PD-94287C

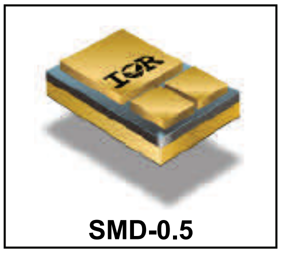
IRF5NJ3315

HEXFET® POWER MOSFET SURFACE MOUNT (SMD-0.5)

150V, N-CHANNEL

Product Summary

Part Number	BV_{DSS}	RDS(on)	I_D
IRF5NJ3315	150V	0.08Ω	20A


SMD-0.5

Description

Fifth Generation HEXFET® power MOSFETs from 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
- Surface Mount
- Light Weight

Absolute Maximum Ratings

Pre-Irradiation

Symbol	Parameter	Value	Units
I_{D1} @ V_{GS} = 10V, T_C = 25°C	Continuous Drain Current	20	A
I_{D2} @ V_{GS} = 10V, T_C = 100°C	Continuous Drain Current	12	
I_{DM} @ T_C = 25°C	Pulsed Drain Current ①	80	
P_D @T_C = 25°C	Maximum Power Dissipation	75	W
	Linear Derating Factor	0.6	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ②	78	mJ
I_{AR}	Avalanche Current ①	12	A
E_{AR}	Repetitive Avalanche Energy ①	7.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	3.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Package Mounting Surface Temp	300 (for 5s)	
	Weight	1.0 (Typical)	g

For Footnotes, refer to the page 2.

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	150	—	—	V	$V_{GS} = 0V$, $I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	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	—	—	0.08	Ω	$V_{GS} = 10V$, $I_{D2} = 12A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient	—	-	—	mV/°C	
gfs	Forward Transconductance	12	—	—	S	$V_{DS} = 15V$, $I_{D2} = 12A$ ④
I_{DSS}	Zero Gate Voltage Drain Current	—	—	25	µA	$V_{DS} = 120V$, $V_{GS} = 0V$
		—	—	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	—	—	95	nC	$I_{D2} = 12A$
Q_{GS}	Gate-to-Source Charge	—	—	11		$V_{DS} = 120V$
Q_{GD}	Gate-to-Drain ('Miller') Charge	—	—	47		$V_{GS} = 10V$
$t_{d(on)}$	Turn-On Delay Time	—	—	25	ns	$V_{DD} = 75V$
t_r	Rise Time	—	—	60		$I_{D2} = 12A$
$t_{d(off)}$	Turn-Off Delay Time	—	—	75		$R_G = 5.1\Omega$
t_f	Fall Time	—	—	60		$V_{GS} = 10V$
$L_S + L_D$	Total Inductance	—	4.0	—	nH	Measured from center of Drain pad to center of Source pad
C_{iss}	Input Capacitance	—	1370	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	300	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	160	—		$f = 1.0MHz$

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	20	A	
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	80		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25°C$, $I_S = 12A$, $V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	—	260	ns	$T_J = 25°C$, $I_F = 12A$, $V_{DD} \leq 25V$
Q_{rr}	Reverse Recovery Charge	—	—	1.7	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	—	—	1.67	°C/W

Footnotes:

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

② $V_{DD} = 50V$, starting $T_J = 25°C$, $L = 1.1mH$, Peak $I_L = 12A$, $V_{GS} = 10V$, $R_G = 25\Omega$

③ $I_{SD} \leq 12A$, $di/dt \leq 120A/\mu s$, $V_{DD} \leq 150V$, $T_J \leq 150°C$

