

**HIGH-FREQUENCY LOW NOISE AMPLIFIER  
NPN SILICON EPITAXIAL TRANSISTOR  
(WITH BUILT-IN 2 × 2SC4227) SMALL MINI MOLD**

The μPA812T 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<sub>CE</sub> = 3 V, I<sub>c</sub> = 7 mA
- High Gain  
|S<sub>21e</sub>|<sup>2</sup> = 12 dB TYP. @ f = 1 GHz, V<sub>CE</sub> = 3 V, I<sub>c</sub> = 7 mA
- A Small Mini Mold Package Adopted
- Built-in 2 Transistors (2 × 2SC4227)

**ORDERING INFORMATION**

PART NUMBER	QUANTITY	PACKING STYLE
μPA812T	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.
μPA812T-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.)

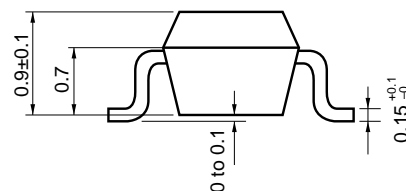
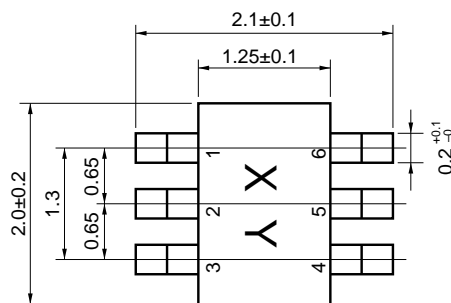
**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C)**

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	V <sub>CB0</sub>	20	V
Collector to Emitter Voltage	V <sub>CE0</sub>	10	V
Emitter to Base Voltage	V <sub>EB0</sub>	1.5	V
Collector Current	I <sub>c</sub>	65	mA
Total Power Dissipation	P <sub>T</sub>	150 in 1 element 200 in 2 elements <sup>Note</sup>	mW
Junction Temperature	T <sub>j</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C

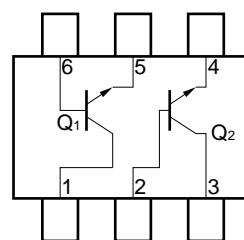
**Note** 110 mW must not be exceeded in 1 element.

**PACKAGE DRAWINGS**

(Unit: mm)



**PIN CONFIGURATION (Top View)**



**PIN CONNECTIONS**

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

The information in this document is subject to change without notice.

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

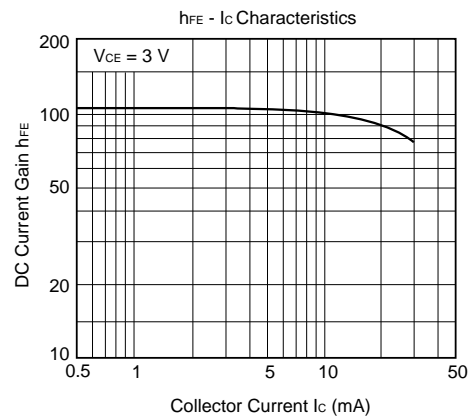
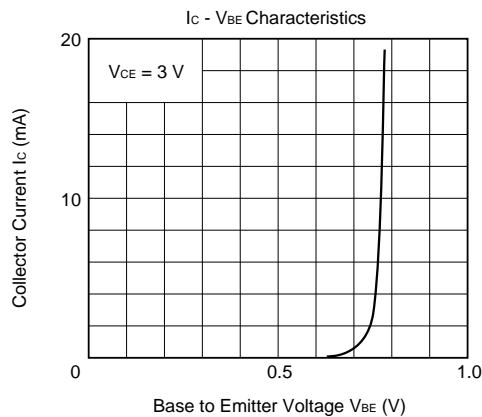
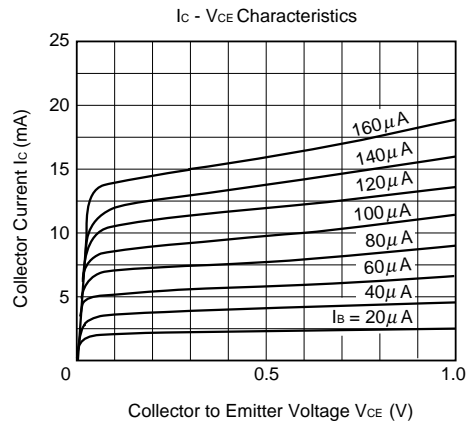
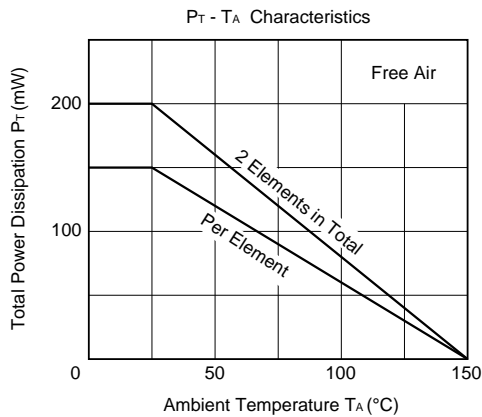
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cutoff Current	I <sub>CB0</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0			0.8	μA
Emitter Cutoff Current	I <sub>EB0</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0			0.8	μA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA <sup>Note 1</sup>	70		240	
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz	4.5	7.0		GHz
Feed-back Capacitance	C <sub>re</sub>	V <sub>CB</sub> = 3 V, I <sub>E</sub> = 0, f = 1 MHz <sup>Note 2</sup>			0.9	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	10	12		dB
Noise Figure	NF	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz		1.4	2.7	dB
h <sub>FE</sub> Ratio	h <sub>FE1</sub> /h <sub>FE2</sub>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA A smaller value among h <sub>FE</sub> of h <sub>FE1</sub> = Q1, Q2 A larger value among h <sub>FE</sub> of h <sub>FE2</sub> = Q1, Q2	0.85			

