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IRFF120

6.0A, 100V, 0.300 Ohm, N-Channel Power MOSFET

This N-Channel enhancement mode silicon gate power field effect transistor is an advanced power MOSFET designed, tested, and guaranteed to withstand a specified level of energy in the breakdown avalanche mode of operation. All of these power MOSFETs are designed for applications such as switching regulators, switching convertors, motor drivers, relay drivers, and drivers for high power bipolar switching transistors requiring high speed and low gate drive power. These types can be operated directly from integrated circuits.

Features

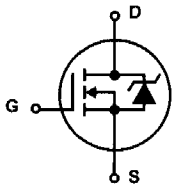
- 6.0A, 100V
- $r_{DS(ON)} = 0.300\Omega$
- Single Pulse Avalanche Energy Rated
- SOA is Power Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Related Literature
  - TB334, "Guidelines for Soldering Surface Mount Components to PC Boards"

Ordering Information

PART NUMBER	PACKAGE	BRAND
IRFF120	TO-205AF	IRFF120

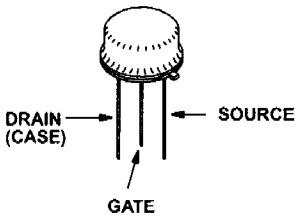
NOTE: When ordering, use the entire part number.

Symbol



Packaging

JEDEC TO-205AF



Absolute Maximum Ratings $T_C = 25^oC$, Unless Otherwise Specified

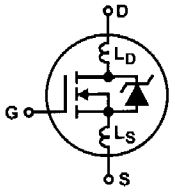
		IRFF120	UNITS
Drain to Source Voltage (Note 1)	V_{DS}	100	V
Drain to Gate Voltage (R_{GS} = 20kΩ) (Note 1)	V_{DGR}	100	V
Continuous Drain Current	I_D	6.0	A
Pulsed Drain Current (Note 3)	I_{DM}	24	A
Gate to Source Voltage	V_{GS}	±20	V
Maximum Power Dissipation	P_D	20	W
Linear Derating Factor		0.16	W/°C
Single Pulse Avalanche Energy Rating (Note 4)	E_{AS}	36	mJ
Operating and Storage Temperature	T_J, T_{STG}	-55 to 150	°C
Maximum Temperature for Soldering			
Leads at 0.063in (1.6mm) from Case for 10s	T_L	300	°C
Package Body for 10s, See Techbrief 334	T_{pkg}	260	°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

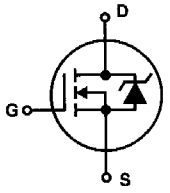
NOTE:

1. $T_J = 25^oC$ to 125^oC.

Electrical Specifications $T_C = 25^oC$, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Drain to Source Breakdown Voltage	BV_{DSS}	I_D = 250μA, V_{GS} = 0V (Figure 10)		100	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$, I_D = 250μA		2.0	-	4.0	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = Rated BV_{DSS}, V_{GS} = 0V		-	-	25	μA
		V_{DS} = 0.8 x Rated BV_{DSS}, V_{GS} = 0V, $T_C = 125^oC$		-	-	250	μA
On-State Drain Current (Note 2)	$I_{D(ON)}$	$V_{DS} > I_{D(ON)} \times r_{DS(ON)MAX}$, V_{GS} = 10V		6.0	-	-	A
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20V		-	-	±100	nA
Drain to Source On Resistance (Note 2)	$r_{DS(ON)}$	I_D = 3.0A, V_{GS} = 10V (Figures 8, 9)		-	0.25	0.300	Ω
Forward Transconductance (Note 2)	g_{fs}	$V_{DS} > I_{D(ON)} \times r_{DS(ON)MAX}$, I_D = 3.0A (Figure 12)		1.5	2.9	-	S
Turn-On Delay Time	$t_{d(ON)}$	$V_{DD} \cong 0.5$ x Rated BV_{DSS}, I_D = 6.0A, R_G = 9.1Ω, V_{GS} =10V (Figures 17, 18), R_L = 8Ω for V_{DSS} = 50V, R_L = 6.3Ω for V_{DSS} = 40V, MOSFET Switching Times are Essentially Independent of Operating Temperatures		-	20	40	ns
Rise Time	t_r			-	37	70	ns
Turn-Off Delay Time	$t_{d(OFF)}$			-	50	100	ns
Fall Time	t_f			-	35	70	ns
Total Gate Charge (Gate to Source + Gate to Drain)	$Q_{g(TOT)}$	V_{GS} = 10V, I_D = 6.0A, V_{DS} = 0.8 x Rated BV_{DSS} (Figures 14, 19, 20) Gate Charge is Essentially Independent of Operating Temperature		-	10	15	nC
Gate to Source Charge	Q_{gs}			-	6.0	-	nC
Gate to Drain ("Miller") Charge	Q_{gd}			-	4.0	-	nC
Input Capacitance	C_{ISS}	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz (Figure 11)		-	450	-	pF
Output Capacitance	C_{OSS}			-	20	-	pF
Reverse Transfer Capacitance	C_{RSS}			-	50	-	pF
Internal Drain Inductance	L_D	Measured from the Drain Lead, 5.0mm (0.2in) from Header to Center of Die	Modified MOSFET Symbol Showing the Internal Devices Inductances 	-	5.0	-	nH
Internal Source Inductance	L_S	Measured from the Source Lead, 5.0mm (0.2in) from Header to Source Bonding Pad		-	15	-	nH
Thermal Resistance, Junction to Case	$R_{\theta JC}$			-	-	6.25	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	Free Air Operation		-	-	175	°C/W

