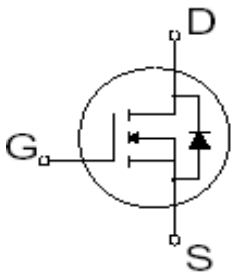
IRF830

Features

- Extremely high dv/dt capability
- Low Gate Charge Qg results in Simple Drive Requirement
- 100% avalanche tested
- Gate charge minimized
- Very low intrinsic capacitances
- Very good manufacturing repeatability



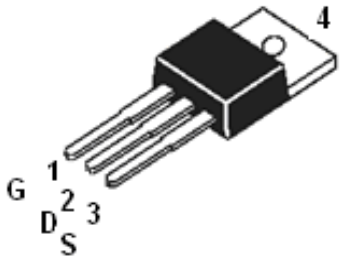
V_{DSS} = 500V

I_D = 5A

$R_{DS(ON)}$ = 1.2 Ω

Description

The IRF830 is a new generation of high voltage N–Channel enhancement mode power MOSFETs and is obtained through an extreme optimization layout design, in additional to pushing on-resistance significantly down, special care is taken to ensure a very good dv/dt capability, provide superior switching performance, withstand high energy pulse in the avalanche, and increases packing density.



IRF830 TOP View (TO220)

Application

- High current, high speed switching
- Lighting
- Ideal for off-line power supply, adaptor, PFC

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D@Tc=25℃	Continuous Drain Current,V_{GS}@10V	5	A
I_D@Tc=100℃	Continuous Drain Current,V_{GS}@10V	3	
I_{DM}	Pulsed Drain Current ①	20	
P_D@Tc=25℃	Power Dissipation	80	W
	Linear Derating Factor	0.67	W/℃
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy ②	120	mJ
I_{AR}	Avalanche Current ①	5	A
E_{AR}	Repetitive Avalanche Energy ①	8.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.5	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	－55 to +150	℃

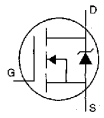
Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case	—	—	1.56	℃/W
$R_{\theta CS}$	Case-to-Sink,Flat,Greased Surface	—	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	—	62.5	

Electrical Characteristics @T_J=25℃(unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	500	—	—	V	V_{GS}=0V,I_D=250μA
△$V_{(BR)DSS}$/△T_J	Breakdown Voltage Temp.Coefficient	—	0.6	—	V/℃	Reference to 25℃,I_D=250μA
$R_{DS(on)}$	Static Drain-to-Source On-resistance	—	1.15	1.2	Ω	V_{GS}=10V,I_D=2.5A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS}=V_{GS},I_D=250μA
gfs	Forward Transconductance	—	4.3	—	S	V_{DS}=40V,I_D=2.25A
I_{DSS}	Drain-to-Source Leakage current	—	—	1	μA	V_{DS}=500V,V_{GS}=0V
		—	—	10		V_{DS}=400V,V_{GS}=0V,T_J=150℃
I_{GSS}	Gate-to-Source Forward leakage	—	—	100	nA	V_{GS}=30V
	Gate-to-Source Reverse leakage	—	—	-100		V_{GS}=-30V
Qg	Total Gate Charge	—	11	15	nC	I_D=5A
Qgs	Gate-to-Source charge	—	3	—		V_{DS}=400V
Qgd	Gate-to-Drain("Miller") charge	—	5	—		V_{GS}=10V
td(on)	Turn-on Delay Time	—	13	36	nS	V_{DD}=250V
tr	Rise Time	—	22	54		I_D=5A
td(off)	Turn-Off Delay Time	—	28	66		R_G=25Ω
tf	Fall Time	—	20	50		
Ciss	Input Capacitance	—	515	670	pF	V_{GS}=0V
Coss	Output Capacitance	—	55	72		V_{DS}=25V
Crss	Reverse Transfer Capacitance	—	6.5	8.5		f=1.0MHz

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	20		
V_{SD}	Diode Forward Voltage	—	—	1.4	V	T_J=25℃,I_S=5A,V_{GS}=0V ④
Trr	Reverse Recovery Time	—	300	—	nS	T_J=25℃,I_F=5A
Qrr	Reverse Recovery Charge	—	1.8		uC	di/dt=100A/μs ④

Notes:

① Repetitive rating; pulse width limited by maxlimum. junction temperature

② L = 15mH, IAS =4 A, VDD = 50V, RG = 25Ω, Starting TJ = 25°C

③ I_{SD}≤5A,di/dt≤200A/μs, V_{DD}≤$V_{(BR)DSS}$, TJ≤25℃

④ Pulse width≤300μS; duty cycle≤2%

Typical Performance Characteristics

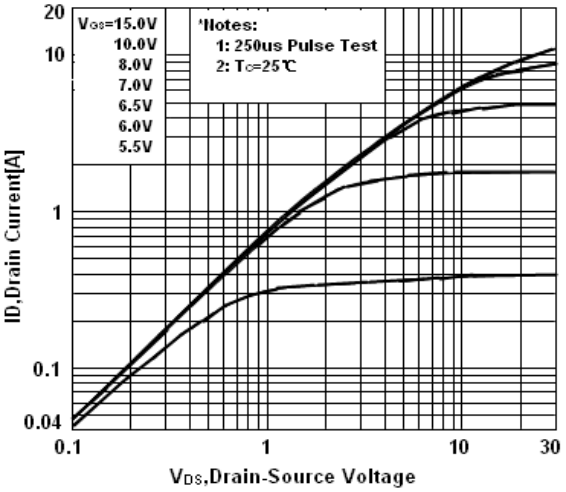


Figure 1 On-Region Characteristics

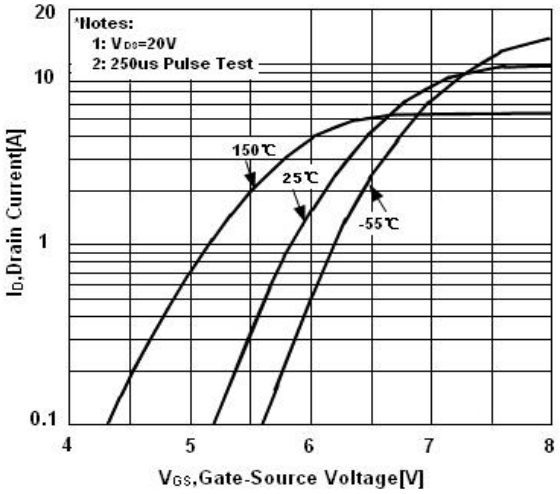


Figure 2 Transfer Characteristics

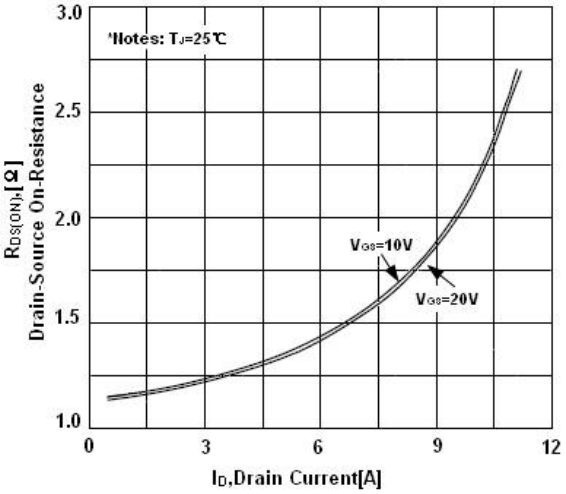


