

Description

The HM40N02Q uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

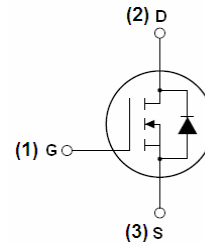
- $V_{DS} = 20V, I_D = 40A$
 $R_{DS(ON)} < 5m\Omega @ V_{GS} = 4.5V$
- High density cell design for ultra low $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

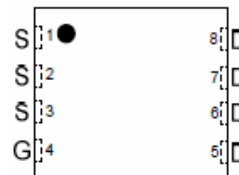
- Load switching
- Hard switched and high frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

100% ΔV_{DS} TESTED!



Schematic diagram



Pin Assignment



DFN 3.3x3.3 EP top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HM40N02Q	HM40N02Q	DFN3X3-8L	-	-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	40	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D (100^\circ C)$	28	A
Pulsed Drain Current	I_{DM}	120	A
Maximum Power Dissipation	P_D	60	W
Derating factor		0.48	W/ $^\circ C$
Single pulse avalanche energy (Note 5)	E_{AS}	200	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	2.1	$^\circ C/W$
---	-----------------	-----	--------------

Electrical Characteristics (T_C=25°C unless otherwise noted)

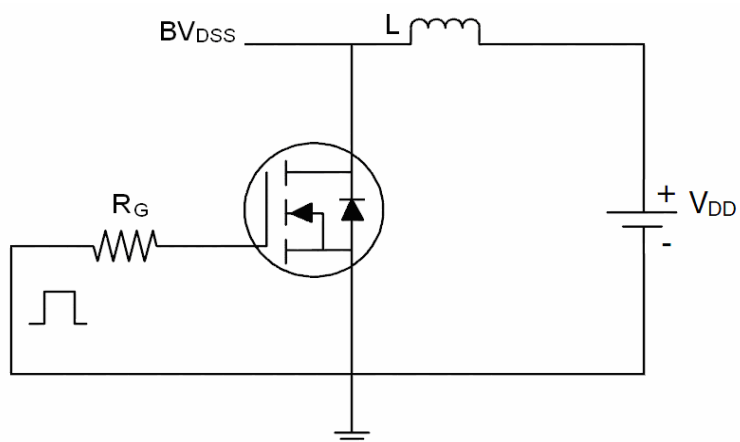
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	20	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =20V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.4	0.7	1.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =20 A	-	3.8	5.0	mΩ
		V _{GS} =2.5V, I _D =15A		4.6	7.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =20A	15	-	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{iss}	V _{DS} =10V, V _{GS} =0V, F=1.0MHz	-	2000	-	PF
Output Capacitance	C _{Oss}		-	500	-	PF
Reverse Transfer Capacitance	C _{rss}		-	200	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V, I _D =2A, R _L =1Ω V _{GS} =4.5V, R _G =3Ω	-	6.4	-	nS
Turn-on Rise Time	t _r		-	17.2	-	nS
Turn-Off Delay Time	t _{d(off)}		-	29.6	-	nS
Turn-Off Fall Time	t _f		-	16.8	-	nS
Total Gate Charge	Q _g	V _{DS} =10V, I _D =20A, V _{GS} =10V	-	27		nC
Gate-Source Charge	Q _{gs}		-	6.5		nC
Gate-Drain Charge	Q _{gd}		-	6.4		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =10A	-		1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	40	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 20A di/dt = 100A/μs ^(Note3)	-	25	-	nS
Reverse Recovery Charge	Q _{rr}		-	24	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

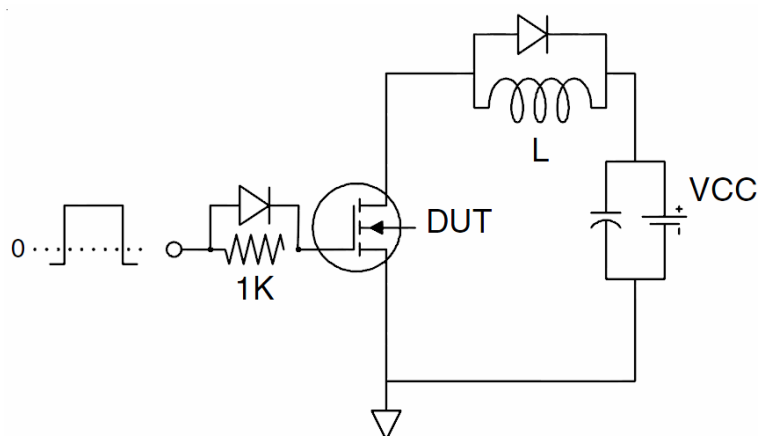
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E_{AS} condition : T_J=25°C, V_{DD}=10V, V_G=10V, L=0.5mH, R_G=25Ω.

