Ordering number:ENN6524

NPN Epitaxial Planar Silicon Transistor

EC3H06B

UHF to S Band Low-Noise Amplifier and OSC Applications

Features

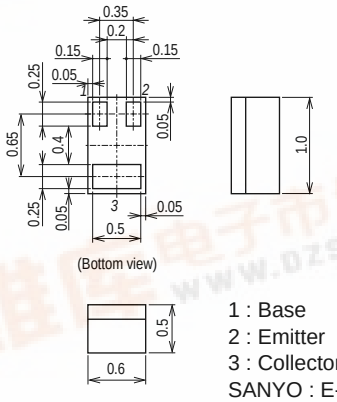
- Low noise : NF=0.9dB typ (f=1GHz).
  : NF=1.4dB typ (f=1.5GHz).
- High gain : $|S21e|^2$=10dB typ (f=1.5GHz).
- High cutoff frequency : f_T=11GHz typ.
- Low voltage, low current operation. (V_{CE}=1V, I_C=1mA)
  : f_T=7GHz typ.
  : $|S21e|^2$=5.5dB typ (f=1.5GHz).
- Ultrasmall (1006size), slim (0.5mm) leadless package.

Package Dimensions

unit:mm

2183

[EC3H06B]



1 : Base
2 : Emitter
3 : Collector
SANYO : E-CSP1006-3

Specifications

Absolute Maximum Ratings at Ta = 25˚C

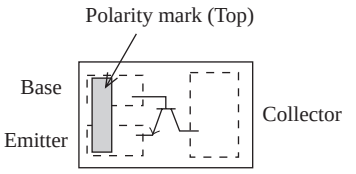
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		20	V
Collector-to-Emitter Voltage	V_{CEO}		10	V
Emitter-to-Base Voltage	V_{EBO}		1.5	V
Collector Current	I_C		30	mA
Collector Dissipation	P_C		100	mW
Junction Temperature	Tj		150	˚C
Storage Temperature	Tstg		–55 to +150	˚C

Electrical Characteristics at Ta = 25˚C

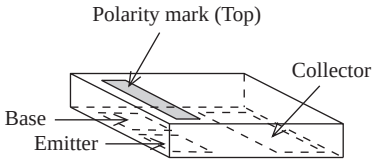
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=10V, I_E=0			1.0	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=1V, I_C=0			10	μA
DC Current Gain	h_{FE}	V_{CE}=5V, I_C=10mA	100		180	
Gain-Bandwidth Product	f_T1	V_{CE}=5V, I_C=10mA	8	11		GHz
	f_T2	V_{CE}=1V, I_C=1mA		7		GHz
Output Capacitance	Cob	V_{CB}=10V, f=1MHz		0.45	0.7	pF
Reverse Transfer Capacitance	Cre	V_{CB}=10V, f=1MHz		0.30		pF
Forward Transfer Gain	$\|S21e\|^2$ 1	V_{CE}=5V, I_C=10mA, f=1.5GHz	8	10		dB
	$\|S21e\|^2$ 2	V_{CE}=1V, I_C=1mA, f=1.5GHz		5.5		dB
Noise Figure	NF1	V_{CE}=5V, I_C=5mA, f=1.5GHz		1.4	3.0	dB
	NF2	V_{CE}=2V, I_C=3mA, f=1GHz		0.9		dB

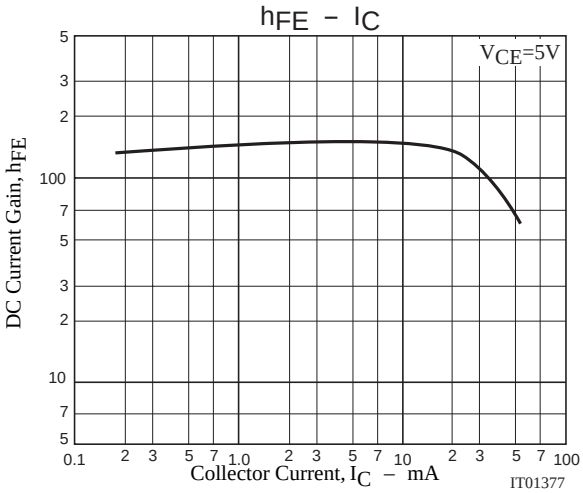
Type No. Indication (Top view)

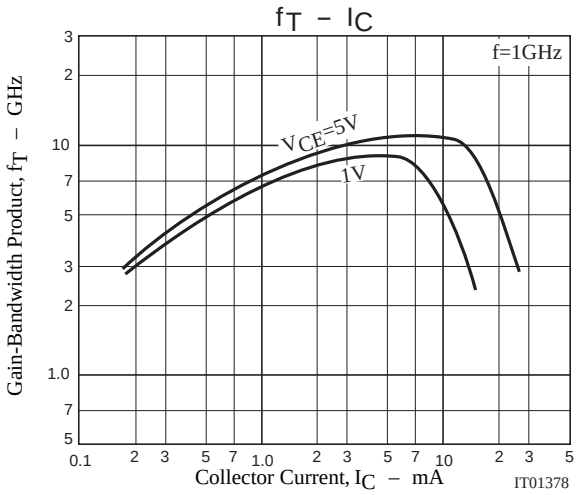
Electrical Connection (Top view)

