

MICROWAVE LOW NOISE, LOW DISTORTION AMPLIFIER  
NPN SILICON EPITAXIAL TRANSISTOR

## DESCRIPTION

The 2SC4703 is designed for low distortion, low noise RF amplifier operating with low supply voltage ( $V_{CE} = 5\text{ V}$ ). This low distortion characteristic makes it suitable for CATV, tele-communication and other use. It employs surface mount type plastic package, Power Mini Mold (SOT-89).

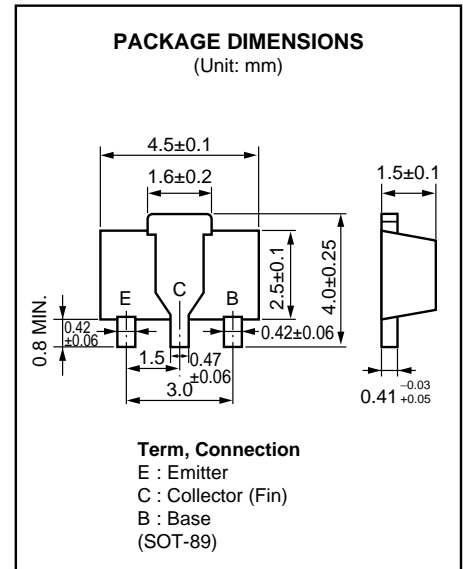
## FEATURES

- Low distortion at low supply voltage.  
 $IM_2 -55\text{ dB TYP.}$ ,  $IM_3 -76\text{ dB TYP.}$   
 $@V_{CE} = 5\text{ V}$ ,  $I_c = 50\text{ mA}$ ,  $V_o = 105\text{ dB}_{\mu/75\Omega}$
- Large  $P_T$  with surface mount type package.

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25\text{ }^\circ\text{C}$ )

Collector to Base Voltage	$V_{CBO}$	25	V
Collector to Emitter Voltage	$V_{CEO}$	12	V
Emitter to Base Voltage	$V_{EBO}$	2.5	V
Collector Current	$I_c$	150	mA
Total Power Dissipation	$P_T$	1.8	W
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

\*  $0.7\text{ mm} \times 16\text{ cm}^2$  double sided ceramic substrate. (Copper plating)



**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I <sub>CBO</sub>			1.5	μA	V <sub>CB</sub> = 20 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EB0</sub>			1.5	μA	V <sub>EB</sub> = 2 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE</sub>	50		250		V <sub>CE</sub> = 5 V, I <sub>C</sub> = 5 mA *1
Gain Bandwidth Product	f <sub>T</sub>		6.0		GHz	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 5 mA
Collector Capacitance *2	C <sub>ob</sub>		1.5	2.5	pF	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0, f = 1 MHz
Insertion Gain	S <sub>21e</sub> <sup>2</sup>	6.5	8.3		dB	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 50 mA, f = 1 GHz
			8.5			V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA, f = 1 GHz
Noise Figure	NF		2.3	3.5	dB	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 50 mA, f = 1 GHz
2nd Order Intermodulation Distortion	IM <sub>2</sub>		-55		dB	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 50 mA, V <sub>O</sub> = 105 dBμ/75Ω
			-63			V <sub>CE</sub> = 10 V, f = 190 MHz - 90 MHz
3rd Order Intermodulation Distortion	IM <sub>3</sub>		-76		dB	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 50 mA, V <sub>O</sub> = 105 dBμ/75Ω
			-81			V <sub>CE</sub> = 10 V, f = 2 × 190 MHz - 200 MHz

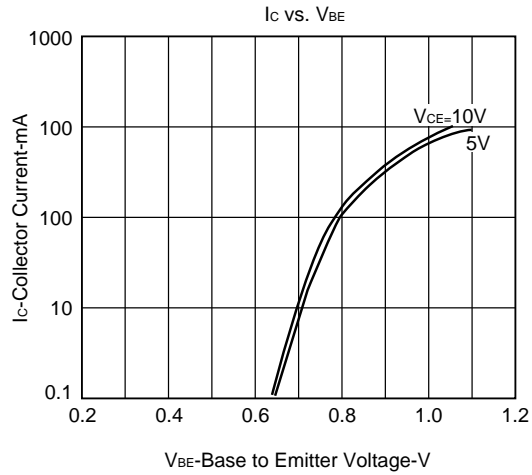
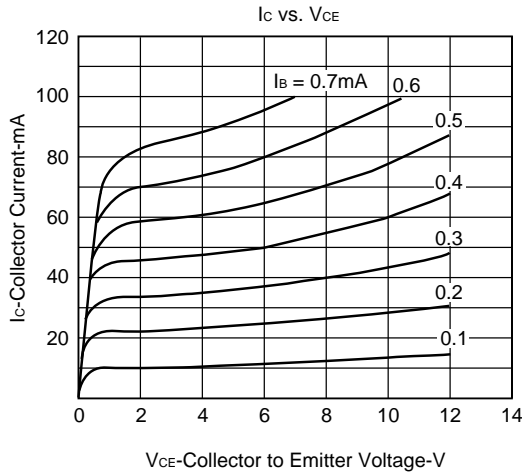
\*1 Puls Measurement PW ≤ 350 μs, Duty Cycle ≤ 2 %

