

NPN High-Frequency Low-Noise Transistor

Description

The 2SC3356 is a silicon epitaxial planar NPN transistor, designed for use in high-frequency broadband low-noise amplifiers at VHF, UHF and CATV band. It features high power gain, low noise figure, high dynamic range and good current characteristics. It is encapsulated in a SOT23 small SMD plastic package.

Features

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

Absolute Maximum Ratings ($T_A=25^\circ C$)

Parameter	Symbol	Value	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	100	mA
Power Dissipation	P_C	200	mW
Junction Temperature	T_j	150	$^\circ C$
Storage Temperature	T_{stg}	-65 ~ +150	$^\circ C$

h_{FE} Classification

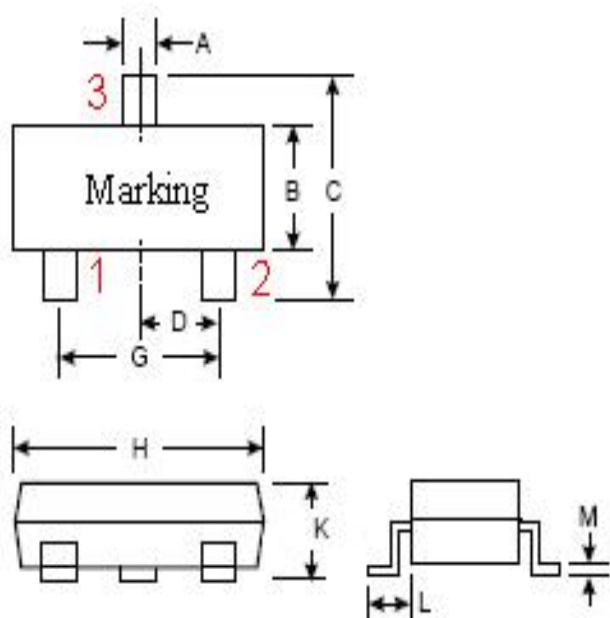
Class	B	C	D
Marking	R25		
h_{FE}	80-140	120-180	170-260

Electrical Characteristics (T_A=25°C)

Parameter	Symbol	Min	Typ	Max		Test conditions
Collector to Base Breakdown Voltage	V _{CB0}	20			V	I _C =1.0μA
Collector Cut-off Current	I _{CB0}			0.1	μA	V _{CB} =10V
Emitter Cut-off Current	I _{EB0}			0.1	μA	V _{EB} =1V
Gain Bandwidth Product	f _T	5.5	7		GHz	V _{CE} =10V, I _C =20mA
Feed-Back Capacitance	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 Figure	NF		1.5		dB	V _{CE} =10V, I _C =7mA, f=1GHz

Package: SOT23

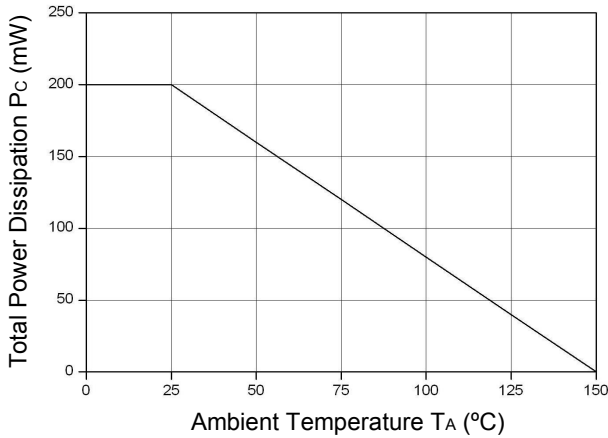
Pin definition: 1-Base 2-Emitter 3-Collector



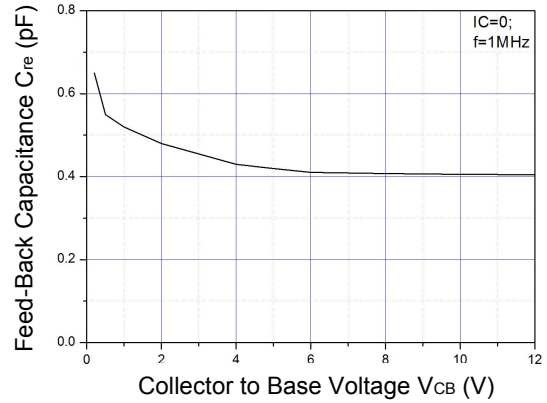
SOT-23		
Symbol	MIN (mm)	MAX (mm)
A	0.3	0.5
B	1.2	1.4
C	2.25	2.55
D	0.95	
G	1.8	2
H	2.8	3
K	0.9	1.15
L	0.55	
M	0.08	0.15

