

NPN EPITAXIAL SILICON TRANSISTOR FOR UHF TUNER OSC/MIX

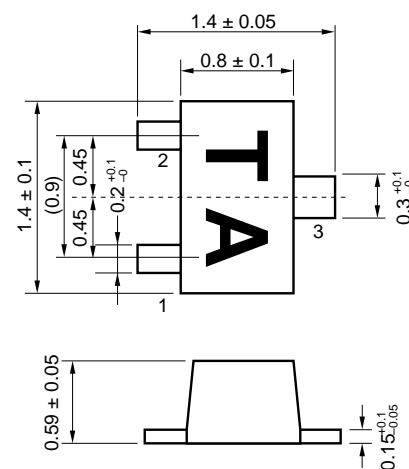
FEATURE

- Ultra super mini-mold thin flat package
(1.4 mm × 0.8 mm × 0.59 mm: TYP.)
- Contains same chip as 2SC5004

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	V _{CB0}	20	V
Collector to Emitter Voltage	V _{CEO}	12	V
Emitter to Base Voltage	V _{EBO}	3	V
Collector Current	I _C	60	mA
Total Power Dissipation	P _T	100	mW
Junction Temperature	T _J	125	°C
Storage Temperature	T _{stg}	-65 to +125	°C

PACKAGE DIMENSIONS (in mm)



PIN CONNECTIONS

- 1: Emitter
- 2: Base
- 3: Collector

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I _{CBO}	V _{CB} = 15 V, I _E = 0			100	nA
Emitter Cut-off Current	I _{EBO}	V _{EB} = 1 V, I _C = 0			100	nA
Collector to Emitter Saturation Voltage	V _{CE(sat)}	h _{FE} = 10, I _C = 5 mA			0.5	V
DC Current Gain	h _{FE}	V _{CE} = 5 V, I _C = 5 mA ^{Note 1}	60		120	
Gain Bandwidth Product	f _T	V _{CE} = 5 V, I _C = 5 mA, f = 1 GHz	3.0	4.3		GHz
Reverse Transfer Capacitance	C _{re}	V _{CB} = 5 V, I _E = 0, f = 1 MHz ^{Note 2}		0.6	1.2	pF
Insertion Power Gain	S _{21e} ²	V _{CE} = 5 V, I _C = 5 mA, f = 1 GHz	5.0			dB

Notes 1. Pulse measurement P_w ≤ 350 μs, duty cycle ≤ 2 %

2. Collector to base capacitance measured by capacitance meter (automatic balance bridge method) when emitter pin is connected to the guard pin.

Because this product uses high-frequency process, avoid excessive input of static electricity, etc.

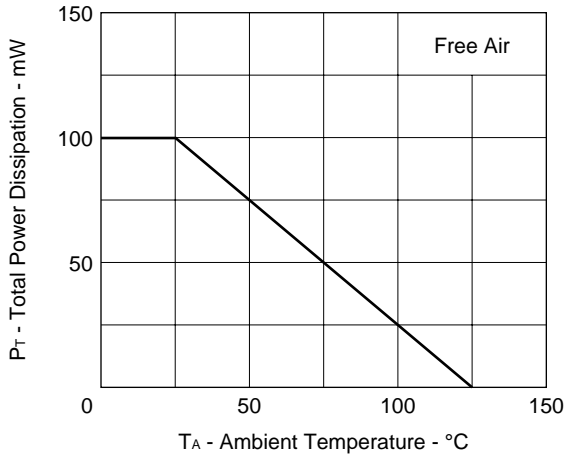
The information in this document is subject to change without notice.

