Product Service

Choose certainty.
Add value.

Report On

RF Exposure Assessment of the
IP Access Ltd
435R S60 Access Point

FCC ID: QGGIPA435R

Document 75939956 Report 03 Issue 1 September 2017

Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

REPORT ON

RF Exposure Assessment of the
IP Access Ltd
435R S60 Access Point

Document 75939956 Report 03 Issue 1

September 2017

PREPARED FOR

IP Access Ltd
Building 2020
Cambourne Business Park
Cambourne
CB23 6DW
United Kingdom

PREPARED BY

David Guyett-Smith
Safety Engineer - Technical Solutions

APPROVED BY

Matthew Russell
Authorised Signatory

DATED

06 September 2017

Product Service

CONTENTS

SECTION 1

REPORT SUMMARY

RF Exposure Assessment of the
IP Access Ltd
435R S60 Access Point

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the RF Exposure Assessment of the IP Access Ltd 435R S60 Access Point to the requirements of the applied test specifications.

Objective	To perform RF Exposure Assessment to determine the Equipment Under Test's (EUT's) compliance of the applied rules.
Applicant	IP Access Ltd
Manufacturer	IP Access Ltd
Manufacturing Description	S60 Access Point
Model Number(s)	435R
Test Specification/Issue/Date	CFR 47 Pt1.1310 (2016)

1.2 REGIONAL REQUIREMENTS

The table below shows the regional requirements that are referenced in this test report. A full list of the requirements is shown in Annex A.

Report Reference	Regional Requirement
FCC	CFR 47 Pt1.1310 (2016)

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment under test was a IP Access Ltd 435R S60 Access Point. A full technical description can be found in the manufacturer's documentation.

All reported calculations were carried out on the relevant information supplied for the 435R S60 Access Point to demonstrate compliance with the applied test specification(s). The sample assessed was found to comply with the requirements of the applied rules.

1.3.2 Supported Features

The following radio access technologies and frequency bands are supported by the equipment under test.

Radio Access Technology	LTE FDD 2
Frequency Band	1930 -1990 MHz

1.3.3 Antennas

The following antennas are supported by the equipment under test.

No.	Model	Gain (dBi)
1	Antenna #1	2.5
2	Antenna #2	2.5

1.4 BRIEF SUMMARY OF RESULTS

The wireless device described within this report has been shown to be capable of compliance with the basic restrictions related to human exposure to electromagnetic fields for both General Public and Occupational. The calculations shown in this report were made in accordance with the procedures specified in the applied test specification(s).

Configuration	Required Compliance Boundary (m)	
	Occupational	General Population
LTE FDD 2 (Antenna #1)	0.02	0.03
LTE FDD 2 (Antenna #2)	0.02	0.03
LTE FDD 2 (Antenna #1) and LTE FDD 2 (Antenna #2)	0.02	0.04

Table 1 – Compliance Boundary Results

1.4.1 Configuration 1 - LTE FDD 2 (Antenna #1)

Regional Requirement	Calculated RF exposure level at compliance boundary of 0.02 m					
	S Field (W/m^2)		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
FCC*	1.7690	5.0000	N/A	N/A	N/A	N/A

* Requirement and Result in mW/cm^2

Table 2 – Occupational Results

The calculations show that the EUT complies with the occupational exposure levels described in the and CFR 47 Pt1.1310 (2016) at the point of investigation, 0.02 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 0.03 m					
	S Field (W/m^2)		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
FCC*	0.7862	1.0000	N/A	N/A	N/A	N/A

* Requirement and Result in mW/cm^2

Table 3 – General Population Results

The calculations show that the EUT complies with the occupational exposure levels described in the and CFR 47 Pt1.1310 (2016) at the point of investigation, 0.03 m.

1.4.2 Configuration 2 - LTE FDD 2 (Antenna #2)

Regional Requirement	Calculated RF exposure level at compliance boundary of 0.02 m					
	S Field (W/m^2)		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
FCC*	1.7690	5.0000	N/A	N/A	N/A	N/A

* Requirement and Result in mW/cm^2

Table 4 – Occupational Results

The calculations show that the EUT complies with the occupational exposure levels described in the and CFR 47 Pt1.1310 (2016) at the point of investigation, 0.02 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 0.03 m					
	S Field (W/m^2)		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
FCC*	0.7862	1.0000	N/A	N/A	N/A	N/A

* Requirement and Result in mW/cm^2

Table 5 – General Population Results

The calculations show that the EUT complies with the occupational exposure levels described in the and CFR 47 Pt1.1310 (2016) at the point of investigation, 0.03 m.

1.4.3 Configuration 3 - LTE FDD 2 (Antenna #1) and LTE FDD 2 (Antenna #2)

Regional Requirement	Calculated RF exposure level at compliance boundary of 0.02 m					
	S Field (W/m^2)		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
FCC*	3.5380	5.0000	N/A	N/A	N/A	N/A

* Requirement and Result in mW/cm^2

Table 6 – Occupational Results

The calculations show that the EUT complies with the occupational exposure levels described in the and CFR 47 Pt1.1310 (2016) at the point of investigation, 0.02 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 0.04 m					
	S Field (W/m^2)		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
FCC*	0.8845	1.0000	N/A	N/A	N/A	N/A

* Requirement and Result in mW/cm^2

Table 7 – General Population Results

The calculations show that the EUT complies with the occupational exposure levels described in the and CFR 47 Pt1.1310 (2016) at the point of investigation, 0.04 m.

