QM3016M3

N-Ch 30V Fast Switching MOSFETs

General Description

The QM3016M3 is the highest performance trench N-ch MOSFETs with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The QM3016M3 meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.

Product Summary

Green

BVDSS	RDSON	ID
30V	4mΩ	80A

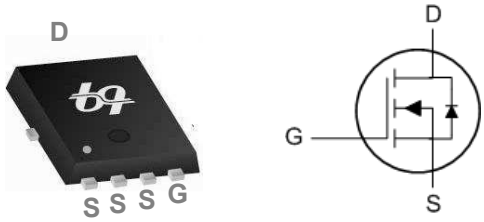
Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

PRPAK3x3 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	80	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V[1]	50	A
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	15.7	A
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V[1]	12.5	A
I_{DM}	Pulsed Drain Current[2]	160	A
EAS	Single Pulse Avalanche Energy[3]	317	mJ
I_{AS}	Avalanche Current	53.8	A
P_D@T_C=25°C	Total Power Dissipation[4]	43.4	W
P_D@T_A=25°C	Total Power Dissipation[4]	1.67	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	75	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	2.88	°C/W

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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	30	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.0213	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=30A	---	3.4	4	mΩ
		V_{GS}=4.5V , I_D=15A	---	5.2	6	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.5	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.73	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=30A	---	26.5	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	1.4	2.4	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=20V , V_{GS}=4.5V , I_D=12A	---	31.6	44.2	nC
Q_{gs}	Gate-Source Charge		---	8.6	12.0	
Q_{gd}	Gate-Drain Charge		---	11.7	16.4	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=1.5Ω , I_D=20A	---	9	18	ns
T_r	Rise Time		---	19	34	
$T_{d(off)}$	Turn-Off Delay Time		---	58	116	
T_f	Fall Time		---	15.2	30.4	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	3075	4305	pF
C_{oss}	Output Capacitance		---	400	560	
C_{rss}	Reverse Transfer Capacitance		---	315	441	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=25V , L=0.1mH , I_{AS}=30A	98	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	80	A
I_{SM}	Pulsed Source Current[2,6]		---	---	160	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V
trr	Reverse Recovery Time	IF=30A , dI/dt=100A/μs , T_J=25℃	---	18	---	nS
Qrr	Reverse Recovery Charge		---	8	---	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}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=53.8A
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.

