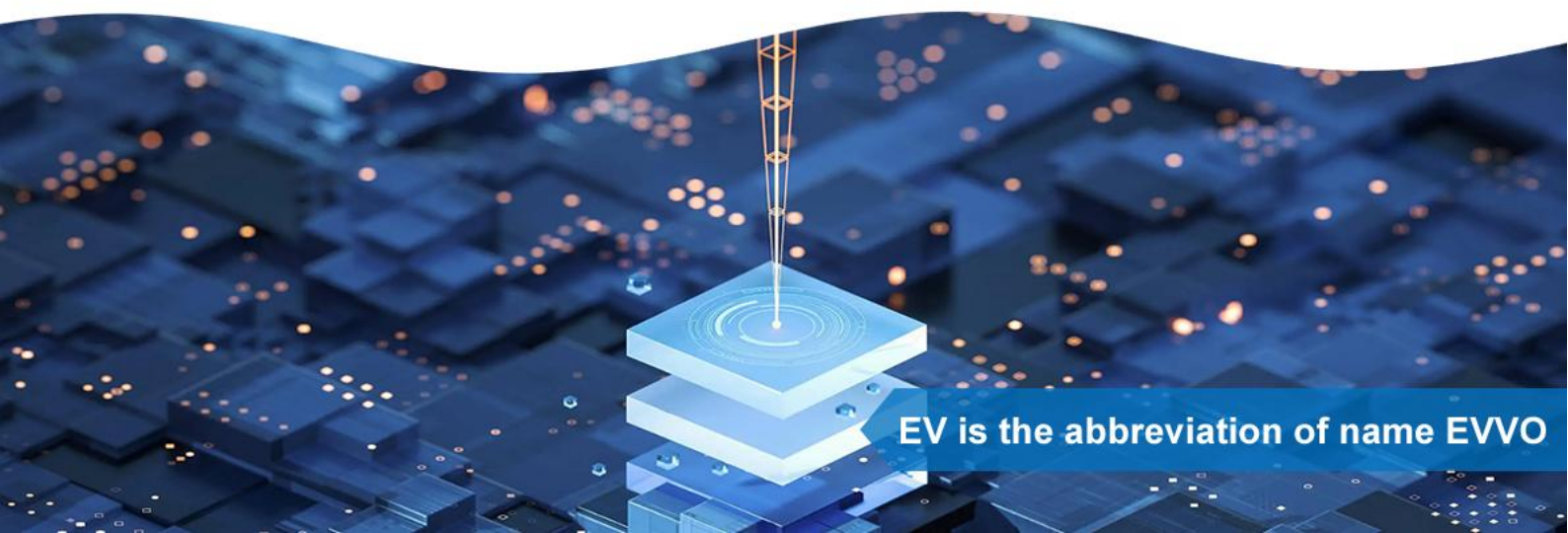
EVVOSEMI®
THINK CHANGE DO

ESD TVS MOS LDO Diode Sensor DC-DC

Product Specification

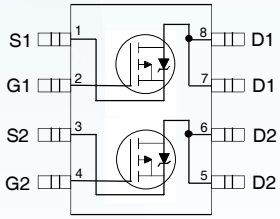
Domestic Part Number	IRF7304
Overseas Part Number	IRF7304
Equivalent Part Number	IRF7304



Dual P-Channel MOSFET

Features

- $V_{DS\ (V)}$ = -20V
- $R_{DS(ON)}$ < 90mΩ (V_{GS} =-4.5V)
- $R_{DS(ON)}$ < 140 m Ω (V_{GS} =-2.7V)
- Generation V Technology
- Ultra Low On-Resistance
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching
- Lead-Free



Top View

Description

The SOP-8 has been modified through a customized leadframe for enhanced thermacharacierstics and multip e-dle capabllity making it deal in a varety o powerapplications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phaseinfra red, or wave soldering technigues. Power dissipation of greater than 0.8W is possible in a typical PCB mount application.

