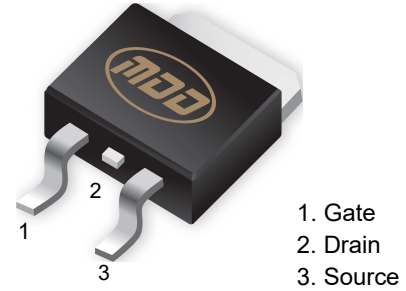


$V_{(BR)DSS}$	$R_{DS(on)Max}$	$I_D Max$
60V	17mΩ@10V	50A

Features

- $R_{DS(ON)} \leq 17m\ \Omega$ @ $V_{GS}=10V, I_D=20A$
- High Switching Speed
- Improved dv/dt capability

TO-252

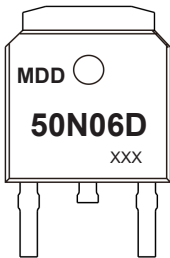


1. Gate
2. Drain
3. Source

Application

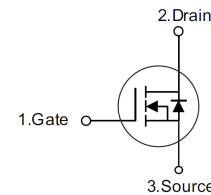
- Switching application

Marking



XXX: Date Code

Equivalent Circuit



Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	50	A
Pulsed Drain Current (Note 2)	I_{DM}	200	A
Avalanche Energy Single Pulsed (Note 3)	E_{AS}	98	mJ
Peak Diode Recovery dv/dt	dv/dt	10	A
Power Dissipation	P_D	62.5	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62	$^\circ C/W$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2	$^\circ C/W$
Junction Temperature	T_J	150	$^\circ C$
Storage Temperature	T_{stg}	-50 ~+150	$^\circ C$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2.Repetitive Rating : Pulse width limited by maximum junction temperature.

3.L=43mH, IAS=43A, VDD=25V, RG=20Ω, Starting $T_J=25^\circ C$

4.ISD $\leq 30A$, VDS=0V, di/dt $\leq 200A/\mu s$, VDD $\leq BVDSS$, Starting $T_J = 25^\circ C$



Ta = 25°C unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	--	--	V
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=60V, V_{GS}=0V$	--	--	1	μA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.8	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=20A$	--	12	17	m Ω
		$V_{GS}=4.5V, I_D=20A$	--	17	23	m Ω

Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{DS}=30V$ $V_{GS}=0V$ $f=1MHz$	--	1889	--	pF
C_{oss}	Output Capacitance		--	113	--	pF
C_{rss}	Reverse Transfer Capacitance		--	92	--	pF
Q_g	Total Gate Charge	$V_{DS}=30V,$ $V_{GS}=10V,$ $I_D=20A$ (Note1,2)	--	40	--	nC
Q_{gs}	Gate Source Charge		--	7.8	--	nC
Q_{gd}	Gate Drain Charge		--	8.3	--	nC

Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	$V_{DS}=30V,$ $V_{GS}=10V,$ $I_D=20A,$ $R_G=3\Omega$ (Note1,2)	--	13	--	ns
t_r	Turn on Rise Time		--	25	--	ns
$t_{d(off)}$	Turn Off Delay Time		--	60	--	ns
t_f	Turn Off Fall Time		--	9	--	ns

Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
I_{SD}	Source drain current(Body Diode)		--	--	50	A
V_{SD}	Drain-Source Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	--	--	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_S=20A,$ $V_{GS}=0V,$ $dI_S/dt=100A/\mu s$	--	29	--	ns
Q_{rr}	Body Diode Reverse Recovery Charge		--	21	--	nC

- Notes:**
1. Pulse test ; Pulse width 300us, duty cycle 2%.
 2. Essentially independent of operating temperature.

