

NPN Epitaxial Planar Silicon Composite Transistor



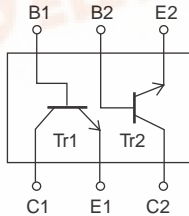
# FH103

## 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 FH103 is formed with two chips, being equivalent to the 2SC4867, placed in one package.
- Excellent in thermal equilibrium and pair capability.

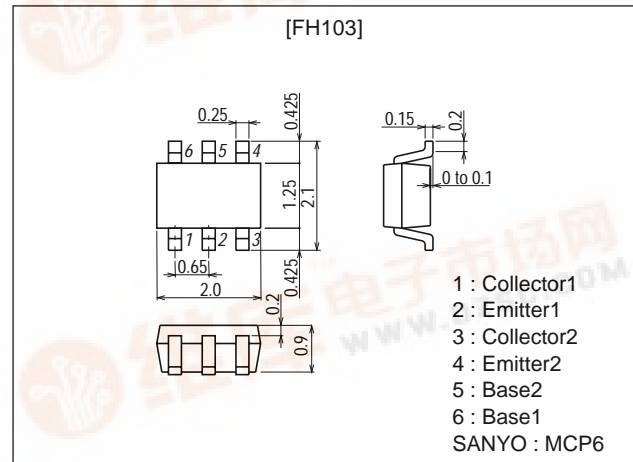
### Electrical Connection



### Package Dimensions

unit:mm

2149



### Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V <sub>CB0</sub>		16	V
Collector-to-Emitter Voltage	V <sub>CEO</sub>		8	V
Emitter-to-Base Voltage	V <sub>EBO</sub>		1.5	V
Collector Current	I <sub>C</sub>		50	mA
Collector Dissipation	P <sub>C</sub>	Mounted on a ceramic board (250mm <sup>2</sup> ×0.8mm) 1unit	300	mW
Total Dissipation	P <sub>T</sub>	Mounted on a ceramic board (250mm <sup>2</sup> ×0.8mm)	500	mW
Junction Temperature	T <sub>J</sub>		150	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C

Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I <sub>CB0</sub>	V <sub>CB</sub> =10V, I <sub>E</sub> =0			1.0	μA
Emitter Cutoff Current	I <sub>EBO</sub>	V <sub>EB</sub> =1V, I <sub>C</sub> =0			10	μA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> =5V, I <sub>C</sub> =15mA	90		200	
DC Current Gain Ratio	h <sub>FE</sub> (small/large)	V <sub>CE</sub> =5V, I <sub>C</sub> =15mA	0.7	0.95		
Base-to-Emitter Voltage Difference	V <sub>BE</sub> (large-small)	V <sub>CB</sub> =5V, I <sub>C</sub> =15mA		1.0		mV

Continued on next page.

Note) The specifications shown above are for each individual transistor.  
Marking : 103

