

NPN SILICON EPITAXIAL TRANSISTOR (WITH 2 DIFFERENT ELEMENTS) IN A FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD PACKAGE

DESCRIPTION

The μPA835TC has built-in two different transistors (Q1 and Q2) for low noise amplification in the VHF band to UHF band.

FEATURES

- Low noise
 - Q1 : NF = 1.5 dB TYP. @ f = 2 GHz, V_{CE} = 3 V, I_c = 3 mA
 - Q2 : NF = 1.2 dB TYP. @ f = 1 GHz, V_{CE} = 3 V, I_c = 7 mA
- High gain
 - Q1 : |S_{21e}|² = 8.5 dB TYP. @ f = 2 GHz, V_{CE} = 3 V, I_c = 10 mA
 - Q2 : |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 package
- Built-in 2 different transistors (2SC5010, 2SC5006)

BUILT-IN TRANSISTORS

	Q1	Q2
3-pin ultra super minimold part No.	2SC5010	2SC5006

ORDERING INFORMATION

Part Number	Package	Quantity	Supplying Form
μPA835TC	Flat-lead 6-pin thin-type ultra super minimold	Loose products (50 pcs)	8 mm wide embossed tape. Pin 6 (Q1 Base), pin 5 (Q2 Emitter), pin 4 (Q2 Base) face to perforation side of the tape.
μPA835TC-T1		Taping products (3 kp/reel)	

Remark To order evaluation samples, please contact your local NEC sales office. (Part number for sample order: μPA835TC.)

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.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings		Unit
		Q1	Q2	
Collector to Base Voltage	V _{CB0}	9	20	V
Collector to Emitter Voltage	V _{CEO}	6	12	V
Emitter to Base Voltage	V _{EBO}	2	3	V
Collector Current	I _c	30	100	mA
Total Power Dissipation	P _T ^{Note}	180 in 1 element	200 in 1 element	mW
		230 in 2 elements		
Junction Temperature	T _j	150	150	°C
Storage Temperature	T _{stg}	-65 to +150		°C

Note Mounted on 1.08 cm² × 1.0 mm glass epoxy substrate.

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

(1) Q1

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector Cutoff Current	I _{CB0}	V _{CB} = 5 V, I _E = 0	–	–	0.1	μA
Emitter Cutoff Current	I _{EBO}	V _{EB} = 1 V, I _C = 0	–	–	0.1	μA
DC Current Gain	h _{FE}	V _{CE} = 3 V, I _C = 10 mA ^{Note 1}	75	–	150	
Gain Bandwidth Product	f _T	V _{CE} = 3 V, I _C = 10 mA, f = 2 GHz	10.0	12.0	–	GHz
Feedback Capacitance	C _{re}	V _{CB} = 3 V, I _E = 0, f = 1 MHz ^{Note 2}	–	0.4	0.7	pF
Insertion Power Gain	S _{21e} ²	V _{CE} = 3 V, I _C = 10 mA, f = 2 GHz	7.0	8.5	–	dB
Noise Figure	NF	V _{CE} = 3 V, I _C = 3 mA, f = 2 GHz	–	1.5	2.5	dB

- Notes**
1. Pulse Measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%
 2. Collector to base capacitance when measured with capacitance meter (automatic balanced bridge method), with emitter connected to guard pin of capacitance meter.

(2) Q2

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector Cutoff Current	I_{CBO}	$V_{CB} = 10\text{ V}, I_E = 0$	–	–	1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 1\text{ V}, I_C = 0$	–	–	1.0	μA
DC Current Gain	h_{FE}	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}$ ^{Note 1}	70	–	140	
Gain Bandwidth Product	f_T	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$	3.0	4.5	–	GHz
Feedback Capacitance	C_{re}	$V_{CB} = 3\text{ V}, I_E = 0, f = 1\text{ MHz}$ ^{Note 2}	–	0.7	1.5	pF
Insertion Power Gain	$ S_{21e} ^2$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$	7.0	9.0	–	dB
Noise Figure	NF	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$	–	1.2	2.5	dB

- Notes**
1. Pulse Measurement: $PW \leq 350\ \mu\text{s}$, Duty Cycle $\leq 2\%$
 2. Collector to base capacitance when measured with capacitance meter (automatic balanced bridge method), with emitter connected to guard pin of capacitance meter.

