

N-Ch and P-Ch Fast Switching MOSFETs

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

Product Summary



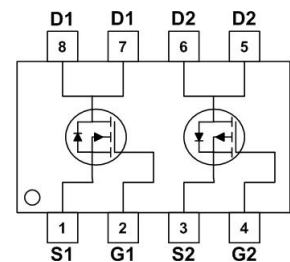
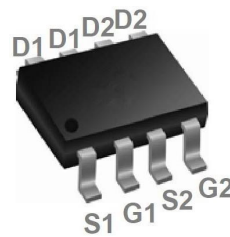
BVDSS	RDS(on)	ID
20V	9mΩ	12A
-20V	13mΩ	-12A

Description

The UD12G02S is the high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDS(on) and gate charge for most of the synchronous buck converter applications.

The UD12G02S meet the RoHS and Green

SOP8 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	± 12	± 12	V
$I_D @ T_a = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	12	-12	A
$I_D @ T_a = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	6	-6.1	A
I_{DM}	Pulsed Drain Current ²	32	-36	A
EAS	Single Pulse Avalanche Energy ³	---	---	mJ
$P_D @ T_c = 25^\circ\text{C}$	Total Power Dissipation ⁴	2	2.6	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	---	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	---	$^\circ\text{C/W}$

N-Ch and P-Ch Fast Switching MOSFETs

N-Channel Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	20	---	---	V
ΔBV _{DSS} /ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C, I _D =1mA	---	---	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =4.5V, I _D =1A	---	9	11	mΩ
		V _{GS} =2.5V, I _D =1A	---	12	15.6	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	0.5	0.75	1.2	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	---	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =20V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =20V, V _{GS} =0V, T _J =55°C	---	---	---	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0V	---	---	±100	nA
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	---	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =15V, V _{GS} =4.5V, I _D =10A	---	15	---	nC
Q _{gs}	Gate-Source Charge		---	2	---	
Q _{gd}	Gate-Drain Charge		---	5.2	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =10V, V _{GS} =4.5V, R _G =3Ω, I _D =10A	---	9	---	ns
T _r	Rise Time		---	25	---	
T _{d(off)}	Turn-Off Delay Time		---	37	---	
T _f	Fall Time		---	14	---	
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHz	---	700	---	pF
C _{oss}	Output Capacitance		---	132	---	
C _{rss}	Reverse Transfer Capacitance		---	114	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	12	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =21A, T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =21A, di/dt=100A / μs, T _J = 25 °C	---	---	---	nS
Q _{rr}	Reverse Recovery Charge		---	---	---	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

N-Ch and P-Ch Fast Switching MOSFETs

P-Channel Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =-1mA	---	---	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =-4.5V, I _D =-1A	---	13	16	mΩ
		V _{GS} =-2.5V, I _D =-1A	---	18	23	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	-0.4	-0.8	-1	V
$\Delta V_{GS(th)}$	V _{GS(th)} Temperature Coefficient		---	---	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-20V, V _{GS} =0V, T _J =25°C	---	---	-1	uA
		V _{DS} =-20V, V _{GS} =0V, T _J =100°C	---	---	-100	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0V	---	---	±100	nA
Q _g	Total Gate Charge	V _{DS} =-4.5V, V _{GS} =-10V, I _D =-6A	---	16	---	nC
Q _{gs}	Gate-Source Charge		---	4	---	
Q _{gd}	Gate-Drain Charge		---	3	---	
T _{d(on)}	Turn-On Delay Time	V _{GS} =-4.5V, V _{DD} =-100V, R _{GEN} =3Ω I _D =-6A	---	8	---	ns
T _r	Rise Time		---	35	---	
T _{d(off)}	Turn-Off Delay Time		---	71	---	
T _f	Fall Time		---	70	---	
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz	---	1797	---	pF
C _{oss}	Output Capacitance		---	213	---	
C _{rss}	Reverse Transfer Capacitance		---	180	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	-12	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =-9A, T _J =25°C	---	---	-1.2	V
t _{rr}	Reverse Recovery Time	I _F =-6A, di/dt=100A/μs, T _J = 25 °C	---	10	---	nS
Q _{rr}	Reverse Recovery Charge		---	3	---	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. EAS condition: Starting T_J=25°C, V_{DD}=-15V, V_G=-10V, R_G=25ohm, L=0.5mH, I_{AS}=-10A
 3. R_{θJA} is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB
 4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.