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Continuous Source to Drain Current	I_{SD}	Modified MOSFET Symbol Showing the Integral Reverse P-N Junction Rectifier 	-	-	6.0	A
Pulse Source to Drain Current (Note 3)	I_{SM}		-	-	24	A
Source to Drain Diode Voltage (Note 2)	V_{SD}	T_J = 25°C, I_{SD} = 6.0A, V_{GS} = 0V (Figure 13)	-	-	2.5	V
Reverse Recovery Time	t_{rr}	T_J = 150°C, I_{SD} = 6.0A, dI_{SD}/dt = 100A/μs	-	230	-	ns
Reverse Recovery Charge	Q_{RR}	T_J = 150°C, I_{SD} = 6.0A, dI_{SD}/dt = 100A/μs	-	1.0	-	μC
Forward Turn-On Time	t_{ON}	Intrinsic Turn-on Time is Negligible, Turn-On Speed is Substantially controlled by $L_S + L_D$	-	-	-	-

NOTES:

2. Pulse test: pulse width ≤ 300μs, duty cycle ≤ 2%.
3. Repetitive rating: pulse width limited by Max junction temperature. See Transient Thermal Impedance curve (Figure 3).
4. V_{DD} = 25V, starting T_J = 25°C, L = 1.5mH, R_G = 25Ω, peak I_{AS} = 6.0A (Figures 15, 16).

Typical Performance Curves Unless Otherwise Specified

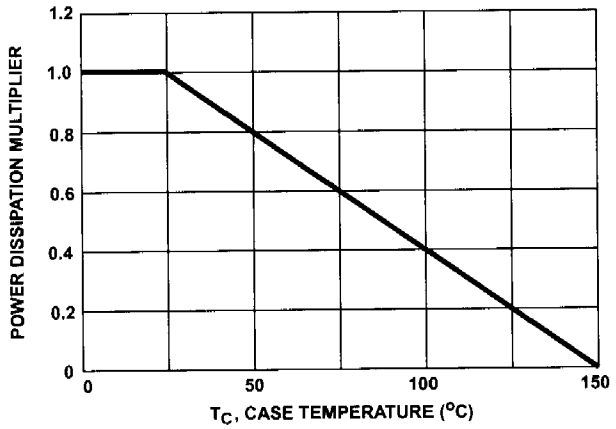


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

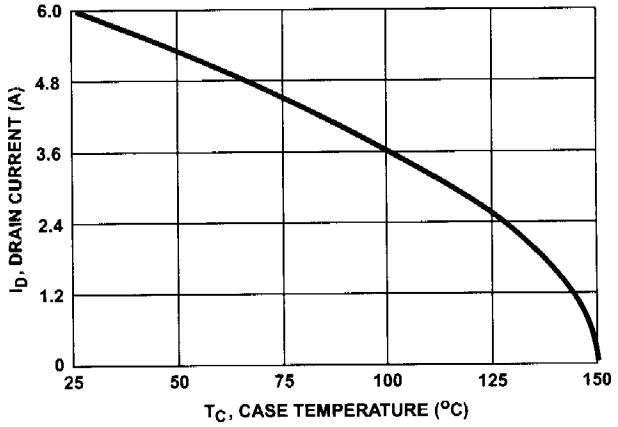


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

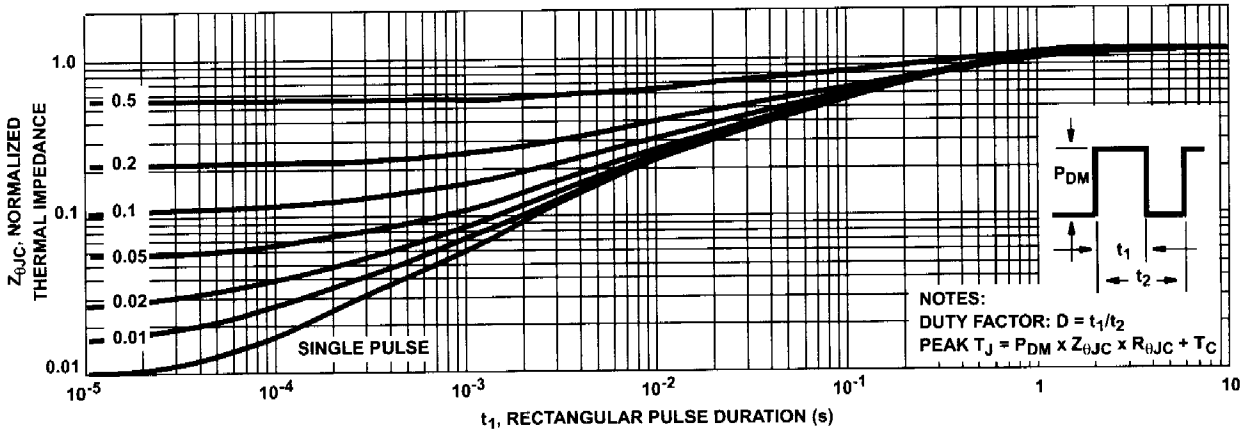


FIGURE 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE