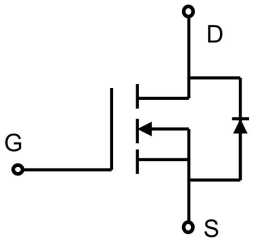
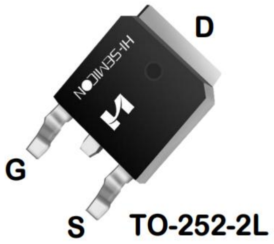
7A, 650V N-CHANNEL MOSFET

GENERAL DESCRIPTION

These N-Channel enhancement mode power field effect transistors are produced using Hi-semicon's proprietary, planar stripe, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction, electronic lamp ballasts based on half bridge topology.





Features

◆VDS(V)=650V, ID=7A

◆$R_{DS(ON)}$

TYP:1.1Ω@V_{GS}=10V I_D=3.5A

MAX:1.4Ω

Applications

◆Power faction correction (PFC)

◆Switched mode power supplies (SMPS)

◆Uninterruptible power supply (UPS)

◆LED lighting power

ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFD7N65E	TO-252-2L	SFD7N65E	Pb Free	Reel

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

Characteristics		Symbol	Ratings	Unit
			SFD7N65E	
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Drain Current	T_C = 25°C	I_D	7.0	A
	T_C = 100°C		5.6	
Drain Current Pulsed (Note 1)		I_{DM}	28	A
Power Dissipation(T_C=25°C)		P_D	100	W
-Derate above 25°C			0.8	W/°C
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	537	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
		SFD7N65E	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.25	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	°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	650	700	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	--	3.3	100	nA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=30V, V_{DS}=0V	--	3.4	100	nA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=-30V, V_{DS}=0V	--	-2.1	-100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D=250μA	2	2.9	4.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=1A	--	1.0	1.38	Ω
		V_{GS}=10V, I_D=3.5A	--	1.1	1.4	Ω
Dynamic Characteristics						
Gate Resistance	Rg	V_{GS}=0V; f=1.0MHZ	1	2.2	10	Ω
Input Capacitance	C_{iss}	V_{DS}=25V V_{GS}=0V f=1.0MHZ	--	1100	--	pF
Output Capacitance	C_{oss}		--	90.5	--	
Reverse Transfer Capacitance	C_{rss}		--	4.9	--	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=325V; V_{GS}=10V R_G=10Ω; I_D=7A (Note 3.4)	--	11.5	--	ns
Turn-on Rise Time	t_r		--	26.3	--	

Turn-off Delay Time	$t_{d(off)}$	V_{DD}=325V; V_{GS}=10V R_G=10Ω; I_D=7A (Note 3.4)	--	39.2	--	ns
Turn-off Fall Time	t_f		--	31.5	--	
Total Gate Charge	Q_g	V_{DS}=520V, I_D=7A V_{GS}=10V (Note 3.4)	--	15.5	--	nc
Gate-Source Charge	Q_{gs}		--	4.3	--	
Gate-Drain Charge	Q_{gd}		--	6.6	--	

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	--	--	7	A
Pulsed Source Current	I_{SM}		--	--	28	
Diode Forward Voltage	V_{SD}	I_S=7A,V_{GS}=0V	--	0.82	1.2	V
Reverse Recovery Time	T_{rr}	I_F=7A,V_R=520V, dIF/dt=100A/μS	--	521	--	ns
Reverse Recovery Charge	Q_{rr}		--	3.6	--	μC

1.Pluse width limited by maximum junction temperature

2.L=10mH, I_{AS}=6A, V_{DD}=100V, 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

