

RF AMPLIFIER FOR UHF TV TUNER  
NPN SILICON EPITAXIAL TRANSISTOR  
SUPER MINI MOLD

DESCRIPTION

The 2SC4183 is specifically designed for UHF RF amplifier applications. The 2SC4183 features high gain, low noise, and excellent forward AGC characteristics in tiny plastic super mini mold package makes it suitable for use in small type equipments such as Hybrid Integrated Circuit and other applications.

FEATURES

- Low NF and high  $G_{pb}$   
 $NF = 3.0 \text{ dB Typ.}$   
 $G_{pb} = 10 \text{ dB Typ. (} f = 900 \text{ MHz)}$
- Forward AGC characteristics.

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

Collector to Base Voltage	$V_{CB0}$	30	V
Collector to Emitter Voltage	$V_{CE0}$	25	V
Emitter to Base Voltage	$V_{EB0}$	3.0	V
Collector Current	$I_C$	20	mA
Total Power Dissipation	$P_T$	160	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

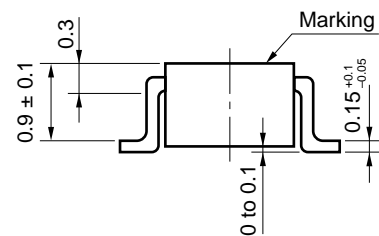
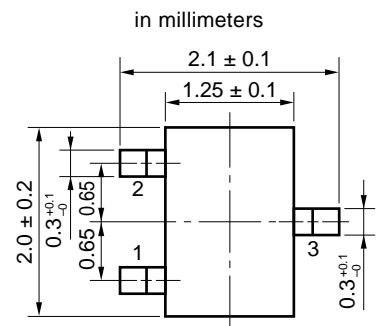
ELECTRICAL CHARACTERISTICS ( $T_A = 25 \text{ }^\circ\text{C}$ )

Characteristics	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Collector Cutoff Current	$I_{CB0}$			0.1	$\mu\text{A}$	$V_{CB} = 10 \text{ V, } I_E = 0$
DC Current Gain	$h_{FE}$	60	100	240		$V_{CE} = 5 \text{ V, } I_C = 2 \text{ mA}$
Gain Bandwidth Product	$f_T$	700	1 000		MHz	$V_{CE} = 5 \text{ V, } I_C = 2 \text{ mA}$
Output Capacitance	$C_{ob}$		0.55	1.0	pF	$V_{CB} = 5 \text{ V, } I_E = 0$
Noise Figure	NF		3.0	4.8	dB	$V_{CE} = 5 \text{ V, } I_C = 2 \text{ mA, } f = 900 \text{ MHz}$
Power Gain	$G_{pb}$	6	10		dB	$V_{CE} = 5 \text{ V, } I_C = 2 \text{ mA, } f = 900 \text{ MHz}$
Collector Saturation Voltage	$V_{CE(sat)}$			0.5	V	$I_C = 10 \text{ mA, } I_B = 1 \text{ mA}$

