



REGULATORY COMPLIANCE TEST REPORT

**FCC Part 15 Subpart F 15.519
- Hand-Held UWB Device**

Report No.: ALER02-U4 Rev A

Company: Alereon Inc.

Model Name: AL5932 Catapult

REGULATORY COMPLIANCE TEST REPORT

Company: Alereon Inc.

Model Name: AL5932 Catapult

To: FCC CFR 47 Part 15 Subpart F 15.519

Test Report Serial No.: ALER02-U4 Rev A

This report supersedes: NONE

Applicant: Alereon Inc.
10800 Pecan Park Blvd, STE 100
Austin, TX 78750
USA

Issue Date: 1st November 2019

This Test Report is Issued Under the Authority of:

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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 Electrical testing laboratory per the international standard ISO/IEC 17025:2005. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; <http://www.a2la.org/scopepdf/2381-01.pdf>



1.2. RECOGNITION

MiCOM Labs, Inc has widely recognized wireless testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA countries. MiCOM Labs test reports are accepted globally.

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	US0159 Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	US0159 Listing #: 4143A-2 4143A-3
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	APEC MRA 2	RCB 210
	VCCI	--	--	A-0012
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	CAB	APEC MRA 1	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	CAB	APEC MRA 1	
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)	CAB	APEC MRA 1	
Vietnam	Ministry of Communication (MIC)	CAB	APEC MRA 1	

EU MRA – European Union Mutual Recognition Agreement.

NB – Notified Body

APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement. Recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.

Phase I - recognition for product testing

Phase II – recognition for both product testing and certification

1.3. PRODUCT CERTIFICATION

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>



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

2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	28 th October 2019	Draft for comment
Draft #2	31 st October 2019	
Rev A	1 st November 2019	Initial Release

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

3. TEST RESULT CERTIFICATE

Manufacturer: Alereon Inc. 10800 Pecan Park Blvd, STE 100 Austin, TX 78750 USA	Tested By: MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model: AL5932	Telephone: +1 925 462 0304
Equipment Type: Mobile & Portable Client Device	Fax: +1 925 462 0306
S/N's: 19200018	
Test Date(s): 16 th – 18 th October 2019	Website: www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15 Subpart F 15.519	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.

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	FCC 47 CFR Part F	2018	Radio Frequency Devices; Subpart F –Ultra Wide Band Devices
II	A2LA	August 2018	R105 - Requirement's When Making Reference to A2LA Accreditation Status
III	ANSI C63.10	2013	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 3 Nov.2012	Expression of Uncertainty and Confidence in Measurements
VII	FCC 47 CFR Part 2.1033	2016	FCC requirements and rules regarding photographs and test setup diagrams.
VIII	KDB 393764 D01 UWB FAQ 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 Alereon AL5932 to FCC CFR 47 Part 15 Subpart F 15.519 Ultra-Wideband (UWB); Hand-Held Device
Applicant:	Alereon Inc. 10800 Pecan Park Blvd, STE 100 Austin, TX 78750 USA
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	ALER02-U4
Date EUT received:	16 th October 2019
Standard(s) applied:	FCC Part 15 Subpart F 15.519
Dates of test (from - to):	16 th – 18 th October 2019
No of Units Tested:	1
Product Name:	AL5932 Catapult
Model(s):	AL5932
Location for use:	Indoors and Outdoors
Declared Frequency Range(s):	3100-10600 MHz
Type of Modulation:	BPM/BPSK
EUT Modes of Operation:	UWB
Declared Nominal Output Power (dBm):	-41.3 dBm
Rated Input Voltage and Current:	5.0 VDC, 180mA
Operating Temperature Range:	-40 ~ +85°C
Equipment Dimensions:	W: 0.710 in. L: 2.335 in. D: 0.267 in
Weight:	0.22 Ozs
Hardware Rev:	2
Software Rev:	28965
Product Application:	Mobile & Portable Client Devices

5.2. Scope Of Test Program

Alereon Inc. Company AL5932 Catapult

The scope of the test program was to test the Alereon Inc. Company AL5932 Catapult configurations in the frequency ranges 3100 - 10600 MHz for compliance against the following specification:

FCC CFR 47 Part 15 Subpart F – 15.519

Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 3100 - 10600 MHz bands.

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

Type (EUT/Support)	Equipment Description (Including Brand Name)	Mfr.	Model No.	Serial No.
EUT	UWB Module with USB interface	Alereon Inc	(AL5932)	19200018
Support	Host Board	Alereon Inc	N/A	N/A
Support	Laptop	Lenovo	N/A	N/A

5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
Chip	Taiyo Yuden	AH086M555003	Patch	1.0/0.2/0.2	N/A	--	No	3168-3696
Chip	Taiyo Yuden	AH086M555003	Patch	0.2/-0.2/0.1	N/A	--	No	6600-7656
Chip	Taiyo Yuden	AH086M555003	Patch	0.1/-1.8/-1.8	N/A	--	No	7656-8712

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

5.5. Cabling and I/O Ports

The Catapult module has a USB interface

5.6. Test Configurations

Results for the following configurations are provided in this report:

Band(s)	Transmission Rate	Channel Frequency (MHz)		
		Low	Mid	High
1	Max	3432	3960	4488
3	Max	6600	7128	7656*
6	Max	7656*	8184	8712

*Please note band group 3 and 6 share the same frequency therefore that channel is only tested once and is reflected in the results.

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

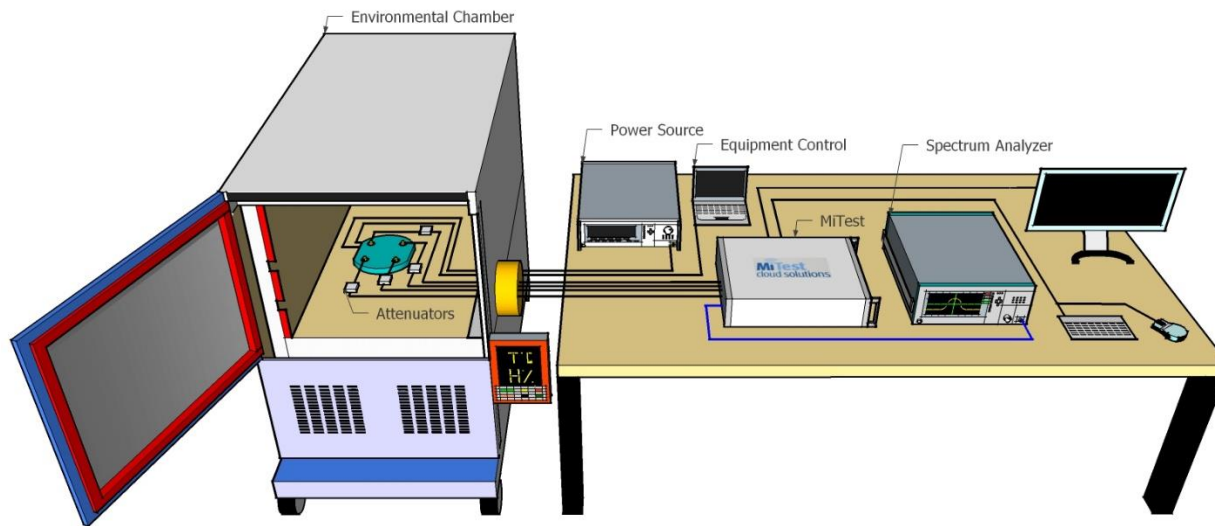
Test Header	Result	Data Link
UWB Bandwidth	Complies	View Data
Peak Power	Complies	View Data
Peak Power Density	Complies	View Data
Spurious Radiated Emissions	Complies	View Data
Spurious Radiated Emissions in GPS Bands	Complies	View Data
Shutdown Timing Requirements	Complies	View Data
AC Wire line Emissions	*Not Applicable	--
Comments: None		

*Note EUT is battery powered

7. TEST EQUIPMENT CONFIGURATION(S)

7.1. Conducted Test Setup

MiTest Automated Test System



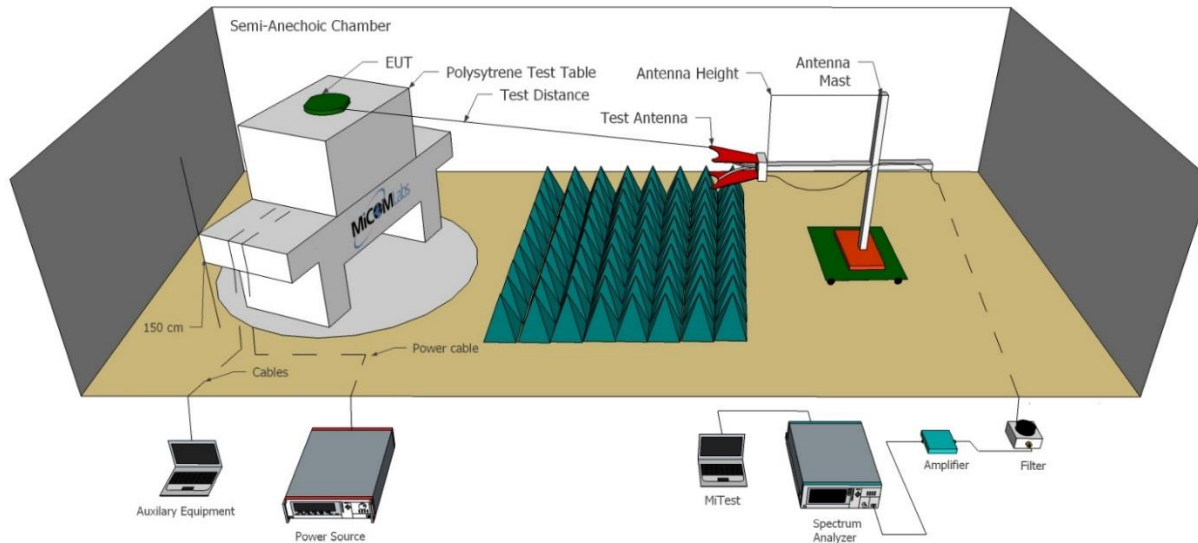
A full system calibration was performed on the test station and any resulting system losses (or gains) were considered in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
249	Resistance Thermometer	Thermotronics	GR2105-02	9340 #2	30 Oct 2019
361	Desktop for RF#1, Labview Software installed	Dell	Vostro 220	WS RF#1	Not Required
378	Rohde & Schwarz 40 GHz Receiver with Generator	Rhode & Schwarz	ESIB40	100107/040	12 Oct 2020
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
445	PoE Injector	D-Link	DPE-101GL	QTAH1E2000625	Not Required
510	Barometer/Thermometer	Control Company	68000-49	170871375	11 Dec 2019
75	Environmental Chamber	Thermatron	SE-300-2-2	27946	24 Feb 2020

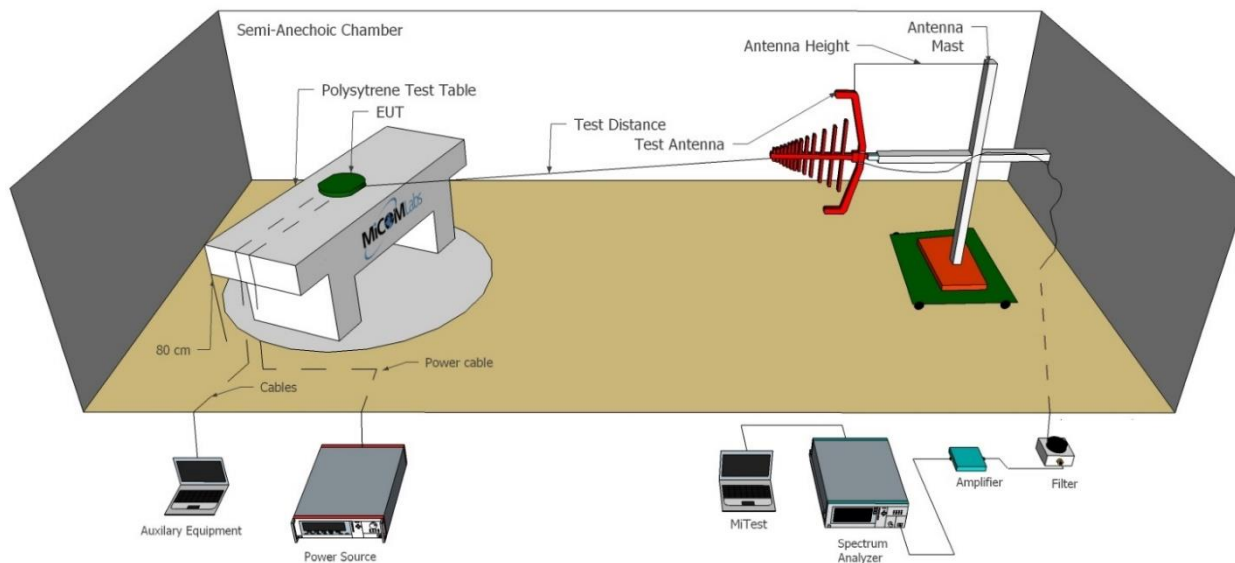
7.2. Radiated Emissions - 3m Chamber

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
107	26–40 GHz Horn Antenna	Millimeter Products	261A	None	15 Jan 2020
145	18–26 GHz Horn Antenna	Millimeter Products	261K	None	15 Jan 2020
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CU101	04R08507	Not Required
298	3M Radiated Emissions Chamber Maintenance Check	MiCOM	3M Chamber	298	21 Apr 2020
336	Active Loop Antenna	Emco	6502	00060498	29 Nov 2019
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	4 Apr 2020
378	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100107/040	12 Oct 2020
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	12 Apr 2020
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	12 Nov 2019
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	12 Apr 2020
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
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
447	MiTest Rad Emissions Test Software	MiCOM	Test Software Version 1.0	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	5 Sep 2020
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	5 Sep 2020
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	9 Sep 2020
465	Low Pass Filter DC-1000 MHz	Mini-Circuits	NLP-1200+	VUU01901402	3 Sep 2020
480	Cable - Bulkhead to Amp	SRC Haverhill	157-3050360	480	9 Sep 2020
481	Cable - Bulkhead to Receiver	SRC Haverhill	151-3050787	481	9 Sep 2020
510	Barometer/Thermometer	Control Company	68000-49	170871375	20 Dec 2019
518	Cable - Amp to Antenna	SRC Haverhill	157-3051574	518	9 Sep 2020

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

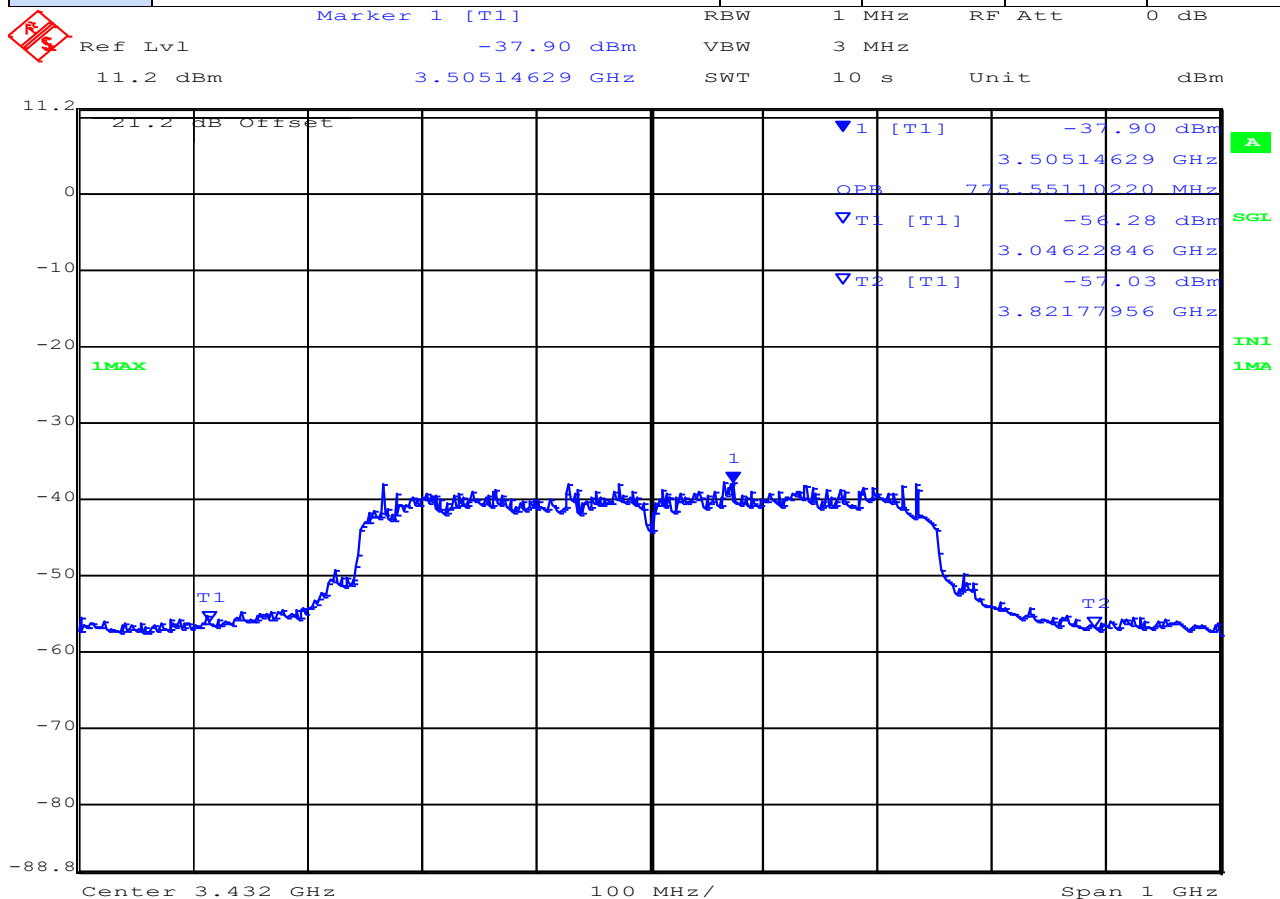
9.1. USB Bandwidth

Conducted Test Conditions for UWB Bandwidth			
Standard:	FCC CFR 47:15.519	Ambient Temp. (°C):	24.0 - 27.5
Test Heading:	UWB Bandwidth	Rel. Humidity (%):	32 - 45
Standard Section(s):	ANSI C63.10 Section 10.1	Pressure (mBars):	999 - 1001
Reference Document(s):	See Normative References		
Test Procedure for UWB Bandwidth Measurement The UWB 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 UWB Bandwidth

Variant:	UWB	Duty Cycle (%):	100
Data Rate:	-	Antenna Gain (dBi):	1.0/0.2/0.2
Modulation:	--	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Frequency	Measured Bandwidth (MHz)	Bandwidth (MHz)			
MHz	Port A	Highest	Lowest		
3432.00	775.551	775.551	775.551		



Date: 17.OCT.2019 11:27:57

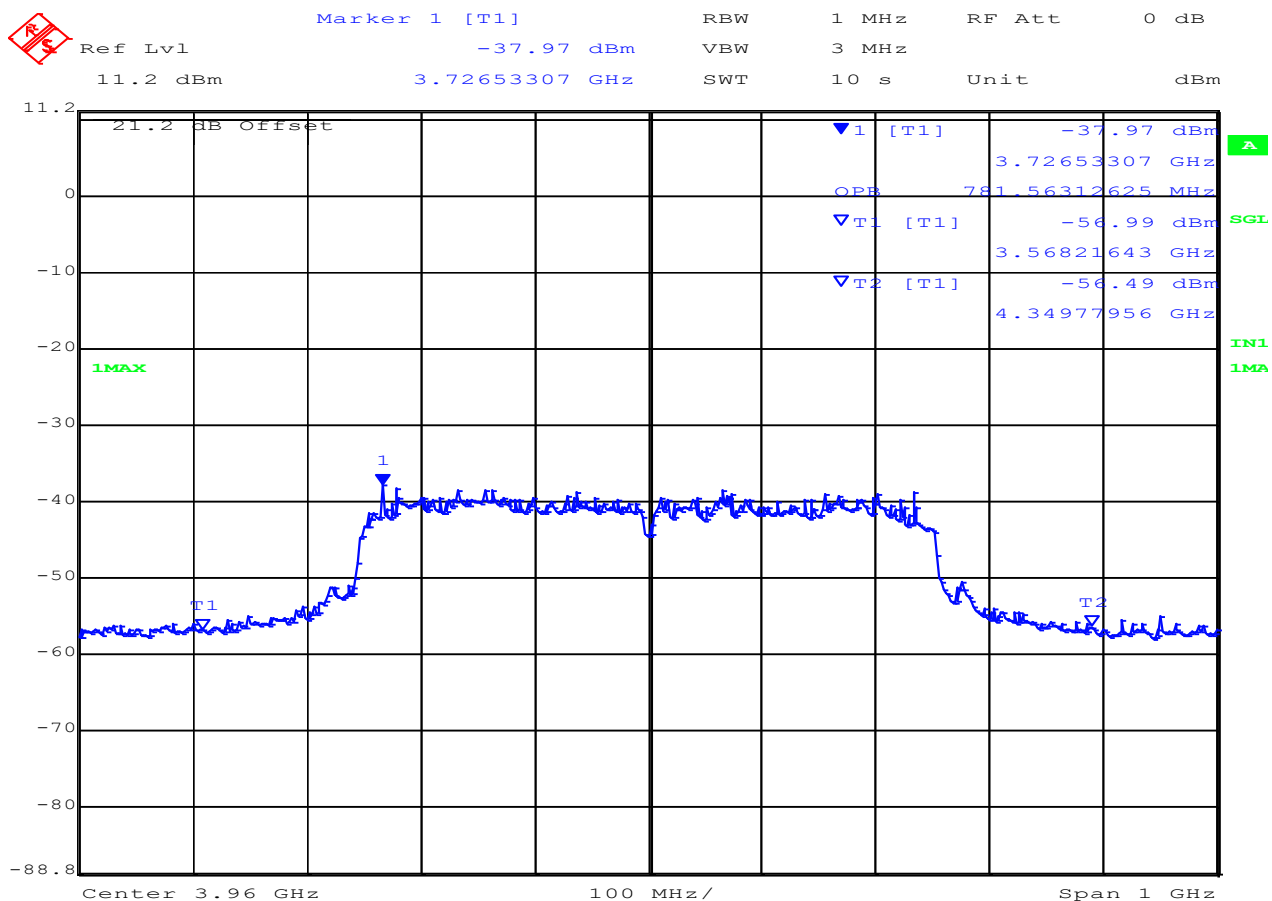
Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

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

Equipment Configuration for UWB Bandwidth

Variant:	UWB	Duty Cycle (%):	100
Data Rate:	-	Antenna Gain (dBi):	1.0/0.2/0.2
Modulation:	--	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Frequency	Measured Bandwidth (MHz)	Bandwidth (MHz)			
MHz	Port A	Highest	Lowest		
3960.00	781.56	781.56	781.56		



Date: 17.OCT.2019 11:28:57

Traceability to Industry Recognized Test Methodologies

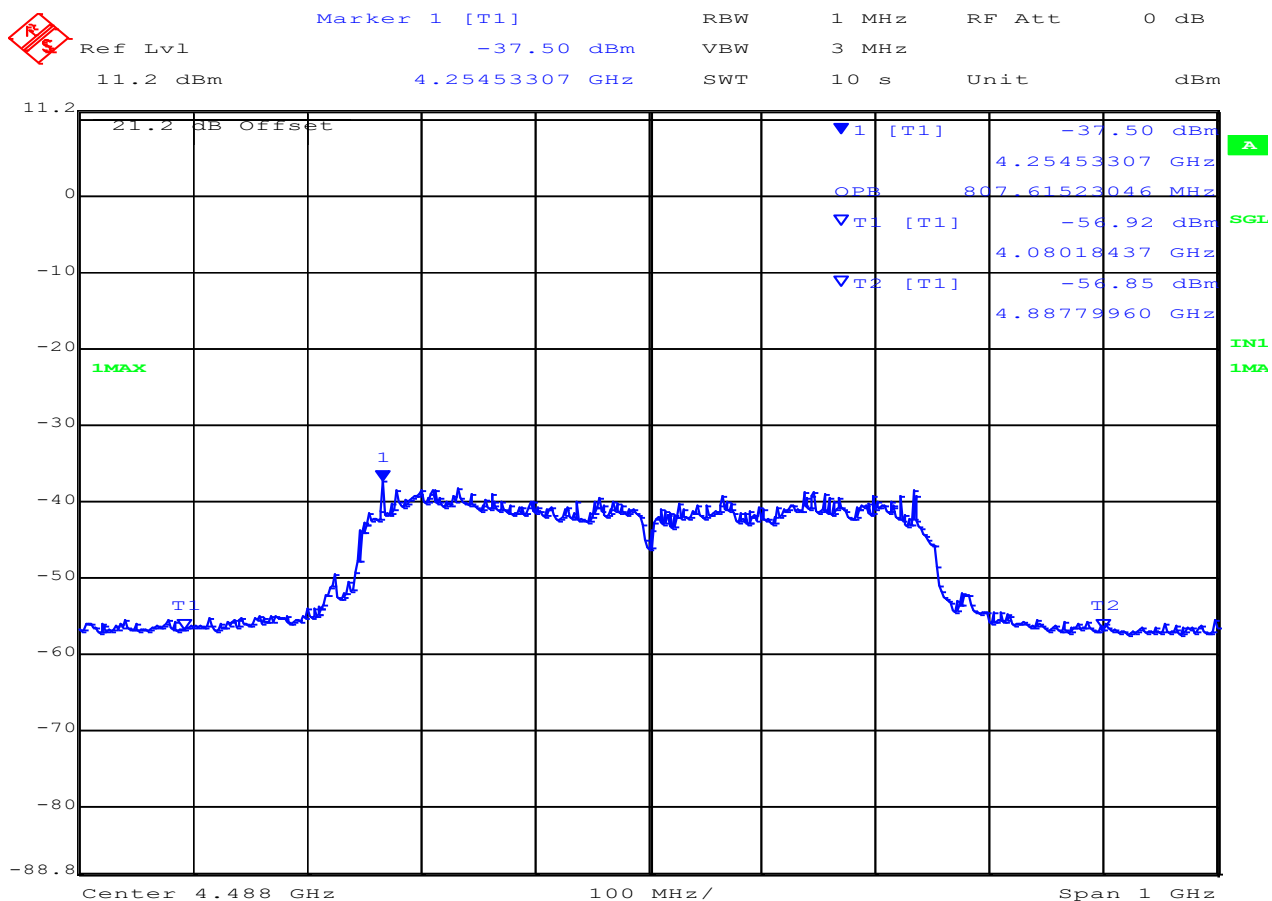
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

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

Equipment Configuration for UWB Bandwidth

Variant:	UWB	Duty Cycle (%):	100
Data Rate:	-	Antenna Gain (dBi):	1.0/0.2/0.2
Modulation:	--	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Frequency	Measured Bandwidth (MHz)	Bandwidth (MHz)			
MHz	Port A	Highest	Lowest		
4488.00	887.61	887.61	887.61		



Date: 17.OCT.2019 11:29:41

Traceability to Industry Recognized Test Methodologies

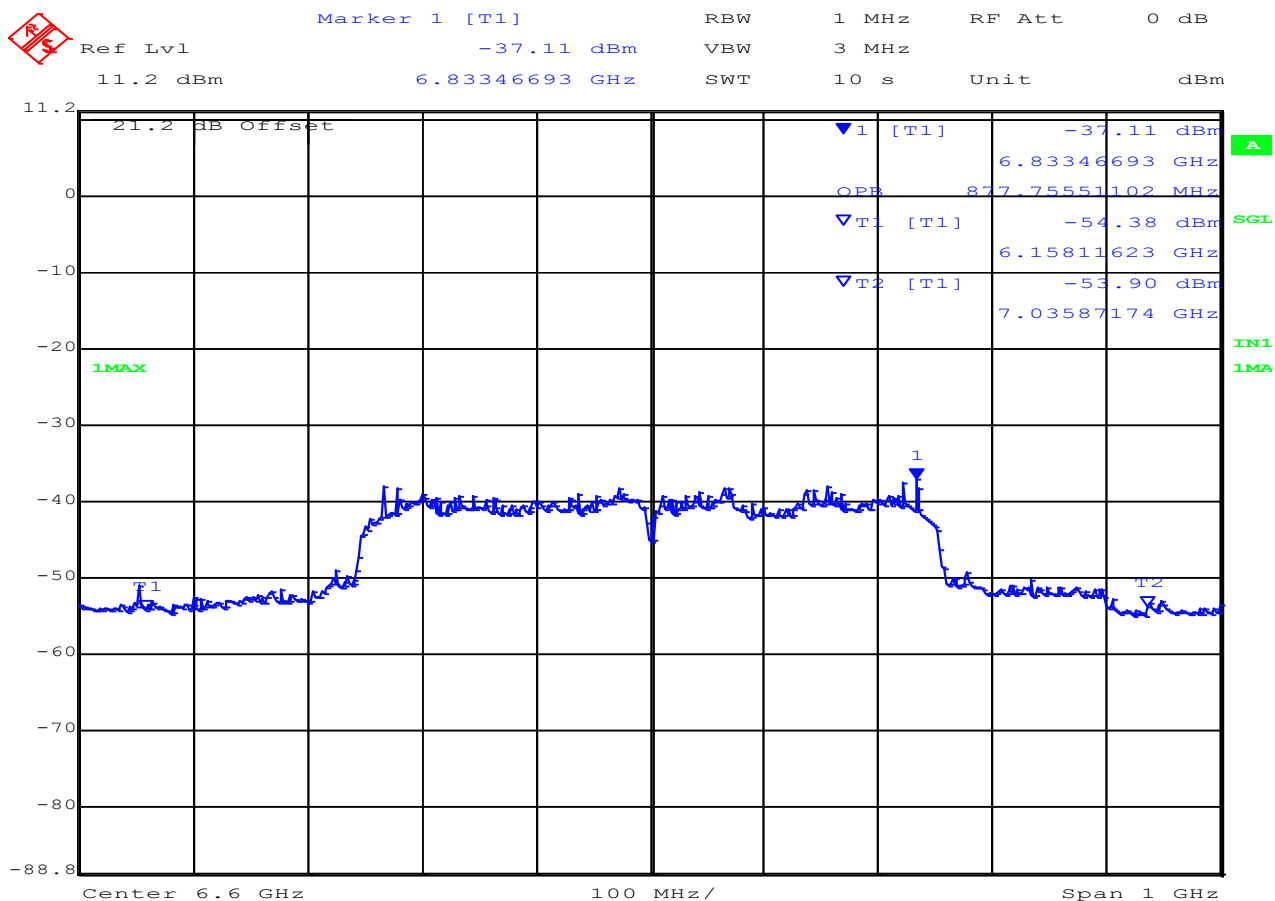
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

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

Equipment Configuration for UWB Bandwidth

Variant:	UWB	Duty Cycle (%):	100
Data Rate:	-	Antenna Gain (dBi):	0.2/-0.2/0.1
Modulation:	--	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Frequency	Measured Bandwidth (MHz)	Bandwidth (MHz)			
MHz	Port A	Highest	Lowest		
6600.00	877.75	877.75	877.75		



Date: 17.OCT.2019 11:30:34

Traceability to Industry Recognized Test Methodologies

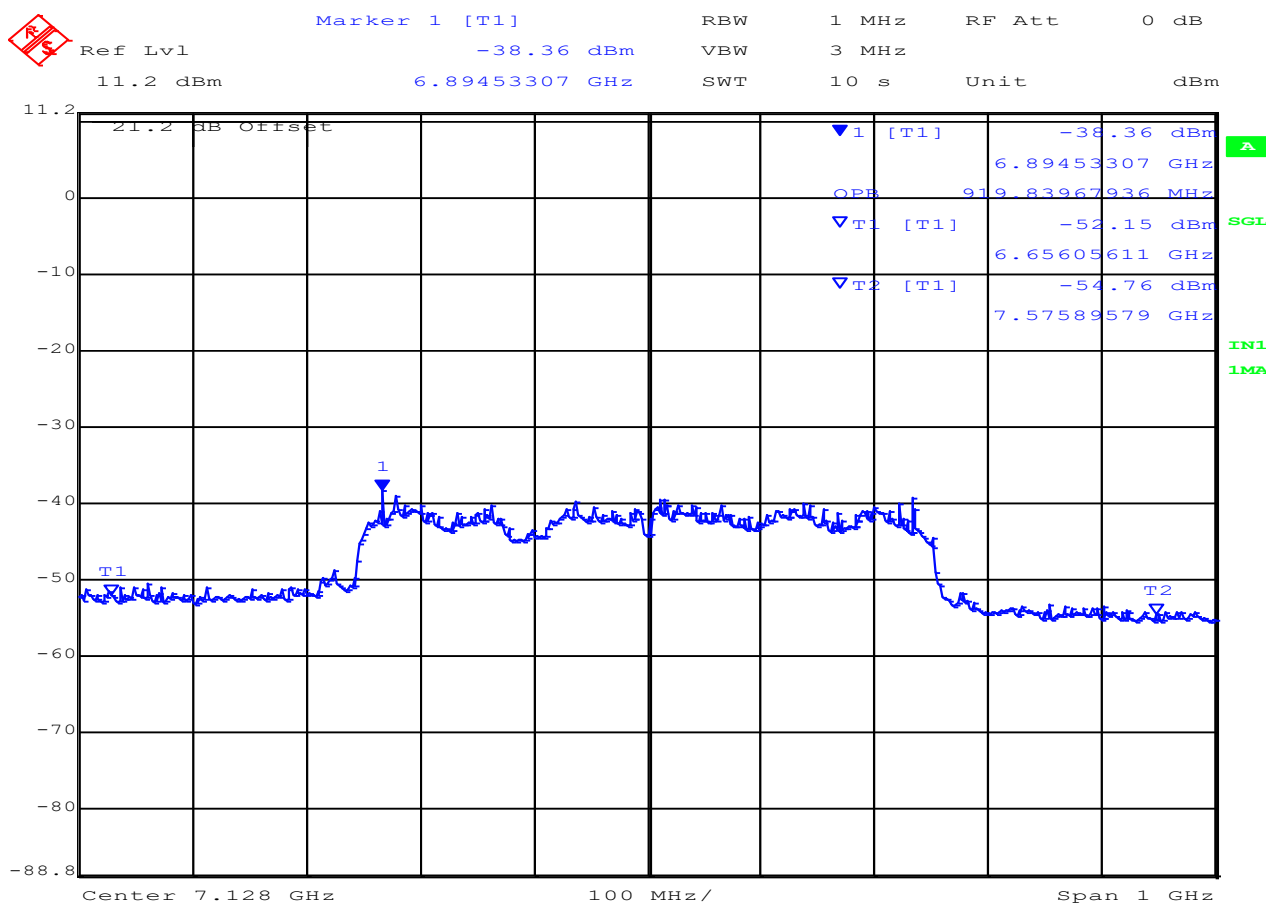
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

