

# SILICON TRANSISTOR 2SC4182

### UHF/VHF OSCILLATOR AND VHF MIXER NPN SILICON EPITAXIAL TRANSISTOR SUPER MINI MOLD

#### DESCRIPTION

The 2SC4182 is designed for use as an oscillator or a mixer in a VHF TV tuners. Super mini mold package makes it suitable for use in small type equipments especially recommended for Hibrid Integrated Circuits and other applications.

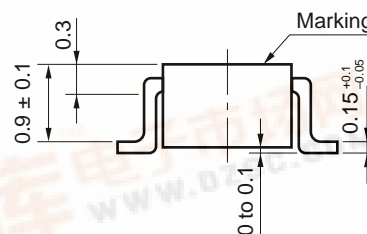
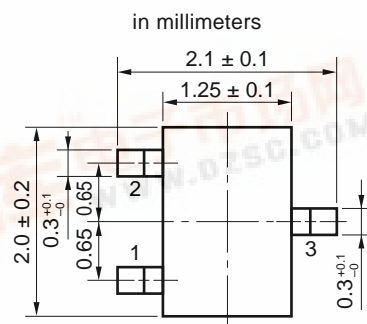
#### FEATURES

- High Gain Bandwidth Product :  $f_T = 1.1 \text{ GHz TYP.}$
- Low Collector to Base Time Constant:  $C_C \cdot \tau_{b'b} = 9 \text{ ps TYP.}$
- Low Output Capacitance :  $C_{ob} = 1.5 \text{ pF MAX.}$

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

Collector to Base Voltage	$V_{CB0}$	30	V
Collector to Emitter Voltage	$V_{CE0}$	15	V
Emitter to Base Voltage	$V_{EB0}$	4.5	V
Collector Current	$I_C$	50	mA
Total Power Dissipation	$P_T$	160	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

