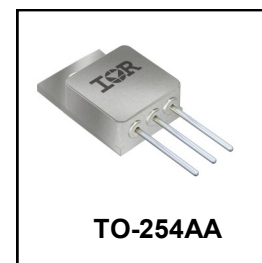


POWER MOSFET THRU-HOLE (TO-254AA)

150V, N-CHANNEL HEXFET[®] MOSFET TECHNOLOGY

Product Summary

Part Number	BV _{DSS}	RDS(on)	I _D
IRF5M3415	150V	0.049Ω	35A



Description

Fifth Generation HEXFET[®] power MOSFET technology is the key to IR HiRel utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon unit area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET[®] power MOSFETs are well known for, provides the designer with an extremely efficient device for use in a wide variety of applications.

These devices are well-suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high-energy pulse circuits.

Features

- Low RDS(on)
- Avalanche Energy Ratings
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Hermetically Sealed
- Light Weight

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I _{D1} @ V _{GS} = 10V, T _C = 25°C	Continuous Drain Current	35	A
I _{D2} @ V _{GS} = 10V, T _C = 100°C	Continuous Drain Current	22	
I _{DM} @ T _C = 25°C	Pulsed Drain Current ①	140	
P _D @ T _C = 25°C	Maximum Power Dissipation	125	W
	Linear Derating Factor	1.0	W/°C
V _{GS}	Gate-to-Source Voltage	± 20	V
E _{AS}	Single Pulse Avalanche Energy ②	290	mJ
I _{AR}	Avalanche Current ①	22	A
E _{AR}	Repetitive Avalanche Energy ①	12.5	mJ
dv/dt	Peak Diode Recovery ③	2.0	V/ns
T _J T _{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Lead Temperature	300 (0.063in./1.6mm from case for 10s)	
	Weight	9.3 (Typical)	

For footnotes refer to the page 2.

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DSS}	Drain-to-Source Breakdown Voltage	150	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.18	—	V/°C	Reference to 25°C, I _D = 1.0mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	—	0.049	Ω	V _{GS} = 10V, I _{D2} = 22A ④
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 250μA
G _{fs}	Forward Transconductance	19	—	—	S	V _{DS} = 15V, I _{D2} = 22A ④
I _{DSS}	Zero Gate Voltage Drain Current	—	—	25	μA	V _{DS} = 150V, V _{GS} = 0V
		—	—	250		V _{DS} = 120V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Leakage Forward	—	—	100	nA	V _{GS} = 20V
	Gate-to-Source Leakage Reverse	—	—	-100		V _{GS} = -20V
Q _G	Total Gate Charge	—	—	200	nC	I _{D2} = 22A
Q _{GS}	Gate-to-Source Charge	—	—	17		V _{DS} = 120V
Q _{GD}	Gate-to-Drain ('Miller') Charge	—	—	98		V _{GS} = 10V
t _{d(on)}	Turn-On Delay Time	—	—	25	ns	V _{DD} = 75V
t _r	Rise Time	—	—	80		I _{D2} = 22A
t _{d(off)}	Turn-Off Delay Time	—	—	75		R _G = 2.5Ω
t _f	Fall Time	—	—	70		V _{GS} = 10V
L _s + L _D	Total Inductance	—	6.8	—	nH	Measured from Drain lead (6mm / 0.25 in from package) to Source lead (6mm / 0.25 in from package)
C _{iss}	Input Capacitance	—	2730	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	570	—		V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	285	—		f = 1.0MHz

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I _S	Continuous Source Current (Body Diode)	—	—	35	A	
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	140		
V _{SD}	Diode Forward Voltage	—	—	1.3	V	T _J = 25°C, I _S = 22A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	—	390	ns	T _J = 25°C, I _F = 22A, V _{DD} ≤ 25V
Q _{rr}	Reverse Recovery Charge	—	—	3.3	μC	di/dt = 100A/μs ④
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)				

Thermal Resistance

Symbol	Parameter	Min.	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	—	1.0	°C/W

Footnotes:

- ① Repetitive Rating; Pulse width limited by maximum junction temperature.
- ② V_{DD} = 25V, starting T_J = 25°C, L = 1.2mH, Peak I_L = 22A, V_{GS} = 10V, R_G = 25Ω.
- ③ I_{SD} ≤ 22A, di/dt ≤ 70A/μs, V_{DD} ≤ 150V, T_J ≤ 150°C.
- ④ Pulse width ≤ 300 μs; Duty Cycle ≤ 2%

