

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

Applicant:	Targus International LLC 1211 North Miller Street Anaheim,CA 92806 USA		
Product Name:	Wireless Receiver		
Brand Name:	TARGUS		
Model No.:	AMP16BR		
Model Difference:	N/A		
FCC ID:	OXM000095		
Report Number:	E2/2018/90072		
FCC Rule Part:	§15.247, Cat: DTS		
Issue Date:	Dec. 10, 2018		
Date of Test:	Sep. 26, 2018 ~ Oct. 29, 2018		
Date of EUT Received:	Sep. 26, 2018		

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Tested By:

Aken Huang / Engineer

Approved By:

Jay Lin / Asst. Supervisor



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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/90072	Rev.00	Initial creation of docu- ment	All	Dec. 10, 2018	Elle Chang

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GENERAL INFORMATION 1

1.1 Product Description

General:

Product Name:	Wireless Receiver	
Brand Name:	TARGUS	
Model No.:	AMP16BR	
Model difference:	N/A	
Hardware Version:	N/A	
Software Version:	N/A	
Power Supply:	5Vdc from USB port	

2.4GHz:

Channel number:	5 channels
Modulation type:	GFSK
Transmit Power:	-7.58 dBm
Frequency Range:	2417 – 2463MHz

Antenna Designation

Antenna Type	Model Number	Supplier	Peak Gain (dBi)
Printed	AMP16-BR	BTL INC.	-0.13

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance v05.

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333 (TAF code 0513)

FCC Registration Number and Designation number are: 735305 / TW0002

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Conducted Test (RF)

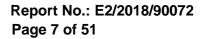
The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 Radiated Emissions

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m 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 max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

2.5 Configuration of Tested System

Fig. 2-1 Conducted (Antenna Port) Emis-



Fig 2-3 Conduction (AC Power Line) Radiated Emission



Fig 2-2 Radiated Emission



Table 2-1 Equipment Used in Tested System

ltem	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Ca- ble	Power Cord
1	2.4G Test Software	N/A	N/A	N/A	N/A	N/A
2	Notebook	Lenovo	L430	R9-WR6X4	Shielded	Unshielded

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SUMMARY OF TEST RESULTS 3

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.205 §15.209 §15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	Peak Power Density	Compliant
§15.203 §15.247(b)	Antenna Requirement	Compliant

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DESCRIPTION OF TEST MODES 4

4.1 Operated in 2417~2463MHz Band

5 channels are provided for 2.4GHz

Item	FREQUENCY	Item	FREQUENCY	Item	FREQUENCY
1	2417 MHz	2	2431 MHz	3	2443 MHz
4	2451 MHz	5	2463 MHz		

4.2 The Worst Test Modes and Channel Details

- 1. The EUT has been tested under operating condition.
- 2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

RADIATED EMISSION TEST:

MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)	
RADIATED EMISSION TEST (BELOW 1 GHz)					
2.4GHz	2417 to 2463	2417, 2443, 2463	GFSK	1	
	RADIATED EMISSION TEST (ABOVE 1 GHz)				
2.4GHz	2417 to 2463	2417, 2443, 2463	GFSK	1	
Note:					

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth LE Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST				
MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)
2.4GHz	2417 to 2463	2417, 2443, 2463	GFSK	1

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MEASUREMENT UNCERTAINTY 5

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
6dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Peak Power Density	+/- 1.3 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty	9kHz – 30MHz: +/- 2.87 dB		
	30MHz - 180MHz: +/- 3.37dB		
	180MHz -417MHz: +/- 3.19dB		
(Polarization : Vertical)	0.417GHz-1GHz: +/- 3.19dB		
	1GHz - 18GHz: +/- 4.04dB		
	18GHz - 40GHz: +/- 4.04dB		

	9kHz – 30MHz: +/- 2.87 dB		
Measurement uncertainty (Polarization : Horizontal)	30MHz - 167MHz: +/- 4.22dB		
	167MHz -500MHz: +/- 3.44dB		
	0.5GHz-1GHz: +/- 3.39dB		
	1GHz - 18GHz: +/- 4.08dB		
	18GHz - 40GHz: +/- 4.08dB		

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

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6 CONDUCTED EMISSION TEST

6.1 Standard Applicable:

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(μV)				
MHz	Quasi-peak	Average			
0.15 to 0.50	66 to 56	56 to 46			
0.50 to 5	56	46			
5 to 30	60	50			
Nata					

Note

1. The lower limit shall apply at the transition frequencies

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2 Measurement Equipment Used:

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
LISN	TESEQ	NNB 51	36076	2018/02/14	2019/02/13		
EMI Test Receiver	R&S	ESCI	101300	2017/11/02	2018/11/01		
Coaxial Cable	EMC In- struments Corp	EMC5D-BM-BM-3 000	1401004	2018/05/25	2019/05/24		
Notebook	Lenovo	T470	P0001293	N/A	N/A		

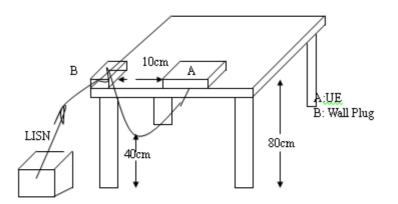
6.3 EUT Setup:

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure:

- 1. The EUT was placed on a table which is 0.8m above ground plan.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all phases of power being supplied by given UE are completed

6.6 Measurement Result:

Note: Refer to next page for measurement data and plots.

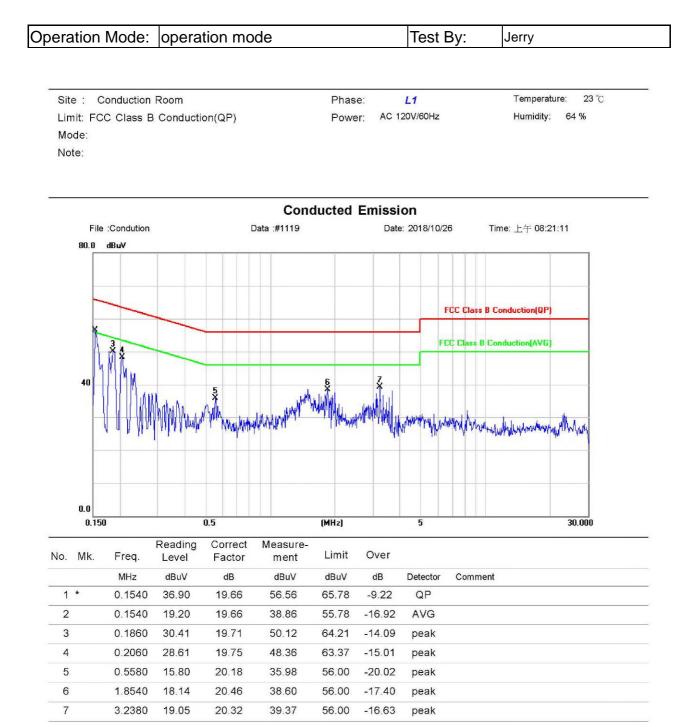
Note2: The * reveals the worst-case results that closet to the limit.

