

30V, 90A P-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

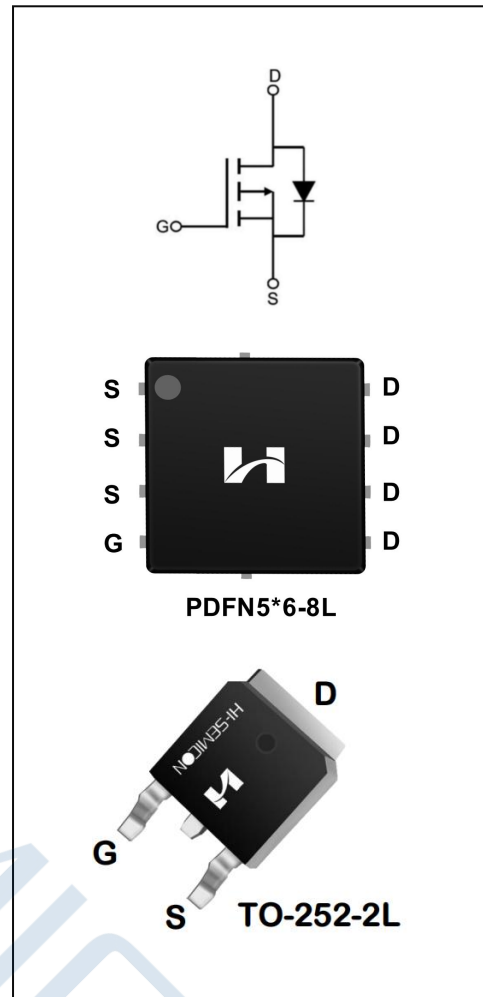
The SFX3009PT uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety applications.

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/°C
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	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	R _{θJC}	2.3	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	52	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _{VDS}	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	R _g	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	$V_{DS}=-15V, I_D=-30A$ $V_{GS}=-10V$ (Note 3.4)	--	30.2	--	nc
Gate-Source Charge	Q_{gs}		--	6.2	--	
Gate-Drain Charge	Q_{gd}		--	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}	$I_F=-15A, V_R=-15V,$ $dI_F/dt=100A/\mu S$	--	32	--	ns
Reverse Recovery Charge	Q_{rr}		--	22.5	--	nC

1. Pulse width limited by maximum junction temperature
2. $L=0.5mH, V_{DD}=-15V, V_G=-10V, R_G=25\Omega,$ starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s,$ Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1: Output Characteristics