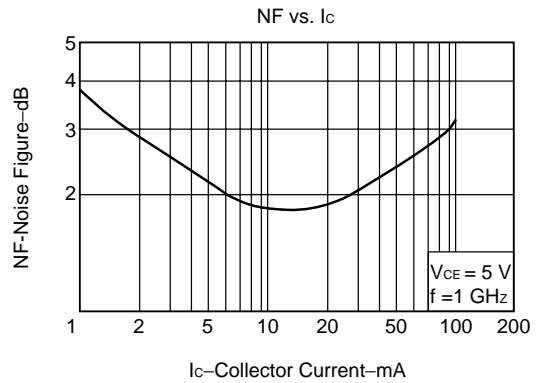
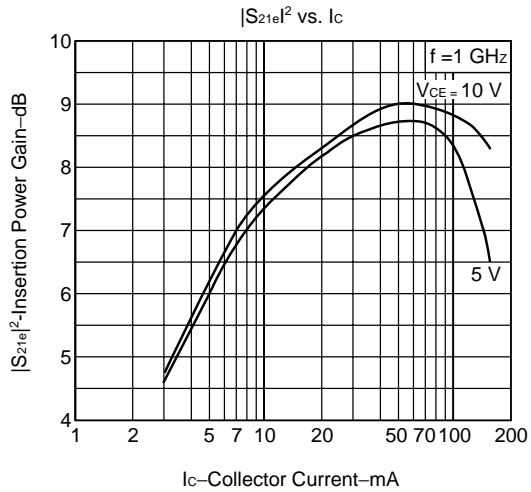
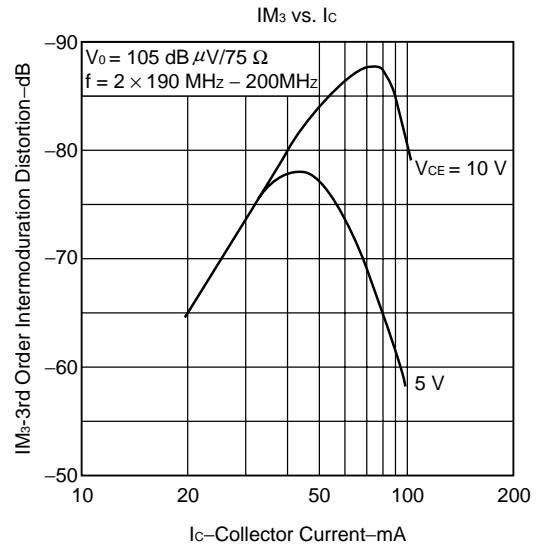
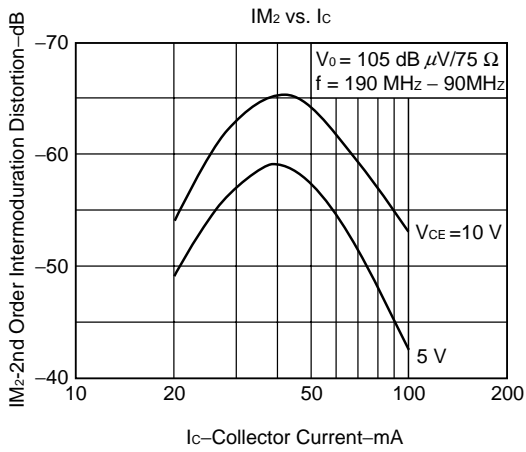
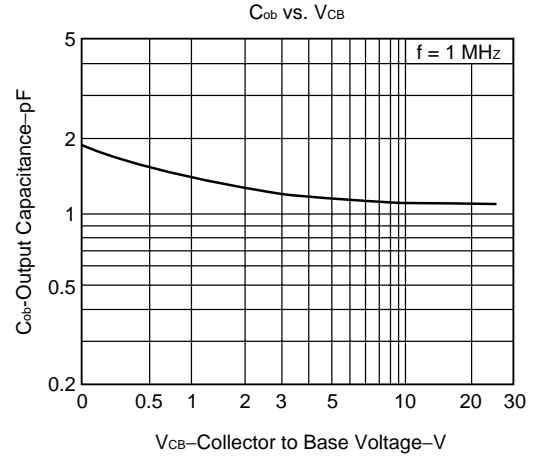
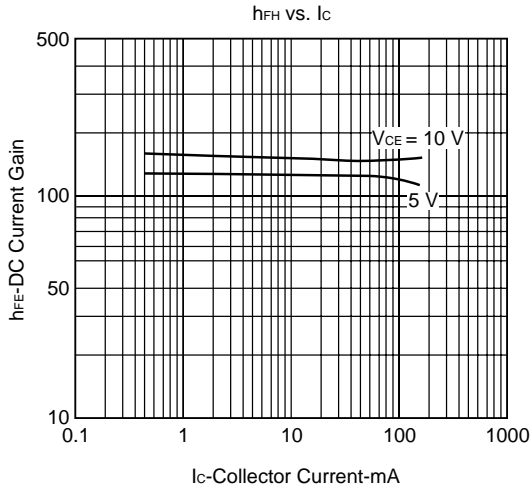
\*2 Emitter terminal should be connected to the guard terminal of the three terminal capacitance bridge.

