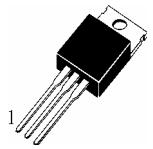
N-Channel Enhancement Mode Field Effect Transistor

General Description

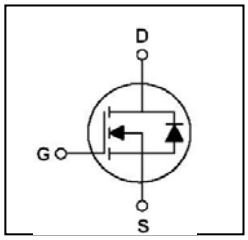
This Power MOSFET is produced using advanced planar stripe, DMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. This devices is specially well suited for half bridge and full bridge resonant topolgy like a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

TO-220



1- G 2-D 3-S

Features



- **10A, 400V, R_{DS}(on) <0.55Ω@V_{GS} = 10 V**
- **Fast switching**
- **100% avalanche tested**
- **Improved dv/dt capability**
- **Equivalent Type:IRF740**

Maximum Ratings (Ta=25℃ unless otherwise specified)

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

T_j ——Operating Junction Temperature ---------- 150℃

V_{DSS} —— Drain-Source Voltage ----------400V

V_{DGR} —— Drain-Gate Voltage (R_{GS}=20kΩ) ---------- 400V

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

I_D —— Drain Current (Continuous) ---------- 10A

P_D —— Maximum Power Dissipation ---------- 125W

I_{AR} —— Avalanche Current, Repetitive or Not-Repetitive
(pulse width limited by Tj max, d < 1%) ---------- 10 A

E_{AS}—— Single Pulse Avalanche Energy
(starting Tj = 25℃, I_D = I_{AR}, V_{DD} = 50 V) ---------- 450 mJ

E_{AR}—— Repetitive Avalanche Energy(pulse width limited by Tj max, d < 1%) ---------- 13.4mJ

Thermal Characteristics

Symbol	Items	TO-220	Unit
Rthj-case	Thermal Resistance Junction-case	Max 1.0	℃/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	400			V	I_D=250μA ,V_{GS}=0V
I_{DSS}	Zero Gate Voltage Drain Current			25	μA	V_{DS} =400V, V_{GS}=0V
				250	μA	V_{DS} =320V, 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			0.55	Ω	V_{GS}=10V, I_D=5A
g_{FS}	Forward Transconductance		9.6		S	V_{DS}=40V, I_D=5A (Note 1)
Dynamic Characteristics and Switching Characteristics						
Ciss	Input Capacitance			1800	pF	V_{DS} = 25 V, V_{GS} = 0V, f = 1.0 MHz
Coss	Output Capacitance			195	pF	
Crss	Reverse Transfer Capacitance			45	pF	
$t_{d(on)}$	Turn - On Delay Time			50	nS	V_{DD} = 200 V, I_D = 10Apk R_G= 25 Ω (Note 1,2)
tr	Rise Time			170	nS	
$t_{d(off)}$	Turn - Off Delay Time			260	nS	
t_f	Fall Time			180	nS	
Qg	Total Gate Charge			53	nC	V_{DS}=0.8V_{DSS}, ID=10A, V_{GS} = 10 V (Note 1,2)
Qgs	Gate–Source Charge		7		nC	
Qgd	Gate–Drain Charge		17		nC	
Drain-Source Diode Characteristics and Maximun Ratings						
I_S	Continuous Source–Drain Diode Forward Current			10	A	
I_{SM}	Pulsed Drain-Source Diode Forward Current			40	A	
V_{SD}	Source–Drain Diode Forward On–Voltage			2.0	V	I_S=10A,V_{GS}=0

Notes:

1. Pulse Test: Pulse width≤300μS, Duty cycle≤2%
2. Essentially independent of operating temperature

Typical Characteristics

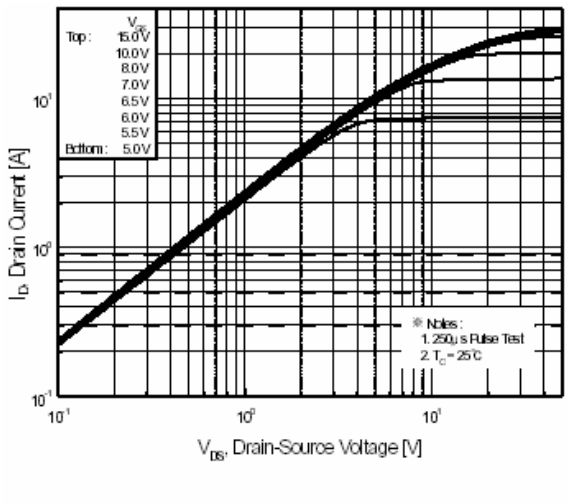


Figure 1. On-Region Characteristics

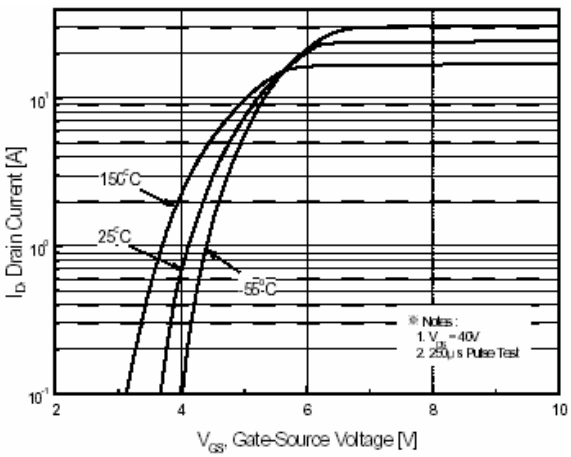


Figure 2. Transfer Characteristics

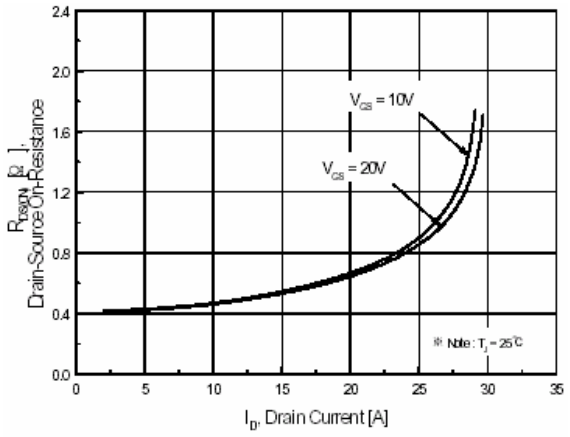


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

