

# NPN SILICON RF TWIN TRANSISTOR

## $\mu$ PA810TC

### NPN SILICON EPITAXIAL TRANSISTOR (WITH BUILT-IN 2 $\times$ 2SC5006) FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD

**DESCRIPTION**

The  $\mu$ PA810TC has built-in low-voltage two transistors which are designed to amplify low noise in the VHF band to the UHF band.

**FEATURES**

- Low noise:  $NF = 1.2$  dB TYP. @  $f = 1$  GHz,  $V_{CE} = 3$  V,  $I_c = 7$  mA
- High gain:  $|S_{21e}|^2 = 9.0$  dB TYP. @  $f = 1$  GHz,  $V_{CE} = 3$  V,  $I_c = 7$  mA
- Flat-lead 6-pin thin-type ultra super minimold
- Built-in 2 transistors (2  $\times$  2SC5006)

**ORDERING INFORMATION**

Part Number	Package	Quantity	Supplying Form
$\mu$ PA810TC	Flat-lead 6-pin thin-type ultra super minimold	Loose products (50 pcs)	Embossed tape 8 mm wide. Pin 6 (Q1 Base), Pin 5 (Q1 Emitter), Pin 4 (Q2 Emitter) face to perforation side of the tape.
$\mu$ PA810TC-T1		Taping products (3 kp/reel)	

**Remark** To order evaluation samples, please contact your local NEC sales office. (Part number for sample order:  $\mu$ PA810TC. Unit sample quantity is 50 pcs.)

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +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	$I_c$	100	mA
Total Power Dissipation	$P_T$ <sup>Note</sup>	200 in 1 element 230 in 2 elements	mW
Junction Temperature	$T_j$	150	°C
Storage Temperature	$T_{stg}$	-65 to +150	°C

**Note** Mounted on 1.08 cm<sup>2</sup>  $\times$  1.0 mm glass epoxy substrate.

**Caution Electro-static sensitive devices**

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.  
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = +25 °C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector Cutoff Current	I <sub>CB0</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0	–	–	1.0	μA
Emitter Cutoff Current	I <sub>EB0</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0	–	–	1.0	μA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA <sup>Note 1</sup>	70	–	140	
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz	3.0	4.5	–	GHz
Feedback Capacitance	C <sub>re</sub>	V <sub>CB</sub> = 3 V, I <sub>E</sub> = 0, f = 1 MHz <sup>Note 2</sup>	–	0.7	1.5	pF
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz	7.0	9.0	–	dB
Noise Figure	NF	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz	–	1.2	2.5	dB

