



### Description

The FDD8780 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.

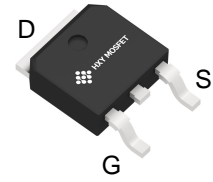
### General Features

$V_{DS} = 30V$   $I_D = 60A$

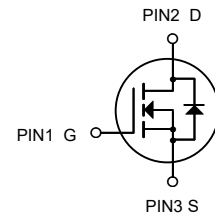
$R_{DS(ON)} < 9m\Omega$  @  $V_{GS} = 10V$

### Application

- Battery protection
- Load switch
- Uninterruptible power supply



TO-252-2L  
(DPAK)



N-Channel MOSFET

### Ordering Information

Product ID	Pack	Brand	Qty(PCS)
FDD8780	TO-252-2L(DPAK)	HXY MOSFET	2500

### Absolute Maximum Ratings (TC=25°C unless otherwise specified)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	60	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	40	A
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	13.6	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	11.4	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	110	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	57.8	mJ
$I_{AS}$	Avalanche Current	34	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation <sup>4</sup>	41	W
$P_D @ T_A = 25^\circ C$	Total Power Dissipation <sup>4</sup>	2.42	W
$T_{STG}$	Storage Temperature Range	-55 to 175	°C
$T_J$	Operating Junction Temperature Range	-55 to 175	°C
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	3.6	°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	---	0.027	---	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	---	7	9	mΩ
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =15A	---	11	14	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	1.5	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-5.8	---	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	---	38	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz	---	2.2	3.5	
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	---	12.6	17.6	nC
Q <sub>gs</sub>	Gate-Source Charge		---	4.2	5.9	
Q <sub>gd</sub>	Gate-Drain Charge		---	5.1	7.1	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V , V <sub>GS</sub> =10V , R <sub>G</sub> =3.3 I <sub>D</sub> =15A	---	4.6	9.2	ns
T <sub>r</sub>	Rise Time		---	12.2	22	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	26.6	53	
T <sub>f</sub>	Fall Time		---	8	16	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V , V <sub>GS</sub> =0V , f=1MHz	---	1317	1843	pF
C <sub>oss</sub>	Output Capacitance		---	163	228	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	131	183	
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	55	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	110	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	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =30A , di/dt=100A/μs , T <sub>J</sub> =25°C	---	9.2	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	2	---	nC

**Note :**

- 1 .The data tested by surface mounted on a 1 inch<sup>2</sup> 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<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>A5</sub>=34A
- 4.The power dissipation is limited by 175°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



