



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

JMSH1509PC

Features

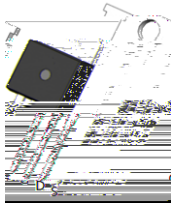
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- 100% UIS Tested
- 100% Vds Tested
- Halogen-free; RoHS-compliant

Applications

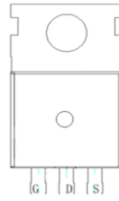
- Load Switch
- PWM Application
- Power Management

Product Summary

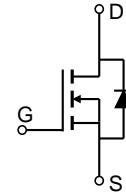
Parameters	Value	Unit
V_{DSS}	150	V
$V_{GS(th_Typ)}$	3.2	V
$I_D(@V_{GS}=10V)$	84	A
$R_{DS(ON)_Typ}(@V_{GS}=10V)$	8.1	m Ω



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	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	150	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 120\text{V}$, $V_{GS} = 0\text{V}$	-	-	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	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	2.2	3.2	4.1	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance ⁽⁴⁾	$V_{GS} = 10\text{V}$, $I_D = 20\text{A}$	-	8.1	10.6	m Ω
Dynamic Characteristics						
R_g	Gate Resistance	$f = 1\text{MHz}$	-	3.7	-	Ω
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$, $V_{DS} = 75\text{V}$, $f = 1\text{MHz}$	-	3569	5353	pF
C_{oss}	Output Capacitance		-	323	485	pF
C_{riss}	Reverse Transfer Capacitance		-	14	21	pF
Q_g	Total Gate Charge	$V_{GS} = 0$ to 10V $V_{DS} = 75\text{V}$, $I_D = 20\text{A}$	-	53	-	nC
Q_{gs}	Gate Source Charge		-	19	-	nC
Q_{gd}	Gate Drain ("Miller") Charge		-	12	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{V}$, $V_{DD} = 75\text{V}$ $I_D = 20\text{A}$, $R_{GEN} = 3\Omega$	-	16	-	ns
t_r	Turn-On Rise Time		-	29	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	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	$V_{GS} = 0\text{V}$, $I_S = 20\text{A}$	-		1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F = 15\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$	-	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 0.5%.





Typical Performance Characteristics

Figure 1: Power De-rating

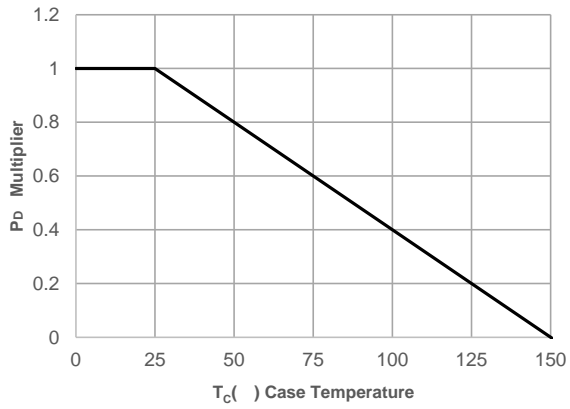
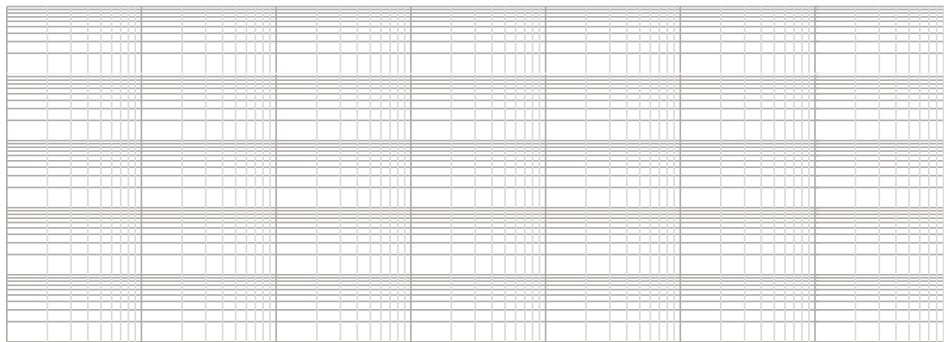
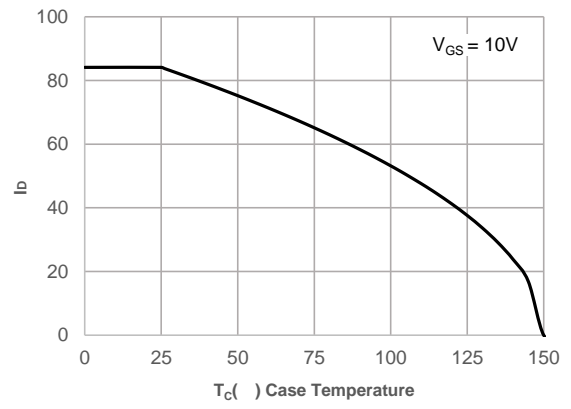


