

150V,84A, 8.1mΩ N-channel Power SGT MOSFET

JMSH1509PC

Features

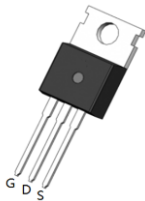
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- 100% UIS Tested
- 100% Vds Tested
- Halogen-free; RoHS-compliant

Applications

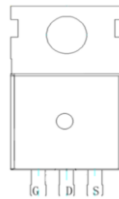
- Load Switch
- PWM Application
- Power Management

Product Summary

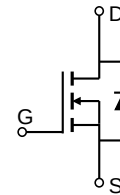
Parameters	Value	Unit
V_{DSS}	150	V
$V_{GS(th_Typ)}$	3.2	V
$I_D(@V_{GS}=10V)$	84	A
$R_{DS(ON_Typ)}(@V_{GS}=10V)$	8.1	mΩ



TO-220-3L Top View



Pin Assignment



Schematic Diagram

Ordering Information

Device	Marking	MSL	Form	Package	Tube(pcs)	Per Carton (pcs)
JMSH1509PC-U	SH1509P	N/A	Tube	TO-220-3L	50	5000

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-to-Source Voltage	150	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	84
		$T_C = 100^\circ\text{C}$	59
I_{DM}	Pulsed Drain Current ⁽¹⁾	Refer to Fig.4	A
E_{AS}	Single Pulsed Avalanche Energy ⁽²⁾	389	mJ
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$	170
		$T_C = 100^\circ\text{C}$	68
T_J, T_{STG}	Junction & Storage Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Max	Unit
R	Thermal Resistance, Junction to Ambient ⁽³⁾	28	$^\circ\text{C/W}$
R	Thermal Resistance, Junction to Case	0.7	

**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	150	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 120V, V _{GS} = 0V	-	-	1.0	μA
I _{GSS}	Gate-Body Leakage Current	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.2	3.2	4.1	V
R _{DS(ON)}	Static Drain-Source ON-Resistance ⁽⁴⁾	V _{GS} = 10V, I _D = 20A	-	8.1	10.6	mΩ
Dynamic Characteristics						
R _g	Gate Resistance	f = 1MHz	-	3.7	-	Ω
C _{iSS}	Input Capacitance	V _{GS} = 0V, V _{DS} = 75V, f = 1MHz	-	3569	5353	pF
C _{oss}	Output Capacitance		-	323	485	pF
C _{rSS}	Reverse Transfer Capacitance		-	14	21	pF
Q _g	Total Gate Charge	V _{GS} = 0 to 10V V _{DS} = 75V, I _D = 20A	-	53	-	nC
Q _{gs}	Gate Source Charge		-	19	-	nC
Q _{gd}	Gate Drain("Miller") Charge		-	12	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On DelayTime	V _{GS} = 10V, V _{DD} = 75V I _D = 20A, R _{GEN} = 3Ω	-	16	-	ns
t _r	Turn-On Rise Time		-	29	-	ns
t _{d(off)}	Turn-Off DelayTime		-	39	-	ns
t _f	Turn-Off Fall Time		-	16	-	ns
Body Diode Characteristics						
I _S	Maximum Continuous Body Diode Forward Current		-	-	84	A
I _{SM}	Maximum Pulsed Body Diode Forward Current		-	-	336	A
V _{SD}	Body Diode Forward Voltage	V _{GS} = 0V, I _S = 20A	-		1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F = 15A, di/dt = 100A/us	-	85	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	253	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting $T_J = 25^\circ\text{C}$, $V_{DD} = 75\text{V}$, $V_G = 10\text{V}$, $R_G = 25\text{ohm}$, $L = 3\text{mH}$, $I_{AS} = 16.1\text{A}$, $V_{DD} = 0\text{V}$ during time in avalanche.
 3. R is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB.
 4. Pulse Test: Pulse Width $\leq$ $\leq 0.5\%$.