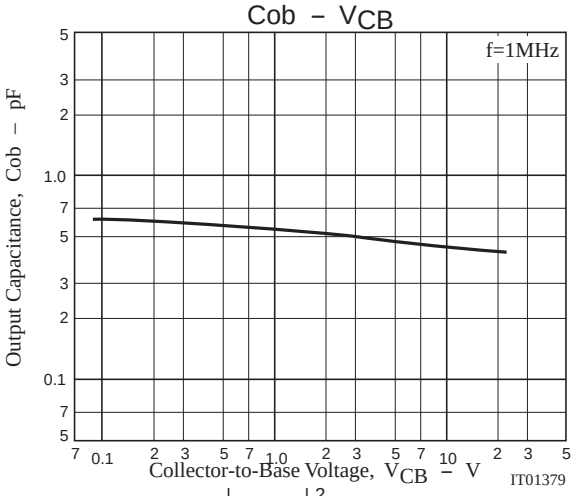


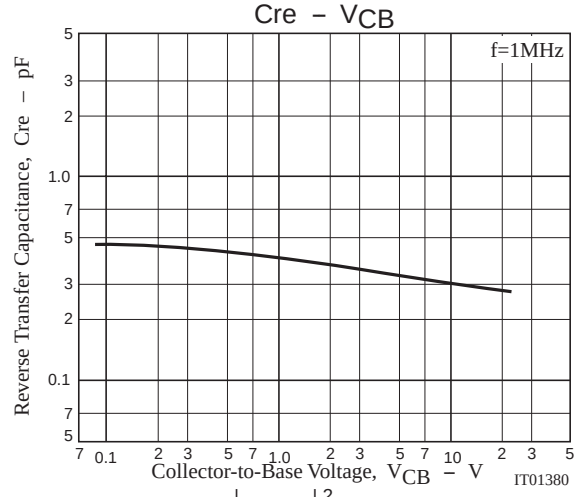
* Electrodes : on the bottom

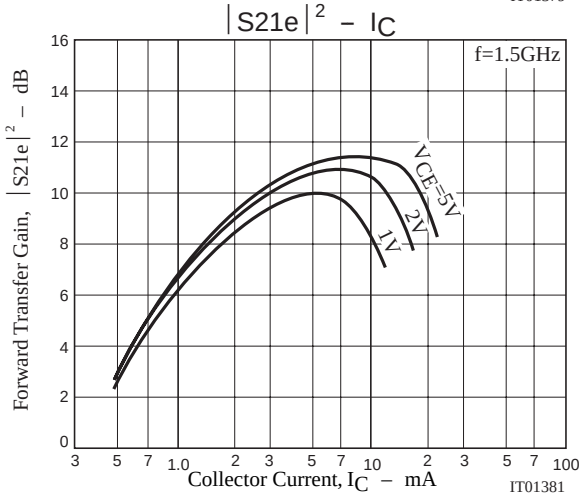


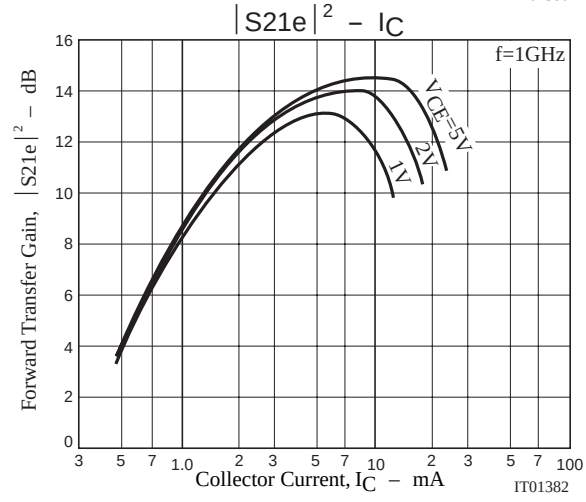


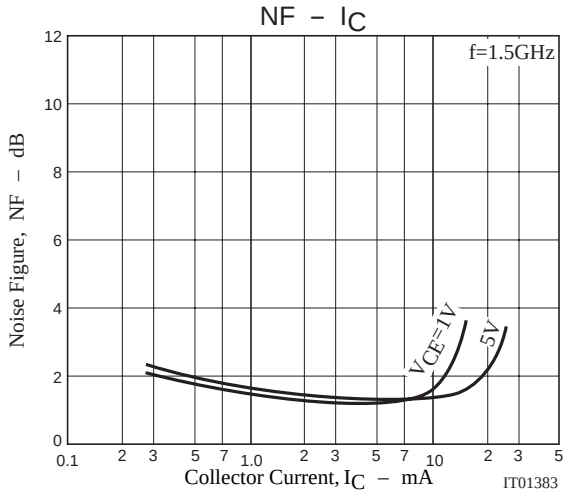


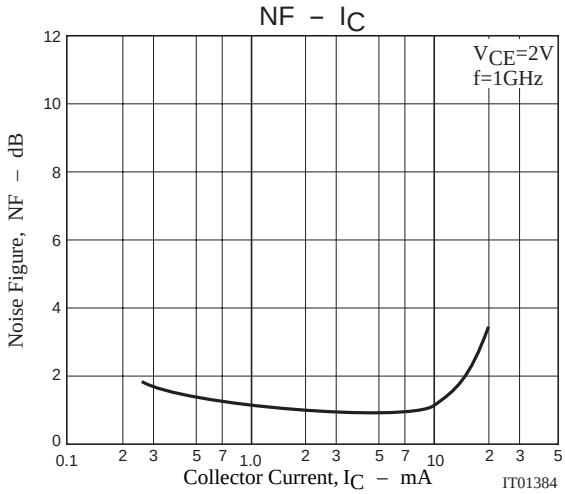


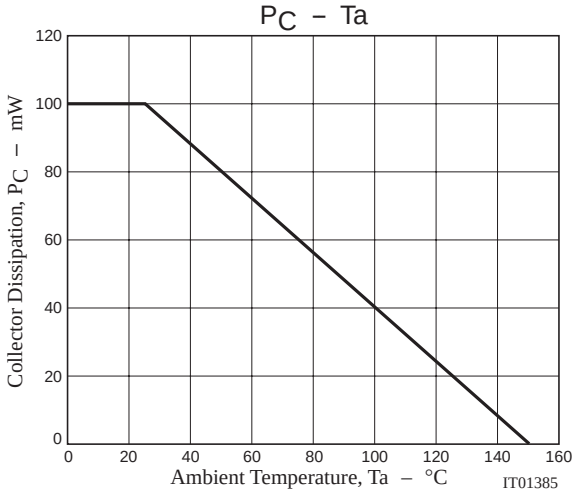












S Parameters (Common emitter)

V_{CE}=1V, 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	0.967	–9.3	3.308	171.4	0.028	83.6	0.990	–5.4
200	0.945	–19.5	3.305	163.3	0.055	77.5	0.976	–10.2
400	0.896	–37.8	3.149	148.2	0.102	66.3	0.922	–20.1
600	0.827	–52.9	2.936	135.4	0.140	55.9	0.854	–28.5
800	0.772	–66.7	2.696	123.6	0.167	48.2	0.787	–34.9
1000	0.738	–77.6	2.381	112.3	0.181	41.9	0.721	–41.0
1200	0.681	–89.3	2.241	104.7	0.198	37.3	0.685	–44.1
1400	0.654	–100.1	1.985	97.2	0.202	33.8	0.670	–46.4
1600	0.631	–106.9	1.755	89.8	0.204	31.8	0.623	–50.4
