

MEDIUM POWER SILICON MICROWAVE TRANSISTOR

PRODUCT DATA SHEET

FEATURES:

- High Gain Bandwidth Product
 $f_t = 8 \text{ GHz typ @ } I_C = 70 \text{ mA}$

- High Gain
 $|S_{21}|^2 = 15.6 \text{ dB @ } 1.0 \text{ GHz}$
 $9.0 \text{ dB @ } 2.0 \text{ GHz}$

- Dice, Plastic, Hermetic and Surface Mount packages available

PERFORMANCE DATA:

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

DESCRIPTION AND APPLICATIONS:

Bipolarics' B15V140 is a high performance silicon bipolar transistor intended for medium power linear and Class C applications at VHF, UHF and microwave frequencies in 7.2 and 12V systems. Depending on package type, the B15V140 can operate at up to 0.5W. These applications include high intermod receivers, CATV and instrumentation amplifiers as well as pre-drivers, drivers and final stages in transmitter applications such as cellular telephone. Package options include Dice, SOT-223 Surface Mount, Ceramic Micro-X, 0.145" Plastic SOT-103 and 0.230" power flange package.

Absolute Maximum Ratings:

SYMBOL	PARAMETERS	RATING	UNITS
V_{CBO}	Collector-Base Voltage	30	V
V_{CEO}	Collector-Emitter Voltage	15	V
V_{EBO}	Emitter-Base Voltage	1.5	V
I_C	Collector Current (continuous)	120	mA
$I_{C\text{MAX}}$	Collector Current (instantaneous)	180	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 $V_{CE} = 10\text{V}, I_C = 70 \text{ mA}, \text{Class A}, \text{unless stated}$	UNIT	MIN.	TYP.	MAX.
f_t	Gain Bandwidth Product	GHz		8.0	
$ S_{21} ^2$	Insertion Power Gain: $f = 1.0 \text{ GHz}$ $f = 2.0 \text{ GHz}$	dB dB		15.6 9.0	
$P_{1\text{dB}}$	Power output at 1dB compression: $f = 1.0 \text{ GHz}$ $I_C = 75 \text{ mA}$	dBm		27.0	
NF	Noise Figure: $V_{CE} = 8\text{V}, I_C = 20 \text{ mA}$ $f = 1.0 \text{ GHz}$	dB		1.6	
h_{FE}	Forward Current Transfer Ratio: $V_{CE} = 8\text{V}, I_C = 15 \text{ mA}$		30	100	300
I_{CBO}	Collector Cutoff Current : $V_{CB} = 10\text{V}$	μA			0.4
C_{CB}	Collector Base Capacitance: $V_{CB} = 10\text{V}$ $f = 1\text{MHz}$	pF		.75	

BIPOLARICS, INC.**Part Number B15V140****MEDIUM POWER SILICON MICROWAVE TRANSISTOR****TYPICAL S PARAMETERS:**

$V_{CE} = 3.3 \text{ V}$, $I_C = 75 \text{ mA}$ $Z_O = 50.0\Omega$ $T_A = 25^\circ$ (Note: S-parameters were taken in a 35 package.)

FREQ. GHz	S21			S12		S11		S22	
	dB	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
0.20	24.00	15.84	109	0.0233	54	0.5370	-162	0.1927	-103
0.50	18.20	8.12	90	0.0380	64	0.6683	178	0.1412	-141
1.00	12.00	3.98	78	0.0691	72	0.7161	176	0.1513	-141
1.50	8.80	2.75	68	0.1011	74	0.6760	159	0.1840	-141
2.00	6.20	2.04	58	0.1364	74	0.6606	152	0.2371	-145
2.50	4.30	1.64	48	0.1621	74	0.7413	145	0.2985	-153
3.00	2.70	1.36	44	0.1883	73	0.7585	142	0.3388	-146
3.50	1.70	1.21	34	0.2213	70	0.8035	133	0.3981	-151
4.00	0.00	1.00	29	0.2454	69	0.7498	131	0.5128	-153

$V_{CE} = 6 \text{ V}$, $I_C = 80 \text{ mA}$ $Z_O = 50.0\Omega$ $T_A = 25^\circ$ (Note: S-parameters were taken in a 35 package.)