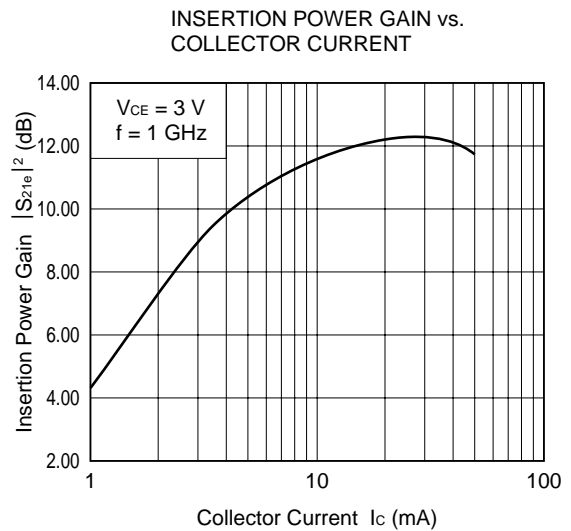
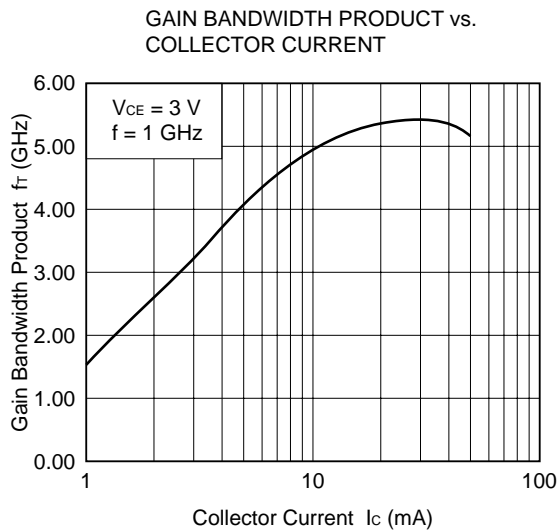
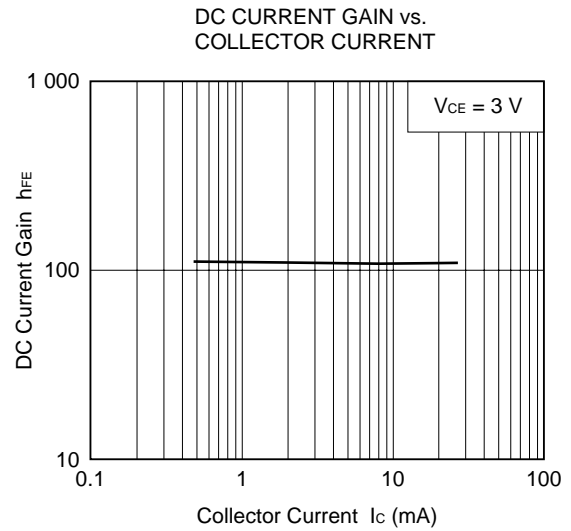
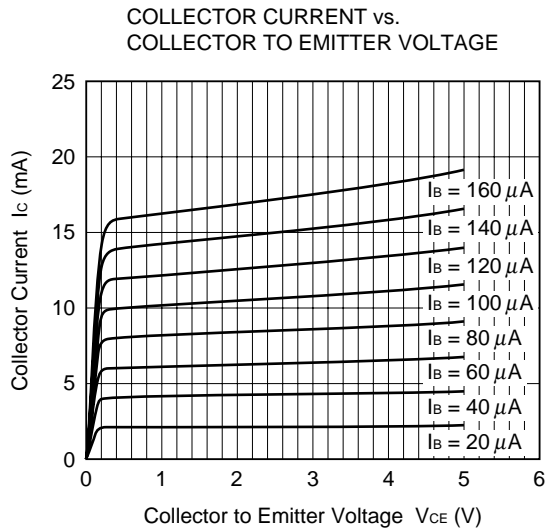
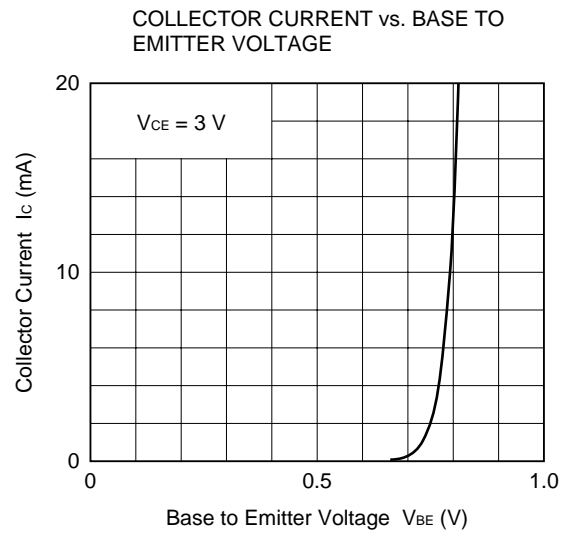
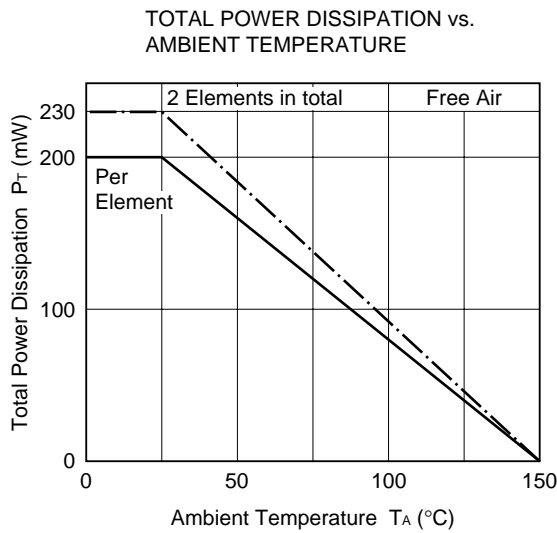
**Notes 1.** Pulse Measurement: PW ≤ 350 μs, Duty Cycle ≤ 2 %

