

**NPN SILICON EPITAXIAL TWIN TRANSISTOR  
(WITH BUILT-IN 2 × 2SC5006)  
FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD**

#### DESCRIPTION

The μPA821TC has built-in low-voltage two transistors which are designed for low-noise amplification in the VHF to UHF band.

#### FEATURES

- Low noise: NF= 1.2 dB TYP. @ f = 1 GHz, V<sub>CE</sub> = 3 V, I<sub>c</sub> = 7 mA
- High gain: IS<sub>21dB</sub><sup>2</sup> = 9.0 dB TYP. @ f = 1 GHz, V<sub>CE</sub> = 3 V, I<sub>c</sub> = 7 mA
- Flat-lead 6-pin thin-type ultra super minimold package
- Built-in 2 transistors (2 × 2SC5006)

#### ORDERING INFORMATION

Part Number	Package	Quantity	Supplying Form
μPA821TC	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 Emitter), Pin 4 (Q2 Base) face to perforation side of the tape.
μPA821TC-T1		Taping products (3 kp/reel)	

**Remark** To order evaluation samples, please contact your local NEC sales office. (Part number for sample order: μPA821TC. Unit sample quantity is 50 pcs).

#### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V <sub>CBO</sub>	20	V
Collector to Emitter Voltage	V <sub>CEO</sub>	12	V
Emitter to Base Voltage	V <sub>EBO</sub>	3	V
Collector Current	I <sub>c</sub>	100	mA
Total Power Dissipation	P <sub>T</sub> <sup>Note</sup>	200 in 1 element 230 in 2 elements	mW
Junction Temperature	T <sub>j</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-65 to 150	°C

**Note** Mounted on 1.08 cm<sup>2</sup> × 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>CBO</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0	–	–	1.0	μA
Emitter Cutoff Current	I <sub>EBO</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

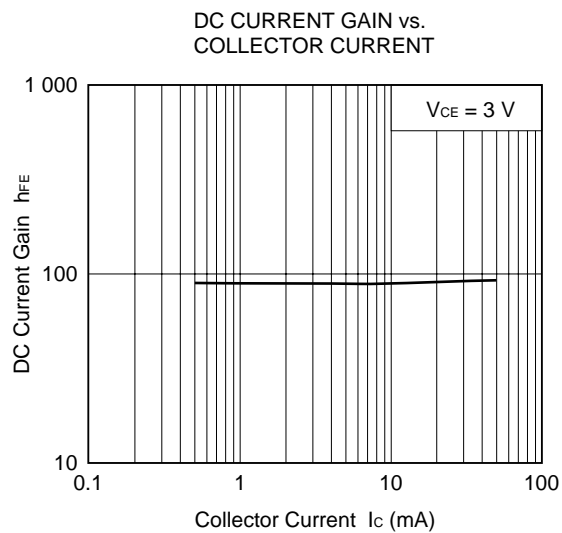
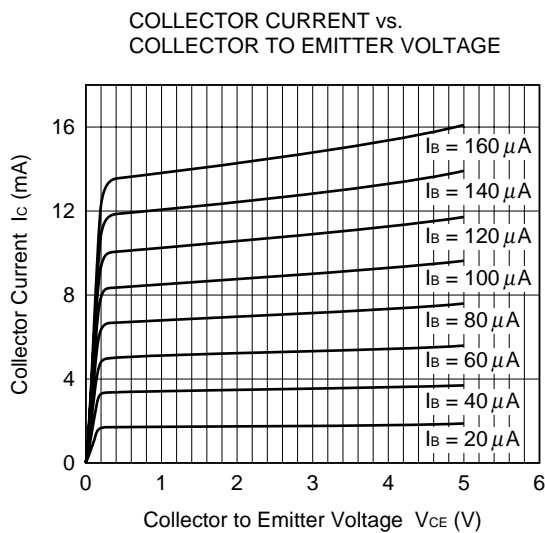
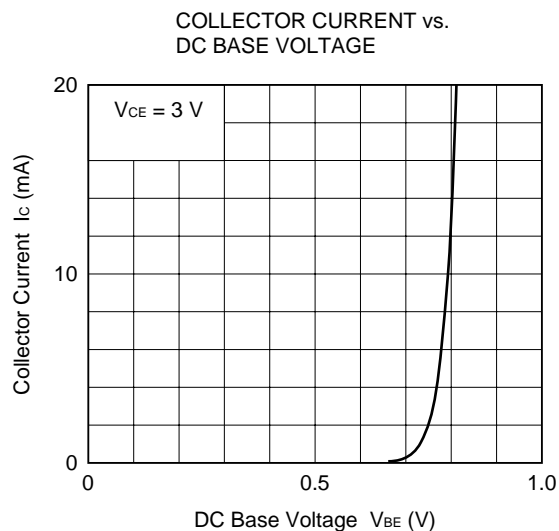
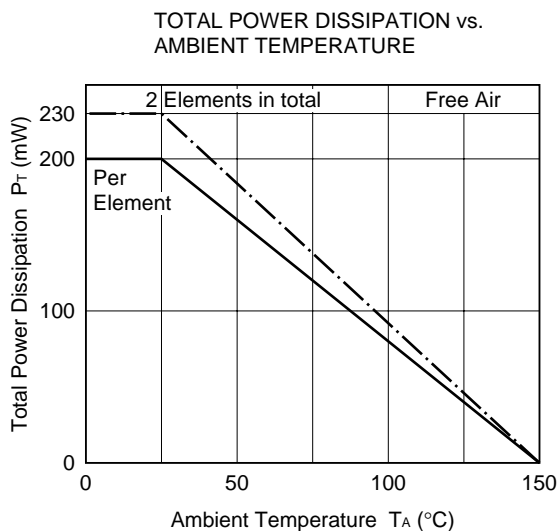
**Notes 1.** Pulse Measurement: PW ≤ 350 μs, Duty Cycle ≤ 2 %