FREQ. GHz	S21			S12		S11		S22	
	dB	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
0.20	24.75	17.27	110	0.0177	49	0.5688	-161	0.1995	-72
0.40	21.40	11.74	94	0.0301	62	0.7079	-179	0.1318	-98
0.60	17.40	7.41	85	0.0346	67	0.6839	173	0.1161	-102
0.80	15.30	5.82	81	0.0457	72	0.6683	174	0.1288	-106
1.00	13.40	4.67	77	0.0543	76	0.6839	174	0.1035	-100
1.20	11.90	3.93	72	0.0660	76	0.6606	162	0.1230	-104
1.50	9.80	3.09	66	0.0822	76	0.6531	153	0.1230	-114
2.00	7.30	2.31	57	0.1148	78	0.6760	149	0.1584	-116
2.50	5.40	1.86	48	0.1412	80	0.7328	133	0.2851	-134
3.50	2.7	1.36	34	0.1949	78	0.8317	120	0.3507	-140
4.00	0.9	1.10	26	0.2238	76	0.8222	120	0.4786	-142

$V_{CE} = 8 \text{ V}$, $I_C = 35 \text{ mA}$ $Z_O = 50.0\Omega$ $T_A = 25^\circ$ (Note: S-parameters were taken in a 35 package.)

FREQ. GHz	S21			S12		S11		S22	
	dB	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
0.20	24.5	16.78	126	0.0239	42	0.5821	-146	0.3801	-86
0.40	21.8	12.30	104	0.0263	48	0.7585	-168	0.2884	-122
0.60	18.3	8.222	92	0.0354	52	0.7244	-179	0.2600	-134
0.80	16.2	6.456	86	0.0426	56	0.7413	179	0.2600	-145
1.00	14.1	5.069	83	0.0467	64	0.7943	176	0.2371	-147
1.20	12.8	4.365	76	0.0543	65	0.7585	166	0.2630	-152
1.40	11.4	3.715	70	0.0602	67	0.7161	159	0.2630	-154
1.60	10.4	3.311	68	0.0691	68	0.7585	156	0.2691	-158
1.80	10.0	3.162	65	0.0724	70	0.7585	154	0.2884	-163
2.00	8.4	2.630	61	0.0794	71	0.7585	150	0.2851	-165
2.20	7.5	2.371	55	0.0841	71	0.7852	141	0.3235	-177
2.40	6.6	2.137	55	0.0870	74	0.7673	138	0.3054	-176
2.60	6.1	2.018	50	0.0954	73	0.8222	134	0.3630	180
2.80	5.2	1.819	47	0.1000	73	0.8222	132	0.3589	175
3.00	4.9	1.757	45	0.1109	76	0.8511	130	0.3935	180
3.20	3.9	1.566	40	0.1148	73	0.8317	126	0.4315	172
3.40	3.4	1.479	41	0.1216	75	0.8413	126	0.3845	171
3.60	3.1	1.428	33	0.1318	75	0.9120	118	0.4677	165
3.80	2.1	1.273	33	0.1303	74	0.8128	115	0.4216	159
4.00	2.0	1.258	35	0.1462	76	0.8709	119	0.4415	170
4.20	1.0	1.122	26	0.1479	72	0.8609	112	0.4518	156

BIPOLARICS, INC.

Part Number B15V140

MEDIUM POWER SILICON MICROWAVE TRANSISTOR

TYPICAL S PARAMETERS:

$V_{CE} = 8 \text{ V}$, $I_C = 75 \text{ mA}$ $Z_0 = 50.0\Omega$ $T_A = 25^\circ\text{C}$ (Note: S-parameters were taken in a 35 package.)

