

NPN high frequency low noise transistor

Description

- The 2SC3356 is an ultra-high frequency low-noise transistor utilizing planar NPN silicon epitaxial bipolar technology. It features high power gain, low noise figure, wide dynamic range, and excellent current characteristics.
- Packaged in SOT-23 SMD format, it is primarily used in VHF, UHF, and CATV broadband low-noise amplifiers.

Features

- High gain: $|S_{21e}|^2$ typical value is 12 dB, @ $V_{CE}=10V$, $I_C=20mA$, $f=1GHz$.
- Low noise: NF typical value is 1.5dB, @ $V_{CE}=10V$, $I_C=7mA$, $f=1GHz$
- Gain bandwidth product: f_T typical value is 7GHz, @ $V_{CE}=10V$, $I_C=20mA$, $f=1GHz$

Limit parameters($T_A=25^\circ C$)

Parameter	Symbol	Value	Unit
collector base breakdown voltage	V_{CBO}	20	V
collector emitter breakdown voltage	V_{CEO}	12	V
emitter base breakdown voltage	V_{EBO}	3	V
collector current	I_C	100	mA
power consumption	P_C	200	mW
junction temperature	T_j	150	$^\circ C$
storage temperature	T_{stg}	-65 ~ +150	$^\circ C$

HFE position

Binning	B	C	D
Label	R25		
HFE	80-140	120-180	170-260

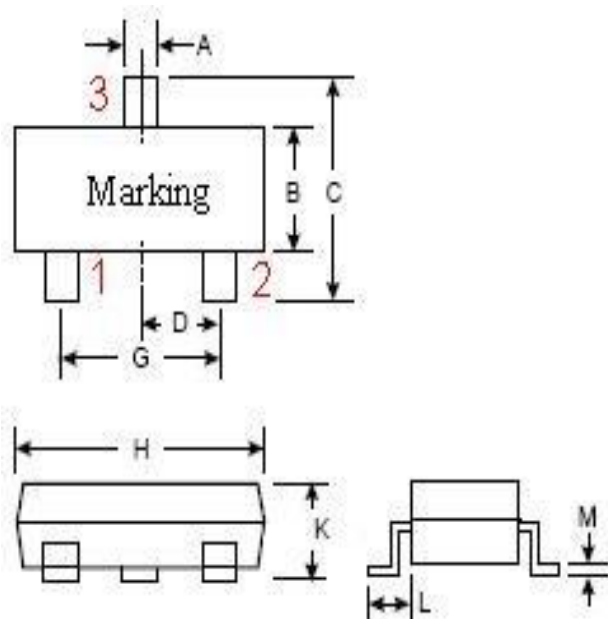
Electrical Characteristics (TA=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
collector base breakdown voltage	V_{CBO}	20			V	$I_C=1.0\mu A$
collector base leakage current	I_{CBO}			0.1	μA	$V_{CB}=10V$
emitter base leakage current	I_{EBO}			0.1	μA	$V_{EB}=1V$
gain bandwidth product	f_T	5.5	7		GHz	$V_{CE}=10V, I_C=20mA$
output feedback capacitor	C_{re}		0.65		pF	$V_{CB}=10V, I_E=0mA, f=1MHz$
power gain	$ S_{21e} ^2$		12		dB	$V_{CE}=10V, I_C=20mA, f=1GHz$
noise factor	NF		1.5		dB	$V_{CE}=10V, I_C=7mA, f=1GHz$

Package

SOT-23

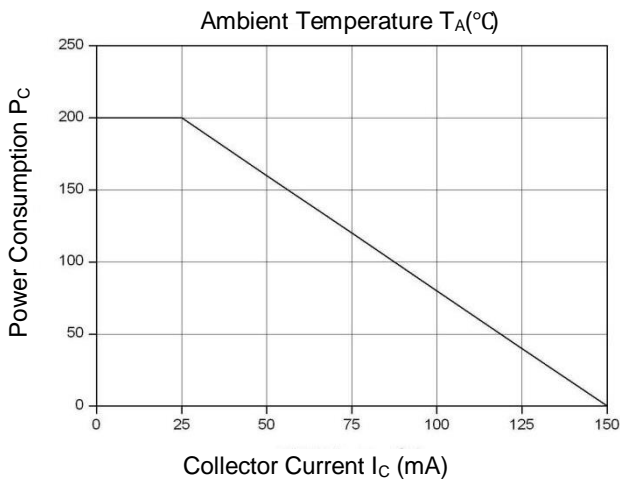
Pin definition: 1.Base; 2.Emitter; 3.Collector



