

-20V, -50A P-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

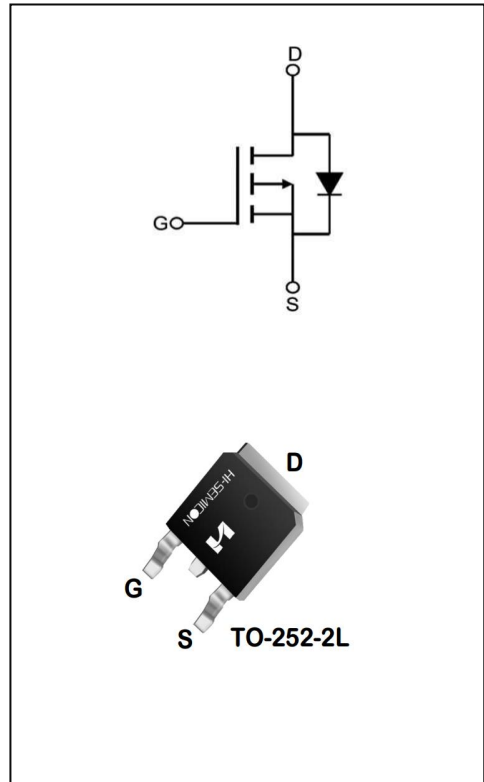
The SFD2005PT uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety applications.

Features

- ◆ $V_{DS}=-20V, I_D=-50A$
- ◆ $R_{DS(on)}$
 TYP:5.4mΩ@ $V_{GS}=-4.5V$
 TYP:8.0mΩ@ $V_{GS}=-2.5V$

Applications

- ◆ PWM Applications
- ◆ Load Switch



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFD2005PT	TO-252-2L	SFD2005PT	Pb Free	Reel

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

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V _{DS}	-20	V
Gate-Source Voltage		V _{GS}	±12	V
Drain Current	T _C = 25°C	I _D	-50	A
	T _C = 100°C		-35	
Drain Current Pulsed(Note 1)		I _{DM}	-200	A
Power Dissipation(T _C =25°C)		P _D	70	W
Single Pulsed Avalanche Energy (Note 2)		E _{AS}	306	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}	1.78	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	°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	-20	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-20V, V _{GS} =0V	--	--	-1	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =12V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-12V, V _{DS} =0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =-250μA	-0.5	-0.85	-1.2	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =-4.5V, I _D =-15A	--	5.4	7.0	mΩ
		V _{GS} =-2.5V, I _D =-12A	--	8.0	10	
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V, f=1.0MHZ	--	6.0	--	Ω
Input Capacitance	C _{iss}	V _{DS} =-10V V _{GS} =0V f=1.0MHZ	--	4536	--	pF
Output Capacitance	C _{oss}		--	512	--	
Reverse Transfer Capacitance	C _{rss}		--	438	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-10V, V _{GS} =-10V R _G =2.5Ω, I _D =-15A	--	8.2	--	ns
Turn-on Rise Time	t _r		--	58.6	--	
Turn-off Delay Time	t _{d(off)}		--	105	--	
Turn-off Fall Time	t _f		--	43.7	--	

Total Gate Charge	Q_g	$V_{DS}=-10V, I_D=-15A$ $V_{GS}=-4.5V$	--	43.5	--	nc
Gate-Source Charge	Q_{gs}		--	7.6	--	
Gate-Drain Charge	Q_{gd}		--	9.8	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Revers P-N Junction Diode in the MOSFET	--	--	-50	A
Pulsed Source Current	I_{SM}		--	--	-200	
Diode Forward Voltage	V_{SD}	$I_S=-15A, V_{GS}=0V$	--	-0.8	-1.2	V
Reverse Recovery Time	T_{rr}	$T_J=25^\circ C, I_{SD}=-15A, V_{GS}=0V$ $di/dt=-100A/\mu s$	--	18	--	ns
Reverse Recovery Charge	Q_{rr}		--	7.7	--	nC

1. Pulse width limited by maximum junction temperature
2. $L=0.5mH, V_{DD}=-10V, V_G=-10V, R_G=25\Omega$, 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

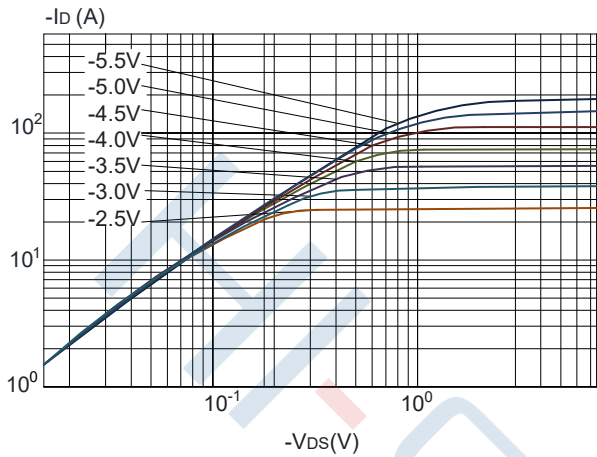


Figure 2: Typical Transfer Characteristics

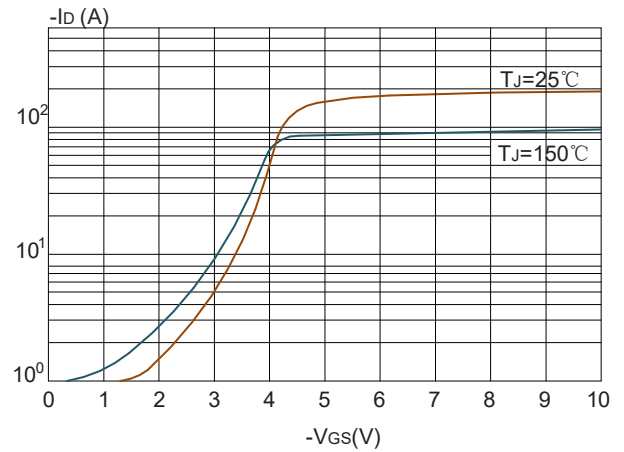


Figure 3: On-resistance vs. Drain Current

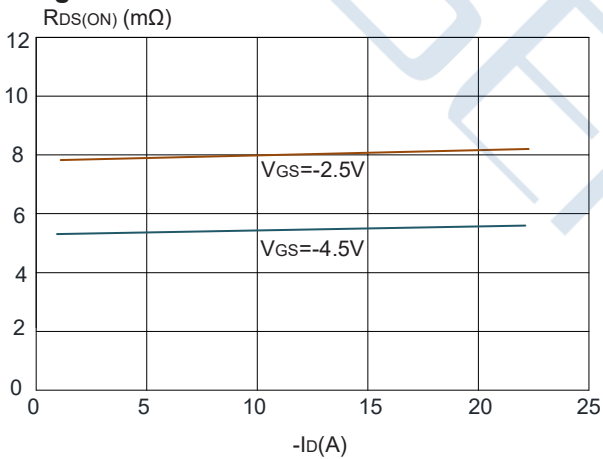


Figure 4: Body Diode Characteristics

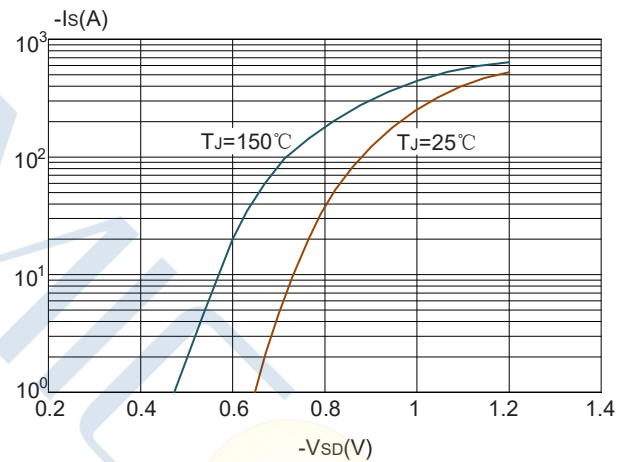


Figure 5: Gate Charge Characteristics

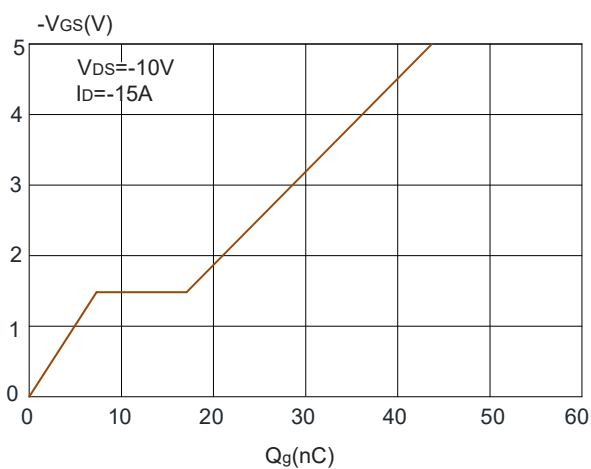
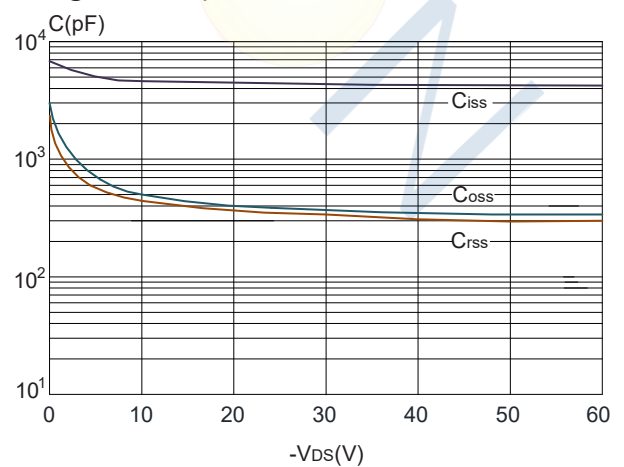