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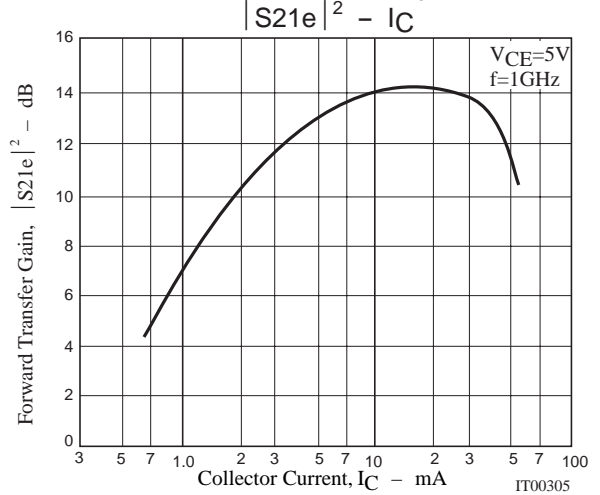
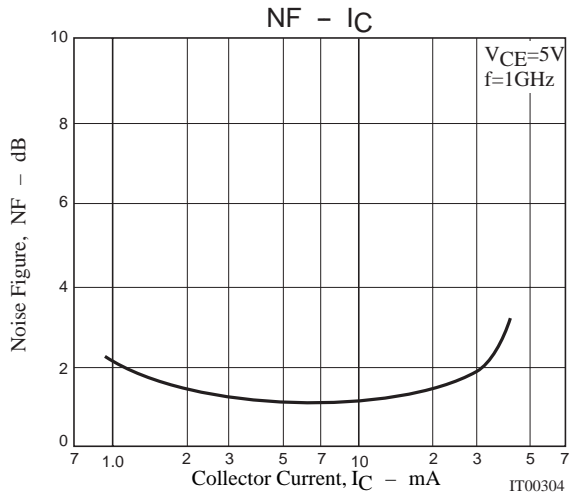
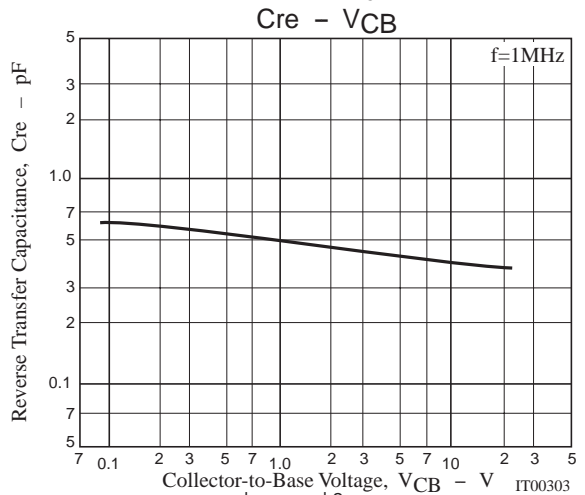
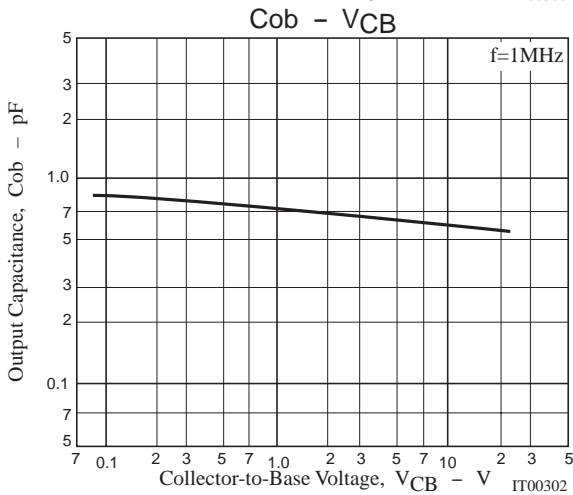
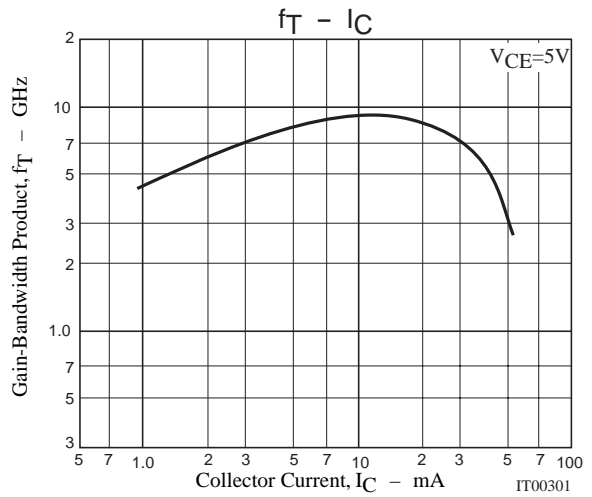
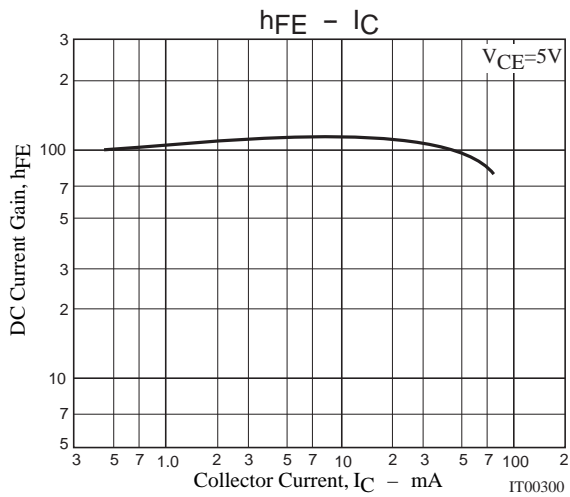