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

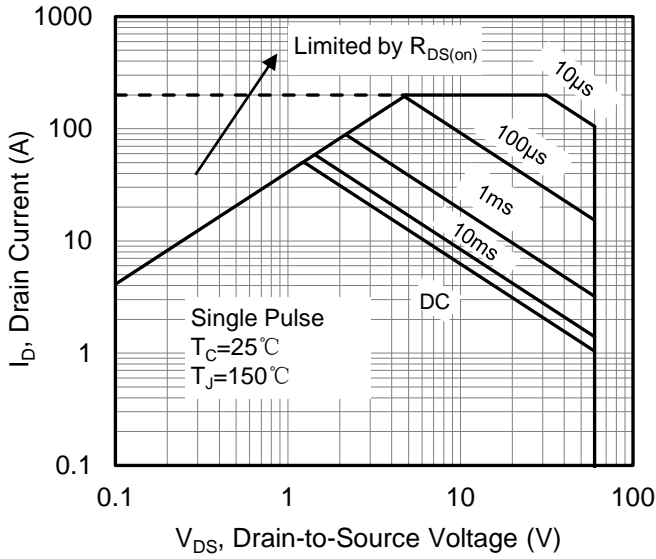


Figure 1. Maximum Safe Operating Area

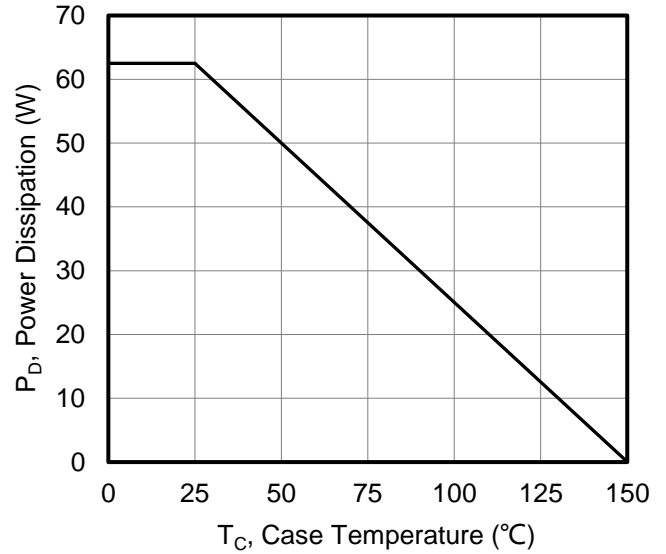


Figure 2. Maximum Power Dissipation vs Case Temperature

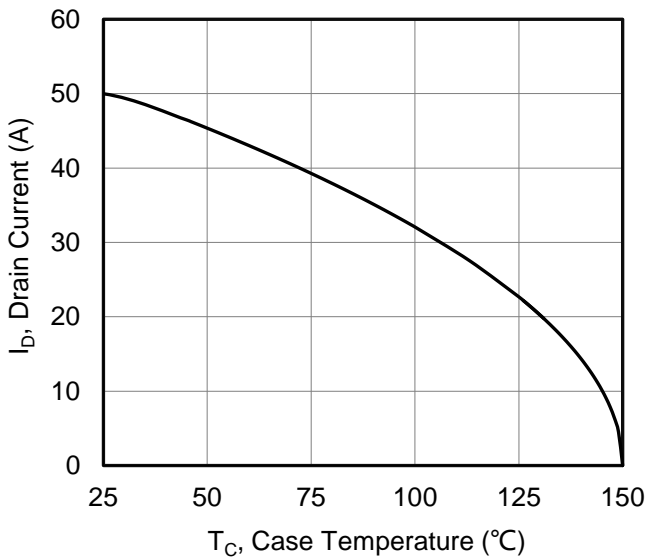


