



Part No. P822601 / P822602

Universal Broadband FR4 Embedded LTE / 5G / LPWA Antenna

698 – 960 MHz / 1710 – 2200 MHz / 2300 – 2400 MHz / 2500 – 2700 MHz / 3300– 3800 MHz

Supports: Broadband LTE (OCTA-BAND), LTE CAT-M, NB-IoT, SigFox, LoRa, Cellular LPWA, RPMA, CBRS



*Mirrored version offered as P822602

Broadband FR4 Embedded LTE/5G/LPWA Antenna

698 - 960 MHz
 1700 - 2700 MHz
 3300 - 3800 MHz

KEY BENEFITS

Reduced Costs and Time-to-Market

Standard antenna eliminates design fees and cycle time associated with a custom solution; getting products to market faster.

Greater Flexibility with Unique Form Factors

KYOCERA AVX's technology helps you deliver more advanced ergonomic designs without adverse impact on product performance. **Reliability**
 Comply with latest RoHS requirements

APPLICATIONS

- Medical applications
- Home automation
- Smart metering
- M2M, Industrial devices
- IoT
- Firstnet
- Automotive Healthcare
- Point of Sale
- Tracking
- NB-IoT
- Sigfox
- LoRa
- Cellular LPWA
- RPMA
- LTE CAT-M

KYOCERA AVX's Universal Broadband Embedded LTE/5G/LPWA antenna utilizes Isolated Magnetic Dipole™ (IMD) technology which address the challenges facing today's product designers. IMD's high performance and isolation characteristics offer better connectivity and minimal interference. Mirrored version variant offered as P822602.

Stays in Tune

KYOCERA AVX antennas use patented IMD technology in many antenna configurations to provide high performance. IMD antennas requires a smaller design keep-out area, carry lower program development risk which yields a quicker time-to-market, without sacrificing RF performance.

Electrical Specifications

Typical P822601/P822602 performance 140 x 50 mm PCB

| Frequency (MHz) | 698-960 | 1710-2200 | 2500-2700 (B7) |
|----------------------|-----------------|-----------|----------------|
| Peak Gain | 2.6 dBi | 4.4 dBi | 3.4 dBi |
| Average Efficiency | 68% | 76% | 52% |
| VSWR Match | < 2.5:1 | | < 2.5:1 |
| Polarization | Linear | | |
| Power Handling | 2 Watt CW | | |
| Feed Point Impedance | 50 Ω unbalanced | | |

| Frequency (MHz) | 2300-2400 (Band 40) | 3300-3800 (n78) |
|----------------------|---------------------|-----------------|
| Peak Gain | 1.8 dBi | 2.8 dBi |
| Average Efficiency | 46% | 59% |
| VSWR Match | < 3.0:1 | < 2.5:1 |
| Polarization | Linear | |
| Power Handling | 2 Watt CW | |
| Feed Point Impedance | 50 Ω unbalanced | |

P822601 / P822602 Universal Broadband Embedded LTE/5G/LPWA Antenna Specifications.
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs.

Mechanical Specifications & Ordering Part Number

| Ordering Part # | P822601 | P822602 |
|--|--|------------------|
| Dimensions (mm) | 49.6 x 8.0 x 3.2 | 49.6 x 8.0 x 3.2 |
| Mounting Type | SMT (P&P) | |
| Variant | P822602 : Mirrored version of P822601 | |
| Weight (grams) | 2.63 | |
| Packaging | Tape and Reel | |
| Storage Temperature/ Humidity <small>(Sealed shipping package)</small> | +5°C to +35°C 45~75% | |
| Operating Temperature | -40 to +85 C | |
| Demo Board | P822601-01 (P822601) P822602-01 (P822602) | |

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LTE Bands covered by (P822601/P822602)

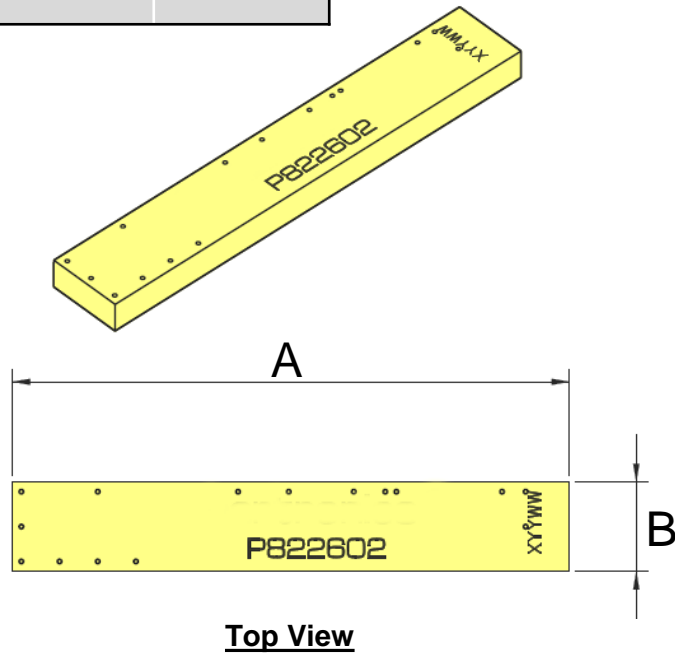
| LTE Band | Frequency Band (MHz) | Uplink (UL) (MHz) | Downlink (DL) (MHz) | Region | Covered |
|----------|----------------------|-------------------|---------------------|---------|---------|
| 1 | 2100 | 1920 - 1980 | 2110 - 2170 | Global | Yes |
| 2 | 1900 | 1850 - 1910 | 1930 - 1990 | NAM | |
| 3 | 1800 | 1710 - 1785 | 1805 - 1880 | Global | |
| 4 | 1700 | 1710 - 1755 | 2110 - 2155 | NAM | |
| 5 | 850 | 824 - 849 | 869 - 894 | NAM | |
| 6 | 850 | 830 - 840 | 875 - 885 | APAC | |
| 7 | 2600 | 2500 - 2570 | 2620 - 2690 | EMEA | |
| 8 | 900 | 880 - 915 | 925 - 960 | Global | |
| 9 | 1800 | 1749.9 - 1784.9 | 1844.9 - 1879.9 | APAC | |
| 10 | 1700 | 1710 - 1770 | 2110 - 2170 | NAM | |
| 11 | 1500 | 1427.9 - 1447.9 | 1475.9 - 1495.9 | Japan | No |
| 12 | 700 | 699 - 716 | 729 - 746 | NAM | Yes |
| 13 | 700 | 777 - 787 | 746 - 756 | NAM | |
| 14 | 700 | 788 - 798 | 758 - 768 | NAM | |
| 17 | 700 | 704 - 716 | 734 - 746 | NAM | |
| 18 | 850 | 815 - 830 | 860 - 875 | Japan | |
| 19 | 850 | 830 - 845 | 875 - 890 | Japan | |
| 20 | 800 | 832 - 862 | 791 - 821 | EMEA | |
| 21 | 1500 | 1447.9 - 1462.9 | 1495.9 - 1510.9 | Japan | No |
| 22 | 3500 | 3410 - 3490 | 3510 - 3590 | EMEA | Yes |
| 23 | 2000 | 2000 - 2020 | 2180 - 2200 | NAM | No |
| 24 | 1600 | 1626.5 - 1660.5 | 1525 - 1559 | NAM | No |
| 25 | 1900 | 1850 - 1915 | 1930 - 1995 | NAM | Yes |
| 26 | 850 | 814 - 849 | 859 - 894 | NAM | |
| 27 | 850 | 807 - 824 | 852 - 869 | NAM | |
| 28 | 700 | 703 - 748 | 758 - 803 | APAC,EU | |
| 29 | 700 | N/A | 717 - 728 | NAM | |
| 30 | 2300 | 2305 - 23151 | 2350 - 2360 | NAM | No |
| 31 | 450 | 452.5 - 457.5 | 462.5 - 467.5 | Global | |
| 32 | 1500 | N/A | 1452 - 1496 | EMEA | |
| 33 | 1900 | | 1900 - 1920 | | Yes |
| 34 | 2000 | | 2010 - 2025 | | |
| 35 | 1850 | | 1850 - 1910 | | |
| 36 | 1900 | | 1930 - 1990 | | |
| 37 | 1900 | | 1910 - 1930 | | |
| 38 | 2600 | | 2570 - 2620 | | |
| 39 | 1900 | | 1880 - 1920 | | |
| 40 | 2300 | | 2300 - 2400 | | |
| 41 | 2500 | | 2496 - 2690 | | |
| 42 | 3500 | | 3400 - 3600 | | |
| 43 | 3700 | | 3600 - 3800 | | |

