JMSH040SPE7Q

Features

- Ultra-low ON-resistance, $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested
- 100% Vds Tested
- Halogen-free; RoHS-compliant
- AEC-Q101 Qualified

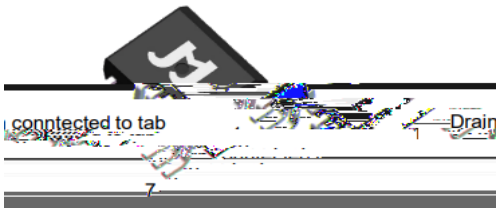
Applications

- Load Switch
- PWM Application
- General Automotive Application

Product Summary

Parameters	Value	Unit
V_{DSS}	40	V
$V_{GS(th)\_Typ}$	2.8	V
I_D(@V_{GS}=10V)	415	A
$R_{DS(ON)\_Typ}$(@V_{GS}=10V)	0.9	m

RoHS



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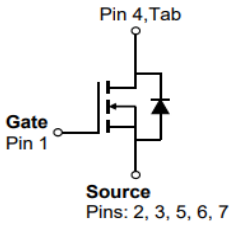


Schematic Diagram

Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMSH040SPE7Q-13	SH040SPQ	1	Tape&Reel	TO-263-7L	800	4000

Absolute Maximum Ratings (@ T_C = 25℃ unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-to-Source Voltage		40	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C = 25℃	415	A
		T_C = 100℃	294	
I_{DM}	Pulsed Drain Current [1]		Refer to Fig.4	A
E_{AS}	Single Pulsed Avalanche Energy [2]		850	mJ
P_D	Power Dissipation	T_C = 25℃	375	W
		T_C = 100℃	188	
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 175	℃

Thermal Characteristics

Symbol	Parameter	Max	Unit
R	Thermal Resistance, Junction to Ambient[3]	34	℃/W
R	Thermal Resistance, Junction to Case	0.4	

Electrical Characteristics (T_J = 25℃ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250 A, V_{GS} = 0V	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 32V, V_{GS} = 0V	-	-	1.0	A
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 = 250 A	2.0	2.8	3.6	V
$R_{DS(ON)}$	Static Drain-Source Ob-Resistance (4)	V_{GS} = 10V, I_D = 20A	-	0.9	1.2	m
Dynamic Characteristics						
R_g	Gate Resistance	f = 1MHz	-	1.2	-	
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} =20V, f = 1MHz	4818	6745	10117	pF
C_{oss}	Output Capacitance		2504	3505	5257	pF
C_{rss}	Reverse Transfer Capacitance		163	228	456	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 20V, I_D = 20A	70	99	148	nC
Q_{gs}	Gate Source Charge		21	29	44	nC
Q_{gd}	Gate Drain("Miller") Charge		17	24	36	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 20V I_D= 20A, R_{GEN} = 3	-	23	-	ns
t_r	Turn-On Rise Time		-	28	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	52	-	ns
t_f	Turn-Off Fall Time		-	24	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	415	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	1662	A
V_{SD}	Body Diode Forward Voltage		-		1.2	V
trr	Body Diode Reverse Recovery Time		50	70	106	ns
Qrr	Body Diode Reverse Recovery Charge		-	116	-	nC

2. E_{AS} condition: Starting T_J=25C, V_{DD}=20V, V_{GS}=10V, R_G=25ohm, L=3mH, I_{AS}=23.8A, V_{DD}=0V during time in avalanche.

