



NPN Epitaxial Planar Type Silicon Transistor

EC3H03BA — VHF to UHF Wide-Band Low-Noise Amplifier and OSC Applications

Features

- Low noise : NF=1.1dB typ (f=1GHz).
- High gain : $|S_{21e}|^2=12\text{dB typ (f=1GHz)}$.
- High cutoff frequency : $f_T=7.5\text{GHz typ}$.
- Ultraminiature (1006 size) and thin (0.5mm) leadless package .
- Halogen free compliance (UL94HB).

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}		12	V
Emitter-to-Base Voltage	V _{EBO}		2	V
Collector Current	I _C		100	mA
Collector Dissipation	P _C		150	mW
Junction Temperature	T _j		150	°C
Storage Temperature	T _{stg}		-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 =0A			1.0	μA
Emitter Cutoff Current	I _{EBO}	V _{EB} =1V, I _C =0A			10	μA
DC Current Gain	h _{FE}	V _{CE} =5V, I _C =30mA	100		180	
Gain-Bandwidth Product	f _T	V _{CE} =5V, I _C =30mA	6	7.5		GHz
Output Capacitance	C _{ob}	V _{CB} =10V, f=1MHz		0.9	1.4	pF
Reverse Transfer Capacitance	C _{re}	V _{CB} =10V, f=1MHz		0.65		pF
Forward Transfer Gain	S _{21e} ²	V _{CE} =5V, I _C =30mA, f=1GHz	10	12		dB
Noise Figure	NF	V _{CE} =5V, I _C =7mA, f=1GHz		1.1	2.0	dB

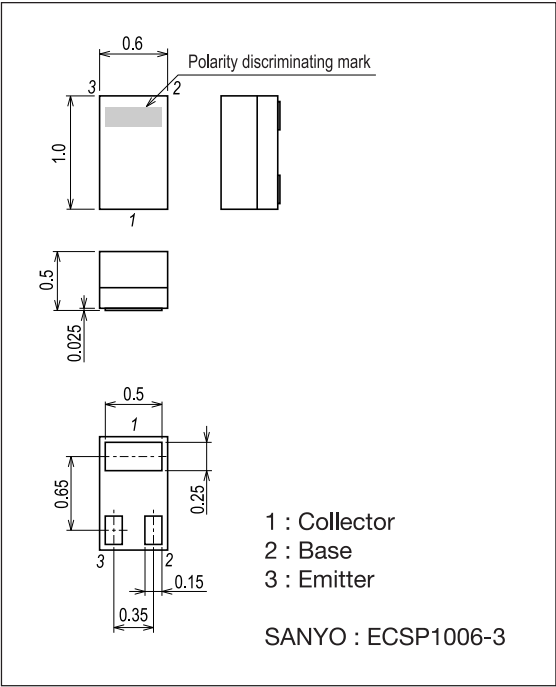
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EC3H03BA

Package Dimensions

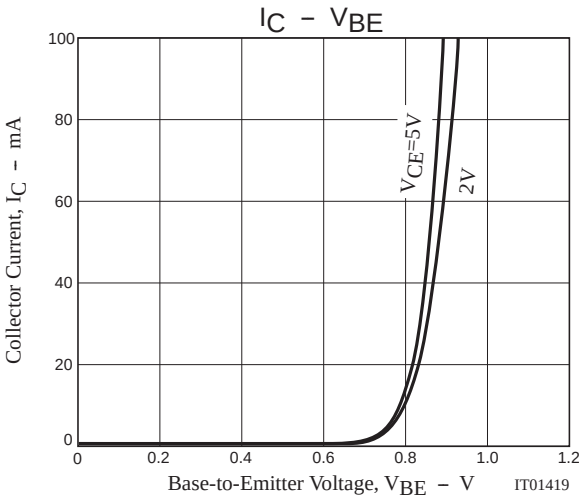
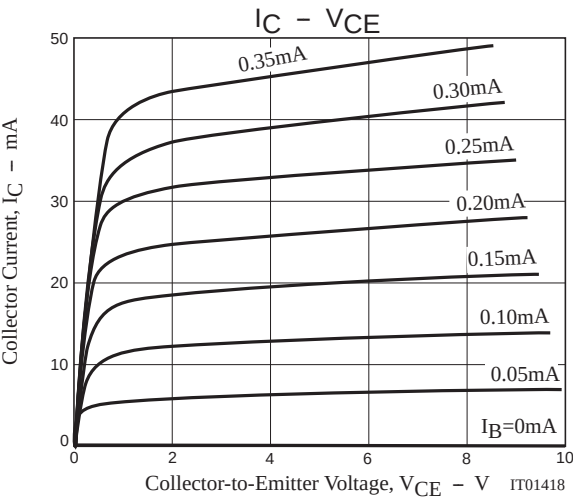
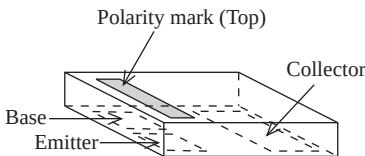
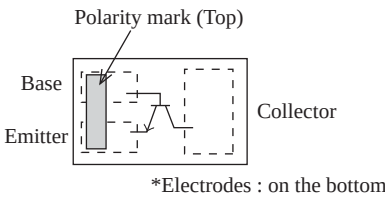
unit : mm (typ)
7039A-005



