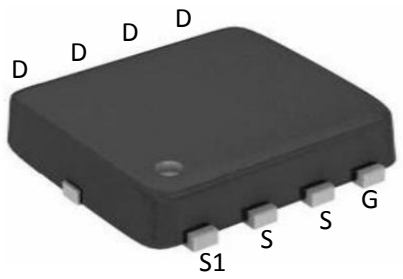
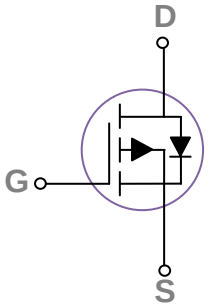
Description：

This P-Channel MOSFET 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.





Features：

1) V_{DS}=-40V,I_D=-38A,$R_{DS(ON)}$=14m Ω @V_{GS}=-10V
2) Low gate charge.
3) Green device available.
4) Advanced high cell denity trench technology for ultra $R_{DS(ON)}$.
5) Excellent package for good heat dissipation.

Absolute Maximum Ratings： (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	-40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Continuous Drain Current	-38	A
	Continuous Drain Current-TC=100℃	-24	
	Pulsed Drain Current[1]	-152	
E_{AS}	Single Pulse Avalanche Energy	130	mJ
P_D	Power Dissipation	52	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	℃

Thermal Characteristics：

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance,Junction to Case	2.4	℃/W
$R_{\theta JA}$	Thermal Resistance,Junction to Ambient	62	

Package Marking and Ordering Information：

Part NO.	Marking	Package
HAQ40P40	Q40P40	DFN3*3-8

Electrical Characteristics： (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourtce Breakdown Voltage	V_{GS}=0V,I_D=250μA	-40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS}=0V, V_{DS}=-40V	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V, V_{DS}=0A	---	---	±100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage	V_{GS}=V_{DS}, I_D=250μA	-1	-1.6	-2.5	V
$R_{DS(ON)}$	Drain-Source On Resistance	V_{GS}=-10V,I_D=-15A	---	11.3	14	mΩ
		V_{GS}=-4.5V,I_D=-8A	---	15.6	21	
G_{FS}	Forward Transconductance	V_{DS}=-10V, I_D=-4A	---	11	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-25V, V_{GS}=0V, f=1MHz	---	2757	4000	pF
C_{oss}	Output Capacitance		---	240	360	
C_{rss}	Reverse Transfer Capacitance		---	137	200	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=-20V, I_D=-A, R_{GEN}=6Ω, V_{GS}=-10V	---	23	40	ns
t_r	Rise Time		---	10	20	ns
$t_{d(off)}$	Turn-Off Delay Time		---	135	250	ns
t_f	Fall Time		---	46	90	ns
Q_g	Total Gate Charge	V_{GS}=-4.5V, V_{DS}=-32V, I_D=-10A	---	22.2	40	nC
Q_{gs}	Gate-Source Charge		---	8.2	16	nC
Q_{gd}	Gate-Drain “Miller” Charge		---	8.8	16	nC
Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage[2]	V_{GS}=0V,I_S=-1A, T_J=25℃	---	---	-1	V

Is	Diode Forward Current(Note 2)	$V_G=V_D=0V$, Force Current	---	-38	A
Ism	Pulsed Source Current		---	-76	A

Notes:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=51A.,R_G=25Ω, Starting T_J=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

Typical Characteristics: (T_C=25℃ unless otherwise noted)

