To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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RENESAS

SILICON TRANSISTOR
μPA811T

HIGH-FREQUENCY LOW NOISE AMPLIFIER
NPN SILICON EPITAXIAL TRANSISTOR
(WITH BUILT-IN 2 × 2SC4228) SMALL MINI MOLD

The μPA811T 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 = 1.9 dB TYP. @ f = 2 GHz, V_{CE} = 1 V, I_C = 3 mA
- High Gain
  $|S_{21e}|^2$ = 6.5 dB TYP. @ f = 2 GHz, V_{CE} = 1 V, I_C = 3 mA
- A Small Mini Mold Package Adopted
- Built-in 2 Transistors (2 × 2SC4228)

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
μPA811T	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.
μPA811T-T1	Taping products (3 KPCS/Reel)	

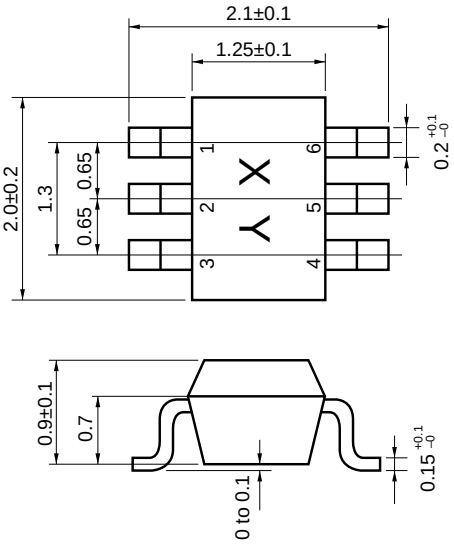
Remark If you require an evaluation sample, please contact an NEC Sales Representative. (Unit sample quantity is 50 pcs.)

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

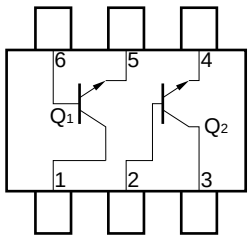
PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	10	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	35	mA
Total Power Dissipation	P_T	150 in 1 element 200 in 2 elements[Note]	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–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. Base (Q2)
3. Collector (Q2)
4. Emitter (Q2)
5. Emitter (Q1)
6. Base (Q1)

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cutoff Current	I_{CBO}	V_{CB} = 10 V, I_E = 0			1.0	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 1 V, I_C = 0			1.0	μA
DC Current Gain	h_{FE}	V_{CE} = 3 V, I_C = 5 mA[Note 1]	80		200	
Gain Bandwidth Product	f_T	V_{CE} = 3 V, I_C = 5 mA	5.5	8.0		GHz
Feed-back Capacitance	C_{re}	V_{CB} = 3 V, I_E = 0, f = 1 MHz[Note 2]			0.7	pF
Insertion Power Gain	$\|S_{21e}\|^2$	V_{CE} = 3 V, I_C = 5 mA, f = 2 GHz	5.5	7.5		dB
Noise Figure	NF	V_{CE} = 3 V, I_C = 5 mA, f = 2 GHz		1.9	3.2	dB
h_{FE} Ratio	h_{FE1}/h_{FE2}	V_{CE} = 3 V, I_C = 5 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: Pw ≤ 350 μs, Duty cycle ≤ 2 %

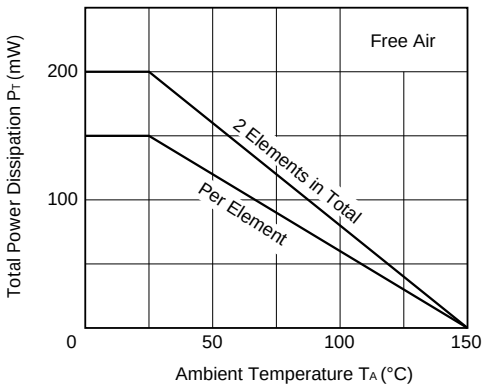
2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

h_{FE} CLASSIFICATION

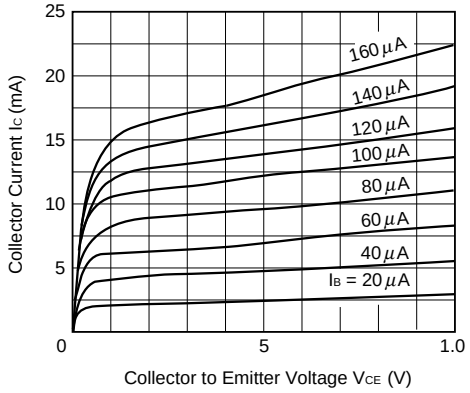
Rank	FB	GB
Marking	44R	45R
h_{FE} Value	80 to 160	125 to 250

TYPICAL CHARACTERISTICS (T_A = 25 °C)

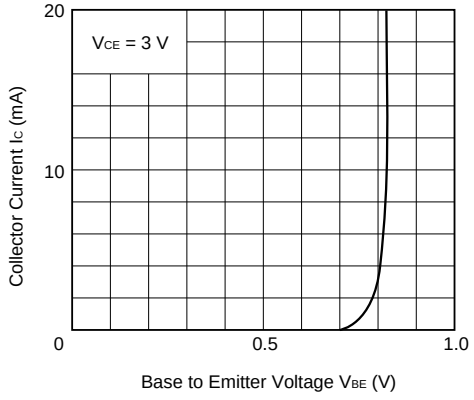
P_T - T_A Characteristics



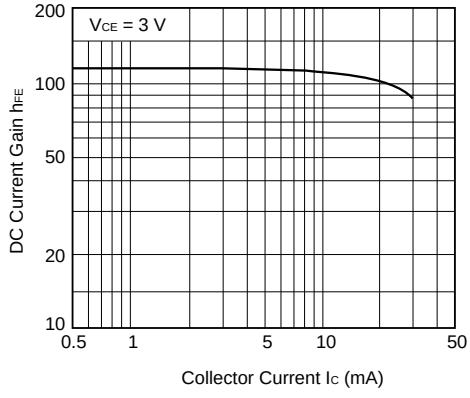
I_C - V_{CE} Characteristics



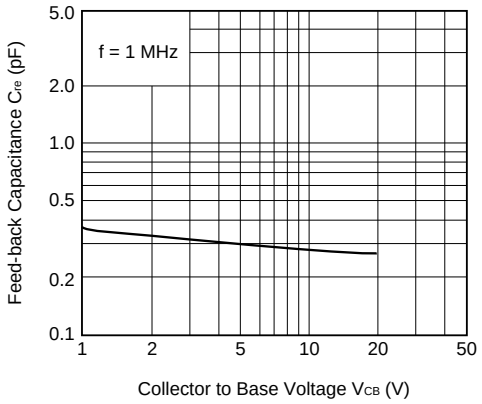
I_C - V_{BE} Characteristics



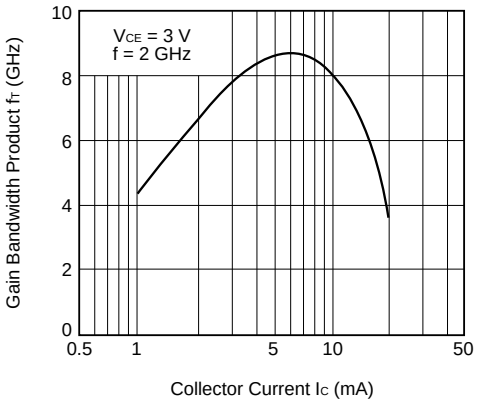
h_{FE} - I_C Characteristics



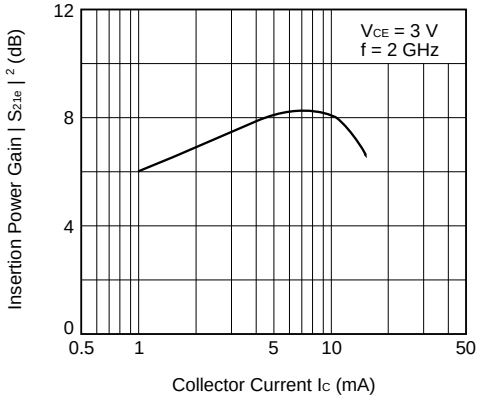
C_{re} - V_{CB} Characteristics



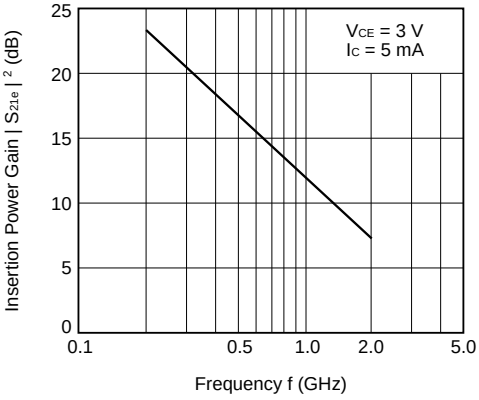
f_T - I_C Characteristics



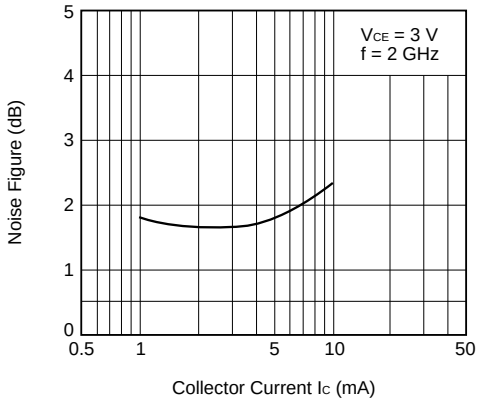
$|S_{21e}|^2$ - I_C Characteristics



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



NF - I_C Characteristics



S-PARAMETERS

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

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.969	–7.9	3.625	172.0	0.016	85.0	0.999	–3.6
200.00	0.957	–14.7	3.405	165.9	0.031	80.7	0.989	–6.4
300.00	0.909	–21.2	3.366	156.4	0.046	73.3	0.961	–10.4
400.00	0.909	–27.4	3.218	153.3	0.059	70.9	0.955	–12.4
500.00	0.895	–33.5	3.147	144.8	0.071	66.4	0.913	–14.2
600.00	0.876	–42.4	3.150	141.2	0.083	65.6	0.913	–16.7
700.00	0.821	–49.4	3.040	132.0	0.092	60.7	0.896	–18.0
800.00	0.750	–56.0	2.966	126.2	0.105	58.0	0.888	–21.1
900.00	0.710	–60.5	2.779	119.6	0.110	55.8	0.869	–23.3
1000.00	0.673	–65.3	2.640	114.1	0.119	51.5	0.840	–27.3
1100.00	0.658	–72.2	2.532	110.6	0.124	51.0	0.805	–28.9
1200.00	0.625	–78.4	2.504	105.6	0.129	48.2	0.758	–30.8
1300.00	0.573	–85.4	2.427	102.7	0.138	46.2	0.738	–31.1
1400.00	0.537	–91.2	2.350	96.2	0.137	44.5	0.706	–31.5
1500.00	0.505	–97.1	2.305	92.3	0.143	42.0	0.709	–32.1
1600.00	0.479	–103.2	2.210	88.3	0.142	43.8	0.693	–32.6
1700.00	0.448	–110.2	2.152	83.6	0.148	41.9	0.689	–35.3
1800.00	0.424	–115.4	2.101	81.0	0.155	42.9	0.678	–36.5
1900.00	0.399	–120.9	2.034	75.9	0.157	40.4	0.650	–39.1
2000.00	0.389	–127.2	1.987	71.7	0.165	38.1	0.631	–40.5

