

# International Rectifier

## HEXFET® POWER MOSFET

Provisional Data Sheet No. PD-9.335E

**JANTX2N6760**  
**JANTXV2N6760**  
**[REF:MIL-PRF-19500/542]**  
**[GENERIC:IRF330]**  
**N-CHANNEL**

### 400 Volt, 1.00Ω 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-established 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 <sub>dss</sub>	R <sub>Ds(on)</sub>	I <sub>D</sub>
JANTX2N6760	400V	1.00Ω	5.5A
JANTXV2N6760			

### Features:

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

### Absolute Maximum Ratings

	Parameter	JANTX2N6760, JANTXV2N6760	Units
I <sub>D</sub> @ V <sub>GS</sub> = 10V, T <sub>C</sub> = 25°C	Continuous Drain Current	5.5	A
I <sub>D</sub> @ V <sub>GS</sub> = 10V, T <sub>C</sub> = 100°C	Continuous Drain Current	3.5	
I <sub>DM</sub>	Pulsed Drain Current ①	22	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Max. Power Dissipation	75	W
	Linear Derating Factor	0.60	W/K ⑤
V <sub>GS</sub>	Gate-to-Source Voltage	±20	V
E <sub>AS</sub>	Single Pulse Avalanche Energy ②	1.7	mJ
I <sub>AR</sub>	Avalanche Current ①	5.5	A
E <sub>AR</sub>	Repetitive Avalanche Energy ①	—	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.0	V/ns
T <sub>J</sub> T <sub>STG</sub>	Operating Junction Storage Temperature Range	-55 to 150	°C
	Lead Temperature	300 (0.063 in. (1.6mm) from case for 10.5 seconds)	
	Weight	11.5 (typical)	g

## JANTX2N6760, JANTXV2N6760 Device

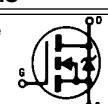
### Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (Unless Otherwise Specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$\text{BV}_{\text{DSS}}$	Drain-to-Source Breakdown Voltage	400	—	—	V	$\text{V}_{\text{GS}} = 0\text{V}, \text{I}_{\text{D}} = 1.0\text{ mA}$
$\Delta \text{BV}_{\text{DSS}}/\Delta T_j$	Temperature Coefficient of Breakdown Voltage	—	0.46	—	$\text{V}^\circ\text{C}$	Reference to $25^\circ\text{C}$ , $\text{I}_{\text{D}} = 1.0\text{ mA}$
$\text{RDS}(\text{on})$	Static Drain-to-Source On-State Resistance	—	—	1.00	$\Omega$	$\text{V}_{\text{GS}} = 10\text{V}, \text{I}_{\text{D}} = 3.5\text{A}$ <sup>④</sup>
		—	—	1.22		$\text{V}_{\text{GS}} = 10\text{V}, \text{I}_{\text{D}} = 5.5\text{A}$
$\text{VGS}(\text{th})$	Gate Threshold Voltage	2.0	—	4.0	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}, \text{I}_{\text{D}} = 250\mu\text{A}$
$\text{gfs}$	Forward Transconductance	2.9	—	—	$\text{S} (\text{d})$	$\text{V}_{\text{DS}} > 15\text{V}, \text{I}_{\text{DS}} = 3.5\text{A}$ <sup>④</sup>
$\text{IDSS}$	Zero Gate Voltage Drain Current	—	—	25	$\mu\text{A}$	$\text{V}_{\text{DS}} = 0.8 \times \text{Max Rating}, \text{V}_{\text{GS}} = 0\text{V}$
		—	—	250		$\text{V}_{\text{DS}} = 0.8 \times \text{Max Rating}$ $\text{V}_{\text{GS}} = 0\text{V}, \text{T}_j = 125^\circ\text{C}$
$\text{IGSS}$	Gate-to-Source Leakage Forward	—	—	100	nA	$\text{V}_{\text{GS}} = 20\text{V}$
$\text{IGSS}$	Gate-to-Source Leakage Reverse	—	—	-100		$\text{V}_{\text{GS}} = -20\text{V}$
$\text{Q}_g$	Total Gate Charge	17	—	39	nC	$\text{V}_{\text{GS}} = 10\text{V}, \text{I}_{\text{D}} = 5.5\text{A}$
$\text{Q}_{\text{gs}}$	Gate-to-Source Charge	2.0	—	6.0		$\text{V}_{\text{DS}} = \text{Max. Rating} \times 0.5$ see figures 6 and 13
$\text{Q}_{\text{gd}}$	Gate-to-Drain ("Miller") Charge	8.0	—	20	ns	$\text{V}_{\text{DD}} = 200\text{V}, \text{I}_{\text{D}} = 5.5\text{A},$ $\text{R}_G = 7.5\Omega, \text{V}_{\text{GS}} = 10\text{V}$  see figure 10
$\text{t}_{\text{d}(\text{on})}$	Turn-On Delay Time	—	—	30		
$\text{t}_r$	Rise Time	—	—	40		
$\text{t}_{\text{d}(\text{off})}$	Turn-Off Delay Time	—	—	80		
$\text{t}_f$	Fall Time	—	—	35		
$\text{L}_D$	Internal Drain Inductance	—	5.0	—	nH	Measured from the drain lead, 6mm (0.25 in.) from package to center of die.
$\text{L}_S$	Internal Source Inductance	—	13.0	—		Measured from the source lead, 6mm (0.25 in.) from package to source bonding pad.
$\text{C}_{\text{iss}}$	Input Capacitance	—	620	—	pF	$\text{V}_{\text{GS}} = 0\text{V}, \text{V}_{\text{DS}} = 25\text{V}$ $f = 1.0\text{ MHz}$ see figure 5
$\text{C}_{\text{oss}}$	Output Capacitance	—	200	—		
$\text{C}_{\text{rss}}$	Reverse Transfer Capacitance	—	75	—		



