General Description

The QM12N65F is the highest performance N-ch MOSFETs with specialized high voltage technology, which provide excellent RDSON and gate charge for most of the SPS, Charger ,Adapter and lighting applications .
The QM12N65F meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.

Features

- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

Product Summery

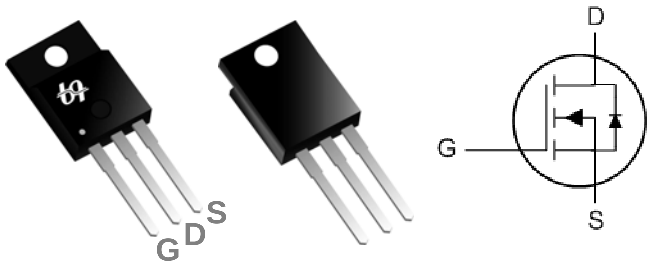
Green

BVDSS	RDSON	ID
650V	0.8Ω	12A

Applications

- High efficient switched mode power supplies
- Electronic lamp ballast
- LCD TV/ Monitor
- Adapter

TO220F Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	±30	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	12	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	7	A
I_{DM}	Pulsed Drain Current[2]	36	A
EAS	Single Pulse Avalanche Energy[3]	90	mJ
I_{AS}	Avalanche Current	8	A
P_D@T_C=25℃	Total Power Dissipation[4]	40	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State)[1]	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	3	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	650	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.4	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=3.5A	---	0.65	0.8	Ω
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	2	---	5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-45	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=520V , V_{GS}=0V , T_J=25℃	---	---	2	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±30V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=15V , I_D=6A	---	10	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	3.2	6.4	Ω
Q_g	Total Gate Charge (10V)	V_{DS}=520V , V_{GS}=10V , I_D=1A	---	44	---	nC
Q_{gs}	Gate-Source Charge		---	12	---	
Q_{gd}	Gate-Drain Charge		---	12.7	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=300V , V_{GS}=10V , R_G=10Ω, I_D=1A	---	24	---	ns
T_r	Rise Time		---	20	---	
$T_{d(off)}$	Turn-Off Delay Time		---	74	---	
T_f	Fall Time		---	44	---	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	2402	---	pF
C_{oss}	Output Capacitance		---	128	---	
C_{rss}	Reverse Transfer Capacitance		---	2.6	---	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=50V , L=1mH , I_{AS}=4A	23	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	12	A
I_{SM}	Pulsed Source Current[2,6]		---	---	36	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V
t_{rr}	Reverse Recovery Time	IF=1A , dI/dt=100A/µs , T_J=25℃	---	160	---	nS
Q_{rr}	Reverse Recovery Charge		---	765	---	nC

Note :

1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3.The EAS data shows Max. rating . The test condition is V_{DD}=50V,V_{GS}=10V,L=1mH,I_{AS}=8A

4.The power dissipation is limited by 150℃ junction temperature

5.The Min. value is 100% EAS tested guarantee.

