NEC

SILICON TRANSISTOR
2SC4568

NPN SILICON EPITAXIAL TRANSISTOR
UHF TV TUNER OSC/MIXER

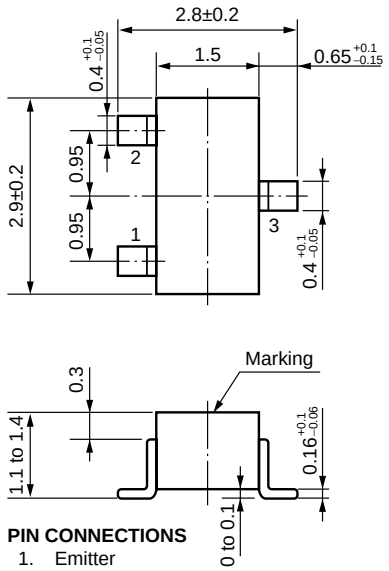
DESCRIPTION

The 2SC4568 is an NPN silicon epitaxial transistor intended for use as UHF oscillator and UHF mixer in a tuner of TV receiver.

FEATURES

- High gain bandwidth product
  f_T = 5.5 GHz TYP.
- Low output capacitance
  C_{ob} = 0.7 pF TYP.
- Surface mount package
  EIAJ: SC-59

PACKAGE DIMENSIONS
(Units: mm)



PIN CONNECTIONS
1. Emitter
2. Base
3. Collector

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Maximum Voltages and Current			
Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	12	V
Emitter to Base Voltage	V_{EBO}	3.0	V
Collector Current	I_C	30	mA
Total Power Dissipation	P_T	150	mW
Junction Temperature	T_j	125	°C
Storage Temperature	T_{stg}	–55 to +125	°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			0.1	μA	V_{CB} = 15 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			0.1	μA	V_{EB} = 1 V, I_C = 0
Collector Saturation Voltage	$V_{CE(sat)}$			0.5	V	h_{FE} = 10, I_C = 5 mA
DC Current Gain	h_{FE}	40	100	200		V_{CE} = 5 V, I_C = 5 mA ***1**
Gain Bandwidth Product	f_T		5.5		GHz	V_{CE} = 5 V, I_C = 5 mA, f = 1.0 GHz
Output Capacitance	C_{ob}		0.7	0.9	pF	V_{CB} = 5 V, I_E = 0, f = 1.0 MHz
Insertion Gain	$\|S_{21e}\|^2$	5.0			dB	V_{CE} = 5 V, I_C = 5 mA, f = 1.0 MHz

***1** Pulsed: PW = 35 μS, Duty Cycle ≤ 2 %

h_{FE} Classification

Class	T72	T73	T74
Marking	T72	T73	T74
h_{FE}	40 to 80	60 to 120	100 to 200

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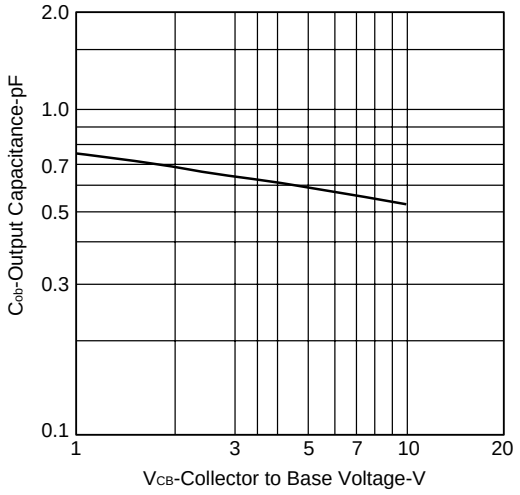
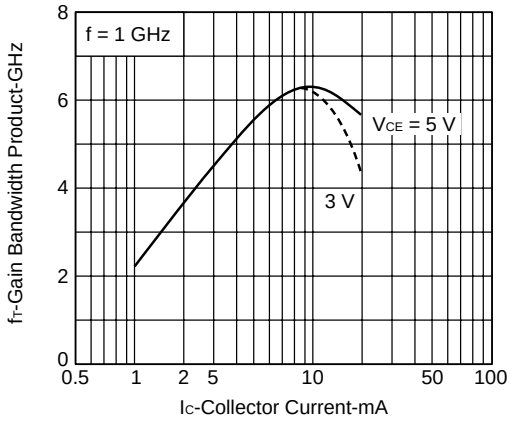
TYPICAL CHARACTERISTICS (T_A = 25 °C)

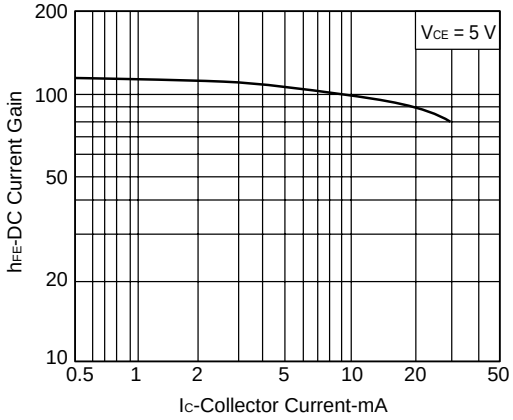
OUTPUT CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT



S-PARAMETER

V_{CE} = 5 V, I_C = 1 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.957	−12.8	3.310	168.1	0.029	81.2	0.988	−5.9
200.00	0.930	−24.4	3.179	157.0	0.056	74.9	0.958	−12.1
300.00	0.878	−35.6	3.059	145.0	0.080	67.6	0.933	−18.2
400.00	0.832	−46.7	2.887	136.0	0.100	61.6	0.900	−22.2
500.00	0.777	−56.0	2.712	127.0	0.117	56.7	0.858	−26.4
600.00	0.714	−64.8	2.533	118.1	0.130	51.7	0.823	−30.8
700.00	0.656	−73.6	2.397	111.0	0.140	49.2	0.791	−33.4
800.00	0.611	−81.2	2.231	104.1	0.150	46.1	0.764	−36.1
900.00	0.570	−89.3	2.109	97.9	0.156	43.6	0.751	−38.5
1000.00	0.537	−96.4	1.962	91.9	0.163	42.3	0.722	−40.5

V_{CE} = 5 V, I_C = 3 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.870	−21.3	9.155	160.5	0.028	77.3	0.957	−11.3
200.00	0.783	−39.1	8.201	143.7	0.050	68.7	0.875	−20.9
300.00	0.671	−54.8	7.205	129.5	0.067	62.2	0.795	−28.0
400.00	0.563	−67.6	6.242	119.2	0.079	58.6	0.722	−31.7
500.00	0.506	−77.9	5.428	110.5	0.090	55.8	0.660	−34.9
600.00	0.433	−86.6	4.760	102.8	0.098	54.0	0.617	−37.7
700.00	0.390	−94.9	4.261	96.9	0.107	54.2	0.584	−38.8
800.00	0.349	−103.4	3.829	91.5	0.116	53.8	0.558	−40.2
900.00	0.316	−111.1	3.505	86.5	0.123	53.7	0.546	−41.7
1000.00	0.294	−116.3	3.207	82.2	0.131	53.4	0.525	−42.7

V_{CE} = 5 V, I_C = 5 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.787	−27.6	13.507	154.8	0.026	75.7	0.928	−15.2
200.00	0.661	−49.1	11.261	135.2	0.045	66.7	0.798	−25.7
300.00	0.529	−66.0	9.283	120.5	0.059	61.6	0.695	−32.1
400.00	0.441	−79.3	7.647	110.8	0.070	59.5	0.618	−34.3
500.00	0.374	−88.9	6.458	103.1	0.079	59.4	0.563	−36.5
600.00	0.313	−98.4	5.530	96.5	0.088	59.1	0.525	−38.0
700.00	0.284	−105.7	4.900	91.2	0.098	60.0	0.500	−38.6
800.00	0.252	−114.2	4.351	86.7	0.107	59.9	0.481	−39.6
900.00	0.232	−122.5	3.956	82.3	0.118	59.7	0.473	−40.7
1000.00	0.211	−126.6	3.596	78.5	0.127	59.7	0.457	−41.4

V_{CE} = 5 V, I_C = 7 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.723	−33.0	16.785	150.2	0.024	70.3	0.897	−18.0
200.00	0.569	−56.4	13.165	129.2	0.041	65.3	0.739	−28.5
300.00	0.437	−73.6	10.387	115.0	0.055	63.3	0.623	−33.6
400.00	0.361	−86.7	8.359	106.1	0.064	62.3	0.559	−34.8
500.00	0.302	−96.7	6.939	99.0	0.073	62.4	0.510	−36.1
600.00	0.252	−106.5	5.917	92.9	0.083	61.9	0.481	−37.1
700.00	0.232	−114.4	5.178	88.3	0.095	62.9	0.460	−37.6
800.00	0.204	−122.2	4.589	84.1	0.103	62.8	0.445	−38.2
900.00	0.189	−131.3	4.150	80.2	0.115	63.2	0.439	−39.5
1000.00	0.175	−136.0	3.774	76.6	0.126	62.7	0.427	−40.3

V_{CE} = 5 V, I_C = 9 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.662	−37.3	19.267	146.4	0.024	75.4	0.870	−20.1
200.00	0.497	−62.6	14.383	124.9	0.038	66.2	0.693	−30.0
300.00	0.374	−80.6	11.350	111.3	0.050	63.6	0.587	−33.9
400.00	0.307	−93.7	8.733	102.8	0.061	64.5	0.522	−34.3
500.00	0.254	−103.1	7.194	96.4	0.075	64.5	0.479	−34.9
600.00	0.213	−114.0	6.093	90.7	0.081	64.9	0.455	−36.0
700.00	0.197	−121.0	5.331	86.4	0.092	65.2	0.438	−36.1
800.00	0.178	−129.0	4.702	82.5	0.103	65.0	0.426	−36.9
900.00	0.170	−138.2	4.243	78.7	0.113	64.9	0.421	−38.0
1000.00	0.156	−144.1	3.866	75.4	0.125	64.6	0.410	−39.1

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