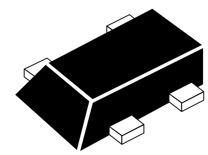
CEL

NEC's NPN SiGe HIGH FREQUENCY TRANSISTOR

NESG3031M14

FEATURES

- **THE DEVICE IS AN IDEAL CHOICE FOR LOW NOISE, HIGH-GAIN AMPLIFICATION:**
  NF = 0.95 dB TYP., G_a = 10.0 dB TYP. @ V_{CE} = 2 V, I_C = 6 mA, f = 5.2 GHz
  NF = 1.1 dB TYP., G_a = 9.5 dB TYP. @ V_{CE} = 2 V, I_C = 6 mA, f = 5.8 GHz
- **MAXIMUM STABLE POWER GAIN:**
  MSG = 15.0 dB TYP. @ V_{CE} = 3 V, I_C = 20 mA, f = 5.8 GHz
- **SiGe HBT TECHNOLOGY (UHS3) ADOPTED:**
  f_{max} = 110 GHz
- **M14 PACKAGE:**
  4-pin lead-less minimold package



M14 Package

ORDERING INFORMATION

PART NUMBER	QUANTITY	SUPPLYING FORM
NESG3031M14-A	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 1 (Collector), Pin 4 (Emitter) face the perforation side of the tape
NESG3031M14-T3-A	10 kpcs/reel	

Remark To order evaluation samples, contact your nearby sales office.
Unit sample quantity is 50 pcs.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector to Base Voltage	V_{CBO}	12.0	V
Collector to Emitter Voltage	V_{CEO}	4.3	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	35	mA
Total Power Dissipation	P_{tot} **Note**	150	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

Note Mounted on 1.08 cm^2 × 1.0 mm (t) glass epoxy PWB

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

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

California Eastern Laboratories

ELECTRICAL CHARACTERISTICS (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	–	–	100	nA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1 V, I_C = 0 mA	–	–	100	nA
DC Current Gain	h_{FE} **Note 1**	V_{CE} = 2 V, I_C = 6 mA	220	300	380	–
RF Characteristics						
Insertion Power Gain	$\lvert S_{21e}\rvert^2$	V_{CE} = 3 V, I_C = 20 mA, f = 5.8 GHz	6.5	9.0	–	dB
Noise Figure (1)	NF	V_{CE} = 2 V, I_C = 6 mA, f = 5.2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	0.95	–	dB
Noise Figure (2)	NF	V_{CE} = 2 V, I_C = 6 mA, f = 5.8 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	1.1	1.5	dB
Associated Gain (1)	G_a	V_{CE} = 2 V, I_C = 6 mA, f = 5.2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	10.0	–	dB
Associated Gain (2)	G_a	V_{CE} = 2 V, I_C = 6 mA, f = 5.8 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	7.5	9.5	–	dB
Reverse Transfer Capacitance	C_{re} **Note 2**	V_{CB} = 2 V, I_E = 0 mA, f = 1 MHz	–	0.15	0.25	pF
Maximum Stable Power Gain	MSG **Note 3**	V_{CE} = 3 V, I_C = 20 mA, f = 5.8 GHz	12.0	15.0	–	dB
Gain 1 dB Compression Output Power	$P_{O\ (1\ dB)}$	V_{CE} = 3 V, $I_{C\ (set)}$ = 20 mA, f = 5.8 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	13.0	–	dBm
3rd Order Intermodulation Distortion Output Intercept Point	OIP_3	V_{CE} = 3 V, $I_{C\ (set)}$ = 20 mA, f = 5.8 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	18.0	–	dBm

