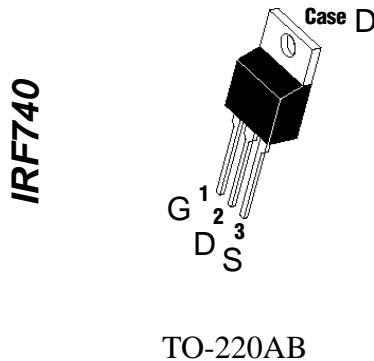


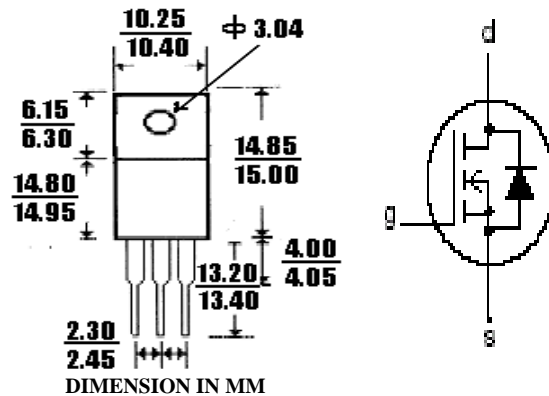


# IRF740 10A 400V N CHANNEL POWER MOSFET

## Description



## Mechanical Dimensions



## GENERAL DESCRIPTION

This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for high voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.

## FEATURES

- ◆ Robust High Voltage Termination
- ◆ Avalanche Energy Specified
- ◆ Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- ◆ Diode is Characterized for Use in Bridge Circuits
- ◆  $I_{BSS}$  and  $V_{DS(on)}$  Specified at Elevated Temperature

## ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	$I_D$	10	A
— Pulsed	$I_{DM}$	40	
Gate-to-Source Voltage — Continue	$V_{GS}$	±20	V
— Non-repetitive	$V_{GSM}$	±40	V
Total Power Dissipation	$P_D$	125	W
Derate above 25°C		1.0	W/°C
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy — $T_J = 25^\circ\text{C}$ ( $V_{DD} = 100\text{V}, V_{GS} = 10\text{V}, I_L = 10\text{A}, L = 6\text{mH}, R_G = 25\Omega$ )	$E_{AS}$	300	mJ
Thermal Resistance — Junction to Case	$\theta_{JC}$	1.7	°C/W
— Junction to Ambient	$\theta_{JA}$	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	$T_L$	260	°C



# IRF740 10A 400V N CHANNEL POWER MOSFET

## ELECTRICAL CHARACTERISTICS

Unless otherwise specified,  $T_J = 25^\circ\text{C}$ .

Characteristic		Symbol	IRF740			Units
			Min	Typ	Max	
Drain-Source Breakdown Voltage ( $V_{GS} = 0\text{ V}$ , $I_D = 250\ \mu\text{A}$ )		$V_{(BR)DSS}$	400			V
Drain-Source Leakage Current ( $V_{DS} = 400\text{ V}$ , $V_{GS} = 0\text{ V}$ ) ( $V_{DS} = 400\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125^\circ\text{C}$ )		$I_{DSS}$			0.25 1.0	mA
Gate-Source Leakage Current-Forward ( $V_{gsf} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$ )		$I_{GSSF}$			100	nA
Gate-Source Leakage Current-Reverse ( $V_{gsr} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$ )		$I_{GSSR}$			-100	nA
Gate Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$ )		$V_{GS(th)}$	2.0		4.0	V
Static Drain-Source On-Resistance ( $V_{GS} = 10\text{ V}$ , $I_D = 5.0\text{A}$ ) *		$R_{DS(on)}$		0.4	0.55	$\Omega$
Drain-Source On-Voltage ( $V_{GS} = 10\text{ V}$ ) ( $I_D = 5.0\text{ A}$ )		$V_{DS(on)}$			6.0	V
Forward Transconductance ( $V_{DS} = 50\text{ V}$ , $I_D = 5.0\text{A}$ ) *		$g_{FS}$		4.0		mhos
Input Capacitance	$(V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$		1570		pF
Output Capacitance		$C_{oss}$		230		pF
Reverse Transfer Capacitance		$C_{rss}$		55		pF
Turn-On Delay Time	$(V_{DD} = 200\text{ V}$ , $I_D = 10.0\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_G = 10\Omega$ ) *	$t_{d(on)}$		25		ns
Rise Time		$t_r$		37		ns
Turn-Off Delay Time		$t_{d(off)}$		75		ns
Fall Time		$t_f$		31		ns
Total Gate Charge	$(V_{DS} = 320\text{ V}$ , $I_D = 10.0\text{ A}$ , $V_{GS} = 10\text{ V}$ )*	$Q_g$		46	63	nC
Gate-Source Charge		$Q_{gs}$		10		nC
Gate-Drain Charge		$Q_{gd}$		23		nC
Internal Drain Inductance (Measured from the drain lead 0.25" from package to center of die)		$L_D$		4.5		nH
Internal Drain Inductance (Measured from the source lead 0.25" from package to source bond pad)		$L_S$		7.5		nH
<b>SOURCE-DRAIN DIODE CHARACTERISTICS</b>						
Forward On-Voltage(1)	$(I_S = 10.0\text{ A}$ , $V_{GS} = 0\text{ V}$ , $d_I/d_t = 100\text{A}/\mu\text{s}$ )	$V_{SD}$			2.0	V
Forward Turn-On Time		$t_{on}$		**		ns
Reverse Recovery Time		$t_{rr}$		250		ns

