

## NPN SILICON MATCHED MICROWAVE TRANSISTORS

### ADVANCE DATA SHEET

#### FEATURES:

- High Gain Bandwidth Product  
 $f_t = 10 \text{ GHz}$
- Matched Performance  
 $\Delta V_{BE} = 25 \text{ mV}$   
 $\Delta \beta = 0.6:1 \text{ max}$

#### BENEFITS/APPLICATIONS:

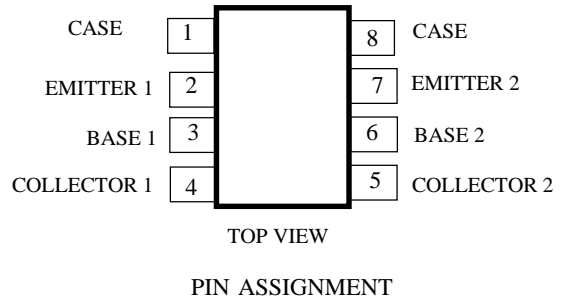
- Low Cost
- Auto Insertion
- Device Tracking (Monolithic)
- High Speed Precision Switching
- Differential Oscillators/Buffers

#### PERFORMANCE DATA:

- Performance Characteristics ( $T_A = 25^\circ\text{C}$ )

#### DESCRIPTION AND APPLICATIONS:

The BTA105M2 is a monolithic silicon NPN matched transistor pair which features typical  $f_t$  of 10 GHz at 10 mA. This matched pair offers superior performance and reliability at low cost. Plastic surface mount (SO-8), hermetic surface mount and unencapsulated chips are available. These devices are well suited to very high speed switching and differential oscillator applications. Two devices can be used as a current source biased differential amplifier for very low voltage applications.



PACKAGE			PLASTIC			HERMETIC		
SYMBOL	PARAMETERS & CONDITIONS	UNIT	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
$f_t$	Gain Bandwidth Product at $V_{CE} = 8V, I_C = 10 \text{ mA}$	GHz	8.0	10		8.0	10	
$\Delta V_{BE}$ CASE	Difference in $V_{BE}$ at $I_E = 10 \text{ mA}$ as larger-smaller	mV			25			25
$\Delta h_{FE}$	Difference in current gain at $I_E = 10 \text{ mA}$ as smaller: larger	Ratio			0.6			0.6
$ S_{21} ^2$	Insertion power Gain at $V_{CE} = 8V, I_C = 10 \text{ mA}, f = 1 \text{ GHz}$	dB		17			17	
$NF_O$	Opt. Noise Figure at $V_{CE} = 8V, I_C = 2 \text{ mA}, f = 1 \text{ GHz}$	dB		1.5			1.5	

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- Electrical Characteristics (  $T_A = 25^\circ\text{C}$  )

PACKAGE			PLASTIC			HERMETIC		
SYMBOL	PARAMETERS & CONDITIONS	UNITS	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
$I_{CBO}$	Collector Cutoff Current at $V_{CB} = 10\text{V}, I_E = 0$	$\mu\text{A}$		10			10	
$h_{FE}$	Forward Current Gain at $V_{CE} = 8\text{V}, I_C = 20\text{ mA},$ $f = 1.0\text{ GHz}$		30	150	300	30	150	300
$C_{OB}$	Output Capacitance at $V_{CB} = 10\text{V}, I_E = 0, f = 1.0\text{ MHz}$	$\text{pF}$		0.35			0.35	

- Absolute Maximum Ratings (  $T_A = 25^\circ\text{C}$  )

SYMBOL	PARAMETERS/CONDITIONS	UNITS	RATING
$V_{CBO}$	Collector-Base Voltage	V	18
$V_{CEO}$	Collector-Base Voltage	V	10
$V_{EBO}$	Emitter-Base Voltage	V	3
$I_C$	Collector Current	mA	40
$T_J$	Operating Junction Temperature		$^\circ\text{C}$ 175
$T_{STG}$	Storage Temperature	$^\circ\text{C}$	-65 to +150

**BIPOLARICS, INC.**

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**BIPOLARICS, INC.****Part Number BTA105M2****NPN SILICON MATCHED MICROWAVE TRANSISTORS**

