

FEATURES

- Supports emerging 802.11ac high-data rate standard
- 2.0% Dynamic EVM @ P_{OUT} = 19.5 dBm with 802.11ac MCS9-HT80 waveform, 5.0 V
- 30 dB of Linear Power Gain @ 5.0 V
- High Accuracy Integrated Power Detector
- 1.8 V CMOS Compatible PA Enable Pin
- Single 3.3/5.0 V Supply Voltage
- 50 Ω-Internally Matched RF Ports
- Leadfree and RoHS Compliant
- 4 x 4 x 0.80 mm QFN package

APPLICATIONS

- 802.11a/n/ac WLAN enabled:
 - Access Points
 - Media Gateways
 - Set top boxes
 - Smart TV's

PRODUCT DESCRIPTION

The ANADIGICS AWL5905 WLAN Power Amplifier is an easy to use module that delivers high levels of linearity and efficiency for high data rate applications. Designed for the 5 GHz WLAN standards, it supports IEEE 802.11a/n/ac applications.

Requiring only a single +3 V to +5 V supply and a CMOS compatible 1.8 V enable voltage, the AWL5905 reduces system power consumption by offering a low leakage current while the amplifier is shut down. The integrated high directivity coupler/detector facilitates accurate power control over varying load conditions. No external circuits are required for RF impedance matching, thus reducing component costs and making it easy to incorporate the device into new designs.

The AWL5905 is manufactured using an advanced InGaP HBT technology that offers state-of-the-art reliability, temperature stability and ruggedness. It is offered in a 4 x 4 x 0.80 mm surface mount module optimized for a 50 Ω system.

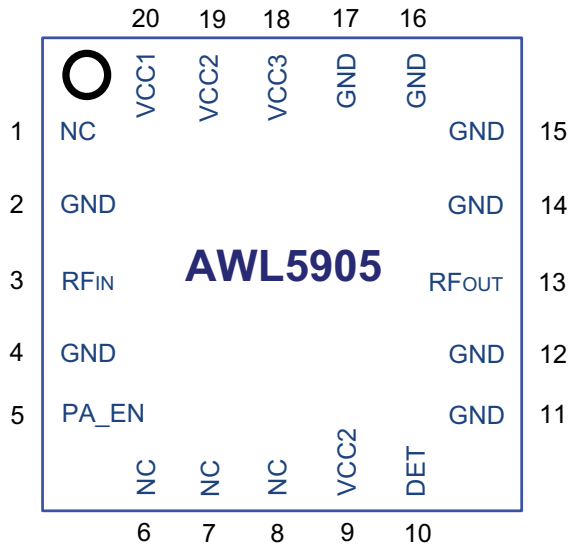


Figure 1: Pinout Diagram

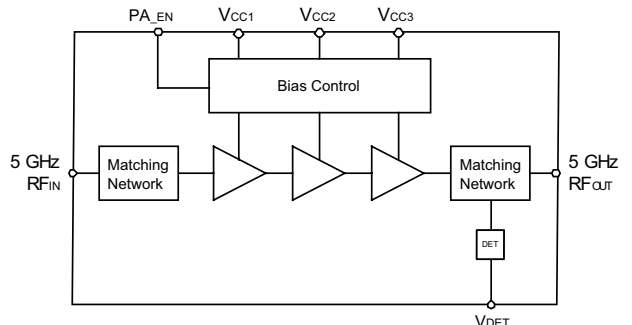


Figure 2: Functional Block Diagram

Table 1: Pin Description

| PIN | NAME | DESCRIPTION |
|---------|-------------------|------------------------------|
| 1 | N/C | No Connection |
| 2 | GND | Ground |
| 3 | RF _{IN} | Power Amplifier RF input |
| 4 | GND | Ground |
| 5 | PA_EN | PA Enable Pin |
| 6, 7, 8 | N/C | No Connection |
| 9 | VCC2 | Second Stage Supply Voltage |
| 10 | DET | Analog Power Detector Output |
| 11, 12 | GND | Ground |
| 13 | RF _{OUT} | Power Amplifier RF output |
| 14 - 17 | GND | Ground |
| 18 | VCC3 | Third Stage Supply Voltage |
| 19 | VCC2 | Second Stage Supply Voltage |
| 20 | VCC1 | First Stage Supply Voltage |

