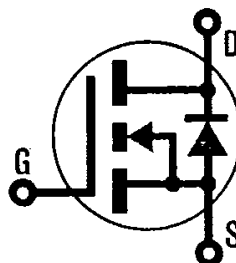


**HEXFET® TRANSISTORS IRFJ140****N-CHANNEL  
POWER MOSFETs****IRFJ141****IRFJ142****IRFJ143****100 Volt, 0.085 Ohm HEXFET**

The HEXFET® technology is the key to International Rectifier's advanced line of power MOSFET transistors. The efficient geometry and unique processing of the HEXFET design achieve very low on-state resistance combined with high transconductance and great device ruggedness.

The HEXFET transistors also feature all of the well established advantages of MOSFETs such as voltage control, very fast switching, ease of paralleling, and temperature stability of the electrical parameters.

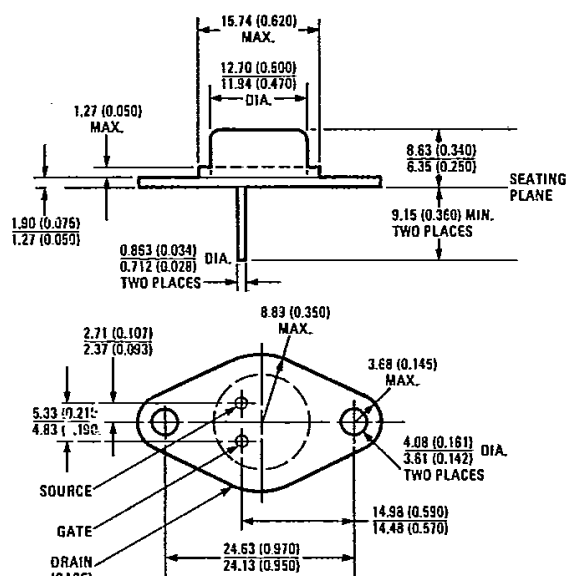
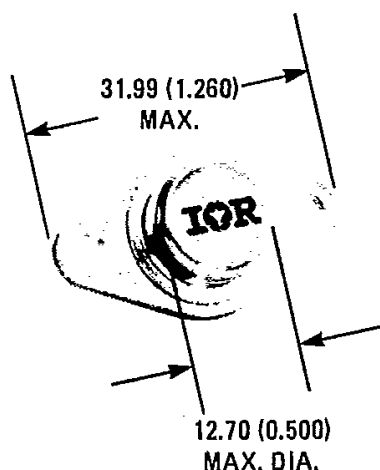
They are well suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers, and high energy pulse circuits.

**Features:**

- Fast Switching
- Low Drive Current
- Ease of Paralleling
- Excellent Temperature Stability

**Product Summary**

Part Number	V <sub>DS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
IRFJ140	100V	0.085Ω	15A
IRFJ141	60V	0.085Ω	15A
IRFJ142	100V	0.11Ω	10A
IRFJ143	60V	0.11Ω	10A

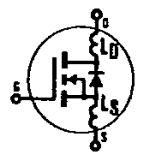
**CASE STYLE AND DIMENSIONS**

Conforms to JEDEC Case Style TO-213AA (TO-66)  
Dimensions in Millimeters and (Inches)

# Absolute Maximum Ratings

Parameter	IRFJ140	IRFJ141	IRFJ142	IRFJ143	Units
V <sub>DS</sub> Drain - Source Voltage ①	100	60	100	60	V
V <sub>DGR</sub> Drain - Gate Voltage (R <sub>GS</sub> = 20 kΩ) ①	100	60	100	60	V
I <sub>D</sub> @ T <sub>C</sub> = 25°C Continuous Drain Current *	15	15	10	10	A
I <sub>D</sub> @ T <sub>C</sub> = 100°C Continuous Drain Current *	13	13	8.0	8.0	A
I <sub>DM</sub> Pulsed Drain Current ③	60	60	40	40	A
V <sub>GS</sub> Gate - Source Voltage	± 20				V
P <sub>D</sub> @ T <sub>C</sub> = 25°C Max. Power Dissipation	70 (See Fig. 14)				W
Linear Derating Factor	0.55 (See Fig. 14)				W/K ④
I <sub>LM</sub> Inductive Current, Clamped	(See Fig. 15 and 16) L = 100 μH				A
	60	60	40	40	
T <sub>J</sub> Operating Junction and Storage Temperature Range	-55 to 150				°C
T <sub>stg</sub> Lead Temperature	300 (0.063 in. (1.6mm) from case for 10s)				°C


## Electrical Characteristics @ T<sub>C</sub> = 25°C (Unless Otherwise Specified)

Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions	
BV <sub>DSS</sub> Drain - Source Breakdown Voltage	IRFJ140 IRFJ142	100	—	—	V	V <sub>GS</sub> = 0V	
	IRFJ141 IRFJ143	60	—	—	V	I <sub>D</sub> = 250 μA	
V <sub>GS(th)</sub> Gate Threshold Voltage	ALL	2.0	—	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	
I <sub>GSS</sub> Gate - Source Leakage Forward	ALL	—	—	100	nA	V <sub>GS</sub> = 20V	
I <sub>GSS</sub> Gate - Source Leakage Reverse	ALL	—	—	-100	nA	V <sub>GS</sub> = -20V	
I <sub>DSS</sub> Zero Gate Voltage Drain Current	ALL	—	—	250	μA	V <sub>DS</sub> = Max. Rating, V <sub>GS</sub> = 0V	
		—	—	1000	μA	V <sub>DS</sub> = Max. Rating x 0.8, V <sub>GS</sub> = 0V, T <sub>C</sub> = 125°C	
I <sub>D(on)</sub> On-State Drain Current ②	IRFJ140 IRFJ141	15	—	—	A	V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max.</sub> , V <sub>GS</sub> = 10V	
	IRFJ142 IRFJ143	10	—	—	A		
R <sub>DS(on)</sub> Static Drain-Source On-State Resistance ②	IRFJ140 IRFJ141	—	0.07	0.085	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A	
	IRFJ142 IRFJ143	—	0.09	0.11	Ω		
g <sub>fs</sub> Forward Transconductance ②	ALL	6.0	10	—	S (Ω)	V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max.</sub> , I <sub>D</sub> = 10A	
C <sub>iss</sub> Input Capacitance	ALL	—	1275	1600	pF	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V, f = 1.0 MHz See Fig. 10	
C <sub>oss</sub> Output Capacitance	ALL	—	550	800	pF		
C <sub>ras</sub> Reverse Transfer Capacitance	ALL	—	160	300	pF		
t <sub>d(on)</sub> Turn-On Delay Time	ALL	—	16	30	ns	V <sub>DD</sub> = 30V, I <sub>D</sub> = 10A; Z <sub>0</sub> = 4.7Ω See Fig. 17 (MOSFET switching times are essentially independent of operating temperature.)	
t <sub>r</sub> Rise Time	ALL	—	27	60	ns		
t <sub>d(off)</sub> Turn-Off Delay Time	ALL	—	38	80	ns		
t <sub>f</sub> Fall Time	ALL	—	14	30	ns		
Q <sub>g</sub> Total Gate Charge (Gate-Source Plus Gate-Drain)	ALL	—	38	60	nC	V <sub>GS</sub> = 10V, I <sub>D</sub> = 26A, V <sub>DS</sub> = 0.8 Max. Rating. See Fig. 18 for test circuit. (Gate charge is essentially independent of operating temperature.)	
Q <sub>gs</sub> Gate-Source Charge	ALL	—	17	—	nC		
Q <sub>gd</sub> Gate-Drain ("Miller") Charge	ALL	—	21	—	nC		
L <sub>D</sub> Internal Drain Inductance	ALL	—	5.0	—	nH	Measured between the contact screw on header that is closer to source and gate pins and center of die.	Modified MOSFET symbol showing the internal device inductances. 
L <sub>S</sub> Internal Source Inductance	ALL	—	12.5	—	nH	Measured from the source pin, 6 mm (0.25 in.) from header and source bonding pad.	

