Eternal Semiconductor Inc.

ET4614

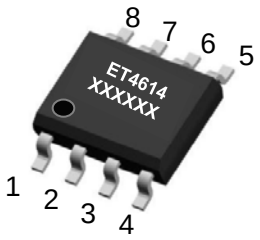
Complementary High Density Trench MOSFET

PRODUCT SUMMARY

PRODUCT SUMMARY (N-Channel)		
V_{DSS}	I_D	$R_{DS(on)}$ (m-ohm) Typ.
40V	6.0A	23 @ VGS = 10 V,I_D=6.0A
		33 @ VGS = 4.5 V,I_D=5.0A
PRODUCT SUMMARY (P-Channel)		
V_{DSS}	I_D	$R_{DS(on)}$ (m-ohm) Typ.
-40V	-5.0A	32.5 @ VGS = -10V,I_D=-5.0A
		51.5 @ VGS = -4.5V,I_D=-4.0A

Features

- Advanced Trench Process Technology
- High Density Cell Design for Ultra Low On-Resistance
- Surface mount Package
- Ordering information： ET4614（Lead（Pb）-free and halogen-free)



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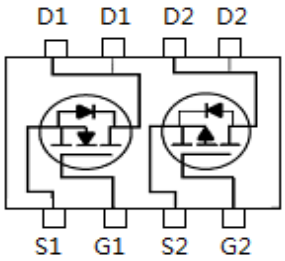
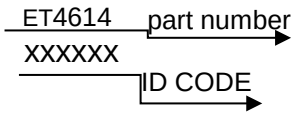


Pin1: Soure1
Pin2: Gate1
Pin3: Soure2
Pin4: Gate2
Pin5/6:Drain2
Pin7/8:Drain1

TOP Marking



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

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D	Drain Current (Continuous)	6	-5	A
I_{DM}	Drain Current (Pulsed) [a]	20	-20	A
P_D	Total Power Dissipation @T_A=25°C	2	2	W
IAS	Avalanche Current, Single pulse L=0.3mH	9	12	A
EAS	Avalanche Energy, Single pulse L=0.3mH	12.2	21.6	Mj
I_S	Maximum Diode Forward Current	2.5	-2.5	A
T_j, T_{stg}	Operating Junction and Storage	-55 to +150	-55 to +150	°C
R_{QJA}	Thermal Resistance Junction to Ambient (PCB	63.2	63.2	°C/W

a: Repetitive Rating: Pulse width limited by the maximum junction temperature.

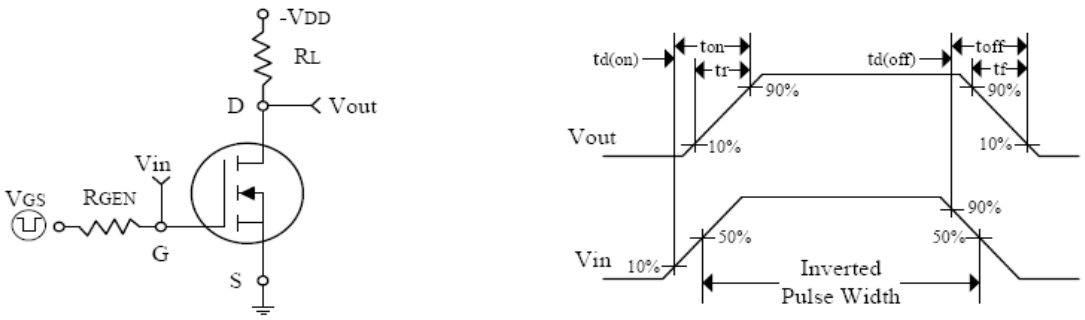
b: 1-in^2 2oz Cu PCB board

c: UIS tested and pulse width limited by maximum junction temperature 150℃ (initial temperature Tj=25℃).

N-Channel Electrical Characteristics (T_A=25°C, unless otherwise noted)

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
• Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
• On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	1.7	2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=6A	-	23	31	mΩ
		V_{GS}=4.5V, I_D=5A	-	33	45	
• Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=15V, V_{GS}=0V, f=1MHz	-	404	-	PF
C_{oss}	Output Capacitance		-	95	-	
C_{rss}	Reverse Transfer Capacitance		-	37	-	
• Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=15V, I_D=3A, V_{GS}=-10V	-	8.3	-	nC
Q_{gs}	Gate-Source Charge		-	1.3	-	
Q_{gd}	Gate-Drain Charge		-	2.3	-	
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=15V, R_L=5Ω, I_D=3A, VGEN=10V, RG=6W	-	4.2	-	nS
t_r	Turn-on Rise Time		-	3.3	-	
$t_{d(off)}$	Turn-off Delay Time		-	15.6	-	
t_f	Turn-off Fall Time		-	3	-	
• Drain-Source Diode Characteristics						
V_{SD}	Drain-Source Diode Forward	V_{GS}=0V, I_S=2A	-	-	1.2	V

