

NCC RF Test Report

Report No.: NCC_RF_SL20021201-TRB-002_UHF

Test Model: R12i

Series Model: N/A

Received Date: 06/30/2020

Test Date: 07/02/2020-07/06/2020

Issued Date: 07/07/2020

Applicant: Trimble, Inc.

Address: 935 Stewart Drive, Sunnyvale, CA 94085, USA

Manufacturer: Trimble, Inc.

Address: 935 Stewart Drive, Sunnyvale, CA 94085, USA

Issued By: Bureau Veritas Consumer Products Services, Inc.

Lab Address: 775 Montague Expressway, Milpitas, CA 95035

Test Location (1): 775 Montague Expressway, Milpitas, CA 95035



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Release Control Record

Issue No.	Description	Date Issued
NCC_RF_SL20021201-TRB-002_UHF	Original Release	07/07/2020

1 Certificate of Conformity

Product: GNSS System integrated with WiFi/BT & UHF

Brand: Trimble

Test Model: R12i

Series Model: N/A

Sample Status: Engineering sample

Applicant: Trimble Inc.

Test Date: 07/02/2020-07/06/2020

Standards: LP0002: 2018

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Deon , **Date:** 07/07/2020
Deon Dai / Test Engineer

Approved by : Chen Ge , **Date:** 07/07/2020
Chen Ge / Engineer Reviewer

2 Summary of Test Results

The EUT has been tested according to the following specifications:

LP0002: 2018		
Item	Test Parameter	Results
1	Spurious Emission/ Unwanted Emissions Strength	Pass

Note: Only radiated spurious emission test in this report, for other test result please see report No.:
NCC_RF_SL20021201-TRB-005 Rev 1.0.

2.1 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
EMI Receiver Rohde & Schwarz	ESW 44	100179	8/30/2019	8/30/2020
Preamplifier RF-Lambda	RAMP00M50GA	17032300047	09/19/2019	09/19/2020
Pre-Amplifier RF Bay, Inc.	LPA-6-30	11170601	04/27/2020	04/27/2021
Hybrid Antenna SUNAR	JB6	A111717	03/09/2020	03/09/2021
Horn Antenna ETS-Lindgren	3117	218554	12/20/2019	12/20/2020
Tuned Dipole Antenna 30 - 1000 MHz (4pcs set)	AD-100	40133	01/23/2020	01/23/2021

2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Frequency	Expanded Uncertainty ($k=2$) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.51dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.73dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.64dB
	6GHz ~ 18GHz	4.82dB
	18GHz ~ 40GHz	4.91dB

2.3 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	GNSS System integrated with WiFi/BT & UHF
Brand	Trimble
Test Model	R12
Identification No. of EUT	N/A
Series Model	N/A
Status of EUT	Engineering sample
Nominal Voltage	100-240VAC, 1.2A, 50-60Hz
Temperature Operating Range	-20°C~55°C
Modulation Type	GMSK, 4FSK
Operating Frequency	410 MHz~473 MHz
Antenna Type	Monopole Antenna
Antenna Gain (dBi)	1.2 dBi
Antenna Connector	MMCX Connector

Note:

1. The EUT uses following adapter.

Brand	TECH
Model	ATS065T-A190
Input Power	100-240V, 50-60Hz, 1.4A Max
Output Power	19Vdc; 3.43A
Power Line	1.2m

2. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Lenovo	E430	MP-3B3NA	N/A	Provided by Customer
B.						
C.						
D.						
E.						
F.						

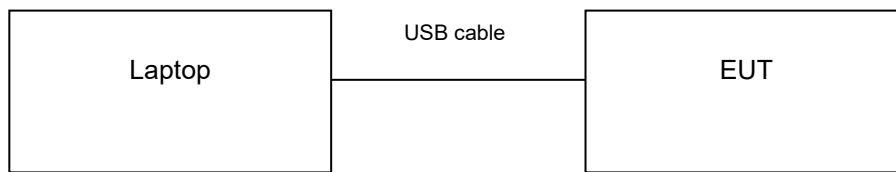
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items E~F acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RS232 to USB	2	1	N	0	Provided by Customer
2.						
3.						
4.						
5.						
6.						

Note: The core(s) is(are) originally attached to the cable(s).

3.2.1 Configuration of System under Test



3.3 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

LP0002: 2018

All test items have been performed and recorded as per the above standard.

4 Test Procedure and Results

4.1 Spurious Emission

4.1.1 Limits of Spurious Emissions

On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.

4.1.2 Test Procedure

Measurement Method	
☐ Conducted measurement	☒ Radiated measurement

4.1.3 Deviation from Test Standard

No deviation.

4.1.4 Test Setup

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The equipment was configured to operate under its worst case situation with respect to output power.
3. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.

