

Features

- Low, guaranteed VSWR
- Low conversion loss
- Broad band IF output
- Biased models for "starved LO" operation
- Improved intermodulation performance

Description

These 90° hybrid balanced mixers feature extremely low, guaranteed VSWR and conversion loss performance in down conversion applications. Integral, hot carrier diodes and a compact, lightweight, economical, design provide low, stable, noise figure performance.

Biased or unbiased models, in octave or wider bandwidths, from 0.5 to 18.0 GHz are available. Biased models allow

Applications

- Low loss down-convertors and receiver front-ends
- AM, FM, PSK demodulators
- Phase detectors
- Phase-locked loops
- Frequency discriminators
- "Starved LO" systems
- Reduction of system LO/RF leakage
- DF, monopulse and other multi-channel phase/amplitude tracking receiver systems
- Test instrumentation

improved conversion loss and intermodulation performance, especially when optimum LO power is not available. Bias compensation can provide optimum conversion loss even for LO power variations of 40 dB. Intermodulation performance can also be significantly improved by bias compensation.

See pages 141-155 for detailed Technical/Application information.

Electrical Specifications

| Model No. | Frequency (GHz) | Isolation LO-RF Min/Typ (dB) | VSWR Max/Typ | Conversion Loss ⁽⁴⁾ Max/Typ (dB) | Noise Figure* Max/Typ (dB) | LO Power (dBm) | Bias ^(1,2) | IF ^(1, 3, 4) Bandwidth (MHz) |
|-----------|-----------------|------------------------------|--------------|---|----------------------------|----------------|-----------------------|---|
| 70114 | 0.5-1.0 | 6/10 | 1.5/1.2 | 7.0/6.0 | 8.0/7.0 | +7 | NO | DC-150 |
| 7H0114 | 0.5-1.0 | 6/10 | 1.5/1.2 | 7.5/6.5 | 8.5/7.5 | 0 | YES | 5-150 |
| 70350 | 0.5-2.0 | 6/10 | 1.7/1.3 | 7.5/6.5 | 8.5/7.5 | +7 | NO | DC-225 |
| 7H0350 | 0.5-2.0 | 6/10 | 1.7/1.3 | 8.0/7.0 | 9.0/8.0 | 0 | YES ⁽⁵⁾ | 10-225 |
| 70115 | 1.0-2.0 | 6/10 | 1.5/1.2 | 7.0/6.0 | 8.0/7.0 | +7 | NO | DC-250 |
| 7H0115 | 1.0-2.0 | 6/10 | 1.5/1.2 | 7.5/6.5 | 8.5/7.5 | 0 | YES | 5-250 |
| 70140 | 1.3-2.6 | 6/10 | 1.6/1.3 | 7.0/6.0 | 8.0/7.0 | +7 | NO | DC-500 |
| 70250 | 1.5-12.0 | 6/10 | 2.0/1.65 | 8.0/7.0 | 9.0/8.0 | +10 | NO | DC-500 |
| 70116 | 2.0-4.0 | 6/10 | 1.6/1.3 | 7.0/6.0 | 8.0/7.0 | +7 | NO | DC-600 |
| 7H0116 | 2.0-4.0 | 6/10 | 1.6/1.3 | 7.5/6.5 | 8.5/7.5 | 0 | YES | 5-600 |
| 70340 | 2.6-5.2 | 6/10 | 1.7/1.3 | 7.0/6.0 | 8.0/7.0 | +7 | NO | DC-800 |
| 7H0340 | 2.6-5.2 | 6/10 | 1.7/1.3 | 7.5/6.5 | 8.5/7.5 | 0 | YES | 5-800 |
| 70117 | 4.0-8.0 | 6/10 | 1.9/1.4 | 7.5/6.5 | 8.5/7.5 | +7 | NO | DC-900 |
| 7H0117 | 4.0-8.0 | 6/10 | 1.9/1.4 | 8.0/7.0 | 9.0/8.0 | 0 | YES | 5-900 |
| 70540 | 5.2-10.4 | 6/10 | 2.0/1.5 | 7.5/6.5 | 8.5/7.5 | +7 | NO | DC-1100 |
| 7H0540 | 5.2-10.4 | 6/10 | 2.0/1.5 | 8.0/7.0 | 9.0/8.0 | 0 | YES | 5-1100 |
| 7G0118 | 8.0-12.4 | 6/10 | 2.0/1.65 | 7.5/6.5 | 8.5/7.5 | +7 | NO | DC-1200 |
| 7H0118 | 8.0-12.4 | 6/10 | 2.0/1.65 | 8.0/7.0 | 9.0/8.0 | 0 | YES | 5-1200 |
| 70160 | 8.0-16.0 | 6/10 | 2.5/1.7 | 8.0/7.0 | 9.0/8.0 | +7 | NO | DC-1200 |
| 7H0160 | 8.0-16.0 | 6/10 | 2.5/1.7 | 8.5/7.5 | 9.5/8.5 | 0 | YES | 5-1200 |
| 70119 | 12.4-18.0 | 6/10 | 2.5/1.7 | 8.0/7.0 | 9.0/8.0 | +7 | NO | DC-1400 |
| 7H0119 | 12.4-18.0 | 6/10 | 2.5/1.7 | 8.5/7.5 | 9.5/8.5 | 0 | YES | 5-1400 |

