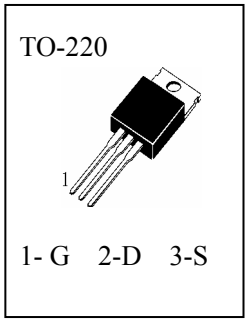
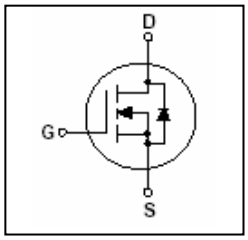
N-Channel Enhancement Mode Field Effect Transistor

General Description

This Power MOSFET is produced using planar stripe, DMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. This devices is specially well suited for half bridge and full bridge resonant topolgy like a electronic lamp ballast.



Features



- **4.5A, 500V, R_{DS}(on) = 1.5Ω@V_{GS} = 10 V**
- **Fast switching**
- **100% avalanche tested**
- **Improved dv/dt capability**
- **Equivalent Type:IRF830**

Maximum Ratings (Ta=25℃ unless otherwise specified)

T_{stg}——Storage Temperature ---------- −55~150℃

T_j ——Operating Junction Temperature ---------- −55~150℃

V_{DSS} —— Drain-Source Voltage ---------- 500V

V_{DGR} —— Drain-Gate Voltage (R_{GS}=1MΩ) ---------- 500V

V_{GSS} —— Gate-Source Voltage ---------- ±20V

I_D —— Drain Current (Continuous) ---------- 4.5A

P_D —— Maximum Power Dissipation ---------- 75W

I_{AR} —— Avalanche Current, Repetitive or Not-Repetitive
(pulse width limited by Tj max, d < 1%) ---------- 4.5 A

E_{AS}—— Single Pulse Avalanche Energy
(starting Tj = 25℃, I_D = I_{AR}, V_{DD} = 50 V) ----------270 mJ

E_{AR}—— Repetitive Avalanche Energy(pulse width limited by Tj max, d < 1%) ---------- 7.3mJ

Thermal Characteristics

Symbol	Items	TO-220	Unit
Rthj-case	Thermal Resistance Junction-case	Max 1.71	℃/W
Rthj-amb	Thermal Resistance Junction-ambient	Max 62.5	℃/W
Rth c-s	Thermal Resistance Case-sink	Typ 0.5	℃/W

Electrical Characteristics (Ta=25℃ unless otherwise specified)

Symbol	Items	Min.	Typ.	Max.	Unit	Conditions
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	500			V	I_D=250μA ,V_{GS}=0V
I_{DSS}	Zero Gate Voltage Drain Current			25	μA	V_{DS} =500V, V_{GS}=0V
				250	μA	V_{DS}=400V, V_{GS}=0V,Tj=125℃
I_{GSS}	Gate – Body Leakage			±100	nA	V_{GS}= ±20V , V_{DS} =0V
On Characteristics						
$V_{GS(TH)}$	Gate Threshold Voltage	2.0		4.0	V	V_{DS} = V_{GS} , I_D=250μA
$R_{DS(ON)}$	Static Drain-Source On-Resistance			1.5	Ω	V_{GS}=10V, I_D=2.5A
g_{FS}	Forward Transconductance	2.5			S	V_{DS}=40V, I_D=2.5A
Dynamic Characteristics and Switching Characteristics						
Ciss	Input Capacitance			800	pF	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz
Coss	Output Capacitance			200	pF	
Crss	Reverse Transfer Capacitance			60	pF	
$t_{d(on)}$	Turn - On Delay Time			30	nS	V_{DD} = 200 V, I_D = 2.5Apk R_G= 15 Ω
tr	Rise Time			30	nS	
$t_{d(off)}$	Turn - Off Delay Time			55	nS	
tf	Fall Time			30	nS	
Qg	Total Gate Charge		22		nC	V_{DS}=0.8V_{DSS}, ID=4.5A, V_{GS} = 10 V
Qgs	Gate–Source Charge		12		nC	
Qgd	Gate–Drain Charge		10		nC	
Drain-Source Diode Characteristics and Maximun Ratings						
I_S	Continuous Source–Drain Diode Forward Current			4.5	A	
I_{SM}	Pulsed Drain-Source Diode Forward Current			18	A	
V_{SD}	Source–Drain Diode Forward On–Voltage			1.5	V	I_S=4.5A,V_{GS}=0

Typical Characteristics (Ta=25℃ unless otherwise specified)

