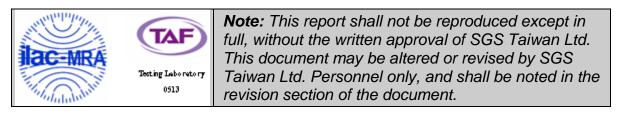


# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

	OF
Product Name:	Bluetooth Stereo Headset
Brand Name:	ON VOCAL
Marketing Name:	Bluetooth Stereo Headset
Model No.:	MIX360
Model Difference:	N/A
FCC ID:	2AG3OOV001
IC:	20993-OV001
Report No.:	E2/2015/90068
Issue Date:	Dec. 09, 2015
FCC Rule Part:	§15.247, Cat: DSS
IC Rule:	RSS-247 issue 1 May 2015
Prepared for:	Onvocal, Inc 104 Otis Street, Suite 28, Northborough, MA. 01532, United States
Prepared by:	SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1 <sup>st</sup> Rd., Guishan District, Taoyuan City, Taiwan 333



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.

Unless otherWise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained to so days only. 除非另有說明,此報告結果僅對測试之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



# VERIFICATION OF COMPLIANCE

Applicant:	Onvocal, Inc 104 Otis Street, Suite 28, Northborough, MA. 01532, United States
Product Name:	Bluetooth Stereo Headset
Brand Name:	ON VOCAL
Marketing Name:	Bluetooth Stereo Headset
Model No.:	MIX360
Model Difference:	N/A
FCC ID:	2AG3OOV001
IC :	20993-OV001
Report Number:	E2/2015/90068
Date of test:	Sep. 30, 2015 ~ Dec. 02, 2015
Date of EUT Received:	Sep. 30, 2015

### 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:	Jerry Lu	Date:	Dec. 09, 2015
Prepared By:	Jerry Lu/Engineer Allon Tsai	Date:	Dec. 09, 2015
Approved By:	Allen Tsai / Engineer		Dec. 09, 2015
дрргочей Бу. _	Jim Chang / Asst. Manager	Dale.	Dec. 03, 2013
除非另有說明,此報告結果僅對測試之樣品 This document is issued by the Company s tronic format documents, subject to Terms	in this test report refer only to the sample(s) tested and such sai 負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不 subject to its General Conditions of Service printed overleaf, avai and Conditions for Electronic Documents at <u>www.sgs.com/terms</u> der of this document is advised that information contained hereo	可部份複製。 ilable on request or acces <u>s_e-document.htm</u> . Atte	ssible at <u>www.sqs.com/terms and conditions.htm</u> and, for elec- ention is drawn to the limitation of liability, indemnification and

tronic fo nits of jurisdict Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. 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



# **Revision History**

Report Number	Revision	Description	Issue Date
E2/2015/90068	Rev.00	Initial creation of document	Dec. 09, 2015

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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



#### **Table of Contents**

1	GENERAL INFORMATION	5
2	SYSTEM TEST CONFIGURATION	8
3	SUMMARY OF TEST RESULTS	10
4	DESCRIPTION OF TEST MODES	11
5	EASUREMENT UNCERTAINTY	13
6	CONDUCTED EMISSION TEST	14
7	PEAK OUTPUT POWER MEASUREMENT	16
8	20dB BANDWIDTH MEASUREMENT	19
9	CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT	32
10	RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT	39
11	FREQUENCY SEPARATION	60
12	NUMBER OF HOPPING FREQUENCY	62
13	TIME OF OCCUPANCY (DWELL TIME)	64
14	ANTENNA REQUIREMENT	78

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle extent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



#### **GENERAL INFORMATION** 1

# **1.1 Product description**

#### General:

Product Name:	Bluetooth Stereo Headset			
Brand Name:	ON VOCA	AL		
Marketing Name:	Bluetooth	Stereo Headset		
Model No.:	MIX360			
Model Difference:	N/A			
Product SW/HW version:	1/3			
Radio SW/HW version:	9529 / N/A			
Test SW Version:	N/A			
RF power setting in TEST SW:	N/A			
	3.6Vdc fro	om Battery		
Power Supply:	Battery: Model No.: 551430; Battery: Supplier: SHENZHEN JHY SCIENCE & TECI NOLOGY CO LTD			

#### Bluetooth BR+EDR:

Bluetooth Version:	Bluetooth V2.1+EDR
Channel number:	79 channels
Modulation type:	GFSK + π/4DQPSK + 8DPSK
Transmit Power:	3.97dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	<= 0.4s
Antenna Designation:	Chip Antenna, Gain:2dBi, Part No.: RFANT3216120A5T Supplier:Walsin Technology Corporation

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. SGS Taiwan Ltd.



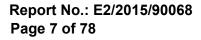
### **1.2 Product Feature of Equipment Under Test**

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

Product Feature				
Product Name: Bluetooth Stereo Headset				
Brand Name: ON VOCAL				
Marketing Name:	Bluetooth Stereo Headset			
Model No.: MIX360				
Model Difference: N/A				
FCC ID: 2AG3OOV001				
IC: 20993-OV001				
Bluetooth Version	V2.1 +EDR			

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

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Cleart's intervention is to available to a state with a cleart and the contract the available to the available to the available to the state with a state and a bilistic and a bilistic and a bilistic to the state with a state and a bilistic and bilistic at a track and a bilistic at a the state available on the state at the state a Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law





# 1.3 Test Methodology of Applied Standards

Canada RSS-247 issue 1: 2015

RSS-Gen Issue 4:2014

FCC Part 15, Subpart C §15.247

FCC Public Notice DA 00-705 Measurement Guidelines

ANSI C63.10:2013

#### Note:

- All test items have been performed and record as per the above standards. 1.
- The composite system is compliance with FCC Subpart B is authorized under 2. 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: 990257

Canada Registration Number: 4620A-5.

#### **1.5 Special Accessories**

There is no special accessory used while test was conducted.

### **1.6 Equipment Modifications**

There was no modification incorporated into the EUT.

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留切天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sqs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sqs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law



#### 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.

Chiefes Solited was stated at resolute and resolute and resolute in the cash of the control of the cash of the control of the cash of th tronic format documents, subject to Terms and Conditions for Electronic Documents at <a href="http://www.sgs.com/terms\_e-document.htm">www.sgs.com/terms\_e-document.htm</a>. Attention is frawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law

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.



### 2.4 Measurement Results Explanation Example

#### For all conducted test items:

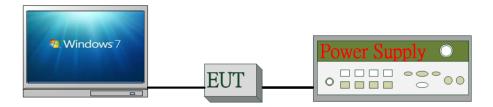
The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

#### Note:

The spectrum analyzer offset is derived from RF cable loss 1dB.

#### 2.5 Configuration of Tested System

#### Fig. 2-1 Radiated Emission & Conducted (Antenna Port) Configuration



#### Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2.	DC Power Supply	Agilent	E3634A	MY53180030	N/A	Un-Shielded
3.	Notebook	Lenovo	L430	R9-YYG88	Shielded	Un-Shielded

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sqs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sqs.com/terms\_e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law



#### 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	Compliant
§15.247(b)(1)	RSS-247 §5.4 (2)	Peak Output Power	Compliant
§15.247(a)(1)	RSS-247 §5.1 (1) RSS-Gen §6.6	20dB & 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(a)(1)	RSS-247 §5.1 (2)	Frequency Separation	Compliant
§15.247(a)(1)(iii)	RSS-247 §5.1 (4)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii)	RSS-247 §5.1 (4)	Time of Occupancy	Compliant
§15.203 §15.247(b)	RSS- Gen §8.3	Antenna Requirement	Compliant

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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



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

### 4.1 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

CH	FREQUENCY		FREQUENCY	СН	FREQUENCY	СН	FREQUENCY
0	2402 MHz	20	2422 MHz	40	2442 MHz	70	2462 MHz
1	2403 MHz	21	2423 MHz	41	2443 MHz	71	2463 MHz
2	2404 MHz	22	2424 MHz	42	2444 MHz	72	2464 MHz
3	2405 MHz	23	2425 MHz	43	2445 MHz	73	2465 MHz
4	2406 MHz	24	2426 MHz	44	2446 MHz	74	2466 MHz
5	2407 MHz	25	2427 MHz	45	2447 MHz	75	2467 MHz
6	2408 MHz	26	2428 MHz	46	2448 MHz	76	2468 MHz
7	2409 MHz	27	2429 MHz	47	2449 MHz	77	2469 MHz
8	2410 MHz	28	2430 MHz	48	2450 MHz	78	2470 MHz
9	2411 MHz	29	2431 MHz	49	2451 MHz	79	2471 MHz
10	2412 MHz	30	2432 MHz	50	2452 MHz	70	2472 MHz
11	2413 MHz	31	2433 MHz	51	2453 MHz	71	2473 MHz
12	2414 MHz	32	2434 MHz	52	2454 MHz	72	2474 MHz
13	2415 MHz	33	2435 MHz	53	2455 MHz	73	2475 MHz
14	2416 MHz	34	2436 MHz	54	2456 MHz	74	2476 MHz
15	2417 MHz	35	2437 MHz	55	2457 MHz	75	2477 MHz
16	2418 MHz	36	2438 MHz	56	2458 MHz	76	2478 MHz
17	2419 MHz	37	2439 MHz	57	2459 MHz	77	2479 MHz
18	2420 MHz	38	2440 MHz	58	2460 MHz	78	2480 MHz
19	2421 MHz	39	2441 MHz	59	2461 MHz		

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



# 4.2 The Worst Test Modes and Channel Details

- 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.
- Investigation has been done on all the possible configurations for searching the worst 3 case.

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	AVAILABLE	TESTED	MODULATION	PACKET		
NODE	CHANNEL	CHANNEL	MODULATION	TYPE		
Bluetooth	0 to 78	0,39,78	GFSK	DH5		
	RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE	TESTED	MODULATION	PACKET		
NODE	CHANNEL	CHANNEL	MODULATION	TYPE		
Bluetooth	0 to 78	0,39,78	GFSK	DH5		

#### 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 BR+EDR Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

#### ANTENNA PORT CONDUCTED MEASUREMENT:

	CONDUCTED TEST						
	F	Peak Output Pov	ver, 20dB Band Wid	th			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE			
	0 to 78 0,39,78 GFSK DH5						
Bluetooth	0 to 78	0,39,78	π/4-DQPSK	DH5			
-	0 to 78	0,39,78	8-DQPK	DH5			
		Bai	nd Edge				
Bluetooth	0 to 78	0,78	GFSK	DH5			
		Frequen	cy Separation				
Bluetooth	0 to 78	0,1,2	GFSK	DH5			
		Number of h	opping frequency				
Bluetooth	0 to 78	0 to 78	GFSK	DH5			
	Time of Occupancy (Dwell time)						
Bluetooth	0 to 78	0,39,78	GFSK	DH1/DH3/DH5			
Bluetooth	0 to 78	39	π/4-DQPSK	DH1/DH3/DH5			
Bluetooth	0 to 78	39	8-DPSK	DH1/DH3/DH5			

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms</u> and <u>conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms</u> and condition of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law



#### **EASUREMENT UNCERTAINTY** 5

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
20dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Frequency Separation	+/- 51.33 Hz
Number of hopping frequency	+/- 51.33 Hz
Time of Occupancy	+/- 51.33 Hz
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> )	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : <b>Horizontal</b> )	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.