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

| PARAMETER | MIN | MAX | UNIT | COMMENTS |
|-------------------------------|------|-------|------|----------------------------|
| DC Power Supply | - | +5.5 | V | |
| PA_EN Voltage | -0.3 | +3.6 | V | |
| RFIN, 5 GHz PA | - | +6 | dBm | Modulated |
| Operating Ambient Temperature | -40 | +85 | °C | |
| Storage Temperature | -40 | +160 | °C | |
| Storage Humidity | - | 60 | % | |
| Junction Temperature | - | 150 | °C | |
| ESD _{HBM} | 1000 | - | V | JEDEC JESD22-A114 all pins |
| MSL Rating | - | MSL-1 | - | @ 260° C |

Functional operation to the specified performance is not implied under these conditions. Operation of any single parameter in excess of the absolute ratings may cause permanent damage. No damage occurs if one parameter is set at the limit while all other parameters are set within normal operating ranges.

Table 3: Operating Ranges

| PARAMETER | MIN | TYP | MAX | UNIT | COMMENTS |
|--|------|------|-------|------|----------------------|
| Operating Frequency Ranges | 4.9 | - | 5.9 | GHz | 802.11a/n/ac |
| DC Power Supply Voltage (V _{CC}) | +3.0 | +5.0 | +5.25 | V | With RF applied |
| Quiescent Current | 100 | 145 | 200 | mA | No RF |
| Leakage Current | - | 5 | 14 | μA | |
| PA_EN Current | 9 | 20 | 36 | μA | |
| PA_EN Voltage | 1.8 | 1.8 | 3.3 | V | Control Voltage High |
| PA_EN Voltage | 0 | - | 0.5 | V | Control Voltage Low |
| Operating Temperature | -40 | - | +85 | °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: Electrical Specifications - 5 V Operation
 (T_c = +25 °C, V_{cc} = +5.0 V, PA_EN = 1.8 V) 802.11ac MCS9 - HT80, unless otherwise noted

| PARAMETER | MIN | TYP | MAX | UNIT | COMMENTS |
|--|--|----------|-----|------|---|
| Frequency | 4.9 | - | 5.9 | GHz | |
| Error Vector Magnitude (EVM) ^(1, 2) | - | -35 | - | dB | 17 dBm, 802.11ac, MCS9 - HT80 |
| | - | 210 | - | mA | |
| | - | -34 | - | dB | 19.5 dBm, 802.11ac, MCS9 - HT80 |
| - | 240 | - | mA | | |
| | - | -31 | - | dB | 21 dBm, 802.11n, MCS7 - HT40 |
| | - | 270 | - | mA | |
| 802.11n Mask | 23 | 24 | - | dBm | 802.11n MCS0 - HT20 |
| Power Gain | - | 30 | - | dB | |
| Gain variation over band | - | +/- 1.0 | - | dB | |
| Gain variation over 80 MHz | - | +/- 0.25 | - | dB | |
| 1 dB output compression point | - | 27 | - | dBm | P _{IN} = CW |
| Input Return Loss | - | -11 | - | dB | |
| Output Spurious Levels - Harmonics | | | | | |
| 2 f _o | - | -30 | - | dBm/ | For Power levels up to 24 dBm OFDM |
| 3 f _o | - | -35 | - | MHz | |
| Rise/Fall Time | - | 0.5 | - | µs | Within 0.5 dB of final value |
| Stability | All non-harmonically related outputs < -50 dBc/100 kHz | | | | P _{OUT} = +22 dBm, V _{CC} = 5 V, VSWR = 6:1, all phases, CW |
| Ruggedness | No damage | | | | P _{IN} = +12 dBm, V _{CC} = 5 V, VSWR = 6:1, all phases, CW |

Notes:

- (1) EVM includes system noise floor of 0.8% (-42 dB).
 (2) P_{OUT} degraded from 4.9 - 5.15 GHz.

