HMR**40N10**

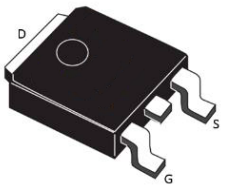
Silicon N-Channel Power MOSFET

General Description :

The HMR40N10 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 TO-252, which accords with the RoHS standard.

V_{DSS}	100	V
I_D	40	A
P_D	140	W
$R_{DS(ON)type}$	14	mΩ

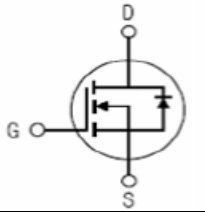
TO-252



Features :

- $R_{DS(ON)}$ <17mΩ @ V_{GS}=10V (Typ14mΩ)
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Inner Equivalent Principium Chart



Applications :

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

Absolute (Tc= 25℃ unless otherwise specified) :

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	100	V
I_D	Continuous Drain Current	40	A
I_{DM}	Pulsed Drain Current	160	A
V_{GS}	Gate-to-Source Voltage	±20	V
P_D	Power Dissipation	140	W
	Derating factor	0.89	W/℃
E_{AS}	Single pulse avalanche energy[a5]	520	mJ
T_J , T_{stg}	Operating Junction and Storage Temperature Range	175 , −55 to 175	℃

Electrical Characteristics (Tc= 25℃ 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=250μA	100	--	--	V
I_{DSS}	Drain to Source Leakage Current	V_{DS}=100V, V_{GS}= 0V,T_a=25℃	--	--	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=28A	--	14	17	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	0.9	1.1	1.5	V
Pulse width tp≤380μs,δ≤2%						

Dynamic Characteristics[a4]						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	V_{DS}=25V,I_D=28A	32	--	--	S
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=25V f=1.0MHz	--	3400	--	pF
C_{oss}	Output Capacitance		--	290	--	
C_{rss}	Reverse Transfer Capacitance		--	221	--	

Resistive Switching Characteristics[a4]						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=30V,I_D=2A,R_L=15Ω V_{GS}=10V,R_G=2.5Ω	--	15	--	ns
t_r	Rise Time		--	11	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	52	--	
t_f	Fall Time		--	13	--	
Q_g	Total Gate Charge	V_{DD}=30V, I_D=30A V_{GS}=10V	--	94	--	nC
Q_{gs}	Gate to Source Charge		--	16	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	24	--	

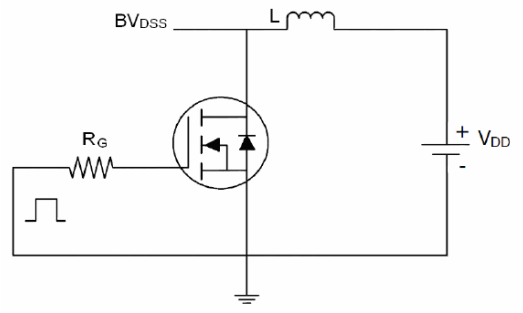
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current [a2](Body Diode)		--	--	40	A
V_{SD}	Diode Forward Voltage[a3]	I_S=28A,V_{GS}=0V	--	--	1.2	V

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case[a2]	1.12	℃/W

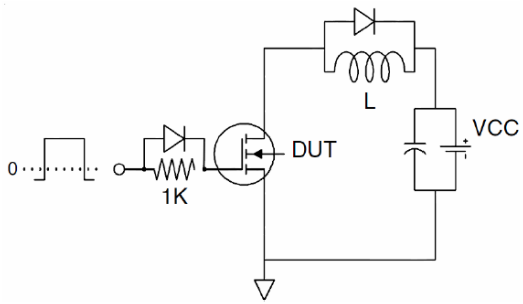
[a1] : Repetitive Rating: Pulse width limited by maximum junction temperature.
[a2] : Surface Mounted on FR4 Board, t≤10sec.
[a3] : Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%.
[a4] : Guaranteed by design, not subject to production
[a5] : EAS condition : Tj=25℃,V_{DD}=50V,VG=10V,L=0.5mH,Rg=25Ω