## Thermal Resistance

R <sub>thJC</sub> Junction-to-Case	ALL	—	—	1.8	K/W ④	
R <sub>thCS</sub> Case-to-Sink	ALL	—	0.2	—	K/W ④	Mounting surface flat, smooth, and greased.
R <sub>thJA</sub> Junction-to-Ambient	ALL	—	—	50	K/W ④	Typical socket mount

\*I<sub>D</sub> LIMITED BY PIN DIMENSION

$I_S$	Continuous Source Current (Body Diode)	IRFJ140	—	—	15	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier.
		IRFJ141	—	—	15	A	
		IRFJ142 IRFJ143	—	—	10	A	
$I_{SM}$	Pulse Source Current (Body Diode) ③	IRFJ140	—	—	40	A	
		IRFJ141	—	—	40	A	
		IRFJ142 IRFJ143	—	—	40	A	
$V_{SD}$	Diode Forward Voltage ②	IRFJ140	—	—	2.5	V	$T_C = 25^\circ\text{C}, I_S = 15\text{A}, V_{GS} = 0\text{V}$
		IRFJ141	—	—	2.5	V	
		IRFJ142 IRFJ143	—	—	2.3	V	
$t_{rr}$	Reverse Recovery Time	ALL	—	500	—	ns	$T_J = 150^\circ\text{C}, I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$
$Q_{RR}$	Reverse Recovered Charge	ALL	—	2.9	—	$\mu\text{C}$	$T_J = 150^\circ\text{C}, I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$
$t_{on}$	Forward Turn-on Time	ALL	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by $L_S + L_D$ .				

①  $T_J = 25^\circ\text{C}$  to  $150^\circ\text{C}$ . ② Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

③ Repetitive Rating: Pulse width limited by max. junction temperature. See Transient Thermal Impedance Curve (Fig. 5).

