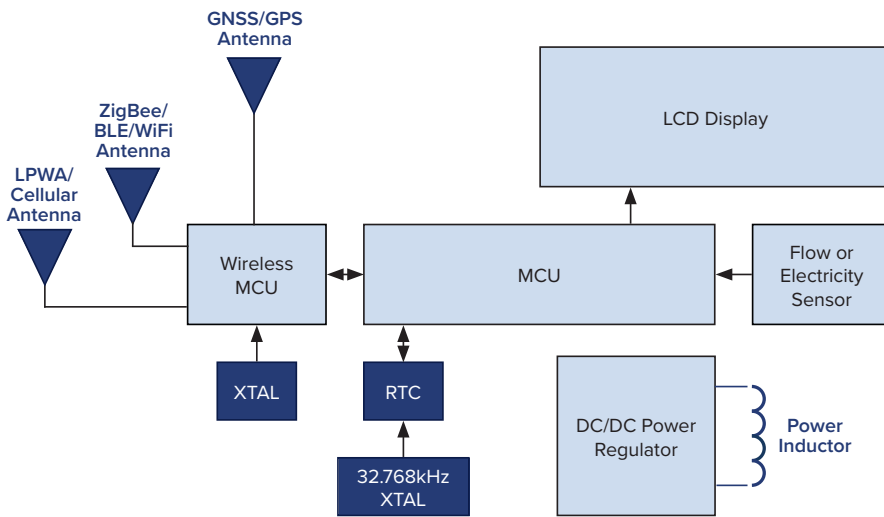
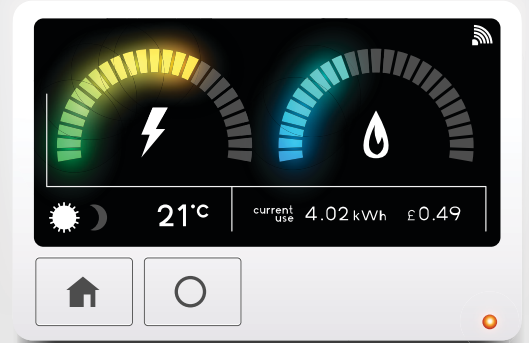


# SMART METERING

## ANTENNA APPLICATION GUIDE

### OVERVIEW

Smart metering gives consumers more visibility into their water, gas and electric usage. Connected metering helps utilities reduce operational costs by creating simplified remote processes. This adds reliability and efficiency to the system while saving energy. Abracon offers an extensive range of antennas to support metering needs for commercial, residential or industrial spaces. This portfolio includes external and internal embedded solutions for various protocols including cellular, GNSS, LoRa, and Wifi/Bluetooth.



### FEATURES

- Combinational antennas available for cellular/LTE, GNSS, WiFi/Bluetooth
- High accuracy multiband GNSS solutions
- Multiple input, multiple output (MIMO) options for LTE and WiFi
- Compact and low profile options
- Weather resistance capability (IP67 rated)
- High gain, low VSWR
- Integrated LNA + filter options
- Customizable mounting styles and cable length

### ANTENNA TYPES



CHIP



PATCH



FLEXIBLE



EXTERNAL

# LPWA/LoRA/SIGFOX/NB-IoT

## SMART METERING

### FEATURED PRODUCT



**AEACAC195013-S915**

The AEACAC254010-S915 external terminal antenna works for end devices in smart metering applications. In addition, it also works for other applications like remote technology, network devices, smart city, agriculture, environment, and consumer tracking.

