

14A, 250V N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

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

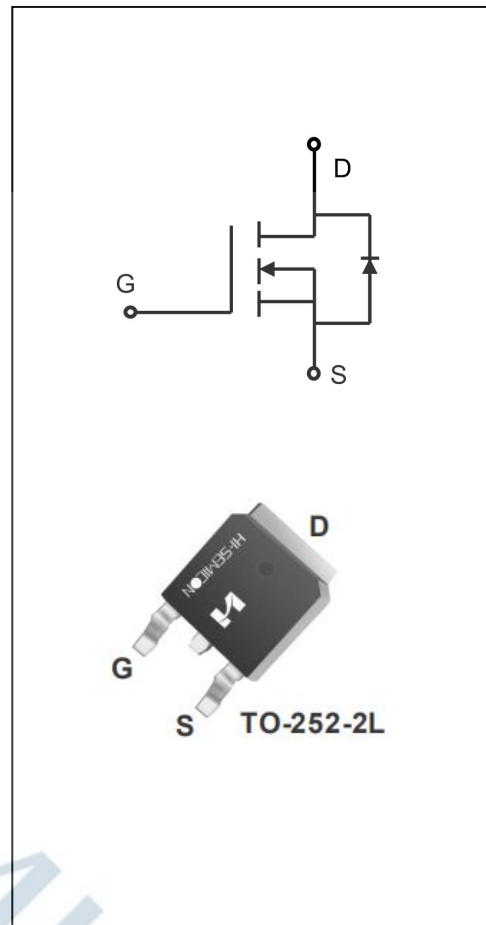
This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction,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

Features

- ◆  $V_{DS}(V)=250V, I_D=14A$
- ◆  $R_{DS(ON)}$   
TYP:  $230m\Omega @ V_{GS}=10V, I_D=7A$

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
SFD14N25	TO-252-2L	SFD14N25	Pb Free	Reel

## ABSOLUTE MAXIMUM RATINGS (T<sub>J</sub>=25°C unless otherwise noted)

Characteristics	Symbol	Ratings	Unit
Drain-Source Voltage	V <sub>DS</sub>	250	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current	I <sub>D</sub>	T <sub>C</sub> = 25°C	14
		T <sub>C</sub> = 100°C	9.5
Drain Current Pulsed (Note 1)	I <sub>DM</sub>	56	A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C	P <sub>D</sub>	133	W
		1.1	W/°C
Single Pulsed Avalanche Energy (Note 2)	E <sub>AS</sub>	240	mJ
Operation Junction Temperature Range	T <sub>J</sub>	-55~+150	°C
Storage Temperature Range	T <sub>stg</sub>	-55~+150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	TL	300	°C

## THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Unit
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	0.94	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	62.5	°C/W

## ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain -Source Breakdown Voltage	$B_{VDSS}$	$V_{GS}=0V, I_D=250\mu A$	250	--	--	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=250V, V_{GS}=0V$	--	--	100	nA
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	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	3.0	3.8	4.5	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=7A$	--	230	280	m $\Omega$
<b>Dynamic Characteristics</b>						
Gate Resistance	$R_g$	$V_{GS}=0V, f=1.0MHz$		3.2		$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=25V$	--	670	--	pF
Output Capacitance	$C_{oss}$	$V_{GS}=0V$	--	104	--	
Reverse Transfer Capacitance	$C_{rss}$	$f=1.0MHz$	--	15	--	
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=125V; V_{GS}=10V$ $R_G=25\Omega; I_D=14A$ (Note 3.4)	--	15	--	ns
Turn-on Rise Time	$t_r$		--	62	--	
Turn-off Delay Time	$t_{d(off)}$		--	25	--	
Turn-off Fall Time	$t_f$		--	28	--	
Total Gate Charge	$Q_g$	$V_{DS}=200V, I_D=14A$ $V_{GS}=10V$ (Note 3.4)	--	17	--	nC
Gate-Source Charge	$Q_{gs}$		--	7.4	--	
Gate-Drain Charge	$Q_{gd}$		--	7.6	--	

## 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	--	--	14	A
Pulsed Source Current	$I_{SM}$		--	--	56	
Diode Forward Voltage	$V_{SD}$	$I_S=16A, V_{GS}=0V$	--	--	1.3	V
Reverse Recovery Time	$T_{rr}$	$I_F=33A, V_{GS}=0V$ $dI_F/dt=100A/\mu S$	--	204	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	1.5	--	$\mu C$