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_A = 25°C	10 Sec. Pulsed Drain Current, V_{GS} @ -4.5V	-4.7	A
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ -4.5V	-4.3	
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ -4.5V	-3.4	
I_{DM}	Pulsed Drain Current ①	-17	
P_D @T_A = 25°C	Power Dissipation	2.0	W
	Linear Derating Factor	0.016	W/°C
V_{GS}	Gate-to-Source Voltage	±12	V
dv/dt	Peak Diode Recovery dv/dt ②	-5.0	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	℃

Thermal Resistance Ratings

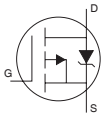
	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient④		62.5	°C/W

Dual P-Channel MOSFET

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-20			V	V_{GS} = 0V, ID = -250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		-0.012		V/°C	Reference to 25°C, I_D = -1mA
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance			90	mΩ	V_{GS} = -4.5V, I_D = -2.2A ③
		1		140		V_{GS} = -2.7V, I_D = -1.8A ③
$V_{GS(th)}$	Gate Threshold Voltage	-0.70			V	V_{DS} = V_{GS}, I_D = -250μA
g_{fs}	Forward Transconductance	4.0			S	V_{DS} = -16V, I_D = -2.2A
I_{DSS}	Drain-to-Source Leakage Current			-1.0	μA	V_{DS} = -16V, V_{GS} = 0V
				-25		V_{DS} = -16V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage			-100	nA	V_{GS} = -12V
	Gate-to-Source Reverse Leakage			100		V_{GS} = 12V
Q_g	Total Gate Charge			22	nC	I_D = -2.2A
Q_{gs}	Gate-to-Source Charge			3.3		V_{DS} = -16V
Q_{gd}	Gate-to-Drain ("Miller") Charge			9.0		V_{GS} = -4.5V, See Fig. 6 and 12 ③
$t_{d(on)}$	Turn-On Delay Time		8.4		ns	V_{DD} = -10V
t_r	Rise Time		26			I_D = -2.2A
$t_{d(off)}$	Turn-Off Delay Time		51			R_G = 6.0Ω
t	Fall Time		33			R = 4.5Ω, See Fig. 10 ③ D
L_{fD}	Internal Drain Inductance		4.0		nH	D
L_S	Internal Source Inductance		6.0			Between lead tip and center of die contact 
C_{iss}	Input Capacitance		610		pF	V_{GS} = 0V
C_{oss}	Output Capacitance		310			V_{DS} = -15V
C_{rss}	Reverse Transfer Capacitance		170			f = 1.0MHz, See Fig. 5

Source-Drain Ratings and 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			-17		
V_{SD}	Diode Forward Voltage			-1.0	V	T_J = 25°C, I_S = -1.8A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time		56	84	ns	T_J = 25°C, I_F = -2.2A
Q_{rr}	Reverse RecoveryCharge		71	110	nC	di/dt = 100A/μs ③
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② I_{SD} ≤ -2.2A, di/dt ≤– 50A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

③ Pulse width ≤ 300μs; duty cycle ≤ 2%.

