

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C AND INDUSTRY CANADA RSS 247 REQUIREMENT

OF

	0F		
Product Name:	BLE and 802.15.4 module		
Brand Name:	Texas Instruments Incorporated		
Model No.:	CC2650MODA		
Model Difference:	N/A		
FCC ID:	ZAT26M1		
IC:	451H-26M1		
Report No.:	E2/2016/40060		
Issue Date:	Jun. 17, 2016		
FCC Rule Part:	§15.247, Cat: DTS		
IC Rule Part:	RSS-247 issue 1 :2015		
Prepared for FCC:	Texas Instruments Inc. 12500 TI Boulevard, M/S 8751, Dallas, TX75243, USA		
Prepared for IC:	Texas Instruments Norway AS Postboks 264 Skøyen Oslo N-0213 Norway		
Prepared by:	SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333		
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# **VERIFICATION OF COMPLIANCE**

Applicant for FCC:	Texas Instruments Inc. 12500 TI Boulevard, M/S 8751, Dallas, TX75243, USA
Applicant for IC:	Texas Instruments Norway AS Postboks 264 Skøyen Oslo N-0213 Norway
Product Name:	BLE and 802.15.4 module
Brand Name:	Texas Instruments Incorporated
Model No.:	CC2650MODA
Model Difference:	N/A
FCC ID:	ZAT26M1
IC:	451H-26M1
Report Number:	E2/2016/40060
Date of test:	May 03, 2016 ~ May 28, 2016
Date of EUT Received:	May 03, 2016

## 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.

Test By:	Aken Huang	Date	Jun. 17, 2016
-	Aken Huang / Engineer		
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# **Revision History**

Report Number	Revision	Description	Issue Date
E2/2016/40060	Rev.00	Initial creation of document	Jun. 17, 2016

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#### **GENERAL INFORMATION** 1

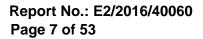
## **1.1 Product Description**

#### General:

Product Name:	BLE and 802.15.4 module
Brand Name:	Texas Instruments Incorporated
Model No.:	CC2650MODA
Model Difference:	N/A
Product SW/HW version:	N/A/ N/A
Radio SW/HW version:	N/A/ N/A
Test SW Version:	N/A
RF power setting in TEST SW:	N/A
Power Supply:	3.3V from DC Power Supply

#### Bluetooth Low Energy:

Frequency Range:	2402 – 2480MHz
Bluetooth Version	BT V4.1 single mode
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	5.12dBm
Antenna Designation:	Chip Antenna, Gain: 1.256dBi





## **1.2 Product Feature of Equipment Under Test**

The equipment under Test (Hereafter Called: EUT) is supporting Bluetooth & Zigbee features, and below is details of information.

Product Feature			
Product Name: BLE and 802.15.4 module			
Brand Name:	Texas Instruments Incorporated		
Model No.:	CC2650MODA		
Model Difference:	N/A		
FCC ID:	ZAT26M1		
IC:	451H-26M1		
Bluetooth Version:	BT V4.1 single mode		
2.4GHz Wireless Function:	Zigbee		

Note: The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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## 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance

Canada RSS-247 issue 1: 2015

Canada RSS-Gen issue 4: 2014

ANSI C63.10:2013

Note:

- 1 All test items have been performed and recorded as per the above standards.
- 2. The composite system is compliance with FCC Subpart B is authorized under a DoC procedure.

## **1.4 Test Facility**

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

FCC Registration Numbers are: 735305

IC Registration Numbers are: 4260A-5

## **1.5 Special Accessories**

There are no special accessories used while test was conducted.

## **1.6 Equipment Modifications**

There was no modification incorporated into the EUT.

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#### SYSTEM TEST CONFIGURATION 2

## 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 as turn table which is 0.8 m above ground plan. 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 50 ohm/ 50uH 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 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. 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 hand-held 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.

## 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.

#### Note:

The spectrum analyzer offset is derived from RF cable loss 10.4dB.

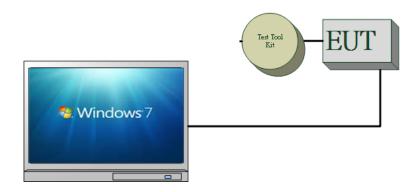
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## 2.5 Configuration of Tested System

Fig. 2-1 Configuration of Radiated Tested System



## Fig. 2-2 Configuration of Conducted Emission Tested System

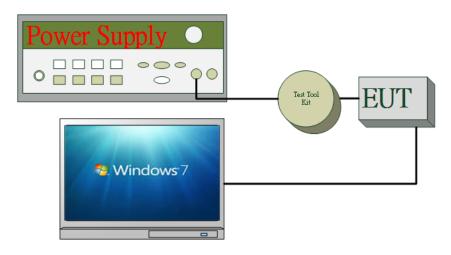


Table 2-1	Equipment	Used in	<b>Tested System</b>
-----------	-----------	---------	----------------------

ltem	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	Bluetooth Test Software	Blue Test3	N/A	N/A	N/A	N/A
2.	DC Power Supply	Agilent	E3640A	MY53130054	N/A	Un-Shielded
3.	Notebook	Lenovo	L440	R9-007LAZ	Shielded	Un-Shielded
4.	Test Tool Kit	N/A	N/A	N/A	N/A	N/A

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#### SUMMARY OF TEST RESULTS 3

FCC Rules	IC Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	N/A
§15.247(b) (3)	RSS-247 §5.4(4)	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 (1) RSS-Gen §6.6	6dB and 99% Bandwidth	Compliant
§15.247(d)	RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	RSS-247 §5.2(2)	Peak Power Density	Compliant
§15.203 §15.247(b)	RSS- Gen §8.3	Antenna Requirement	Compliant

