REGULATORY COMPLIANCE TEST REPORT

FCC CFR 47 Part 15 Subpart C 15.250 - WB Device

Report No.: CATA012-U2 Rev A

Company: Catapult Sports Pty Ltd

Model Name: B001

REGULATORY COMPLIANCE TEST REPORT

Company: Catapult Sports Pty Ltd

Model Name: B001

To: FCC CFR 47 Part 15 Subpart C 15.250 – WB Device

Test Report Serial No.: CATA012-U2 Rev A

This report supersedes: NONE

Applicant: Catapult Sports Pty Ltd Company
75-83 High St Prahran
Melbourne, Victoria 3181
Australia

Issue Date: 21st July 2022

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
575 Boulder Court
Pleasanton California 94566
USA
Phone: +1 (925) 462-0304
Fax: +1 (925) 462-0306
www.micomlabs.com

ACCREDITED
TESTING CERT #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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1. ACCREDITATION, LISTINGS & RECOGNITION

1.1. TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard ISO/IEC 17065:2012. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

Accredited Product Certification Body

A2LA has accredited

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Pleasanton, CA

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC 17065:2012 *Requirements for bodies certifying products, processes and services*. This product certification body also meets the *A2LA R322 – Specific Requirements – Notified Body Accreditation Requirements* and *A2LA R308 - Specific Requirements - ISO-IEC 17065 - Telecommunication Certification Body Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a management system.

Presented this 14th day of January 2022

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2023

For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.

United States of America – Telecommunication Certification Body (TCB)
Industry Canada – Certification Body, CAB Identifier – US0159
Europe – Notified Body (NB), NB Identifier - 2280
UK – Approved Body (AB), AB Identifier - 2280
Japan – Recognized Certification Body (RCB), RCB Identifier - 210

1.2. RECOGNITION

MiCOM Labs, Inc is widely recognized for its wireless testing and certification capabilities. In addition to being recognized for Testing and Certification under Phase 2 Mutual Recognition Agreements (MRA) with Canada, Europe, United Kingdom and Japan, our international recognition includes Conformity Assessment Body (CAB) designation status under agreements with Asia Pacific (APEC) MRA Phase 1 countries giving acceptance of MiCOM test reports. MiCOM Labs test reports are accepted globally.

Country	Recognition Body	Status	MRA Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	US0159 Test Site Designation #: US1084
Canada	Industry Canada (ISED)	FCB	APEC MRA 2	US0159 Test Company #: 4143A
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	Japan MRA 2	RCB 210
	Japan Approvals Institute for Telecommunication Equipment (JATE)			
	VCCI	--	--	A-0012
Europe	European Commission	NB	EU MRA 2	NB 2280
United Kingdom	Department for Business, Energy & Industrial Strategy (BEIS)	AB	UK MRA 2	AB 2280
Mexico	Instituto Federal de Telecomunicaciones (IFT)	CAB	Mexico MRA 1	US0159
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)			
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)			
Singapore	Infocomm Development Authority (IDA)			
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)			
Vietnam	Ministry of Communication (MIC)			

TCB- Telecommunications Certification Bodies (TCB)
FCB – Foreign Certification Body
CAB – Conformity Assessment Body
NB – Notified Body;
AB – Approved Body
MRA – Mutual Recognition Agreement

MRA Phases
Phase I - recognition for product testing
Phase II – recognition for both product testing and certification

1.3. PRODUCT CERTIFICATION

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2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	19th July 2022	Draft for comment
Rev A	21st July 2022	Initial Release

In the above table the latest report revision will replace all earlier versions.

MiCOM Labs, 575 Boulder Court, Pleasanton, California 94566 USA, Phone: +1 (925) 462 0304, Fax: +1 (925) 462 0306, www.micomlabs.com

3. TEST RESULT CERTIFICATE

Manufacturer:	Catapult Sports Pty Ltd 75-83 High St Prahran Melbourne, Victoria 3181 Australia	**Tested By:**	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model:	B001	**Telephone:**	+1 925 462 0304
Equipment Type:	WB (Smart Football)	**Fax:**	+1 925 462 0306
S/N's:	None		
Test Date(s):	14th July 2022	**Website:**	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15 Subpart C 15.250	EQUIPMENT COMPLIES

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.

2. Details of test methods used have been recorded and kept on file by the laboratory.

3. Test results apply only to the item(s) tested.

A2LA ACCREDITED
TESTING CERT #2381.01

Approved & Released for MiCOM Labs, Inc. by:

Graeme Grieve
Quality Manager MiCOM Labs, Inc.

Gordon Hurst
President & CEO MiCOM Labs, Inc.

4. REFERENCES AND MEASUREMENT UNCERTAINTY

4.1. Normative References

REF.	PUBLICATION	YEAR	TITLE
I	15.250	Feb 2005	Operation of wideband systems within the band 5925-7250 MHz.
II	A2LA	June 2022	R105 - Requirement's When Making Reference to A2LA Accreditation Status
III	ANSI C63.10	2020	American National Standard for Testing Unlicensed Wireless Devices
IV	ANSI C63.4	2014	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
V	ETSI TR 100 028	2001-12	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
VI	M 3003	Edition 4 Oct.2019	Expression of Uncertainty and Confidence in Measurements
VII	FCC 47 CFR Part 2.1033	2021	FCC requirements and rules regarding photographs and test setup diagrams.
VIII	KDB 393764 D01 WBFAQ v02	January 29, 2018	Ultra-Wideband (UWB) Devices frequently asked questions

4.2. Test and Uncertainty Procedure

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

5. PRODUCT DETAILS AND TEST CONFIGURATIONS

5.1. Technical Details

Details	Description
Purpose:	Test of the Catapult Sports Pty Ltd B001 Smart Football to FCC CFR 47 Part 15 Subpart C 15.250.
Applicant:	Catapult Sports Pty Ltd 75-83 High St Prahran Melbourne, Victoria 3181 Australia
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	CATA012-U2
Date EUT received:	12th May 2021
Standard(s) applied:	FCC CFR 47 Part 15 Subpart C 15.250
Dates of test (from - to):	14th July 2022
No of Units Tested:	1
Product Family Name:	Smart Football
Model(s):	B001
Location for use:	Indoors and Outdoors
Declared Frequency Range(s):	6489.6 GHz
Type of Modulation:	BPM/BPSK
EUT Modes of Operation:	WB
Declared Nominal Output Power (dBm):	-7 dBm
Rated Input Voltage and Current:	3.7Vdc (Li-ion Battery)
Operating Temperature Range:	-20 to 60°C
Equipment Dimensions:	175 x 130 x 59.5 mm
Weight:	520 g
Hardware Rev:	MP
Software Rev:	1.1.0
Product Application:	Mobile & Portable Client Devices

