

**60V, 13A, 9.4mΩ N-channel Power SGT MOSFET**
**JMSL0608PP**
**Features**

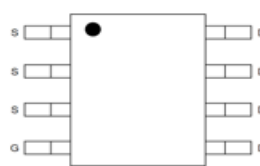
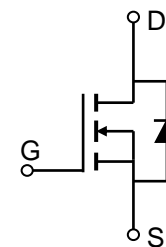
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- 100% UIS TESTED
- 100%  $\Delta V_{ds}$  TESTED
- Halogen-free; RoHS-compliant
- Pb-free plating

**Applications**

- Load Switch
- PWM Application
- Power Management

**Product Summary**

Parameters	Value	Unit
$V_{DSS}$	60	V
$V_{GS(th)_{Typ}}$	1.7	V
$I_D(@V_{GS}=10V)$	14	A
$R_{DS(ON)_{Typ}}(@V_{GS}=10V)$	7.9	mΩ
$R_{DS(ON)_{Typ}}(@V_{GS}=4.5V)$	9.4	mΩ


**SOP-8**

**Pin Assignment**

**Schematic Diagram**
**Ordering Information**

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMSL0608PP	SL0608P	3	Tape&Reel	SOP-8	4000	40000

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

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-to-Source Voltage	60	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_A = 25^\circ\text{C}$	14
		$T_A = 100^\circ\text{C}$	10
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	Refer to Fig.4	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(2)</sup>	74	mJ
$P_D$	Power Dissipation	$T_A = 25^\circ\text{C}$	2.8
		$T_A = 100^\circ\text{C}$	1
$T_J, T_{STG}$	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>	65	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(4)</sup>	45	

**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	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	60	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 48\text{V}, V_{GS} = 0\text{V}$	-	-	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	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.2	1.7	2.3	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance <sup>(5)</sup>	$V_{GS} = 10\text{V}, I_D = 12\text{A}$	-	7.9	10.3	$\text{m}\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 6\text{A}$	-	9.4	12.2	$\text{m}\Omega$
<b>Dynamic Characteristics</b>						
$R_g$	Gate Resistance	$f = 1\text{MHz}$	-	2	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 30\text{V}, f = 1\text{MHz}$	-	1178	-	pF
$C_{oss}$	Output Capacitance		-	513	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	34	-	pF
$Q_g$	Total Gate Charge	$V_{GS} = 0 \text{ to } 4.5\text{V}$ $V_{DS} = 30\text{V}, I_D = 15\text{A}$	-	21	-	nC
$Q_{gs}$	Gate Source Charge		-	4	-	nC
$Q_{gd}$	Gate Drain("Miller") Charge		-	5	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On DelayTime	$V_{GS} = 10\text{V}, V_{DD} = 30\text{V}$ $I_D = 15\text{A}, R_{GEN} = 3\Omega$	-	7	-	ns
$t_r$	Turn-On Rise Time		-	24	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	22	-	ns
$t_f$	Turn-Off Fall Time		-	6	-	ns
<b>Body Diode Characteristics</b>						
$I_S$	Maximum Continuous Body Diode Forward Current		-	-	14	A
$I_{SM}$	Maximum Pulsed Body Diode Forward Current		-	-	56	A
$V_{SD}$	Body Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 12\text{A}$	-		1.2	V
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = 15\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	32	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge		-	23.6	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2.  $E_{AS}$  condition: Starting  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 30\text{V}$ ,  $V_G = 10\text{V}$ ,  $R_G = 25\text{ohm}$ ,  $L = 3\text{mH}$ ,  $I_{AS} = 7\text{A}$ ,  $V_{DD} = 0\text{V}$  during time in avalanche.
  3.  $R_{\theta JA}$  is measured with the device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  4.  $R_{\theta JA}$  is measured with the device mounted on a  $1\text{inch}^2$  pad of 2oz copper FR4 PCB.
  5. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$ .