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AC POWER LINE CONDUCTED EMISSION TEST DATA



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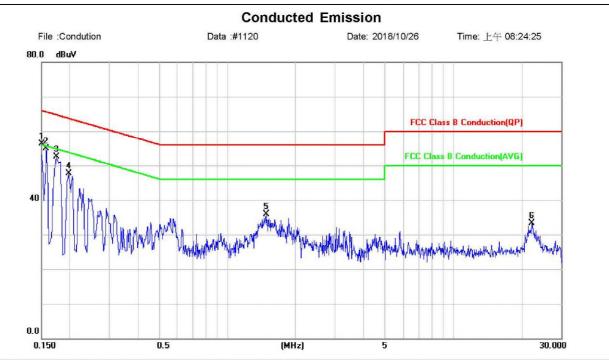
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Site : Conduction Room	Phase:	N	Temperature: 23 °C
Limit: FCC Class B Conduction(QP)	Power:	AC 120V/60Hz	Humidity: 64 %
Mode:			
Note:			



Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
	0.1500	36.74	19.64	56.38	66.00	-9.62	peak	
	0.1580	35.28	19.66	54.94	65.57	-10.63	peak	
	0.1740	32.85	19.68	52.53	64.77	-12.24	peak	
	0.1980	28.05	19.72	47.77	63.69	-15.92	peak	
	1.4860	15.69	20.17	35.86	56.00	-20.14	peak	
	22.2580	13.26	20.11	33.37	60.00	-26.63	peak	
		MHz 0.1500 0.1580 0.1740 0.1980 1.4860	Mk. Freq. Level MHz dBuV 0.1500 36.74 0.1580 35.28 0.1740 32.85 0.1980 28.05 1.4860 15.69	Mk. Freq. Level Factor MHz dBuV dB 0.1500 36.74 19.64 0.1580 35.28 19.66 0.1740 32.85 19.68 0.1980 28.05 19.72 1.4860 15.69 20.17	Mk. Freq. Level Factor ment MHz dBuV dB dBuV 0.1500 36.74 19.64 56.38 0.1580 35.28 19.66 54.94 0.1740 32.85 19.68 52.53 0.1980 28.05 19.72 47.77 1.4860 15.69 20.17 35.86	Mk. Freq. Level Factor ment Limit MHz dBuV dB dBuV d	Mk. Freq. Level Factor ment Limit Over MHz dBuV dB dBuV dBuV dB dBuV dB 0.1500 36.74 19.64 56.38 66.00 -9.62 0.1580 35.28 19.66 54.94 65.57 -10.63 0.1740 32.85 19.68 52.53 64.77 -12.24 0.1980 28.05 19.72 47.77 63.69 -15.92 1.4860 15.69 20.17 35.86 56.00 -20.14	Mk. Freq. Level Factor ment Limit Over MHz dBuV dB dBuV dBuV dB Detector 0.1500 36.74 19.64 56.38 66.00 -9.62 peak 0.1580 35.28 19.66 54.94 65.57 -10.63 peak 0.1740 32.85 19.68 52.53 64.77 -12.24 peak 0.1980 28.05 19.72 47.77 63.69 -15.92 peak 1.4860 15.69 20.17 35.86 56.00 -20.14 peak

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7 PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable:

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

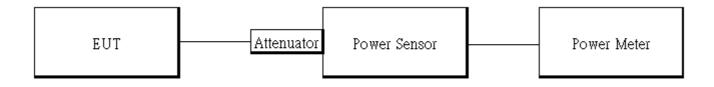
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

7.2 Measurement Equipment Used:

Conducted Emission Test Site								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
TYPE		NUMBER	NUMBER	CAL.				
Spectrum Analyzer	Agilent	N9010A	MY53400256	2017/10/30	2018/10/29			
DC Block	PASTERNACK	PE8210	RF81	2017/12/26	2018/12/25			
Notebook	Lenovo	L420	S0011721	N/A	N/A			
Power Meter	Anritsu	ML2496A	1326001	2018/08/09	2019/08/02			
Power Sensor	Anritsu	MA2411B	1315048	2018/08/09	2019/08/02			
Power Sensor	Anritsu	MA2411B	1315049	2018/08/09	2019/08/02			
Splitter	Woken	DOM35LW1A2	RF36	2017/12/26	2018/12/25			

7.3 Test Set-up:



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7.4 Measurement Procedure:

- 1.Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3.Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

Power Meter:

It is used as the auxiliary test equipment to conduct the output power measurement.

4. Record the max. Reading as observed from Power Meter.

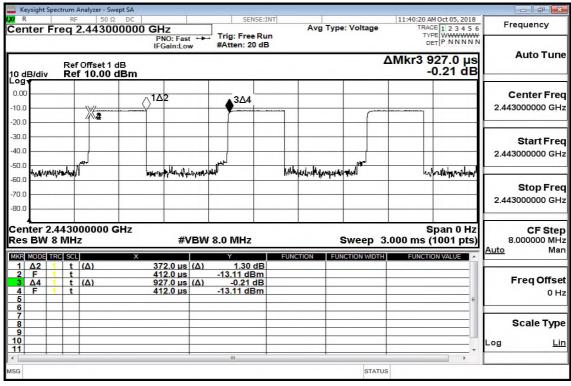
5. Repeat above procedures until all test default channel measured was complete.

Formula:

Duty Cycle = Ton / (Ton+Toff)

Duty Factor:

	Duty Cycle (%)	Duty Factor (dB)	1/T (kHz)	VBW setting (kHz)
2.4G	40.13	3.97	2.69	3.00



Duty Cycle Factor:10*log(1/(40.1294498381877/100))=3.97

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7.5 Measurement Result:

2.4G mode:

СН	Frequency (MHz)	Peak Power Output (dBm)	Required Limit
Low	2417	-7.58	1 Watt = 30 dBm
Mid	2443	-7.79	1 Watt = 30 dBm
High	2463	-7.88	1 Watt = 30 dBm
2.4G mo	ode:		
CH Frequency (MHz)		Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit
Low	2417	-7.92	1 Watt = 30 dBm
Mid	2443	-8.12	1 Watt = 30 dBm
High	2463	-8.31	1 Watt = 30 dBm

*Note: Measured by power meter, cable loss as 1 dB that offsets on the power meter in Peak *Note: Measured by power meter, as cable loss+ Duty cycle factor that offsets on the power meter *Note: Max. Output include tune up tolerance Power is average power

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8 6DB BANDWIDTH MEASUREMENT

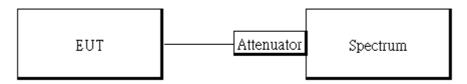
8.1 Standard Applicable

The minimum 6 dB bandwidth shall be at least 500 kHz .

