UBIQ
Semiconductor Corp.

QM2403V

P-Ch 20V Fast Switching MOSFETs

General Description

The QM2403V is the highest performance trench P-ch MOSFETs with extreme high cell density , which provide excellent RDSON and gate charge for most of the small power switching and load switch applications.

The QM2403V meet the RoHS and Green Product requirement , with full function reliability approved.

Features

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

Product Summery

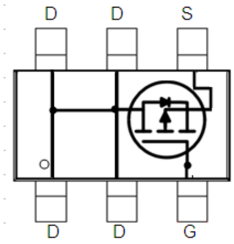
Green

BVDSS	RDSON	ID
-20V	55mΩ	-3.8A

Applications

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

TSOP6 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	±8	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ -4.5V[1]	-3.8	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ -4.5V[1]	-3	A
I_{DM}	Pulsed Drain Current[2]	-15.2	A
P_D@T_A=25℃	Total Power Dissipation[3]	1.1	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 [1]	---	110	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	70	℃/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	-20	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.016	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-4.5V , I_D=-3A	---	44	55	mΩ
		V_{GS}=-2.5V , I_D=-2A	---	56	70	
		V_{GS}=-1.8V , I_D=-1A	---	73	85	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-0.3	-0.5	-1.0	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3.97	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-16V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-16V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±8V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-3A	---	14	---	S
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-3A	---	12.1	16.9	nC
Q_{gs}	Gate-Source Charge		---	1.5	2.1	
Q_{gd}	Gate-Drain Charge		---	3.1	4.3	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-10V , V_{GS}=-4.5V , R_G=3.3Ω, I_D=-3A	---	4.4	8.8	ns
T_r	Rise Time		---	45	81	
$T_{d(off)}$	Turn-Off Delay Time		---	48.4	97	
T_f	Fall Time		---	30.4	60.8	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	938	1313	pF
C_{oss}	Output Capacitance		---	108	151	
C_{rss}	Reverse Transfer Capacitance		---	96	134	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	-3.8	A
I_{SM}	Pulsed Source Current[2,4]		---	---	-15.2	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1	V
t_{rr}	Reverse Recovery Time	IF=-3A , dI/dt=100A/μs , T_J=25℃	---	28	---	nS
Q_{rr}	Reverse Recovery Charge		---	9	---	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 power dissipation is limited by 150℃ junction temperature
4.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

