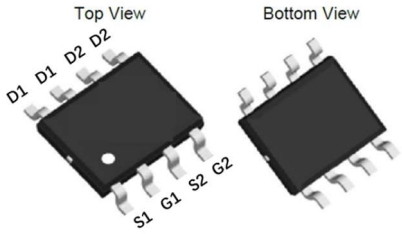
Features

- N-Channel: 30V, 9A
  $R_{DS(ON)}$***TYP*** = 16mΩ @ V_{GS} = 10V
  $R_{DS(ON)}$***TYP*** = 22mΩ @ V_{GS} = 4.5V
- P-Channel: -30V, -7A
  $R_{DS(ON)}$***TYP*** = 35mΩ @ V_{GS} = -10V
  $R_{DS(ON)}$***TYP*** = 48mΩ @ V_{GS} = -4.5V
- Excellent Gate Charge x $R_{DS(ON)}$ Product(FOM)
- Very Low On-resistance $R_{DS(ON)}$
- Fast Switching Speed

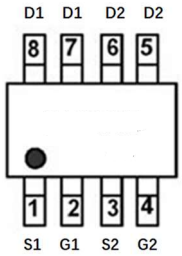


SOP-8(Dual)

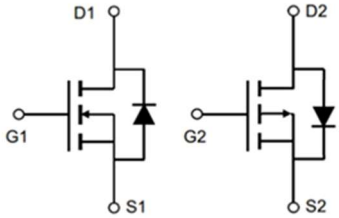
Application

- Battery Protection
- Load Switch
- Power Management

100% UIS TESTED!
100% ΔVds TESTED!



Pin Assignment



Schematic Diagram

Absolute Maximum Ratings (T_A=25℃ unless otherwise specified)

Symbol	Parameter		Max. N-Channel	Max. P-Channel	Units
V_{DSS}	Drain-Source Voltage		30	-30	V
V_{GSS}	Gate-Source Voltage		±20	±20	V
I_D	Continuous Drain Current	T_A = 25℃	9	-7	A
		T_A = 100℃	6	-4.6	A
I_{DM}	Pulsed Drain Current note1		36	-28	A
E_{AS}	Single Pulsed Avalanche Energy note2		30	36	mJ
P_D	Power Dissipation	T_A = 25℃	2.7	2.5	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		46.3	50	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150		℃

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	1.0	1.6	2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note2	V_{GS}=10V, I_D=5A	-	16	25	mΩ
		V_{GS}=4.5V, I_D=3A	-	22	40	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=15V, V_{GS}=0V, f=1.0MHz	-	533	-	pF
C_{oss}	Output Capacitance		-	69	-	pF
C_{rss}	Reverse Transfer Capacitance		-	52	-	pF
Q_g	Total Gate Charge	V_{DS}=15V, I_D=5A, V_{GS}=10V	-	10	-	nC
Q_{gs}	Gate-Source Charge		-	2.0	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	2.0	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=15V, I_D=3A, V_{GS}=10V, R_{REN} =3Ω	-	4.0	-	ns
t_r	Turn-on Rise Time		-	11	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	14.5	-	ns
t_f	Turn-off Fall Time		-	2.0	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	9	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	36	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S= 9A	-	0.8	1.2	V

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

2. EAS condition : T_J=25℃, V_{DD}=15V, V_G=10V, L=0.5mH, Rg=25Ω, I_{AS}=11A

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

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D= -250μA	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= -30V, V_{GS}=0V,	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS}=0V, V_{GS}= ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D= -250μA	-1.0	-1.6	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note3	V_{GS}= -10V, I_D= -7A	-	35	44	mΩ
		V_{GS}= -4.5V, I_D= -4A	-	48	61	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}= -15V, V_{GS}=0V, f=1.0MHz	-	505	-	pF
C_{oss}	Output Capacitance		-	72	-	pF
C_{rss}	Reverse Transfer Capacitance		-	59	-	pF
Q_g	Total Gate Charge	V_{DS}= -15V, I_D= -4A, V_{GS}= -10V	-	11	-	nC
Q_{gs}	Gate-Source Charge		-	2	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	2	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}= -15V, I_D= -7A, V_{GS}= -10V, R_{GEN}=2.5Ω	-	3	-	ns
t_r	Turn-on Rise Time		-	2	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	26	-	ns
t_f	Turn-off Fall Time		-	15	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-7	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-28	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S= -7A	-	-0.8	-1.2	V

