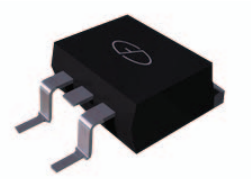
GOOD-ARK
SEMICONDUCTOR

SSFT4003A

40V N-Channel MOSFET

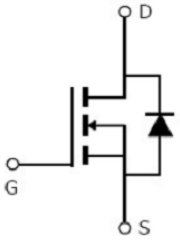
Main Product Characteristics

V_{DSS}	40V
$R_{DS(on)}$	2.4mΩ (Typ.)
I_D	200A①



TO-263

SSFT4003A



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 175°C operating temperature
- Lead free

Description

The SSFT4003A utilizes the latest processing techniques to achieve high cell density, low on- resistance and high repetitive avalanche rating. These features make this device extremely efficient and reliable for use in power switching applications and a wide variety of other applications.

Absolute Max Ratings

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	200①	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	135①	
I_{DM}	Pulsed Drain Current②	750	
P_D @T_C = 25°C	Power Dissipation③	220	W
	Linear Derating Factor	1.5	W/°C
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-to-Source Voltage	± 24	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.3mH	912	mJ
I_{AS}	Avalanche Current @ L=0.3mH	78	A
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to +175	°C

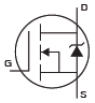
Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case③	—	0.62	°C/W
$R_{\theta JA}$	Junction-to-Ambient (t ≤ 10s) ④	—	60	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ④	—	40	°C/W

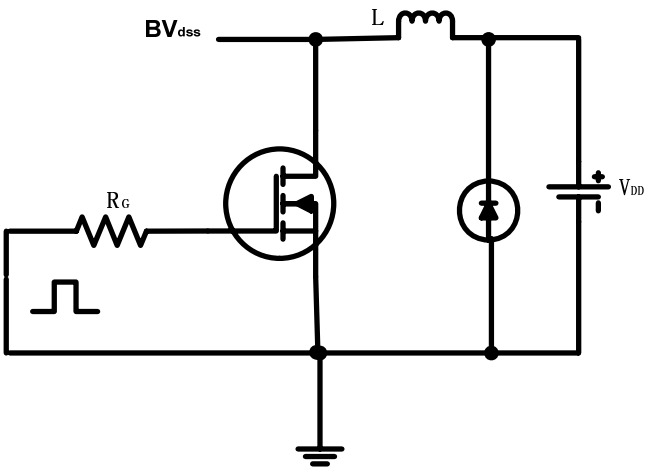
Electrical Characteristics (T_A=25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	40	—	—	V	V_{GS} = 0V, I_D = 250μA
$R_{DS(on)}$	Static Drain-to-Source On-resistance	—	2.4	3.5	mΩ	V_{GS}=10V,I_D = 30A
		—	4.1	—		T_J = 125°C
$V_{GS(th)}$	Gate Threshold Voltage	2	—	4	V	V_{DS} = V_{GS}, I_D = 250μA
		—	2.0	—		T_J = 125°C
I_{DSS}	Drain-to-Source Leakage Current	—	—	1	μA	V_{DS} = 40V,V_{GS} = 0V
		—	—	50		T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} =24V
		—	—	-100		V_{GS} = -24V
Q_g	Total Gate Charge	—	104	—	nC	I_D = 75A,
Q_{gs}	Gate-to-Source Charge	—	16	—		V_{DS} 32V,
Q_{gd}	Gate-to-Drain("Miller") Charge	—	40	—		V_{GS} = 10V
$t_{d(on)}$	Turn-on Delay Time	—	21.4	—	ns	V_{GS}=10V, V_{DS} =20V,
t_r	Rise time	—	57.8	—		R_L=0.26Ω,
$t_{d(off)}$	Turn-Off Delay Time	—	48.7	—		R_{GEN}=3.0Ω,
t_f	Fall Time	—	19.9	—		I_D = 75A
C_{iss}	Input Capacitance	—	7615	—	pF	V_{GS} = 0V,
C_{oss}	Output Capacitance	—	959	—		V_{DS} = 25V,
C_{rss}	Reverse Transfer Capacitance	—	342	—		f = 1MHz