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

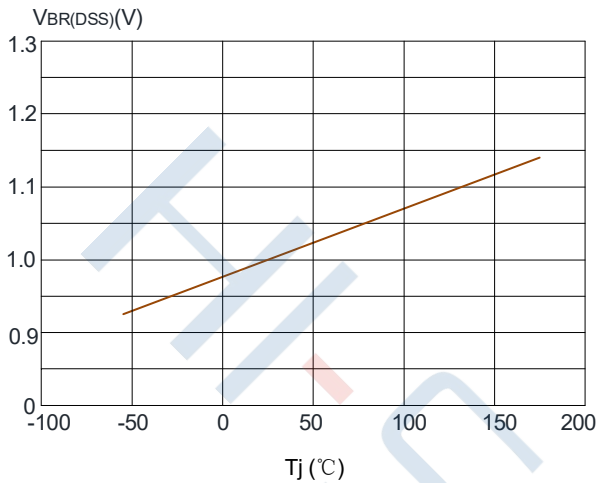


Figure 8: Normalized on Resistance vs. Junction Temperature

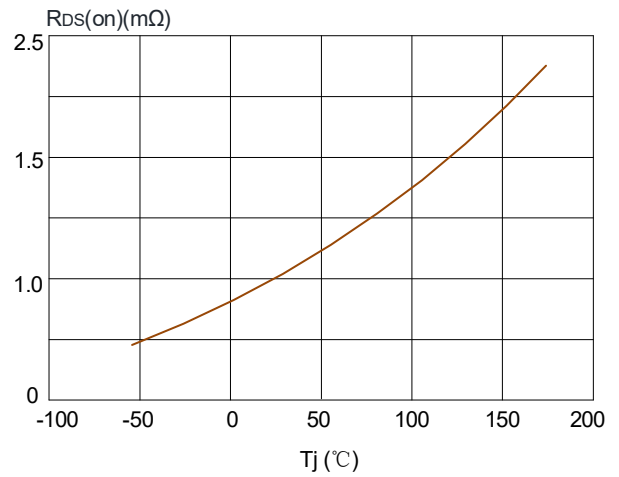


Figure 9: Maximum Safe Operating Area

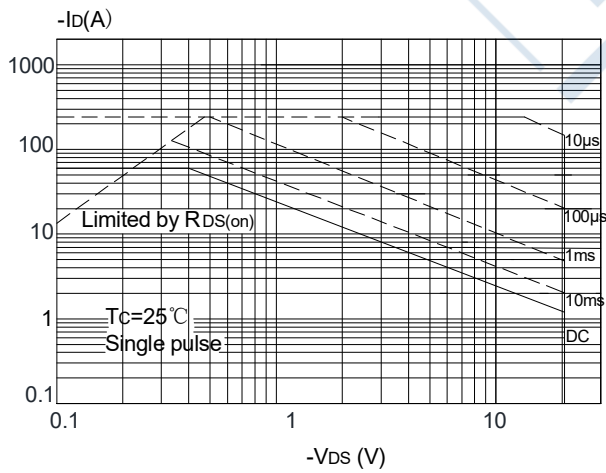
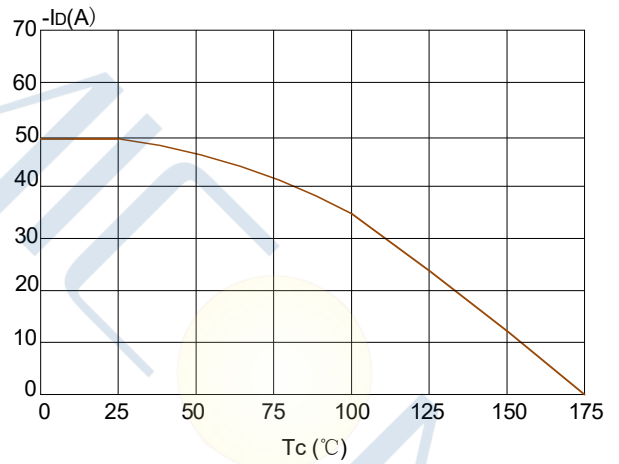
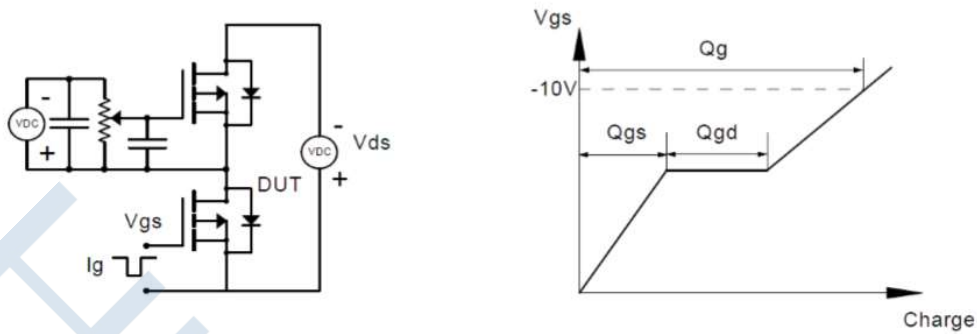