## Typical Performance Characteristics

Figure 1: Power De-rating

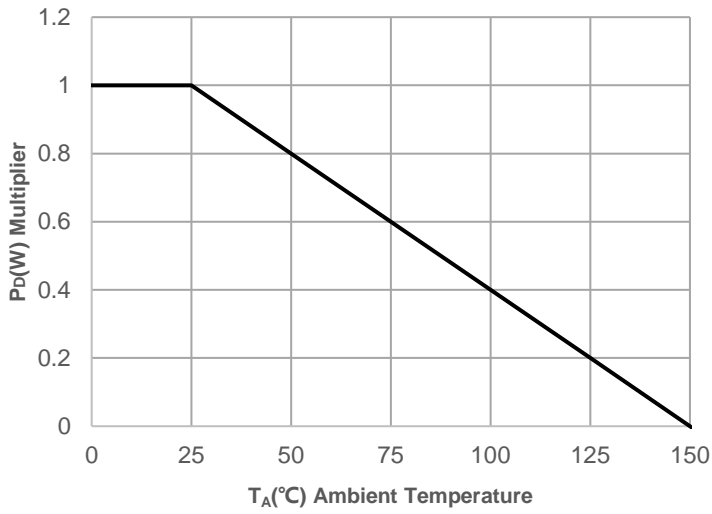


Figure 2: Current De-rating

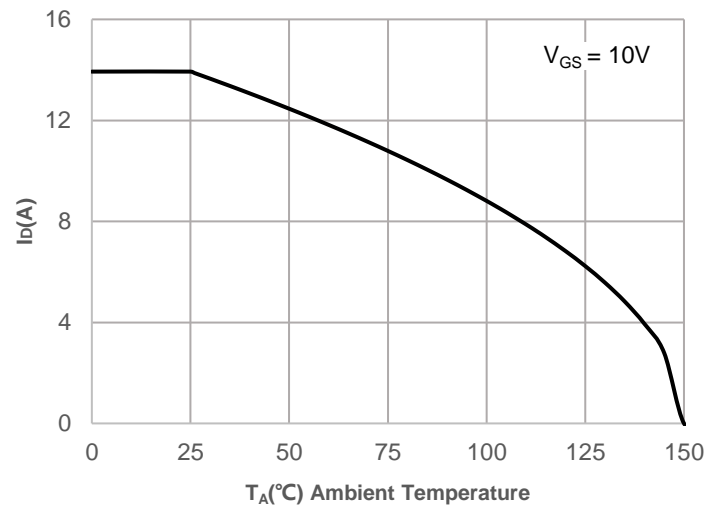