Figure 3. Maximum Continuous Drain Current vs Case Temperature

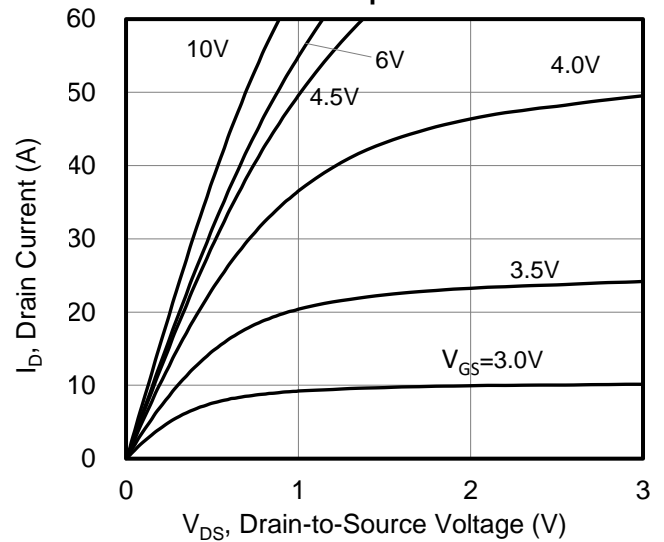


Figure 4. Typical output Characteristics

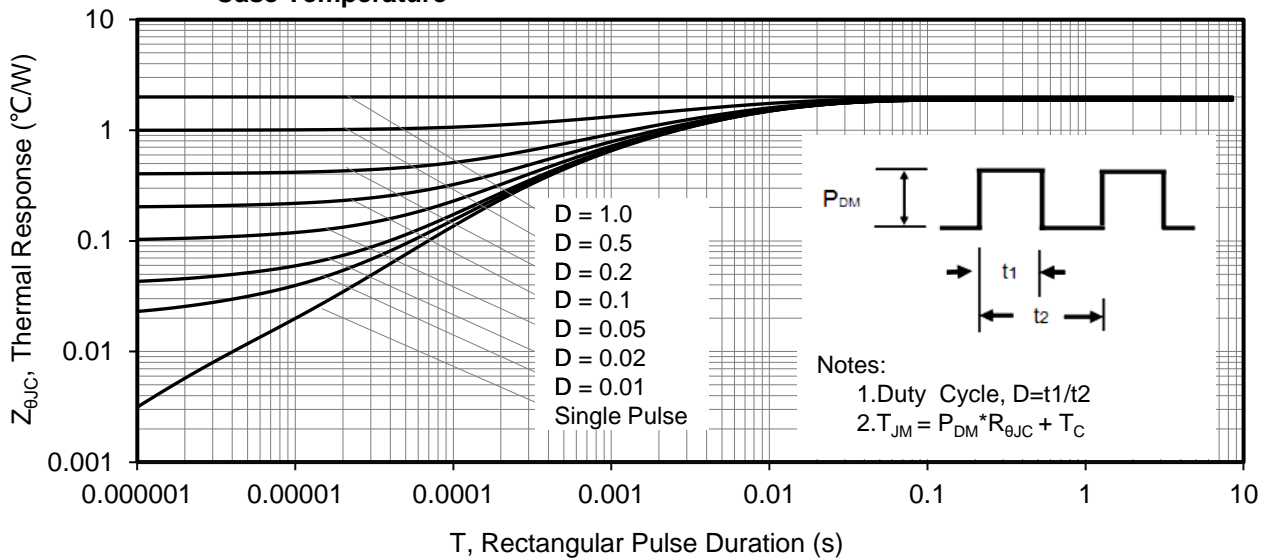


Figure 5. Maximum Effective Thermal Impedance, Junction to Case



MDD50N06D

60V N-Channel Enhancement Mode MOSFET