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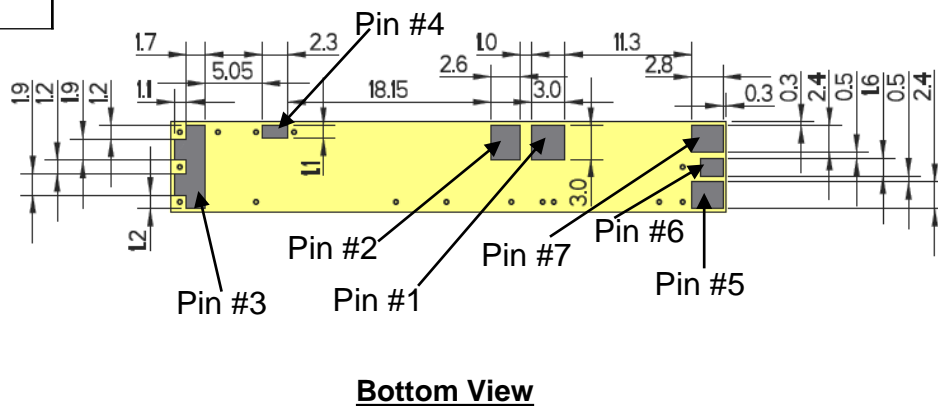
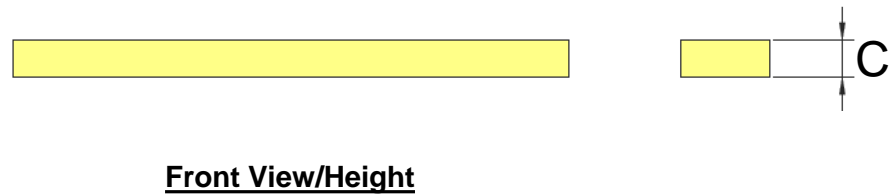
Antenna Dimensions (P822602)

Typical antenna dimensions (mm)

| Part Number | A (mm) | B (mm) | C (mm) |
|-------------|------------|-----------|-----------|
| P822602 | 49.6 ± 0.3 | 8.0 ± 0.2 | 3.2 ± 0.3 |



| Pin# | Description |
|------|------------------|
| 1 | Feed |
| 2 | Ground |
| 3 | Dummy Pad |
| 4 | Low Band Tuning |
| 5 | High Band Tuning |
| 6 | Dummy Pad |
| 7 | Dummy Pad |

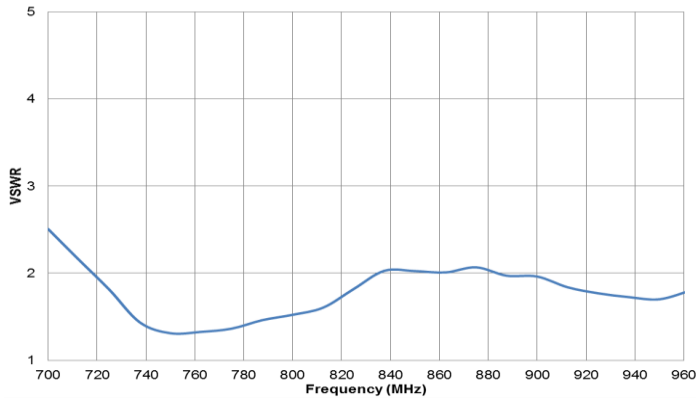


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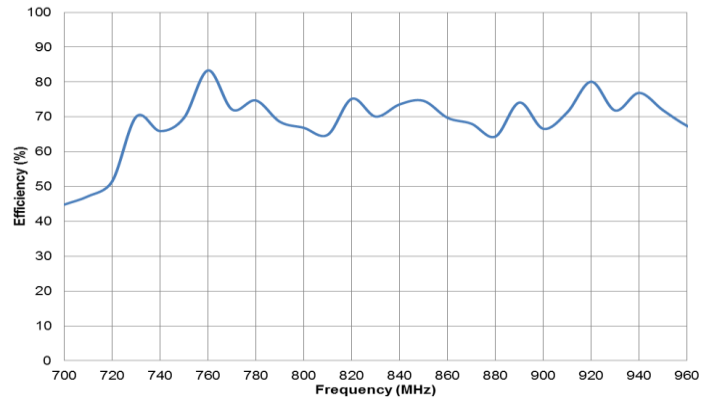
VSWR and Efficiency Plots