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

2. Collector to base capacitance when the emitter grounded

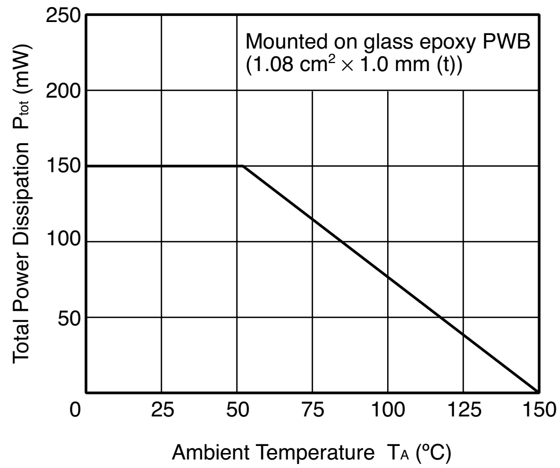
3. $MSG = \left| \frac{S_{21}}{S_{12}} \right|$

h_{FE} CLASSIFICATION

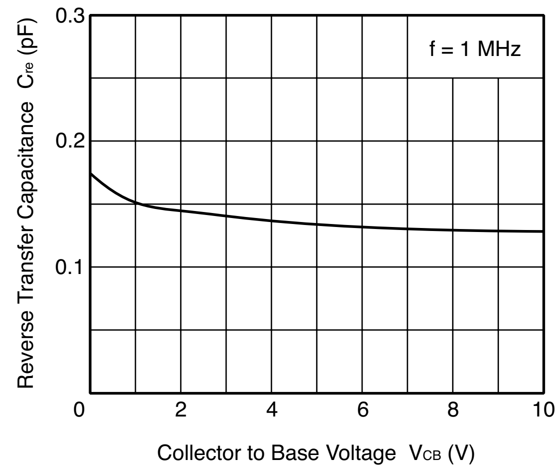
RANK	FB
Marking	zJ
h_{FE} Value	220 to 380

TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

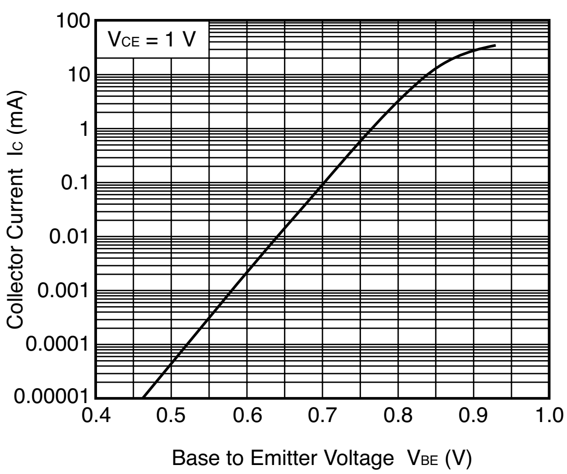
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



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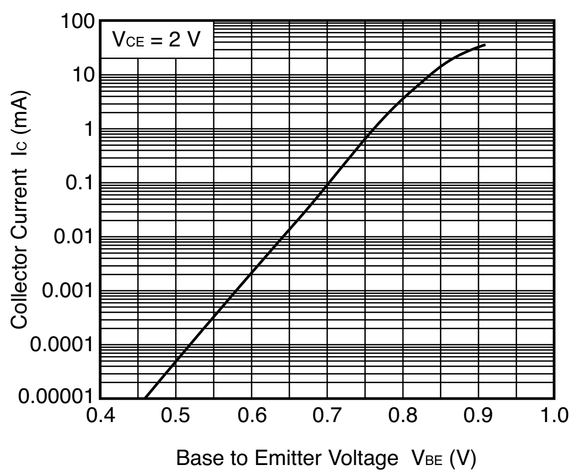
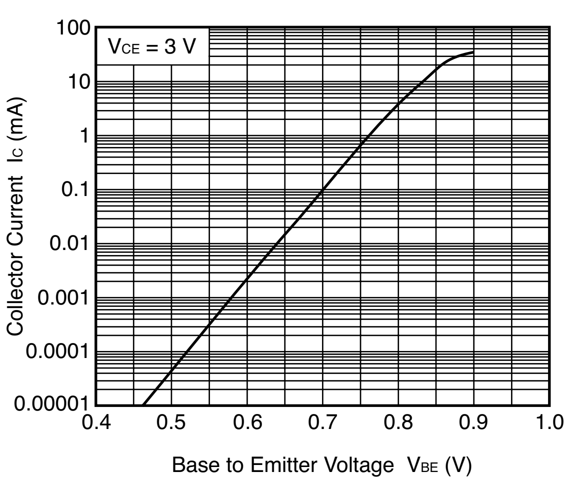
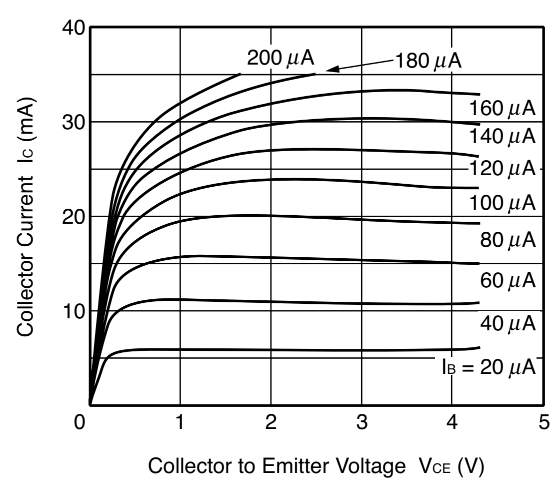


COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

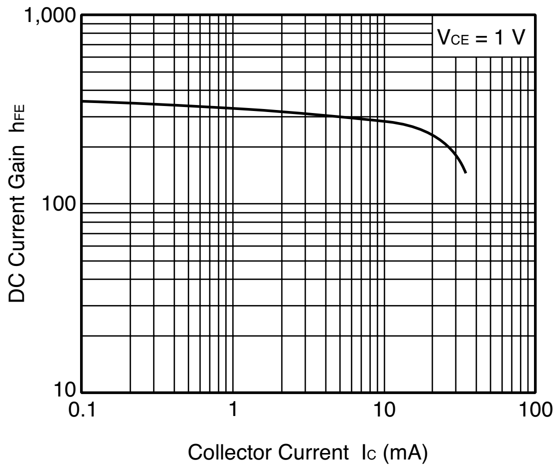


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



Remark The graphs indicate nominal characteristics.

DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
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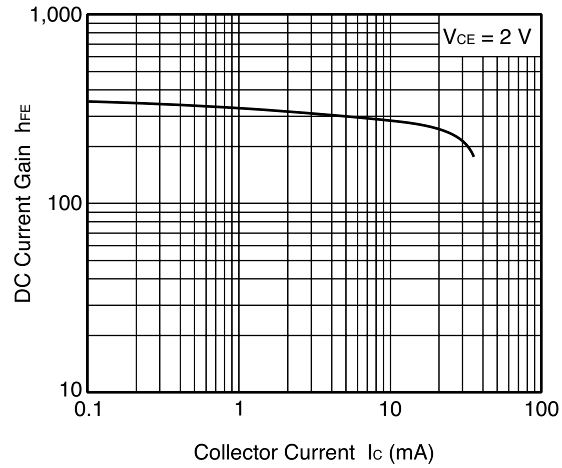

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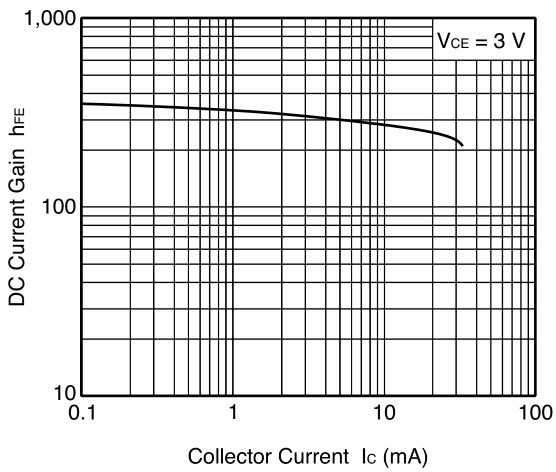
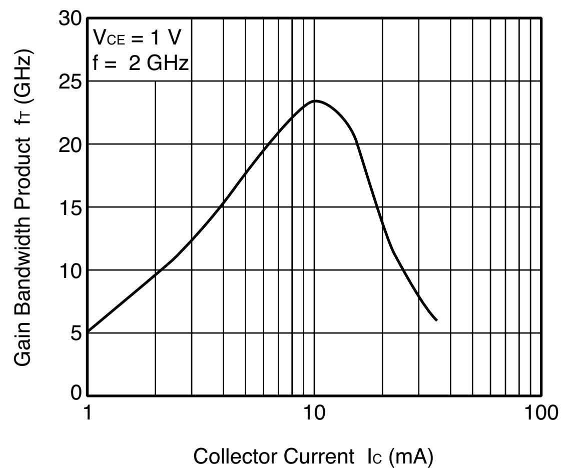


GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT
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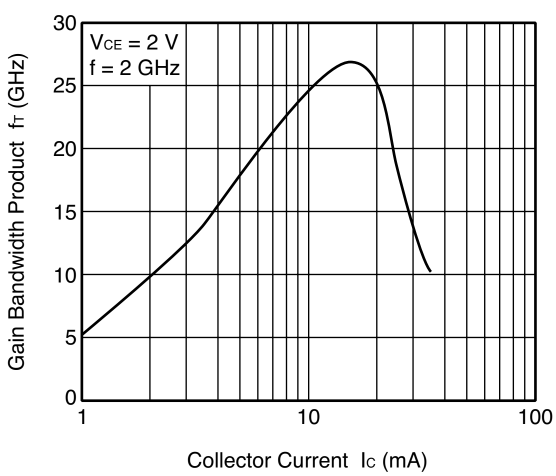

GAIN BANDWIDTH PRODUCT
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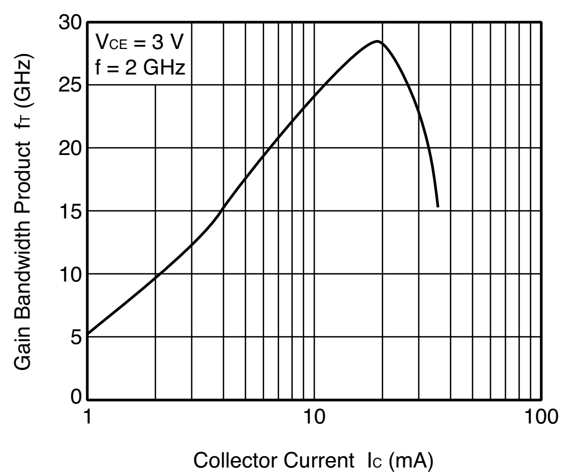

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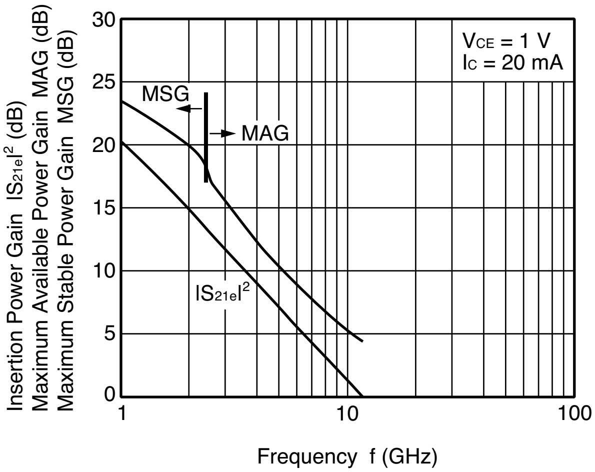
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