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

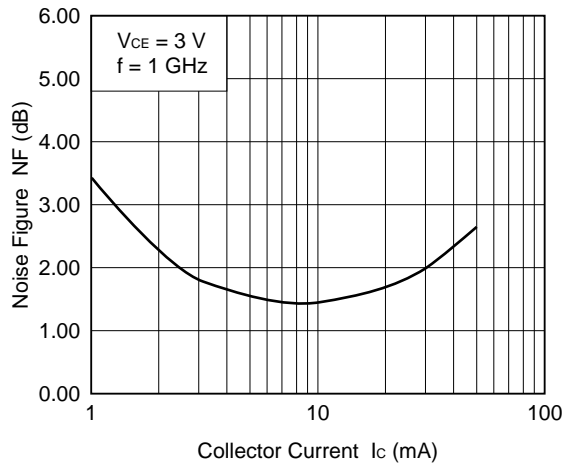
**h<sub>FE</sub> CLASSIFICATION**

Rank	FB
Marking	75
h <sub>FE</sub> Value	70 to 140

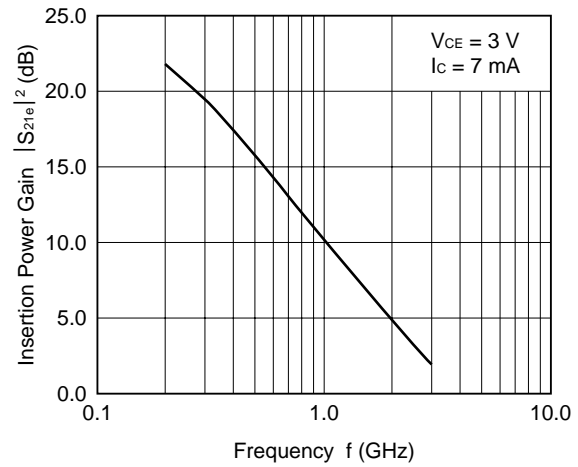
TYPICAL CHARACTERISTICS ( $T_A = +25\text{ }^\circ\text{C}$ )



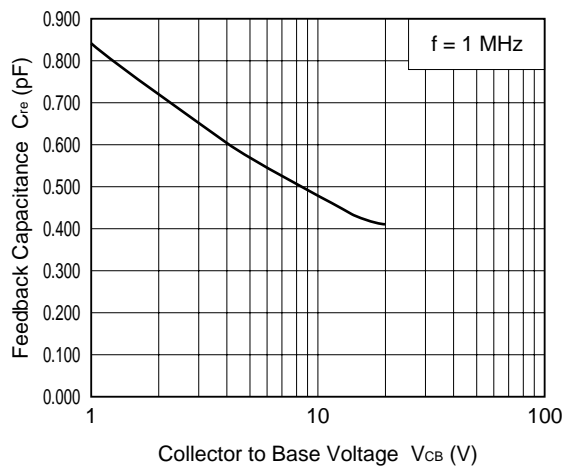
NOISE FIGURE vs. COLLECTOR CURRENT



INSERTION POWER GAIN vs. FREQUENCY



FEEDBACK CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



S-PARAMETERS Q1

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 1 mA

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.949	-30.7	3.885	156.9	0.056	46.5	0.990	-13.3
0.2	0.916	-58.0	3.492	136.7	0.077	53.1	0.942	-26.2
0.3	0.883	-82.5	3.150	118.8	0.107	35.9	0.897	-38.0
0.4	0.835	-106.7	2.819	101.2	0.126	22.2	0.838	-48.3
0.5	0.808	-127.0	2.566	85.6	0.135	7.8	0.786	-57.4
0.6	0.774	-146.3	2.282	71.3	0.145	-2.5	0.747	-65.9
0.7	0.764	-163.4	2.074	57.7	0.155	-13.9	0.713	-73.9
0.8	0.748	-179.2	1.892	45.6	0.153	-24.1	0.684	-82.4
0.9	0.738	165.9	1.730	33.6	0.151	-31.6	0.662	-89.9
1.0	0.729	152.0	1.607	22.3	0.150	-39.8	0.643	-97.9
1.1	0.733	138.9	1.490	11.4	0.146	-48.3	0.625	-106.2
1.2	0.727	126.4	1.394	0.7	0.140	-54.3	0.615	-114.4
1.3	0.733	115.0	1.307	-9.2	0.134	-59.8	0.603	-122.7
1.4	0.732	103.2	1.230	-19.5	0.129	-65.4	0.595	-131.0
1.5	0.737	92.6	1.162	-29.1	0.126	-71.9	0.583	-139.8
1.6	0.739	81.7	1.105	-38.6	0.116	-75.3	0.576	-148.3
1.7	0.744	71.5	1.048	-48.0	0.116	-77.5	0.570	-157.5
1.8	0.746	61.4	1.003	-57.5	0.110	-79.5	0.565	-167.0
1.9	0.752	51.8	0.955	-66.2	0.108	-81.9	0.561	-176.6
2.0	0.752	42.2	0.910	-75.1	0.108	-81.8	0.555	174.3
2.1	0.758	32.8	0.871	-83.6	0.111	-83.7	0.549	164.4
2.2	0.759	23.8	0.832	-92.5	0.112	-82.2	0.545	153.7
2.3	0.767	15.0	0.802	-100.4	0.120	-83.3	0.539	143.2
2.4	0.768	6.0	0.768	-108.8	0.132	-84.4	0.537	132.7
2.5	0.770	-2.3	0.740	-116.5	0.144	-88.2	0.528	121.7
2.6	0.775	-11.0	0.711	-124.6	0.161	-92.7	0.522	110.5
2.7	0.779	-19.0	0.691	-132.1	0.178	-97.7	0.515	99.2
2.8	0.779	-26.7	0.667	-139.8	0.196	-105.0	0.505	88.0
2.9	0.782	-34.4	0.649	-147.6	0.207	-113.2	0.488	77.9
3.0	0.791	-42.1	0.616	-155.5	0.216	-122.8	0.482	69.4