Typical Performance Characteristics-N

Figure 1: Output Characteristics

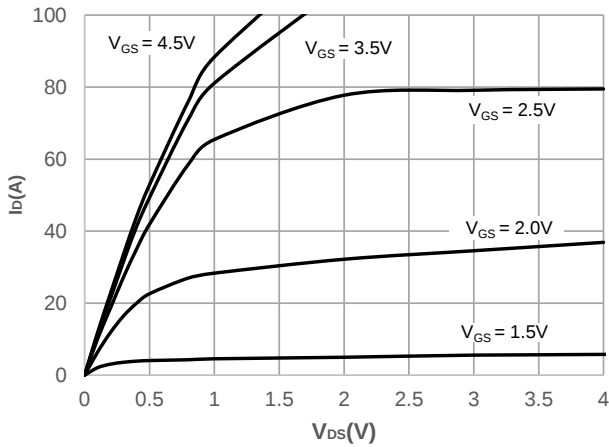


Figure 2: Typical Transfer Characteristics

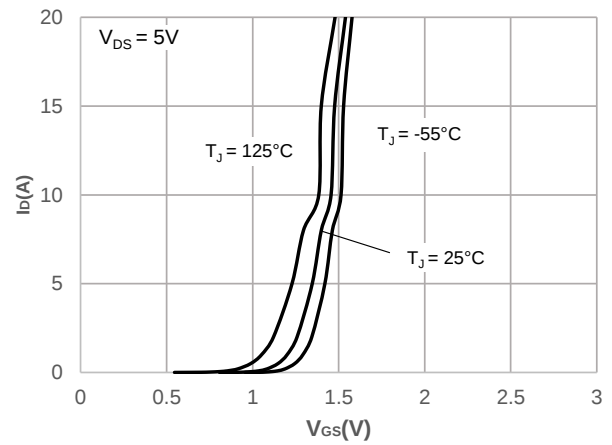


Figure 3: On-resistance vs. Drain Current

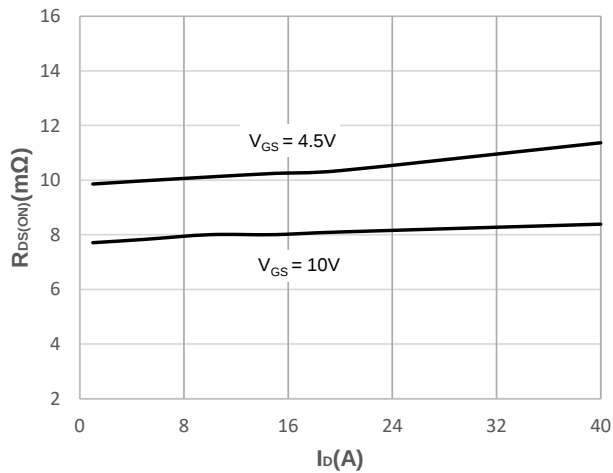


Figure 4: Body Diode Characteristics

