TEST REPORT



DT&C Co., Ltd.

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1. Report No: DRTFCC2101-0008				
2. Customer				
Name : BLUEBIRD INC.				
• Address : 3F, 115, Irwon-ro, Gangnam-gu, Seoul, South Korea				
3. Use of Report : FCC Certification				
4. Product Name / Model Name : Enterprise Full Touch Handheld Computer / EF550				
FCC ID : SS4EF550				
5. FCC Regulation(s): Part 15.247				
Test Method Used : KDB558074 D01v05r02, ANSI C63.10-20				
6. Date of Test : 2020.10.07 ~ 2021.01.08				
7. Location of Test : X Permanent Testing Lab				
8. Testing Environment : See appended test report.				
9. Test Result : Refer to the attached test result.				
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.				
Affirmation Tested by Reviewed by				
Name : JaeHyeok Bang Ann Name : JaeJin Lee A Signature)				
2021. 01. 13.				
DT&C Co., Ltd.				
This test report is a general report that does not use the KOLAS accreditation mark and is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.				
If this report is required to confirmation of authenticity, please contact to report@dtnc.net				

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2101-0008	Jan. 13, 2021	Initial issue	JaeHyeok Bang	JaeJin Lee

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1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	Enterprise Full Touch Handheld Computer
Model Name	EF550
Add Model Name	EF550R
Hardware Version	REV 0.3
Software Version	R1.0
Power Supply	DC 3.85 V
Frequency Range	▪ 802.11b/g/n(20 MHz) : 2 412 MHz ~ 2 462 MHz
Max. RF Output Power	2.4 GHz Band • 802.11b : 15.78 dBm • 802.11g : 19.90 dBm • 802.11n (HT20) : 18.76 dBm
Modulation Type	• 802.11b: CCK, DSSS • 802.11g/n: OFDM
Antenna Specification	Antenna type: PIFA Antenna Antenna gain: Refer to the clause 7 in test report.

Transmitting configuration of EUT

	SIS	0	MIMO(CDD)	MIMO(SDM)
Mode	Ant 1	Ant 2	Ant 1 & 2	Ant 1 & 2
	Data rate			
802.11b	1 Mbps ~ 11 Mbps	1 Mbps ~ 11 Mbps	-	-
802.11g	6 Mbps ~ 54 Mbps	6 Mbps ~ 54 Mbps	6 Mbps ~ 54 Mbps	-
802.11n(HT20)	MCS 0 ~ MCS 7	MCS 0 ~ MCS 7	MCS 0 ~ MCS 7	MCS 8 ~ MCS 15

Note1: SDM = Spatial Diversity Multiplexing, CDD = Cycle Delay Diversity, SS = Spatial Streams

2. INFORMATION ABOUT TESTING

2.1 Test mode

Test mode	Worst case data rate	Те	ested Frequency (MF	łz)
TM 1	802.11b 1 Mbps (Single transmitting)	2 412	2 437	2 462
TM 2	802.11g 18 Mbps (CDD Multiple transmitting)	2 412	2 437	2 462
ТМ 3	802.11n(HT20) MCS 2 (CDD Multiple transmitting)	2 412	2 437	2 462

Note1: The worst case data rate was determined according to the power measurements.

Note2: The power measurement results for all modes and data rate were reported.

2.2 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.3 Tested environment

Temperature	-	+20 °C ~ +25 °C
Relative humidity content	:	38 % ~ 45 %
Details of power supply	:	DC 3.85 V

2.4 EMI suppression Device(s) / Modifications

EMI suppression device(s) added and/or modifications made during testing \rightarrow None

2.5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014 and ANSI C 63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

Test items	Measurement uncertainty
Antenna-port conducted emission	0.9 dB (The confidence level is about 95 %, k = 2)
AC power-line conducted emission	3.6 dB (The confidence level is about 95 %, k = 2)
Radiated emission (1 GHz Below)	4.9 dB (The confidence level is about 95 %, k = 2)
Radiated emission (1 GHz ~ 18 GHz)	5.1 dB (The confidence level is about 95 %, k = 2)
Radiated emission (18 GHz Above)	5.3 dB (The confidence level is about 95 %, k = 2)

3. SUMMARY OF TESTS

FCC Part Section(s)	Parameter	Limit	Test Condition	Status Note 1
15.247(a)	6 dB Bandwidth	> 500 kHz		С
15.247(b)	Transmitter Output Power	< 1 Watt		С
15.247(d)	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW	Conducted	С
15.247(e)	Transmitter Power Spectral Density	< 8 dBm/3 kHz		С
15.247(d) 15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC 15.209 limits (See section 8.5)	Radiated	C Note 3
15.207	AC Line Conducted Emissions	FCC 15.207 limits (See section 8.6)	AC Line Conducted	С
15.203	Antenna Requirements	FCC 15.203 (See section 7)	-	С

Note 3: This test item was performed in each axis and the worst case data was reported.



4. TEST METHODOLOGY

The measurement procedures described in the ANSI C63.10-2013 and the guidance provided in KDB558074 D01v05r02 were used in measurement of the EUT.

The EUT was tested per the guidance of KDB558074 D01v05r02. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

4.1 EUT configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

4.3 General test procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB558074 D01v05r02.

So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector

Radiated Emissions

Basically the radiated tests were performed with KDB558074 D01v05r02. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10 as stated on section 12.1 of the KDB558074 D01V05R02.

The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axes.



4.4 Description of test modes

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics.

A test program is used to control the EUT for staying in continuous transmitting mode.