Figure 3 On-Resistance Variation vs. Drain Current and Gate Voltage

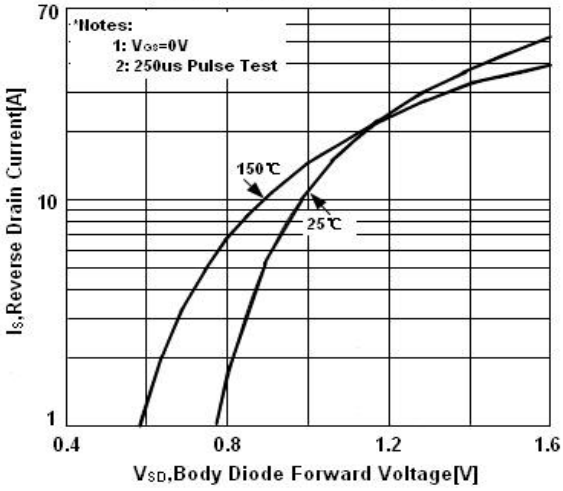


Figure 4 Body diode forward Voltage Variation vs. Source Current and temperature

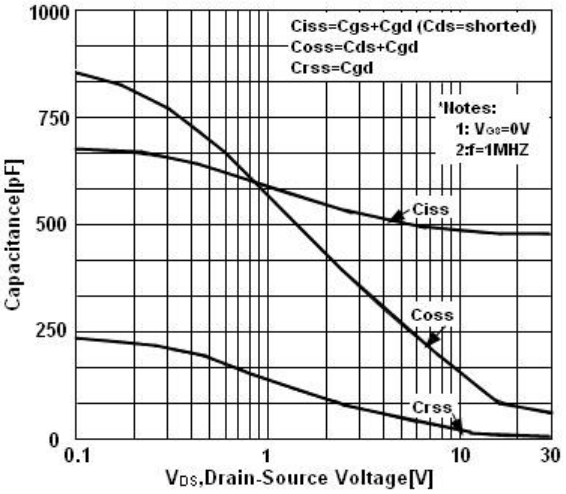


Figure 5 Capacitance Characteristics

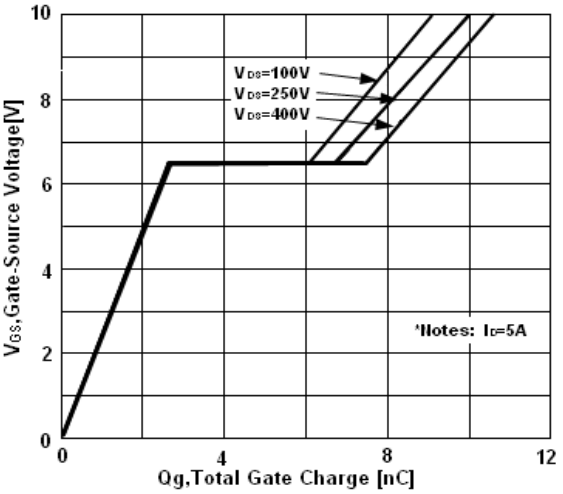


Figure 6 Gate Charge Characteristics

Typical Performance Characteristics

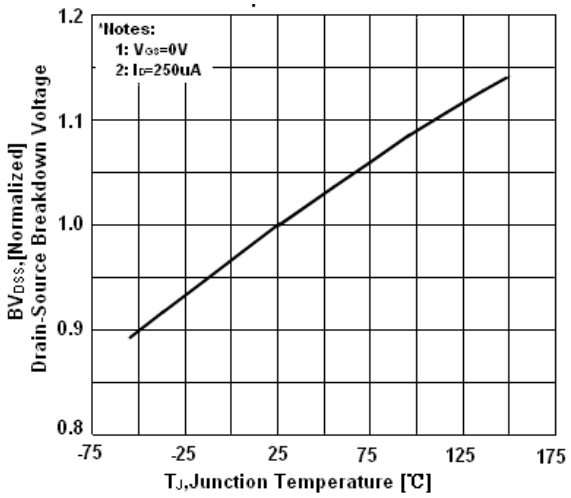