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



#### CONDUCTED EMISSION TEST 6

# 6.1 Standard Applicable

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

Frequency range	Limits dB(uV) Quasi-peak Average					
MHz						
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							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
EMI Test Receiver	R&S	ESCI 7	100950	12/12/2014	12/11/2015		
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	01/06/2015	01/07/2016		
LISN	Schwarzbeck	NSLK 8127	8127-648	06/09/2015	06/08/2016		
LISN	Rolf-Heine	NNB-2/16Z	99012	03/04/2015	03/03/2016		
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.		

## 6.3 EUT Setup

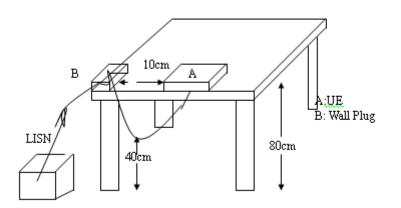
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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.

Weif S date weight and the results and the results and set of the results and results Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law



# 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 frequency measured were complete.

#### 6.6 Measurement Result

N/A, This device is powered by battery.

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Clearts intervention is to available to the same available on requestion and available to the same available and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law



# 7 PEAK OUTPUT POWER MEASUREMENT

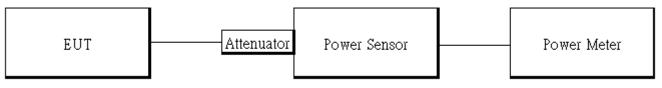
## 7.1 Standard Applicable

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, The Limit: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: The Limit: 0.125 Watts. The power limit for 1Mbps is 1watt, and 2Mbps, 3Mbps and AFH mode are 0.125 watts.

	Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
TYPE		NUMBER	NUMBER	CAL.				
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016			
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016			
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016			
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015			
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015			

### 7.2 Measurement Equipment Used

### 7.3 Test Set-up:



### 7.4 Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max Hold, Detector = Peak, RBW >=20dB bandwidth)
- 4. Record the max. reading.
- 5. Repeat above procedures until all default test channel is completed.

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.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sqs.com/terms and conditions.htm</u> and, for electronic format document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sqs.com/terms and Conditions.htm</u> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sqs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extern of the law.



### 7.5 Measurement Result

#### 1M BR mode (Peak):

Channel	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	3.62	2.301	1000
39	2441.00	3.97	2.495	1000
78	2480.00	3.79	2.393	1000

#### 1M BR mode (Average)(Worst Case):

Channel	Frequency (MHz)	Average Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	2.22	1.667	1000
39	2441.00	2.62	1.828	1000
78	2480.00	2.45	1.758	1000

#### 2M EDR mode (Peak):

Channel	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	3.60	2.291	125
39	2441.00	3.71	2.350	125
78	2480.00	3.75	2.371	125

#### 2M EDR mode (Average):

Channel	Frequency (MHz)	Average Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	0.59	1.146	125
39	2441.00	0.40	1.096	125
78	2480.00	0.17	1.040	125

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



#### 3M EDR mode (Peak):

Channel	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	3.63	2.307	125
39	2441.00	3.88	2.443	125
78	2480.00	3.77	2.382	125

#### 3M EDR mode (Average):

Channel	requency	Average Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	0.16	1.038	125
39	2441.00	0.36	1.086	125
78	2480.00	0.23	1.054	125

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

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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



#### 20dB BANDWIDTH MEASUREMENT 8

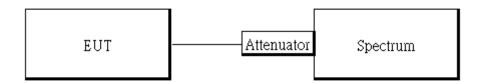
### 8.1 Standard Applicable

For frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

### 8.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT MFR MODEL SERIAL LAS				LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016		
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015		
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015		

### 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 FCC Public Notice DA 00-705 Measurement Guidelines.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set the spectrum analyzer as RBW=10 kHz (1 % of 20 dB Bandwidth.), VBW = 30 kHz, Span= 3MHz, Sweep=auto, Detector = Peak, and Max hold for 20dB Bandwidth test.
- 5. Mark the peak frequency and -20dB (upper and lower) frequency
- 6. Repeat above procedures until all test default channel is completed

Weif S date weight and the results and the results and set of the results and results Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law

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



#### 8.5 Measurement Result

#### **GFSK**

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
0	2402	0.9250
39	2441	0.9236
78	2480	0.9293

#### π/4-DQPSK

Channel	Channel	20 dB Bandwidth (MHz)
0	2402	1.258
39	2441	1.208
78	2480	1.250

#### 8-DPSK

Channel	Channel	20 dB Bandwidth (MHz)
0	2402	1.262
39	2441	1.263
78	2480	1.249

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle extent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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



#### **GFSK**

СН	99% Bandwidth (MHz)		
Low	0.85166		
Mid	0.84926		
High	0.84975		

#### π/4-DQPSK

СН	99% Bandwidth (MHz)
Low	1.1799
Mid	1.1785
High	1.1748

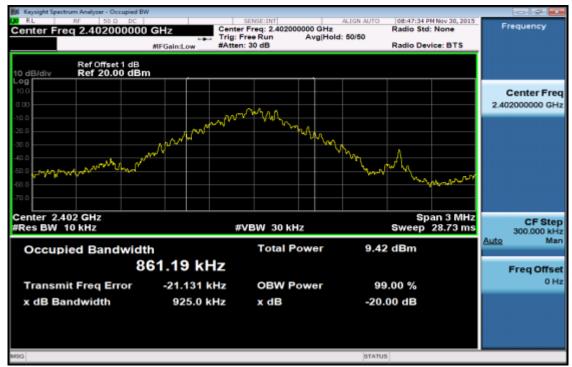
#### 8-DPSK

СН	99% Bandwidth (MHz)
Low	1.1767
Mid	1.1743
High	1.1694

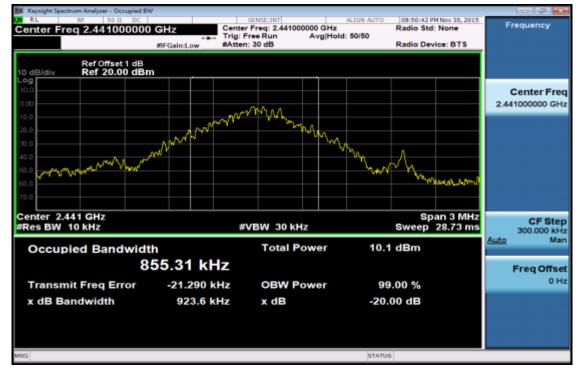
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



### 20dB Band Width Test Data CH-Low (GFSK mode)



## 20dB Band Width Test Data CH-Mid (GFSK mode)

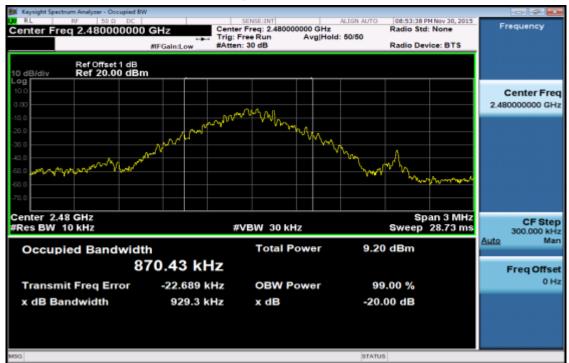


Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

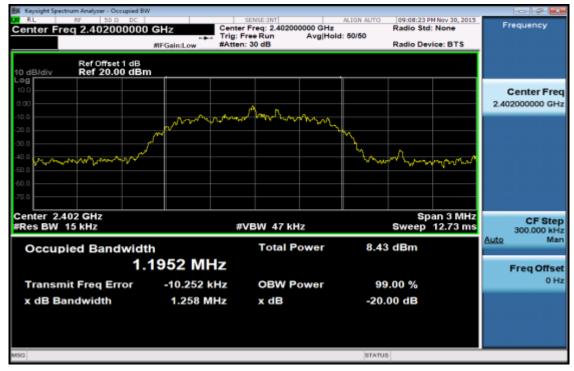
Contention is stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



# 20dB Band Width Test Data CH-High (GFSK mode)



## 20dB Band Width Test Data CH-Low (π/4-DQPSK mode)



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.

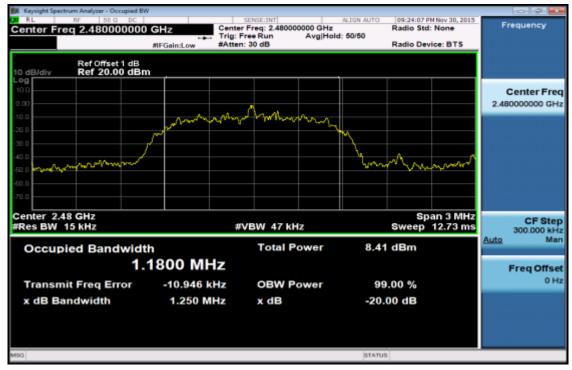
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative in so days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



### 20dB Band Width Test Data CH-Mid (π/4-DQPSK mode)

Center Freq: 2.441000000 GHz Trig: Free Run Avg|Hol #Atten: 30 dB 09:21:50 PM Nov 30, 2015 Radio Std: None Center Freq 2.441000000 GHz Frequency Avg|Hold: 50/50 #IFGain:Low Radio Device: BTS Ref Offset 1 dB Ref 20.00 dBm 0 dB/d Center Freq 2 441000000 GHz Span 3 MHz Sweep 12.73 ms Center 2.441 GHz #Res BW 15 kHz CF Step #VBW 47 kHz 300.000 kHz Man Auto Occupied Bandwidth Total Power 8.30 dBm 1.1965 MHz Freq Offset 0 H: Transmit Freq Error -13.926 kHz OBW Power 99.00 % x dB Bandwidth 1.208 MHz x dB -20.00 dB STATUS

## 20dB Band Width Test Data CH-High (π/4-DQPSK mode)



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.