FREQ. GHz	S21			S12		S11		S22	
	dB	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
0.20	25.0	17.78	124	0.0169	46	0.6456	-156	0.3090	-102
0.40	21.6	12.02	102	0.0229	54	0.8128	-136	0.2630	-136
0.60	18.4	8.317	92	0.0288	62	0.7843	176	0.2511	-145
0.80	16.2	6.456	87	0.0371	68	0.7952	174	0.2600	-155
1.00	14.2	5.128	83	0.0426	72	0.7943	172	0.2371	-155
1.20	12.8	4.365	78	0.0506	73	0.7943	162	0.2630	-159
1.40	11.4	3.715	72	0.0575	73	0.7478	156	0.2630	-169
1.60	10.1	3.198	70	0.0630	74	0.7943	154	0.2722	-164
1.80	9.1	2.851	66	0.0707	77	0.7762	151	0.2884	-168
2.00	8.2	2.570	63	0.0794	77	0.7673	148	0.2851	-168
2.20	6.9	2.213	58	0.0860	75	0.7852	139	0.3235	178
2.40	6.0	1.995	59	0.0891	78	0.7762	136	0.3090	180
2.60	5.5	1.883	54	0.1000	77	0.8222	132	0.3845	176
2.80	4.6	1.698	51	0.1047	77	0.8222	131	0.4265	172
3.00	4.3	1.640	49	0.1109	79	0.8413	129	0.4073	177
3.20	3.6	1.513	45	0.1174	76	0.8317	128	0.4073	169
3.40	3.0	1.412	46	0.1244	78	0.8413	125	0.3801	168
3.60	2.7	1.364	37	0.1348	75	0.9120	117	0.4677	162
3.80	1.5	1.188	17	0.1303	76	0.8128	114	0.4168	156
4.00	1.8	1.230	18	0.1462	79	0.8709	118	0.4365	167
4.20	0.6	1.071	30	0.1479	74	0.8609	111	0.4415	-154

$V_{CE} = 8 \text{ V}$, $I_C = 75 \text{ mA}$ $Z_0 = 50.0\Omega$ $T_A = 25^\circ\text{C}$ (Note: S-parameters were taken in a 23 package.)

FREQ. GHz	S21			S12		S11		S22	
	dB	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
0.20	25.60	19.05	106	0.0151	-12	0.5128	-147	0.3090	-102
0.50	20.0	10.0	85	0.0208	20	0.4731	174	0.3162	-109
1.00	15.60	6.02	66	0.0446	58	0.5011	168	0.5623	-149
1.50	12.20	4.07	46	0.0676	68	0.4518	121	0.3198	4
2.00	9.0	2.82	20	0.0776	30	0.4027	87	0.6095	163
2.50	8.0	2.51	14	0.0562	-38	0.2238	21	0.5128	160
3.00	6.80	2.23	-54	0.1258	-36	0.6309	-1	0.6683	94
3.50	4.40	1.66	-79	0.0891	-30	0.6025	-23	0.7413	44
4.00	1.60	1.20	-90	0.0794	-64	0.3548	-65	0.7585	48

$V_{CE} = 8 \text{ V}$, $I_C = 80 \text{ mA}$ $Z_0 = 50.0\Omega$ $T_A = 25^\circ\text{C}$ (Note: S-parameters were taken in a -18 package.)