- 915 MHz LPWA/ISM
- VSWR < 2.5
- Gain of 3 dBi
- 195.0 x Ø12.9 mm
- Linear polarization

| PART NUMBER         | FREQUENCY (MHz) | GAIN PEAK (dBi) | POLARIZATION | PACKAGE SIZE (mm) |
|---------------------|-----------------|-----------------|--------------|-------------------|
| <b>CHIP</b>         |                 |                 |              |                   |
| ACAJ-110-T          | 868, 915        | 2.5, 2.7        | Linear       | 9.0 x 3.0 x 1.2   |
| ACAG1204-433-T      | 433             | -1.72           | Linear       | 12.0 x 4.0 x 1.6  |
| ACAG1204-915-T      | 915             | 3.42            | Linear       | 12.0 x 4.0 x 1.6  |
| ACAG1204-868-T      | 868             | 2.63            | Linear       | 12.0 x 4.0 x 1.6  |
| <b>PATCH</b>        |                 |                 |              |                   |
| APAE868R2540JBDB2-T | 868             | -1.37           | RHCP         | 25.0 x 25.0 x 4.0 |
| APAE915R2540ABDB1-T | 915             |                 | RHCP         | 25.0 x 25.0 x 4.0 |
| APAES923R3640C16-T  | 923             | 1.5             | RHCP         | 36.0 x 36.0 x 4.0 |
| APAES915R6460C16-T  | 915             | 3.5             | RHCP         | 62.5 x 62.5 x 6.0 |
| APAES868R8060C16-T  | 868             | 5.0             | RHCP         | 80.0 x 80.0 x 6.0 |
| APAES915R80C16-T    | 915             | 5.0             | RHCP         | 80.0 x 80.0 x 6.0 |
| <b>EXTERNAL</b>     |                 |                 |              |                   |
| AEACAC054010-S915   | 915             | 2.0             | Linear       | Ø10.0 x 45.9      |
| AEACAC049018-S868   | 868             | 2.0             | Linear       | Ø18.6 x 49.9      |
| AEACAC053010-S433   | 433             | 2.0             | Linear       | Ø10.4 x 53.4      |
| AEACAC053010-S868   | 868             | 2.0             | Linear       | Ø10.4 x 53.4      |
| AEACAD153029-S433   | 433 ~ 960       | 3.0             | Linear       | Ø29.4 x 153.3     |
| AEACAQ190012-S868   | 868             | 3.5             | Linear       | Ø12.9 x 190.0     |
| AEACAQ190012-S915   | 915             | 3.5             | Linear       | Ø12.9 x 190.0     |
| AEACAC195013-S915   | 915             | 3.0             | Linear       | Ø12.9 x 195.0     |
| AEACAC195013-S868   | 868             | 3.0             | Linear       | Ø12.9 x 195.0     |
| AEACAC254010-S169   | 169             | 2.0             | Linear       | Ø10.9 x 254.0     |

# 5G/4G/LTE/3G/2G/GSM

## SMART METERING

### FEATURED PRODUCT



**AEACBK081014-S698**

The AEACBK081014-S698 external antenna works for end devices used for smart metering applications. This antenna can provide higher output power and antenna efficiency.

- 4G/LTE full band coverage
- IP67 Rated
- Gain of 3 dBi
- Ø81.3 x 14.6 mm
- Screw mount
- Linear polarization

