

IRFE9130 (JANTX2N6849U)

PD-91716E

Repetitive Avalanche and dv/dt Rated Power MOSFET Surface Mount (LCC-18) -100V, -6.5A, P-channel

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

Product Summary

- **BV_{DSS}** : -100V
- **I_D** : -6.5A
- **$R_{DS(on),max}$** : 0.30Ω
- **$Q_{G,max}$** : 34.8nC
- **REF**: MIL-PRF-19500/564



Potential Applications

- DC-DC converter
- Motor drives

Product Validation

Qualified to JANTX screening flow according to MIL-PRF-19500 for high-reliability applications

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.

Ordering Information

Table 1 **Ordering options**

Part number	Package	Screening Level
IRFE9130	LCC-18	COTS
JANTX2N6849U	LCC-18	JANTX
JANTXV2N6849U	LCC-18	JANTXV

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Power MOSFET Surface Mount (LCC-18)

Table of contents

Table of contents

Features 1

Potential Applications..... 1

Product Validation..... 1

Description 1

Table of contents..... 2

1 Absolute Maximum Ratings 3

2 Device Characteristics 4

2.1 Electrical Characteristics4

2.2 Source-Drain Diode Ratings and Characteristics5

2.3 Thermal Characteristics5

3 Electrical Characteristics Curves..... 6

4 Test Circuits 9

5 Package Outline10

Revision history.....11

Absolute Maximum Ratings

1 Absolute Maximum Ratings

Table 2 Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$I_{D1} @ V_{GS} = -10V, T_C = 25^{\circ}C$	Continuous Drain Current	-6.5	A
$I_{D2} @ V_{GS} = -10V, T_C = 100^{\circ}C$	Continuous Drain Current	-4.1	A
$I_{DM} @ T_C = 25^{\circ}C$	Pulsed Drain Current ¹	-25	A
$P_D @ T_C = 25^{\circ}C$	Maximum Power Dissipation	25	W
	Linear Derating Factor	0.20	W/ $^{\circ}C$
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ²	165	mJ
I_{AR}	Avalanche Current ¹	-6.5	A
E_{AR}	Repetitive Avalanche Energy ¹	2.5	mJ
dv/dt	Peak Diode Reverse Recovery ³	-5.5	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	$^{\circ}C$
	Lead Temperature	300 (for 5s)	
	Weight	0.42 (Typical)	

¹ Repetitive Rating; Pulse width limited by maximum junction temperature.² $V_{DD} = -25V$, starting $T_J = 25^{\circ}C$, Peak $I_L = -6.5A$ ³ $I_{SD} \leq -6.5A$, di/dt $\leq -390A/\mu s$, $V_{DD} \leq -100V$, $T_J \leq 150^{\circ}C$, Suggested $R_g = 7.5\Omega$

Device Characteristics

2 Device Characteristics

2.1 Electrical Characteristics

Table 3 Static and Dynamic Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (Unless Otherwise Specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	-100	—	—	V	$V_{GS} = 0V, I_D = -1.0mA$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.10	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = -1.0mA$
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance	—	—	0.30	Ω	$V_{GS} = -10V, I_{D2} = -4.1A^1$
		—	—	0.32		$V_{GS} = -10V, I_{D2} = -6.5A^1$
$V_{GS(th)}$	Gate Threshold Voltage	-2.0	—	-4.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
I_{DSS}	Zero Gate Voltage Drain Current	—	—	-25	μA	$V_{DS} = -80V, V_{GS} = 0V$
		—	—	-250		$V_{DS} = -80V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
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	$I_{D1} = -6.5A$
Q_{GS}	Gate-to-Source Charge	—	—	6.8		$V_{DS} = -50V$
Q_{GD}	Gate-to-Drain ('Miller') Charge	—	—	23.1		$V_{GS} = -10V$
$t_{d(on)}$	Turn-On Delay Time	—	—	60	ns	$I_{D1} = -6.5A^{**}$ $V_{DD} = -40V$ $R_G = 7.5\Omega$ $V_{GS} = -10V$
t_r	Rise Time	—	—	140		
$t_{d(off)}$	Turn-Off Delay Time	—	—	140		
t_f	Fall Time	—	—	140		
$L_s + L_D$	Total Inductance	—	6.1	—	nH	Measured from the center of drain pad to center of source pad
C_{iss}	Input Capacitance	—	790	—	pF	$V_{GS} = 0V$ $V_{DS} = -25V$ $f = 1.0MHz$
C_{oss}	Output Capacitance	—	340	—		
C_{rss}	Reverse Transfer Capacitance	—	71	—		