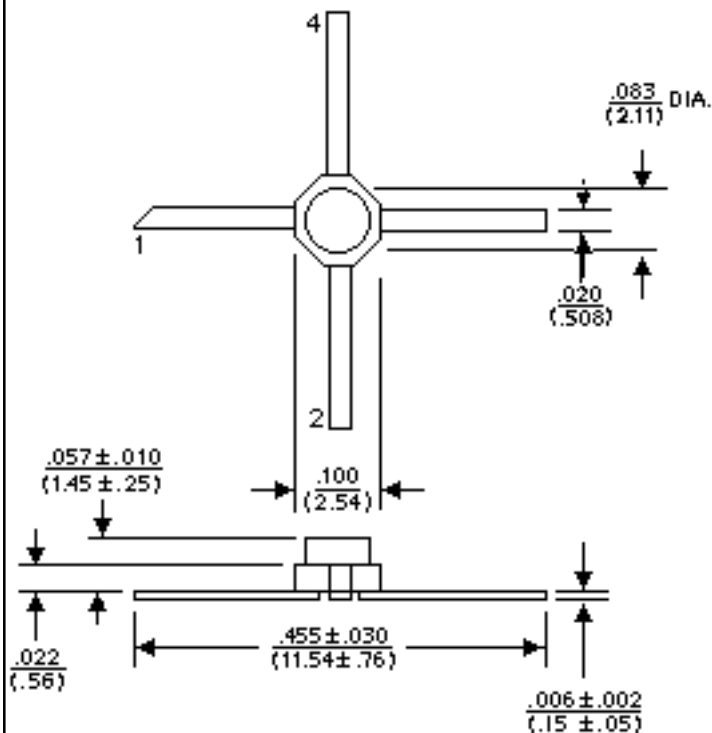
FREQ. GHz	S21			S12		S11		S22	
	dB	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
0.20	26.80	21.87	100	0.0199	66	0.4216	-160	0.2691	-78
0.50	19.80	9.77	80	0.0431	70	0.5688	175	0.1972	-98
1.00	14.00	5.01	60	0.0841	71	0.5011	157	0.3162	-106
1.50	11.00	3.54	50	0.1258	72	0.4168	146	0.5308	-111
2.00	8.70	2.72	35	0.1778	65	0.3162	120	0.6760	-128
2.50	6.20	2.04	35	0.2344	62	0.2511	94	0.7673	-139
3.00	5.80	1.95	9	0.3019	56	0.2113	56	0.6165	-155
3.50	5.00	1.77	-2	0.3630	48	0.2018	0	0.6918	-158
4.00	4.60	1.69	-14	0.4731	35	0.2290	-60	0.5888	-160

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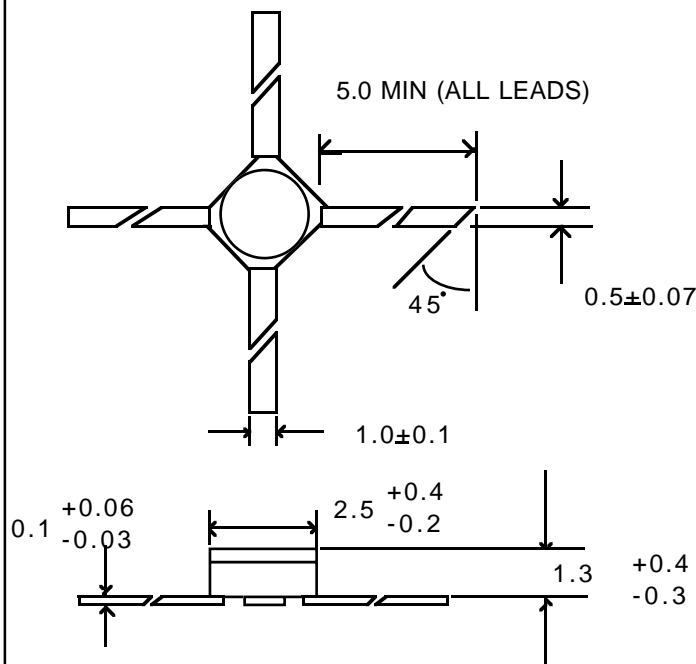
Part Number B15V140

