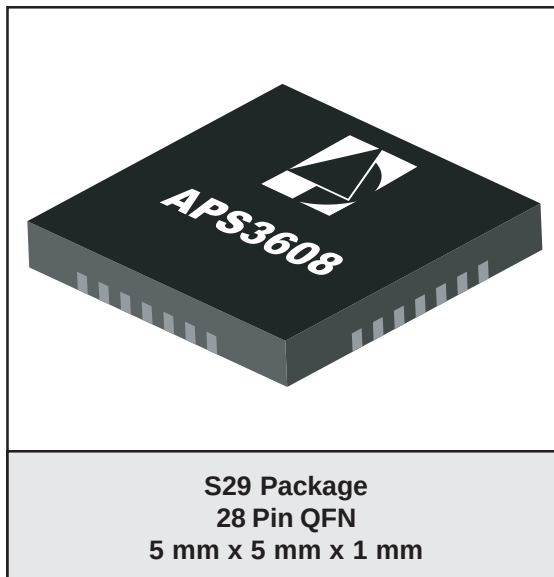


### FEATURES

- Single Input, Triple Output Design  
- Three Video Tuner Outputs
- Wideband Operation: To Above 1 GHz
- 5 dB Typical Noise Figure at 5 dB Gain
- Extended Dynamic Range AGC Control, Independent for each Tuner Path
- High Linearity, Low Distortion
- Single +5 V Supply
- Balanced 75 Ohm Inputs/Outputs
- RoHS Compliant/Lead Free

### APPLICATIONS

- CATV Set-Top Boxes with Multiple Tuners



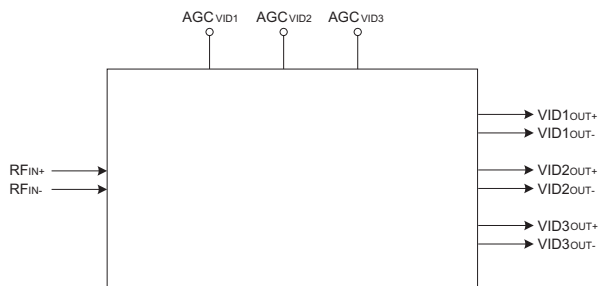
### PRODUCT DESCRIPTION

This active splitter from ANADIGICS accepts a balanced RF input in the 50 MHz to 1.1 GHz frequency range and provides three balanced RF outputs with minimal degradation in signal quality. The single-package surface mount device amplifies the input signals using highly linear, low noise amplification stages, and couples the amplified signal to three separate output paths to drive video tuner inputs.

Each of the output paths includes independent Automatic Gain Control (AGC). The overall linearity

of each tuner path is maintained across a wide AGC range, ensuring low distortion effects on each output signal.

Requiring only a single +5 Volt supply, the active splitter design is implemented using the ANADIGICS GaAs MESFET process. The surface mount packaging makes the device ideal for use in today's multiple-tuner set-top boxes for Cable TV.