5.2. Scope Of Test Program

Catapult Sports Pty Ltd Company B001

The scope of the test program was to test the Catapult Sports Pty Ltd Company B001 Smart Football for compliance against the following specifications:

FCC CFR 47 Part 15 Subpart C 15.250
Operation of wideband systems within the band 5925 -7250 MHz

5.3. Equipment Model(s) and Serial Number(s)

Type (EUT/ Support)	Equipment Description	Manufacturer	Model No.	Serial No.
EUT	Smart Football	Catapult Sports Pty Ltd	B001	N/A
Support	Charging Cradle	Energous	--	--

5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
integral	Catapult Sports Pty Ltd	TaoGlas UWC.21	Bespoke	-0.15	--	--	--	3750-7500

BF Gain - Beamforming Gain
Dir BW - Directional BeamWidth
X-Pol - Cross Polarization

5.5. Cabling and I/O Ports

The EUT has no I/O Ports, it connects to the charger wirelessly.

5.6. Test Configurations

Results for the following configurations are provided in this report:

Operational Mode(s)	Data Rate with Highest Power MBit/s	Channel Frequency (MHz)		
		Low	Mid	High
5925 - 7250 MHz				
WB	--	--	--	6489.6

5.7. Equipment Modifications

The following modifications were required to bring the equipment into compliance:
1. NONE

5.8. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:
1. NONE

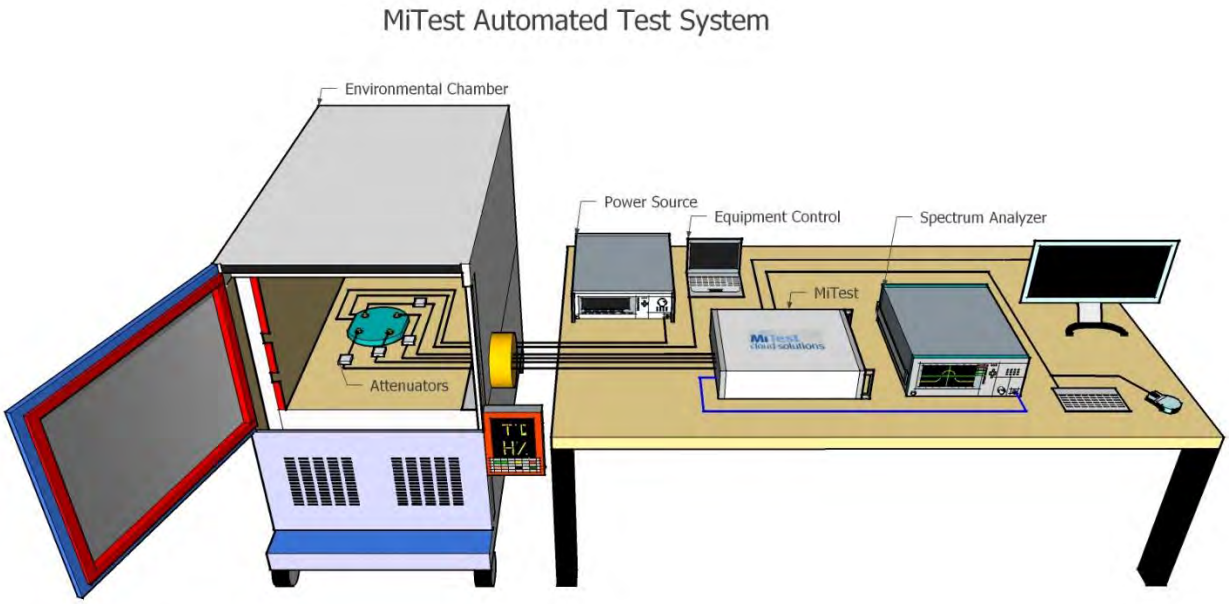
6. TEST SUMMARY

List of Measurements

Test Header	Result	Data Link
WB Bandwidth	Complies	View Data
Average Output Power	Complies	View Data
Peak Power Density	Complies	View Data
Transmitter Spurious Radiated Emissions	Complies	View Data
Digital Emissions	Complies, see MiCOM Labs CATA08-U2 Emissions Report	
AC Wire Line Emissions	Complies, see MiCOM Labs CATA08-U2 Emissions Report	
Comments: None		

7. TEST EQUIPMENT CONFIGURATION(S)

7.1. Conducted Test Setup



A full system calibration was performed on the test station and any resulting system losses (or gains) were considered in the production of all final measurement data.

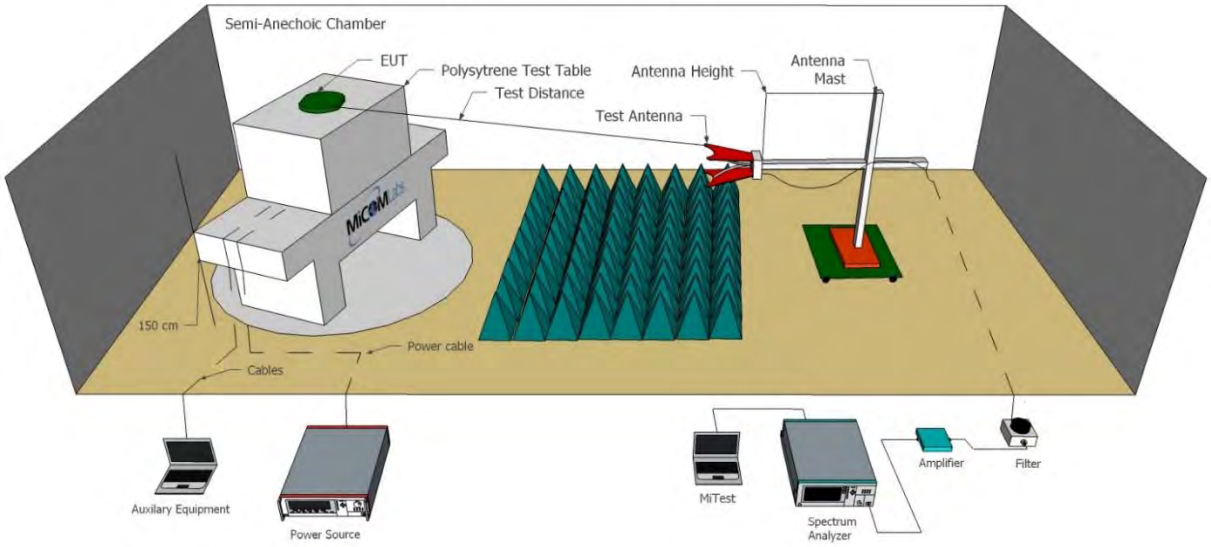
Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
#3 SA	MiTest Box to SA	Fairview Microwave	SCA1814-0101-72	#3 SA	7 Oct 2022
#3P1	EUT to MiTest box port 1	Fairview Microwave	SCA1814-0101-72	#3P1	7 Oct 2022
#3P2	EUT to MiTest box port 2	Fairview Microwave	SCA1814-0101-72	#3P2	7 Oct 2022
#3P3	EUT to MiTest box port 3	Fairview Microwave	SCA1814-0101-72	#3P3	7 Oct 2022
#3P4	EUT to MiTest box port 4	Fairview Microwave	SCA1812-0101-72	#3P4	7 Oct 2022
249	Thermocouple; Resistance Thermometer	Thermotronics	GR2105-02	9340 #2	30 Oct 2022
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	8 Oct 2022
398	MiTest RF Conducted Test Software	MiCOM	MiTest ATS	Version 4.2.3.0	Not Required
405	DC Power Supply 0-60V	Agilent	6654A	MY4001826	Cal when used
408	USB to GPIB interface	National Instruments	GPIB-USB HS	14C0DE9	Not Required
441	USB Wideband Power Sensor	Boonton	55006	9179	20 Sep 2022

