NEC's NPN SiGe RF TRANSISTOR FOR MEDIUM OUTPUT POWER AMPLIFICATION (800 mW) 3-PIN POWER MINIMOLD (34 PACKAGE)

NESG250134

FEATURES

- **THIS PRODUCT IS SUITABLE FOR MEDIUM OUTPUT POWER (800 mW) AMPLIFICATION**
  P_O = 29 dBm TYP. @ V_{CE} = 3.6 V, P_{in} = 15 dBm, f = 460 MHz
  P_O = 29 dBm TYP. @ V_{CE} = 3.6 V, P_{in} = 20 dBm, f = 900 MHz
- **MAXIMUM STABLE GAIN:**
  MSG = 23 dB TYP @ V_{CE} = 3.6 V, I_C = 100 mA, f = 460 MHz
- **SiGe TECHNOLOGY:**
  UHS2-HV process
- **ABSOLUTE MAXIMUM RATINGS:**
  V_{CBO} = 20 V
- **3-PIN POWER MINIMOLD (34 PACKAGE)**

ORDERING INFORMATION

PART NUMBER	ORDER NUMBER	PACKAGE	QUANTITY	SUPPLYING FORM
NESG250134-AZ	NESG250134-AZ	3-pin power minimold (Pb-Free) Note1	25 pcs (Non reel)	• 12 mm wide embossed taping • Pin 2 (Emitter) face the perforation side of the tape
NESG250134-T1-AZ	NESG250134-T1-AZ		1 kpcs/reel	

Note 1. Contains lead in the part except the electrode terminals.

Remark To order evaluation samples, contact your nearby sales office.
Unit sample quantity is 25 pcs.

ABSOLUTE MAXIMUM RATINGS (T_A =+25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	9.2	V
Emitter to Base Voltage	V_{EBO}	2.8	V
Collector Current	I_C	500	mA
Total Power Dissipation	P_{tot} Note	1.5	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	−65 to +150	°C

Note Mounted on 34.2 cm^2 × 0.8 mm (t) glass epoxy PWB

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

THERMAL RESISTANCE (T_A = 25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance from Junction to Ambient Note	$R_{th\,j\text{-}a}$	80	°C/W

Note Mounted on 34.2 cm^2 × 0.8 mm (t) glass epoxy PWB

RECOMMENDED OPERATING RANGE (T_A = 25°C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Collector to Emitter Voltage	V_{CE}	−	3.6	4.5	V
Collector Current	I_C	−	400	500	mA
Input Power Note	P_{in}	−	12	17	dBm

Note Input power under conditions of $V_{CE} \leq 4.5$ V, f = 460 MHz

ELECTRICAL CHARACHTERISTICS (T_A = 25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Characteristics						
Collector Cut-off Current	I_{CBO}	V_{CB} = 5 V, I_E = 0 mA	–	–	1	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 0.5 V, I_C = 0 mA	–	–	1	μA
DC Current Gain	h_{FE} **Note 1**	V_{CE} = 3 V, I_C = 100 mA	80	120	180	–
RF Characteristics						
Gain Bandwidth Product	f_T	V_{CE} = 3.6 V, I_C = 100 mA, f = 460 MHz	–	10	–	GHz
Insertion Power Gain	$\|S_{21e}\|^2$	V_{CE} = 3.6 V, I_C = 100 mA, f = 460 MHz	–	19	–	dB
Maximum Stable Gain	MSG **Note 2**	V_{CE} = 3.6 V, I_C = 100 mA, f = 460 MHz	–	23	–	dB
Linear gain (1)	G_L	V_{CE} = 3.6 V, $I_{C\,(set)}$ = 30 mA (RF OFF), f = 460 MHz, P_{in} = 0 dBm	16	19	–	dB
Linear gain (2)	G_L	V_{CE} = 3.6 V, $I_{C\,(set)}$ = 30 mA (RF OFF), f = 900 MHz, P_{in} = 0 dBm	–	16	–	dB
Output Power (1)	Po	V_{CE} = 3.6 V, $I_{C\,(set)}$ = 30 mA (RF OFF), f = 460 MHz, P_{in} = 15 dBm	27	29	–	dBm
Output Power (2)	Po	V_{CE} = 3.6 V, $I_{C\,(set)}$ = 30 mA (RF OFF), f = 900 MHz, P_{in} = 20 dBm	–	29	–	dBm
Collector Efficiency (1)	η_c	V_{CE} = 3.6 V, $I_{C\,(set)}$ = 30 mA (RF OFF), f = 460 MHz, P_{in} = 15 dBm	–	60	–	%
Collector Efficiency (2)	η_c	V_{CE} = 3.6 V, $I_{C\,(set)}$ = 30 mA (RF OFF), f = 900 MHz, P_{in} = 20 dBm	–	60	–	%