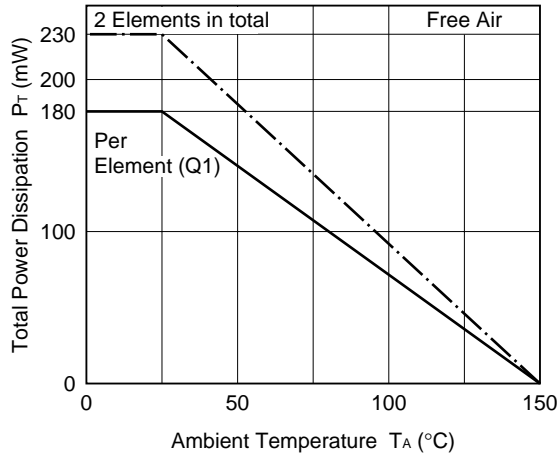
h_{FE} CLASSIFICATION

Rank	FB
Marking	37
h_{FE} Value of Q1	75 to 150
h_{FE} Value of Q2	70 to 140

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

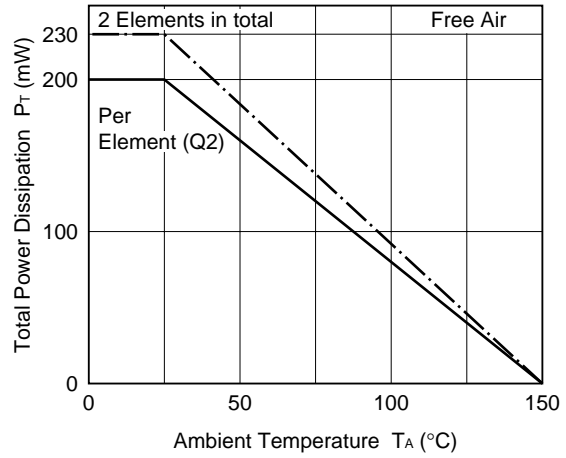
Q1

TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE

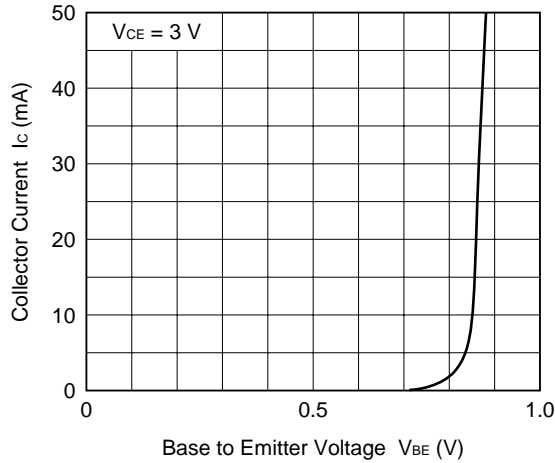


Q2

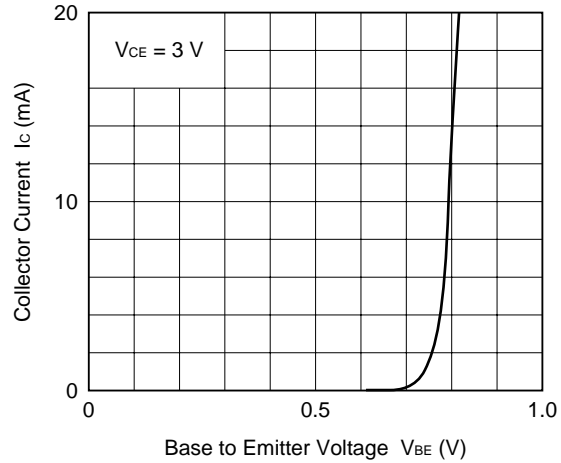
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



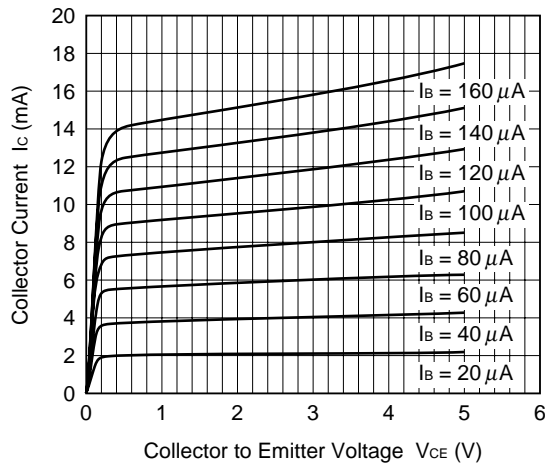
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



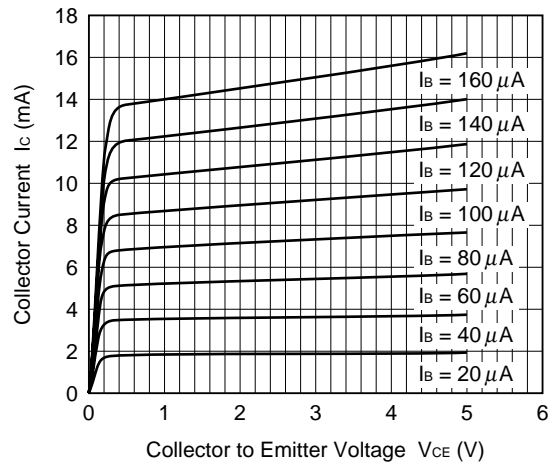
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

