

PRELIMINARY DATA SHEET

NEC

SILICON TRANSISTOR

2SC5433

NPN EPITAXIAL SILICON TRANSISTOR FOR HIGH-FREQUENCY LOW-NOISE AMPLIFICATION

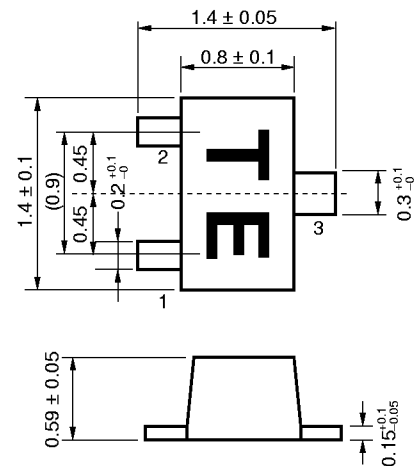
FEATURE

- Ultra super mini-mold thin flat package
(1.4 mm × 0.8 mm × 0.59 mm: TYP.)
- Contains same chip as 2SC5007

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	V _{CB0}	20	V
Collector to Emitter Voltage	V _{CE0}	10	V
Emitter to Base Voltage	V _{EB0}	1.5	V
Collector Current	I _C	65	mA
Total Power Dissipation	P _T	125	mW
Junction Temperature	T _J	150	°C
Storage Temperature	T _{stg}	-65 to +150	°C

PACKAGE DIMENSIONS (in mm)



PIN CONNECTIONS

- 1: Emitter
2: Base
3: Collector

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I _{CBO}	V _{CB} = 10 V, I _E = 0			800	nA
Emitter Cut-off Current	I _{EB0}	V _{EB} = 1 V, I _C = 0			800	nA
DC Current Gain	h _{FE}	V _{CE} = 3 V, I _C = 7 mA ^{Note 1}	80		145	
Gain Bandwidth Product	f _T	V _{CE} = 3 V, I _C = 7 mA, f = 1 GHz	4.5	7.0		GHz
Reverse Transfer Capacitance	C _{re}	V _{CB} = 3 V, I _E = 0, f = 1 MHz ^{Note 2}			0.9	pF
Insertion Power Gain	S _{21e} ²	V _{CE} = 3 V, I _C = 7 mA, f = 1 GHz	10.0	12.0		dB
Noise Figure	NF	V _{CE} = 3 V, I _C = 7 mA, f = 1 GHz		1.4	2.7	dB

Notes 1. Pulse measurement P_w ≤ 350 μs, duty cycle ≤ 2 %

2. Collector to base capacitance measured by capacitance meter (automatic balance bridge method) when emitter pin is connected to the guard pin.