Typical Performance Characteristics

Figure 1: Power De-rating

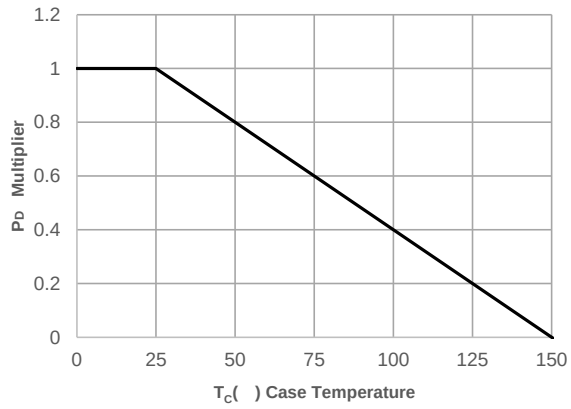
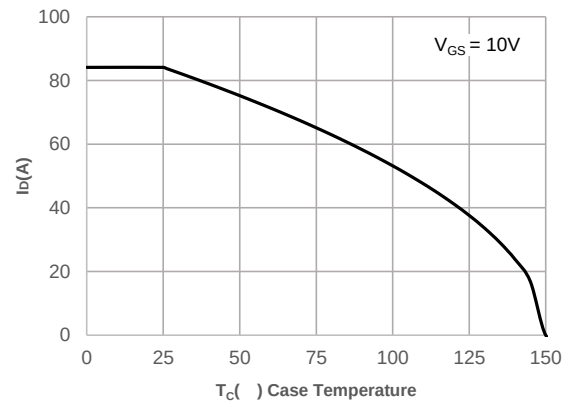
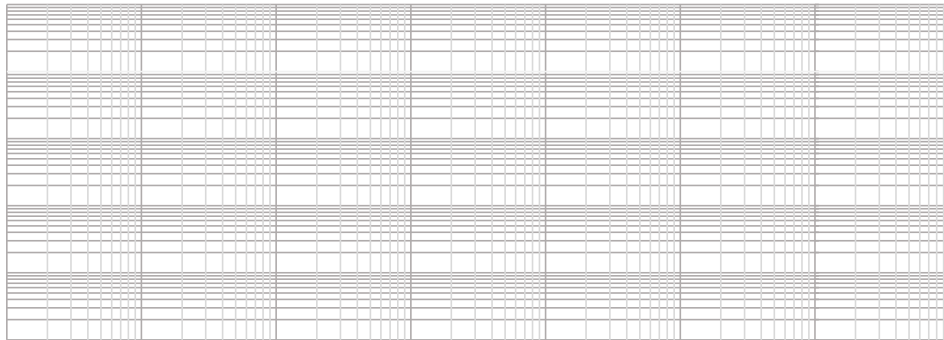