1. Pulse width limited by maximum junction temperature
2.  $L=30mH, I_{AS}=4A, V_{DD}=100V, V_G=10V, R_G=25\Omega$ , 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

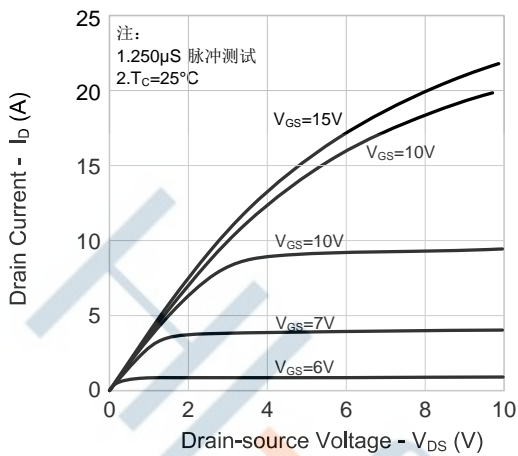


Figure 2. Transfer Characteristics

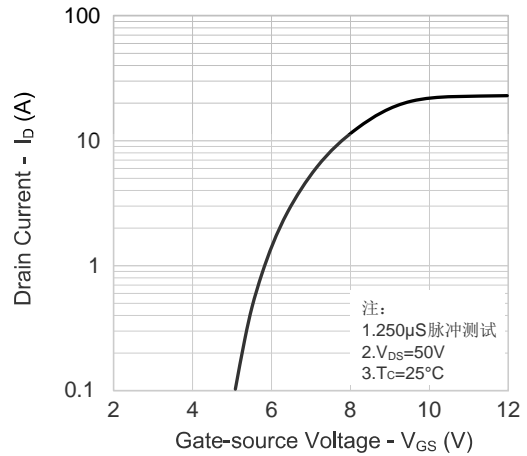


Figure 3. On-Resistance vs. Drain Current

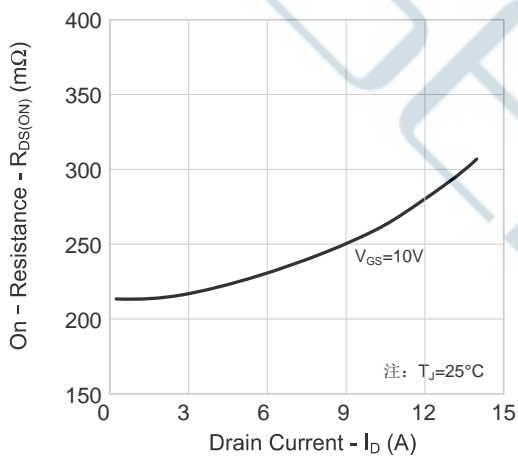