### Source-Drain Diode Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$\text{I}_S$	Continuous Source Current (Body Diode)	—	—	5.5	A	Modified MOSFET symbol showing the integral reverse p-n junction rectifier.
$\text{ISM}$	Pulse Source Current (Body Diode) <sup>①</sup>	—	—	22	A	
$\text{V}_{\text{SD}}$	Diode Forward Voltage	—	—	1.5	V	$\text{T}_j = 25^\circ\text{C}, \text{I}_S = 5.5\text{A}, \text{V}_{\text{GS}} = 0\text{V}$ <sup>④</sup>
$\text{t}_{\text{rr}}$	Reverse Recovery Time	—	—	700	ns	$\text{T}_j = 25^\circ\text{C}, \text{I}_F = 5.5\text{A}, \text{dI}/\text{dt} \leq 100\text{A}/\mu\text{s}$ $\text{V}_{\text{DD}} \leq 50\text{V}$ <sup>④</sup>
$\text{QRR}$	Reverse Recovery Charge	—	—	6.2	$\mu\text{C}$	
$\text{t}_{\text{on}}$	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by $\text{L}_S + \text{L}_D$ .				



### Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$\text{R}_{\text{thJC}}$	Junction-to-Case	—	—	1.67	K/W	Typical socket mount
$\text{R}_{\text{thJA}}$	Junction-to-Ambient	—	—	30		

