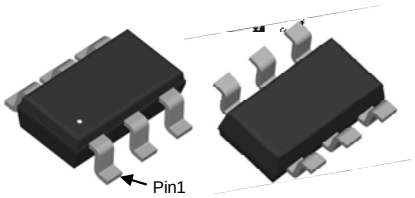
SOT23-6L

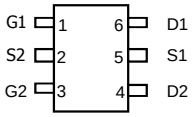
Top View Bottom View

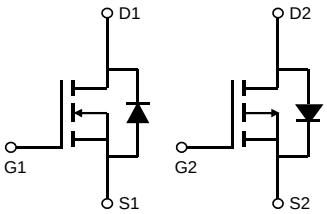


Features

- N-channel: 20V, 4.0A
  $R_{DS(ON)}$ < 42mΩ @ V_{GS} = 4.5V
  $R_{DS(ON)}$ < 60mΩ @ V_{GS} = 2.5V
- P-channel: -20V, -3.0A
  $R_{DS(ON)}$ < 70mΩ @ V_{GS} = -4.5V
  $R_{DS(ON)}$ < 100mΩ @ V_{GS} = -2.5V
- Excellent Gate Charge x $R_{DS(ON)}$ Product(FOM)
- Very Low On-resistance $R_{DS(ON)}$
- Fast Switching Speed

Top View





n-channel p-channel

Applications

- Battery Protection
- Load Switch
- Power Management

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

Symbol	Parameter		Value-N-channel	Value-P-channel	Units
V_{DS}	Drain-to-Source Voltage		20	-20	V
V_{GS}	Gate-to-Source Voltage		±12		V
I_D	Continuous Drain Current	T_A = 25°C	4.0	-3.0	A
		T_A = 100°C	2.4	-1.8	
I_{DM}	Pulsed Drain Current (1)		15	-11	A
P_D	Power Dissipation	T_A = 25°C	1.03	1.03	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient(2)		121	121	°C/W
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150		°C

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 20V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	0.5	0.65	1.0	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = 4.5V, I_D = 4A	-	31	42	mΩ
		V_{GS} = 2.5V, I_D = 3A	-	38	60	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 10V, f = 1MHz	-	265	-	pF
C_{oss}	Output Capacitance		-	40	-	pF
C_{rss}	Reverse Transfer Capacitance		-	33	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 4.5V V_{DD} = 10V, I_D = 2A	-	5.9	-	nC
Q_{gs}	Gate Source Charge		-	0.9	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	1.4	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 4.5V, V_{DD} = 10V I_D= 2A, R_{GEN} = 2.7Ω	-	4	-	ns
t_r	Turn-On Rise Time		-	13	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	67	-	ns
t_f	Turn-Off Fall Time		-	32	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	4.0	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	15	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = 3.8A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I_F=2A,di/dt=60A/μs	-	6.6	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	0.8	-	nC

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = -250μA, V_{GS} = 0V	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -20V, V_{GS} = 0V	-	-	-1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-0.5	-0.65	-1.0	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = -4.5V, I_D = -3A	-	43	70	mΩ
		V_{GS} = -2.5V, I_D = -2A	-	55	100	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = -10V, f = 1MHz	-	483	-	pF
C_{oss}	Output Capacitance		-	51	-	pF
C_{rss}	Reverse Transfer Capacitance		-	40	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to -4.5V, V_{DD} = -10V, I_D = -2A	-	5.7	-	nC
Q_{gs}	Gate Source Charge		-	0.9	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	1.0	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = -4.5V, V_{DD} = -10V, I_D= -2A, R_{GEN} = 2.7Ω	-	5	-	ns
t_r	Turn-On Rise Time		-	21	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	96	-	ns
t_f	Turn-Off Fall Time		-	243	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-2.8	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-11	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = -2.8A	-	-	-1.2	V
trr	Body Diode Reverse Recovery Time	I_F=-2A,di/dt=50A/μs	-	37	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	4.7	-	nC

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

2. $R_{\theta JA}$ is measured with the device mounted on a 1inch^2 pad of 2oz copper FR4 PCB