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

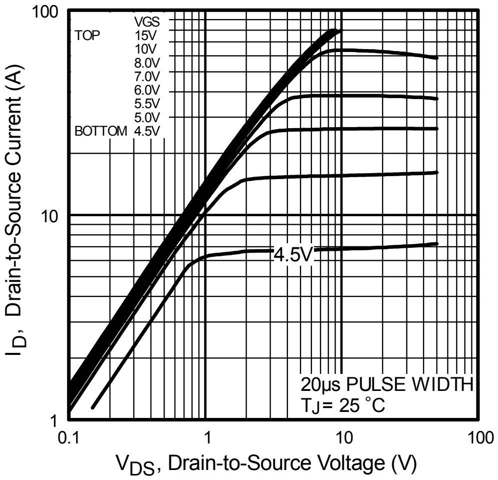


Fig 1. Typical Output Characteristics

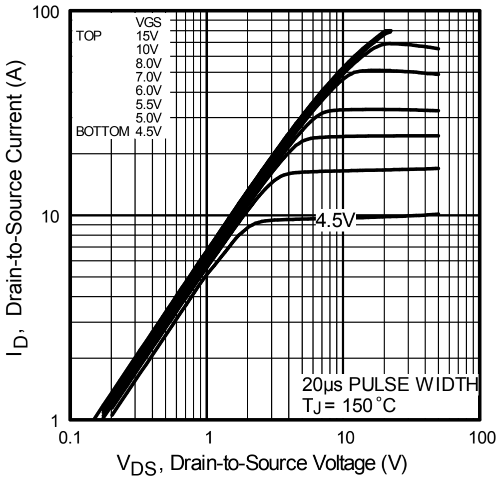


Fig 2. Typical Output Characteristics

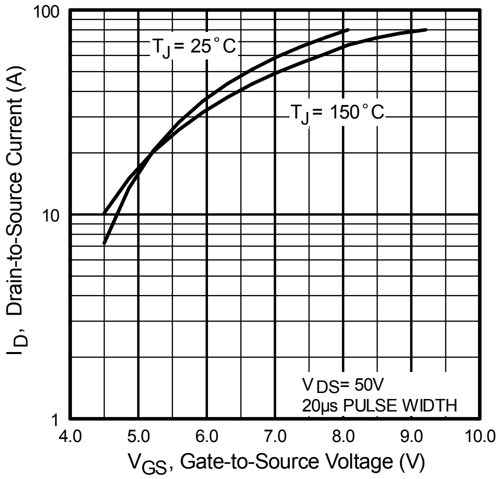


Fig 3. Typical Transfer Characteristics

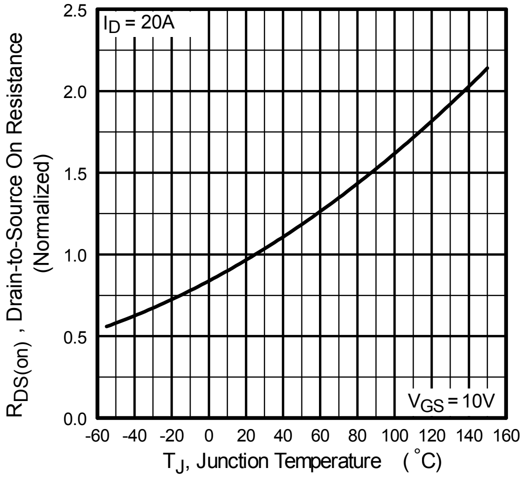


Fig 4. Normalized On-Resistance Vs. Temperature

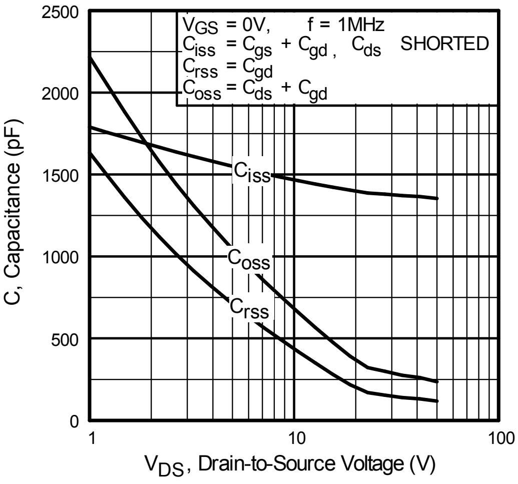


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