**Figure 1: Functional Block Diagram**

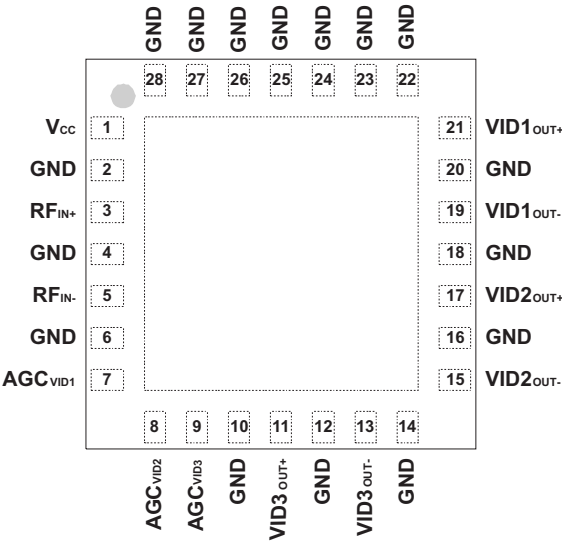


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

| PIN | NAME                 | DESCRIPTION               | PIN | NAME                 | DESCRIPTION        |
|-----|----------------------|---------------------------|-----|----------------------|--------------------|
| 1   | V <sub>CC</sub>      | Supply Voltage            | 28  | GND                  | Ground             |
| 2   | GND                  | Ground                    | 27  | GND                  | Ground             |
| 3   | RF <sub>IN+</sub>    | RF Input (+)              | 26  | GND                  | Ground             |
| 4   | GND                  | Ground                    | 25  | GND                  | Ground             |
| 5   | RF <sub>IN-</sub>    | RF Input (-)              | 24  | GND                  | Ground             |
| 6   | GND                  | Ground                    | 23  | GND                  | Ground             |
| 7   | AGC <sub>VID1</sub>  | Video 1 AGC Control Input | 22  | GND                  | Ground             |
| 8   | AGC <sub>VID2</sub>  | Video 2 AGC Control Input | 21  | VID1 <sub>OUT+</sub> | Video 1 Output (+) |
| 9   | AGC <sub>VID3</sub>  | Video 3 AGC Control Input | 20  | GND                  | Ground             |
| 10  | GND                  | Ground                    | 19  | VID1 <sub>OUT-</sub> | Video 1 Output (-) |
| 11  | VID3 <sub>OUT+</sub> | Data Path Output (+)      | 18  | GND                  | Ground             |
| 12  | GND                  | Ground                    | 17  | VID2 <sub>OUT+</sub> | Video 2 Output (+) |
| 13  | VID3 <sub>OUT-</sub> | Data Path Output (-)      | 16  | GND                  | Ground             |
| 14  | GND                  | Ground                    | 15  | VID2 <sub>OUT-</sub> | Video 2 Output (-) |

## ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

| PARAMETER                       | MIN | MAX | UNIT | COMMENTS                      |
|---------------------------------|-----|-----|------|-------------------------------|
| Supply Voltage ( $V_{CC}$ )     | 0   | +8  | V    |                               |
| AGC Input Voltage ( $V_{AGC}$ ) | 0   | +5  | V    |                               |
| RF Input Power ( $P_{IN}$ )     | -   | +25 | dBmV | differential into 75 $\Omega$ |

Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Table 3: Operating Ranges

| PARAMETER                       | MIN  | TYP | MAX  | UNIT               | COMMENTS                      |
|---------------------------------|------|-----|------|--------------------|-------------------------------|
| Operating Frequency (f)         | 50   | -   | 1100 | MHz                |                               |
| Supply Voltage ( $V_{CC}$ )     | -    | +5  | -    | V                  |                               |
| AGC Input Voltage ( $V_{AGC}$ ) | +0.3 | -   | +3.0 | V                  | max. gain at +3 V             |
| RF Input Power ( $P_{IN}$ )     | -15  | -   | +15  | dBmV               | differential into 75 $\Omega$ |
| Case Temperature ( $T_C$ )      | -20  | -   | +85  | $^{\circ}\text{C}$ |                               |

The device may be operated safely over these conditions; however, parametric performance is guaranteed only over the conditions defined in the electrical specifications.

**Table 4: DC Electrical Specifications**  
**(T<sub>c</sub> = +25 °C, V<sub>cc</sub> = +5 V, 75 Ω system)**

| PARAMETER                 | MIN | TYP | MAX | UNIT | COMMENTS         |
|---------------------------|-----|-----|-----|------|------------------|
| Current Consumption       | -   | 175 | -   | mA   | from +5 V supply |
| AGC Input Leakage Current | -   | 50  | -   | μA   | each AGC input   |

**Table 5: Video Tuner Path AC Electrical Specifications**  
**(T<sub>c</sub> = +25 °C, V<sub>cc</sub> = +5 V, 75 Ω system)**