- Notes**
1. Pulse Measurement: P<sub>w</sub> ≤ 350 μs, Duty cycle ≤ 2 %
  2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

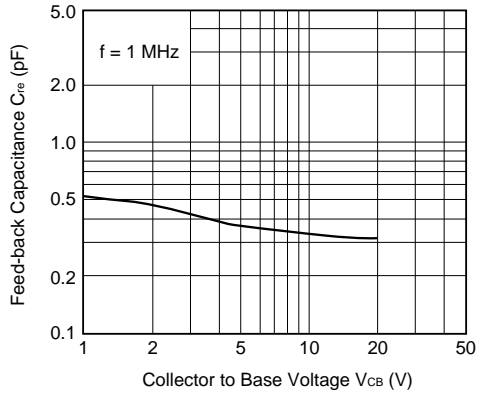
**h<sub>FE</sub> CLASSIFICATION**

Rank	FB	GB
Marking	34R	35R
h <sub>FE</sub> Value	70 to 150	110 to 240

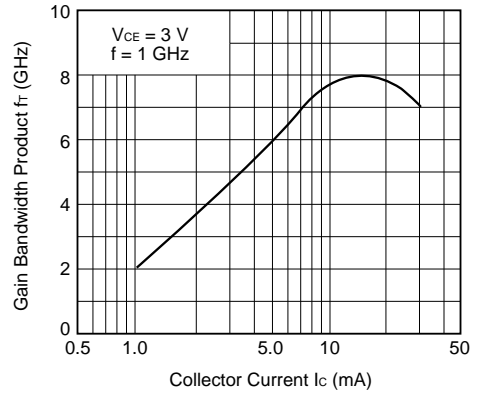
**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**



