PRELIMINARY DATA SHEET

NEC

SILICON TRANSISTOR
μPA803T

NPN SILICON EPITAXIAL TRANSISTOR
(WITH BUILT-IN 2 ELEMENTS) MINI MOLD

μPA803T has built-in 2 transistors which were developed for UHF.

FEATURES

- High f_T
  f_T = 5.5 GHz TYP. (@V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz)
- Small Collector Capacitance
  C_{ob} = 0.7 pF TYP. (@V_{CB} = 5 V, I_E = 0, f = 1 MHz)
- A Surface Mounting Package Adopted
- Built-in 2 Transistors (2 $\times$ 2SC4570)

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
μPA803T	Loose products (50 PCS)	Embossed tape 8 mm wide. Pin 6 (Q1 Base), Pin 5 (Q2 Base), Pin 4 (Q2 Emitter) face to perforation side of the tape.
μPA803T-T1	Taping products (3 KPCS/Reel)	

Remark If you require an evaluation sample, please contact an NEC Sales Representative. (Unit sample quantity is 50 pcs.)

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}	12	V
Emitter to Base Voltage	V_{EBO}	3	V
Collector Current	I_C	30	mA
Total Power Dissipation	P_T	120 in 1 element 160 in 2 elements[Note]	mW
Junction Temperature	T_j	125	°C
Storage Temperature	T_{stg}	−55 to +125	°C

Note 90 mW must not be exceeded in 1 element.

PACKAGE DRAWINGS
(Unit: mm)
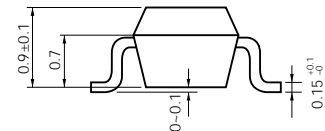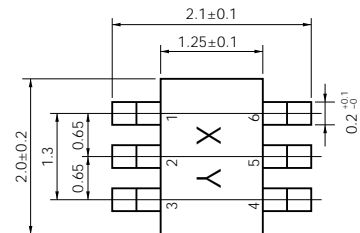
PIN CONFIGURATION (Top View)
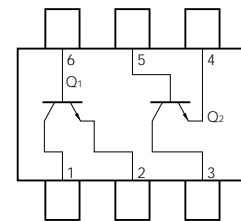
PIN CONNECTIONS
1. Collector (Q1) 4. Emitter (Q2)
2. Emitter (Q1) 5. Base (Q2)
3. Collector (Q2) 6. Base (Q1)

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

ELECTRICAL CHARACTERISTICS (Tₐ = 25 °C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cutoff Current	I_{CBO}	V_{CB} = 15 V, I_E = 0			0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 1 V, I_C = 0			0.1	μA
Collector to Emitter Saturation Voltage	$V_{CE (sat)}$	h_{FE} = 10, I_C = 5 mA			0.5	V
DC Current Gain	h_{FE}	V_{CE} = 5 V, I_C = 5 mA**Note 1**	60		200	
Gain Bandwidth Product	f_T	V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz	3.0	5.5		GHz
Feed-back Capacitance	C_{re}	V_{CB} = 5 V, I_E = 0, f = 1 MHz**Note 2**		0.7	0.9	pF
Insertion Power Gain	$|S_{21}|^2$	V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz	5			dB
h_{FE} Ratio	h_{FE1}/h_{FE2}	V_{CE} = 5 V, I_C = 5 mA A smaller value among h_{FE} of h_{FE1} = Q1, Q2 A larger value among h_{FE} of h_{FE2} = Q1, Q2	0.85			

Notes 1. Pulse Measurement: Pw ≤ 350 μs, Duty cycle ≤ 2 %

2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.
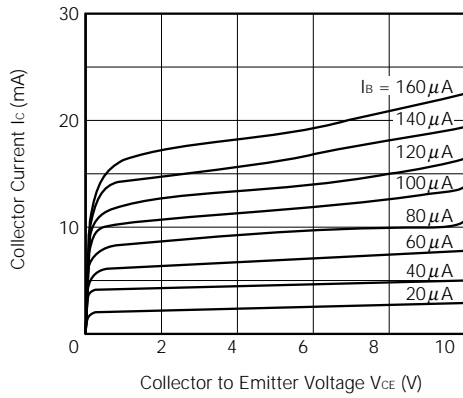
hFE CLASSIFICATION