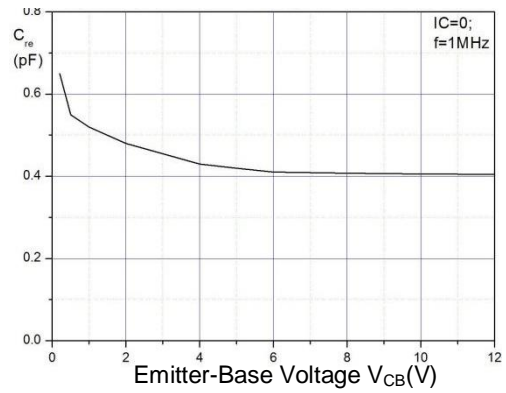
SOT-23		
Symbol	Min. (mm)	Max. (mm)
A	0.3	0.5
B	1.2	1.4
C	2.25	2.55
D	0.95	
G	1.8	2
H	2.8	3
K	0.9	1.15
L	0.55	
M	0.08	0.15

Typical characteristic curves (TA = 25°C)

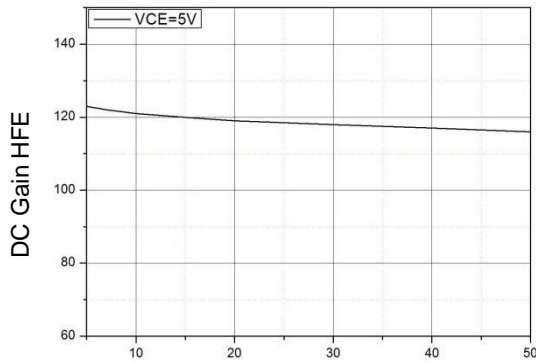
Power Consumption vs. Ambient Temperature



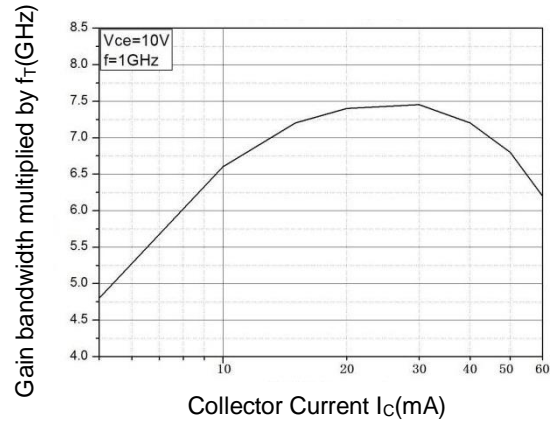
Common Emitter Feedback Capacitance vs. Voltage Between Emitter And Base



