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

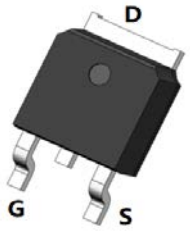
- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers

Product Summary

Parameters	Value	Unit
V_{DSS}	850	V
$V_{GS(th)\_Typ}$	3.6	V
I_D(@V_{GS}=15V)	20	A
$R_{DS(ON)\_Max}$(@V_{GS}=18V	180	mΩ
$R_{DS(ON)\_Typ}$(@V_{GS}=15V	160	mΩ

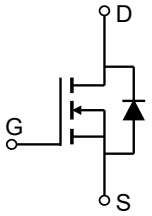
RoHS

Lead-free Green



TO-252-3L(DPAK) Top View

Marking and Pin Assignment



Schematic Diagram

Ordering Information

Device	Marking	MSL	Form	Package	Reel Size	Reel(pcs)	Per Carton (pcs)
HMM20TN80K		3	Tape&Reel	TO-252-3L	13"	2500	25000

Absolute Maximum Ratings (@ T_C = 25°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	20	A
		T_C = 175°C	12	
I_{DM}	Pulsed Drain Current (1)		Refer to Fig.4	A
E_{AS}	Single Pulsed Avalanche Energy (2)		220	mJ
P_D	Power Dissipation	T_C = 25°C	123	W
		T_C = 175°C	91	
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 175	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient(3)	36	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.1	

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	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 = 10A	-	180	230	mΩ
		V_{GS} = 18V, I_D = 10A	-	160	200	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 400V, f = 1MHz	-	1400	-	pF
C_{oss}	Output Capacitance		-	120	-	pF
C_{rss}	Reverse Transfer Capacitance		-	21	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 15V, I_D = 20A	-	12	-	nC
Q_{gs}	Gate Source Charge		-	8	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	5.8	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 400V I_D= 20A, 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 =20A	-	-	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=25C, V_{DD}=50V, V_G=10V, R_G=25ohm, L=0.5mH, I_{AS}=25A
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≤300μs, Duty Cycle≤0.5%.