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

Typical Performance Characteristics-N

Figure 1: Output Characteristics

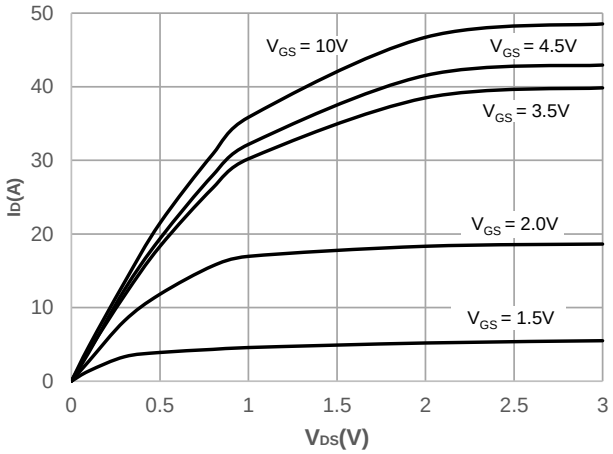


Figure 2: Typical Transfer Characteristics

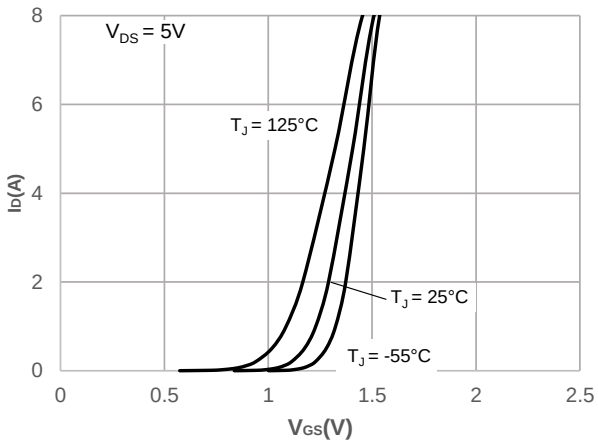


