P-Ch 60V Fast Switching MOSFETs

General Description

The UD6003 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 UD6003 meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.

Features

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

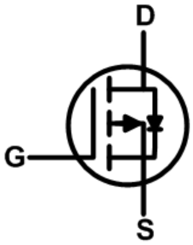
Product Summery

BV_{DSS}	$RD_{S(ON)}$	ID
-60V	60mΩ	-18A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter.
- Networking DC-DC Power System
- Load Switch

TO252 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	±20	V
$I_D@T_C=25℃$	Continuous Drain Current, V_{GS} @ -10V[1]	-18	A
$I_D@T_C=100℃$	Continuous Drain Current, V_{GS} @ -10V[1]	-11	A
$I_D@T_A=25℃$	Continuous Drain Current, V_{GS} @ -10V[1]	-4.3	A
$I_D@T_A=70℃$	Continuous Drain Current, V_{GS} @ -10V[1]	-3.5	A
I_{DM}	Pulsed Drain Current[2]	-36	A
EAS	Single Pulse Avalanche Energy[3]	51.2	mJ
I_{AS}	Avalanche Current	-26.6	A
$P_D@T_C=25℃$	Total Power Dissipation[4]	34.7	W
$P_D@T_A=25℃$	Total Power Dissipation[4]	2	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
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	---	62	℃/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	---	3.6	℃/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	-60	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.03	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-12A	---	50	60	mΩ
		V_{GS}=-4.5V , I_D=-8A	---	75	90	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	---	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.56	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-48V , 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=-12A	---	15.4	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	13.5	27	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-48V , V_{GS}=-4.5V , I_D=-10A	---	9.86	---	nC
Q_{gs}	Gate-Source Charge		---	3.08	---	
Q_{gd}	Gate-Drain Charge		---	2.95	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3Ω, I_D=-1A	---	28.8	---	ns
T_r	Rise Time		---	19.8	---	
$T_{d(off)}$	Turn-Off Delay Time		---	60.8	---	
T_f	Fall Time		---	7.2	---	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	1447	---	pF
C_{oss}	Output Capacitance		---	97.3	---	
C_{rss}	Reverse Transfer Capacitance		---	70	---	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=-25V , L=0.1mH , I_{AS}=-20A	29	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	-18	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℃	---	---	-1.2	V

