DATA SHEET

NEC

SILICON TRANSISTOR
2SC4227

HIGH FREQUENCY LOW NOISE AMPLIFIER
NPN SILICON EPITAXIAL TRANSISTOR
SUPER MINI MOLD

DESCRIPTION

The 2SC4227 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

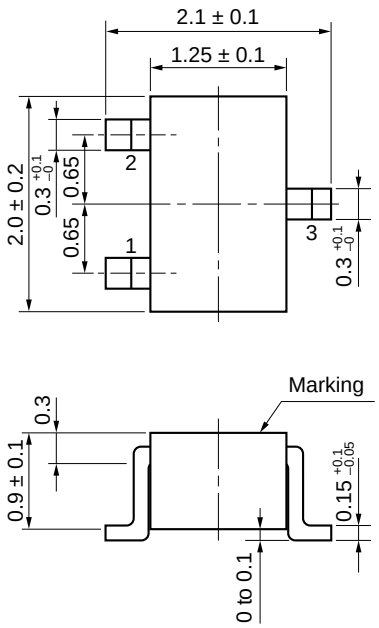
- Low Noise
  NF = 1.4 dB TYP. @ f = 1 GHz, V_{CE} = 3 V, I_C = 7 mA
- High Gain
  $|S_{21e}|^2$ = 12 dB TYP. @ f = 1 GHz, V_{CE} = 3 V, I_C = 7 mA
- Small Mini Mold Package
  EIAJ: SC-70

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC4227-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin3 (Collector) face to perforation side of the tape.
2SC4227-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.: 2SC4227)

PACKAGE DIMENSIONS
in millimeters



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

Document No. P10371EJ2V0DS00 (2nd edition)
(Previous No. TC-2403)
Date Published July 1995 P
Printed in Japan

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	10	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	65	mA
Total Power Dissipation	P_T	150	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	I_{CBO}			0.8	μA	V_{CB} = 10 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			0.8	μA	V_{EB} = 1 V, I_C = 0
DC Current Gain	h_{FE}	40		240		V_{CE} = 3 V, I_C = 7 mA***1**
Gain Bandwidth Product	f_T	4.5	7.0		GHz	V_{CE} = 3 V, I_C = 7 mA
Feedback Capacitance	C_{re}		0.45	0.9	pF	V_{CE} = 3 V, I_E = 0, f = 1 MHz***2**
Insertion Power Gain	$\|S_{21e}\|^2$	10	12		dB	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz
Noise Figure	NF		1.4	2.7	dB	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz

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

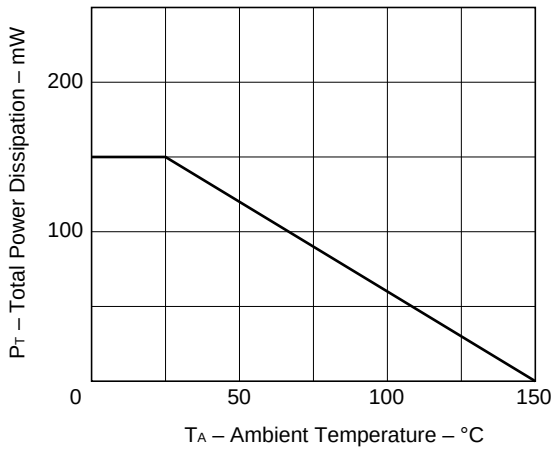
***2** Measured with 3 terminals bridge, Emitter and Case should be grounded.

h_{FE} Classification

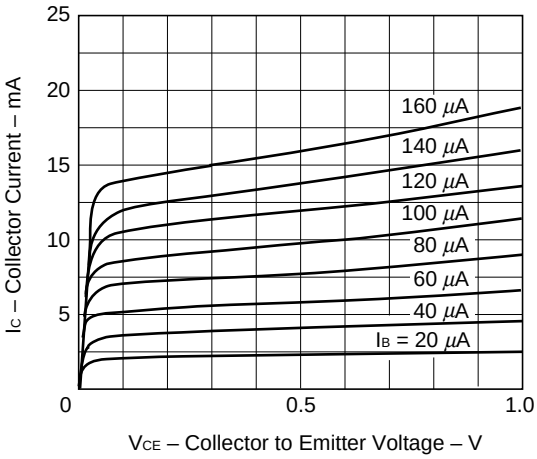
Rank	R33	R34	R35
Marking	R33	R34	R35
h_{FE}	40 to 90	70 to 150	110 to 240

TYPICAL CHARACTERISTICS (T_A = 25 °C)