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

2. EAS condition : T_J=25℃, V_{DD}= -15V, V_G= -10V, L=0.5mH, Rg=25Ω, I_{AS}= -12A

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

Typical Performance Characteristics-N

Figure 1: Output Characteristics

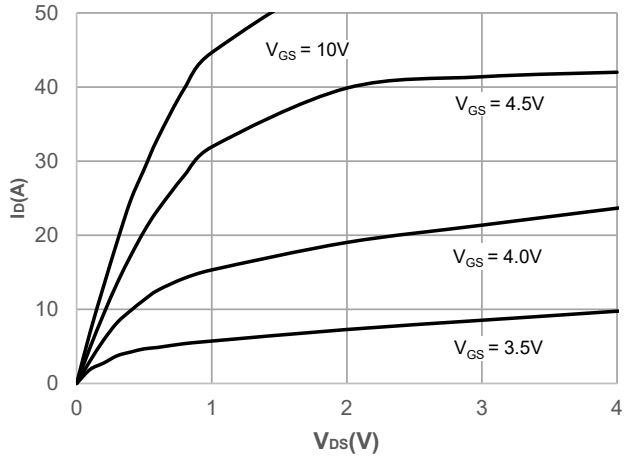


Figure 2: Typical Transfer Characteristics

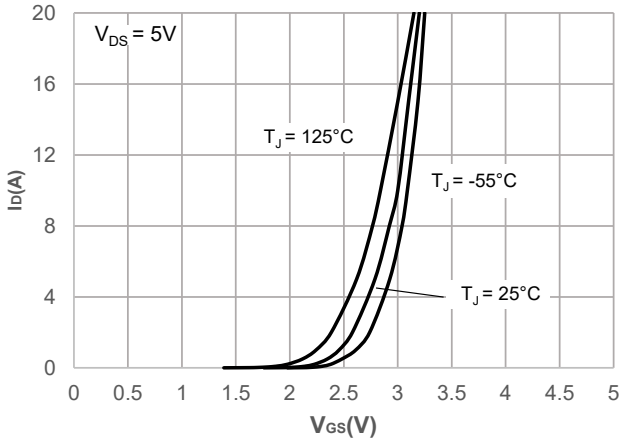


Figure 3: On-resistance vs. Drain Current

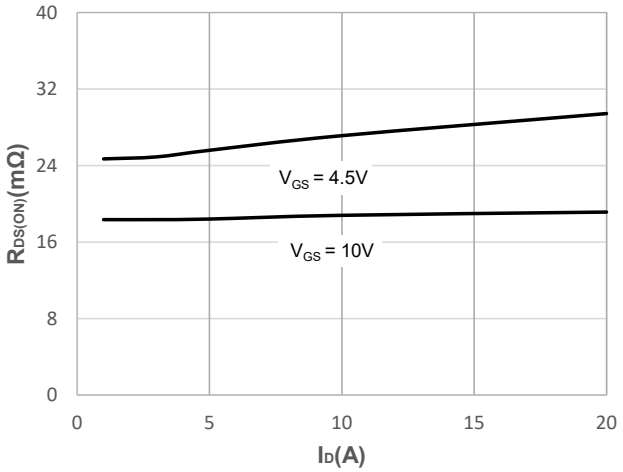


Figure 4: Body Diode Characteristics

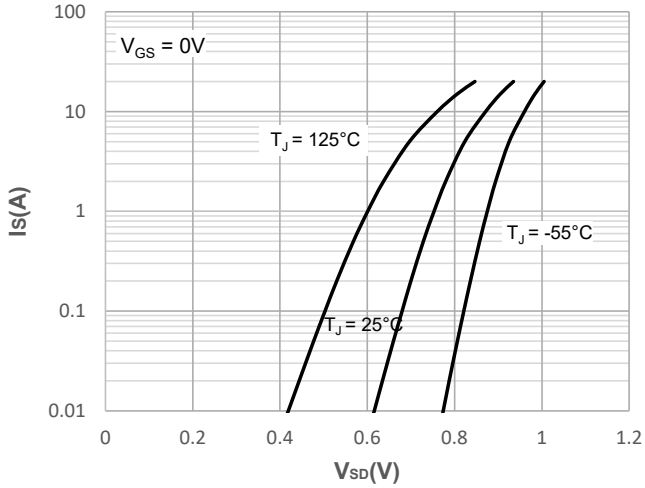


Figure 5: Gate Charge Characteristics

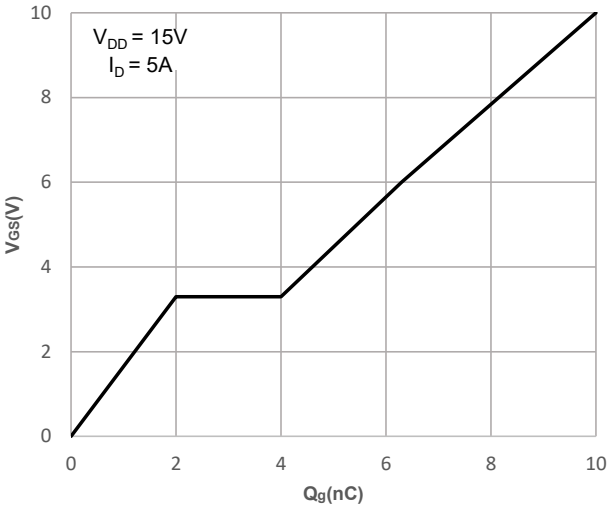