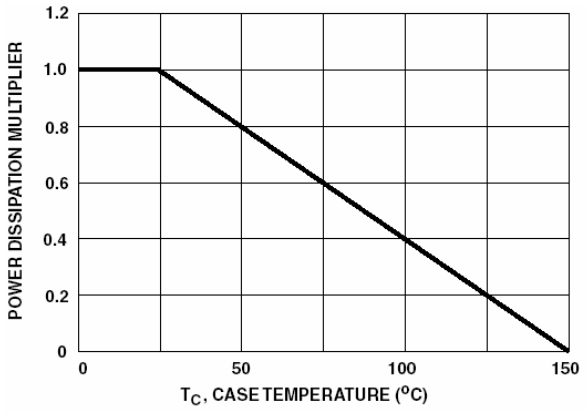


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

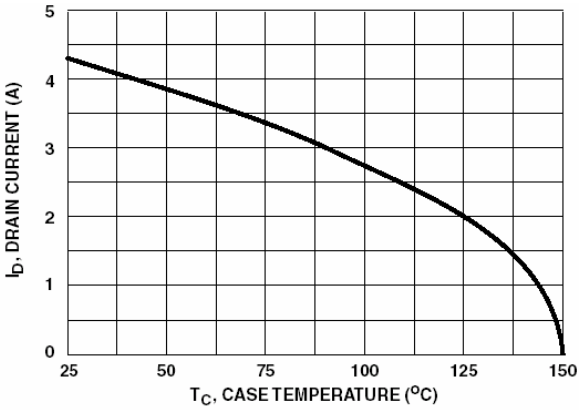


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

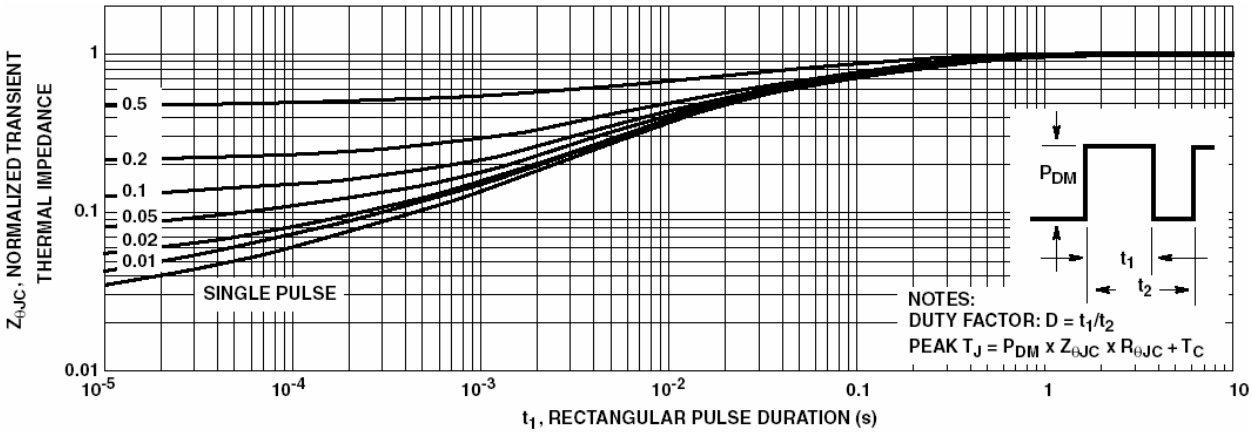


FIGURE 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

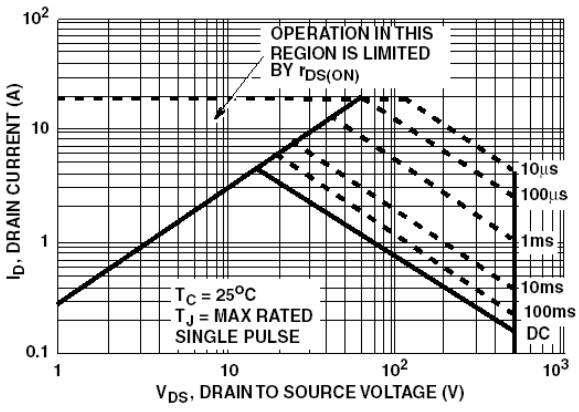


FIGURE 4. FORWARD BIAS SAFE OPERATING AREA

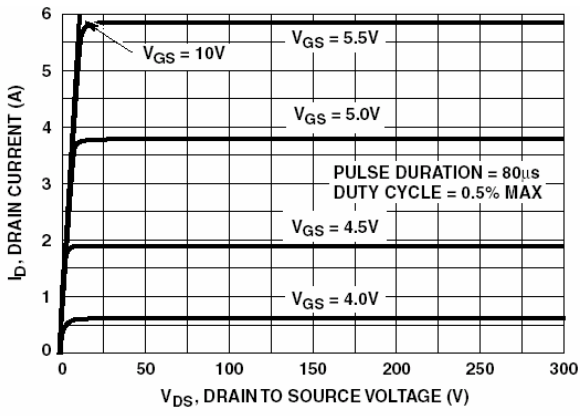


FIGURE 5. OUTPUT CHARACTERISTICS

Typical Characteristics (Ta=25℃ unless otherwise specified)

