International **IⓇR** Rectifier

POWER MOSFET
THRU-HOLE (TO-254AA)

IRFM260
200V, N-CHANNEL
HEXFET® MOSFET TECHNOLOGY

Product Summary

Part Number	R$_{DS(on)}$	I$_D$
IRFM260	0.060 Ω	35A*

HEXFET® MOSFET technology is the key to International Rectifier's advanced line of power MOSFET transistors. The efficient geometry design 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, high energy pulse circuits, and virtually any application where high reliability is required. The HEXFET transistor's totally isolated package eliminates the need for additional isolating material between the device and the heatsink. This improves thermal efficiency and reduces drain capacitance.

TO-254AA
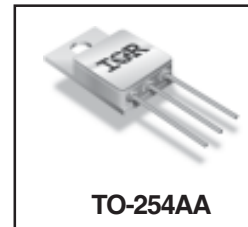
Features:

- Simple Drive Requirements
- Ease of Paralleling
- Hermetically Sealed
- Electrically Isolated
- Dynamic dv/dt Rating
- Light-weight

Absolute Maximum Ratings

	Parameter		Units
I$_D$ @ V$_{GS}$ = 10V, T$_C$ = 25°C	Continuous Drain Current	35*	A
I$_D$ @ V$_{GS}$ = 10V, T$_C$ = 100°C	Continuous Drain Current	28	
I$_{DM}$	Pulsed Drain Current ①	140	
P$_D$ @ T$_C$ = 25°C	Max. Power Dissipation	250	W
	Linear Derating Factor	2.0	W/°C
V$_{GS}$	Gate-to-Source Voltage	±20	V
E$_{AS}$	Single Pulse Avalanche Energy ②	700	mJ
I$_{AR}$	Avalanche Current ①	35	A
E$_{AR}$	Repetitive Avalanche Energy ①	25	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.3	V/ns
T$_J$	Operating Junction	-55 to 150	°C
T$_{STG}$	Storage Temperature Range		
	Lead Temperature	300 (0.063 in.(1.6mm) from case for 10s)	
	Weight	9.3 (Typical)	g

* Current is limited by Package

For footnotes refer to the last page

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$_D$ = 1.0mA
ΔBV$_{DSS}$/ΔT$_J$	Temperature Coefficient of Breakdown Voltage	—	0.24	—	V/°C	Reference to 25°C, I$_D$ = 1.0mA
R$_{DS(on)}$	Static Drain-to-Source On-State Resistance	—	—	0.060	Ω	V$_{GS}$ = 10V, I$_D$ = 28A ④
		—	—	0.068		V$_{GS}$ = 10V, I$_D$ = 35A
V$_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V$_{DS}$ = V$_{GS}$, I$_D$ = 250µA
g$_{fs}$	Forward Transconductance	22	—	—	S (℧)	V$_{DS}$ > 15V, I$_{DS}$ = 28A ④
I$_{DSS}$	Zero Gate Voltage Drain Current	—	—	25	µA	V$_{DS}$= 160V ,V$_{GS}$=0V
		—	—	250		V$_{DS}$ = 160V, 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	—	—	230	nC	V$_{GS}$ =10V, I$_D$ = 35A V$_{DS}$ = 100V
Q$_{gs}$	Gate-to-Source Charge	—	—	40		
Q$_{gd}$	Gate-to-Drain ('Miller') Charge	—	—	110		
t$_{d(on)}$	Turn-On Delay Time	—	—	29	ns	V$_{DD}$ = 100V, I$_D$ = 35A, V$_{GS}$ =10V, R$_G$ = 2.35Ω
t$_r$	Rise Time	—	—	120		
t$_{d(off)}$	Turn-Off Delay Time	—	—	110		
t$_f$	Fall Time	—	—	92		
L$_S$ + L$_D$	Total Inductance	—	6.8	—	nH	Measured from drain lead (6mm/ 0.25in. from package) to source lead (6mm/0.25in. from package)
C$_{iss}$	Input Capacitance	—	5100	—	pF	V$_{GS}$ = 0V, V$_{DS}$ = 25V f = 1.0MHz
C$_{oss}$	Output Capacitance	—	1100	—		
C$_{rss}$	Reverse Transfer Capacitance	—	280	—		