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

Equipment Configuration for UWB Bandwidth

Variant:	UWB	Duty Cycle (%):	100
Data Rate:	-	Antenna Gain (dBi):	0.2/-0.2/0.1
Modulation:	--	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Frequency	Measured Bandwidth (MHz)	Bandwidth (MHz)			
MHz	Port A	Highest	Lowest		
7128.00	919.83	919.83	919.83		



Date: 17.OCT.2019 11:32:45

Traceability to Industry Recognized Test Methodologies

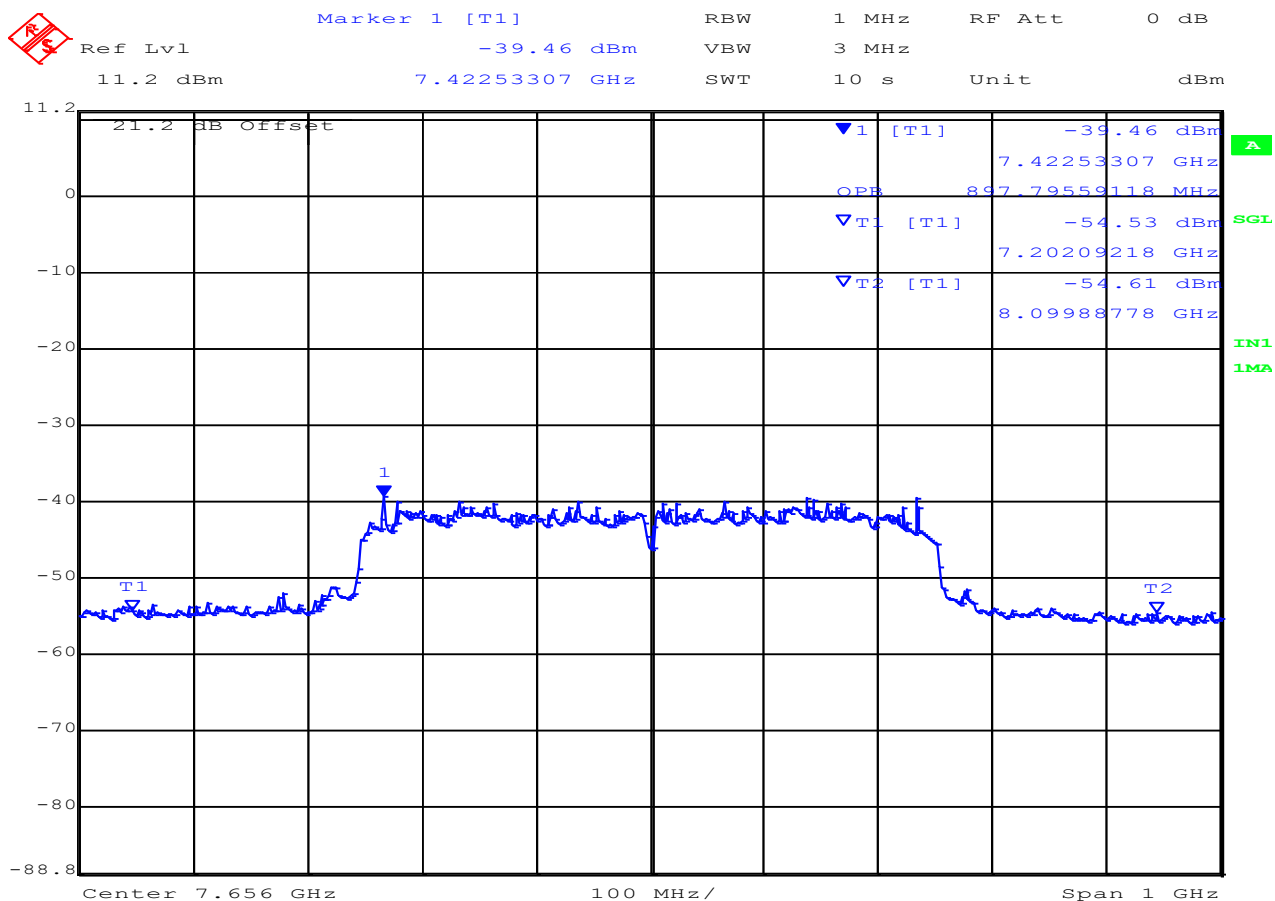
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

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

Equipment Configuration for UWB Bandwidth

Variant:	UWB	Duty Cycle (%):	100
Data Rate:	-	Antenna Gain (dBi):	0.2/-0.2/0.1
Modulation:	--	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Frequency	Measured Bandwidth (MHz)	Bandwidth (MHz)			
MHz	Port A	Highest	Lowest		
7656.00	897.79	897.79	897.79		



Date: 17.OCT.2019 11:33:36

Traceability to Industry Recognized Test Methodologies

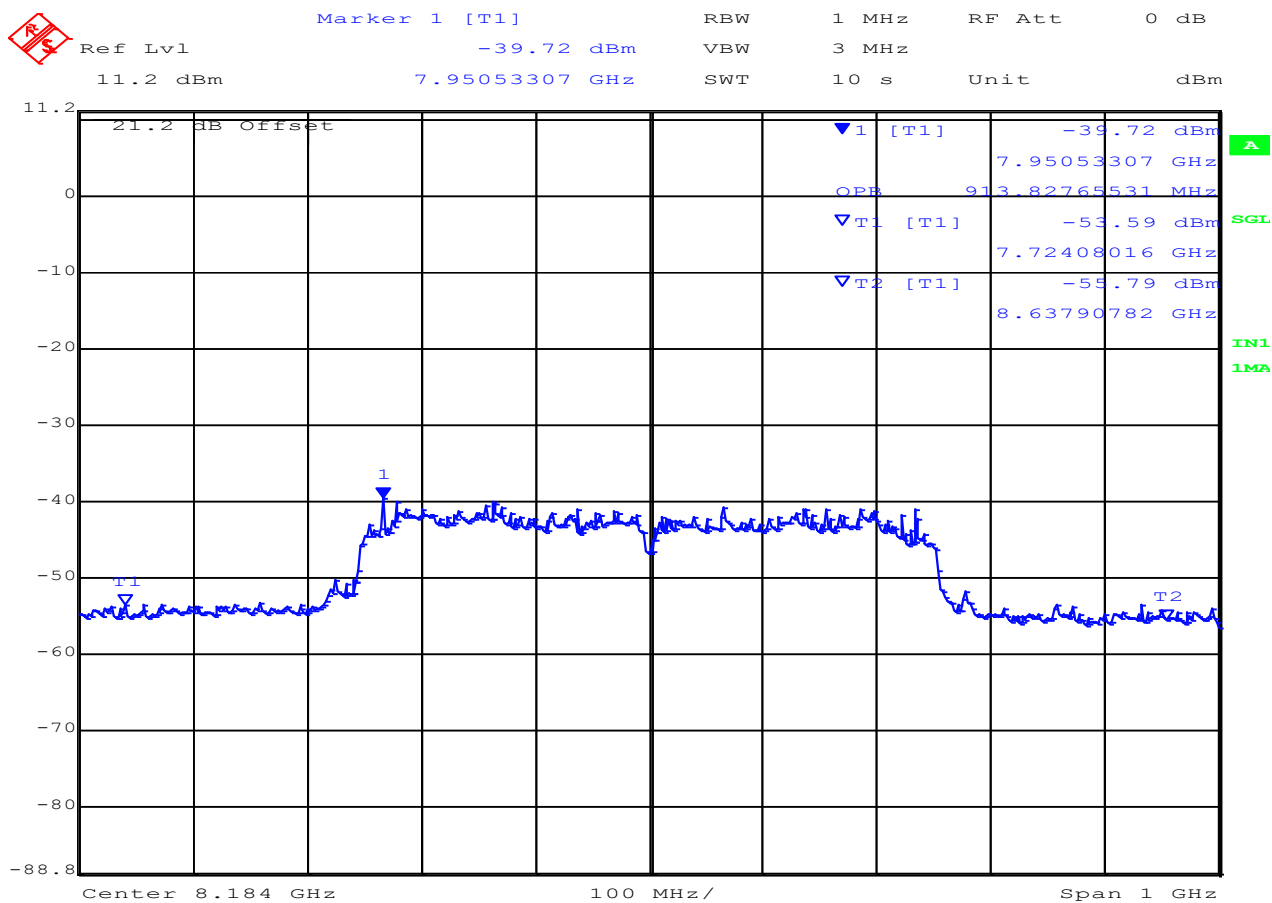
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

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

Equipment Configuration for UWB Bandwidth

Variant:	UWB	Duty Cycle (%):	100
Data Rate:	-	Antenna Gain (dBi):	0.1/-1.8/-1.8
Modulation:	--	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Frequency	Measured Bandwidth (MHz)	Bandwidth (MHz)			
MHz	Port A	Highest	Lowest		
8184.00	913.82	913.82	913.82		



Date: 17.OCT.2019 11:34:20

Traceability to Industry Recognized Test Methodologies

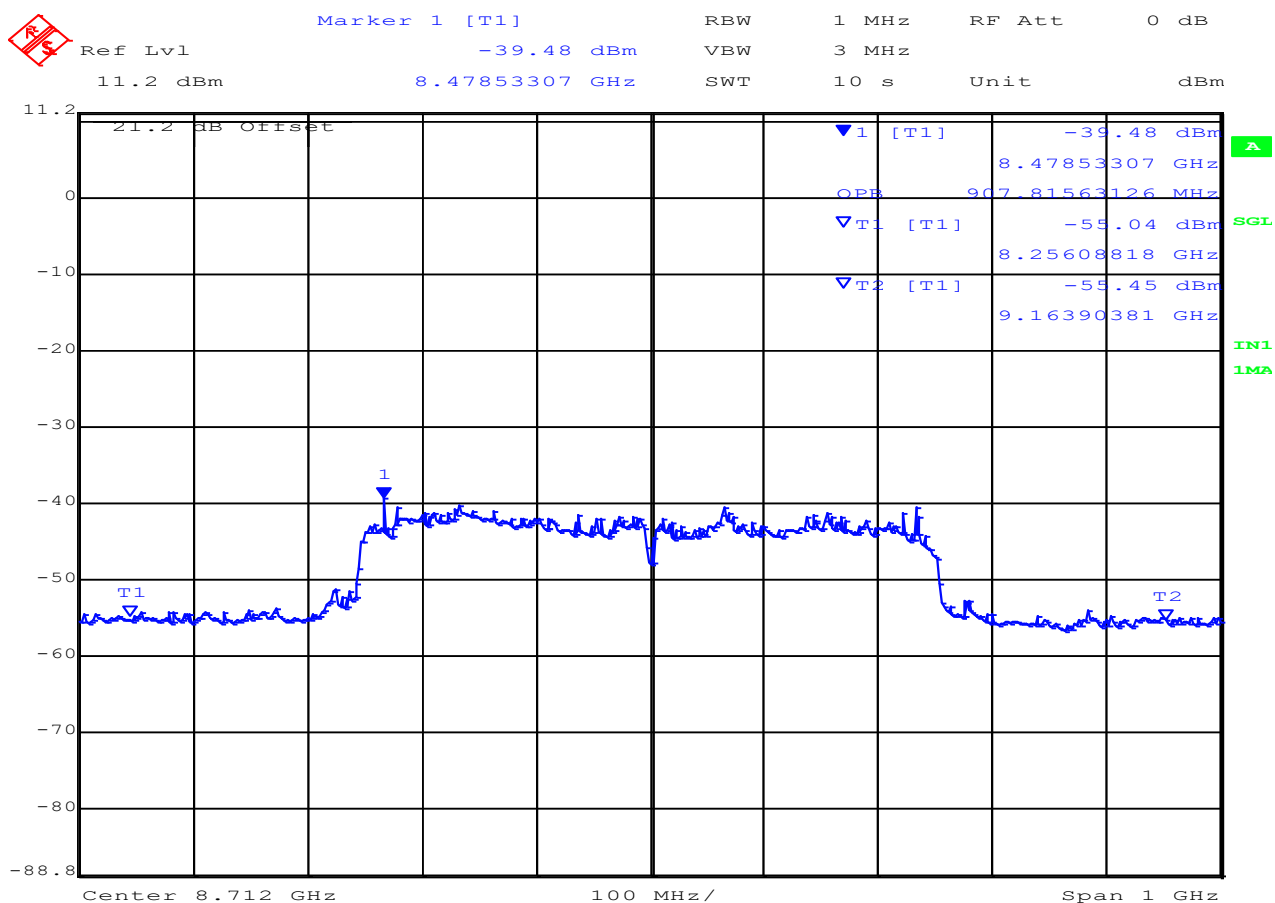
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

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

Equipment Configuration for UWB Bandwidth

Variant:	UWB	Duty Cycle (%):	100
Data Rate:	-	Antenna Gain (dBi):	0.1/-1.8/-1.8
Modulation:	--	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Frequency	Measured Bandwidth (MHz)	Bandwidth (MHz)			
MHz	Port A	Highest	Lowest		
8712.00	997.81	997.81	997.81		



Date: 17.OCT.2019 11:34:55

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.

9.2. Transmit Power

Conducted Test Conditions for Maximum Radiated Output Power									
Standard:	FCC CFR 47:15.519 (c)	Ambient Temp. (°C):	24.0 - 27.5						
Test Heading:	Radiated Emissions UWB Transmission	Rel. Humidity (%):	32 - 45						
Standard Section(s):	ANSI C63.10 Section 10.3.5	Pressure (mBars):	999 - 1001						
Reference Document(s):	None								
Test Procedure for UWB 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: 3100-10600 MHz Limits Maximum EIRP (dBm) <table><tr><th>Frequency (MHz)</th><th>EIRP Limit (dBm)</th><th>EIRP at 3 Meters (dBuv/m)</th></tr><tr><td>3100 - 10600</td><td>-41.3</td><td>53.9</td></tr></table>				Frequency (MHz)	EIRP Limit (dBm)	EIRP at 3 Meters (dBuv/m)	3100 - 10600	-41.3	53.9
Frequency (MHz)	EIRP Limit (dBm)	EIRP at 3 Meters (dBuv/m)							
3100 - 10600	-41.3	53.9							

Equipment Configuration for RF Output Power

Variant:	Band Group 1	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	1.0/0.2/0.2
Modulation:	BPM/BPSK	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency MHz	Measured Output Power(dBm)	Limit	Margin	EUT Power Setting
	Port A	dBm	Numeric	Numeric
3432.00	-42.37	-41.3	-1.07	Max
3960.00	-42.28	-41.3	-0.98	Max
4488.00	-42.62	-41.3	-1.32	Max

Traceability to Industry Recognized Test Methodologies

Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

Equipment Configuration for RF Output Power

Variant:	Band Group 3	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	0.2/-0.2/0.1
Modulation:	BPM/BPSK	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency MHz	Measured Output Power(dBm)	Limit	Margin	EUT Power Setting
	Port A	dBm	Numeric	Numeric
6600.00	-41.89	-41.3	-0.59	Max
7128.00	-43.53	-41.3	-2.23	Max
7656.00	-41.34	-41.3	-0.04	Max

Traceability to Industry Recognized Test Methodologies

Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

Equipment Configuration for RF Output Power

Variant:	Band Group 6	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	0.1/-1.8/-1.8
Modulation:	BPM/BPSK	Beam Forming Gain (Y)(dB):	Not Applicable
TPC:	Not Applicable	Tested By:	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency MHz	Measured Output Power(dBm)	Limit	Margin	EUT Power Setting
	Port A	dBm	Numeric	Numeric
7656.00	-41.34	-41.3	-0.04	Max
8184.00	-41.92	-41.3	-0.62	Max
8712.00	-41.31	-41.3	-0.01	Max

Traceability to Industry Recognized Test Methodologies

Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

9.3. Peak Power Density

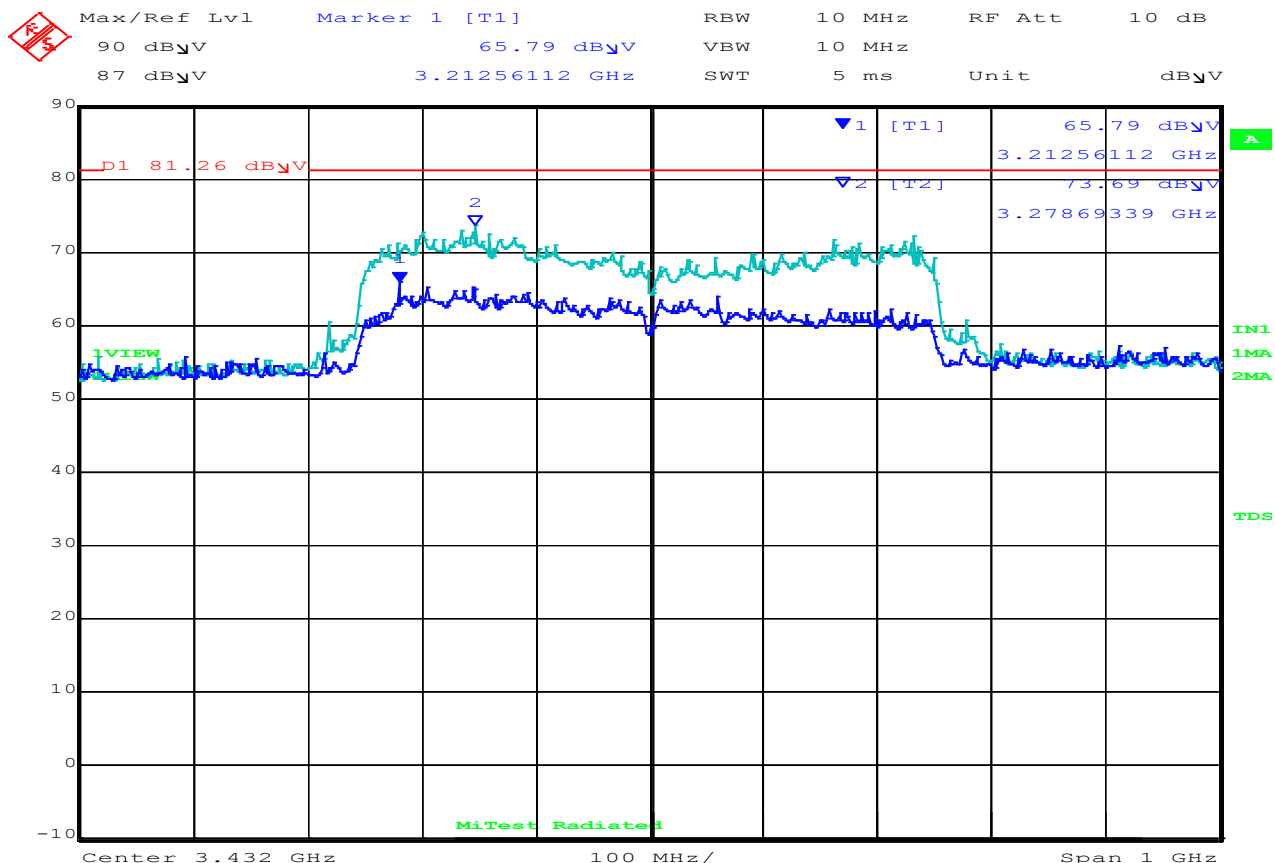
Test Conditions for Maximum Peak Power Density			
Standard:	FCC CFR 47:15.519 (e)	Ambient Temp. (°C):	24.0 - 27.5
Test Heading:	Radiated Emissions UWB Transmission	Rel. Humidity (%):	32 - 45
Standard Section(s):	ANSI C63.10 Section 10.3.6	Pressure (mBars):	999 - 1001
Reference Document(s):	None		
Test Procedure for UWB 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.			
Measurements were gathered with a RBW of 1MHz and converted to 50MHz using the following formula:			
$\text{EIRP}_{1\text{ MHz}} = \text{EIRP}_{50\text{ MHz}} + 20\log(1\text{MHz}/50\text{MHz}) = 0\text{dBm} + (-34\text{dBm}) = -34\text{dBm}$			
$(\text{dBuV/m}) = \text{P(e.i.r.p. (dBm))} + 95.2$			
Operating Frequency Band:			
3100-10600 MHz			
Limits Maximum EIRP (dBm)			
Frequency (MHz)	EIRP Limit (dBm/50MHz)	EIRP Limit (dBm/10MHz)	EIRP Limit (dBuV10MHz)
3100 - 10600	0	-13.97	81.26

Equipment Configuration for Peak Power Density

Variant:	UWB	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	1.0/0.2/0.2
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 (dBuV)	Polarity	Limit (dBuV)	Margin (dB)	EUT Power Setting
3432.00	73.69	Horizontal	81.26	-7.57	Max



Date: 16.OCT.2019 12:10:13

Traceability to Industry Recognized Test Methodologies

Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

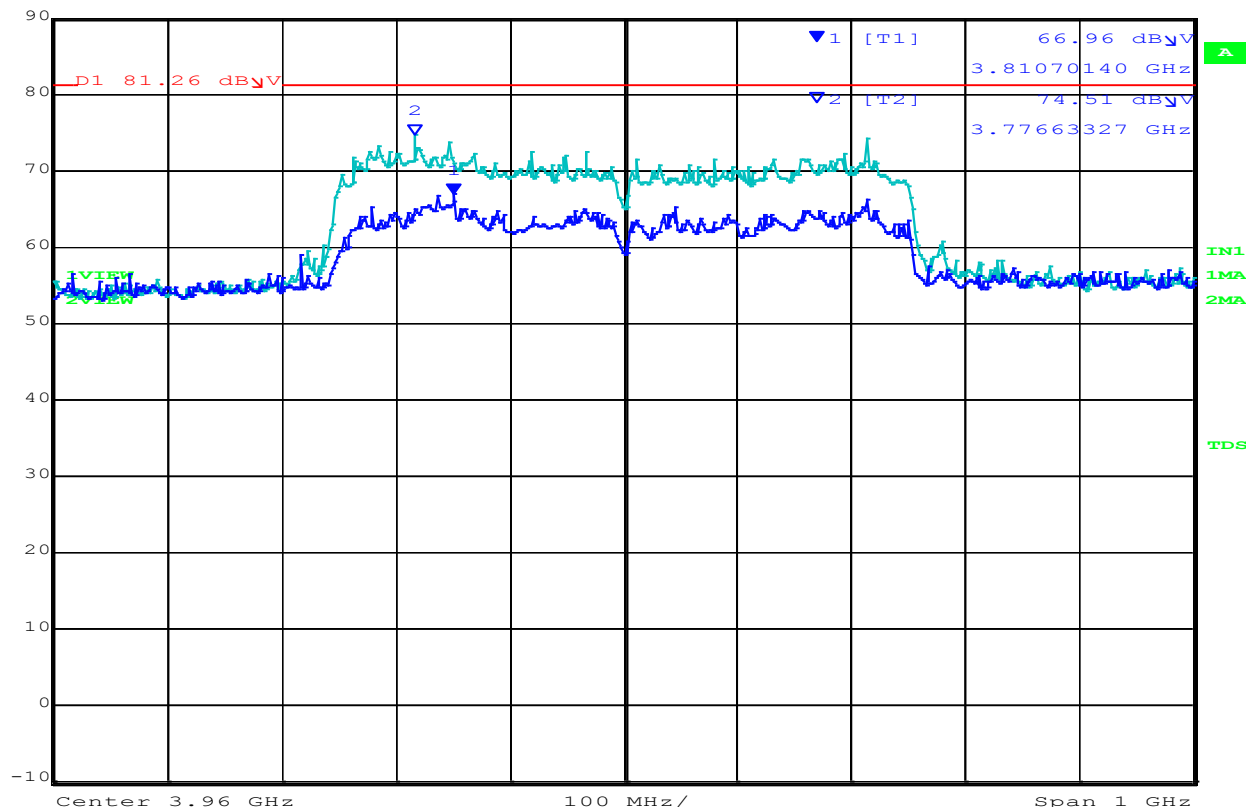
Equipment Configuration for Peak Power Density

Variant:	UWB	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	1.0/0.2/0.2
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 (dBuV)	Polarity	Limit (dBuV)	Margin (dB)	EUT Power Setting
3960.00	74.51	Horizontal	81.26	-6.75	Max


 Max/Ref Lvl Marker 1 [T1] RBW 10 MHz RF Att 10 dB
 90 dBuV 66.96 dBuV VBW 10 MHz
 87 dBuV 3.81070140 GHz SWT 5 ms Unit dBuV



Date: 16.OCT.2019 13:31:33

Traceability to Industry Recognized Test Methodologies

Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

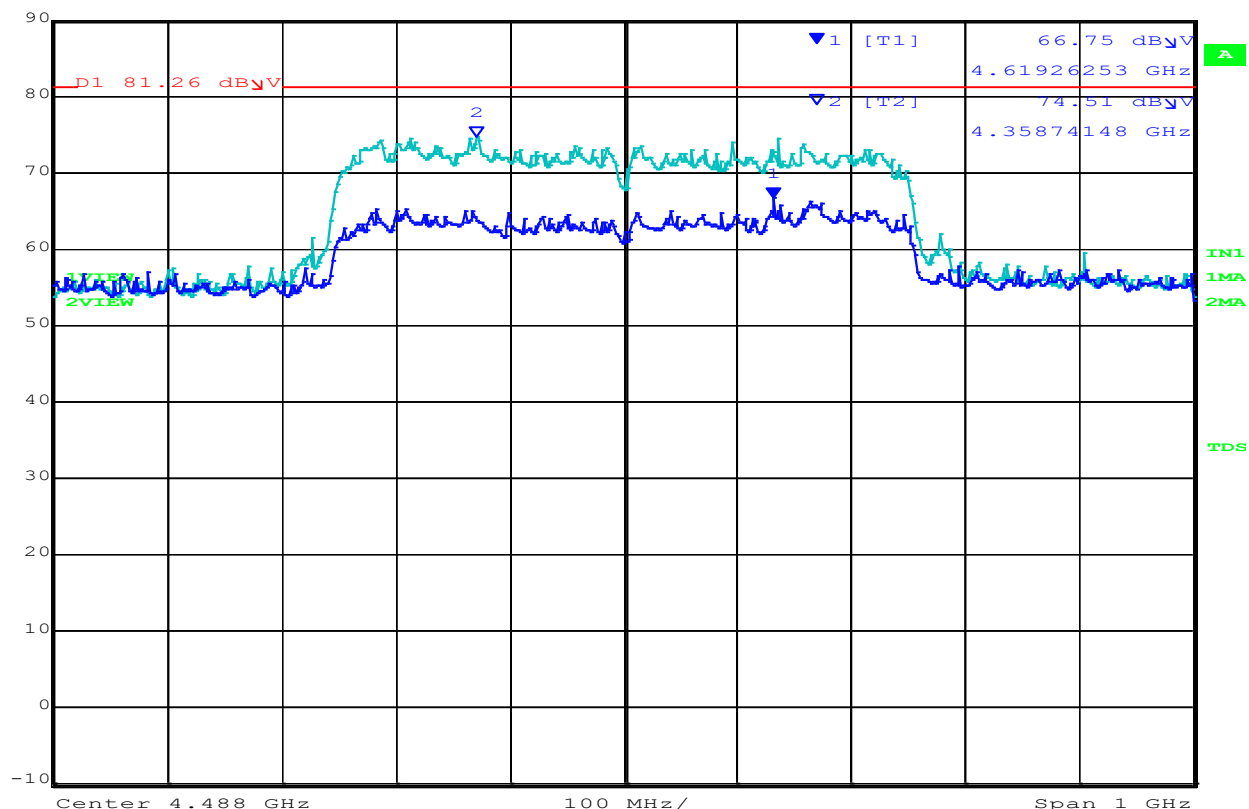
Equipment Configuration for Peak Power Density

Variant:	UWB	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	1.0/0.2/0.2
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 (dBuV)	Polarity	Limit (dBuV)	Margin (dB)	EUT Power Setting
4488.00	74.51	Horizontal	81.26	-6.75	Max


 Max/Ref Lvl Marker 1 [T1] RBW 10 MHz RF Att 10 dB
 90 dBuV 66.75 dBuV VBW 10 MHz
 87 dBuV 4.61926253 GHz SWT 5 ms Unit dBuV



Date: 16.OCT.2019 15:12:55

Traceability to Industry Recognized Test Methodologies

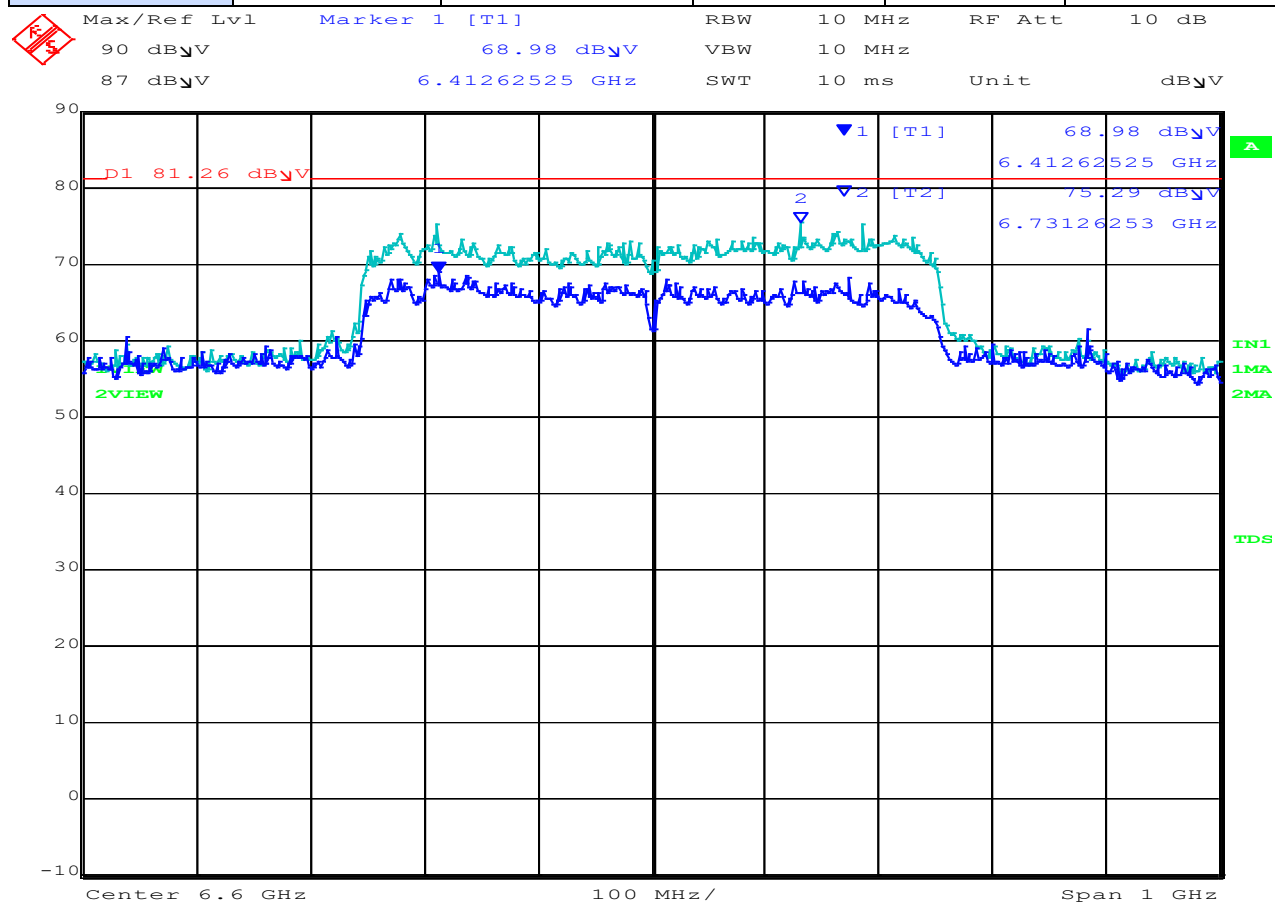
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

Equipment Configuration for Peak Power Density

Variant:	UWB	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	0.2/-0.2/0.1
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 (dBuV)	Polarity	Limit (dBuV)	Margin (dB)	EUT Power Setting
6600.00	75.29	Horizontal	81.26	-5.97	Max