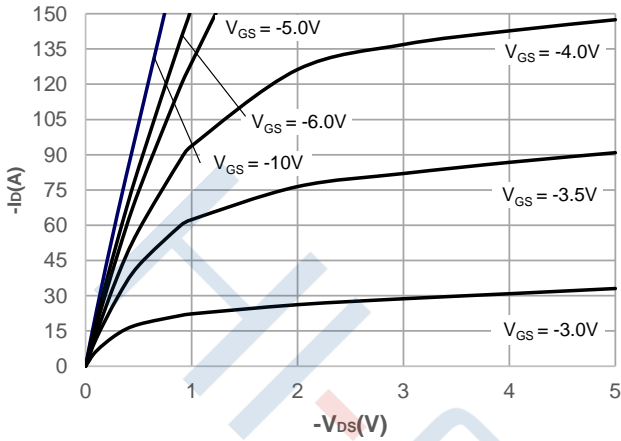


Figure 2: Typical Transfer Characteristics

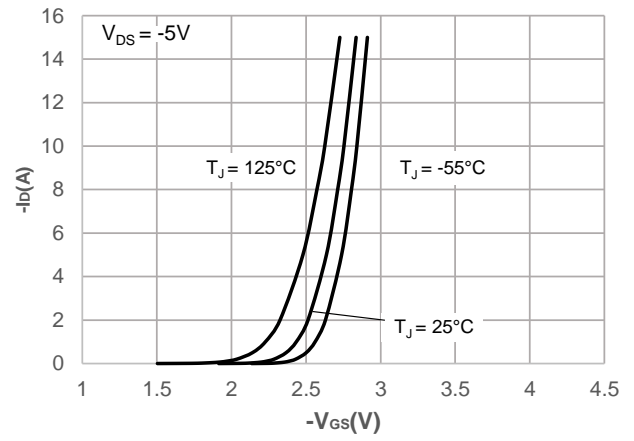


Figure 3: On-resistance vs. Drain Current

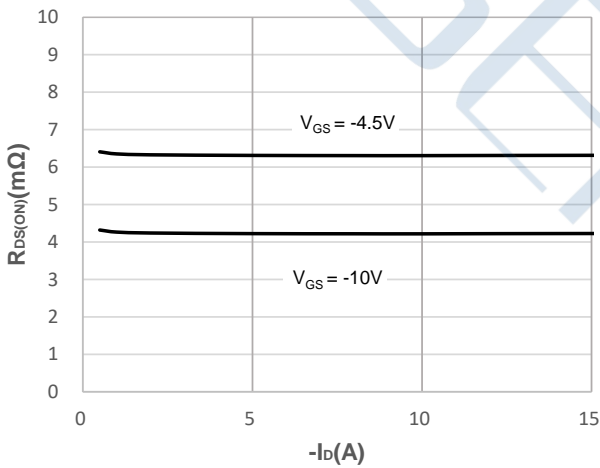


Figure 4: Body Diode Characteristics

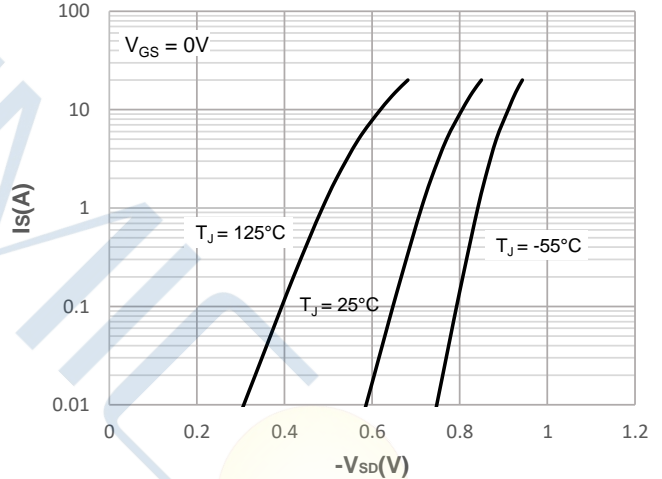


Figure 5: Gate Charge Characteristics

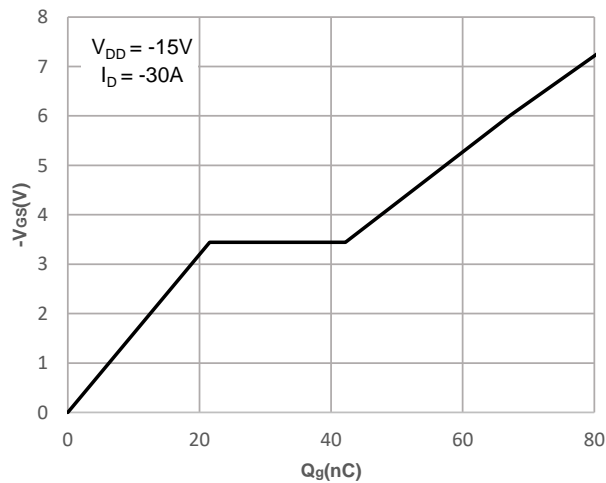
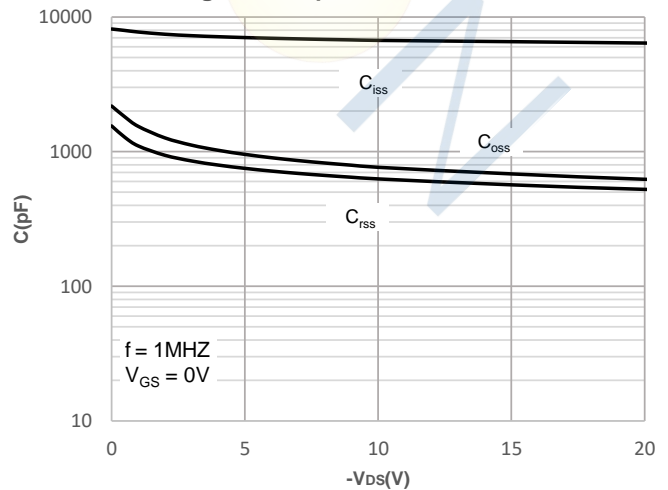


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

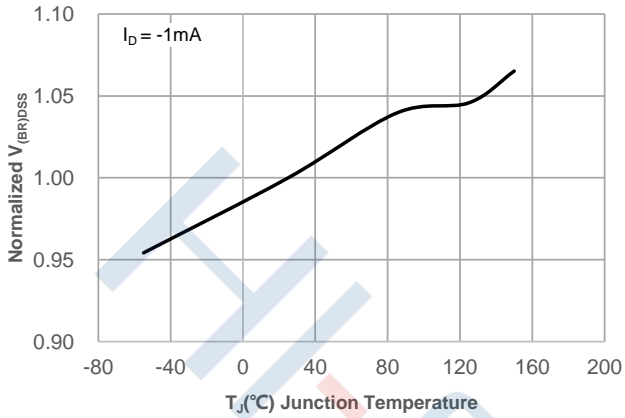


Figure 8: Normalized on Resistance vs. Junction Temperature

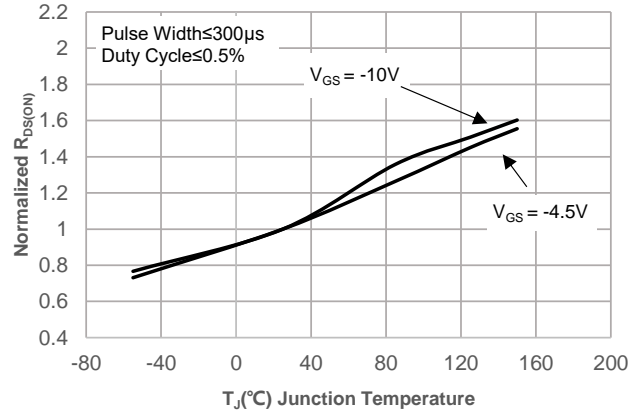


Figure 9: Normalized Threshold Voltage vs. Junction Temperature

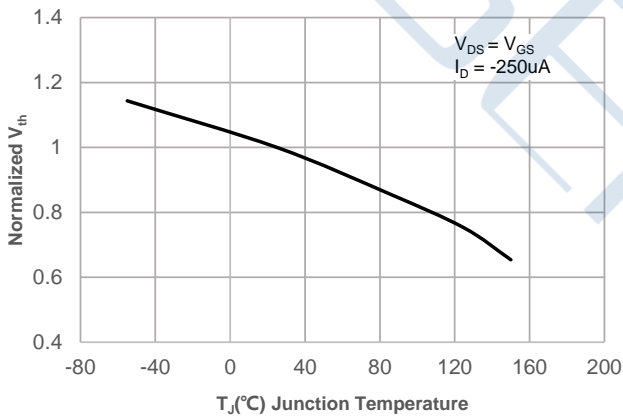


Figure 10: R_{DS(ON)} vs. V_{GS}