6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

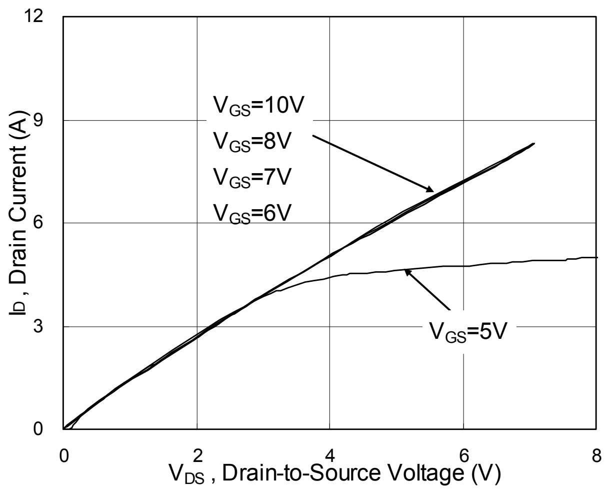


Fig.1 Typical Output Characteristics

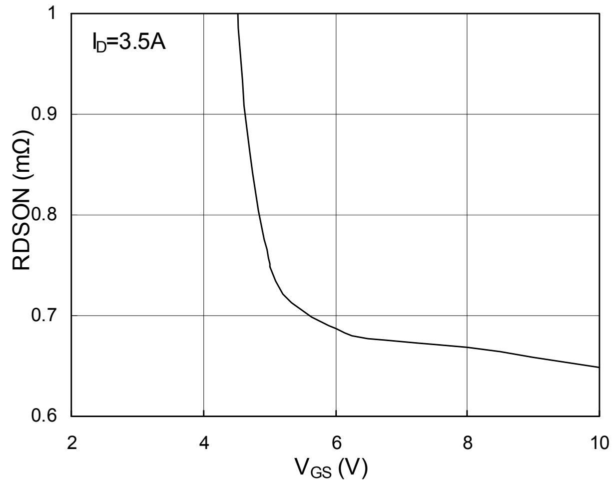


Fig.2 On-Resistance vs. G-S Voltage

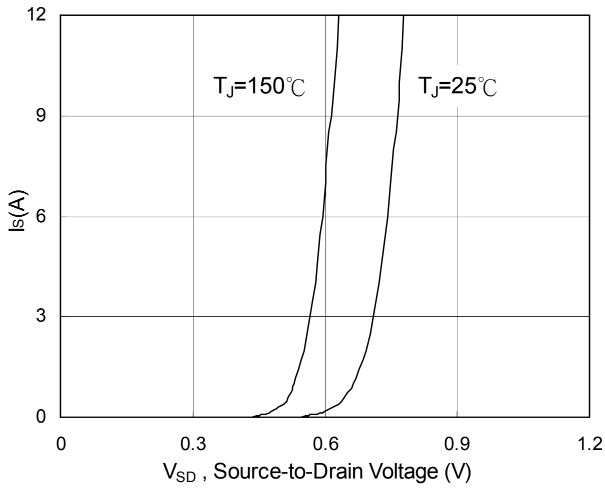


Fig.3 Forward Characteristics of Reverse

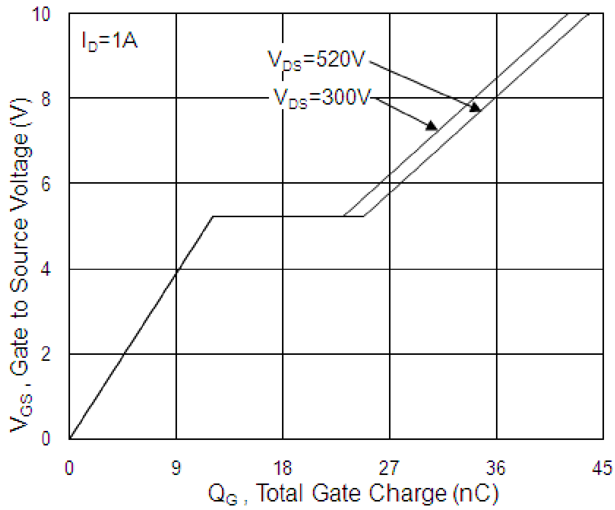