#### PACKAGE DIMENSIONS



#### PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

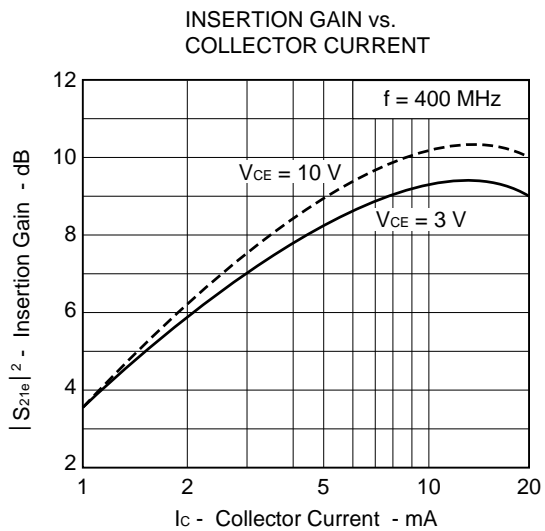
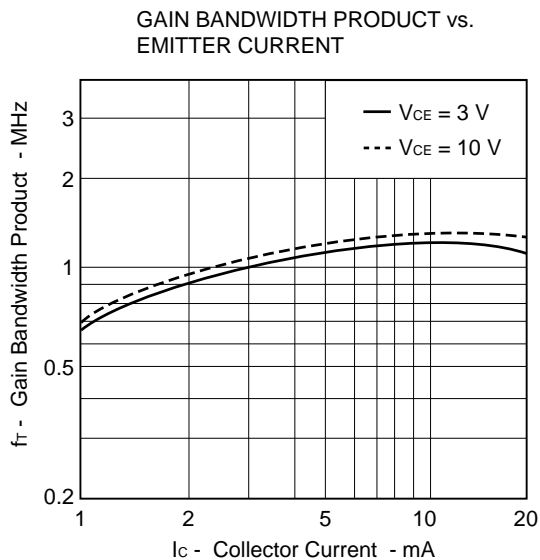
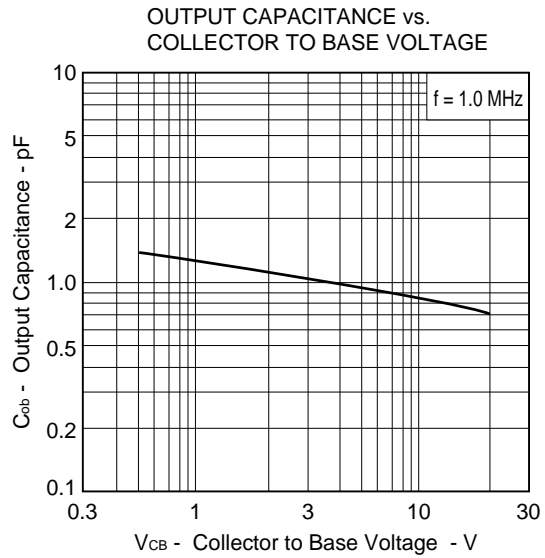
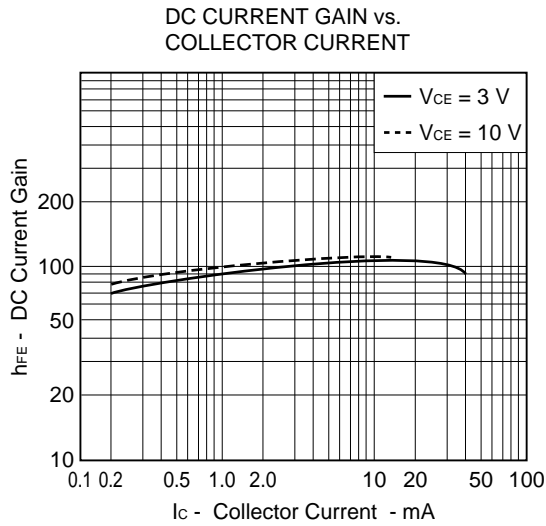
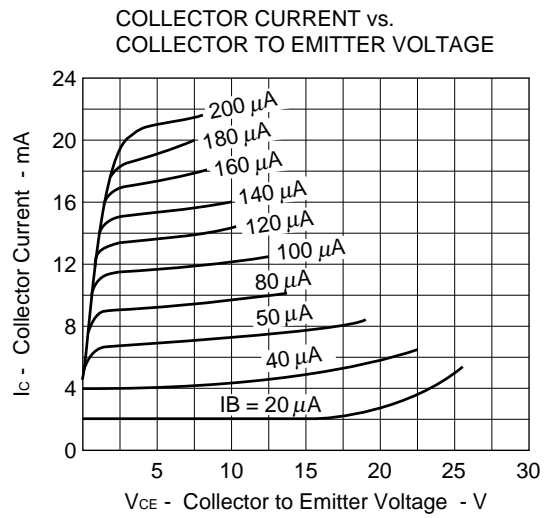
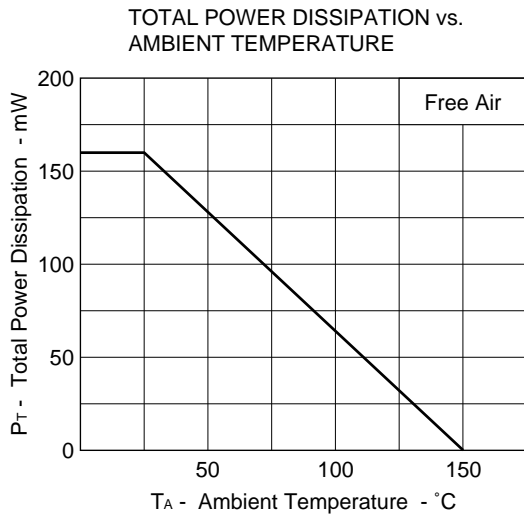
#### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

Characteristics	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Collector Cutoff Current	$I_{CB0}$			0.1	$\mu\text{A}$	$V_{CB} = 20 \text{ V}, I_E = 0$
DC Current Gain	$h_{FE}$	60		220		$V_{CE} = 3 \text{ V}, I_C = 5 \text{ mA}$
Collector Saturation Voltage	$V_{CE(sat)}$			0.5	V	$I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$
Gain Bandwidth Product	$f_T$		1 100		MHz	$V_{CE} = 3 \text{ V}, I_C = 5 \text{ mA}$
Output Capacitance	$C_{ob}$		1.1	1.5	pF	$V_{CB} = 3 \text{ V}, I_E = 0$
Collector to Base Time Constant	$C_C \cdot \tau_{b'b}$		9	15	ps	$V_{CE} = 3 \text{ V}, I_E = -5 \text{ mA}, f = 31.9 \text{ MHz}$

#### $h_{FE}$ Classifications

Rank	T32	T33	T34
Marking	T32	T33	T34
$h_{FE}$	60 to 105	85 to 150	120 to 220

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



S-PARAMETER

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 3 mA

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.644	-57.9	6.137	125.9	0.045	66.9	0.857	-14.1
200.00	0.466	-85.1	3.833	104.4	0.065	59.1	0.764	-15.7
300.00	0.388	-103.6	2.855	91.8	0.085	54.1	0.718	-18.6
400.00	0.365	-117.7	2.189	83.9	0.100	54.0	0.701	-19.7
500.00	0.363	-130.2	1.802	76.5	0.111	50.7	0.670	-21.5
600.00	0.371	-142.2	1.559	71.6	0.125	50.5	0.675	-23.8
700.00	0.378	-153.2	1.392	64.2	0.133	48.2	0.665	-25.6
800.00	0.390	-161.9	1.268	59.0	0.144	47.3	0.673	-29.6
900.00	0.403	-169.1	1.132	53.7	0.147	48.7	0.671	-32.7
1000.00	0.429	-176.5	1.040	49.1	0.153	47.5	0.658	-38.1
1100.00	0.454	175.9	0.969	45.6	0.159	50.1	0.653	-42.2
1200.00	0.466	167.3	0.918	40.3	0.167	49.9	0.631	-46.4
1300.00	0.473	161.5	0.886	35.9	0.178	50.8	0.618	-50.4
1400.00	0.476	157.0	0.799	31.7	0.179	51.8	0.607	-54.3
1500.00	0.503	153.0	0.757	26.1	0.189	52.1	0.604	-58.7
1600.00	0.527	148.9	0.696	26.0	0.196	56.4	0.599	-64.0
1700.00	0.547	142.8	0.647	23.2	0.207	57.0	0.591	-69.6
1800.00	0.566	138.1	0.636	22.6	0.227	59.8	0.578	-76.3
1900.00	0.574	134.2	0.604	20.1	0.247	59.8	0.568	-81.5
2000.00	0.588	130.5	0.594	16.7	0.267	58.3	0.549	-87.6

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 10 mA

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.411	-89.0	9.009	109.8	0.031	63.2	0.727	-14.9
200.00	0.371	-119.5	5.001	93.7	0.050	59.7	0.663	-14.3
300.00	0.377	-137.9	3.455	83.5	0.066	56.7	0.632	-16.4
400.00	0.398	-150.7	2.725	77.1	0.075	57.8	0.622	-17.3
500.00	0.423	-161.2	2.198	70.6	0.084	56.5	0.601	-18.9
600.00	0.441	-170.7	1.874	66.3	0.095	58.8	0.608	-21.0
700.00	0.452	-179.3	1.644	59.5	0.103	58.7	0.605	-22.9
800.00	0.466	174.9	1.478	54.7	0.113	60.0	0.614	-26.8
900.00	0.476	170.4	1.298	49.9	0.120	62.7	0.617	-30.1
1000.00	0.510	165.1	1.182	45.5	0.130	62.8	0.608	-35.4
1100.00	0.539	159.6	1.088	42.6	0.140	65.9	0.604	-39.8
1200.00	0.549	152.3	1.021	37.7	0.151	66.4	0.585	-44.1
1300.00	0.554	147.3	0.977	33.4	0.168	67.6	0.573	-48.2
1400.00	0.554	143.7	0.874	29.6	0.177	68.6	0.564	-52.5
1500.00	0.577	140.5	0.821	24.1	0.195	67.9	0.561	-57.0
1600.00	0.596	137.3	0.750	24.4	0.209	71.0	0.557	-62.5
1700.00	0.615	132.3	0.693	21.7	0.228	69.9	0.548	-68.4
1800.00	0.629	128.5	0.676	21.3	0.253	71.0	0.536	-75.4
1900.00	0.636	125.1	0.640	19.1	0.277	69.2	0.527	-81.1
2000.00	0.649	121.9	0.626	15.9	0.302	66.3	0.510	-87.4

