

μPA862TD

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
- <R> • 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
<R> 3-pin thin-type ultra super minimold part No.	2SC5010	2SC5801

<R> ORDERING INFORMATION

Part Number	Order Number	Quantity	Package	Supplying Form
μPA862TD	μPA862TD-A	50 pcs (Non reel)	6-pin lead -less minimold (1208) (Pb-Free)	<ul style="list-style-type: none"> • 8 mm wide embossed taping • Pin 1 (Q1 Collector), Pin 6 (Q1 Base) face the perforation side of the tape
μPA862TD-T3	μPA862TD-T3-A	10 kpcs/reel		

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

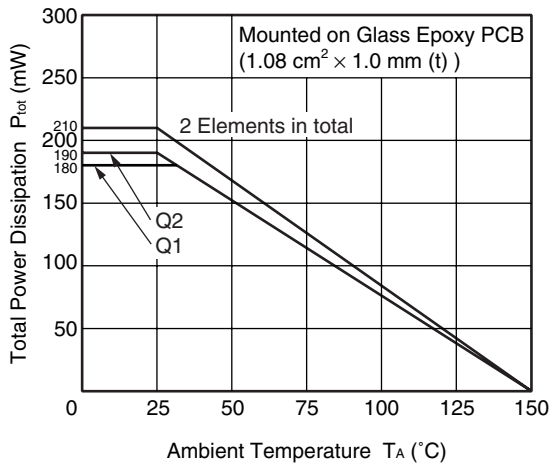
- Notes 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%
 2. Collector to base capacitance when the emitter grounded

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°C)

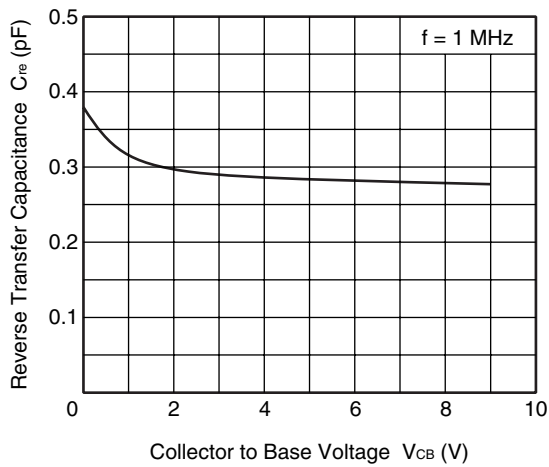
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



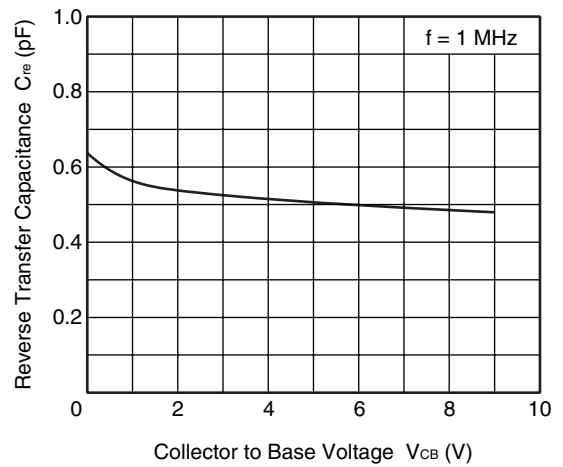
Q1

Q2

REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



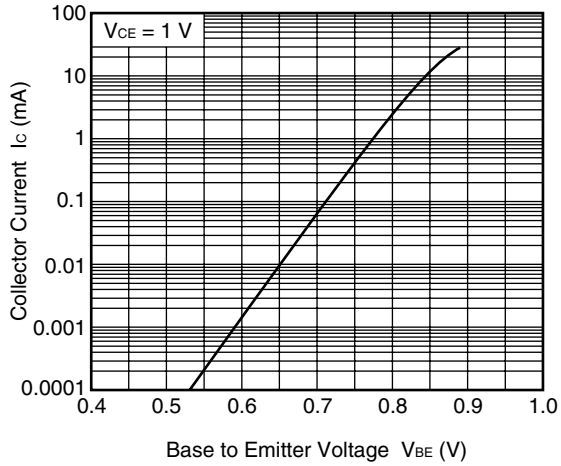
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



Remark The graphs indicate nominal characteristics.

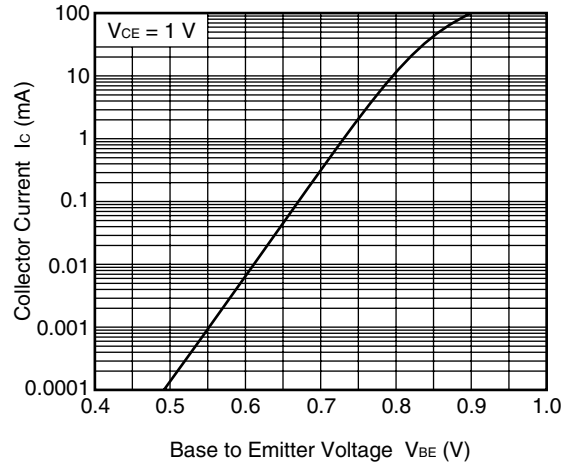
Q1

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

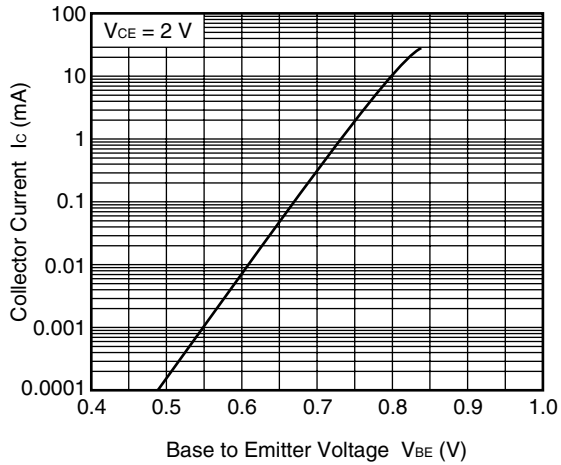


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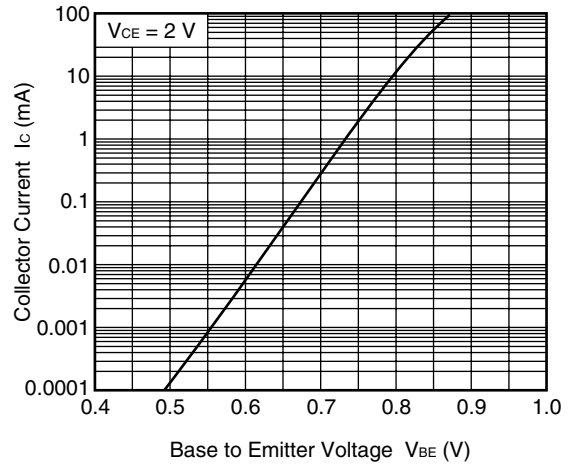
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



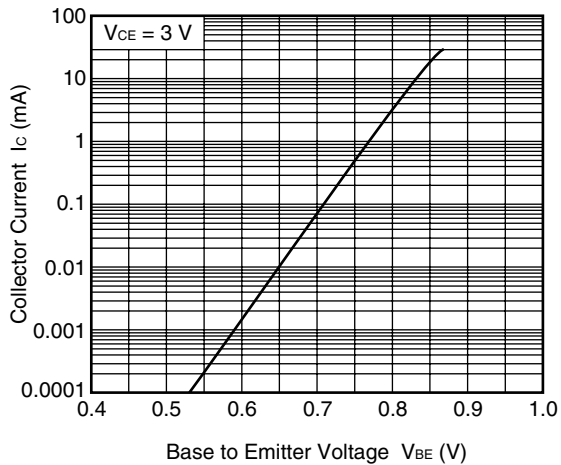
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

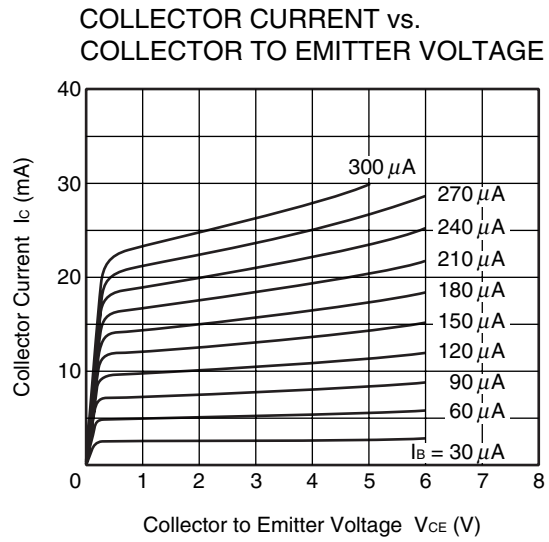


COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

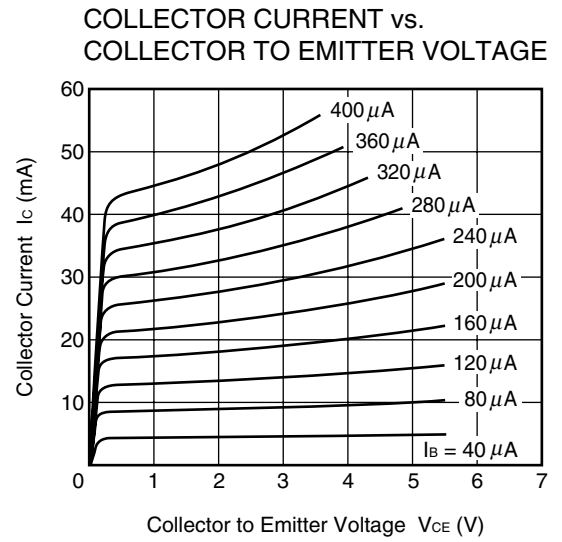


Remark The graphs indicate nominal characteristics.

Q1



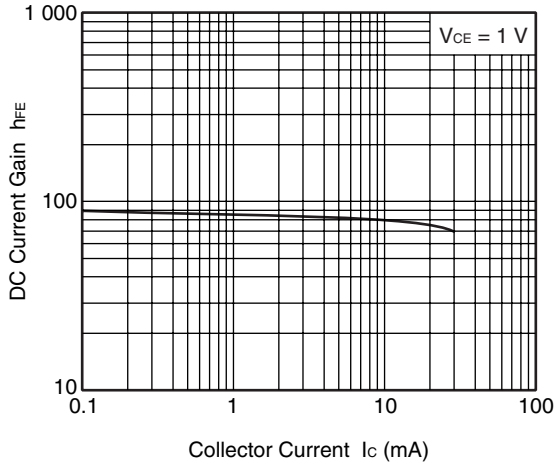
Q2



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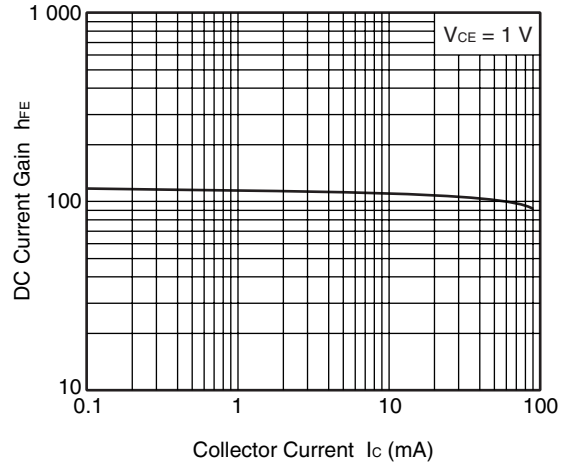
Q1

DC CURRENT GAIN vs. COLLECTOR CURRENT

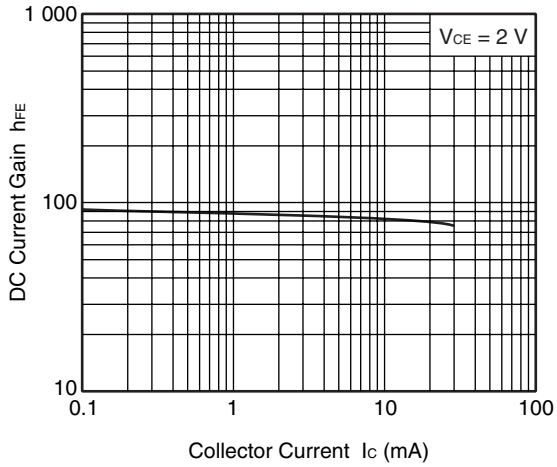


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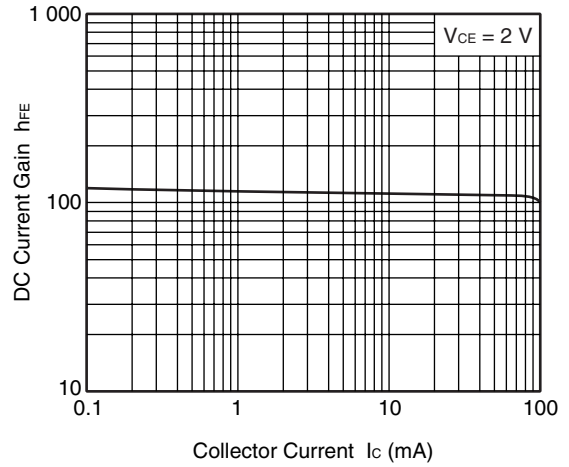
DC CURRENT GAIN vs. COLLECTOR CURRENT



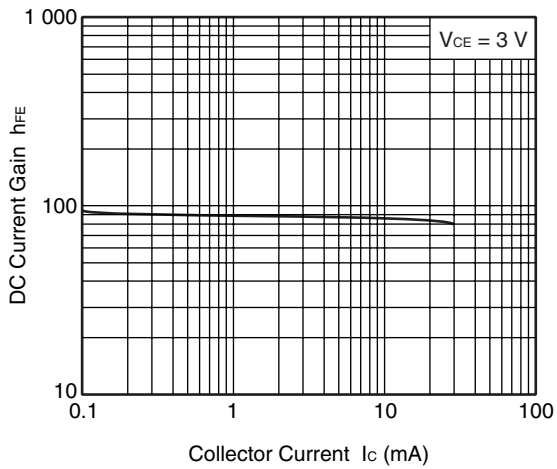
DC CURRENT GAIN vs. COLLECTOR CURRENT



DC CURRENT GAIN vs. COLLECTOR CURRENT



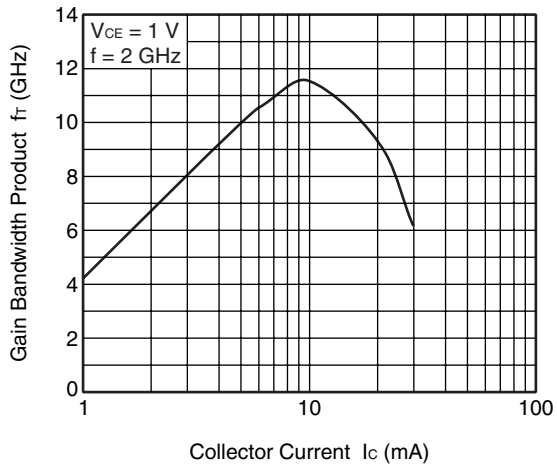
DC CURRENT GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

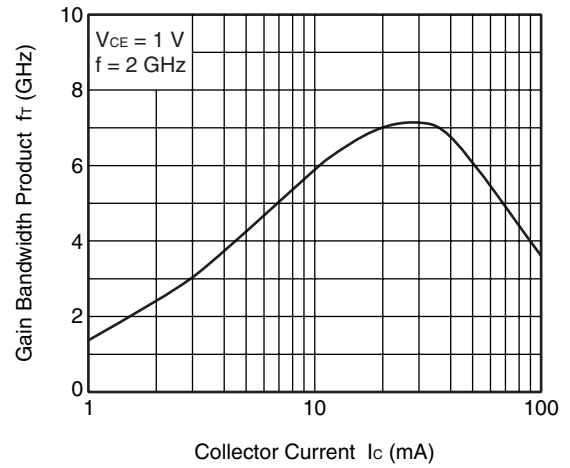
Q1

GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

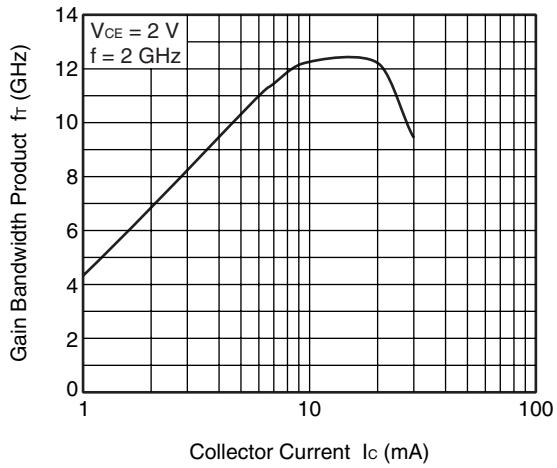


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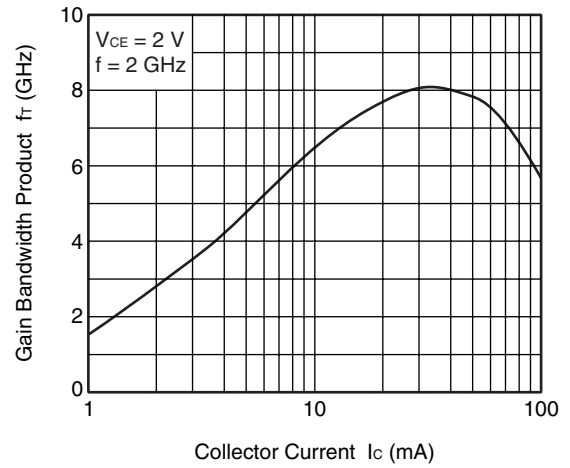
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



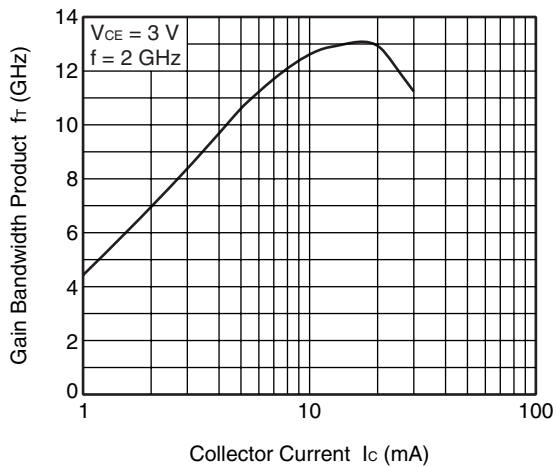
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



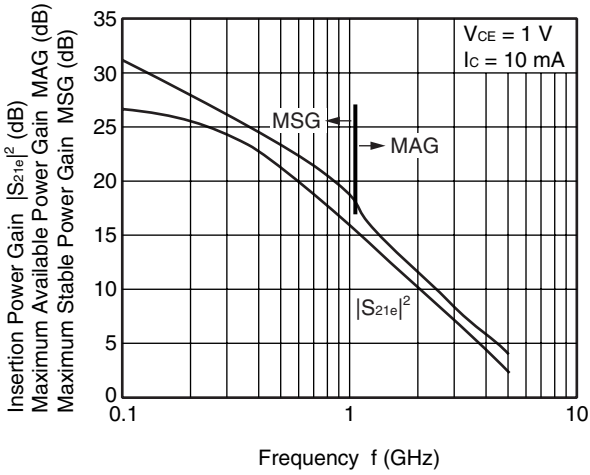
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



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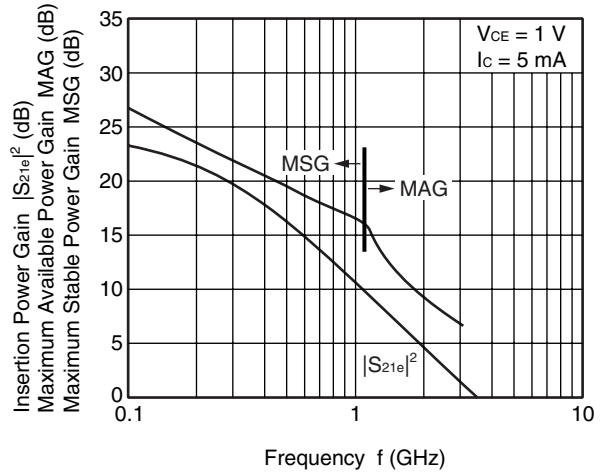
Q1

INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY

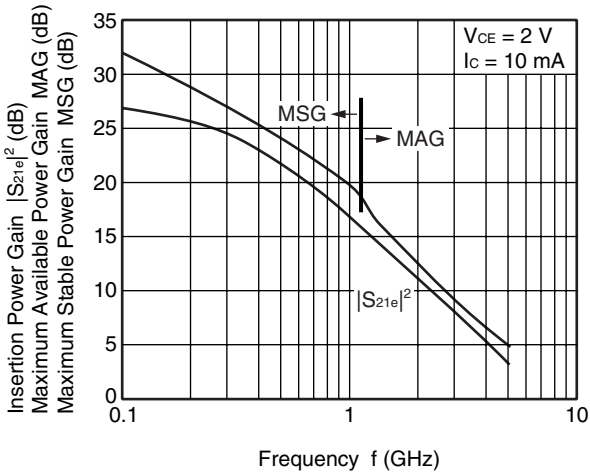


Q2

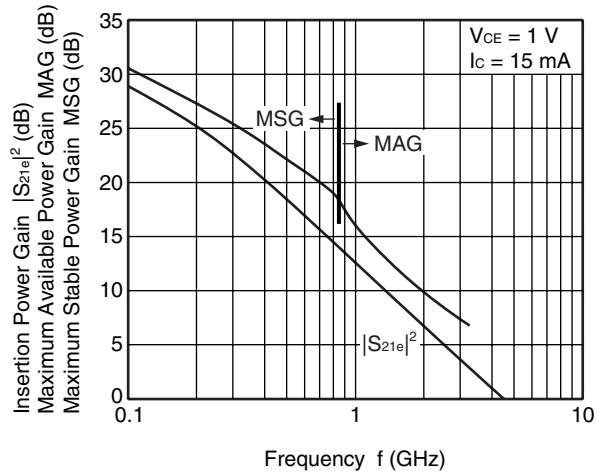
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



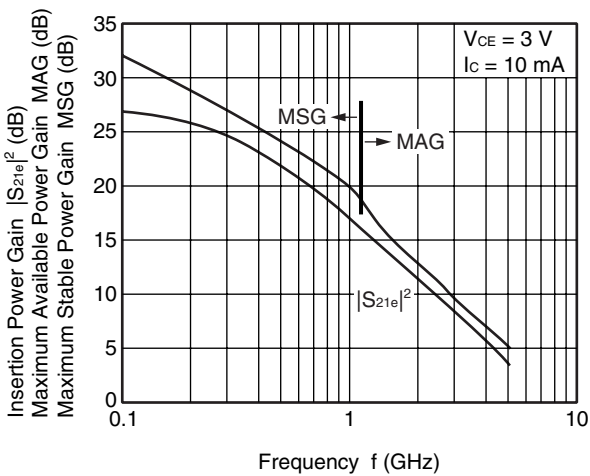
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



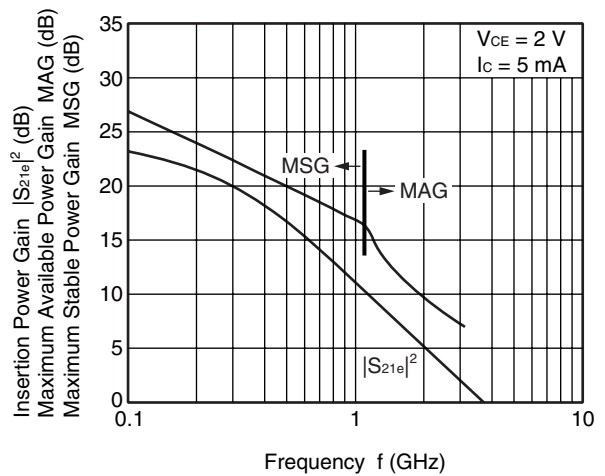
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



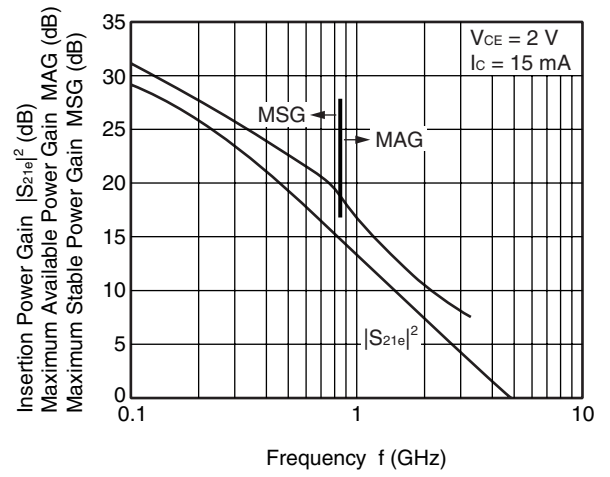
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



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Q2

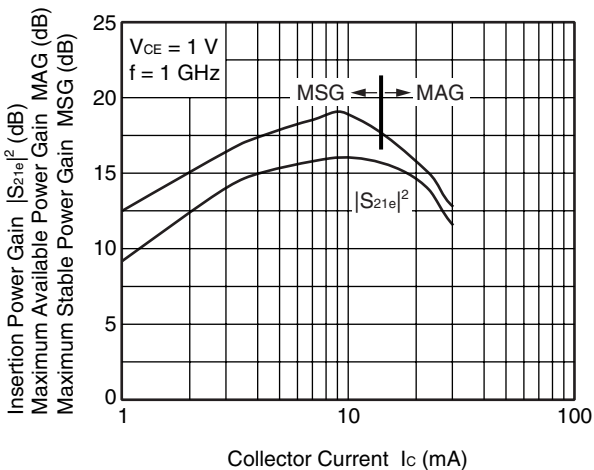
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



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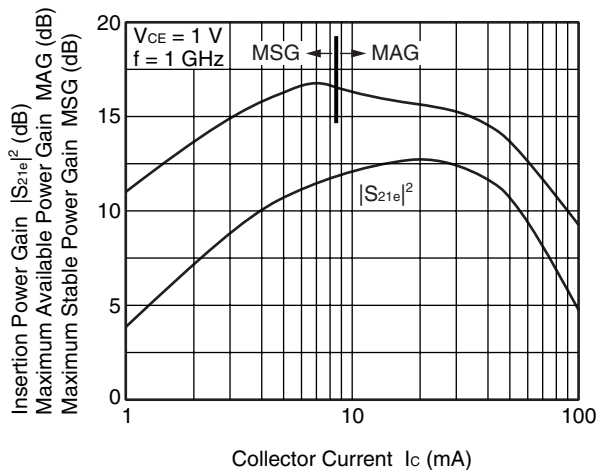
Q1

INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

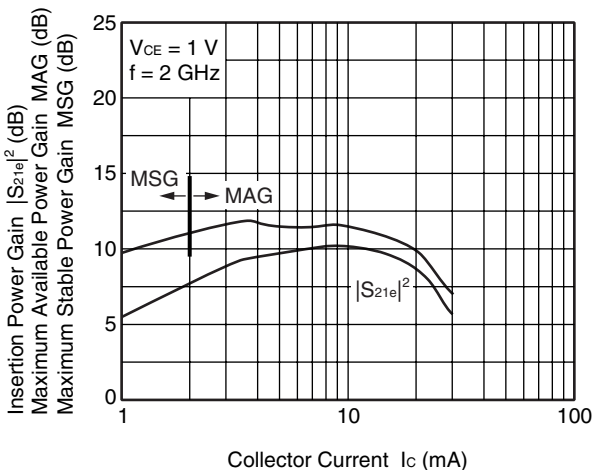


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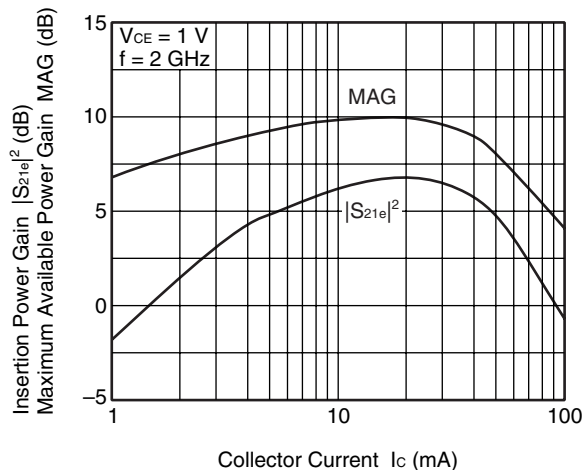
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



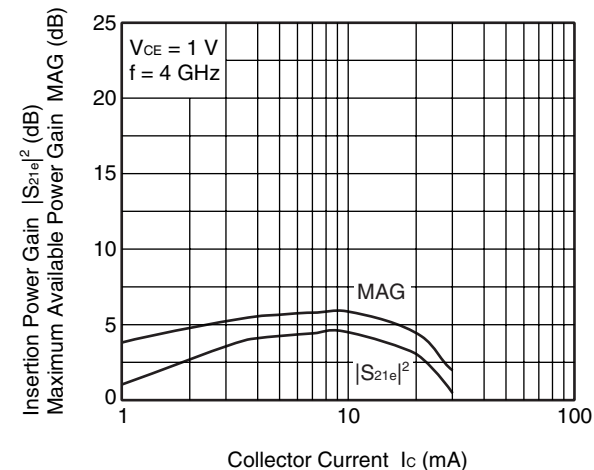
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



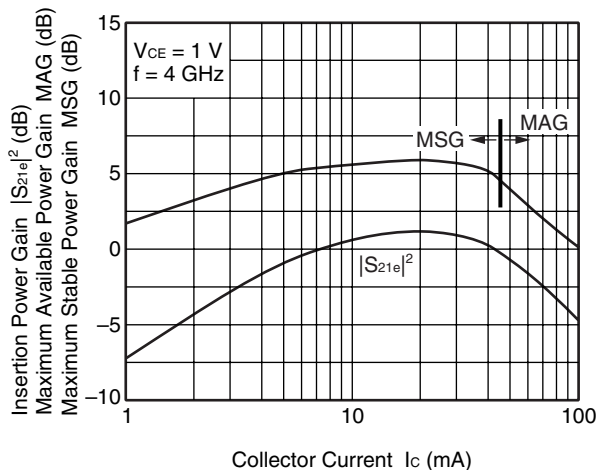
INSERTION POWER GAIN, MAG vs. COLLECTOR CURRENT



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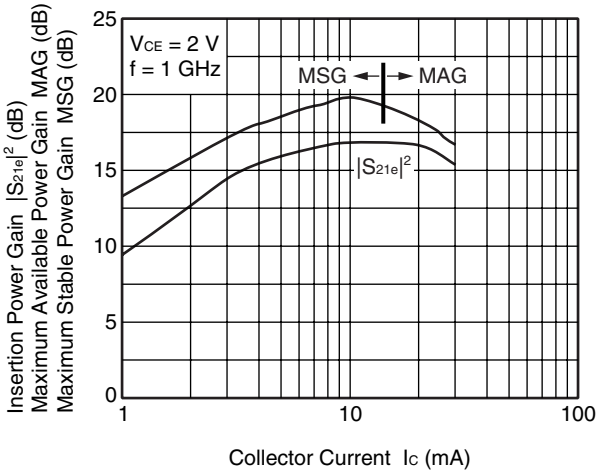
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



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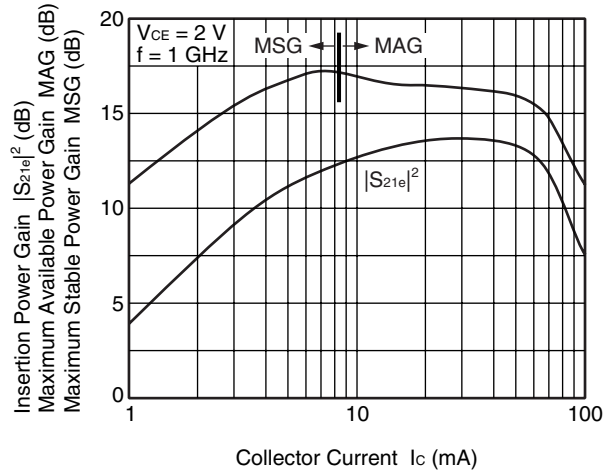
Q1

INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

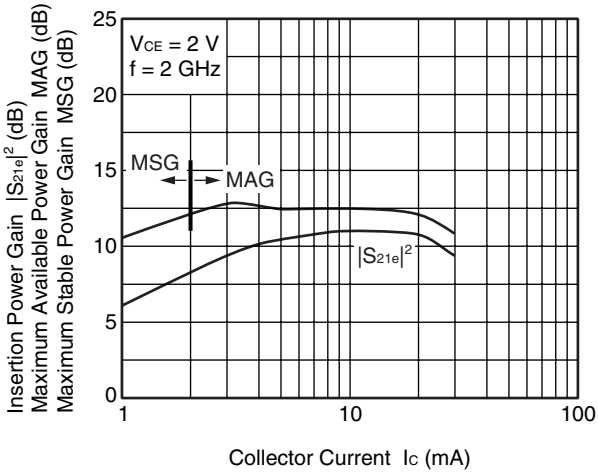


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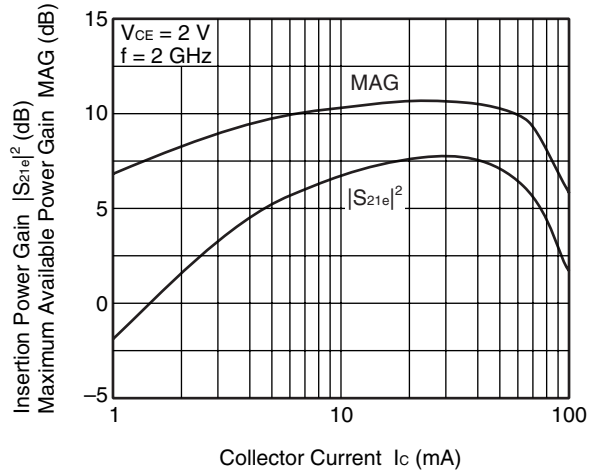
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



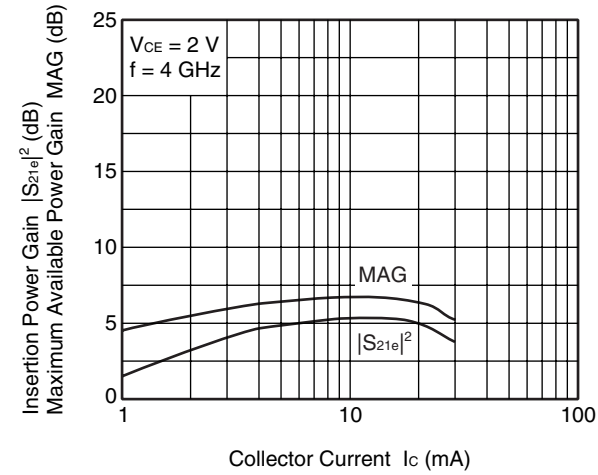
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



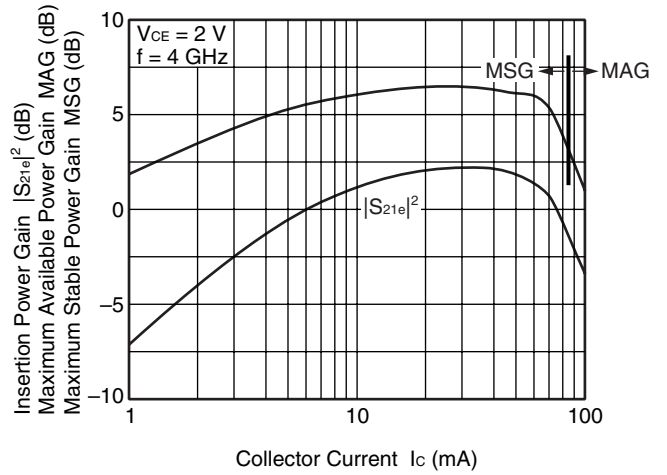
INSERTION POWER GAIN, MAG vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG vs. COLLECTOR CURRENT



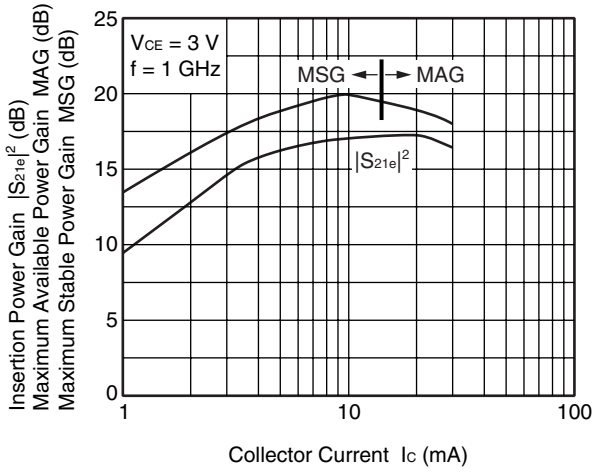
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



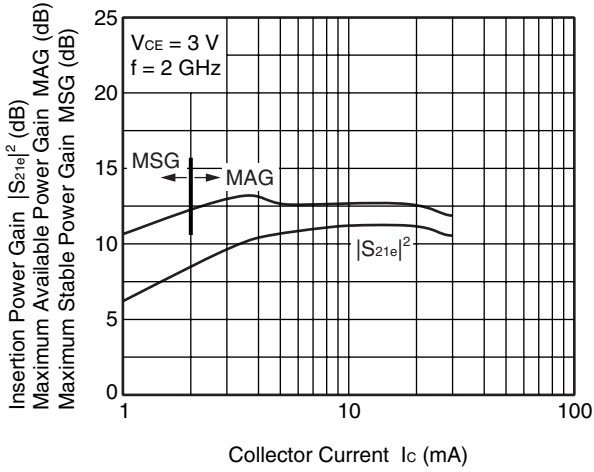
Remark The graphs indicate nominal characteristics.

Q1

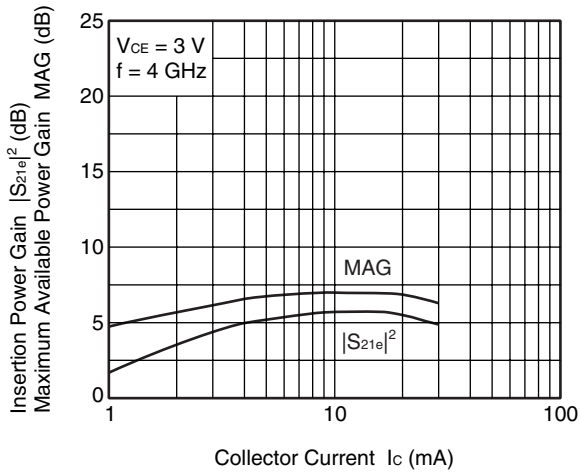
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



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vs. COLLECTOR CURRENT



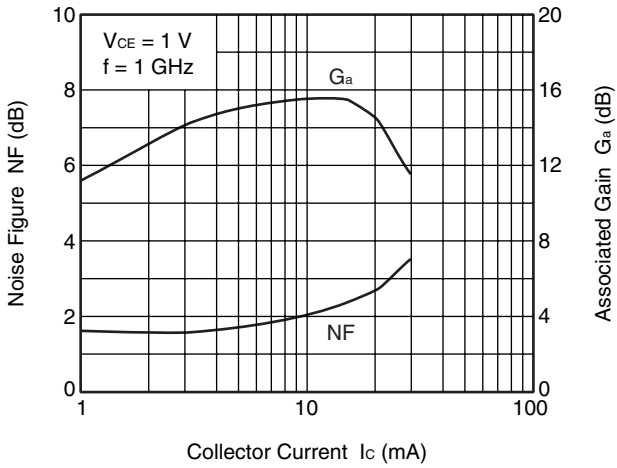
INSERTION POWER GAIN, MAG
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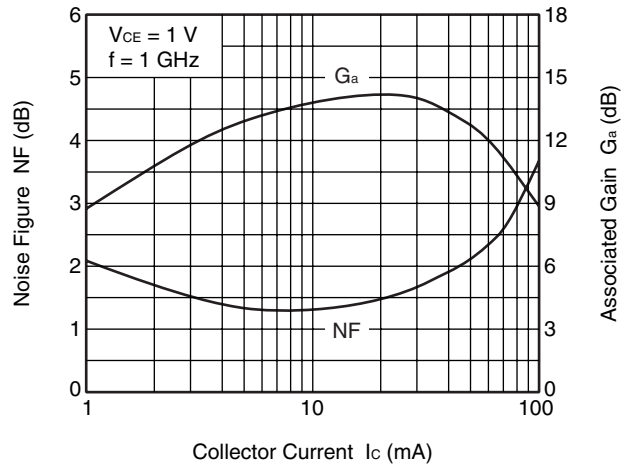
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

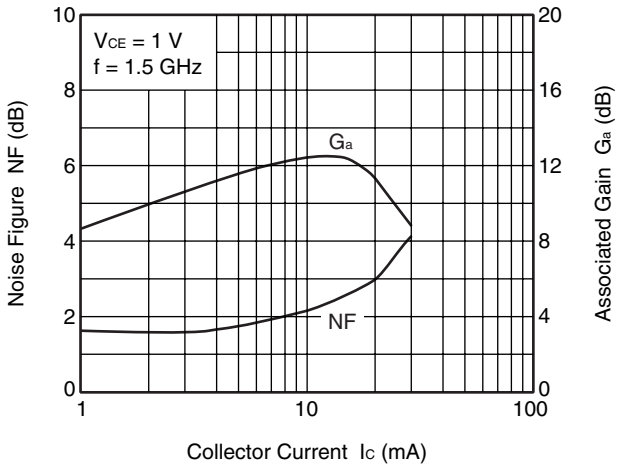


Q2

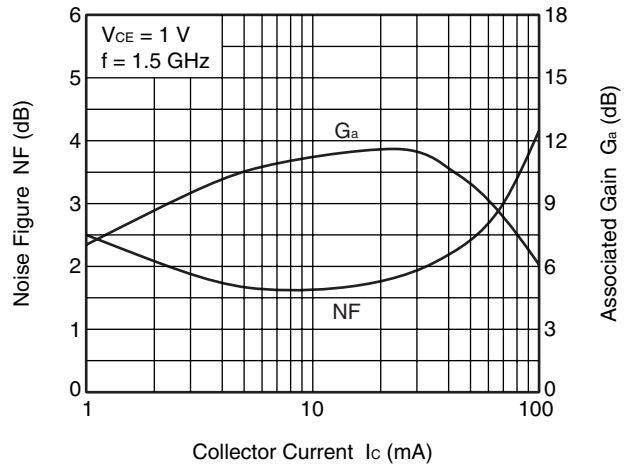
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



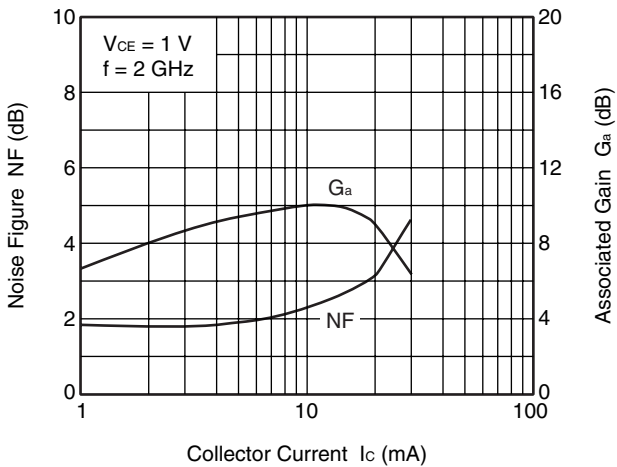
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



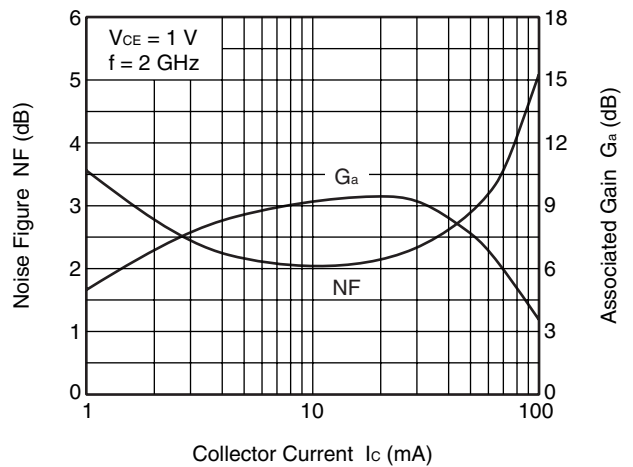
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



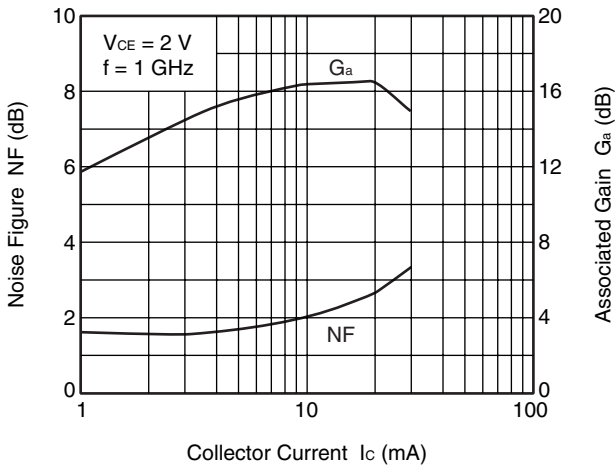
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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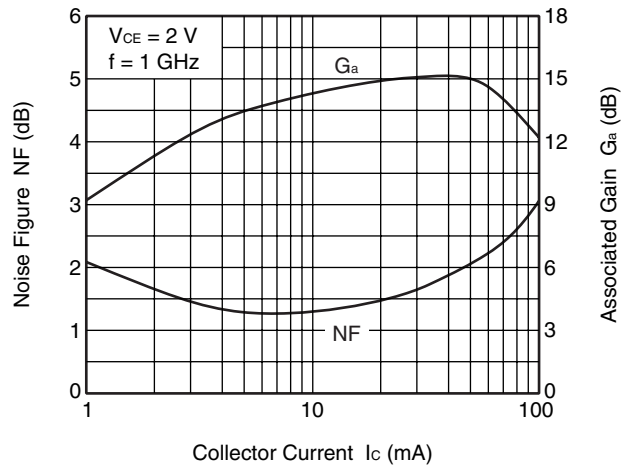
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

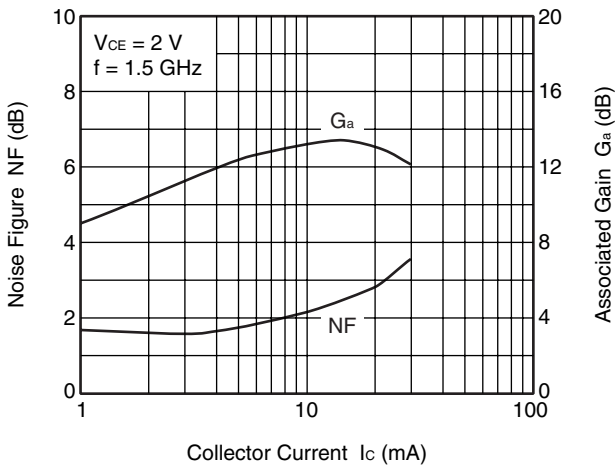


Q2

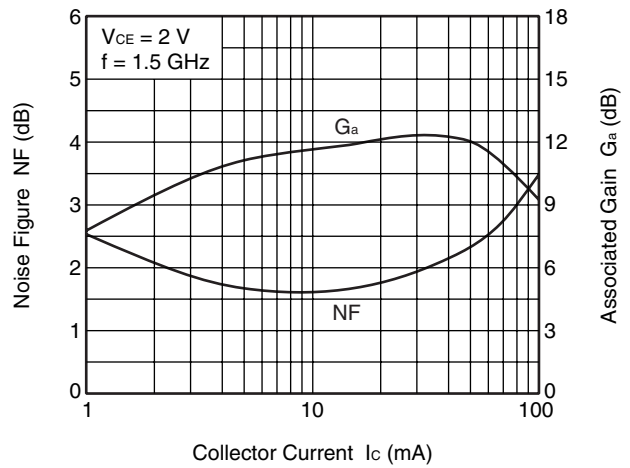
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



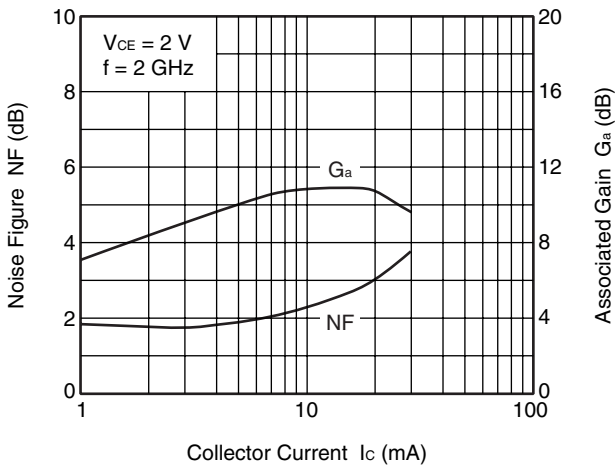
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



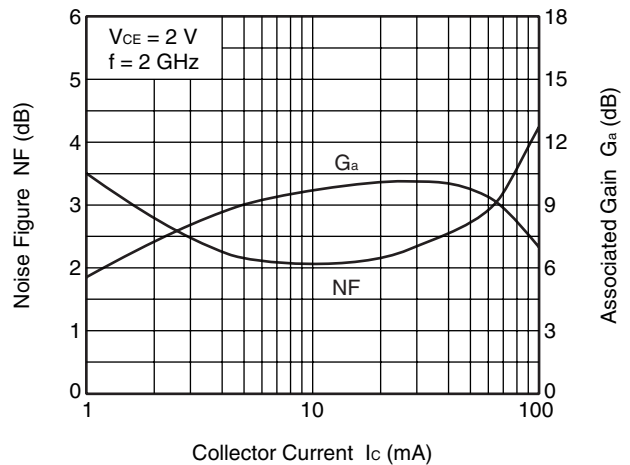
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



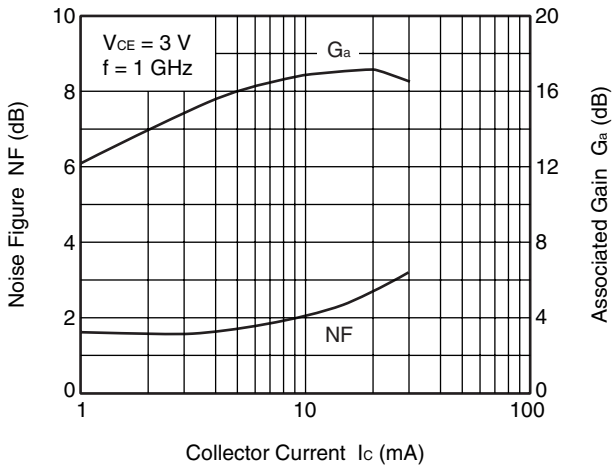
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



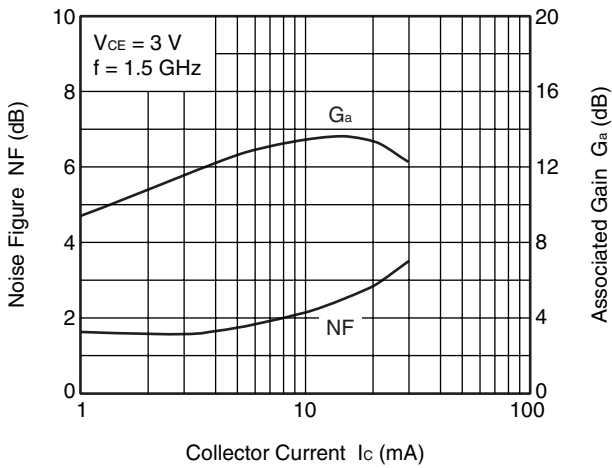
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Q1

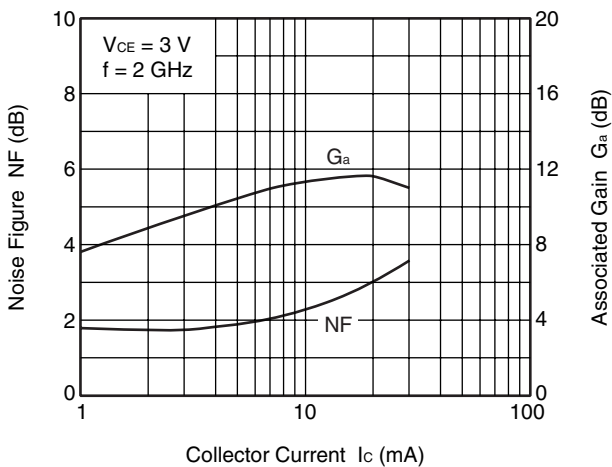
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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.

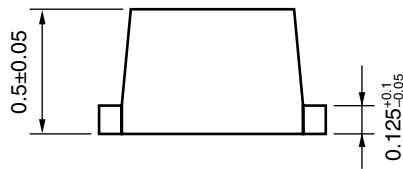
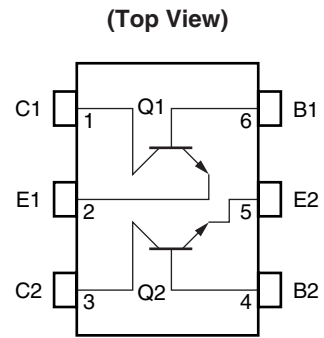
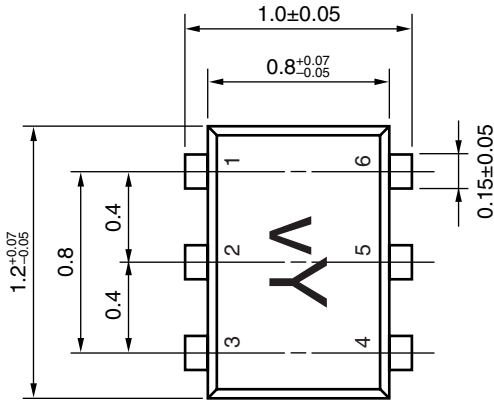
Click [here](#) to download S-parameters.

[RF and Microwave] → [Device Parameters]

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

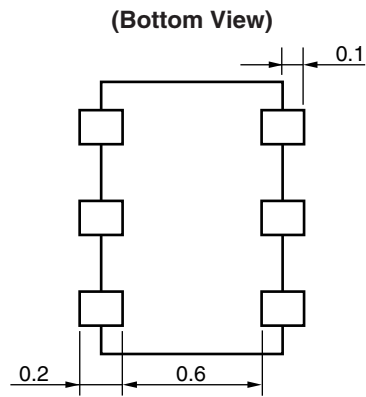
<R> PACKAGE DIMENSIONS

6-PIN LEAD-LESS MINIMOLD (1208) (UNIT: mm)



PIN CONNECTIONS

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



Revision History

 μ PA862TD Data Sheet

Rev.	Date	Description	
		Page	Summary
–	July 2001	–	Previous No. : P15685EJ1V0DS00
2.00	Dec 19, 2011	Throughout	Deletion of S-PARAMETERS Q1, S-PARAMETERS Q2
		p.1	Modification of FEATURES
		p.1	Modification of BUILT-IN TRANSISTORS
		p.1	Modification of ORDERING INFORMATION
		p.18	Modification of PACKAGE DIMENSIONS

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