Figure 3: On-resistance vs. Drain Current

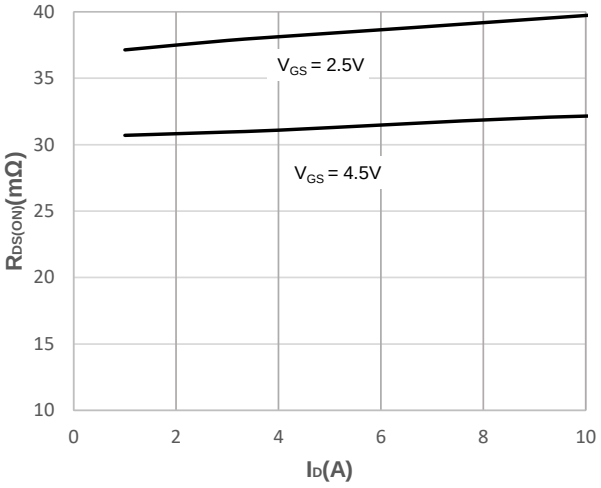


Figure 4: Body Diode Characteristics

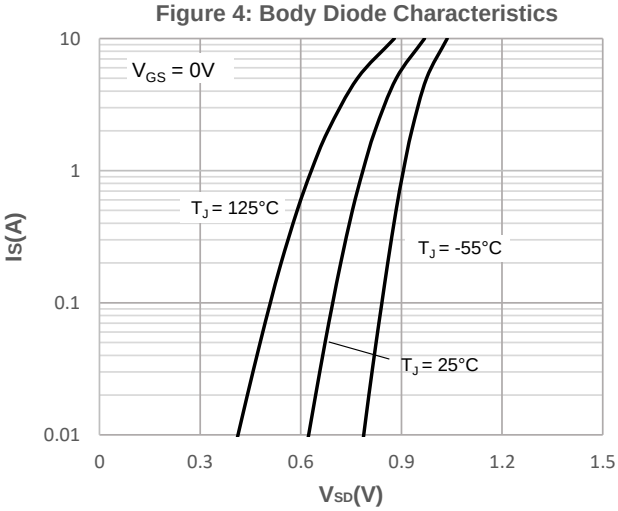


Figure 5: Gate Charge Characteristics

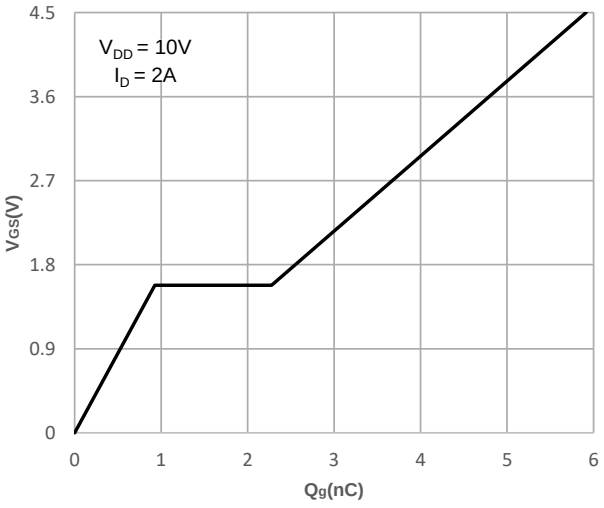
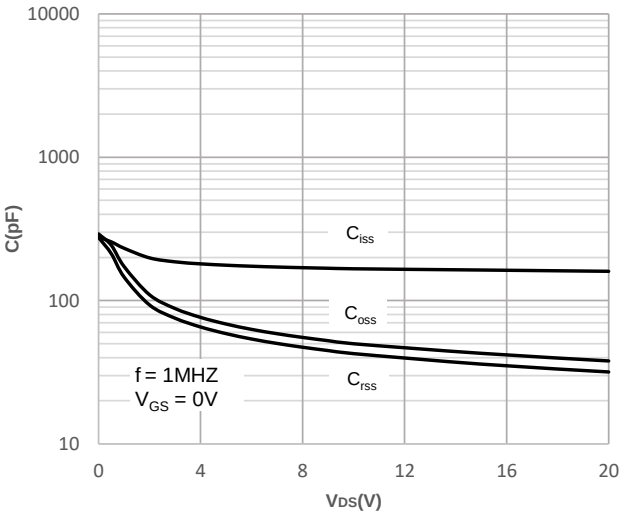