Date: 16.OCT.2019 15:41:04

Traceability to Industry Recognized Test Methodologies

Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

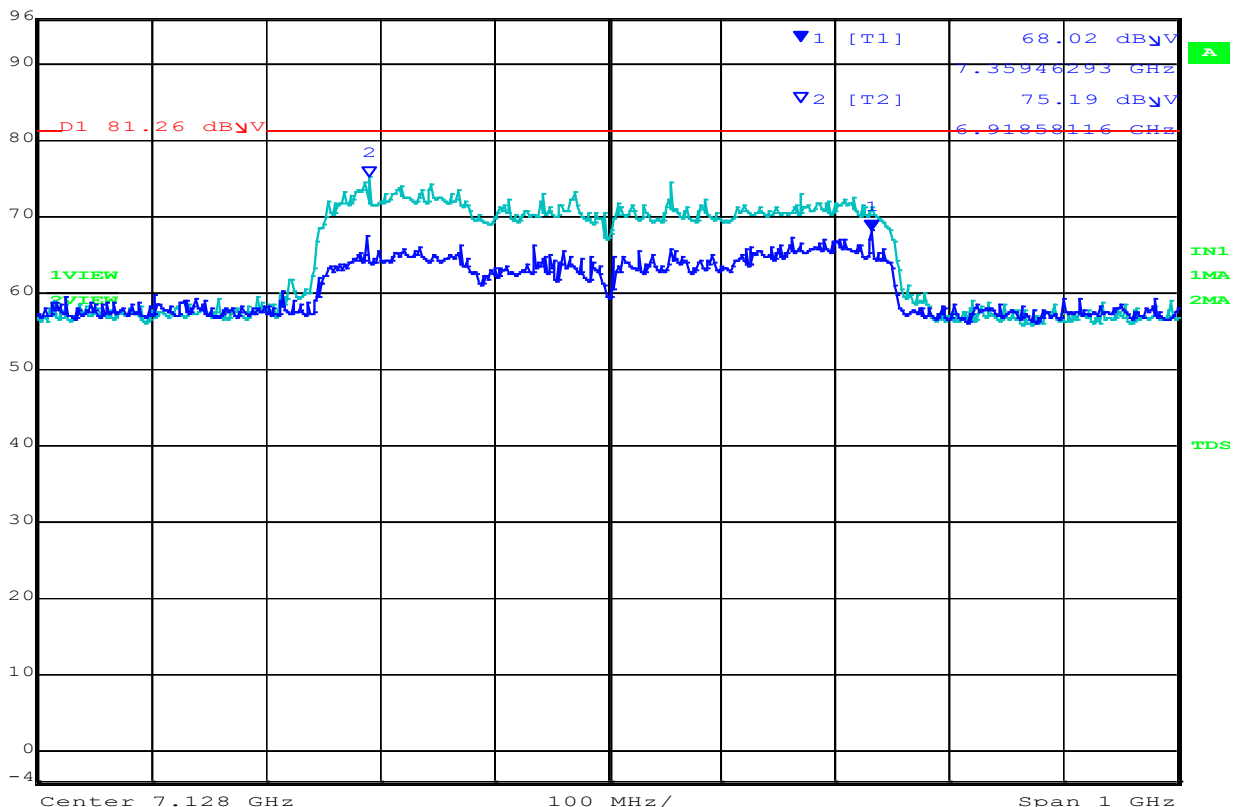
Equipment Configuration for Peak Power Density

Variant:	UWB	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	0.2/-0.2/0.1
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 (dBuV)	Polarity	Limit (dBuV)	Margin (dB)	EUT Power Setting
7128.00	75.19	Horizontal	81.26	-6.07	Max


 Max/Ref Lvl Marker 1 [T1] RBW 10 MHz RF Att 10 dB
 96 dBuV 68.02 dBuV VBW 10 MHz
 93 dBuV 7.35946293 GHz SWT 10 ms Unit dBuV



Date: 17.OCT.2019 09:22:17

Traceability to Industry Recognized Test Methodologies

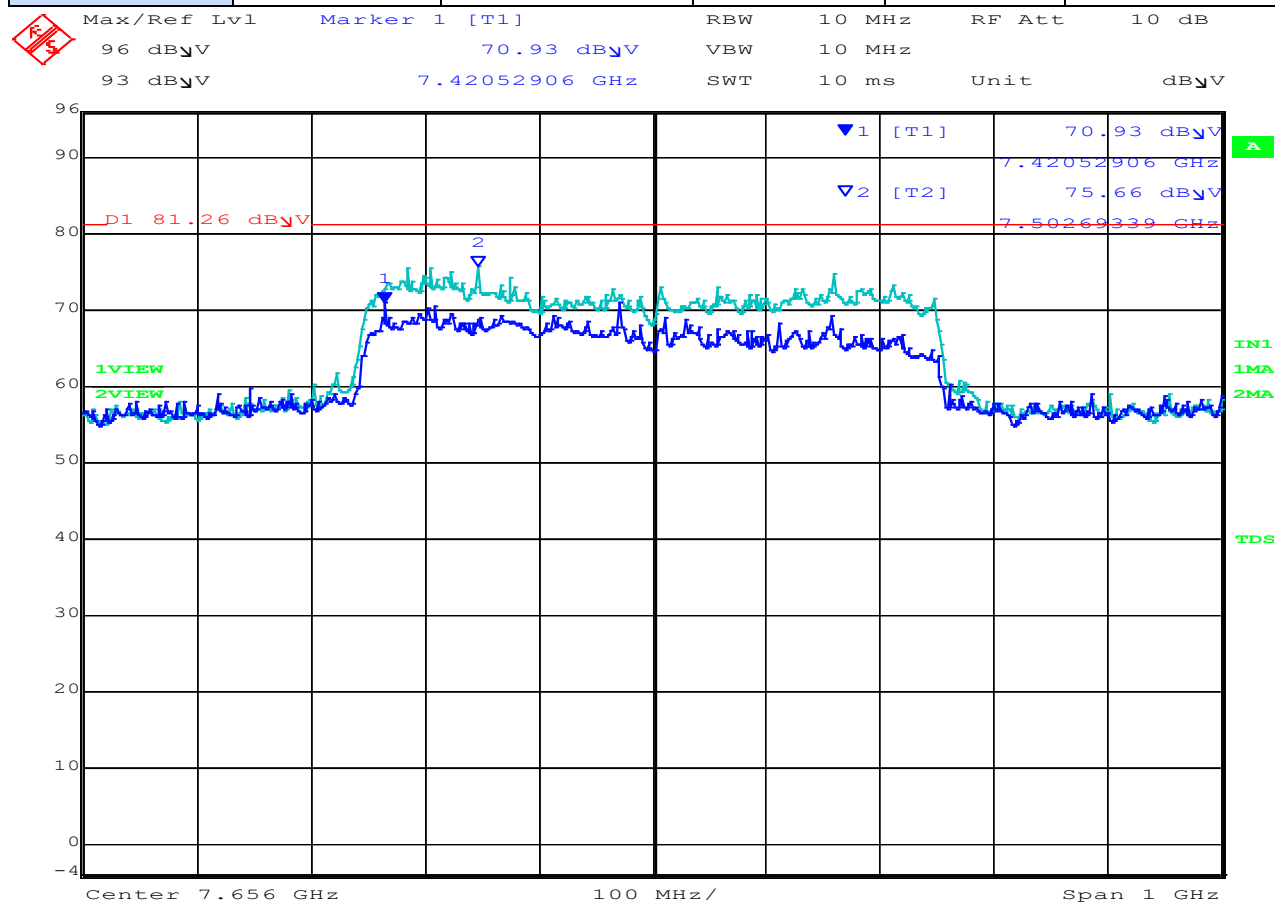
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

Equipment Configuration for Peak Power Density

Variant:	UWB	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	0.2/-0.2/0.1
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 (dBuV)	Polarity	Limit (dBuV)	Margin (dB)	EUT Power Setting
7656.00	75.66	Horizontal	81.26	-5.6	Max



Date: 17.OCT.2019 09:38:44

Traceability to Industry Recognized Test Methodologies

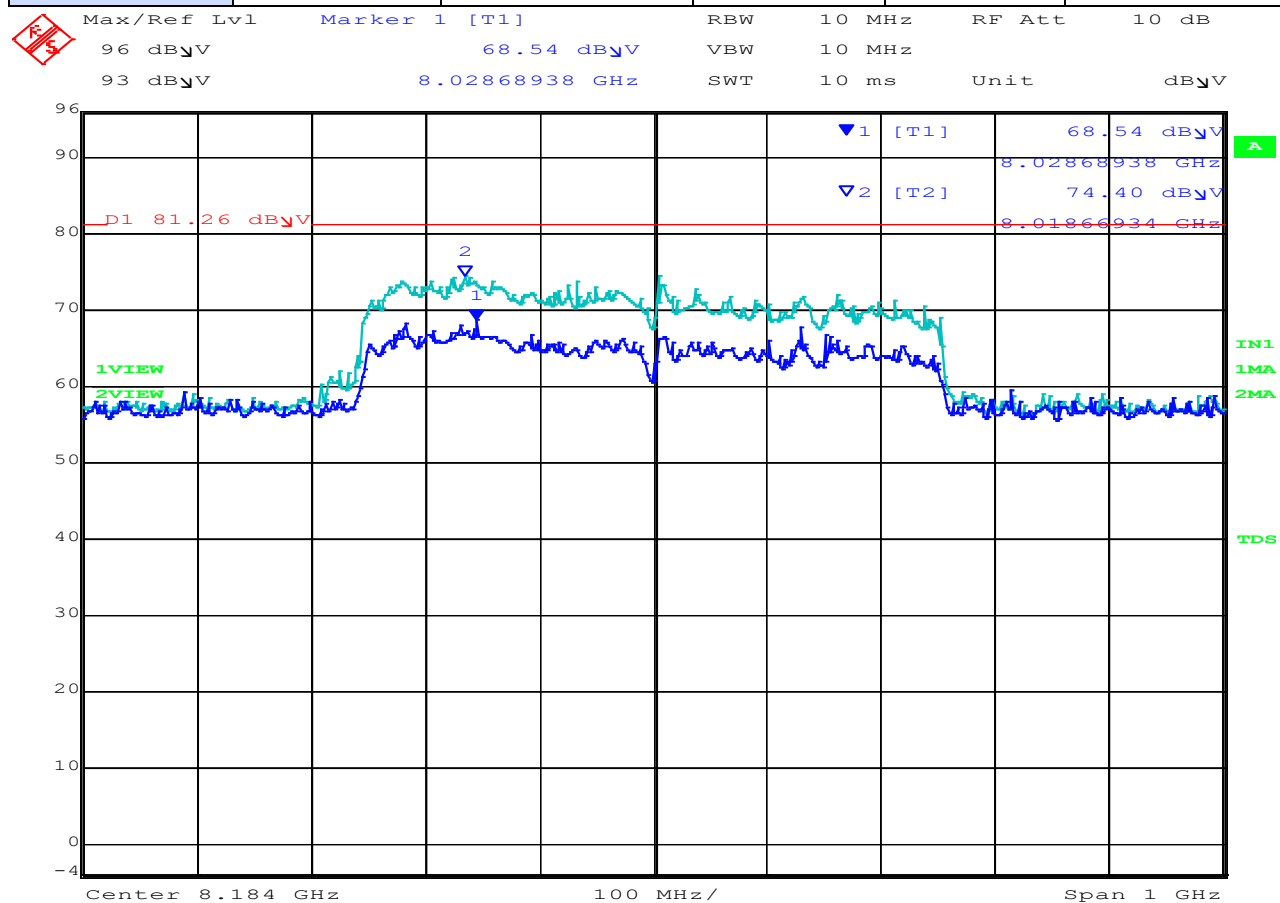
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

Equipment Configuration for Peak Power Density

Variant:	UWB	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	0.1/-1.8/-1.8
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 (dBuV)	Polarity	Limit (dBuV)	Margin (dB)	EUT Power Setting
8184.00	74.40	Horizontal	81.26	-6.86	Max



Date: 17.OCT.2019 10:30:51

Traceability to Industry Recognized Test Methodologies

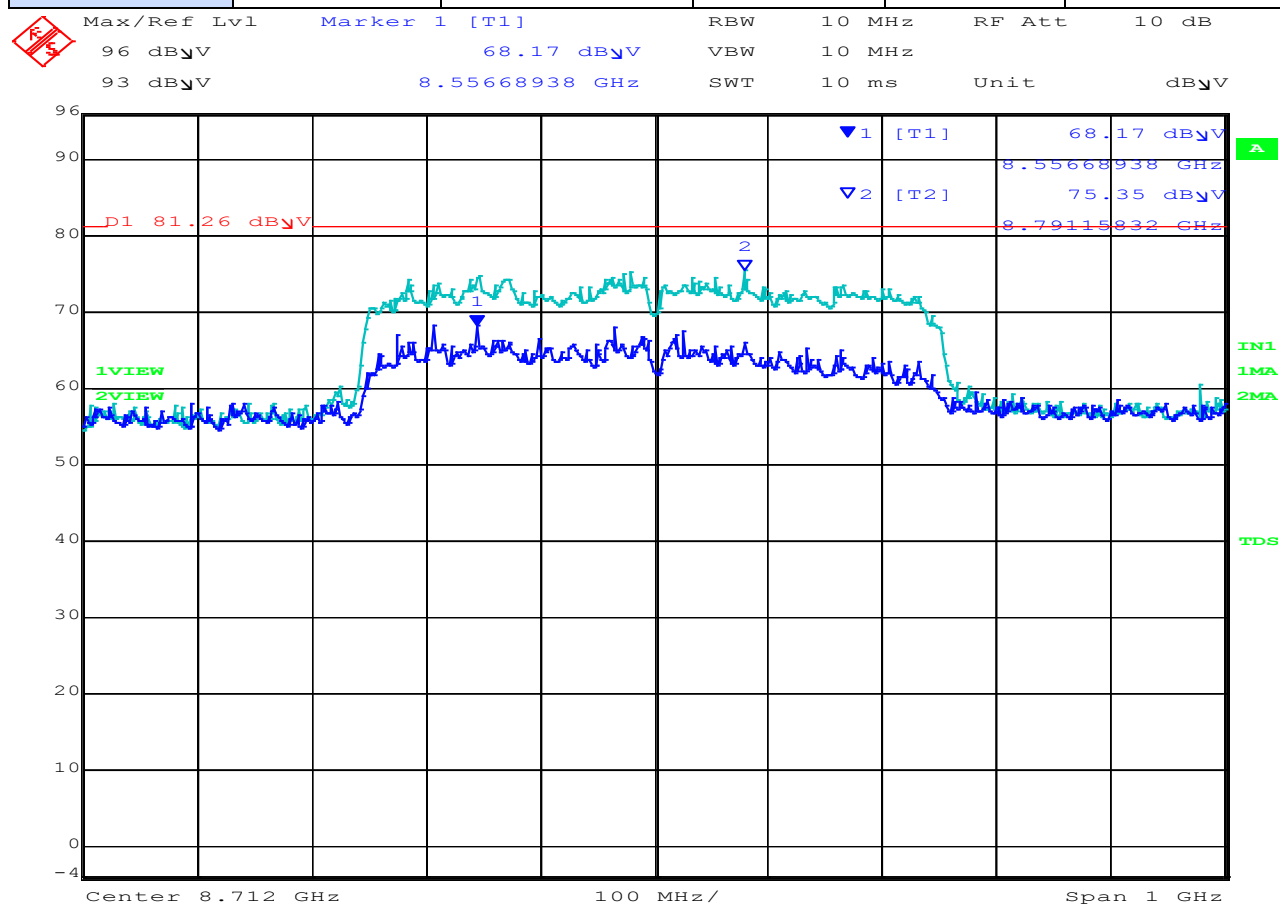
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

Equipment Configuration for Peak Power Density

Variant:	UWB	Duty Cycle (%):	99
Data Rate:	-	Antenna Gain (dBi):	0.1/-1.8/-1.8
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 (dBuV)	Polarity	Limit (dBuV)	Margin (dB)	EUT Power Setting
8712.00	75.35	Horizontal	81.26	-4.09	Max



Date: 17.OCT.2019 10:37:10

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 15.519	Ambient Temp. (°C):	20.0 - 24.5
Test Heading:	Radiated Spurious and Band-Edge Emissions	Rel. Humidity (%):	32 - 45
Standard Section(s):	ANSI C63.10 Section 10.2 + 10.3	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.

Limits for Restricted Bands (15.205, 15.209)

Peak emission: 68.23 dBuV/m

Average emission: 54 dBuV/m

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)
960	1610	-75.3	29.4
1610	1990	-63.3	41.4
1990	3100	-61.3	43.4
3100	10600	-41.3	63.4
10600	18000	-61.3	43.4

Radiated Spurious Emissions in the GPS Bands 15.519 (d)

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 15.519 (e)

Within 50 MHz bandwidth centered on highest radiated emissions f_M , Limit is 0.0 dBm EIRP. At 1-meter distance the equivalent level is 104.77 dBuV/m

9.4.1. Transmitter Spurious Emissions

3432 MHz

Equipment Configuration for Spurious Emissions 1-1.61 GHz

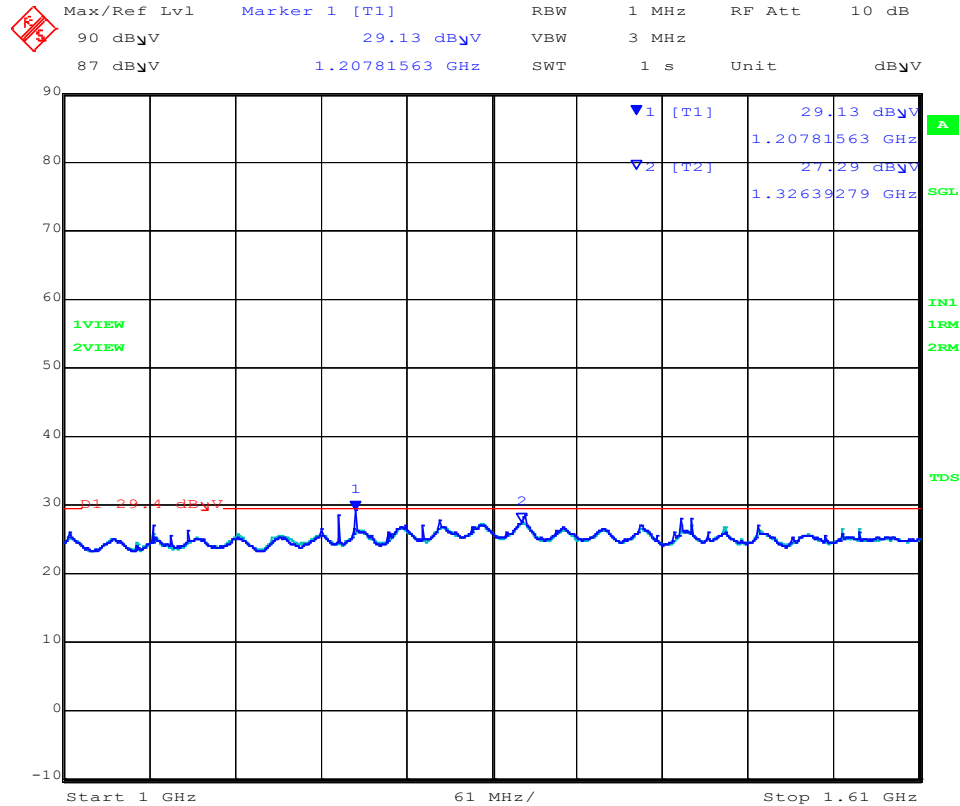
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3432.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 11:12:16

1000.00– 1610.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1207.81	29.13	Average	Vertical	150	0	29.4	-0.27	Pass
2	1326.39	27.29	Average	Horizontal	150	0	29.4	-2.11	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.61 - 1.99 GHz

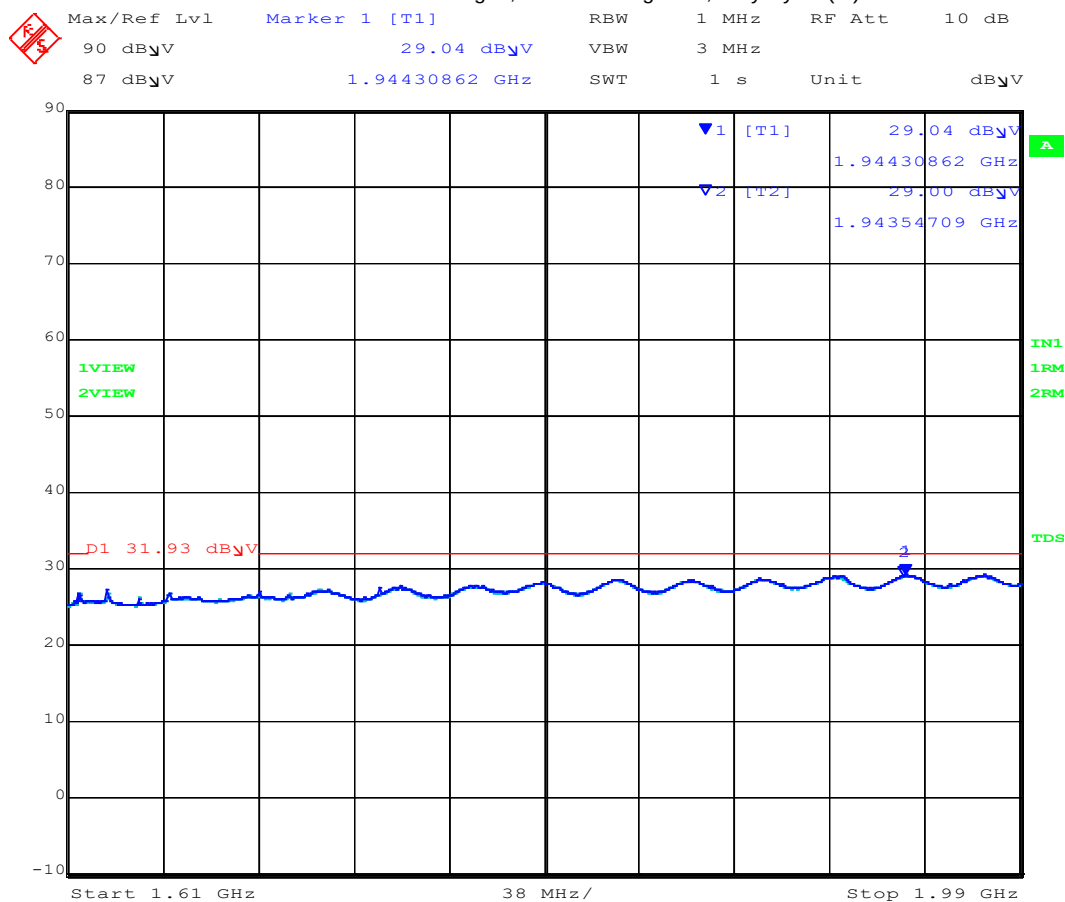
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3432.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 11:19:34

1610-1990 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1944.30	29.04	Average	Vertical	150	0	31.93	-2.89	Pass
2	1943.54	29.00	Average	Horizontal	150	0	31.93	-2.93	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.99 – 3.1 GHz

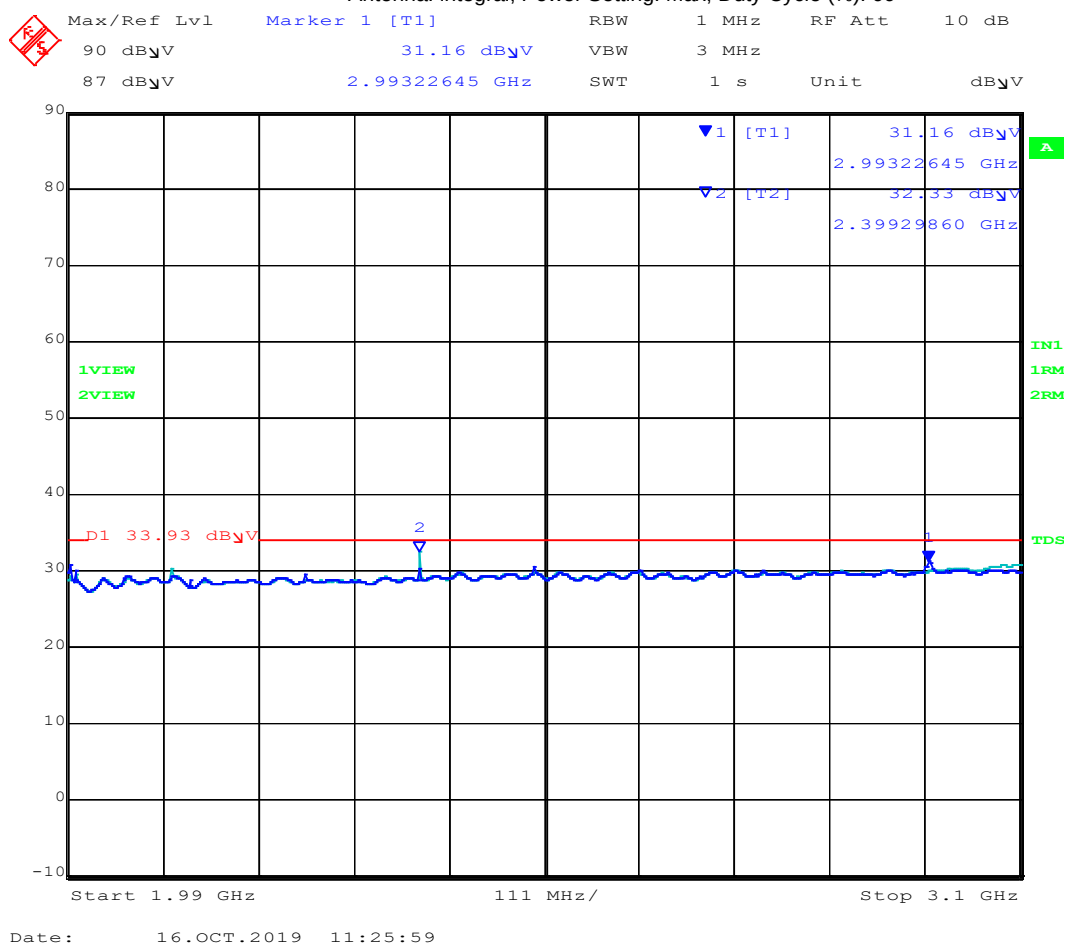
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3432.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1990-3100 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2993.22	31.16	Average	Vertical	150	0	33.93	-2.77	Pass
2	2399.29	32.33	Average	Horizontal	150	0	33.93	-1.60	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 3.1 – 10.6 GHz

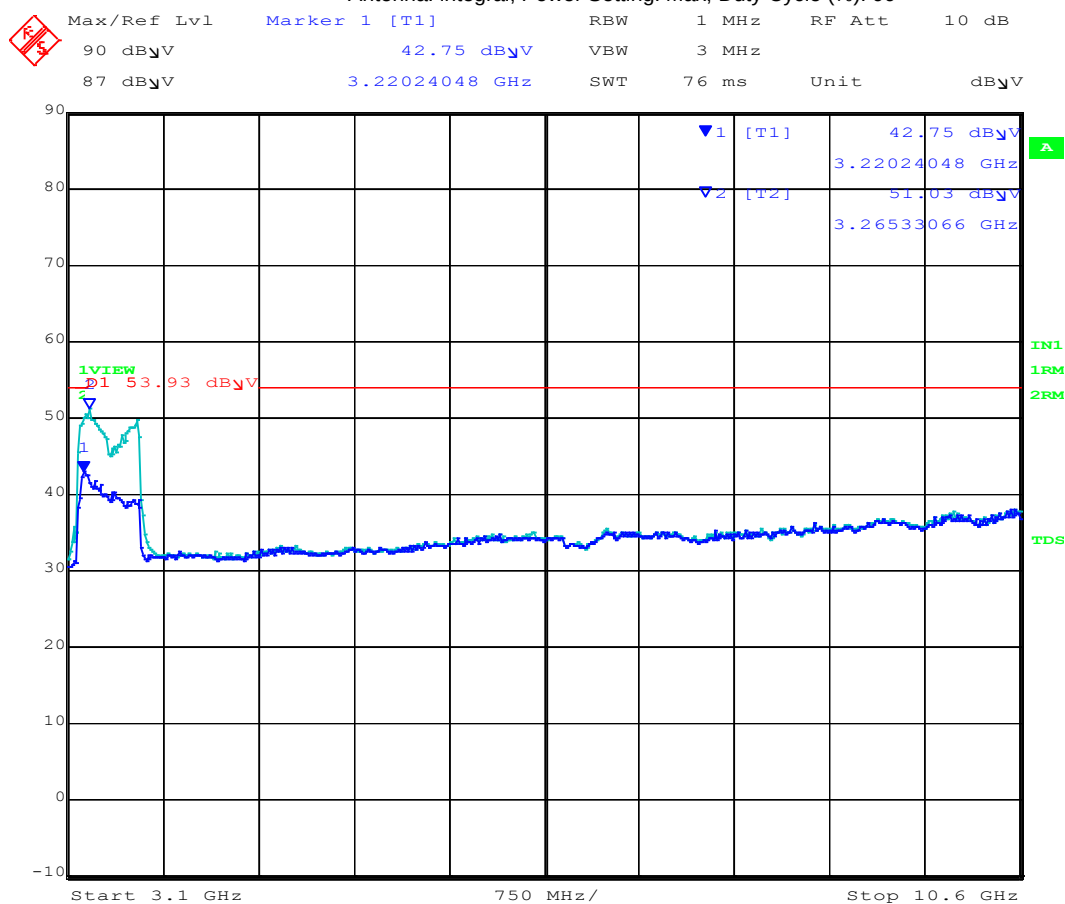
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3432.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 11:32:15

3100-10600 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	3220.24	42.75	Average	Vertical	150	0	53.93	-11.18	Pass
2	3265.33	51.03	Average	Horizontal	150	0	53.93	-2.90	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 10.6 – 18.0 GHz

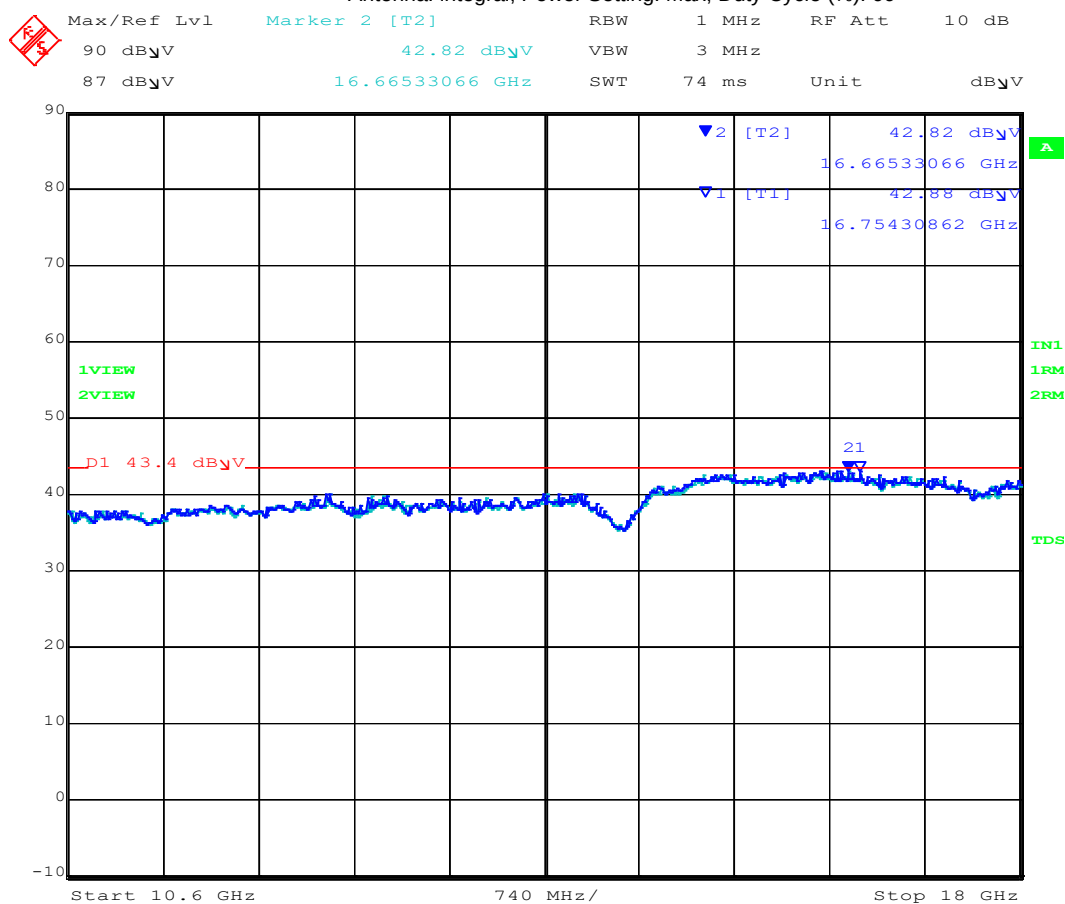
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3432.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 11:37:57

10600-18000 MHz									
Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	16754.30	42.88	Average	Vertical	150	0	43.4	-0.52	Pass
2	16665.33	42.82	Average	Horizontal	150	0	43.4	-0.58	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

3960 MHz

Equipment Configuration for Spurious Emissions 1-1.61 GHz

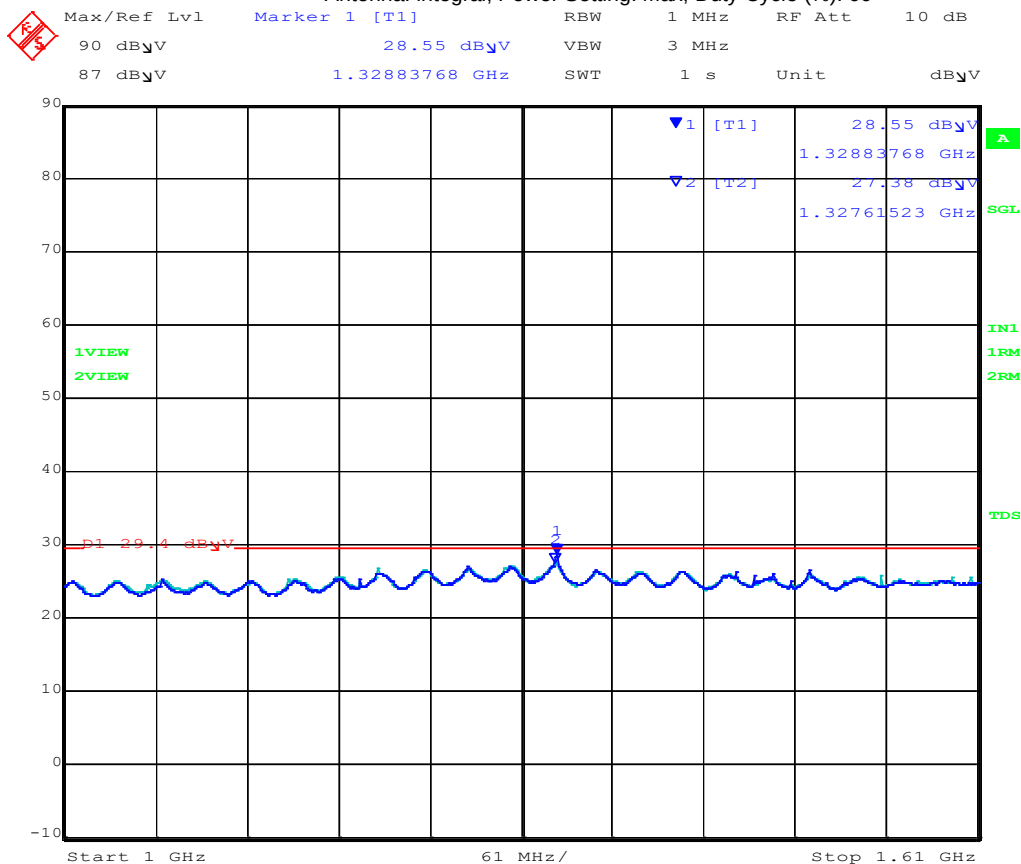
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3960	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 13:46:38

