

Features

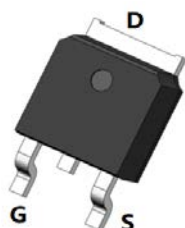
- High Blocking Voltage with Low On- Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

Applications

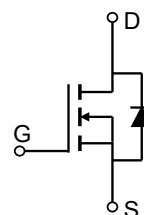
- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers

Product Summary

Parameters	Value	Unit
V_{DS}	850	V
$V_{GS(th) Typ}$	3.6	V
$I_D(@V_{GS}=15V)$	12	A
$R_{DS(ON)_{Max}}(@V_{GS}=18V)$	380	mΩ
$R_{DS(ON)_{Typ}}(@V_{GS}=15V)$	360	mΩ



TO-252-3L(DPAK) Top View



Schematic Diagram

Ordering Information

Device	Marking	MSL	Form	Package	Reel Size	Reel(pcs)	Per Carton (pcs)
HMM11TN80K		3	Tape&Reel	TO-252-3L	13"	2500	25000

Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter		Value	Unit
V _{DS}	Drain-to-Source Voltage		850	V
V _{GS}	Gate-to-Source Voltage		0/15	V
I _D	Continuous Drain Current	T _C = 25°C	12	A
		T _C = 175°C	9	
I _{DM}	Pulsed Drain Current ⁽¹⁾		Refer to Fig.4	A
E _{AS}	Single Pulsed Avalanche Energy ⁽²⁾		110	mJ
P _D	Power Dissipation	T _C = 25°C	53	W
		T _C = 175°C	21	
T _J , T _{STG}	Junction & Storage Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ⁽³⁾	36	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.4	

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 = 250μA, V _{GS} = 0V	850	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 850V, V _{GS} = 0V	-	-	1.0	μA
I _{GSS}	Gate-Body Leakage Current	V _{DS} = 0V, V _{GS} = ±15V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.4	3.2	4.5	V
R _{DS(ON)}	Static Drain-Source ON-Resistance ⁽⁴⁾	V _{GS} = 15V, I _D = 5A	-	380	580	mΩ
		V _{GS} = 18V, I _D = 5A	-	360	500	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 600V, f = 1MHz	-	170	-	pF
C _{oss}	Output Capacitance		-	32	-	pF
C _{rss}	Reverse Transfer Capacitance		-	2.7	-	pF
Q _g	Total Gate Charge	V _{GS} = 0 to 10V V _{DS} = 600V, I _D = 10A	-	9.2	-	nC
Q _{gs}	Gate Source Charge		-	3.5	-	nC
Q _{gd}	Gate Drain("Miller") Charge		-	1.6	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On DelayTime	V _{GS} = 10V, V _{DD} = 400V I _D = 10A, R _{GEN} = 3Ω	-	162	-	ns
t _r	Turn-On Rise Time		-	60	-	ns
t _{d(off)}	Turn-Off DelayTime		-	252	-	ns
t _f	Turn-Off Fall Time		-	37	-	ns
Drain-Source Diode Characteristics						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	20	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	160	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = 10A	-	-	3.8	V
trr	Body Diode Reverse Recovery Time	I _F = 20A, di/dt = 100A/us	-	11	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	2.3	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting $T_J = 25^\circ\text{C}$, $V_{DD} = 50\text{V}$, $V_G = 10\text{V}$, $R_G = 25\text{ohm}$, $L = 0.5\text{mH}$, $I_{AS} = 18\text{A}$
 3. $R_{\theta JA}$ is measured with the device mounted on a 1inch^2 pad of 2oz copper FR4 PCB
 4. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$.

