



Description

The IRFR3709ZPBF 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

$V_{DS}=30V$ $I_D=80A$

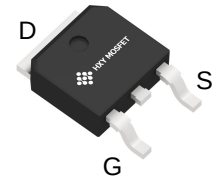
$R_{DS(ON)} < 6.8m\Omega @ V_{GS}=10V$

Application

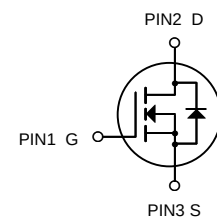
Battery protection

Load switch

Uninterruptible power supply



TO-252-2L



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
IRFR3709ZPBF	TO-252-2L	HXY MOSFET	2500

Absolute Maximum Ratings ($T_C=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_C=25^{\circ}C$)	80	A
	Drain Current – Continuous ($T_C=100^{\circ}C$)	51	A
I_{DM}	Drain Current – Pulsed ¹	320	A
EAS	Single Pulse Avalanche Energy ²	88	mJ
IAS	Single Pulse Avalanche Current ²	42	A
P_D	Power Dissipation ($T_C=25^{\circ}C$)	54	W
	Power Dissipation – Derate above $25^{\circ}C$	0.43	W/ $^{\circ}C$
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance Junction to ambient	62	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	2.3	$^{\circ}C/W$



Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	30	---	---	V
$\Delta BVDSS/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	0.04	---	$V/^{\circ}\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=30V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=24V$, $V_{GS}=0V$, $T_J=125^{\circ}\text{C}$	---	---	10	μA
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
RDS(ON)	Static Drain-Source On-Resistance ³	$V_{GS}=10V$, $I_D=20A$	---	5	6.8	$m\Omega$
		$V_{GS}=4.5V$, $I_D=10A$	---	6.5	9	$m\Omega$
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4	---	$mV/^{\circ}\text{C}$
gfs	Forward Transconductance	$V_{DS}=10V$, $I_D=10A$	---	18	---	S
Q_g	Total Gate Charge ^{3, 4}	$V_{DS}=15V$, $V_{GS}=4.5V$, $I_D=20A$	---	11.1	---	nC
Q_{gs}	Gate-Source Charge ^{3, 4}		---	1.85	---	
Q_{gd}	Gate-Drain Charge ^{3, 4}		---	6.8	---	
$T_{d(on)}$	Turn-On Delay Time ^{3, 4}	$V_{DD}=15V$, $V_{GS}=10V$, $R_G=3.3\Omega$ $I_D=15A$	---	7.5	---	ns
T_r	Rise Time ^{3, 4}		---	14.5	---	
$T_{d(off)}$	Turn-Off Delay Time ^{3, 4}		---	35.2	---	
T_f	Fall Time ^{3, 4}		---	9.6	---	
Ciss	Input Capacitance	$V_{DS}=25V$, $V_{GS}=0V$, $F=1MHz$	---	1160	---	pF
Coss	Output Capacitance	$V_{GS}=0V$, $V_{DS}=0V$, $F=1MHz$	---	200	---	Ω
Crss	Reverse Transfer Capacitance		---	180	---	
R_g	Gate resistance		---	2.5	---	
EAS	Single Pulse Avalanche Energy	$V_{DD}=25V$, $L=0.1mH$, $I_{AS}=20A$	20	---	---	mJ
IS	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	80	A
ISM	Pulsed Source Current ³		---	---	320	A
VSD	Diode Forward Voltage ³	$V_{GS}=0V$, $I_S=1A$, $T_J=25^{\circ}\text{C}$	---	---	1	V
trr	Reverse Recovery Time	$V_{GS}=0V$, $I_S=1A$, $di/dt=100A/\mu s$, $T_J=25^{\circ}\text{C}$	---	---	---	ns
Q_{rr}	Reverse Recovery Charge		---	---	---	nC



