

NPN Epitaxial Planar Silicon Transistor

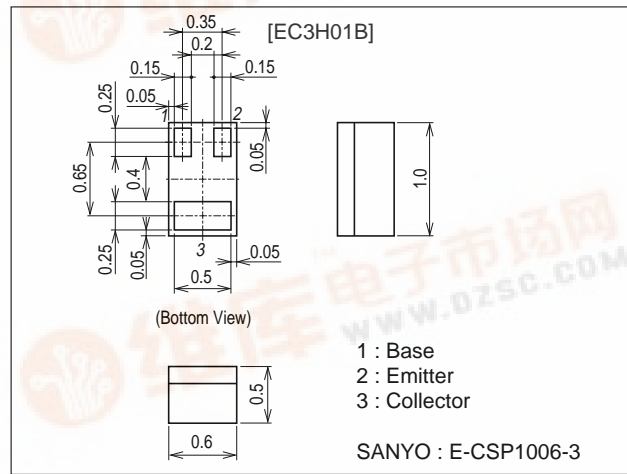
SANYO**EC3H01B****VHF Band Low-Noise Amplifier
and OSC Applications****Features**

- Low noise : NF=1.8dB typ (f=150MHz).
- High gain : $|S_{21e}|^2=16\text{dB typ (f=150MHz)}$.
- Ultraminiature (1006 size) and thin (0.5mm) leadless package.

Package Dimensions

unit : mm

2183

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

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		20	V
Collector-to-Emitter Voltage	V_{CEO}		12	V
Emitter-to-Base Voltage	V_{EBO}		2	V
Collector Current	I_C		50	mA
Collector Dissipation	P_C		100	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}	$V_{CB}=10\text{V}, I_E=0$			1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=1\text{V}, I_C=0$			10	μA
DC Current Gain	h_{FE1}	$V_{CE}=2\text{V}, I_C=3\text{mA}$	100		180	
	h_{FE2}	$V_{CE}=2\text{V}, I_C=50\text{mA}$	70			
Gain Bandwidth Product	f_{T1}	$V_{CE}=2\text{V}, I_C=3\text{mA}$	1.0	1.7		GHz
	f_{T2}	$V_{CE}=2\text{V}, I_C=20\text{mA}$		5.0		GHz
Output Capacitance	C_{ob}	$V_{CB}=10\text{V}, f=1\text{MHz}$		1.1	1.8	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.8		pF
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=2\text{V}, I_C=3\text{mA}, f=150\text{MHz}$	13	16		dB
Noise Figure	NF	$V_{CE}=2\text{V}, I_C=3\text{mA}, f=150\text{MHz}$		1.8	3.0	dB

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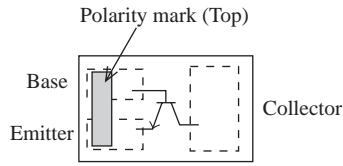
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Type No. Indication (Top view)