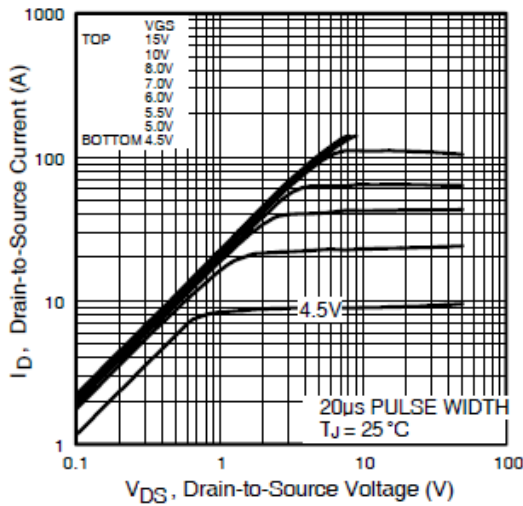


Fig 1. Typical Output Characteristics

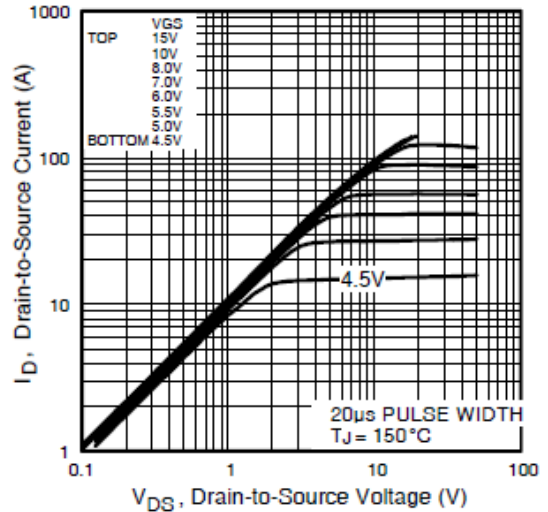


Fig 2. Typical Output Characteristics

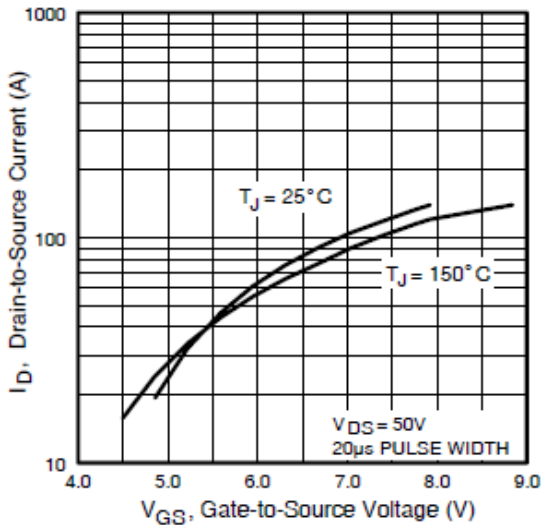


Fig 3. Typical Transfer Characteristics

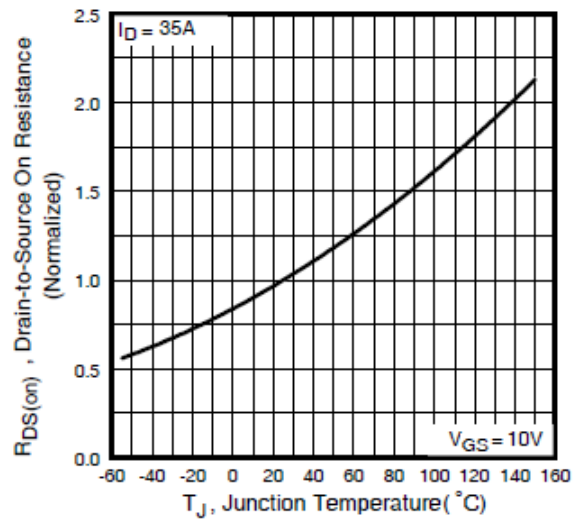


Fig 4. Normalized On-Resistance Vs. Temperature