**h<sub>FE</sub> Classification**

Class	SH	SF	SE
Marking	SH	SF	SE
h <sub>FE</sub>	50 to 100	80 to 160	125 to 250

**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**





S-PARAMETER

2SC4073 5V 50mA

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.641	-66.7	17.277	127.9	0.053	67.6	0.694	-45.3
200.00	0.426	-102.5	10.572	110.0	0.071	61.2	0.452	-60.2
300.00	0.345	-125.2	8.139	98.5	0.093	54.5	0.342	-69.7
400.00	0.306	-144.0	5.907	88.8	0.105	54.8	0.262	-77.4
500.00	0.288	-157.1	4.897	84.2	0.123	59.1	0.254	-80.5
600.00	0.276	-169.2	4.054	79.5	0.145	59.5	0.214	-86.2
700.00	0.278	178.7	3.711	75.8	0.172	58.6	0.203	-89.2
800.00	0.276	171.9	3.207	68.7	0.184	55.9	0.187	-94.5
900.00	0.297	162.4	2.836	65.8	0.199	57.6	0.182	-89.7
1000.00	0.278	156.6	2.598	63.2	0.223	57.2	0.173	-100.9
1100.00	0.295	149.6	2.444	59.0	0.253	55.1	0.174	-103.0
1200.00	0.285	142.4	2.244	54.7	0.266	52.6	0.174	-109.9
1300.00	0.308	137.8	2.051	51.3	0.274	51.9	0.178	-114.4
1400.00	0.315	131.2	1.939	50.4	0.294	52.9	0.173	-121.0
1500.00	0.329	128.2	1.916	45.1	0.329	49.3	0.177	-125.8
1600.00	0.328	122.6	1.745	42.4	0.332	47.0	0.175	-126.7
1700.00	0.344	121.4	1.680	39.1	0.352	45.4	0.189	-133.7
1800.00	0.349	116.4	1.581	38.6	0.361	46.2	0.195	-137.8
1900.00	0.360	113.8	1.627	34.5	0.402	43.3	0.198	-141.8
2000.00	0.370	109.3	1.455	30.8	0.393	40.6	0.189	-147.2

2SC4073 5V 100mA

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.614	-74.1	17.789	124.8	0.048	62.1	0.651	-50.7
200.00	0.400	-109.1	10.554	107.4	0.065	58.1	0.398	-64.4
300.00	0.339	-133.0	8.039	96.5	0.092	56.2	0.303	-73.7
400.00	0.306	-150.7	5.810	87.2	0.104	55.9	0.234	-82.1
500.00	0.294	-163.7	4.803	82.8	0.124	60.1	0.230	-85.0
600.00	0.284	-174.6	3.970	78.2	0.145	60.1	0.194	-91.6
700.00	0.289	173.9	3.627	74.7	0.173	59.3	0.183	-95.5
800.00	0.288	167.7	3.143	67.6	0.187	56.6	0.173	-100.5
900.00	0.312	159.1	2.775	64.8	0.202	58.0	0.169	-105.1
1000.00	0.293	153.7	2.542	62.3	0.227	57.3	0.161	-107.5
1100.00	0.311	147.5	2.391	58.1	0.256	55.8	0.161	-109.4
1200.00	0.302	140.2	2.195	53.9	0.273	53.0	0.165	-115.5
1300.00	0.324	136.1	2.006	50.4	0.282	51.7	0.168	-121.2
1400.00	0.329	130.0	1.896	49.5	0.300	52.4	0.165	-127.0
1500.00	0.344	126.9	1.879	44.4	0.335	49.5	0.171	-131.9
1600.00	0.343	121.5	1.709	41.6	0.338	47.2	0.167	-133.4
1700.00	0.358	120.1	1.647	38.4	0.359	44.8	0.183	-139.9
1800.00	0.364	115.7	1.547	37.9	0.366	45.6	0.188	-143.4
1900.00	0.374	112.9	1.597	33.8	0.410	42.8	0.198	-147.6
2000.00	0.385	108.4	1.428	30.1	0.398	40.3	0.185	-153.4