****** Switching speed maximum limits are based on manufacturing test equipment and capability.

¹ Pulse width $\leq 300\mu s$; Duty Cycle $\leq 2\%$

Device Characteristics

2.2 Source-Drain Diode Ratings and Characteristics

Table 4 Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
I _S	Continuous Source Current (Body Diode)	—	—	-6.5	A	
I _{SM}	Pulsed Source Current (Body Diode) ¹	—	—	-25	A	
V _{SD}	Diode Forward Voltage	—	—	-4.3	V	T _J = 25°C, I _S = -6.5A, V _{GS} = 0V ²
t _{rr}	Reverse Recovery Time	—	—	250	ns	T _J = 25°C, I _F = -6.5A, V _{DD} ≤ -50V di/dt = -100A/μs
Q _{rr}	Reverse Recovery Charge	—	2.0	—	μC	
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)				

2.3 Thermal Characteristics

Table 5 Thermal Resistance

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case	—	—	5.0	$^\circ\text{C}/\text{W}$
$R_{\theta J-PCB}$	Junction-to-PC Board (Soldered to a copper clad PC board)	—	—	19	

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

² Pulse width $\leq 300\ \mu\text{s}$; Duty Cycle $\leq 2\%$

IRFE9130 (JANTX2N6849U)

Power MOSFET Surface Mount (LCC-18)

