



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

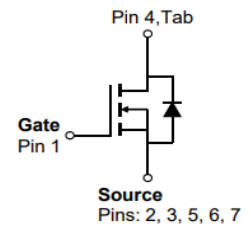
- Load Switch
- PWM Application
- General Automotive Application

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



TO-263 -7L



Schematic Diagram

Ordering Information

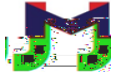
Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMSH040SPE7Q-13	SH040SPQ	1	Tape&Reel	TO-263-7L	800	4000

Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ 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	$T_C = 25^\circ\text{C}$	415
		$T_C = 100^\circ\text{C}$	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	$T_C = 25^\circ\text{C}$	375
		$T_C = 100^\circ\text{C}$	188
T_J, T_{STG}	Junction & Storage Temperature Range	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Max	Unit
R	Thermal Resistance, Junction to Ambient ⁽³⁾	34	$^\circ\text{C}/\text{W}$
R	Thermal Resistance, Junction to Case	0.4	

**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	$I_D = 250\text{ A}, V_{GS} = 0\text{V}$	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$	-	-	1.0	A
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	$V_{DS} = V_{GS}, I_D = 250\text{ A}$	2.0	2.8	3.6	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ⁽⁴⁾	$V_{GS} = 10\text{V}, I_D = 20\text{A}$	-	0.9	1.2	m
Dynamic Characteristics						
R_g	Gate Resistance	$f = 1\text{MHz}$	-	1.2	-	
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 20\text{V}, f = 1\text{MHz}$	4818	6745	10117	pF
C_{oss}	Output Capacitance		2504	3505	5257	pF
C_{riss}	Reverse Transfer Capacitance		163	228	456	pF
Q_g	Total Gate Charge	$V_{GS} = 0\text{ to }10\text{V}$ $V_{DS} = 20\text{V}, I_D = 20\text{A}$	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 Delay Time	$V_{GS} = 10\text{V}, V_{DD} = 20\text{V}$ $I_D = 20\text{A}, R_{GEN} = 3$	-	23	-	ns
t_r	Turn-On Rise Time		-	28	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	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
t_{rr}	Body Diode Reverse Recovery Time		50	70	106	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	116	-	nC

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

2

4. Pulse Test: Pulse Width 0.5%.



Typical Performance Characteristics

Figure 1: Power De-rating

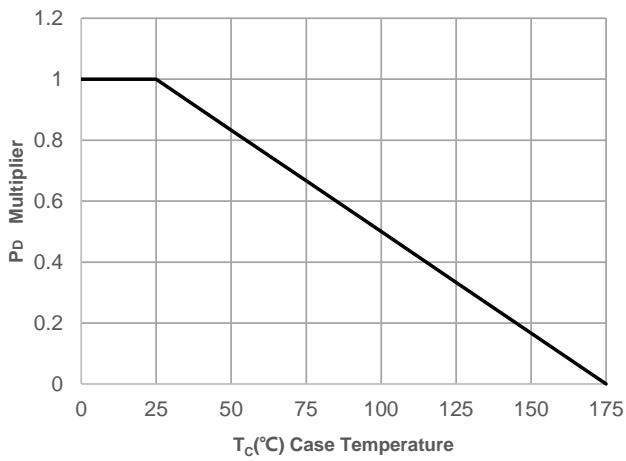
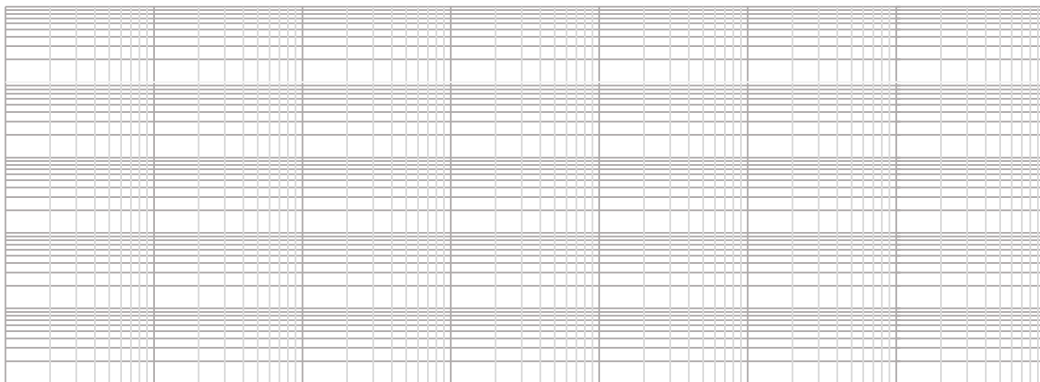
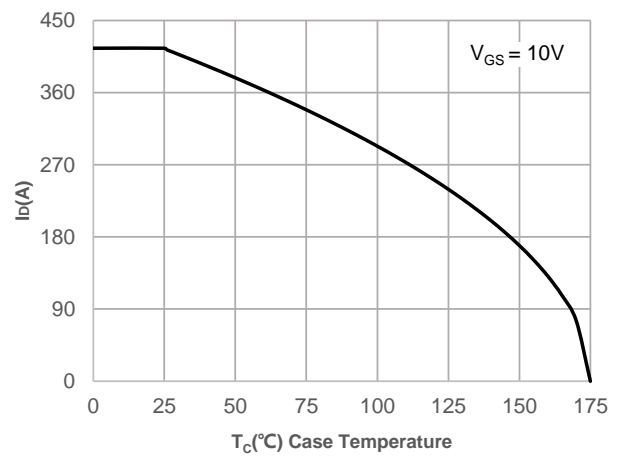