Figure 6: Capacitance Characteristics

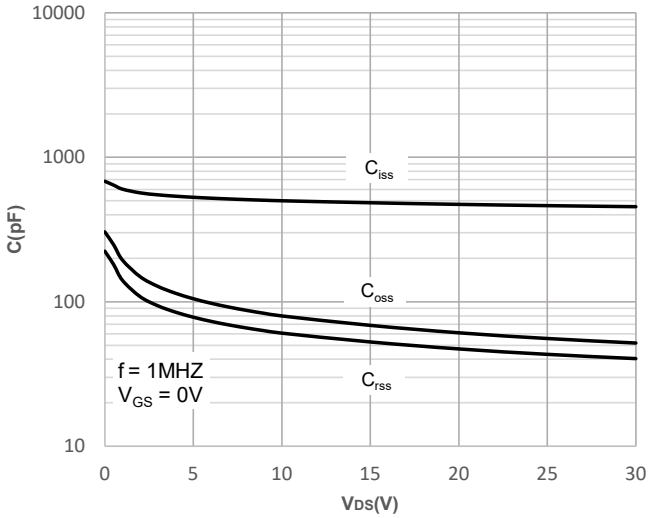


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

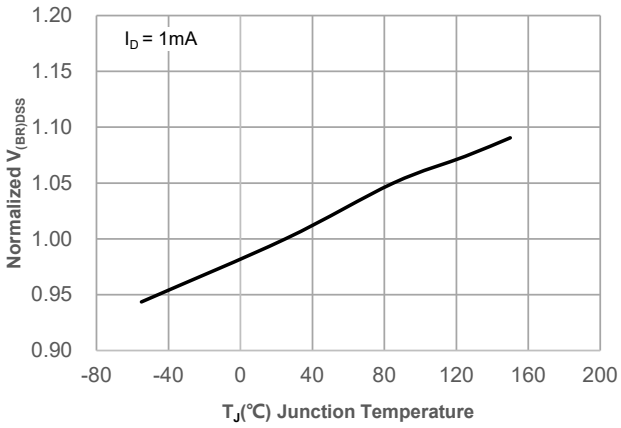


Figure 8: Normalized on Resistance vs. Junction Temperature

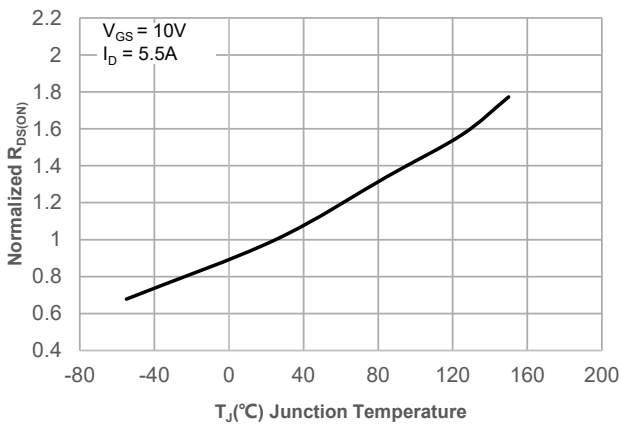


Figure 9: Maximum Safe Operating Area

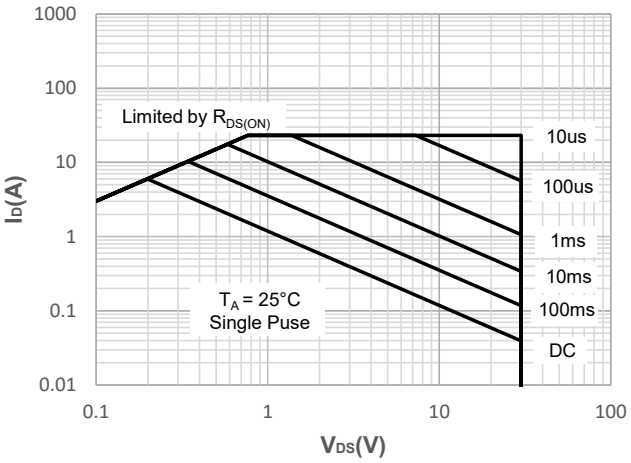


Figure 10: Maximum Continuous Drian Current vs. Ambient Temperature

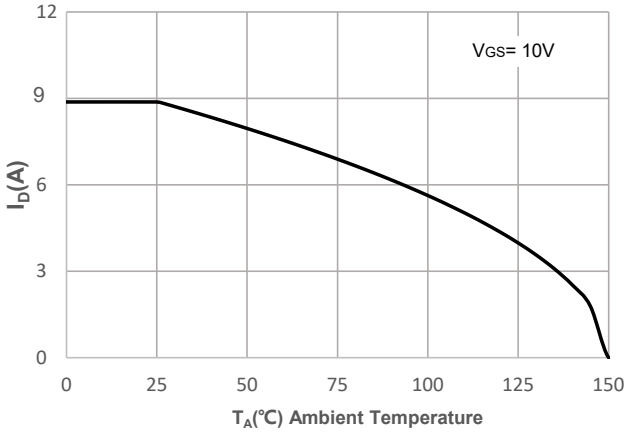


Figure 11: Normalized Maximum Transient Thermal Impedance

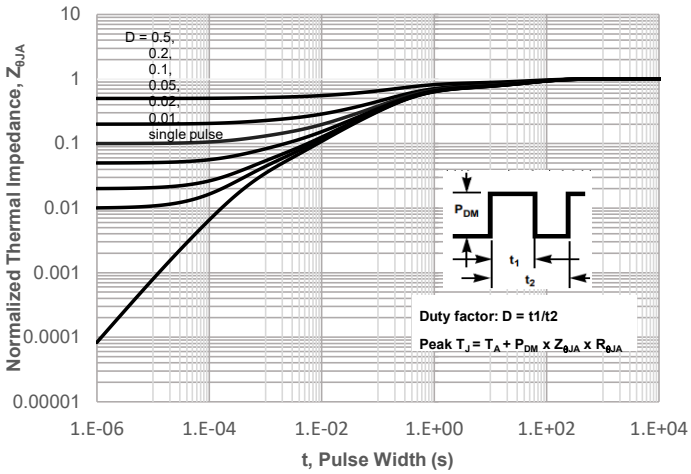
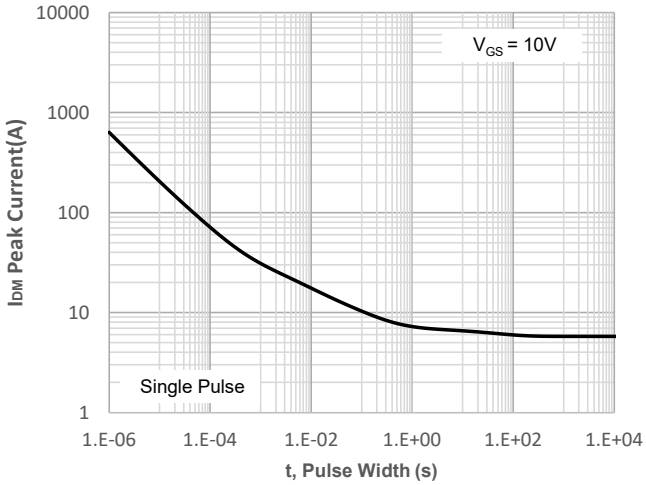