**2.** Capacitance between collector and base measured with a capacitance meter (auto-balancing bridge method). Emitter should be connected to the guard pin of capacitance meter.

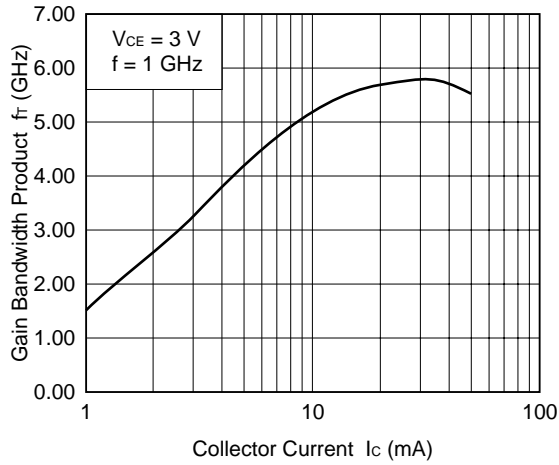
**h<sub>FE</sub> CLASSIFICATION**

Rank	FB
Marking	81
h <sub>FE</sub> Value	70 to 140

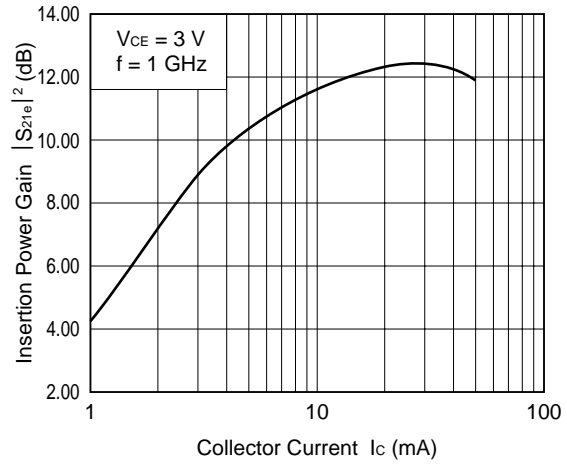
TYPICAL CHARACTERISTICS ( $T_A = +25\text{ }^\circ\text{C}$ )



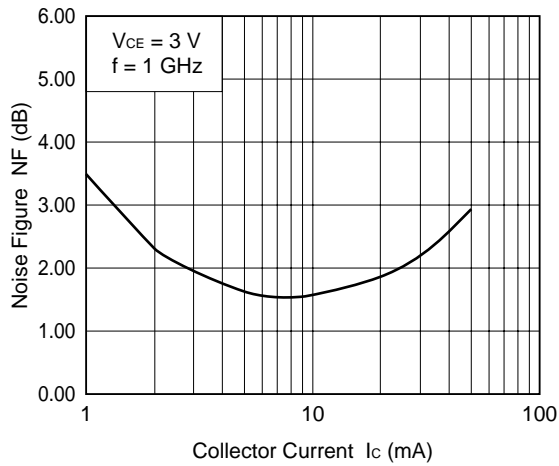
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