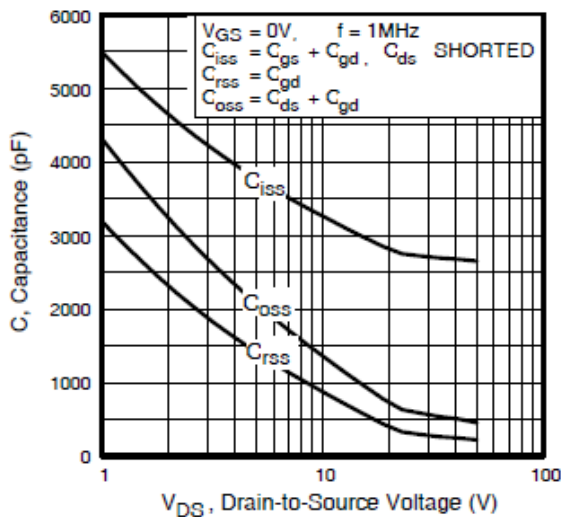


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

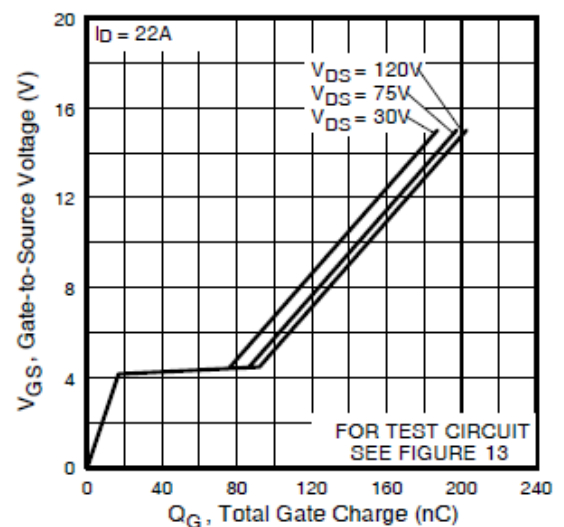


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

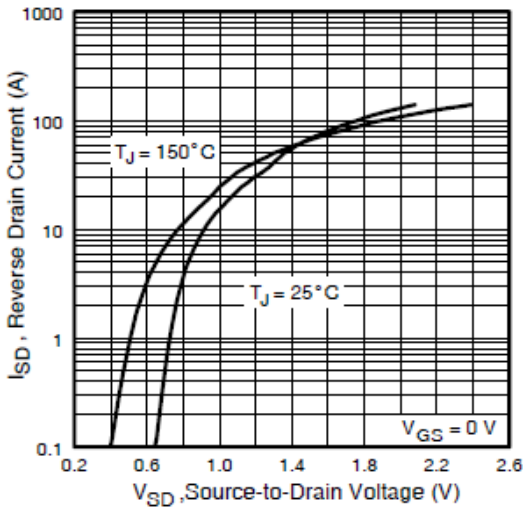


Fig 7. Typical Source-Drain Diode Forward Voltage

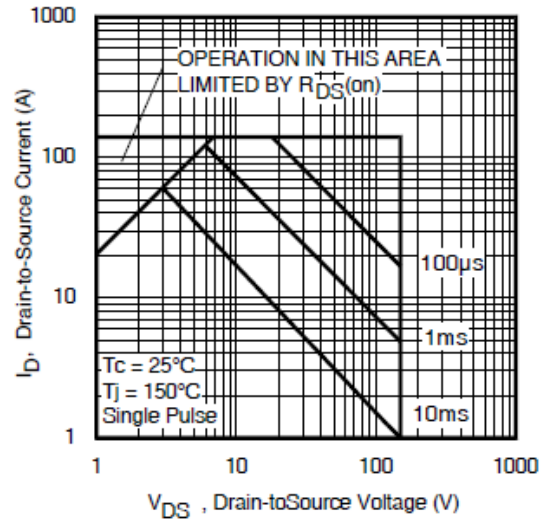


Fig 8. Maximum Safe Operating Area