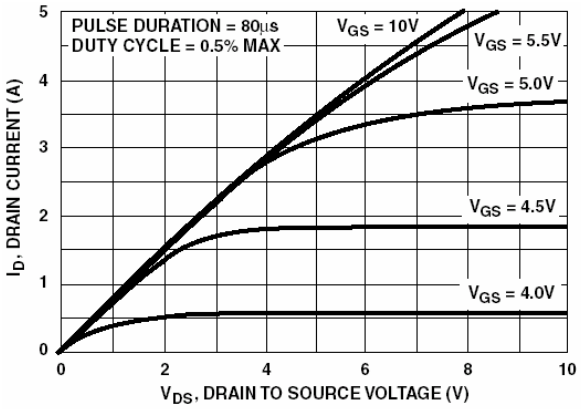


FIGURE 6. SATURATION CHARACTERISTICS

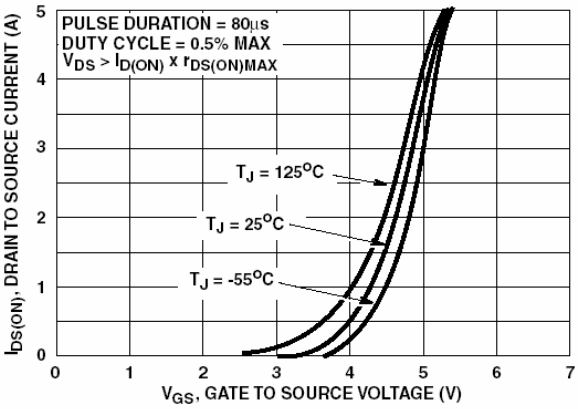


FIGURE 7. TRANSFER CHARACTERISTICS

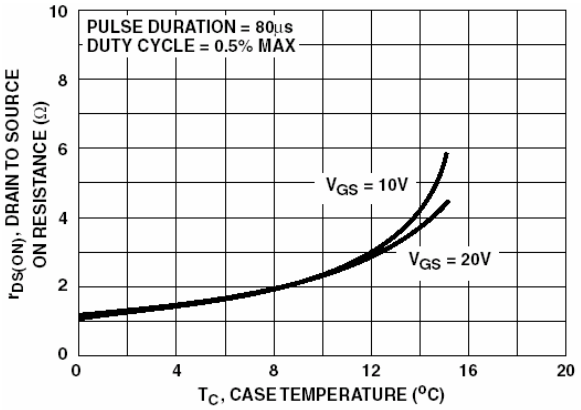


FIGURE 8. DRAIN TO SOURCE ON RESISTANCE vs GATE VOLTAGE AND DRAIN CURRENT

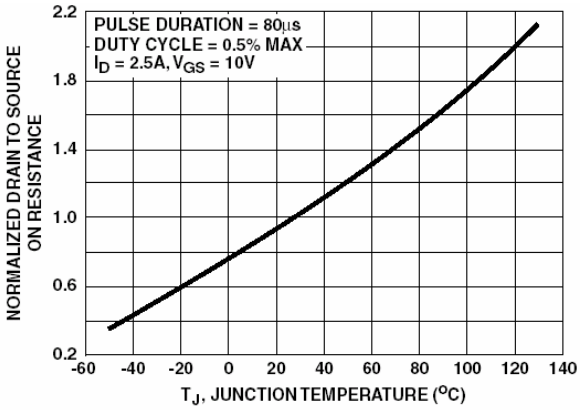


FIGURE 9. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

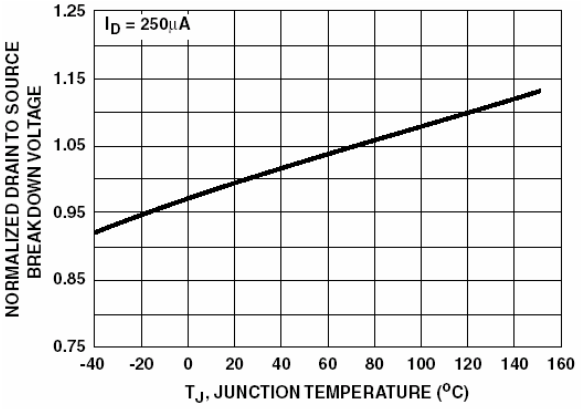


FIGURE 10. NORMALIZED DRAIN TO SOURCE BREAKDOWN VOLTAGE vs JUNCTION TEMPERATURE