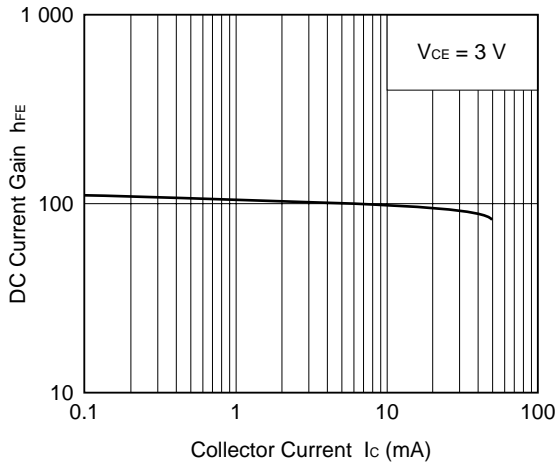


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



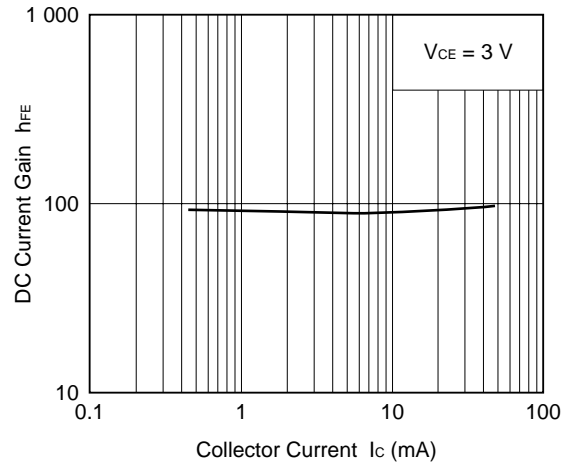
Q1

DC CURRENT GAIN vs. COLLECTOR CURRENT

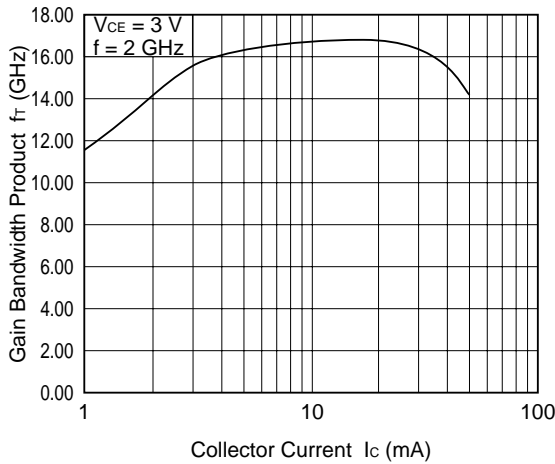


Q2

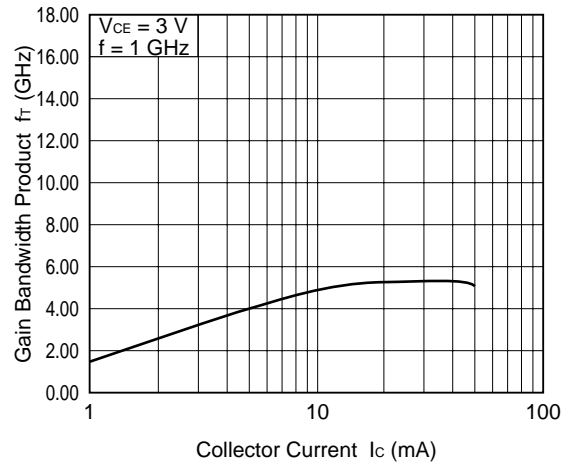
DC CURRENT GAIN vs. COLLECTOR CURRENT



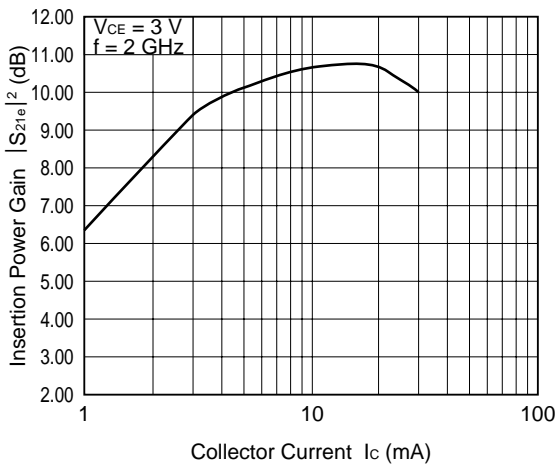
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



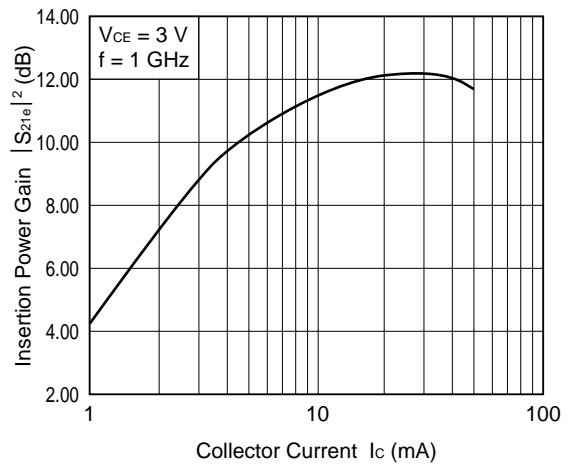
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



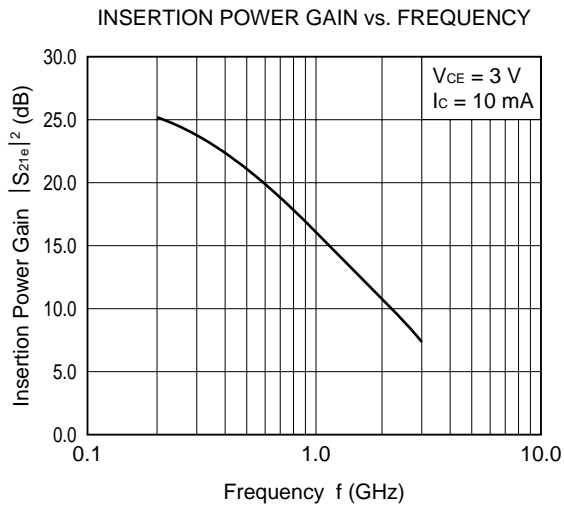
INSERTION POWER GAIN vs. COLLECTOR CURRENT