Source-Drain Diode Ratings and Characteristics

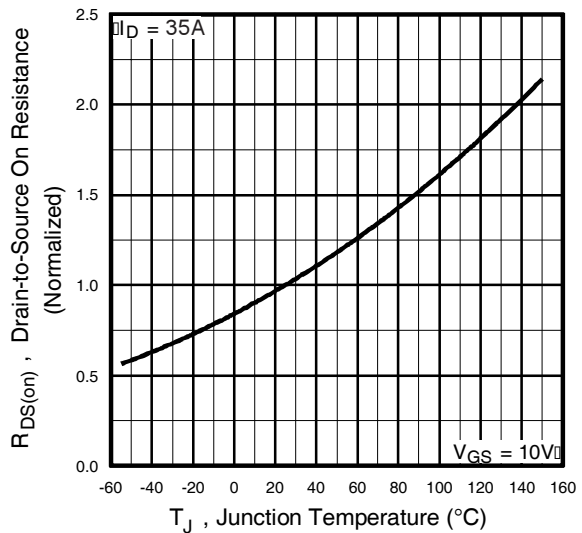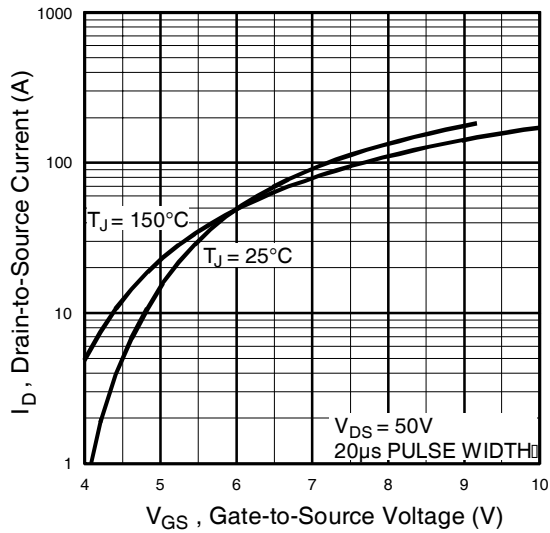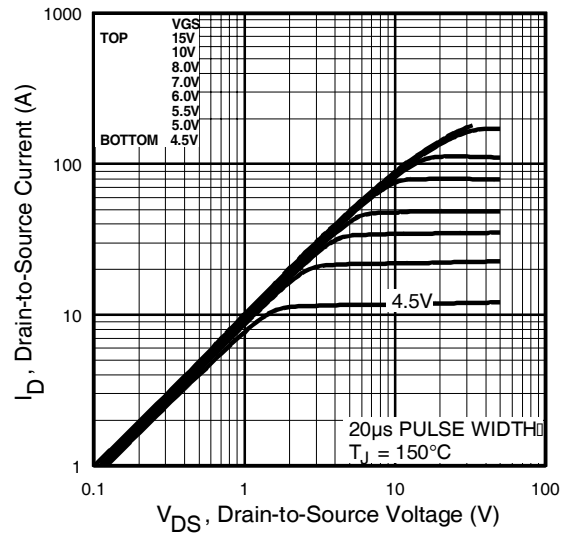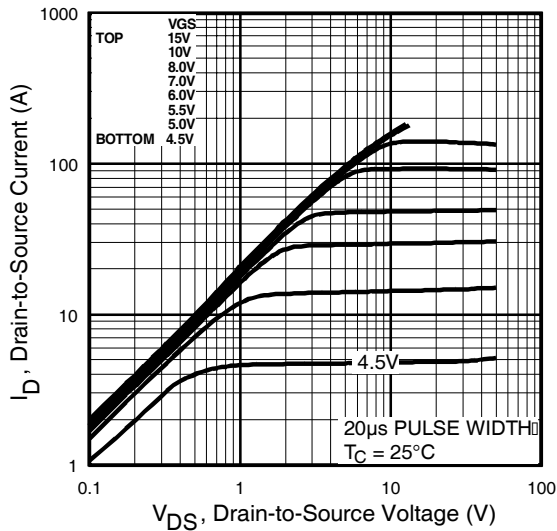|	Parameter	Min	Typ	Max	Units	Test Conditions
I$_S$	Continuous Source Current (Body Diode)	—	—	35*	A	
I$_{SM}$	Pulse Source Current (Body Diode) ①	—	—	140		
V$_{SD}$	Diode Forward Voltage	—	—	1.8	V	T$_j$ = 25°C, I$_S$ = 35A, V$_{GS}$ = 0V ④
t$_{rr}$	Reverse Recovery Time	—	—	420	ns	T$_j$ = 25°C, I$_F$ = 35A, di/dt ≤ 100A/µs
Q$_{RR}$	Reverse Recovery Charge	—	—	4.9	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$_D$.				