Electrical Characteristics Curves

3 Electrical Characteristics Curves

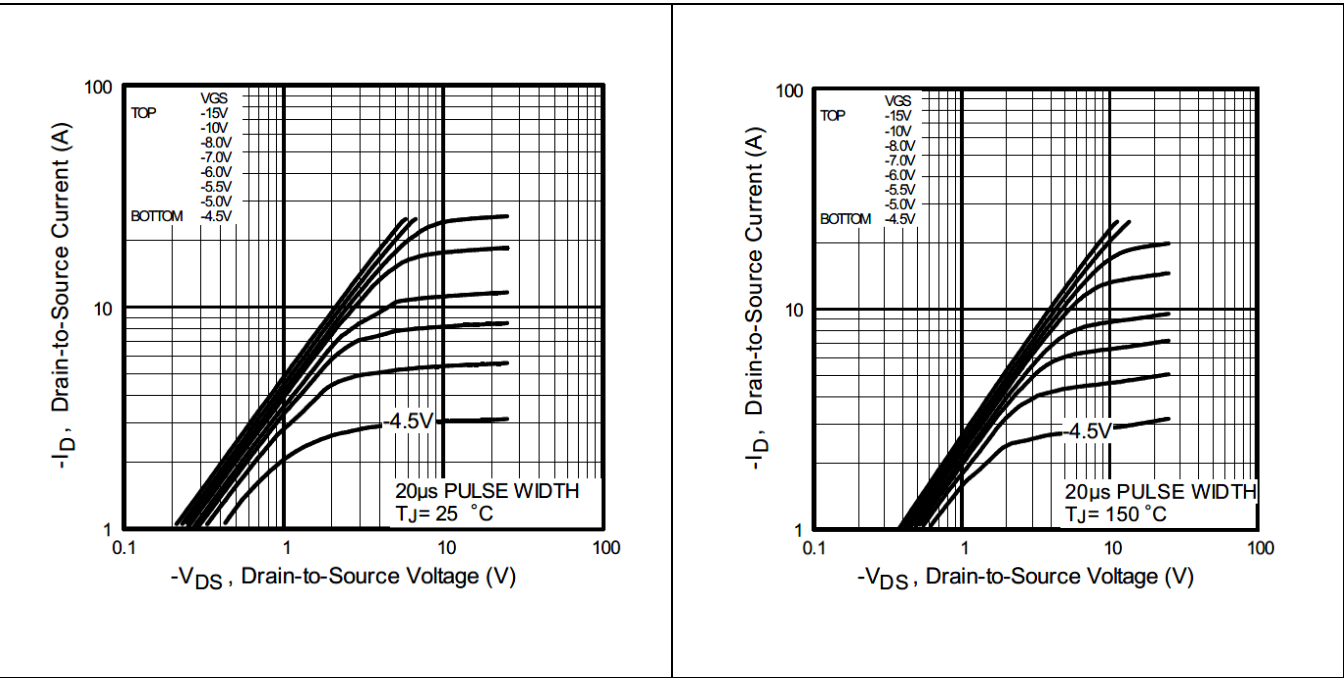


Figure 1 Typical Output Characteristics

Figure 2 Typical Output Characteristics

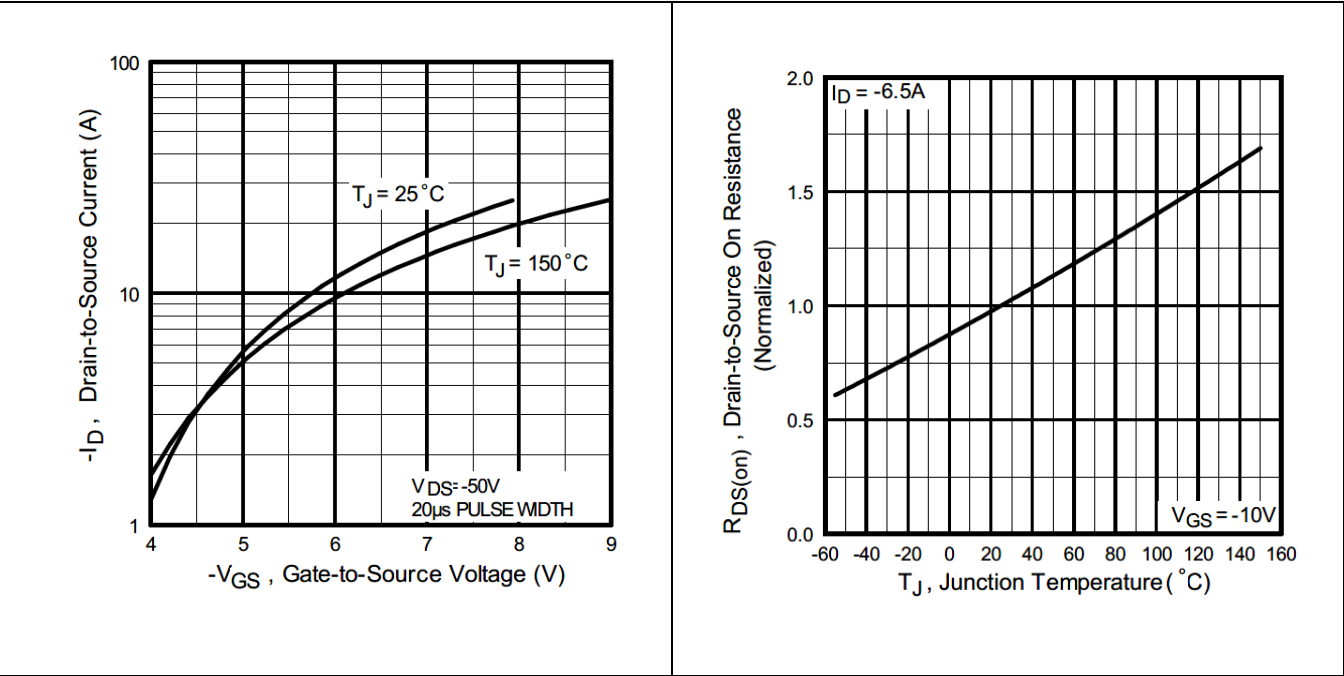


Figure 3 Typical Transfer Characteristics

Figure 4 Normalized On-Resistance Vs. Temperature

IRFE9130 (JANTX2N6849U)

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Electrical Characteristics Curves

