Ordering number:ENN6291

NPN Epitaxial Planar Silicon Transistor

2SC5538

VHF to UHF OSC, High-Frequency Amplifier Applications

Features

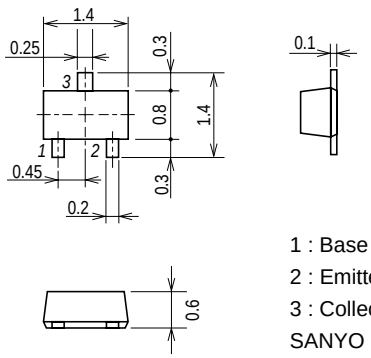
- High gain : $|S21e|^2$=10.5dB typ (f=1GHz).
- High cutoff frequency : f_T=5.2GHz typ.
- Ultrasmall, slim flat-lead package. (1.4mm×0.8mm×0.6mm)

Package Dimensions

unit:mm

2159

[2SC5538]



1 : Base
2 : Emitter
3 : Collector
SANYO : SSFP

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}		2	V
Collector Current	I_C		100	mA
Collector Dissipation	P_C		100	mW
Junction Temperature	Tj		150	˚C
Storage Temperature	Tstg		–55 to +150	˚C

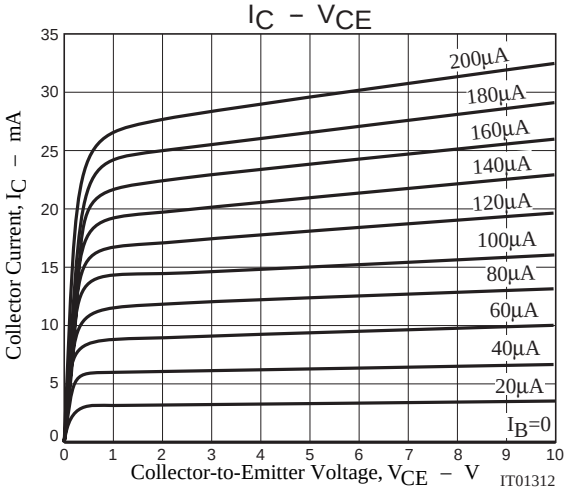
Electrical Characteristics at Ta = 25˚C

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	$h_{FE}1$	V_{CE}=3V, I_C=7mA	110		200	
	$h_{FE}2$	V_{CE}=3V, I_C=30mA	100			
Gain-Bandwidth Product	f_T	V_{CE}=3V, I_C=7mA	3	5.2		GHz
Output Capacitance	Cob	V_{CB}=3V, f=1MHz		1.0	1.5	pF
Reverse Transfer Capacitance	Cre	V_{CB}=3V, f=1MHz		0.7		pF
Forward Transfer Gain	$\|S21e\|^2$	V_{CE}=3V, I_C=7mA, f=1GHz	8	10.5		dB
Noise Figure	NF	V_{CE}=3V, I_C=7mA, f=1GHz		1.4	2.5	dB

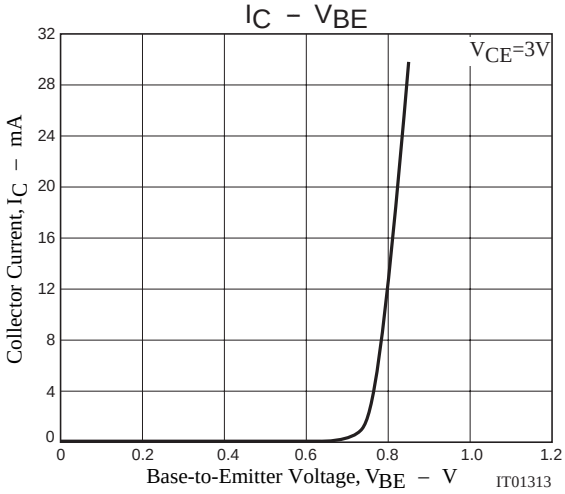
Marking : NA

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

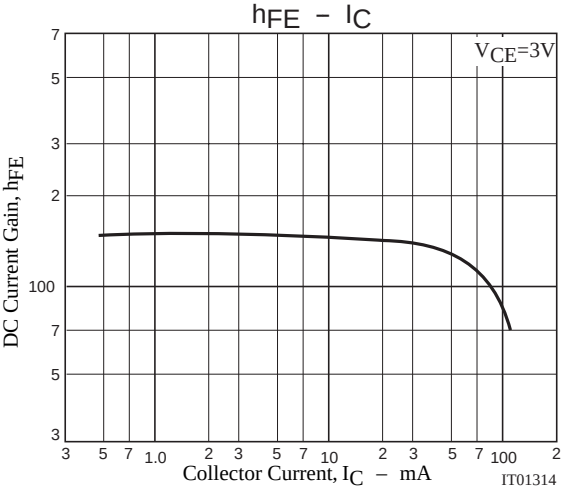
$I_C - V_{CE}$



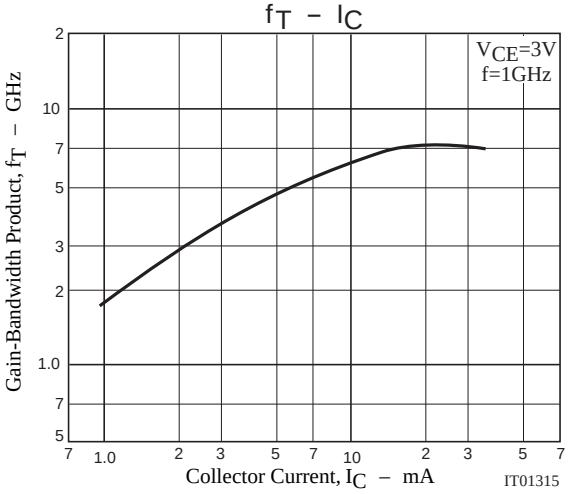
$I_C - V_{BE}$



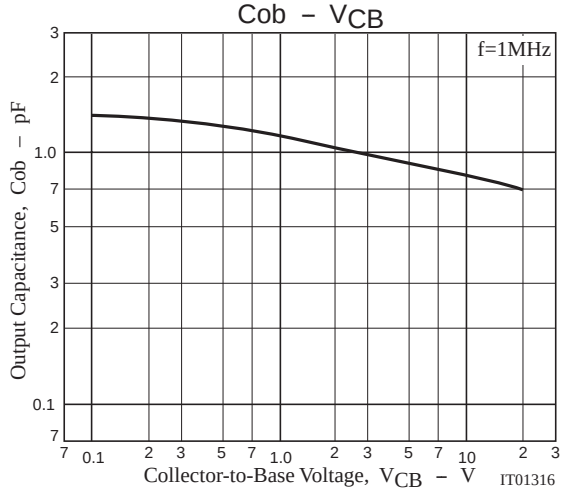
$h_{FE} - I_C$



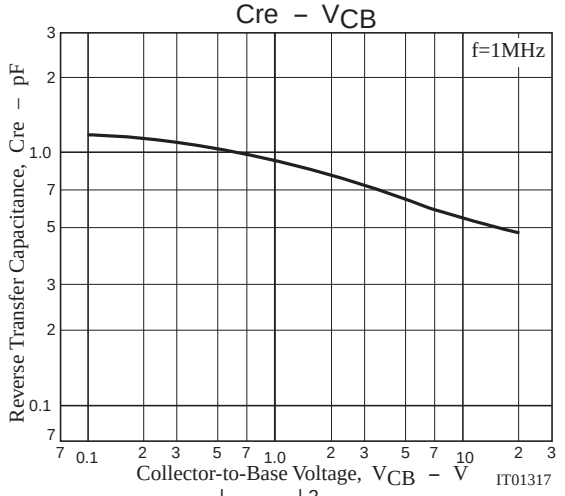
$f_T - I_C$



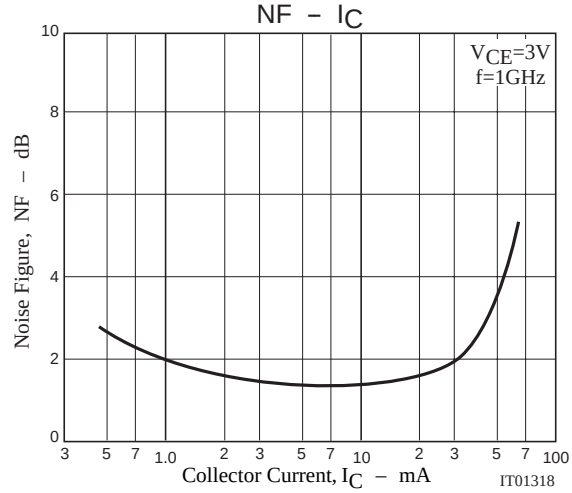
Cob – V_{CB}



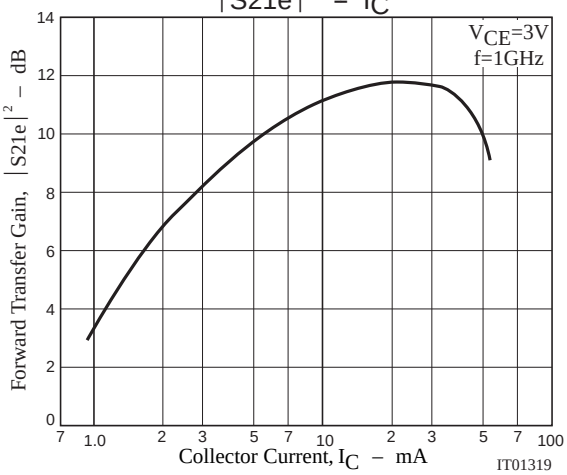
Cre – V_{CB}

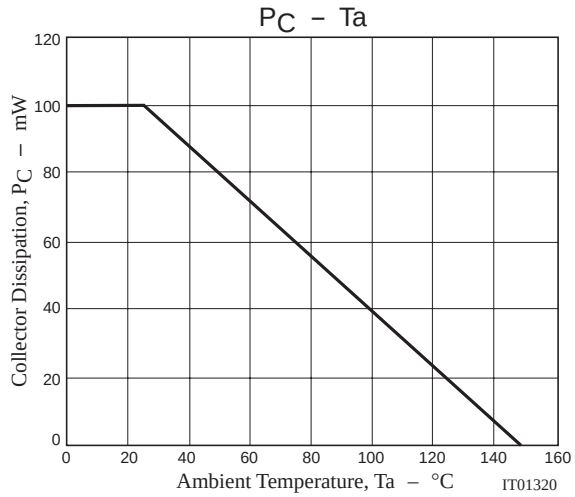


NF – I_C



$|S21e|^2 - I_C$





S Parameters (Common emitter)

V_{CE}=1V, 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	0.874	–40.6	8.627	152.3	0.062	67.9	0.918	–23.4
200	0.785	–71.6	6.874	132.5	0.101	52.1	0.748	–41.7
400	0.651	–114.8	4.701	107.3	0.135	37.1	0.537	–57.6
600	0.613	–136.9	3.365	92.8	0.152	31.1	0.430	–65.6
800	0.581	–153.9	2.716	81.9	0.155	29.9	0.361	–74.3
1000	0.568	–164.2	2.218	73.4	0.161	30.0	0.326	–80.2
1200	0.556	–172.0	1.863	66.2	0.170	30.5	0.300	–86.1
1400	0.563	–178.1	1.626	59.6	0.177	32.7	0.297	–92.3
1600	0.558	175.4	1.473	53.9	0.185	35.4	0.306	–96.5
1800	0.560	168.9	1.345	48.1	0.196	37.4	0.313	–100.6
2000	0.567	163.1	1.230	42.5	0.205	38.0	0.335	–102.9