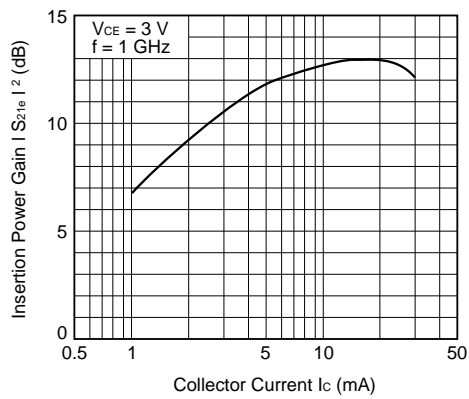
$C_{re} - V_{CB}$  Characteristics



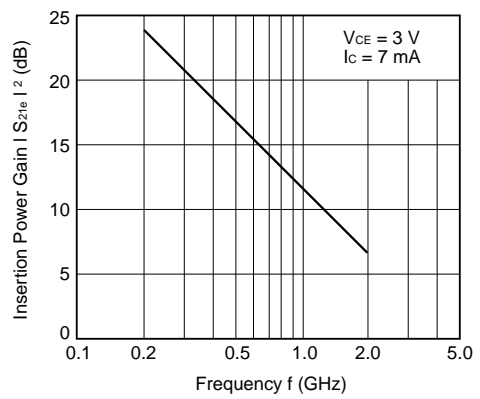
$f_r - I_c$  Characteristics



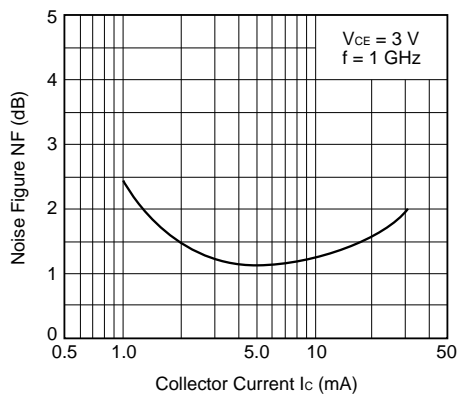
$|S_{21e}|^2 - I_c$  Characteristics



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



NF -  $I_c$  Characteristics



S-PARAMETERS

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

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.966	-13.9	3.691	168.9	0.025	85.1	0.995	-5.1
200.00	0.947	-25.9	3.436	159.6	0.045	72.9	0.978	-9.2
300.00	0.878	-37.8	3.310	147.9	0.067	65.7	0.936	-14.3
400.00	0.866	-48.5	3.089	142.0	0.084	60.8	0.916	-16.9
500.00	0.833	-58.4	2.955	132.3	0.097	53.8	0.858	-19.4
600.00	0.809	-71.5	2.859	127.1	0.110	51.7	0.847	-22.0
700.00	0.767	-82.4	2.718	116.8	0.117	45.7	0.819	-23.2
800.00	0.704	-92.8	2.608	110.6	0.127	42.4	0.804	-26.3
900.00	0.659	-101.8	2.389	102.8	0.128	40.3	0.782	-28.3
1000.00	0.630	-110.4	2.242	96.8	0.132	36.0	0.752	-32.1
1100.00	0.609	-119.2	2.097	92.3	0.135	36.0	0.720	-33.7
1200.00	0.582	-128.2	2.024	86.7	0.138	33.2	0.678	-35.6
1300.00	0.562	-136.0	1.935	83.4	0.143	31.5	0.659	-36.1
1400.00	0.547	-142.6	1.826	77.5	0.136	30.3	0.632	-36.5
1500.00	0.549	-150.4	1.765	73.4	0.138	29.3	0.634	-37.4
1600.00	0.548	-158.0	1.682	69.9	0.132	32.1	0.622	-38.2
1700.00	0.536	-167.1	1.618	65.6	0.135	31.5	0.621	-41.1
1800.00	0.523	-172.7	1.589	62.5	0.137	34.6	0.612	-42.9
1900.00	0.506	-177.9	1.527	57.5	0.139	34.5	0.590	-45.8
2000.00	0.522	177.6	1.489	52.5	0.143	33.9	0.577	-48.0

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

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.898	-22.1	9.389	161.7	0.023	79.6	0.974	-9.5
200.00	0.830	-40.3	8.404	146.9	0.041	70.0	0.910	-16.5
300.00	0.714	-56.9	7.363	132.7	0.058	59.3	0.820	-23.1
400.00	0.651	-69.8	6.494	124.7	0.068	55.8	0.759	-25.6
500.00	0.588	-81.3	5.717	115.4	0.075	51.5	0.682	-27.1
600.00	0.546	-94.6	5.214	110.6	0.083	51.6	0.651	-28.3
700.00	0.500	-106.0	4.680	101.3	0.088	49.1	0.617	-28.4
800.00	0.452	-116.3	4.326	96.6	0.095	48.9	0.596	-29.9
900.00	0.422	-125.3	3.818	89.9	0.098	49.7	0.576	-31.0
1000.00	0.404	-133.9	3.502	85.1	0.104	47.7	0.548	-33.5
1100.00	0.387	-142.2	3.376	81.9	0.109	49.6	0.522	-34.3
1200.00	0.371	-150.9	3.164	77.5	0.114	48.8	0.491	-35.4
1300.00	0.361	-157.3	2.986	74.6	0.123	49.3	0.474	-35.1
1400.00	0.355	-162.7	2.772	70.4	0.124	49.6	0.455	-34.8
1500.00	0.366	-169.0	2.632	67.0	0.131	49.0	0.453	-35.0
1600.00	0.375	-175.4	2.486	64.5	0.134	52.2	0.443	-35.5
1700.00	0.374	176.8	2.379	61.3	0.143	51.0	0.439	-37.7
1800.00	0.370	171.8	2.317	58.7	0.152	52.7	0.429	-39.4
1900.00	0.365	167.5	2.212	54.4	0.159	51.1	0.410	-41.7
2000.00	0.378	164.5	2.151	49.8	0.170	49.6	0.396	-43.4