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-N

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

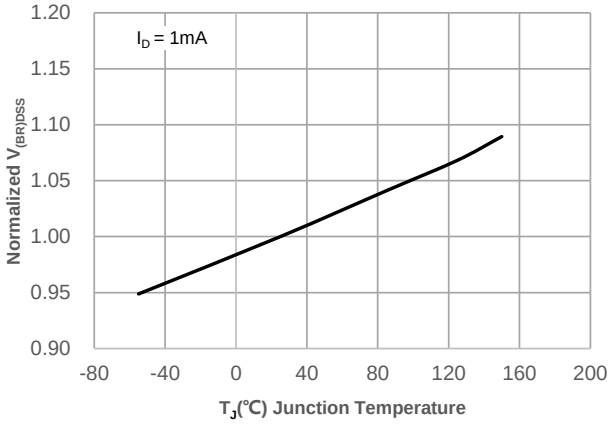


Figure 8: Normalized on Resistance vs. Junction Temperature

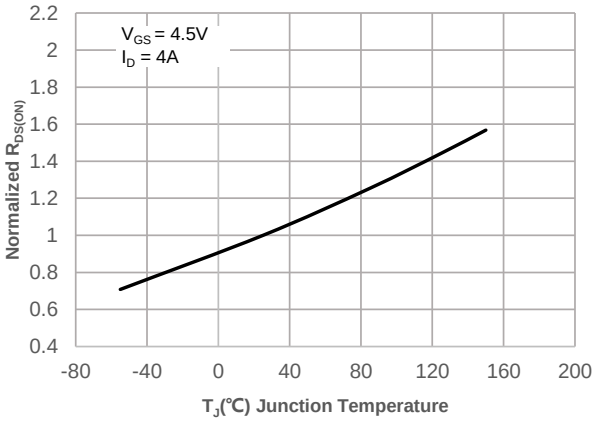


Figure 9: Maximum Safe Operating Area

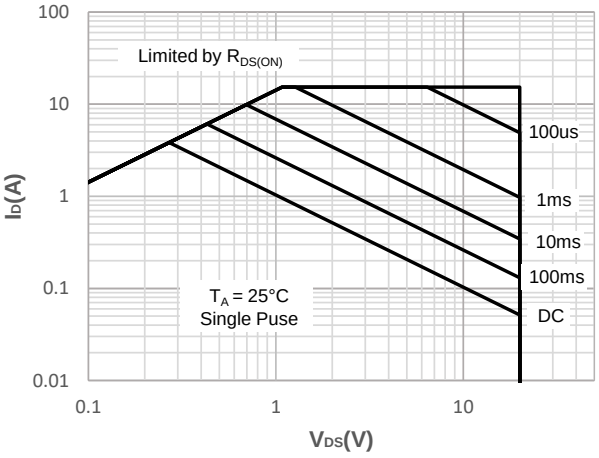


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

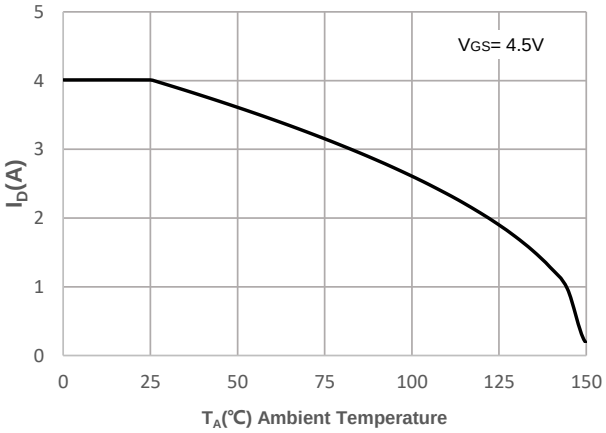


Figure 11: Normalized Maximum Transient Thermal Impedance

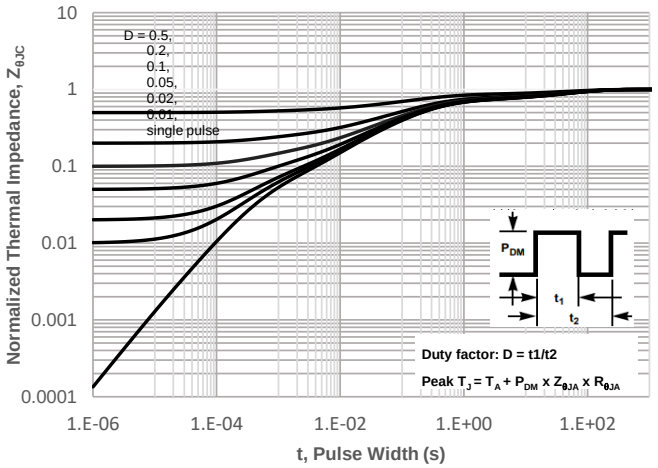
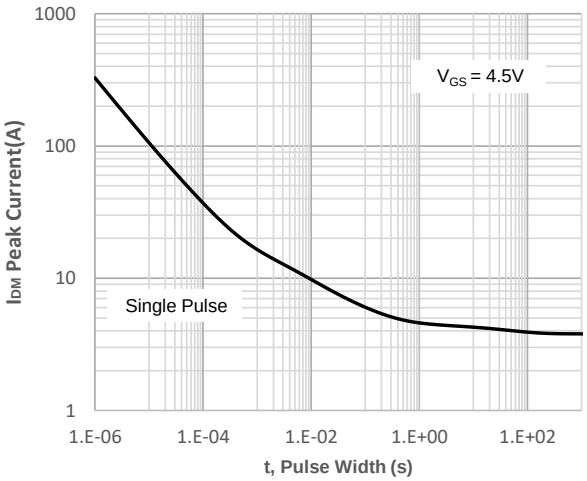