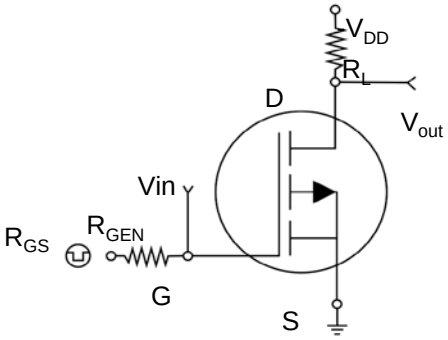
Note: Pulse Test: Pulse Width≤300us, Duty Cycle≤2%

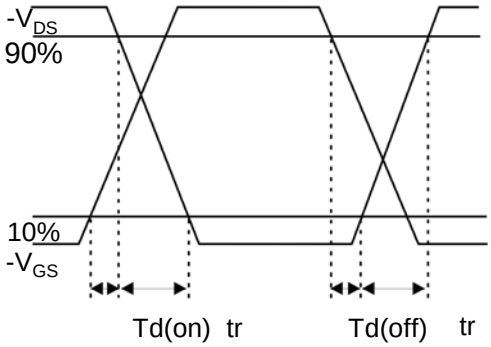


Switching Test Circuit and Switching Waveforms

P-Channel Electrical Characteristics (T_A=25°C, unless otherwise noted)

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
• Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250uA	-40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-40V, V_{GS}=0V	-	-	-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
• On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250uA	-1	-1.7	-2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=-10V, I_D=-6A	-	32.5	45	mΩ
		V_{GS}=-4.5V, I_D=-5A	-	51.5	63	
• Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-15V, V_{GS}=0V, f=1MHz	-	657	-	PF
C_{oss}	Output Capacitance		-	143	-	
C_{rss}	Reverse Transfer Capacitance		-	63	-	
• Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=-15V, I_D=-3A, V_{GS}=-10V	-	13.6	-	nC
Q_{gs}	Gate-Source Charge		-	6.8	-	
Q_{gd}	Gate-Drain Charge		-	3.9	-	
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-15V, R_L=5Ω, I_D=-3A, VGEN=-10V, RG=6W	-	7.5	-	nS
t_r	Turn-on Rise Time		-	6.7	-	
$t_{d(off)}$	Turn-off Delay Time		-	26	-	
t_f	Turn-off Fall Time		-	11.2	-	
• Drain-Source Diode Characteristics						
V_{SD}	Drain-Source Diode Forward	V_{GS}=0V, I_S=-2A	-	-	-1.2	V





Switching Test Circuit and Swithcing Waveforms

Characteristics Curve(N-Channel)