Typical Performance Characteristics

Figure 1: Maximum Power Dissipation Derating vs. Case Temperature

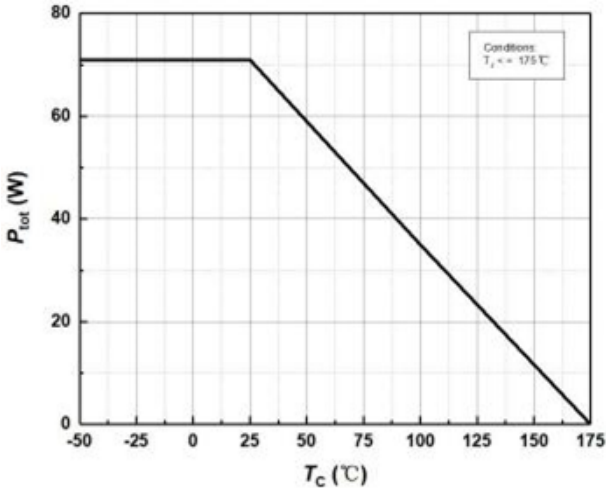


Figure 2: Continuous Drain Current Derating vs Case Temperature

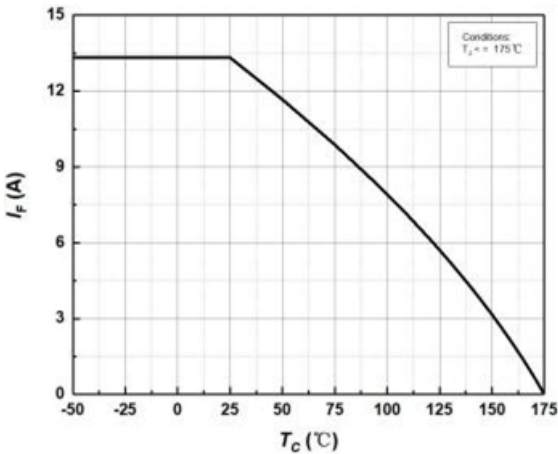


Figure 3: Normalized Maximum Transient Thermal Impedance

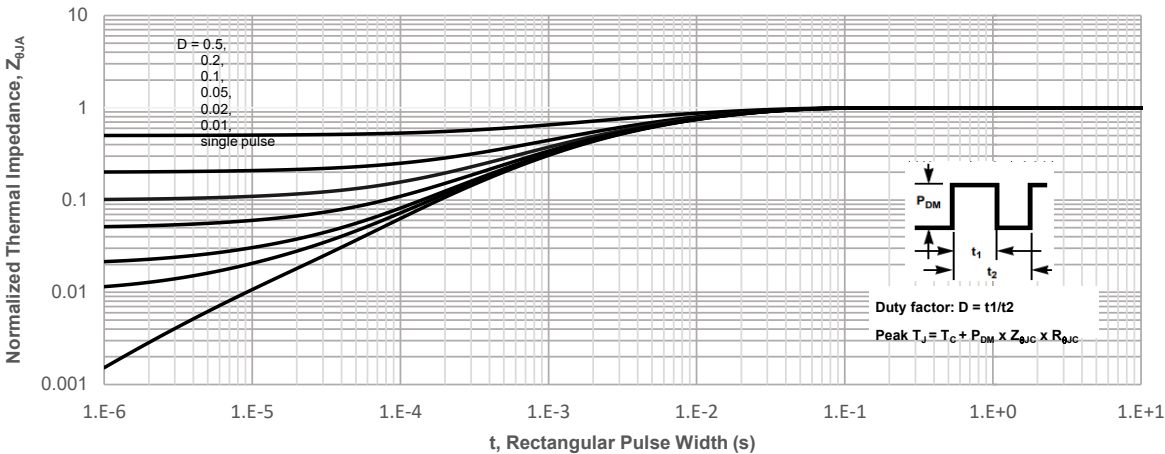
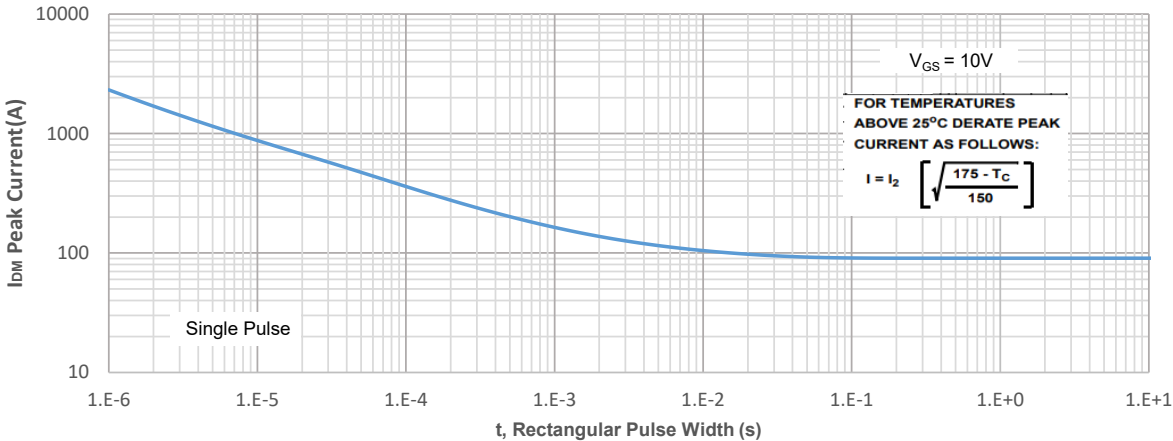


