

# 110V, 303A, 1.3mΩ N-channel Power SGT MOSFET

## JMSH1101PE7

### Features

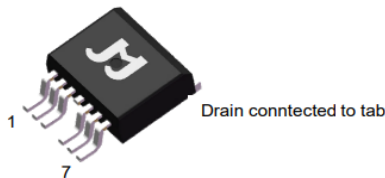
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- 100% UIS Tested
- 100%  $\Delta V_{ds}$  Tested
- Halogen-free; RoHS-compliant

### Applications

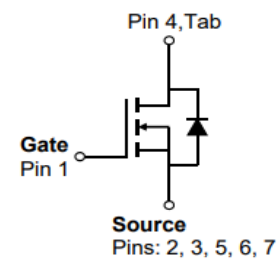
- Load Switch
- PWM Application
- Power Management

### Product Summary

Parameters	Value	Unit
$V_{DSS}$	110	V
$V_{GS(th\_Typ)}$	3.0	V
$I_D(@V_{GS}=10V)$	303	A
$R_{DS(ON\_Typ)}(@V_{GS}=10V)$	1.3	mΩ



TO-263-7L



Schematic Diagram

### Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMSH1101PE7	SH1101P	1	Tape&Reel	TO-263-7L	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	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$	303
		$T_C = 100^\circ\text{C}$	191
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	Refer to Fig.4	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(2)</sup>	1765	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	313
		$T_C = 100^\circ\text{C}$	125
$T_J, T_{STG}$	Junction & Storage Temperature Range	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(3)</sup>	34	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.4	

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
$V_{(BR)DSS}$	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	$\mu\text{A}$
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.1	3.0	3.9	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance <sup>(4)</sup>	$V_{GS} = 10\text{V}, I_D = 20\text{A}$	-	1.3	1.6	m $\Omega$
<b>Dynamic Characteristics</b>						
$R_g$	Gate Resistance	$f = 1\text{MHz}$	-	2.5	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 55\text{V},$ $f = 1\text{MHz}$	8305	11626	15696	pF
$C_{oss}$	Output Capacitance		1123	1572	2122	pF
$C_{rss}$	Reverse Transfer Capacitance		25	35	47	pF
$Q_g$	Total Gate Charge	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 55\text{V}, I_D = 20\text{A}$	124	174	235	nC
$Q_{gs}$	Gate Source Charge		40	56	75	nC
$Q_{gd}$	Gate Drain("Miller") Charge		29	41	56	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On DelayTime	$V_{GS} = 10\text{V}, V_{DD} = 55\text{V}$ $I_D = 20\text{A}, R_{GEN} = 3\Omega$	-	35	-	ns
$t_r$	Turn-On Rise Time		-	43	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	99	-	ns
$t_f$	Turn-Off Fall Time		-	51	-	ns
<b>Body Diode Characteristics</b>						
$I_S$	Maximum Continuous Body Diode Forward Current		-	-	303	A
$I_{SM}$	Maximum Pulsed Body Diode Forward Current		-	-	1211	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	$I_F = 20\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	104	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge		-	341	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2.  $E_{AS}$  condition: Starting  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 55\text{V}$ ,  $V_G = 10\text{V}$ ,  $R_G = 25\text{ohm}$ ,  $L = 3\text{mH}$ ,  $I_{AS} = 34.3\text{A}$ ,  $V_{DD} = 0\text{V}$  during time in avalanche.
  3.  $R_{\theta JA}$  is measured with the device mounted on a  $1\text{inch}^2$  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

