Provisional Data Sheet No. PD-9.427B

International
IOR Rectifier

HEXFET® POWER MOSFET

JANTX2N6790
JANTXV2N6790
[REF:MIL-PRF-19500/555]
[GENERIC:IRFF220]

N-CHANNEL

200 Volt, 0.80Ω HEXFET

HEXFET technology is the key to International Rectifier's advanced line of power MOSFET transistors. The efficient geometry achieves very low on-state resistance combined with high transconductance.

HEXFET transistors also feature all of the well-establish advantages of MOSFETs, such as voltage control, very fast switching, ease of paralleling and electrical parameter temperature stability. They are well-suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers, and high energy pulse circuits, and virtually any application where high reliability is required.

Product Summary

Part Number	BV_{DSS}	$R_{DS(on)}$	I_D
JANTX2N6790 JANTXV2N6790	200V	0.80Ω	3.5A

Features:

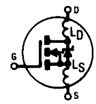
- Avalanche Energy Rating
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Ease of Paralleling
- Hermetically Sealed

Absolute Maximum Ratings

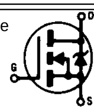
	Parameter	JANTX2N6790, JANTXV2N6790	Units
I_D @ V_{GS} = 10V, T_C = 25°C	Continuous Drain Current	3.5	A
I_D @ V_{GS} = 10V, T_C = 100°C	Continuous Drain Current	2.25	
I_{DM}	Pulsed Drain Current ①	14	
P_D @ T_C = 25°C	Max. Power Dissipation	20	W
	Linear Derating Factor	0.16	W/K ⑤
V_{GS}	Gate-to-Source Voltage	±20	V
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J T_{STG}	Operating Junction Storage Temperature Range	-55 to 150	°C
	Lead Temperature	300 (0.063 in. (1.6mm) from case for 10.5 seconds)	
	Weight	0.98 (typical)	g

JANTX2N6790, JANTXV2N6790 Device

Electrical Characteristics @ Tj = 25°C (Unless Otherwise Specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	200	—	—	V	V_{GS} = 0V, I_D = 1.0 mA
$\Delta BV_{DSS}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	—	0.25	—	V/°C	Reference to 25°C, I_D = 1.0 mA
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance	—	—	0.80	Ω	V_{GS} = 10V, I_D = 2.25A ④
		—	—	0.92		V_{GS} = 10V, I_D = 3.5A
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250μA
g_{fs}	Forward Transconductance	1.5	—	—	S (℧)	V_{DS} > 15V, I_{DS} = 2.25A ④
I_{DSS}	Zero Gate Voltage Drain Current	—	—	25	μA	V_{DS} = 0.8 x Max Rating, V_{GS} = 0V
		—	—	250		V_{DS} = 0.8 x Max Rating V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Leakage Forward	—	—	100	nA	V_{GS} = 20V
I_{GSS}	Gate-to-Source Leakage Reverse	—	—	-100		V_{GS} = -20V
Q_g	Total Gate Charge	8.0	—	14.3	nC	V_{GS} = 10V, I_D = 3.5A
Q_{gs}	Gate-to-Source Charge	0.9	—	3.0		V_{DS} = Max. Rating x 0.5
Q_{gd}	Gate-to-Drain ("Miller") Charge	2.3	—	9.0		see figures 6 and 13
$t_{d(on)}$	Turn-On Delay Time	—	—	40	ns	V_{DD} = 100V, I_D = 3.5A,
t_r	Rise Time	—	—	50		R_G = 7.5Ω, VGS = 10V
$t_{d(off)}$	Turn-Off Delay Time	—	—	50		
t_f	Fall Time	—	—	50		see figure 10
L_D	Internal Drain Inductance	—	5.0	—	nH	Measured from the drain lead, 6mm (0.25 in.) from package to center of die. Modified MOSFET symbol showing the internal inductances. 
L_S	Internal Source Inductance	—	15	—		Measured from the source lead, 6mm (0.25 in.) from package to source bonding pad.
C_{iss}	Input Capacitance	—	260	—	pF	V_{GS} = 0V, V_{DS} = 25V
C_{oss}	Output Capacitance	—	100	—		f = 1.0 MHz
C_{rss}	Reverse Transfer Capacitance	—	30	—		see figure 5

Source-Drain Diode Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	3.5	A	Modified MOSFET symbol showing the integral reverse p-n junction rectifier. 
I_{SM}	Pulse Source Current (Body Diode) ①	—	—	14		
V_{SD}	Diode Forward Voltage	—	—	1.5	V	T_j = 25°C, I_S = 3.5A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	—	400	ns	T_j = 25°C, I_F = 3.5A, di/dt ≤ 100A/μs
Q_{RR}	Reverse Recovery Charge	—	—	4.3	μC	V_{DD} ≤ 50V ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by L_S + L_D.				