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 3 mA

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.872	-40.4	9.566	149.6	0.049	43.5	0.952	-20.7
0.2	0.789	-76.2	8.034	126.3	0.068	46.8	0.832	-38.1
0.3	0.735	-105.5	6.761	107.1	0.082	32.8	0.722	-50.9
0.4	0.686	-131.0	5.671	90.2	0.091	19.2	0.630	-61.6
0.5	0.660	-150.8	4.890	75.8	0.098	9.2	0.562	-69.7
0.6	0.636	-169.3	4.198	62.8	0.106	1.4	0.512	-77.2
0.7	0.625	175.0	3.707	51.3	0.107	-7.9	0.476	-83.7
0.8	0.623	160.9	3.325	40.2	0.110	-13.8	0.443	-90.7
0.9	0.617	147.7	2.991	29.8	0.112	-19.4	0.421	-97.9
1.0	0.616	135.7	2.731	19.5	0.111	-24.1	0.400	-104.5
1.1	0.618	123.9	2.513	9.7	0.114	-28.5	0.382	-112.5
1.2	0.614	112.8	2.324	0.2	0.119	-33.8	0.372	-120.0
1.3	0.625	102.4	2.169	-9.2	0.119	-37.1	0.359	-127.7
1.4	0.629	92.2	2.035	-18.3	0.120	-42.1	0.347	-135.5
1.5	0.634	82.5	1.912	-27.3	0.124	-45.3	0.340	-144.2
1.6	0.639	72.6	1.805	-36.6	0.128	-50.3	0.329	-151.8
1.7	0.645	63.5	1.711	-45.3	0.132	-54.1	0.320	-161.2
1.8	0.651	54.2	1.621	-54.3	0.139	-58.5	0.314	-169.5
1.9	0.656	45.4	1.545	-62.8	0.145	-62.5	0.309	-179.4
2.0	0.661	36.5	1.471	-71.5	0.153	-66.8	0.297	172.1
2.1	0.668	27.8	1.409	-79.8	0.156	-72.1	0.293	162.5
2.2	0.672	19.8	1.348	-88.5	0.163	-75.8	0.286	152.4
2.3	0.678	11.3	1.297	-96.7	0.172	-81.3	0.276	141.0
2.4	0.683	2.9	1.243	-105.0	0.183	-86.4	0.274	130.8
2.5	0.691	-4.7	1.202	-113.1	0.194	-92.4	0.268	119.4
2.6	0.698	-12.4	1.158	-121.3	0.208	-98.4	0.263	107.8
2.7	0.701	-19.9	1.111	-129.3	0.218	-104.9	0.258	96.8
2.8	0.714	-27.6	1.067	-137.7	0.231	-113.3	0.255	86.6
2.9	0.722	-34.9	1.026	-145.4	0.233	-121.0	0.248	77.8
3.0	0.736	-42.3	0.983	-152.9	0.234	-129.9	0.261	69.1