④  $K/W = ^\circ\text{C}/\text{W}$   
 $W/K = \text{W}/^\circ\text{C}$

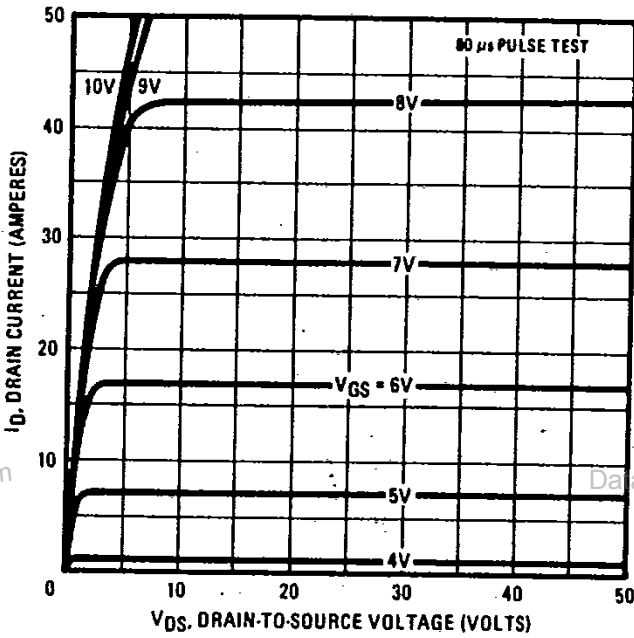


Fig. 1 – Typical Output Characteristics

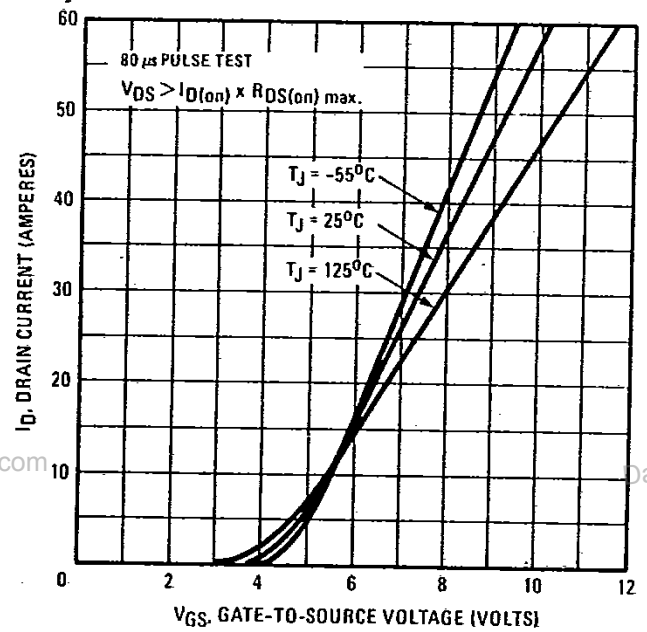


Fig. 2 – Typical Transfer Characteristics

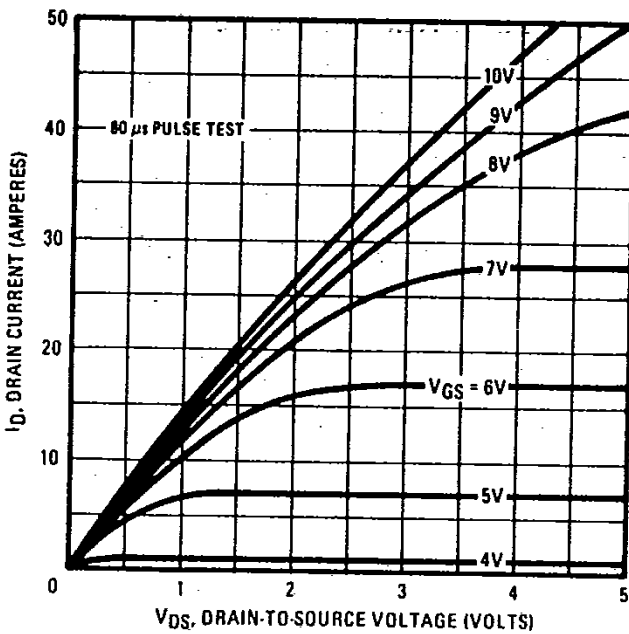


