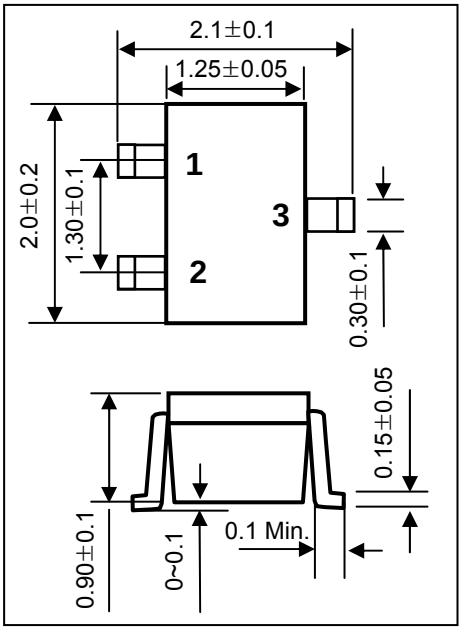
AUK Semiconductor

TBN4228 Series

Si NPN Transistor

SOT-323 **Unit in mm**



Pin Configuration

1. Base
2. Emitter
3. Collector

☐ *Applications*

- VHF and UHF low noise amplifier

☐ *Features*

- High gain bandwidth product

  f_T = 9 GHz at V_{CE} = 3 V, I_C = 5 mA

- High power gain

  $|S_{21}|^2$ = 6.6 dB at V_{CE} = 3 V, I_C = 5 mA, f = 2 GHz

  $|S_{21}|^2$ = 12 dB at V_{CE} = 3 V, I_C = 10 mA, f = 1 GHz

- Low noise figure

  NF = 1.9 dB at V_{CE} = 3 V, I_C = 5 mA, f = 2 GHz

  NF = 1.2 dB at V_{CE} = 3 V, I_C = 3 mA, f = 1 GHz

☐ *Absolute Maximum Ratings* (T_A = 25 ℃)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	BV_{CBO}	20	V
Collector to Emitter Voltage	BV_{CEO}	8	V
Emitter to Base Voltage	BV_{EBO}	3	V
Collector Current	I_C	35	mA
Total Power Dissipation	P_{tot}	150	mW
Operating Junction Temperature	T_j	150	℃
Storage Temperature	T_{stg}	-65 ~ 150	℃

Caution : **E**lectro **S**tatic **D**ischarge sensitive device

☐ *Electrical Characteristics* (T_A = 25 ℃)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Collector Cut-off Current	I_{CBO}	V_{CB} = 15 V, I_E = 0 mA	-	-	0.5	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 2 V, I_C = 0 mA	-	-	0.5	μA
DC Current Gain	h_{FE}	V_{CE} = 3 V, I_C = 5 mA	70	100	250	
Gain Bandwidth Product	f_T	V_{CE} = 3 V, I_C = 5 mA	6.0	9.0	-	GHz
Insertion Power Gain	$\|S_{21}\|^2$	V_{CE} = 3 V, I_C = 5 mA, f = 2 GHz	5.0	6.6	-	dB
		V_{CE} = 3 V, I_C = 10 mA, f = 1 GHz	10.0	12.0	-	
Noise Figure	NF	V_{CE} = 3 V, I_C = 5 mA, f = 2 GHz	-	1.9	3.0	dB
Reverse Transfer Capacitance	C_{re}	V_{CB} = 3 V, I_E = 0 mA, f = 1 MHz	-	0.5	0.8	pF