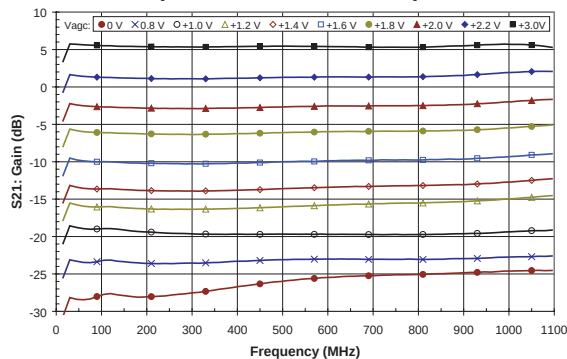
| PARAMETER                                          | MIN  | TYP  | MAX | UNIT | COMMENTS                |
|----------------------------------------------------|------|------|-----|------|-------------------------|
| Gain at Maximum AGC                                | 4.5  | 5.5  | -   | dB   | at 1 GHz                |
| Gain at Minimum AGC                                | -    | -24  | -   | dB   | at 1 GHz                |
| AGC Range                                          | 28.0 | 29.5 | -   | dB   | at 1 GHz                |
| Noise Figure                                       | -    | 4.8  | 6   | dB   | at maximum gain         |
| CTB <sup>(1)</sup>                                 | -    | -70  | -66 | dBc  |                         |
| CSO <sup>(1)</sup>                                 | -    | -70  | -66 | dBc  |                         |
| XMOD <sup>(1)</sup>                                | -    | -67  | -   | dBc  |                         |
| Isolation Between Output and Any Other Output Port | -    | 30   | -   | dB   |                         |
| Isolation Between Input and Output                 | -    | 30   | -   | dB   |                         |
| Input Return Loss                                  | -    | -8   | -   | dB   | 75 Ω differential input |
| Output Impedance                                   | -    | 75   | -   | Ω    | differential            |

Notes:

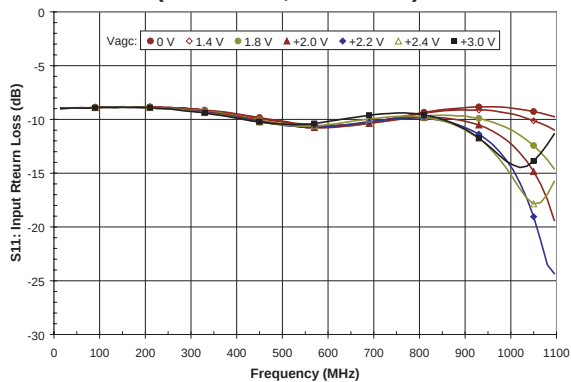
(1) 132 channels, +6 dBmV flat output, up to +15 dBmV flat input

## PERFORMANCE DATA

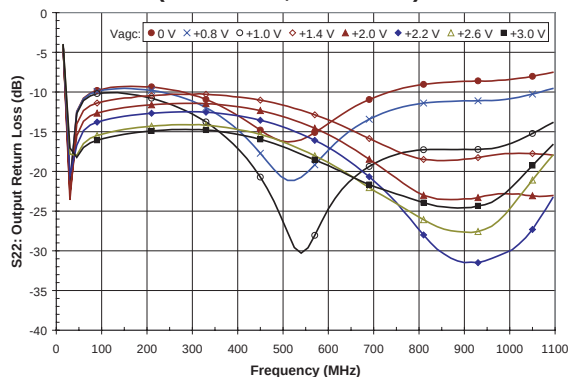
**Figure 3: Gain vs. Frequency**  
( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +5\text{ V}$ )



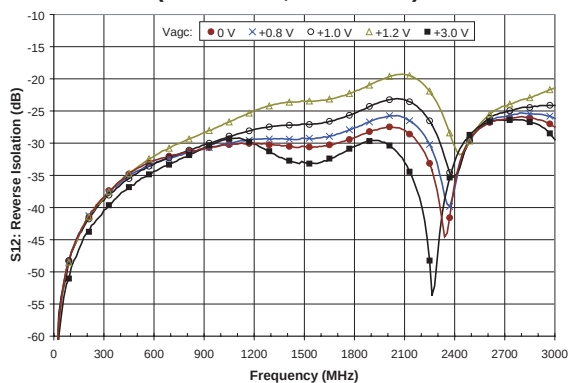
**Figure 4: Input Return Loss vs. Frequency**  
( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +5\text{ V}$ )



