

**POWER MOSFET
THRU-HOLE (TO-254AA)**
**IRFM140
JANTX2N7218
JANTXV2N7218**
**100V, N-CHANNEL
REF: MIL-PRF-19500/596**
HEXFET® MOSFET TECHNOLOGY
Product Summary

Part Number	R _{DS(on)}	I _D
IRFM140	0.077Ω	28A


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 transconductance. HEXFET transistors also feature all of the well-established advantages of MOSFETs, such as voltage control, very fast switching 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.

Features

- Simple Drive Requirements
- Hermetically Sealed
- 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	28	A
I _{D2} @ V _{GS} = 10V, T _C = 100°C	Continuous Drain Current	20	
I _{DM} @ T _C = 25°C	Pulsed Drain Current ①	112	
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	250	mJ
I _{AR}	Avalanche Current ①	28	A
E _{AR}	Repetitive Avalanche Energy ①	12.5	mJ
dv/dt	Peak Diode Recovery ③	5.5	V/ns
T _J T _{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Lead Temperature	300 (for 5seconds)	
	Weight	9.3 (Typical)	g

For footnotes refer to the page 2.

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	100	—	—	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = 1.0\text{mA}$
$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.13	—	V/ $^\circ\text{C}$	Reference to 25°C , $\text{I}_D = 1.0\text{mA}$
$\text{R}_{\text{DS(on)}}$	Static Drain-to-Source On-Resistance	—	—	0.077	Ω	$\text{V}_{\text{GS}} = 10\text{V}$, $\text{I}_{\text{D2}} = 20\text{A}$ ④
		—	—	0.125		$\text{V}_{\text{GS}} = 10\text{V}$, $\text{I}_{\text{D1}} = 28\text{A}$ ④
$\text{V}_{\text{GS(th)}}$	Gate Threshold Voltage	2.0	—	4.0	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = 250\mu\text{A}$
G_{fs}	Forward Transconductance	9.1	—	—	S	$\text{V}_{\text{DS}} = 15\text{V}$, $\text{I}_{\text{D2}} = 20\text{A}$ ④
I_{DSS}	Zero Gate Voltage Drain Current	—	—	25	μA	$\text{V}_{\text{DS}} = 80\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
		—	—	250		$\text{V}_{\text{DS}} = 80\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Forward	—	—	100	nA	$\text{V}_{\text{GS}} = 20\text{V}$
	Gate-to-Source Leakage Reverse	—	—	-100		$\text{V}_{\text{GS}} = -20\text{V}$
Q_{G}	Total Gate Charge	—	—	59	nC	$\text{I}_{\text{D1}} = 28\text{A}$
Q_{GS}	Gate-to-Source Charge	—	—	16		$\text{V}_{\text{DS}} = 50\text{V}$
Q_{GD}	Gate-to-Drain ('Miller') Charge	—	—	30.7		$\text{V}_{\text{GS}} = 10\text{V}$
$t_{\text{d(on)}}$	Turn-On Delay Time	—	—	21	ns	$\text{V}_{\text{DD}} = 50\text{V}$
t_{r}	Rise Time	—	—	105		$\text{I}_{\text{D1}} = 20\text{A}$
$t_{\text{d(off)}}$	Turn-Off Delay Time	—	—	64		$\text{R}_G = 9.1\Omega$
t_f	Fall Time	—	—	65		$\text{V}_{\text{GS}} = 10\text{V}$
$\text{L}_{\text{s}} + \text{L}_{\text{D}}$	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	—	1600	—	pF	$\text{V}_{\text{GS}} = 0\text{V}$
C_{oss}	Output Capacitance	—	550	—		$\text{V}_{\text{DS}} = 25\text{V}$
C_{rss}	Reverse Transfer Capacitance	—	120	—		$f = 1.0\text{MHz}$

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_{s}	Continuous Source Current (Body Diode)	—	—	28	A	
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	112		
V_{SD}	Diode Forward Voltage	—	—	1.5	V	$T_J = 25^\circ\text{C}$, $\text{I}_{\text{s}} = 28\text{A}$, $\text{V}_{\text{GS}} = 0\text{V}$ ④
t_{rr}	Reverse Recovery Time	—	—	400	ns	$T_J = 25^\circ\text{C}$, $\text{I}_{\text{F}} = 28\text{A}$, $\text{V}_{\text{DD}} \leq 30\text{V}$
Q_{rr}	Reverse Recovery Charge	—	—	2.9	μC	$\text{di/dt} = 100\text{A}/\mu\text{s}$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $\text{L}_{\text{s}} + \text{L}_{\text{D}}$)				

