Ordering number : ENN8064

SANYO Semiconductors
DATA SHEET

15GN03N — NPN Epitaxial Planar Silicon Transistor
VHF High-frequency Amplifier Applications

Applications

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

Features

- High cutoff frequency : f_T=1.5GHz typ.
- High gain : $|S21e|^2$=11.5dB typ (f=0.4GHz).

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		20	V
Collector-to-Emitter Voltage	V_{CEO}		10	V
Emitter-to-Base Voltage	V_{EBO}		3	V
Collector Current	I_C		70	mA
Collector Dissipation	P_C		400	mW
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		−55 to +150	°C

Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=10V, I_E=0			0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=2V, I_C=0			1	μA
DC Current Gain	h_{FE}	V_{CE}=5V, I_C=10mA	100		180	
Gain-Bandwidth Product	f_T	V_{CE}=5V, I_C=20mA	1.0	1.5		GHz
Output Capacitance	Cob	V_{CB}=10V, f=1MHz		1.1	1.4	pF
Reverse Transfer Capacitance	Cre	V_{CB}=10V, f=1MHz		0.7		pF
Forward Transfer Gain	$\|S21e\|^2$	V_{CE}=5V, I_C=20mA, f=0.4GHz	9	11.5		dB
Noise Figure	NF	V_{CE}=3V, I_C=2mA, f=0.4GHz		1.6		dB

Marking : ZC

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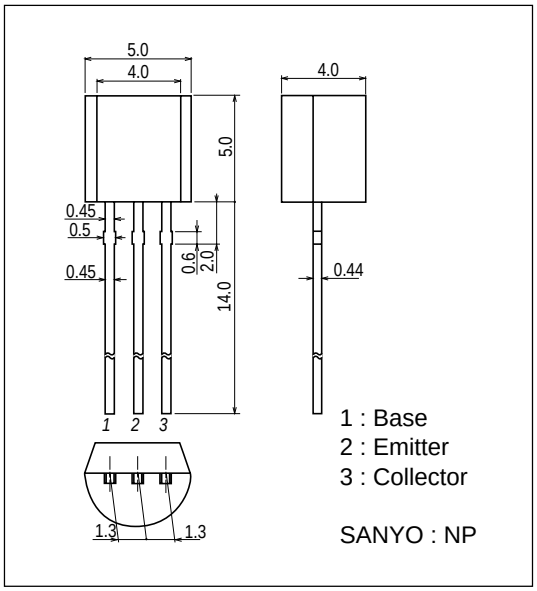
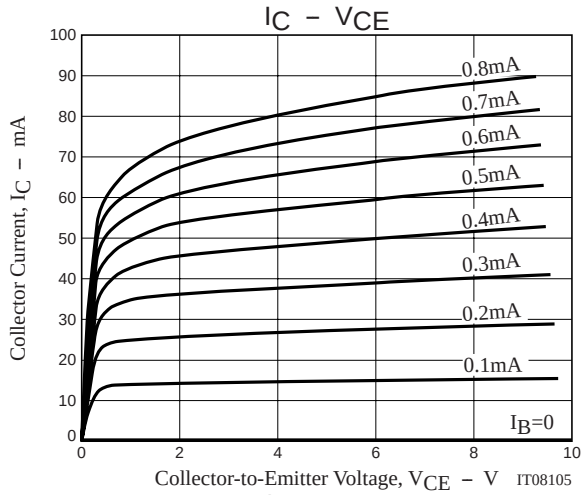
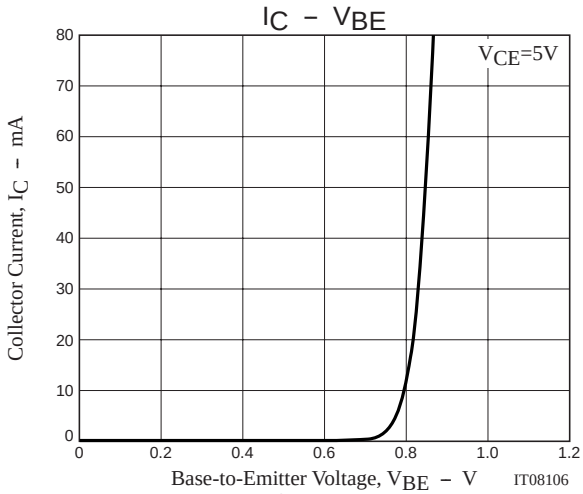
Package Dimensions