Figure 3: Normalized Maximum Transient Thermal Impedance

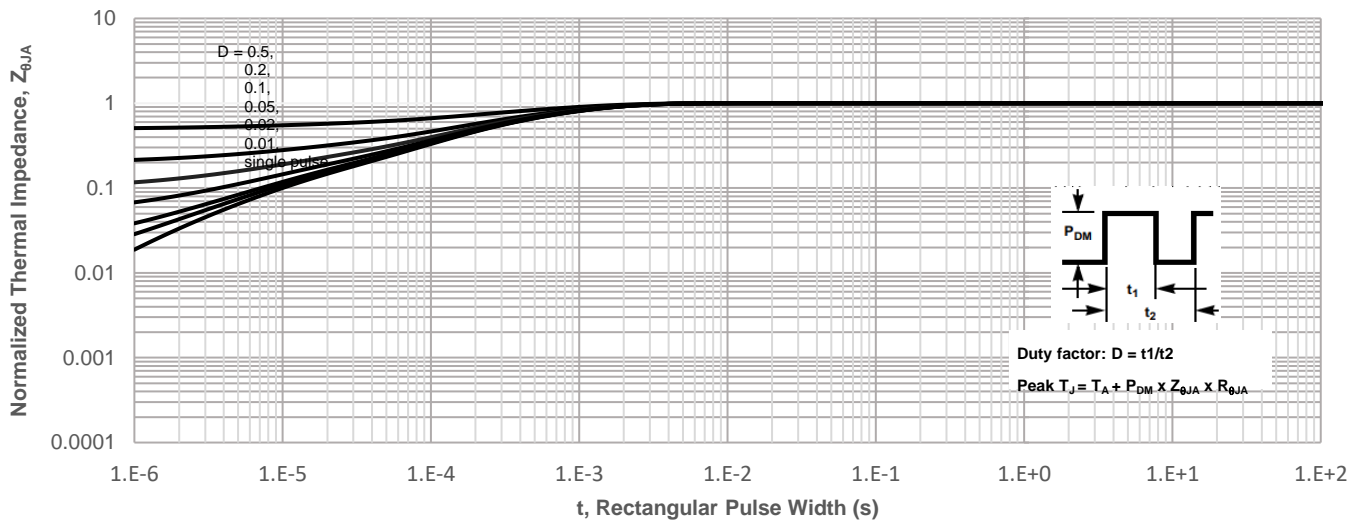
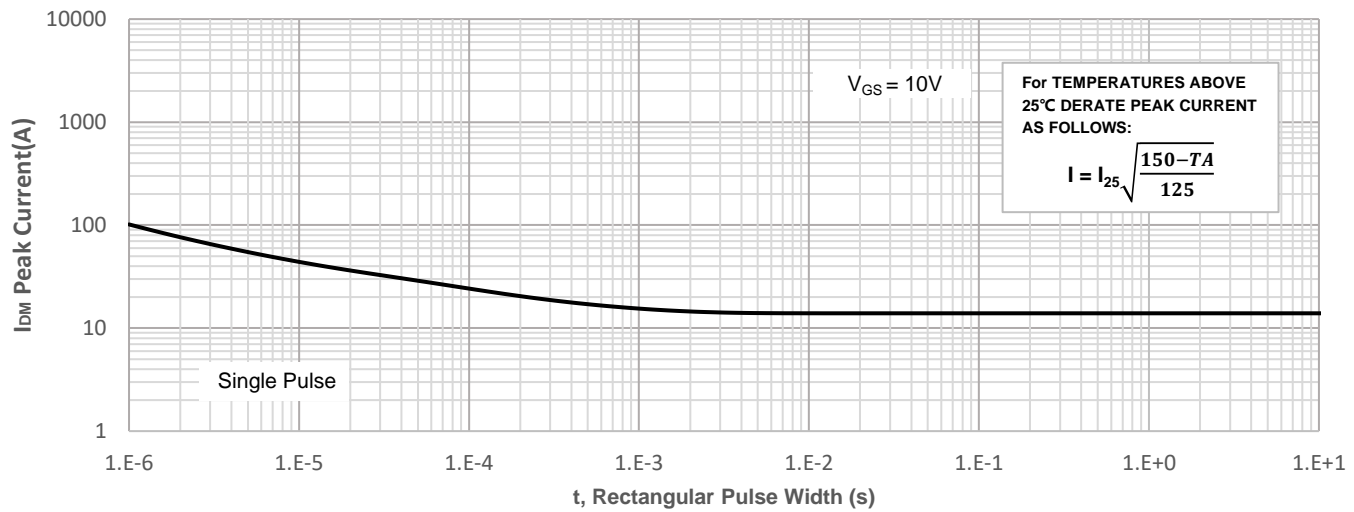