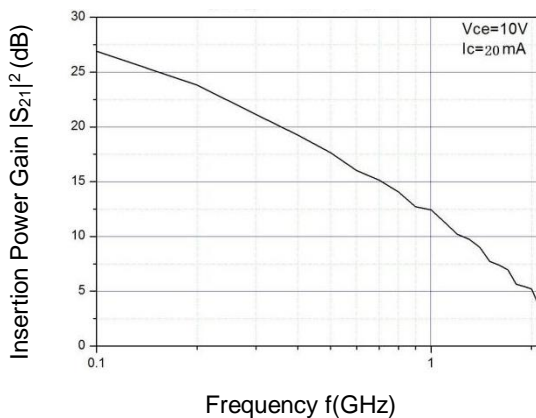
DC Gain vs. Collector Current



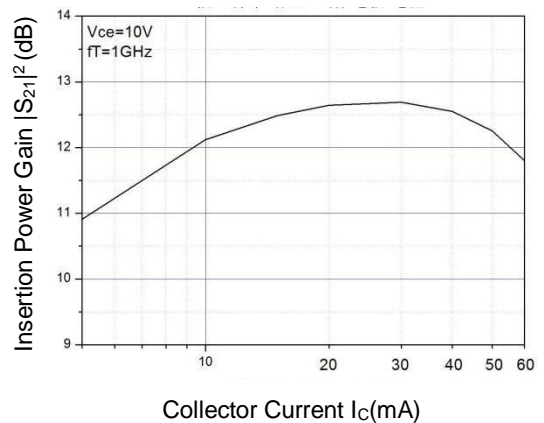
Gain Bandwidth Product vs. Collector Current



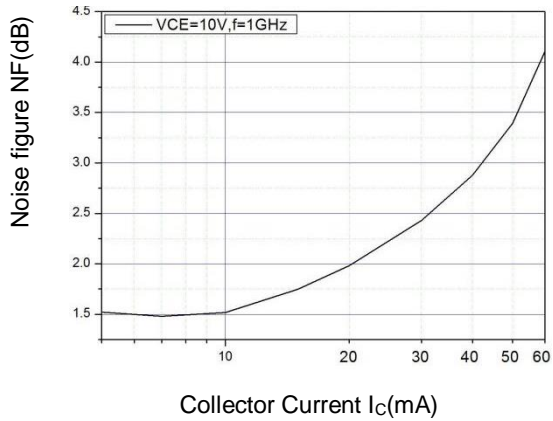
Insertion Power Gain vs. Frequency



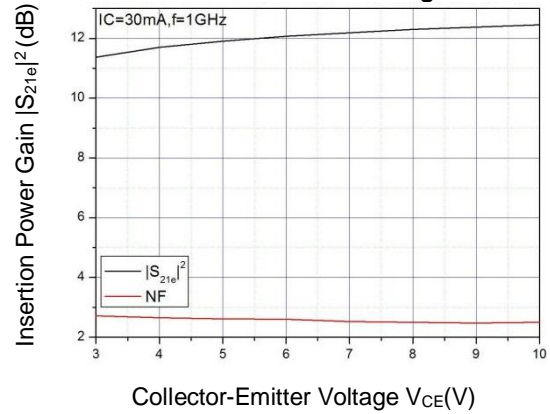
Insertion Power Gain vs. Collector Current



Noise Figure vs. Collector Current



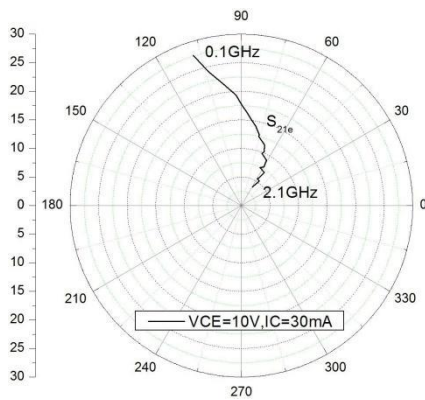
Insertion Power Gain, Noise Figure vs. Collector-Emitter Voltage



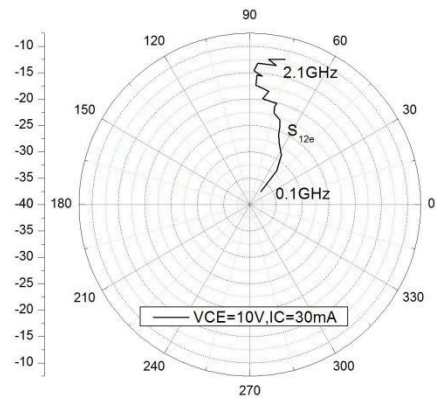
SMITH

Test conditions: $V_{CE}=10V$, $I_C=20mA$.