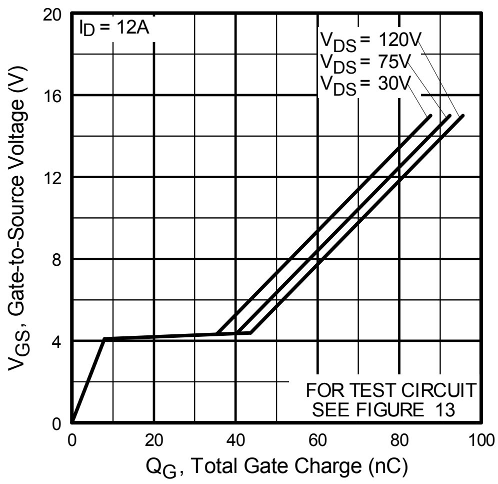


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

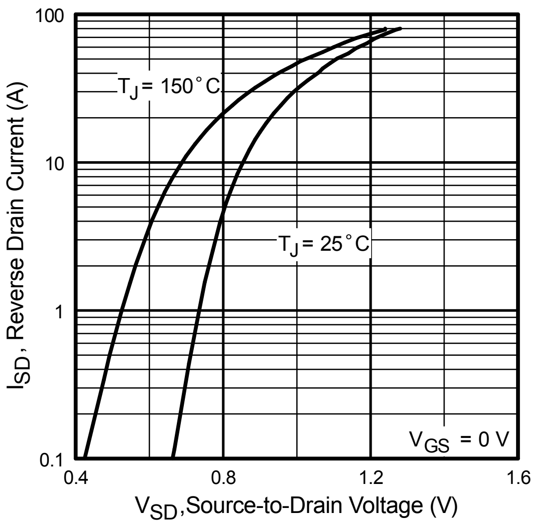


Fig 7. Typical Source-Drain Diode Forward Voltage

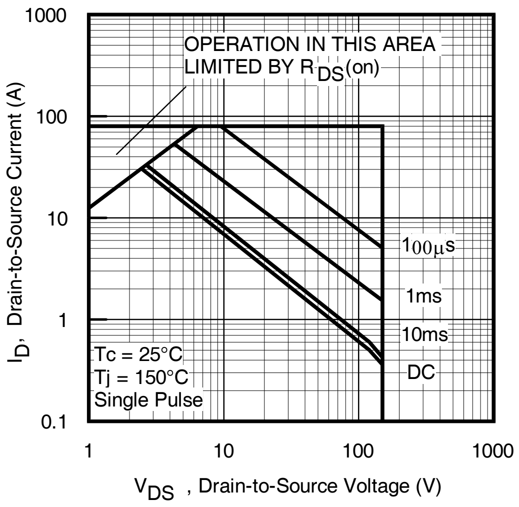


Fig 8. Maximum Safe Operating Area

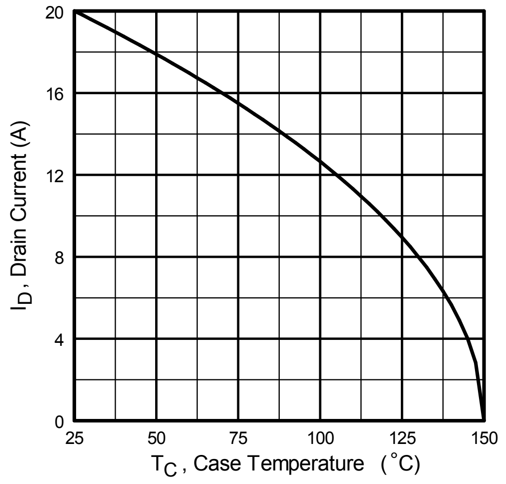


Fig 9. Maximum Drain Current Vs.Case Temperature

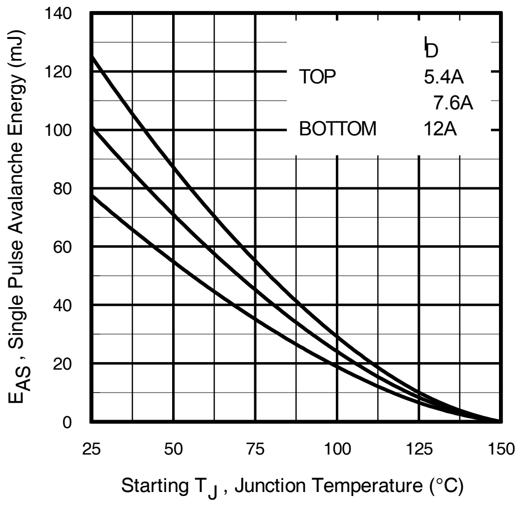


Fig 10. Maximum Avalanche Energy Vs. Drain Current

