RF EXPOSURE REPORT

REPORT NO.:	SA140828E03A
MODEL NO.:	D5001, D3001, D3003
FCC ID:	NQ8D5001
RECEIVED:	Aug. 28, 2014
TESTED:	Sep. 23 to Oct 08, 2014
ISSUED:	Jan. 14, 2015
APPLICANT:	Pace Micro Technology plc
ADDRESS:	Saltaire, Shipley,West Yorkshire,BD18 3LF, UK
ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by any government agencies.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA140828E03A	Original release	Jan. 14, 2015

1. CERTIFICATION

PRODUCT:	DOCSIS 3.0 Wireless Gateway Router with MOCA 2.0
BRAND NAME:	Pace
MODEL NO.:	D5001, D3001, D3003
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Pace Micro Technology plc
TESTED DATE:	Sep. 23 to Oct 08, 2014
STANDARDS:	FCC Part 2 (Section 2.1091)
	KDB 447498 D03
	IEEE C95.1

The above equipment (Model: D5001) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ , **DATE:** Jan. 14, 2015
(Elsie Hsu, Specialist)

APPROVED BY : _____ , **DATE:** Jan. 14, 2015
(May Chen, Manager)

2. RF EXPOSURE LIMIT

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

FREQUENCY RANGE (MHz)	ELECTRIC FIELD STRENGTH (V/m)	MAGNETIC FIELD STRENGTH (A/m)	POWER DENSITY (mW/cm^2)	AVERAGE TIME (minutes)
LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE				
300-1500	…	…	F/1500	30
1500-100,000	…	…	1.0	30

F = Frequency in MHz

3. MPE CALCULATION FORMULA

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

pi = 3.1416

r = distance between observation point and center of the radiator in cm

4. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 35cm away from the body of the user. So, this device is classified as **Mobile Device**.

5. ANTENNA GAIN

There are six antennas provided to this EUT, please refer to the following table:

Antenna No.	Transmitter Circuit	Brand	Model	Gain (dBi) (Include cable loss)	Frequency range (GHz to GHz)	Antenna Type	Connecter Type	Cable Length (mm)
LB1	2	Galtronics	02102073-05762B1	2.84	2.4~2.4835	Dipole	i-pex(MHF)	310
LB2	0	Galtronics	02102073-05762C1	3.8	2.4~2.4835	PCB	i-pex(MHF)	161
LB3	1	Galtronics	02102073-05762A1	4.87	2.4~2.4835	PCB	i-pex(MHF)	66
HB1	0	Galtronics	02102142-05762B2	5.50 5.27	5.15~5.35 5.47~5.85	Dipole	i-pex(MHF)	130
HB2	2	Galtronics	02102142-05762B1	4.75 5.68	5.15~5.35 5.47~5.85	Dipole	i-pex(MHF)	80
HB3	1	Galtronics	02102142-05762B3	4.03 5.74	5.15~5.35 5.47~5.85	Dipole	i-pex(MHF)	170

6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

For 15.247 and 15.407(U-NII-1 & U-NII-3) data was copied from the original test report (Report No.: SA140828E03).

For WLAN: 15.247(2.4GHz)

For Mode 1 (3TX / CDD Mode)

802.11b

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2412 - 2462	808.083	8.65	35	0.38469	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.65dBi

802.11g

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2412 - 2462	986.932	8.65	35	0.46983	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.65dBi

802.11n (HT20)

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2412 - 2462	995.844	8.65	35	0.47407	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.65dBi

802.11n (HT40)

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2422 - 2452	254.792	8.65	35	0.12129	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.65dBi

For Mode 2 (3TX / Beamforming Mode)

802.11n (HT20)

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2412 - 2462	531.12	8.65	35	0.25284	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.65dBi

802.11n (HT40)

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2422 - 2452	254.792	8.65	35	0.12129	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.65dBi

For WLAN: 15.407(5GHz - U-NII-1 & U-NII-3)

For Mode 1 (3TX / CDD Mode)

802.11a

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5180 – 5240 & 5745 - 5825	678.435	10.34	35	0.47661	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.55dBi