* Current is limited by Package

Thermal Resistance

	Parameter	Min	Typ	Max	Units	Test Conditions
R$_{thJC}$	Junction-to-Case	—	—	0.50	°C/W	
R$_{thJCS}$	Case-to-Sink	—	0.21	—		
R$_{thJA}$	Junction-to-Ambient	—	—	48		Typical socket mount

Note: Corresponding Spice and Saber models are available on International Rectifier Website.
For footnotes refer to the last page

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Fig 1. Typical Output Characteristics

Fig 2. Typical Output Characteristics

Fig 3. Typical Transfer Characteristics

Fig 4. Normalized On-Resistance
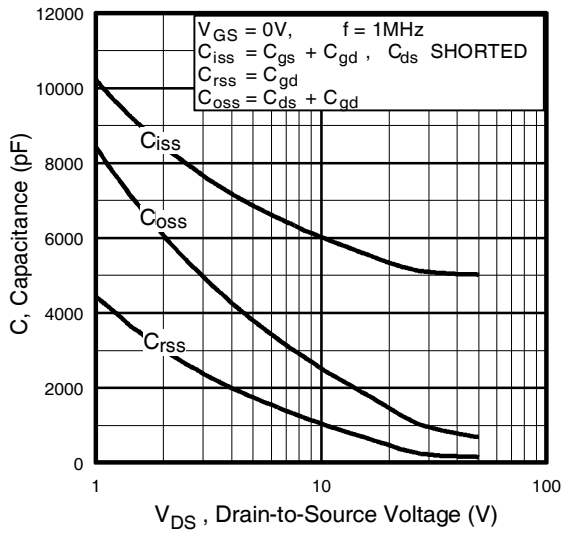Vs. Temperature

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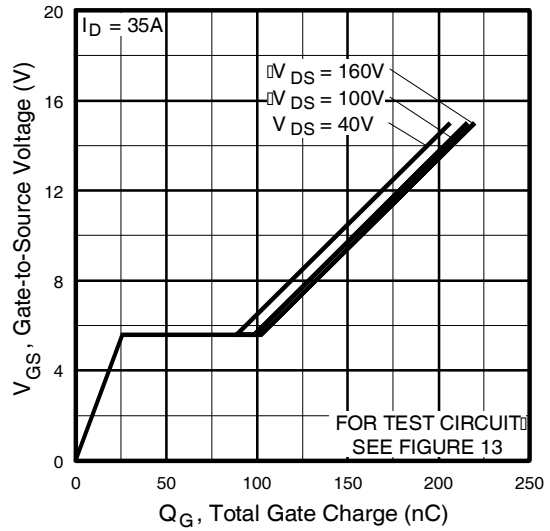Drain-to-Source Voltage