Figure1. Drain Current vs. Drain-Source Voltage

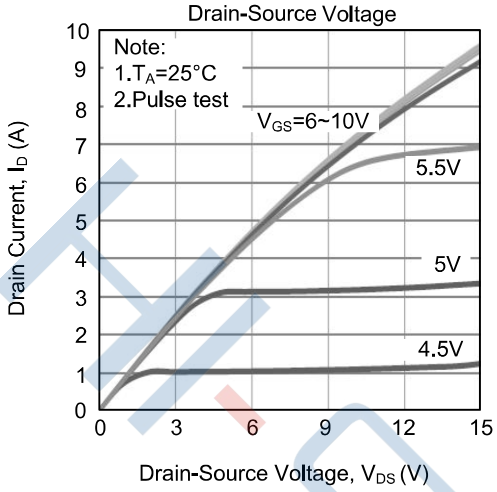


Figure2. Drain-Source On-Resistance vs. Gate-Source Voltage

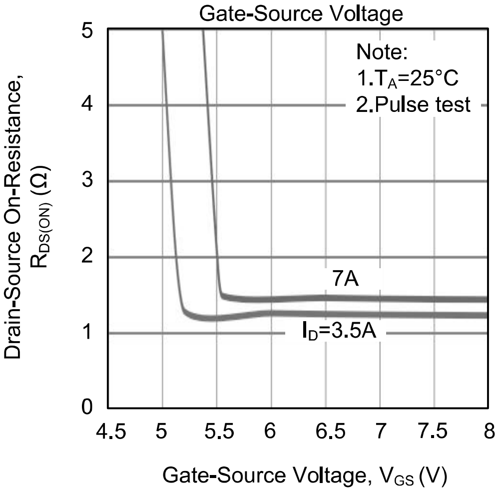


Figure3. Gate Charge Characteristics

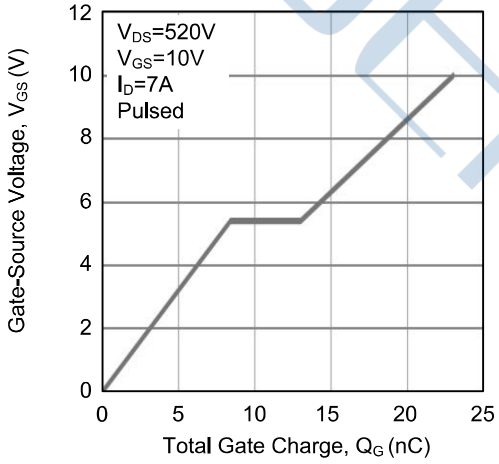


Figure4. Capacitance Characteristics

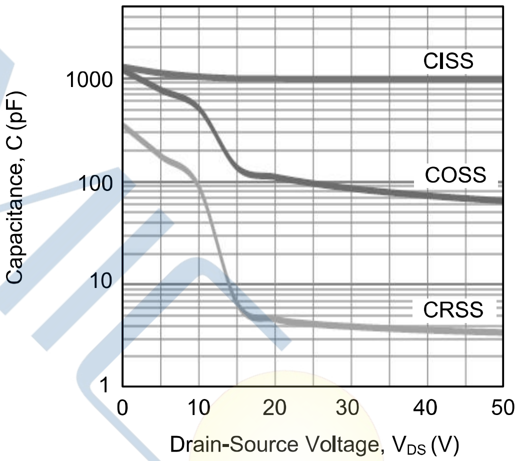


Figure5. Drain-Source On-Resistance vs. Junction Temperature

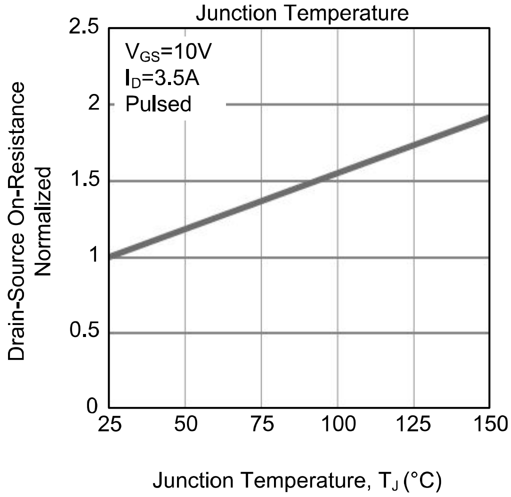
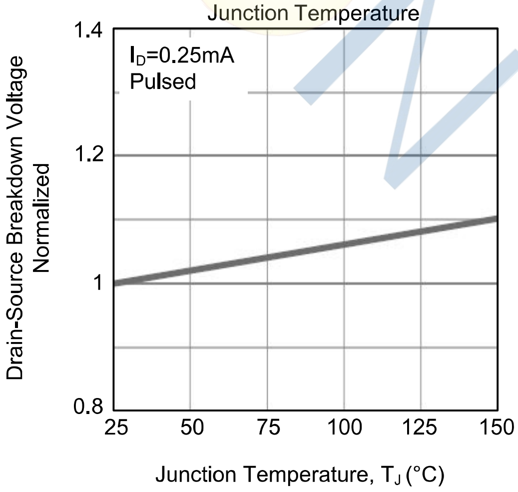


