IR HiRel
An Infineon Technologies Company

IRFM340
JANTX2N7221
JANTXV2N7221

POWER MOSFET
THRU-HOLE (TO-254AA)

400V, N-CHANNEL
REF: MIL-PRF-19500/596
HEXFET MOSFET TECHNOLOGY

Product Summary

Part Number	$R_{DS(on)}$	I_D
IRFM340	0.55Ω	10A

TO-254AA

Description

HEXFET MOSFET technology is the key to IR HiRel advanced line of power MOSFET transistors. The efficient geometry design achieves very low on-state resistance combined with high trans conductance. 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 heat sink. This improves thermal efficiency and reduces drain capacitance.

Features

- Simple Drive Requirements
- Hermetically Sealed
- Electrically Isolated
- Dynamic dv/dt Rating
- Light Weight
- ESD Rating: Class 2 per MIL-STD-750, Method 1020

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{D1} @ V_{GS} = 10V, T_C = 25°C	Continuous Drain Current	10	A
I_{D2} @ V_{GS} = 10V, T_C = 100°C	Continuous Drain Current	6.0	
I_{DM} @T_C = 25°C	Pulsed Drain Current ①	40	
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	650	mJ
I_{AR}	Avalanche Current ①	10	A
E_{AR}	Repetitive Avalanche Energy ①	12.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Lead Temperature	300 (0.063 in. /1.6 mm from case for 10s)	
	Weight	9.3 (Typical)	g

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	400	——	——	V	V_{GS} = 0V, I_D = 1.0mA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.49	——	V/°C	Reference to 25°C, I_D = 1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance	——	——	0.55	Ω	V_{GS} = 10V, I_{D2} = 6.0A ④
		——	——	0.70		V_{GS} = 10V, I_{D1} = 10A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	——	4.0	V	V_{DS} = V_{GS}, I_D = 250μA
Gfs	Forward Transconductance	4.9	——	——	S	V_{DS} = 15V, I_{D2} = 6.0A ④
I_{DSS}	Zero Gate Voltage Drain Current	——	——	25	μA	V_{DS} = 320V, V_{GS} = 0V
		——	——	250		V_{DS} = 320V, 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	——	——	65	nC	I_{D1} = 10A
Q_{GS}	Gate-to-Source Charge	——	——	10		V_{DS} = 200V
Q_{GD}	Gate-to-Drain ('Miller') Charge	——	——	40.5		V_{GS} = 10V
$t_{d(on)}$	Turn-On Delay Time	——	——	25	ns	V_{DD} = 200V
tr	Rise Time	——	——	92		I_{D1} = 10A
$t_{d(off)}$	Turn-Off Delay Time	——	——	79		R_G = 2.35Ω
t_f	Fall Time	——	——	58		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) with Source wire internally bonded from Source pin to Drain pad
C_{iss}	Input Capacitance	——	1400	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	350	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	230	——		f = 1.0MHz

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	——	——	10	A	
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	40		
V_{SD}	Diode Forward Voltage	——	——	1.5	V	T_J = 25°C, I_S = 10A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	——	600	ns	T_J = 25°C, I_F = 10A, V_{DD} ≤ 50V
Q_{rr}	Reverse Recovery Charge	——	——	5.6	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
$R_{\theta JC}$	Junction-to-Case	——	——	1.0	°C/W
$R_{\theta CS}$	Case -to-Sink	——	0.21	——	
$R_{\theta JA}$	Junction-to-Ambient (Typical socket mount)	——	——	48	

Footnotes:

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

② V_{DD} = 50V, starting T_J = 25°C, L = 13mH, Peak I_L = 10A, V_{GS} = 10V

③ I_{SD} ≤ 10A, di/dt ≤ 100A/μs, V_{DD} ≤ 400V, T_J ≤ 150°C

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

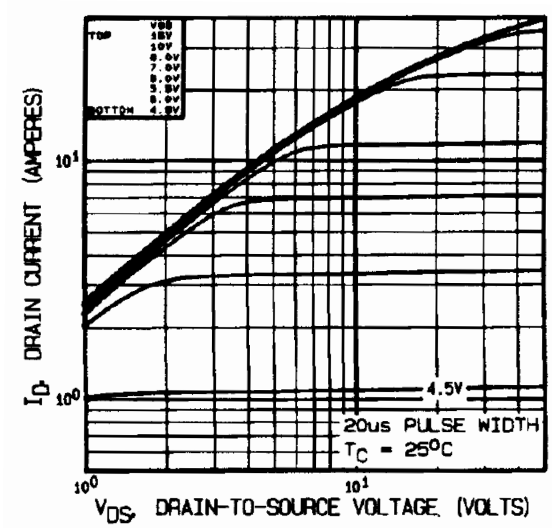


Fig 1. Typical Output Characteristics

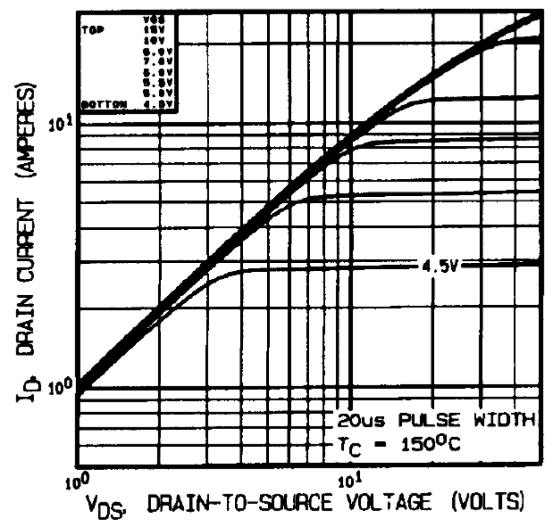


Fig 2. Typical Output Characteristics

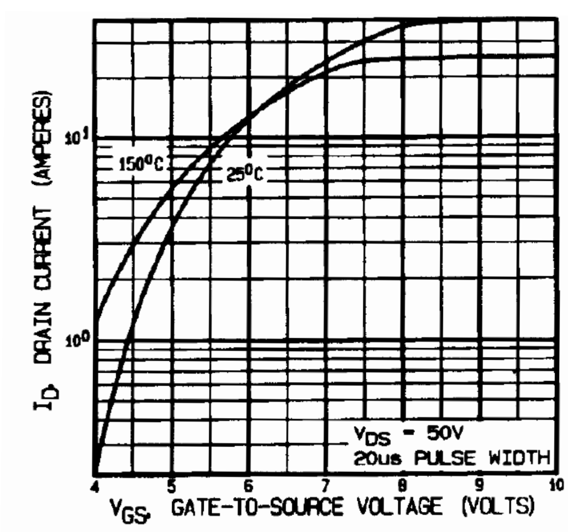


Fig 3. Typical Transfer Characteristics

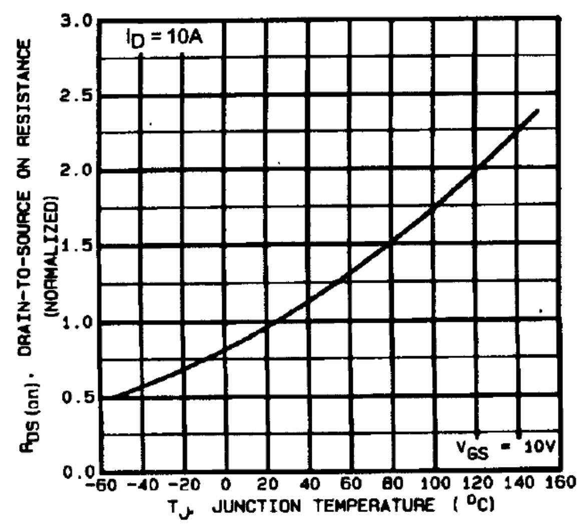


Fig 4. Normalized On-Resistance Vs. Temperature

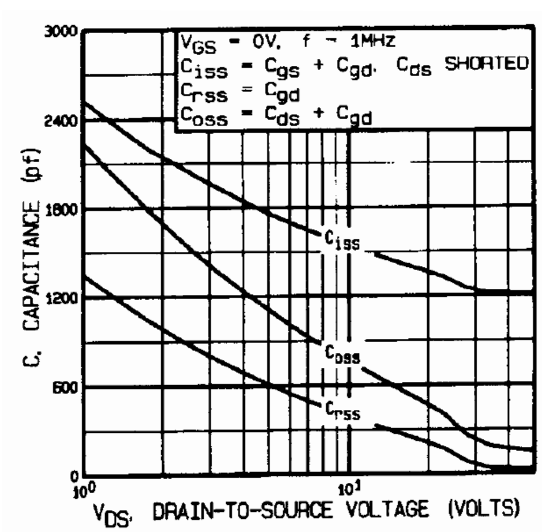


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

