Access Point Product Specification

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Access Point Product Specification

014-0030-00 Rev. G

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Revision History

Revision	Release Date	Change Description
A	October 10, 2011	Initial release.
B	November 2, 2011	Updated with information for operating at the ETSI RFID configuration for the Access Point.
C	April 13, 2012	Updated product specifications, regulatory certifications, lightning/ESD test compliance, transmitter information, and antenna requirements. Also added Access Point mechanical drawing.
D	September 14, 2012	Updated: ■ The product specifications table ■ The L-com antenna information for the ETSI configuration Added: ■ Model numbers for various AP configurations ■ An LED section in the Hardware Requirements chapter
E	September 26, 2012	Updated the product specifications table with regulatory compliance information.
F	July 31, 2013	■ Updated the product specifications table to include the IEEE 802.15.4k requirement. ■ Clarified some product specifications in chapter 2. ■ Updated the ORW logo ■ Updated the AP photo, AP references, and model number.
G	December 7, 2015	■ Updated for new branding. ■ Updated model number. ■ Added Sectorized AP definition and block diagram and FCC ID ■ Added Dual Latency AP definition and block diagram and FCC/IC ID

1 Introduction

This document provides an overview of the Access Point and is shown below. It also provides product specifications, characteristics, and requirements for the Access Point (AP).

Figure 1. Access Point

1.1 AP Product Configurations

The following AP product configurations are currently available for worldwide markets. The Element Management System (EMS) software is used during network configuration and setup of the AP. This software automatically configures the maximum allowed TX power levels (EIRP) taking into account regulatory domain, antenna gain, and cable loss.

1. **FCC/IC Configuration (Model: ULPAP110)**
   The Federal Communications Commission (FCC)/Industry Canada (IC) configuration supports transmit power requirements up to 30 dBm conducted, 36 dBm EIRP, with 38 channels available. It contains a cavity filter for high out-of-band rejection. It is EMC compliance certified to FCC Part 15C Section 15.247 and IC RSS 210 Issue 7.
2. **FCC Sectorized AP (Model: ULPAP210)**
   The Sectorized AP Configuration is limited to 26 dBm conducted transmit power, up to 43 dBm EIRP, from (2402-2475.63MHz). This configuration requires two ULPAP110 APs professionally installed, with each AP connected to a 17dBi 90 degree antennas.
3. **FCC/IC Dual Latency Configuration (Model: ULPAP310)**
   The ETSI Dual Latency configuration is made up of two ULPE100, one for each sub-band, connected to the antenna through a diplexer. The software configures each sub-band channel to a maximum of 30dBm at the antenna port. The antenna gain must be such that the maximum radiated power is 36dBm EIRPper channel. The system processess two independent information streams through the diplexer to the antenna. Each diplexer sub-band allows 3 or 4 one MHz channels. There are four possible sub-bands. The system is professionally installed.
4. **ETSI Standard Configuration (Model: ULPAPE100)**
   The European Telecommunications Standards Institute (ETSI) configuration is limited to 10 dBm of conducted transmit power, up to 10 dBm EIRP, with 40 channels available. It

does not have an internal cavity filter. It is EMC compliance certified to ETSI-301-489 and ETSI-300-440.

5. **ETSI RFID Configuration (Model: ULPAPE100)**
   The ETSI Radio Frequency Identification (RFID) configuration is limited to 10 dBm conducted transmit power, up to 27 dBm EIRP, with three channels available (2446-2454MHz). This configuration does not have an internal cavity filter. The hardware is the same as the ETSI standard version; however the software is configured to accommodate the power and frequency specifics. The AP is EMC compliance certified to ETSI-301-489, ETSI-300-440, and EU REC 70-03 (Annex 11). APs are permitted to operate under EU REC 70-03 (Annex 11) in France, Germany, Ireland, Spain, Switzerland–Liechtenstein, and United Kingdom.

6. **Japan Configuration (Model: ULPAPE100)**
   The Japan configuration is limited to 10 dBm conducted transmit power and up to 12 dBm EIRP with 41 channels available. It does not have an internal cavity filter. The hardware is the same as the ETSI standard version, however the software is configured to accommodate the power and frequency specifics. It is EMC compliance certified to Japanese Radio Law; Item 19 of Article 12 (category WW) and ARIB STD-T66.

7. **Hong Kong Configuration (Model: ULPAP110)**
   Hong Kong allows two different paths to certification utilizing rules for either China or FCC/IC. The FCC/IC certification rules were used to certify the AP. Certification in Hong Kong is based on the same information and tests provided for FCC/IC certification. The Hong Kong version of the AP is identical to the FCC/IC version so all information is the same. As with the FCC/IC configuration, the Hong Kong version supports transmit power requirements up to 30 dBm conducted, 36 dBm EIRP, with 38 channels available. It contains a cavity filter for high out-of-band rejection. It is EMC compliance certified to FCC Part 15C Section 15.247 and IC RSS 210 Issue 7.

1.2 References

The following document provides additional details about the AP.