Figure6. Breakdown Voltage vs. Junction Temperature



Typical Performance Characteristics

Figure7. Gate Threshold Voltage vs. Junction Temperature

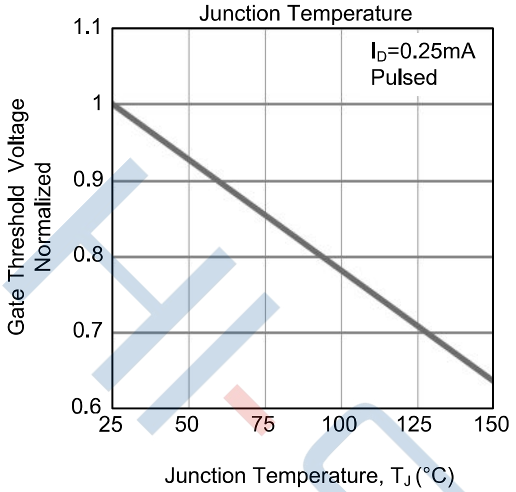


Figure8. Source Current vs. Source-Drain Voltage

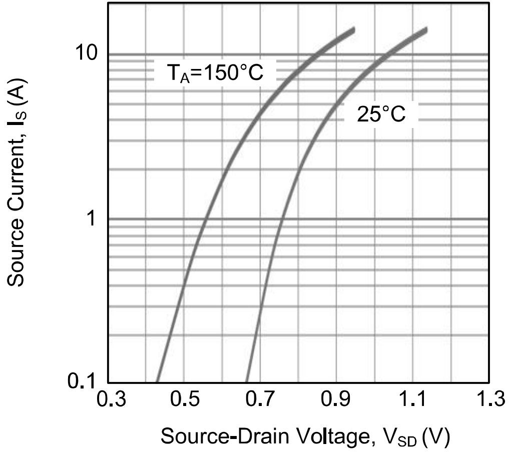


Figure9. Drain Current vs. Gate-Source Voltage

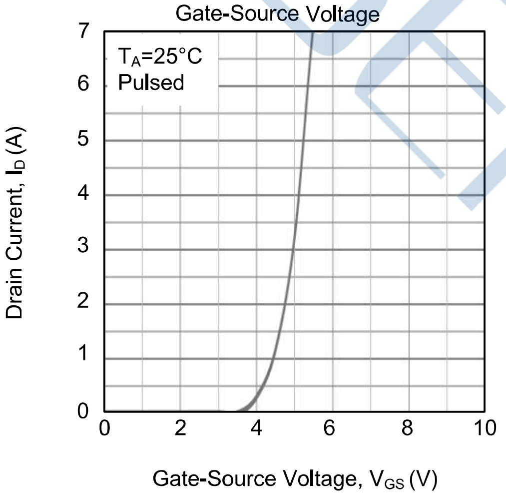


Figure10. Drain-Source On-Resistance vs. Drain Current

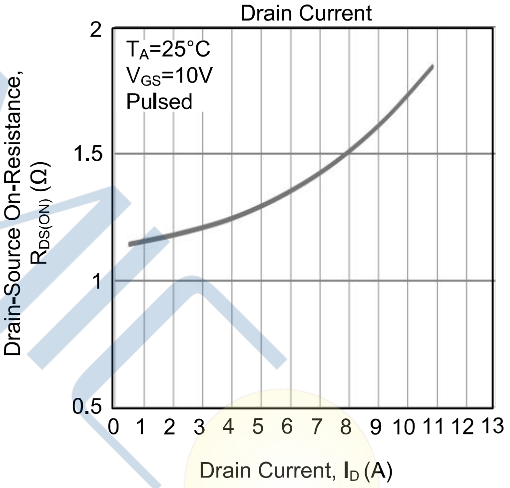


Figure11. Power Dissipation vs. Junction Temperature

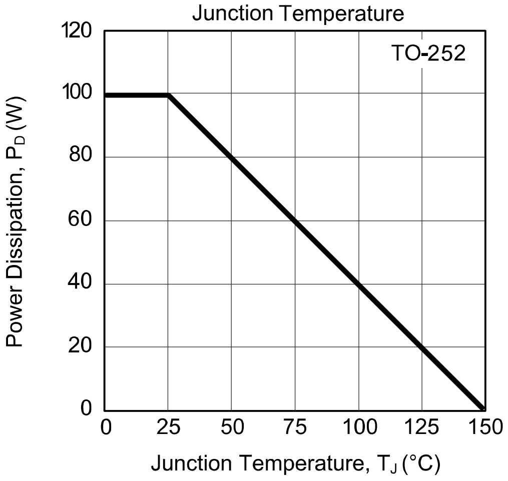
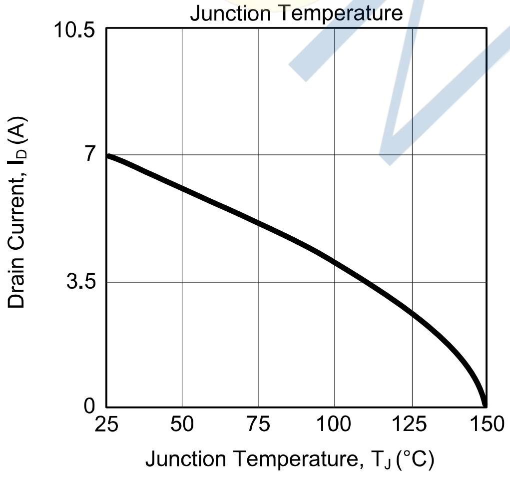
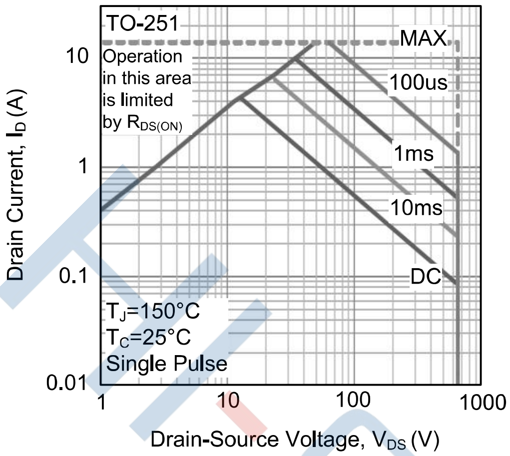