Fig. 3 – Typical Saturation Characteristics

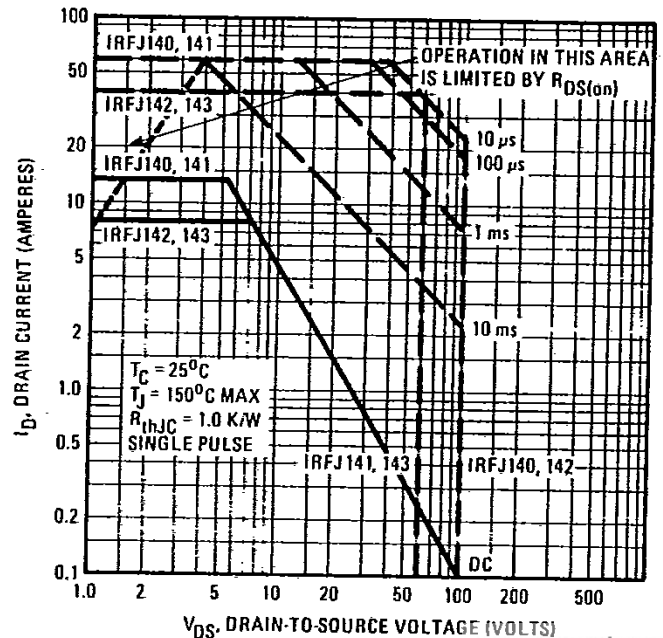


Fig. 4 – Maximum Safe Operating Area

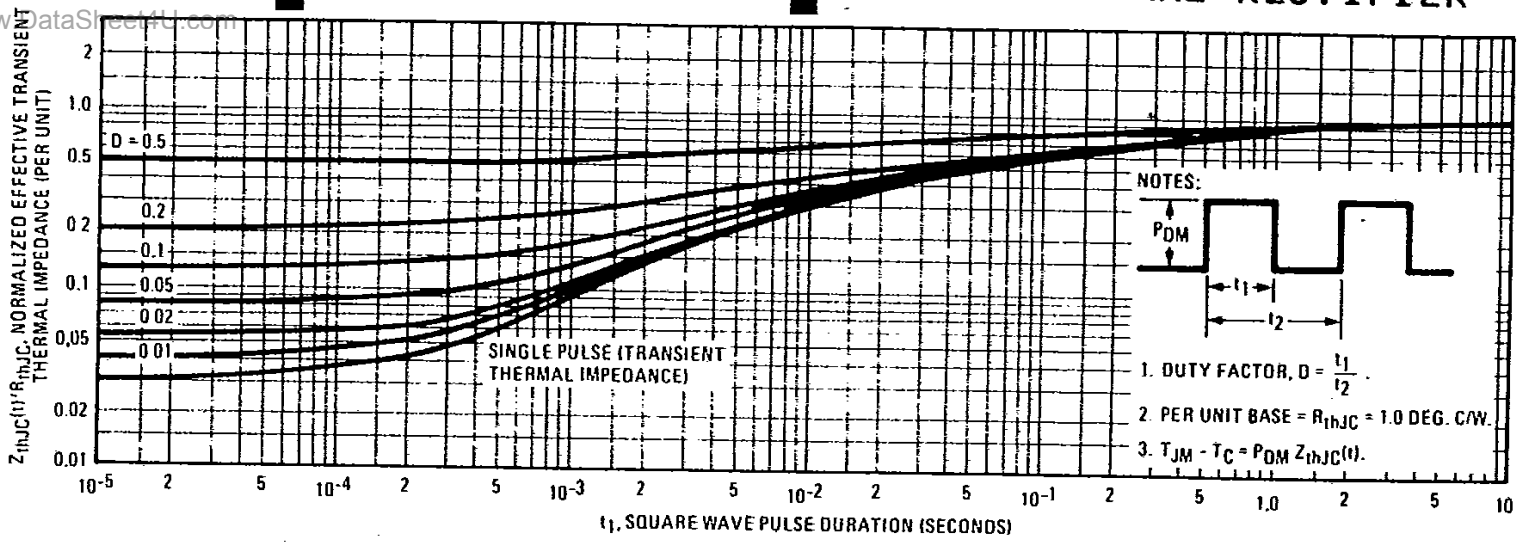


Fig. 5 – Maximum Effective Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration

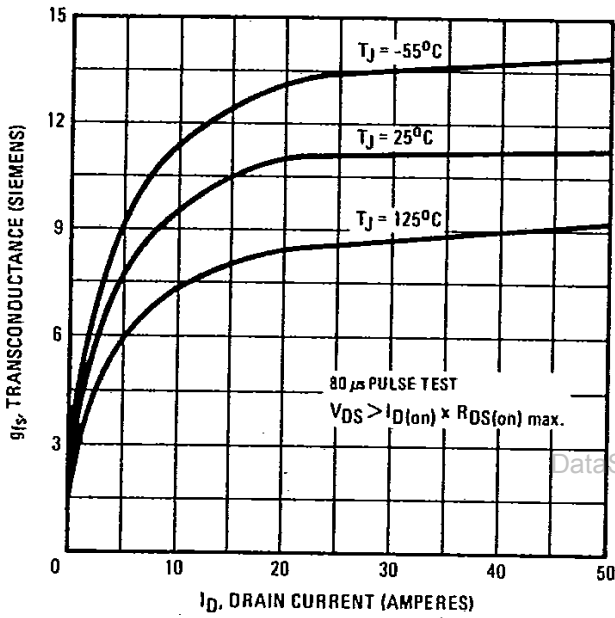


Fig. 6 – Typical Transconductance Vs. Drain Current

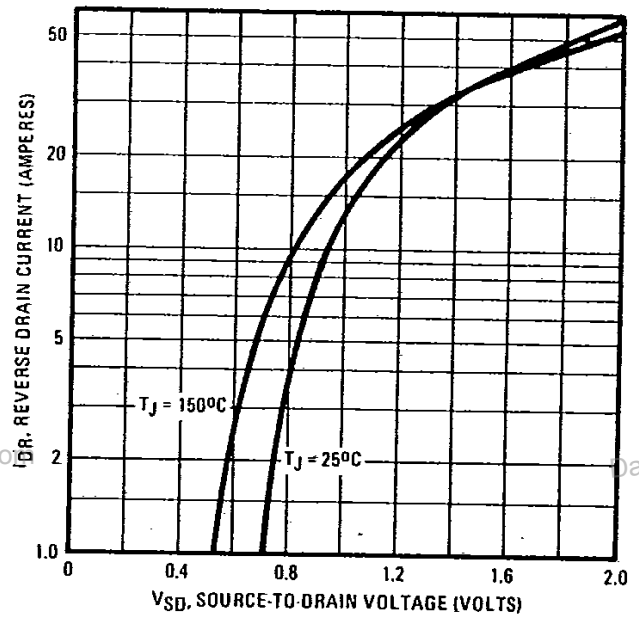


Fig. 7 – Typical Source-Drain Diode Forward Voltage

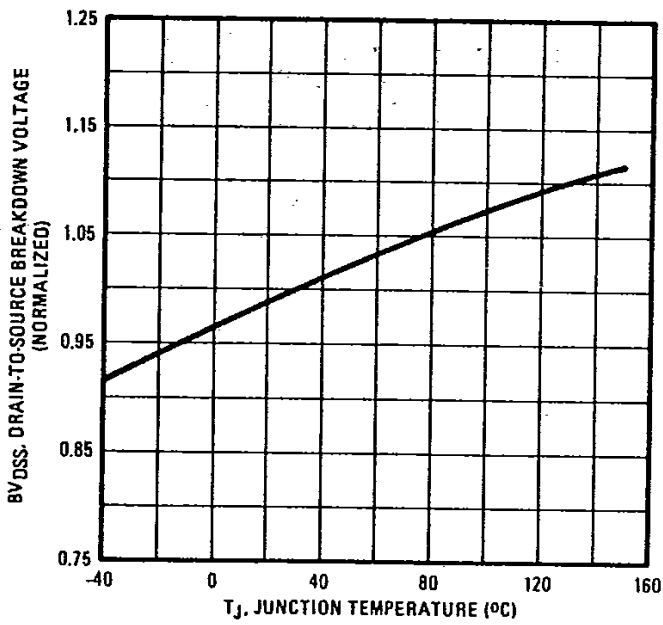


Fig. 8 – Breakdown Voltage Vs. Temperature

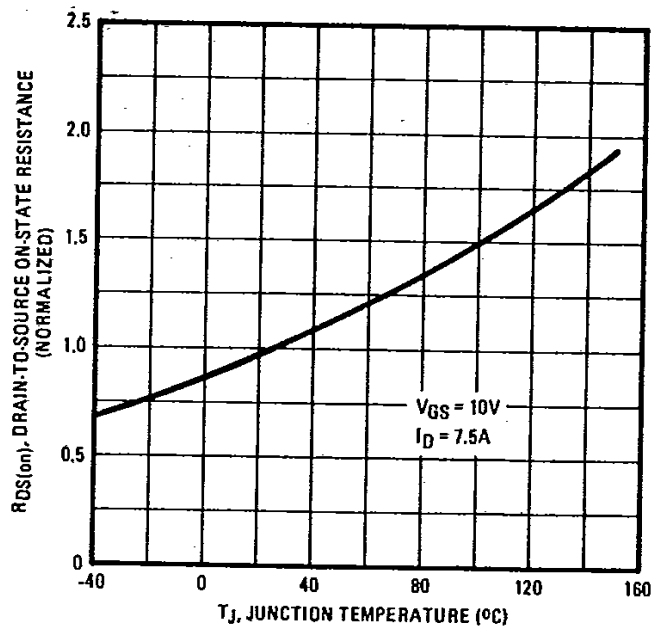


Fig. 9 – Normalized On-Resistance Vs. Temperature

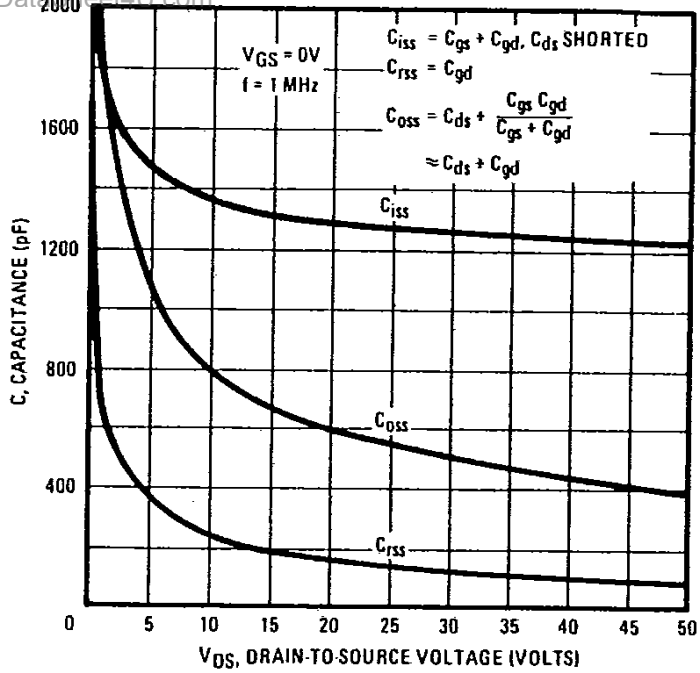