Typical Performance Characteristics

Figure 1: Maximum Power Dissipation Derating vs. Case Temperature

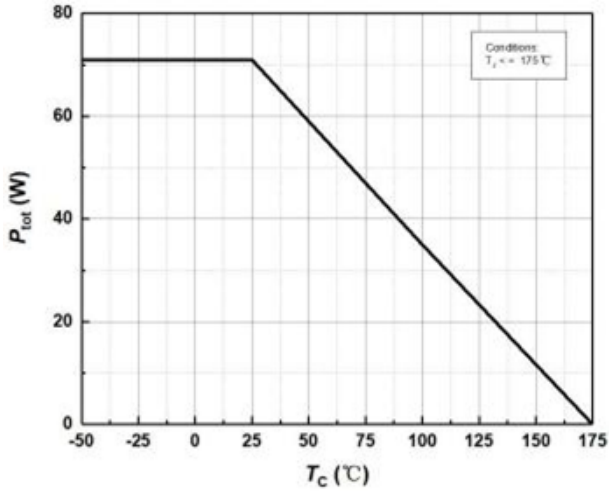


Figure 2: Continuous Drain Current Derating vs Case Temperature

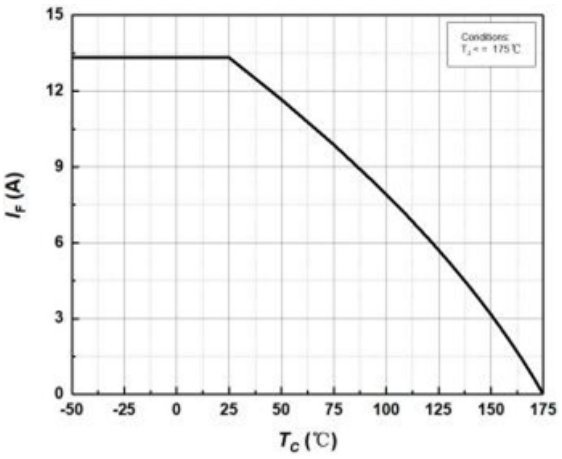


Figure 3: Normalized Maximum Transient Thermal Impedance

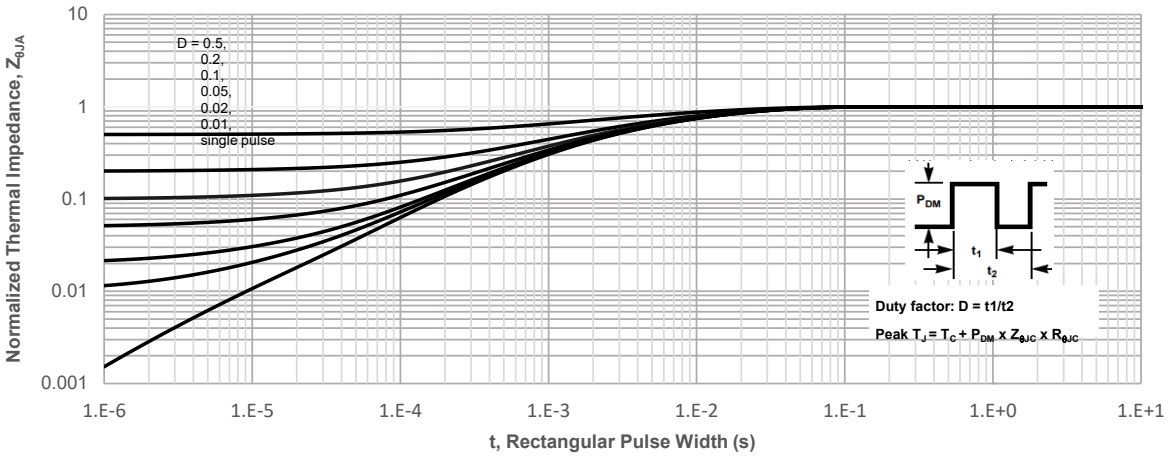
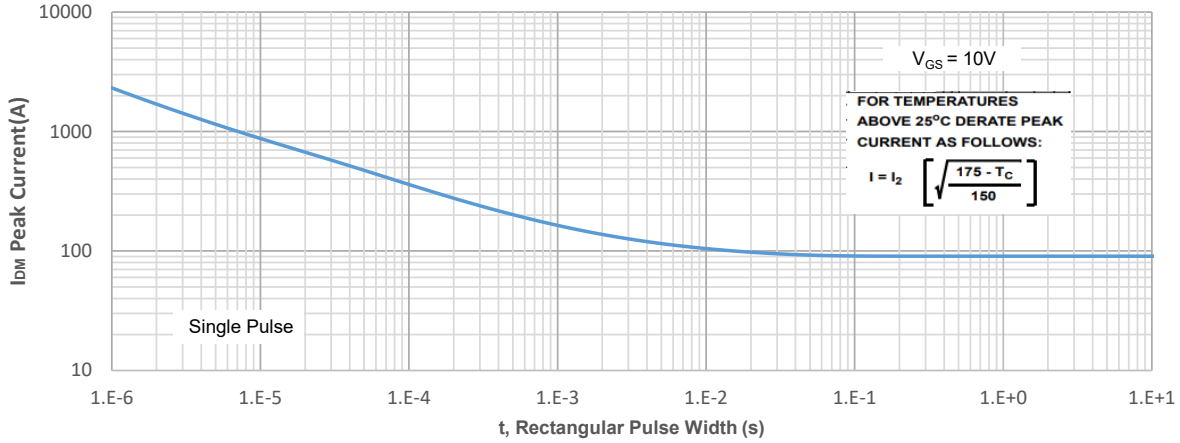
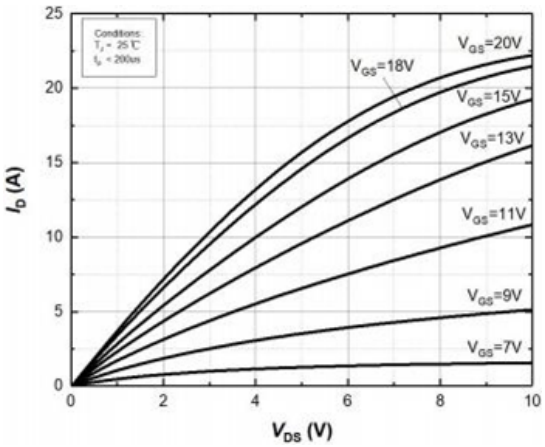