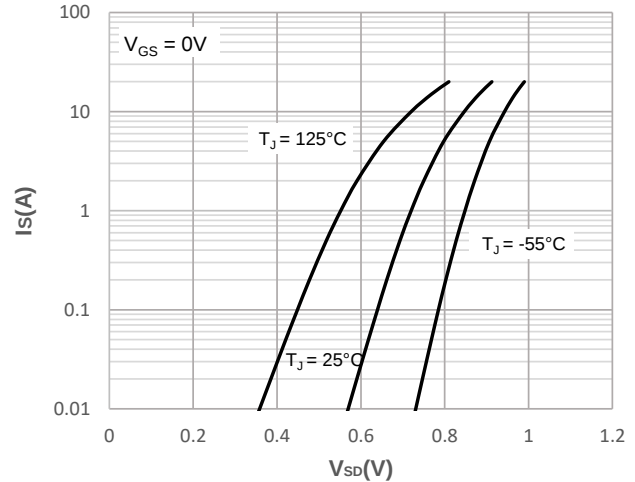


Figure 5: Gate Charge Characteristics

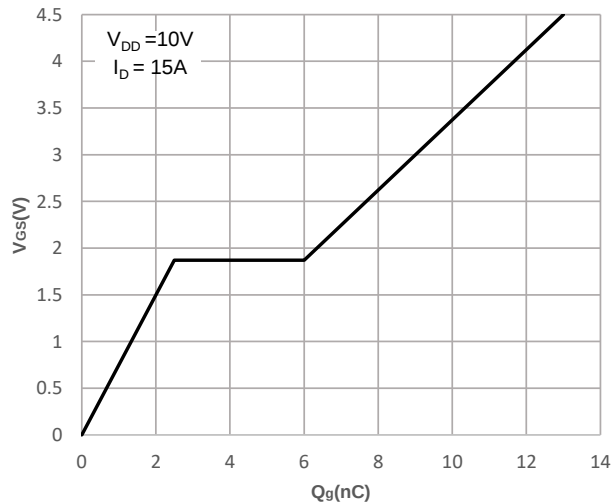
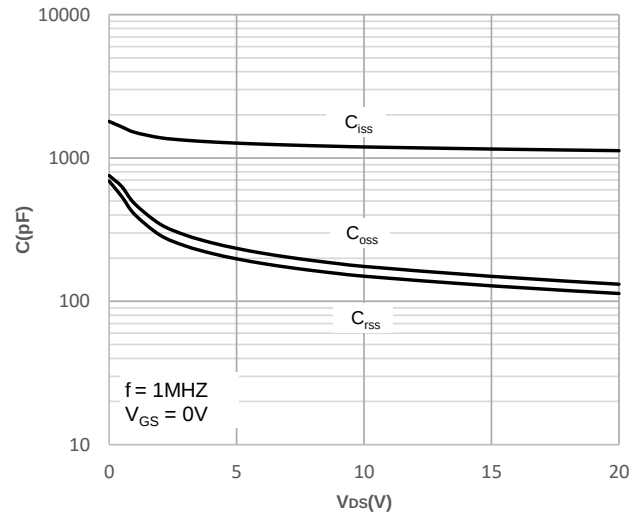


Figure 6: Capacitance Characteristics



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Figure 7: Normalized Breakdown voltage vs. Junction Temperature