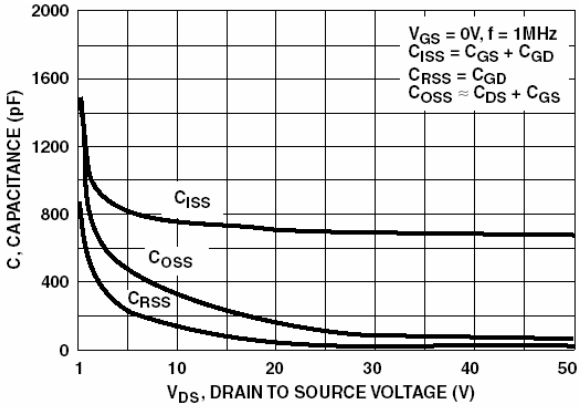


FIGURE 11. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE

Typical Characteristics (Ta=25℃ unless otherwise specified)

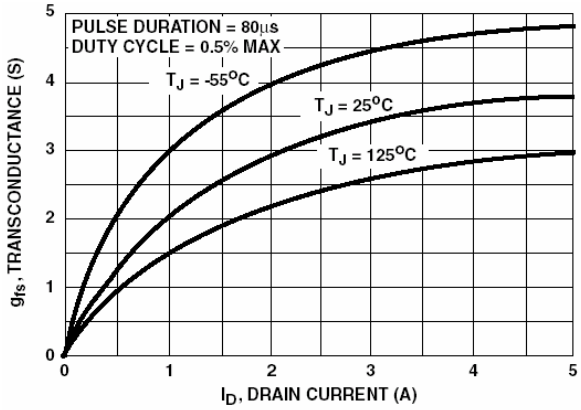


FIGURE 12. TRANSCONDUCTANCE vs DRAIN CURRENT

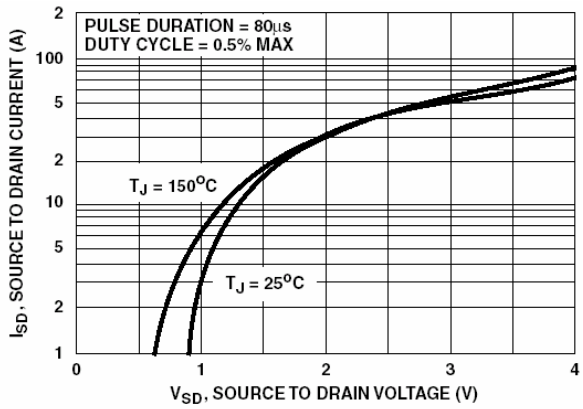


FIGURE 13. SOURCE TO DRAIN DIODE VOLTAGE

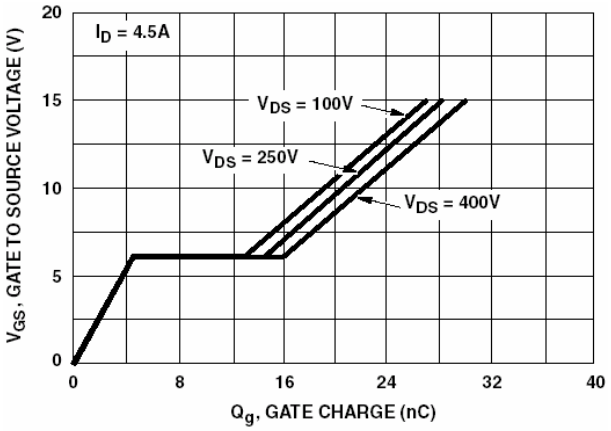


FIGURE 14. GATE TO SOURCE VOLTAGE vs GATE CHARGE

Typical Characteristics (Ta=25℃ unless otherwise specified)