8.2 Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
TYPE		NUMBER	NUMBER	CAL.				
Spectrum Analyzer	Agilent	N9010A	MY5340025 6	2017/10/30	2018/10/29			
DC Block	PASTERNACK	PE8210	RF81	2017/12/26	2018/12/25			
Notebook	Lenovo	L420	S0011721	N/A	N/A			
Power Meter	Anritsu	ML2496A	1326001	2018/08/09	2019/08/02			
Power Sensor	Anritsu	MA2411B	1315048	2018/08/09	2019/08/02			
Power Sensor	Anritsu	MA2411B	1315049	2018/08/09	2019/08/02			
Splitter	Woken	DOM35LW1A2	RF36	2017/12/26	2018/12/25			

8.3 Test Set-up:



8.4 Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. For 6dB Bandwidth:

Set the spectrum analyzer as RBW=100 kHz, VBW= 3*RBW, Span = 5MHz, Detector=Peak, Sweep=auto.

- 5. Mark the peak frequency and -6dB (upper and lower) frequency.
- 6. For 99% Bandwidth:

Set the spectrum analyzer as RBW=1%, VBW=3*RBW, Span = 2MHz, Detector=Sample,



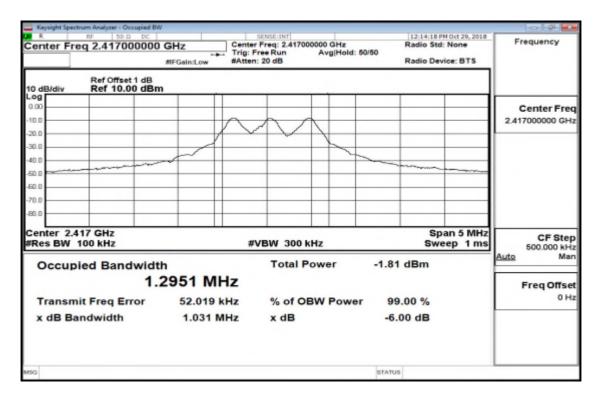
Sweep=auto.

- 7. Turn on the 99% bandwidth function, max reading.
- 8. Repeat above procedures until all test default channel is completed

8.5 Measurement Result:

2.4G mode							
Frequency (MHz)	6dB BW (MHz)	BW (MHz)	Result				
2417	1.031	> 0.5	PASS				
2443	1.058	> 0.5	PASS				
2463	1.077	> 0.5	PASS				

6dB Band Width Test Data CH-Low



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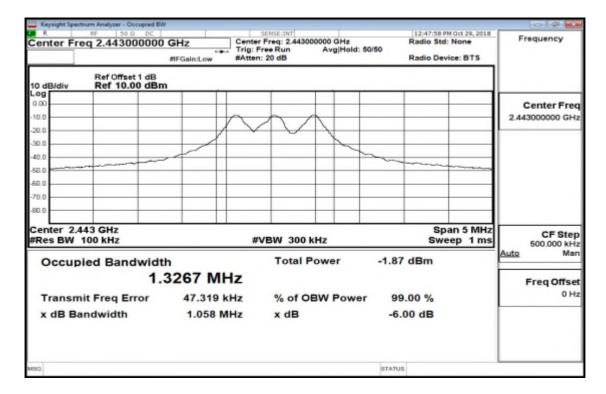
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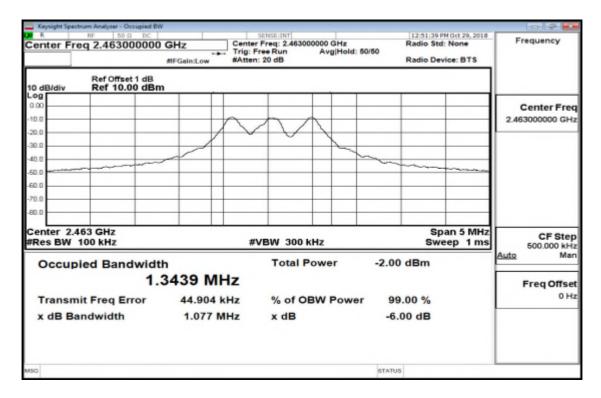
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6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



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9 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

9.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

9.2 Measurement Equipment Used:

Conducted Emission Test Site								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
Spectrum Analyzer	Agilent	N9010A	MY53400256	2017/10/30	2018/10/29			
DC Block	PASTER- NACK	PE8210	RF81	2017/12/26	2018/12/25			
Notebook	Lenovo	L420	S0011721	N/A	N/A			
Power Meter	Anritsu	ML2496A	1326001	2018/08/09	2019/08/02			
Power Sensor	Anritsu	MA2411B	1315048	2018/08/09	2019/08/02			
Power Sensor	Anritsu	MA2411B	1315049	2018/08/09	2019/08/02			
Splitter	Woken	DOM35LW1A2	RF36	2017/12/26	2018/12/25			

9.3 Test SET-UP:



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9.4 Measurement Procedure

Reference Level of Emission Limit:

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 100kHz & VBW = 300 kHz.
- 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.

Conducted Band Edge:

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
- 5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
- 6. Mark the highest reading of the emission as the reference level measurement.
- 7. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 kHz immediately outside the authorized (2400~2483.5MHz) be attenuated by 20dB at least relative to the maximum emission of power.
- 8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

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Conducted Spurious Emission:

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set RBW = 100 kHz & VBW=300 kHz, Detector =Peak, Sweep = Auto
- 4. Allow trace to fully stabilize.
- 5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
- 6. Repeat above procedures until all default test channel measured were complete.

9.5 Measurement Result

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB
2417	-8.23	(dBm) -28.23
2443	-8.43	-28.43
2463	-8.63	-28.63

Reference Level of Limit

NOTE: cable loss as 1dB that offsets in the spectrum NOTE: Refer to next page for plots.

