

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

DESCRIPTION

The 2SC4184 is designed for use as an oscillator or a mixer in a UHF 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

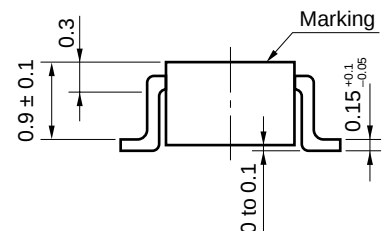
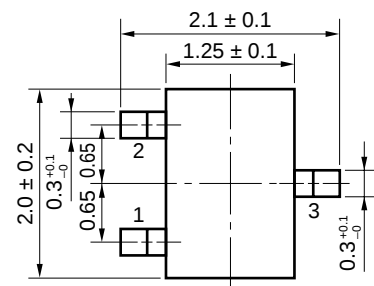
- High Gain Bandwidth Product : $f_T = 1.8 \text{ GHz TYP.}$
- Low Collector to Base Time Constant: $C_C \cdot r_{b'b} = 3.5 \text{ ps TYP.}$
- Low Feedback Capacitance : $C_{re} = 1.2 \text{ pF MAX.}$

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}	4.0	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

in millimeters

**PIN CONNECTIONS**

1. Emitter
2. Base
3. Collector

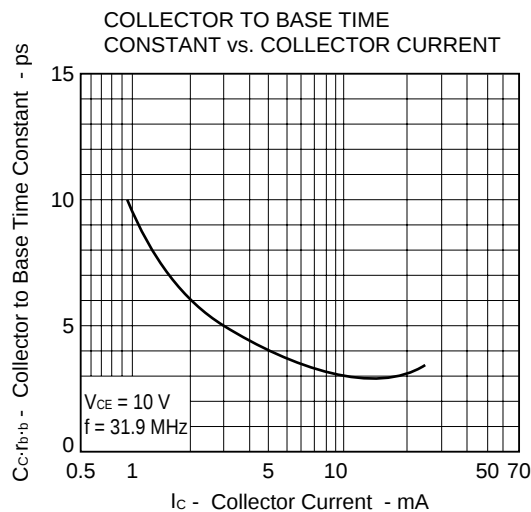
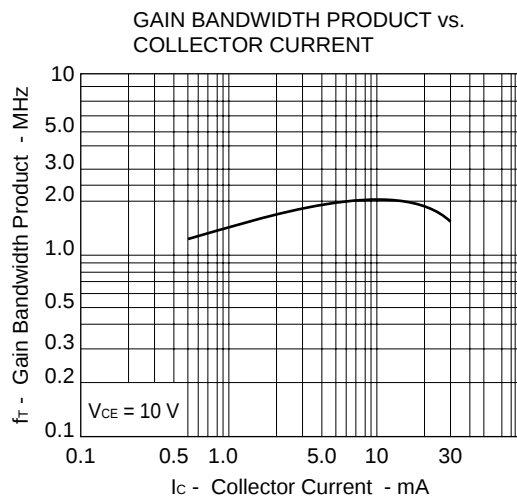
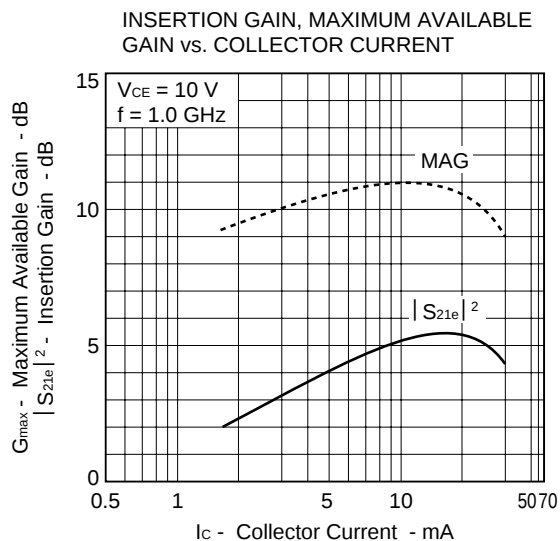
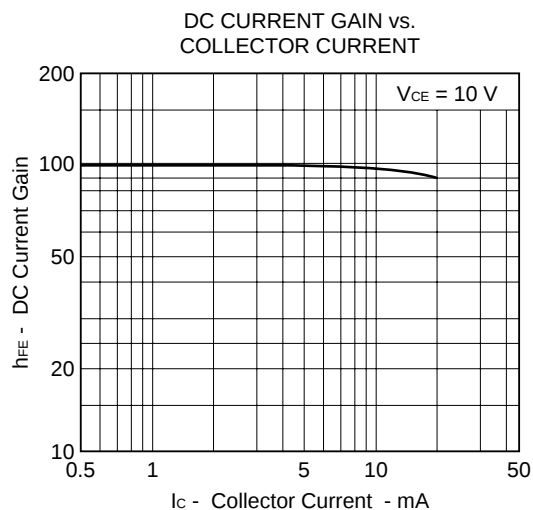
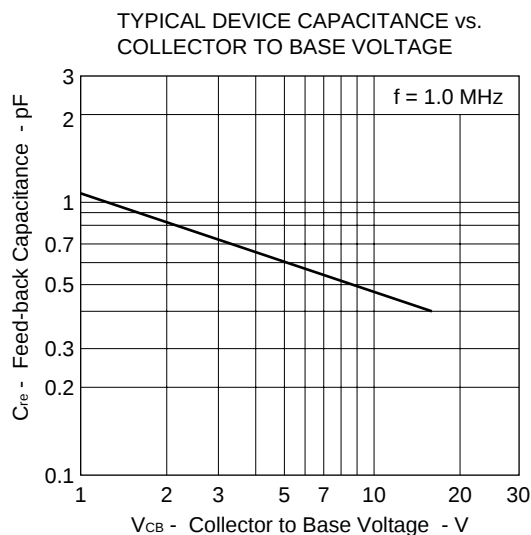
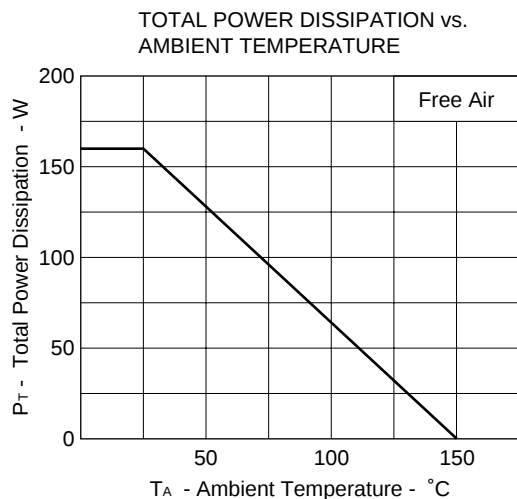
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

Characteristics	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Collector Cutoff Current	I_{CB0}			0.1	μA	$V_{CB} = 20 \text{ V}, I_E = 0$
DC Current Gain	h_{FE}	40	100	200		$V_{CE} = 3 \text{ V}, I_C = 5 \text{ mA}$
Collector Saturation Voltage	$V_{CE(sat)}$			0.5	V	$I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$
Gain Bandwidth Product	f_T	1.2	1.8		GHz	$V_{CE} = 3 \text{ V}, I_C = 5 \text{ mA}$
Feedback Capacitance	C_{re}		0.55	1.2	pF	$V_{CB} = 3 \text{ V}, I_E = 0, f = 1 \text{ MHz}$
Collector to Base Time Constant	$C_C \cdot r_{b'b}$		3.5	8.0	ps	$V_{CE} = 3 \text{ V}, I_E = -5 \text{ mA}, f = 31.9 \text{ MHz}$

