

Silicon N-Channel Power MOSFET

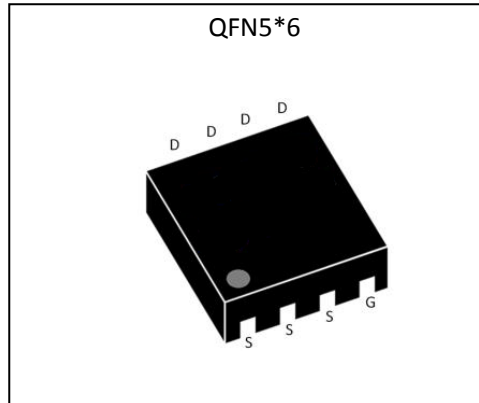
General Description :

The HMQ120N10 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. The package form is QFN5*6, which accords with the RoHS standard.

V_{DSS}	100	V
I_D	120	A
P_D	120	W
$R_{DS(ON)max}$	5	m Ω

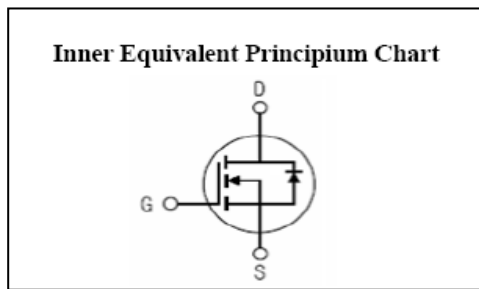
Features :

- $R_{DS(ON)} < 5m\Omega @ V_{GS}=10V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation



Applications :

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



Absolute ($T_c = 25^\circ C$ unless otherwise specified) :

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	100	V
I_D	Continuous Drain Current	120	A
I_{DM}	Pulsed Drain Current	480	A
V_{GS}	Gate-to-Source Voltage	± 20	V
P_D	Power Dissipation	120	W
	Derating factor	0.8	W/ $^\circ C$
E_{AS}	Single pulse avalanche energy ^{a5}	700	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature Range	175, -55 to 175	$^\circ C$

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

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	100	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=100V, V_{GS}=0V, T_a=25^\circ\text{C}$	--	--	1.0	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+20V$	--	--	0.1	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-20V$	--	--	-0.1	μA

ON Characteristics^{a3}						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=60A$	--	--	5.0	$m\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.8	3.0	V

Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$

Dynamic Characteristics^{a4}						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=60A$	60	--	--	S
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=50V$ $f=1.0\text{MHz}$	--	4600	--	pF
C_{oss}	Output Capacitance		--	380	--	
C_{rss}	Reverse Transfer Capacitance		--	25	--	

Resistive Switching Characteristics^{a4}						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=50V, I_D=60A$ $V_{GS}=10V, R_G=4.7\Omega$	--	14	--	ns
t_r	Rise Time		--	60	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	41	--	
t_f	Fall Time		--	8	--	
Q_g	Total Gate Charge	$V_{DD}=50V, I_D=60A$ $V_{GS}=10V$	--	72	--	nC
Q_{gs}	Gate to Source Charge		--	26	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	10	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current ^{a2} (Body Diode)		--	--	120	A
V_{SD}	Diode Forward Voltage ^{a3}	$I_S=120A, V_{GS}=0V$	--	--	1.2	V

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case ^{a2}	1.25	°C/W

^{a1} : Repetitive Rating: Pulse width limited by maximum junction temperature.

^{a2} : Surface Mounted on FR4 Board, $t \leq 10\text{sec}$.

