

## NPN SILICON RF TRANSISTOR FOR HIGH-FREQUENCY LOW DISTORTION AMPLIFIER 4-PIN POWER MINIMOLD

### FEATURES

- Low distortion:  $IM_2 = 59.0$  dB TYP.,  $IM_3 = 82.0$  dB TYP. @  $V_{CE} = 10$  V,  $I_C = 50$  mA
- Low noise  
 $NF = 1.5$  dB TYP. @  $V_{CE} = 10$  V,  $I_C = 10$  mA,  $f = 500$  MHz  
 $NF = 2.0$  dB TYP. @  $V_{CE} = 10$  V,  $I_C = 10$  mA,  $f = 1$  GHz
- 4-pin power minimold package with improved gain from the 2SC3356

### ★ ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5337	25 pcs (Non reel)	• Magazine case
2SC5337-T1	1 kpcs/reel	• 12 mm wide embossed taping • Collector face the perforation side of the tape

**Remark** To order evaluation samples, consult your NEC sales representative.  
Unit sample quantity is 25 pcs.

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

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	$V_{CBO}$	30	V
Collector to Emitter Voltage	$V_{CEO}$	15	V
Emitter to Base Voltage	$V_{EBO}$	3.0	V
Collector Current	$I_C$	250	mA
Total Power Dissipation	$P_{tot}^{Note}$	2.0	W
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

**Note** Mounted on  $16\text{ cm}^2 \times 0.7\text{ mm}$  (t) ceramic substrate (Copper plating)

**Because this product uses high-frequency technology, avoid excessive static electricity, etc.**

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = +25°C)**

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 20 V, I <sub>E</sub> = 0 mA	–	0.01	5.0	μA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>BE</sub> = 2 V, I <sub>C</sub> = 0 mA	–	0.03	5.0	μA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA	40	120	200	–
RF Characteristics						
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, f = 1 GHz	7.0	8.3	–	dB
Noise Figure (1)	N <sub>F</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, f = 500 MHz	–	1.5	3.5	dB
Noise Figure (2)	N <sub>F</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, f = 1 GHz	–	2.0	3.5	dB
2nd Order Intermodulation Distortion	IM <sub>2</sub>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, R <sub>S</sub> = R <sub>L</sub> = 75 Ω, V <sub>in</sub> = 105 dBμV/75 Ω, f <sub>1</sub> = 190 MHz, f <sub>2</sub> = 90 MHz, f = f <sub>1</sub> – f <sub>2</sub>	–	59.0	–	dB
3rd Order Intermodulation Distortion	IM <sub>3</sub>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, R <sub>S</sub> = R <sub>L</sub> = 75 Ω, V <sub>in</sub> = 105 dBμV/75 Ω, f <sub>1</sub> = 190 MHz, f <sub>2</sub> = 200 MHz, f = 2 × f <sub>1</sub> – f <sub>2</sub>	–	82.0	–	dB

