DATA SHEET

NEC

SILICON TRANSISTOR
2SC3357

NPN SILICON EPITAXIAL TRANSISTOR
POWER MINI MOLD

DESCRIPTION

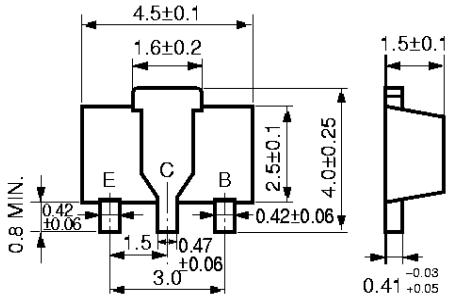
The 2SC3357 is an NPN silicon epitaxial transistor designed for low noise amplifier at VHF, UHF and CATV band.

It has large dynamic range and good current characteristic.

FEATURES

- Low Noise and High Gain
  NF = 1.1 dB TYP., G_a = 8.0 dB TYP. @V_{CE} = 10 V,
  I_C = 7 mA, f = 1.0 GHz
  NF = 1.8 dB TYP., G_a = 9.0 dB TYP. @V_{CE} = 10 V,
  I_C = 40 mA, f = 1.0 GHz
- Large P_T in Small Package
  P_T : 2 W with 16 cm^2 × 0.7 mm Ceramic Substrate.

PACKAGE DIMENSIONS
(Unit: mm)



Term, Connection
E : Emitter
C : Collector (Fin)
B : Base
(SOT-89)

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

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	100	mA
Total Power Dissipation	P_T*	1.2	W
Thermal Resistance	$R_{th(j-a)}$*	62.5	°C/W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	−65 to +150	°C

* mounted on 16 cm^2 × 0.7 mm Ceramic Substrate

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			1.0	μA	V_{CB} = 10 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			1.0	μA	V_{EB} = 1.0 V, I_C = 0
DC Current Gain	h_{FE}*	50	120	300		V_{CE} = 10 V, I_C = 20 mA
Gain Bandwidth Product	f_T		6.5		GHz	V_{CE} = 10 V, I_C = 20 mA
Feed-Back Capacitance	C_{re}**		0.65	1.0	pF	V_{CB} = 10 V, I_E = 0, f = 1.0 MHz
Insertion Power Gain	$\|S_{21e}\|^2$		9		dB	V_{CE} = 10 V, I_C = 20 mA, f = 1.0 GHz
Noise Figure	NF		1.1		dB	V_{CE} = 10 V, I_C = 7 mA, f = 1.0 GHz
Noise Figure	NF		1.8	3.0	dB	V_{CE} = 10 V, I_C = 40 mA, f = 1.0 GHz

* Pulse Measurement PW ≤ 350 μs, Duty Cycle ≤ 2 %

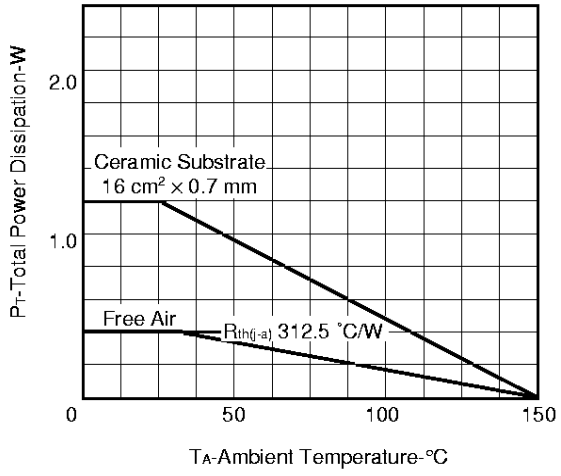
** The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitnace bridge.

h_{FE} Classification

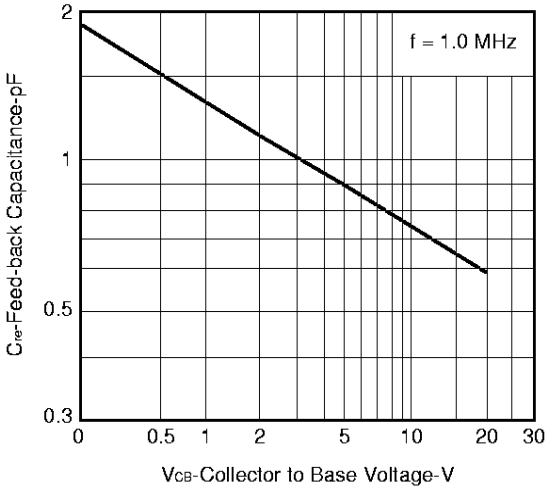
Class	RH	RF	RE
Marking	RH	RF	RE
h_{FE}	50 to 100	80 to 160	125 to 250