442	USB Wideband Power Sensor	Boonton	55006	9181	19 Oct 2022
445	PoE Injector	D-Link	DPE-101GL	QTAH1E2000625	Not Required
461	Spectrum Analyzer	Agilent	E4440A	MY46185537	27 Sep 2023
493	USB Wideband Power Sensor	Boonton	55006	9634	8 Oct 2022
494	USB Wideband Power Sensor	Boonton	55006	9726	19 Oct 2022
510	Barometer/Thermometer	Digi Sense	68000-49	170871375	4 Jan 2023
512	MiTest Cloud Solutions RF Test Box	MiCOM	2nd Gen with DFS	512	29 Jun 2023
555	Rhode & Schwarz Receiver (Firmware Version : 2.00 SP1)	Rhode & Schwarz	ESW 44	101893	28 Jun 2023
75	Environmental Chamber	Thermatron	SE-300-2-2	27946	20 Feb 2023

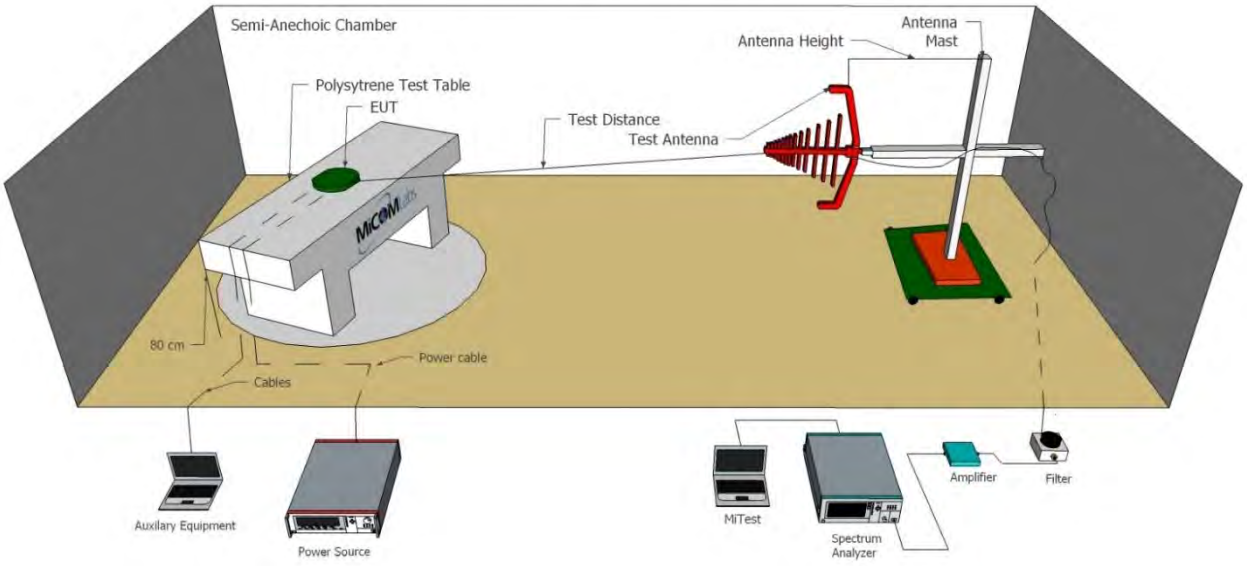
7.2. Radiated Emissions - 3m Chamber

The following tests were performed using the radiated test set-up shown in the diagram below.
Radiated emissions above and below 1GHz.

Radiated Emissions Above 1GHz Test Setup



Radiated Emissions Below 1GHz Test Setup



A full system calibration was performed on the test station and any resulting system losses (or gains) were considered in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CU101	04R08507	Not Required
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	8 Oct 2022
298	3M Radiated Emissions Chamber Maintenance Check	MiCOM	3M Chamber	298	24 Sep 2022
330	Variac 0-280 Vac	Staco Energy Co	3PN1020B	0546	Cal when used
336	Active loop Ant 10kHz to 30 MHz	EMCO	EMCO 6502	00060498	29 Nov 2022
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	29 Sep 2023
373	26III RMS Multimeter	Fluke	Fluke 26 series III	76080720	29 Sep 2022
377	Band Rejection Filter 5150 to 5880MHz	Microtronics	BRM50716	034	6 Oct 2022
396	2.4 GHz Notch Filter	Microtronics	BRM50701	001	6 Oct 2022
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	27 Oct 2022
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	30 Sep 2023
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	2 Nov 2022
410	Desktop Computer	Dell	Inspiron 620	WS38	Not Required
411	Mast/Turntable Controller	Sunol Sciences	SC98V	060199-1D	Not Required
412	USB to GPIB Interface	National Instruments	GPIB-USB HS	11B8DC2	Not Required
413	Mast Controller	Sunol Science	TWR95-4	030801-3	Not Required
414	DC Power Supply 0-60V	HP	6274	1029A01285	Cal when used
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
416	Gigabit ethernet filter	ETS-Lingren	Gigafoil 260366	None	Not Required
447	MiTest Rad Emissions Test Software	MiCOM	Rad Emissions Test Software Version 1.0	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	27 Oct 2022
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	27 Oct 2022
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	27 Oct 2022
480	Cable - Bulkhead to Amp	SRC Haverhill	157-3050360	480	6 Oct 2022

