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IRFE9230

JANTX2N6851U

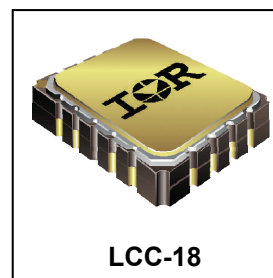
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REPETITIVE AVALANCHE AND dv/dt RATED HEXFET® TRANSISTORS SURFACE MOUNT (LCC-18)

200V, P-CHANNEL
REF: MIL-PRF-19500/564

Product Summary

Part Number	BVDSS	RDS(on)	I _D
IRFE9230	-200V	0.80Ω	-4.0A



Description

The leadless chip carrier (LCC) package represents the logical next step in the continual evolution of surface mount technology. Designed to be a close replacement for the TO-39 package, the LCC will give designers the extra flexibility they need to increase circuit board density. IR HiRel has engineered the LCC package to meet the specific needs of the power market by increasing the size of the bottom source pad, thereby enhancing the thermal and electrical performance. The lid of the package is grounded to the source to reduce RF interference.

Features

- Surface Mount
- Small Footprint
- Alternative to TO-39 Package
- Hermetically Sealed
- Dynamic dv/dt Rating
- Avalanche Energy Rating
- Simple Drive Requirements
- Light Weight
- ESD Rating: Class 1C 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	-4.0	A
I _{D2} @ V _{GS} = -10V, T _C = 100°C	Continuous Drain Current	-2.4	
I _{DM} @ T _C = 25°C	Pulsed Drain Current ①	-16	
P _D @ T _C = 25°C	Maximum Power Dissipation	25	W
	Linear Derating Factor	0.20	W/°C
V _{GS}	Gate-to-Source Voltage	± 20	V
E _{AS}	Single Pulse Avalanche Energy ②	171	mJ
I _{AR}	Avalanche Current ①	-4.0	A
E _{AR}	Repetitive Avalanche Energy ①	2.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-1.1	V/ns
T _J T _{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Package Mounting Surface Temp.	300 (for 5 s)	
	Weight	0.42 (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	-200	—	—	V	V _{GS} = 0V, I _D = -1.0mA
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	-0.21	—	V/°C	Reference to 25°C, I _D = -1.0mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	—	0.80	Ω	V _{GS} = -10V, I _{D2} = -2.4A ④
		—	—	0.83		V _{GS} = -10V, I _{D1} = -4.0A ④
V _{GS(th)}	Gate Threshold Voltage	-2.0	—	-4.0	V	V _{DS} = V _{GS} , I _D = -250μA
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
	Gate-to-Source Leakage Reverse	—	—	100		V _{GS} = 20V
Q _G	Total Gate Charge	—	—	34.8	nC	I _{D1} = -4.0A
Q _{GS}	Gate-to-Source Charge	—	—	6.1		V _{DS} = -100V
Q _{GD}	Gate-to-Drain ('Miller') Charge	—	—	20.5		V _{GS} = -10V
t _{d(on)}	Turn-On Delay Time	—	—	50	ns	V _{DD} = -75V
t _r	Rise Time	—	—	100		I _{D1} = -4.0A
t _{d(off)}	Turn-Off Delay Time	—	—	80		R _G = 7.5Ω
t _f	Fall Time	—	—	80		V _{GS} = -10V
L _S + L _D	Total Inductance	—	6.1	—	nH	Measured from the center of drain pad to center of source pad
C _{iss}	Input Capacitance	—	700	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	200	—		V _{DS} = -25V
C _{rss}	Reverse Transfer Capacitance	—	45	—		f = 1.0MHz

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I _S	Continuous Source Current (Body Diode)	—	—	-4.0	A	
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	-16		
V _{SD}	Diode Forward Voltage	—	—	-5.6	V	T _J = 25°C, I _S = -4.0A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	—	400	ns	T _J = 25°C, I _F = -4.0A, V _{DD} ≤ -50V
Q _{rr}	Reverse Recovery Charge	—	—	4.0	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	—	—	5.0	°C/W
R _{θJPCB}	Junction-to-PC Board	—	—	19	

Footnotes:

- ① Repetitive Rating; Pulse width limited by maximum junction temperature.
- ② V_{DD} = -50V, starting T_J = 25°C, Peak I_L = -4.0A
- ③ I_{SD} ≤ -4.0A, di/dt ≤ -600A/μs, V_{DD} ≤ -200V, T_J ≤ 150°C, Suggested R_G = 7.5 Ω
- ④ Pulse width ≤ 300 μs; Duty Cycle ≤ 2%

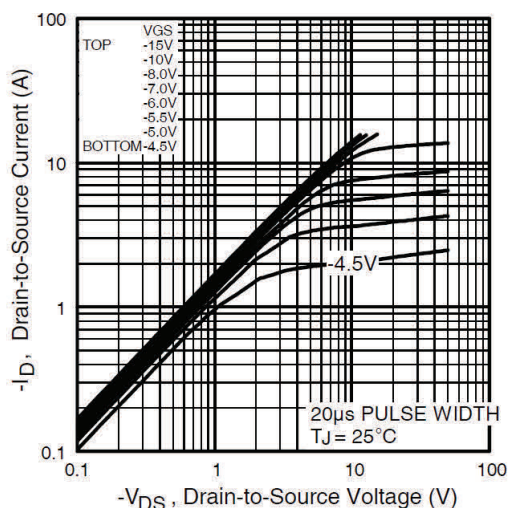


Fig 1. Typical Output Characteristics

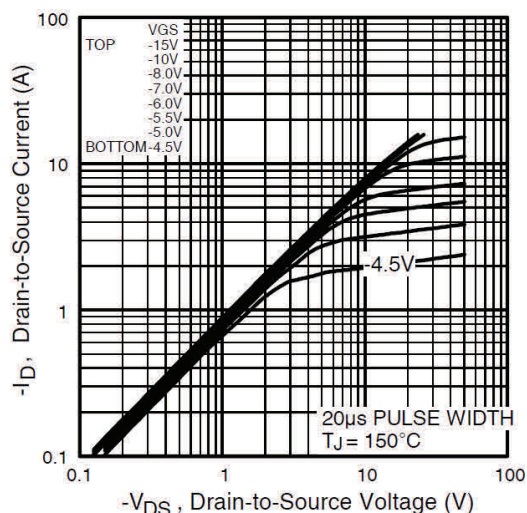