Figure 2: Current De-rating



Typical Performance Characteristics

Figure 5: Output Characteristics

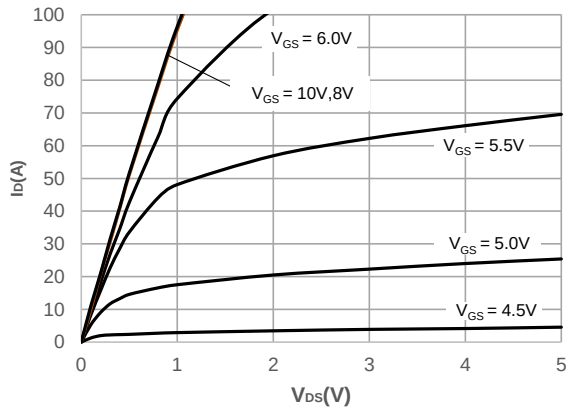


Figure 6: Typical Transfer Characteristics

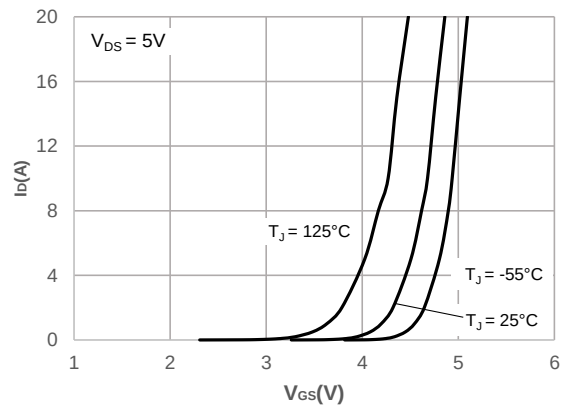


Figure 7: On-resistance vs. Drain Current

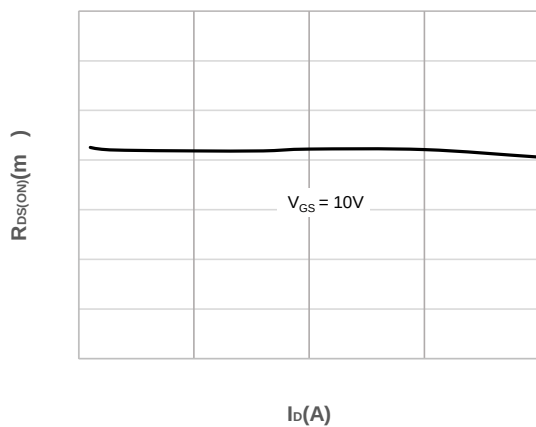


Figure 8: Body Diode Characteristics

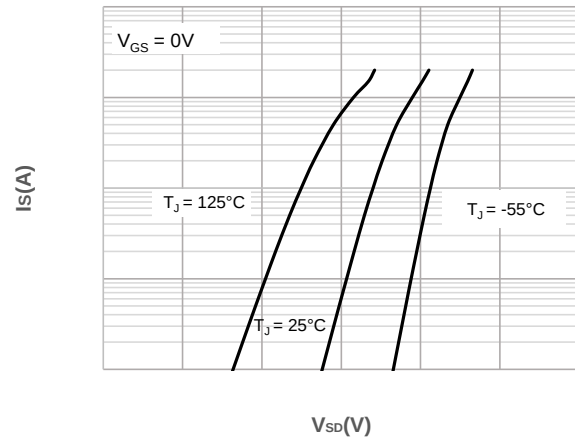


Figure 9: Gate Charge Characteristics

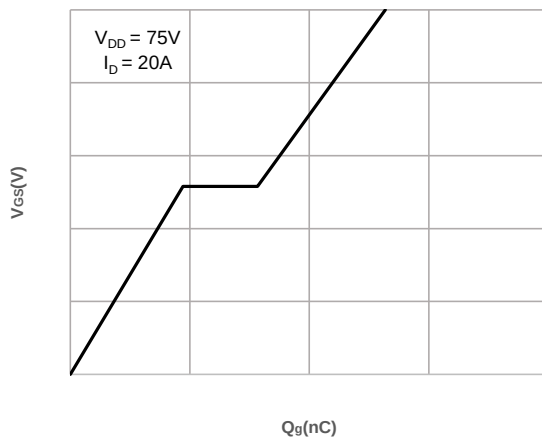
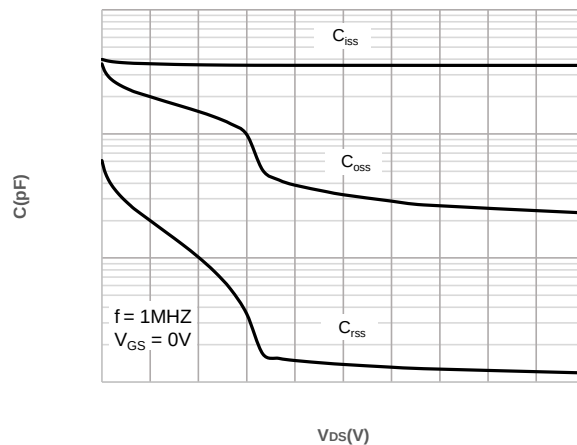


