

240A, 40V N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

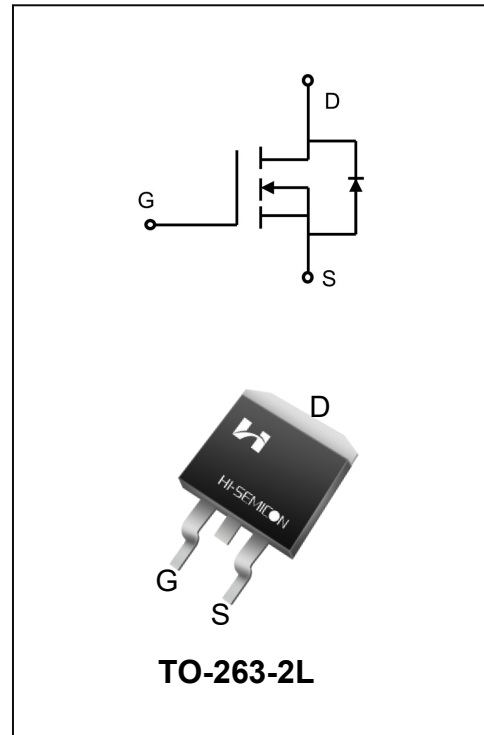
The SFA4024T uses advanced Process technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety applications.

Features

- ◆ $V_{DS}=40V, I_D=240A$
- ◆ $R_{DS(on)}$
TYP: $2.0m\Omega @ V_{GS}=10V, I_D=60A$

Applications

- ◆ Load switch
- ◆ Power switch applications



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFA4024T	TO-263-2L	SFA4024T	Pb Free	Reel

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	240	A
	T _C = 100°C		150	
Drain Current Pulsed(Note 1)		I _{DM}	960	A
Power Dissipation(T _C =25°C) -Derate above 25°C		P _D	250	W
			2.0	W/°C
Single Pulsed Avalanche Energy (Note 2)		E _{AS}	611	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}	0.5	°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	40	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V	--	--	1.0	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	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	2.2	--	3.8	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =60A	--	2.0	2.5	mΩ
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V; f=1.0MHZ		4.0		Ω
Input Capacitance	C _{iss}	V _{DS} =25V V _{GS} =0V f=1.0MHZ	--	5620	--	pF
Output Capacitance	C _{oss}		--	783	--	
Reverse Transfer Capacitance	C _{rss}		--	518	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =20V; V _{GS} =10V R _G =2.7Ω; I _D =30A (Note 3.4)	--	26	--	ns
Turn-on Rise Time	t _r		--	88	--	
Turn-off Delay Time	t _{d(off)}		--	135	--	
Turn-off Fall Time	t _f		--	116	--	

Total Gate Charge	Q_g	$V_{DS}=32V, I_D=50A$ $V_{GS}=10V$ (Note 3.4)	--	109	--	nc
Gate-Source Charge	Q_{gs}		--	35	--	
Gate-Drain Charge	Q_{gd}		--	32	--	

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	--	--	240	A
Pulsed Source Current	I_{SM}		--	--	960	
Diode Forward Voltage	V_{SD}	$I_S=50A, V_{GS}=0V$	--	--	1.2	V
Reverse Recovery Time	T_{rr}	$I_F=50A, V_{GS}=0V$ $dI/dt=100A/\mu S$	--	30	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.03	--	μC

1. Pulse width limited by maximum junction temperature
2. $L=1.0mH, V_{DD}=38V, V_G=10V, R_G=25\Omega$, 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

