

JMSH0401MGQ

Product Summary

Parameters	Value	Unit
V_{DSS}	40	V
$V_{GS(th_Typ)}$	2.7	V
$I_D(@V_{GS}=10V)$	223	A
$R_{DS(ON)_Typ}(@V_{GS}=10V)$	1.4	m

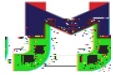
Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMSH0401MGQ-13	SH0401MQ	1	Tape&Reel	PDFN5x6-8L	5000	50000

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	$T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	223 158	A
I_{DM}	Pulsed Drain Current ⁽¹⁾	Refer to Fig.4	A	
E_{AS}	Single Pulsed Avalanche Energy ⁽²⁾	459	mJ	
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	157 78	W
T_J STG			$^\circ\text{C}$	

Symbol	Parameter	Max	Unit
R_{JA}	Thermal Resistance, Junction to Ambient ⁽³⁾	42	$^\circ\text{C/W}$
R_{JC}	Thermal Resistance, Junction to Case	1.0	$^\circ\text{C/W}$

**Electrical Characteristics** ($T_J = 25^\circ\text{C}$ unless otherwise specified)

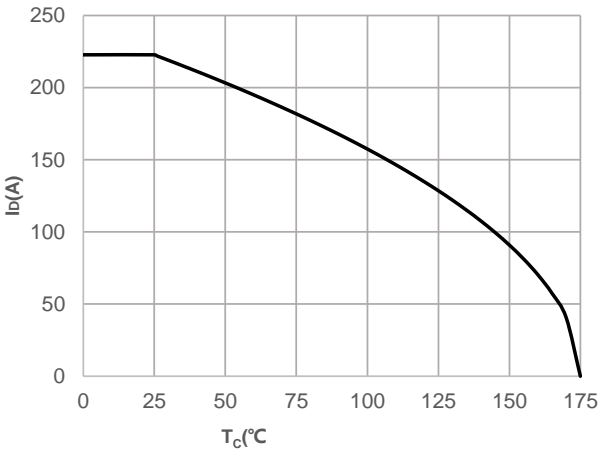
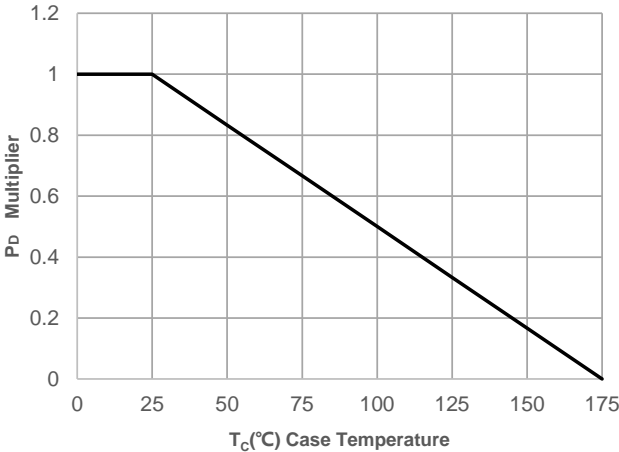
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\text{ A}, V_{GS} = 0\text{V}$	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$	-	-	1.0	
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	± 100	
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ A}$	1.9	2.7	3.5	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance ⁽⁴⁾	$V_{GS} = 10\text{V}, I_D = 20\text{A}$	-	1.4	1.7	m
Dynamic Characteristics						
R_g	Gate Resistance	$f = 1\text{MHz}$	-	0.9	-	
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 20\text{V},$ $f = 1\text{MHz}$	2589	3625	4893	pF
C_{oss}	Output Capacitance		1413	1979	2671	pF
C_{riss}	Reverse Transfer Capacitance		113	158	213	pF
Q_g	Total Gate Charge	$V_{GS} = 0\text{ to }10\text{V}$ $V_{DS} = 20\text{V}, I_D = 20\text{A}$	42	59	80	nC
Q_{GS}	Gate Source Charge		11	15	21	nC
Q_{gd}	Gate Drain("Miller") Charge		12	16	22	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	$V_{GS} = 10\text{V}, V_{DD} = 20\text{V}$ $I_D = 20\text{A}, R_{GEN} = 3$	-	16	-	ns
t_r	Turn-On Rise Time		-	29	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	35	-	ns
t_f	Turn-Off Fall Time		-	13	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	223	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	891	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	$I_F = 20\text{A}, di/dt = 100\text{A/us}$	37	52	70	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	66	-	nC

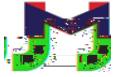
- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting $T_J = 25^\circ\text{C}$, $V_{DD} = 20\text{V}$, $V_{GS} = 10\text{V}$, $R_G = 25\text{ohm}$, $L = 3\text{mH}$, $I_{AS} = 17.5\text{A}$, $V_{DD} = 0\text{V}$ during time in avalanche.
 3. R_{JA} is measured with the device mounted on a 1inch^2 pad of 2oz copper FR4 PCB.
 4. Pulse Test: Pulse Width $300\mu\text{s}$, Duty Cycle 0.5% .



