

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

	OF
Applicant:	Quanta Computer Inc. No.188, Wenhua 2nd Rd., Guishan Dist., Taoyuan City 33377,
	Taiwan (R.O.C)
Product Name:	All-in-One PC
Brand Name:	HP
Model No.:	TPC-Q065-32
Model Difference:	
Report Number:	E2/2019/80055
FCC ID:	HFSQTA-NZF
IC:	1787B-QTANZF
FCC Rule Part:	§15.247, Cat: DSS
IC Rule Part:	RSS-247 issue 2 Feb 2017
Issue Date:	Oct. 07, 2019
Date of Test:	Aug. 14, 2019 ~ Sep. 10, 2019
Date of EUT Re-	Aug. 14, 2019
ceived:	

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.

Tom, Huang

Tested By:

台

Tom Huang / Engineer

Approved By:





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Revision History							
Revision Description Issue Date Remark							
Rev.00	Original.	Sep. 24, 2019	Revised By: Yuri Tsai				
Rev.01	Updated product name	Oct. 07, 2019	Revised By: Yuri Tsai				

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GENERAL INFORMATION 1

1.1 Product description

Product Name:	All-in-One PC		
Brand Name:	HP		
Model No.:	TPC-Q065-32		
Model Difference:	N/A		
Hardware Version:	N/A		
Software Version:	N/A		
Dowor Supply:	19.5Vdc from AC/DC Adapter		
Power Supply:	Adapter: Model No.: TPC-DA60, Supplier: Delta		

Radio Technology:	Bluetooth_BR+EDR
Channel number:	79 channels
Modulation type:	GFSK + π/4DQPSK + 8DPSK
Transmit Power:	3.98dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	<= 0.4s

1.2 Antenna Designation

Antenna Type	Supplier	Antenna Model No.	Freq. (MHz)	Peak Antenna Gain (dBi)
РСВ	LITEON	WB301A	2402 - 2480	3.3

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1.3 Test Methodology of Applied Standards

Canada RSS-247 issue 2 Feb. 2017

RSS-Gen. issue 5 Mar. 2019

FCC Part 15, Subpart C §15.247

KDB 558074 D01 v05 DSS Meas. Guidance

ANSI C63.10:2013

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

1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803(TAF code 0513)

FCC Designation number: TW0001

Canada Registration Number: 4620A-4

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.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Conducted Test (RF)

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

2.3.3 Radiated Emissions

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

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2.4 Measurement Results Explanation Example

For all conducted test items:

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

2.5 Configuration of Tested System



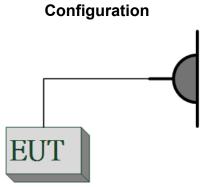


Fig.2-2 AC power line Configuration

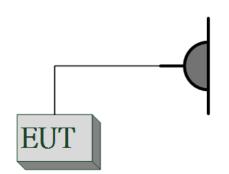


Table 2-1 Equipment Used in Tested System

ltem	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

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SUMMARY OF TEST RESULTS 3

FCC Rules	IC Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	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 §6.7	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 RSS-Gen §8.9 RSS-Gen §8.10	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 §6.8	Antenna Requirement	Compliant

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DESCRIPTION OF TEST MODES 4

4.1 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY
1	2402 MHz	21	2422 MHz	41	2442 MHz	71	2462 MHz
2	2403 MHz	22	2423 MHz	42	2443 MHz	72	2463 MHz
3	2404 MHz	23	2424 MHz	43	2444 MHz	73	2464 MHz
4	2405 MHz	24	2425 MHz	44	2445 MHz	74	2465 MHz
5	2406 MHz	25	2426 MHz	45	2446 MHz	75	2466 MHz
6	2407 MHz	26	2427 MHz	46	2447 MHz	76	2467 MHz
7	2408 MHz	27	2428 MHz	47	2448 MHz	77	2468 MHz
8	2409 MHz	28	2429 MHz	48	2449 MHz	78	2469 MHz
9	2410 MHz	29	2430 MHz	49	2450 MHz	79	2470 MHz
10	2411 MHz	30	2431 MHz	50	2451 MHz	70	2471 MHz
11	2412 MHz	31	2432 MHz	51	2452 MHz	71	2472 MHz
12	2413 MHz	32	2433 MHz	52	2453 MHz	72	2473 MHz
13	2414 MHz	33	2434 MHz	53	2454 MHz	73	2474 MHz
14	2415 MHz	34	2435 MHz	54	2455 MHz	74	2475 MHz
15	2416 MHz	35	2436 MHz	55	2456 MHz	75	2476 MHz
16	2417 MHz	36	2437 MHz	56	2457 MHz	76	2477 MHz
17	2418 MHz	37	2438 MHz	57	2458 MHz	77	2478 MHz
18	2419 MHz	38	2439 MHz	58	2459 MHz	78	2479 MHz
19	2420 MHz	39	2440 MHz	59	2460 MHz	79	2480 MHz
20	2421 MHz	40	2441 MHz	60	2461 MHz		

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4.2 The Worst Test Modes and Channel Details

- 1 The EUT has been tested under operating condition.
- 2 Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- 3 Investigation has been done on all the possible configurations for searching the worst case.

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)							
AVAILABLETESTEDPACKETMODEFREQUENCYFREQUENCYMODULATIONPACKET(MHz)(MHz)(MHz)TYPE							
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5			
	RADIATED EMISSION TEST (ABOVE 1 GHz)						
Bluetooth 2402 to 2480 2402, 2441, 2480 GFSK DH5							

Note:

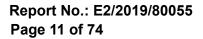
The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth BR+EDR Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST							
	Peak Output Power, 20dB Band Width						
MODE	AVAILABLETESTEDMODEFREQUENCYFREQUENCYMODULATION(MHz)(MHz)(MHz)						
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK, π/4-DQPSK, 8-DQPK	DH5			
Band Edge							
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5			
		Frequency S	Separation				
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5			
	Number of hopping frequency						
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5			
Time of Occupancy (Dwell time)							
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK, π/4-DQPSK, 8-DQPK	DH1/DH3/DH5			

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MEASUREMENT 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					
	9kHz~30MHz: +-2.3dB				
	30MHz - 180MHz: +/- 3.37dB				
Polarization: Vertical	180MHz -417MHz: +/- 3.19dB				
	0.417GHz-1GHz: +/- 3.19dB				
	1GHz - 18GHz: +/- 4.04dB				
	18GHz - 40GHz: +/- 4.04dB				
	9kHz~30MHz: +-2.3dB				
	30MHz - 167MHz: +/- 4.22dB				
Polarization: Horizontal	167MHz -500MHz: +/- 3.44dB				
	0.5GHz-1GHz: +/- 3.39dB				
	1GHz - 18GHz: +/- 4.08dB				
	18GHz - 40GHz: +/- 4.08dB				

Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6 CONDUCTED EMISSION TEST

6.1 Standard Applicable

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

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

Note

1. The lower limit shall apply at the transition frequencies

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

6.2 Measurement Equipment Used

Conducted Emission Test Site									
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.				
EMI Test Re- ceiver	R&S	ESCI 3	100335	02/12/2019	02/11/2020				
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2018	11/25/2019				
LISN	SCHWARZ- BECK	NSLK 8127	8127-649	04/02/2019	04/01/2020				
LISN	FCC	FCC-LISN-50/250-2 5-2-01	4034	04/09/2019	04/08/2020				
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R	N.C.R				

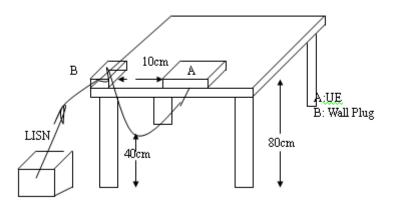
6.3 EUT Setup

- 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.

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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

- 1. The EUT was placed on a table which is 0.8m above ground plan.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.

6.6 Measurement Result

Note: Refer to next page for measurement data and plots. Note2: The * reveals the worst-case results that closet to the limit.

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4

5

6

0.3620

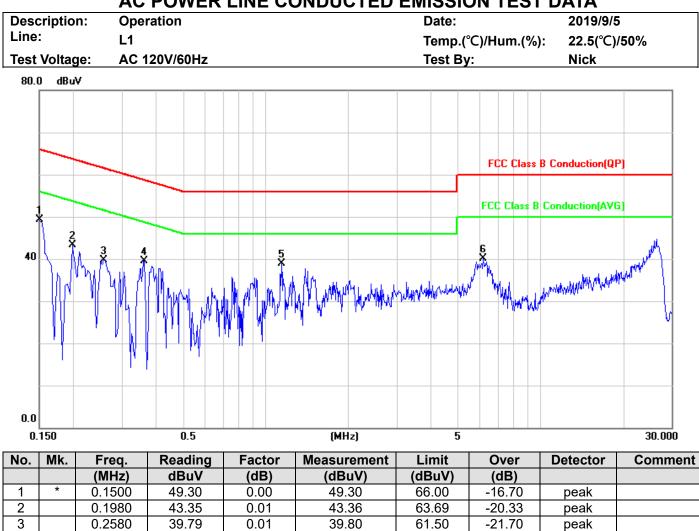
1.1460

6.2020

39.48

38.84

39.83



39.49

38.87

40.04

58.68

56.00

60.00

-19.19

-17.13

-19.96

peak

peak

peak

AC POWER LINE CONDUCTED EMISSION TEST DATA

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0.01

0.03

0.21

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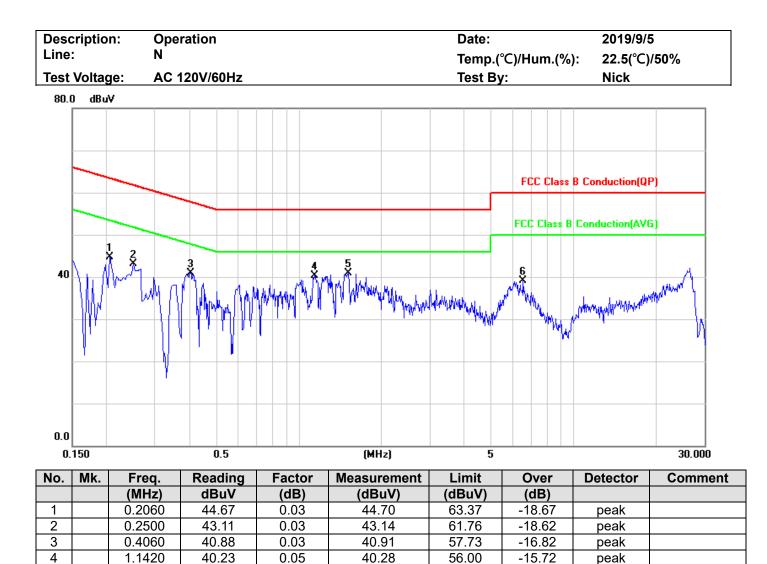
6

1.5140

6.5780

40.90

38.86



41.00

39.09

56.00

60.00

-15.00

-20.91

peak

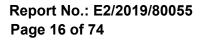
peak

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0.10

0.23

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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 and the e.i.r.p. shall not exceed 0.5 W if the hop set uses less than 75 hopping channels.

