

Description

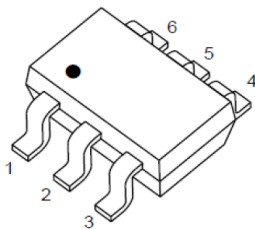
JMT N And P-channel Enhancement Mode Power MOSFET

Features

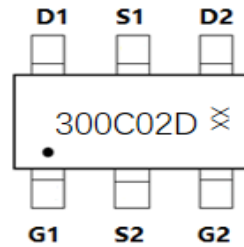
- N-channel: 20V, 3.8A
 $R_{DS(ON)} < 30m\Omega @ V_{GS} = 4.5V$
 $R_{DS(ON)} < 37m\Omega @ V_{GS} = 2.5V$
- P-channel: -20V, -2.8A
 $R_{DS(ON)} < 51m\Omega @ V_{GS} = -4.5V$
 $R_{DS(ON)} < 65m\Omega @ V_{GS} = -2.5V$
- Excellent Gate Charge x $R_{DS(ON)}$ Product(FOM)
- Very Low On-resistance $R_{DS(ON)}$
- Fast Switching Speed

Applications

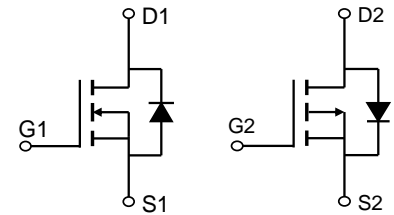
- Battery Protection
- Load Switch
- Power Management



SOT-23-6L Top View



Marking and Pin Assignment



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Outline	Package	Reel Size	Reel(pcs)	Per Carton (pcs)
300C02D	JMTM300C02D	TAPING	SOT-23-6L	13"	3000	120000

Absolute Maximum Ratings (@ $T_A = 25^\circ C$ 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	$T_A = 25^\circ C$	3.8	-2.8
		$T_A = 100^\circ C$	2.4	-1.8
I_{DM}	Pulsed Drain Current ⁽¹⁾	15	-11	A
P_D	Power Dissipation	$T_A = 25^\circ C$	1.03	1.03
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ⁽²⁾	121	121	$^\circ C/W$
T_J, T_{STG}	Junction & Storage Temperature Range	-55 to 150		$^\circ C$



N-channel Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 12\text{V}$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	0.4	0.8	1.0	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance ⁽³⁾	$V_{GS} = 4.5\text{V}, I_D = 4\text{A}$	-	23	30	$\text{m}\Omega$
		$V_{GS} = 2.5\text{V}, I_D = 3\text{A}$	-	29	37	$\text{m}\Omega$
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 10\text{V}, f = 1\text{MHz}$	-	466	-	pF
C_{oss}	Output Capacitance		-	62	-	pF
C_{rss}	Reverse Transfer Capacitance		-	53	-	pF
Q_g	Total Gate Charge	$V_{GS} = 0 \text{ to } 4.5\text{V}$ $V_{DD} = 10\text{V}, I_D = 2\text{A}$	-	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 Delay Time	$V_{GS} = 4.5\text{V}, V_{DD} = 10\text{V}$ $I_D = 2\text{A}, R_{GEN} = 2.7\Omega$	-	4	-	ns
t_r	Turn-On Rise Time		-	13	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	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		-	-	3.8	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	15	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 3.8\text{A}$	-	-	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F = 2\text{A}, di/dt = 60\text{A}/\mu\text{s}$	-	6.6	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	0.8	-	nC



P-channel Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$	-	-	-1.0	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 12\text{V}$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	-0.4	-0.6	-1.0	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance ⁽³⁾	$V_{GS} = -4.5\text{V}, I_D = -3\text{A}$	-	39	51	$\text{m}\Omega$
		$V_{GS} = -2.5\text{V}, I_D = -2\text{A}$	-	50	65	$\text{m}\Omega$
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = -10\text{V}, f = 1\text{MHz}$	-	538	-	pF
C_{oss}	Output Capacitance		-	61	-	pF
C_{rss}	Reverse Transfer Capacitance		-	49	-	pF
Q_g	Total Gate Charge	$V_{GS} = 0 \text{ to } -4.5\text{V}$ $V_{DD} = -10\text{V}, I_D = -2\text{A}$	-	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 Delay Time	$V_{GS} = -4.5\text{V}, V_{DD} = -10\text{V}$ $I_D = -2\text{A}, R_{GEN} = 2.7\Omega$	-	5	-	ns
t_r	Turn-On Rise Time		-	21	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	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	$V_{GS} = 0\text{V}, I_S = -2.8\text{A}$	-	-	-1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F = -2\text{A}, di/dt = 50\text{A}/\mu\text{s}$	-	37	-	ns
Q_{rr}	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 $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$.