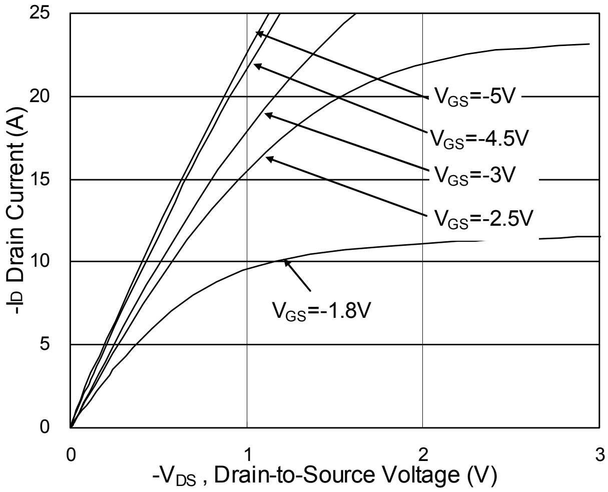


Fig.1 Typical Output Characteristics

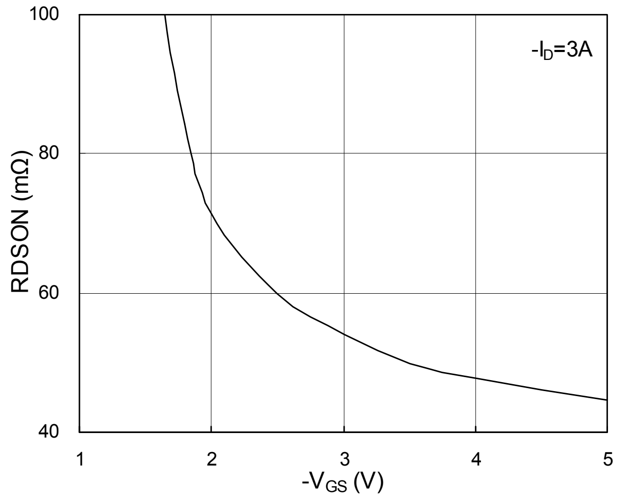


Fig.2 On-Resistance vs. G-S Voltage

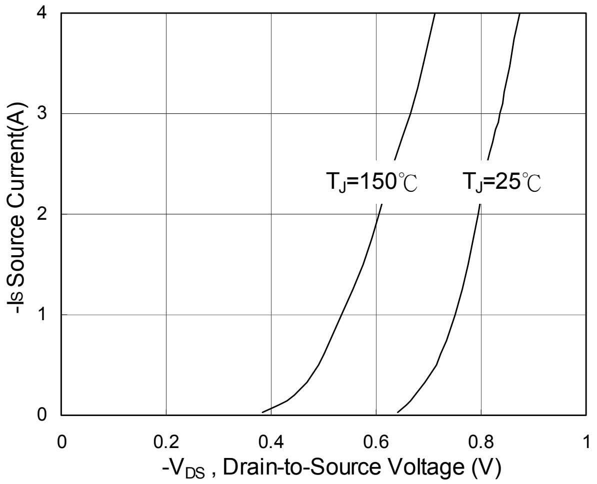


Fig.3 Forward Characteristics of Reverse

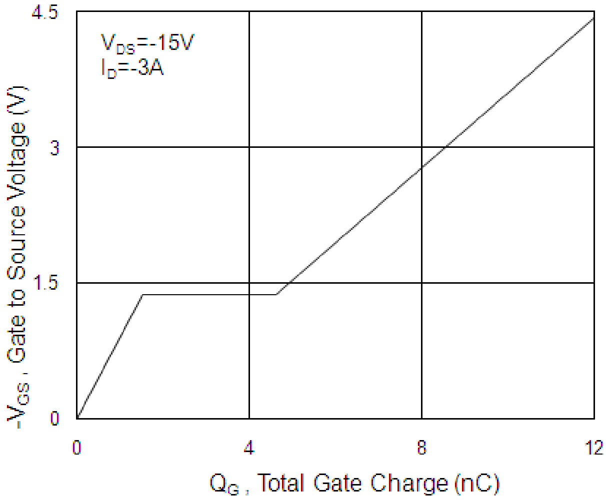


Fig.4 Gate-Charge Characteristics

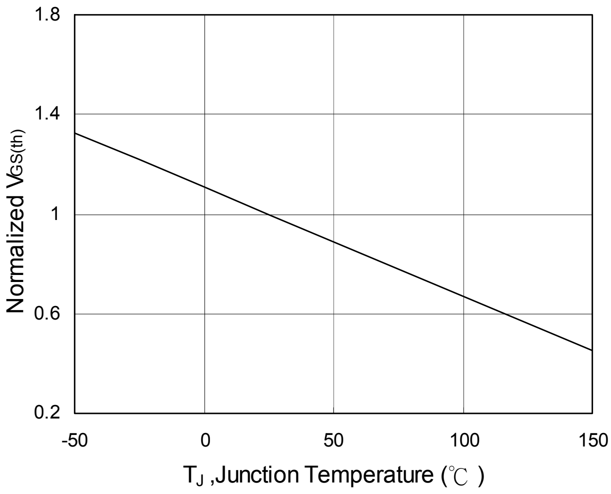


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

