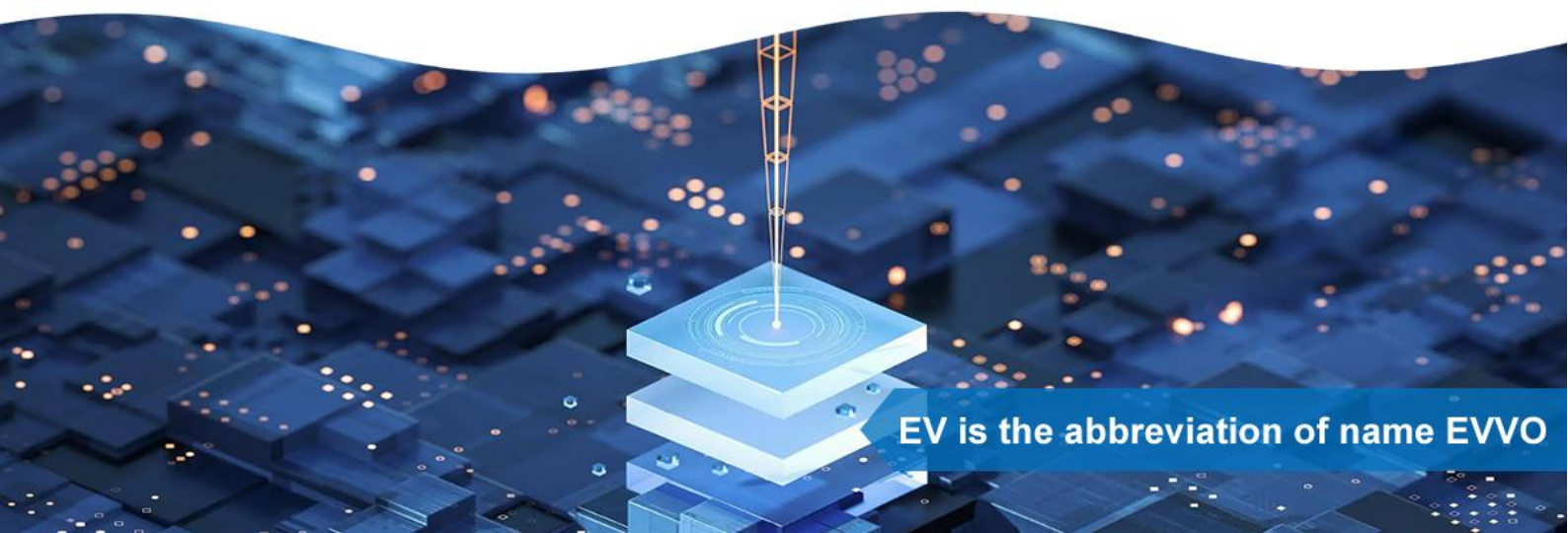
EVVOSEMI®
THINK CHANGE DO

ESD TVS MOS LDO Diode Sensor DC-DC

Product Specification

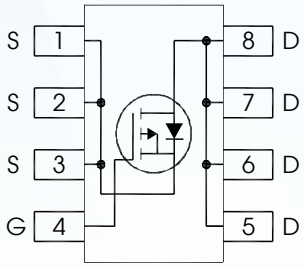
Domestic Part Number	IRF9310
Overseas Part Number	IRF9310
Equivalent Part Number	IRF9310



P-Channel 30 V (D-S) MOSFET

Product Summary

V_{DS} (V)	$R_{DS(on)}$ (mΩ)	I_D (A)[d]	Q_g (Typ.)
- 30	4.6 at V_{GS} = - 10 V	-20	58 nC
	6.8 at V_{GS} = - 4.5 V		



Features

- Industry-standard pinout SOP-8 Package
- Compatible with Existing Surface Mount Techniques
- RoHS Compliant, Halogen-Free
- MSL1, Industrial qualification

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	-30	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	-20	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	-16	
I_{DM}	Pulsed Drain Current ①	-160	
P_D @T_A = 25°C	Power Dissipation ④	2.5	W
P_D @T_A = 70°C	Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