Figure 4: Peak Current Capacity



## Typical Performance Characteristics

Figure 5: Output Characteristics

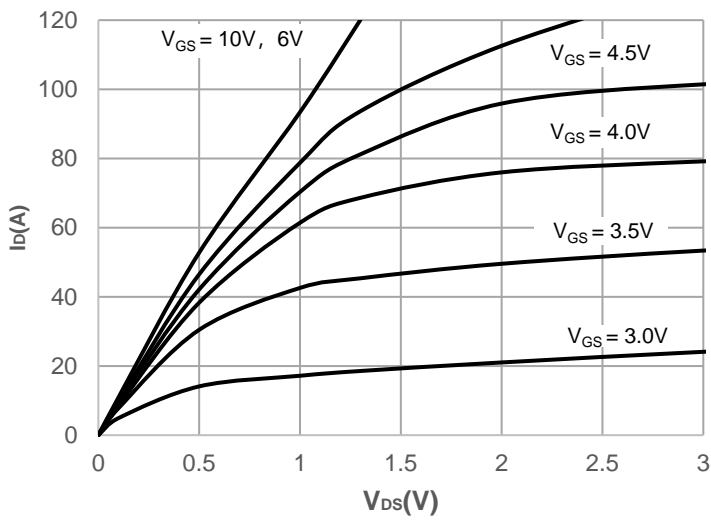


Figure 6: Typical Transfer Characteristics

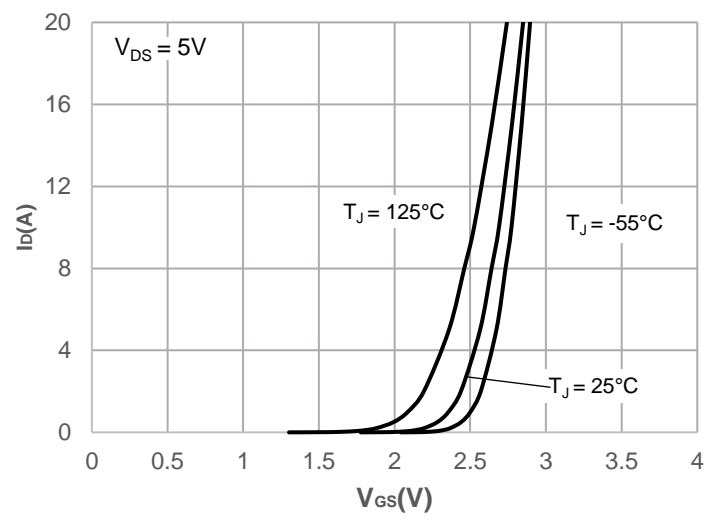


Figure 7: On-resistance vs. Drain Current

