



## Description

The FDD6688S uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 30V$   $I_D = 100A$

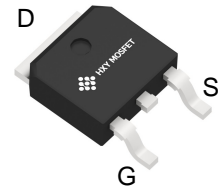
$R_{DS(ON)} < 5m\Omega$  @  $V_{GS}=10V$

## Application

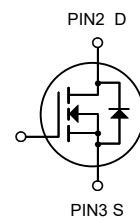
Battery protection

Load switch

Uninterruptible power supply



TO-252-2L



N-Channel MOSFET

## Ordering Information

Product ID	Pack	Brand	Qty(PCS)
FDD6688S	TO-252-2L	HXY MOSFET	2500

## Absolute Maximum Ratings ( $T_c=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating		Units
VDS	Drain- Source Voltage	30		V
VGS	Gate-Source Voltage	$\pm 20$		V
$I_D@T_c=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	100		A
$I_D@T_c=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	57		A
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	27	17	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	23	14.5	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	160		A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	115.2		mJ
$I_{AS}$	Avalanche Current	48		A
$P_D@T_c=25^\circ C$	Total Power Dissipation <sup>4</sup>	53		W
$P_D@T_A=25^\circ C$	Total Power Dissipation <sup>4</sup>	6	2.4	W
$T_{STG}$	Storage Temperature Range	-55 to 175		$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 175		$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	62		$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup> (t $\leq 10s$ )	25		$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	2.8		$^\circ C/W$



**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	30	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C , I <sub>D</sub> =1mA	---	0.028	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V , I <sub>D</sub> =30A	---	3.8	5.5	mΩ
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =15A	---	7.5	9	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	1.5	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-6.16	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =24V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =24V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V , I <sub>D</sub> =30A	---	22	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz	---	1.7	3.4	Ω
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =15V , V <sub>GS</sub> =4.5V , I <sub>D</sub> =15A	---	20	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	7.6	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	7.2	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V , V <sub>GS</sub> =10V , R <sub>G</sub> =3.3Ω , I <sub>D</sub> =15A	---	7.8	---	ns
T <sub>r</sub>	Rise Time		---	15	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	37.3	---	
T <sub>f</sub>	Fall Time		---	10.6	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V , V <sub>GS</sub> =0V , f=1MHz	---	2295	---	pF
C <sub>oss</sub>	Output Capacitance		---	267	---	
C <sub>riss</sub>	Reverse Transfer Capacitance		---	210	---	
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	80	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	160	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25°C	---	---	1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =30A , di/dt=100A/μs , T <sub>J</sub> =25°C	---	14	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	5	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width .The EAS data shows Max. rating .
- 3.The test cond≤ 300us , duty cycle ition is V<sub>DD</sub>=25≤V , V<sub>GS</sub> =10V , L=0.1mH , I<sub>AS</sub>=53.8A
- 4.The power dissipation is limited by 175°C junction temperature
- 5.The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.



