IRF6N40

POWER MOSFET

GENERAL DESCRIPTION

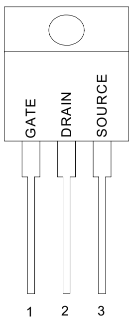
This Power MOSFET is designed for low voltage, high speed power switching applications such as switching regulators, conveters, solenoid and relay drivers.

FEATURES

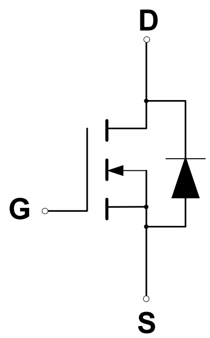
- Higher Current Rating
- Lower $r_{DS(ON)}$, Lower Capacitances
- Lower Total Gate Charge
- Tighter VSD Specifications
- Avalanche Energy Specified

PIN CONFIGURATION

TO-220
Top View



SYMBOL



N-Channel MOSFET

ORDERING INFORMATION

Part Number	Package
IRF6N40	TO-220

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current – Continuous	I_D	6.0	A
– Pulsed (Note 1)	I_{DM}	21	
Gate-to-Source Voltage – Continue	V_{GS}	±20	V
Total Power Dissipation	P_D	96	W
Derate above 25℃		0.77	W/℃
Single Pulse Drain-to-Source Avalanche Energy – T_J = 25℃ (V_{DD} = 100V, V_{GS} = 10V, I_L = 6A, L = 10mH, R_G = 25Ω)	E_{AS}	180	mJ
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	℃
Thermal Resistance – Junction to Case	θ_{JC}	1.70	℃/W
– Junction to Ambient	θ_{JA}	62	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	300	℃

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_J = 25℃.

Characteristic	Conditions	Symbol	IRF6N40 Min	IRF6N40 Typ	IRF6N40 Max	Units
Drain-Source Breakdown Voltage	(V_{GS} = 0 V, I_D = 250 μA)	$V_{(BR)DSS}$	400			V
Drain-Source Leakage Current	(V_{DS} = 400V, V_{GS} = 0 V) (V_{DS} = 400V, V_{GS} = 0 V, T_J = 125℃)	I_{DSS}			25 100	μA
Gate-Source Leakage Current-Forward	(V_{gsf} = 20 V, V_{DS} = 0 V)	I_{GSSF}			100	nA
Gate-Source Leakage Current-Reverse	(V_{gsr} = -20 V, V_{DS} = 0 V)	I_{GSSR}			-100	nA
Gate Threshold Voltage	(V_{DS} = V_{GS}, I_D = 250 μA)	$V_{GS(th)}$	2.0		4.0	V
Static Drain-Source On-Resistance	(V_{GS} = 10 V, I_D = 3A) (Note 4)	$R_{DS(on)}$			1.0	Ω
Forward Transconductance	(V_{DS} = 50V, I_D = 3 A) (Note 4)	g_{FS}	2.9			mhos
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		515	720	pF
Output Capacitance		C_{oss}		185	260	pF
Reverse Transfer Capacitance		C_{rss}		15	30	pF
Turn-On Delay Time	(V_{DD} = 200 V, I_D = 6 A, R_G = 9.1Ω, V_{GS} = 10 V) (Note 4)	$t_{d(on)}$		7	10	ns
Rise Time		t_r		11	20	ns
Turn-Off Delay Time		$t_{d(off)}$		19	40	ns
Fall Time		t_f		10	20	ns
Total Gate Charge	(V_{DS} = 320V, I_D = 6A V_{GS} = 10 V) (Note 4)	Q_g		9.5		nC
Gate-Source Charge		Q_{gs}		2		nC
Gate-Drain Charge		Q_{gd}		3		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
SOURCE-DRAIN DIODE CHARACTERISTICS						
Reverse Recovery Charge	I_F = 6A, di/dt = 100A/μs , T_J = 25℃ (Note 4)	Q_{rr}		1.6		μC
Forward Turn-On Time		t_{on}		**		
Reverse Recovery Time		t_{rr}		270		ns
Diode Forward Voltage	I_S = 6A, V_{GS} = 0 V, T_J = 25℃ (Note 4)	V_{SD}			1.5	V

