NEC

SILICON TRANSISTOR

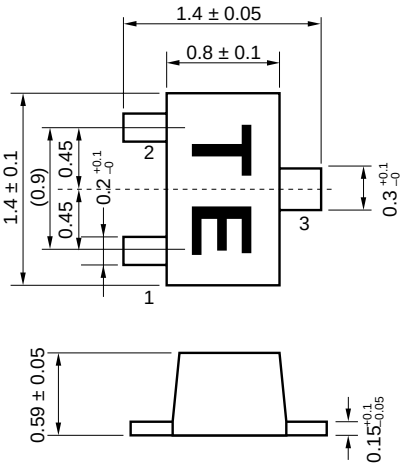
2SC5433

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

PACKAGE DIMENSIONS (in mm)



PIN CONNECTIONS
1: Emitter
2: Base
3: Collector

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	10	V
Emitter to Base Voltage	V_{EBO}	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

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_{EBO}	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	Cre	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 $P_W \leq 350\ \mu s$, 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.

The information in this document is subject to change without notice.

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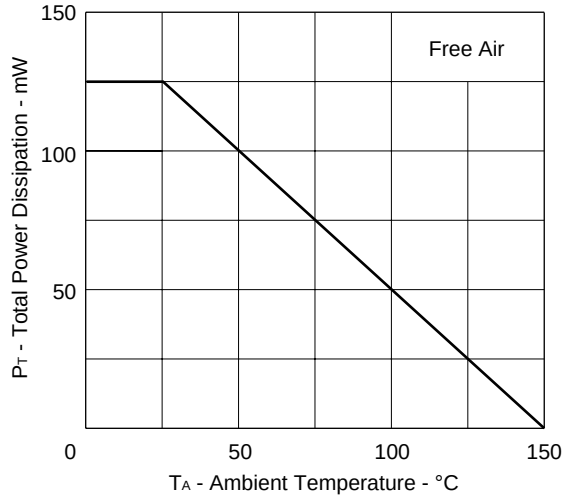
h_{FE} CLASSIFICATION

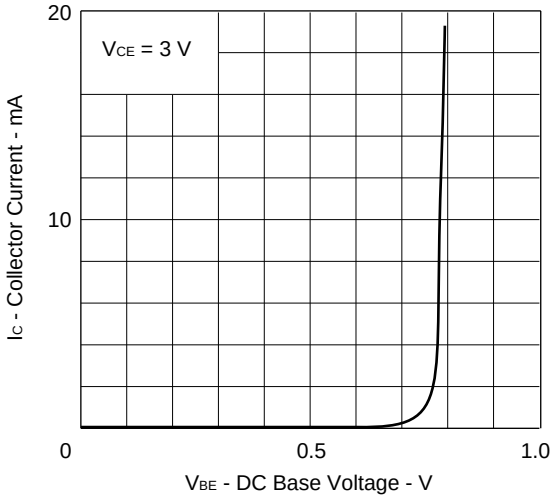
RANK	EB	FB
Marking	TE	TF
h_{FE}	80 to 110	100 to 145

TYPICAL CHARACTERISTICS (T_A = 25 °C)

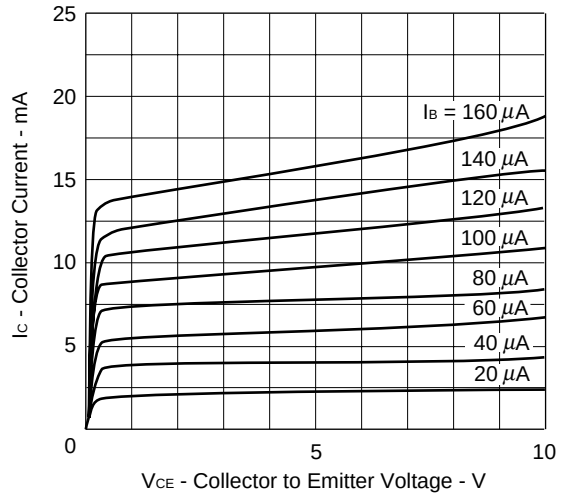
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