Typical Performance Characteristics

Figure 1: Power De-rating





Typical Performance Characteristics

Figure 5: Output Characteristics

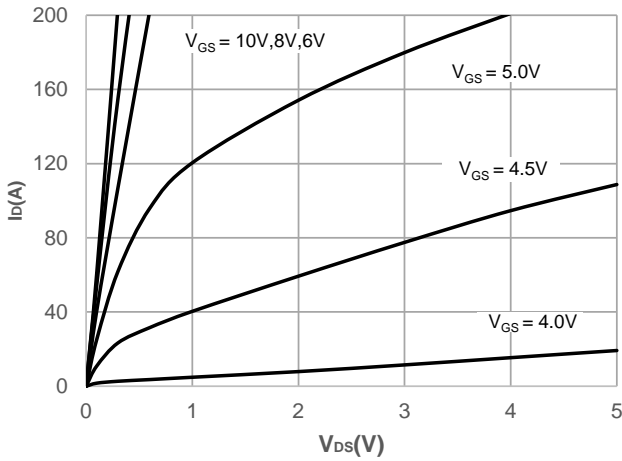


Figure 6: Typical Transfer Characteristics

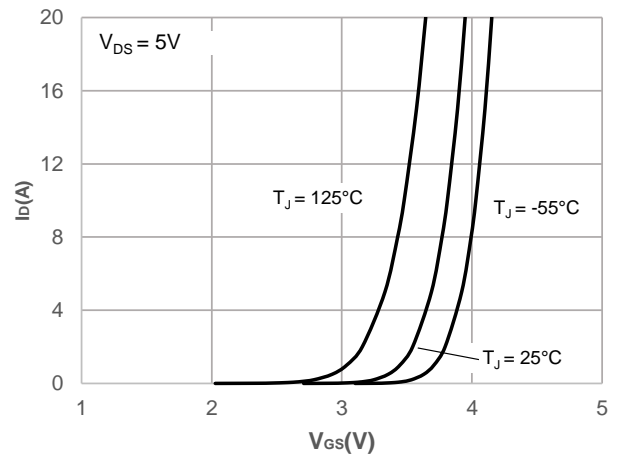