Thermal Resistance

Symbol	Parameter	Min.	Typ.	Max.	Units
$\text{R}_{\theta\text{JC}}$	Junction-to-Case	—	—	1.0	$^\circ\text{C/W}$
$\text{R}_{\theta\text{CS}}$	Case-to-Sink	—	0.21	—	
$\text{R}_{\theta\text{JA}}$	Junction-to-Ambient (Typical socket mount)	—	—	48	

Footnotes:

- ① Repetitive Rating; Pulse width limited by maximum junction temperature.
- ② $\text{V}_{\text{DD}} = 25\text{V}$, starting $T_J = 25^\circ\text{C}$, $L = 0.64\text{mH}$, Peak $\text{I}_{\text{L}} = 28\text{A}$, $\text{V}_{\text{GS}} = 10\text{V}$.
- ③ $\text{I}_{\text{SD}} \leq 28\text{A}$, $\text{di/dt} \leq 170\text{A}/\mu\text{s}$, $\text{V}_{\text{DD}} \leq 100\text{V}$, $T_J \leq 150^\circ\text{C}$.
- ④ Pulse width $\leq 300\ \mu\text{s}$; Duty Cycle $\leq 2\%$

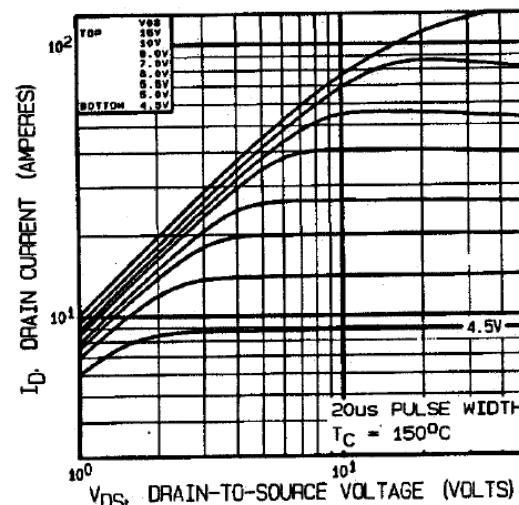
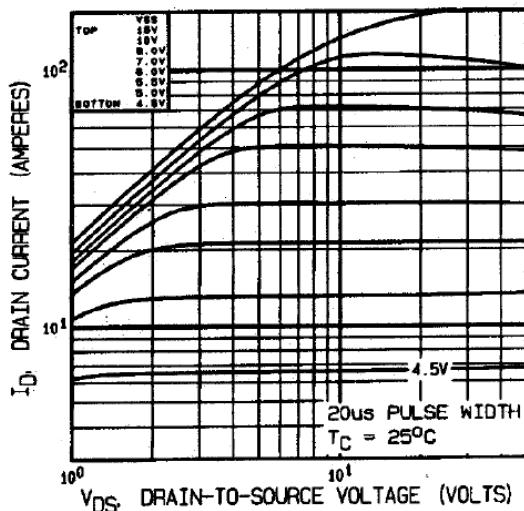


