3SK297

Silicon N-Channel Dual Gate MOS FET

HITACHI

ADE-208-389
1st. Edition

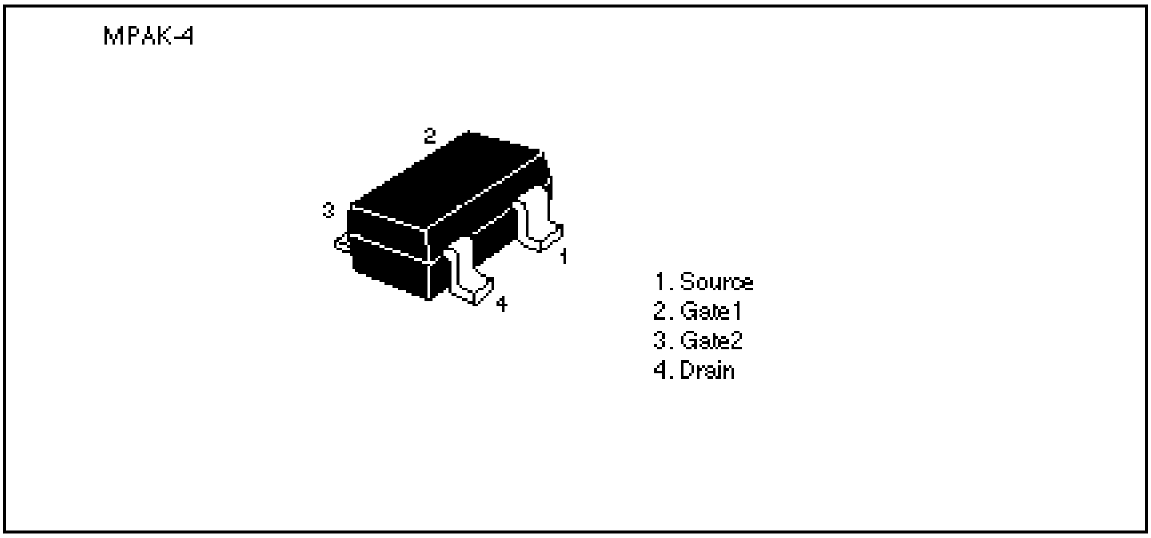
Application

UHF / VHF RF amplifier

Features

- Low noise figure.
  NF = 1.0 dB typ. at f = 200 MHz
- Capable of low voltage operation

Outline



Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

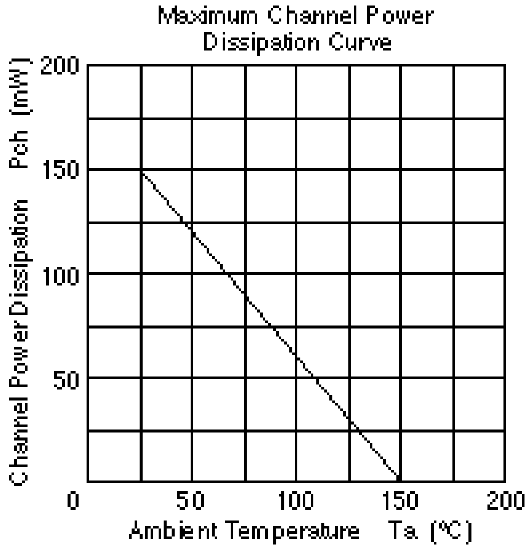
Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	12	V
Gate 1 to source voltage	V_{G1S}	±8	V
Gate 2 to source voltage	V_{G2S}	±8	V
Drain current	I_D	25	mA
Channel power dissipation	Pch	150	mW
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

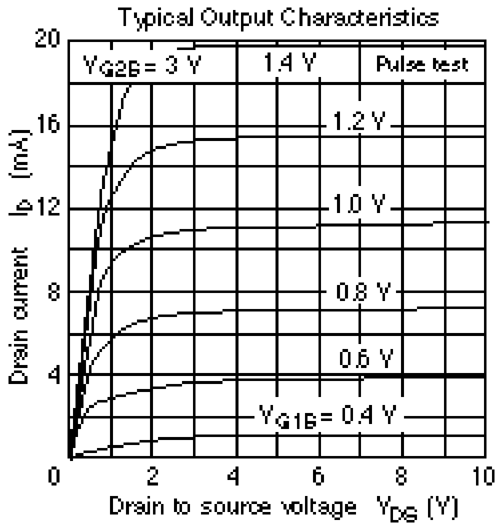
Attention: This device is very sensitive to electro static discharge.
It is recommended to adopt appropriate cautions when handling this transistor.

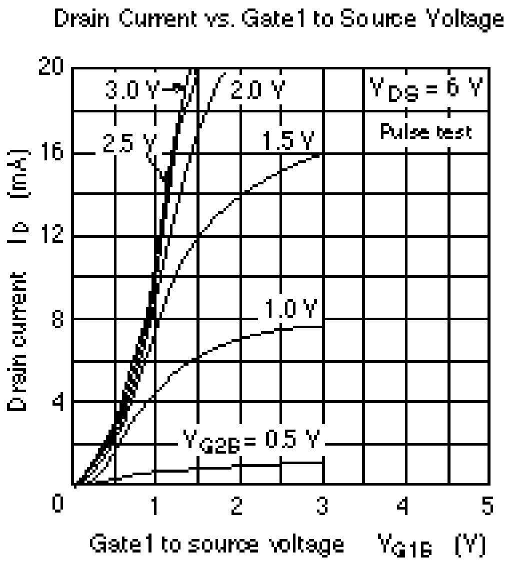
Electrical Characteristics (Ta = 25°C)

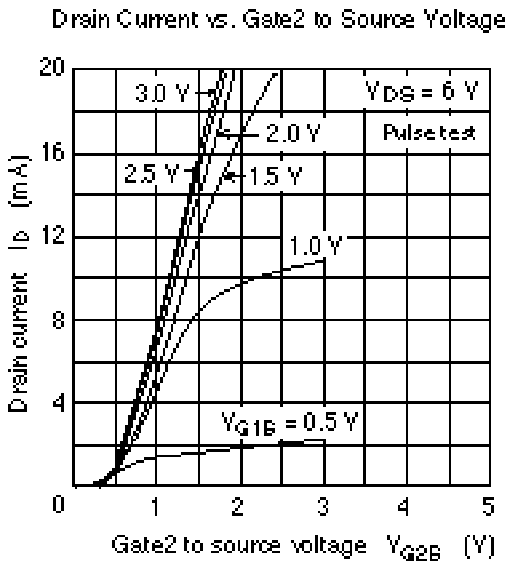
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSX}$	12	—	—	V	I_D = 200 µA , V_{G1S} = –3 V, V_{G2S} = –3 V
Gate 1 to source breakdown voltage	$V_{(BR)G1SS}$	±8	—	—	V	I_{G1} = ±10 µA, V_{G2S} = V_{DS} = 0
Gate 2 to source breakdown voltage	$V_{(BR)\ G2SS}$	±8	—	—	V	I_{G2} = ±10 µA, V_{G1S} = V_{DS} = 0
Gate 1 cutoff current	I_{G1SS}	—	—	±100	nA	V_{G1S} = ±6 V, V_{G2S} = V_{DS} = 0
Gate 2 cutoff current	I_{G2SS}	—	—	±100	nA	V_{G2S} = ±6 V, V_{G1S} = V_{DS} = 0
Drain current	$I_{DS(on)}$	0.5	—	10	mA	V_{DS} = 6 V, V_{G1S} = 0.75V, V_{G2S} = 3 V
Gate 1 to source cutoff voltage	$V_{G1S(off)}$	0	—	+1.0	V	V_{DS} = 10 V, V_{G2S} = 3V, I_D = 100 µA
Gate 2 to source cutoff voltage	$V_{G2S(off)}$	0	—	+1.0	V	V_{DS} = 10 V, V_{G1S} = 3V, I_D = 100 µA
Forward transfer admittance	$\|y_{fs}\|$	16	20	—	mS	V_{DS} = 6 V, V_{G2S} = 3V, I_D = 10 mA, f = 1 kHz
Input capacitance	Ciss	2.4	2.9	3.4	pF	V_{DS} = 6 V, V_{G2S} = 3V, I_D = 10 mA, f = 1 MHz
Output capacitance	Coss	0.8	1.0	1.4	pF	
Reverse transfer capacitance	Crss	—	0.023	0.04	pF	
Power gain	PG	22	25	—	dB	V_{DS} = 6 V, V_{G2S} = 3V, I_D = 10 mA, f = 200 MHz
Noise figure	NF	—	1.0	1.8	dB	
Power gain	PG	12	15	—	dB	V_{DS} = 6 V, V_{G2S} = 3V, I_D = 10 mA, f = 900 MHz
Noise figure	NF	—	3.2	4.5	dB	
Noise figure	NF	—	2.8	3.5	dB	V_{DS} = 6 V, V_{G2S} = 3V, I_D = 10 mA, f = 60 MHz

Note: Marking is “ZP–”

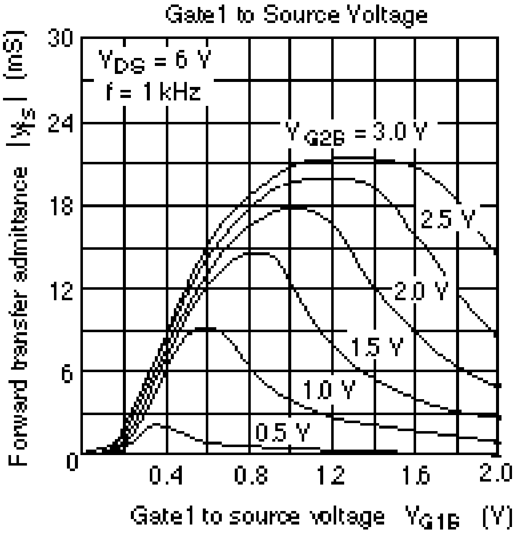

Maximum Channel Power
Dissipation Curve
Channel Power Dissipation Pch (mW)
200
150
100
50
0
50
100
150
200
Ambient Temperature Ta (°C)


Typical Output Characteristics
VG2S = 3 V
1.4 V
Pulse test
1.2 V
1.0 V
0.8 V
0.6 V
VG1S = 0.4 V
Drain current ID (mA)
20
16
12
8
4
0
2
4
6
8
10
Drain to source voltage VDS (V)

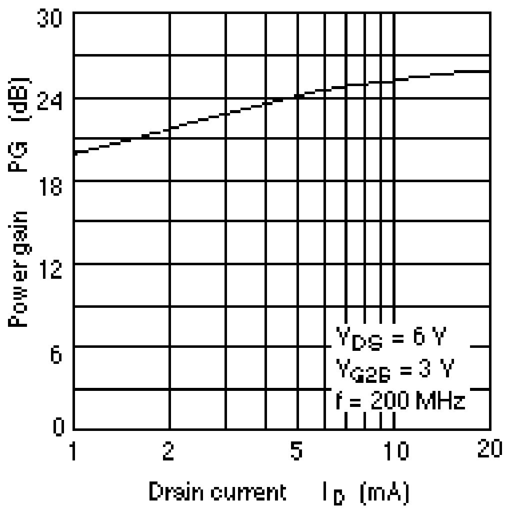

Drain Current vs. Gate1 to Source Voltage
3.0 V
2.0 V
2.5 V
1.5 V
VDS = 6 V
Pulse test
1.0 V
VG2S = 0.5 V
Drain current ID (mA)
20
16
12
8
4
0
1
2
3
4
5
Gate1 to source voltage VG1S (V)


Drain Current vs. Gate2 to Source Voltage
3.0 V
2.0 V
2.5 V
1.5 V
VDS = 6 V
Pulse test
1.0 V
VG1S = 0.5 V
Drain current ID (mA)
20
16
12
8
4
0
1
2
3
4
5
Gate2 to source voltage VG2S (V)

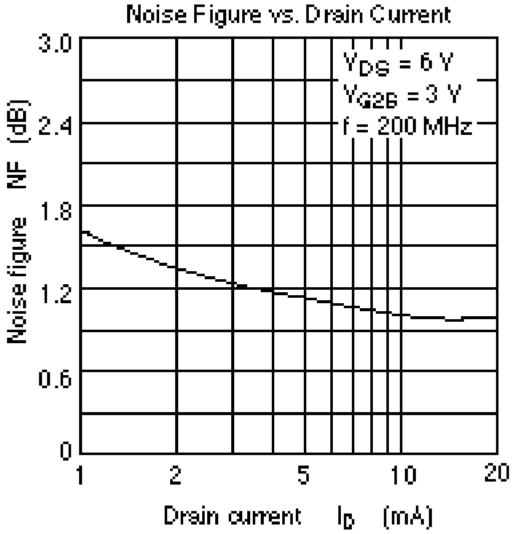
Forward Transfer Admittance vs. Gate1 to Source Voltage



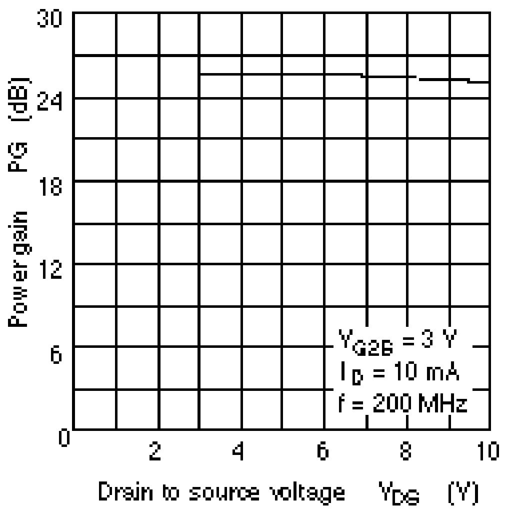
Power Gain vs. Drain Current

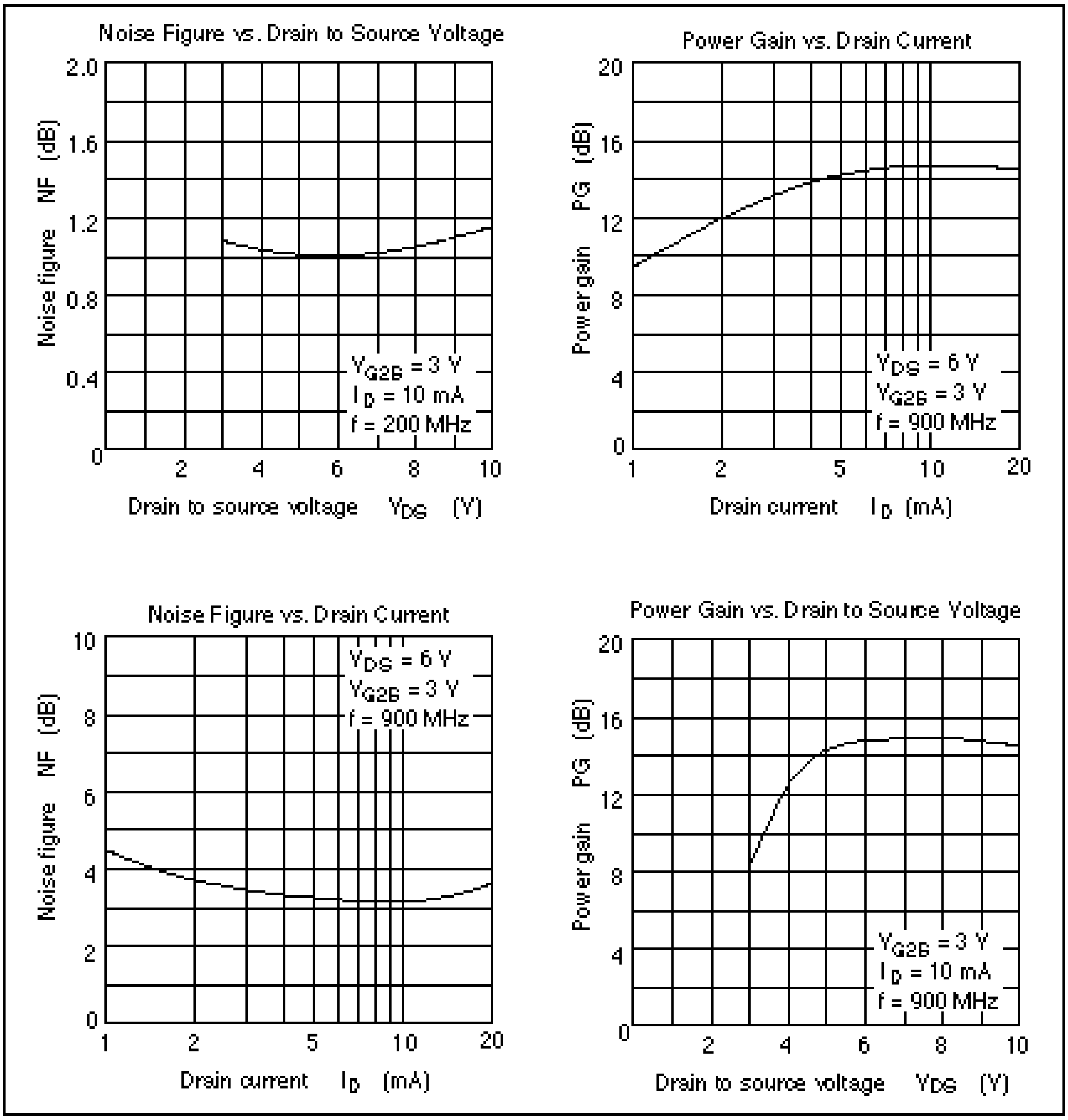


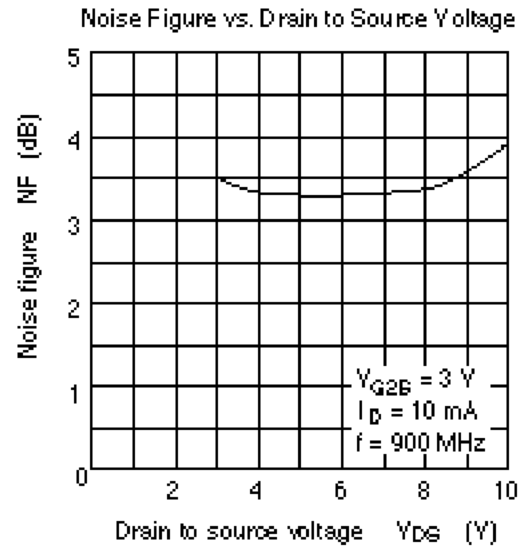
Noise Figure vs. Drain Current



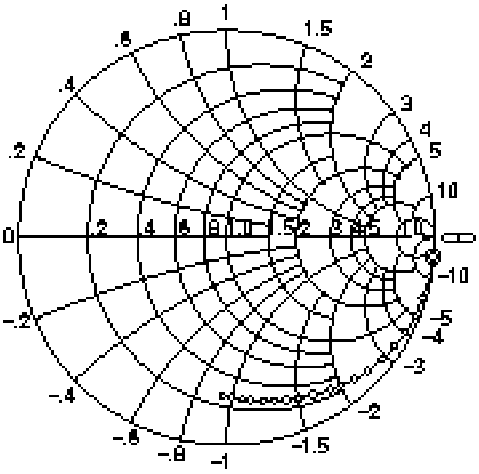
Power Gain vs. Drain to Source Voltage




Noise Figure vs. Drain to Source Voltage
Noise figure NF (dB)
2.0
1.6
1.2
0.8
0.4
0
2
4
6
8
10
VG2S = 3 V
ID = 10 mA
f = 200 MHz
Drain to source voltage VDS (V)
Power Gain vs. Drain Current
Power gain PG (dB)
20
16
12
8
4
0
1
2
5
10
20
VDS = 6 V
VG2S = 3 V
f = 900 MHz
Drain current ID (mA)
Noise Figure vs. Drain Current
Noise figure NF (dB)
10
8
6
4
2
0
1
2
5
10
20
VDS = 6 V
VG2S = 3 V
f = 900 MHz
Drain current ID (mA)
Power Gain vs. Drain to Source Voltage
Power gain PG (dB)
20
16
12
8
4
0
2
4
6
8
10
VG2S = 3 V
ID = 10 mA
f = 900 MHz
Drain to source voltage VDS (V)

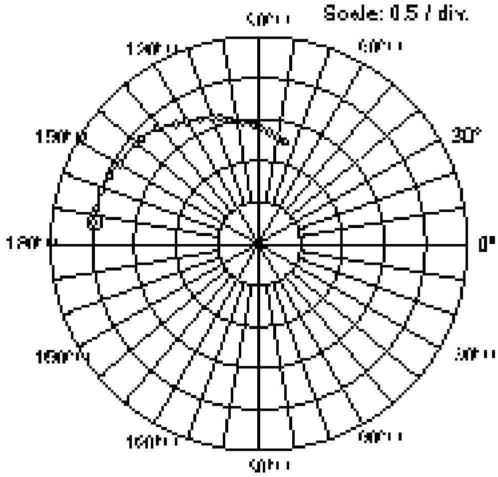

Noise Figure vs. Drain to Source Voltage
Noise figure NF (dB)
0
1
2
3
4
5
2
4
6
8
10
V_G2S = 3 V
I_D = 10 mA
f = 900 MHz
Drain to source voltage V_DS (V)

S11 Parameter vs. Frequency



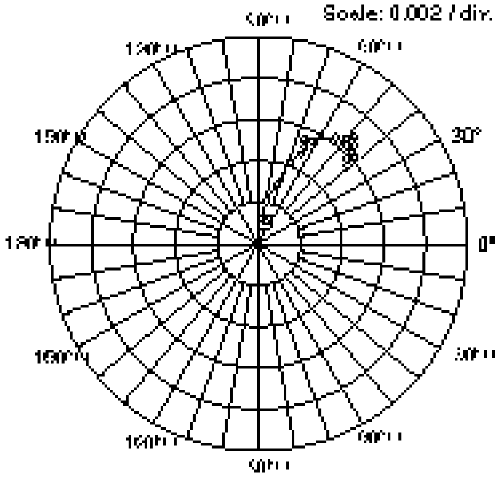
Condition: V_{DS} = 6 V , V_{G2S} = 3 V
I_D = 10 mA , Zo = 50 Ω
50 to 1000 MHz (50 MHz step)

S21 Parameter vs. Frequency



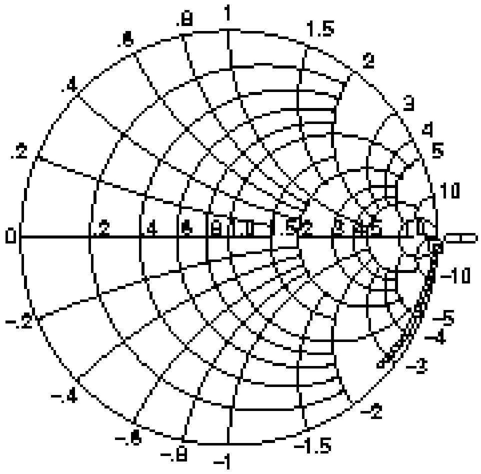
Condition: V_{DS} = 6 V , V_{G2S} = 3 V
I_D = 10 mA , Zo = 50 Ω
50 to 1000 MHz (50 MHz step)

S12 Parameter vs. Frequency



Condition: V_{DS} = 6 V , V_{G2S} = 3 V
I_D = 10 mA , Zo = 50 Ω
50 to 1000 MHz (50 MHz step)

S22 Parameter vs. Frequency



Condition: V_{DS} = 6 V , V_{G2S} = 3 V
I_D = 10 mA , Zo = 50 Ω
50 to 1000 MHz (50 MHz step)

S Parameter (V_{DS} = 6 V, V_{G2S} = 3 V, I_D = 10 mA, Z_O = 50 Ω)

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
50	0.994	–5.8	2.04	173.6	0.00116	76.9	0.993	–2.2
100	0.993	–11.0	2.02	167.4	0.00132	85.7	0.993	–4.5
150	0.986	–16.8	2.00	161.5	0.00229	78.2	0.991	–6.4
200	0.980	–22.5	1.98	155.5	0.00313	73.5	0.990	–8.5
250	0.973	–27.8	1.94	149.6	0.00427	68.7	0.987	–10.5
300	0.950	–33.0	1.90	142.6	0.00473	63.9	0.985	–12.5
350	0.936	–38.3	1.86	137.1	0.00536	64.3	0.982	–14.4
400	0.924	–43.4	1.83	131.6	0.00561	64.5	0.979	–16.2
450	0.912	–48.0	1.77	126.8	0.00562	60.9	0.975	–18.2
500	0.893	–52.5	1.71	121.0	0.00640	53.5	0.971	–20.2
550	0.874	–57.3	1.67	115.5	0.00638	49.3	0.967	–22.0
600	0.859	–62.0	1.64	111.1	0.00647	49.0	0.964	–23.9
650	0.846	–66.1	1.58	106.7	0.00667	50.2	0.960	–25.8
700	0.829	–69.8	1.50	102.1	0.00694	49.3	0.955	–27.6
750	0.810	–74.2	1.46	97.1	0.00661	46.6	0.952	–29.4
800	0.802	–78.0	1.44	92.7	0.00618	43.7	0.948	–31.2
850	0.791	–81.6	1.38	88.9	0.00622	44.7	0.944	–33.2
900	0.778	–84.6	1.34	84.2	0.00615	43.6	0.940	–35.1
950	0.756	–88.5	1.30	80.2	0.00576	45.1	0.935	–36.8
1000	0.751	–92.2	1.26	75.9	0.00562	40.7	0.932	–38.5

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