

# 55GN01CA

## NPN Epitaxial Planar Silicon Transistor

### UHF Wide-band Low-noise Amplifier Applications

#### Features

- High cutoff frequency :  $f_T = 5.5\text{GHz typ.}$
- High gain :  $|S_{21e}|^2 = 9.5\text{dB typ (f=1GHz).}$

#### Specifications

##### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CB0}$		20	V
Collector-to-Emitter Voltage	$V_{CEO}$		10	V
Emitter-to-Base Voltage	$V_{EB0}$		3	V
Collector Current	$I_C$		70	mA
Collector Dissipation	$P_C$		200	mW
Junction Temperature	$T_j$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

##### Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=10\text{V}, I_E=0\text{A}$			0.1	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=2\text{V}, I_C=0\text{A}$			1	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}, I_C=10\text{mA}$	100		180	
Gain-Bandwidth Product	$f_T1$	$V_{CE}=3\text{V}, I_C=5\text{mA}$	3.0	4.5		GHz
	$f_T2$	$V_{CE}=5\text{V}, I_C=20\text{mA}$		5.5		GHz
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}, f=1\text{MHz}$		1.1	1.3	pF
Reverse Transfer Capacitance	$C_{re}$	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.7		pF
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=5\text{V}, I_C=20\text{mA}, f=1\text{GHz}$	6.5	9.5		dB
Noise Figure	NF	$V_{CE}=3\text{V}, I_C=5\text{mA}, f=1\text{GHz}, Z_S=Z_L=50\Omega$		1.9		dB

Marking : ZW

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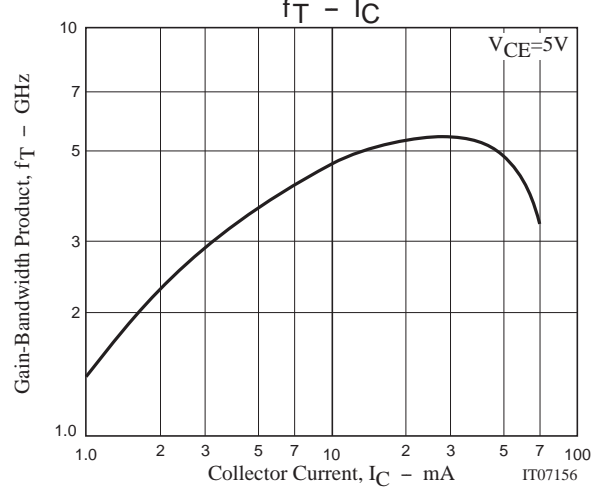
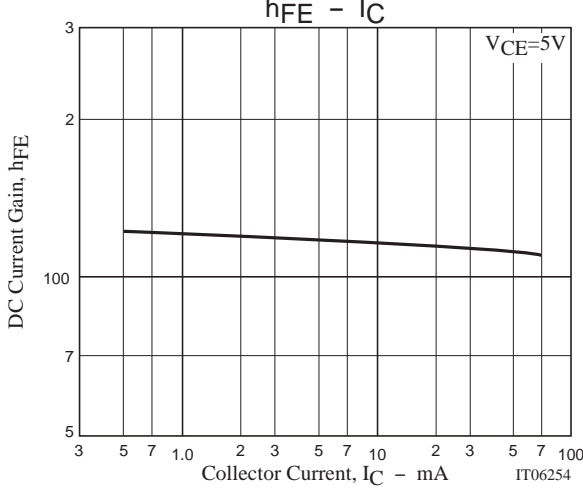
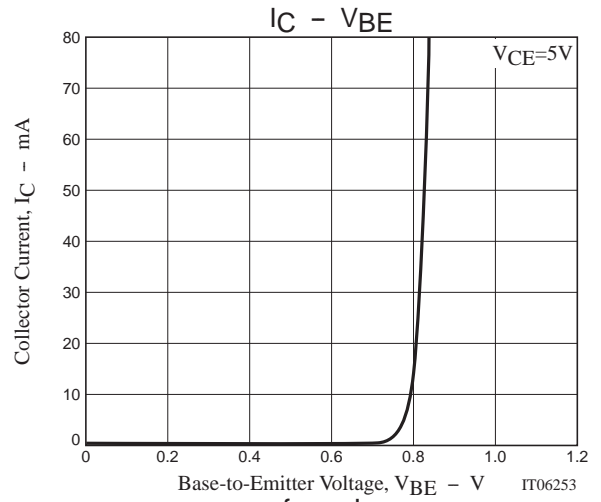
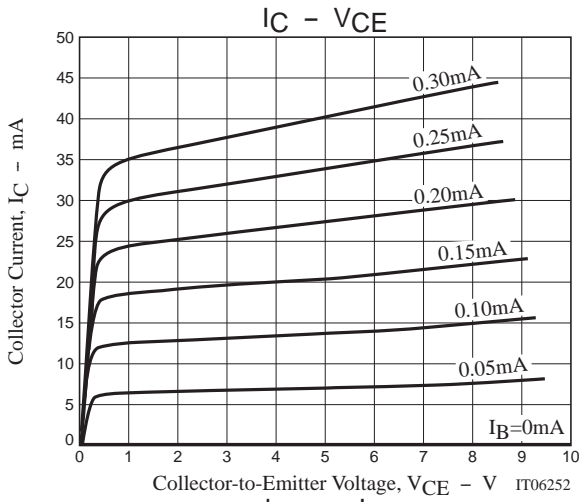
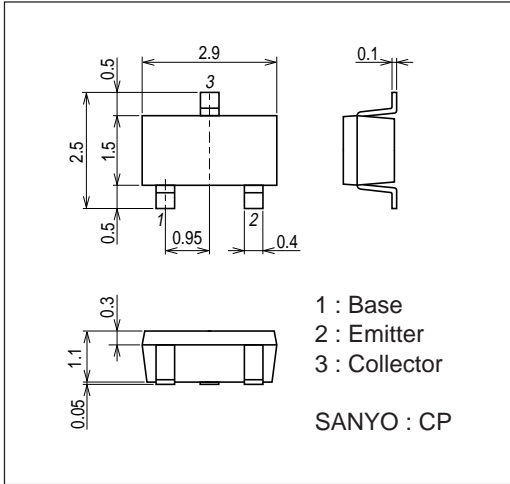
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## Package Dimensions