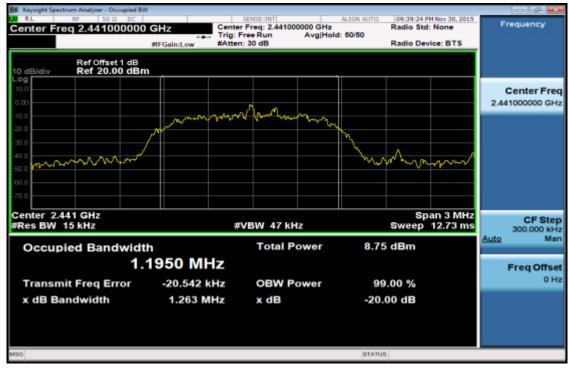
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative in so days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



## 20dB Band Width Test Data CH-Low (8-DPSK mode)

09:36:51 PM Nov 30, 2015 Radio Std: None Center Freq: 2.402000000 GHz Trig: Free Run Avg|Hol #Atten: 30 dB Center Freq 2.402000000 GHz Frequency Avg|Hold: 50/50 #IFGain:Low Radio Device: BTS Ref Offset 1 dB Ref 20.00 dBm 0 dB/di Center Freq 2 40200000 GHz n A A Span 3 MHz Sweep 12.73 ms Center 2.402 GHz #Res BW 15 kHz CF Step #VBW 47 kHz 300.000 kHz Man Auto Occupied Bandwidth Total Power 8.01 dBm 1.2029 MHz Freq Offset 0 H: Transmit Freq Error -18.694 kHz OBW Power 99.00 % x dB Bandwidth 1.262 MHz x dB -20.00 dB STATUS

## 20dB Band Width Test Data CH-Mid (8-DPSK mode)

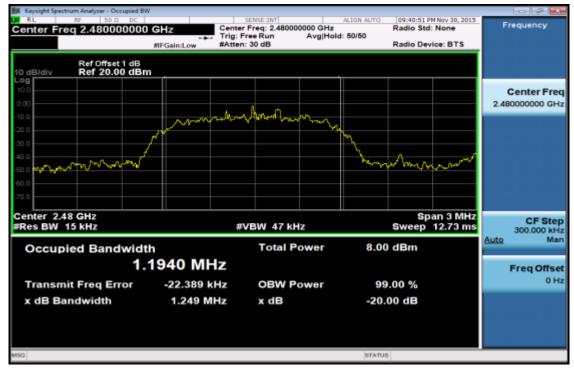


Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative in so days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



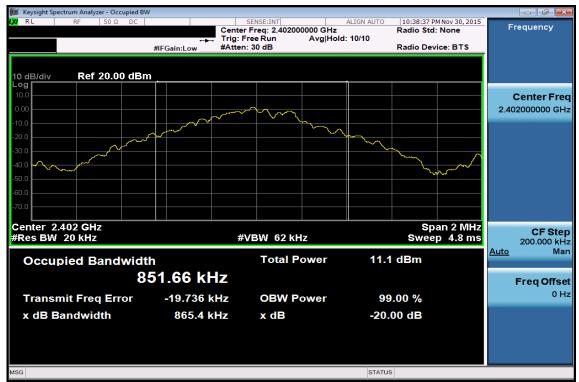
# 20dB Width Test Data CH-High (8-DPSK mode)



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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



### 99% Band Width Test Data CH-Low (GFSK mode)



## 99% Band Width Test Data CH-Mid (GFSK mode)



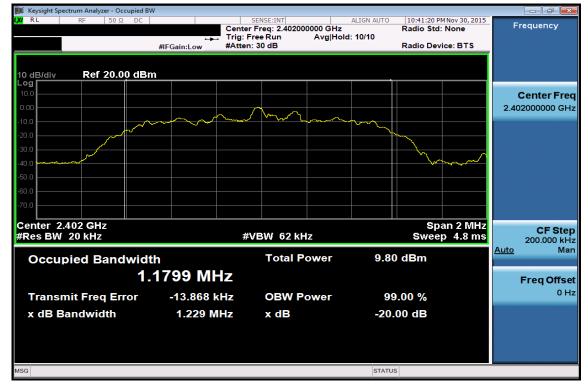
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative in so days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

# 99% Band Width Test Data CH-High (GFSK mode)



### 99% Band Width Test Data CH-Low (π/4-DQPSK mode)

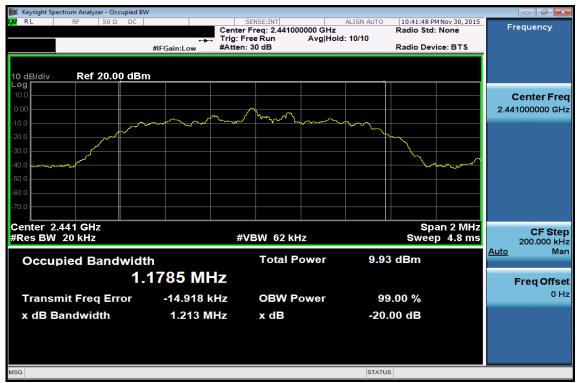


Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

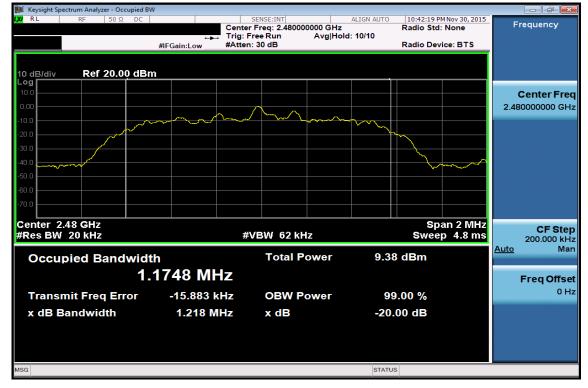
Contention is stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



# 99% Band Width Test Data CH-Mid (π/4-DQPSK mode)



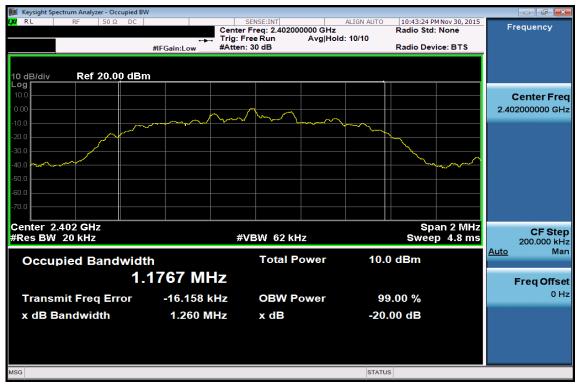
## 99% Band Width Test Data CH-High (π/4-DQPSK mode)



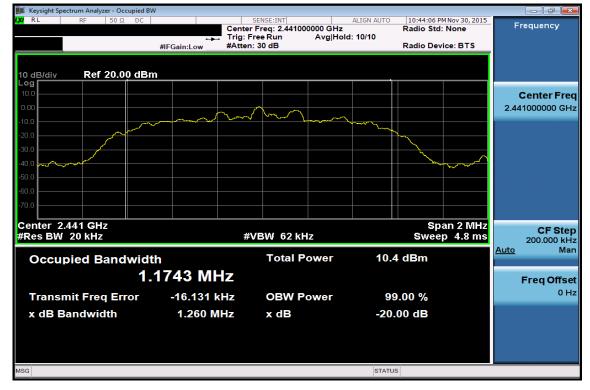
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative in so days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

# 99% Band Width Test Data CH-Low (8-DPSK mode)



# 99% Band Width Test Data CH-Mid (8-DPSK mode)

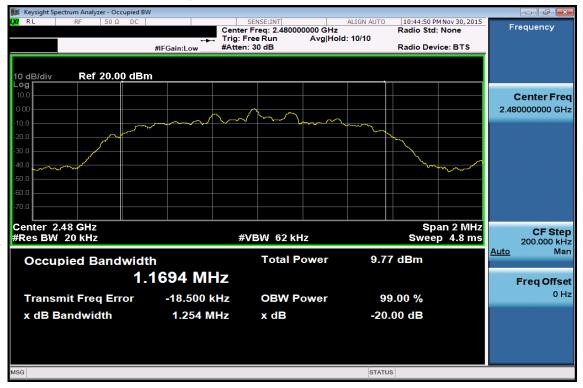


Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Contention is stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



# 99% Width Test Data CH-High (8-DPSK mode)



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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



#### CONDUCTED BAND EDGES AND SPURIOUS EMISSION 9

# MEASUREMENT

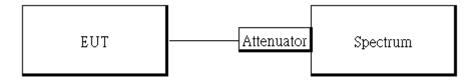
#### 9.1 Standard Applicable

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

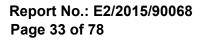
Conducted Emission Test Site							
EQUIPMENT MFR MODEL SERIAL LAST					CAL DUE.		
ТҮРЕ		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016		
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015		
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015		

### 9.3 Test SET-UP



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

Chiefes Solited was stated at resolute and resolute and resolute in the cash of the control of the cash of the control of the cash of th tronic format documents, subject to Terms and Conditions for Electronic Documents at <a href="https://www.sgs.com/terms\_e-document.htm">www.sgs.com/terms\_e-document.htm</a>. Attention is frawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law





# 9.4 Measurement Procedure

#### **Conducted Band Edge:**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 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 center frequency of spectrum analyzer = operating frequency.
- 5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Sweep = auto
- 6. Mark Peak, 2.3999GHz and 2.4836GHz and record the max. level.
- 7. Repeat above procedures until all frequency measured were complete.

#### **Conducted Spurious Emission:**

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 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.

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	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

### 9.5 Measurement Result

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

- 1. Cable loss as 5.1dB that offsets in the spectrum
- 2. The occurrence of the spike on the conducted emission is the signal of the fundamental emission.

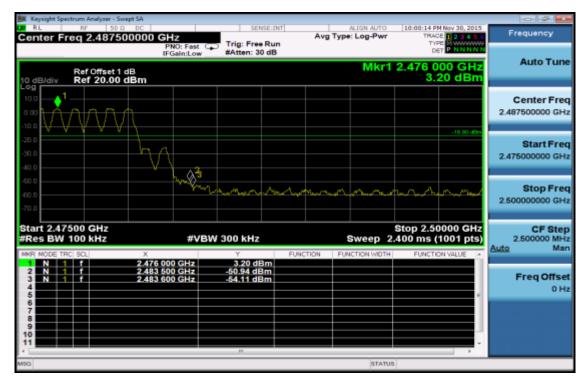
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另右說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留卽天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. 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



# Band Edges Test Data CH-Low (Hopping mode)

Keysight Spectrum Analyzer - Swept SA				
Center Freq 2.365000000	GHz	Avg Type: Log-Pwr	09:59:15 PM Nov 30, 2015 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 1 dB	PN0: Fast Trig: Free Run IFGain:Low #Atten: 30 dB		TYPE P NNNNN DET P NNNNN 1 2.411 97 GHz	Auto Tune
10 dB/div Ref 20.00 dBm			3.70 dBm	
10.0 0.00 -10.0				Center Freq 2.36500000 GHz
-20.0			ý <sup>2</sup>	Start Freq 2.310000000 GHz
-50.0 -60.0 -70.0	an a		<i>x</i>	Stop Freq 2.420000000 GHz
Start 2.31000 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep 1	Stop 2.42000 GHz 0.53 ms (1001 pts)	CF Step 11.000000 MHz Auto Man
	11 97 GHz 3.70 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE *	
3 N 1 f 2.39	99 90 GHz -44.71 dBm 90 00 GHz -54.97 dBm		ы. Б	Freq Offset 0 Hz
6 7 8 9				
10				
MSG	19	STATU	3	