Typical P822601/P822602 performance 140 x 50 mm PCB

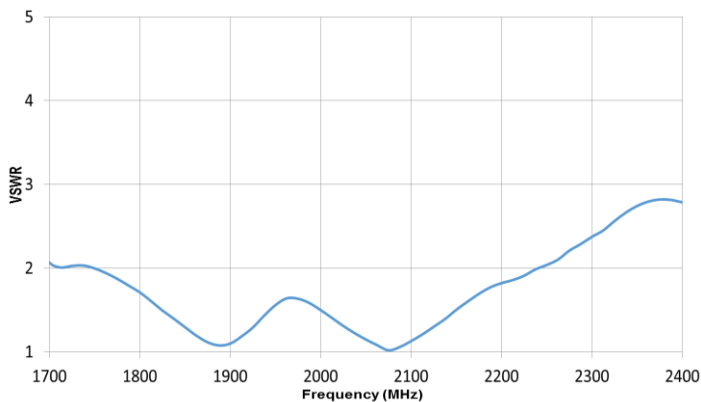
Low Band VSWR



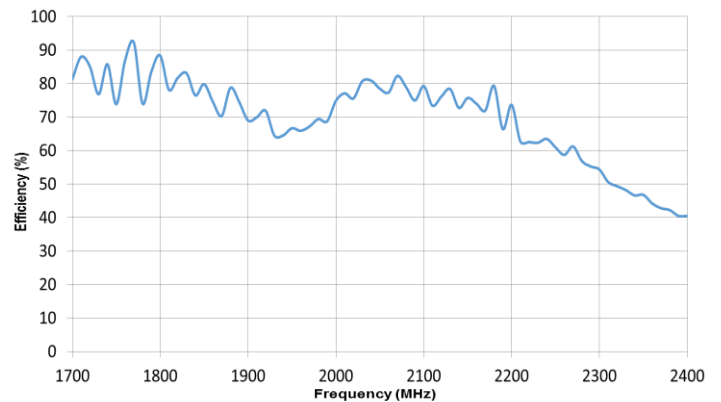
Low Band Efficiency



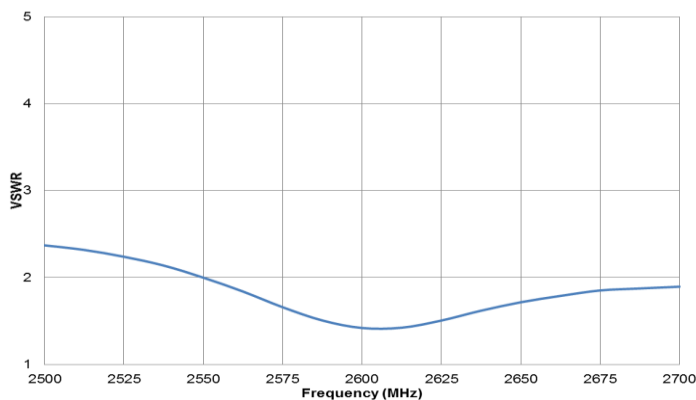
High Band VSWR



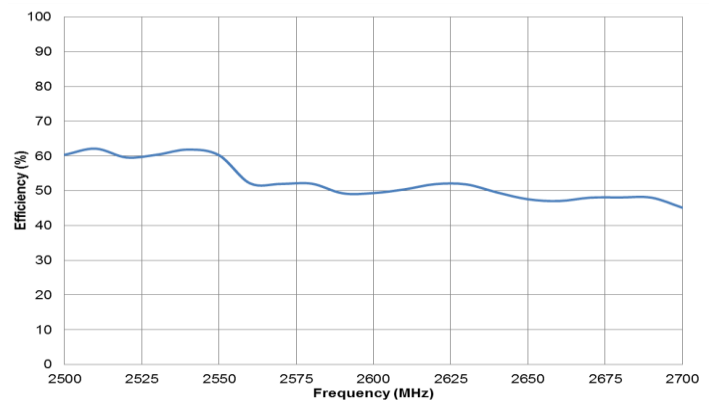
High Band Efficiency



Band 7 VSWR



Band 7 Efficiency

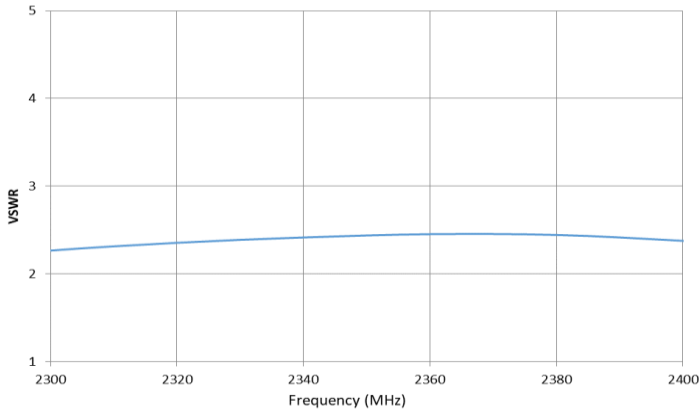


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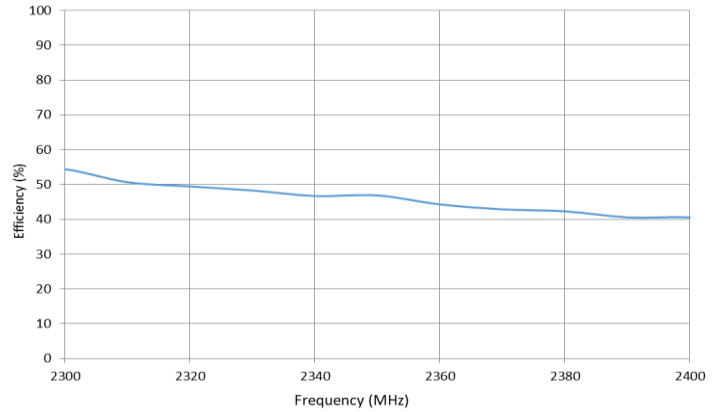
VSWR and Efficiency Plots

Typical P822601/P822602 performance 140 x 50 mm PCB

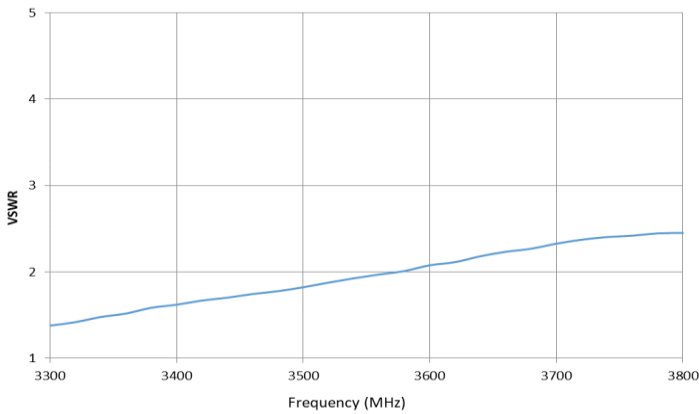
Band 40 VSWR



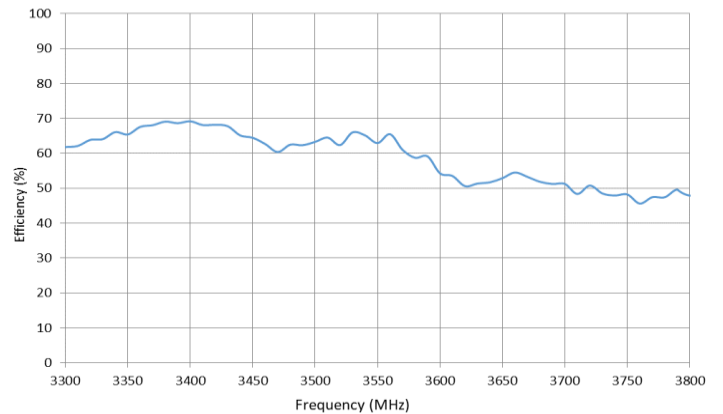
Band 40 Efficiency



n78 VSWR



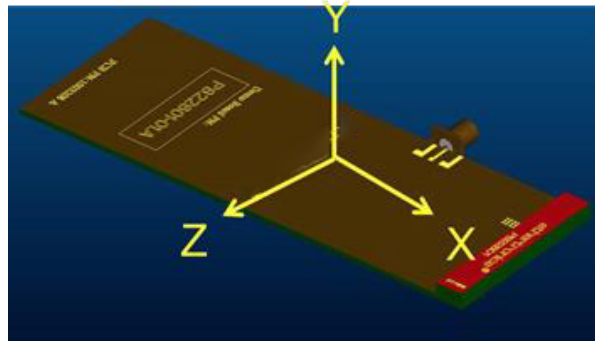
n78 Efficiency



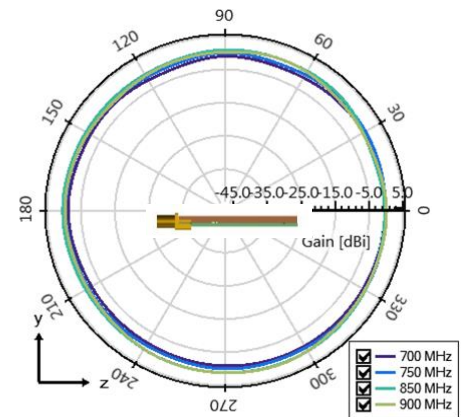
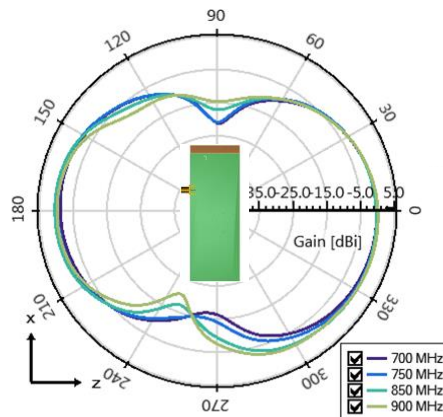
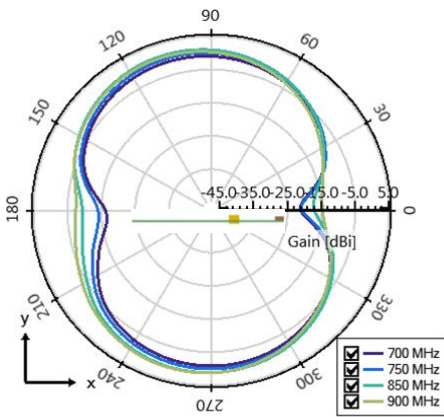
P822601 / P822602 Universal Broadband Embedded LTE/5G/LPWA Antenna Specifications. KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs.