Figure 12: Peak Current Capacity



Test Circuit-N

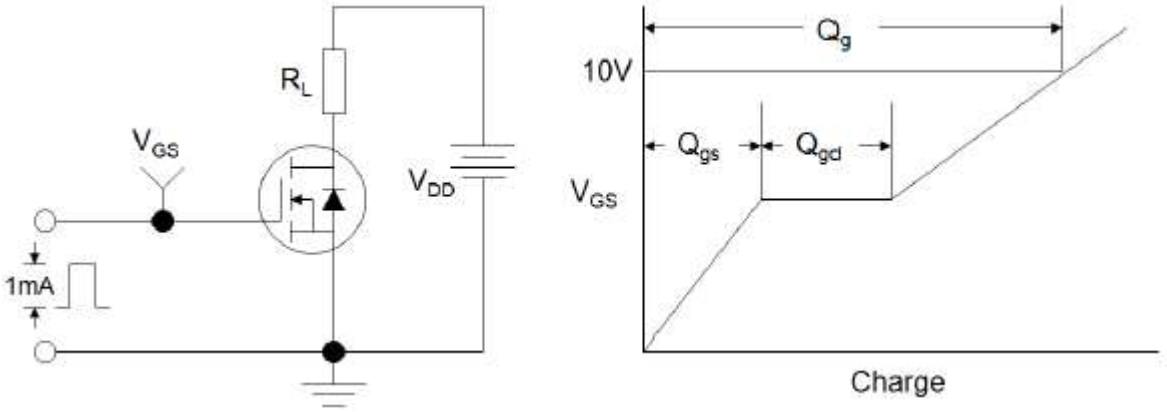


Figure1:Gate Charge Test Circuit & Waveform

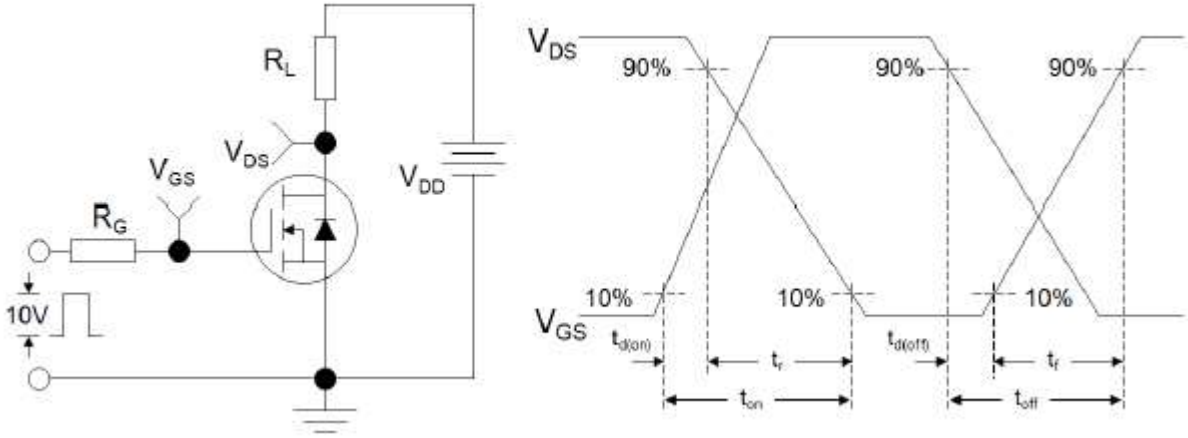


Figure 2: Resistive Switching Test Circuit & Waveforms

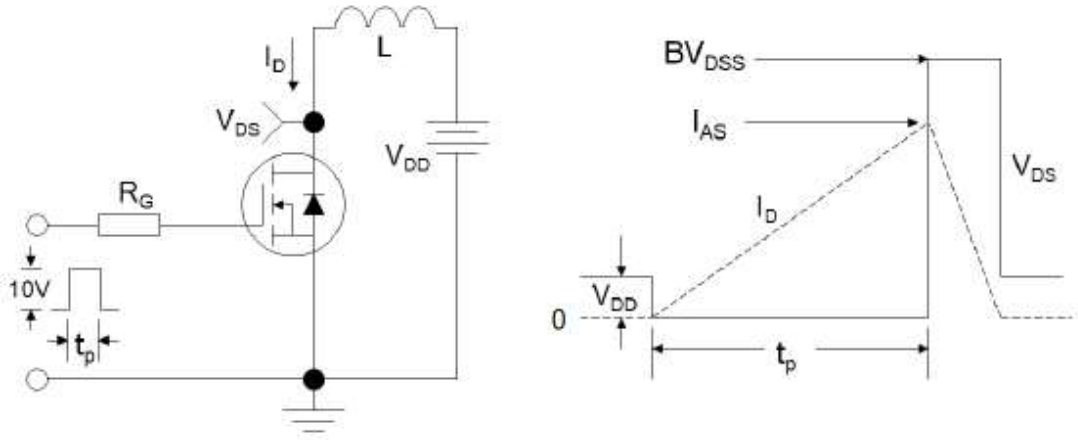


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Typical Performance Characteristics-P