 h_{FE} Classifications

Rank	T42	T43	T44
Marking	T42	T43	T44
h_{FE}	40 to 80	60 to 120	100 to 200

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



S-PARAMETER

 $V_{CE} = 3\text{ V}$, $I_C = 3\text{ mA}$

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.780	-45.1	7.990	142.7	0.038	72.2	0.912	-14.1
200.00	0.599	-75.4	5.939	120.0	0.055	58.9	0.787	-18.6
300.00	0.461	-97.5	4.471	104.5	0.070	52.2	0.702	-21.4
400.00	0.389	-113.6	3.554	95.7	0.079	54.5	0.666	-20.8
500.00	0.349	-127.2	3.002	88.2	0.087	54.5	0.625	-20.8
600.00	0.327	-140.4	2.590	83.5	0.098	57.4	0.623	-21.4
700.00	0.311	-152.0	2.301	76.2	0.107	56.8	0.613	-21.7
800.00	0.304	-161.4	2.086	71.6	0.121	57.7	0.617	-24.0
900.00	0.303	-169.1	1.845	66.3	0.128	59.5	0.616	-26.0
1000.00	0.315	-176.4	1.697	61.8	0.139	58.7	0.604	-29.8
1100.00	0.329	175.8	1.567	58.5	0.149	60.7	0.595	-32.6
1200.00	0.335	167.5	1.480	53.8	0.160	60.3	0.575	-35.2
1300.00	0.337	161.8	1.412	49.6	0.175	60.1	0.561	-37.4
1400.00	0.341	157.7	1.294	45.5	0.179	60.2	0.548	-39.5
1500.00	0.359	154.0	1.215	40.5	0.192	59.0	0.547	-41.9
1600.00	0.378	150.3	1.144	39.9	0.200	62.0	0.541	-45.1
1700.00	0.395	144.9	1.071	37.1	0.212	61.2	0.535	-48.8
1800.00	0.412	140.7	1.065	35.3	0.230	62.8	0.524	-52.9
1900.00	0.421	137.4	1.028	32.3	0.246	61.8	0.515	-56.6
2000.00	0.436	134.3	1.018	27.4	0.263	59.6	0.502	-60.5

 $V_{CE} = 3\text{ V}$, $I_C = 10\text{ mA}$

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.471	-83.2	13.160	120.4	0.026	64.3	0.757	-17.7
200.00	0.349	-119.5	7.654	100.5	0.037	63.0	0.646	-16.0
300.00	0.301	-140.2	5.293	89.6	0.050	63.2	0.605	-16.1
400.00	0.291	-153.2	3.997	83.3	0.061	67.1	0.592	-15.5
500.00	0.295	-163.3	3.219	77.5	0.072	66.9	0.572	-15.5
600.00	0.301	-172.5	2.829	74.7	0.085	69.9	0.579	-16.5
700.00	0.306	179.5	2.483	68.7	0.096	68.7	0.577	-17.1
800.00	0.313	174.1	2.232	64.8	0.111	68.7	0.584	-19.8
900.00	0.323	169.9	1.961	60.5	0.120	70.1	0.587	-22.1
1000.00	0.346	165.4	1.794	56.7	0.132	68.4	0.577	-26.1
1100.00	0.370	160.2	1.652	53.9	0.144	70.0	0.570	-29.0
1200.00	0.380	153.6	1.552	49.4	0.153	69.0	0.552	-31.9
1300.00	0.386	149.0	1.479	45.4	0.170	69.0	0.540	-34.2
1400.00	0.391	146.0	1.346	41.8	0.177	69.0	0.529	-36.5
1500.00	0.410	143.2	1.259	36.9	0.191	67.6	0.529	-39.1
1600.00	0.430	140.6	1.181	36.5	0.201	70.2	0.523	-42.4
1700.00	0.448	136.2	1.100	34.0	0.215	69.1	0.520	-46.2
1800.00	0.466	132.8	1.094	32.5	0.236	70.4	0.509	-50.6
1900.00	0.475	129.9	1.047	29.7	0.253	68.8	0.499	-54.5
2000.00	0.490	127.0	1.034	24.9	0.273	66.3	0.487	-58.6

