

## Chris Harvey

---

**From:** Ferrer, Michael <Michael.Ferrer@ul.com>  
**Sent:** Thursday, March 27, 2014 3:35 PM  
**To:** Harvey, Christopher  
**Cc:** Harvey, Christopher; Hoque, Claire; danieljoonpark@hotmail.com  
**Subject:** RE: Packet Power, //WCGP5T3 //AN14T0142 8751A-P5T3 // AN14I5577 Notice #1  
**Attachments:** Theory of operation 2.pdf

Chris

This should be the last of your comments. #4 is attached. #5 is below.

5. The Operational Description indicates that the 2.4GHz is using transceiver Nordic Semiconductor nRF51822, but the chip is also referenced as nRF51 in several places, which causes confusion. Please confirm that this reference is to the same chip.

A: nRF51822 and nRF51 all refer to the same transceiver Nordic Semiconductor nRF51822.

Michael Ferrer, P.E.  
Project Lead  
Consumer Technology Division  
UL Verification Services - EMC  
-----

UL LLC.  
333 Pfingsten Rd.  
Northbrook, IL 60062  
T: (847)-664-1312  
W: ul.com

-----Original Message-----

From: Ferrer, Michael  
Sent: Thursday, March 20, 2014 3:11 PM  
To: Harvey, Christopher  
Cc: Harvey, Christopher; Hoque, Claire; 'danieljoonpark@hotmail.com'  
Subject: RE: Packet Power, //WCGP5T3 //AN14T0142 8751A-P5T3 // AN14I5577 Notice #1

Chris

Additional responses. I am still waiting on #4 and 5, but can you review the others and let me know if you have further comments. Thanks

Michael Ferrer, P.E.  
Project Lead  
Consumer Technology Division  
UL Verification Services - EMC  
-----

UL LLC.  
333 Pfingsten Rd.  
Northbrook, IL 60062  
T: (847)-664-1312  
W: ul.com

-----Original Message-----

From: Ferrer, Michael

Sent: Friday, March 14, 2014 3:04 PM

To: Harvey, Christopher

Cc: Harvey, Christopher; Hoque, Claire; danieljoonpark@hotmail.com

Subject: RE: Packet Power, //WCGP5T3 //AN14T0142 8751A-P5T3 // AN14I5577 Notice #1

Chris

Here are my responses for the test report. Still awaiting client responses on the other exhibits.

Michael Ferrer, P.E.

Project Lead

Consumer Technology Division

UL Verification Services

-----  
UL LLC.

333 Pfingsten Rd.

Northbrook, IL 60062

T: (847)-664-1312

W: ul.com

-----Original Message-----

From: Chris.Harvey@ul.com [mailto:Chris.Harvey@ul.com]

Sent: Thursday, March 13, 2014 8:10 AM

To: Ferrer, Michael

Cc: Harvey, Christopher; Hoque, Claire; danieljoonpark@hotmail.com

Subject: Packet Power, //WCGP5T3 //AN14T0142 8751A-P5T3 // AN14I5577 Notice #1

Dear Michael,

You are listed as the Technical Contact for the above referenced TCB application. The following item(s) need(s) to be resolved before the review can be continued:

1. I see that the Block Diagram indicates  $\frac{1}{4}$  wavelength antennas for the 900 MHz and 2.4GHz antennas, but I cannot find these antennas in the Schematic diagram or the Internal/external photos. The Internal Photos seem to show solder points on the PC Board labeled as ANT1 and ANT2, but nothing is connected. The Test Setups seem to show extra wires coming from the EUT. Please confirm that the antennas are provided and connected to the device when marketed. Please provide an updated photo exhibit showing the antennas. If the User Installs/Connects the antennas, please provide an indication how this complies with the FCC antenna requirements of 15.203.

A: attached antenna exhibit

2. The FCC Confidentiality Letter references the incorrect FCC ID (and IC) Number(s). Please provide separate FCC and IC Confidentiality letters with the correct identification numbers as the confidentiality requirements for FCC and IC are different and should reference the correct agency requirements (i.e. IC does not have Short Term Confidentiality).

A: attached confidentiality letters

3. Please update the Manual to include the wording required by FCC 15.21.

A: attached updated manual

4. You have indicated that the hopping sequence is pseudo-random. However, there are several other FCC FHSS requirements that are not yet declared as being compliant in the application referenced above. Please either provide individual declarations of compliance with the following items needed for FCC 15.247 compliance:

The hopping sequence is pseudorandom, based on the technical description, but please provide description/example of the sequence.