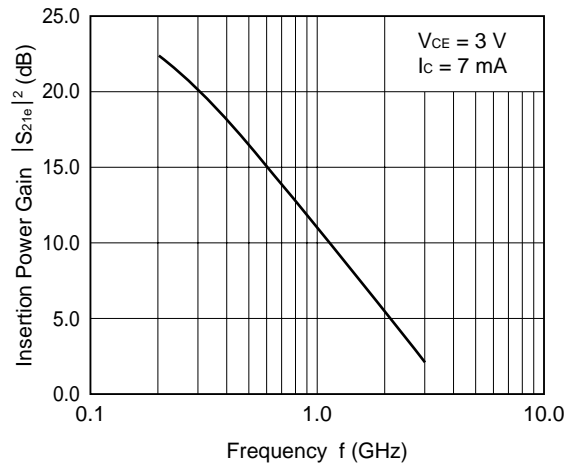
INSERTION POWER GAIN vs. COLLECTOR CURRENT



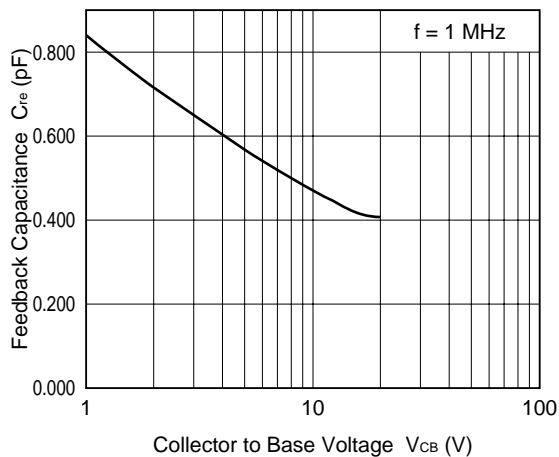
NOISE FIGURE vs. COLLECTOR CURRENT



INSERTION POWER GAIN vs. FREQUENCY



FEEDBACK CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



**S-PARAMETER 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	0.941	-30.4	3.863	157.1	0.058	64.5	0.997	-13.0
0.2	0.913	-58.3	3.499	136.9	0.079	52.1	0.947	-25.8
0.3	0.872	-83.6	3.156	118.9	0.103	35.2	0.898	-37.2
0.4	0.847	-107.8	2.833	101.5	0.125	20.1	0.845	-47.7
0.5	0.807	-129.2	2.549	85.9	0.130	8.6	0.793	-56.4
0.6	0.786	-148.3	2.281	71.5	0.142	-4.6	0.755	-64.9
0.7	0.773	-165.3	2.069	58.3	0.146	-15.7	0.718	-72.9
0.8	0.763	178.4	1.880	45.8	0.150	-25.2	0.693	-81.2
0.9	0.753	163.7	1.726	33.9	0.149	-33.2	0.673	-88.6
1.0	0.748	150.0	1.597	22.5	0.146	-42.0	0.656	-96.4
1.1	0.749	136.7	1.479	11.6	0.144	-49.9	0.644	-104.8
1.2	0.740	124.2	1.378	1.1	0.141	-57.4	0.633	-112.6
1.3	0.748	111.9	1.291	-9.2	0.135	-64.1	0.623	-120.4
1.4	0.748	100.6	1.216	-19.3	0.127	-71.9	0.614	-128.6
1.5	0.756	89.6	1.147	-29.1	0.124	-77.6	0.608	-137.1
1.6	0.757	78.6	1.079	-38.8	0.118	-81.3	0.602	-145.6
1.7	0.762	68.6	1.025	-48.1	0.110	-86.0	0.597	-154.5
1.8	0.765	58.2	0.973	-57.4	0.105	-88.5	0.594	-163.3
1.9	0.770	48.6	0.928	-66.3	0.102	-92.8	0.593	-172.3
2.0	0.773	38.7	0.882	-75.2	0.100	-93.1	0.587	178.7
2.1	0.779	29.2	0.841	-83.8	0.098	-95.6	0.584	169.7
2.2	0.776	20.0	0.801	-92.6	0.097	-95.0	0.580	160.0
2.3	0.786	11.4	0.767	-100.7	0.097	-95.6	0.577	150.3
2.4	0.788	2.0	0.736	-109.0	0.102	-96.1	0.577	140.6
2.5	0.791	-6.5	0.705	-116.8	0.111	-97.8	0.574	130.5
2.6	0.795	-15.0	0.677	-124.7	0.119	-99.7	0.577	120.4
2.7	0.797	-23.6	0.651	-132.0	0.131	-102.7	0.573	110.3
2.8	0.797	-31.2	0.624	-139.8	0.139	-108.3	0.573	100.1
2.9	0.801	-39.3	0.602	-147.3	0.146	-113.9	0.572	90.3
3.0	0.810	-47.0	0.578	-154.6	0.152	-117.5	0.582	80.2