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

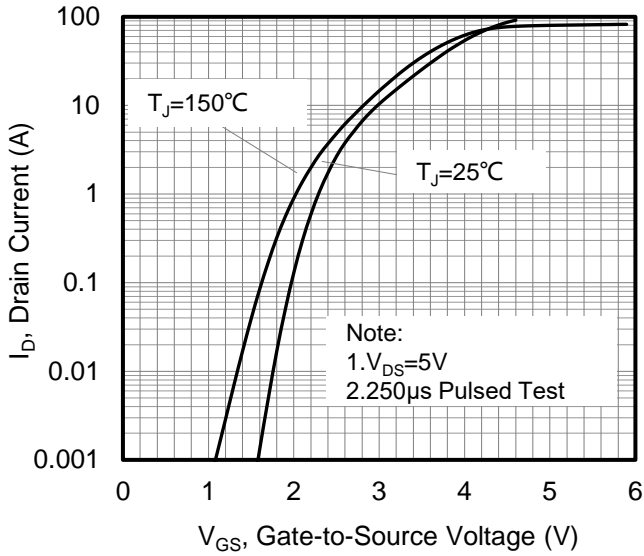


Figure 6. Typical Transfer Characteristics

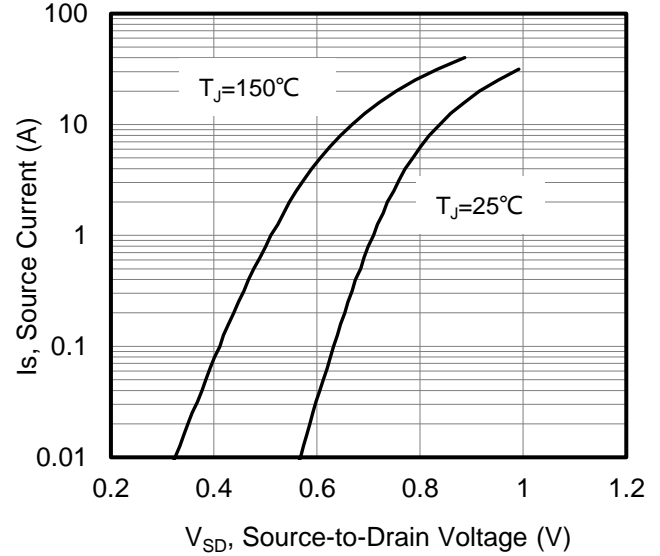


Figure 7. Typical Body Diode Transfer Characteristics

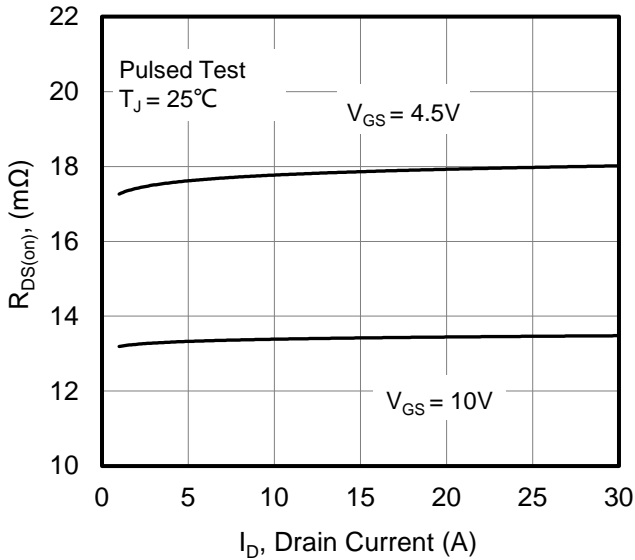


Figure 8. Drain-to-Source On Resistance vs Drain Current

