

MEDIUM POWER SILICON MICROWAVE TRANSISTOR

PRODUCT DATA SHEET

FEATURES:

- High Gain Bandwidth Product
 $f_t = 10 \text{ GHz typ @ } I_C = 70 \text{ mA}$
- 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' B12V140 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 B12V140 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 | 24 | V |
| V_{CEO} | Collector-Emitter Voltage | 12 | V |
| V_{EBO} | Emitter-Base Voltage | 1.5 | V |
| I_C | Collector Current (continuous) | 120 | mA |
| $I_{C_{MAX}}$ | 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 $V_{CE} = 10V, I_C = 70 \text{ mA}$, Class A, unless stated | UNIT | MIN. | TYP. | MAX. |
|--------------|---|---------------|------|-------------|------|
| f_t | Gain Bandwidth Product | GHz | | 10.0 | |
| $ S_{21} ^2$ | Insertion Power Gain: f = 1.0 GHz f = 2.0 GHz | dB dB | | 15.6 9.0 | |
| P_{1dB} | Power output at 1dB compression: f = 1.0 GHz $I_C = 75 \text{ mA}$ | dBm | | 27.0 | |
| NF | Noise Figure: $V_{CE} = 8V, I_C = 20 \text{ mA}$ f = 1.0 GHz | dB | | 1.6 | |
| h_{FE} | Forward Current Transfer Ratio: $V_{CE} = 8V, I_C = 15 \text{ mA}$ | | 30 | 100 | 300 |
| I_{CBO} | Collector Cutoff Current : $V_{CB} = 10V$ | μA | | | 0.4 |
| C_{CB} | Collector Base Capacitance: $V_{CB} = 10V$ f = 1MHz | pF | | .75 | |

BIPOLARICS, INC.**Part Number B12V140****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 B12V140

MEDIUM POWER SILICON MICROWAVE TRANSISTOR

TYPICAL S PARAMETERS:

$V_{CE} = 8\text{ V}$, $I_C = 75\text{ mA}$ $Z_O = 50.0\Omega$ $T_A = 25^\circ\text{C}$ (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 |