# Band Edges Test Data CH-High



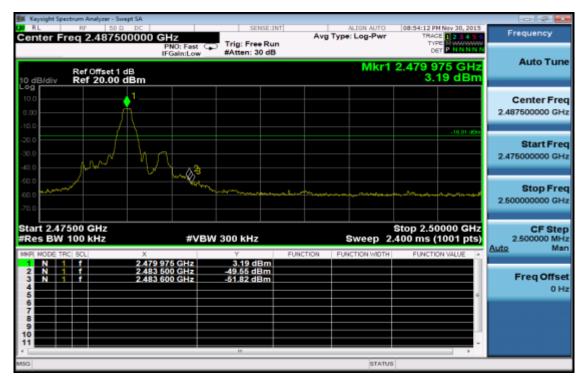
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



#### Center Freq 2.365000000 GHz Frequency Avg Type: Log-Pwr Trig: Free Run #Atten: 30 dB PNO: Fast 😱 IFGain:Low Auto Tune Mkr1 2.401 96 GHz 3.13 dBm Ref Offset 1 dB Ref 20.00 dBm Center Freq 2.365000000 GHz Start Freq 2.310000000 GH; $\Diamond^3$ Stop Freq 2.42000000 GHz Start 2.31000 GHz #Res BW 100 kHz Stop 2.42000 GHz Sweep 10.53 ms (1001 pts) CF Step 11.000000 MHz Mar #VBW 300 kHz Auto 4.24 dBm 0.35 dBm Freq Offset 0 Hz

# Band Edges Test Data CH-Low (Non-Hopping mode)

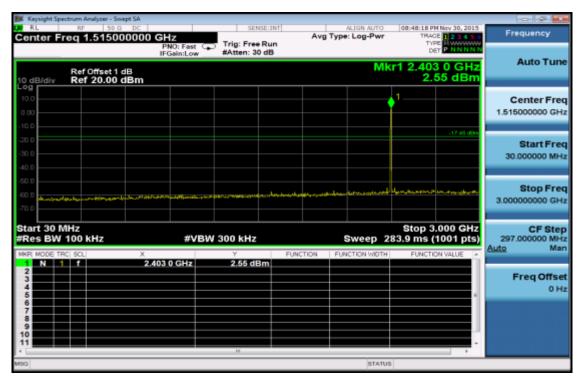
# Band Edges Test Data CH-High



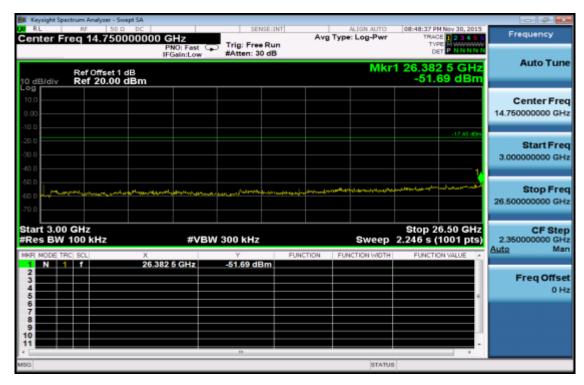
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



## **Conducted Spurious Emission Measurement Result** Ch Low 30MHz – 3GHz



## Ch Low 3GHz – 26.5GHz



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.

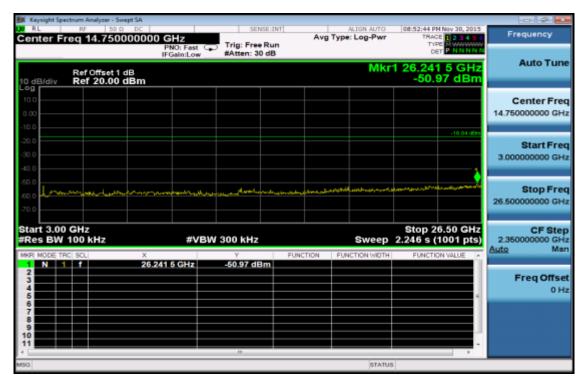
Contention is stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



## Ch Mid 30MHz – 3GHz

Keysight Spectrum Analyzer - Swept SA					
RL ΝΓ 50 Ω DC Center Freq 1.515000000	) GHz	Avg Type	Log-Pwr TRA	PM Nov 30, 2015	Frequency
Ref Offset 1 dB	PNO: Fast Trig: Free IFGain:Low #Atten: 30		Mkr1 2.44	ET P NNNNN	Auto Tune
10.0 0.00			1		Center Free 1.515000000 GH
-20.0				-16.84 dBr	Start Free 30.000000 MH
-50.0 -60.0 -70.0	And a start of the		nerest helener a denerghanne	Mill-Involuciality-M	Stop Free 3.000000000 GH
Start 30 MHz #Res BW 100 kHz	#VBW 300 kHz		weep 283.9 ms		CF Step 297.000000 MH Auto Mar
MRR MODE TRC SCL X 1 N 1 7 2 3 4 4 5 6 6 7 8 9 9 10 11	2.441 6 GHz 3.16 dB		FUNCT	ION VALUE +	Freq Offse 0 H
493			STATUS		

## Ch Mid 3GHz – 26.5GHz



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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

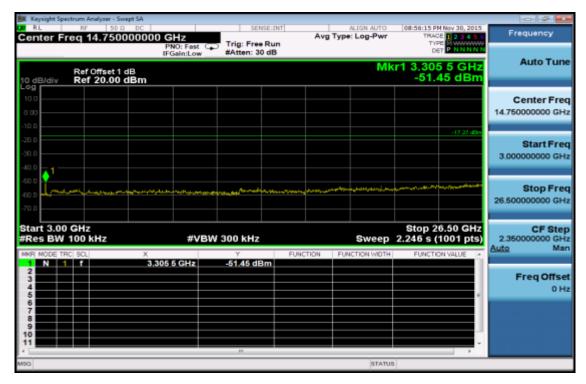
SGS Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134號



# Ch High 30MHz – 3GHz

Keysight Spectrum Analyzer - Swept SA				
RL RF 50Ω DC Center Freq 1.515000000 0		Aug Type: Log-Pwr	08:55:50 PM Nov 30, 2015 TRACE 1 2 3 4 5 0 TYPE	Frequency
Ref Offset 1 dB 10 dB/div Ref 20.00 dBm	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	Mk	r1 2.480 3 GHz 2.73 dBm	Auto Tune
10.0 0.00			•1	Center Fred 1.515000000 GHz
-20.0			-17.27 dBn	Start Free 30.000000 MH
-50.0 -60.0 -70.0	Alata Argene al general	name and a start of the start o		Stop Free 3.000000000 GH
Start 30 MHz #Res BW 100 kHz	#VBW 300 kHz		Stop 3.000 GHz 83.9 ms (1001 pts)	CF Step 297.000000 MH Auto Mar
MRR MODE TRC SCL X  1 N 1 1 2.4 2 3 4 5 6 7 8 9 9 10 10 1	Y Fi 180 3 GHz 2.73 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offsel
190		STATUS		

## Ch High 3GHz – 26.5GHz



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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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



# **10 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASURE-**

# MENT

## **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  $(dB\mu V/m) = 20 \log Emission level (dB\mu V/m)$

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sqs.com/terms and conditions.htm</u> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sqs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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.



# 10.2 Measurement Equipment Used

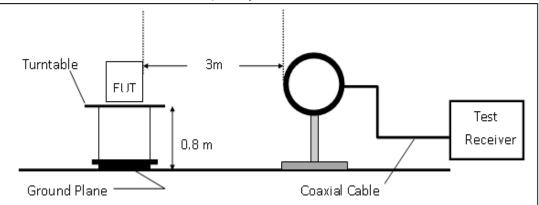
966 Chamber									
EQUIPMENT MFR		MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
EMI Test Receiver	R&S	ESU 40	100363	04/09/2015	04/08/2016				
Loop Antenna	ETS-Lindgren	6502	00143303	12/09/2014	12/08/2015				
Broadband Antenna	TESEQ	CBL 6112D	35240	12/05/2014	12/04/2015				
Horn Antenna	ETS-Lindgren	3117	00143272	12/08/2014	12/07/2015				
Horn Antenna	Schwarzbeck	BBHA9170	185	07/25/2015	07/24/2016				
Pre Amplifier	EMC Instruments	EMC330	980096	12/19/2014	12/18/2015				
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/19/2014	12/18/2015				
Pre Amplifier	R&S	SCU-18	10204	12/19/2014	12/18/2015				
Pre Amplifier	R&S	SCU-26	100780	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/19/2014	12/18/2015				
Attenuator	WOKEN	218FS-10	RF27	12/19/2014	12/18/2015				
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016				
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016				
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2015	05/03/2016				
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.

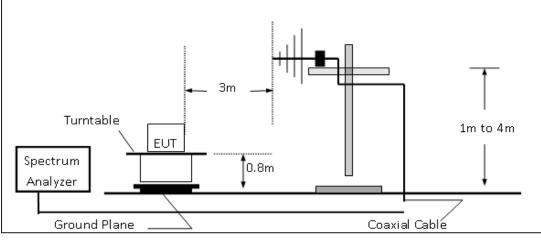


## 10.3 Test SET-UP

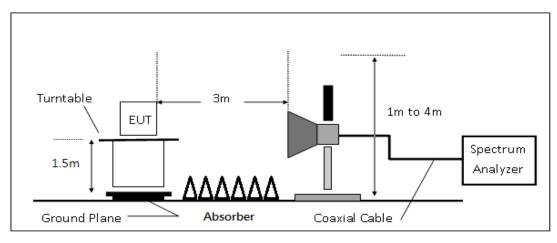
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Cleart's intervention is to available to a state with a cleart and the contract the available to the available to the available to the state with a cleart and bility in the most the state and bility in the state the state with the cleart at the cleart and the state with a cleart the state that and the state with the state of the state at the state at the state at the state and bility to the state at the s Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law

S 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



# **10.4 Measurement Procedure**

## **Radiated Emission**

- 1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 0.8m 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. Use the follow spectrum analyzer setting:
  - (1) Span = wide enough to fully capture the emission being measured
  - (2) RBW = 1 MHz for  $f \ge 1$  GHz, 100 kHz for f < 1 GHz, VBW  $\ge$  RBW, Sweep = auto, Detector function = peak, Trace = max hold
  - (3) For average measurement: use duty cycle correction factor method per 15.35(c)

Duty Cycle = On time/100 milliseconds

On time = N1\*L1=N2\*L2+...+N(n-1)\*LN(n-1)+N(n)\*L(n)

Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.

Average Emission Level = Peak Emission Level + 20\*log (duty Cycle)

- 6. 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.
- 7. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 8. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 9. Repeat above procedures until all frequency of the interest measured were complete.