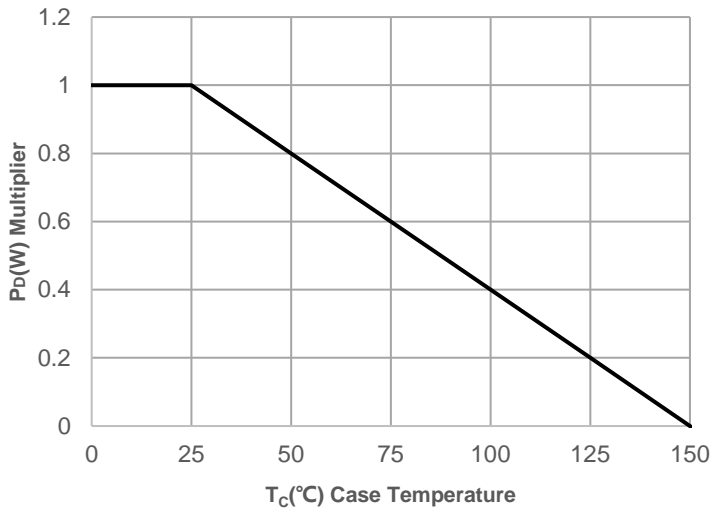


Figure 2: Current De-rating

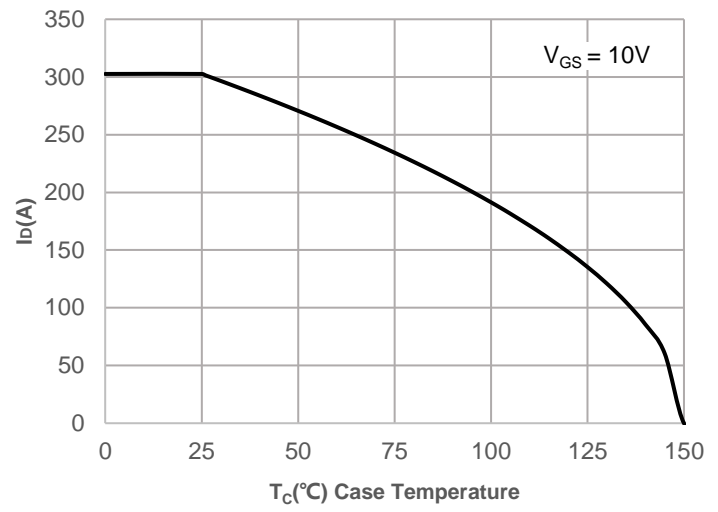