SECTION 2

TEST DETAILS

2.1 RATIONALE FOR ASSESSMENT OF THE RF EXPOSURE

The aim of the assessment report is to evaluate the compliance boundary for a set of given input power(s) according to the basic restrictions (directly or indirectly via compliance with reference levels) related to human exposure to radio frequency electromagnetic fields.
The chosen assessment method to establish the compliance boundary in the far-field region is the reference method as defined in the relevant specifications.

The RF exposure assessment is based upon the following criteria:

The 435R S60 Access Point operates with the following transmitters active on the antenna ports shown in Section 1.3.3. For each transmitter, the Radio Access Technology (RAT), EIRP inclusive of antenna gain and duty cycle, gain of the antenna and lowest frequency of operation are shown as they contribute to the calculation of S Field, E field and H field values according to the following formulas.

The power flux (S Field):

$$S = \frac{PG_{(\theta,\phi)}}{4\pi r^2}$$

The electric field strength (E Field):

$$E = \frac{\sqrt{30PG_{(\theta,\phi)}}}{r}$$

The magnetic field strength (H Field):

$$H = \frac{E}{\eta_o}$$

Where:

P = Average Power (W)
G = Antenna Gain (dBi)
r = Distance (cm) or (m)
η_o = 377

2.2 TEST RESULT DETAILS

The frequencies shown in the tables below have been chosen based on the lowest possible frequency that the EUT can transmit.

2.2.1 Configuration 1 - LTE FDD 2 (Antenna #1)

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 0.02 m		
								S Field (W/m^2)	E Field (V/m)	H Field (A/m)
1	1	1	LTE FDD 2	0.089	100	2.5	1930.7	17.6901	81.6640	0.2166

Table 8 – Occupational Transmitter Summary

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 0.03 m		
								S Field (W/m^2)	E Field (V/m)	H Field (A/m)
1	1	1	LTE FDD 2	0.089	100	2.5	1930.7	7.8623	54.4427	0.1444

Table 9 – General Population Transmitter Summary

2.2.2 Configuration 2 - LTE FDD 2 (Antenna #2)

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 0.02 m		
								S Field (W/m^2)	E Field (V/m)	H Field (A/m)
1	1	2	LTE FDD 2	0.089	100	2.5	1930.7	17.6901	81.6640	0.2166

Table 10 – Occupational Transmitter Summary

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 0.03 m		
								S Field (W/m^2)	E Field (V/m)	H Field (A/m)
1	1	2	LTE FDD 2	0.089	100	2.5	1930.7	7.8623	54.4427	0.1444

Table 11 – General Population Transmitter Summary

2.2.3 Configuration 3 - LTE FDD 2 (Antenna #1) and LTE FDD 2 (Antenna #2)

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 0.02 m		
								S Field (W/m^2)	E Field (V/m)	H Field (A/m)
1	1	1	LTE FDD 2	0.089	100	2.5	1930.7	17.6901	81.6640	0.2166
2	1	2	LTE FDD 2	0.089	100	2.5	1930.7	17.6901	81.6640	0.2166

Table 12 – Occupational Transmitter Summary

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 0.04 m		
								S Field (W/m^2)	E Field (V/m)	H Field (A/m)
1	1	1	LTE FDD 2	0.089	100	2.5	1930.7	4.4225	40.8320	0.1083
2	1	2	LTE FDD 2	0.089	100	2.5	1930.7	4.4225	40.8320	0.1083

Table 13 – General Population Transmitter Summary

2.2.4 Configuration 3 - LTE FDD 2 (Antenna #1) and LTE FDD 2 (Antenna #2)

The following tables show a summary of each antenna port and the summation of the RF exposure results and limit for each region.

Antenna Port	EIRP (W)	Regional Requirement	Calculated RF exposure level at compliance boundary of 0.02 m					
			S Field (W/m^2)		E Field (V/m)		H Field (A/m)	
			Result	Limit	Result	Limit	Result	Limit
1	0.089	FCC*	1.7690	5.0000	N/A	N/A	N/A	N/A
2	0.089	FCC*	1.7690	5.0000	N/A	N/A	N/A	N/A

* Requirement and Result in mW/cm^2

Table 14 – Occupational Antenna Port Summary

Antenna Port	EIRP (W)	Regional Requirement	Calculated RF exposure level at compliance boundary of 0.04 m					
			S Field (W/m^2)		E Field (V/m)		H Field (A/m)	
			Result	Limit	Result	Limit	Result	Limit
1	0.089	FCC*	0.4423	1.0000	N/A	N/A	N/A	N/A
2	0.089	FCC*	0.4423	1.0000	N/A	N/A	N/A	N/A

* Requirement and Result in mW/cm^2

Table 15 – General Population Antenna Port Summary

SECTION 3

DISCLAIMERS AND COPYRIGHT

3.1 DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

ANNEX A

REGIONAL REQUIREMENTS

Frequency Range (MHz)	S Field (mW/cm^2)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0 - 0.3	-	-	-
0.3 - 3	100	614	1.63
3 - 30	900/f^2	1842/f	4.89/f
30 - 300	1	61.4	0.163
300 - 1500	f/300	-	-
1500 - 100000	5	-	-

Table A.1 – CFR 47 Pt1.1310 (2016) Occupational Limits

Frequency Range (MHz)	S Field (mW/cm^2)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0 - 0.3	-	-	-
0.3 - 3	100	614	1.63
3 - 30	180/f^2	824/f	2.19/f
30 - 300	0.2	27.5	0.073
300 - 1500	f/1500	-	-
1500 - 100000	1	-	-

Table A.2 – CFR 47 Pt1.1310 (2016) General Population Limits