Operation test setup for EUT

- Test Software Version: QRCT / 3.0.277.0
- Power setting:

Mode	Frequency [MHz]	Power Setting
	2 412	9
802.11b	2 437	9
	2 462	9
	2 412	7
802.11g	2 437	7
	2 462	7
802.11n (HT20)	2 412	6
	2 437	6
	2 462	6



5. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

6. FACILITIES AND ACCREDITATIONS

6.1 Facilities

DT&C Co., Ltd.

The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of § 2.948 according to ANSI C63.4-2014.

- FCC & ISED MRA Designation No. : KR0034

- ISED#: 5740A

www.dtnc.net		
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6.2 Equipment

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, loop, horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

7. ANTENNA REQUIREMENTS

7.1 According to FCC 47 CFR §15.203

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna is attached on the device by means of unique coupling method (Spring Tension). Therefore this E.U.T Complies with the requirement of §15.203

7.2 Directional antenna gain:

Bands	SI	SO	MIMO (CDD) Note 1.	MIMO (SDM) Note 2	
Dundo	ANT 1 [dBi]	ANT 2 [dBi]	Directional Gain [dBi]	Directional Gain [dBi]	
2.4 GHz	1.00	-0.19	3.44	0.45	

Note 1. Directional gain (Correlated signal with unequal antenna gain and equal transmit power) $10 \log \left[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT} \right] dBi$

Note 2. Directional gain (Completely uncorrelated signal with unequal antenna gain and equal transmit power) 10 log [(10^{G1/10} + 10^{G2/10} + ... + 10^{GN/10}) / N_{ANT}] dBi

8. TEST RESULT

8.1 6 dB bandwidth

Test Requirements and limit, §15.247(a)

The bandwidth at 6 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration:

Refer to the APPENDIX I.

Test Procedure

- KDB558074 D01v05r02 Section 8.2
- ANSI C63.10-2013 Section 11.8.2

Option 2

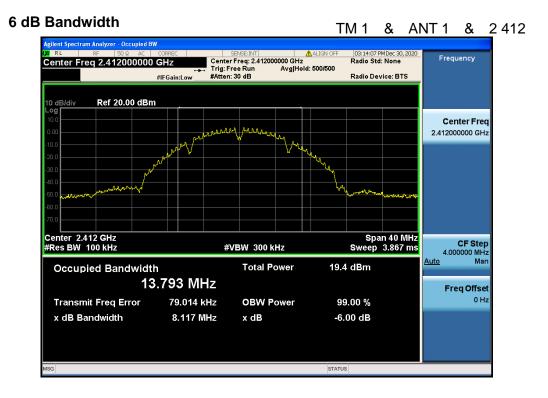
- 1. Set resolution bandwidth (RBW) = 100 kHz.
- 2. Set the video bandwidth (VBW) \ge 3 x RBW.
- 3. Detector = **Peak**.
- 4. Trace mode = **Max hold**.
- 5. Sweep = Auto couple.
- 6. Allow the trace to stabilize.

7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level in the fundamental emission.

Test Results: Comply

Test Mode	Frequency	Test Results[MHz]				
Test Mode	Frequency	ANT 1	ANT 2			
	2 412	8.12	8.57			
TM 1	2 437	9.08	8.57			
	2 462	8.60	8.60			
	2 412	15.77	15.44			
TM 2	2 437	15.47	16.02			
	2 462	16.37	16.07			
	2 412	17.02	15.74			
ТМ 3	2 437	16.27	16.95			
	2 462	17.36	16.40			

RESULT PLOTS





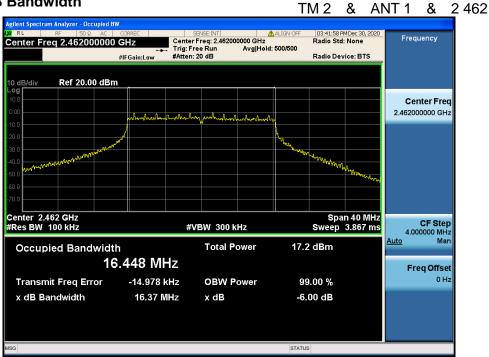


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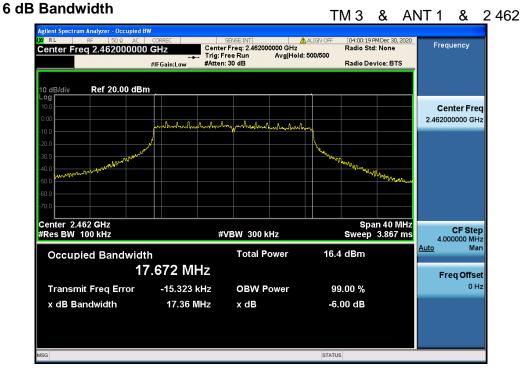
TM 3 & ANT 1 & 2412 I SENSE:INT ▲ ALIGN OFF Center Freq: 2.412000000 GHz Trig: Free Run Avg|Hold: 500/500 #Atten: 30 dB R 03:51:31 PM Dec 30, 2020 Radio Std: None Frequency Center Freq 2.412000000 GHz #IFGain:Low Radio Device: BTS Ref 20.00 dBm **Center Freq** 2.412000000 GHz And . A. A Andreal A. March Center 2.412 GHz #Res BW 100 kHz Span 40 MHz Sweep 3.867 ms CF Step 4.000000 MHz Man #VBW 300 kHz <u>Auto</u> Total Power **Occupied Bandwidth** 16.7 dBm 17.619 MHz Freq Offset 0 Hz Transmit Freq Error 21.255 kHz **OBW Power** 99.00 % x dB Bandwidth 17.02 MHz x dB -6.00 dB