1000.00- 1610.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1328.83	28.55	Average	Vertical	150	0	29.4	-0.85	Pass
2	1327.61	27.38	Average	Horizontal	150	0	29.4	-2.02	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.61 - 1.99 GHz

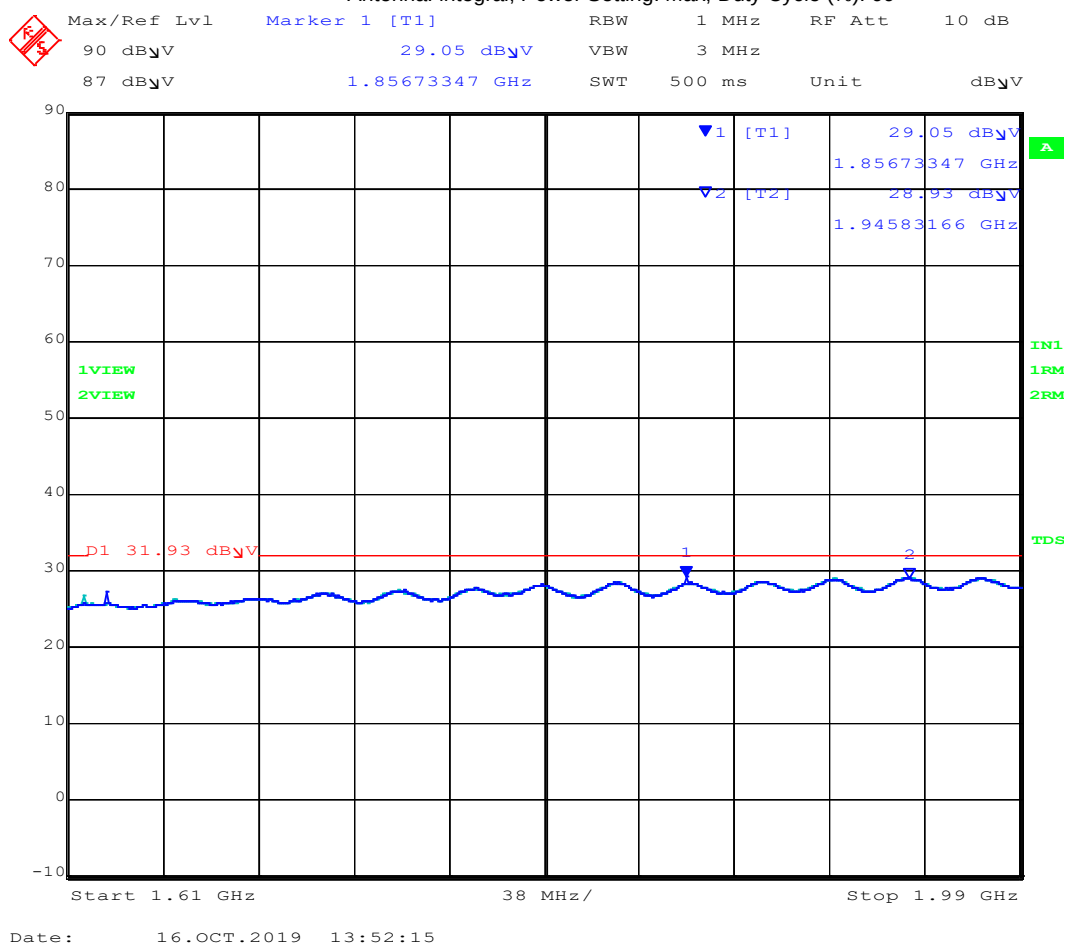
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3960.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1610-1990 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1856.73	29.05	Average	Vertical	150	0	31.93	-2.88	Pass
2	1945.31	28.93	Average	Horizontal	150	0	31.93	-3.00	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.99 – 3.1 GHz

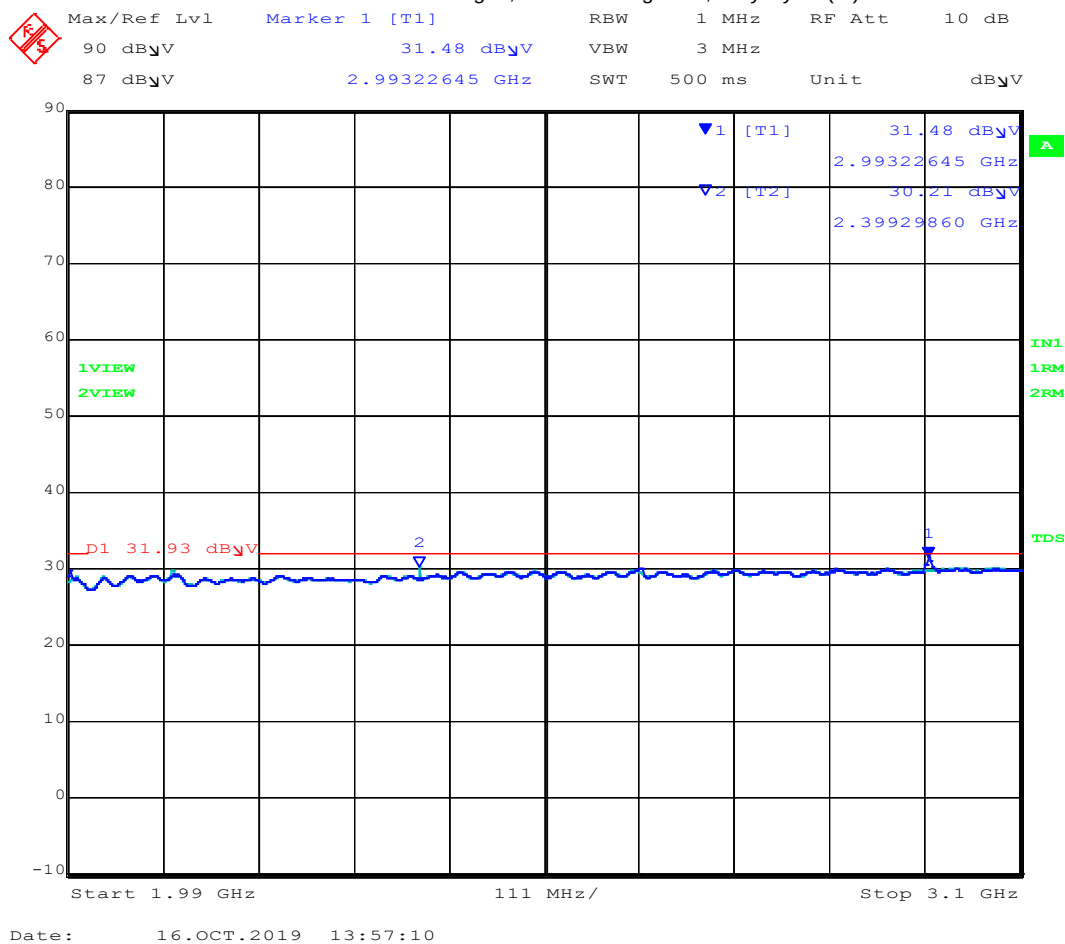
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3960.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1990-3100 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2993.22	31.48	Average	Vertical	150	0	33.93	-2.45	Pass
2	2939.92	30.21	Average	Horizontal	150	0	33.93	-3.72	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 3.1 – 10.6 GHz

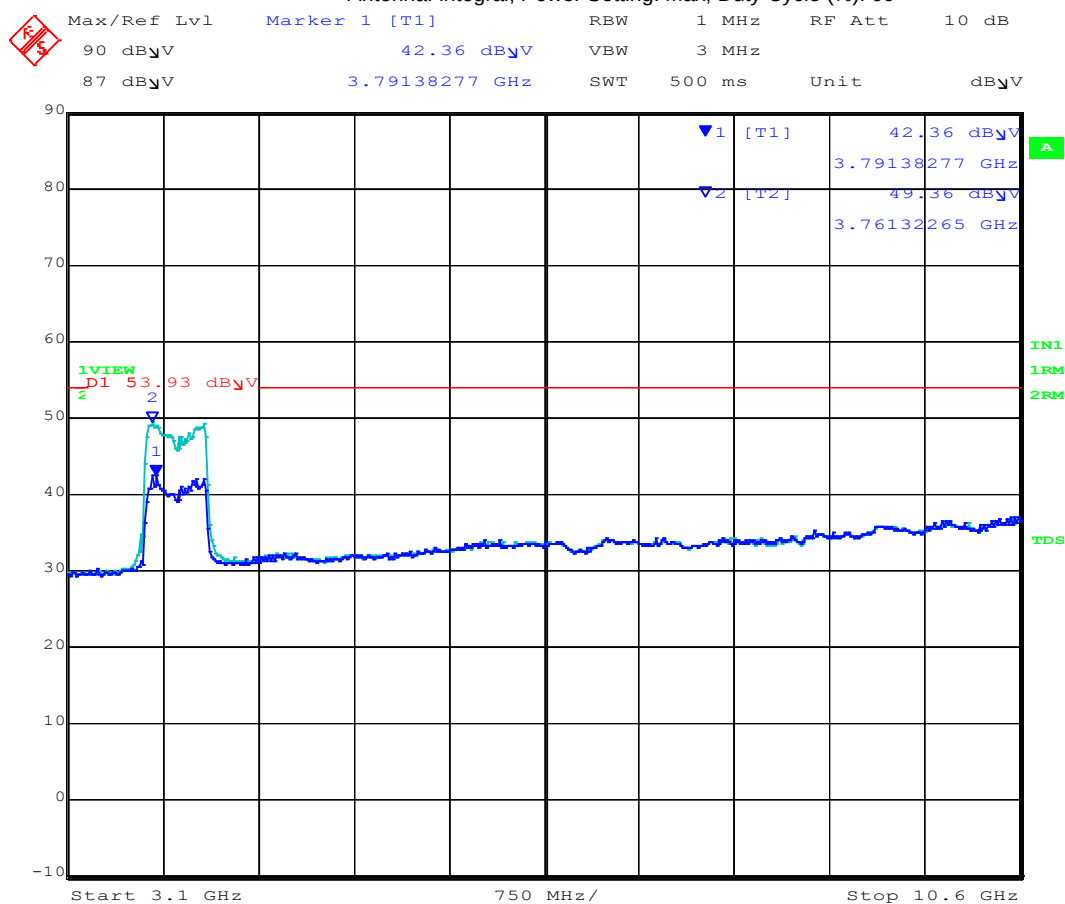
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3960.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 14:01:59

3100-10600 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	3791.38	42.36	Average	Vertical	150	0	53.93	-11.57	Pass
2	3761.32	49.36	Average	Horizontal	150	0	53.93	-4.57	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 10.6 – 18.0 GHz

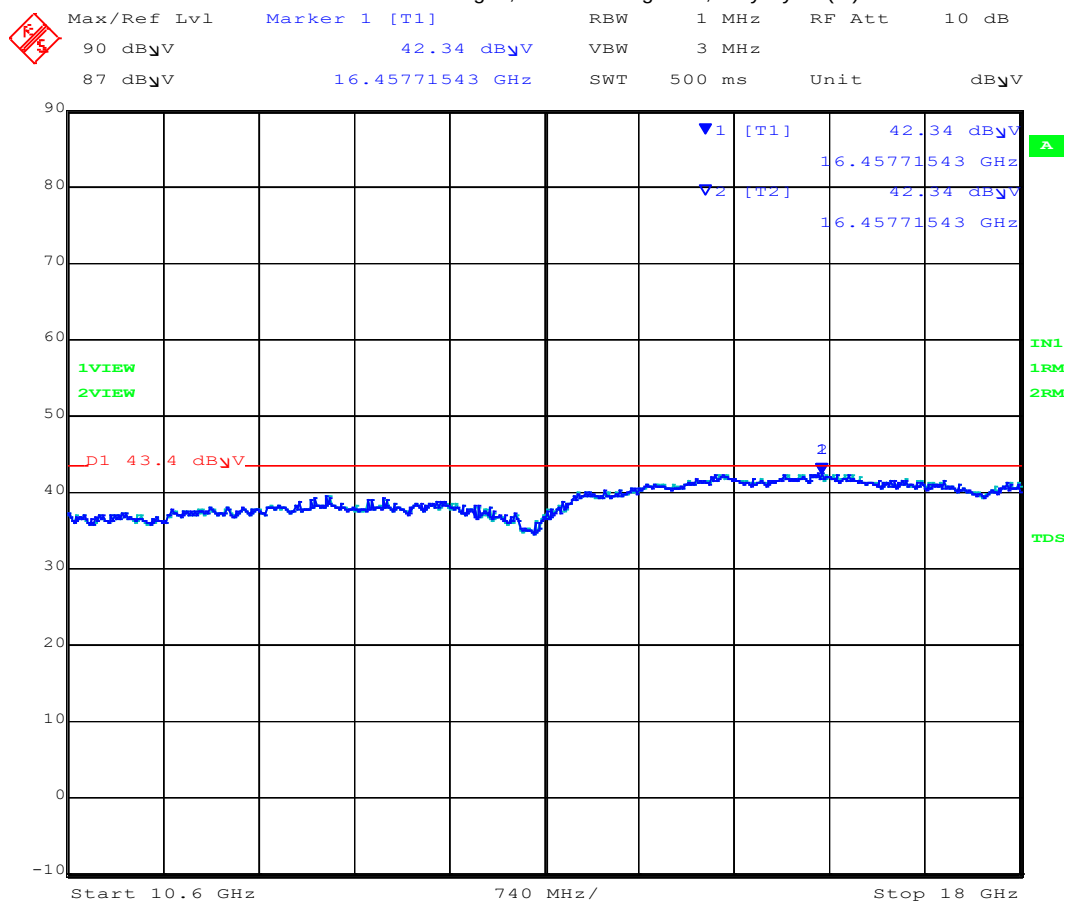
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3960.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 14:07:07

10600-18000 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	16457.71	42.34	Average	Vertical	150	0	43.4	-1.06	Pass
2	16457.71	42.34	Average	Horizontal	150	0	43.4	-1.06	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

4488 MHz

Equipment Configuration for Spurious Emissions 1-1.61 GHz

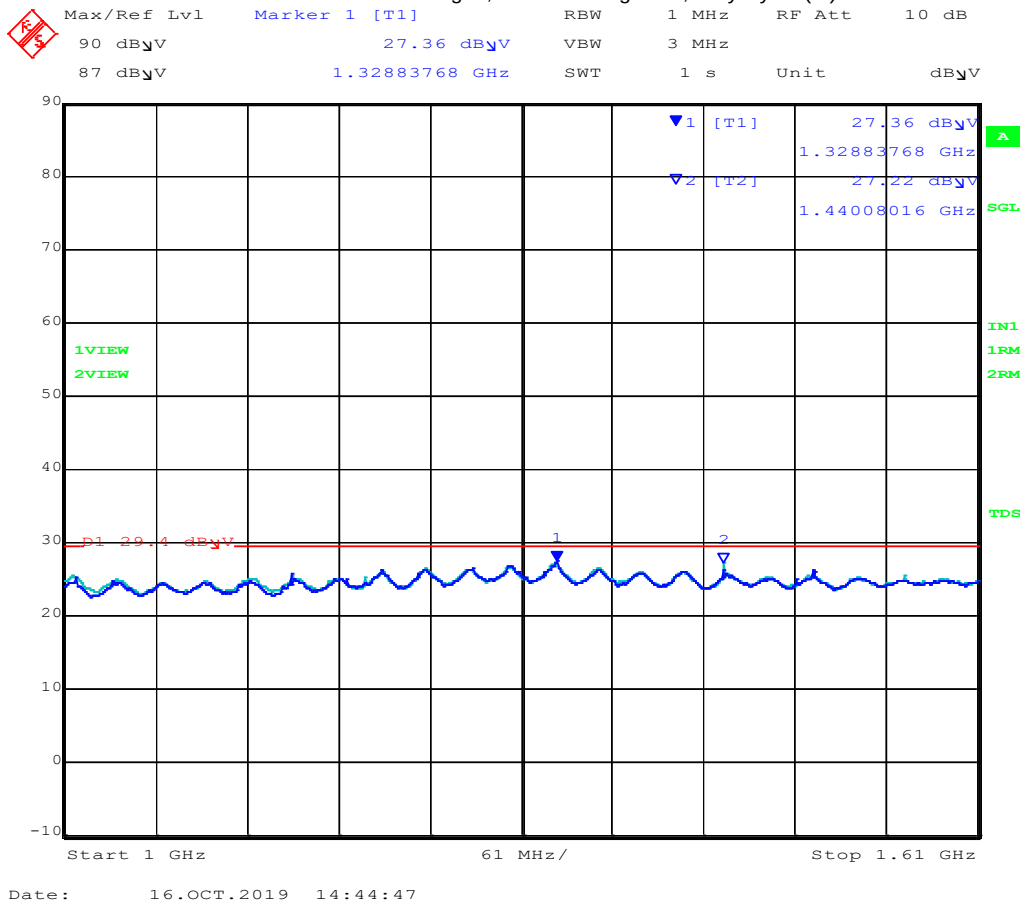
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	4488.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1000.00- 1610.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1328.83	27.36	Average	Vertical	150	0	29.4	-2.04	Pass
2	1440.08	27.22	Average	Horizontal	150	0	29.4	-2.18	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.61 - 1.99 GHz

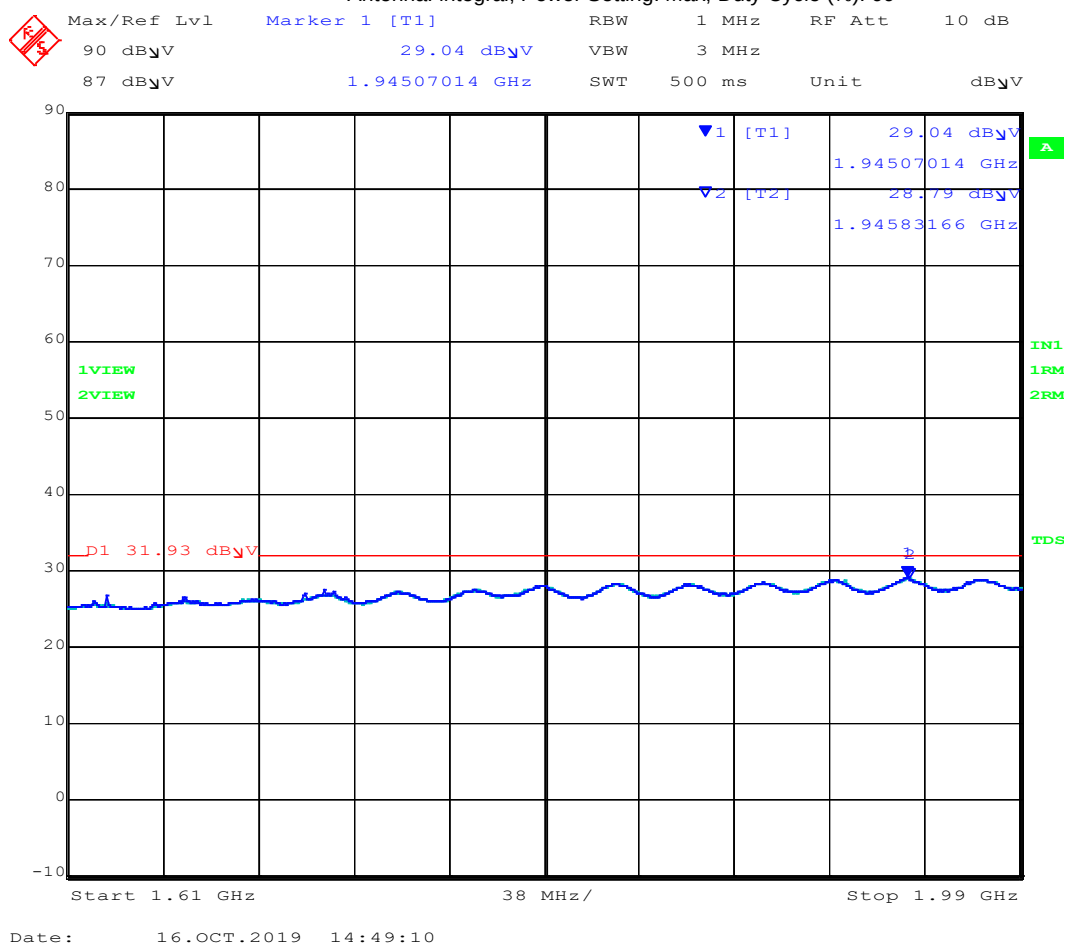
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	4488.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1610-1990 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1945.07	29.04	Average	Vertical	150	0	31.93	-2.89	Pass
2	1945.83	28.79	Average	Horizontal	150	0	31.93	-3.14	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.99 – 3.1 GHz

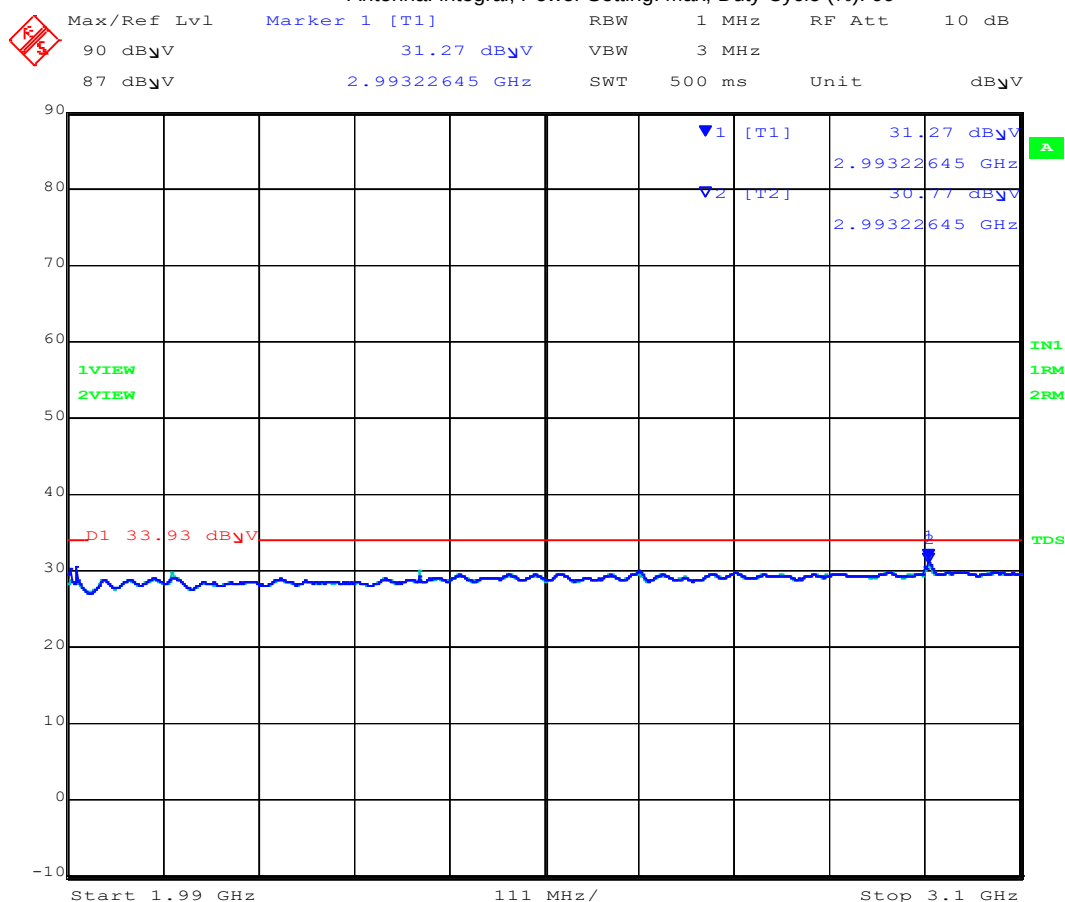
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	4488.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 14:54:31

1990-3100 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2993.22	31.27	Average	Vertical	150	0	33.93	-2.66	Pass
2	2399.29	30.77	Average	Horizontal	150	0	33.93	-3.16	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 3.1 – 10.6 GHz

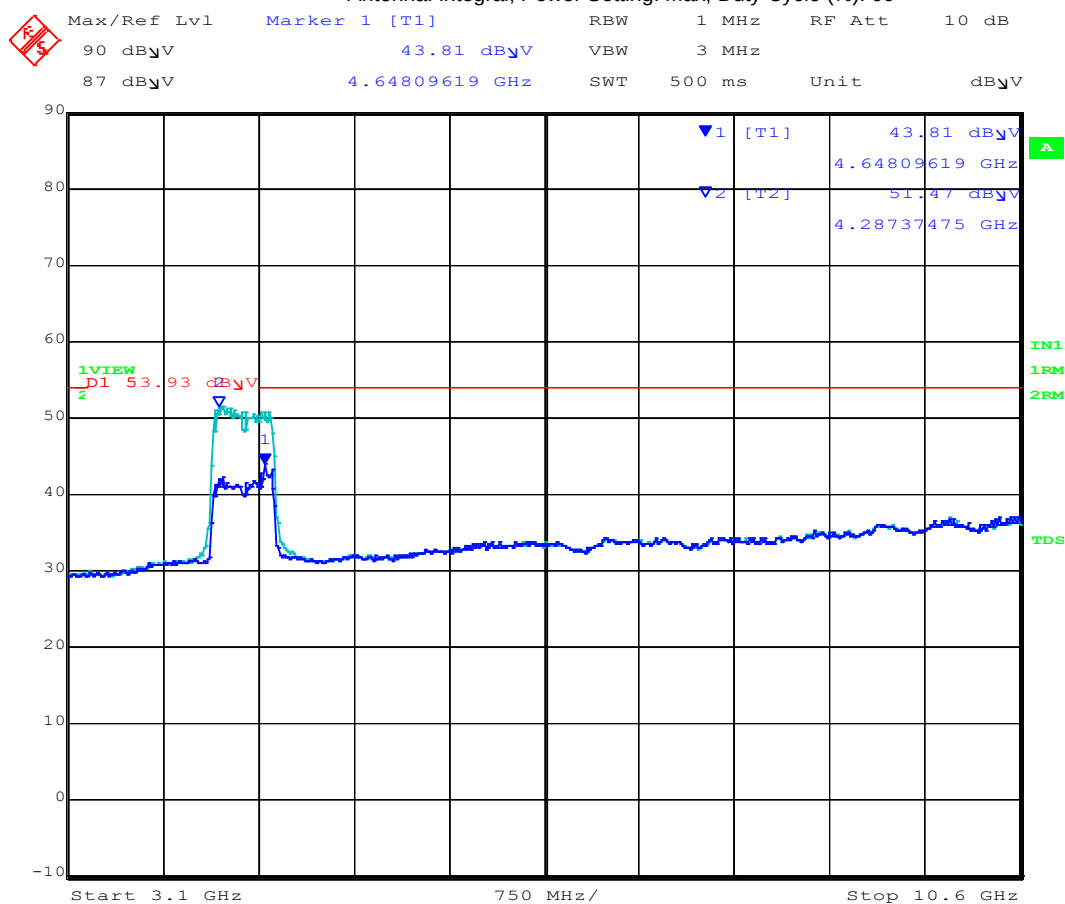
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	4488.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 14:59:58

3100-10600 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4648.09	43.81	Average	Vertical	150	0	53.93	-10.12	Pass
2	4287.37	51.47	Average	Horizontal	150	0	53.93	-2.46	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 10.6 – 18.0 GHz

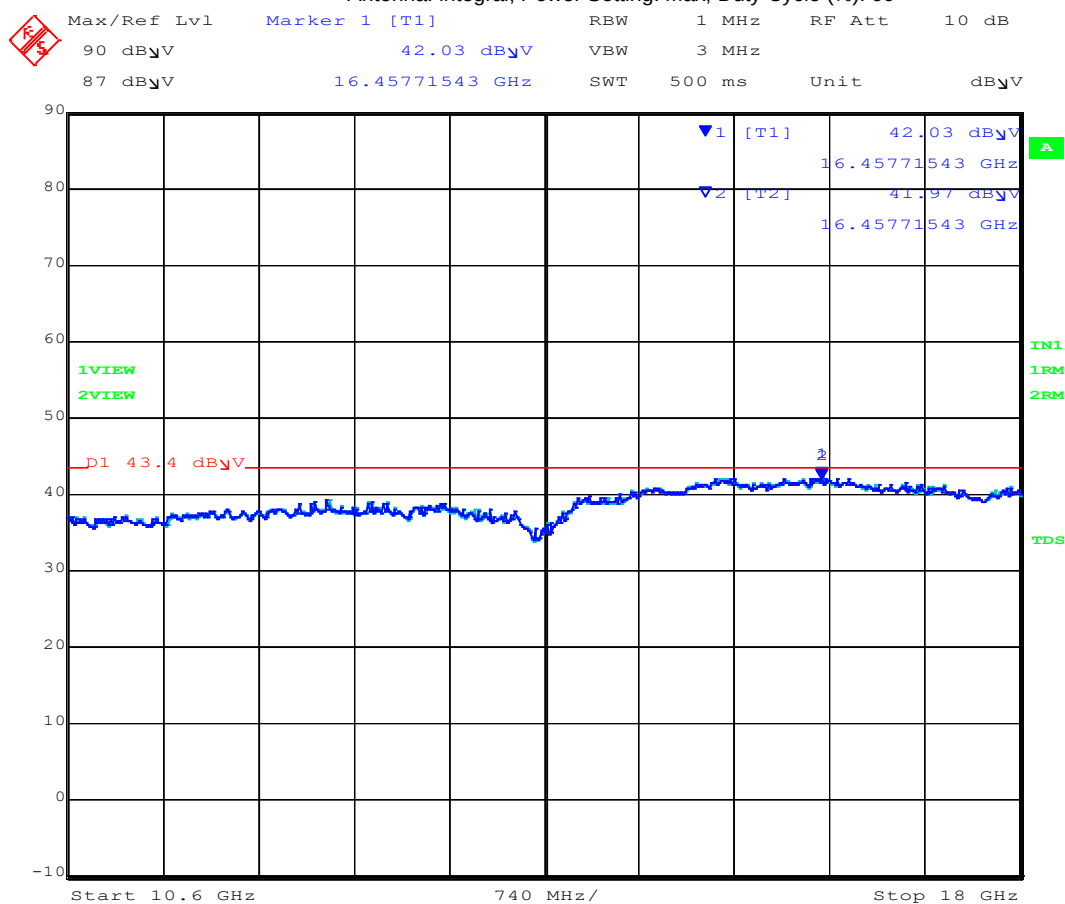
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	4488.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 15:01:22

10600-18000 MHz									
Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	16457.71	42.03	Average	Vertical	150	0	43.4	-1.37	Pass
2	16457.71	41.97	Average	Horizontal	150	0	43.4	-1.43	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

6600 MHz

Equipment Configuration for Spurious Emissions 1-1.61 GHz

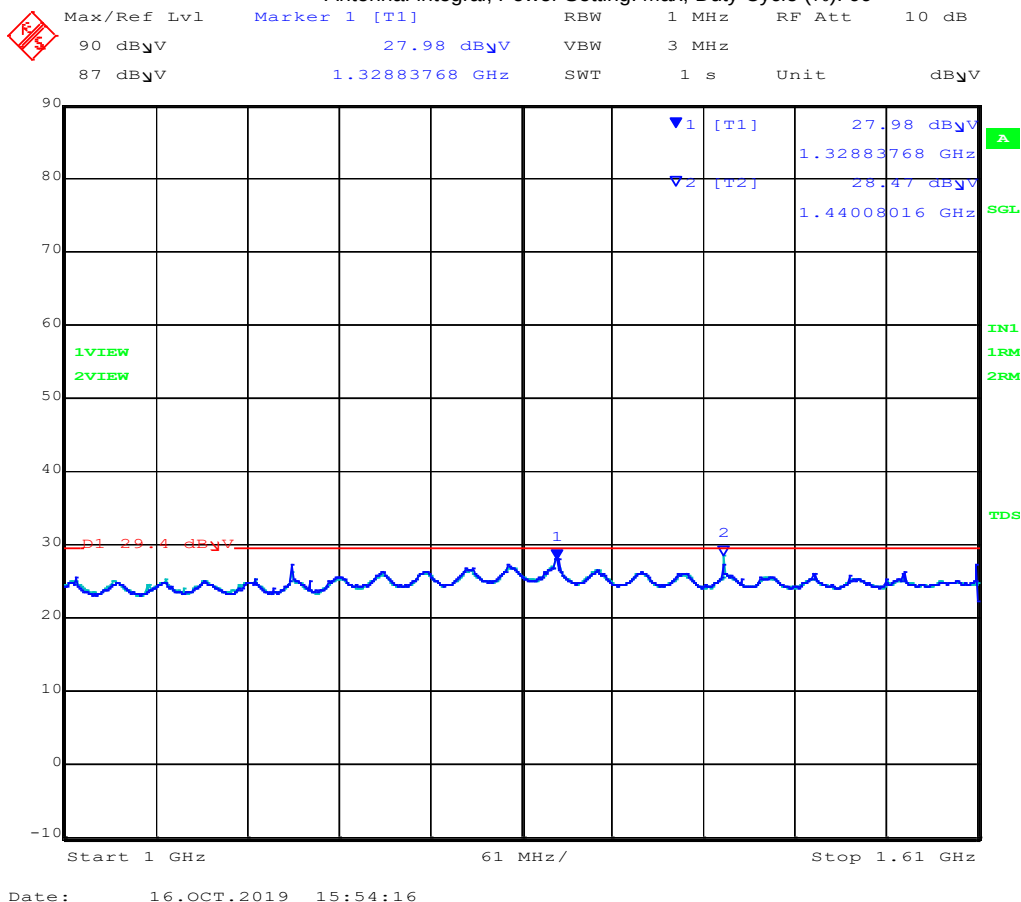
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	6600.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1000.00- 1610.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1328.83	27.98	Average	Vertical	150	0	29.4	-1.42	Pass
2	1440.08	28.47	Average	Horizontal	150	0	29.4	-0.93	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.61 - 1.99 GHz