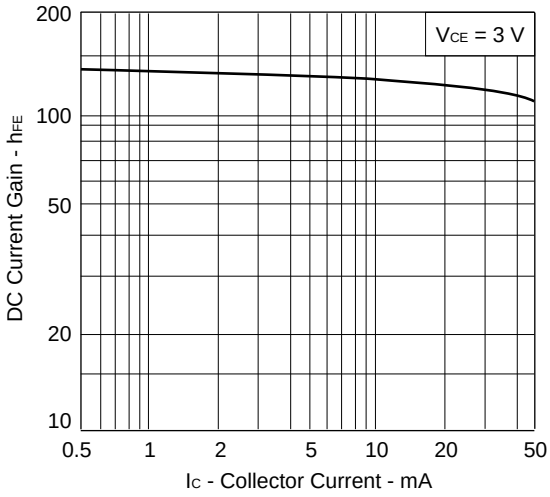
COLLECTOR CURRENT vs. DC BASE VOLTAGE



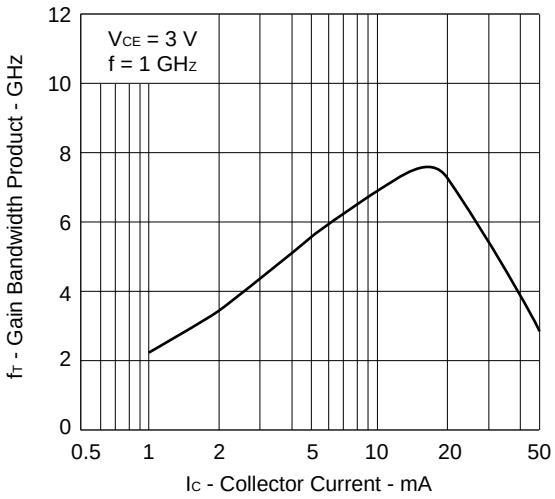
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



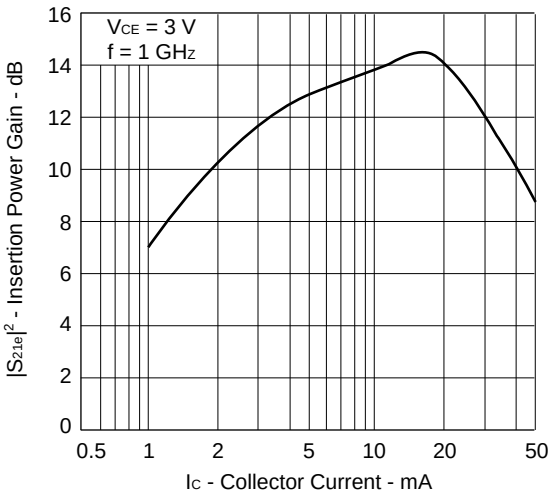
DC CURRENT GAIN vs. COLLECTOR CURRENT



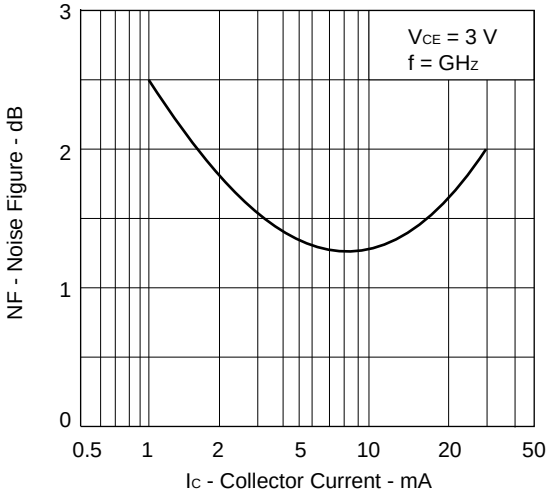
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



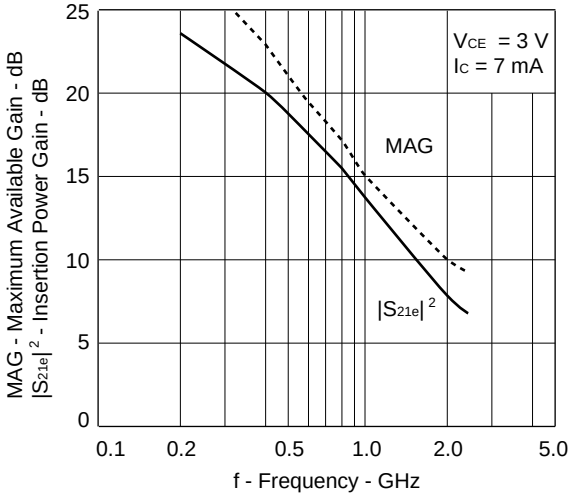
INSERTION POWER GAIN
vs. COLLECTOR CURRENT



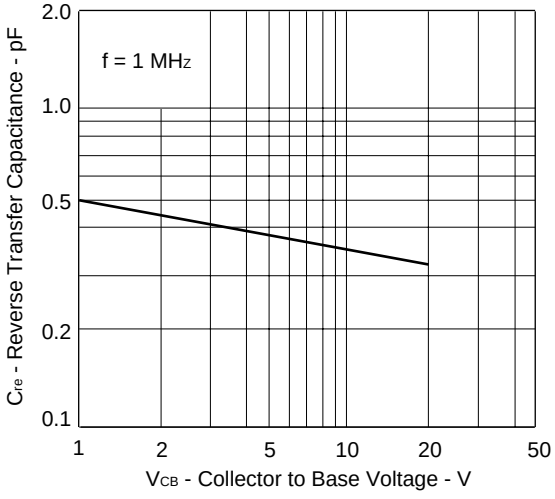
NOISE FIGURE vs. COLLECTOR CURRENT



MAXIMUM AVAILABLE GAIN/INSERTION
POWER GAIN vs. FREQUENCY



REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



2SC5433 S PARAMETER

V_{CE} = 3 V, I_C = 10 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	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 V, I_C = 7 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	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 V, I_C = 5 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	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 V, I_C = 3 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	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 V, I_C = 1 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	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 V, I_C = 5 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	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 V, I_C = 3 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	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 V, I_C = 1 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	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

[MEMO]

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