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 5 mA

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.788	-51.6	13.755	144.7	0.031	52.4	0.911	-26.2
0.2	0.712	-90.1	10.866	119.6	0.064	46.6	0.739	-46.1
0.3	0.649	-120.7	8.673	100.1	0.068	30.2	0.607	-59.3
0.4	0.610	-144.4	7.054	84.3	0.078	18.2	0.514	-68.4
0.5	0.596	-164.3	5.936	70.7	0.082	12.2	0.442	-76.0
0.6	0.582	179.5	5.078	58.8	0.090	7.5	0.397	-83.4
0.7	0.571	164.9	4.415	48.0	0.094	-1.4	0.361	-89.4
0.8	0.570	151.3	3.924	37.5	0.098	-6.1	0.335	-95.7
0.9	0.568	139.2	3.531	27.5	0.099	-8.2	0.314	-103.5
1.0	0.574	127.9	3.199	17.9	0.105	-13.6	0.295	-110.0
1.1	0.577	117.2	2.937	8.5	0.113	-18.5	0.280	-117.1
1.2	0.579	106.4	2.708	-0.8	0.118	-24.0	0.265	-124.0
1.3	0.588	96.9	2.523	-9.8	0.120	-28.6	0.258	-132.1
1.4	0.586	86.9	2.353	-18.5	0.127	-32.8	0.246	-140.0
1.5	0.596	77.7	2.210	-27.5	0.131	-37.1	0.237	-148.1
1.6	0.603	68.5	2.079	-36.1	0.139	-43.3	0.225	-156.5
1.7	0.609	59.8	1.974	-44.6	0.148	-47.0	0.219	-166.4
1.8	0.615	50.9	1.872	-53.3	0.154	-51.8	0.210	-174.6
1.9	0.623	42.4	1.779	-61.8	0.160	-58.6	0.202	175.3
2.0	0.626	33.8	1.692	-70.3	0.169	-63.8	0.196	165.5
2.1	0.633	25.4	1.621	-78.7	0.176	-69.2	0.188	155.2
2.2	0.638	17.4	1.548	-87.2	0.184	-75.2	0.181	144.2
2.3	0.648	9.5	1.490	-95.1	0.192	-80.7	0.176	132.7
2.4	0.654	1.5	1.431	-103.4	0.203	-86.9	0.171	120.5
2.5	0.655	-6.1	1.375	-111.0	0.212	-93.4	0.168	108.1
2.6	0.666	-13.8	1.324	-119.4	0.223	-99.8	0.164	96.2
2.7	0.669	-20.8	1.280	-127.2	0.237	-106.9	0.165	84.0
2.8	0.682	-28.3	1.225	-135.5	0.244	-115.0	0.164	73.7
2.9	0.696	-35.4	1.176	-143.2	0.250	-123.5	0.161	65.2
3.0	0.715	-42.9	1.128	-150.7	0.246	-131.7	0.178	56.6

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 7 mA

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.719	-60.9	18.194	138.9	0.045	46.4	0.866	-32.7
0.2	0.635	-105.8	13.362	112.4	0.051	45.0	0.637	-52.7
0.3	0.579	-134.7	10.199	94.0	0.062	30.2	0.504	-65.7
0.4	0.563	-158.0	8.075	79.1	0.068	23.4	0.414	-74.9
0.5	0.545	-176.3	6.672	66.7	0.074	18.5	0.342	-81.1
0.6	0.538	169.1	5.657	55.5	0.077	13.1	0.312	-87.7
0.7	0.540	155.1	4.904	44.9	0.081	9.9	0.279	-93.2
0.8	0.539	143.2	4.348	35.3	0.087	3.7	0.254	-99.6
0.9	0.543	132.1	3.880	25.6	0.097	-2.0	0.235	-106.7
1.0	0.546	121.6	3.520	16.5	0.105	-5.3	0.220	-113.3
1.1	0.551	111.1	3.225	7.3	0.110	-10.2	0.207	-121.0
1.2	0.554	101.4	2.972	-1.7	0.119	-15.8	0.195	-127.3
1.3	0.561	92.5	2.759	-10.2	0.123	-20.9	0.184	-136.1
1.4	0.564	82.9	2.577	-18.8	0.132	-26.3	0.171	-144.6
1.5	0.575	74.1	2.415	-27.7	0.139	-31.9	0.163	-153.3
1.6	0.582	65.2	2.267	-36.4	0.148	-37.4	0.154	-163.5
1.7	0.588	56.9	2.155	-44.4	0.159	-43.3	0.145	-171.9
1.8	0.594	48.4	2.024	-53.2	0.164	-48.3	0.139	178.9
1.9	0.602	40.2	1.940	-61.3	0.174	-55.2	0.134	166.8
2.0	0.607	31.9	1.838	-69.7	0.182	-60.5	0.125	155.6
2.1	0.616	23.6	1.762	-77.8	0.188	-67.2	0.117	145.2
2.2	0.619	16.0	1.681	-86.2	0.200	-73.3	0.111	129.8
2.3	0.629	8.2	1.616	-94.2	0.207	-79.5	0.110	115.2
2.4	0.633	0.4	1.551	-102.3	0.221	-86.2	0.107	100.7
2.5	0.639	-7.0	1.488	-110.1	0.230	-93.3	0.105	86.1
2.6	0.649	-13.9	1.434	-118.6	0.242	-99.8	0.109	73.3
2.7	0.659	-21.1	1.380	-126.1	0.255	-108.1	0.105	59.7
2.8	0.671	-27.8	1.315	-134.1	0.255	-116.9	0.105	52.2
2.9	0.698	-35.2	1.262	-141.5	0.255	-126.0	0.111	46.6
3.0	0.717	-43.2	1.217	-148.4	0.243	-132.8	0.137	40.2

