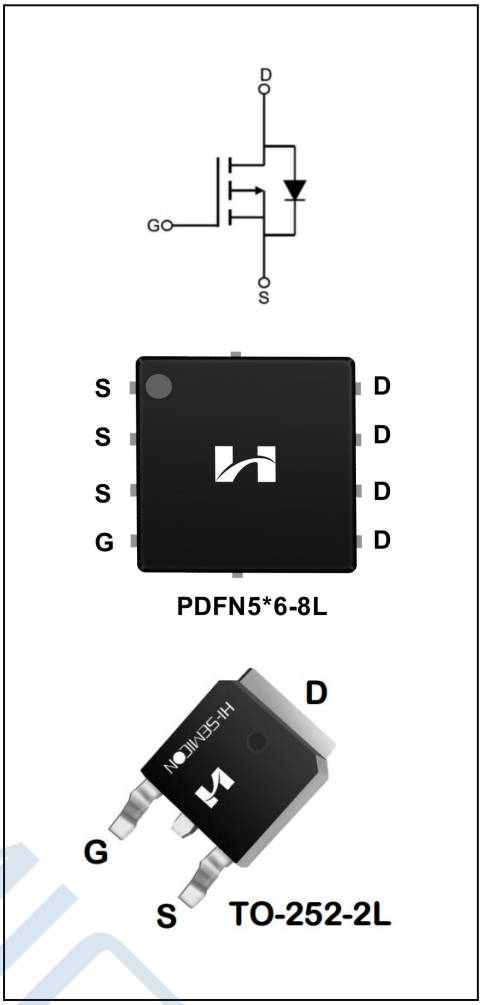
30V, 90A P-CHANNEL POWER MOSFET



GENERAL DESCRIPTION

The SFX3009PT uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.
It can be used in a wide variety applications.

Features

- ◆V_{DS}=-30V,I_D=-90A
- ◆$R_{DS(on)}$(PDFN5*6-8L)
  - TYP:3.9mΩ@V_{GS}=-10V
  - TYP:5.7mΩ@V_{GS}=-4.5V
- ◆$R_{DS(on)}$(TO-252-2L)
  - TYP:4.3mΩ@V_{GS}=-10V
  - TYP:6.2mΩ@V_{GS}=-4.5V

Applications

- ◆PWM Applications
- ◆Load Switch
- ◆Power Management

ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFM3009PT	PDFN5*6-8L	SFM3009PT	Pb Free	Reel
SFD3009PT	TO-252-2L	SFD3009PT	Pb Free	Reel

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current	T_C = 25°C	I_D	-90	A
	T_C = 100°C		-63	
Drain Current Pulsed(Note 1)		I_{DM}	-280	A
Power Dissipation(T_C=25°C)		P_D	55	W
-Derate above 25°C			0.44	W/℃
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	210	mJ
Operation Junction Temperature Range		T_J	-55～+150	°C
Storage Temperature Range		T_{stg}	-55～+150	°C
Maximum lead temperature for soldering purposes,1/8" from case for 5 seconds		TL	300	℃

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.3	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	52	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V, I_D=-250μA	-30	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-30V, V_{GS}=0V	--	--	1	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=20V, V_{DS}=0V	--	--	100	nA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=-20V, V_{DS}=0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D=2-50μA	-1.0	-1.6	-2.5	V
Static Drain- Source On State Resistance (PDFN5*6-8L)	$R_{DS(on)}$	V_{GS}=-10V, I_D=-30A	--	3.9	5.5	mΩ
		V_{GS}=4.5V, I_D=-20A	--	5.7	9	
Static Drain- Source On State Resistance (TO-252-2L)	$R_{DS(on)}$	V_{GS}=-10V, I_D=-30A	--	4.3	5.5	
		V_{GS}=4.5V, I_D=-20A	--	6.2	9	
Dynamic Characteristics						
Gate Resistance	Rg	V_{GS}=0V; f=1.0MHZ	--	2.5	--	Ω
Input Capacitance	C_{iss}	V_{DS}=-15V V_{GS}=0V f=1.0MHZ	--	6572	--	pF
Output Capacitance	C_{oss}		--	763	--	
Reverse Transfer Capacitance	C_{rss}		--	750	--	
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V, I_D=-30A V_{GS}=-10V, R_G=2.5Ω (Note 3.4)	--	11.1	--	ns
Turn-on Rise Time	t_r		--	12.8	--	
Turn-off Delay Time	$t_{d(off)}$		--	52.2	--	
Turn-off Fall Time	t_f		--	21.4	--	