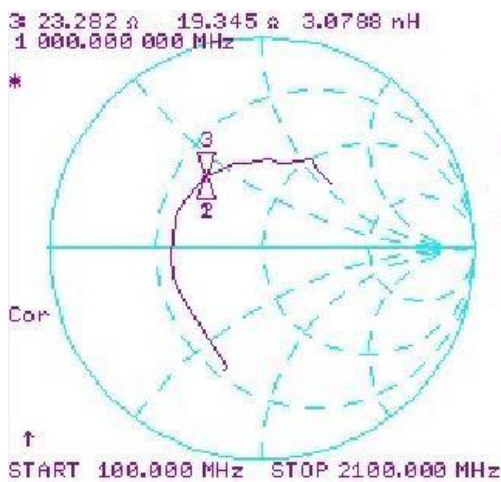
S21e -FREQUENCY



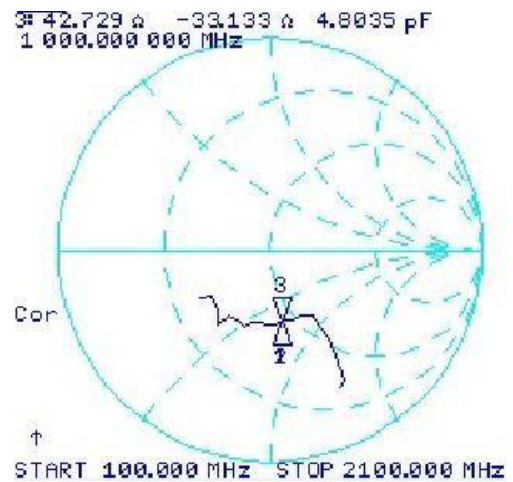
S12e -FREQUENCY



S11e -FREQUENCY



S22e -FREQUENCY



Scattering parameter (S-PARAMETER)

 Test conditions: $V_{CE}=10V$, $I_C=20mA$, $Z_O=50\Omega$.

test frequency	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.1	-4.4887	-107.42	27.586	107.71	-36.76	49.128	-2.9397	-62.468
0.2	-6.7891	-140.98	24.2	103.81	-31.8	51.684	-6.0189	-57.342
0.3	-7.2322	-163.11	21.338	98.039	-28.868	57.605	-7.9522	-56.709
0.4	-7.1858	-176.01	19.392	92.782	-26.985	64.917	-8.6659	-57.373
0.5	-7.4501	172.11	17.747	90.058	-25.557	67.75	-8.9477	-59.875
0.6	-7.3244	160.46	16.1	86.005	-24.173	68.77	-9.3303	-64.141
0.7	-7.2467	153.42	15.174	83.595	-22.96	70.383	-9.3035	-68.472
0.8	-7.5163	144.71	14.099	79.671	-22.02	75.134	-9.169	-72.808
0.9	-7.3334	135.33	12.767	75.789	-20.838	75.774	-9.3152	-77.445
1	-7.2486	129.3	12.445	75.699	-20.221	75.086	-9.2763	-82.417
1.1	-7.6324	120.87	11.337	68.982	-19.773	83.079	-9.0412	-89.48
1.2	-7.5426	112.22	10.248	67.1	-18.25	80.563	-9.0646	-93.193
1.3	-7.4681	106.23	9.8065	68.457	-17.795	83.598	-9.1476	-98.654
1.4	-7.7615	99.036	9.069	60.986	-17.352	87.012	-9.0139	-105.22
1.5	-7.7131	93.069	7.8139	59.825	-15.394	86.83	-8.4818	-107.7
1.6	-7.418	84.714	7.4217	64.124	-15.545	84.385	-8.6765	-112.92
1.7	-7.7491	79.21	7.0271	55.497	-14.625	88.168	-8.7946	-120.51
1.8	-7.5523	73.983	5.7067	57.787	-13.122	86.822	-7.5139	-125.48
1.9	-6.427	62.268	5.4719	59.598	-13.185	79.194	-8.4837	-131.5
2	-6.8626	54.527	5.2739	53.898	-12.216	82.641	-9.2253	-140.88
2.1	-7.0205	44.405	3.8021	59.296	-11.669	76.371	-7.9545	-145.67