Figure 3: Normalized Maximum Transient Thermal Impedance

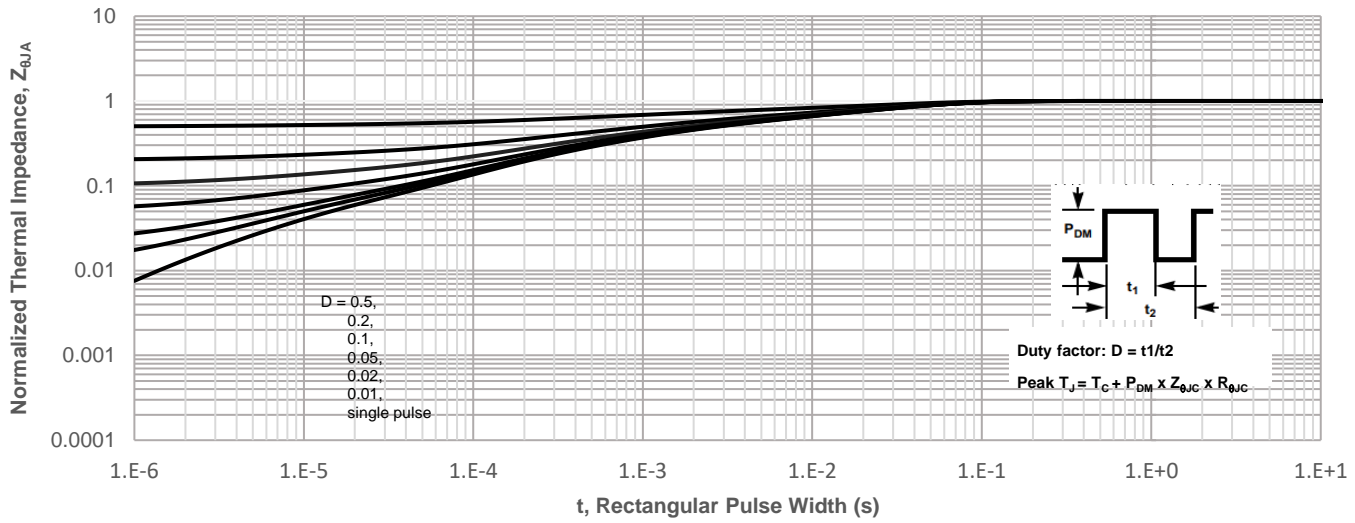
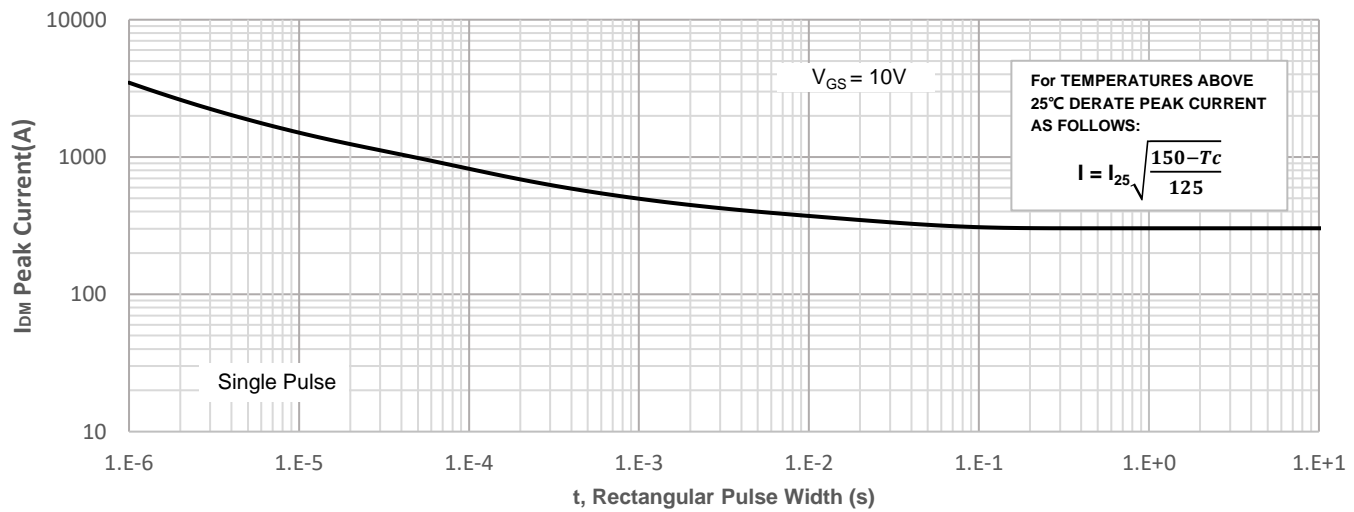