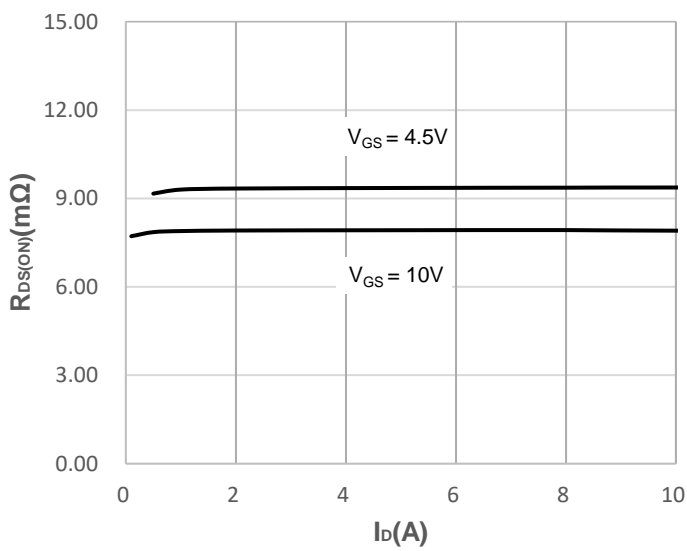


Figure 8: Body Diode Characteristics

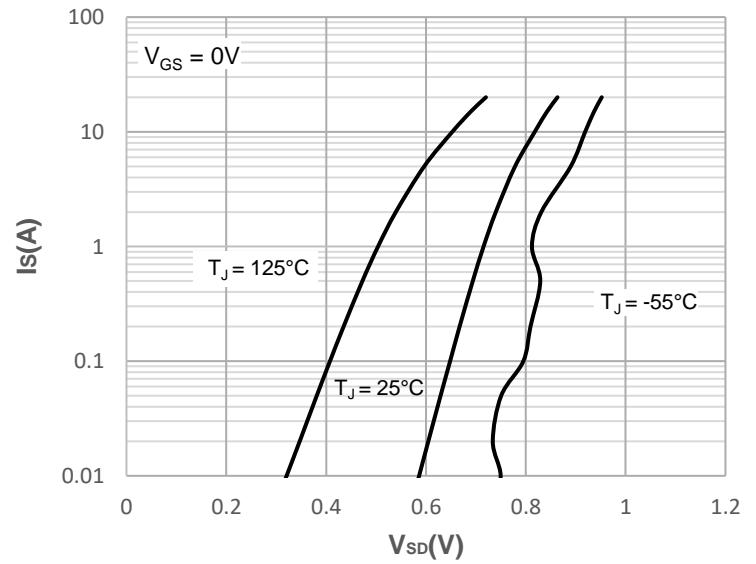


Figure 9: Gate Charge Characteristics

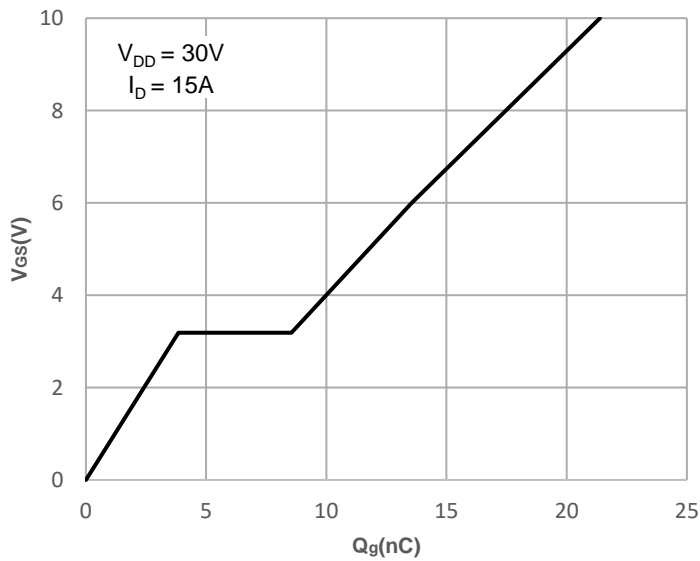
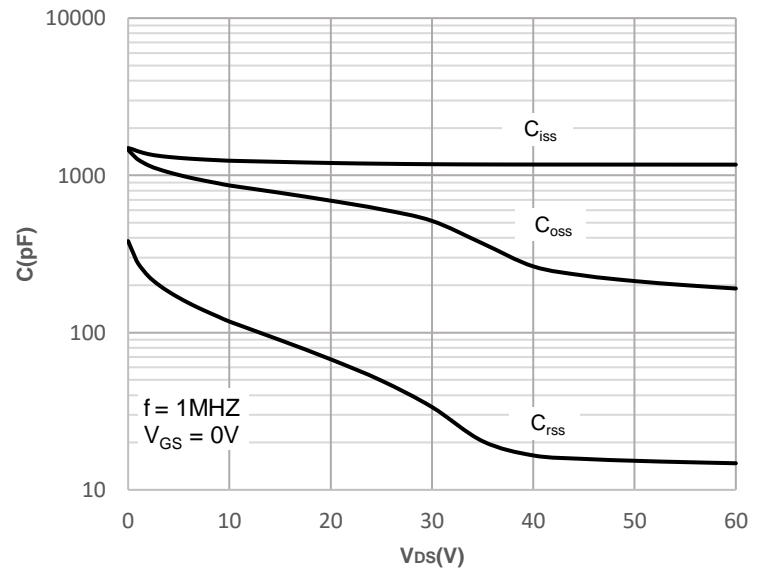