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

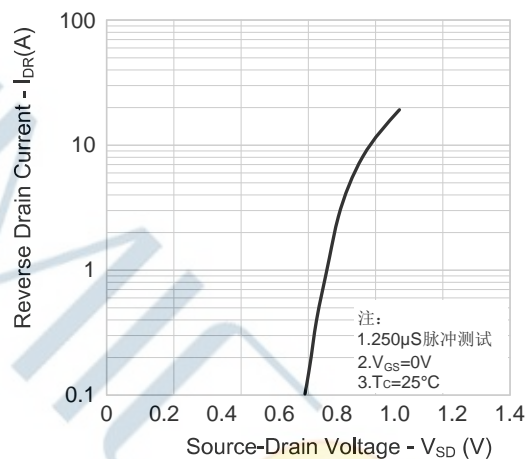


Figure 5. Capacitance Characteristics

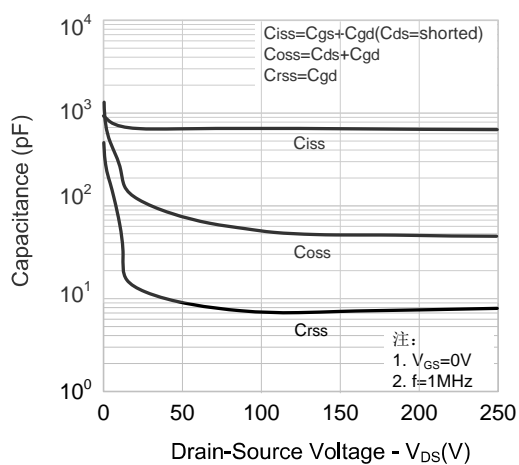
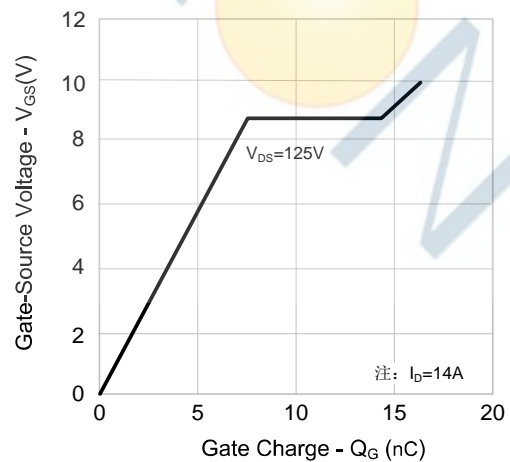
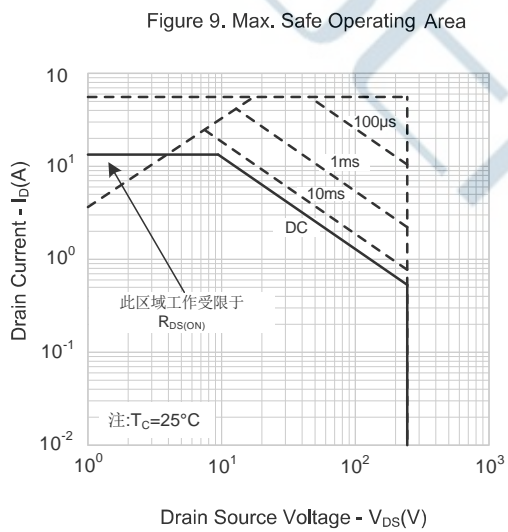
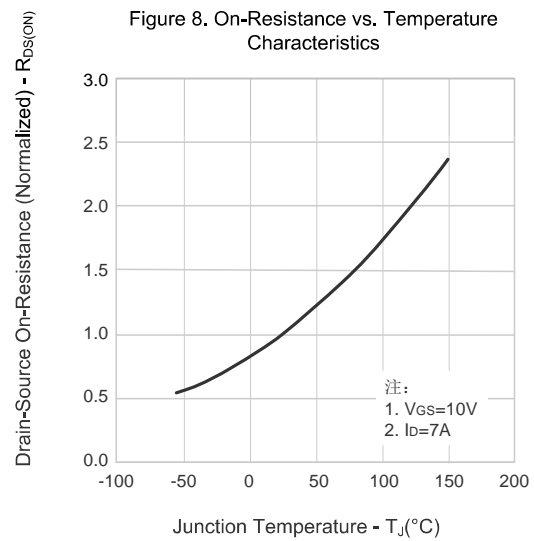
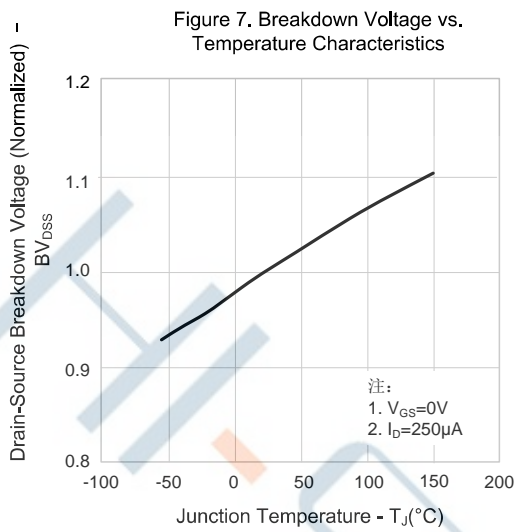