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#### **DESCRIPTION OF TEST MODES** 4

## 4.1 Operated in 2400 ~ 2483.5MHz Band

#### 40 channels are provided for Bluetooth LE

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
0	2402 MHz	14	2430 MHz	28	2458 MHz
1	2404 MHz	15	2432 MHz	29	2460 MHz
2	2406 MHz	16	2434 MHz	30	2462 MHz
3	2408 MHz	17	2436 MHz	31	2464 MHz
4	2410 MHz	18	2438 MHz	32	2466 MHz
5	2412 MHz	19	2440 MHz	33	2468 MHz
6	2414 MHz	20	2442 MHz	34	2470 MHz
7	2416MHz	21	2444 MHz	35	2472 MHz
8	2418 MHz	22	2446 MHz	36	2474 MHz
9	2420 MHz	23	2448 MHz	37	2476 MHz
10	2422 MHz	24	2450 MHz	38	2478 MHz
11	2424 MHz	25	2452 MHz	39	2480 MHz
12	2426 MHz	26	2454 MHz		
13	2428 MHz	27	2456 MHz		

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## 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:**

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE	TESTED	MODULATION	DATA RATE	
MODE	CHANNEL	CHANNEL		(Mbps)	
Bluetooth LE	0 to 39	0,19,39	GFSK	1	
	RADIATE	ED EMISSION	TEST (ABOVE 1 GHz)		
MODE	AVAILABLE	TESTED	MODULATION	DATA RATE	
MODE	CHANNEL	CHANNEL	WODULATION	(Mbps)	
Bluetooth LE	0 to 39	0,19,39	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 CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	
Bluetooth LE	0 to 39	0,19,39	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 (Polarization : <b>Vertical</b> )	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

	9kHz – 30MHz: +/- 2.87 dB		
Magguramantungartaintu	30MHz - 167MHz: +/- 4.22dB		
Measurement uncertainty (Polarization : <b>Horizontal</b> )	167MHz -500MHz: +/- 3.44dB		
(i olarization : horizontal)	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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#### CONDUCTED EMISSION TEST 6

## 6.1 Standard Applicable:

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

	Limits				
Frequency range	dB(uV)				
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				
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							
Name of Equip-	Manufacturer	Medel	Serial	Calibration	Calibra-		
ment	Manufacturer	Model	Number	Date	tion Due		
EMI Test Receiver	R&S	ESCI 7	100950	12/12/2015	12/11/2016		
Coaxial Cables	N/A	N30N30-1042-1 50cm	N/A	02/07/2016	02/06/2017		
LISN	Schwarzbeck	NSLK 8127	8127-648	03/11/2016	03/10/2017		
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.		

## 6.3 EUT Setup:

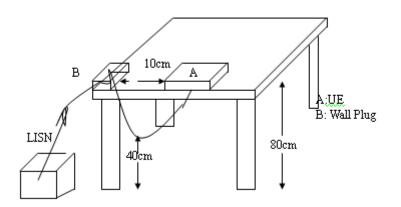
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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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:

N/A, the device is powered by DC 3.3V.

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#### PEAK OUTPUT POWER MEASUREMENT 7

## 7.1 Standard Applicable:

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

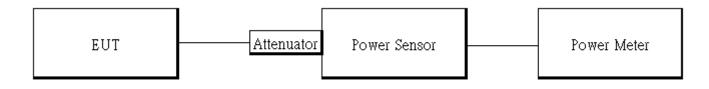
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

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						
Name of Equip-	Manufacturer	Serial Num-		Calibration	Calibra-	
ment	Manufacturer	Model	ber	Date	tion Due	
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017	
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016	
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016	
Power Sensor	Anritsu	MA2411B	1315049	06/23/2015	06/22/2016	
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2015	12/11/2016	
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016	
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/12/2015	12/11/2016	
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016	
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017	

## 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.

## **Duty Factor:**

	Duty Cycle (%)	Duty Factor (dB)
BLE	73.05	1.36

Keysight Spectrum Analyzer - Swept SA				
Center Freq 2.442000000	GHZ PNO: Fast Trig: Free F	Avg Type: Log-Pw		Frequency
Ref Offset 10.4 dB 10 dB/div Ref 20.00 dBm	IFGain:Low #Atten: 20		DET PNNNNN	Auto Tune
Log 10.0 -10.0				Center Freq 2.442000000 GHz
-20.0				Start Free 2.442000000 GHz
-50.0				Stop Free 2.442000000 GHz
Center 2.442000000 GHz Res BW 8 MHz	#VBW 8.0 MHz		Span 0 Hz 3.013 ms (401 pts)	CF Step 8.000000 MH Auto Mar
MKR MODE TRC SCL X	Y	FUNCTION FUNCTION WID	TH FUNCTION VALUE +	Freq Offse 0 H
6 7 8 9 10 11				
4 MSG	17	STA	TUS	

## Duty Cycle Factor:10\*log(1/73.05/100)=1.36

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## 7.5 Measurement Result:

#### BT4.1 mode:

#### BLE mode:

СН	Frequency (MHz)	Peak Power Output including tune-up tolerance (dBm)	Required Limit
0	2402	5.12	1 Watt = 30 dBm
20	2442	5.03	1 Watt = 30 dBm
39	2480	4.88	1 Watt = 30 dBm

СН	Frequency (MHz)				
0	2402	5.00	1 Watt = 30 dBm		
20	2442	4.92	1 Watt = 30 dBm		
39	2480	4.77	1 Watt = 30 dBm		

\*Note: Measured by power meter, as cable loss+ Duty cycle factor that offsets on the power meter



