Ordering number : ENA1068

SANYO Semiconductors

DATA SHEET

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 : $|S21e|^2$=12dB typ (f=1GHz).
- High cutoff frequency : f_T=7.5GHz 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	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=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-Bandwitch Product	f_T	V_{CE}=5V, I_C=30mA	6	7.5		GHz
Output Capacitance	Cob	V_{CB}=10V, f=1MHz		0.9	1.4	pF
Reverse Transfer Capacitance	Cre	V_{CB}=10V, f=1MHz		0.65		pF
Forward Transfer Gain	$\|S21e\|^2$	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

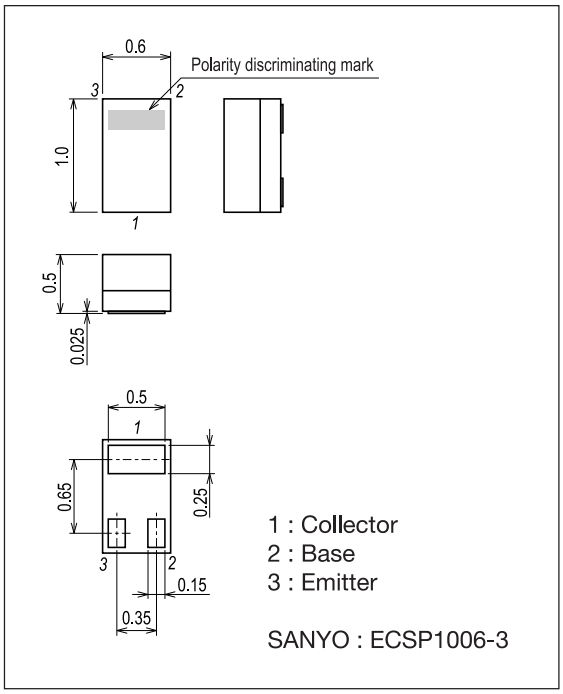
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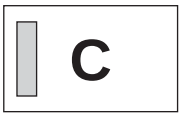
Package Dimensions

unit : mm (typ)

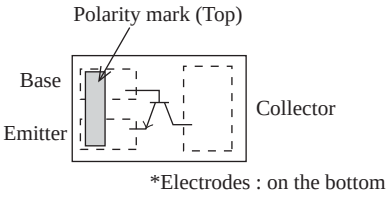
7039A-005

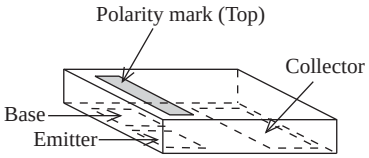


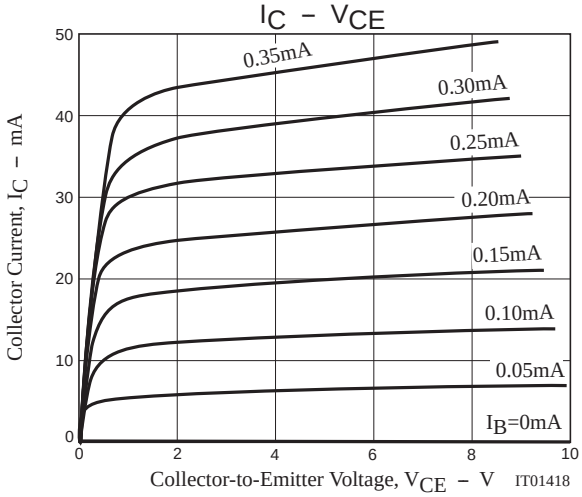
Type No. Indication (Top view)

