

μPA862TD

Data Sheet

NPN Silicon RF Twin Transistor (with 2 Different Elements)
in a 6-pin Lead-less Minimold

R09DS0032EJ0200
Rev.2.00
Dec 19, 2011

FEATURES

- Low voltage operation
- 2 different built-in transistors (2SC5010, 2SC5801)
 - Q1: Built-in high gain transistor
 $f_T = 12.0 \text{ GHz TYP.}$, $|S_{21e}|^2 = 8.5 \text{ dB TYP. @ } V_{CE} = 3 \text{ V, } I_C = 10 \text{ mA, } f = 2 \text{ GHz}$
 - Q2: Built-in low phase distortion transistor suited for OSC operation
 $f_T = 4.5 \text{ GHz TYP.}$, $|S_{21e}|^2 = 4.0 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_C = 5 \text{ mA, } f = 2 \text{ GHz}$
- 6-pin lead-less minimold package

BUILT-IN TRANSISTORS

	Q1	Q2
3-pin thin-type ultra super minimold part No.	2SC5010	2SC5801

ORDERING INFORMATION

Part Number	Order Number	Quantity	Package	Supplying Form
μPA862TD	μPA862TD-A	50 pcs (Non reel)	6-pin lead -less minimold	• 8 mm wide embossed taping
μPA862TD-T3	μPA862TD-T3-A	10 kpcs/reel	(1208) (Pb-Free)	• Pin 1 (Q1 Collector), Pin 6 (Q1 Base) face the perforation side of the tape

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

CAUTION

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

The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings		Unit
		Q1	Q2	
Collector to Base Voltage	V _{CBO}	9	9	V
Collector to Emitter Voltage	V _{CEO}	6	5.5	V
Emitter to Base Voltage	V _{EBO}	2	1.5	V
Collector Current	I _C	30	100	mA
Total Power Dissipation	P _{tot} ^{Note}	180	190	mW
		210 in 2 elements		
Junction Temperature	T _j	150		°C
Storage Temperature	T _{stg}	−65 to +150		°C

Note Mounted on 1.08 cm² × 1.0 mm (t) glass epoxy PCB

ELECTRICAL CHARACTERISTICS (T_A = +25°C)**(1) Q1**

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I _{CBO}	V _{CB} = 5 V, I _E = 0	–	–	100	nA
Emitter Cut-off Current	I _{EBO}	V _{BE} = 1 V, I _C = 0	–	–	100	nA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 3 V, I _C = 10 mA	75	110	150	–
Gain Bandwidth Product	f _T	V _{CE} = 3 V, I _C = 10 mA, f = 2 GHz	10.0	12.0	–	GHz
Insertion Power Gain	S _{21e} ²	V _{CE} = 3 V, I _C = 10 mA, f = 2 GHz	7.0	8.5	–	dB
Noise Figure	NF	V _{CE} = 3 V, I _C = 3 mA, f = 2 GHz, Z _S = Z _{opt}	–	1.5	2.5	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 3 V, I _E = 0, f = 1 MHz	–	0.4	0.7	pF

(2) Q2

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I _{CBO}	V _{CB} = 5 V, I _E = 0	–	–	600	nA
Emitter Cut-off Current	I _{EBO}	V _{BE} = 1 V, I _C = 0	–	–	600	nA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 1 V, I _C = 5 mA	100	120	145	–
Gain Bandwidth Product (1)	f _T	V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz	3.0	4.5	–	GHz
Gain Bandwidth Product (2)	f _T	V _{CE} = 1 V, I _C = 15 mA, f = 2 GHz	5.0	6.5	–	GHz
Insertion Power Gain (1)	S _{21e} ²	V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz	3.0	4.0	–	dB
Insertion Power Gain (2)	S _{21e} ²	V _{CE} = 1 V, I _C = 15 mA, f = 2 GHz	4.5	5.5	–	dB
Noise Figure	NF	V _{CE} = 1 V, I _C = 10 mA, f = 2 GHz, Z _S = Z _{opt}	–	1.9	2.5	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 0.5 V, I _E = 0, f = 1 MHz	–	0.6	0.8	pF

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

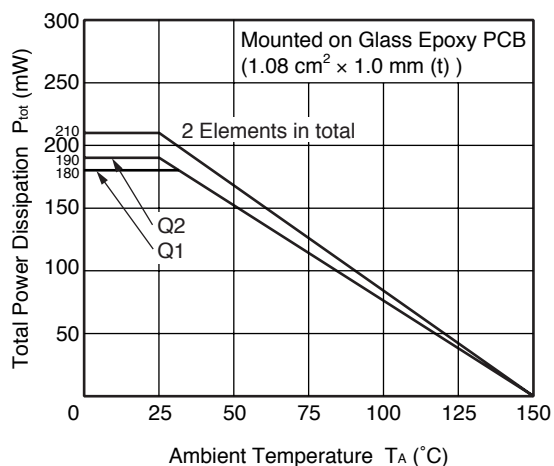
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

Rank	FB/YFB
Marking	vY
h _{FE} Value of Q1	75 to 150
h _{FE} Value of Q2	100 to 145

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

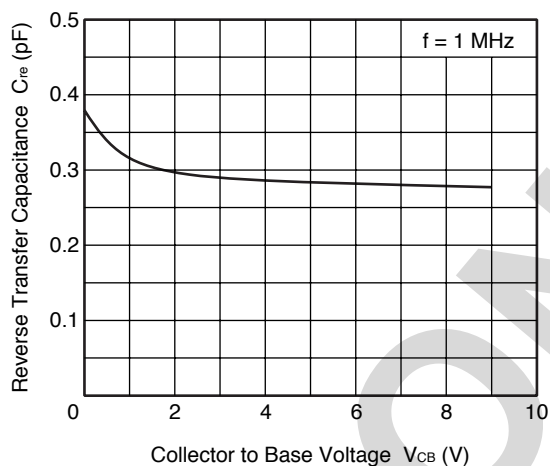
**TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE**



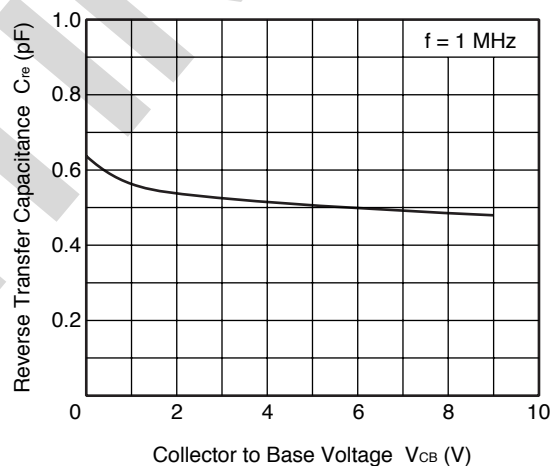
Q1

Q2

**REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE**



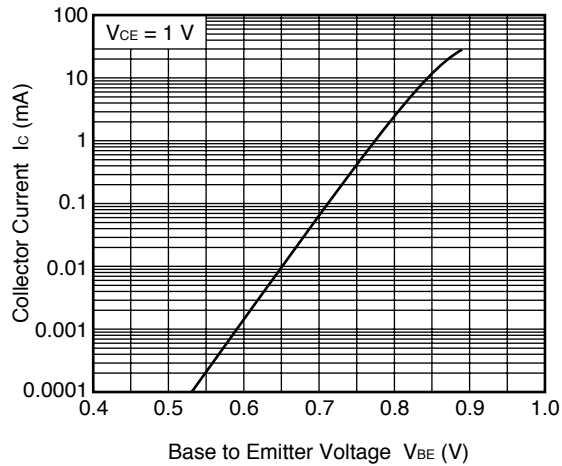
**REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE**



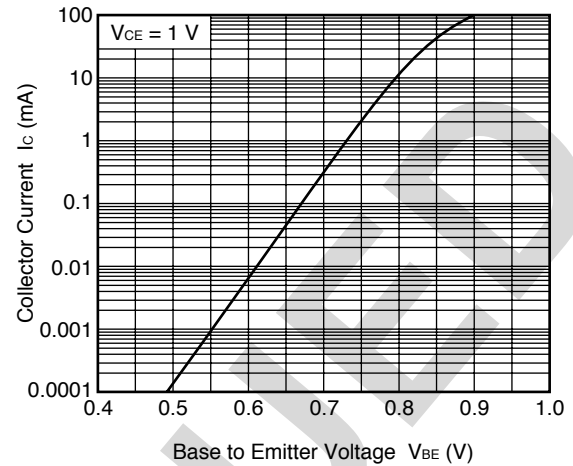
Remark The graphs indicate nominal characteristics.