TYPICAL CHARACTERISTICS (T_A = 25 °C)

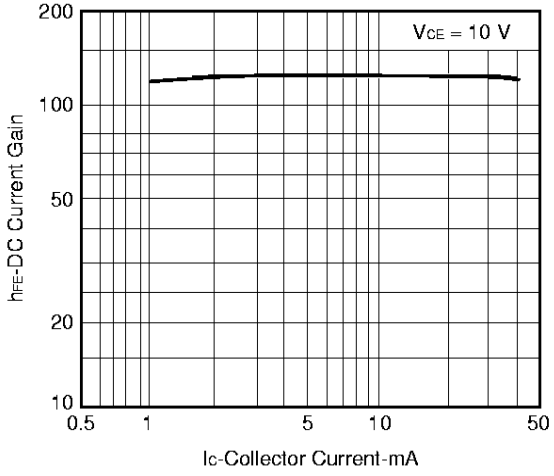
TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE



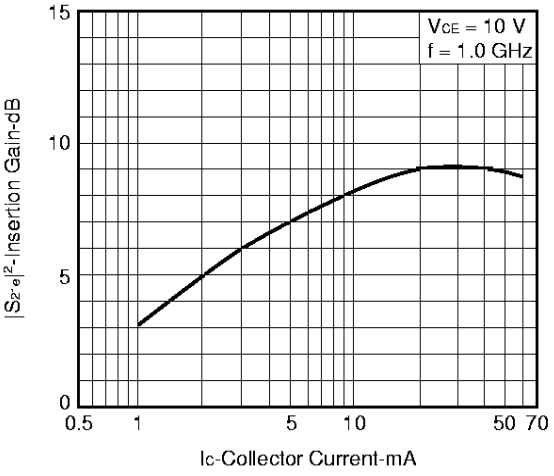
FEED-BACK CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