Figure 4: Peak Current Capacity



Typical Performance Characteristics

Figure 5: Output Characteristics



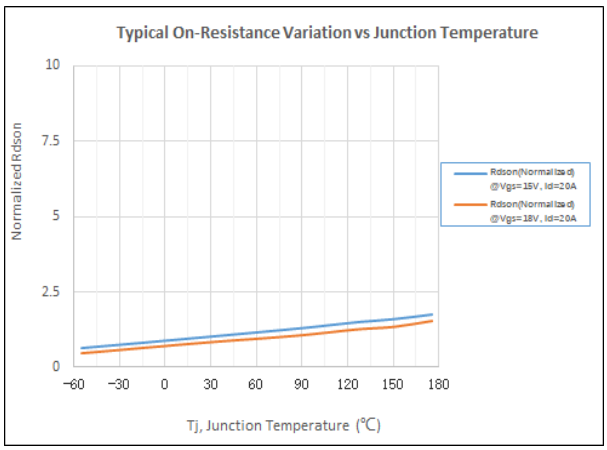


Figure 7: Body Diode Characteristics at Tj=25°C

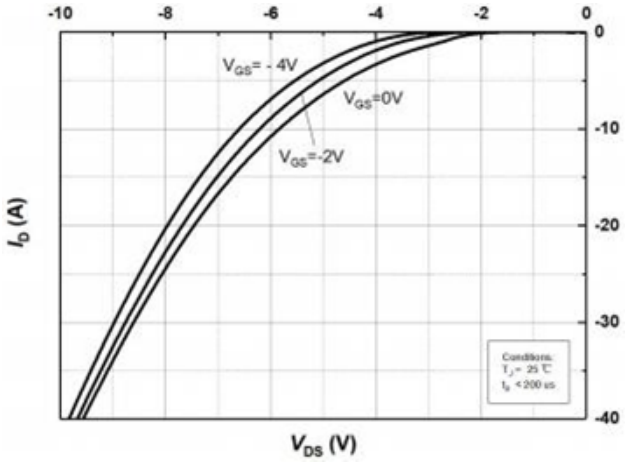


Figure 8: Body Diode Characteristics at Tj=175°C

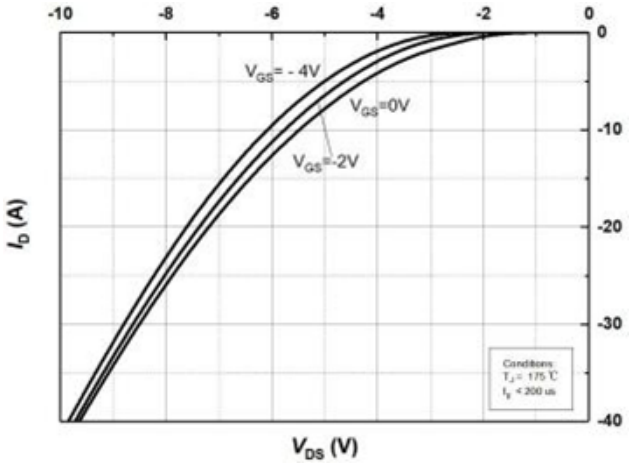


Figure 9: Gate Charge Characteristics

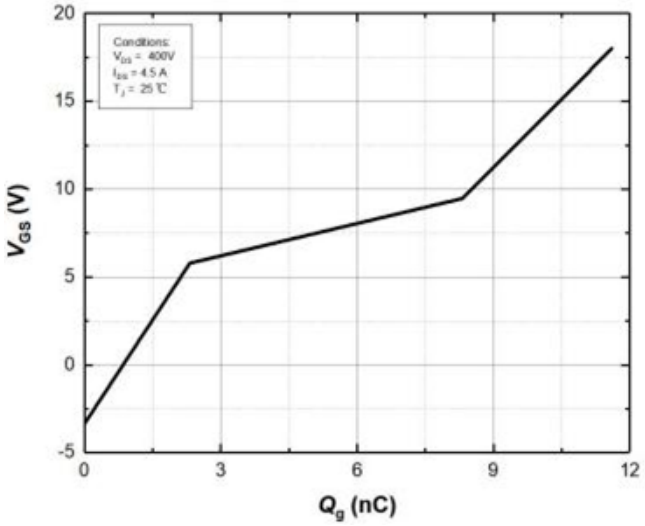
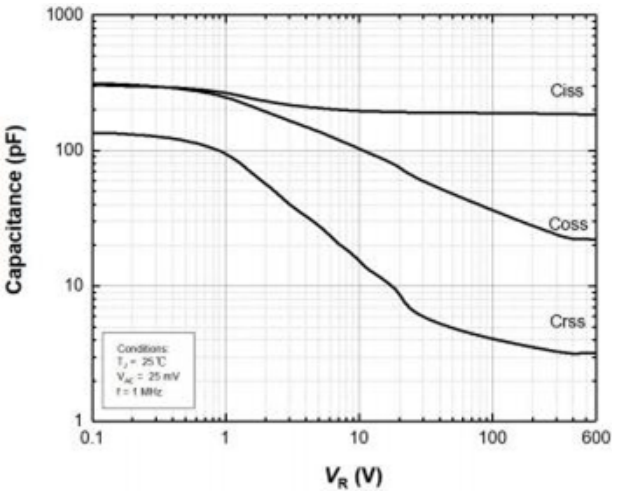