7.2 Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
Power Meter	Anritsu	ML2496A	1804001	02/13/2019	02/12/2020			
Power Sensor	Anritsu	MA2411B	1726104	02/13/2019	02/12/2020			
Power Sensor	Anritsu	MA2411B	1726107	02/13/2019	02/12/2020			

7.3 Test Set-up:

EUT	Power Sensor		Power Meter
-----	--------------	--	-------------

7.4 Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows ANSI C63.10:2013. 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.

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Output

Power

(mW)

1.603

1.660 1.600 Limit

(mW)

125 125

125

7.5 Measurement Result

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

1M BR mode (Peak):						t mode (Av	erage):
СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)	СН	Freq. (MHz)	Max ir tu to Pov
Low	2402	3.98	2.500	125	Low	2402	
Mid	2441	3.91	2.460	125	Mid	2441	
High	2480	3.97	2.495	125	High	2480	

nit W)	СН	Freq. (MHz)	include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
25	Low	2402	3.82	2.410	125
25	Mid	2441	3.70	2.344	125
25	High	2480	3.83	2.415	125

2M EDR mode (Peak):

2M EDR mode (Average):

СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)	СН	Freq. (MHz)	Max. Avg.Output include tune up tolerance Power (dBm)
Low	2402	3.96	2.489	125	Low	2402	2.05
Mid	2441	3.97	2.495	125	Mid	2441	2.20
High	2480	3.83	2.415	125	High	2480	2.04

3M EDR mode (Peak):

СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	3.96	2.489	125
Mid	2441	3.92	2.466	125
High	2480	3.81	2.404	125

3M EDR mode (Average):

_					
Ī			Max. Avg.Output		
l	CH Freq. (MHz)	Erog	include	Output	Limit
I		tune up	Power		
I		(IVI⊓Z)	tolerance	(mW)	(mW)
			Power (dBm)		
	Low	2402	2.07	1.611	125
	Mid	2441	2.21	1.663	125
	High	2480	2.04	1.600	125

NOTE: cable loss as 1.8dB that offsets in the sp

*Note: Max. Output include tune up tolerance Power measured by using average detector.

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1M BR mode EIRP

Channel	Frequency (MHz)	Max. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (mW)	Limit (mW)
Low	2402	3.82	3.30	5.152	4000
Mid	2441	3.70	3.30	5.012	4000
High	2480	3.83	3.30	5.164	4000

2M EDR mode EIRP

Channel	Frequency (MHz)	Max. Avg.Output include tune up tolerance	Antenna Gain (dBi)	EIRP (mW)	Limit (mW)
Low	2402	2.05	3.30	3.428	4000
Mid	2441	2.20	3.30	3.548	4000
High	2480	2.04	3.30	3.420	4000

3M EDR mode EIRP

Channel	Frequency (MHz)	Max. Avg.Output include tune up tolerance	Antenna Gain (dBi)	EIRP (mW)	Limit (mW)
Low	2402	2.07	3.30	3.443	4000
Mid	2441	2.21	3.30	3.556	4000
High	2480	2.04	3.30	3.420	4000

* Note: EIRP = Average Power + Gain

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8 20dB & 99% BANDWIDTH MEASUREMENT

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	-	CAL DUE.	
TYPE		NUMBER	NUMBER	CAL.		
EXA Spectrum Ana- lyzer	Agilent	N9010A	MY5042019 5	05/02/2019	05/01/2020	
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020	

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 ANSI C63.10:2013. 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.
- 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. Turn on the 99% bandwidth function, max reading.
- 7. Repeat above procedures until all test default channel is completed

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8.5 Measurement Result

GFSK			_	π/4-D	QPSK
СН	20 dB BW	2/3 BW		СН	20 dE BW
	(MHz)	(MHz)			(MHz
Low	0.926	0.62		Low	1.266
Mid	0.9255	0.62		Mid	1.288
High	0.9265	0.62		High	1.295

99%

Bandwidth

(MHz)

0.899

0.89833

0.89754

	20 dB	2/3		
СН	BW	BW		
	(MHz)	(MHz)		
Low	1.266	0.84		
Mid	1.288	0.86		
High	1.295	0.86		

8-DPSK				
	20 dB	2/3		
СН	BW	BW		
	(MHz)	(MHz)		
Low	1.269	0.85		
Mid	1.271	0.85		
High	1.282	0.85		

СН

Low Mid

High

π/4-DQPSK

CH

Low

Mid

High

8 99% Bandwidth (MHz)

1.1902

1.1969

1.2029

3-DPSK	
	99%
СН	Bandwidth
	(MHz)
Low	1.1752
Mid	1.1777
High	1.1824

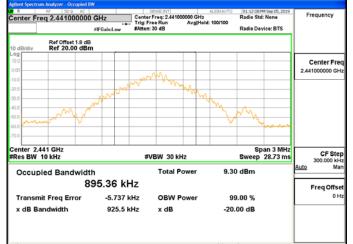
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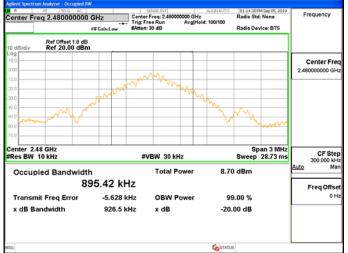
BW CH-Low (GFSK mode)



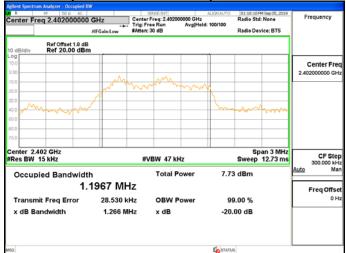
CH-Mid (GFSK mode)



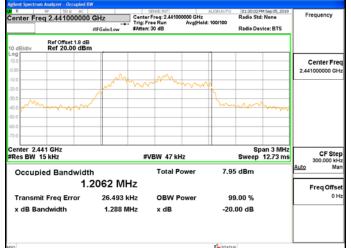
CH-High (GFSK mode)



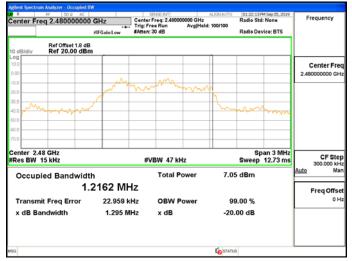
CH-Low (π/4-DQPSK mode)



CH-Mid (π/4-DQPSK mode)



CH-High (π/4-DQPSK mode)



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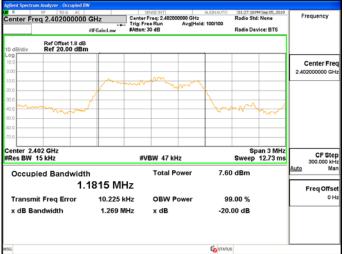
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CH-Low (8-DPSK mode)



CH-Mid (8-DPSK mode)

enter Fre	eq 2.441000000 G	Trig	sense pvr ter Freq: 2.441000000 GHz ; Free Run Avg Hol en: 30 dB	ALIGNAUTO	01:29:45 PM Sep 05, 2019 Radio Std: None Radio Device: BTS	Frequency
0 dB/div	Ref Offset 1.8 dB Ref 20.00 dBm					
0.0						Center Free 2.441000000 GH
0.0			in white			
0.0					www.	
enter 2.4	44.0%				Onen 2 Mills	
Res BW			#VBW 47 kHz		Span 3 MHz Sweep 12.73 ms	CF Ste 300.000 kH
Occup	ied Bandwidth	889 MHz	Total Power	7.81	dBm	Auto Ma
Transm	it Freq Error	8.654 kHz	OBW Power	99	0.00 %	Freq Offse 0 H
	ndwidth	1.271 MHz	x dB	-20.	00 dB	

CH-High (8-DPSK mode)

Agilent Spectrum Analyzer - Occupied BW						
Center Freq 2.480000000 GH	z Cente Trig: F	rFreq: 2.48000000 GHz ree Run Avg[Hol : 30 dB	ALIGN AUTO	Radio Std		Frequency
Ref Offset 1.8 dB 10 dB/div Ref 20.00 dBm						
10.0 0.00						Center Freq 2.480000000 GHz
-20.0	/ mand	an marine		~~~		
40.0				~~ .	hard	
Center 2.48 GHz #Res BW 15 kHz	#	VBW 47 kHz			an 3 MHz 12.73 ms	CF Step 300.000 kHz
Occupied Bandwidth	46 MHz	Total Power	6.95	dBm		<u>Auto</u> Mar
Transmit Freq Error x dB Bandwidth	6.609 kHz 1.282 MHz	OBW Power x dB		00 % 00 dB		Freq Offset 0 Hz
MSG			STATUS			

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99% Bandwidth BW CH-Low (GFSK mode)

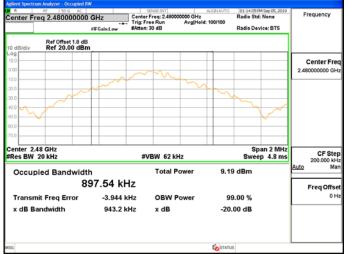


CH-Mid (GFSK mode)

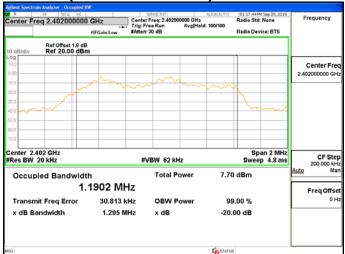


ťh,

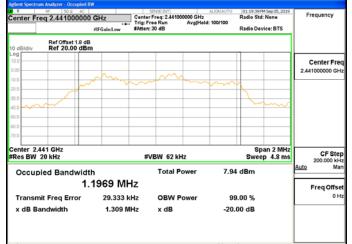
CH-High (GFSK mode)



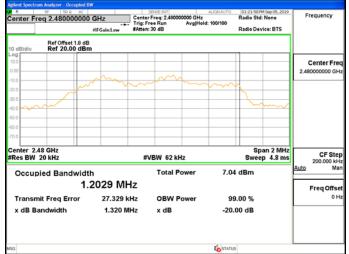
CH-Low (π/4-DQPSK mode)



CH-Mid (π/4-DQPSK mode)



CH-High (π/4-DQPSK mode)



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CH-Low (8-DPSK mode)

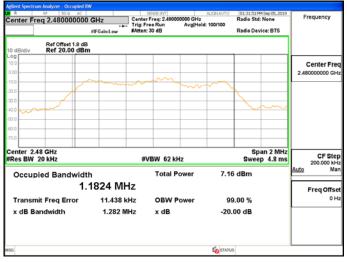
	<u> </u>		/		
Agilent Spectrum Analyzer					
Center Freg 2.402		Center Freq: 2.40200	ALISNAUTO	01:26:54 PM Sep 05, 2019 Radio Std: None	Frequency
center Freq 2.402	#IFGain:Low	#Atten: 30 dB	Avg[Hold: 100/100	Radio Device: BTS	
10 dB/div Ref 2	fset 1.8 dB 0.00 dBm				
10.0					Center Fre
0.00					2.402000000 GH
-10.0		mm			
20.0					
30.0				\mathbf{X}	
40.0				m	
50.0					
-60.0					
70.0					
Center 2.402 GHz #Res BW 20 kHz		#VBW 62 kH	Ηz	Span 2 MHz Sweep 4.8 ms	CF Ste 200.000 kH
Occupied Ba	ndwidth	Total P	ower 7.8	1 dBm	Auto Mai
	1.1753 N	1Hz			Freq Offse
Transmit Freq	Error 13.92	7 kHz OBW P	ower 9	9.00 %	0 H
x dB Bandwidth	h 1.276	MHz xdB	-20	.00 dB	
15G			K STATU	6	

CH-Mid (8-DPSK mode)

Center Fre	eq 2.441000000	GHz #IFGain:Low	Several Center Freq: 2.44100 Trig: Free Run #Atten: 30 dB	ALISNAUTO 0000 GHz Avg[Hold: 100/100	Radio Std: None Radio Device: BTS	Frequency
10 dB/div	Ref Offset 1.8 dB Ref 20.00 dBm	1			_	
10.0		~	~~~~			Center Freq 2.441000000 GHz
-10.0				~~~~~		
-30.0					\sim	
50.0						
-50.0						
Center 2.4 #Res BW			#VBW 62 kH	z	Span 2 MHz Sweep 4.8 ms	
Occup	ied Bandwidt	h	Total Po	ower 8.0	03 dBm	<u>Auto</u> Man
	1.1	1777 MH	z			Freq Offset
Transm	nit Freq Error	12.865 kł	z OBW P	ower 9	99.00 %	0 Hz
x dB Ba	andwidth	1.276 M	lz xdB	-20	0.00 dB	

(h

CH-High (8-DPSK mode)



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9 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

9.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.9 limit.