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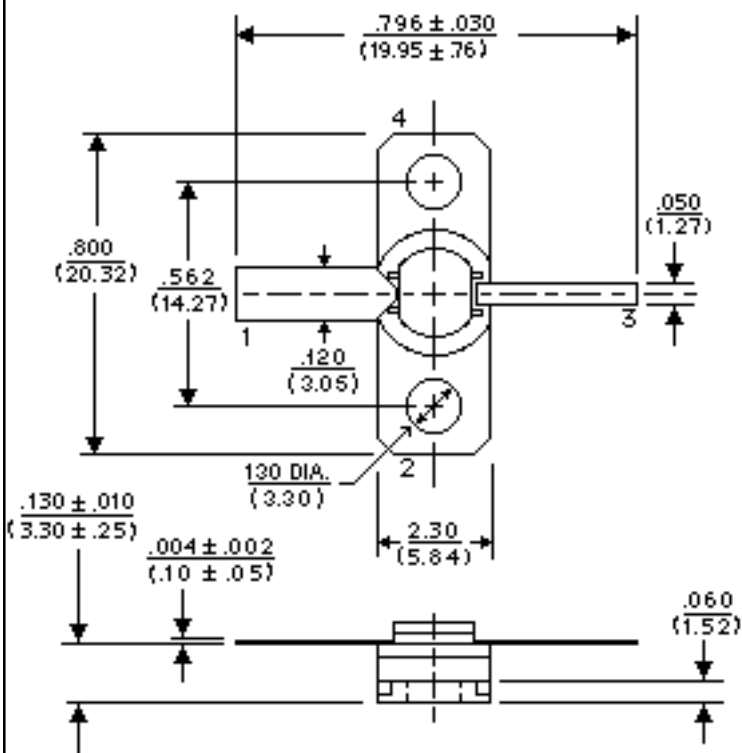
85 Package: Micro-X 85 Mil Ceramic



70 Package: 70 Mil Stripline



23 Package: 0.230" BeO Flange



LEAD	1	2	3	4
10 Package	Emitter	Base	Emitter	Collector
14, 85, 86, 35 & 04 Package	Base	Emitter	Collector	Emitter