## ADVANCED DATA SHEET

## TYPICAL S PARAMETERS:

BIAS CONDITION:  $V_{CE} = 8 \text{ V}$ ,  $V_{BE} = 0.83 \text{ V}$ ,  $I_C = 10 \text{ mA}$ S-MATRIX:  $Z_S = 50.0 + j 0.0$        $Z_L = 50.0 + j 0.0$ 

FREQ. GHz	S11		S21		S12		S22		S21 dB
	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang	
0.05000	0.706	- 10.4	18.238	171.9	0.004	92.0	0.983	- 4.0	25.22
0.10000	0.701	- 20.0	18.140	165.3	0.007	82.5	0.977	- 7.4	25.17
0.20000	0.681	- 38.9	16.945	152.5	0.015	79.2	0.946	-14.3	24.58
0.30000	0.670	- 56.6	15.313	140.6	0.022	70.3	0.895	-20.7	23.70
0.40000	0.621	- 73.4	13.927	130.4	0.026	64.9	0.831	-26.0	22.88
0.50000	0.589	- 87.2	12.428	122.1	0.031	60.6	0.768	-30.0	21.89
0.60000	0.559	- 98.4	10.996	115.6	0.034	56.6	0.713	-32.5	20.82
0.70000	0.544	-107.9	9.857	109.5	0.037	53.9	0.660	-34.4	19.87
0.80000	0.520	-116.4	8.832	105.1	0.039	52.7	0.624	-35.7	18.92
0.90000	0.502	-123.8	8.025	101.1	0.040	50.7	0.590	-37.0	18.09
1.00000	0.489	-129.7	7.291	98.0	0.042	49.7	0.567	-37.6	17.26
1.20000	0.476	-139.6	6.185	91.4	0.045	48.2	0.522	-38.4	15.83
1.40000	0.468	-147.4	5.357	86.5	0.048	49.1	0.495	-39.4	14.58
1.60000	0.461	-154.1	4.744	82.1	0.050	49.3	0.471	-40.3	13.52
1.80000	0.456	-159.5	4.226	77.9	0.053	50.8	0.457	-41.5	12.52
2.00000	0.458	-164.0	3.836	74.3	0.056	52.4	0.443	-43.4	11.68
2.20000	0.456	-168.9	3.528	70.7	0.059	53.1	0.428	-45.5	10.95
2.40000	0.460	-171.9	3.200	67.5	0.063	54.1	0.425	-46.9	10.10
2.60000	0.462	-174.8	2.981	64.9	0.065	55.2	0.419	-48.5	9.49
2.80000	0.466	-177.5	2.755	61.7	0.069	55.7	0.416	-50.1	8.80
3.00000	0.469	178.8	2.591	58.8	0.072	56.2	0.407	-52.4	8.27
3.25000	0.474	175.4	2.402	55.0	0.076	57.3	0.400	-55.2	7.61
3.50000	0.482	172.2	2.237	51.4	0.082	59.5	0.394	-58.5	6.99
3.75000	0.489	169.3	2.093	48.0	0.086	59.0	0.392	-61.5	6.42
4.00000	0.496	166.6	1.967	44.5	0.092	59.1	0.385	-65.1	5.88
4.25000	0.503	164.2	1.855	41.3	0.097	59.8	0.380	-68.9	5.37
4.50000	0.512	161.8	1.755	37.9	0.103	59.2	0.376	-72.9	4.89
4.75000	0.520	159.8	1.659	34.7	0.108	59.6	0.374	-77.3	4.40
5.00000	0.530	157.6	1.579	31.4	0.115	59.4	0.371	-81.8	3.97

**BIPOLARICS, INC.****Part Number BTA105M2****NPN SILICON MATCHED MICROWAVE TRANSISTORS**

## ADVANCE DATA SHEET

## TYPICAL S PARAMETERS: (Continued)

BIAS CONDITION:  $V_{CE} = 8 \text{ V}$ ,  $V_{BE} = 0.83 \text{ V}$ ,  $I_C = 10 \text{ mA}$ S-MATRIX:  $Z_S = 50.0 + j 0.0$        $Z_L = 50.0 + j 0.0$ 