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Avg Type: Log-Pv

Avg Type: Log-Pw

B.

ep

Frequency

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Center Fre 2.370000000 GH Start Fre 2.310000000 GH Stop Fre

CF Step

Freq Offse OH: Scale Typ

Frequency

Auto Tu

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Stop Free

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Scale Typ

LE

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2.550000000 GH

2 5000000

12.0

PARA NA PA

Mkr3 2.390 00 GHz -66.57 dBm

Span 120.0 11.53 ms (100

10 PM Oct 23, 2618 TRACE 1 2 3 4 5 TYPE NWWWW DET P NNNN

1.1-25.63

jų,

(1001 pts

Span 100.0 M 9.600 ms (1001 p

Mkr3 2.483 6 GHz -61.26 dBm

Band Edges Test Data CH-Low

H

2,416 68 GHz 2,399 90 GHz 2,399 00 GHz

Band Edges Test Data CH-High

13 Mary

2.462 6 GHz (Δ) 2.483 6 GHz (Δ) 2.483 6 GHz (Δ)

#VBW 300 kHz

-8.69 dBm -61.30 dBm

R NT 55 0 C R Strong 2.50000000 GHz FN0: Fest Atten: 20 dB

Ref Offset 1 dB Ref 10.00 dBm

2.50000 GH

100 k

NNN

300 kHz

-8.16 dBr -62.85 dBr -66.67 dBr

Renter Freq 2.370000000 GHz PNO: Fast Cather: 20 dB

Ref Offset 1 dB Ref 10.00 dB

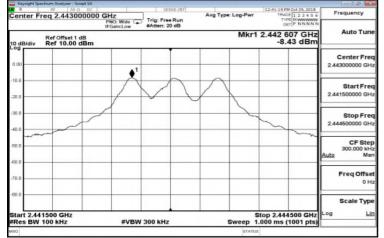
2.37000 W 100 k

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Reference Level of Emission Limit (CH-Low)

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90.0										Scale Typ
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sa						BTAT	18			

Reference Level of Emission Limit (CH-Mid)



Reference Level of Emission Limit (CH-High)

Keysight Spectrum Analyzer - Swept SA				
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20.0				Start Fre 2.461500000 GH
40.0	4			Stop Fre 2.464500000 GH
50.0				CF Ste 300.000 kit Auto Mit
70.0				Freq Offs 01
60 0 Start 2.461500 GHz #Res BW 100 kHz	#VBW 300 kHz		Stop 2.464500 GHz 1.000 ms (1001 pts)	Scale Typ

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Conducted Spurious Emission Measurement Result

CH-Low 30MHz – 3GHz

R	RF 50 G	DC [1	SENSE-31			12:37:5	0 PM Gcl 23, 2018	-
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CH-Low 3GHz – 26.5GHz

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CH-Mid 30MHz – 3GHz

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(1001 pts)	83.9 ms					#VBW		kHz	100	BW	#Res
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CH-Mid 3GHz – 26.5GHz

🚢 Keynight Sp	ectrum Analyzer - Sw						
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	4.75 GHz 100 kHz	#V	BW 300 kHz	FUNCTION		Span 23.50 GHz 2.246 s (1001 pts)	CF Ste 2.35000000 GH Auto Ma
1 N	1 1 (Δ)	26.288 5 GHz	(Δ) -60.00 dBm				Freq Offse 0 H
2 4 5 6 7 8 9 9							Scale Typ
* [н 1		STATUS	•	

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CH-High 30MHz – 3GHz

Keynight Spec	strum Analyzer - Six		sense-ner!		12-57:39 PM ()		0.1
enter Fr		00000 GHz PN0: Fast C		Avg Type: Log-Pwr	TRACE	23456 NNNNN	Frequency
0 dB/div	Ref Offset 1 Ref 10.00	IFGein/Low	#Atten: 20 dB	MH	r2 2.462		Auto Tune
og 1.00					¢ ²		Center Free 1.515000000 GH
		01			DL1	-25 £3 dbn	Start Free 30.000000 MH
D, D		and Muniterson	بېن ^{ىر} ە ئادىق ە دىر سەمىدىر سە	ant man the second	Mours	- Changelot	Stop Fre 3.000000000 GH
	515 GHz 100 kHz	#VB	W 300 kHz	Sweep 2	Span 2.9) 83.9 ms (10	01 pts)	CF Ste 297.000000 MH Auto Ma
1 N 1 Z N 1 4	τ (Δ) τ	935.9 MHz (A 2.462 4 GHz					Freq Offse 0 H
6 7 8 9 0							Scale Typ
-	1 1		15	1		1 .	

CH- High 3GHz – 26.5GHz

			SENSE-INT	51				, itr	
DET P NNNNN	Log-Pwr	Avg Type: Lo			O: Fast (.	F	14.750	req '	ter F
									B/div
			_					_	
DL1 -20 03 eDm								_	
and the second second second	ىرىنىيەر بەرمىيەر يەرىيىنىيە تەرىمىيە. ئارىلەر بەرمەر يېرىنىيە تەرىپىدىنىيە تەرىمىيەر	Sere Barrowine A			-		an a	non o	~
6 s (1001 pts)	Sweep 2.246			300 kHa	#VBW	- Kc	kHz	100	s BW
			dBm	-60.44 d	5 GHz (Δ)	26.288	(Δ)	1 1	N
			_		_			-	-
	пасе (23455 остраняться) 2885 5 GHz 2885 5 GHz 281-280 dHz 1-2350 GHz 5 (1001 pts)	Mkr1 26.288 5 GHz -60.44 dBm -21.363 dm	Avg Type: Log-Pwr Trace [] 224 s e Trace [] 274 s e Trace [] 27	Avg Type: Log-Pwr to db Avg Type: Log-Pwr to db Mkr1 26,288 5 GHz -60,44 dBm Akr 126,288 5 GHz -60,44 dBm -60,44 dBm -	Avg Type: Log-Pwr Trig: Free Run #Atten: 20 dB Mkr1 26.288 5 GHz -60.44 dBm -0.1.365 dHz Span 23.50 GHz 300 kHz Sweep 2.246 s (1001 pts)	HZ Avg Type: Log-Per Troc: 1 2.3 4 5 cm GainLow Trig: Free Run Scher: 20 dB Mkr1 26.285 5 GHz -60.44 dBm Mkr1 26.285 5 GHz -60.44 dBm 21.385 dm 23.35 dm SWeby 300 kHz Sweep 2.246 s (1001 pts) Sweep 2.246 s (1001 pts) -	ODODOD GHz Prodelicaw Trig: Free Run Anter: 20 db Avg Type: Log-Pwr Or Type: Log-Pwr Cell P Method Tride: 12.3 4 s e Webby Type: Log-Pwr Cell P Method Ba Mkr1 26, 22.4 s e Cell P Method Tride: 22.4 s e Webby Type: Log-Pwr Cell	14.750000000 GHz Trig: Free Run Avg Type: Log-Per Trid: 1 2 3 4 3 45 PMO: Fax: Trig: Free Run Avg Type: Log-Per Trid: 1 2 3 4 3 45 Offert 1 dB Mkr1 26.288 5 GHz -60.44 dBm 10.00 dBm -60.44 dBm -60.44 dBm 10.00 dBm -80.44 dBm -80.44 dBm 11.00 dBm -80.45 dBm -80.45 dBm 241 dB dBm -80.45 dBm -80.45 dBm 241 dB dBm -80.45 dBm -80.45 dBm 241 dB dBm -80.45 dBm -80.45 dBm 242 dB dBm -80.45 dBm -80.45 dBm	Proc 12.3 as e Trig: Free Run Procent Low Avg Type: Log-Perr Trig: Free Run Anter: 20 db Trig: Free Run Rate: 20 db Trig: Free Run Rate: 20 db Trig: Free Run Rate: 20 db Mkr1 26, 22 as e Coll Preval -60.44 dBm Ref Offset db B Mkr1 26, 22 as e -60.44 dBm Trig: Free Run Rate: 20 db Trig: Free Run Rate: 20 db Mkr1 26, 22 as e -60.44 dBm

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10 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 limit as below.