6 dB Bandwidth

TM 3 & ANT 1 & 2437

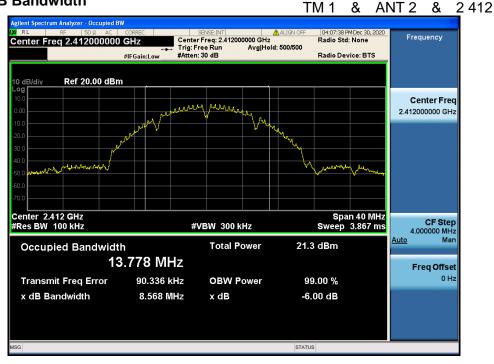


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6 dB Bandwidth



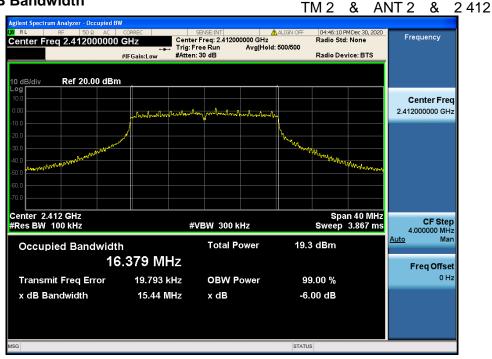




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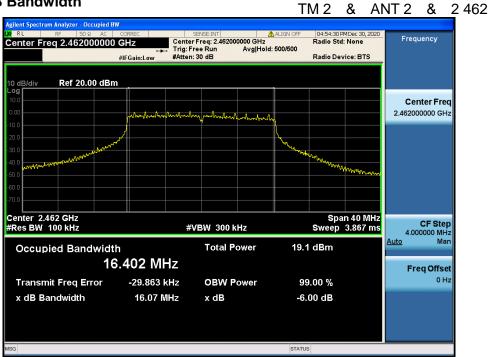


6 dB Bandwidth



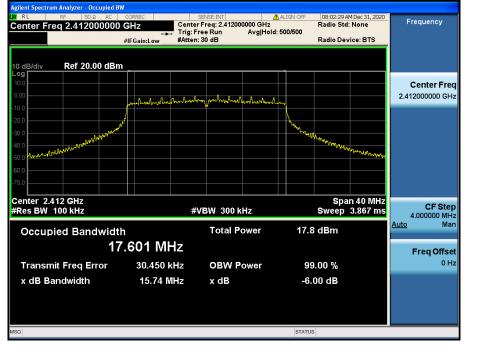
6 dB Bandwidth TM 2 & ANT 2 & 2437 gilent Spectrum Analyzer - Occupied BW Center Freq: 2.437000000 GHz Trig: Free Run Avg|Hold: 500/500 #Atten: 30 dB RL 04:50:00 PMDec 30, 2020 Radio Std: None Frequency Center Freq 2.437000000 GHz #IFGain:Low Radio Device: BTS Ref 20.00 dBm 10 r Center Freq 2.437000000 GHz whith Span 40 MHz Sweep 3.867 ms Center 2.437 GHz #Res BW 100 kHz CF Step 4.000000 MHz #VBW 300 kHz Auto Man Total Power 18.8 dBm **Occupied Bandwidth** 16.409 MHz Freq Offset 0 Hz Transmit Freq Error 13.333 kHz **OBW Power** 99.00 % x dB Bandwidth 16.02 MHz x dB -6.00 dB

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TM 3 & ANT 2 & 2412

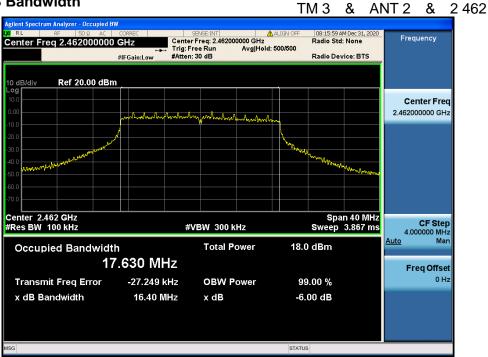


Center Freq: 2.43700000 GHz Trig: Freq Run Avg|Hold: 500/500 #Atten: 30 dB 08:10:46 AM Dec 31, 2020 Radio Std: None Frequency Center Freq 2.437000000 GHz #IFGain:Low Radio Device: BTS Ref 20.00 dBm **Center Freq** 2.437000000 GHz In the almonth when and have been broken Center 2.437 GHz #Res BW 100 kHz Span 40 MHz Sweep 3.867 ms CF Step 4.000000 MHz #VBW 300 kHz <u>Auto</u> Man Total Power 17.9 dBm **Occupied Bandwidth** 17.637 MHz Freq Offset 12.562 kHz 0 Hz Transmit Freq Error **OBW Power** 99.00 % x dB Bandwidth 16.95 MHz x dB -6.00 dB STATUS

6 dB Bandwidth

TM 3 & ANT 2 & 2437

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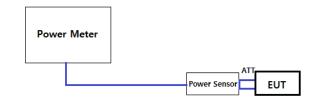


8.2 Maximum peak conducted output power

Test Requirements and limit, §15.247(b)

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

1. PKPM1 Peak power meter method of KDB558074 D01V05R02

The maximum conducted output powers were measured using a broadband peak RF power meter which has greater video bandwidth than DUT's DTS bandwidth and utilize a fast-responding diode detector.