### Typical Characteristics

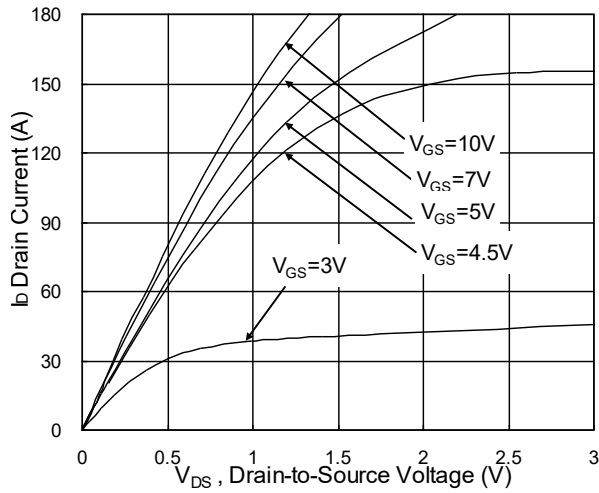


Fig.1 Typical Output Characteristics

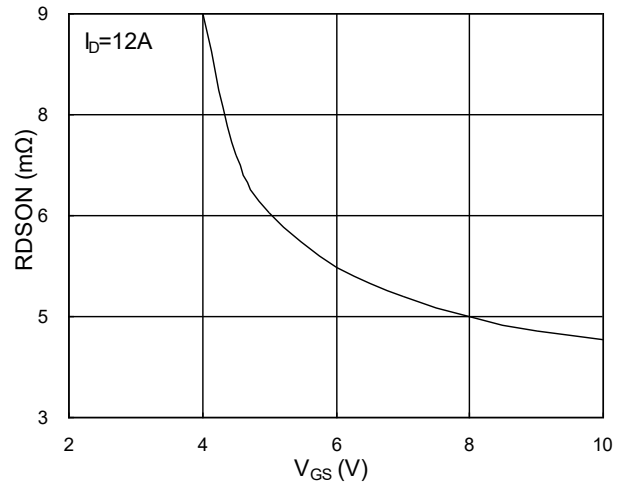


Fig.2 On-Resistance vs. G-S Voltage

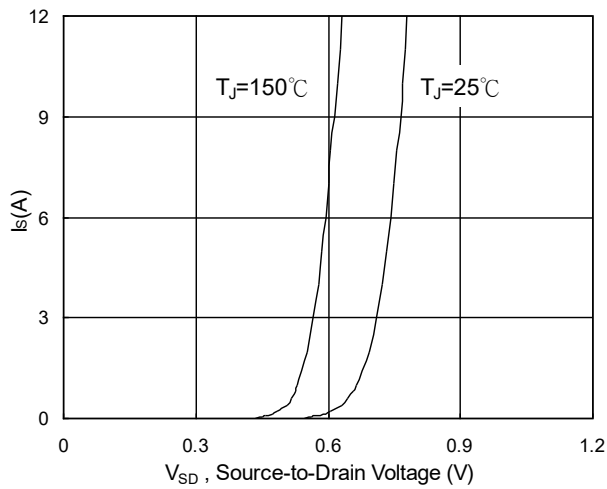


Fig.3 Forward Characteristics of Reverse

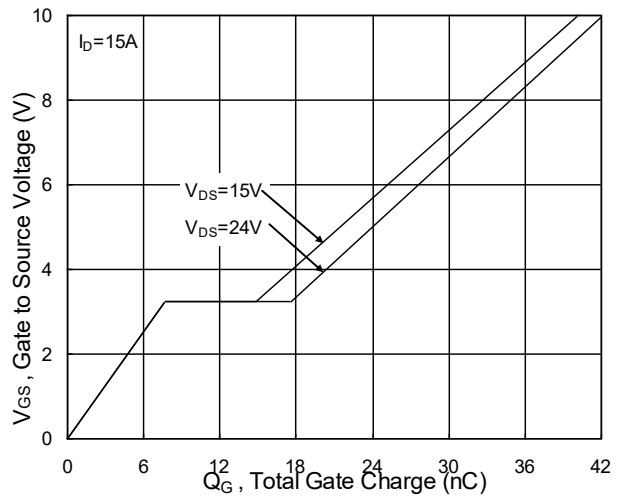


Fig.4 Gate-Charge Characteristics