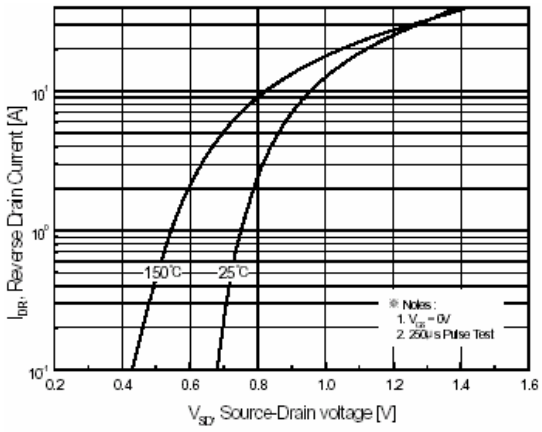


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

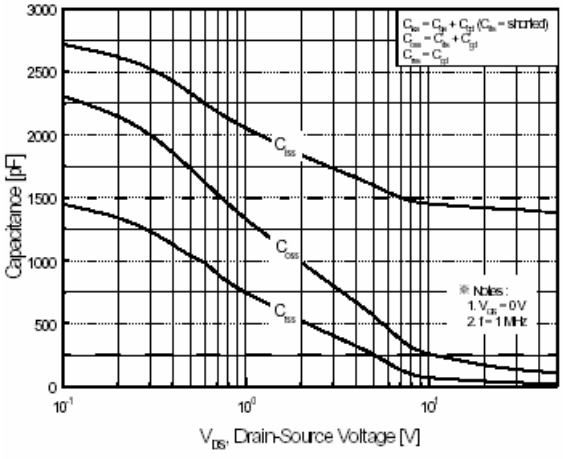


Figure 5. Capacitance Characteristics

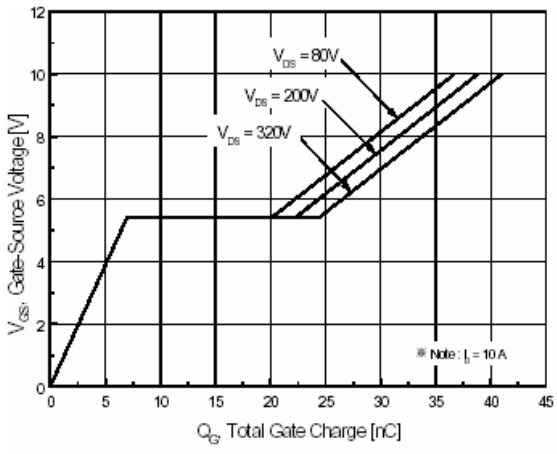


Figure 6. Gate Charge Characteristics

Typical Characteristics

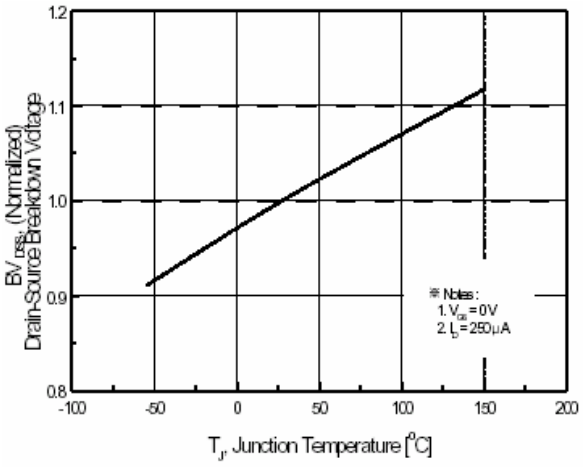


Figure 7. Breakdown Voltage Variation vs Temperature

