# AP3509 100 TO 3500 MHz TO-8 CASCADABLE AMPLIFIER

| *Typical Values* | *AP3509* |
|---|---|
| *Ultra Broad Bandwidth* | *100-3500 MHz* |
| *High Output Level* | *+27.5 dBm* |
| *High Performance Thin Film* | |
| *Standard Size TO-8* | |

## SPECIFICATIONS

| Parameter | | Typical | Guaranteed* 0 to 50° C | Guaranteed* -55 to +85° C |
|---|---|---|---|---|
| **Frequency (Min.)** | | **50-3600 MHz** | **100-3500 MHz** | **100-3500 MHz** |
| **Small Signal Gain (Min.)** | | 8.5 dB | 8.0 dB | 7.5 dB |
| **Gain Flatness (Max.)** | | ±0.3 dB | ±0.6 dB | ±0.7 dB |
| **Noise Figure (Max.)** | | | | |
| | 0.5-3.5 GHz | 5.5 dB | 6.5 dB | 7.0 dB |
| | 0.1-0.5 GHz | 7.0 dB | 8.0 dB | 8.5 dB |
| **SWR (Max.)** | Input | 1.6:1 | 1.8:1 | 2.0:1 |
| | Output | 1:9:1 | 2:2:1 | 2:3:1 |
| **Power Output (Min.)** @ 1dB comp. | | +27.0 dBm | +26.0 dBm | +25.5 dBm |
| **DC Current (Max.)** | | 190.0 mA | 200.0 mA | 205.0 mA |

* Measured in a 50-ohm system at +15.0 Vdc unless otherwise specified.

## INTERMODULATION PERFORMANCE

| *Typical @ 25° C* | *AP3509* |
|---|---|
| **Second Order Harmonic Intercept Point** | +54 dBm |
| **Second Order Two Tone Intercept Point** | +48 dBm |
| **Third Order Two Tone Intercept Point** | +38 dBm |

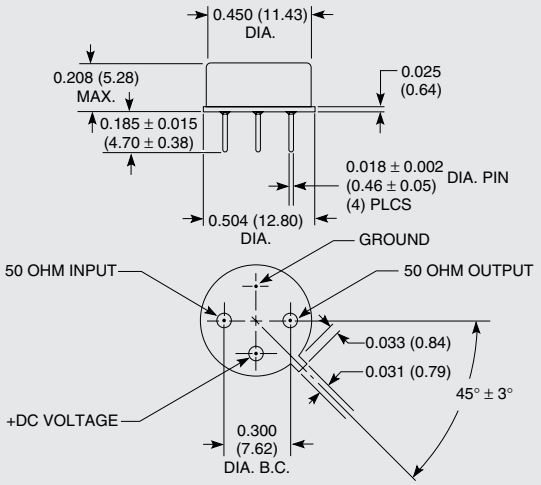
## ABSOLUTE MAXIMUM RATINGS

| | |
|---|---|
| **Storage Temperature** | -62 to 125° C |
| **Maximum Case Temperature** | +100° C |
| **Maximum DC Voltage** | +17 Volts |
| **Maximum Continuous RF Input Power** | +22 dBm |
| **Maximum Short Term Input Power** (1 Minute Max.) | 200 Milliwatts |
| **Maximum Peak Power** (3 µsec Max.) | 0.25 Watt |
| **Burn-in Temperature** | +75° C |
| **Thermal Resistance**[1] (θjc) | +25° C/Watt |
| **Junction Temperature Rise Above Case** (Tjc) | +64.8° C |

[1]Thermal resistance is based on total power dissipation.