## JANTX2N6760, JANTXV2N6760 Device

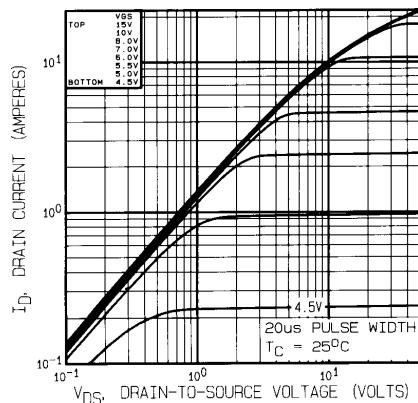


Fig. 1 — Typical Output Characteristics  
 $T_C = 25^\circ\text{C}$

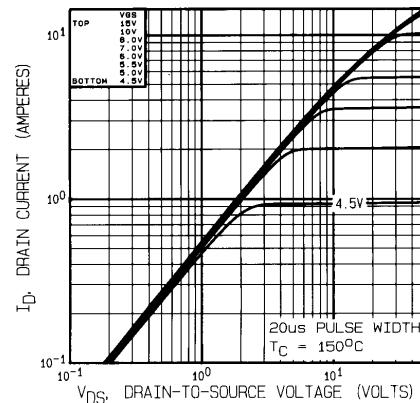


Fig. 2 — Typical Output Characteristics  
 $T_C = 150^\circ\text{C}$

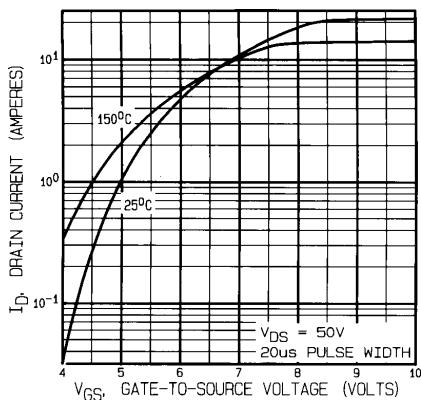


Fig. 3 — Typical Transfer Characteristics

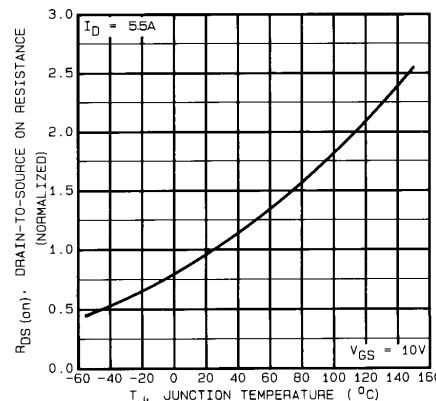


Fig. 4 — Normalized On-Resistance Vs. Temperature

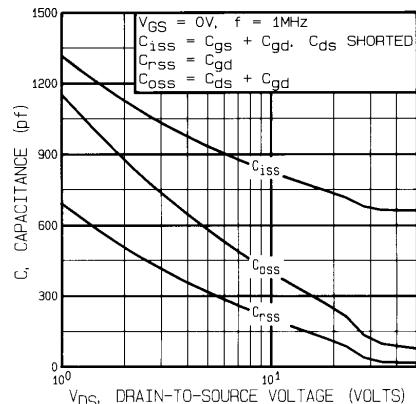


Fig. 5 — Typical Capacitance Vs. Drain-to-Source Voltage

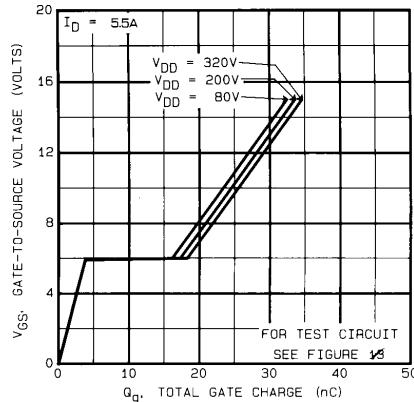


Fig. 6 — Typical Gate Charge Vs. Gate-to-Source Voltage