- **AP Deployment Guide (PN: 010-0006-00 for 1.4 system and PN: 010-0021-00 for 2.1 system)**
  Provides network planning considerations, installation and software configuration guidelines and instructions, and maintenance information for the AP as a part of the RPMA network which enables remote wireless communication.

2 Product Specification Overview

2.1 AP Product Specifications

The following table provides basic specification information for the AP.

Table 1. Basic AP Specifications

Size	Inches: 9.1"H x 8.1"W x 4.5"D Millimeters: 232mm H x 202mm W x 111mm D
Maximum Weight	Pounds: 9.6 Kilograms: 4.35
Operating Environment	Outdoors or indoors
Power Dissipation	17 Watts (maximum)
Antenna Connector	Type N, female
GPS Connector	Type N, female
GPS Antenna Type	Powered
Data and Power Connector	RJ45 (POE)

Product specifications are summarized in the following table. Where available, additional information is provided for some specifications; refer to the *Link* column.

Table 2. Summary of AP Product Specifications

Requirement Description	Requirement	Comments	Link
General			
Product Lifetime	> 10 years		
Enclosure	IP66		
Signal Modulation	DSSS-ODBPSK	Direct-Sequence Spread Spectrum Orthogonal Differential BPSK	
Multiple Access Scheme	RPMA	Random Phase Multiple Access	
PHY/MAC Standard	IEEE 802.15.4k		
Frequency Range by market: FCC/IC version ETSI Standard version ETSI RFID version Japan version	Frequency 2.402 – 2.475.63 GHz 2.402 – 2.479.61 GHz 2.446 – 2.454 GHz 2.402 – 2.481.60 GHz	Channels CH1 – CH38 CH1 – CH40 CH24 – CH26 CH1 – CH41	
Frequency Channel Step Size	1.99 MHz	See section 3.2 for exact channels.	3.2

Requirement Description	Requirement	Comments	Link
Operating Temperature Range*	-40°C – +80°C	Ambient, not including solar loading	
Operating Temperature Rate of Change*	-10°C – +40°C	Constant rate of change measured over 1 hour.	
Storage Temperature Range*	-40°C – +85°C		
Humidity**	5% – 95%	Non-condensing	
ESD, EN 61000-4-2	± 16.5 kV Air Discharge ± 9 kV Contact Discharge	On any exposed point of an installed product.	
Sine Vibration* Operating Non-operating	 5 – 200 Hz, 4 m/s^2 5 – 200 Hz, 2 m/s^2		
Random Vibration* Operating Non-operating	 5 – 100 Hz, 1.5 Grms 5 – 100 Hz, 1.06 Grms		
Shock* Operating Non-operating	 40 G, Half Sine 30 G, Half Sine		
Operating Condensation Cycle**	50 – 98%		
FCC/IC Requirements	15.247, 15.207, 15.215 RSS210e	Single AP FCC ID: XTE-ULPAP110 IC Emissions Designation: 2M48G1D	4
FCC Requirements	15.247, 15.207, 15.215	Sectorized AP, FCC ID: XTE-ULPAP210	4
FCC/IC Requirements	15.247, 15.207, 15.215 RSS210e	Dual Latency AP, FCC ID: XTE-ULPAP310 IC ID: 8655A-ULPAP310 IC Emissions Designation: 2M48G1D	4
ETSI Requirements	300 440-1 and 440-2 301 489-1 IEC/EN/UL/CSA 60950-1	Compliance tests performed. Documents on file, available upon request.	4.2
Japan Requirements	Japanese Radio Law; Item 19 of Article 12	Compliance tests performed. Category WW, Test Report R83818.	
Access Point Capacity	Typical: 4,000 to 16,000 Maximum: 64,000	The number of nodes an AP can support is dependent on the application.	
Data Rate	60 kbps	Measured as throughput at each data point.	
Power Source Voltage Range (PoE)	38 – 72 VDC	Nominal 48 VDC Power Over Ethernet.	