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

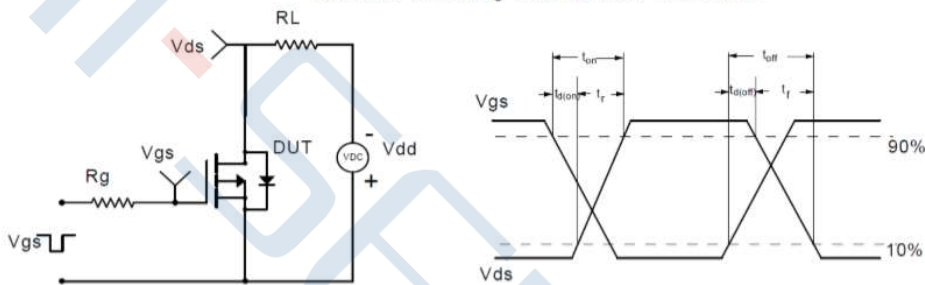


Test Circuit

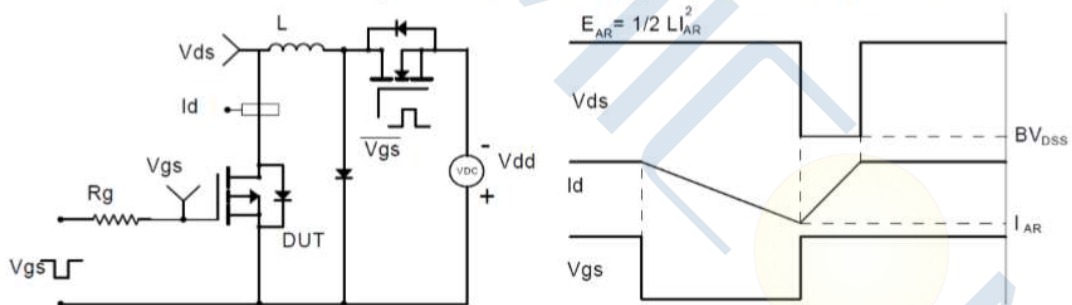
Gate Charge Test Circuit & Waveform



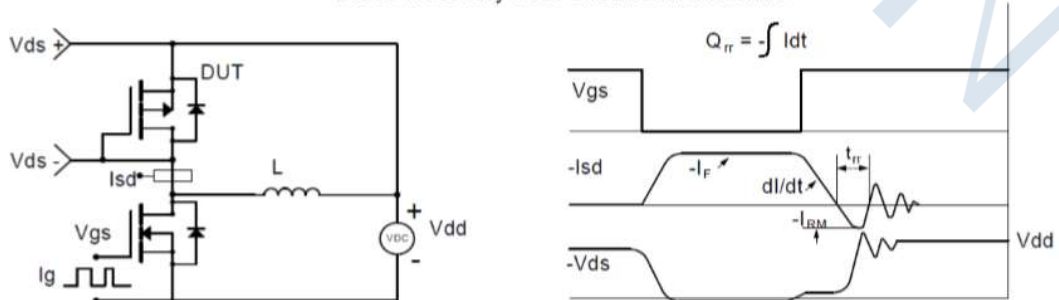
Resistive Switching Test Circuit & Waveforms



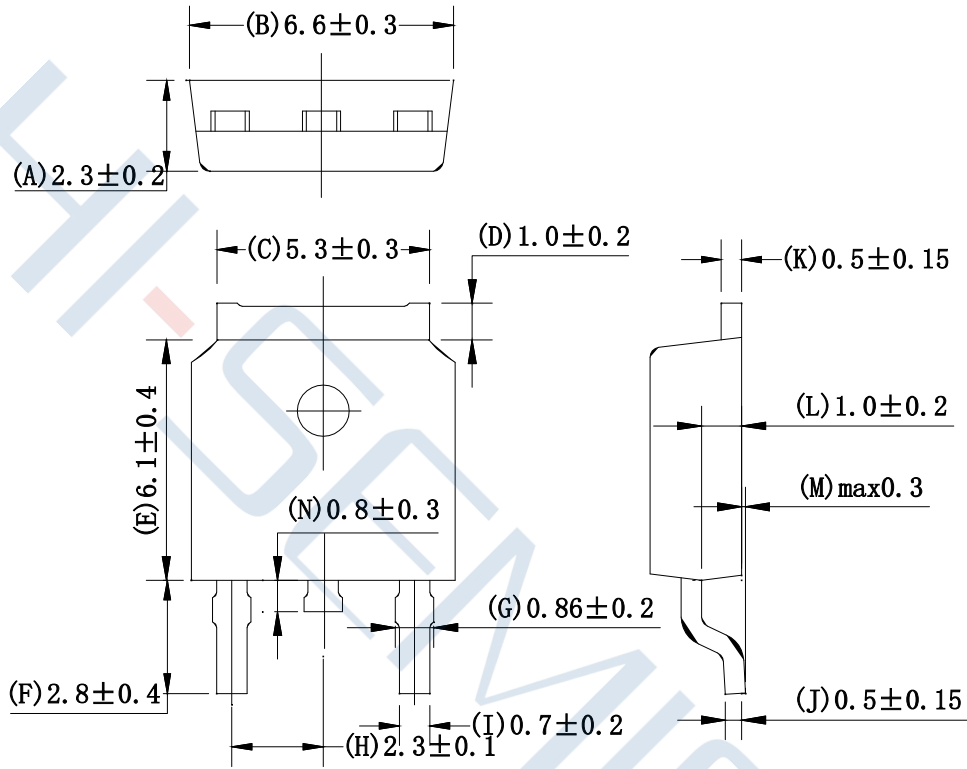
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