Figure 2: Current De-rating





Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

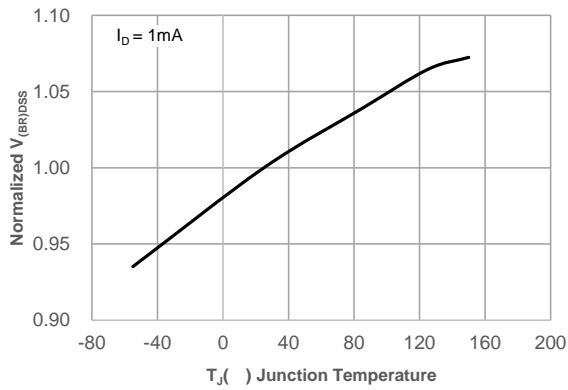


Figure 12: Normalized on Resistance vs. Junction Temperature

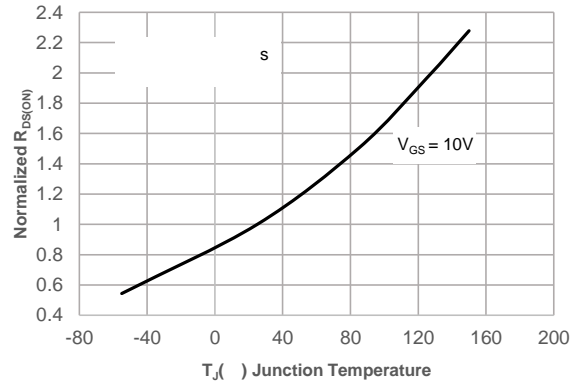


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

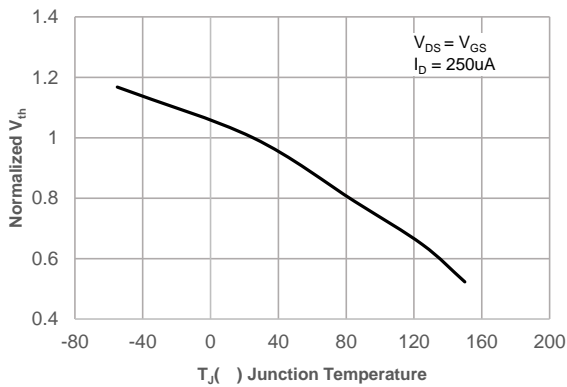


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

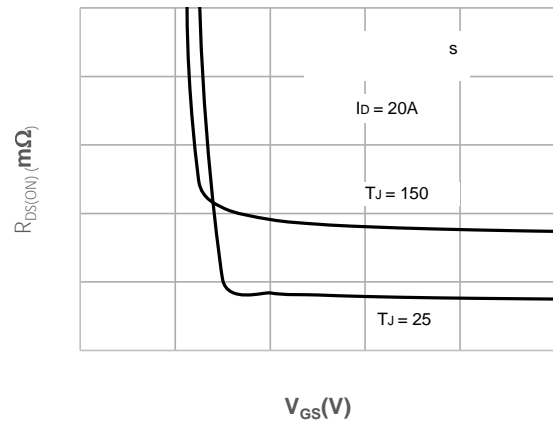
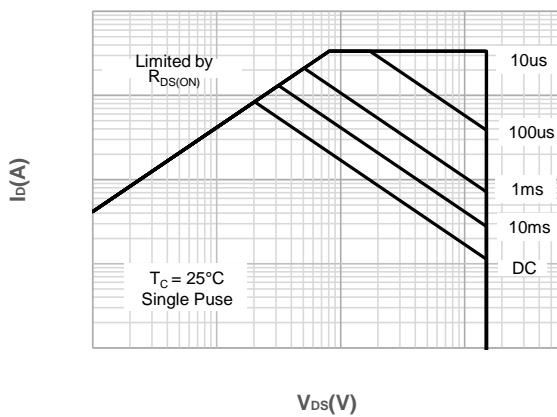


Figure 15: Maximum Safe Operating Area



Test Circuit

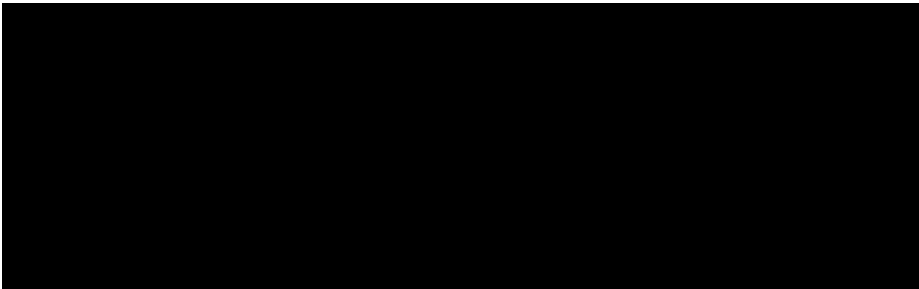


Figure 1: Gate Charge Test Circuit & Waveform