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}=-26.6A

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

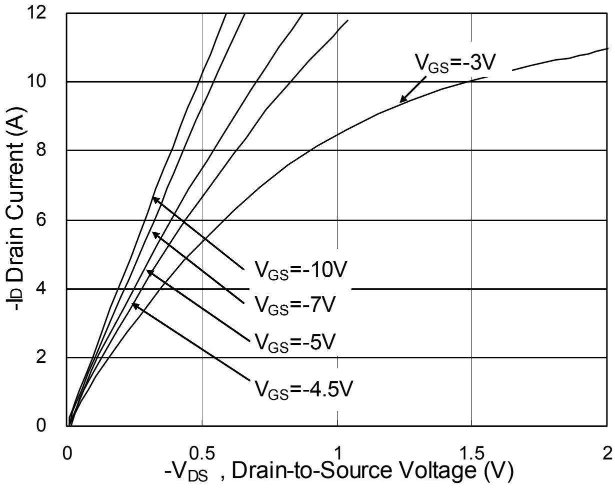


Fig.1 Typical Output Characteristics

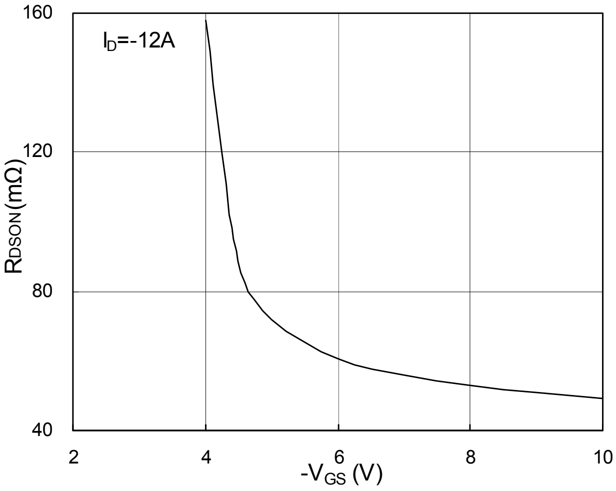


Fig.2 On-Resistance v.s Gate-Source

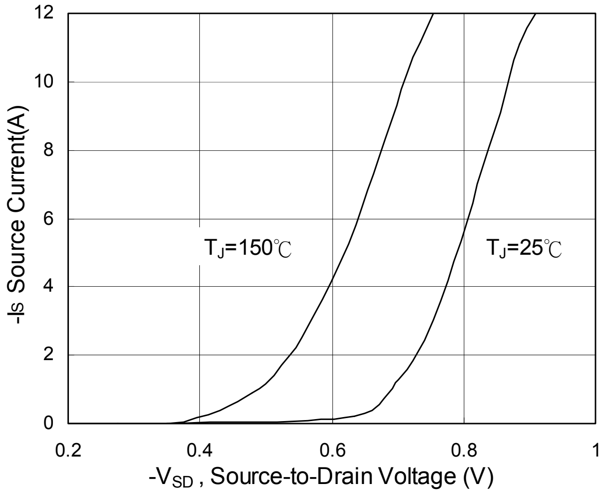


Fig.3 Forward Characteristics of Reverse

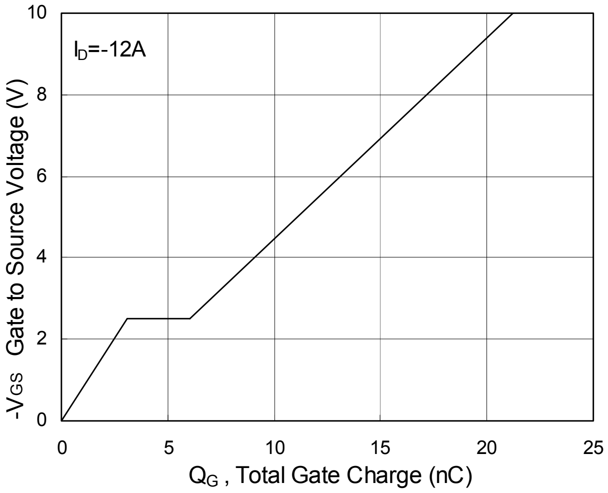


Fig.4 Gate-Charge Characteristics

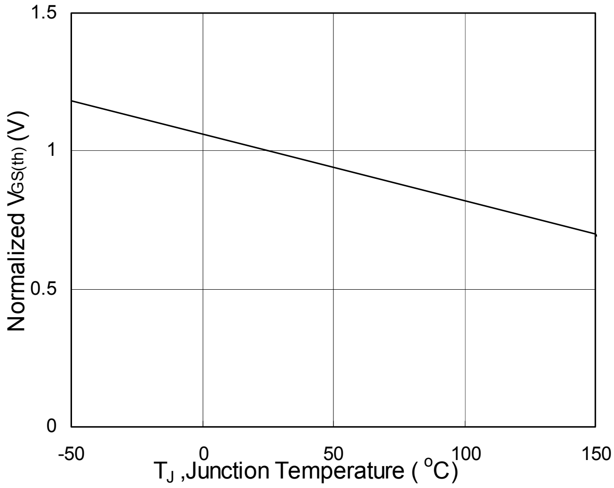