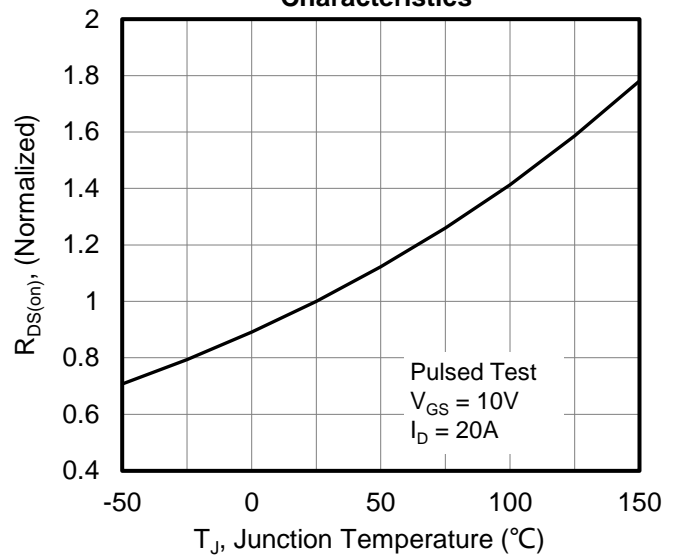


Figure 9. Normalized On Resistance vs Junction Temperature

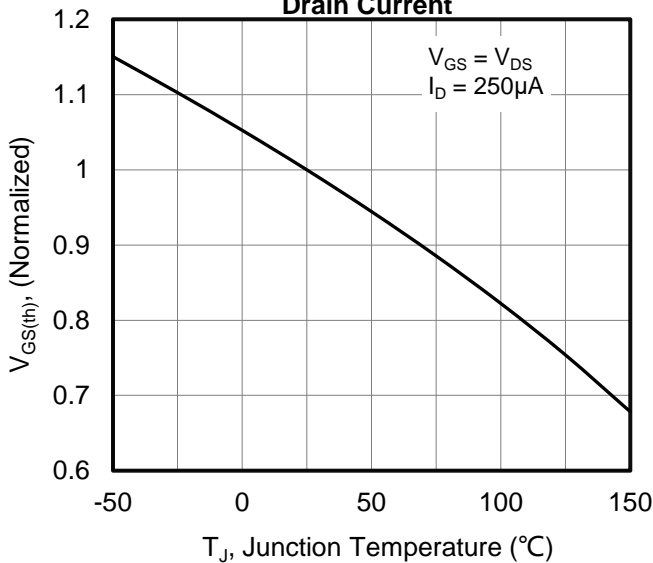


Figure 10. Normalized Threshold Voltage vs Junction Temperature

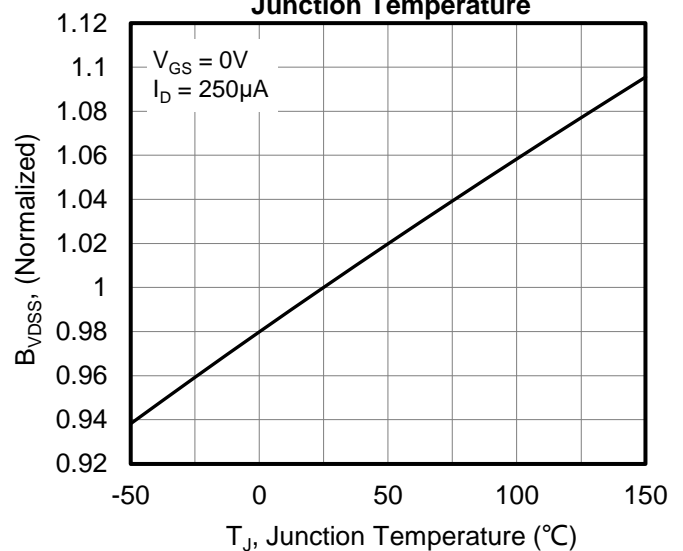