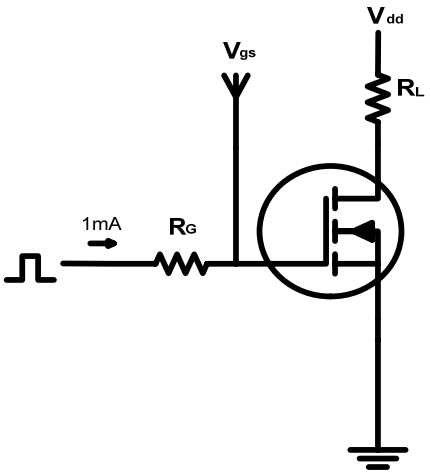
Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	200 ①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	750	A	
V_{sd}	Diode Forward Voltage	—	0.86	1.3	V	I_S=30A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	29.6	—	ns	T_J = 25°C, I_F =50A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	22.2	—	nC	

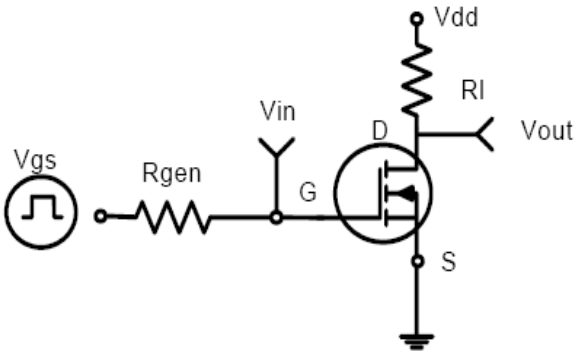
Test Circuits and Waveforms



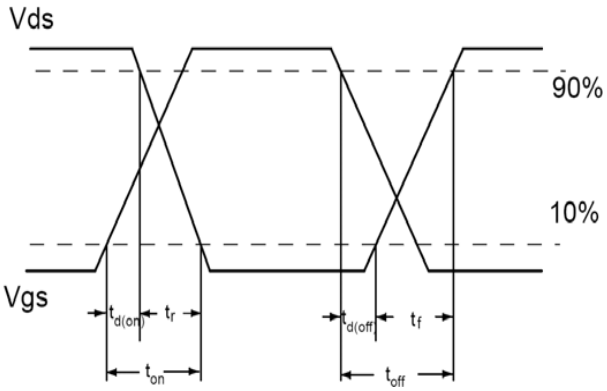
E_{AS} Test Circuit



Gate Charge Test Circuit



Switching Time Test Circuit



Switching Waveform

Notes:

①Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

②Repetitive rating; pulse width limited by max junction temperature.

③The power dissipation P_D is based on max junction temperature, using junction-to-case thermal resistance.