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	0.869	-42.8	9.904	149.2	0.038	52.2	0.945	-21.8
0.2	0.794	-78.9	8.266	125.9	0.070	45.7	0.819	-38.9
0.3	0.737	-108.3	6.914	106.6	0.088	30.5	0.711	-52.4
0.4	0.695	-133.8	5.786	89.7	0.087	16.2	0.623	-62.4
0.5	0.669	-154.6	4.961	75.5	0.103	5.7	0.553	-71.2
0.6	0.652	-172.5	4.274	62.6	0.101	-0.4	0.506	-78.2
0.7	0.641	172.0	3.789	50.9	0.103	-10.3	0.470	-85.7
0.8	0.636	157.8	3.375	39.8	0.108	-14.9	0.440	-92.3
0.9	0.634	144.5	3.030	29.4	0.110	-22.1	0.417	-99.5
1.0	0.634	132.1	2.760	19.2	0.108	-26.9	0.397	-106.7
1.1	0.637	120.4	2.538	9.3	0.111	-31.4	0.386	-114.0
1.2	0.638	108.9	2.341	-0.1	0.114	-36.6	0.372	-121.6
1.3	0.643	98.6	2.178	-9.4	0.116	-40.6	0.362	-129.4
1.4	0.647	88.3	2.036	-18.6	0.114	-45.4	0.350	-136.6
1.5	0.654	78.3	1.917	-27.9	0.118	-49.6	0.343	-145.7
1.6	0.659	68.6	1.804	-36.9	0.120	-54.4	0.335	-153.7
1.7	0.665	59.2	1.700	-45.7	0.123	-58.0	0.330	-162.4
1.8	0.673	49.7	1.615	-54.7	0.127	-62.5	0.325	-171.0
1.9	0.679	40.8	1.533	-63.1	0.130	-67.3	0.319	179.7
2.0	0.684	31.6	1.458	-71.8	0.137	-70.3	0.318	170.8
2.1	0.689	23.0	1.393	-80.2	0.140	-75.8	0.313	161.6
2.2	0.695	14.5	1.329	-88.7	0.146	-79.9	0.308	151.7
2.3	0.704	6.1	1.274	-96.8	0.152	-85.2	0.306	141.8
2.4	0.709	-2.2	1.220	-105.1	0.157	-89.9	0.305	132.4
2.5	0.713	-10.4	1.172	-112.9	0.165	-94.8	0.299	121.2
2.6	0.720	-18.4	1.130	-121.0	0.173	-99.8	0.304	110.7
2.7	0.725	-26.6	1.083	-128.8	0.181	-105.7	0.307	100.5
2.8	0.734	-34.4	1.040	-136.8	0.189	-111.1	0.308	90.0
2.9	0.737	-42.2	1.010	-144.4	0.197	-116.8	0.309	79.6
3.0	0.744	-49.8	0.974	-152.1	0.206	-121.9	0.317	68.9