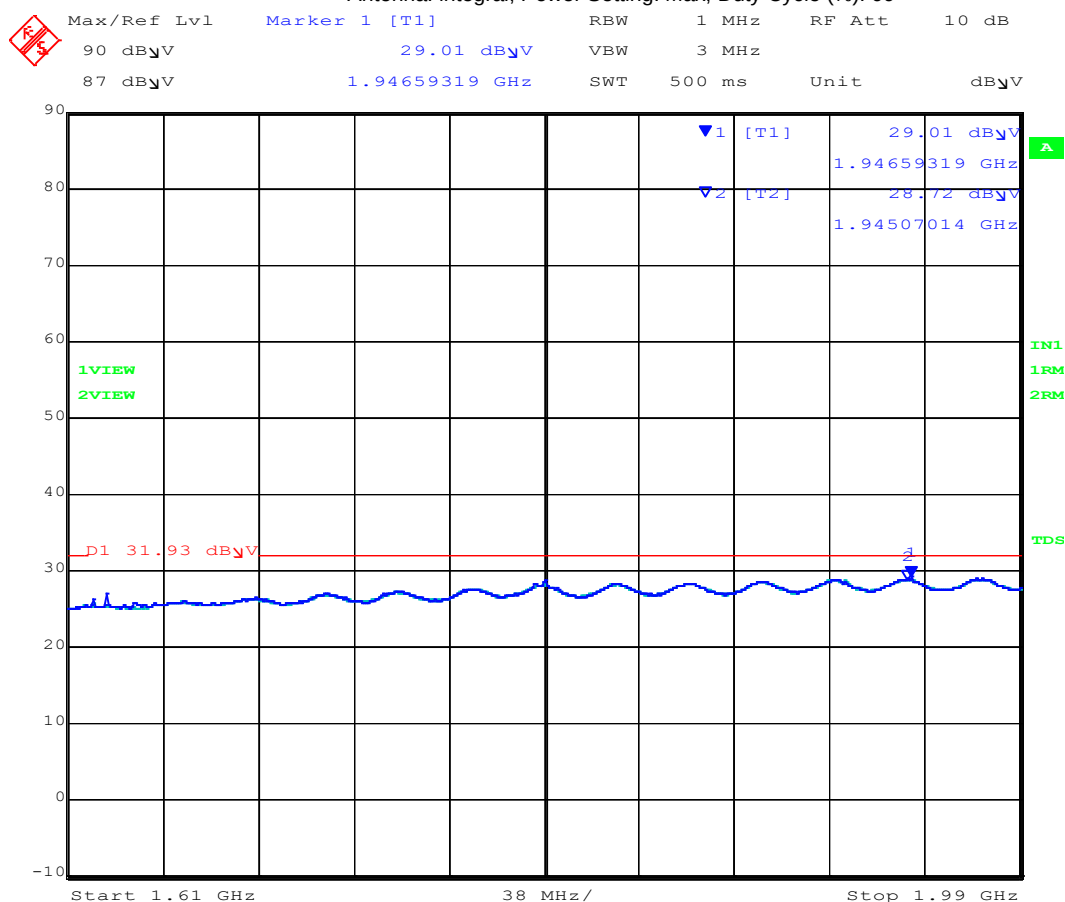
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	6600.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 16:04:37

1610-1990 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1946.59	29.01	Average	Vertical	150	0	31.93	-2.92	Pass
2	1945.07	28.72	Average	Horizontal	150	0	31.93	-3.21	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.99 – 3.1 GHz

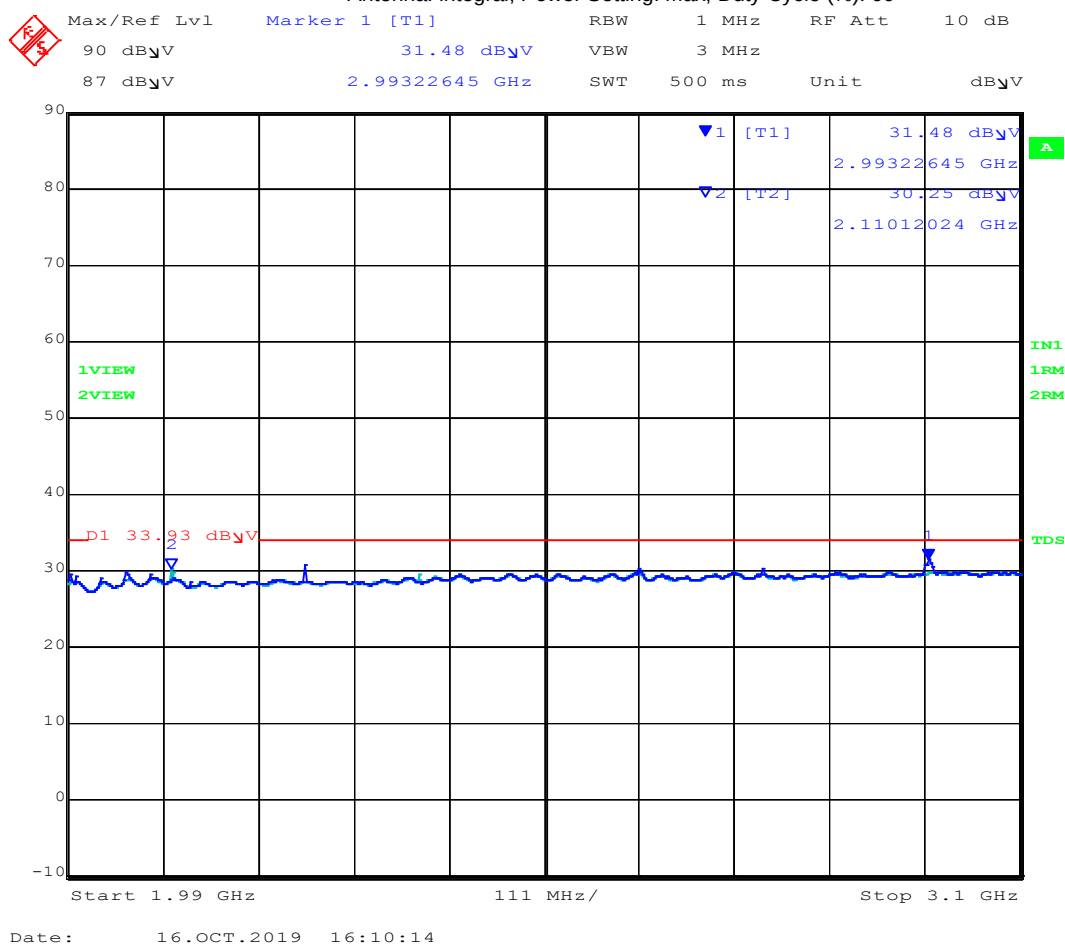
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	6600.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1990-3100 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2993.22	31.48	Average	Vertical	150	0	33.93	-2.45	Pass
2	2110.12	30.25	Average	Horizontal	150	0	33.93	-3.68	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 3.1 – 10.6 GHz

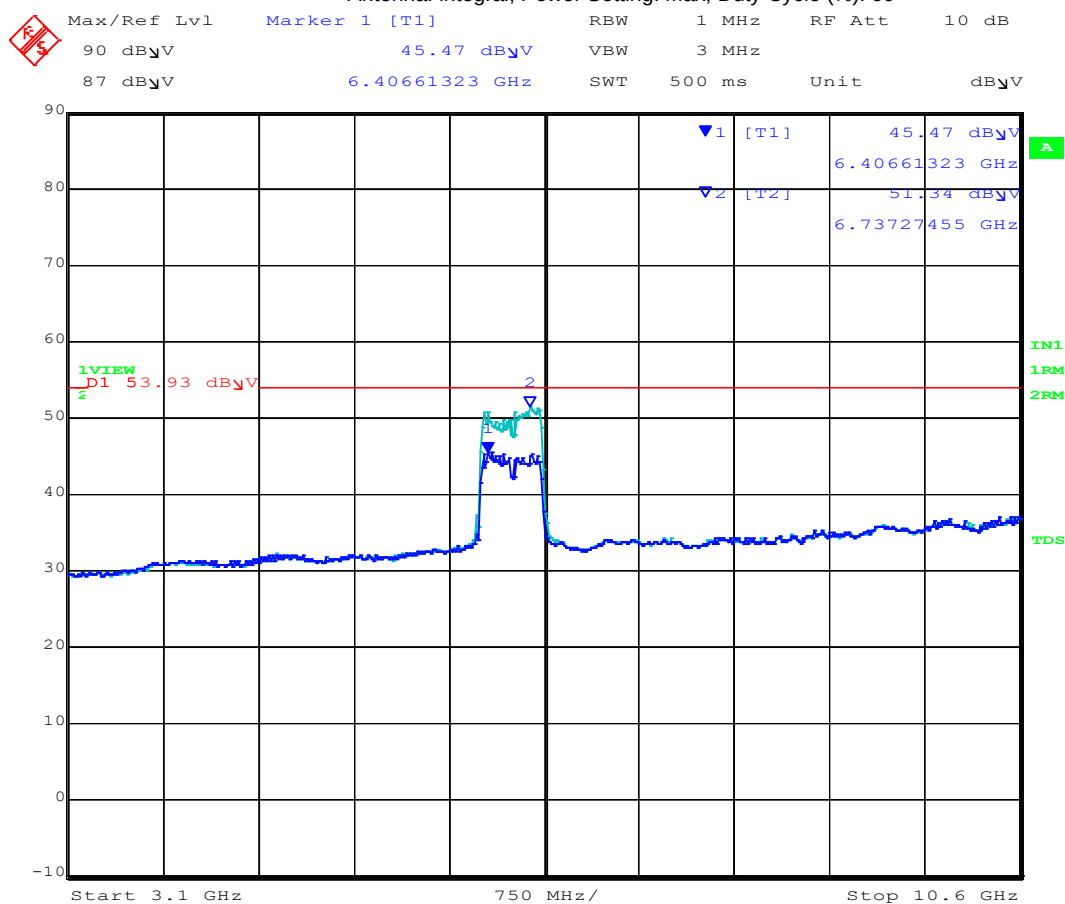
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	6600.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 16:15:20

3100-10600 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	6406.61	45.47	Average	Vertical	150	0	53.93	-8.46	Pass
2	6737.27	51.34	Average	Horizontal	150	0	53.93	-2.59	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 10.6 – 18.0 GHz

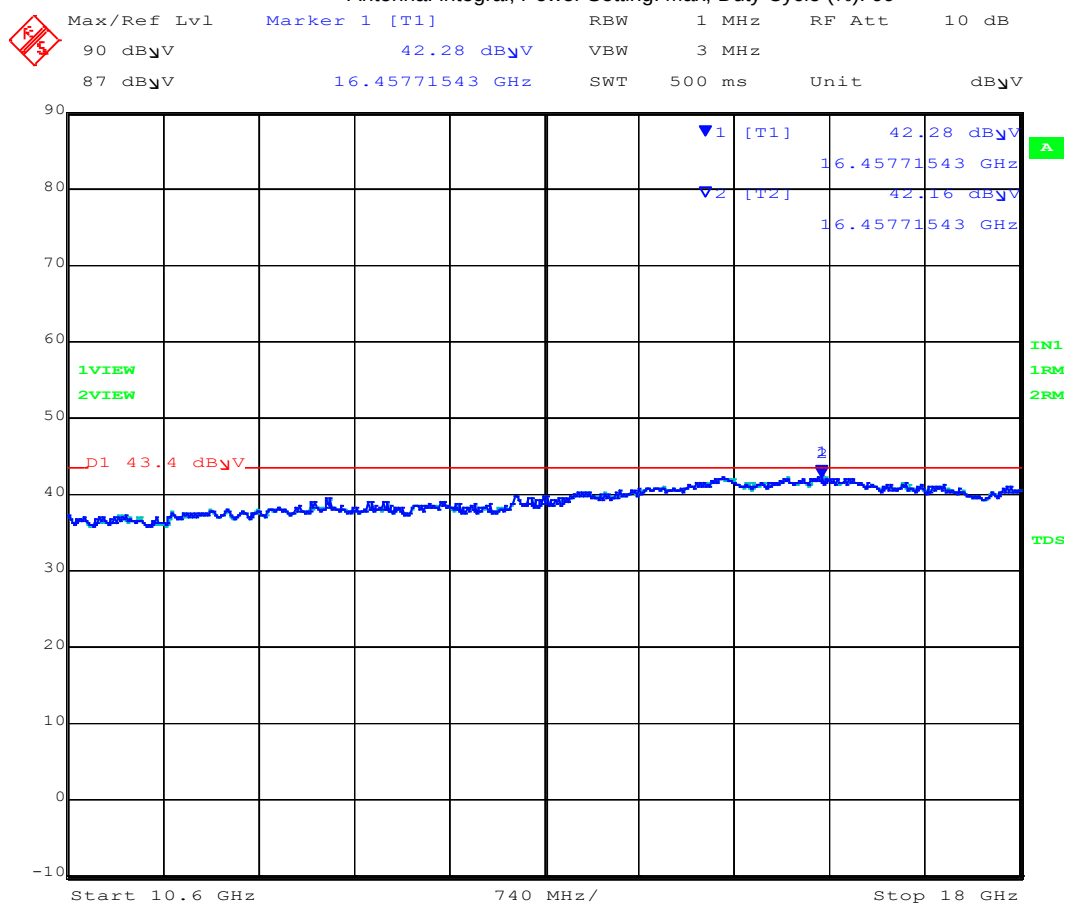
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	6600.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 16:18:46

10600-18000 MHz									
Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	16457.71	42.28	Average	Vertical	150	0	43.4	-1.12	Pass
2	16457.71	42.16	Average	Horizontal	150	0	43.4	-1.24	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

7128 MHz

Equipment Configuration for Spurious Emissions 1-1.61 GHz

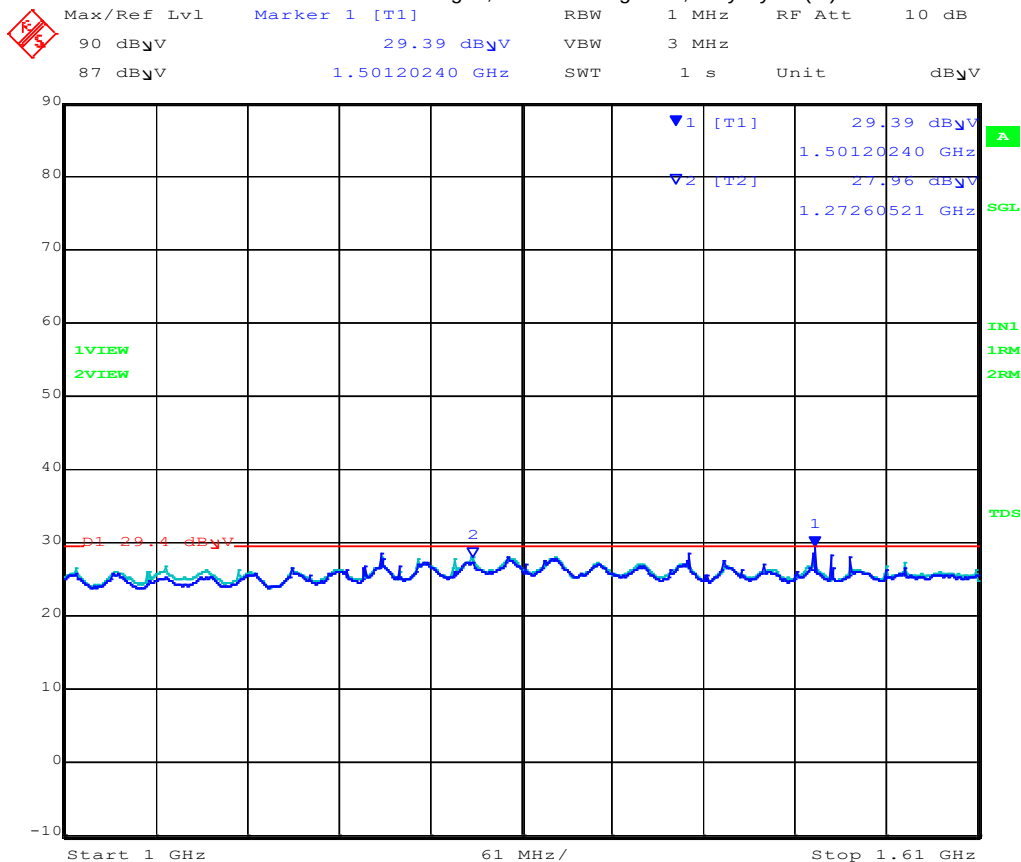
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7128.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 08:53:42

1000.00- 1610.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1501.2	29.39	Average	Vertical	150	0	29.4	-0.01	Pass
2	1272.6	27.96	Average	Horizontal	150	0	29.4	-1.44	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.61 - 1.99 GHz

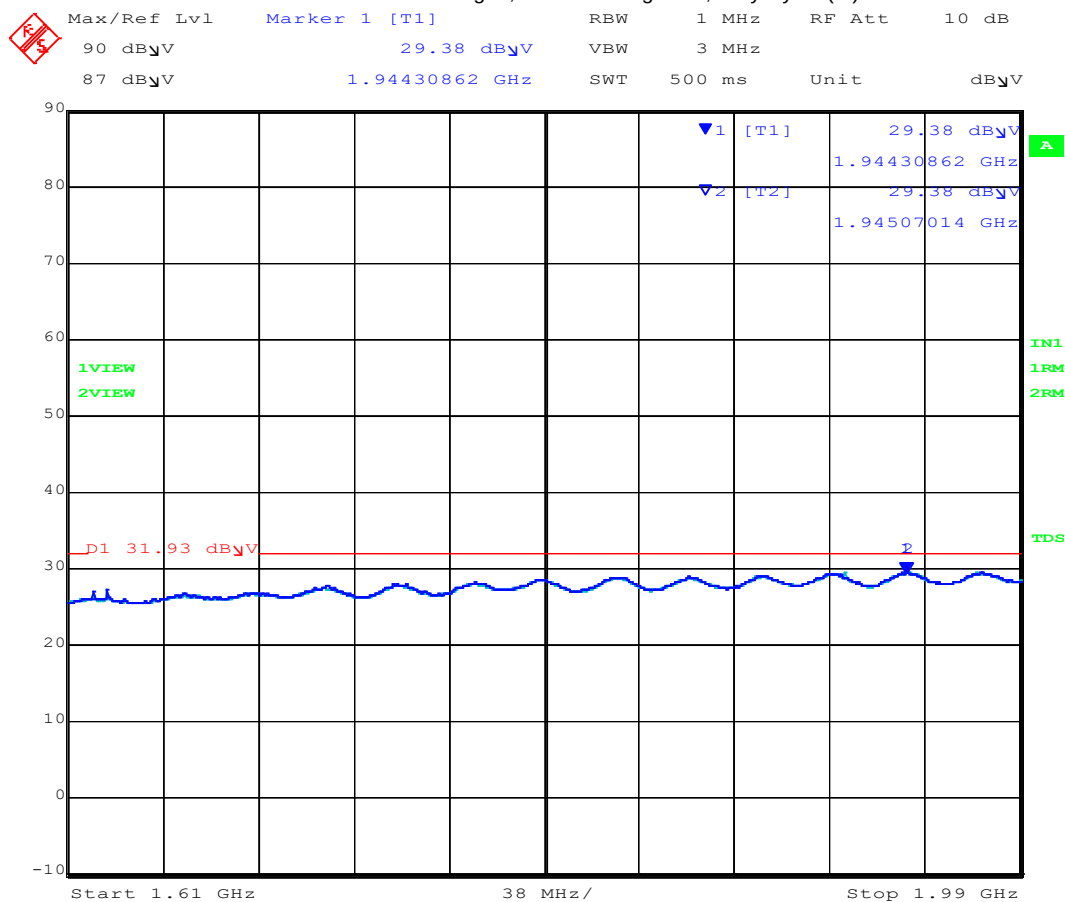
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7128.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 09:04:02

1610-1990 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1944.3	29.38	Average	Vertical	150	0	31.93	-2.55	Pass
2	1945.07	29.38	Average	Horizontal	150	0	31.93	-2.55	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.99 – 3.1 GHz

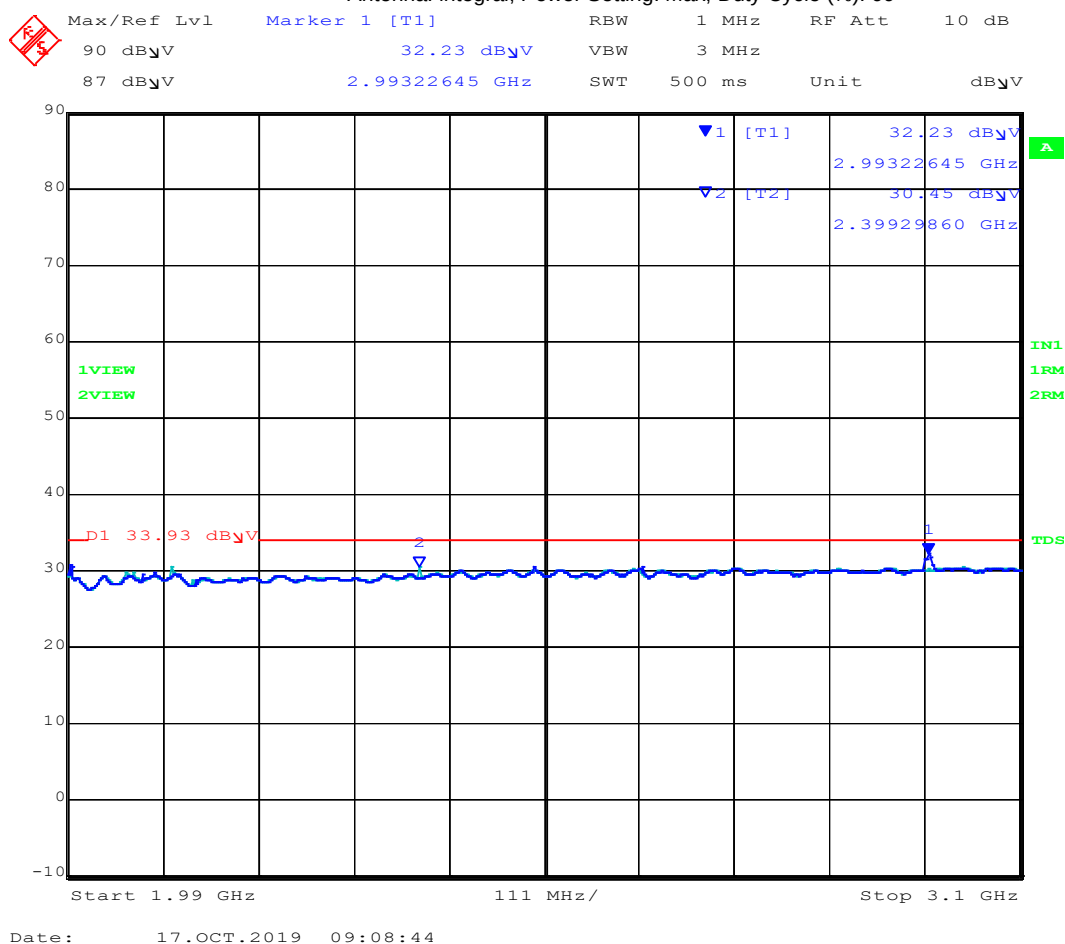
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7128.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1990-3100 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2993.22	32.23	Average	Vertical	150	0	33.93	-1.70	Pass
2	2399.29	30.45	Average	Horizontal	150	0	33.93	-3.48	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 3.1 – 10.6 GHz

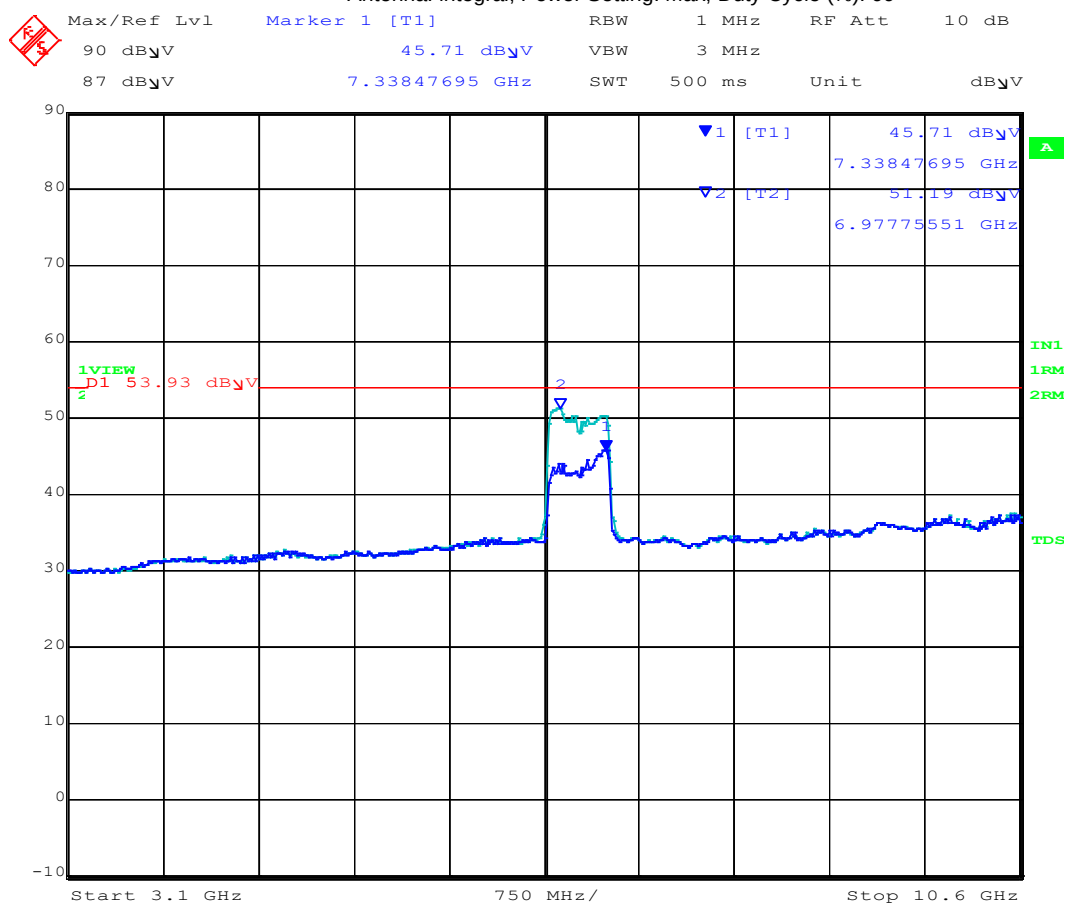
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7128.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 09:13:16

3100-10600 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	7338.4	45.71	Average	Vertical	150	0	53.93	-8.22	Pass
2	6977.75	51.19	Average	Horizontal	150	0	53.93	-2.74	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 10.6 – 18.0 GHz

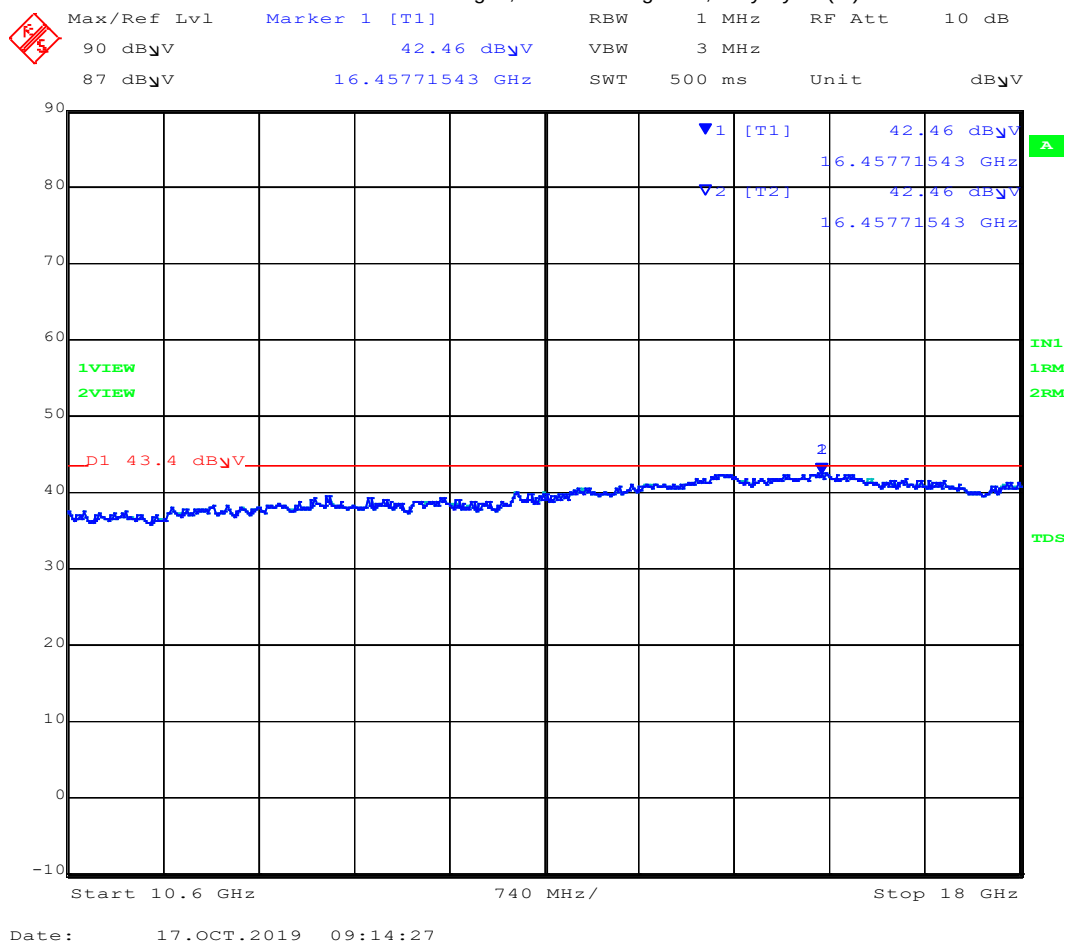
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7128.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



10600-18000 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	164577.15	42.46	Average	Vertical	150	0	43.4	-0.94	Pass
2	164577.15	42.46	Average	Horizontal	150	0	43.4	-0.94	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

7656 MHz (Covers Band Group 3 TFC 7 and Band Group 6 TFC 5)

Equipment Configuration for Spurious Emissions 1-1.61 GHz

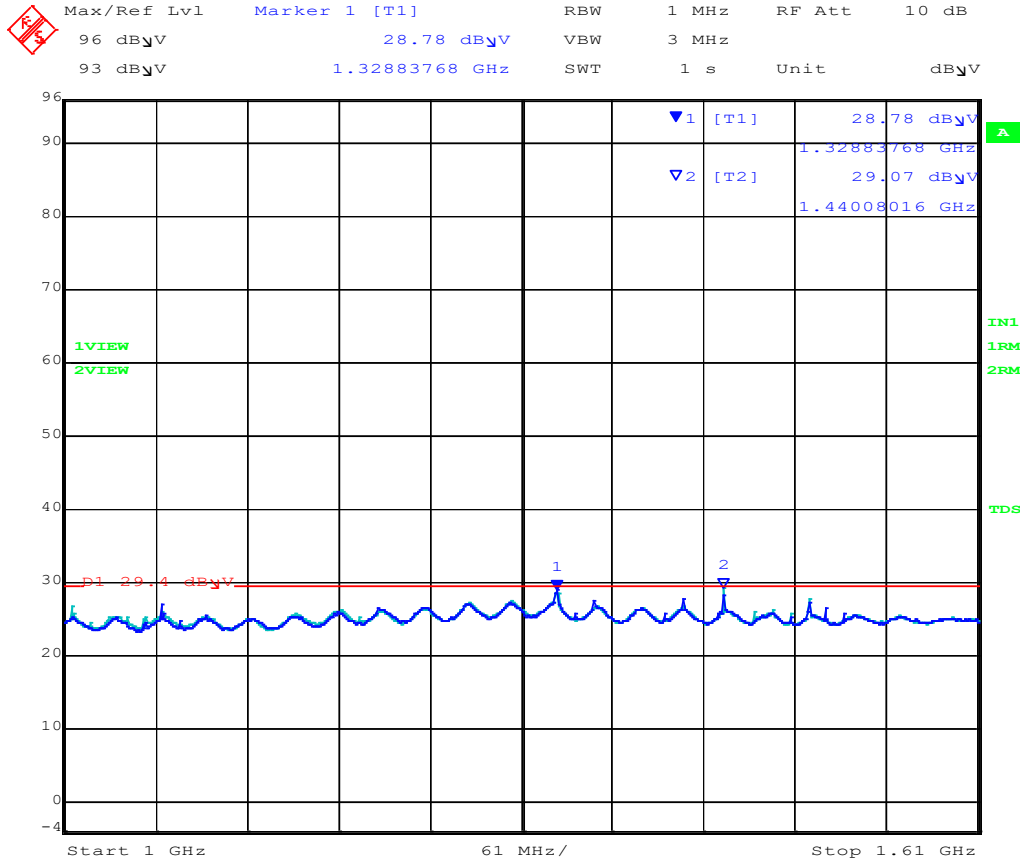
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7656.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 09:44:02

1000.00- 1610.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1328.83	28.78	Average	Vertical	150	0	29.4	-0.62	Pass
2	1440.08	29.07	Average	Horizontal	150	0	29.4	-0.33	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.61 - 1.99 GHz