### Typical Characteristics

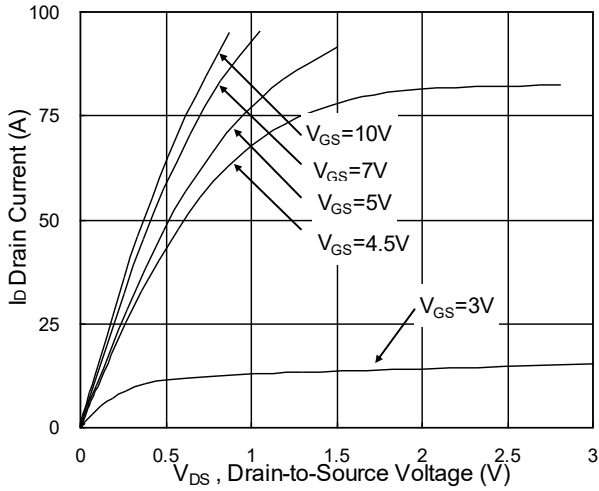


Fig.1 Typical Output Characteristics

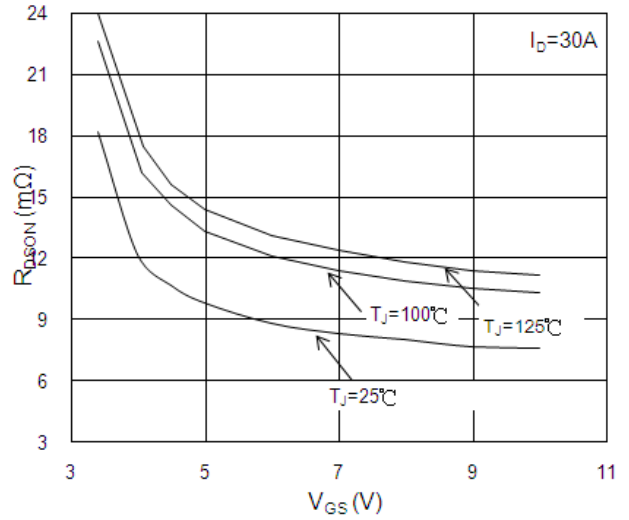


Fig.2 On-Resistance vs. G-S Voltage

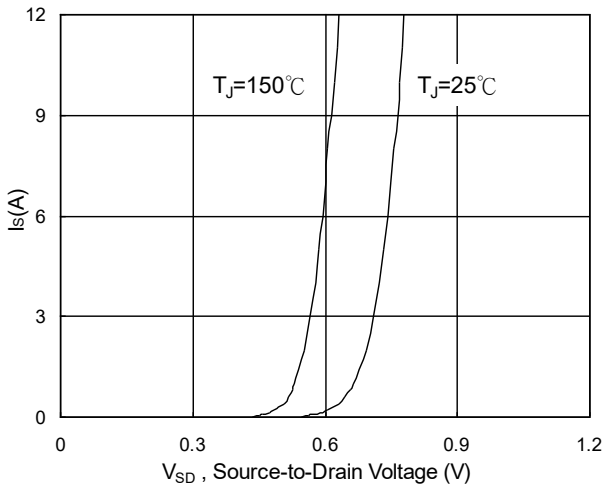


Fig.3 Forward Characteristics of Reverse

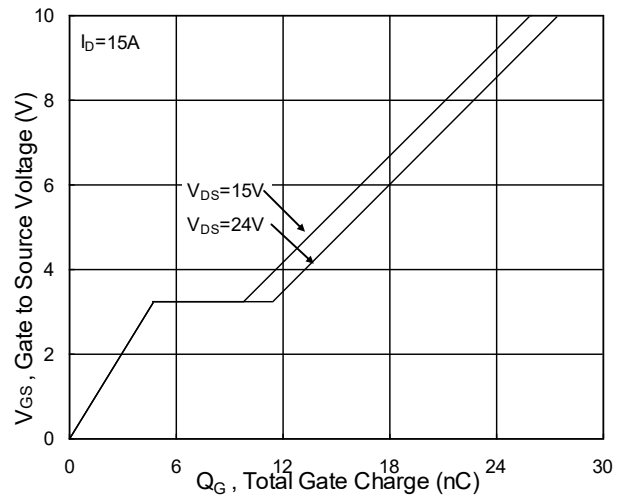


