PRELIMINARY DATA SHEET

NEC

Silicon Transistor

2SC5337

NPN EPITAXIAL SILICON TRANSISTOR
HIGH FREQUENCY LOW DISTORTION AMPLIFIER

DESCRIPTION

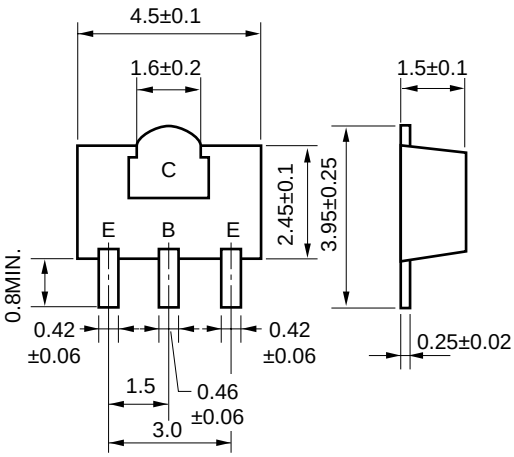
The 2SC5337 is a high-frequency transistor designed for a low distortion and low noise amplifier on the VHF to UHF band, which is suitable for the CATV, tele-communication, and such.

FEATURES

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

PACKAGE DIMENSIONS

(in millimeters)



PIN CONNECTIONS
E: Emitter
C: Collector
B: Base

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Parameter	Symbol	Rating	Unit
Collector to Base Voltage	V_{CBO}	30	V
Collector to Emitter Voltage	V_{CEO}	15	V
Emitter to Base Voltage	V_{EBO}	3.0	V
Collector Current	I_C	250	mA
Total Power Dissipation	P_T Note1	2.0	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

Note 1. 0.7 mm × 16 cm^2 double sided ceramic substrate (Copper plaiting)

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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 Intermoduration 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 Intermoduration 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 = $2 \times f_1 - f_2$		82.0		dB

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

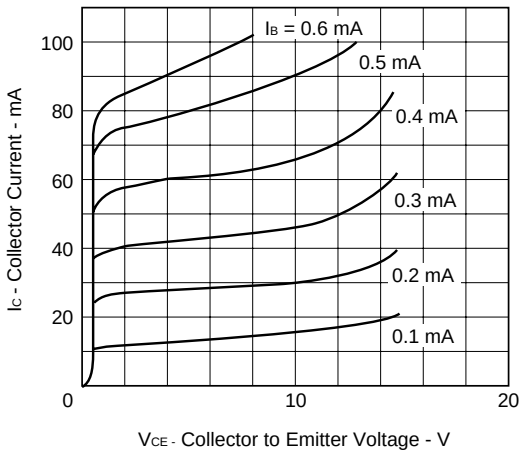
3. R_S = R_L = 50 Ω, tuned

h_{FE} Classification

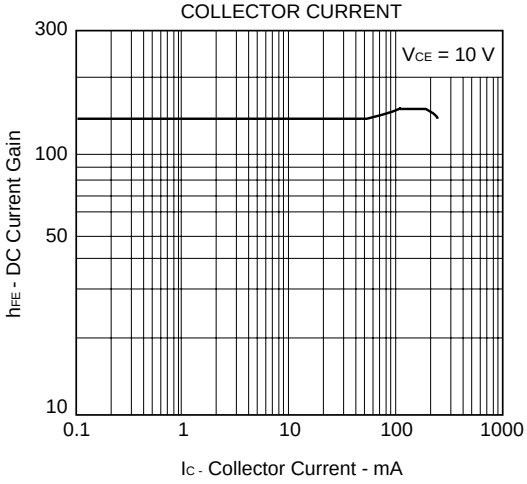
Rank	QQ	QR	QS
Marking	QQ	QR	QS
h_{FE}	40 to 80	60 to 120	100 to 200

TYPICAL CHARACTERISTICS (T_A = 25 °C)

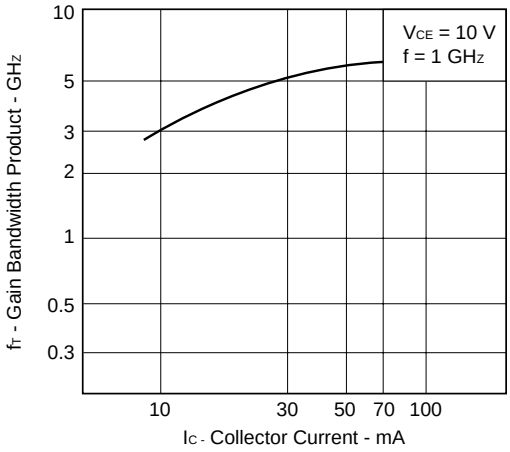
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