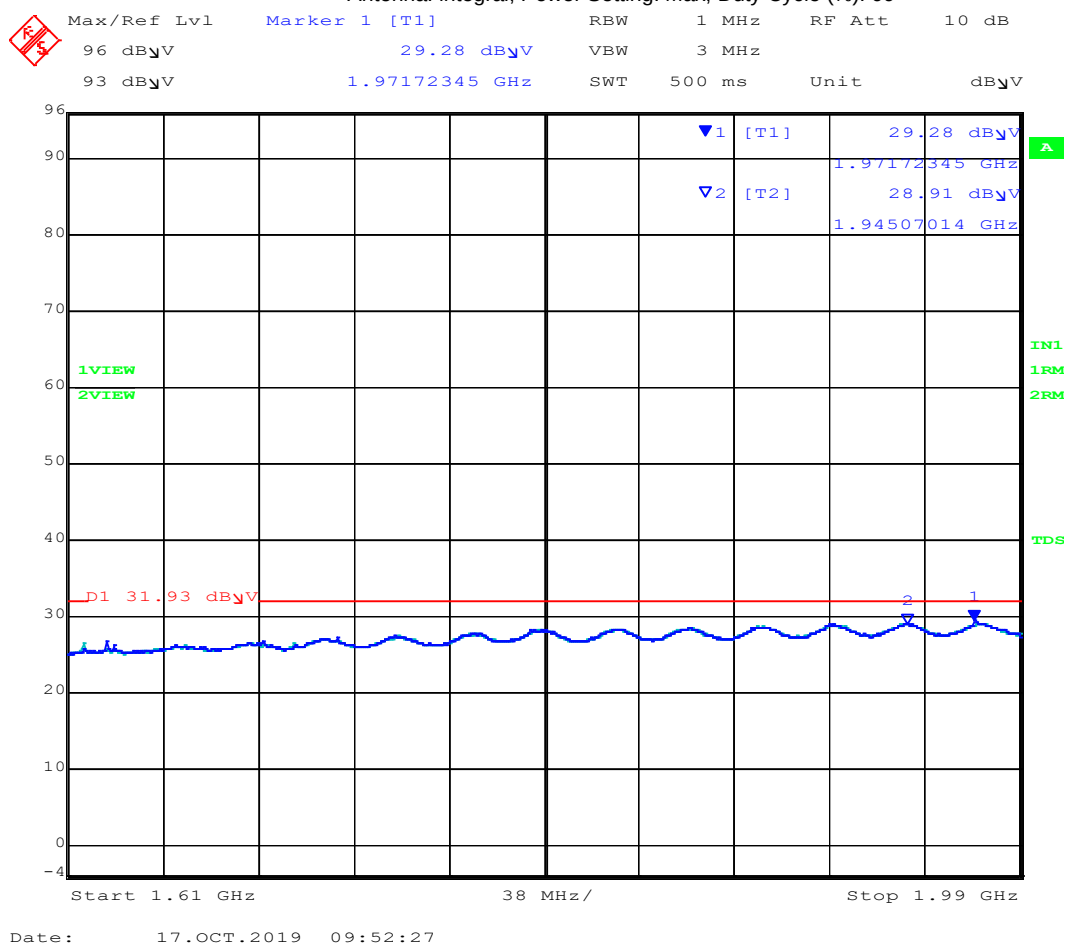
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7656.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1610-1990 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1971.72	29.28	Average	Vertical	150	0	31.93	-2.65	Pass
2	1945.07	28.91	Average	Horizontal	150	0	31.93	-3.02	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.99 – 3.1 GHz

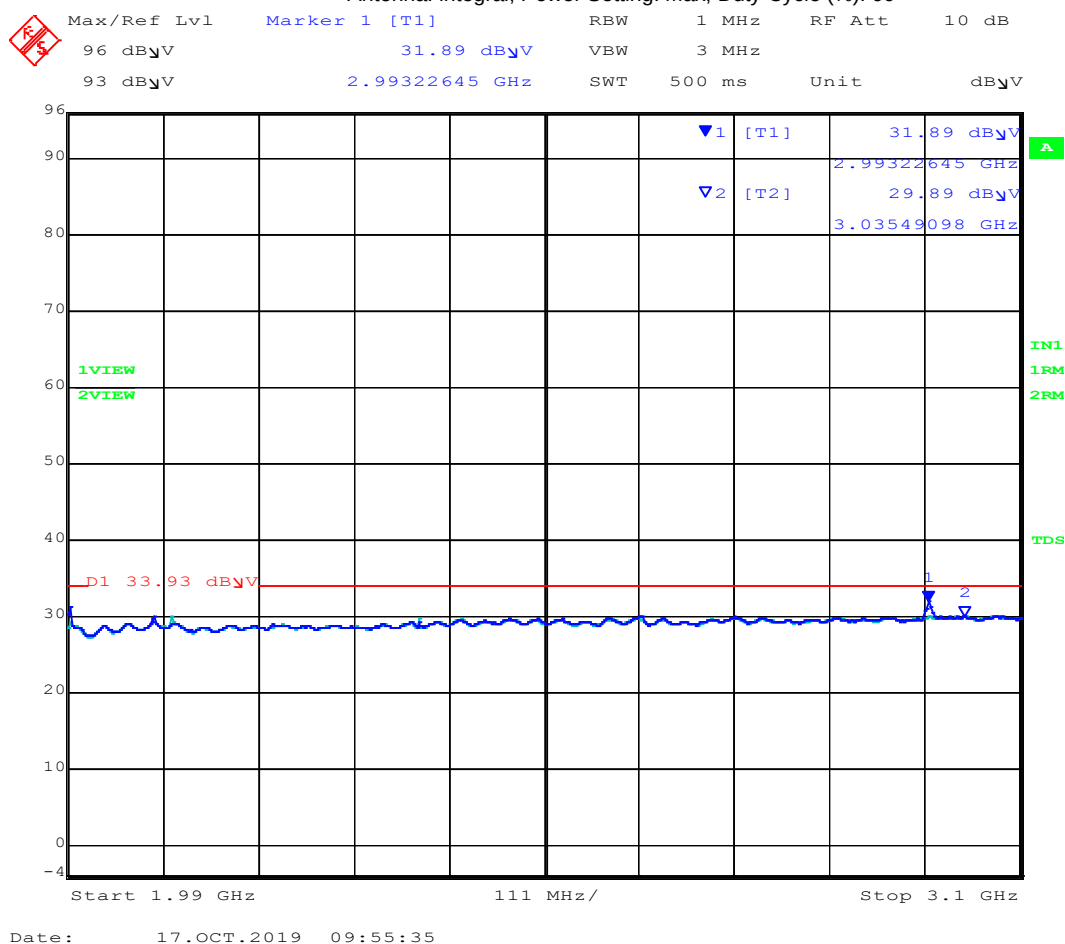
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7656.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1990-3100 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2993.22	31.89	Average	Vertical	150	0	33.93	-2.04	Pass
2	3035.49	29.89	Average	Horizontal	150	0	33.93	-4.04	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 3.1 – 10.6 GHz

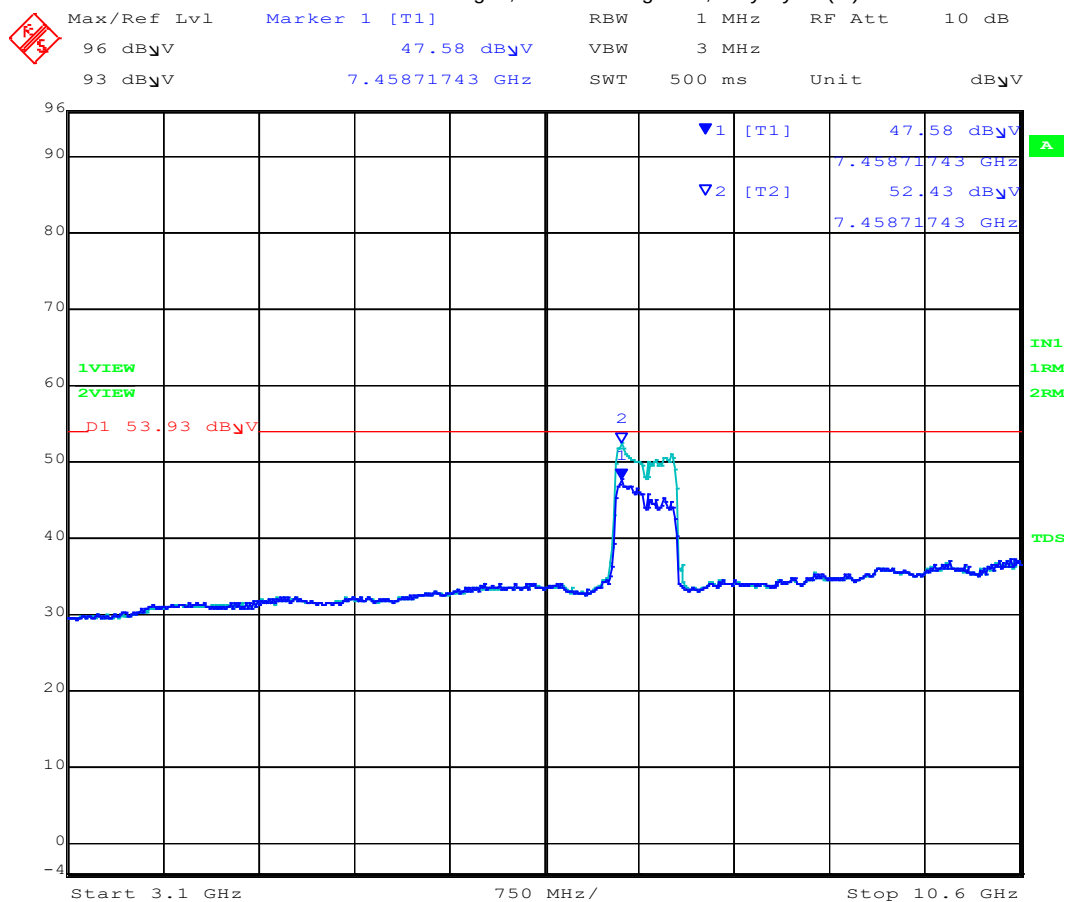
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7656.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 09:58:18

3100-10600 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	7458.71	47.58	Average	Vertical	150	0	53.93	-6.35	Pass
2	7458.71	52.43	Average	Horizontal	150	0	53.93	-1.50	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 10.6 – 18.0 GHz

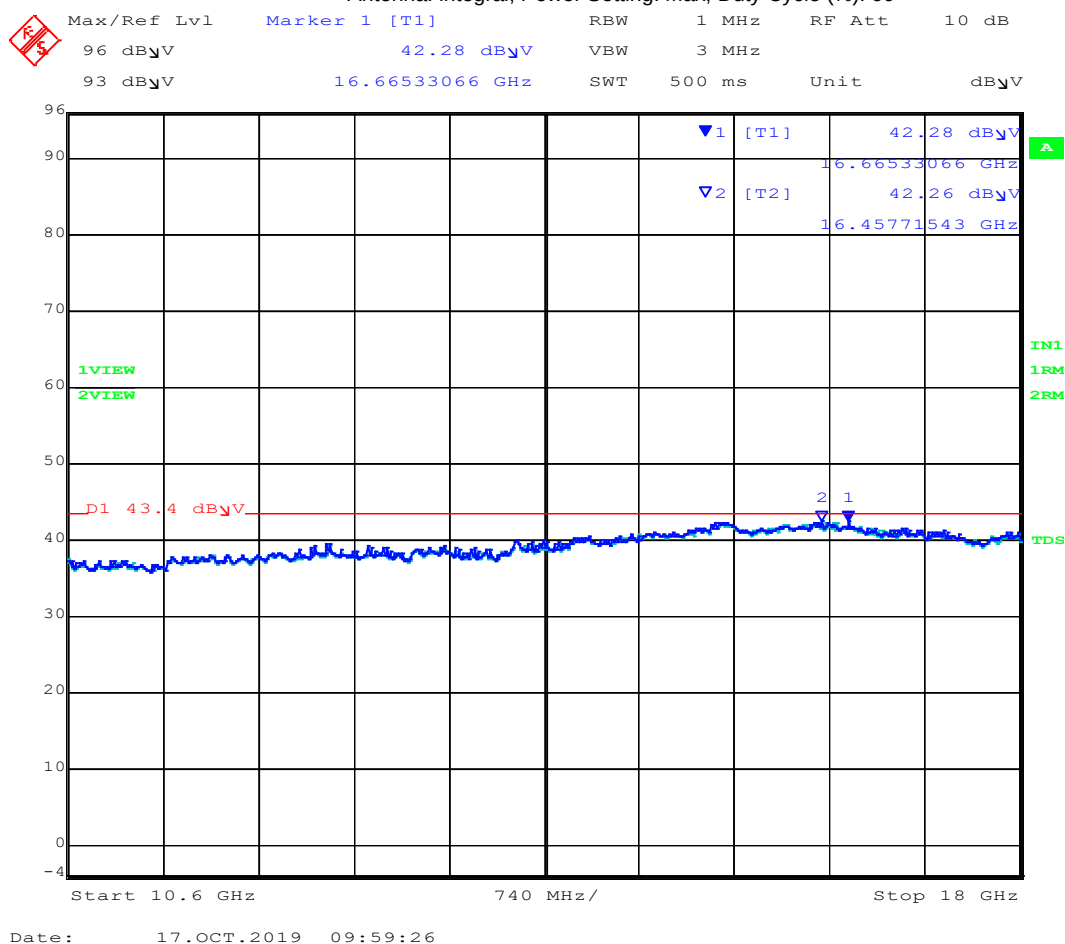
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7656.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



10600-18000 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	16665.33	42.28	Average	Vertical	150	0	43.4	-1.12	Pass
2	16457.71	42.26	Average	Horizontal	150	0	43.4	-1.14	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

8184 MHz

Equipment Configuration for Spurious Emissions 1-1.61 GHz

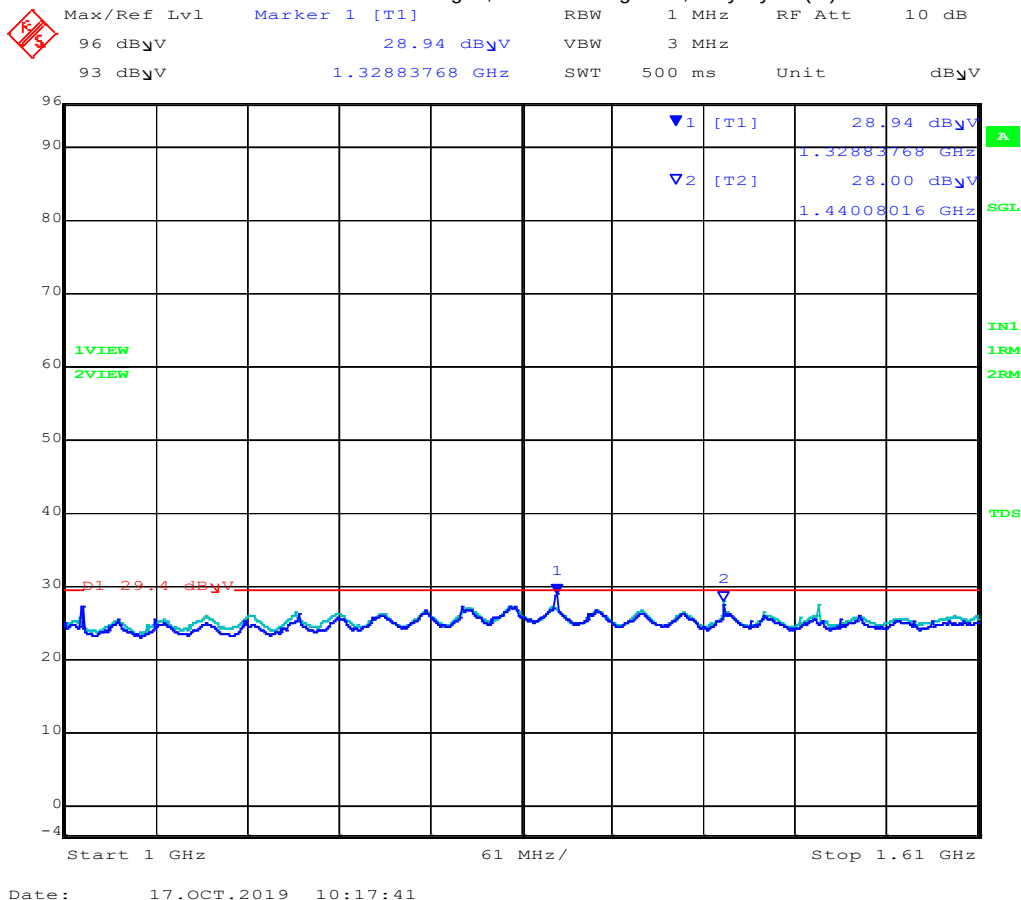
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8184.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1000.00– 1610.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1328.82	28.94	Average	Vertical	150	0	29.4	-0.46	Pass
2	1440.08	28.00	Average	Horizontal	150	0	29.4	-1.40	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.61 - 1.99 GHz

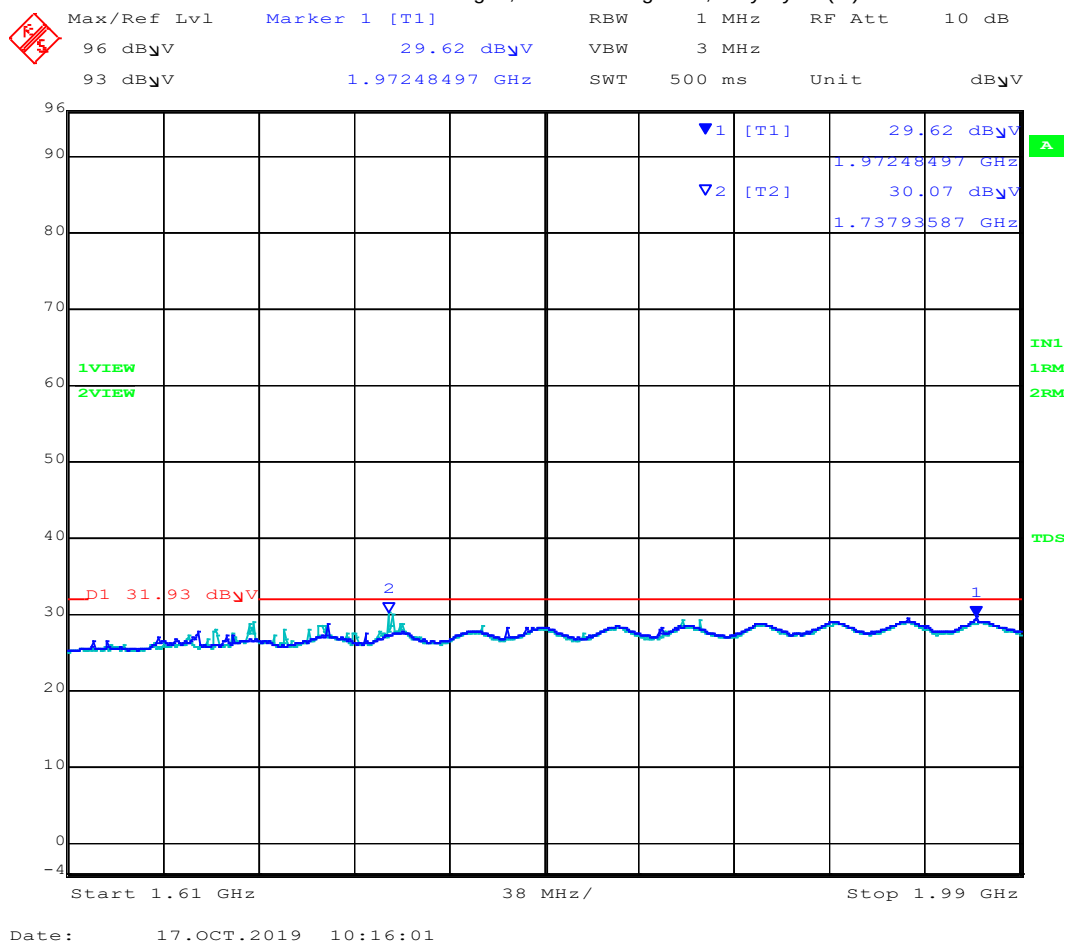
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8184.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1610-1990 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1972.24	29.62	Average	Vertical	150	0	31.93	-2.31	Pass
2	1737.93	30.07	Average	Horizontal	150	0	31.93	-1.86	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.99 – 3.1 GHz

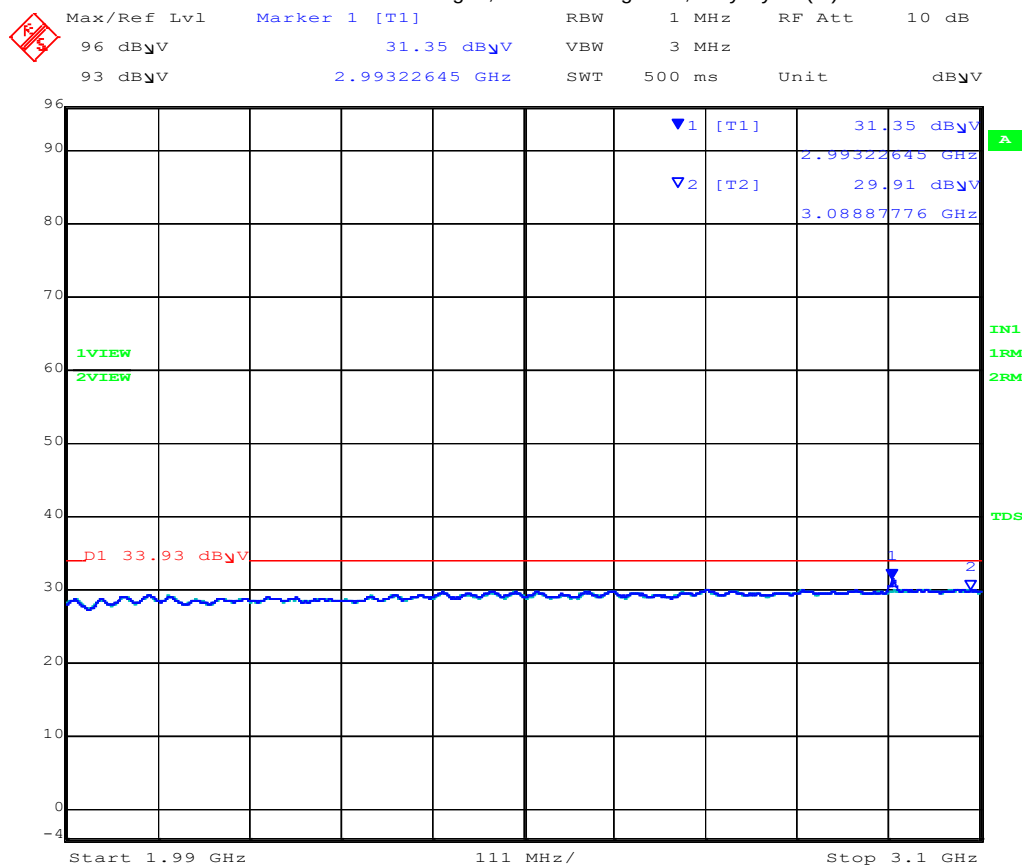
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8184.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 10:12:47

1990-3100 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2993.22	31.35	Average	Vertical	150	0	33.93	-2.58	Pass
2	3088.87	29.91	Average	Horizontal	150	0	33.93	-4.02	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 3.1 – 10.6 GHz

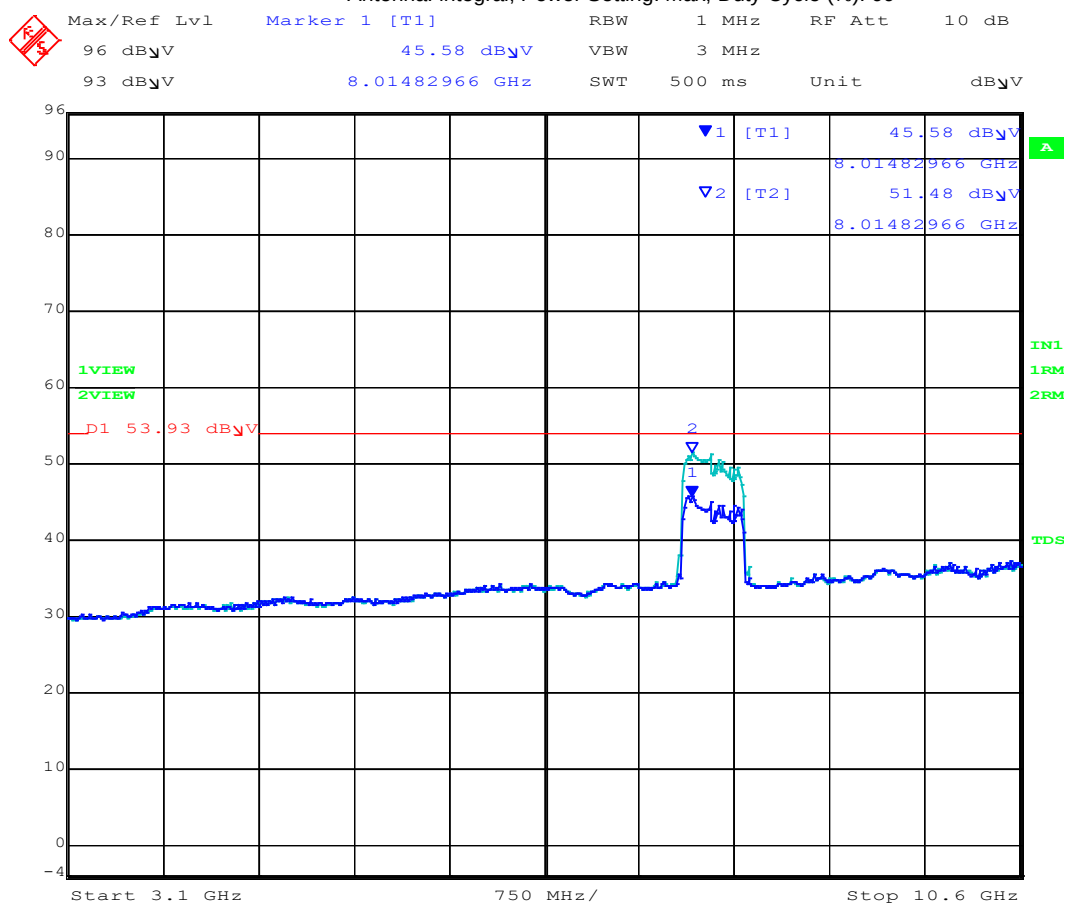
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8184.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 10:11:03

3100-10600 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	8014.82	45.58	Average	Vertical	150	0	53.93	-8.35	Pass
2	8014.82	51.48	Average	Horizontal	150	0	53.93	-2.45	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 10.6 – 18.0 GHz

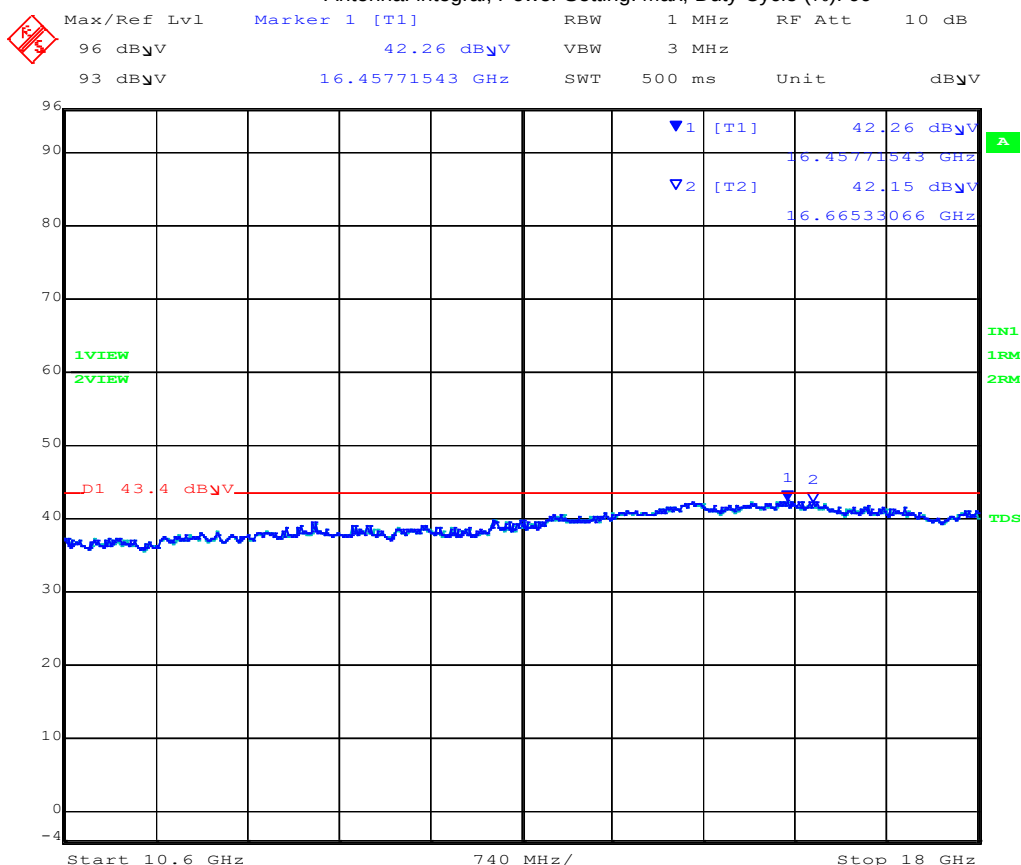
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8184.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 10:08:06

10600-18000 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	16457.77	42.26	Average	Vertical	150	0	43.4	-1.14	Pass
2	16665.33	42.15	Average	Horizontal	150	0	43.4	-1.25	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

8712 MHz

Equipment Configuration for Spurious Emissions 1-1.61 GHz

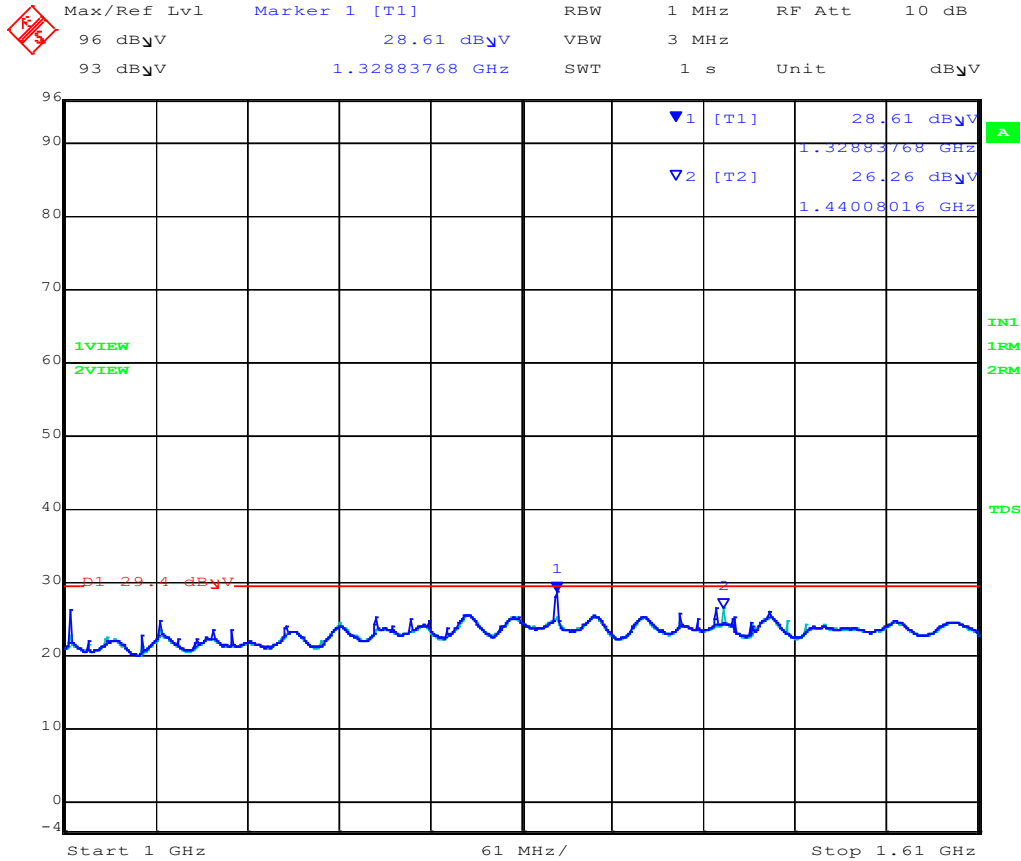
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8712.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 10:47:27

1000.00- 1610.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1328.82	28.61	Average	Vertical	150	0	29.4	-0.79	Pass
2	1440.08	26.26	Average	Horizontal	150	0	29.4	-3.14	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.61 - 1.99 GHz