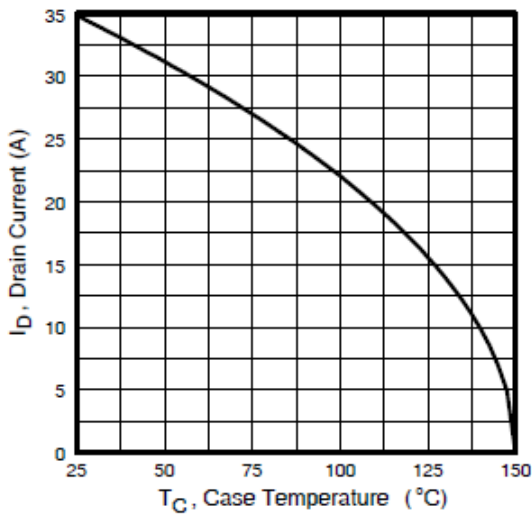


Fig 9. Maximum Drain Current Vs. Case Temperature

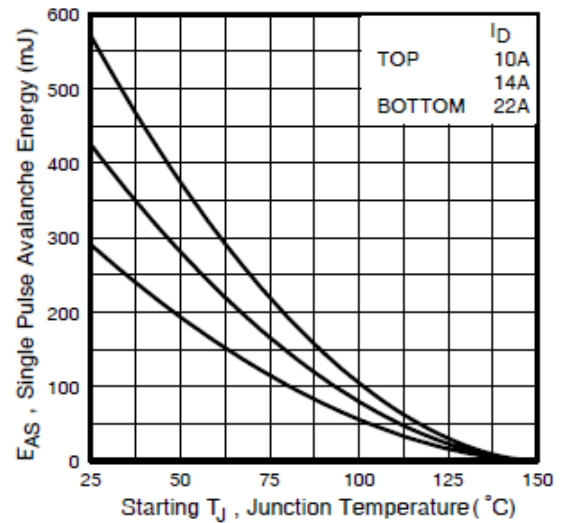


Fig 10. Maximum Avalanche Energy Vs. Drain Current

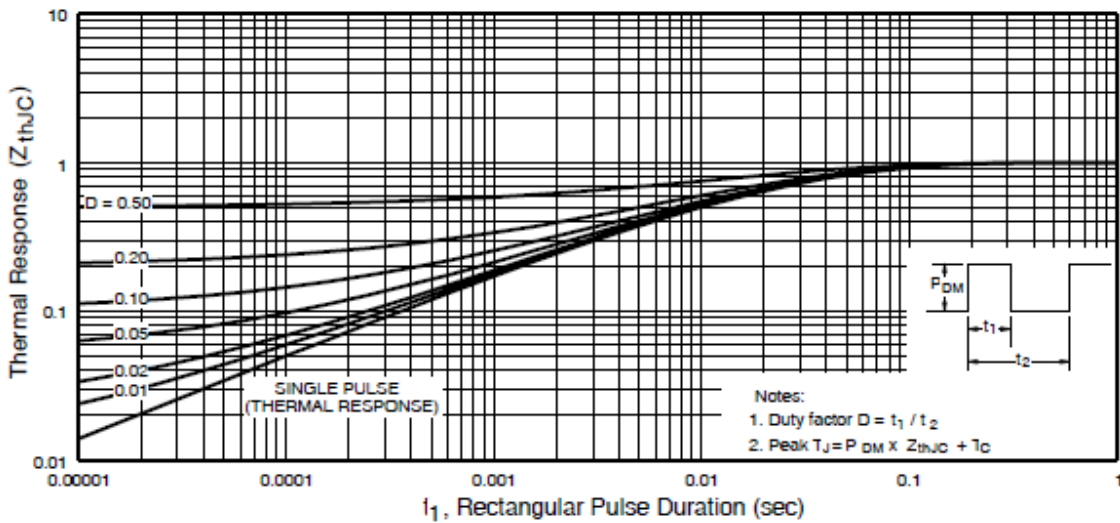


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

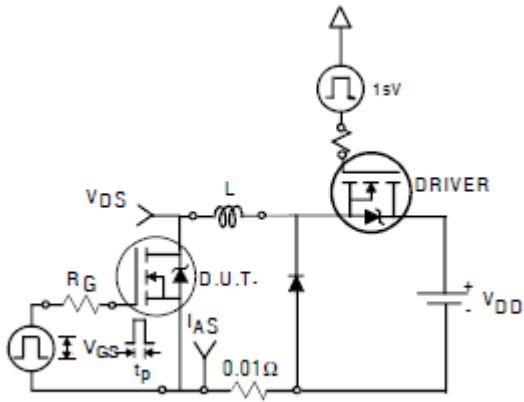