Antenna Radiation Patterns – Low / High Band (LTE)

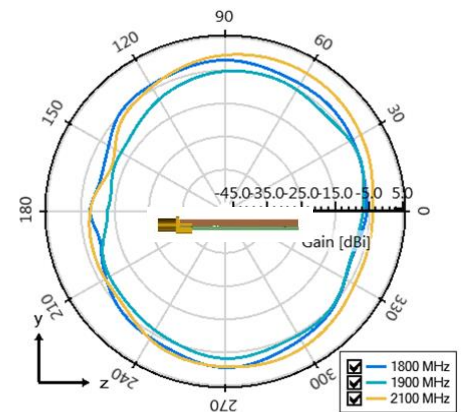
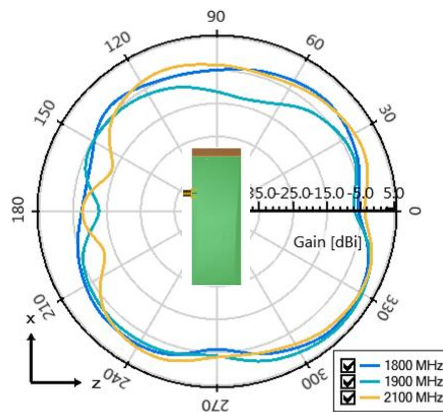
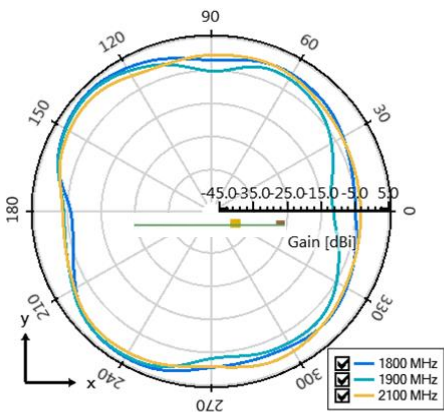
Typical P822601/P822602 performance 140 x 50 mm PCB



**Low Band measured at
700, 750, 850, 900 MHz**



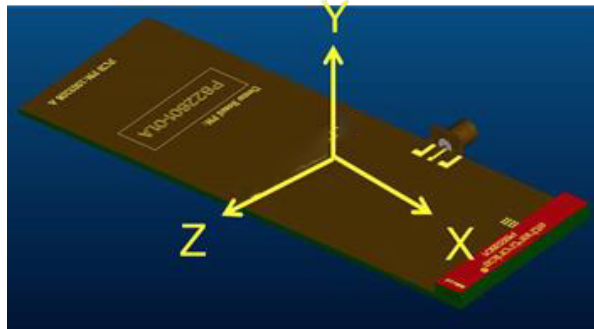
**High Band measured at
1800, 1900, 2100 MHz**



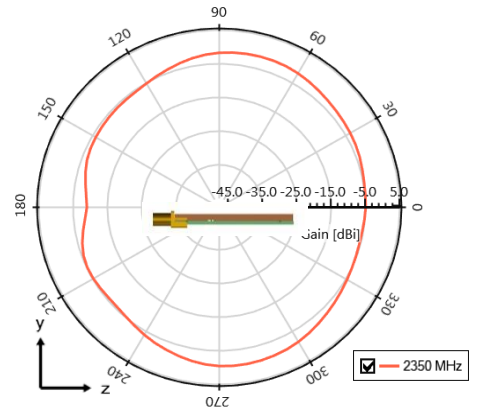
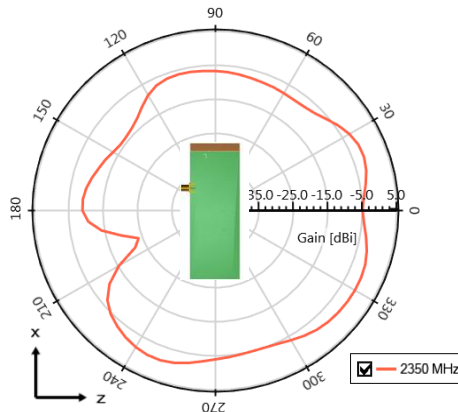
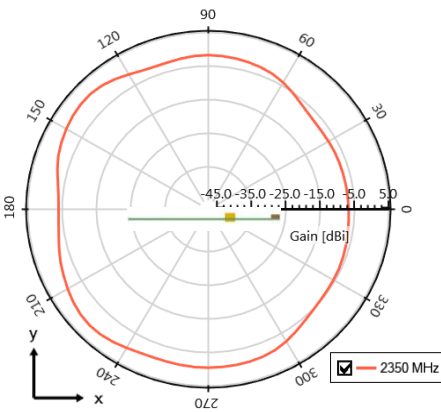
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Antenna Radiation Patterns – Band 40, Band 7

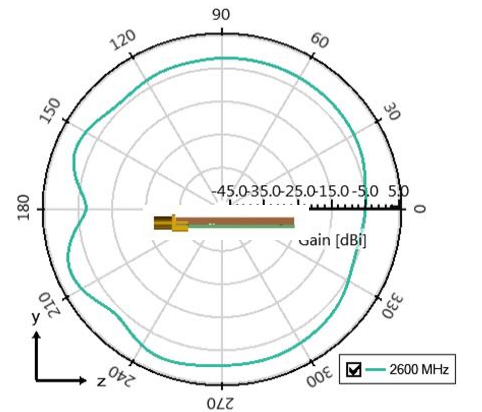
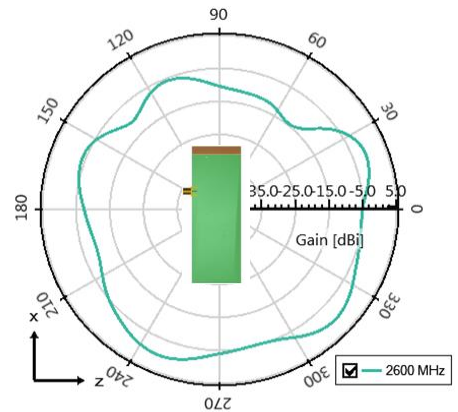
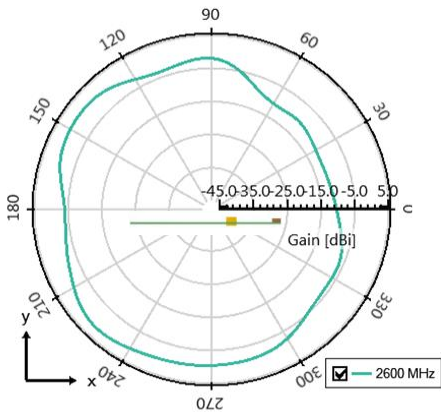
Typical P822601/P822602 performance 140 x 50 mm PCB



Band 40 measured at 2350 MHz



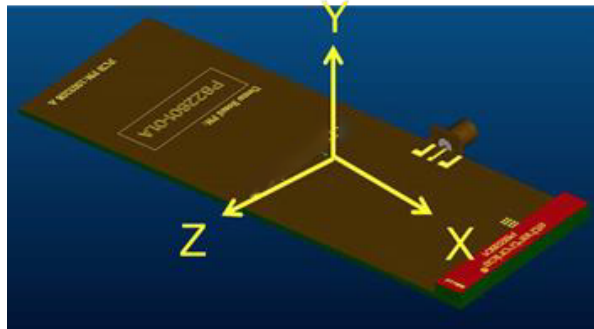
Band 7 measured at 2600 MHz



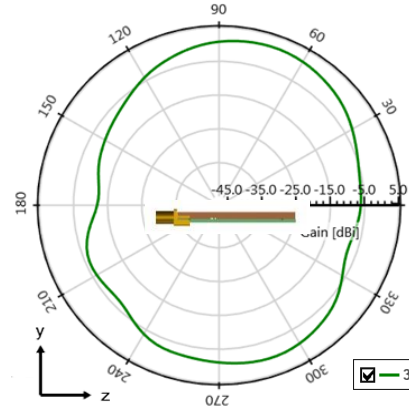
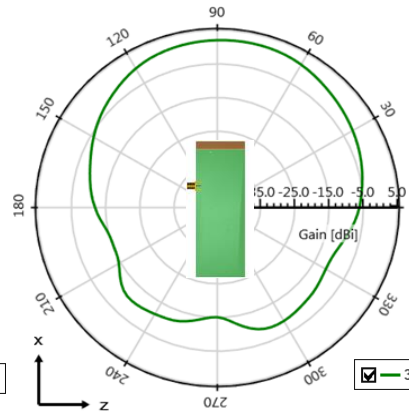
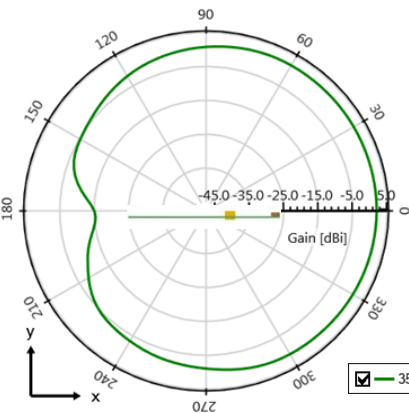
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Antenna Radiation Patterns – n78