Typical Performance Characteristics-N

Figure 1: Output Characteristics

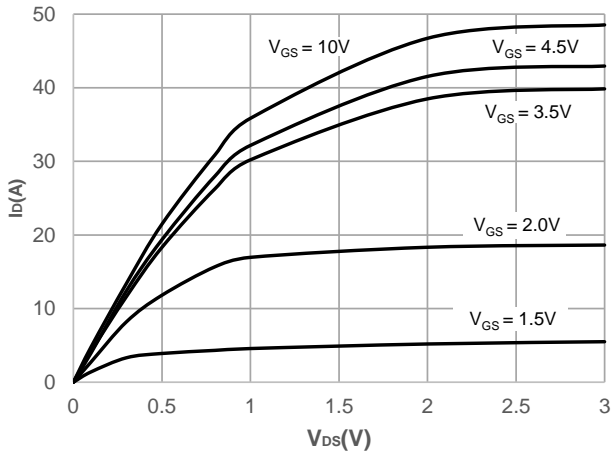


Figure 2: Typical Transfer Characteristics

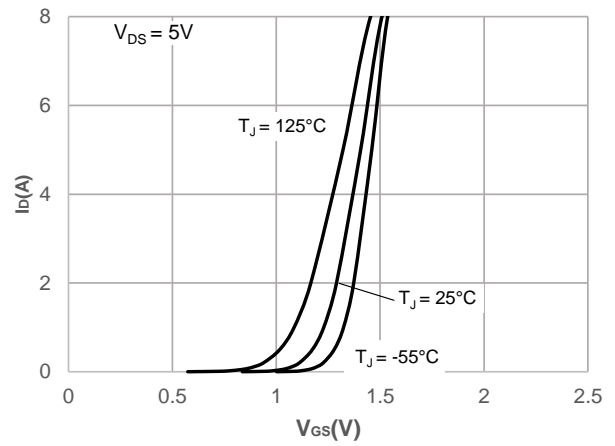


Figure 3: On-resistance vs. Drain Current

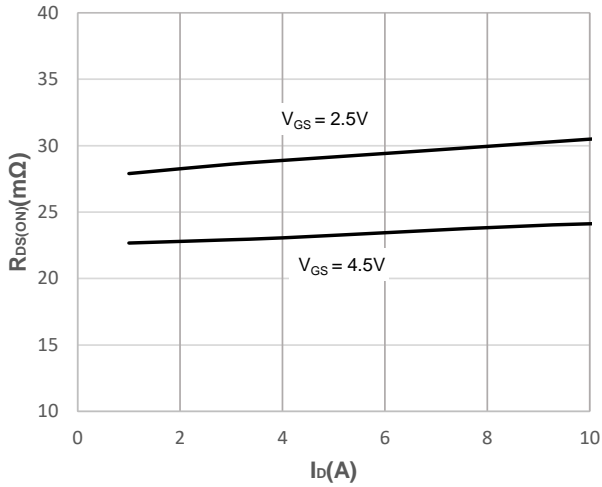


Figure 4: Body Diode Characteristics

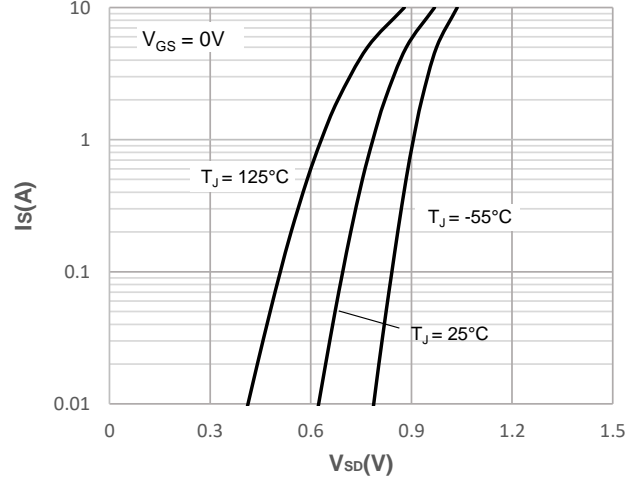


Figure 5: Gate Charge Characteristics

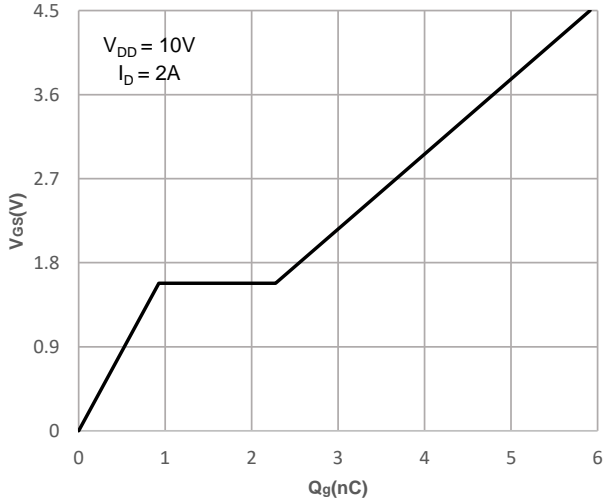
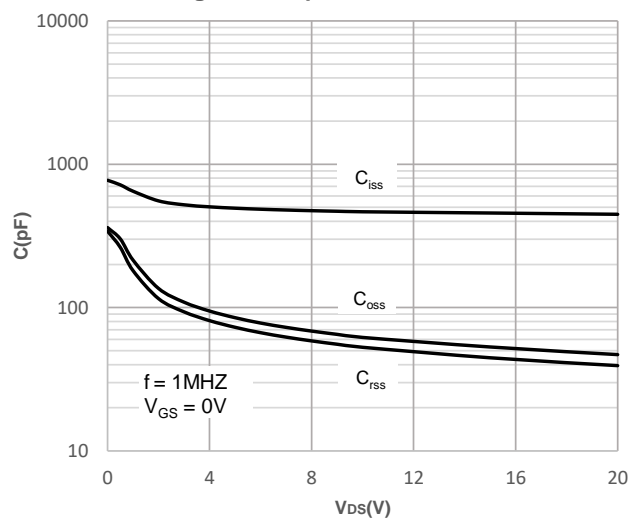