Figure 10: Capacitance Characteristics



Typical Performance Characteristics

Figure 11: Normalized On-Resistance vs. Temperature

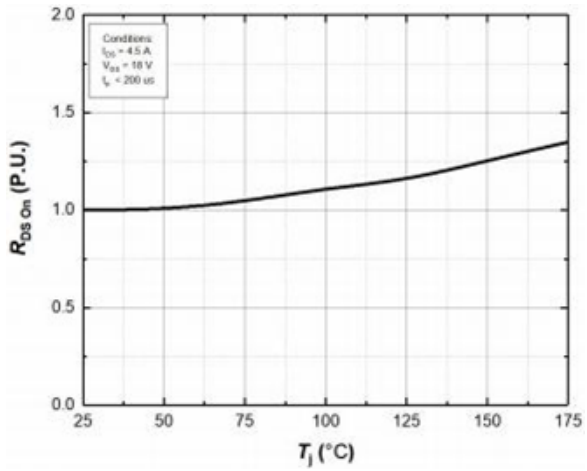


Figure 12: On-Resistance vs. Drain current for Various Temperatur

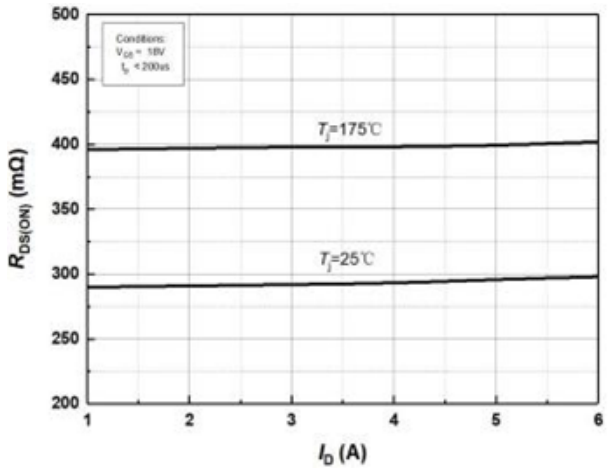
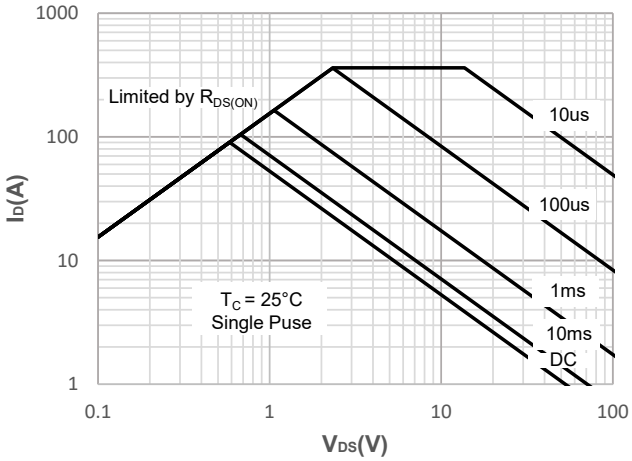