Figure12. Drain Current vs. Junction Temperature

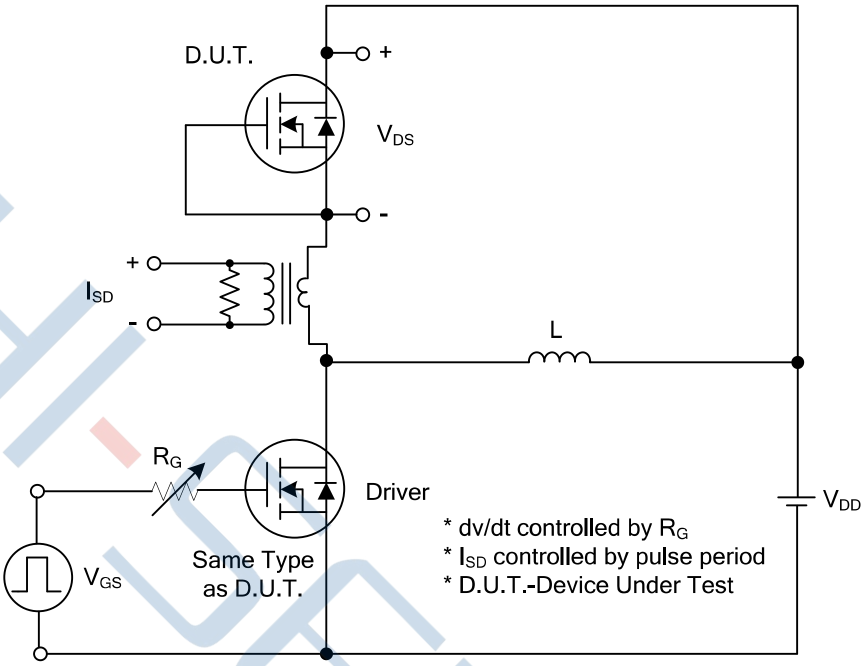


Typical Performance Characteristics

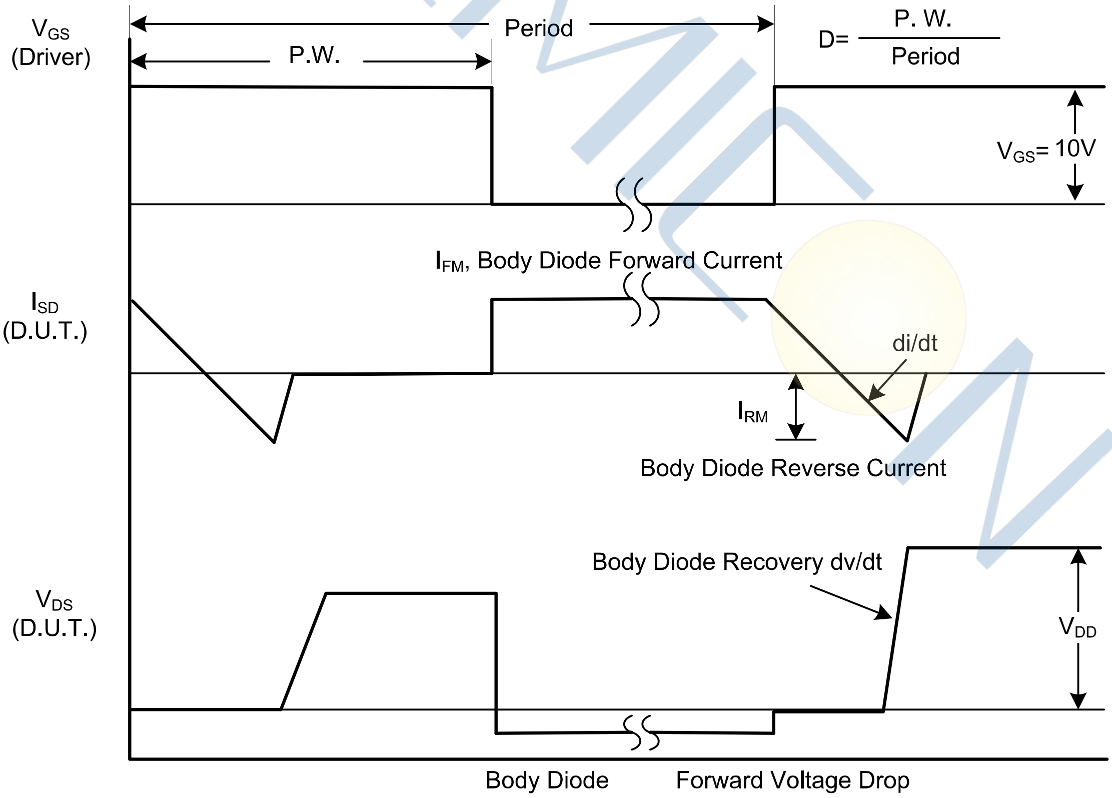
Figure13. Safe Operating Area



Test Circuit

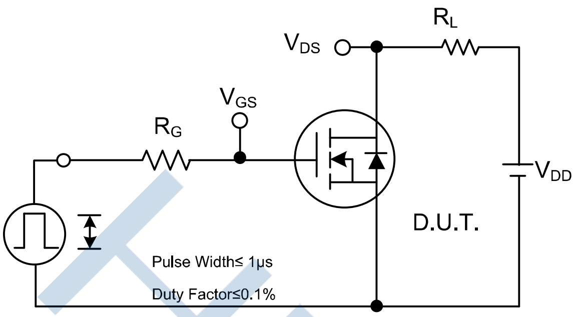