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-N

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

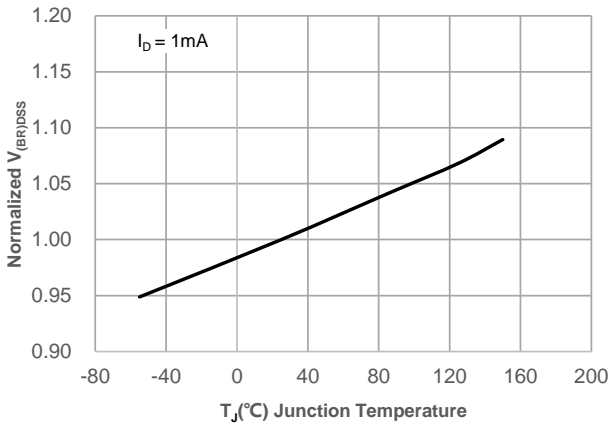


Figure 8: Normalized on Resistance vs. Junction Temperature

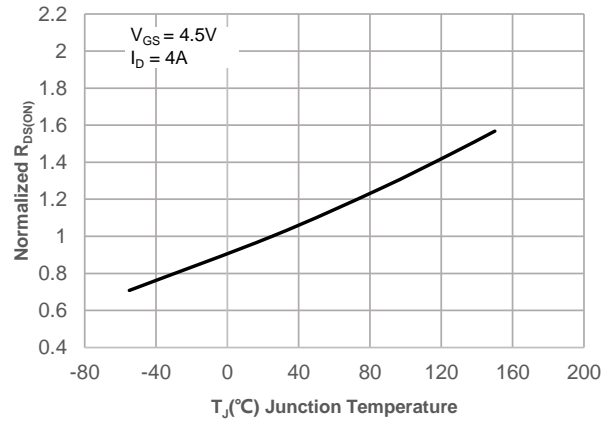


Figure 9: Maximum Safe Operating Area

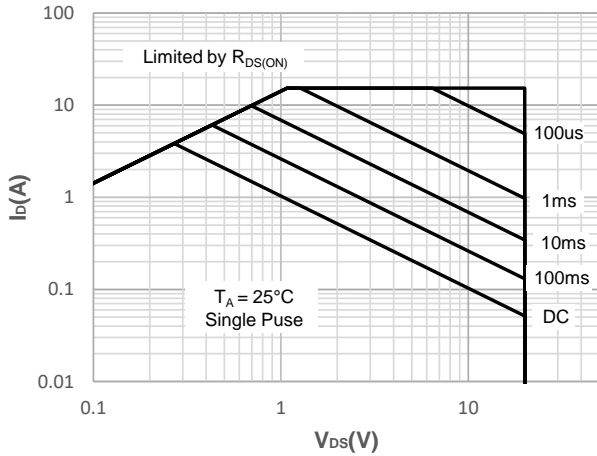


Figure 10: Maximum Continuous Driand Current vs. Case Temperature

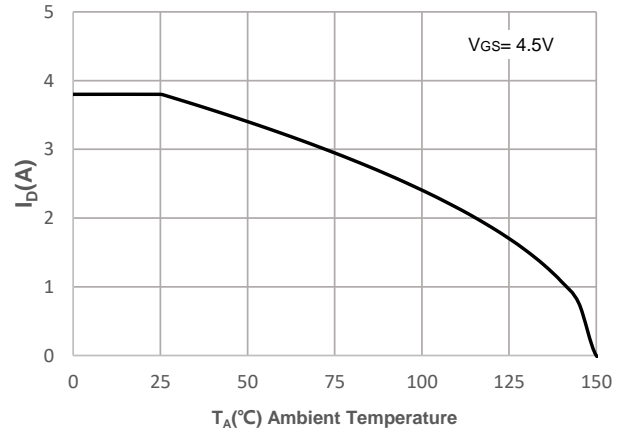