P-Channel 30 V (D-S) MOSFET

Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	-30	—	—	V	V_{GS} = 0V, I_D = -250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.020	—	V/°C	Reference to 25°C, I_D = -1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.9	4.6	mΩ	V_{GS} = -10V, I_D = -20A ③
		—	5.8	6.8		V_{GS} = -4.5V, I_D = -16A ③
$V_{GS(th)}$	Gate Threshold Voltage	-1.3	-1.8	-2.4	V	V_{DS} = V_{GS}, I_D = -100μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-5.8	—	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	—	—	-1.0	μA	V_{DS} = -24V, V_{GS} = 0V
		—	—	-150		V_{DS} = -24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	V_{GS} = -20V
	Gate-to-Source Reverse Leakage	—	—	100		V_{GS} = 20V
gfs	Forward Transconductance	39	—	—	S	V_{DS} = -10V, I_D = -16A
Q_g	Total Gate Charge	—	58	—	nC	V_{DS} = -15V, V_{GS} = -4.5V, I_D = - 16A
Q_g	Total Gate Charge	—	110	165	nC	V_{GS} = -10V
Q_{gs}	Gate-to-Source Charge	—	17	—		V_{DS} = -15V
Q_{gd}	Gate-to-Drain Charge	—	28	—		I_D = -16A
R_G	Gate Resistance	—	2.8	—	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	25	—	ns	V_{DD} = -15V, V_{GS} = -4.5V ③
t_r	Rise Time	—	47	—		I_D = -1.0A
$t_{d(off)}$	Turn-Off Delay Time	—	65	—		R_G = 1.8Ω
t_f	Fall Time	—	70	—		See Figs. 20a &20b
C_{iss}	Input Capacitance	—	5250	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	1300	—		V_{DS} = -15V
C_{rss}	Reverse Transfer Capacitance	—	880	—		f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	630	mJ
I_{AR}	Avalanche Current ①	—	-16	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-2.5	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	-160		
V_{SD}	Diode Forward Voltage	—	—	-1.2	V	T_J = 25°C, I_S = -2.5A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	71	107	ns	T_J = 25°C, I_F = -2.5A, V_{DD} = -24V
Q_{rr}	Reverse Recovery Charge	—	12	18	nC	di/dt = 100A/μs ③

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	—	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④	—	50	

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 4.9mH, R_G = 25Ω, I_{AS} = -16A.

③ Pulse width ≤ 400μs; duty cycle ≤ 2%.

④ When mounted on 1 inch square copper board.

⑤ R_θ is measured at T_J of approximately 90°C.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