Typical P822601/P822602 performance 140 x 50 mm PCB



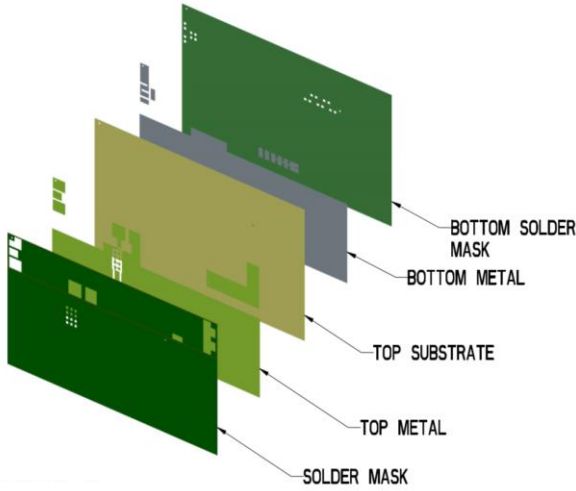
n78 measured at
 3500 MHz



P822601 / P822602 Universal Broadband Embedded LTE/5G/LPWA Antenna Specifications.
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Antenna Layout (P822601)

Typical layout dimensions (mm)



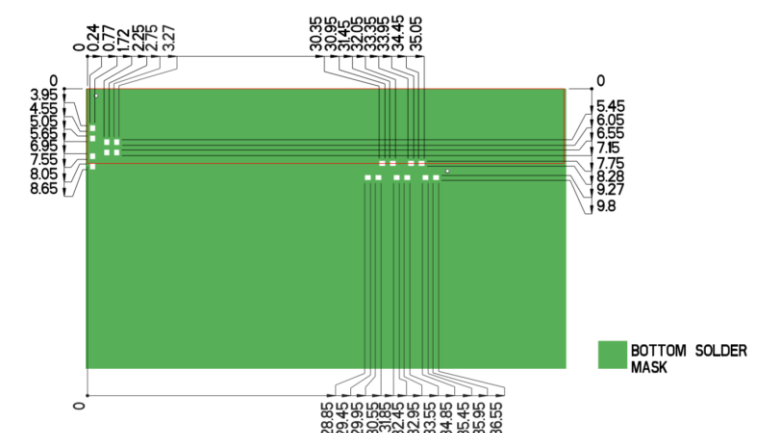
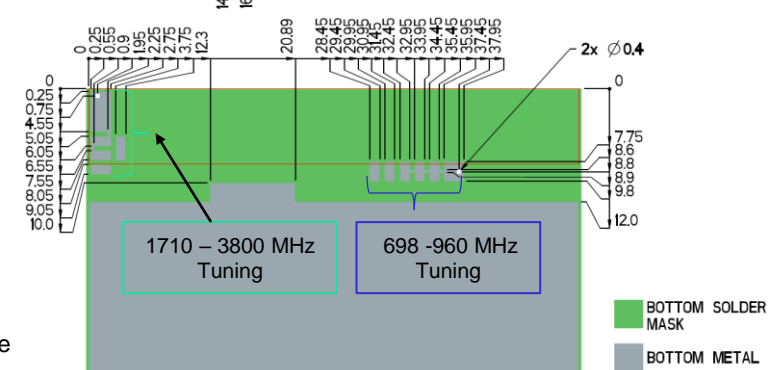
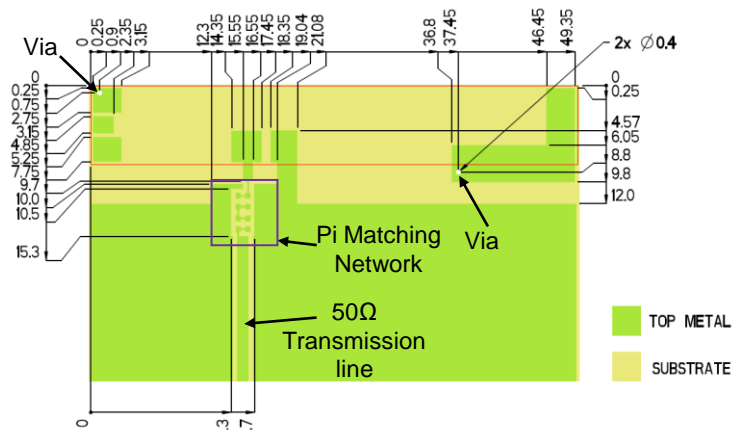
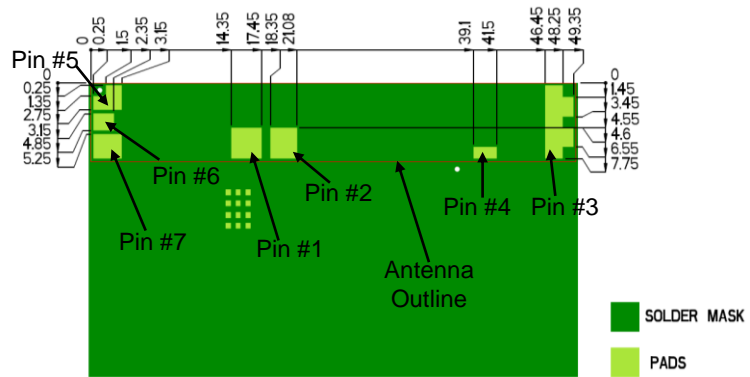
- Additional VIAS: Diam. 0.2mm to be placed around antenna, (no vias on transmission lines).
- Via holes must be covered by solder mask

Pin Descriptions

| Pin# | Description |
|------|------------------|
| 1 | Feed |
| 2 | Ground |
| 3 | Dummy Pad |
| 4 | Low Band Tuning |
| 5 | High Band Tuning |
| 6 | Dummy Pad |
| 7 | Dummy Pad |

*P822602 uses the same layout but mirrored.

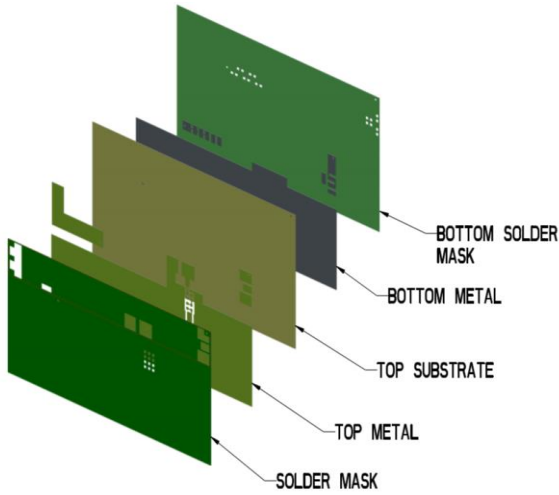
Default Pi Matching Network values with instructions can be found under Antenna Matching Network.