Figure 11: Normalized Maximum Transient Thermal Impedance

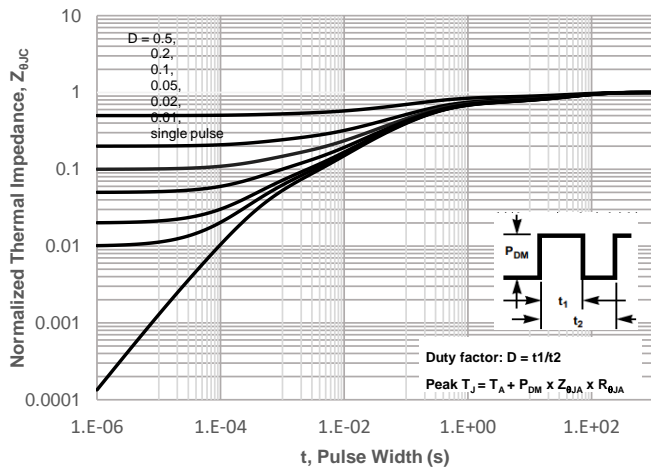
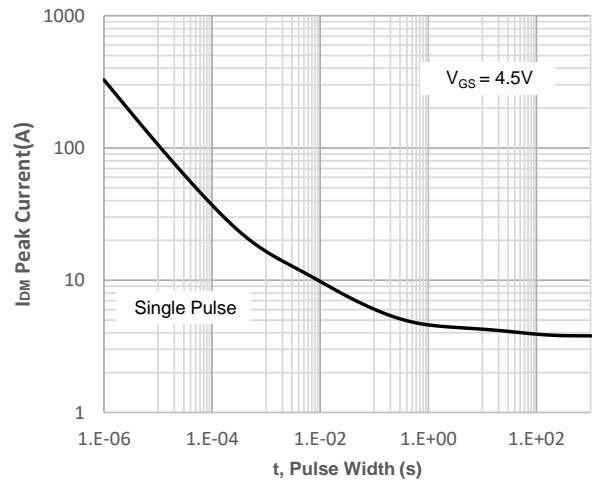


Figure 12: Peak Current Capacity



Test Circuit-N

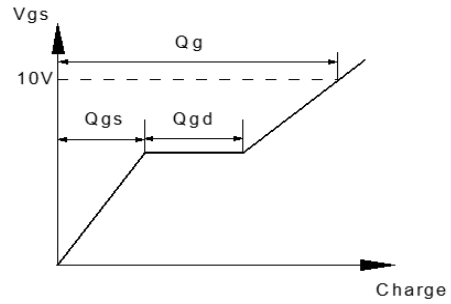
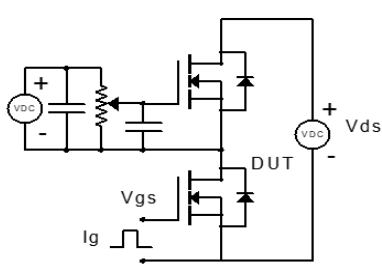


Figure 1: Gate Charge Test Circuit & Waveform

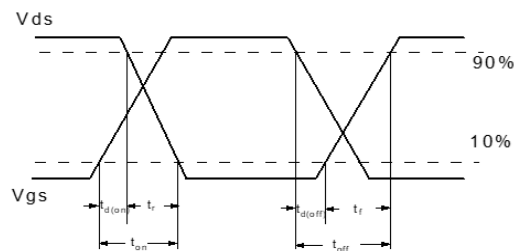
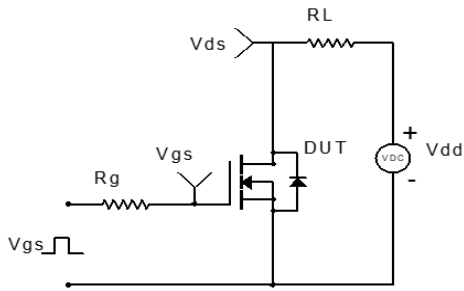