Test circuit

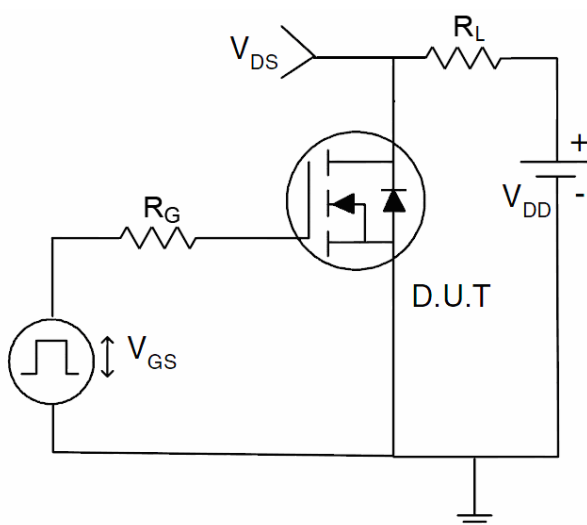
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

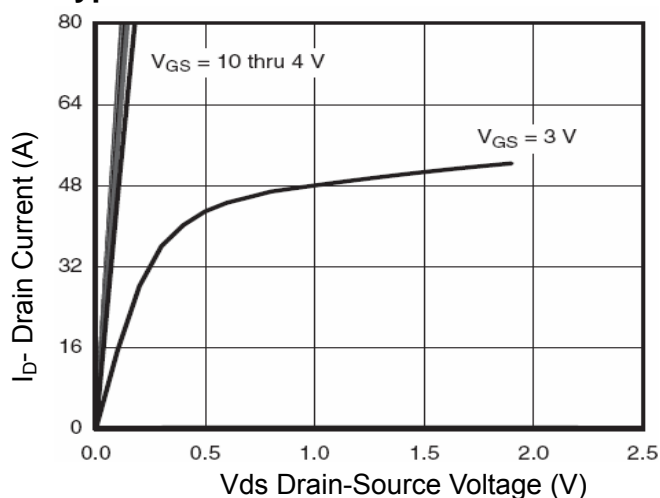


Figure 1 Output Characteristics

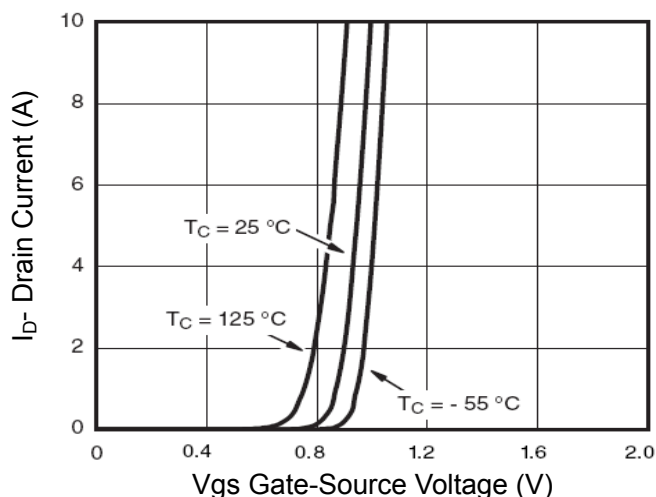


Figure 2 Transfer Characteristics

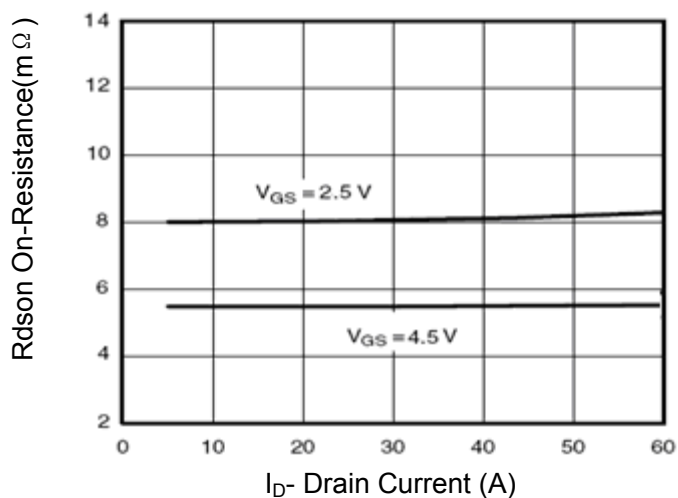


Figure 3 Rdson- Drain Current