9.2 Measurement Equipment Used

Conducted Emission Test Site						
EQUIPMENT MFR MODEL SERIAL LAST CAL DU					CAL DUE.	
TYPE		NUMBER	NUMBER	CAL.		
EXA Spectrum Ana- lvzer	Agilent	N9010A	MY5042019 5	05/02/2019	05/01/2020	
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020	

9.3 Test SET-UP



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9.4 Measurement Procedure

Conducted Band Edge:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows ANSI C63.10:2013. 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 ANSI C63.10:2013. 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

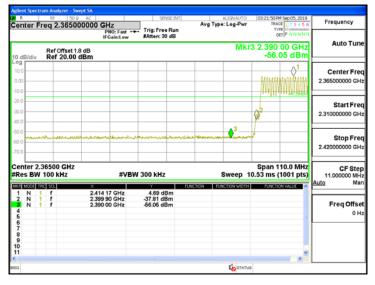
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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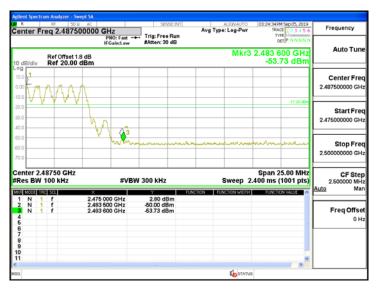
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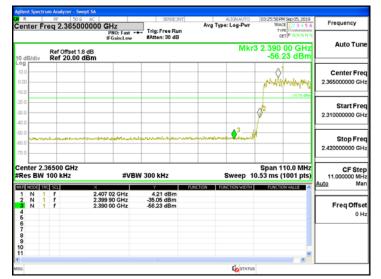
Hopping mode BR Band Edge CH-Low



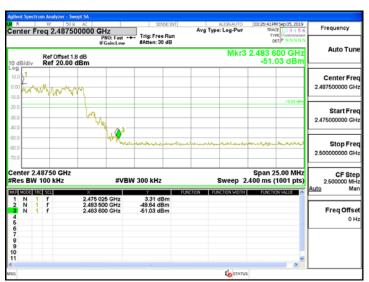
BR Band Edge CH-High



EDR Band Edge CH-Low



EDR Band Edge CH-High



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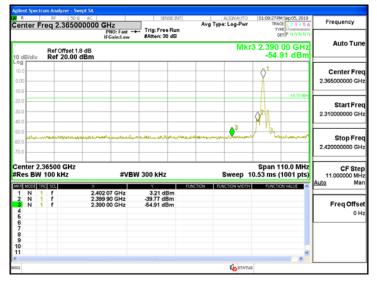
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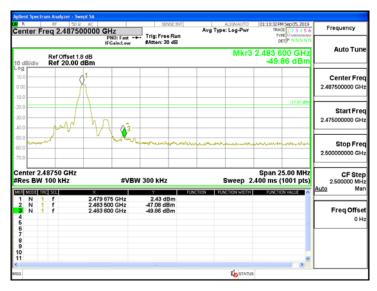
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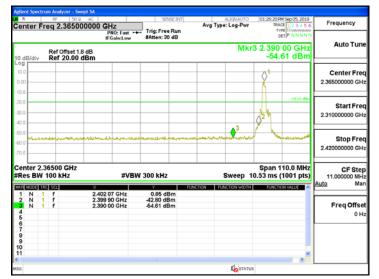
Non-Hopping BR Band Edge CH-Low



BR Band Edge CH-High



EDR Band Edge CH-Low



EDR Band Edge CH-High



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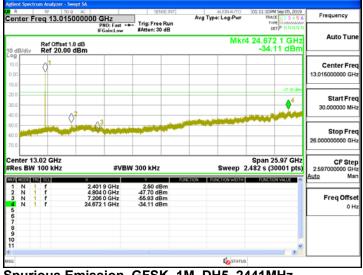
prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

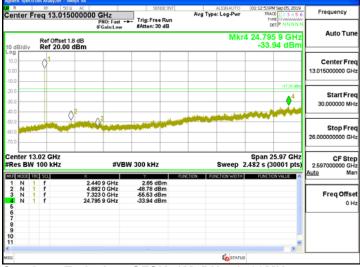
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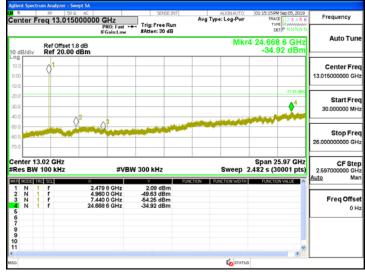
Spurious Emission_GFSK_1M_DH5_2402MHz



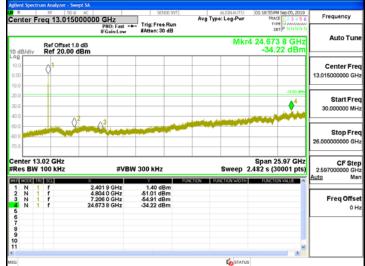
Spurious Emission_GFSK_1M_DH5_2441MHz



Spurious Emission_GFSK_1M_DH5_2480MHz



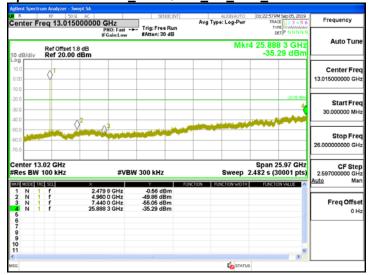
Spurious Emission_π4DQPSK_2M_DH5_2402MHz



Spurious Emission_π4DQPSK_2M_DH5_2441MHz



Spurious Emission_π4DQPSK_2M_DH5_2480MHz



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Spurious Emission 8DPSK 3M DH5 2402MHz

RF 50 g	AC	SENSE:INT	ALIGNAUTO	01:28:03PM Sep 05, 2019	
Freq 13.01500	PNO: Fast	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr	TYPE MWWWWW DET P N N N N N	Frequency
Ref Offset 1.8 d Ref 20.00 dB			Mkr	4 24.731 8 GHz -34.78 dBm	Auto Tu
01					Center Fr 13.015000000 G
				-19.96 dBm	Start Fr 30.000000 N
	<mark>∂3</mark>				Stop Fr 26.00000000 G
er 13.02 GHz BW 100 kHz	#VB\	V 300 kHz	Sweep 2	Span 25.97 GHz 2.482 s (30001 pts)	CF St 2.597000000 G Auto M
102 9703 1501 1 1 f 1 1 f 1 1 f 1 f	2.401 9 GHz 4.804 0 GHz 7.206 0 GHz 24.731 8 GHz	0.04 dBm -52.19 dBm -54.20 dBm -34.78 dBm	PUNCTION WOTH	PUNCTION VALUE	Freq Off
				× *	
			Ko status		

Spurious Emission_8DPSK_3M_DH5_2441MHz

		SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	01:30:30 PM Sep 05, 2019 TRACE 1 2 3 4 5 6	Frequency
ter Freq 13.015	PNO: Fast H IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Par	TYPE MUMUMUM DET P NNNNN	
Ref Offset 1	.8 dB	PAREN. 00 GD	Mkr	4 25.216 6 GHz -35.30 dBm	Auto Tur
					Center Fro 13.015000000 Gi
	A2			-20.89 dbm	Start Fr 30.000000 M
					Stop Fr 26.00000000 G
nter 13.02 GHz es BW 100 kHz	#VBW	/ 300 kHz	Sweep 2	Span 25.97 GHz 2.482 s (30001 pts)	CF Sto 2.597000000 G Auto M
N 1 f N 1 f N 1 f N 1 f	2,440 9 GHz 4,882 0 GHz 7,323 0 GHz 25,216 6 GHz	-0.88 dBm -50.36 dBm -54.83 dBm -35.30 dBm			Freq Offs 0
			to status		

Spurious Emission_8DPSK_3M_DH5_2480MHz



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t (886-2) 2299-3279



10 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, must also comply with the §15.209 & RSS-Gen §8.10 Table 6 limit.

And according to §15.33(a) (1) & RSS-Gen §8.9 Table 4 & 5, 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 ($dB\mu V/m$)

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10.2 Measurement Equipment Used

	966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	01/10/2019	01/09/2020	
Horn Antenna	Schwarzbeck	BBHA9170	07/02/1900	12/27/2018	12/26/2019	
Horn Antenna	Schwarzbeck	BBHA9120D	D803	12/24/2018	12/23/2019	
3m Site NSA	SGS	966 chamber	N/A	01/02/2019	01/01/2020	
Loop Antenna	ETS.LINDGREN	6502	148045	10/08/2018	10/07/2019	
PXA Spectrum Ana- lyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020	
EMI Test Receiver	R&S	ESCI 3	100335	02/12/2019	02/11/2020	
Pre-Amplifier	EMC Instru- ments	EMC184045B	980135	01/02/2019	01/01/2020	
Pre-Amplifier	EMC Instru- ments	EMC051825	980152	01/02/2019	01/01/2020	
Pre-Amplifier	HP	8447D	2944A09469	01/02/2019	01/01/2020	
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M1	01/02/2019	01/01/2020	
High Pass Filter	WI	WHKX4.0/18G- 10SS	22	01/02/2019	01/01/2020	
Low Loss Cable	Huber Suhner	966_RX	9	01/02/2019	01/01/2020	
Software		e3 V6.	11-20180413			

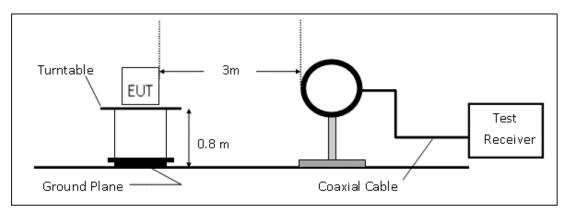
NOTE: N.C.R refers to Not Calibrated Required.