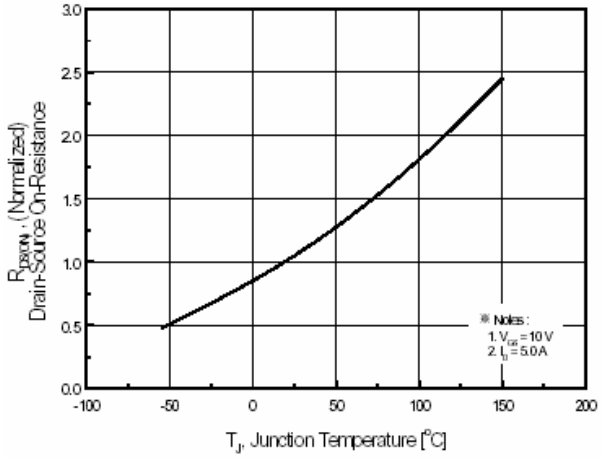


Figure 8. On-Resistance Variation vs Temperature

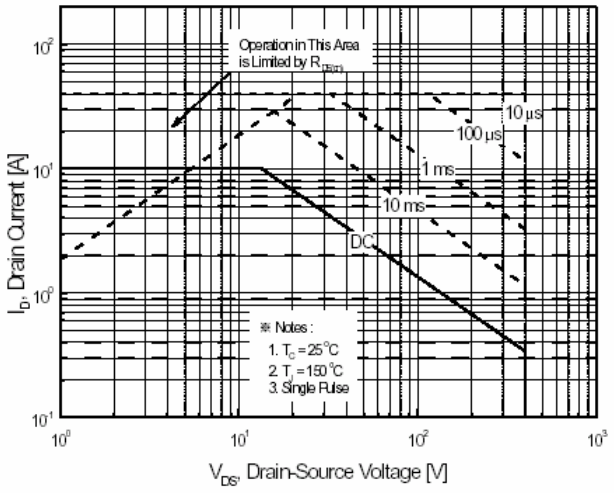


Figure 9. Maximum Safe Operating Area

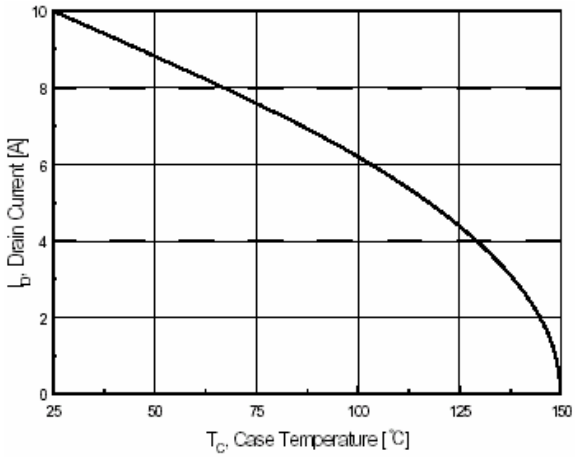


Figure 10. Maximum Drain Current vs Case Temperature

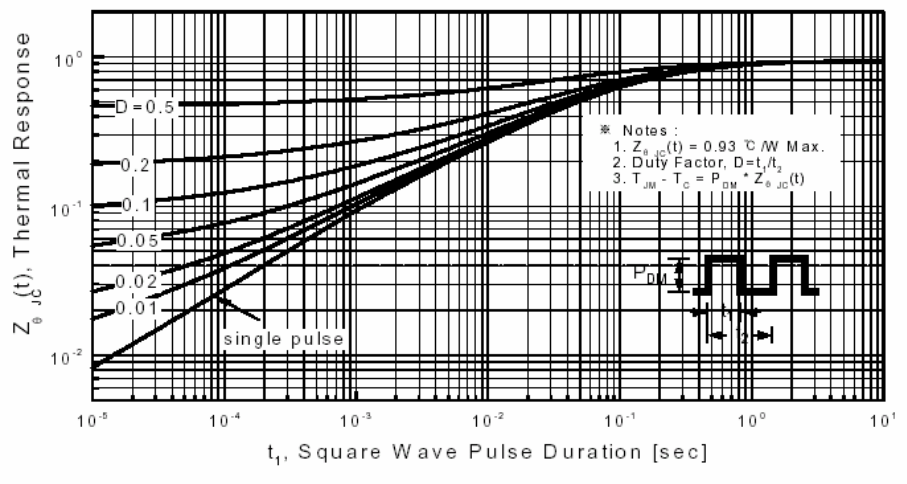
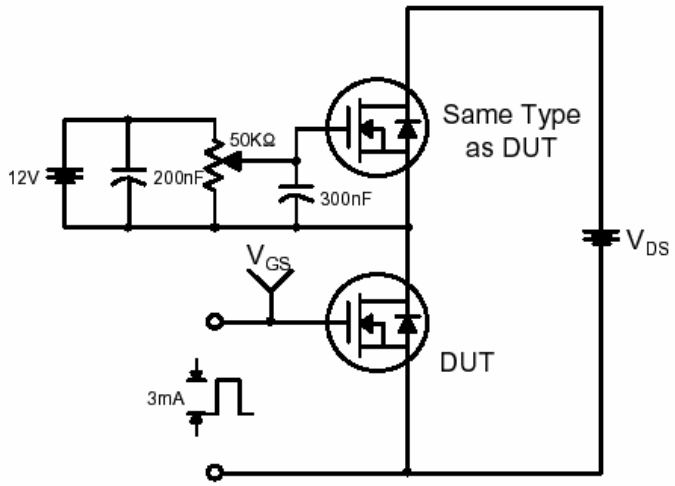
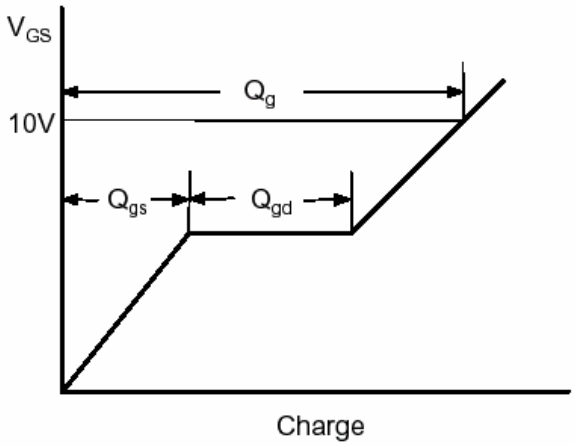