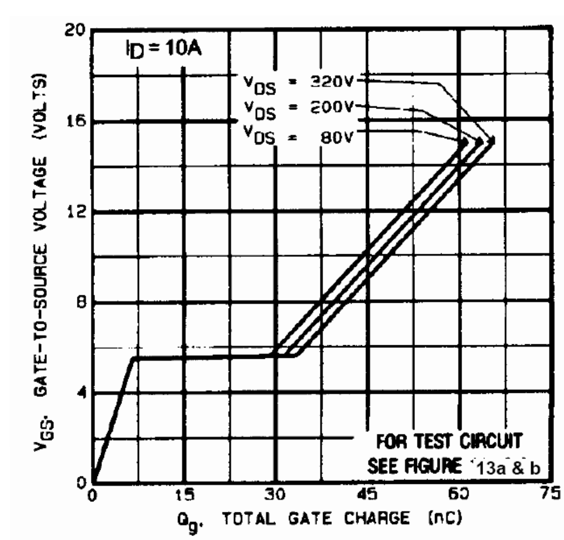


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

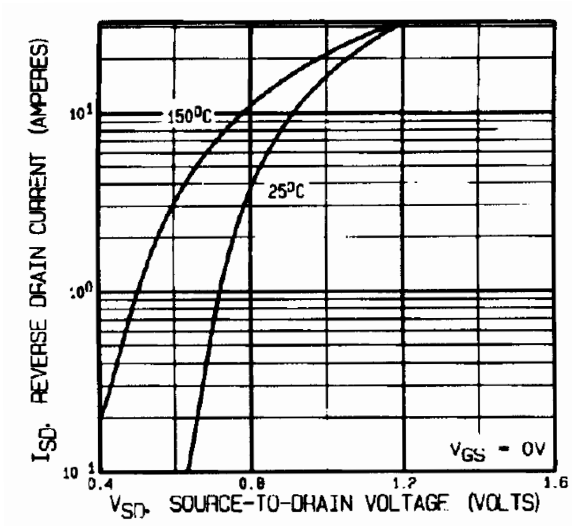


Fig 7. Typical Source-Drain Diode Forward Voltage

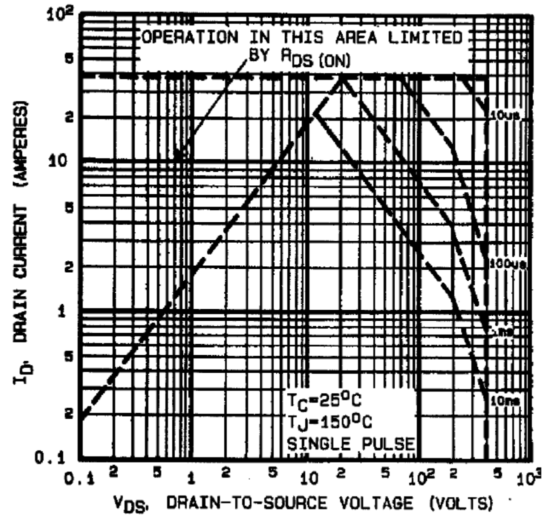


Fig 8. Maximum Safe Operating Area

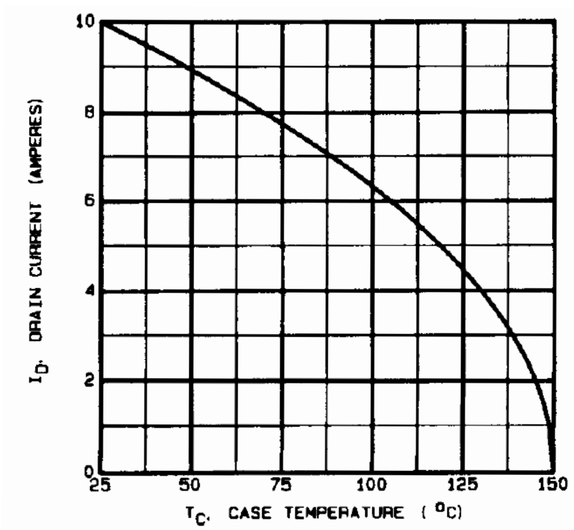


Fig 9. Maximum Drain Current Vs. Case Temperature

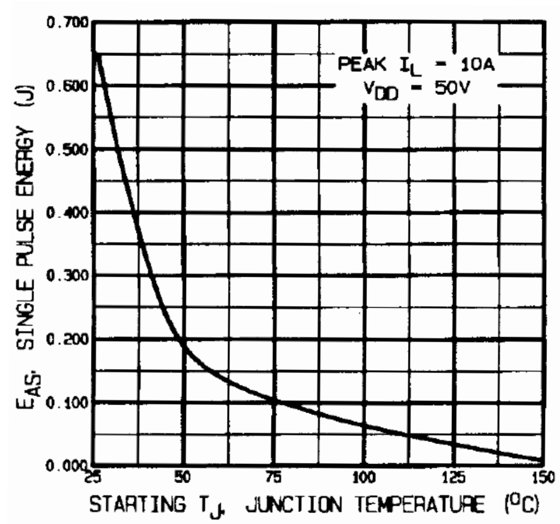


Fig 10. Maximum Avalanche Energy Vs. Drain Current

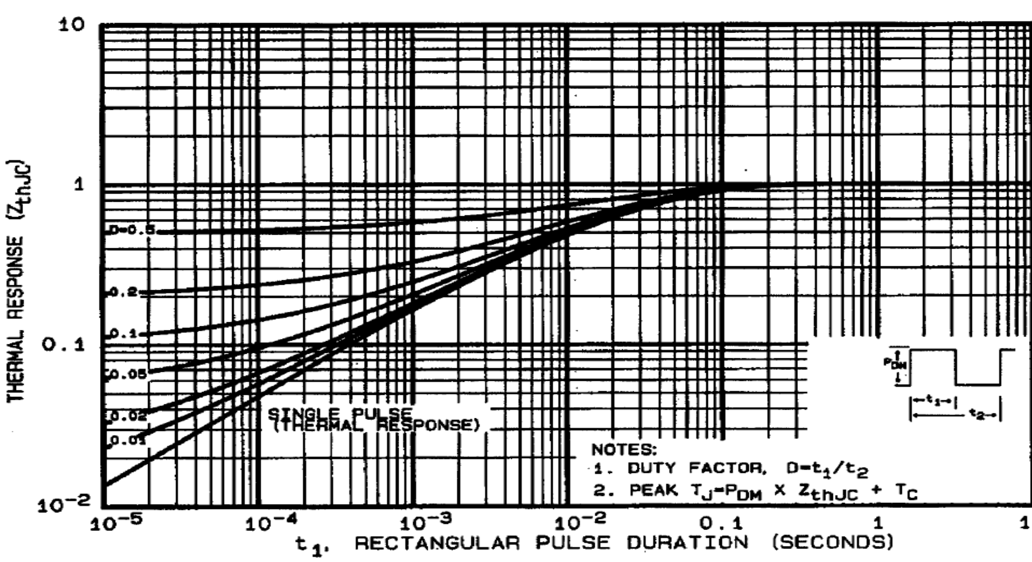


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

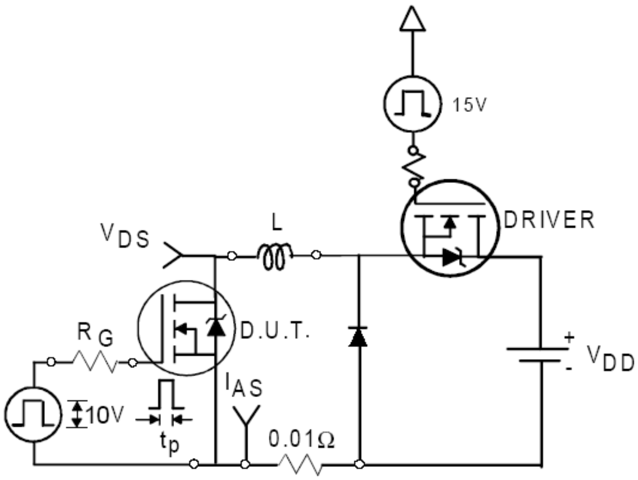


Fig 12a. Unclamped Inductive Test Circuit

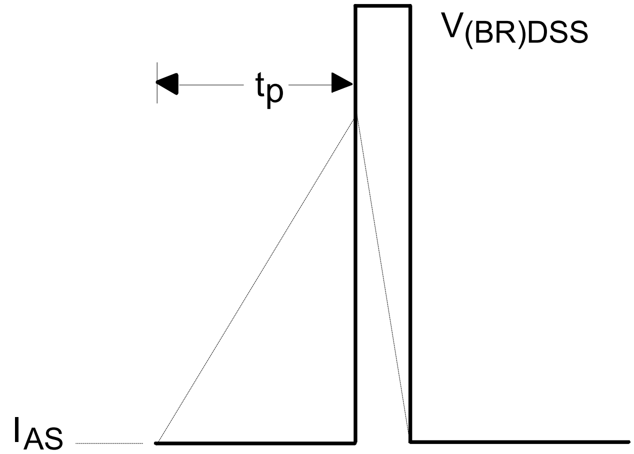