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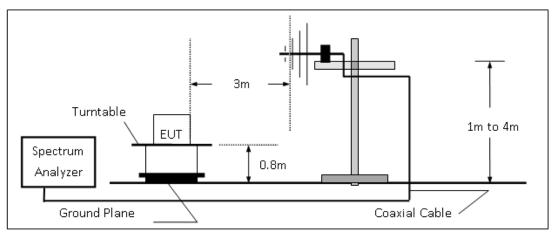


10.3 Test SET-UP

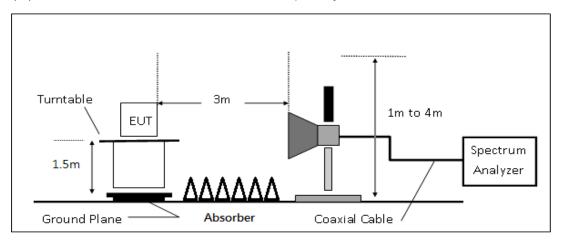
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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(新年方方見)、10年間時に、11日間に、1

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台灣檢驗科技股份有限公司	t (886-2) 2299-3279	f (886-2) 2298-0488	www.tw.sgs.com	



10.4 Measurement Procedure

Radiated Emission

- 1. The testing follows ANSI C63.10:2013. 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. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
- 6. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
- 7. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Du-ty cycle < 98%) for Average Detector at frequency above 1 GHz.
- 8. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 11. Repeat above procedures until all frequency of the interest measured were complete.

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10.5 Field Strength Calculation

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

FS = RA + AF + CL - AG

Where	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(dBµV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

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

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

10.7 Measurement Result

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

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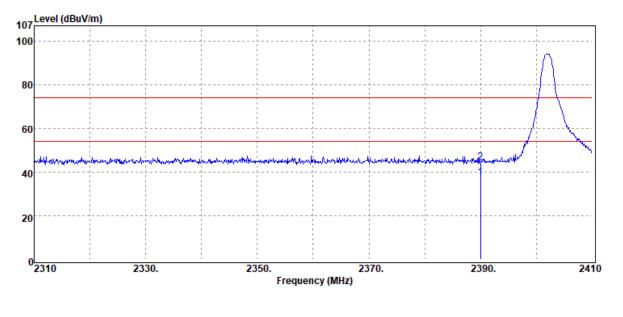


Radiated Band Edge Measurement Result:

Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT BR :2402 MHz :Bandedge CH Low :E2 Plane

:2019-09-05 :25.2/73 :VERTICAL :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m		
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
2390.00	Average	29.85	7.57	37.42	54.00	-16.58	-
2390.00	Peak	36.70	7.57	44.27	74.00	-29.73	

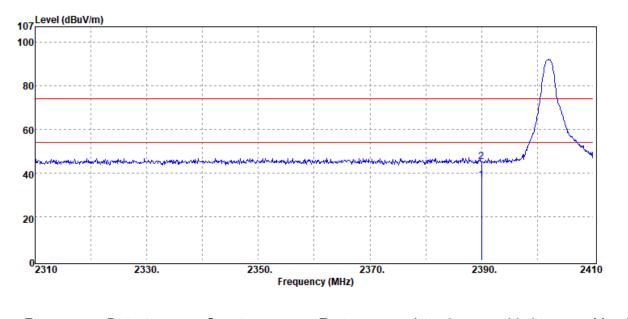
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Report Number Operation Mode Test Channel Test Mode EUT Pol :E2/2019/80055 :BT BR :2402 MHz :Bandedge CH Low :E2 Plane Test Date Temp./Humi. Antenna Pol. Engineer :2019-09-05 :25.2/73 :HORIZONTAL :Nick



Margin
-
dB
-17.48
-28.92

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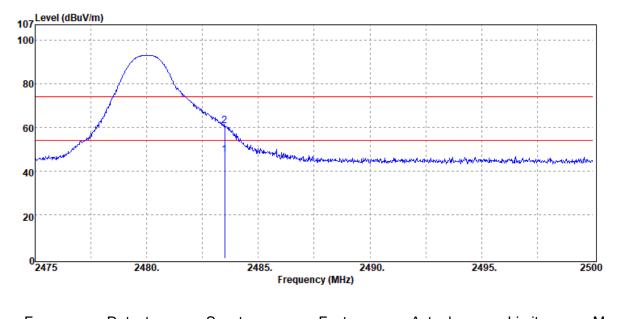


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT BR :2480 MHz :Bandedge CH High :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :VERTICAL :Nick



Detector	Spectrum	⊢actor	Actual	Limit	Margın	
Mode	Reading Level		FS	@3m	-	
PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
Average	40.49	6.94	47.43	54.00	-6.57	
Peak	53.77	6.94	60.71	74.00	-13.29	
	Mode PK/QP/AV Average	ModeReading LevelPK/QP/AVdBµVAverage40.49	ModeReading LevelPK/QP/AVdBµVdBAverage40.496.94	ModeReading LevelFSPK/QP/AVdBµVdBdBµV/mAverage40.496.9447.43	Mode Reading Level FS @3m PK/QP/AV dBμV dB dBμV/m dBμV/m Average 40.49 6.94 47.43 54.00	Mode Reading Level FS @3m PK/QP/AV dBμV dB dBμV/m dBμV/m dB Average 40.49 6.94 47.43 54.00 -6.57

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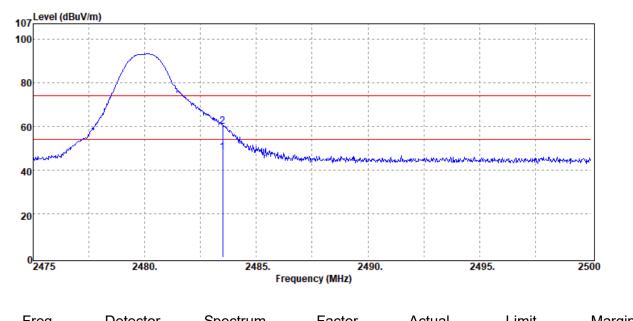


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT BR :2480 MHz :Bandedge CH High :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :HORIZONTAL :Nick



	Freq.	Delector	Spectrum	Factor	Actual	LIMIL	wargin	
		Mode	Reading Level		FS	@3m		
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
_	2483.50	Average	41.02	6.94	47.96	54.00	-6.04	_
	2483.50	Peak	53.22	6.94	60.16	74.00	-13.84	

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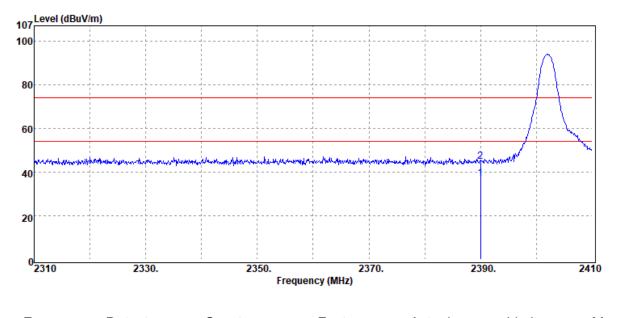
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Report Number Operation Mode Test Channel Test Mode EUT Pol :E2/2019/80055 :BT EDR :2402 MHz :Bandedge CH Low :E2 Plane Test Date Temp./Humi. Antenna Pol. Engineer :2019-09-05 :25.2/73 :VERTICAL :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m	-	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
2390.00	Average	29.58	7.57	37.15	54.00	-16.85	
2390.00	Peak	37.11	7.57	44.68	74.00	-29.32	

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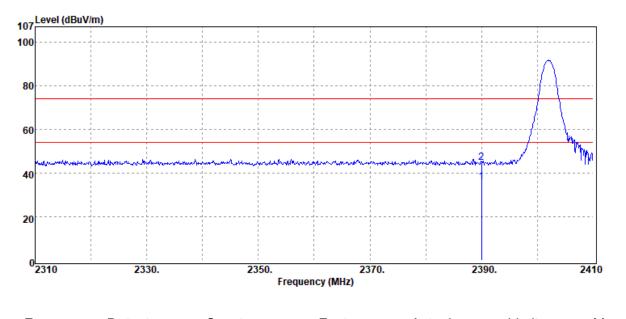


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT EDR :2402 MHz :Bandedge CH Low :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :HORIZONTAL :Nick



	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
		Mode	Reading Level		FS	@3m	-	
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
_	2390.00	Average	28.33	7.57	35.90	54.00	-18.10	
	2390.00	Peak	37.09	7.57	44.66	74.00	-29.34	

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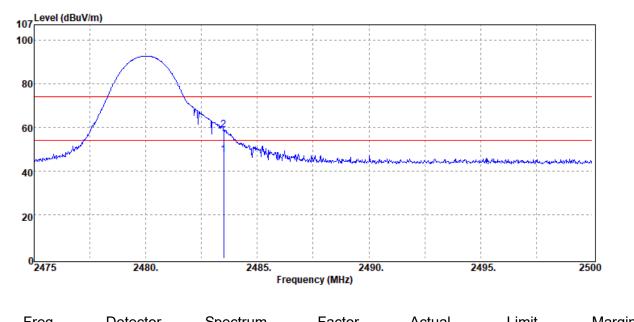


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT EDR :2480 MHz :Bandedge CH High :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :VERTICAL :Nick



	Freq.	Delector	Spectrum	Factor	Actual	Limit	wargin	
		Mode	Reading Level		FS	@3m		
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
_	2483.50	Average	40.36	6.94	47.30	54.00	-6.70	-
	2483.50	Peak	52.01	6.94	58.95	74.00	-15.05	

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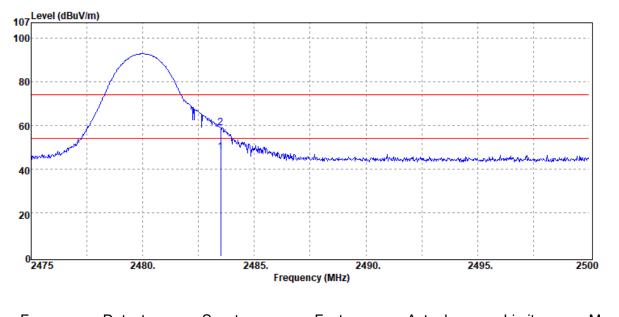


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT EDR :2480 MHz :Bandedge CH High :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :HORIZONTAL :Nick



nit Margin
m
//m dB
-6.35
-15.00
3

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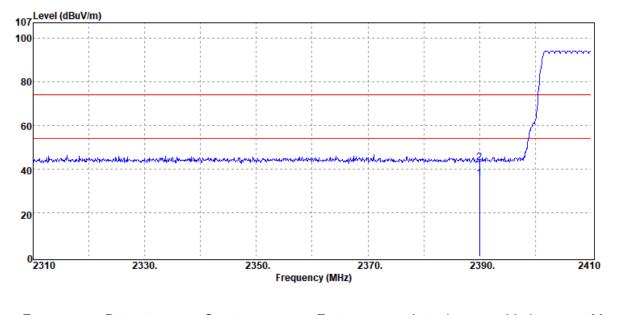


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT BR Hopping :2402 MHz :Bandedge CH Low :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :VERTICAL :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Average	27.97	7.57	35.54	54.00	-18.46
2390.00	Peak	35.49	7.57	43.06	74.00	-30.94

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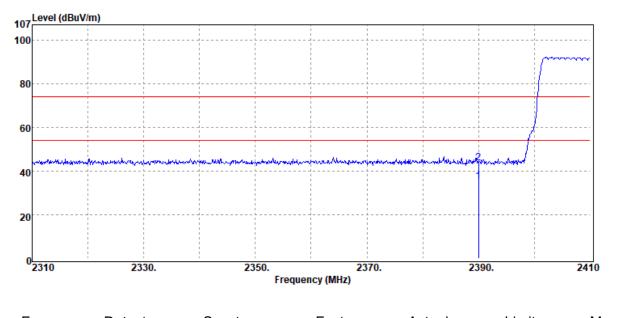
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Report Number Operation Mode Test Channel Test Mode EUT Pol :E2/2019/80055 :BT BR Hopping :2402 MHz :Bandedge CH Low :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer :2019-09-05 :25.2/73 :HORIZONTAL :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m	-	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
2390.00	Average	27.65	7.57	35.22	54.00	-18.78	
2390.00	Peak	36.15	7.57	43.72	74.00	-30.28	
MHz 2390.00	Mode PK/QP/AV Average	Reading Level dBµV 27.65	dB 7.57	FS dBµV/m 35.22	@3m dBµV/m 54.00	dB -18.78	3

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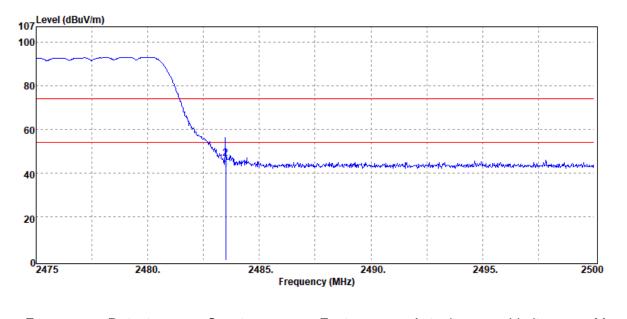


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT BR Hopping :2480 MHz :Bandedge CH High :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :VERTICAL :Nick



	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
		Mode	Reading Level		FS	@3m	-	
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
_	2483.50	Average	34.49	6.94	41.43	54.00	-12.57	
	2483.50	Peak	39.73	6.94	46.67	74.00	-27.33	

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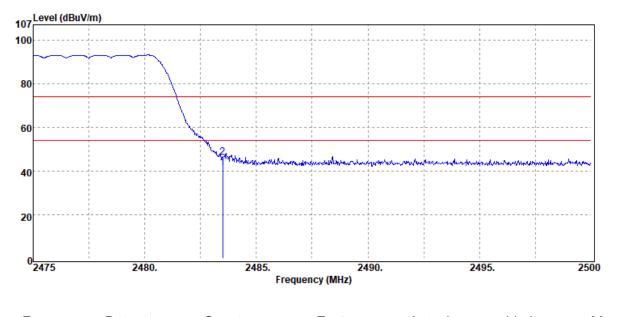


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT BR Hopping :2480 MHz :Bandedge CH High :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :HORIZONTAL :Nick



	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
		Mode	Reading Level		FS	@3m	_	
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
_	2483.50	Average	34.54	6.94	41.48	54.00	-12.52	-
	2483.50	Peak	39.34	6.94	46.28	74.00	-27.72	

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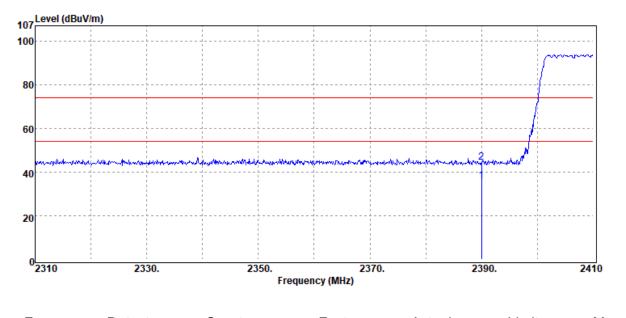
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Report Number Operation Mode Test Channel Test Mode EUT Pol :E2/2019/80055 :BT EDR Hopping :2402 MHz :Bandedge CH Low :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer :2019-09-05 :25.2/73 :VERTICAL :Nick



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m	-	
 MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
 2390.00	Average	28.29	7.57	35.86	54.00	-18.14	_
2390.00	Peak	36.78	7.57	44.35	74.00	-29.65	

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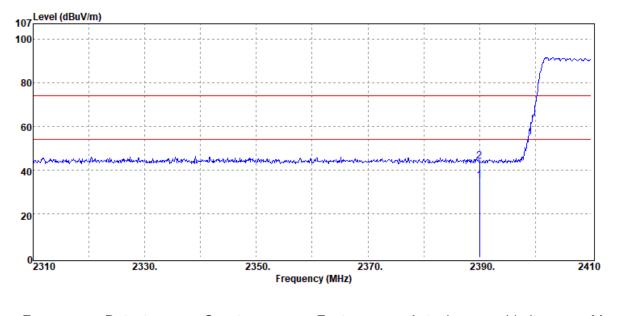
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Report No.: E2/2019/80055 Page 49 of 74



Report Number Operation Mode Test Channel Test Mode EUT Pol :E2/2019/80055 :BT EDR Hopping :2402 MHz :Bandedge CH Low :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer :2019-09-05 :25.2/73 :HORIZONTAL :Nick



Detector	Spectrum	Factor	Actual	Limit	Margin	
Mode	Reading Level		FS	@3m		
PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
Average	27.65	7.57	35.22	54.00	-18.78	_
Peak	36.61	7.57	44.18	74.00	-29.82	
	Mode PK/QP/AV Average	ModeReading LevelPK/QP/AVdBµVAverage27.65	ModeReading LevelPK/QP/AVdBµVdBAverage27.657.57	ModeReading LevelFSPK/QP/AVdBµVdBdBµV/mAverage27.657.5735.22	Mode Reading Level FS @3m PK/QP/AV dBμV dB dBμV/m dBμV/m Average 27.65 7.57 35.22 54.00	Mode Reading Level FS @3m PK/QP/AV dBμV dB dBμV/m dB Average 27.65 7.57 35.22 54.00 -18.78

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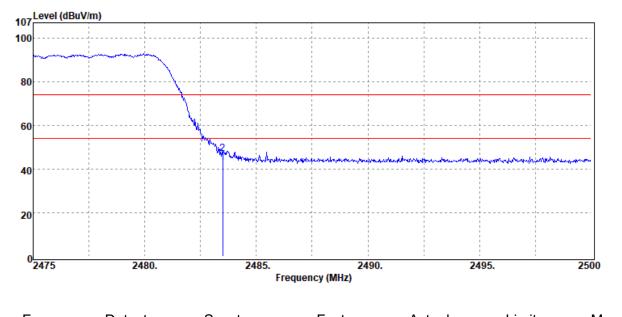


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT EDR Hopping :2480 MHz :Bandedge CH High :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :VERTICAL :Nick



Detector	Spectrum	⊢actor	Actual	Limit	Margın
Mode	Reading Level		FS	@3m	-
PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
Average	36.12	6.94	43.06	54.00	-10.94
Peak	40.08	6.94	47.02	74.00	-26.98
	Mode PK/QP/AV Average	ModeReading LevelPK/QP/AVdBµVAverage36.12	ModeReading LevelPK/QP/AVdBµVdBAverage36.126.94	ModeReading LevelFSPK/QP/AVdBµVdBdBµV/mAverage36.126.9443.06	Mode Reading Level FS @3m PK/QP/AV dBμV dB dBμV/m dBμV/m Average 36.12 6.94 43.06 54.00

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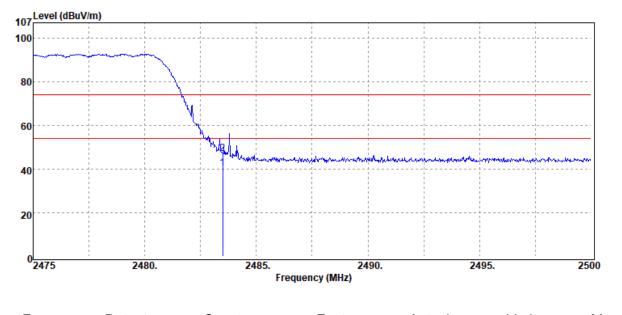


Report Number Operation Mode Test Channel Test Mode EUT Pol

:E2/2019/80055 :BT EDR Hopping :2480 MHz :Bandedge CH High :E2 Plane

Test Date Temp./Humi. Antenna Pol. Engineer

:2019-09-05 :25.2/73 :HORIZONTAL :Nick



	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
		Mode	Reading Level		FS	@3m	-	
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
_	2483.50	Average	33.57	6.94	40.51	54.00	-13.49	
	2483.50	Peak	39.90	6.94	46.84	74.00	-27.16	

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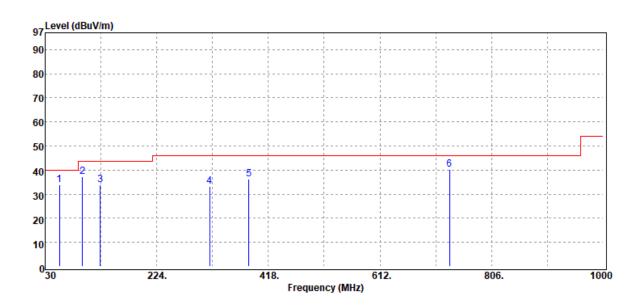
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Radiated Spurious Emission Measurement Result:

Frequency form 30MHz to 1000MHz

Report Number	:E2/2019/80055	Test Date	:2019-09-05
Operation Mode	:BT BR	Temp./Humi.	: 25.2/73
Test Channel	:2441 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Mid	Engineer	:Nick
EUT Pol	:E2 Plane		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
55.22	QP	50.52	-16.57	33.95	40.00	-6.05
94.99	QP	50.57	-13.43	37.14	43.50	-6.36
126.03	QP	45.15	-11.20	33.95	43.50	-9.55
316.15	Peak	41.33	-8.00	33.33	46.00	-12.67
384.05	Peak	42.83	-6.62	36.21	46.00	-9.79
733.25	Peak	42.34	-1.94	40.40	46.00	-5.60

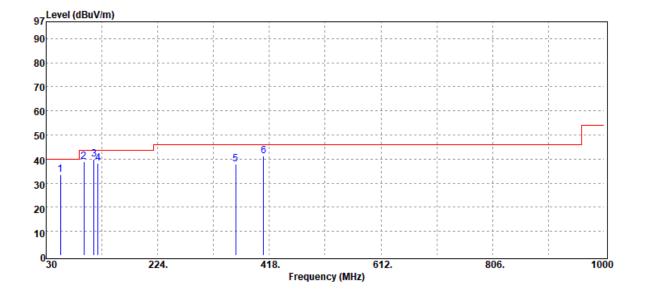
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Report No.: E2/2019/80055 Page 53 of 74



Report Number	:E2/2019/80055	Test Date	:2019-09-05
Operation Mode	:BT BR	Temp./Humi.	: 25.2/73
Test Channel	:2441 MHz	Antenna Pol.	:HORIZONTAI
Test Mode EUT Pol	:Tx CH Mid :E2 Plane	Engineer	:Nick



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
55.22	QP	50.14	-16.57	33.57	40.00	-6.43
95.96	Peak	52.09	-13.12	38.97	43.50	-4.53
113.42	Peak	51.35	-11.49	39.86	43.50	-3.64
120.21	QP	49.60	-11.19	38.41	43.50	-5.09
359.80	Peak	44.92	-6.98	37.94	46.00	-8.06
408.30	Peak	47.13	-5.68	41.45	46.00	-4.55