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

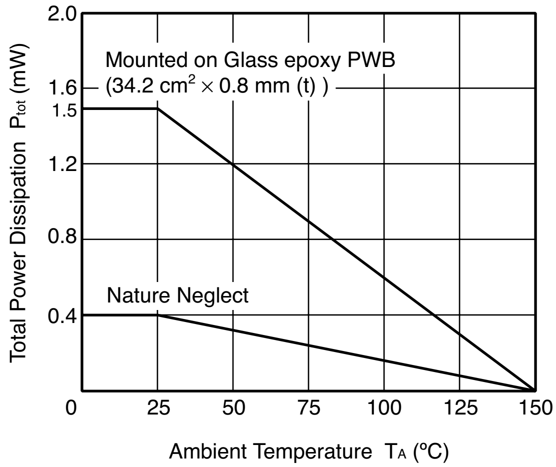
2. $MSG = \left| \frac{S_{21}}{S_{12}} \right|$

h_{FE} CLASSIFICATION

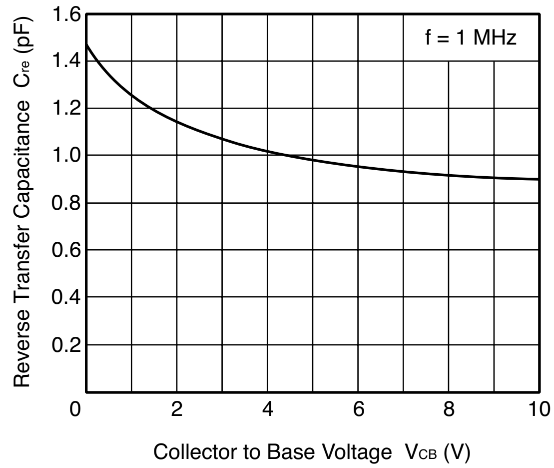
RANK	FB
Marking	SN
h_{FE} Value	80 to 180

TYPICAL CHARACHTERISTICS (TA = +25°C, unless otherwise specified)

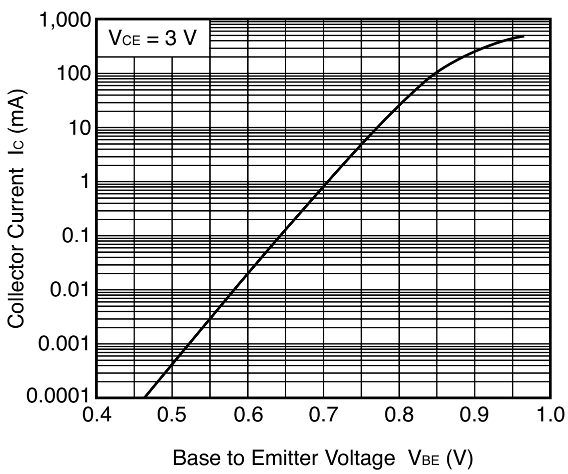
TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



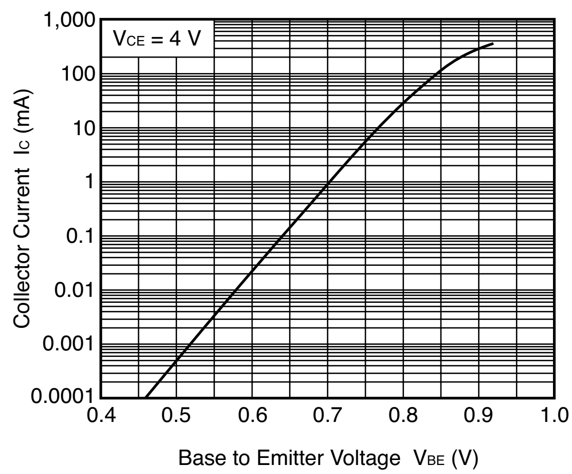
REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



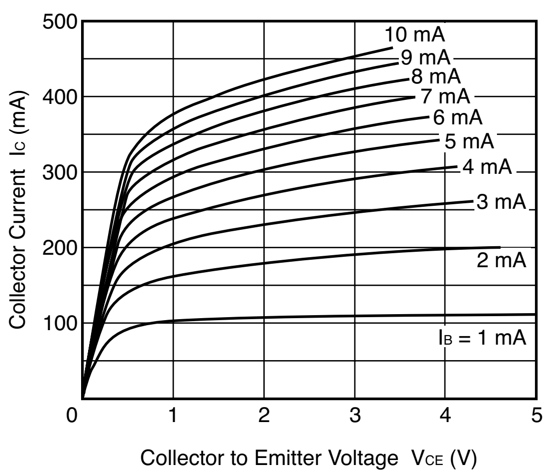
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

