

NPN Epitaxial Planar Silicon Transistor



2SC5540

UHF to S Band Low-Noise Amplifier and OSC Applications

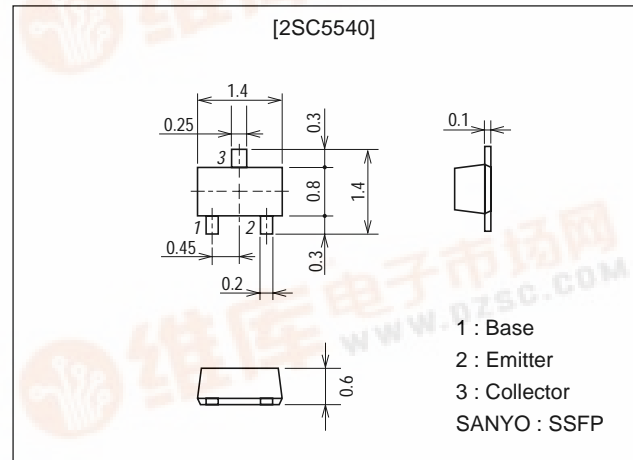
Features

- High cutoff frequency : $f_T=10\text{GHz}$ typ.
- High gain : $|S_{21e}|^2=13\text{dB}$ typ ($f=1\text{GHz}$).
- Low noise : $NF=1.3\text{dB}$ typ ($f=1\text{GHz}$).
- Small Cob : $Cob=0.4\text{pF}$ typ.
- Ultrasmall, slim flat-lead package.
(1.4mm × 0.8mm × 0.6mm)

Package Dimensions

unit:mm

2159



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CB0}		16	V
Collector-to-Emitter Voltage	V_{CEO}		8	V
Emitter-to-Base Voltage	V_{EBO}		1.5	V
Collector Current	I_C		20	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 $T_a = 25^\circ\text{C}$

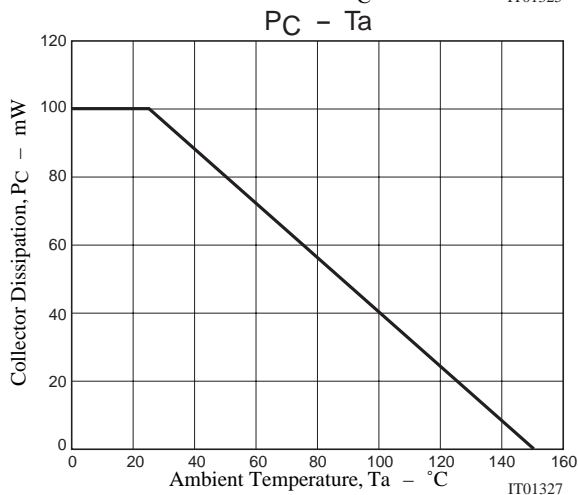
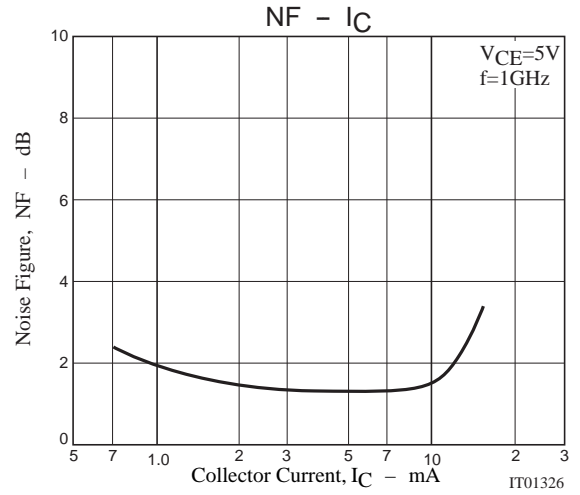
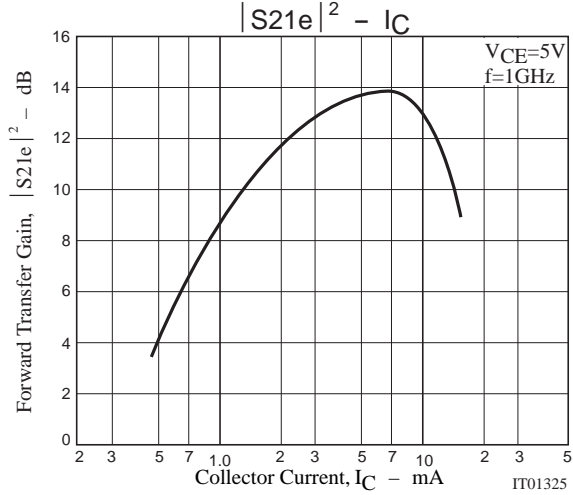
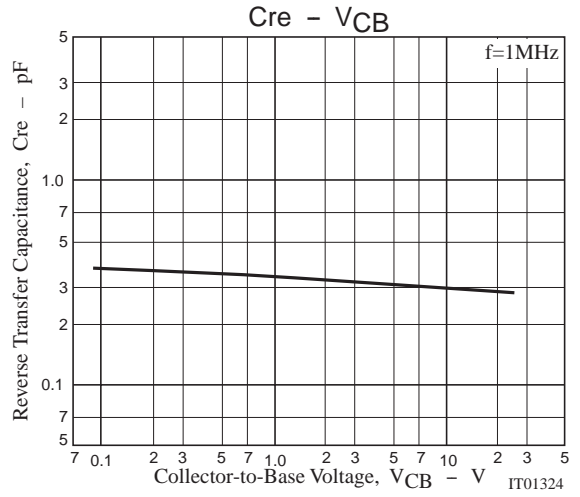
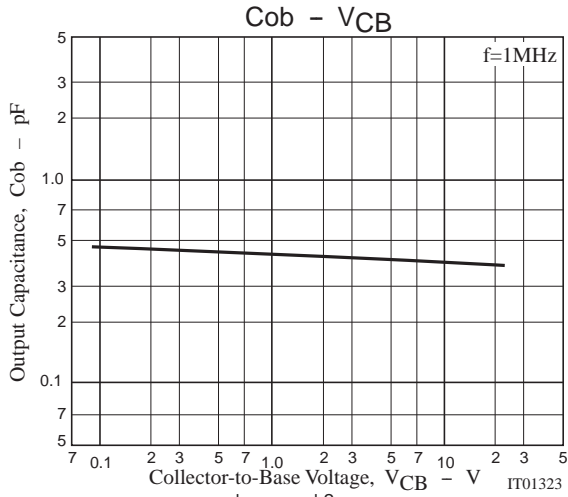
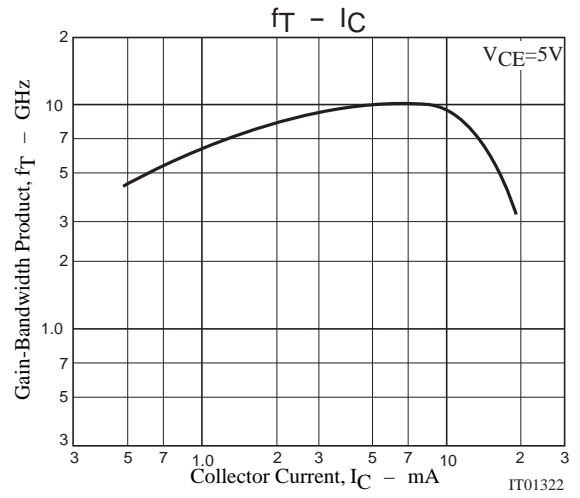
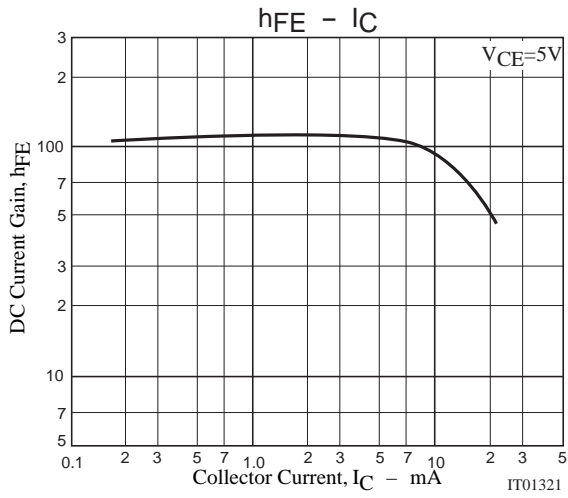
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	$V_{CB}=10\text{V}, I_E=0$			1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=1\text{V}, I_C=0$			10	μA
DC Current Gain	h_{FE}	$V_{CE}=5\text{V}, I_C=4\text{mA}$	90		200	
Gain-Bandwidth Product	f_T	$V_{CE}=5\text{V}, I_C=4\text{mA}$		10		GHz
Output Capacitance	Cob	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.4	0.7	pF
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=5\text{V}, I_C=7\text{mA}, f=1\text{GHz}$	10	13		dB
Noise Figure	NF	$V_{CE}=5\text{V}, I_C=4\text{mA}, f=1\text{GHz}$		1.3	2.8	dB

