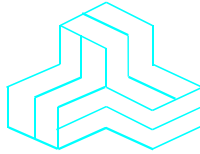


# ENGINEERING TEST REPORT



**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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File #: 16LYI130\_MPE  
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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 Bolton, Ontario Canada L7E 4E8
<b>Contact Person:</b>	Donald Ferguson Phone #: 905-501-1533 Fax #: 905-501-1538 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, S (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )	MPE Ratio
Radio Module LTE Band (700 MHz)	0.141	0.518	0.272
Radio Module 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.