# FH103

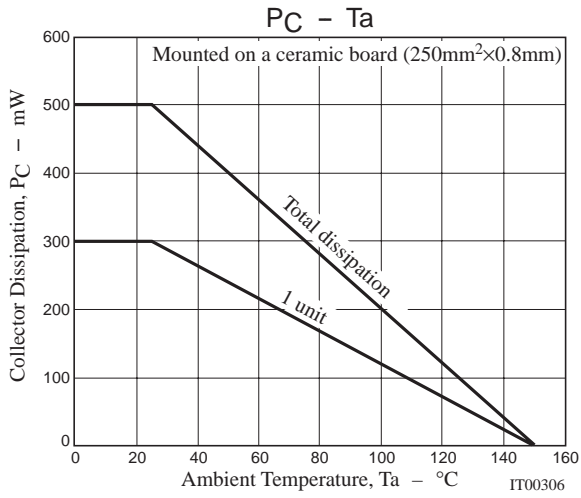
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Gain-Bandwidth Product	$f_T$	$V_{CE}=5V, I_C=15mA$		9		GHz
Output Capacitance	$C_{ob}$	$V_{CB}=10V, f=1MHz$		0.6	1.1	pF
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=5V, I_C=15mA, f=1GHz$	10	13		dB
Noise Figure	NF	$V_{CE}=5V, I_C=5mA, f=1GHz$		1.2	2.5	dB

Note) The specifications shown above are for each individual transistor.  
Marking : 103

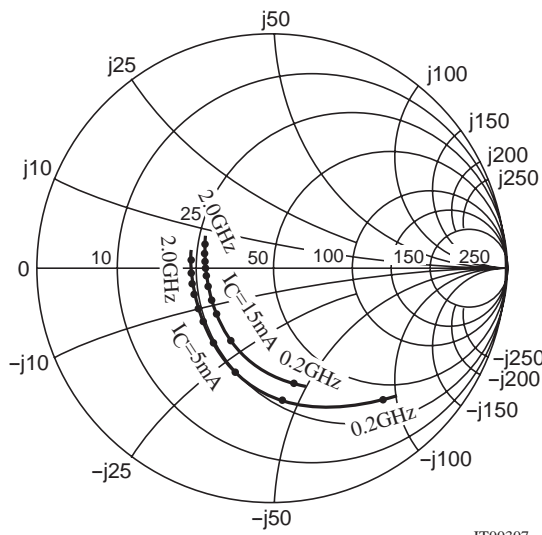


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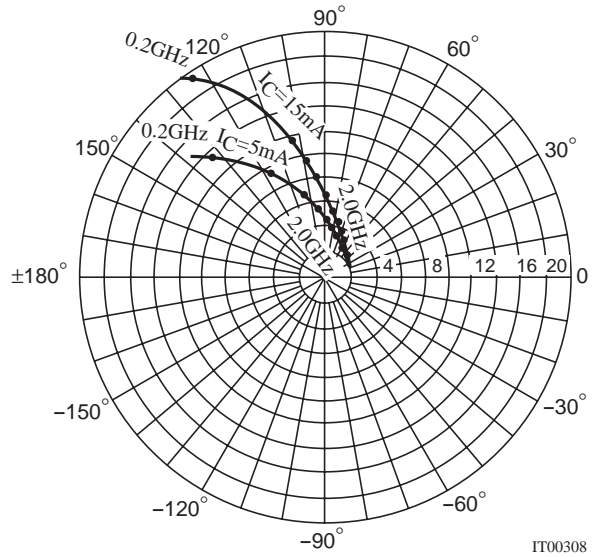