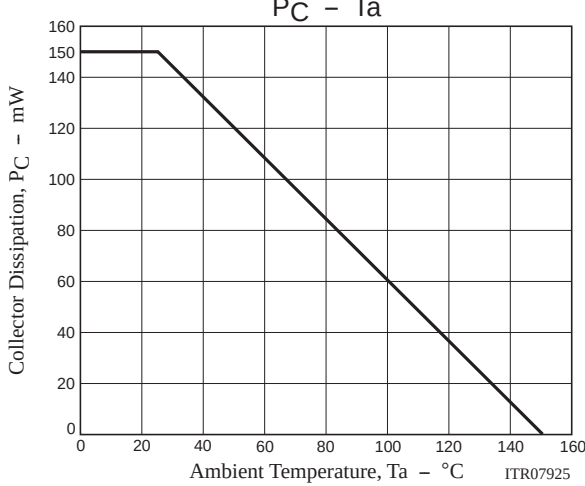
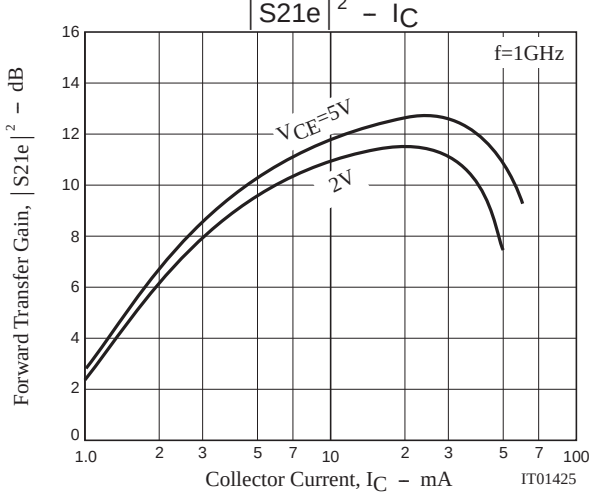
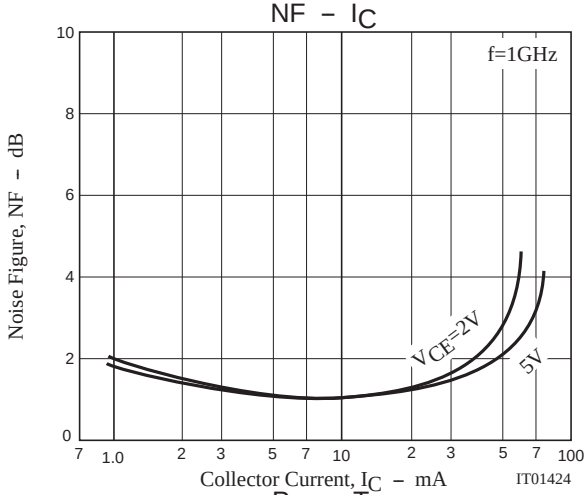
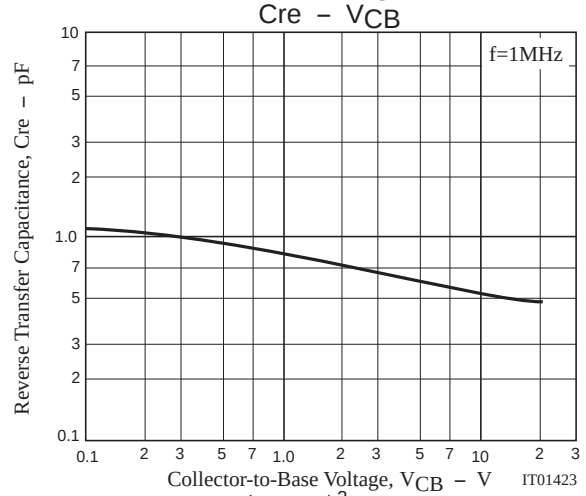