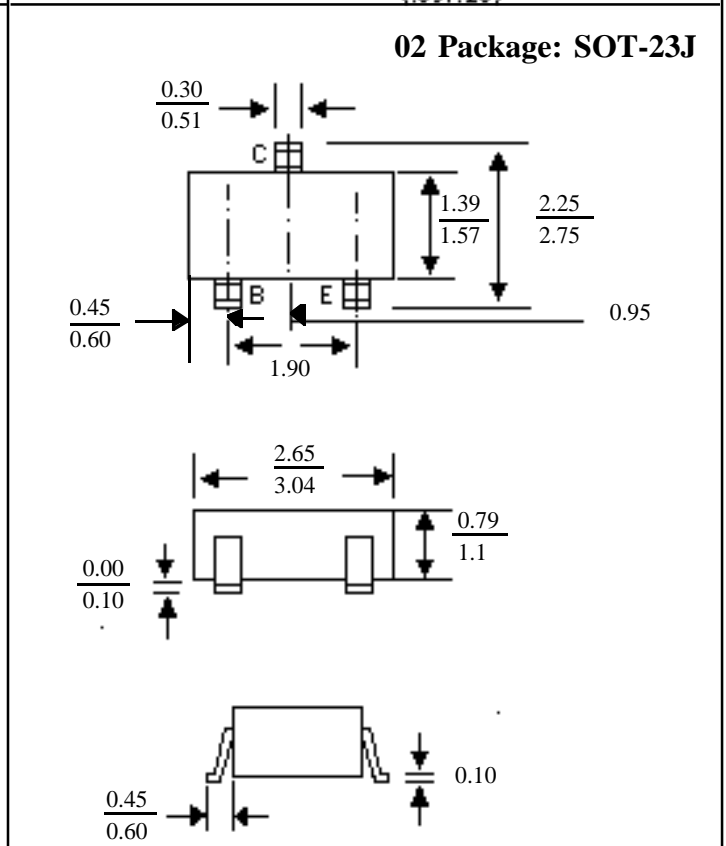
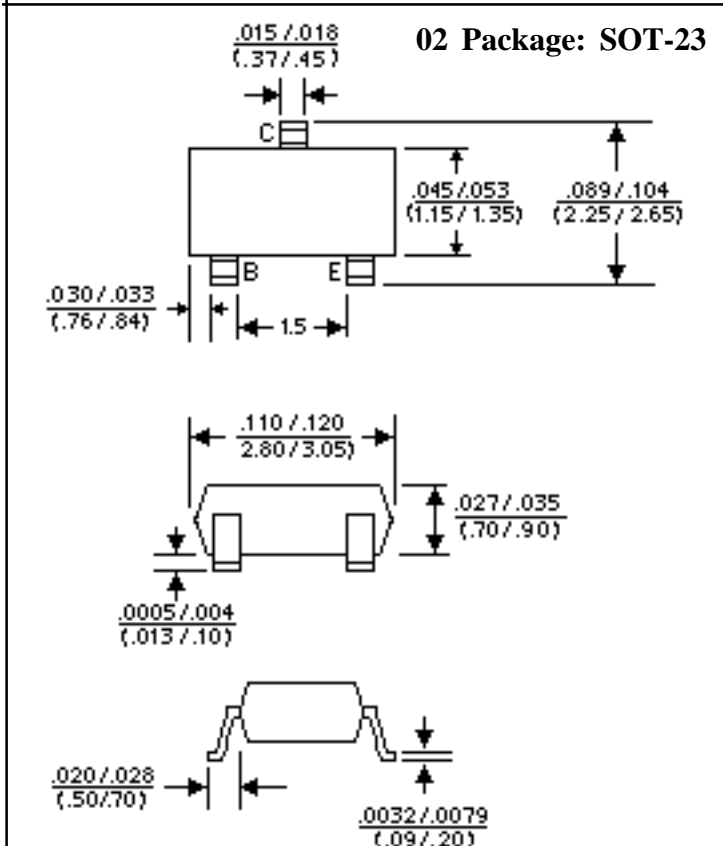
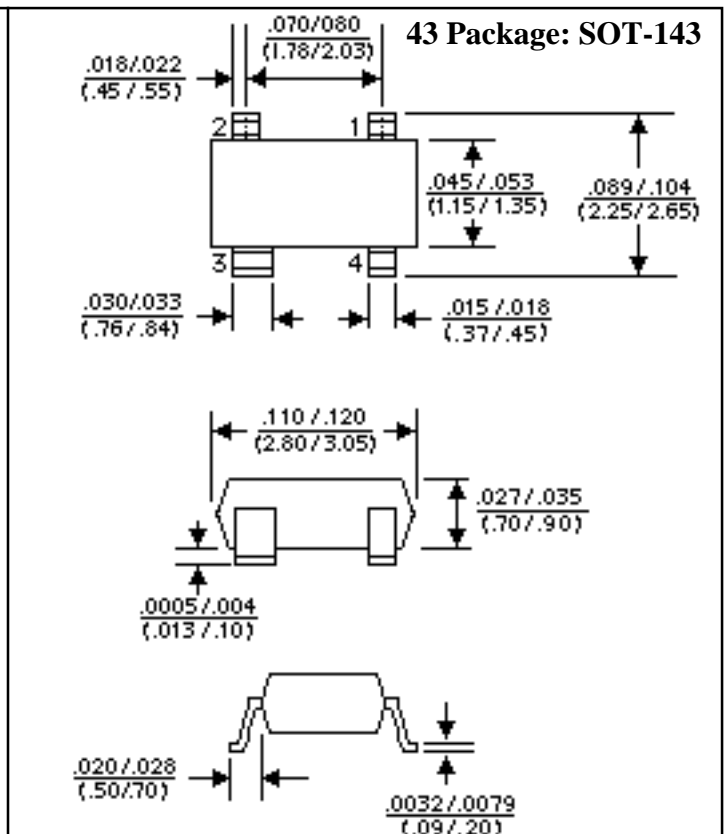
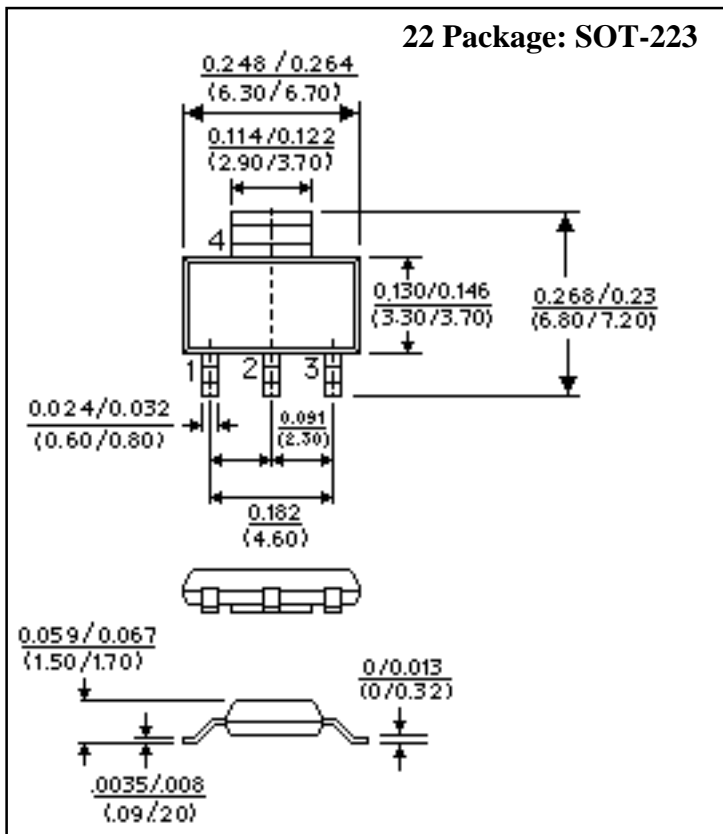
$V_{CE} = 8\text{ V}$, $I_C = 75\text{ mA}$ $Z_O = 50.0\Omega$ $T_A = 25^\circ\text{C}$ (Note: S-parameters were taken in a 23 package.)

