

NPN LOW NOISE SILICON MICROWAVE TRANSISTOR

PRODUCT DATA SHEET

FEATURES:

- High Gain Bandwidth Product
 $f_t = 10 \text{ GHz typ @ } I_C = 25\text{mA}$
- Low Noise Figure
 1.4 dB typ at 1.0 GHz
 1.7 dB typ at 2.0 GHz
- High Gain
 $|S_{21}|^2 = 16.9 \text{ dB @ } 1.0 \text{ GHz}$
 $12.0 \text{ dB @ } 2.0 \text{ GHz}$
- Dice, Plastic, Hermetic and Surface Mount packages available

PERFORMANCE DATA:

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

DESCRIPTION AND APPLICATIONS:

Bipolarics' B12V114 is a high performance silicon bipolar transistor intended for use in low noise applications at VHF, UHF and microwave frequencies. These applications include narrowband and wideband amplifiers, oscillators and micropower transmitters. Typical applications include cellular telephone preamplifiers/mixers, CATV amplifiers and Part 15 receivers and transmitters. Commercial plastic, surface mount and hermetic (including Stripline) packaging options make this device very versatile; from consumer product to space flight.

Absolute Maximum Ratings:

SYMBOL	PARAMETERS	RATING	UNITS
V_{CBO}	Collector-Base Voltage	20	V
V_{CEO}	Collector-Emitter Voltage	12	V
V_{EBO}	Emitter-Base Voltage	1.5	V
I_C	Collector Current	60	mA
T_J (1)	Junction Temperature	200	$^\circ\text{C}$
T_{STG}	Storage Temperature	-65 to 150	$^\circ\text{C}$

(1) Depends on package

SYMBOL	PARAMETERS & CONDITIONS $V_{CE} = 8\text{V}, I_C = 25 \text{ mA}$ unless stated	UNIT	MIN.	TYP.	MAX.
f_t	Gain Bandwidth Product	GHz		10.0	
$ S_{21} ^2$	Insertion Power Gain:				
	$f = 1.0 \text{ GHz}$	dB		16.9	
	$f = 2.0 \text{ GHz}$	dB		12.0	
P_{1dB}	Power output at 1dB compression:				
	$f = 1.0 \text{ GHz}$	dBm		18.0	
G_{1dB}	Gain at 1dB compression:				
	$f = 1.0 \text{ GHz}$	dBm		15.0	
NF	Noise Figure: $V_{CE} = 8\text{V}, I_C = 10\text{mA}$				
	$f = 1.0 \text{ GHz}$	dB		1.4	
h_{FE}	Forward Current Transfer Ratio: $V_{CE} = 8\text{V}, I_C = 25 \text{ mA}$				
	$f = 1\text{MHz}$		30	150	300
I_{CBO}	Collector Cutoff Current : $V_{CB} = 8\text{V}$	μA			0.2
I_{EBO}	Emitter Cutoff Current : $V_{EB} = 1\text{V}$	μA			1.0
C_{CB}	Collector Base Capacitance: $V_{CB} = 8\text{V}$				
	$f = 1\text{MHz}$	pF		0.25	

BIPOLARICS, INC.**Part Number B12V114****NPN LOW NOISE SILICON MICROWAVE TRANSISTOR****PRODUCT DATA SHEET****TYPICAL S PARAMETERS:**BIAS CONDITION: $V_{CE} = 8 \text{ V}$, $I_C = 10 \text{ mA}$ S-MATRIX: $Z_S = 50.0 + j 0.0$ $Z_L = 50.0 + j 0.0$

(NOTE: S-Parameters were taken in a ceramic Micro-X package; See package outline 35, 36)