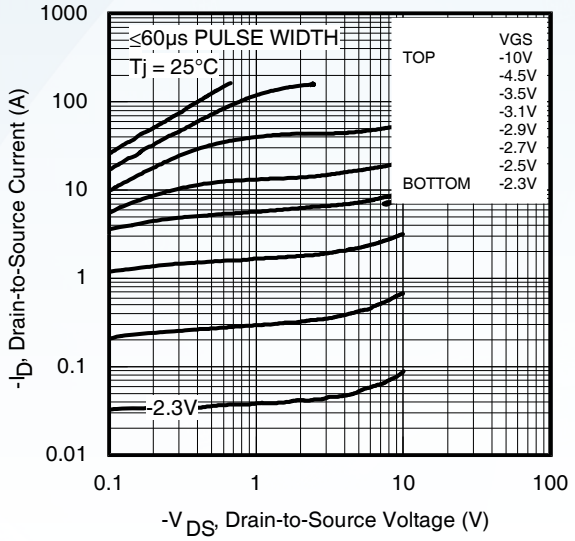


Fig 1. Typical Output Characteristics

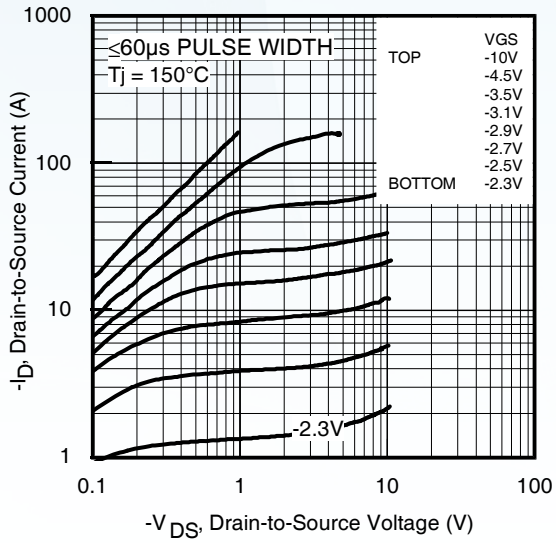


Fig 2. Typical Output Characteristics

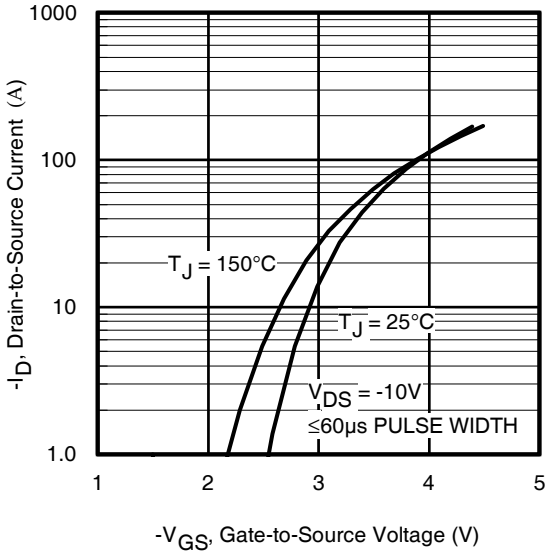


Fig 3. Typical Transfer Characteristics

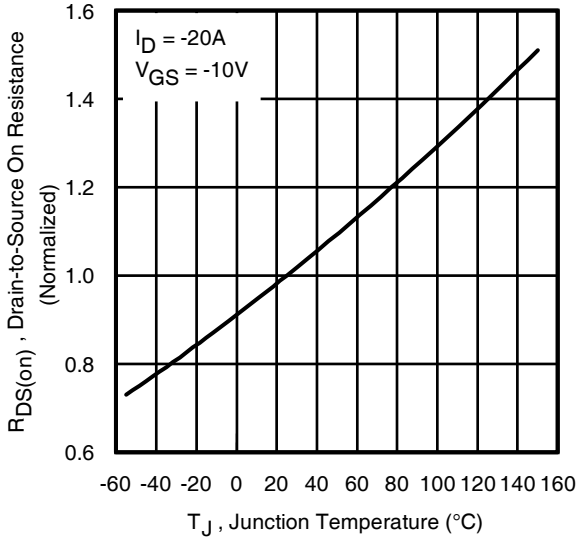


Fig 4. Normalized On-Resistance vs. Temperature