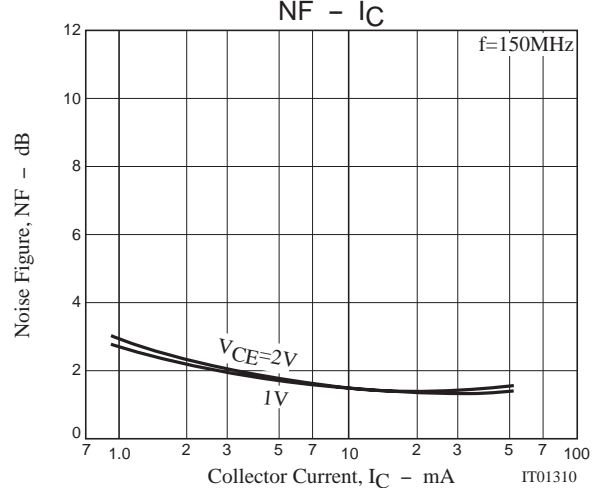
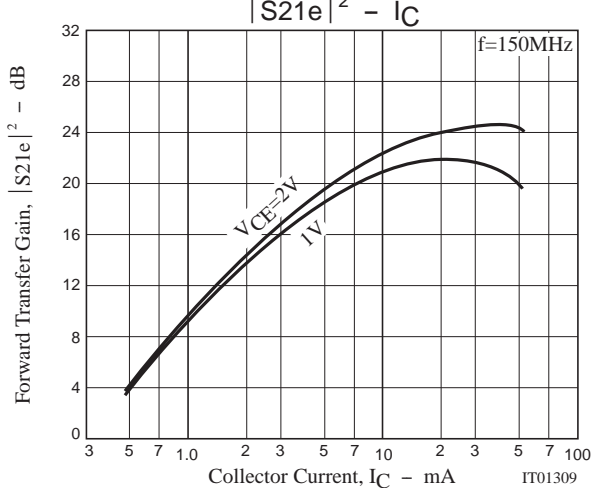
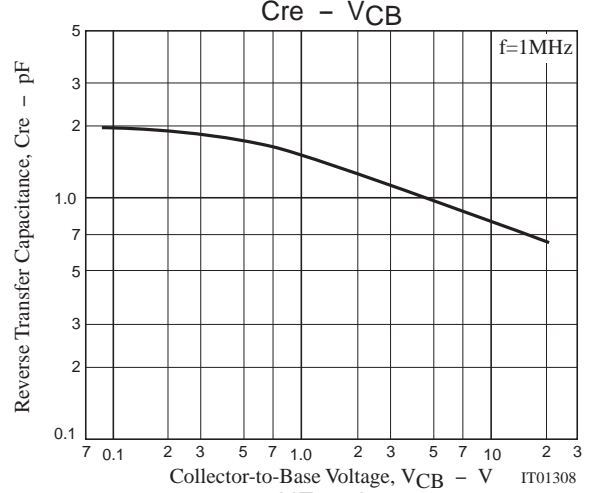
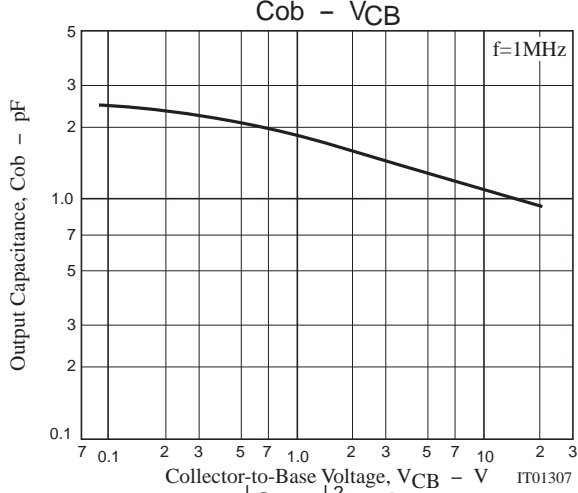
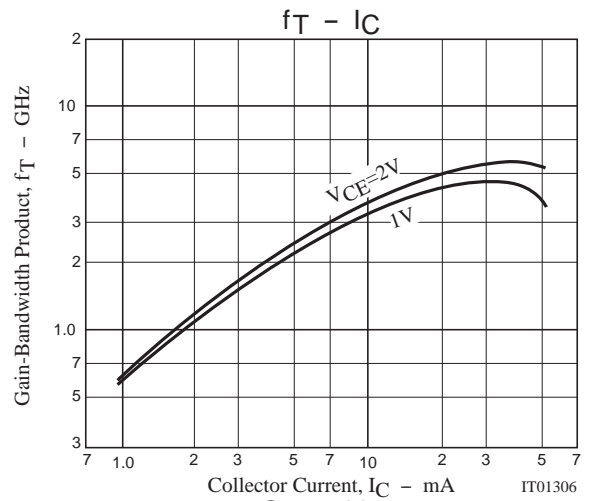
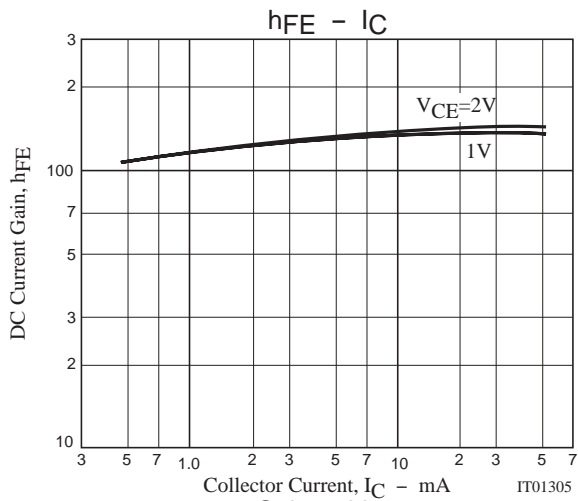
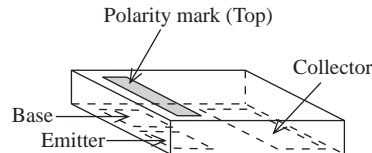