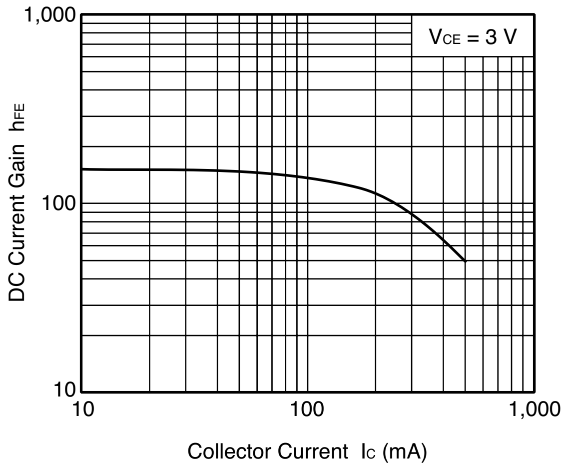


COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE

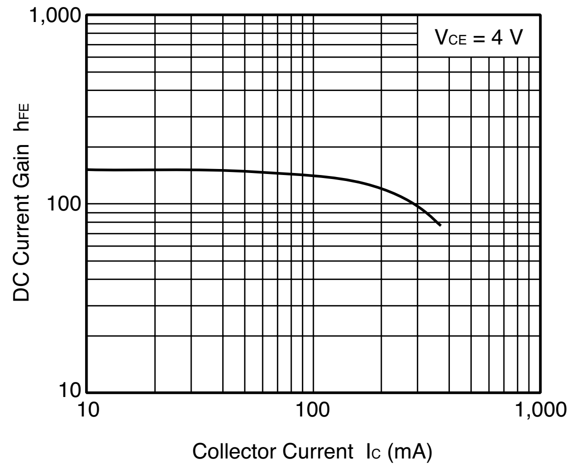


Remark The graphs indicate nominal characteristics.

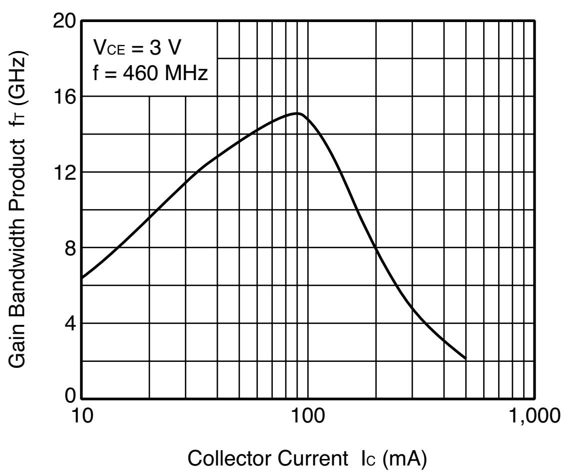
DC CURRENT GAIN vs.
COLLECTOR CURRENT



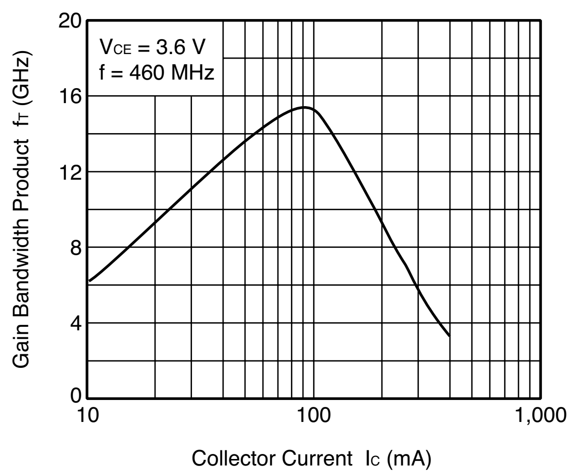
DC CURRENT GAIN vs.
COLLECTOR CURRENT



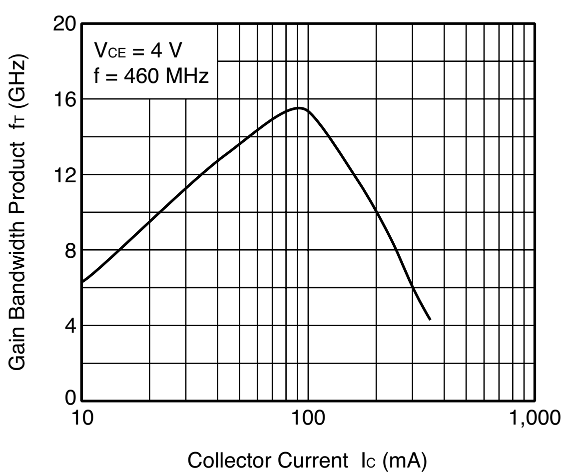
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



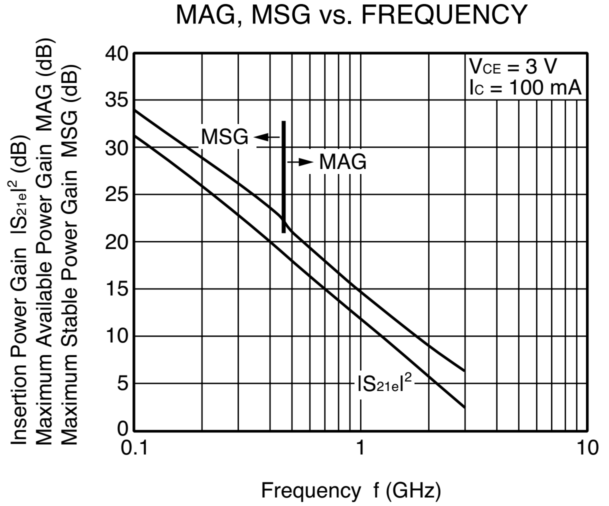
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