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	0.795	-50.7	14.193	144.1	0.042	40.1	0.913	-27.9
0.2	0.713	-93.1	11.180	118.7	0.061	45.2	0.735	-46.8
0.3	0.656	-123.6	8.924	99.5	0.071	28.4	0.601	-60.5
0.4	0.625	-147.9	7.214	83.6	0.079	16.9	0.501	-70.4
0.5	0.603	-166.9	6.066	70.3	0.085	14.3	0.437	-77.9
0.6	0.593	175.8	5.156	58.3	0.087	5.1	0.392	-85.2
0.7	0.588	161.3	4.500	47.3	0.091	-3.8	0.355	-92.3
0.8	0.586	147.7	3.990	37.1	0.091	-7.2	0.328	-98.9
0.9	0.591	135.5	3.580	27.1	0.098	-10.1	0.310	-105.5
1.0	0.590	123.9	3.247	17.5	0.101	-16.3	0.292	-112.1
1.1	0.598	112.9	2.973	8.1	0.105	-20.4	0.277	-120.2
1.2	0.599	102.6	2.741	-1.2	0.108	-24.9	0.264	-127.8
1.3	0.607	92.5	2.540	-10.1	0.114	-30.3	0.259	-135.6
1.4	0.611	82.4	2.370	-19.1	0.119	-34.6	0.250	-143.3
1.5	0.618	73.0	2.227	-27.8	0.124	-40.1	0.241	-152.5
1.6	0.625	63.7	2.093	-36.8	0.131	-45.2	0.233	-160.3
1.7	0.631	54.8	1.973	-45.1	0.134	-49.8	0.230	-169.7
1.8	0.639	45.7	1.868	-53.8	0.141	-54.6	0.223	-177.6
1.9	0.645	37.1	1.781	-62.0	0.146	-60.4	0.219	171.6
2.0	0.649	28.4	1.688	-70.6	0.155	-66.1	0.215	162.5
2.1	0.654	19.7	1.613	-79.0	0.161	-72.0	0.211	152.9
2.2	0.658	11.5	1.535	-87.2	0.168	-76.9	0.208	142.9
2.3	0.668	3.5	1.475	-95.2	0.174	-81.6	0.206	131.2
2.4	0.676	-4.8	1.413	-103.3	0.182	-88.0	0.206	121.1
2.5	0.679	-12.7	1.357	-111.3	0.192	-94.5	0.203	109.4
2.6	0.686	-20.6	1.303	-119.4	0.201	-100.3	0.206	99.1
2.7	0.688	-27.8	1.256	-127.3	0.211	-108.8	0.209	88.7
2.8	0.705	-35.0	1.210	-134.9	0.203	-116.3	0.219	77.2
2.9	0.716	-43.3	1.169	-142.6	0.210	-120.4	0.221	65.3
3.0	0.722	-50.9	1.133	-149.7	0.220	-125.2	0.230	54.7

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	0.728	-59.4	17.820	139.6	0.052	34.1	0.894	-32.6
0.2	0.646	-105.6	13.278	113.3	0.054	40.0	0.655	-53.9
0.3	0.597	-135.1	10.194	94.7	0.063	32.2	0.515	-66.6
0.4	0.572	-159.0	8.098	79.7	0.062	23.0	0.425	-76.4
0.5	0.571	-176.6	6.725	67.0	0.072	13.4	0.356	-83.9
0.6	0.563	167.9	5.698	55.6	0.080	10.6	0.319	-90.2
0.7	0.563	153.9	4.929	45.3	0.079	5.4	0.287	-97.4
0.8	0.564	141.5	4.353	35.5	0.090	-0.2	0.261	-104.0
0.9	0.565	129.9	3.907	25.8	0.094	-4.4	0.244	-111.3
1.0	0.569	119.2	3.527	16.4	0.098	-7.5	0.232	-117.4
1.1	0.577	108.5	3.235	7.2	0.102	-14.4	0.219	-126.0
1.2	0.579	98.6	2.977	-1.6	0.111	-19.8	0.206	-132.8
1.3	0.586	89.0	2.759	-10.5	0.116	-24.4	0.198	-142.0
1.4	0.593	79.2	2.571	-19.2	0.123	-29.1	0.190	-149.4
1.5	0.601	70.1	2.411	-28.0	0.130	-34.2	0.184	-159.1
1.6	0.605	61.2	2.264	-36.4	0.135	-40.4	0.175	-167.5
1.7	0.612	52.3	2.130	-44.9	0.144	-45.8	0.173	-178.3
1.8	0.620	43.6	2.014	-53.3	0.149	-51.4	0.166	172.4
1.9	0.627	34.9	1.926	-61.5	0.157	-57.6	0.163	162.2
2.0	0.631	26.4	1.822	-69.9	0.164	-62.2	0.160	152.2
2.1	0.644	18.2	1.735	-78.0	0.168	-69.0	0.156	141.8
2.2	0.646	9.8	1.659	-86.5	0.177	-75.4	0.153	130.0
2.3	0.654	1.9	1.592	-94.3	0.185	-80.9	0.155	117.7
2.4	0.660	-6.1	1.525	-102.4	0.193	-87.6	0.157	106.5
2.5	0.663	-13.8	1.464	-110.0	0.204	-94.3	0.158	94.9
2.6	0.662	-21.3	1.405	-117.9	0.213	-100.4	0.162	84.0
2.7	0.675	-28.7	1.352	-125.9	0.220	-108.9	0.167	73.6
2.8	0.690	-35.8	1.302	-133.5	0.215	-116.5	0.179	61.6
2.9	0.703	-44.2	1.261	-141.0	0.221	-120.2	0.183	50.2
3.0	0.711	-51.8	1.221	-148.8	0.227	-126.4	0.195	39.0