Note

(1) Repetitive rating; pulse width limited by max. junction temperature

(2) V_{DD} = 50V, starting T_J = 25℃, L=24mH, R_G = 25Ω, I_{AS} = 4.5A

(3) I_{SD} ≦ 4.5A, di/dt ≦ 75A/μs, V_{DD} ≦ $V_{(BR)DSS}$, T_J ≦ 150℃

(4) Pulse Test: Pulse Width ≦300μs, Duty Cycle ≦2%

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

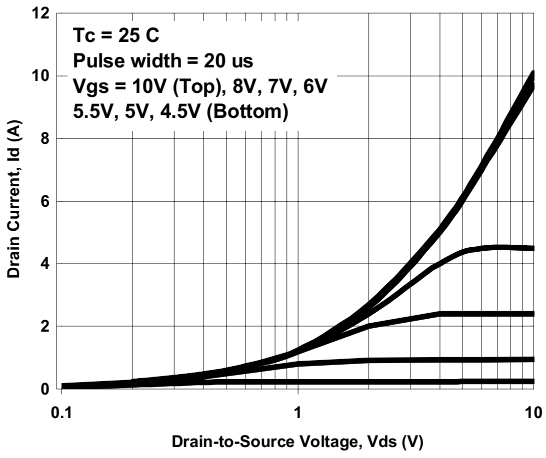


Figure 1. Id versus Vds Curve

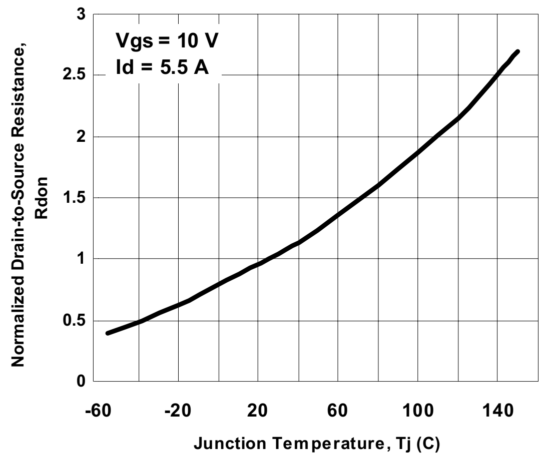


Figure 2. Rdon versus Tj Curve

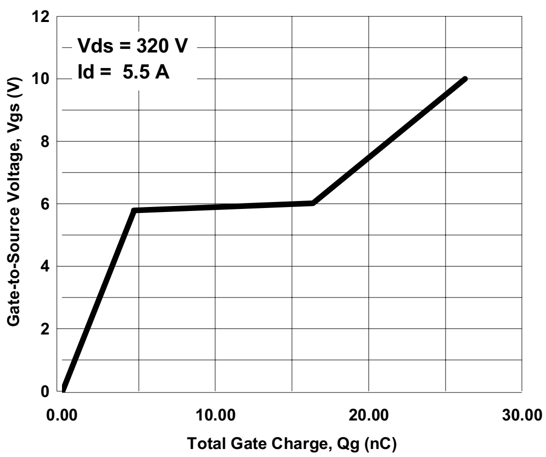


Figure 3. Vgs versus Qg Curve

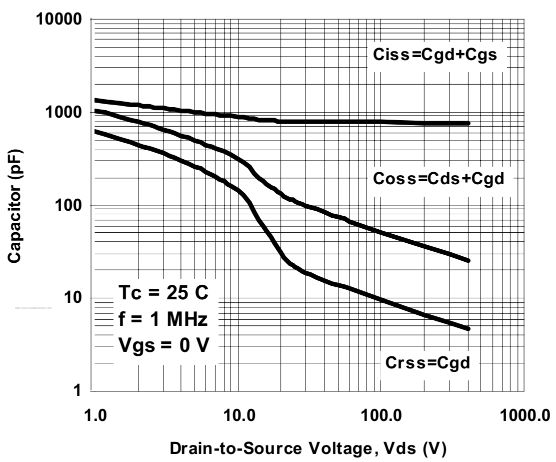


Figure 4. Capacitor versus Vds Curve

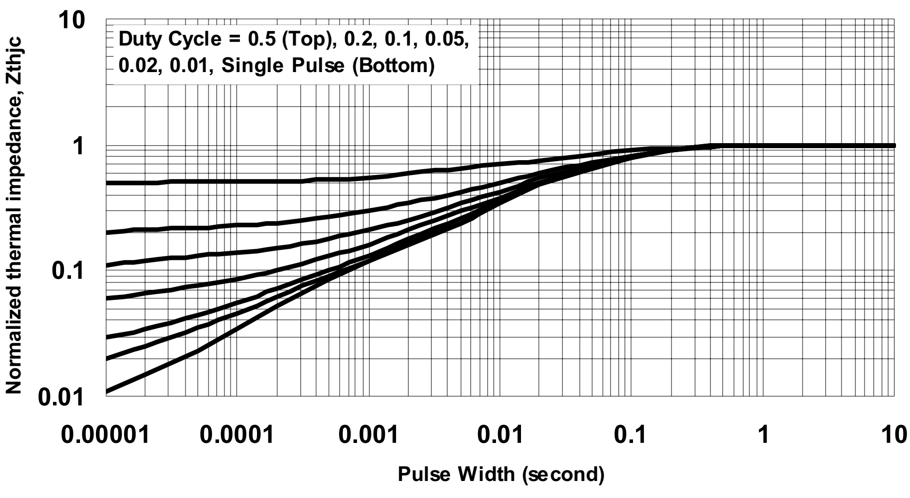


Figure 5. Transient thermal impedance Curve