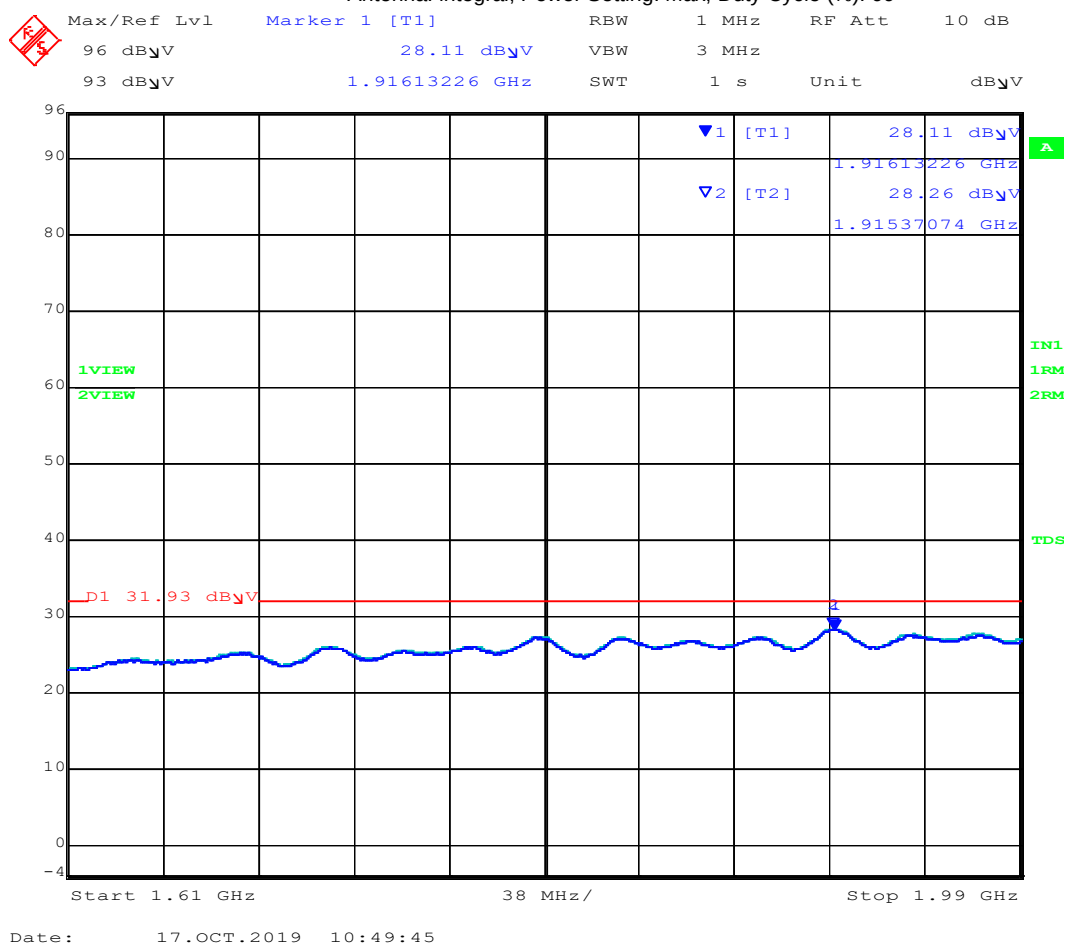
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8712.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1610-1990 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1916.13	28.11	Average	Vertical	150	0	31.93	-3.82	Pass
2	1915.37	28.26	Average	Horizontal	150	0	31.93	-3.67	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.99 – 3.1 GHz

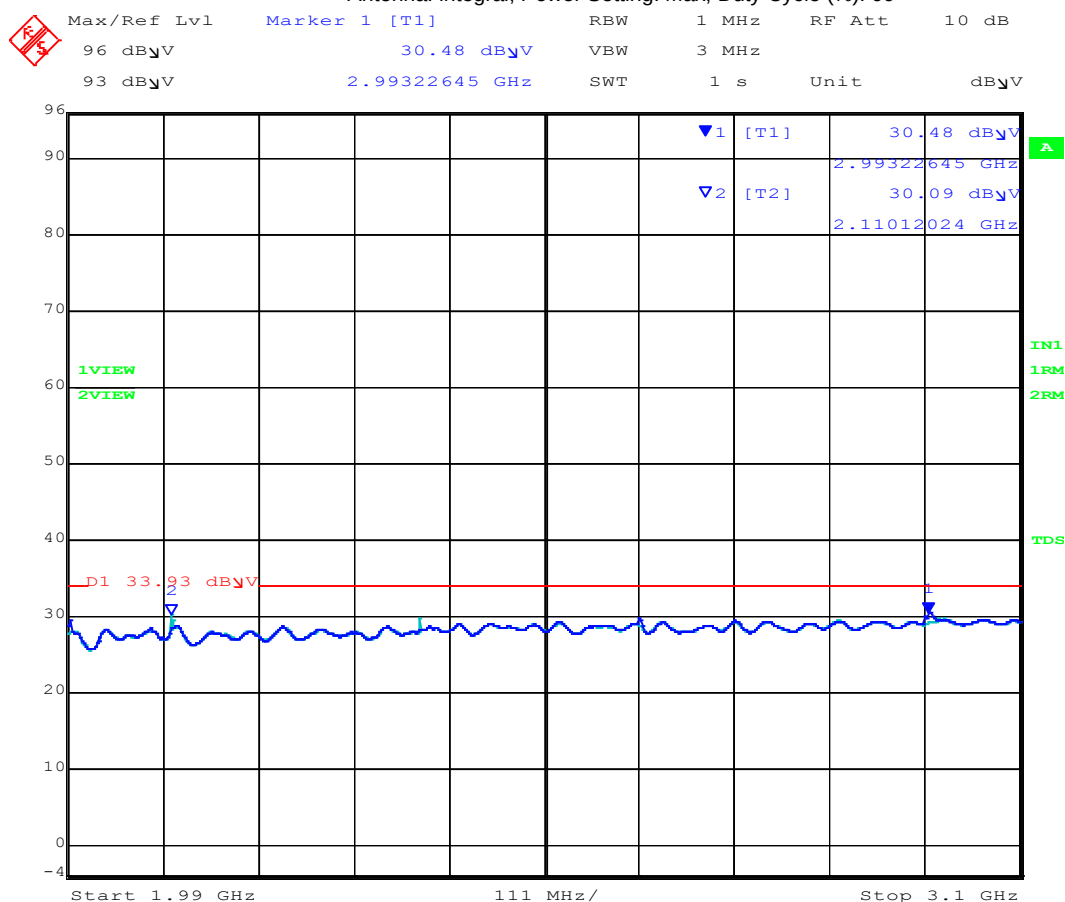
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8712.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 10:54:41

1990-3100 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2993.22	30.48	Average	Vertical	150	0	33.93	-3.45	Pass
2	2110.12	30.09	Average	Horizontal	150	0	33.93	-3.84	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 3.1 – 10.6 GHz

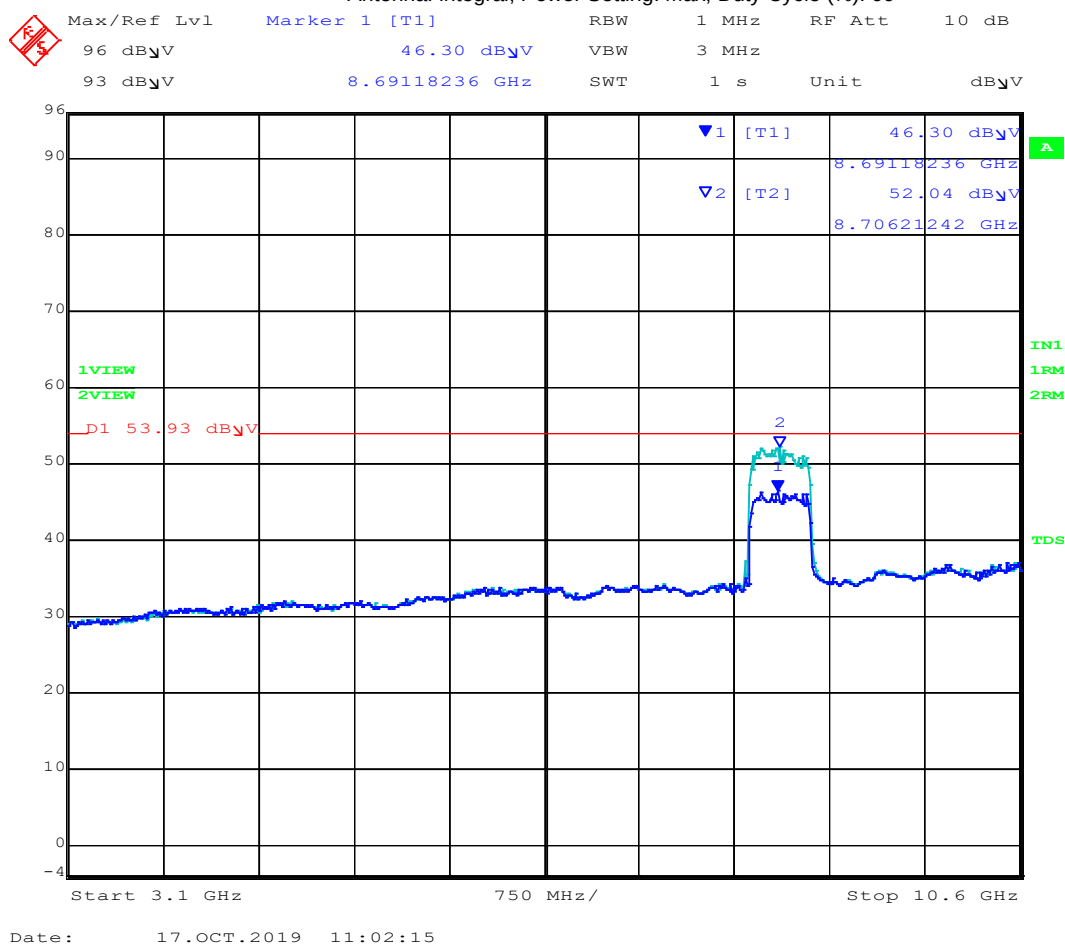
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8712.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



3100-10600 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	8691.18	46.3	Average	Vertical	150	0	53.93	-7.63	Pass
2	8706.21	52.04	Average	Horizontal	150	0	53.93	-1.89	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 10.6 – 18.0 GHz

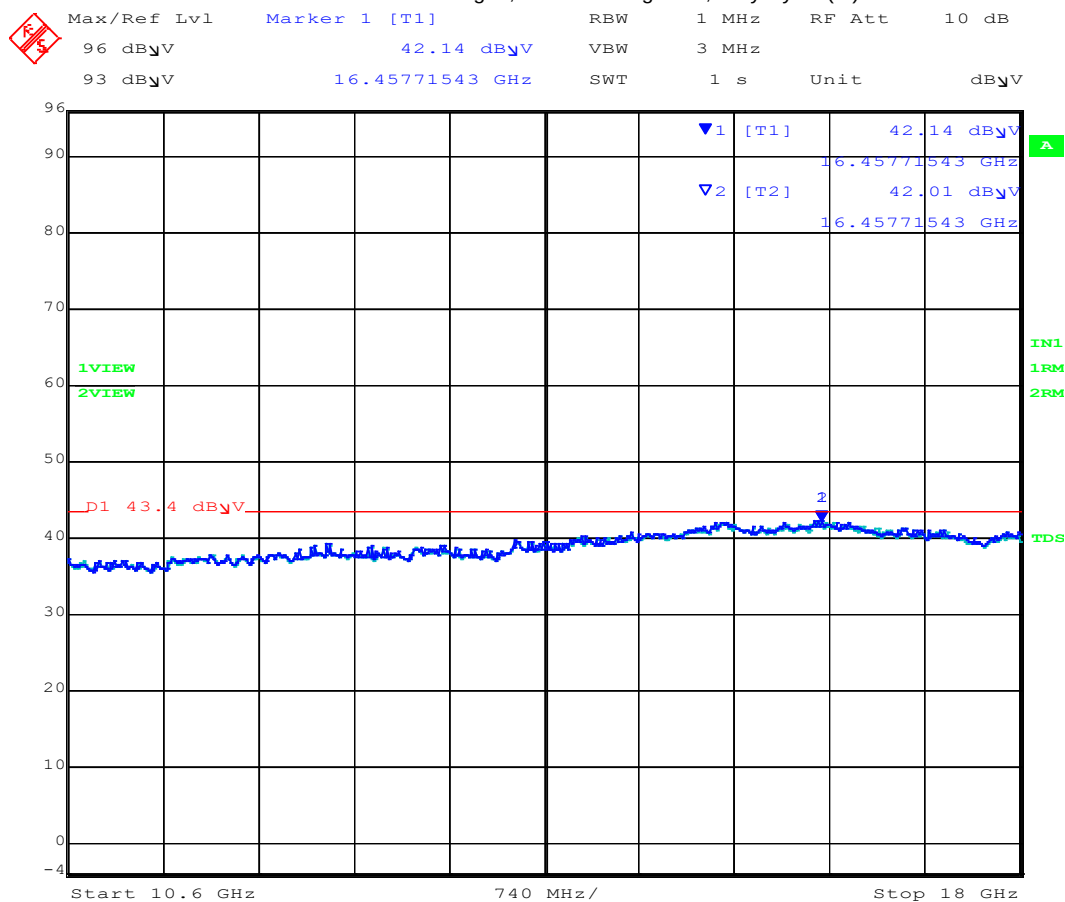
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8712.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 11:03:24

10600-18000 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	16457.71	42.14	Average	Vertical	150	0	43.4	-1.26	Pass
2	16457.71	42.01	Average	Horizontal	150	0	43.4	-1.39	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

9.4.2. GPS Band Emissions

3432 MHz

Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz

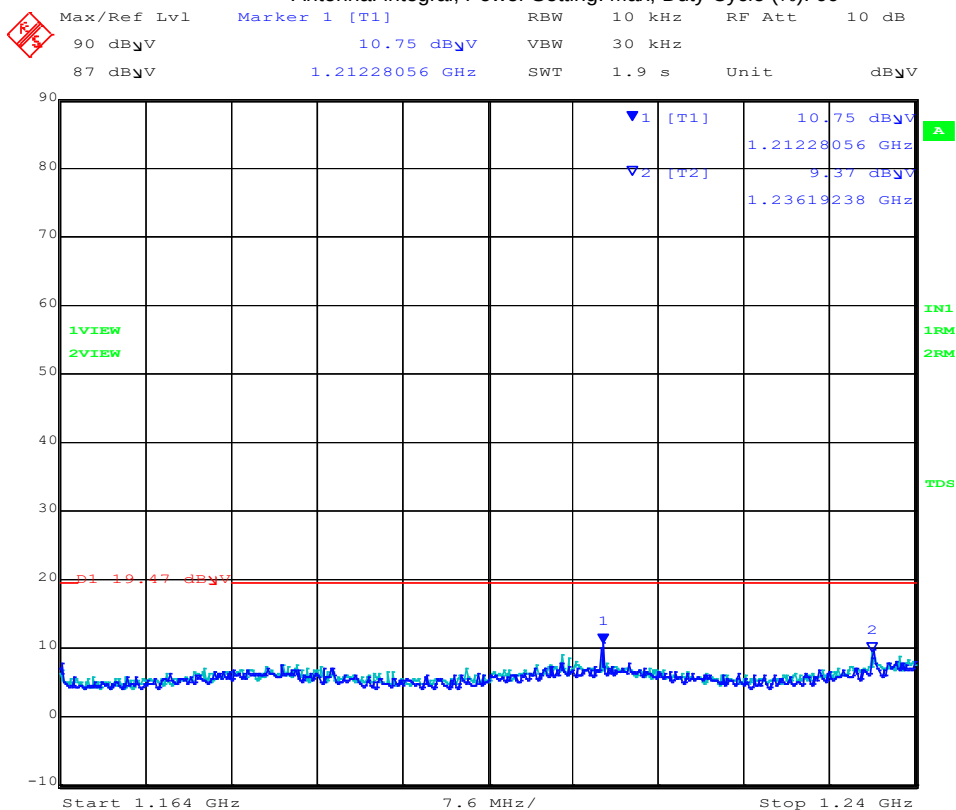
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3432.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 16.OCT.2019 11:42:08

1164.00 – 1240.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1212.28	10.75	Average	Vertical	150	0	19.47	-8.72	Pass
2	1236.19	9.37	Average	Horizontal	150	0	19.47	-10.10	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

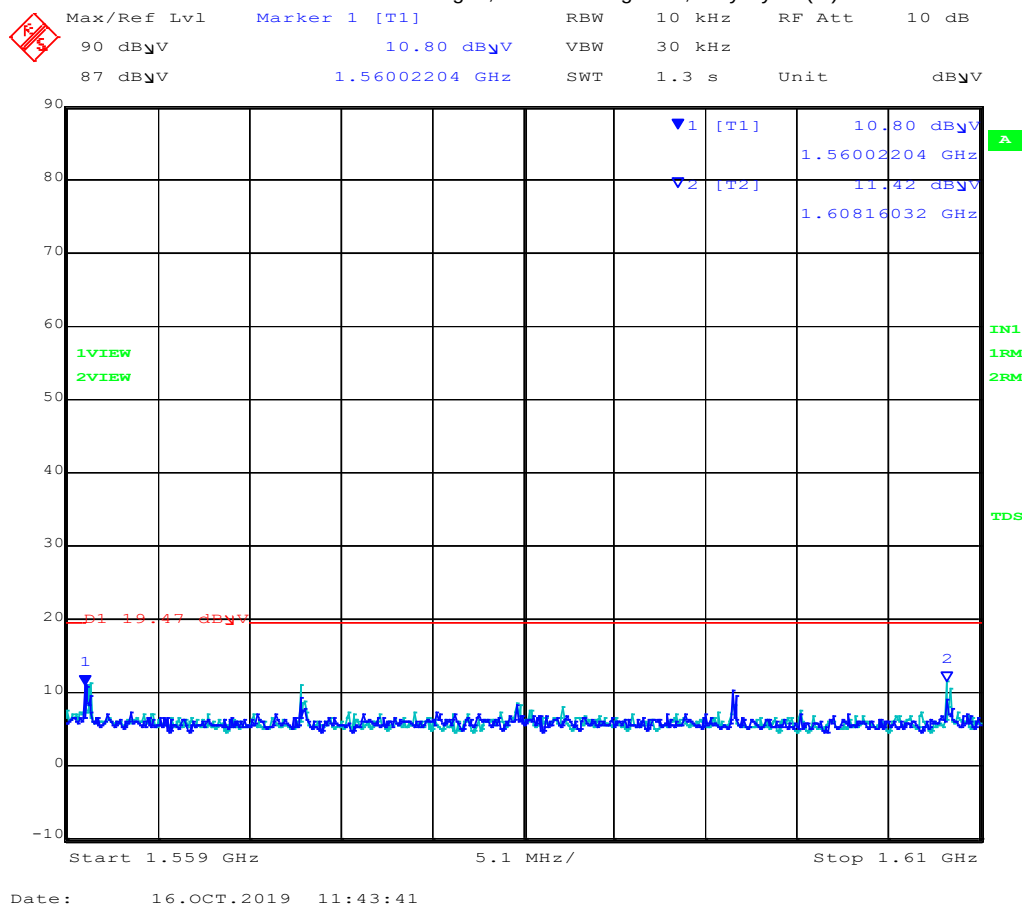
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3432.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1559 - 1610 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1560.02	10.80	Average	Vertical	150	0	19.47	-8.67	Pass
2	1608.16	11.42	Average	Horizontal	150	0	19.47	-8.05	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

3960 MHz

Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz

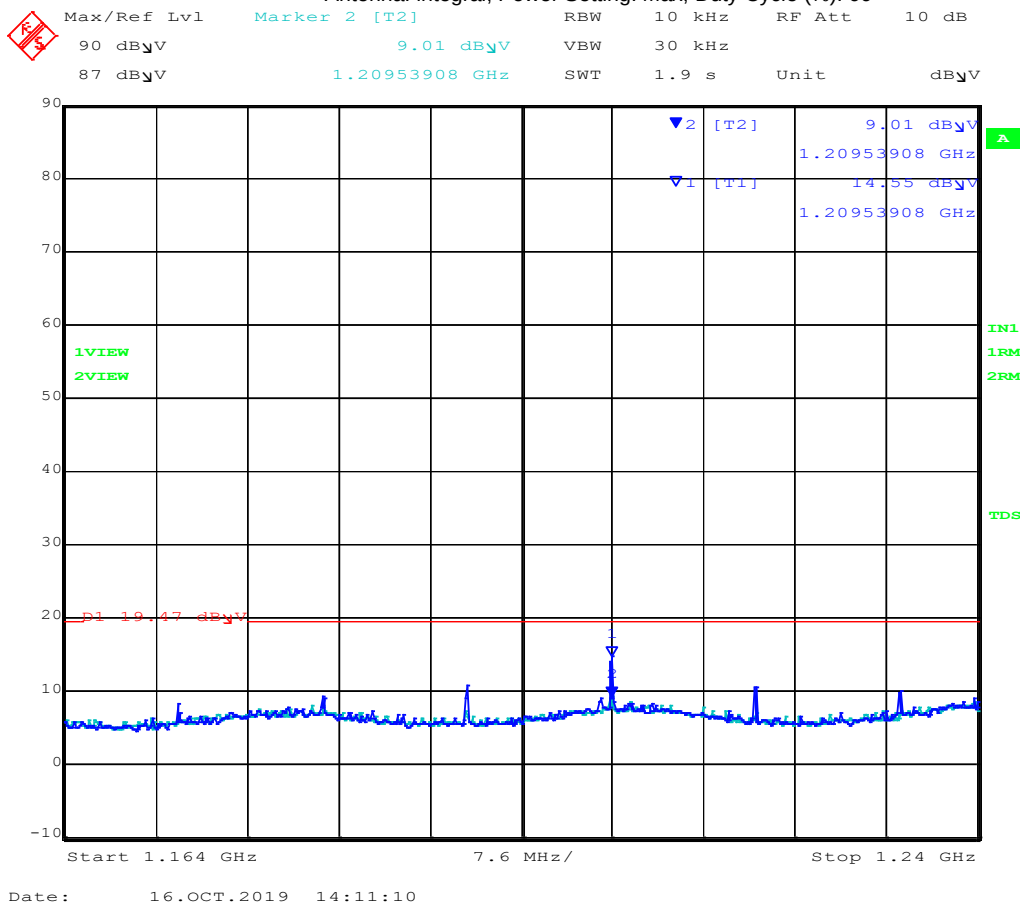
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3960.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1164.00 – 1240.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1209.53	14.55	Average	Vertical	150	0	19.47	-4.92	Pass
2	1209.52	9.01	Average	Horizontal	150	0	19.47	-10.46	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

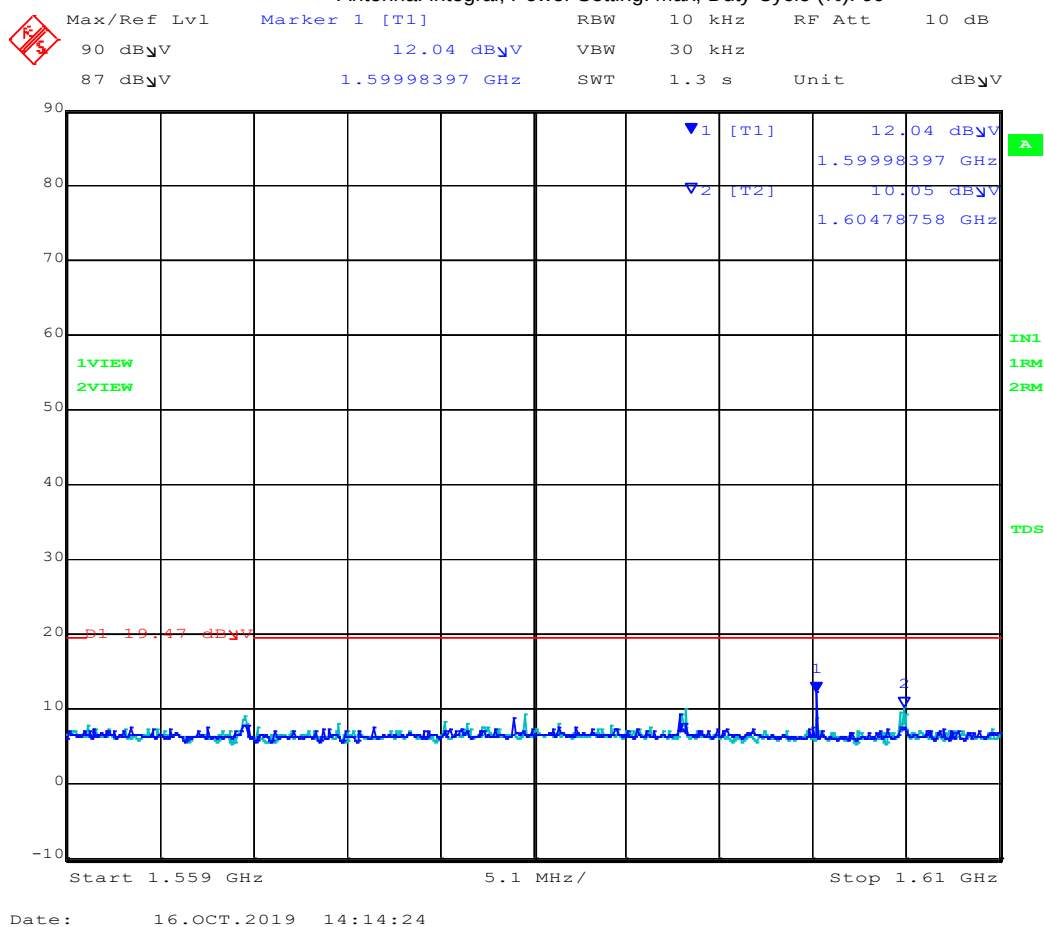
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	3960.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1559 - 1610 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1599.98	12.04	Average	Vertical	150	0	19.47	-7.43	Pass
2	1604.78	10.05	Average	Horizontal	150	0	19.47	-9.42	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

4488 MHz

Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz

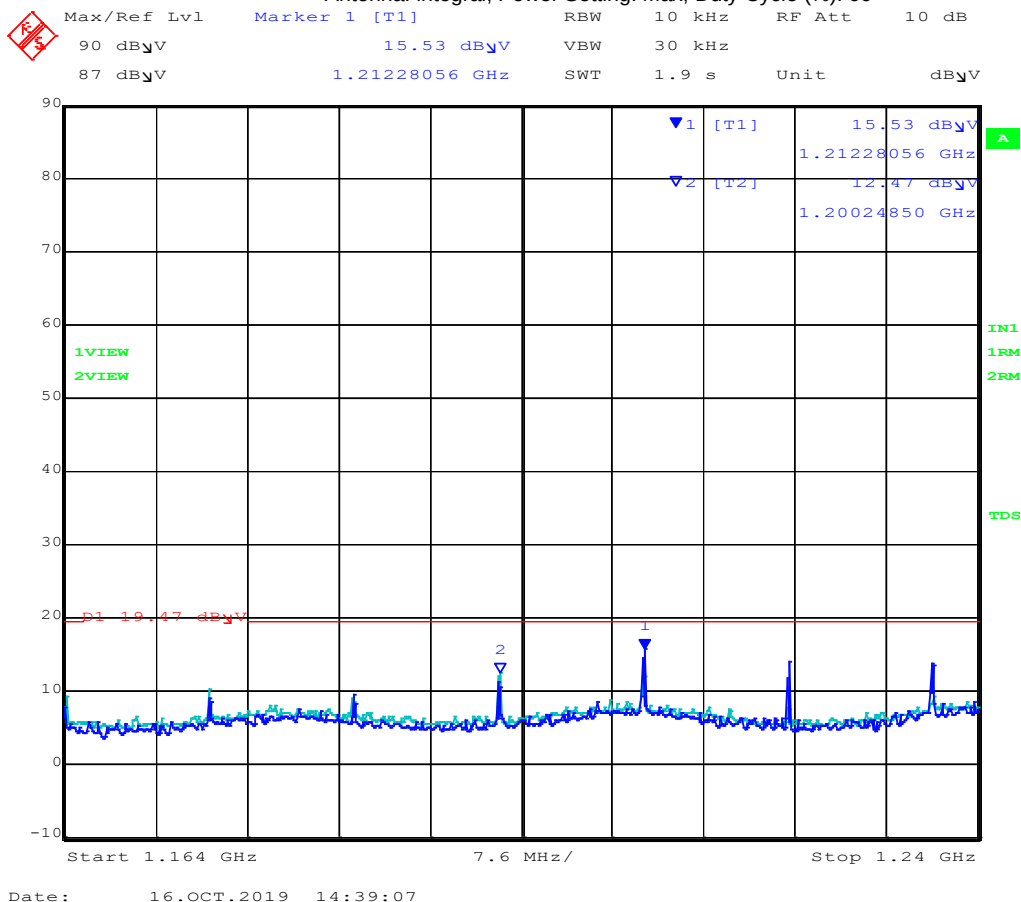
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	4488.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1164.00 – 1240.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1212.28	15.53	Average	Vertical	150	0	19.47	-3.94	Pass
2	1200.24	12.47	Average	Horizontal	150	0	19.47	-7.00	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

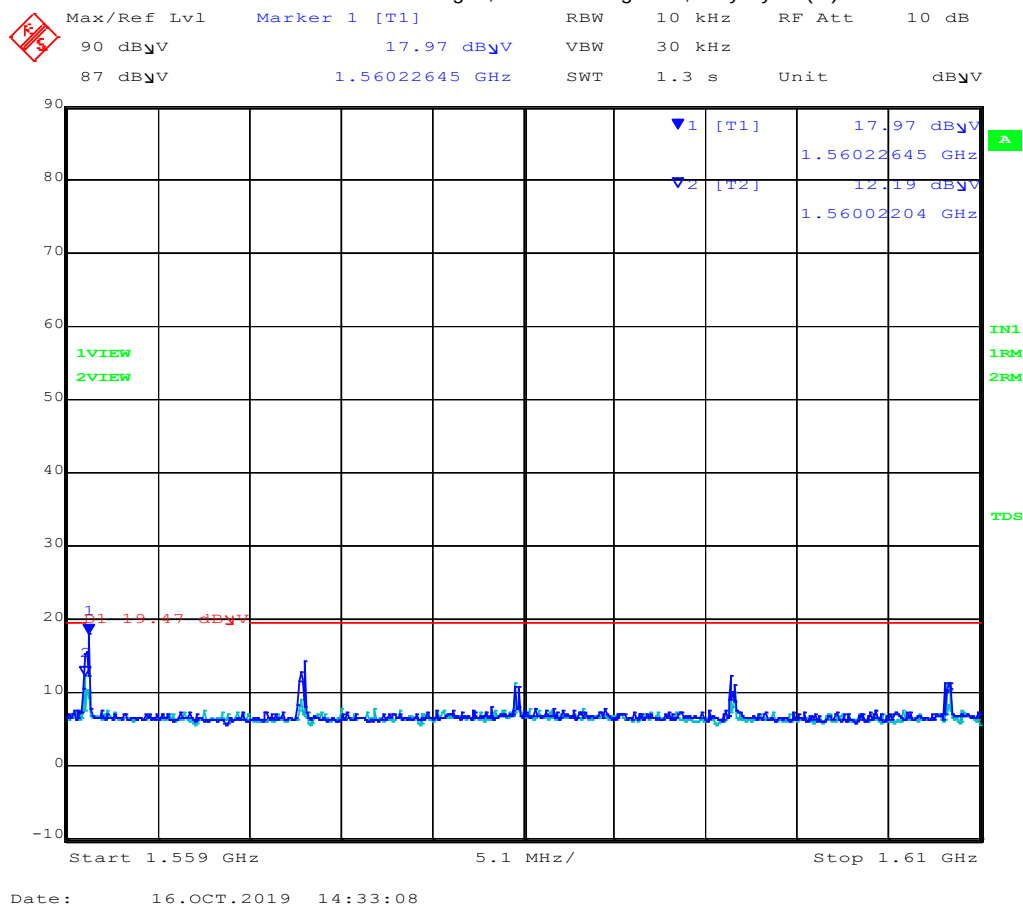
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	1.0/0.2/0.2	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	4488.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1559 - 1610 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1560.22	17.97	Average	Vertical	150	0	19.47	-1.50	Pass
2	1560.02	12.19	Average	Horizontal	150	0	19.47	-7.28	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

6600 MHz

Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz

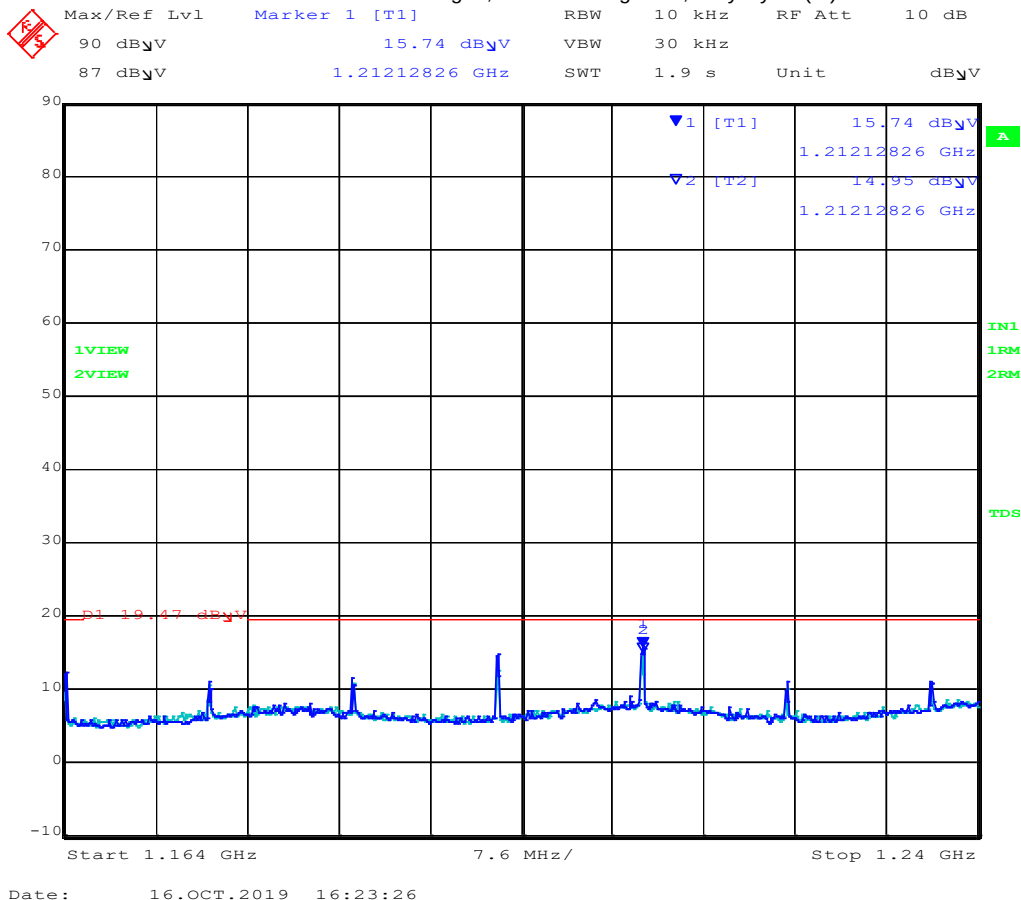
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	6600.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1164.00 – 1240.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1212.12	15.74	Average	Vertical	150	0	19.47	-3.73	Pass
2	1212.12	14.95	Average	Horizontal	150	0	19.47	-4.52	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