Requirement Description	Requirement	Comments	Link
Current Consumption	0.35A maximum @ 48 VDC	See section 3.3 for details.	3.3
GPS Power	3.3 VDC @ 50 mA maximum over coaxial cable	DC power supplied on GPS RF connector.	5
Transmitter Related			
Transmit Power Range	0 – 16 dBm (LP) 16 – 30 dBm (HP)	Referenced to AP N-connector. Switchover point (16 dBm) is approximate.	
Transmitter Rated Power by market (Country: Agency): ■ United States: FCC ■ Canada: IC ■ Europe: ETSI ■ Europe: ETSI (RFID) ■ Japan: TELEC ■ Hong Kong: OFTA ■ South Africa: ICASA ■ Brazil: ANATEL ■ Korea: RRA ■ Singapore: IDA ■ Macau: DSRT	Maximum TX EIRP: ■ 36 dBm ■ 36 dBm ■ 10 dBm ■ 27 dBm ■ 12 dBm ■ 36 dBm ■ 10 dBm ■ 26 dBm ■ 10 dBm ■ 20 dBm ■ 20 dBm	Modulated conditions. ETSI is the default choice for all of Europe. ETSI RFID is only allowed in certain countries of the EU***. Requires quad-sector antenna (not Omni).	
Peak to Average Ratio	≈ 2.9 dB		
Signal Bandwidth	≈ 1 MHz		
BT Factor	0.46		
TX Spectral Bandwidth	2.32 MHz	99% bandwidth (-20 dB each side)	6.1
ACPR	≤ -30 dBc	Spec and test method comes from FCC 15.247(d).	
Harmonics	≤ -47 dBm	At any TX power level. Note harmonics fall into FCC restricted bands.	
Transmit Power Level Accuracy	≤ ±1.7 dB	Estimated sum of all contributors. Normal link mode (closed loop).	
Transmitter Spurious Outputs In-band but >1 MHz offset 30 MHz to 2400 MHz 2480 MHz to 8000 MHz	 < -45 dBm < -70 dBm < -70 dBm	At any TX power level. Applies to spurious, not ACPR or harmonics.	
Load VSWR Range	≤ 1.4:1 (≈ ≤ -15dB RL)	Exceeding this range influences power accuracy.	6.2
Customer RF Cables Loss Range	FCC: 0 dB to 3 dB Others: 0 dB to 5 dB GPS: 0 dB to 5 dB	Range of acceptable cable losses connecting the AP to its respective antenna.	7.2
Customer Ethernet Cable Length	≤ 100 meters	Maximum length for emissions compliance.	7.3

Requirement Description	Requirement	Comments	Link
Receiver Related			
Receive Sensitivity: FCC/IC (with cavity filter) ETSI/Japan (no cavity filter)	 -140 dBm -142 dBm	Referenced to AP N-connector	
Maximum Receive Signal Level	-30 dBm	Referenced to AP N-connector	
Noise Figure	≤ 7 dB nominal < 8 dB maximum	Referenced to AP N-connector, FCC configuration (including CF)	
Synthesizer Related			
Precision Reference Frequency	26 MHz	High stability VCTCXO is used, GPS referenced	
Frequency Accuracy (Test mode, not GPS locked)	± 1 ppm ± 0.25 ppm ± 1 ppm	Initial tolerance. Over temperature range. Aging in first year.	
Frequency Accuracy (Normal mode, GPS locked)	± 0.05 ppm	GPS required for field deployment. The GPS system provides precision 1 pps timing that allows the AP to meet the demanding ± 0.05 ppm required by the AP for communication.	
Digital Clocks	26 MHz for digital, RF, AFE 33.33 MHz for CPU PLL 25 MHz for Ethernet 11.0592 MHz for UART		

* Referenced standard: ETSI EN 300 019-2-4 V2.2.2 (2003-04)

** Referenced standard: IEC 60068-2-30 (Third Edition)

*** As of September 2012 the countries currently approving ETSI RFID power levels for the AP include France, Germany, Ireland, Liechtenstein, Spain, Switzerland, and United Kingdom.

2.2 RF Subsystem Block Diagram

The AP RF subsystem operates as a half-duplex transceiver. The SPDT switches allow connection from the antenna to one of three paths:

- TX high power
- TX low power
- RX

The Cavity Filter is only used in the FCC/IC configuration, specifically to avoid the 2483 MHz Restricted Band when near max power. It also provides excellent out-of-band rejection.

