



NPN SILICON RF TWIN TRANSISTOR

μ PA828TD

NPN SILICON RF TRANSISTOR (WITH 2 ELEMENTS) IN A 6-PIN LEAD-LESS MINIMOLD (M16, 1208 PKG)

FEATURES

- Built-in low phase distortion transistor suited for OSC applications
 $f_T = 9.0 \text{ GHz TYP.}$, $|S_{21e}|^2 = 7.5 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_C = 10 \text{ mA, } f = 2 \text{ GHz}$
 $NF = 1.3 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_C = 3 \text{ mA, } f = 2 \text{ GHz}$
- Built-in 2 transistors ($2 \times \text{NE687}$)
- 6-pin lead-less minimold (M16, 1208 PKG)

BUILT-IN TRANSISTORS

	Q1, Q2
3-pin thin-type ultra super minimold part No.	NE687

<R> ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
μ PA828TD	μ PA828TD-A	6-pin lead-less minimold (M16, 1208 PKG) (Pb-Free)	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 1 (Q1 Collector), Pin 6 (Q1 Base) face the perforation side of the tape
μ PA828TD-T3	μ PA828TD-T3-A		10 kpcs/reel	

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

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

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ABSOLUTE MAXIMUM RATINGS ($T_A = +25^\circ\text{C}$)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	5.0	V
Collector to Emitter Voltage	V_{CEO}	3.0	V
Emitter to Base Voltage	V_{EBO}	2	V
Collector Current	I_C	30	mA
Total Power Dissipation	P_{tot} ^{Note}	90 in 1 element	mW
		180 in 2 elements	
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$

Note Mounted on $1.08\text{ cm}^2 \times 1.0\text{ mm}$ (t) glass epoxy PCB

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I_{CBO}	$V_{CB} = 5\text{ V}, I_E = 0\text{ mA}$	–	–	100	nA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1\text{ V}, I_C = 0\text{ mA}$	–	–	100	nA
DC Current Gain	h_{FE} ^{Note 1}	$V_{CE} = 2\text{ V}, I_C = 20\text{ mA}$	70	–	140	–
RF Characteristics						
Gain Bandwidth Product (1)	f_T	$V_{CE} = 1\text{ V}, I_C = 10\text{ mA}, f = 2\text{ GHz}$	7.0	9.0	–	GHz
Gain Bandwidth Product (2)	f_T	$V_{CE} = 2\text{ V}, I_C = 20\text{ mA}, f = 2\text{ GHz}$	9.0	11.0	–	GHz
Insertion Power Gain (1)	$ S_{21e} ^2$	$V_{CE} = 1\text{ V}, I_C = 10\text{ mA}, f = 2\text{ GHz}$	6.0	7.5	–	dB
Insertion Power Gain (2)	$ S_{21e} ^2$	$V_{CE} = 2\text{ V}, I_C = 20\text{ mA}, f = 2\text{ GHz}$	7.0	8.5	–	dB
Noise Figure (1)	NF	$V_{CE} = 1\text{ V}, I_C = 3\text{ mA}, f = 2\text{ GHz}, Z_S = Z_{opt}$	–	1.3	2.0	dB
Noise Figure (2)	NF	$V_{CE} = 2\text{ V}, I_C = 3\text{ mA}, f = 2\text{ GHz}, Z_S = Z_{opt}$	–	1.3	2.0	dB
Reverse Transfer Capacitance	C_{re} ^{Note 2}	$V_{CB} = 2\text{ V}, I_E = 0\text{ mA}, f = 1\text{ MHz}$	–	0.4	0.8	pF
h_{FE} Ratio	h_{FE1}/h_{FE2}	$V_{CE} = 2\text{ V}, I_C = 20\text{ mA},$ h_{FE1} : Smaller value of Q1 and Q2, h_{FE2} : Larger value of Q1 and Q2	0.85	–	–	–