Fig.4 Gate-Charge Characteristics

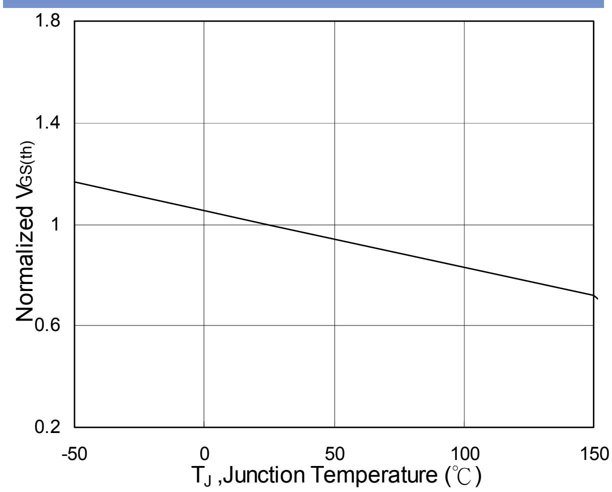


Fig.5 $V_{GS(th)}$ vs. T_J

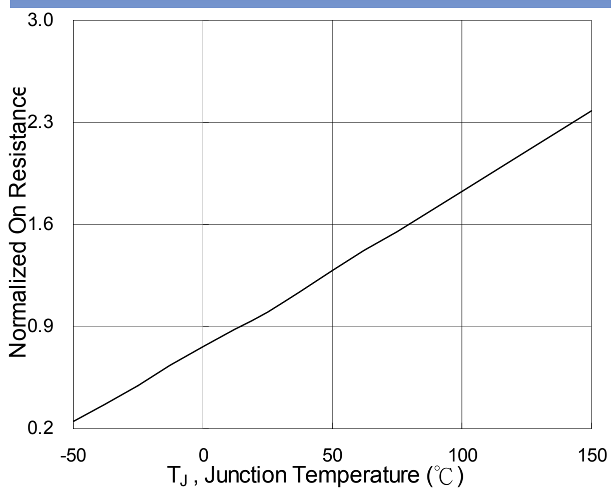


Fig.6 Normalized R_{DSON} vs. T_J

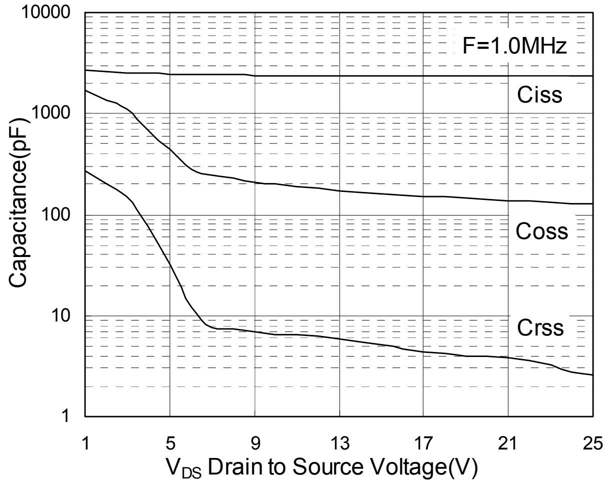


Fig.7 Capacitance

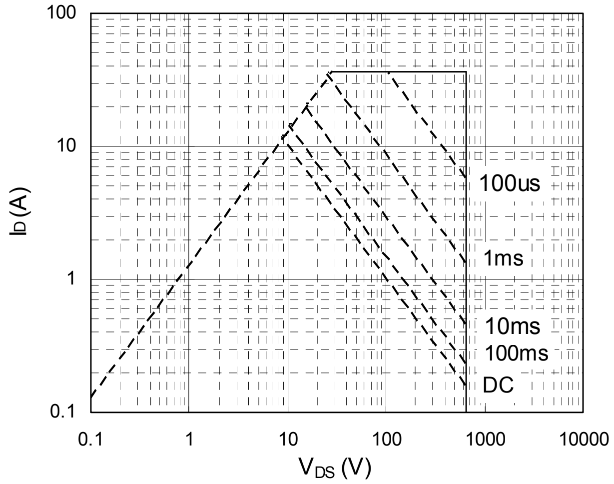


Fig.8 Safe Operating Area