Fig.4 Gate-Charge Characteristics

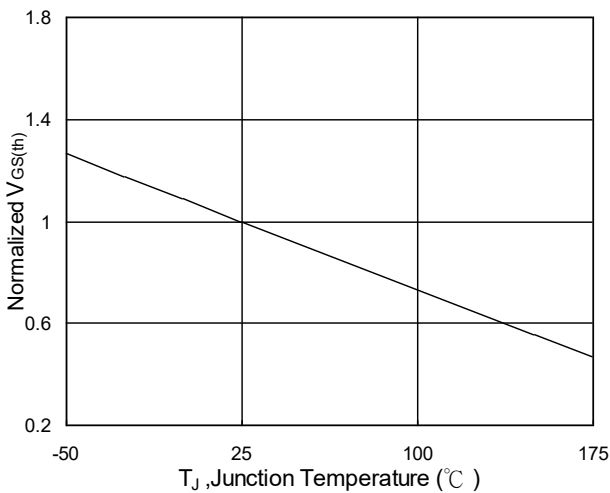


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

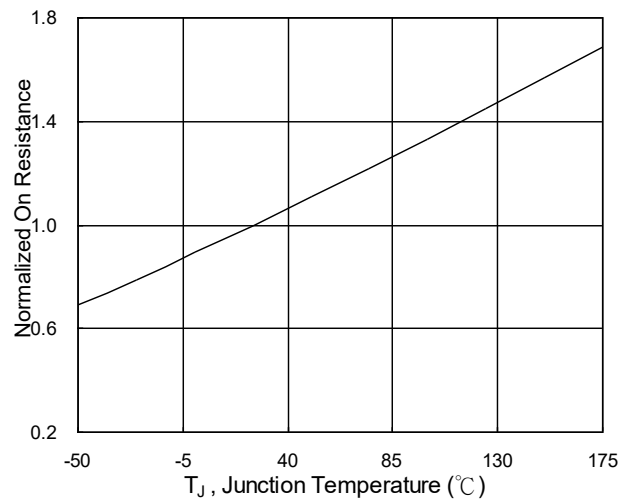


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

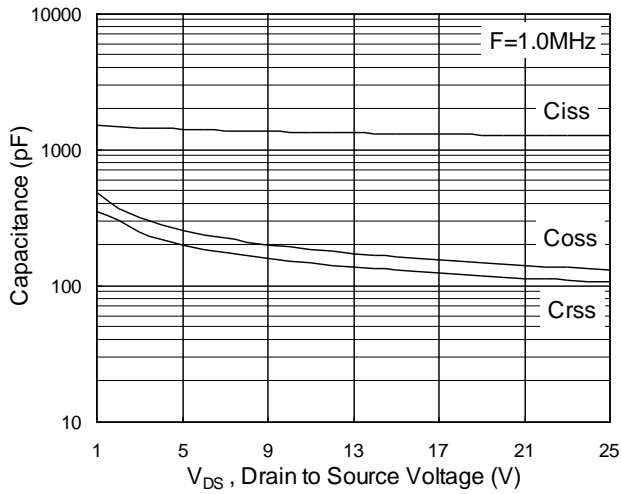


Fig.7 Capacitance

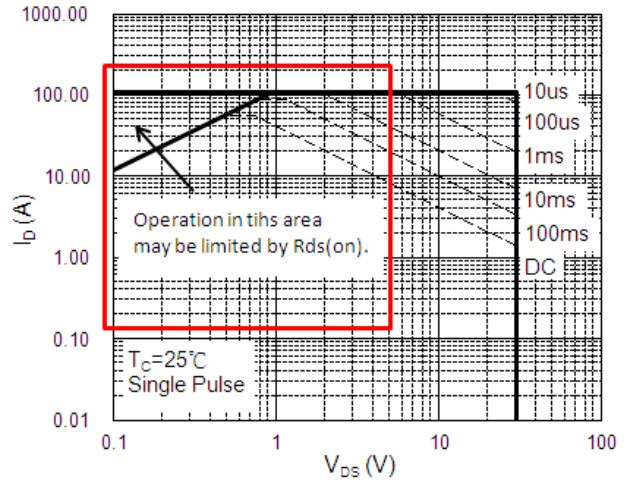