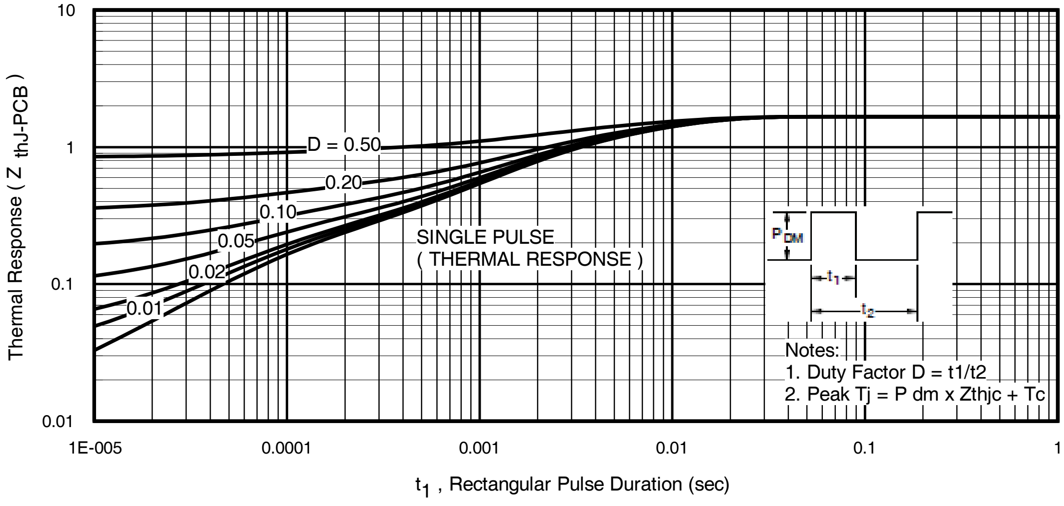


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

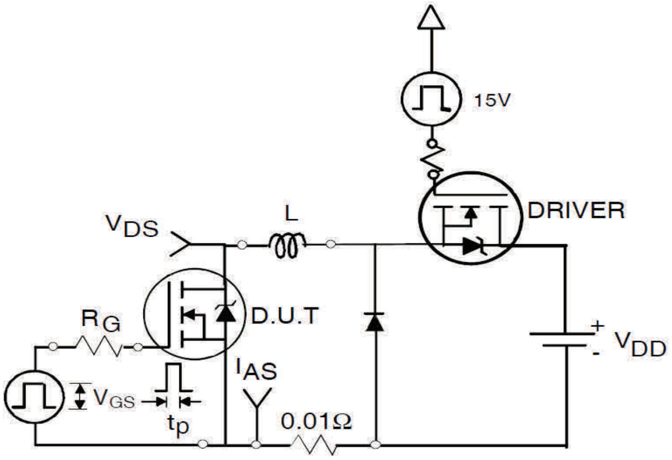


Fig 12a. Unclamped Inductive Test Circuit

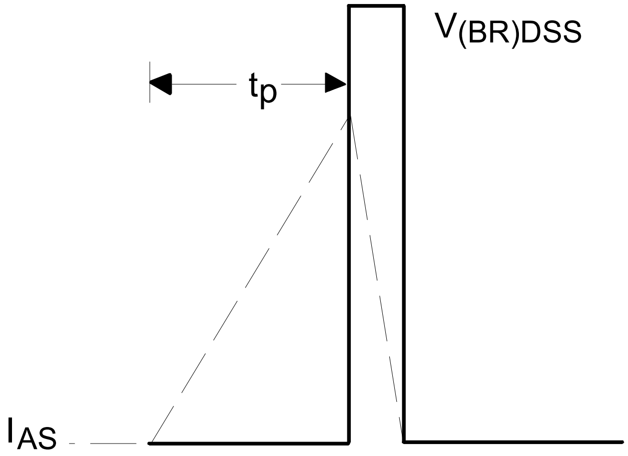


Fig 12b. Unclamped Inductive Waveforms

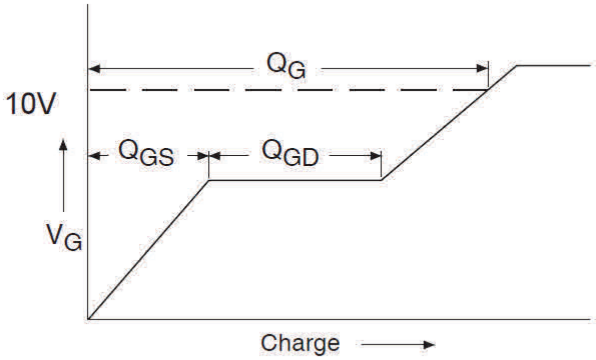


Fig 13a. Gate Charge Waveform

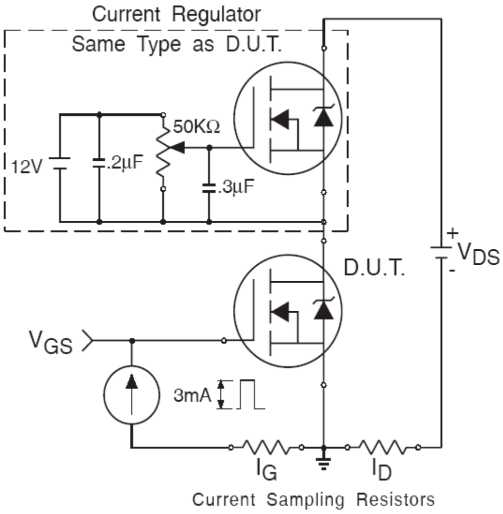


Fig 13b. Gate Charge Test Circuit

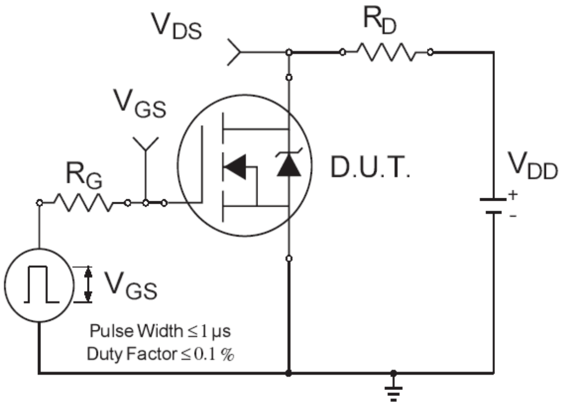


Fig 14a. Switching Time Test Circuit