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Antenna Layout (P822602)

Typical layout dimensions (mm)



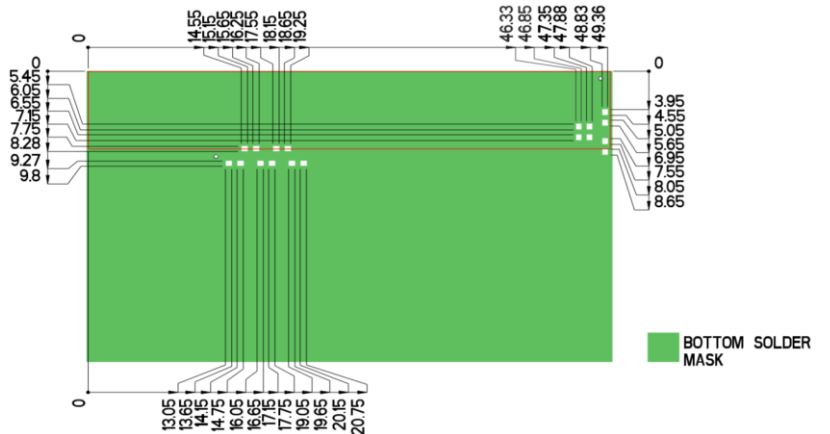
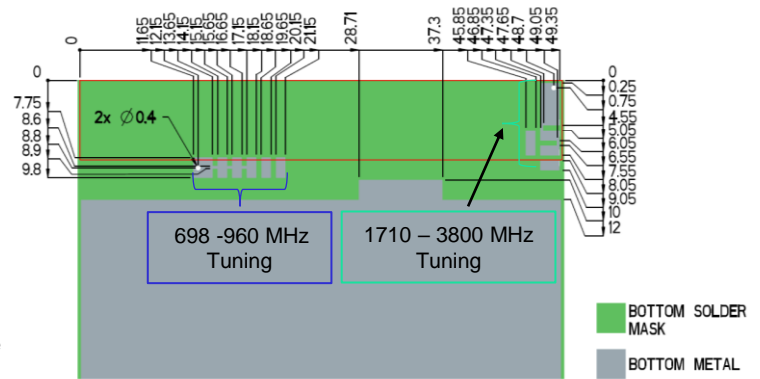
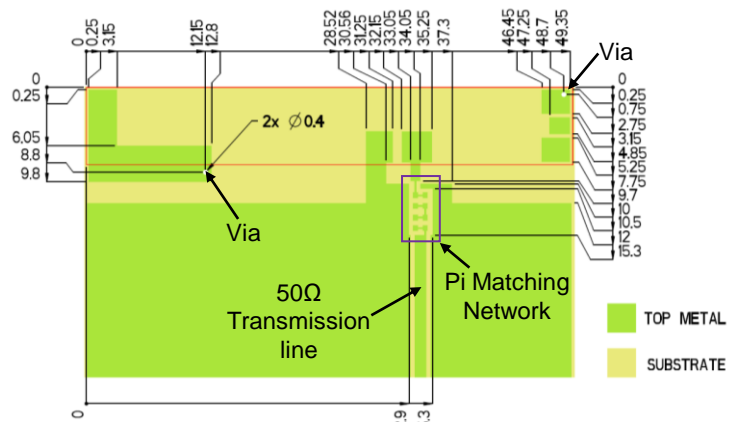
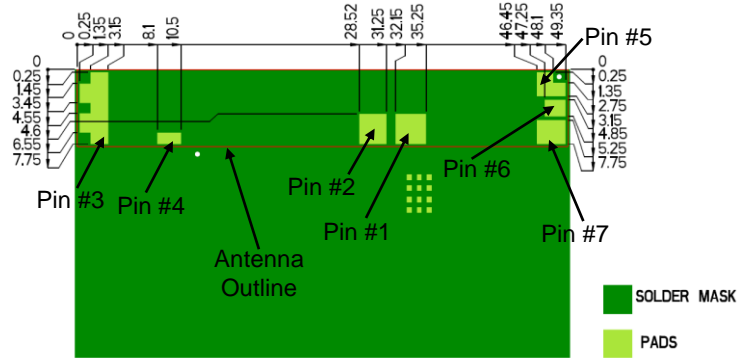
- Additional VIAS : Diam. 0.2mm to be placed around antenna, (no vias on transmission lines).
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Pin Descriptions

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**P822601 uses the same layout but mirrored.*

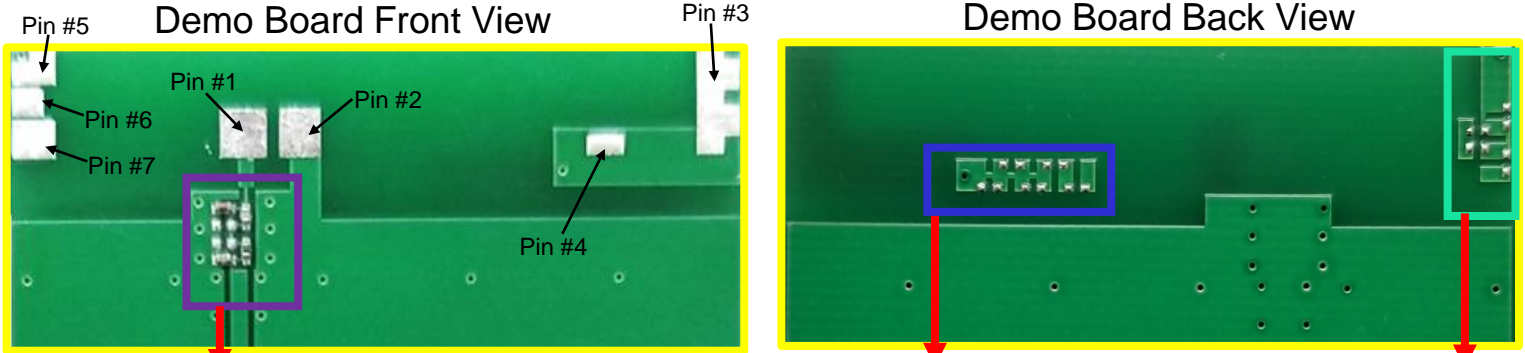
Default Pi Matching Network values with instructions can be found under Antenna Matching Structure.



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Antenna Matching Structure (P822601)

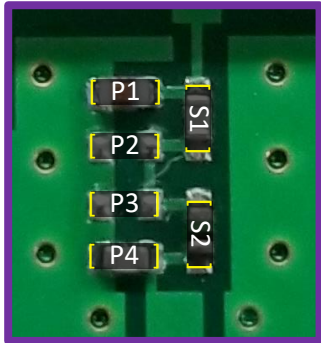
Typical matching values on 140 x 50 mm PCB



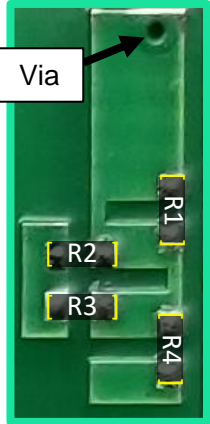
Antenna Matching

698-960 MHz Tuning

1710-3800 MHz Tuning

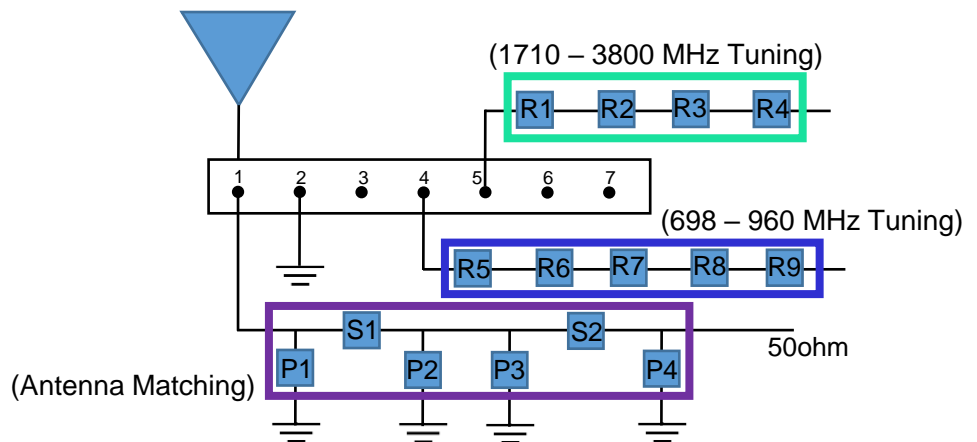


(Antenna Matching): pads are directly inline with the antenna feed trace.