Figure 4: Peak Current Capacity



Typical Performance Characteristics

Figure 5: Output Characteristics

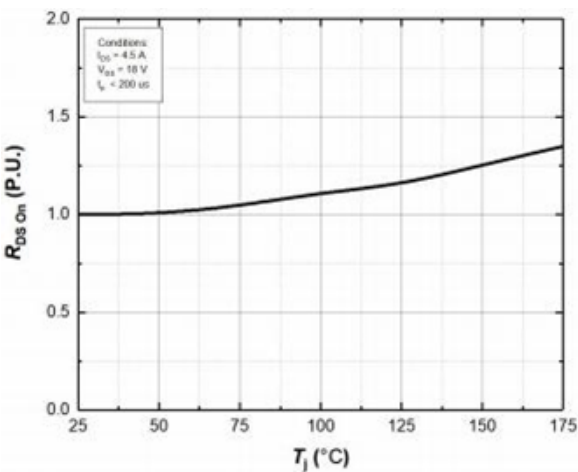
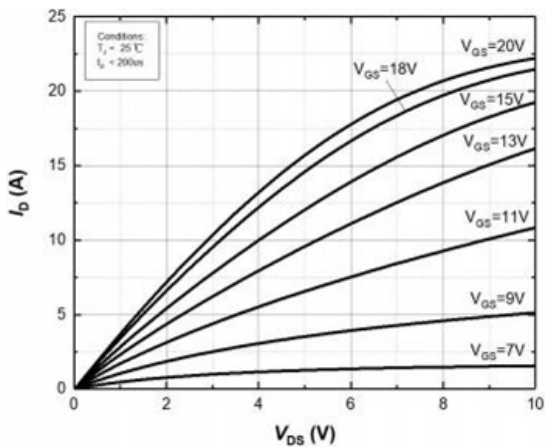