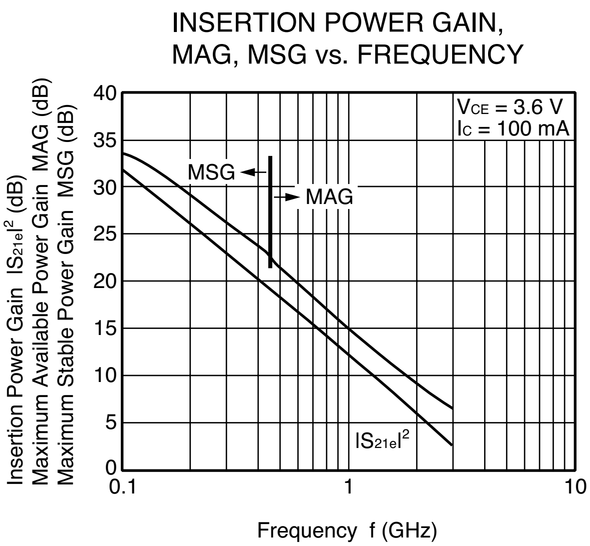
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT

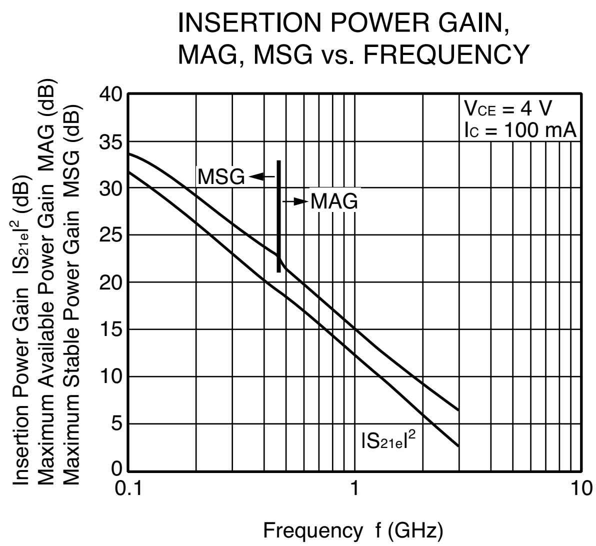


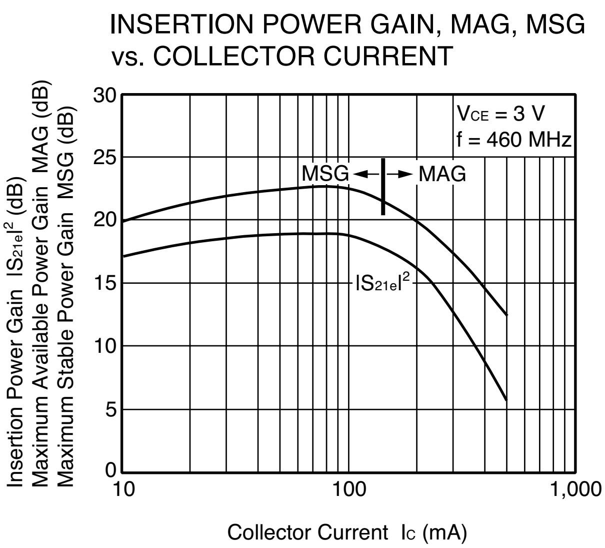
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY

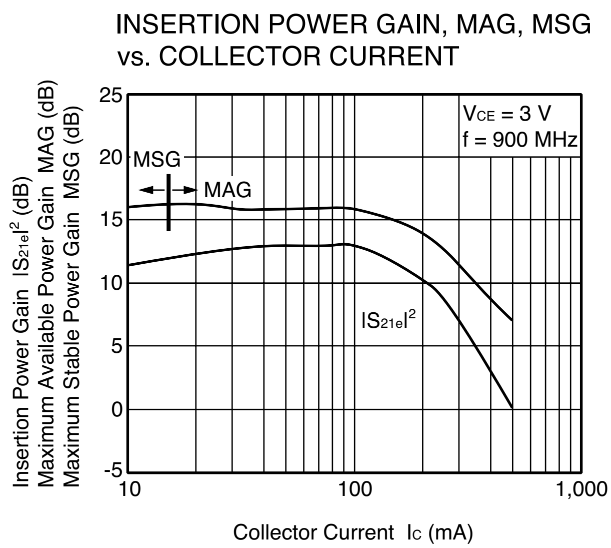


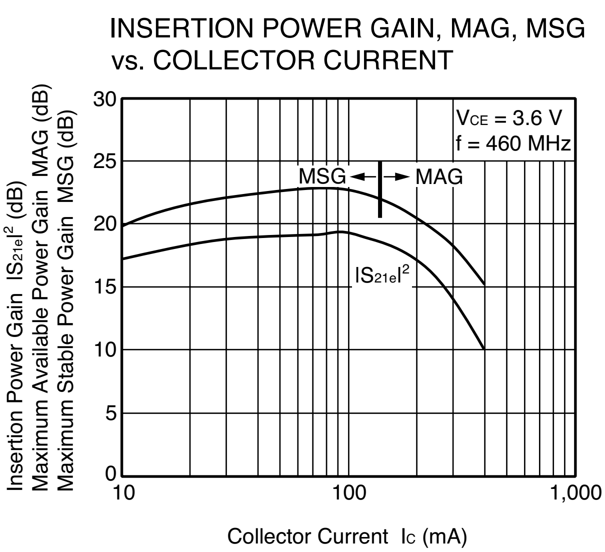
Remark The graphs indicate nominal characteristics.