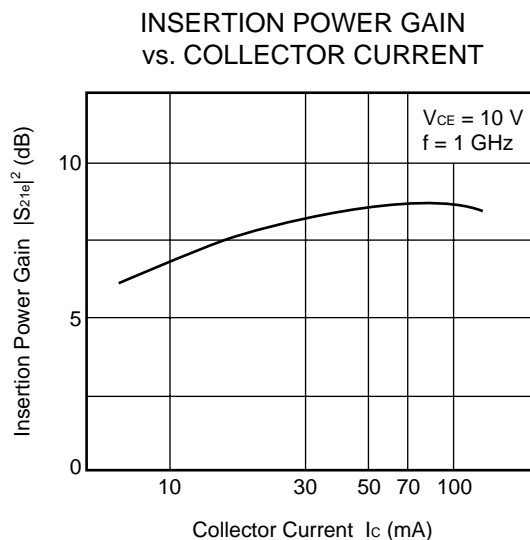
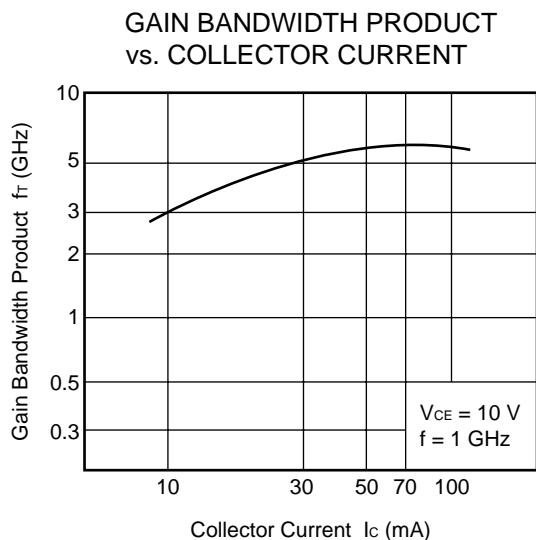
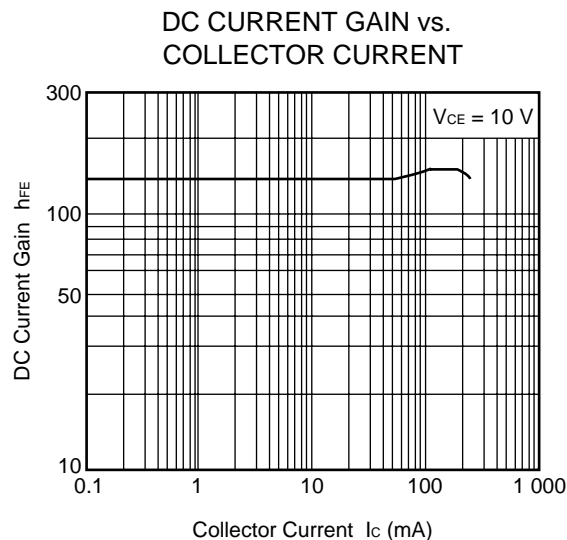
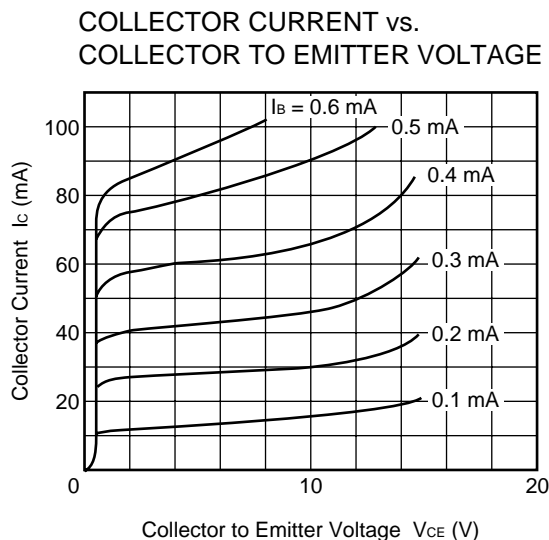
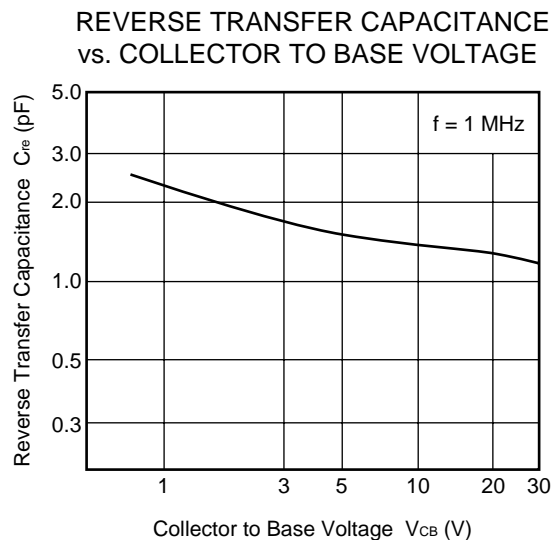
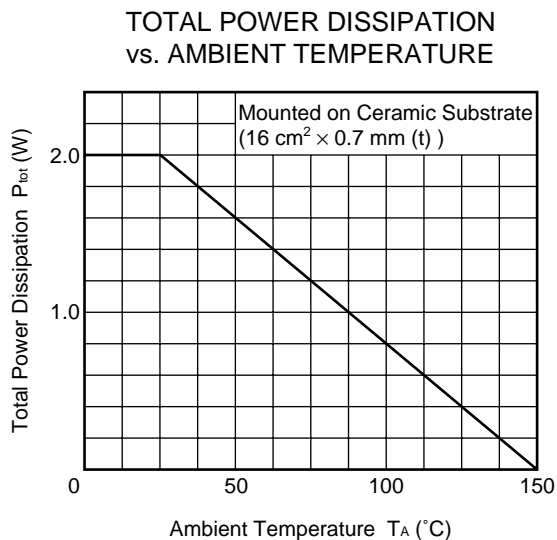
**Notes 1.** Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