Total Gate Charge	Q_g	V_{DS}=-15V, I_D=-30A	--	30.2	--	nc
Gate-Source Charge	Q_{gs}	V_{GS}=-10V	--	6.2	--	
Gate-Drain Charge	Q_{gd}	(Note 3.4)	--	7.9	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	-90	A
Pulsed Source Current	I_{SM}		--	--	-360	
Diode Forward Voltage	V_{SD}	I_S=-30A,V_{GS}=0V	--	0.85	-1.4	V
Reverse Recovery Time	T_{rr}	I_F=-15A,V_R=-15V, dIF/dt=100A/μS	--	32	--	ns
Reverse Recovery Charge	Q_{rr}		--	22.5	--	nC

1.Pluse width limited by maximum junction temperature

2.L=0.5mH, V_{DD}=-15V, V_G=-10V, R_G=25Ω, starting T_J=25°C

3.Pulse Test: Pulse width ≤300μs, Duty cycle≤2%

4.Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1: Output Characteristics

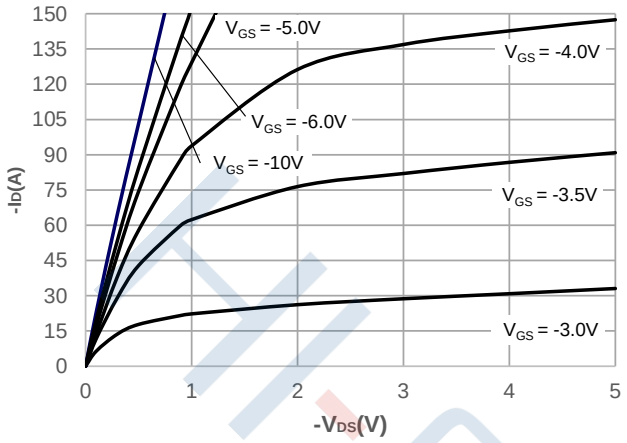


Figure 2: Typical Transfer Characteristics

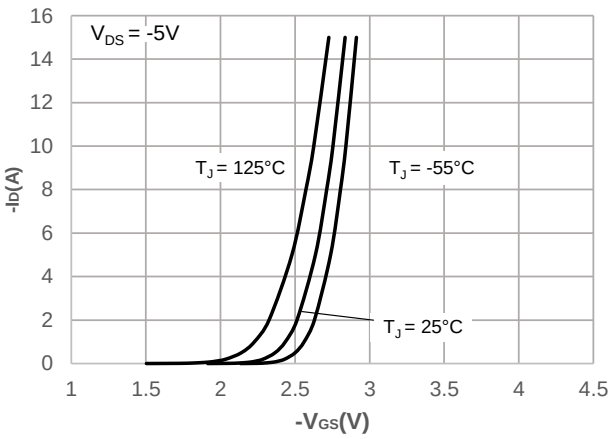


Figure 3: On-resistance vs. Drain Current

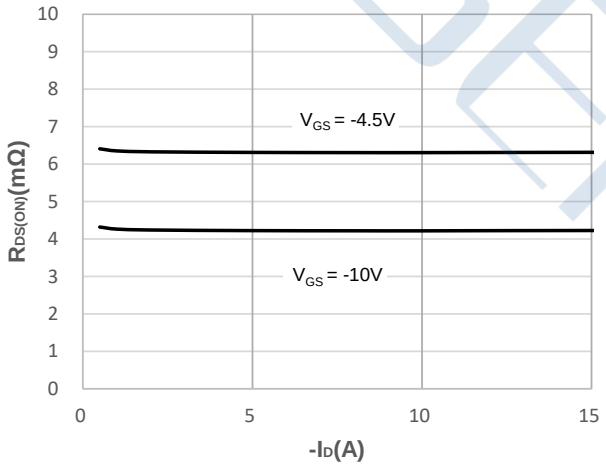


Figure 4: Body Diode Characteristics

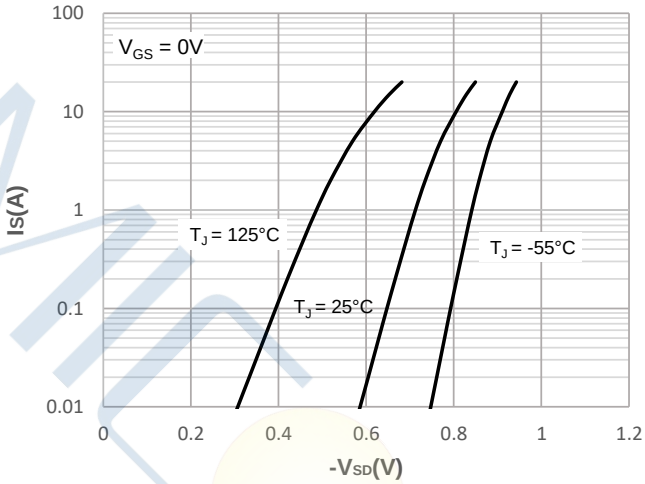


Figure 5: Gate Charge Characteristics

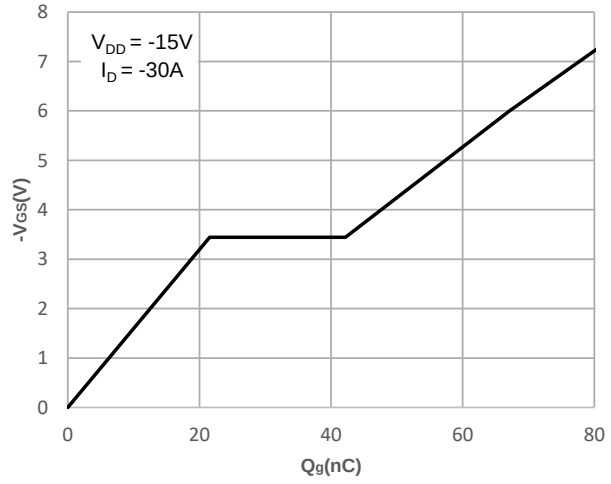
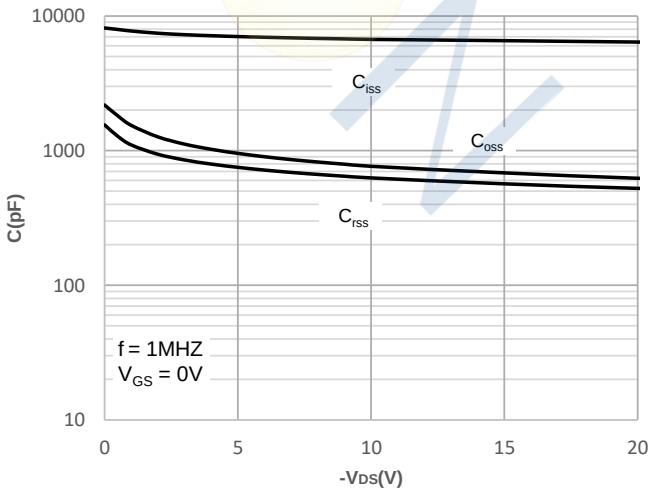