Fig. 10 - Typical Capacitance Vs. Drain-to-Source Voltage

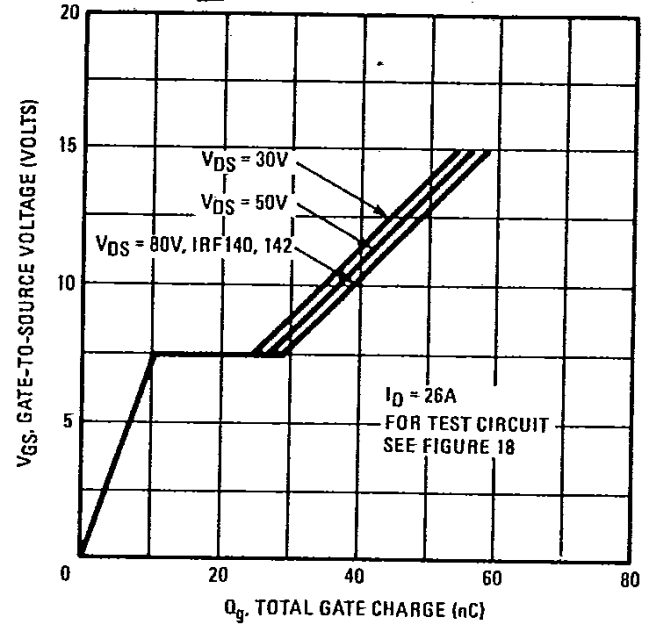


Fig. 11 - Typical Gate Charge Vs. Gate-to-Source Voltage

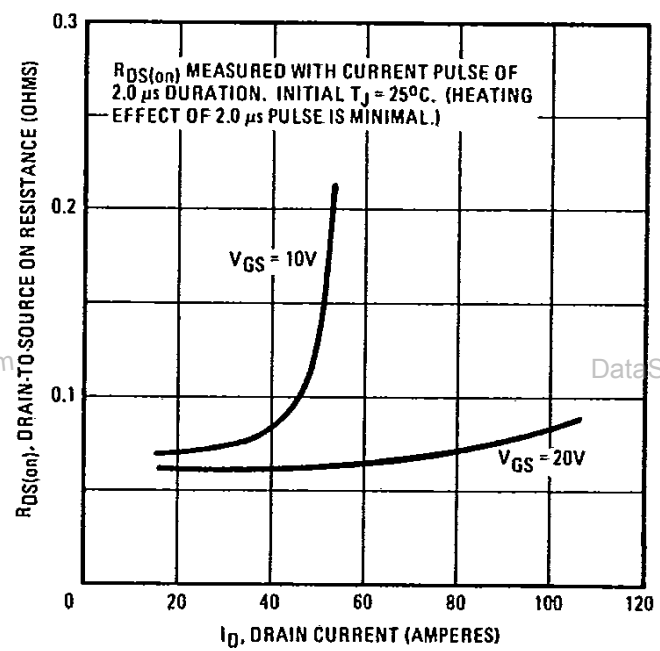


Fig. 12 - Typical On-Resistance Vs. Drain Current

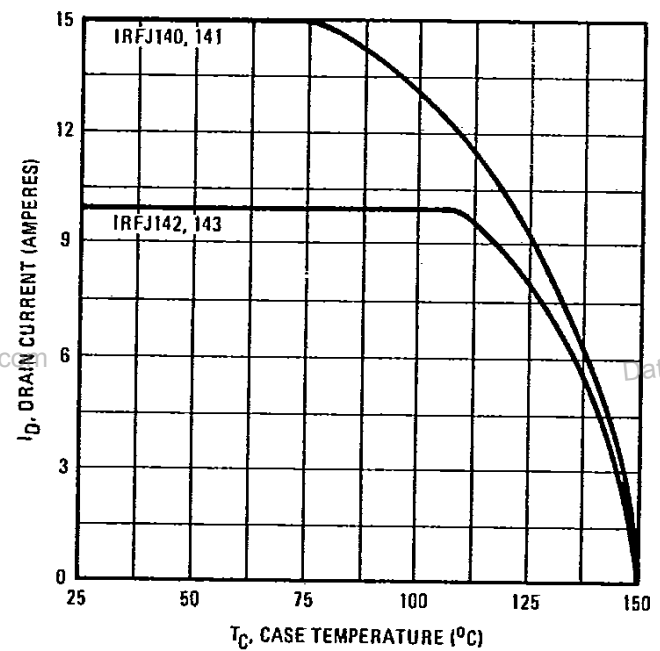


Fig. 13 - Maximum Drain Current Vs. Case Temperature

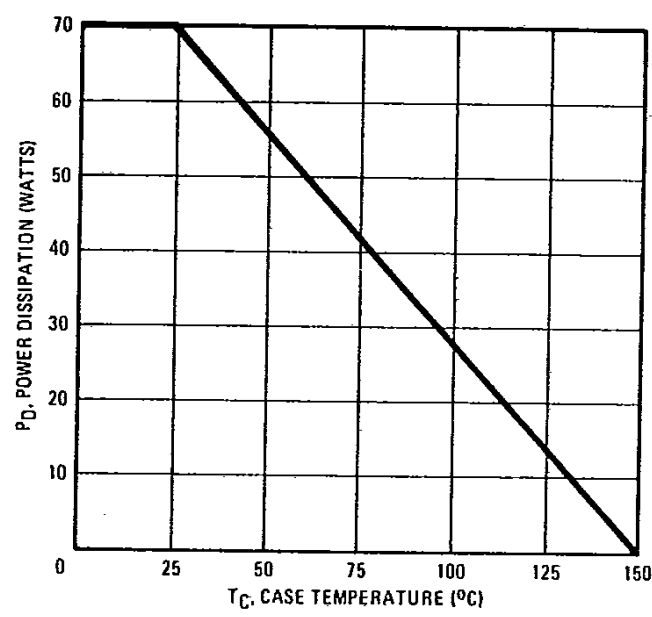


