

NPN EPITAXIAL SILICON TRANSISTOR
FOR UHF TUNER OSC/MIX

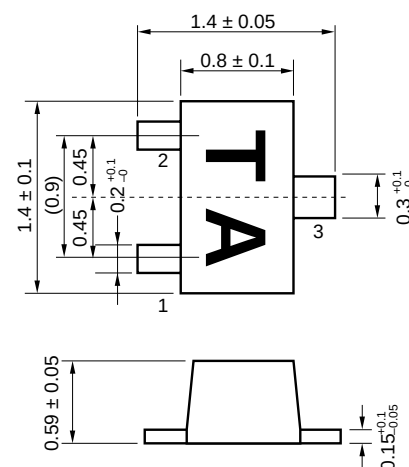
FEATURE

- 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 ($T_A = 25^\circ\text{C}$)

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	V_{CBO}	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	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +125	$^\circ\text{C}$

PACKAGE DIMENSIONS (in mm)



PIN CONNECTIONS

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

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	$V_{CB} = 15\text{ V}, I_E = 0$			100	nA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1\text{ V}, I_C = 0$			100	nA
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$h_{FE} = 10, I_C = 5\text{ mA}$			0.5	V
DC Current Gain	h_{FE}	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA}$ ^{Note 1}	60		120	
Gain Bandwidth Product	f_T	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, f = 1\text{ GHz}$	3.0	4.3		GHz
Reverse Transfer Capacitance	C_{re}	$V_{CB} = 5\text{ V}, I_E = 0, f = 1\text{ MHz}$ ^{Note 2}		0.6	1.2	pF
Insertion Power Gain	$ S_{21e} ^2$	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, f = 1\text{ GHz}$	5.0			dB

Notes 1. Pulse measurement $P_w \leq 350\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

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.

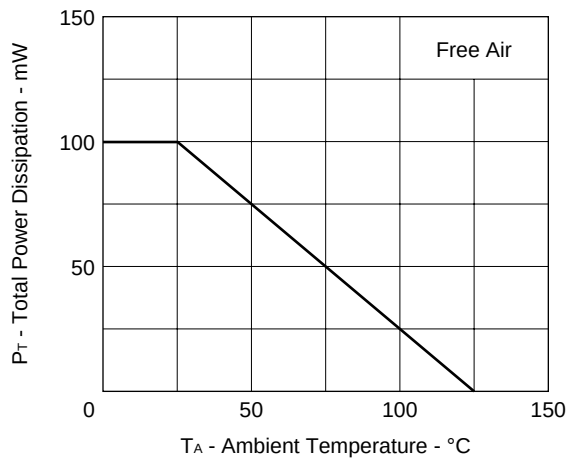
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h_{FE} CLASSIFICATION

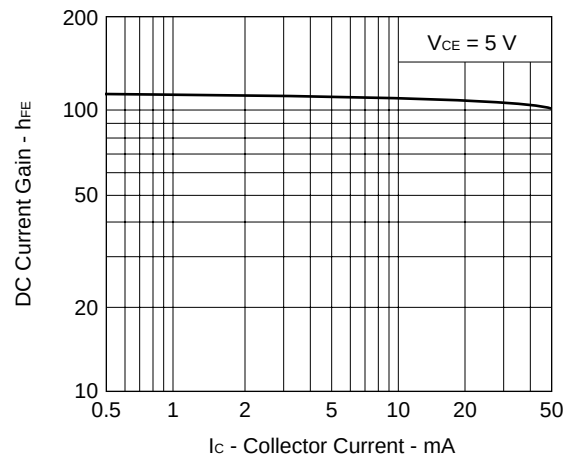
RANK	EB	FB
Marking	TA	TB
h_{FE}	60 to 90	80 to 120

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

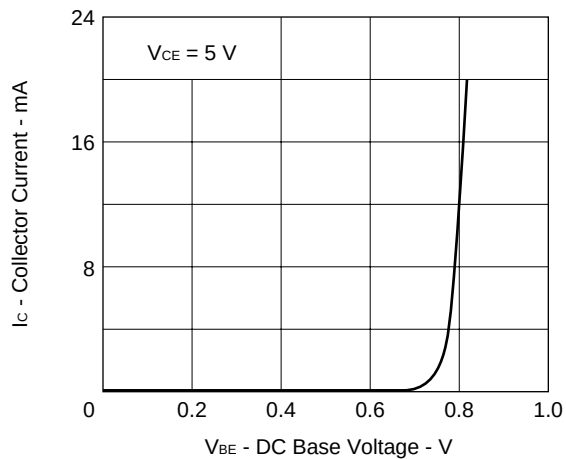
TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



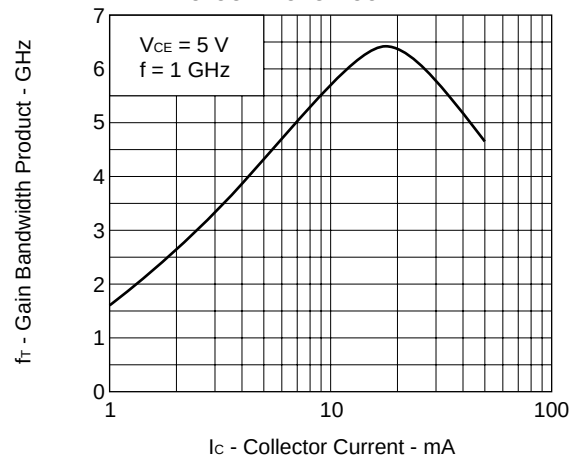
DC CURRENT GAIN vs. COLLECTOR CURRENT

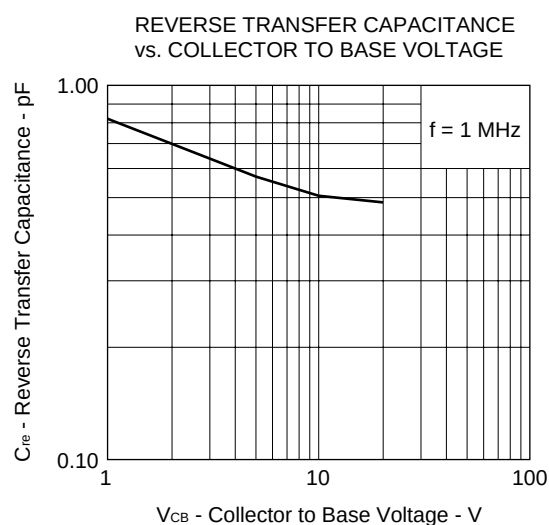
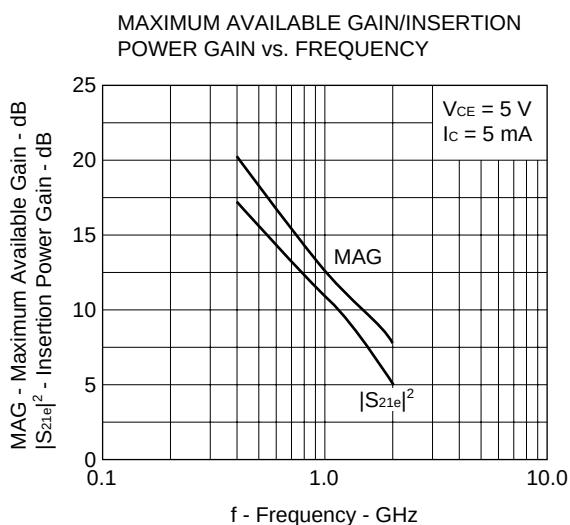
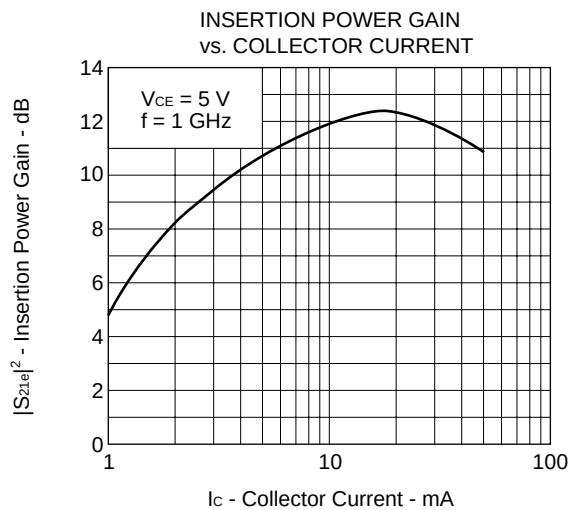
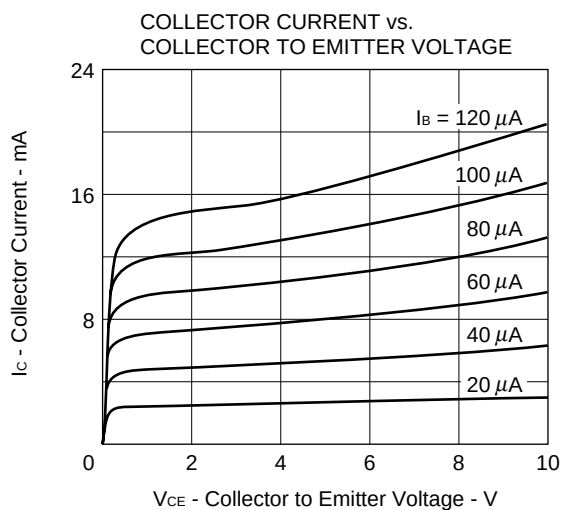


COLLECTOR CURRENT vs. DC BASE VOLTAGE



GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT





2SC5431 S PARAMETER

 $V_{CE} = 5.0\text{ V}$ $I_C = 5.0\text{ mA}$, $Z_0 = 50\ \Omega$

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

 $V_{CE} = 5.0\text{ V}$ $I_C = 3.0\text{ mA}$, $Z_0 = 50\ \Omega$

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

 $V_{CE} = 5.0\text{ V}$ $I_C = 1.0\text{ mA}$, $Z_0 = 50\ \Omega$

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

$V_{CE} = 3.0 \text{ V}$, $I_C = 5.0 \text{ mA}$, $Z_0 = 50 \Omega$

FREQUENCY		S ₁₁		S ₂₁		S ₁₂		S ₂₂	
MHz	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	

$V_{CE} = 3.0 \text{ V}$, $I_C = 3.0 \text{ mA}$, $Z_0 = 50 \Omega$

FREQUENCY		S ₁₁		S ₂₁		S ₁₂		S ₂₂	
MHz	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	

$V_{CE} = 3.0 \text{ V}$, $I_C = 1.0 \text{ mA}$, $Z_0 = 50 \Omega$

FREQUENCY		S ₁₁		S ₂₁		S ₁₂		S ₂₂	
MHz	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	

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