



Description

The IRFR4105PBF 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

$V_{DS} = 60V$ $I_D = 20A$

$R_{DS(ON)} < 32m\Omega$ @ $V_{GS} = 10V$

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
IRFR4105PBF	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	60	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	20	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	10	A
I_{DM}	Pulsed Drain Current ²	80	A
EAS	Single Pulse Avalanche Energy ³	38	mJ
$P_D @ T_C = 25^\circ C$	Total Power Dissipation ⁴	34.7	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$



Electrical Characteristics (T_J = 25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	60	-	-	V
Gate-Body Leakage Current	I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J =25°C	V _{DS} = 60V, V _{GS} = 0V	-	-	1	μA
	T _J =100°C		-	-	100	
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1.2	1.7	2.5	V
Drain-Source on-Resistance ⁴	R _{DS(on)}	V _{GS} = 10V, I _D = 10A	-	25	32	mΩ
		V _{GS} = 4.5V, I _D = 5A	-	31.5	40	
Forward Transconductance ⁴	g _{fs}	V _{DS} = 5V, I _D = 10A	-	15.5	-	S
Dynamic Characteristics⁵						
Input Capacitance	C _{iss}	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz	-	1355	-	pF
Output Capacitance	C _{oss}		-	60	-	
Reverse Transfer Capacitance	C _{rss}		-	49	-	
Gate Resistance	R _G	f = 1MHz	-	1.2	-	Ω
Switching Characteristics⁵						
Total Gate Charge	Q _g	V _{GS} = 10V, V _{DD} = 30V, I _D = 10A	-	22	-	nC
Gate-Source Charge	Q _{gs}		-	4.2	-	
Gate-Drain Charge	Q _{gd}		-	6.9	-	
Turn-on Delay Time	t _{d(on)}	V _{GS} = 10V, V _{DD} = 30V, R _G = 3Ω, I _D = 10A	-	6.4	-	ns
Rise Time	t _r		-	15.3	-	
Turn-off Delay Time	t _{d(off)}		-	25	-	
Fall Time	t _f		-	7.6	-	
Body Diode Reverse Recovery Time	t _{rr}	I _F = 10A, dI _F /dt = 100A/μs	-	26	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	45	-	nC
Drain-Source Body Diode Characteristics						
Diode Forward Voltage ⁴	V _{SD}	I _S = 10A, V _{GS} = 0V	-	-	1.2	V
Continuous Source Current	I _S	T _C = 25°C	-	-	20	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)} = 150°C
2. The EAS data shows Max. rating. The test condition is V_{DD} = 25V, V_{GS} = 10V, L = 0.4mH, I_{AS} = 14A
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.