APPLICATION CIRCUIT

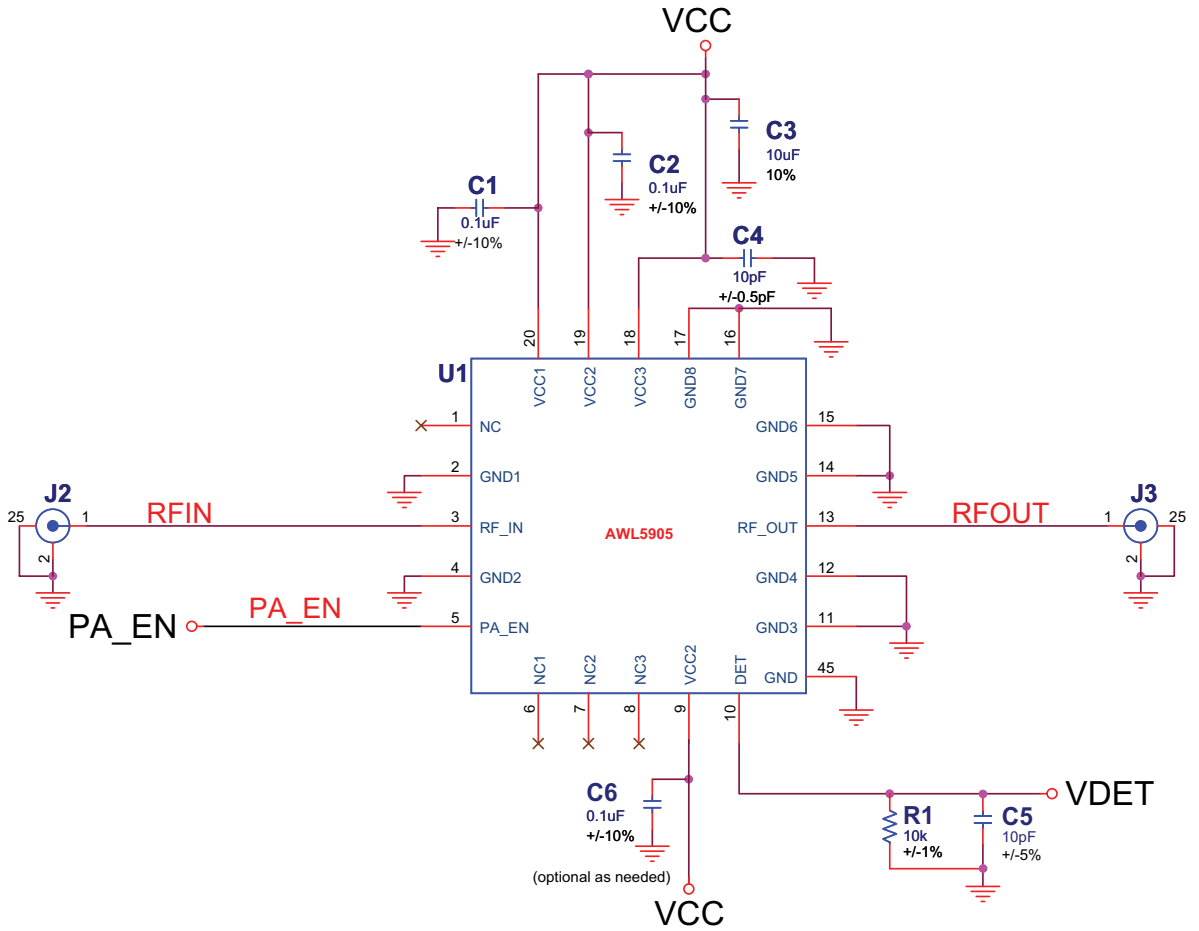
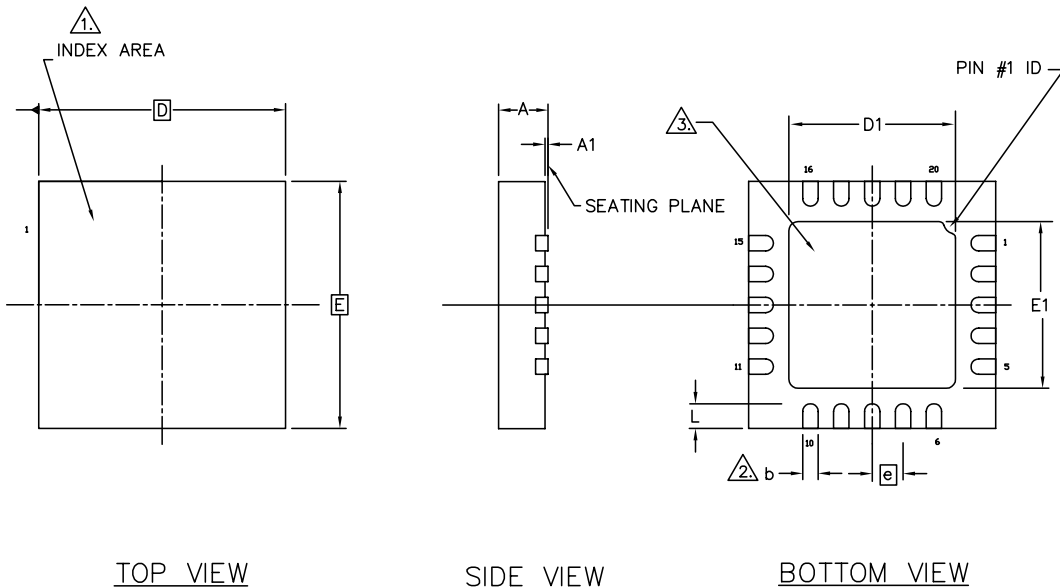