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level (dB μ V/m) = 20 log Emission level (dB μ V/m)

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10.2 **Measurement Equipment Used**

966 Chamber										
EQUIPMENT	MFR	LAST	CAL DUE.							
TYPE		NUMBER	NUMBER	CAL.						
Broadband Antenna	TESEQ	CBL 6112D	35243	2017/11/10	2018/11/09					
Horn Antenna	Schwarzbeck	BBHA9120D	1187	2018/01/04	2019/01/03					
Horn Antenna	SCHWAZBECK	BBHA9170	184	2017/12/12	2018/12/11					
Loop Antenna	ETS.LINDGREN	6502	148045	2018/04/19	2019/04/18					
EMI Test Receiver	R&S	ESU 40	100363	2018/04/11	2019/04/10					
Pre-Amplifier	EMC Instru-	EMC330	980096	2017/12/26	2018/12/25					
	ments				2010/12/20					
Pre-Amplifier	EMC Instru-	EMC0011830	980199	2017/12/26	2018/12/25					
-	ments									
Pre-Amplifier	EMC Instru- ments	EMC184045B	980135	2017/10/27	2018/10/26					
Attenuator	Marvelous	WATT-218FS-10	RF246	2017/12/26	2018/12/25					
Highpass Filter	Micro Tronics	BRM50701-01	G008	2017/12/26	2018/12/25					
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	2017/12/26	2018/12/25					
Coaxial Cable	Huber Suhner	EMC106-SM-SM -7200	150703	2017/12/26	2018/12/25					
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	2017/12/26	2018/12/25					
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	2017/12/26	2018/12/25					
Notebook	Lenovo	T470	P0001293	N/A	N/A					

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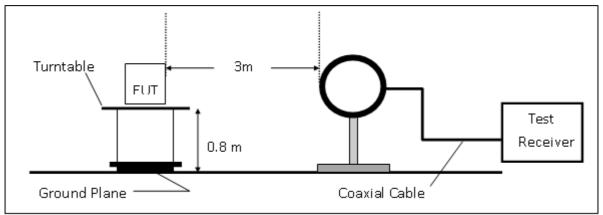
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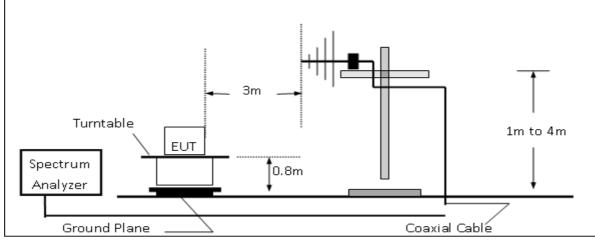


10.3 Test SET-UP

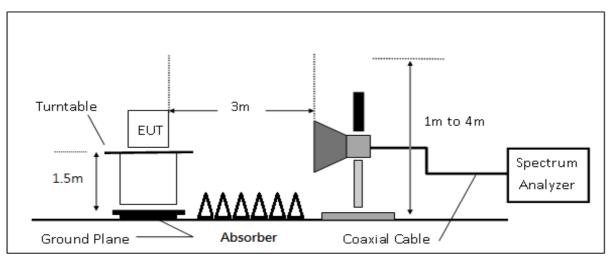
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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10.4 Measurement Procedure

- 1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plan.
- 3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 5. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
- 6. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
- Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
- 8. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
- 11. Repeat above procedures until all default test channel measured were complete.

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10.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	8	CL = Cable Attenuation Factor (Cable Loss)							
	RA = Reading Amplitude	AG = Amplifier Gain							
	AF = Antenna Factor								

Actual FS(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

 $Factor(dB) = Antenna Factor(dB\mu V/m) + Cable Loss(dB) - Pre_Amplifier Gain(dB)$

10.6 Test Results of Radiated Spurious Emissions form 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

10.7 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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2430



0 2310

Radiated Band Edge Measurement Result

2334.

Test M EUT P Test C	ition Moo lode Pol Channel		:2.40 :BE :E2	CH LOW	1	Te An	st Date mp./Hum tenna Po gineer			:2018-10-05 :24/60 :VERTICAL :Ashton
100	Level (dBuV	/m)								1
90										
80								ſ		
70									<u> </u>	
60								- A		

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2388.24	Average	33.14	3.38	36.52	54.00	-17.48
2388.24	Peak	45.41	3.38	48.79	74.00	-25.21
2390.00	Average	33.04	3.39	36.43	54.00	-17.57
2390.00	Peak	45.40	3.39	48.79	74.00	-25.21

Frequency (MHz)

2382.

2406.

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2358.

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Operat Test Mo EUT Po Test Ch	ol	e :2.4G :BE CH LOW :E2 Plan :2417 MHz					T A E	:2018-10-05 :24/60 :HORIZONTAL :Ashton			
100 <mark>L</mark>	evel (dBuV/m)			1	1				1	7
90											
80									<u></u> Γ	\	
70									+ +	1	
60											
50	****	and the second states	the second section of the second	*****	monad	ather antimeter and a state of the state	2 4	Here and a garrent by here and	aut entre		
40							3				-
30											
20											
10											-
02	310	23	34.	23) 58.		82.	24	406.	24	 30
					Freque	ency (MHz)					
Fr	eq.	Dete		Spectr		Factor		Actual		_imit	Margin
N/	lHz	Mo PK/Q		Reading dBµ ^v		dB		FS dBµV/m		⊉3m sµV/m	dB
	II IZ		i //\\	чър	v	uБ		սերչյու	uE	μν/Π	uD
238	86.92	Aver	age	32.8	2	3.38		36.20	5	4.00	-17.80
238	36.92	Pe		45.7	5	3.38		49.13	7	4.00	-24.87
239	0.00	Aver	age	32.8	6	3.39		36.25	5	4.00	-17.75
239	90.00	Pe	ak	44.54		3.39		47.93 74.0		4.00	-26.07

