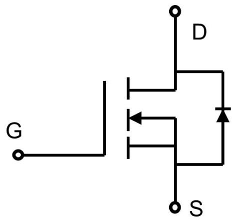
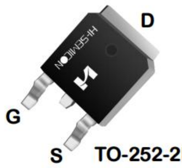
40V, 30A N-CHANNEL POWER MOSFET

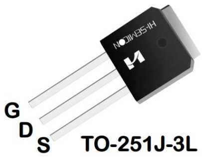
GENERAL DESCRIPTION

The SFX4003T 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.





TO-252-2L



TO-251J-3L

Features

- ◆V_{DS}=40V,I_D=30A
- ◆$R_{DS(on)}$
  TYP:19mΩ@V_{GS}=10V I_D=20A

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
SFD4003T	TO-252-2L	SFD4003T	Pb Free	Reel
SFU4003T	TO-251J-3L	SFU4003T	Pb Free	Tube

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

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current	T_C = 25°C	I_D	30	A
	T_C = 100°C		22	
Drain Current Pulsed(Note 1)		I_{DM}	110	A
Power Dissipation(T_C=25°C)		P_D	52	W
-Derate above 25°C			0.36	W/℃
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	98	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	$R_{\theta JC}$	2.8	°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	40	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=40V, 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
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D=250μA	1.0	1.3	2.2	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	V_{GS}=4.5V, I_D=10A	--	22	44	mΩ
		V_{GS}=10V, I_D=20A	--	19	23	mΩ
Dynamic Characteristics						
Gate Resistance	Rg	V_{GS}=0V; f=1.0MHZ	1	6	10	Ω
Input Capacitance	C_{iss}	V_{DS}=20V V_{GS}=0V f=1.0MHZ	--	650	--	pF
Output Capacitance	C_{oss}		--	65	--	
Reverse Transfer Capacitance	C_{rss}		--	50	--	
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V； V_{GS}=10V R_G=3.3Ω (Note 3.4)	--	8.5	--	ns
Turn-on Rise Time	t_r		--	7.2	--	
Turn-off Delay Time	$t_{d(off)}$		--	20.1	--	
Turn-off Fall Time	t_f		--	5.6	--	

Total Gate Charge	Q_g	V_{DS}=20V, I_D=20A V_{GS}=10V (Note 3.4)	--	21.2	--	nc
Gate-Source Charge	Q_{gs}		--	2.5	--	
Gate-Drain Charge	Q_{gd}		--	5.1	--	

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	--	--	30	A
Pulsed Source Current	I_{SM}		--	--	110	
Diode Forward Voltage	V_{SD}	I_S=20A,V_{GS}=0V	--	0.95	1.2	V
Reverse Recovery Time	T_{rr}	I_F=20A,V_R=15V, dIF/dt=100A/μS	--	16	--	ns
Reverse Recovery Charge	Q_{rr}		--	25	--	μC

1.Pluse width limited by maximum junction temperature

2.L=0.5mH, V_{DD}=20V, 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.On-Region Characteristics