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

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.903	–14.0	8.928	165.7	0.016	89.5	0.985	–6.5
200.00	0.856	–25.6	8.248	154.2	0.028	74.6	0.951	–11.2
300.00	0.763	–36.2	7.535	141.5	0.042	68.0	0.889	–16.4
400.00	0.713	–44.7	6.882	135.1	0.051	65.0	0.851	–18.6
500.00	0.656	–52.3	6.233	125.9	0.058	61.2	0.785	–20.1
600.00	0.602	–62.4	5.854	121.4	0.067	61.4	0.764	–21.7
700.00	0.536	–70.5	5.342	112.1	0.072	58.8	0.733	–21.9
800.00	0.466	–77.7	4.989	106.9	0.080	57.9	0.717	–23.8
900.00	0.412	–82.8	4.471	100.4	0.084	58.0	0.696	–25.0
1000.00	0.374	–87.8	4.123	95.3	0.091	55.7	0.669	–27.6
1100.00	0.346	–93.4	3.871	92.3	0.095	56.9	0.639	–28.3
1200.00	0.315	–100.2	3.667	88.1	0.100	55.9	0.603	–29.2
1300.00	0.285	–106.7	3.575	86.0	0.108	55.8	0.587	–28.7
1400.00	0.263	–112.8	3.367	81.3	0.111	55.6	0.566	–28.3
1500.00	0.245	–119.7	3.214	78.3	0.118	54.5	0.570	–28.2
1600.00	0.230	–126.7	3.038	75.5	0.121	57.3	0.561	–28.3
1700.00	0.214	–135.0	2.918	72.3	0.129	55.9	0.559	–30.5
1800.00	0.202	–141.2	2.821	69.9	0.137	57.2	0.553	–31.5
1900.00	0.192	–147.9	2.696	65.8	0.143	54.8	0.532	–33.7
2000.00	0.193	–154.2	2.613	61.8	0.152	53.2	0.515	–34.7

S-PARAMETERS

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

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.848	–18.5	12.800	161.3	0.015	78.5	0.974	–8.3
200.00	0.766	–33.1	11.314	146.2	0.026	71.6	0.913	–14.0
300.00	0.647	–45.5	9.862	132.5	0.038	66.4	0.829	–19.0
400.00	0.575	–54.3	8.611	125.0	0.044	64.0	0.778	–20.4
500.00	0.506	–62.0	7.527	116.3	0.052	62.0	0.712	–20.9
600.00	0.450	–71.5	6.847	112.2	0.058	63.0	0.691	–21.5
700.00	0.393	–79.6	6.116	103.6	0.064	61.6	0.666	–21.0
800.00	0.335	–86.5	5.624	99.2	0.072	61.8	0.652	–22.2
900.00	0.290	–91.7	4.970	93.3	0.076	62.4	0.637	–23.1
1000.00	0.260	–97.0	4.521	88.7	0.084	60.4	0.616	–25.3
1100.00	0.236	–102.5	4.202	86.2	0.088	62.0	0.592	–25.7
1200.00	0.213	–109.7	3.947	82.4	0.094	61.2	0.561	–26.4
1300.00	0.193	–116.7	3.792	80.3	0.102	61.3	0.550	–25.7
1400.00	0.178	–123.3	3.468	76.1	0.106	61.1	0.532	–25.1
1500.00	0.168	–131.8	3.408	73.8	0.115	60.2	0.538	–25.1
1600.00	0.161	–139.7	3.218	71.4	0.118	62.3	0.533	–25.2
1700.00	0.153	–149.2	3.085	68.7	0.128	60.8	0.532	–27.5
1800.00	0.148	–156.1	2.980	66.4	0.137	61.9	0.527	–28.5
1900.00	0.143	–163.5	2.840	62.7	0.143	59.4	0.507	–30.7
2000.00	0.149	–169.9	2.752	58.8	0.153	57.6	0.492	–31.8

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