AT-42035

Up to 6 GHz Medium Power Silicon Bipolar Transistor

Data Sheet

Description

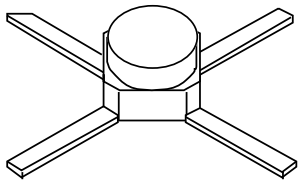
Avago Technologies' AT-42035 is a general purpose NPN bipolar transistor that offers excellent high frequency performance. The AT-42035 is housed in a cost effective surface mount 100 mil micro-X package. The 4 micron emitter-to-emitter pitch enables this transistor to be used in many different functions. The 20 emitter finger interdigitated geometry yields a medium sized transistor with impedances that are easy to match for low noise and medium power applications. This device is designed for use in low noise, wideband amplifier, mixer and oscillator applications in the VHF, UHF, and microwave frequencies. An optimum noise match near 50 Ω up to 1 GHz, makes this device easy to use as a low noise amplifier.

The AT-42035 bipolar transistor is fabricated using Avago's 10 GHz f_T Self-Aligned-Transistor (SAT) process. The die is nitride passivated for surface protection. Excellent device uniformity, performance and reliability are produced by the use of ion-implantation, self-alignment techniques, and gold metalization in the fabrication of this device.

Features

- **High Output Power:**
  21.0 dBm Typical $P_{1\ dB}$ at 2.0 GHz
  20.5 dBm Typical $P_{1\ dB}$ at 4.0 GHz
- **High Gain at 1 dB Compression:**
  14.0 dB Typical $G_{1\ dB}$ at 2.0 GHz
  9.5 dB Typical $G_{1\ dB}$ at 4.0 GHz
- **Low Noise Figure:**
  1.9 dB Typical NF_O at 2.0 GHz
- **High Gain-Bandwidth Product:** 8.0 GHz Typical f_T
- **Cost Effective Ceramic Microstrip Package**

35 micro-X Package



AT-42035 Absolute Maximum Ratings [1]

Symbol	Parameter	Units	Absolute Maximum
V_{EBO}	Emitter-Base Voltage	V	1.5
V_{CBO}	Collector-Base Voltage	V	20
V_{CEO}	Collector-Emitter Voltage	V	12
I_C	Collector Current	mA	80
P_T	Power Dissipation [2,3]	mW	600
T_j	Junction Temperature	°C	150
T_{STG}	Storage Temperature[4]	°C	-65 to 150

Thermal Resistance[2,5]:
$\theta_{jc} = 175°C/W$

Notes:
1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{CASE} = 25°C$.
3. Derate at 5.7 mW/°C for $T_C > 95°C$.
4. Storage above +150°C may tarnish the leads of this package making it difficult to solder into a circuit.
5. The small spot size of this technique results in a higher, though more accurate determination of θ_{jc} than do alternate methods. See MEASUREMENTS section "Thermal Resistance" for more information.

Electrical Specifications, $T_A = 25°C$

Symbol	Parameters and Test Conditions[1]		Units	Min.	Typ.	Max.
$\|S_{21E}\|^2$	Insertion Power Gain; $V_{CE} = 8$ V, $I_C = 35$ mA	f = 2.0 GHz f = 4.0 GHz	dB	10.0	11.0 5.0	
$P_{1\ dB}$	Power Output @ 1 dB Gain Compression $V_{CE} = 8$ V, $I_C = 35$ mA	f = 2.0 GHz f= 4.0 GHz	dBm		21.0 20.5	
$G_{1\ dB}$	1 dB Compressed Gain; $V_{CE} = 8$ V, $I_C = 35$ mA	f = 2.0 GHz f = 4.0 GHz	dB		14.0 9.5	
NF_O	Optimum Noise Figure: $V_{CE} = 8$ V, $I_C = 10$ mA	f = 2.0 GHz f = 4.0 GHz	dB		2.0 3.0	
G_A	Gain @ NF_O; $V_{CE} = 8$ V, $I_C = 10$ mA	f = 2.0 GHz f = 4.0 GHz	dB		13.5 10.0	
f_T	Gain Bandwidth Product: $V_{CE} = 8$ V, $I_C = 35$ mA		GHz		8.0	
h_{FE}	Forward Current Transfer Ratio; $V_{CE} = 8$ V, $I_C = 35$ mA		—	30	150	270
I_{CBO}	Collector Cutoff Current; $V_{CB} = 8$ V		μA			0.2
I_{EBO}	Emitter Cutoff Current; $V_{EB} = 1$ V		μA			2.0
C_{CB}	Collector Base Capacitance[1]: $V_{CB} = 8$ V, f = 1 MHz		pF		0.28	

Notes:
1. For this test, the emitter is grounded.