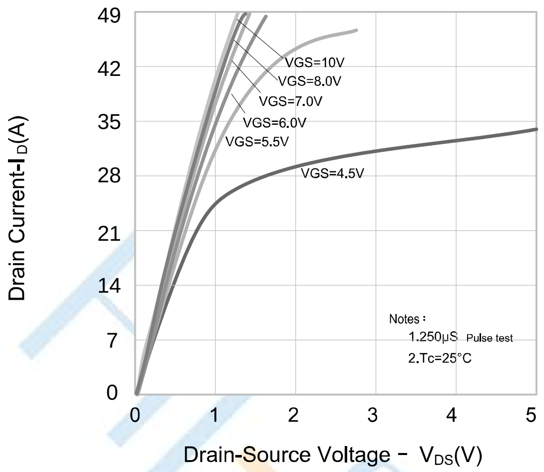


Figure 2.Transfer Characteristics

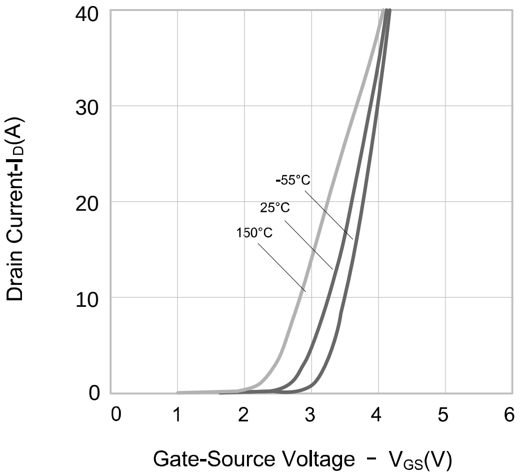


Figure 3.On-Resistance Variation vs. Drain-Current,Gate Voltage

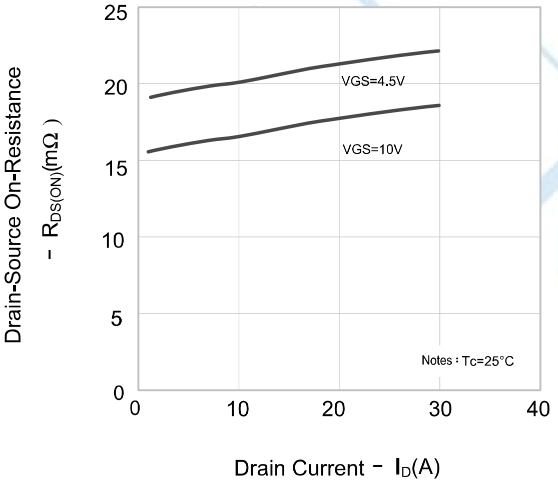


Figure 4.Body Diode Forward Voltage Variation vs.Source Current and Temperature

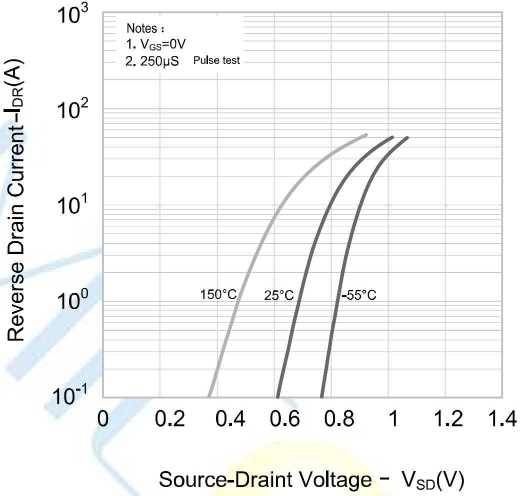


Figure 5.Capacitance Characteristics

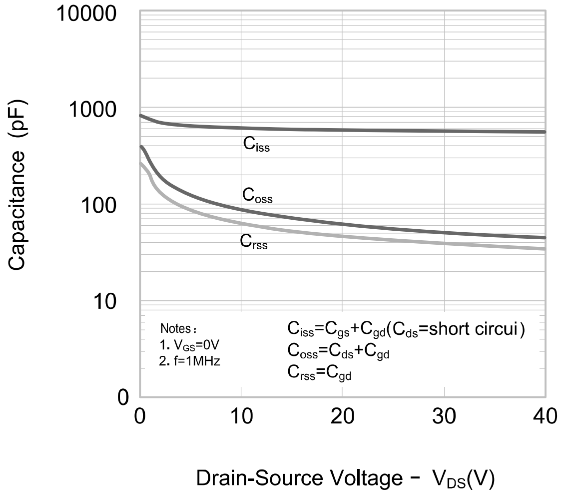
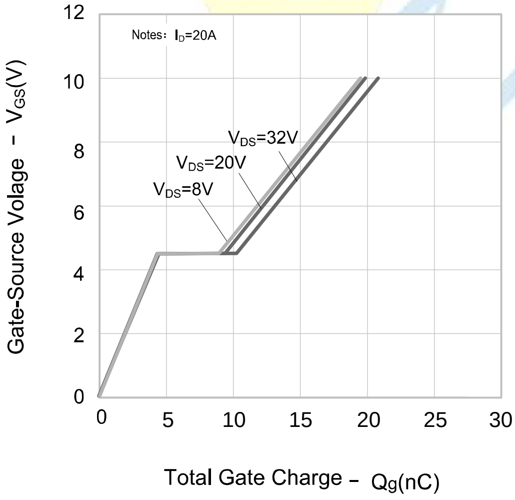