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

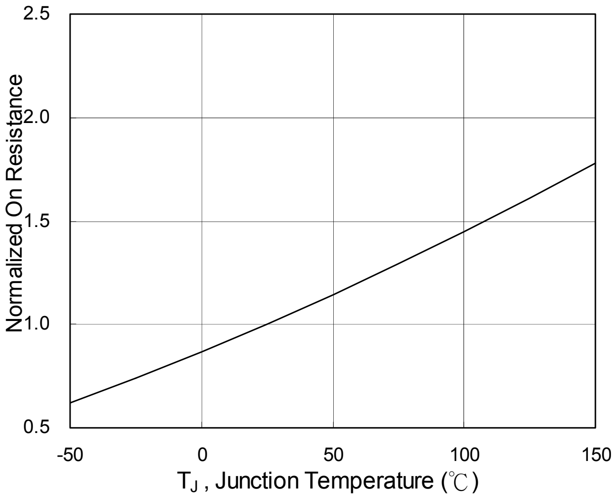


Fig.6 Normalized R_{DSON} v.s T_J

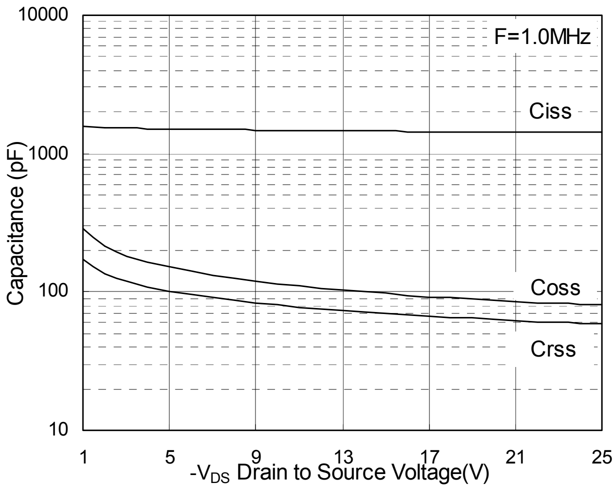


Fig.7 Capacitance

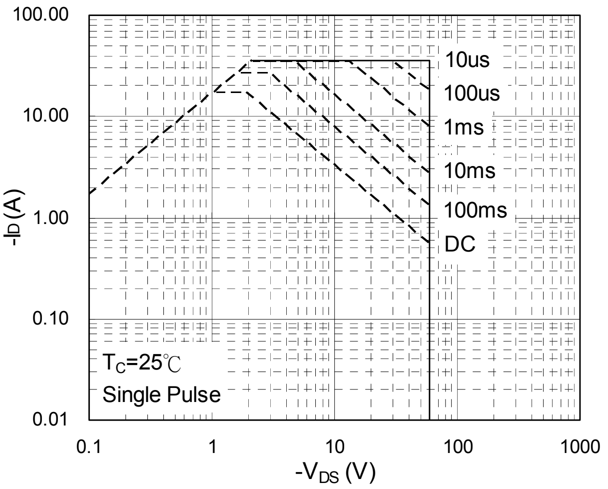


Fig.8 Safe Operating Area

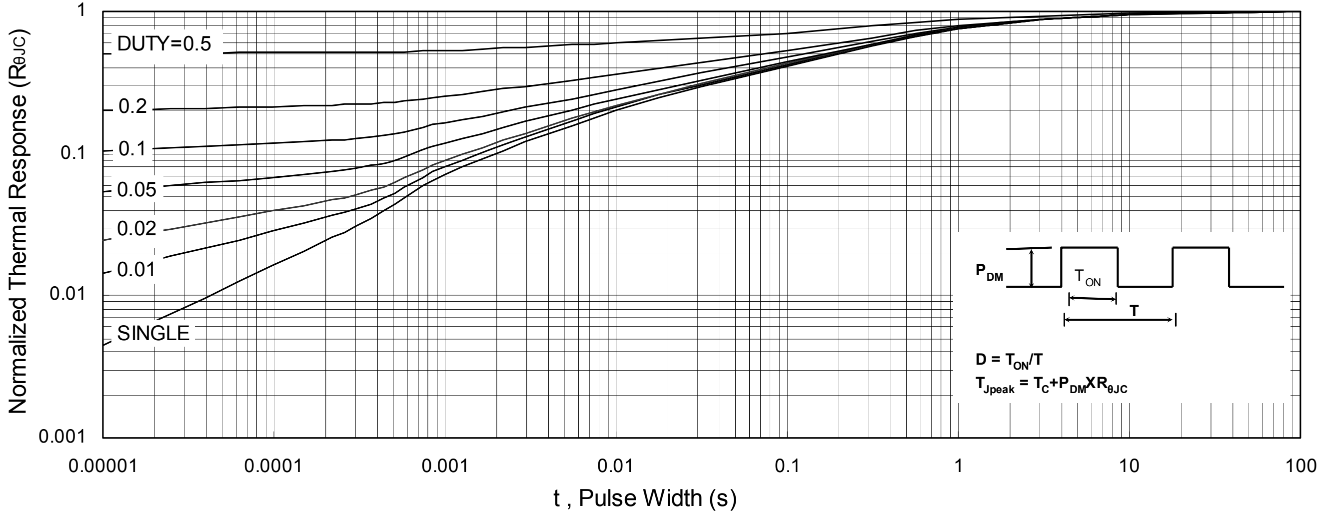
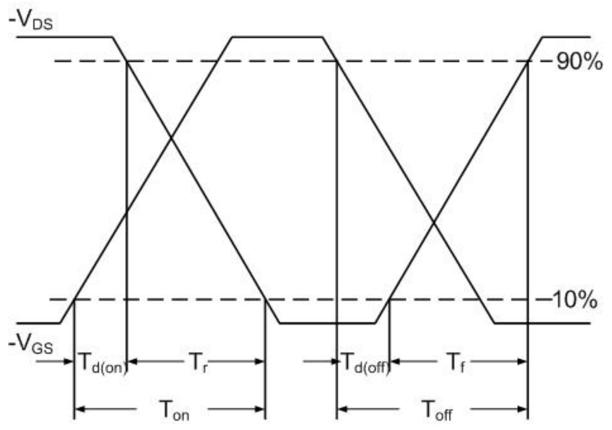


Fig.9 Normalized Maximum Transient Thermal Impedance



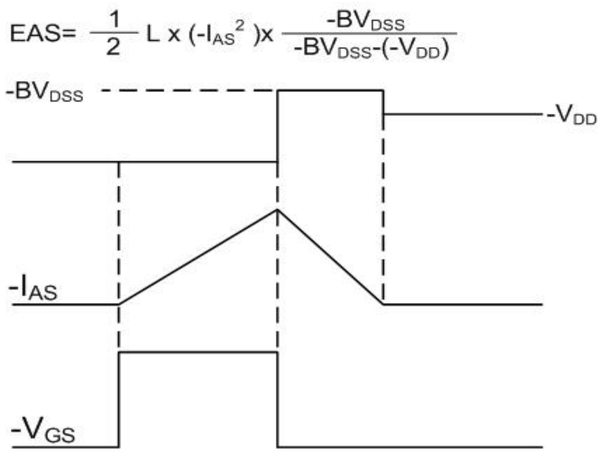


Fig.10 Switching Time Waveform

Fig.11 Unclamped Inductive Waveform