Fig 2. Typical Output Characteristics

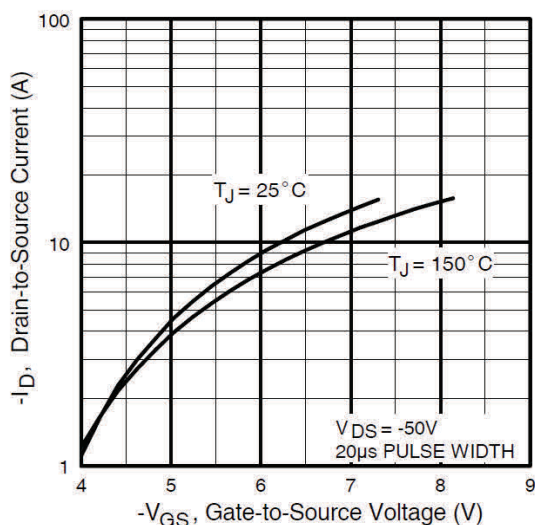


Fig 3. Typical Transfer Characteristics

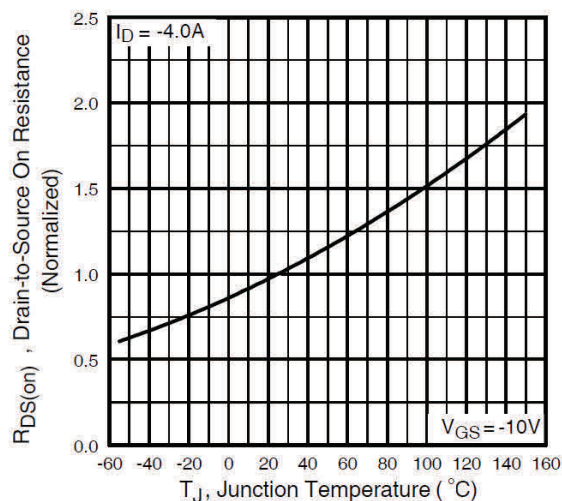


Fig 4. Normalized On-Resistance Vs. Temperature

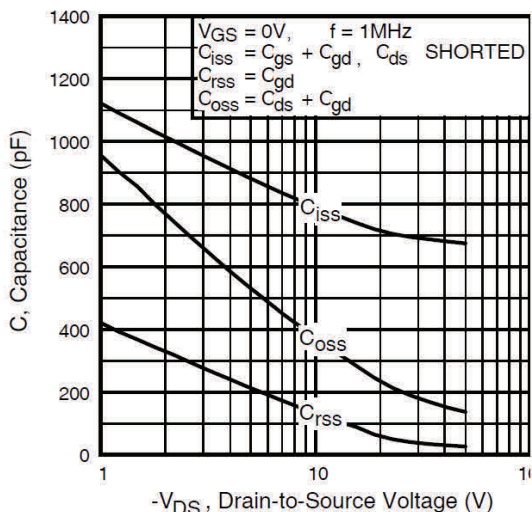


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

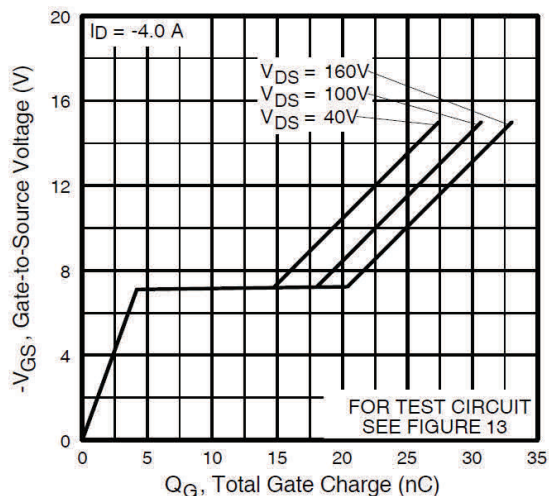