Fig 3. Typical Transfer Characteristics

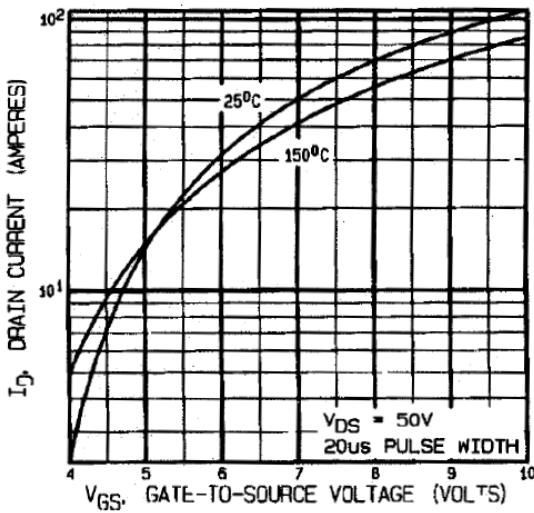


Fig 4. Normalized On-Resistance Vs. Temperature

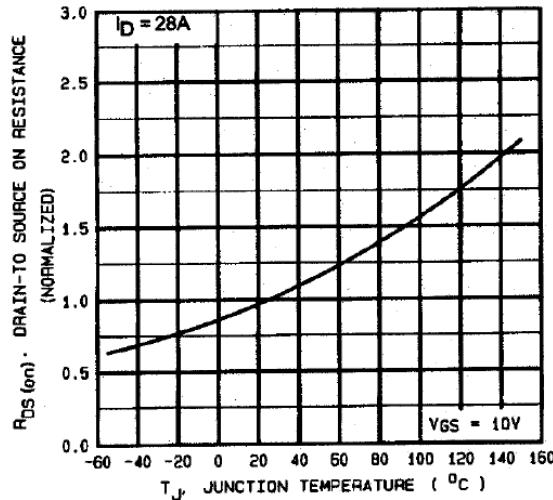


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

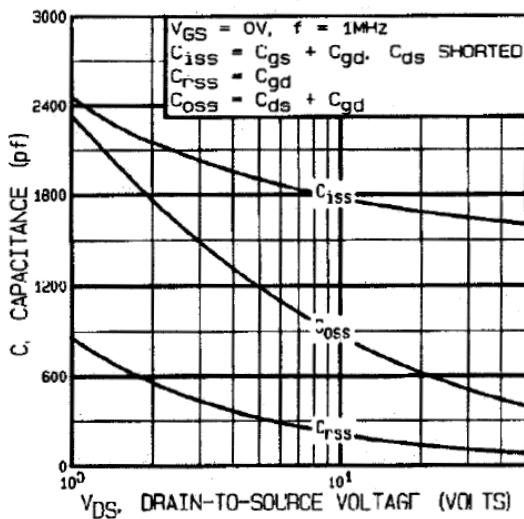
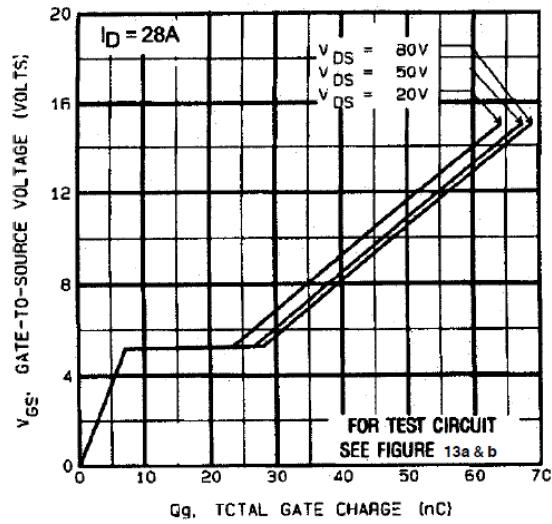