(1) Biased mixers normally have a built-in dc blocking capacitor in the IF output. Models without this capacitor are available (on special order) which allow a dc coupled IF response. There is approximately +350 to +450 mV dc offset at the IF terminals for dc coupled, biased models.

(2) The bias current required for optimum conversion loss is a function of the LO power applied. All biased models shown can also be used unbiased by grounding the bias terminal and applying normal LO power. All models (except 7H0350) require an external bias current limiting resistor.

*Approximately .5 dB degradation @ +95°C.

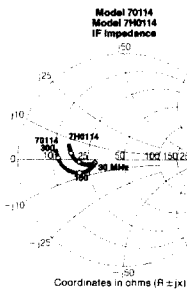
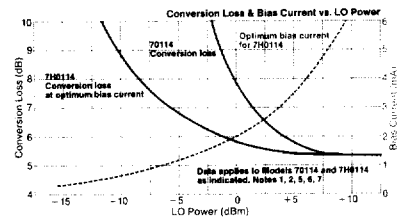
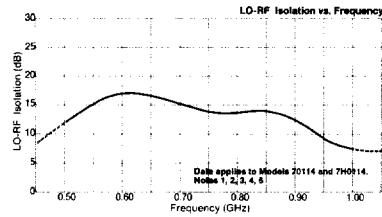
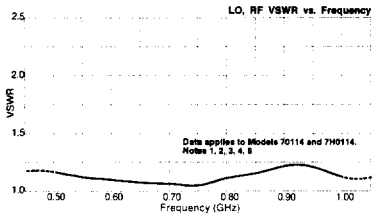
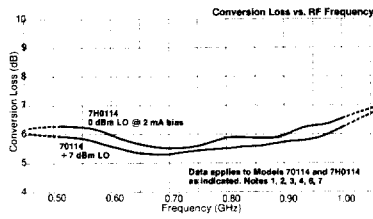
See page 144 for detailed information on using the bias option.

(3) IF bandwidth for biased models is at -3 dB response points. DC coupled models have "flat" response to dc.

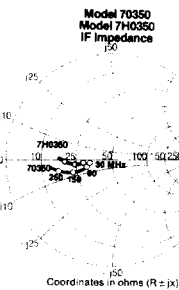
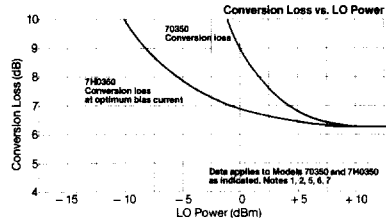
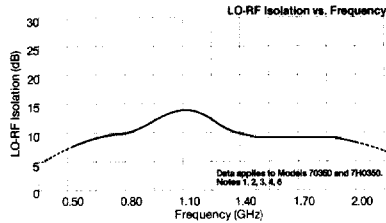
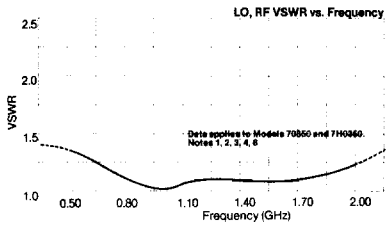
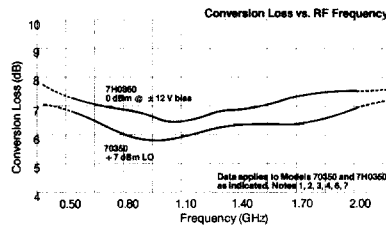
(4) Conversion loss is measured at 30 or 60 MHz.