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Operation Moc Test Mode EUT Pol Test Channel	:B :E	2.4G BE CH HIGH E2 Plan 2463 MHz		Test Date Temp./Humi. Antenna Pol. Engineer					
100	/m)					-			
90									
80									
70									
60									
50	Wat which we want	24	1-4-4-4	and the factor of the second	- Sected and an address of the other sectors				
40									
30									
20									
10									
0 2450	2470.	2490.	2510.	2530.	25	50			
		Freque	ency (MHz)						
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin			
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB			
	1 1 4 Set // W								
2483.50	Average	33.12	3.96	37.08	54.00	-16.92			
2483.50	Peak	45.03	3.96	48.99	74.00	-25.01			
2485.30	Average	33.04	3.98	37.02	54.00	-16.98			
2485.30	Peak	46.12	3.98	50.10	74.00	-23.90			

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Test M EUT P		e	:2.4G :BE CH HIGH :E2 Plan :2463 MHz					:2 :H	:2018-10-05 :24/60 :HORIZONTAL :Ashton					
100	Level (dBuV/	m)				1				1				
90														
80		\sim												
70		\vdash												
60														
-	Not and a start of the start of	June	Marrie Contraction											
50				and a set of the	edenthe hydrawige	www.when	Managerality	and the second	Manhalan dinakan meningkan dinakan dina	ales,		14-44		
40														
30												_		
20												_		
10												—		
0	2450	24	70		24	90.	2	510.	21	530.		2550		
-		-			21		ency (MHz)		2.			2000		
F	req.	Dete			pectr		Factor		Actual		Limit		Margin	
	41.1-	Mo		Rea		Level	d٦		FS		@3m		٩D	
IV	/Hz	PK/Q	r/AV		dBµ\	/	dB		dBµV/m	a	BµV/m		dB	
249	83.50	Aver	ane		32.8	2	3.96		36.78		54.00		-17.22	
	83.50	Pe			44.5		3.96		48.47		74.00		-25.53	

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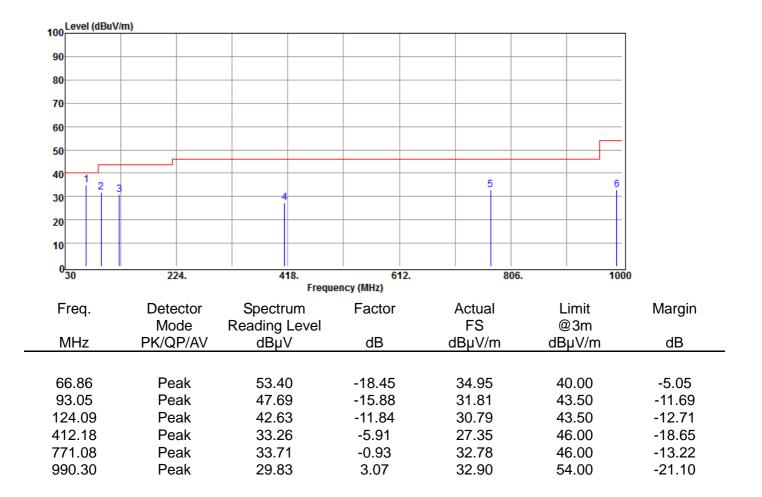


Radiated Spurious Emission Measurement Result For Frequency form 30MHz to 1000MHz

·2 4G

Operation Mode Test Mode EUT Pol Test Channel

Test Date Temp./Humi. Antenna Pol. Engineer :2018-10-03 :24/60 :VERTICAL :Enzo



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Operation Mode Test Mode EUT Pol Test Channel	e	:T) :E)	4G X CH LOW 2 Plan 417 MHz			Te Ar	st Date mp./Hu Itenna F Igineer	mi.			:2018-10-03 :24/60 :HORIZONTAL :Enzo
100 Level (dBuV/n	n)										
90											
80											
70											
60											
50											
40							4	5		6	
30 2		3									
20											
10											
030	22	4.	41	18.	61	2.		806.		1000	
				Freque	ncy (MHz)						
Freq.	Dete		Spectr		Factor		Actual		Limit		Margin
MHz	Moo PK/QI		Reading dBµ\		dB		FS ∄BµV/m		@3m dBµV/m		dB
			ubμ	/	uВ	(ωμν/Π		ωμν/π		UD
30.97	Pea	ak	32.0 ⁻	1	-4.16		27.85		40.00		-12.15
129.91	Pea	ak	41.1	7	-11.44		29.73		43.50		-13.77
275.41	Pea	ak	40.96	6	-10.27		30.69		46.00		-15.31
772.05	Pea	ak	34.12		-0.90		33.22		46.00		-12.78
873.90	Pea		32.00		0.95		32.95		46.00		-13.05
996.12	Pea	ak	30.3	1	3.20		33.51		54.00		-20.49

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Operation Mod Test Mode EUT Pol Test Channel	:T) :E2	4G X CH MID 2 Plan 143 MHz		Test Date Temp./Humi. Antenna Pol. Engineer		:2018-10-03 :24/60 :VERTICAL :Enzo
100 Level (dBuV/r	n)					_
90						
80						
70						
60						
50						
40 1 2 3				4	5 6	
30						
20						
10						
0 <mark></mark> 30	224.	418.	612.	806.	10	_ DO
		-	ency (MHz)			
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
		ασμν	uв	αθμν/m	αθμν/m	ub
67.83	Peak	52.40	-18.28	34.12	40.00	-5.88
93.05	Peak	48.03	-15.88	32.15	43.50	-11.35
128.94	Peak	41.98	-11.51	30.47	43.50	-13.03
769.14	Peak	33.58	-0.96	32.62	46.00	-13.38
903.97	Peak	31.16	1.25	32.41	46.00	-13.59
969.93	Peak	30.90	2.55	33.45	54.00	-20.55

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Operation Mode Test Mode EUT Pol Test Channel	:T) :E2	4G X CH MID 2 Plan 443 MHz		Test Date Temp./Humi. Antenna Pol. Engineer		:2018-10-03 :24/60 :HORIZONTAL :Enzo
100 Level (dBuV	//m)					1
90						
80						
70						
60						
50						
40					6	
30 2	3		4	5		
20						
10						
0 <mark></mark>	224.	418.	612.	806.	10	
50	227.		ency (MHz)	000.	10	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
101112			uD		dDpt/m	
30.97	Peak	32.43	-4.16	28.27	40.00	-11.73
66.86	Peak	45.68	-18.45	27.23	40.00	-12.77
129.91	Peak	41.83	-11.44	30.39	43.50	-13.11
505.30	Peak	32.44	-4.10	28.34	46.00	-17.66
773.02	Peak	32.43	-0.88	31.55	46.00	-14.45
933.07	Peak	31.85	1.76	33.61	46.00	-12.39