④The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C

Typical Electrical and Thermal Characteristics

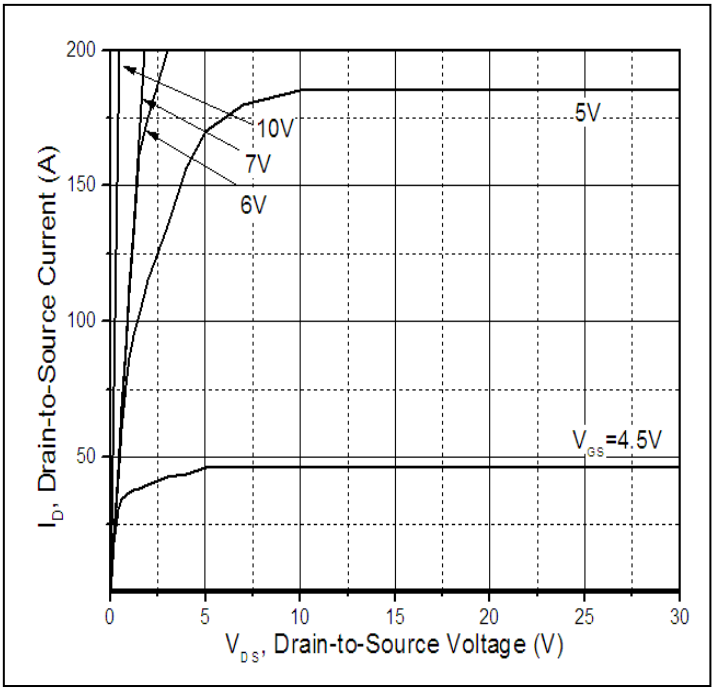


Figure 1. Typical Output Characteristics

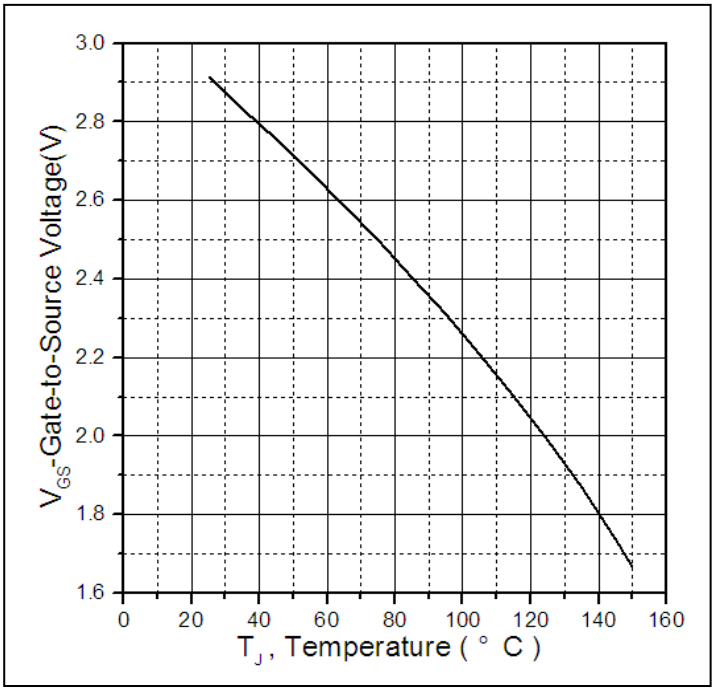


Figure 2. Gate to Source Cut-off Voltage

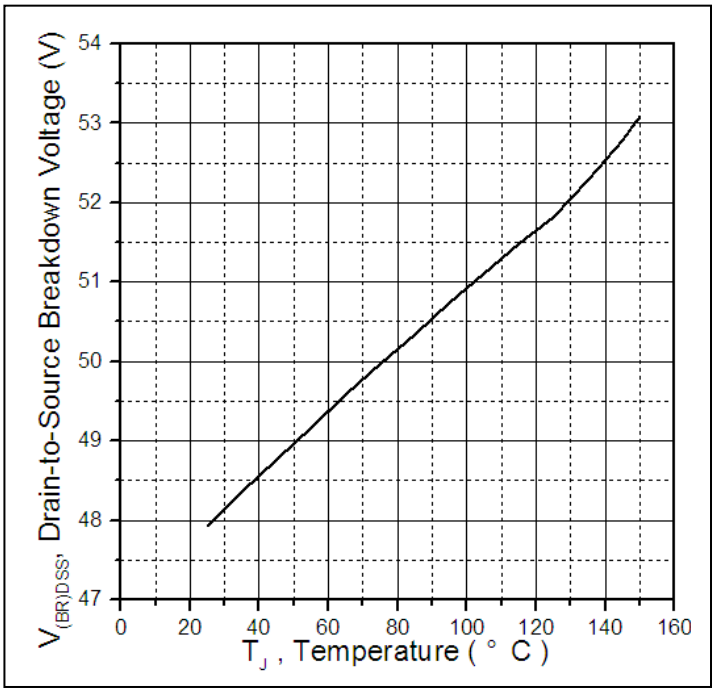


Figure 3. Drain-to-Source Breakdown Voltage vs Case Temperature

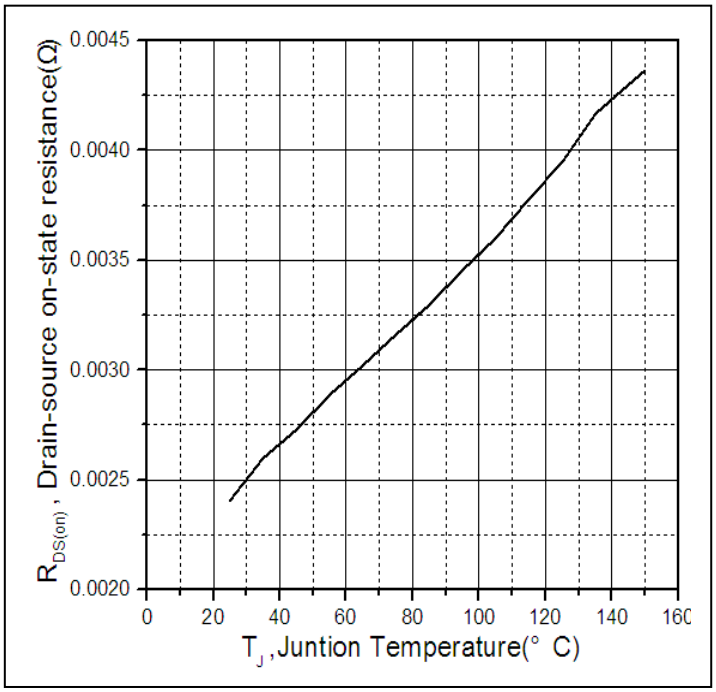


Figure 4. Normalized On-Resistance Vs. Case Temperature

Typical Electrical and Thermal Characteristics

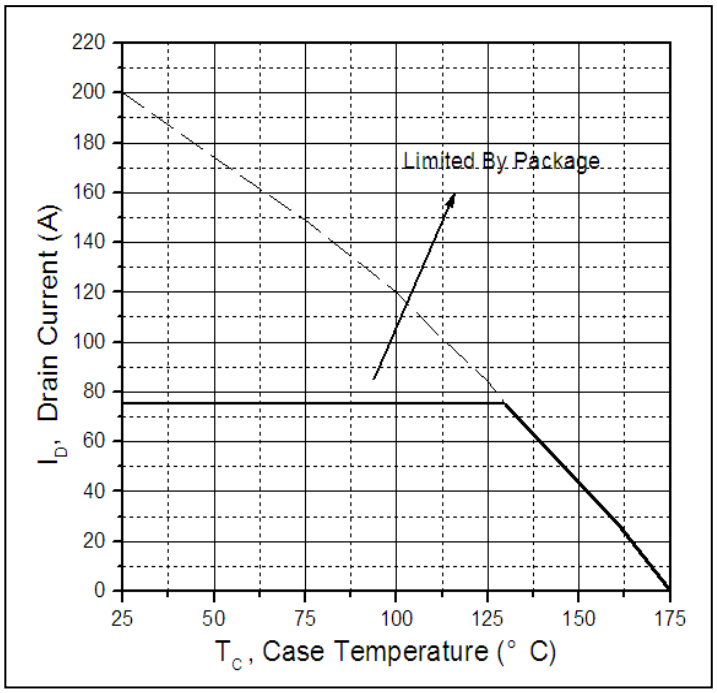


Figure 5. Maximum Drain Current vs Case Temperature