Typical Characteristics

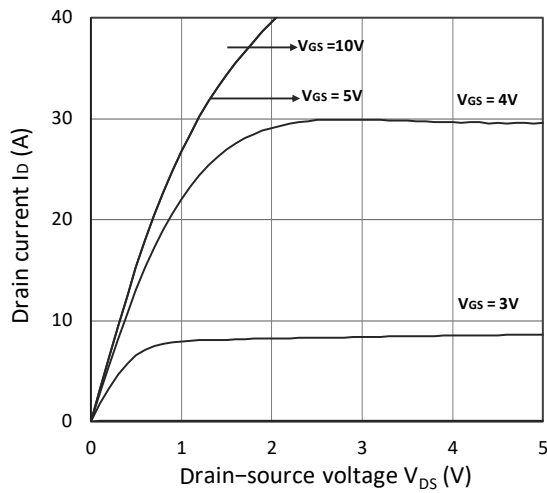


Figure 1. Output Characteristics

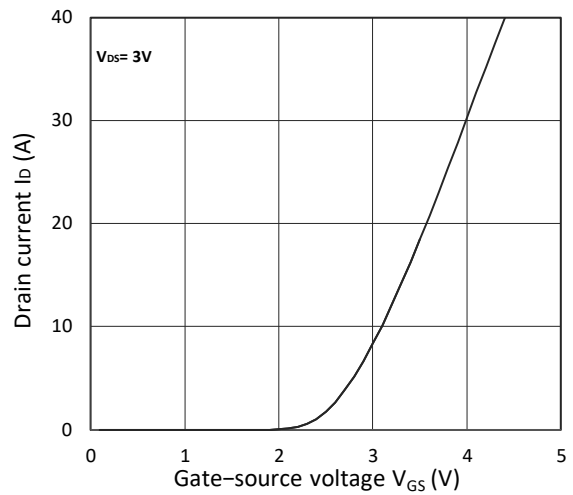


Figure 2. Transfer Characteristics

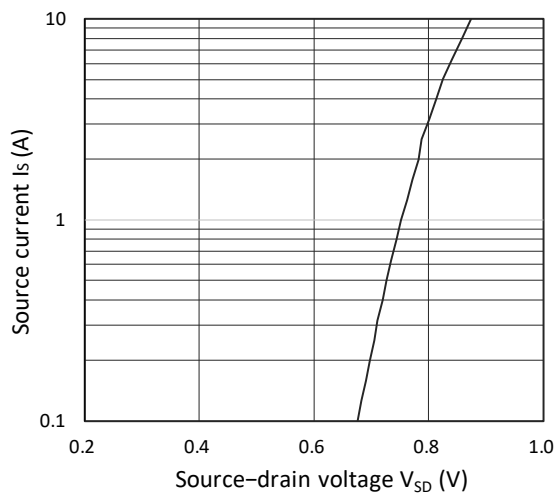


Figure 3. Forward Characteristics of Reverse

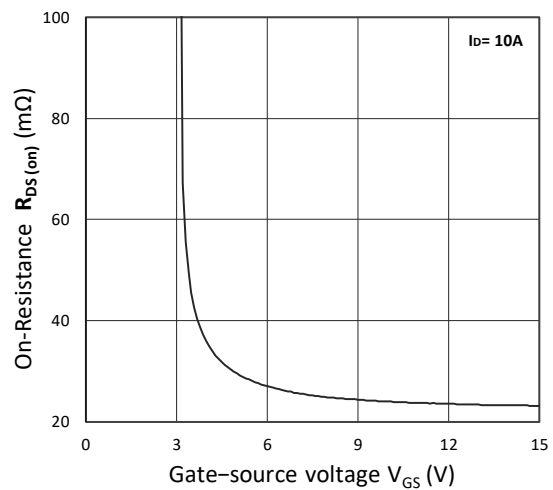


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

