Radio Frequency Exposure Evaluation Report

FOR:
Transparent Technologies

Model Name:
T2-SYS-GTWY

Product Description:
The Gateway is a device to bridge the gap of meters in the field and our server.

FCC ID: RXNGW1BH1025
IC ID: 6872A-0421GWBH

Per:

CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISEDC RSS-102 Issue 5

Report number: EMC_TRANS-001-21001_FCC_ISED_MPE_R2

DATE: 2021-05-25

CETECOM **Inc.**
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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).
In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model #
Transparent Technologies	The Gateway is a device to bridge the gap of meters in the field and our server.	T2-SYS-GTWY

Report reviewed by: TCB Evaluator

Date	Section	Name	Signature
2021-05-25	Compliance	Kevin Wang (Lab Manager)	kevin.wang@cetecom.com Digitally signed by: kevin.wang@cetecom.com DN: CN = kevin.wang@cetecom.com Date: 2021.05.25 15:12:26 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
2021-05-25	Compliance	Yuchan Lu (Test Engineer)	Yuchan Lu Digitally signed by: Yuchan Lu DN: CN = Yuchan Lu email = Yuchan.Lu@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2021.05.25 15:11:17 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Lab Manager:	Kevin Wang
Responsible Project Leader:	Akanksha Baskaran

2.2 Identification of the Client / Manufacturer

Client's Name:	Transparent Technologies
Street Address:	5665 Airport Blvd
City/Zip Code	Boulder, CO 80301
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Assessment

Marketing name:	VN Gateway
HW Version :	v1.1.2
SW Version :	v1.10
Hardware Version Identification Number (HVIN):	T2-SYS-GTWY
Product Marketing Name (PMN):	VN Gateway
Regulatory Band:	❖ **Cellular Module:** ▪ LTE BAND 4: 1717.5 ~ 1747.5 MHz ▪ LTE BAND 13: 779.5 ~ 784.5 MHz ❖ **ISM:** ▪ Nominal band: 903 MHz – 927 MHz; ▪ Center to center: 903 MHz (ch 0) – 927 MHz (ch 23), 24 channels
Integrated Module Info:	❖ **LTE** ▪ Module name: Telit ▪ Module number: LE910-SVL ▪ FCC/IC ID: RI7LE910SVL / 5131A-LE910SVL ❖ **ISM** ▪ Module name: SemTech ▪ Module number: SX1232IMLTRT ❖ **GPS** ▪ Module name: Telit ▪ Module number: SE873
Antenna Type:	❖ **Cellular, ISM:** ▪ Skywave LTE Fle Antena 15-8324-B ▪ 704~960 MHz /1710~2155MHz ▪ VSWR ≤ 3.0 ▪ 2.1 dBi Gain (nominal)
Maximum Conducted Output Power:	❖ **Cellular:** From modular grant [Watts]: ▪ LTE Band 4: 0.194 ▪ LTE Band 13: 0.170 ❖ **ISM:** From measurement [Watts]: 0.033

Power Supply/ Rated Operating Voltage Range:	Low 3.0 VDC, Nominal 3.6 VDC, High 3.7 VDC
Operating Temperature Range:	Low -10ºC, Nominal 20ºC, High 50ºC
Sample Revision:	☐Prototype Unit; ■ Production Unit; ☐ Pre-Production

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100000	1.0	30

IC

300 – 6000	0.02619 x f (MHz) $^{0.6834}$	6

4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC
operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9 dBm);
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9 dBm);

IC
300MHz < = operating frequency < 6 GHz: excluded if EIRP < 0.0131 x f (MHz) $^{0.6834}$ W

4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm² or W/m²)
P = power input to the antenna (mW or W)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (cm or m)

5 Evaluations

5.1 Analysis of RF Exposure for simultaneous transmission

- Evaluations are based on worst case power density limits for Canada.
- Calculations are made for 20cm.
- Evaluations are based on ERP/EIRP measured or calculated from known gain and conducted output power.

Radio	freq [MHz]	Max Conducted power [W]	Max Conducted power + Tune up [W]	Gain [dBi]	Gain [lin]	EIRP [W]	IC Limit [W/m2]	FCC LImit [W/m2]	Actual [W/m2]^2	How much of limit is used up
LTE 4	1710	0.194	0.251	2.1	1.62	0.407	4.242	10.000	0.810	19.08%
LTE 13	699	0.17	0.251	2.1	1.62	0.407	2.302	4.660	0.810	35.16%
ISM	905	0.031	0.031	2.1	1.62	0.050	2.746	6.033	0.100	3.64%

Note1： The calculation is based on the distance of 20cm

5.2 Conclusion:

The worst-case transmission is LTE band 13 and ISM, which is using 38.9 of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

6 Revision History

Date	Report Name	Changes to report	Prepared by
2021-04-13	EMC_TRANS-001-21001_FCC_ISED_MPE	Initial Release	Yuchan Lu
2021-04-13	EMC_TRANS-001-21001_FCC_ISED_MPE_R1	Updated the ISM output power and antenna gain values	Yuchan Lu
2021-05-25	EMC_TRANS-001-21001_FCC_ISED_MPE_R2	Added the antenna details	Yuchan Lu

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