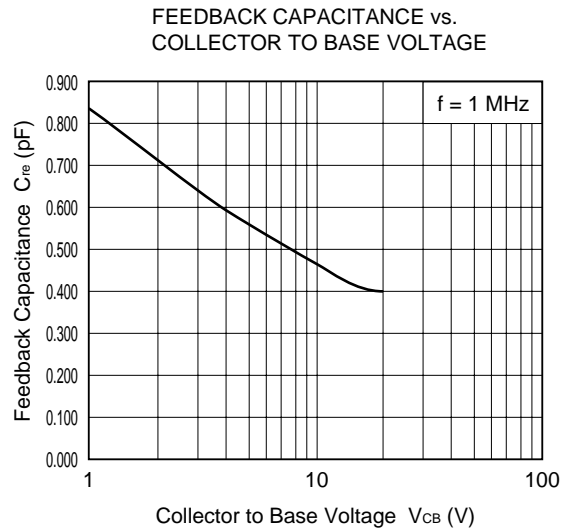
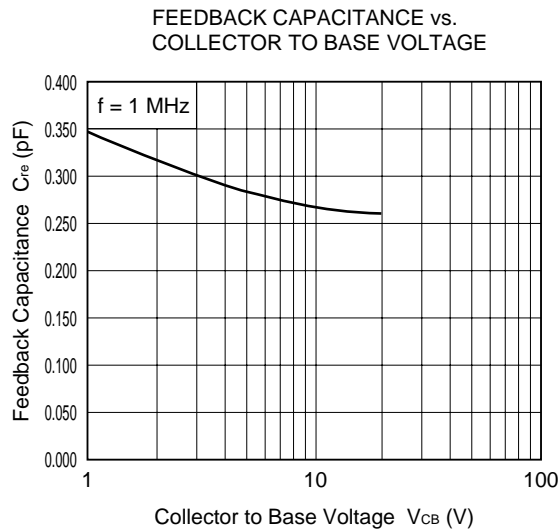
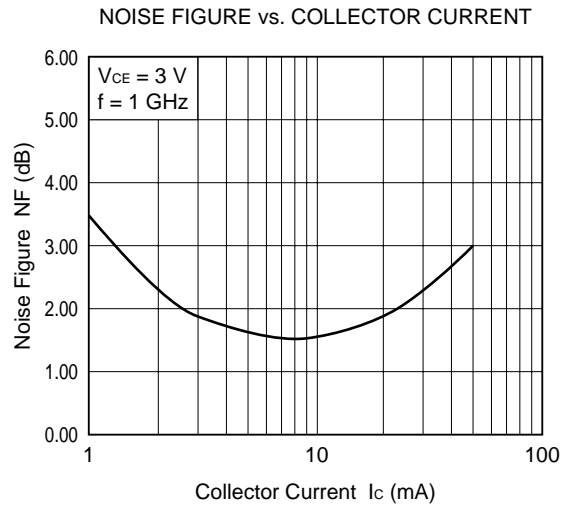
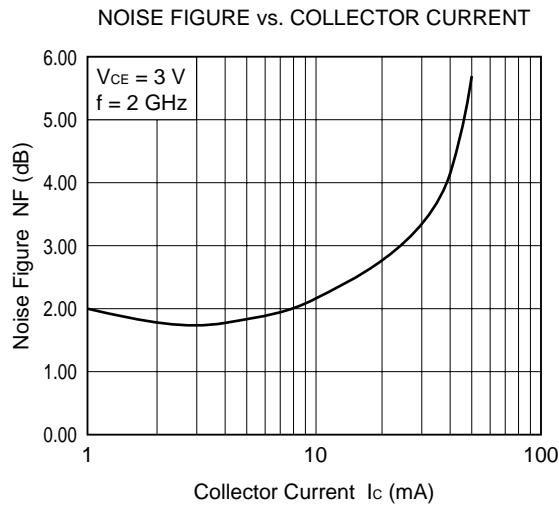
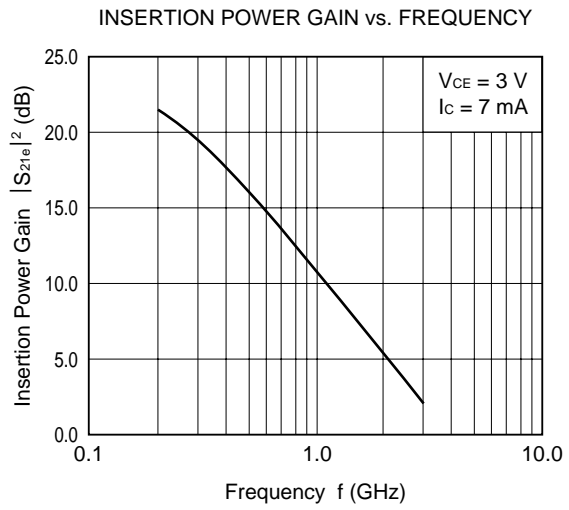
INSERTION POWER GAIN vs. COLLECTOR CURRENT



