

## HIGH FREQUENCY LOW NOISE AMPLIFIER

## NPN SILICON EPITAXIAL TRANSISTOR

## SUPER MINI MOLD

### DESCRIPTION

The 2SC4226 is a low supply voltage transistor designed for VHF, UHF low noise amplifier.

It is suitable for a high density surface mount assembly since the transistor has been applied small mini mold package.

### FEATURES

- Low Noise  
NF = 1.2 dB TYP. @  $f = 1$  GHz,  $V_{CE} = 3$  V,  $I_C = 7$  mA
- High Gain  
 $|S_{21e}|^2 = 9.0$  dB TYP. @  $f = 1$  GHz,  $V_{CE} = 3$  V,  $I_C = 7$  mA
- Small Mini Mold Package  
EIAJ: SC-70

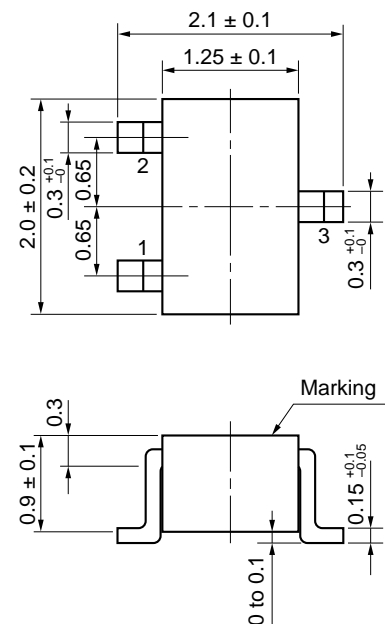
### ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC4226-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin3 (Collector)face to perforation side of the tape.
2SC4226-T2	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin1 (Emitter), Pin2 (Base) face to perforation side of the tape.

- \* Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs. (Part No.: 2SC4226)

### PACKAGE DIMENSIONS

in millimeters



### PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C)**

Collector to Base Voltage	V <sub>CBO</sub>	20	V
Collector to Emitter Voltage	V <sub>CEO</sub>	12	V
Emitter to Base Voltage	V <sub>EBO</sub>	3	V
Collector Current	I <sub>C</sub>	100	mA
Total Power Dissipation	P <sub>T</sub>	150	mW
Junction Temperature	T <sub>j</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C

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

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	I <sub>CBO</sub>			1.0	μA	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EBO</sub>			1.0	μA	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE</sub>	40	110	250		V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA* <sup>1</sup>
Gain Bandwidth Product	f <sub>T</sub>	3.0	4.5		GHz	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA
Feed back Capacitance	C <sub>re</sub>		0.7	1.5	pF	V <sub>CE</sub> = 3 V, I <sub>E</sub> = 0, f = 1 MHz* <sup>2</sup>
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	7	9		dB	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz
Noise Figure	NF		1.2	2.5	dB	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz

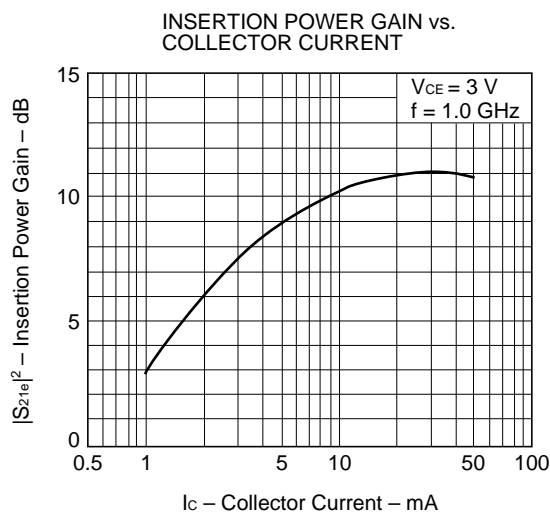
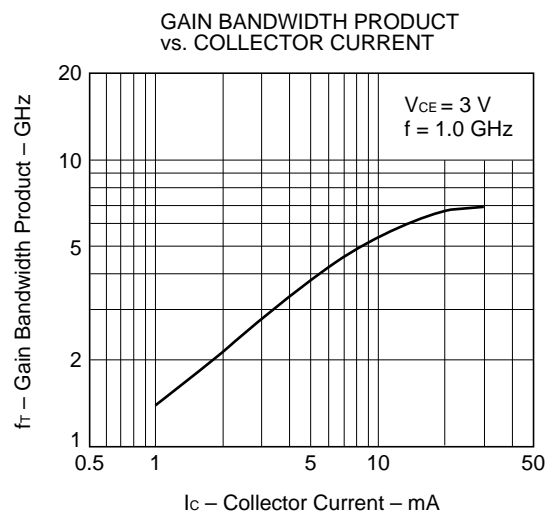
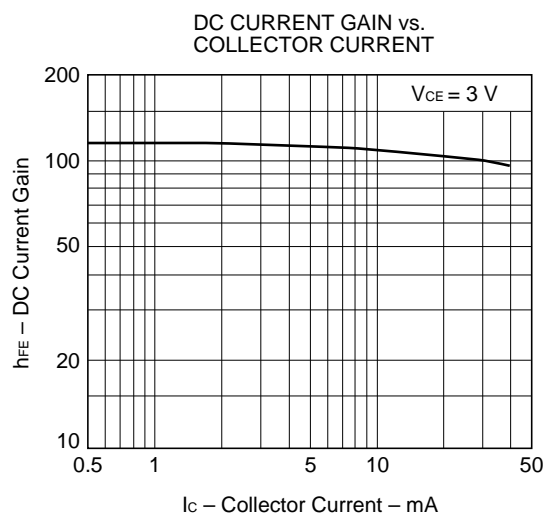
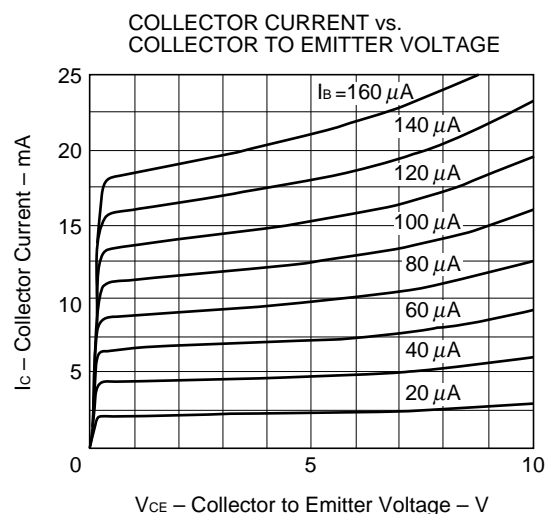
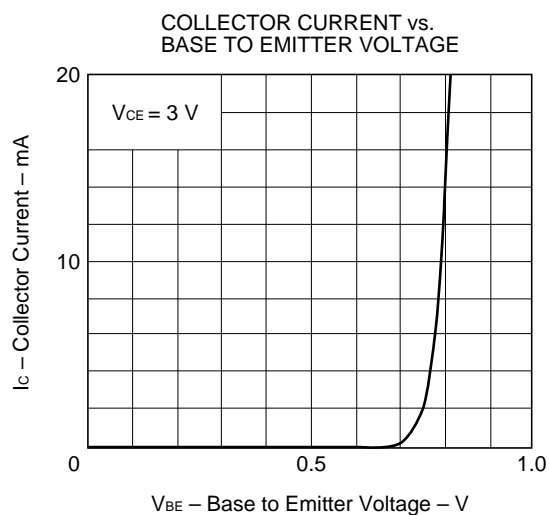
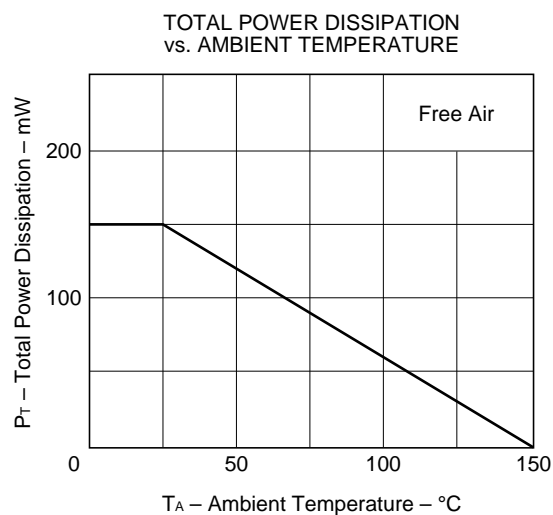
\*1 Pulse Measurement ; PW ≤ 350 μs, Duty Cycle ≤ 2 % Pulsed.