V_{CE}=3V, 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	0.789	–48.3	16.232	147.7	0.039	66.1	0.862	–27.2
200	0.670	–83.7	12.431	126.4	0.061	53.0	0.673	–44.6
400	0.552	–123.8	7.607	104.7	0.081	45.2	0.438	–59.1
600	0.522	–145.3	5.401	92.7	0.094	45.9	0.333	–65.1
800	0.504	–158.5	4.155	84.1	0.106	48.2	0.290	–68.7
1000	0.488	–169.1	3.425	77.1	0.121	49.1	0.270	–71.0
1200	0.478	–176.1	2.849	71.0	0.136	51.0	0.253	–74.7
1400	0.481	178.4	2.511	65.6	0.152	52.2	0.239	–79.6
1600	0.478	172.7	2.237	60.7	0.167	52.8	0.240	–82.8
1800	0.492	167.4	2.016	55.5	0.185	53.2	0.245	–86.7
2000	0.489	162.0	1.844	50.5	0.200	52.7	0.248	–90.0

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	0.643	–66.4	26.381	137.4	0.029	62.8	0.748	–36.3
200	0.530	–104.6	17.543	116.5	0.041	54.2	0.531	–52.5
400	0.459	–140.3	9.835	98.9	0.058	55.4	0.322	–62.7
600	0.447	–157.2	6.805	89.4	0.074	59.2	0.246	–65.5
800	0.440	–168.4	5.210	82.4	0.092	61.4	0.213	–68.6
1000	0.434	–175.9	4.194	76.6	0.110	61.9	0.199	–70.2
1200	0.437	177.1	3.518	71.5	0.129	62.3	0.191	–72.9
1400	0.437	173.0	3.077	66.7	0.148	61.8	0.184	–76.5
1600	0.438	168.4	2.730	62.5	0.166	61.6	0.181	–80.9
1800	0.439	164.2	2.459	58.0	0.186	60.7	0.186	–84.8
2000	0.444	159.1	2.249	53.5	0.203	59.5	0.192	–87.3