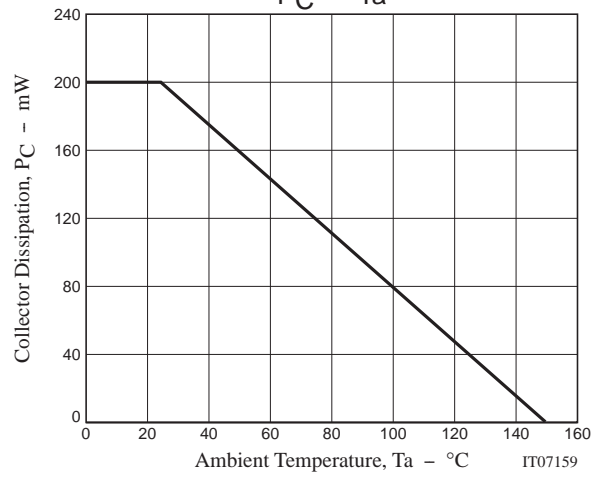
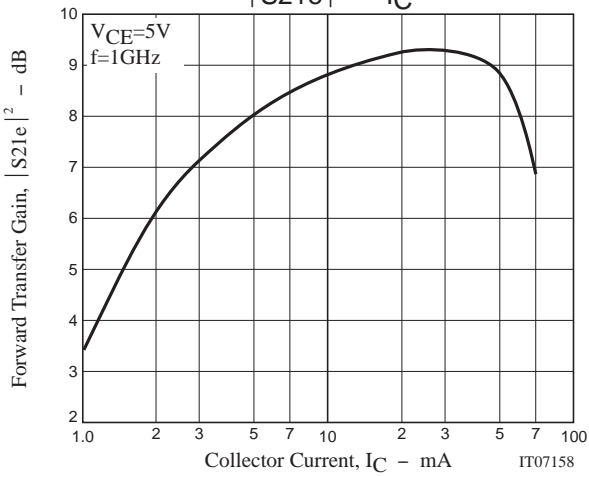
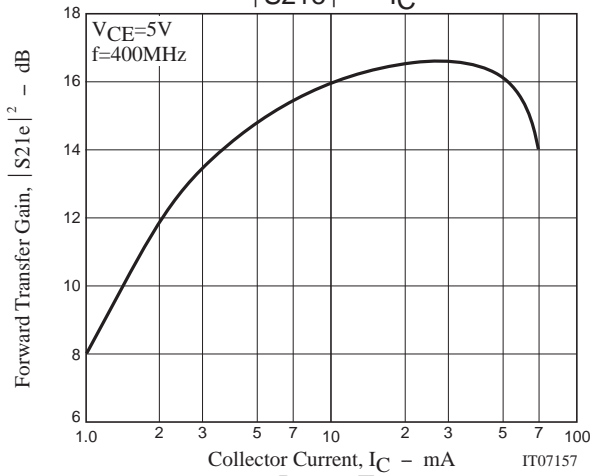
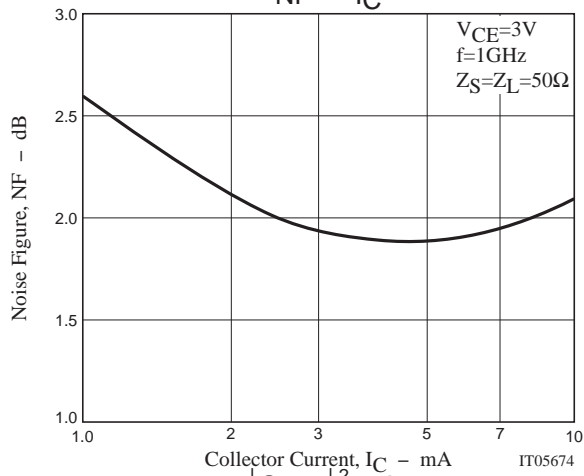
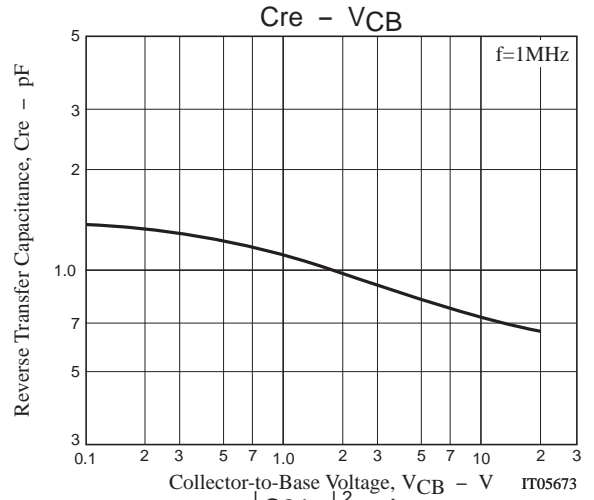
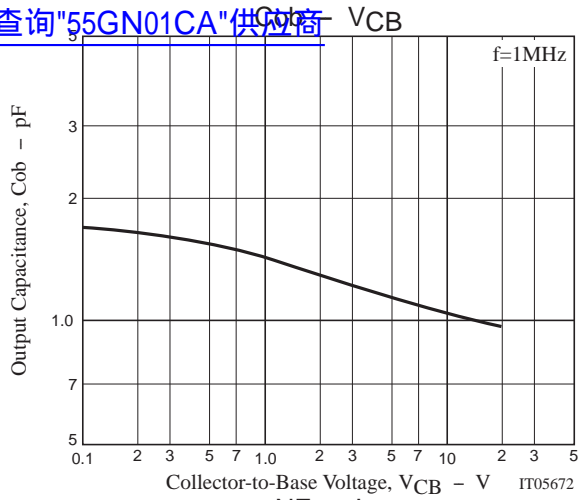
unit : mm (typ)