Figure 2: Resistive Switching Test Circuit & Waveform

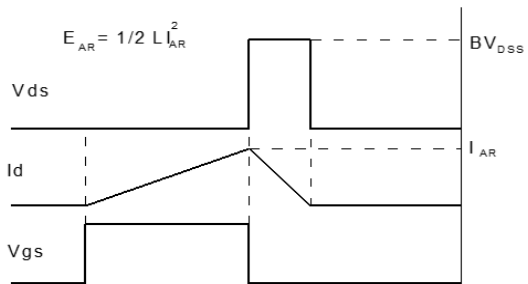
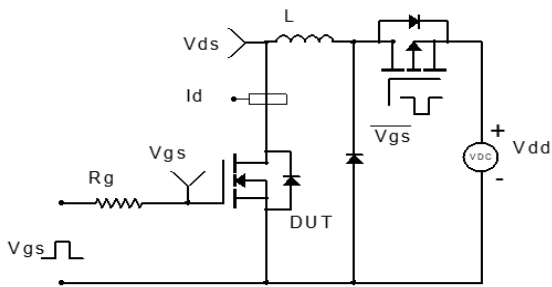


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

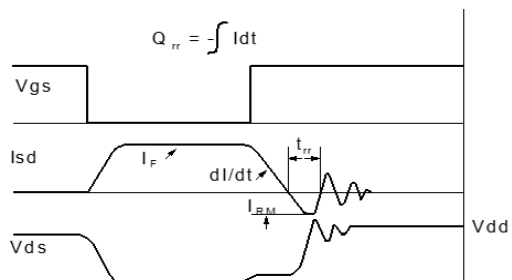
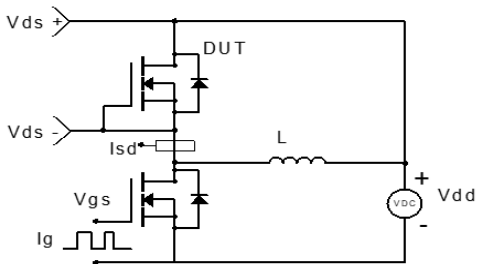