Figure 1: Output Characteristics

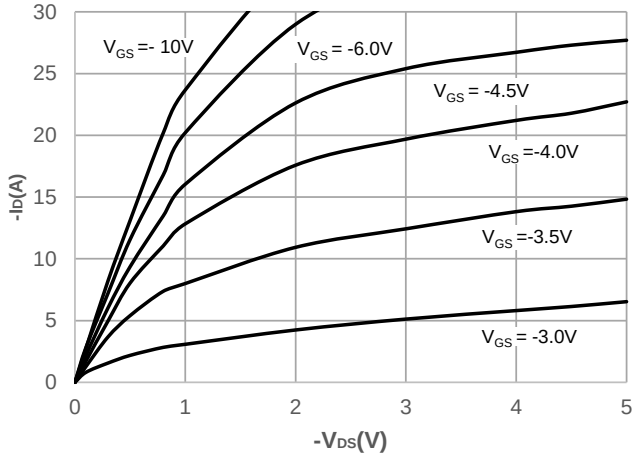


Figure 2: Typical Transfer Characteristics

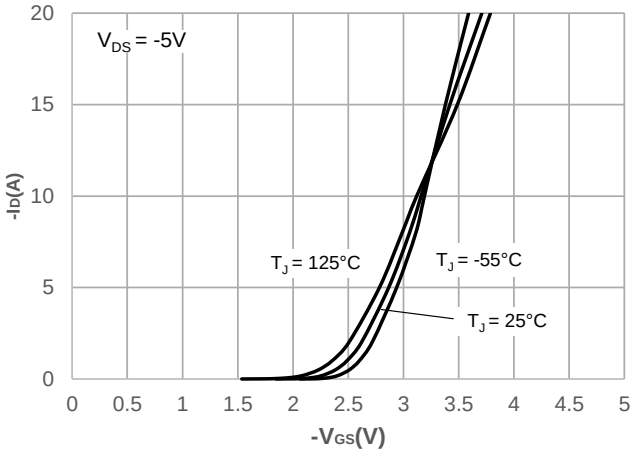


Figure 3: On-resistance vs. Drain Current

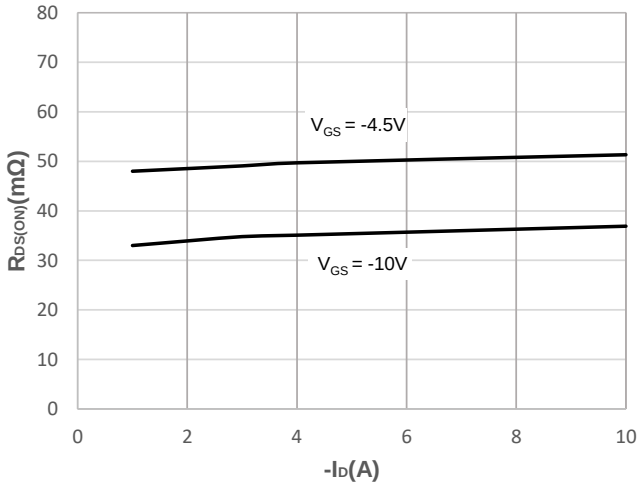


Figure 4: Body Diode Characteristics

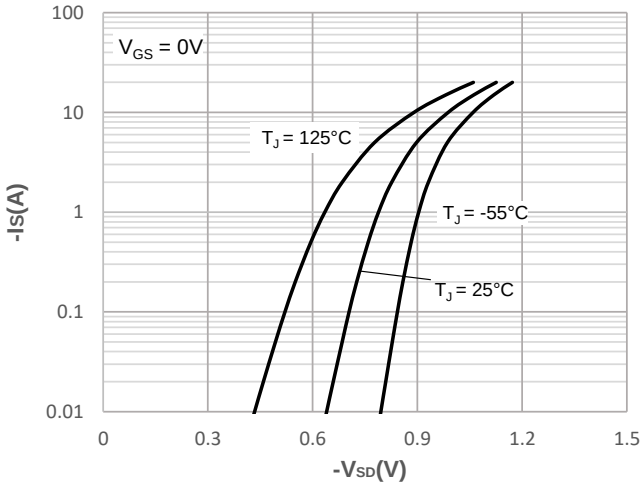


Figure 5: Gate Charge Characteristics