Q1



Q2



S-PARAMETERS Q1

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

FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.946	-13.6	3.770	166.9	0.023	55.8	0.993	-9.9
0.2	0.943	-25.7	3.643	154.2	0.044	73.9	0.987	-18.7
0.3	0.934	-37.8	3.536	143.0	0.060	52.7	0.984	-28.4
0.4	0.906	-50.2	3.450	130.5	0.072	51.6	0.966	-37.4
0.5	0.887	-62.5	3.393	118.9	0.086	41.2	0.943	-46.6
0.6	0.846	-74.8	3.268	107.2	0.104	31.0	0.923	-55.6
0.7	0.818	-87.0	3.188	95.8	0.113	21.0	0.896	-63.8
0.8	0.773	-98.7	3.077	84.5	0.126	11.0	0.866	-72.6
0.9	0.738	-110.6	2.980	73.4	0.137	4.3	0.845	-81.0
1.0	0.704	-122.4	2.887	62.8	0.148	-4.7	0.820	-89.4
1.1	0.665	-134.1	2.796	52.2	0.153	-14.1	0.787	-97.8
1.2	0.630	-146.0	2.715	42.0	0.163	-21.6	0.767	-105.3
1.3	0.597	-158.1	2.619	31.5	0.170	-29.8	0.741	-113.4
1.4	0.566	-170.1	2.540	21.7	0.175	-36.9	0.713	-121.3
1.5	0.536	-178.4	2.455	11.9	0.181	-45.4	0.690	-129.0
1.6	0.507	165.6	2.381	1.8	0.186	-53.0	0.668	-136.5
1.7	0.480	153.4	2.302	-8.0	0.190	-60.0	0.647	-144.4
1.8	0.456	141.3	2.236	-17.5	0.192	-67.5	0.627	-152.0
1.9	0.436	129.0	2.175	-26.7	0.195	-75.2	0.603	-159.1
2.0	0.423	116.0	2.109	-36.2	0.196	-81.3	0.590	-166.5
2.1	0.405	102.6	2.039	-45.6	0.200	-88.8	0.567	-173.9
2.2	0.391	90.6	1.977	-54.9	0.202	-95.4	0.551	-178.2
2.3	0.381	78.0	1.916	-63.8	0.202	-101.9	0.536	-171.0
2.4	0.376	65.1	1.863	-72.8	0.205	-108.2	0.519	-163.2
2.5	0.369	52.6	1.808	-81.7	0.207	-115.2	0.504	-155.7
2.6	0.371	40.4	1.757	-90.6	0.207	-121.8	0.490	-147.7
2.7	0.368	28.5	1.701	-99.1	0.211	-127.1	0.475	-140.0
2.8	0.371	17.0	1.652	-107.6	0.207	-133.5	0.463	-132.3
2.9	0.376	5.5	1.611	-115.9	0.208	-139.3	0.451	-124.7
3.0	0.380	-5.4	1.564	-124.4	0.211	-145.1	0.442	-116.8

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

FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.886	-19.0	9.528	161.8	0.010	47.7	0.978	-13.2
0.2	0.851	-34.6	8.889	146.3	0.043	67.8	0.961	-24.9
0.3	0.804	-51.0	8.377	131.9	0.050	52.1	0.919	-37.0
0.4	0.745	-66.6	7.805	117.1	0.063	41.6	0.867	-47.7
0.5	0.691	-81.2	7.343	103.9	0.075	38.4	0.809	-57.5
0.6	0.623	-95.0	6.732	91.0	0.088	28.1	0.757	-66.8
0.7	0.571	-109.2	6.288	79.0	0.089	15.7	0.707	-75.5
0.8	0.522	-122.1	5.843	67.6	0.099	9.7	0.664	-84.0
0.9	0.473	-135.3	5.404	56.9	0.107	2.2	0.628	-91.8
1.0	0.433	-148.0	5.052	46.5	0.111	-4.5	0.589	-99.4
1.1	0.394	-160.7	4.730	36.6	0.119	-13.2	0.562	-106.7
1.2	0.361	-173.5	4.453	26.8	0.125	-18.2	0.534	-114.0
1.3	0.338	173.5	4.187	17.4	0.130	-25.5	0.507	-121.5
1.4	0.312	160.3	3.966	8.1	0.134	-30.9	0.486	-128.4
1.5	0.295	147.5	3.764	-0.9	0.137	-37.2	0.464	-135.6
1.6	0.281	133.8	3.571	-9.9	0.144	-43.6	0.445	-142.7
1.7	0.271	120.5	3.395	-18.5	0.151	-50.0	0.427	-150.0
1.8	0.263	106.6	3.230	-27.4	0.155	-56.1	0.412	-156.9
1.9	0.257	93.7	3.109	-35.9	0.160	-62.3	0.397	-164.6
2.0	0.255	80.0	2.974	-44.7	0.165	-68.1	0.382	-171.3
2.1	0.257	67.0	2.860	-52.8	0.170	-74.6	0.368	-178.4
2.2	0.265	54.9	2.747	-61.6	0.177	-81.5	0.351	-173.2
2.3	0.271	41.9	2.644	-69.6	0.180	-87.8	0.335	-165.5
2.4	0.279	29.9	2.541	-78.1	0.184	-93.9	0.319	-157.9
2.5	0.284	18.1	2.444	-86.1	0.192	-100.3	0.305	-150.4
2.6	0.296	7.8	2.367	-94.4	0.196	-106.2	0.294	-141.8
2.7	0.304	-2.6	2.287	-102.2	0.200	-111.9	0.281	-133.6
2.8	0.315	-12.1	2.209	-110.2	0.205	-118.9	0.273	-125.9
2.9	0.328	-21.9	2.144	-118.1	0.209	-124.8	0.261	-117.8
3.0	0.341	-31.2	2.062	-125.9	0.213	-130.8	0.248	-108.6