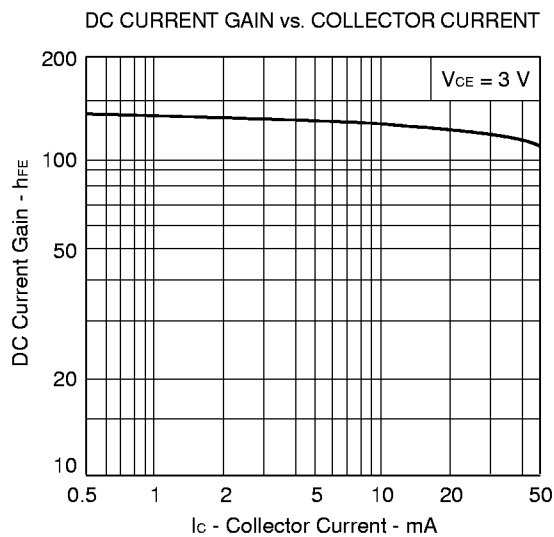
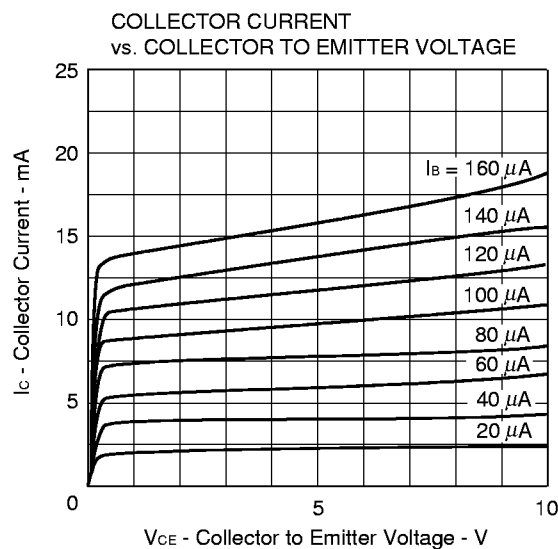
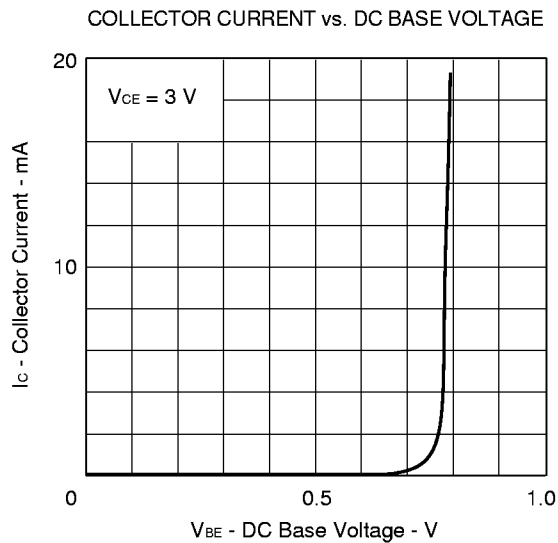
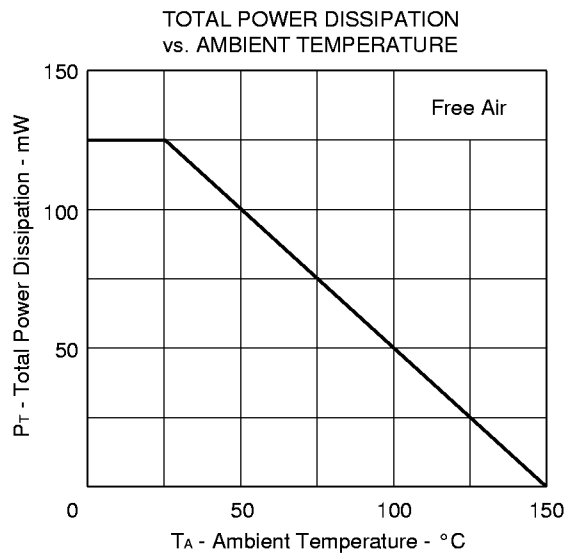
Because this product uses high-frequency process, avoid excessive input of static electricity, etc.