This product adopts a high-frequency process. Please be careful when handling it because it is susceptible to static electricity.

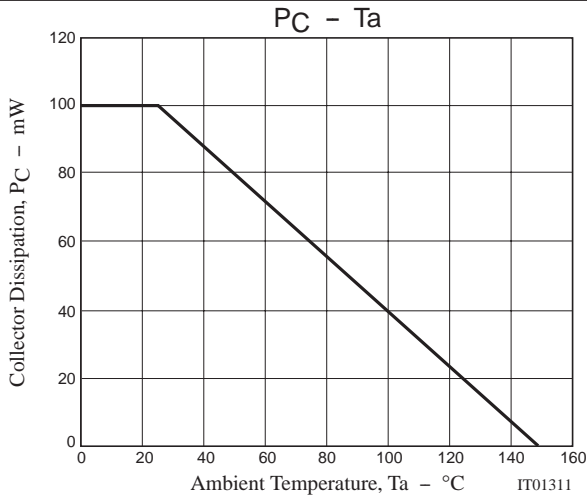
Electrical Connection (Top view)



*Electrodes : on the bottom



EC3H01B



S Parameters (Common emitter)

$V_{CE}=1V, I_C=3mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
50	0.896	-43.1	9.814	154.6	0.054	66.4	0.909	-23.3
100	0.877	-72.4	7.271	137.7	0.095	51.7	0.794	-35.5
150	0.835	-99.6	6.387	123.3	0.109	38.1	0.630	-52.5
200	0.826	-112.9	5.162	114.2	0.123	31.8	0.554	-56.6
250	0.815	-125.5	4.496	106.5	0.131	26.3	0.496	-60.0
300	0.815	-132.6	3.849	100.9	0.136	22.6	0.455	-63.1
350	0.799	-141.8	3.350	96.2	0.134	19.7	0.405	-69.4
400	0.798	-146.3	3.034	92.1	0.136	17.4	0.396	-69.6
450	0.798	-150.9	2.547	88.8	0.130	17.3	0.348	-77.8
500	0.793	-155.4	2.464	85.2	0.136	14.9	0.362	-75.3

$V_{CE}=1V, I_C=30mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
50	0.708	-116.6	31.386	124.6	0.031	45.7	0.651	-89.1
100	0.753	-145.8	18.450	107.7	0.039	34.5	0.531	-123.5
150	0.764	-157.7	12.776	100.4	0.041	35.5	0.499	-140.9
200	0.768	-164.1	9.666	96.0	0.044	38.1	0.481	-150.0
250	0.772	-167.9	7.795	92.9	0.048	42.0	0.475	-156.2
300	0.775	-170.8	6.539	90.4	0.052	45.3	0.472	-160.3
350	0.773	-173.0	5.627	88.2	0.056	46.9	0.472	-163.2
400	0.774	-174.7	4.926	86.5	0.060	50.0	0.471	-165.6
450	0.776	-176.2	4.406	85.0	0.063	51.5	0.471	-168.1
500	0.775	-177.7	3.971	83.3	0.068	53.1	0.468	-169.1