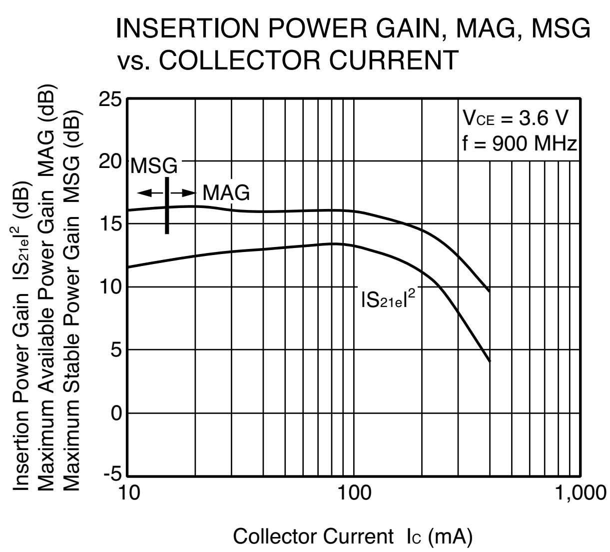






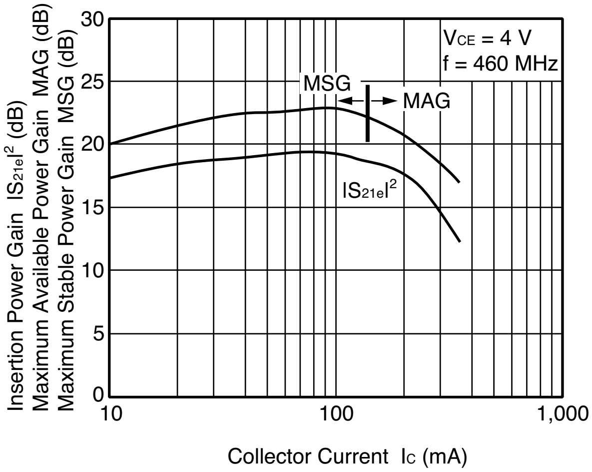




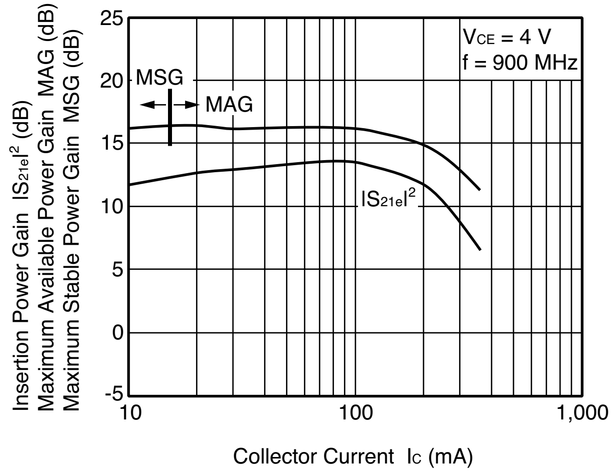


Remark The graphs indicate nominal characteristics.

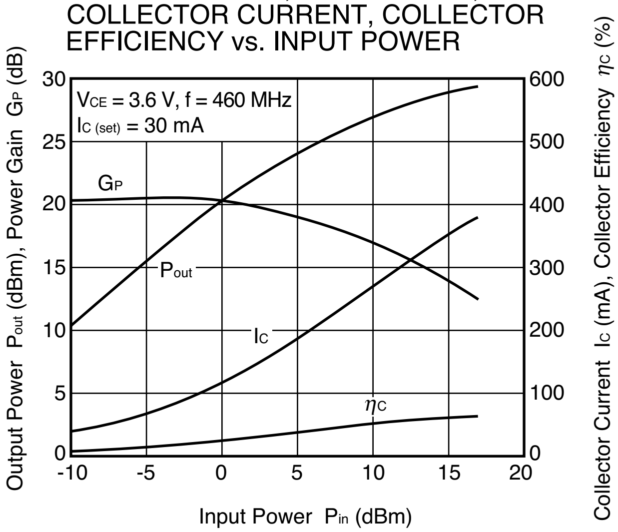
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



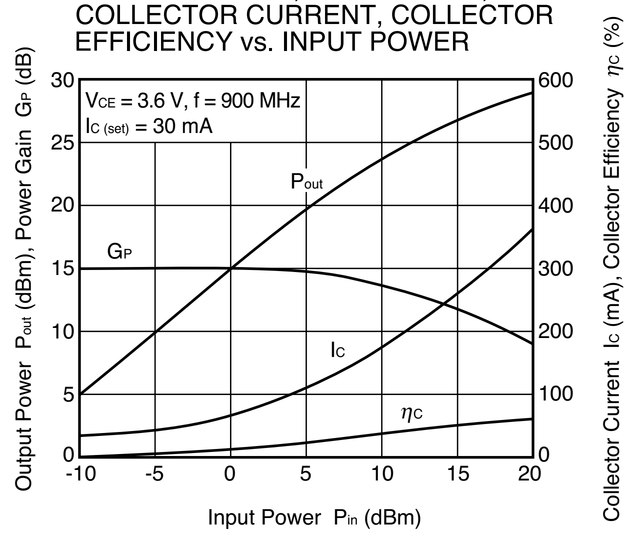
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



