

110V, 342A, 2.1mΩ N-channel Power SGT MOSFET

JMSH11025E1LQ

Features

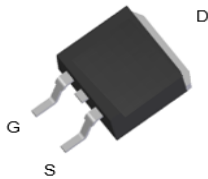
- Ultra-low ON-resistance, $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested
- 100% ΔV_{ds} Tested
- Halogen-free; RoHS-compliant
- AEC-Q101 Qualified

Applications

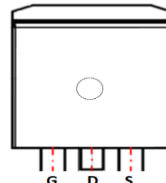
- Load Switch
- PWM Application
- General Automotive Application

Product Summary

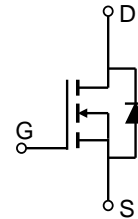
Parameters	Value	Unit
V_{DSS}	110	V
$V_{GS(th_Typ)}$	2.5	V
$I_D(@V_{GS}=10V)$	342	A
$R_{DS(ON_Typ)}(@V_{GS}=10V)$	2.1	mΩ



TO-263 -3L



Pin Assignment



Schematic Diagram

Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMSH11025E1LQ-13	SH110251LQ	1	Tape&Reel	TO-263-3L	800	4000

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-to-Source Voltage	110	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	342
		$T_C = 100^\circ\text{C}$	242
I_{DM}	Pulsed Drain Current ⁽¹⁾	Refer to Fig.4	A
E_{AS}	Single Pulsed Avalanche Energy ⁽²⁾	1912	mJ
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$	600
		$T_C = 100^\circ\text{C}$	300
T_J, T_{STG}	Junction & Storage Temperature Range	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ⁽³⁾	32	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.25	

**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	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	110	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 88\text{V}$, $V_{GS} = 0\text{V}$	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	2.0	2.5	3.5	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance ⁽⁴⁾	$V_{GS} = 10\text{V}$, $I_D = 20\text{A}$	-	2.1	2.5	m Ω
Dynamic Characteristics						
R_g	Gate Resistance	$f = 1\text{MHz}$	-	1.3	-	Ω
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$, $V_{DS} = 55\text{V}$, $f = 1\text{MHz}$	-	14569	19670	pF
C_{oss}	Output Capacitance		-	1916	2600	pF
C_{riss}	Reverse Transfer Capacitance		-	54	75	pF
Q_g	Total Gate Charge	$V_{GS} = 0$ to 10V $V_{DS} = 55\text{V}$, $I_D = 20\text{A}$	-	197	-	nC
Q_{gs}	Gate Source Charge		-	62	-	nC
Q_{gd}	Gate Drain ("Miller") Charge		-	33	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{V}$, $V_{DD} = 55\text{V}$ $I_D = 20\text{A}$, $R_{GEN} = 3\Omega$	-	37	-	ns
t_r	Turn-On Rise Time		-	40	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	103	-	ns
t_f	Turn-Off Fall Time		-	48	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	342	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	1368	A
V_{SD}	Body Diode Forward Voltage	$V_{GS} = 0\text{V}$, $I_S = 20\text{A}$	-		1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F = 20\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$	52	103	155	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	333	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting $T_J = 25^\circ\text{C}$, $V_{DD} = 55\text{V}$, $V_{GS} = 10\text{V}$, $R_G = 250\text{ohm}$, $L = 3\text{mH}$, $I_{AS} = 35.7\text{A}$, $V_{DD} = 0\text{V}$ during time in avalanche.
 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: Power De-rating