(5) Model 7H0350 requires ±12V bias for any LO power level and incorporates optimum load-line bias network as described on page 144.

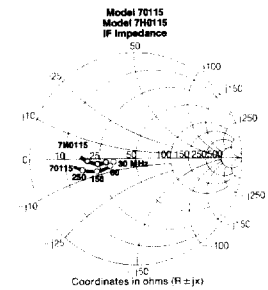
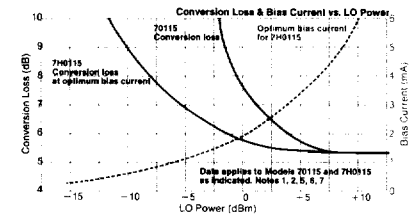
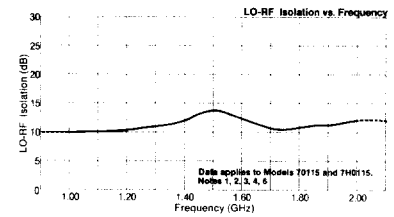
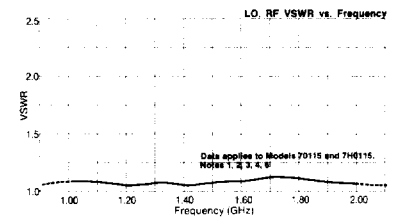
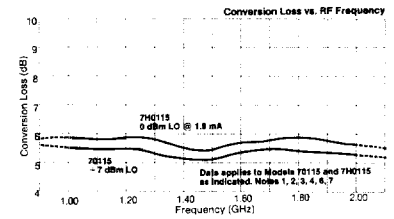
**70114
7H0114**



**70350
7H0350**



**70115
7H0115**



Data taken with HP 8405 vector voltmeter, referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

Notes:

1. $T_A = 25^\circ\text{C}$
2. IF frequency = 60 MHz.
3. LO power (Model 70114): +7 dBm.
4. LO power (Model 7H0114): 0 dBm @ 2 mA bias current.
5. LO frequency = 0.75 GHz.
6. All measurements made in a 50 ohm system.
7. Model 7H0114 has same conversion loss characteristics as Model 70114 when bias terminal is grounded.

Data taken with HP 8405 vector voltmeter, referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

Notes:

1. $T_A = 25^\circ\text{C}$.
2. IF frequency = 60 MHz.
3. LO power (Model 70350): +7 dBm.
4. LO power (Model 7H0350): 0 dBm @ $\pm 12\text{V}$ bias current.
5. LO frequency = 1.25 GHz.
6. All measurements made in a 50 ohm system.
7. Model 7H0350 has same conversion loss characteristics as 70350 when bias terminal is grounded.

Data taken with HP 8405 vector voltmeter, referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