2. Method AVGPM-G (Measurement using a gated RF average power meter) of KDB558074 D01V05R02

The average conducted output powers were measured using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

Test Results: Comply

Multiple transmitting CDD

	_	-		Maxim	um Peak Co	onducted Ou	tput Power	(dBm) for <u>8(</u>	02.11b	
ANT	Freq. (MHz)	Det.	Data Rate [Mbps]							
	(1	2	5.5	11	-	-	-	-
	2 412	PK	14.25	14.17	14.08	14.06	-	-	-	-
	2412	AV	11.93	11.81	11.79	11.76	-	-	-	-
ANT 1	2 437	PK	14.85	14.79	14.77	14.02	-	-	-	-
	2 437	AV	12.62	12.64	12.63	11.69	-	-	-	-
	2 462	PK	13.83	13.70	13.68	13.58	-	-	-	-
	2 402	AV	11.66	11.63	11.62	11.61	-	-	-	-
	2 412	PK	15.78	15.73	15.57	15.53	-	-	-	-
	2412	AV	13.51	13.49	13.44	13.41	-	-	-	-
ANT 2	2 437	PK	15.26	15.10	15.08	15.03	-	-	-	-
ANT Z	2 437	AV	12.95	12.91	12.87	12.84	-	-	-	-
	2 462	PK	15.22	15.04	14.96	14.88	-	-	-	-
	2 402	AV	13.02	12.98	12.95	12.91	-	-	-	-

	-	-		Maxim	um Peak Co	onducted Ou	tput Power	(dBm) for <u>8(</u>	02.11 <u>g</u>		
ANT	Freq. (MHz)	Det.		Data Rate [Mbps]							
	、 <i>,</i>		6	9	12	18	24	36	48	54	
	0.440	PK	14.16	14.22	14.29	16.24	16.08	14.89	15.04	15.19	
	2 412	AV	9.64	9.69	9.72	10.25	10.22	9.89	9.87	9.85	
ANT 1	2 437	PK	13.76	13.70	13.79	15.81	15.69	15.28	14.90	14.87	
ANTI	2 437	AV	9.23	9.25	9.31	9.91	9.84	9.52	9.45	9.41	
	2 462	PK	13.77	13.72	13.87	15.85	15.80	14.90	14.72	14.64	
	2 402	AV	9.30	9.31	9.36	10.01	9.98	9.48	9.50	9.46	
	0 440	PK	16.52	16.65	16.38	17.45	17.23	17.31	17.09	17.00	
	2 412	AV	11.52	11.58	11.59	11.77	11.72	11.62	11.61	11.55	
ANT 2	2 427	PK	16.06	16.13	16.25	17.02	16.92	16.70	16.76	16.77	
ANT 2	2 437	AV	11.02	10.97	11.00	11.23	11.19	11.14	11.10	11.06	
	2.462	PK	16.37	16.44	16.67	17.39	17.11	17.21	16.97	16.95	
	2 462	AV	11.37	11.30	11.31	11.57	11.55	11.29	11.36	11.49	
	2 412	PK	18.51	18.61	18.47	19.90	19.70	19.28	19.20	19.20	
Sum (ANT 1+2)	2 437	PK	18.07	18.09	18.20	19.47	19.36	19.06	18.94	18.93	
	2 462	PK	18.27	18.30	18.50	19.70	19.51	19.22	19.00	18.96	



		-		Maximum	Peak Condu	ucted Outpu	t Power (dB	m) for <u>802.1</u>	1n(HT20)		
ANT	Freq. (MHz)	Det.			Data Rate [MCS]						
	(11112)		0	1	2	3	4	5	6	7	
	2 4 4 2	PK	13.40	13.36	15.20	15.11	14.38	14.36	14.21	14.15	
	2 412	AV	8.60	8.64	9.27	9.25	8.74	8.72	8.80	8.82	
ANT 1	0 407	PK	12.95	12.88	14.93	14.91	13.44	13.51	13.74	13.55	
ANTI	2 437	AV	8.20	8.25	8.89	8.87	8.42	8.47	8.44	8.39	
	2 462	PK	12.74	12.71	14.91	14.88	13.21	13.16	13.20	13.27	
		AV	8.36	8.43	9.01	8.98	8.62	8.65	8.72	8.61	
	2 412	PK	13.99	13.94	16.08	15.92	15.88	15.75	15.83	15.96	
	2412	AV	9.54	9.53	10.22	10.20	9.74	9.76	9.83	9.84	
ANT 2	2 437	PK	14.02	14.11	16.03	15.88	15.52	15.21	15.38	15.43	
ANT 2	2 437	AV	9.72	9.74	10.32	10.30	9.91	9.97	9.99	9.93	
	2 462	PK	14.26	14.24	16.46	16.41	15.98	15.94	15.81	15.79	
	2 402	AV	9.86	9.82	10.52	10.50	10.12	10.15	10.19	10.22	
	2 412	PK	16.72	16.67	18.67	18.54	18.20	18.12	18.11	18.16	
Sum (ANT 1+2)	2 437	PK	16.53	16.55	18.53	18.43	17.61	17.45	17.65	17.60	
	2 462	PK	16.58	16.55	18.76	18.72	17.82	17.78	17.71	17.72	