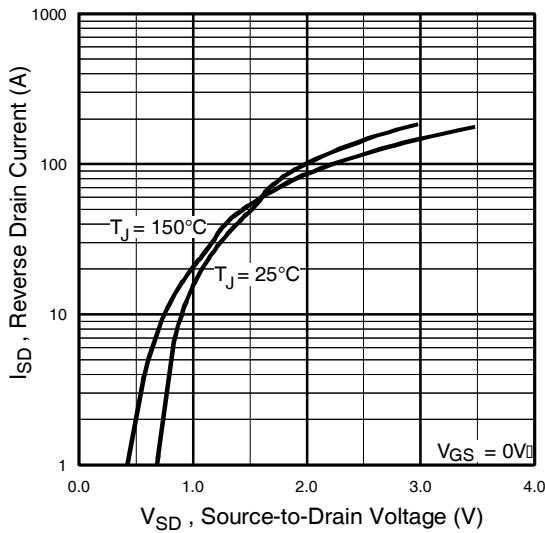**Fig 6.** Typical Gate Charge Vs.
Gate-to-Source Voltage

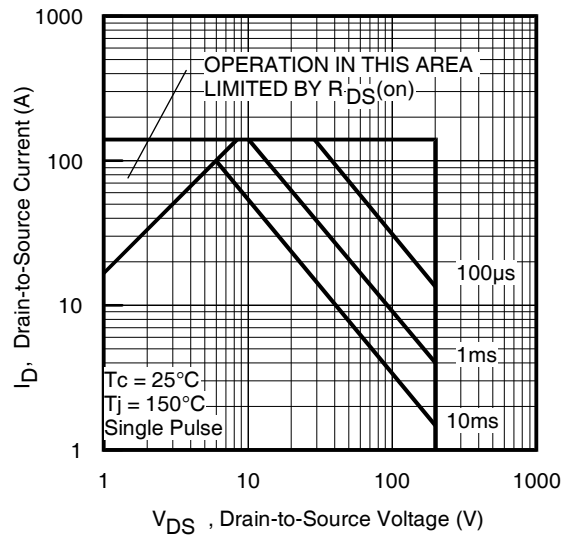**Fig 7.** Typical Source-Drain Diode
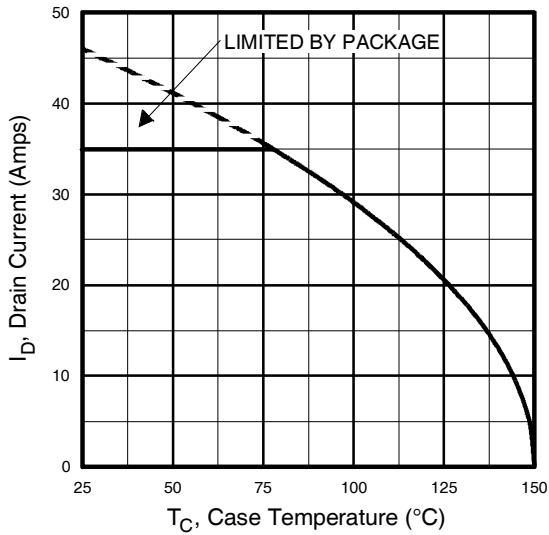Forward Voltage

Fig 8. Maximum Safe Operating Area

4

Fig 9. Maximum Drain Current Vs. Case Temperature
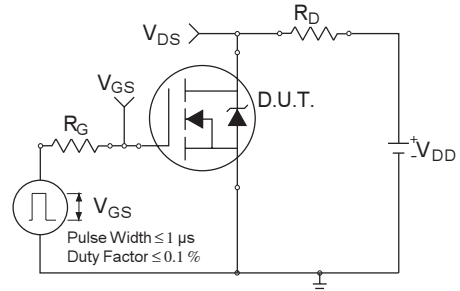
Fig 10a. Switching Time Test Circuit

