

NPN Epitaxial Planar Silicon Composite Transistor



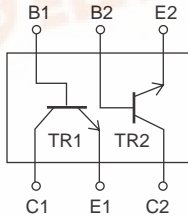
FH104

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 FH104 is formed with two chips equivalent to the 2SC4853 placed in one package.
- Excellent in thermal equilibrium and pair capability.

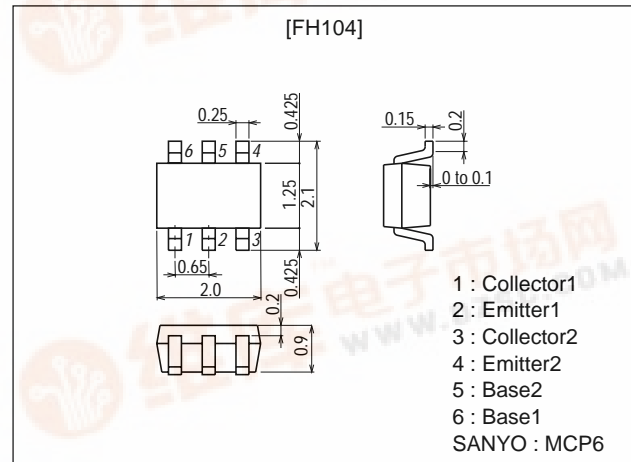
Electrical Connection



Package Dimensions

unit:mm

2149



Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CB0}		12	V
Collector-to-Emitter Voltage	V_{CEO}		6	V
Emitter-to-Base Voltage	V_{EBO}		1.5	V
Collector Current	I_C		15	mA
Collector Dissipation	P_C	1 unit	80	mW
Total Dissipation	P_T		150	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_{CB0}	$V_{CB}=10V, I_E=0$			1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=1V, I_C=0$			10	μA
DC Current Gain	h_{FE}	$V_{CE}=1V, I_C=1mA$	90		200	
DC Current Gain Ratio	h_{FE} (small/large)	$V_{CE}=1V, I_C=1mA$	0.7	0.95		
Base-to-Emitter Voltage Difference	V_{BE} (large-small)	$V_{CB}=1V, I_C=1mA$		1.0		mV

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Note) The specifications shown above are for each individual transistor. However, the ratings for h_{FE} (small/large) and V_{BE} (large-small) indicate pair characteristics.