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

FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.826	-23.1	13.981	158.4	0.015	70.3	0.961	-15.5
0.2	0.764	-40.7	12.736	140.4	0.038	65.2	0.921	-29.3
0.3	0.699	-59.2	11.601	124.1	0.045	54.5	0.846	-42.2
0.4	0.619	-76.9	10.428	108.4	0.056	43.7	0.773	-53.1
0.5	0.546	-92.0	9.448	94.8	0.061	35.3	0.701	-63.1
0.6	0.481	-106.8	8.471	81.9	0.071	25.2	0.642	-71.5
0.7	0.427	-120.9	7.641	70.2	0.076	14.9	0.598	-79.4
0.8	0.378	-134.3	6.949	59.6	0.084	8.9	0.555	-86.6
0.9	0.336	-147.3	6.379	49.3	0.091	4.7	0.521	-93.8
1.0	0.303	-160.6	5.868	39.3	0.098	-0.5	0.488	-100.9
1.1	0.276	-174.5	5.433	29.8	0.104	-8.0	0.465	-107.9
1.2	0.250	172.2	5.069	20.8	0.111	-13.4	0.437	-114.2
1.3	0.237	158.8	4.735	11.7	0.115	-18.9	0.420	-121.2
1.4	0.217	144.3	4.448	3.1	0.118	-26.5	0.403	-127.6
1.5	0.212	130.2	4.185	-5.5	0.127	-31.8	0.385	-134.9
1.6	0.206	115.4	3.952	-14.2	0.135	-37.9	0.369	-141.9
1.7	0.204	101.8	3.751	-22.7	0.140	-42.7	0.356	-149.4
1.8	0.202	88.1	3.580	-31.0	0.147	-49.5	0.341	-155.9
1.9	0.206	74.8	3.417	-39.1	0.154	-56.0	0.328	-163.7
2.0	0.212	61.5	3.249	-47.4	0.160	-61.7	0.314	-170.1
2.1	0.220	49.0	3.122	-55.6	0.164	-68.7	0.300	-177.9
2.2	0.227	37.6	2.981	-63.9	0.171	-74.9	0.288	-174.4
2.3	0.235	26.5	2.875	-71.7	0.177	-81.0	0.276	-166.6
2.4	0.246	15.7	2.761	-79.7	0.181	-87.6	0.261	-159.1
2.5	0.258	5.8	2.657	-87.5	0.189	-94.3	0.249	-150.7
2.6	0.272	-4.3	2.564	-95.4	0.198	-99.4	0.240	-142.6
2.7	0.282	-13.0	2.475	-103.1	0.203	-106.3	0.229	-134.4
2.8	0.295	-21.6	2.391	-111.0	0.208	-113.5	0.217	-125.9
2.9	0.308	-30.8	2.325	-118.6	0.214	-119.7	0.209	-117.3
3.0	0.319	-38.9	2.244	-126.5	0.220	-125.5	0.201	-107.5

V_{CE} = 3 V, I_C = 10 mA

FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.712	-27.5	20.853	152.8	0.023	40.4	0.950	-19.6
0.2	0.619	-52.5	18.111	131.2	0.028	57.0	0.836	-35.5
0.3	0.527	-71.9	15.435	113.2	0.042	46.6	0.746	-48.6
0.4	0.436	-90.0	13.155	97.4	0.049	44.8	0.644	-57.8
0.5	0.371	-105.6	11.390	84.1	0.056	37.1	0.577	-66.2
0.6	0.312	-120.8	9.922	72.0	0.059	30.3	0.523	-73.5
0.7	0.267	-135.3	8.761	61.5	0.066	22.2	0.479	-80.0
0.8	0.235	-150.0	7.816	51.3	0.076	17.4	0.446	-85.8
0.9	0.207	-163.7	7.036	42.0	0.083	10.7	0.421	-92.9
1.0	0.181	-178.6	6.440	32.6	0.089	6.5	0.398	-98.7
1.1	0.167	165.4	5.906	23.6	0.098	0.1	0.379	-105.5
1.2	0.155	150.2	5.465	15.2	0.102	-5.5	0.361	-111.2
1.3	0.151	134.6	5.071	6.8	0.109	-13.0	0.350	-118.4
1.4	0.148	120.2	4.753	-1.5	0.117	-17.5	0.335	-124.6
1.5	0.147	105.1	4.471	-9.9	0.125	-23.3	0.326	-131.9
1.6	0.153	90.9	4.202	-18.0	0.134	-30.1	0.310	-138.8
1.7	0.159	77.9	3.989	-26.1	0.140	-37.7	0.298	-145.5
1.8	0.169	65.0	3.779	-34.1	0.148	-43.3	0.289	-152.9
1.9	0.176	52.7	3.612	-41.9	0.156	-49.7	0.275	-160.9
2.0	0.187	41.9	3.430	-50.0	0.162	-56.2	0.265	-167.8
2.1	0.202	31.7	3.291	-57.6	0.168	-63.0	0.253	-174.8
2.2	0.212	21.2	3.144	-65.8	0.177	-69.5	0.241	-176.8
2.3	0.227	11.6	3.026	-73.3	0.183	-75.7	0.228	-168.8
2.4	0.235	2.4	2.908	-81.2	0.188	-83.0	0.217	-160.8
2.5	0.249	-6.3	2.799	-88.8	0.197	-89.9	0.203	-151.7
2.6	0.268	-14.7	2.703	-96.9	0.203	-96.1	0.195	-142.5
2.7	0.278	-23.3	2.608	-104.3	0.208	-102.3	0.184	-133.7
2.8	0.291	-31.1	2.514	-111.9	0.216	-109.6	0.176	-124.8
2.9	0.302	-39.7	2.444	-119.6	0.222	-116.1	0.165	-115.4
3.0	0.317	-47.1	2.352	-127.0	0.228	-122.8	0.157	-105.1