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <a href="http://www.sgs.com/terms-e-document.htm">www.sgs.com/terms-e-document.htm</a>. Attention is frawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law



# **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	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

The limit of the emission level is expressed in dBuV/m, which converts 20\*log(uV/m)

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 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.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。



### Radiated Band Edge Measurement Result: (Hopping Mode)

Operation Mode:	BT BR Hopping	Test Date :	22.7deg_C/57RH
Fundamental Frequency:	2402 MHz	Temp. / Humi. :	
Operation Band :	BE CH LOW	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical

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
2388.96	S	Peak	55.14	-6.85	48.29	74	-25.71
2388.96	S	Average	40.97	-6.85	34.12	54	-19.88
2390.00	E	Peak	54.20	-6.84	47.35	74	-26.65
2390.00	E	Average	40.95	-6.84	34.11	54	-19.89

Operation Mode :	BT BR Hopping	Test Date :	
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH LOW	Test Engineer :	Vito
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
	1/11/L/O		uDμν	uD	ασμν/π	ασμν/π	uD
2385.72	S	Peak	56.52	-6.86	49.66	74	-24.34
2385.72	S	Average	40.92	-6.86	34.06	54	-19.94
2390.00	E	Peak	56.15	-6.84	49.31	74	-24.69
2390.00	Е	Average	42.05	-6.84	35.21	54	-18.79



Operation Mode : Fundamental Frequency : Operation Band : EUT Pol. :		2480 MHz - BE CH HIGH -		Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. :			22.7deg_ Vito Vertical	_C/57RH	
	Freq.	Note	Detector	Spec	tum	Factor	Actual	Limit	Margin
			Mode	Reading	g Level		FS	@3m	_
	MHz	F/H/E/S	PK/QP/AV	dBµ	٧	dB	dBµV/m	dBµV/m	dB
-	2483.50	E	Peak	55.	88	-6.38	49.50	74	-24.50
	2483.50	E	Average	41.42		-6.38	35.04	54	-18.96
Operation Mode : Fundamental Frequency : Operation Band : EUT Pol. :		2480 MHz Temp BE CH HIGH Test F		Test En	Date : . / Humi. : Engineer : urement Antenna Pol. :		22.7deg_C/57RH Vito Horizontal		
	Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spec Reading dBi	g Level	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
-	2483.50	E	Peak	60.		-6.38	54.34	<u>ubµv/m</u> 74	-19.66
	2483.50	E	Average	42.		-6.38	35.67	54	-18.33
	2400.00	<b>L</b>	, weituge	<b>ΤΖ</b> .		0.00	00.07	07	10.00



### Radiated Emission – Band Edge (Non-Hopping Mode):

Operation Mode :	BT BR	Test Date :	22.7deg_C/57RH
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	
Operation Band :	BE CH LOW	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical

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
2379.36	S	Peak	55.71	-6.88	48.83	74	-25.17
2379.36	S	Average	40.43	-6.88	33.55	54	-20.45
2390.00	Е	Peak	53.56	-6.84	46.71	74	-27.29
2390.00	Е	Average	40.64	-6.84	33.80	54	-20.20

Operation Mode :	BT BR	Test Date :	
Fundamental Frequency:	2402 MHz	Temp. / Humi. :	22.7 deg_C/57RH
Operation Band :	<b>BE CH LOW</b>	Test Engineer :	Vito
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
2375.76	S	Peak	57.50	-6.89	50.61	74	-23.39
2375.76	S	Average	46.21	-6.89	39.32	54	-14.68
2390.00	E	Peak	54.59	-6.84	47.75	74	-26.25
2390.00	Е	Average	41.47	-6.84	34.63	54	-19.37

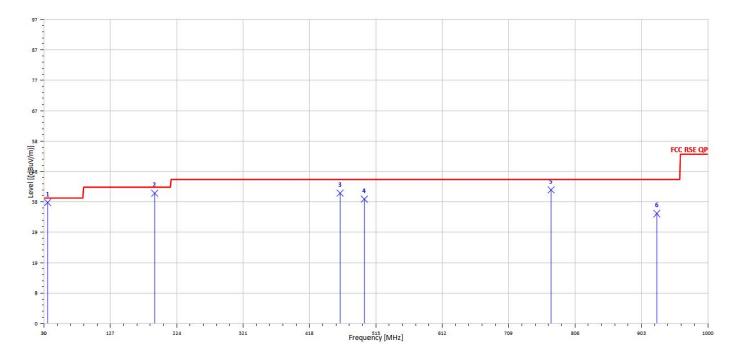


Operation Mode :BT BRFundamental Frequency :2480 MHzOperation Band :BE CH HIGHEUT Pol. :E2		HIGH Test Eng	lumi. :	ına Pol. :	22.7deg_0 Vito Vertical	C/57 RH	
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	_
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	58.23	-6.38	51.85	74	-22.15
2483.50	Е	Average	46.21	-6.38	39.83	54	-14.17
2483.88	S	Peak	58.54	-6.38	52.16	74	-21.84
2483.88	S	Average	44.13	-6.38	37.75	54	-16.25
Operation Mode :BT BRFundamental Frequency :2480 MHzOperation Band :BE CH HIGHEUT Pol. :E2		HIGH Test Eng	Humi. :	nna Pol. :	22.7deg_0 Vito Horizontal	C/57 RH	
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	61.93	-6.38	55.54	74	-18.46
2483.50	Е	Average	50.15	-6.38	43.77	54	-10.23



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

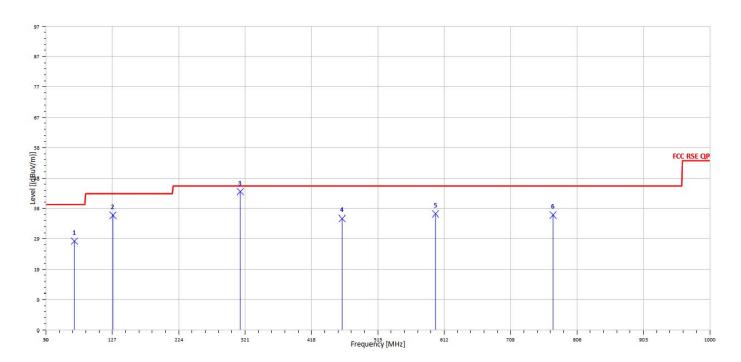
3R Test Date :	
2 MHz Temp. / Humi. :	22.7deg_C/57RH
CH LOW Test Engineer :	Vito
Measurement Antenna P	ol.: Vertical
	2 MHz Temp. / Humi. : CH LOW Test Engineer :



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	62.37	-23.81	38.56	40	-1.44
191.99	S	Peak	66.67	-25.11	41.56	43.5	-1.94
462.62	S	Peak	58.77	-17.18	41.59	46	-4.41
498.51	S	Peak	57.01	-17.35	39.66	46	-6.34
771.08	S	Peak	54.23	-11.58	42.65	46	-3.35
925.31	S	Peak	44.86	-9.83	35.03	46	-10.97



Operation Mode :	BT BR	Test Date :	
Fundamental Frequency:	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH LOW	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal

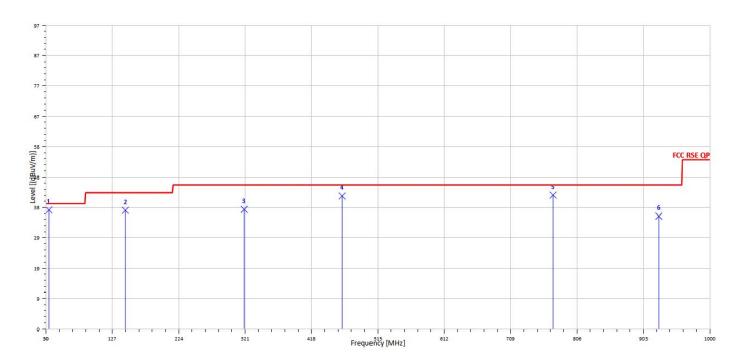


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
71.71	S	Peak	54.10	-25.78	28.32	40	-11.68
127.97	S	Peak	61.25	-24.66	36.59	43.5	-6.91
314.21	S	Peak	65.23	-21.04	44.19	46	-1.81
462.62	S	Peak	52.78	-17.18	35.61	46	-10.39
599.39	S	Peak	51.97	-14.94	37.04	46	-8.96
771.08	S	Peak	48.26	-11.58	36.68	46	-9.32

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



Operation Mode :	BT BR	Test Date :	
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH MID	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical

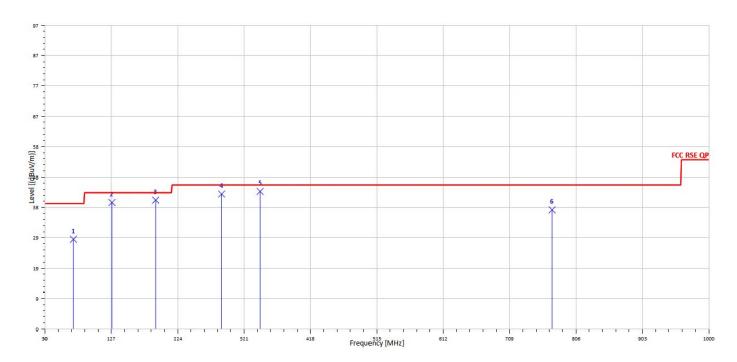


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
34.85	S	Peak	61.95	-23.97	37.98	40	-2.02
146.40	S	Peak	60.36	-22.50	37.86	43.5	-5.64
320.03	S	Peak	58.91	-20.77	38.14	46	-7.86
462.62	S	Peak	59.62	-17.18	42.45	46	-3.55
771.08	S	Peak	54.31	-11.58	42.74	46	-3.26
925.31	S	Peak	45.83	-9.83	36.00	46	-10.00

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



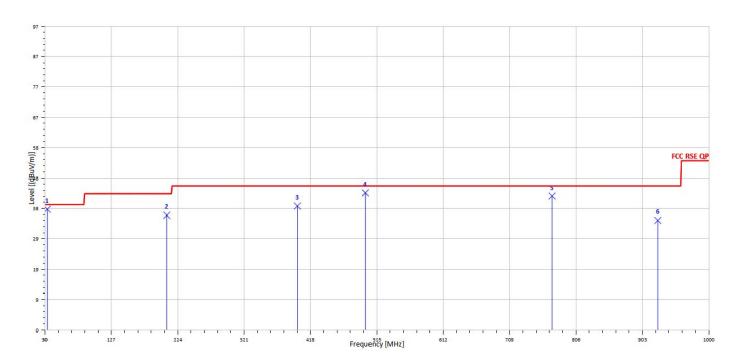
Operation Mode :	BT BR	Test Date :	
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH MID	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
71.71	S	Peak	54.38	-25.78	28.60	40	-11.40
127.97	S	Peak	64.98	-24.66	40.32	43.5	-3.18
191.99	S	Peak	66.22	-25.11	41.11	43.5	-2.39
288.02	S	Peak	64.70	-21.64	43.07	46	-2.93
344.28	S	Peak	64.25	-20.33	43.92	46	-2.08
771.08	S	Peak	49.52	-11.58	37.95	46	-8.05