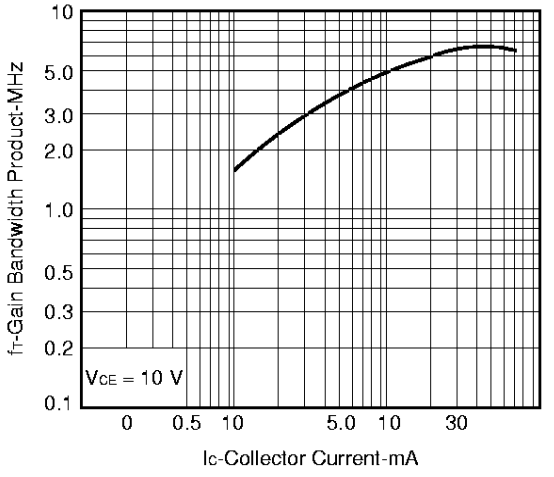
DC CURRENT GAIN vs.
COLLECTOR CURRENT



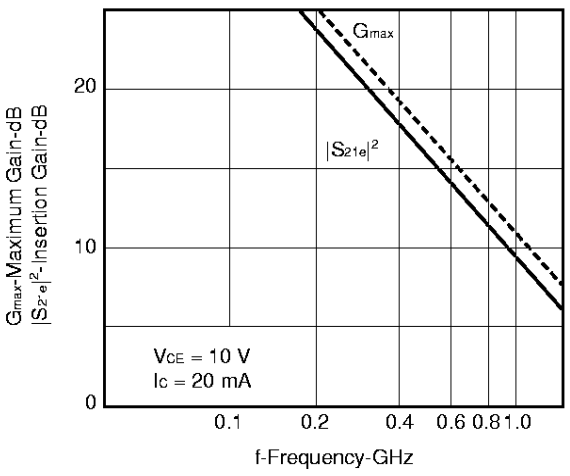
INSERTION GAIN vs.
COLLECTOR CURRENT



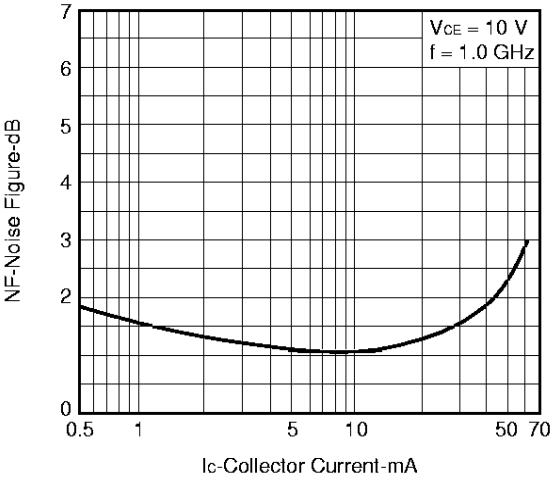
GAIN BANDWIDTH PROUDCT vs.
COLLECTOR CURRENT



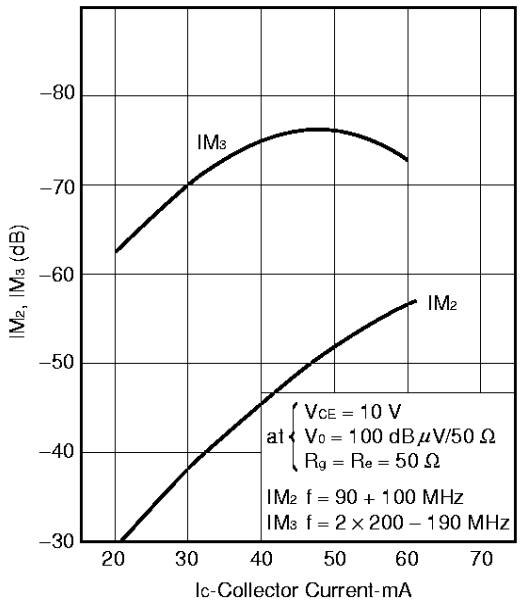
INSERTION GAIN, MAXIMUM GAIN
vs. FREQUENCY



NOISE FIGURE vs.
COLLECTOR CURRENT



INTERMODULATION DISTORTION vs.
COLLECTOR CURRENT



S-PARAMETER

V_{CE} = 10 V, I_C = 40 mA, Z_O = 50 Ω

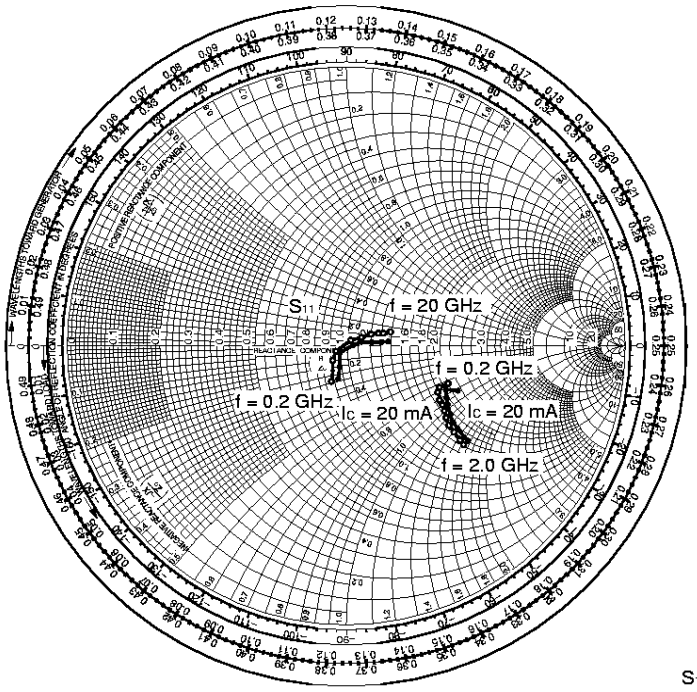
f (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.196	−94.4	13.023	102.4	0.043	74.5	0.444	−21.1
400	0.103	−118.3	6.852	89.2	0.081	77.4	0.398	−25.3
600	0.056	−131.1	4.632	78.3	0.118	77.5	0.399	−26.9
800	0.024	−43.7	3.527	75.9	0.152	78.0	0.414	−28.9
1000	0.008	−2.0	2.854	68.7	0.188	78.4	0.440	−33.5
1200	0.039	13.1	2.421	65.7	0.218	75.7	0.461	−33.3
1400	0.072	11.8	2.118	59.0	0.255	71.7	0.479	−36.3
1600	0.102	9.6	1.887	57.1	0.278	73.1	0.499	−35.5
1800	0.129	8.6	1.681	52.5	0.308	71.3	0.515	−38.8
2000	0.151	9.8	1.579	51.4	0.339	71.8	0.537	−35.9