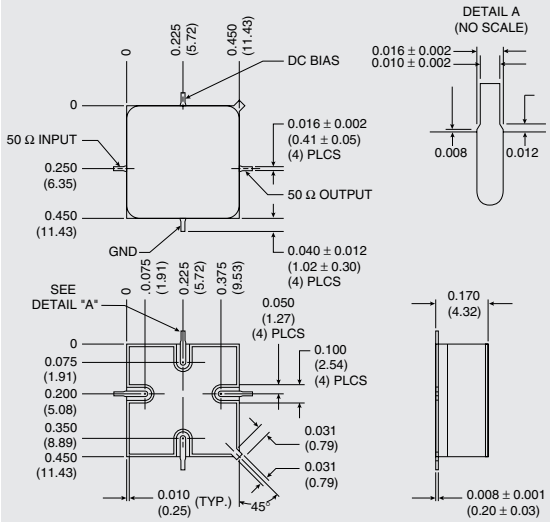
## AP3509

*TO-8 Package for Amplifiers*




## APS3509

*SMTO-8 Package for Amplifiers*

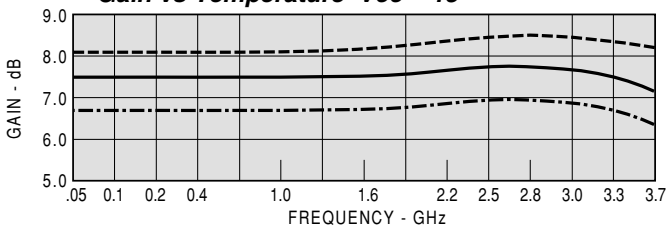



DIMENSIONS ARE IN INCHES (MILLIMETERS)