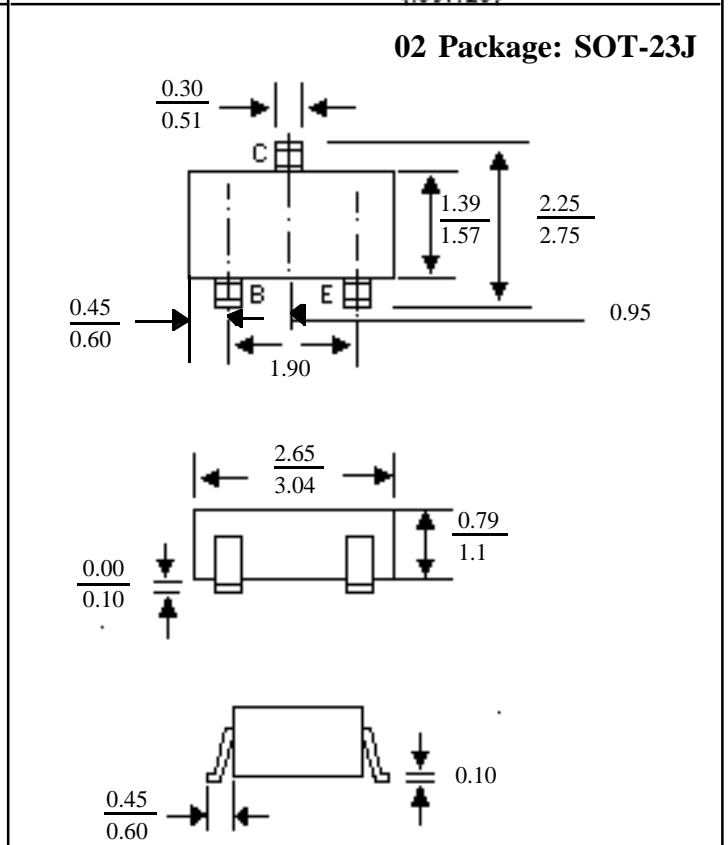
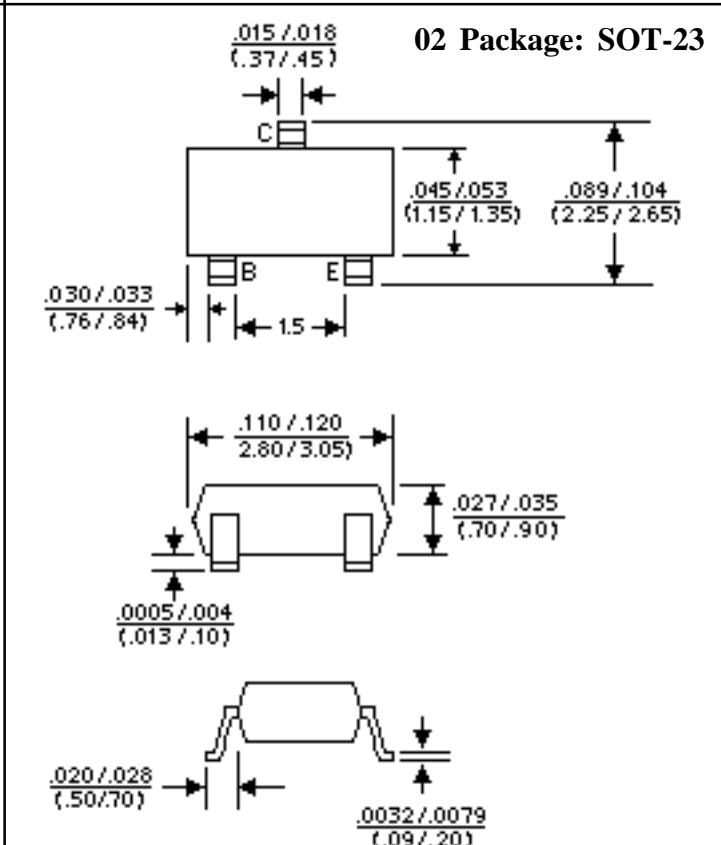
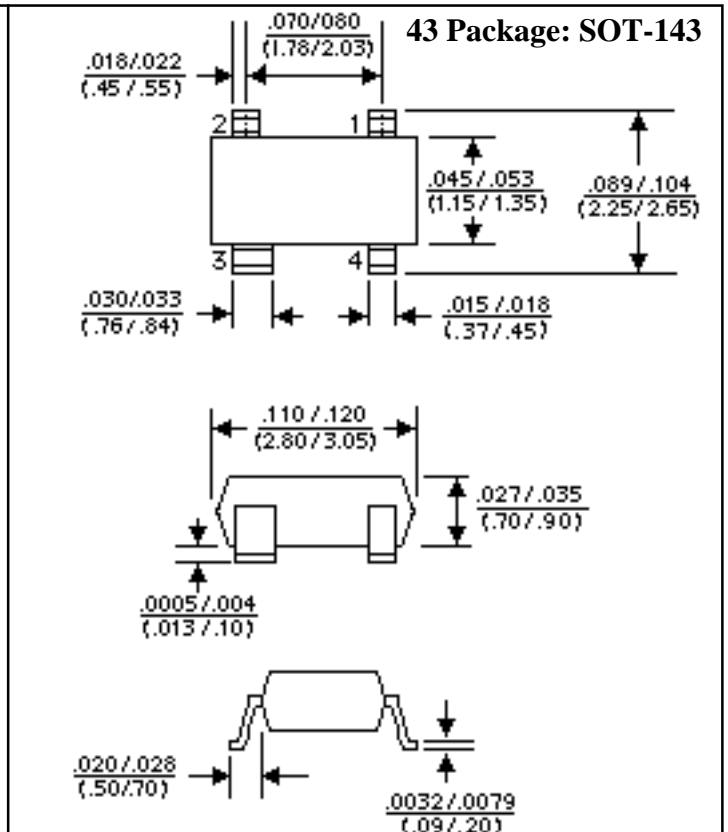
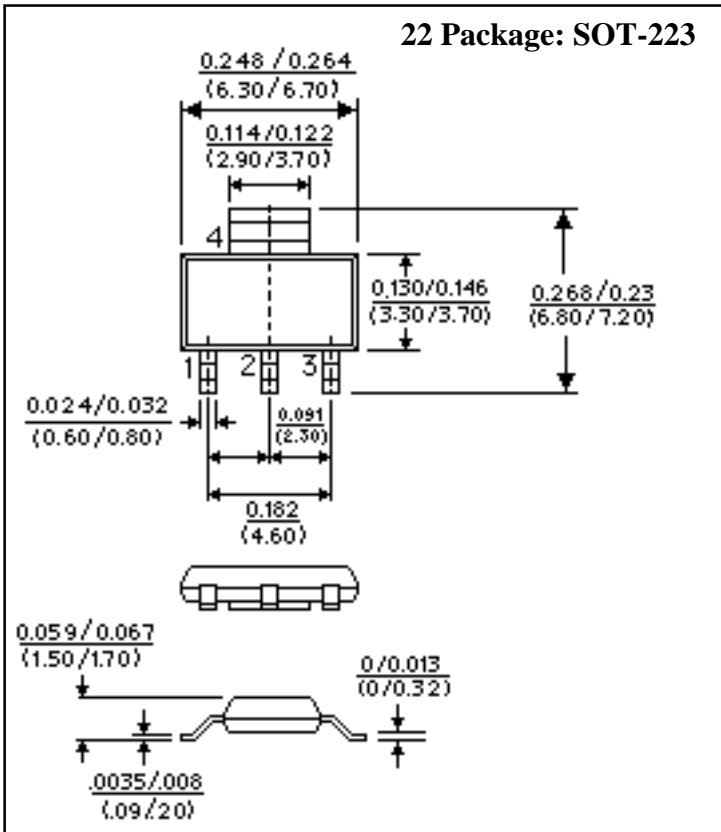
NOTES: (unless otherwise specified)