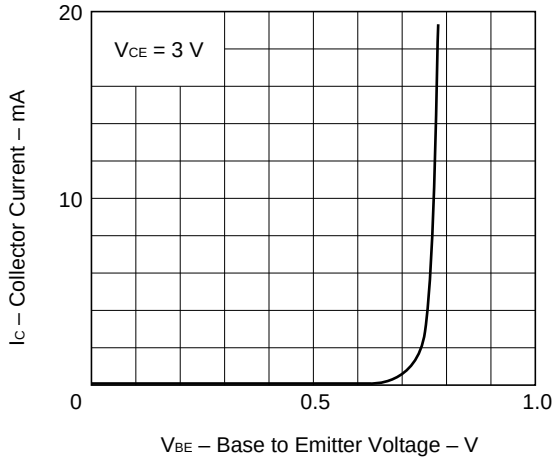
TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE



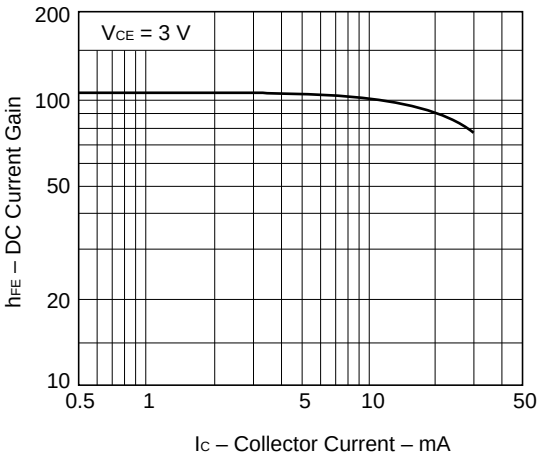
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



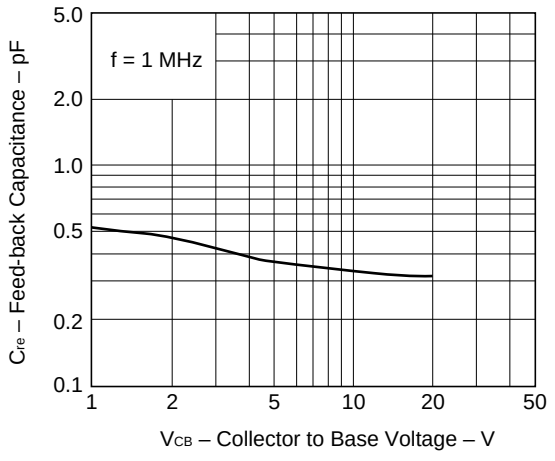
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



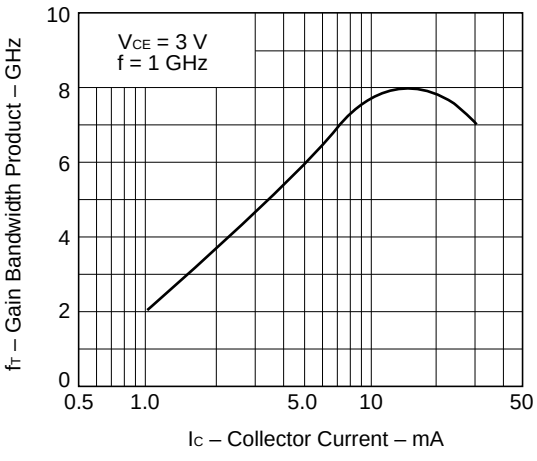
DC CURRENT GAIN vs.
COLLECTOR CURRENT



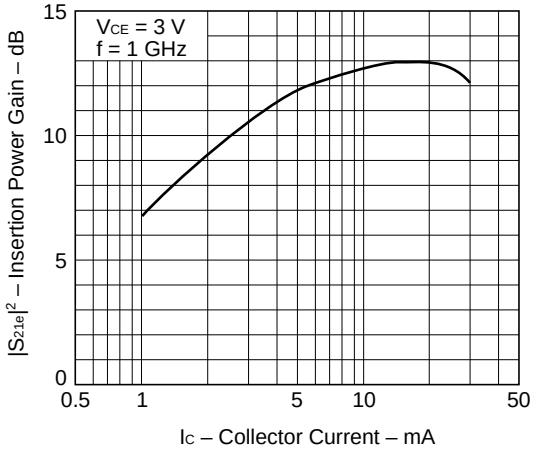
FEED-BACK CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