Figure 11. Normalized Breakdown Voltage vs Junction Temperature



MDD50N06D

60V N-Channel Enhancement Mode MOSFET

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

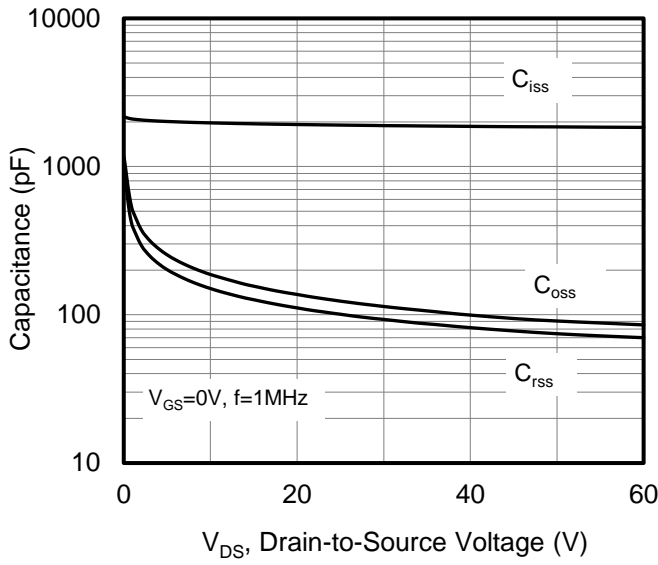


Figure 12. Capacitance Characteristics

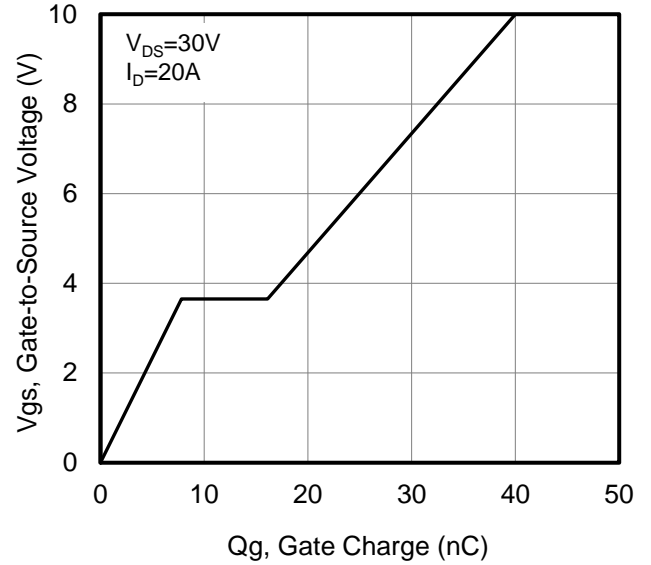


Figure 13. Typical Gate Charge vs Gate to Source Voltage