Operation Mode :	BT BR	Test Date :	
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH HIGH	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol.:	Vertical

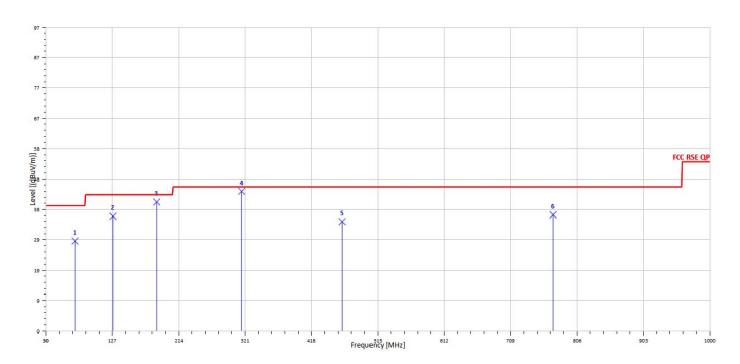


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
33.88	S	Peak	62.65	-24.13	38.52	40	-1.48
208.48	S	Peak	61.76	-25.16	36.60	43.5	-6.90
398.60	S	Peak	58.31	-18.77	39.54	46	-6.46
498.51	S	Peak	61.14	-17.35	43.79	46	-2.21
771.08	S	Peak	54.34	-11.58	42.76	46	-3.24
925.31	S	Peak	44.84	-9.83	35.01	46	-10.99

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



Operation Mode :	BT BR	Test Date :	
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH HIGH	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol.:	Horizontal

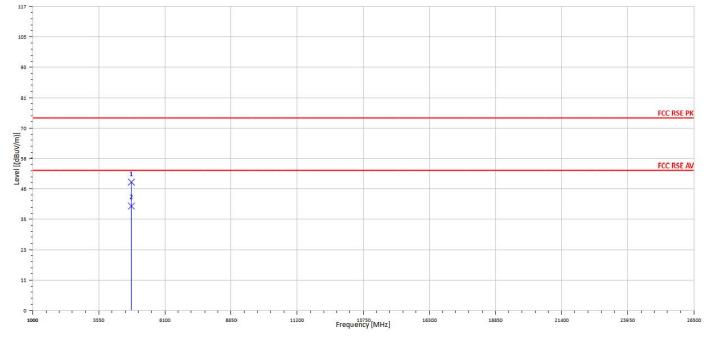


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
72.68	S	Peak	54.68	-26.02	28.66	40	-11.34
127.97	S	Peak	61.28	-24.66	36.62	43.5	-6.88
191.99	S	Peak	66.27	-25.11	41.16	43.5	-2.34
316.15	S	Peak	65.55	-20.95	44.59	46	-1.41
462.62	S	Peak	52.08	-17.18	34.91	46	-11.09
771.08	S	Peak	48.66	-11.58	37.08	46	-8.92



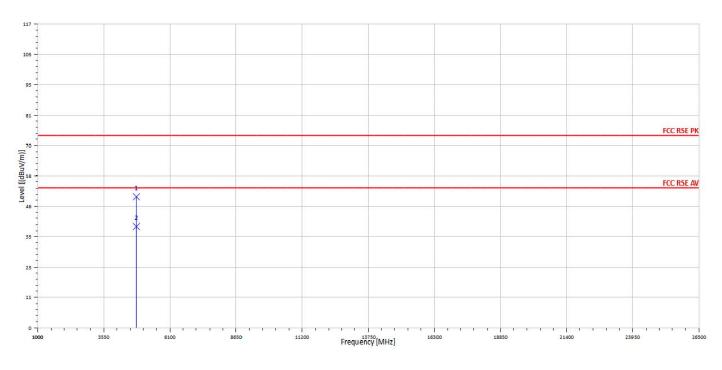
# **Radiated Spurious Emission Measurement Result:** For Frequency above 1 GHz

Operation Mode :	BT BR	Test Date :	
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH LOW	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol.:	Vertical



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
4804.00	Н	Peak	50.54	-1.16	49.38	74	-24.62
4804.00	Н	Average	41.41	-1.16	40.25	54	-13.75

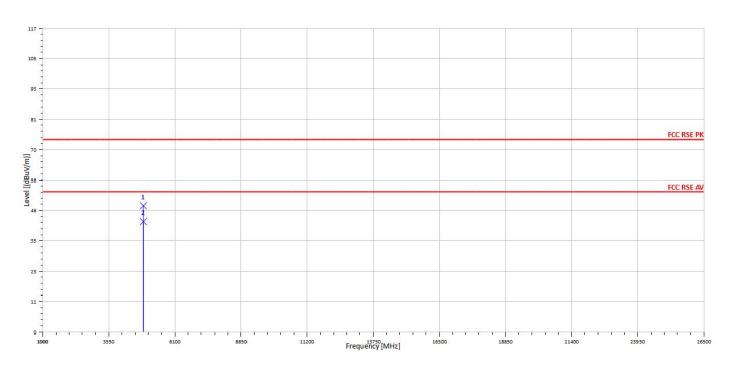




Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4804.00	Н	Peak	51.68	-1.16	50.52	74	-23.48
4804.00	Н	Average	40.23	-1.16	39.07	54	-14.93



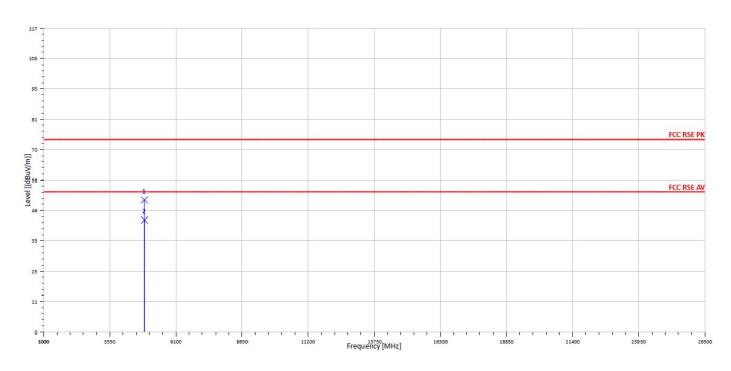
Operation Mode :	BT BR	Test Date :	
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH MID	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical



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
4882.00	Н	Peak	49.25	-0.70	48.55	74	-25.45
4882.00	Н	Average	43.25	-0.70	42.55	54	-11.45



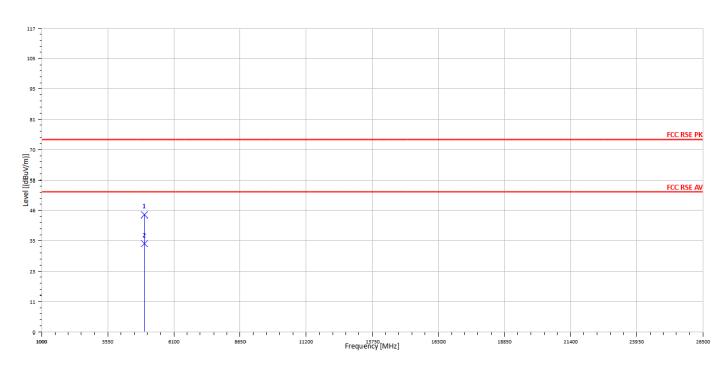
Operation Mode :	BT BR	Test Date :	
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH MID	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



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
4882.00	Н	Peak	51.54	-0.70	50.84	74	-23.16
4882.00	Н	Average	43.82	-0.70	43.12	54	-10.88



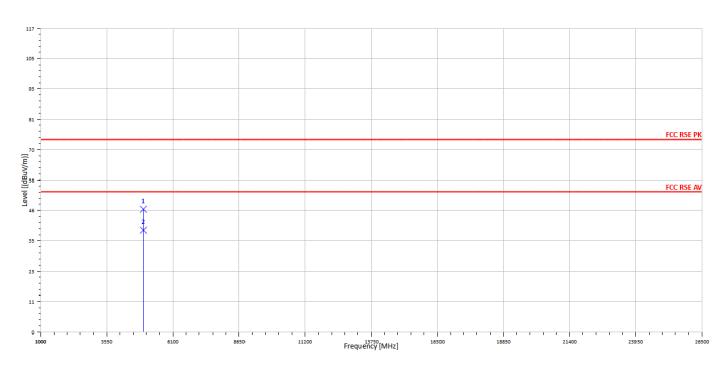
Operation Mode :	BT BR	Test Date :	22.7deg_C/57RH
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	
Operation Band : EUT Pol. :	Tx CH HIGH E2	Test Engineer : Measurement Antenna Pol. :	Vito Vertical



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
4960.00	Н	Peak	45.71	-0.66	45.05	74	-28.95
4960.00	Н	Average	34.63	-0.66	33.97	54	-20.03



Operation Mode :	BT BR	Test Date :	22.7deg_C/57RH
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	
Operation Band :	Tx CH HIGH	Test Engineer :	Vito
EUT Pol. :	E2	Measurement Antenna Pol. :	Horizontal



Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
Н	Peak	47.85	-0.66	47.20	74	-26.80
Н	Average	39.88	-0.66	39.22	54	-14.78
	F/H/E/S H	Mode F/H/E/S PK/QP/AV H Peak	Mode Reading Level F/H/E/S PK/QP/AV dBµV H Peak 47.85	Mode Reading Level F/H/E/S PK/QP/AV dBµV dB H Peak 47.85 -0.66	ModeReading LevelFSF/H/E/SPK/QP/AVdBµVdBdBµV/mHPeak47.85-0.6647.20	Mode         Reading Level         FS         @3m           F/H/E/S         PK/QP/AV         dBµV         dB         dBµV/m         dBµV/m           H         Peak         47.85         -0.66         47.20         74



# **11 FREQUENCY SEPARATION**

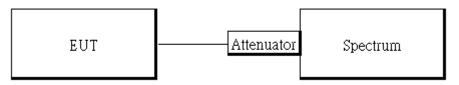
# 11.1 Standard Applicable

Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25 kHz or the 2/3\*20dB bandwidth of the hopping channel, whichever is greater.

# 11.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT	JIPMENT MFR MODEL SERIAL LAST CAL DUE						
ТҮРЕ		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016		
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015		
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015		

## 11.3 Test Set-up



# **11.4 Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 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 center frequency of spectrum analyzer = middle of hopping channel.
- 5. Set the spectrum analyzer as RBW, VBW=100 kHz, Adjust Span to 5MHz, Sweep = auto.
- 6. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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.



## **11.5 Measurement Result**

Channel separation (MHz)	Limit	Result
1	>=25 kHz or 2/3 times 20dB bandwidth	PASS

# **Frequency Separation Test Data**



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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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



# **12 NUMBER OF HOPPING FREQUENCY**

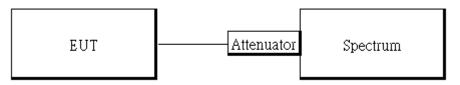
## 12.1 Standard Applicable

Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

## **12.2 Measurement Equipment Used**

Conducted Emission Test Site							
EQUIPMENT	UIPMENT MFR MODEL SERIAL LAST CAL DU						
ТҮРЕ		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016		
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015		
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015		

## 12.3 Test Set-up



# **12.4 Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 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 spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
- 5. Set the spectrum analyzer as RBW=430 kHz, VBW=1.5MHz., Detector = Peak
- 6. Max hold, view and count how many channel in the band.