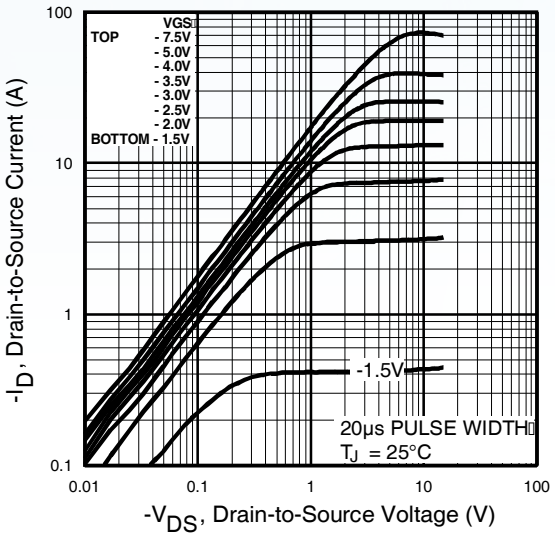


Fig 1. Typical Output Characteristics

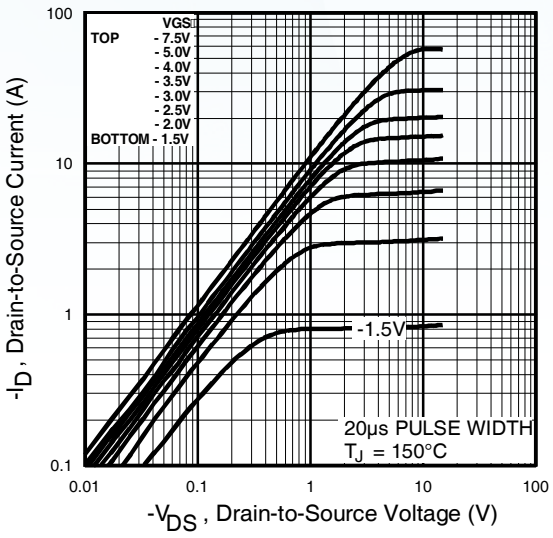


Fig 2. Typical Output Characteristics

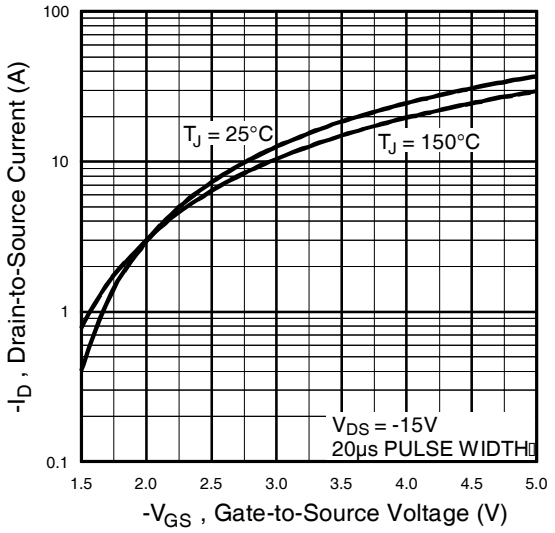


Fig 3. Typical Transfer Characteristics

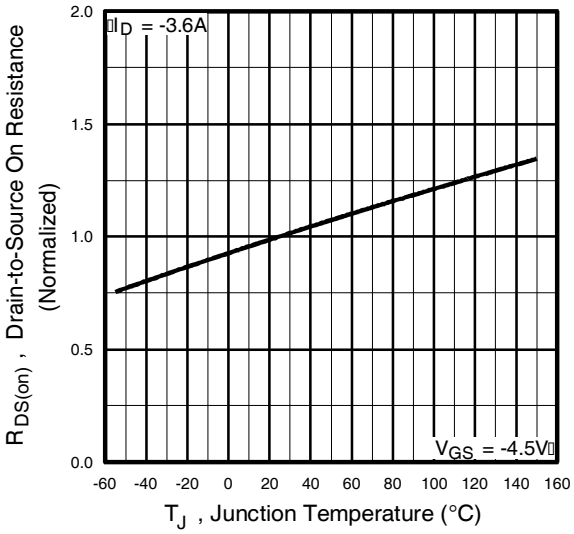


Fig 4. Normalized On-Resistance Vs. Temperature

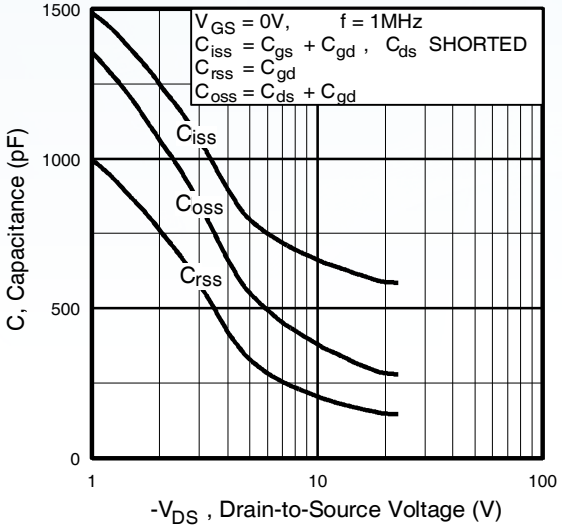


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

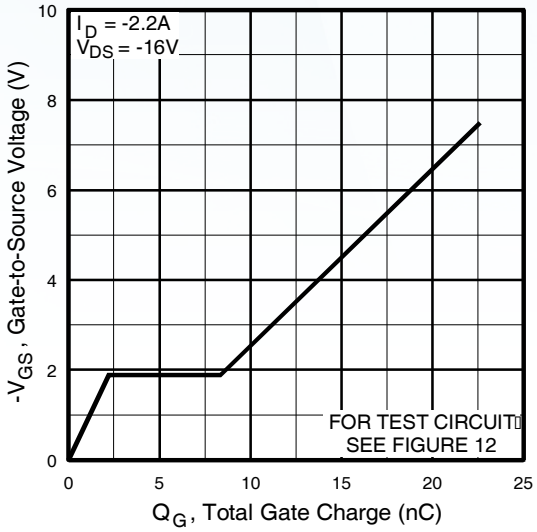


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

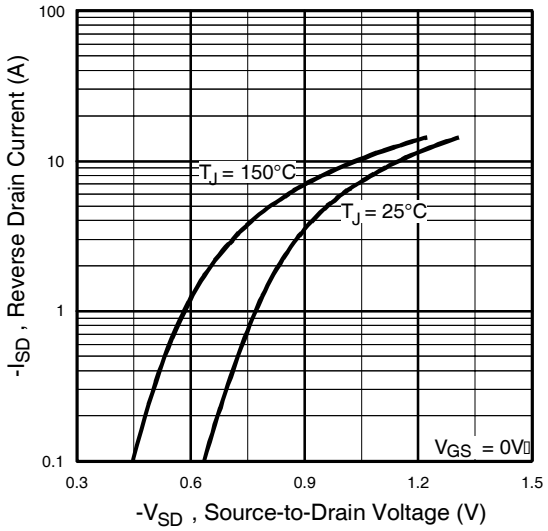


Fig 7. Typical Source-Drain Diode Forward Voltage

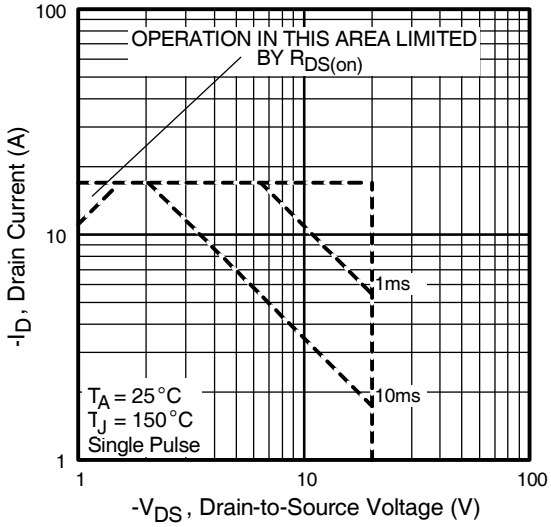


Fig 8. Maximum Safe Operating Area

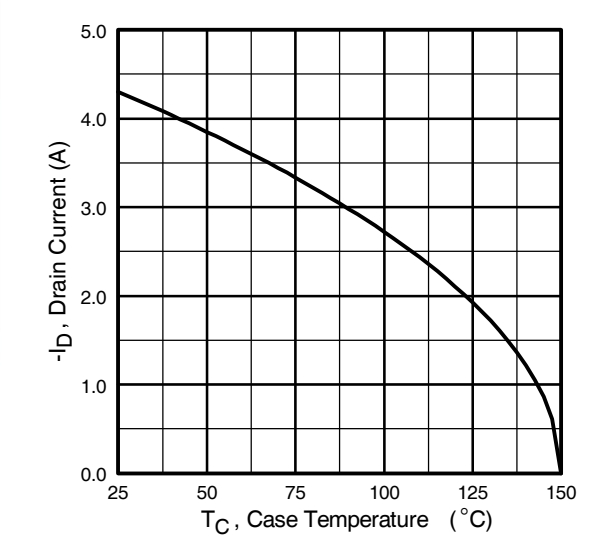


Fig 9. Maximum Drain Current Vs. Ambient Temperature