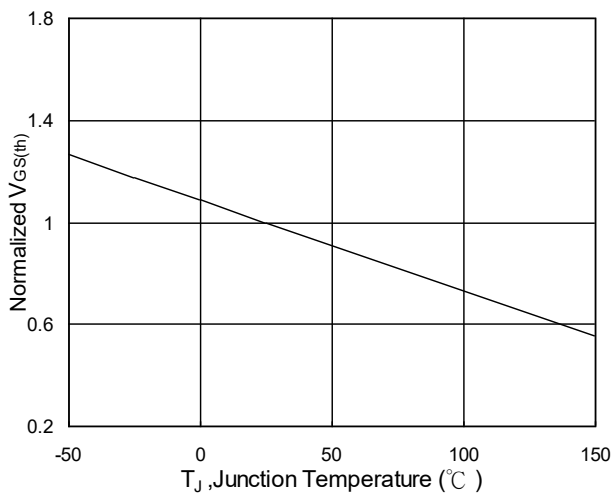


Fig.5 Normalized V<sub>GS(th)</sub> vs. T<sub>J</sub>

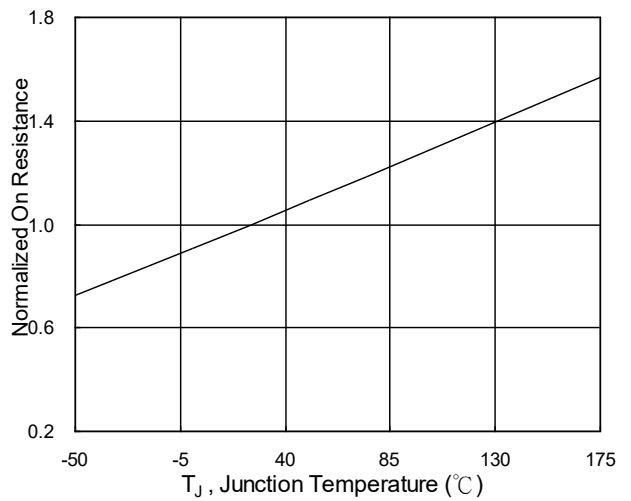


Fig.6 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>

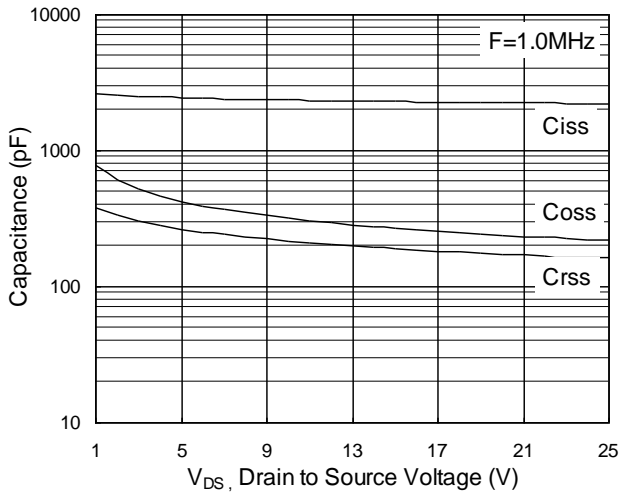


Fig.7 Capacitance

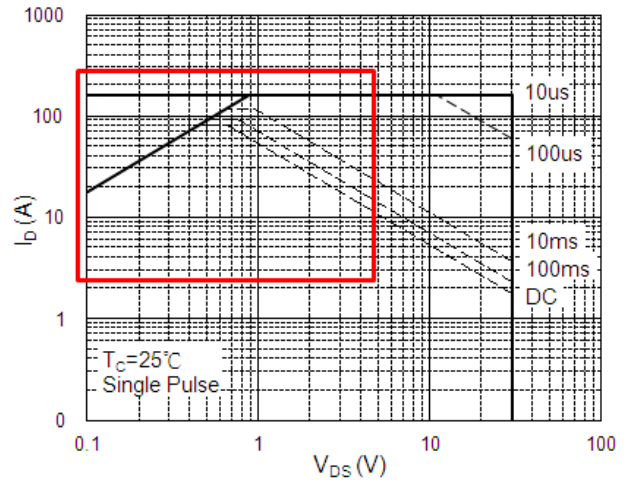