## 12.5 Measurement Result

### Tabular Data of Total Channel Number

	Channel Number	Limit
2.4 GHz – 2.441GHz	40	
2.441 GHz – 2.4835GHz	39	>15
2.4GHz ~2.4835GHz	(40+39) = 79	

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

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law

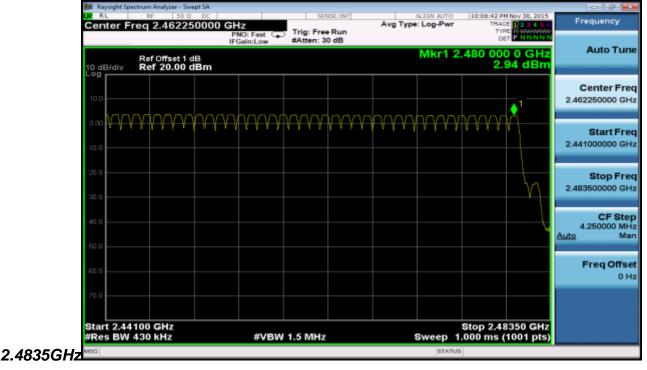


## **Channel Number**

P 10:05:59 PM Frequency Center Freq 2.420500000 GHz Avg Type: Log-Pwr Trig: Free Run #Atten: 30 dB PNO: Fast C Auto Tune Mkr1 2,402 000 Ref Offset 1 dB Ref 20.00 dBm 3.60 dBm 0 dB/d Center Frea 2.420500000 GHz Start Freq 2.400000000 GHz Stop Freq 2.441000000 GHz **CF** Step 4.100000 MHz Mar Auto Freq Offset O Hz Start 2.40000 GHz #Res BW 430 kHz Stop 2.44100 GHz Sweep 1.000 ms (1001 pts) #VBW 1.5 MHz 2.441GHz

2.4 GHz -

#### 2.441 GHz –



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.



# 13 TIME OF OCCUPANCY (DWELL TIME)

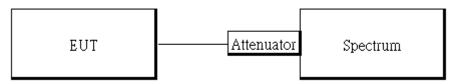
## **13.1 Standard Applicable**

Frequency hopping systems operating in the 2400MHz-2483.5MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

## **13.2 Measurement Equipment Used**

Conducted Emission Test Site							
EQUIPMENT	JIPMENT MFR MODEL SERIAL LAST CAL						
TYPE		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016		
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015		
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015		

## 13.3 Test Set-up



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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留的天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions of Electronic Documents at <u>www.sgs.com/terms</u> <u>and</u> conditions of lability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Clearly independent of the company is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law



# 13.4 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 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 center frequency of spectrum analyzer = operating frequency.
- 5. Set the spectrum analyzer as RBW, VBW=1MHz, 3MHz, Span = 0Hz, Detector = Peak, Adjust Sweep = 2~8ms.

6. Repeat above procedures until all frequency of the interest measured were complete.

Formula Deduced: time occupancy of one time slot X Hopping rate / total slot in one channel / total channel that hops X period of working channels.

Where, standard hopping rate is 1600 hops/s, slot in one channel for DH1, DH3, and DH5 is 2, 4, and 6, respectively.

DH1 consists of single time slot of the uplink, and one slot of the downlink Total Slot: 2 DH3 consists of three time slot of the uplink, and one slot of the downlink. Total Slot: 4 DH5 consists of five time slot of the uplink, and one slot of the downlink. Total Slot: 6

In AFH mode, hopping rate is 800 hop/s with 6 slots in 20 hopping channels with channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 \* 20 ) (S), Hop Over Occupancy Time comes to (800 / 6 / 20 )\*(0.4 \*20 ) =53.33

Note: the result of the complete test default channel at 1Mbps is recorded on the test report. 2Mbps, and 3Mbps only records the measurement result at middle channel that reveals no much deviation.

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.

Since Statement is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <a href="http://www.sgs.com/terms-e-document.htm">www.sgs.com/terms-e-document.htm</a>. Attention is frawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law



## 13.5 Tabular Result of the Measurement

### GFSK (1Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	DH1	131.20	400ms
0	DH3	264.64	400ms
	DH5	309.87	400ms
	DH1	129.60	400ms
39	DH3	266.72	400ms
	DH5	309.87	400ms
78	DH1	129.60	400ms
	DH3	266.72	400ms
	DH5	309.87	400ms

#### π/4 DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
39	DH1	134.72	400ms
	DH3	268.64	400ms
	DH5	311.89	400ms

### 8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	DH1	134.40	400ms
39	DH3	266.72	400ms
	DH5	309.87	400ms



### A period time = 0.4 (s) \* 79 = 31.6 (s)

### GFSK (1Mbps):

CH Low	DH1 time slot = DH3 time slot = DH5 time slot =	1.654 *	(1600/4/79) *	31.6 =	131.20 (ms) 264.64 (ms) 309.87 (ms)
CH Mid	DH1 time slot = DH3 time slot = DH5 time slot =	1.667 *	(1600/4/79) *	31.6 =	129.60 (ms) 266.72 (ms) 309.87 (ms)
CH High	DH1 time slot = DH3 time slot = DH5 time slot =	1.667 *	(1600/2/79) * (1600/4/79) * (1600/6/79) *	31.6 =	129.60 (ms) 266.72 (ms) 309.87 (ms)

#### $\pi/4$ -DQPSK (2Mbps):

CH Mid	2DH1 time slot=	0.421 *	(1600/2/79) *	31.6 =	134.72 (ms)
	2DH3 time slot=	1.679 *	(1600/4/79) *	31.6 =	268.64 (ms)
	2DH5 time slot=	2.924 *	(1600/6/79) *	31.6 =	311.89 (ms)

#### 8-DPSK (3Mbps):

CH Mid	3DH1 time slot=	0.420 *	(1600/2/79) *	31.6 =	134.40 (ms)
	3DH3 time slot=	1.667 *	(1600/4/79) *	31.6 =	266.72 (ms)
	3DH5 time slot=	2.905 *	(1600/6/79) *	31.6 =	309.87 (ms)



GFSK (1Mbps) for AFH Mode					
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)		
20	DH5	154.93	400ms		
	π/4 DQPSK (2I	Nbps) for Mode			
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)		
20	DH5	155.95	400ms		
8-DPSK (3Mbps) for AFH Mode					
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)		
20	DH5	154.93	400ms		

### GFSK (1Mbps):

DH5 time sl =	2.905	(ms) *	(800/6/20)*8 =	154.93	(ms)
$\pi/4$ -DQPSK (2Mbps					
2DH5 time :=	2.924	(ms) *	(800/6/20)*8 =	155.95	(ms)
8-DPSK (3Mbps):					
3DH5 time :=	2.905	(ms) *	(800/6/20)*8 =	154.93	(ms)

## **13.6 Measurement Result**

Note: Refer to next page for plots.

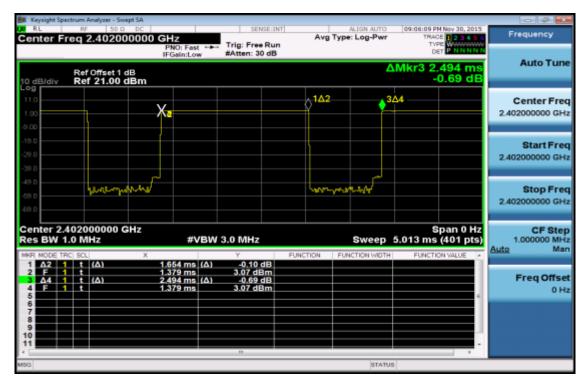
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



# CH-Low DH1

Keysight Spectrum Analyzer - Swept SA						
enter Freq 2.402000000	GHz PN0: Fast	rig: Free Run	Avg Type	LIGN AUTO	09:04:44 PM Nov 30, 2015 TRACE 1 2 3 4 5 TYPE	Frequency
Ref Offset 1 dB 0 dB/div Ref 21.00 dBm	IFGain:Low #	Atten: 30 dB		ΔΝ	Ikr3 1.250 ms -0.04 dB	Auto Tur
11.0 1.00 9.00	142			<b>3∆4</b> ~~~		Center Fr 2.402000000 G
19.0 29.0 30.0						Start Fr 2.402000000 G
	mp m bis	Manan	Warry	~		Stop Fi 2.402000000 0
enter 2.402000000 GHz es BW 1.0 MHz	#VBW 3.				Span 0 Hz 000 ms (401 pts)	CF St 1.000000 M Auto M
TR MODE TRC SCL X	410.0 μs (Δ)	-3.89 dB	FUNCTION FUN	CTION WIDTH	FUNCTION VALUE	
2 F 1 t 3 Δ4 1 t (Δ) 4 F 1 t		-7.90 dBm -0.04 dB -7.90 dBm				Freq Off 0
6 7 8 9						
					,	
G				STATUS		

### DH3



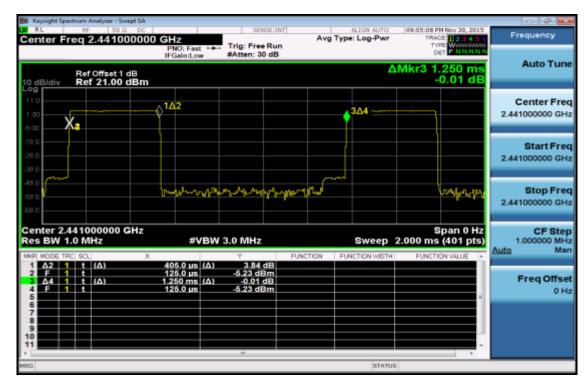


## DH5

Keysight Spectrum Analyzer - Swept SA			
Center Freq 2.402000000	GHz SENSE:1	Avg Type: Log-Pwr TR	ACE 2 3 4 5 6 Frequency
Ref Offset 1 dB	PNO: Fast Trig: Free Ru IFGain:Low #Atten: 30 dB		3.754 ms 1.70 dB
11.00 .9 00	Xa		Center Freq 2.402000000 GHz
-19.0			Start Freq 2.402000000 GHz
-49.0 -69.0		nnevnuk	Stop Freq 2.402000000 GHz
Center 2.402000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 7.547 m	Span 0 Hz s (401 pts) TION VALUE A
2 = 1 = 1 $3 = \Delta 4 = 1 = 1 = (\Delta)$	2.905 ms (Δ) 1.67 dB 2.434 ms 1.38 dBm 3.754 ms (Δ) 1.70 dB 2.434 ms 1.38 dBm		Freq Offsel
7 8 9 10 11			
M9G		STATUS	