$h_{FE}$  Classification

Rank	U16	U17	U18
Marking	U16	U17	U18
$h_{FE}$	60 to 120	90 to 180	120 to 240

PACKAGE DIMENSIONS

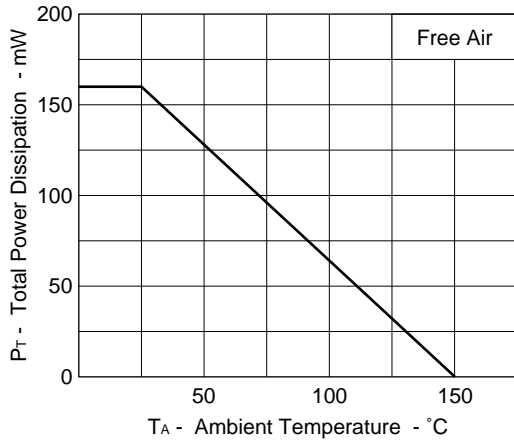


PIN CONNECTIONS

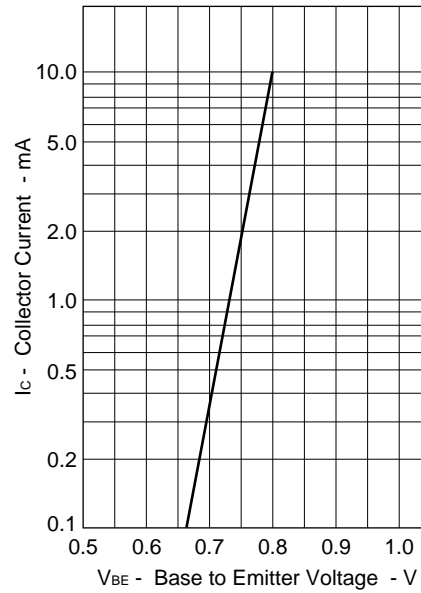
1. Emitter
2. Base
3. Collector

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

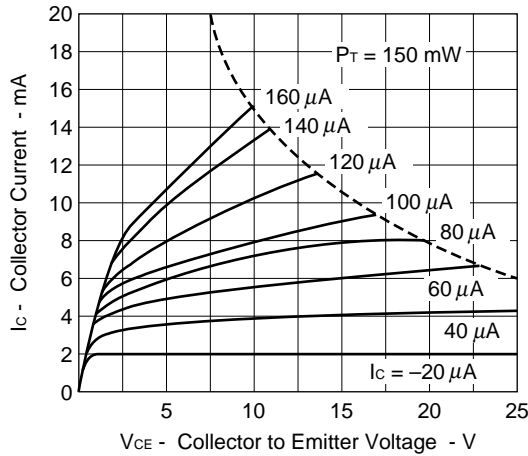
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



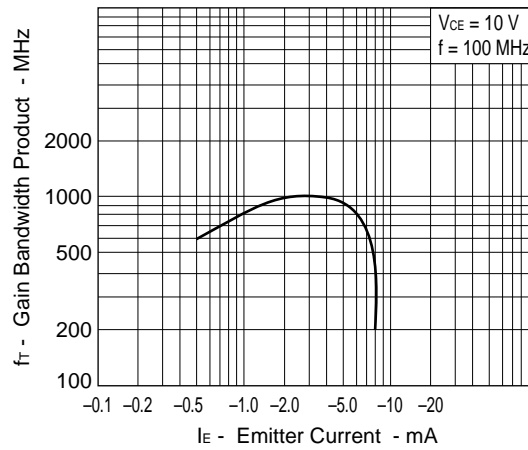
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



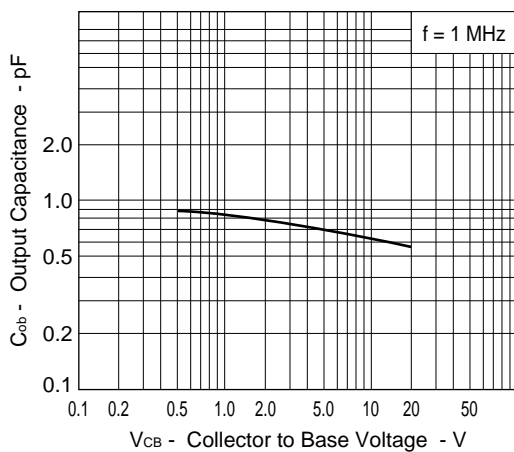
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



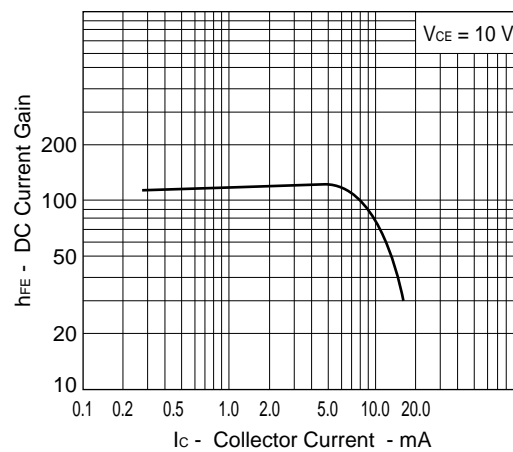
GAIN BANDWIDTH PRODUCT vs. EMITTER CURRENT



OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



DC CURRENT GAIN vs. COLLECTOR CURRENT



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	0.575	-92.0	4.073	116.3	0.022	51.5	0.899	-5.2
200.00	0.423	-131.1	2.321	97.1	0.027	47.1	0.871	-5.1
300.00	0.368	-153.0	1.613	85.9	0.033	49.1	0.846	-6.7
400.00	0.358	-167.3	1.206	78.4	0.036	54.8	0.845	-6.8
500.00	0.361	-178.5	0.973	71.7	0.042	57.0	0.817	-6.9
600.00	0.363	171.3	0.835	67.1	0.048	62.1	0.827	-7.8
700.00	0.364	162.1	0.726	60.4	0.053	63.3	0.823	-7.8
800.00	0.366	156.1	0.655	55.1	0.060	65.2	0.830	-9.8
900.00	0.369	151.5	0.570	51.0	0.066	67.9	0.826	-10.9
1000.00	0.391	147.0	0.516	46.3	0.073	68.2	0.812	-14.0
1100.00	0.410	142.0	0.473	44.4	0.078	70.4	0.794	-15.0
1200.00	0.418	135.4	0.440	39.8	0.085	70.6	0.760	-16.4
1300.00	0.424	130.5	0.415	36.3	0.094	71.2	0.746	-16.4
1400.00	0.427	126.9	0.370	33.3	0.097	72.1	0.723	-16.4
1500.00	0.440	124.0	0.344	29.3	0.106	71.4	0.729	-16.5
1600.00	0.452	120.9	0.313	30.7	0.112	74.0	0.715	-16.9
1700.00	0.465	117.3	0.289	29.5	0.119	73.2	0.716	-18.9
1800.00	0.475	114.4	0.279	30.8	0.129	75.3	0.707	-19.6
1900.00	0.484	111.8	0.265	29.8	0.137	74.1	0.686	-21.3
2000.00	0.500	109.3	0.256	28.6	0.148	71.8	0.672	-22.3

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	0.796	176.6	0.023	29.2	0.018	23.3	0.733	-2.1
200.00	0.791	171.0	0.023	33.5	0.020	33.2	0.727	-2.6
300.00	0.797	166.9	0.026	43.5	0.024	40.6	0.715	-4.0
400.00	0.798	163.7	0.028	51.8	0.027	54.1	0.714	-4.1
500.00	0.820	158.7	0.032	60.4	0.031	59.5	0.697	-4.2
600.00	0.824	153.7	0.036	66.8	0.036	67.7	0.706	-4.8
700.00	0.813	147.1	0.042	71.9	0.042	71.5	0.707	-4.8
800.00	0.805	143.9	0.050	74.9	0.049	75.1	0.712	-6.5
900.00	0.782	141.4	0.055	78.6	0.054	79.3	0.710	-7.6
1000.00	0.817	138.4	0.064	79.2	0.064	79.6	0.699	-10.3
1100.00	0.833	135.3	0.070	82.7	0.071	81.9	0.684	-11.2
1200.00	0.831	129.2	0.079	82.8	0.077	82.6	0.657	-12.3
1300.00	0.829	125.1	0.089	83.5	0.088	83.6	0.645	-12.0
1400.00	0.814	122.1	0.094	83.8	0.094	83.8	0.628	-11.8
1500.00	0.819	119.6	0.105	82.3	0.106	82.9	0.633	-11.7
1600.00	0.823	116.8	0.113	85.0	0.113	84.7	0.624	-11.9
1700.00	0.826	113.3	0.123	84.6	0.123	83.3	0.626	-13.7
1800.00	0.822	110.5	0.134	84.3	0.134	84.7	0.619	-14.2
1900.00	0.826	108.1	0.144	82.4	0.143	82.9	0.601	-15.8
2000.00	0.835	105.6	0.155	79.8	0.155	80.3	0.590	-16.7