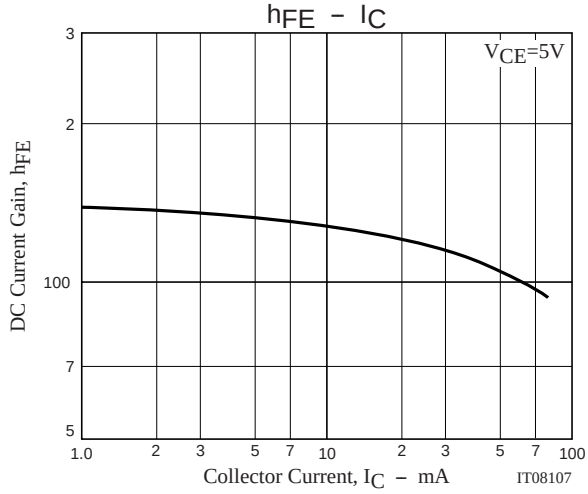
unit : mm

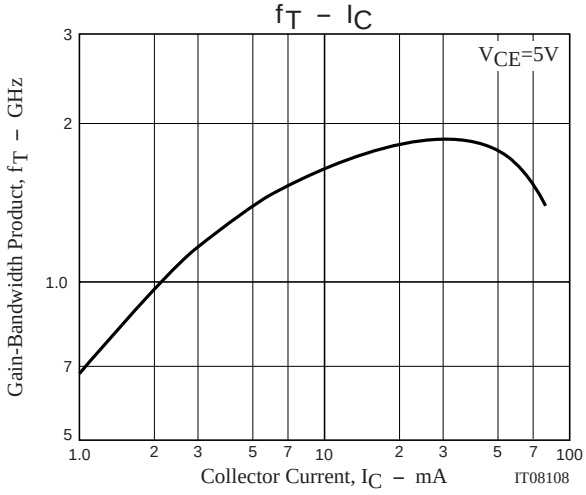
2004B



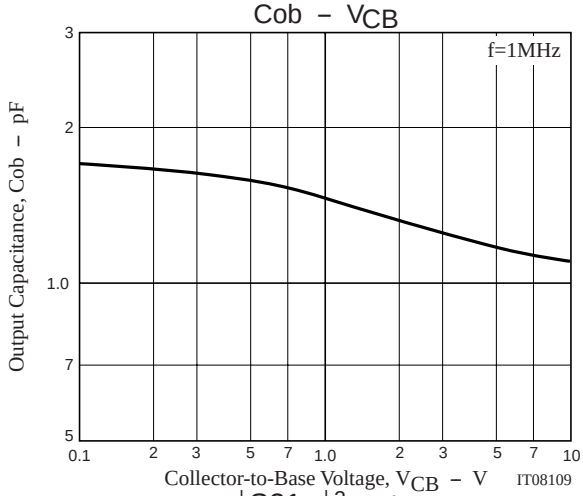




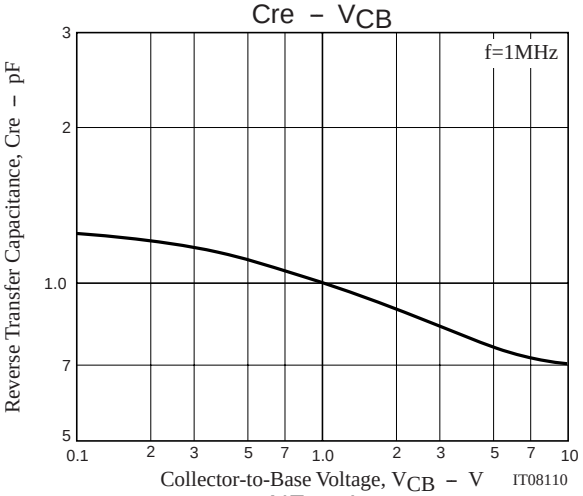




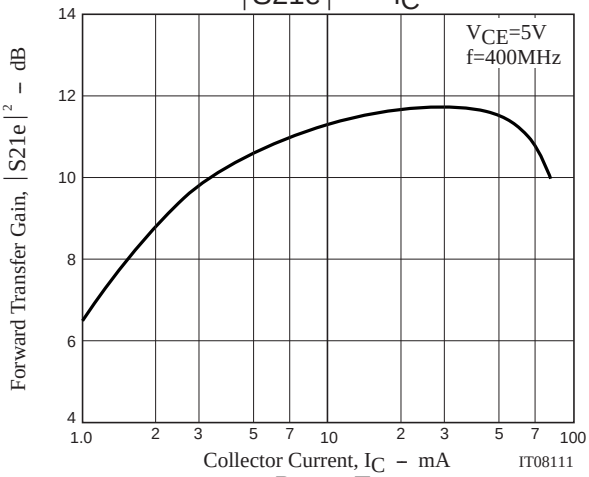
Cob – V_{CB}



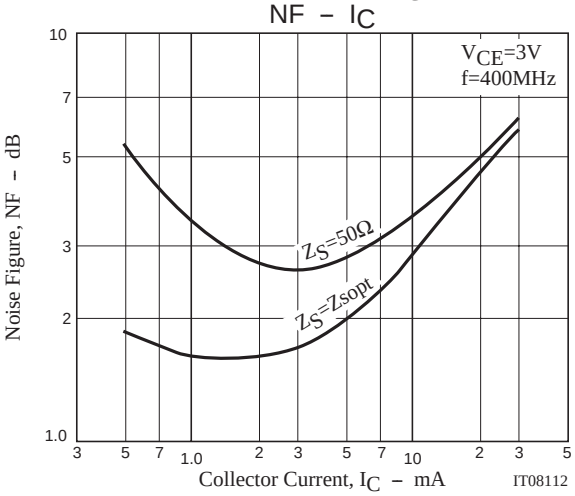
Cre – V_{CB}



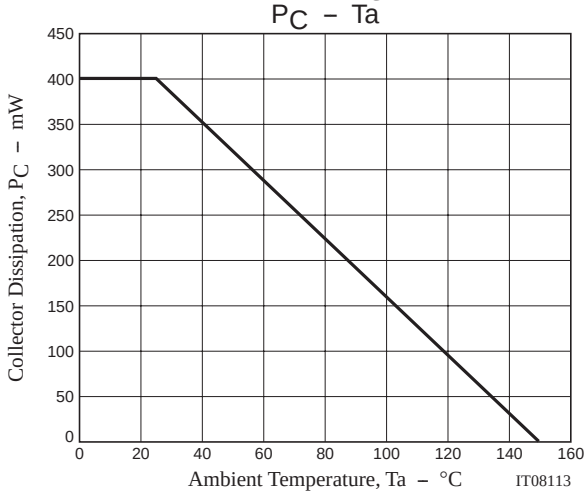
$|S21e|^2$ – I_C



NF – I_C



P_C – Ta



S Parameters (Common emitter)

V_{CE}=5V, I_C=1mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.911	−38.35	3.396	150.54	0.044	67.89	0.965	−11.16
200	0.789	−73.55	2.932	125.94	0.072	50.24	0.894	−19.16
300	0.667	−105.98	2.480	105.39	0.086	38.97	0.833	−24.89
400	0.581	−135.99	2.119	88.18	0.085	33.03	0.793	−29.61
500	0.530	−163.88	1.820	73.68	0.081	35.93	0.768	−33.50
600	0.516	170.66	1.591	61.24	0.080	44.02	0.752	−38.35
700	0.524	149.05	1.411	50.19	0.087	54.80	0.743	−43.53
800	0.544	130.45	1.265	40.26	0.107	61.94	0.735	−49.30
900	0.569	114.61	1.151	31.22	0.134	66.13	0.728	−56.06
1000	0.599	101.73	1.053	23.11	0.166	65.91	0.725	−64.11

V_{CE}=5V, I_C=3mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.734	−62.22	7.688	133.47	0.037	59.82	0.876	−15.78