Test circurt

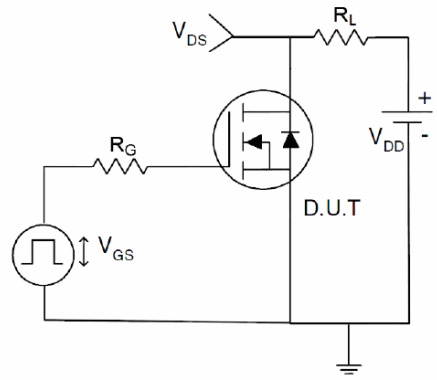
1) EAS test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Characteristics Curve :

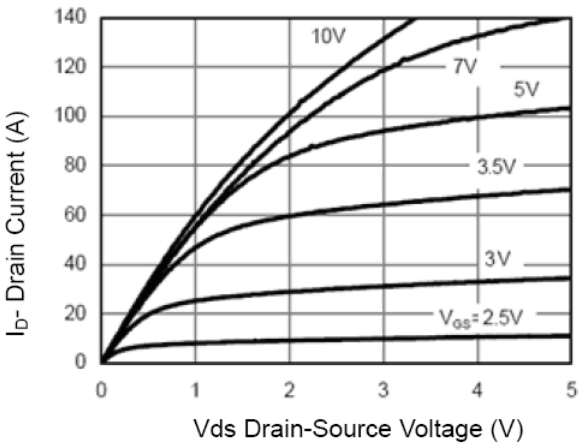


Figure 1 Output Characteristics

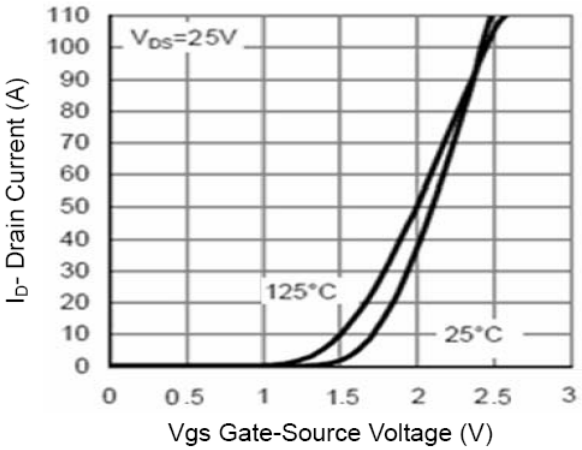


Figure 2 Transfer Characteristics

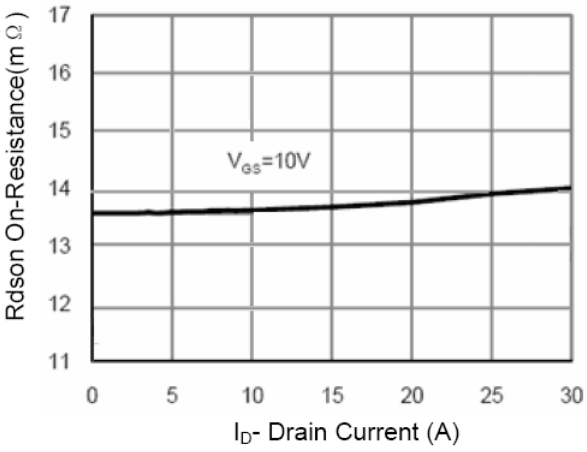