Typical Characteristics

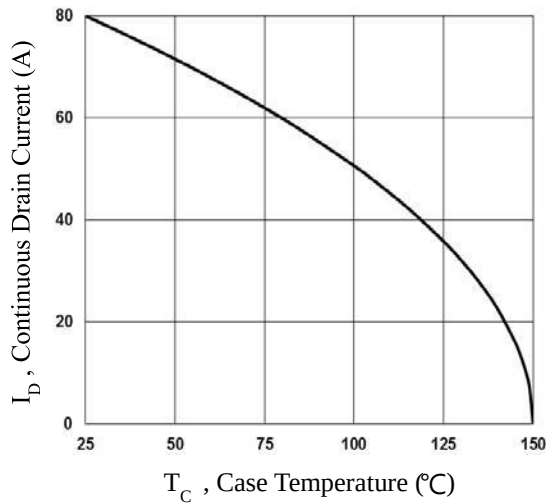


Fig.1 Continuous Drain Current vs. T_C

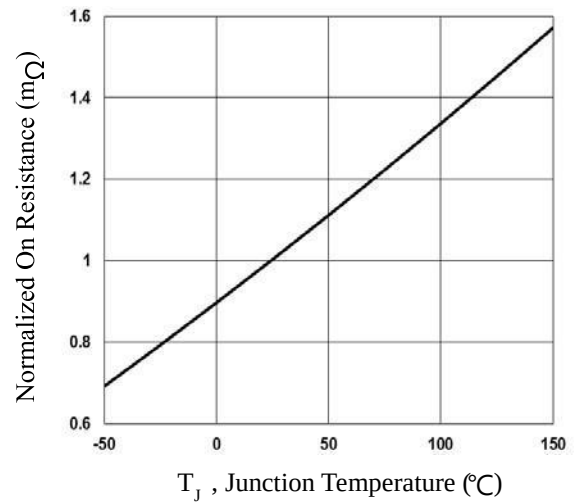


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

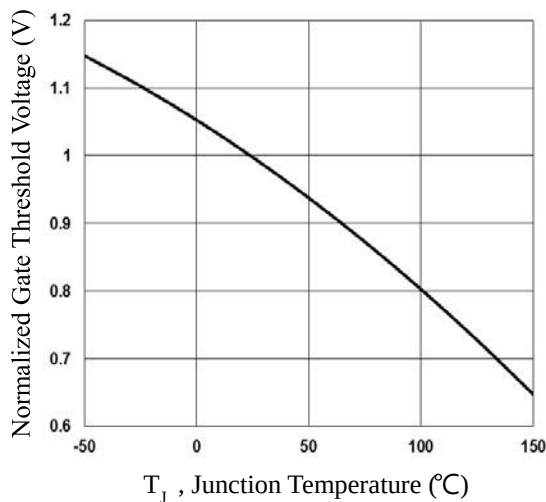


Fig.3 Normalized V_{th} vs. T_J

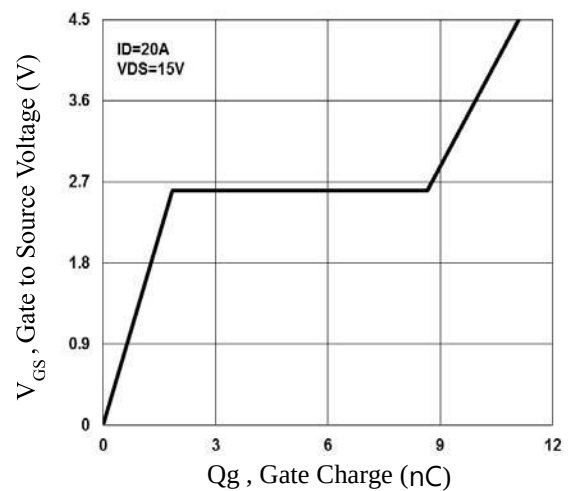


Fig.4 Gate Charge Waveform

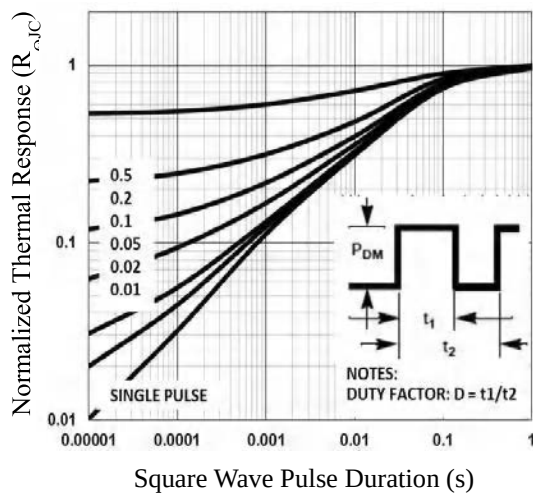


Fig.5 Normalized Transient Impedance