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

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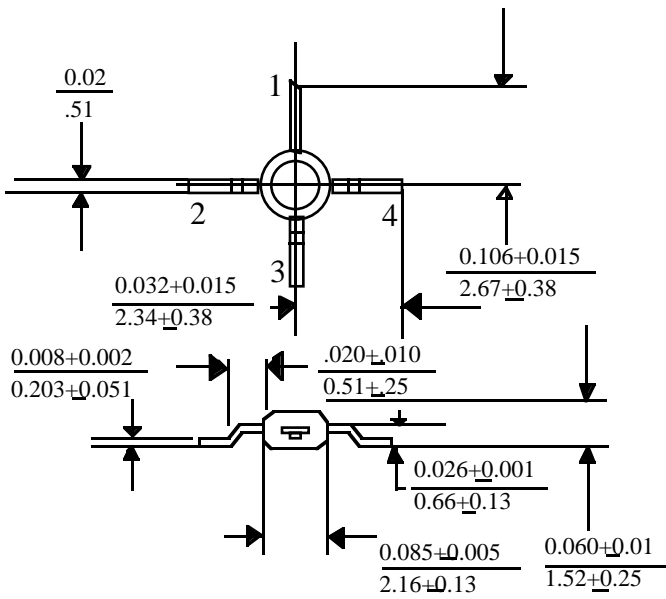


