
2SC4791

Silicon NPN Epitaxial

HITACHI

Application

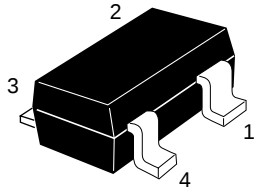
VHF / UHF wide band amplifier

Features

- High gain bandwidth product
 $f_T = 10 \text{ GHz Typ.}$
- High gain, low noise figure
 $PG = 15.5 \text{ dB Typ, NF} = 1.2 \text{ dB Typ at } f = 900 \text{ MHz}$

Outline

MPAK-4



1. Collector
2. Emitter
3. Base
4. Emitter

Absolute Maximum Ratings (Ta = 25°C)

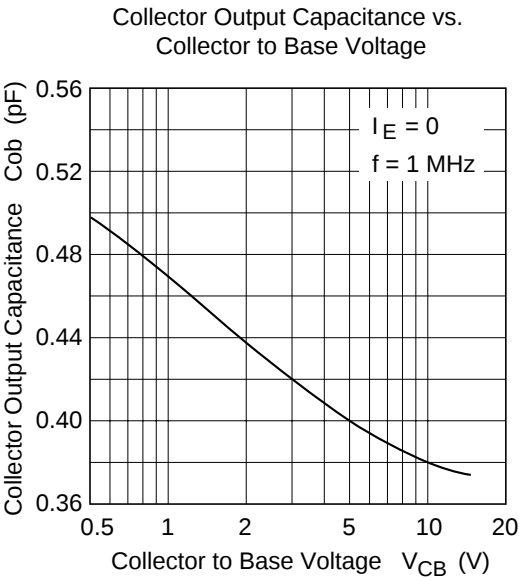
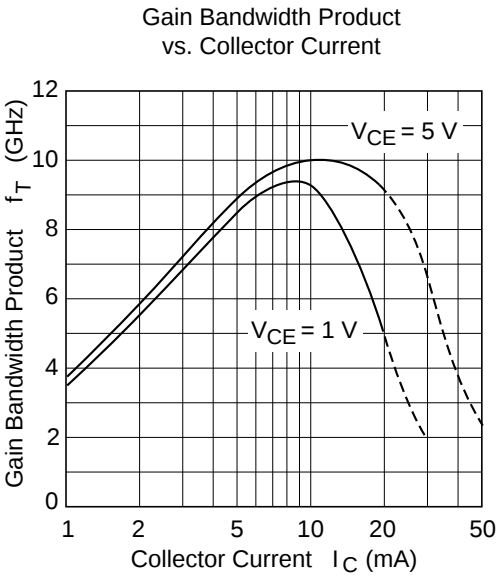
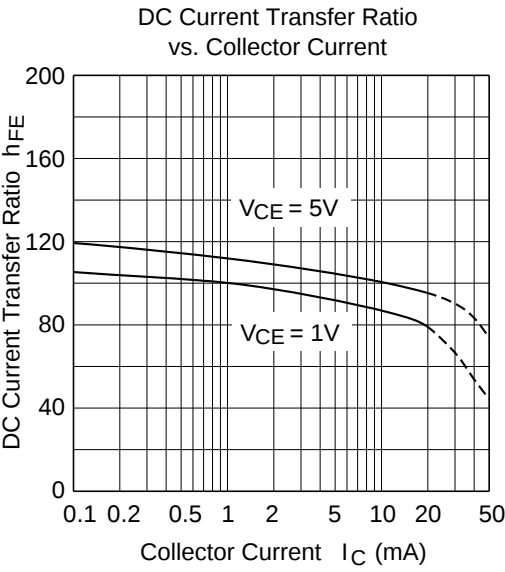
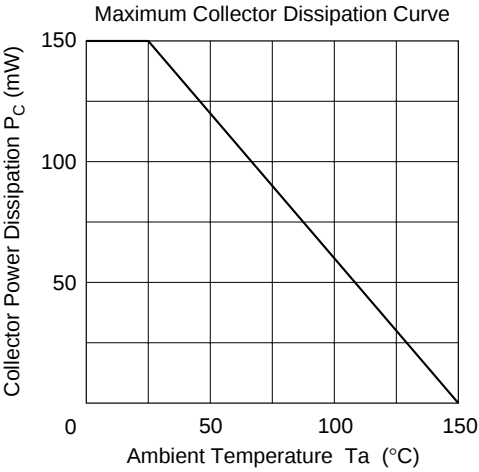
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	8	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	20	mA
Collector power dissipation	P_C	150	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