Figure 14: Maximum Safe Operating Area



Test Circuit

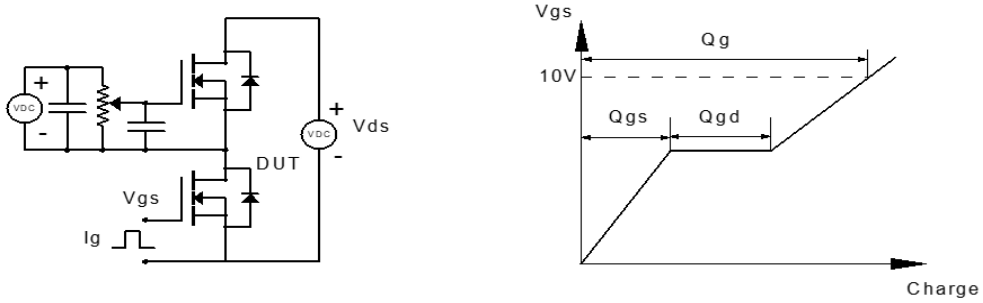


Figure 1: Gate Charge Test Circuit & Waveform

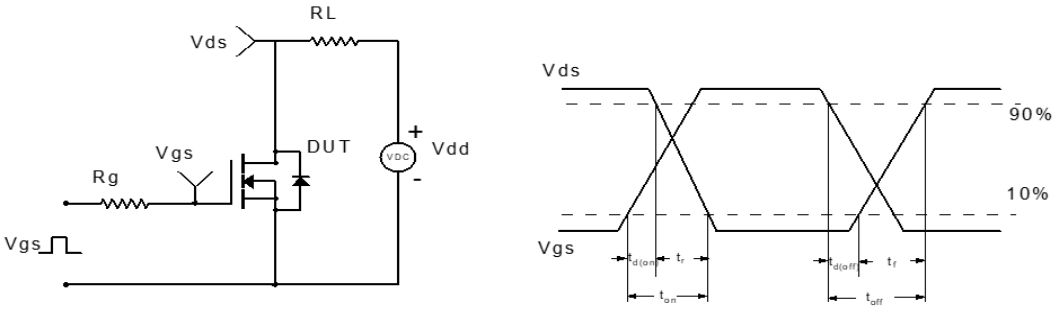


Figure 2: Resistive Switching Test Circuit & Waveform

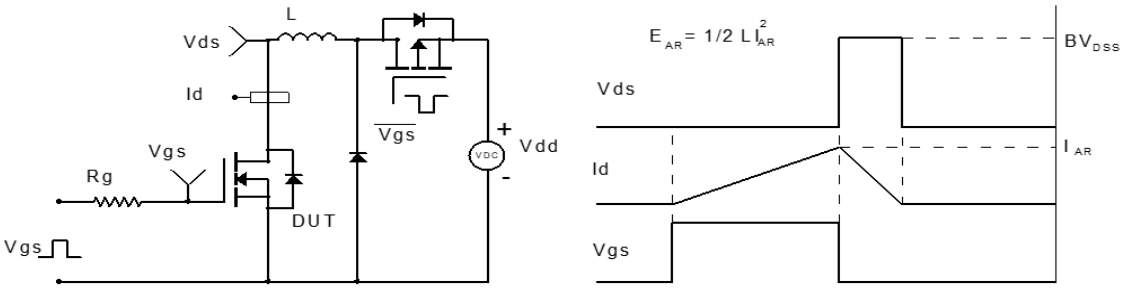