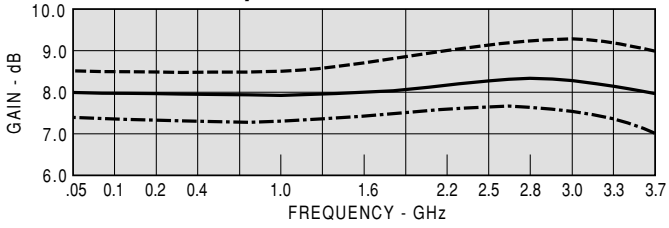
## TYPICAL PERFORMANCE

KEY: +25 °C —— +85 °C -·-·- -55 °C - - -

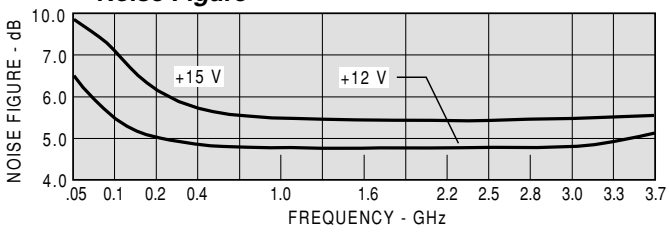
### Gain vs Temperature Vcc = 15



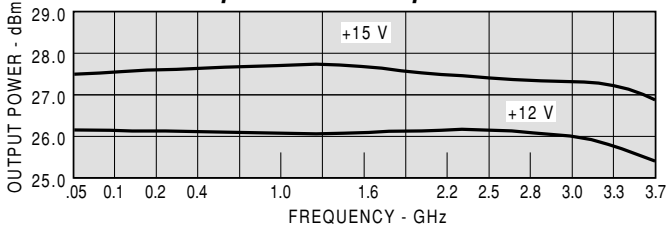

### Gain vs Temperature Vcc = 12



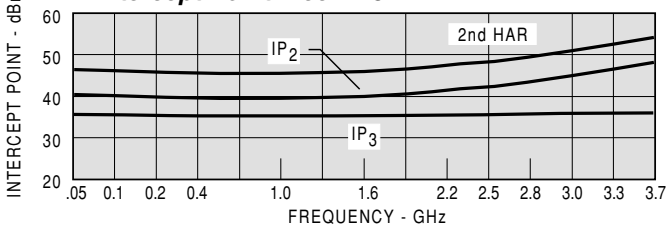

### Noise Figure



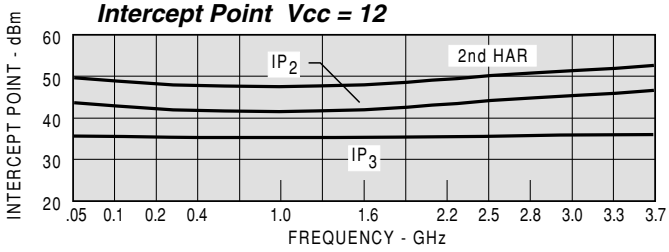

### Power Output at 1 dB Compression




### Intercept Point Vcc = 15




### Intercept Point Vcc = 12




## TYPICAL AUTOMATIC TEST DATA

MODEL: AP3509 Vcc = +15V Icc = 190.30 mA

| FREQUENCY MHZ | VSWR IN | VSWR OUT | GAIN DB | GROUP DELAY NSEC | REV/ISO DB |
|---|---|---|---|---|---|
| 50 | 1.38 | 1.27 | 7.5 | 0.417 | -15.8 |
| 100 | 1.34 | 1.26 | 7.5 | 0.417 | -15.9 |
| 300 | 1.33 | 1.23 | 7.6 | 0.235 | -15.9 |
| 500 | 1.34 | 1.21 | 7.6 | 0.212 | -15.9 |
| 700 | 1.34 | 1.18 | 7.7 | 0.203 | -15.9 |
| 900 | 1.36 | 1.14 | 7.7 | 0.205 | -16.1 |
| 1100 | 1.40 | 1.10 | 7.6 | 0.199 | -16.3 |
| 1300 | 1.43 | 1.05 | 7.7 | 0.202 | -16.4 |
| 1500 | 1.47 | 1.01 | 7.7 | 0.206 | -16.6 |
| 1700 | 1.50 | 1.07 | 7.8 | 0.202 | -16.9 |
| 1900 | 1.55 | 1.14 | 7.8 | 0.212 | -17.1 |
| 2100 | 1.54 | 1.21 | 7.9 | 0.209 | -17.2 |
| 2300 | 1.54 | 1.30 | 8.0 | 0.216 | -17.5 |
| 2500 | 1.53 | 1.37 | 8.0 | 0.223 | -17.6 |
| 2700 | 1.45 | 1.44 | 8.1 | 0.225 | -17.6 |
| 2900 | 1.38 | 1.47 | 8.0 | 0.222 | -17.8 |
| 3100 | 1.30 | 1.48 | 7.9 | 0.241 | -17.8 |
| 3300 | 1.34 | 1.45 | 7.9 | 0.239 | -17.8 |
| 3500 | 1.51 | 1.39 | 7.8 | 0.252 | -17.9 |
| 3700 | 1.80 | 1.34 | 7.6 | 0.262 | -18.0 |