☐ *h_{FE} Classification*

Marking	SO2	SO1
h_{FE} Value	70 - 140	125 - 250

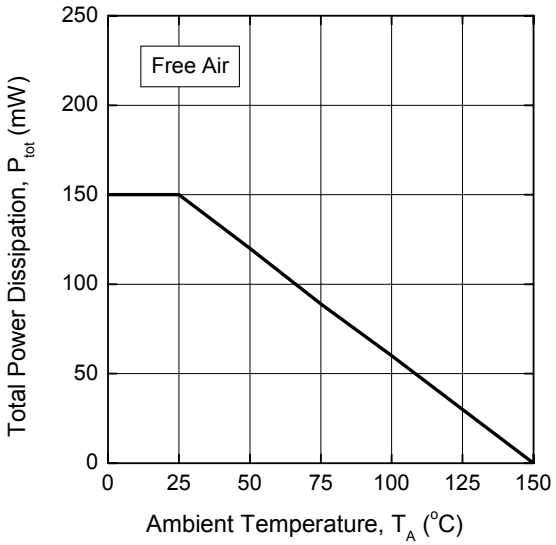
☐ *Available Package*

Unit in mm

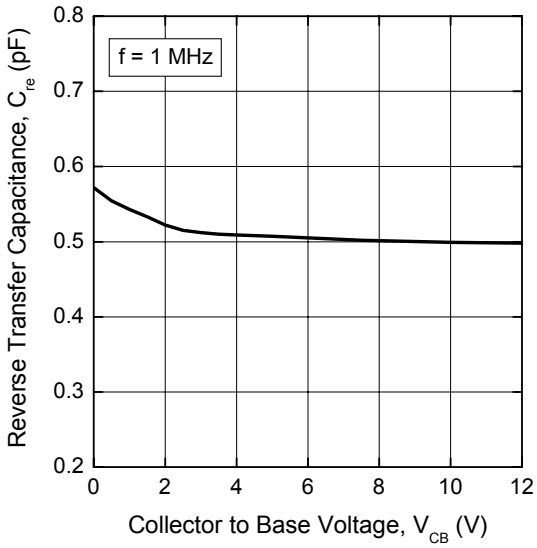
Product	Package	Dimension
TBN4228S	SOT-23	2.9 x 1.3, 1.2t
TBN4228U	SOT-323	2.0 x 1.25, 1.0t
TBN4228E	SOT-523	1.6 x 0.8, 0.8t
TBN4228KF	SOT-623F	1.4 x 0.8, 0.6t

□ *Typical Characteristics (T_A = 25 ℃, unless otherwise specified)*

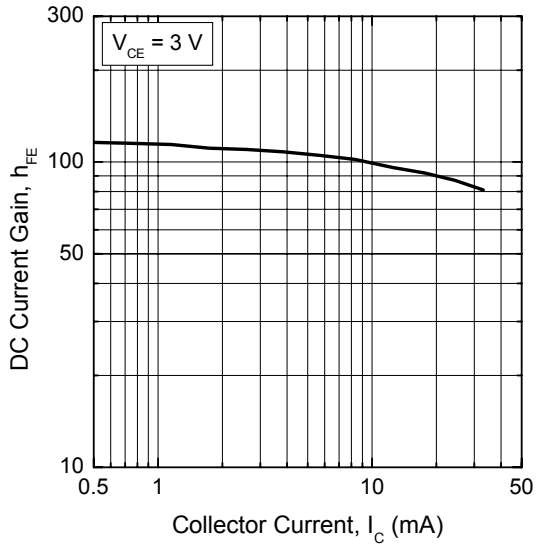
Total Power Dissipation vs. Ambient Temperature



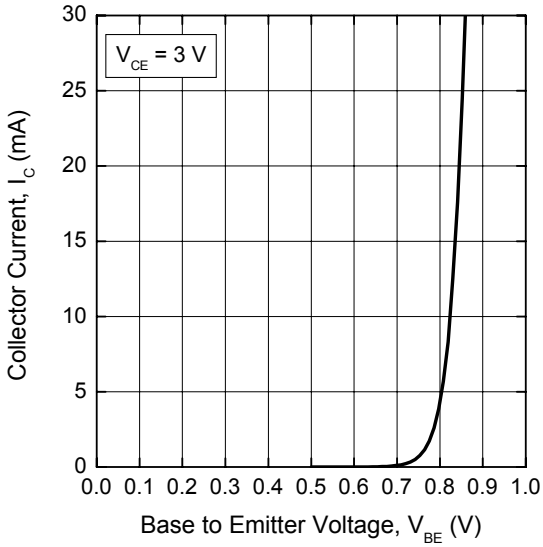
Reverse Transfer Capacitance vs. Collector to Base Voltage