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

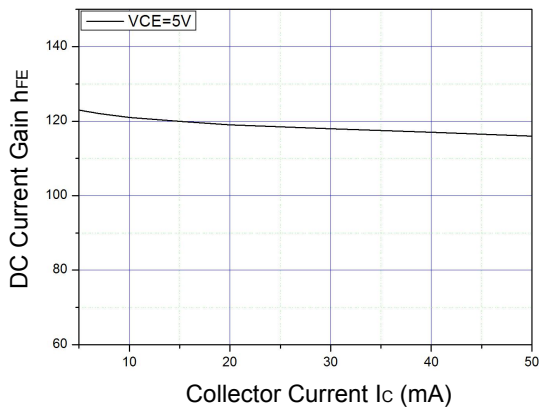
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



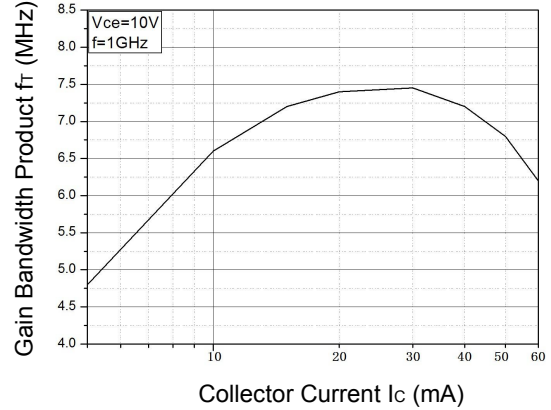
FEED-BACK CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



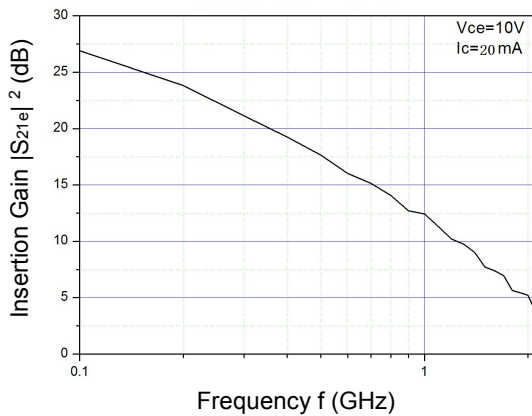
DC CURRENT GAIN vs. COLLECTOR CURRENT



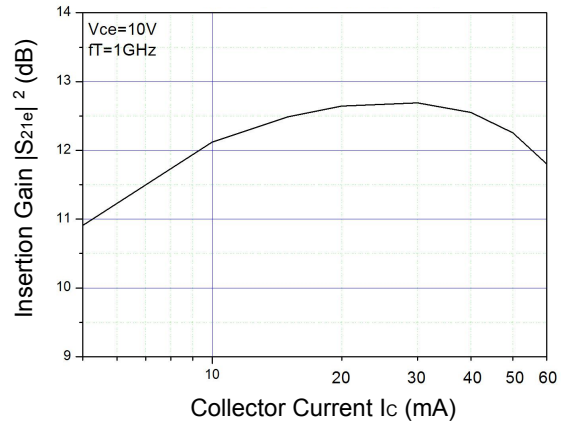
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