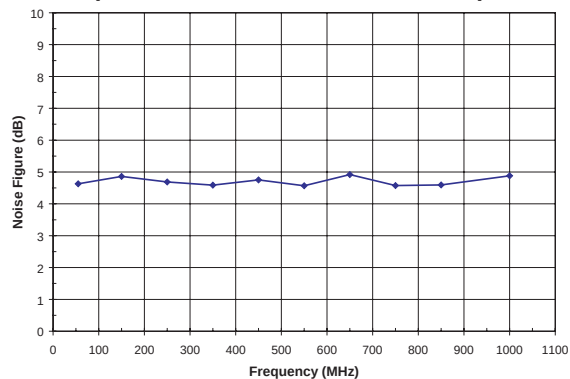
**Figure 5: Output Return Loss vs. Frequency**  
( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +5\text{ V}$ )



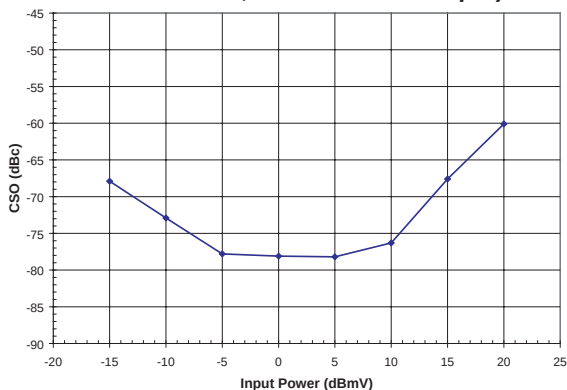
**Figure 6: Reverse Isolation vs. Frequency**  
( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +5\text{ V}$ )



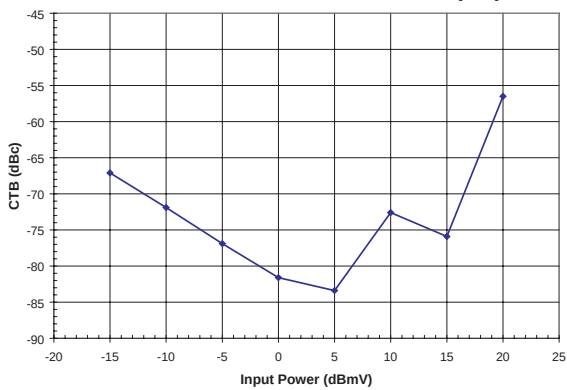
**Figure 7: Noise Figure vs. Frequency**  
( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +5\text{ V}$ ,  $V_{AGC} = +3\text{ V}$ )



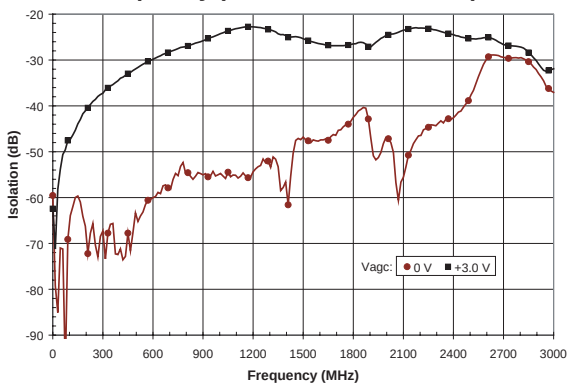
**Figure 8: CSO vs. Input Power**  
 ( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +5\text{ V}$ ,  $f = 77\text{ MHz}$ ,  
 $P_{OUT} = +6\text{ dBmV}$ , 135 channel flat input)