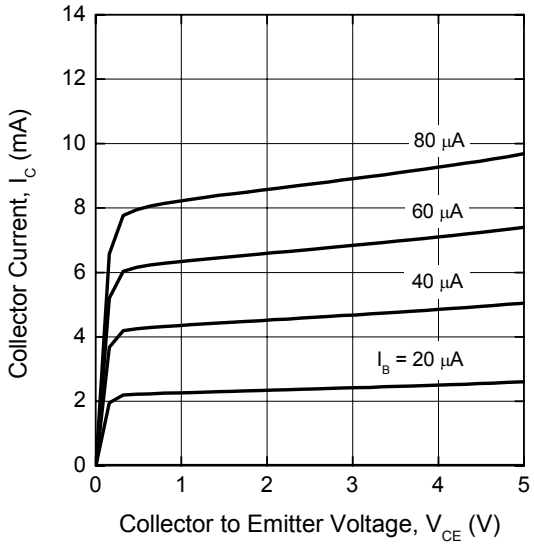
DC Current Gain vs. Collector Current



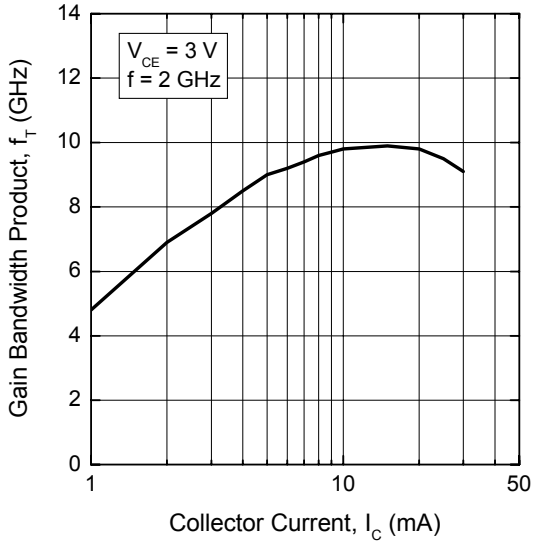
Collector Current vs. Base to Emitter Voltage



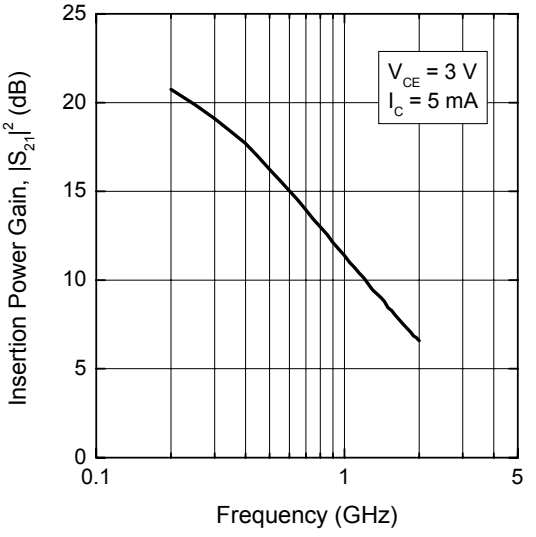
Collector Current vs. Collector to Emitter Voltage



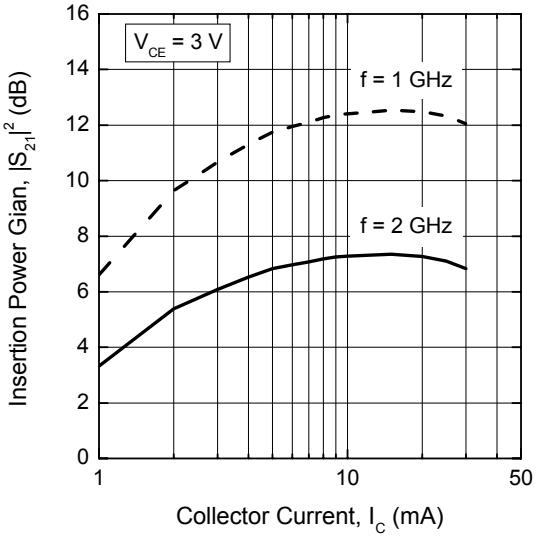
Gain Bandwidth Product vs. Collector Current



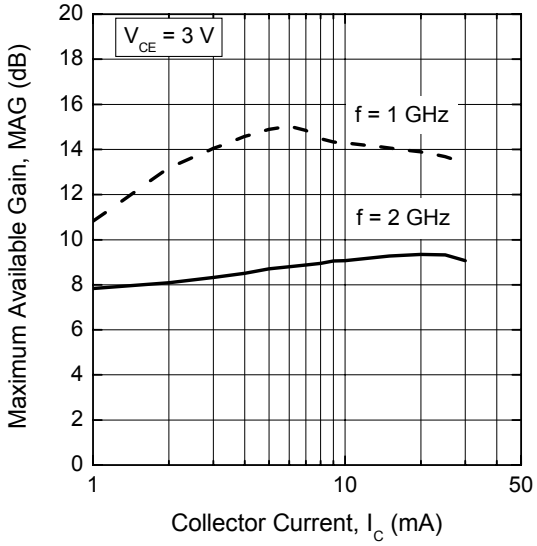
Insertion Power Gain vs. Frequency



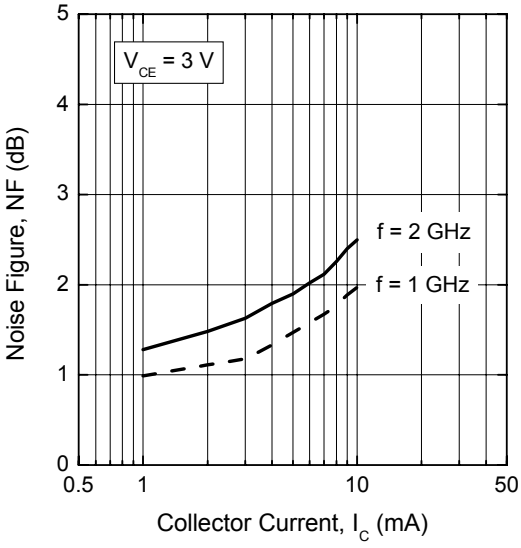
Insertion Power Gain vs. Collector Current



Maximum Available Gain vs. Collector Current



Noise Figure vs. Collector Current

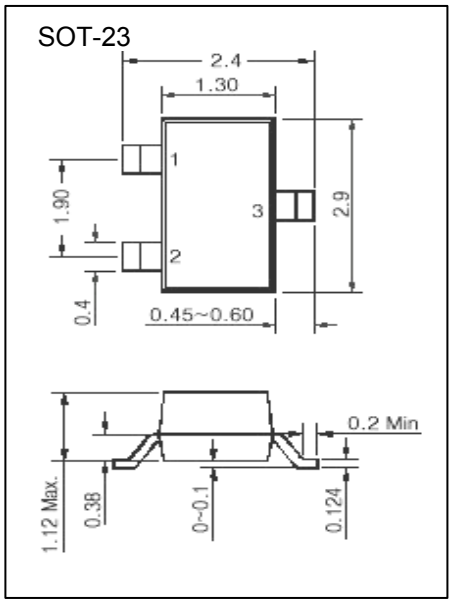


Noise Parameter vs. Frequency

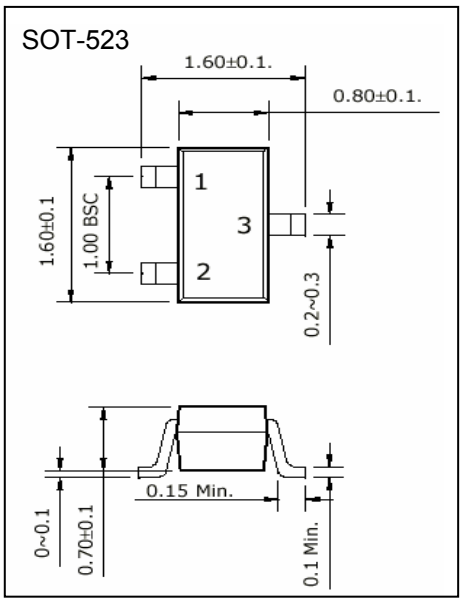
(at V_{CE} = 3 V, I_C = 5 mA)

Frequency (GHz)	Fmin (dB)	rn	Γ_{opt}		Association gain (dB)	G_{max} (dB)
			Mag	Phase		
0.9	1.579	0.493	0.5441	24.21	11.591	15.517
1	1.465	0.474	0.5147	30.26	11.087	14.827
1.5	1.745	0.446	0.4479	38.57	8.4	10.687
2	1.984	0.364	0.3423	47.01	6.902	8.926

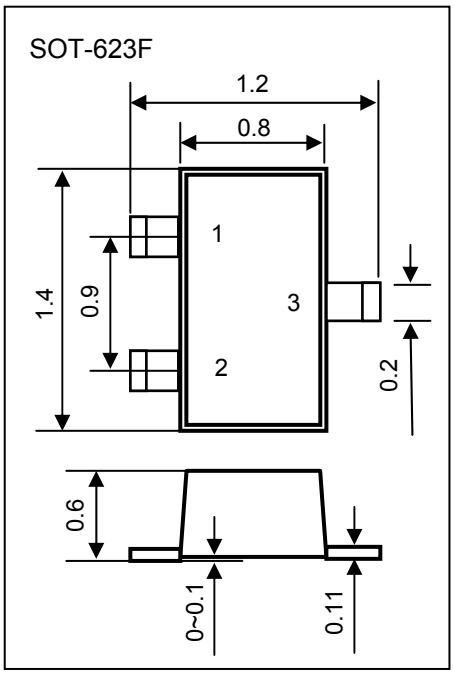
☐ **Dimensions of TBN4228S in mm**



☐ **Dimensions of TBN4228E in mm**



☐ **Dimensions of TBN4228KF in mm**



Pin Configuration

(SOT-23, SOT-523, SOT-623F)

Pin No.	Symbol	Description
1	B	Base
2	E	Emitter
3	C	Collector