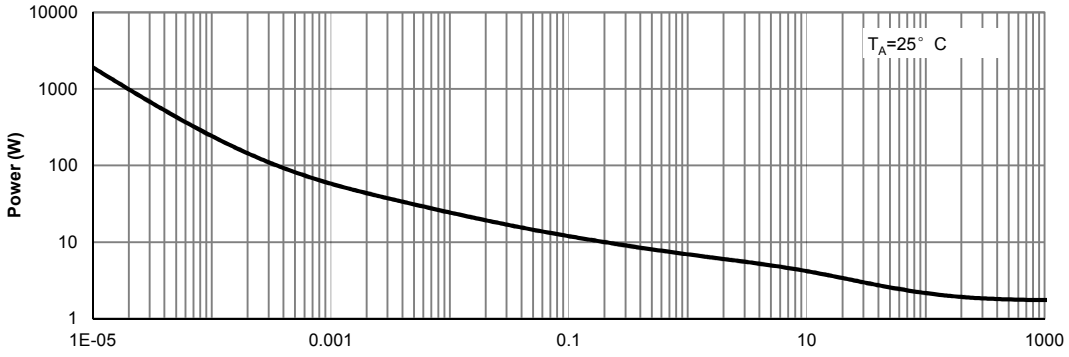


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

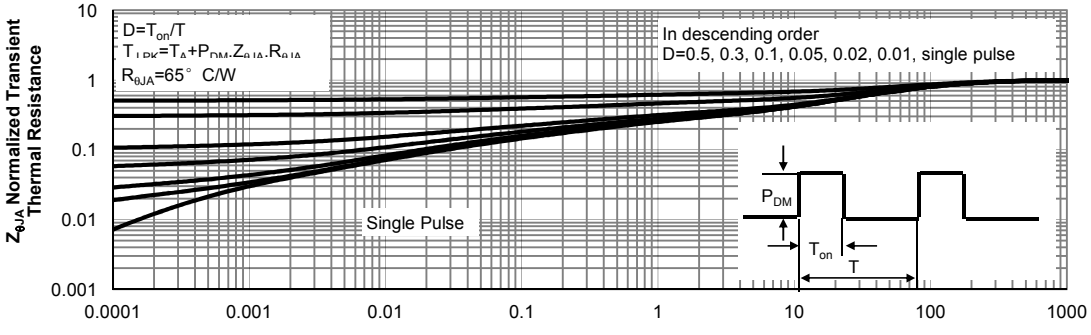


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)