



Radio Frequency Exposure Evaluation Report

FOR:
Trimble Inc.

Model:
R580

Product Description:
GNSS receiver with an integrated Wi-Fi/BT modem with TDL450i (Rx-only)

FCC ID: JUP-R580
IC: 1756A-R580

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

Report number: EMC_TRIMB_163_22001_FCC_ISED_RF_Exposure_Rev1

DATE: 2023-07-24



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
Trimble Inc.	GNSS receiver with an integrated Wi-Fi/BT modem with TDL450i (Rx-only)	R580

Report reviewed by: TCB Evaluator

2023-07-24	Compliance	Arndt Stoecker (Director of Regulatory Services)	
Date	Section	Name	Signature

Responsible for the Report:

2023-07-24	Compliance	Cheng Song (EMC Engineer)	
Date	Section	Name	Signature

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
Director of Regulatory Services:	Arndt Stoecker
Responsible Project Leader:	Phillip Quintal

2.2 Identification of the Client / Manufacturer

Client's Name:	Trimble Inc.
Street Address:	935 Stewart Drive
City/Zip Code	Sunnyvale, CA 94085
Country	USA

Identification of the Manufacturer

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

3 Equipment under Assessment

Model:	R580
HW Version :	125761-A
SW Version :	5.6x
Product Marketing Name (PMN):	R580
Radio Information:	<p>WiFi:</p> <ul style="list-style-type: none"> • Module: Trimble R580 • FCC ID: JUP-R580, IC: 1756A-R580 • Technologies: 802.11b/g/n 2.4GHz <p>Bluetooth:</p> <ul style="list-style-type: none"> • Module: Trimble R580 • FCC ID: JUP-R580, IC: 1756A-R580 • BDR/EDR
Antenna Information:	WLAN/BT max gain: +6.6 dBi
Power Supply/ Rated Operating Voltage Range:	USB Power
Operating Temperature Range:	-20 °C to +55 °C
Sample Revision:	<input type="checkbox"/> Prototype Unit; <input checked="" type="checkbox"/> Production Unit; <input type="checkbox"/> Pre-Production

4 RF Exposure Limits and FCC and IC Basic Rules

4.1 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 1.1307(b)(3)(i)(B).

Single RF sources is exempt if the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

4.2 ISED Exemption Limits for Routine Evaluation – RF Exposure Evaluation per IC RSS-102 Issue 5 section 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

5 Evaluations

5.1 Analysis of RF Exposure

FCC:

Radio	Freq-Low _[GHz]	Pwr _[dBm]	Power _[W]	Ant-G _[dBi]	ERP _[mW]	FCC 2.1091(c)(1) Pth _[mW] = ERP _{20cm}
BT	2.4020	7.23	0.005	6.60	14.723	3060.00
WLAN	2.4120	26.31	0.428	6.60	1191.242	3060.00

Bluetooth does not transmit simultaneously with WLAN.
 RF exposure exemption applicable

IC:

Radio	Freq-Low [MHz]	Pwr _[dBm]	Power _[W]	Ant-G [dBi]	EIRP _[W]	Exemption limit for Routine Evaluation
BT	2402.0	7.23	0.005	6.6	0.024	2.68
WLAN	2412.0	26.31	0.428	6.6	1.954	2.68

Bluetooth does not transmit simultaneously with WLAN.
 RF exposure exemption applicable

6 Revision History

Date	Report Name	Changes to report	Prepared by
2023-06-29	EMC_TRIMB_163_22001_FCC_ISED_RF_Exposure	Initial Release	Cheng Song
2023-07-24	EMC_TRIMB_163_22001_FCC_ISED_RF_Exposure_Rev1	Updated section 3 Updated section 5.1	Cheng Song

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