h_{FE} CLASSIFICATION

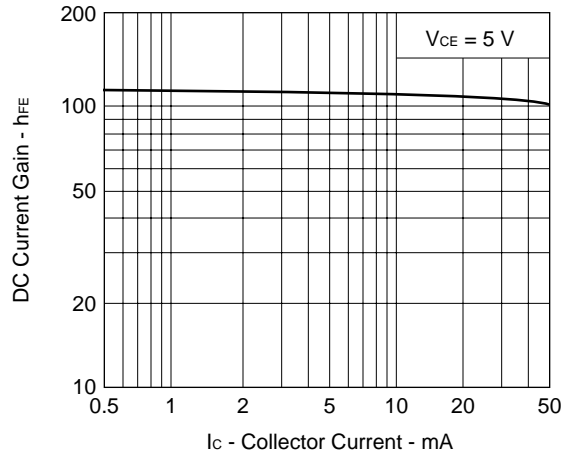
RANK	EB	FB
Marking	TA	TB
h _{FE}	60 to 90	80 to 120

TYPICAL CHARACTERISTICS (T_A = 25 °C)

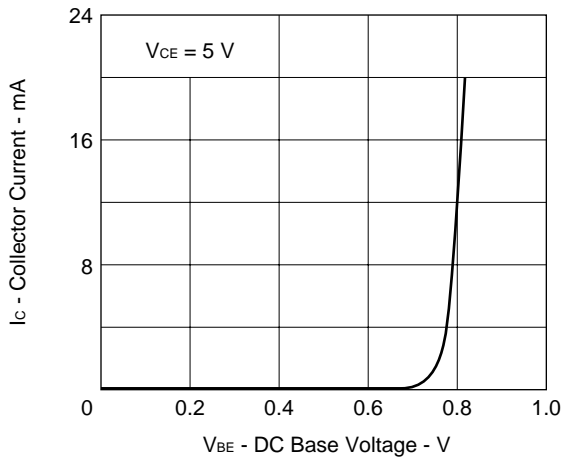
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



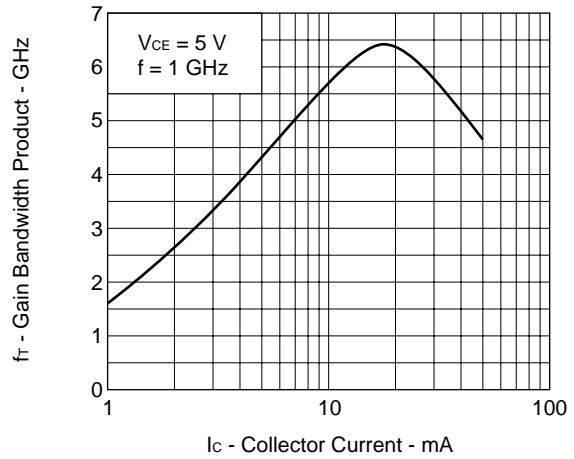
DC CURRENT GAIN vs. COLLECTOR CURRENT



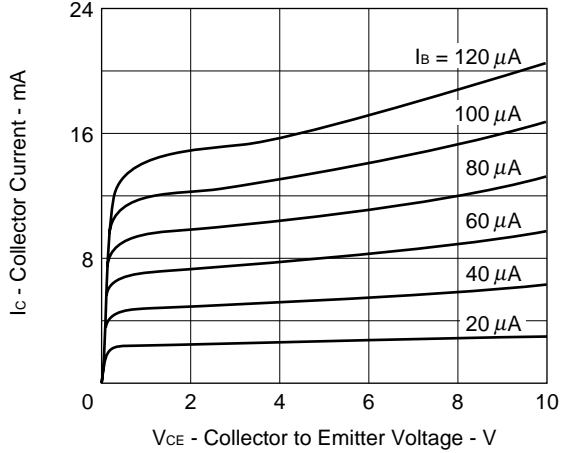
COLLECTOR CURRENT vs. DC BASE VOLTAGE



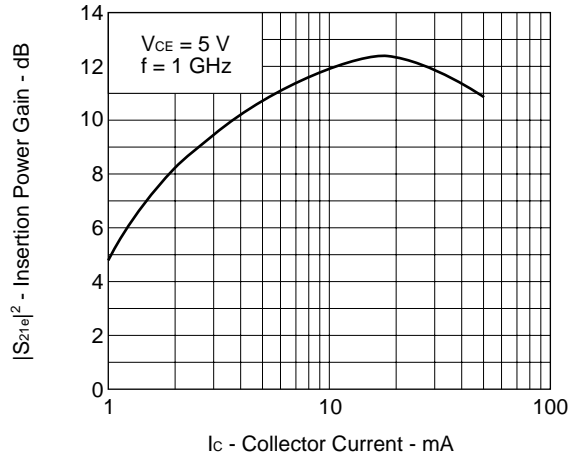
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



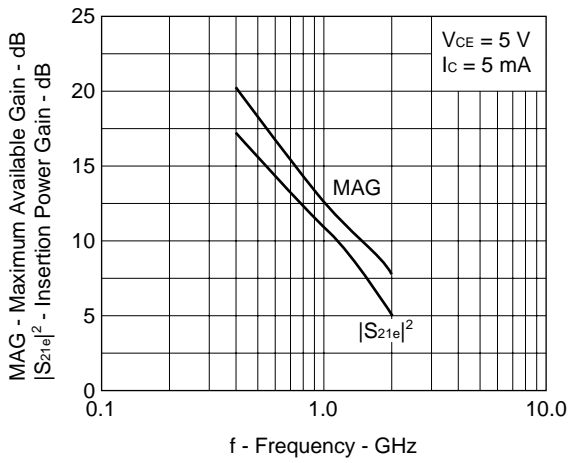
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



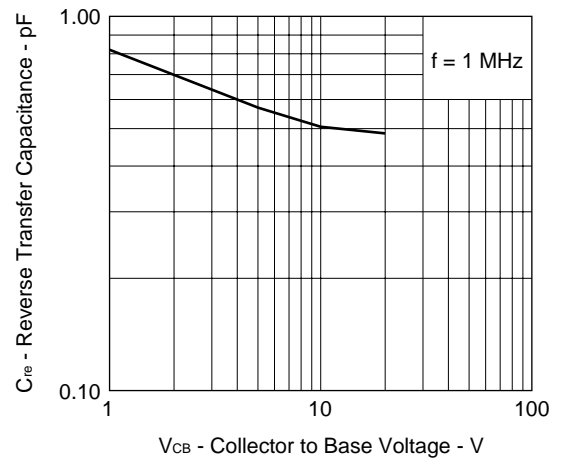
INSERTION POWER GAIN vs. COLLECTOR CURRENT



MAXIMUM AVAILABLE GAIN/INSERTION POWER GAIN vs. FREQUENCY



REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



2SC5431 S PARAMETER

V_{CE} = 5.0 V I_c = 5.0 mA, Z₀ = 50 Ω

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.675	-66.0	10.641	135.2	0.052	57.8	0.786	-29.4
400.00	0.550	-108.8	7.098	111.6	0.074	46.8	0.546	-41.0
600.00	0.513	-133.2	5.218	96.6	0.088	45.0	0.428	-47.0
800.00	0.489	-149.5	4.145	88.0	0.097	45.5	0.377	-50.1
1000.00	0.487	-162.2	3.458	81.6	0.108	47.9	0.345	-50.9
1200.00	0.501	-170.9	2.973	75.0	0.119	50.1	0.316	-51.8
1400.00	0.508	-176.5	2.566	69.0	0.133	52.1	0.290	-54.8
1600.00	0.498	177.3	2.279	64.7	0.143	55.0	0.269	-59.4
1800.00	0.502	169.8	2.018	60.4	0.153	56.4	0.257	-65.0
2000.00	0.524	164.0	1.800	56.0	0.162	56.5	0.246	-71.1
2200.00	0.545	160.2	1.645	50.1	0.176	55.6	0.233	-78.4
2400.00	0.560	156.9	1.559	45.5	0.191	55.4	0.229	-88.3
2600.00	0.571	153.6	1.475	43.0	0.210	56.1	0.236	-97.3
2800.00	0.585	150.5	1.337	39.9	0.222	57.1	0.239	-104.3
3000.00	0.602	148.5	1.246	35.4	0.226	57.1	0.240	-110.6

V_{CE} = 5.0 V I_c = 3.0 mA, Z₀ = 50 Ω

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.723	-49.7	7.443	139.6	0.057	60.0	0.839	-24.0
400.00	0.525	-86.6	5.234	115.4	0.082	45.9	0.617	-35.2
600.00	0.444	-111.6	3.929	99.6	0.094	41.3	0.501	-41.5
800.00	0.390	-129.2	3.168	90.6	0.098	39.8	0.452	-45.1
1000.00	0.362	-144.4	2.663	84.0	0.106	40.3	0.424	-46.4
1200.00	0.359	-156.6	2.247	77.1	0.115	42.2	0.397	-47.3
1400.00	0.362	-164.8	1.987	70.4	0.124	45.5	0.372	-50.3
1600.00	0.354	-172.8	1.784	66.0	0.131	49.1	0.349	-54.8
1800.00	0.356	178.2	1.589	61.6	0.138	52.4	0.338	-60.2
2000.00	0.374	170.5	1.426	57.1	0.144	53.2	0.328	-65.8
2200.00	0.397	165.6	1.316	51.3	0.155	54.2	0.315	-72.5
2400.00	0.414	162.0	1.253	46.8	0.169	55.1	0.310	-81.4
2600.00	0.429	158.2	1.186	44.2	0.185	56.6	0.320	-89.7
2800.00	0.446	154.8	1.083	41.4	0.196	58.6	0.329	-96.2
3000.00	0.465	152.3	1.018	36.2	0.204	59.2	0.331	-102.7

V_{CE} = 5.0 V, I_c = 1.0 mA, Z₀ = 50 Ω

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.886	-32.7	3.235	150.8	0.066	66.7	0.948	-12.9
400.00	0.711	-62.0	2.597	127.7	0.109	49.9	0.821	-22.2
600.00	0.616	-86.9	2.130	109.4	0.131	39.3	0.722	-30.2
800.00	0.538	-104.5	1.844	97.1	0.139	32.5	0.682	-36.4
1000.00	0.481	-120.1	1.577	87.9	0.145	27.7	0.666	-39.6
1200.00	0.448	-134.2	1.362	79.1	0.148	26.0	0.639	-41.9
1400.00	0.437	-145.2	1.222	70.8	0.148	27.7	0.611	-45.7
1600.00	0.421	-154.8	1.116	64.9	0.144	29.8	0.584	-50.7
1800.00	0.407	-165.5	1.008	59.5	0.138	32.6	0.574	-56.6
2000.00	0.417	-175.6	0.915	54.3	0.135	34.1	0.566	-62.5
2200.00	0.439	177.1	0.849	47.8	0.138	37.8	0.550	-69.0
2400.00	0.455	172.0	0.812	43.3	0.143	42.2	0.542	-77.8
2600.00	0.466	167.2	0.768	40.5	0.152	47.0	0.558	-86.0
2800.00	0.480	162.4	0.701	37.4	0.159	51.8	0.573	-92.3
3000.00	0.499	158.8	0.661	32.5	0.167	55.6	0.566	-98.7

V_{CE} = 3.0 V, I_c = 5.0 mA, Z₀ = 50 Ω

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.597	-65.7	9.659	130.5	0.056	53.8	0.719	-35.9
400.00	0.431	-106.4	6.136	107.4	0.075	44.3	0.463	-49.2
600.00	0.375	-130.0	4.420	93.7	0.086	43.7	0.354	-55.6
800.00	0.347	-146.7	3.497	86.2	0.093	44.8	0.305	-58.8
1000.00	0.340	-160.1	2.911	80.3	0.105	47.0	0.272	-59.9
1200.00	0.348	-169.5	2.441	74.2	0.116	49.1	0.246	-61.7
1400.00	0.355	-175.6	2.153	68.4	0.130	51.6	0.225	-66.0
1600.00	0.352	177.6	1.925	64.4	0.142	54.4	0.210	-71.9
1800.00	0.359	170.0	1.706	60.4	0.152	56.4	0.200	-78.5
2000.00	0.381	163.8	1.533	56.1	0.161	56.4	0.192	-86.1
2200.00	0.404	160.0	1.411	50.7	0.175	55.8	0.185	-96.3
2400.00	0.421	157.0	1.343	46.6	0.191	55.7	0.191	-107.2
2600.00	0.435	153.7	1.270	44.3	0.209	56.3	0.206	-115.6
2800.00	0.454	150.8	1.162	41.6	0.220	57.4	0.218	-122.2
3000.00	0.472	149.0	1.088	36.6	0.227	57.0	0.228	-129.3

V_{CE} = 3.0 V, I_c = 3.0 mA, Z₀ = 50 Ω

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.707	-53.0	7.303	137.7	0.064	58.0	0.814	-27.8
400.00	0.514	-91.3	5.041	113.3	0.091	43.6	0.575	-40.8
600.00	0.439	-116.2	3.754	97.8	0.102	38.9	0.457	-48.1
800.00	0.391	-133.8	3.018	88.9	0.107	37.8	0.404	-52.1
1000.00	0.369	-148.6	2.525	82.3	0.116	38.2	0.372	-53.8
1200.00	0.370	-159.9	2.132	75.2	0.125	40.2	0.343	-55.5
1400.00	0.374	-167.5	1.885	68.7	0.135	43.3	0.318	-59.4
1600.00	0.367	-175.1	1.693	64.2	0.141	46.6	0.299	-64.8
1800.00	0.370	176.3	1.506	59.8	0.148	49.4	0.289	-70.7
2000.00	0.390	168.9	1.355	55.2	0.155	50.2	0.280	-77.1
2200.00	0.413	164.3	1.251	49.5	0.167	50.7	0.268	-85.6
2400.00	0.430	160.7	1.189	45.0	0.180	51.9	0.272	-95.6
2600.00	0.444	157.1	1.126	42.7	0.196	53.3	0.286	-104.0
2800.00	0.462	153.8	1.028	39.5	0.206	54.8	0.297	-110.4
3000.00	0.480	151.4	0.964	34.6	0.214	55.2	0.303	-117.3

V_{CE} = 3.0 V, I_c = 1.0 mA, Z₀ = 50 Ω

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200.00	0.878	-34.4	3.225	149.4	0.076	65.6	0.939	-14.8
400.00	0.699	-64.9	2.556	125.7	0.123	48.1	0.796	-25.3
600.00	0.607	-90.1	2.080	107.1	0.148	37.3	0.691	-34.0
800.00	0.531	-107.9	1.791	94.8	0.154	30.0	0.647	-40.4
1000.00	0.477	-123.5	1.524	85.4	0.161	25.2	0.626	-43.9
1200.00	0.450	-137.4	1.316	76.4	0.164	23.3	0.596	-46.6
1400.00	0.442	-148.0	1.184	68.0	0.163	24.6	0.567	-50.9
1600.00	0.427	-157.3	1.081	62.1	0.159	26.6	0.543	-56.5
1800.00	0.415	-167.7	0.976	56.8	0.152	28.8	0.534	-62.8
2000.00	0.426	-177.6	0.883	51.5	0.148	29.8	0.526	-69.2
2200.00	0.450	-175.6	0.821	45.2	0.150	33.0	0.509	-76.5
2400.00	0.467	170.7	0.786	40.7	0.153	37.3	0.508	-86.2
2600.00	0.477	166.1	0.741	37.9	0.161	42.2	0.527	-94.4
2800.00	0.492	161.5	0.676	34.8	0.167	46.5	0.541	-100.8
3000.00	0.511	158.0	0.638	29.9	0.174	50.0	0.536	-107.8

[MEMO]

[MEMO]

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.

While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

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.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.