#### **6DB & 99% BANDWIDTH MEASUREMENT** 8

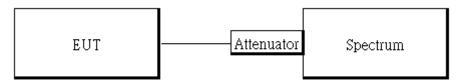
## 8.1 Standard Applicable

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

## 8.2 Measurement Equipment Used

Conducted Emission Test Site											
Name of Equip-	Manufacturer			Calibration	Calibra-						
ment	Manufacturer	Model	ber	Date	tion Due						
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017						
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016						
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016						
Power Sensor	Anritsu	MA2411B	1315049	06/23/2015	06/22/2016						
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2015	12/11/2016						
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016						
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/12/2015	12/11/2016						
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016						
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017						

## 8.3 Test Set-up:



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## **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:

Frequency (MHz)	6dB Bandwidth (MHz)	Bandwidth (MHz)	Result
2402	0.7283	> 0.5	PASS
2442	0.7305	> 0.5	PASS
2480	0.7403	> 0.5	PASS

RI F mode

## **BLE mode**

Frequency (MHz)	99%Bandwidth (MHz)
2402	1.0906
2442	1.0831
2480	1.0940

Note: Refer to next page for plots.

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BT4.1 mode 6dB & 99% Band Width Test Data **CH-Low** 



#### CH-Mid

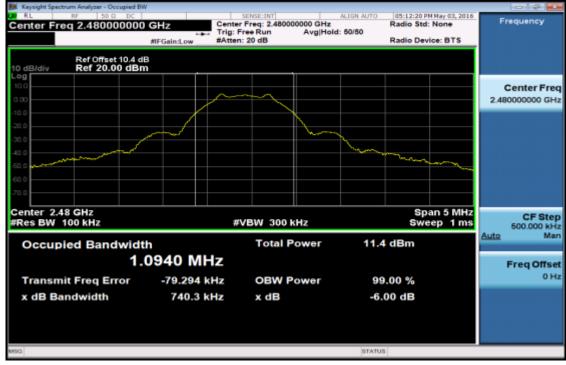


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## **CH-High**



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#### CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT 9

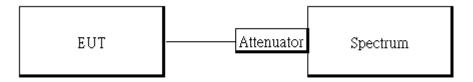
## 9.1 Standard Applicable

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).

Conducted Emission Test Site											
Name of Equip-	Manufacturer	Model	Serial Num-	Calibration	Calibra-						
ment	Manufacturer	Model	ber	Date	tion Due						
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017						
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016						
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016						
Power Sensor	Anritsu	MA2411B	1315049	06/23/2015	06/22/2016						
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2015	12/11/2016						
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016						
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/12/2015	12/11/2016						
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016						
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017						

## 9.2 Measurement Equipment Used:

## 9.3 Test SET-UP:



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## 9.4 Measurement Procedure

#### **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.
- Set DL as the limit = reading on marker 1 20dBm
- 8. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 kHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
- 9. Repeat above procedures until all default test channel (low, middle, and high) was complete.

## **Conducted Spurious Emission:**

- To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance V03r04.
- 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

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

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## BT4.1 mode Band Edges Test Data CH-Low

M Keysight Spectrum Analyzer - Swept SA						
Center Freq 2.360000000	GHz	SENSE:1	Avg	ALIGN AUTO Type: Log-Pwr	03:07:00 PM May 04, 2016 TRACE 1 2 3 4 5	Frequency
Ref Offset 10.4 dB	PNO: Fast G	Trig: Free Ru #Atten: 20 dB	n	Mk	TYPE DET P NNNN	Auto Tune
10 dB/div Ref 20.00 dBm					-60.50 dBm	
10.0 0.00 -10.0						Center Freq 2.360000000 GHz
-20.0					¢2	Start Freq 2.310000000 GHz
-50.0 -60.0	and an and the group of the state	anadore caracteria	nan af an		3 Man	Stop Freq 2.410000000 GHz
Start 2.31000 GHz #Res BW 100 kHz	#VBV	V 300 kHz		Sweep 9	Stop 2.41000 GHz .600 ms (1001 pts)	
2 N 1 f 2.	402 2 GHz 399 9 GHz 390 0 GHz	4.39 dBm -41.74 dBm -60.50 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Freq Offset 0 Hz
7 8 9 10 11						
MBG		11		STATUS	8	

## **Band Edges Test Data CH-High**

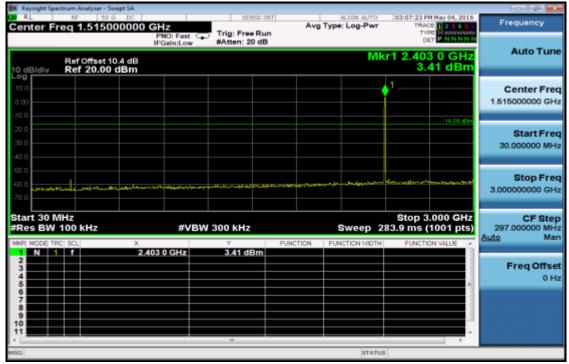


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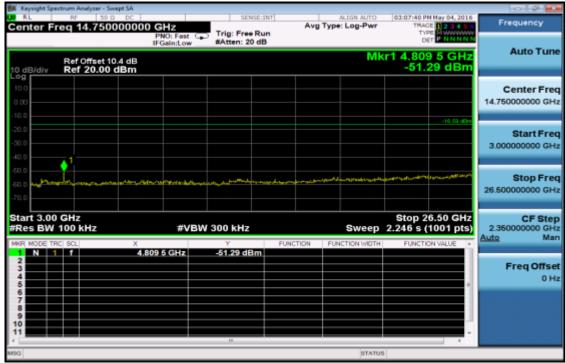
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## **Conducted Spurious Emission Measurement Result** CH-Low 30MHz - 3GHz