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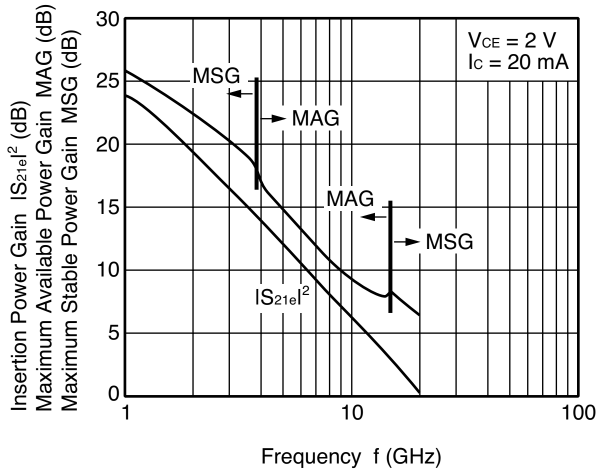

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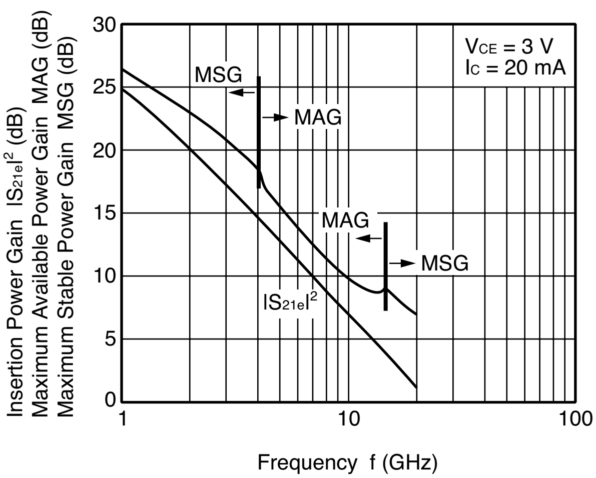

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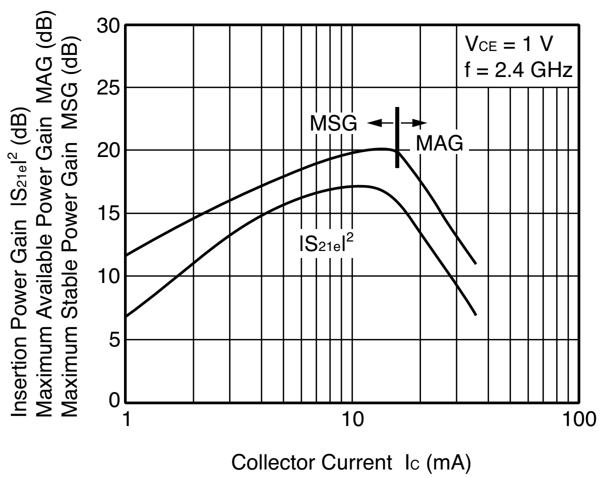

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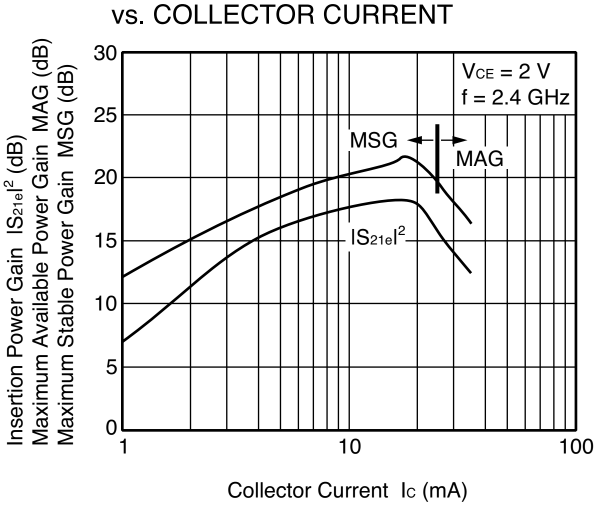