AT-42035 Typical Performance, $T_A = 25°C$

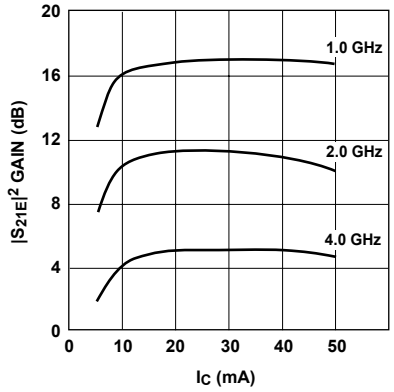


Figure 1. Insertion Power Gain vs. Collector Current and Frequency. V_{CE} = 8 V.

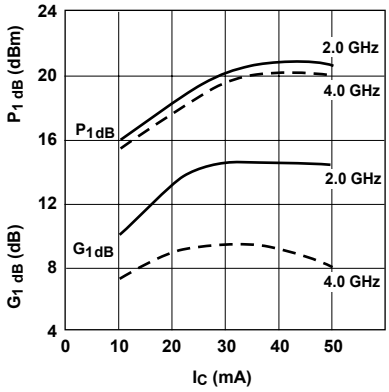


Figure 2. Output Power and 1 dB Compressed Gain vs. Collector Current and Frequency. V_{CE} = 8 V.

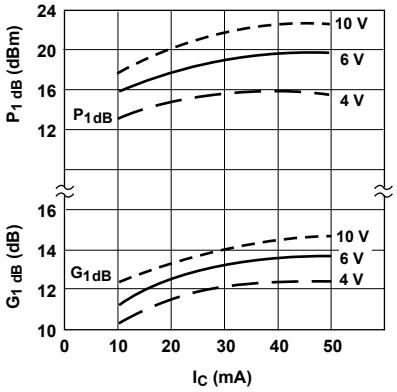


Figure 3. Output Power and 1 dB Compressed Gain vs. Collector Current and Voltage. f = 2.0 GHz.

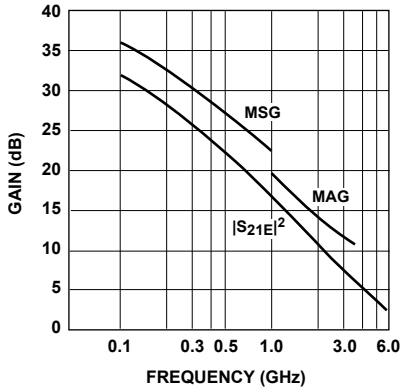


Figure 4. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. V_{CE} = 8 V, I_C = 35 mA.

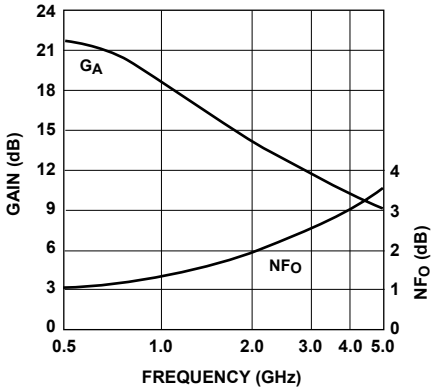


Figure 5. Noise Figure and Associated Gain vs. Frequency. V_{CE} = 8 V, I_C = 10 mA.