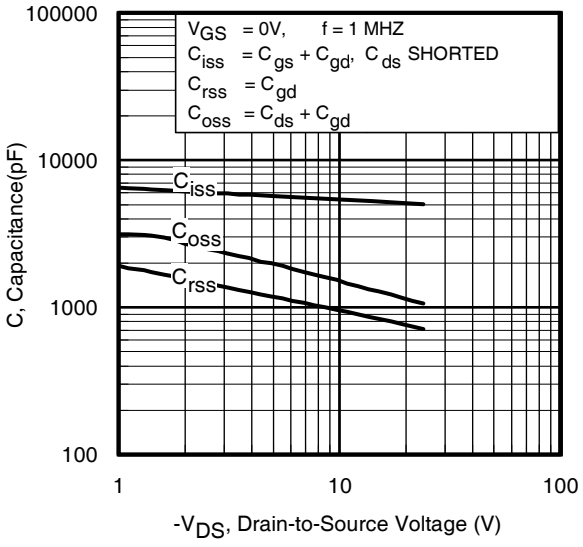


Fig 5. Typical Capacitance vs.Drain-to-Source Voltage

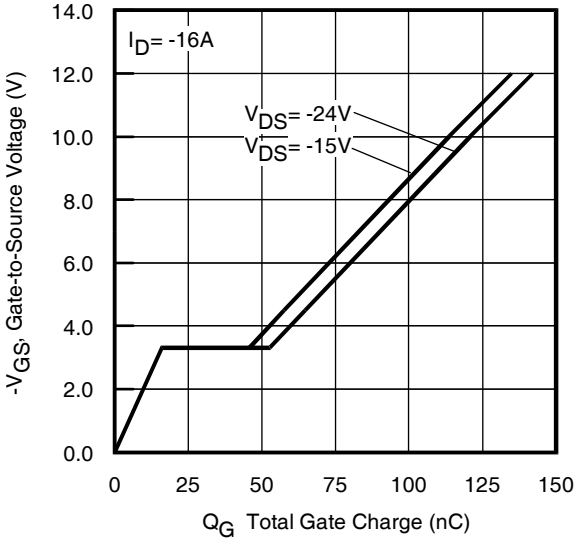


Fig 6. Typical Gate Charge vs.Gate-to-Source Voltage

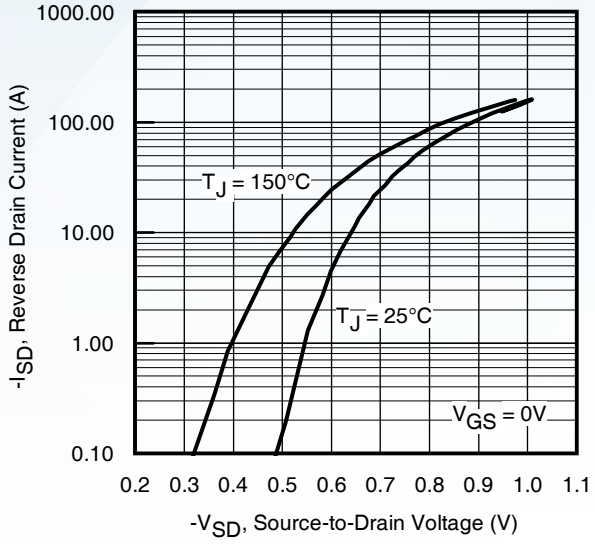


Fig 7. Typical Source-Drain Diode Forward Voltage

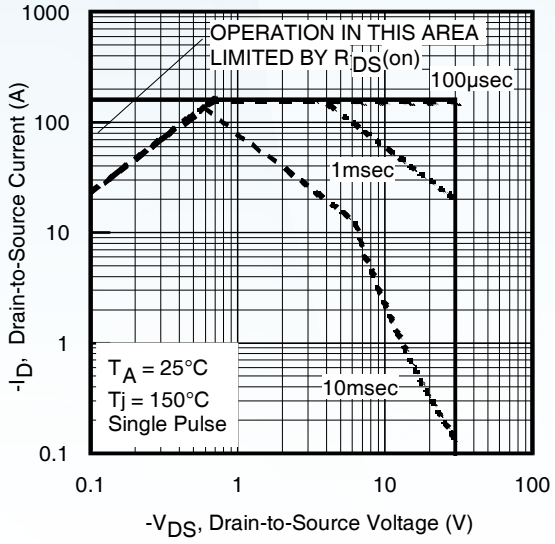


Fig 8. Maximum Safe Operating Area

