

## PointRed Base Station Transmitter

### Class 2 Permissive Change Request

FCC ID: QDU-MCRD-BASE-2R5  
 Original Grant: 25 June 2002

Two changes have been made to the original equipment:

- a) A new case has been designed for the outdoor radio transceiver unit.
- b) The low pass filter at the antenna port has been improved.

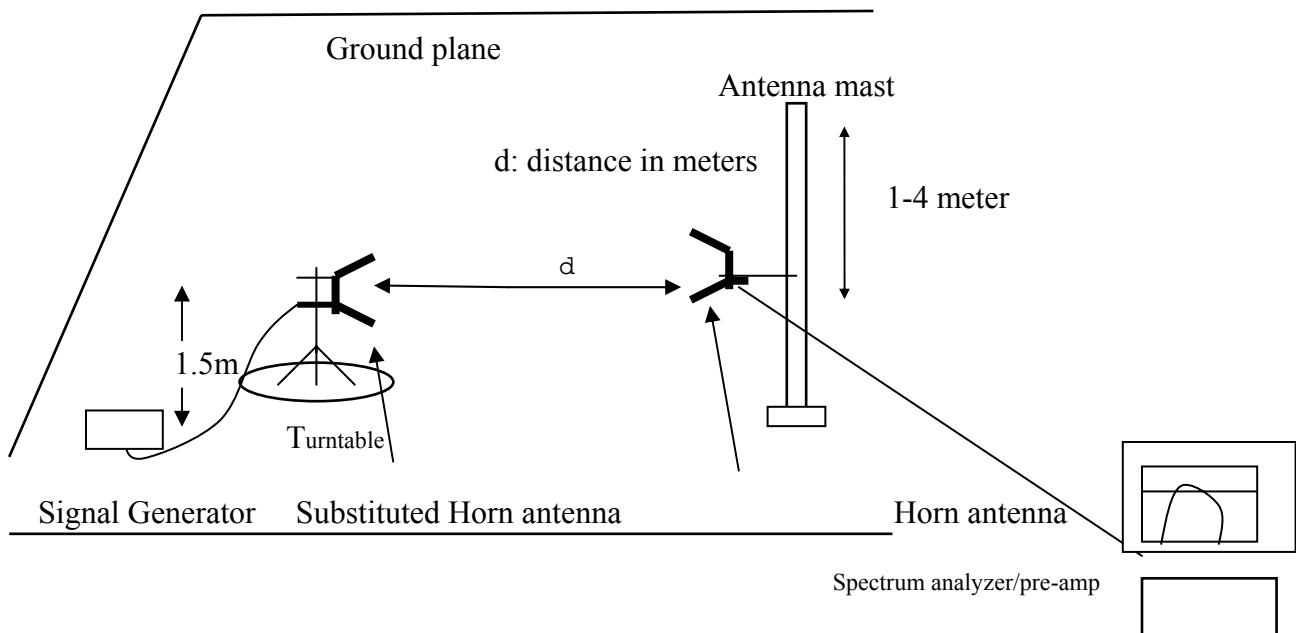
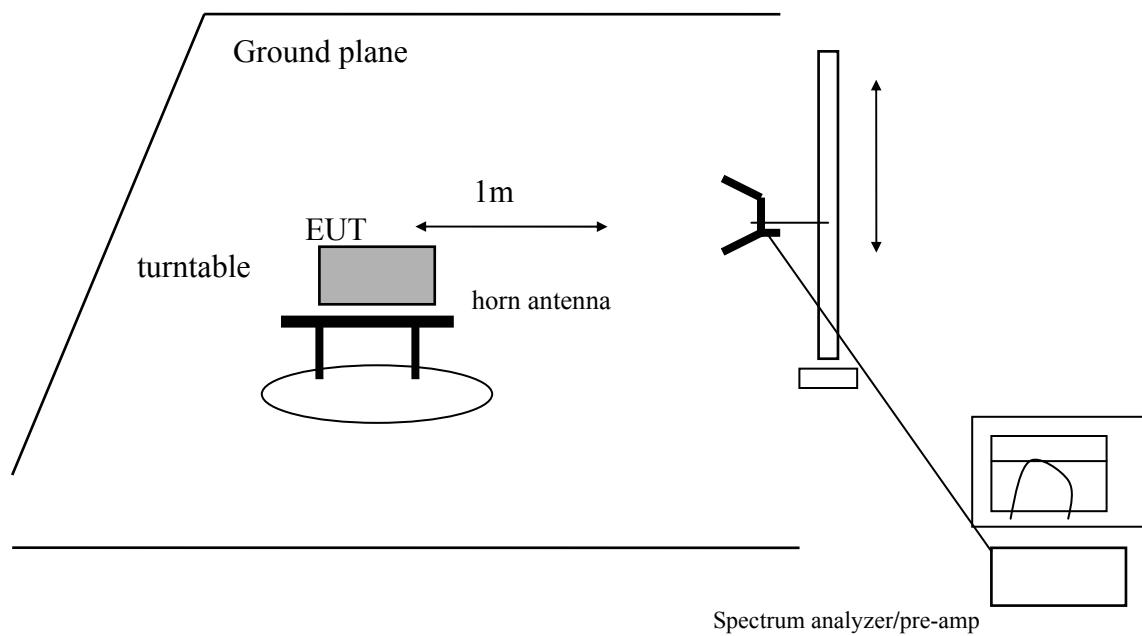
The low pass filter modification was effected by changing the etch shape on the foil side of the pcb. A drawing of the change is presented as a separate attachment. There were no changes to the schematic.

