



SANYO Semiconductors

DATA SHEET

FH105A

NPN Epitaxial Planar Silicon Composite Transistor

High-Frequency Low-Noise Amplifier, Differential Amplifier Applications

Features

- Composite type with 2 transistors contained in the MCP package currently in use, improving the mounting efficiency greatly.
- The FH105A is formed with two chips, being equivalent to the 2SC5245A, placed in one package.
- Optimal for differential amplification due to excellent thermal equilibrium and pair capability.

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V _{CB0}		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	When mounted on ceramic substrate (250mm ² ×0.8mm) 1unit	150	mW
Total Dissipation	P _T	When mounted on ceramic substrate (250mm ² ×0.8mm)	300	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 =10mA	90		200	

Marking : 105

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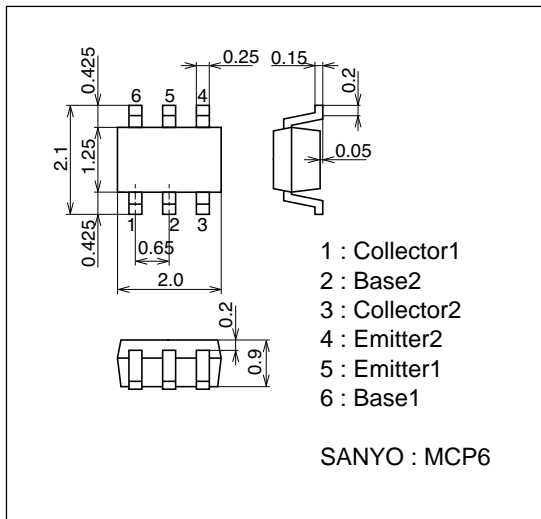
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
DC Current Gain Ratio	$h_{FE}(\text{small/large})$	$V_{CE}=5V, I_C=10mA$	0.7	0.95		
Base-to-Emitter Voltage Diffrence	$V_{BE}(\text{large-small})$	$V_{CE}=5V, I_C=10mA$		1.0		mV
Gain-Bandwidth Product	f_T	$V_{CE}=5V, I_C=10mA$	5	8		GHz
Output Capacitance	C_{ob}	$V_{CB}=10V, f=1MHz$		0.45	0.7	pF
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=5V, I_C=10mA, f=1.5GHz$	8	10		dB
Noise Figure	NF	$V_{CE}=5V, I_C=5mA, f=1.5GHz$		1.4	3.0	dB

Note) The specifications shown above are for each individual transistor except the $h_{FE}(\text{small/large})$ and $V_{BE}(\text{large-small})$ for which pair capability is also shown.

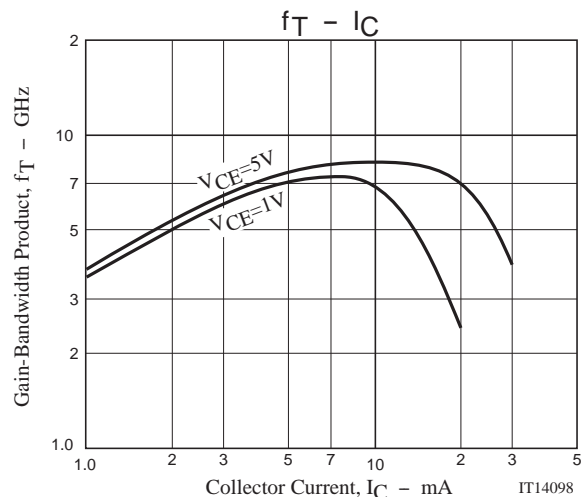
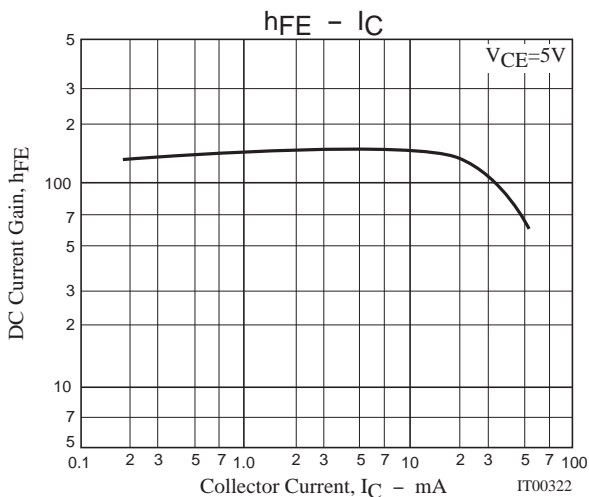
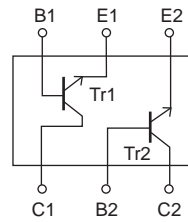
Package Dimensions

