

RF EXPOSURE EVALUATION

Maximum Permissible Exposure [MPE]

Applicant Name:

 Council Rock Enterprises LLC
 11 Centre Park
 Rochester, NY 14614
 United States

Date of Testing:

04/02 - 08/10/2021

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M2108110091-02.2AL52

FCC ID:
2AL52E15008A
Applicant:
Council Rock Enterprises LLC
Application Type:

Class II Permissive Change

Model:

TELiG E1500-8NW

Additional Model:

TELiG E1500-8W

EUT Type:

Cellular Module Integrated Into TELiG Device

FCC Classification:

PCS Licensed Transmitter (PCB)

FCC Rule Part:

FCC Part 1 (§1.1310) and Part 2 (§2.1091)

Test Procedure(s):

KDB 447498 D01

Class II Permissive Change:

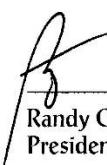
Integrating and co-locating module into host TELiG E1500 product

Original Grant Date:

04/28/2021

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC KDB 447498 D01. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



 Randy Ortanez
 President


| | | | | |
|---|--|------------------------------|-------------------------------------|-----------------------------------|
| FCC ID: 2AL52E15008A |  PCTEST Proud to be part of  | | MAXIMUM PERMISSIBLE EXPOSURE REPORT | Approved by: Technical Manager |
| Test Report S/N: 1M2104020027-02.2AL52 | Test Dates: 04/02 - 08/10/2021 | EUT Type: Cellular Module | | Page 1 of 7 |

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1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 Introduction

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §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).

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm ²) | Average Time (Minutes) |
|---|-------------------------------|-------------------------------|-------------------------------------|------------------------|
| (A) Limits For Occupational / Control Exposures (f = frequency) | | | | |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | ... | ... | f/300 | 6 |
| 1500-100,000 | ... | ... | 5.0 | 6 |
| (B) Limits For General Population / Uncontrolled Exposure (f = frequency) | | | | |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | ... | ... | f/1500 | 30 |
| 1500-100,000 | ... | ... | 1.0 | 30 |

Table 1-1. Limits for Maximum Permissible Exposure (MPE)

1.2 EUT Description

The EUT (FCC ID: 2AL52E15008A) is an LTE modem. This MPE evaluation will only cover RF exposure for LTE Band 8 operation. RF Exposure is evaluated to the Mobile Device requirements for General Population/Uncontrolled Exposure.

This module is being integrated and co-located into a host device. The Table 1-1 lists the modules being collocated.

| Model | mPCIe1 | mPCIe2 | M.2 |
|-----------------|-------------|-------------|--------------|
| TELiG E1500-8NW | TK4WLE900VX | 2AL52E1500N | 2AL52E15008A |
| TELiG E1500-8W | | TK4WLE900VX | 2AL52E15008A |

Table 1-2. Collocated Modules

| | | | | |
|---|---|------------------------------|--|-----------------------------------|
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1.3 Procedure

The procedure used to determine the RF power density was based upon a calculation for determining compliance with the MPE requirements. The power generated by each transmitter used in this product was initially measured by a spectrum analyzer and the powers were recorded.

Through use of the Friis transmission formula, the following MPE evaluations are calculations based on maximum power and maximum antenna gain allowed to achieve power density compliance for the General Population Exposure case while remaining under the 1.5W categorical exclusion limit in 2.1091(c)(1)(i).