FREQ.	S11		S21		S12		S22		S21
GHz	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang	dB
0.20000	0.5956	-62	15.84	147	0.0251	59	0.7244	-29	24.0
0.40000	0.5821	-114	12.02	132	0.0446	56	0.6309	-45	21.6
0.60000	0.5248	-134	9.120	114	0.0512	50	0.4466	-50	19.2
0.80000	0.5188	-149	7.244	106	0.0602	52	0.4466	-54	17.2
1.00000	0.4786	-164	6.456	99	0.0676	55	0.3235	-52	16.2
1.20000	0.4518	-168	5.370	92	0.0741	56	0.3311	-52	14.6
1.40000	0.4623	-175	4.841	89	0.0812	58	0.2660	-63	13.7
1.60000	0.5688	166	4.315	85	0.0901	59	0.2454	-61	12.7
1.80000	0.5432	164	3.758	84	0.1023	60	0.2722	-63	11.5
2.00000	0.5559	157	3.630	78	0.1135	58	0.2317	-65	11.2
2.20000	0.5956	146	3.388	74	0.1202	60	0.2187	-75	10.6
2.40000	0.5888	142	3.090	71	0.1230	62	0.1905	-79	9.8
2.60000	0.6998	138	2.917	69	0.1333	64	0.1995	-86	9.3
2.80000	0.6918	132	2.754	65	0.1396	65	0.1927	-93	8.8
3.00000	0.6382	131	2.511	63	0.1479	66	0.1883	-97	8.0
3.20000	0.6531	127	2.344	61	0.1548	67	0.1862	-106	7.4
3.40000	0.6683	124	2.213	59	0.1603	68	0.1737	-111	6.9
3.60000	0.7161	115	2.162	56	0.1698	69	0.2137	-123	6.7
3.80000	0.7079	113	1.972	53	0.1698	68	0.1862	-132	5.9
4.00000	0.6683	116	1.927	52	0.1778	72	0.2089	-127	5.7
4.20000	0.6760	109	1.840	48	0.1927	69	0.2041	-132	5.3

BIPOLARICS, INC.**Part Number B12V114****NPN LOW NOISE SILICON MICROWAVE TRANSISTOR**

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TYPICAL S PARAMETERS:

BIAS CONDITION: $V_{CE} = 8V$, $I_C = 25 \text{ mA}$ S-MATRIX: $Z_S = 50.0 + j 0.0$ $Z_L = 50.0 + j 0.0$

(NOTE: S-Parameters were taken in a ceramic Micro-X package; See package outline 35, 36)

FREQ. GHz	S11		S21		S12		S22		S21 dB
	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang	
0.20000	0.4466	-96	17.78	143	0.0229	61	0.5888	-36	25.0
0.40000	0.4897	-128	14.28	124	0.0380	58	0.4677	-53	23.1
0.60000	0.4677	-154	10.35	108	0.0457	59	0.3090	-56	20.3
0.80000	0.4731	-157	8.317	100	0.0562	61	0.2951	-58	18.4
1.00000	0.4365	-166	6.998	86	0.0645	64	0.2398	-54	16.9
1.20000	0.4120	-170	5.888	80	0.0758	65	0.2483	-53	15.4
1.40000	0.4365	176	5.128	87	0.0812	68	0.2089	-65	14.2
1.60000	0.5623	170	4.518	84	0.0922	69	0.1905	-65	13.1
1.80000	0.5308	158	4.168	83	0.1059	68	0.1972	-70	12.4
2.00000	0.5495	152	3.981	78	0.1161	64	0.1659	-70	12.0
2.20000	0.5888	142	3.758	73	0.1288	66	0.1445	-84	11.5
2.40000	0.5821	137	3.273	71	0.1333	67	0.1303	-88	10.3
2.60000	0.6165	135	3.126	69	0.1462	69	0.1428	-100	9.9
2.80000	0.6309	130	2.917	65	0.1531	69	0.1258	-109	9.3
3.00000	0.6309	129	2.630	64	0.1621	70	0.1348	-114	8.4
3.20000	0.6456	124	2.483	61	0.1678	68	0.1288	-124	7.9
3.40000	0.6606	121	2.371	60	0.1757	70	0.1230	-131	7.5
3.60000	0.6918	115	2.317	56	0.1862	69	0.1905	-137	7.3
3.80000	0.6531	112	2.113	54	0.1862	70	0.1445	-156	6.5
4.00000	0.6531	114	2.089	54	0.1995	73	0.1584	-141	6.4
4.20000	0.6683	107	1.949	49	0.2162	70	0.1819	-152	5.8