2

4. Pulse Test: Pulse Width 0.5%.

Typical Performance Characteristics

Figure 1: Power De-rating

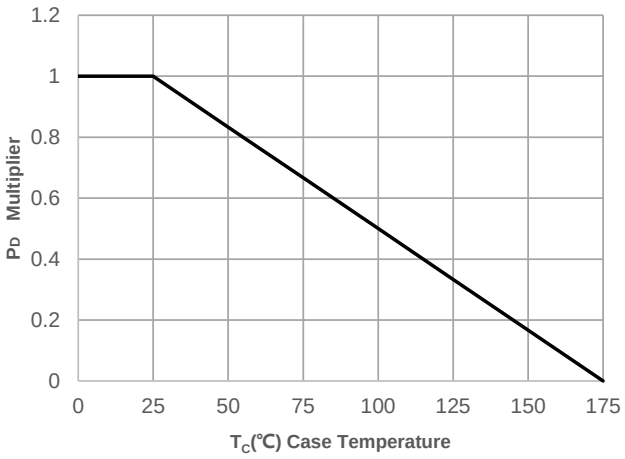
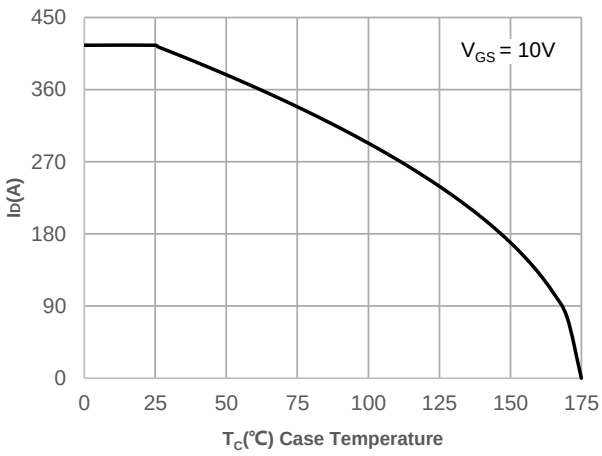
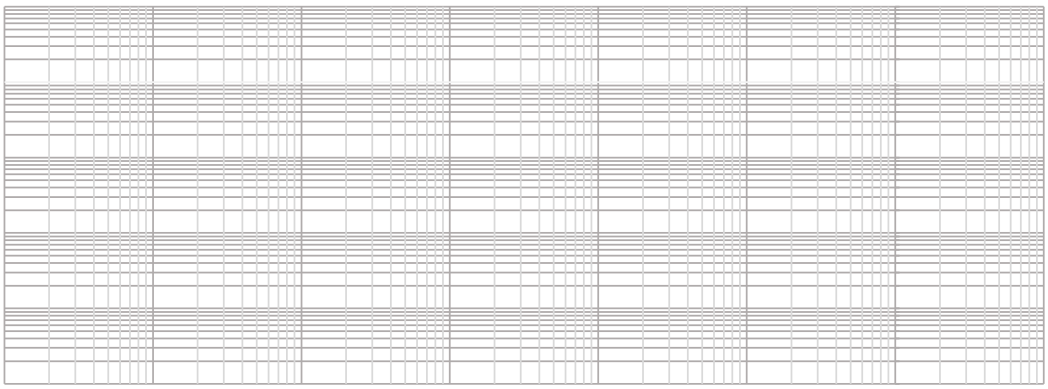


Figure 2: Current De-rating





Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

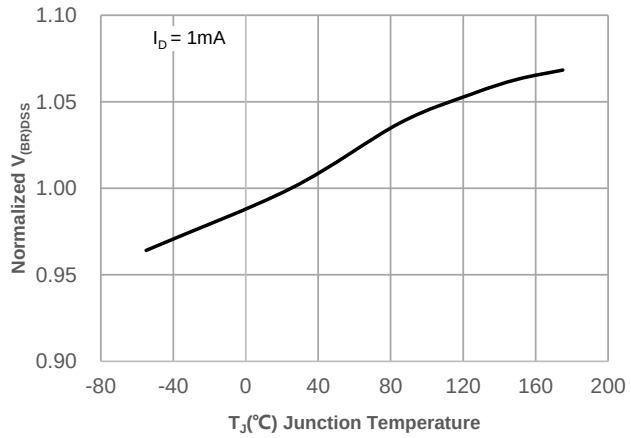
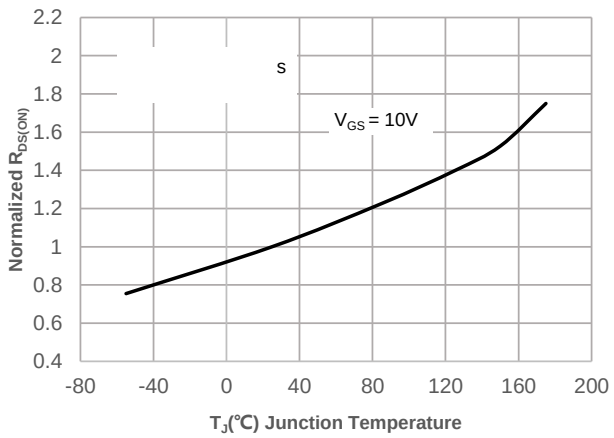
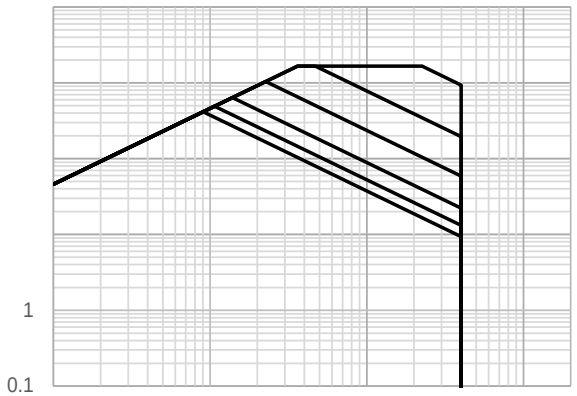