## S parameter

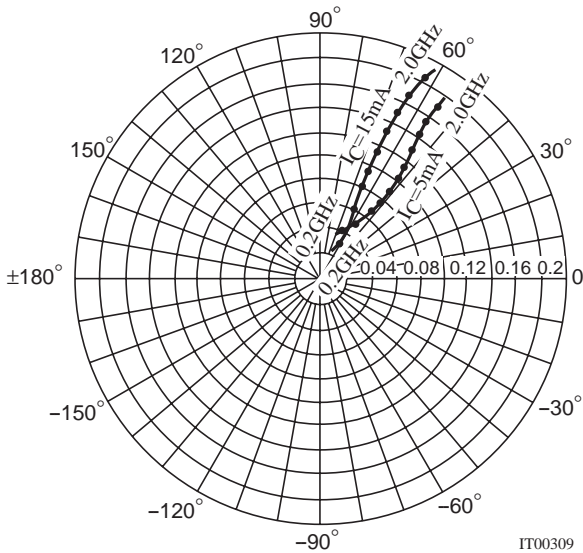
V<sub>CE</sub>=5V  
f=200MHz to 2000MHz(200MHz Step)



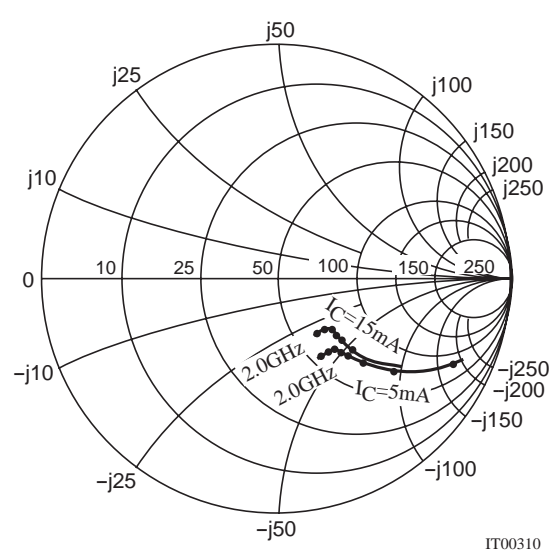
V<sub>CE</sub>=5V  
f=200MHz to 2000MHz(200MHz Step)



V<sub>CE</sub>=5V  
f=200MHz to 2000MHz(200MHz Step)



V<sub>CE</sub>=5V  
f=200MHz to 2000MHz(200MHz Step)



## FH103

### 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	0.749	-50.7	12.229	141.6	0.044	65.4	0.847	-25.4
400	0.583	-85.7	8.900	118.1	0.068	54.3	0.655	-37.4
600	0.487	-109.6	6.636	103.7	0.081	51.6	0.538	-42.3
800	0.428	-126.6	5.276	93.9	0.093	51.6	0.473	-44.4
1000	0.405	-139.3	4.379	85.9	0.106	52.6	0.443	-46.2
1200	0.387	-150.6	3.731	78.7	0.117	53.6	0.421	-48.1
1400	0.377	-160.1	3.258	72.6	0.130	54.4	0.405	-49.6
1600	0.365	-166.8	2.924	67.5	0.142	55.2	0.393	-52.1
1800	0.362	-174.3	2.589	61.9	0.156	55.6	0.387	-54.3
2000	0.361	178.3	2.363	56.8	0.171	55.9	0.383	-56.4

$V_{CE}=5V, I_C=15mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.507	-81.6	19.422	124.2	0.033	61.9	0.650	-36.9
400	0.382	-119.5	11.595	103.8	0.050	61.0	0.445	-43.0
600	0.341	-140.9	8.046	93.3	0.065	63.3	0.365	-43.5
800	0.332	-154.0	6.182	86.4	0.081	65.1	0.330	-43.3
1000	0.320	-163.0	5.063	79.8	0.099	65.6	0.318	-43.8
1200	0.316	-170.9	4.263	74.1	0.116	65.7	0.311	-45.9
1400	0.315	-178.0	3.716	69.2	0.134	65.0	0.304	-47.4
1600	0.314	176.7	3.270	64.3	0.150	64.4	0.297	-50.3
1800	0.311	171.2	2.922	60.0	0.167	63.3	0.293	-52.6
2000	0.313	165.4	2.656	55.9	0.186	62.1	0.295	-54.8

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