NEC

NPN SILICON RF TWIN TRANSISTOR
μPA804TC

NPN SILICON EPITAXIAL TRANSISTOR (WITH BUILT-IN 2 × 2SC5004) FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD

DESCRIPTION

The μPA804TC has built-in two transistors which were developed for UHF.

FEATURES

- High f_T: f_T = 5.0 GHz TYP. (@ V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz)
- Flat-lead 6-pin thin-type ultra super minimold package
- Built-in 2 transistors (2 × 2SC5004)

ORDERING INFORMATION

Part Number	Package	Quantity	Supplying Form
μPA804TC	Flat-lead 6-pin thin-type ultra super minimold	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.
μPA804TC-T1		Taping products (3 kp/reel)	

Remark To order evaluation samples, please contact your local NEC sales office. (Part number for sample order: μPA804TC. Unit sample quantity is 50 pcs.)

ABSOLUTE MAXIMUM RATINGS (T_A = +25 °C)

Parameter	Symbol	Ratings	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	60	mA
Total Power Dissipation	P_T**Note**	150 in 1 element 200 in 2 elements	mW
Junction Temperature	T_j	125	°C
Storage Temperature	T_{stg}	–55 to +125	°C

Note Mounted on 1.08 cm^2 × 1.0 mm glass epoxy substrate.

Caution Electro-static sensitive devices

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ELECTRICAL CHARACTERISTICS (T_A = +25 °C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector Cutoff Current	I_{CBO}	V_{CB} = 15 V, I_E = 0	–	–	100	nA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 1 V, I_C = 0	–	–	100	nA
DC Current Gain	h_{FE}	V_{CE} = 5 V, I_C = 5 mA[Note 1]	60	–	200	
Gain Bandwidth Product (1)	f_T	V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz	3.0	5.0	–	GHz
Feedback Capacitance	C_{re}	V_{CB} = 5 V, I_E = 0, f = 1 MHz[Note 2]	–	0.9	1.2	pF
Insertion Power Gain (1)	$\|S_{21e}\|^2$	V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz	5.0	–	–	dB

Notes 1. Pulse Measurement: PW ≤ 350 μs, Duty Cycle ≤ 2 %

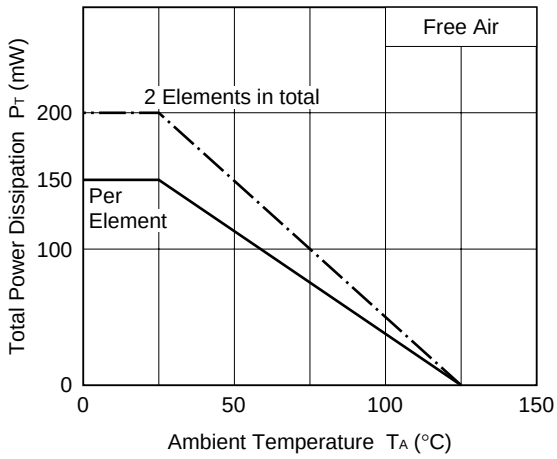
2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

h_{FE} CLASSIFICATION

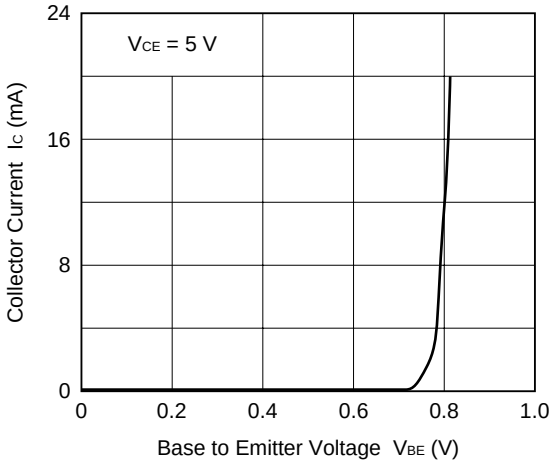
Rank	FB	GB
Marking	72	73
h_{FE} Value	60 to 120	100 to 200

TYPICAL CHARACTERISTICS (T_A = +25 °C)

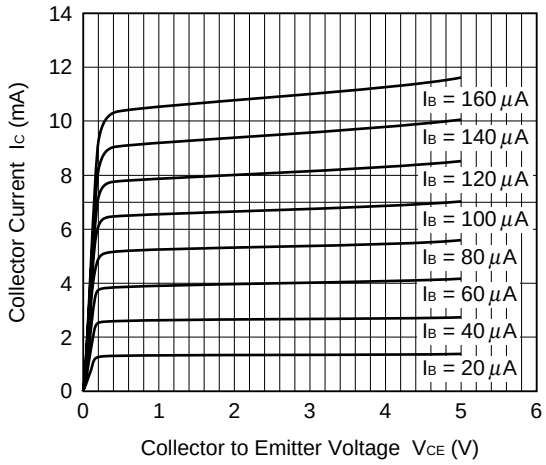
TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE



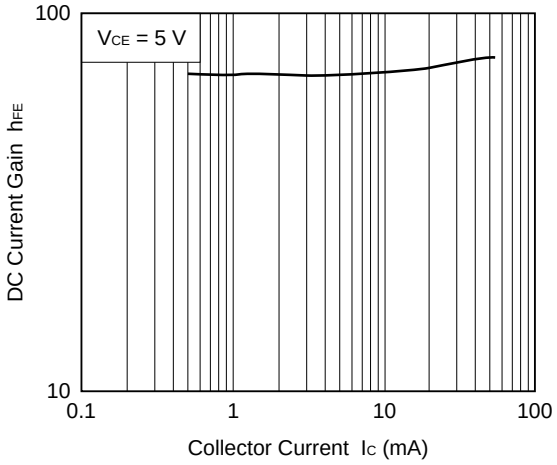
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



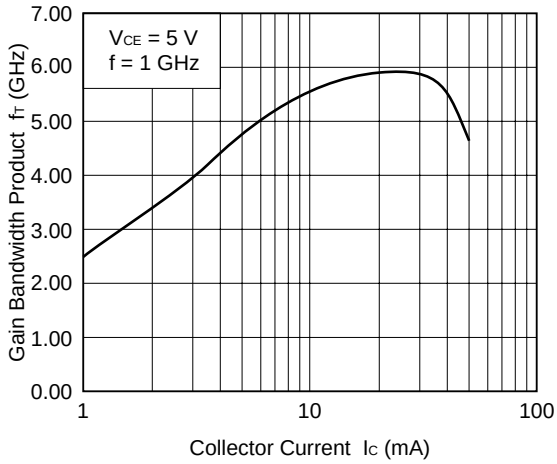
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



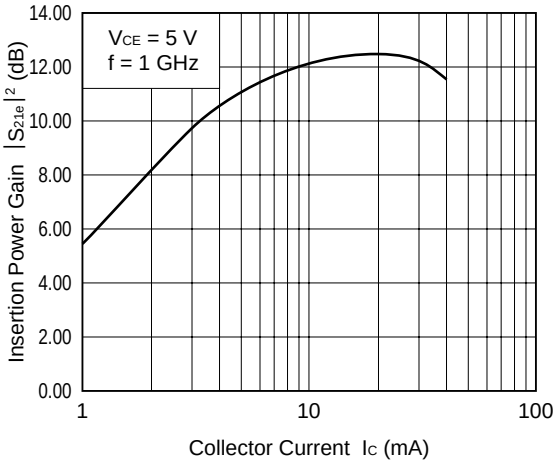
DC CURRENT GAIN vs.
COLLECTOR CURRENT



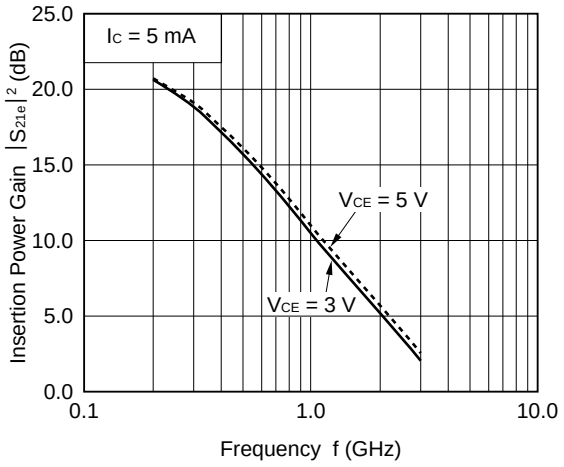
GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



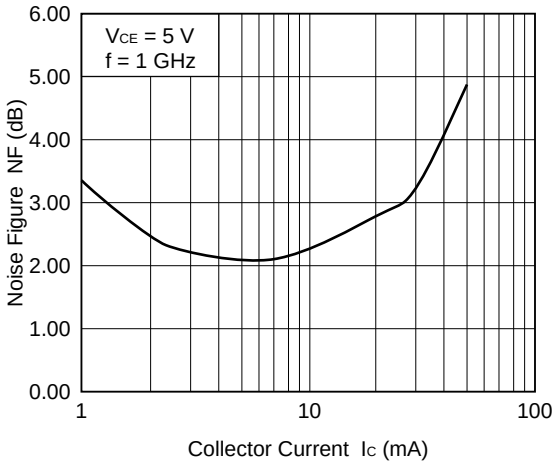
INSERTION POWER GAIN vs.
COLLECTOR CURRENT



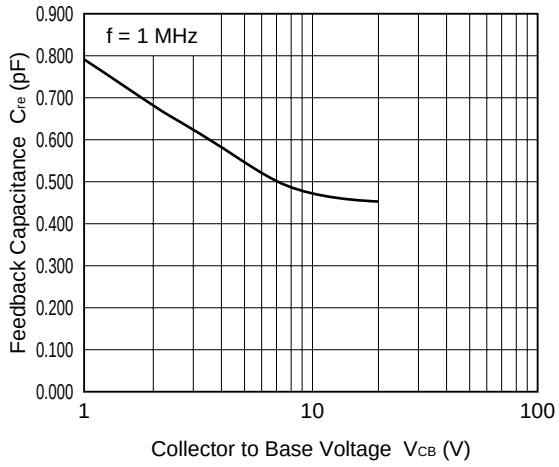
INSERTION POWER GAIN vs. FREQUENCY



NOISE FIGURE vs. COLLECTOR CURRENT



FEEDBACK CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



S-PARAMETERS

V_{CE} = 3 V, I_C = 1 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.921	–25.3	3.707	159.0	0.059	66.9	0.995	–12.6
0.2	0.895	–49.4	3.398	140.1	0.078	58.5	0.954	–25.2
0.3	0.851	–71.3	3.131	123.0	0.100	42.1	0.914	–36.8
0.4	0.805	–93.0	2.863	106.2	0.122	26.9	0.863	–47.4
0.5	0.759	–113.2	2.635	90.6	0.137	15.9	0.813	–56.8
0.6	0.720	–131.2	2.398	76.4	0.148	5.0	0.774	–65.7
0.7	0.691	–148.2	2.196	63.0	0.158	–6.8	0.733	–74.0
0.8	0.662	–164.9	2.009	50.5	0.165	–16.7	0.701	–81.7
0.9	0.642	179.6	1.857	38.6	0.164	–24.9	0.681	–89.8
1.0	0.628	165.5	1.729	27.0	0.167	–33.2	0.656	–97.7
1.1	0.619	151.3	1.617	16.0	0.170	–40.8	0.638	–105.5
1.2	0.612	138.1	1.515	5.2	0.171	–47.6	0.622	–113.0
1.3	0.610	125.5	1.430	–5.1	0.169	–54.9	0.611	–121.0
1.4	0.608	113.1	1.355	–15.0	0.167	–61.3	0.602	–129.0
1.5	0.607	101.8	1.279	–24.9	0.164	–67.4	0.592	–136.9
1.6	0.607	90.3	1.217	–34.8	0.161	–73.8	0.583	–145.0
1.7	0.612	79.2	1.158	–44.3	0.162	–79.1	0.577	–153.4
1.8	0.614	68.5	1.104	–53.8	0.159	–84.1	0.573	–161.4
1.9	0.619	58.3	1.063	–62.8	0.158	–89.9	0.566	–170.5
2.0	0.623	47.9	1.014	–71.9	0.157	–94.3	0.558	–178.7
2.1	0.629	38.2	0.974	–80.8	0.156	–99.8	0.555	172.5
2.2	0.633	28.7	0.932	–89.8	0.155	–104.5	0.554	163.4
2.3	0.641	19.3	0.902	–98.2	0.152	–107.9	0.548	154.6
2.4	0.644	10.4	0.868	–106.6	0.154	–111.4	0.545	145.1
2.5	0.647	1.2	0.836	–114.8	0.157	–115.9	0.542	135.7
2.6	0.660	–7.3	0.806	–123.3	0.160	–119.9	0.543	126.0
2.7	0.662	–16.1	0.777	–131.2	0.161	–123.7	0.539	116.9
2.8	0.668	–24.8	0.749	–139.2	0.167	–129.0	0.543	106.9
2.9	0.672	–33.1	0.727	–146.8	0.169	–131.7	0.536	97.9
3.0	0.679	–41.1	0.698	–154.3	0.173	–136.4	0.541	87.8

V_{CE} = 3 V, I_C = 3 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.809	–36.5	9.255	151.6	0.046	45.1	0.962	–20.4
0.2	0.743	–68.2	7.928	129.3	0.063	48.9	0.853	–36.9
0.3	0.678	–95.6	6.811	110.1	0.080	31.8	0.751	–50.6
0.4	0.619	–120.9	5.789	93.2	0.092	22.7	0.662	–61.2
0.5	0.580	–141.3	5.033	78.8	0.102	13.4	0.589	–70.0
0.6	0.545	–160.1	4.377	65.9	0.103	5.2	0.539	–77.5
0.7	0.525	–176.9	3.876	53.8	0.106	–2.3	0.496	–84.6
0.8	0.511	168.0	3.471	43.0	0.115	–9.3	0.465	–91.9
0.9	0.504	154.0	3.130	32.3	0.113	–14.4	0.440	–99.0
1.0	0.500	141.1	2.866	22.2	0.118	–20.8	0.421	–106.0
1.1	0.501	128.3	2.638	12.3	0.123	–27.2	0.402	–113.8
1.2	0.502	116.9	2.444	2.7	0.127	–29.8	0.385	–120.8
1.3	0.504	105.9	2.278	–6.6	0.132	–36.3	0.377	–128.1
1.4	0.511	94.5	2.137	–15.8	0.134	–42.2	0.366	–135.7
1.5	0.515	84.2	2.008	–24.9	0.139	–47.3	0.356	–143.9
1.6	0.522	74.0	1.897	–33.9	0.145	–53.0	0.346	–151.5
1.7	0.525	64.6	1.796	–42.6	0.148	–56.6	0.341	–160.1
1.8	0.533	54.5	1.705	–51.7	0.152	–62.4	0.335	–167.6
1.9	0.540	45.3	1.631	–59.9	0.156	–68.8	0.326	–176.7
2.0	0.544	36.0	1.550	–68.7	0.163	–73.4	0.320	175.2
2.1	0.555	26.7	1.487	–77.0	0.167	–80.5	0.313	166.6
2.2	0.560	18.4	1.424	–85.7	0.173	–85.0	0.309	157.5
2.3	0.570	9.9	1.372	–93.8	0.177	–90.4	0.306	148.1
2.4	0.578	1.1	1.316	–102.1	0.185	–95.4	0.301	138.7
2.5	0.580	–7.0	1.266	–110.2	0.189	–101.7	0.299	128.8
2.6	0.590	–15.3	1.223	–118.5	0.195	–107.4	0.299	119.1
2.7	0.599	–23.1	1.186	–126.2	0.204	–112.3	0.296	109.1
2.8	0.605	–31.0	1.140	–134.3	0.208	–119.1	0.296	99.1
2.9	0.614	–38.9	1.106	–142.1	0.214	–124.5	0.294	89.4
3.0	0.621	–46.7	1.068	–149.8	0.222	–130.4	0.301	79.2

V_{CE} = 3 V, I_C = 5 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.735	–44.8	12.630	148.2	0.032	52.7	0.940	–24.3
0.2	0.666	–80.2	10.431	124.0	0.058	48.3	0.793	–43.4
0.3	0.605	–109.9	8.612	104.7	0.068	33.5	0.667	–57.3
0.4	0.564	–135.4	7.124	88.2	0.079	21.4	0.570	–67.7
0.5	0.537	–155.4	6.050	74.3	0.085	14.0	0.497	–75.6
0.6	0.519	–173.3	5.210	61.8	0.096	9.1	0.448	–83.7
0.7	0.505	171.0	4.567	50.7	0.093	1.7	0.405	–90.5
0.8	0.500	156.8	4.059	40.2	0.103	–3.2	0.376	–97.4
0.9	0.500	143.8	3.655	30.2	0.106	–8.9	0.355	–104.7
1.0	0.499	131.3	3.327	20.5	0.110	–14.0	0.334	–111.1
1.1	0.500	120.1	3.052	10.9	0.115	–20.1	0.320	–118.5
1.2	0.508	108.8	2.813	1.6	0.123	–25.1	0.306	–125.6
1.3	0.514	98.5	2.622	–7.4	0.126	–31.2	0.295	–133.4
1.4	0.515	88.0	2.448	–16.3	0.132	–36.0	0.287	–140.9
1.5	0.524	78.1	2.295	–25.3	0.138	–40.6	0.277	–148.9
1.6	0.528	68.6	2.168	–34.1	0.143	–47.2	0.268	–156.8
1.7	0.536	59.3	2.050	–42.5	0.151	–52.7	0.262	–165.9
1.8	0.543	50.0	1.936	–51.3	0.155	–57.7	0.255	–173.3
1.9	0.550	41.3	1.852	–59.5	0.160	–64.2	0.248	177.4
2.0	0.554	32.0	1.759	–68.2	0.166	–69.3	0.243	169.3
2.1	0.563	23.2	1.678	–76.4	0.172	–76.4	0.237	159.8
2.2	0.562	14.9	1.601	–84.9	0.179	–81.1	0.233	150.7
2.3	0.575	6.7	1.542	–92.7	0.184	–87.2	0.229	140.9
2.4	0.574	–1.6	1.482	–100.7	0.190	–93.2	0.227	131.9
2.5	0.585	–9.4	1.431	–108.7	0.200	–99.2	0.224	121.4
2.6	0.595	–17.3	1.382	–116.8	0.203	–105.9	0.225	110.8
2.7	0.607	–25.2	1.330	–124.8	0.210	–111.5	0.224	100.8
2.8	0.609	–32.9	1.283	–132.4	0.217	–118.2	0.226	90.9
2.9	0.619	–40.4	1.250	–140.5	0.223	–124.2	0.226	80.8
3.0	0.627	–47.9	1.205	–148.3	0.230	–130.7	0.230	70.3

V_{CE} = 5 V, I_C = 1 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.943	–23.9	3.788	159.8	0.034	56.6	1.005	–12.6
0.2	0.894	–47.5	3.510	141.4	0.063	54.5	0.967	–23.6
0.3	0.854	–69.0	3.247	124.9	0.087	46.3	0.935	–34.3
0.4	0.810	–90.4	2.980	108.2	0.104	29.1	0.882	–44.4
0.5	0.765	–109.6	2.756	93.3	0.118	20.3	0.839	–53.2
0.6	0.727	–128.3	2.514	78.6	0.132	6.6	0.795	–61.8
0.7	0.683	–145.1	2.315	65.7	0.136	–4.1	0.763	–70.4
0.8	0.664	–161.6	2.133	53.1	0.143	–13.2	0.735	–77.5
0.9	0.642	–176.9	1.967	41.4	0.147	–21.7	0.713	–85.7
1.0	0.626	168.5	1.835	29.9	0.149	–29.2	0.697	–93.0
1.1	0.613	154.4	1.710	18.9	0.150	–36.9	0.676	–100.8
1.2	0.604	140.5	1.608	8.3	0.153	–44.8	0.663	–108.4
1.3	0.603	128.4	1.516	–1.9	0.149	–51.5	0.652	–115.9
1.4	0.594	115.5	1.427	–12.0	0.149	–57.2	0.641	–123.5
1.5	0.603	103.2	1.356	–22.1	0.148	–63.5	0.632	–131.5
1.6	0.600	92.1	1.288	–31.8	0.147	–70.0	0.621	–139.3
1.7	0.598	80.8	1.227	–40.9	0.147	–75.4	0.617	–147.5
1.8	0.602	69.7	1.170	–50.6	0.144	–79.8	0.611	–155.1
1.9	0.609	59.3	1.121	–59.4	0.142	–85.5	0.605	–163.4
2.0	0.609	49.1	1.066	–68.8	0.143	–90.1	0.602	–171.6
2.1	0.611	38.7	1.024	–77.5	0.141	–94.6	0.596	180.0
2.2	0.615	28.9	0.981	–86.4	0.140	–99.1	0.592	171.3
2.3	0.615	19.7	0.945	–94.6	0.141	–103.4	0.586	162.6
2.4	0.617	11.0	0.914	–102.8	0.144	–106.8	0.586	153.6
2.5	0.626	2.5	0.884	–111.1	0.147	–111.4	0.583	145.0
2.6	0.638	–6.3	0.855	–119.6	0.151	–115.1	0.578	135.6
2.7	0.645	–15.2	0.826	–127.6	0.155	–118.4	0.576	126.5
2.8	0.652	–23.5	0.796	–135.5	0.158	–122.6	0.575	117.0
2.9	0.661	–32.2	0.774	–143.7	0.163	–126.6	0.572	107.9
3.0	0.663	–40.4	0.742	–151.3	0.168	–131.2	0.575	98.5

V_{CE} = 5 V, I_C = 3 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.811	–35.0	9.215	153.1	0.027	27.9	0.980	–18.4
0.2	0.763	–64.8	8.022	131.7	0.061	57.0	0.880	–32.8
0.3	0.701	–91.2	6.967	113.0	0.074	38.7	0.790	–45.5
0.4	0.649	–116.2	5.999	96.2	0.079	22.4	0.709	–55.5
0.5	0.603	–136.4	5.271	81.7	0.091	16.9	0.647	–63.6
0.6	0.569	–155.3	4.609	68.4	0.095	6.5	0.593	–71.7
0.7	0.547	–172.0	4.088	56.6	0.098	–2.2	0.557	–78.4
0.8	0.529	172.4	3.667	45.5	0.103	–8.5	0.528	–85.4
0.9	0.524	158.0	3.338	34.8	0.106	–13.0	0.504	–92.6
1.0	0.517	145.1	3.038	24.5	0.108	–19.5	0.488	–99.0
1.1	0.516	131.9	2.803	14.6	0.109	–25.5	0.466	–106.4
1.2	0.515	120.0	2.604	5.0	0.116	–30.4	0.455	–112.9
1.3	0.519	108.8	2.422	–4.3	0.120	–36.3	0.444	–120.3
1.4	0.519	97.2	2.267	–13.6	0.120	–40.5	0.436	–128.0
1.5	0.529	87.0	2.143	–22.9	0.126	–46.1	0.423	–135.5
1.6	0.532	76.6	2.020	–31.9	0.128	–51.2	0.414	–143.0
1.7	0.540	66.6	1.907	–40.7	0.135	–56.1	0.411	–151.0
1.8	0.545	56.8	1.812	–49.6	0.137	–61.0	0.403	–158.4
1.9	0.551	47.6	1.734	–58.0	0.142	–67.7	0.397	–166.7
2.0	0.556	38.0	1.647	–66.6	0.147	–71.1	0.390	–174.8
2.1	0.565	28.9	1.575	–75.1	0.149	–77.4	0.381	177.3
2.2	0.570	20.1	1.506	–83.9	0.156	–82.8	0.375	168.3
2.3	0.577	11.4	1.448	–92.0	0.161	–88.3	0.370	159.7
2.4	0.587	3.0	1.395	–100.3	0.165	–94.1	0.363	151.2
2.5	0.591	–5.9	1.338	–108.2	0.169	–99.4	0.357	141.9
2.6	0.602	–13.8	1.293	–116.7	0.174	–105.0	0.356	132.8
2.7	0.607	–22.5	1.240	–124.4	0.183	–111.1	0.350	123.5
2.8	0.612	–30.5	1.191	–132.7	0.184	–117.5	0.347	113.9
2.9	0.620	–38.3	1.152	–140.5	0.189	–122.1	0.339	105.2
3.0	0.619	–46.1	1.110	–147.4	0.192	–126.9	0.340	96.6

V_{CE} = 5 V, I_C = 5 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.717	–42.2	13.296	148.6	0.023	62.3	0.940	–22.8
0.2	0.671	–78.6	11.061	125.0	0.048	49.1	0.806	–38.9
0.3	0.596	–106.9	9.153	105.7	0.061	37.7	0.687	–51.7
0.4	0.547	–131.6	7.611	89.4	0.065	25.4	0.598	–61.4
0.5	0.519	–153.0	6.492	75.7	0.073	18.3	0.536	–68.6
0.6	0.499	–170.7	5.573	63.6	0.078	13.2	0.485	–75.5
0.7	0.488	173.1	4.898	52.0	0.080	4.9	0.450	–82.0
0.8	0.480	158.8	4.366	41.6	0.086	–3.3	0.425	–88.5
0.9	0.481	145.8	3.919	31.6	0.095	–6.5	0.406	–95.2
1.0	0.478	133.2	3.567	21.8	0.098	–10.5	0.389	–101.2
1.1	0.482	121.9	3.271	12.4	0.103	–16.7	0.374	–108.3
1.2	0.483	110.5	3.024	3.3	0.109	–21.5	0.362	–115.5
1.3	0.491	99.9	2.806	–5.8	0.113	–26.7	0.348	–122.6
1.4	0.497	89.6	2.629	–14.7	0.117	–32.2	0.341	–129.5
1.5	0.502	79.7	2.467	–23.3	0.124	–37.2	0.337	–137.5
1.6	0.508	70.0	2.322	–32.2	0.130	–43.0	0.327	–144.6
1.7	0.516	60.7	2.189	–40.9	0.139	–47.6	0.319	–153.2
1.8	0.521	51.3	2.087	–49.3	0.142	–53.8	0.313	–160.1
1.9	0.531	42.5	1.984	–58.0	0.148	–60.5	0.304	–169.3
2.0	0.537	33.3	1.893	–66.3	0.154	–66.2	0.299	–177.1
2.1	0.546	24.5	1.805	–74.6	0.157	–72.0	0.291	175.0
2.2	0.554	16.3	1.725	–83.0	0.163	–77.9	0.282	166.3
2.3	0.559	7.7	1.658	–91.2	0.172	–83.8	0.276	157.1
2.4	0.568	–0.5	1.593	–99.3	0.177	–90.0	0.275	147.6
2.5	0.575	–8.8	1.529	–107.2	0.183	–96.1	0.270	139.0
2.6	0.587	–16.8	1.473	–115.4	0.187	–102.5	0.264	129.4
2.7	0.590	–24.9	1.418	–122.9	0.194	–108.2	0.257	119.4
2.8	0.597	–33.0	1.364	–131.1	0.199	–114.8	0.255	109.8
2.9	0.601	–41.1	1.313	–138.7	0.198	–120.5	0.245	100.6
3.0	0.602	–48.2	1.260	–145.8	0.204	–124.9	0.247	93.3

V_{CE} = 3 V, I_C = 1 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.934	–25.9	3.849	157.7	0.017	85.8	0.985	–14.1
0.2	0.889	–50.6	3.540	139.0	0.071	64.6	0.942	–25.9
0.3	0.838	–73.1	3.239	121.1	0.102	39.8	0.905	–37.8
0.4	0.792	–94.2	2.943	104.0	0.115	28.4	0.853	–48.0
0.5	0.747	–112.8	2.693	88.7	0.129	16.3	0.799	–57.6
0.6	0.704	–131.4	2.419	74.0	0.141	4.6	0.766	–66.8
0.7	0.671	–148.2	2.217	60.9	0.146	–6.1	0.731	–75.0
0.8	0.648	–163.8	2.036	48.2	0.154	–15.1	0.706	–83.3
0.9	0.625	–178.1	1.879	36.6	0.153	–22.4	0.676	–91.4
1.0	0.608	168.0	1.749	24.9	0.155	–29.9	0.658	–99.6
1.1	0.598	155.1	1.632	14.0	0.159	–38.6	0.640	–107.6
1.2	0.589	142.4	1.535	3.3	0.160	–44.3	0.623	–115.7
1.3	0.585	130.5	1.446	–7.0	0.158	–50.6	0.615	–123.9
1.4	0.576	118.9	1.375	–17.1	0.157	–56.6	0.607	–132.1
1.5	0.571	107.8	1.299	–26.8	0.157	–62.8	0.597	–140.5
1.6	0.571	96.8	1.242	–37.0	0.154	–67.6	0.586	–148.9
1.7	0.571	86.3	1.187	–46.4	0.156	–72.8	0.580	–157.6
1.8	0.571	76.0	1.141	–55.7	0.157	–77.6	0.574	–165.8
1.9	0.572	66.0	1.096	–64.7	0.159	–83.0	0.567	–174.9
2.0	0.571	55.9	1.051	–74.0	0.163	–86.6	0.563	176.1
2.1	0.572	46.1	1.014	–83.1	0.162	–91.8	0.553	167.6
2.2	0.571	36.6	0.976	–92.0	0.166	–96.7	0.547	158.2
2.3	0.574	27.5	0.945	–100.5	0.168	–99.9	0.540	148.8
2.4	0.577	17.8	0.915	–109.1	0.176	–105.4	0.534	139.7
2.5	0.575	8.6	0.881	–117.4	0.181	–109.2	0.528	130.4
2.6	0.580	–0.1	0.859	–125.7	0.186	–113.9	0.525	121.2
2.7	0.581	–8.8	0.833	–133.5	0.195	–118.3	0.521	111.8
2.8	0.580	–17.7	0.804	–141.3	0.204	–123.3	0.522	102.4
2.9	0.581	–26.2	0.787	–149.2	0.211	–128.6	0.519	92.6
3.0	0.583	–34.7	0.766	–157.0	0.221	–133.7	0.521	82.7

V_{CE} = 3 V, I_C = 3 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.805	–36.8	9.163	150.9	0.029	70.3	0.959	–19.5
0.2	0.746	–68.2	7.820	128.2	0.067	49.6	0.855	–36.2
0.3	0.675	–95.2	6.676	109.1	0.083	32.5	0.761	–49.2
0.4	0.615	–120.0	5.674	92.0	0.090	23.3	0.671	–59.5
0.5	0.573	–139.8	4.930	77.3	0.095	13.9	0.603	–67.8
0.6	0.541	–156.9	4.280	64.5	0.102	8.1	0.555	–75.4
0.7	0.522	–173.0	3.778	52.6	0.104	0.2	0.517	–82.6
0.8	0.507	171.9	3.391	41.4	0.114	–6.5	0.491	–90.3
0.9	0.495	158.1	3.068	30.5	0.117	–11.0	0.473	–97.5
1.0	0.488	146.1	2.813	20.3	0.121	–17.9	0.452	–104.5
1.1	0.487	134.3	2.593	10.4	0.125	–22.7	0.436	–112.2
1.2	0.483	122.7	2.411	0.6	0.132	–27.8	0.422	–119.4
1.3	0.484	111.9	2.250	–8.8	0.136	–34.3	0.411	–127.5
1.4	0.484	101.4	2.116	–18.1	0.141	–39.3	0.405	–134.8
1.5	0.487	91.6	1.999	–27.4	0.146	–43.7	0.397	–143.6
1.6	0.486	81.1	1.885	–36.6	0.152	–49.9	0.389	–150.8
1.7	0.488	72.1	1.800	–45.4	0.159	–54.1	0.384	–159.5
1.8	0.489	62.7	1.719	–54.5	0.164	–59.4	0.378	–167.2
1.9	0.493	53.4	1.641	–63.0	0.172	–65.3	0.374	–176.2
2.0	0.494	44.2	1.575	–72.1	0.179	–71.1	0.368	175.3
2.1	0.499	34.9	1.512	–80.5	0.186	–76.9	0.362	166.5
2.2	0.498	26.2	1.455	–89.3	0.195	–82.6	0.357	157.7
2.3	0.502	17.5	1.404	–97.6	0.204	–88.5	0.352	148.9
2.4	0.505	9.1	1.358	–106.1	0.212	–94.0	0.351	139.4
2.5	0.505	0.2	1.311	–114.2	0.221	–99.9	0.347	129.9
2.6	0.510	–7.9	1.270	–122.5	0.232	–105.3	0.345	120.3
2.7	0.515	–16.0	1.238	–130.7	0.240	–112.2	0.341	110.7
2.8	0.519	–24.5	1.196	–138.9	0.250	–119.0	0.342	101.7
2.9	0.522	–32.6	1.172	–146.9	0.259	–125.5	0.337	91.7
3.0	0.524	–40.3	1.140	–154.8	0.271	–131.7	0.340	82.5

V_{CE} = 3 V, I_C = 5 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.716	–43.5	12.868	146.4	0.037	56.5	0.926	–23.9
0.2	0.649	–81.0	10.435	121.7	0.057	50.9	0.779	–42.2
0.3	0.579	–109.2	8.514	102.4	0.068	35.6	0.659	–55.1
0.4	0.526	–133.9	6.969	85.8	0.073	25.3	0.565	–64.8
0.5	0.495	–154.3	5.918	72.2	0.084	17.5	0.502	–72.5
0.6	0.473	–171.1	5.063	59.9	0.087	14.0	0.454	–79.3
0.7	0.462	174.3	4.440	48.6	0.094	4.0	0.423	–85.9
0.8	0.455	160.4	3.952	38.3	0.102	0.9	0.397	–92.5
0.9	0.452	148.3	3.564	28.0	0.107	–2.4	0.377	–99.7
1.0	0.445	136.5	3.243	18.1	0.113	–8.8	0.361	–106.4
1.1	0.447	125.2	2.978	8.6	0.121	–14.5	0.349	–113.6
1.2	0.443	114.3	2.767	–0.8	0.127	–20.4	0.337	–121.0
1.3	0.448	104.5	2.575	–9.8	0.135	–25.0	0.329	–128.5
1.4	0.450	94.7	2.416	–18.8	0.142	–31.1	0.322	–136.2
1.5	0.454	84.9	2.272	–28.1	0.150	–36.0	0.314	–144.4
1.6	0.454	75.5	2.150	–36.7	0.157	–42.6	0.303	–152.1
1.7	0.459	66.7	2.041	–45.6	0.167	–49.1	0.300	–160.3
1.8	0.463	57.4	1.936	–54.4	0.175	–54.4	0.293	–168.4
1.9	0.463	48.9	1.863	–62.9	0.185	–61.3	0.289	–177.3
2.0	0.467	39.7	1.778	–71.5	0.192	–67.3	0.286	174.7
2.1	0.470	31.1	1.703	–80.0	0.201	–73.4	0.277	165.7
2.2	0.474	23.1	1.638	–88.7	0.212	–79.1	0.271	156.8
2.3	0.480	14.2	1.585	–96.9	0.218	–85.9	0.268	147.1
2.4	0.483	5.9	1.529	–105.4	0.231	–92.3	0.261	137.3
2.5	0.485	–2.4	1.475	–113.7	0.241	–99.3	0.252	127.5
2.6	0.493	–10.7	1.413	–122.2	0.248	–106.2	0.241	119.1
2.7	0.491	–19.2	1.369	–129.0	0.255	–112.6	0.244	113.5
2.8	0.492	–27.4	1.338	–137.1	0.263	–118.9	0.253	103.6
2.9	0.493	–35.2	1.310	–145.1	0.274	–124.6	0.253	93.9
3.0	0.499	–42.8	1.276	–153.3	0.285	–131.9	0.258	83.2

V_{CE} = 5 V, I_C = 1 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.927	–25.9	3.927	158.5	0.039	35.7	1.000	–12.7
0.2	0.896	–49.0	3.601	140.0	0.066	54.6	0.958	–24.2
0.3	0.854	–70.5	3.305	123.0	0.087	43.9	0.925	–35.1
0.4	0.805	–91.8	3.015	106.2	0.098	29.9	0.880	–45.4
0.5	0.754	–111.4	2.777	91.0	0.112	17.8	0.836	–54.3
0.6	0.713	–129.0	2.504	76.7	0.122	6.3	0.798	–63.0
0.7	0.682	–146.0	2.295	63.3	0.130	–3.6	0.770	–70.9
0.8	0.658	–161.6	2.120	50.9	0.133	–11.6	0.743	–79.2
0.9	0.634	–176.1	1.955	39.1	0.134	–19.8	0.724	–87.2
1.0	0.615	169.8	1.814	27.7	0.132	–28.1	0.710	–95.1
1.1	0.607	156.6	1.696	16.9	0.135	–37.0	0.691	–103.2
1.2	0.591	144.1	1.599	6.2	0.137	–42.3	0.680	–110.9
1.3	0.587	131.7	1.507	–3.9	0.136	–48.4	0.670	–119.1
1.4	0.581	119.8	1.432	–13.9	0.135	–53.8	0.661	–126.9
1.5	0.582	108.2	1.358	–24.1	0.135	–58.9	0.653	–135.2
1.6	0.575	97.7	1.293	–33.5	0.135	–65.0	0.642	–143.5
1.7	0.579	86.9	1.233	–42.9	0.136	–68.2	0.640	–152.2
1.8	0.574	76.3	1.182	–52.4	0.133	–73.4	0.636	–160.4
1.9	0.575	66.3	1.138	–61.7	0.136	–77.9	0.632	–168.8
2.0	0.571	56.1	1.092	–70.8	0.137	–80.7	0.625	–177.4
2.1	0.573	46.1	1.053	–79.8	0.139	–85.6	0.618	173.9
2.2	0.575	36.5	1.014	–88.8	0.142	–89.1	0.610	164.7
2.3	0.576	27.1	0.982	–97.4	0.146	–91.9	0.610	155.4
2.4	0.575	17.6	0.950	–105.9	0.154	–96.1	0.600	145.9
2.5	0.579	8.5	0.918	–114.6	0.165	–100.5	0.589	136.3
2.6	0.585	–0.8	0.880	–123.3	0.174	–105.2	0.565	127.8
2.7	0.585	–9.9	0.849	–130.3	0.176	–111.1	0.565	121.4
2.8	0.585	–18.4	0.824	–137.9	0.183	–115.0	0.587	112.4
2.9	0.584	–27.4	0.809	–145.8	0.192	–120.0	0.590	102.4
3.0	0.588	–35.8	0.787	–153.7	0.203	–124.5	0.594	92.4

V_{CE} = 5 V, I_C = 3 mA

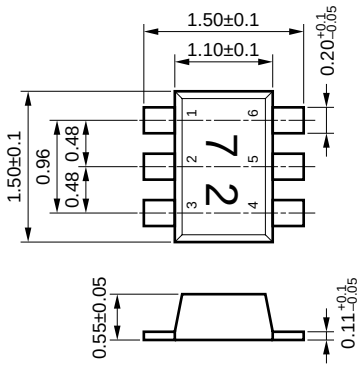
FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.834	–34.5	9.087	152.7	0.039	26.9	0.974	–18.1
0.2	0.763	–65.0	7.935	130.6	0.055	50.6	0.881	–32.7
0.3	0.691	–90.6	6.855	111.7	0.069	39.7	0.791	–44.5
0.4	0.630	–113.6	5.885	94.9	0.077	26.9	0.717	–54.9
0.5	0.578	–133.5	5.134	80.3	0.085	17.2	0.659	–63.0
0.6	0.549	–151.9	4.493	67.1	0.092	10.5	0.611	–70.5
0.7	0.525	–167.5	3.990	55.1	0.094	2.5	0.575	–77.4
0.8	0.508	177.1	3.575	43.7	0.101	–5.2	0.546	–84.7
0.9	0.492	163.8	3.245	33.2	0.104	–9.2	0.529	–92.1
1.0	0.484	151.1	2.974	22.7	0.108	–16.3	0.513	–98.5
1.1	0.479	139.1	2.747	12.7	0.113	–21.8	0.495	–106.3
1.2	0.477	127.5	2.557	3.0	0.119	–26.8	0.485	–113.4
1.3	0.475	116.6	2.388	–6.4	0.122	–31.1	0.476	–120.9
1.4	0.470	105.6	2.240	–15.6	0.127	–36.7	0.467	–128.4
1.5	0.476	95.7	2.121	–25.0	0.132	–42.2	0.457	–136.5
1.6	0.475	85.4	2.006	–34.1	0.137	–47.6	0.452	–143.9
1.7	0.475	76.0	1.903	–42.8	0.144	–51.8	0.446	–152.6
1.8	0.478	66.3	1.815	–51.9	0.148	–57.6	0.439	–160.0
1.9	0.481	57.2	1.740	–60.6	0.154	–62.8	0.435	–168.8
2.0	0.479	47.8	1.666	–69.4	0.163	–69.2	0.432	–176.5
2.1	0.484	38.8	1.599	–78.0	0.167	–74.4	0.425	175.0
2.2	0.487	29.9	1.536	–86.7	0.178	–79.3	0.419	166.2
2.3	0.488	21.1	1.485	–95.0	0.183	–85.6	0.416	157.7
2.4	0.492	12.6	1.436	–103.5	0.192	–91.2	0.410	148.9
2.5	0.493	3.6	1.388	–111.8	0.201	–96.3	0.407	139.9
2.6	0.497	–4.4	1.344	–120.1	0.208	–102.6	0.405	131.0
2.7	0.502	–13.1	1.307	–128.3	0.218	–108.7	0.399	121.7
2.8	0.503	–21.3	1.264	–136.4	0.228	–115.2	0.399	112.9
2.9	0.505	–29.3	1.234	–144.5	0.236	–121.5	0.394	103.3
3.0	0.508	–37.0	1.197	–152.6	0.250	–127.6	0.395	94.0

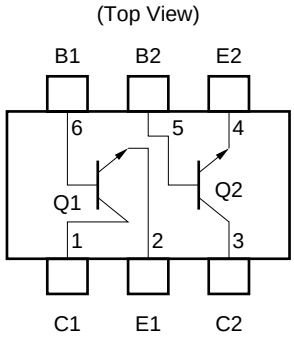
V_{CE} = 5 V, I_C = 5 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.773	–39.8	12.384	149.1	0.051	22.6	0.959	–21.4
0.2	0.668	–74.0	10.357	125.2	0.044	52.8	0.819	–37.4
0.3	0.603	–101.5	8.633	105.9	0.067	33.8	0.725	–49.4
0.4	0.547	–124.6	7.172	89.6	0.071	23.0	0.628	–58.7
0.5	0.501	–144.9	6.127	75.4	0.076	21.3	0.567	–65.8
0.6	0.479	–162.3	5.308	62.8	0.081	14.3	0.526	–73.3
0.7	0.460	–178.1	4.663	51.6	0.085	7.2	0.492	–79.3
0.8	0.451	167.9	4.150	40.8	0.092	2.1	0.462	–86.2
0.9	0.442	155.1	3.754	30.4	0.099	–3.3	0.447	–92.7
1.0	0.440	142.9	3.418	20.6	0.105	–8.0	0.435	–99.2
1.1	0.439	131.5	3.145	11.0	0.108	–14.0	0.420	–106.7
1.2	0.431	120.0	2.910	1.7	0.115	–21.2	0.411	–113.9
1.3	0.434	110.2	2.721	–7.3	0.122	–25.1	0.403	–121.4
1.4	0.434	99.6	2.543	–16.5	0.129	–30.0	0.393	–128.6
1.5	0.438	89.8	2.392	–25.6	0.135	–35.5	0.389	–136.3
1.6	0.440	80.4	2.267	–34.5	0.145	–42.2	0.379	–144.1
1.7	0.444	71.5	2.156	–43.2	0.150	–47.3	0.374	–152.4
1.8	0.445	62.0	2.041	–52.0	0.159	–52.8	0.370	–159.5
1.9	0.450	53.5	1.961	–60.2	0.164	–58.8	0.361	–167.9
2.0	0.448	44.2	1.875	–69.3	0.174	–65.1	0.361	–176.3
2.1	0.452	35.6	1.800	–77.7	0.179	–71.6	0.352	175.9
2.2	0.456	26.9	1.730	–86.2	0.191	–77.5	0.349	167.3
2.3	0.462	18.4	1.671	–94.4	0.196	–83.4	0.341	158.7
2.4	0.462	9.9	1.612	–102.7	0.205	–89.5	0.337	149.8
2.5	0.464	1.5	1.559	–110.9	0.214	–96.6	0.332	141.1
2.6	0.471	–6.7	1.509	–119.4	0.225	–102.7	0.330	132.1
2.7	0.472	–14.4	1.470	–127.0	0.232	–108.7	0.327	122.7
2.8	0.474	–22.8	1.429	–135.4	0.242	–115.0	0.327	113.8
2.9	0.478	–30.7	1.386	–143.6	0.250	–122.0	0.321	104.3
3.0	0.482	–38.6	1.343	–151.5	0.263	–128.4	0.322	95.1

PACKAGE DIMENSIONS

FLAT-LEAD 6 PIN THIN-TYPE ULTRA SUPER MINIMOLD (Unit: mm)





PIN CONNECTIONS

1. Collector (Q1)
2. Emitter (Q1)
3. Collector (Q2)
4. Emitter (Q2)
5. Base (Q2)
6. Base (Q1)

[MEMO]

[MEMO]

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