Peak Diode Recovery dv/dt Test Circuit

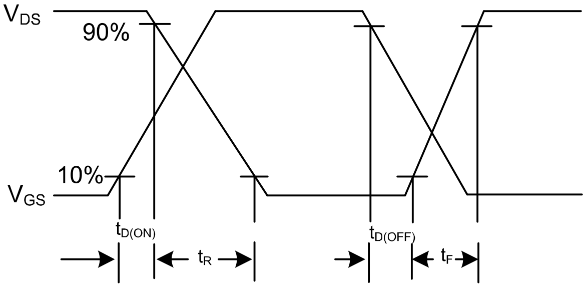


Peak Diode Recovery dv/dt Waveforms

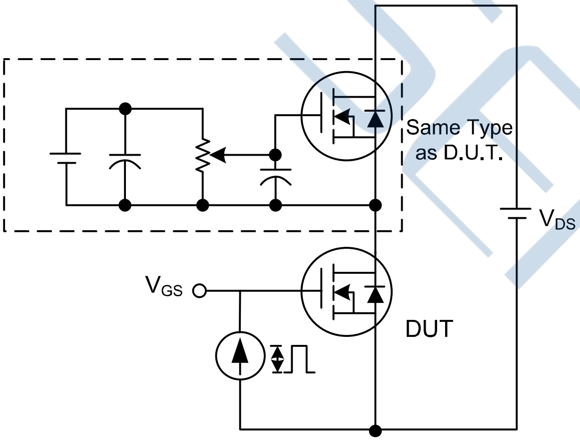
Test Circuit



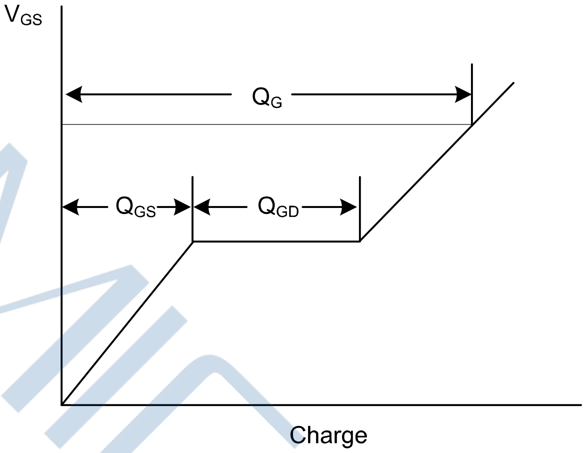