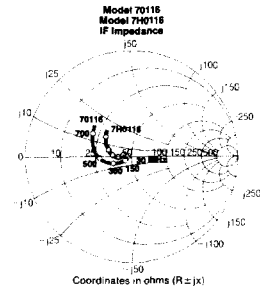
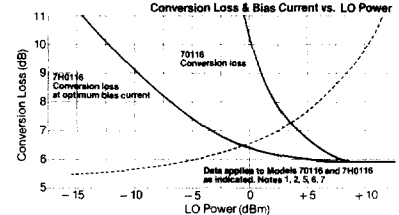
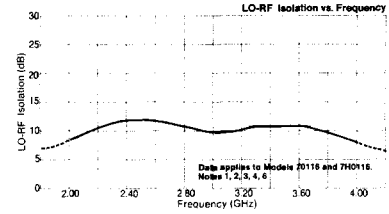
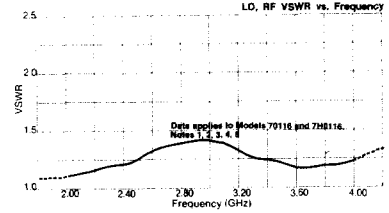
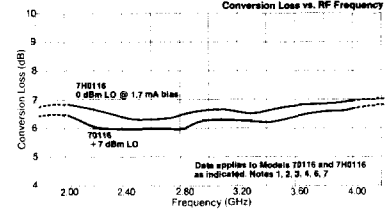
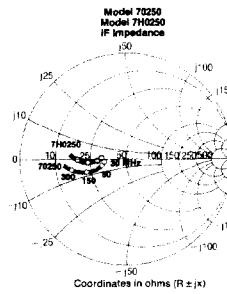
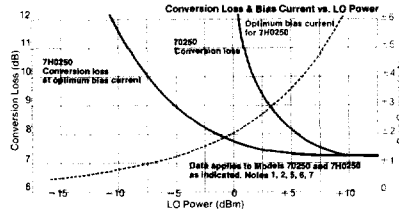
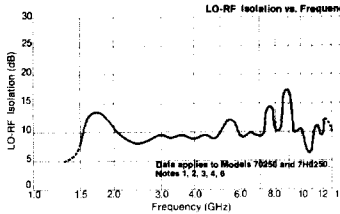
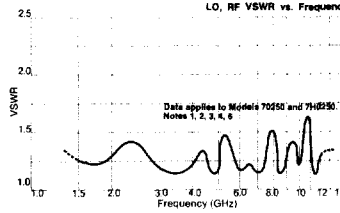
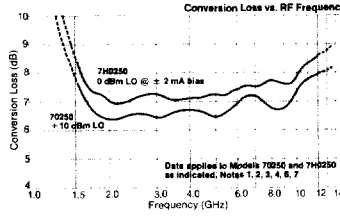
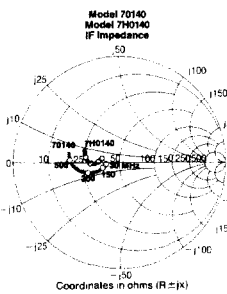
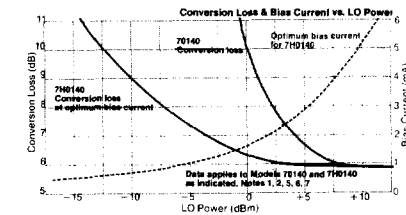
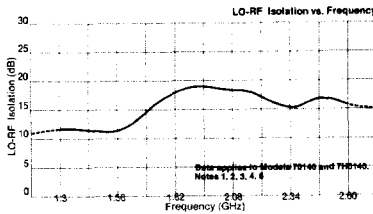
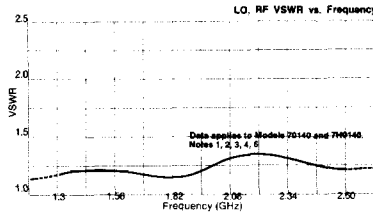
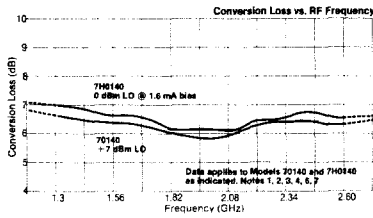
Notes:

1. $T_A = 25^\circ\text{C}$.
2. IF frequency = 60 MHz.
3. LO power (Model 70115): +7 dBm.
4. LO power (Model 7H0115): 0 dBm @ 1.9 mA bias current.
5. LO frequency = 1.50 GHz.
6. All measurements made in a 50 ohm system.
7. Model 7H0115 has same conversion loss characteristics as Model 70115 when bias terminal is grounded.

70140

70250

70116 7H0116



Data taken with HP 8405 vector voltmeter; referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

Notes:

1. $T_A = 25^\circ\text{C}$.
2. IF frequency \uparrow 60 MHz.
3. LO power (Model 70140): +7 dBm.
4. LO power (Model 7H0140): 0 dBm @ 1.6 mA bias current.
5. LO frequency = 1.95 GHz.
6. All measurements made in a 50 ohm system.
7. Model 7H0140 has same conversion loss characteristics as Model 70140 when bias terminal is grounded.

Data taken with HP 8405 vector voltmeter; referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

Notes:

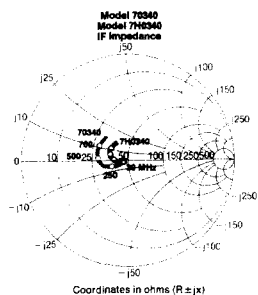
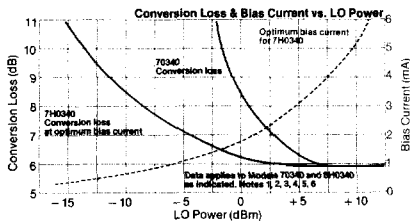
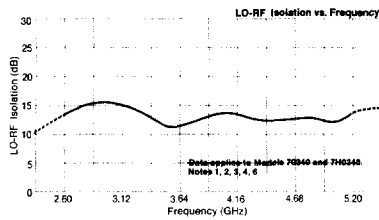
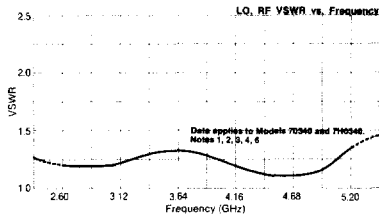
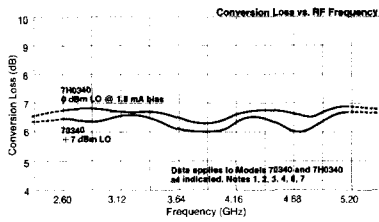
1. $T_A = 25^\circ\text{C}$.
2. IF frequency = 60 MHz.
3. LO power (Model 70250): +10 dBm.
4. LO power (Model 7H0250): 0 dBm @ ± 2 mA bias current.
5. LO frequency = 7.0 GHz.
6. All measurements made in a 50 ohm system.
7. Model 7H0250 has conversion loss characteristics similar to Model 70250 when bias terminals are grounded.

Data taken with HP 8405 vector voltmeter; referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

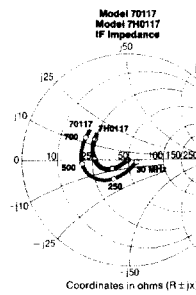
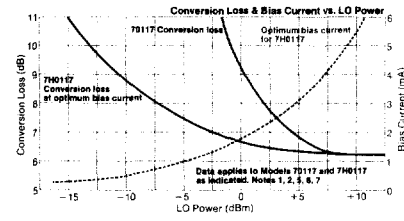
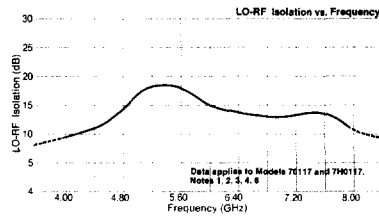
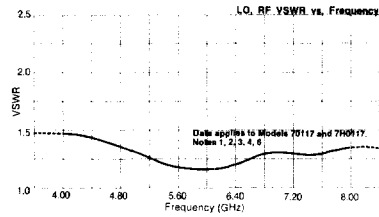
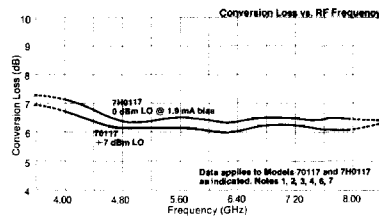
Notes:

1. $T_A = 25^\circ\text{C}$.
2. IF frequency = 60 MHz.
3. LO power (Model 70116): +7 dBm.
4. LO power (Model 7H0116): 0 dBm @ 1.7 mA bias current.
5. LO frequency = 3.0 GHz.
6. All measurements made in a 50 ohm system.
7. Model 7H0116 has same conversion loss characteristics as Model 70116 when bias terminal is grounded.

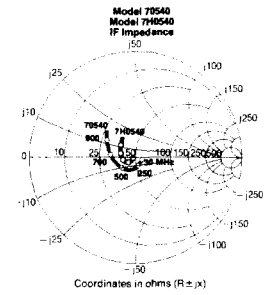
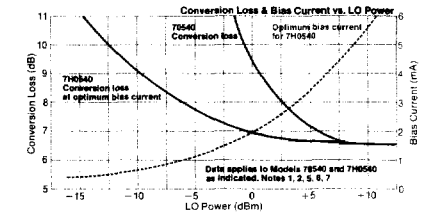
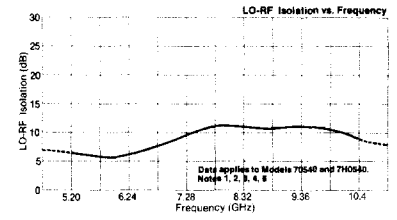
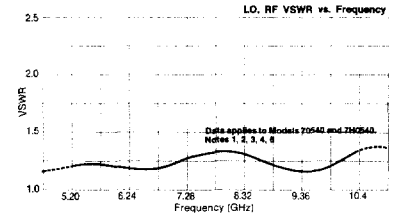
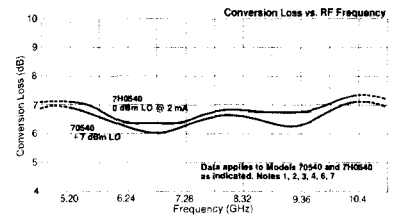
70340 7H0340



70117 7H0117



70540 7H0540



Data taken with HP 8405 vector voltmeter, referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

Notes:

1. $T_A = 25^\circ\text{C}$.
2. IF frequency = 60 MHz.
3. LO power (Model 70340): +7 dBm.
4. LO power (Model 7H0340): 0 dBm @ 1.8 mA bias current.
5. LO frequency = 3.90 GHz.
6. All measurements made in a 50 ohm system.
7. Model 7H0340 has same conversion loss characteristic as Model 70340 when bias terminal is grounded.