Q1

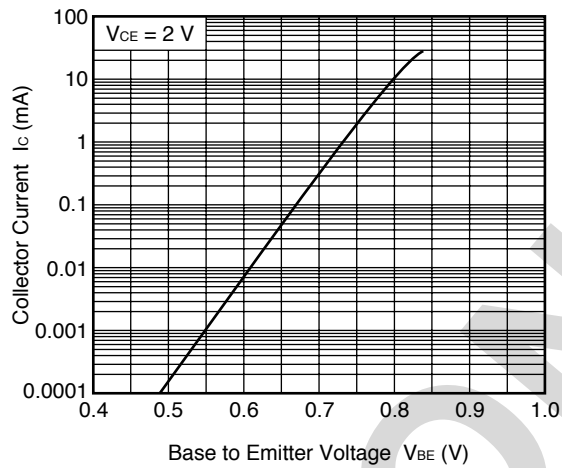
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

**Q2**

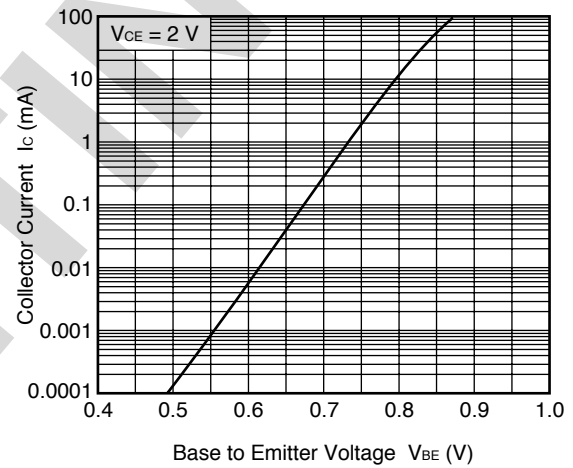
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



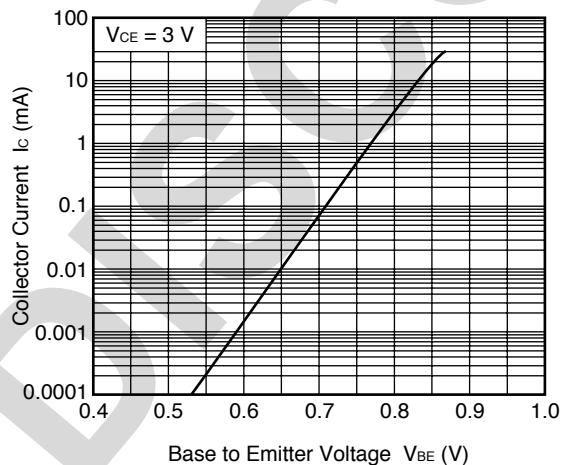
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

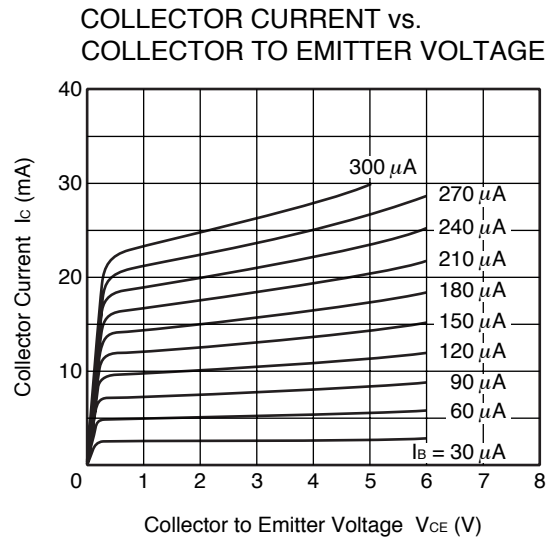


COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

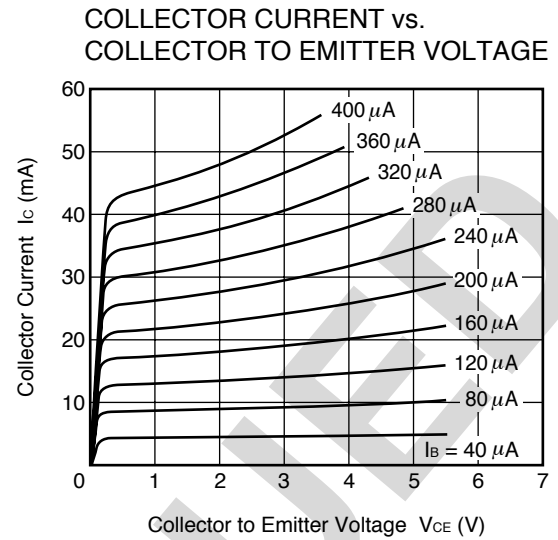


Remark The graphs indicate nominal characteristics.