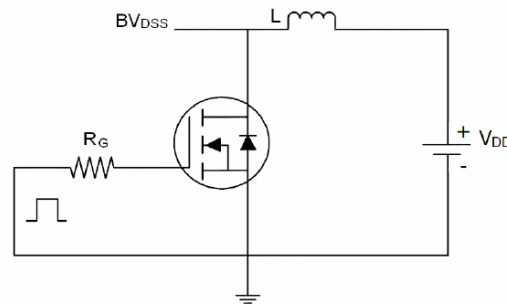
^{a3} : Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

^{a4} : Guaranteed by design, not subject to production

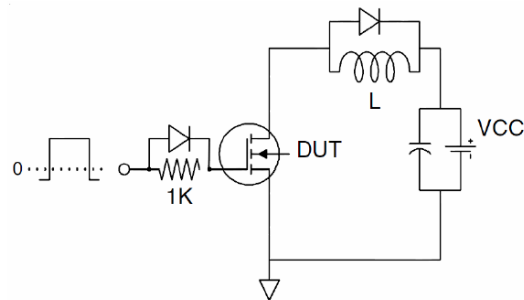
^{a5} : EAS condition : $T_j=25^\circ\text{C}, V_{DD}=50\text{V}, V_G=10\text{V}, L=0.5\text{mH}, R_g=25\Omega$

Test circuit

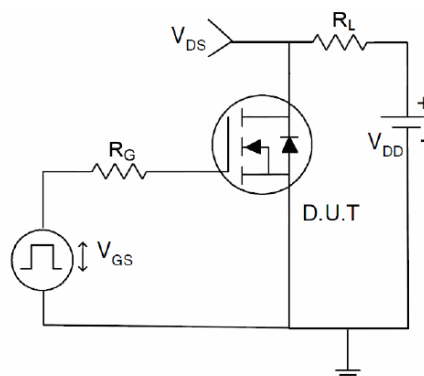
1) EAS test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Characteristics Curve :