Pulse Width ≤ 1 μs
Duty Factor ≤ 0.1 %
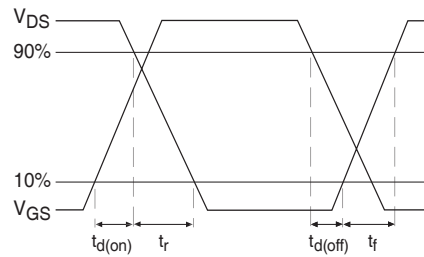
Fig 10b. Switching Time Waveforms

Notes:
1. Duty factor D = t_1 / t_2

2. Peak $T_J = P_{DM} \times Z_{thJC} + T_C$

SINGLE PULSE
(THERMAL RESPONSE)
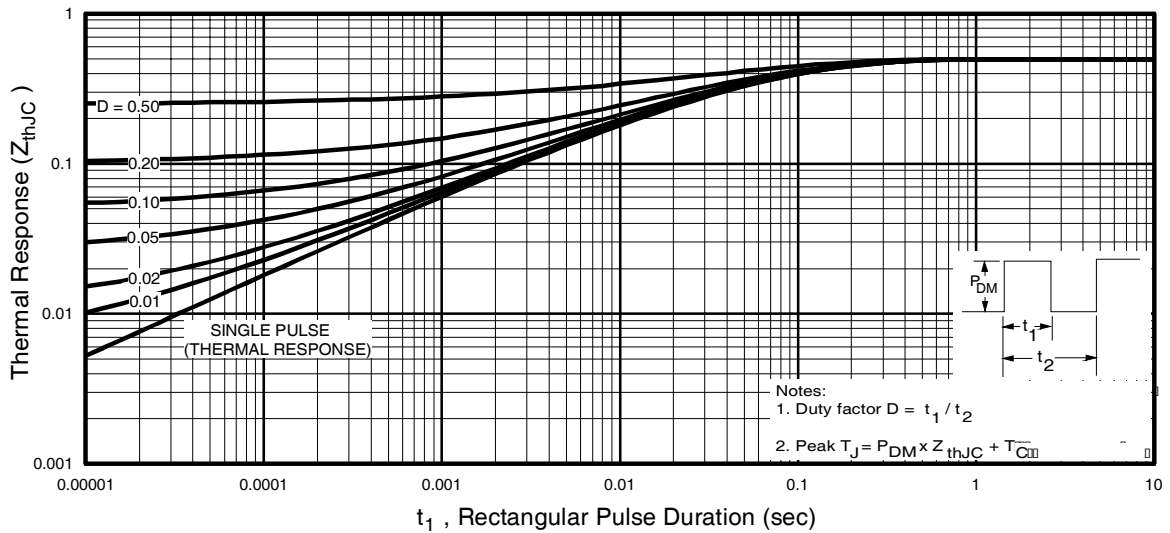
Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case
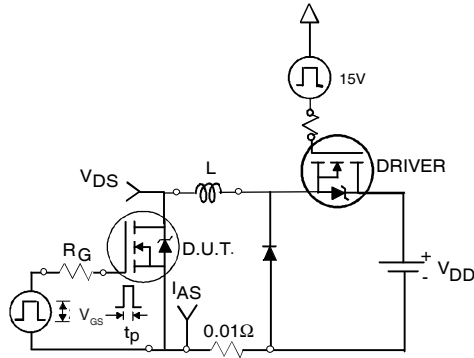
Fig 12a. Unclamped Inductive Test Circuit

Fig 12b. Unclamped Inductive Waveforms

Fig 12c. Maximum Avalanche Energy
Vs. Drain Current
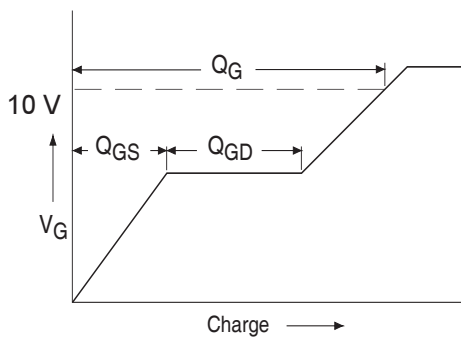
Fig 13a. Basic Gate Charge Waveform

