



Description

The IRFR3709ZTRPBF 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.



TO-252-2L

General Features

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

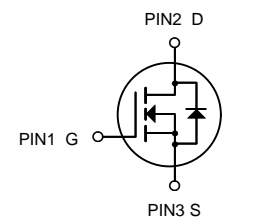
$R_{DS(ON)} < 6.8m\Omega @ V_{GS}=10V$

Application

Battery protection

Load switch

Uninterruptible power supply



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
IRFR3709ZTRPBF	TO-252-2L	RFR3709 XXXX	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°C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	30	---	---	V
ΔBVDSS/ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.04	---	V/°C
IDSS	Drain-Source Leakage Current	V _{DS} =30V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =24V, V _{GS} =0V, T _J =125°C	---	---	10	uA
IGSS	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
RDS(ON)	Static Drain-Source On-Resistance ³	V _{GS} =10V, I _D =20A	---	5	6.8	mΩ
		V _{GS} =4.5V, I _D =10A	---	6.5	9	mΩ
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1	1.6	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-4	---	mV/°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	---	
Td(on)	Turn-On Delay Time ^{3,4}	V _{DD} =15V, V _{GS} =10V, R _G =3.3Ω I _D =15A	---	7.5	---	ns
T _r	Rise Time ^{3,4}		---	14.5	---	
Td(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		---	200	---	
Crss	Reverse Transfer Capacitance		---	180	---	
R _g	Gate resistance		V _{GS} =0V, V _{DS} =0V, F=1MHz	---	2.5	
EAS	Single Pulse Avalanche Energy	V _{DD} =25V, L=0.1mH, IAS=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°C	---	---	1	V
trr	Reverse Recovery Time	V _{GS} =0V, I _S =1A, di/dt=100A/μs T _J =25°C	---	---	---	ns
Q _{rr}	Reverse Recovery Charge		---	---	---	nC