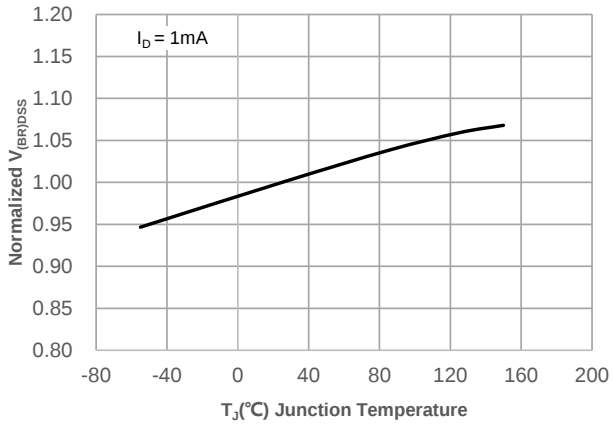


Figure 8: Normalized on Resistance vs. Junction Temperature

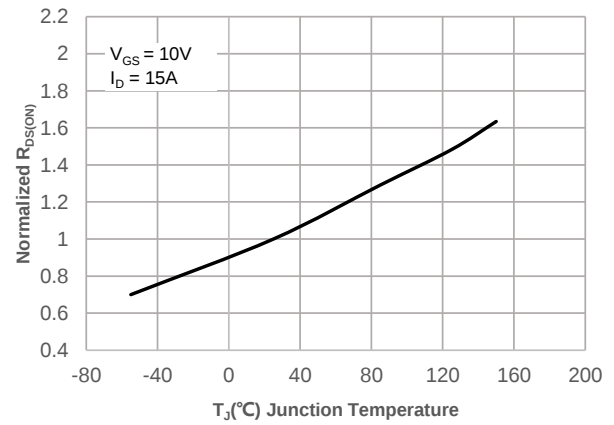


Figure 9: Maximum Safe Operating Area

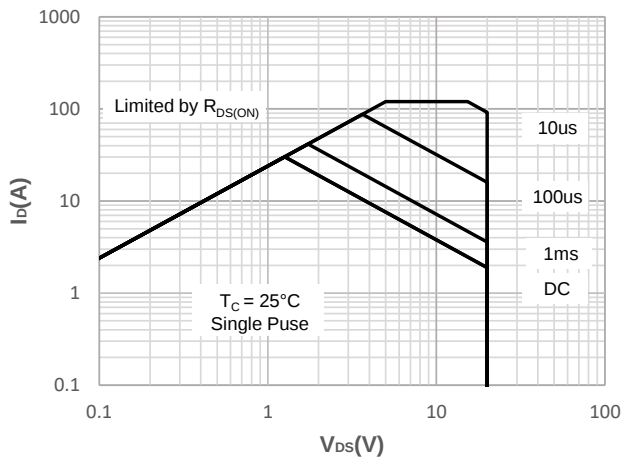


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

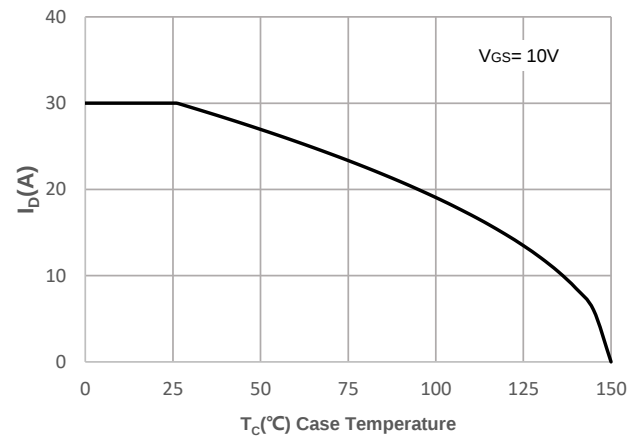


Figure 11: Normalized Maximum Transient Thermal Impedance

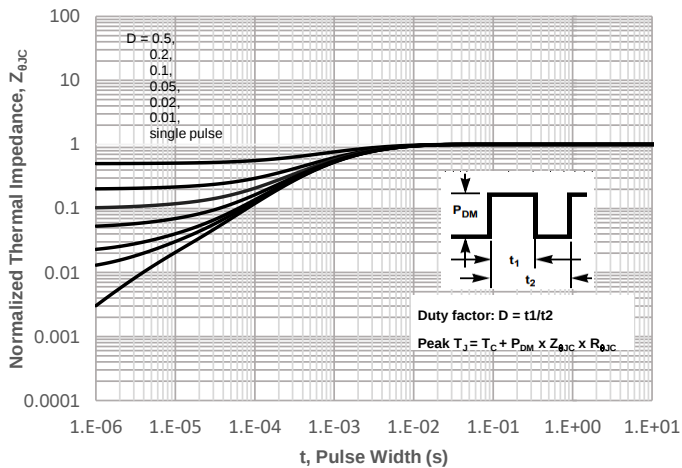
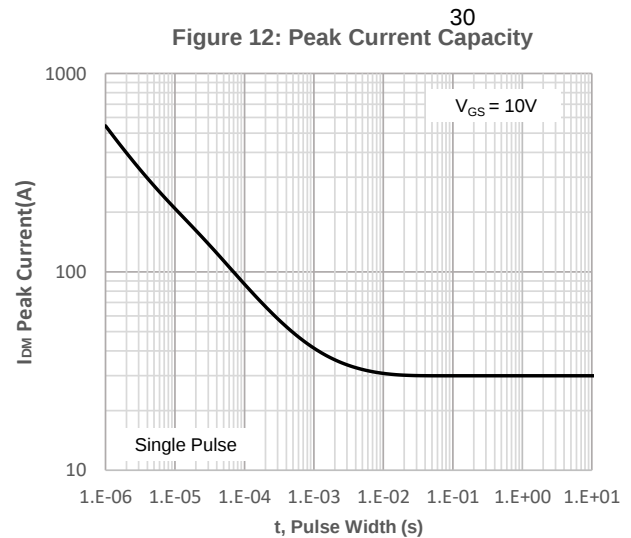