**S-PARAMETER 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	0.940	-30.5	3.922	157.0	0.055	52.8	0.994	-13.7
0.2	0.908	-58.7	3.540	136.7	0.080	52.1	0.939	-26.0
0.3	0.876	-83.9	3.181	118.8	0.107	35.6	0.891	-37.4
0.4	0.848	-107.0	2.840	101.5	0.121	18.0	0.838	-47.5
0.5	0.816	-127.6	2.559	86.2	0.135	10.1	0.789	-56.7
0.6	0.793	-146.3	2.289	71.9	0.143	-2.9	0.747	-65.1
0.7	0.774	-163.2	2.075	58.8	0.146	-14.3	0.713	-73.5
0.8	0.762	-178.2	1.889	46.8	0.147	-24.0	0.688	-81.1
0.9	0.758	167.8	1.735	35.3	0.148	-30.6	0.671	-89.2
1.0	0.750	154.4	1.604	23.9	0.148	-39.8	0.655	-97.0
1.1	0.749	142.1	1.492	13.3	0.141	-46.9	0.635	-105.2
1.2	0.746	130.1	1.392	2.9	0.139	-53.2	0.623	-112.9
1.3	0.751	118.8	1.306	-7.2	0.135	-61.4	0.613	-121.0
1.4	0.746	107.5	1.231	-16.9	0.127	-66.3	0.606	-129.9
1.5	0.751	97.2	1.162	-26.6	0.126	-71.8	0.598	-138.5
1.6	0.755	87.2	1.107	-36.0	0.119	-77.1	0.591	-146.8
1.7	0.759	77.2	1.051	-45.3	0.114	-80.6	0.585	-155.8
1.8	0.759	67.5	1.004	-54.5	0.109	-83.1	0.578	-164.6
1.9	0.763	58.0	0.966	-63.4	0.108	-86.2	0.574	-173.8
2.0	0.765	48.6	0.915	-72.1	0.103	-87.0	0.572	176.6
2.1	0.768	39.7	0.877	-80.7	0.100	-89.5	0.562	167.1
2.2	0.767	30.8	0.840	-89.2	0.105	-89.5	0.561	156.9
2.3	0.771	22.4	0.808	-97.4	0.106	-90.5	0.557	146.9
2.4	0.774	13.4	0.776	-105.8	0.114	-90.8	0.553	136.7
2.5	0.780	5.0	0.746	-113.5	0.120	-91.9	0.550	126.3
2.6	0.785	-3.1	0.721	-121.7	0.128	-95.2	0.550	115.6
2.7	0.787	-11.8	0.693	-129.1	0.140	-97.0	0.548	105.1
2.8	0.790	-19.4	0.667	-136.4	0.149	-101.2	0.551	94.6
2.9	0.792	-27.5	0.647	-143.8	0.162	-105.3	0.550	83.6
3.0	0.795	-35.2	0.626	-150.8	0.176	-110.7	0.551	72.6