Figure 4: Peak Current Capacity



## Typical Performance Characteristics

Figure 5: Output Characteristics

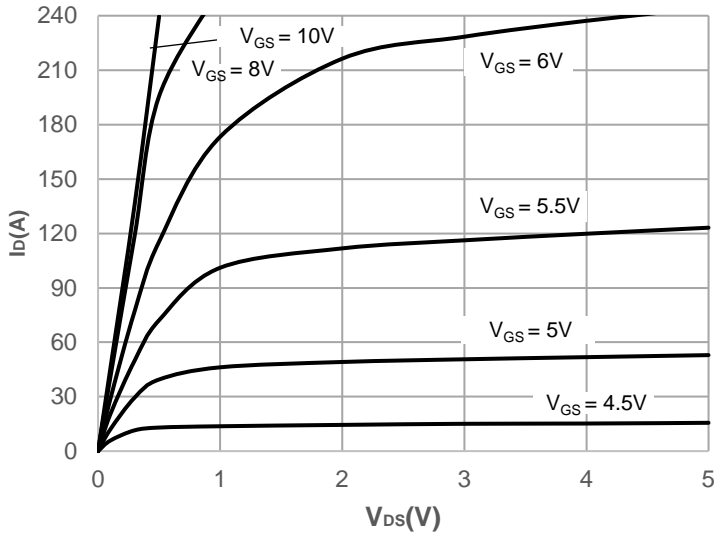


Figure 6: Typical Transfer Characteristics

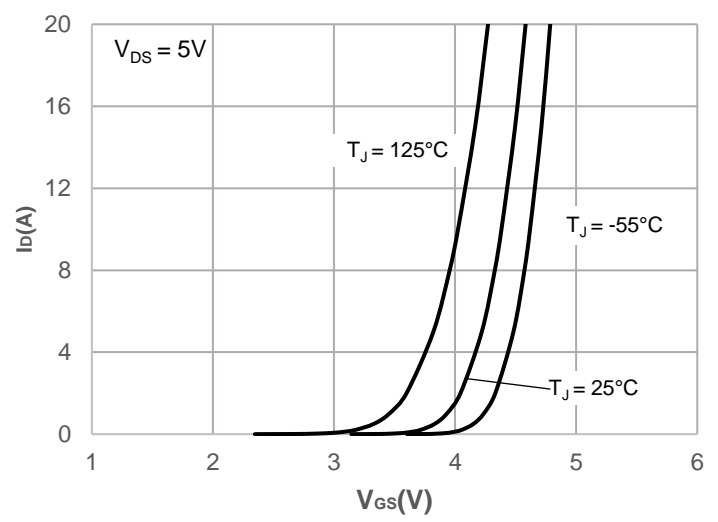


Figure 7: On-resistance vs. Drain Current