Figure 12: Peak Current Capacity



Test Circuit-N

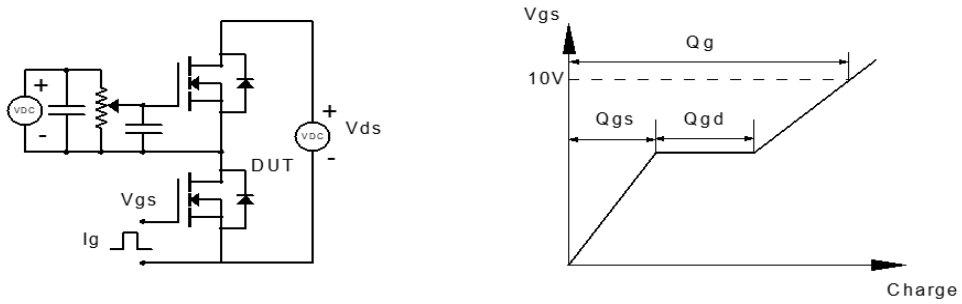


Figure 1: Gate Charge Test Circuit & Waveform

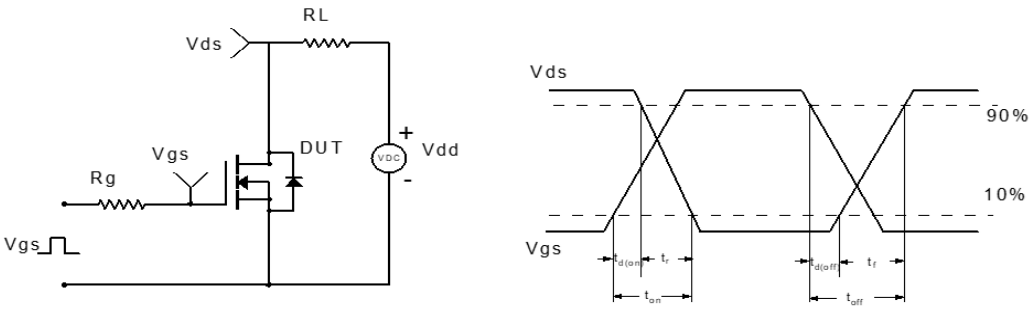


Figure 2: Resistive Switching Test Circuit & Waveform

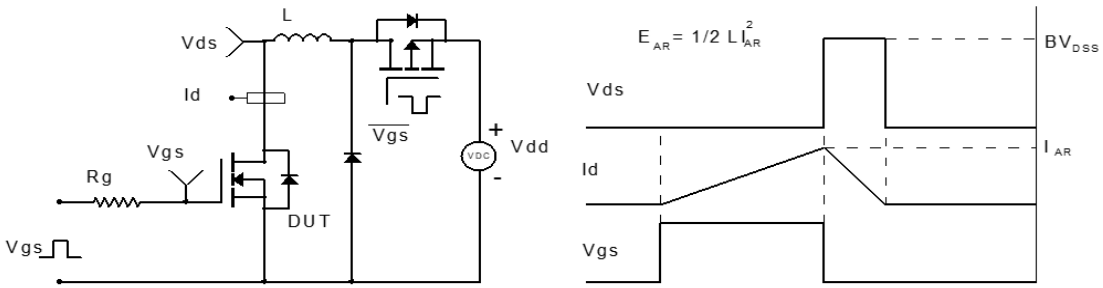


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

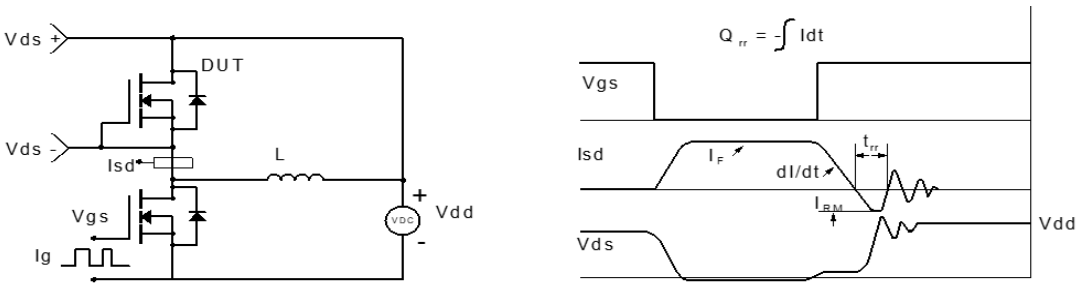


Figure 4: Diode Recovery Test Circuit & Waveform

Typical Performance Characteristics-P