Multiple transmitting SDM

ANT	-			Maximum	Peak Condu	ucted Outpu	t Power (dB	m) for <u>802.1</u>	1n(HT20)		
	Freq. (MHz)	Det.			Data Rate [MCS]						
	、		8	9	10	11	12	13	14	15	
	2 412	PK	13.43	13.39	15.26	15.17	14.44	14.49	14.28	14.20	
	2412	AV	8.70	8.72	9.35	9.33	8.80	8.81	8.88	8.85	
ANT 1	2 437	PK	12.92	14.82	14.95	14.87	13.38	13.41	13.59	13.65	
ANTI	2 437	AV	8.27	8.30	8.96	8.92	8.48	8.55	8.56	8.47	
	2 462	PK	12.74	12.70	14.96	14.90	13.15	13.18	13.25	13.30	
	2 402	AV	8.42	8.51	9.04	9.01	8.62	8.71	8.75	8.72	
	2 412	PK	14.10	14.18	16.15	15.91	15.74	15.69	15.81	15.82	
	2412	AV	9.38	9.40	10.25	10.22	9.62	9.66	9.74	9.76	
ANT 2	2 437	PK	13.75	13.84	16.08	16.02	15.08	15.54	15.29	15.26	
ANT 2	2 437	AV	9.62	9.65	10.39	10.35	9.76	9.83	9.86	9.89	
	2 462	PK	14.15	14.19	16.40	16.22	16.04	16.20	16.32	16.10	
	2 402	AV	9.86	9.94	10.54	10.46	10.10	10.05	10.01	10.12	
	2 412	PK	16.79	16.81	18.74	18.57	18.15	18.14	18.12	18.10	
Sum (ANT 1+2)	2 437	PK	16.37	17.37	18.56	18.49	17.32	17.61	17.53	17.54	
	2 462	PK	16.51	16.52	18.75	18.62	17.84	17.96	18.06	17.93	



8.3 Maximum power spectral density

Test requirements and limit, §15.247(e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Configuration:

Refer to the APPENDIX I.

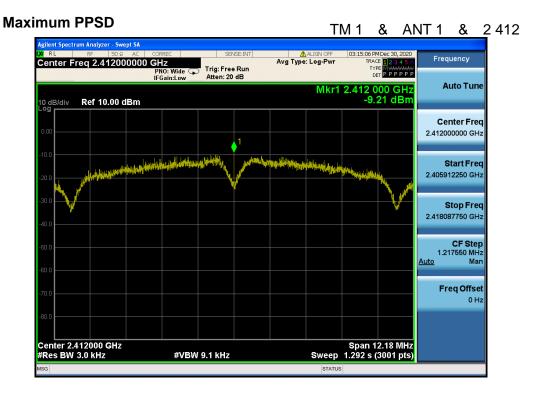
Test Procedure

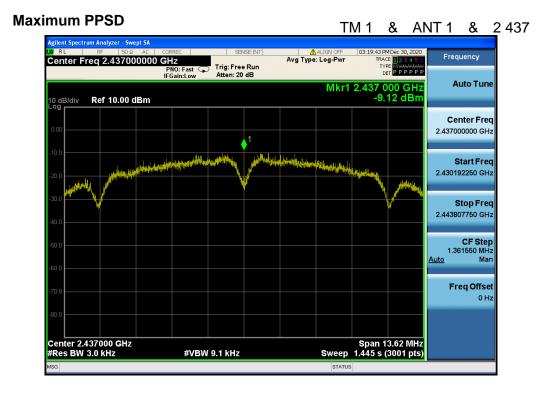
- KDB558074 D01v05r02 Section 8.4
- ANSI C63.10-2013 Section 11.10.2
- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to **1.5 times** the DTS bandwidth.
- 3. Set the RBW to : 3 kHz \leq RBW \leq 100 kHz
- 4. Set the VBW \geq 3 x RBW
- 5. Detector = **Peak**
- 6. Sweep time = **Auto couple**
- 7. Trace mode = Max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Results: Comply

Test Mode	F	DDW		Limit		
	Frequency	RBW	ANT 1	ANT 2	SUM (ANT 1 + ANT 2)	[dBm]
	2 412	3 kHz	-9.21	-8.33	-	8.00
TM 1	2 437	3 kHz	-9.12	-7.74	-	8.00
	2 462	3 kHz	-9.62	-8.57	-	8.00
	2 412	3 kHz	-10.43	-11.31	-7.84	8.00
TM 2	2 437	3 kHz	-10.31	-11.57	-7.89	8.00
	2 462	3 kHz	-12.27	-11.07	-8.62	8.00
	2 412	3 kHz	-9.96	-13.60	-8.40	8.00
TM 3	2 437	3 kHz	-10.47	-14.74	-9.09	8.00
	2 462	3 kHz	-12.81	-13.51	-10.14	8.00

RESULT PLOTS



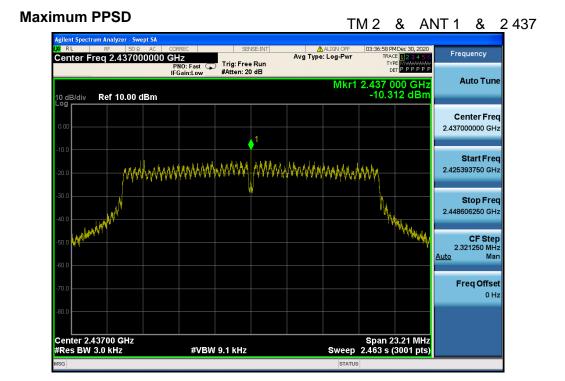
















Maximum PPSD

TM 3 & ANT 1 & 2412



Maximum PPSD TM 3 & ANT 1 & 2437 F ALIGN OFF Avg Type: Log-Pwr Frequency Center Freq 2.437000000 GHz PR0: Fast IFGain:Low Atten: 20 dB TYPE DET PPPPP Mkr1 2.437 000 GHz -10.47 dBm Auto Tune Ref 10.00 dBm 10 dB/div **Center Freq** 2.437000000 GHz Start Freq 2.424796000 GHz Stop Freq 2.449204000 GHz **M** W. CF Step 2.440800 MHz Man Auto Freq Offset 0 Hz Center 2.43700 GHz #Res BW 3.0 kHz Span 24.41 MHz Sweep 2.590 s (3001 pts) #VBW 9.1 kHz