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

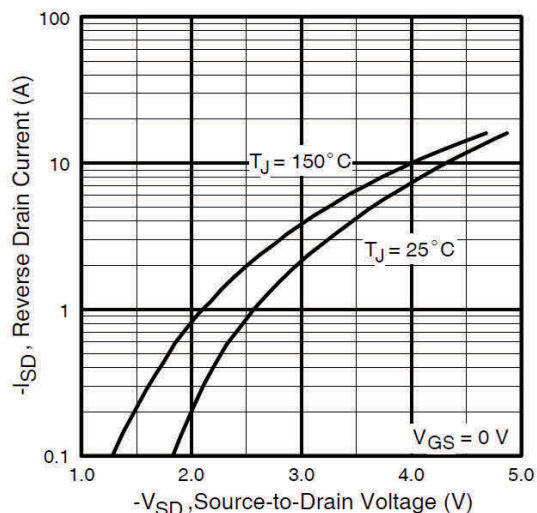


Fig 7. Typical Source-Drain Diode

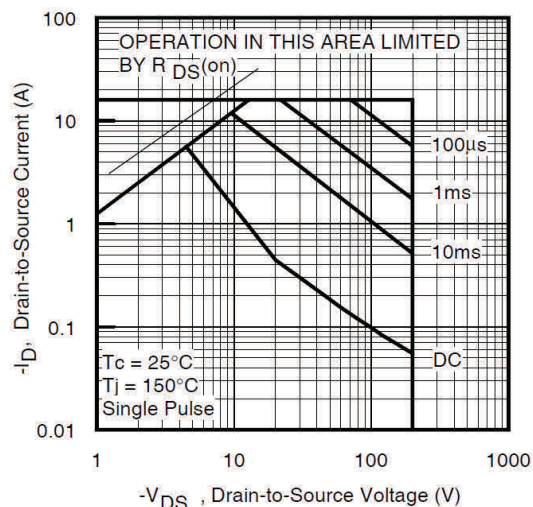


Fig 8. Maximum Safe Operating Area

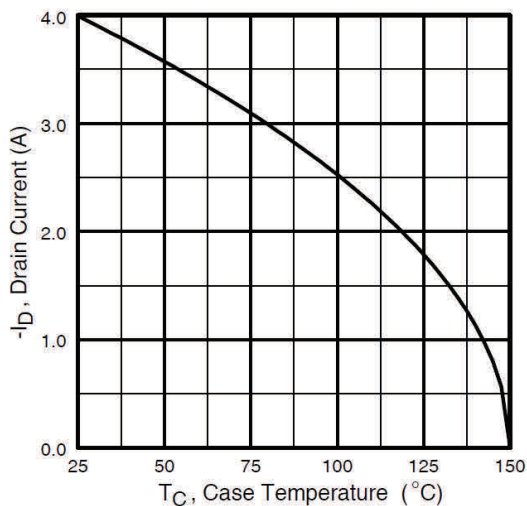


Fig 9. Maximum Drain Current Vs. Case Temperature

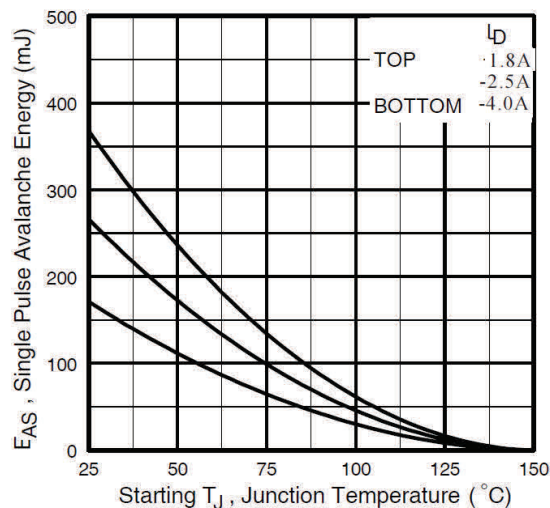


Fig 10. Maximum Avalanche Energy Vs. Drain Current