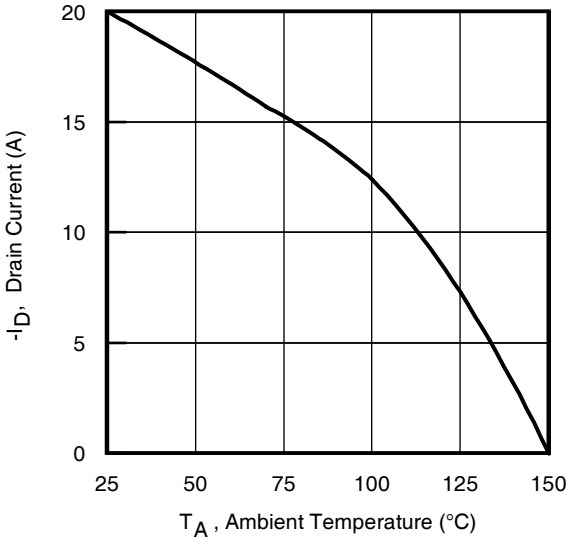


Fig 9. Maximum Drain Current vs. Ambient Temperature

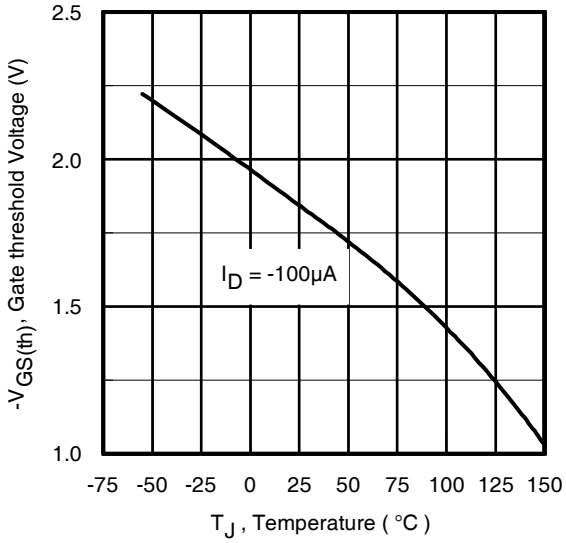


Fig 10. Threshold Voltage vs. Temperature

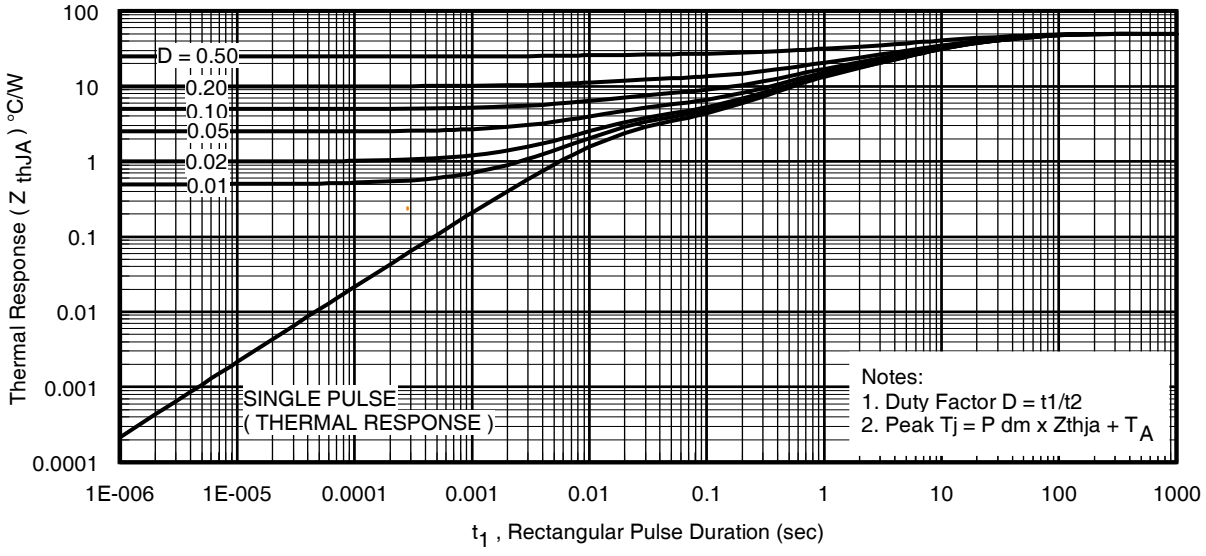


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

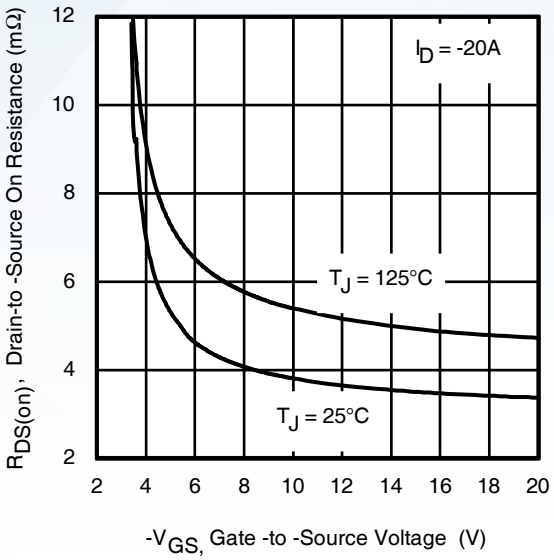


Fig 12. On-Resistance vs. Gate Voltage