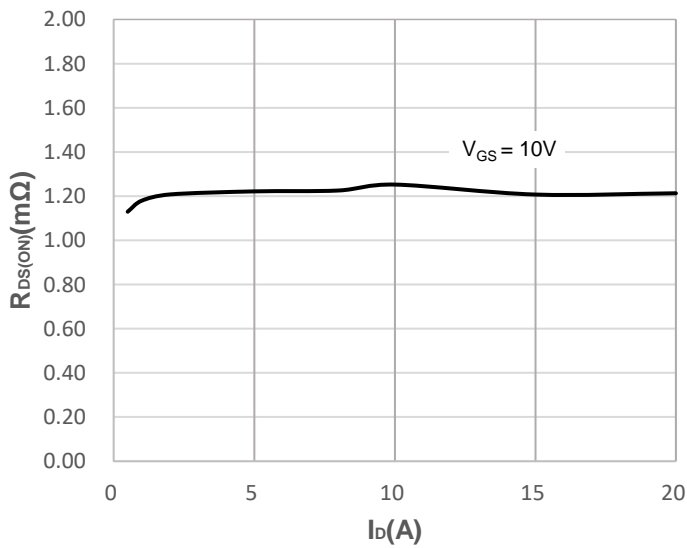


Figure 8: Body Diode Characteristics

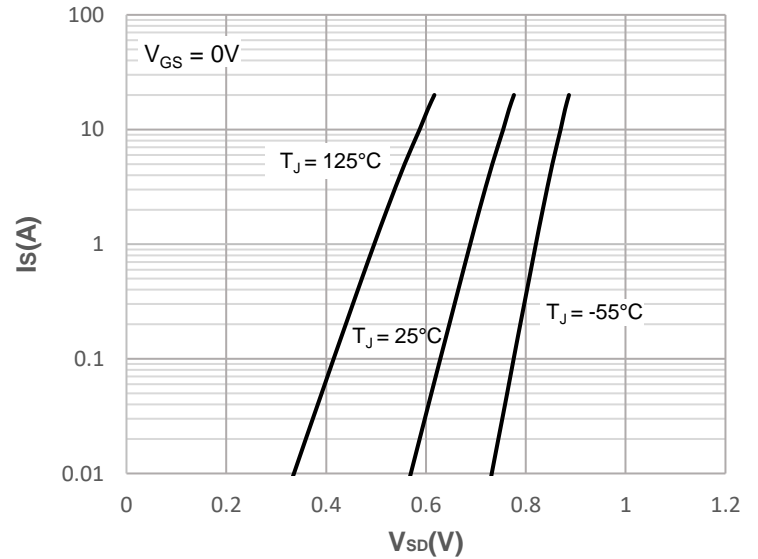


Figure 9: Gate Charge Characteristics

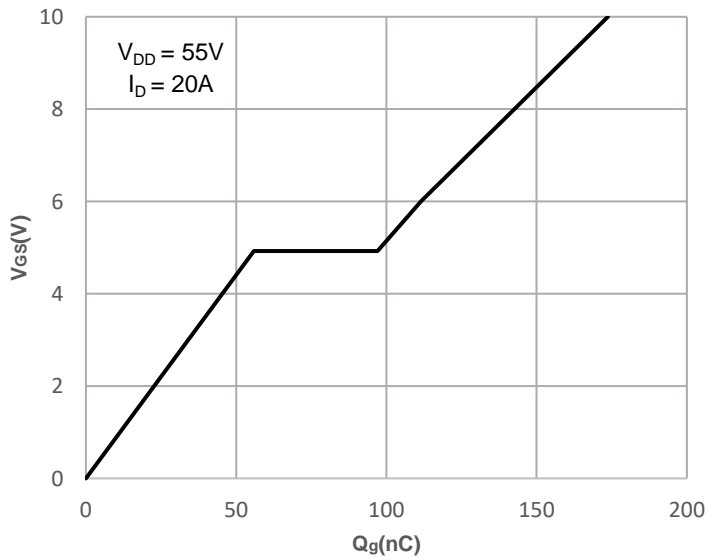
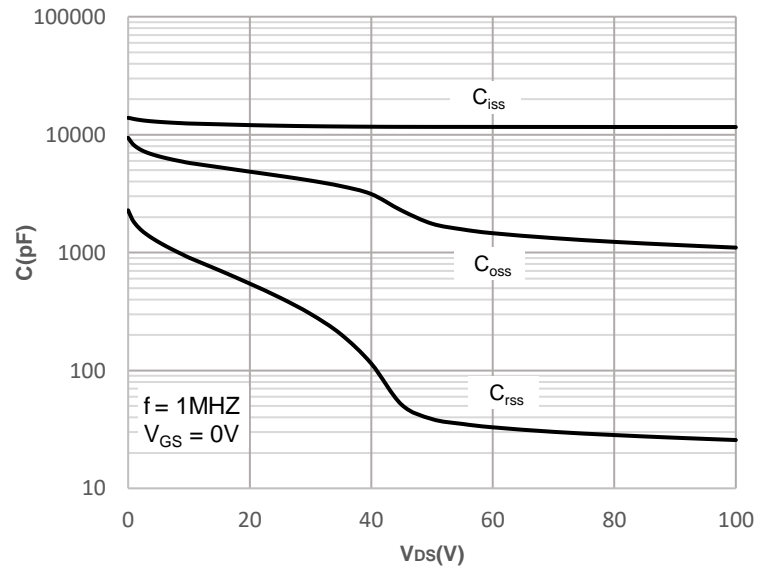