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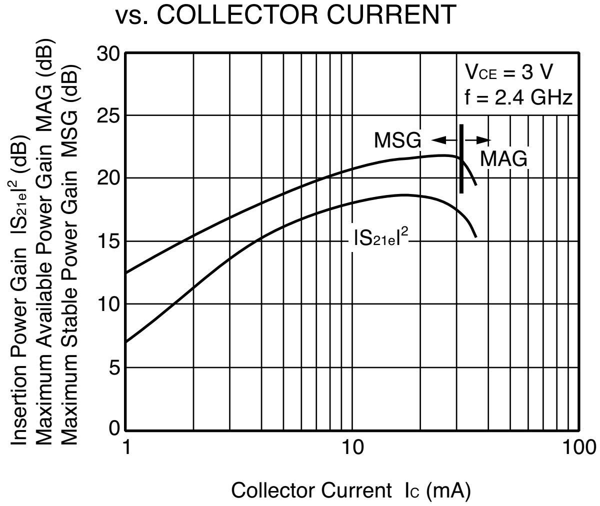

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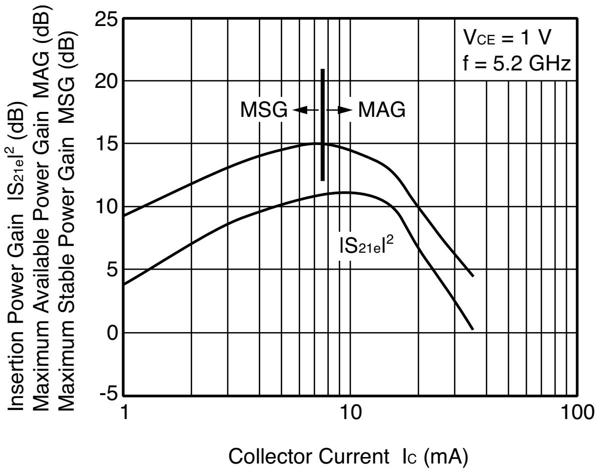

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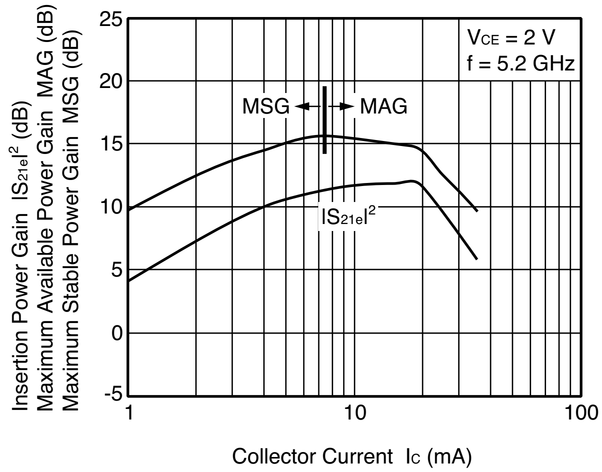

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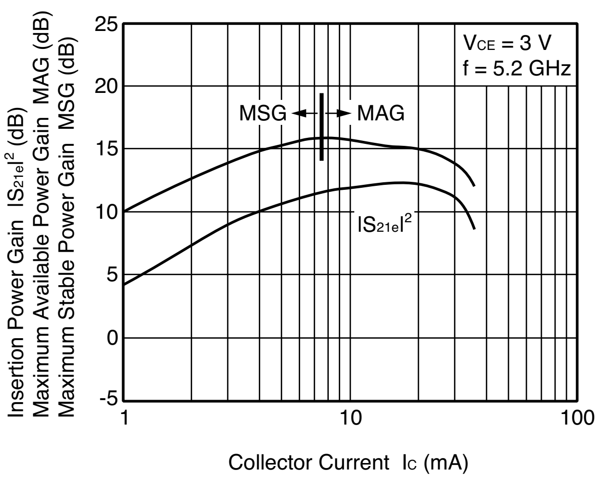