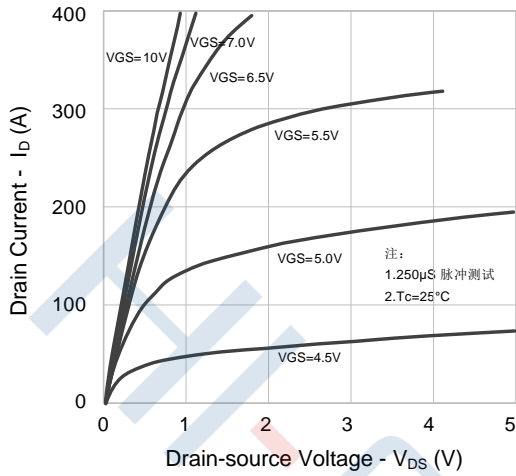


Figure 2. Transfer Characteristics

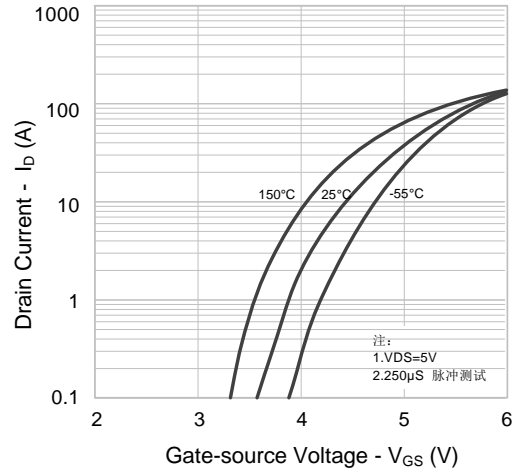


Figure 3. On-resistance vs. Drain Current

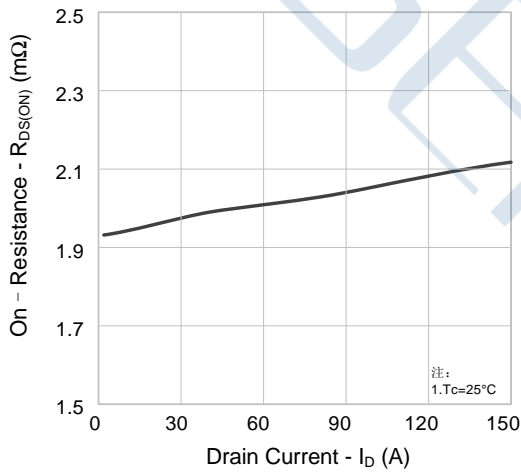


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

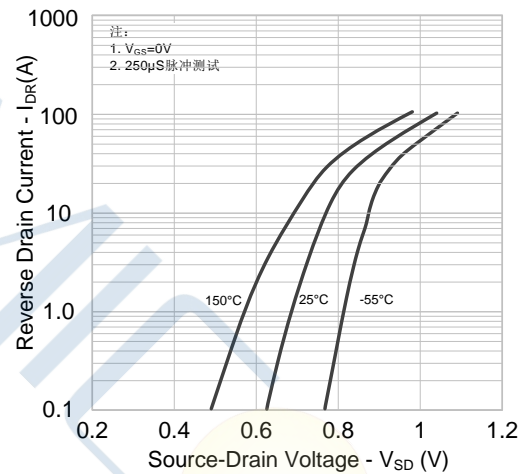


Figure 5. Capacitance Characteristics

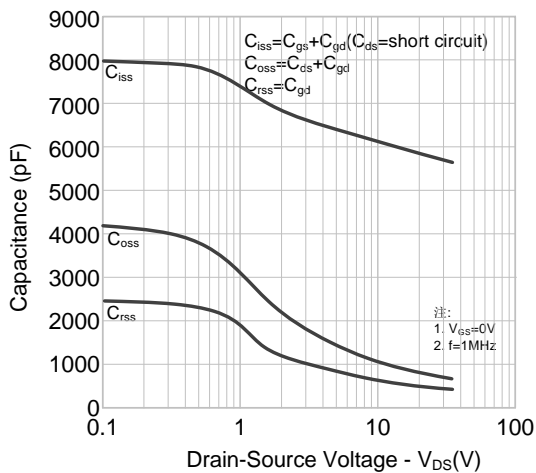
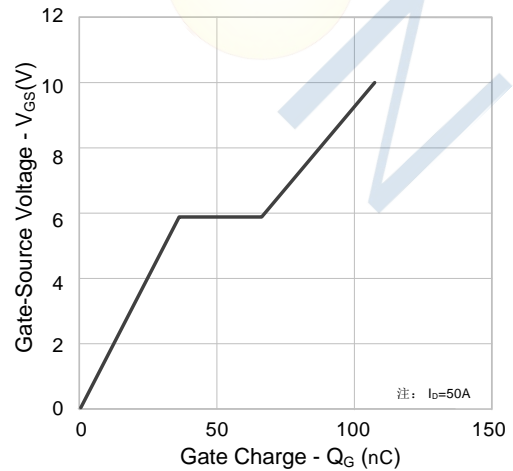