Figure 12: Peak Current Capacity





Typical Performance Characteristics-P

Figure 1: Output Characteristics

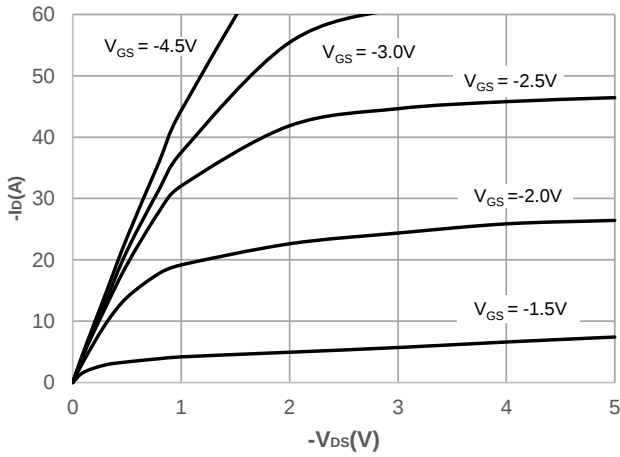


Figure 2: Typical Transfer Characteristics

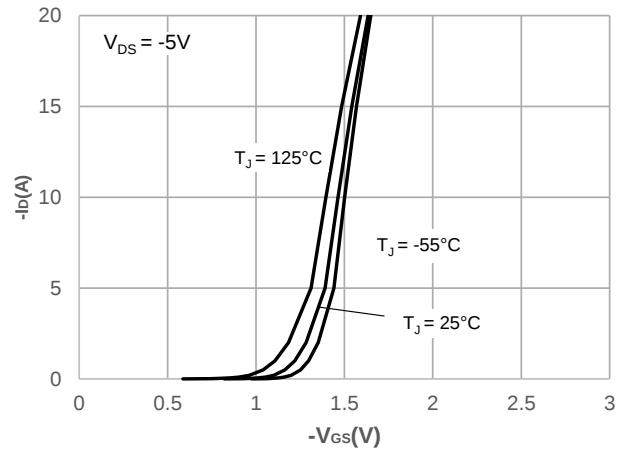


Figure 3: On-resistance vs. Drain Current

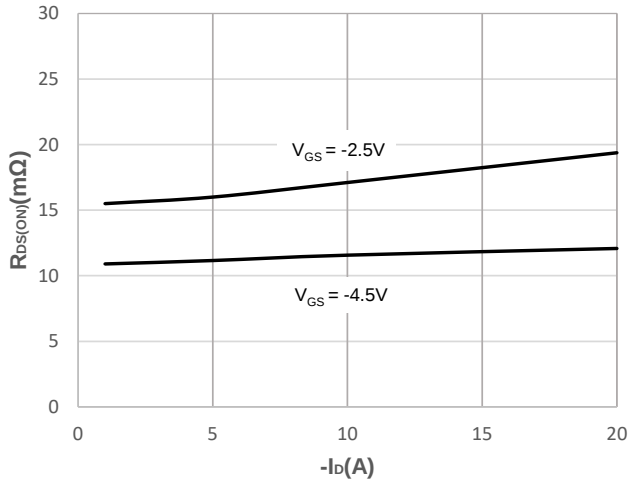