| PART NUMBER              | FREQUENCY (MHz)                     | GAIN PEAK (dBi) | POLARIZATION | PACKAGE SIZE (mm)  |
|--------------------------|-------------------------------------|-----------------|--------------|--------------------|
| <b>CHIP</b>              |                                     |                 |              |                    |
| ACAJ-109-T               | 824 ~ 960, 1710 ~ 2170              | 1.3 ~ 6.4       | Linear       | 24.0 x 5.5 x 4.4   |
| ACAR3005-S824            | 824 ~ 960, 1710 ~ 2170              | 3.12            | Linear       | 30.0 x 5.0 x 5.0   |
| ACAR3705-S698            | 700 ~ 960, 1710 ~ 2170, 2500 ~ 2700 | -1.13           | Linear       | 37.0 x 5.0 x 5.0   |
| ACAR4008-S698            | 700 ~ 960, 1710 ~ 2170, 2500 ~ 2700 | 4.10            | Linear       | 40.0 x 8.0 x 3.2   |
| <b>EXTERNAL</b>          |                                     |                 |              |                    |
| AEACBA081014-M698 (MIMO) | 698 ~ 960, 1710 ~ 2690              | 3.0             | Linear       | Ø81.6 x 14.5       |
| AEACBK081014-M698 (MIMO) | 698 ~ 960, 1710 ~ 2690              | 2.5             | Linear       | Ø81.6 x 14.5       |
| AEACBK081014-S698        | 698 ~ 960, 1710 ~ 2690              | 3.0             | Linear       | Ø81.3 x 14.6       |
| APAMS-119                | 890 ~ 960, 1710 ~ 1880              | 2.15            | Linear       | Ø12.0 x 78.0       |
| AEACAD097015-S698        | 700 ~ 2700                          | 5.0             | Linear       | Ø15.0 x 97.0       |
| APAMS-118                | 890 ~ 960, 1710 ~ 1880              | 2.0, 3.0        | Linear       | Ø10.0 x 108.1      |
| AEACCA115021-S698        | 698 ~ 960, 1710 ~ 2655              | 2.0             | Linear       | 115.6 x 21.7 x 5.8 |
| APAMS-102                | 820 ~ 960, 1710 ~ 2170              | 1, 2, 2.5, 3    | Linear       | 138.0 x 21.0 x 6.0 |
| AEACAC198013-S698        | 698 ~ 960, 1710 ~ 2655              | 3.0             | Linear       | Ø13.0 x 198.0      |
| AEACAC198013-S5GNR       | 698 ~ 960, 1710 ~ 2690, 3300 ~ 3800 | 3.0             | Linear       | Ø13.0 x 198.0      |
| <b>FLEXIBLE</b>          |                                     |                 |              |                    |
| AFAC110020-S698          | 698 ~ 960, 1710 ~ 2690              | 3.0             | Linear       | 67.4 x 58.4 x 0.2  |
| AFAC5867-S698            | 698 ~ 960, 1710 ~ 2690              | 2.0             | Linear       | 110.0 x 20.0 x 0.2 |
| AFAC240020-M698          | 698 ~ 960, 1710 ~ 2690              | 3.0             | Linear       | 240.0 x 20.0 x 0.2 |

# WIFI/BLUETOOTH/ZIGBEE

## SMART METERING

### FEATURED PRODUCT



**AEACBK050048-SW2**

The AEACBK050048-SW2 external antenna works in repeaters or access points mounted on utility poles. The access points receive data from the smart meter and transit the information back to the utility company.

- Dualband 2.4/5.5GHz WiFi
- IP67 Rated
- VSWR < 2.5
- 48.0 x Ø50.0 mm
- Screw mount
- Linear polarization