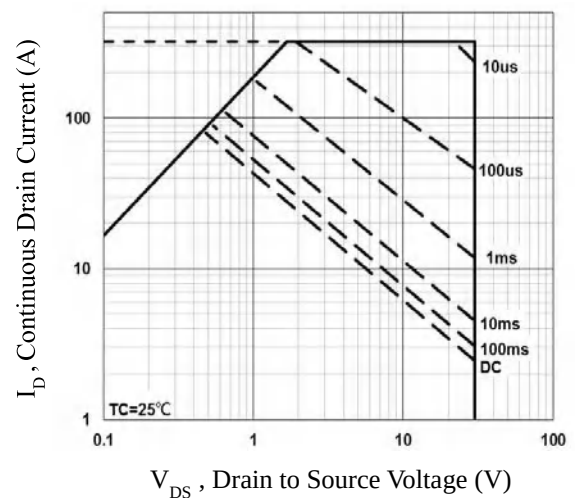


Fig.6 Maximum Safe Operation Area

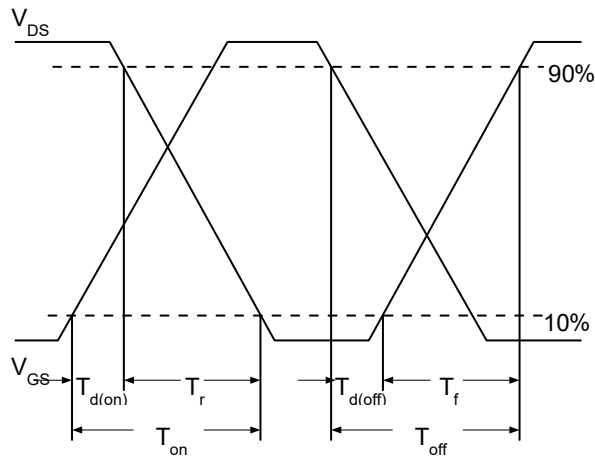


Fig.7 Switching Time Waveform

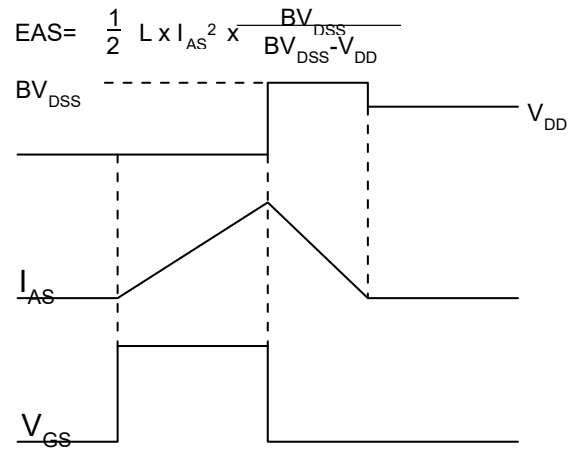
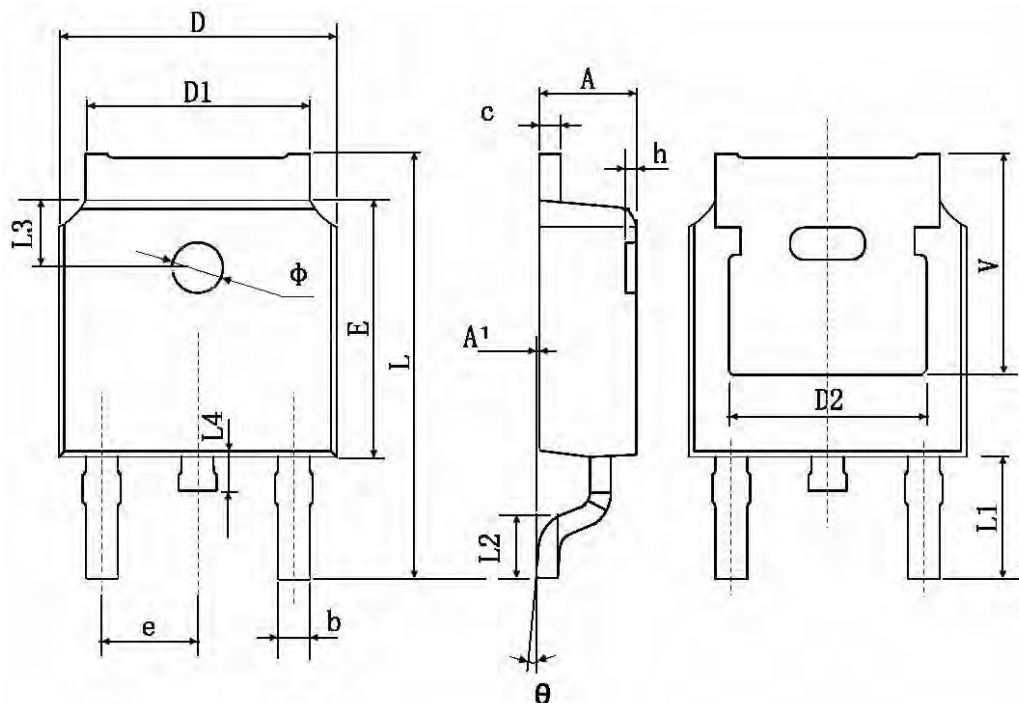


Fig.8 EAS Waveform



TO-252-2L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	0.483 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	



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