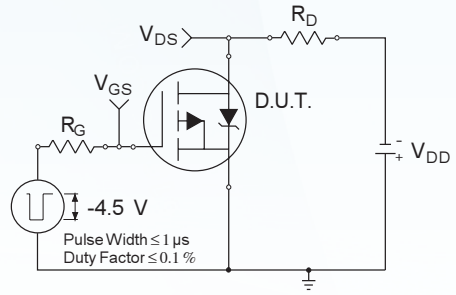


Fig 10a. Switching Time Test Circuit

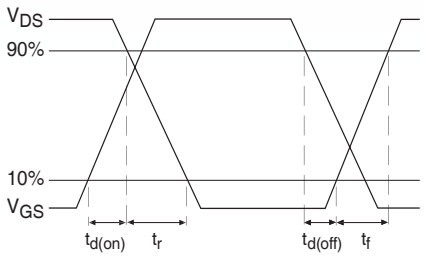


Fig 10b. Switching Time Waveforms

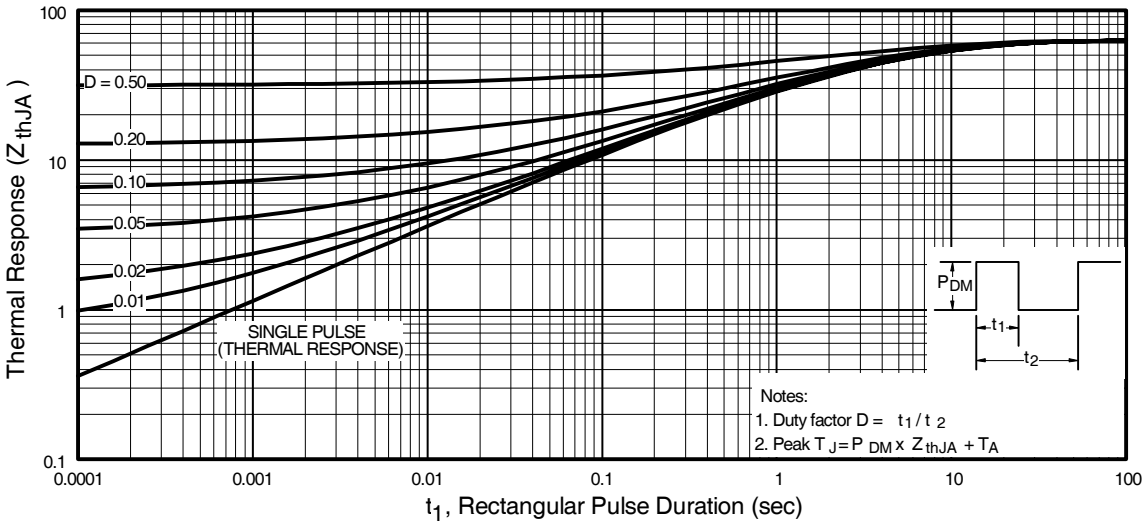


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

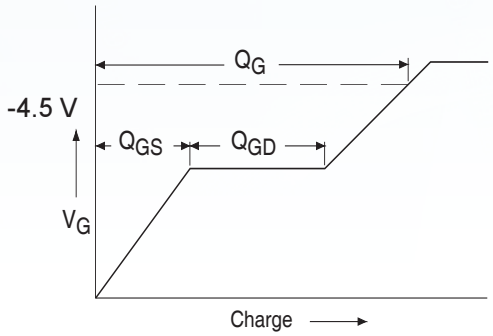


Fig 12a. Basic Gate Charge Waveform

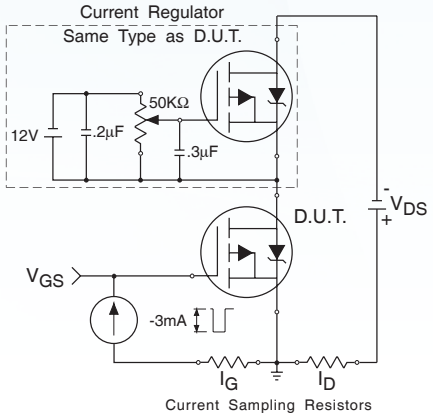
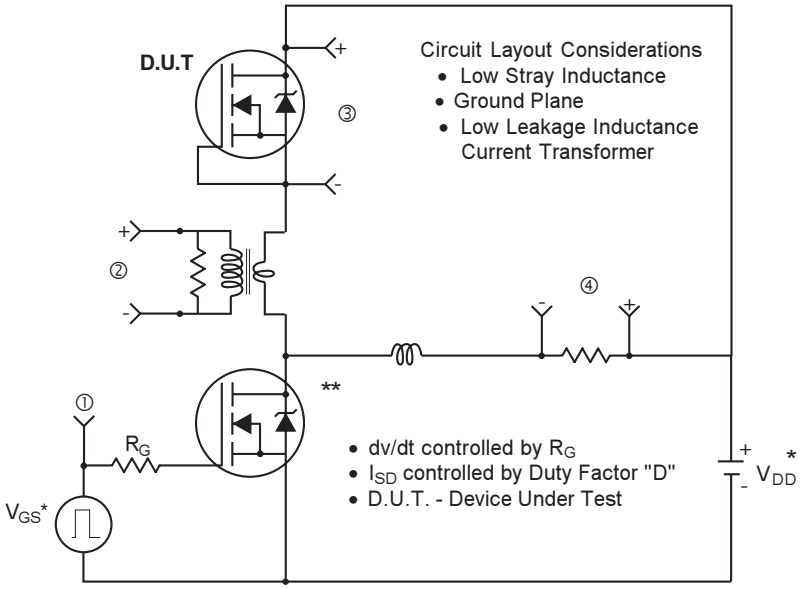