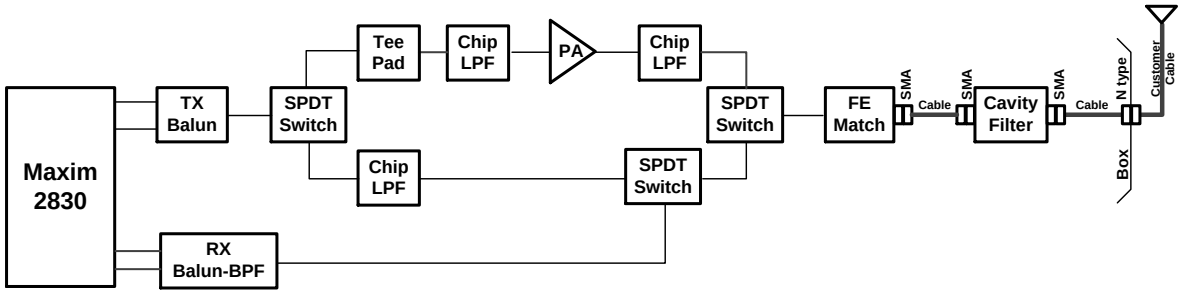

Figure 2. AP Radio Block Diagram for FCC/IC

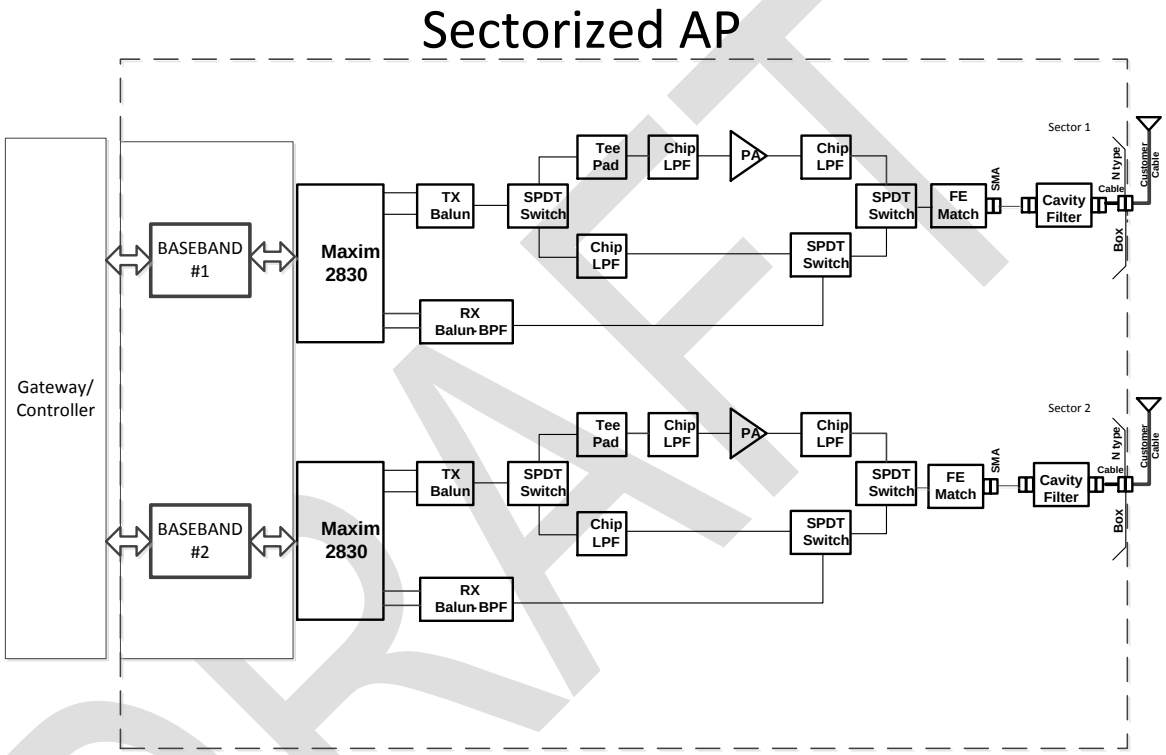

Figure 3: Sectorized AP Block Diagram

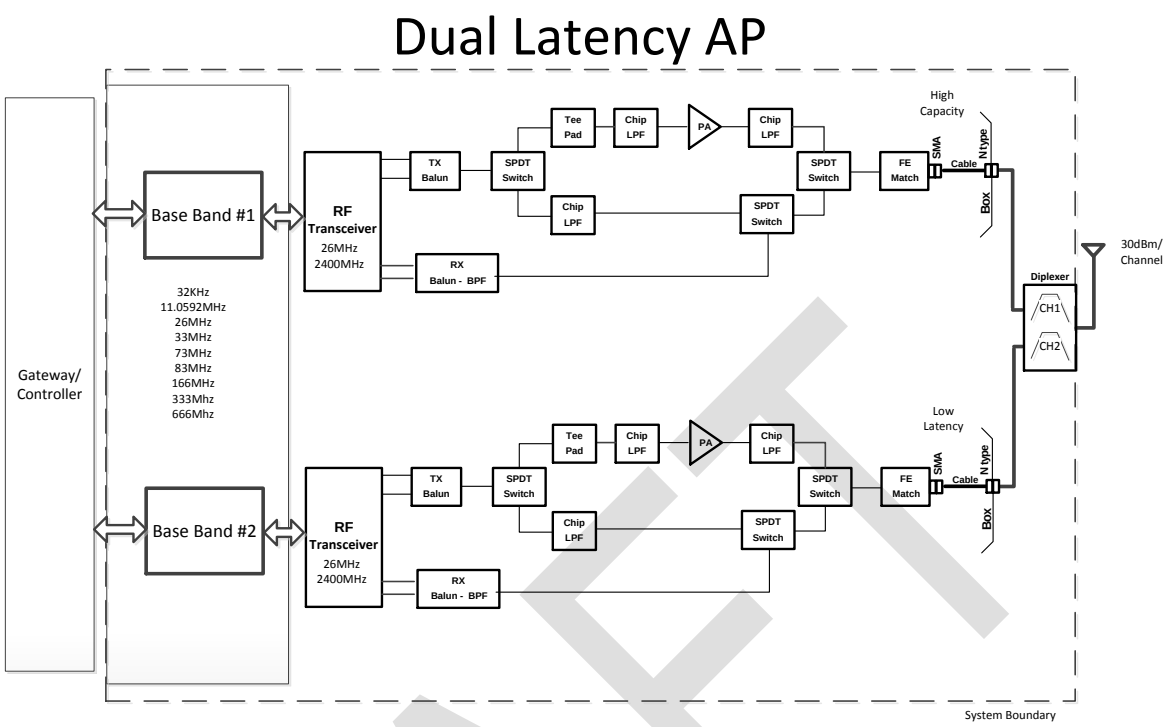

Figure 4: Dual Latency Block Diagram

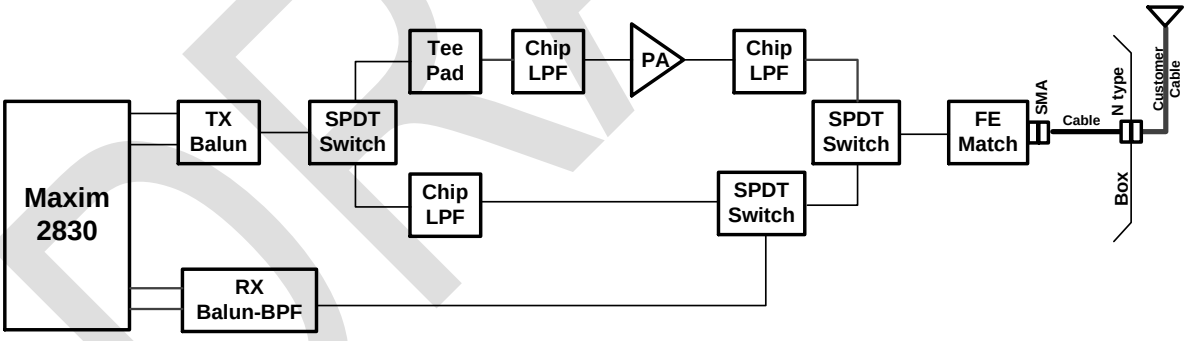

Figure 5. AP Radio Block Diagram for ETSI/Japan

3 Electrical Characteristics

3.1 Power over Ethernet (PoE)

The nominal 48VDC on the Ethernet cable is separated from the data and regulated with a switching power supply to 5.0VDC. This printed circuit board is equipped with lightning protection, surge protection, and differential and common mode filtering. It also includes a tamper protection device that will report to the system if the box cover has been opened.

NOTE: The AP is not 802.3AF or 802.3AT compliant. It requires a dedicated passive injector and cannot be powered directly from most PoE switches.

Table 3. Electrical Protection

Surge Life (@500A 10/1000µs)	Nominal Impulse Discharge Current (8/20µs)	Nominal AC Discharge Current (10x1sec @50-60Hz)	Max Impulse Discharge Current (1 Application @ 10/350µs)
400 shots	10 shots @ 20 kA	20 A	2.5 kA

3.2 Channel Numbering

Channel numbers start at 2402 MHz and are spaced at 1.99 MHz intervals. The following table lists all channels.

Note the following:

- ETSI also uses channels 39 and 40 (1-40). These are not available for the FCC/IC markets.
- Japan also has CH41 (2481.60 MHz, 1-41). These are not available for the FCC/IC markets.
- ETSI RFID *only* uses channels 24, 25, 26.