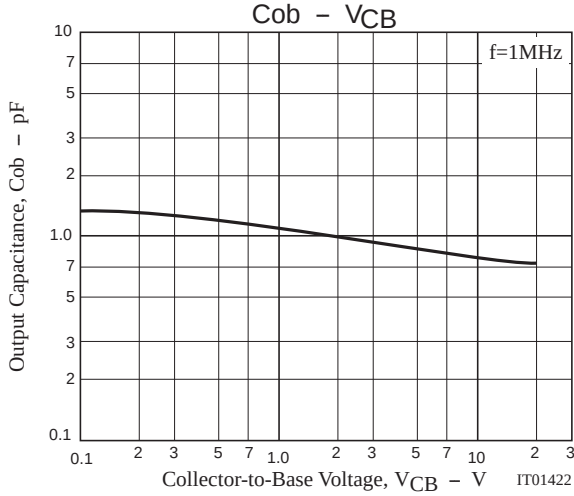
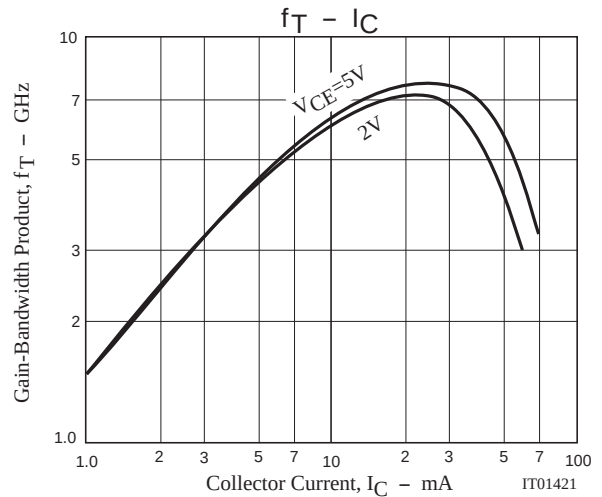
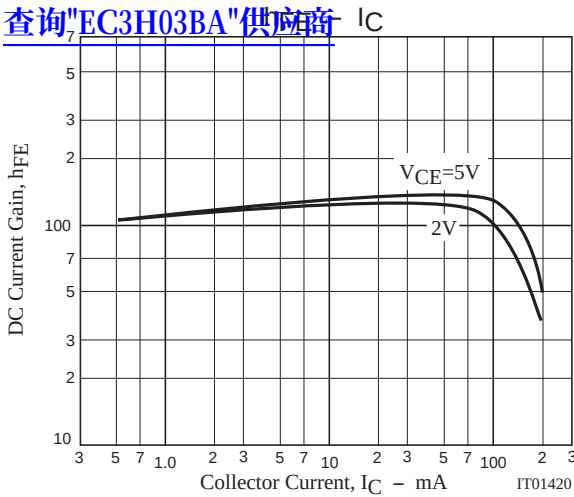
Type No. Indication (Top view)