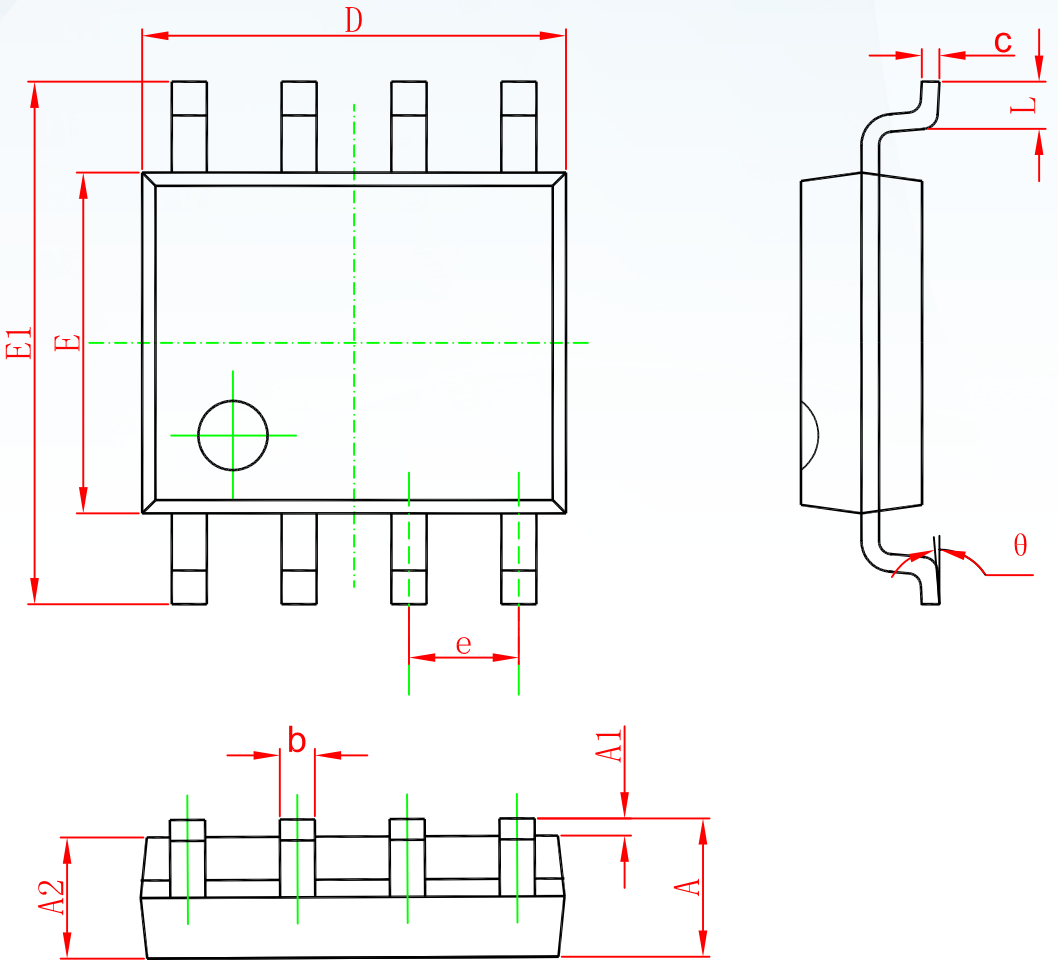
Fig 12b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



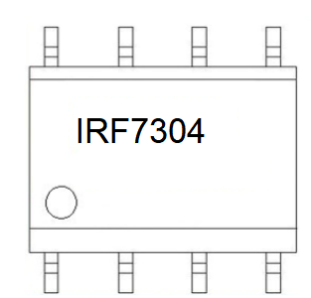
* Reverse Polarity for P-Channel
** Use P-Channel Driver for P-Channel Measurements

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°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
IRF7304	SOP-8	3000	Tape and reel

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