To all our customers

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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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Keep safety first in your circuit designs!

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2SC4899

Silicon NPN Epitaxial

ADE-208-1126A (Z)
2nd. Edition
Mar. 2001

Application

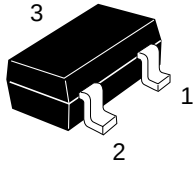
VHF / UHF wide band amplifier

Features

- High gain bandwidth product
  f_T = 9 GHz Typ
- High gain, low noise figure
  PG = 14.0 dB Typ, NF = 1.2 dB Typ at f = 900 MHz

Outline

CMPAK



1. Emitter
2. Base
3. Collector

Note: Marking is “YH–”.

Attention: This is electrostatic sensitive device.

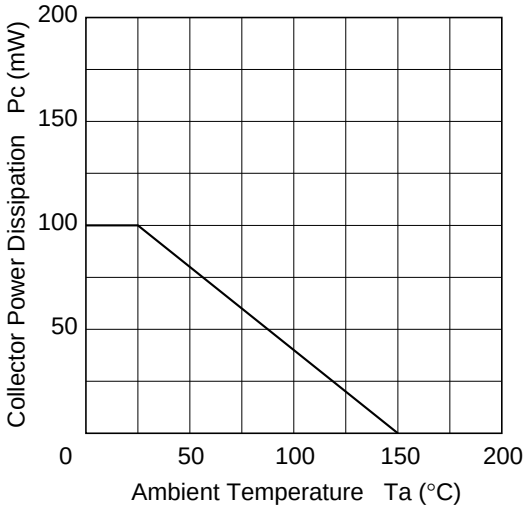
Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	9	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	20	mA
Collector power dissipation	P_C	100	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

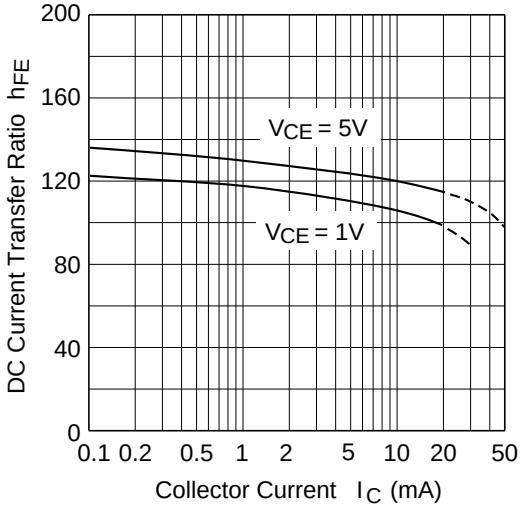
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector cutoff current	I_{CBO}	—	—	10	µA	V_{CB} = 15 V, I_E = 0
	I_{CEO}	—	—	1	mA	V_{CE} = 9 V, R_{BE} =
Emitter cutoff current	I_{EBO}	—	—	10	µA	V_{EB} = 1.5 V, I_C = 0
DC current transfer ratio	h_{FE}	50	120	250		V_{CE} = 5 V, I_C = 10 mA
Collector output capacitance	Cob	—	0.5	0.85	pF	V_{CB} = 5 V, I_E = 0, f = 1 MHz
Gain bandwidth product	f_T	6.0	9.0	—	GHz	V_{CE} = 5 V, I_C = 10 mA
Power gain	PG	11.0	14.0	—	dB	V_{CE} = 5 V, I_C = 10 mA, f = 900 MHz
Noise figure	NF	—	1.2	2.5	dB	V_{CE} = 5 V, I_C = 5 mA, f = 900 MHz

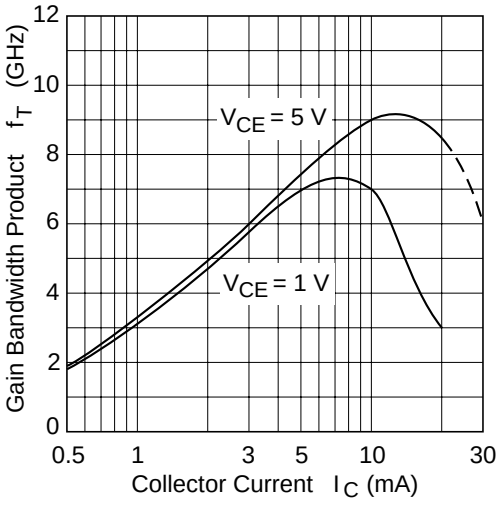
Maximum Collector Dissipation Curve



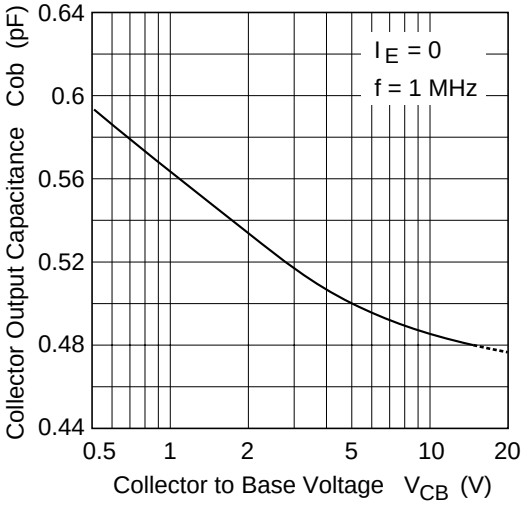
DC Current Transfer Ratio
vs. Collector Current



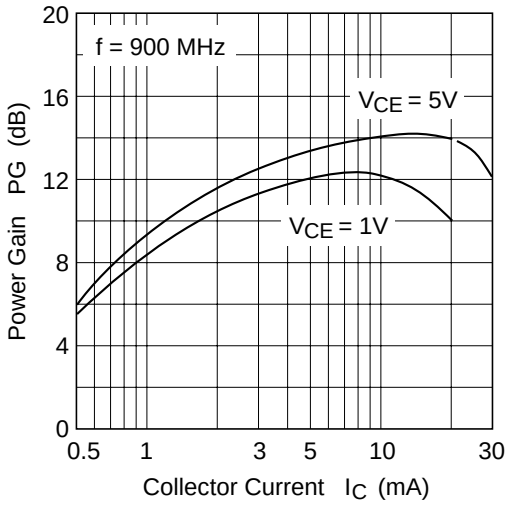
Gain Bandwidth Product
vs. Collector Current



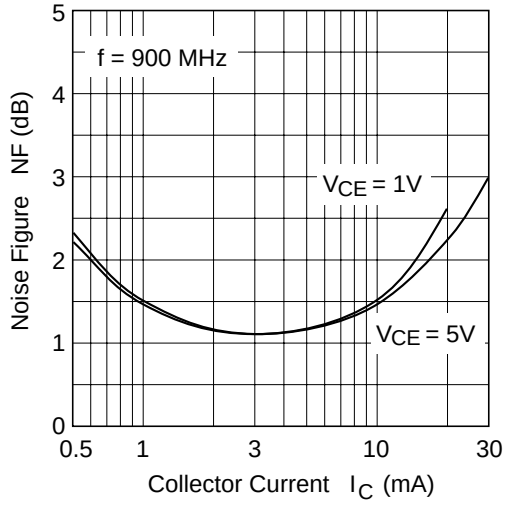
Collector Output Capacitance vs.
Collector to Base Voltage



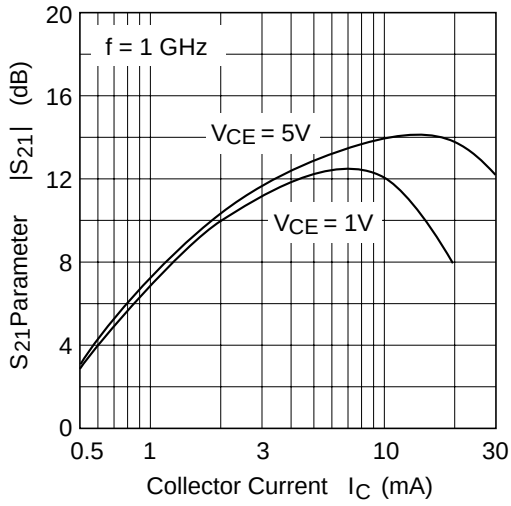
Power Gain vs. Collector Current



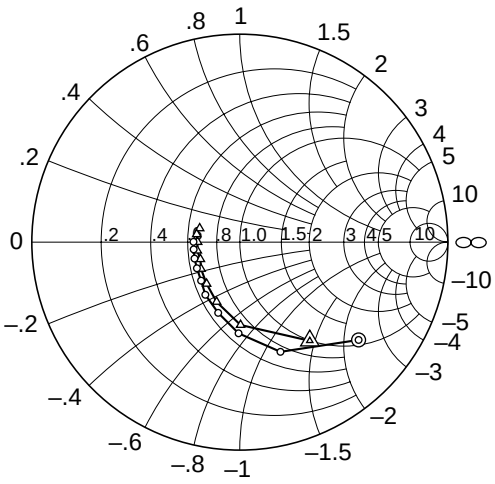
Noise Figure vs. Collector Current



S21 Parameter vs. Collector Current

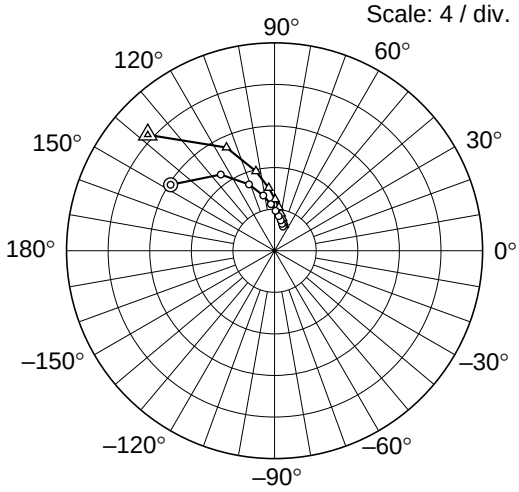


S11 Parameter vs. Frequency



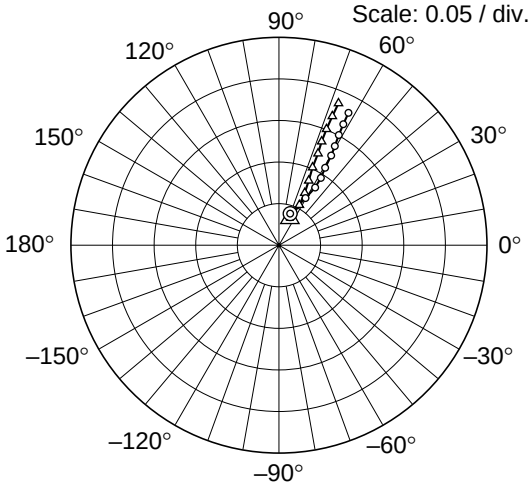
Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 10 mA)

S21 Parameter vs. Frequency



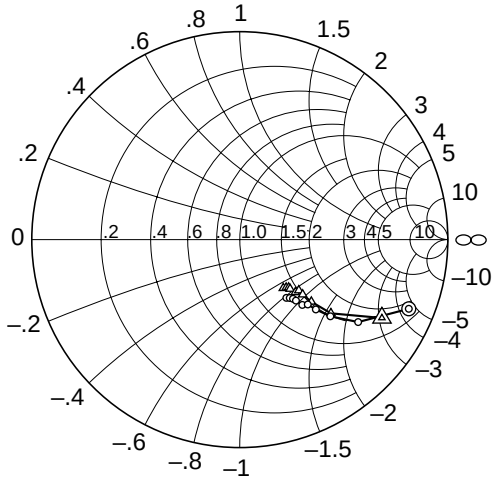
Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 10 mA)

S12 Parameter vs. Frequency



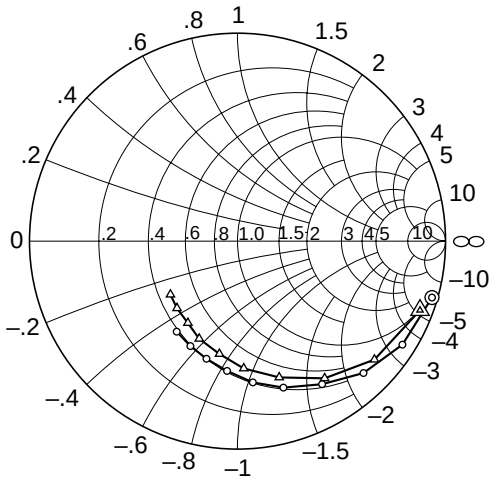
Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 10 mA)

S22 Parameter vs. Frequency



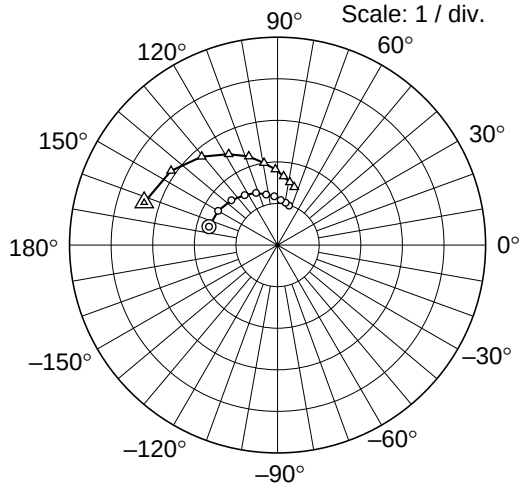
Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 10 mA)

S11 Parameter vs. Frequency



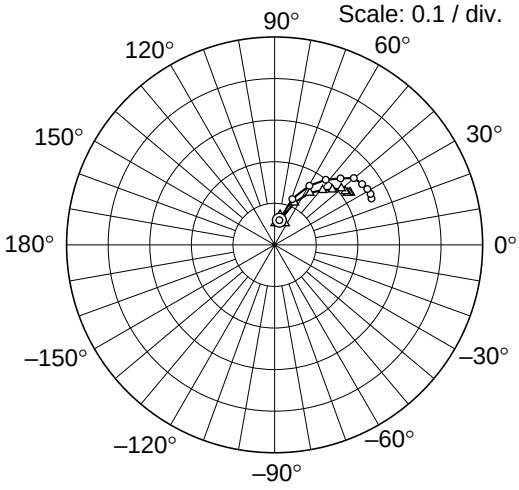
Condition: V_{CE} = 1 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 0.5 mA)
(I_C = 1 mA)

S21 Parameter vs. Frequency



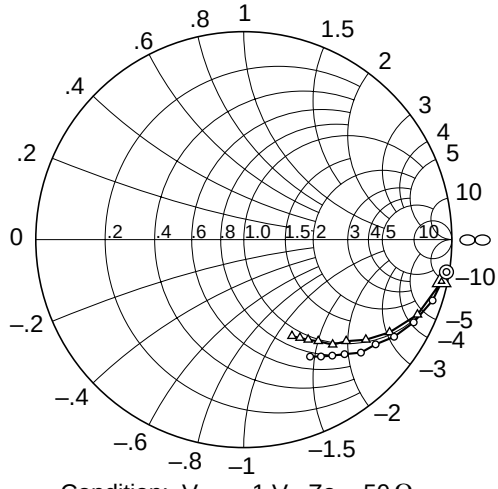
Condition: V_{CE} = 1 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 0.5 mA)
(I_C = 1 mA)

S12 Parameter vs. Frequency



Condition: V_{CE} = 1 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 0.5 mA)
(I_C = 1 mA)

S22 Parameter vs. Frequency



Condition: V_{CE} = 1 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 0.5 mA)
(I_C = 1 mA)

S Parameter (V_{CE} = 5 V, I_C = 5 mA, Z_O = 50 Ω, Emitter Common)

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.814	–20.5	13.23	163.0	0.0214	79.4	0.961	–11.8
200	0.740	–39.5	11.84	147.6	0.0403	70.6	0.878	–22.3
300	0.648	–56.3	10.34	134.9	0.0550	64.1	0.780	–29.7
400	0.563	–69.7	8.99	125.2	0.0653	60.6	0.694	–34.9
500	0.499	–80.8	7.81	117.6	0.0744	58.4	0.626	–38.1
600	0.439	–90.8	6.81	111.1	0.0821	57.9	0.571	–40.3
700	0.393	–99.1	6.11	106.0	0.0888	57.8	0.528	–41.8
800	0.356	–107.0	5.44	101.6	0.0956	58.1	0.497	–42.6
900	0.322	–115.5	4.93	97.7	0.102	58.3	0.469	–43.0
1000	0.303	–123.2	4.51	94.6	0.109	59.2	0.452	–43.7
1100	0.275	–129.7	4.17	91.6	0.116	60.3	0.442	–43.8
1200	0.263	–135.1	3.86	88.7	0.125	59.8	0.435	–46.3
1300	0.253	–141.7	3.61	85.9	0.130	60.2	0.414	–47.3
1400	0.242	–148.6	3.37	83.5	0.137	60.6	0.399	–47.4
1500	0.237	–154.2	3.17	81.1	0.144	61.2	0.360	–47.8
1600	0.232	–160.0	3.00	78.7	0.151	61.5	0.383	–48.1
1700	0.224	–166.4	2.83	77.0	0.158	61.8	0.376	–48.8
1800	0.225	–171.0	2.70	74.9	0.165	62.0	0.370	–49.5
1900	0.228	–176.5	2.59	73.0	0.172	62.2	0.363	–50.2
2000	0.223	179.7	2.47	71.3	0.180	62.3	0.359	–51.4

S Parameter (V_{CE} = 5 V, I_C = 10 mA, Z_O = 50 Ω, Emitter Common)

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.688	–29.6	20.06	156.3	0.0201	76.3	0.921	–16.8
200	0.582	–54.7	16.54	137.5	0.0349	67.8	0.780	–28.9
300	0.479	–74.0	13.31	124.0	0.0459	64.0	0.653	–35.6
400	0.399	–89.5	10.97	114.9	0.0544	63.0	0.564	–39.0
500	0.345	–101.3	9.20	108.4	0.0624	62.6	0.501	–40.4
600	0.309	–111.2	7.87	103.1	0.0702	63.7	0.456	–41.0
700	0.280	–120.4	6.90	98.7	0.0782	64.3	0.424	–41.1
800	0.257	–128.5	6.09	95.2	0.0857	65.2	0.402	–41.2
900	0.243	–137.6	5.45	92.0	0.0936	66.0	0.384	–41.0
1000	0.227	–145.3	4.97	89.3	0.102	66.6	0.375	–40.8
1100	0.216	–153.0	4.56	86.8	0.111	67.3	0.373	–40.8
1200	0.207	–156.5	4.22	84.2	0.120	66.9	0.369	–43.5
1300	0.206	–163.1	3.93	82.2	0.126	67.1	0.350	–44.4
1400	0.209	–168.6	3.65	80.0	0.135	67.6	0.339	–44.5
1500	0.204	–176.8	3.43	77.9	0.143	67.5	0.334	–44.4
1600	0.203	180.0	3.24	75.9	0.151	67.7	0.330	–44.6
1700	0.207	173.7	3.06	74.2	0.160	67.6	0.325	–45.5
1800	0.211	169.8	2.91	72.5	0.168	67.5	0.322	–46.1
1900	0.215	164.6	2.78	71.1	0.177	67.4	0.317	–47.2
2000	0.204	161.2	2.66	69.2	0.185	67.2	0.314	–48.2

S Parameter (V_{CE} = 1 V, I_C = 0.5 mA, Z_O = 50 Ω, Emitter Common)

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.983	–7.8	1.76	172.6	0.0295	85.3	0.996	–4.5
200	0.974	–16.2	1.71	165.0	0.0604	79.3	0.987	–9.1
300	0.958	–24.3	1.69	157.1	0.0910	73.8	0.972	–13.7
400	0.936	–32.1	1.65	149.9	0.118	68.9	0.954	–17.9
500	0.904	–39.4	1.59	142.8	0.143	64.1	0.933	–22.0
600	0.877	–46.3	1.55	135.7	0.165	59.6	0.909	–26.0
700	0.845	–53.1	1.48	129.3	0.184	55.5	0.886	–29.3
800	0.799	–59.4	1.44	123.2	0.199	51.9	0.861	–32.9
900	0.781	–66.6	1.39	117.4	0.214	48.3	0.835	–35.9
1000	0.738	–72.6	1.36	112.3	0.225	45.3	0.810	–38.5
1100	0.714	–78.0	1.32	107.2	0.235	43.5	0.791	–40.9
1200	0.683	–83.8	1.25	102.6	0.249	40.2	0.783	–44.0
1300	0.657	–89.0	1.21	98.3	0.253	37.0	0.758	–46.7
1400	0.626	–94.6	1.18	93.8	0.256	34.8	0.734	–48.7
1500	0.603	–99.6	1.14	89.8	0.259	32.9	0.717	–50.9
1600	0.585	–104.8	1.09	85.9	0.260	31.1	0.702	–52.7
1700	0.567	–109.5	1.06	82.5	0.261	29.6	0.687	–54.7
1800	0.553	–114.2	1.04	79.1	0.261	28.0	0.674	–56.6
1900	0.538	–119.8	1.02	76.5	0.260	27.1	0.659	–58.7
2000	0.524	–123.9	0.994	73.7	0.258	25.6	0.647	–60.5

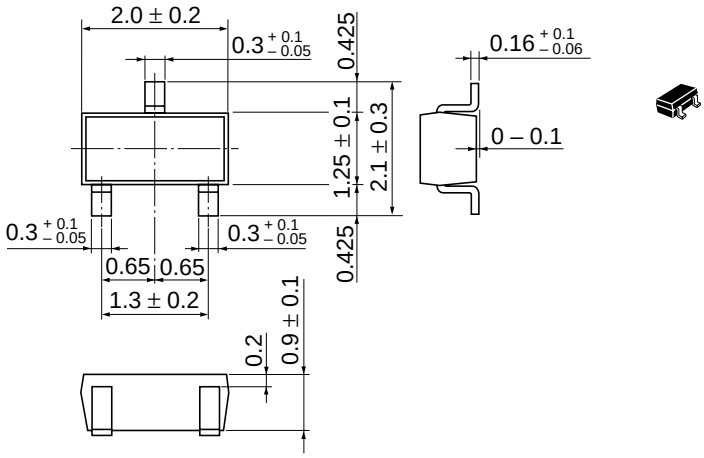
S Parameter (V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω, Emitter Common)

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.956	–10.5	3.49	171.1	0.0298	83.7	0.991	–6.1
200	0.938	–20.8	3.37	162.3	0.0596	77.0	0.972	–12.0
300	0.912	–31.1	3.26	153.2	0.0874	70.7	0.945	–18.1
400	0.871	–40.9	3.12	145.1	0.112	65.1	0.910	–23.4
500	0.830	–50.1	2.94	137.9	0.133	60.0	0.871	–28.1
600	0.782	–57.6	2.80	130.6	0.151	56.0	0.831	–32.5
700	0.740	–65.8	2.63	124.0	0.164	51.9	0.795	–36.1
800	0.686	–73.0	2.48	118.2	0.175	48.8	0.759	–39.4
900	0.656	–80.7	2.35	112.5	0.185	45.9	0.725	–42.4
1000	0.613	–87.2	2.24	107.9	0.192	43.8	0.694	–44.8
1100	0.582	–93.3	2.13	103.8	0.200	42.8	0.672	–47.0
1200	0.551	–99.1	2.00	99.3	0.210	40.3	0.662	–49.8
1300	0.532	–104.7	1.91	95.3	0.210	38.1	0.631	–52.4
1400	0.505	–111.4	1.82	91.6	0.213	37.2	0.606	–53.8
1500	0.483	–116.3	1.74	88.1	0.215	36.3	0.587	–55.6
1600	0.461	–121.2	1.66	84.9	0.216	35.6	0.573	–57.3
1700	0.445	–127.2	1.59	81.9	0.217	34.9	0.558	–58.6
1800	0.435	–132.0	1.54	78.9	0.219	35.0	0.545	–60.3
1900	0.425	–137.6	1.49	76.7	0.221	34.7	0.531	–61.8
2000	0.413	–141.4	1.45	73.9	0.221	34.6	0.519	–63.5

Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	CMPAK
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.006 g

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