481	Cable - Bulkhead to Receiver	SRC Haverhill	151-3050787	481	6 Oct 2022
510	Barometer/Thermometer	Digi Sense	68000-49	170871375	4 Jan 2023
554	Precision SMA Cable	Fairview Microwave	SCE18060101-400CM	554	6 Oct 2022
555	Rhode & Schwarz Receiver (Firmware Version : 2.00 SP1)	Rhode & Schwarz	ESW 44	101893	28 Jun 2023
87	Uninterruptible Power Supply	Falcon Electric	ED2000-1/2LC	F3471 02/01	Cal when used
CC05	Confidence Check	MiCOM	CC05	None	27 Feb 2023

8. MEASUREMENT AND PRESENTATION OF TEST DATA

The measurement and graphical data presented in this test report was generated automatically using state-of-the-art technology creating an easy to read report structure. Numerical measurement data is separated from supporting graphical data (plots) through hyperlinks. Numerical measurement data can be reviewed without scrolling through numerous graphical pages to arrive at the next data matrix.

Plots have been relegated into the Appendix 'Graphical Data'.

Test and report automation was performed by MiTest. MiTest is an automated test system developed by MiCOM Labs. MiTest is the first cloud based modular test system enabling end-to-end automation of regulatory compliance testing for conducted RF testing.

The MiCOM Labs "MiTest" Automated Test System" (Patent Pending)

9. TEST RESULTS

9.1. WB Bandwidth

Conducted Test Conditions for WB Bandwidth			
Standard:	FCC CFR 47 Part 15 Subpart C 15.250	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	WB Bandwidth	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI C63.10 Section 10.1; 5.1(a)(b) 15.250(a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for WB Bandwidth Measurement
The WB Bandwidth is measured radiated, at a 3-meter distance, while EUT is operating in transmission mode at the appropriate center frequency. The Resolution Bandwidth was set to 1MHz RBW IAW ANSI C63.10.
Testing was performed under ambient conditions at nominal voltage.

Test configuration and setup used for the measurement was per the Radiated Test Set-up section specified in this document.

Equipment Configuration for WB Bandwidth			
Variant:	WB	**Duty Cycle (%):**	100
Data Rate:	--	**Antenna Gain (dBi):**	-0.15
Modulation:	--	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Frequency	Measurement Technique 10 dB Bandwidth (MHz)	10 dB Bandwidth (MHz)			
MHz	**Port A**	**Highest**	**Lowest**		
6489.6	718.680	718.680	718.680		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

The above values are representative of the worst-case value between polarities and based on the power measurements.

MiCOM Labs, 575 Boulder Court, Pleasanton, California 94566 USA, Phone: +1 (925) 462 0304, Fax: +1 (925) 462 0306, www.micomlabs.com

9.2. Transmit Power

Conducted Test Conditions for Maximum Radiated Output Power			
Standard:	FCC CFR 47 Part 15 Subpart C 15.250	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Radiated Emissions WB Transmission	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI C63.10 Section 10.3.5; 5.3.1; Section 4 Annex 15.250 (d)(1)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	None		

Test Procedure for WB Transmission

Testing was performed under ambient conditions at nominal voltage.

Test configuration and setup used for the measurement was per the Radiated Test Set-up section specified in this document. Supporting KDB's referenced below.

Operating Frequency Band:
5925-7250 MHz

Limits Maximum EIRP (dBm)

Frequency (MHz)	EIRP Limit (dBm)	EIRP at 1 Meters (dBuv/m)
5925-7250	-41.3	43.9

Equipment Configuration for RF Output Power			
Variant:	WB	**Duty Cycle (%):**	99
Data Rate:	-	**Antenna Gain (dBi):**	-0.15
Modulation:	-	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency MHz	Measured Radiated Output Power (dBm)	EIRP + Duty Cycle Correction Factor (99%)	Limit (dBm)	Margin (dB)	EUT Power Setting
6489.6	-41.79	-41.94	-41.3	-0.64	16.0

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

9.3. Peak Power Density

Test Conditions for Maximum Peak Power Density			
Standard:	FCC CFR 47 Part 15 Subpart C 15.250	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Radiated Emissions WB Transmission	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI C63.10 Section 10.3.6; 5.3.1; Section 4 Annex 15.250 (d)(3)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	None		

Test Procedure for WB Transmission

Testing was performed under ambient conditions at nominal voltage.

Test configuration and setup used for the measurement was per the Conducted Test Set-up section specified in this document.

Operating Frequency Band:
5925-7250 MHz

Limits Maximum EIRP (dBm)

Frequency (MHz)	EIRP Limit (dBm/50MHz)
5925-7250	0

Equipment Configuration for Peak Power Density			
Variant:	WB	**Duty Cycle (%):**	99
Data Rate:	-	**Antenna Gain (dBi):**	-0.15
Modulation:	--	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency MHz	Measured Peak Power Density (dBm)	EIRP + Duty Cycle Correction Factor (99%)	Limit (dBm)	Margin (dB)	EUT Power Setting
6489.6	-7.41	-7.56	0	-7.56	16.0

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

9.4. Transmitter Spurious Band Emissions

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47 Part 15 Subpart C 15.250	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Radiated Spurious Emissions	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI C63.10 Section 10.2 + 10.3; 5.3.1 15.250 (d)(1)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious and Band-Edge Emissions
Radiated emissions for restricted bands above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in max hold mode. Depending on the frequency band spanned a notch filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned. Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

Field Strength Calculation
The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.
FS = R + AF + CORR - FO

where:
FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss

Measurements made at 1 meter to meet noise floor to limit requirements

Frequency Range		Average Limit		
MHz	**MHz**	**EIRP (dBm)**	**EIRP at 1 Meters (dBuV/m)**	**EIRP at 3 Meters (dBuV/m)**
960	1610	-75.30	29.40	19.93
1610	1990	-63.40	41.40	31.93
1990	3100	-61.30	43.40	33.93
3100	5925	-51.30	53.40	43.93
5925	7250	-41.30	63.40	53.93
7250	10600	-51.30	53.40	43.93
10600	18000	-61.30	43.40	33.93

Radiated Spurious Emissions in the GPS Bands FCC 15.250 (d)(2)