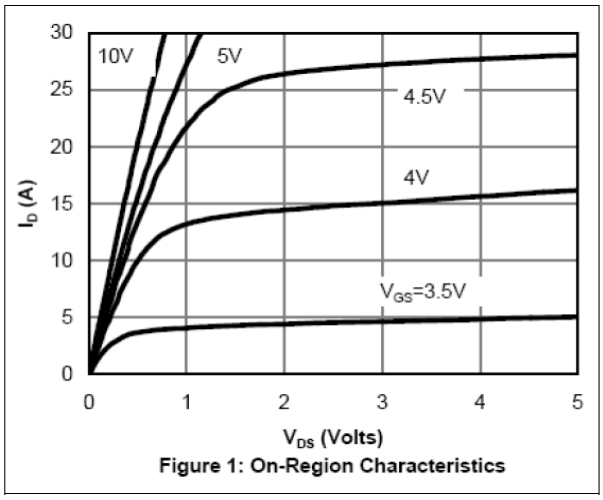


Figure 1: On-Region Characteristics

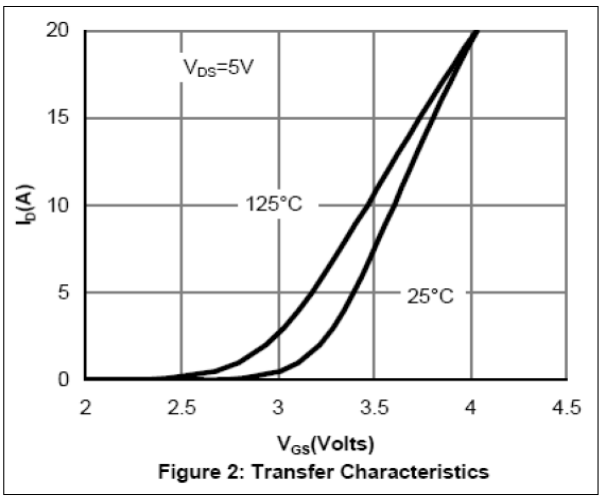


Figure 2: Transfer Characteristics

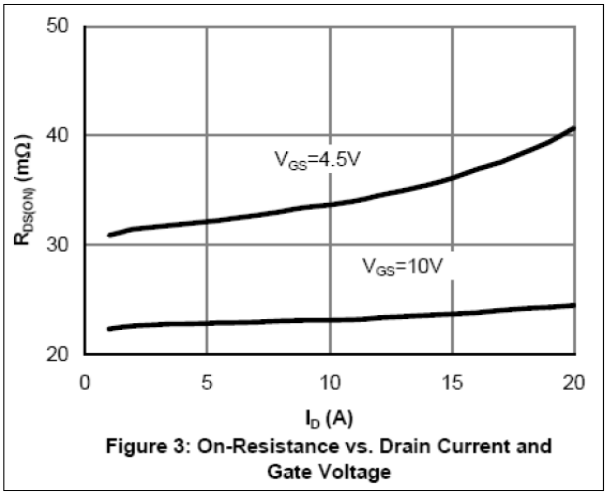


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

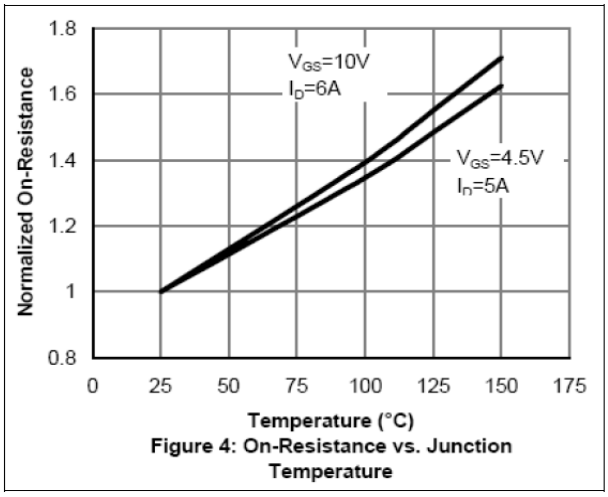


Figure 4: On-Resistance vs. Junction Temperature