Switching Test Circuit



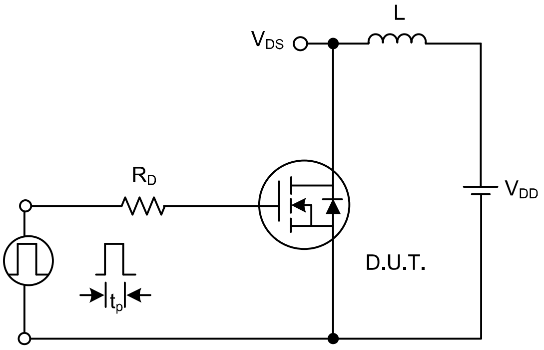
Switching Waveforms

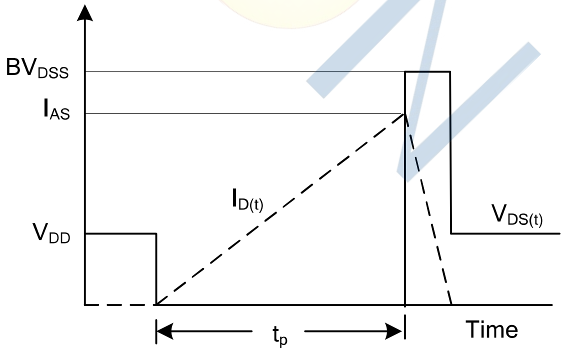


Gate Charge Test Circuit



Gate Charge Waveform



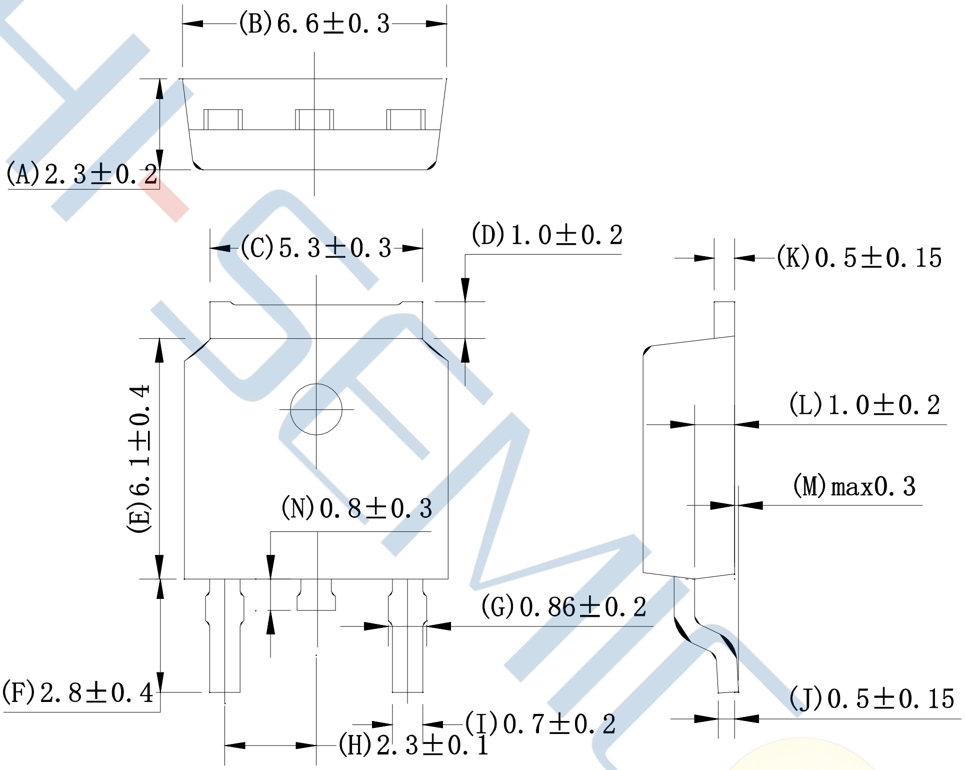


Unclamped Inductive Switching Test Circuit