Frequency Range		Average Limit	
MHz	**MHz**	**EIRP (dBm)**	**EIRP at 1 Meters (dBuV/m)**
1164	1240	-85.3	19.47
1559	1610	-85.3	19.47

50 MHz Peak Emissions 15.250 (d)(3)

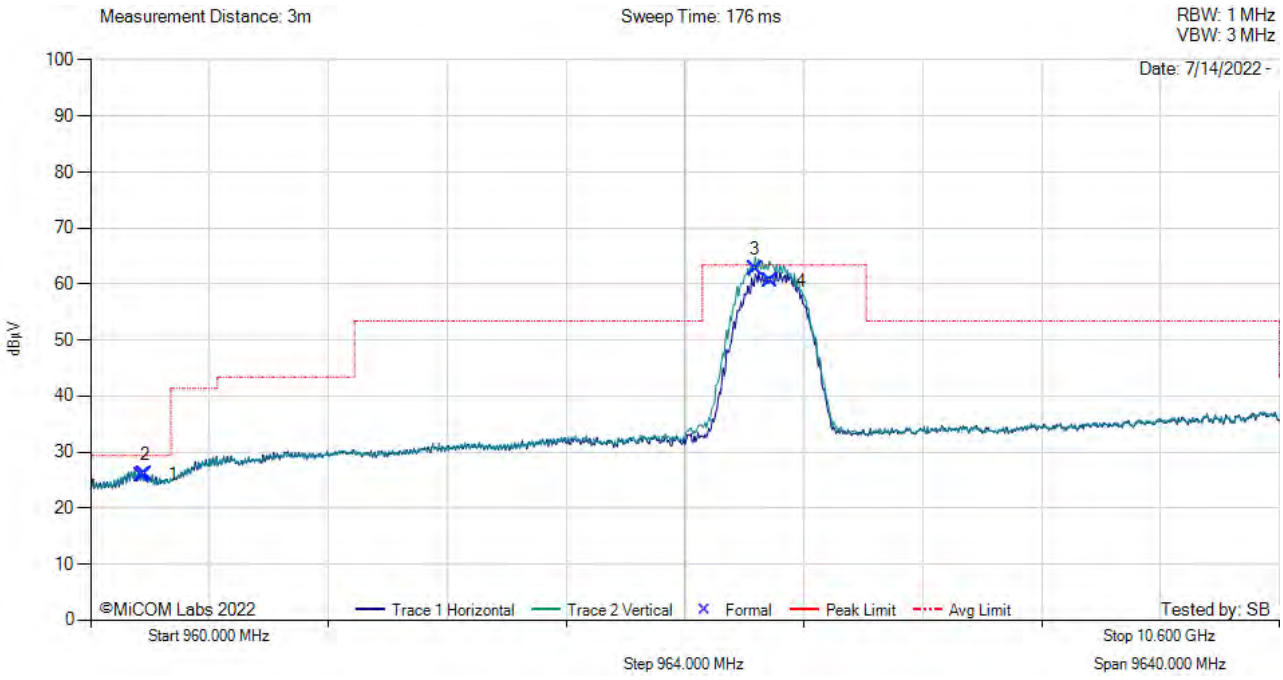
There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs and this 50 MHz bandwidth must be contained within the 5925-7250 MHz band. The peak EIRP limit is 20 log (RBW/50) dBm where RBW is the resolution bandwidth in megahertz that is employed by the measurement instrument. RBW shall not be lower than 1 MHz or greater than 50 MHz. The video bandwidth of the measurement instrument shall not be less than RBW. If RBW is greater than 3 MHz, the application for certification filed with the Commission shall contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing

Equipment Configuration for Spurious Emissions 960MHZ - 10600GHZ			
Antenna:	Integral	**Variant:**	WB
Antenna Gain (dBi):	-0.15	**Modulation:**	BPSK
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	6489.6	**Data Rate:**	Not Applicable
Power Setting:	16	**Tested By:**	SB

Test Measurement Results

FCC Spurious 960MHz - 10600GHz

Antenna: Integral



960.00 - 10600.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	1374.53	40.30	1.51	-15.89	25.92	AVG	Horizontal	59	149	29.4	-3.5	Pass
2	1403.43	40.55	1.52	-16.07	26.00	AVG	Vertical	36	149	29.4	-3.4	Pass
3	6348.86	68.17	3.34	-8.76	62.75	AVG	Vertical	220	149	63.4	-0.6	Pass
4	6473.98	65.93	3.38	-8.72	60.59	AVG	Horizontal	219	149	63.4	-2.8	Pass

