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

Product Summary

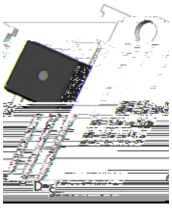
Parameters	Value	Unit
V_{DSS}	150	V
$V_{GS(th)\_Typ}$	3.2	V
I_D(@V_{GS}=10V)	84	A
$R_{DS(ON)\_Typ}$(@V_{GS}=10V)	8.1	mΩ

Applications

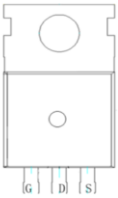
Load Switch

PWM Application

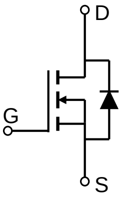
Power Management



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°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°C	84	A
		T_C = 100°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°C	170	W
		T_C = 100°C	68	
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Max	Unit
R	Thermal Resistance, Junction to Ambient(3)	28	°C/W
R	Thermal Resistance, Junction to Case	0.7	

Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu A$, $V_{GS} = 0V$	150	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 120V$, $V_{GS} = 0V$	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0V$, $V_{GS} = \pm 20V$	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	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	$V_{GS} = 10V$, $V_{DD} = 75V$ $I_D = 20A$, $R_{GEN} = 3\Omega$	-	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
trr	Body Diode Reverse Recovery Time	$I_F = 15A$, di/dt = 100A/us	-	85	-	ns
Qrr	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=25C, V_{DD}=75V, V_G=10V, R_G=25ohm, L=3mH, I_{AS}=16.1A, V_{DD}=0V during time in avalanche.
3. R is measured with the device mounted on a $1inch^2$ pad of 2oz copper FR4 PCB.
4. Pulse Test: Pulse Width 0.5%.

Typical Performance Characteristics

Figure 1: Power De-rating

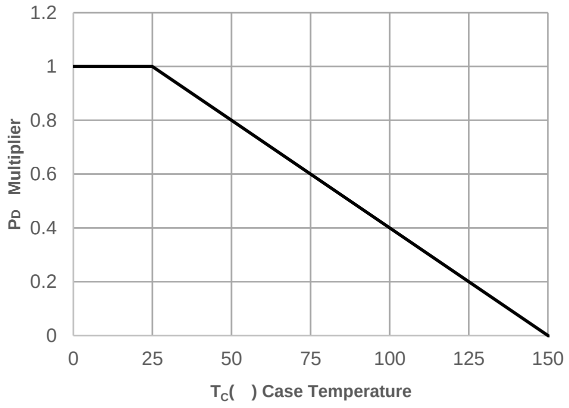
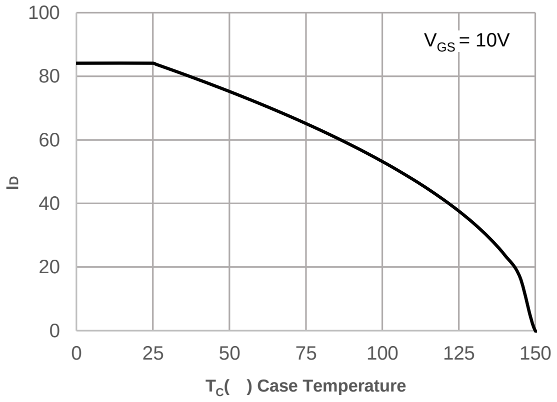


Figure 2: Current De-rating



Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

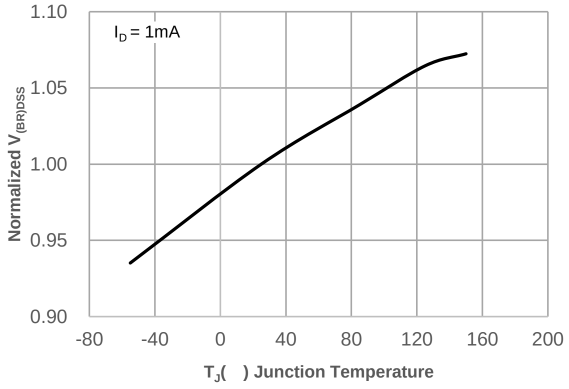


Figure 12: Normalized on Resistance vs. Junction Temperature

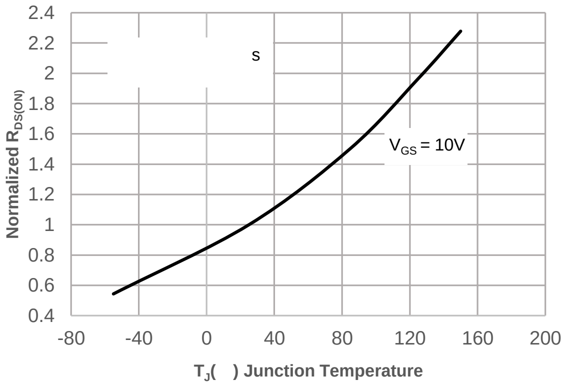


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

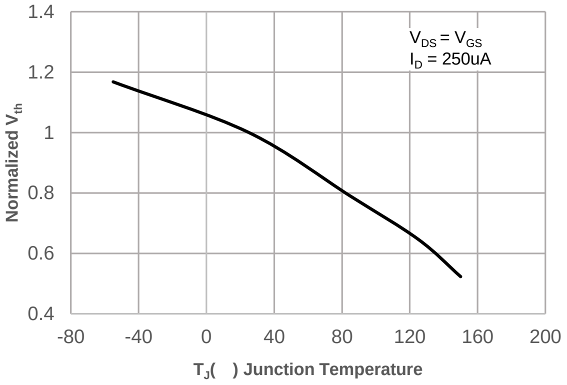


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

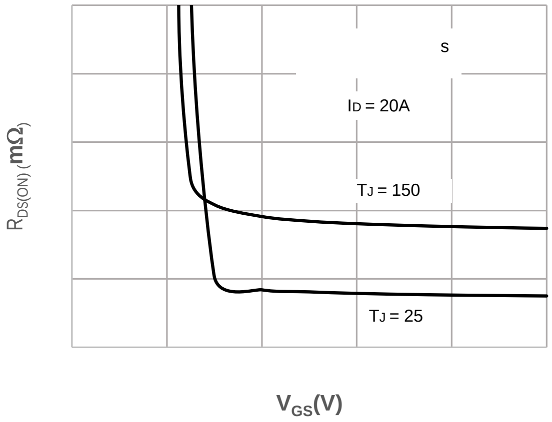
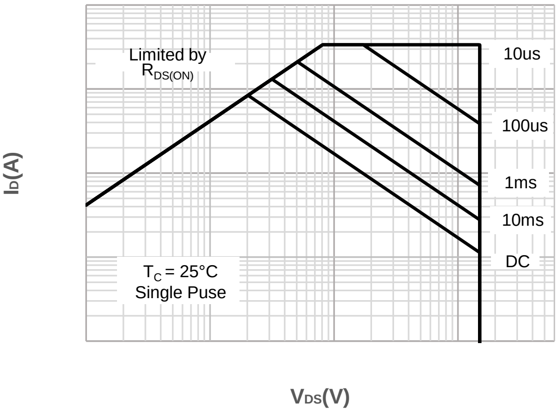


Figure 15: Maximum Safe Operating Area



Test Circuit

Figure 1: Gate Charge Test Circuit & Waveform