Figure 4: Body Diode Characteristics

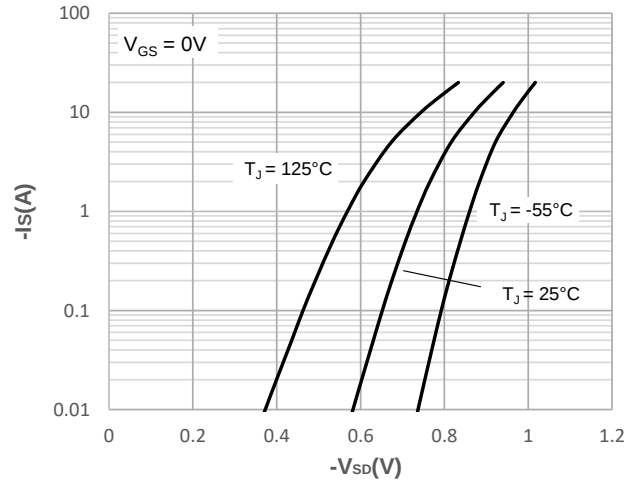


Figure 5: Gate Charge Characteristics

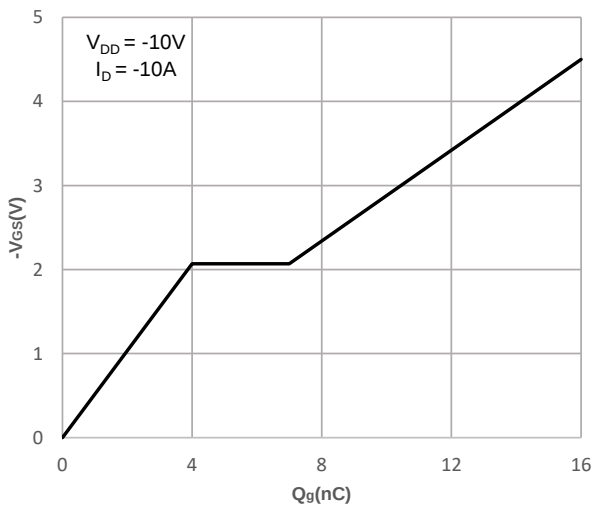
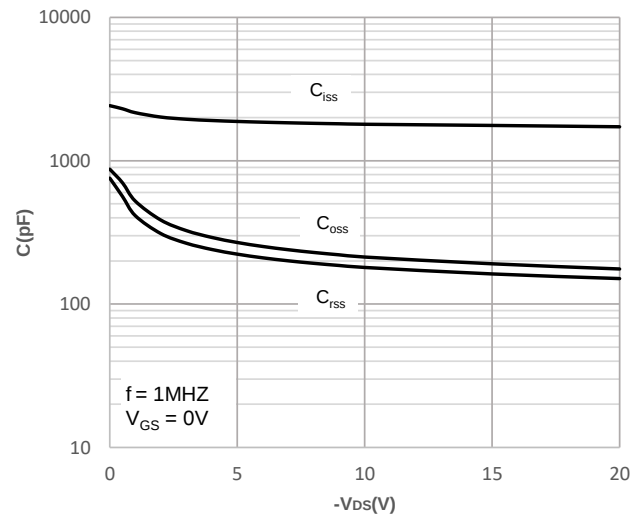


Figure 6: Capacitance Characteristics





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Figure 7: Normalized Breakdown voltage vs. Junction Temperature