Figure 1: Output Characteristics

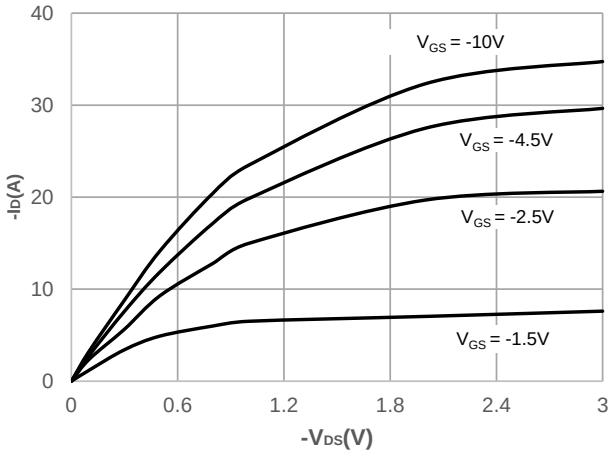


Figure 2: Typical Transfer Characteristics

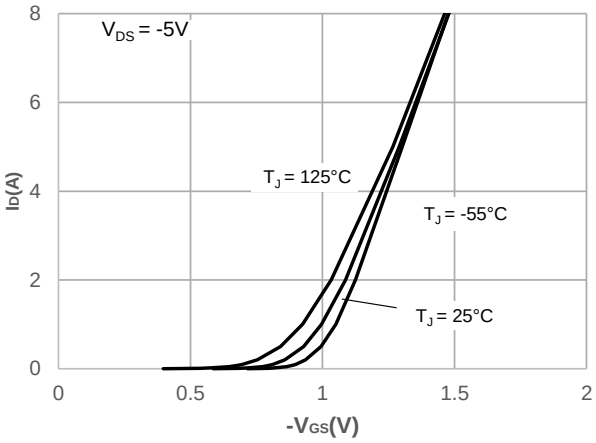


Figure 3: On-resistance vs. Drain Current

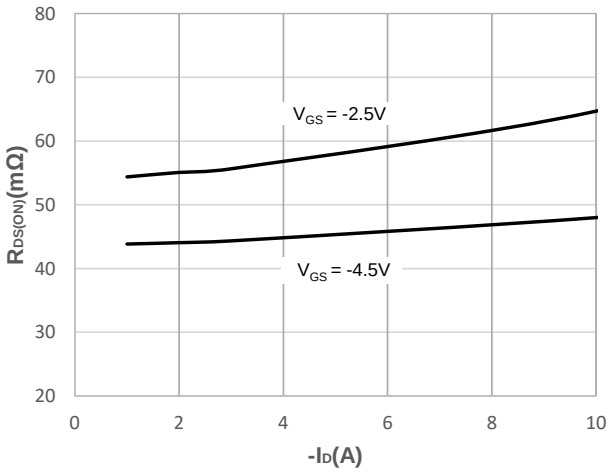


Figure 4: Body Diode Characteristics

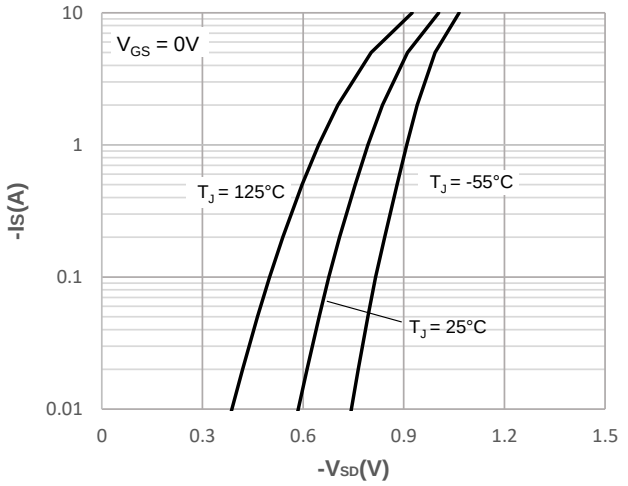


Figure 5: Gate Charge Characteristics

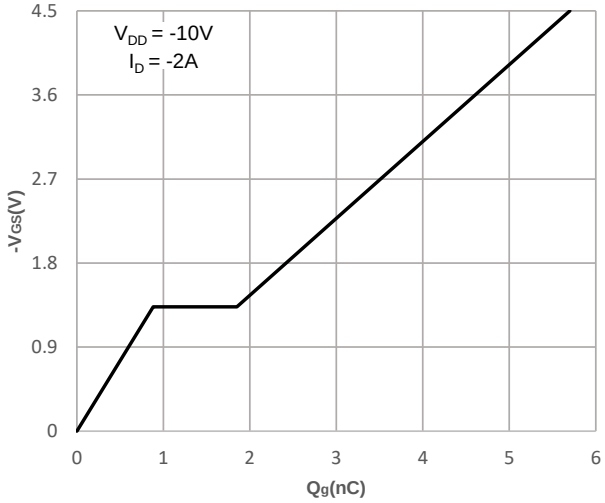
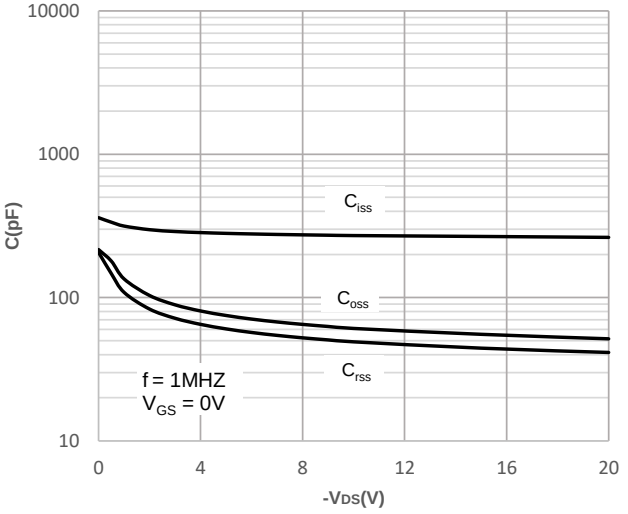