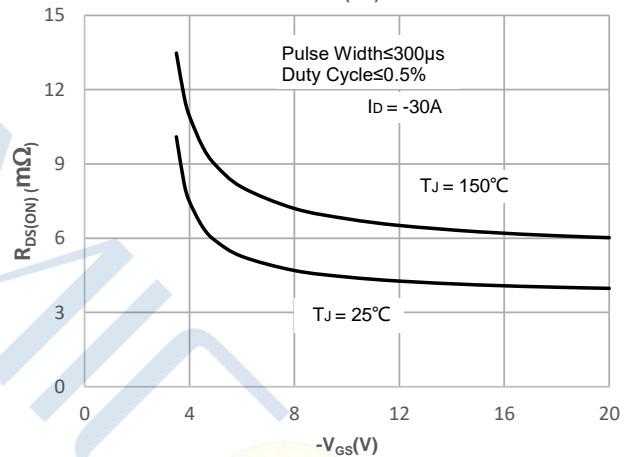
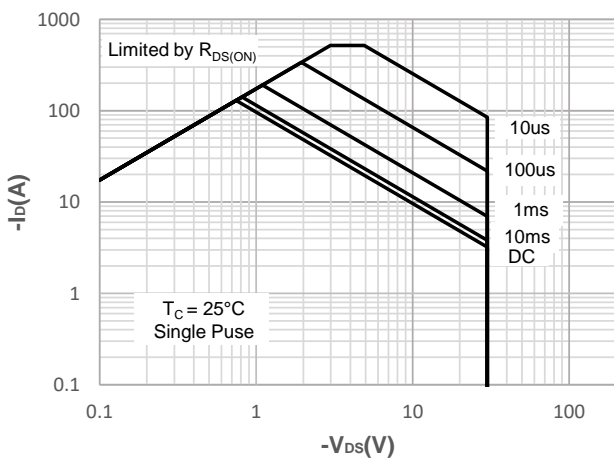


Figure 11: Maximum Safe Operating Area



Test Circuit

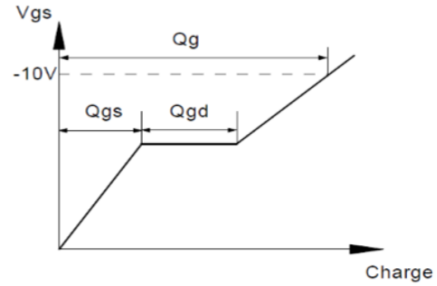
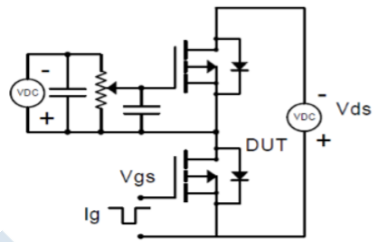


Figure 1: Gate Charge Test Circuit & Waveform

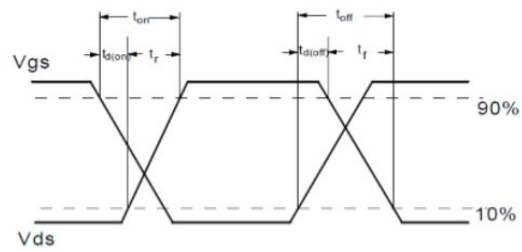
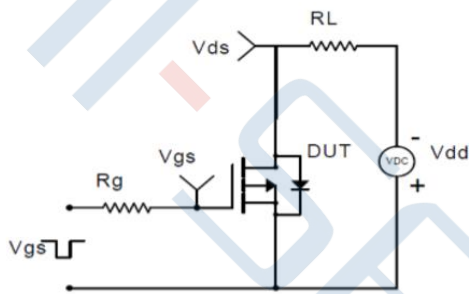