Figure 7 Breakdown Voltage Variation vs. Temperature

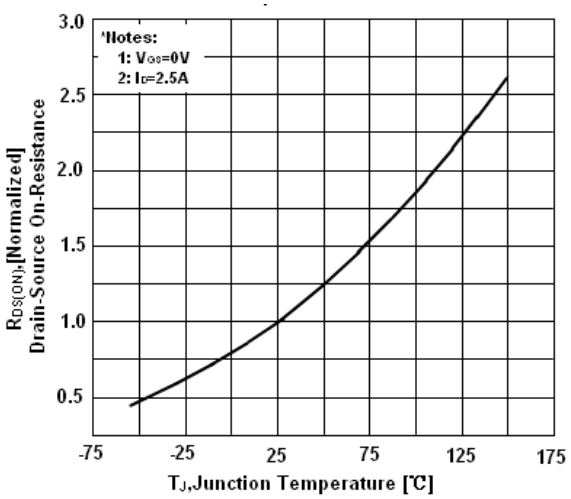


Figure 8 On-Resistance Variation vs. Temperature

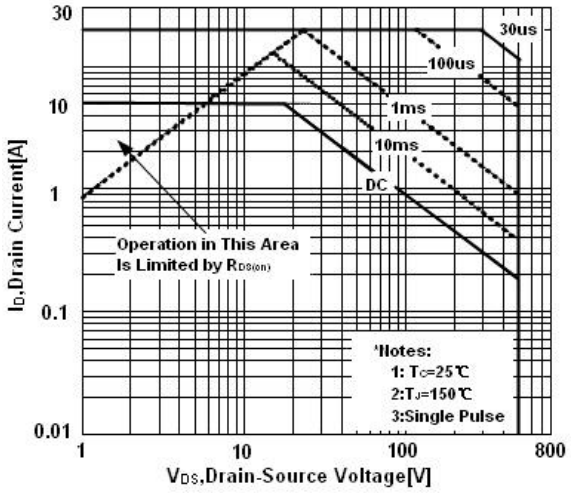


Figure 9 Maximum Safe Operation Area

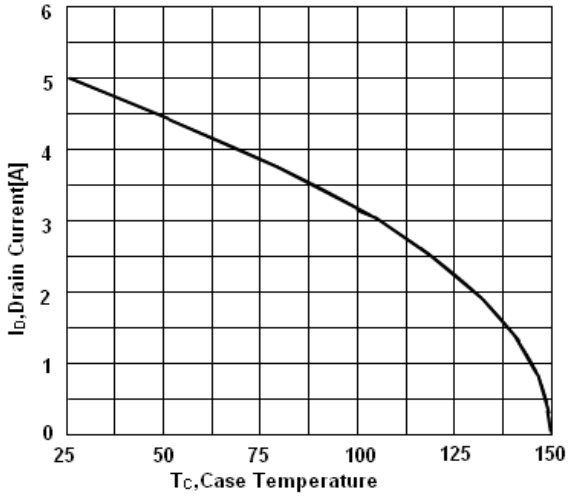


Figure 10 Maximum Drain Current vs. Case Temperature

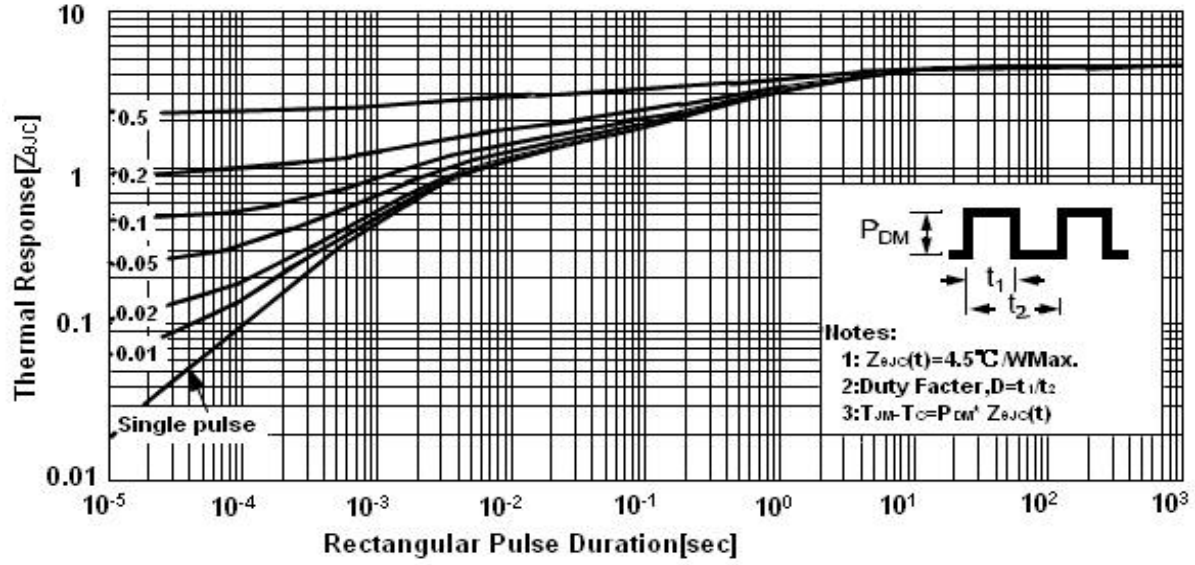
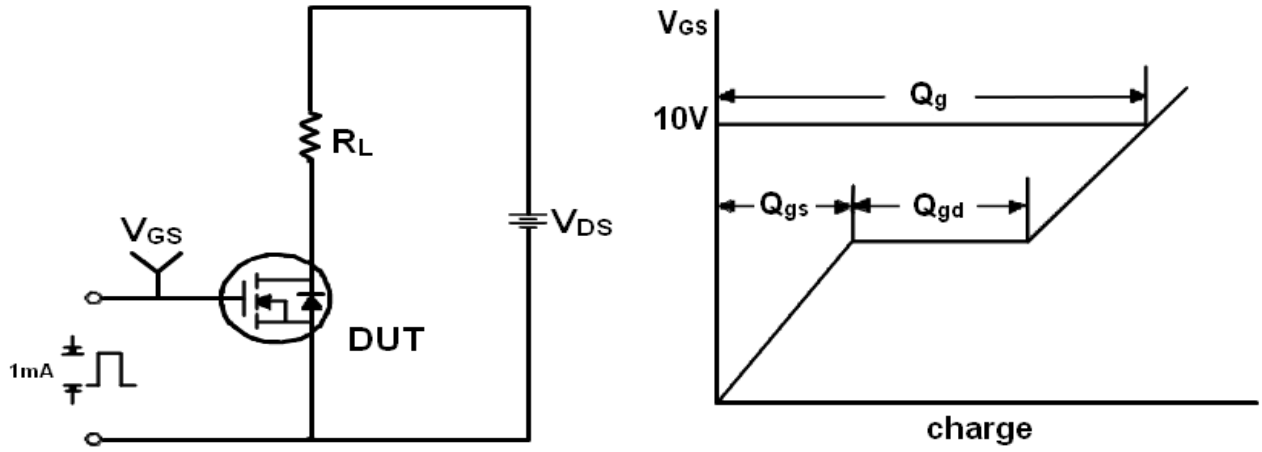
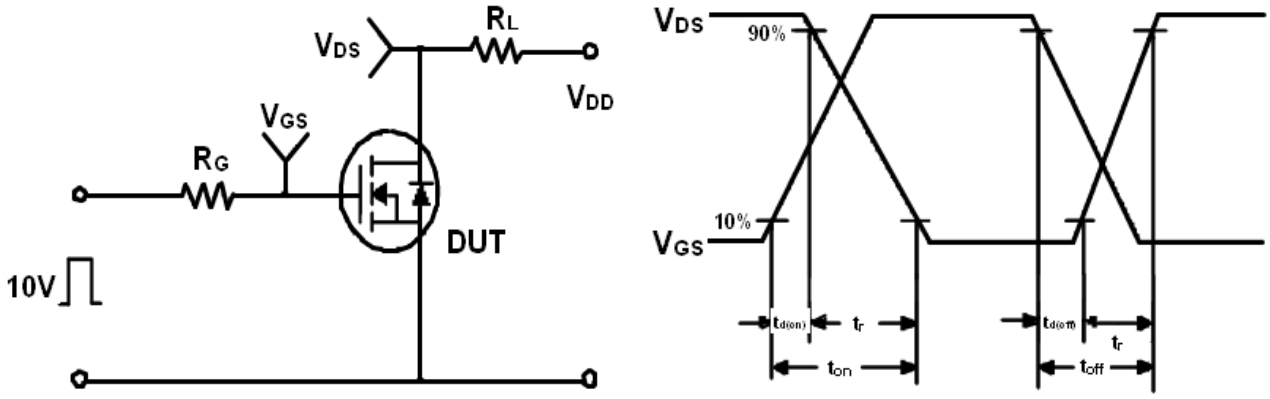