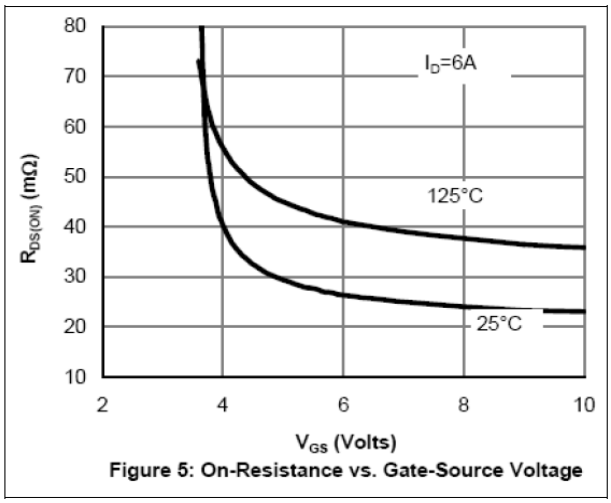


Figure 5: On-Resistance vs. Gate-Source Voltage

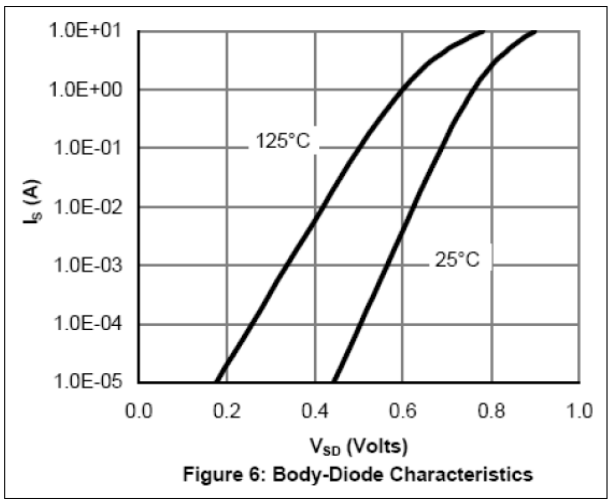


Figure 6: Body-Diode Characteristics

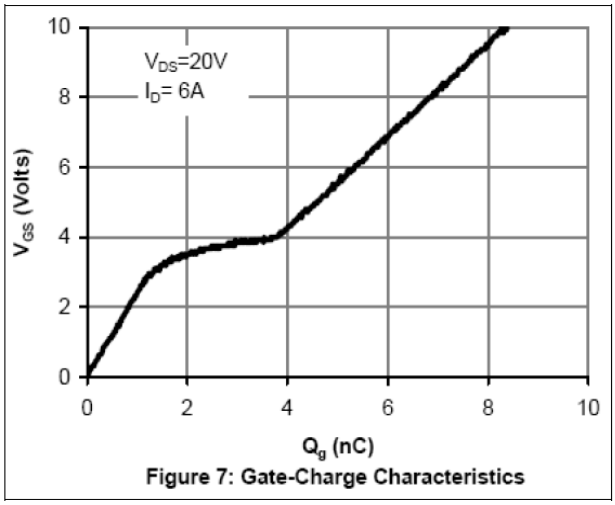


Figure 7: Gate-Charge Characteristics

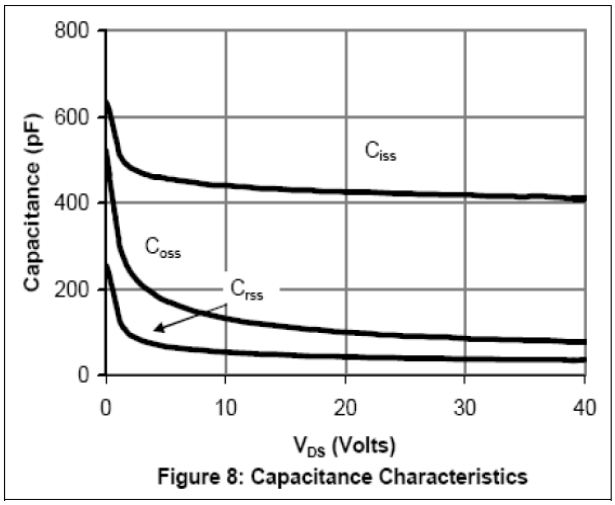


Figure 8: Capacitance Characteristics