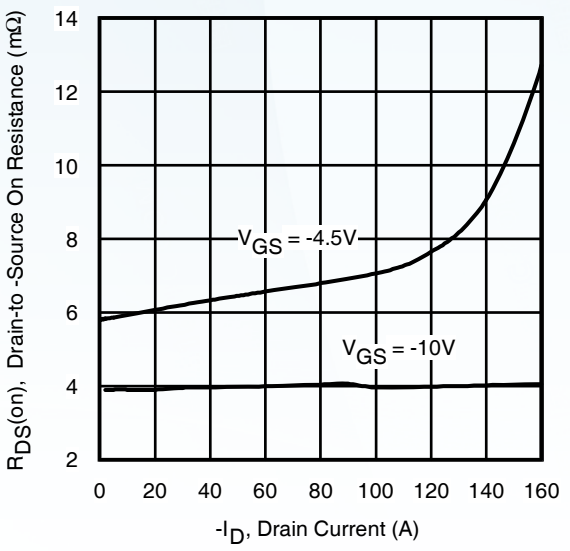


Fig 13. Typical On-Resistance vs. Drain Current

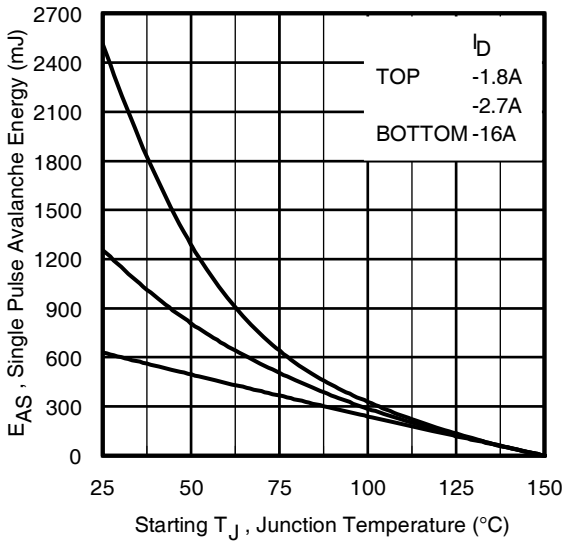


Fig 14. Maximum Avalanche Energy vs. Drain Current

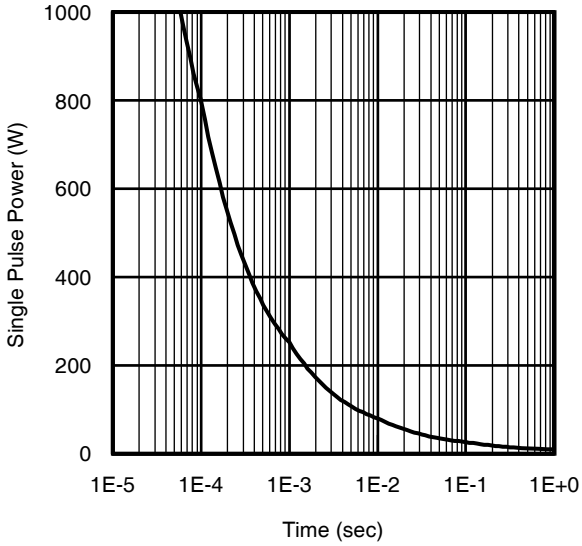


Fig 16. Typical Power vs. Time

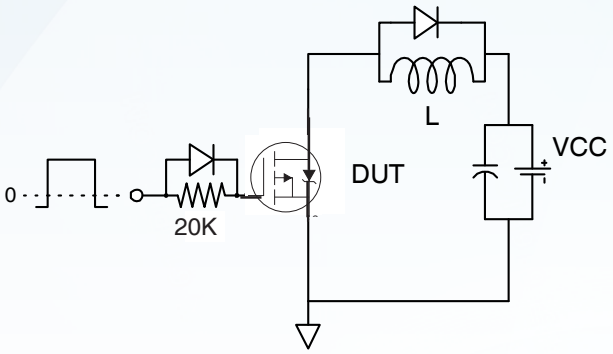


Fig 18a. Gate Charge Test Circuit

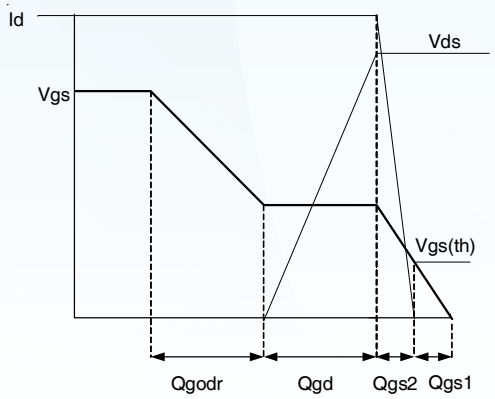