Figure 2: Resistive Switching Test Circuit & Waveform

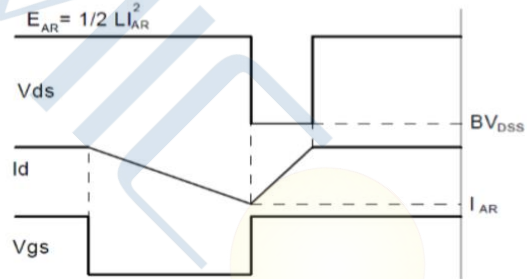
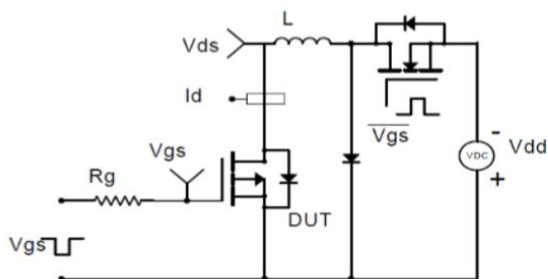


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

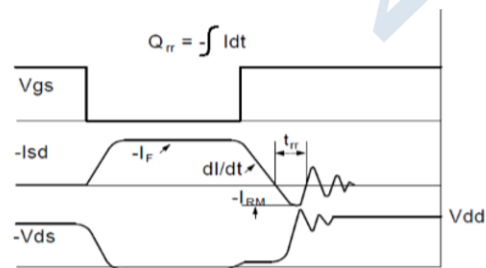
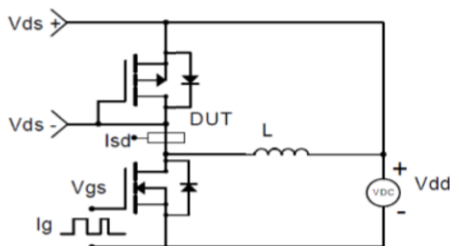
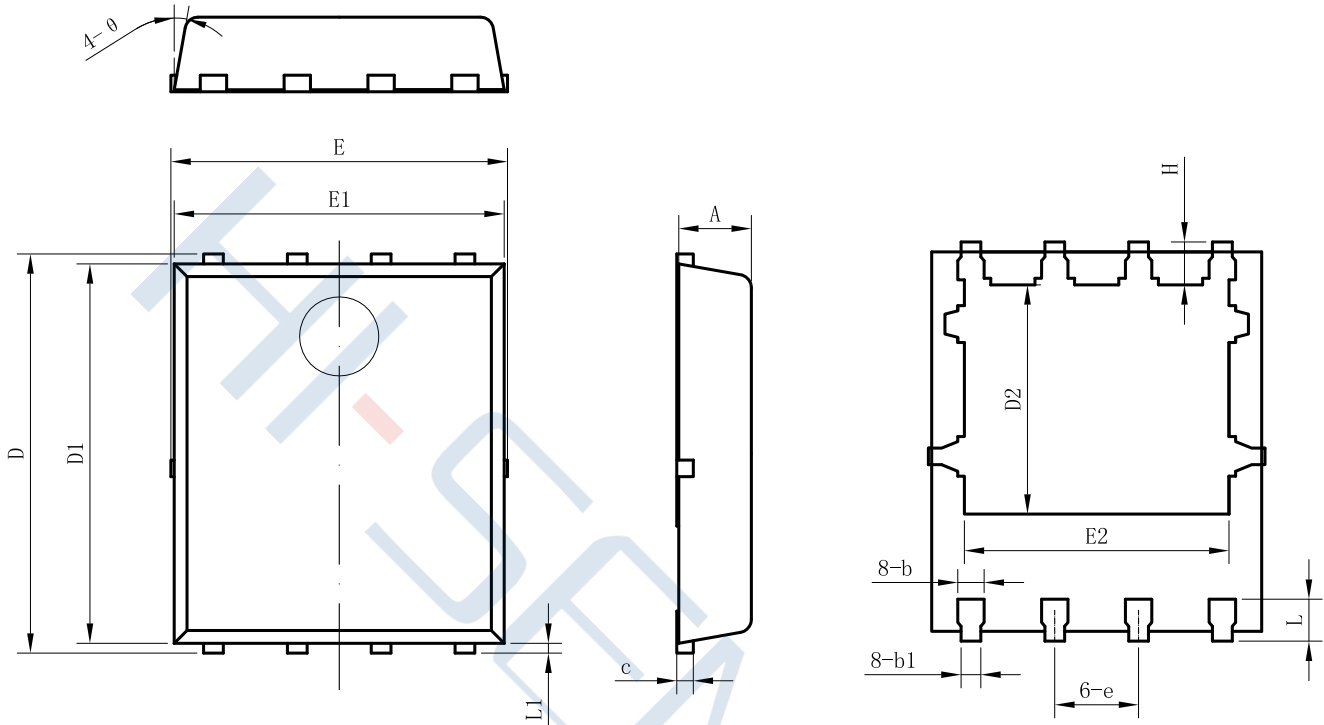