Is each channel used equally on average, based on the technical description?

Does the associated system receiver have a compliant input bandwidth, based on the measured 20 dB emission bandwidth?

Does the associated system receiver have the ability to hop in synchronization with the transmitter, based on the technical description?

Does the design of the frequency hopping system allow it to comply with all pertinent requirements when presented with a lengthy data stream?

Does the frequency hopping system comply with the non-coordination requirement?

5. The Operational Description indicates that the 2.4GHz is using transceiver Nordic Semiconductor nRF51822, but the chip is also referenced as nRF51 in several places, which causes confusion. Please confirm that this reference is to the same chip.

6. The Operational Description indicates an operating frequency of 860-928 MHz and 2400-2483 MHz, but this device has been tested for operation in narrower ranges. Please update this exhibit to indicate the actual frequencies of operation and how this US/Canada model frequency ranges are set and if they can be changed by the user/installer.

A: See attached exhibit system overview.

From client:

The attached revised document states the clarification: (page 3 paragraph 2) The device operates in and was tested in 902-928MHz and 2402-2480MHz in the US and Canada. The frequency range used by the device is set by the manufacturer prior to shipment to the user and cannot be changed by the user / installer.

7. The Frequency of operation in the 2.4GHz report is inconsistent throughout the report, being listed as 201-280 MHz, 202-280MHz, 201-264MHz, and possibly other ranges. Please confirm the actual frequency of operation (center of bottom channel to center of upper channel) and correct the report accordingly.

A: updated

8. The 900MHz report seems to contain some data for the 2.4GHz operations, and misses some of the 900MHz data.

A: updated

9. The 900 MHz and 2.4GHz reports page 24 shows DH Packet, but there is no explanation of packet structure. Also, the 2.4GHz Spurious emissions tables indicate the mode as 34 or 36 Packets, but again, it is not clear what this is. Please expand the Operational Description exhibit to include details of the modulation and the packet-ing.

A: removed DH as there are no other modulations.

10. The Output power test procedure should be revised to reflect the radiated method, and should show an example calculation of the conversion from Field strength to power.

A: updated wording

11. The plots for the number of hopping channels in the 2.4GHz report does not have resolution to determine or count the number of channels. The plot should be split and the RBW reduced to resolve the actual channels.

A: updated with new plot

12. The hopping frequency separation data results should be analyzed and stated. It appears that the channel separation may be either very close to the limit or possibly just out of compliance. The 2.4GHz data shows a 20dB BW of 1.477 MHz, and a channel separation of 1.018 MHz. The 900MHz data seems compliant with much margin.

A: updated with new plot

13. The IC Test Report Cover Sheet should list the RF power of this FHSS device as the limits for FHSS are stated in Watts, not in field-strength.

A: updated power and 99%BW

14. RF Exposure exhibit needs to be submitted for 15.247, but is likely to be exempted based on the low power, but this exhibit must show exemption.

A: added to test reports section 11

15. Please also explain the antenna gains stated in this application: 900MHz 0.5dBi and 2.4GHz 1.5dBi.... but these are both 1/4 wavelength wire.

A: Antenna length is shown in test report section 5.3

The items indicated above must be submitted before processing can continue on the above referenced application. Failure to provide the requested information within 30 days of the original e-mail date may result in application dismissal and forfeiture of the filing fee. Also, please note that partial responses increase processing time and should not be submitted. Any questions about the content of this correspondence should be directed to the e-mail address listed below the name of the sender. Revised documentation should not be emailed, but instead should be submitted through "Add Attachment" function at the UL-CCS website. Please have your Assessment Number and FCC ID/IC Certification number handy. You may use the following link: <https://cert.ccsemc.com/filing/>

Best regards,

Chris Harvey  
Chris.Harvey@ul.com

This e-mail may contain privileged or confidential information. If you are not the intended recipient: (1) you may not disclose, use, distribute, copy or rely upon this message or attachment(s); and (2) please notify the sender by reply e-mail, and then delete this message and its attachment(s). Underwriters Laboratories Inc. and its affiliates disclaim all liability for any errors, omissions, corruption or virus in this message or any attachments.

-----

No virus found in this message.

Checked by AVG - [www.avg.com](http://www.avg.com)

Version: 2014.0.4354 / Virus Database: 3722/7240 - Release Date: 03/24/14