Figure A: Gate Charge Test Circuit and Waveform

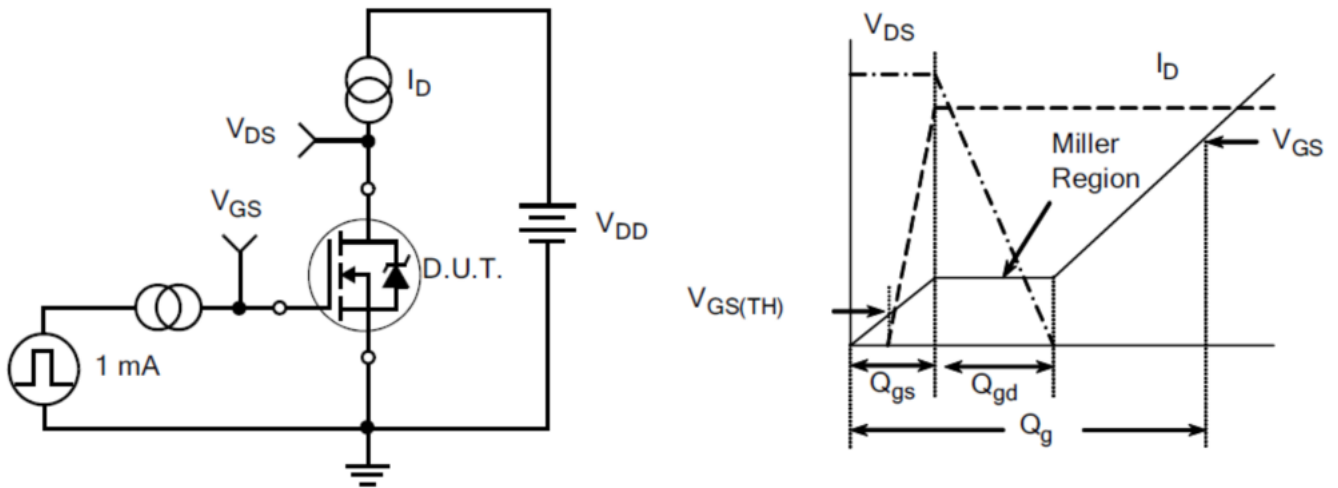


Figure B: Resistive Switching Test Circuit and Waveform

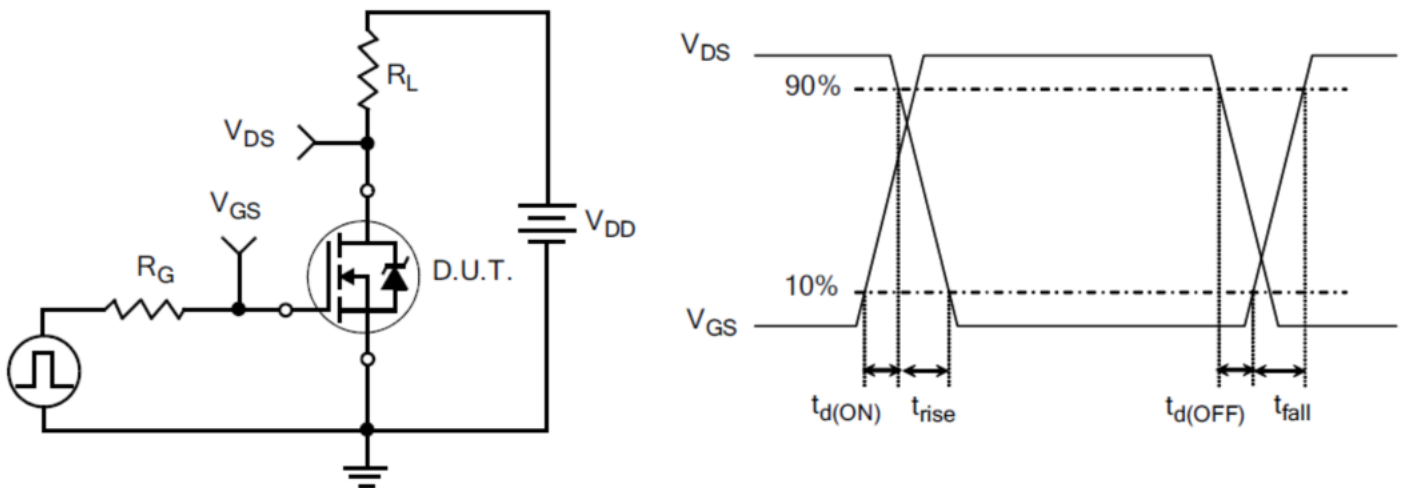
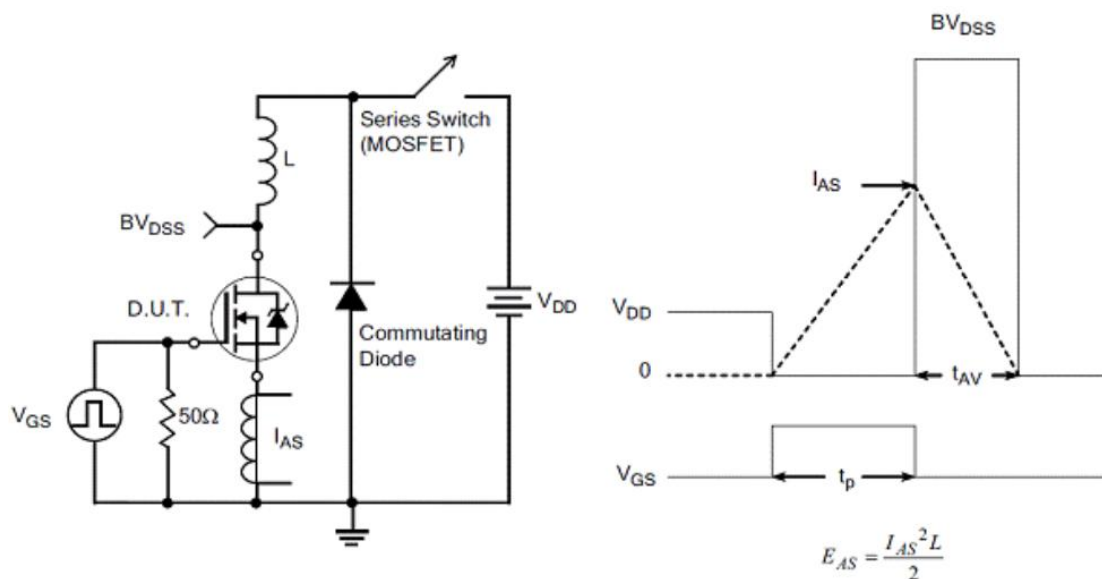
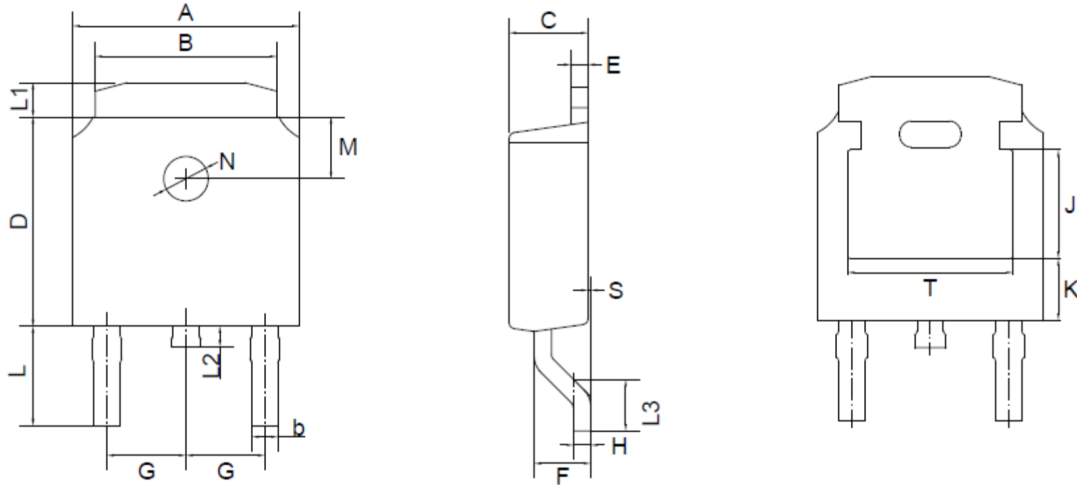