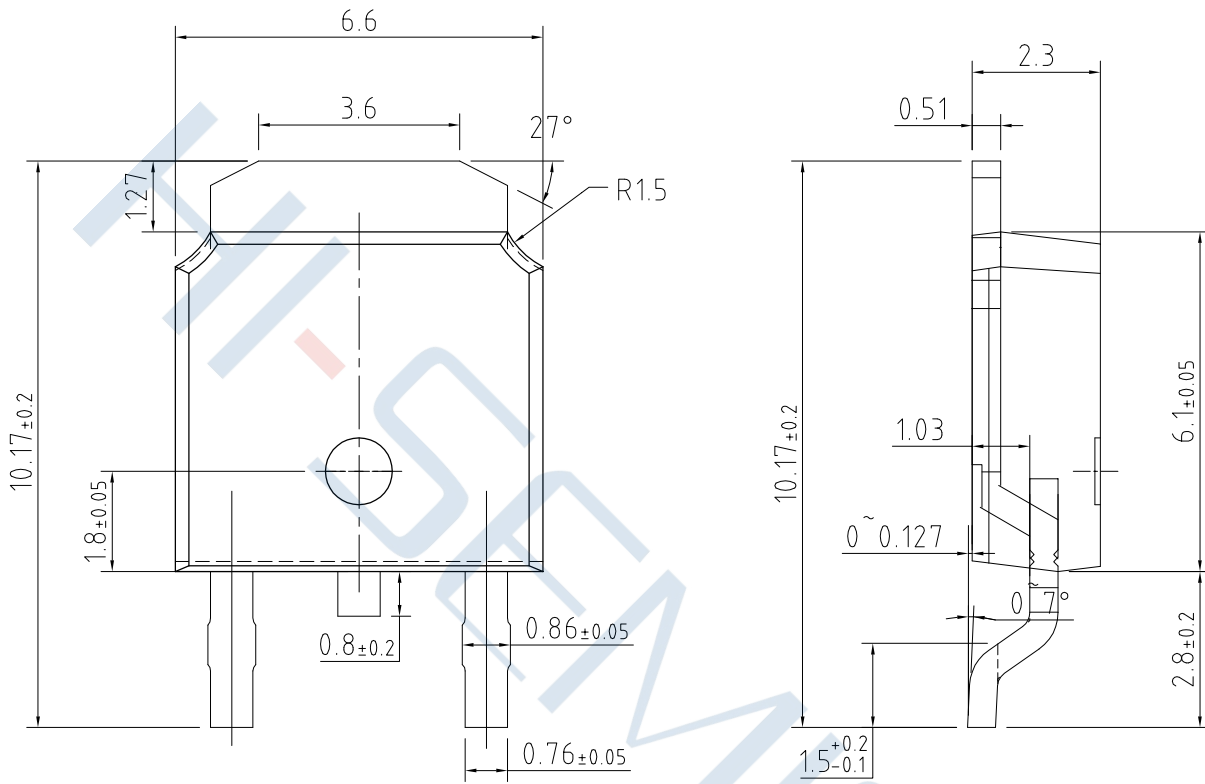
Diode Recovery Test Circuit & Waveforms



Package Dimensions of TO-252-2L



Package Dimensions of TO-252-2L



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