Figure 4: Diode Recovery Test Circuit & Waveform

Typical Performance Characteristics-P

Figure 1: Output Characteristics

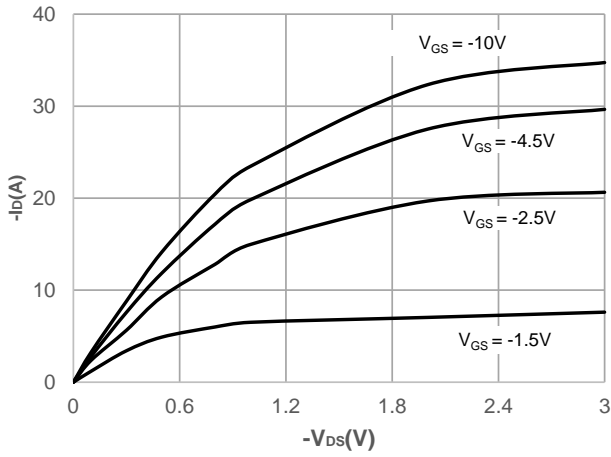


Figure 2: Typical Transfer Characteristics

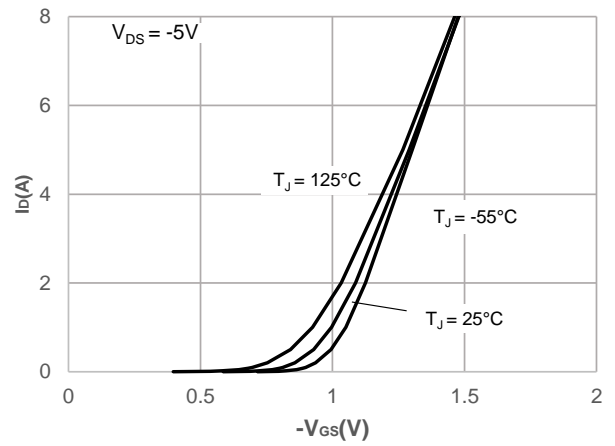


Figure 3: On-resistance vs. Drain Current

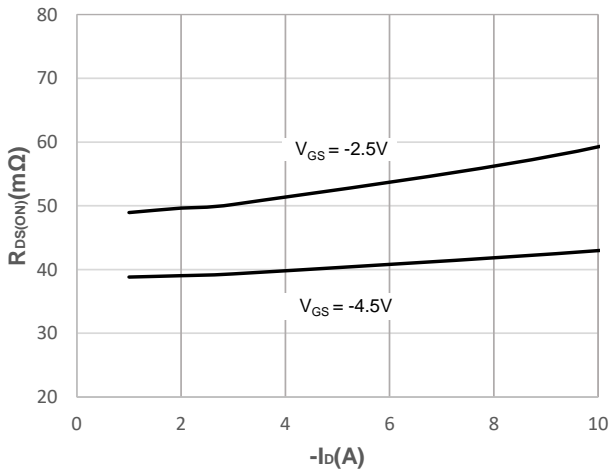


Figure 4: Body Diode Characteristics

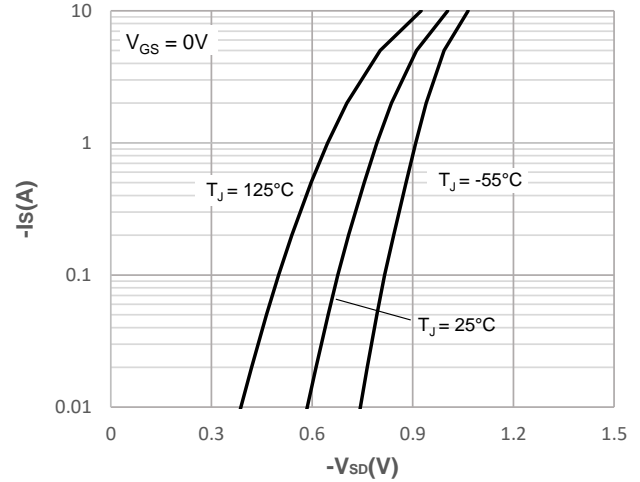


Figure 5: Gate Charge Characteristics

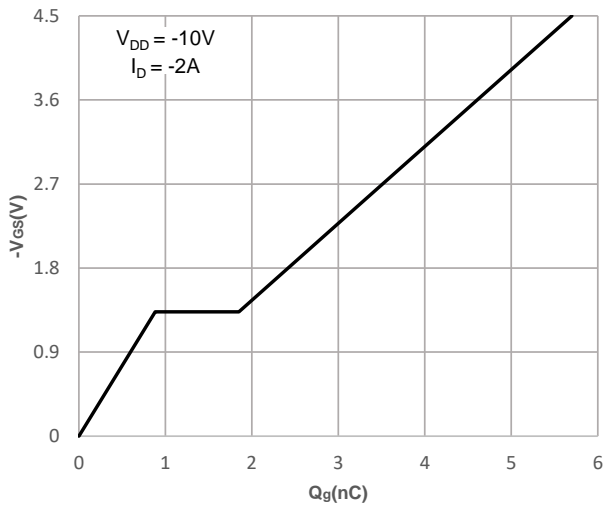
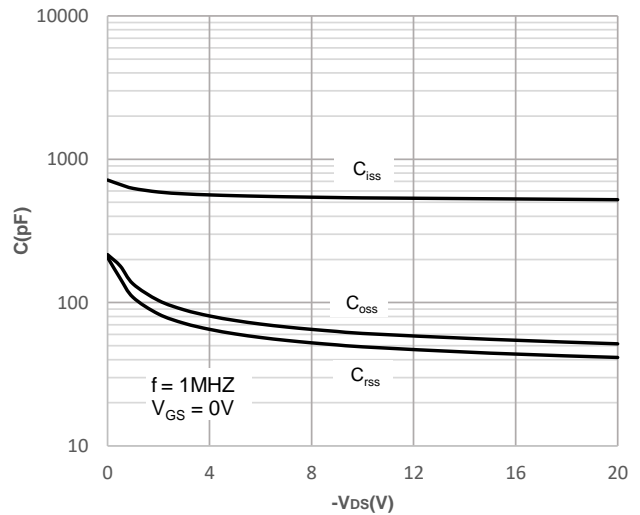