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

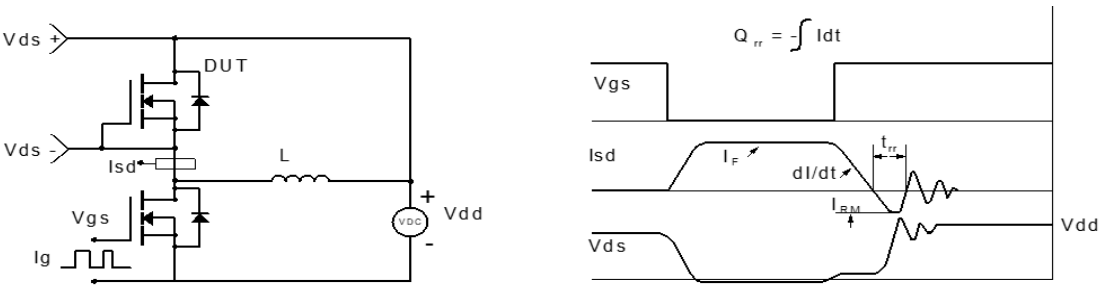
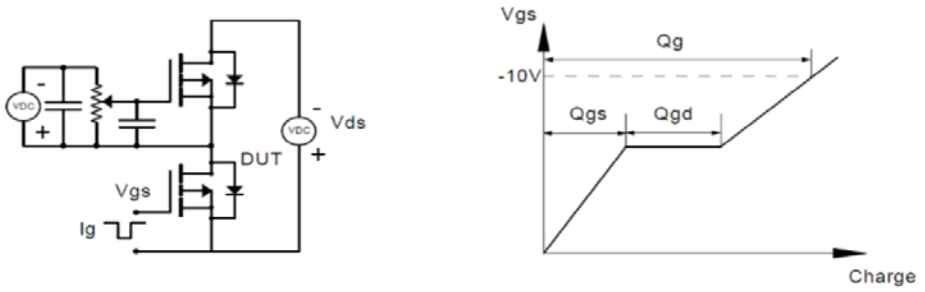


Figure 4: Diode Recovery Test Circuit & Waveform

Test Circuit



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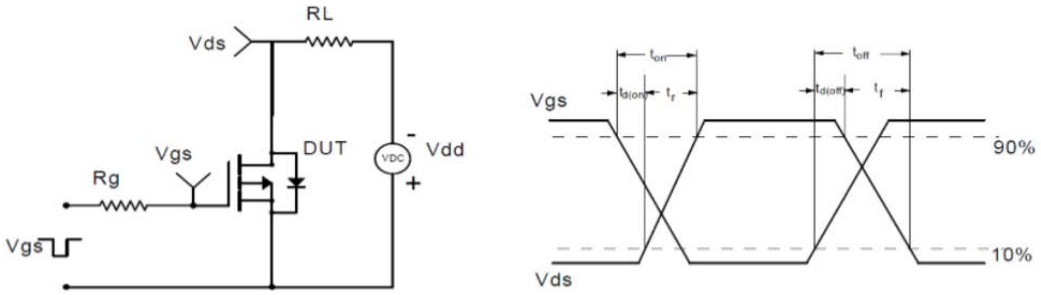