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PRODUCT DATA SHEET

TYPICAL S PARAMETERS:

BIAS CONDITION: $V_{CE} = 8 \text{ V}$, $I_C = 40 \text{ mA}$ S-MATRIX: $Z_S = 50.0 + j 0.0$ $Z_L = 50.0 + j 0.0$

(NOTE: S-Parameters were taken in a ceramic Micro-X package; See package outline 35, 36)

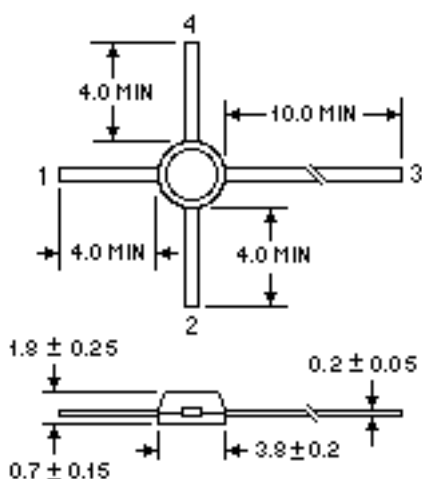
FREQ. GHz	S11		S21		S12		S22		S21 dB
	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang	
0.20000	0.4027	-100	18.30	141	0.0208	63	0.5370	-40	25.25
0.40000	0.4786	-138	14.45	122	0.0346	60	0.4120	-53	23.20
0.60000	0.4731	-163	10.71	106	0.0436	62	0.2754	-55	20.6
0.80000	0.4623	-164	8.317	88	0.0524	66	0.2570	-58	18.4
1.00000	0.4365	-170	6.998	94	0.0602	69	0.2137	-52	16.9
1.20000	0.4168	174	5.888	88	0.0707	70	0.2238	-54	15.4
1.40000	0.4365	173	5.128	86	0.0794	71	0.1883	-67	14.2
1.60000	0.5623	168	4.466	83	0.0901	72	0.1757	-65	13.0
1.80000	0.5370	155	4.120	81	0.1035	70	0.1862	-70	12.3
2.00000	0.5495	150	3.935	77	0.1148	68	0.1548	-69	11.9
2.20000	0.5888	140	3.715	72	0.1230	70	0.1318	-84	11.4
2.40000	0.5888	135	3.235	70	0.1288	72	0.1135	-98	10.2
2.60000	0.6237	133	3.090	68	0.1428	73	0.1258	-100	9.8
2.80000	0.6382	128	2.884	65	0.1513	74	0.1148	-109	9.2
3.00000	0.6382	127	2.630	63	0.1584	73	0.1202	-116	8.4
3.20000	0.6531	123	2.454	61	0.1659	73	0.1202	-128	7.8
3.40000	0.6606	120	2.317	60	0.1737	75	0.1148	-134	7.3
3.60000	0.7079	114	2.290	56	0.1862	74	0.1412	-145	7.2
3.80000	0.6606	111	2.089	54	0.1862	74	0.1380	-158	6.4
4.00000	0.6606	113	2.065	53	0.1995	77	0.1513	-143	6.3
4.20000	0.6760	106	1.949	49	0.2187	74	0.1737	-156	5.8

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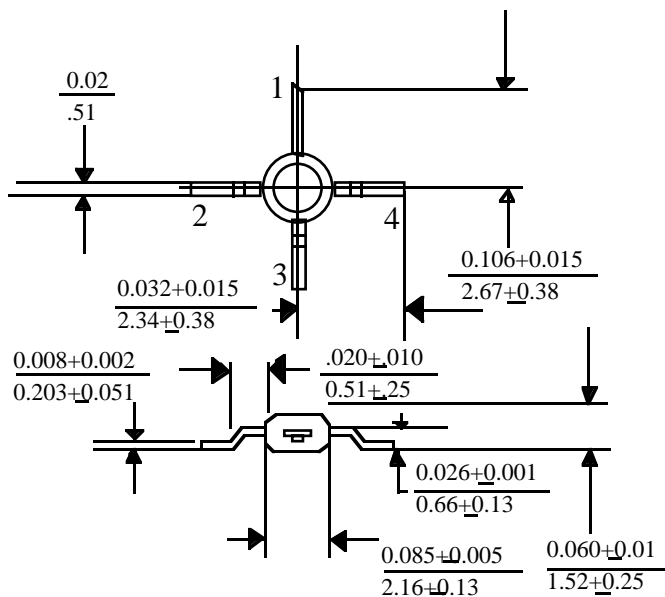
Part Number B12V114