Test Circuits and Waveforms

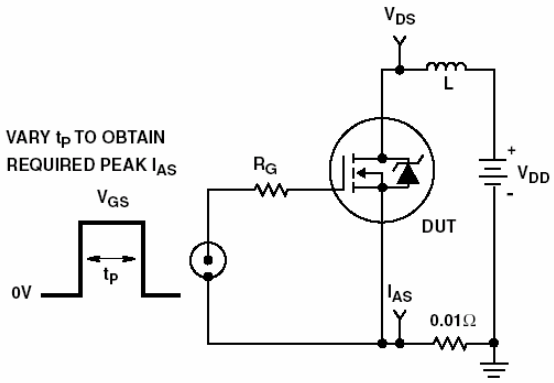


FIGURE 15. UNCLAMPED ENERGY TEST CIRCUIT

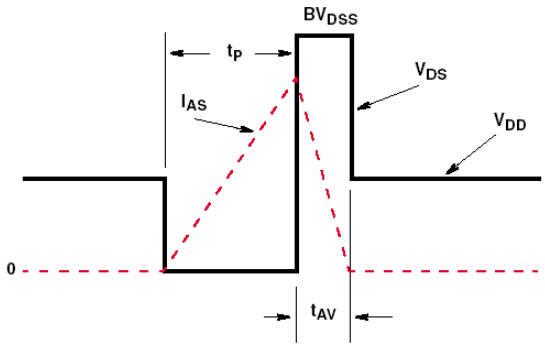


FIGURE 16. UNCLAMPED ENERGY WAVEFORMS

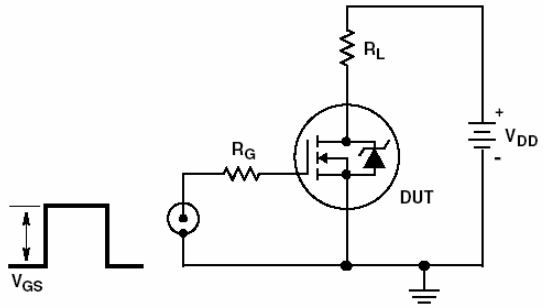


FIGURE 17. SWITCHING TIME TEST CIRCUIT

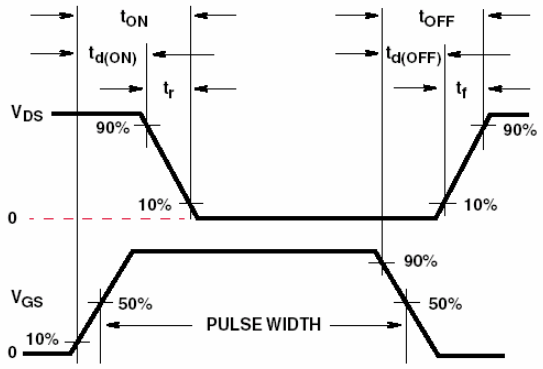


FIGURE 18. RESISTIVE SWITCHING WAVEFORMS

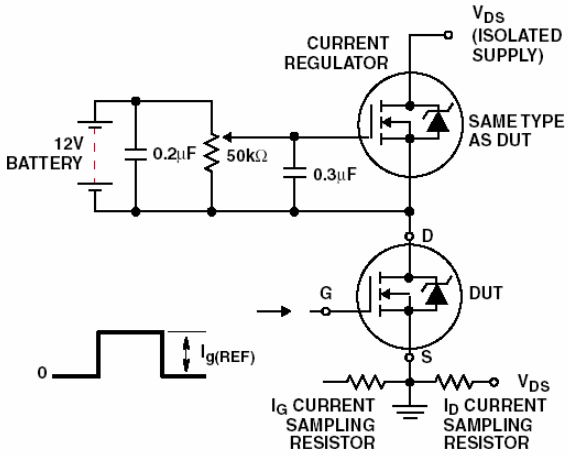


FIGURE 19. GATE CHARGE TEST CIRCUIT

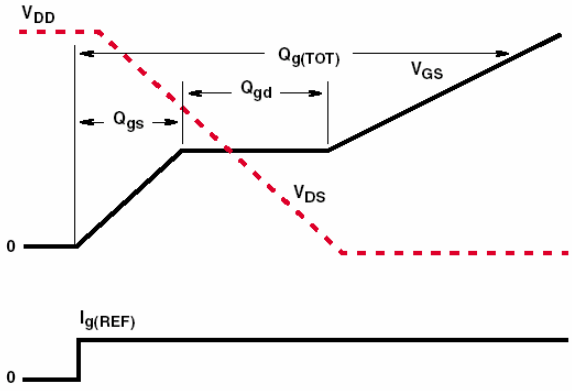


FIGURE 20. GATE CHARGE WAVEFORMS