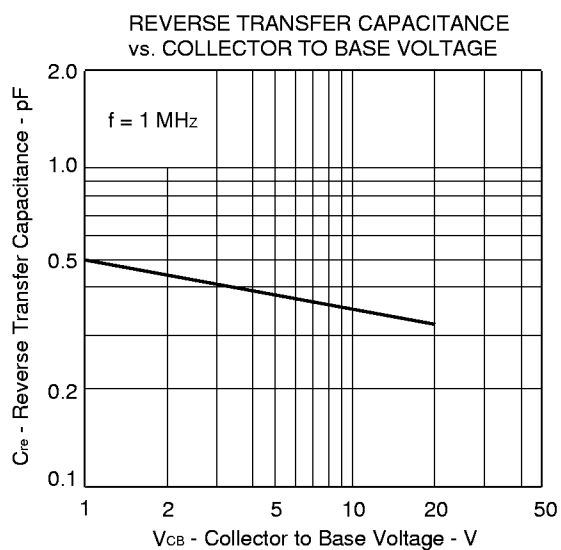
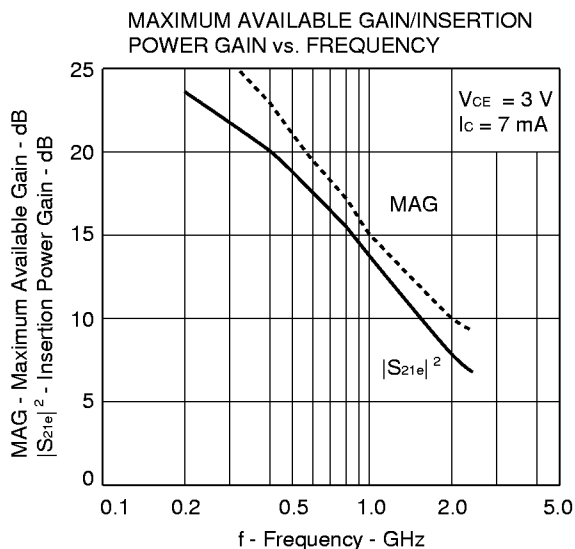
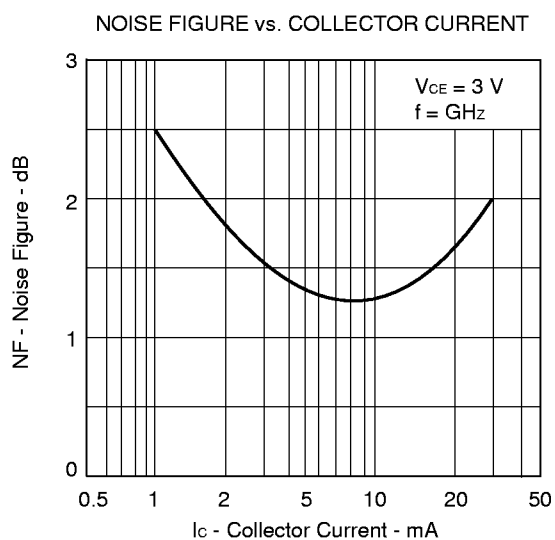
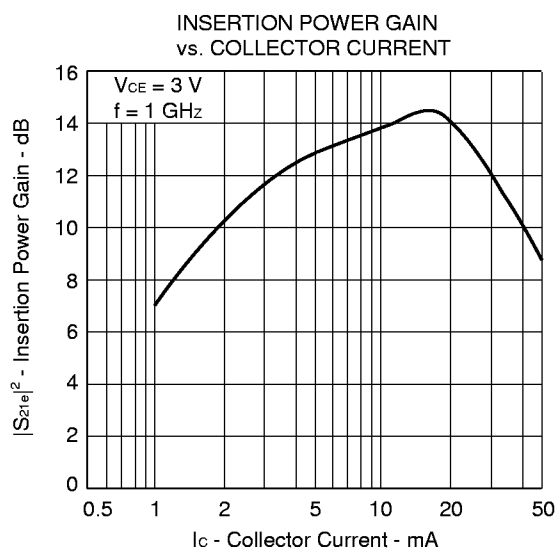
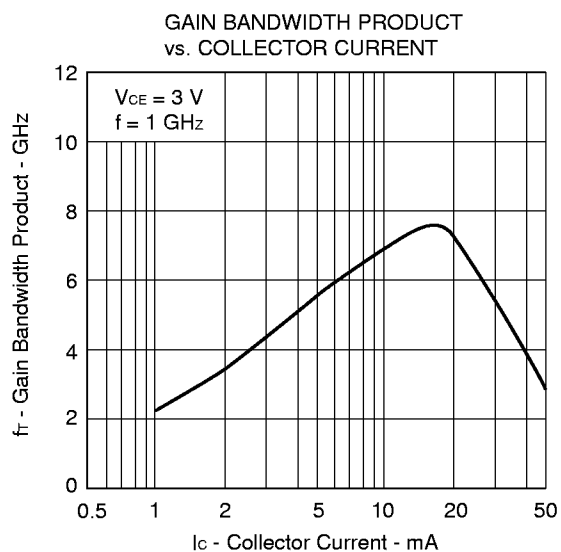
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h_{FE} CLASSIFICATION

RANK	EB	FB
Marking	TE	TF
h_{FE}	80 to 110	100 to 145

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$)