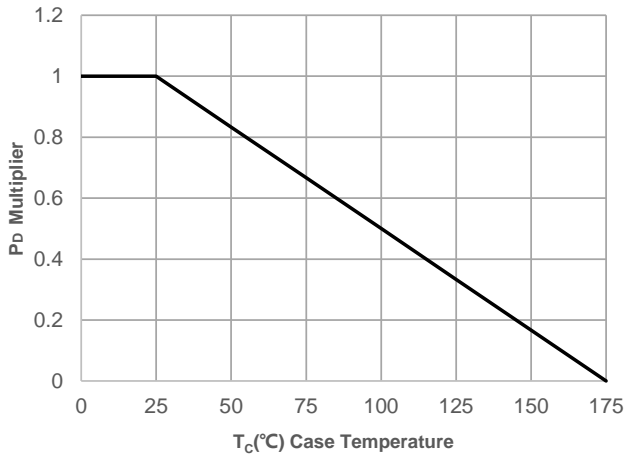


Figure 2: Current De-rating

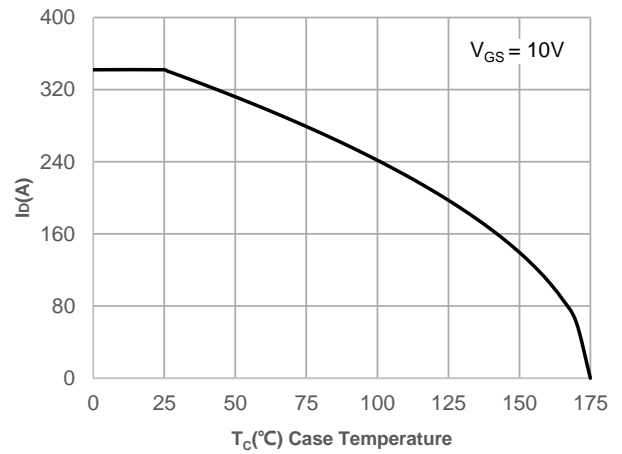


Figure 3: Normalized Maximum Transient Thermal Impedance

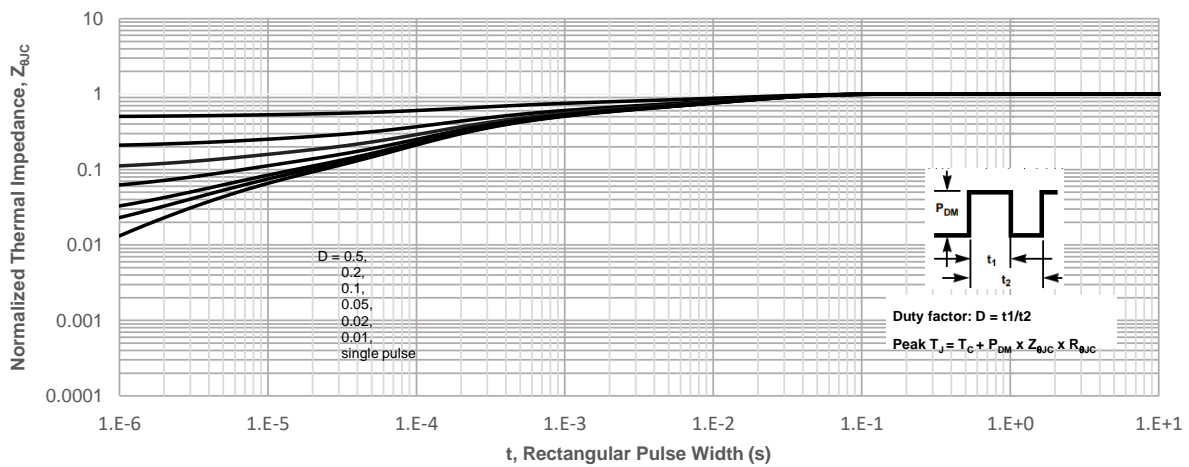
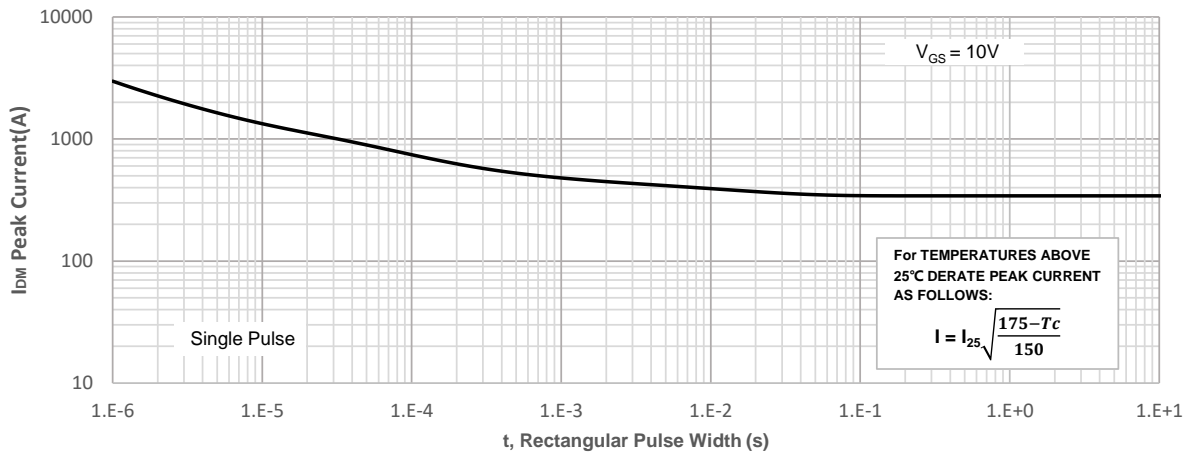