Pin Descriptions

| Pin# | Description |
|------|------------------|
| 1 | Feed |
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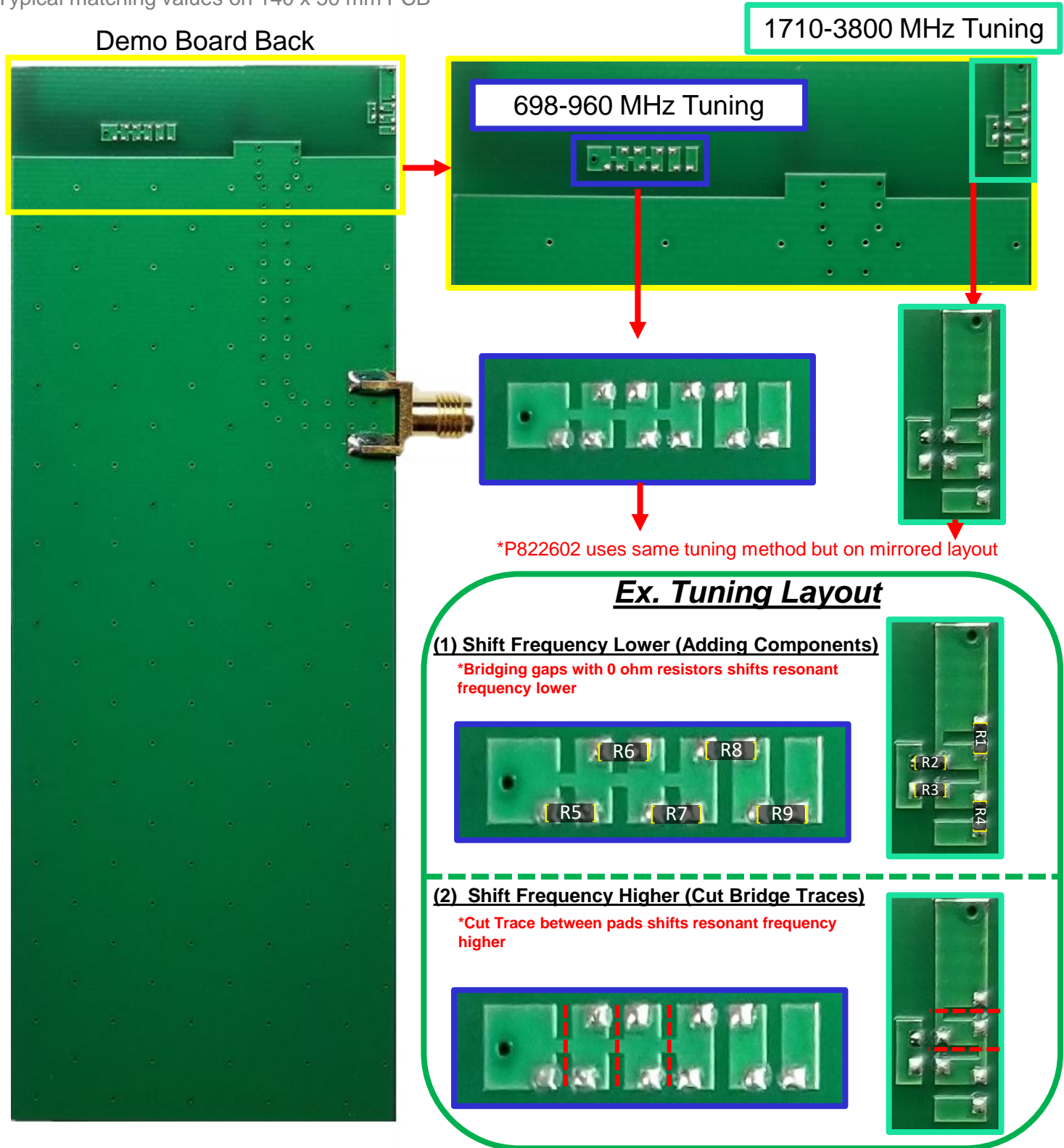


*P822602 uses same matching values

| | P1 | S1 | P2 | P3 | S2 | P4 | R1-R4 | R5-R9 |
|-------------------------|-------|----------|-----|-----|---------|---------|-------|-------|
| Default Matching | 24nH | 2.4pF | DNI | DNI | 1.0nH | 0.3pF | DNI | DNI |
| Tolerance | ± 20% | ± 0.25pF | N/A | N/A | ± 0.3nH | ± 0.1pF | N/A | N/A |

Antenna Matching Structure (P822601)

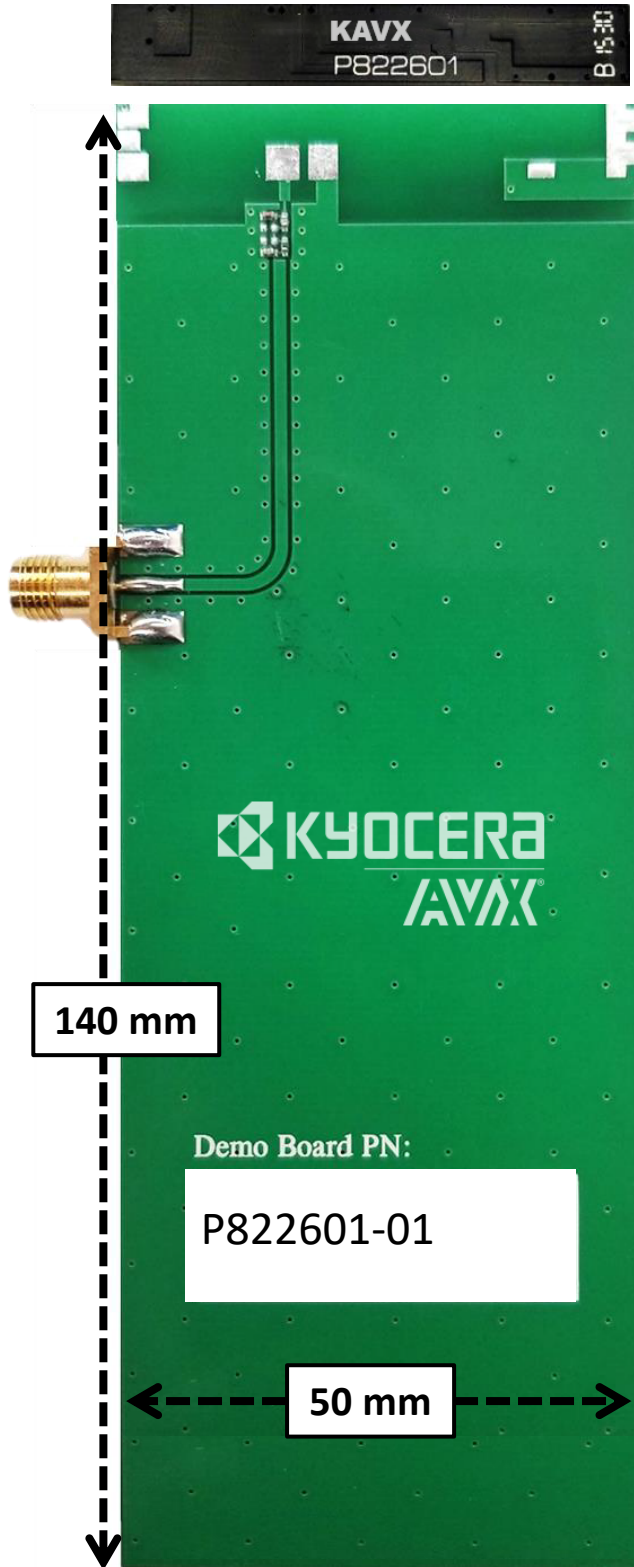
Typical matching values on 140 x 50 mm PCB