2SC5433 S PARAMETER

$V_{CE} = 3\text{ V}$, $I_C = 10\text{ mA}$, $Z_0 = 50\ \Omega$

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.593	-73.5	17.349	130.6	0.036	58.5	0.701	-33.6
400.00	0.470	-115.9	10.897	108.5	0.051	53.7	0.454	-43.4
600.00	0.435	-138.3	7.822	95.9	0.063	55.3	0.348	-47.0
800.00	0.418	-153.3	6.134	89.3	0.075	57.9	0.300	-48.0
1000.00	0.418	-165.0	5.060	84.4	0.087	59.6	0.270	-46.9
1200.00	0.431	-172.7	4.321	79.2	0.100	61.1	0.243	-45.7
1400.00	0.438	-177.4	3.713	73.9	0.115	62.5	0.219	-46.7
1600.00	0.432	176.8	3.234	70.3	0.129	63.8	0.196	-49.6
1800.00	0.438	170.0	2.853	66.8	0.139	65.3	0.179	-53.7
2000.00	0.461	164.5	2.564	63.4	0.150	64.6	0.164	-58.5
2200.00	0.483	161.1	2.350	59.0	0.162	63.6	0.148	-64.3
2400.00	0.499	158.4	2.213	55.1	0.178	62.5	0.134	-73.7
2600.00	0.512	155.5	2.095	52.9	0.195	62.6	0.130	-83.7
2800.00	0.529	152.8	1.922	50.8	0.207	63.5	0.127	-92.6
3000.00	0.547	151.0	1.785	46.8	0.213	63.1	0.125	-101.2

$V_{CE} = 3\text{ V}$, $I_C = 7\text{ mA}$, $Z_0 = 50\ \Omega$

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.673	-61.7	14.941	136.5	0.040	61.6	0.773	-29.2
400.00	0.523	-103.4	10.008	113.4	0.058	51.9	0.527	-41.0
600.00	0.474	-127.5	7.335	99.6	0.070	51.2	0.406	-46.4
800.00	0.444	-144.1	5.814	91.9	0.080	52.6	0.349	-48.3
1000.00	0.435	-157.2	4.839	86.4	0.091	54.3	0.313	-47.9
1200.00	0.444	-166.4	4.135	80.8	0.102	56.2	0.281	-47.0
1400.00	0.450	-172.3	3.562	75.0	0.116	58.0	0.254	-47.9
1600.00	0.442	-178.6	3.109	71.0	0.128	60.2	0.228	-50.6
1800.00	0.445	173.9	2.741	67.5	0.137	62.2	0.211	-54.4
2000.00	0.466	167.7	2.474	63.9	0.146	61.8	0.195	-58.5
2200.00	0.489	163.8	2.266	59.2	0.159	61.1	0.178	-63.8
2400.00	0.505	160.7	2.136	55.1	0.173	60.3	0.164	-72.0
2600.00	0.518	157.7	2.021	53.0	0.190	61.0	0.159	-80.7
2800.00	0.534	154.6	1.855	50.6	0.201	62.2	0.157	-88.3
3000.00	0.551	152.6	1.722	46.5	0.207	61.9	0.153	-95.5

$V_{CE} = 3\text{ V}$, $I_C = 5\text{ mA}$, $Z_0 = 50\ \Omega$

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.759	-50.6	12.082	142.5	0.045	62.8	0.844	-24.2
400.00	0.593	-89.5	8.740	119.7	0.067	51.4	0.615	-36.8
600.00	0.533	-115.2	6.641	104.4	0.080	47.9	0.483	-44.2
800.00	0.487	-132.9	5.367	95.5	0.088	47.5	0.418	-47.3
1000.00	0.467	-147.3	4.496	89.2	0.097	48.2	0.376	-47.5
1200.00	0.468	-158.3	3.871	83.0	0.107	49.6	0.338	-46.9
1400.00	0.473	-165.5	3.337	76.7	0.118	52.2	0.306	-48.2
1600.00	0.462	-172.6	2.925	72.2	0.127	55.0	0.277	-50.6
1800.00	0.460	179.1	2.585	68.2	0.135	57.1	0.258	-54.1
2000.00	0.479	171.9	2.349	64.7	0.142	57.2	0.241	-57.8
2200.00	0.502	167.4	2.139	59.5	0.154	57.4	0.224	-62.4
2400.00	0.518	163.9	2.017	55.1	0.166	57.3	0.209	-69.5
2600.00	0.529	160.4	1.908	52.8	0.182	58.6	0.204	-76.9
2800.00	0.544	157.1	1.752	50.1	0.192	60.3	0.202	-83.4
3000.00	0.562	154.8	1.631	45.8	0.198	60.5	0.195	-89.3