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

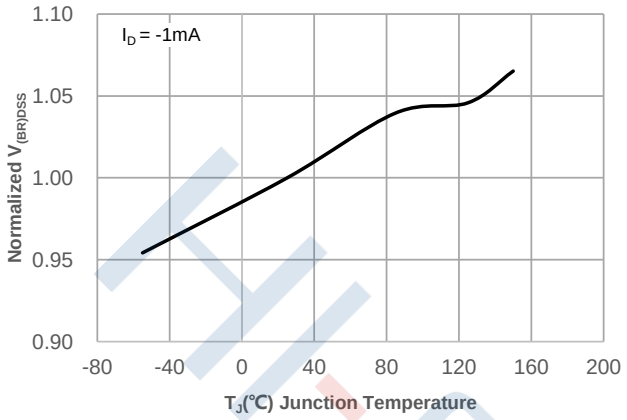


Figure 8: Normalized on Resistance vs. Junction Temperature

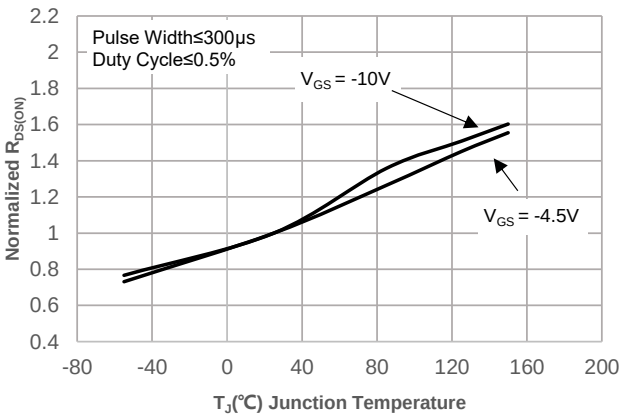


Figure 9: Normalized Threshold Voltage vs. Junction Temperature

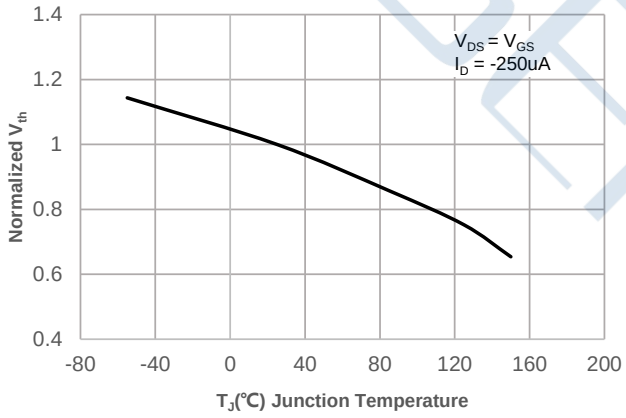


Figure 10: $R_{DS(ON)}$ vs. V_{GS}

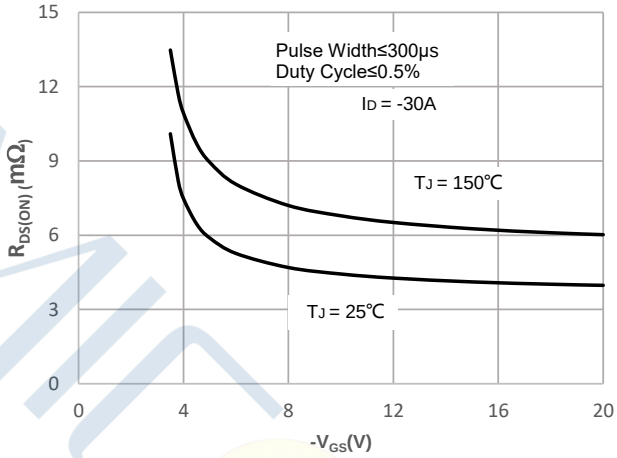
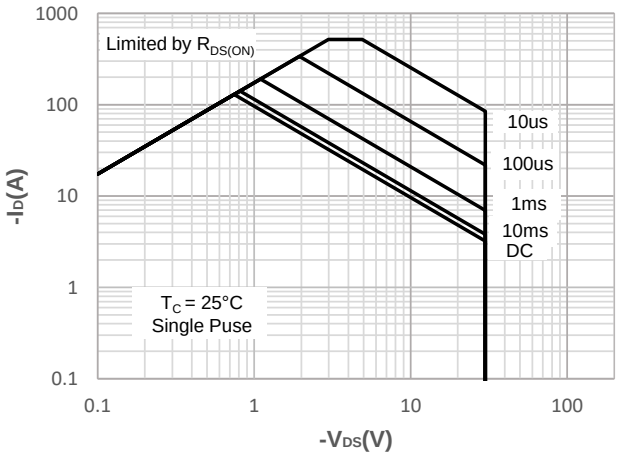