Marking : HN

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S Parameters (Common emitter)

$V_{CE}=5V, I_C=2mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.918	-17.4	5.729	162.1	0.038	78.2	0.965	-11.1
400	0.854	-33.9	5.503	146.5	0.069	68.8	0.908	-19.6
600	0.758	-48.8	4.667	133.9	0.091	61.3	0.825	-27.2
800	0.674	-60.6	4.171	122.8	0.109	56.7	0.754	-32.3
1000	0.622	-68.1	3.839	113.0	0.125	53.8	0.703	-35.8
1200	0.561	-76.3	3.443	104.9	0.136	51.6	0.660	-38.4
1400	0.510	-83.5	3.104	97.9	0.146	50.2	0.627	-40.8
1600	0.465	-89.9	2.844	92.0	0.155	49.7	0.602	-42.6
1800	0.411	-97.7	2.589	86.6	0.161	49.7	0.579	-44.3
2000	0.375	-103.0	2.390	81.6	0.169	49.6	0.565	-45.7

$V_{CE}=5V, I_C=7mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.745	-37.3	12.779	147.8	0.032	70.2	0.881	-18.6
400	0.592	-64.0	9.874	126.1	0.053	61.9	0.730	-27.9
600	0.471	-83.5	7.650	112.6	0.066	59.6	0.621	-31.5
800	0.395	-97.1	6.143	102.8	0.078	59.7	0.559	-32.7
1000	0.348	-106.6	5.115	95.2	0.089	60.3	0.523	-33.5
1200	0.311	-115.0	4.361	89.2	0.100	61.3	0.501	-34.3
1400	0.284	-122.2	3.792	84.1	0.111	62.2	0.486	-35.4
1600	0.263	-128.8	3.382	79.8	0.123	63.0	0.478	-36.4
1800	0.245	-135.6	3.065	75.8	0.135	63.7	0.474	-37.5
2000	0.229	-141.4	2.791	72.0	0.146	64.2	0.473	-38.8

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