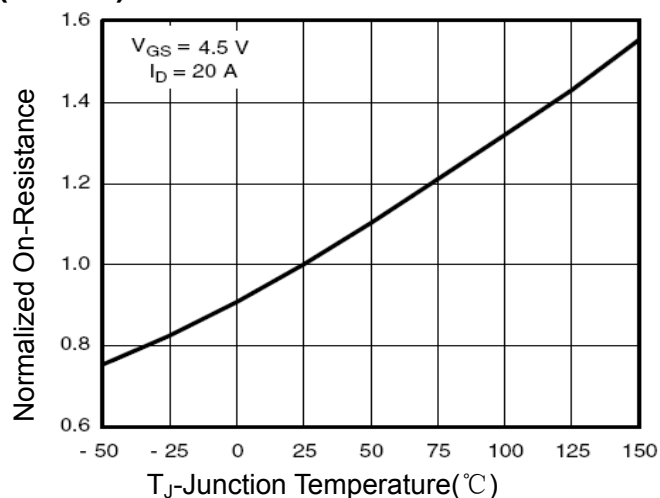


Figure 4 Rdson-Junction Temperature

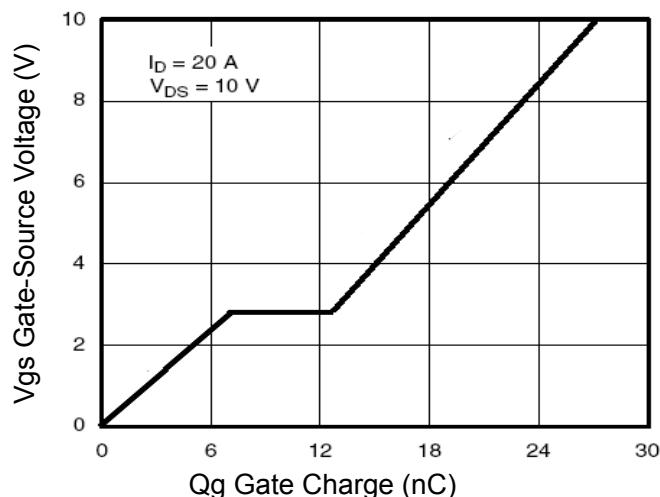


Figure 5 Gate Charge

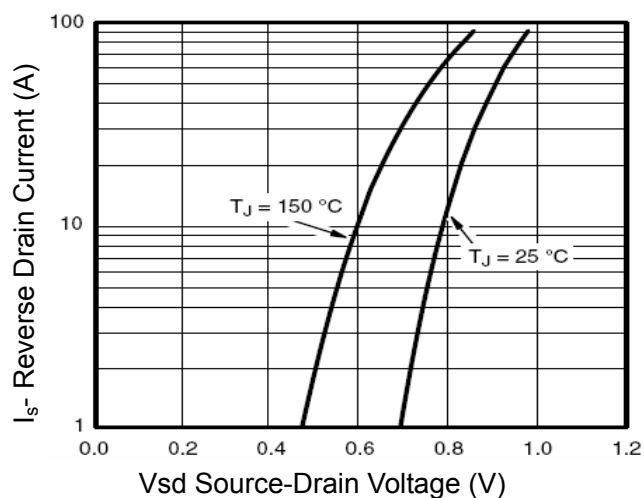


Figure 6 Source- Drain Diode Forward

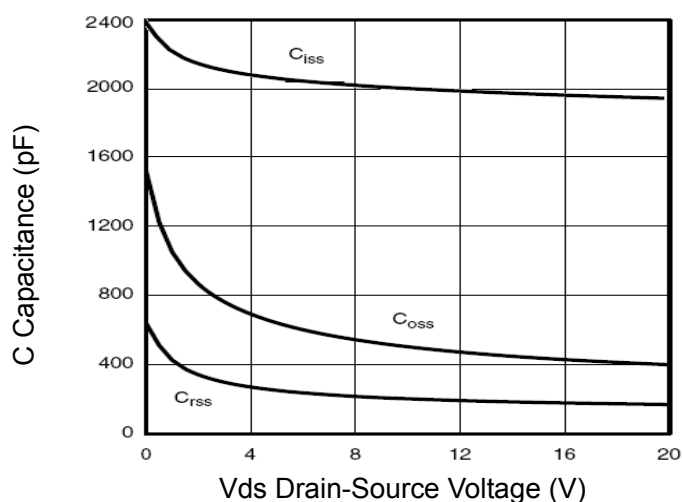


Figure 7 Capacitance vs Vds

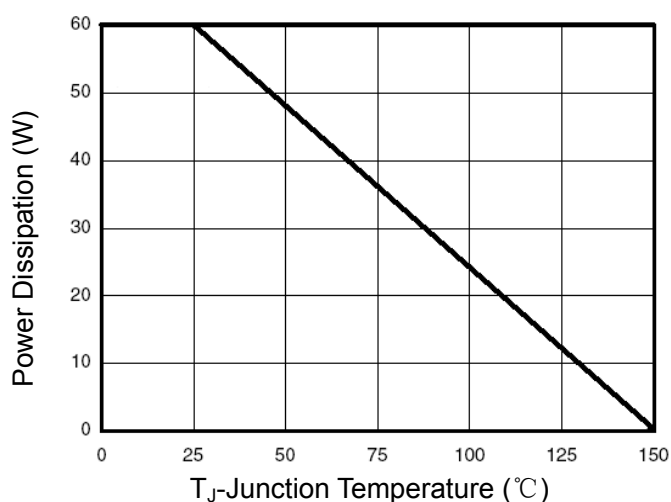