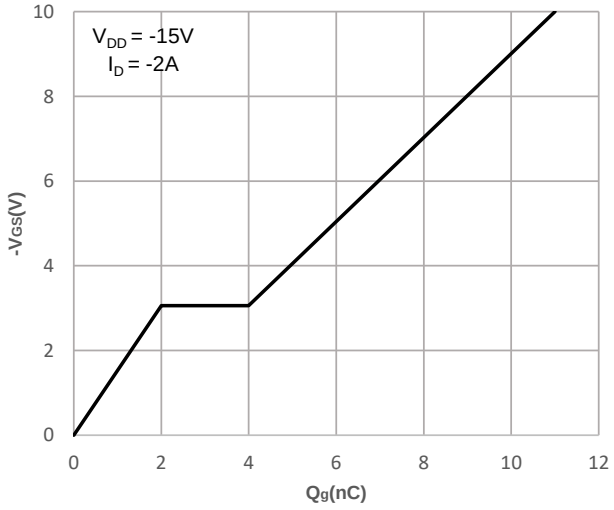


Figure 6: Capacitance Characteristics

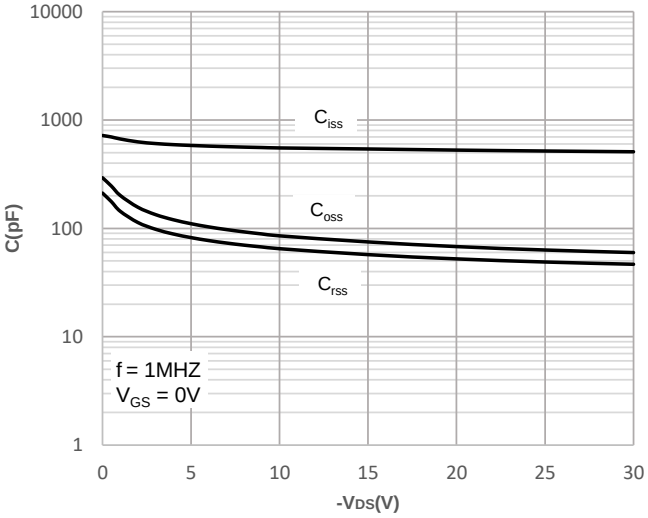


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

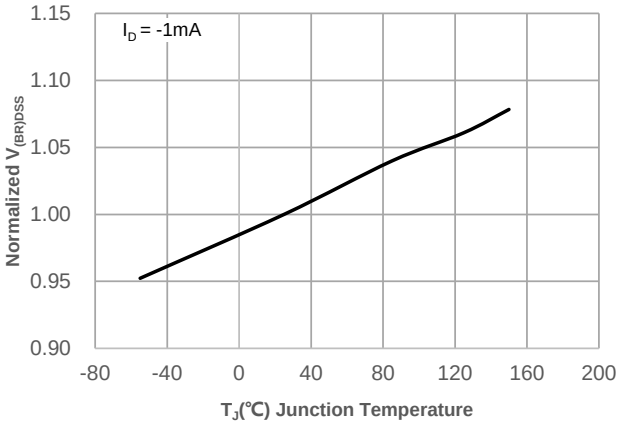


Figure 8: Normalized on Resistance vs. Junction Temperature

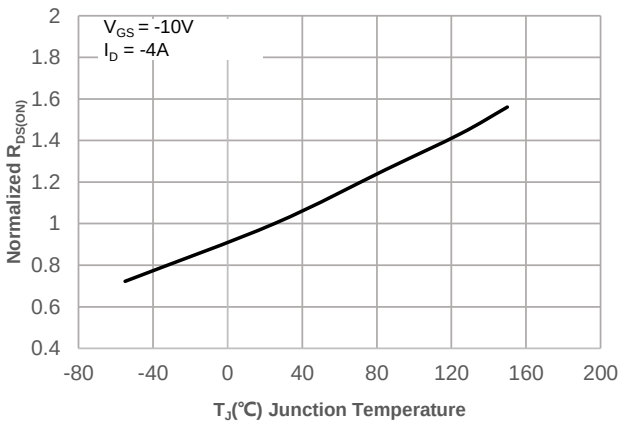


Figure 9: Maximum Safe Operating Area