| PART NUMBER             | FREQUENCY (MHz)            | GAIN PEAK (dBi) | POLARIZATION | PACKAGE SIZE (mm) |
|-------------------------|----------------------------|-----------------|--------------|-------------------|
| <b>CHIP</b>             |                            |                 |              |                   |
| ACAG0201-2450-T         | 2450                       | 2.7             | Linear       | 2.0 x 1.25 x 0.6  |
| ACAR0301-SW2            | 2400 ~ 2500, 5150 ~ 5825   | 1.0, 2.5        | Linear       | 3.05 x 1.6 x 0.55 |
| ACAG0301-2450-T         | 2450                       | 5.19            | Linear       | 3.2 x 1.6 x 1.2   |
| ACAG0301-24505500-T     | 2400 ~ 2500, 5150 ~ 5850   | 2.23, 4.05      | Linear       | 3.2 x 1.6 x 1.2   |
| AMCA31-2R450G-S1F-T     | 2450                       | 0.5             | Linear       | 3.2 x 1.6 x 1.2   |
| ACAG0301-5500-T         | 5500                       | 4.5             | Linear       | 3.2 x 1.6 x 1.2   |
| ACAG0801-2450-T         | 2450                       | 7.29            | Linear       | 8.0 x 1.0 x 1.0   |
| <b>PATCH</b>            |                            |                 |              |                   |
| APARN1204-S2450         | 2400 ~ 2500                | 2.0             | Linear       | 12.0 x 12.0 x 4.0 |
| APAKN1304-S5517-T       | 5150 ~ 5885                | 6.0             | Linear       | 13.0 x 13.0 x 4.0 |
| APAKN2504-S2448-T       | 2412 ~ 2484                | 7.0             | Linear       | 25.0 x 25.0 x 4.0 |
| APARC2505-S2450         | 2450                       | 0.5             | RHCP         | 25.1 x 25.1 x 5.5 |
| <b>PCB</b>              |                            |                 |              |                   |
| ABAR1504-S2450          | 2400 ~ 2500                | 1.5 ~ 2.2       | Linear       | 15.0 x 4.0 x 0.8  |
| <b>FLEXIBLE</b>         |                            |                 |              |                   |
| AFAG2220-SW2            | 2400 ~ 2500, 5100 ~ 5900   | 1.0 ~ 2.0       | Linear       | 22.0 x 20.0       |
| <b>EXTERNAL</b>         |                            |                 |              |                   |
| AEACAC025009-S2400      | 2400 ~ 2483.5              | 2.0             | Linear       | Ø9.5 x 25.9       |
| AEACBK050048-MW2 (MIMO) | 2400 ~ 2483.5, 4900 ~ 5825 | 2.0             | Linear       | Ø50.0 x 48.0      |
| AEACBK050048-SW2        | 2400 ~ 2483.5, 4900 ~ 5825 | 2.0             | Linear       | Ø50.0 x 48.0      |
| APAMBJ-135              | 2.4, 5.0                   | 2.0             | Linear       | Ø10.0 x 54.4      |
| APAMBJ-145              | 2.4, 5.1 ~ 5.9             | 5.0, 2.0        | Linear       | Ø36.5 x 77.3      |
| APAMS-121               | 2350 ~ 2450, 5700 ~ 5900   | 2.0             | Linear       | Ø10.0 x 86.0      |
| AEACAQ190012-S2400      | 2400 ~ 2483.5              | 5.0             | Linear       | Ø12.9 x 190.0     |