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	—	—	6.25	K/W	
R_{thJA}	Junction-to-Ambient	—	—	175		Typical socket mount

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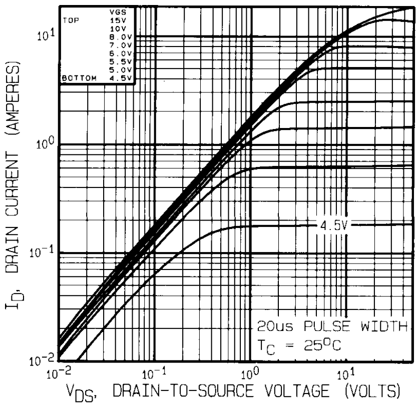

Fig. 1 — Typical Output Characteristics
T_C = 25°C

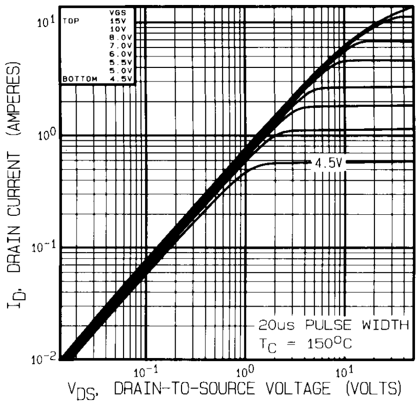

Fig. 2 — Typical Output Characteristics
T_C = 150°C

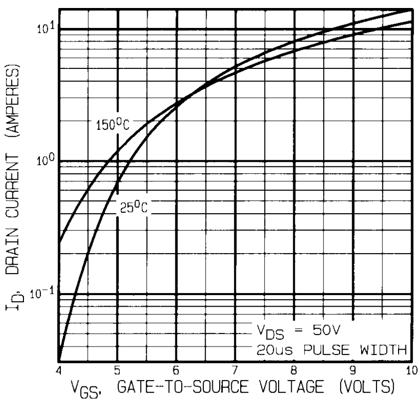

Fig. 3 — Typical Transfer Characteristics

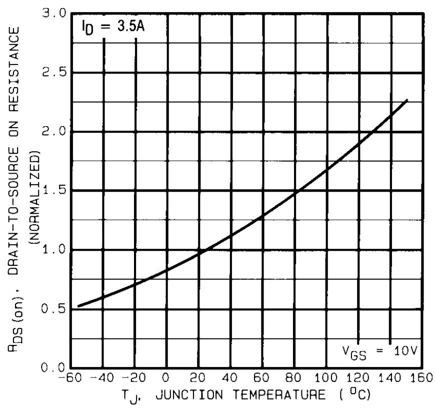

Fig. 4 — Normalized On-Resistance Vs.Temperature

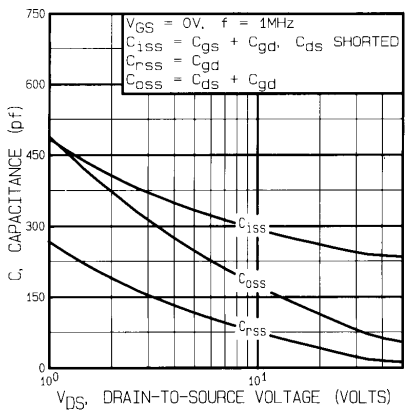

Fig. 5 — Typical Capacitance Vs. Drain-to-Source Voltage

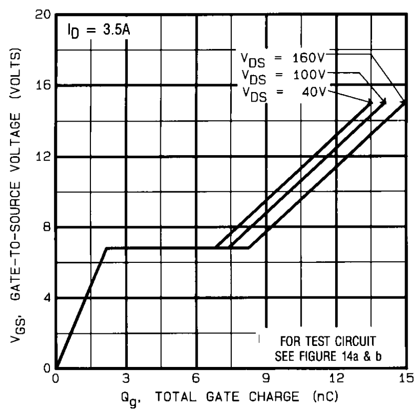