S-PARAMETERS Q2

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 1 mA

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.725	-58.0	15.087	138.9	0.039	60.2	0.850	-34.1
0.2	0.618	-99.7	11.136	112.1	0.066	41.7	0.645	-54.8
0.3	0.554	-128.8	8.515	93.3	0.077	31.6	0.508	-68.5
0.4	0.510	-153.2	6.744	78.1	0.088	26.7	0.421	-78.2
0.5	0.488	-170.9	5.601	65.6	0.091	20.7	0.353	-85.5
0.6	0.475	173.4	4.751	53.8	0.106	17.7	0.315	-92.7
0.7	0.471	160.2	4.115	43.5	0.111	10.9	0.288	-99.7
0.8	0.470	147.1	3.661	33.4	0.121	5.4	0.264	-106.4
0.9	0.467	135.4	3.277	23.6	0.130	2.8	0.246	-113.4
1.0	0.467	123.9	2.985	14.3	0.139	-2.9	0.233	-119.4
1.1	0.470	113.7	2.742	5.1	0.151	-8.4	0.219	-127.6
1.2	0.471	103.3	2.536	-4.0	0.161	-13.3	0.214	-134.2
1.3	0.473	94.2	2.365	-12.6	0.170	-18.5	0.207	-141.5
1.4	0.473	84.3	2.223	-21.2	0.181	-23.8	0.199	-148.8
1.5	0.480	75.2	2.088	-30.0	0.193	-30.2	0.195	-157.4
1.6	0.481	66.0	1.984	-38.4	0.204	-36.0	0.189	-165.8
1.7	0.482	57.5	1.885	-46.8	0.217	-40.7	0.188	-174.4
1.8	0.488	48.5	1.796	-55.1	0.228	-47.3	0.180	178.2
1.9	0.489	40.0	1.731	-63.2	0.241	-54.0	0.179	168.5
2.0	0.493	31.3	1.655	-71.6	0.252	-59.7	0.174	160.1
2.1	0.497	22.7	1.598	-79.6	0.263	-66.2	0.168	150.8
2.2	0.500	15.0	1.537	-87.8	0.276	-72.5	0.166	141.5
2.3	0.505	6.7	1.492	-95.5	0.288	-78.6	0.162	130.8
2.4	0.505	-1.6	1.443	-103.5	0.302	-85.2	0.158	121.2
2.5	0.507	-9.7	1.400	-111.1	0.315	-91.6	0.156	110.8
2.6	0.517	-17.6	1.360	-119.4	0.327	-98.1	0.156	99.5
2.7	0.518	-25.6	1.328	-126.7	0.343	-104.6	0.155	88.5
2.8	0.519	-33.5	1.291	-134.2	0.356	-111.8	0.154	78.5
2.9	0.521	-41.5	1.267	-142.0	0.370	-118.3	0.156	67.3
3.0	0.524	-48.6	1.232	-149.3	0.382	-125.4	0.159	57.6