2SC5433 S PARAMETER

$V_{CE} = 3\text{ V}$, $I_C = 3\text{ mA}$, $Z_0 = 50\ \Omega$

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.849	-39.1	8.593	149.9	0.049	67.9	0.910	-18.1
400.00	0.690	-72.9	6.799	128.1	0.078	53.3	0.728	-30.3
600.00	0.626	-99.3	5.461	111.5	0.096	46.0	0.595	-39.2
800.00	0.565	-117.8	4.546	101.0	0.104	42.3	0.525	-44.2
1000.00	0.528	-133.4	3.893	93.5	0.111	40.7	0.478	-45.5
1200.00	0.515	-146.4	3.387	86.5	0.118	40.9	0.433	-45.6
1400.00	0.515	-155.4	2.949	79.2	0.126	43.1	0.394	-47.1
1600.00	0.500	-163.5	2.631	74.4	0.130	46.1	0.360	-49.6
1800.00	0.490	-172.8	2.342	69.8	0.134	48.8	0.339	-53.2
2000.00	0.505	178.7	2.095	65.4	0.137	49.3	0.322	-56.7
2200.00	0.528	173.1	1.910	59.7	0.146	50.5	0.302	-60.7
2400.00	0.543	168.9	1.808	54.9	0.156	51.9	0.287	-66.9
2600.00	0.553	164.9	1.713	52.3	0.169	53.8	0.283	-73.6
2800.00	0.566	161.0	1.571	49.3	0.177	56.6	0.284	-79.0
3000.00	0.583	158.0	1.464	44.8	0.182	57.8	0.276	-84.0

$V_{CE} = 3\text{ V}$, $I_C = 1\text{ mA}$, $Z_0 = 50\ \Omega$

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.955	-23.9	3.465	160.1	0.053	73.5	0.977	-9.3
400.00	0.852	-47.2	3.060	142.4	0.097	60.6	0.894	-17.6
600.00	0.803	-71.0	2.702	126.3	0.130	49.7	0.802	-26.5
800.00	0.759	-88.9	2.480	113.4	0.147	41.4	0.754	-33.8
1000.00	0.710	-104.8	2.263	103.8	0.159	34.0	0.723	-37.4
1200.00	0.667	-119.3	1.995	95.1	0.167	29.3	0.677	-39.2
1400.00	0.653	-131.7	1.791	85.4	0.169	27.8	0.630	-41.7
1600.00	0.632	-141.9	1.654	78.2	0.164	27.1	0.589	-45.0
1800.00	0.602	-152.6	1.508	72.1	0.154	26.6	0.565	-49.1
2000.00	0.599	-163.9	1.359	66.4	0.147	25.0	0.549	-53.3
2200.00	0.621	-172.4	1.256	59.2	0.143	26.8	0.529	-57.3
2400.00	0.635	-178.4	1.200	53.7	0.139	30.1	0.511	-63.4
2600.00	0.639	176.3	1.137	50.5	0.138	34.9	0.513	-70.0
2800.00	0.645	171.0	1.038	46.5	0.136	41.1	0.522	-75.1
3000.00	0.659	166.4	0.976	41.4	0.135	46.7	0.512	-79.8