Figure 11: Maximum Safe Operating Area



Test Circuit

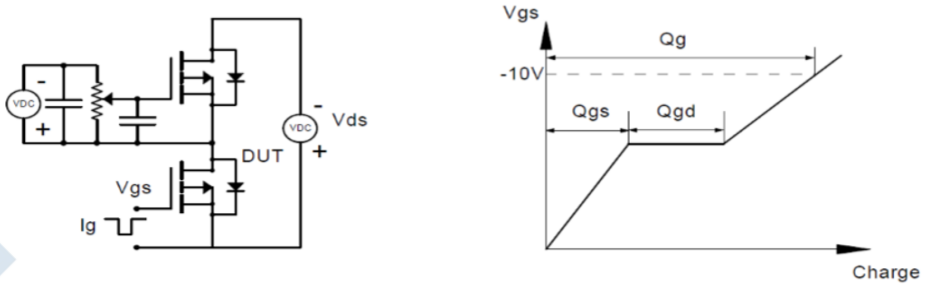


Figure 1: Gate Charge Test Circuit & Waveform

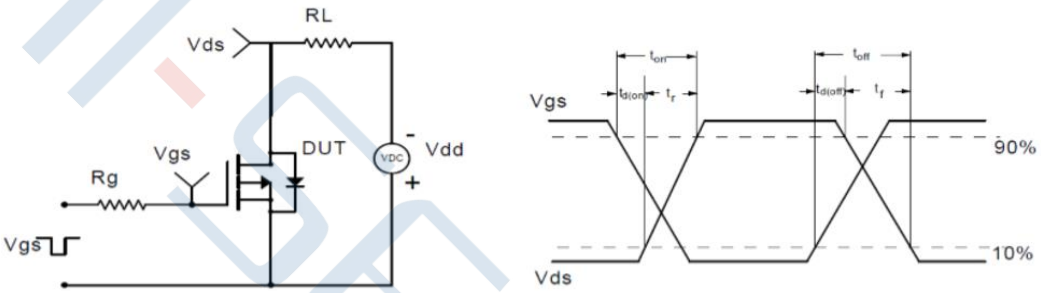