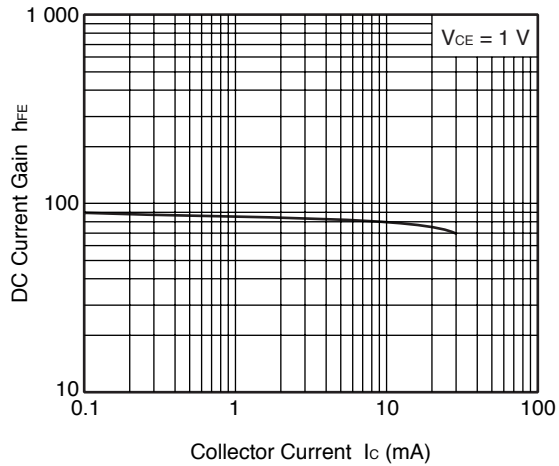
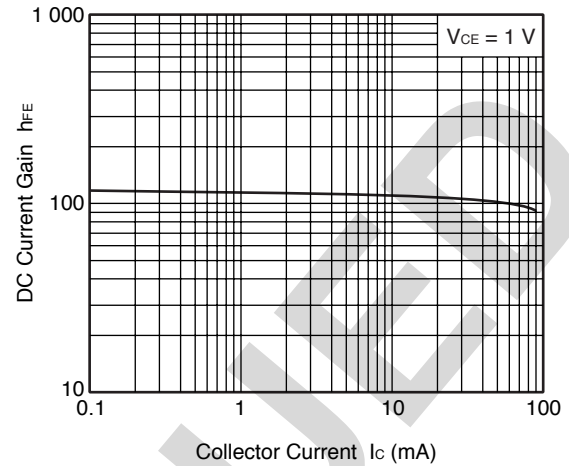
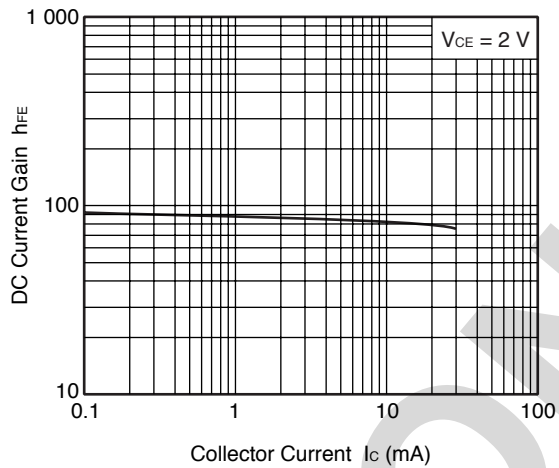
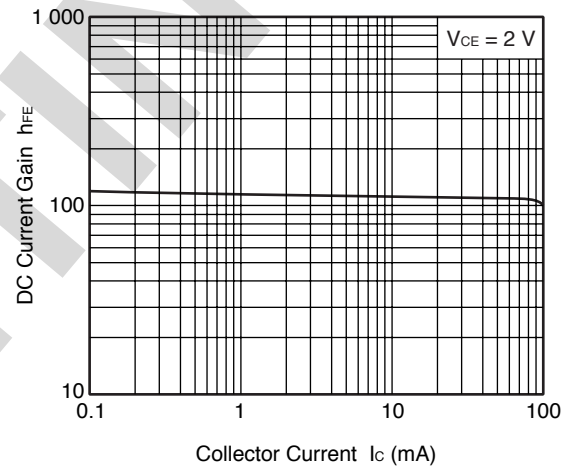
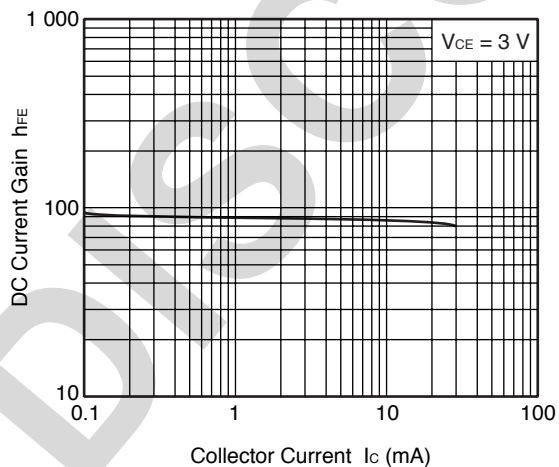
Q1



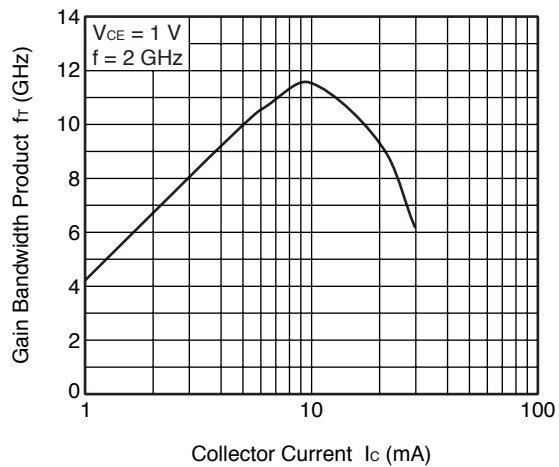
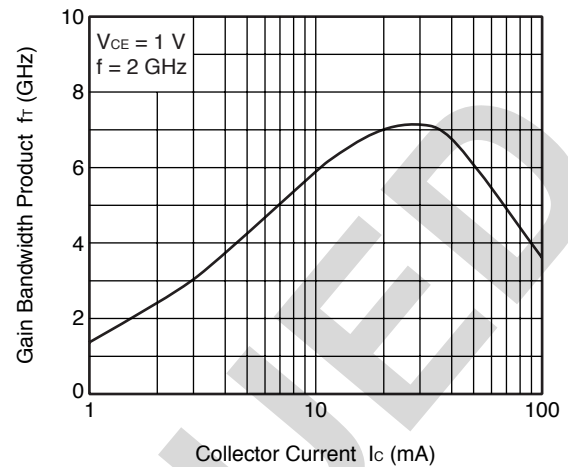
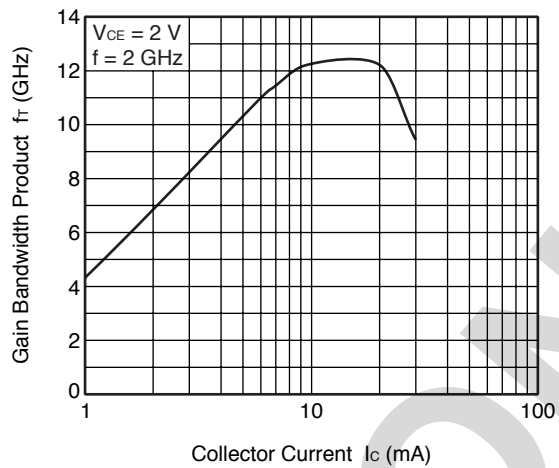
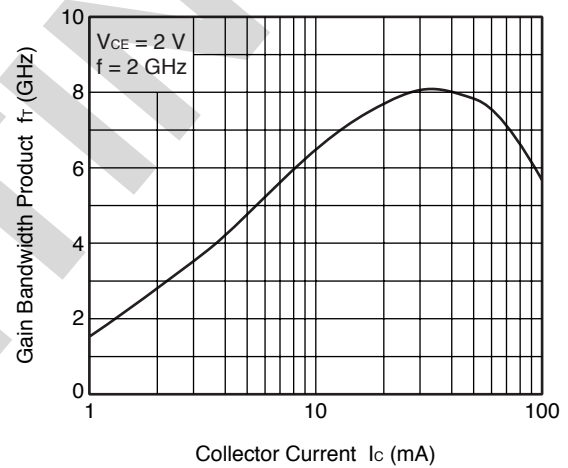
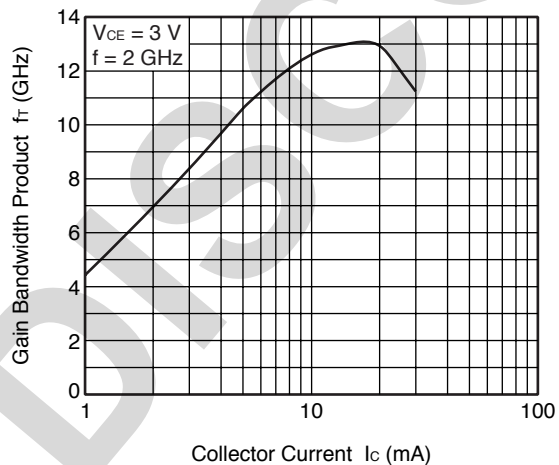
Q2