The nature of the change requires that only radiated emissions testing be performed to determine continuing compliance.

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
EMI Test Receiver	R & S	ESHS 20	827129/006	4/17/2003
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/2003
LISN, 10 kHz ~ 30 MHz	Solar	D12-50-R-24-BN	837990	9/6/2003
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	4/26/2003
Quasi-Peak Adaptor	HP	85650A	2811A01155	5/16/2003
SA Display Section 2	HP	85662A	2816A16696	5/16/2003
SA RF Section, 1.5 GHz	HP	85680B	2732A03661	5/16/2003
Preamplifier, 1300 MHz	HP	8447D	2944A06589	8/22/2003
Antenna, Bilog	Chase	CBL6112B	2586	3/28/2003
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	1/31/2003
PSA Series Spectrum Analyzer	Agilent	E4440A	89443	9/24/2003
Horn Antenna	ARA	3115	6717	1/31/2004
High Pass Filter	FSY Microwave	FM-4570-9SS	3	NCR

**Section 2.1053 Field Strength of Spurious and Harmonic Radiation**  
**Requirement/Limit: 21.909(e)**

**Test Set-Up**



## Minimum Requirement

The magnitude of each spurious and harmonic emission detected as being radiated from the EUT must be at a level more than 60 dB below channel output power.

Output power: 25.1 dBm

Limit:  $(25.11 - 60) \text{ dBm} = -34.9 \text{ dBm ERP}$

## Test Method

The antenna output port of the EUT was terminated with a 50 ohm load. With the transmitter operating at full power, the EUT was rotated 360° and the search antenna was raised and lowered in both polarities, all in an attempt to maximize the levels of the received emission for each harmonic and spurious emission up to 10 fo.

## Test Results

**Pass.** No emissions were detected above test system noise floor. Field strengths were measured and were compared against EIRP using the relationship

$E, \text{ dBuV/m} @ 3\text{m} = 95.24 \text{ dB} + \text{EIRP}$

$\text{ERP} = \text{EIRP} - 2.15 \text{ dB}$

Calculations indicated noise floor is at least 10 dB below the limit.

Refer to data presented in the attached spread sheets.

FCC Measurement											
<b>Compliance Certification Services</b> , Morgan Hill Open Field Site										Site A	
<b>N. Raj</b>											
PointRed Networks				02/03/03							
Radio module											
FCC ID: QDU-MCRD-BASE-2R5											
	Cable length										
	12.0	feet									
	Distance to Antenna										
	3.3	feet									
Average Measurements:				Peak Measurements:							
	1 MHz Resolution Bandwidth				1MHz Resolution Bandwidth						
	10Hz Video Bandwidth				1MHz Video Bandwidth						
	<b>Low Channel</b>										
	2.503 GHz						3m E				
<b>f</b>	Peak R.	AF	CL	Amp	D Corr	HPF	Peak	ERPpk	Pk Lim	Peak Mar	Notes
GHz	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBm	dBuV/m	dB	
<b>5.006</b>	<b>47.6</b>	32.9	4.7	-36.1	-9.5	0.0	39.7	-57.7	-34.9	-22.8	VER, WITH PREAMP
<b>7.509</b>	<b>42.9</b>	37.1	5.9	-36.5	-9.5	0.0	40.0	-57.4	-34.9	-22.5	VER, WITH PREAMP
<b>10.012</b>	<b>42.5</b>	37.9	7.0	-35.7	-9.5	0.0	42.1	-55.3	-34.9	-20.4	VER, WITH PREAMP
<b>12.515</b>	<b>43.0</b>	39.3	7.8	-36.8	-9.5	0.0	43.8	-53.6	-34.9	-18.7	VER, WITH PREAMP
<b>15.018</b>	<b>45.0</b>	37.9	8.9	-36.5	-9.5	0.0	45.8	-51.6	-34.9	-16.7	VER, WITH PREAMP
<b>17.521</b>	<b>44.0</b>	39.1	10.1	-37.0	-9.5	0.0	46.7	-50.7	-34.9	-15.8	VER, WITH PREAMP
<b>5.006</b>	<b>46.0</b>	43.9	4.7	-38.0	-9.5	0.0	47.1	-50.3	-34.9	-15.4	H,WITH PREAMP
<b>7.509</b>	<b>42.1</b>	46.6	5.9	-39.0	-9.5	0.0	46.1	-51.3	-34.9	-16.4	H,WITH PREAMP
<b>10.012</b>	<b>42.0</b>	46.6	7.0	-39.0	-9.5	0.0	47.1	-50.3	-34.9	-15.4	H,WITH PREAMP
<b>12.515</b>	<b>43.1</b>	46.6	7.8	-39.0	-9.5	0.0	49.0	-48.4	-34.9	-13.5	H,WITH PREAMP
<b>15.018</b>	<b>45.3</b>	46.6	8.9	-39.0	-9.5	0.0	52.3	-45.1	-34.9	-10.2	H,WITH PREAMP
<b>17.521</b>	<b>43.9</b>	46.6	10.1	-39.0	-9.5	0.0	52.1	-45.3	-34.9	-10.4	H,WITH PREAMP
to 26 GHz	NED										
TX Pout = 25.1 dBm											
21.909(e) limit: 25.1 - 60 = -34.9 ERP											
E, dBuV/m at 3m = 95.24 dB + PdBm + GdBi = 95.24 + EIRP											
ERP (dipole) = EIRP (isotropic) - 2.15 dB											
ERP, dBm = E, dBuV/m at 3m - 95.24 - 2.15											
<b>f</b>	Measurement Frequency					HPF					
Peak R.	Analyzer Peak Reading					Peak					
Avg. R.	Analyzer Avg. Reading					Avg					
AF	Antenna Factor					Pk Lim					
CL	Cable Loss					Avg Lim					
Amp	Pre amp gain					Pk Mar					
D Corr	3m extrapolation					Avg Mar					
NED	No emission detected										