## CH-Low 3GHz – 26.5GHz



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## CH-Mid 30MHz – 3GHz

M Keysight Sp	ectrum Analyzer - Swept SA	A					
Center F	req 1.5150000		Trig: Free Run	Ave	Type: Log-Pwr	05:10:01 PM May 03, TRACE 1 2 3 TYPE NWW	45.6 Frequency
10 dB/div	Ref Offset 10.4 d Ref 20.00 dBr	IFGain:Low	#Atten: 20 dB		Mk	r1 2.441 6 G 3.04 dE	HZ Auto Tu
10.0 0.00						↓1	Center Fr 1.515000000 G
-20.0 -30.0 -40.0						2 31- 2 31 2 31 2 31 2 31 2 31 2 31 2 31 2 31	Start Fr 30.000000 M
-50.0 -60.0 -70.0	usul	ant for the second star		concretadori	مېرىيەر بىرىغ بار يېزىر بىرىغ يېزىر بىرىغ يېزىر بىرىغ يېزىكى يېزىر يېزىر يېزىر يېزىر بىرى يېزىر بىرى يېزىر بىر يېزىكى يېزىر يېز	Harristanse	3.00000000 G
Start 30 f #Res BW	100 kHz	#VB	W 300 kHz			Stop 3.000 G 83.9 ms (1001 p	297.000000 N Auto N
MKR MODE T		X 2.441 6 GHz	Ƴ 3.04 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Freq Offs
10 11 MISG			HT.		STATU	8	

## CH-Mid 3GHz – 26.5GHz

😹 Keysight Spi	ectrum Analyzer - Swe	ept SA							
Center F	req 14.7500	000000 G		Trig: Free R	Ave	ALIGN AUTO	TRACE	May 03, 2016	Frequency
10 dB/div	Ref Offset 10 Ref 20.00 d	IF .4 dB	NO:Fast G Gain:Low	#Atten: 20 d		M	0ET	PINNNN	Auto Tune
10.0 0.00									Center Freq 14.750000000 GHz
-20.0 -30.0 -40.0	_1							-16.96 dBn	Start Freq 3.000000000 GHz
-50.0 -60.0		in nin the	يسلي ما معم		مادراه سام من وي وي وي	ant-Morine-AnalyA	a and a second	ميد باريويين. ا	Stop Freq 26.50000000 GHz
Start 3.00 #Res BW	100 kHz	X 4 880	#VB\ 0 GHz	V 300 kHz Y -49.28 dBm	FUNCTION	Sweep FUNCTION WIDTH	2.246 s (1		CF Step 2.350000000 GHz Auto Man
2 3 4 5 6 7		4.000		43.20 000					Freq Offset 0 Hz
8 9 10 11				17		STATU	5	, .	

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SGS Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號



## CH-High 30MHz – 3GHz

Keysight Spectrum Analyzer - Swept SA						
Center Freq 1.515000000	GHz PN0: Fast	Trig: Free Run		Type: Log-Pwr	05:14:27 PM May 03, 20 TRACE 2 3 4 TYPE NWWW	Frequency
Ref Offset 10.4 dB 10 dB/div Ref 20.00 dBm	IFGein:Low	#Atten: 20 dB		Mk	r1 2.480 3 GH 4.17 dB	Auto Tun
• <b>9</b> 10.0 10.0					•1	Center Fre 1.515000000 GH
20.0					-15.03 d	Start Fre
50. D 60. D 70. 0	un magderie (se pieden)	a parte that a super-standing of	*	۰	and queen and an allow	Stop Fre 3.00000000 GF
tart 30 MHz Res BW 100 kHz	#VBV	V 300 kHz		Sweep 2	Stop 3.000 GH 83.9 ms (1001 pt	
2 3 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	480 3 GHz	Υ 4.17 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Freq Offse
6 7 8 9 10 11						
9G		17		STATUS	•	

## CH- High 3GHz – 26.5GHz

🗱 Keysight Sp	ectrum Analyzer - Swept SA	A					
Center F	req 14.750000		Trig: Free R	Ave	Type: Log-Pwr	05:15:06 PM May 03, 2016 TRACE 1 2 3 4 5 TYPE	Frequency
10 dB/div	Ref Offset 10.4 d Ref 20.00 dBr	IFGain:Low		iB	Mkr	1 26.476 5 GHz -51.95 dBm	Auto Tune
10.0 0.00							Center Freq 14.750000000 GHz
-20.0 -30.0 -40.0						15.82 dBn	Start Freq 3.000000000 GHz
-50.0 -60.0	مىلغۇنىتىنى <sub>بىلم</sub> ىغى <del>بال</del> ىرى	dell'Addited Sochow, ge	united and the second	the advantable of the state of	مىزىنىرى ھار يېمىرىرىم	an a	Stop Freq 26.50000000 GHz
Start 3.00 #Res BW	RC SCL	#V × 26.476 5 GHz	BW 300 kHz -51.95 dBm	FUNCTION	Sweep FUNCTION WIDTH	Stop 26.50 GHz 2.246 s (1001 pts) FUNCTION VALUE	CF Step 2.350000000 GHz Auto Man
2 3 4 5 6		20.470 5 GHZ	-01,30 461				Freq Offset 0 Hz
7 8 9 10 11							
MSG					STATU	8	

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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.
- Emission level (dBµV/m) = 20 log Emission level (dBµV/m)

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## **10.2 Measurement Equipment Used**