Figure 3 Rdson- Drain Current

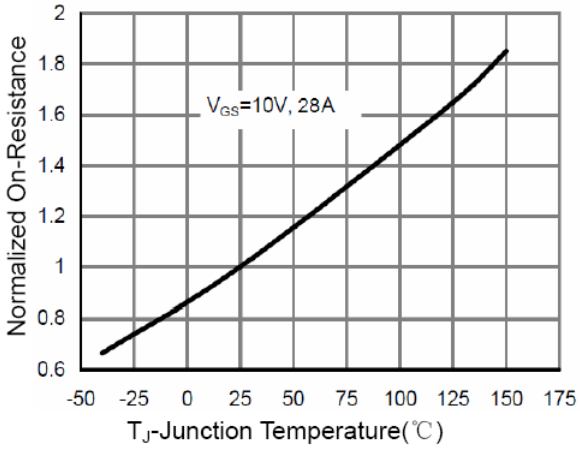


Figure 4 Rdson-JunctionTemperature

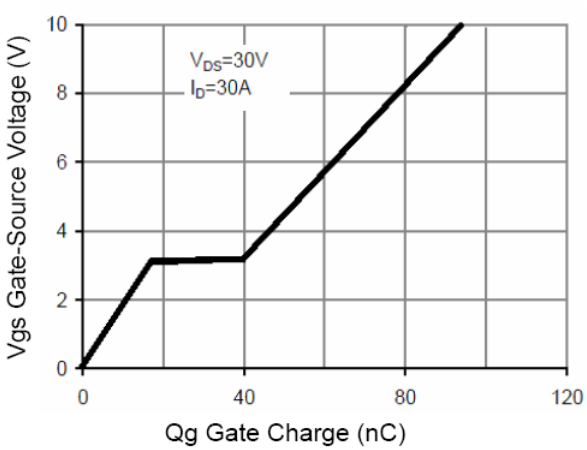


Figure 5 Gate Charge

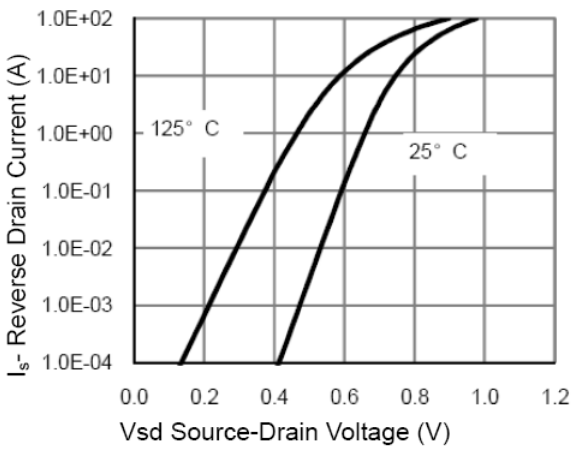


Figure 6 Source- Drain Diode Forward

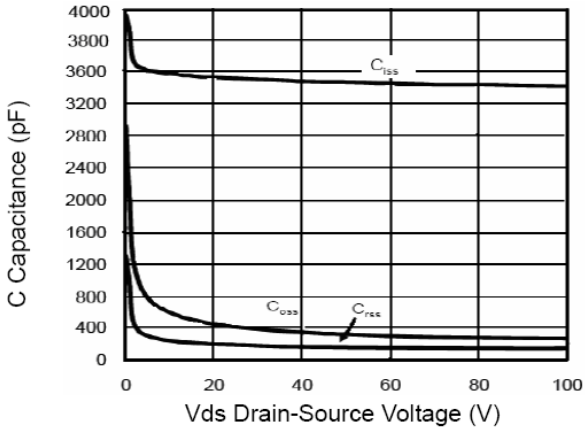


Figure 7 Capacitance vs Vds