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage



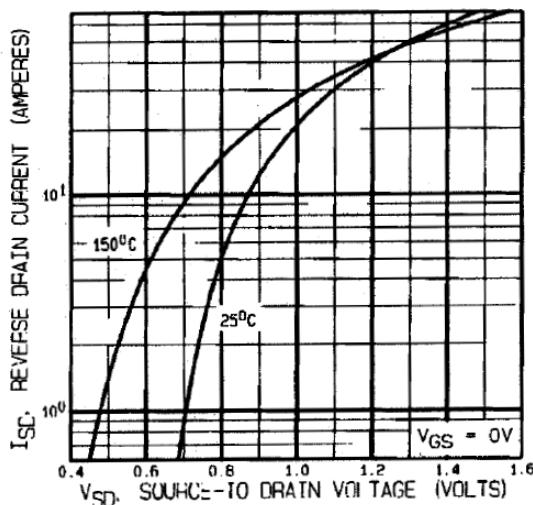


Fig 7. Typical Source-Drain Diode Forward Voltage

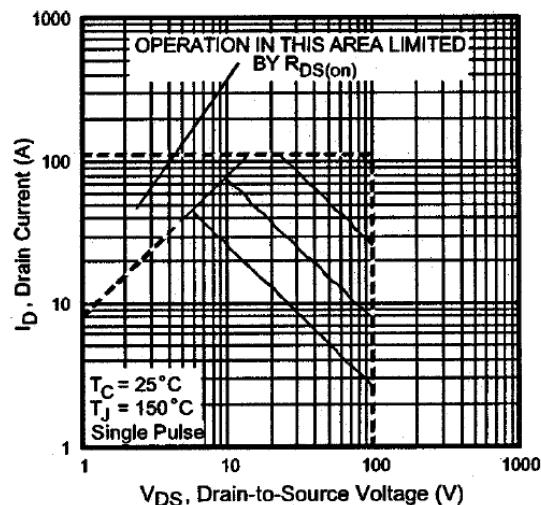


Fig 8. Maximum Safe Operating Area

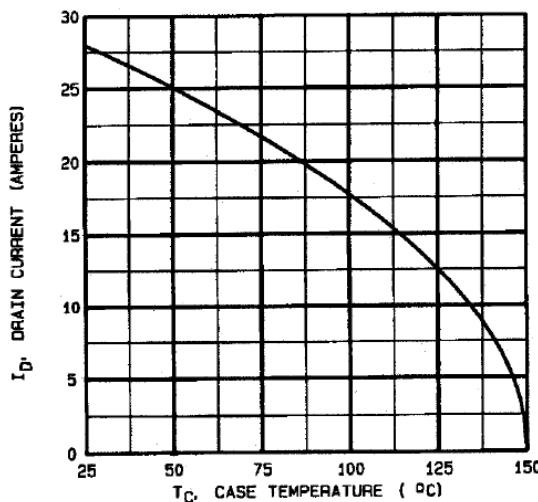


Fig 9. Maximum Drain Current Vs. Case Temperature

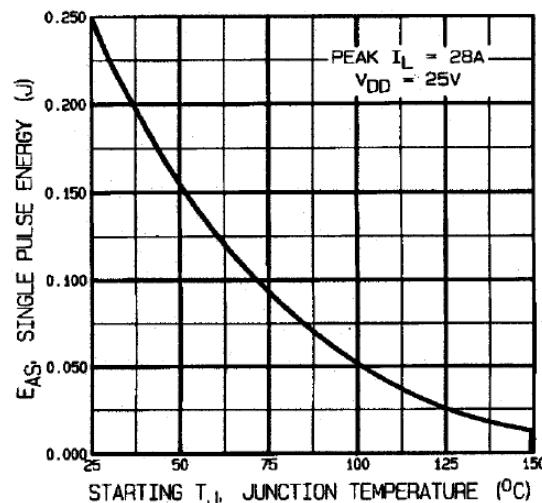


Fig 10. Maximum Avalanche Energy Vs. Drain Current