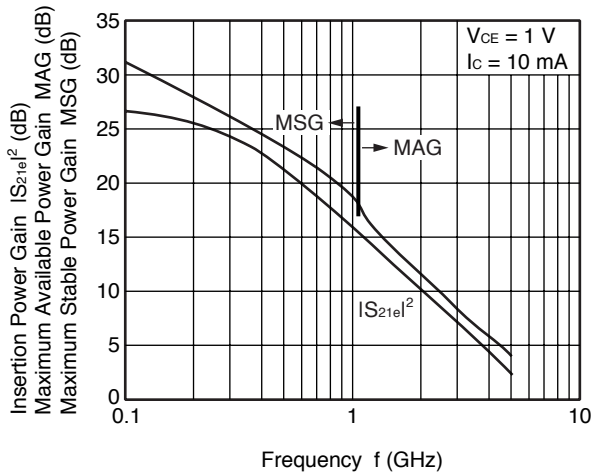
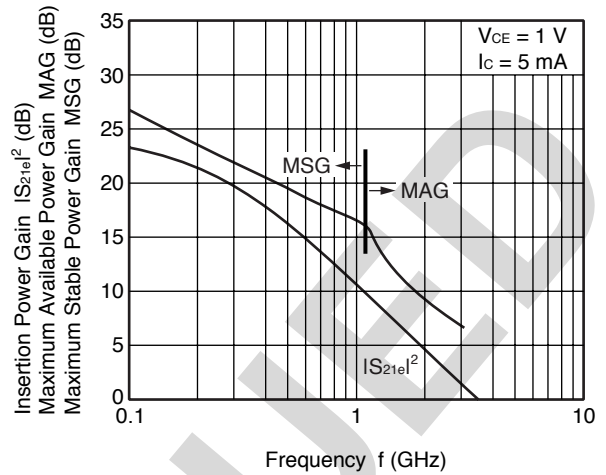
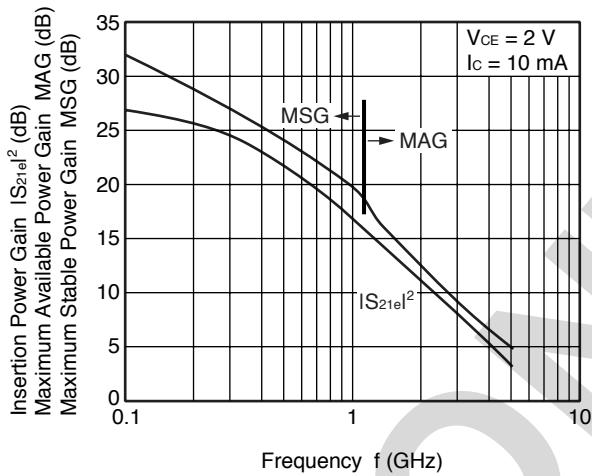
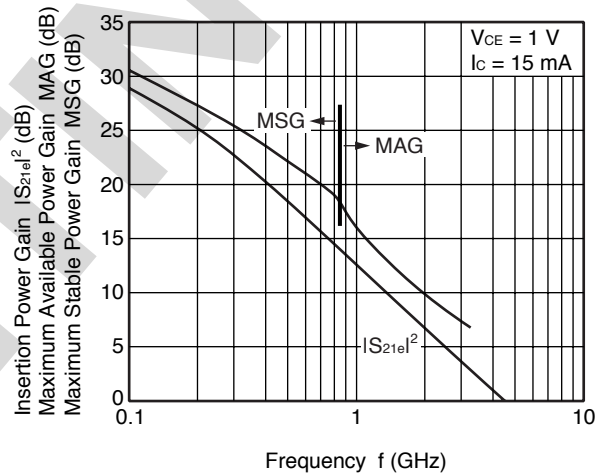
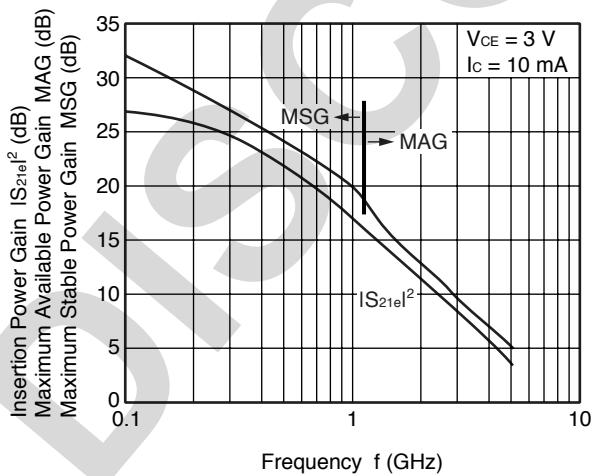
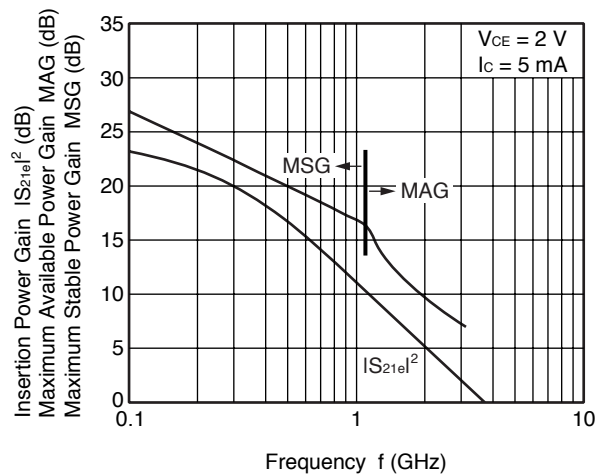
Remark The graphs indicate nominal characteristics.

Q1**DC CURRENT GAIN vs.
COLLECTOR CURRENT****Q2****DC CURRENT GAIN vs.
COLLECTOR CURRENT****DC CURRENT GAIN vs.
COLLECTOR CURRENT****DC CURRENT GAIN vs.
COLLECTOR CURRENT****DC CURRENT GAIN vs.
COLLECTOR CURRENT**

Remark The graphs indicate nominal characteristics.

Q1**GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT****Q2****GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT****GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT****GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT****GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT**

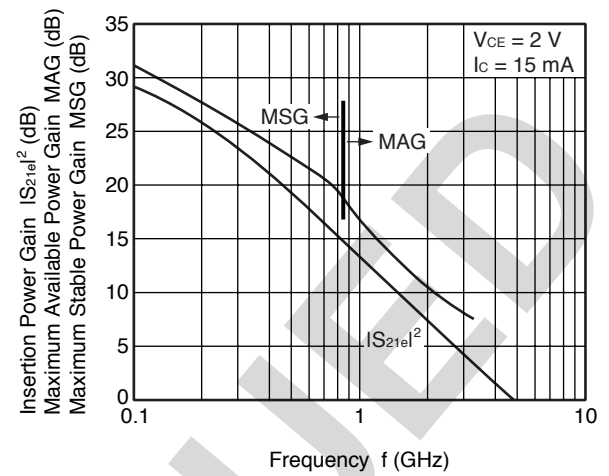
Remark The graphs indicate nominal characteristics.

Q1**INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY****Q2****INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY****INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY****INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY****INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY****INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY**

