

**HIGH-FREQUENCY LOW NOISE AMPLIFIER  
NPN SILICON EPITAXIAL TRANSISTOR  
(WITH BUILT-IN 2 ELEMENTS) MINI MOLD**

The  $\mu$ PA802T has built-in 2 low-voltage transistors which are designed to amplify low noise in the VHF band to the UHF band.

**FEATURES**

- Low Noise  
NF = 1.4 dB TYP. @ f = 1 GHz,  $V_{CE} = 3$  V,  $I_c = 7$  mA
- High Gain  
 $|S_{21e}|^2 = 12$  dB TYP. @ f = 1 GHz,  $V_{CE} = 3$  V,  $I_c = 7$  mA
- A Mini Mold Package Adopted
- Built-in 2 Transistors (2  $\times$  2SC4227)

**ORDERING INFORMATION**

PART NUMBER	QUANTITY	PACKING STYLE
$\mu$ PA802T	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.
$\mu$ PA802T-T1	Taping products (3 KPCS/Reel)	

**Remark** If you require an evaluation sample, please contact an NEC Sales Representative. (Unit sample quantity is 50 pcs.)

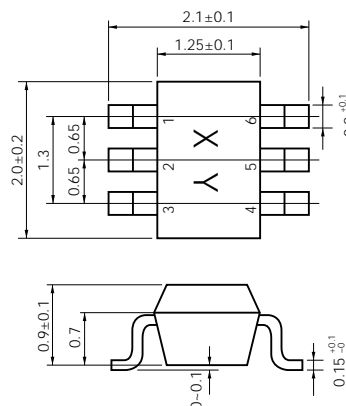
**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C)**

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	$V_{CBO}$	20	V
Collector to Emitter Voltage	$V_{CEO}$	10	V
Emitter to Base Voltage	$V_{EBO}$	1.5	V
Collector Current	$I_c$	65	mA
Total Power Dissipation	$P_T$	150 in 1 element 200 in 2 elements <sup>Note</sup>	mW
Junction Temperature	$T_j$	150	°C
Storage Temperature	$T_{stg}$	-65 to +150	°C

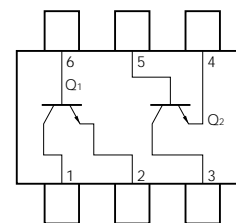
**Note** 110 mW must not be exceeded in 1 element.

**PACKAGE DRAWINGS**

(Unit: mm)