P822601 / P822602 Universal Broadband Embedded LTE/5G/LPWA Antenna Specifications.
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Antenna Demo Board (P822601/P822602)

Demo Board Front View



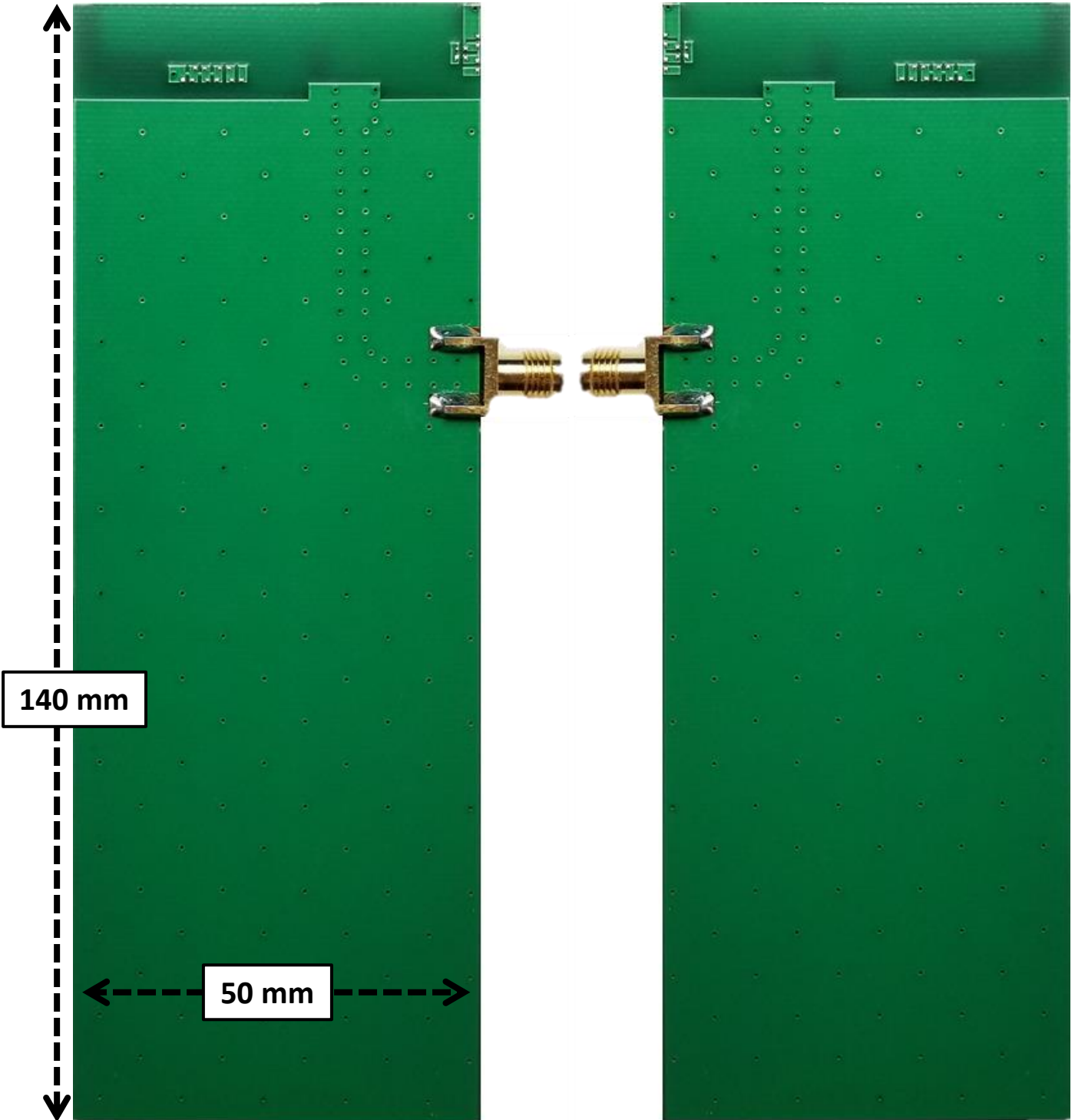
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Antenna Demo Board (P822601/P822602)

Demo Board Back View (mm)

P822601-01

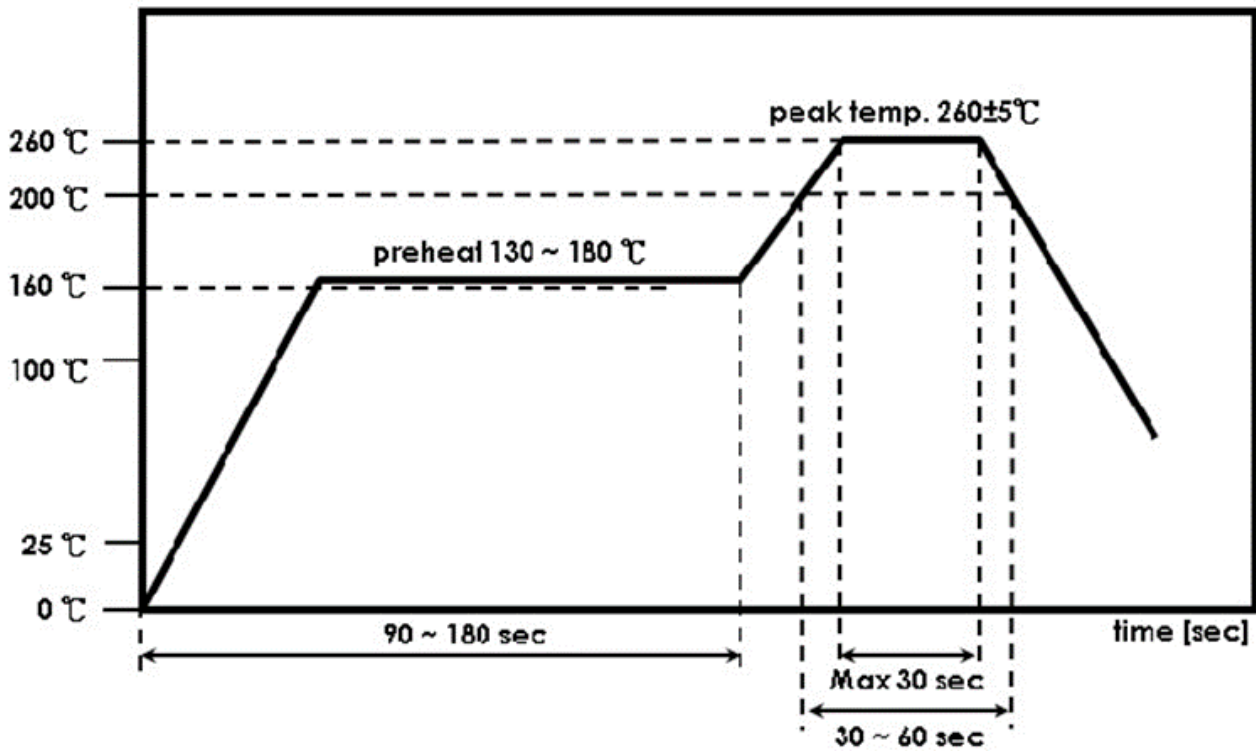
P822602-01



P822601 / P822602 Universal Broadband Embedded LTE/5G/LPWA Antenna Specifications.
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Recommended Reflow Soldering Profile

The recommended method for soldering the antenna to the board is forced convection reflow soldering. The following suggestions provide information on how to optimize the reflow process for the FR4 antenna:



*Adjust the reflow duration to create good solder joints without raising the antenna temperature beyond the allowed maximum of 260° C.