SGS 966 Chamber No.C										
Name of		N# - 1 - 1	Serial Num-	Calibration	Calibration					
Equipment	Manufacturer	Model	ber	Date	Due					
EMI Test Receiver	R&S	ESU 40	100363	04/12/2016	04/11/2017					
Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2015	12/22/2016					
Broadband Antenna	TESEQ	CBL 6112D	35240	10/28/2015	10/27/2016					
Horn Antenna	ETS-Lindgren	3117	00143272	12/16/2015	12/15/2016					
Horn Antenna	Schwarzbeck	BBHA9170	185	07/24/2015	07/23/2016					
Pre Amplifier	EMC Instruments	EMC330	980096	12/12/2015	12/11/2016					
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2015	12/11/2016					
Pre Amplifier	R&S	SCU-18	10204	12/12/2015	12/11/2016					
Pre Amplifier	R&S	SCU-26	100780	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/12/2015	12/11/2016					
Attenuator	WOKEN	218FS-10	RF27	12/12/2015	12/11/2016					
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017					
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017					
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2016	05/03/2017					
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.					
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.					
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.					
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.					

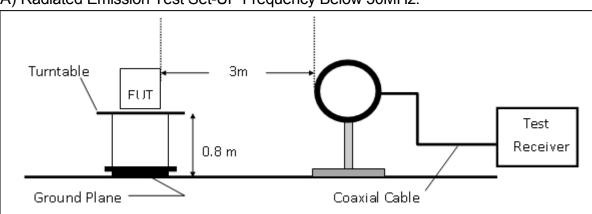
NOTE: N.C.R refers to Not Calibrated Required.

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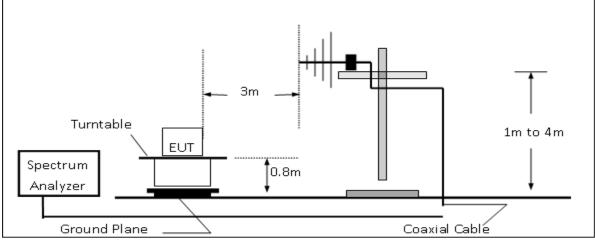


## 10.3 Test SET-UP

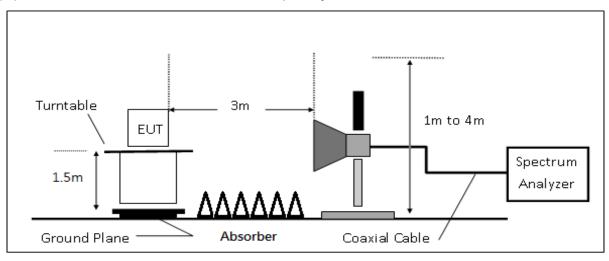


(A) Radiated Emission Test Set-UP Frequency Below 30MHz.

## (B) Radiated Emission Test Set-Up, Frequency from 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.
- The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 0.8m for frequen-2. cy> 1GHz above ground plan.
- The turn table shall rotate 360 degrees to determine the position of maximum emission level. 3.
- 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.
- 7. 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.
- Maximum procedure was performed on the six highest emissions to ensure EUT compli-9. ance.
- 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	6	CL = Cable Attenuation Factor (Cable Loss)				
	RA = Reading Amplitude	AG = Amplifier Gain				
	AF = Antenna Factor					

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB $\mu$ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

### Note :

"F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

## 10.6 Test Results of Radiated Spurious Emissions from 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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### Radiated Band Edge Measurement Result (BT4.1 mode)

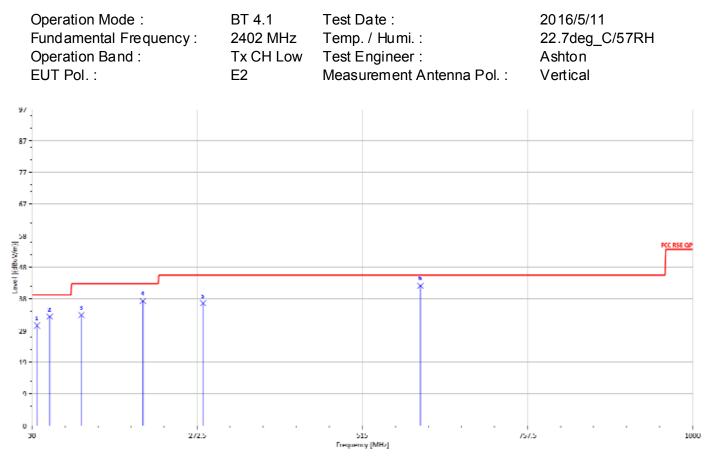
Operation Mode: Fundamental Frequency: Operation Band: EUT Pol.:		BT 4.1 y : 2402 M BE CH E2	Hz Temp./Hz Low Test Eng	Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. :		2016/5/10 22.7deg_C/57RH Ashton Vertical	
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	43.79	5.78	49.57	74	-24.43
2390.00	E	Average	32.83	5.78	38.61	54	-15.39
Fundamental Frequency : Operation Band :		•	2402 MHzTemp. / Humi. :BE CH LowTest Engineer :		na Pol. :	2016/5/10 22.7deg_C/57RH Ashton Horizontal	
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	43.03	5.78	48.81	74	-25.19
2390.00	E	Average	32.86	5.78	38.64	54	-15.36



Operation Mode: Fundamental Frequency: Operation Band: EUT Pol.:		BT 4.1 2480 M BE CH E2	Hz Temp. / High Test Eng	Test Date: Temp. / Humi.: Test Engineer: Measurement Antenna Pol.:		2016/5/10 22.7deg_C/57RH Ashton Vertical	
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	47.62	5.88	53.50	74	-20.50
2483.50	E	Average	39.65	5.88	45.53	54	-8.47
Operation Mode :BT 4.1Fundamental Frequency :2480 MHzOperation Band :BE CH HigEUT Pol. :E2			Hz Temp. / High Test Eng	•		2016/5/10 22.7deg_C/57RH Ashton Horizontal	
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	51.68	5.88	57.56	74	-16.44
2483.50	E	Average	46.00	5.88	51.88	54	-2.12