Figure 4: Peak Current Capacity



Typical Performance Characteristics

Figure 5: Output Characteristics

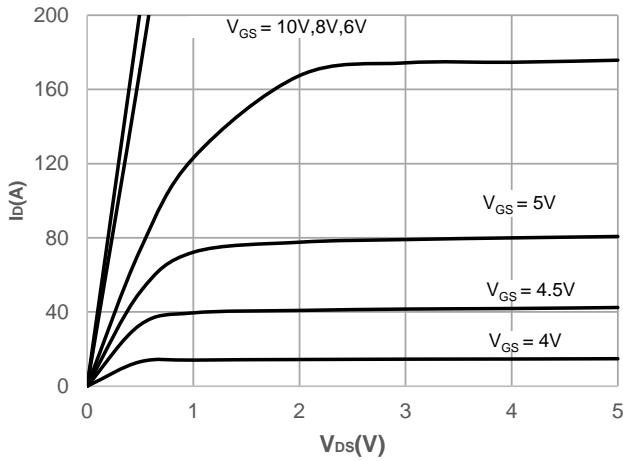


Figure 6: Typical Transfer Characteristics

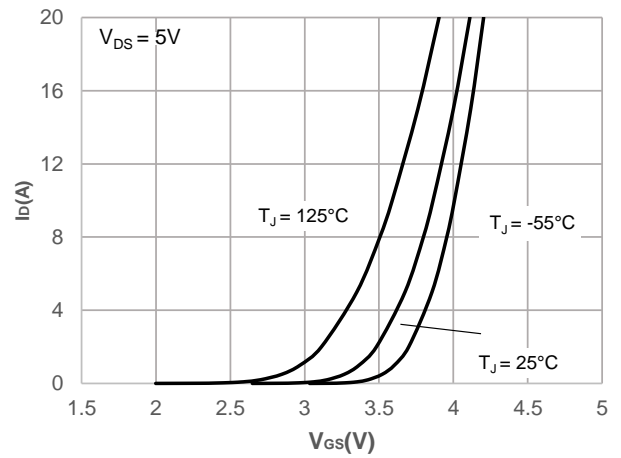


Figure 7: On-resistance vs. Drain Current