unit : mm (typ)

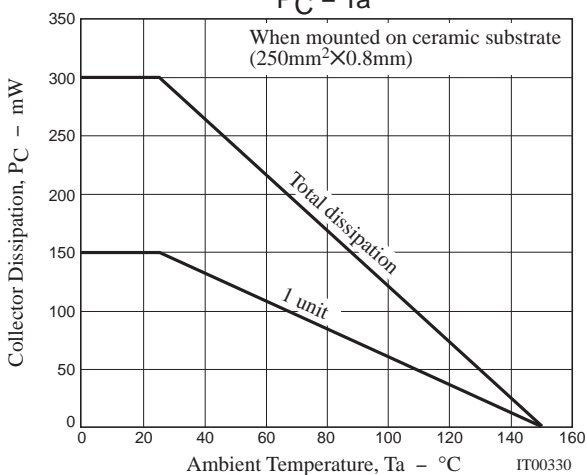
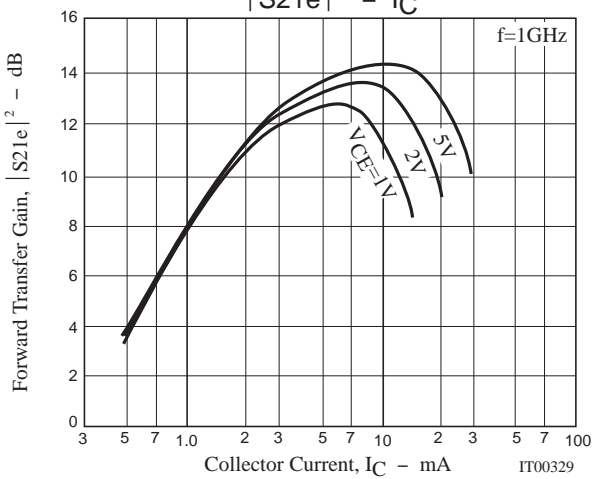
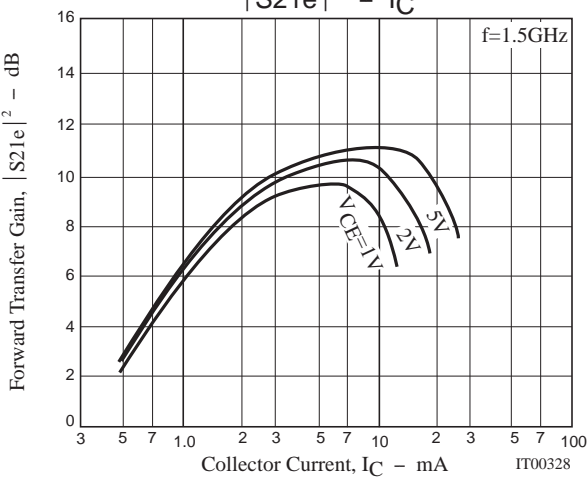