Rank	FB	GB
Marking	T73	T74
h_{FE} Value	60 to 120	100 to 200

TYPICAL CHARACTERISTICS (Tₐ = 25 °C)

PT - TA Characteristics

IC - VBE Characteristics
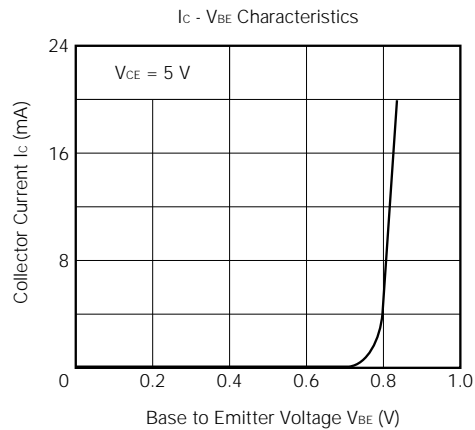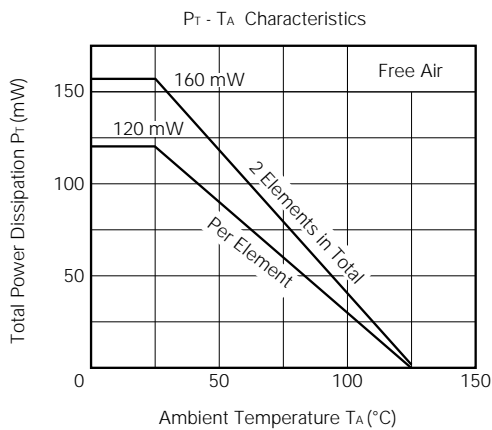
Iᴄ - Vᴄᴇ Characteristics

hꜰᴇ - Iᴄ Characteristics
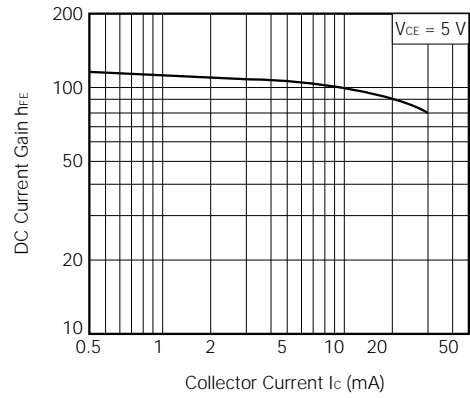
fᴛ - Iᴄ Characteristics
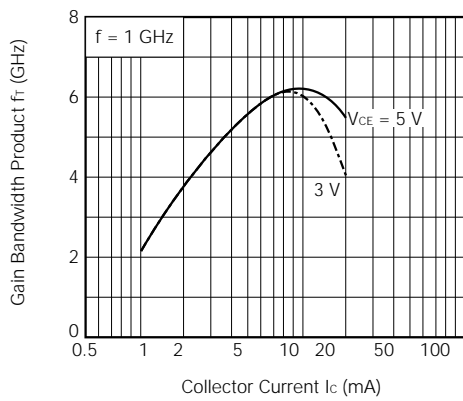
I S₂₁ₑ I² - Iᴄ Characteristics
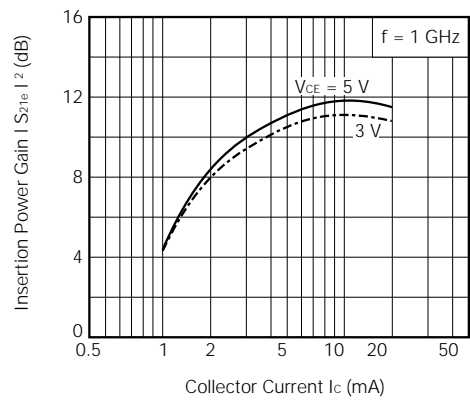
I S₂₁ₑ I² - f Characteristics
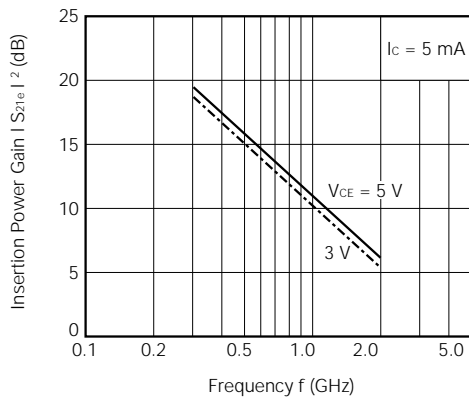
Cₒᵦ - Vᴄᴃ Characteristics
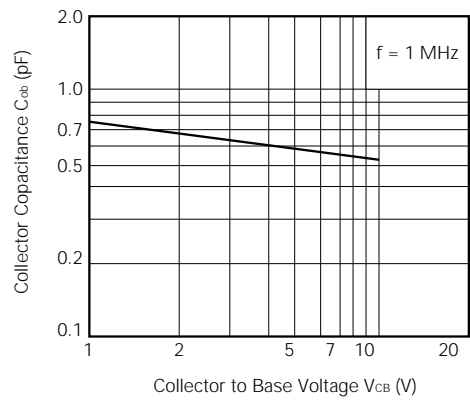
S-PARAMETERS