**PIN CONFIGURATION (Top View)**



**PIN CONNECTIONS**

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

**ELECTRICAL CHARACTERISTICS (TA = 25 °C)**

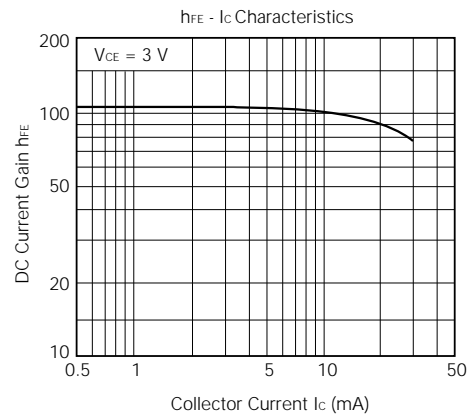
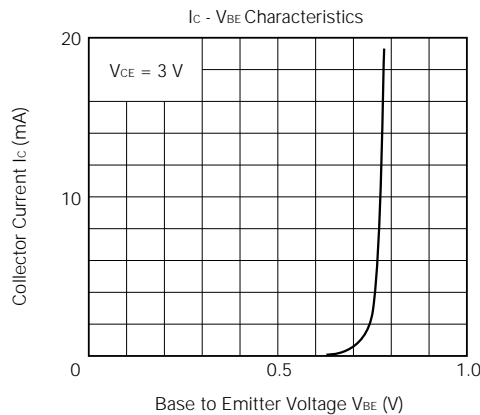
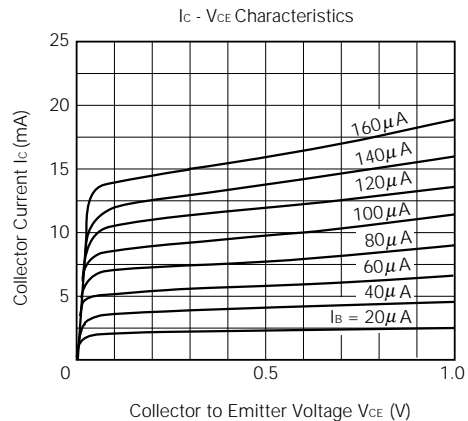
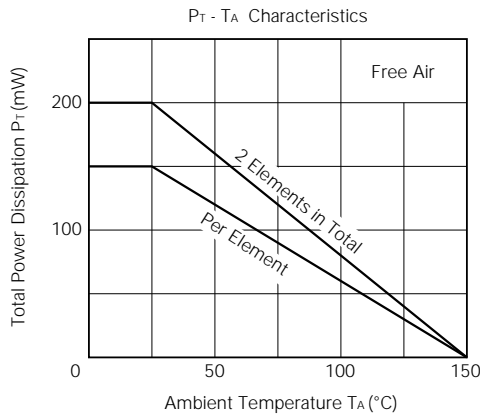
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = 10\text{ V}, I_E = 0$			0.8	μA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 1\text{ V}, I_C = 0$			0.8	μA
DC Current Gain	$h_{FE}$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}$ <sup>Note 1</sup>	70		240	
Gain Bandwidth Product	$f_T$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$	4.5	7.0		GHz
Feed-back Capacitance	$C_{re}$	$V_{CB} = 3\text{ V}, I_E = 0, f = 1\text{ MHz}$ <sup>Note 2</sup>			0.9	pF
Insertion Power Gain	$ S_{21} ^2$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$	10	12		dB
Noise Figure	NF	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$		1.4	1.7	dB
$h_{FE}$ Ratio	$h_{FE1}/h_{FE2}$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}$ A smaller value among $h_{FE}$ of $h_{FE1} = Q1, Q2$ A larger value among $h_{FE}$ of $h_{FE2} = Q1, Q2$	0.85			

- Notes**
1. Pulse Measurement:  $P_w \leq 350\ \mu\text{s}$ , Duty cycle  $\leq 2\%$
  2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

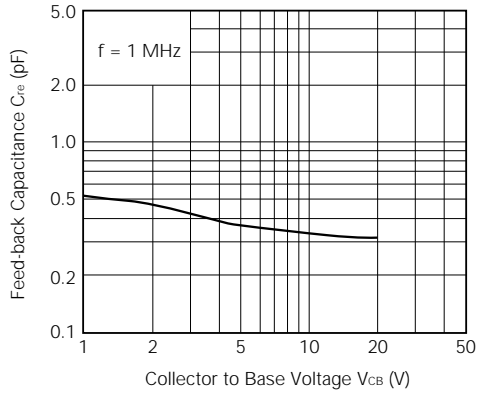
**$h_{FE}$  CLASSIFICATION**

Rank	FB	GB
Marking	R34	R35
$h_{FE}$ Value	70 to 150	110 to 240

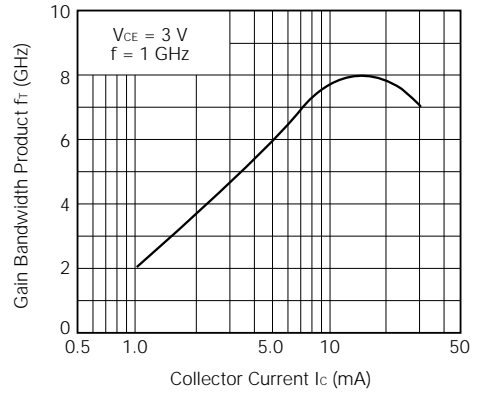
**TYPICAL CHARACTERISTICS (TA = 25 °C)**