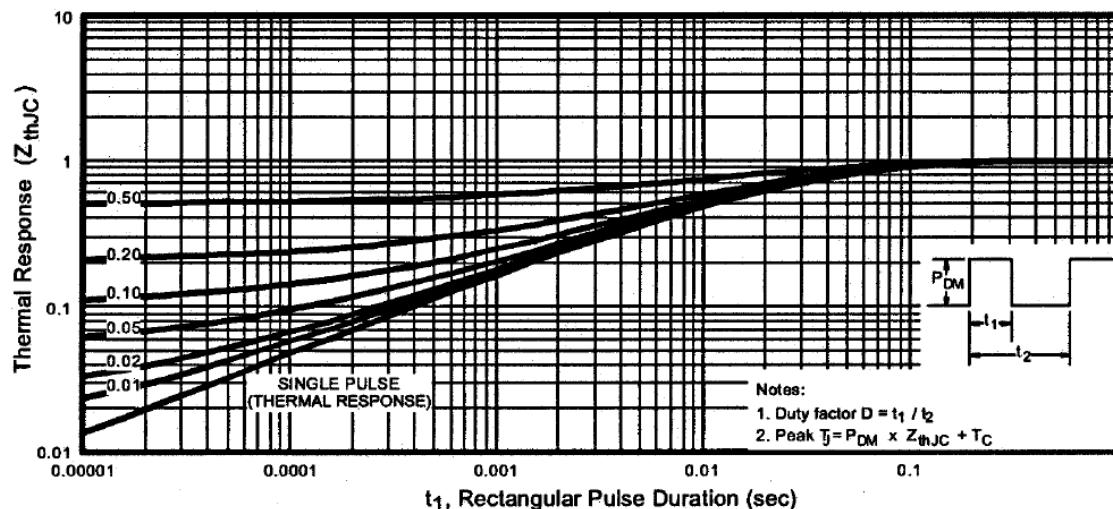


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

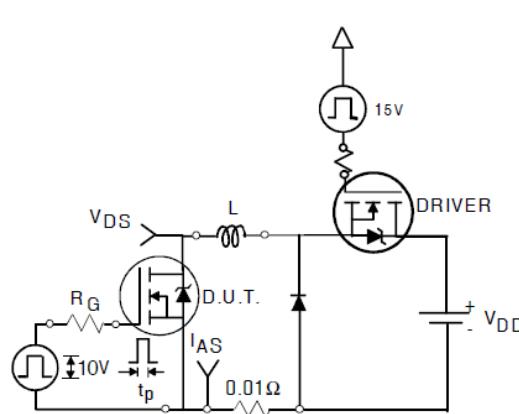


Fig 12a. Unclamped Inductive Test Circuit

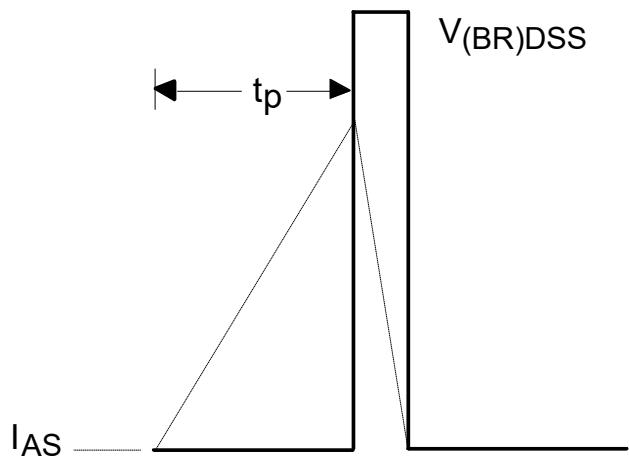


Fig 12b. Unclamped Inductive Waveforms

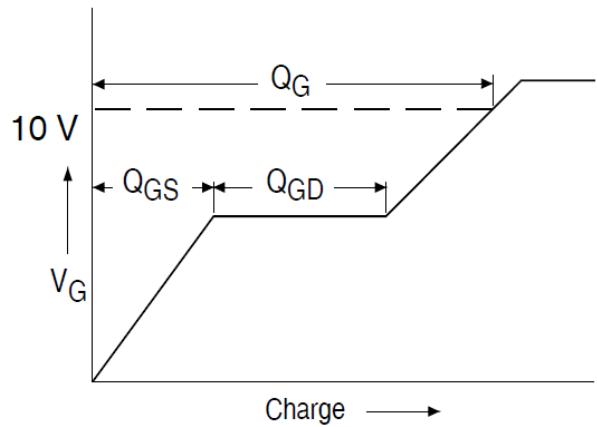


Fig 13a. Gate Charge Waveform

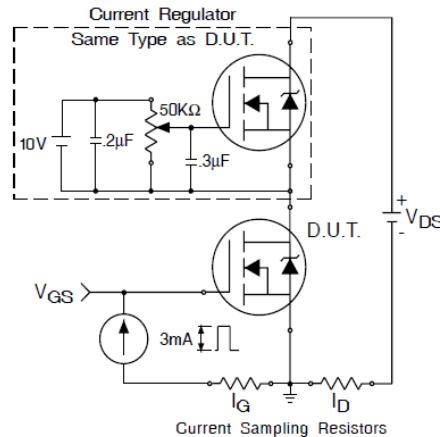