Figure 2: Current De-rating



Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

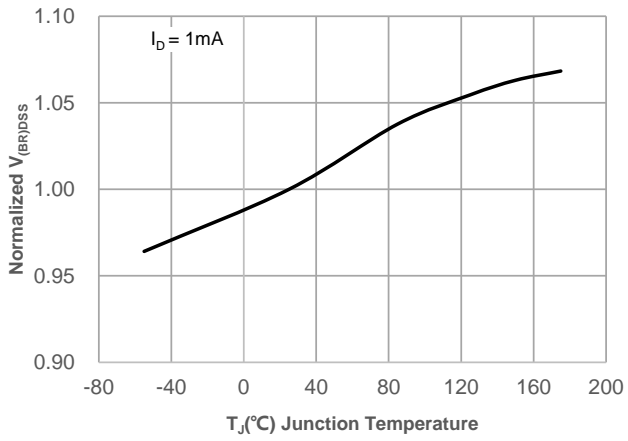
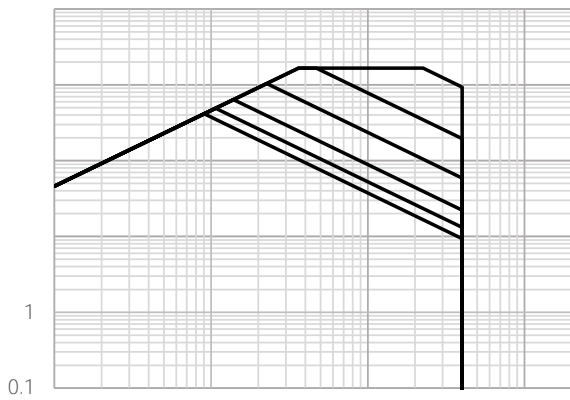
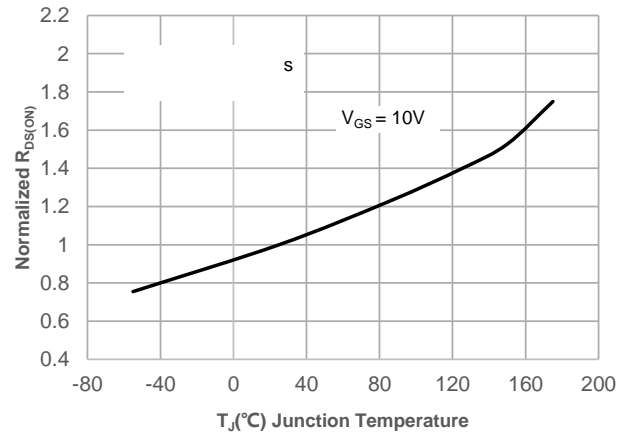