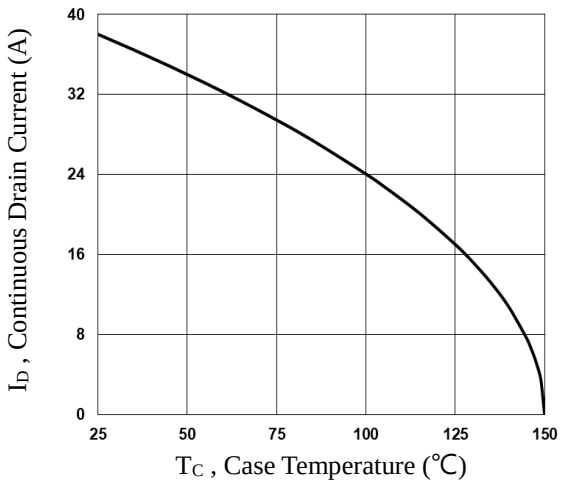


Fig.1 Continuous Drain Current vs. T_C

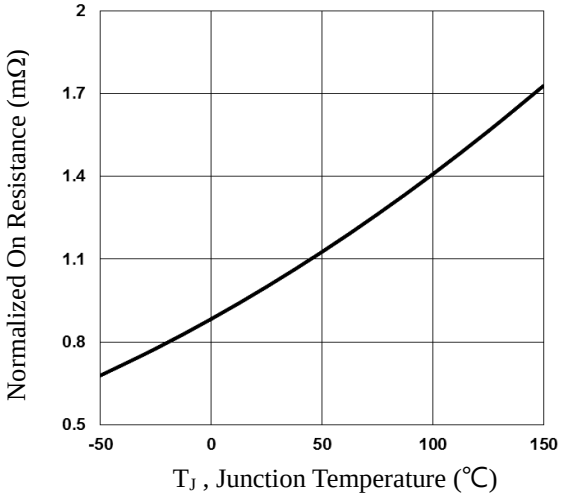


Fig.2 Normalized RDSON vs. T_J

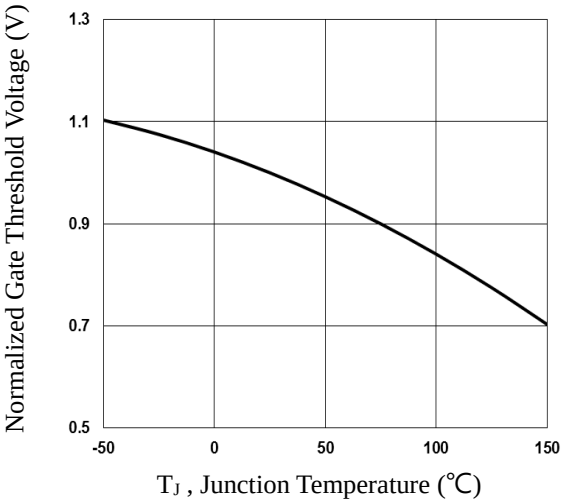


Fig.3 Normalized V_{th} vs. T_J

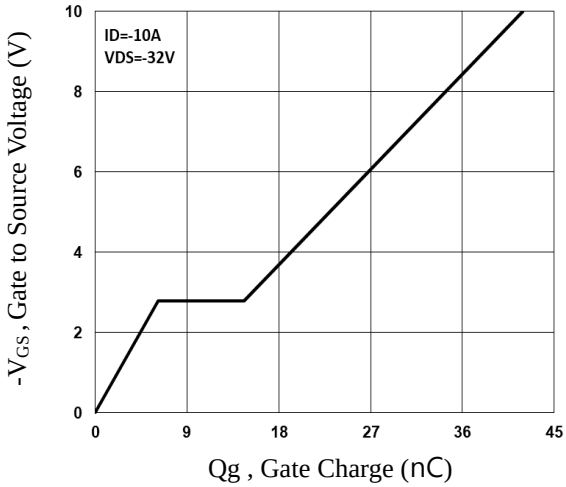


Fig.4 Gate Charge Waveform

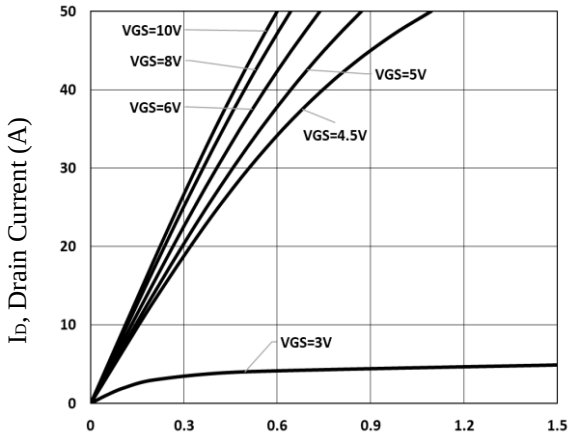


Fig.5 Typical Output Characteristics

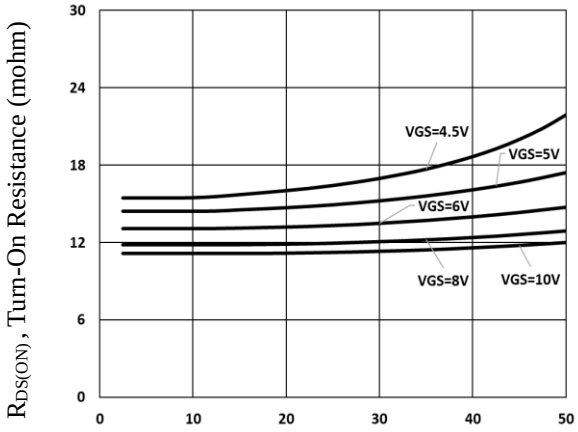