Figure 7: Body Diode Characteristics at $T_J=25^\circ\text{C}$

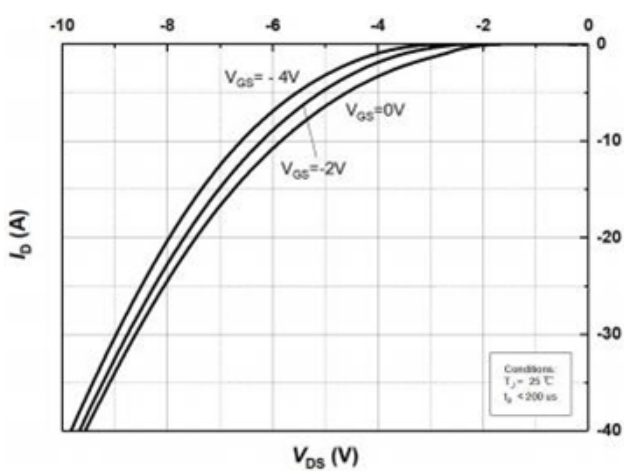


Figure 8: Body Diode Characteristics at $T_J=175^\circ\text{C}$

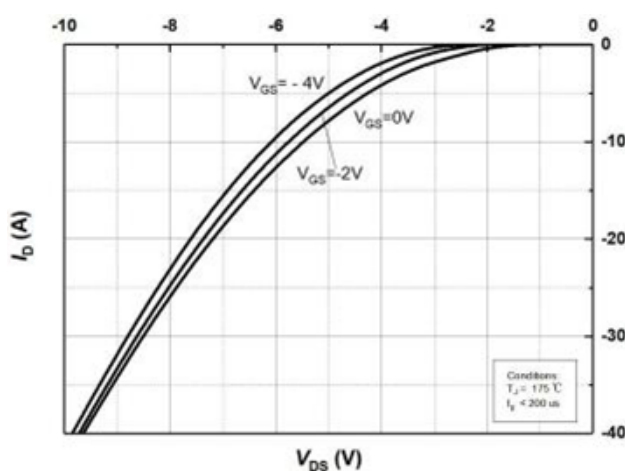


Figure 9: Gate Charge Characteristics

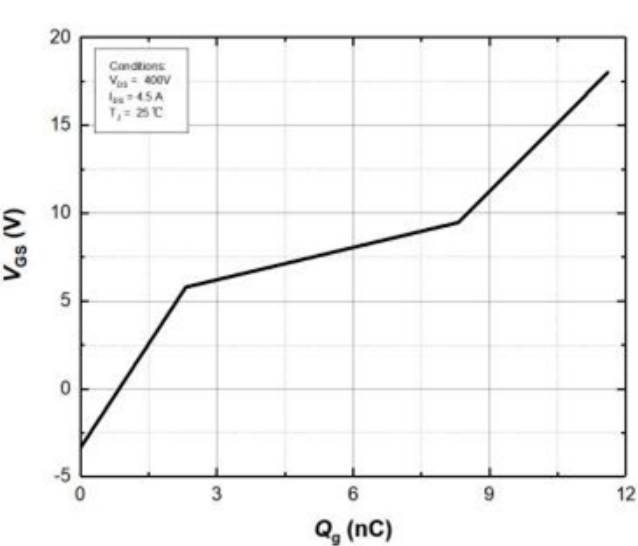
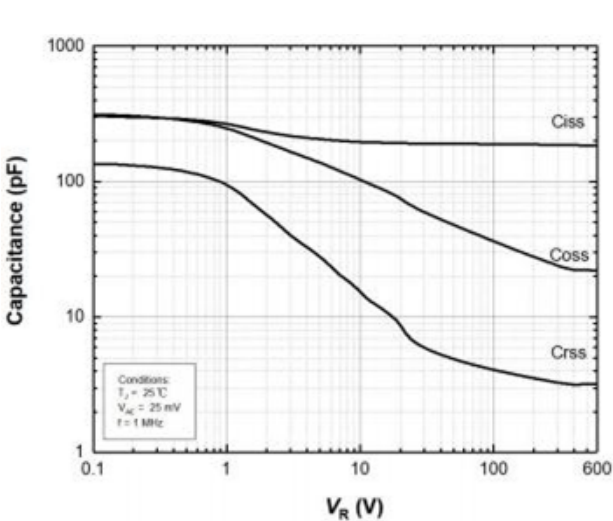


Figure 10: Capacitance Characteristics



Typical Performance Characteristics

Figure 11: Normalized On-Resistance vs. Temperature

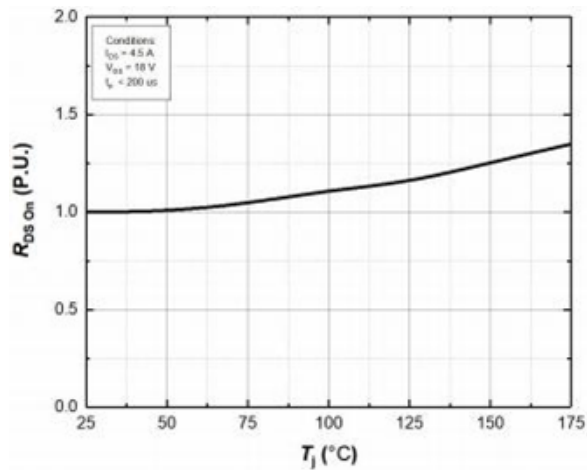


Figure 12: On-Resistance vs. Drain current for Various Temperature

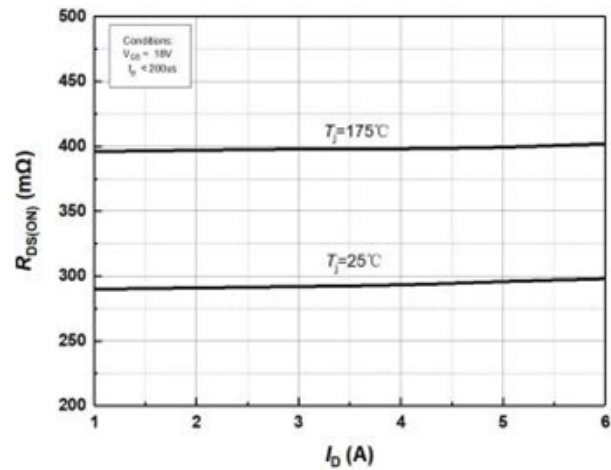
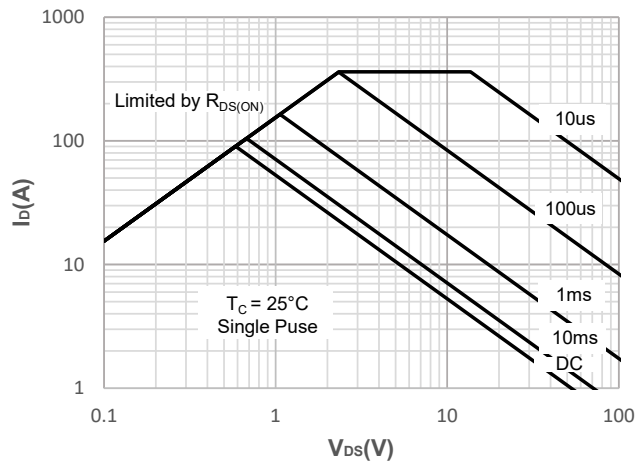


Figure 14: Maximum Safe Operating Area



Test Circuit

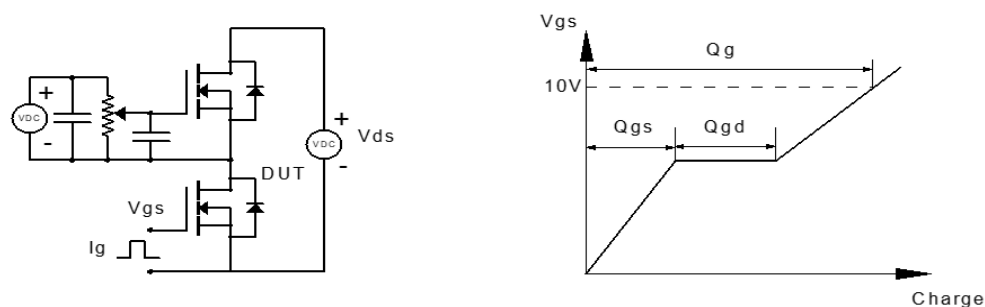


Figure 1: Gate Charge Test Circuit & Waveform

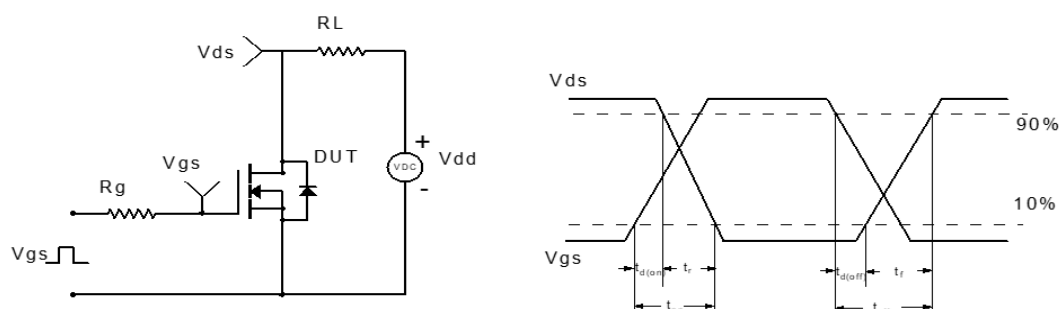


Figure 2: Resistive Switching Test Circuit & Waveform

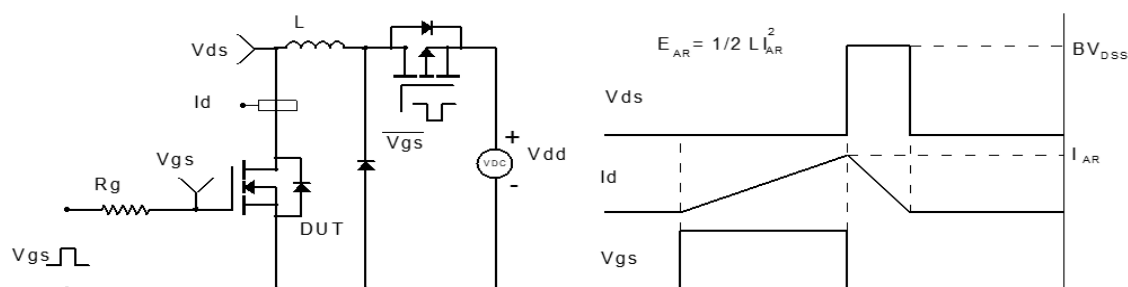


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

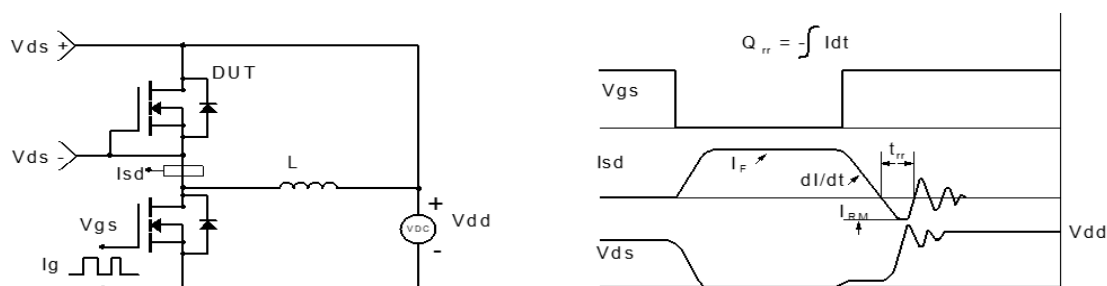


Figure 4: Diode Recovery Test Circuit & Waveform

Test Circuit

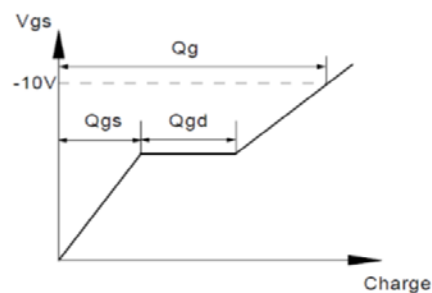
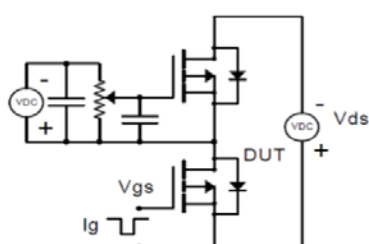