Figure 12: Normalized on Resistance vs. Junction Temperature



Test Circuit



Figure 1: Gate Charge Test Circuit & Waveform

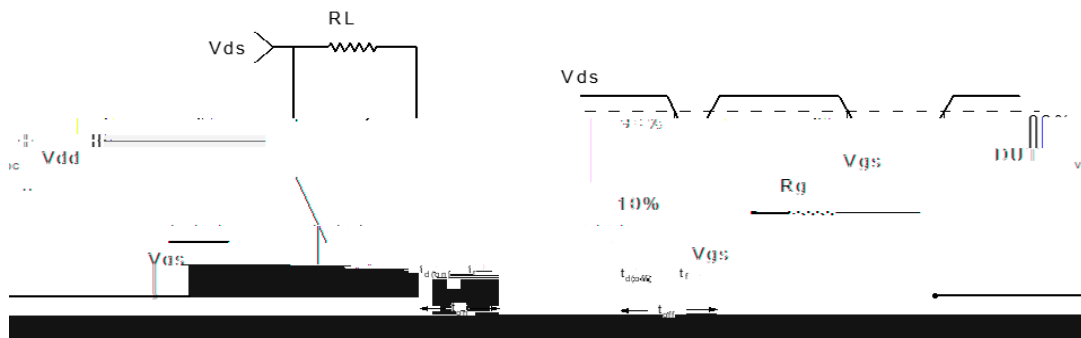


Figure 2: Resistive Switching Test Circuit & Waveform

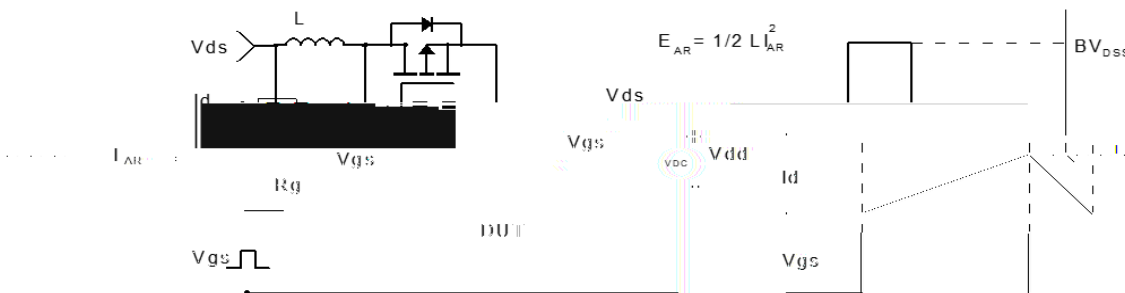


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

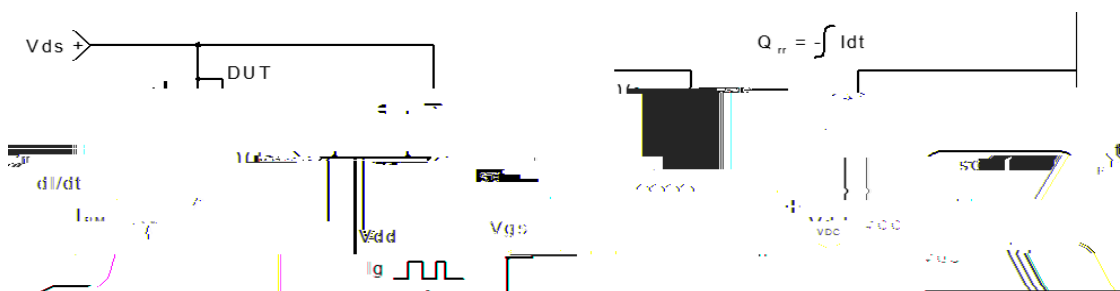
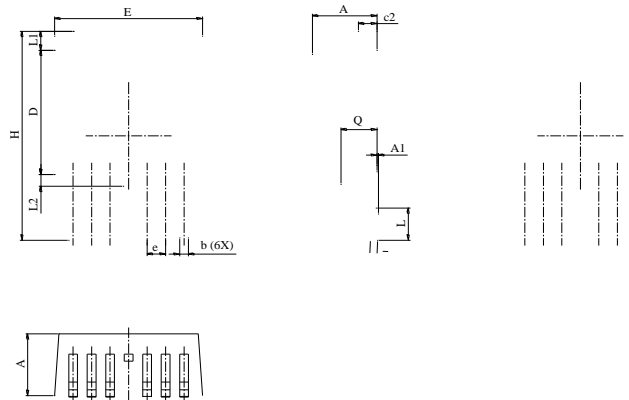


Figure 4: Diode Recovery Test Circuit & Waveform





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

037210DITC90S/0046403074001553002/016/D40/78 202303 232.78 892.597 32.57 81.444 282047 81.92.597 32.03133 25444 251.78 12833.1

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