## JANTX2N6760, JANTXV2N6760 Device

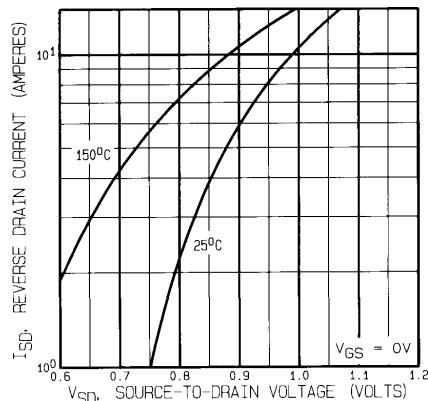


Fig. 7 — Typical Source-to-Drain Diode Forward Voltage

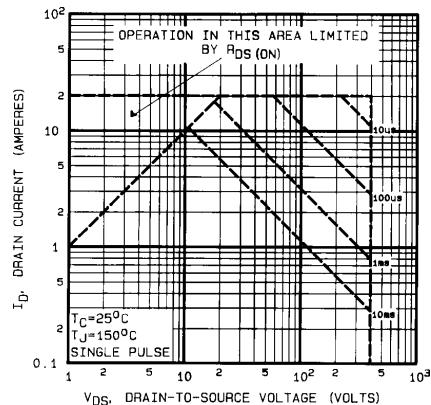


Fig. 8 — Maximum Safe Operating Area

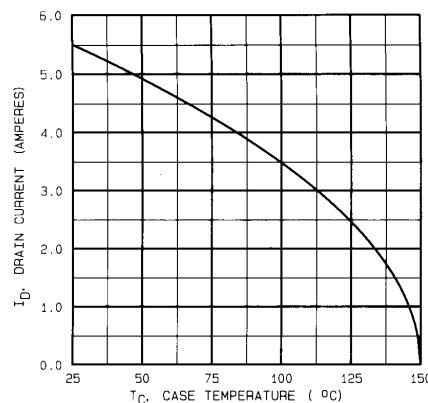


Fig. 9 — Maximum Drain Current Vs. Case Temperature

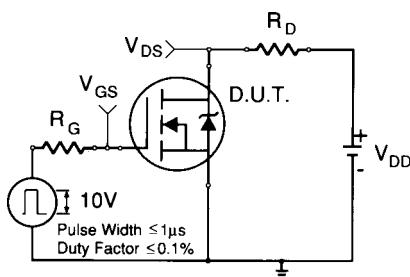


Fig. 10a — Switching Time Test Circuit

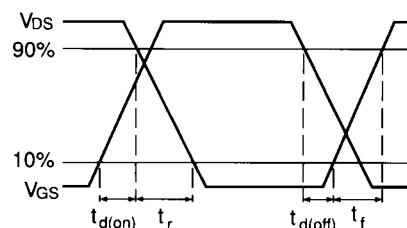


Fig. 10b — Switching Time Waveforms

## JANTX2N6760, JANTXV2N6760 Device

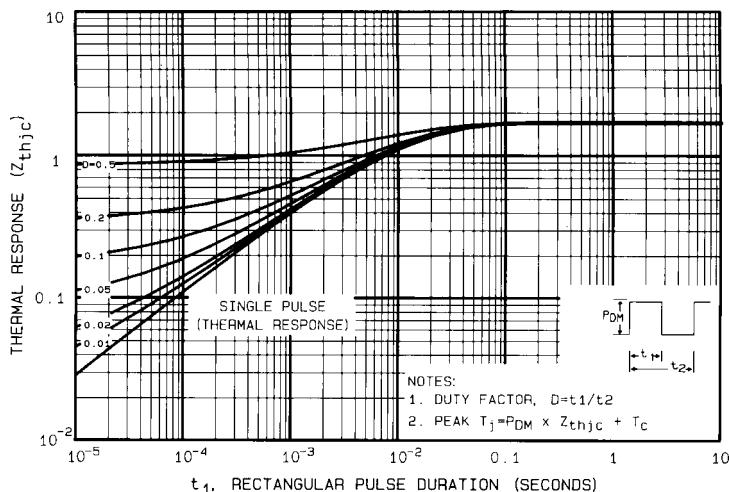


Fig. 11 — Maximum Effective Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration

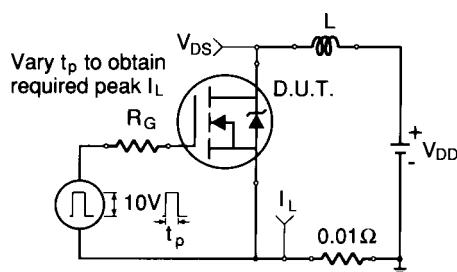


Fig. 12a — Unclamped Inductive Test Circuit

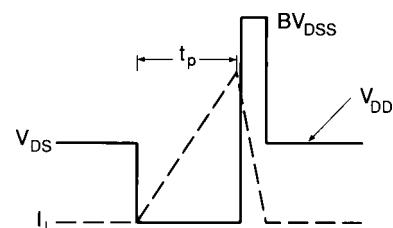


Fig. 12b — Unclamped Inductive Waveforms

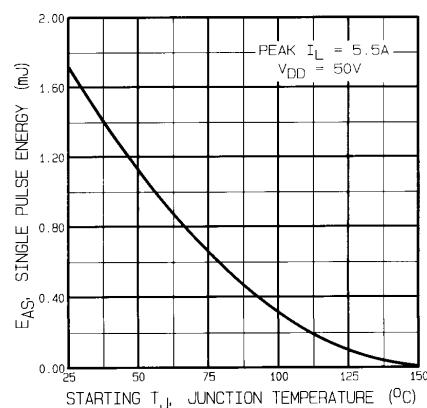


Fig. 12c — Max. Avalanche Energy vs. Current

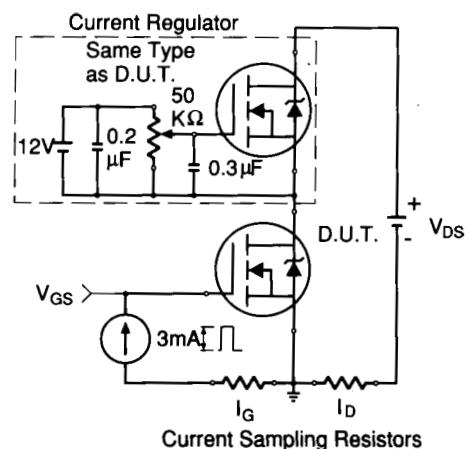
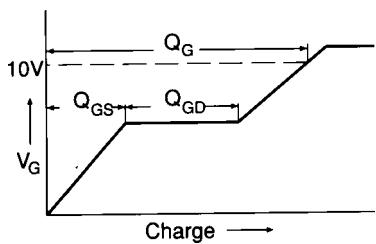


Fig. 13a — Gate Charge Test Circuit

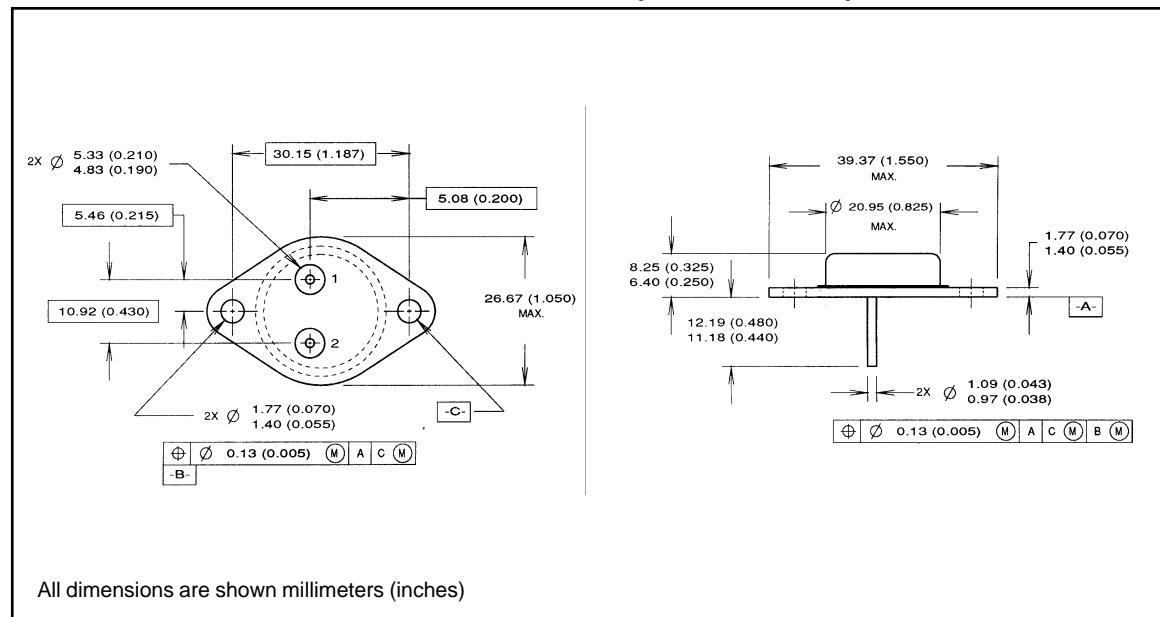
## JANTX2N6760, JANTXV2N6760 Device



- ① Repetitive Rating; Pulse width limited by maximum junction temperature.  
(see figure 11)
- ② @  $V_{DD} = 50V$ , Starting  $T_J = 25^\circ C$ ,  
 $EAS = [0.5 * L * (I_L^2) * [BV_{DSS}/(BV_{DSS}-V_{DD})]]$   
Peak  $I_L = 5.5A$ ,  $V_{GS} = 10V$ ,  $25 \leq R_G \leq 200\Omega$
- ③  $I_{SD} \leq 5.5A$ ,  $dI/dt \leq 90A/\mu s$ ,  
 $V_{DD} \leq BV_{DSS}$ ,  $T_J \leq 150^\circ C$
- ④ Pulse width  $\leq 300 \mu s$ ; Duty Cycle  $\leq 2\%$
- ⑤  $K/W = ^\circ C/W$   
 $W/K = W/^{\circ}C$

Fig. 13b — Basic Gate Charge Waveform

## Case Outline and Dimensions — TO-204AA (Modified TO-3)



International  
**IR** Rectifier

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<http://www.irf.com/> Data and specifications subject to change without notice.

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