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-P

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

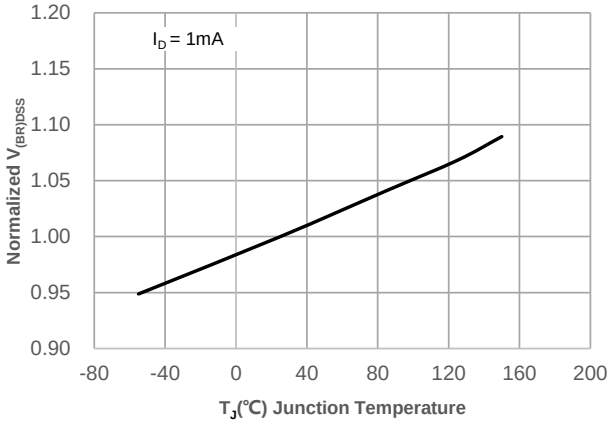


Figure 8: Normalized on Resistance vs. Junction Temperature

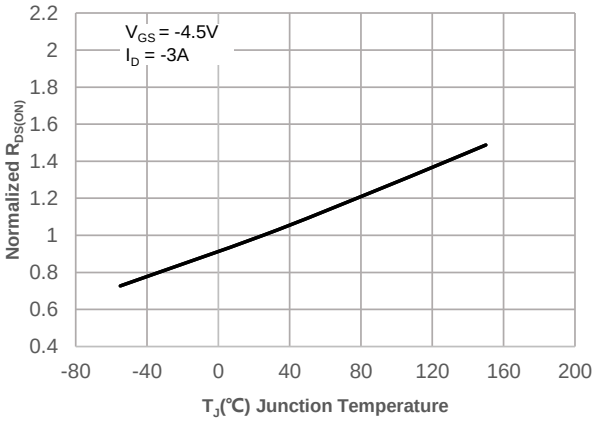


Figure 9: Maximum Safe Operating Area

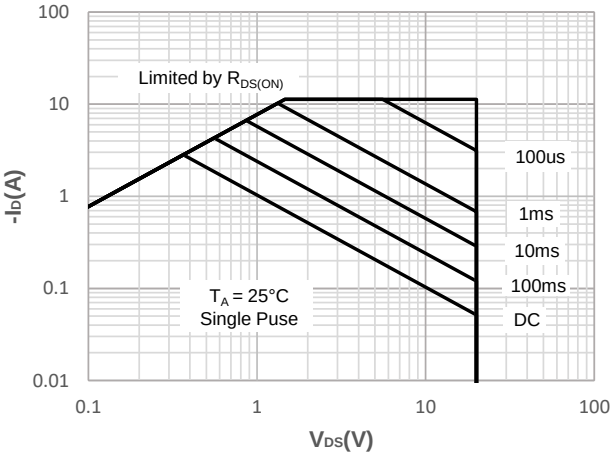


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

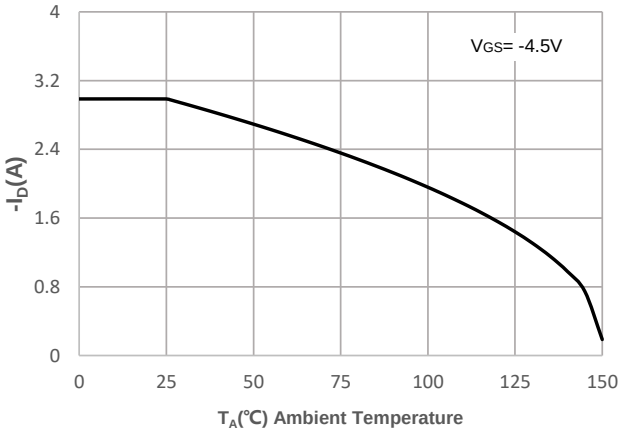


Figure 11: Normalized Maximum Transient Thermal Impedance

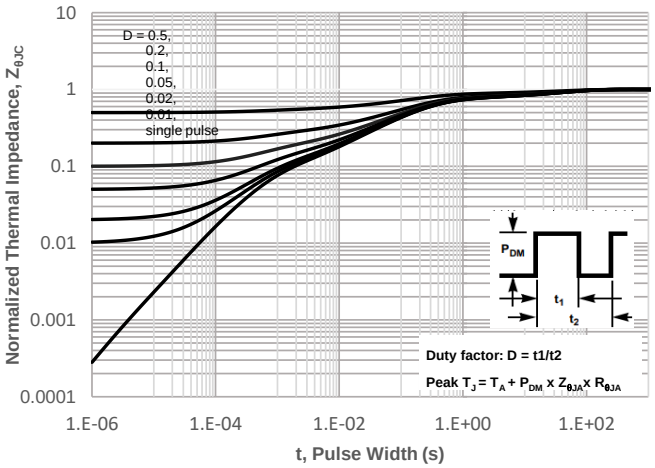
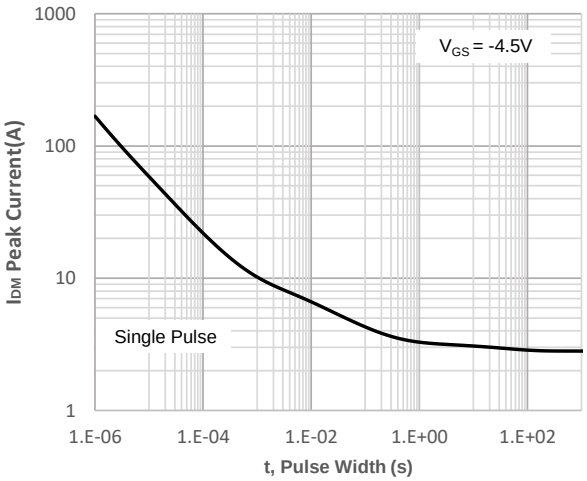