Figure 2: Resistive Switching Test Circuit & Waveform

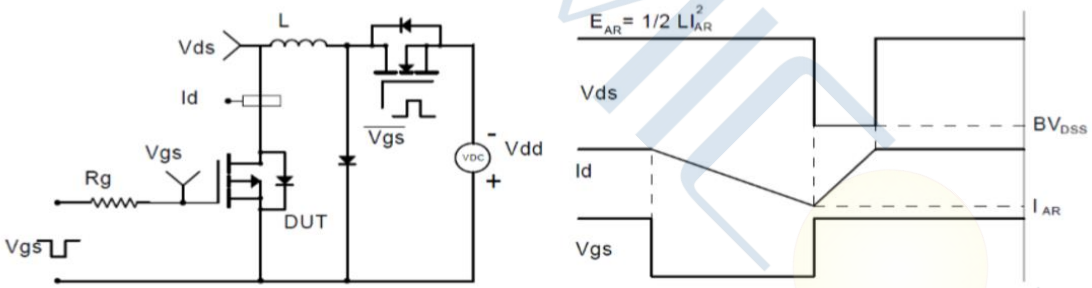


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

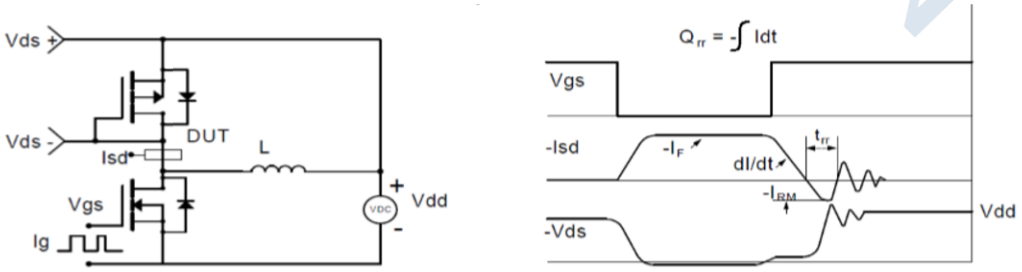
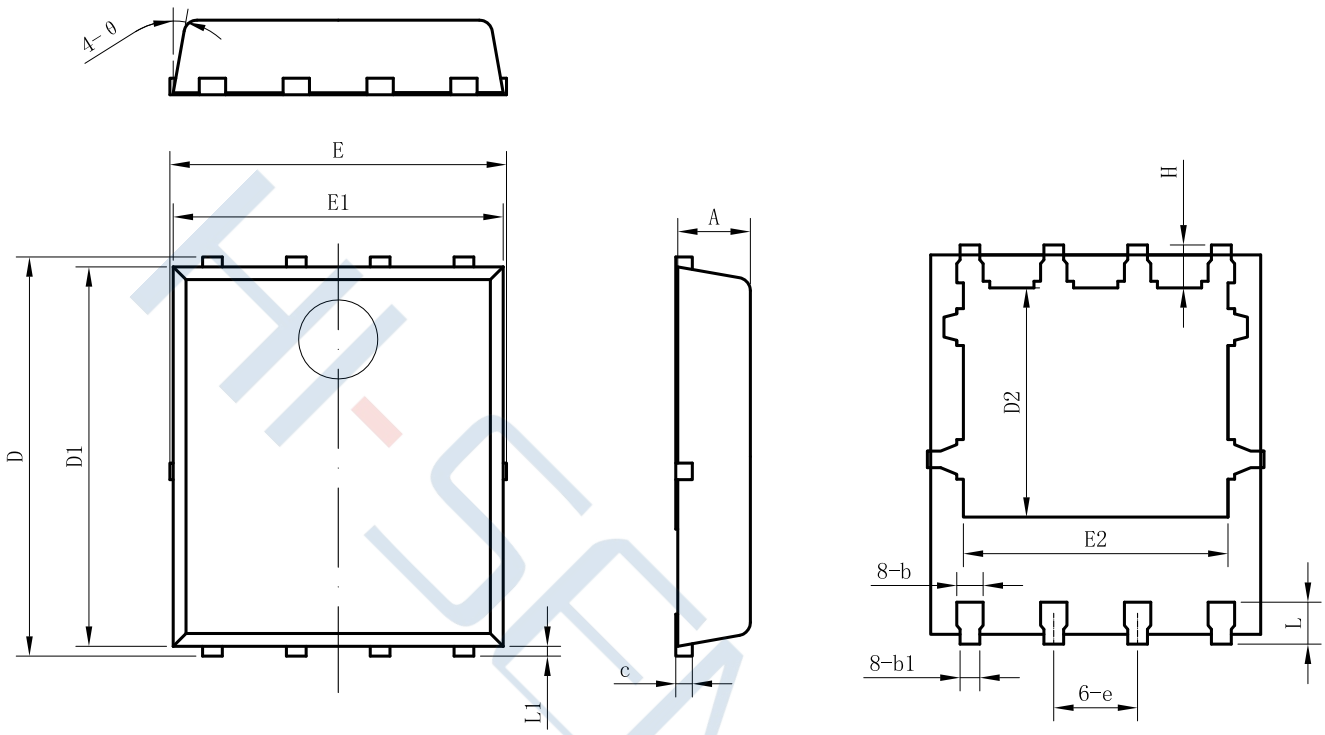