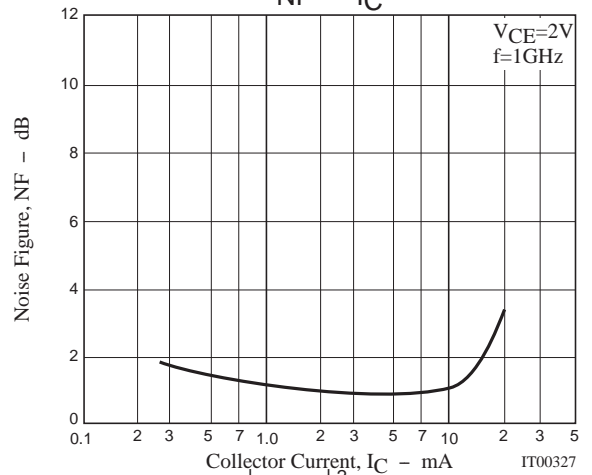
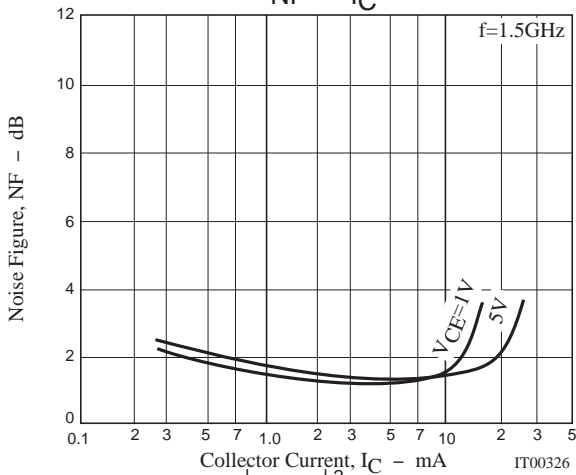
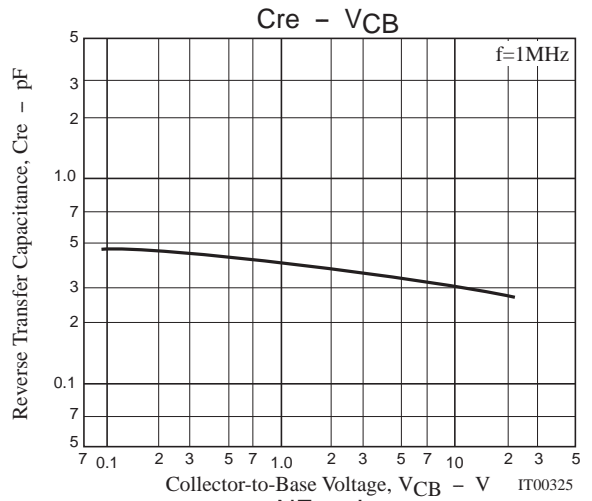
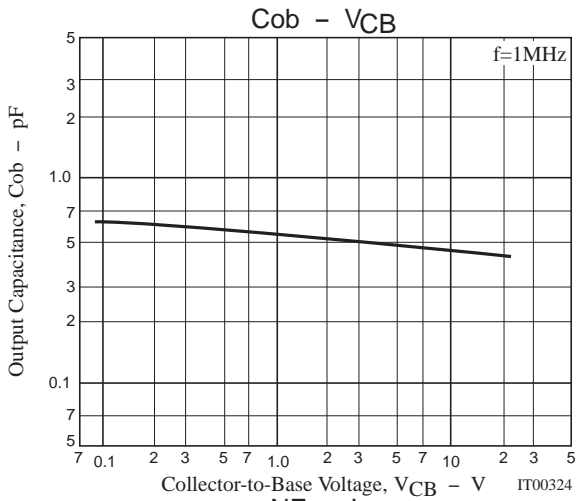
7026-005