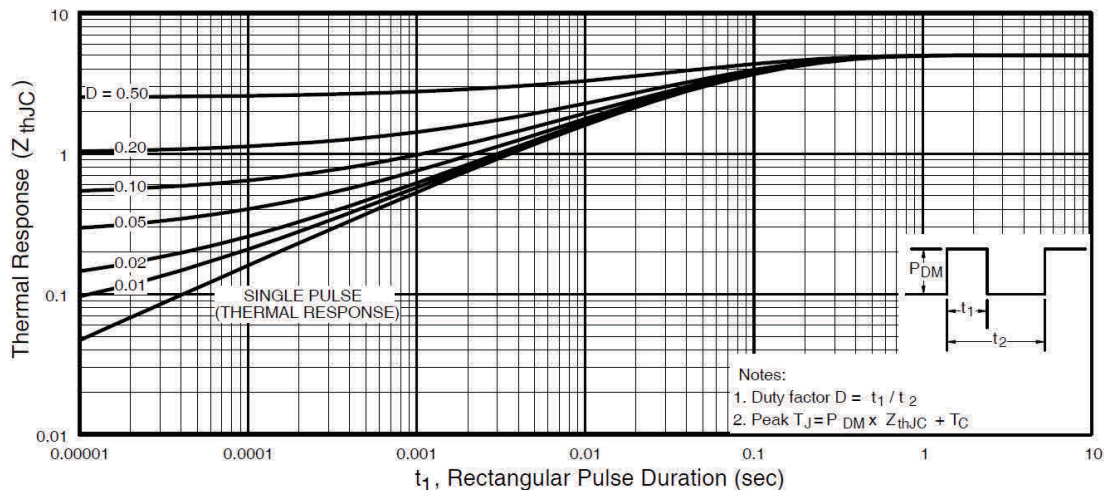


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

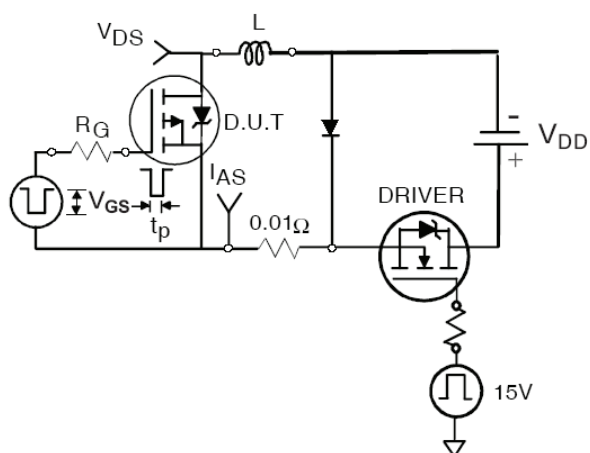


Fig 12a. Unclamped Inductive Test Circuit

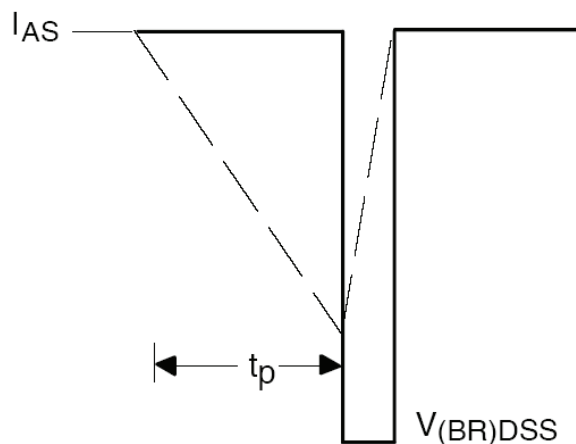


Fig 12b. Unclamped Inductive Waveforms

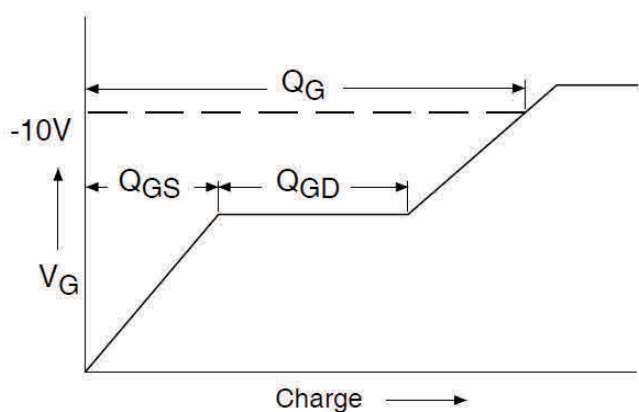


Fig 13a. Gate Charge Waveform

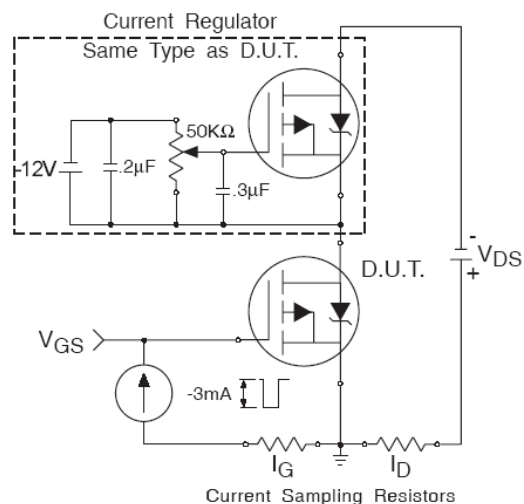