FCC Measurement																					
<b>Compliance Certification Services</b> , Morgan Hill Open Field Site						Site A															
<b>N. Raj</b>																					
PointRed Networks			02/03																		
Radio module			/03																		
FCC ID: QDU-MCRD-BASE-2R5																					
Cable length																					
	12.0	feet																			
Distance to Antenna																					
	3.3	feet																			
Average Measurements:	Peak Measurements:																				
1 MHz Resolution Bandwidth	1MHz Resolution Bandwidth																				
10Hz Video Bandwidth	1MHz Video Bandwidth																				
<b>Mid Channel:</b>																					
2.575 GHz						3m E															
<b>f</b>	Peak R.	AF	CL	Amp	D Corr	HPF	Peak	ERPpk	Pk Lim	Peak Mar	Notes										
GHz	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBm	dBuV/m	dB											
5.150	47.6	33.3	4.8	-36.1	-9.5	0.0	40.1	-57.3	-34.9	-22.4	VER, WITH PREAMP										
7.725	41.3	37.0	6.0	-36.5	-9.5	0.0	38.3	-59.1	-34.9	-24.2	VER, WITH PREAMP										
10.300	41.7	38.1	7.1	-35.7	-9.5	0.0	41.6	-55.8	-34.9	-20.9	VER, WITH PREAMP										
12.875	44.2	39.8	7.9	-36.8	-9.5	0.0	45.7	-51.7	-34.9	-16.8	VER, WITH PREAMP										
15.450	45.9	37.9	9.1	-36.5	-9.5	0.0	46.9	-50.4	-34.9	-15.5	VER, WITH PREAMP										
18.025	43.1	39.1	10.3	-37.0	-9.5	0.0	46.0	-51.4	-34.9	-16.5	VER, WITH PREAMP										
5.150	46.2	43.9	4.8	-38.0	-9.5	0.0	47.4	-50.0	-34.9	-15.1	H,WITH PREAMP										
7.725	41.6	46.6	6.0	-39.0	-9.5	0.0	45.7	-51.7	-34.9	-16.8	H,WITH PREAMP										
10.300	41.5	46.6	7.1	-39.0	-9.5	0.0	46.7	-50.7	-34.9	-15.8	H,WITH PREAMP										
12.875	43.0	46.6	7.9	-39.0	-9.5	0.0	49.0	-48.4	-34.9	-13.5	H,WITH PREAMP										
15.450	45.0	46.6	9.1	-39.0	-9.5	0.0	52.2	-45.2	-34.9	-10.3	H,WITH PREAMP										
18.025	43.0	46.6	10.3	-39.0	-9.5	0.0	51.4	-46.0	-34.9	-11.1	H,WITH PREAMP										
to 26 GHz	NED																				
TX Pout = 25.1 dBm																					
21.909(e) limit: 25.1 - 60 = -34.9 ERP																					
E, dBuV/m at 3m = 95.24 dB + PdBm + GdBi = 95.24 + EIRP																					
ERP (dipole) = EIRP (isotropic) - 2.15 dB																					
ERP, dBm = E, dBuV/m at 3m -95.24 -2.15																					
<b>f</b>	Measurement Frequency					HPF															
Peak R.	Analyzer Peak Reading					Peak															
Avg. R.	Analyzer Avg. Reading					Avg															
AF	Antenna Factor					Pk Lim															
CL	Cable Loss					Avg Lim															
Amp	Pre amp gain					Pk Mar															
D Corr	Dis corrections to 3 meter					Avg Mar															
NED	No emission detected																				