S-PARAMETERS Q2

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

FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.941	-30.0	3.791	157.1	0.037	54.8	0.985	-13.1
0.2	0.910	-57.7	3.421	137.0	0.085	54.6	0.946	-25.6
0.3	0.883	-82.7	3.092	119.2	0.107	36.1	0.897	-37.2
0.4	0.848	-106.0	2.773	101.9	0.125	21.4	0.840	-47.4
0.5	0.819	-125.9	2.502	86.6	0.136	9.1	0.792	-56.4
0.6	0.783	-144.6	2.233	72.6	0.144	-2.4	0.757	-64.6
0.7	0.771	-161.7	2.034	59.3	0.147	-13.3	0.721	-73.0
0.8	0.760	-176.9	1.862	46.9	0.151	-22.8	0.692	-80.8
0.9	0.749	168.9	1.704	35.4	0.150	-30.1	0.674	-88.8
1.0	0.744	155.5	1.575	24.1	0.148	-38.4	0.659	-96.6
1.1	0.741	143.0	1.465	13.5	0.144	-47.4	0.644	-104.4
1.2	0.740	130.7	1.371	2.9	0.140	-54.4	0.630	-112.9
1.3	0.739	119.3	1.288	-6.9	0.138	-59.6	0.622	-121.1
1.4	0.742	108.4	1.220	-16.9	0.132	-66.2	0.613	-129.2
1.5	0.746	97.7	1.152	-26.7	0.125	-71.7	0.604	-138.1
1.6	0.744	87.3	1.090	-36.1	0.124	-76.2	0.594	-146.4
1.7	0.749	77.5	1.042	-45.2	0.118	-78.7	0.590	-155.6
1.8	0.750	67.5	0.992	-54.6	0.113	-81.9	0.585	-164.7
1.9	0.755	58.0	0.952	-63.4	0.112	-84.9	0.579	-173.9
2.0	0.756	48.9	0.905	-72.3	0.111	-86.3	0.571	177.0
2.1	0.759	39.5	0.872	-81.0	0.109	-89.1	0.566	167.4
2.2	0.759	30.6	0.835	-89.6	0.108	-89.9	0.563	157.8
2.3	0.770	21.8	0.804	-97.8	0.113	-89.4	0.557	147.6
2.4	0.769	13.0	0.772	-106.1	0.117	-91.1	0.554	137.3
2.5	0.772	4.5	0.742	-113.8	0.122	-93.8	0.553	126.9
2.6	0.774	-3.5	0.715	-121.7	0.134	-95.2	0.552	116.5
2.7	0.780	-12.1	0.689	-129.2	0.145	-98.5	0.550	105.9
2.8	0.783	-19.9	0.666	-136.6	0.156	-103.0	0.551	95.2
2.9	0.784	-28.2	0.645	-143.8	0.168	-107.0	0.546	84.2
3.0	0.789	-35.9	0.623	-151.2	0.182	-111.9	0.552	73.1

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

FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.836	-42.5	9.801	149.7	0.043	42.3	0.953	-21.0
0.2	0.790	-78.7	8.213	126.2	0.064	40.9	0.826	-38.5
0.3	0.738	-107.1	6.904	107.1	0.083	31.7	0.718	-51.3
0.4	0.694	-132.1	5.769	90.2	0.090	16.5	0.627	-61.4
0.5	0.663	-152.4	4.943	76.2	0.096	9.0	0.553	-68.9
0.6	0.654	-168.9	4.289	63.3	0.100	2.8	0.504	-76.5
0.7	0.639	175.3	3.768	51.8	0.101	-7.8	0.468	-83.7
0.8	0.636	162.0	3.367	41.3	0.105	-13.9	0.442	-90.7
0.9	0.633	149.6	3.041	30.9	0.109	-18.9	0.422	-97.3
1.0	0.630	137.6	2.776	20.9	0.109	-22.6	0.400	-104.6
1.1	0.632	126.7	2.549	11.2	0.111	-29.0	0.386	-112.1
1.2	0.630	115.7	2.365	1.7	0.114	-33.2	0.370	-119.3
1.3	0.637	105.7	2.205	-7.5	0.116	-38.0	0.359	-127.1
1.4	0.640	95.4	2.061	-16.6	0.120	-42.3	0.351	-134.4
1.5	0.644	86.5	1.945	-25.4	0.119	-46.3	0.339	-143.3
1.6	0.650	77.0	1.832	-34.7	0.124	-50.6	0.328	-151.1
1.7	0.657	68.0	1.739	-43.3	0.128	-54.2	0.322	-160.4
1.8	0.659	59.1	1.656	-52.1	0.130	-58.9	0.315	-168.5
1.9	0.665	50.3	1.581	-60.4	0.137	-63.8	0.310	-178.2
2.0	0.667	41.7	1.504	-69.2	0.142	-67.6	0.300	173.0
2.1	0.674	33.0	1.441	-77.5	0.148	-73.0	0.291	164.2
2.2	0.675	25.0	1.378	-86.1	0.155	-77.1	0.288	154.1
2.3	0.687	16.5	1.329	-94.0	0.159	-81.3	0.283	142.9
2.4	0.690	8.5	1.277	-102.3	0.168	-86.6	0.278	132.8
2.5	0.694	0.6	1.228	-110.1	0.176	-91.5	0.273	121.6
2.6	0.699	-7.7	1.180	-118.5	0.184	-97.0	0.273	111.0
2.7	0.707	-14.9	1.145	-125.9	0.195	-102.6	0.272	99.8
2.8	0.708	-22.8	1.103	-133.9	0.202	-108.5	0.273	88.1
2.9	0.716	-30.5	1.069	-141.8	0.209	-113.6	0.274	76.8
3.0	0.722	-37.9	1.032	-149.6	0.221	-119.6	0.282	65.9