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-P

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

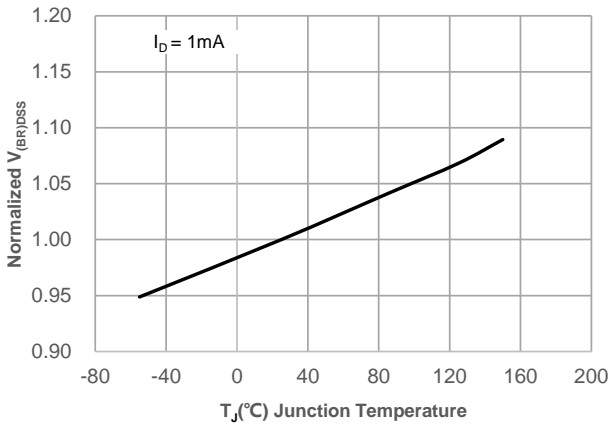


Figure 8: Normalized on Resistance vs. Junction Temperature

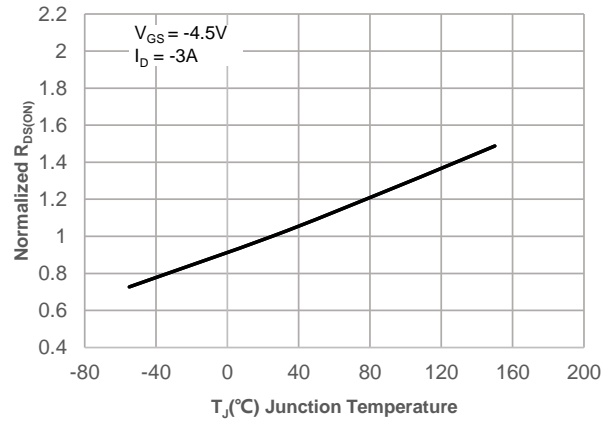


Figure 9: Maximum Safe Operating Area

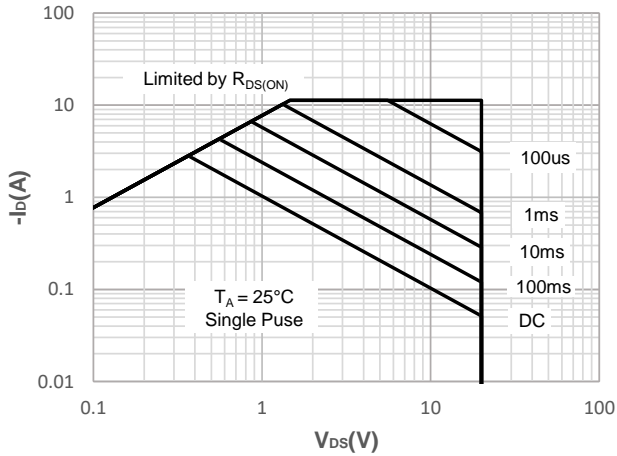


Figure 10: Maximum Continuous Driand Current vs. Case Temperature

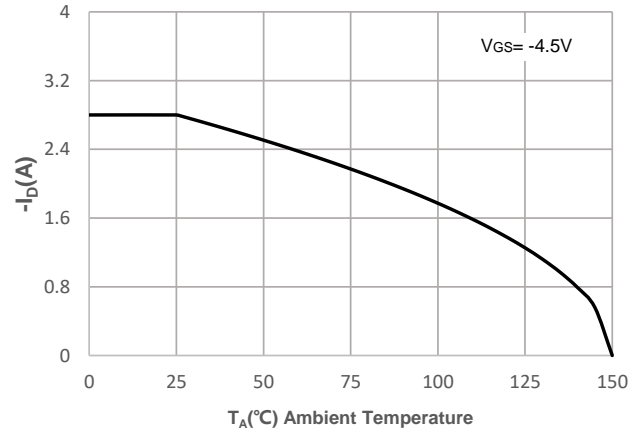


Figure 11: Normalized Maximum Transient Thermal Impedance

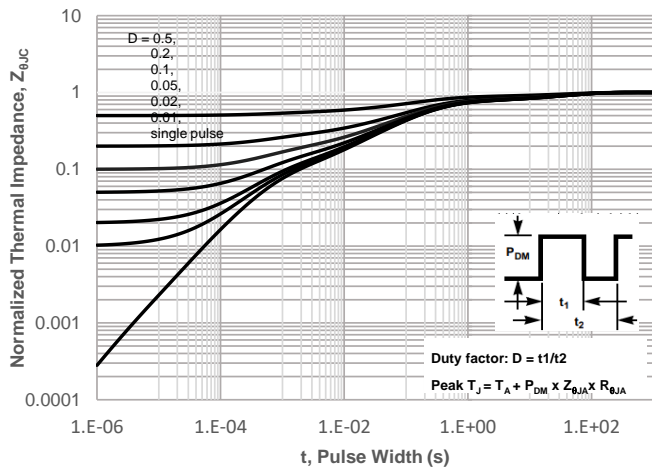
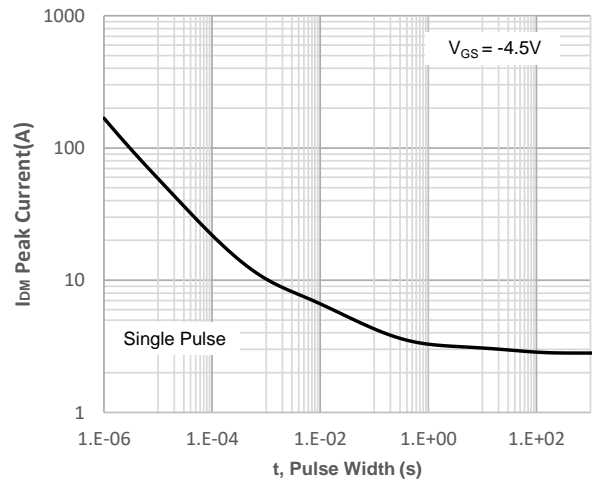