Data taken with HP 8405 vector voltmeter, referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

Notes:

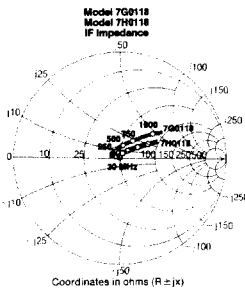
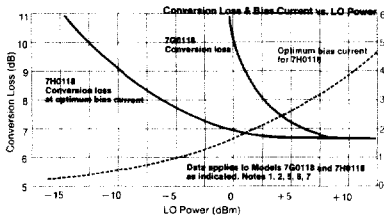
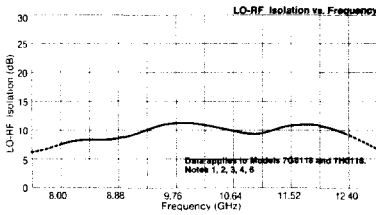
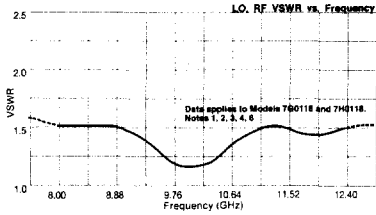
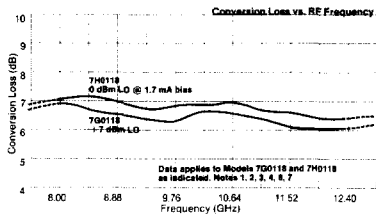
1. $T_A = 25^\circ\text{C}$.
2. IF frequency = 60 MHz.
3. LO power (Model 70117): +7 dBm.
4. LO power (Model 7H0117): 0 dBm @ 1.9 mA bias current.
5. LO frequency = 6.0 GHz.
6. All measurements made in a 50 ohm system.
7. Model 7H0117 has same conversion loss characteristic as Model 70117 when bias terminal is grounded.

Data taken with HP 8405 vector voltmeter, referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

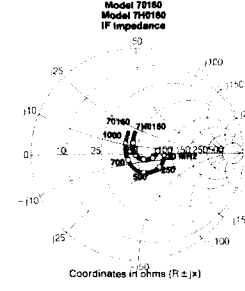
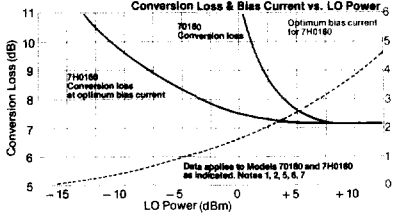
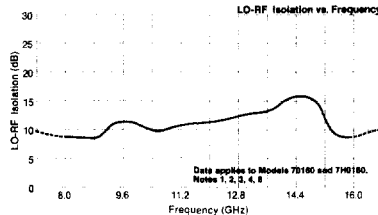
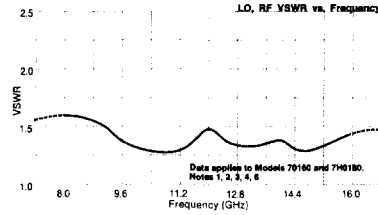
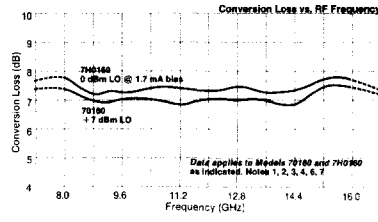
Notes:

1. $T_A = 25^\circ\text{C}$.
2. IF frequency = 60 MHz.
3. LO power (Model 70540): +7 dBm.
4. LO power (Model 7H0540): 0 dBm @ 2.0 mA bias current.
5. LO frequency = 7.8 GHz.
6. All measurements made in a 50 ohm system.
7. Model 7H0540 has same conversion loss characteristics as Model 70540 when bias terminal is grounded.