Figure 11. Transient Thermal Response Curve

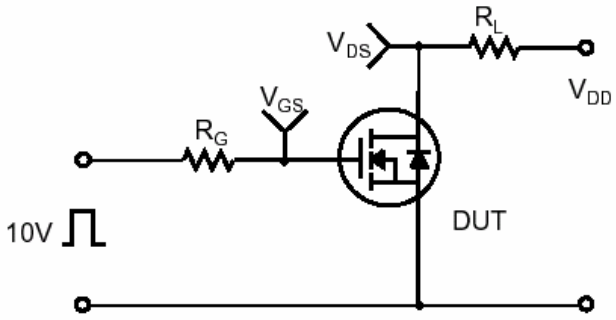
Typical Characteristics

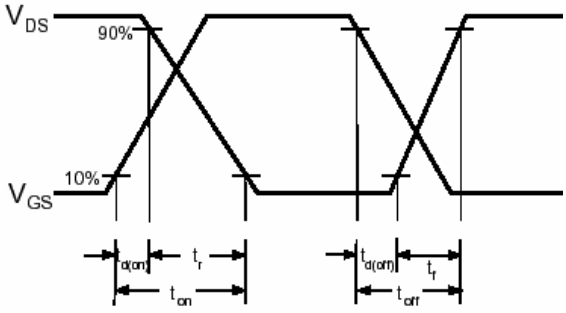
Gate Charge Test Circuit & Waveform



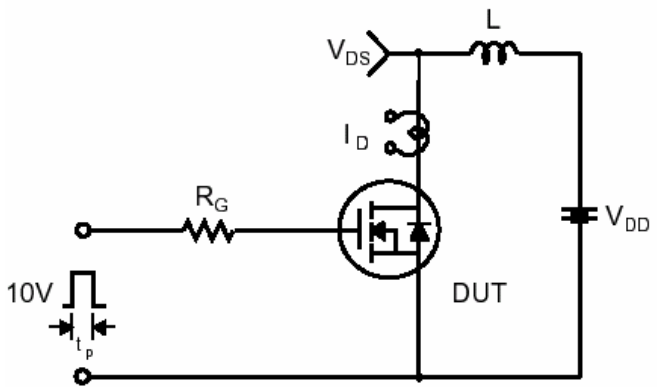


Resistive Switching Test Circuit & Waveforms

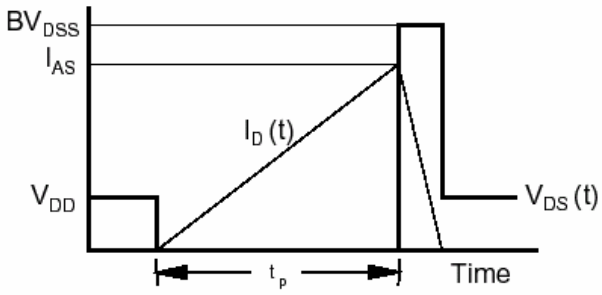




Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



Typical Characteristics