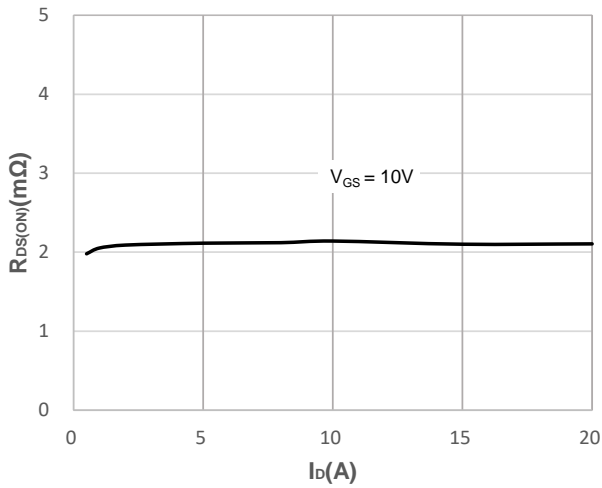


Figure 8: Body Diode Characteristics

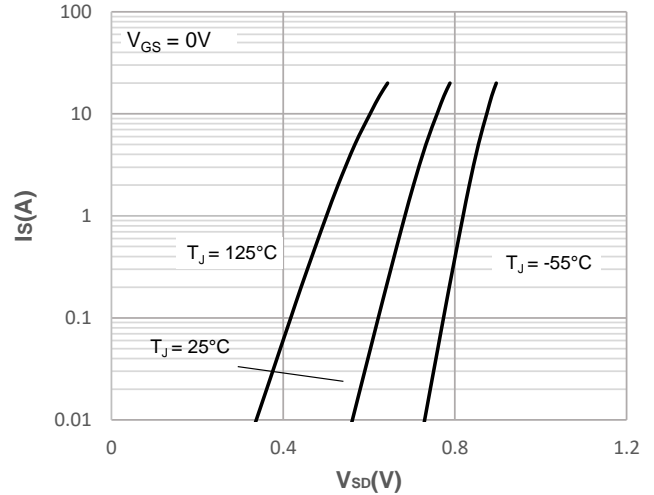


Figure 9: Gate Charge Characteristics

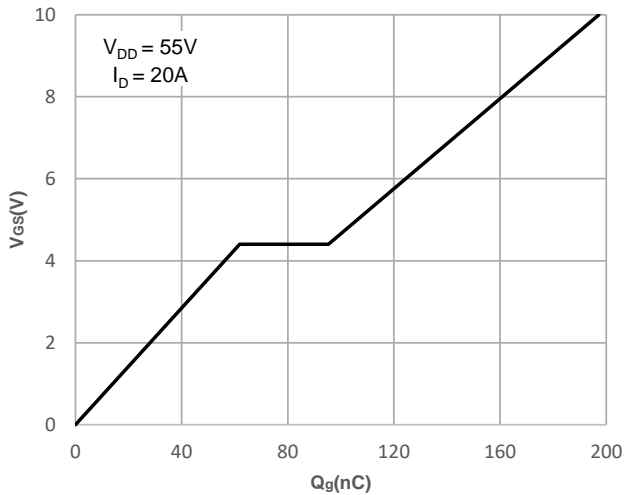
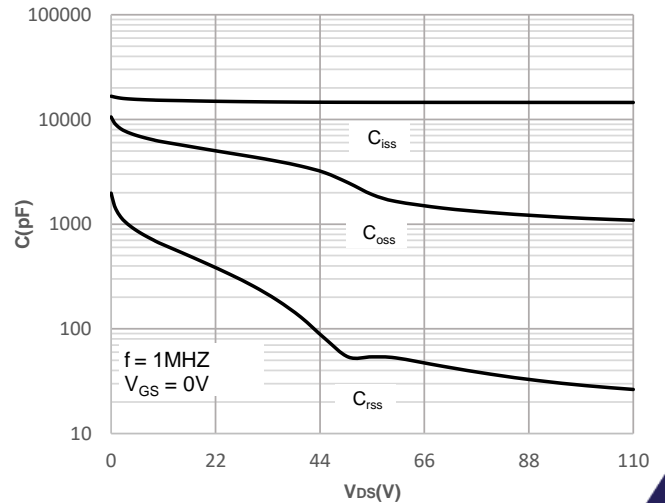