Figure 4: Diode Recovery Test Circuit & Waveform

Package Dimensions of PDFN5*6-8L

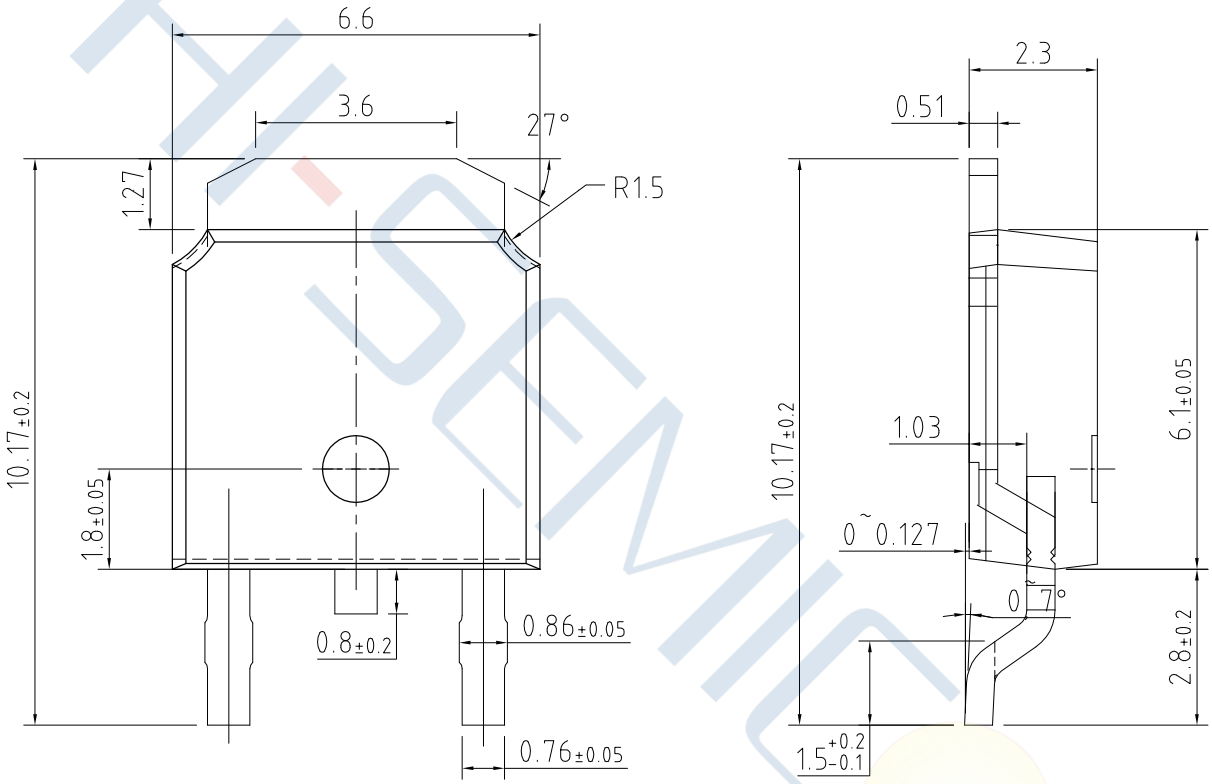


COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.0	1.1	1.2
b	0.35	0.4	0.45
b1		(0.3)	
c	0.2	0.25	0.35
D	5.9	6.05	6.2
D1	5.65	5.75	5.85
D2		(3.475)	
E			5.2
E1	4.9	5	5.1
E2		(4.01)	
e		1.27BSC	
H	0.5	0.65	0.75
L	0.51	0.635	0.75
L1		0.15	
θ		10°	

Package Dimensions of TO-252-2L

Unit:mm



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