FCC Measurement												
<b>Compliance Certification Services</b> , Morgan Hill Open Field Site												Site A
<b>N. Raj</b>												
PointRed Networks				02/03/03								
Radio module												
FCC ID: QDU-MCRD-BASE-2R5												
Cable length												
	12.0	feet										
Distance to Antenna												
	3.3	feet										
Average Measurements:				Peak Measurements:								
	1 MHz Resolution Bandwidth					1MHz Resolution Bandwidth						
	10Hz Video Bandwidth					1MHz Video Bandwidth						
High Channel:												
	2.683 GHz					3m E						
<b>f</b>	Peak R.	AF	CL	Amp	D Corr	HPF	Peak	ERPpk	Pk Lim	Peak Mar	Notes	
GHz	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBm	dBuV/m	dB		
<b>5.366</b>	<b>42.4</b>	33.9	4.9	-36.1	-9.5	0.0	35.6	-61.7	-34.9	-26.8	VER, WITH PREAMP	
<b>8.049</b>	<b>41.6</b>	36.9	6.1	-36.5	-9.5	0.0	38.6	-58.8	-34.9	-23.9	VER, WITH PREAMP	
<b>10.732</b>	<b>40.0</b>	38.2	7.2	-35.7	-9.5	0.0	40.1	-57.3	-34.9	-22.4	VER, WITH PREAMP	
<b>13.415</b>	<b>42.0</b>	41.2	8.2	-36.8	-9.5	0.0	45.0	-52.4	-34.9	-17.5	VER, WITH PREAMP	
<b>16.098</b>	<b>43.9</b>	37.9	9.4	-36.5	-9.5	0.0	45.2	-52.2	-34.9	-17.3	VER, WITH PREAMP	
<b>18.781</b>	<b>44.0</b>	39.1	10.6	-37.0	-9.5	0.0	47.2	-50.2	-34.9	-15.3	VER, WITH PREAMP	
<b>5.366</b>	<b>41.8</b>	43.9	4.9	-38.0	-9.5	0.0	43.1	-54.3	-34.9	-19.4	H,WITH PREAMP	
<b>8.049</b>	<b>39.9</b>	46.6	6.1	-39.0	-9.5	0.0	44.1	-53.3	-34.9	-18.4	H,WITH PREAMP	
<b>10.732</b>	<b>39.7</b>	46.6	7.2	-39.0	-9.5	0.0	45.0	-52.4	-34.9	-17.5	H,WITH PREAMP	
<b>13.415</b>	<b>41.6</b>	46.6	8.2	-39.0	-9.5	0.0	47.9	-49.5	-34.9	-14.6	H,WITH PREAMP	
<b>16.098</b>	<b>43.0</b>	46.6	9.4	-39.0	-9.5	0.0	50.5	-46.9	-34.9	-12.0	H,WITH PREAMP	
<b>18.781</b>	<b>43.8</b>	46.6	10.6	-39.0	-9.5	0.0	52.5	-44.9	-34.9	-10.0	H,WITH PREAMP	
to 26 GHz	NED											
TX Pout = 25.1 dBm												
21.909(e) limit: 25.1 - 60 = -34.9 ERP												
E, dBuV/m at 3m = 95.24 dB + PdBm + GdBi = 95.24 + EIRP												
ERP (dipole) = EIRP (isotropic) - 2.15 dB												
ERP, dBm = E, dBuV/m at 3m -95.24 - 2.15												
<b>f</b>	Measurement Frequency						HPF					
Peak R.	Analyzer Peak Reading						Peak					
Avg. R.	Analyzer Avg. Reading						Avg					
AF	Antenna Factor						PK Lim					
CL	Cable Loss						Avg Lim					
Amp	Pre amp gain						PK Mar					
D Corr	Dis corrections to 3 meter						Avg Mar					
NED	No emission detected											

**Test Site**

All testing was performed at PointRed Technologies (antenna conducted measurement) and at Compliance Certification Services (radiated emissions) either by me or under my supervision. Conducted and radiated emissions were performed using test equipment with calibration traceable to NIST, and following test procedures accepted by the industry.

THOMAS N. COKENIAS  
Consultant, EMC&Radio Type Approvals  
Agent for PointRed Technologies