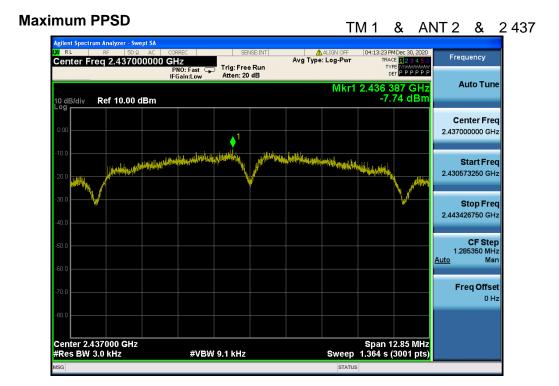




Dt&C





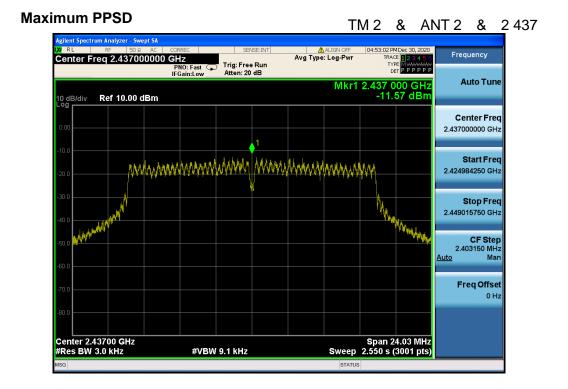




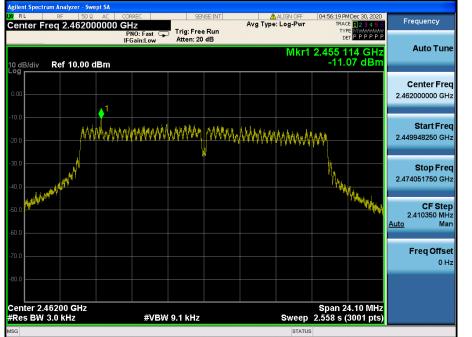












Dt&C

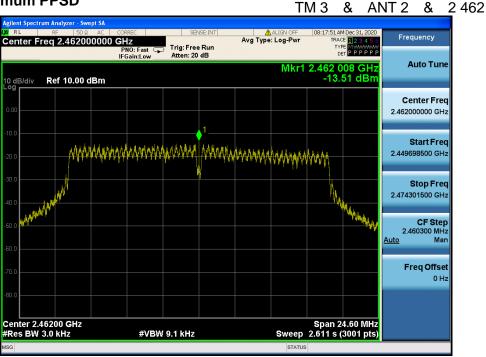
Maximum PPSD

TM 3 & ANT 2 & 2412



Maximum PPSD TM 3 & ANT 2 & 2437 ALIGN OFF Avg Type: Log-Pwr Frequency Center Freq 2.437000000 GHz PR0: Fast IFGain:Low Atten: 20 dB TYPE DET PPPPP Auto Tune Mkr1 2.438 297 GHz -14.74 dBm Ref 10.00 dBm 10 dB/div **Center Freq** 2.437000000 GHz ¢ Start Freq MANAN MANA MANAMANA ANNA ANA 2.424285250 GHz Stop Freq 2.449714750 GHz 14 N. CF Step 2.542950 MHz Man Auto Freq Offset 0 Hz Center 2.43700 GHz #Res BW 3.0 kHz Span 25.43 MHz Sweep 2.698 s (3001 pts) #VBW 9.1 kHz

TRF-RF-232(03)161101





8.4 Out of band emissions at the band edge / conducted spurious emissions

Test requirements and limit, §15.247(d)

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level. If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level. If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in band average PSD level.

In either case, attenuation to levels below the general emission limits specified in §15.209(a) is not required.

Test Configuration:

Refer to the APPENDIX I.

Test Procedure

- KDB558074 D01v05r02 Section 8.5
- ANSI C63.10-2013 Section 11.11

Reference level measurement

- 1. Set instrument center frequency to DTS channel center frequency.
- 2. Set the span to \geq 1.5 times the DTS bandwidth.
- 3. Set the RBW = 100 kHz.
- 4. Set the VBW \geq 3 x RBW.
- 5. Detector = **Peak.**
- 6. Sweep time = **Auto couple.**
- 7. Trace mode = **Max hold.**
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum PSD level.

Emission level measurement

- 1. Set the center frequency and span to encompass frequency range to be measured.
- 2. Set the RBW = 100 kHz. (Actual 1 MHz , See below note)
- 3. Set the VBW \ge 3 x RBW. (Actual 3 MHz, See below note)
- 4. Detector = **Peak**.
- 5. Ensure that the number of measurement points \geq Span / RBW.
- 6. Sweep time = Auto couple.
- 7. Trace mode = **Max hold.**
- 8. Allow the trace to stabilize. (this may take some time, depending on the extent of the span)
- 9. Use the peak marker function to determine the maximum amplitude level.

Note: The conducted spurious emission was tested with below settings.

Frequency range: 9 kHz ~ 30 MHz

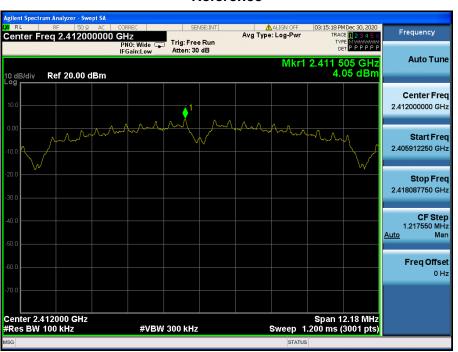
RBW = 100 kHz, VBW = 300 kHz, Sweep time = Auto, Detector = Peak, Trace = Max hold, Sweep points: 40 001 **Frequency range: 30 MHz ~ 10 GHz, 10 GHz ~ 25 GHz** RBW = 1 MHz, VBW = 3 MHz, Sweep time = Auto, Detector = Peak, Trace = Max hold, Sweep points: 40 001

LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)

If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2 001 to get accurate emission level within 100 kHz BW.