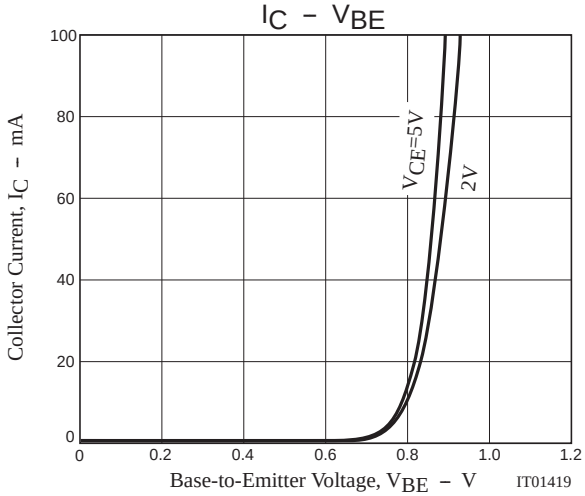


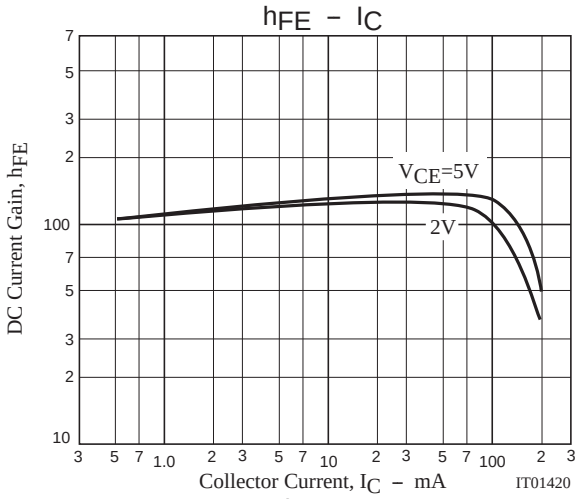
Electrical Connection (Top view)