Fig 12a. Unclamped Inductive Test Circuit

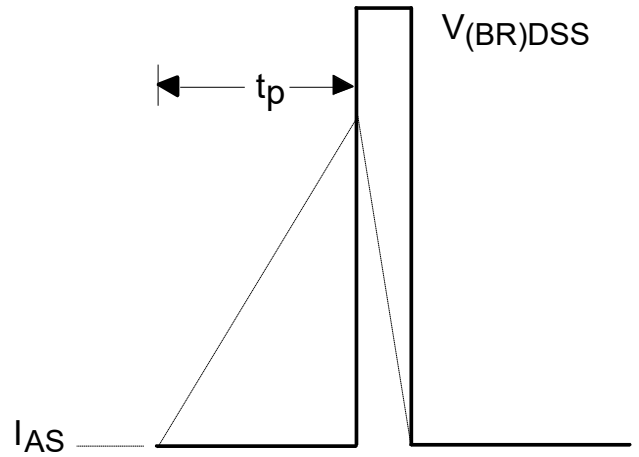


Fig 12b. Unclamped Inductive Waveforms

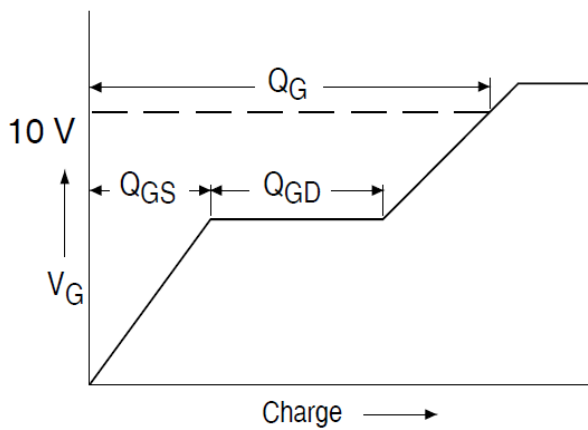


Fig 13a. Gate Charge Waveform

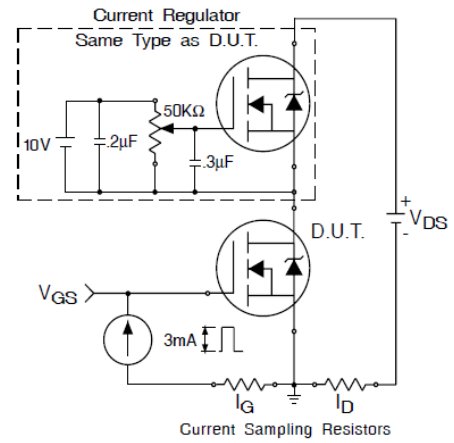


Fig 13b. Gate Charge Test Circuit

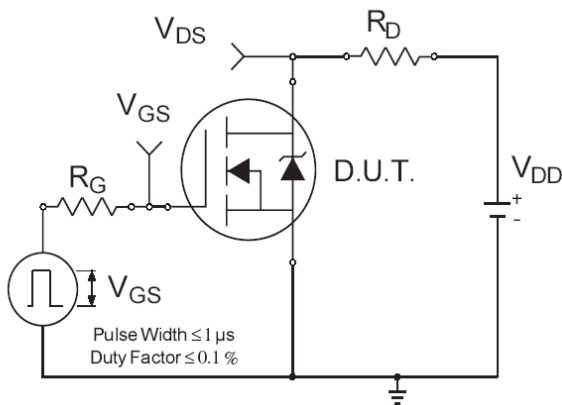


Fig 14a. Switching Time Test Circuit

