

Main Product Characteristics:

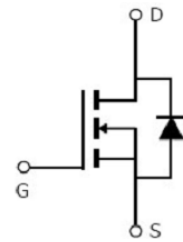
V_{DS}	40V
$R_{DS(on)}$	2.4m Ω (typ.)
I_D	200A ^①



TO-220
SSFT4003



TO-263
SSFT4003A



Schematic diagram

Features and Benefits:

- Advanced MOSFET process technology
- Special designed 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


Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute max Rating:

Symbol	Parameter	Max.	Units
I_D @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V	200 ^①	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V	135 ^①	
I_{DM}	Pulsed Drain Current ^②	750	
P_D @ TC = 25°C	Power Dissipation ^③	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

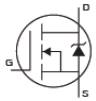
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ^③	—	0.62	°C/W
$R_{\theta JA}$	Junction-to-ambient ($t \leq 10s$) ^④	—	60	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ^④	—	40	°C/W

Electrical Characterizes @ $T_A=25^\circ\text{C}$ unless otherwise specified

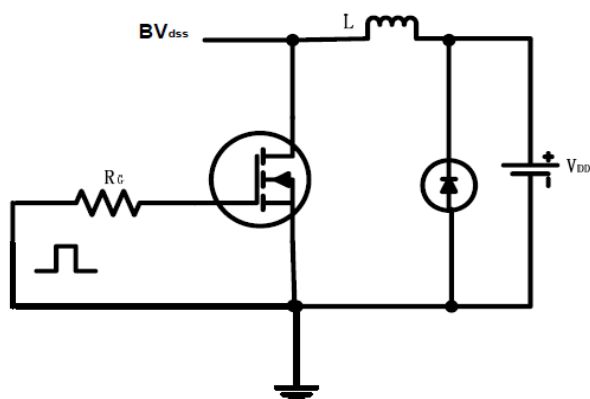
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	40	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	2.4	3.5	m Ω	$V_{GS}=10V, I_D = 30A$
		—	4.1	—		$T_J = 125^\circ\text{C}$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		—	2.0	—		$T_J = 125^\circ\text{C}$
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 40V, V_{GS} = 0V$
		—	—	50		$T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 24V$
		—	—	-100		$V_{GS} = -24V$
Q_g	Total gate charge	—	104	—	nC	$I_D = 75A,$ $V_{DS} 32V,$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source charge	—	16	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	40	—		
$t_{d(on)}$	Turn-on delay time	—	21.4	—	ns	$V_{GS}=10V, V_{DS} = 20V,$ $R_L=0.26\Omega,$ $R_{GEN}=3.0\Omega,$ $I_D = 75A$
t_r	Rise time	—	57.8	—		
$t_{d(off)}$	Turn-Off delay time	—	48.7	—		
t_f	Fall time	—	19.9	—		
C_{iss}	Input capacitance	—	7615	—	pF	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1MHz$
C_{oss}	Output capacitance	—	959	—		
C_{rss}	Reverse transfer capacitance	—	342	—		

Source-Drain Ratings and Characteristics

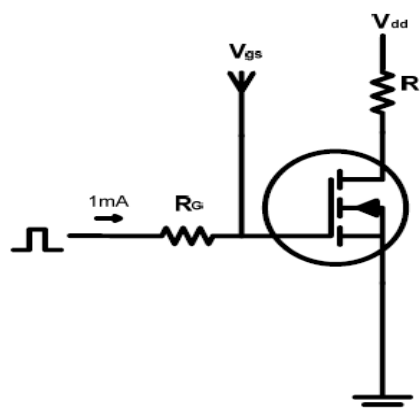
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	200 ^①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	750	A	
V_{SD}	Diode Forward Voltage	—	0.86	1.3	V	$I_S=30A, V_{GS}=0V$
t_{rr}	Reverse Recovery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