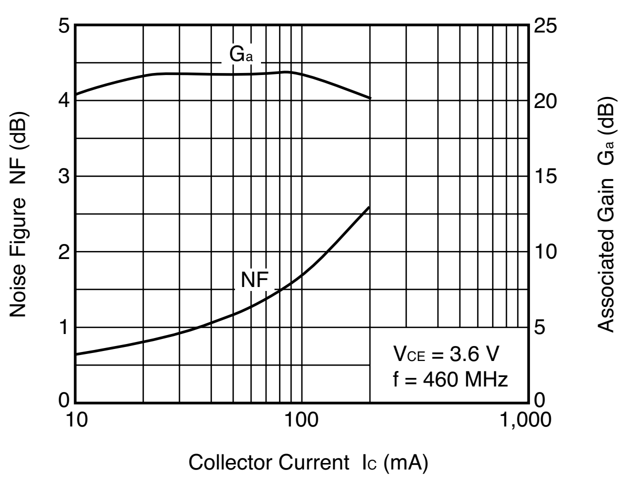
OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER

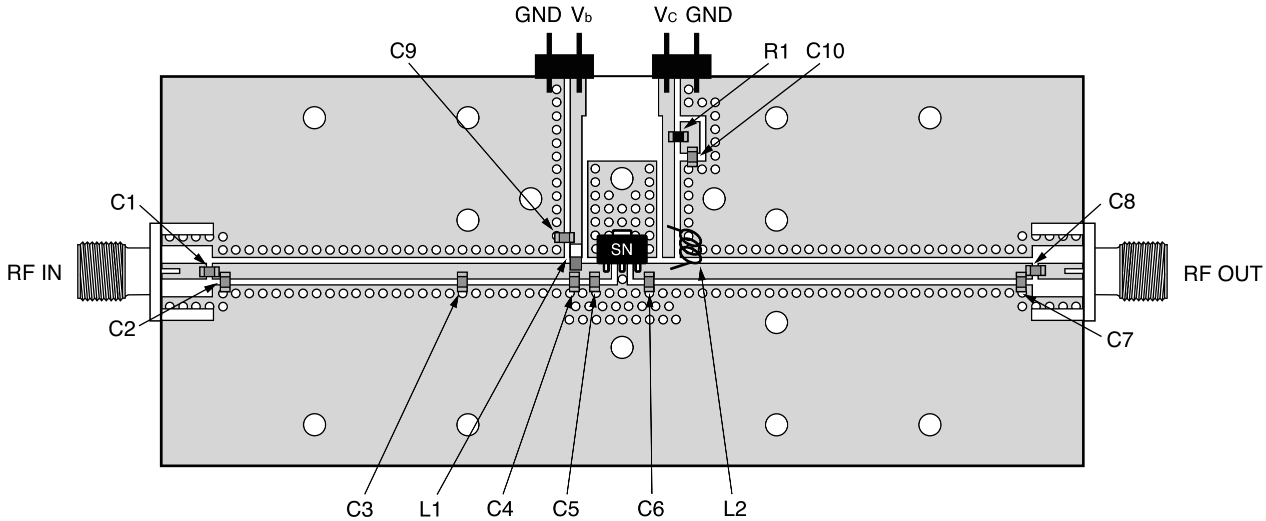


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

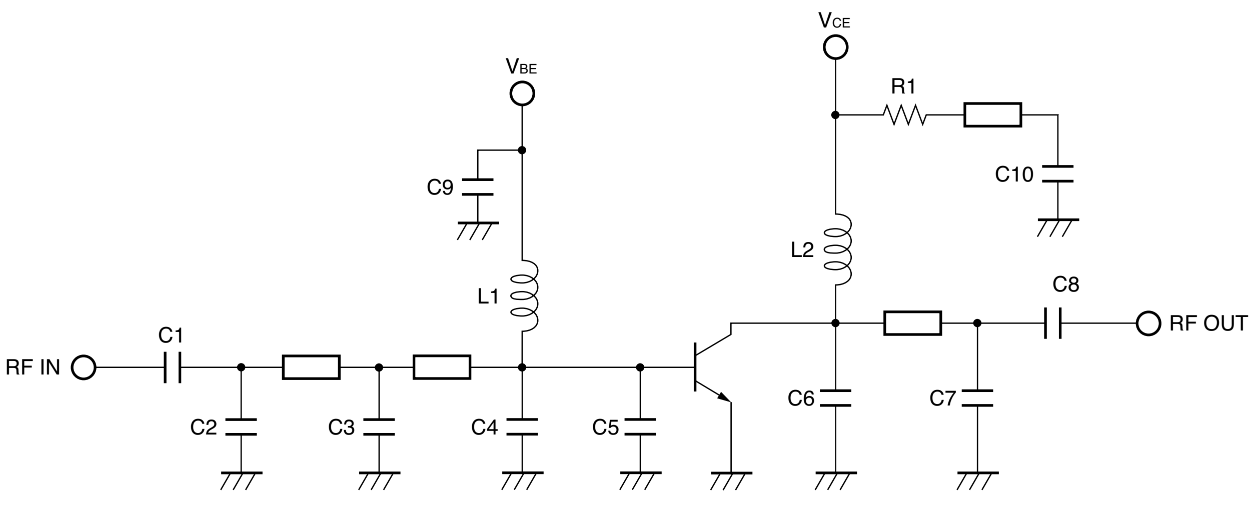
PA EVALUATION BOARD (f = 460 MHz)