#### **Radiated Spurious Emission Measurement Result (BT4.1 mode)** For Frequency from 30MHz to 1000MHz

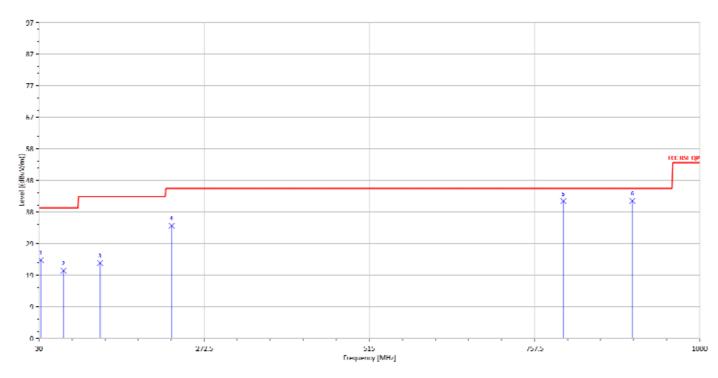


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
37.76	S	Peak	42.13	-11.49	30.64	40	-9.36
56.19	S	Peak	54.89	-21.59	33.30	40	-6.70
102.75	S	Peak	51.20	-17.40	33.80	43.5	-9.70
192.96	S	Peak	56.17	-18.05	38.13	43.5	-5.37
281.23	S	Peak	51.04	-13.59	37.45	46	-8.55
600.36	S	Peak	49.42	-6.56	42.86	46	-3.14

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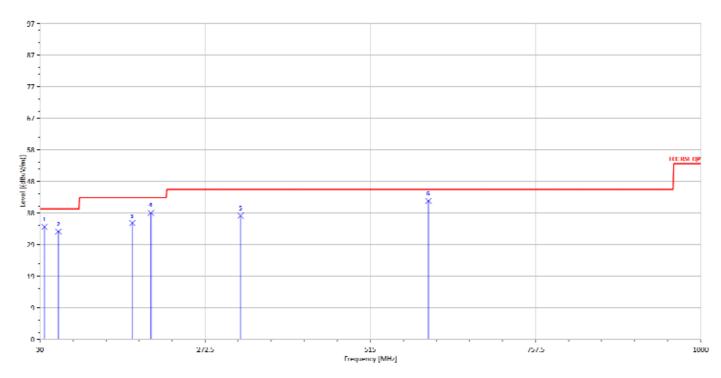
Operation Mode :	BT 4.1	Test Date :	2016/5/11
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
32.91	S	Peak	32.80	-8.75	24.05	40	-15.95
65.89	S	Peak	43.07	-22.29	20.78	40	-19.22
120.21	S	Peak	39.00	-15.84	23.16	43.5	-20.34
224.97	S	Peak	51.31	-16.74	34.57	46	-11.43
800.18	S	Peak	45.64	-3.56	42.08	46	-3.92
901.06	S	Peak	44.23	-2.09	42.15	46	-3.85



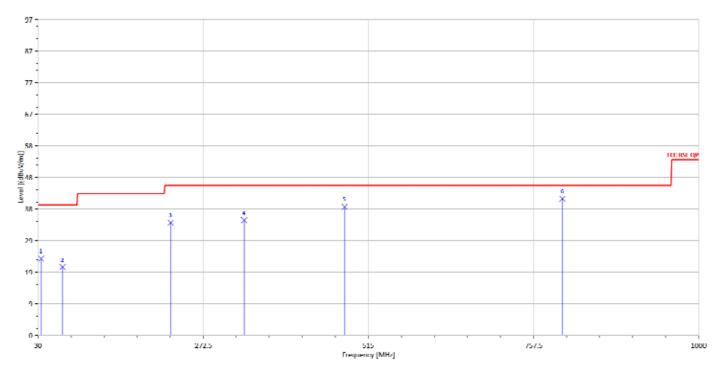
Operation Mode :	BT 4.1	Test Date :	2016/5/11
Fundamental Frequency:	2442 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
36.79	S	Peak	45.47	-10.93	34.54	40	-5.46
57.16	S	Peak	55.07	-21.98	33.08	40	-6.92
165.80	S	Peak	53.62	-17.92	35.70	43.5	-7.80
192.96	S	Peak	56.91	-18.05	38.86	43.5	-4.64
324.88	S	Peak	49.93	-11.95	37.98	46	-8.02
600.36	S	Peak	48.99	-6.56	42.43	46	-3.57