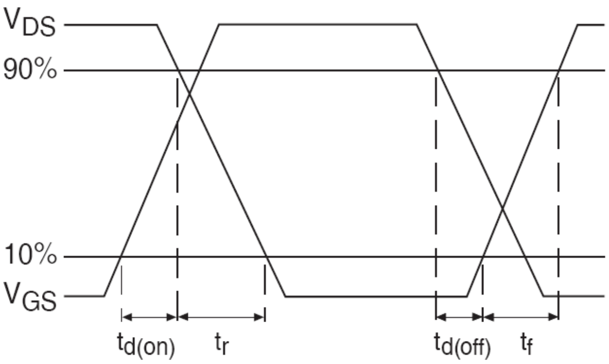
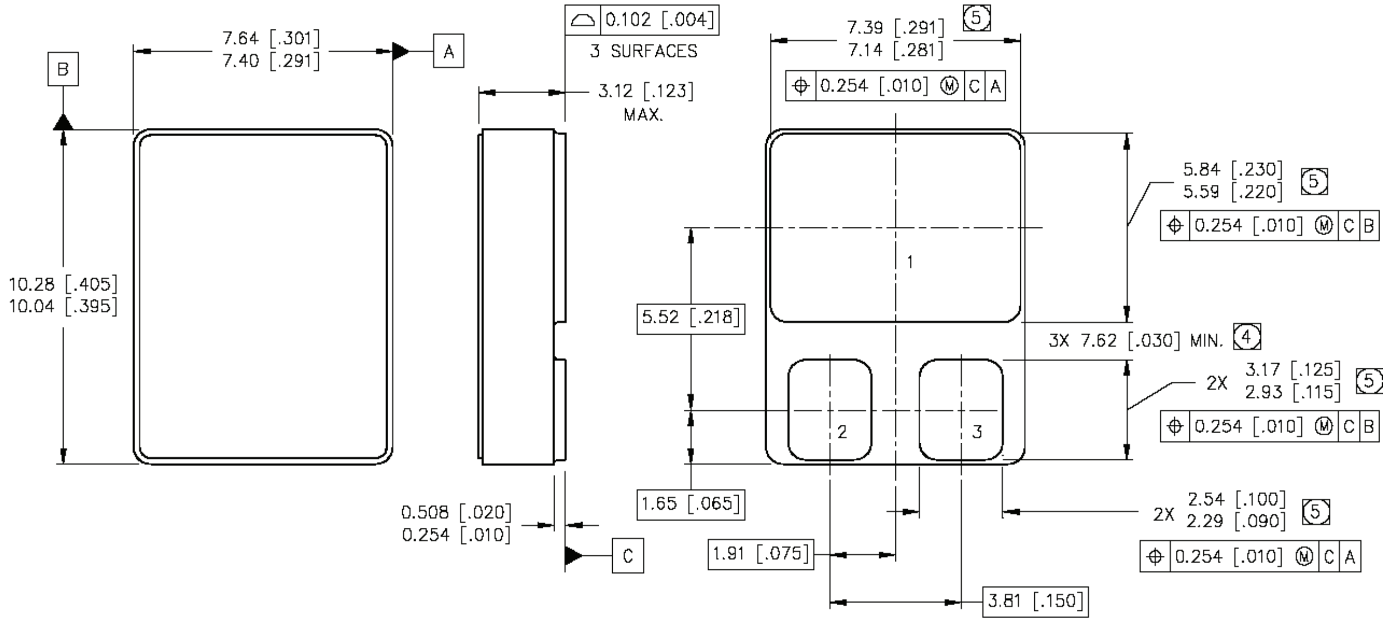


Fig 14b. Switching Time Waveforms

Case Outline and Dimensions — SMD-0.5



NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M−1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

④ DIMENSION INCLUDES METALLIZATION FLASH.

⑤ DIMENSION DOES NOT INCLUDE METALLIZATION FLASH.

PAD ASSIGNMENTS

1 = DRAIN
2 = GATE
3 = SOURCE

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