1800	0.587	–116.8	1.727	83.5	0.216	28.8	0.604	–53.8
2000	0.570	–122.7	1.616	78.0	0.218	27.0	0.590	–56.7

V_{CE}=1V, I_C=5mA, Z_O=50Ω

Freq (MHz)	$\lvert S_{11} \rvert$	$\angle S_{11}$	$\lvert S_{21} \rvert$	$\angle S_{21}$	$\lvert S_{12} \rvert$	$\angle S_{12}$	$\lvert S_{22} \rvert$	$\angle S_{22}$
100	0.840	–24.4	13.287	161.8	0.026	76.0	0.944	–14.8
200	0.780	–44.6	11.885	147.0	0.047	66.3	0.850	–27.0
400	0.648	–77.8	9.149	125.2	0.073	53.1	0.655	–42.6
600	0.556	–100.8	7.016	111.6	0.086	48.5	0.519	–49.8
800	0.504	–117.0	5.630	101.9	0.097	47.4	0.434	–53.9
1000	0.473	–129.4	4.700	94.6	0.107	47.3	0.382	–56.2
1200	0.456	–137.7	4.005	88.6	0.115	49.0	0.345	–58.0
1400	0.439	–144.8	3.501	83.5	0.125	49.8	0.317	–59.5
1600	0.431	–151.6	3.135	79.0	0.135	50.6	0.300	–60.6
1800	0.431	–156.4	2.824	74.9	0.145	51.9	0.288	–62.0
2000	0.427	–160.2	2.579	71.0	0.156	52.7	0.286	–63.6