**S-PARAMETERS**

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

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.838	-28.0	13.699	156.6	0.022	74.9	0.950	-12.9
200.00	0.730	-50.0	11.577	138.5	0.038	66.2	0.848	-21.0
300.00	0.598	-68.3	9.624	124.0	0.052	58.1	0.734	-27.2
400.00	0.519	-81.6	8.123	115.7	0.059	56.2	0.661	-28.6
500.00	0.459	-93.4	6.915	107.5	0.065	54.1	0.587	-28.8
600.00	0.420	-106.1	6.163	103.3	0.073	56.0	0.559	-29.0
700.00	0.382	-117.3	5.439	95.2	0.079	55.0	0.530	-28.3
800.00	0.350	-127.2	4.972	91.1	0.088	55.4	0.513	-29.1
900.00	0.331	-136.1	4.347	85.3	0.093	56.3	0.498	-29.8
1000.00	0.321	-144.4	3.957	80.7	0.100	55.3	0.476	-31.9
1100.00	0.310	-152.5	3.645	77.8	0.107	56.4	0.453	-32.5
1200.00	0.302	-160.7	3.419	73.9	0.113	55.7	0.426	-33.3
1300.00	0.295	-166.8	3.333	71.6	0.123	56.4	0.412	-32.8
1400.00	0.294	-171.5	3.084	68.0	0.127	56.1	0.395	-32.3
1500.00	0.308	-177.0	2.917	64.8	0.136	54.7	0.394	-32.5
1600.00	0.319	177.6	2.753	62.7	0.141	57.7	0.385	-32.8
1700.00	0.322	170.4	2.629	59.8	0.153	56.1	0.380	-34.9
1800.00	0.322	165.8	2.555	57.3	0.162	56.8	0.370	-36.5
1900.00	0.321	162.0	2.438	53.4	0.170	54.7	0.352	-38.7
2000.00	0.334	159.4	2.365	49.0	0.182	52.7	0.337	-40.1

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

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.775	-33.7	17.552	151.6	0.020	75.0	0.922	-15.7
200.00	0.638	-58.3	14.050	131.9	0.035	65.7	0.785	-24.3
300.00	0.502	-77.4	11.178	117.2	0.047	58.9	0.661	-29.3
400.00	0.424	-90.9	9.075	109.5	0.054	58.6	0.588	-29.4
500.00	0.371	-102.6	7.636	102.2	0.060	57.7	0.526	-28.8
600.00	0.339	-114.8	6.710	98.8	0.068	60.5	0.500	-28.1
700.00	0.310	-126.0	5.868	91.3	0.075	59.5	0.477	-27.1
800.00	0.289	-135.6	5.329	87.7	0.085	60.2	0.464	-27.6
900.00	0.276	-144.0	4.644	82.4	0.090	60.9	0.453	-28.2
1000.00	0.273	-152.1	4.219	78.2	0.100	59.3	0.432	-30.1
1100.00	0.266	-159.9	3.879	75.6	0.107	61.0	0.416	-30.5
1200.00	0.263	-167.8	3.631	72.0	0.114	59.7	0.389	-31.3
1300.00	0.260	-173.5	3.538	69.8	0.126	59.9	0.377	-30.5
1400.00	0.260	-177.7	3.265	66.4	0.130	59.4	0.361	-30.2
1500.00	0.275	177.5	3.079	63.4	0.140	58.0	0.360	-30.2
1600.00	0.288	172.7	2.904	61.5	0.146	60.3	0.352	-30.5
1700.00	0.294	166.0	2.772	59.0	0.158	58.3	0.346	-32.7
1800.00	0.295	161.7	2.693	56.5	0.169	58.9	0.337	-34.1
1900.00	0.297	158.3	2.569	52.6	0.177	56.5	0.319	-36.1
2000.00	0.309	156.2	2.493	48.3	0.190	54.3	0.303	-37.5

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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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