4.1.5 Test Results

Radiated Test

Below 1GHz Worst-case Data

Frequency Range	30 MHz ~ 1 GHz	Operating Channel	GMSK, 4800, BW 12.5kHz, Mid channel
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Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
31.37	-49.01	122	155	V	31.37	-44.12	0	0.23	-44.35	-13	-31.35
335.22	-50.3	28	162	V	335.22	-45.41	0	0.56	-45.97	-13	-32.97
31.37	-48.33	297	190	H	31.37	-43.44	0	0.23	-43.67	-13	-30.67
335.22	-44.83	107	200	H	335.22	-39.94	0	0.56	-40.5	-13	-27.5

Above 1GHz

Frequency Range	1GHz ~ 4GHz	Operating Channel	GMSK, 4800, BW 12.5kHz, Low channel
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Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1230.45	-49.66	228	176	V	1230.45	-44.37	8.36	1.33	-37.34	-13	-24.34
2352.77	-47.02	109	180	V	2352.77	-41.73	9.27	1.99	-34.45	-13	-21.45
1230.45	-48.2	257	174	H	1230.45	-42.91	8.36	1.33	-35.88	-13	-22.88
2352.77	-45.82	300	209	H	2352.77	-40.53	9.27	1.99	-33.25	-13	-20.25

Frequency Range	1GHz ~ 4GHz	Operating Channel	GMSK, 4800, BW 12.5kHz, Middle channel
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Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1315.45	-46.38	128	155	V	1315.45	-41.39	8.2	1.45	-34.64	-13	-21.64
2188.35	-43.79	311	185	V	2188.35	-40.51	9.47	1.89	-32.93	-13	-19.93
1315.45	-48.06	282	184	H	1315.45	-42.49	8.2	1.45	-35.74	-13	-22.74
2188.35	-44.16	109	202	H	2188.35	-39.15	9.47	1.89	-31.57	-13	-18.57

REMARKS:

1. Absolute level (dBm) = Level (dBm) + Ant Gain(dBi) – Cable Loss(dB)
2. Margin value = Absolute level – Limit value.

Frequency Range	1GHz ~ 4GHz	Operating Channel	GMSK, 4800, BW 12.5kHz, High channel
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Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1409.55	-48.34	222	145	V	1409.55	-43.34	8.87	1.42	-35.89	-13	-22.89
2868.39	-46.29	128	155	V	2868.39	-41.4	9.33	2.14	-34.21	-13	-21.21
1409.55	-49.35	9	192	H	1409.55	-44.25	8.87	1.42	-36.8	-13	-23.8
2868.39	-47.83	281	211	H	2868.39	-42.85	9.33	2.14	-35.66	-13	-22.66

Frequency Range	1GHz ~ 4GHz	Operating Channel	GMSK, 4800, BW 25kHz, Low channel
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Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1230.45	-50.07	133	166	V	1230.45	-45.09	8.36	1.33	-38.06	-13	-25.06
3789.2	-49.45	251	190	V	3789.2	-44.47	9.76	2.41	-37.12	-13	-24.12
1230.45	-50.65	90	207	H	1230.45	-45.67	8.36	1.33	-38.64	-13	-25.64
3789.2	-47.25	282	274	H	3789.2	-42.27	9.76	2.41	-34.92	-13	-21.92

Frequency Range	1GHz ~ 4GHz	Operating Channel	GMSK, 4800, BW 25kHz, Middle channel
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Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1315.45	-50.42	42	174	V	1315.45	-45.4	8.2	1.45	-38.65	-13	-25.65
2179.38	-47.63	185	167	V	2179.38	-42.65	9.47	1.89	-35.07	-13	-22.07
1315.45	-49.41	212	199	H	1315.45	-43.94	8.2	1.45	-37.19	-13	-24.19
2179.38	-47.59	144	200	H	2179.38	-42.69	9.47	1.89	-35.11	-13	-22.11

REMARKS:

1. Absolute level (dBm) = Level (dBm) + Ant Gain(dBi) – Cable Loss(dB)
2. Margin value = Absolute level – Limit value.

Frequency Range	1GHz ~ 4GHz	Operating Channel	GMSK, 4800, BW 25kHz, High channel
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Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1409.55	-49.71	201	165	V	1409.55	-45.43	8.87	1.42	-37.98	-13	-24.98
1911.4	-48.26	182	156	V	1911.4	-43.24	9.18	1.56	-35.62	-13	-22.62
1409.55	-49.72	73	209	H	1409.55	-45.44	8.87	1.42	-37.99	-13	-24.99
1911.4	-48.51	355	231	H	1911.4	-43.49	9.18	1.56	-35.87	-13	-22.87

Frequency Range	1GHz ~ 4GHz	Operating Channel	Standby
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Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
2362.27	-68.31	128	139	V	3225.25	-64.03	9.27	1.99	-56.75	-47	-9.75
3755.19	-71.15	307	198	V	1735.75	-66.17	9.76	2.41	-58.82	-47	-11.82
2362.27	-68.64	282	208	H	3225.25	-63.62	9.27	1.99	-56.34	-47	-9.34
3755.19	-68.75	1	271	H	1735.75	-64.21	9.76	2.41	-56.86	-47	-9.86

REMARKS:

1. Absolute level (dBm) = Level (dBm) + Ant Gain(dBi) – Cable Loss(dB)
2. Margin value = Absolute level – Limit value.

Appendix - Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

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The address and road map of all our labs can be found in our web site also.

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