Test circuits and Waveforms

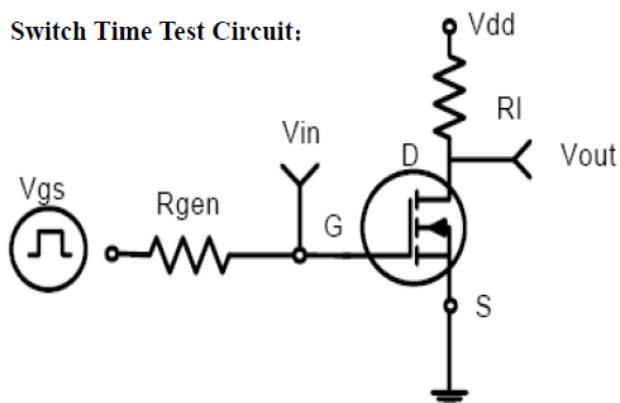
EAS test circuits:



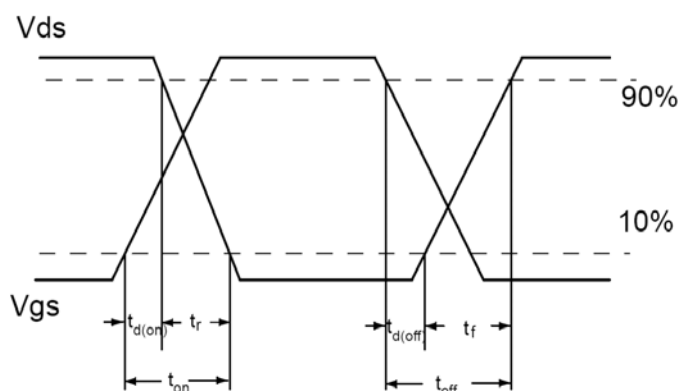
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Notes:

- ① Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ② Repetitive rating; pulse width limited by max junction temperature.
- ③ The power dissipation PD is based on max junction temperature, using junction-to-case thermal resistance.
- ④ The 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 $T_A = 25^\circ\text{C}$