Marking : 104

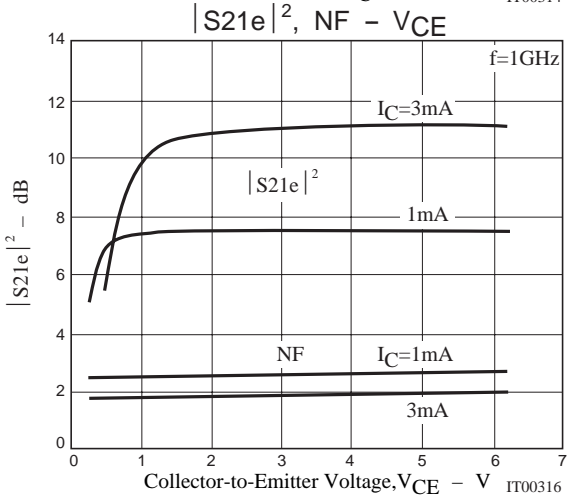
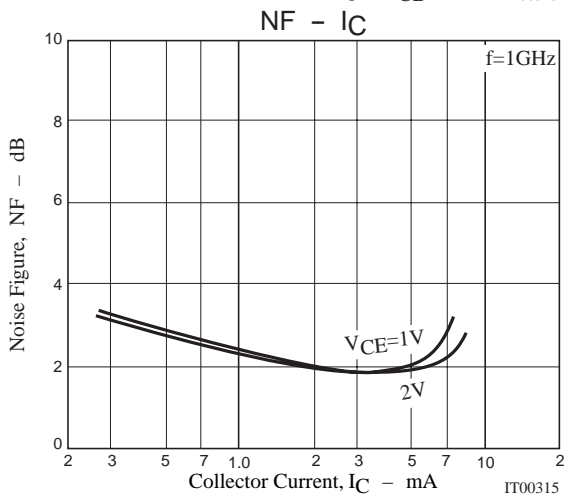
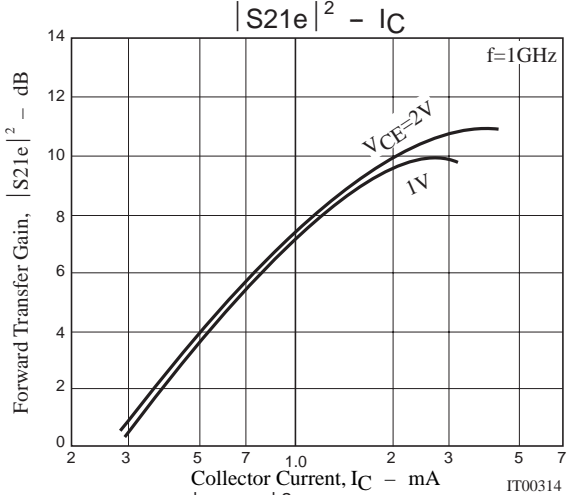
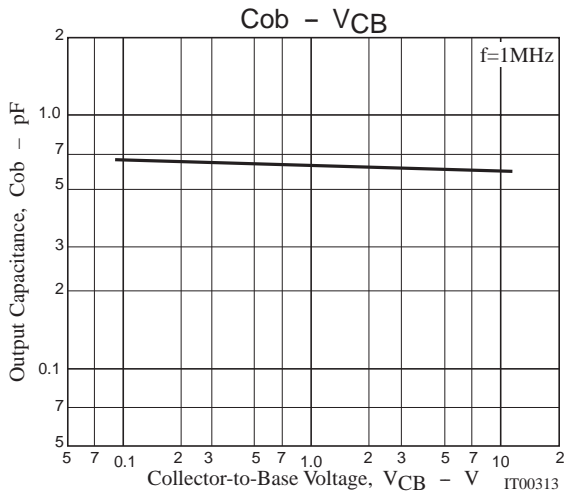
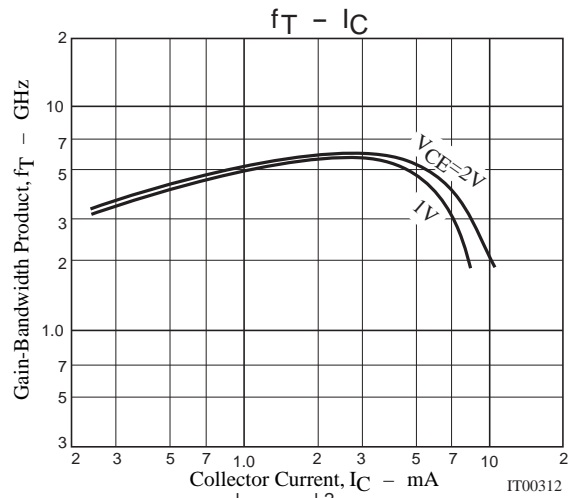
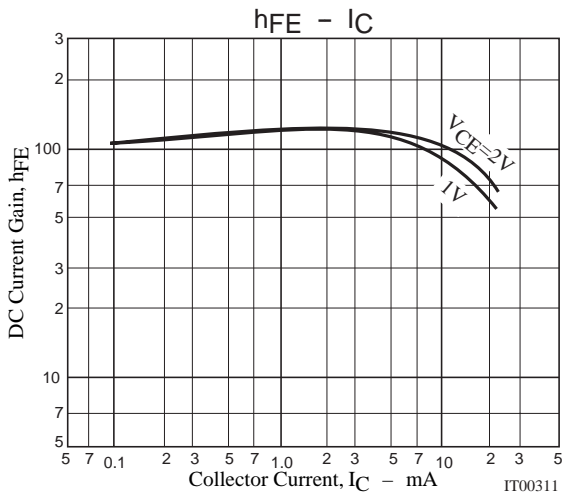
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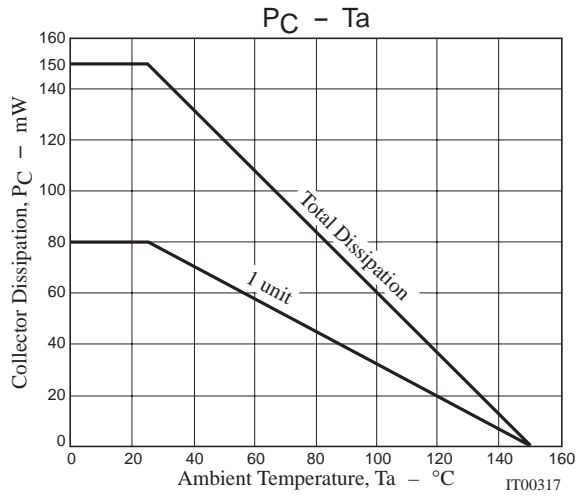
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Gain-Bandwidth Product	f_T	$V_{CE}=1V, I_C=1mA$		5		GHz
Output Capacitance	C_{ob}	$V_{CB}=1V, f=1MHz$		0.6	1.0	pF
Forward Transfer Gain	$ S_{21e} ^2 1$	$V_{CE}=1V, I_C=1mA, f=1GHz$	4.5	7		dB
	$ S_{21e} ^2 2$	$V_{CE}=2V, I_C=3mA, f=1GHz$		10.5		dB
Noise Figure	NF	$V_{CE}=1V, I_C=1mA, f=1GHz$		2.6	4.5	dB