Electrical Characteristics (Ta = 25°C)

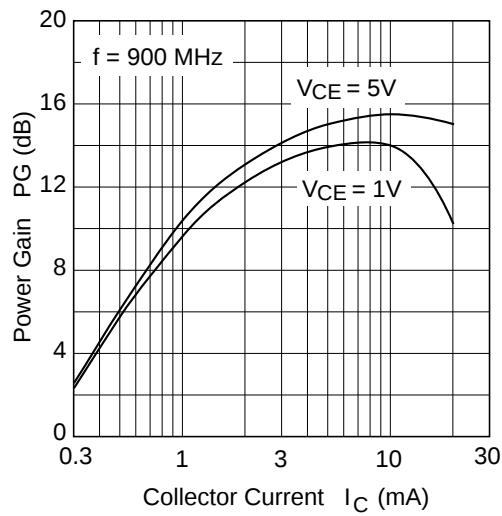
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector cutoff current	I_{CBO}	—	—	10	μA	$V_{CB} = 15\text{ V}, I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 8\text{ V}, R_{BE} = \infty$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 1.5\text{ V}, I_C = 0$
DC current transfer ratio	h_{FE}	50	120	250		$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$
Collector output capacitance	C_{ob}	—	0.4	0.75	pF	$V_{CB} = 5\text{ V}, I_E = 0, f = 1\text{ MHz}$
Gain bandwidth product	f_T	7.0	10.0	—	GHz	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$
Power gain	PG	12.5	15.5	—	dB	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}, f = 900\text{ MHz}$
Noise figure	NF	—	1.2	2.5	dB	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, f = 900\text{ MHz}$

Note: Marking is “YA—”.

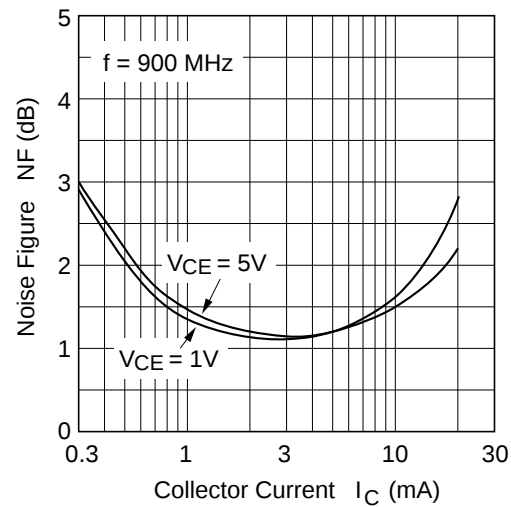
Attention: This is electrostatic sensitive device.



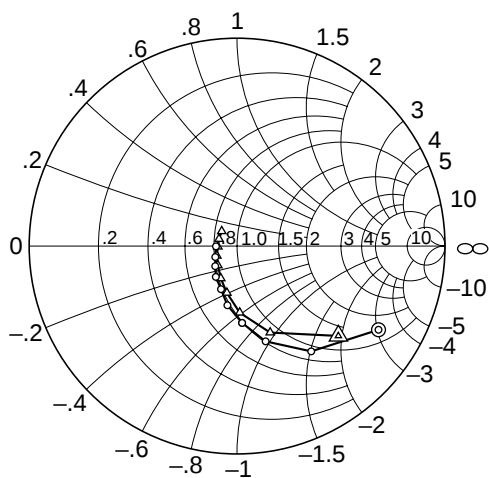
Power Gain vs. Collector Current



Noise Figure vs. Collector Current

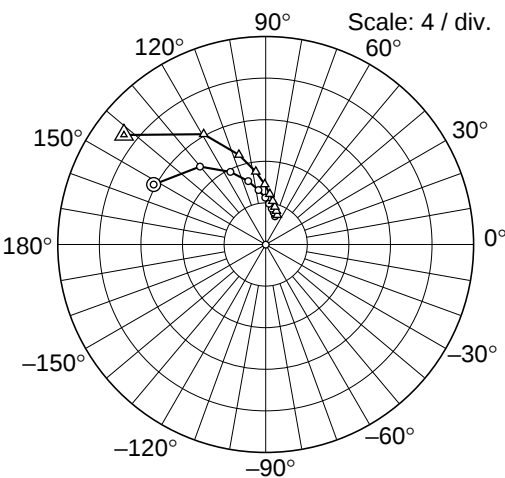


S11 Parameter vs. Frequency



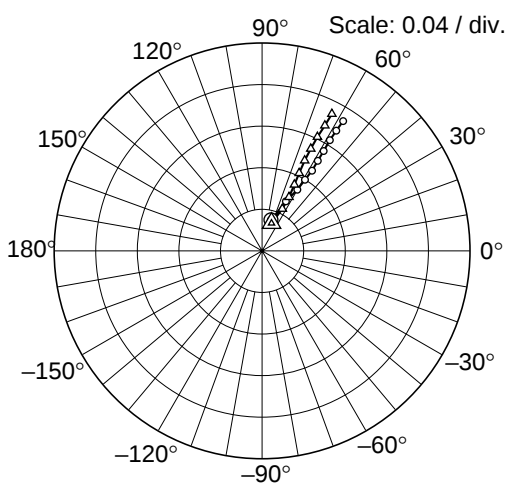
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 10\text{ mA}$)

S21 Parameter vs. Frequency



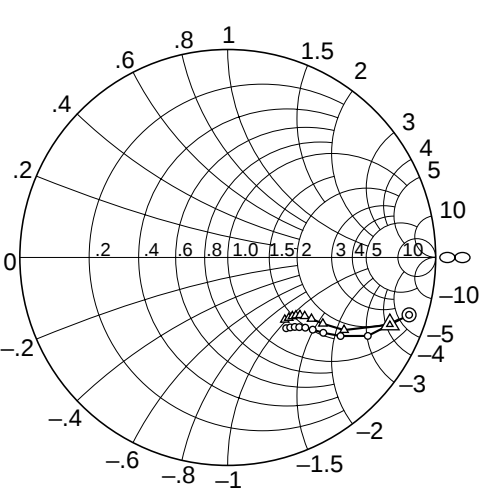
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 10\text{ mA}$)

S12 Parameter vs. Frequency



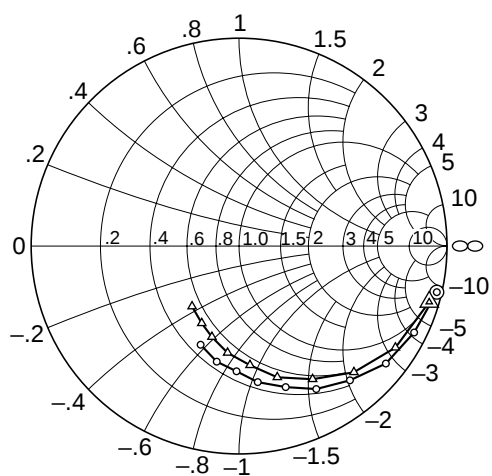
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 10\text{ mA}$)