Fig.8 Safe Operating Area

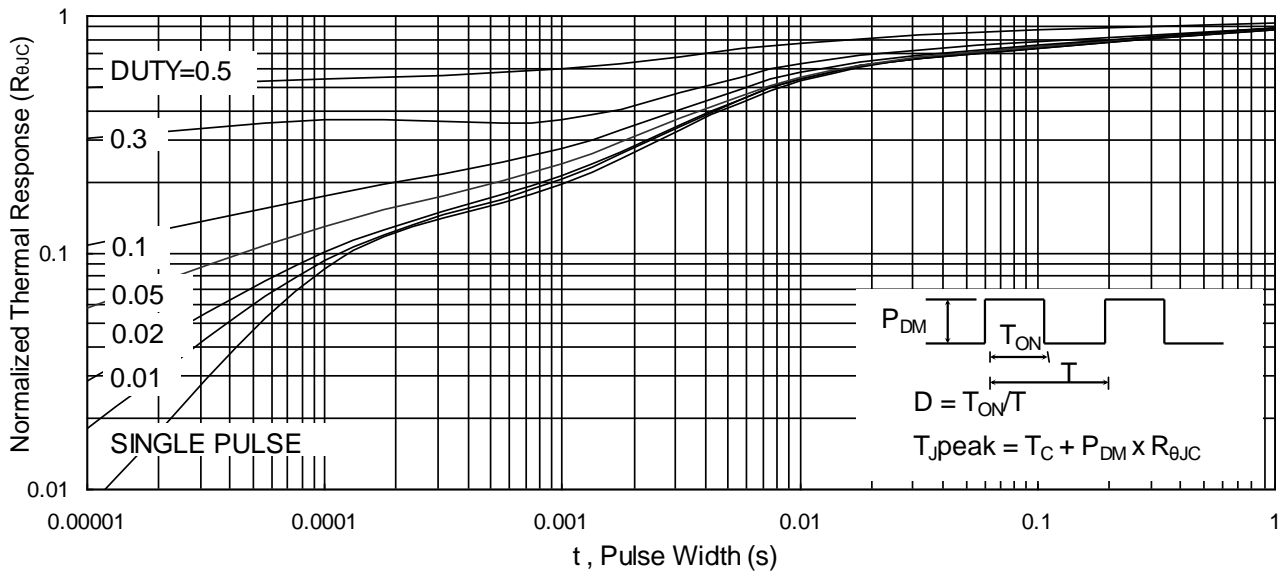


Fig.9 Normalized Maximum Transient Thermal Impedance

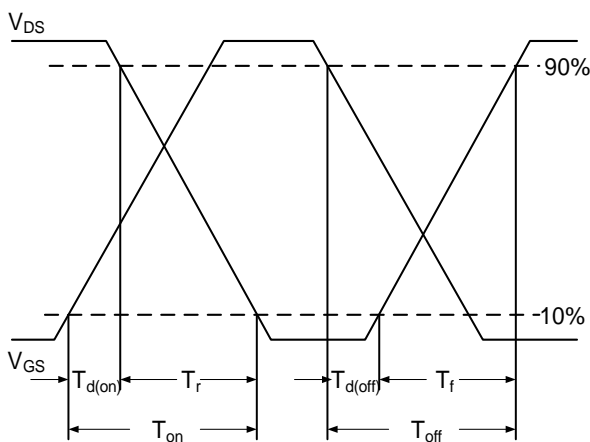


Fig.10 Switching Time Waveform

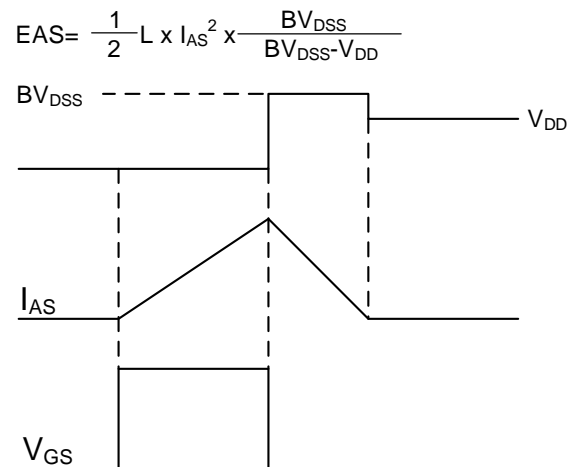


Fig.11 Unclamped Inductive Switching Waveform





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