Figure 9 Power De-rating

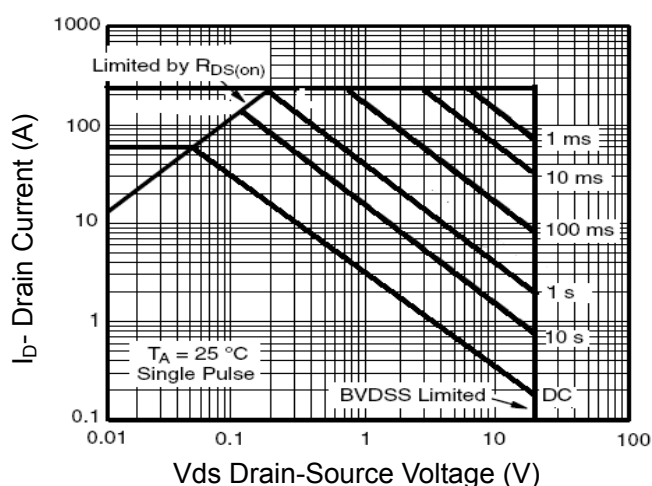


Figure 8 Safe Operation Area

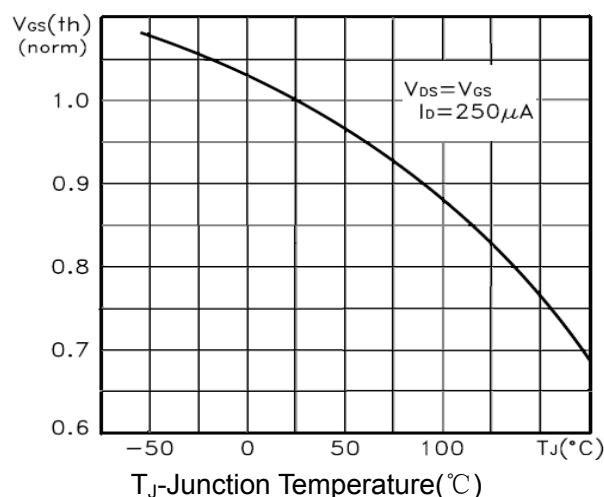


Figure 10 $V_{GS(th)}$ vs Junction Temperature

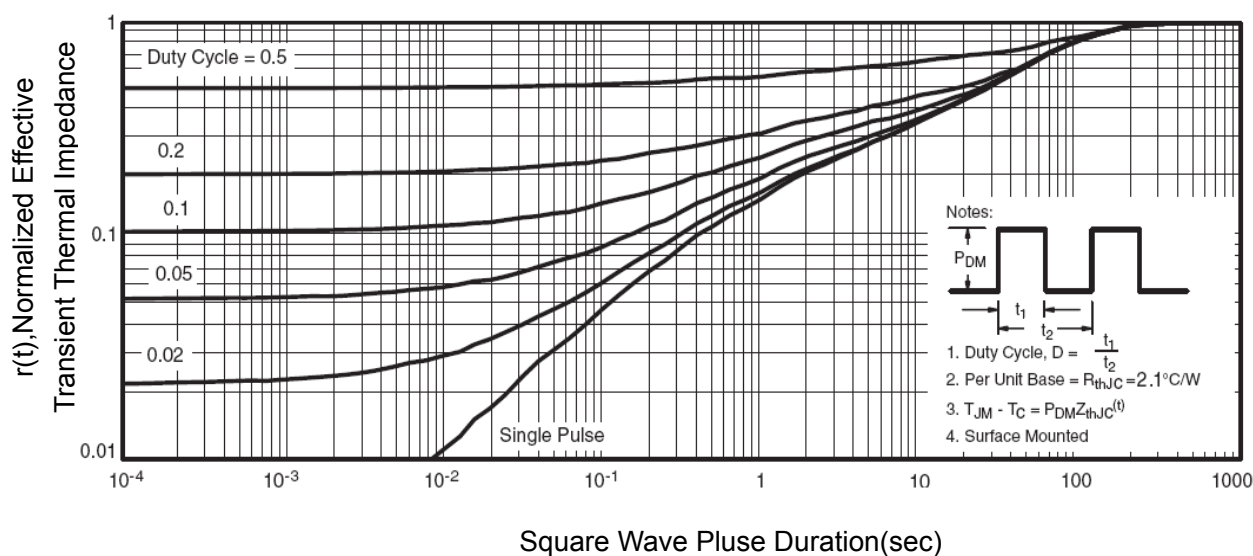
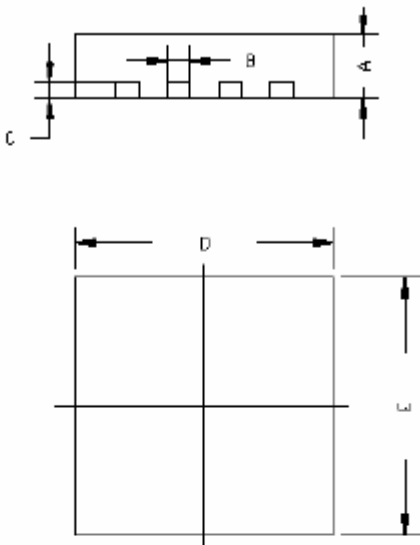


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN3.3X3.3 EP Package Information

封装外形尺寸图				
	符号	单位: mm		
		MIN	MAX	TYP
	A	0.75	0.85	0.8
B	0.25	0.35	0.3	
C	0.18	0.22	0.2	
D	3.2	3.3	3.25	
E	3.2	3.3	3.25	
F	2.2	2.5	2.35	
G	1.8	2.0	1.9	
H	0.3	0.4	0.35	
I	0.15	0.25	0.2	
J	0.4	0.5	0.45	
K	0.6	0.7	0.65	
L	1.38	1.58	1.48	
M	1.8	2.1	1.95	
N	0.15*45°			
O	0.4	0.5	0.45	