\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

\*\* Negligible, Dominated by circuit inductance



# IRF740 10A 400V N CHANNEL POWER MOSFET

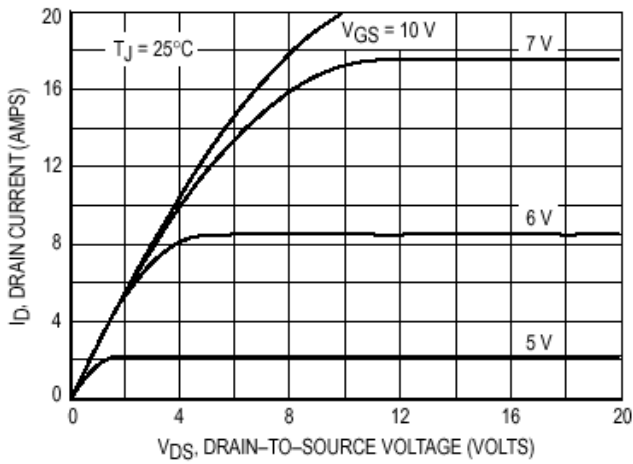


Figure 1. On-Region Characteristics

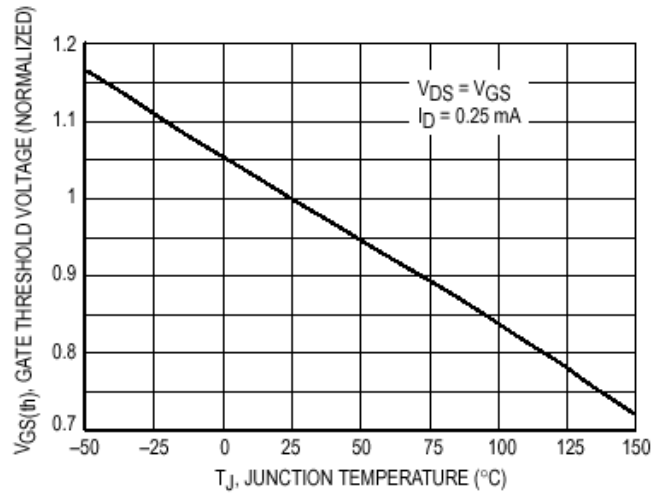


Figure 2. Gate-Threshold Voltage Variation With Temperature