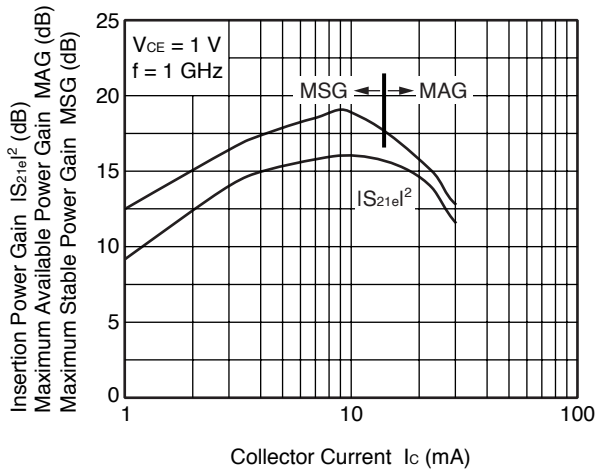
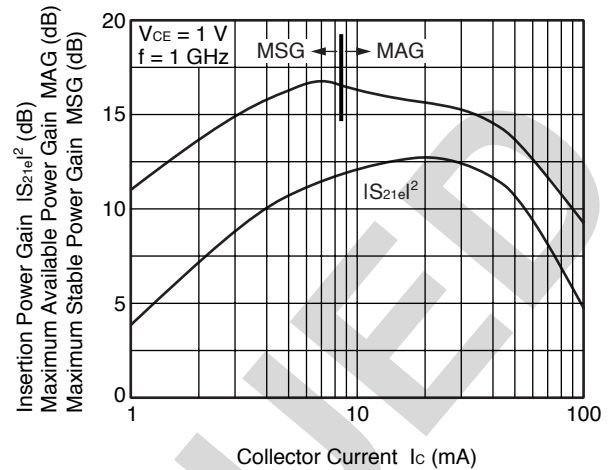
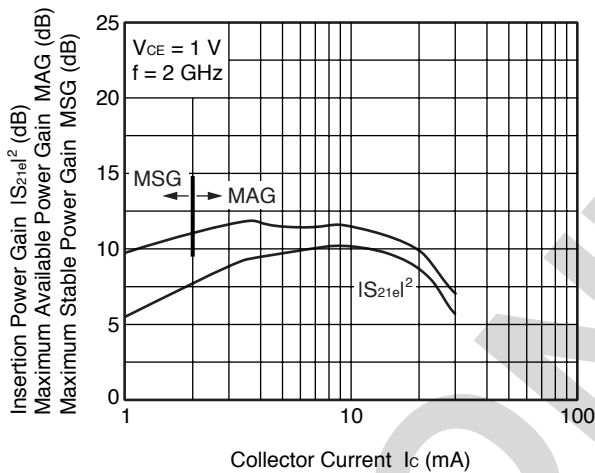
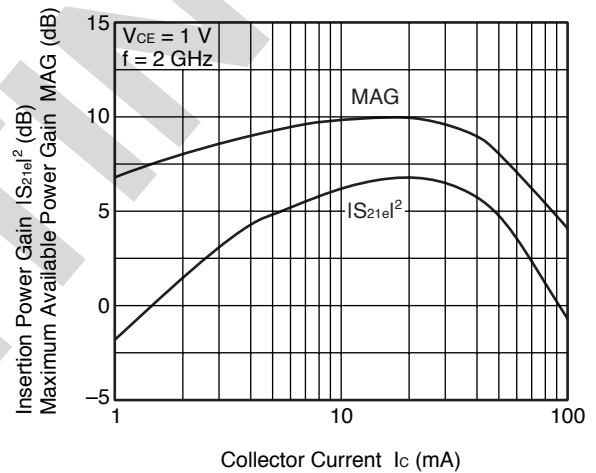
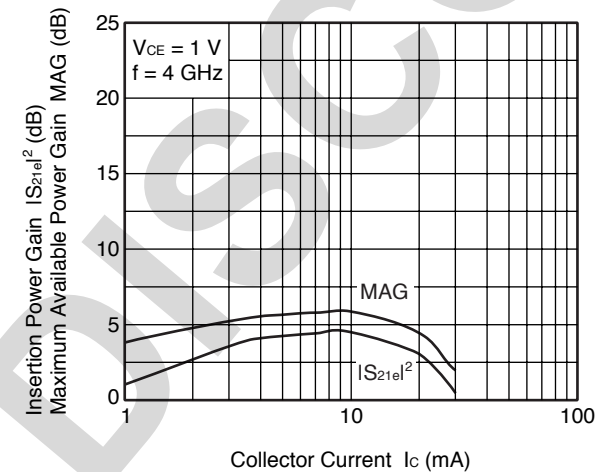
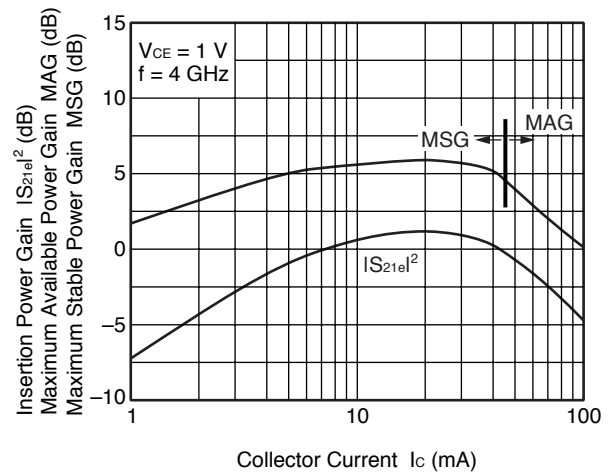
Remark The graphs indicate nominal characteristics.

Q2

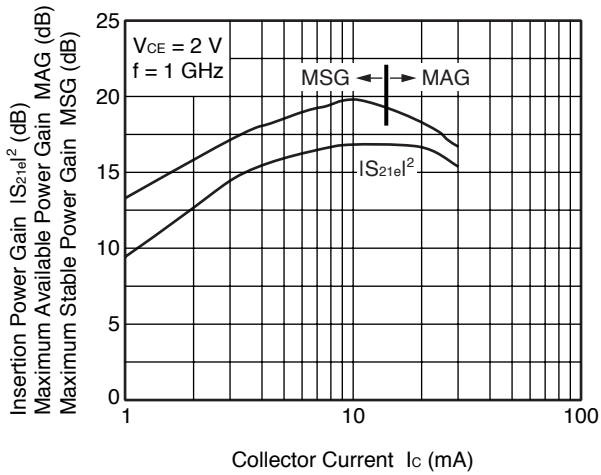
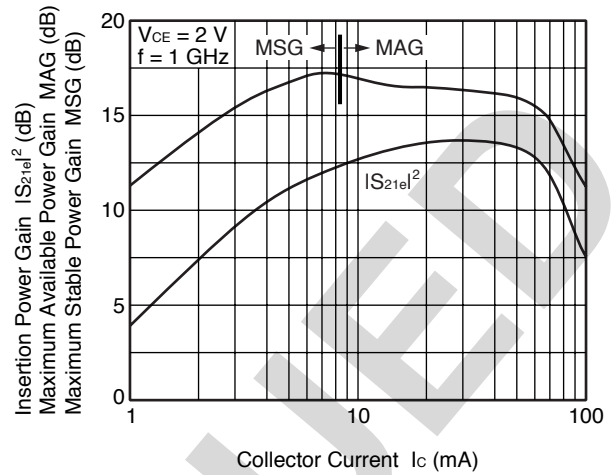
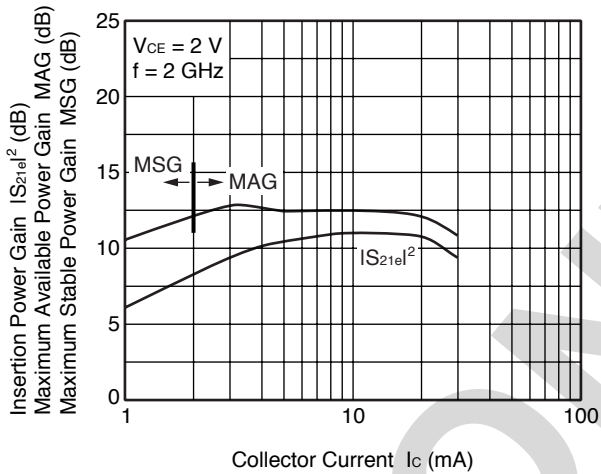
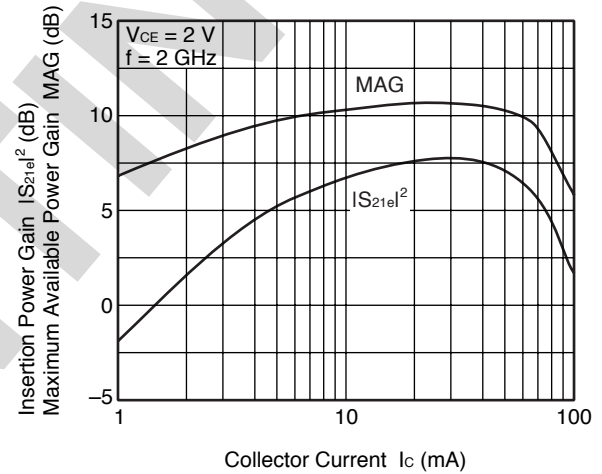
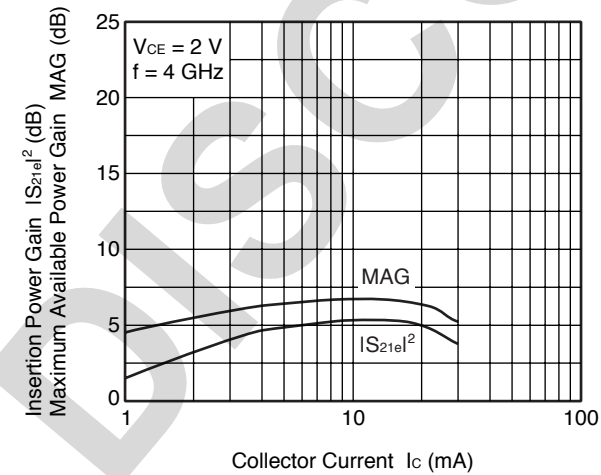
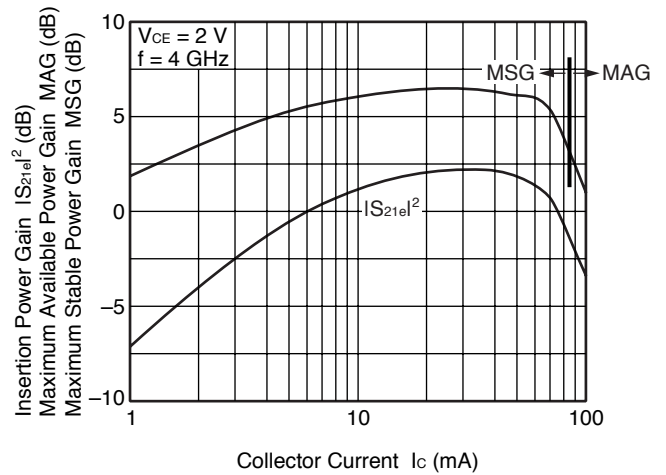
**INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY**