V$_{CE}$ = 5 V, I$_C$ = 5 mA, Z$_O$ = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.887	−16.9	8.517	156.4	.024	76.9	.940	−13.3
200.00	.781	−34.4	8.107	140.8	.042	68.3	.832	−22.8
300.00	.663	−49.9	7.483	127.9	.057	62.6	.735	−28.2
400.00	.555	−63.2	6.775	117.0	.067	60.4	.662	−31.4
500.00	.456	−74.9	6.086	107.9	.076	59.2	.606	−33.4
600.00	.388	−83.6	5.369	100.7	.085	58.1	.567	−35.0
700.00	.328	−92.0	4.815	94.4	.094	58.3	.540	−36.3
800.00	.285	−99.2	4.342	89.2	.103	57.9	.520	−37.6
900.00	.250	−106.3	3.955	84.3	.111	58.0	.503	−38.8
1000.00	.223	−113.2	3.618	80.2	.122	56.7	.490	−40.1
1100.00	.201	−120.2	3.334	76.5	.129	57.1	.482	−41.5
1200.00	.184	−127.0	3.101	72.8	.138	56.5	.474	−42.9
1300.00	.169	−133.9	2.899	69.4	.147	55.9	.467	−44.4
1400.00	.159	−140.6	2.724	66.0	.156	55.6	.463	−45.7
1500.00	.150	−148.7	2.561	63.1	.166	55.0	.457	−47.1
1600.00	.145	−155.8	2.428	60.1	.174	54.2	.453	−48.4
1700.00	.141	−162.4	2.314	57.1	.183	53.5	.448	−49.8
1800.00	.137	−168.8	2.206	54.5	.193	53.2	.445	−51.3
1900.00	.136	−175.8	2.114	51.6	.201	52.4	.439	−52.7
2000.00	.139	177.0	2.029	48.8	.210	51.4	.429	−54.9
2100.00	.140	170.8	1.946	46.4	.219	50.6	.423	−56.7
2200.00	.141	165.7	1.875	43.9	.229	49.5	.417	−58.9
2300.00	.145	160.2	1.816	41.3	.239	48.5	.413	−61.1
2400.00	.148	155.2	1.757	38.9	.247	47.7	.406	−63.7
2500.00	.154	150.9	1.708	36.4	.258	46.3	.401	−66.8
2600.00	.158	146.8	1.658	34.1	.266	45.5	.397	−70.0
2700.00	.163	142.4	1.614	31.8	.273	44.3	.393	−73.0
2800.00	.167	138.3	1.570	29.5	.284	43.3	.394	−76.5
2900.00	.173	135.3	1.534	27.3	.291	42.4	.395	−79.8
3000.00	.179	131.3	1.498	25.1	.299	41.2	.396	−82.7