Figure 12: Peak Current Capacity



Test Circuit-P

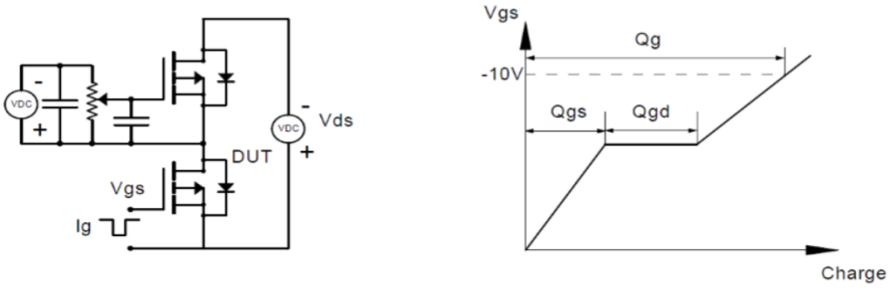


Figure 1: Gate Charge Test Circuit & Waveform

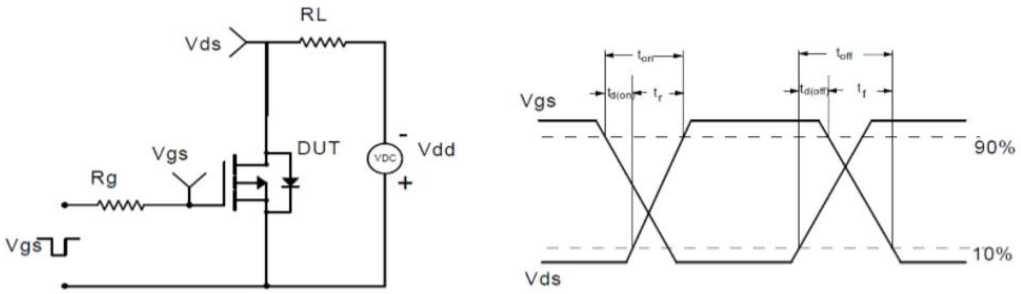


Figure 2: Resistive Switching Test Circuit & Waveform

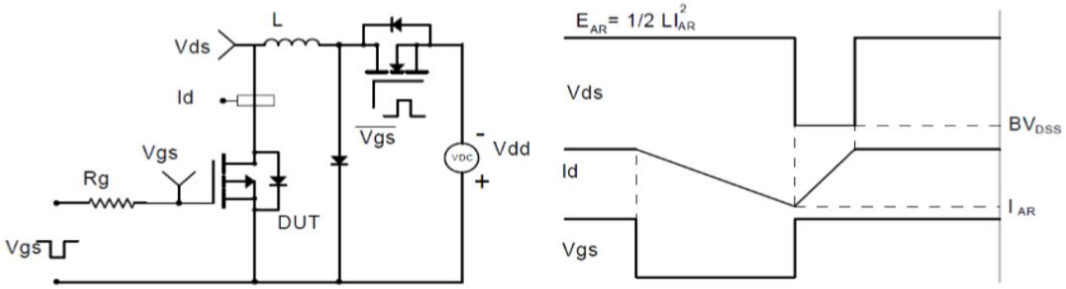


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

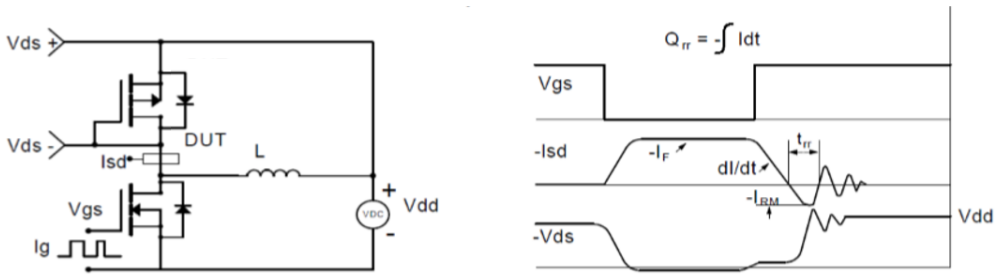
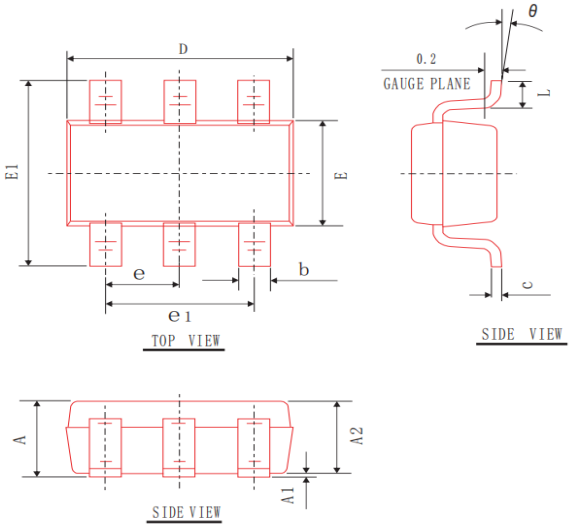


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(SOT-23-6L)



COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	——	——	1.20
A1	0.00	0.05	0.10
A2	1.00	1.10	1.20
b	0.30	0.40	0.50
c	0.119	0.127	0.135
e1	1.80	1.90	2.00
D	2.80	2.90	3.00
E	1.50	1.60	1.70
E1	2.60	2.80	3.00
L	0.30	0.45	0.60
θ	0°	4°	8°
e	0.95BSC		