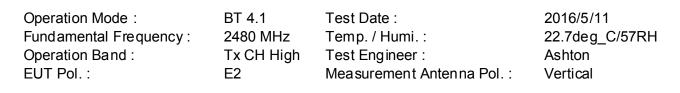


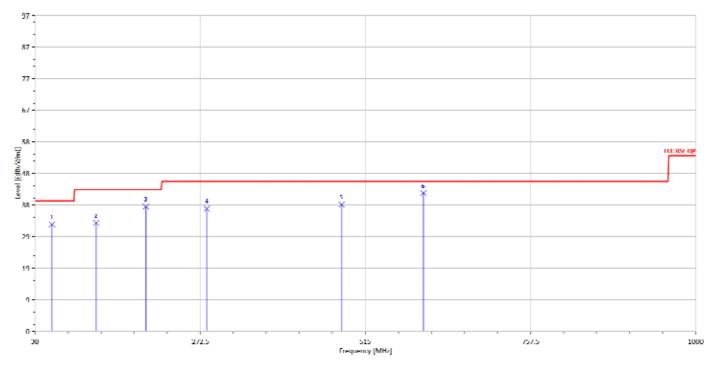
Operation Mode :	BT 4.1	Test Date :	2016/5/11
Fundamental Frequency :	2442 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
34.85	S	Peak	33.36	-9.78	23.58	40	-16.42
65.89	S	Peak	43.26	-22.29	20.97	40	-19.03
224.97	S	Peak	51.32	-16.74	34.58	46	-11.42
332.64	S	Peak	47.26	-11.92	35.34	46	-10.66
480.08	S	Peak	47.29	-7.81	39.48	46	-6.52
800.18	S	Peak	45.43	-3.56	41.87	46	-4.13



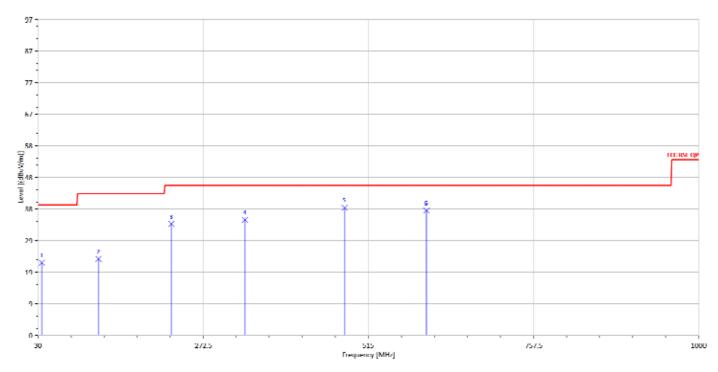




Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
55.22	S	Peak	54.08	-21.25	32.83	40	-7.17
120.21	S	Peak	49.13	-15.84	33.29	43.5	-10.21
192.96	S	Peak	56.35	-18.05	38.31	43.5	-5.19
282.20	S	Peak	51.21	-13.53	37.68	46	-8.32
480.08	S	Peak	46.75	-7.81	38.94	46	-7.06
600.36	S	Peak	48.96	-6.56	42.40	46	-3.60



Operation Mode:	BT 4.1	Test Date :	2016/5/11
Fundamental Frequency:	2480 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
35.82	S	Peak	32.67	-10.35	22.32	40	-17.68
119.24	S	Peak	39.37	-15.88	23.49	43.5	-20.01
225.94	S	Peak	50.87	-16.66	34.21	46	-11.79
333.61	S	Peak	47.36	-11.88	35.48	46	-10.52
480.08	S	Peak	47.00	-7.81	39.19	46	-6.81
600.36	S	Peak	44.90	-6.56	38.34	46	-7.66



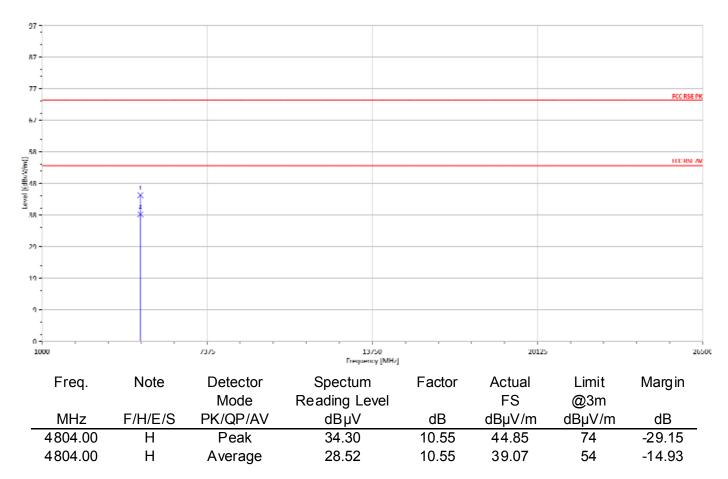
### **Radiated Spurious Emission Measurement Result (BT4.1 mode)** For Frequency above 1GHz

	Operation N Fundament Operation E EUT Pol. :	al Frequenc	BT 4.1 cy : 2402 M Tx CH E2	Low Test E	0ate : . / Humi. : Engineer : urement Anter	nna Pol. :	2016/5/10 22.7deg_C Ashton Vertical	/57RH
97	1							
87 -	-							
77 -								FCC RSE PK
67								
58 28								FCC RSE AV
Level [(dBuV/m)]		1.						
38 - 38 -	-							
29	]							
19								
g.								
0								
			73/5	13. Frequen	/50 sy [MH/]	2012	5	26500
	Freq.	Note	Detector Mode	Spectum Reading Le		Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
	4804.00	Н	Peak	33.45	10.55	44.00	74	-30.00
	4804.00	Н	Average	27.46	10.55	38.01	54	-15.99

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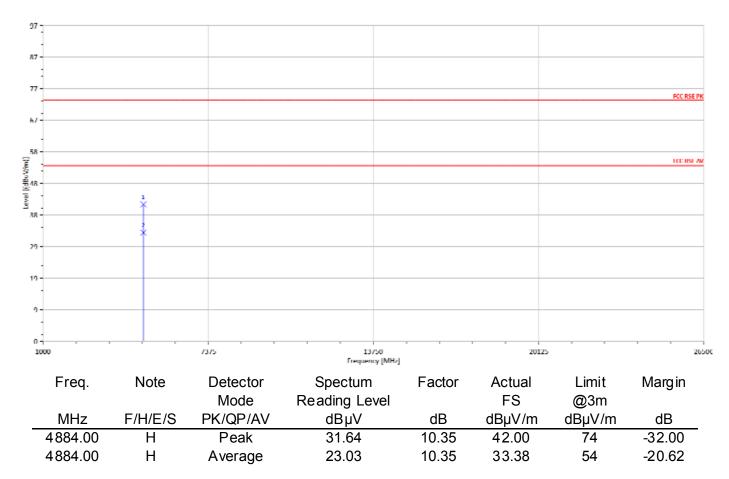