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Typical Characteristics

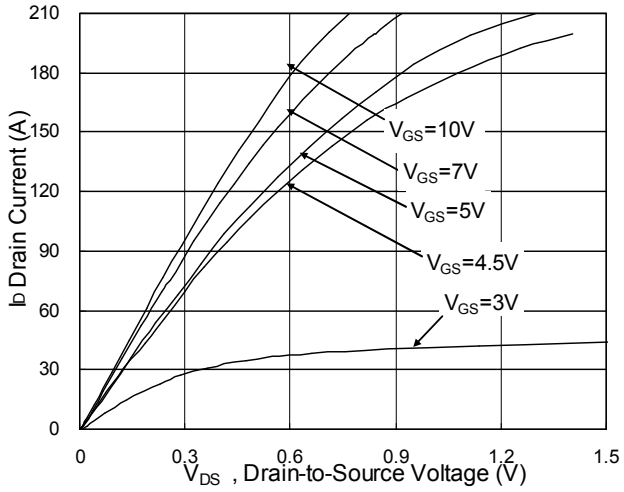


Fig.1 Typical Output Characteristics

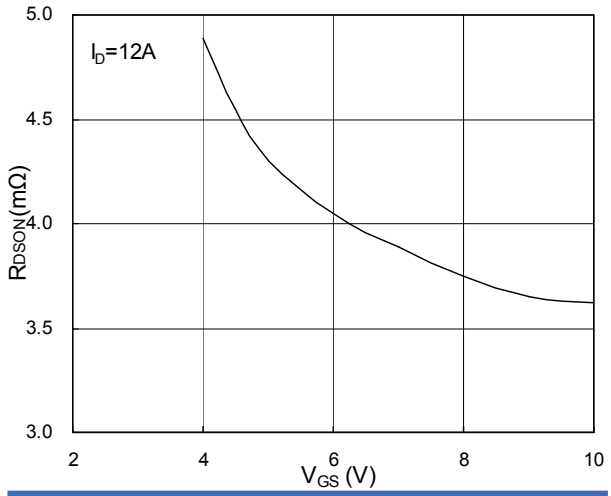


Fig.2 On-Resistance vs. G-S Voltage

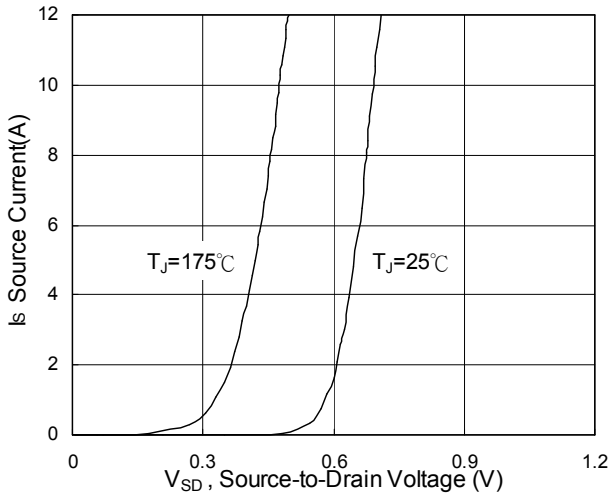


Fig.3 Forward Characteristics of Reverse

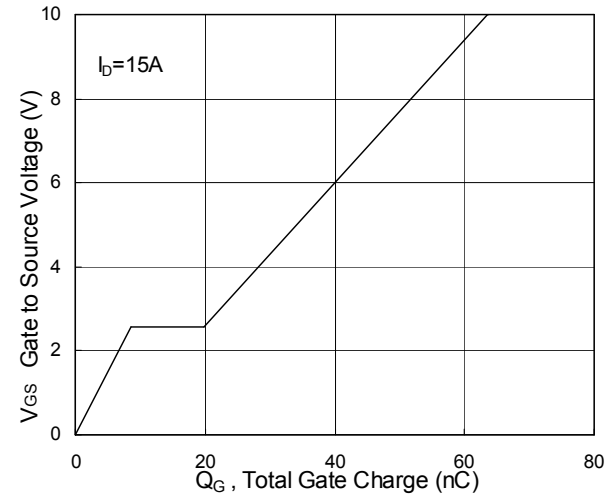


Fig.4 Gate-charge Characteristics