Figure 6.Gate Charage Characteristics



Typical Performance Characteristics

Figure 7.Breakdown Voltage Variation vs.Temperature

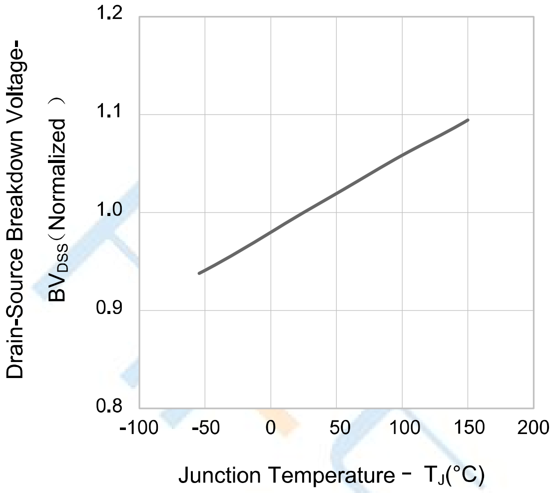


Figure 8.On-resistance Variation vs.Temperature

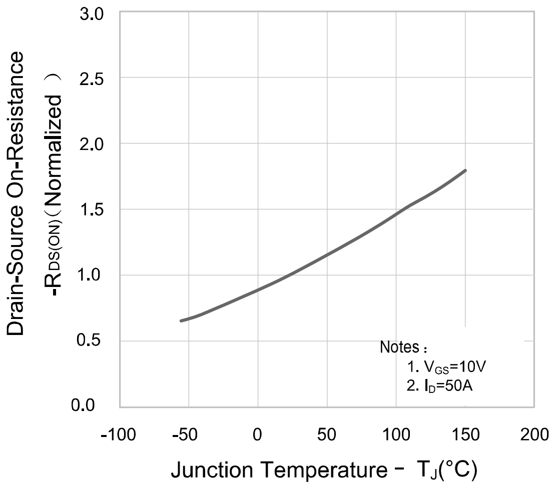
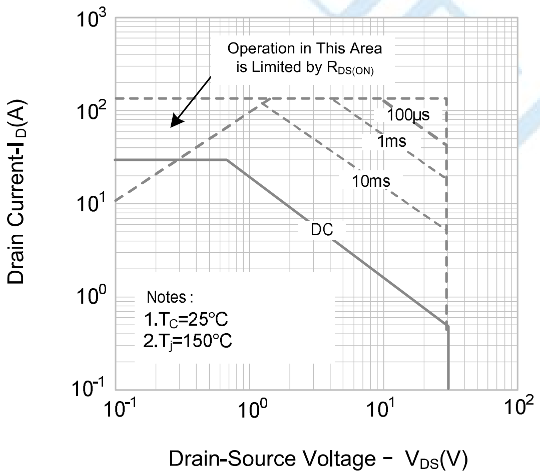
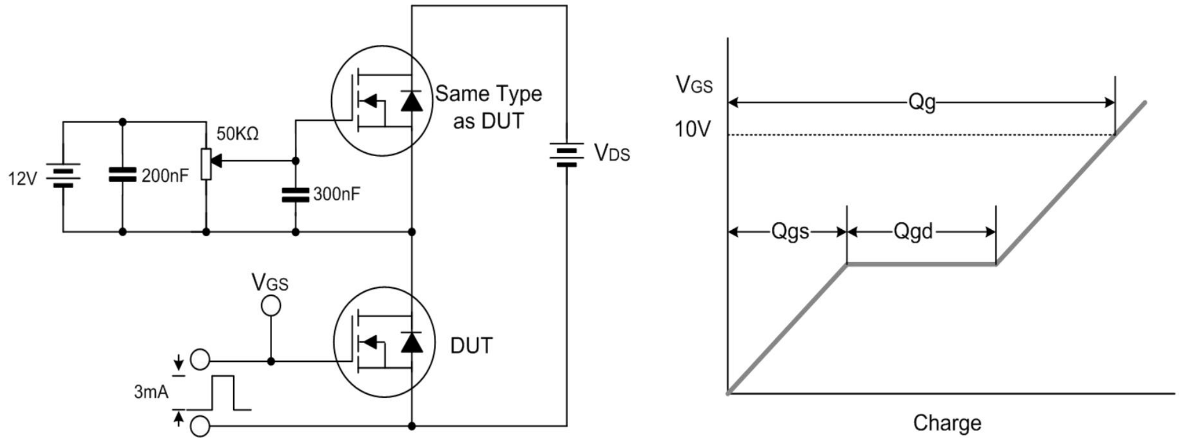