Figure 7: On-resistance vs. Drain Current

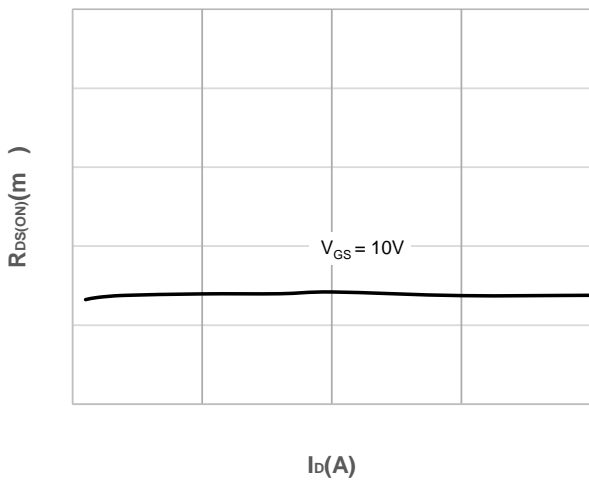


Figure 8: Body Diode Characteristics

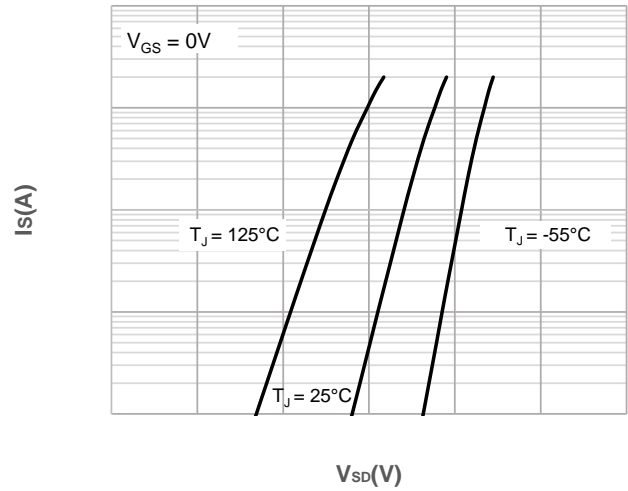


Figure 9: Gate Charge Characteristics

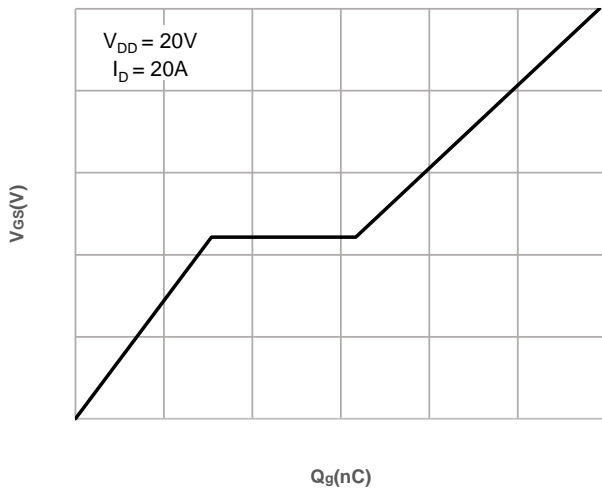
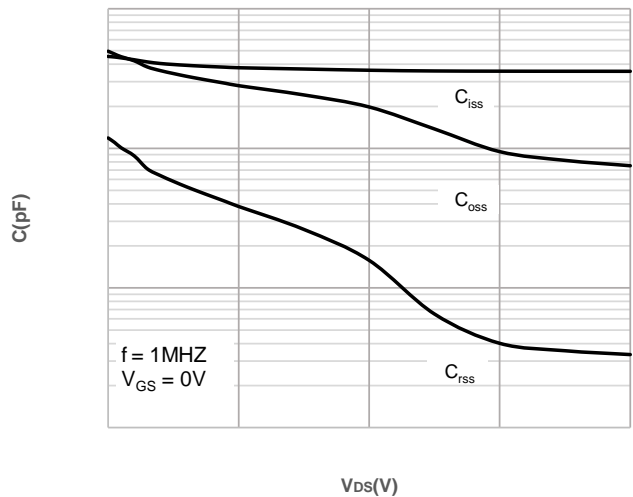