Fig. 6 — Typical Gate Charge Vs. Gate-to-Source Voltage

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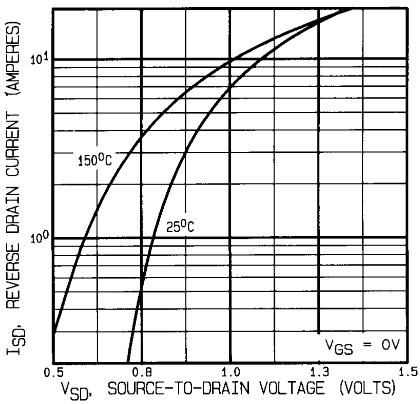


Fig. 7 — Typical Source-to-Drain Diode Forward Voltage

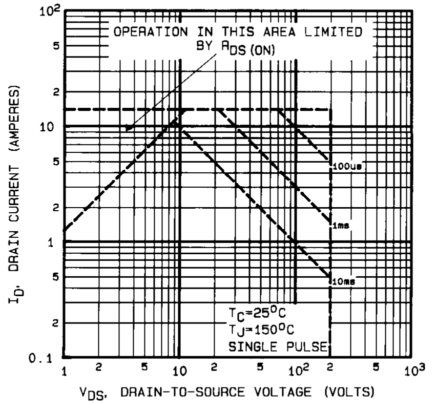


Fig. 8 — Maximum Safe Operating Area

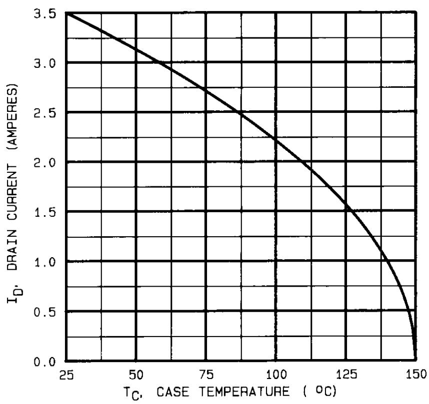


Fig. 9 — Maximum Drain Current Vs. Case Temperature

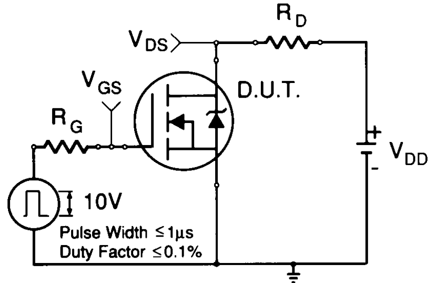


Fig. 10a — Switching Time Test Circuit

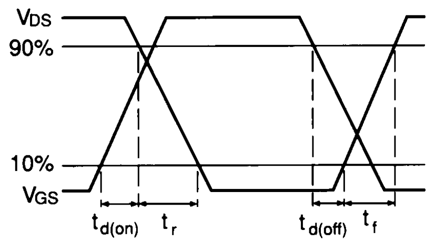


Fig. 10b — Switching Time Waveforms

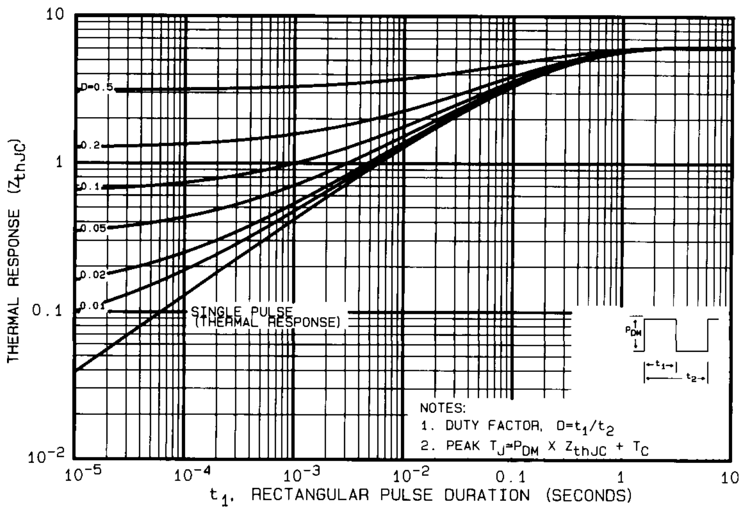


Fig. 11 — Maximum Effective Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration

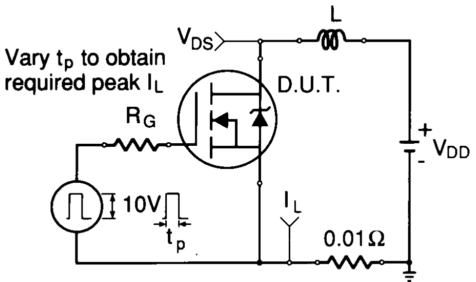


Fig. 12a — Unclamped Inductive Test Circuit

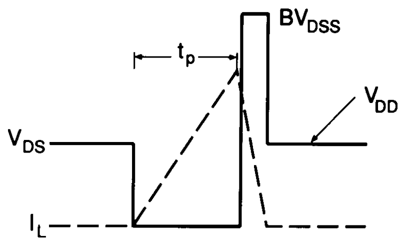


Fig. 12b — Unclamped Inductive Waveforms

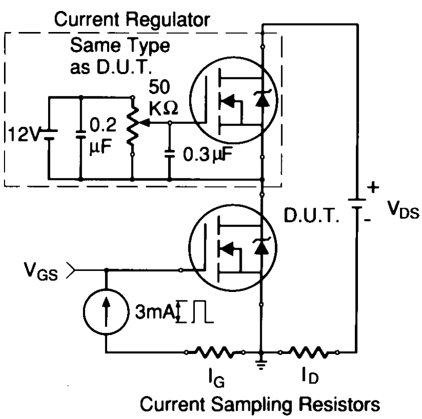


Fig. 13a — Gate Charge Test Circuit

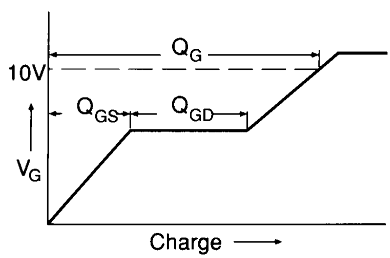


Fig. 13b — Basic Gate Charge Waveform

① Repetitive Rating; Pulse width limited by maximum junction temperature. (see figure 11)

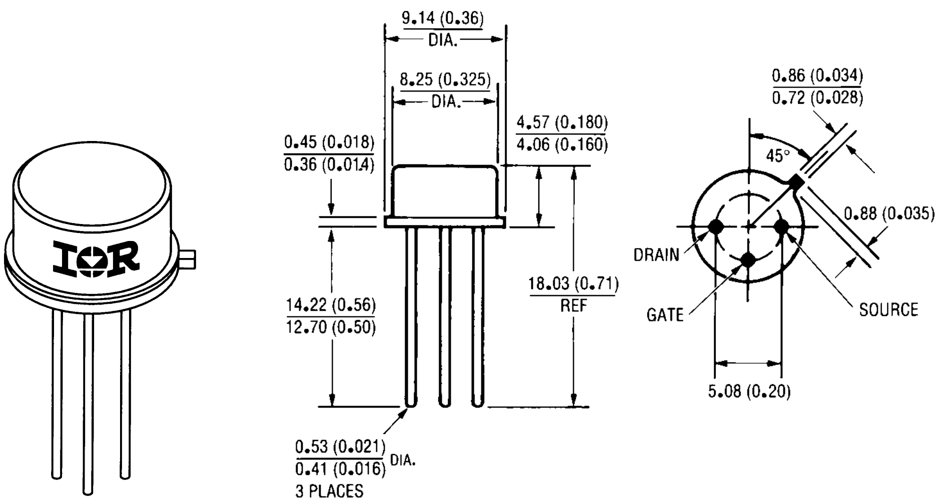
② @ V_{DD} = 50V, Starting T_J = 25°C, $E_{AS} = [0.5 * L * (I_L^2) * [BV_{DSS}/(BV_{DSS}-V_{DD})]$ Peak I_L = 3.5A, V_{GS} = 10V, 25 ≤ R_G ≤ 200Ω

③ I_{SD} ≤ 3.5A, di/dt ≤ 95A/µs, V_{DD} ≤ BV_{DSS}, T_J ≤ 150°C

④ Pulse width ≤ 300 µs; Duty Cycle ≤ 2%

⑤ K/W = °C/W
W/K = W/°C

Case Outline and Dimensions — TO-205AF (Modified TO-39)



All dimensions are shown millimeters (inches)

International
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