# GNSS/GPS/GLONASS/BEIDOU/GALILEO

## SMART METERING

| PART NUMBER           | FREQUENCY (MHz)                                    | GAIN PEAK (dBi)   | POLARIZATION | PACKAGE SIZE (mm)  |
|-----------------------|--|---|--------------|--------------------|
| <b>CHIP</b>           |  |   |              |                    |
| ACAR0301-SG3          | 1561 ~ 1610  | 1.69<br>-1.81<br>1.43   | Linear       | 3.05 x 1.6 x 0.55  |
| ACAG0301-1575-T       | 1575   | 4.18  | Linear       | 3.2 x 1.6 x 0.6    |
| <b>PATCH</b>          |  |   |              |                    |
| APAEA1575R0940K14-T   | 1606   | -1  | RHCP         | 9.0 x 9.0 x 4.0    |
| APAE1575R1240ABDD1-T  | 1575.42  | 0.6   | RHCP         | 12.0 x 12.0 x 4.0  |
| APAKN1304-C2G-T       | 1575.42<br>1602                                    | 2.6<br>2.4  | RHCP         | 13.0 x 13.0 x 4.0  |
| APAE1575R1540AZDB2F-T | 1575.42  | 1.2   | RHCP         | 15.0 x 15.0 x 4.0  |
| APARM1504-SG3         | 1561,<br>1575,<br>1602                             | -3,<br>-4.5,<br>0.8   | RHCP         | 15.0 x 15.0 x 4.0  |
| APAE1575R1820ABDC1-T  | 1575.42  | 3.3   | RHCP         | 18.0 x 18.0 x 2.0  |
| APARM1804-SG3         | 1561,<br>1575,<br>1602                             | 3.0,<br>2.0,<br>4.0   | RHCP         | 18.0 x 18.0 x 4.0  |
| APAKN1804-C2G-T       | 1575.42<br>1602                                    | 2.8<br>2.9  | RHCP         | 18.0 x 18.0 x 4.0  |
| APAE1575R1840BADB1F-T | 1575.42  | 3.3   | RHCP         | 18.0 x 18.0 x 4.0  |
| APAE1575R2040ABDD2-T  | 1575.42  |   | RHCP         | 20.0 x 20.0 x 4.0  |
| APAE1575R2520ABDD7-T  | 1575.42  | 4.3   | RHCP         | 25.0 x 25.0 x 2.0  |
| APAE1575R2540AADBE-T  | 1575.42  | 4.5   | RHCP         | 25.0 x 25.0 x 4.0  |
| APAKN2504-C2G-T       | 1575.42<br>1602                                    | 3.6   | RHCP         | 25.0 x 25.0 x 4.0  |
| APARM2504-SG3         | 1561,<br>1575,<br>1602                             | 2.5,<br>1.5,<br>3.5   | RHCP         | 25.1 x 25.1 x 4.0  |
| APARM3503-SG3         | 1561,<br>1575,<br>1602                             | 4.0,<br>3.0,<br>4.5   | RHCP         | 35.0 x 35.0 x 3.0  |
| APAGM3606-SG3         | 1561,<br>1575,<br>1602                             | 4.0   | RHCP         | 36.0 x 36.0 x 6.0  |
| <b>STACKED PATCH</b>  |  |   |              |                    |
| APAKM2507S-SGL5       | 1575.42,<br>1176.45                                | L1: 4.0<br>L2: -3.0   | RHCP         | 25.0 x 25.0 x 7.5  |
| APARM2508S-SGL2L5     | 1575.42,<br>1176.45                                | L1: 3.8<br>L2: -0.3<br>L5: -0.5                                   | RHCP         | 25.0 x 25.0 x 8.0  |
| APARM2508S-SG3L5      | 1575.42,<br>1176.45,<br>1577,<br>1602,<br>1561.098 | L1: 0.6<br>L5: 0.5<br>Galileo: 0.6<br>GLONASS: 3.4<br>BeiDou: 2.4 | RHCP         | 25.1 x 25.1 x 8.0  |
| APAKM3513-SGL2        | 1224,<br>1574                                      | L1: 3.1<br>L2: 1.2  | Circular     | 35.6 x 35.6 x 13.5 |