Electrical Connection



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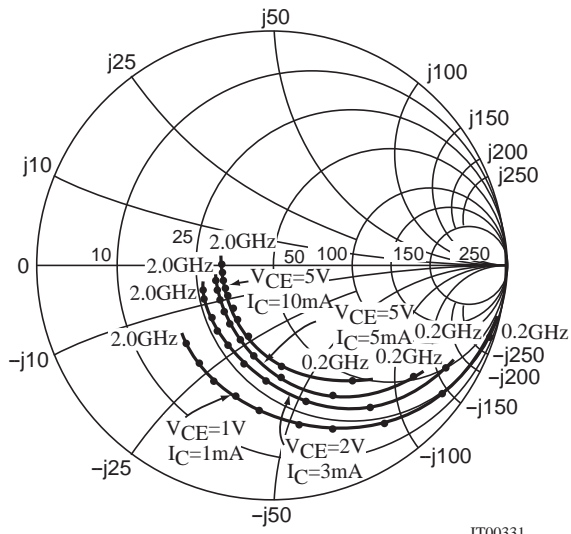


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S Parameter

S11e

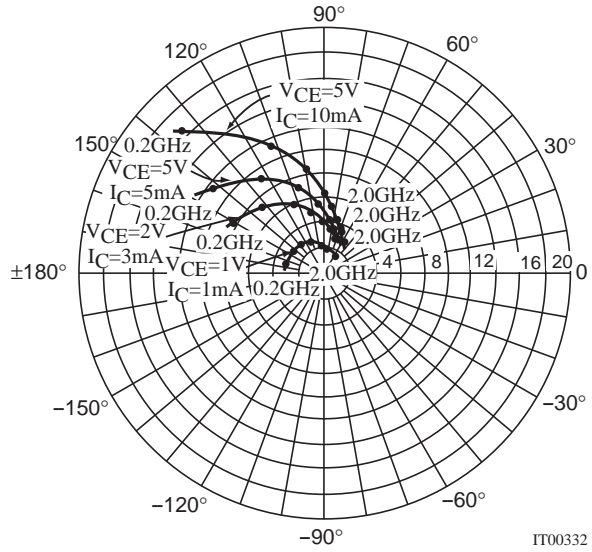
f=200MHz to 2000MHz(200MHz Step)



IT00331

S21e

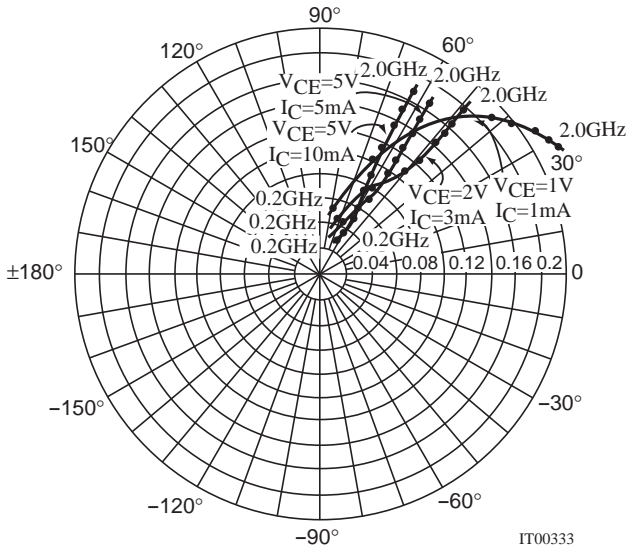
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IT00332

S12e

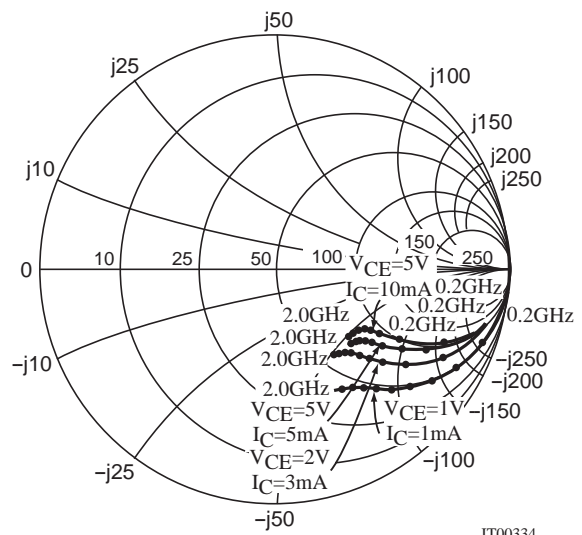
f=200MHz to 2000MHz(200MHz Step)