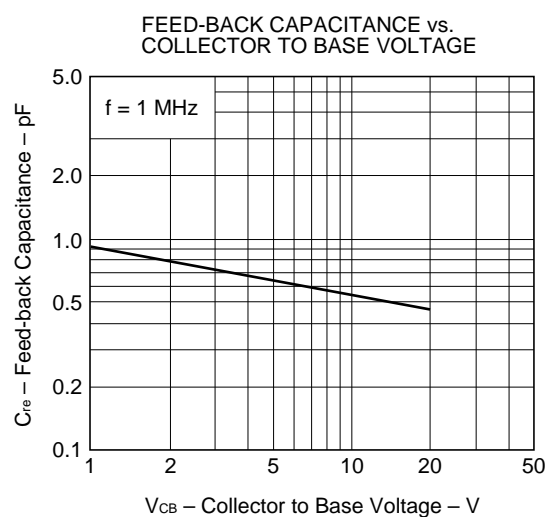
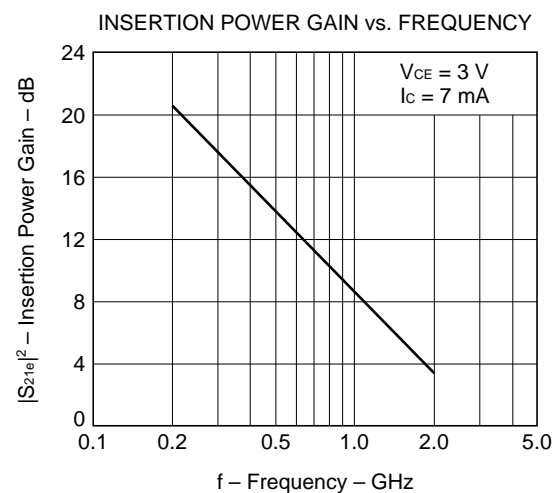
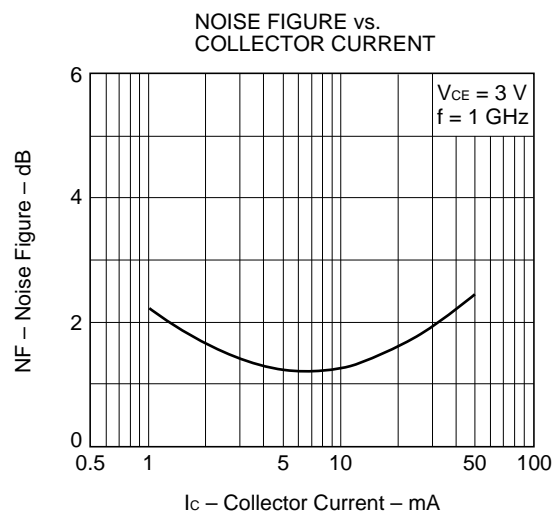
\*2 Measured with 3 terminals bridge, Emitter and Case should be grounded.