Table 4. Channel Numbers vs. Frequency

1 [L]	2	3	4	5	6	7	8	9	10
2402.00	2403.99	2405.98	2407.97	2409.96	2411.95	2413.94	2415.93	2417.92	2419.91
11	12	13	14	15	16	17	18	19	**20 [M]**
2421.90	2423.89	2425.88	2427.87	2429.86	2431.85	2433.84	2435.83	2437.82	**2439.81**
21	22	23	24	25	26	27	28	29	30
2441.80	2443.79	2445.78	2447.77	2449.76	2451.75	2453.74	2455.73	2457.72	2459.71
31	32	33	34	35	36	37	**38 [H]**	*39*	*40*
2461.70	2463.69	2465.68	2467.67	2469.66	2471.65	2473.64	**2475.63**	*2477.62*	*2479.61*

3.3 Current and Power Consumption

Typical current and power consumption for the AP, in different modes with a 48VDC PoE power supply, is listed in the following table.

NOTE: Overdriven power is not normally encountered but can be seen in Test Mode if TXGAIN is pushed too hard. It is listed here for informational purposes.

Table 5. Typical AP Current and Power Consumption

Operational Mode	Typical Current	Typical Power	Comments
Transmit, Full P_{out} (≈32dBm conducted)	350 mA	17 W	Overdriven
Transmit, Max P_{out} (≈30dBm conducted)	290 mA	14 W	Max rated P_{out}
Transmit, Mid P_{out} (≈20dBm conducted)	190 mA	9.1 W	
Transmit, Mid P_{out} (≈10dBm conducted)	125 mA	6.0 W	
Transmit, Min P_{out} (≈0dBm conducted)	120 mA	5.8 W	
Receive or Idle	105 mA	5.0 W	

3.4 Lightning/ESD Test Compliance

The AP was tested according to the EN 301 489 test methods and is compliant for lightning strike/electrostatic discharge (ESD) with ± 9 kV direct discharge and ± 16.5 kV air discharge on all external ports, seams, LEDs, and cables.