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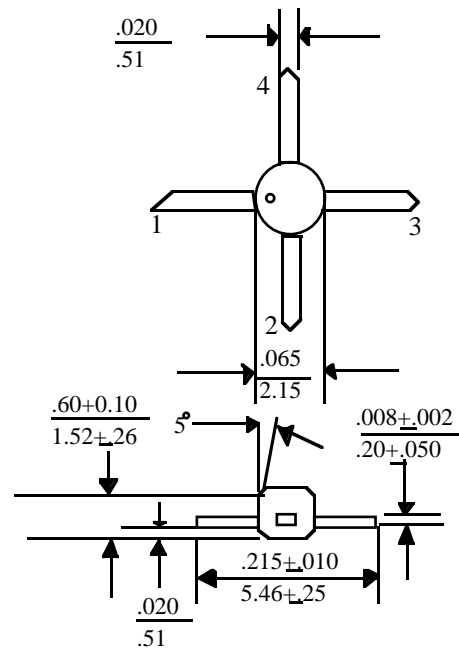
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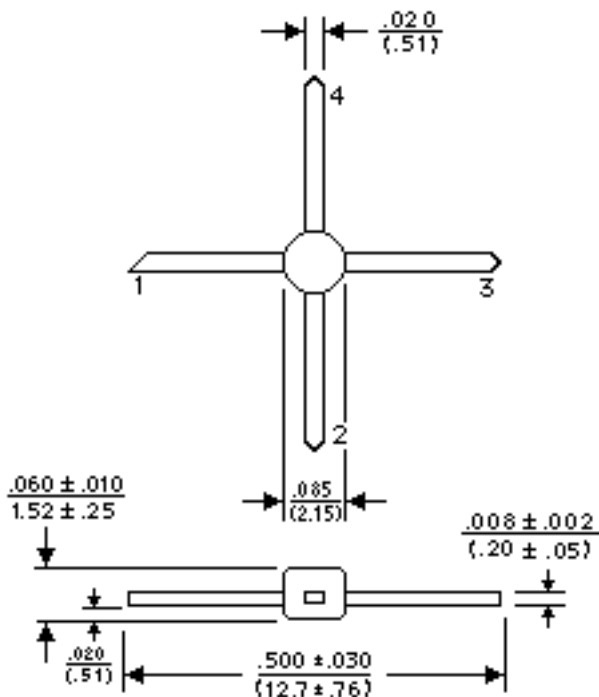
**86 Package: 0.08" Plastic Micro-X,
Surface Mount**



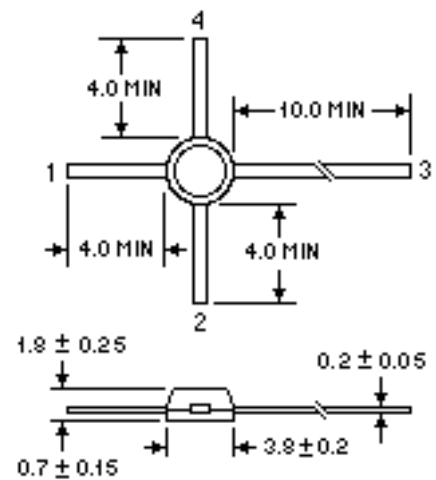
**87 Package: 0.085" Plastic Micro-X,
Short Lead**

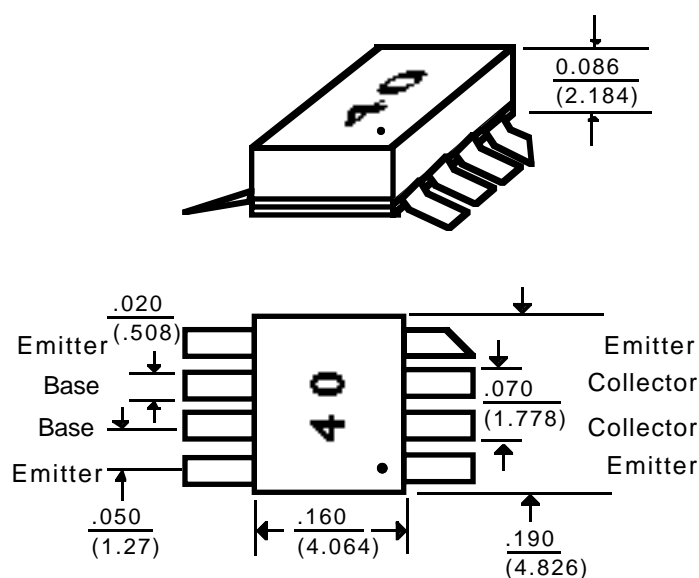


85 Package: 0.085" Plastic Micro-X



04 Package: 0.145" Plastic Macro-X



BIPOLARICS, INC.**Part Number B15V140****MIDIUM POWER SILICON MICROWAVE TRANSISTOR****PRODUCT DATA SHEET****08 Ceramic SO8 Package****NOTES:** (unless otherwise specified)

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

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