Fig 13b. Gate Charge Test Circuit

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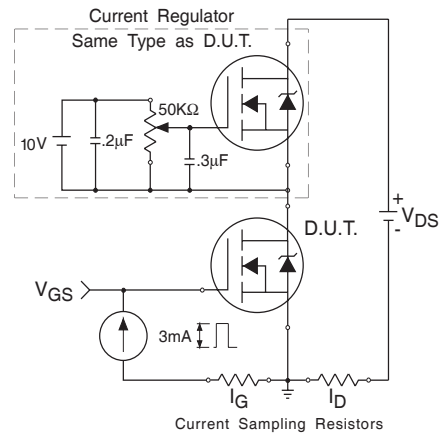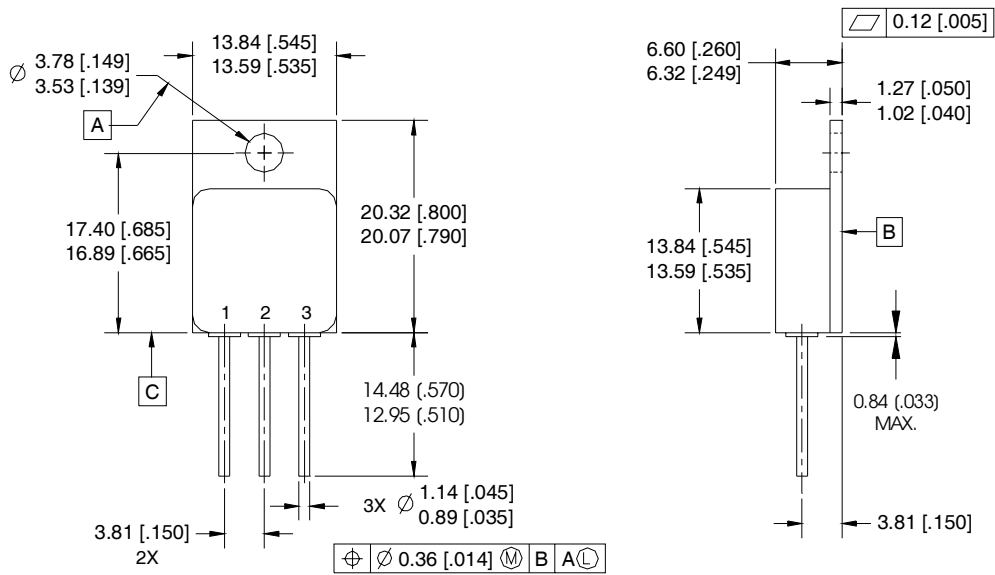
Footnotes:

① Repetitive Rating; Pulse width limited by maximum junction temperature.

② V_{DD} = 50V, starting T_J = 25°C, L= 1.3mH
Peak I_L = 35A, V_{GS} = 10V

③ I_{SD} ≤ 35A, di/dt ≤ 130A/μs,
V_{DD} ≤ 200V, T_J ≤ 150°C

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

Case Outline and Dimensions — TO-254AA

NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. CONTROLLING DIMENSION: INCH.
4. CONFORMS TO JEDEC OUTLINE TO-254AA.

PIN ASSIGNMENTS
1 = DRAIN
2 = SOURCE
3 = GATE

CAUTION
BERYLLIA WARNING PER MIL-PRF-19500
Package containing beryllia shall not be ground, sandblasted, machined, or have other operations performed on them which will produce beryllia or beryllium dust. Furthermore, beryllium oxide packages shall not be placed in acids that will produce fumes containing beryllium.

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