Figure 4: Diode Recovery Test Circuit & Waveform

Package Dimensions of PDFN5*6-8L

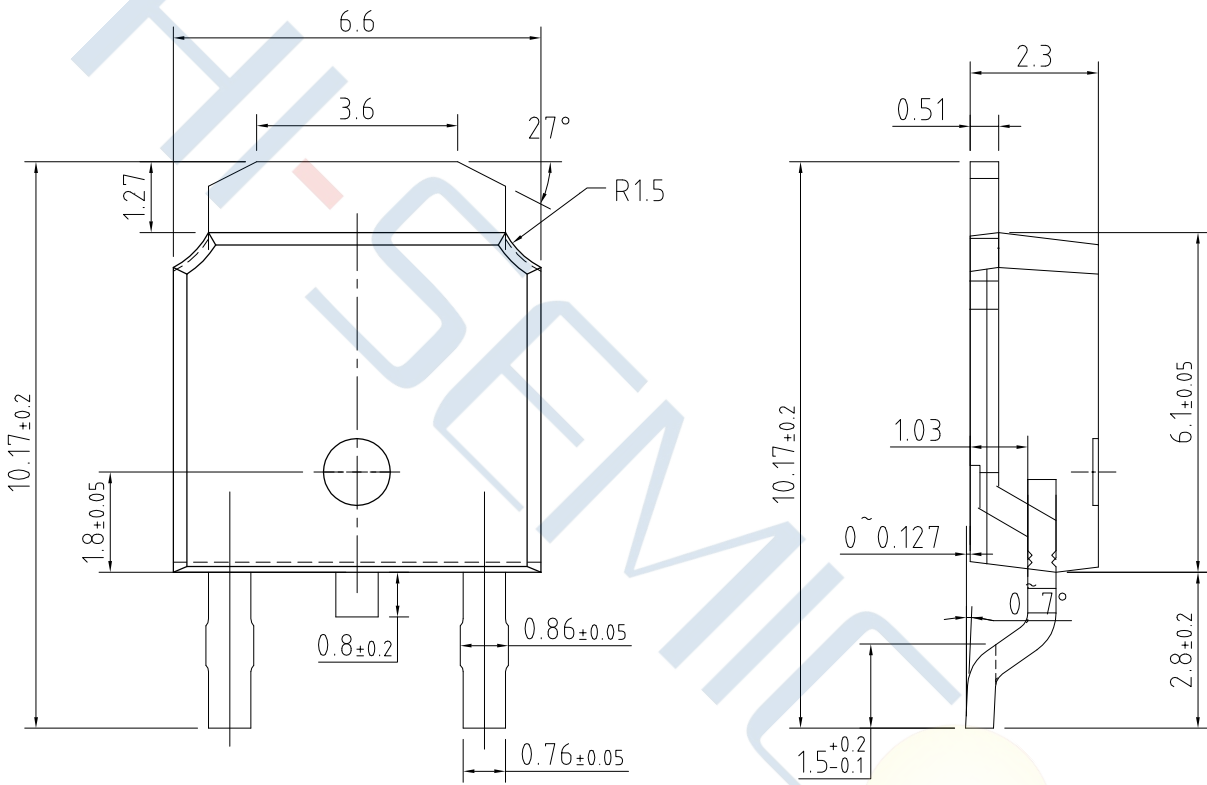


COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

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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