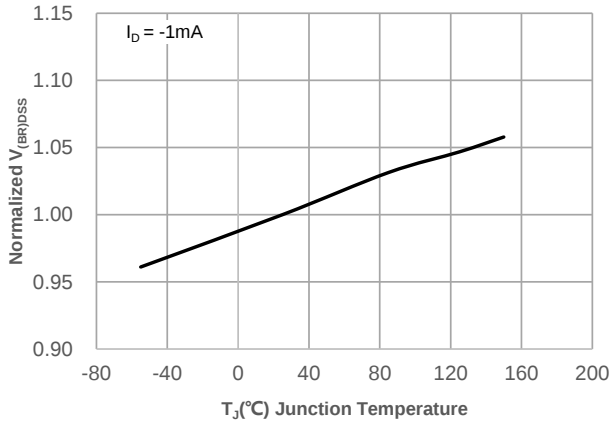


Figure 8: Normalized on Resistance vs. Junction Temperature

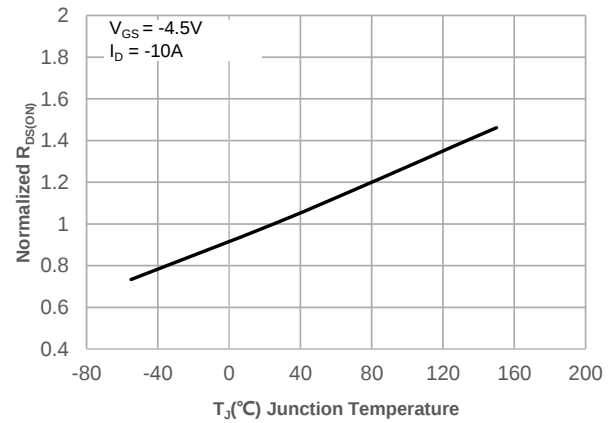


Figure 9: Maximum Safe Operating Area

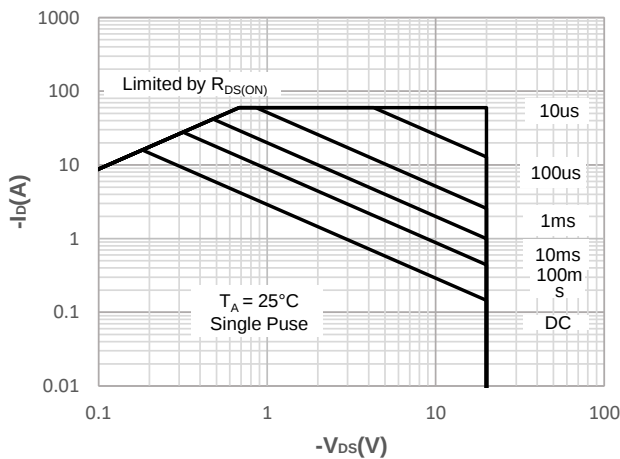


Figure 10: Maximum Continuous Drianc Current vs. Ambient Temperature

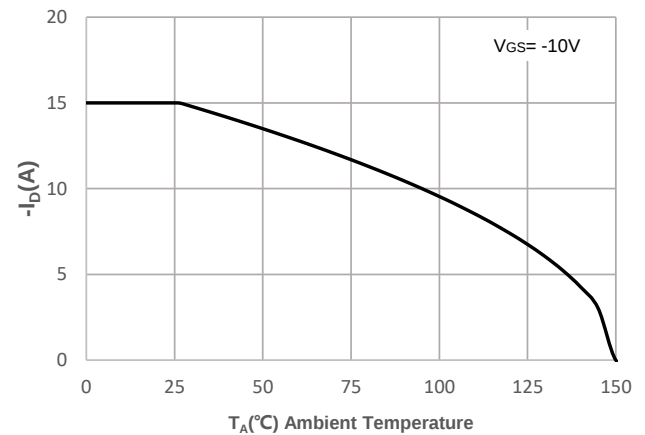


Figure 11: Normalized Maximum Transient Thermal Impedance