S-PARAMETER

2SC4073 10V 50mA

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.642	-64.7	17.702	128.9	0.047	67.3	0.688	-43.8
200.00	0.417	-98.0	10.932	110.9	0.067	58.8	0.446	-57.5
300.00	0.335	-120.3	8.436	99.2	0.091	56.0	0.347	-66.6
400.00	0.287	-139.6	6.135	89.7	0.103	55.4	0.271	-72.5
500.00	0.268	-152.8	5.094	85.0	0.122	60.1	0.262	-75.8
600.00	0.254	-165.6	4.214	80.2	0.141	59.2	0.220	-81.4
700.00	0.252	-178.6	3.851	76.8	0.167	59.1	0.208	-83.6
800.00	0.251	174.1	3.333	69.6	0.180	56.7	0.192	-89.1
900.00	0.272	164.0	2.952	66.6	0.196	58.4	0.186	-92.0
1000.00	0.255	158.1	2.696	64.1	0.218	58.1	0.176	-93.9
1100.00	0.269	150.7	2.532	60.1	0.247	55.8	0.177	-96.0
1200.00	0.262	142.8	2.326	55.8	0.263	53.5	0.178	-103.4
1300.00	0.283	138.2	2.124	52.4	0.273	52.5	0.178	-107.1
1400.00	0.291	131.8	2.007	51.4	0.289	53.7	0.175	-113.2
1500.00	0.305	129.0	1.985	46.3	0.324	49.8	0.179	-117.9
1600.00	0.305	122.7	1.806	43.5	0.325	48.1	0.173	-119.6
1700.00	0.320	121.6	1.739	40.4	0.347	45.9	0.187	-127.0
1800.00	0.325	116.7	1.636	39.9	0.355	46.7	0.194	-130.1
1900.00	0.336	113.8	1.682	35.7	0.397	44.3	0.194	-135.6
2000.00	0.348	109.4	1.504	32.1	0.388	41.5	0.183	-140.6

2SC4073 10V 100mA

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.625	-70.1	18.613	125.5	0.049	59.7	0.658	-48.1
200.00	0.395	-104.9	11.086	108.0	0.068	58.8	0.401	-62.3
300.00	0.317	-127.3	8.456	97.2	0.089	56.8	0.307	-68.5
400.00	0.281	-145.7	6.120	88.0	0.101	57.6	0.240	-75.4
500.00	0.263	-158.8	5.067	83.6	0.122	60.5	0.234	-78.2
600.00	0.255	-171.2	4.185	79.1	0.143	61.1	0.201	-84.6
700.00	0.256	176.4	3.826	75.7	0.170	60.2	0.188	-87.4
800.00	0.254	169.9	3.307	68.7	0.181	57.3	0.175	-92.3
900.00	0.277	160.7	2.920	65.7	0.197	58.7	0.171	-95.6
1000.00	0.261	154.8	2.673	63.3	0.222	58.4	0.165	-97.1
1100.00	0.277	148.4	2.510	59.2	0.251	56.7	0.164	-99.9
1200.00	0.269	140.7	2.306	55.0	0.266	54.2	0.167	-106.7
1300.00	0.288	135.9	2.106	51.6	0.275	52.8	0.168	-111.6
1400.00	0.297	130.0	1.990	50.8	0.294	53.8	0.163	-117.1
1500.00	0.312	127.1	1.966	45.7	0.327	49.9	0.170	-121.9
1600.00	0.311	121.5	1.788	43.0	0.331	48.0	0.165	-123.7
1700.00	0.327	120.0	1.721	39.8	0.350	45.8	0.178	-131.0
1800.00	0.331	115.5	1.620	39.3	0.359	46.8	0.184	-134.4
1900.00	0.344	112.7	1.669	35.2	0.400	43.7	0.184	-138.7
2000.00	0.356	108.0	1.491	31.5	0.391	41.2	0.177	-144.7

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