Unclamped Inductive Switching Waveforms

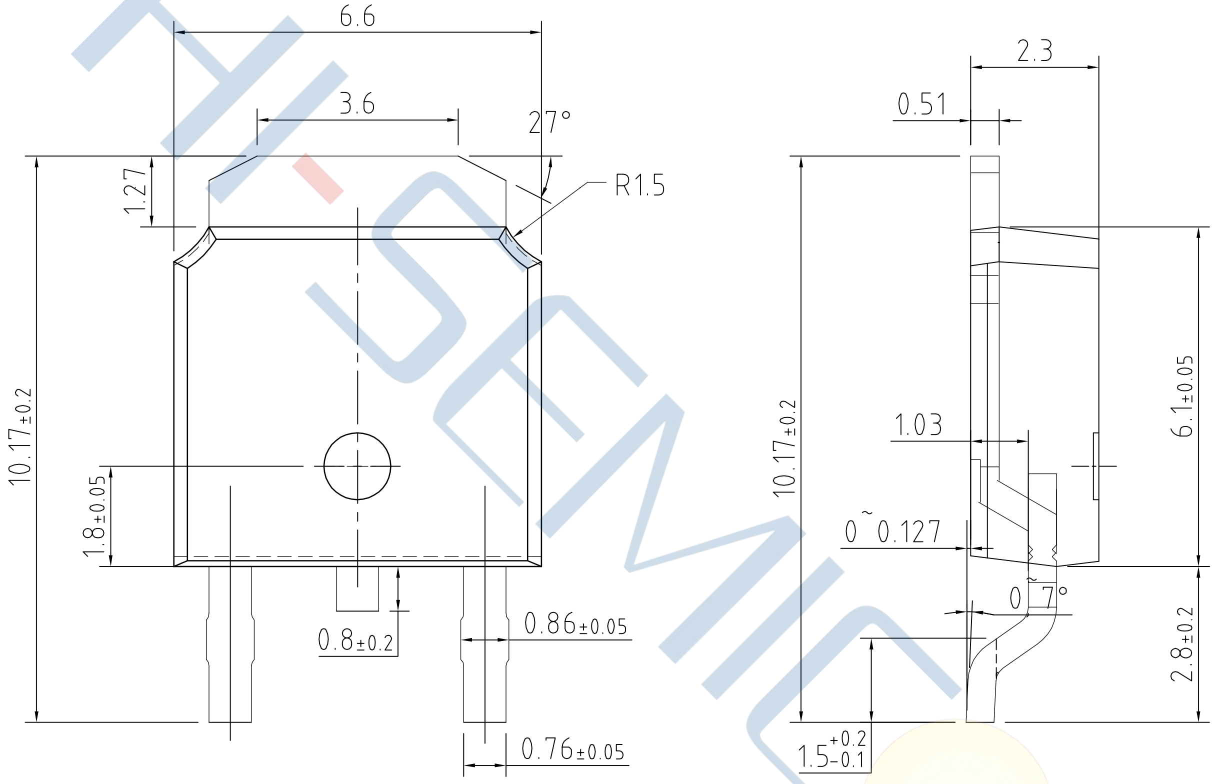
Package Dimensions of TO-252-2L

Unit:mm



Package Dimensions of TO-252-2L

Unit:mm



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