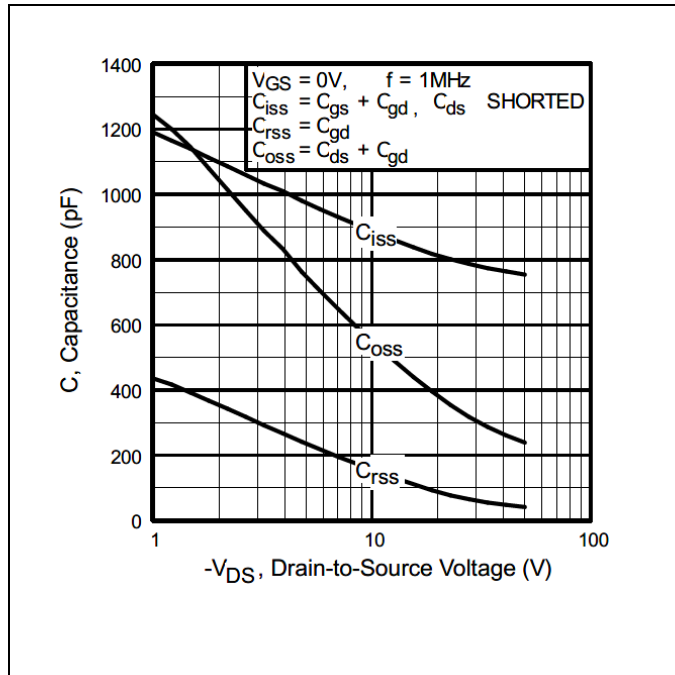


Figure 5 Typical Capacitance Vs. Drain-to-Source Voltage

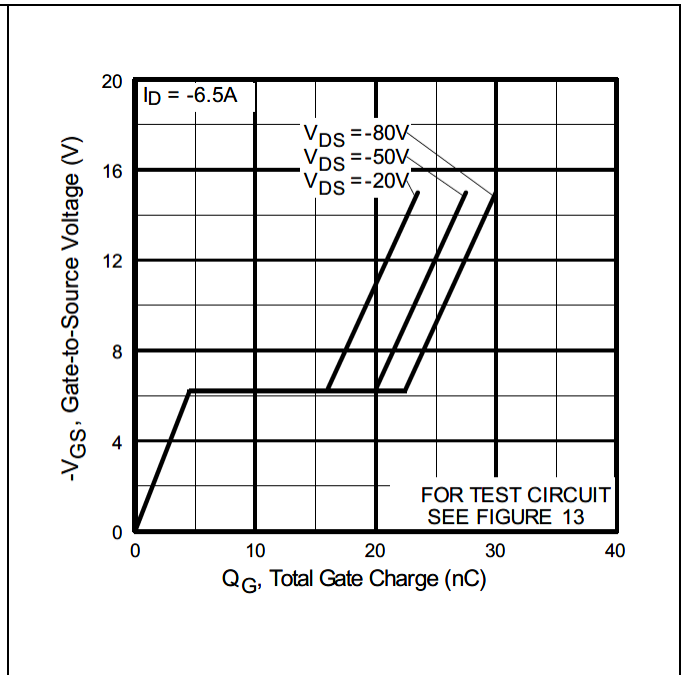


Figure 6 Typical Gate Charge Vs. Gate-to-Source Voltage

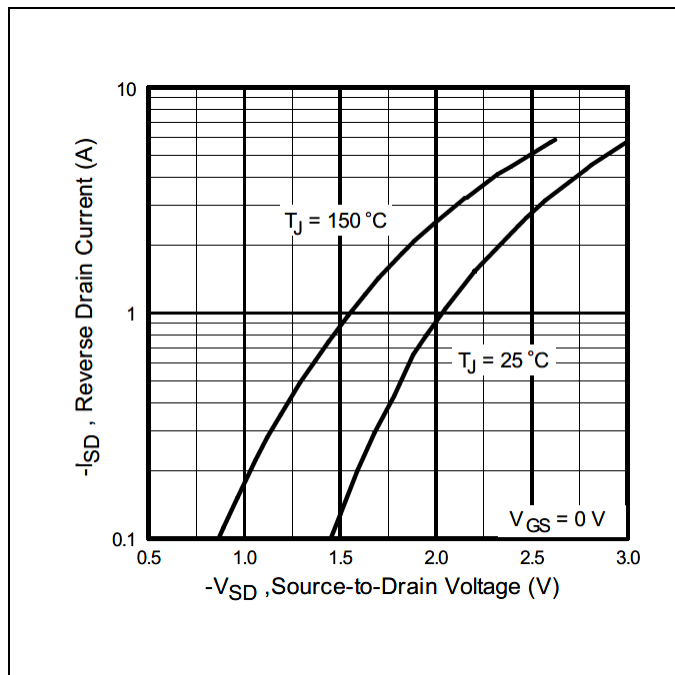


Figure 7 Typical Source-Drain Diode Forward Voltage

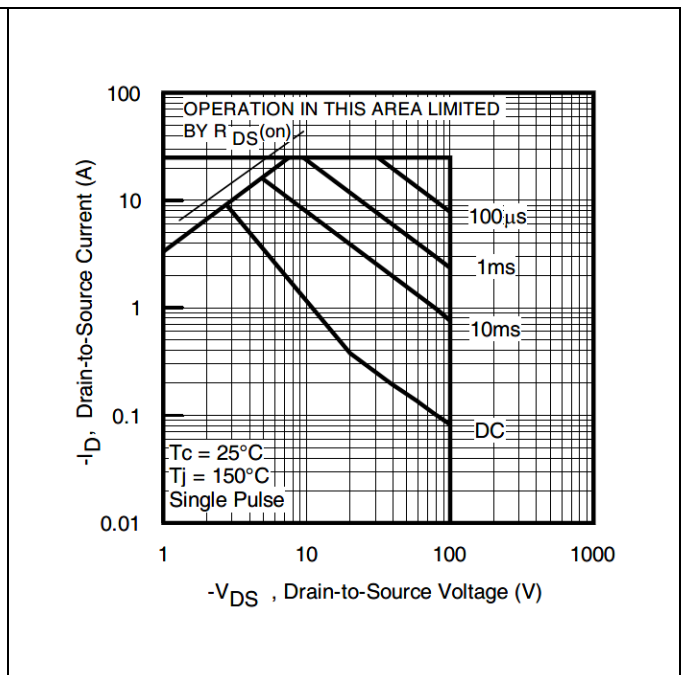


Figure 8 Maximum Safe Operating Area

IRFE9130 (JANTX2N6849U)