NOTE: Proper installation is required, including a grounded RF surge suppressor with an antenna that has a grounded center pin.

4 Compliance Certifications

4.1 FCC/IC Certification

The compliance tests for FCC and IC certification are listed below.

Table 6. FCC and IC Compliance Tests for Certification

Paragraph	Test	Conducted/Radiated
15.207(a)	DC and/or AC Powerline Conducted Emission	Powerline Conducted
15.215©	TX 20dB Bandwidth	RF Conducted
RSS210e	TX 99% Bandwidth	RF Conducted
15.247(a)(2)	TX 6 dB Bandwidth	RF Conducted
15.247(b)(1)	TX Peak Output Power	RF Conducted
15.247(d)	TX Radiated Spurious Emissions & Band Edge	RF Radiated
15.247(d)	TX Conducted Spurious Emissions & Band Edge	RF Conducted
15.247€	TX Power Spectral Density	RF Conducted
RSS210e	RX Radiated Spurious Emissions	RF Radiated

4.2 ETSI Certification

The compliance tests for ETSI Emissions EN 300-440-2 certification are listed below.

Table 7. ETSI Emissions EN 300-440-2 Compliance Tests for Certification

440-2: Clause	Test	Market
4.2.1.1	EIRP	
4.2.1.2	Permitted range of operating Frequencies	
4.2.1.3	Unwanted emissions in the spurious domain	
4.2.2.2	Blocking or desensitization	Not for ETSI RFID
4.2.2.3	Receive spurious emissions	

The compliance tests for ETSI Immunity 301-489-2 certification are listed below.

Table 8. ETSI Immunity 301-489-2 Compliance Tests for Certification

489-2: Clause	Test
8.3	Conducted Emissions (DC side)
8.4	Conducted Emissions (AC side)

489-2: Clause	Test
8.7	Conducted Emissions (Telecom port)
9.2	Radiated Immunity
9.3	ESD
9.4	Fast Transient Burst Immunity
9.5	RF Common Mode
9.7	Voltage Dips & Interruptions
9.8	Voltage Surges

4.3 ETSI RFID Certification

The ETSI RFID certification is based on EN 300-440-2 V1.4.1 requirements:

- Electromagnetic compatibility and Radio spectrum Matters (ERM)
- Short range devices
- Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2

The AP is certified for the channels and frequencies listed in Table 2.

Table 9. Countries in which the AP is certified for ETSI RFID

Country	Certification Approval Received	Conditions of Notification (where applicable)
France	Yes	ANFR Has Power Restrictions. Please contact French Telecom regulatory authority ARCEP to provide precise info on the conditions of use of this equipment, packaging, and instructions. See http://www.arcep.fr
Germany	Yes	None
Ireland	Yes	All apparatus for wireless telegraphy requires a license unless that apparatus has been specifically exempted. See www.askcomreg.ie
Spain	Yes	None
Switzerland – Liechtenstein	Yes	None
United Kingdom	Yes	Need DOC to be available to user and Wireless Equipment that is intended for use in the UK must comply with the UK Interface Requirements, which can be obtained from Ofcom's website at: http://www.ofcom.org.uk/radiocomms/ifi/tech/interface_req/

The compliance tests for ETSI RFID that are unique to the RFID version are listed below. All tests performed on the standard ETSI model also apply to the ETSI RFID model unless otherwise stated.

Table 10. ETSI RFID Emissions EN 300-440-2 V1.4.1 Compliance Tests for Certification

EN 300 440-2 Section	Test
4.2.1.4	Duty Cycle
4.2.2.1	Adjacent channel selectivity-in-band
4.2.3	Tests for RFID Systems at 2.45 GHz
4.2.4	Tests for GBSAR Systems

4.4 Japan Certification

The compliance tests for Japan are listed below.

Table 11. Compliance Tests for Certification in Japan

Item 19 of Article 12	Test
Notice 88 (Appendix 43, 44, 45)	RF Accessibility
	Antenna Gain
	Frequency Error
	Occupied Bandwidth
	Spreading Rate
	Spurious Emissions
	Antenna Power
	EIRP

4.5 Hong Kong Certification

Certification in Hong Kong is based on the same information and tests provided for FCC/IC certification. See section 4.1.

5 GPS

In normal operation, the AP requires Global Positioning System (GPS) synchronization. The GPS connector of the AP receives signals from its externally mounted antenna. The AP also supplies approximately 3.3 VDC at up to 50 mA through the RF connector for best GPS reception. No additional external DC connections are required. There is an internal current limit function that is designed to limit the available current in the range of 100 mA to 150 mA. Since there is DC power on the RF connector, keep in mind there should never be a DC short applied to the GPS connector. However, the current limit should self-protect itself from shorts. If a short is detected a software alarm is generated and the 3.3 VDC is removed from the GPS connector.

NOTE: The AP must be power cycled to restore power to the GPS antenna.