Friis Transmission Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4\pi r^2)$

Where,

P_d = Power Density (mW/cm²) $\pi = 3.1416$

P_{out} = output power to antenna (mW)

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

G = gain of antenna in linear scale

| | | | | |
|------------------------|--------|--------------------|-----------|----|
| Frequency | 700.50 | MHz | | |
| Limit | 0.467 | mW/cm ² | | |
| Distance (cm), R = | 22 | cm | | |
| Power (dBm), P = | 25 | dBm | 316.23 | mW |
| TX Ant Gain (dBi), G = | 5 | dBi | | |
| Power Density (S) = | 0.164 | mW/cm ² | (at 20cm) | |
| Minimum Distance = | 13.1 | cm | | |

**Table 1-3. Maximum Calculated MPE Data for 700.5MHz – 2AL52E1500N
(General Population/Uncontrolled Exposure)**

| | | | | |
|------------------------|-------|--------------------|-----------|----|
| Frequency: | 700.5 | MHz | | |
| Limit: | 0.467 | mW/cm ² | | |
| Distance (cm), R = | 22 | cm | | |
| Power (dBm), P = | 24 | dBm | 251.19 | mW |
| TX Ant Gain (dBi), G = | 5 | dBi | | |
| Power Density (S) = | 0.131 | mW/cm ² | (at 20cm) | |
| Minimum Distance = | 11.6 | cm | | |

**Table 1-4. Maximum Calculated MPE Data for 700.5MHz – 2AL52E15008A
(General Population/Uncontrolled Exposure)**

| | | | | |
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| | | | |
|-----------------------|--------------------------|-----------|--|
| Frequency | 2437 MHz | | |
| Limit | 1.000 mW/cm ² | | |
| Distance (cm), R = | 22 cm | | |
| Power (dBm), P = | 24.3 dBm | 269.15 mW | |
| TX Ant Gain (dB), G = | 2 dBi | | |
| Power Density (S) = | 0.070 mW/cm ² | (at 20cm) | |
| Minimum Distance = | 5.8 cm | | |

**Table 1-5. Maximum Calculated MPE Data for 2.4GHz – TK4WLE900VX
(General Population/Uncontrolled Exposure)**

| | | | |
|-----------------------|--------------------------|-----------|--|
| Frequency | 5240 MHz | | |
| Limit | 1.000 mW/cm ² | | |
| Distance (cm), R = | 22 cm | | |
| Power (dBm), P = | 24.97 dBm | 314.05 mW | |
| TX Ant Gain (dB), G = | 5 dBi | | |
| Power Density (S) = | 0.163 mW/cm ² | (at 20cm) | |
| Minimum Distance = | 8.9 cm | | |

**Table 1-6. Maximum Calculated MPE Data for 5GHz – TK4WLE900VX
(General Population/Uncontrolled Exposure)**

| | Power Density (mW/cm ²) | Limit (mW/cm ²) | Percent MPE Used (%) |
|-------------------------------------|--|--------------------------------|----------------------------|
| Transmitter #1 - 700.5MHz - CAT-M1 | 0.164 | 0.467 | 35.21 |
| Transmitter #2 - 700.5MHz - LTE | 0.131 | 0.467 | 27.97 |
| Transmitter #3 - 5GHz - WiFi - MIMO | 0.163 | 1.000 | 16.33 |
| Total | | | 79.50 |

**Table 1-7. Cumulative Results for Multiple Transmitters
(General Population/Uncontrolled Exposure)**

| | | | | |
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1.4 Summary of Results

| Frequency Band [MHz] | Maximum Antenna Gain [dBi] | MPE @ 22cm (mW/cm ²) | Test Result |
|----------------------|----------------------------|----------------------------------|-------------|
| 699.0 – 716.0 | 5.00 | 0.164 | PASS |
| 699.0 – 716.0 | 5.00 | 0.131 | PASS |
| 2412 - 2472 | 2.00 | 0.070 | PASS |
| 5180 - 5825 | 5.00 | 0.163 | PASS |

Table 1-7. Maximum Permissible Exposure Summary Table

| | | | | |
|---|---|-------------------------------------|-------------|-----------------------------------|
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2.0 CONCLUSION

This device meets the mobile General Population limits with the antenna gains and at the distances specified in this report per §2.1091 of the FCC Rules and Regulations. An appropriate RF exposure compliance statement will be placed in the user's manual.

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