Figure 10: Capacitance Characteristics



Typical Performance Characteristics

Figure 11: Normalized Breakdown Voltage vs. Junction Temperature

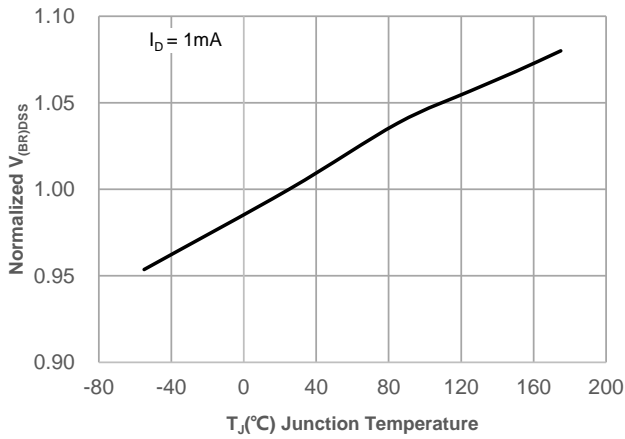


Figure 12: Normalized on Resistance vs. Junction Temperature

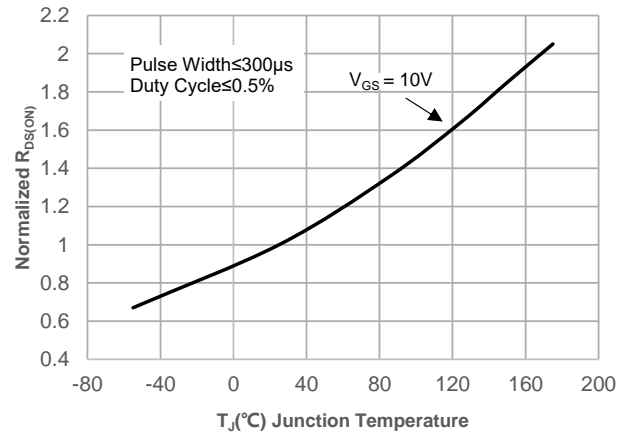


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

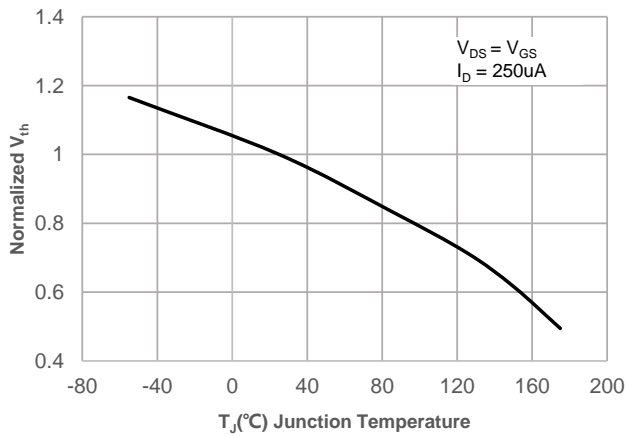


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

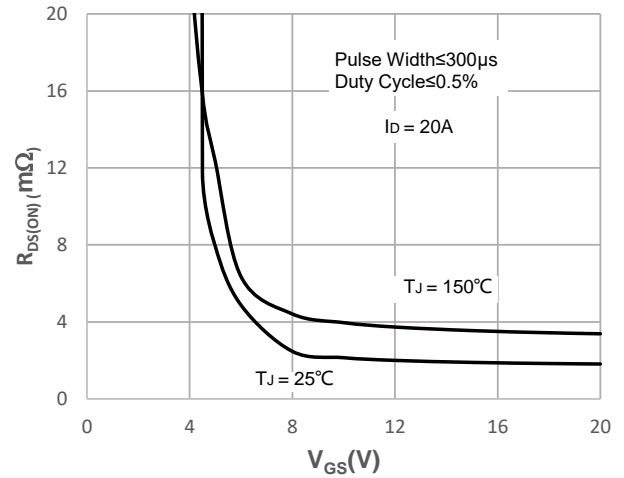
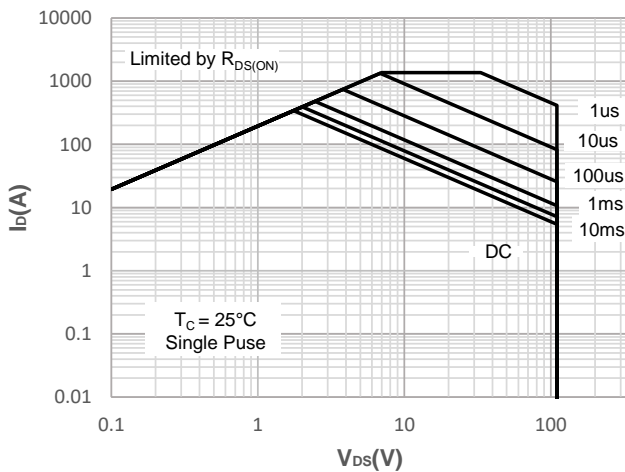