200	0.520	−107.28	5.350	105.85	0.051	48.96	0.764	−20.74
300	0.412	−142.46	3.906	88.51	0.060	50.51	0.718	−23.92
400	0.374	−171.32	3.088	75.17	0.069	55.03	0.693	−27.48
500	0.369	164.72	2.527	64.19	0.080	60.30	0.683	−31.29
600	0.390	145.05	2.157	54.55	0.096	63.41	0.673	−36.13
700	0.416	128.83	1.893	45.49	0.116	65.58	0.666	−41.49
800	0.447	115.53	1.691	37.01	0.138	64.99	0.654	−47.20
900	0.481	104.33	1.531	28.78	0.165	64.38	0.644	−53.59
1000	0.513	94.85	1.405	20.91	0.196	61.55	0.633	−61.70

V_{CE}=5V, I_C=5mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.601	−77.46	10.083	123.30	0.032	58.18	0.813	−17.09
200	0.401	−124.33	6.214	97.86	0.045	55.73	0.710	−19.74
300	0.330	−158.33	4.368	82.77	0.056	60.17	0.677	−22.45
400	0.316	174.70	3.384	71.30	0.069	63.56	0.661	−26.09
500	0.328	153.64	2.764	61.57	0.085	65.89	0.654	−29.88
600	0.355	136.94	2.346	52.55	0.104	67.02	0.644	−35.07
700	0.385	122.98	2.058	44.10	0.126	67.31	0.636	−40.45
800	0.416	111.48	1.842	35.87	0.149	65.15	0.624	−46.16
900	0.451	101.75	1.668	28.07	0.175	62.95	0.612	−52.85
1000	0.488	93.45	1.525	20.21	0.202	59.91	0.598	−60.59