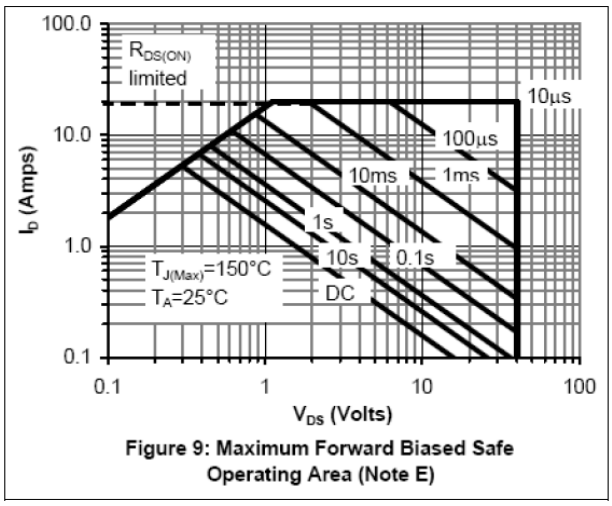


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

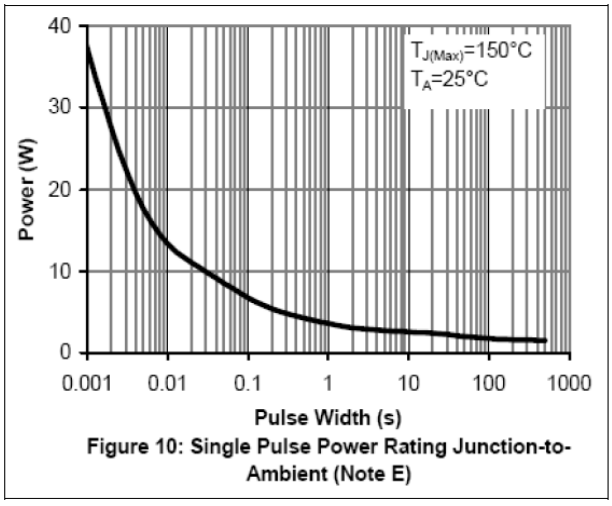


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

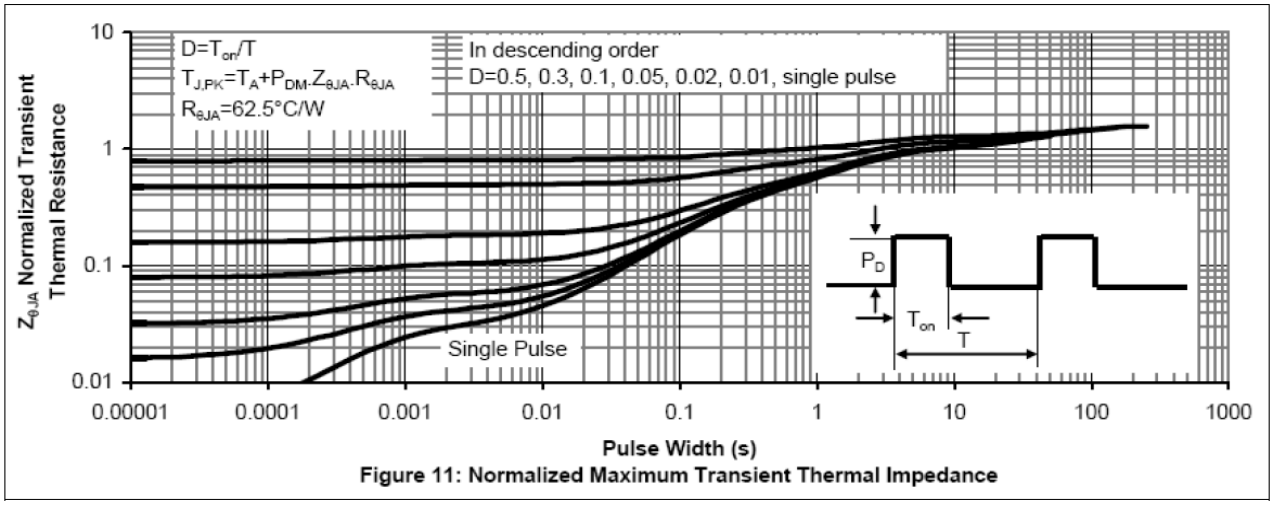


Figure 11: Normalized Maximum Transient Thermal Impedance

Characteristics Curve(P-Channel)