Figure 6. Gate Charge



Typical Performance Characteristics

Figure 7. Breakdown Voltage vs. Temperature Characteristics

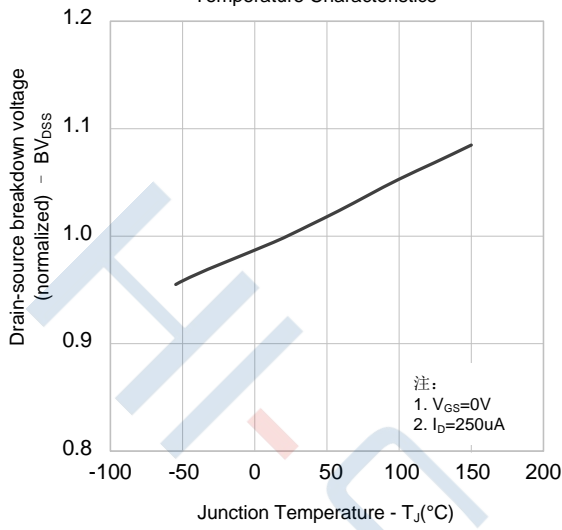


Figure 8. On-resistance vs. Temperature Characteristics

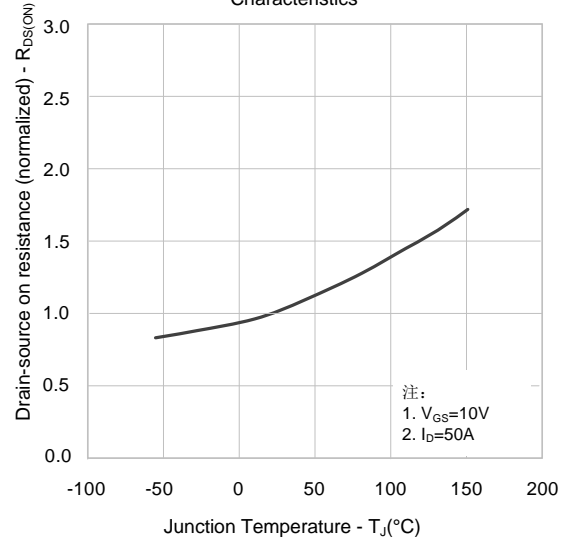
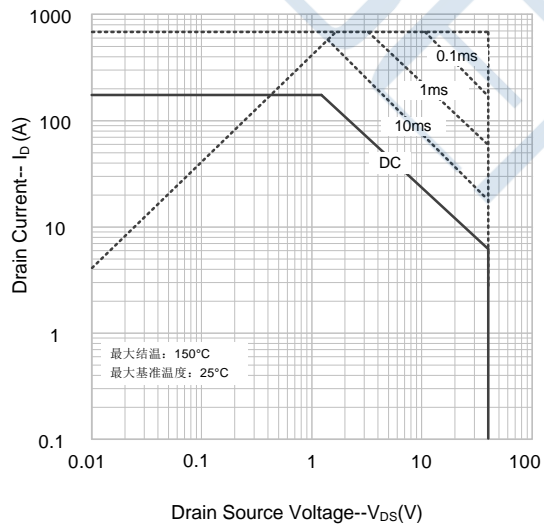
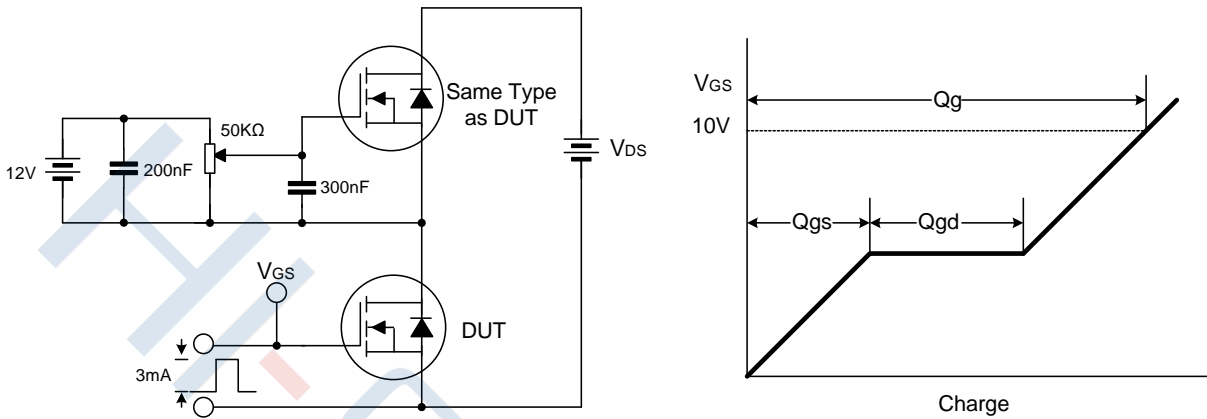