# GNSS/GPS/GLONASS/BEIDOU/GALILEO SMART METERING

| PART NUMBER            | FREQUENCY (MHz)            | GAIN PEAK (dBi)             | POLARIZATION | PACKAGE SIZE (mm)  |
|------------------------|----------------------------|-----------------------------|--------------|--------------------|
| <b>ACTIVE PATCH</b>    |                            |                             |              |                    |
| APAM0968JL03V2.0       | 1575.42                    | -3                          | RHCP         | 9.0 x 9.0 x 6.8    |
| APAM1268JL02V2.0       | 1575.42                    | 0                           | RHCP         | 12.0 x 12.0 x 6.8  |
| APAM1568YE15V2.0       | 1575.42                    | 1.5                         | RHCP         | 15.0 x 15.0 x 6.8  |
| APARC1807A-SG3         | 1561 ~ 1610                | -6.5,<br>-6.0,<br>-6.5      | RHCP         | 18.0 x 18.0 x 7.6  |
| APAM1866YA18           | 1575.42                    | 2.5                         | RHCP         | 18.0 x 18.0 x 7.0  |
| APAKC2506A-SG3         | 1555 ~ 1615                | -1.5,<br>-1.0,<br>-2.5,     | RHCP         | 25.0 x 25.0 x 6.9  |
| APARC2504A-SG3         | 1561,<br>1575.42,<br>1602  | -1.0,<br>-2.5,<br>-1.5      | RHCP         | 25.0 x 25.0 x 7.4  |
| APAM2764YK0175         | 1575.42                    | 2.5                         | RHCP         | 27.0 x 27.0 x 7.0  |
| APAKC3508A-SG3         | 1555 ~ 1615                | 3.0,<br>2.8,<br>2.5,<br>3.0 | RHCP         | 35.0 x 35.0 x 8.7  |
| <b>FLEXIBLE PCB</b>    |                            |                             |              |                    |
| AFAG4330-SG3           | 1550 ~ 1620                | 6.3                         | Linear       | 40.0 x 10.0        |
| <b>EXTERNAL ACTIVE</b> |                            |                             |              |                    |
| APAMP-114              | 1575.42                    | 1.0                         | RHCP         | 26.0 x 23.0 x 12.0 |
| APAMP-127              | 1576.44                    | 5.0                         | RHCP         | 38.0 x 34.0 x 12.0 |
| APAMP-111              | 1575.42                    | 5.0                         | RHCP         | 38.3 x 35.0 x 12.0 |
| APAMP-115              | 1575.42                    | 3.5                         | RHCP         | 40.0 x 35.0 x 15.1 |
| APAMPJ-132             | 1575.42                    | 4.0                         | RHCP         | 41.0 x 34.0 x 14.5 |
| APAMP-116              | 1575.42                    | 5.0                         | RHCP         | 44.0 x 37.0 x 14.5 |
| APAMPG-117             | 1575.42<br>1594 ~ 1610     | 5.0                         | RHCP         | 44.0 x 14.5        |
| AEACBA045015-SG2       | 1575 ~ 1602                | 5.0                         | RHCP         | 45.2 x 35.8 x 15.2 |
| APAMP-112              | 1575.42                    | 5.0                         | RHCP         | 46.0 x 38.0 x 15.0 |
| AEARBA048014-SG3       | 1561,<br>1575,<br>1602     | 5.78,<br>4.27,<br>5.65      | RHCP         | 48.5 x 47.0 x 14.0 |
| APAMP-106              | 1575.42                    | 5.0                         |              | 48.6 x 39.2 x 15.2 |
| APAMP-122              | 1576.44                    | 5.0                         | RHCP         | 48.6 x 39.2 x 15.2 |
| AEACBA050018-SG3       | 1561 ~ 1602                | 5.0                         | RHCP         | 50.0 x 50.0 x 18.0 |
| AEACBA050018-SG4L2L5   | 1561 ~ 1602<br>1176 ~ 1227 | 3.0                         | RHCP         | 50.0 x 50.0 x 18.0 |
| APAMP-109              | 1575.42                    | 5.0                         | RHCP         | 50.6 x 50.6 x 15.1 |
| APAMP-108              | 1575.42                    | 5.0                         | RHCP         | 54.5 x 44.5 x 14.8 |
| AEAGMK148060-S1575     | 1164 ~ 1610                | 4.5                         | RHCP         | Ø148.0 x 60.0      |
| AEACMK0660746-SG4      | 1561 ~ 1602                | 5.0                         | RHCP         | Ø66.0 x 76.0       |