Typical electrical and thermal characteristics

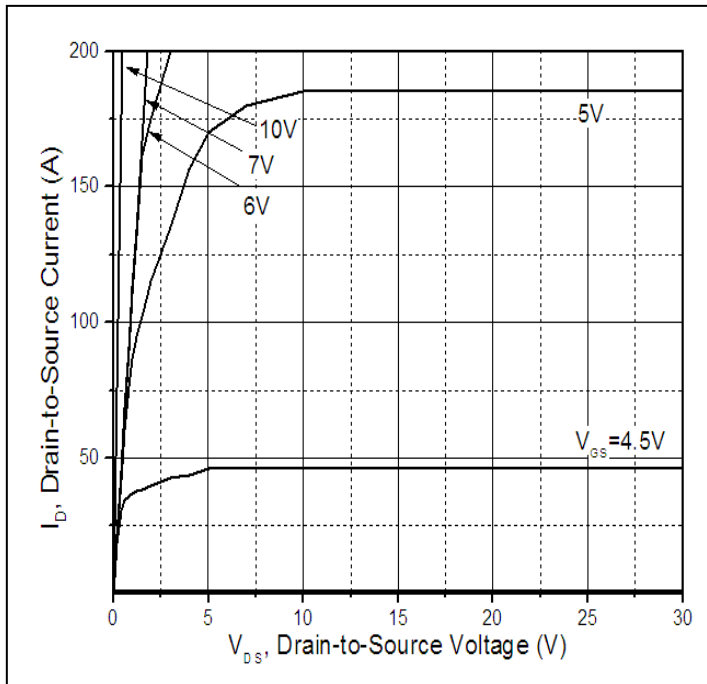


Figure 1: Typical Output Characteristics

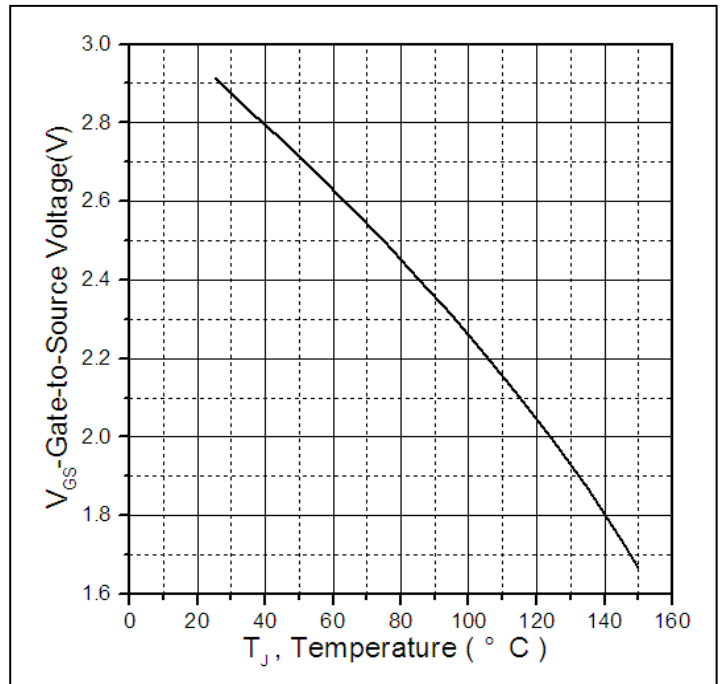


Figure 2: Gate to source cut-off voltage

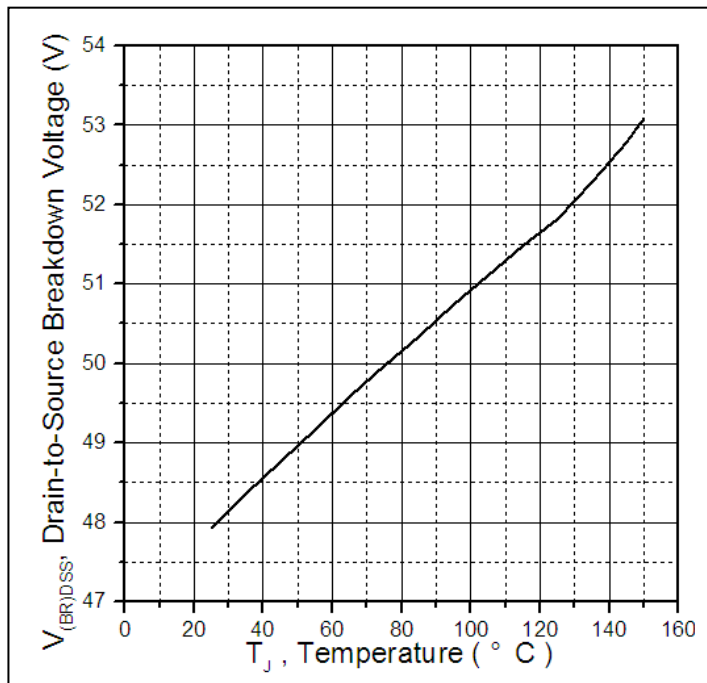


Figure 3: Drain-to-Source Breakdown Voltage Vs. Case Temperature

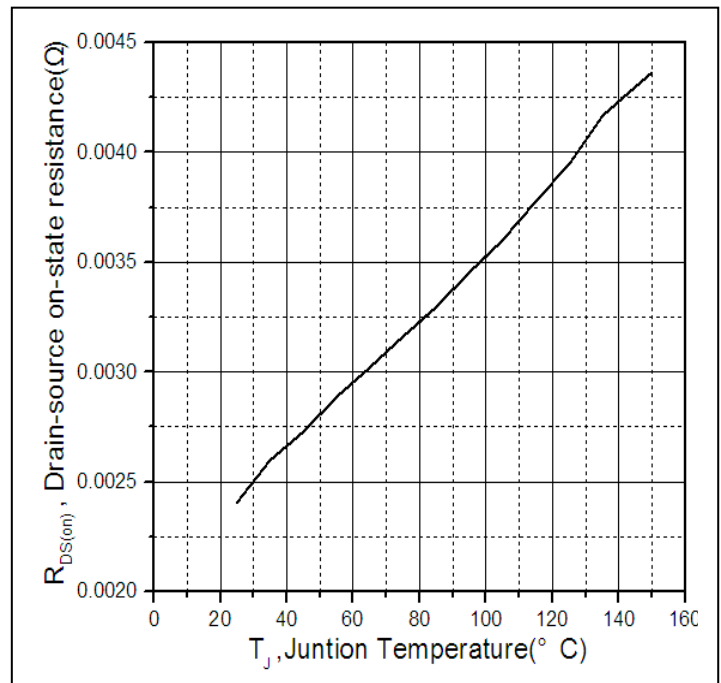


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical electrical and thermal characteristics