LINEAR S-PARAMETERS

MODEL: AP3509 Vcc = +15V Icc = 190.30 mA

| FREQ. | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| MHZ | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 50 | 0.16 | -23.5 | 2.36 | -175.6 | 0.161 | 3 | 0.12 | 162.1 |
| 100 | 0.15 | -20.6 | 2.38 | 177.1 | 0.161 | -2 | 0.12 | 163.9 |
| 300 | 0.14 | -34.8 | 2.40 | 160.2 | 0.160 | -13 | 0.10 | 151.3 |
| 500 | 0.14 | -51.0 | 2.40 | 144.8 | 0.161 | -23 | 0.09 | 139.8 |
| 700 | 0.15 | -68.6 | 2.42 | 130.2 | 0.160 | -32 | 0.08 | 128.9 |
| 900 | 0.15 | -85.5 | 2.41 | 115.5 | 0.156 | -41 | 0.07 | 117.9 |
| 1100 | 0.17 | -101.4 | 2.41 | 101.1 | 0.153 | -50 | 0.05 | 108.6 |
| 1300 | 0.18 | -116.7 | 2.43 | 86.8 | 0.152 | -60 | 0.02 | 105.5 |
| 1500 | 0.19 | -128.5 | 2.43 | 71.8 | 0.148 | -69 | 0.01 | -155.2 |
| 1700 | 0.20 | -141.1 | 2.44 | 57.1 | 0.144 | -79 | 0.03 | -117.0 |
| 1900 | 0.21 | -154.9 | 2.46 | 42.1 | 0.140 | -87 | 0.06 | -124.7 |
| 2100 | 0.21 | -166.2 | 2.48 | 27.2 | 0.137 | -97 | 0.10 | -135.5 |
| 2300 | 0.21 | -179.1 | 2.50 | 11.4 | 0.133 | -106 | 0.13 | -146.5 |
| 2500 | 0.21 | 164.4 | 2.51 | -4.5 | 0.132 | -114 | 0.15 | -156.5 |
| 2700 | 0.18 | 147.6 | 2.53 | -20.8 | 0.131 | -124 | 0.18 | -167.5 |
| 2900 | 0.16 | 124.1 | 2.52 | -36.7 | 0.129 | -133 | 0.19 | -179.2 |
| 3100 | 0.13 | 94.1 | 2.49 | -54.0 | 0.129 | -142 | 0.19 | 168.4 |
| 3300 | 0.15 | 50.9 | 2.48 | -71.2 | 0.128 | -151 | 0.18 | 155.2 |
| 3500 | 0.20 | 8.5 | 2.45 | -89.2 | 0.127 | -162 | 0.16 | 142.2 |
| 3700 | 0.29 | -18.4 | 2.39 | -108.2 | 0.126 | -172 | 0.15 | 127.8 |
| 3900 | 0.38 | -40.2 | 2.34 | -128.1 | 0.126 | 177 | 0.13 | 107.3 |

MODEL: AP3509 Vcc = +12V Icc = 192.26 mA

| FREQUENCY MHZ | VSWR IN | VSWR OUT | GAIN DB | GROUP DELAY NSEC | REV/ISO DB |
|---|---|---|---|---|---|
| 50 | 1.33 | 1.35 | 7.9 | 0.409 | -16.2 |
| 100 | 1.30 | 1.35 | 7.9 | 0.409 | -16.2 |
| 300 | 1.28 | 1.32 | 8.0 | 0.231 | -16.3 |
| 500 | 1.28 | 1.29 | 8.0 | 0.210 | -16.2 |
| 700 | 1.29 | 1.27 | 8.1 | 0.199 | -16.3 |
| 900 | 1.30 | 1.23 | 8.1 | 0.201 | -16.3 |
| 1100 | 1.33 | 1.19 | 8.0 | 0.195 | -16.5 |
| 1300 | 1.35 | 1.14 | 8.1 | 0.196 | -16.6 |
| 1500 | 1.39 | 1.08 | 8.1 | 0.206 | -16.7 |
| 1700 | 1.43 | 1.02 | 8.2 | 0.198 | -16.9 |
| 1900 | 1.46 | 1.05 | 8.3 | 0.209 | -17.0 |
| 2100 | 1.47 | 1.12 | 8.3 | 0.203 | -17.1 |
| 2300 | 1.47 | 1.19 | 8.4 | 0.215 | -17.2 |
| 2500 | 1.46 | 1.25 | 8.4 | 0.217 | -17.3 |
| 2700 | 1.40 | 1.32 | 8.5 | 0.223 | -17.4 |
| 2900 | 1.34 | 1.34 | 8.5 | 0.220 | -17.2 |
| 3100 | 1.23 | 1.34 | 8.5 | 0.235 | -17.3 |
| 3300 | 1.23 | 1.31 | 8.5 | 0.237 | -17.3 |
| 3500 | 1.34 | 1.24 | 8.4 | 0.251 | -17.2 |
| 3700 | 1.59 | 1.20 | 8.3 | 0.262 | -17.3 |

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