Remark The graph indicates nominal characteristics.

Q1**INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT****Q2****INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT****INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT****INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT****INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT****INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT**

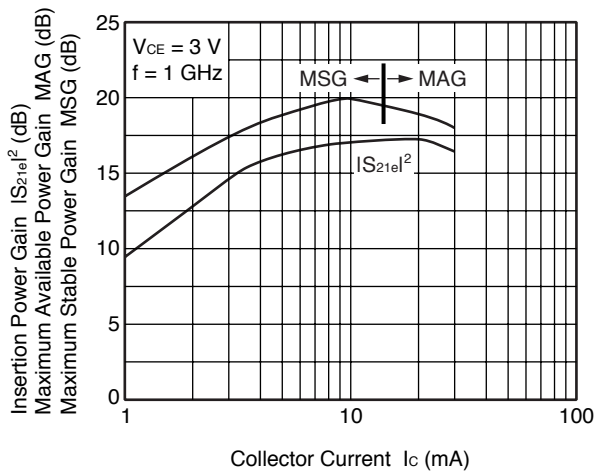
Remark The graphs indicate nominal characteristics.

Q1**INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT****Q2****INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT****INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT****INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT****INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT****INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT**

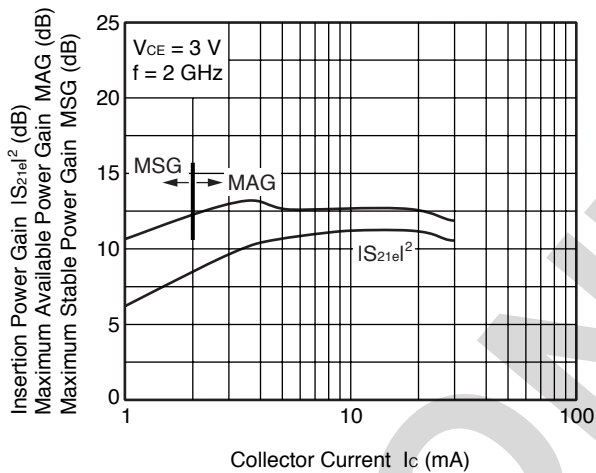
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Q1

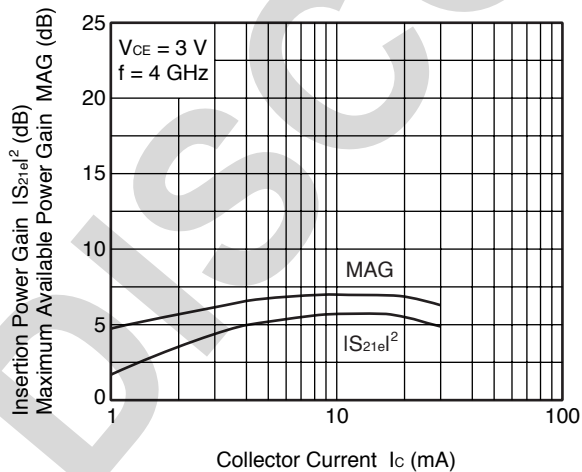
**INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT**