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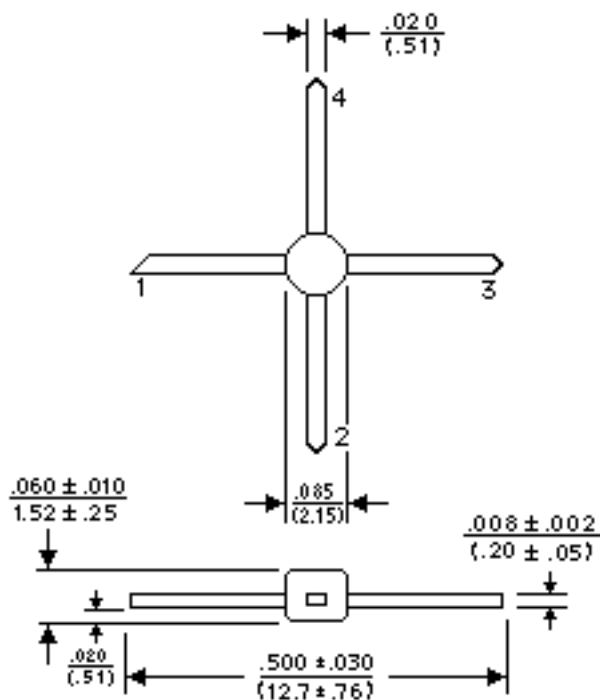
04 Package: 0.145" Plastic X-PAC



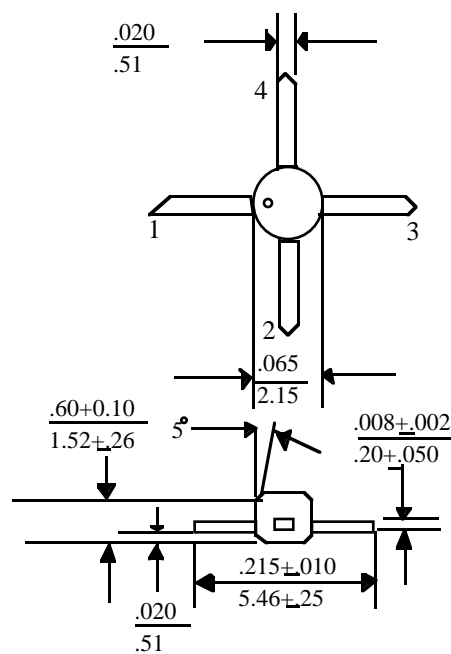
86 Package: 0.085" Plastic, Surface Mount