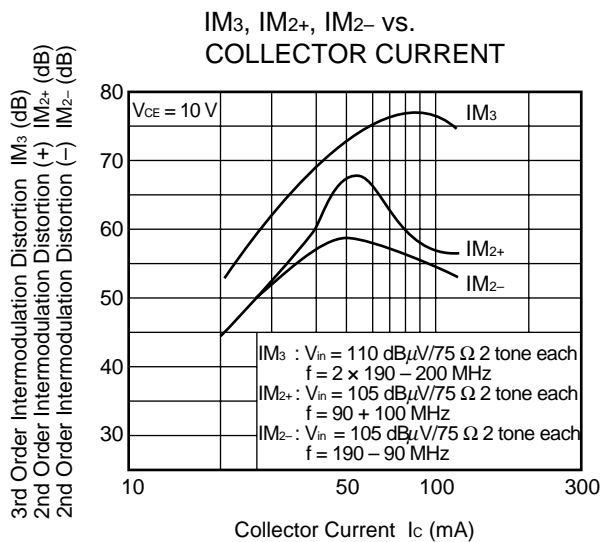
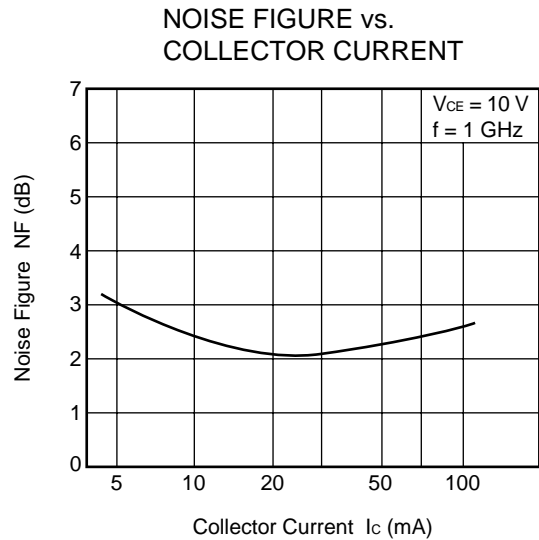
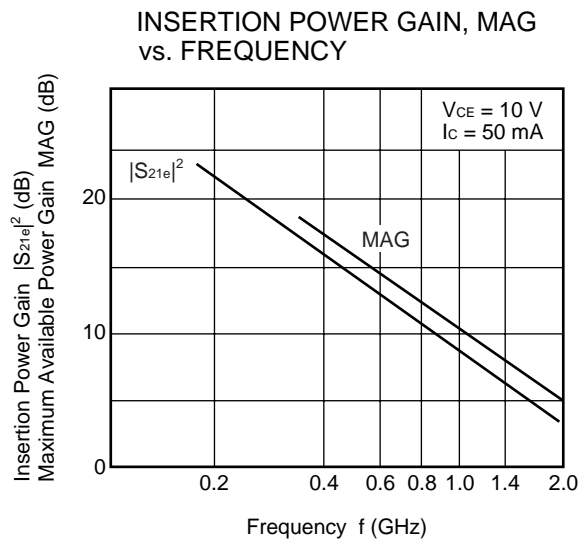
**2.** R<sub>S</sub> = R<sub>L</sub> = 50 Ω, tuned

**h<sub>FE</sub> CLASSIFICATION**

Rank	QQ	QR	QS
Marking	QQ	QR	QS
h <sub>FE</sub> Value	40 to 80	60 to 120	100 to 200

★ TYPICAL CHARACTERISTICS (Unless otherwise specified,  $T_A = +25^\circ\text{C}$ )