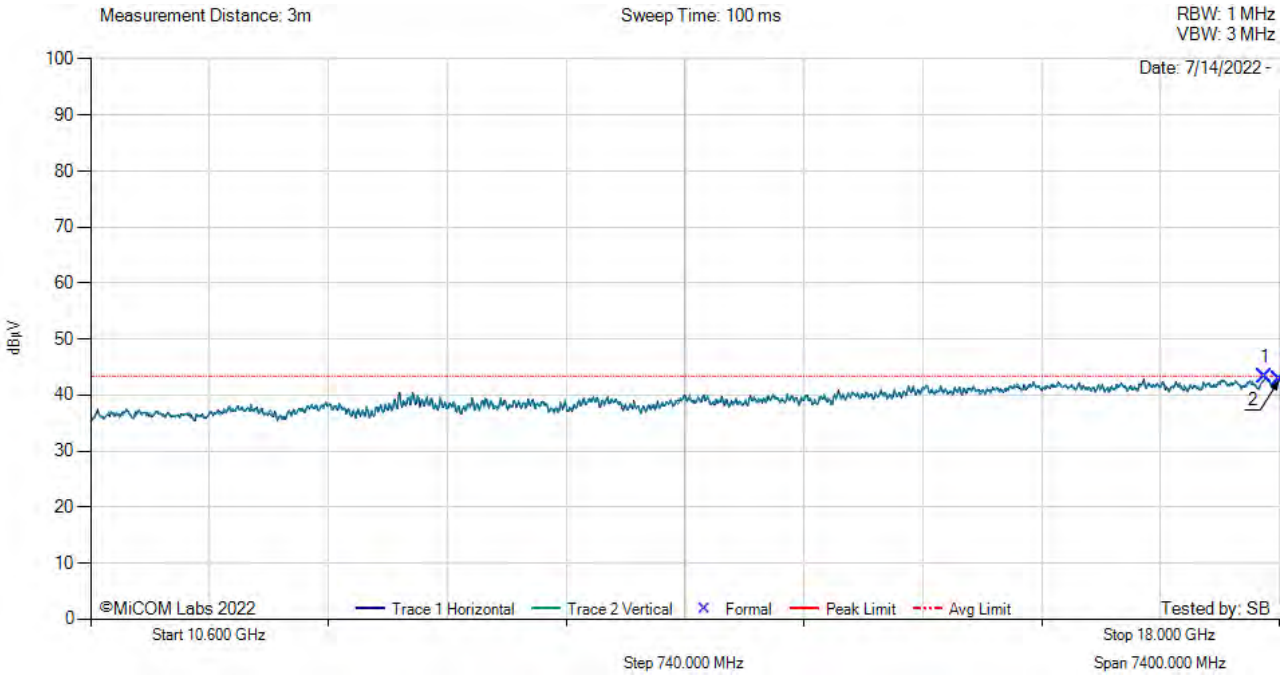
Test Notes: EUT operating at 3.7VDC

Equipment Configuration for Spurious Emissions 10600 - 18000MHZ			
Antenna:	Integral	**Variant:**	WB
Antenna Gain (dBi):	-0.15	**Modulation:**	BPSK
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	6489.6	**Data Rate:**	Not Applicable
Power Setting:	16	**Tested By:**	SB

Test Measurement Results

FCC Spurious 10600 - 18000MHz

Antenna: Integral



10600.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	17911.29	36.16	6.76	0.44	43.35	AVG	Horizontal	308	149	43.4	-0.05	Pass
2	17999.91	36.25	6.43	0.08	42.76	AVG	Vertical	99	149	43.4	-0.6	Pass

Test Notes: EUT operating at 3.7VDC

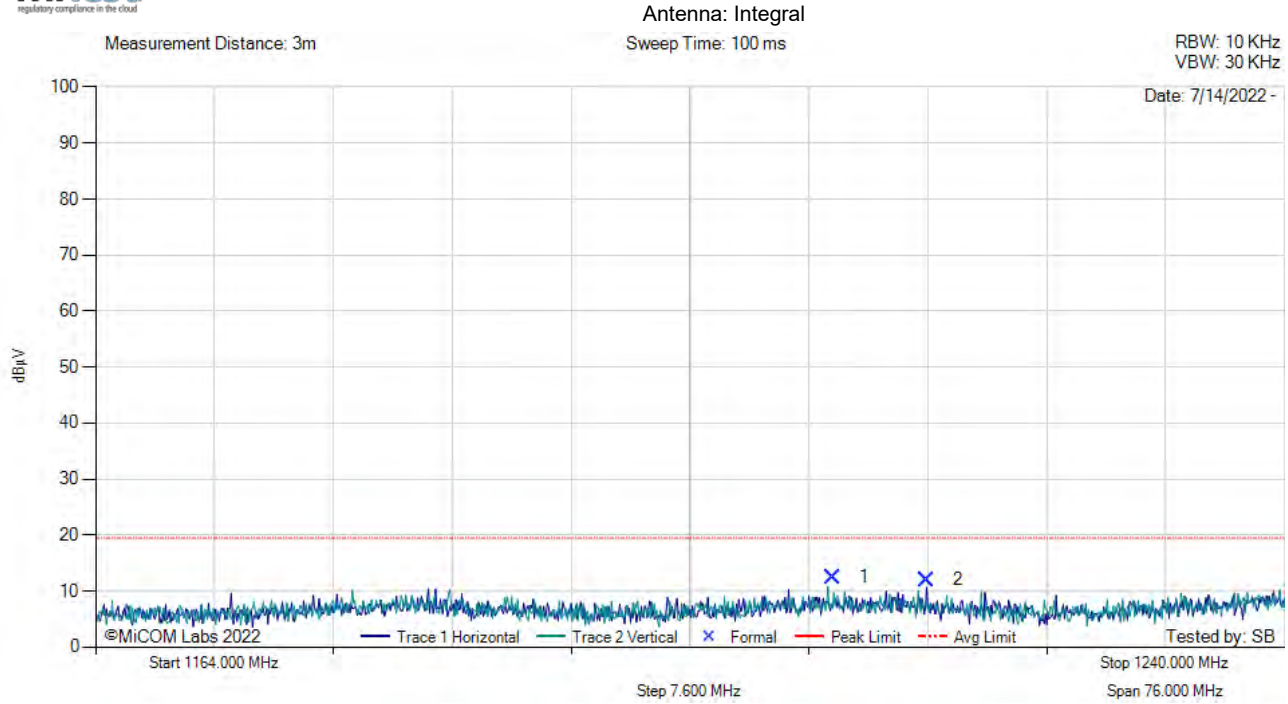
Equipment Configuration for Spurious Emissions for GPS 1164MHZ - 1240MHZ

Antenna:	Integral	**Variant:**	WB
Antenna Gain (dBi):	-0.15	**Modulation:**	BPSK
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	6489.6	**Data Rate:**	Not Applicable
Power Setting:	16	**Tested By:**	SB

Test Measurement Results

FCC GPS Spurious 1164MHz - 1240MHz

Antenna: Integral



1164.00 - 1240.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	1211.10	27.79	1.41	-16.70	12.50	AVG	Vertical	32	149	19.5	-7.0	Pass
2	1217.15	27.23	1.40	-16.62	12.01	AVG	Horizontal	119	149	19.5	-7.5	Pass