Figure 9.Max.Safe Operating Area

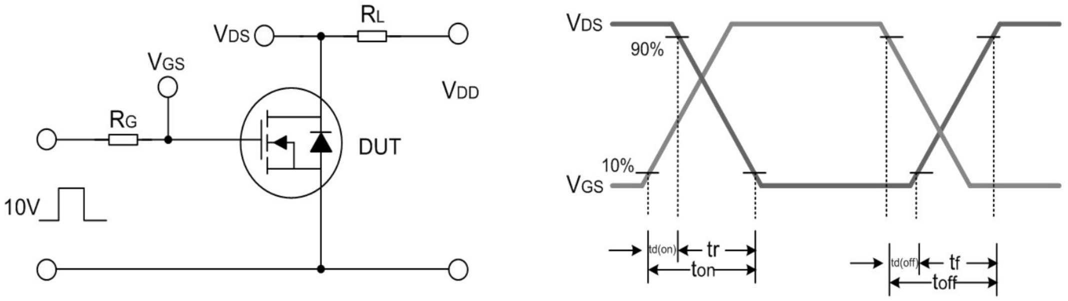


Test Circuit

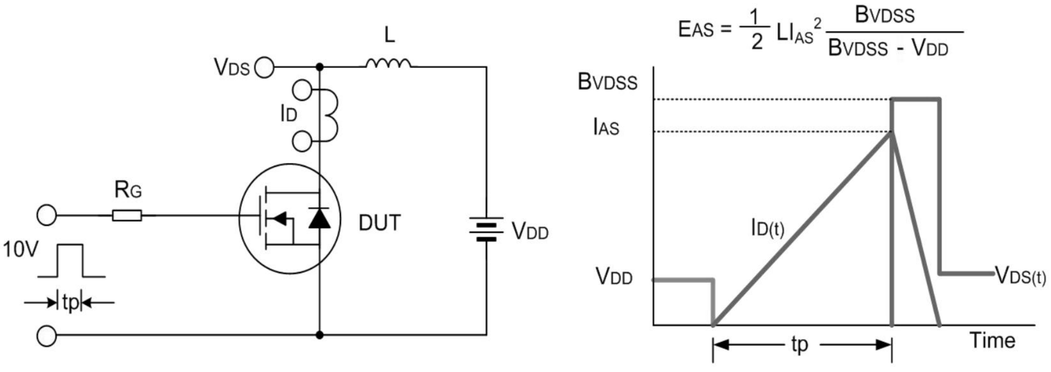
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