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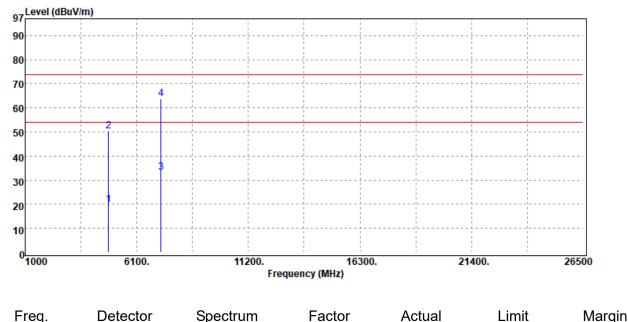
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Report No.: E2/2019/80055 Page 54 of 74



Frequency above 1 GHz

Report Number	:E2/2019/80055	Test Date	:2019-09-05
Operation Mode	:BT BR	Temp./Humi.	:25.2/73
Test Channel	:2402 MHz	Antenna Pol.	:VERTICAL
Test Mode	:Tx CH Low	Engineer	:Nick
EUT Pol	:E2 Plane	-	



Mada	Deeding Level		F 0	@ 3 m	5	
Iviode	Reading Level		F2	@3m		
PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
Average		-30.46	19.75	54.00	-34.25	-
Peak	35.64	14.57	50.21	74.00	-23.79	
Average		-30.46	33.19	54.00	-20.81	
Peak	42.44	21.21	63.65	74.00	-10.35	
	Average Peak Average	PK/QP/AV dBµV Average Peak 35.64 Average	PK/QP/AV dBµV dB Average -30.46 Peak 35.64 14.57 Average -30.46	PK/QP/AV dBμV dB dBμV/m Average -30.46 19.75 Peak 35.64 14.57 50.21 Average -30.46 33.19	PK/QP/AVdBμVdBdBμV/mdBμV/mAverage30.4619.7554.00Peak35.6414.5750.2174.00Average30.4633.1954.00	Mode Reading Level FS @3m PK/QP/AV dBμV dB dBμV/m dBμV/m dB Average -30.46 19.75 54.00 -34.25 Peak 35.64 14.57 50.21 74.00 -23.79 Average -30.46 33.19 54.00 -20.81

Note: Avg correct Factor = 20log(3/100) = -30.46

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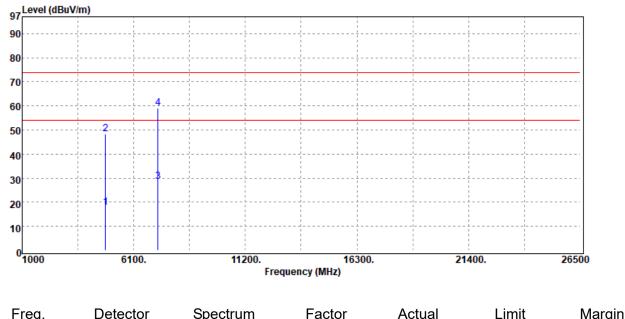
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Report No.: E2/2019/80055 Page 55 of 74



Report Number Operation Mode Test Channel Test Mode EUT Pol	:E2/2019/80055 :BT BR :2402 MHz :Tx CH Low :E2 Plane	Test Date Temp./Humi. Antenna Pol. Engineer	:2019-09-05 :25.2/73 :HORIZONTAL :Nick



1104.	Mode	Reading Level	i dotor	FS	@3m	Margin	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
4804.00	Average		-30.46	17.83	54.00	-36.17	
4804.00	Peak	33.72	14.57	48.29	74.00	-25.71	
7206.00	Average		-30.46	28.61	54.00	-25.39	
7206.00	Peak	37.86	21.21	59.07	74.00	-14.93	

Note: Avg correct Factor = 20log(3/100) = -30.46

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Opera		:E2/2019/80 :BT BR :2441 MHz :Tx CH Mid :E2 Plane	055		Ten Ante	t Date np./Humi enna Pol jineer			:2019-09-05 :25.2/73 :VERTICAL :Nick
97	Level (dBuV/m)								1
90									
80					1 1 1 1 1				
70				- - 	, , , , , ,		; ; ; ; ;	 	

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4882.00	Average		-30.46	21.12	54.00	-32.88
4882.00	Peak	36.50	15.08	51.58	74.00	-22.42
7323.00	Average		-30.46	30.75	54.00	-23.25
7323.00	Peak	39.04	22.17	61.21	74.00	-12.79

Frequency (MHz)

16300.

21400.

26500

11200.

Note: Avg correct Factor = $20\log(3/100) = -30.46$

6100.

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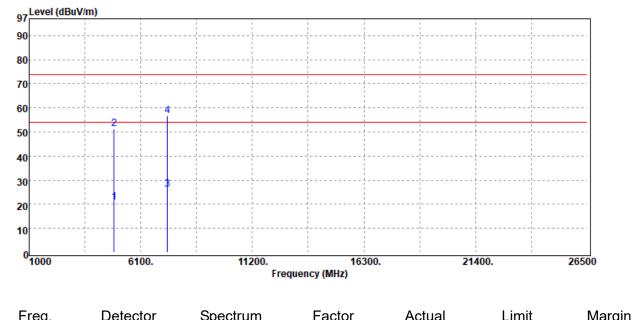
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Report Number Operation Mode Test Channel Test Mode EUT Pol	:E2/2019/80055 :BT BR :2441 MHz :Tx CH Mid :E2 Plane	Test Date Temp./Humi. Antenna Pol. Engineer	:2019-09-05 :25.2/73 :HORIZONTAL :Nick



	rieq.	Mode	Reading Level		FS	@3m	Margin	
_	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
	4882.00	Average		-30.46	20.96	54.00	-33.04	
	4882.00	Peak	36.34	15.08	51.42	74.00	-22.58	
	7323.00	Average		-30.46	26.33	54.00	-27.67	
	7323.00	Peak	34.62	22.17	56.79	74.00	-17.22	

Note: Avg correct Factor = 20log(3/100) = -30.46

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eport Number peration Mode est Channel est Mode UT Pol	:E2/2019/80055 :BT BR :2480 MHz :Tx CH High :E2 Plane	Test Date Temp./Humi. Antenna Pol. Engineer	:2019-09-05 :25.2/73 :VERTICAL :Nick
97 Level (dBuV/m) 90			
80			
70			
60			
50			
40			
30	3		

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.00	Average		-30.46	20.06	54.00	-33.94
4960.00	Peak	35.39	15.13	50.52	74.00	-23.48
7440.00	Average		-30.46	30.17	54.00	-23.83
7440.00	Peak	38.37	22.26	60.63	74.00	-13.37

Frequency (MHz)

16300.

21400.

26500

11200.

Note: Avg correct Factor = $20\log(3/100) = -30.46$

6100.

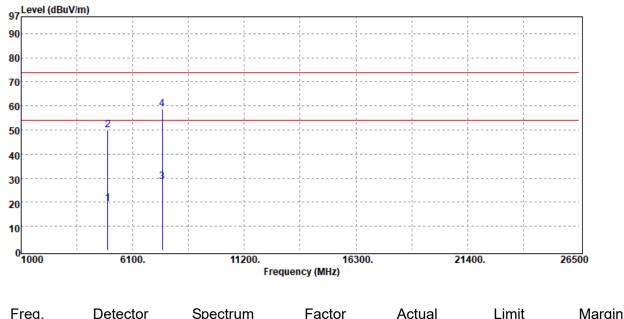
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Report Number Operation Mode Test Channel Test Mode EUT Pol	:E2/2019/80055 :BT BR :2480 MHz :Tx CH High :E2 Plane	Test Date Temp./Humi. Antenna Pol. Engineer	:2019-09-05 :25.2/73 :HORIZONTAL :Nick



1104.	Mode	Reading Level	i dotor	FS	@3m	Margin	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
4960.00	Average		-30.46	19.54	54.00	-34.46	
4960.00	Peak	34.87	15.13	50.00	74.00	-24.00	
7440.00	Average		-30.46	28.38	54.00	-25.62	
7440.00	Peak	36.58	22.26	58.84	74.00	-15.16	

Note: Avg correct Factor = 20log(3/100) = -30.46

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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	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
EXA Spectrum Analyz- er	Agilent	N9010A	MY5042019 5	05/02/2019	05/01/2020		
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020		

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 ANSI C63.10:2013. 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.

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11.5 Measurement Result

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

Frequency Separation Test Data

gilent Spectrum Analyzer - Swept SA					
R RF 50 Ω AC Center Freg 2.403000000 G			ALIGNAUTO 03: De: Log-Pwr	21:17 PM Sep 05, 2019 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide ↔ Trig: Fr FGain:Low #Atten:	ee Run	e. Log-i wi	TYPE MWWWWW DET P N N N N N	
Ref Offset 1.8 dB			∆Mkr3	1.000 MHz -0.40 dB	Auto Tune
og 10.0 0.00 10.0	**************************************	1D2	3∆4	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Center Fre 2.403000000 GH
20.0 30.0 40.0					Start Fre 2.400500000 G⊦
50.0					Stop Fre 2.405500000 GH
center 2.403000 GHz Res BW 100 kHz	#VBW 100 kH	z	Sp Sweep 1.000	· · ·	CF Ste 500.000 kH
2 F 1 f 2.402 0 3 Δ4 1 f (Δ) 1.0	00 GHz 3.75 00 MHz (Δ) -0.4	8 dB dBm 0 dB	JNCTION WIDTH	FUNCTION VALUE	Auto Ma Freq Offs
5 6 7	00 GHz 3.57	dBm			01
8 9 0 1					
36					

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台灣檢驗科技股份有限公司	t (886-2) 2299-3279	f (886-2) 2298-0488	www.tw.sgs.com	



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	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
EXA Spectrum Ana- lyzer	Agilent	N9010A	MY5042019 5	05/02/2019	05/01/2020		
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020		

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 ANSI C63.10:2013. 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		

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Channel Number

	trum Analyzer - Swept								b.
x R Center F	RF 50 Ω Freq 2.420500		:Fast ↔	1		LIGNAUTO	TRAC	1 Sep 05, 2019 E 1 2 3 4 5 6 E M WWWWWW	Frequency
10 dB/div	Ref Offset 1.8 d Ref 20.00 dB	IFGai IB	n:Low	#Atten: 30		Mkr1	2.402 0	00 GHz 81 dBm	Auto Tun
10.0	1								Center Fre 2.420500000 GF
0.00	<u> </u>		¥ ¥ ¥ ¥	<u>' </u>	<u>Γ</u> ΥΥΥΥ'	 (YYY)			Start Fre 2.40000000 GF
20.0 30.0									Stop Fre 2.441000000 Gi
40.0									CF Ste 4.100000 M <u>Auto</u> M
60.0									Freq Offs
70.0									
	.42050 GHz / 430 kHz		#VBW	1.5 MHz		Sweep 1	Span 4 .000 ms (1.00 MHz 1001 pts)	
ISG							5		

2.400GHz - 2.441GHz

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										t Spectrum A	
Frequency	123456	03:22:46 PM Se TRACE	LIGNAUTO	Avg Type		SEP Trig: Free	lz	0000 GH		ter Freq	Cent
Auto Tune	0 GHz 3 dBm	480 000	Mkr1 2			#Atten: 30	NO: Fast 😱 Gain:Low	dB	f Offset 1.8 f 20.00 d		10 dB
Center Freq 2.462250000 GHz	↓ 1										10.0
Start Freq 2.441000000 GHz		VVVV	VYYY	AM	WWW	<u> YVVY</u>				¥¥¥¥.	0.00 -
Stop Freq 2.483500000 GHz											-20.0
CF Step 4.250000 MH; Auto Mar	Y \ \v										-40.0 -
Freq Offse 0 Ha											-60.0
		Stop 2.483 .000 ms (10				1.5 MHz	#VBW			t 2.44100 s BW 430	
											/ISG

2.441GHz - 2.4835GHz

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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 MFR MODEL SERIAL LAST CAL D								
TYPE		NUMBER	NUMBER	CAL.				
EXA Spectrum Ana- lyzer	Agilent	N9010A	MY5042019 5	05/02/2019	05/01/2020			
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020			

13.3 Test Set-up



13.4 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows ANSI C63.10:2013. 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.

