



SANYO Semiconductors

DATA SHEET

15GN03CA

 — NPN Epitaxial Planar Silicon Transistor
VHF High-frequency Amplifier Applications

Applications

- VHF, RF, MIXER, OSC, IF amplifier.

Features

- High cutoff frequency : $f_T=1.5\text{GHz}$ typ.
- High gain : $|S_{21e}|^2=13\text{dB}$ typ ($f=0.4\text{GHz}$).

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_{CE0}		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_{CB0}	$V_{CB}=10\text{V}, I_E=0\text{A}$			0.1	μA
Emitter Cutoff Current	I_{EB0}	$V_{EB}=2\text{V}, I_C=0\text{A}$			1	μA
DC Current Gain	h_{FE}	$V_{CE}=5\text{V}, I_C=10\text{mA}$	100		180	
Gain-Bandwidth Product	f_T	$V_{CE}=5\text{V}, I_C=20\text{mA}$	1.0	1.5		GHz
Output Capacitance	C_{ob}	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.95	1.25	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.65		pF

Marking : ZU

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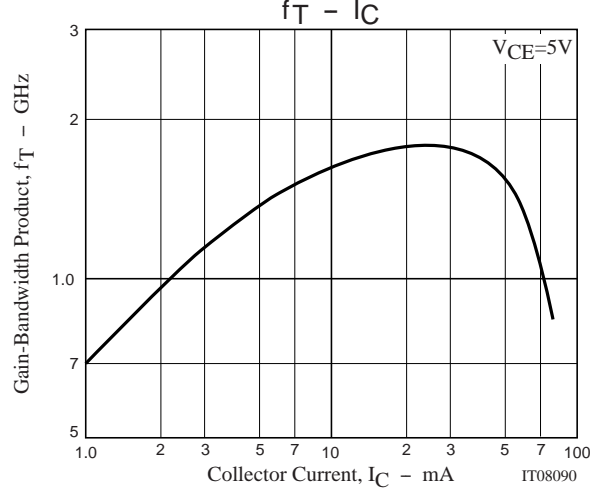
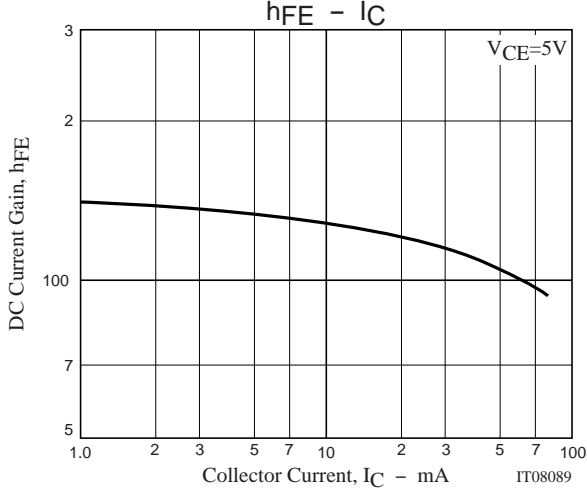
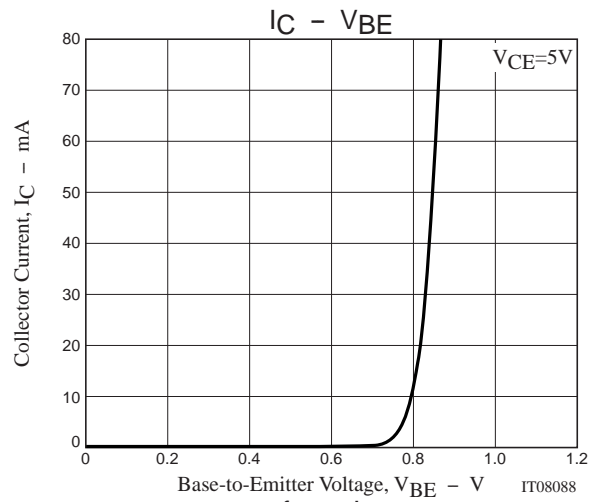
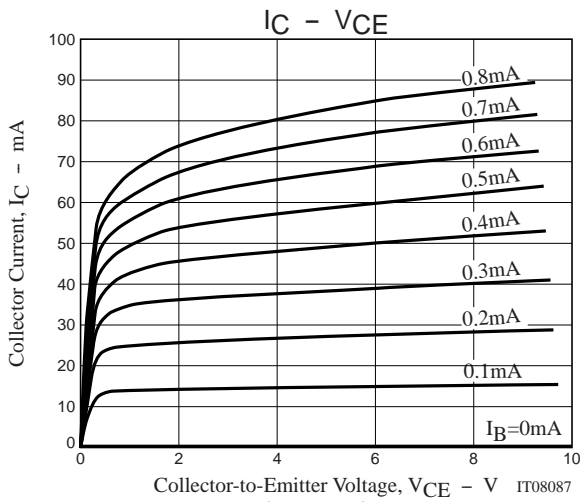
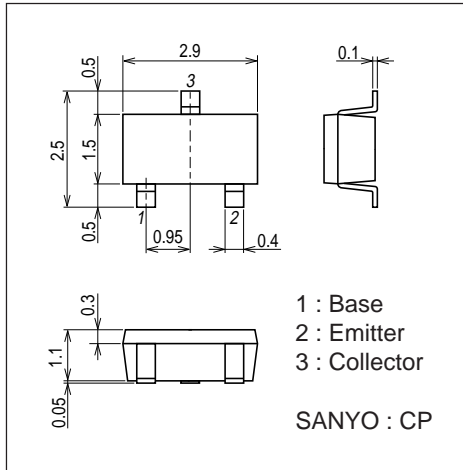
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=5V, I_C=20mA, f=0.4GHz$	10	13		dB
Noise Figure	NF	$V_{CE}=3V, I_C=2mA, f=0.4GHz$		1.6		dB