V$_{CE}$ = 5 V, I$_C$ = 3 mA, Z$_O$ = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.929	−14.0	5.432	162.2	.025	78.4	.968	−10.1
200.00	.868	−26.8	5.334	147.4	.046	70.8	.900	−18.5
300.00	.785	−39.6	5.158	135.7	.063	64.4	.823	−24.5
400.00	.700	−51.3	4.873	125.9	.076	59.3	.756	−29.0
500.00	.613	−62.7	4.628	116.9	.086	56.7	.698	−32.2
600.00	.543	−71.7	4.216	109.1	.096	55.1	.656	−34.8
700.00	.469	−80.8	3.934	101.8	.103	53.8	.620	−36.7
800.00	.412	−88.7	3.645	95.5	.112	52.9	.594	−38.6
900.00	.363	−96.1	3.383	89.9	.119	52.4	.572	−40.0
1000.00	.323	−102.8	3.153	84.8	.126	51.5	.554	−41.6
1100.00	.290	−109.7	2.936	80.4	.135	51.6	.542	−43.0
1200.00	.262	−116.1	2.752	76.2	.143	51.6	.534	−44.8
1300.00	.241	−122.4	2.577	72.3	.149	51.3	.523	−46.1
1400.00	.224	−129.3	2.438	68.6	.157	50.5	.517	−47.4
1500.00	.208	−136.0	2.310	65.3	.165	50.4	.509	−48.9
1600.00	.197	−142.4	2.193	61.9	.173	50.1	.502	−50.2
1700.00	.189	−148.9	2.095	58.7	.181	49.4	.497	−51.6
1800.00	.180	−155.2	2.000	55.7	.189	49.1	.491	−53.2
1900.00	.174	−161.7	1.918	52.7	.198	48.7	.484	−54.9
2000.00	.171	−169.2	1.848	49.9	.207	48.1	.478	−56.8
2100.00	.170	−175.5	1.779	47.1	.215	47.6	.469	−58.6
2200.00	.168	178.7	1.719	44.2	.223	46.8	.464	−60.9
2300.00	.169	172.8	1.664	41.7	.231	46.0	.458	−63.1
2400.00	.170	167.5	1.609	39.1	.239	45.4	.452	−65.7
2500.00	.173	162.3	1.566	36.6	.248	44.4	.446	−68.7
2600.00	.175	157.6	1.522	34.1	.257	43.6	.443	−72.0
2700.00	.179	152.6	1.483	31.6	.263	42.6	.440	−74.9
2800.00	.183	147.9	1.444	29.2	.274	42.0	.440	−78.3
2900.00	.187	144.0	1.411	26.9	.282	40.9	.441	−81.4
3000.00	.191	139.8	1.380	24.7	.289	40.1	.442	−84.5

S-PARAMETERS

V_{CE} = 5 V, I_C = 1 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.974	−8.7	1.934	166.8	.026	83.1	.993	−5.8
200.00	.957	−18.0	1.952	156.5	.051	76.3	.970	−11.2
300.00	.922	−27.1	1.975	146.8	.073	69.1	.941	−16.4
400.00	.882	−35.5	1.960	138.2	.092	63.4	.911	−20.8
500.00	.837	−44.3	1.956	130.5	.108	58.5	.874	−24.9
600.00	.793	−52.1	1.846	122.9	.123	54.3	.844	−28.6
700.00	.741	−60.0	1.815	115.4	.133	50.5	.812	−32.0
800.00	.693	−67.7	1.768	108.5	.142	47.2	.785	−34.9
900.00	.645	−75.0	1.726	102.2	.148	44.9	.757	−37.7
1000.00	.596	−82.7	1.706	96.0	.155	42.6	.735	−40.1
1100.00	.547	−90.0	1.668	90.3	.160	40.8	.716	−42.3
1200.00	.504	−97.0	1.625	84.9	.166	39.7	.704	−44.6
1300.00	.470	−103.2	1.568	79.9	.170	38.8	.690	−46.6
1400.00	.438	−109.9	1.523	75.1	.174	37.9	.680	−48.4
1500.00	.410	−116.0	1.461	70.9	.178	37.2	.669	−50.1
1600.00	.386	−122.2	1.421	66.6	.180	36.9	.660	−52.0
1700.00	.362	−128.5	1.376	62.5	.184	36.6	.651	−53.8
1800.00	.344	−134.4	1.331	58.9	.189	36.3	.643	−55.7
1900.00	.329	−140.3	1.293	55.2	.193	36.5	.635	−57.7
2000.00	.312	−147.2	1.261	51.8	.198	36.3	.626	−59.7
2100.00	.302	−153.2	1.225	48.5	.201	36.5	.618	−61.8
2200.00	.293	−158.9	1.189	45.2	.206	36.4	.613	−64.3
2300.00	.285	−165.1	1.166	42.2	.211	36.6	.605	−66.7
2400.00	.280	−170.8	1.129	39.2	.217	36.4	.600	−69.6
2500.00	.276	−176.5	1.107	36.4	.222	36.4	.594	−72.6
2600.00	.272	177.7	1.078	33.6	.228	36.7	.591	−75.9
2700.00	.271	172.4	1.055	30.9	.233	36.4	.588	−79.1
2800.00	.270	167.1	1.030	28.3	.241	36.4	.589	−82.4
2900.00	.270	162.1	1.012	26.0	.247	36.4	.588	−85.6
3000.00	.271	157.0	.989	23.6	.253	36.4	.588	−88.6