13.5 Tabular Result of the Measurement

GFSK (1Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)	1/T (kHz)	VBW setting (kHz)
	DH1	134.40	400ms	2.38	3.00
Low	DH3	268.80	400ms	0.60	1.00
	DH5	312.00	400ms	0.34	1.00
	DH1	134.40	400ms	2.38	3.00
Mid	DH3	267.20	400ms	0.60	1.00
	DH5	312.00	400ms	0.34	1.00
	DH1	134.40	400ms	2.38	3.00
High	DH3	267.20	400ms	0.60	1.00
	DH5	312.00	400ms	0.00	1.00

π/4 DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)	1/T (kHz) 2.33 0.60 0.34	VBW setting (kHz)
	2DH1	137.60	400ms	2.33	3.00
Mid	2DH3	268.80	400ms	0.60	1.00
	2DH5	313.60	400ms	0.34	1.00

8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)	1/T (kHz) 2.33 0.60	VBW setting (kHz)
	3DH1	137.60	400ms	2.33	3.00
Mid	3DH3	268.80	400ms	0.60	1.00
	3DH5	313.60	400ms	0.34	1.00

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

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GFSK (1Mbps):

CH Low	DH1 time slot =	0.420 *	(1600/2/79) *	31.6 =	134.40 (ms)
	DH3 time slot =	1.680 *	(1600/4/79) *	31.6 =	268.80 (ms)
	DH5 time slot =	2.925 *	(1600/6/79) *	31.6 =	312.00 (ms)
CH Mid	DH1 time slot =	0.420 *	(1600/2/79) *	31.6 =	134.40 (ms)
	DH3 time slot =	1.670 *	(1600/4/79) *	31.6 =	267.20 (ms)
	DH5 time slot =	2.925 *	(1600/6/79) *	31.6 =	312.00 (ms)
CH High	DH1 time slot =	0.420 *	(1600/2/79) *	31.6 =	134.40 (ms)
	DH3 time slot =	1.670 *	(1600/4/79) *	31.6 =	267.20 (ms)
	DH5 time slot =	2.925 *	(1600/6/79) *	31.6 =	312.00 (ms)
π/4 -DQPS	K (2Mbps):				
CH Mid	2DH1 time slot=	0.430 *	(1600/2/79) *	31.6 =	137.60 (ms)
	2DH3 time slot=	1.680 *	(1600/4/79) *	31.6 =	268.80 (ms)
	2DH5 time slot=	2.940 *	(1600/6/79) *	31.6 =	313.60 (ms)

8-DPSK (3Mbps):

CH Mid	3DH1 time slot=	0.430 *	(1600/2/79) *	31.6 =	137.60 (ms)
	3DH3 time slot=	1.680 *	(1600/4/79) *	31.6 =	268.80 (ms)
	3DH5 time slot=	2.940 *	(1600/6/79) *	31.6 =	313.60 (ms)

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GFSK (1Mbps) for AFH Mode								
Hopping Channel	PACKET TYPE	Measurement Result	Limit					
Number	PACKETTIPE	(ms)	(ms)					
20	DH5	156.00	400ms					
π/4 DQPSK (2Mbps) for AFH Mode								
Hopping Channel	ΡΑСΚΕΤ ΤΥΡΕ	Measurement Result	Limit					
Number	PACKETTIPE	(ms)	(ms)					
20	2DH5	156.80	400ms					
	8-DPSK (3Mbps) for AFH Mode							
Hopping Channel	ΡΑСΚΕΤ ΤΥΡΕ	Measurement Result	Limit					
Number	FAUNCI ITPE	(ms)	(ms)					
20	3DH5	156.80	400ms					

GFSK (1Mbps):

DH5 time sl =	2.925	(ms) *	(800/6/20)* 8 =	156.00 (ms)
π/4 -DQPSK (2Mbps				
2DH5 time :=	2.940	(ms) *	(800/6/20)* 8 =	156.80 (ms)
8-DPSK (3Mbps):				
3DH5 time :=	2.940	(ms) *	(800/6/20)* 8 =	156.80 (ms)

13.6 **Measurement Result**

Note: Refer to next page for plots.

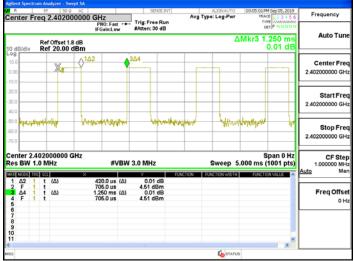
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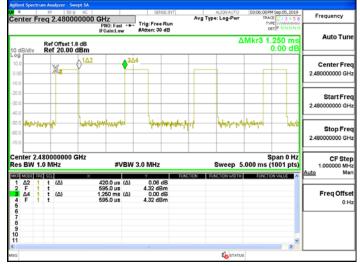
Dwell Time_GFSK_1M_DH1_2402MHz



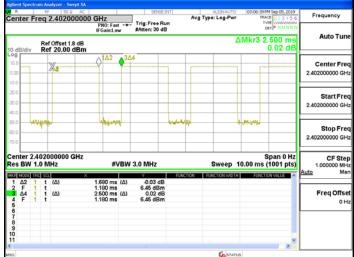
Dwell Time_GFSK_1M_DH1_2441MHz



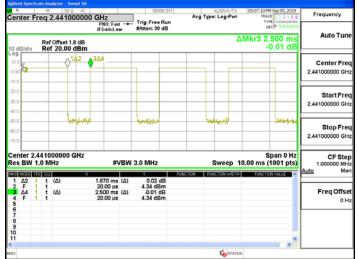
Dwell Time_GFSK_1M_DH1_2480MHz



Dwell Time_GFSK_1M_DH3_2402MHz



Dwell Time_GFSK_1M_DH3_2441MHz



Dwell Time_GFSK_1M_DH3_2480MHz

Renter Fre	RF 50 g								
	eq 2.480000	000 GHz PNO: Fas	Trie	SENSE INT	Avg Type:	Log-Pwr	03:07:36 PM Sep TRACE TYPE	23456	Frequency
10 dB/div	Ref Offset 1.8 o Ref 20.00 dB	IFGain:Lo		ten: 30 dB		Δ	Mkr3 2.50	0 ms 2 dB	Auto Tun
10.0 0.00	01	Δ2 3Δ4						1	Center Fre 2.480000000 GH
20.0									Start Fre 2.480000000 GH
50.0 4 9 60.0 70.0		iferen and		webgigerij		apriced		laine and	Stop Fre 2.480000000 GF
Center 2.43 Tes BW 1.0			/BW 3.0			weep 1	Spar 0.00 ms (100		CF Ste 1.000000 Mi Auto Mi
1 Δ2 1 2 F 1 3 Δ4 1 4 F 1 6 7	t (Δ) t t (Δ) t	270.0 µs 270.0 µs 2.500 ms 270.0 µs	(Δ)	0.05 dB 59 dBm 0.02 dB 59 dBm	INC ION		PONCTION VA		Freq Offs
8 9 10 11									

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Dwell Time_GFSK_1M_DH5_2402MHz

Agilent Spect										
Center F		50 R AC	GHz		SENSE:INT	Avg Typ	ALIGNAUTO E: Log-Pwr	03:08:02 PM TRACE		Frequency
			PNO: Fast IFGain:Low		ee Run 30 dB			DET	PNNNNN	
10 dB/div		set 1.8 dB).00 dBm					Δ	Mkr3 3.7 0	/50 ms .01 dB	Auto Tun
10.0					3∆4					Center Fre
0.00		Xa		Ť					7 - F	2.40200000 GH
20.0										
30.0										Start Fre 2.402000000 GH
-40.0	-	44		14460					ener	
60.0		-		and a second					441.441	Stop Fre
70.0				-						2.402000000 GH
Center 2. Res BW		000 GHz	#V	BW 3.0 MH	z		Sweep 1	Sp 5.00 ms (1	an 0 Hz 001 pts)	CF Ste 1.000000 MH
	AC SCL 1 t (Δ)	×	2.925 ms	(A) 0.0	2 dB	NCTION FUI	NCTION WIDTH	FUNCTION	walue 🛆	Auto Ma
2 F 3 Δ4	1 t 1 t (Δ)		3.420 ms 3.750 ms	4.99 (Δ) 0.0	dBm 1 dB					Freq Offse
4 F 6	1 t		3.420 ms	4.99	dBm					01
7										
8 9 10										
11				M					>	
sg							🗞 STATUS	ŝ		

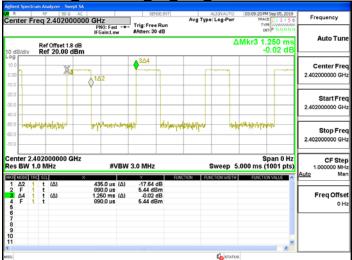
Dwell Time_GFSK_1M_DH5_2441MHz



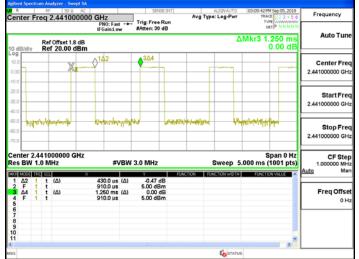
Dwell Time_GFSK_1M_DH5_2480MHz

Agilent Spect	rum Analyzer - Swept SA							
R Center F	reg 2.40200000		SENSE: IN		ALIGNAUTO e: Log-Pwr	03:09:20 PM Se TRACE	2 3 4 5 6	Frequency
	Ref Offset 1.8 dB Ref 20.00 dBm	PNO: Fast IFGain:Low	Trig: Free Run #Atten: 30 dB		•	Mkr3 1.25	NNNN	Auto Tune
10 dB/div 10.0 0.00	Ker 20.00 dBm	7	3∆4					Center Fred 2.402000000 GH:
-20.0								Start Free 2.402000000 GH
-50.0 -70.0	ukrisekukelevitet.	p the second	th ph	in the states		peikipsisperia		Stop Fre 2.402000000 GH
Center 2. Res BW		#VBW	3.0 MHz	FUNCTION FU		.000 ms (10		CF Step 1.000000 MH Auto Ma
1 Δ2 2 F 3 Δ4 4 F 5 6 7	t (Δ) t t (Δ) t	435.0 μs (Δ) 890.0 μs 1.250 ms (Δ) 890.0 μs	-17.64 dB 5.44 dBm -0.02 dB 5.44 dBm					Freq Offse 0 H
8 9 10 11 <			al.		S STATU	8	*	