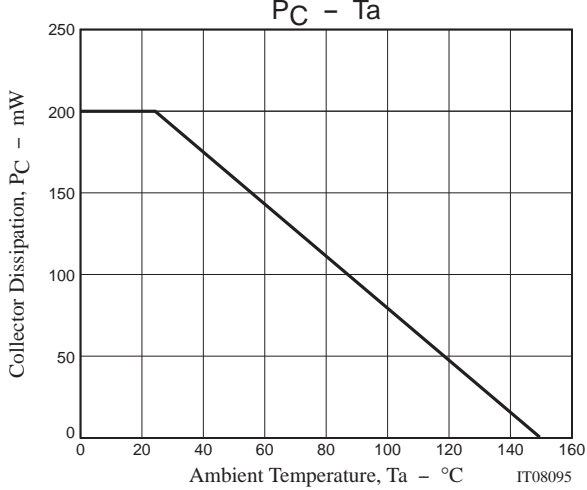
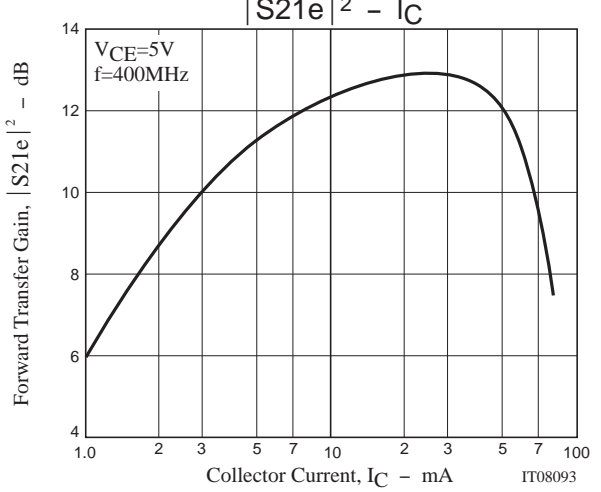
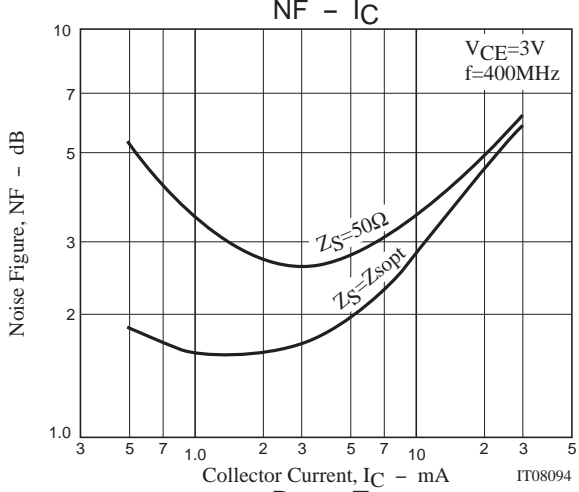
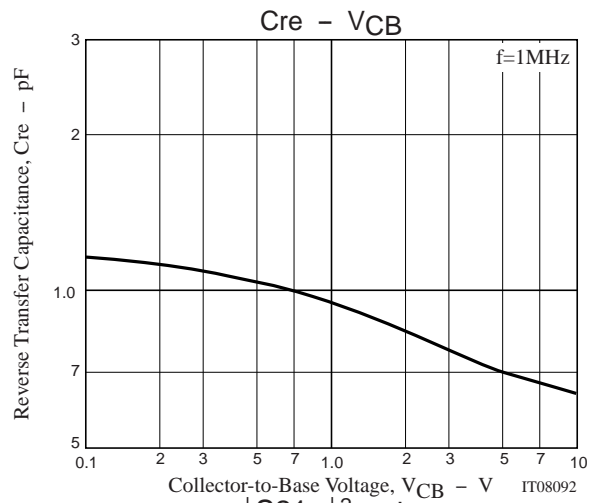
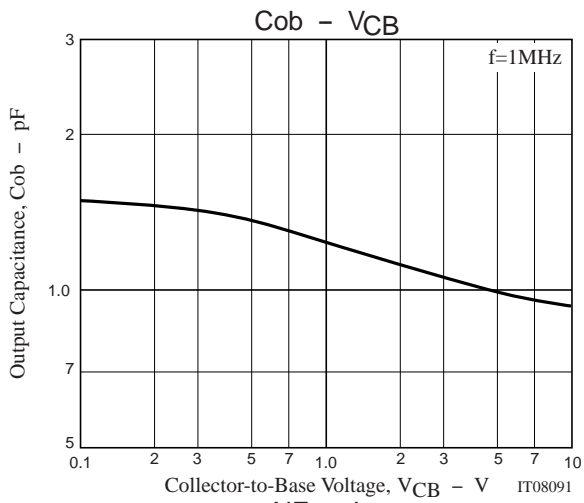
Package Dimensions

unit : mm (typ)

7013A-009



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S Parameters (Common emitter)

$V_{CE}=5V, I_C=1mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.918	-34.17	3.328	154.00	0.040	67.14	0.963	-9.32
200	0.816	-63.46	2.833	133.91	0.063	50.52	0.897	-15.61
300	0.719	-87.48	2.349	118.47	0.075	39.90	0.847	-19.59
400	0.650	-106.66	1.974	106.31	0.081	33.68	0.816	-22.72
500	0.603	-123.45	1.709	96.50	0.081	30.41	0.795	-25.65
600	0.579	-137.17	1.492	88.62	0.078	30.45	0.785	-28.56
700	0.562	-149.31	1.328	81.55	0.074	30.61	0.779	-31.42
800	0.557	-159.59	1.197	75.34	0.070	34.97	0.777	-34.68
900	0.557	-168.64	1.094	70.12	0.068	41.63	0.773	-38.02
1000	0.560	-176.38	1.003	65.13	0.066	50.34	0.773	-41.22

$V_{CE}=5V, I_C=3mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.799	-55.14	7.483	141.00	0.033	59.88	0.886	-14.45
200	0.641	-93.26	5.412	118.03	0.047	44.28	0.773	-18.84
300	0.553	-118.80	4.036	104.19	0.050	40.23	0.719	-21.00
400	0.512	-136.73	3.182	94.58	0.052	40.73	0.693	-22.61
500	0.492	-150.89	2.627	86.95	0.055	44.74	0.683	-24.93
600	0.488	-161.99	2.244	80.86	0.056	49.28	0.677	-27.44
700	0.487	-171.08	1.958	75.25	0.059	55.44	0.675	-30.18
800	0.492	-178.68	1.749	70.37	0.063	62.40	0.675	-33.31
900	0.502	174.60	1.575	65.89	0.068	67.82	0.674	-36.39
1000	0.508	168.93	1.433	61.61	0.078	74.10	0.677	-39.25

$V_{CE}=5V, I_C=5mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.703	-69.63	10.162	132.63	0.030	54.51	0.821	-16.94
200	0.550	-109.80	6.625	110.25	0.037	43.19	0.704	-19.31
300	0.490	-133.75	4.733	98.16	0.041	44.91	0.660	-20.36
400	0.464	-149.68	3.666	89.82	0.045	49.05	0.643	-21.83
500	0.458	-161.66	3.003	83.25	0.049	56.14	0.635	-23.97
600	0.460	-170.95	2.537	77.83	0.054	60.18	0.632	-26.46
700	0.465	-178.51	2.212	72.71	0.058	65.91	0.631	-29.05
800	0.472	174.93	1.962	68.10	0.067	71.03	0.633	-32.06
900	0.482	169.11	1.764	64.09	0.075	76.57	0.634	-35.26
1000	0.491	164.18	1.602	59.88	0.085	78.96	0.635	-38.26