Figure 6. Gate Charge

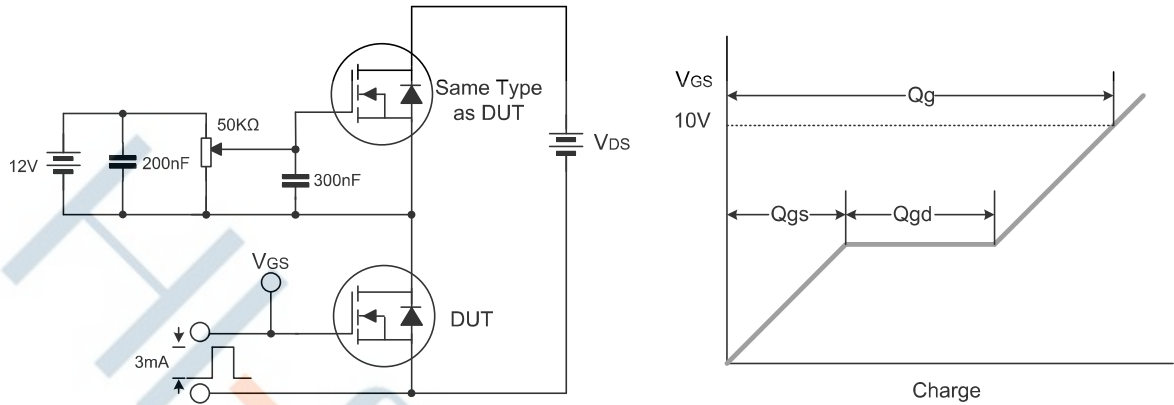


Typical Performance Characteristics

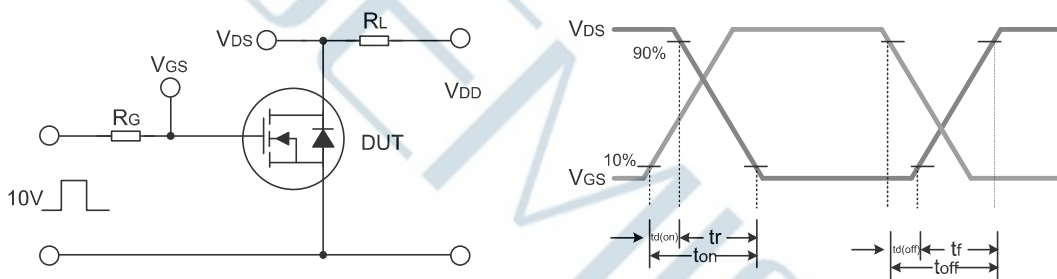


Test Circuit

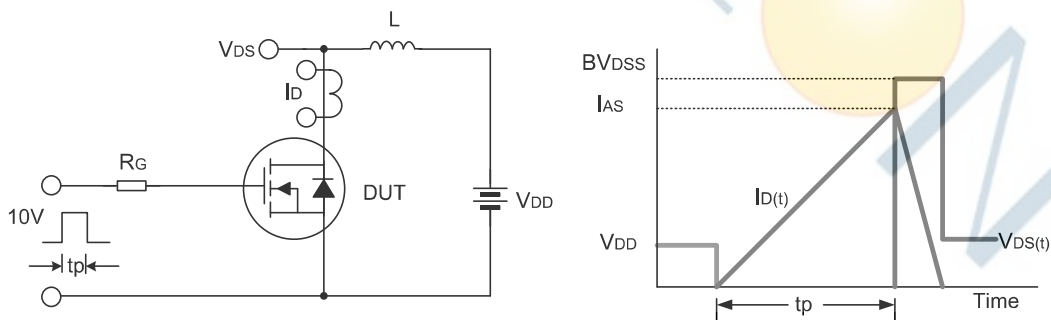
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