V_{CE}=2V, I_C=3mA, Z_O=50Ω

Freq (MHz)	$\lvert S_{11} \rvert$	$\angle S_{11}$	$\lvert S_{21} \rvert$	$\angle S_{21}$	$\lvert S_{12} \rvert$	$\angle S_{12}$	$\lvert S_{22} \rvert$	$\angle S_{22}$
100	0.902	–15.9	9.012	167.2	0.023	80.4	0.976	–9.1
200	0.873	–29.3	8.417	156.1	0.044	72.2	0.929	–17.2
400	0.771	–54.9	7.291	137.1	0.074	59.8	0.806	–29.7
600	0.670	–75.9	6.048	122.7	0.093	51.5	0.688	–37.7
800	0.595	–91.9	5.110	111.7	0.105	47.6	0.599	–42.6
1000	0.543	–105.5	4.426	103.3	0.115	45.4	0.543	–45.7
1200	0.508	–114.9	3.811	96.2	0.122	44.9	0.494	–47.9
1400	0.482	–122.2	3.396	90.2	0.128	44.9	0.456	–49.4
1600	0.461	–130.7	3.093	84.9	0.136	45.2	0.435	–51.2
1800	0.454	–137.2	2.781	80.2	0.143	46.3	0.421	–52.8
2000	0.445	–142.4	2.552	75.8	0.149	47.3	0.414	–54.6

V_{CE}=2V, I_C=7mA, Z_O=50Ω

Freq (MHz)	$\lvert S_{11} \rvert$	$\angle S_{11}$	$\lvert S_{21} \rvert$	$\angle S_{21}$	$\lvert S_{12} \rvert$	$\angle S_{12}$	$\lvert S_{22} \rvert$	$\angle S_{22}$
100	0.803	–26.1	16.966	160.2	0.022	76.4	0.939	–14.9
200	0.727	–48.8	14.766	144.6	0.038	65.7	0.835	–26.5
400	0.586	–82.8	10.927	122.8	0.058	55.6	0.633	–40.0
600	0.498	–105.2	8.256	109.8	0.070	52.1	0.504	–45.0
800	0.451	–120.7	6.551	100.7	0.080	52.4	0.426	–47.2
1000	0.426	–131.7	5.426	93.6	0.090	53.6	0.378	–48.1
1200	0.410	–140.3	4.609	88.2	0.099	55.4	0.351	–48.7
1400	0.397	–146.8	4.005	83.6	0.109	57.3	0.330	–49.1
1600	0.391	–152.5	3.571	79.4	0.119	57.9	0.315	–49.5
1800	0.389	–158.0	3.215	75.5	0.131	59.0	0.309	–50.9
2000	0.387	–161.4	2.931	72.0	0.142	59.3	0.309	–52.4

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	0.861	–19.3	13.088	164.6	0.019	79.2	0.964	–10.5
200	0.809	–36.1	12.414	151.0	0.035	70.3	0.897	–19.2
400	0.680	–64.6	9.973	130.4	0.057	58.6	0.740	–30.9
600	0.574	–85.3	7.846	116.7	0.069	53.3	0.620	–36.0
800	0.505	–101.2	6.411	106.6	0.079	51.8	0.542	–38.5
1000	0.458	–114.1	5.376	99.0	0.087	52.3	0.493	–39.9
1200	0.434	–122.9	4.629	92.8	0.095	53.0	0.460	–40.6
1400	0.408	–131.0	4.068	87.5	0.103	53.7	0.437	–41.4
1600	0.391	–138.4	3.636	83.1	0.112	55.5	0.421	–42.2
1800	0.388	–143.7	3.285	78.6	0.120	56.3	0.409	–43.2
2000	0.382	–148.1	2.998	74.8	0.129	57.6	0.407	–44.6

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	0.761	–29.0	20.734	158.1	0.017	76.5	0.931	–14.8
200	0.676	–53.1	17.775	141.1	0.030	65.5	0.814	–25.2
400	0.529	–87.9	12.546	119.3	0.046	57.3	0.614	–35.0
600	0.446	–109.3	9.228	107.1	0.056	56.3	0.503	–36.9
800	0.404	–124.2	7.248	98.7	0.065	58.0	0.442	–37.1
1000	0.384	–135.2	5.968	92.3	0.075	59.7	0.407	–37.0
1200	0.371	–142.5	5.052	87.2	0.084	61.6	0.389	–36.9
1400	0.361	–148.6	4.386	82.9	0.094	63.0	0.376	–37.2
1600	0.355	–154.5	3.904	79.0	0.105	64.2	0.366	–37.6
1800	0.355	–159.2	3.510	75.3	0.115	65.2	0.362	–38.9
2000	0.354	–162.4	3.194	71.9	0.126	65.5	0.365	–40.5