Figure 9. Max. Safe Operating Area

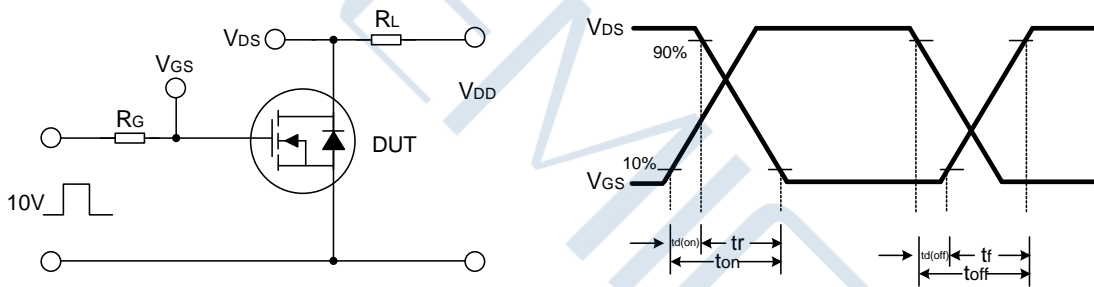


Test Circuit

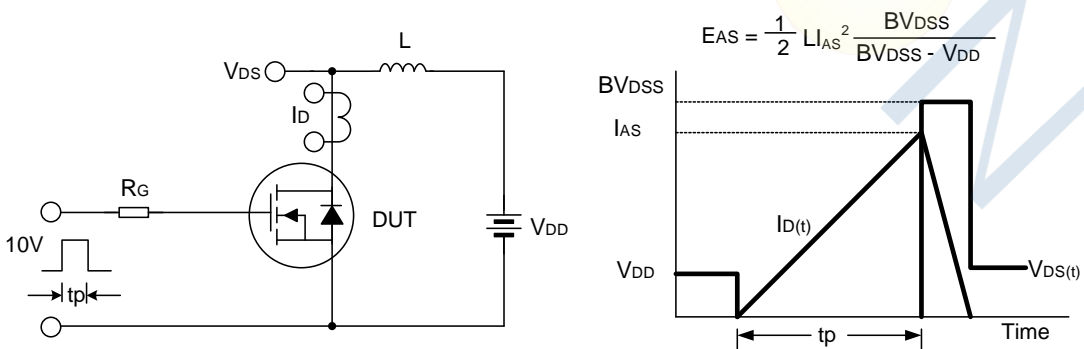
Gate Charge Test Circuit & Waveform



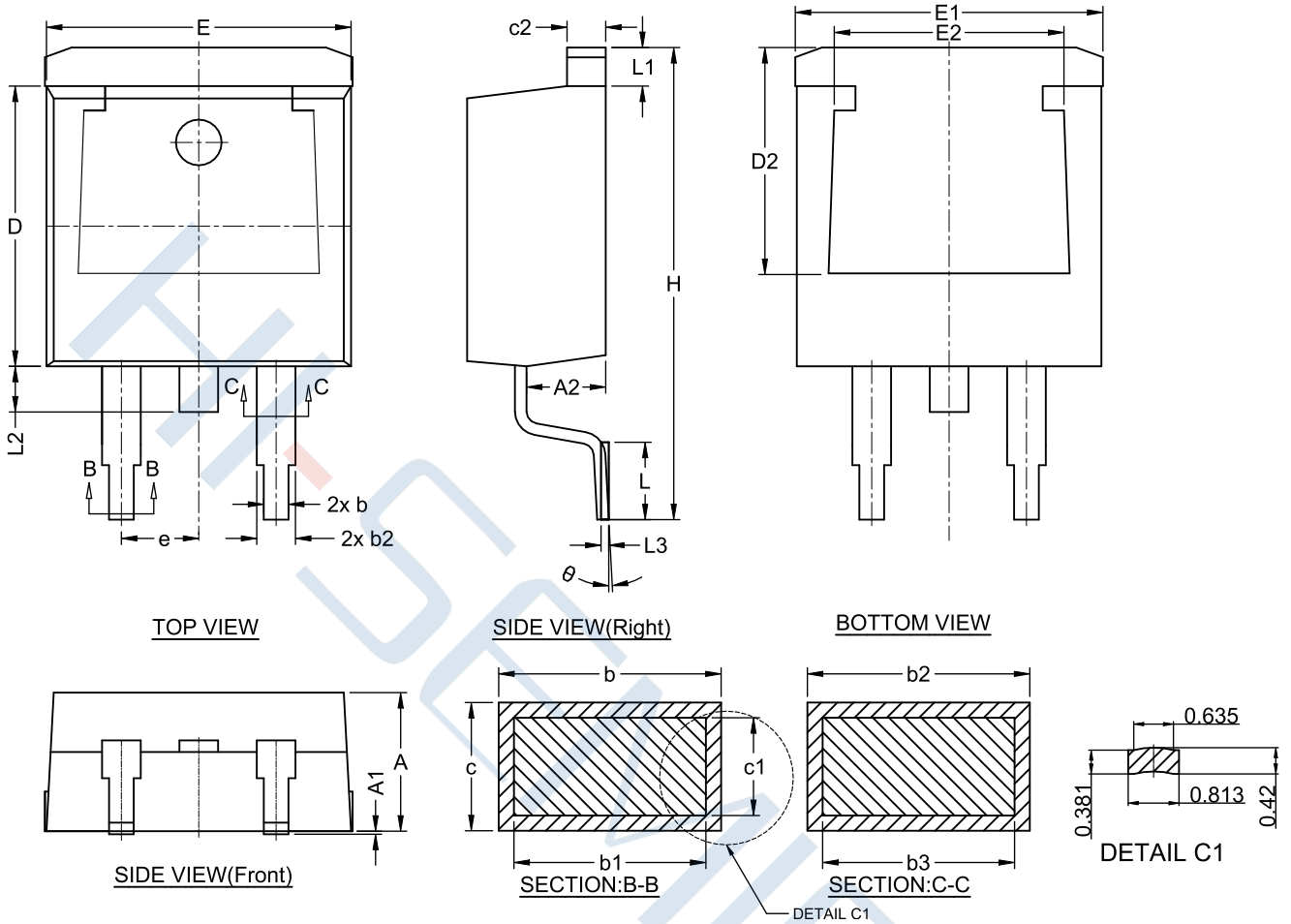
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of TO-263-2L



DIM SYMBOL	MIN.	NOM.	MAX.
A	4.450	4.550	4.650
A1	0.000	---	0.150
A2	2.500	2.600	2.700
b	0.753	0.853	0.953
b1	0.713	0.813	0.913
b2	1.210	1.310	1.410
b3	1.170	1.270	1.370
c	0.330	0.421	0.521
c1	0.281	0.381	0.481
c2	1.210	1.310	1.410
D	9.100	9.200	9.300
D2	7.215	7.415	7.615
E	9.900	10.000	10.100
E1	9.900	10.100	10.300
E2	7.341	7.541	7.741
e	2.540 BSC.		
H	15.300	15.500	15.700
L	2.340	2.540	2.740
L1	1.066	1.266	1.466
L2	1.400	1.500	1.600
L3	0.254 BSC.		
θ	0°	---	5°

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