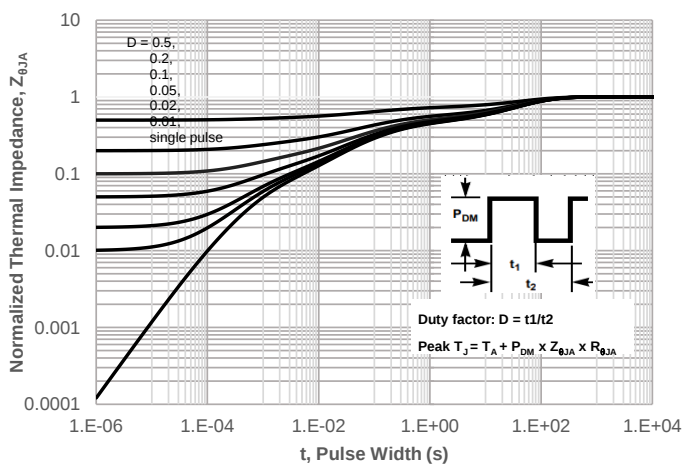
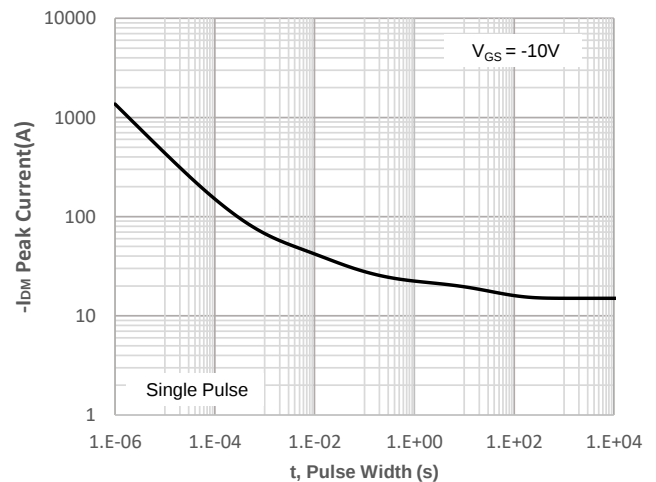
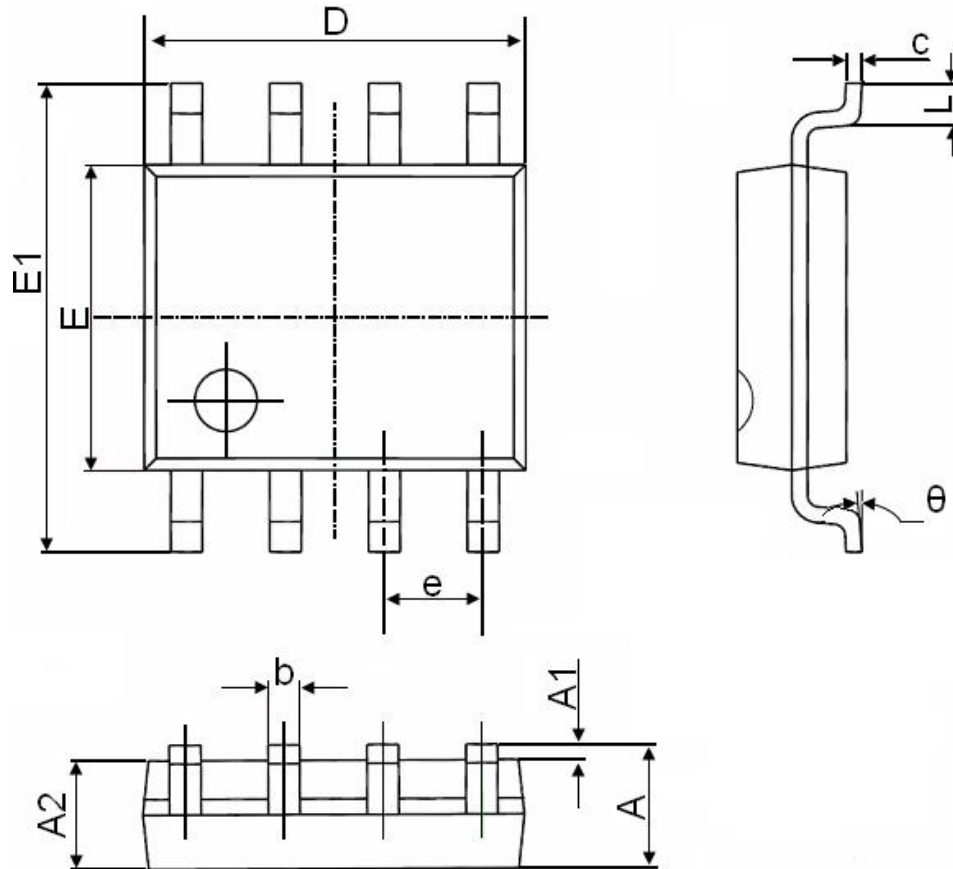


Figure 12: Peak Current Capacity



SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	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	0.006	0.010
D	4.700	5.100	0.185	0.200
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°