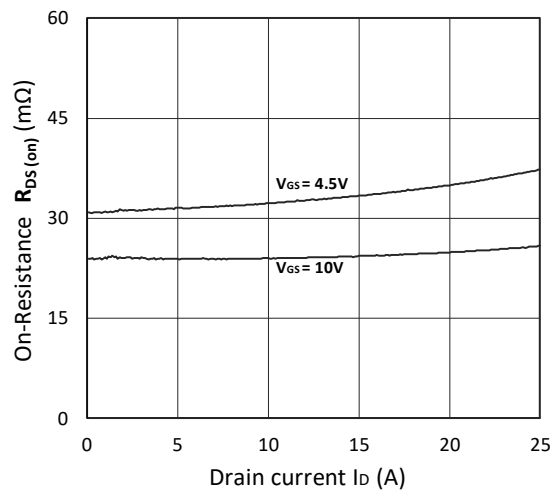


Figure 5. $R_{DS(ON)}$ vs. I_D

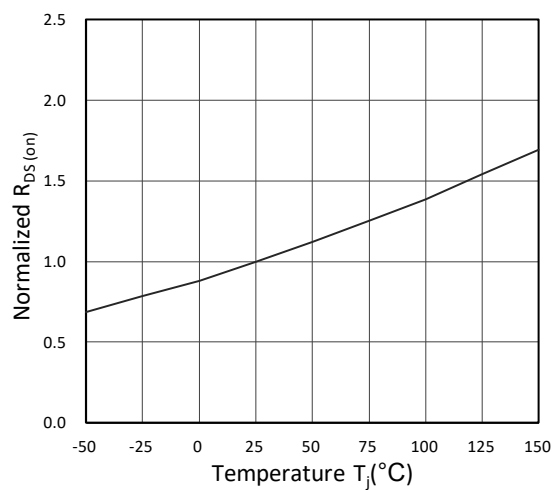


Figure 6. Normalized $R_{DS(ON)}$ vs. Temperature



Figure 7. Capacitance Characteristics

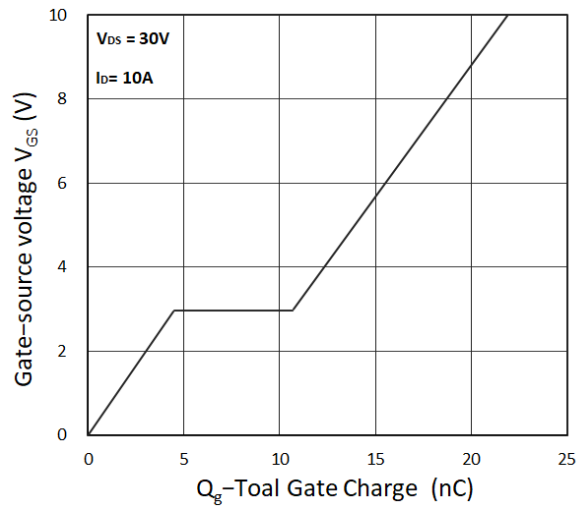


Figure 8. Gate Charge Characteristics

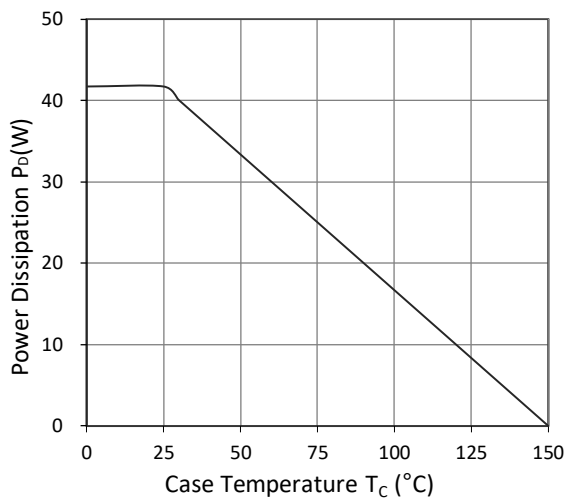