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

Rank	R23	R24	R25
Marking	R23	R24	R25
h <sub>FE</sub>	40 to 80	70 to 140	125 to 250

TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )





S-PARAMETER

$V_{CE} = 3 \text{ V}$ ,  $I_C = 7 \text{ mA}$ ,  $Z_o = 50 \Omega$

FREQUENCY		S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.750	-45.7	11.858	144.0	.035	63.3	.816	-28.5	
200.00	.618	-84.9	10.093	122.3	.053	53.2	.609	-41.8	
300.00	.528	-114.5	8.219	107.7	.064	50.6	.481	-46.7	
400.00	.483	-134.3	6.684	97.9	.073	50.6	.411	-49.1	
500.00	.459	-148.5	5.565	90.5	.081	50.7	.365	-50.5	
600.00	.447	-158.8	4.737	84.6	.089	52.3	.337	-51.5	
700.00	.441	-167.4	4.134	79.7	.098	53.5	.316	-52.6	
800.00	.439	-174.4	3.653	75.2	.107	54.2	.300	-54.2	
900.00	.437	179.2	3.283	71.1	.117	54.9	.290	-55.9	
1000.00	.437	173.7	2.978	67.2	.126	55.6	.281	-57.9	
1100.00	.440	168.6	2.732	63.7	.136	55.8	.275	-59.6	
1200.00	.443	163.9	2.533	60.0	.147	55.3	.270	-62.3	
1300.00	.444	159.6	2.357	56.6	.158	55.4	.267	-64.7	
1400.00	.449	155.5	2.216	53.4	.169	55.3	.264	-67.5	
1500.00	.450	151.6	2.077	50.3	.180	54.7	.259	-70.6	
1600.00	.455	147.9	1.972	47.4	.192	54.5	.258	-73.3	
1700.00	.459	144.3	1.868	44.3	.202	53.9	.256	-76.3	
1800.00	.462	140.9	1.789	41.3	.214	53.0	.255	-79.6	
1900.00	.466	137.5	1.702	38.4	.226	52.3	.253	-83.0	
2000.00	.470	134.4	1.635	36.1	.238	51.5	.253	-86.4	

$V_{CE} = 3 \text{ V}$ ,  $I_C = 5 \text{ mA}$ ,  $Z_o = 50 \Omega$

FREQUENCY		S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.819	−38.9	8.934	148.0	.038	65.8	.868	−23.6	
200.00	.701	−73.4	8.007	127.6	.060	53.1	.687	−36.7	
300.00	.608	−102.3	6.898	112.6	.072	47.6	.560	−42.4	
400.00	.549	−123.6	5.819	101.8	.079	45.2	.483	−45.4	
500.00	.511	−139.6	4.970	93.5	.086	45.7	.434	−47.2	
600.00	.494	−151.0	4.255	86.9	.093	46.5	.402	−48.6	
700.00	.481	−160.8	3.750	81.4	.099	47.2	.379	−49.9	
800.00	.475	−168.6	3.328	76.3	.107	48.9	.361	−51.5	
900.00	.472	−175.7	3.004	72.0	.113	49.7	.350	−53.4	
1000.00	.471	178.2	2.734	67.7	.122	50.9	.340	−55.4	
1100.00	.473	172.8	2.522	64.0	.130	51.6	.332	−57.3	
1200.00	.474	167.6	2.355	60.2	.139	52.3	.328	−59.7	
1300.00	.474	162.9	2.176	56.7	.148	53.1	.322	−62.3	
1400.00	.477	158.4	2.038	53.2	.158	53.3	.319	−65.2	
1500.00	.481	154.4	1.921	49.8	.168	53.7	.315	−68.2	
1600.00	.484	150.3	1.818	46.7	.177	53.3	.313	−70.9	
1700.00	.489	146.5	1.726	43.9	.190	53.3	.312	−73.9	
1800.00	.490	142.9	1.647	40.6	.200	53.0	.312	−77.2	
1900.00	.495	139.3	1.578	37.6	.212	52.7	.309	−80.8	
2000.00	.501	136.0	1.505	35.0	.223	52.0	.309	−84.0	