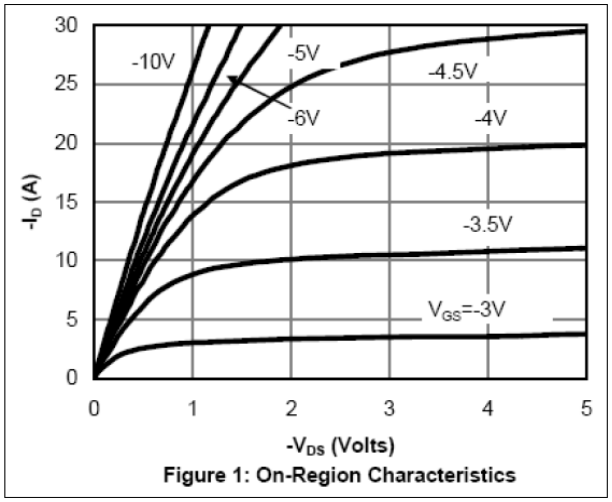


Figure 1: On-Region Characteristics

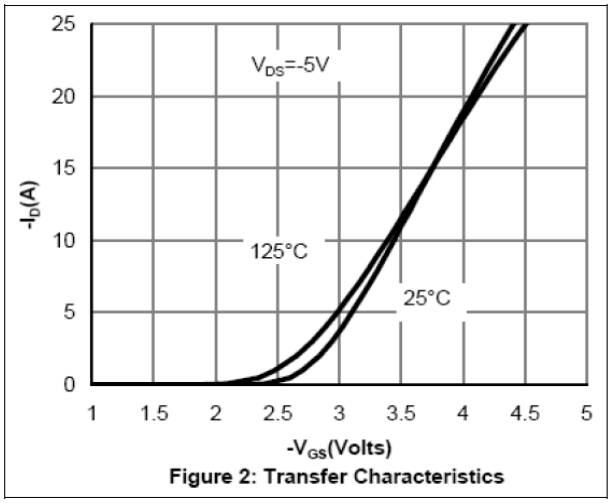


Figure 2: Transfer Characteristics

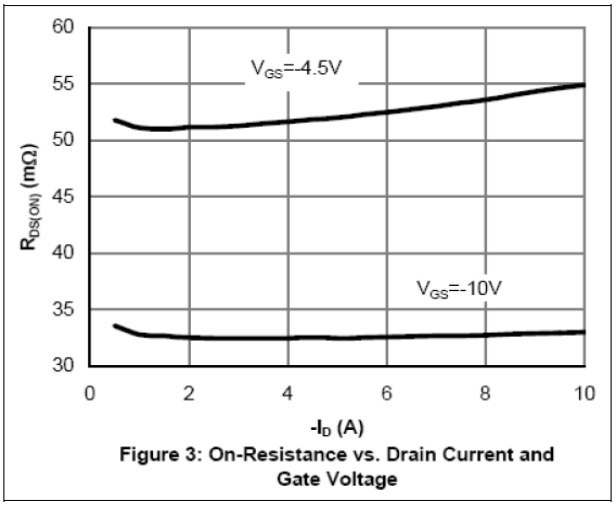


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

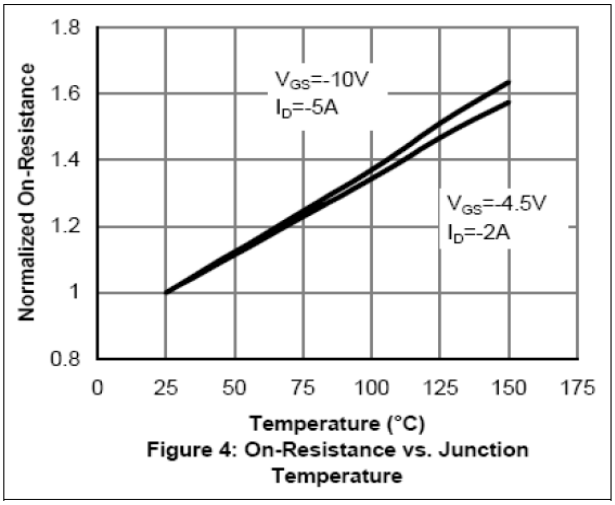


Figure 4: On-Resistance vs. Junction Temperature

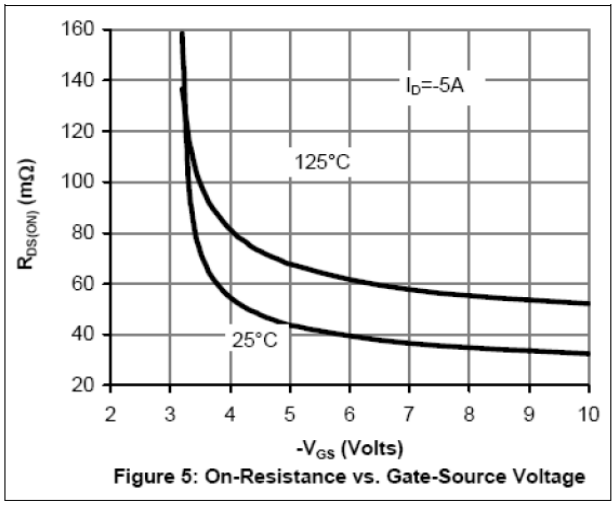