Fig.8 Safe Operating Area

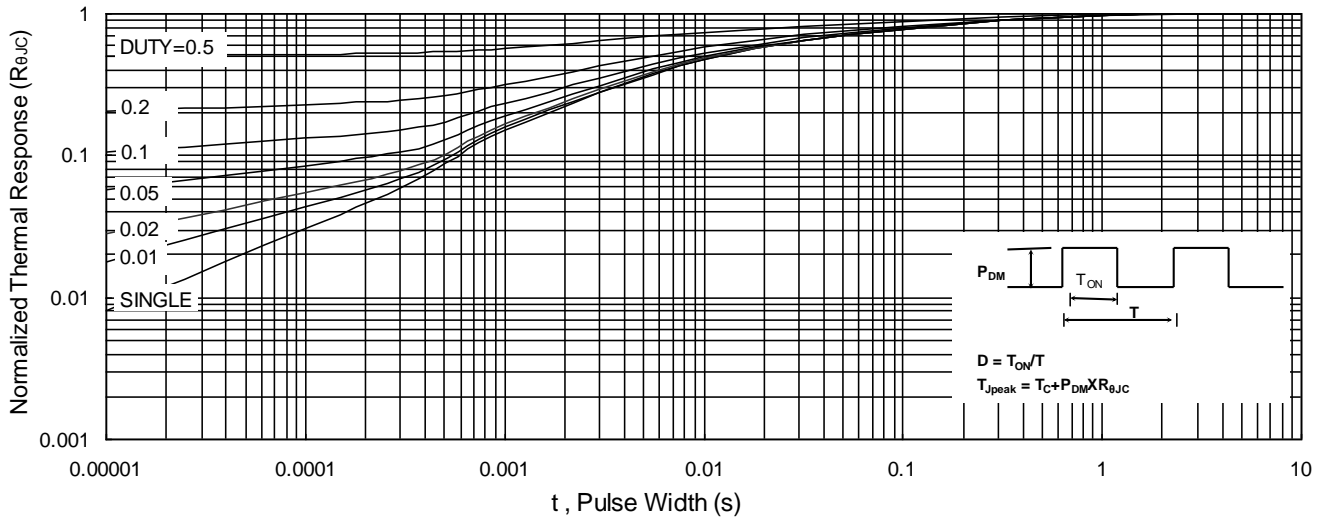


Fig.9 Normalized Maximum Transient Thermal Impedance

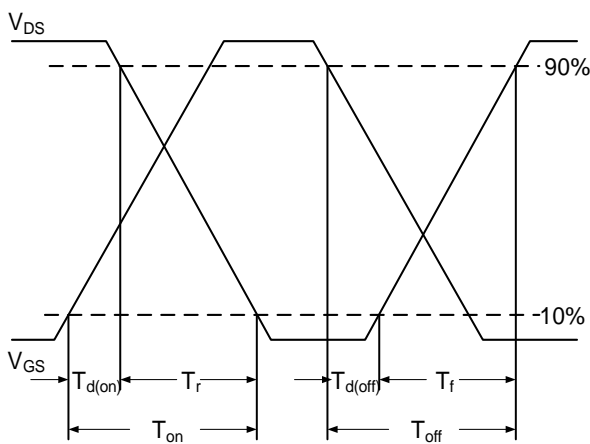


Fig.10 Switching Time Waveform

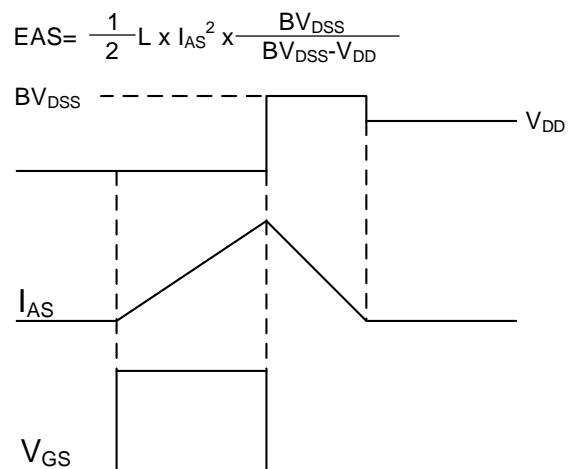


Fig.11 Unclamped Inductive Switching Waveform





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