$V_{CE}=5V, I_C=10mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.568	-91.34	13.492	121.50	0.022	51.19	0.729	-18.79
200	0.463	-130.04	7.837	102.18	0.030	50.01	0.628	-18.37
300	0.435	-149.86	5.435	92.29	0.035	56.54	0.598	-18.84
400	0.427	-162.69	4.153	85.23	0.041	59.99	0.587	-20.20
500	0.431	-171.77	3.374	79.57	0.047	67.05	0.586	-22.36
600	0.438	-179.07	2.842	74.63	0.055	70.37	0.585	-24.64
700	0.446	174.71	2.460	69.90	0.062	74.51	0.587	-27.44
800	0.457	169.18	2.181	65.54	0.072	78.16	0.588	-30.30
900	0.469	164.67	1.954	61.61	0.080	80.51	0.592	-33.49
1000	0.482	160.55	1.775	57.60	0.092	82.60	0.596	-36.43

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S Parameters (Common emitter)

$V_{CE}=5V, I_C=15mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.506	-103.02	14.843	116.40	0.020	52.22	0.680	-19.13
200	0.433	-139.11	8.300	98.87	0.027	55.27	0.595	-17.41
300	0.418	-156.74	5.691	89.86	0.032	60.47	0.571	-17.79
400	0.416	-167.49	4.336	83.26	0.040	65.01	0.567	-19.20
500	0.423	-175.59	3.518	77.72	0.047	70.77	0.564	-21.38
600	0.434	177.94	2.949	72.99	0.056	75.36	0.566	-23.76
700	0.441	172.60	2.558	68.36	0.064	77.18	0.566	-26.43
800	0.454	167.70	2.257	64.14	0.073	80.34	0.573	-29.43
900	0.468	163.21	2.026	60.20	0.084	82.23	0.576	-32.58
1000	0.478	159.35	1.833	56.21	0.094	82.82	0.579	-35.40

$V_{CE}=5V, I_C=20mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.473	-110.94	15.555	113.24	0.018	48.75	0.651	-18.99
200	0.420	-144.96	8.504	96.80	0.025	55.46	0.577	-16.75
300	0.412	-160.51	5.806	88.35	0.032	64.32	0.556	-16.94
400	0.412	-170.47	4.415	81.97	0.040	69.43	0.553	-18.38
500	0.423	-177.81	3.567	76.52	0.047	73.49	0.552	-20.62
600	0.434	176.33	2.998	72.06	0.054	76.85	0.554	-23.22
700	0.443	171.32	2.597	67.40	0.064	79.43	0.555	-25.76
800	0.457	166.61	2.289	62.99	0.075	80.21	0.562	-28.77
900	0.470	162.56	2.044	58.98	0.084	82.61	0.567	-31.92
1000	0.484	159.03	1.849	54.97	0.095	83.62	0.572	-34.90

$V_{CE}=5V, I_C=30mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.444	-121.15	16.032	109.59	0.018	56.45	0.620	-18.33
200	0.414	-151.46	8.590	94.42	0.023	58.54	0.558	-15.68
300	0.413	-164.93	5.826	86.42	0.031	69.33	0.543	-15.93
400	0.418	-173.75	4.420	80.00	0.040	71.41	0.541	-17.58
500	0.429	179.87	3.560	74.72	0.048	75.89	0.545	-19.95
600	0.442	174.95	2.980	69.97	0.056	78.14	0.546	-22.37
700	0.454	170.06	2.575	65.31	0.067	79.78	0.550	-25.11
800	0.467	165.62	2.268	61.02	0.077	81.97	0.556	-27.94
900	0.485	161.83	2.027	57.14	0.086	83.95	0.563	-31.50
1000	0.497	158.27	1.829	53.02	0.096	84.97	0.570	-34.37

$V_{CE}=5V, I_C=50mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.436	-135.54	15.112	105.16	0.016	53.23	0.591	-16.61
200	0.431	-160.16	7.915	91.13	0.021	62.83	0.547	-14.06
300	0.439	-170.89	5.332	83.37	0.030	71.57	0.538	-15.05
400	0.447	-177.86	4.022	77.04	0.039	75.43	0.538	-16.92
500	0.462	176.77	3.231	71.43	0.046	77.82	0.543	-19.30
600	0.477	172.03	2.708	66.71	0.057	81.23	0.548	-22.35
700	0.490	167.59	2.318	61.92	0.065	82.45	0.553	-25.43
800	0.507	163.59	2.037	57.52	0.076	84.13	0.559	-28.69
900	0.523	159.90	1.813	53.42	0.087	86.15	0.566	-32.45
1000	0.539	156.32	1.629	49.36	0.099	87.07	0.573	-35.73

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