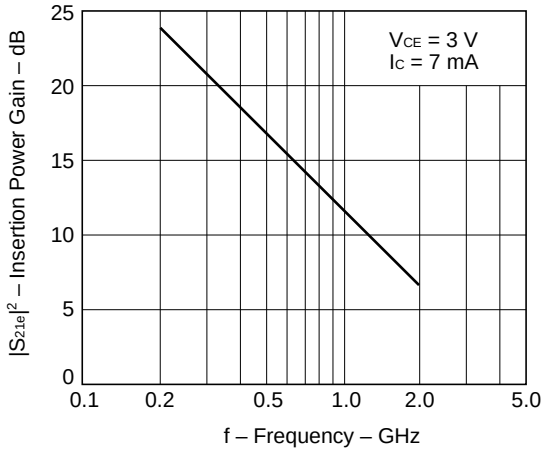
GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



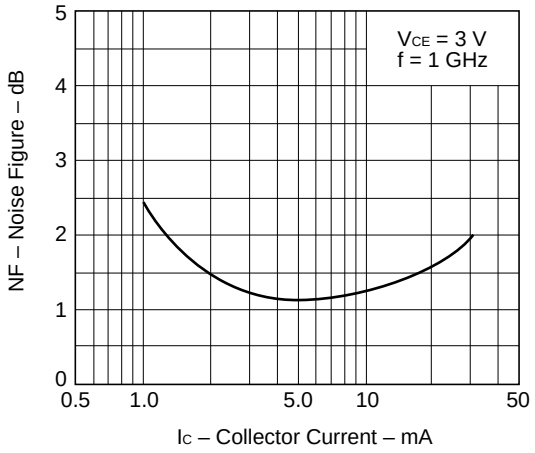
INSERTION POWER GAIN vs.
COLLECTOR CURRENT



INSERTION POWER GAIN vs.
FREQUENCY



NOISE FIGURE vs.
COLLECTOR CURRENT



S-PARAMETER

(V_{CE} = 3 V, I_C = 7 mA, Z_O = 50 Ω)

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.804	–23.8	11.631	154.8	.023	74.8	.920	–16.5
200.00	.692	–48.6	10.839	137.5	.040	64.1	.791	–27.7
300.00	.581	–70.3	9.722	123.8	.050	59.9	.675	–33.5
400.00	.489	–89.0	8.519	112.9	.060	56.7	.597	–37.0
500.00	.419	–104.9	7.434	104.1	.067	55.9	.538	–38.7
600.00	.376	–117.1	6.468	97.5	.075	55.6	.497	–40.0
700.00	.342	–128.6	5.729	91.8	.082	55.7	.467	–41.0
800.00	.321	–138.4	5.115	86.7	.089	56.3	.443	–41.7
900.00	.305	–147.3	4.630	82.5	.096	56.1	.427	–42.5
1000.00	.296	–155.2	4.207	78.5	.104	56.4	.412	–43.6
1100.00	.289	–162.2	3.879	74.8	.111	56.0	.401	–44.6
1200.00	.284	–169.3	3.595	71.4	.119	56.4	.393	–45.8
1300.00	.282	–175.3	3.349	68.1	.127	56.2	.384	–47.3
1400.00	.281	179.0	3.133	64.8	.136	56.0	.379	–48.8
1500.00	.283	173.8	2.945	61.9	.143	55.4	.372	–50.1
1600.00	.283	168.6	2.780	58.8	.151	55.0	.367	–51.8
1700.00	.285	163.8	2.631	56.2	.160	54.4	.363	–53.7
1800.00	.286	159.9	2.514	53.3	.168	53.9	.359	–55.4
1900.00	.289	155.4	2.390	50.5	.177	53.3	.354	–57.3
2000.00	.293	151.8	2.293	47.8	.186	52.5	.351	–59.2

(V_{CE} = 3 V, I_C = 5 mA, Z_O = 50 Ω)

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.818	–29.4	14.580	156.2	.023	79.9	.932	–14.4
200.00	.689	–54.3	12.120	137.5	.040	65.1	.824	–23.4
300.00	.594	–73.1	10.142	124.6	.052	55.0	.716	–30.3
400.00	.500	–89.8	8.340	114.4	.063	58.5	.620	–32.2
500.00	.457	–102.8	7.300	107.5	.069	56.4	.577	–34.2
600.00	.404	–115.0	6.211	101.0	.081	54.9	.525	–35.1
700.00	.377	–124.4	5.496	96.8	.084	59.5	.511	–36.1
800.00	.359	–134.3	4.908	91.4	.091	58.4	.471	–36.2
900.00	.342	–141.5	4.450	88.1	.097	58.4	.458	–35.3
1000.00	.335	–150.3	4.018	84.7	.100	61.2	.440	–36.5
1100.00	.326	–155.9	3.750	81.4	.112	61.8	.442	–36.8
1200.00	.321	–162.4	3.410	78.1	.115	61.4	.417	–37.8
1300.00	.317	–167.2	3.181	75.6	.124	62.3	.412	–38.5
1400.00	.321	–173.4	2.995	72.5	.131	63.9	.411	–39.9
1500.00	.318	–177.5	2.802	69.8	.138	63.6	.407	–40.4
1600.00	.320	176.6	2.665	67.3	.149	66.4	.400	–41.1
1700.00	.323	173.2	2.533	66.1	.156	65.3	.394	–43.7
1800.00	.326	167.8	2.369	63.0	.162	65.9	.394	–44.3
1900.00	.331	165.6	2.275	61.0	.177	65.4	.390	–45.5
2000.00	.333	161.4	2.196	59.2	.183	64.5	.384	–47.6