$V_{CE} = 1\text{ V}$, $I_C = 5\text{ mA}$, $Z_0 = 50\ \Omega$

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.732	-59.6	11.569	138.4	0.055	60.0	0.790	-31.6
400.00	0.588	-101.6	8.006	115.1	0.081	47.5	0.536	-48.4
600.00	0.543	-126.5	5.948	100.2	0.094	44.0	0.403	-58.2
800.00	0.511	-143.6	4.748	91.7	0.102	43.7	0.334	-63.0
1000.00	0.501	-156.8	3.960	85.6	0.112	44.2	0.283	-64.7
1200.00	0.511	-166.4	3.400	79.2	0.123	45.5	0.243	-66.6
1400.00	0.516	-172.5	2.936	73.0	0.135	47.9	0.213	-70.5
1600.00	0.505	-179.0	2.602	69.1	0.145	50.7	0.189	-75.6
1800.00	0.506	173.1	2.296	65.0	0.153	52.4	0.170	-81.5
2000.00	0.527	166.8	2.047	61.0	0.161	52.3	0.157	-88.6
2200.00	0.548	162.8	1.865	55.7	0.173	52.1	0.144	-99.3
2400.00	0.564	159.5	1.761	51.5	0.186	52.1	0.144	-110.9
2600.00	0.574	156.2	1.661	49.1	0.202	53.0	0.150	-119.7
2800.00	0.588	153.1	1.521	46.6	0.210	54.2	0.156	-127.5
3000.00	0.605	151.0	1.415	42.1	0.217	54.2	0.163	-134.9

2SC5433 S PARAMETER

$V_{CE} = 1\text{ V}$, $I_C = 3\text{ mA}$, $Z_0 = 50\ \Omega$

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.829	-45.4	8.382	146.5	0.061	64.5	0.878	-23.6
400.00	0.673	-82.9	6.392	123.5	0.097	49.0	0.662	-39.2
600.00	0.619	-109.4	5.005	106.9	0.115	41.6	0.521	-50.1
800.00	0.568	-127.9	4.115	96.8	0.122	38.0	0.444	-56.0
1000.00	0.542	-143.0	3.493	89.2	0.130	36.2	0.387	-58.3
1200.00	0.540	-154.9	3.029	82.2	0.138	36.4	0.340	-59.8
1400.00	0.543	-162.7	2.607	75.3	0.146	38.7	0.301	-63.0
1600.00	0.529	-170.3	2.338	70.4	0.149	41.4	0.271	-67.1
1800.00	0.522	-179.2	2.072	65.8	0.153	43.4	0.251	-71.8
2000.00	0.540	173.2	1.850	61.3	0.156	43.6	0.234	-76.9
2200.00	0.563	168.2	1.692	55.5	0.165	44.5	0.215	-84.6
2400.00	0.577	164.4	1.598	51.0	0.176	45.8	0.209	-93.4
2600.00	0.586	160.6	1.511	48.4	0.188	47.7	0.213	-101.4
2800.00	0.600	157.1	1.382	45.4	0.195	49.7	0.216	-108.0
3000.00	0.616	154.4	1.288	40.7	0.199	50.6	0.217	-114.8

$V_{CE} = 1\text{ V}$, $I_C = 1\text{ mA}$, $Z_0 = 50\ \Omega$

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.947	-26.7	3.453	158.0	0.068	72.9	0.967	-11.9
400.00	0.835	-52.6	2.996	138.7	0.123	57.4	0.863	-22.3
600.00	0.787	-77.5	2.609	121.6	0.161	45.7	0.757	-32.9
800.00	0.738	-95.9	2.363	108.5	0.178	36.8	0.699	-40.9
1000.00	0.692	-112.1	2.118	98.6	0.192	29.0	0.654	-44.9
1200.00	0.656	-126.6	1.853	89.4	0.200	24.3	0.602	-47.4
1400.00	0.648	-138.2	1.663	79.7	0.201	22.9	0.554	-50.7
1600.00	0.629	-148.0	1.528	72.7	0.194	21.7	0.513	-55.0
1800.00	0.603	-158.4	1.385	66.6	0.182	20.6	0.490	-59.6
2000.00	0.606	-169.1	1.247	60.9	0.173	18.5	0.472	-64.2
2200.00	0.629	-176.8	1.156	53.8	0.169	19.6	0.448	-69.6
2400.00	0.643	177.7	1.100	48.3	0.163	22.6	0.437	-77.1
2600.00	0.649	172.8	1.039	45.1	0.159	26.0	0.445	-84.3
2800.00	0.656	167.8	0.945	41.3	0.153	31.0	0.452	-89.8
3000.00	0.672	163.6	0.886	35.9	0.151	35.5	0.444	-95.4