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 3 mA

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.657	-54.8	6.220	127.2	0.038	66.5	0.876	-12.6
200.00	0.473	-80.6	3.926	105.9	0.058	60.5	0.793	-14.0
300.00	0.391	-98.6	2.930	93.4	0.078	55.6	0.748	-16.8
400.00	0.364	-112.6	2.253	85.6	0.091	55.7	0.734	-17.8
500.00	0.359	-125.0	1.855	78.5	0.102	52.4	0.702	-19.4
600.00	0.365	-137.5	1.606	73.9	0.115	52.1	0.709	-21.5
700.00	0.370	-148.9	1.437	66.5	0.122	50.2	0.700	-23.1
800.00	0.381	-158.2	1.307	61.5	0.133	49.7	0.709	-26.9
900.00	0.393	-165.8	1.164	56.2	0.135	50.7	0.709	-29.7
1000.00	0.417	-173.6	1.074	51.6	0.141	49.7	0.697	-34.8
1100.00	0.442	178.4	0.998	48.1	0.147	52.6	0.692	-38.5
1200.00	0.454	169.6	0.945	42.9	0.153	52.9	0.669	-42.4
1300.00	0.460	163.6	0.911	38.5	0.164	53.9	0.656	-45.8
1400.00	0.463	159.0	0.822	34.3	0.165	55.4	0.645	-49.4
1500.00	0.491	154.8	0.779	28.9	0.176	55.9	0.642	-53.3
1600.00	0.515	150.5	0.717	28.7	0.183	60.6	0.639	-58.0
1700.00	0.536	144.3	0.667	25.8	0.195	61.2	0.631	-63.1
1800.00	0.555	139.4	0.657	25.1	0.214	64.0	0.618	-69.2
1900.00	0.563	135.4	0.625	22.5	0.234	64.0	0.609	-74.0
2000.00	0.578	131.6	0.614	18.9	0.255	62.6	0.589	-79.5

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 10 mA

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.420	-83.2	9.315	111.3	0.029	67.9	0.759	-13.4
200.00	0.366	-112.8	5.199	95.2	0.045	62.5	0.701	-12.8
300.00	0.364	-132.2	3.618	85.3	0.060	57.8	0.669	-14.9
400.00	0.381	-146.0	2.856	78.9	0.070	59.4	0.661	-15.7
500.00	0.403	-156.9	2.306	72.7	0.078	57.8	0.638	-17.0
600.00	0.420	-167.0	1.967	68.5	0.088	59.6	0.647	-19.0
700.00	0.432	-176.0	1.729	61.8	0.095	60.0	0.644	-20.5
800.00	0.446	177.8	1.553	57.0	0.106	61.0	0.655	-24.1
900.00	0.457	172.8	1.367	52.2	0.111	64.0	0.658	-27.0
1000.00	0.490	167.3	1.243	48.0	0.121	64.3	0.648	-32.0
1100.00	0.518	161.5	1.147	44.9	0.130	67.6	0.644	-36.0
1200.00	0.529	154.0	1.074	40.1	0.140	68.5	0.626	-39.8
1300.00	0.535	149.0	1.029	35.7	0.155	70.0	0.615	-43.4
1400.00	0.536	145.3	0.920	31.9	0.164	71.2	0.605	-47.0
1500.00	0.559	142.1	0.865	26.4	0.181	70.9	0.604	-51.0
1600.00	0.579	138.7	0.791	26.7	0.196	74.1	0.600	-55.8
1700.00	0.598	133.7	0.732	23.9	0.213	73.4	0.593	-61.2
1800.00	0.614	129.8	0.716	23.2	0.237	74.5	0.580	-67.3
1900.00	0.621	126.3	0.677	20.9	0.260	73.1	0.571	-72.4
2000.00	0.635	123.0	0.663	17.4	0.285	70.2	0.553	-78.0