Figure 12: Peak Current Capacity



Test Circuit-P

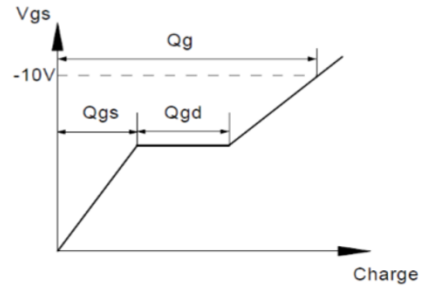
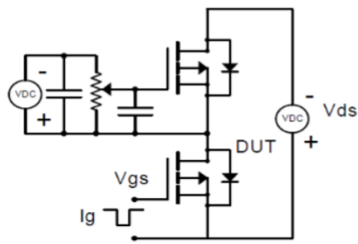


Figure 1: Gate Charge Test Circuit & Waveform

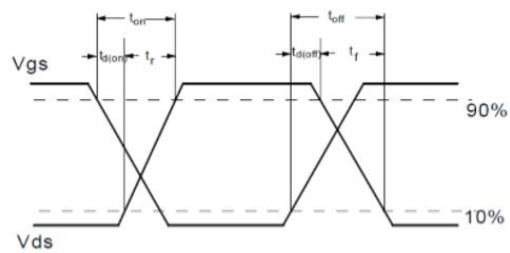
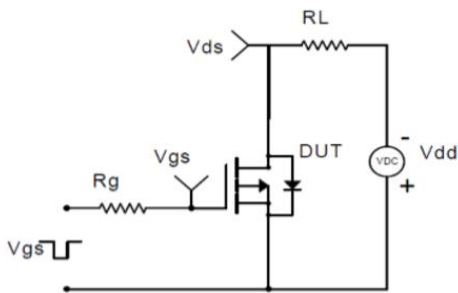


Figure 2: Resistive Switching Test Circuit & Waveform

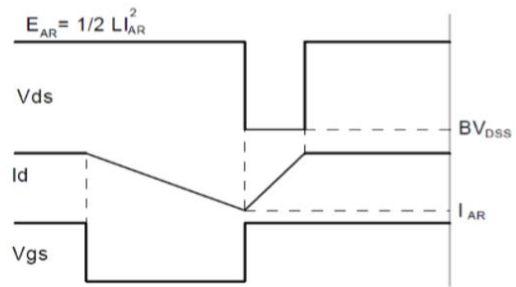
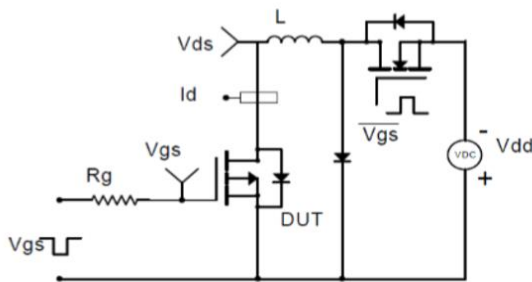


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

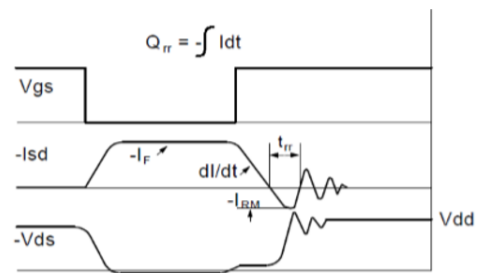
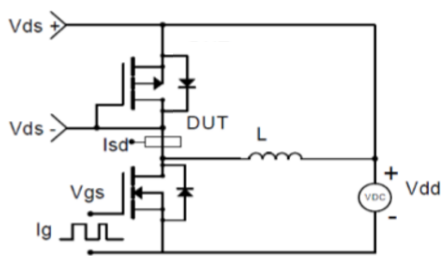
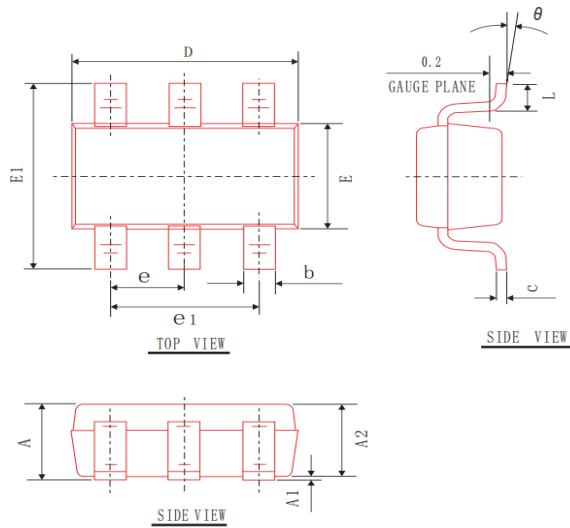


Figure 4: Diode Recovery Test Circuit & Waveform



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		

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