V_{CE}=5V, I_C=10mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.418	−98.93	12.653	110.98	0.025	61.57	0.726	−16.94
200	0.289	−145.70	7.004	90.22	0.041	65.66	0.657	−17.68
300	0.263	−176.64	4.795	77.68	0.056	68.69	0.639	−20.61
400	0.272	160.88	3.684	67.70	0.075	69.86	0.629	−24.59
500	0.294	143.46	3.003	58.71	0.092	69.86	0.623	−28.71
600	0.323	129.85	2.541	50.56	0.113	68.29	0.613	−33.65
700	0.356	118.38	2.230	42.41	0.134	66.15	0.606	−39.34
800	0.390	108.55	1.995	34.57	0.157	64.16	0.591	−45.22
900	0.428	100.12	1.804	26.83	0.183	61.23	0.578	−51.67
1000	0.465	92.70	1.655	19.00	0.210	58.00	0.561	−59.46

S Parameters (Common emitter)

V_{CE}=5V, I_C=15mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.336	−111.37	13.633	105.51	0.023	66.42	0.689	−16.01
200	0.251	−156.52	7.291	87.18	0.039	68.50	0.638	−16.50
300	0.243	175.36	4.950	75.58	0.058	72.23	0.624	−19.64
400	0.259	155.17	3.804	66.12	0.075	71.30	0.615	−23.84
500	0.282	139.97	3.085	57.58	0.096	70.72	0.610	−28.09
600	0.315	127.91	2.623	49.47	0.116	68.73	0.599	−33.22
700	0.349	117.19	2.294	41.46	0.139	66.53	0.589	−38.91
800	0.382	108.15	2.051	33.59	0.162	63.69	0.576	−44.65
900	0.423	100.27	1.857	25.77	0.186	60.44	0.561	−51.26
1000	0.461	93.31	1.699	18.04	0.213	56.83	0.543	−58.90

V_{CE}=5V, I_C=20mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.295	−119.70	14.064	102.72	0.023	68.43	0.670	−15.25
200	0.236	−163.17	7.419	85.53	0.040	72.56	0.627	−15.71
300	0.236	171.09	5.038	74.53	0.057	73.42	0.613	−19.17
400	0.252	153.03	3.857	65.19	0.077	71.74	0.606	−23.55
500	0.279	138.70	3.134	56.66	0.097	70.80	0.600	−27.92
600	0.311	127.43	2.662	48.69	0.118	69.12	0.590	−32.97
700	0.348	117.20	2.322	40.64	0.139	66.53	0.582	−38.63
800	0.382	108.37	2.076	32.72	0.163	63.36	0.567	−44.57
900	0.422	100.51	1.875	24.96	0.187	59.97	0.553	−50.89
1000	0.463	93.56	1.717	17.22	0.214	56.66	0.534	−58.57

V_{CE}=5V, I_C=30mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.255	−132.18	14.413	99.45	0.022	72.81	0.646	−14.31
200	0.228	−171.53	7.502	83.61	0.040	75.43	0.614	−14.88
300	0.235	166.38	5.066	72.97	0.059	74.03	0.604	−18.31
400	0.257	150.61	3.881	63.80	0.079	73.36	0.597	−23.02
500	0.284	137.65	3.149	55.32	0.099	71.09	0.592	−27.40
600	0.319	127.33	2.670	47.24	0.119	68.99	0.582	−32.58
700	0.355	117.59	2.329	39.18	0.142	66.19	0.574	−38.29
800	0.391	108.78	2.078	31.33	0.165	62.94	0.559	−44.08
900	0.432	100.94	1.873	23.50	0.188	59.89	0.544	−50.63
1000	0.476	93.96	1.712	15.58	0.214	56.33	0.527	−58.36

V_{CE}=5V, I_C=50mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.245	−148.53	14.210	96.44	0.023	73.67	0.625	−13.18
200	0.244	−179.65	7.331	81.36	0.041	76.18	0.600	−14.33
300	0.258	162.46	4.937	70.79	0.060	75.61	0.592	−18.11
400	0.284	149.02	3.773	61.59	0.081	73.24	0.585	−22.99
500	0.314	137.48	3.057	52.94	0.101	71.86	0.583	−27.31
600	0.349	127.61	2.577	44.66	0.122	68.97	0.573	−32.63
700	0.390	117.90	2.248	36.55	0.144	65.54	0.565	−38.50
800	0.427	109.32	1.996	28.38	0.169	63.25	0.549	−44.65
900	0.472	101.47	1.796	20.36	0.193	60.00	0.536	−51.23
1000	0.513	94.18	1.633	12.42	0.219	56.02	0.516	−59.35