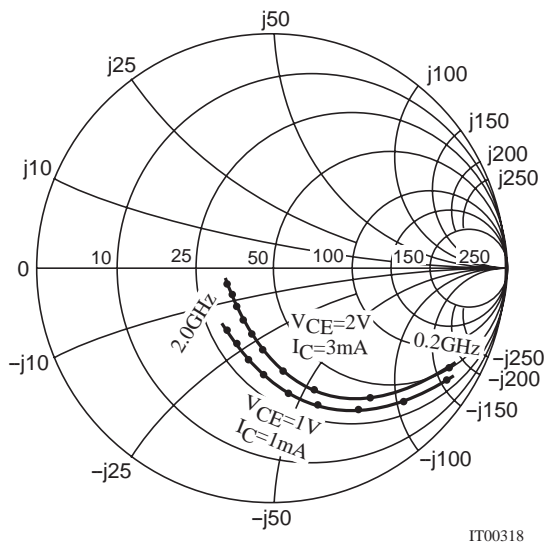


FH104

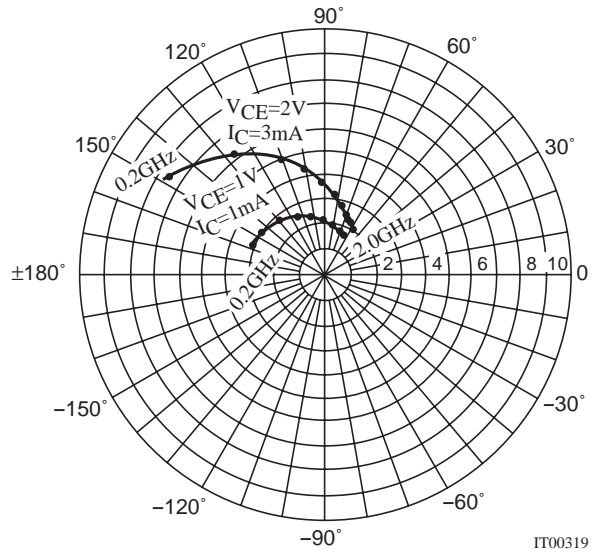


S parameter

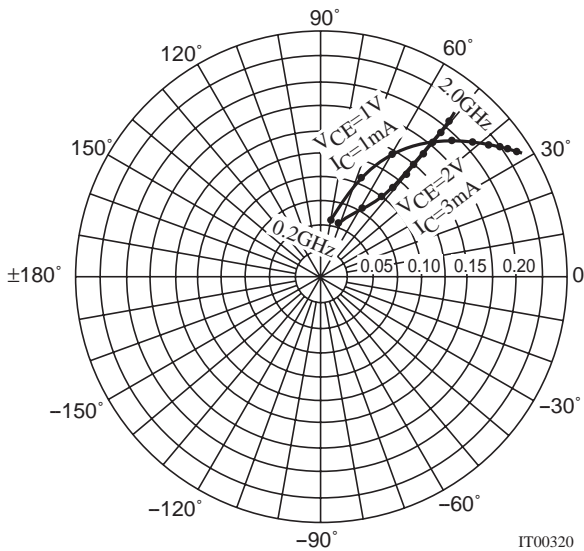
f=200MHz to 2000MHz(200MHz Step)
S11e



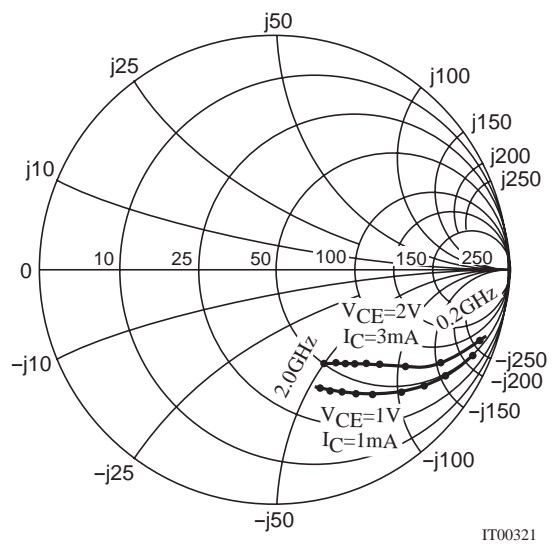
f=200MHz to 2000MHz(200MHz Step)
S21e



f=200MHz to 2000MHz(200MHz Step)
S12e



f=200MHz to 2000MHz(200MHz Step)
S22e



FH104

S Parameters (Common emitter)

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.940	-17.9	3.228	159.6	0.058	77.1	0.972	-12.2
400	0.863	-33.7	2.983	143.7	0.107	66.6	0.914	-22.7
600	0.778	-48.0	2.732	129.9	0.145	58.1	0.844	-31.7
800	0.698	-60.5	2.469	117.7	0.173	50.9	0.773	-39.6
1000	0.608	-73.5	2.320	106.2	0.195	45.4	0.717	-46.0
1200	0.546	-84.7	2.106	96.3	0.210	40.9	0.668	-51.7
1400	0.470	-96.2	1.977	87.1	0.129	37.6	0.624	-56.5
1600	0.418	-106.4	1.826	78.8	0.224	35.3	0.590	-60.6
1800	0.388	-117.3	1.700	72.2	0.230	33.8	0.562	-64.3
2000	0.354	-127.0	1.615	65.9	0.234	32.9	0.546	-67.5

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.839	-30.6	7.428	149.3	0.050	71.4	0.916	-18.3
400	0.672	-53.7	6.016	128.5	0.083	60.6	0.778	-30.2
600	0.536	-71.7	4.908	113.6	0.105	55.1	0.672	-37.1
800	0.431	-85.7	4.073	101.9	0.121	52.5	0.597	-41.9
1000	0.360	-99.0	3.494	92.7	0.135	51.4	0.548	-45.7
1200	0.310	-111.4	3.033	84.4	0.150	50.9	0.514	-49.2
1400	0.265	-122.6	2.694	77.4	0.162	50.9	0.492	-52.3
1600	0.242	-134.7	2.422	70.9	0.175	51.0	0.475	-55.6
1800	0.228	-148.0	2.205	65.9	0.189	51.1	0.461	-59.0
2000	0.217	-157.2	2.061	60.8	0.205	51.0	0.456	-61.8

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