RESULT PLOTS

TM 1 & ANT 1 & 2412



Reference

Low Band-edge



Agilent Spectrum Analyzer - Sw X/ RL RF 50 G			A 41 JON OFF	00.46.00 PMP 00, 0000	
Center Freq 15.004	15.004500 MHz PNO: East Trig: Free Run		Avg Type: Log-Pwr	03:16:28 PM Dec 30, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P	Frequency
10 dB/div Ref 20.00	IFGain:Low	Atten: 30 dB		Vkr1 289.4 kHz -32.33 dBm	Auto Tune
-og 10.0 					Center Fre 15.004500 MH
-20.0 1				-15.95 dBm	Start Free 9.000 kH
50.0 60.0 70.0	ntijevaanin tegen drage natooplikaatien	jadan parangan na sang kang kang panang p	id Maada ing mga katang kat	la ping pina tika pakitan paking paking pina kataka bahari	Stop Fre 30.000000 MH
Start 9 kHz Res BW 100 kHz		W 300 kHz		Stop 30.00 MHz 333 ms (40001 pts)	CF Ste 2.999100 M⊢ Auto Ma
I N I f 2	× 289.4 kHz	Y FUI -32.33 dBm	ICTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offse 0 H
6 7 8 9 10					
		III		>	
G			STATUS	DC Coupled	

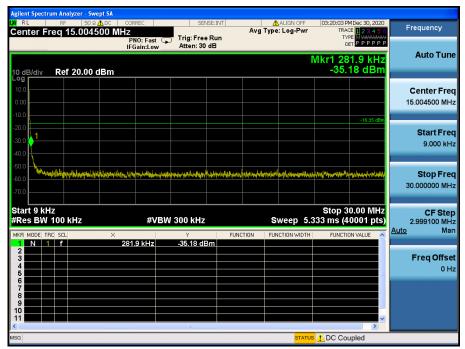
Agilent Spectrum Analyzer - Swe						
RL RF 50 Ω Center Freq 5.01500		SENSE:INT	Avg Type:	ALIGN OFF	03:16:37 PM Dec 30, 2020 TRACE 1 2 3 4 5	Frequency
Conter Freq 0.01000	PNO: Fast G IFGain:Low	Trig: Free Run Atten: 30 dB	•	•	DET P P P P	*
	II Odinieow			Mkr	5 3.384 41 GHz	Auto Tune
10 dB/div Ref 20.00 d						
Log 10.0	1					Center Freq
0.00						5.015000000 GHz
-10.0						
-20.0					-15.95 dBn	Otort From
-30.0		<i> </i>	4			Start Freq 30.000000 MHz
-40.0		The particular of the local data	a disco Militato participato da s	an a	CHARACTER OF STREET, ST	00.000000 Mil 12
-50.0 - state to the later and and a state of the	a starting of the state of the	at proposition and a second	ر بقامطالیم بر یادیمونی او ب <mark>ال</mark> الگان	(paleters alter	a an	
-60.0						Stop Freq 10.000000000 GHz
-70.0						10.00000000 GH2
Start 30 MHz					Stop 10.000 GHz	CF Step
#Res BW 1.0 MHz	#VB\	N 3.0 MHz	Sv	veep 18	.67 ms (40001 pts	997.000000 MHz
MKR MODE TRC SCL	×		FUNCTION FUNC	TION WIDTH	FUNCTION VALUE	Auto Man
1 N 1 f 2 N 1 f	2.412 08 GHz 3.155 10 GHz	7.50 dBm -36.43 dBm				
3 N 1 f	3.191 99 GHz 5.689 97 GHz	-36.99 dBm -37.26 dBm				Freq Offset
5 N 1 f	3.384 41 GHz	-37.50 dBm			-	0 Hz
7						
8 9 9						
10					~	
<		m				
MSG				STATUS		