Power MOSFET Surface Mount (LCC-18)

Electrical Characteristics Curves

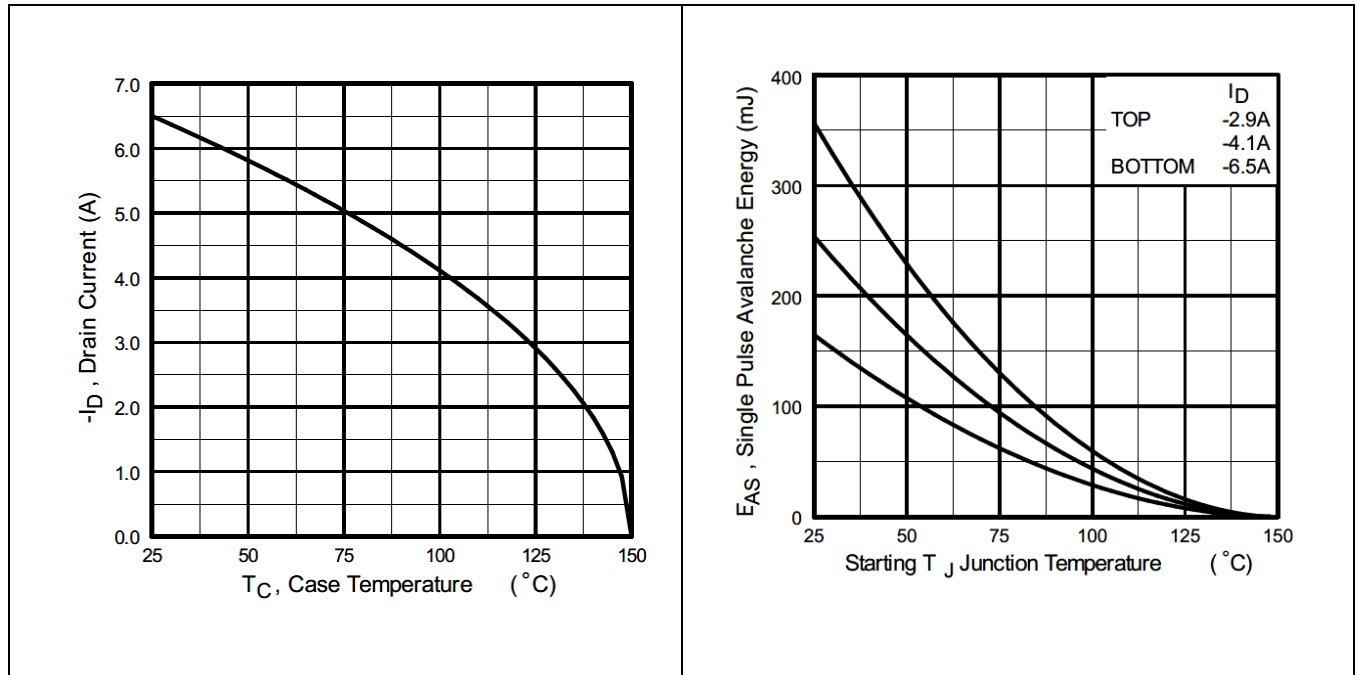


Figure 9 Maximum Drain Current Vs. Case Temperature

Figure 10 Maximum Avalanche Energy Vs. Junction Temperature

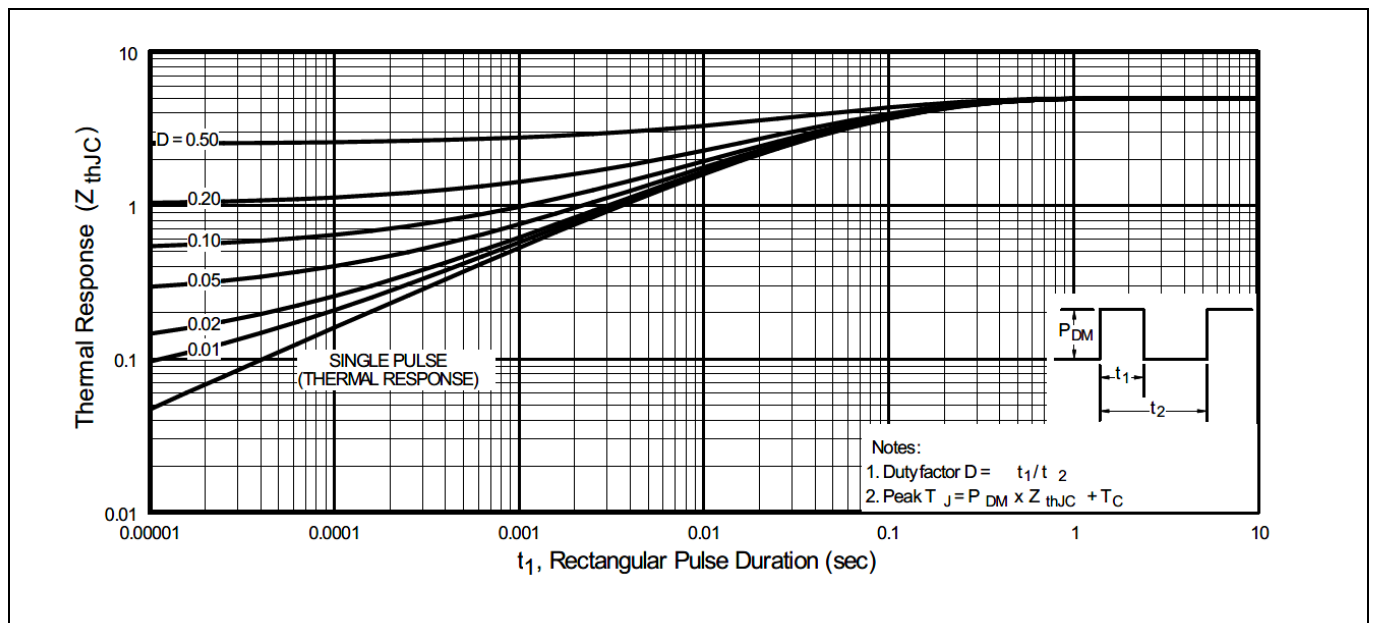


Figure 11 Maximum Effective Transient Thermal Impedance, Junction-to-Case

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Power MOSFET Surface Mount (LCC-18)