S-PARAMETER

(V_{CE} = 3 V, I_C = 3 mA, Z_O = 50 Ω)

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.906	–22.7	9.710	161.6	.026	82.5	.962	–10.6
200.00	.810	–43.7	8.541	145.3	.049	63.8	.895	–18.3
300.00	.742	–60.6	7.695	133.4	.062	58.7	.811	–25.8
400.00	.638	–76.6	6.580	122.4	.073	56.0	.732	–27.7
500.00	.587	–89.8	5.934	114.1	.082	53.4	.680	–31.2
600.00	.524	–102.2	5.148	107.1	.091	49.7	.624	–33.5
700.00	.490	–111.4	4.627	102.2	.094	51.8	.603	–34.4
800.00	.460	–121.4	4.181	96.0	.099	51.2	.568	–35.0
900.00	.435	–129.9	3.827	92.6	.101	52.9	.540	–35.7
1000.00	.427	–138.2	3.443	88.1	.107	50.9	.523	–36.7
1100.00	.404	–144.9	3.199	84.2	.115	53.7	.512	–36.8
1200.00	.399	–151.7	2.989	79.8	.113	56.6	.500	–38.6
1300.00	.392	–157.9	2.779	77.4	.121	54.9	.489	–39.2
1400.00	.392	–163.6	2.638	73.5	.126	56.4	.483	–40.4
1500.00	.386	–169.1	2.443	71.3	.135	56.4	.477	–41.8
1600.00	.380	–174.5	2.344	68.0	.137	60.0	.477	–42.4
1700.00	.382	–179.7	2.239	65.3	.143	59.5	.466	–44.4
1800.00	.389	176.1	2.113	63.0	.151	59.4	.461	–44.9
1900.00	.383	172.5	2.025	61.4	.154	62.6	.456	–46.9
2000.00	.387	168.3	1.922	58.2	.163	62.0	.464	–48.3

(V_{CE} = 3 V, I_C = 7 mA, Z_O = 50 Ω)

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	1.009	–14.5	3.544	168.8	.027	78.6	.994	–5.6
200.00	.955	–29.7	3.359	156.3	.055	73.6	.969	–10.1
300.00	.937	–42.6	3.277	147.1	.073	63.4	.947	–15.9
400.00	.864	–56.2	3.034	136.6	.091	57.7	.898	–18.8
500.00	.838	–67.3	2.891	128.6	.107	51.1	.865	–22.1
600.00	.775	–79.3	2.674	120.0	.116	46.6	.824	–25.8
700.00	.745	–88.5	2.485	114.2	.125	45.2	.803	–27.5
800.00	.708	–99.1	2.338	106.8	.127	41.2	.776	–29.7
900.00	.670	–107.9	2.177	101.4	.132	40.2	.740	–31.5
1000.00	.649	–116.8	2.052	96.0	.135	37.2	.723	–33.7
1100.00	.621	–124.0	1.914	90.8	.131	36.6	.719	–34.2
1200.00	.608	–131.8	1.819	86.0	.129	35.4	.700	–36.3
1300.00	.587	–138.5	1.713	82.4	.130	35.2	.691	–37.6
1400.00	.587	–144.5	1.628	77.7	.128	36.1	.681	–39.2
1500.00	.573	–152.6	1.533	73.4	.127	36.0	.662	–40.7
1600.00	.559	–157.1	1.464	70.3	.124	37.5	.660	–42.7
1700.00	.562	–164.2	1.421	67.2	.120	39.1	.658	–44.0
1800.00	.557	–168.9	1.350	64.7	.122	43.3	.658	–46.0
1900.00	.557	–173.9	1.296	61.1	.122	45.2	.641	–47.8
2000.00	.551	–178.6	1.240	58.0	.124	48.5	.643	–50.1

[MEMO]