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	0.782	-59.3	7.097	135.7	0.023	67.0	0.926	-7.7
200.00	0.586	-96.5	4.886	112.4	0.030	48.9	0.854	-8.1
300.00	0.472	-122.1	3.532	97.9	0.036	44.9	0.811	-8.7
400.00	0.422	-140.6	2.807	89.3	0.038	49.4	0.801	-7.6
500.00	0.401	-155.4	2.271	82.0	0.042	50.8	0.774	-6.9
600.00	0.391	-168.4	1.928	77.4	0.046	56.1	0.785	-7.0
700.00	0.384	-179.9	1.686	70.3	0.049	58.1	0.784	-6.5
800.00	0.383	171.8	1.510	65.5	0.055	62.1	0.794	-8.0
900.00	0.384	165.4	1.314	60.5	0.059	66.4	0.794	-8.8
1000.00	0.405	159.1	1.188	56.1	0.066	67.4	0.785	-11.5
1100.00	0.426	152.4	1.083	53.1	0.071	70.6	0.771	-12.3
1200.00	0.433	144.6	1.004	48.2	0.076	71.5	0.743	-13.4
1300.00	0.438	138.9	0.950	43.9	0.085	73.3	0.733	-13.2
1400.00	0.439	134.7	0.847	40.2	0.089	74.8	0.716	-13.0
1500.00	0.455	131.2	0.789	35.0	0.098	74.8	0.726	-13.1
1600.00	0.469	127.6	0.722	35.1	0.104	78.0	0.718	-13.4
1700.00	0.484	123.2	0.667	32.2	0.112	77.4	0.723	-15.5
1800.00	0.496	119.6	0.647	31.2	0.123	79.4	0.718	-16.1
1900.00	0.506	116.4	0.614	28.5	0.132	78.2	0.700	-18.0
2000.00	0.522	113.3	0.593	24.5	0.143	76.4	0.691	-19.1

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	0.729	178.0	0.076	54.1	0.011	31.5	0.847	-2.4
200.00	0.730	171.9	0.038	45.2	0.014	41.6	0.839	-3.1
300.00	0.740	167.5	0.031	47.4	0.017	52.0	0.822	-5.0
400.00	0.745	164.1	0.027	54.1	0.020	64.3	0.822	-5.4
500.00	0.766	159.0	0.029	62.9	0.023	71.4	0.797	-5.6
600.00	0.772	153.8	0.031	74.6	0.029	81.6	0.807	-6.6
700.00	0.763	147.3	0.036	81.3	0.034	85.3	0.805	-6.6
800.00	0.757	144.0	0.045	84.6	0.042	88.4	0.811	-8.6
900.00	0.738	141.5	0.049	89.4	0.048	91.6	0.807	-9.8
1000.00	0.771	138.4	0.058	89.6	0.057	91.2	0.794	-12.8
1100.00	0.789	135.2	0.064	93.1	0.065	93.3	0.776	-13.8
1200.00	0.789	129.1	0.073	92.5	0.072	93.6	0.743	-15.0
1300.00	0.789	125.0	0.083	93.5	0.083	94.6	0.729	-15.0
1400.00	0.775	121.9	0.090	94.1	0.090	94.6	0.707	-14.9
1500.00	0.782	119.3	0.102	92.0	0.102	93.0	0.712	-14.9
1600.00	0.787	116.5	0.110	94.2	0.110	94.1	0.700	-15.2
1700.00	0.791	113.0	0.121	92.9	0.121	92.1	0.702	-17.1
1800.00	0.789	110.2	0.132	92.2	0.132	93.1	0.693	-17.6
1900.00	0.793	107.8	0.142	90.3	0.141	90.7	0.673	-19.3
2000.00	0.804	105.3	0.153	87.7	0.154	88.1	0.661	-20.3