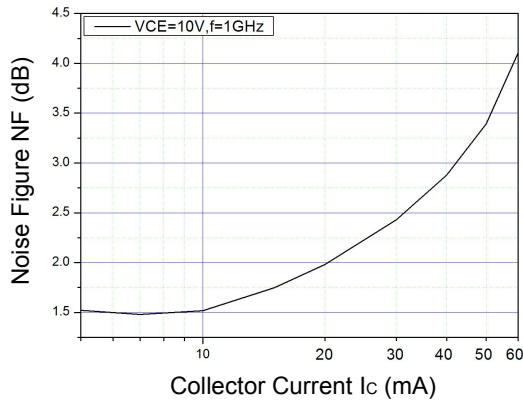
INSERTION GAIN vs. FREQUENCY



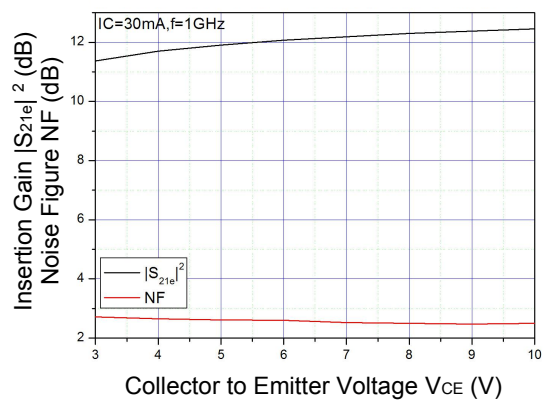
INSERTION GAIN vs. COLLECTOR CURRENT



NOISE FIGURE vs. COLLECTOR CURRENT



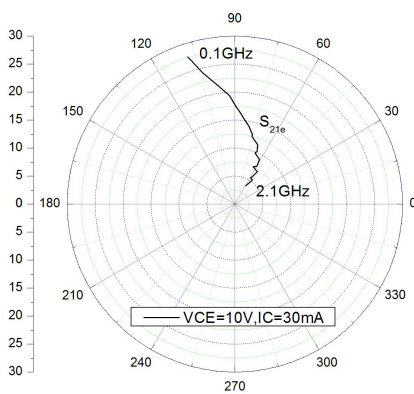
NOISE FIGURE, FORWARD INSERTION GAIN vs. COLLECTOR TO EMITTER VOLTAGE



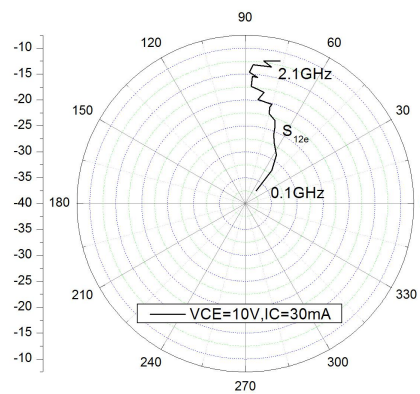
SMITH CHART

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

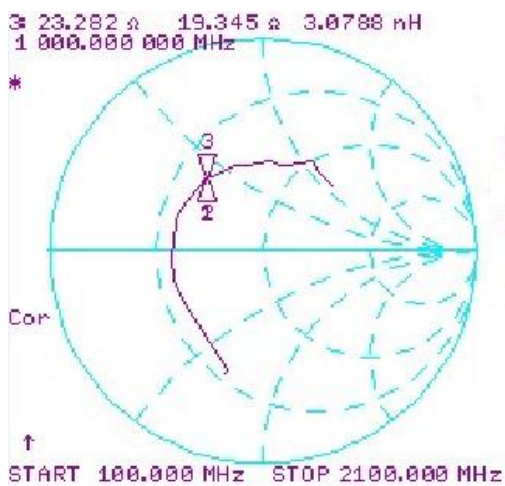
S_{21e} -FREQUENCY



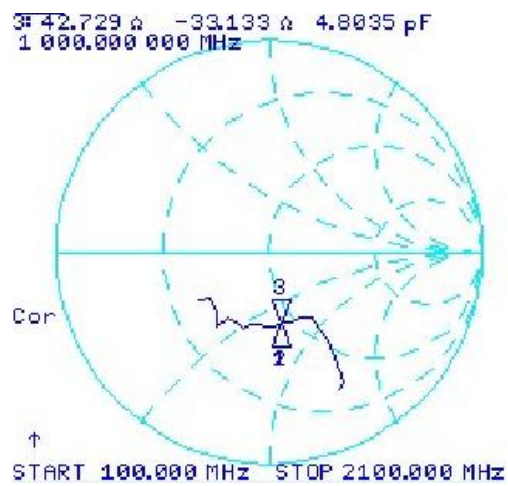
S_{12e} -FREQUENCY



S_{11e} -FREQUENCY



S_{22e} -FREQUENCY



SCATTERING PARAMETERS (S-PARAMETERS)

Test conditions: $V_{CE}=10V$, $I_C=20mA$, $Z_0=50\Omega$

测试频率 GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	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