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



Outline Drawing

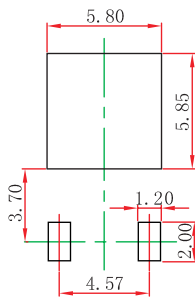
TO-252 Package Outline Dimensions



TO-252(D-PAK) mechanical data

UNIT		A	B	b	C	D	E	F	G	H	L	L1	L2	L3	S	M	N	J	K	T
mm	max	6.7	5.5	0.8	2.5	6.3	0.6	1.8	2.29 TYPICAL	0.55	3.1	1.2	1.0	1.75	0.1	1.8 TYPICAL	1.3 TYPICAL	3.16 ref.	1.80 ref.	4.83 ref.
	min	6.3	5.1	0.3	2.1	5.9	0.4	1.3		0.45	2.7	0.8	0.6	1.40	0.0					
mil	max	264	217	31	98	248	24	71	90 TYPICAL	22	122	47	39	69	4	71 TYPICAL	51 TYPICAL	124 ref.	71 ref.	190 ref.
	min	248	201	12	83	232	16	51		18	106	31	24	55	0					

Suggested Pad Layout



Note:

1. Controlling dimension: in/millimeters.
2. General tolerance: ± 0.05 mm.
3. The pad layout is for reference purposes only.

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