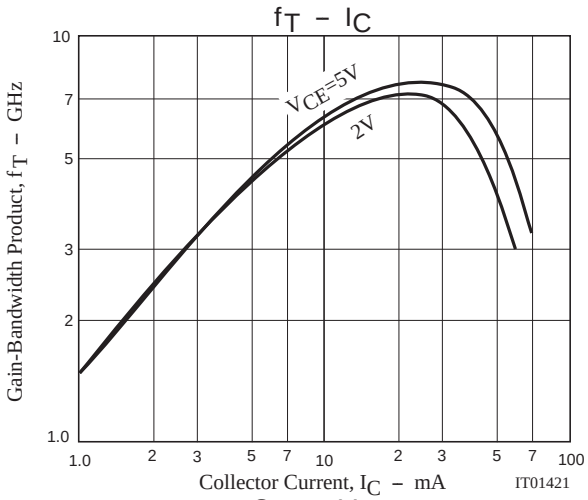


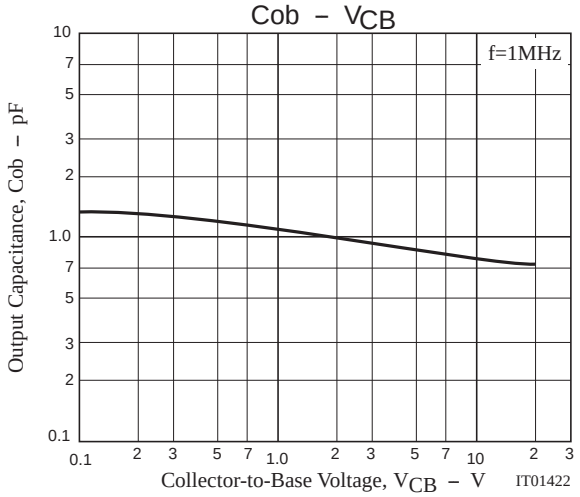


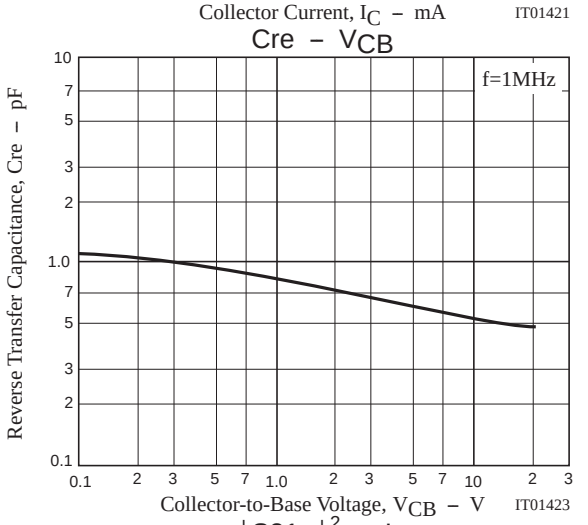


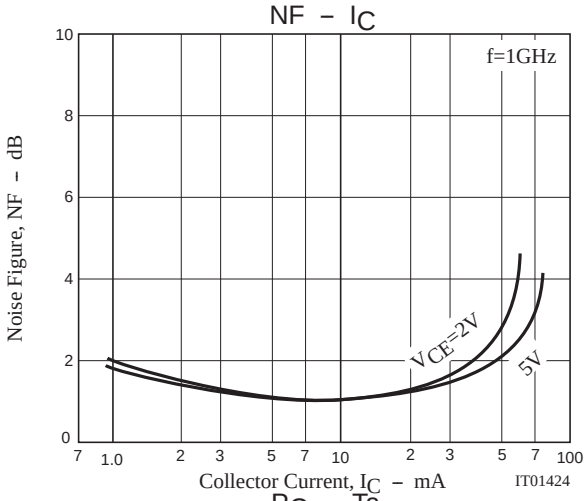


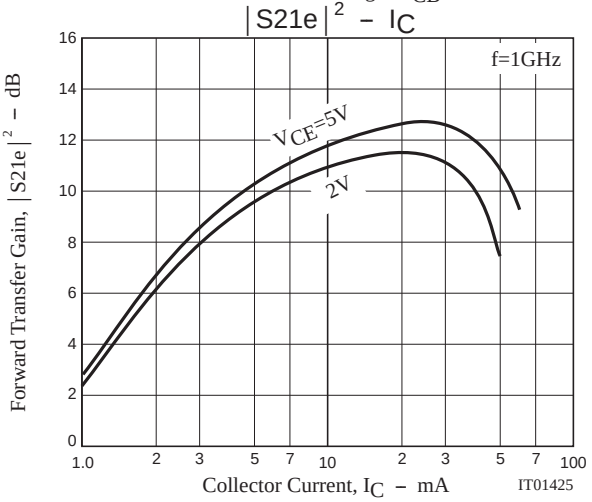

hFE – IC
DC Current Gain, hFE
VCE=5V
2V
Collector Current, IC – mA
IT01420

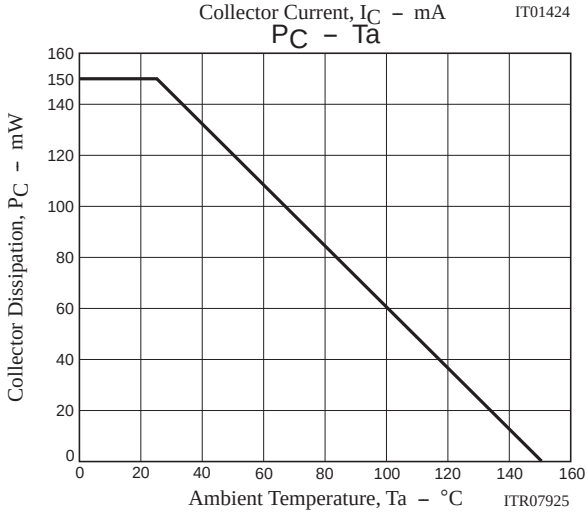

fT – IC
Gain-Bandwidth Product, fT – GHz
VCE=5V
2V
Collector Current, IC – mA
IT01421


Cob – VCB
Output Capacitance, Cob – pF
f=1MHz
Collector-to-Base Voltage, VCB – V
IT01422


Cre – VCB
Reverse Transfer Capacitance, Cre – pF
f=1MHz
Collector-to-Base Voltage, VCB – V
IT01423


NF – IC
Noise Figure, NF – dB
f=1GHz
VCE=2V
5V
Collector Current, IC – mA
IT01424


|S21e|2 – IC
Forward Transfer Gain, |S21e|2 – dB
f=1GHz
VCE=5V
2V
Collector Current, IC – mA
IT01425


PC – Ta
Collector Dissipation, PC – mW
Ambient Temperature, Ta – °C
ITR07925

S Parameters (Common emitter)

V_{CE}=2V, 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	0.964	–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)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
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)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
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

S Parameters (Common emitter)

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	0.907	–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

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	0.751	–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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