Figure 3: Application Circuit

PACKAGE OUTLINE



| SYMBOL | DIMENSIONS—MM | | | NOTE |
|--------|---------------|------|------|------|
| | MIN. | NOM. | MAX. | |
| A | 0.70 | 0.75 | 0.80 | |
| A1 | 0.00 | 0.02 | 0.05 | |
| b | 0.18 | 0.25 | 0.30 | |
| D | 3.95 | 4.00 | 4.05 | |
| D1 | 2.55 | 2.70 | 2.80 | |
| E | 3.95 | 4.00 | 4.05 | |
| E1 | 2.55 | 2.70 | 2.80 | |
| e | 0.50 BSC | | | |
| L | 0.30 | 0.40 | 0.50 | |

NOTES :

- ① TERMINAL #1 IDENTIFIER AND PAD NUMBERING CONVENTION SHALL CONFORM TO JESD 95-1 SPP-012.
- ② DIMENSION b APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30mm FROM TERMINAL TIP.
- ③ BILATERAL COPLANARITY ZONE APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

Figure 4: Package Outline - 20 Pin, 4 x 4 x 0.80 mm QFN

TOP BRAND

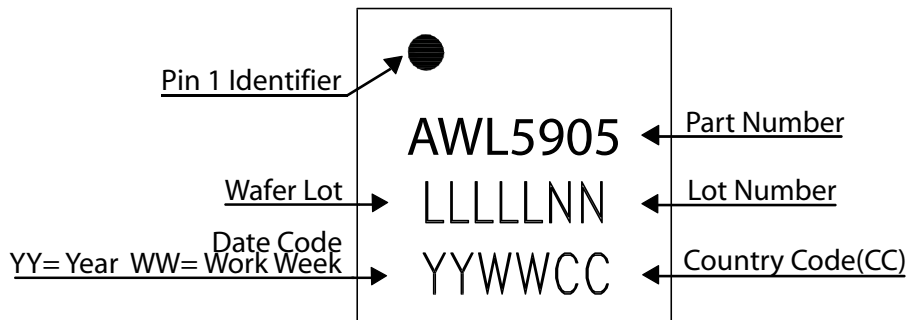


Figure 5: Branding Specification

NOTES:

- (1) OUTLINE DRAWING REFERENCE: P8002541
- (2) UNLESS SPECIFIED DIMENSIONS ARE SYMMETRICAL ABOUT CENTER LINES SHOWN.
- (3) DIMENSIONS IN MILLIMETERS.
- (4) VIAS SHOWN IN PCB METAL VIEW ARE FOR REFERENCE ONLY. NUMBER & SIZE OF THERMAL VIAS REQUIRED DEPENDENT ON HEAT DISSIPATION REQUIREMENT AND THE PCB PROCESS CAPABILITY.
- (5) RECOMMENDED STENCIL THICKNESS: APPROX. 0.125mm (5 Mils)