85 Package: 0.085" Plastic Micro-X

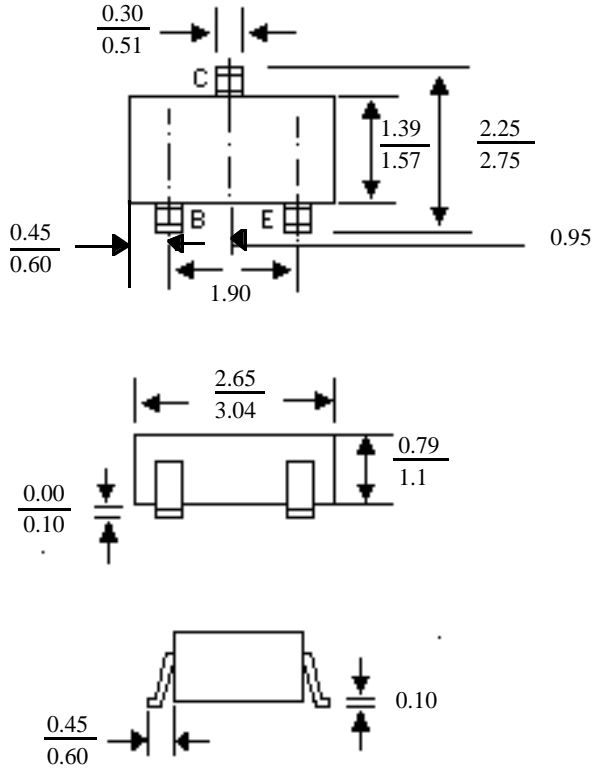


87 Package: 0.085" Plastic, Short Lead

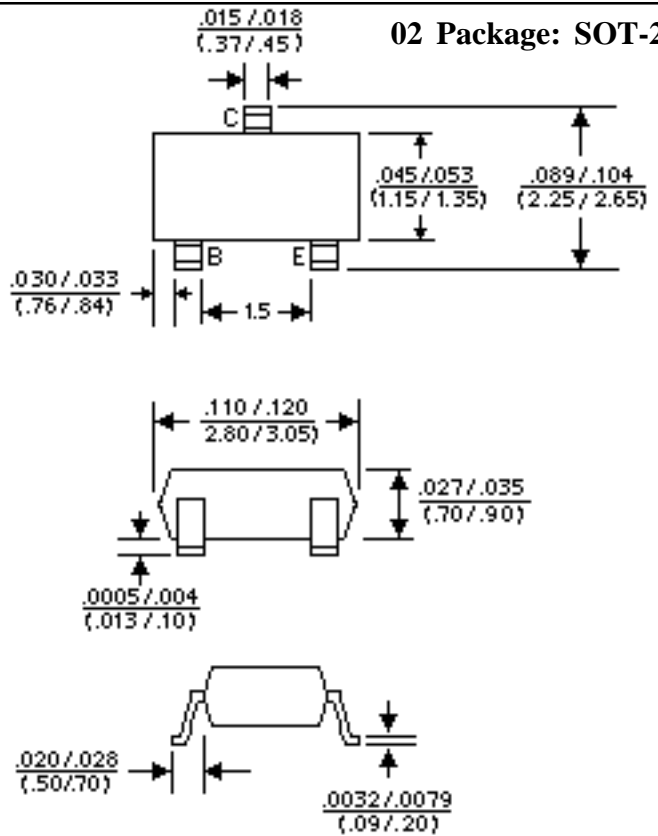


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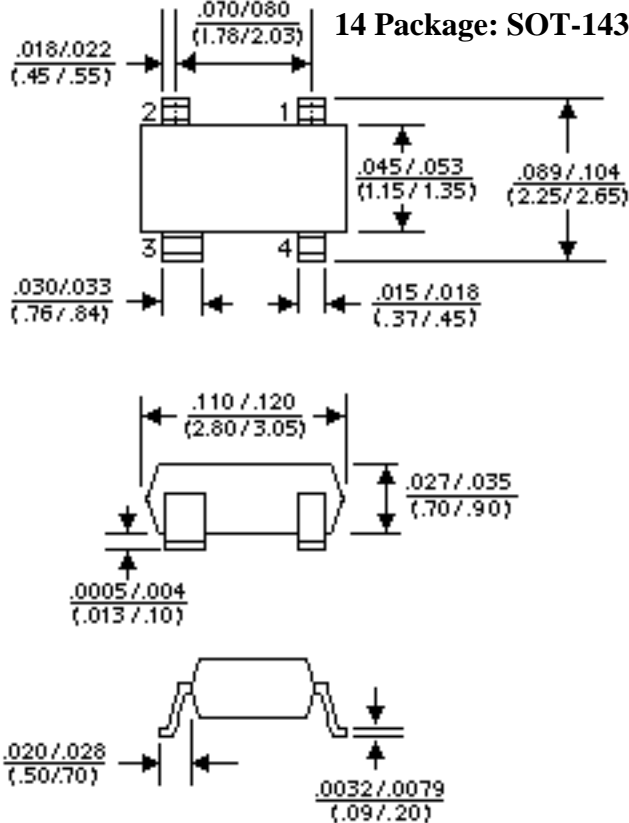
02 Package: SOT-23J