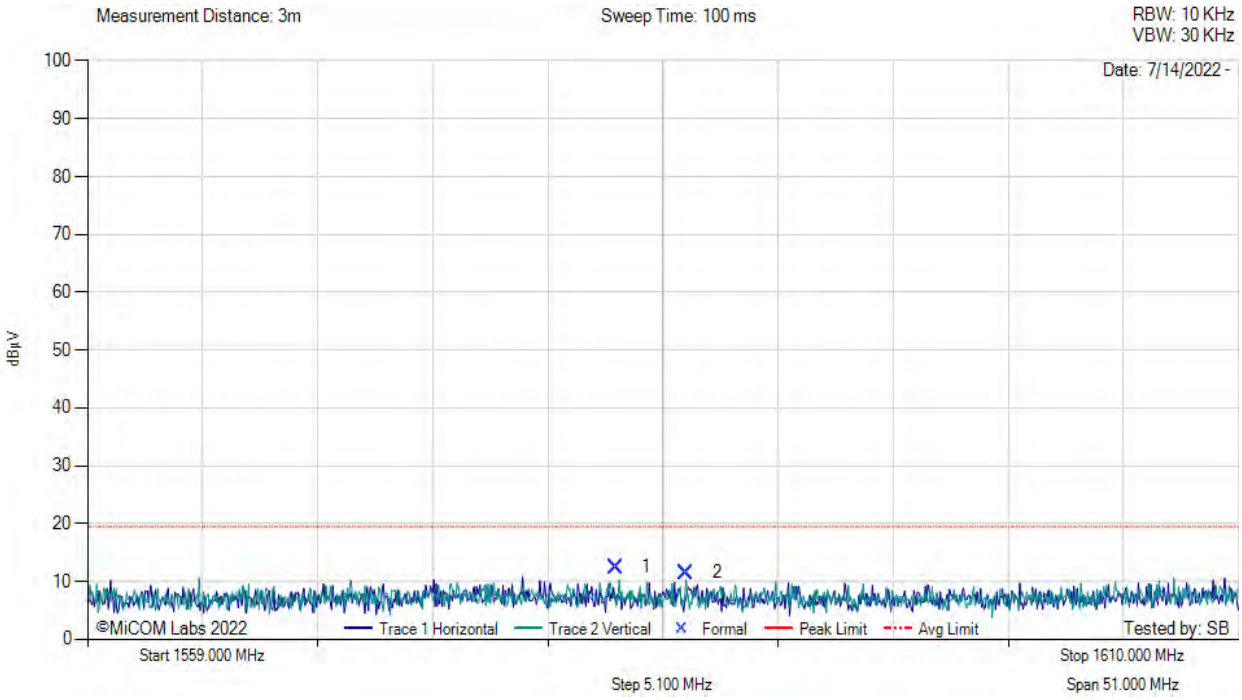
Test Notes: EUT operating at 3.7VDC

Equipment Configuration for Spurious Emissions for GPS 1559MHZ - 1610MHZ			
Antenna:	Integral	**Variant:**	WB
Antenna Gain (dBi):	-0.15	**Modulation:**	BPSK
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	6489.6	**Data Rate:**	Not Applicable
Power Setting:	16	**Tested By:**	SB

Test Measurement Results

FCC GPS Spurious 1559MHz - 1610MHz

Antenna: Integral



1559.00 - 1610.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	1582.39	27.78	1.59	-16.86	12.51	AVG	Horizontal	262	149	19.5	-7.0	Pass
2	1585.54	26.84	1.61	-16.88	11.57	AVG	Vertical	6	149	19.5	-7.9	Pass