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Operation Test Moo EUT Pool Test Cha	de I		:E2	4G (CH HIGH 2 Plan 63 MHz	ł		Te Ar	st Date mp./H ntenna nginee	umi. Pol.			:2018-10-03 :24/60 :VERTICAL :Enzo
100	vel (dBuV/m)			1							1
90												
80												
70—												
60												
50												
40 1												
30	2 3 4					5		6				
20												
10												
0 <mark></mark>		22	24.	4	18. Freque	61 ency (MHz)	12.		806.		100	0
Fre	eq.	Dete	ector	Spectr	um	Factor		Actual		Li	imit	Margin
		Мо		Reading				FS			3m	
MF	lz	PK/Q	P/AV	dBh,	V	dB	(dBµV/r	n	dBj	uV/m	dB
37.	76	Pe	ak	42.7	6	-7.62		35.14		10	0.00	-4.86
67.8		Pe		52.7		-18.28		34.42).00	-5.58
93.0		Pe		47.7		-15.88		31.88			3.50 3.50	-11.62
129.		Pe		42.0		-11.44		30.58			3.50	-12.92
513.		Pe	ak	32.5		-3.92		28.63			6.00	-17.37
772.	.05	Pe	ak	33.3	7	-0.90		32.47		46	6.00	-13.53

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Operation Mod Test Mode EUT Pol Test Channel	:T) :E2	4G X CH HIGH 2 Plan 163 MHz		Test Date Temp./Humi. Antenna Pol. Engineer		:2018-10-03 :24/60 :HORIZONTAL :Enzo
100 Level (dBuV/	m)					1
90						
80						
70						
60						
50						
40	J			4	5 6	
30 2	2 3			4		
20						
10						
0 <mark></mark>	224.	418.	612.	806.	100	
			ency (MHz)	0001		
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level	dB	FS dBµV/m	@3m dBu\//m	dB
	FN/QF/AV	dBµV	UD	ασμν/π	dBµV/m	UD
80.44	Peak	48.99	-16.84	32.15	40.00	-7.85
128.94	Peak	42.34	-11.51	30.83	43.50	-12.67
243.40	Peak	38.68	-11.32	27.36	46.00	-18.64
770.11	Peak	33.21	-0.95	32.26	46.00	-13.74
940.83	Peak	31.20	1.89	33.09	46.00	-12.91
959.26	Peak	30.34	2.28	32.62	46.00	-13.38

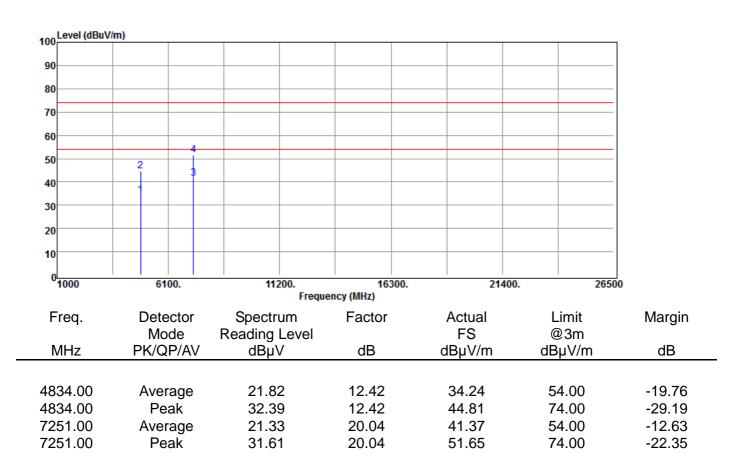
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



Radiated Spurious Emission Measurement Result For Frequency above 1GHz

Operation Mode Test Mode EUT Pol Test Channel

:2.4G :TX CH LOW :E2 Plan :2417 MHz Test Date Temp./Humi. Antenna Pol. Engineer :2018-10-05 :24/60 :VERTICAL :Ashton



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Operatio Test Moo EUT Pol Test Cha	de		:T) :E2	4G K CH LOW 2 Plan 117 MHz	,		T A	est Date emp./Hum ntenna Po ngineer			:2018-10-05 :24/60 :HORIZONTAL :Ashton
100	el (dBuV/m))			1						7
90											_
80											_
70											_
60											_
50			4								_
		2	3								
40		1									
30											_
20											_
10											_
0 ^L 100)0	61	00.	11	200. Eroquo	163 ncy (MHz)	600.	21	400.	265	500
Fre	a	Dete	octor	Spectr		Factor		Actual		.imit	Margin
110	ч·	Mo		Reading		1 00101		FS		⊉3m	Margin
MH	z	PK/Q	P/AV	dBµ'		dB		dBµV/m	dB	μV/m	dB
		_							_		
4834		Ave		19.2		12.42		31.66		4.00	-22.34
4834 7251			ak	33.0 18.7		12.42 20.04		45.43 38.82		4.00 4.00	-28.57 -15.18
7251		Aveı Pe	•	31.8		20.04 20.04		38.82 51.87		4.00 4.00	-15.18 -22.13
1201		10	un	01.0	0	20.04		01.07	1	1.00	22.10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Operat Test Me EUT Pe Test Ch	ol)	:T) :E)	4G X CH MID 2 Plan 143 MHz			Te Ai	est Date emp./Hum ntenna Po ngineer			:2018-10-05 :24/60 :VERTICAL :Ashton
100	evel (dBuV/m)	1		1			1			-
90											_
80											_
70											_
60											_
50		2	4								_ _
40			3								_
30											-
20											-
10											-
0	000	61	00.	11:	200.	163	600.	21	400.	265	500
					Freque	ency (MHz)					
Fr	eq.		ector	Spectr		Factor		Actual		_imit	Margin
М	lHz	Mo PK/Q		Reading dBµ ^v		dB		FS dBµV/m		⊉3m 8µV/m	dB
			,1 // \V	αDμ	v	<u>ub</u>			uL	ΥΥΥ!!!	
488	86.00	Avei	age	19.6	2	12.64		32.26	5	4.00	-21.74
488	86.00		ak	33.7	8	12.64		46.42	7	4.00	-27.58
	29.00	Avei	•	18.6		20.08		38.72		4.00	-15.28
732	29.00	Pe	ak	29.4	9	20.08		49.57	7	4.00	-24.43

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Operation Mo Test Mode EUT Pol Test Channel	:T :E :2	.4G X CH MID 2 Plan 443 MHz		Test Date Temp./Humi. Antenna Pol. Engineer		:2018-10-05 :24/60 :HORIZONTAL :Ashton
100 Level (dBu	V/m)					7
90						-
80						
70						
60						-
50	2 4					
40						
30						-
20						-
10						-
0 <mark></mark>	6100.	11200. Frogue	16300. ency (MHz)	21400.	265	 00
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4886.00	Average	18.82	12.64	31.46	54.00	-22.54
4886.00	Peak	33.32	12.64	45.96	74.00	-28.04
7329.00	Average	18.64	20.08	38.72	54.00	-15.28
7329.00	Peak	30.01	20.08	50.09	74.00	-23.91