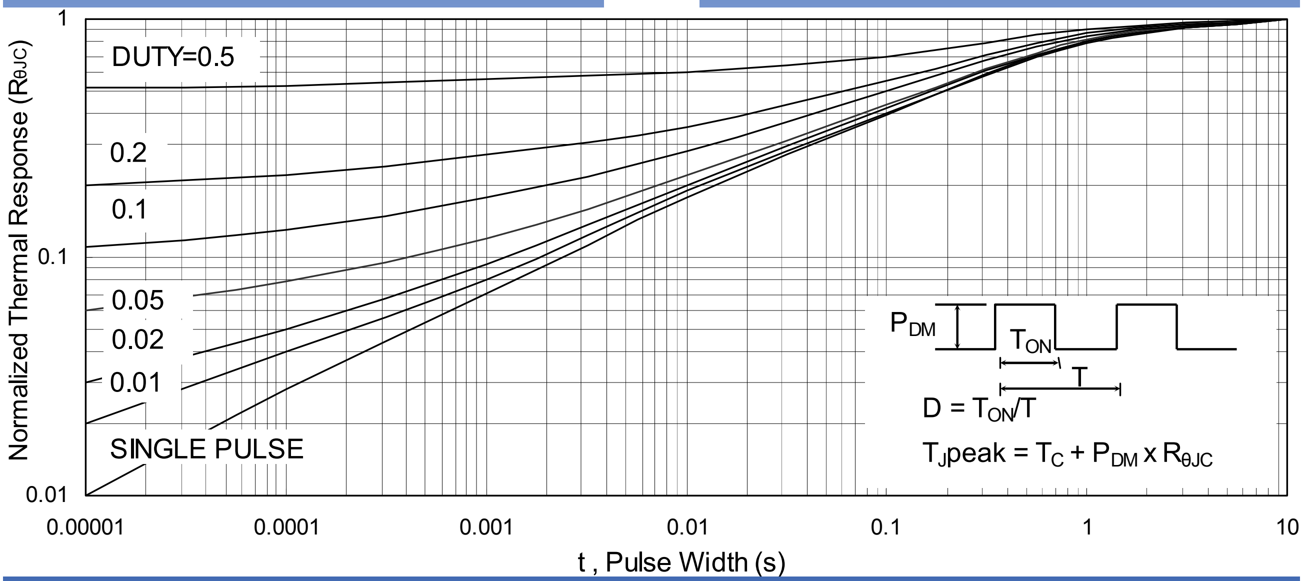


Fig.9 Normalized Maximum Transient Thermal Impedance

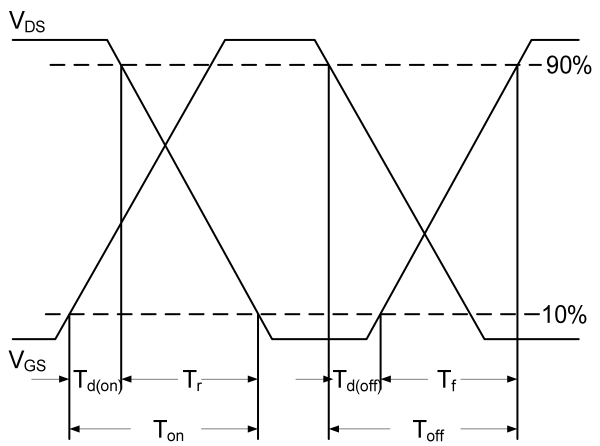


Fig.10 Switching Time Waveform

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

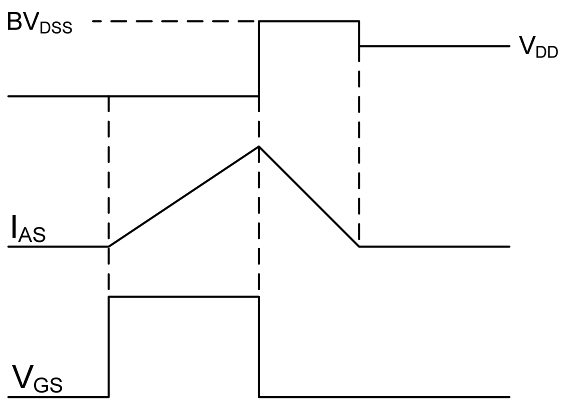


Fig.11 Unclamped Inductive Switching Waveform