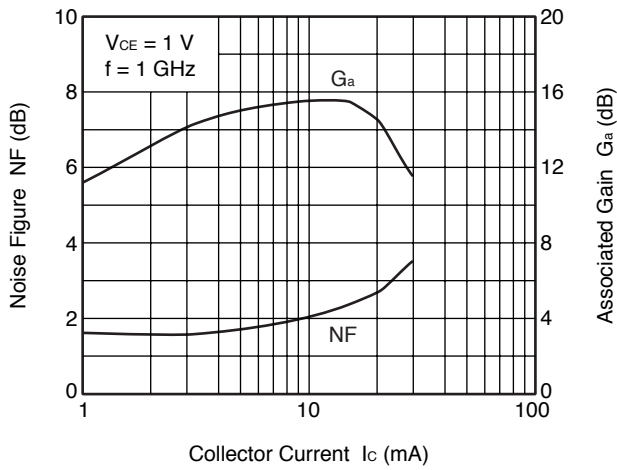
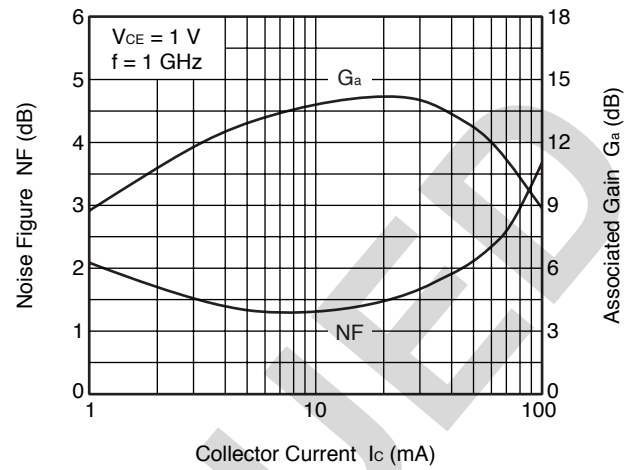
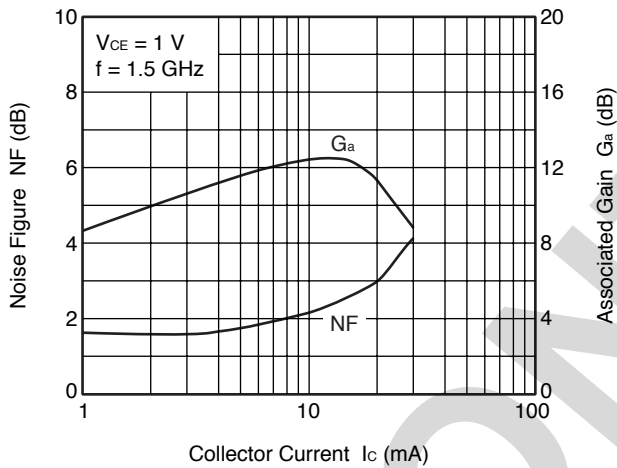
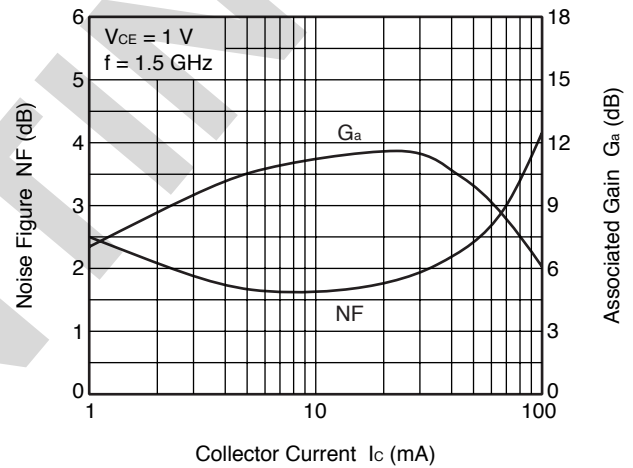
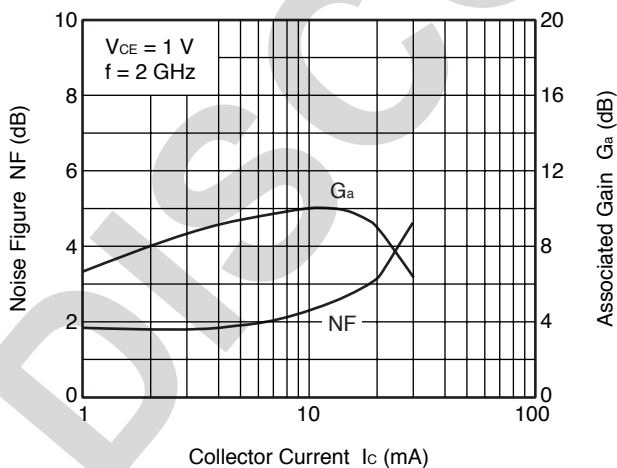
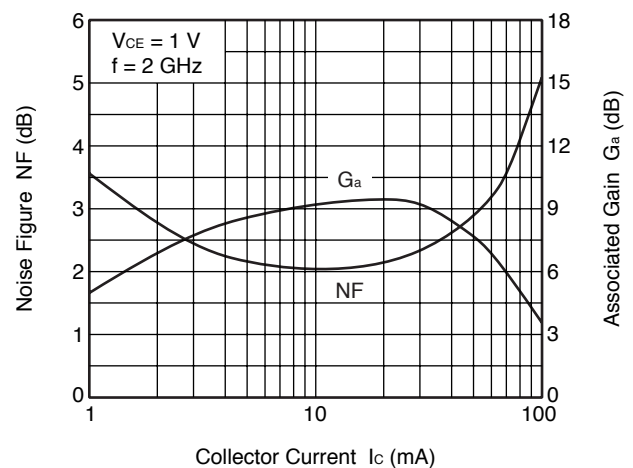
**INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT**



**INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT**



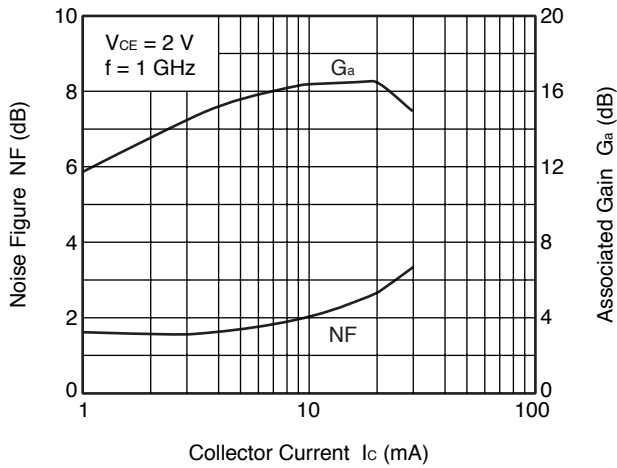
Remark The graphs indicate nominal characteristics.

Q1**NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT****Q2****NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT****NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT****NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT****NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT****NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT**

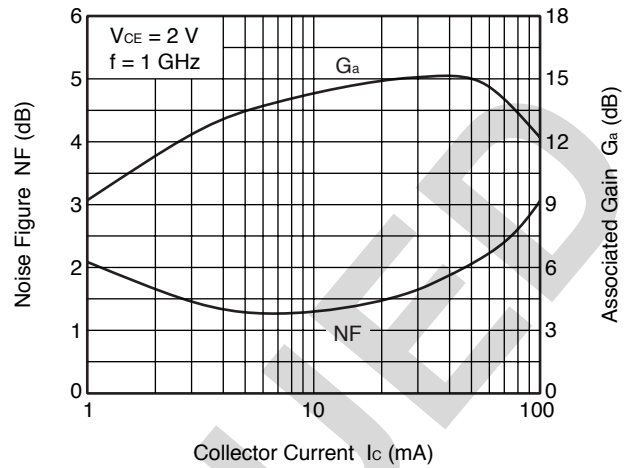
Remark The graphs indicate nominal characteristics.

Q1

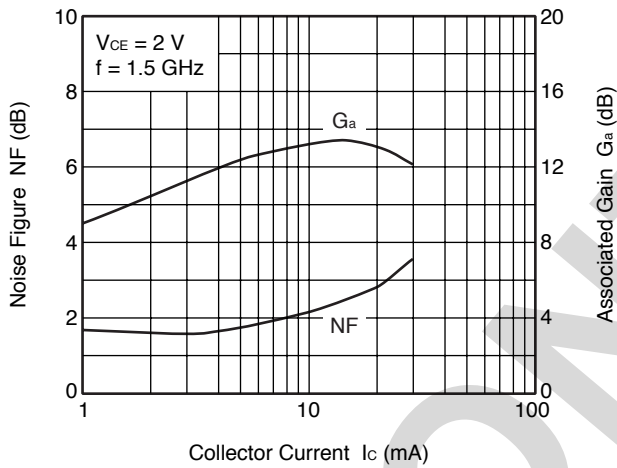
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT

**Q2**

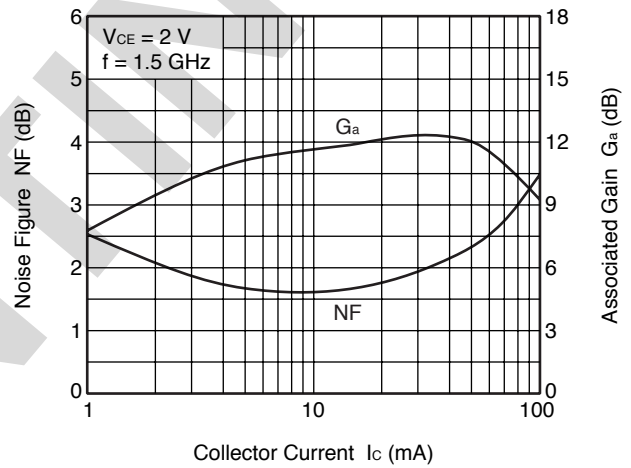
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