$V_{CE} = 5\text{ V}$, $I_c = 3\text{ mA}$

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.787	-43.0	8.019	143.8	0.035	70.1	0.923	-12.5
200.00	0.606	-72.3	6.026	121.4	0.051	60.3	0.810	-16.8
300.00	0.465	-93.7	4.568	105.8	0.065	54.3	0.729	-19.4
400.00	0.389	-109.3	3.640	97.1	0.073	56.6	0.695	-18.9
500.00	0.345	-122.8	3.081	89.6	0.080	55.6	0.656	-18.8
600.00	0.320	-136.0	2.658	84.8	0.091	58.7	0.656	-19.4
700.00	0.302	-147.7	2.367	77.6	0.099	58.1	0.647	-19.6
800.00	0.294	-157.5	2.144	73.1	0.112	59.3	0.653	-22.0
900.00	0.291	-165.6	1.897	67.7	0.119	61.4	0.653	-23.7
1000.00	0.301	-173.4	1.743	63.4	0.130	60.8	0.641	-27.4
1100.00	0.313	178.4	1.610	60.2	0.139	62.8	0.633	-29.9
1200.00	0.319	170.0	1.520	55.3	0.149	62.3	0.612	-32.4
1300.00	0.320	164.0	1.447	51.3	0.164	62.4	0.599	-34.4
1400.00	0.324	159.7	1.326	47.2	0.168	62.6	0.587	-36.3
1500.00	0.343	155.9	1.244	42.4	0.181	61.8	0.586	-38.3
1600.00	0.363	151.9	1.172	41.6	0.187	64.8	0.581	-41.1
1700.00	0.379	146.5	1.100	38.9	0.200	64.2	0.579	-44.7
1800.00	0.396	142.2	1.095	37.0	0.216	65.9	0.568	-48.3
1900.00	0.406	138.7	1.054	34.0	0.233	65.1	0.560	-51.7
2000.00	0.421	135.5	1.043	29.1	0.250	63.0	0.547	-55.3

 $V_{CE} = 5\text{ V}$, $I_c = 10\text{ mA}$

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.487	-77.7	13.538	122.2	0.024	64.1	0.785	-16.2
200.00	0.346	-113.2	8.008	101.9	0.035	63.2	0.681	-14.7
300.00	0.290	-134.4	5.559	90.9	0.048	63.6	0.638	-14.8
400.00	0.275	-148.3	4.216	84.6	0.057	67.6	0.626	-14.1
500.00	0.275	-158.7	3.396	78.8	0.067	68.0	0.606	-14.1
600.00	0.280	-168.6	2.974	76.0	0.080	70.5	0.613	-15.0
700.00	0.284	-176.9	2.610	70.2	0.090	69.6	0.612	-15.5
800.00	0.291	177.1	2.347	66.4	0.104	70.0	0.620	-17.9
900.00	0.302	172.6	2.065	62.0	0.112	71.2	0.625	-20.1
1000.00	0.324	167.8	1.884	58.2	0.124	69.8	0.616	-23.9
1100.00	0.346	162.2	1.734	55.5	0.134	71.3	0.608	-26.5
1200.00	0.358	155.4	1.630	51.2	0.143	70.7	0.590	-29.1
1300.00	0.364	150.7	1.548	47.3	0.159	71.0	0.579	-31.1
1400.00	0.369	147.6	1.410	43.7	0.165	71.1	0.568	-33.0
1500.00	0.389	144.8	1.320	38.9	0.179	70.0	0.569	-35.2
1600.00	0.408	142.0	1.236	38.5	0.189	72.6	0.564	-38.1
1700.00	0.427	137.5	1.153	35.9	0.203	71.5	0.563	-41.8
1800.00	0.445	134.0	1.147	34.3	0.222	73.1	0.553	-45.6
1900.00	0.455	131.1	1.102	31.7	0.238	71.7	0.545	-49.1
2000.00	0.470	128.3	1.089	26.5	0.258	69.2	0.533	-52.9