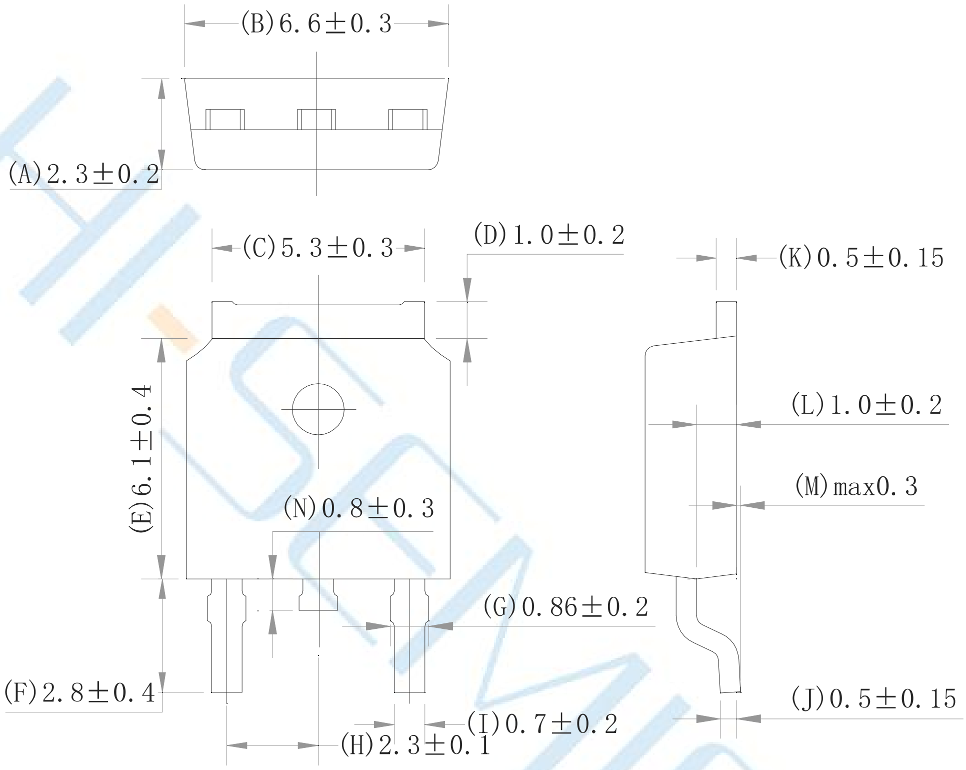


Unclamped Inductive Switching Test Circuit & Waveform

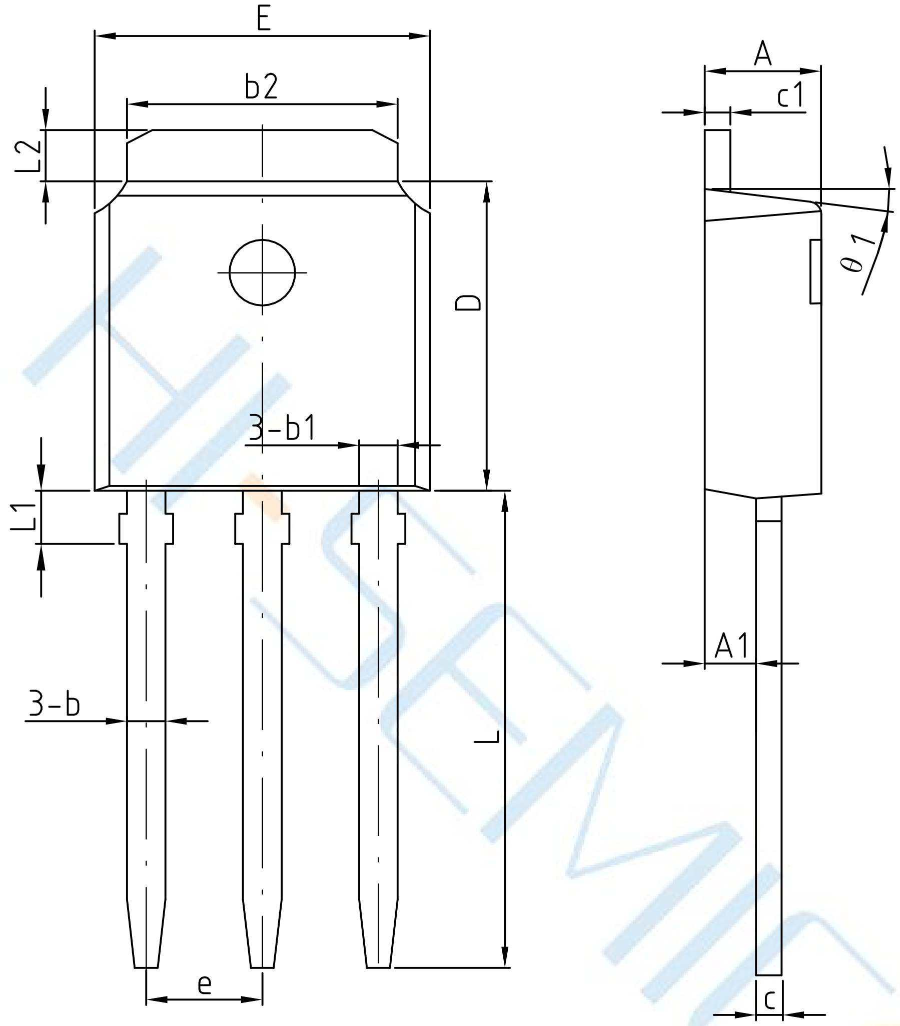


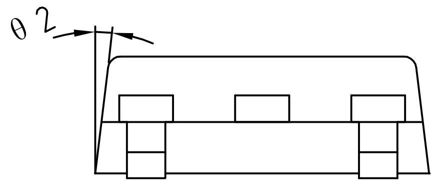
Package Dimensions of TO-252-2L

Unit:mm



Package Dimensions of TO-251J-3L





COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.2	2.30	2.38
A1	0.90	1.01	1.10
b	0.71	0.76	0.86
b1	–	0.76	–
b2	5.13	5.33	5.46
c	0.46	0.50	0.60
c1	0.46	0.50	0.60
D	6.00	6.10	6.20
E	6.50	6.60	6.70
e	2.286BSC		
L	9.10	9.40	9.70
L1		1.05	
L2	0.90	–	1.25
θ 1		7°	
θ 2		7°	

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