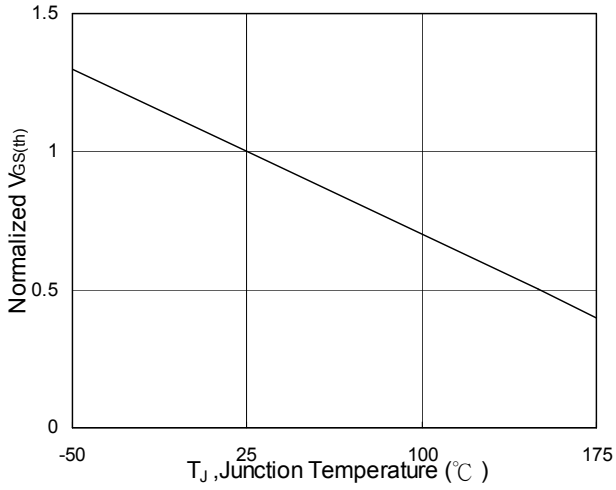


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

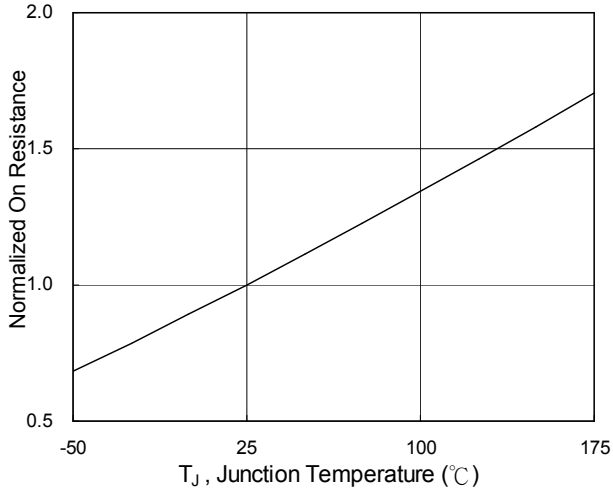


Fig.6 Normalized R_{DSON} vs. T_J

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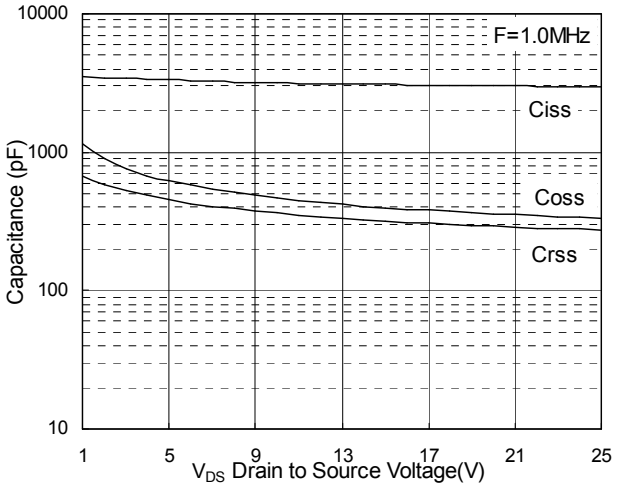


Fig.7 Capacitance

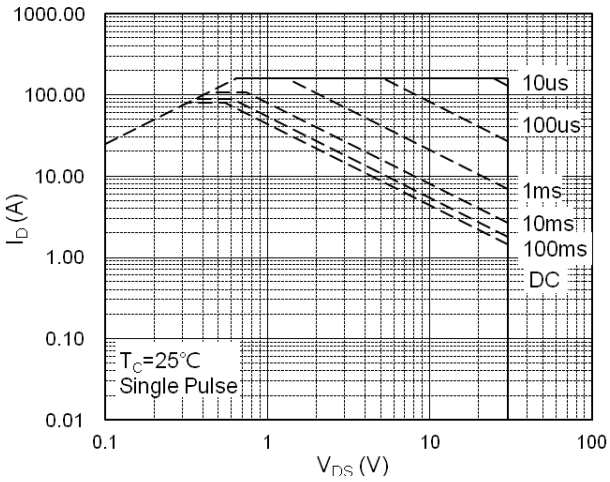
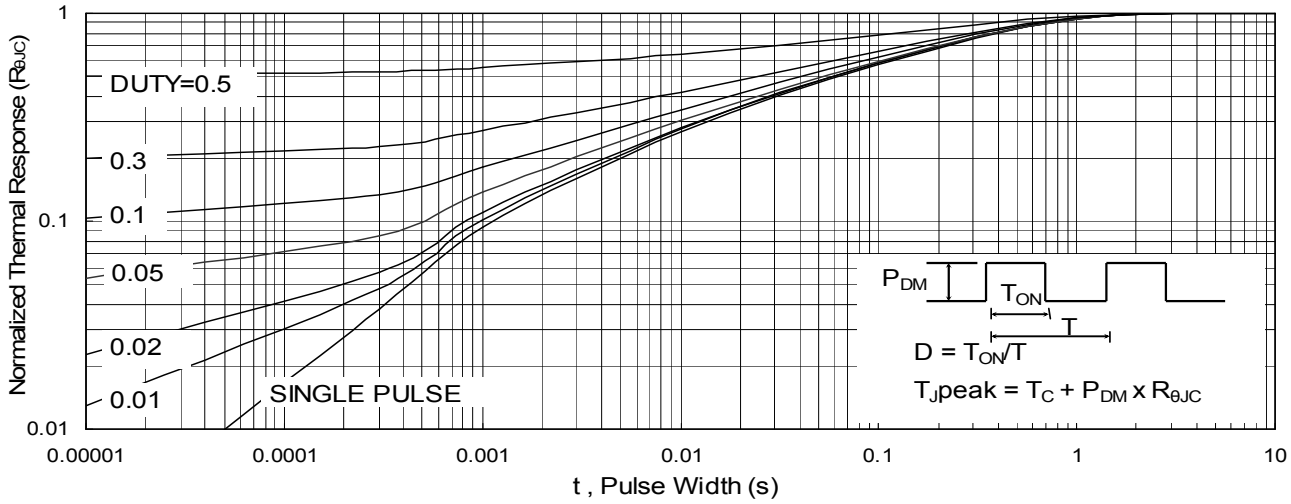