**7G0118
7H0118**



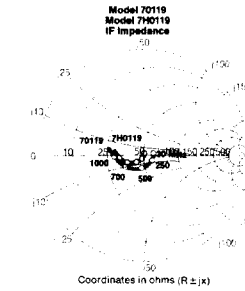
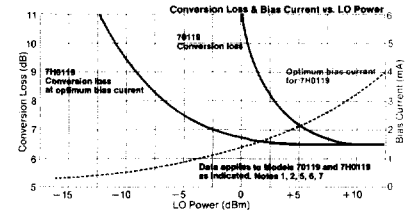
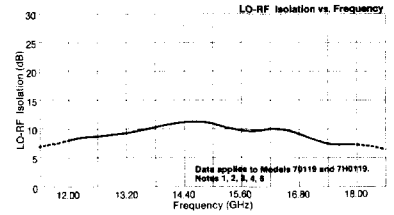
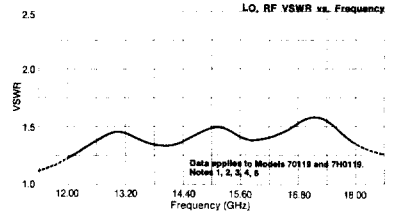
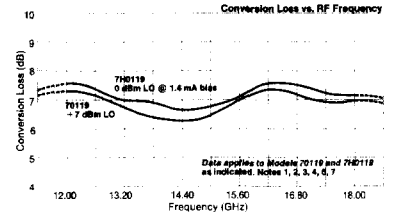
**70160
7H0160**



Data taken with HP 8405 vector voltmeter, referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

- Notes:**
1. $T_A = 25^\circ\text{C}$.
 2. IF frequency = 60 MHz.
 3. LO power (Model 7G0118): + 7 dBm.
 4. LO power (Model 7H0118): 0 dBm @ 1.7 mA bias current.
 5. LO frequency = 10.2 GHz.
 6. All measurements made in a 50 ohm system.
 7. Model 7H0118 has same conversion loss characteristic as Model 7G0118 when bias terminal is grounded.

**70119
7H0119**



Data taken with HP 8405 vector voltmeter, referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

- Notes:**
1. $T_A = 25^\circ\text{C}$.
 2. IF frequency = 60 MHz.
 3. LO power (Model 70160): + 7 dBm.
 4. LO power (Model 7H0160): 0 dBm @ 1.7 mA bias current.
 5. LO frequency = 12 GHz.
 6. All measurements made in a 50 ohm system.
 7. Model 7H0160 has same conversion loss characteristics as Model 70160 when bias terminal is grounded.

Data taken with HP 8405 vector voltmeter, referenced to open at input of IF connector. Notes 1, 3, 4, 5, 6.

- Notes:**
1. $T_A = 25^\circ\text{C}$.
 2. IF frequency = 60 MHz.
 3. LO power (Model 70119): + 7 dBm.
 4. LO power (Model 7H0119): 0 dBm @ 1.4 mA bias current.
 5. LO frequency = 15 GHz.
 6. All measurements made in 50 ohm system.
 7. Model 7H0119 has same conversion loss characteristics as Model 70119 when bias terminal is grounded.