Fig 13b. Gate Charge Test Circuit

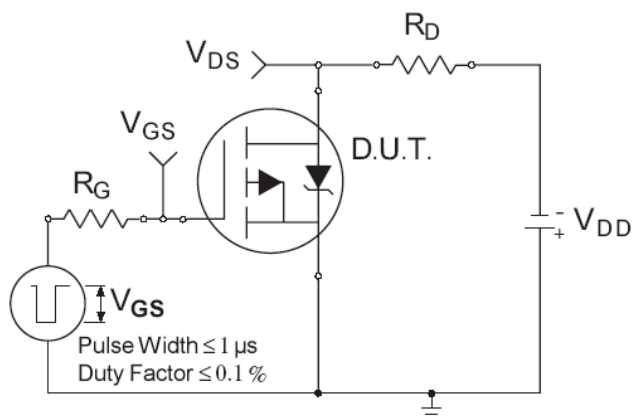


Fig 14a. Switching Time Test Circuit

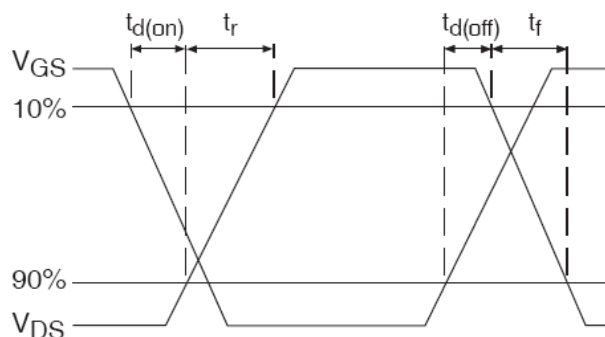
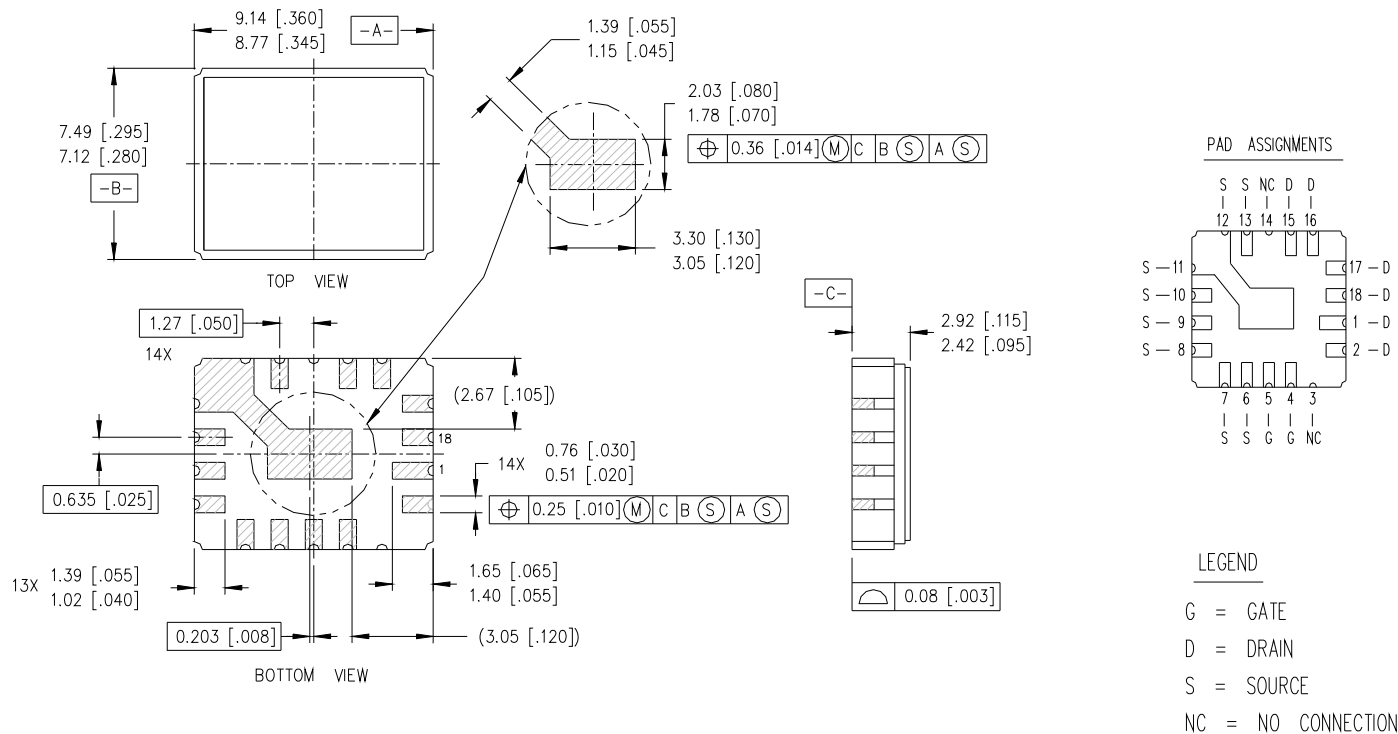


Fig 14b. Switching Time Waveforms

Case Outline and Dimensions - LCC-18



NOTES:

1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

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