Typical Characteristics

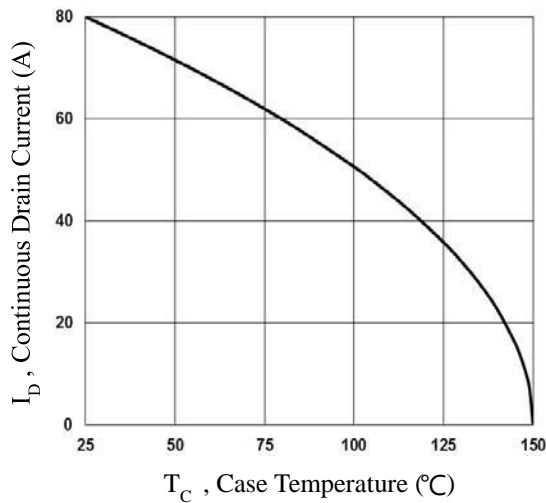


Fig.1 Continuous Drain Current vs. T_C

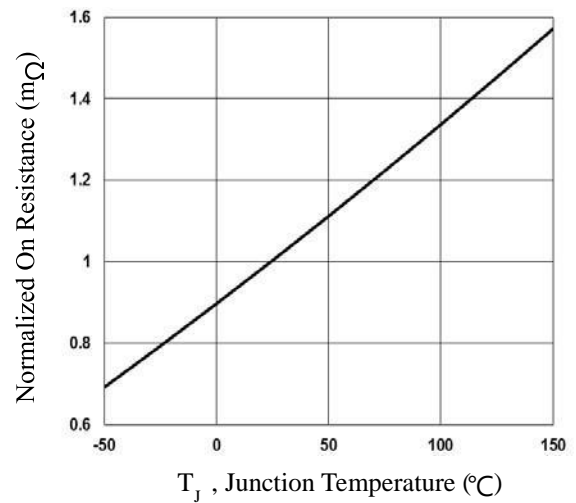


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

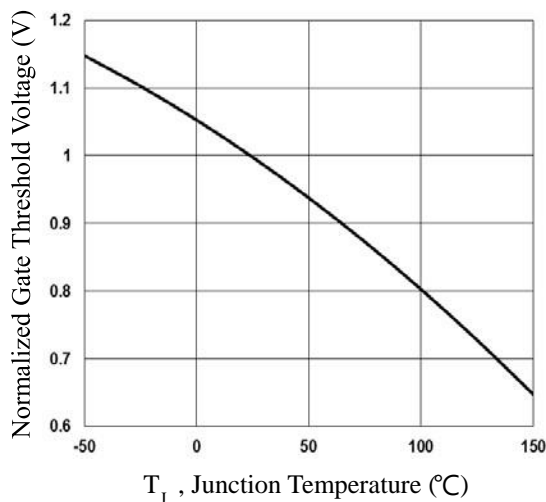


Fig.3 Normalized V_{th} vs. T_J

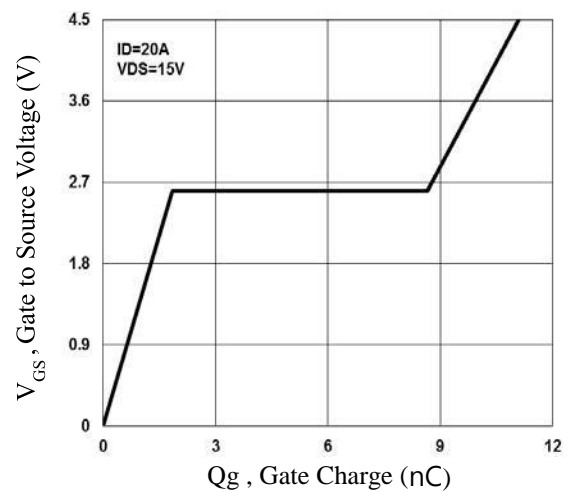


Fig.4 Gate Charge Waveform

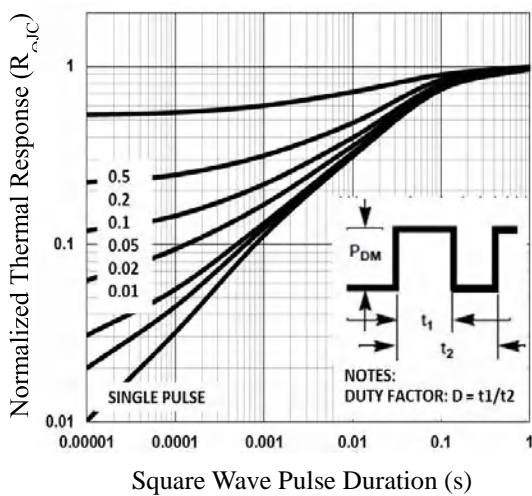