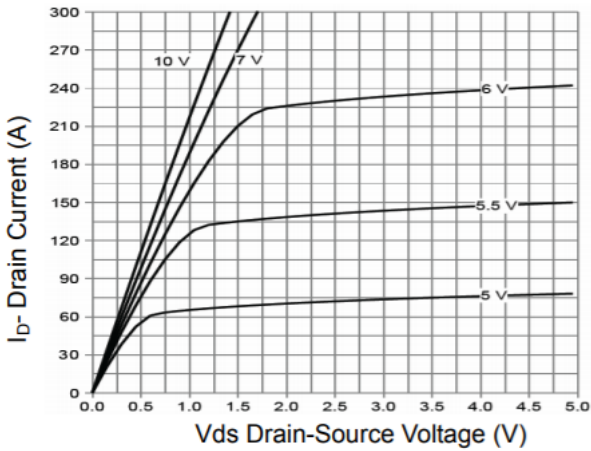


Figure 1 Output Characteristics

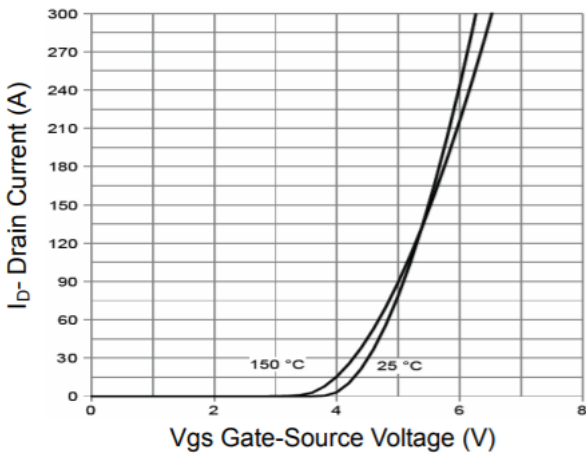


Figure 2 Transfer Characteristics

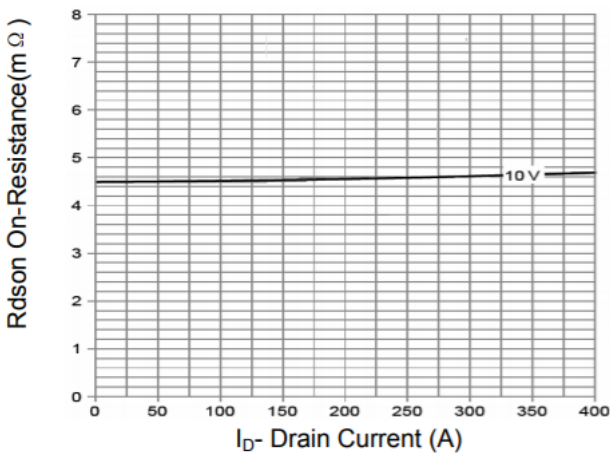


Figure 3 Rdson- Drain Current

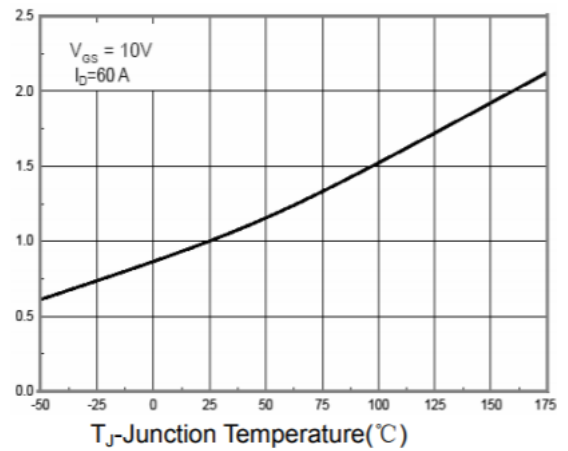


Figure 4 Rdson-Junction Temperature

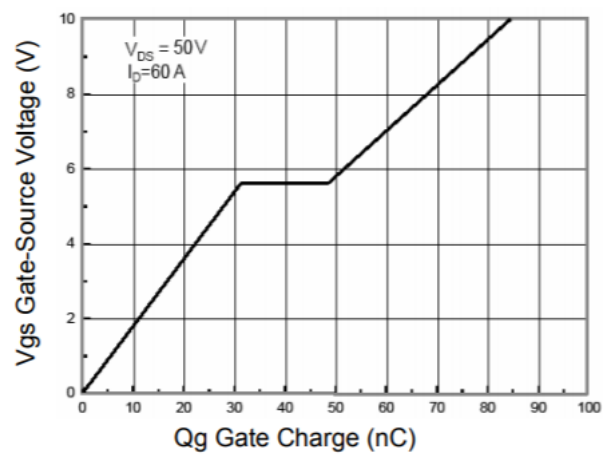


Figure 5 Gate Charge

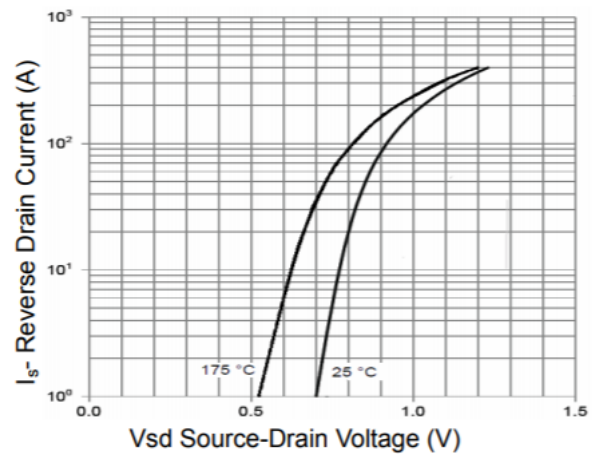