Notes

1. 38 × 90 mm, t = 0.8 mm double sided copper clad glass epoxy PWB.
2. Back side: GND pattern
3. Solder gold plated on pattern
4. ∘○: Through holes

PA EVALUATION CIRCUIT (f = 460 MHz)

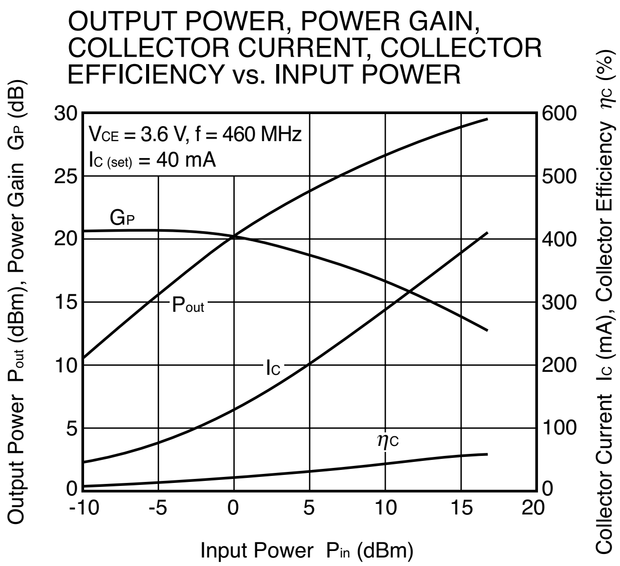


The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

COMPONENT LIST

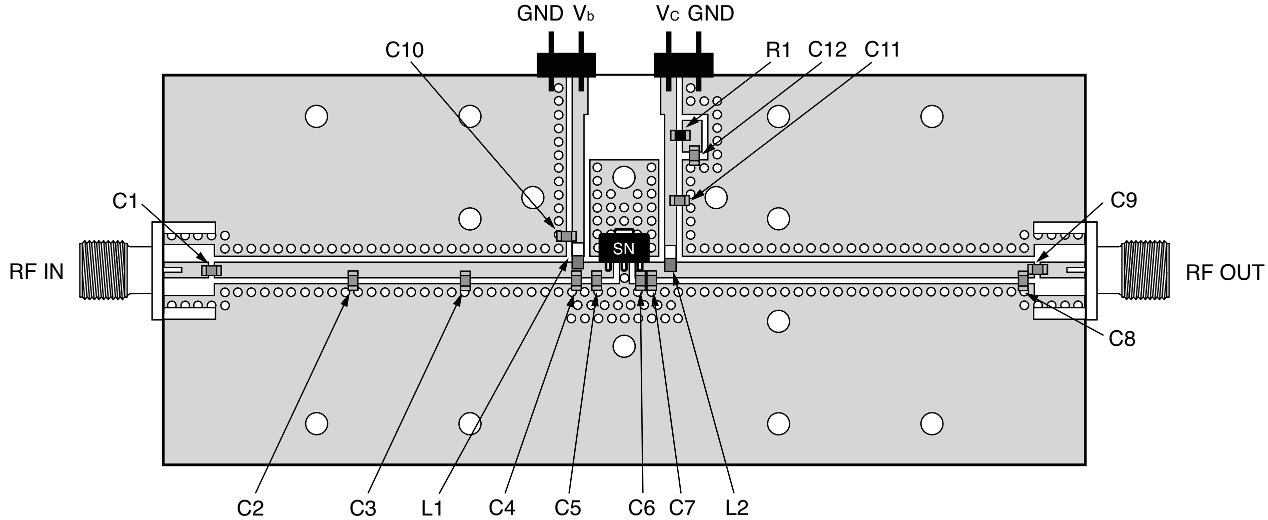
	VALUE	MAKER
C1	30 pF	Murata
C2	6 pF	Murata
C3, C4	7 pF	Murata
C5	3 pF	Murata
C6	0.5 pF	Murata
C7	5 pF	Murata
C8	10 pF	Murata
C9, C10	100 nF	Murata
L1	100 nH	Toko
L2	3 nH	Toko
R1	30 Ω	SSM

PA EVALUATION CIRCUIT TYPICAL CHARACTERISTICS



Remark The graphs indicate nominal characteristics.