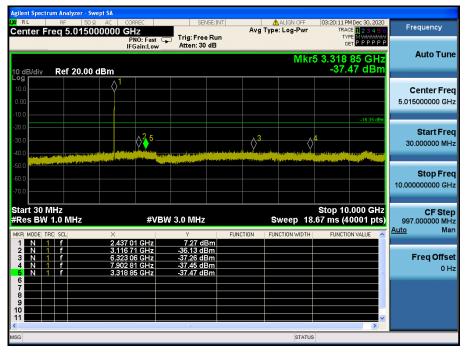


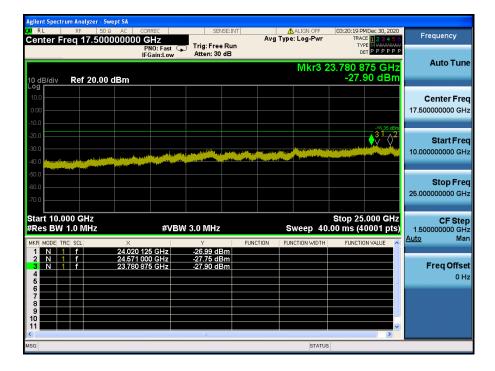
TM 1 & ANT 1 & 2437

Reference









TM 1 & ANT 1 & 2462

Reference



High Band-edge



Agilent Spectrum Analyzer - Swej		or Nor-With	A 11/01-055	00.00.40.000.000.0000	
Center Freq 15.0045	ADC CORREC SENSE:INT 4500 MHZ PNO: Fast IFGain:Low Atten: 30 dB		Avg Type: Log-Pwr	03:23:18 PM Dec 30, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P P	Frequency
10 dB/div Ref 20.00 d		Atten. oo da		Mkr1 281.9 kHz -35.07 dBm	Auto Tune
Log 10.0 0.00 -10.0					Center Fred 15.004500 MHz
-20.0				-16.59 dBm	Start Frec 9.000 kHz
-50.0	waarsonthiseversionaarstaan	er of the contract of the first of the proceeds the	หล _{าย} ประชุษณ์และหนึ่งเป็นที่หาดูให้แห่งทางให้รู้เหลี่ทำงาน	ntradistrational dense for the sector sector and	Stop Free 30.000000 MH;
Start 9 kHz #Res BW 100 kHz	#VB	W 300 kHz	Sweep 5.3	Stop 30.00 MHz 333 ms (40001 pts)	CF Stej 2.999100 MH Auto Ma
MKR MODE TRC SCL 1 N 1 f 2 5	× 281.9 kHz	Y 1 -35.07 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offse
6 7 8 9 10					
11					
5G			STATUS	DC Coupled	

Agilent Spectrum Analyzer - Swe						
RL RF 50 Ω Center Freq 5.01500		SENSE:INT		ALIGN OFF	03:23:27 PM Dec 30, 2020 TRACE 123456	Frequency
	PNO: Fast G IFGain:Low	Trig: Free Run Atten: 30 dB				
	IFGall.Low	The second secon		Mkr	5 3.175 78 GHz	Auto Tune
10 dB/div Ref 20.00 d						
10.0						Center Freq
0.00						5.015000000 GHz
-10.0						
-20.0					-16.59 dBm	
-30.0	<u>∧23 ⊾5</u>		4			Start Freq
-40.0		The second second second		مغلقه وروب والملحور ورو		30.000000 MHz
-50.0 estents attributed to a state the basis		A CONTRACTOR OF	and the state of the	and the second site of	Real Production in the second second	
-60.0						Stop Freq
-70.0						10.00000000 GHz
Start 30 MHz #Res BW 1.0 MHz	4\/B\	V 3.0 MHz	0		Stop 10.000 GHz .67 ms (40001 pts)	CF Step
				-		997.000000 MHz Auto Man
MKR MODE TRC SCL	× 2.461 93 GHz	∀ 6.81 dBm	FUNCTION FUN	ICTION WIDTH	FUNCTION VALUE	
2 N 1 f	2.634 91 GHz 2.760 28 GHz	-36.95 dBm -37.09 dBm				Freq Offset
4 N 1 f	6.262 50 GHz	-37.10 dBm				0 Hz
5 N 1 f	3.175 78 GHz	-37.29 dBm				
7 8						
9						
10					~	
<					>	
MSG				STATUS		

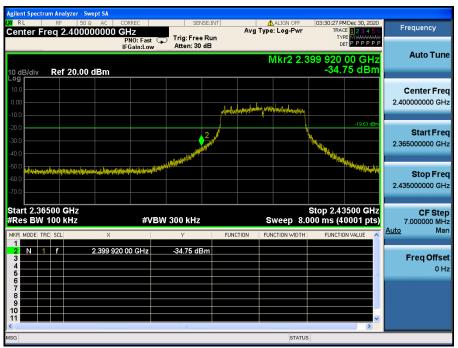




TM 2 & ANT 1 & 2412

nt Spectrum Analyzer 03:29:23 PM Dec 30, 2020 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P P P P OR RL RF 50.9 AL COMPLEX Center Freq 2.412000000 GHz PNC: Fast IFGain:Low Atten: 30 dB ALIGN OFF Frequency Auto Tune Mkr1 2.413 254 GHz 0.37 dBm Ref 20.00 dBm 10 dB/div **Center Freq** 2.412000000 GHz **♦**¹ Manhandunder monter manhowman Start Freq 2.400169500 GHz Stop Freq MAN MAN 2.423830500 GHz CF Step 2.366100 MHz Man <u>Auto</u> Freq Offset 0 Hz Span 23.66 MHz Sweep 2.400 ms (3001 pts) Center 2.41200 GHz #Res BW 100 kHz #VBW 300 kHz





Reference

Agilent Spectru										
X/RL			ORREC	SE	NSE:INT	Aug	ALIGN OFF		4Dec 30, 2020 E 1 2 3 4 5 6	Frequency
Center Fre	eq 15.004		Z PNO: Fast IFGain:Low	Trig: Fre Atten: 3		Avg	Type: Log-Pwr	TYF	23456 26 M WAAAAAAA TPPPPPP	
10 dB/div Log	Ref 20.00	dBm					1	Mkr1 28 -33.4	1.9 kHz 42 dBm	Auto Tune
										Center Fre 15.004500 MH
-20.0									-19.63 dBm	Start Fre
-30.0										9.000 kH
-50.0 -60.0 -70.0	noblevi i v preložena l	**********	nesse filmen after be	at in the state of	high water that has the	ki fan er fan er	nter in the second s	i yani di mili Manjir	ahinadala <mark>a ataraha</mark> a	Stop Fre 30.000000 MH
Start 9 kHz #Res BW 1			#V	BW 300 kH;	2		Sweep 5.3	Stop 3 333 ms (4	0.00 MHz 0001 pts)	CF Ste 2.999100 MH
		× 2	81.9 kHz	ү -33.42 d		NCTION	FUNCTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u> Ma
2 3 4 5 6										FreqOffso 0 ⊦
8 8 9 10										
									×	
SG							STATIS	DC Cou	unlod	





TM 2 & ANT 1 & 2437

Reference