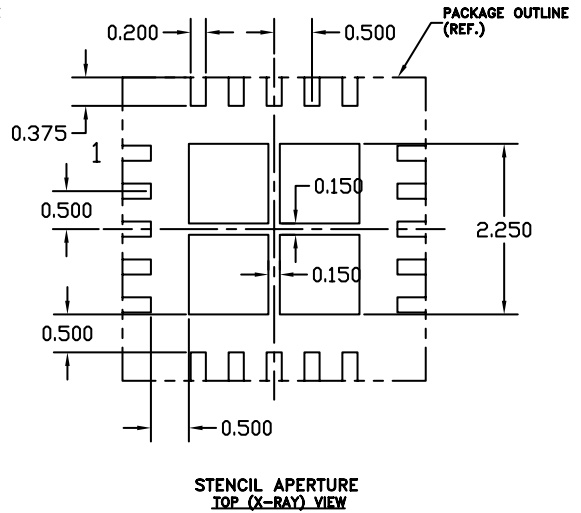
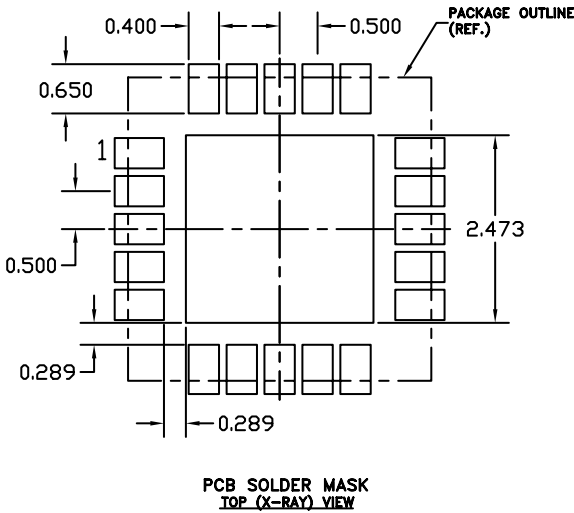
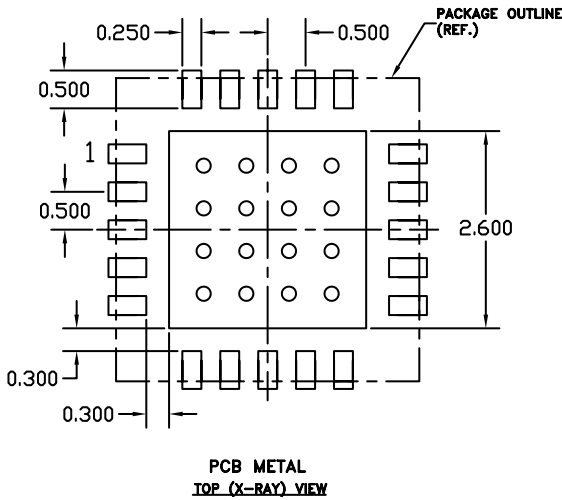
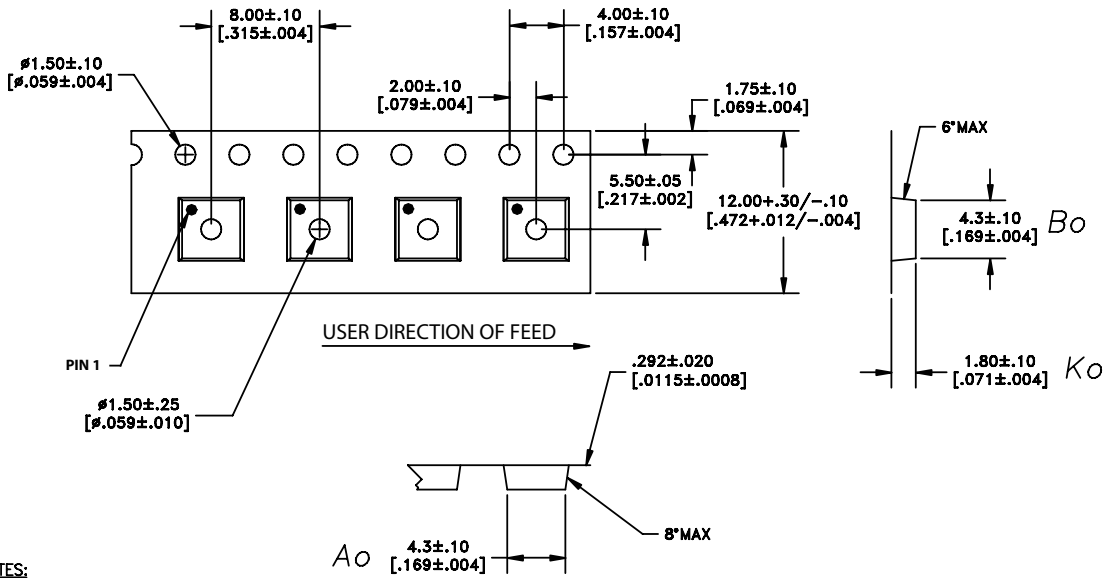