2. 5725~5850MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.34dBi

802.11ac (VHT20)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5180 – 5240 & 5745 - 5825	704.784	10.34	35	0.49512	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.55dBi

2. 5725~5850MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.34dBi

802.11ac (VHT40)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5190 – 5230 & 5755 - 5795	630.307	10.34	35	0.44280	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.55dBi

2. 5725~5850MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.34dBi

802.11ac (VHT80)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5210 & 5775	171.995	10.34	35	0.12083	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.55dBi

2. 5725~5850MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.34dBi

For Mode 2 (3TX / Beamforming Mode)

802.11ac (VHT20)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5180 – 5240 & 5745 - 5825	398.179	9.55	35	0.23320	1.00

NOTE: 1. 5150~5250MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 9.55$dBi

2. 5725~5850MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 10.34$dBi

802.11ac (VHT40)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5190 – 5230 & 5755 - 5795	359.682	10.34	35	0.25268	1.00

NOTE: 1. 5150~5250MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 9.55$dBi

2. 5725~5850MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 10.34$dBi

802.11ac (VHT80)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5210 & 5775	171.995	10.34	35	0.12083	1.00

NOTE: 1. 5150~5250MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 9.55$dBi

2. 5725~5850MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 10.34$dBi

For WLAN: 15.407(5GHz - U-NII-2A & U-NII-2C)

For Mode 1 (3TX / CDD Mode)

802.11a

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5260-5320	110.658	9.55	35	0.06481	1.00
5500-5720	91.804	10.34	35	0.06449	1.00

NOTE: 1. 5250~5350MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.55dBi

2. 5470~5725MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.34dBi

802.11ac (VHT20)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5260-5320	109.354	9.55	35	0.06405	1.00
5500-5720	91.364	10.34	35	0.06418	1.00

NOTE: 1. 5250~5350MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.55dBi

2. 5470~5725MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.34dBi

802.11ac (VHT40)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5250-5350	204.965	9.55	35	0.12004	1.00
5470-5720	183.702	10.34	35	0.12905	1.00

NOTE: 1. 5250~5350MHz: Directional gain = 5.5dBi + 10log(3) = 9.55dBi

2. 5470~5725MHz: Directional gain = 5.74dBi + 10log(3) = 10.34dBi

802.11ac (VHT80)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5250-5350	146.162	9.55	35	0.08560	1.00
5470-5720	238.089	10.34	35	0.16726	1.00

NOTE: 1. 5250~5350MHz: Directional gain = 5.5dBi + 10log(3) = 9.55dBi

2. 5470~5725MHz: Directional gain = 5.74dBi + 10log(3) = 10.34dBi

For Mode 2 (3TX / Beamforming Mode)

802.11ac (VHT20)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5260-5320	109.354	9.55	35	0.06405	1.00
5500-5720	91.364	10.34	35	0.06418	1.00

NOTE: 1. 5250~5350MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.55dBi

2. 5470~5725MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.34dBi

802.11ac (VHT40)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5250-5350	108.338	9.55	35	0.06345	1.00
5470-5720	92.07	10.34	35	0.06468	1.00

NOTE: 1. 5250~5350MHz: Directional gain = 5.5dBi + 10log(3) = 9.55dBi

2. 5470~5725MHz: Directional gain = 5.74dBi + 10log(3) = 10.34dBi

802.11ac (VHT80)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5250-5350	108.665	9.55	35	0.06364	1.00
5470-5720	90.685	10.34	35	0.06371	1.00

NOTE: 1. 5250~5350MHz: Directional gain = 5.5dBi + 10log(3) = 9.55dBi

2. 5470~5725MHz: Directional gain = 5.74dBi + 10log(3) = 10.34dBi

CONCLUSION:

Both of the 2.4GHz and 5GHz can transmit simultaneously, the formula of calculated the MPE is:

$CPD_1 / LPD_1 + CPD_2 / LPD_2$ + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is 0.47407 / 1 + 0.49512 / 1 = 0.969, which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.

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