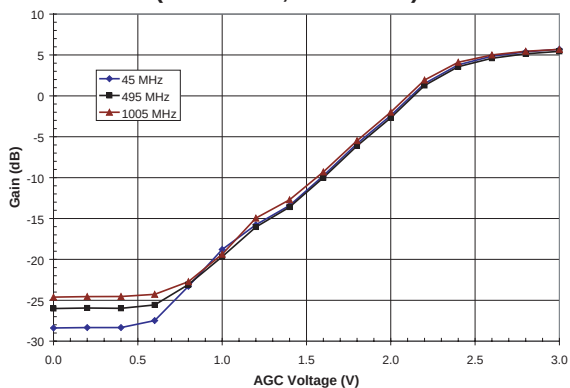
**Figure 9: CTB vs. Input Power**  
 ( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +5\text{ V}$ ,  $f = 439\text{ MHz}$ ,  
 $P_{OUT} = +6\text{ dBmV}$ , 135 channel flat input)

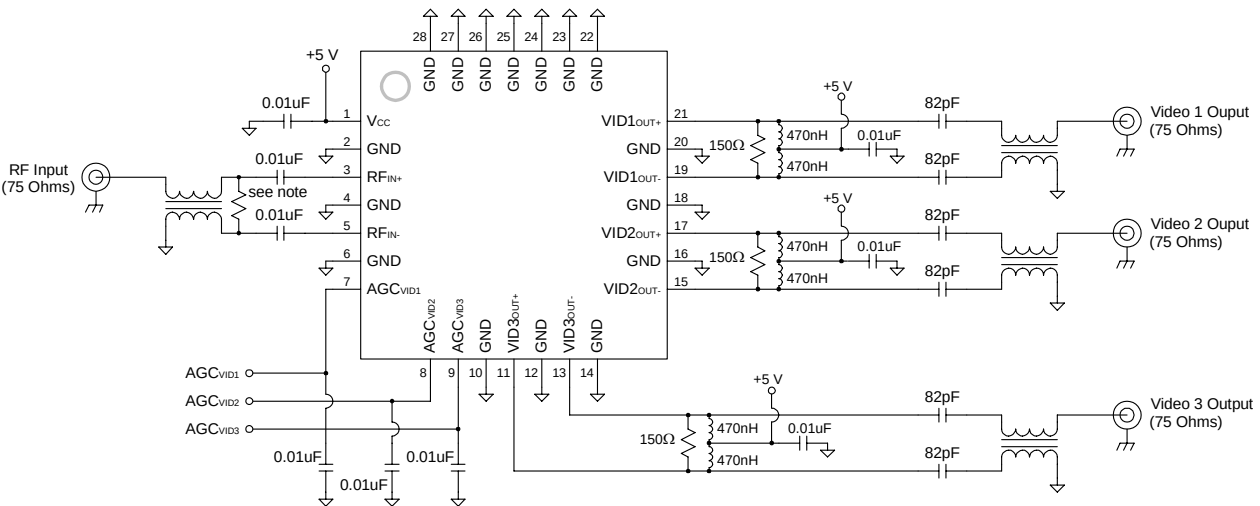


**Figure 10: Output Port-to-Port Isolation vs. Frequency**  
 ( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +5\text{ V}$ )