| 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 |

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

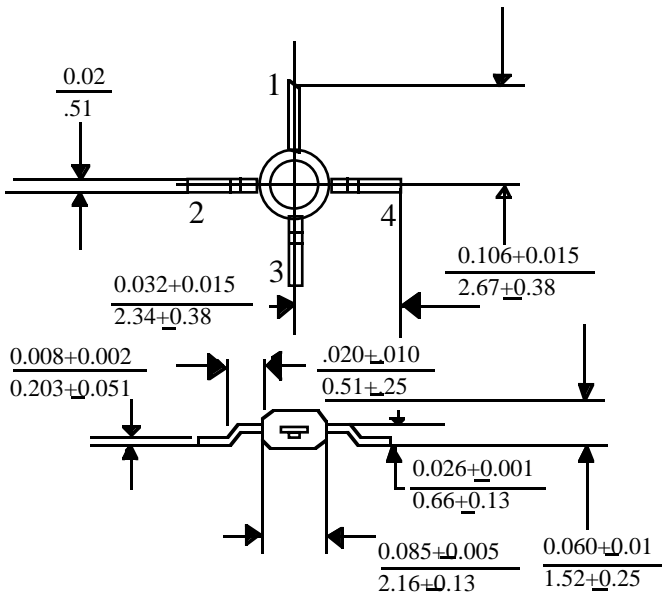
| FREQ. GHz | S21 | | | S12 | | S11 | | S22 | |
|--------------|-------|-------|-----|--------|-----|--------|------|--------|------|
| | dB | Mag | Ang | Mag | Ang | Mag | Ang | Mag | Ang |
| 0.20 | 26.80 | 21.87 | 100 | 0.0199 | 66 | 0.4216 | -160 | 0.2691 | -78 |
| 0.50 | 19.80 | 9.77 | 80 | 0.0431 | 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 |