Mechanical Specifications

| Model No. | A | | B | | C | | D | | E | | F | | Figure No. | Weight | |
|-----------|------|----|------|----|------|----|------|----|------|----|-----|----|------------|--------|-----|
| | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | | oz | gm |
| 70114 | 1.88 | 48 | 2.20 | 56 | 1.63 | 41 | 1.07 | 27 | 1.10 | 28 | — | — | 1 | 2.7 | 77 |
| 7H0114 | 1.88 | 48 | 2.20 | 56 | 1.63 | 41 | 1.07 | 27 | 1.10 | 28 | .60 | 15 | 2 | 2.7 | 77 |
| 70115 | 1.88 | 48 | 2.20 | 56 | 1.63 | 41 | 1.07 | 27 | 1.10 | 28 | — | — | 1 | 2.7 | 77 |
| 7H0115 | 1.88 | 48 | 2.20 | 56 | 1.63 | 41 | 1.07 | 27 | 1.10 | 28 | .60 | 15 | 2 | 2.7 | 77 |
| 70116 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | — | — | 1 | 2.0 | 57 |
| 7H0116 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | .52 | 13 | 2 | 2.0 | 57 |
| 70117 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | — | — | 1 | 2.0 | 57 |
| 7H0117 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | .52 | 13 | 2 | 2.1 | 60 |
| 7G0118 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | — | — | 1 | 2.1 | 60 |
| 7H0118 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | .52 | 13 | 2 | 2.1 | 60 |
| 70119 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | — | — | 1 | 2.1 | 60 |
| 7H0119 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | .52 | 13 | 2 | 2.1 | 60 |
| 70140 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | — | — | 1 | 2.0 | 57 |
| 70160 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | — | — | 1 | 2.0 | 57 |
| 7H0160 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | .52 | 13 | 2 | 2.1 | 60 |
| 70250 | 2.40 | 61 | 2.60 | 66 | 2.15 | 55 | 1.30 | 33 | 1.60 | 41 | — | — | 3 | 4.5 | 114 |
| 70340 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | — | — | 1 | 2.0 | 57 |
| 7H0340 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | .52 | 13 | 2 | 2.3 | 65 |
| 70350 | 1.60 | 41 | 2.60 | 66 | 1.35 | 34 | .70 | 18 | 1.60 | 41 | — | — | 3 | 3.0 | 86 |
| 7H0350 | 1.60 | 41 | 2.60 | 66 | 1.35 | 34 | .70 | 18 | .50 | 13 | .90 | 23 | 4 | 3.1 | 88 |
| 70540 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | — | — | 1 | 2.0 | 57 |
| 7H0540 | 1.45 | 37 | 2.00 | 51 | 1.20 | 30 | .63 | 16 | 1.00 | 25 | .52 | 13 | 2 | 2.3 | 65 |

Figure 1

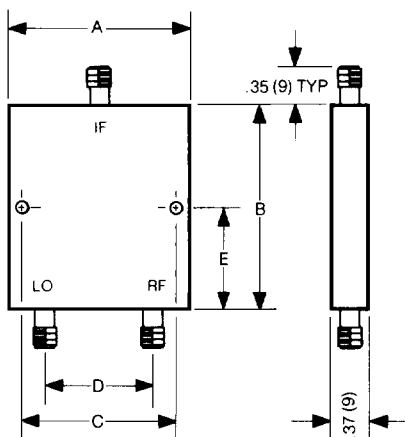


Figure 2

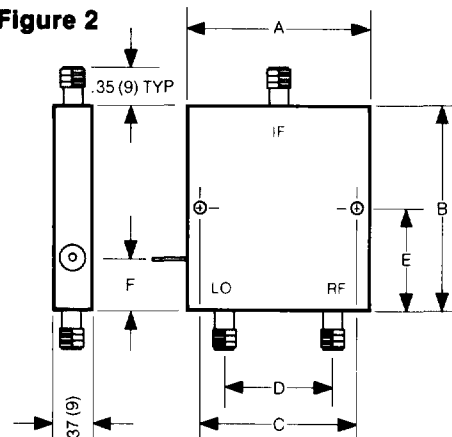


Figure 3

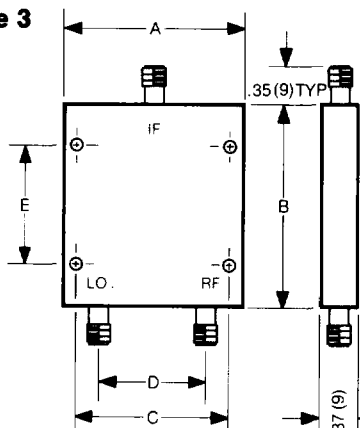
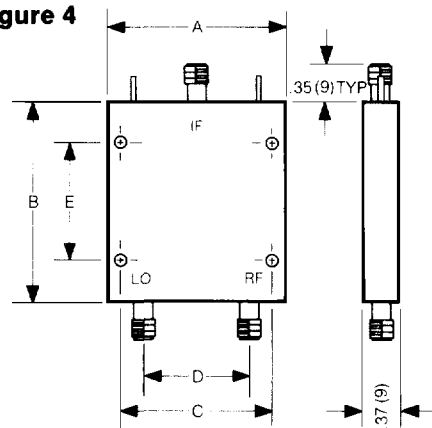


Figure 4



Dimensions are in inches and (mm).
 All units are designed to meet requirements of MIL-E-5400, class 3, as applicable.
 RF, LO and IF connectors are SMA, female, per MIL-C-39012.
 Bias terminals are EMI feedthroughs.
 Mounting hole dia.: .145 ± .005 (3.7 ± .1).
 Specifications subject to change without notice.

Contact Anaren for latest outline details.