MAXIMUM GAIN					CONJUGATE MATCH GAMMA			
FREQ.	K	SIGN	AVAIL.	STABLE	SOURCE		LOAD	
GHz		B1	dB	dB	Mag	Ang	Mag	Ang
0.05000	0.052	+		36.59				
0.10000	0.092	+		36.14				
0.20000	0.072	+		30.53				
0.30000	0.144	+		28.43				
0.40000	0.228	+		27.29				
0.50000	0.315	+		26.03				
0.60000	0.421	+		25.10				
0.70000	0.518	+		24.26				
0.80000	0.611	+		23.55				
0.90000	0.720	+		23.02				
1.00000	0.800	+		22.40				
1.20000	0.967	+		21.38				
1.40000	1.092	+	18.63		0.785	157.1	0.795	48.1
1.60000	1.231	+	16.88		0.694	162.0	0.699	47.9
1.80000	1.331	+	15.57		0.655	166.1	0.656	48.0
2.00000	1.402	+	14.58		0.639	169.2	0.630	49.0
2.20000	1.477	+	13.68		0.620	173.1	0.603	50.2
2.40000	1.519	+	12.81		0.617	175.5	0.594	51.1
2.60000	1.585	+	12.12		0.608	177.7	0.580	52.0
2.80000	1.611	+	11.43		0.608	-180.0	0.575	53.3
3.00000	1.651	+	10.84		0.604	-177.0	0.563	54.9
3.25000	1.687	+	10.16		0.603	-174.2	0.554	56.9
3.50000	1.670	+	9.58		0.612	-171.8	0.553	59.1
3.75000	1.687	+	9.03		0.615	-169.2	0.550	61.7
4.00000	1.674	+	8.50		0.622	-166.9	0.548	64.6
4.25000	1.676	+	8.01		0.626	-165.0	0.544	67.5
4.50000	1.652	+	7.59		0.636	-162.9	0.546	70.9
4.75000	1.650	+	7.15		0.642	-161.3	0.545	74.3
5.00000	1.608	+	6.80		0.654	-159.5	0.550	77.8

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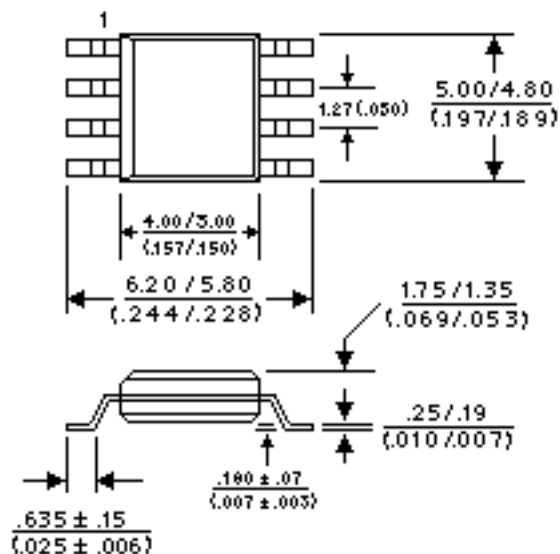
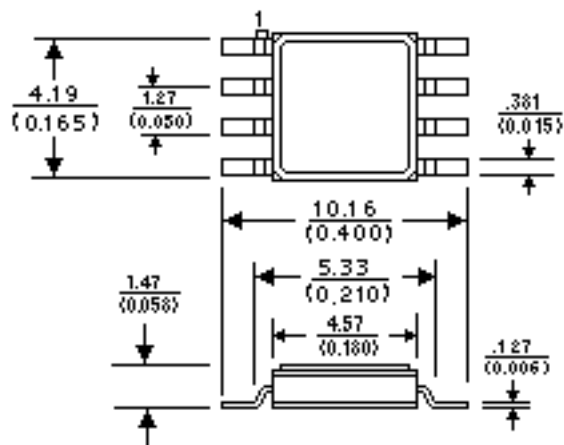
## ORDERING INFORMATION:

P/N Including Pkg	Temp Range/App
BTA105M2 - A/00	-55 to +125
BTA105M2 - B/S8	-40 to +85
BTA105M2 - A/08	-55 to +125

NOTES: (unless otherwise specified)

- Dimensions are  $\frac{\text{in}}{\text{(mm)}}$
- Tolerances:  
in .xxx =  $\pm .005$   
mm .xx =  $\pm .13$
- All dimensions nominal; subject to change without notice

## PACKAGE OUTLINES:

**S8 Package: SO-8 Plastic****08 Package: SO-8 Hermetic****BIPOLARICS, INC.**

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