Fig 18b. Gate Charge Waveform

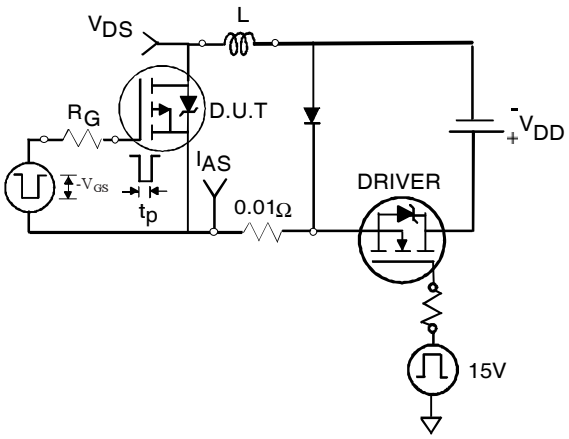


Fig 19a. Unclamped Inductive Test Circuit

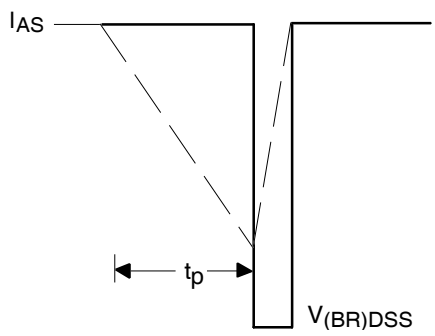


Fig 19b. Unclamped Inductive Waveforms

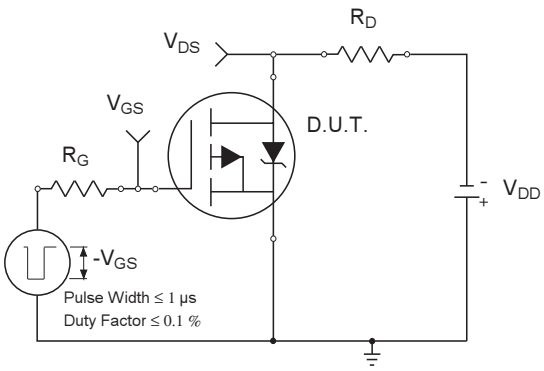


Fig 20a. Switching Time Test Circuit

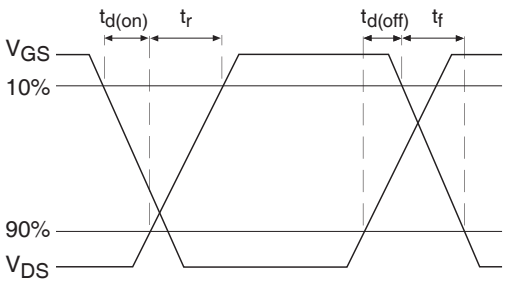
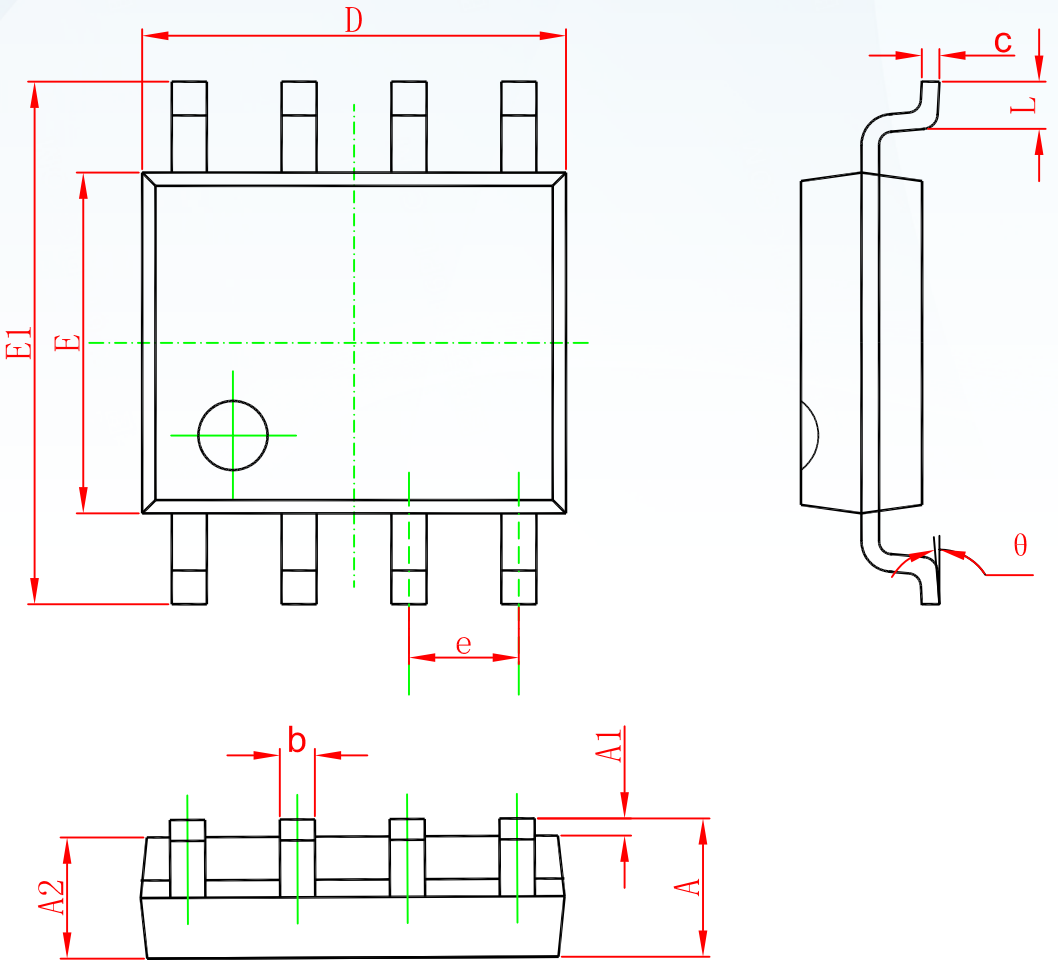


Fig 20b. Switching Time Waveforms

P-Channel 30 V (D-S) MOSFET

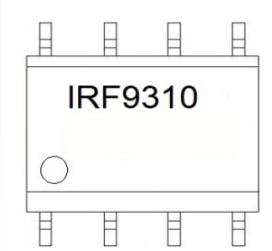
SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

P-Channel 30 V (D-S) MOSFET

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
IRF9310	SOP-8	3000	Tape and reel

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