Operation Mode :	BT 4.1	Test Date :	2016/5/10
Fundamental Frequency:	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



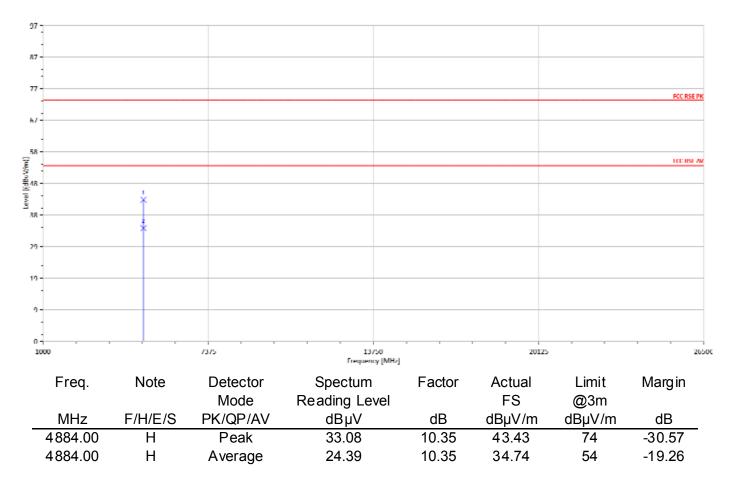


Operation Mode :	BT 4.1	Test Date :	2016/5/10
Fundamental Frequency:	2442 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical



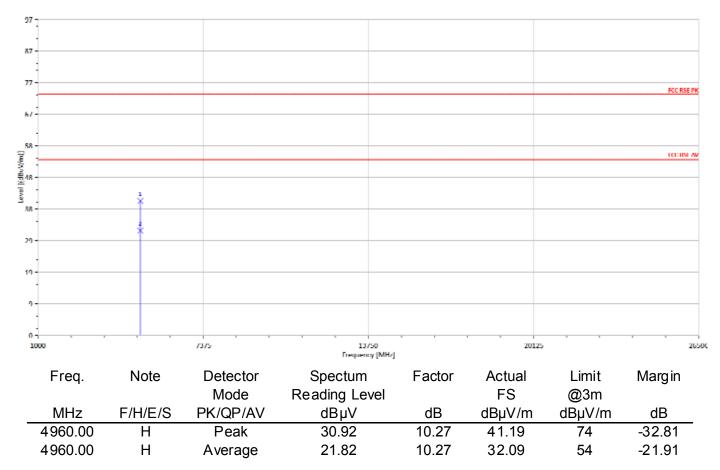


Operation Mode :	BT 4.1	Test Date :	2016/5/10
Fundamental Frequency:	2442 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



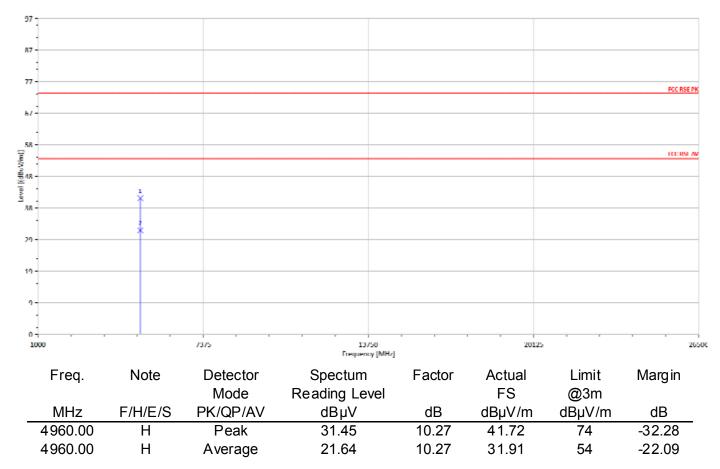


Operation Mode :	BT 4.1	Test Date :	2016/5/10
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical





Operation Mode:	BT 4.1	Test Date :	2016/5/10
Fundamental Frequency:	2480 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal





## **11 PEAK POWER SPECTRAL DENSITY**

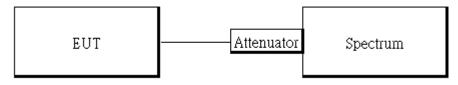
### 11.1 Standard Applicable:

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					
Name of Equip-	Manufacturer	Model	Serial Num-	Calibration	Calibra-
ment	Manufacturer	woder	ber	Date	tion Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016
Power Sensor	Anritsu	MA2411B	1315049	06/23/2015	06/22/2016
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2015	12/11/2016
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017

### 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.
- 5. Set the VBW = 10 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.

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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### **11.5 Measurement Result:**

#### **BLE mode**

Frequency (MHz)	RF Power Density (dBm)	Maximum Limit (dBm)	Result
2402	-7.69	8	PASS
2442	-7.07	8	PASS
2480	-6.62	8	PASS

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# BT4.1 mode

# Power Spectral Density Test Plot (CH-Low)



### Power Spectral Density Test Plot (CH-Mid)



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### 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:**

An embedded-in antenna design is used.

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

The antenna gain is less than 6dBi. Therefore, it is not necessary to reduce maximum output power limit.

### ~ End of Report ~

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