6 Transmitter Information

6.1 Transmit Spectral Shape

The spectrum shape of the AP can be described as similar to the Global System for Mobile Communications (GSM) which uses Gaussian Minimum Shift Keying (GMSK) but with a 1 MHz signal passband instead of the 200 kHz for GSM. Spectral side lobes are present even when the transmitter is in the linear range. As the Power Amplifier (PA) goes into compression (starting around 25 dBm) the main lobe compresses inward while the side lobes increase in amplitude.

$P_{out} \approx 0$ dBm **$P_{out} \approx 30$ dBm**

Figure 6. Spectral Shape—Linear and Compressed

6.2 Load VSWR Effects on TX Power Accuracy

The gain of the high power PA ($P_{out} \geq 16$ dBm) is susceptible to load Voltage Standing Wave Ratio (VSWR). A summary of VSWR effects on TX power accuracy is listed in the following table. This establishes minimum return loss (VSWR) requirements of ≤ -15 dB. Note that in normal operation, the closed loop power control will attempt to compensate for some gain variation.

Table 12. Summary of TX Gain/Power Variation Due to Load VSWR

Return Loss	Gain/Power Variation	Comments
7 dB	± 1.5 dB	Not to specification
15 dB	± 0.7 dB	To specification
20 dB	± 0.35 dB	To specification

7 Hardware Requirements

7.1 Antenna Requirements

For the main antenna the exact model(s) are part of the compliance testing and are required to be used to avoid EMC non-conformance. In some cases if customers use a different antenna and it is the same radiation type (monopole, sector, etc.) and is of equal or lower gain, non-conformance is avoided. The exact requirements are specific to each market. Customers are encouraged to contact Ingenu application engineering or their local regulatory agency for details. All main antennas are required to have a return loss in-band of ≥ 15 dB (≤ 1.4:1 VSWR), per Table 12, for VSWR.

The GPS antenna can be any of the commonly available amplified types on the market. The optimum gain range is approximately 20 dBic to 50 dBic.

Table 13. Antennas for FCC Configuration

	Manufacturer	Part Number	Gain	Comment
Main Antenna	L-com	HG-2409U-PRO HGV-2409U	9 dBi 8 dBi	N-type connector N-type connector
GPS Antenna	PCTEL	GPSL1-TMG-SPI-40NCB	40 dBic	N-type connector, active gain, lightning protection

NOTE: Depending on the application, Ingenu recommends two options for the main antenna in the FCC market. The HG-2409U-PRO has 1 dB more gain and slightly more rugged construction. The HGV-2409U has better return loss and can be mounted upside down.

Table 14. Antennas for ETSI Configuration

	Manufacturer	Part Number	Gain	Comment
Main Antenna	L-com	HGV-2402U	0 dBi	N-type connector
GPS Antenna	PCTEL	GPSL1-TMG-SPI-40NCB	40 dBic	N-type connector, active gain, lightning protection

Table 15. Antennas for ETSI RFID Configuration

	Manufacturer	Part Number	Gain	Comment
Main Antenna	L-com	HG-2417P-090	17 dBi	14 dBi model is also approved

	Manufacturer	Part Number	Gain	Comment
GPS Antenna	PCTEL	GPSL1-TMG-SPI-40NCB	40 dBic	N-type connector, active gain, lightning protection

Table 16. Antennas for Japan Configuration

	Manufacturer	Part Number	Gain	Comment
Main Antenna	L-Com	HGV-2404U	4 dBi	Limited to 8 dBm conducted TX
GPS Antenna	PCTEL	GPSL1-TMG-SPI-40NCB	40 dBic	N-type connector, active gain, lightning protection

7.2 RF Cable Requirements

It is generally recommended to use very low loss cable such as LMR400. The acceptable loss ranges are listed in Table 2. Summary of AP Product Specifications. The length that can be achieved within these ranges depends on the cable chosen.

7.3 Ethernet Speed and Cable Requirements

Unshielded CAT5 (or CAT5E or CAT6) with a length up to 100 meters is permissible. For ETSI markets the host Ethernet adaptor must be configured for 10 MB full duplex communication, not 100 MB or auto. Using 100 MB speeds will result in non-compliance to ETSI EMC regulations, per 489-2: clause 8.7.

7.4 LEDs

The AP has two green LEDs that are visible on its front panel.

- ***Status***
  This LED indicates RPMA network receive/transmit activity. The AP must be online and active.
- ***Link***
  This LED reflects the status of Ethernet activity for the AP.

