3SK318

Silicon N-Channel Dual Gate MOS FET
UHF RF Amplifier

HITACHI

ADE-208-600(Z)
1st. Edition
February 1998

Features

- Low noise characteristics;
  (NF= 1.4 dB typ. at f= 900 MHz)
- Excellent cross modulation characteristics
- Capable low voltage operation; +B= 5V

Outline

CMPAK-4

1. Source
2. Gate1
3. Gate2
4. Drain

Note: Marking is “YB–”.

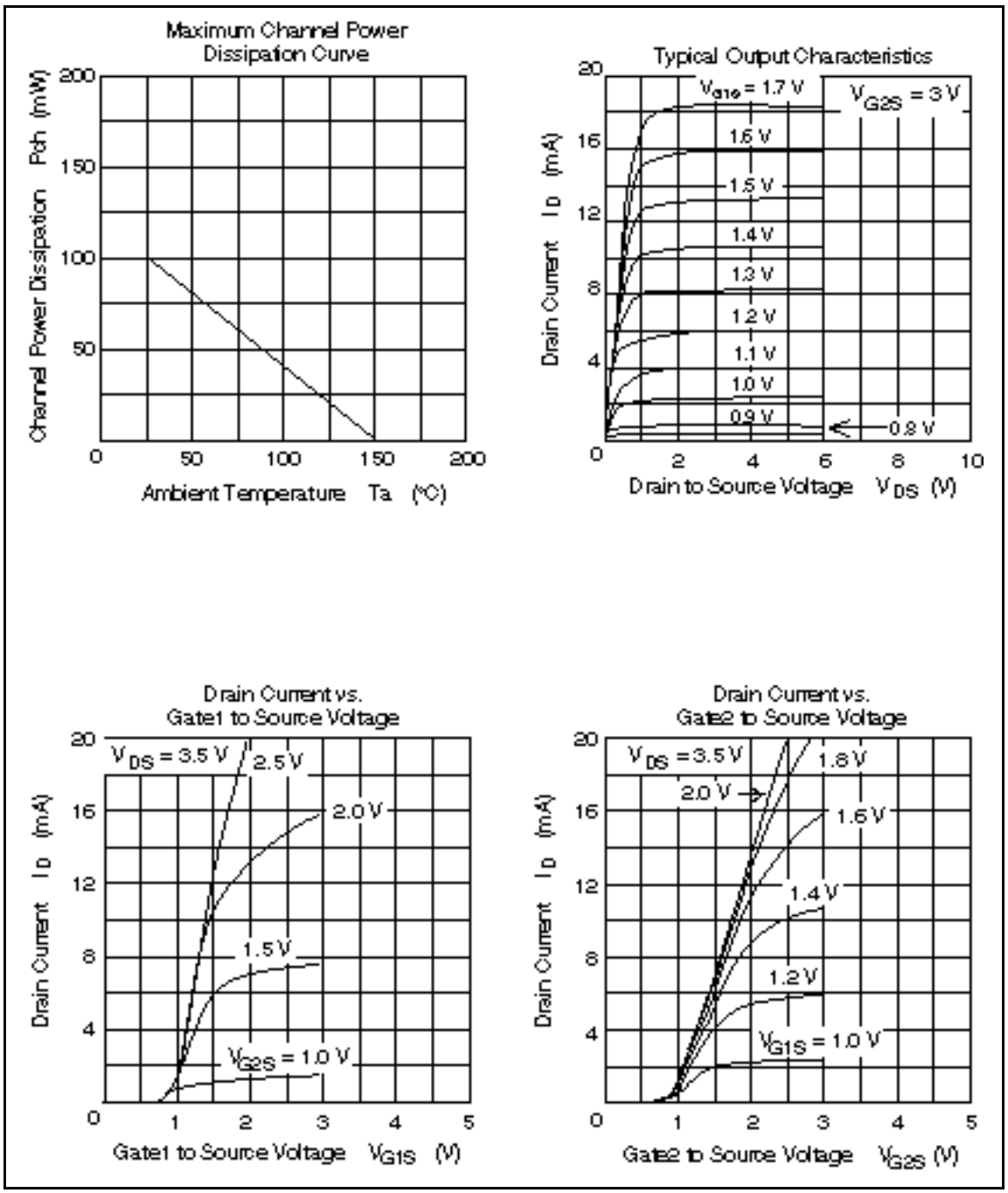
Hitachi semiconductor

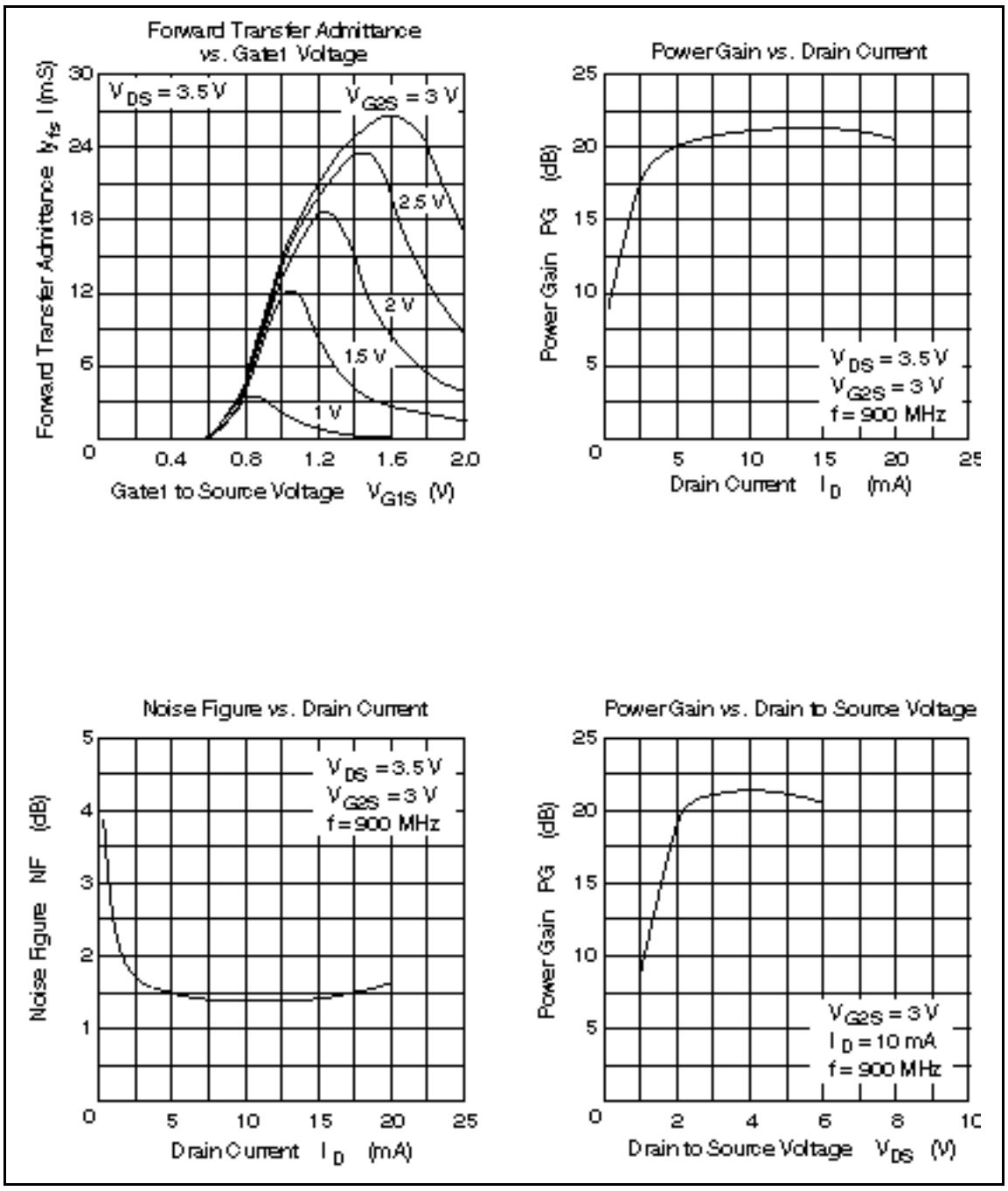
Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	6	V
Gate1 to source voltage	V_{G1S}	±6	V
Gate2 to source voltage	V_{G2S}	±6	V
Drain current	I_D	20	mA
Channel power dissipation	Pch	100	mW
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

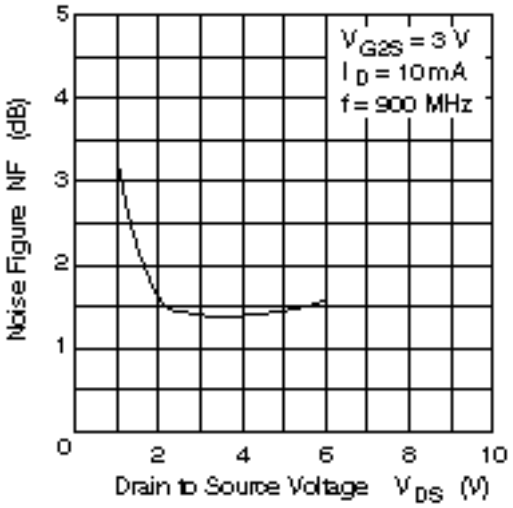
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	6	—	—	V	I_D = 200µA, V_{G1S} = V_{G2S} = 0
Gate1 to source breakdown voltage	$V_{(BR)G1SS}$	±6	—	—	V	I_{G1} = ±10µA, V_{G2S} = V_{DS} = 0
Gate2 to source breakdown voltage	$V_{(BR)G2SS}$	±6	—	—	V	I_{G2} = ±10µA, V_{G1S} = V_{DS} = 0
Gate1 to source cutoff current	I_{G1SS}	—	—	±100	nA	V_{G1S} = ±5V, V_{G2S} = V_{DS} = 0
Gate2 to source cutoff current	I_{G2SS}	—	—	±100	nA	V_{G2S} = ±5V, V_{G1S} = V_{DS} = 0
Gate1 to source cutoff voltage	$V_{G1S(off)}$	0.5	0.7	1.0	V	V_{DS} = 5V, V_{G2S} = 3V I_D = 100µA
Gate2 to source cutoff voltage	$V_{G2S(off)}$	0.5	0.7	1.0	V	V_{DS} = 5V, V_{G1S} = 3V I_D = 100µA
Drain current	$I_{DS(op)}$	0.5	4	10	mA	V_{DS} = 3.5V, V_{G1S} = 1.1V V_{G2S} = 3V
Forward transfer admittance	$\|y_{fs}\|$	18	24	32	mS	V_{DS} = 3.5V, V_{G2S} = 3V I_D = 10mA , f = 1kHz
Input capacitance	C_{iss}	1.3	1.6	1.9	pF	V_{DS} = 3.5V, V_{G2S} = 3V
Output capacitance	C_{oss}	0.9	1.2	1.5	pF	I_D = 10mA , f= 1MHz
Reverse transfer capacitance	C_{rss}	—	0.019	0.03	pF	
Power gain	PG	18	21	—	dB	V_{DS} = 3.5V, V_{G2S} = 3V
Noise figure	NF	—	1.4	2.2	dB	I_D = 10mA , f = 900MHz

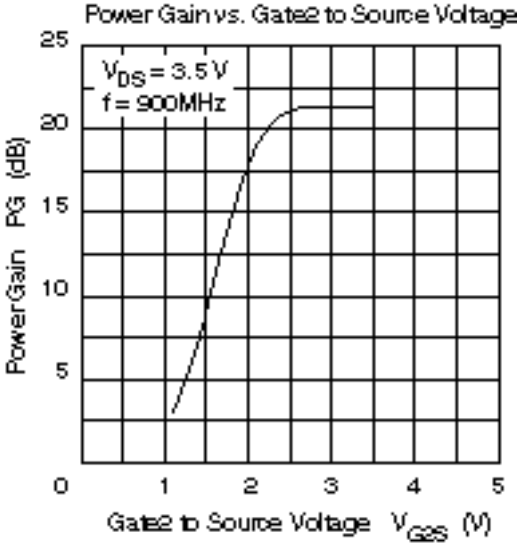

Maximum Channel Power Dissipation Curve
Channel Power Dissipation Pch (mW)
200
150
100
50
0
50
100
150
200
Ambient Temperature Ta (°C)
Typical Output Characteristics
Drain Current ID (mA)
20
16
12
8
4
0
2
4
6
8
10
Drain to Source Voltage VDS (V)
VG1S = 1.7 V
VG2S = 3 V
1.6 V
1.5 V
1.4 V
1.3 V
1.2 V
1.1 V
1.0 V
0.9 V
0.8 V
Drain Current vs. Gate1 to Source Voltage
Drain Current ID (mA)
VDS = 3.5 V
2.5 V
2.0 V
1.5 V
VG2S = 1.0 V
Gate1 to Source Voltage VG1S (V)
Drain Current vs. Gate2 to Source Voltage
Drain Current ID (mA)
VDS = 3.5 V
2.0 V
1.8 V
1.6 V
1.4 V
1.2 V
VG1S = 1.0 V
Gate2 to Source Voltage VG2S (V)


Forward Transfer Admittance vs. Gate1 Voltage
Forward Transfer Admittance y_{fs} (mS)
V_{DS} = 3.5 V
V_{G2S} = 3 V
2.5 V
2 V
1.5 V
1 V
Gate1 to Source Voltage V_{G1S} (V)
Power Gain vs. Drain Current
Power Gain PG (dB)
V_{DS} = 3.5 V
V_{G2S} = 3 V
f = 900 MHz
Drain Current I_D (mA)
Noise Figure vs. Drain Current
Noise Figure NF (dB)
V_{DS} = 3.5 V
V_{G2S} = 3 V
f = 900 MHz
Drain Current I_D (mA)
Power Gain vs. Drain to Source Voltage
Power Gain PG (dB)
V_{G2S} = 3 V
I_D = 10 mA
f = 900 MHz
Drain to Source Voltage V_{DS} (V)

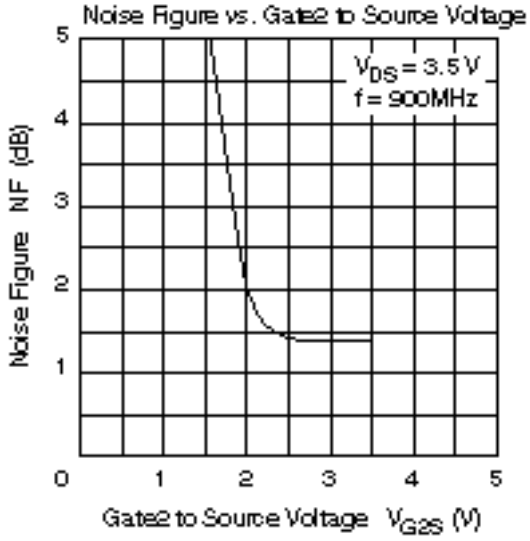
Noise Figure vs. Drain to Source Voltage



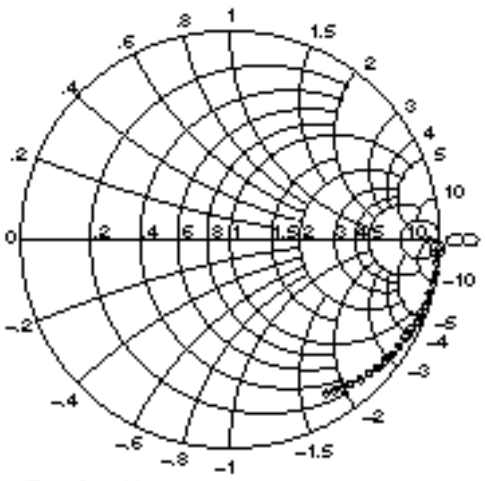
Power Gain vs. Gate2 to Source Voltage



Noise Figure vs. Gate2 to Source Voltage



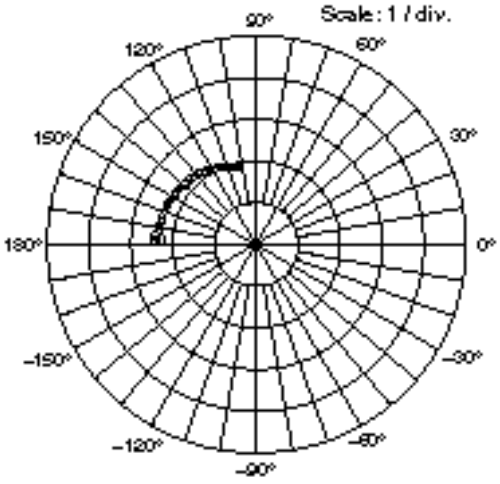
S11 Parametervs. Frequency



Test Condition : V_{DS}= 3.5 V , V_{G2S} = 3 V
I_D = 10m A
50 to 1000 MHz (50 MHz step)

S21 Parametervs. Frequency

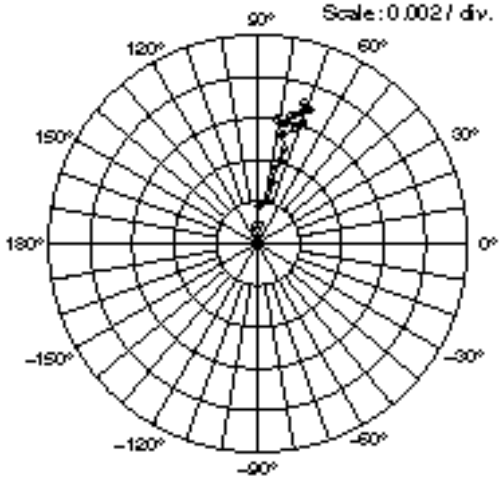
Scale : 1 / div.



Test Condition : V_{DS}= 3.5 V , V_{G2S} = 3 V
I_D = 10m A
50 to 1000 MHz (50 MHz step)

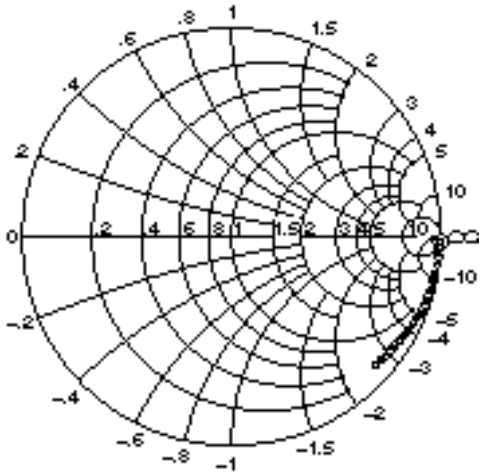
S12 Parametervs. Frequency

Scale : 0.002 / div.



Test Condition : V_{DS}= 3.5 V , V_{G2S} = 3 V
I_D= 10m A
50 to 1000 MHz (50 MHz step)

S22 Parametervs. Frequency



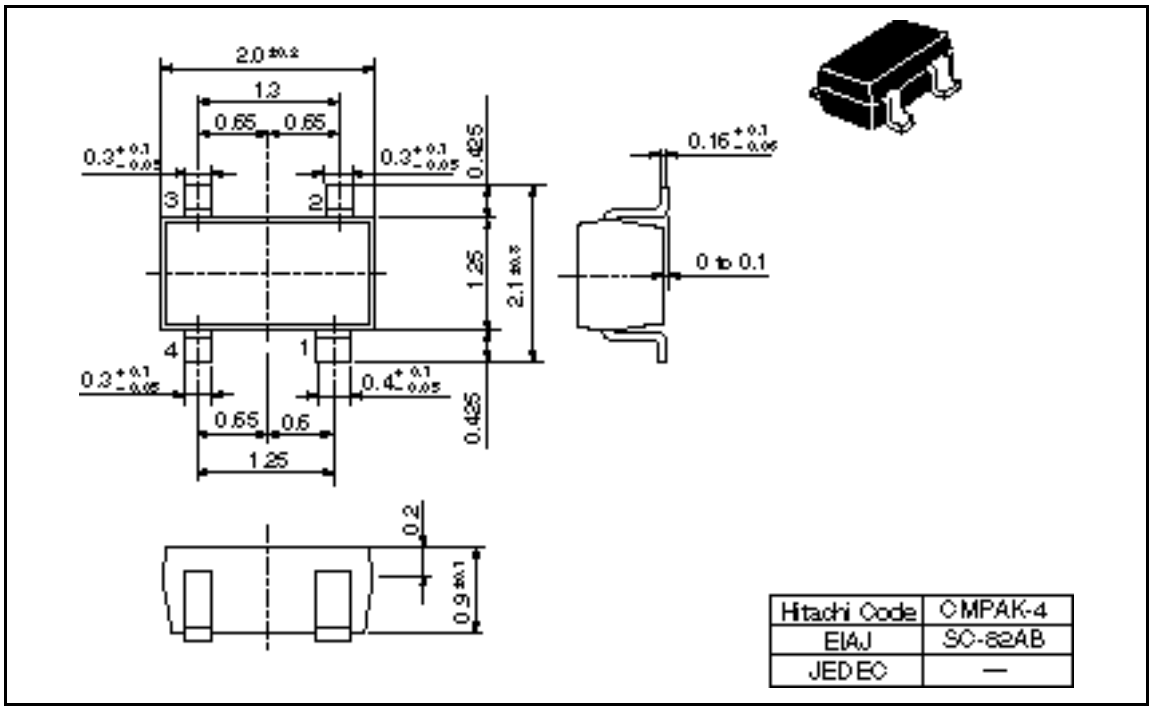
Test Condition : V_{DS}= 3.5 V , V_{G2S} = 3 V
I_D = 10m A
50 to 1000 MHz (50 MHz step)

Sparameter (V_{DS} = 3.5V, V_{G2S} = 3V, I_D = 10mA, Zo = 50Ω)

	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
50	1.000	–2.8	2.41	176.3	0.00068	89.1	0.999	–2.2
100	0.998	–5.8	2.41	171.9	0.00176	88.5	0.996	–4.5
150	0.997	–9.1	2.39	167.6	0.00223	80.7	0.996	–6.7
200	0.994	–12.2	2.38	163.7	0.00303	76.6	0.994	–8.7
250	0.994	–15.1	2.37	159.8	0.00365	79.1	0.991	–11.0
300	0.986	–18.5	2.35	155.5	0.00414	75.4	0.988	–13.2
350	0.978	–21.3	2.30	151.4	0.00484	75.0	0.983	–15.3
400	0.972	–24.1	2.28	147.6	0.00533	78.0	0.980	–17.4
450	0.969	–27.0	2.26	143.6	0.00588	71.6	0.976	–19.6
500	0.954	–29.7	2.23	140.0	0.00617	69.5	0.971	–21.7
550	0.955	–32.8	2.19	135.9	0.00666	71.5	0.966	–23.7
600	0.941	–35.7	2.17	132.2	0.00672	70.6	0.960	–25.6
650	0.932	–38.3	2.14	128.6	0.00694	69.0	0.955	–27.8
700	0.924	–41.3	2.09	125.0	0.00709	71.4	0.948	–29.9
750	0.919	–44.1	2.07	121.5	0.00689	69.0	0.942	–31.8
800	0.905	–46.9	2.03	117.9	0.00699	68.9	0.937	–33.8
850	0.896	–49.2	2.00	114.7	0.00644	74.2	0.930	–35.8
900	0.884	–52.4	1.96	110.4	0.00633	75.5	0.923	–37.6
950	0.880	–54.7	1.93	107.1	0.00585	77.8	0.917	–39.8
1000	0.866	–57.7	1.89	103.8	0.00605	82.1	0.910	–41.9

Package Dimensions

Unit: mm



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