**S-PARAMETER** $V_{CE} = 3\text{ V}$ ,  $I_C = 3\text{ mA}$ ,  $Z_o = 50\ \Omega$ 

FREQUENCY		S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.899	−30.6	5.578	153.7	.042	69.0	.923	−17.3	
200.00	.808	−60.6	5.327	134.4	.069	54.5	.793	−29.2	
300.00	.723	−86.7	4.877	119.6	.084	46.0	.679	−35.4	
400.00	.660	−108.2	4.341	108.1	.093	41.1	.604	−39.5	
500.00	.610	−125.9	3.883	98.5	.098	38.8	.550	−42.0	
600.00	.583	−138.6	3.388	90.9	.102	37.4	.513	−44.2	
700.00	.560	−150.0	3.046	84.3	.106	37.8	.487	−45.9	
800.00	.547	−159.4	2.741	78.5	.108	38.1	.468	−47.9	
900.00	.538	−167.4	2.498	73.4	.112	39.5	.455	−49.9	
1000.00	.535	−174.4	2.287	68.9	.116	41.0	.444	−52.3	
1100.00	.534	179.3	2.111	64.6	.120	43.0	.435	−54.7	
1200.00	.533	173.4	1.965	60.2	.125	45.1	.429	−57.2	
1300.00	.533	168.3	1.830	56.3	.131	46.7	.424	−59.9	
1400.00	.534	163.2	1.721	52.7	.139	48.3	.422	−62.8	
1500.00	.538	158.7	1.620	49.2	.146	49.8	.417	−65.7	
1600.00	.542	154.3	1.544	45.7	.155	51.3	.414	−68.8	
1700.00	.545	150.0	1.464	42.7	.164	52.4	.415	−72.0	
1800.00	.548	146.1	1.396	39.5	.174	53.0	.412	−75.3	
1900.00	.552	142.0	1.336	36.6	.187	53.7	.411	−78.8	
2000.00	.556	138.3	1.280	33.6	.199	54.1	.411	−82.3	

 $V_{CE} = 3\text{ V}$ ,  $I_C = 1\text{ mA}$ ,  $Z_o = 50\ \Omega$ 

FREQUENCY		S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.967	−22.9	1.935	159.9	.045	74.0	.978	−9.2	
200.00	.930	−45.8	1.968	143.1	.083	60.1	.931	−17.4	
300.00	.884	−67.1	1.938	129.1	.108	48.9	.870	−23.2	
400.00	.842	−85.9	1.827	117.2	.125	39.4	.822	−28.0	
500.00	.801	−103.1	1.748	106.7	.134	32.6	.779	−31.9	
600.00	.771	−117.0	1.576	97.4	.137	27.1	.749	−35.3	
700.00	.742	−130.0	1.498	89.2	.137	22.9	.722	−38.4	
800.00	.722	−141.2	1.403	81.9	.134	20.0	.702	−41.3	
900.00	.706	−151.1	1.326	75.6	.129	18.5	.690	−44.4	
1000.00	.695	−159.9	1.242	69.6	.124	17.8	.680	−47.4	
1100.00	.689	−167.7	1.169	64.5	.118	18.1	.671	−50.4	
1200.00	.685	−174.9	1.102	59.6	.112	19.8	.666	−53.6	
1300.00	.681	178.7	1.030	55.3	.106	23.5	.660	−56.9	
1400.00	.681	172.6	.979	50.9	.103	28.0	.658	−60.4	
1500.00	.683	166.8	.925	47.2	.100	33.6	.654	−64.0	
1600.00	.684	161.4	.884	43.6	.102	40.4	.651	−67.6	
1700.00	.684	156.1	.842	40.4	.107	47.5	.651	−71.5	
1800.00	.686	151.4	.804	37.3	.115	53.5	.649	−75.1	
1900.00	.689	146.6	.773	34.6	.127	57.9	.646	−79.2	
2000.00	.690	142.1	.738	32.3	.141	62.1	.646	−83.0	

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