Figure 12: Normalized on Resistance vs. Junction Temperature





Test Circuit

Figure 1: Gate Charge Test Circuit & Waveform

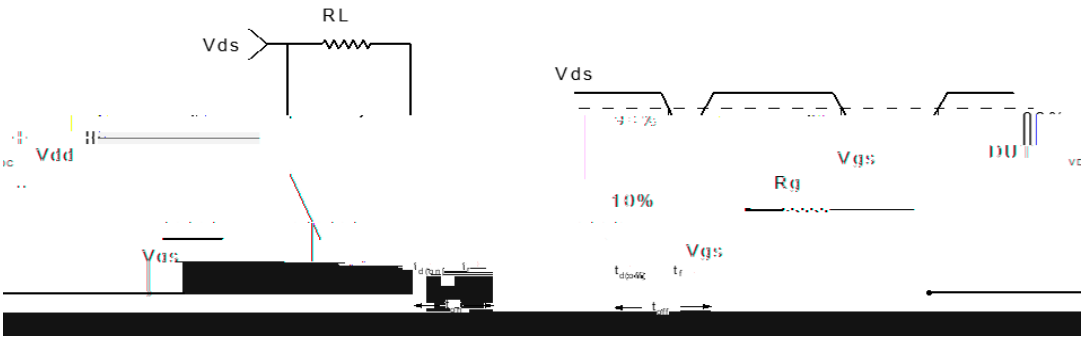


Figure 2: Resistive Switching Test Circuit & Waveform

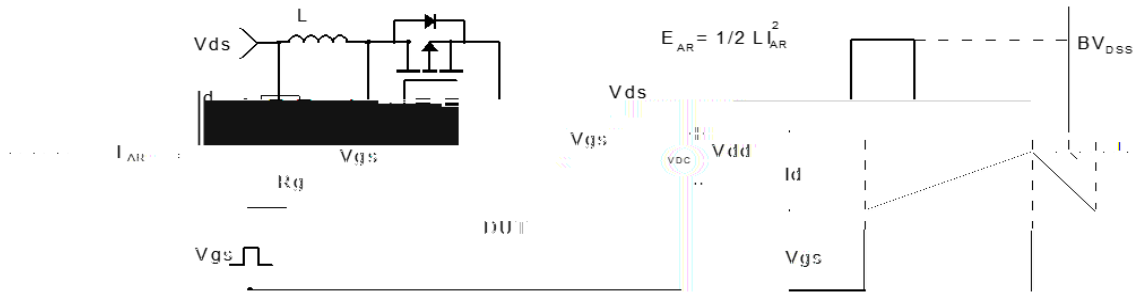


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

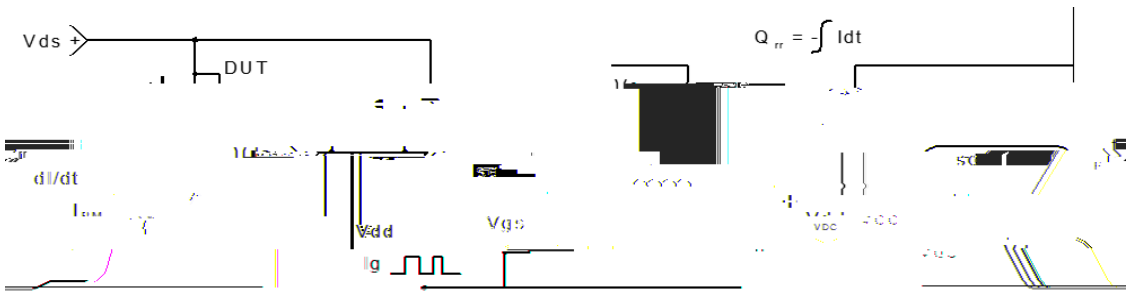
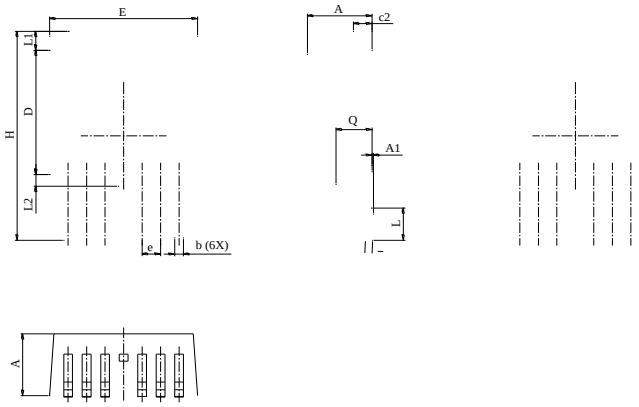


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(TO-263 -7L)



			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

232.78 592.597 32.57 61.444 282047 81.92.597 32.03133 2S444 251.78 I2S33.