

**NPN EPITAXIAL SILICON TRANSISTOR
HIGH FREQUENCY LOW DISTORTION AMPLIFIER**

DESCRIPTION

The 2SC5337 is a high-frequency transistor designed for a low distortion and low noise amplifier on the VHF to UHF band, which is suitable for the CATV, tele-communication, and such.

FEATURES

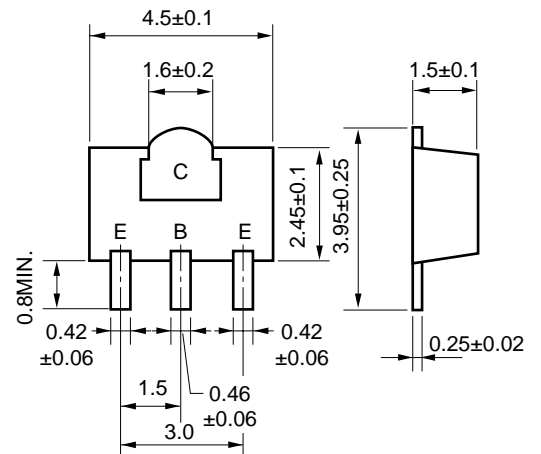
- Low distortion
 $IM_2 = 59 \text{ dB TYP. @ } V_{CE} = 10 \text{ V, } I_C = 50 \text{ mA}$
 $IM_3 = 82 \text{ dB TYP. @ } V_{CE} = 10 \text{ V, } I_C = 50 \text{ mA}$
- Low noise
 $NF = 1.5 \text{ dB TYP. @ } V_{CE} = 10 \text{ V, } I_C = 10 \text{ mA, } f = 1 \text{ GHz}$
- New power mini-mold package version of a 4-pin type gain-improved on the 2SC3356

ABSOLUTE MAXIMUM RATINGS ($T_A = 25 \text{ }^\circ\text{C}$)

Parameter	Symbol	Rating	Unit
Collector to Base Voltage	V_{CB0}	30	V
Collector to Emitter Voltage	V_{CE0}	15	V
Emitter to Base Voltage	V_{EB0}	3.0	V
Collector Current	I_C	250	mA
Total Power Dissipation	P_T ^{Note1}	2.0	W
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$

PACKAGE DIMENSIONS

(in millimeters)



PIN CONNECTIONS

- E: Emitter
- C: Collector
- B: Base

Note 1. $0.7 \text{ mm} \times 16 \text{ cm}^2$ double sided ceramic substrate (Copper plating)

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cutoff Current	I _{CBO}	V _{CB} = 20 V, I _E = 0		0.01	5.0	μA
Emitter Cutoff Current	I _{EBO}	V _{EB} = 2 V, I _C = 0		0.03	5.0	μA
DC Current Gain	h _{FE}	V _{CE} = 10 V, I _C = 50 mA ^{Note2}	40	120	200	
Insertion Power Gain	S _{21e} ²	V _{CE} = 10 V, I _C = 50 mA, f = 1 GHz	7.0	8.3		dB
Noise Figure 1	NF ₁	V _{CE} = 10 V, I _C = 50 mA, f = 500 MHz ^{Note3}		1.5	3.5	dB
Noise Figure 2	NF ₂	V _{CE} = 10 V, I _C = 50 mA, f = 1 GHz ^{Note3}		2.0	3.5	dB
2nd Order Intermodulation Distortion	IM ₂	V _{CE} = 10 V, I _C = 50 mA, R _S = R _L = 75 Ω P _{in} = 105 dB μV/75 Ω, f ₁ = 190 MHz f ₂ = 90 MHz, f = f ₁ - f ₂		59.0		dB
3rd Order Intermodulation Distortion	IM ₃	V _{CE} = 10 V, I _C = 50 mA, R _S = R _L = 75 Ω P _{in} = 105 dB μV/75 Ω, f ₁ = 190 MHz f ₂ = 200 MHz, f = 2 × f ₁ - f ₂		82.0		dB

Notes 2. Pulse measurement: PW ≤ 350 μS, Duty Cycle ≤ 2 %

3. R_S = R_L = 50 Ω, tuned

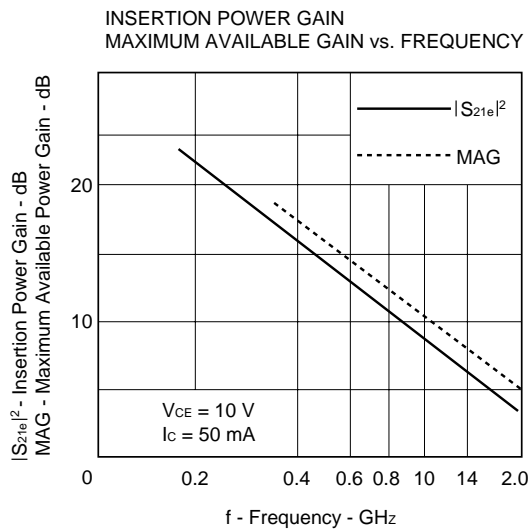
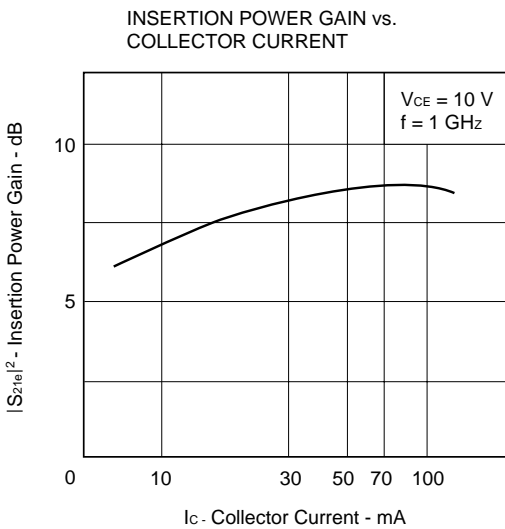
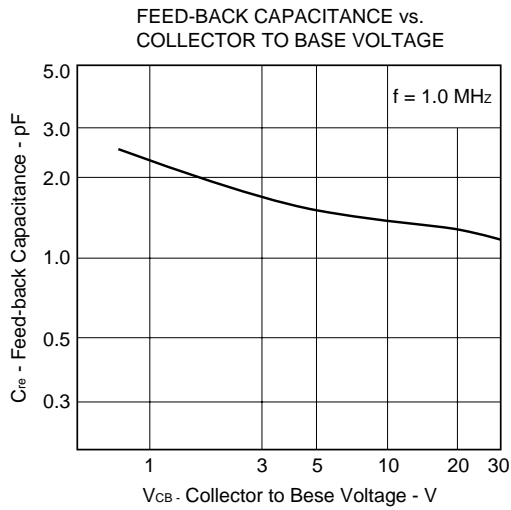
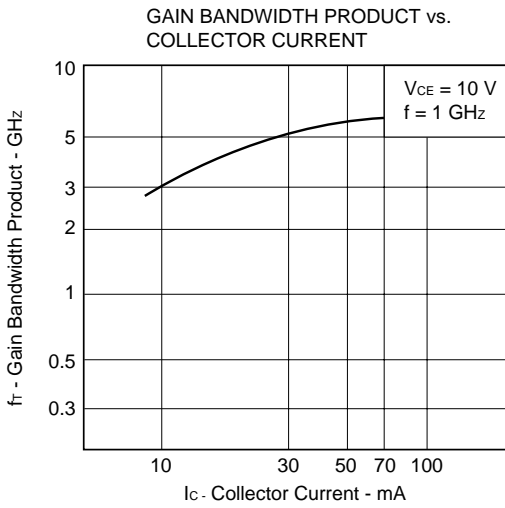
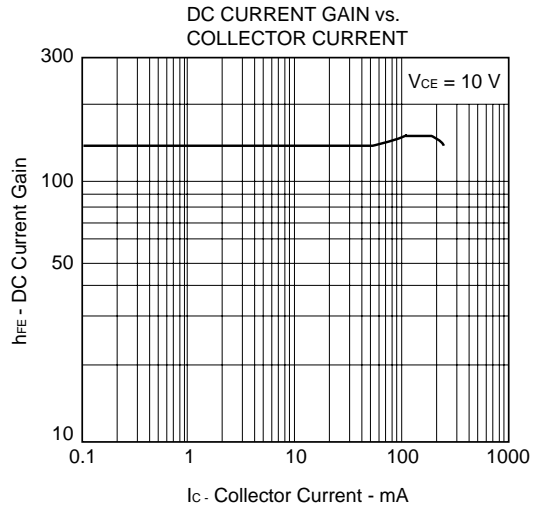
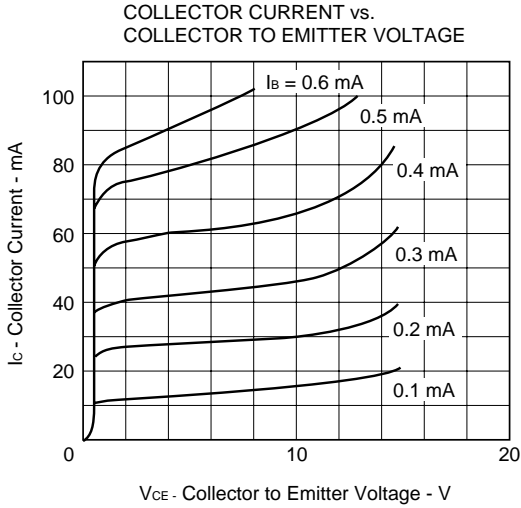
h_{FE} Classification

Rank	QQ	QR	QS
Marking	QQ	QR	QS
h _{FE}	40 to 80	60 to 120	100 to 200

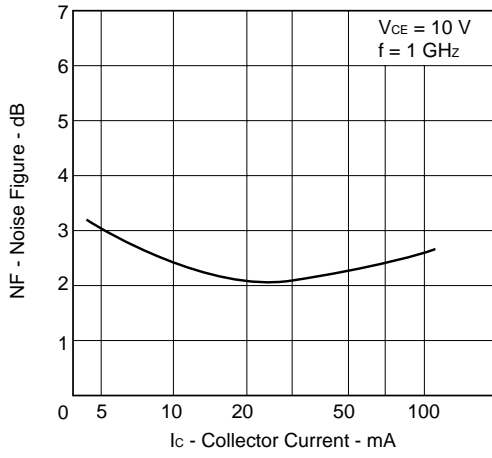
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TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$)

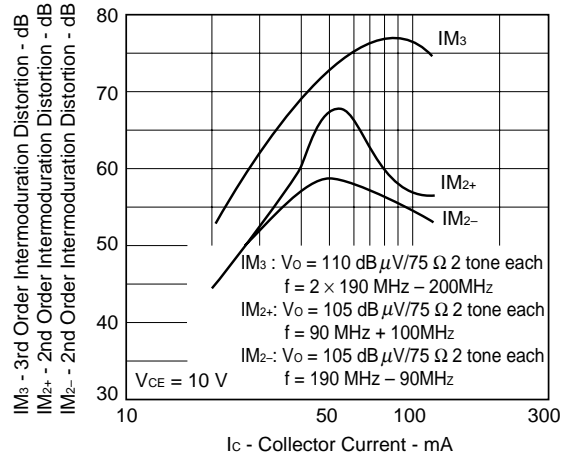
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NOISE FIGURE vs. COLLECTOR CURRENT



3RD ORDER INTERMODULATION DISTORTION, 2ND ORDER INTERMODULATION DISTORTION (+) AND 2ND ORDER INTERMODULATION DISTORTION (-) vs. COLLECTOR CURRENT



S-PARAMETER

V_{CE} = 10 V, f = 1 GHz

I _C (mA)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
10.0	.553	175.2	2.007	64.7	.127	67.4	.336	- 91.0
30.0	.500	168.1	2.492	68.0	.156	69.9	.247	- 122.5
50.0	.490	166.3	2.561	68.1	.158	70.3	.223	- 131.3
70.0	.490	165.3	2.640	69.0	.167	71.2	.253	- 136.0
100.0	.492	164.8	2.601	68.6	.162	69.3	.225	- 138.1

V_{CE} = 10 V, I_C = 50 mA

f (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	.592	- 136.6	24.447	108.4	.030	50.5	.465	- 95.2
200	.577	- 160.0	12.746	96.5	.042	57.4	.335	- 123.0
300	.566	- 168.5	8.591	91.2	.055	67.3	.276	- 130.1
400	.558	- 174.0	6.438	87.2	.066	70.8	.269	- 132.7
500	.554	- 177.5	5.160	84.1	.083	68.6	.262	- 134.5
600	.542	- 179.4	4.312	82.3	.095	70.6	.262	- 139.1
700	.527	177.9	3.729	80.9	.112	71.2	.251	- 133.4
800	.519	175.8	3.292	78.7	.123	74.6	.252	- 132.9
900	.509	174.4	2.983	77.7	.136	75.0	.252	- 124.6
1000	.514	171.0	2.759	76.6	.151	75.3	.257	- 125.3
1100	.498	166.8	2.648	75.4	.166	75.8	.278	- 118.4
1200	.494	167.3	2.665	71.3	.180	74.7	.306	- 120.2
1300	.487	161.7	2.478	63.0	.194	75.9	.314	- 124.2
1400	.467	160.4	2.177	60.1	.216	74.7	.273	- 124.0
1500	.477	157.4	1.973	57.9	.230	74.9	.281	- 123.2
1600	.471	154.5	1.815	57.2	.240	73.2	.291	- 120.2
1700	.467	152.5	1.754	55.3	.260	72.9	.316	- 118.7
1800	.469	151.3	1.639	54.4	.273	70.5	.312	- 123.1
1900	.465	149.1	1.568	53.4	.285	69.9	.316	- 125.5
2000	.468	147.0	1.475	52.6	.289	69.3	.323	- 126.3

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S-PARAMETER

V_{CE} = 10 V, I_C = 100 mA

f (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	.564	-146.0	24.857	105.3	.019	50.2	.284	-116.1
200	.586	-165.8	12.845	94.5	.026	59.6	.204	-129.9
300	.576	-171.9	8.681	89.7	.041	73.2	.199	-138.7
400	.561	-176.3	6.541	86.3	.048	77.8	.200	-140.1
500	.550	179.9	5.209	83.5	.060	81.4	.196	-137.0
600	.540	178.2	4.358	82.2	.069	82.0	.182	-137.6
700	.538	175.7	3.772	80.6	.086	84.2	.216	-131.0
800	.521	174.6	3.332	78.4	.099	85.1	.210	-130.5
900	.510	173.2	3.037	77.0	.113	85.4	.222	-122.2
1000	.524	168.5	2.780	76.9	.119	83.5	.198	-120.1
1100	.502	165.2	2.680	75.3	.136	86.8	.213	-114.9
1200	.489	165.9	2.718	72.3	.156	83.5	.246	-114.9
1300	.488	161.1	2.578	63.0	.177	85.5	.251	-122.8
1400	.472	157.9	2.213	58.7	.184	81.8	.209	-127.2
1500	.480	155.3	2.012	57.8	.194	85.3	.252	-114.1
1600	.470	153.4	1.846	57.2	.219	82.2	.242	-117.6
1700	.465	151.1	1.745	56.5	.235	82.4	.240	-112.9
1800	.464	149.5	1.677	54.9	.248	79.0	.263	-121.9
1900	.460	147.9	1.571	53.3	.249	78.6	.281	-120.0
2000	.466	146.0	1.514	52.3	.264	77.4	.276	-124.0

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