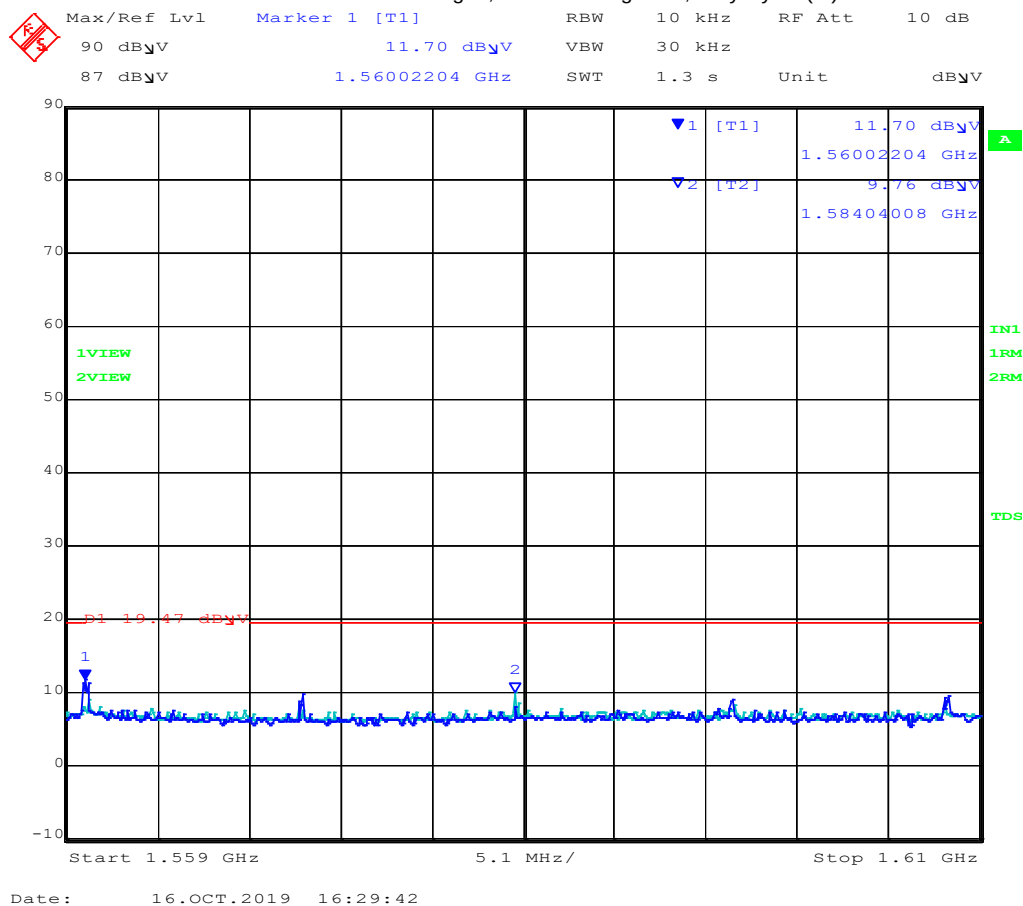
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	6600.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1559 - 1610 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1560.02	11.7	Average	Vertical	150	0	19.47	-7.77	Pass
2	1584.04	9.76	Average	Horizontal	150	0	19.47	-9.71	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

7128 MHz

Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz

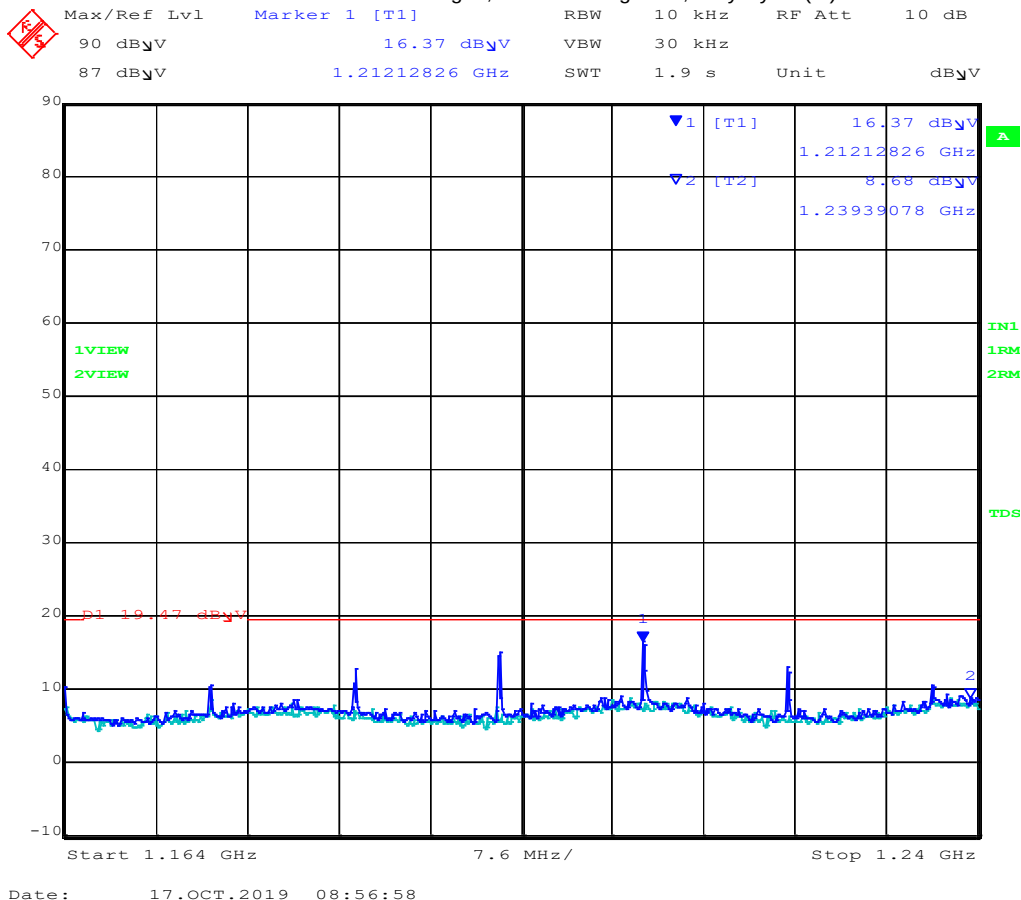
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7128.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1164.00 – 1240.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1212.12	16.37	Average	Vertical	150	0	19.47	-3.10	Pass
2	1239.39	8.68	Average	Horizontal	150	0	19.47	-10.79	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

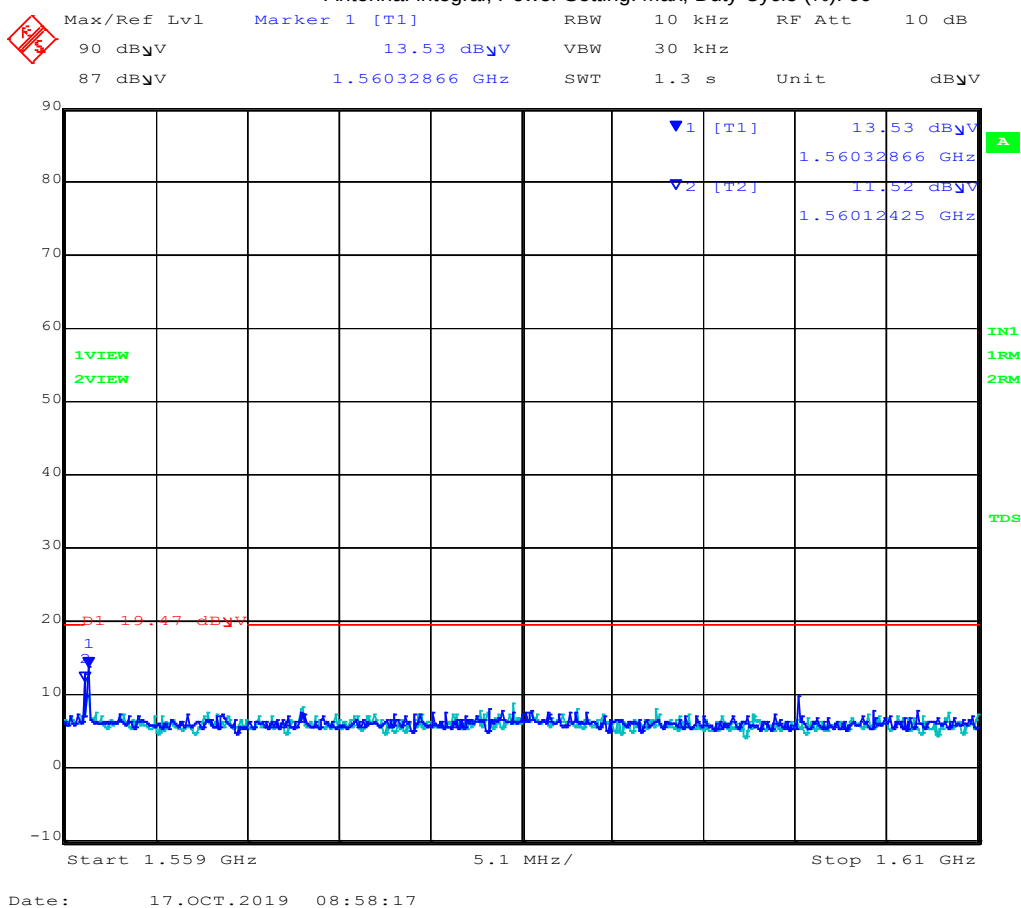
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7128.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1559 - 1610 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1560.32	13.53	Average	Vertical	150	0	19.47	-5.94	Pass
2	1560.12	11.52	Average	Horizontal	150	0	19.47	-7.95	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

7656 MHz (Covers Band Group 3 TFC 7 and Band Group 6 TFC 5)

Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz

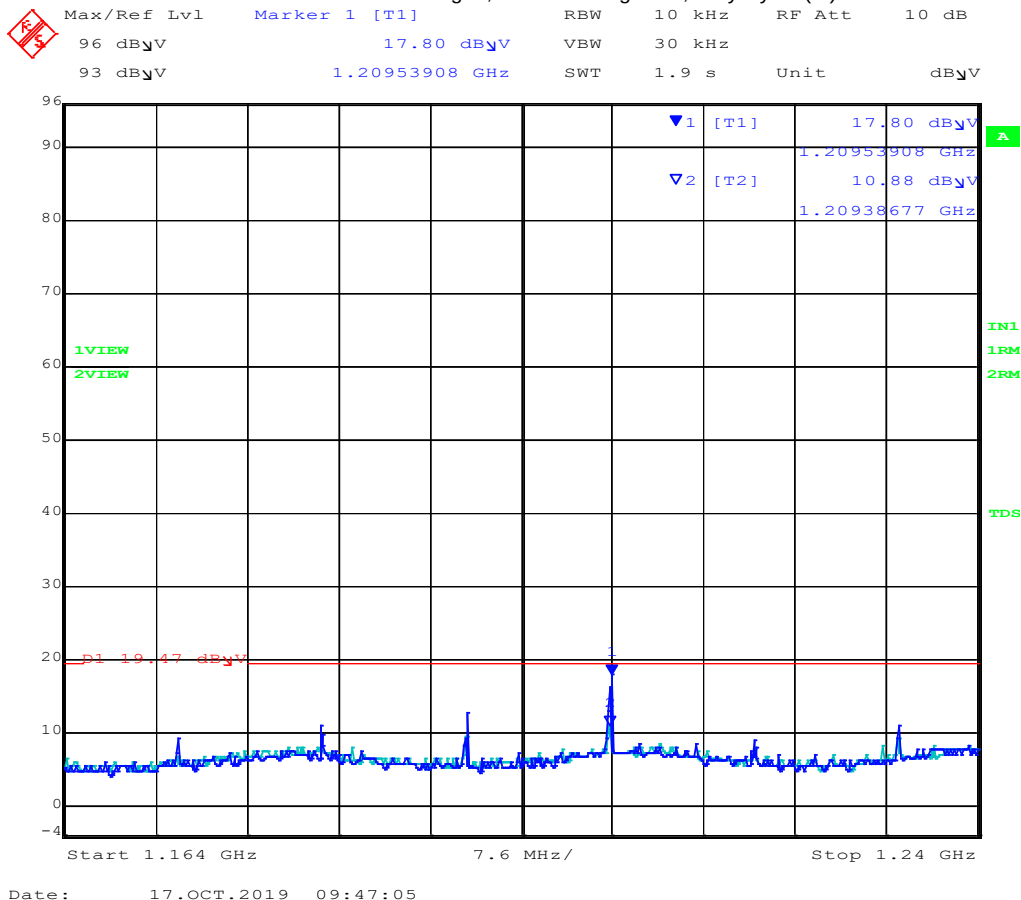
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7656.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



Date: 17.OCT.2019 09:47:05

1164.00 – 1240.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1209.53	17.8	Average	Vertical	150	0	19.47	-1.67	Pass
2	1209.38	10.88	Average	Horizontal	150	0	19.47	-8.59	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

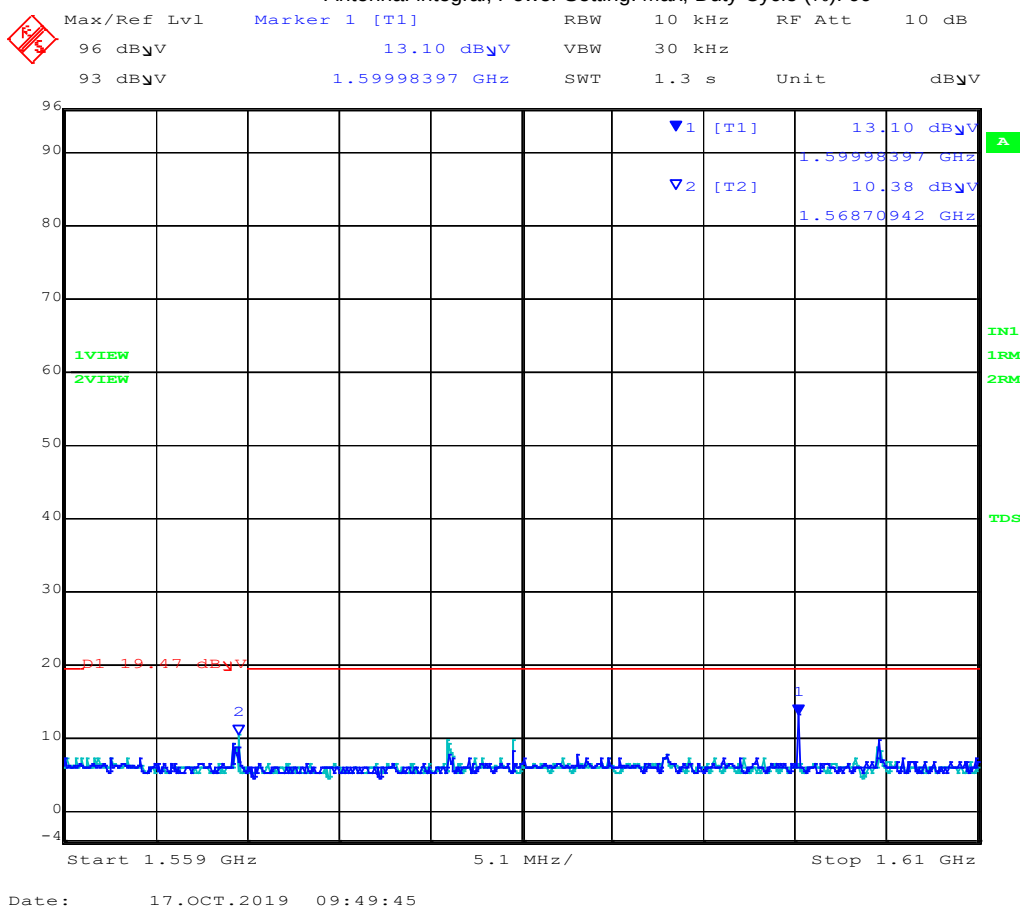
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.2/-0.2/0.1	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	7656.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1559 - 1610 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1599.98	13.1	Average	Vertical	150	0	19.47	-6.37	Pass
2	1568.7	10.38	Average	Horizontal	150	0	19.47	-9.09	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

8184 MHz

Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz

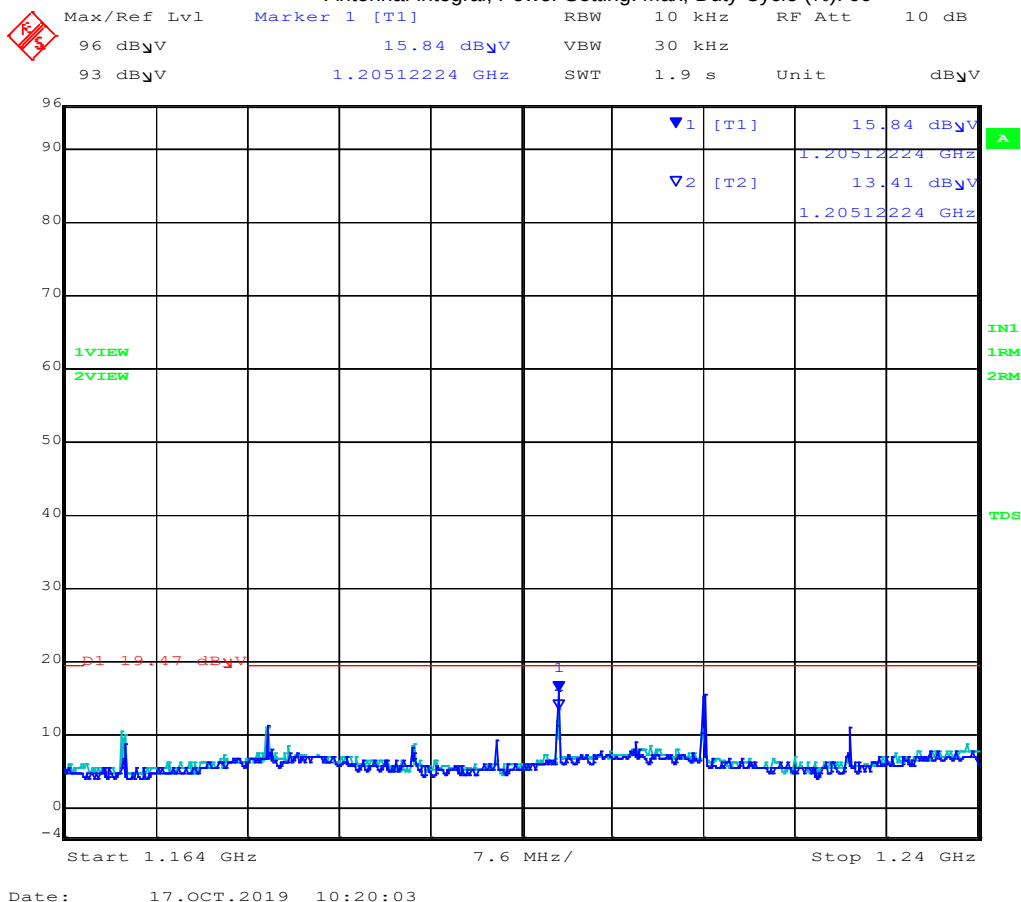
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8184.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1164.00 – 1240.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1205.12	15.84	Average	Vertical	150	0	19.47	-3.63	Pass
2	1205.12	13.41	Average	Horizontal	150	0	19.47	-6.06	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

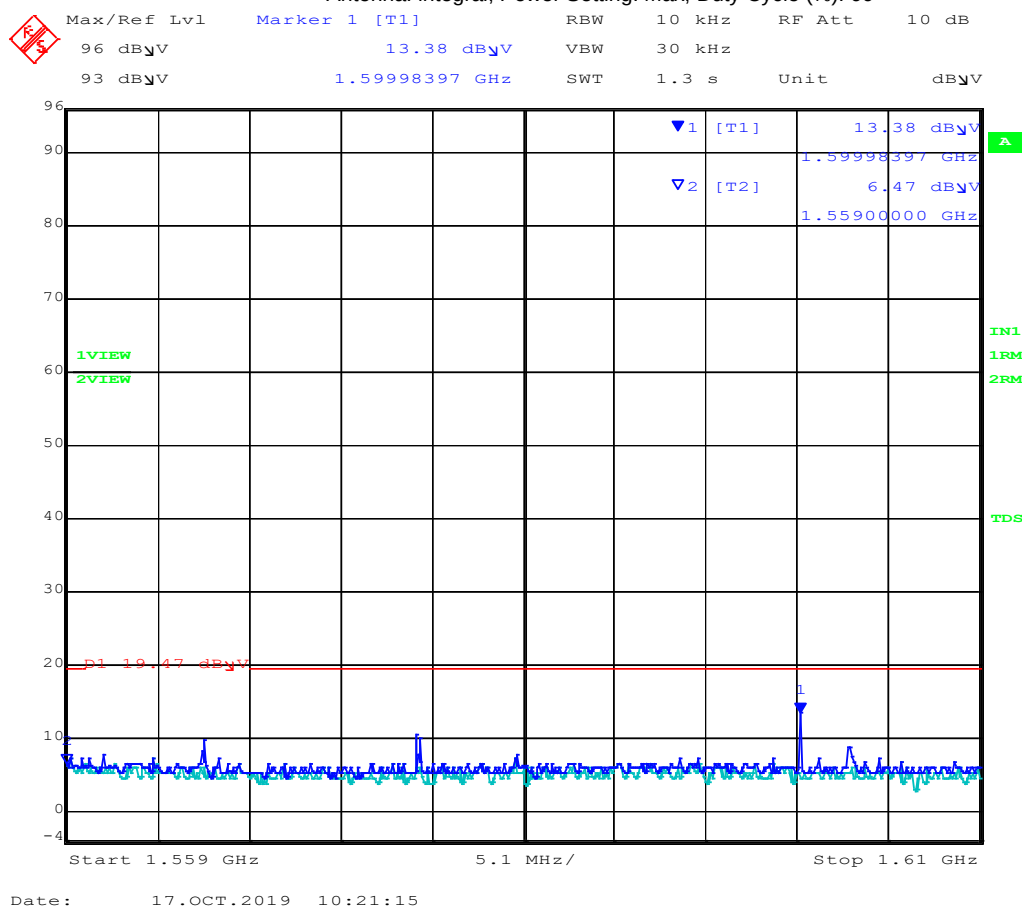
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8184.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1559 - 1610 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1599.98	13.38	Average	Vertical	150	0	19.47	-6.09	Pass
2	1559	6.47	Average	Horizontal	150	0	19.47	-13.00	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

8712 MHz

Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz

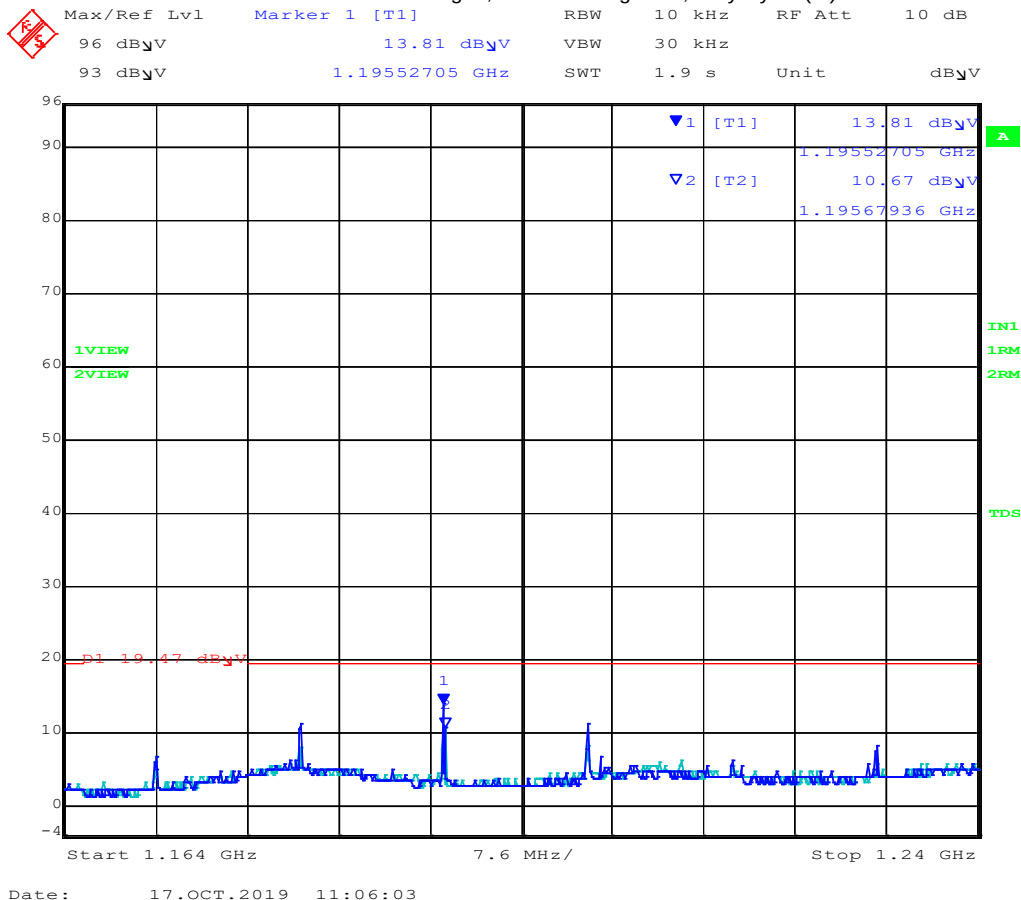
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8712.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz



Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1164.00 – 1240.00 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1195.52	13.81	Average	Vertical	150	0	19.47	-5.66	Pass
2	1195.67	10.67	Average	Horizontal	150	0	19.47	-8.80	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

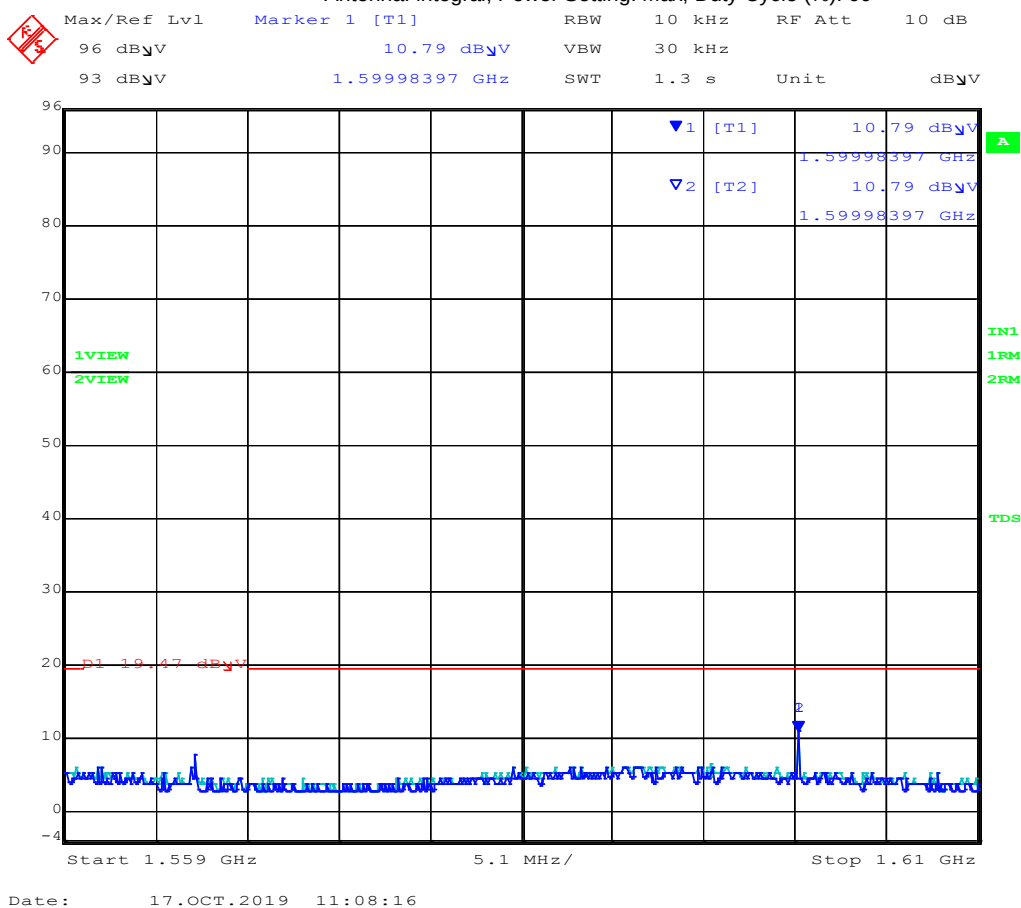
Antenna:	Chip	Variant:	500 MHz Bandwidth
Antenna Gain (dBi):	0.1/-1.8/-1.8	Modulation:	BPM/BPSK
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99%
Channel Frequency (MHz):	8712.00	Data Rate:	
Power Setting:	Max	Tested By:	SB

Test Measurement Results



RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99



1559 - 1610 MHz

Num	Frequency MHz	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	1599.98	10.79	Average	Vertical	150	0	19.47	-8.68	Pass
2	1599.98	10.79	Average	Horizontal	150	0	19.47	-8.68	Pass

Test Notes:

Laptop connected via 10ft USB cable with Ferrites (TDK ZCAT-330-1236 and Fair-Rite Type 61 with one turn at each end)

9.4. Shutoff Timing Requirements

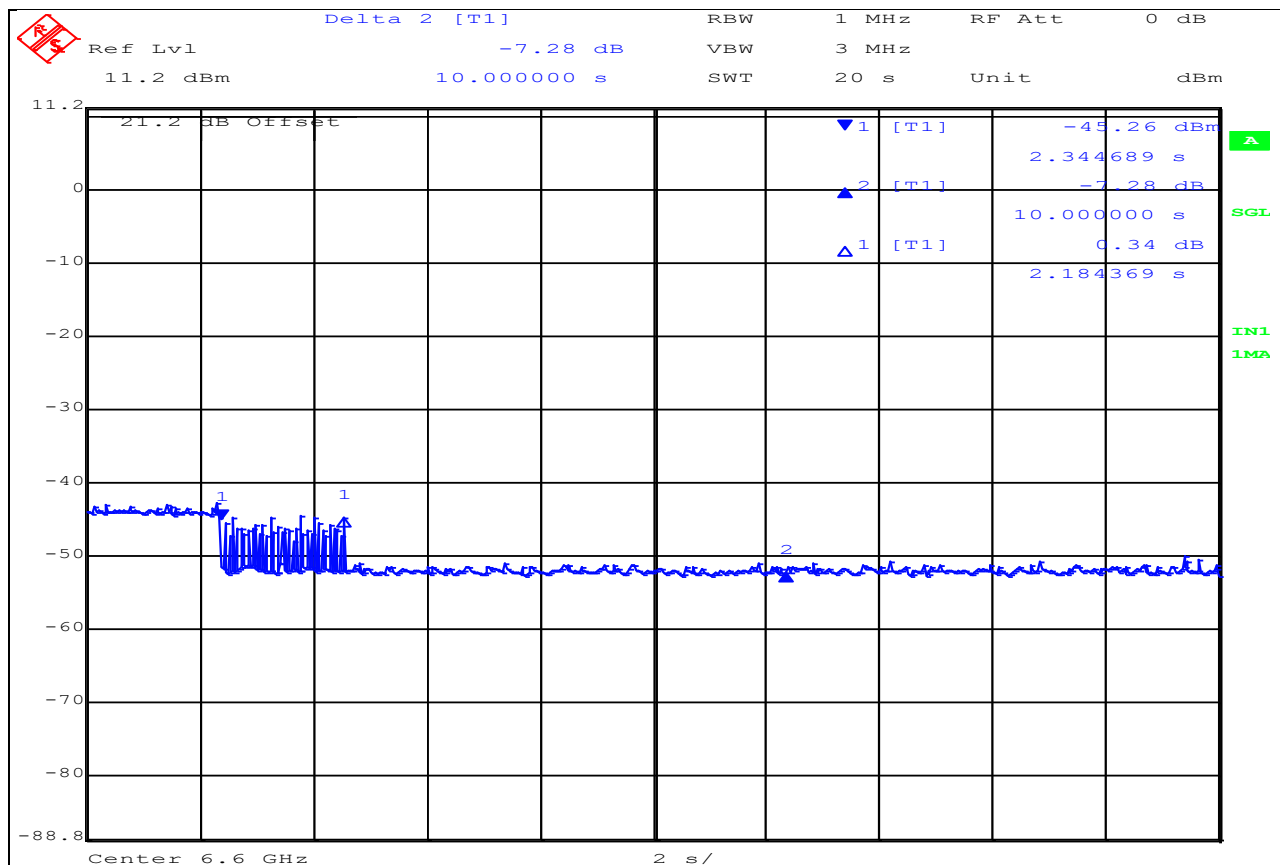
Radiated Test Conditions for Shutoff Timing Requirements			
Standard:	FCC CFR 47:15.519 (a)(1)	Ambient Temp. (°C):	24.0 - 27.5
Test Heading:	Shutoff Timing Requirements	Rel. Humidity (%):	32 - 45
Standard Section(s):	ANSI C63.10 Section 10.3.6	Pressure (mBars):	999 - 1001
Reference Document(s):	None		
Test Procedure for UWB 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. Operating Frequency Band: 3100-10600 MHz Limits The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received.			

Equipment Configuration for Shutdown Timing Requirements

Variant:	Taoglas UWC.21	Variant:	UWB
Data Rate:	-0.86	Modulation:	--
Modulation:	Not Applicable	Duty Cycle (%):	99%
TPC:	6600.00	Data Rate:	
Engineering Test Notes:			

Test Measurement Results

Frequency (MHz)	Shutdown Time	Limit	Margin	EUT Power Setting
	(s)	(s)	(s)	Numeric
6600.00	2.18	10	-7.82	Max



Date: 17.OCT.2019 13:32:28

Traceability to Industry Recognized Test Methodologies

Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB



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