Figure 15: Maximum Safe Operating Area



Test Circuit

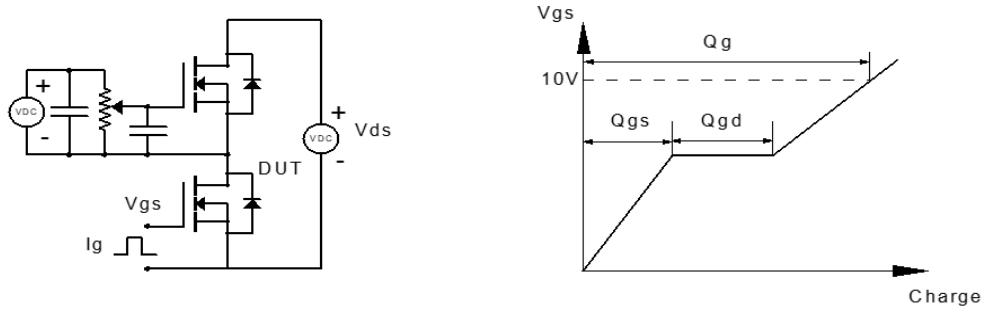


Figure 1: Gate Charge Test Circuit & Waveform

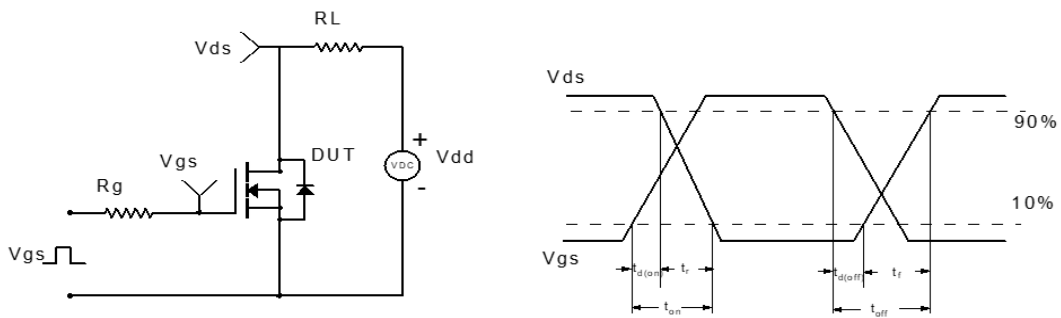


Figure 2: Resistive Switching Test Circuit & Waveform



Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

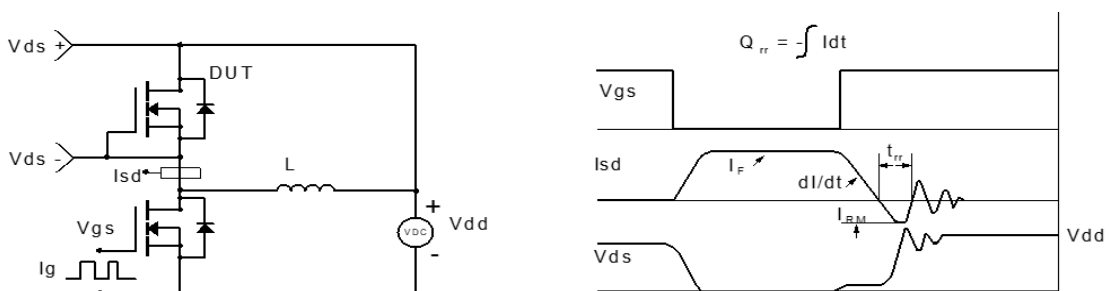
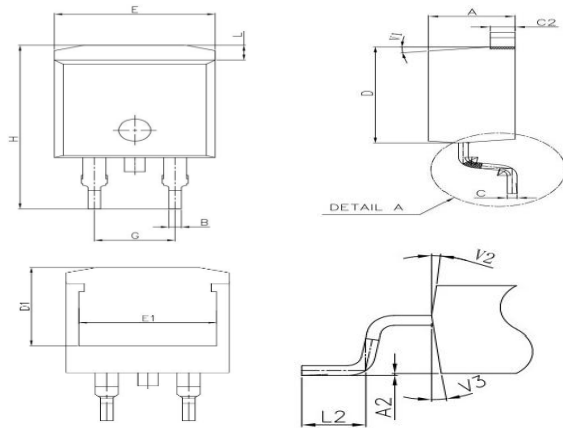


Figure 4: Diode Recovery Test Circuit & Waveform

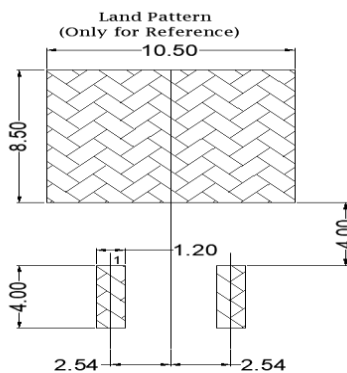




Package Mechanical Data(TO-263 -3L)



SYMBOL	DIMENSIONS		
	MIN	NOM	MAX
A	4.3	4.55	4.7
A2	0		0.15
B	0.75	0.8	0.85
C	0.38	0.46	0.55
C2	1.25	1.3	1.35
D	8.9	9.3	9.6
D1	7.4	7.65	7.9
E	9.9	10.05	10.21
E1	8.3	8.6	8.9
G	5.03	5.08	5.13
H	14.7	15	15.8
L2	2.2	2.35	2.5
L	1.16	1.36	1.61
V1	5°	7°	9°
V2	3°	5°	7°
V3	6°	8°	10°



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