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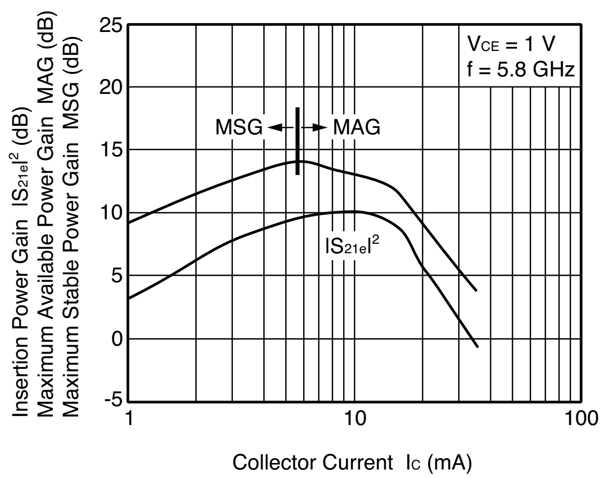

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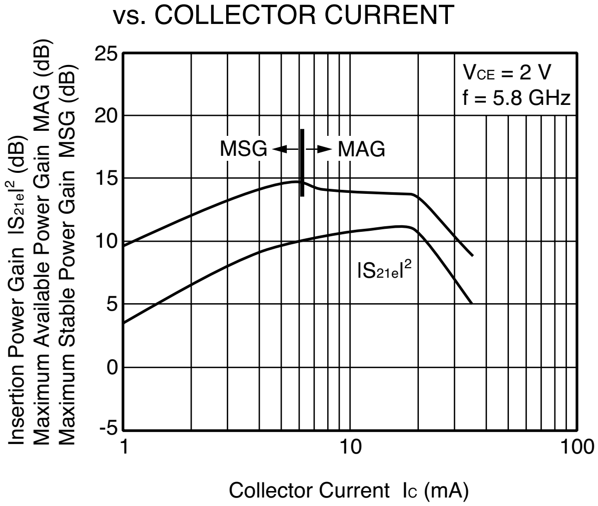

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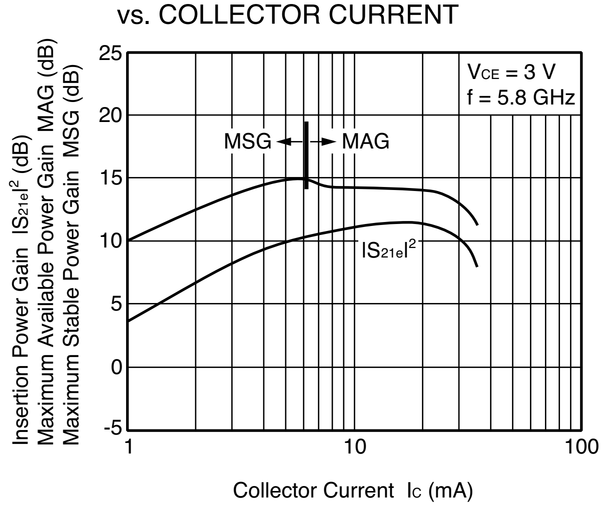

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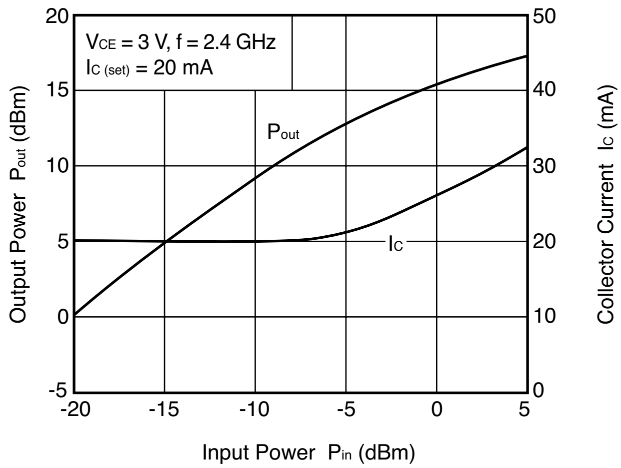
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