# COMBINATIONAL ANTENNAS

## SMART METERING

| PART NUMBER              | FREQUENCY (MHz)  | GAIN PEAK (dBi)     | POLARIZATION             | PACKAGE SIZE (mm)   | FEATURES   |
|--------------------------|--|---------------------|--------------------------|---------------------|--|
| <b>CHIP</b>              |  |                     |                          |                     |  |
| ACAG0301-15752450-T      | 1575, 2450   | 1.21, 3.18          | Linear                   | 3.2 x 1.6 x 1.2     | WiFi, GPS  |
| ACAR3705-SB              | 698 ~ 960  | 0.61                | Linear                   | 37.0 x 5.0 x 5.0    | 2G/3G, 4G/LTE, GSM, ISM, LPWA/LORA/SigFox                          |
| ACAR3005-C2WB            | 824 ~ 960, 2400 ~ 2500                                     | 2.61                | Linear                   | 30.0 x 5.0 x 5.0    | LPWA/LORA/SigFox, NB-IoT, WiFi, Bluetooth, Zigbee                  |
| <b>FLEXIBLE</b>          |  |                     |                          |                     |  |
| AFAC120050-U6G           | 698 ~ 6000   | 5.0                 | Linear                   | 120.0 x 50.0 x 0.2  | 2G/3G, 4G/LTE, Bluetooth, CDMA, GPS, GSM, ISM, UMTS, Wi-Fi, ZigBee |
| <b>EXTERNAL</b>          |  |                     |                          |                     |  |
| AEACBK046014-C2WG        | 1575.42, 2400 ~ 2483.5, 4800 ~ 5825                        | 2.0                 | RHCP<br>Linear<br>Linear | Ø46.6 x 14.5        | Active GPS, Dual Band WiFi   |
| AEACBK050048-C2LG        | 698-960, 1710-2690, 1575.42                                | 2.0<br>2.0          | Linear<br>RHCP           | Ø50.0 x 48.0        | 2G/3G, 4G/LTE, GPS, GSM, IP67 Certified                            |
| APAMPS-106               | 1575.42, 806 ~ 960, 1710 ~ 1880                            | 5.0<br>-1.0<br>1.0  | RHCP<br>Linear           | Ø75.0 x 14.1        | GSM, Active GPS  |
| APAMPS-105               | 1575.42, 806 ~ 960, 1710 ~ 1880                            | 5.0<br>-1.0<br>1.0  | RHCP<br>Linear           | Ø76.8 x 15.5        | GSM, Active GPS  |
| APAMSJ-147               | 850 ~ 960, 1700 ~ 2100, 1575 ~ 1610                        | 1.5,<br>0.5         | Linear<br>RHCP           | Ø77.0 x 12.0        | GSM, Active GPS/GLONASS, IP67 Certified                            |
| APAMPSBJ-144             | 791 ~ 960, 1710 ~ 2960, 1572 ~ 1610                        | 2.0,<br>3.0         | Linear<br>RHCP           | Ø77.3 x 66.5        | 4G/LTE/3G, GSM, WiFi, GPS/GLONASS, Active GPS/GLONASS              |
| AEACBA081016-C2LG        | 698-960, 1710-2690, 1575.42                                | 2.5<br>2.0          | Linear<br>RHCP           | Ø81.6 x 16.2        | 2G/3G, 4G/LTE, GPS, GSM, IP67 Certified                            |
| APAMPSLJ-142             | 1572 ~ 1610, 380 ~ 500, 824 ~ 2497                         | 2.2,<br>2.0,<br>2.0 | RHCP<br>Vertical         | 92.0 x 52.0 x 157.0 | GSM, Active GPS/GLONASS, WiFi                                      |
| AEACBK110053-MLWG (MIMO) | 698-960, 1710-2690, 1575.42-1610, 2400-2483.5, 4900 - 5825 | 3.0<br>28<br>2.0    | Linear<br>RHCP<br>Linear | Ø110.0 x 53.0       | GPS/GLONASS, LTE MIMO, WiFi MIMO, IP67 Certified                   |
| APAMSTJ-138              | 380 ~ 500, 824 ~ 900, 1800 ~ 2500                          | 2.2                 | Linear                   | 126.5 x 22.0 x 6.7  | TETRA, GSM, WiFi   |
| APAMPSLJ-140             | 1559 ~ 1606, 699 ~ 960, 1710 ~ 2690                        | 3.0                 | Linear                   | 196.0 x 38.0 x 13.8 | 4G/LTE, GSM, WiFi, GPS/GLONASS                                     |