Fig.6 Turn-On Resistance vs. ID

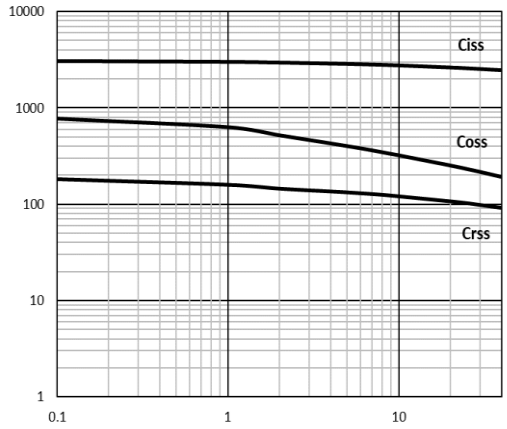


Fig.7 Capacitance Characteristics

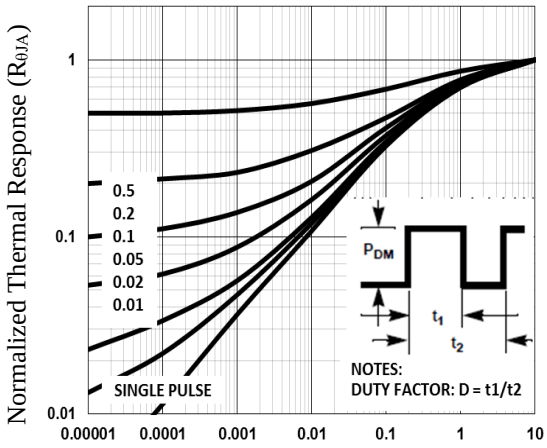


Fig.8 Normalized Transient Impedance

-

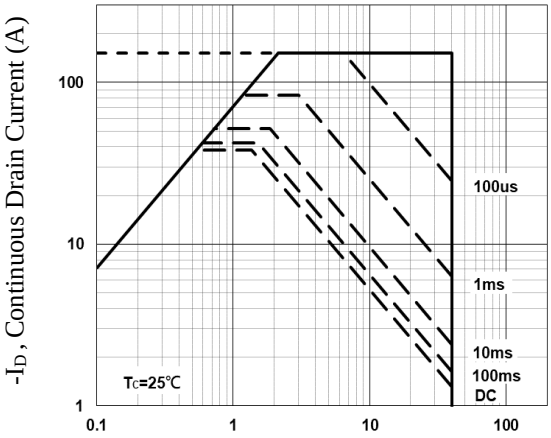


Fig.9 Maximum Safe Operation Area

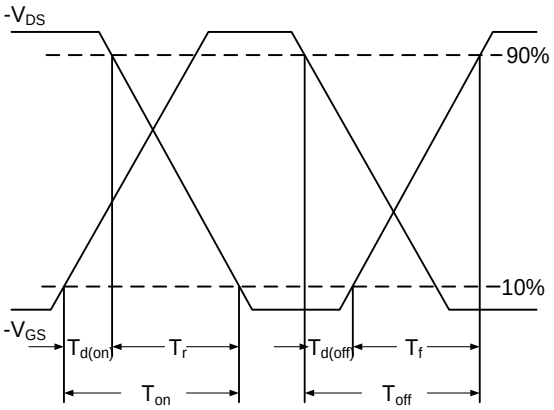


Fig.10 Switching Time Waveform

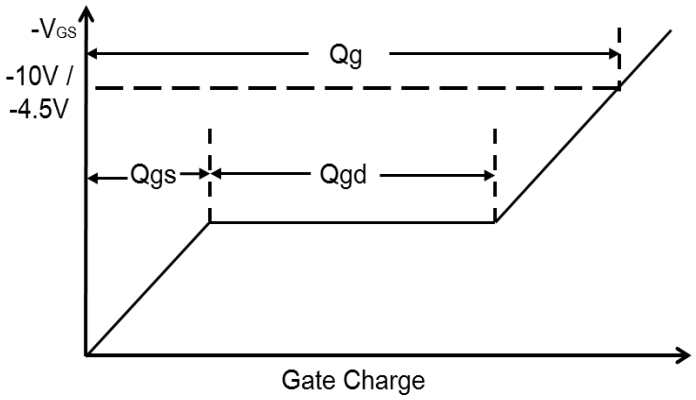


Fig.11 Gate Charge Waveform