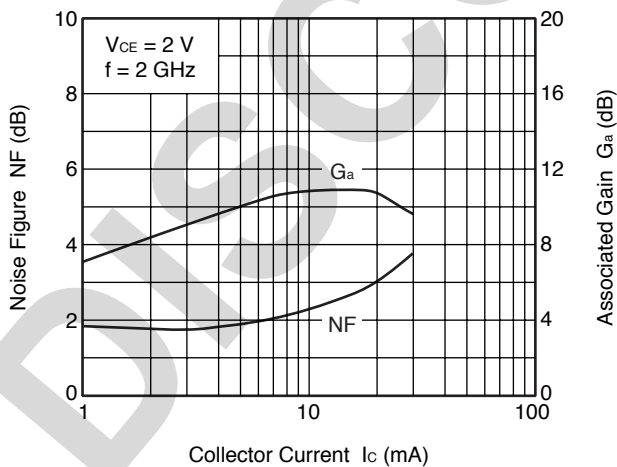
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



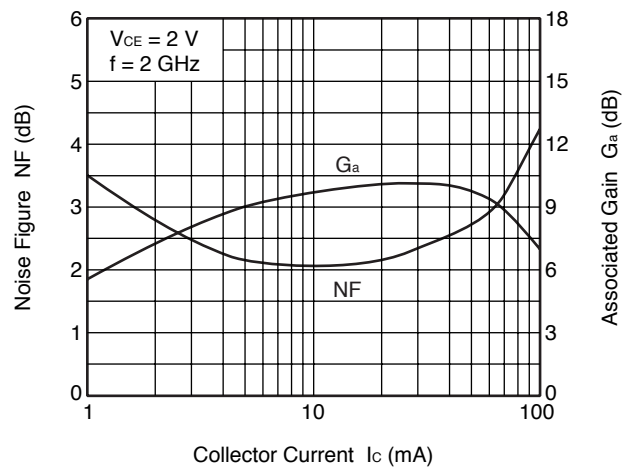
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



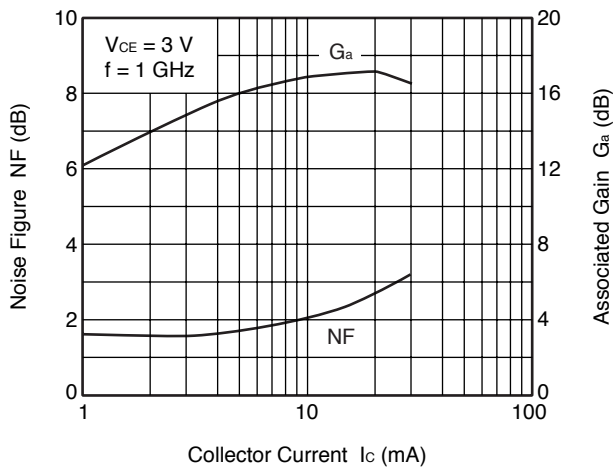
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



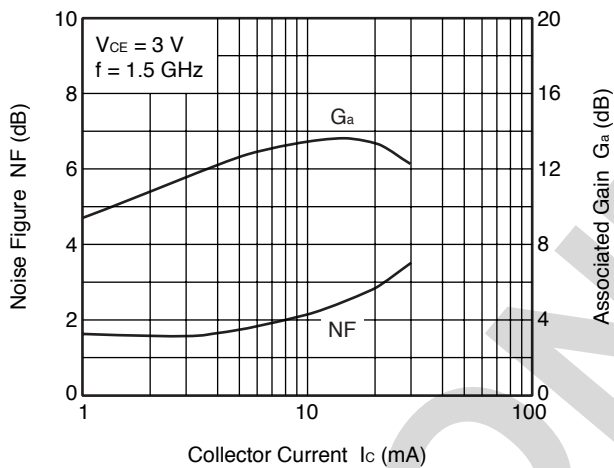
Remark The graphs indicate nominal characteristics.

Q1

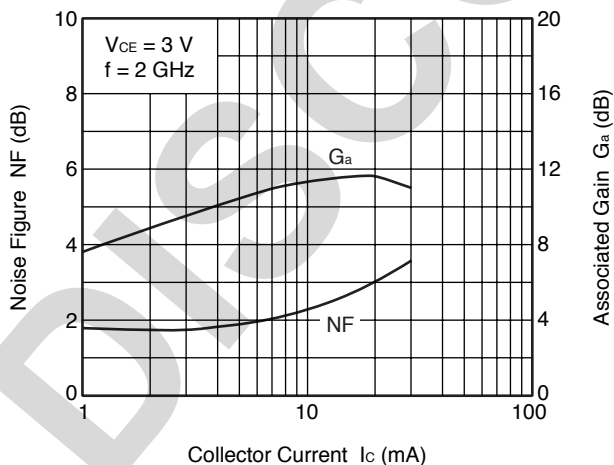
**NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT**



**NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT**



**NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT**



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

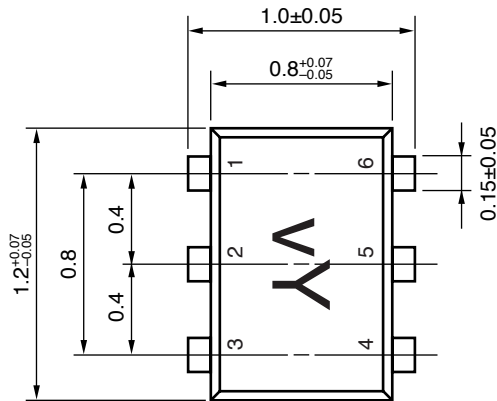
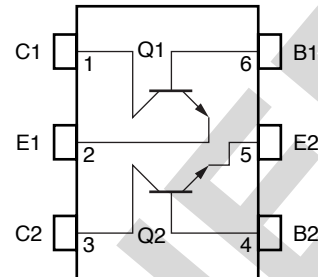
S-parameters and noise parameters are provided on our Web site in a format (S2P) that enables the direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

Click here to download S-parameters.

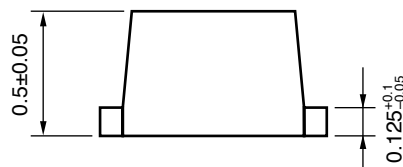
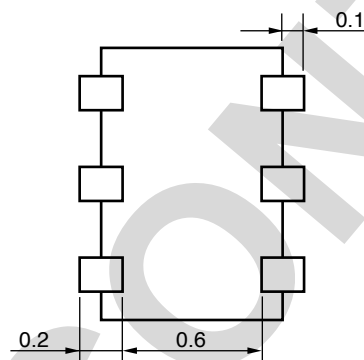
[RF and Microwave] → [Device Parameters]

URL <http://www2.renesas.com/microwave/en/download.html>

DISCONTINUED

<R> PACKAGE DIMENSIONS**6-PIN LEAD-LESS MINIMOLD (1208) (UNIT: mm)****(Top View)****PIN CONNECTIONS**

1. Collector (Q1)
2. Emitter (Q1)
3. Collector (Q2)
4. Base (Q2)
5. Emitter (Q2)
6. Base (Q1)

**(Bottom View)**

Mouser Electronics

Authorized Distributor

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