Figure 10: Capacitance Characteristics



## Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

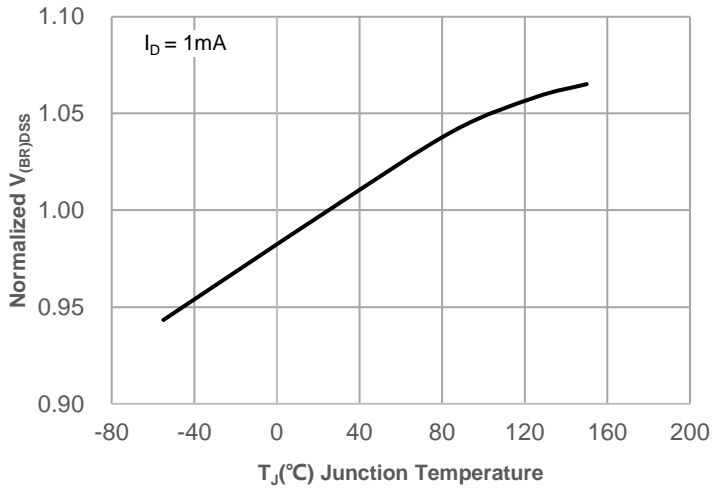


Figure 12: Normalized on Resistance vs. Junction Temperature

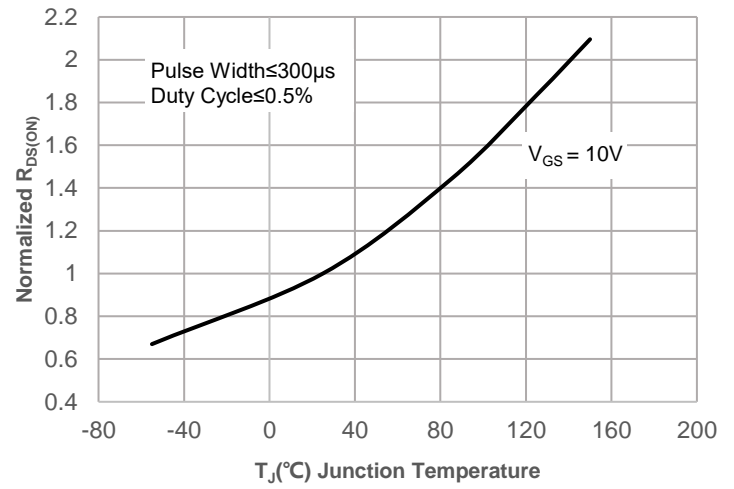


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

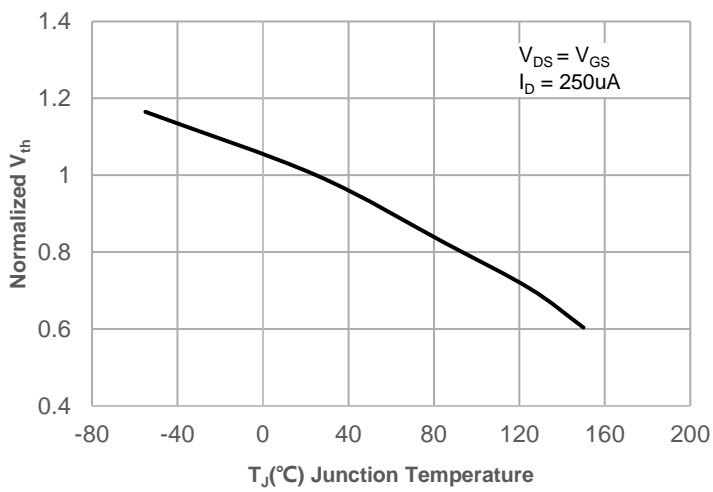


Figure 14:  $R_{DS(ON)}$  vs.  $V_{GS}$

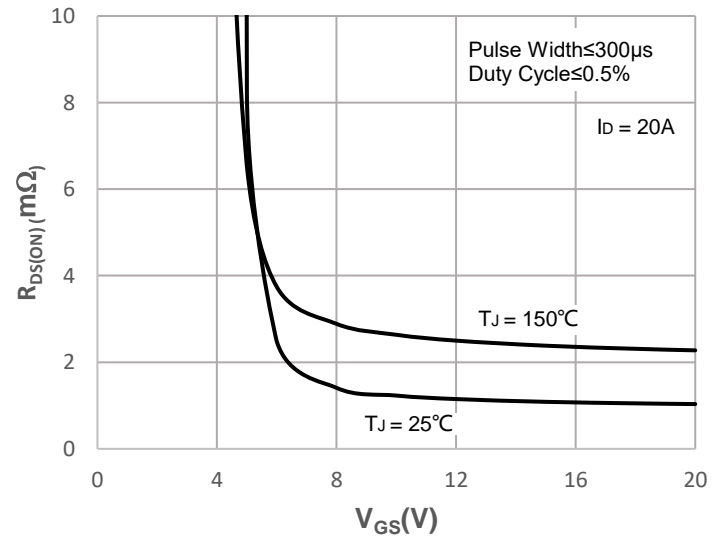
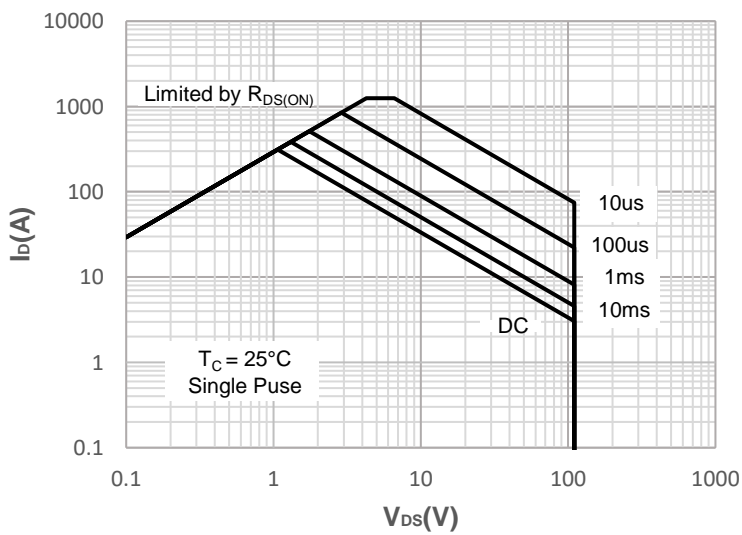