$V_{CE} = 10\text{ V}$, $I_C = 3\text{ mA}$

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.799	-40.5	7.976	145.0	0.030	71.8	0.937	-10.9
200.00	0.618	-68.1	6.066	122.9	0.046	60.5	0.836	-14.6
300.00	0.471	-88.5	4.643	107.4	0.057	56.0	0.763	-17.0
400.00	0.390	-103.5	3.710	98.6	0.065	57.7	0.733	-16.5
500.00	0.340	-116.4	3.144	91.1	0.073	57.3	0.695	-16.5
600.00	0.311	-129.5	2.719	86.4	0.083	60.3	0.698	-17.0
700.00	0.290	-141.4	2.419	79.2	0.090	60.1	0.690	-17.0
800.00	0.278	-151.6	2.194	74.7	0.103	61.0	0.698	-19.3
900.00	0.273	-160.3	1.941	69.4	0.108	63.5	0.699	-20.8
1000.00	0.280	-168.7	1.782	65.1	0.118	62.7	0.689	-24.4
1100.00	0.291	-177.4	1.644	61.8	0.127	65.1	0.679	-26.7
1200.00	0.296	173.6	1.551	57.0	0.136	64.9	0.657	-28.9
1300.00	0.298	167.4	1.474	53.0	0.149	65.0	0.646	-30.4
1400.00	0.302	162.8	1.350	49.0	0.153	65.7	0.633	-32.0
1500.00	0.321	158.6	1.269	44.3	0.165	65.0	0.637	-33.7
1600.00	0.340	154.4	1.197	43.5	0.172	67.9	0.631	-36.1
1700.00	0.357	148.7	1.124	40.9	0.184	67.7	0.632	-39.3
1800.00	0.374	144.1	1.117	39.1	0.201	69.6	0.624	-42.5
1900.00	0.385	140.4	1.077	36.0	0.214	68.9	0.616	-45.6
2000.00	0.399	137.1	1.064	31.0	0.230	66.7	0.606	-48.7

 $V_{CE} = 10\text{ V}$, $I_C = 10\text{ mA}$

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.507	-71.4	13.698	124.2	0.022	69.9	0.816	-14.2
200.00	0.348	-104.2	8.229	103.6	0.032	65.4	0.719	-13.1
300.00	0.279	-124.9	5.731	92.4	0.044	64.5	0.678	-13.3
400.00	0.254	-139.4	4.348	86.2	0.054	68.8	0.669	-12.6
500.00	0.249	-150.8	3.504	80.2	0.062	68.1	0.647	-12.5
600.00	0.251	-161.6	3.083	77.6	0.074	71.4	0.657	-13.3
700.00	0.254	-170.8	2.710	71.8	0.083	70.4	0.656	-13.6
800.00	0.261	-177.6	2.436	68.1	0.096	70.8	0.665	-15.9
900.00	0.271	177.0	2.141	63.7	0.103	72.0	0.669	-17.8
1000.00	0.292	171.7	1.953	60.0	0.114	70.8	0.661	-21.4
1100.00	0.314	165.4	1.798	57.3	0.123	72.8	0.654	-23.7
1200.00	0.324	158.4	1.691	52.9	0.132	72.2	0.634	-26.0
1300.00	0.332	153.5	1.604	49.1	0.147	72.8	0.625	-27.7
1400.00	0.338	150.0	1.461	45.6	0.151	72.8	0.613	-29.3
1500.00	0.358	147.1	1.369	40.9	0.165	72.1	0.618	-30.9
1600.00	0.378	144.0	1.282	40.4	0.174	75.1	0.613	-33.4
1700.00	0.397	139.5	1.201	38.0	0.187	74.3	0.615	-36.7
1800.00	0.415	135.8	1.188	36.4	0.205	75.8	0.607	-39.8
1900.00	0.426	132.7	1.147	33.4	0.219	74.6	0.599	-43.1
2000.00	0.442	129.9	1.130	28.6	0.238	72.4	0.589	-46.4