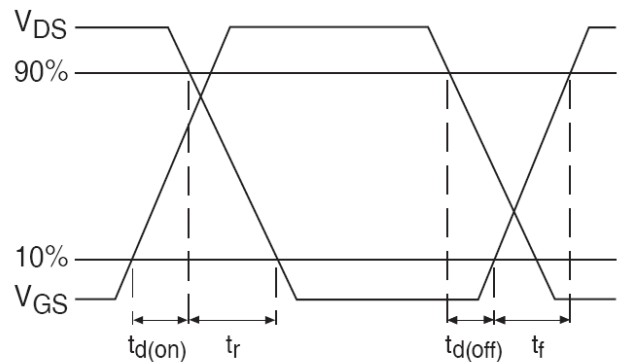
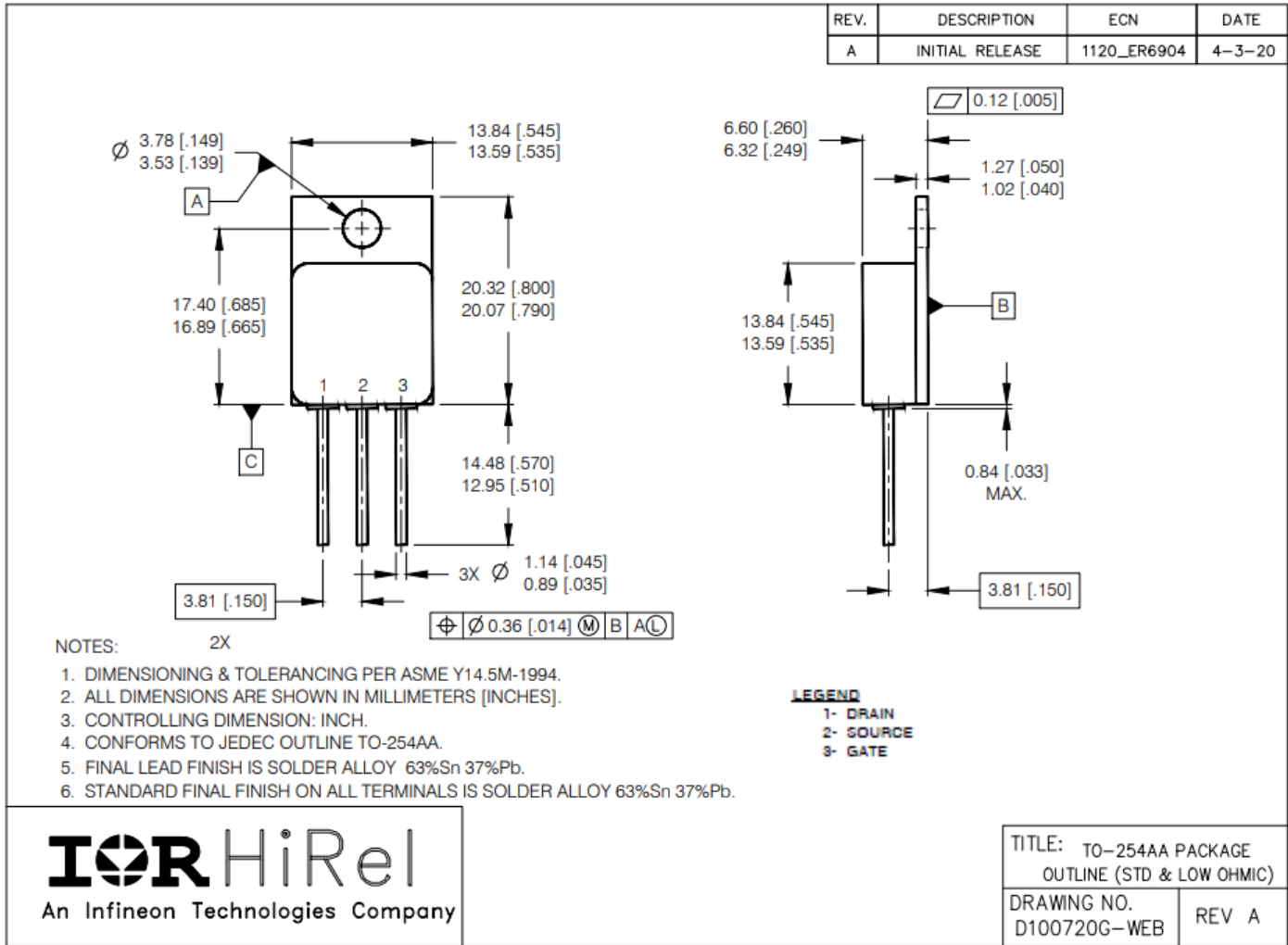


Fig 14b. Switching Time Waveforms

Note: For the most updated package outline, please see the website: TO-254AA

Case Outline and Dimensions - Low-Ohmic TO-254AA



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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