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	0.822	-48.8	7.517	141.7	0.021	67.7	0.947	-6.9
200.00	0.630	-82.1	5.516	119.0	0.028	54.9	0.877	-7.9
300.00	0.492	-106.6	4.122	103.7	0.035	49.8	0.829	-8.8
400.00	0.420	-125.1	3.247	94.5	0.037	52.1	0.818	-7.7
500.00	0.385	-140.6	2.722	87.1	0.040	52.4	0.788	-6.9
600.00	0.365	-154.9	2.325	82.5	0.044	58.0	0.799	-6.8
700.00	0.351	-167.7	2.046	75.2	0.047	59.4	0.799	-6.2
800.00	0.346	-177.4	1.838	70.4	0.053	62.9	0.809	-7.5
900.00	0.347	174.8	1.608	65.1	0.055	67.3	0.810	-8.3
1000.00	0.363	167.3	1.460	60.5	0.062	68.2	0.802	-10.8
1100.00	0.382	159.7	1.330	57.4	0.066	71.9	0.789	-11.6
1200.00	0.389	151.2	1.242	52.5	0.071	73.3	0.762	-12.6
1300.00	0.392	145.0	1.167	48.1	0.080	75.4	0.754	-12.2
1400.00	0.396	140.4	1.046	44.4	0.084	76.9	0.737	-12.1
1500.00	0.413	136.7	0.978	38.9	0.093	77.1	0.751	-12.1
1600.00	0.429	132.8	0.901	38.8	0.098	80.5	0.744	-12.4
1700.00	0.446	128.0	0.835	35.6	0.106	79.9	0.753	-14.6
1800.00	0.461	124.2	0.815	34.2	0.116	82.3	0.750	-15.1
1900.00	0.471	120.8	0.776	31.1	0.124	81.3	0.732	-17.0
2000.00	0.488	117.5	0.752	26.5	0.136	79.4	0.724	-18.3

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	0.548	-170.0	0.710	84.2	0.009	55.6	0.930	-2.0
200.00	0.564	177.7	0.341	67.9	0.012	63.9	0.925	-3.0
300.00	0.577	171.6	0.218	57.1	0.015	67.5	0.907	-5.3
400.00	0.590	167.1	0.151	51.7	0.018	79.0	0.909	-5.7
500.00	0.610	161.5	0.116	48.8	0.023	82.7	0.879	-6.2
600.00	0.620	155.9	0.096	50.6	0.028	89.0	0.892	-7.3
700.00	0.618	149.2	0.082	51.5	0.034	90.7	0.887	-7.4
800.00	0.615	145.5	0.077	55.3	0.042	93.8	0.895	-9.5
900.00	0.607	142.8	0.070	62.0	0.047	95.9	0.890	-10.7
1000.00	0.637	139.7	0.071	66.2	0.056	95.0	0.875	-13.9
1100.00	0.656	136.1	0.071	73.1	0.063	96.1	0.856	-15.0
1200.00	0.661	130.0	0.075	76.3	0.069	97.0	0.819	-16.3
1300.00	0.664	125.7	0.082	80.9	0.080	97.8	0.803	-16.3
1400.00	0.658	122.6	0.086	83.9	0.086	97.9	0.780	-16.4
1500.00	0.667	119.9	0.095	84.9	0.098	96.1	0.786	-16.5
1600.00	0.676	117.1	0.102	89.0	0.105	97.5	0.772	-16.9
1700.00	0.684	113.5	0.113	89.6	0.116	95.4	0.773	-18.9
1800.00	0.686	110.6	0.123	90.6	0.127	96.2	0.765	-19.5
1900.00	0.692	108.2	0.132	89.2	0.136	94.0	0.744	-21.2
2000.00	0.706	105.7	0.144	87.6	0.148	91.6	0.731	-22.2

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