V<sub>CE</sub> = 10 V, I<sub>c</sub> = 3 mA

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.671	-50.9	6.248	128.7	0.035	69.8	0.897	-10.6
200.00	0.486	-74.5	3.991	107.7	0.052	62.3	0.824	-12.2
300.00	0.398	-91.4	2.991	95.4	0.070	57.2	0.781	-14.9
400.00	0.367	-104.8	2.306	87.9	0.083	57.2	0.770	-15.8
500.00	0.356	-117.2	1.902	80.9	0.092	54.0	0.738	-17.2
600.00	0.359	-130.2	1.654	76.4	0.104	54.5	0.747	-19.1
700.00	0.361	-142.0	1.482	69.3	0.111	52.1	0.739	-20.3
800.00	0.367	-152.0	1.347	64.4	0.121	51.7	0.750	-23.8
900.00	0.379	-160.5	1.202	59.0	0.123	53.2	0.751	-26.3
1000.00	0.399	-168.8	1.110	54.4	0.129	52.1	0.739	-31.1
1100.00	0.422	-177.3	1.030	50.9	0.134	55.0	0.734	-34.5
1200.00	0.433	173.5	0.976	45.8	0.140	55.5	0.711	-37.9
1300.00	0.440	167.2	0.940	41.4	0.149	56.7	0.698	-40.8
1400.00	0.445	162.3	0.848	37.2	0.151	58.6	0.686	-43.8
1500.00	0.472	157.8	0.803	31.8	0.161	59.6	0.687	-47.0
1600.00	0.497	153.2	0.743	31.6	0.167	64.5	0.683	-51.2
1700.00	0.517	146.7	0.691	28.6	0.180	65.5	0.678	-55.8
1800.00	0.537	141.5	0.681	27.7	0.198	68.3	0.667	-61.0
1900.00	0.546	137.3	0.649	25.0	0.216	68.8	0.657	-65.4
2000.00	0.561	133.5	0.637	21.2	0.237	67.2	0.638	-70.2

V<sub>CE</sub> = 10 V, I<sub>c</sub> = 10 mA

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.438	-73.6	9.469	113.2	0.026	67.2	0.799	-11.6
200.00	0.363	-101.5	5.347	97.4	0.042	63.1	0.744	-11.4
300.00	0.348	-121.7	3.753	87.6	0.057	58.9	0.711	-13.6
400.00	0.356	-136.7	2.984	81.4	0.066	60.0	0.703	-14.2
500.00	0.373	-148.8	2.420	75.4	0.073	58.6	0.678	-15.2
600.00	0.388	-159.8	2.073	71.3	0.082	60.5	0.688	-16.9
700.00	0.398	-169.7	1.824	64.7	0.089	60.1	0.685	-18.1
800.00	0.412	-176.6	1.644	60.0	0.099	61.4	0.697	-21.4
900.00	0.425	177.7	1.449	55.2	0.103	64.5	0.701	-23.9
1000.00	0.456	171.7	1.321	50.9	0.112	64.6	0.692	-28.5
1100.00	0.483	165.3	1.216	47.7	0.120	68.1	0.688	-31.9
1200.00	0.495	157.6	1.147	43.0	0.128	69.4	0.667	-35.3
1300.00	0.501	152.4	1.093	38.6	0.142	71.0	0.657	-38.3
1400.00	0.504	148.5	0.978	34.8	0.149	72.8	0.646	-41.1
1500.00	0.528	145.1	0.922	29.2	0.165	72.9	0.648	-44.4
1600.00	0.550	141.6	0.846	29.2	0.178	76.4	0.644	-48.5
1700.00	0.570	136.4	0.784	26.2	0.194	75.9	0.640	-53.1
1800.00	0.587	132.1	0.766	25.3	0.217	77.6	0.630	-58.4
1900.00	0.595	128.7	0.728	22.7	0.238	76.4	0.621	-62.9
2000.00	0.610	125.2	0.711	18.8	0.262	74.0	0.603	-67.8

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