Fig 12b. Unclamped Inductive Waveforms

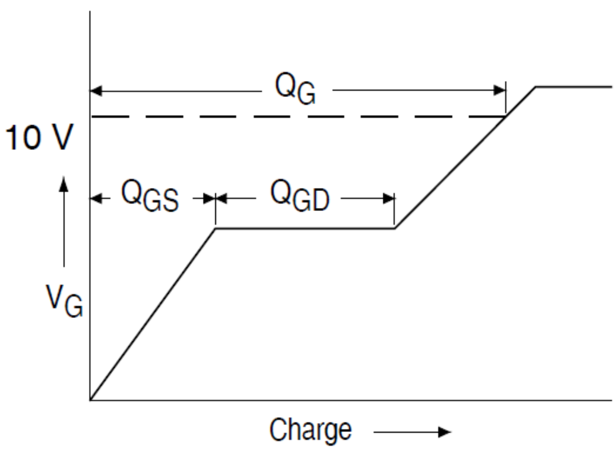


Fig 13a. Basic Gate Charge Waveform

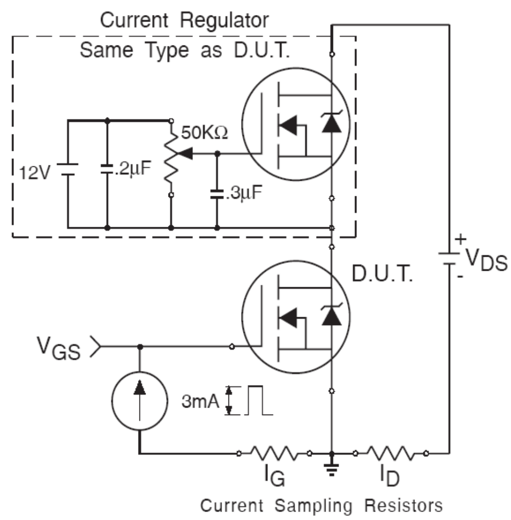


Fig 13b. Gate Charge Test Circuit

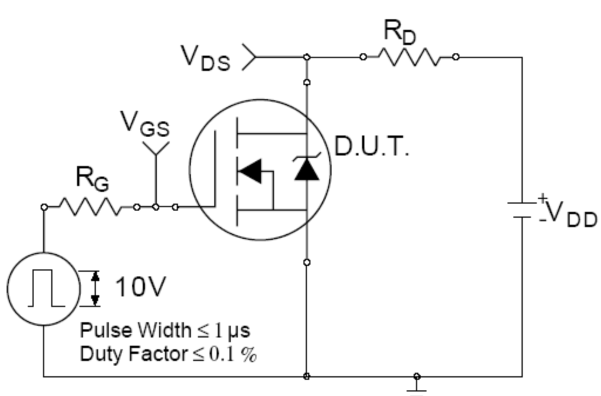


Fig 14a. Switching Time Test Circuit

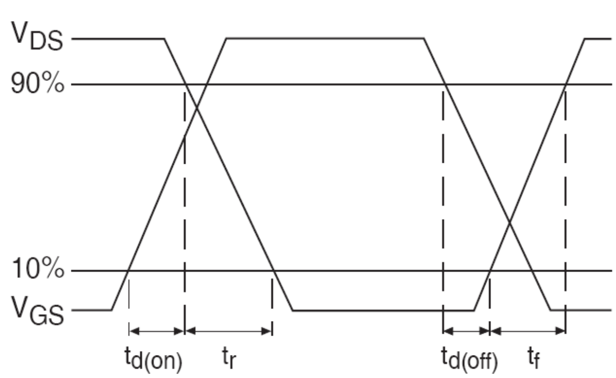
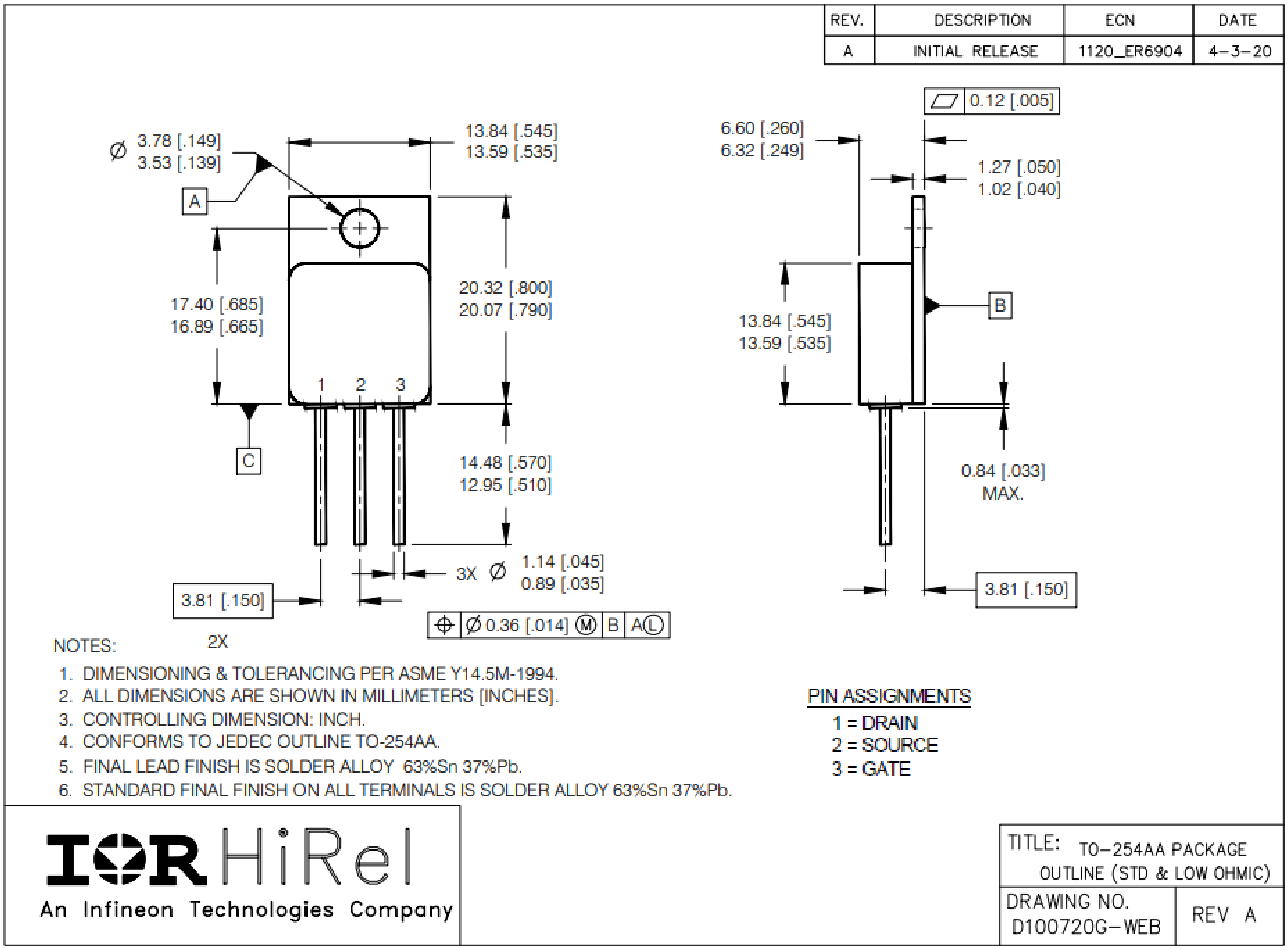


Fig 14b. Switching Time Waveforms

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.

An Infineon Technologies Company
www.infineon.com/irhirel

Infineon Technologies Service Center: USA Tel: +1 (866) 951-9519 and International Tel: +49 89 234 65555
Leominster, Massachusetts 01453, USA Tel: +1 (978) 534-5776
San Jose, California 95134, USA Tel: +1 (408) 434-5000

IMPORTANT NOTICE

The information given in this document shall be in no event regarded as guarantee of conditions or characteristic. The data contained herein is a characterization of the component based on internal standards and is intended to demonstrate and provide guidance for typical part performance. It will require further evaluation, qualification and analysis to determine suitability in the application environment to confirm compliance to your system requirements.

With respect to any example hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind including without limitation warranties on non- infringement of intellectual property rights and any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's product and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of any customer's technical departments to evaluate the suitability of the product for the intended applications and the completeness of the product information given in this document with respect to applications.

For further information on the product, technology, delivery terms and conditions and prices, please contact your local sales representative or go to (www.infineon.com/irhirel).

WARNING

Due to technical requirements products may contain dangerous substances. For information on the types in question, please contact your nearest Infineon Technologies office.