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

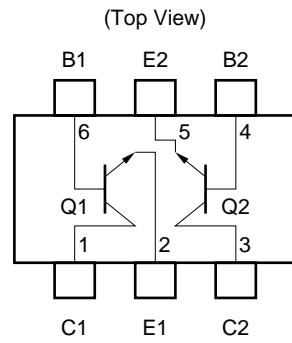
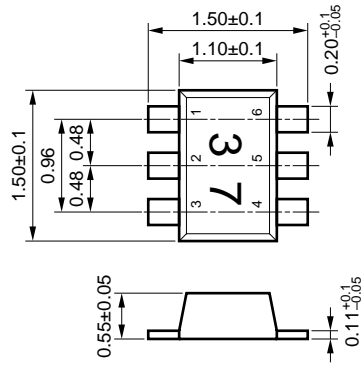
FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.780	-51.3	13.572	145.3	0.043	33.0	0.919	-28.3
0.2	0.716	-90.8	10.762	120.1	0.062	39.6	0.745	-44.8
0.3	0.665	-120.8	8.650	100.9	0.068	30.1	0.617	-58.5
0.4	0.625	-144.3	7.032	85.1	0.077	20.8	0.523	-67.8
0.5	0.611	-164.1	5.914	71.6	0.081	13.3	0.456	-75.6
0.6	0.598	-179.7	5.042	59.6	0.086	7.2	0.405	-82.1
0.7	0.592	166.4	4.436	49.0	0.091	-0.3	0.371	-89.1
0.8	0.592	153.6	3.929	38.6	0.092	-6.5	0.342	-95.1
0.9	0.593	141.8	3.527	28.9	0.100	-9.0	0.323	-101.9
1.0	0.594	130.9	3.208	19.3	0.101	-14.1	0.304	-108.2
1.1	0.601	120.6	2.948	10.0	0.107	-18.5	0.291	-116.1
1.2	0.598	110.4	2.723	0.9	0.112	-24.0	0.278	-123.6
1.3	0.602	100.8	2.535	-7.9	0.116	-28.3	0.266	-130.6
1.4	0.604	91.6	2.372	-16.7	0.120	-33.9	0.256	-138.4
1.5	0.618	82.4	2.222	-25.6	0.127	-38.6	0.247	-147.0
1.6	0.615	73.2	2.095	-34.2	0.132	-43.5	0.235	-155.5
1.7	0.625	64.7	1.986	-43.0	0.138	-47.9	0.229	-164.3
1.8	0.628	56.0	1.884	-51.5	0.144	-52.6	0.222	-172.9
1.9	0.636	47.5	1.802	-59.8	0.151	-58.1	0.213	177.9
2.0	0.638	39.2	1.712	-68.2	0.156	-63.3	0.208	168.5
2.1	0.647	30.9	1.636	-76.4	0.165	-69.3	0.198	158.0
2.2	0.649	22.7	1.568	-84.9	0.172	-74.2	0.196	147.6
2.3	0.661	14.8	1.509	-92.8	0.177	-79.1	0.188	135.8
2.4	0.663	6.7	1.450	-100.9	0.186	-85.4	0.186	124.6
2.5	0.665	-0.9	1.397	-108.7	0.194	-91.5	0.184	112.4
2.6	0.677	-8.9	1.346	-116.9	0.202	-97.9	0.185	101.4
2.7	0.686	-16.1	1.307	-124.5	0.211	-103.2	0.186	88.4
2.8	0.684	-23.9	1.255	-132.3	0.218	-110.2	0.187	76.4
2.9	0.693	-31.4	1.218	-140.0	0.226	-115.1	0.188	64.5
3.0	0.700	-38.7	1.171	-147.8	0.237	-121.4	0.197	53.0

V_{CE} = 3 V, I_C = 7 mA

FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.799	-44.6	13.333	147.7	0.052	43.2	0.934	-26.4
0.2	0.712	-83.9	10.995	123.0	0.068	47.2	0.769	-46.0
0.3	0.653	-112.1	8.986	103.9	0.081	32.7	0.642	-61.2
0.4	0.614	-136.6	7.380	87.8	0.084	21.4	0.533	-72.0
0.5	0.593	-156.5	6.275	74.0	0.090	17.0	0.456	-80.3
0.6	0.577	-172.8	5.389	62.1	0.096	9.8	0.399	-88.8
0.7	0.567	171.9	4.692	50.9	0.104	0.2	0.361	-96.3
0.8	0.565	158.8	4.188	40.6	0.110	-5.6	0.322	-102.6
0.9	0.560	146.9	3.768	30.7	0.113	-8.9	0.298	-109.6
1.0	0.557	135.3	3.427	21.1	0.117	-15.0	0.276	-116.8
1.1	0.563	124.5	3.149	11.6	0.123	-20.4	0.260	-124.7
1.2	0.564	113.9	2.907	2.5	0.126	-24.7	0.242	-131.6
1.3	0.569	104.4	2.713	-6.4	0.130	-30.1	0.225	-139.1
1.4	0.570	94.3	2.525	-15.3	0.139	-35.6	0.214	-147.4
1.5	0.579	85.4	2.379	-24.2	0.146	-40.1	0.204	-156.1
1.6	0.582	76.0	2.249	-32.8	0.151	-46.8	0.193	-164.2
1.7	0.586	67.6	2.130	-41.2	0.159	-50.9	0.183	-173.7
1.8	0.586	58.7	2.014	-49.7	0.164	-56.7	0.175	178.3
1.9	0.595	50.4	1.928	-57.9	0.173	-63.0	0.166	167.4
2.0	0.600	41.6	1.836	-66.7	0.178	-68.1	0.160	157.5
2.1	0.611	33.5	1.758	-74.8	0.183	-74.2	0.148	147.0
2.2	0.616	25.3	1.681	-83.2	0.193	-79.8	0.147	135.4
2.3	0.623	17.2	1.621	-91.0	0.198	-85.6	0.139	122.3
2.4	0.627	9.1	1.558	-99.3	0.207	-91.5	0.137	111.0
2.5	0.633	1.2	1.501	-107.1	0.213	-97.4	0.134	98.2
2.6	0.638	-6.4	1.443	-115.1	0.222	-103.5	0.137	84.9
2.7	0.646	-14.0	1.403	-123.0	0.230	-109.3	0.137	72.3
2.8	0.655	-21.8	1.350	-130.9	0.238	-116.5	0.146	59.1
2.9	0.661	-29.5	1.314	-138.8	0.243	-122.2	0.145	46.6
3.0	0.665	-36.8	1.274	-146.5	0.253	-128.9	0.154	36.2

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) |

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