Fig. 14 - Power Vs. Temperature Derating Curve

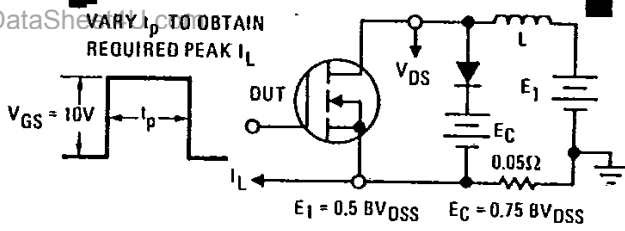


Fig. 15 – Clamped Inductive Test Circuit

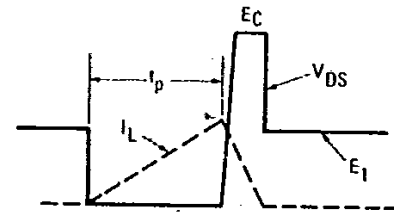


Fig. 16 – Clamped Inductive Waveforms

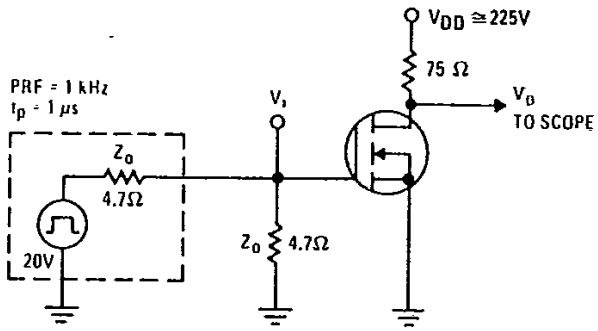


Fig. 17 – Switching Time Test Circuit

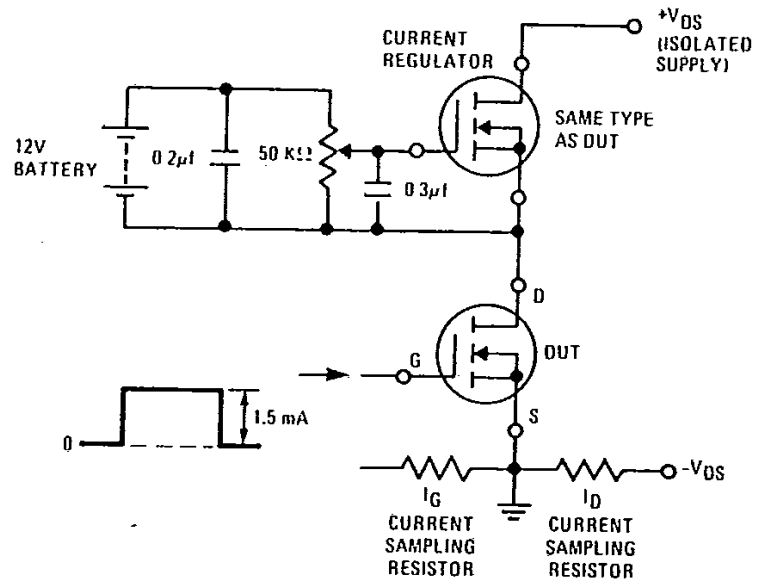


Fig. 18 – Gate Charge Test Circuit