7013A-009



# 55GN01CA

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## S Parameters (Common Emitter)

V<sub>CE</sub>=5V, I<sub>C</sub>=1mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.949	-22.44	3.333	161.77	0.051	76.83	0.974	-10.27
200	0.896	-42.53	3.106	145.66	0.096	64.91	0.926	-19.70
400	0.771	-76.67	2.521	119.93	0.149	47.18	0.801	-32.90
600	0.679	-102.20	2.043	101.07	0.167	38.13	0.714	-40.64
800	0.622	-122.03	1.712	86.82	0.169	34.45	0.661	-46.50
1000	0.585	-138.21	1.490	75.34	0.164	35.98	0.642	-51.94
1200	0.566	-152.02	1.321	65.79	0.158	41.97	0.633	-56.73
1400	0.555	-163.57	1.192	57.95	0.167	51.00	0.636	-62.43
1600	0.550	-173.92	1.101	51.64	0.189	57.12	0.653	-68.80
1800	0.545	176.42	1.027	45.83	0.209	64.08	0.665	-74.79
2000	0.543	167.94	0.963	41.62	0.262	70.03	0.683	-80.37

V<sub>CE</sub>=5V, I<sub>C</sub>=3mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.849	-36.58	8.604	151.45	0.047	69.52	0.908	-19.05
200	0.719	-65.72	7.078	130.50	0.077	58.46	0.768	-32.07
400	0.543	-104.50	4.701	105.14	0.109	49.29	0.576	-42.71
600	0.466	-128.63	3.425	90.40	0.126	50.26	0.500	-47.19
800	0.434	-145.01	2.697	79.88	0.141	53.53	0.463	-51.04
1000	0.417	-157.80	2.265	71.34	0.162	57.40	0.455	-55.89
1200	0.414	-167.96	1.951	63.80	0.183	60.44	0.454	-60.20
1400	0.415	-176.38	1.735	57.35	0.214	63.33	0.460	-65.55
1600	0.418	175.97	1.591	51.56	0.245	61.95	0.473	-71.92
1800	0.421	169.02	1.462	45.89	0.266	63.26	0.487	-77.11
2000	0.426	163.03	1.370	41.27	0.313	65.05	0.508	-81.84

V<sub>CE</sub>=5V, I<sub>C</sub>=5mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.765	-46.98	12.335	143.95	0.044	67.33	0.845	-24.79
200	0.598	-80.18	9.191	121.62	0.066	56.98	0.662	-37.77
400	0.442	-118.84	5.505	99.01	0.093	54.34	0.476	-45.43
600	0.392	-140.14	3.887	86.64	0.118	58.30	0.418	-48.57
800	0.374	-154.61	3.029	77.50	0.143	61.09	0.392	-52.48
1000	0.367	-165.56	2.520	70.15	0.169	63.39	0.389	-57.19
1200	0.367	-174.16	2.162	63.07	0.197	64.83	0.391	-61.75
1400	0.373	179.13	1.916	57.27	0.232	65.23	0.398	-67.63
1600	0.378	172.36	1.749	51.58	0.263	62.63	0.412	-74.04
1800	0.384	166.49	1.606	46.28	0.284	62.94	0.424	-79.34
2000	0.391	161.65	1.501	41.77	0.331	63.69	0.445	-83.92

V<sub>CE</sub>=5V, I<sub>C</sub>=10mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.604	-65.10	17.802	131.98	0.037	62.29	0.725	-33.04
200	0.444	-100.60	11.395	111.07	0.056	60.51	0.514	-43.72
400	0.347	-135.89	6.264	92.91	0.085	63.77	0.367	-46.89
600	0.325	-153.23	4.335	82.90	0.117	66.77	0.332	-49.51
800	0.319	-164.36	3.342	75.17	0.148	67.58	0.321	-54.09
1000	0.321	-173.02	2.760	68.51	0.181	67.37	0.321	-59.12
1200	0.326	-179.73	2.364	62.39	0.211	67.45	0.327	-64.26
1400	0.336	174.71	2.089	57.19	0.249	66.65	0.337	-70.42
1600	0.343	169.12	1.904	51.75	0.280	62.79	0.350	-77.67
1800	0.349	164.16	1.741	46.76	0.300	62.41	0.361	-82.73
2000	0.358	160.18	1.629	42.30	0.347	62.24	0.382	-87.25

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## S Parameters (Common Emitter)