Electrical Connection (Top view)



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SP Parameters (Common Emitter)

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V_{CE}=2V, I_C=1mA, Z_O=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.964	-19.7	3.124	165.8	0.045	78.6	0.978	-9.0
200	0.935	-39.7	2.708	153.5	0.082	65.9	0.939	-16.3
400	0.897	-67.9	2.474	129.9	0.138	49.5	0.836	-27.7
600	0.833	-93.6	2.245	113.2	0.163	36.1	0.744	-35.1
800	0.778	-114.5	1.987	99.4	0.177	27.8	0.689	-39.9
1000	0.759	-127.0	1.874	88.7	0.188	20.5	0.657	-44.0
1200	0.720	-140.2	1.499	80.2	0.179	17.2	0.622	-48.2
1400	0.731	-146.4	1.211	71.9	0.166	16.5	0.625	-52.1
1600	0.738	-151.5	1.105	65.2	0.157	15.4	0.657	-55.1
1800	0.741	-156.8	1.016	59.4	0.148	16.0	0.610	-60.5
2000	0.720	-164.1	1.014	54.3	0.140	15.6	0.599	-64.9

V_{CE}=2V, I_C=5mA, Z_O=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.838	-40.4	13.956	153.7	0.038	70.0	0.905	-22.6
200	0.773	-70.4	11.300	134.6	0.063	55.1	0.747	-39.0
400	0.668	-112.8	7.451	111.9	0.087	41.8	0.521	-55.2
600	0.630	-133.8	5.422	99.0	0.094	39.5	0.406	-61.2
800	0.609	-147.0	4.241	89.9	0.103	40.2	0.334	-65.8
1000	0.600	-155.3	3.447	83.2	0.110	41.0	0.294	-69.9
1200	0.593	-162.1	2.923	77.3	0.119	42.9	0.268	-73.4
1400	0.590	-167.1	2.558	72.1	0.127	45.8	0.255	-76.1
1600	0.583	-172.2	2.297	67.5	0.135	47.9	0.253	-78.2
1800	0.578	-175.8	2.053	63.1	0.145	50.0	0.259	-79.7
2000	0.576	-179.7	1.861	58.7	0.155	52.6	0.254	-82.2

V_{CE}=2V, I_C=20mA, Z_O=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.618	-80.4	28.462	135.0	0.029	58.2	0.705	-46.8
200	0.574	-119.9	18.357	114.6	0.039	48.7	0.461	-69.0
400	0.558	-149.5	10.129	98.0	0.053	52.8	0.273	-89.1
600	0.554	-161.5	6.930	89.8	0.066	57.1	0.203	-99.8
800	0.552	-168.7	5.257	83.8	0.081	60.9	0.170	-108.1
1000	0.549	-173.6	4.252	78.9	0.098	62.6	0.156	-113.9
1200	0.545	-177.4	3.595	74.5	0.115	63.7	0.148	-117.2
1400	0.546	179.4	3.104	70.6	0.129	64.5	0.142	-121.2
1600	0.544	176.5	2.742	66.8	0.147	64.0	0.140	-123.8
1800	0.541	173.9	2.470	63.4	0.162	63.8	0.140	-126.9
2000	0.541	171.5	2.241	59.6	0.178	63.8	0.133	-128.1

EC3H03BA

EC3H03BA (Common emitter)

VCE=5V, IC=3mA, ZO=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.907	-27.4	9.110	161.3	0.032	74.5	0.956	-12.6
200	0.857	-51.5	8.122	145.5	0.057	62.3	0.881	-21.8
400	0.737	-91.8	6.152	122.5	0.085	46.8	0.698	-34.9
600	0.682	-114.8	4.800	107.6	0.096	38.9	0.588	-39.9
800	0.650	-130.1	3.718	97.3	0.100	37.7	0.516	-43.1
1000	0.638	-140.2	3.112	89.3	0.104	35.8	0.458	-46.2
1200	0.628	-148.2	2.749	81.8	0.109	37.1	0.458	-47.0
1400	0.612	-156.0	2.487	75.8	0.112	36.7	0.453	-49.0
1600	0.597	-163.0	2.161	70.6	0.115	41.4	0.450	-51.6
1800	0.595	-167.0	1.930	65.7	0.118	44.5	0.437	-54.6
2000	0.599	-171.1	1.679	60.7	0.125	51.1	0.424	-57.2

VCE=5V, IC=10mA, ZO=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.751	-49.5	22.017	148.6	0.027	67.7	0.860	-25.8
200	0.660	-84.6	16.702	128.2	0.042	53.2	0.664	-40.9
400	0.572	-123.4	10.313	107.1	0.056	49.0	0.437	-52.3
600	0.543	-142.1	7.243	96.4	0.066	50.6	0.342	-54.4
800	0.530	-153.3	5.571	88.8	0.077	53.2	0.289	-55.6
1000	0.525	-160.2	4.531	83.1	0.088	55.2	0.259	-56.7
1200	0.518	-166.2	3.831	78.1	0.098	58.2	0.244	-57.7
1400	0.515	-170.5	3.312	73.6	0.110	60.6	0.235	-59.4
1600	0.514	-174.4	2.943	69.5	0.122	61.5	0.232	-60.3
1800	0.509	-177.2	2.636	65.7	0.135	62.4	0.234	-62.8
2000	0.511	-179.6	2.387	61.7	0.148	63.4	0.230	-63.9

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