Figure 12 Transient Thermal Response Curve

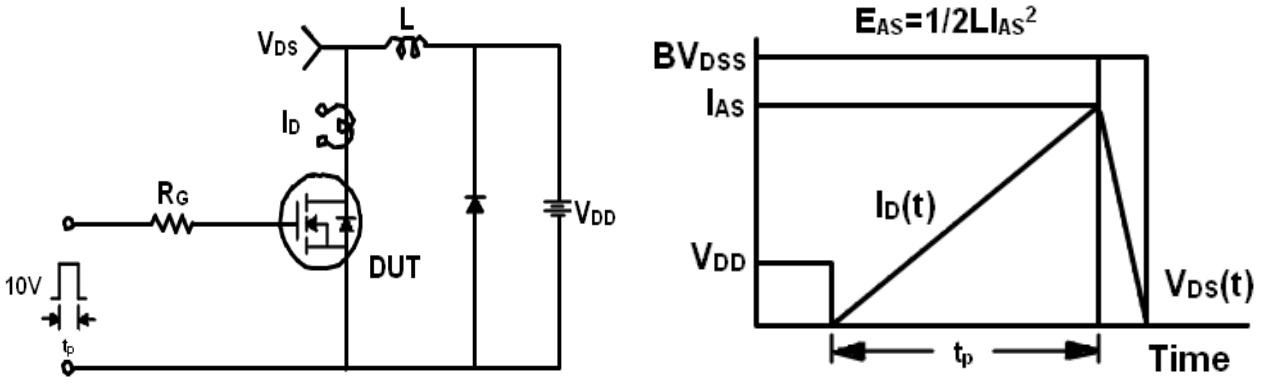
Test Circuit and Waveform



Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform

Mechanical Dimensions

TO-220