V_{CE} = 10 V, I_C = 20 mA, Z_O = 50 Ω

f (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.130	−109.2	13.430	98.1	0.042	79.0	0.403	−22.1
400	0.073	−134.1	6.930	87.2	0.081	80.6	0.382	−24.7
600	0.037	−146.6	4.690	79.4	0.119	79.4	0.392	−25.6
800	0.010	177.1	3.560	75.2	0.154	79.7	0.412	−27.1
1000	0.024	23.7	2.878	68.2	0.191	76.5	0.440	−31.9
1200	0.056	17.2	2.439	65.4	0.220	76.8	0.463	−32.3
1400	0.093	13.8	2.133	59.0	0.257	72.9	0.483	−35.7
1600	0.124	12.0	1.898	57.3	0.280	74.0	0.504	−35.3
1800	0.151	11.0	1.693	52.9	0.311	72.4	0.519	−38.4
2000	0.174	13.4	1.591	52.0	0.341	72.8	0.542	−36.3

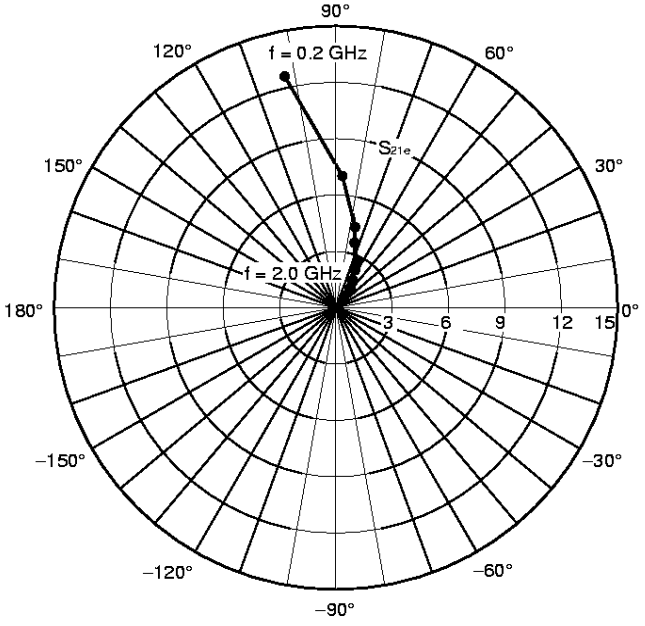
S_{11e}, S_{22e}-FREQUENCY

CONDITION V_{CE} = 10 V



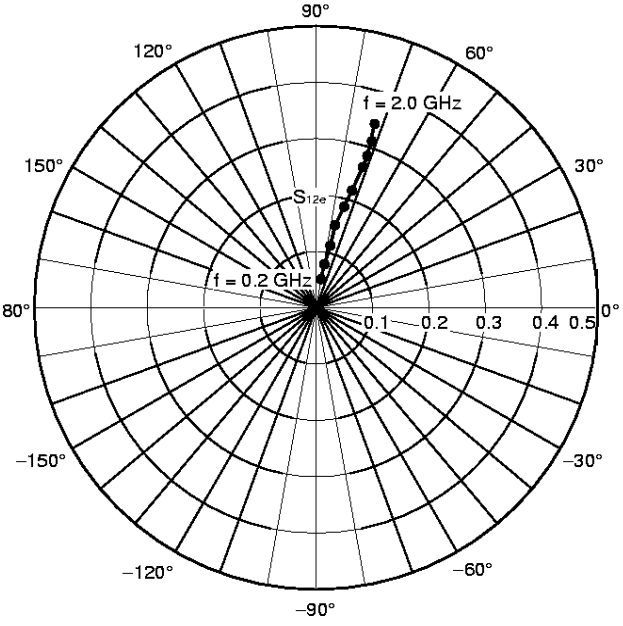
S_{21e}-FREQUENCY

CONDITION V_{CE} = 10 V
I_C = 20 mA



S_{12e}-FREQUENCY

CONDITION V_{CE} = 10 V
I_C = 20 mA



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