Figure 15: Maximum Safe Operating Area



### Test Circuit

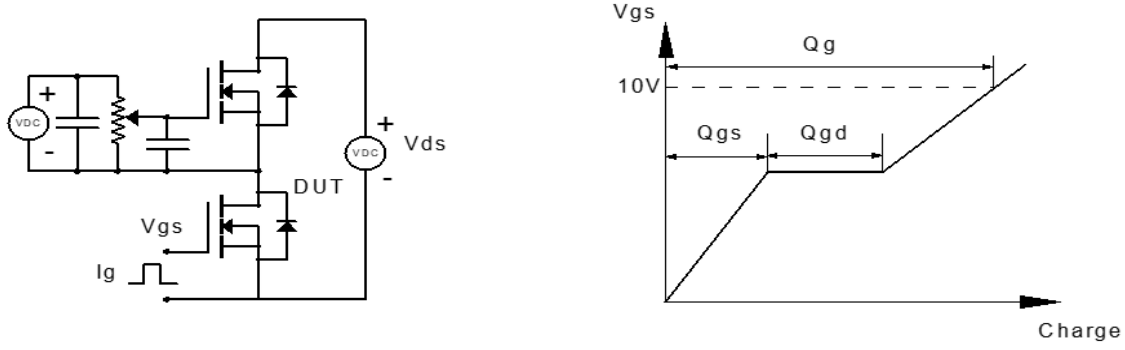


Figure 1: Gate Charge Test Circuit & Waveform

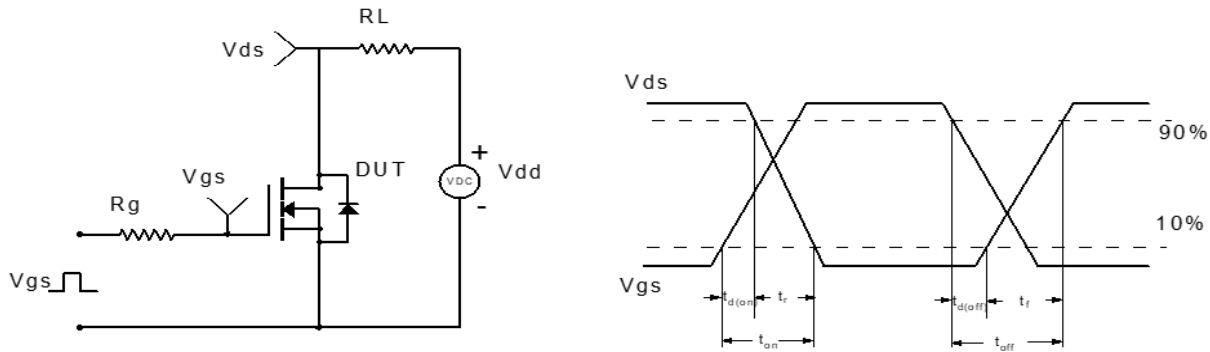


Figure 2: Resistive Switching Test Circuit & Waveform

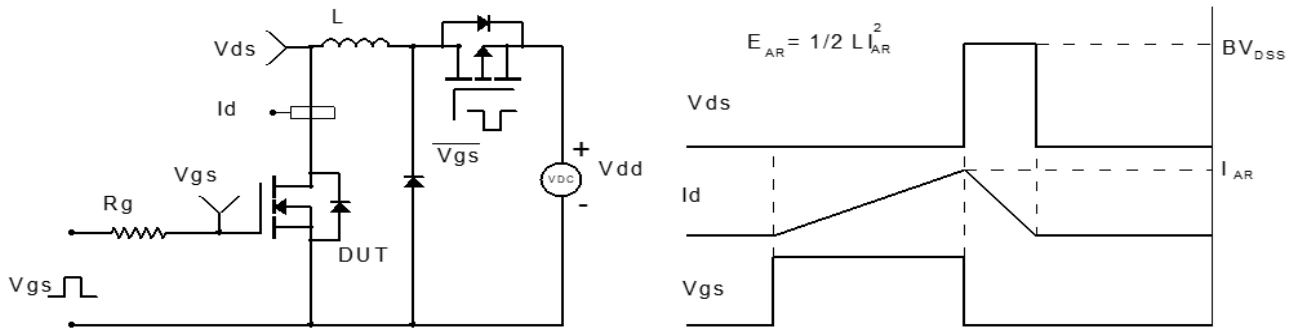


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

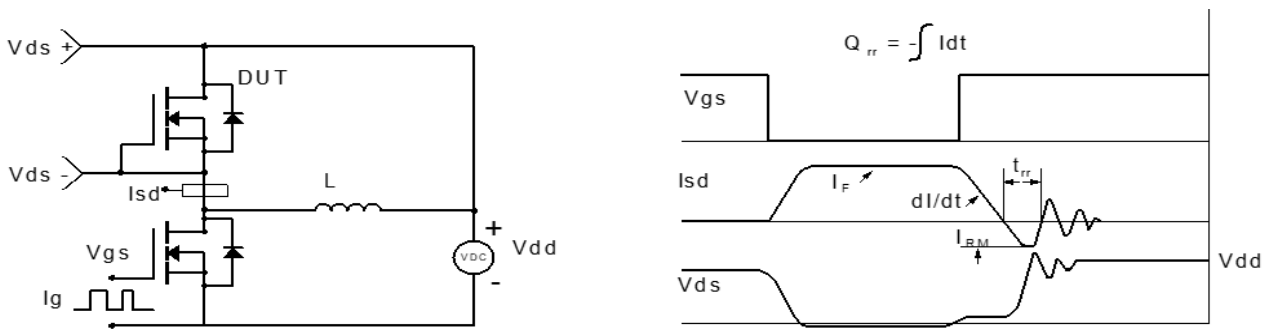
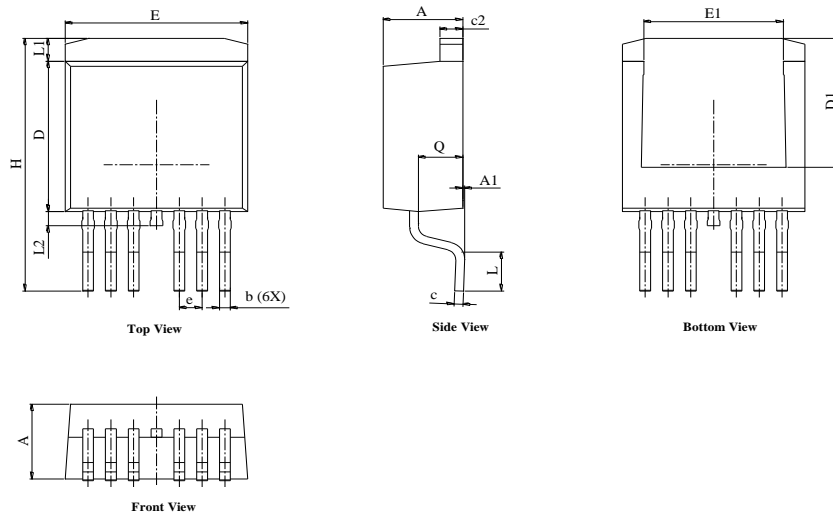


Figure 4: Diode Recovery Test Circuit & Waveform



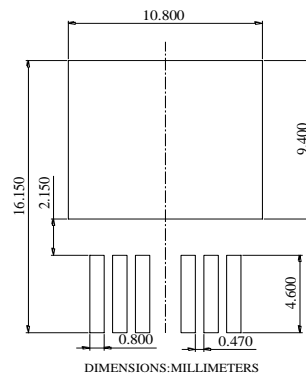
## Package Mechanical Data(TO-263-7L)

Package Outline



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
b	0.50	0.60	0.70
c	0.40	0.50	0.60
c2	1.15	1.27	1.40
D	8.82	8.92	9.02
D1	7.65 REF.		
E	9.96	10.16	10.36
E1	6.80	7.80	8.00
e	1.27 BSC		
H	14.61	15.00	15.88
L	1.78	2.32	2.80
L1	1.36 REF.		
L2	1.20 REF.		
L3	0.25 BSC		
Q	2.30	2.48	2.70

### Recommended Soldering Footprint



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