V<sub>CE</sub>=5V, I<sub>C</sub>=15mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.511	-75.82	20.333	125.66	0.034	62.58	0.649	-37.05
200	0.379	-111.32	12.202	106.68	0.051	63.43	0.445	-45.58
400	0.315	-144.06	6.538	90.52	0.084	68.22	0.326	-47.13
600	0.302	-158.98	4.489	81.46	0.118	69.82	0.299	-49.32
800	0.301	-168.64	3.455	74.33	0.153	69.70	0.290	-54.83
1000	0.307	-176.32	2.857	67.93	0.186	68.77	0.296	-60.27
1200	0.314	177.94	2.433	62.00	0.217	68.37	0.302	-65.94
1400	0.322	172.88	2.153	57.01	0.256	66.71	0.311	-71.94
1600	0.329	167.84	1.961	51.67	0.286	62.74	0.325	-79.69
1800	0.337	163.07	1.792	46.79	0.308	61.86	0.337	-84.37
2000	0.348	159.32	1.676	42.28	0.355	61.87	0.359	-88.78

V<sub>CE</sub>=5V, I<sub>C</sub>=20mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.461	-82.96	21.657	121.91	0.031	64.47	0.600	-39.22
200	0.346	-118.63	12.582	104.09	0.049	64.74	0.406	-46.06
400	0.299	-149.09	6.669	89.15	0.084	70.72	0.302	-46.24
600	0.293	-162.67	4.554	80.67	0.118	71.64	0.283	-49.39
800	0.295	-171.32	3.503	73.57	0.153	70.77	0.275	-54.70
1000	0.299	-178.25	2.900	67.59	0.187	69.56	0.282	-60.94
1200	0.307	176.25	2.468	61.65	0.221	68.70	0.290	-66.45
1400	0.316	172.08	2.178	56.76	0.260	66.77	0.300	-72.89
1600	0.325	166.77	1.988	51.53	0.290	62.70	0.316	-80.43
1800	0.333	162.69	1.813	46.81	0.310	62.12	0.325	-85.59
2000	0.343	158.91	1.692	42.30	0.357	61.46	0.347	-89.65

V<sub>CE</sub>=5V, I<sub>C</sub>=30mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.399	-93.89	22.859	117.43	0.029	65.09	0.537	-40.85
200	0.317	-127.93	12.830	101.25	0.045	68.93	0.364	-45.35
400	0.289	-154.90	6.712	87.64	0.082	71.95	0.281	-44.97
600	0.288	-166.40	4.587	79.56	0.119	72.93	0.266	-48.17
800	0.293	-174.03	3.524	72.71	0.155	72.01	0.262	-54.35
1000	0.298	179.55	2.904	66.80	0.190	70.26	0.269	-60.45
1200	0.306	174.88	2.478	61.04	0.223	69.29	0.279	-66.19
1400	0.318	170.70	2.188	56.20	0.261	66.98	0.289	-73.12
1600	0.327	165.85	1.992	50.94	0.292	63.01	0.305	-80.46
1800	0.336	161.66	1.815	46.08	0.313	62.10	0.318	-85.63
2000	0.347	158.15	1.699	41.95	0.358	61.22	0.337	-90.00

V<sub>CE</sub>=5V, I<sub>C</sub>=50mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.362	-108.51	22.521	112.91	0.026	65.35	0.481	-39.63
200	0.317	-140.52	12.288	98.38	0.044	72.35	0.338	-40.74
400	0.307	-162.72	6.363	85.74	0.080	73.69	0.278	-40.44
600	0.310	-172.48	4.352	77.92	0.119	74.51	0.271	-44.11
800	0.316	-178.74	3.340	71.23	0.153	72.84	0.270	-50.45
1000	0.324	175.82	2.762	65.12	0.189	71.55	0.280	-57.21
1200	0.333	171.21	2.353	59.35	0.220	70.16	0.289	-63.53
1400	0.345	167.33	2.077	54.36	0.260	68.28	0.300	-70.35
1600	0.354	162.55	1.888	49.16	0.289	63.88	0.317	-78.50
1800	0.363	158.67	1.725	44.33	0.313	63.21	0.330	-83.35
2000	0.376	155.01	1.615	39.70	0.361	62.47	0.352	-88.07

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