Fig.5 Normalized Transient Impedance

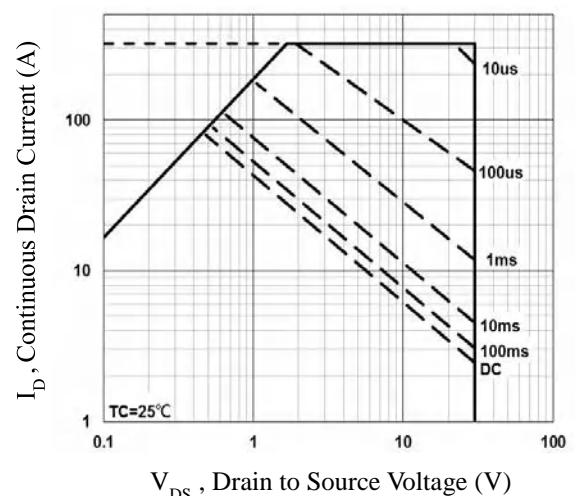


Fig.6 Maximum Safe Operation Area

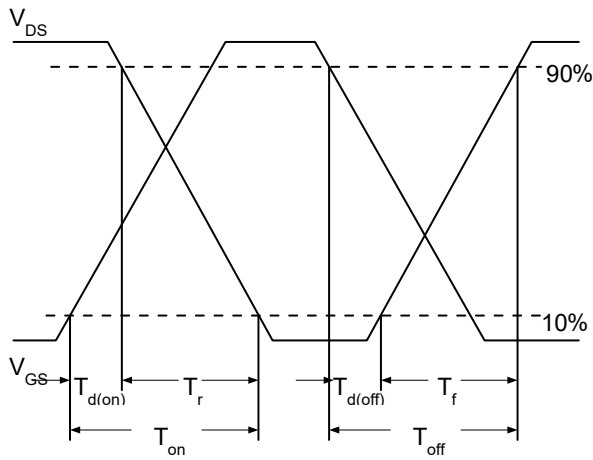


Fig.7 Switching Time Waveform

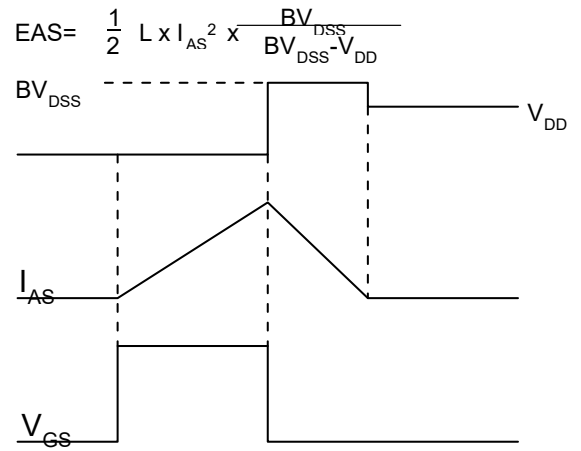
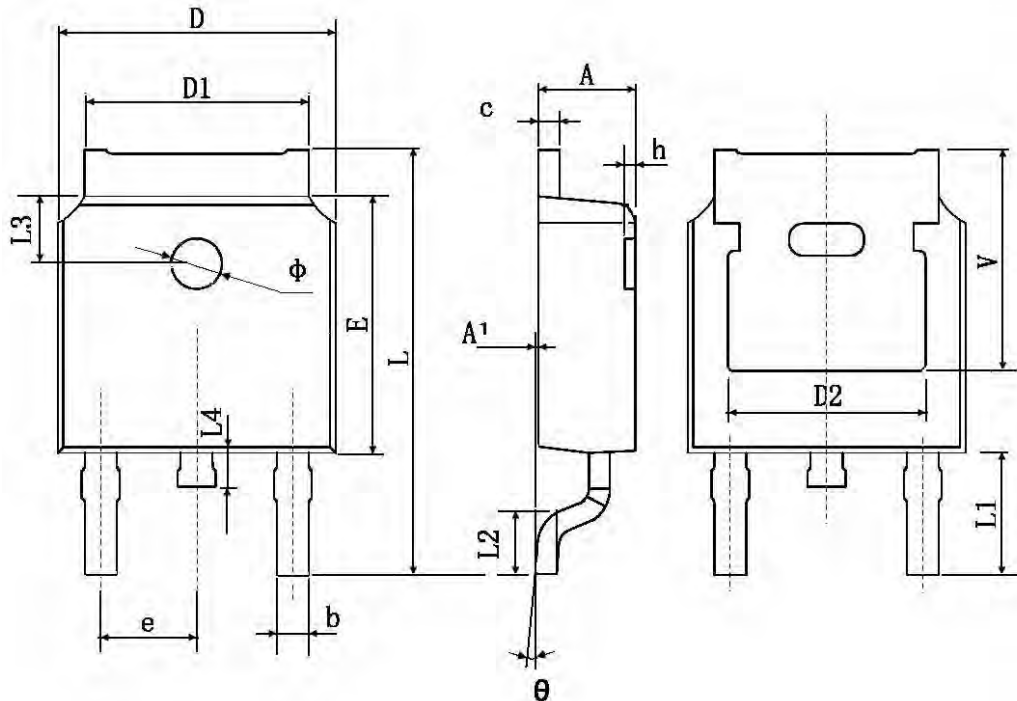


Fig.8 EAS Waveform



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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