Figure 10: Capacitance Characteristics



## Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

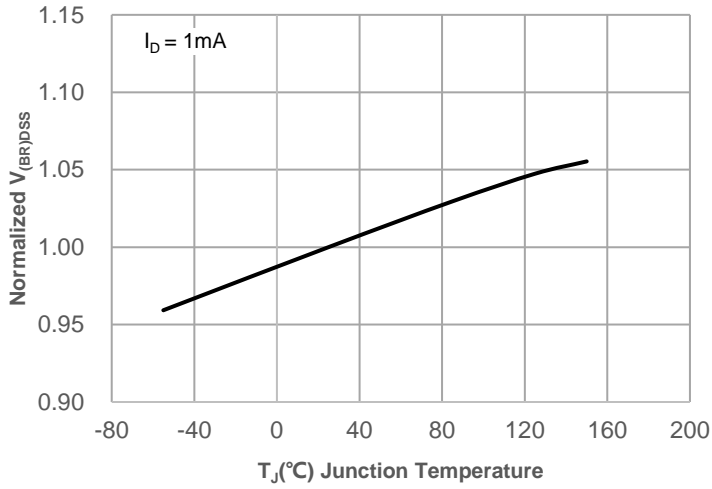


Figure 12: Normalized on Resistance vs. Junction Temperature

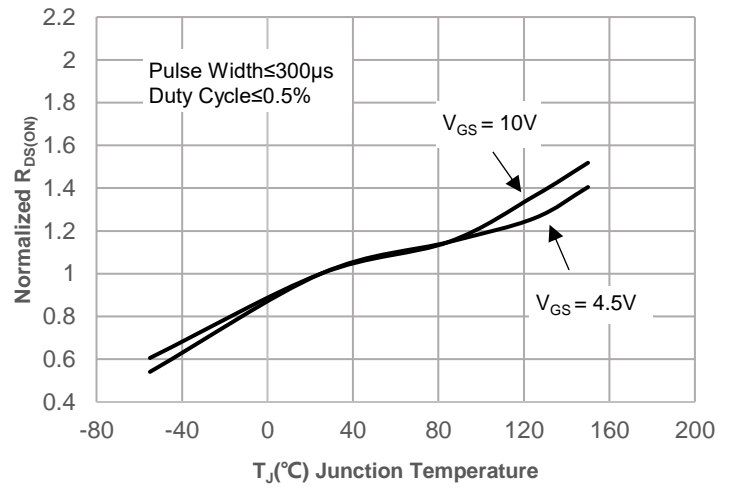


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

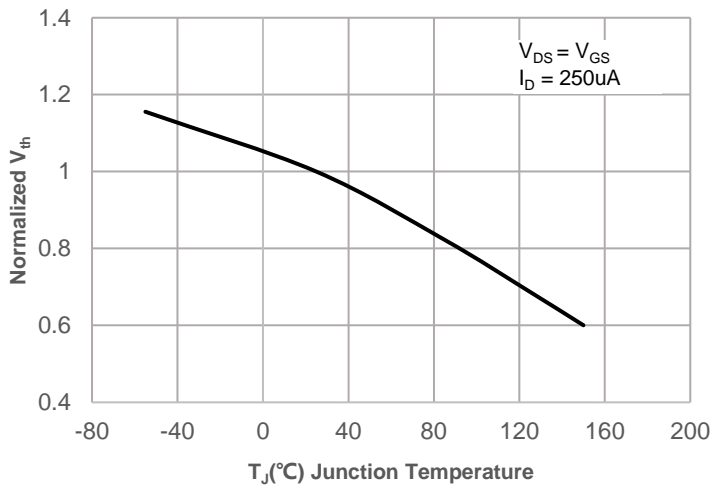


Figure 14: R\_DS(ON) vs. V\_GS

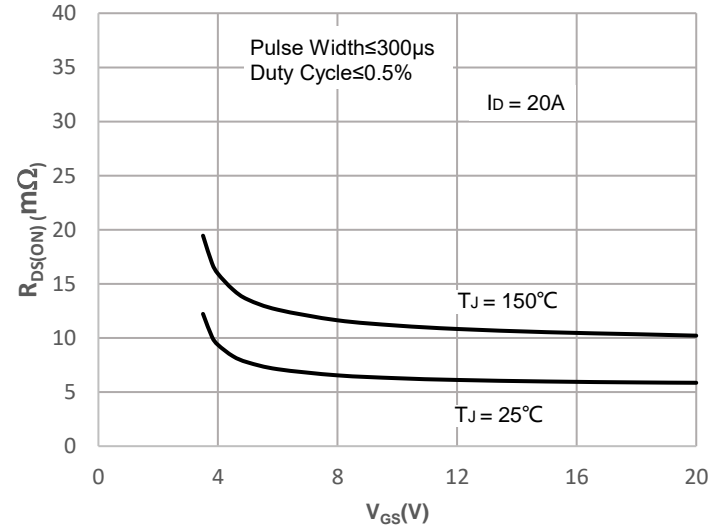
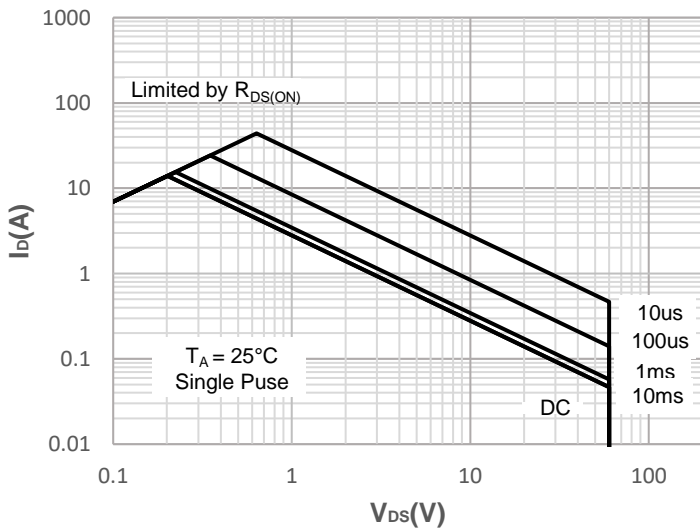