Appendix A Access Point Mechanical Drawing

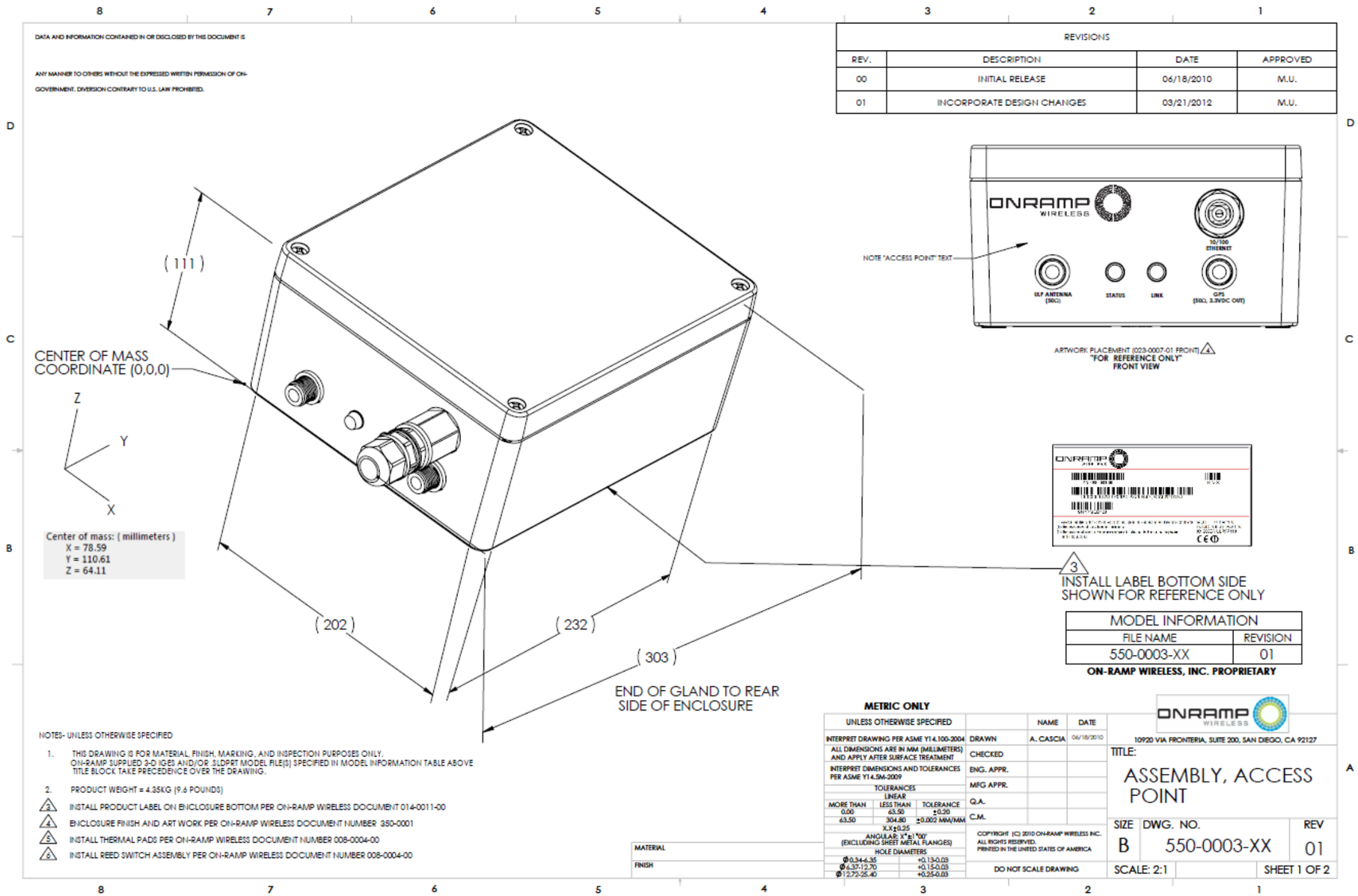

Figure 7. Access Point Mechanical Drawing

Appendix B Abbreviations and Terms

Abbreviation/Term	Definition
ACPR	Adjacent Channel Power Ratio
AP	Access Point. The RPMA network component geographically deployed over a territory.
CPU	Central Processing Unit
DSSS	Direct-Sequence Spread Spectrum
EIRP	Effective Isotropic Radiated Power. This is conducted RF power (in dBm) plus antenna gain (in dBi).
EMC	Electromagnetic Compatibility
ERM	Electromagnetic compatibility and Radio spectrum Matters
ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
GMSK	Gaussian Minimum Shift Keying
GPS	Global Positioning System
GSM	Global System for Mobile Communications
IC	Industry Canada
microNode	A second generation, small form factor, wireless network module developed by On-Ramp Wireless that works in combination with various devices and sensors and communicates data to an Access Point.
ODBPSK	Orthogonal Differential BPSK
PA	Power Amplifier
PLL	Phase Locked Loop
PoE	Power over Ethernet
RF	Radio Frequency
RFID	Radio Frequency Identification
RPMA	Random Phase Multiple Access. The On-Ramp Wireless proprietary wireless communication technology.
RX	Receive/Receiver
SPDT switch	Single Pole Double Throw switch
TX	Transmit/Transmitter
UART	Universal Asynchronous Receiver/Transmitter
VCTCXO	Voltage Controlled Temperature Compensated Crystal Oscillator
VSWR	Voltage Standing Wave Ratio