Figure 10: Capacitance Characteristics



Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

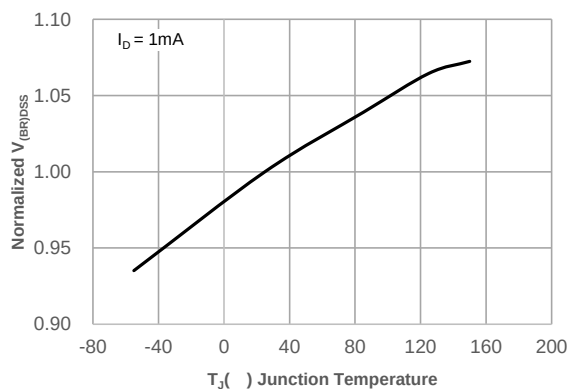


Figure 12: Normalized on Resistance vs. Junction Temperature

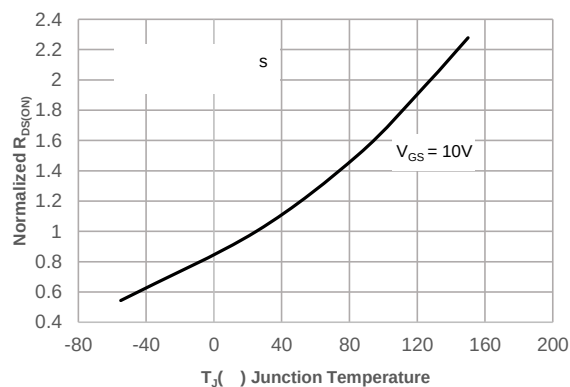


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

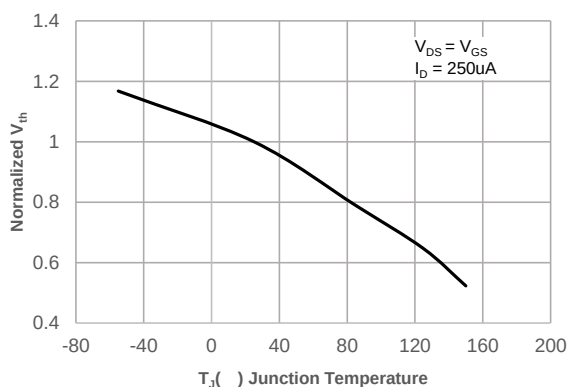


Figure 14: R_{DS(ON)} vs. V_{GS}

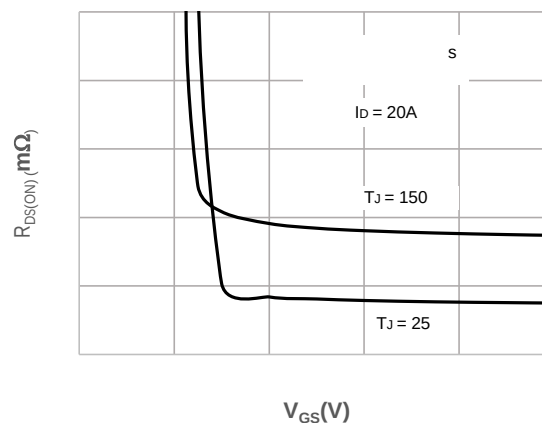
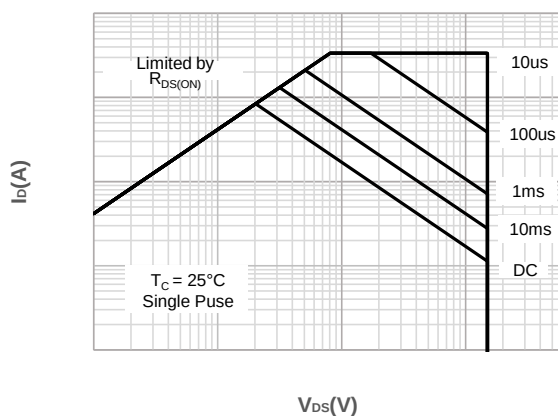