AT-42035 Typical Scattering Parameters,

Common Emitter, Z_O = 50 Ω, T_A = 25°C, V_{CE} = 8 V, I_C = 10 mA

Freq.	S_{11}			S_{21}			S_{12}		S_{22}	
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
0.1	.72	-46	28.3	26.09	152	-37.0	.014	73	.92	-14
0.5	.59	-137	20.9	11.13	102	-31.0	.028	44	.58	-27
1.0	.56	-171	15.4	5.91	80	-28.2	.039	47	.51	-29
1.5	.56	169	12.1	4.03	67	-26.6	.047	52	.50	-33
2.0	.58	155	9.7	3.06	55	-24.2	.062	55	.48	-38
2.5	.59	147	8.0	2.50	48	-22.6	.074	61	.47	-42
3.0	.61	137	6.5	2.10	38	-20.8	.092	65	.46	-51
3.5	.63	128	5.2	1.82	27	-19.6	.105	62	.47	-63
4.0	.63	117	4.0	1.60	17	-18.0	.126	57	.49	-72
4.5	.63	106	3.1	1.43	7	-16.5	.149	53	.51	-80
5.0	.64	93	2.3	1.30	-3	-15.4	.169	48	.52	-87
5.5	.67	79	1.5	1.19	-13	-14.3	.193	41	.51	-94
6.0	.72	70	0.6	1.07	-23	-13.4	.215	35	.46	-105

AT-42035 Typical Scattering Parameters,

Common Emitter, Z_O = 50 Ω, T_A = 25°C, V_{CE} = 8 V, I_C = 35 mA

Freq.	S_{11}			S_{21}			S_{12}		S_{22}	
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
0.1	.50	-88	33.2	45.64	135	-42.0	.008	68	.77	-22
0.5	.52	-164	22.4	13.24	92	-32.8	.023	57	.45	-25
1.0	.53	174	16.6	6.75	76	-28.2	.039	63	.42	-26
1.5	.53	160	13.1	4.55	64	-25.6	.053	66	.41	-30
2.0	.55	148	10.8	3.45	53	-23.2	.069	65	.41	-36
2.5	.57	142	9.0	2.81	47	-21.6	.084	67	.39	-40
3.0	.59	134	7.5	2.37	37	-20.0	.101	64	.38	-49
3.5	.60	125	6.3	2.06	27	-18.4	.120	61	.39	-61
4.0	.60	116	5.2	1.81	17	-17.0	.141	57	.41	-71
4.5	.60	104	4.2	1.62	7	-16.0	.158	50	.43	-78
5.0	.61	92	3.4	1.47	-2	-14.9	.179	45	.44	-84
5.5	.64	79	2.6	1.35	-13	-14.1	.198	37	.43	-91
6.0	.69	70	1.7	1.21	-23	-13.2	.219	30	.38	-102

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

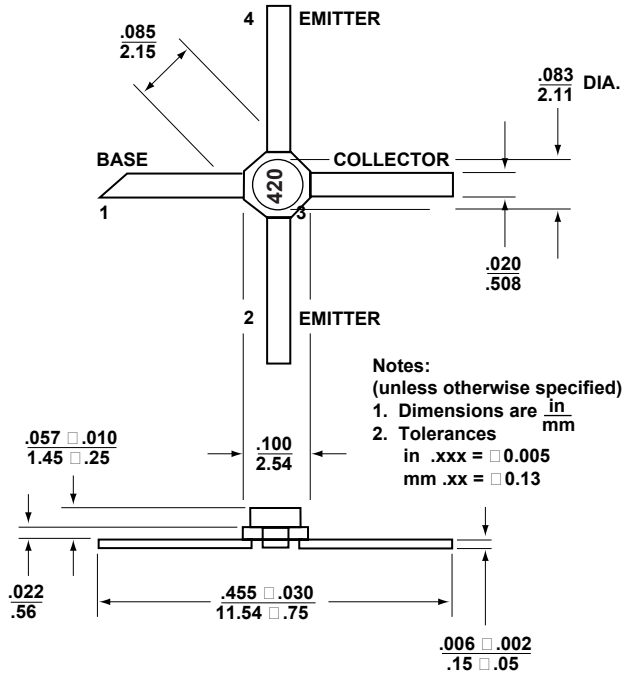
AT-42035 Noise Parameters: V_{CE} = 8 V, I_C = 10 mA

Freq.	NF_0	Γ_{opt}		$R_N/50$
GHz	dB	Mag	Ang	
0.1	1.0	.04	10	0.13
0.5	1.1	.04	66	0.12
1.0	1.3	.07	150	0.12
2.0	2.0	.20	-178	0.12
4.0	3.0	.51	-110	0.36

Ordering Information

Part Numbers	No. of Devices
AT-42035G	100

35 micro-X Package Dimensions



For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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