Figure 5: On-Resistance vs. Gate-Source Voltage

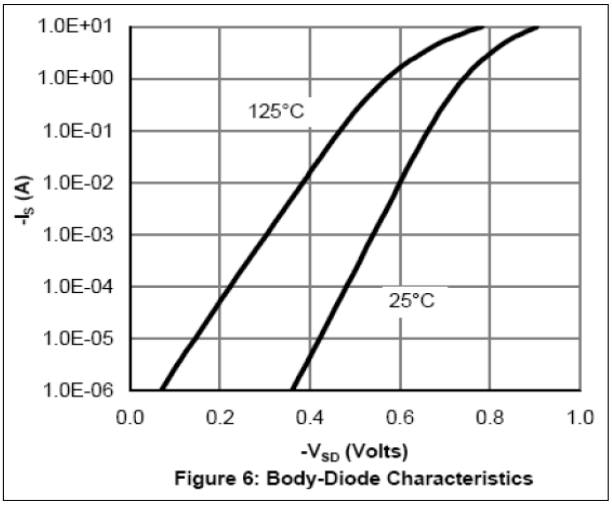


Figure 6: Body-Diode Characteristics

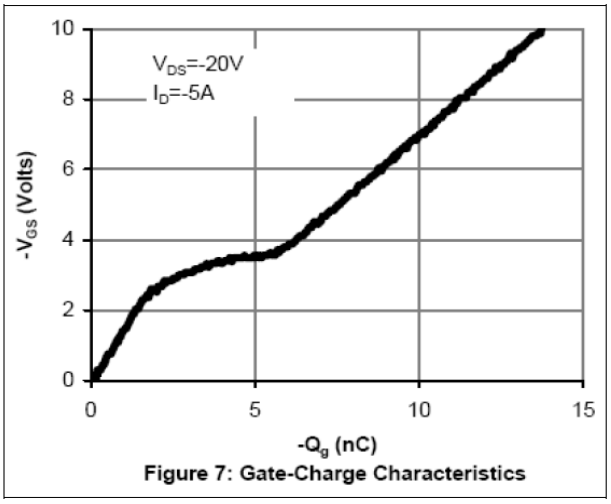


Figure 7: Gate-Charge Characteristics

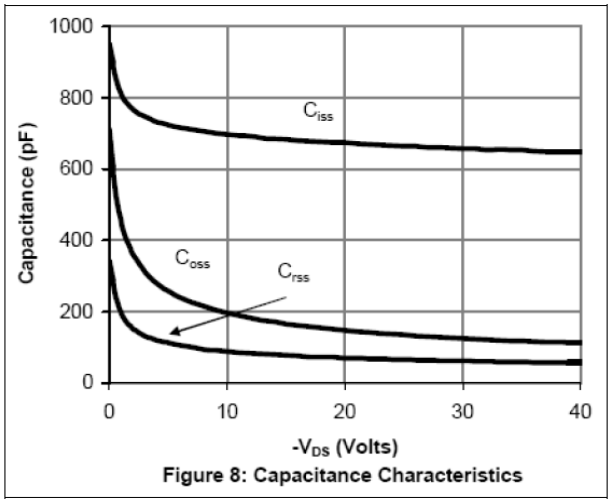
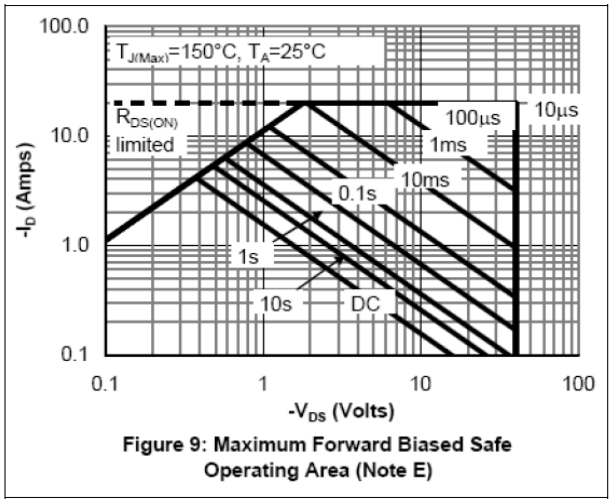


Figure 8: Capacitance Characteristics



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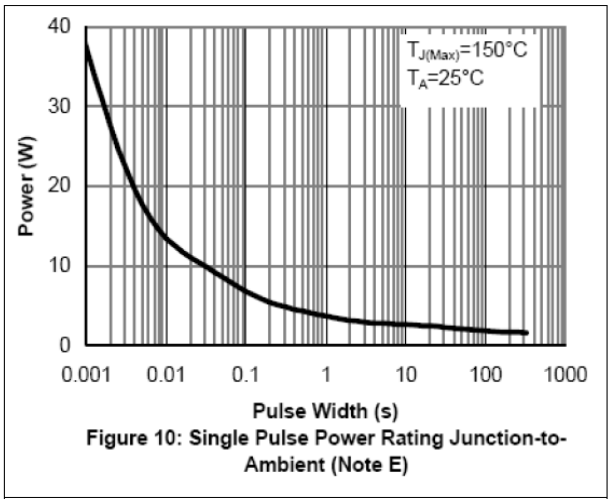