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Operati Test Mc EUT Pc Test Ch	bl		:T) :E	4G X CH HIGH 2 Plan 463 MHz	ł		Te An	st Date mp./Hum tenna Po gineer			:2018-10-05 :24/60 :VERTICAL :Ashton
100	evel (dBuV/m)							1			_
90											_
80											_
70											_
60											_
50		2	4								_
40			3								_
30		1									_
20											_
10											_
0 <mark></mark>	000	61	00.	11:	200.	163	300.	21	400.	26	500
					Freque	ency (MHz)					
Fr€	eq.	Dete		Spectr		Factor		Actual		_imit	Margin
Mł	」 →	Mo PK/Q		Reading dBµ\		dB		FS IBµV/m		⊉3m 8µV/m	dB
	IZ			υвμ	v	UD	Ľ	ωμν/п	UE	μν/Π	UD
4926	6.00	Aver	ade	18.7	7	12.81		31.58	5	4.00	-22.42
4926		Pe		33.6		12.81		46.50	-	4.00	-27.50
7389		Aver	•	18.4		20.10		38.55		4.00	-15.45
7389	9.00	Pe	ak	30.2	0	20.10		50.30	7	4.00	-23.70

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Test M EUT P)	:T) :E2	4G K CH HIGH 2 Plan 463 MHz	ł		۲ A	ēst Date ēmp./Hum Antenna Po Engineer			:2018-10-05 :24/60 :HORIZONTAL :Ashton
100	evel (dBuV/m)							1		7
90											_
80											_
70											-
60											_
50			4								-
40		2	3								_
30											-
20											-
10											-
0	1000	61	00.	11	200.	163	600.	21	400.	265	600
						ncy (MHz)					
Fr	req.	Dete		Spectr		Factor		Actual		.imit	Margin
N	1Hz	Mo PK/Q		Reading dBµ		dB		FS dBµV/m		⊉3m µV/m	dB
	11 12			чър	v	чD		ασμν/Π	ub	μν/Π	UD
492	26.00	Aver	rage	18.6	4	12.81		31.45	5	4.00	-22.55
492	26.00		ak	29.4	1	12.81		42.22	7	4.00	-31.78
738	39.00	Aver	rage	19.2	4	20.10		39.34	5	4.00	-14.66
738	39.00	Pe	ak	30.9	0	20.10		51.00	7	4.00	-23.00

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11 POWER SPECTRAL DENSITY

11.1 Standard Applicable:

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

11.2 Measurement Equipment Used:

	Conducted Emission Test Site										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.						
TYPE		NUMBER	NUMBER	CAL.							
Spectrum Analyzer	Agilent	N9010A	MY53400 256	2017/10/30	2018/10/29						
DC Block	PASTERNACK	PE8210	RF81	2017/12/26	2018/12/25						
Notebook	Lenovo	L420	S0011721	N/A	N/A						
Power Meter	Anritsu	ML2496A	1326001	2018/08/09	2019/08/02						
Power Sensor	Anritsu	MA2411B	1315048	2018/08/09	2019/08/02						
Power Sensor	Anritsu	MA2411B	1315049	2018/08/09	2019/08/02						
Splitter	Woken	DOM35LW1A2	RF36	2017/12/26	2018/12/25						

11.3 Test Set-up:



11.4 Measurement Procedure:

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 3 kHz. & the VBW = 10 kHz
- For defining Restricted Band Edge Limit:
 Set the RBW = 100kHz & VBW = 300 kHz.
- 6. Detector = peak.
- 7. Sweep time = auto couple.
- 8. Trace mode = max hold.
- 9. Allow trace to fully stabilize.
- 10. Use the peak marker function to determine the maximum amplitude level.

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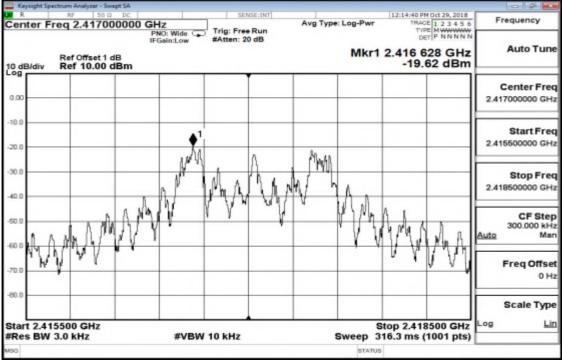


11.5 Measurement Result:

2.4G mode										
Frequency (MHz)	RF Power Density (dBm)	Maximum Limit (dBm)	Result							
2417	-19.62	8	PASS							
2443	-20.07	8	PASS							
2463	-18.75	8	PASS							

NOTE: cable loss as 1dB that offsets in the spectrum

Power Spectral Density Test Plot (CH-Low)



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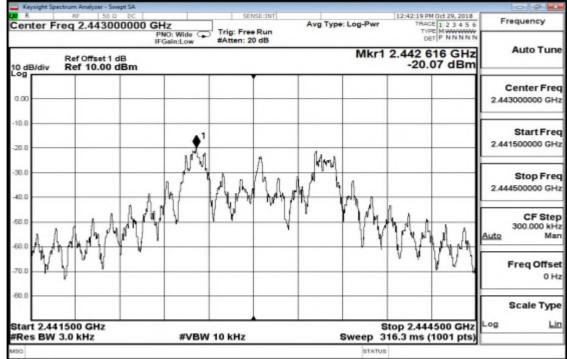
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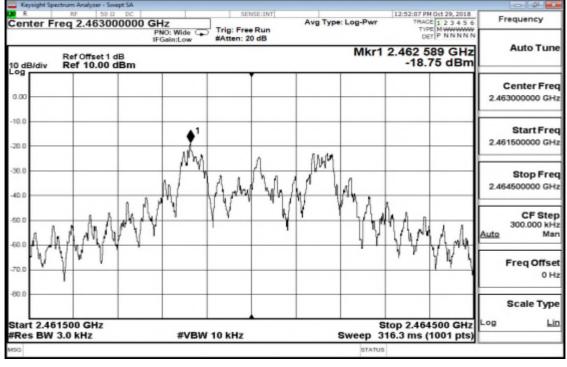
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Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



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12 ANTENNA REQUIREMENT

12.1 Standard Applicable:

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

In case of point-to-point operation, the power shall be reduced by the one dB for every 3 dB that the directional gain of antenna exceeds 6dBi.

12.2 Antenna Connected Construction:

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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