**Figure 11: Gain vs. AGC Voltage**  
 ( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +5\text{ V}$ )

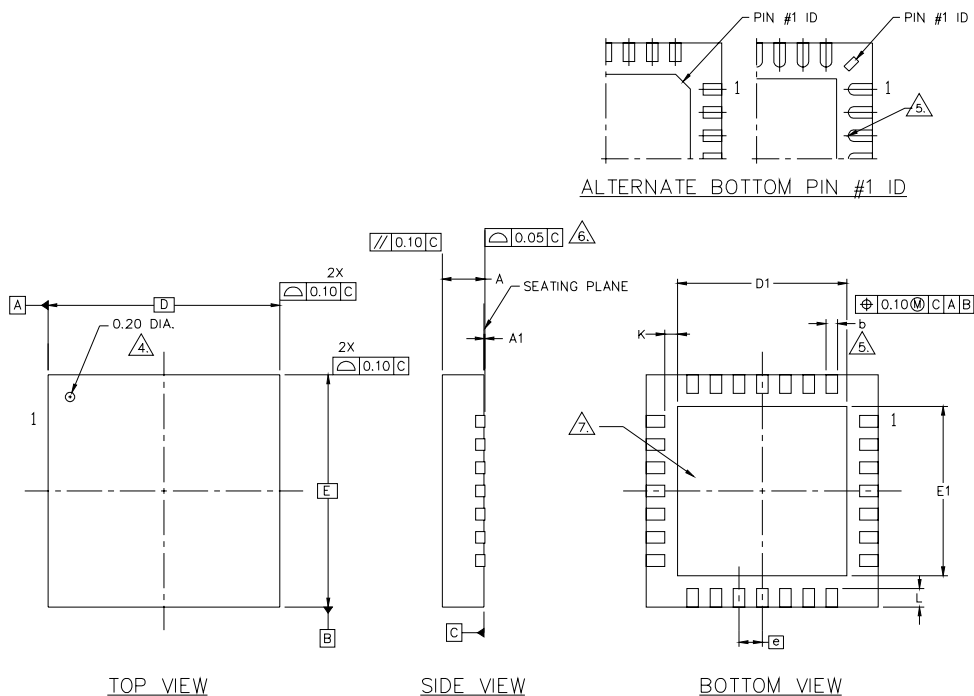




NOTE: Optional resistor across input pins may be used to tune input return loss.

Figure 12: Application Circuit

## PACKAGE OUTLINE



## NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. MAX. PACKAGE WARPAGE IS 0.05 mm.
3. MAXIMUM ALLOWABLE BURRS IS 0.076 mm IN ALL DIRECTIONS.

△4 PIN #1 ID ON TOP WILL BE LASER MARKED.

△5 DIMENSION b APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30mm FROM TERMINAL TIP. RADIUS OPTIONAL. DIMENSION b SHOULD NOT BE MEASURED IN RADIUS AREA.

△6 BILATERAL COPLANARITY ZONE APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS.

7. REFERENCE JEDEC OUTLINE MO-220.

| S<br>V<br>W<br>G | DIMENSIONS—MM |      | n <sub>o</sub> t <sub>e</sub> | S<br>V<br>W<br>G | DIMENSIONS—INCHES |       | n <sub>o</sub> t <sub>e</sub> |
|------------------|---------------|------|-------------------------------|------------------|-------------------|-------|-------------------------------|
|                  | MIN.          | MAX. |                               |                  | MIN.              | MAX.  |                               |
| A                | 0.80          | 1.00 |                               | A                | 0.031             | 0.039 |                               |
| A1               | 0.00          | 0.05 |                               | A1               | 0.000             | 0.002 |                               |
| b                | 0.18          | 0.30 |                               | b                | 0.007             | 0.012 |                               |
| D                | 5.00          | BSC  |                               | D                | 0.197             | BSC   |                               |
| D1               | 3.40          | 3.80 |                               | D1               | 0.134             | 0.149 |                               |
| E                | 5.00          | BSC  |                               | E                | 0.197             | BSC   |                               |
| E1               | 3.40          | 3.80 |                               | E1               | 0.134             | 0.149 |                               |
| ⓐ                | 0.50          | BSC  |                               | ⓐ                | 0.020             | BSC   |                               |
| K                | 0.20          | MIN. |                               | K                | 0.007             | MIN.  |                               |
| L                | 0.35          | 0.57 |                               | L                | 0.014             | 0.022 |                               |

Figure 13: S29 Package Outline - 28 Pin 5 mm x 5 mm x 1 mm QFN



# NOTES



## NOTES

**ORDERING INFORMATION**

| ORDER NUMBER  | TEMPERATURE RANGE | PACKAGE DESCRIPTION                                        | COMPONENT PACKAGING                 |
|---------------|-------------------|------------------------------------------------------------|-------------------------------------|
| APS3608RS29P8 | -20 °C to +85 °C  | RoHS Compliant 28 Pin<br>5 mm x 5 mm x 1 mm<br>QFN Package | Tape and Reel, 2500 pieces per Reel |

**ANADIGICS, Inc.**

141 Mount Bethel Road  
Warren, New Jersey 07059, U.S.A.  
Tel: +1 (908) 668-5000  
Fax: +1 (908) 668-5132

URL: <http://www.anadigics.com>  
E-mail: [Mktg@anadigics.com](mailto:Mktg@anadigics.com)

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