MEDIUM POWER SILICON MICROWAVE TRANSISTOR

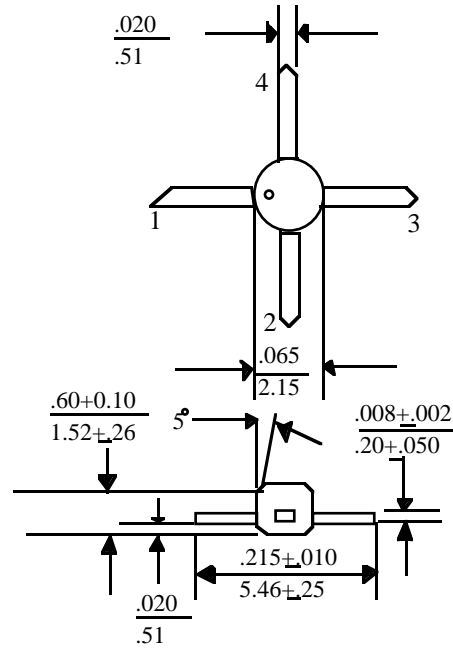


MIDIUM POWER SILICON MICROWAVE TRANSISTOR

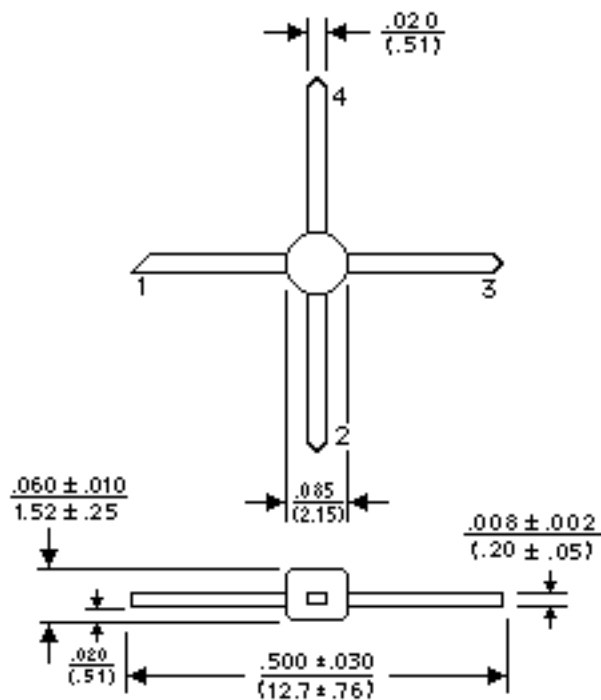
**86 Package: 0.08" Plastic Micro-X,
Surface Mount**



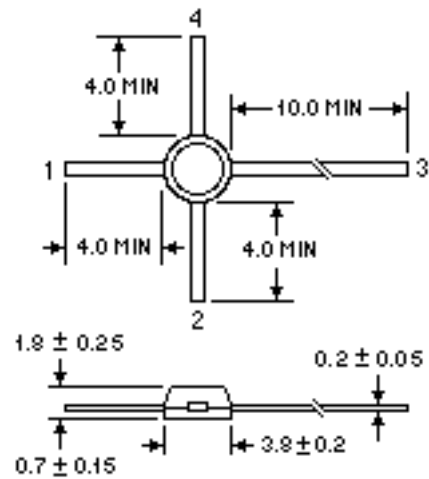
**87 Package: 0.085" Plastic Micro-X,
Short Lead**



85 Package: 0.085" Plastic Micro-X



04 Package: 0.145" Plastic Macro-X



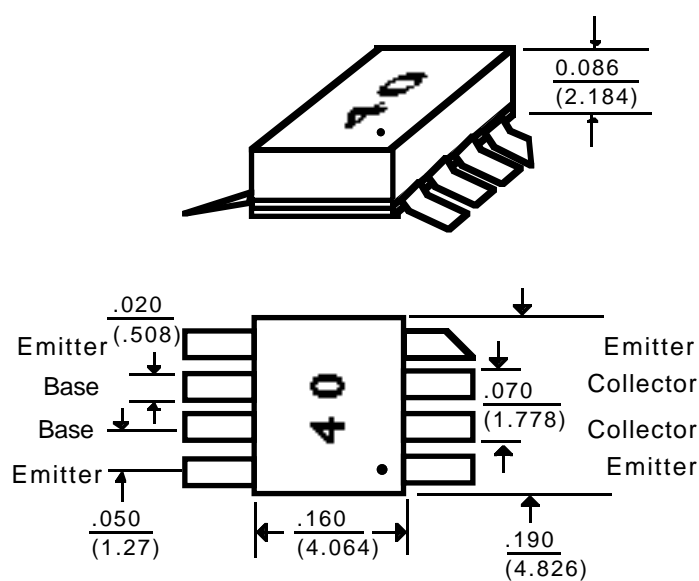
BIPOLARICS, INC.

Part Number B12V140

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

BIPOLARICS, INC.
46766 Lakeview Blvd.
Fremont, CA 94538
Phone: (510) 226-6565 FAX: (510) 226-6765