Test Circuits

4 Test Circuits

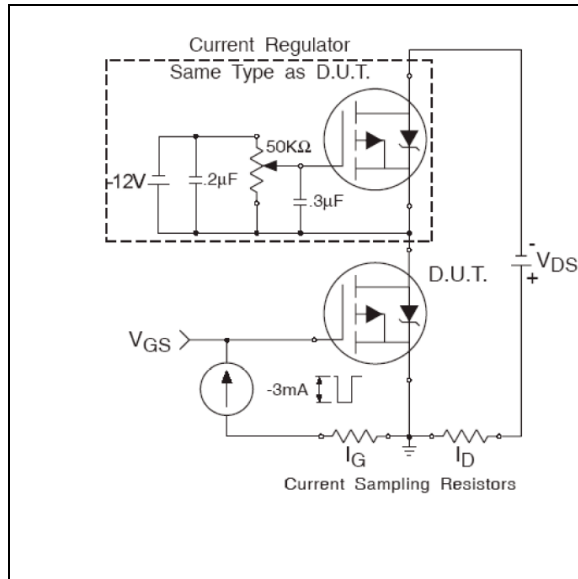


Figure 12 Gate Charge Test Circuit

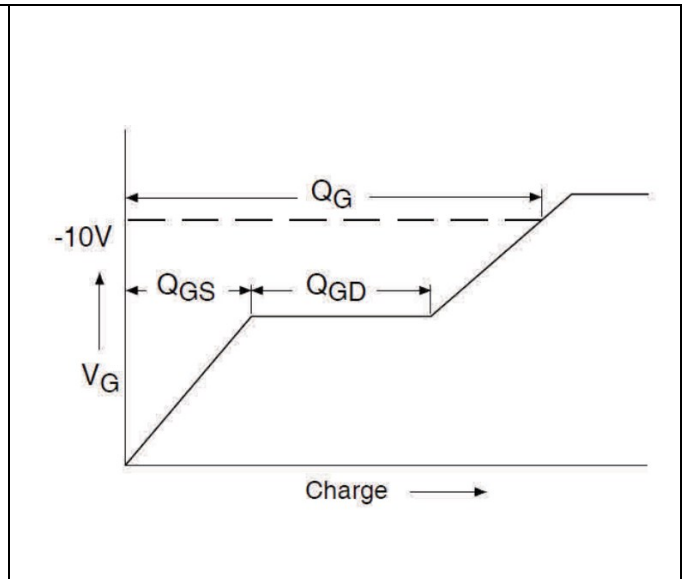


Figure 13 Gate Charge Waveform

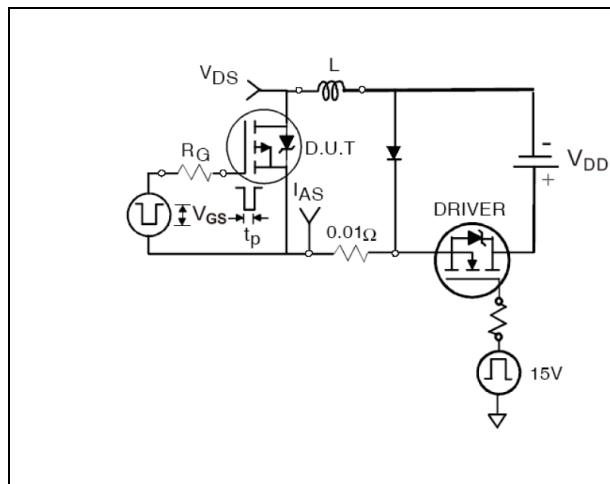


Figure 14 Unclamped Inductive Test Circuit

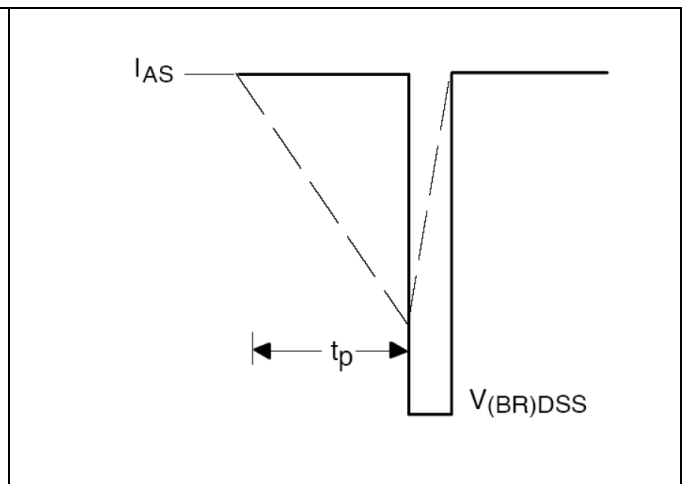


Figure 15 Unclamped Inductive Waveform

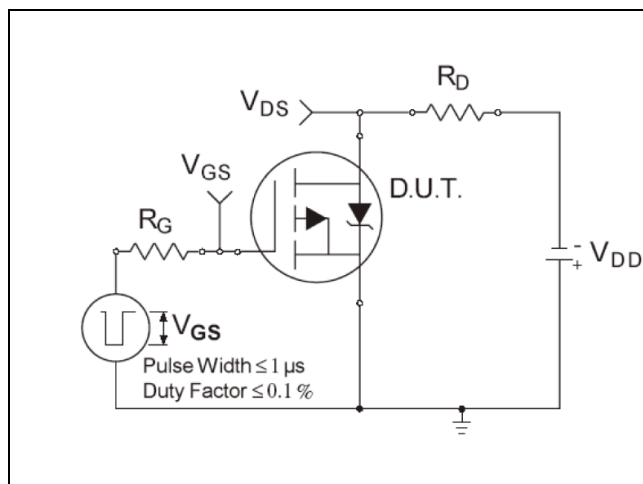