Figure 10: Capacitance Characteristics



Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

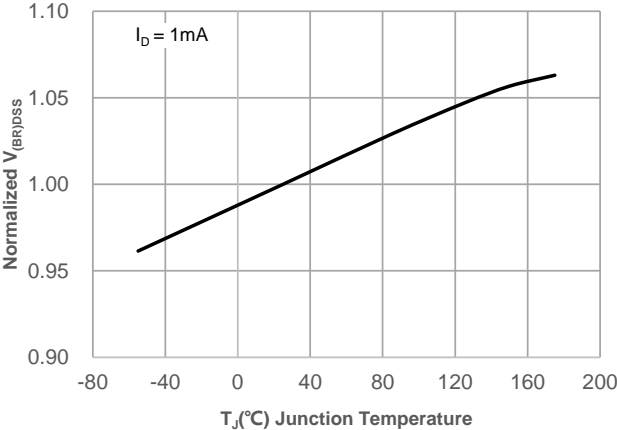


Figure 12: Normalized on Resistance vs. Junction Temperature

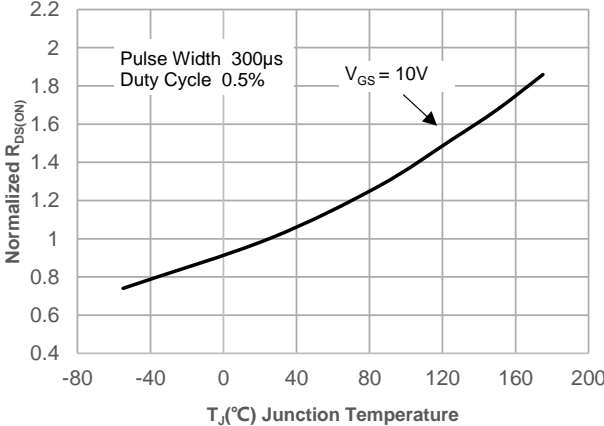
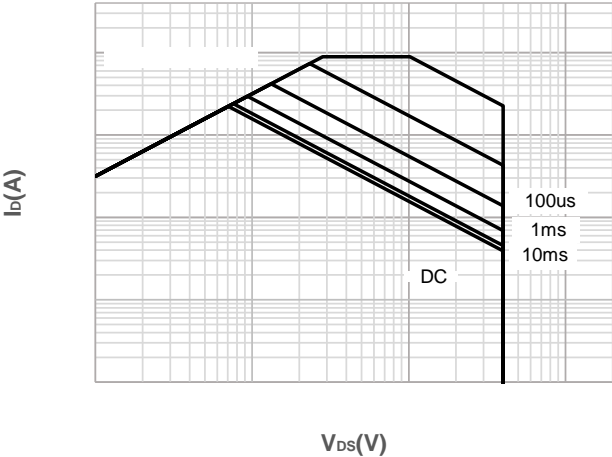


Figure 15: Maximum Safe Operating Area

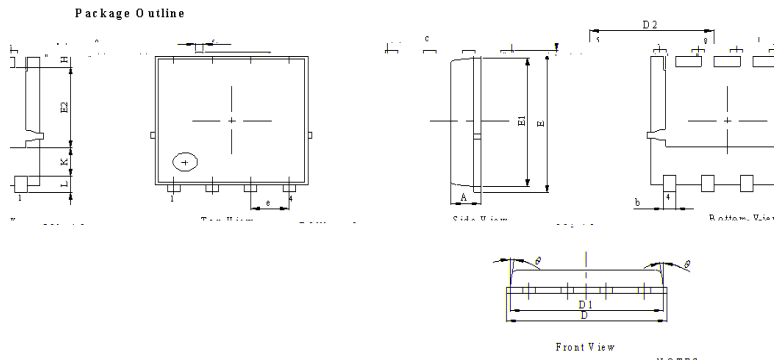


Test Circuit

Figure 1: Gate



Package Mechanical Data(PDFN5X6-8L)



tolerance per ASME Y14.5M, 1994.
in millimeter (angle in degree).

NOTES:
1. Dimension and
2. All dimensions
3. Dimension in

MILLIMETER	
MAX.	MIN.
1	1.15
1.1	1.1
1.15	1.1
5.05	5.15
4.1	4.2
6.15	6.25
5.6	5.7
0.6	0.7
0.7	0.8
0.8	0.9
0.9	1.0
1.0	1.1
1.1	1.2
1.2	1.3
1.3	1.4
1.4	1.5
1.5	1.6
1.6	1.7
1.7	1.8
1.8	1.9
1.9	2.0
2.0	2.1
2.1	2.2
2.2	2.3
2.3	2.4
2.4	2.5
2.5	2.6
2.6	2.7
2.7	2.8
2.8	2.9
2.9	3.0
3.0	3.1
3.1	3.2
3.2	3.3
3.3	3.4
3.4	3.5
3.5	3.6
3.6	3.7
3.7	3.8
3.8	3.9
3.9	4.0
4.0	4.1
4.1	4.2
4.2	4.3
4.3	4.4
4.4	4.5
4.5	4.6
4.6	4.7
4.7	4.8
4.8	4.9
4.9	5.0
5.0	5.1
5.1	5.2
5.2	5.3
5.3	5.4
5.4	5.5
5.5	5.6
5.6	5.7
5.7	5.8
5.8	5.9
5.9	6.0
6.0	6.1
6.1	6.2
6.2	6.3
6.3	6.4
6.4	6.5
6.5	6.6
6.6	6.7
6.7	6.8
6.8	6.9
6.9	7.0
7.0	7.1
7.1	7.2
7.2	7.3
7.3	7.4
7.4	7.5
7.5	7.6
7.6	7.7
7.7	7.8
7.8	7.9
7.9	8.0
8.0	8.1
8.1	8.2
8.2	8.3
8.3	8.4
8.4	8.5
8.5	8.6
8.6	8.7
8.7	8.8
8.8	8.9
8.9	9.0
9.0	9.1
9.1	9.2
9.2	9.3
9.3	9.4
9.4	9.5
9.5	9.6
9.6	9.7
9.7	9.8
9.8	9.9
9.9	10.0



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