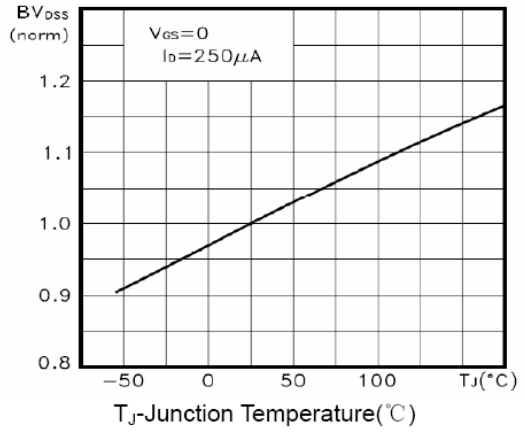


Figure 9 BV_{DSS} vs Junction Temperature

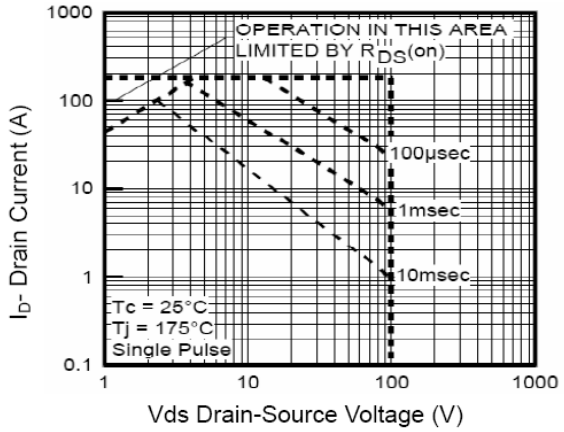


Figure 8 Safe Operation Area

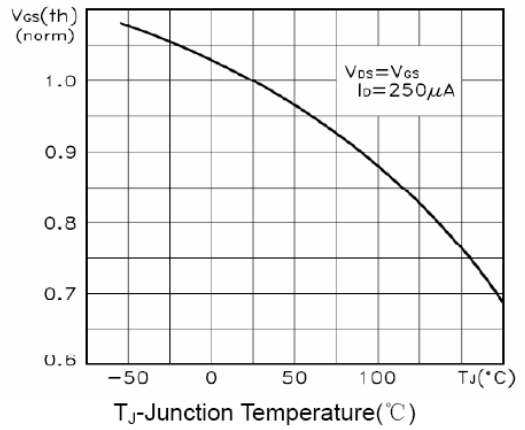


Figure 10 $V_{GS(th)}$ vs Junction Temperature

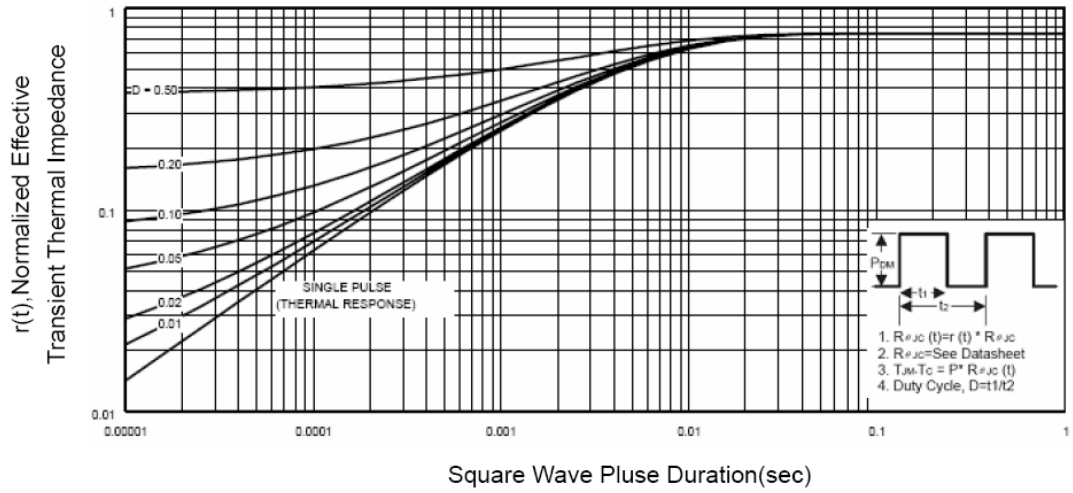


Figure 11 Normalized Maximum Transient Thermal Impedance