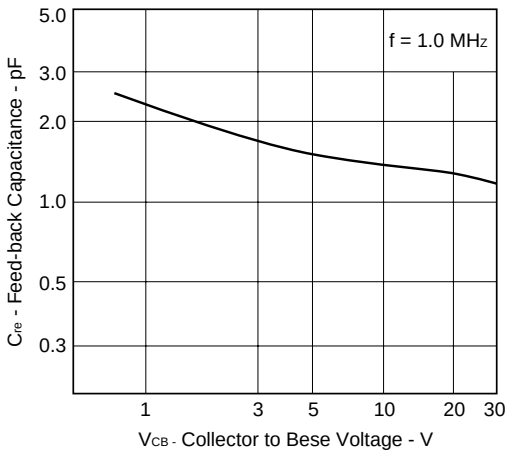
DC CURRENT GAIN vs.
COLLECTOR CURRENT



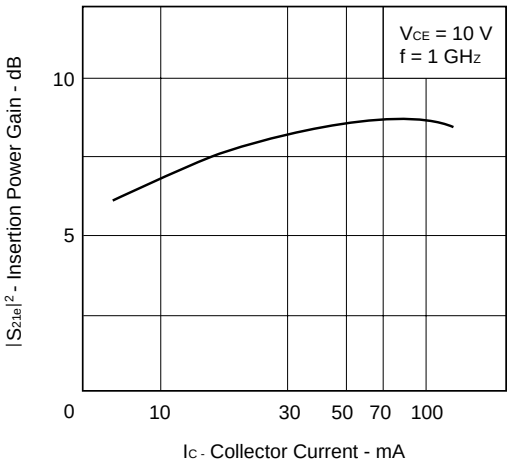
GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



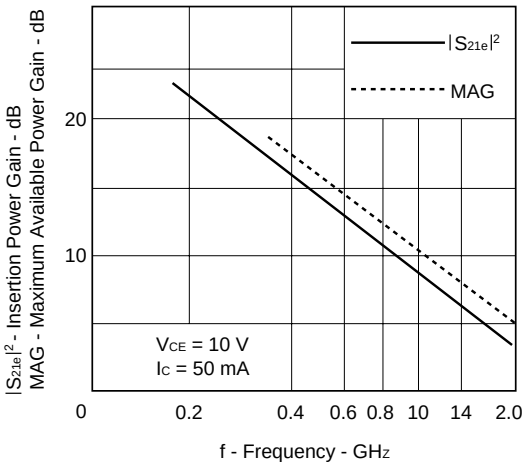
FEED-BACK CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



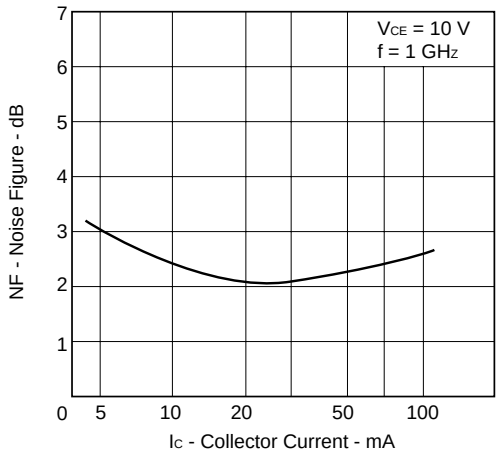
INSERTION POWER GAIN vs.
COLLECTOR CURRENT



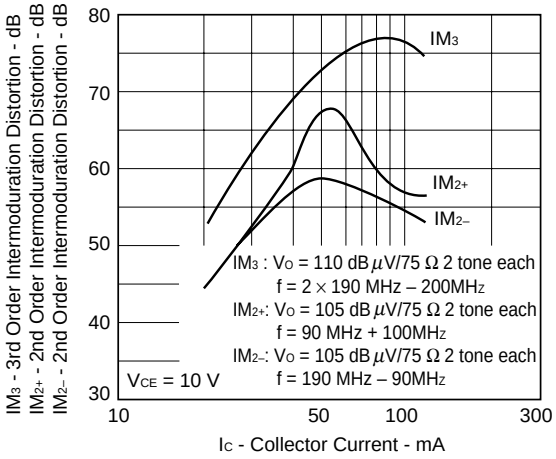
INSERTION POWER GAIN
MAXIMUM AVAILABLE GAIN vs. FREQUENCY



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

	S_{11}		S_{21}		S_{12}		S_{22}	
I_C (mA)	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

	S_{11}		S_{21}		S_{12}		S_{22}	
f (MHz)	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

S-PARAMETER

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

	S_{11}		S_{21}		S_{12}		S_{22}	
f (MHz)	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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