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	0.859	-41.4	9.530	149.9	0.059	46.3	0.965	-20.7
0.2	0.803	-78.2	7.977	126.6	0.067	42.2	0.836	-37.7
0.3	0.744	-106.9	6.695	107.5	0.088	26.9	0.727	-51.2
0.4	0.703	-131.2	5.614	90.7	0.091	17.2	0.637	-60.7
0.5	0.687	-151.3	4.863	76.4	0.100	7.7	0.568	-68.7
0.6	0.665	-169.1	4.172	63.9	0.101	0.0	0.519	-76.5
0.7	0.655	176.4	3.678	52.2	0.101	-8.0	0.480	-82.4
0.8	0.649	162.7	3.300	41.3	0.107	-14.3	0.448	-90.3
0.9	0.646	150.1	2.967	31.1	0.107	-19.3	0.429	-97.3
1.0	0.641	138.2	2.717	21.0	0.110	-24.9	0.410	-104.2
1.1	0.648	126.9	2.500	11.2	0.111	-29.8	0.393	-111.7
1.2	0.646	116.4	2.317	1.6	0.110	-35.0	0.380	-119.2
1.3	0.645	106.2	2.155	-7.4	0.113	-40.3	0.371	-126.7
1.4	0.652	96.4	2.021	-16.6	0.114	-44.3	0.359	-134.5
1.5	0.662	87.0	1.904	-25.5	0.116	-47.3	0.351	-142.6
1.6	0.662	77.6	1.797	-34.5	0.120	-51.6	0.341	-151.1
1.7	0.668	68.5	1.705	-43.5	0.123	-54.8	0.336	-160.0
1.8	0.670	59.4	1.618	-52.2	0.127	-59.1	0.329	-168.6
1.9	0.675	50.8	1.551	-60.5	0.130	-64.0	0.324	-177.8
2.0	0.678	42.2	1.472	-69.2	0.137	-68.8	0.314	172.8
2.1	0.686	33.4	1.409	-77.4	0.142	-73.0	0.305	163.4
2.2	0.686	25.4	1.348	-86.1	0.147	-76.7	0.302	153.5
2.3	0.693	17.1	1.294	-94.2	0.153	-80.8	0.299	142.8
2.4	0.698	9.0	1.242	-102.3	0.162	-85.7	0.293	132.5
2.5	0.703	1.3	1.200	-110.1	0.169	-90.6	0.293	121.8
2.6	0.709	-6.7	1.157	-118.3	0.178	-95.8	0.291	110.9
2.7	0.710	-14.2	1.123	-125.6	0.186	-101.3	0.291	99.8
2.8	0.717	-21.9	1.080	-133.7	0.195	-107.2	0.291	88.4
2.9	0.724	-29.5	1.044	-141.5	0.204	-112.5	0.293	77.1
3.0	0.727	-37.0	1.009	-149.4	0.215	-118.5	0.298	66.0

$V_{CE} = 3\text{ V}$ ,  $I_C = 5\text{ mA}$ ,  $Z_0 = 50\ \Omega$

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	0.774	-52.0	14.036	144.4	0.035	28.8	0.928	-27.8
0.2	0.700	-93.8	11.057	119.1	0.057	40.7	0.729	-45.7
0.3	0.657	-122.9	8.835	100.1	0.072	31.2	0.602	-59.2
0.4	0.630	-146.9	7.147	84.3	0.076	17.7	0.505	-69.4
0.5	0.616	-165.6	6.011	71.1	0.077	12.2	0.439	-76.1
0.6	0.601	179.2	5.143	59.3	0.087	7.0	0.397	-83.6
0.7	0.598	164.7	4.479	48.5	0.088	0.7	0.359	-88.8
0.8	0.597	152.3	3.984	38.6	0.096	-6.8	0.329	-95.9
0.9	0.598	140.5	3.571	28.4	0.096	-9.8	0.311	-102.9
1.0	0.601	129.9	3.240	19.1	0.103	-14.3	0.291	-109.3
1.1	0.601	119.4	2.971	9.8	0.106	-18.6	0.278	-116.6
1.2	0.604	109.4	2.745	0.7	0.108	-23.8	0.267	-123.4
1.3	0.612	100.3	2.554	-8.2	0.113	-27.9	0.254	-131.2
1.4	0.615	90.8	2.387	-17.0	0.116	-32.9	0.245	-138.8
1.5	0.622	81.6	2.236	-25.7	0.122	-36.1	0.236	-147.5
1.6	0.624	73.0	2.115	-34.5	0.129	-41.3	0.227	-156.5
1.7	0.631	64.5	2.003	-42.8	0.138	-46.9	0.220	-165.4
1.8	0.636	55.8	1.897	-51.3	0.142	-51.7	0.213	-173.8
1.9	0.643	47.6	1.809	-59.6	0.147	-57.3	0.203	176.6
2.0	0.647	39.1	1.716	-67.9	0.154	-62.0	0.198	166.9
2.1	0.653	30.5	1.649	-76.3	0.160	-68.6	0.192	156.5
2.2	0.656	22.9	1.574	-84.7	0.169	-74.0	0.186	145.4
2.3	0.662	15.0	1.516	-92.6	0.173	-79.2	0.183	133.9
2.4	0.668	6.9	1.455	-100.6	0.184	-85.0	0.181	122.6
2.5	0.672	-0.5	1.404	-108.5	0.191	-90.8	0.177	110.3
2.6	0.681	-8.3	1.352	-116.6	0.199	-95.5	0.181	98.8
2.7	0.685	-15.9	1.307	-124.0	0.207	-102.5	0.182	86.5
2.8	0.687	-23.4	1.257	-131.8	0.214	-108.9	0.186	75.3
2.9	0.695	-30.7	1.226	-139.6	0.224	-114.6	0.189	62.9
3.0	0.701	-38.0	1.187	-147.1	0.233	-120.8	0.196	51.6