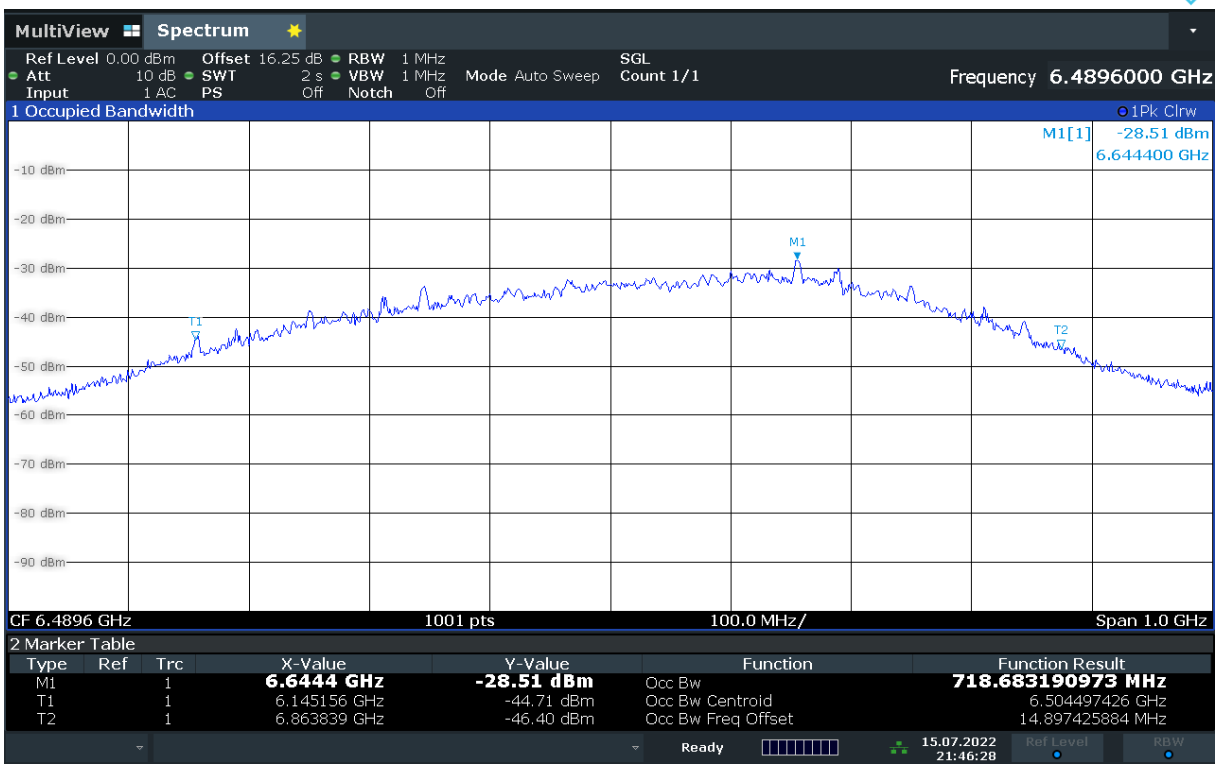
Test Notes: EUT operating at 3.7VDC

A. Appendix A - Graphical Images

A.1. Occupied Bandwidth

Occupied Bandwidth

Variant: WB, Channel: 6489.6 MHz, Chain a, Temp: 20, Voltage: 3.7 Vdc



Date: 15.JUL.2022 21:46:28

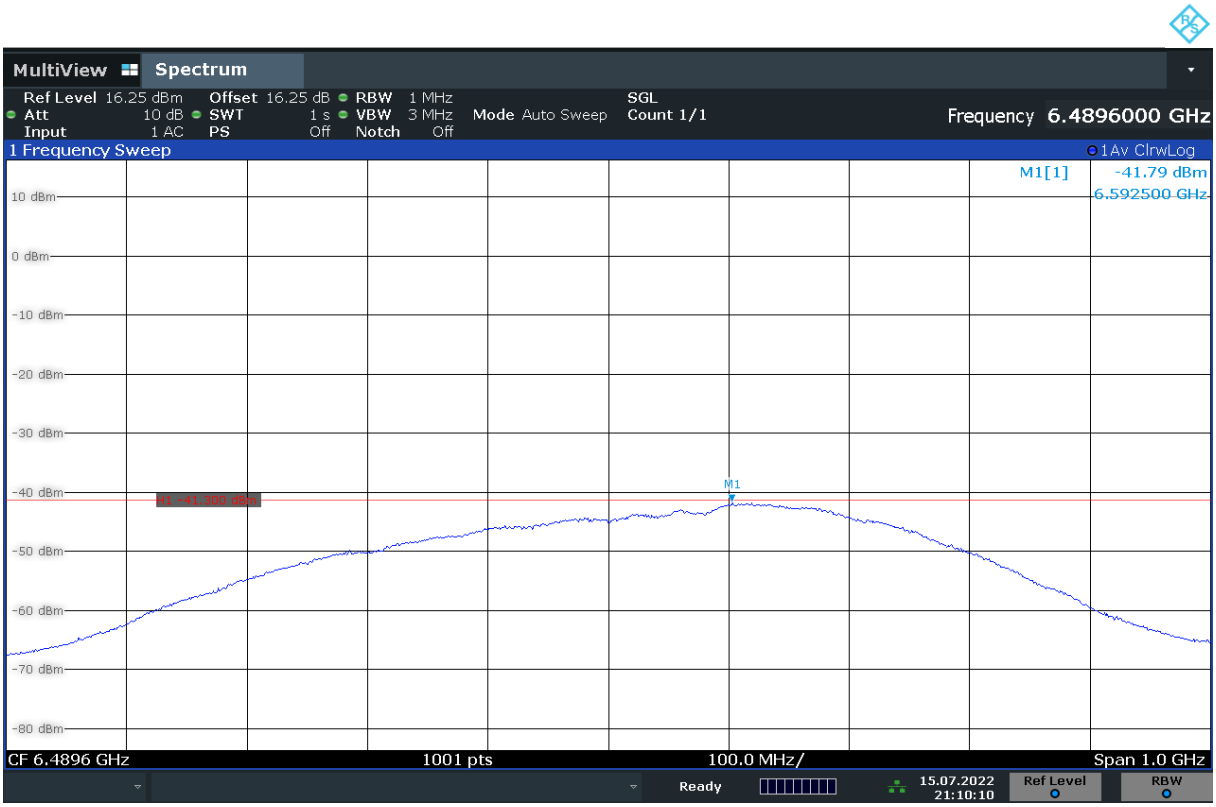
Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = CLR/WRITE	M1 : 4491.598 MHz : --28.51 dBm T1 : 6145.156 MHz : -44.71 dBm T2 : 6863.830 MHz : -46.40 dBm OBW : 718.681 MHz	Pass

back to matrix

A.2. Transmit Power

TRANSMIT POWER

Variant: WB, Channel: 6489.6 MHz, Chain a, Temp: 20, Voltage: 3.7 Vdc



Date: 15.JUL.2022 21:10:10

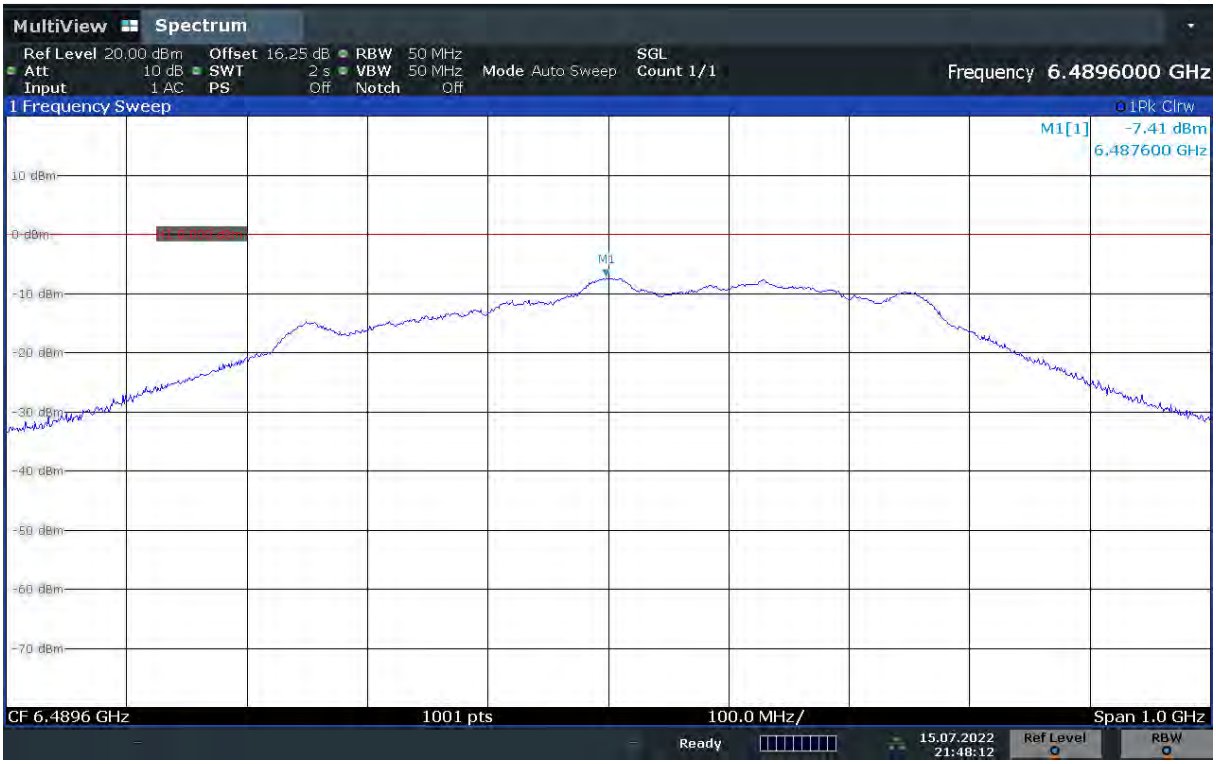
Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVER Sweep Count = 1 RF Atten (dB) = 10 Trace Mode = CLR/WRITE	M1 : 6489.6 MHz : -41.79 dBm	Pass

back to matrix

A.3. Peak Power Density

PEAK POWER DENSITY

Variant: WB, Channel: 6489.6 MHz, Chain a, Temp: 20, Voltage: 3.7 Vdc



Date: 15.JUL.2022 21:48:12

Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = PEAK Sweep Count = 1 RF Atten (dB) = 10 Trace Mode = CLR/WRITE	M1 : 6489.6 MHz : -7.41 dBm	Channel Frequency: 6489.6 MHz

back to matrix

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