**Remark** The graphs indicate nominal characteristics.

# S-PARAMETERS

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 50 mA

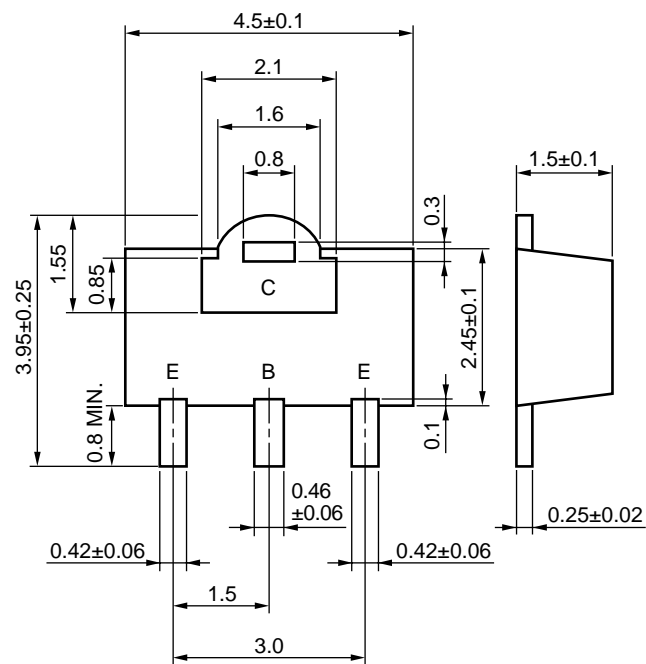
Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.592	-136.6	24.447	108.4	0.030	50.5	0.465	-95.2
0.2	0.577	-160.0	12.746	96.5	0.042	57.4	0.335	-123.0
0.3	0.566	-168.5	8.591	91.2	0.055	67.3	0.276	-130.1
0.4	0.558	-174.0	6.438	87.2	0.066	70.8	0.269	-132.7
0.5	0.554	-177.5	5.160	84.1	0.083	68.6	0.262	-134.5
0.6	0.542	-179.4	4.312	82.3	0.095	70.6	0.262	-139.1
0.7	0.527	177.9	3.729	80.9	0.112	71.2	0.251	-133.4
0.8	0.519	175.8	3.292	78.7	0.123	74.6	0.252	-132.9
0.9	0.509	174.4	2.983	77.7	0.136	75.0	0.252	-124.6
1.0	0.514	171.0	2.759	76.6	0.151	75.3	0.257	-125.3
1.1	0.498	166.8	2.648	75.4	0.166	75.8	0.278	-118.4
1.2	0.494	167.3	2.665	71.3	0.180	74.7	0.306	-120.2
1.3	0.487	161.7	2.478	63.0	0.194	75.9	0.314	-124.2
1.4	0.467	160.4	2.177	60.1	0.216	74.7	0.273	-124.0
1.5	0.477	157.4	1.973	57.9	0.230	74.9	0.281	-123.2
1.6	0.471	154.5	1.815	57.2	0.240	73.2	0.291	-120.2
1.7	0.467	152.5	1.754	55.3	0.260	72.9	0.316	-118.7
1.8	0.469	151.3	1.639	54.4	0.273	70.5	0.312	-123.1
1.9	0.465	149.1	1.568	53.4	0.285	69.9	0.316	-125.5
2.0	0.468	147.0	1.475	52.6	0.289	69.3	0.323	-126.3

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 100 mA

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.564	-146.0	24.857	105.3	0.019	50.2	0.284	-116.1
0.2	0.586	-165.8	12.845	94.5	0.026	59.6	0.204	-129.9
0.3	0.576	-171.9	8.681	89.7	0.041	73.2	0.199	-138.7
0.4	0.561	-176.3	6.541	86.3	0.048	77.8	0.200	-140.1
0.5	0.550	179.9	5.209	83.5	0.060	81.4	0.196	-137.0
0.6	0.540	178.2	4.358	82.2	0.069	82.0	0.182	-137.6
0.7	0.538	175.7	3.772	80.6	0.086	84.2	0.216	-131.0
0.8	0.521	174.6	3.332	78.4	0.099	85.1	0.210	-130.5
0.9	0.510	173.2	3.037	77.0	0.113	85.4	0.222	-122.2
1.0	0.524	168.5	2.780	76.9	0.119	83.5	0.198	-120.1
1.1	0.502	165.2	2.680	75.3	0.136	86.8	0.213	-114.9
1.2	0.489	165.9	2.718	72.3	0.156	83.5	0.246	-114.9
1.3	0.488	161.1	2.578	63.0	0.177	85.5	0.251	-122.8
1.4	0.472	157.9	2.213	58.7	0.184	81.8	0.209	-127.2
1.5	0.480	155.3	2.012	57.8	0.194	85.3	0.252	-114.1
1.6	0.470	153.4	1.846	57.2	0.219	82.2	0.242	-117.6
1.7	0.465	151.1	1.745	56.5	0.235	82.4	0.240	-112.9
1.8	0.464	149.5	1.677	54.9	0.248	79.0	0.263	-121.9
1.9	0.460	147.9	1.571	53.3	0.249	78.6	0.281	-120.0
2.0	0.466	146.0	1.514	52.3	0.264	77.4	0.276	-124.0

## ★ PACKAGE DIMENSIONS

#### 4-PIN POWER MINIMOLD (UNIT: mm)



## PIN CONNECTIONS

E: Emitter  
C: Collector  
B: Base

[MEMO]

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