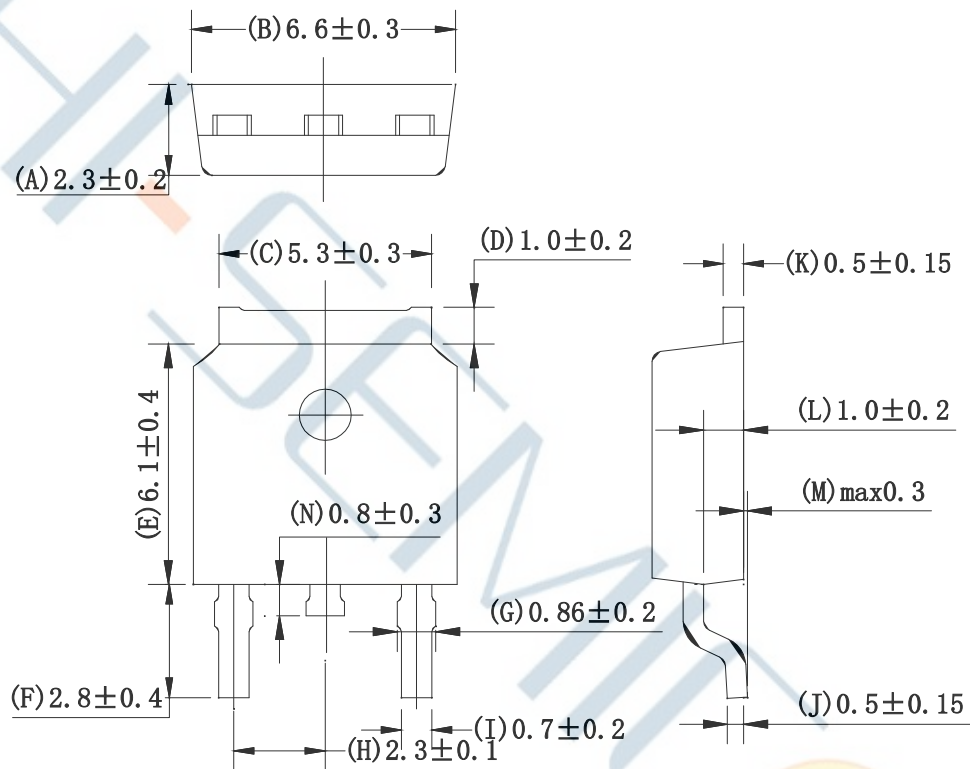


Unclamped Inductive Switching Test Circuit & Waveform



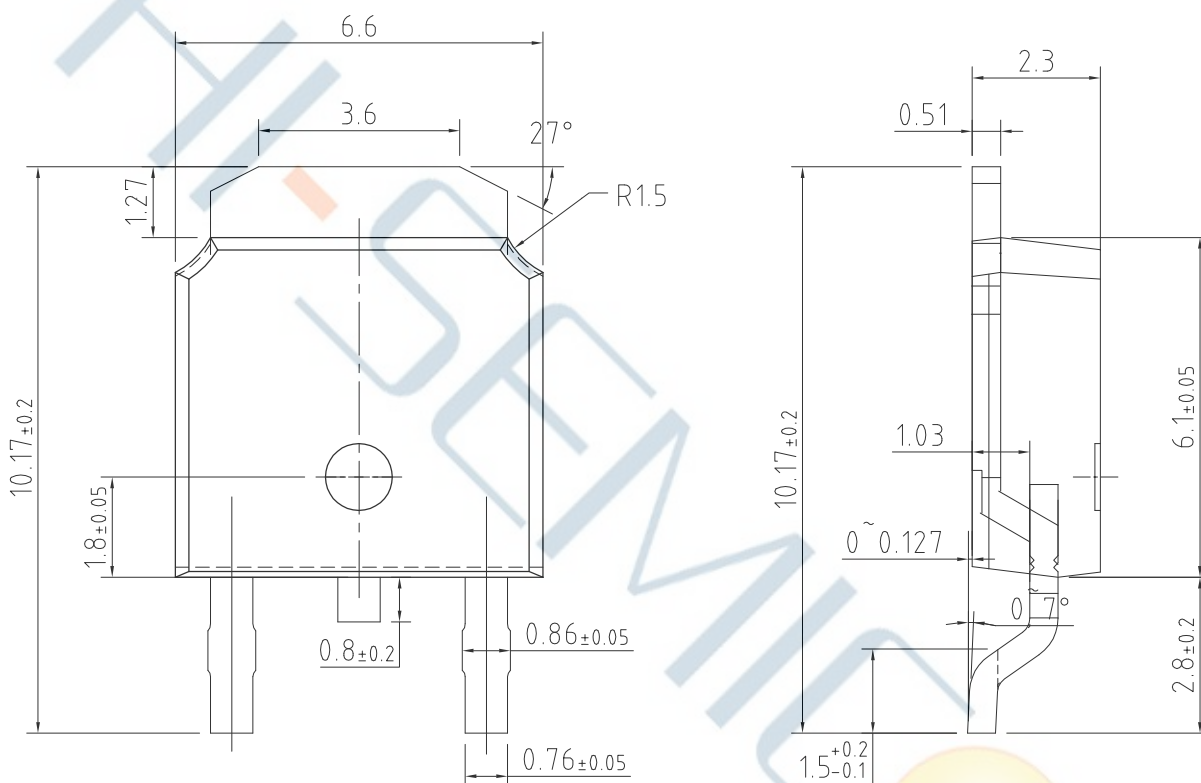
Package Dimensions of TO-252-2L

Unit:mm



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Unit:mm





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