V_{CE} = 3 V, I_C = 5 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.879	−17.8	8.523	155.5	.027	75.6	.932	−15.0
200.00	.768	−36.6	8.074	139.8	.047	66.8	.812	−25.5
300.00	.646	−53.1	7.436	126.6	.061	61.3	.704	−31.5
400.00	.536	−67.3	6.691	115.7	.073	58.7	.627	−35.1
500.00	.442	−80.0	5.987	106.5	.082	57.5	.568	−37.3
600.00	.375	−89.5	5.261	99.5	.092	56.7	.528	−39.0
700.00	.319	−98.7	4.707	93.2	.101	56.9	.496	−40.3
800.00	.279	−106.9	4.239	87.9	.110	56.5	.475	−41.7
900.00	.247	−114.8	3.852	83.3	.120	56.0	.456	−42.8
1000.00	.222	−122.5	3.526	79.1	.129	55.4	.443	−44.2
1100.00	.203	−130.1	3.239	75.1	.139	55.6	.434	−45.6
1200.00	.189	−137.5	3.013	71.5	.148	55.0	.427	−47.0
1300.00	.178	−144.8	2.814	68.2	.157	54.6	.419	−48.3
1400.00	.170	−152.1	2.641	64.8	.167	54.2	.415	−49.7
1500.00	.163	−159.6	2.498	62.0	.177	53.4	.408	−51.0
1600.00	.160	−166.3	2.366	58.8	.187	52.5	.403	−52.4
1700.00	.159	−173.0	2.245	55.9	.196	51.8	.398	−54.0
1800.00	.156	−178.7	2.145	52.9	.205	51.3	.392	−55.4
1900.00	.157	175.0	2.051	50.5	.215	50.4	.385	−57.0
2000.00	.161	168.3	1.974	47.7	.224	49.5	.378	−59.0
2100.00	.164	163.1	1.903	45.1	.234	48.8	.370	−60.7
2200.00	.166	158.3	1.828	42.6	.244	47.5	.364	−63.4
2300.00	.170	153.3	1.771	40.1	.253	46.4	.359	−65.7
2400.00	.173	149.2	1.714	37.6	.262	45.5	.353	−68.6
2500.00	.179	145.1	1.664	35.2	.272	44.5	.347	−71.8
2600.00	.183	141.2	1.613	32.9	.282	43.3	.345	−75.2
2700.00	.189	137.8	1.573	30.5	.291	42.2	.340	−78.6
2800.00	.193	133.9	1.530	28.2	.300	40.9	.342	−82.2
2900.00	.199	130.8	1.494	26.0	.309	39.8	.342	−85.6
3000.00	.205	127.5	1.462	23.9	.316	38.7	.343	−88.8

S-PARAMETERS

V_{CE} = 3 V, I_C = 3 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.920	−14.3	5.495	160.8	.028	77.6	.962	−11.3
200.00	.860	−28.2	5.327	146.5	.051	69.7	.886	−20.5
300.00	.774	−41.7	5.129	134.7	.069	63.1	.802	−27.2
400.00	.689	−54.1	4.838	124.8	.083	58.5	.731	−32.1
500.00	.600	−66.2	4.584	115.6	.094	55.3	.669	−35.5
600.00	.530	−75.7	4.162	107.8	.103	53.2	.623	−38.2
700.00	.456	−85.4	3.873	100.4	.112	52.1	.585	−40.3
800.00	.402	−94.0	3.577	94.1	.120	51.3	.556	−42.2
900.00	.354	−101.9	3.323	88.6	.129	50.4	.533	−43.9
1000.00	.317	−109.3	3.082	83.5	.136	50.3	.513	−45.3
1100.00	.286	−116.4	2.865	79.2	.144	50.2	.500	−47.0
1200.00	.261	−123.8	2.687	74.9	.152	49.6	.491	−48.5
1300.00	.241	−130.3	2.518	71.0	.160	49.6	.480	−49.9
1400.00	.228	−137.6	2.381	67.2	.168	49.0	.471	−51.3
1500.00	.214	−144.5	2.255	64.0	.177	48.5	.464	−52.5
1600.00	.205	−151.3	2.144	60.6	.185	48.2	.458	−54.1
1700.00	.198	−157.9	2.045	57.3	.194	47.6	.451	−55.6
1800.00	.192	−163.9	1.956	54.3	.202	47.1	.444	−57.1
1900.00	.188	−170.5	1.873	51.3	.210	46.6	.437	−58.8
2000.00	.187	−177.6	1.802	48.4	.219	46.2	.429	−60.9
2100.00	.187	176.7	1.738	45.8	.227	45.4	.421	−62.8
2200.00	.187	171.2	1.675	43.0	.236	44.4	.416	−65.2
2300.00	.189	165.7	1.626	40.3	.245	43.6	.408	−67.4
2400.00	.191	160.8	1.574	37.7	.253	42.9	.402	−70.4
2500.00	.195	155.9	1.531	35.2	.263	42.1	.397	−73.7
2600.00	.197	151.5	1.486	32.7	.272	41.1	.395	−76.8
2700.00	.202	147.3	1.449	30.3	.279	40.3	.392	−80.3
2800.00	.205	143.1	1.413	27.8	.288	39.2	.391	−83.6
2900.00	.209	139.4	1.379	25.6	.297	38.2	.392	−86.8
3000.00	.214	135.5	1.350	23.3	.305	37.5	.394	−90.1

V_{CE} = 3 V, I_C = 1 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.973	−9.2	1.928	166.5	.029	82.1	.990	−6.3
200.00	.954	−18.7	1.948	155.8	.057	74.4	.967	−12.2
300.00	.918	−28.1	1.975	145.9	.080	68.1	.935	−17.6
400.00	.878	−36.9	1.954	137.0	.102	62.2	.901	−22.5
500.00	.831	−46.1	1.948	129.2	.120	56.9	.860	−26.9
600.00	.785	−54.0	1.838	121.4	.134	52.4	.827	−30.9
700.00	.733	−62.3	1.808	113.9	.145	49.0	.794	−34.5
800.00	.684	−70.4	1.758	106.9	.156	45.3	.764	−37.6
900.00	.634	−77.9	1.717	100.5	.163	42.9	.734	−40.5
1000.00	.586	−85.8	1.689	94.2	.169	40.8	.711	−43.0
1100.00	.539	−93.2	1.649	88.5	.175	38.7	.693	−45.3
1200.00	.495	−100.5	1.607	83.0	.179	37.4	.677	−47.5
1300.00	.464	−107.2	1.549	78.1	.184	36.1	.661	−49.5
1400.00	.433	−114.0	1.449	73.3	.188	35.2	.649	−51.5
1500.00	.406	−120.4	1.440	69.1	.191	34.8	.639	−53.3
1600.00	.383	−126.8	1.396	64.9	.195	34.5	.627	−55.2
1700.00	.363	−133.3	1.359	60.7	.198	33.9	.619	−57.2
1800.00	.346	−139.4	1.310	57.0	.203	33.8	.609	−59.1
1900.00	.331	−145.4	1.273	53.4	.206	33.7	.601	−61.0
2000.00	.318	−152.2	1.242	49.9	.210	33.5	.591	−63.4
2100.00	.308	−158.4	1.206	46.6	.215	33.7	.582	−65.5
2200.00	.300	−164.1	1.169	43.3	.220	33.3	.576	−68.1
2300.00	.294	−170.1	1.148	40.3	.224	33.3	.568	−70.6
2400.00	.290	−175.5	1.112	37.4	.229	33.3	.563	−73.7
2500.00	.288	178.7	1.091	34.6	.235	33.1	.558	−76.9
2600.00	.286	173.3	1.064	31.9	.241	33.2	.554	−80.2
2700.00	.284	168.1	1.042	29.2	.247	32.9	.551	−83.5
2800.00	.284	162.9	1.015	26.5	.253	33.1	.551	−86.9
2900.00	.285	158.3	.997	24.2	.259	32.8	.552	−90.2
3000.00	.286	153.5	.977	21.8	.265	33.2	.552	−98.4

6

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