Figure 2: Resistive Switching Test Circuit & Waveform

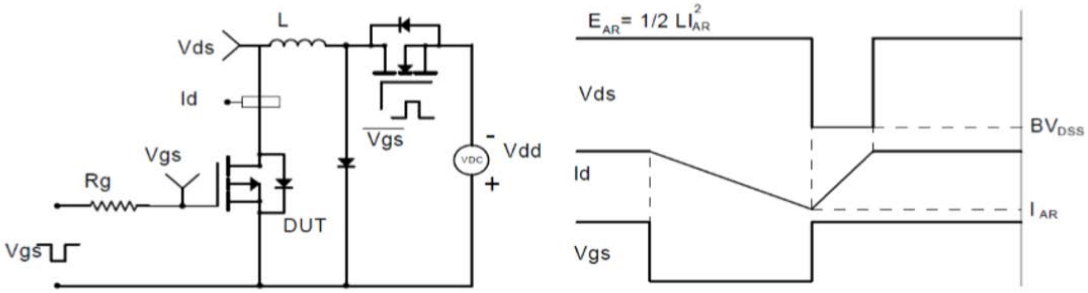


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

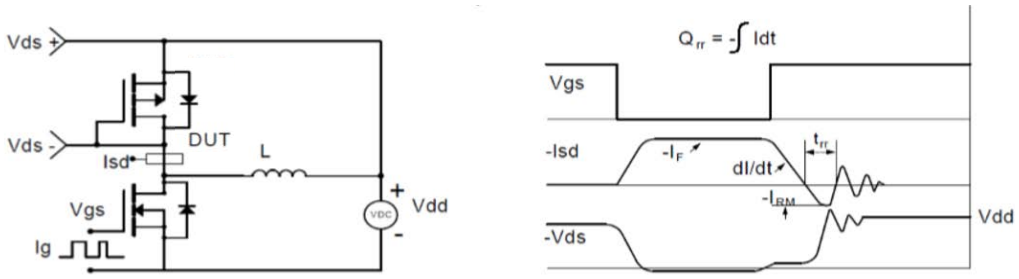
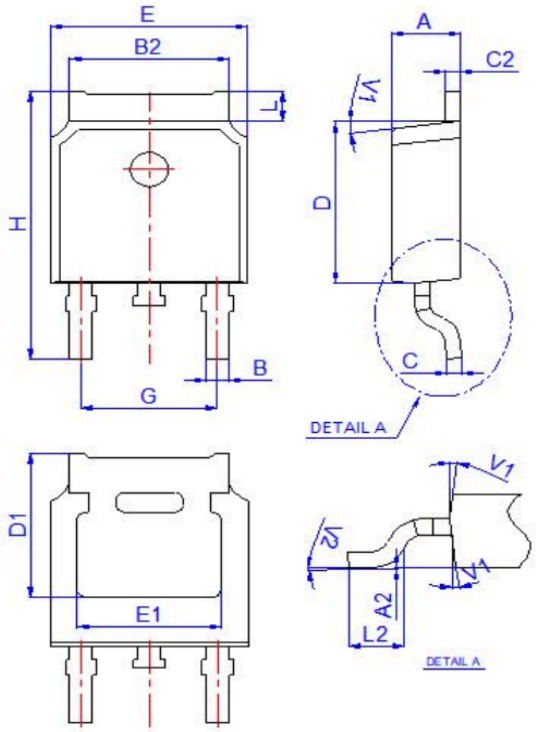


Figure 4: Diode Recovery Test Circuit & Waveform

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°