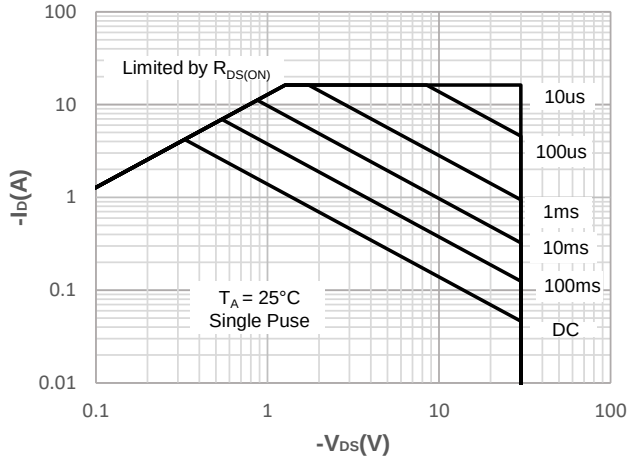


Figure 10: Maximum Continuous Drian Current vs. Ambient Temperature

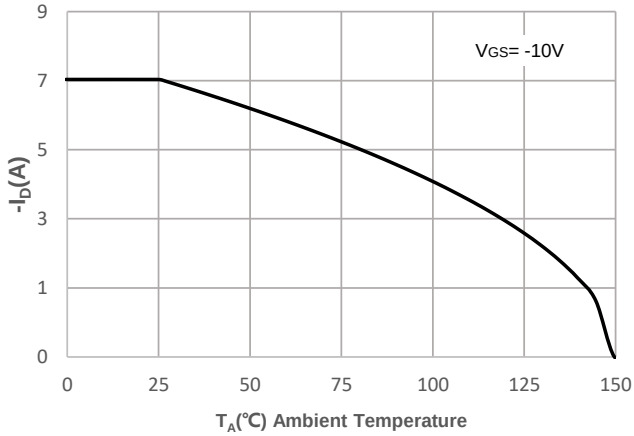


Figure 11: Normalized Maximum Transient Thermal Impedance

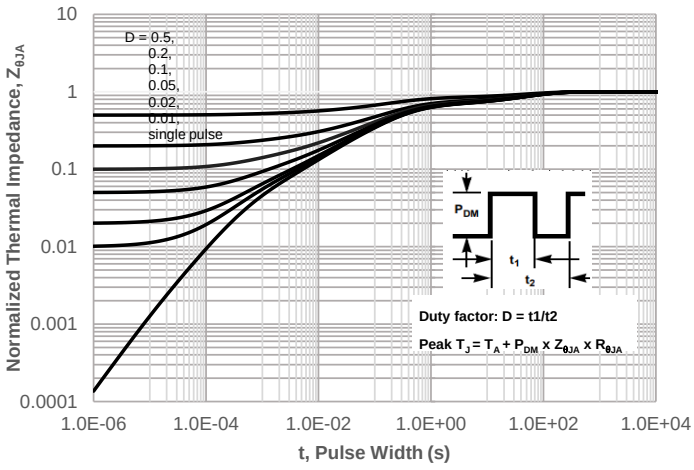
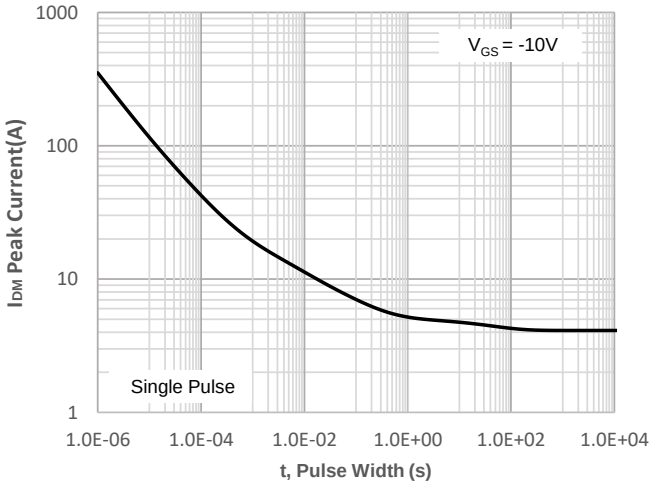
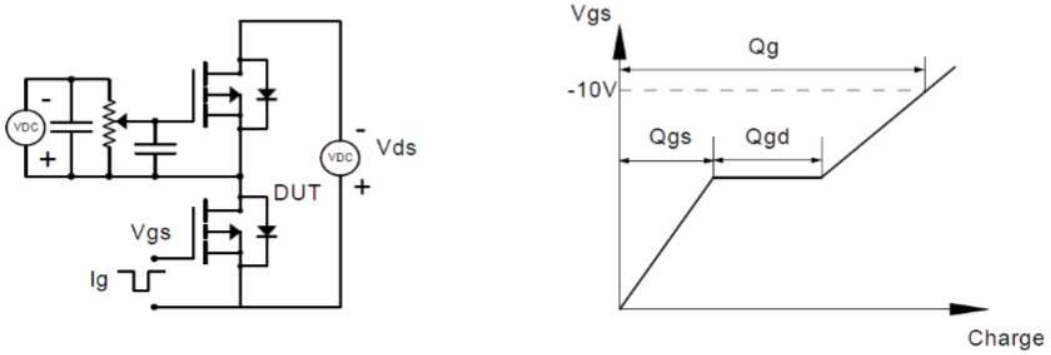