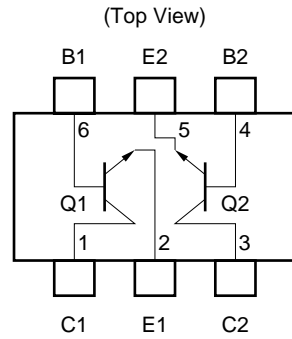
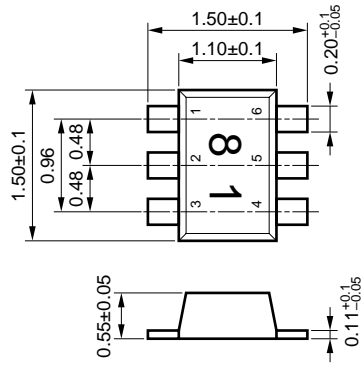
$V_{CE} = 3\text{ V}$ ,  $I_C = 7\text{ mA}$

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	0.716	-54.8	16.827	141.3	0.073	54.7	0.897	-28.5
0.2	0.659	-100.9	12.791	115.4	0.050	37.9	0.674	-51.3
0.3	0.609	-131.4	9.920	96.6	0.064	28.4	0.543	-64.6
0.4	0.583	-154.2	7.925	81.4	0.068	22.6	0.446	-74.4
0.5	0.575	-171.7	6.631	68.9	0.073	17.5	0.373	-81.3
0.6	0.570	173.1	5.602	57.4	0.079	12.1	0.332	-88.5
0.7	0.569	159.9	4.892	47.2	0.083	5.2	0.297	-93.9
0.8	0.569	148.0	4.323	37.3	0.089	-0.5	0.270	-100.3
0.9	0.571	136.7	3.873	27.8	0.095	-3.9	0.250	-107.7
1.0	0.574	126.6	3.507	18.5	0.099	-8.7	0.234	-113.3
1.1	0.576	116.2	3.224	9.3	0.108	-14.2	0.222	-122.4
1.2	0.581	106.6	2.969	0.3	0.114	-19.6	0.209	-128.4
1.3	0.589	97.8	2.765	-8.3	0.119	-23.3	0.197	-136.5
1.4	0.590	88.6	2.581	-16.9	0.122	-27.9	0.187	-145.1
1.5	0.599	79.8	2.423	-25.6	0.131	-33.9	0.178	-153.4
1.6	0.601	71.2	2.284	-34.0	0.139	-39.4	0.170	-162.1
1.7	0.605	62.7	2.146	-42.5	0.146	-45.0	0.163	-172.0
1.8	0.612	54.4	2.044	-51.0	0.151	-49.4	0.153	179.3
1.9	0.620	46.1	1.948	-59.0	0.160	-56.2	0.149	167.7
2.0	0.623	38.2	1.857	-67.4	0.168	-61.4	0.139	158.0
2.1	0.632	29.8	1.770	-75.3	0.172	-67.6	0.134	146.2
2.2	0.636	22.2	1.695	-83.7	0.183	-73.4	0.130	134.0
2.3	0.638	13.9	1.629	-91.5	0.188	-79.7	0.129	121.3
2.4	0.648	6.1	1.565	-99.7	0.197	-85.2	0.125	109.2
2.5	0.653	-1.4	1.510	-107.5	0.205	-91.3	0.127	95.9
2.6	0.660	-9.1	1.455	-115.4	0.214	-97.2	0.130	82.3
2.7	0.665	-16.4	1.408	-123.1	0.223	-103.4	0.134	68.9
2.8	0.673	-23.9	1.356	-130.8	0.230	-110.5	0.142	56.9
2.9	0.676	-31.3	1.323	-138.4	0.236	-116.8	0.145	44.7
3.0	0.682	-38.4	1.279	-145.9	0.243	-123.1	0.156	34.8



PACKAGE DIMENSIONS

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



PIN CONNECTIONS

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

[MEMO]

[MEMO]

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