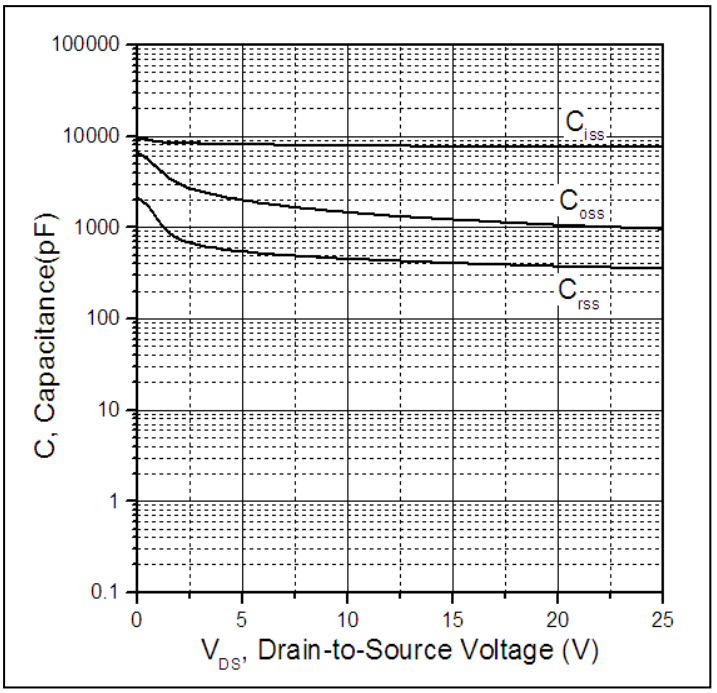


Figure 6. Typical Capacitance vs Drain-to-Source Voltage

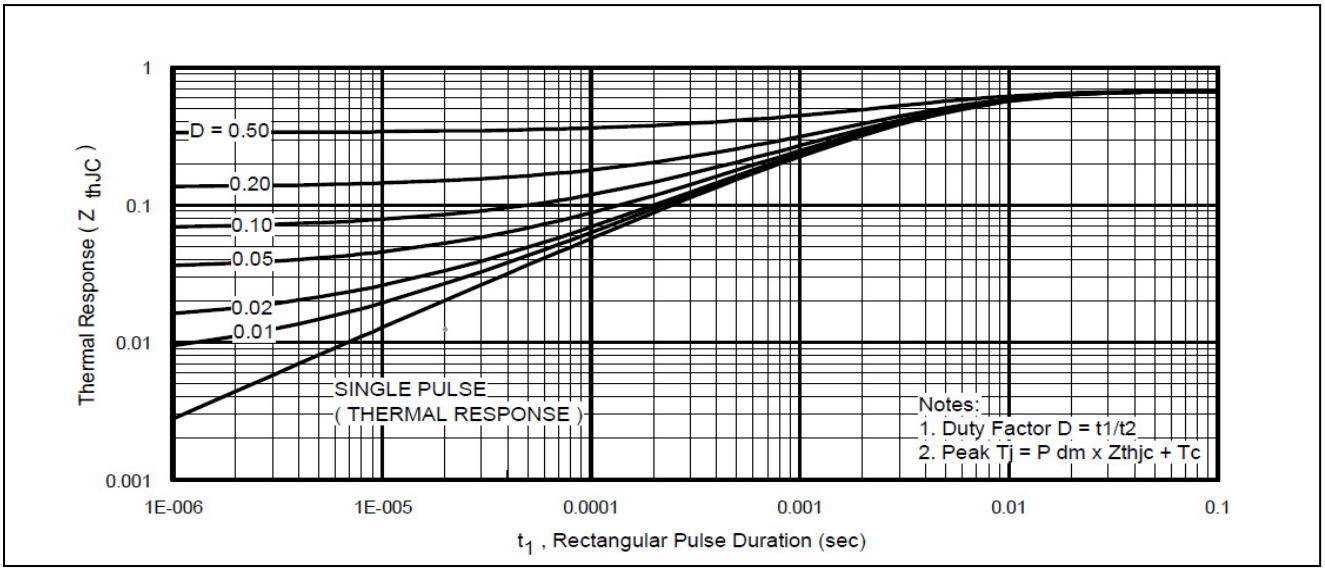
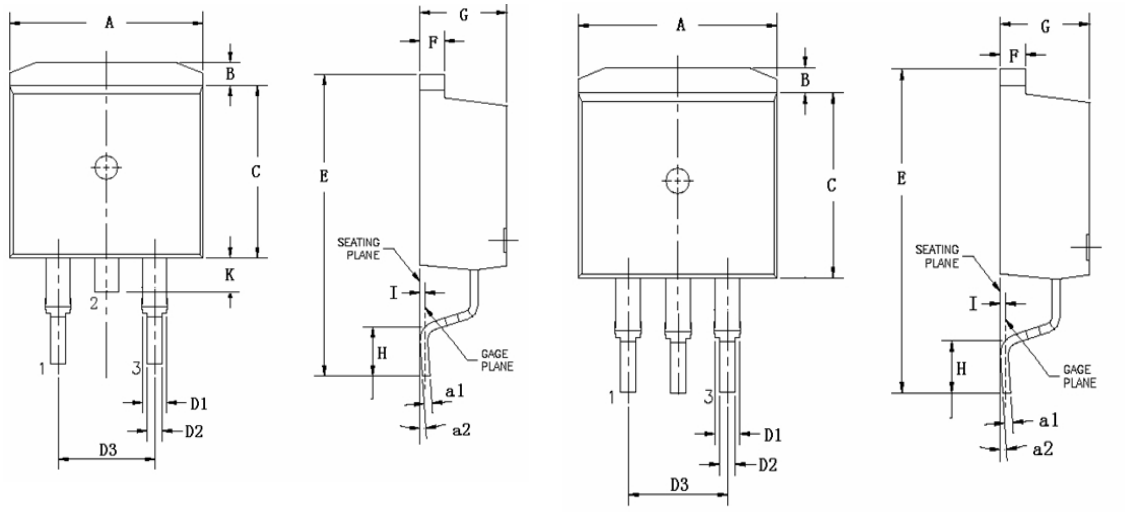


Figure 7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

TO-263(D^2PAK) PACKAGE OUTLINE DIMENSION



Symbol	Dimensions (mm)		Dimensions (in)	
	Min	Max	Min	Max
A	9.660	10.280	0.380	0.405
B	1.020	1.320	0.040	0.052
C	8.590	9.400	0.338	0.370
D1	1.140	1.400	0.045	0.055
D2	0.700	0.950	0.028	0.037
D3	5.080 (TYP)		0.200 (TYP)	
E	15.090	15.390	0.594	0.606
F	1.150	1.400	0.045	0.055
G	4.300	4.700	0.169	0.185
H	2.290	2.790	0.090	0.110
I	0.250 (TYP)		0.010 (TYP)	
K	1.300	1.600	0.051	0.063
a1	0.450	0.650	0.018	0.026
a2	0^0	8^0	1^0	8^0

Ordering and Marking Information

Device Marking: SSFT4003A

Package (Available)
TO263 (D^2PAK)
Operating Temperature Range
C : -55 to 175 ºC

Devices per Unit

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
D^2PAK	50	20	1000	6	6000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HT_{RB})	T_j=125°C to 175°C @ 80% of Max $V_{DSS}/V_{CES}/V_R$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HT_{GB})	T_j=150°C or 175°C @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices