



**AT-41411**  
Surface Mount Low Noise  
Silicon Bipolar Transistor

T-31-15

**Features**

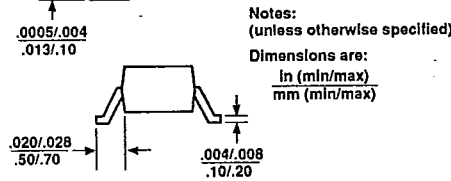
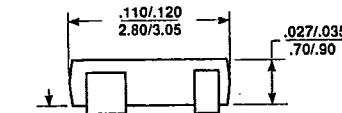
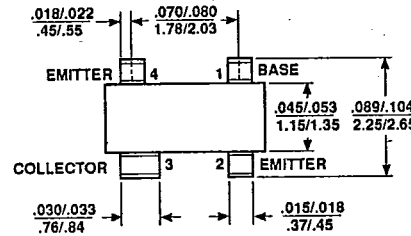
- Low Noise Figure: 1.4 dB typical at 1.0 GHz  
1.8 dB typical at 2.0 GHz
- High Associated Gain: 18.0 dB typical at 1.0 GHz  
13.0 dB typical at 2.0 GHz
- High Gain-Bandwidth Product: 7.0 GHz typical  $f_T$
- Low Cost Surface Mount Plastic Package
- Tape-and-Reel Packaging Option Available!

**Description**

Avantek's AT-41411 is a low cost NPN silicon bipolar transistor housed in the surface mount plastic SOT-143 package. This device is designed for use in low noise, wide band amplifier and oscillator applications operating over VHF, UHF and microwave frequencies.

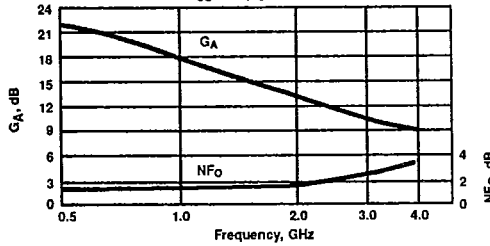
Excellent device uniformity, performance and reliability are produced by the use of ion-implantation, self-alignment techniques, and gold metallization in the fabrication of these devices.

**Avantek SOT-143 Plastic**



Notes:  
(unless otherwise specified)  
Dimensions are:  
in (min/max)  
mm (min/max)

**NOISE FIGURE AND ASSOCIATED GAIN  
vs. FREQUENCY**  
 $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$



**Noise Parameters:  $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$**

Freq. GHz	NF0 dB	Gamma Opt Mag	Ang	R <sub>N</sub> /50
0.1	1.3	.12	4	0.17
0.5	1.3	.10	23	0.17
1.0	1.4	.07	57	0.16
2.0	1.8	.09	-158	0.16
4.0	3.5	.31	-87	0.38

**Electrical Specifications,  $T_A = 25^\circ\text{C}$**

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
NF0	Optimum Noise Figure: $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$ $f = 1.0\text{ GHz}$ $f = 2.0\text{ GHz}$ $f = 4.0\text{ GHz}$	dB		1.4 1.8 3.5	
GA	Gain @ NF0: $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$ $f = 1.0\text{ GHz}$ $f = 2.0\text{ GHz}$ $f = 4.0\text{ GHz}$	dB		18.0 13.0 9.0	
$ S_{21E} ^2$	Insertion Power Gain: $V_{CE} = 8\text{ V}, I_C = 20\text{ mA}$ $f = 1.0\text{ GHz}$ $f = 2.0\text{ GHz}$	dB	14.5	16.5 11.0	
P <sub>1</sub> dB	Power Output @ 1 dB Gain Compression: $V_{CE} = 8\text{ V}, I_C = 20\text{ mA}$ $f = 2.0\text{ GHz}$	dBm		17.0	
G <sub>1</sub> dB	1 dB Compressed Gain: $V_{CE} = 8\text{ V}, I_C = 20\text{ mA}$ $f = 2.0\text{ GHz}$	dB		13.0	
f <sub>T</sub>	Gain Bandwidth Product: $V_{CE} = 8\text{ V}, I_C = 20\text{ mA}$	GHz		7.0	
h <sub>FE</sub>	Forward Current Transfer Ratio: $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$		30	150	300
I <sub>CBO</sub>	Collector Cutoff Current: $V_{CB} = 8\text{ V}$	mA			0.2
I <sub>EBO</sub>	Emitter Cutoff Current: $V_{EB} = 1\text{ V}$	mA			1.0

Note: 1. Refer to PACKAGING section "Tape-and-Reel Packaging for Surface Mount Semiconductors".

**Absolute Maximum Ratings**

Parameter	Symbol	Absolute Maximum <sup>1</sup>
Emitter-Base Voltage	VEBO	1.5 V
Collector-Base Voltage	VCBO	20 V
Collector-Emitter Voltage	VCEO	12 V
Collector Current	IC	50 mA
Power Dissipation <sup>2,3</sup>	PT	225 mW
Junction Temperature	Tj	150°C
Storage Temperature	TSTG	-65°C to 150°C

Thermal Resistance<sup>2,4</sup>:  $\theta_{JC} = 550^\circ \text{C/W}$

**Notes:**

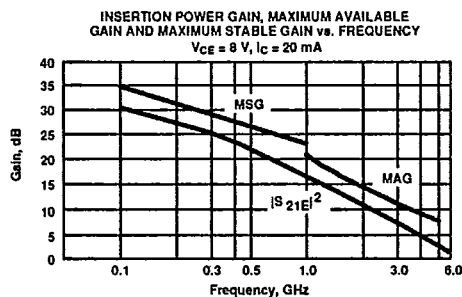
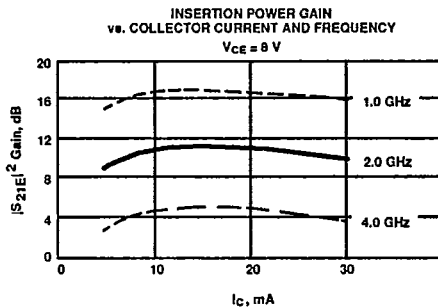
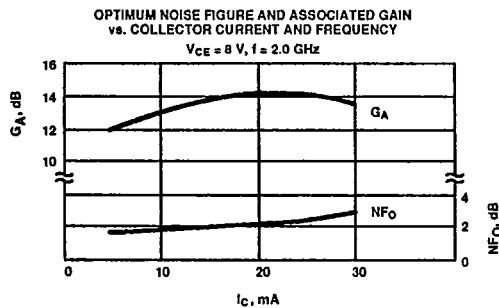
1. Operation of this device above any one of these parameters may cause permanent damage.
2. TCASE = 25°C.
3. Derate at 1.8 mW/°C for TC > 26°C.
4. See MEASUREMENTS section "Thermal Resistance" for more information

**Part Number Ordering Information**

Part Number	Devices Per Reel	Reel Size
AT-41411-TR1	3000	7"
AT-41411-TR2	10000	13"

**Typical Performance, TA = 25°C**

(unless otherwise noted)



AT-41411

Low Noise Silicon Bipolar Transistor

Typical Scattering Parameters: Common Emitter,  $Z_o = 50 \Omega$

$T_A = 25^\circ\text{C}$ ,  $V_{CE} = 8 \text{ V}$ ,  $I_C = 10 \text{ mA}$

Freq. GHz	S <sub>11</sub>		S <sub>21</sub>			S <sub>12</sub>		S <sub>22</sub>		
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.85	-30	27.3	23.20	158	-37.7	.013	64	.93	-11
0.5	.58	-112	21.7	12.18	109	-29.1	.035	44	.62	-30
1.0	.49	-156	16.5	6.70	85	-27.2	.044	43	.50	-33
1.5	.49	178	13.2	4.58	71	-25.0	.056	47	.46	-36
2.0	.50	160	10.8	3.45	59	-23.4	.068	47	.45	-41
2.5	.53	153	9.0	2.82	53	-22.5	.075	56	.43	-43
3.0	.55	142	7.5	2.37	43	-21.0	.089	54	.43	-53
3.5	.56	133	6.1	2.02	33	-19.8	.102	52	.44	-63
4.0	.56	121	4.9	1.76	23	-18.8	.115	49	.46	-73

$T_A = 25^\circ\text{C}$ ,  $V_{CE} = 8 \text{ V}$ ,  $I_C = 20 \text{ mA}$

0.1	.65	-46	30.4	33.07	150	-40.0	.010	59	.89	-15
0.5	.46	-137	22.4	13.21	100	-32.0	.025	56	.57	-26
1.0	.43	-175	16.7	6.85	80	-28.4	.038	58	.52	-29
1.5	.44	163	13.3	4.63	67	-26.4	.048	61	.51	-32
2.0	.47	148	10.8	3.47	56	-24.2	.062	61	.50	-37
2.5	.50	140	9.0	2.82	50	-22.9	.071	60	.47	-39
3.0	.53	132	7.5	2.36	40	-20.7	.092	61	.46	-48
3.5	.55	122	6.1	2.02	30	-19.6	.105	57	.45	-60
4.0	.56	112	4.8	1.74	19	-18.3	.122	53	.45	-73

A model for this device is available in the DEVICE MODELS section.