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 3 mA

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.853	-42.4	8.913	147.9	0.049	45.5	0.949	-24.5
0.2	0.773	-78.7	7.359	123.2	0.083	44.9	0.796	-41.9
0.3	0.695	-108.6	6.081	103.3	0.092	28.0	0.684	-55.5
0.4	0.628	-131.6	5.025	86.5	0.108	18.0	0.593	-66.5
0.5	0.602	-152.3	4.325	72.0	0.112	11.4	0.523	-74.4
0.6	0.576	-170.1	3.701	59.2	0.119	4.5	0.478	-82.8
0.7	0.557	174.3	3.257	47.4	0.122	-1.9	0.442	-90.0
0.8	0.552	160.2	2.905	36.5	0.127	-7.8	0.416	-96.9
0.9	0.545	146.8	2.630	25.8	0.132	-10.4	0.399	-104.3
1.0	0.543	134.7	2.402	15.8	0.132	-15.8	0.380	-111.5
1.1	0.542	123.0	2.215	5.9	0.138	-21.5	0.368	-119.3
1.2	0.540	112.4	2.060	-3.5	0.145	-25.2	0.354	-126.1
1.3	0.543	101.4	1.913	-12.8	0.152	-28.7	0.352	-134.4
1.4	0.546	90.9	1.806	-21.9	0.157	-32.4	0.347	-141.5
1.5	0.550	81.2	1.704	-31.1	0.164	-35.8	0.339	-149.8
1.6	0.549	71.4	1.612	-39.5	0.171	-40.8	0.335	-158.0
1.7	0.553	62.2	1.538	-48.1	0.182	-44.9	0.332	-166.2
1.8	0.557	52.5	1.470	-57.0	0.190	-49.6	0.326	-174.5
1.9	0.559	43.3	1.412	-65.0	0.203	-54.3	0.325	176.3
2.0	0.561	33.9	1.360	-73.7	0.213	-59.6	0.320	168.1
2.1	0.568	25.6	1.303	-81.5	0.224	-65.0	0.315	158.9
2.2	0.567	16.6	1.258	-90.1	0.240	-70.3	0.313	149.6
2.3	0.571	7.9	1.217	-97.8	0.253	-75.8	0.308	140.2
2.4	0.572	-0.6	1.178	-105.9	0.266	-81.6	0.308	130.6
2.5	0.576	-9.2	1.145	-113.6	0.282	-87.6	0.304	120.5
2.6	0.584	-17.7	1.117	-121.5	0.298	-93.7	0.303	110.5
2.7	0.586	-26.1	1.082	-129.0	0.315	-99.8	0.301	100.7
2.8	0.587	-34.2	1.056	-136.8	0.331	-106.5	0.303	90.7
2.9	0.587	-42.4	1.033	-143.9	0.344	-113.0	0.299	80.1
3.0	0.590	-50.4	1.010	-151.3	0.361	-119.5	0.303	70.4

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 5 mA

FREQUENCY		S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	
0.1	0.798	-51.1	12.419	143.0	0.039	25.4	0.905	-31.1	
0.2	0.688	-90.5	9.685	116.7	0.071	43.1	0.711	-49.4	
0.3	0.613	-120.7	7.637	97.3	0.085	31.9	0.582	-64.1	
0.4	0.555	-143.7	6.155	81.4	0.090	22.0	0.482	-74.2	
0.5	0.532	-163.5	5.148	68.0	0.101	13.3	0.418	-82.1	
0.6	0.516	-179.9	4.399	55.8	0.107	12.7	0.377	-88.9	
0.7	0.500	165.1	3.832	45.1	0.110	4.9	0.340	-96.0	
0.8	0.499	152.4	3.399	34.6	0.120	1.9	0.317	-103.5	
0.9	0.493	139.9	3.066	24.7	0.129	-0.9	0.296	-109.2	
1.0	0.493	128.6	2.784	15.0	0.137	-6.9	0.283	-116.5	
1.1	0.493	117.5	2.564	5.5	0.144	-12.8	0.272	-124.5	
1.2	0.493	107.3	2.377	-3.6	0.153	-16.6	0.263	-130.3	
1.3	0.497	97.2	2.217	-12.5	0.160	-22.6	0.256	-138.4	
1.4	0.496	87.3	2.078	-21.3	0.172	-26.7	0.248	-146.0	
1.5	0.503	77.9	1.966	-30.1	0.184	-32.2	0.244	-153.7	
1.6	0.506	68.4	1.856	-38.9	0.194	-37.7	0.238	-162.0	
1.7	0.508	59.5	1.767	-47.3	0.205	-42.8	0.237	-171.0	
1.8	0.511	50.4	1.687	-55.7	0.215	-48.0	0.232	-178.4	
1.9	0.513	41.8	1.623	-63.9	0.227	-54.0	0.223	172.4	
2.0	0.515	32.7	1.555	-72.2	0.240	-59.5	0.221	163.5	
2.1	0.521	24.3	1.494	-80.2	0.252	-66.1	0.217	155.7	
2.2	0.524	16.2	1.445	-88.4	0.264	-71.7	0.213	145.7	
2.3	0.526	7.8	1.403	-96.4	0.276	-77.8	0.211	135.9	
2.4	0.531	-0.6	1.360	-104.5	0.291	-83.9	0.207	126.3	
2.5	0.533	-9.1	1.316	-112.2	0.302	-90.4	0.205	115.9	
2.6	0.540	-17.5	1.277	-120.0	0.316	-96.3	0.203	105.5	
2.7	0.538	-25.1	1.242	-127.7	0.332	-103.0	0.202	95.6	
2.8	0.544	-32.9	1.213	-135.4	0.347	-110.0	0.204	84.8	
2.9	0.542	-40.8	1.191	-142.8	0.359	-116.6	0.201	74.2	
3.0	0.544	-48.3	1.160	-150.1	0.374	-123.5	0.204	64.2	