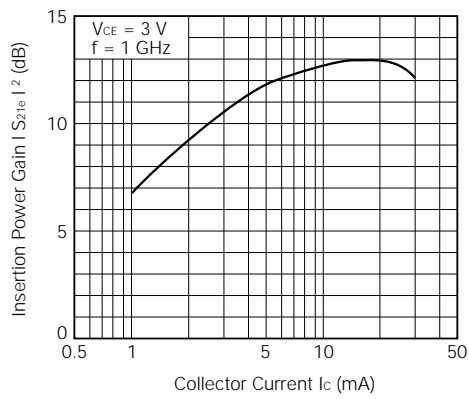
$C_{re} - V_{CB}$  Characteristics



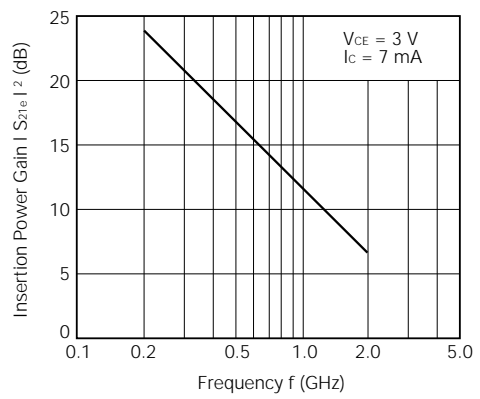
$f_r - I_c$  Characteristics



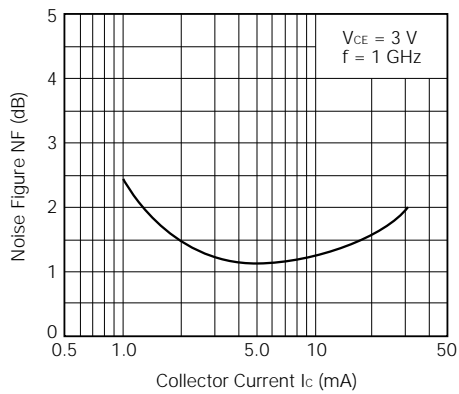
$|S_{21e}|^2 - I_c$  Characteristics



$|S_{21e}|^2 - f$  Characteristics



NF -  $I_c$  Characteristics



S-PARAMETERS

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 7 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.000	.804	-23.8	11.631	154.8	.023	74.8	.920	-16.5
200.000	.692	-48.6	10.839	137.5	.040	64.1	.791	-27.7
300.000	.581	-70.3	9.722	123.8	.050	59.9	.675	-33.5
400.000	.489	-89.0	8.519	112.9	.060	56.7	.597	-37.0
500.000	.419	-104.9	7.434	104.1	.067	55.9	.538	-38.7
600.000	.376	-117.1	6.468	97.5	.075	55.6	.497	-40.0
700.000	.342	-128.6	5.729	91.8	.082	55.7	.467	-41.0
800.000	.321	-138.4	5.115	86.7	.089	56.3	.443	-41.7
900.000	.305	-147.3	4.630	82.5	.096	56.1	.427	-42.5
1000.000	.296	-155.2	4.207	78.5	.104	56.4	.412	-43.6
1100.000	.289	-162.2	3.879	74.8	.111	56.0	.401	-44.6
1200.000	.284	-169.3	3.595	71.4	.119	56.4	.393	-45.8
1300.000	.282	-175.3	3.349	68.1	.127	56.2	.384	-47.3
1400.000	.281	179.0	3.133	64.8	.136	56.0	.379	-48.8
1500.000	.283	173.8	2.945	61.9	.143	55.4	.372	-50.1
1600.000	.283	168.6	2.780	58.8	.151	55.0	.367	-51.8
1700.000	.285	163.8	2.631	56.2	.160	54.4	.363	-53.7
1800.000	.286	159.9	2.514	53.3	.168	53.9	.359	-55.4
1900.000	.289	155.4	2.390	50.5	.177	53.3	.354	-57.3
2000.000	.293	151.8	2.293	47.8	.186	52.5	.351	-59.2

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 5 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	.818	-29.4	14.580	156.2	.023	79.9	.932	-14.4
200.0000	.689	-54.3	12.120	137.5	.040	65.1	.824	-23.4
300.0000	.594	-73.1	10.142	124.6	.052	55.0	.716	-30.3
400.0000	.500	-89.8	8.340	114.4	.063	58.5	.620	-32.2
500.0000	.457	-102.8	7.300	107.5	.069	56.4	.577	-34.2
600.0000	.404	-115.0	6.211	101.0	.081	54.9	.525	-35.1
700.0000	.377	-124.4	5.496	96.8	.084	59.5	.511	-36.1
800.0000	.359	-134.3	4.908	91.4	.091	58.4	.471	-36.2
900.0000	.342	-141.5	4.450	88.1	.097	58.4	.458	-35.3
1000.0000	.335	-150.3	4.018	84.7	.100	61.2	.440	-36.5
1100.0000	.326	-155.9	3.750	81.4	.112	61.8	.442	-36.8
1200.0000	.321	-162.4	3.410	78.1	.115	61.4	.417	-37.8
1300.0000	.317	-167.2	3.181	75.6	.124	62.3	.412	-38.5
1400.0000	.321	-173.4	2.995	72.5	.131	63.9	.411	-39.9
1500.0000	.318	-177.5	2.802	69.8	.138	63.6	.407	-40.4
1600.0000	.320	176.6	2.665	67.3	.149	66.4	.400	-41.1
1700.0000	.323	173.2	2.533	66.1	.156	65.3	.394	-43.7
1800.0000	.326	167.8	2.369	63.0	.162	65.9	.394	-44.3
1900.0000	.331	165.6	2.275	61.0	.177	65.4	.390	-45.5
2000.0000	.333	161.4	2.196	59.2	.183	64.5	.384	-47.6