Fig.8 Safe Operating Area



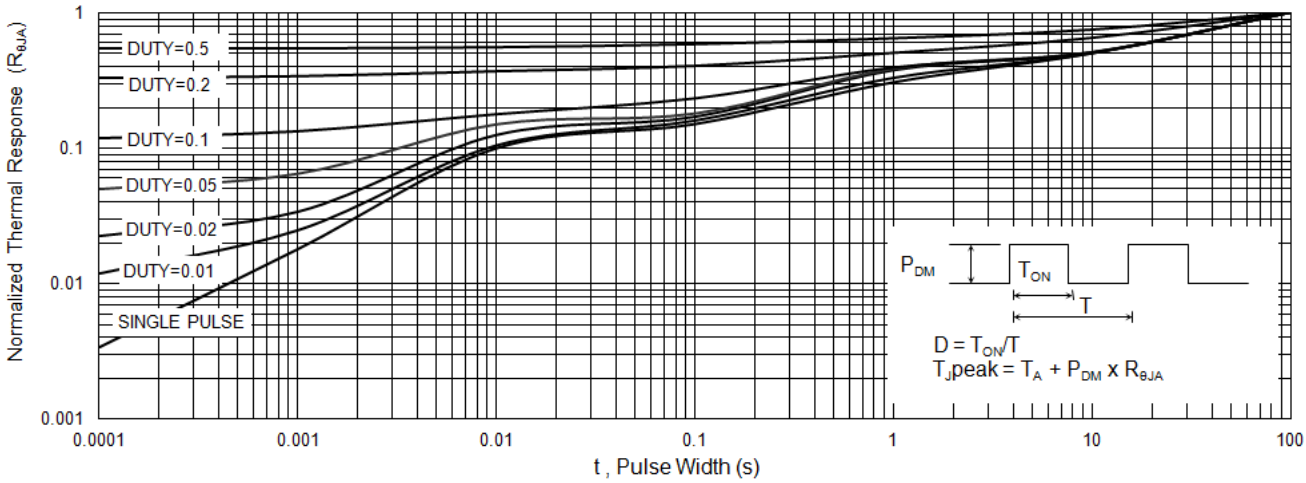


Fig.9 Normalized Maximum Transient Thermal Impedance

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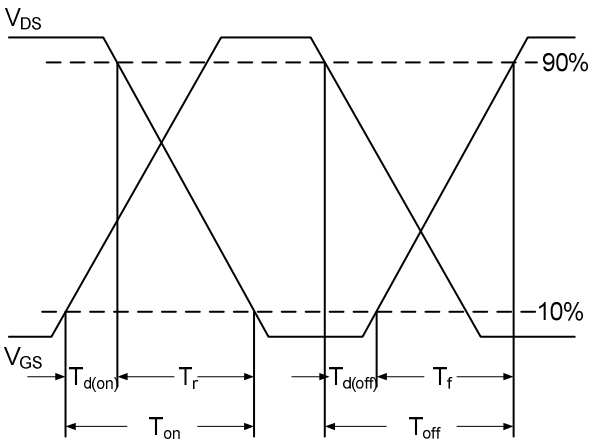


Fig.10 Switching Time Waveform

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

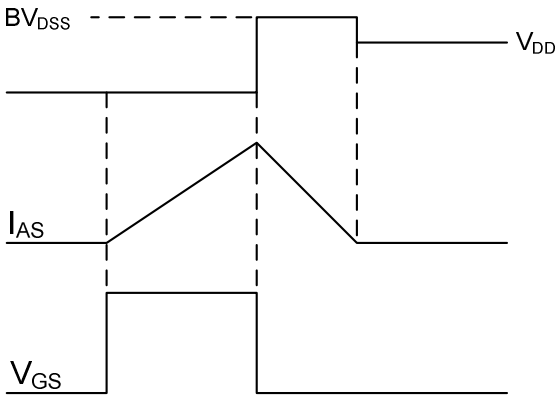


Fig.11 Unclamped Inductive Switching Waveform

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