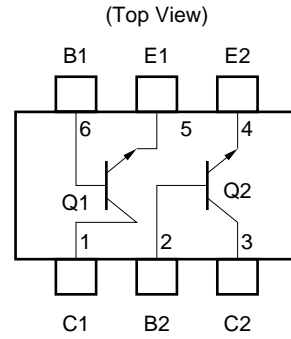
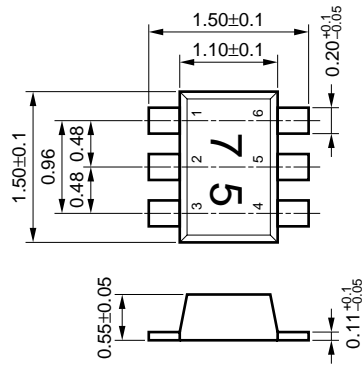
V<sub>CE</sub> = 3 V, I<sub>c</sub> = 7 mA

FREQUENCY		S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	
0.1	0.725	-58.0	15.087	138.9	0.039	60.2	0.850	-34.1	
0.2	0.618	-99.7	11.136	112.1	0.066	41.7	0.645	-54.8	
0.3	0.554	-128.8	8.515	93.3	0.077	31.6	0.508	-68.5	
0.4	0.510	-153.2	6.744	78.1	0.088	26.7	0.421	-78.2	
0.5	0.488	-170.9	5.601	65.6	0.091	20.7	0.353	-85.5	
0.6	0.475	173.4	4.751	53.8	0.106	17.7	0.315	-92.7	
0.7	0.471	160.2	4.115	43.5	0.111	10.9	0.288	-99.7	
0.8	0.470	147.1	3.661	33.4	0.121	5.4	0.264	-106.4	
0.9	0.467	135.4	3.277	23.6	0.130	2.8	0.246	-113.4	
1.0	0.467	123.9	2.985	14.3	0.139	-2.9	0.233	-119.4	
1.1	0.470	113.7	2.742	5.1	0.151	-8.4	0.219	-127.6	
1.2	0.471	103.3	2.536	-4.0	0.161	-13.3	0.214	-134.2	
1.3	0.473	94.2	2.365	-12.6	0.170	-18.5	0.207	-141.5	
1.4	0.473	84.3	2.223	-21.2	0.181	-23.8	0.199	-148.8	
1.5	0.480	75.2	2.088	-30.0	0.193	-30.2	0.195	-157.4	
1.6	0.481	66.0	1.984	-38.4	0.204	-36.0	0.189	-165.8	
1.7	0.482	57.5	1.885	-46.8	0.217	-40.7	0.188	-174.4	
1.8	0.488	48.5	1.796	-55.1	0.228	-47.3	0.180	178.2	
1.9	0.489	40.0	1.731	-63.2	0.241	-54.0	0.179	168.5	
2.0	0.493	31.3	1.655	-71.6	0.252	-59.7	0.174	160.1	
2.1	0.497	22.7	1.598	-79.6	0.263	-66.2	0.168	150.8	
2.2	0.500	15.0	1.537	-87.8	0.276	-72.5	0.166	141.5	
2.3	0.505	6.7	1.492	-95.5	0.288	-78.6	0.162	130.8	
2.4	0.505	-1.6	1.443	-103.5	0.302	-85.2	0.158	121.2	
2.5	0.507	-9.7	1.400	-111.1	0.315	-91.6	0.156	110.8	
2.6	0.517	-17.6	1.360	-119.4	0.327	-98.1	0.156	99.5	
2.7	0.518	-25.6	1.328	-126.7	0.343	-104.6	0.155	88.5	
2.8	0.519	-33.5	1.291	-134.2	0.356	-111.8	0.154	78.5	
2.9	0.521	-41.5	1.267	-142.0	0.370	-118.3	0.156	67.3	
3.0	0.524	-48.6	1.232	-149.3	0.382	-125.4	0.159	57.6	



PACKAGE DIMENSIONS

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



PIN CONNECTIONS

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

[MEMO]

[MEMO]

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