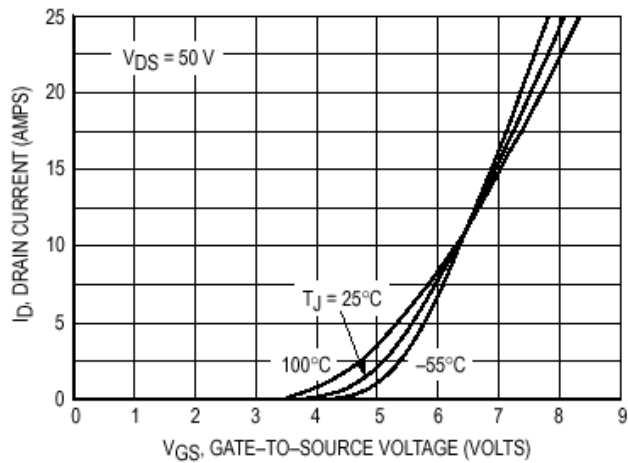


Figure 3. Transfer Characteristics

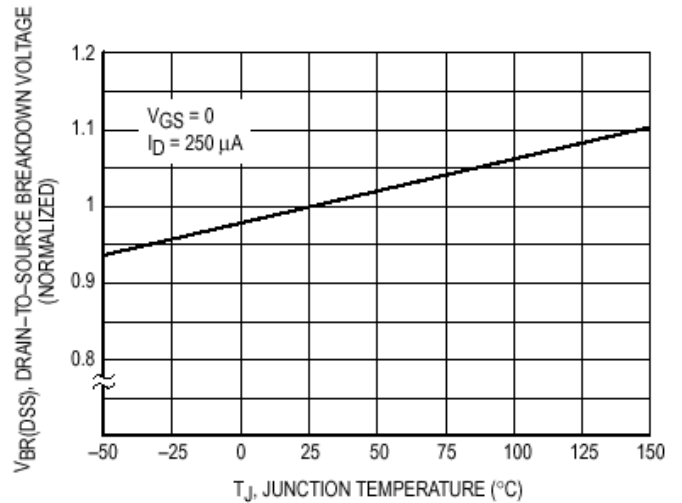


Figure 4. Breakdown Voltage Variation With Temperature

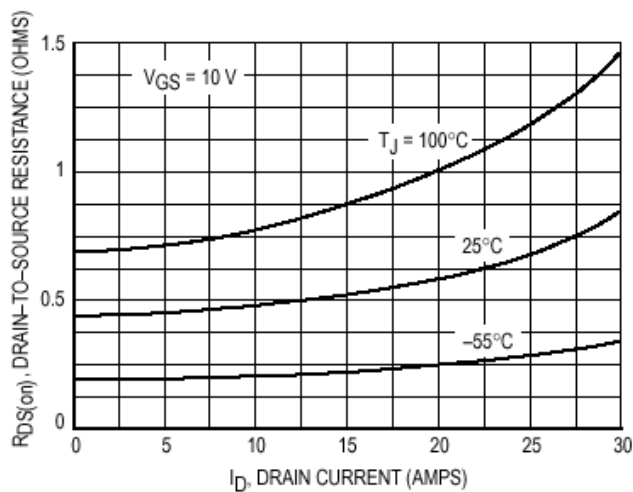


Figure 5. On-Resistance versus Drain Current

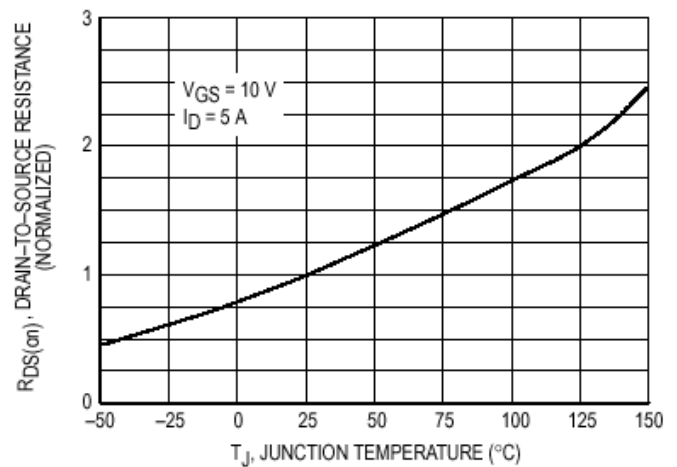


Figure 6. On-Resistance Variation With Temperature