Figure 1: Gate Charge Test Circuit & Waveform

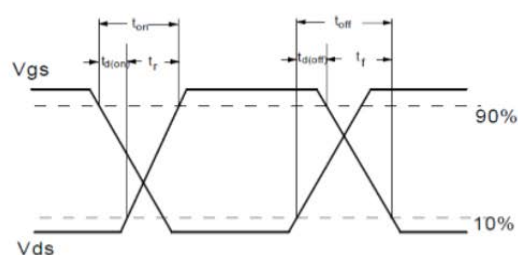
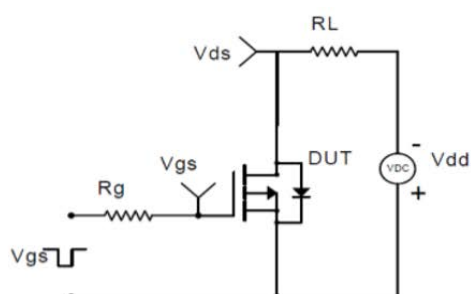


Figure 2: Resistive Switching Test Circuit & Waveform

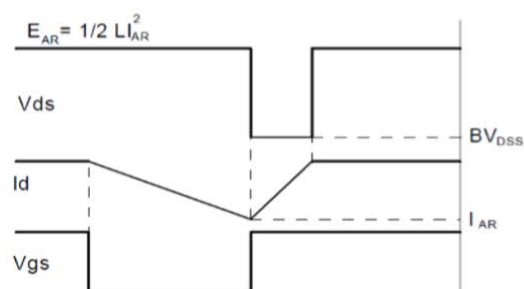
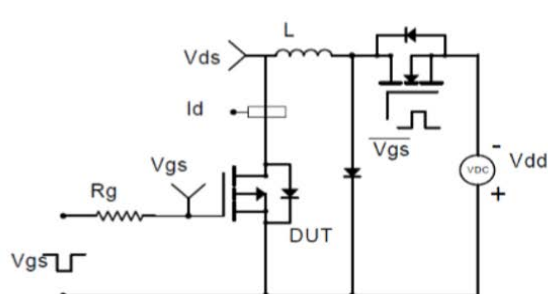


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

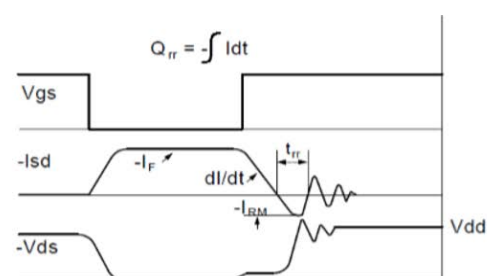
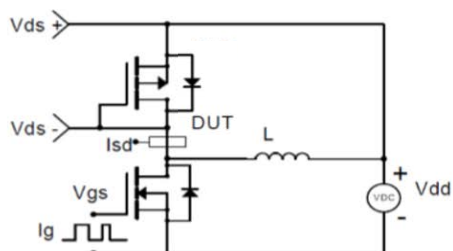
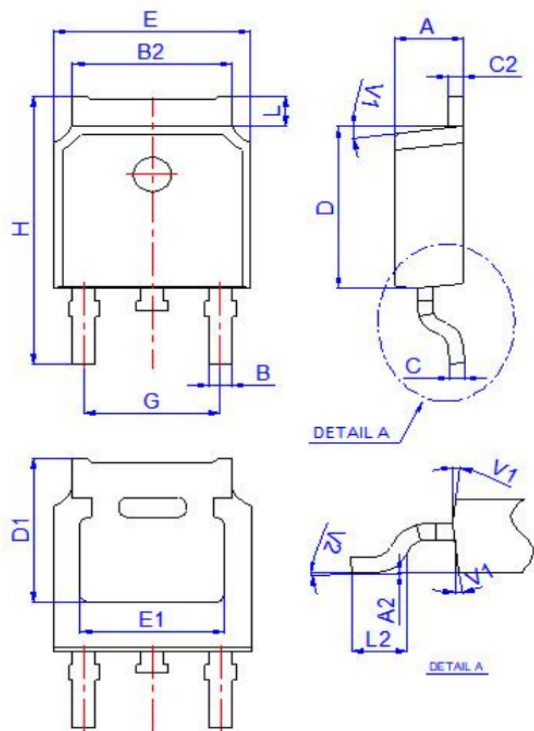


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(TO-252-3L)



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°