$V_{CE}=2V, I_C=1mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
50	0.960	-27.0	3.322	163.6	0.045	75.5	0.979	-8.0
100	0.958	-47.3	2.991	149.3	0.083	61.8	0.936	-14.7
150	0.923	-71.2	2.712	136.7	0.113	50.8	0.882	-20.5
200	0.919	-83.6	2.330	126.5	0.131	40.9	0.819	-25.4
250	0.904	-97.6	2.211	117.3	0.146	35.0	0.802	-27.2
300	0.902	-106.8	2.103	110.3	0.152	28.1	0.746	-31.3
350	0.879	-118.1	2.047	103.5	0.164	24.1	0.755	-32.0
400	0.876	-125.0	1.654	98.2	0.165	20.1	0.740	-33.9
450	0.868	-132.0	1.484	93.1	0.162	16.3	0.696	-37.1
500	0.860	-137.8	1.392	88.6	0.166	13.0	0.708	-38.3

EC3H01B

V_{CE}=2V, I_C=3mA, Z_O=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
50	0.910	-36.5	10.051	157.6	0.043	70.8	0.932	-18.0
100	0.882	-66.6	7.542	142.0	0.075	55.9	0.841	-27.7
150	0.854	-90.0	6.850	128.0	0.090	41.8	0.692	-41.3
200	0.837	-105.9	5.632	118.7	0.104	36.0	0.617	-44.6
250	0.825	-118.8	4.990	110.8	0.111	29.8	0.564	-46.9
300	0.817	-128.1	4.298	105.0	0.116	25.9	0.520	-49.5
350	0.805	-136.5	3.779	100.0	0.115	23.9	0.470	-53.5
400	0.803	-142.0	3.437	95.9	0.119	21.2	0.457	-53.7
450	0.802	-146.2	2.879	92.6	0.113	19.9	0.401	-59.5
500	0.797	-151.0	2.810	88.9	0.117	18.0	0.418	-57.5

V_{CE}=2V, I_C=10mA, Z_O=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
50	0.781	-63.1	22.825	146.1	0.036	59.1	0.825	-38.9
100	0.765	-102.5	17.041	125.6	0.053	44.0	0.617	-63.6
150	0.755	-124.3	12.823	113.8	0.060	37.9	0.481	-80.1
200	0.749	-137.4	10.134	106.3	0.065	33.3	0.400	-89.9
250	0.750	-146.2	8.276	101.2	0.067	31.3	0.347	-99.5
300	0.748	-152.4	7.003	97.3	0.068	31.5	0.313	-105.1
350	0.747	-157.1	6.126	93.7	0.071	33.2	0.293	-111.8
400	0.747	-160.7	5.337	91.3	0.072	32.7	0.274	-116.3
450	0.747	-163.4	4.806	88.7	0.076	33.3	0.262	-119.8
500	0.746	-166.2	4.305	86.5	0.076	35.7	0.256	-124.2

V_{CE}=2V, I_C=30mA, Z_O=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
50	0.668	-99.9	37.088	131.5	0.026	51.3	0.685	-68.6
100	0.708	-135.5	23.026	112.8	0.035	40.7	0.503	-102.7
150	0.721	-149.9	16.197	104.2	0.038	40.0	0.432	-122.1
200	0.725	-158.1	12.372	99.0	0.041	42.1	0.399	-134.2
250	0.728	-163.0	10.017	95.5	0.045	43.8	0.383	-142.9
300	0.733	-166.7	8.389	92.6	0.047	44.7	0.375	-148.4
350	0.730	-169.1	7.243	90.3	0.051	49.8	0.370	-152.3
400	0.733	-171.3	6.353	88.5	0.055	53.0	0.367	-155.8
450	0.732	-173.1	5.675	86.6	0.058	53.0	0.362	-158.4
500	0.734	-175.0	5.115	85.0	0.062	53.8	0.361	-160.5

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