IT00333

S22e

f=200MHz to 2000MHz(200MHz Step)



IT00334

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S Parameters (Common emitter)

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.763	-37.5	11.926	146.9	0.036	70.7	0.892	-19.1
400	0.590	-65.4	9.202	124.3	0.058	60.9	0.740	-29.1
600	0.456	-85.5	7.173	109.4	0.073	57.4	0.631	-33.7
800	0.374	-102.0	5.743	98.7	0.086	56.7	0.566	-35.8
1000	0.323	-115.0	4.785	90.5	0.098	56.7	0.528	-37.2
1200	0.288	-127.5	4.105	83.6	0.110	57.2	0.505	-38.4
1400	0.264	-137.7	3.599	77.5	0.123	57.7	0.488	-39.6
1600	0.248	-147.4	3.213	71.3	0.136	57.6	0.476	-41.2
1800	0.239	-156.9	2.905	66.4	0.150	57.6	0.466	-43.3
2000	0.235	-165.7	2.651	61.3	0.165	57.2	0.462	-45.4

$V_{CE}=5V, I_C=10mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.605	-52.6	16.354	136.2	0.031	67.5	0.804	-23.9
400	0.417	-84.6	11.011	113.3	0.048	62.4	0.622	-30.5
600	0.319	-106.3	8.026	100.5	0.062	62.2	0.533	-32.0
800	0.266	-124.6	6.250	91.3	0.076	63.4	0.491	-32.4
1000	0.238	-136.5	5.115	84.7	0.090	64.3	0.469	-33.2
1200	0.225	-148.9	4.336	78.8	0.104	64.4	0.458	-34.6
1400	0.215	-158.3	3.813	73.4	0.119	64.5	0.449	-35.8
1600	0.213	-167.3	3.365	68.1	0.135	63.8	0.443	-37.7
1800	0.212	-175.6	3.030	63.5	0.150	63.1	0.436	-39.6
2000	0.216	-177.5	2.754	58.9	0.166	62.5	0.438	-41.9

$V_{CE}=2V, I_C=3mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.842	-30.7	8.491	153.0	0.044	72.5	0.931	-17.1
400	0.704	-56.3	7.161	131.9	0.075	60.9	0.808	-28.8
600	0.579	-76.1	5.879	116.3	0.095	54.1	0.696	-36.2
800	0.480	-93.1	4.882	104.2	0.109	51.0	0.615	-40.6
1000	0.417	-106.3	4.154	95.0	0.121	49.3	0.564	-43.5
1200	0.376	-119.6	3.597	87.1	0.132	48.7	0.526	-45.8
1400	0.343	-130.2	3.212	80.2	0.143	48.6	0.496	-47.5
1600	0.319	-140.5	2.875	73.4	0.154	48.7	0.475	-49.6
1800	0.303	-150.0	2.604	67.7	0.166	48.6	0.461	-51.6
2000	0.298	-160.0	2.383	62.1	0.179	48.9	0.451	-52.9

$V_{CE}=1V, I_C=1mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.945	-18.9	3.296	162.5	0.054	77.2	0.980	-11.0
400	0.884	-37.3	3.206	145.9	0.102	65.9	0.934	-20.5
600	0.810	-53.6	2.942	131.2	0.139	56.3	0.870	-29.0
800	0.728	-69.4	2.711	117.8	0.166	48.6	0.811	-35.5
1000	0.667	-82.5	2.449	107.0	0.187	42.5	0.763	-40.9
1200	0.605	-95.8	2.252	96.9	0.199	37.3	0.715	-45.7
1400	0.561	-106.1	2.061	88.1	0.207	33.5	0.673	-49.4
1600	0.518	-117.2	1.909	79.5	0.212	30.6	0.638	-53.4
1800	0.492	-127.5	1.766	72.2	0.215	28.6	0.611	-56.5
2000	0.465	-137.9	1.658	65.2	0.217	27.6	0.592	-59.9

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