# CH-Mid

DH1

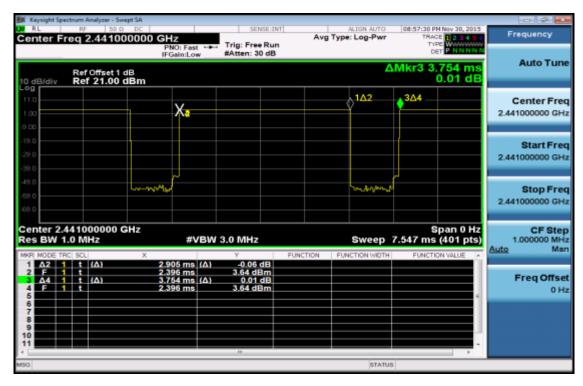




## DH3

🗱 Keysight Spectrum Analyzer - Swept SA			
Center Freg 2.441000000	GHz	ALIGN AUTO 09:06:32 PM Nov 30, 2015 Avg Type: Log-Pwr TRACE 12:34 5	Frequency
Ref Offset 1 dB	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	ΔMkr3 2.507 ms 7.21 dE	Auto Tune
Log 11.0 9.00	X		Center Freq 2.441000000 GHz
-19.0			Start Free 2.441000000 GH:
-49.0 -69.0	nul		Stop Fred 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Span 0 Hz Sweep 5.013 ms (401 pts)	CF Step 1.000000 MH Auto Mar
2 F 1 t 3 Δ4 1 t (Δ)	1.667 ms (Δ) 4.13 dB 1.767 ms -3.67 dBm 2.607 ms (Δ) 7.21 dB 1.767 ms -3.57 dBm		Freq Offse 0 H
8 9 10 11 4	17	status	

### DH5



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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

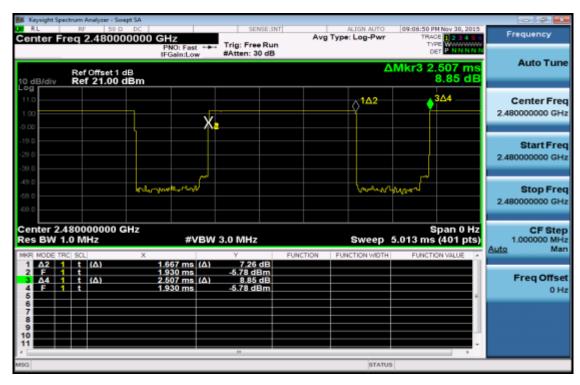
GS Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134號



# CH-High DH1

Keysight Spectrum Analyzer - Swept SA			
Center Freq 2.480000000	GHz SENSE:INT	ALIGN AUTO 09:05:27 PM Nov 30, 2015 Avg Type: Log-Pwr TRACE 1 2 3 4 5	Frequency
Ref Offset 1 dB	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	ΔMkr3 1.250 ms -0.02 dB	Auto Tune
110 1.00 .5.00	······································	304	Center Freq 2.48000000 GHz
-19.0			Start Freq 2.480000000 GHz
-49.0	ี่ มาการให้แก้งหรู้กรูก	shipriganaliyovlati	Stop Freq 2.480000000 GHz
Center 2.480000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Span 0 Hz Sweep 2.000 ms (401 pts)	CF Step 1.000000 MHz Auto Man
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	405.0 μs (Δ) -6.61 dB 485.0 μs -0.29 dBm 1.260 ms (Δ) -0.02 dB 485.0 μs -0.29 dBm		Freq Offset 0 Hz
7 8 9 10 11			
MBG		STATUS	

### DH3





## DH5

🐹 Keysight Spectrum Analyzer - Swept SA				- ÷ 👬
Center Freq 2.480000000		Aug Type: Log-Pwr	08:58:01 PM Nov 30, 2015 TRACE 1 2 3 4 5 6 Type	Frequency
Ref Offset 1 dB 10 dB/div Ref 21.00 dBm	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	Δ	Mkr3 3.754 ms 0.02 dB	Auto Tune
11.0 1.00 -9.00			√ <sup>1∆2</sup>	Center Fred 2.480000000 GH;
-19.0 -29.0 -39.0				Start Free 2.480000000 GH;
-49.0 -59.0 -69.0			www	Stop Free 2.480000000 GH:
Center 2.480000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep	Span 0 Hz 7.547 ms (401 pts)	CF Step 1.000000 MH: Auto Mar
MKR         MODE         TEC         SCL         X           1         A2         1         t         (A)           2         F         1         t           3         A4         1         t         (A)           5         6         6         6         6           7         7         7         7         7           9         9         10         8         6	2.905 ms (Δ) -0.02 dB 3.245 ms 3.05 dBm 3.754 ms (Δ) 0.02 dB 3.245 ms 3.05 dBm	NCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offse 0 H
11	19	STATUS	•	

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law.

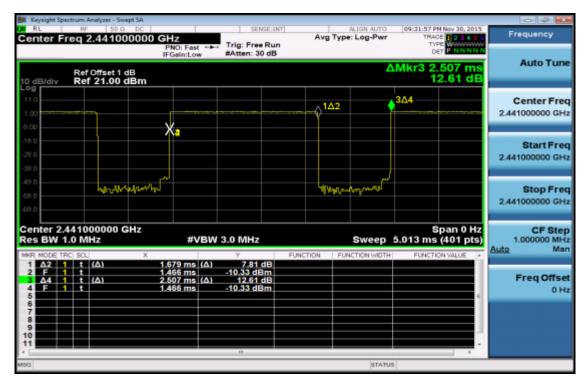
pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.



# CH-Mid 2DH1

Keysight Spectrum Analyzer - Swept SA				5 =
Center Freg 2.441000000	GH7 SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	09:29:00 PM Nov 30, 2015 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 1 dB	PNO: Fast — Trig: Free Run IFGain:Low #Atten: 30 dB	ΔΜ	kr3 1.253 ms 7.25 dB	Auto Tune
11.0 	X.		<u>3∆4</u>	Center Freq 2.441000000 GHz
-19.0				Start Freq 2.441000000 GHz
-49.0 -69.0		<sub>น</sub> ไปปีสาขามสาขางป่ารูโฟสามา		Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz MKR MODE TRC SCL X	#VBW 3.0 MHz	Sweep 2.0	Span 0 Hz 080 ms (401 pts) FUNCTION VALUE	CF Step 1.000000 MHz Auto Man
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	421.2 μs (Δ) 2.30 dB 592.8 μs -8.44 dBm 1.263 ms (Δ) 7.25 dB 592.8 μs -8.44 dBm		p.	Freq Offset 0 Hz
9 10 11 11 Wisc		STATUS	, ·	

### 2DH3





## 2DH5

🗱 Keysight Spectrum Analyzer - Swept SA			×
Center Freq 2.44100000		ALIGN AUTO 09:33:23 PM Nov 30, 2015 Avg Type: Log-Pwr TRACE 2 3 4 5 6 Trace	Frequency
Ref Offset 1 dB	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	ΔMkr3 3.754 ms 0.01 dB	Auto Tune
11.0 9.00	Xa	1∆23∆4	Center Freq 2.441000000 GHz
-19.0			Start Freq 2.441000000 GHz
-49.0 -69.0		hereford	Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Span 0 Hz Sweep 7.547 ms (401 pts)	CF Step 1.000000 MHz Auto Man
MKR MODE TRC SCL         X           1         Δ2         1         t         (Δ)           2         F         1         t         (Δ)           3         Δ4         1         t         (Δ)           4         F         1         t         5           6         -         -         -         -           9         -         -         -         -           9         -         -         -         -           10         -         -         -         -	2.924 ms (Δ) -4.25 dB 2.000 ms 2.29 dBm 3.754 ms (Δ) 0.01 dB 2.000 ms 2.29 dBm	CTION FUNCTION WIDTH FUNCTION VALUE =	Freq Offset 0 Hz
MSG		STATUS	

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law.

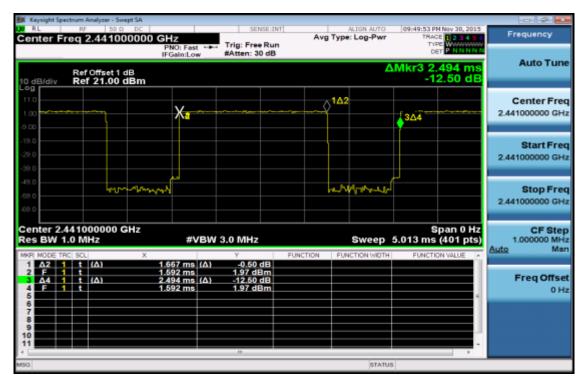
pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.



# CH-Mid **3DH1**

M Keysight Spectrum Analyzer - Swept SA			
RL 10 50 Ω DC Center Freq 2.441000000 GHz	SENSE:INT		CE TI204 50 Frequency
PN0: Fe IFGain:Lo Ref Offset 1 dB 10 dB/div Ref 21.00 dBm		ΔMkr3 1	.250 ms 0.02 dB
110 1.00 .5.06	142		Center Freq 2.441000000 GHz
-19.0			Start Freq 2.441000000 GHz
-49.0 -69.0	And a start of the	uyman marinal y	2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz #	VBW 3.0 MHz	Sweep 2.000 ms	Span 0 Hz s (401 pts) INVALUE AUTO Man
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	-9.41 dBm s (Δ) 0.02 dB		Freq Offset 0 Hz
7 8 9 10 11			
MSG		STATUS	

### 3DH3





## 3DH5

🗱 Keysight Spectrum Analyzer - Swept SA				
Center Freq 2.441000000		ALIGN AUTO Avg Type: Log-Pwr	09:51:38 PM Nov 30, 2015 TRACE 1 2 3 4 5 6 TYPE	Frequency
Ref Offset 1 dB	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	Δ	Mkr3 3.736 ms -6.33 dB	Auto Tune
11.0 1.00 9.00		304	·····	Center Freq 2.441000000 GHz
-19.0				Start Freq 2.441000000 GHz
-49.0 -69.0		mont		Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz		Span 0 Hz 7.547 ms (401 pts)	CF Step 1.000000 MHz Auto Man
2 F 1 t 3 Δ4 1 t (Δ)	Υ         FU         FU           2.905 ms         (Δ)         -0.28 dB         1.528 ms         2.31 dBm           3.736 ms         (Δ)         -6.33 dB         1.528 ms         2.31 dBm           1.528 ms         2.31 dBm         2.31 dBm         1.528 ms         2.31 dBm	NCTION FUNCTION WDTH	FUNCTION VALUE	Freq Offset 0 Hz
11 •		STATUS	-	

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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is advised any be prosecuted to the fulle at vent of the law.

pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.



# **14 ANTENNA REQUIREMENT**

## 14.1 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.

## 14.2 Antenna Connected Construction

An embedded-in antenna design is used.

The antenna connector is designed with unique type RF connector 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 ~

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.

Weif S date weight and the results and the results and set of the results and results Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law