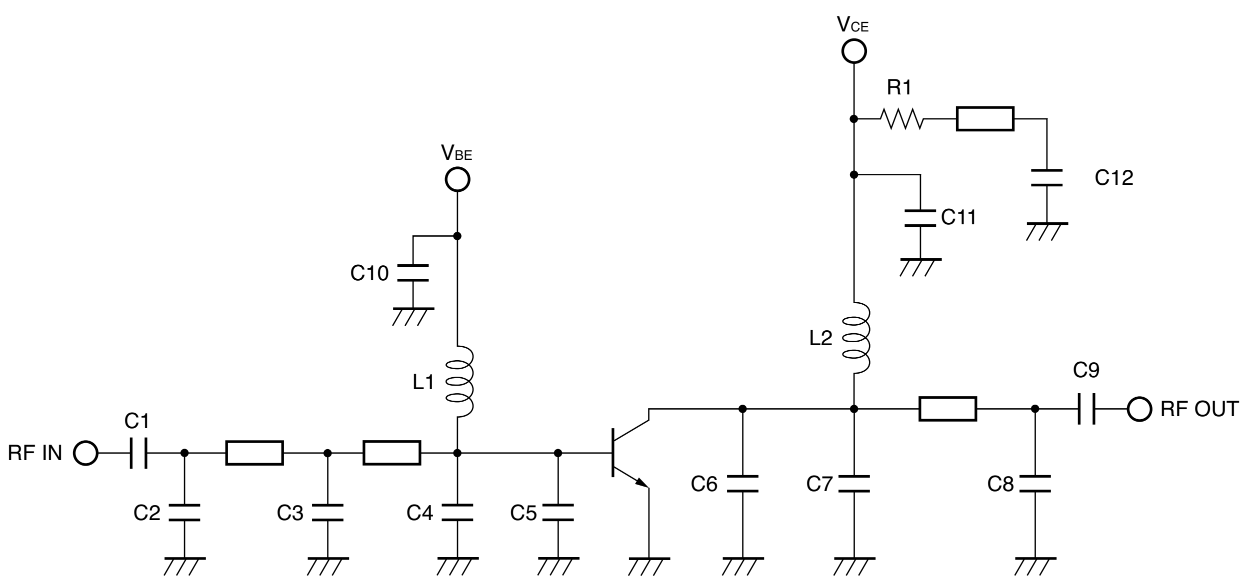
DISTORTION EVALUATION BOARD (f = 460 MHz)



Notes

1. 38 × 90 mm, t = 0.8 mm, double sided copper clad glass epoxy PWB.
2. Back side: GND pattern
3. Solder gold plated on pattern
4. ∘◯: Through holes

DISTORTION EVALUATION CIRCUIT (f = 460 MHz)

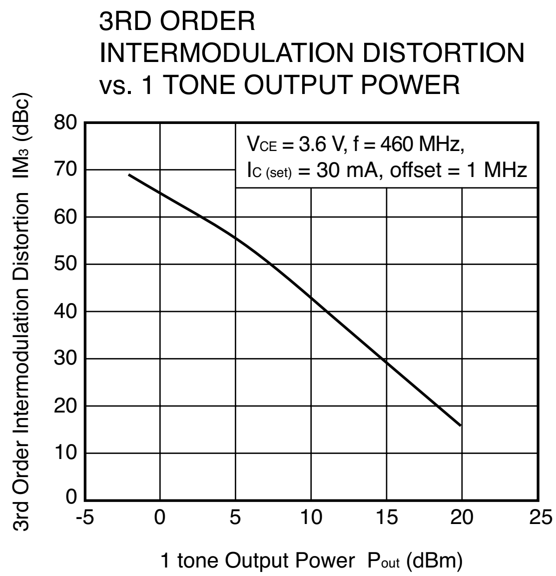


The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

COMPONENT LIST

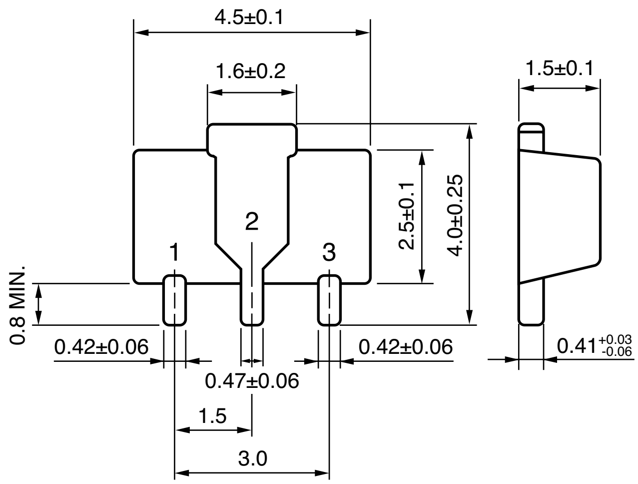
	VALUE	MAKER
C1	47 pF	Murata
C2	12 pF	Murata
C3, C4	7 pF	Murata
C5	3 pF	Murata
C6	6 pF	Murata
C7	0.5 pF	Murata
C8	5 pF	Murata
C9	51 pF	Murata
C10, C12	100 nF	Murata
C11	1 μF	Murata
L1	100 nH	Toko
L2	15 nH	Toko
R1	30 Ω	SSM

DISTORTION EVALUATION CIRCUIT TYPICAL CHARACTERISTICS



Remark The graphs indicate nominal characteristics.

3-PIN POWER MINIMOLD (34 PACKAGE) (UNIT:mm)



PIN CONNECTIONS

1. Collector
2. Emitter
3. Base

CEL **California Eastern Laboratories,** Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.
4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • FAX (408) 988-0279 • **www.cel.com**

CEL California Eastern Laboratories

4590 Patrick Henry Drive
Santa Clara, CA 95054-1817
Telephone: (408) 919-2500
Facsimile: (408) 988-0279

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.