Fig 13b. Gate Charge Test Circuit

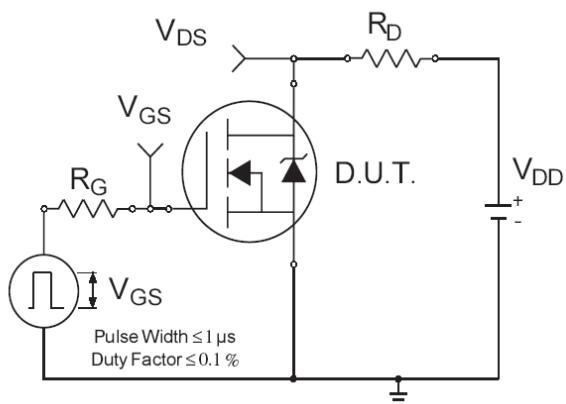


Fig 14a. Switching Time Test Circuit

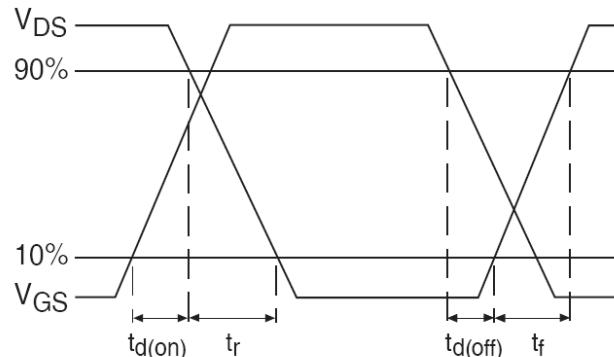
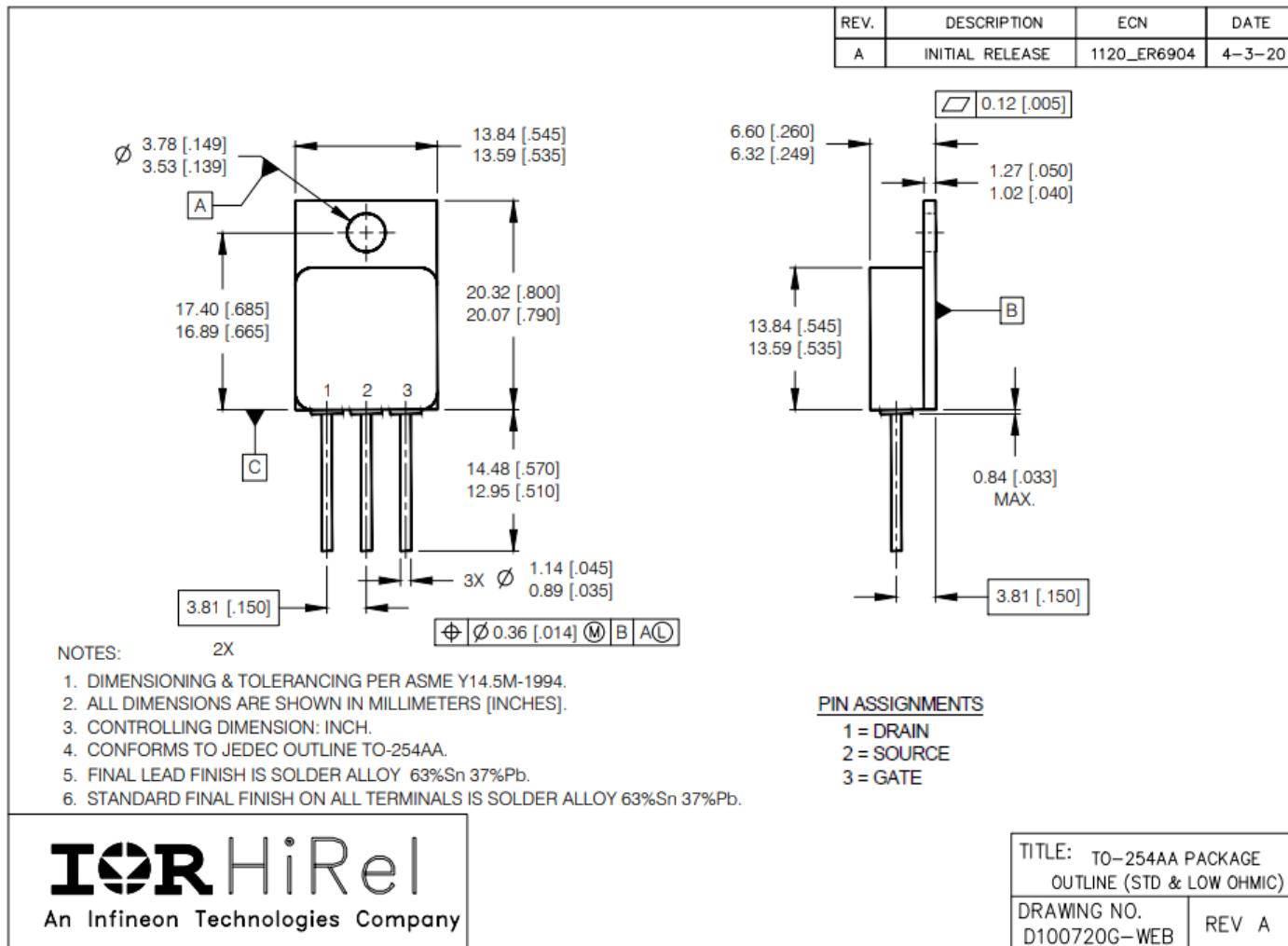


Fig 14b. Switching Time Waveforms

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.

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/hirel).

WARNING

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