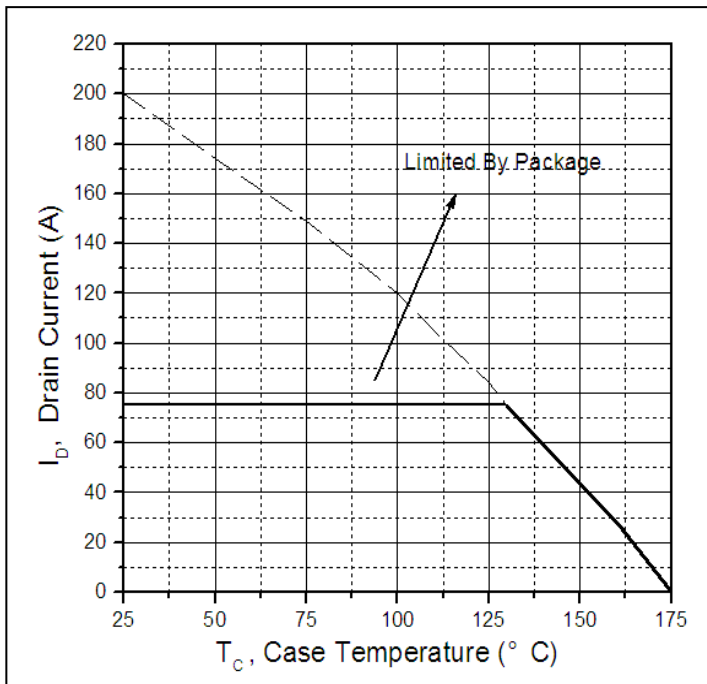


Figure 5. Maximum Drain Current Vs. Case Temperature

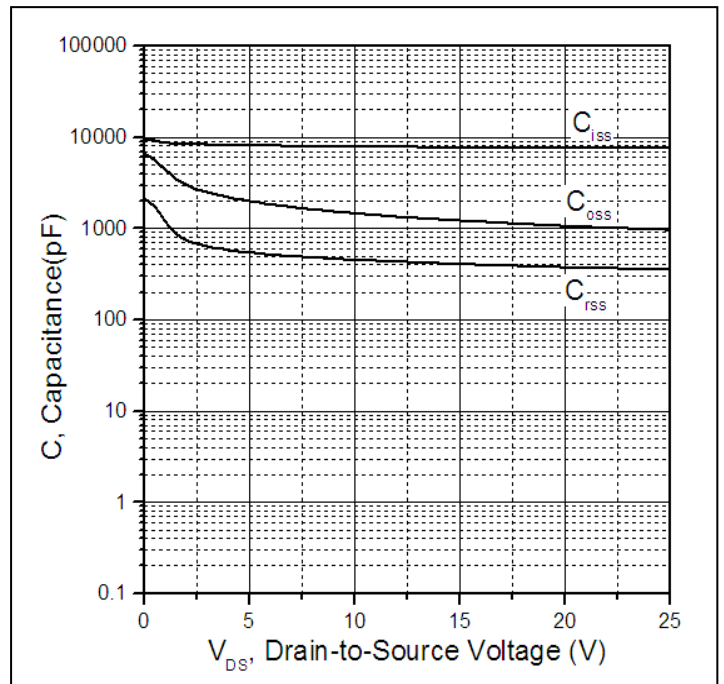


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

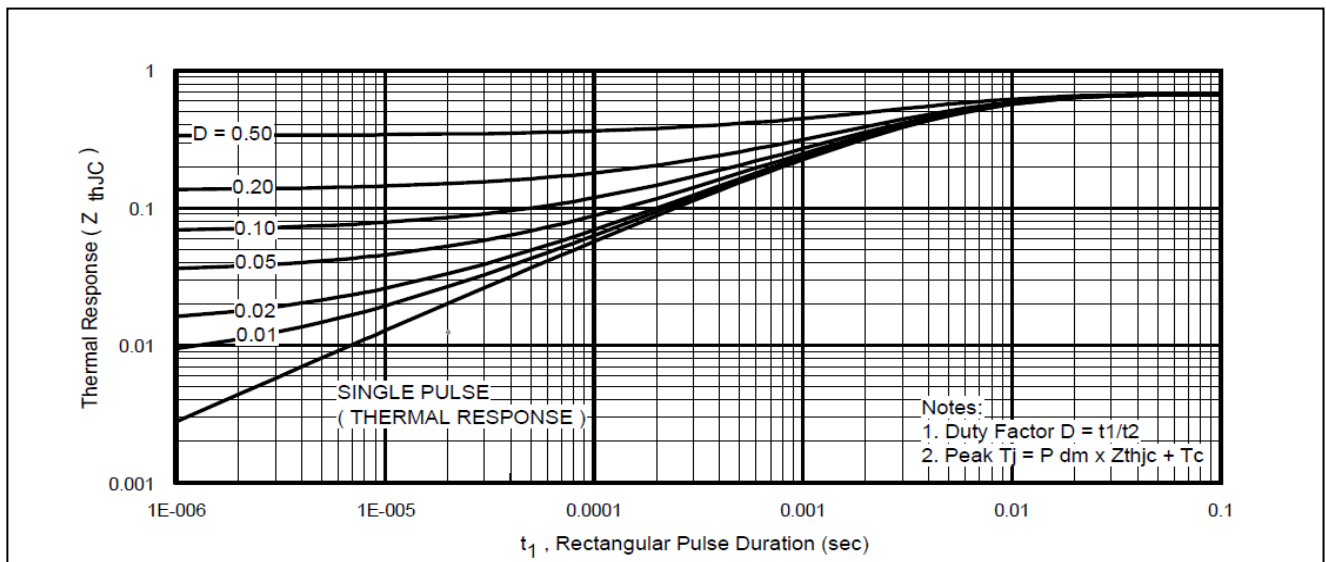
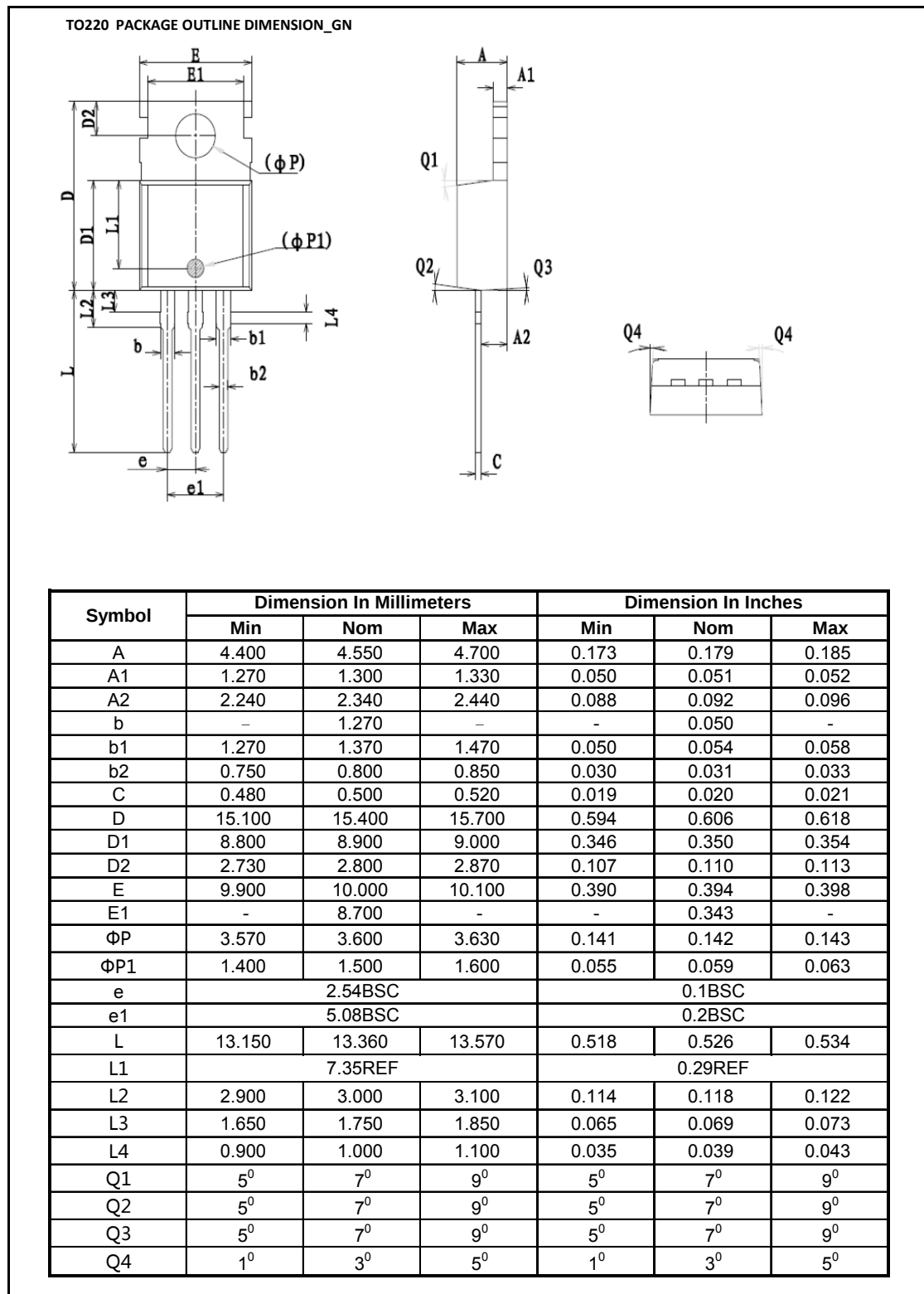
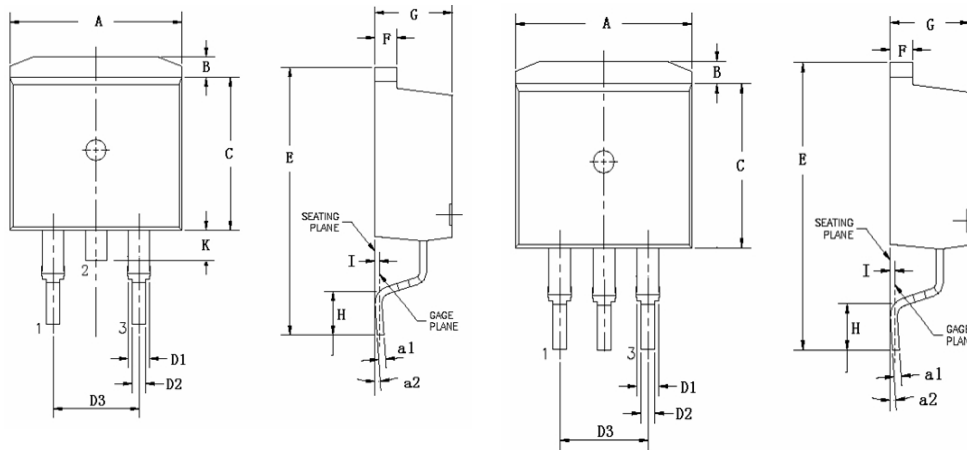


Figure7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data:


D2PAK PACKAGE OUTLINE DIMENSION


Symbol	Dimension In Millimeters		Dimension In Inches	
	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°	8°	1°	8°

Ordering and Marking Information**Device Marking: SSFT4003 & SSFT4003A****Package (Available)****TO220/TO263****Operating Temperature Range****C : -55 to 175 °C****Devices per Unit**

Package Type	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO220	50	20	1000	6	6000
D2PAK	50	20	1000	6	6000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	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(HTGB)	T_j=150°C or 175°C @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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