S22 Parameter vs. Frequency



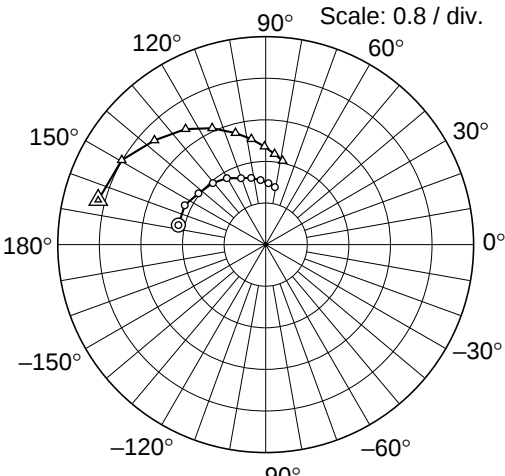
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 10\text{ mA}$)

S11 Parameter vs. Frequency



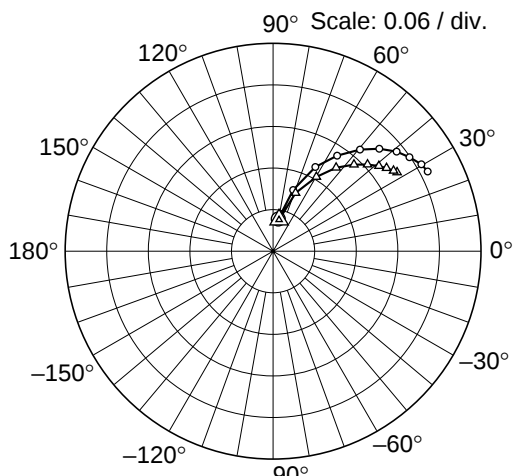
Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ ($I_C = 0.5\text{ mA}$)
△ ($I_C = 1\text{ mA}$)

S21 Parameter vs. Frequency



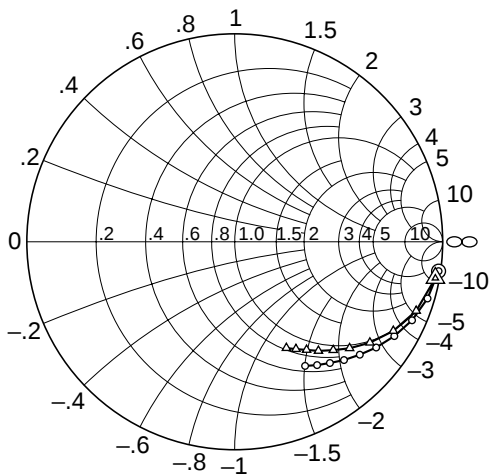
Scale: 0.8 / div.
Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ ($I_C = 0.5\text{ mA}$)
△ ($I_C = 1\text{ mA}$)

S12 Parameter vs. Frequency



Scale: 0.06 / div.
Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ ($I_C = 0.5\text{ mA}$)
△ ($I_C = 1\text{ mA}$)

S22 Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ ($I_C = 0.5\text{ mA}$)
△ ($I_C = 1\text{ mA}$)

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

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.859	−15.9	13.192	165.5	0.016	82.3	0.974	−9.3
200	0.790	−30.6	12.225	151.9	0.031	73.9	0.914	−17.5
300	0.700	−44.0	10.967	139.9	0.043	68.2	0.841	−24.2
400	0.618	−54.8	9.802	130.2	0.053	64.0	0.771	−29.2
500	0.543	−64.7	8.686	122.4	0.061	61.4	0.710	−32.5
600	0.477	−73.3	7.761	116.0	0.068	59.8	0.660	−34.8
700	0.421	−80.1	6.955	110.2	0.074	58.9	0.619	−36.7
800	0.369	−86.3	6.316	105.5	0.080	58.7	0.584	−38.2
900	0.331	−92.8	5.748	101.0	0.086	58.1	0.557	−39.3
1000	0.287	−99.4	5.275	97.6	0.091	57.9	0.535	−40.3
1100	0.226	−104.8	4.869	94.1	0.097	57.9	0.517	−41.2
1200	0.220	−110.7	4.498	90.6	0.102	58.1	0.502	−42.1
1300	0.200	−110.7	4.169	88.2	0.107	58.4	0.492	−43.1
1400	0.179	−125.0	3.926	85.4	0.113	58.2	0.479	−44.2
1500	0.159	−131.7	3.698	83.0	0.119	58.2	0.471	−44.9
1600	0.142	−138.0	3.493	80.5	0.125	58.4	0.463	−46.0
1700	0.126	−147.6	3.311	78.1	0.130	58.5	0.456	−47.2
1800	0.117	−154.1	3.143	76.1	0.136	58.2	0.450	−48.2
1900	0.109	−166.9	3.008	74.0	0.142	58.0	0.445	−49.3
2000	0.102	179.8	2.864	71.9	0.147	57.9	0.440	−50.4

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

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.758	−22.4	19.871	159.8	0.015	78.6	0.942	−12.6
200	0.650	−41.5	17.252	142.4	0.028	71.0	0.842	−22.5
300	0.538	−57.1	14.423	129.0	0.037	66.8	0.739	−28.5
400	0.445	−69.1	12.168	119.4	0.045	64.3	0.659	−32.0
500	0.383	−79.6	10.376	112.2	0.052	63.3	0.600	−33.7
600	0.320	−87.8	8.995	106.7	0.058	63.4	0.577	−34.9
700	0.274	−95.4	7.914	101.8	0.065	63.7	0.524	−35.4
800	0.230	−102.4	7.057	97.8	0.071	64.0	0.499	−36.3
900	0.205	−109.8	6.332	93.9	0.076	64.4	0.480	−36.7
1000	0.174	−116.9	5.778	91.0	0.083	64.5	0.466	−37.4
1100	0.154	−125.9	5.291	88.1	0.089	64.6	0.454	−38.0
1200	0.131	−135.1	4.862	85.4	0.096	64.7	0.444	−38.7
1300	0.118	−142.7	4.508	82.9	0.102	64.6	0.438	−39.4
1400	0.108	−154.7	4.226	80.8	0.109	64.5	0.431	−40.4
1500	0.104	−165.2	3.961	78.7	0.116	64.3	0.426	−41.4
1600	0.093	−178.6	3.718	76.4	0.122	64.1	0.420	−42.4
1700	0.095	169.4	3.532	74.3	0.129	64.0	0.417	−43.6
1800	0.094	158.4	3.347	72.4	0.135	63.4	0.413	−44.8
1900	0.094	148.2	3.190	70.5	0.142	63.2	0.409	−46.0
2000	0.101	136.0	3.036	68.6	0.148	63.0	0.406	−47.3

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

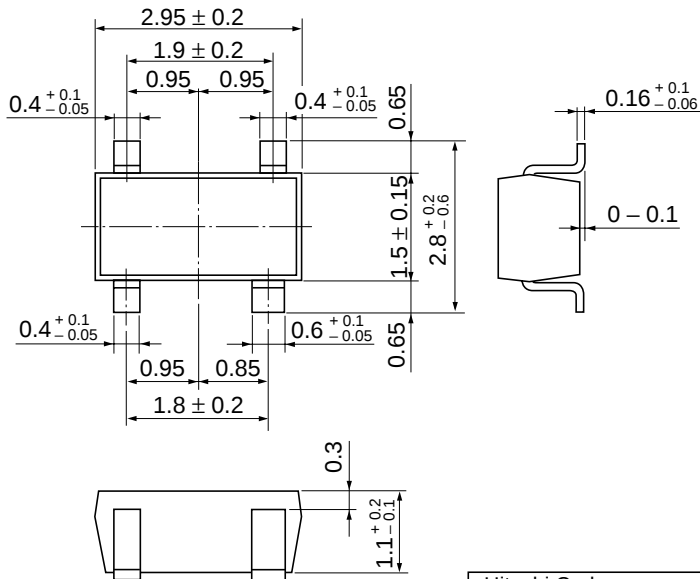
Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.983	−6.6	1.757	174.0	0.023	85.8	0.995	−4.1
200	0.976	−13.1	1.723	167.3	0.047	80.7	0.990	−8.2
300	0.961	−19.6	1.741	160.2	0.071	76.4	0.980	−12.3
400	0.938	−26.2	1.734	154.0	0.093	71.9	0.966	−16.4
500	0.920	−32.5	1.666	147.6	0.093	67.6	0.950	−20.1
600	0.903	−38.6	1.629	142.6	0.133	63.4	0.932	−23.9
700	0.868	−44.6	1.584	136.2	0.151	59.9	0.913	−27.3
800	0.836	−50.4	1.564	130.6	0.166	56.2	0.891	−30.6
900	0.819	−56.1	1.520	125.3	0.180	52.8	0.869	−33.8
1000	0.780	−61.6	1.484	120.3	0.193	49.5	0.849	−36.8
1100	0.749	−66.9	1.434	115.3	0.204	46.7	0.828	−39.6
1200	0.713	−71.7	1.369	110.4	0.213	44.0	0.810	−42.1
1300	0.687	−77.0	1.322	107.2	0.221	41.4	0.794	−44.8
1400	0.659	−82.2	1.317	102.3	0.229	38.9	0.774	−47.3
1500	0.629	−86.9	1.282	98.5	0.234	36.7	0.757	−49.7
1600	0.601	−91.2	1.248	94.6	0.239	34.6	0.741	−51.9
1700	0.578	−96.7	1.215	91.0	0.243	32.4	0.726	−54.2
1800	0.656	−101.0	1.187	87.5	0.248	30.4	0.713	−56.3
1900	0.532	−106.3	1.155	84.4	0.249	28.9	0.699	−58.4
2000	0.508	−111.4	1.124	81.0	0.251	27.3	0.686	−60.5

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

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.969	−8.3	3.406	172.8	0.023	84.7	0.992	−5.3
200	0.953	−16.4	3.337	165.1	0.046	79.1	0.980	−10.3
300	0.927	−25.1	3.270	157.0	0.070	73.7	0.960	−15.8
400	0.896	−33.0	3.218	149.3	0.090	68.8	0.933	−20.8
500	0.860	−40.5	3.068	143.0	0.108	64.2	0.905	−25.1
600	0.820	−47.7	2.950	136.9	0.124	59.7	0.874	−29.3
700	0.778	−54.5	2.816	130.7	0.139	56.3	0.844	−33.2
800	0.731	−61.1	2.711	124.8	0.151	52.9	0.810	−36.7
900	0.703	−67.5	2.580	119.7	0.162	49.8	0.780	−39.9
1000	0.657	−73.8	2.470	114.8	0.171	46.9	0.752	−42.8
1100	0.617	−79.8	2.363	110.2	0.178	44.7	0.725	−45.5
1200	0.575	−84.8	2.229	105.3	0.185	42.5	0.703	−47.7
1300	0.549	−89.8	2.104	102.4	0.191	40.8	0.686	−50.1
1400	0.516	−96.2	2.053	97.9	0.196	38.8	0.660	−52.5
1500	0.485	−101.5	1.975	94.3	0.199	37.6	0.641	−54.5
1600	0.456	−106.7	1.891	90.9	0.203	36.2	0.623	−56.4
1700	0.429	−111.9	1.827	87.8	0.206	34.9	0.607	−58.3
1800	0.412	−115.9	1.751	84.6	0.209	33.7	0.593	−60.3
1900	0.389	−122.6	1.700	81.7	0.211	33.2	0.580	−62.1
2000	0.368	−128.0	1.645	78.8	0.212	32.4	0.567	−64.1

Unit: mm



Hitachi Code	MPAK-4
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.013 g

Cautions

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