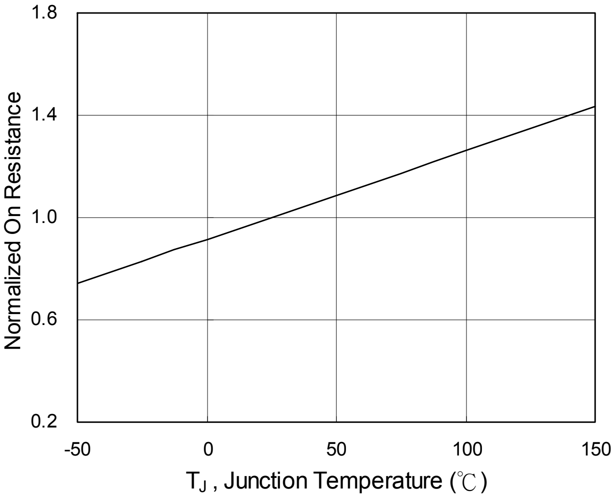


Fig.6 Normalized R_{DSON} vs. T_J

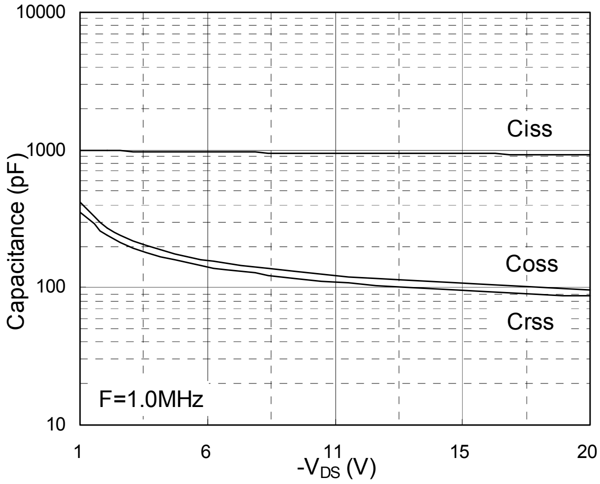


Fig.7 Capacitance

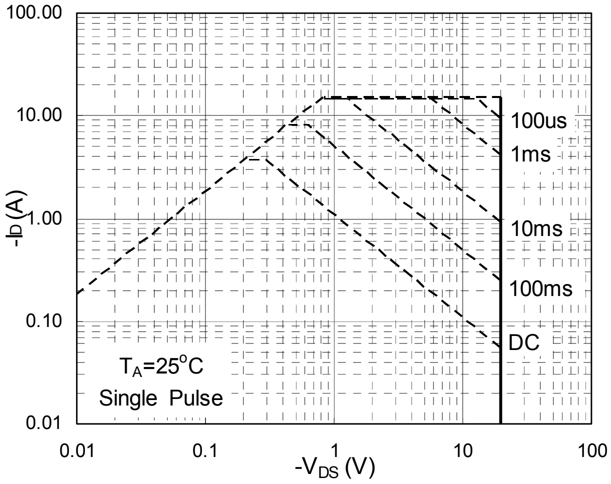


Fig.8 Safe Operating Area

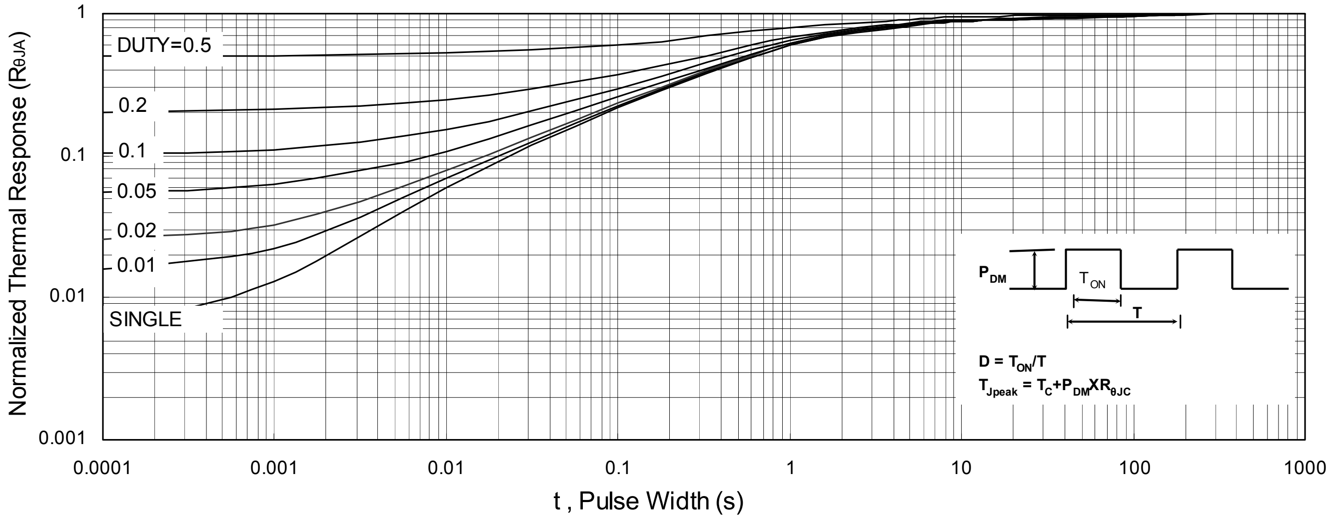
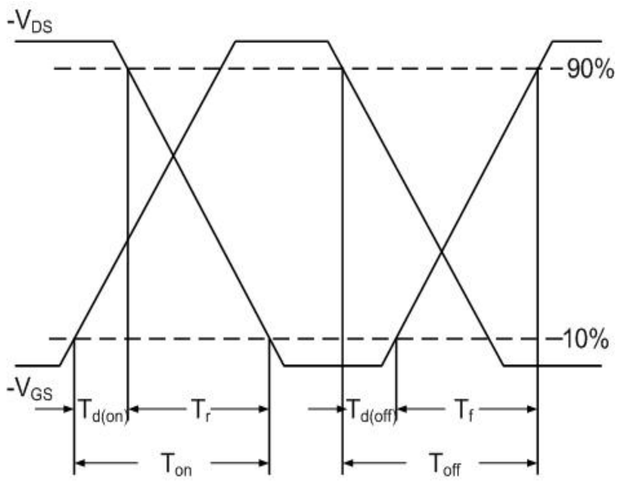


Fig.9 Normalized Maximum Transient Thermal Impedance



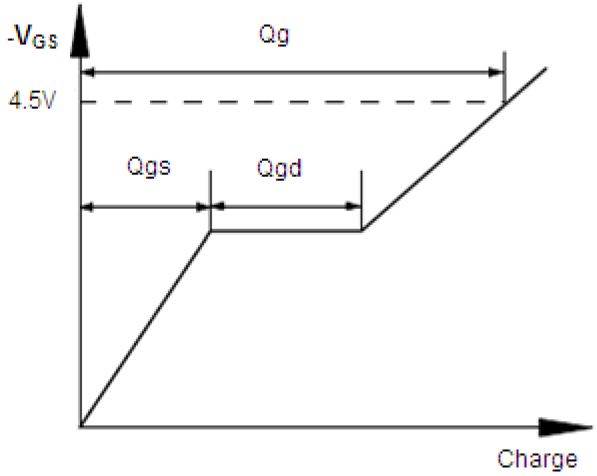


Fig.10 Switching Time Waveform

Fig.11 Gate Charge Waveform