Figure 6: Recommended PCB Layout Information

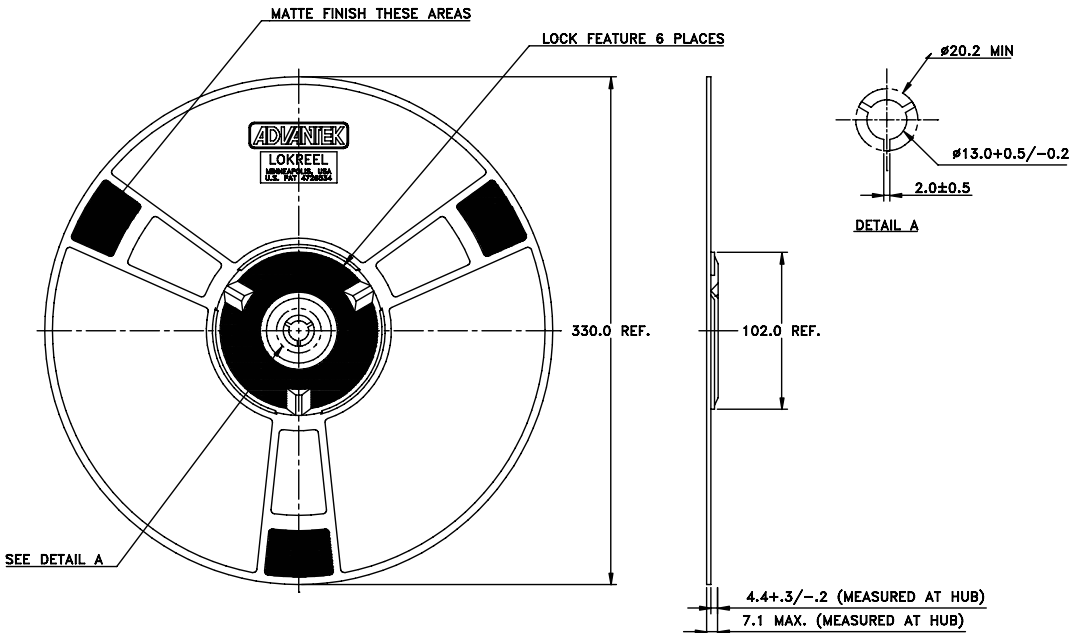


NOTES:

- 1. MATERIAL: 3000 (CARBON FILLED POLYCARBONATE)
100% RECYCLABLE.

DIMENSIONING AND TOLERANCING PER ASME Y14.5M

Figure 7: Carrier Tape



NOTES:

- 1. SURFACE RESISTIVITY: $\leq 10^8$ ohms/square ASTM D-257
- MATERIAL: HIGH IMPACT POLYSTYRENE
- SHELF LIFE: INDEFINITE
- COLOR: BLACK

DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994

Figure 8: Reel

ORDERING INFORMATION

| ORDER NUMBER | TEMPERATURE RANGE | PACKAGE DESCRIPTION | COMPONENT PACKAGING |
|--------------|-------------------|---|---------------------|
| AWL5905P7 | -40 °C to +85 °C | 20 pin, 4 x 4 x 0.80 mm Surface Mount Module | Bags |
| AWL5905P8 | -40 °C to +85 °C | 20 pin, 4 x 4 x 0.80 mm Surface Mount Module | 2500 piece T/R |
| AWL5905P9 | -40 °C to +85 °C | 20 pin, 4 x 4 x 0.80 mm Surface Mount Module | Partial Reel |
| EVB5905 | -40 °C to +85 °C | Evaluation Board | Evaluation Board |

**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>

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