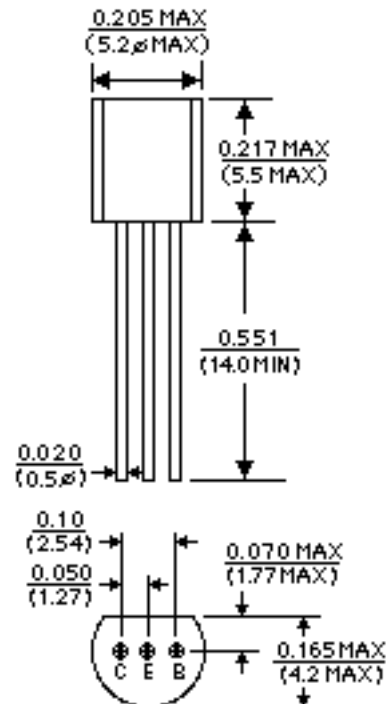
02 Package: SOT-23



14 Package: SOT-143



92 Package: TO-92

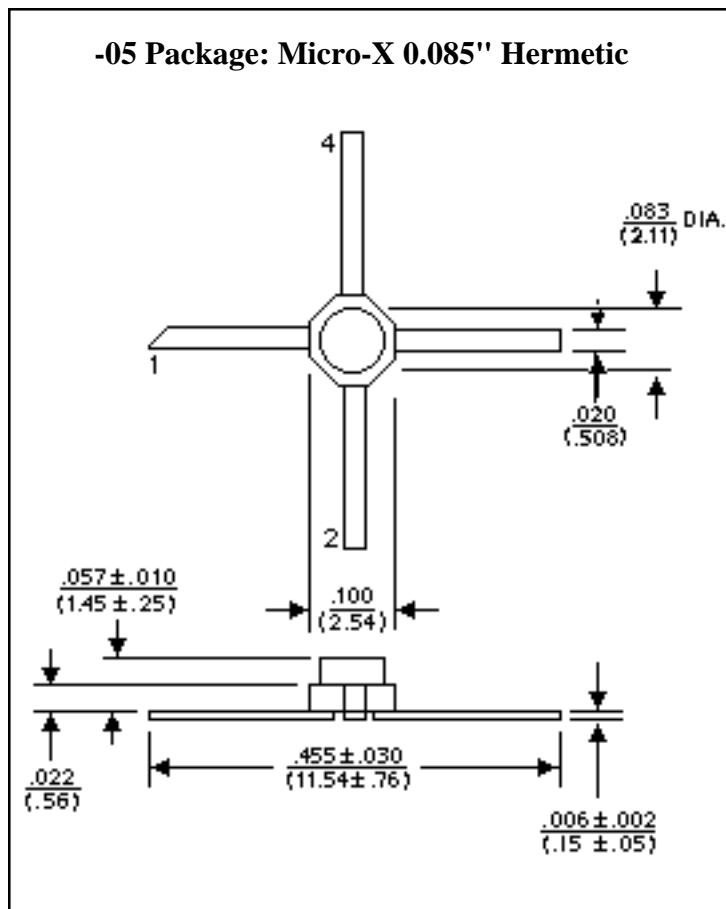


BIPOLARICS, INC.**Part Number B12V114****NPN LOW NOISE SILICON MICROWAVE TRANSISTOR****ORDERING INFORMATION:**

P/N Including Pkg	Temp Range/App
B12V114 00	-55 to +125°C
B12V114 02	-40 to +85°C
B12V114 14	-40 to +85°C
B12V114 35	-55 to +125°C
B12V114 92	-40 to +85°C

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



LEAD	1	2	3	4
14, 85, 86, 87, 35, 36 & 04 Packages	Base	Emitter	Collector	Emitter

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