Figure 15: Maximum Safe Operating Area



Test Circuit



Figure 1: Gate Charge Test Circuit & Waveform

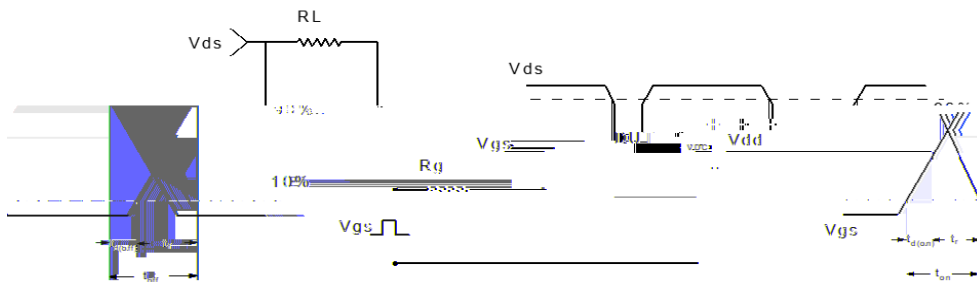


Figure 2: Resistive Switching Test Circuit & Waveform

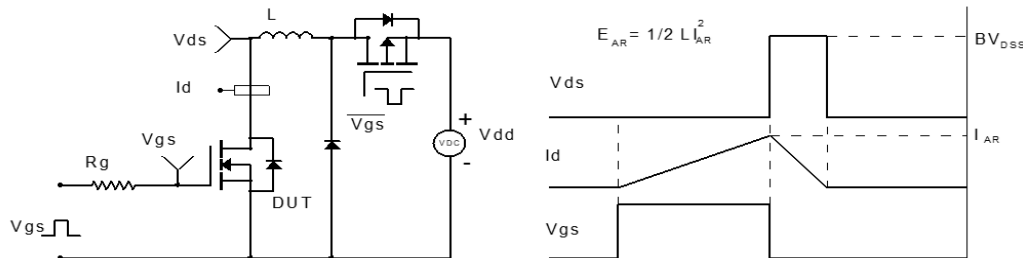


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

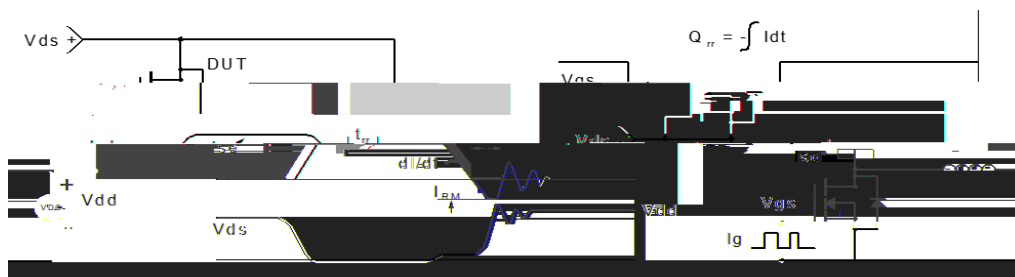
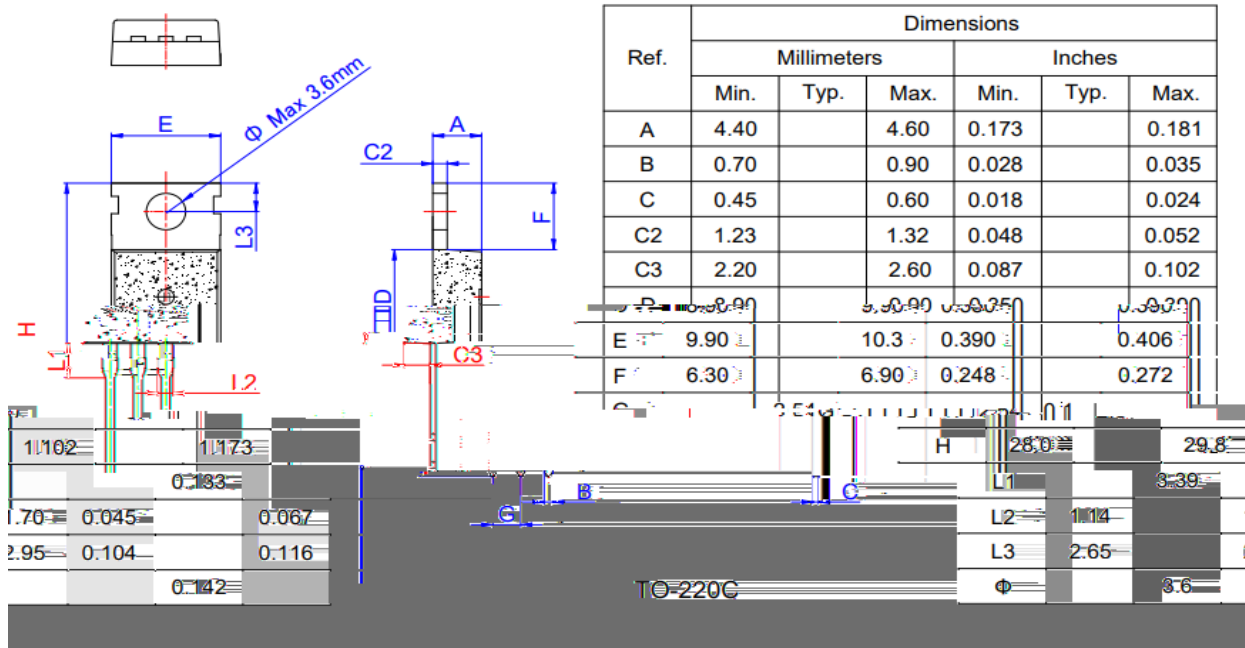


Figure 4: Diode Recovery Test Circuit & Waveform



Package Mechanical Data(TO-220-3L)



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