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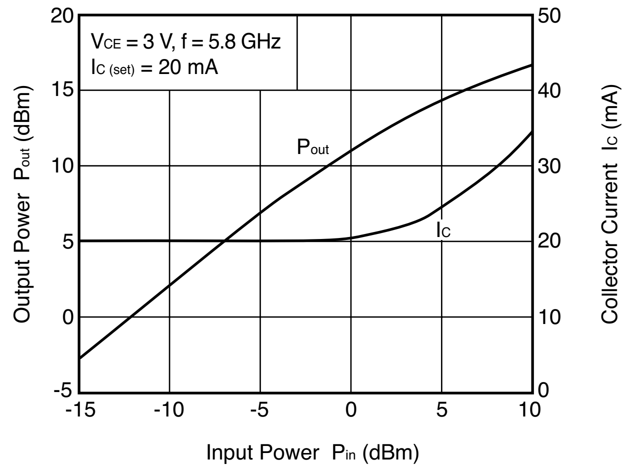
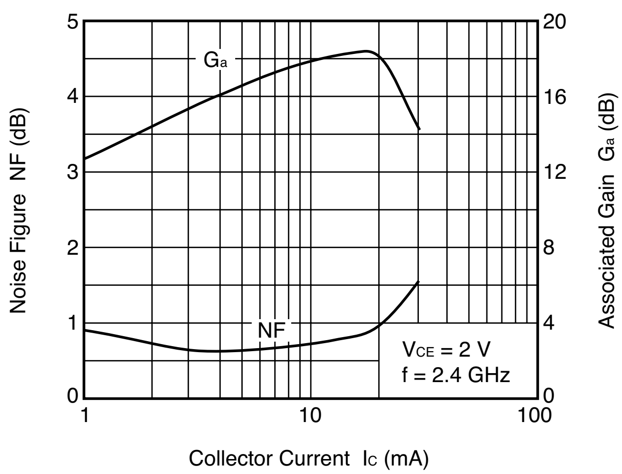


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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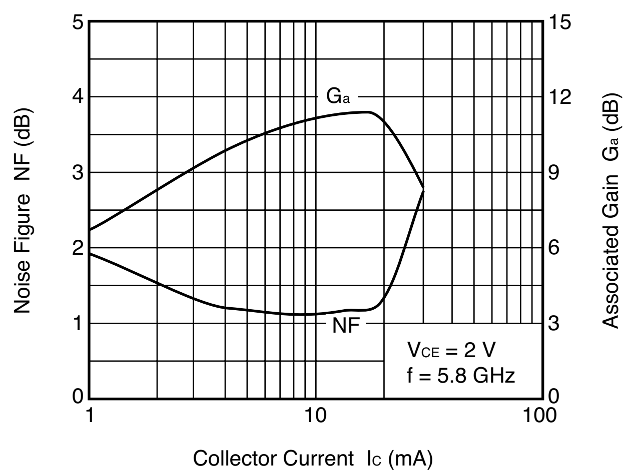

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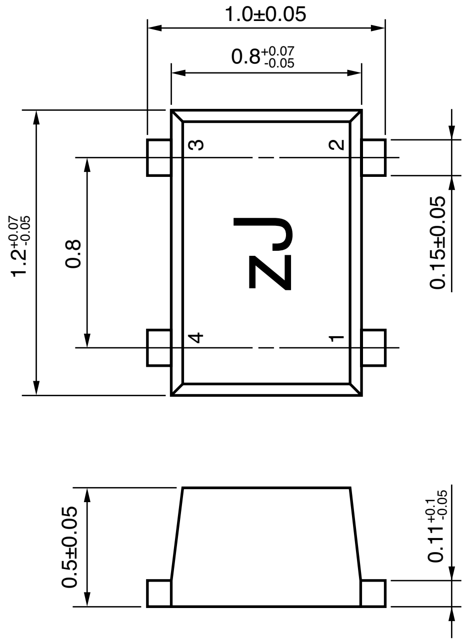
PACKAGE DIMENSIONS (UNIT : mm)

4-PIN LEAD-LESS MINIMOLD (M14, 1208 PACKAGE)



PIN CONNECTIONS

1. Collector
2. Emitter
3. Base
4. Emitter

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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.

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