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 3 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	.906	-22.7	9.710	161.6	.026	82.5	.962	-10.6
200.0000	.810	-43.7	8.541	145.3	.049	63.8	.895	-18.3
300.0000	.742	-60.6	7.695	133.4	.062	58.7	.811	-25.8
400.0000	.638	-76.6	6.580	122.4	.073	56.0	.732	-27.7
500.0000	.587	-89.8	5.934	114.1	.082	53.4	.680	-31.2
600.0000	.524	-102.2	5.148	107.1	.091	49.7	.624	-33.5
700.0000	.490	-111.4	4.627	102.2	.094	51.8	.603	-34.4
800.0000	.460	-121.4	4.181	96.0	.099	51.2	.568	-35.0
900.0000	.435	-129.9	3.827	92.6	.101	52.9	.540	-35.7
1000.0000	.427	-138.2	3.443	88.1	.107	50.9	.523	-36.7
1100.0000	.404	-144.9	3.199	84.2	.115	53.7	.512	-36.8
1200.0000	.399	-151.7	2.989	79.8	.113	56.6	.500	-38.6
1300.0000	.392	-157.9	2.779	77.4	.121	54.9	.489	-39.2
1400.0000	.392	-163.6	2.638	73.5	.126	56.4	.483	-40.4
1500.0000	.386	-169.1	2.443	71.3	.135	56.4	.477	-41.8
1600.0000	.380	-174.5	2.344	68.0	.137	60.0	.477	-42.4
1700.0000	.382	-179.7	2.239	65.3	.143	59.5	.466	-44.4
1800.0000	.389	176.1	2.113	63.0	.151	59.4	.461	-44.9
1900.0000	.383	172.5	2.025	61.4	.154	62.6	.456	-46.9
2000.0000	.387	168.3	1.922	58.2	.163	62.0	.464	-48.3

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 1 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	1.009	-14.5	3.544	168.8	.027	78.6	.994	-5.6
200.0000	.955	-29.7	3.359	156.3	.055	73.6	.969	-10.1
300.0000	.937	-42.6	3.277	147.1	.073	63.4	.947	-15.9
400.0000	.864	-56.2	3.034	136.6	.091	57.7	.898	-18.8
500.0000	.838	-67.3	2.891	128.6	.107	51.1	.865	-22.1
600.0000	.775	-79.3	2.674	120.0	.116	46.6	.824	-25.8
700.0000	.745	-88.5	2.485	114.2	.125	45.2	.803	-27.5
800.0000	.708	-99.1	2.338	106.8	.127	41.2	.776	-29.7
900.0000	.670	-107.9	2.177	101.4	.132	40.2	.740	-31.5
1000.0000	.649	-116.8	2.052	96.0	.135	37.2	.723	-33.7
1100.0000	.621	-124.0	1.914	90.8	.131	36.6	.719	-34.2
1200.0000	.608	-131.8	1.819	86.0	.129	35.4	.700	-36.3
1300.0000	.587	-138.5	1.713	82.4	.130	35.2	.691	-37.6
1400.0000	.587	-144.5	1.628	77.7	.128	36.1	.681	-39.2
1500.0000	.573	-152.6	1.533	73.4	.127	36.0	.662	-40.7
1600.0000	.559	-157.1	1.464	70.3	.124	37.5	.660	-42.7
1700.0000	.562	-164.2	1.421	67.2	.120	39.1	.658	-44.0
1800.0000	.557	-168.9	1.350	64.7	.122	43.3	.658	-46.0
1900.0000	.557	-173.9	1.296	61.1	.122	45.2	.641	-47.8
2000.0000	.551	-178.6	1.240	58.0	.124	48.5	.643	-50.1

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