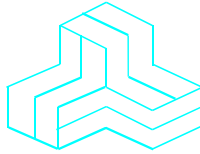


# ENGINEERING TEST REPORT



**Product / Model # PR34X-V**  
**FCC ID: PQG-PR34X-V**

*Applicant:*

**Lyngsoe Systems Ltd.**  
101 Simona Dr., Unit 2  
Bolton, Ontario L7E 4E8

**Federal Communications Commission (FCC)**  
**Maximum Permissible Exposure (MPE) Evaluation**

**UltraTech's File No.: 16LYI130\_MPE**

This Test report is Issued under the Authority of  
Tri M. Luu  
Vice President of Engineering  
UltraTech Group of Labs

Date: April 14, 2016

Report Prepared by: Dharmajit Solanki

Tested by: N/A

Issued Date: April 14, 2016

Test Dates: N/A

- The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.
- This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.

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*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

## EXHIBIT 1. GENERAL INFORMATION

### 1.1. CLIENT INFORMATION

| APPLICANT              |                                                                                                          |
|------------------------|----------------------------------------------------------------------------------------------------------|
| <b>Name:</b>           | Lyngsoe Systems Ltd.                                                                                     |
| <b>Address:</b>        | 101 Simona Dr., Unit 2<br>Bolton, Ontario<br>Canada L7E 4E8                                              |
| <b>Contact Person:</b> | Donald Ferguson<br>Phone #: 905-501-1533<br>Fax #: 905-501-1538<br>Email Address: dfe@lyngsoesystems.com |

### 1.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information was supplied by the applicant.

|                                       |                                                                                             |
|---------------------------------------|---------------------------------------------------------------------------------------------|
| <b>Brand Name:</b>                    | Lyngsoe Systems                                                                             |
| <b>Product Name:</b>                  | PR34X-V                                                                                     |
| <b>Model Name or Number:</b>          | PR34X-V                                                                                     |
| <b>Type of Equipment:</b>             | LTE Radio Module (Licensed Non Broadcast Station Transmitter)                               |
| <b>Co-located Transmitter 1:</b>      | 2.4 GHz Wi-Fi DTS Module, FCC ID: QPU8000                                                   |
| <b>Co-located Transmitter 2:</b>      | 900 MHz RFID Module, FCC ID: QV5MERCURY6EM                                                  |
| <b>Primary User Functions of EUT:</b> | Unit will be mounted on a belt loader and reads UHF passive tags going on and off the plane |

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## EXHIBIT 2. RF EXPOSURE REQUIREMENTS [§§ 15.247(i), 1.1310 & 2.1091]

### 2.1. Limits

§ 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

#### Limits for Maximum Permissible Exposure (MPE)

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1500                                                       |                               |                               | f/300                               | 6                        |
| 1500-100,000                                                   |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30-300                                                         | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1500                                                       |                               |                               | f/1500                              | 30                       |
| 1500-100,000                                                   |                               |                               | 1.0                                 | 30                       |

f = frequency in MHz

\* = Plane-wave equivalent power density

Note 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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## 2.2. Method of Measurements

### Calculation Method of Power Density/RF Safety Distance:

$$S = \frac{PG}{4\pi \cdot r^2} = \frac{EIRP}{4\pi \cdot r^2}$$

Where,  
P: power input to the antenna in mW  
EIRP: equivalent (or effective) isotropically radiated power  
S: power density mW/cm<sup>2</sup>  
G: numeric gain of antenna relative to isotropic radiator  
r: distance to centre of radiation in cm

## 2.3. RF Evaluation, Co-location with Wi-Fi & RFID Modules

Pursuant to KDB 447498 D01 General RF Exposure Guidance v06, Section 7.2:

*Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is  $\leq 1.0$ , according to calculated/estimated, numerically modeled, or measured field strengths or power density.*

As per Manufacturer's C2PC declaration of PR34X-V, this model consisted of the following 3 radio modules and their associated antennas. Power Densities are calculated as below. Prediction Distance: 30cm.

- 1) LTE transmitters integrated in the PR34X-V:
  - (a) LTE 700 MHz: O/p Power: 201 mW, Max Gain: 9 dBi, Power Density  $S = 0.141 \text{ mW/cm}^2$
  - (b) LTE 1700 MHz: O/p Power: 211 mW, Max Gain: 6 dBi, Power Density  $S = 0.074 \text{ mW/cm}^2$
- 2) Wi-Fi Transmitter integrated in the PR34X-V:  
2.4 GHz Tx: O/p Power: 195 mW, Max Gain: 0.8 dBi, Power Density  $S = 0.020 \text{ mW/cm}^2$
- 3) RFID Transmitter integrated in the PR34X-V:  
900 MHz Tx: O/p Power: 933.25 mW, Max Gain: 6.0 dBi, Power Density  $S = 0.328 \text{ mW/cm}^2$

Co-location at minimum **30 cm** evaluation separation distance when operated is required by the operating configurations and exposure conditions of the host device with integrated Wi-Fi and RFID modules.

The following MPE evaluation of the PR34X-V is to show that the MPE ratio is  $\leq 1$ . The test data is the worst-case derived from MPE reports of integrated Wi-Fi and RFID modules from FCC site.

**MPE Ratio Calculation of all 3 Modules at an Evaluation Distance of 30 cm**

| Modules                             | Max. Power Density,<br>S (mW/cm <sup>2</sup> ) | MPE Limit<br>(mW/cm <sup>2</sup> ) | MPE Ratio |
|-------------------------------------|------------------------------------------------|------------------------------------|-----------|
| Radio Module<br>LTE Band (700 MHz)  | 0.141                                          | 0.518                              | 0.272     |
| Radio Module<br>LTE Band (1700 MHz) | 0.074                                          | 1.000                              | 0.074     |
| Wi-Fi Module (2.4GHz)               | 0.020                                          | 1.000                              | 0.020     |
| RFID Module (900 MHz)               | 0.328                                          | 0.612                              | 0.536     |
| Maximum MPE Ratio:                  |                                                |                                    | 0.902     |

Verdict: Based on the above configurations and computation, the maximum MPE ratio of the model PR34X-V is 0.902 and is  $\leq 1.0$  is in compliance with FCC RF exposure requirements and requires minimum MPE separation distance of **30cm** from General Populations/Equipment Operators when installed and shall be declared by the manufacturer under RF Exposure warning in the user manual.