Figure 16 Switching Time Test Circuit

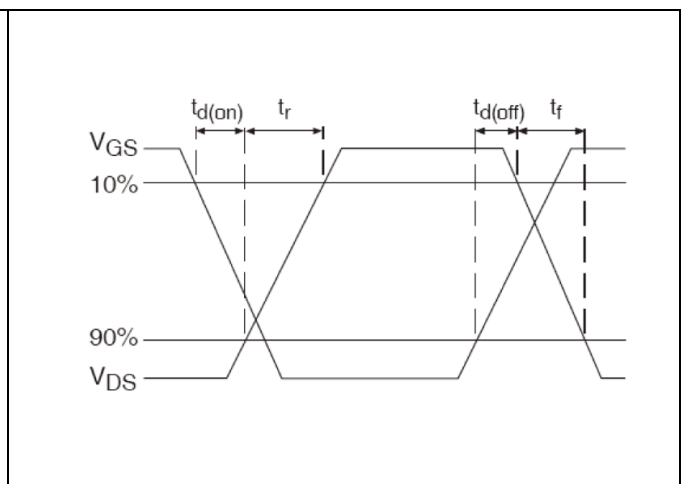


Figure 17 Switching Time Waveforms

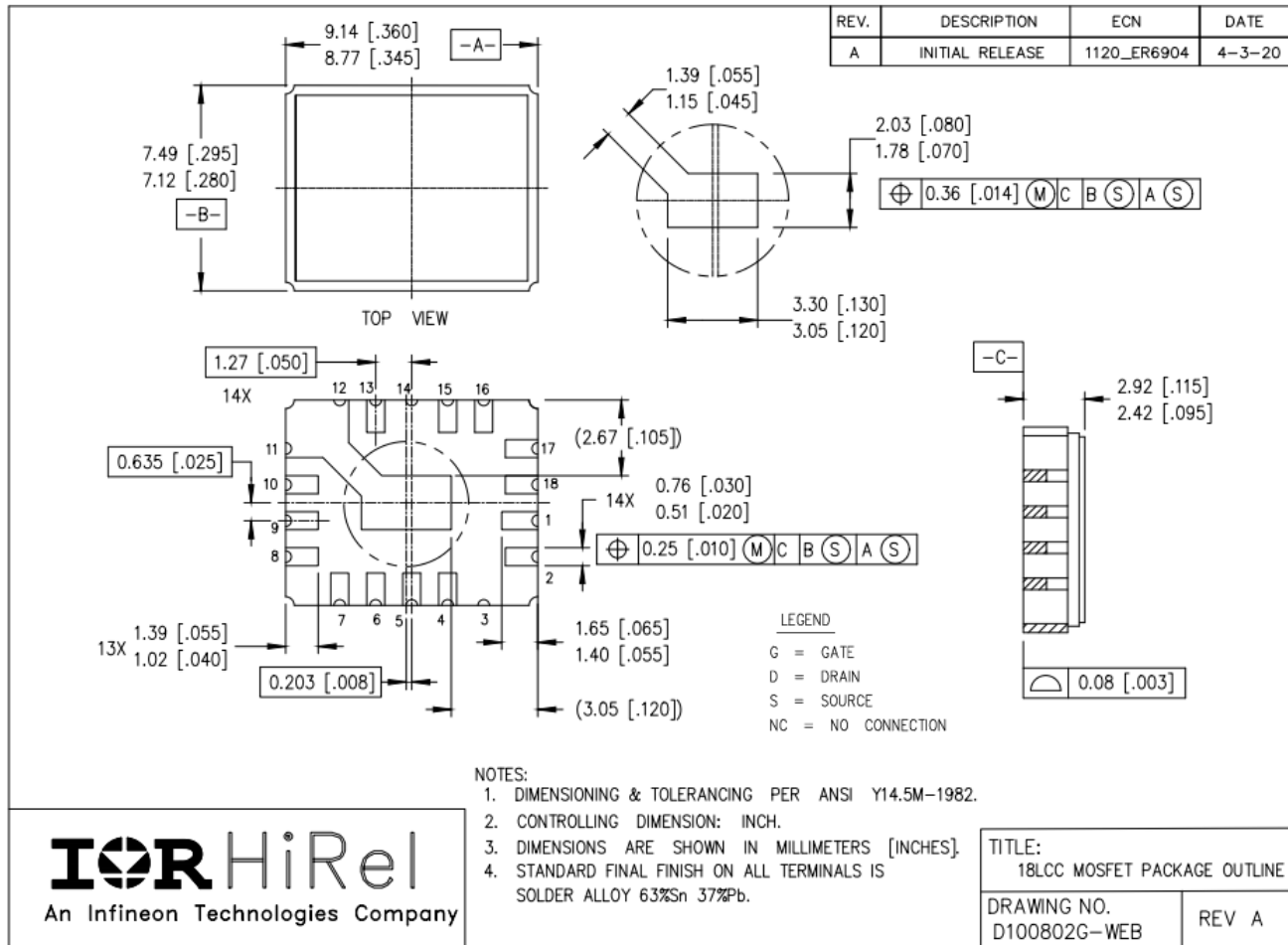
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Power MOSFET Surface Mount (LCC-18)

Package Outline

5 Package Outline

Note: For the most updated package outline, please see the website: [LCC-18](#)



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Power MOSFET Surface Mount (LCC-18)

Revision history

Revision history

Document version	Date of release	Description of changes
	01/25/2001	Datasheet (PD-91716B)
Rev C	07/28/2015	Updated based on ECN-1120_03204
Rev D	02/17/2019	Updated based on ECN-1120_06822
Rev E	12/06/2024	Updated based on ECN-1120_10116

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