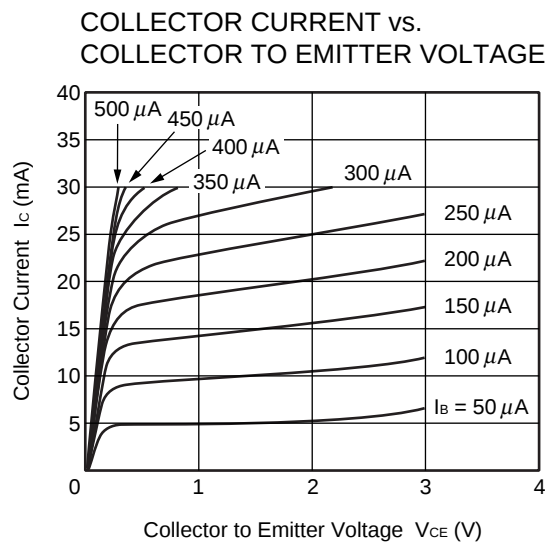
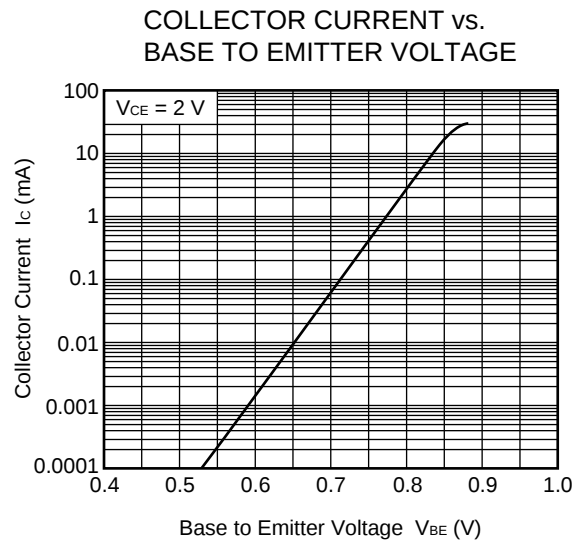
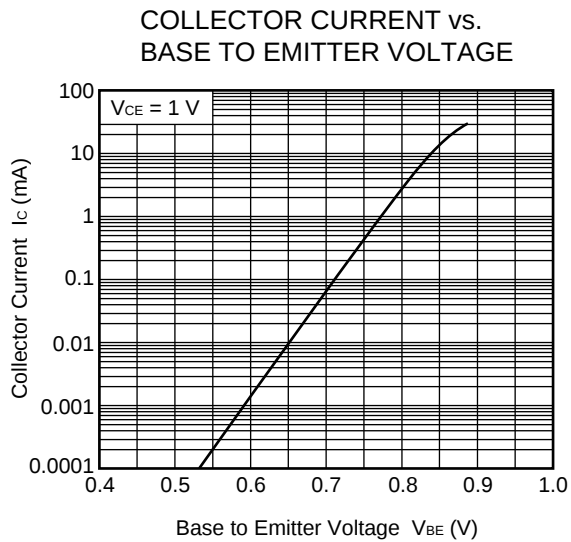
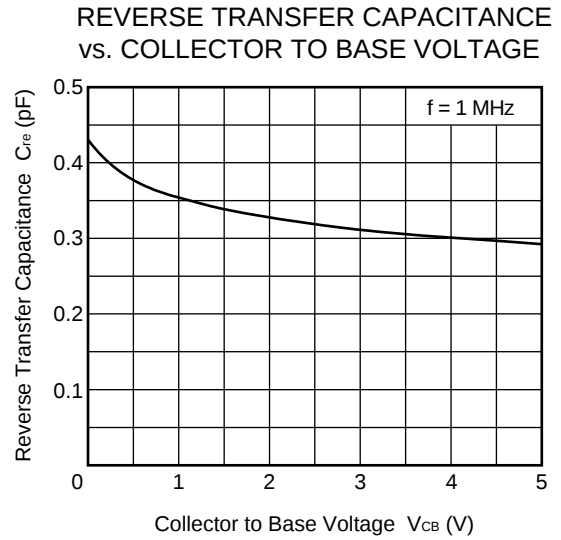
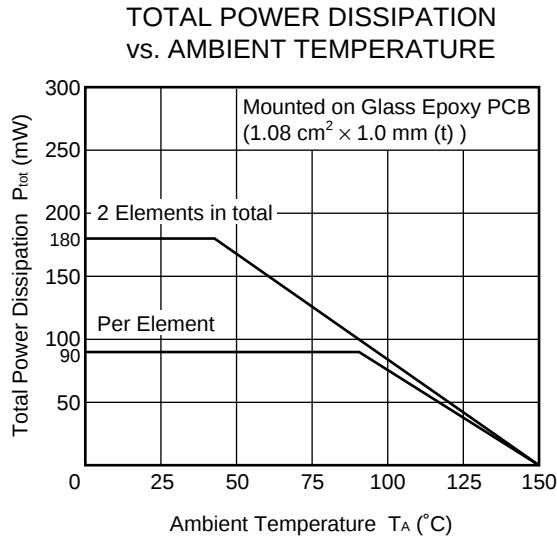
Notes 1. Pulse measurement: $PW \leq 350\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$

2. Collector to base capacitance when the emitter grounded.

 h_{FE} CLASSIFICATION

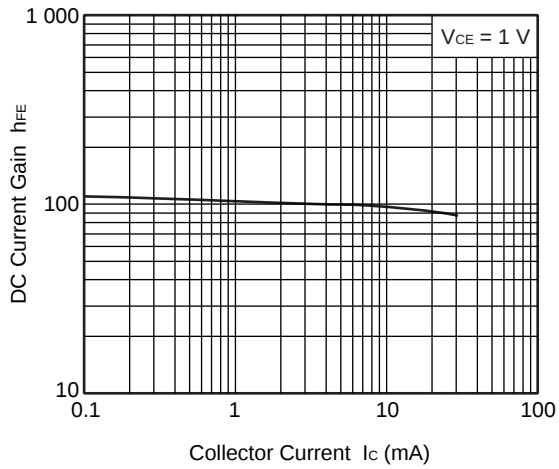
Rank	FB
Marking	kL
h_{FE} Value	70 to 140

<R> **TYPICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise specified)**

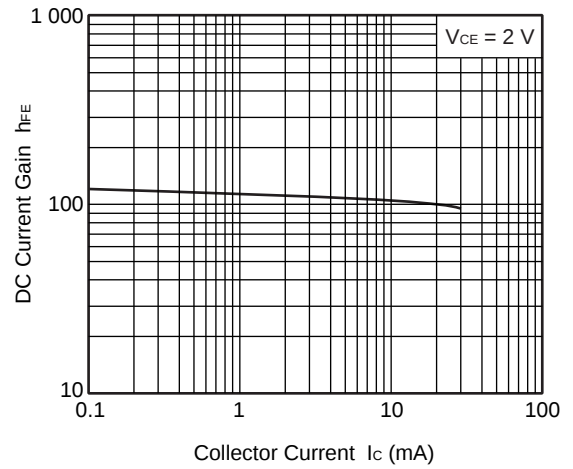


Remark The graphs indicate nominal characteristics.

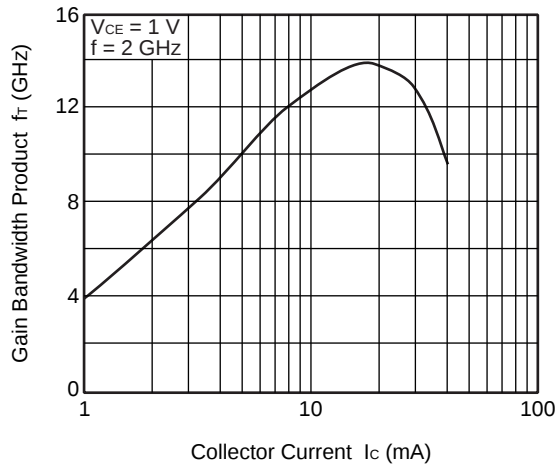
DC CURRENT GAIN vs.
COLLECTOR CURRENT



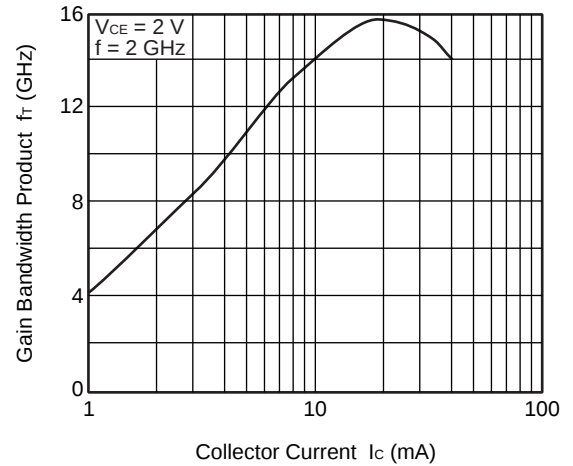
DC CURRENT GAIN vs.
COLLECTOR CURRENT



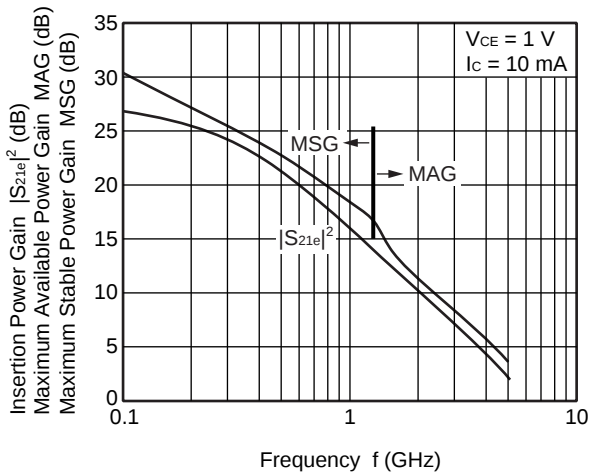
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



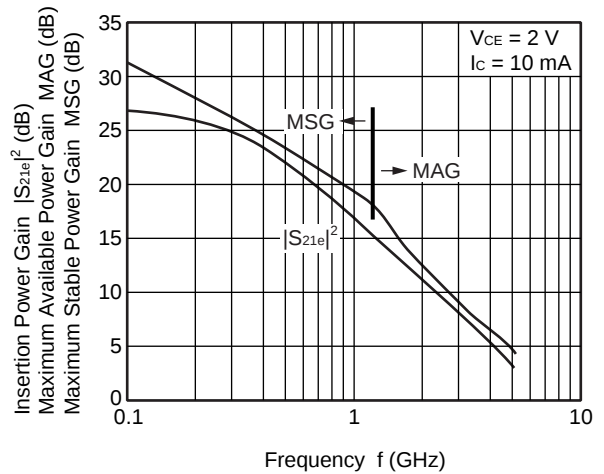
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



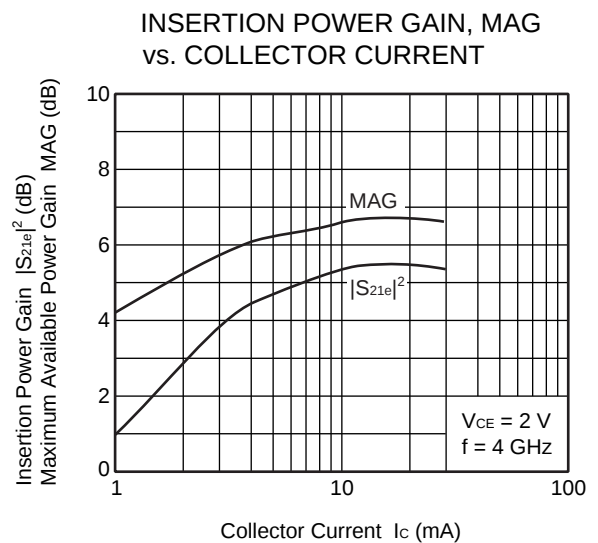
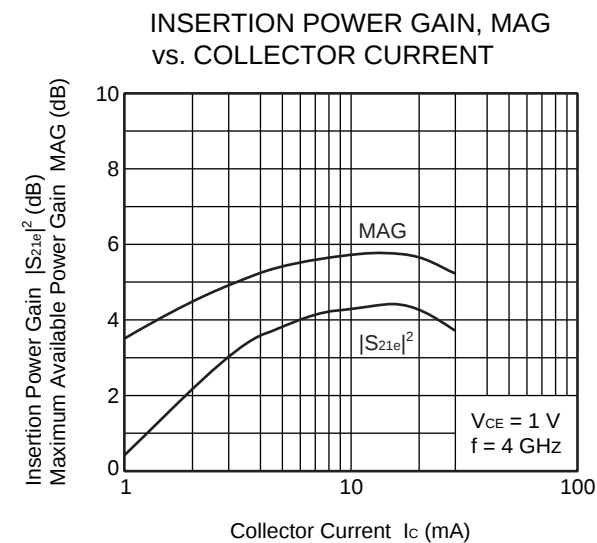
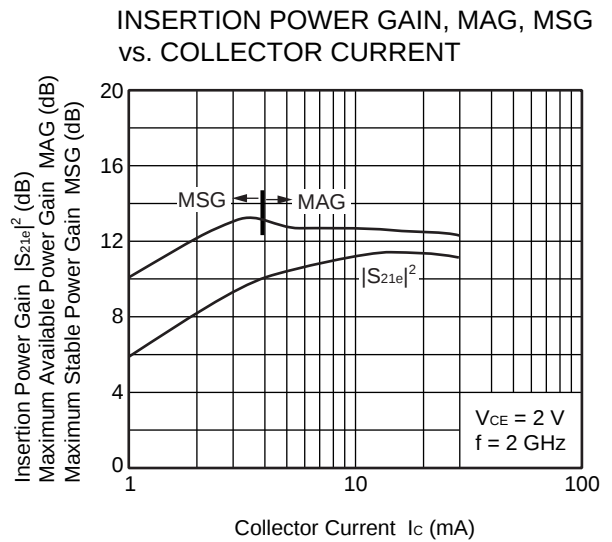
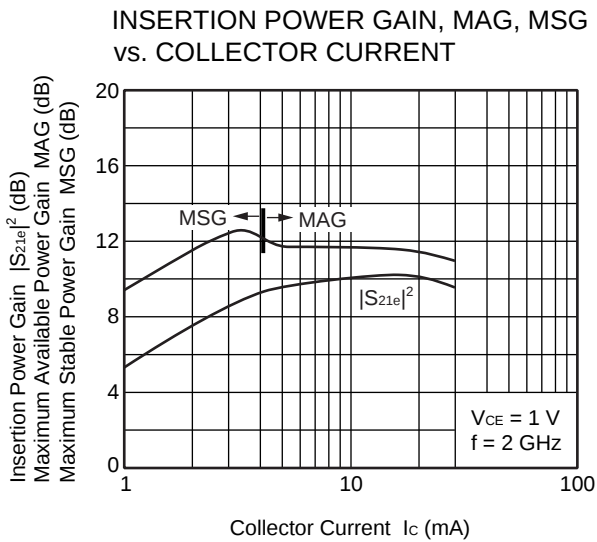
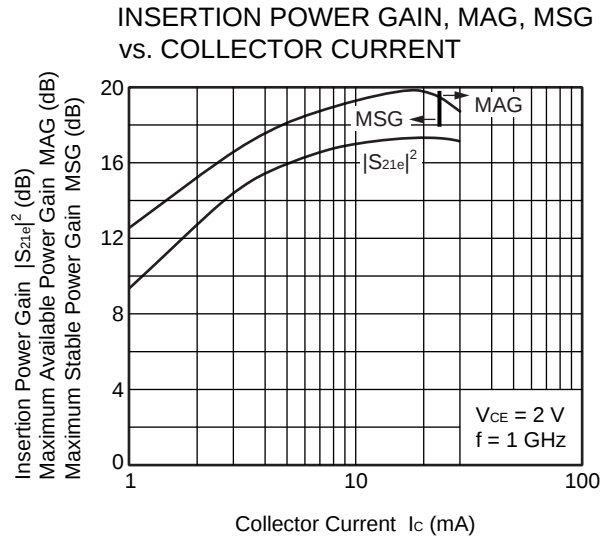
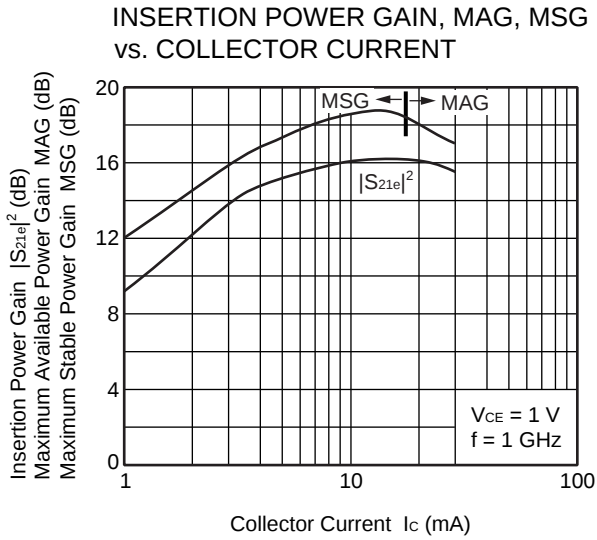
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY

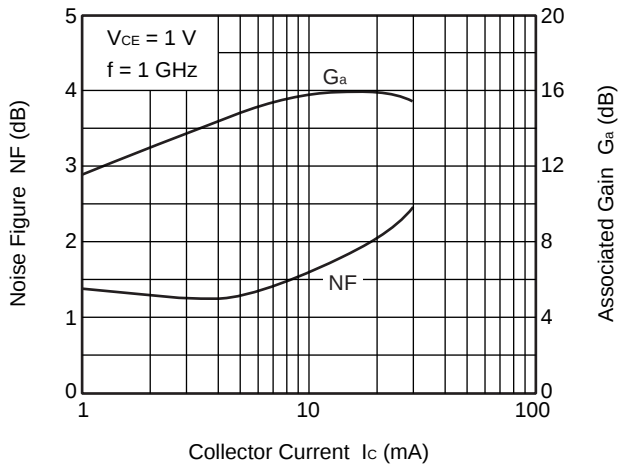


Remark The graphs indicate nominal characteristics.

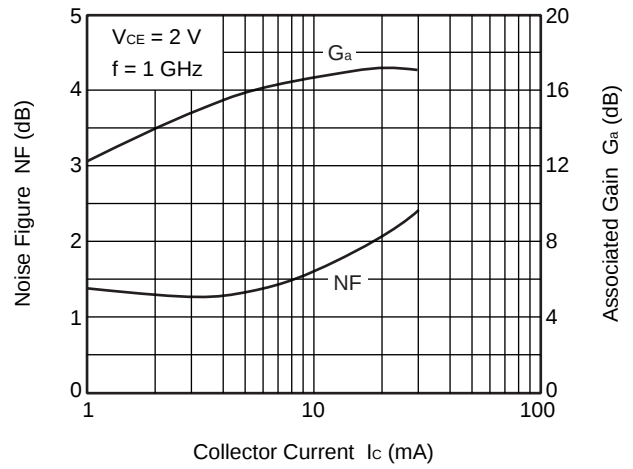


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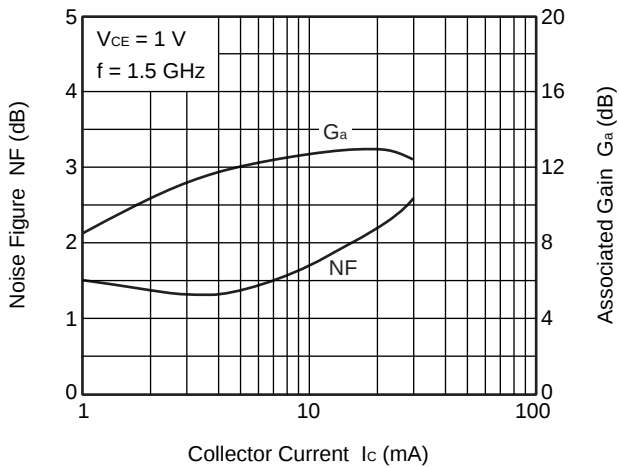
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



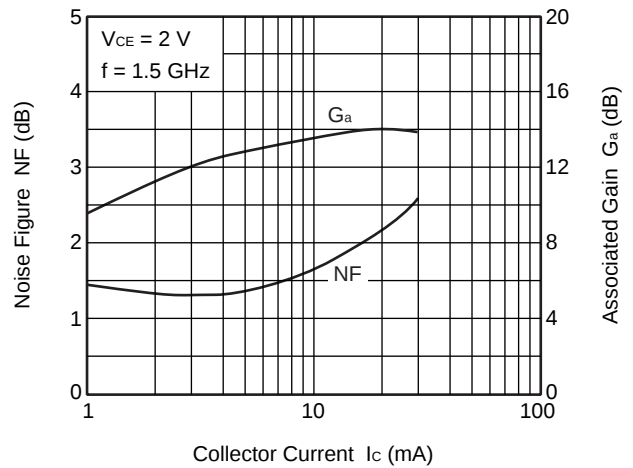
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



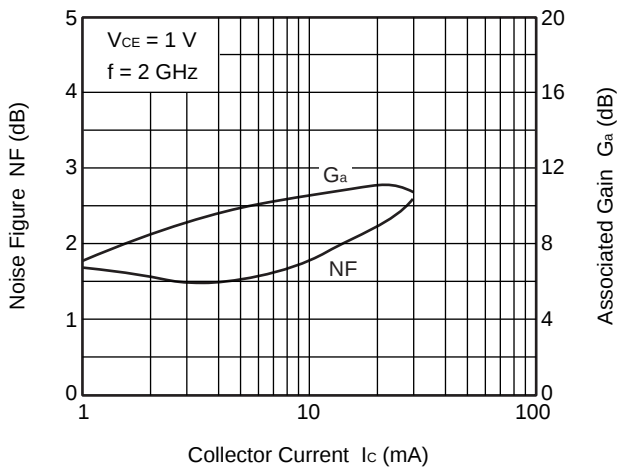
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



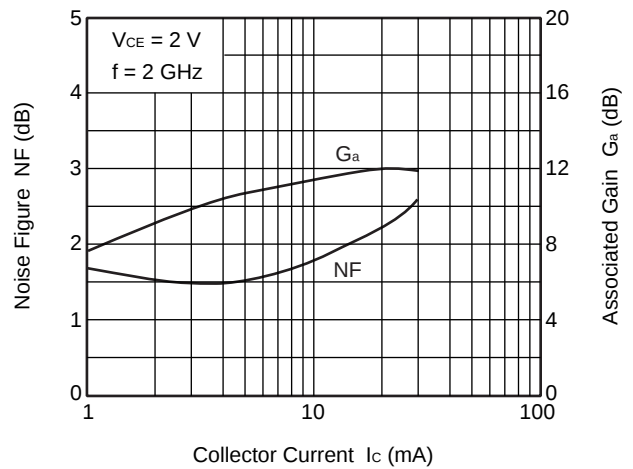
NOISE FIGURE, ASSOCIATED GAIN
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NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



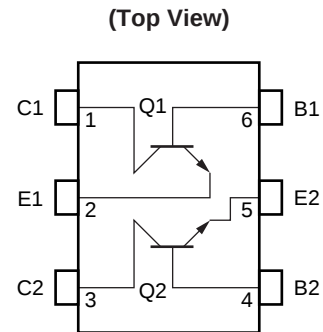
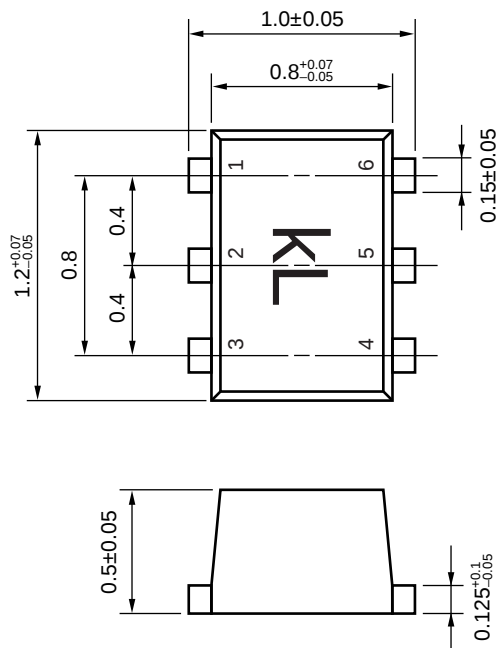
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN LEAD-LESS MINIMOLD (M16, 1208 PKG) (UNIT: mm)



PIN CONNECTIONS

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

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