Figure 15: Maximum Safe Operating Area



### Test Circuit



Figure 1: Gate Charge Test Circuit & Waveform

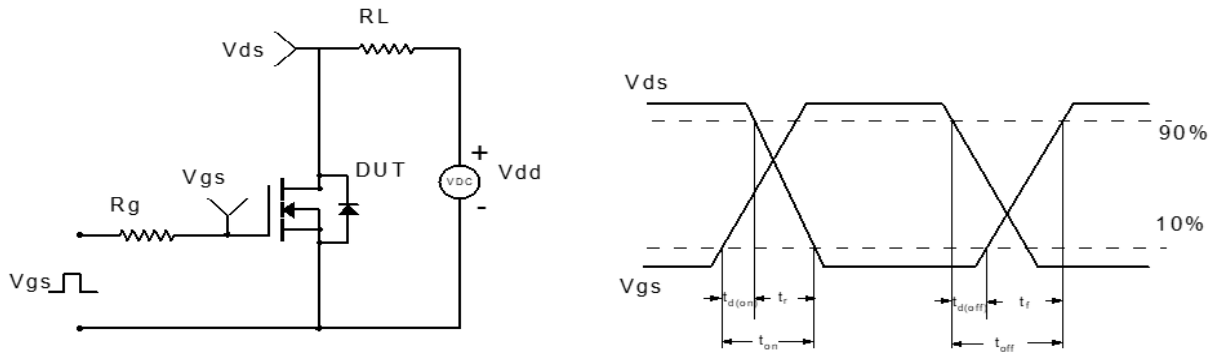


Figure 2: Resistive Switching Test Circuit & Waveform

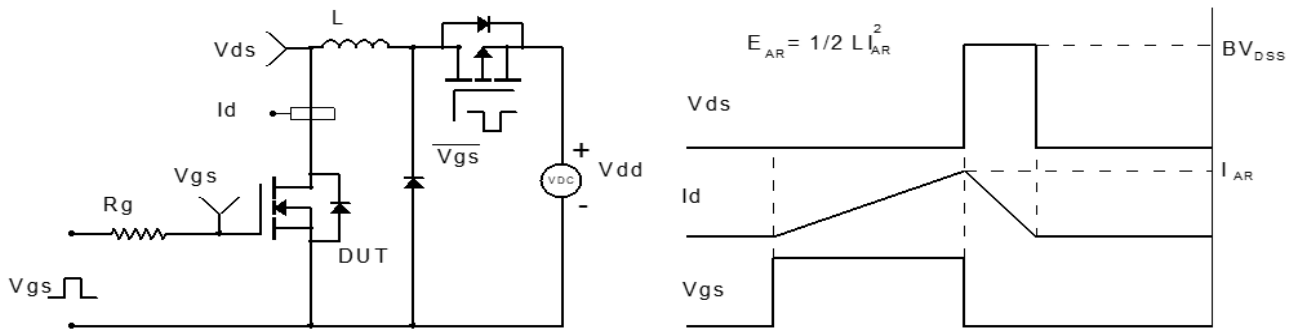


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

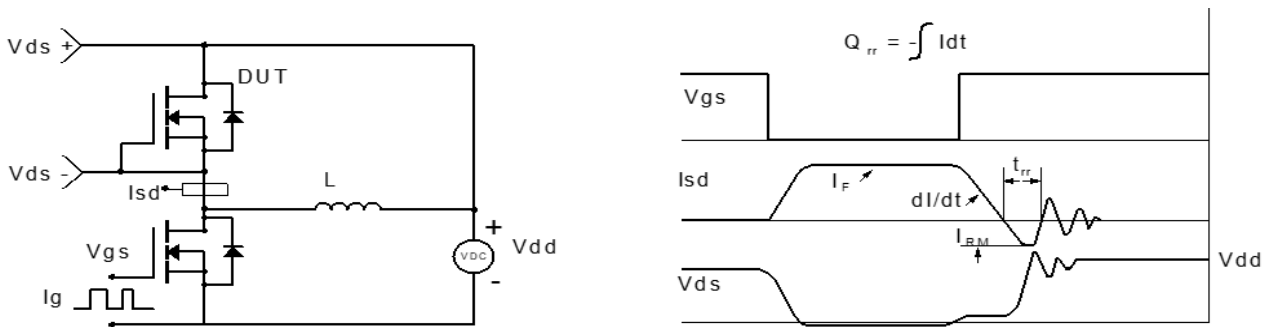
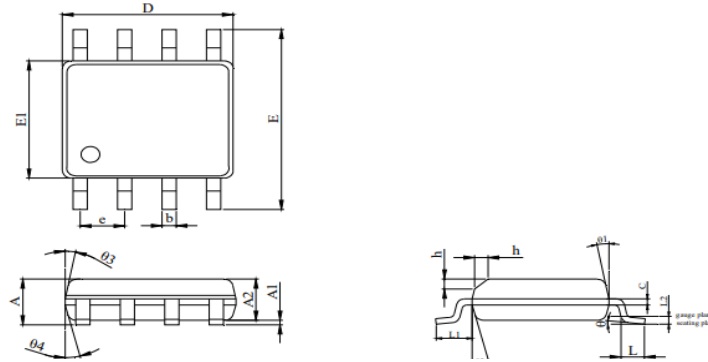


Figure 4: Diode Recovery Test Circuit & Waveform

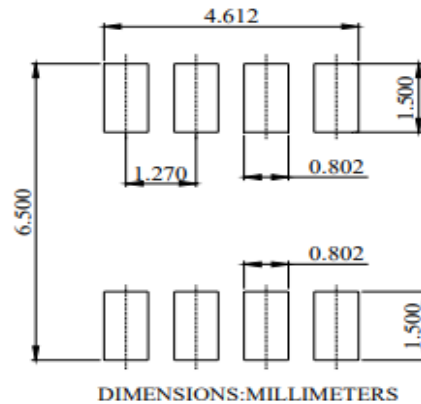
## Package Mechanical Data(SOP-8)

Package Outline



DIM	MILLIMETER		
	MIN.	NOM.	MAX.
A	1.35	1.50	1.65
A1	0.05	0.10	0.15
A2	1.35	1.40	1.50
b	0.38	--	0.50
c	0.17	--	0.25
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27(BSC)		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
h	0.30	0.40	0.50
$\theta$	0°	--	8°
$\theta_1$	10°	12°	14°
$\theta_2$	8°	10°	12°
$\theta_3$	10°	12°	14°
$\theta_4$	8°	10°	12°

Recommended Footprint



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