Figure 9. Power Dissipation

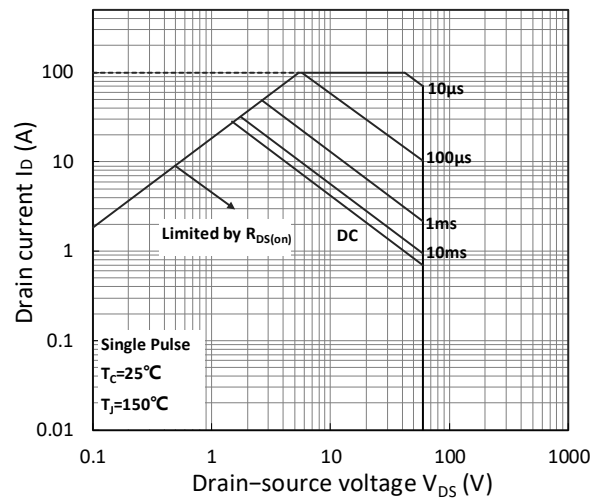


Figure 10. Safe Operating Area

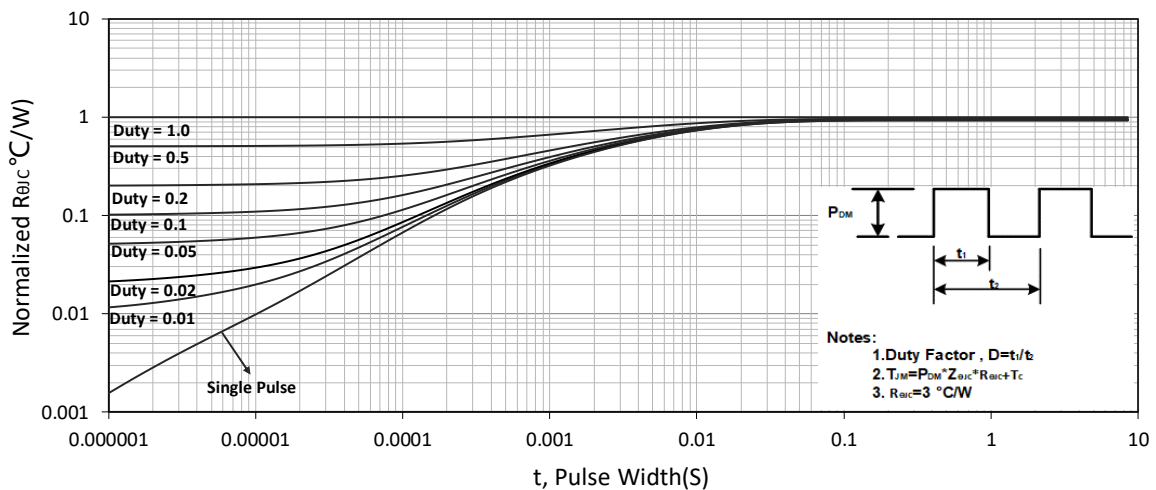
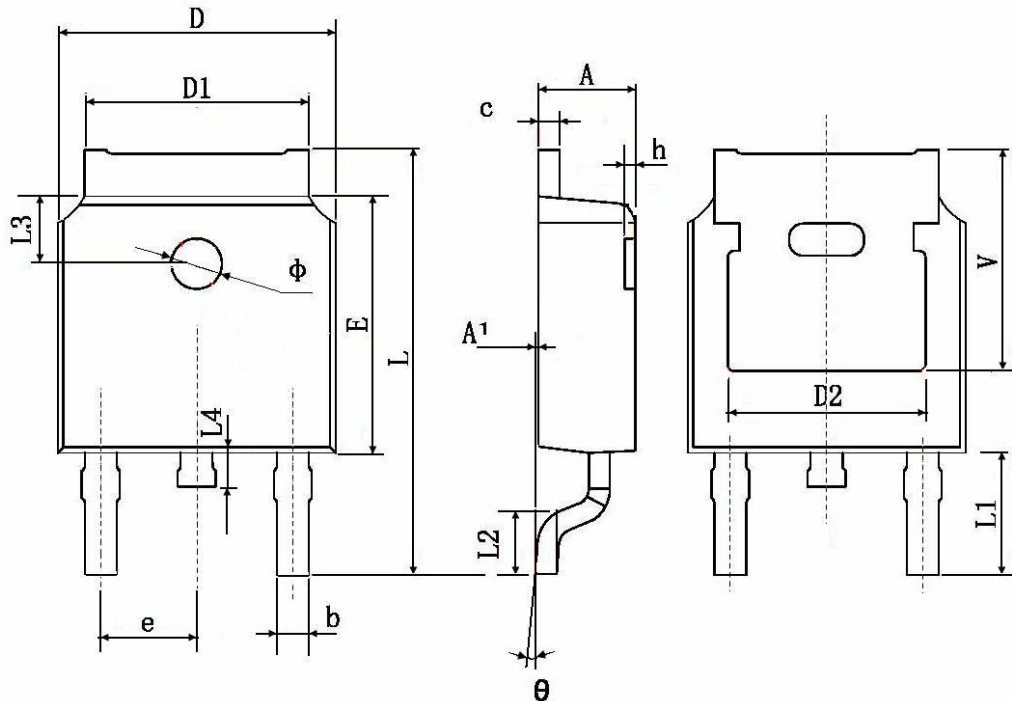


Figure 11. Normalized Maximum Transient Thermal Impedance



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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