Figure 6 Source- Drain Diode Forward

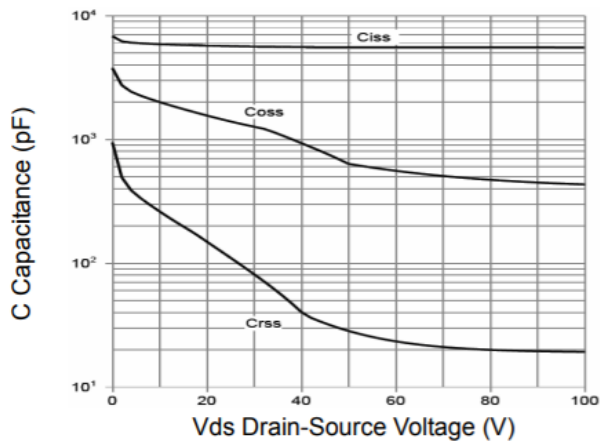


Figure 7 Capacitance vs Vds

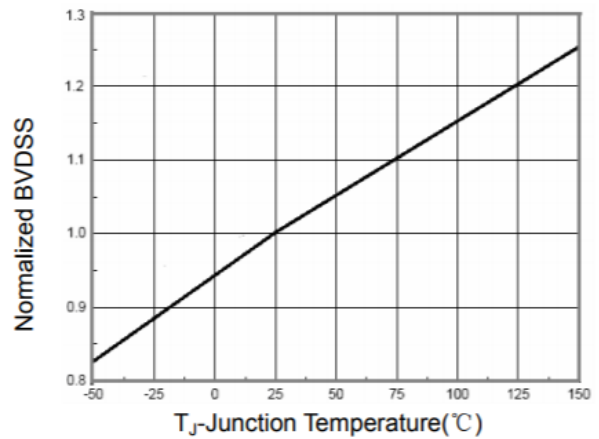


Figure 9 BV_{DSS} vs Junction Temperature

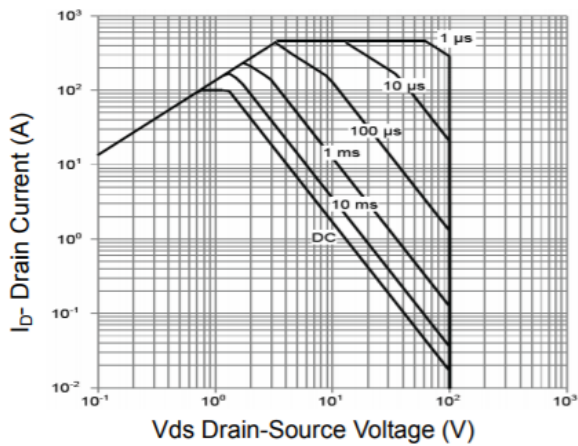


Figure 8 Safe Operation Area

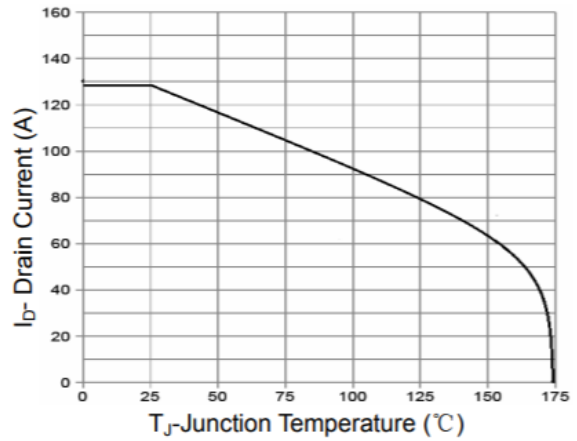


Figure 10 Current De-rating

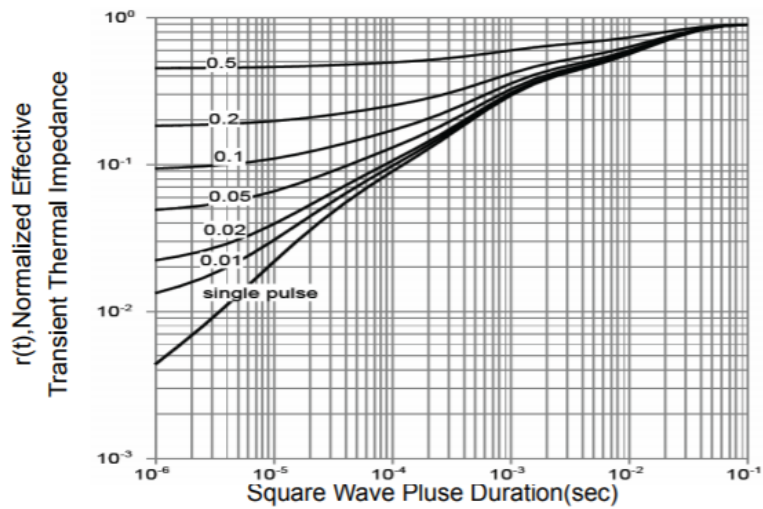


Figure 11 Normalized Maximum Transient Thermal Impedance