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

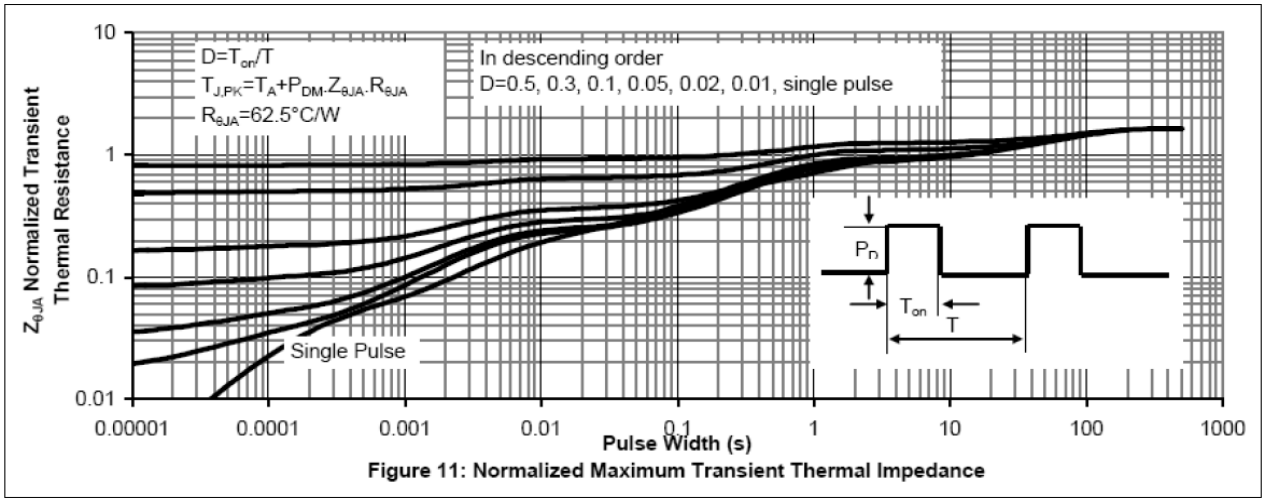
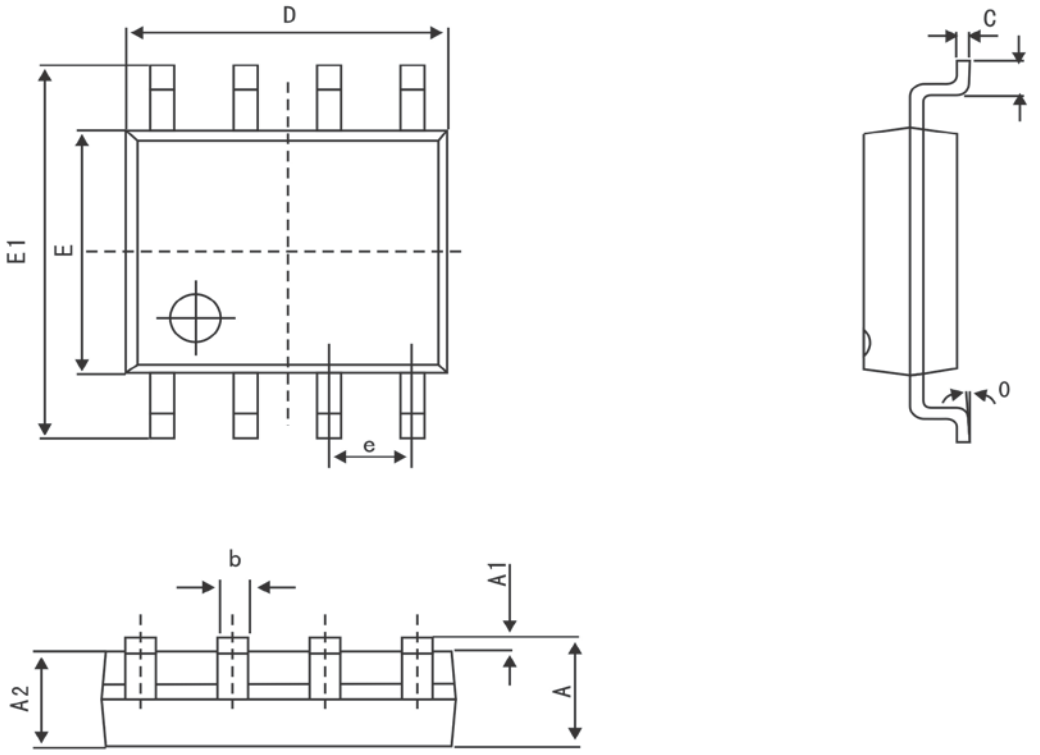


Figure 11: Normalized Maximum Transient Thermal Impedance

SOP-8 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters (MM)		Dimensions In Inches (MIL)	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270（BSC)		0.050（BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°