Figure 12: Peak Current Capacity

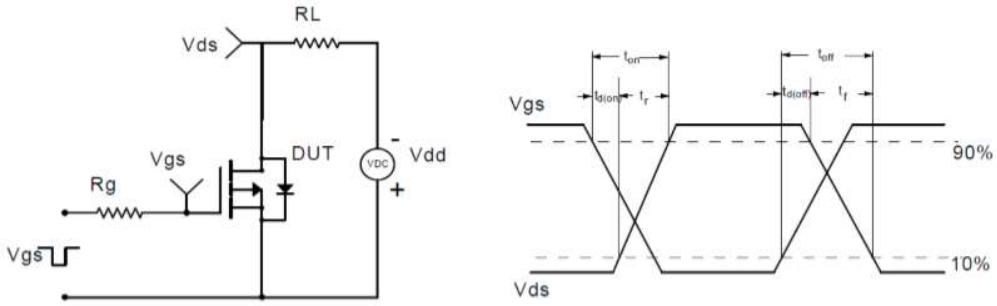


Test Circuit-P

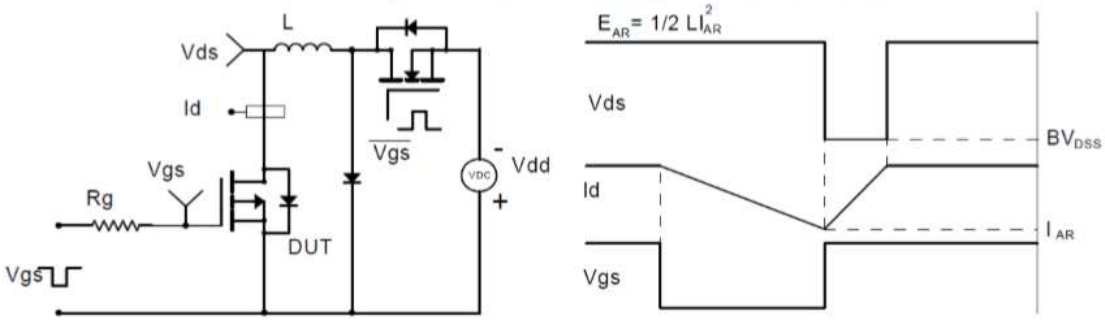
Gate Charge Test Circuit & Waveform



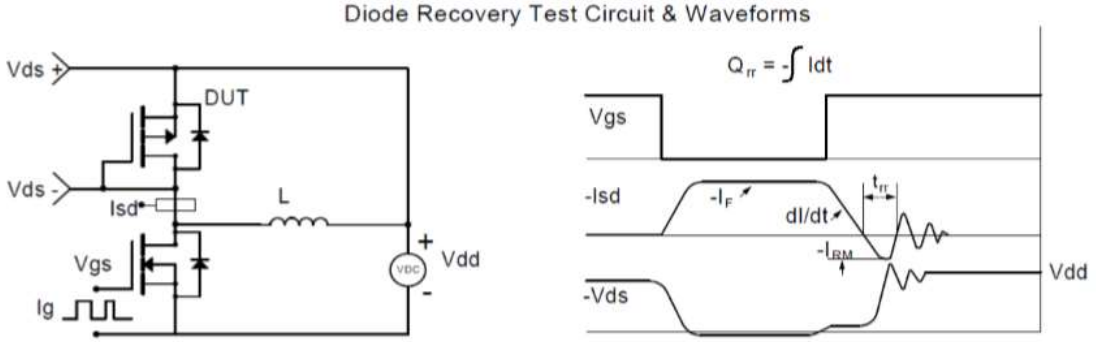
Resistive Switching Test Circuit & Waveforms



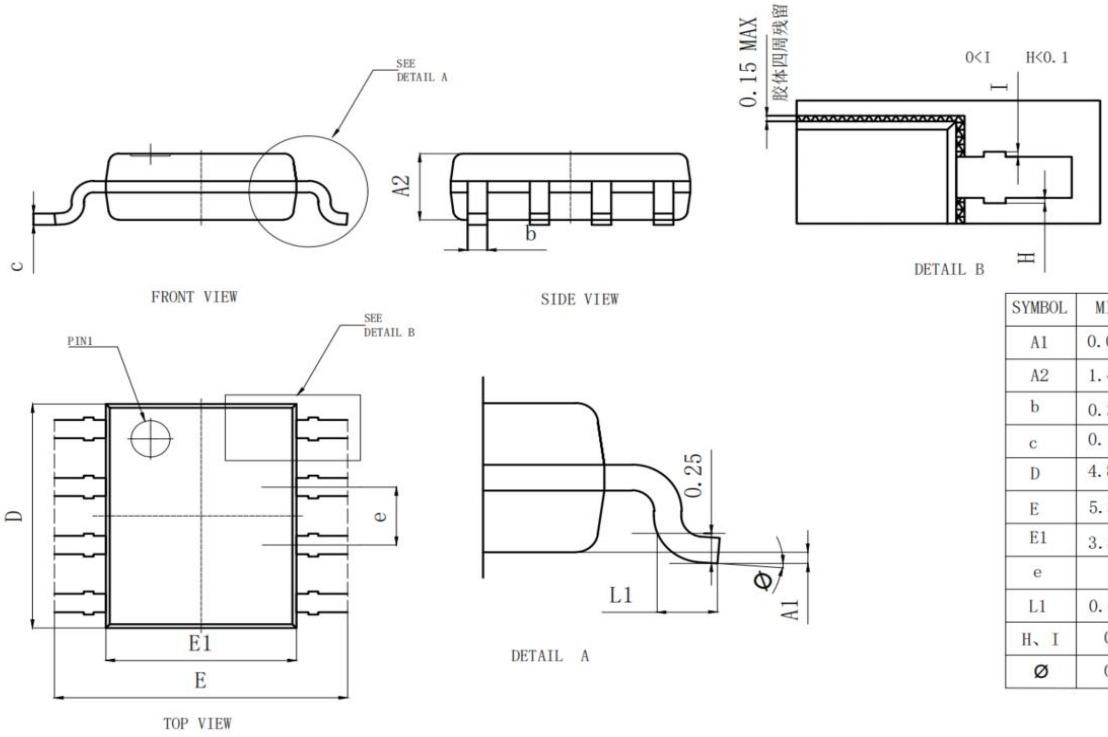
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data-SOP-8



SYMBOL	MIN	NOM	MAX
A1	0.030	0.090	0.150
A2	1.425	1.450	1.475
b	0.300	0.400	0.500
c	0.150	0.200	0.250
D	4.800	5.000	5.200
E	5.800	6.000	6.200
E1	3.800	4.000	4.200
e	1.270BSC		
L1	0.400	0.600	0.800
H、I	0	NA	0.100
Ø	0°	NA	8°