Dwell Time_π4DQPSK_2M_DH1_2402MHz



Dwell Time_π4DQPSK_2M_DH1_2441MHz



Dwell Time_π4DQPSK_2M_DH1 2480MHz

R R	RF 50 & AC		SENSE: IN		LIGNAUTO	03:10:06 PM Sep 05, 2019	
enter F	req 2.48000000	PNO: Fast	Trig: Free Run	Avg Type:	Log-Pwr	TRACE 1 2 3 4 5 6 Type www.www	<u> </u>
		IFGain:Low	#Atten: 30 dB			DET P NNNNN	Auto Tun
dB/div	Ref Offset 1.8 dB Ref 20.00 dBm				Δ	Mkr3 1.250 ms -0.02 dB	
0.0			▲3∆4				Center Fre
	1 Xa					<u>п</u> (2.48000000 GH
					-		
0							Start Fre
					_		2.480000000 GH
.0	hugodinaros	material	marten	hipeditally	-	hiphat, Walkmaps	Stop Fre
							2.480000000 GH
Inter 2	480000000 GHz					Span 0 Hz	CF Ste
	1.0 MHz	#VBW	3.0 MHz	s	weep 5	.000 ms (1001 pts)	1.000000 MH
	RC SCL X	435.0 us (A)	-17.02 dB	FUNCTION FUNC	TION WIDTH	FUNCTION VALUE	Auto Ma
1 Δ2 2 F 3 Δ4	t t (Δ)	1.145 ms 1.250 ms (Δ)	2.25 dBm -0.02 dB				Freq Offse
	t t	1.145 ms	2.25 dBm				01
4 F 1							L
3							
8 9 0							
1							
3							

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Dwell Time_π4DQPSK_2M_DH3_2402MHz

Agilent Spectrum Ana						
Center Freq 2	2.402000000		SENSE:INT	Aug Type: Log-Pwr	03:10:35 PM Sep 05, 2019 TRACE 1 2 3 4 5 6 TYPE	Frequency
	Offset 1.8 dB 20.00 dBm	PNO: Fast +++ IFGain:Low	#Atten: 30 dB	Δ	Mkr3 2.500 ms -0.02 dB	Auto Tun
			1Δ2 3Δ4			Center Fre 2.402000000 GH
20.0						Start Fre 2.402000000 GH
50.0 60.0 70.0			haven	Longer 1944	ليبينها	Stop Fre 2.402000000 GH
Center 2.40200 Res BW 1.0 MI	Hz	#VBW	3.0 MHz		Span 0 Hz 0.00 ms (1001 pts)	CF Ste 1.000000 Mi Auto Mi
2 F 1 t	χ (Δ)	1.690 ms (Δ) 2.430 ms 2.500 ms (Δ) 2.430 ms	-0.86 dB 5.63 dBm -0.02 dB 5.63 dBm	FUNCTION WIDTH	FUNCTION VALUE	Freq Offs
10 11				Co STATUS	*	

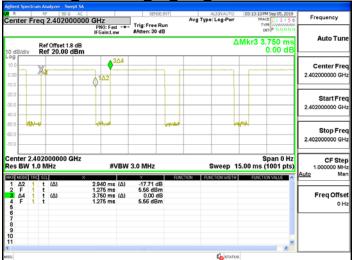
Dwell Time_π4DQPSK_2M_DH3_2441MHz



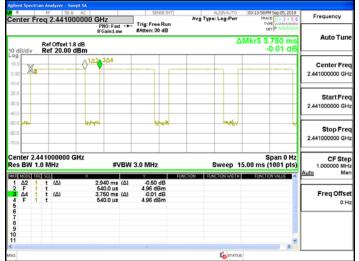
Dwell Time_π4DQPSK_2M_DH3_2480MHz

	Analyzer - Swept S							
	q 2.4800000			SENSE: INT	ALIGN Avg Type: Log		2:10 PM Sep 05, 2019 TRACE 1 2 3 4 5 6	Frequency
R 10 dB/div R	Ref Offset 1.8 dB	PNO: Fast IFGain:Lov		ee Run 30 dB		ΔMkr	3 2.500 ms 0.01 dB	Auto Tune
10.0 0.00	X	↓	3∆4		- 17			Center Free 2.480000000 GH
-20.0			_					Start Free 2.480000000 GH
-50.0	*	himmen.		househog		hu, ani ilia		Stop Free 2.480000000 GH
Center 2.480 Res BW 1.0			/BW 3.0 MH	-		· .	Span 0 Hz ms (1001 pts)	CF Ste 1.000000 MH Auto Ma
1 Δ2 1 2 F 1 3 Δ4 1 4 F 1 6 7	t (Δ) t t (Δ) t	1.680 ms 960.0 μs 2.500 ms 960.0 μs	(Δ) -0.1 3.30	7 dB dBm 1 dB				Freq Offse 0 H
8 9 10 11 <					4	STATUS	,×	

Dwell Time_π4DQPSK_2M_DH5_2402MHz



Dwell Time_π4DQPSK_2M_DH5_2441MHz



Dwell Time_π4DQPSK_2M_DH5_ 2480MHz

		alyzer - Swept SA							
Center l	⊳ Freq	2.48000000	0 GHz			ALIGNAUTO ype: Log-Pwr	03:14:40 PM Sep 05 TRACE 1 2 TYPE 0000	3456	Frequency
			PNO: Fast IFGain:Lov		dB		DET P N	NNNN	Auto Tun
10 dB/div		f Offset 1.8 dB f 20.00 dBm					Mkr3 3.750 0.00		
10.0			,	01∆2	3∆4			—I[Center Fre
10.00			2					f	2.480000000 GH
20.0	_							⊣lr	Start Fre
40.0						+			2.480000000 GH
50.0		بهبيها		ليتوجه		une		n l	
-70.0	-					_			Stop Fre 2.480000000 GH
Center 2 Res BW		000000 GHz 1Hz	#V	BW 3.0 MHz		Sweep 1	Span 5.00 ms (1001	pts)	CF Ste 1.000000 MH
1 Δ2	TAC SC 1 t	(Δ)	2.925 ms	(Δ) -0.12	dB	FUNCTION WIDTH	FUNCTION VALU		<u>Auto</u> Ma
1 Δ2 2 F 3 Δ4 4 F	1 t 1 t	(Δ)	3.540 ms 3.750 ms	3.29 di (Δ) 0.00	dB				Freq Offs
4 F 6	1 t		3.540 ms	3.29 di	sm				0 H
7									
8 9 10									
< so						G STATU		2	
~						No of Allo	,		

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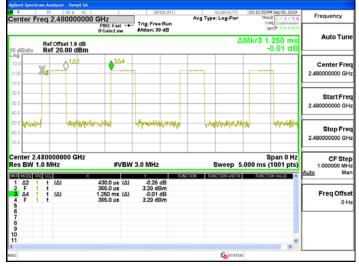
Dwell Time_8DPSK_3M_DH1_2402MHz

PNO: Fast - Trig IFGain:Low #Att	3∆4		ΔMkr3 1.25		Auto Tur enter Fre
····· Φ ^{1Δ2}	304		••••		
					Start Fr
- naturatinglesensel	**	ntransfordet	brenanystan		Stop Fr 000000 G
#VBW 3.01			o 5.000 ms (100	01 pts) 1.0	CF St 000000 M M
1.140 ms 5. 1.250 ms (Δ)	0.25 dB 57 dBm 0.01 dB	- HON FUNCTION W			req Offs 01
	d			*	
	#VBW 3.0 430.0 μs (Δ) 1.140 ms 5. 1.250 ms (Δ)	#VBW 3.0 MHz #VBW 3.0 MHz 430.0 us (Δ) - 0.25 dB 1.140 ms - 6.57 dBm 1.250 ms (Δ) - 0.01 dB	#VBW 3.0 MHz Sweep 430.0 us (a) 0.26 dB 4004000 10040000 1.140 ms 5.57 dBm 1004000 10040000	#VBW 3.0 MHz Sweep 5.000 ms (10) 430.0 us (a) 0.25 dB 1.140 ms 5.67 dBm 1.250 ms (a) 0.01 dB	430.0 ms 6.57 dBm 100 store

Dwell Time_8DPSK_3M_DH1_2441MHz

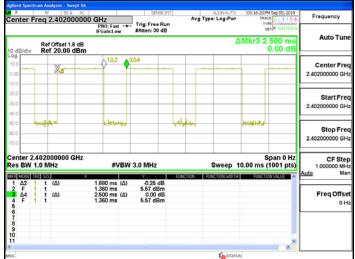


Dwell Time_8DPSK_3M_DH1_2480MHz

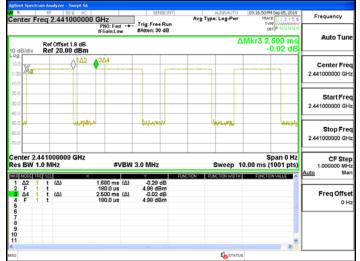


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Dwell Time_8DPSK_3M_DH3_2402MHz



Dwell Time_8DPSK_3M_DH3_2441MHz



Dwell Time_8DPSK_3M_DH3_2480MHz

Agilent Spectr	RF 50.9 AC				
	req 2.48000000	00 GHz	Avg Type:	LIGNAUTO 03:17:13PM 5 Log-Pwr TRACE	Frequency
		PNO: Fast Trig: Fre- IFGain:Low #Atten: 3	0 dB	DET	PNNNNN
10 dB/div	Ref Offset 1.8 dB Ref 20.00 dBm	1		ΔMkr3 2.5 0	00 ms
10.0	3.4		∆4		Center Fre
0.00	X	102			2.480000000 GH
20.0		Q			
30.0					2.480000000 GH
40.0	Lander by Pal	is contained	attan .		- Int
60.0					Stop Fre 2.48000000 GH
70.0					2.48000000 011
Center 2. Res BW 1	480000000 GHz 1.0 MHz	#VBW 3.0 MHz	s	Sp weep 10.00 ms (1	an 0 Hz CF Ste 001 pts) 1.000000 MH
MKR MODE T	RC SOL	K ¥	FUNCTION FUNC	TION WIDTH FUNCTION	Auto Ma
1 <u>A2</u> 2 F 3 <u>A4</u>	t (Δ) t t (Δ)	1.690 ms (Δ) -18.38 2.200 ms 2.83 d 2.500 ms (Δ) 0.00	Bm		FreqOffse
3 ∆4 4 F 6	t	2.200 ms 2.93 d	Bm		OH
7					
8 9 10					
11					× *
ISG				Ko STATUS	

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(ボチラカ 乳切) "比較容認本性質別風(人体的資質) 「同時比除的資源」の一体的学校の合理時間の人。本報 学校学校の 音型時間 小 个可能力後衰。 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_edocument.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 Com-pany'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 company the function of the Documents. This document company the function of the document is advised that intervention document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document company for the function of the document is advised that information document documents for the function of the document for the document. 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.

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Dwell Time_8DPSK_3M_DH5_2402MHz

R	RF	.402000000	CHa	_	SENSE: INT	ALIGNA Avg Type: Log-	UTO 03:17:44	PM Sep 05, 2019 ACE 1 2 3 4 5 6	Frequency
Inter P	req 2	402000000	PNO: Fas IFGain:Lo		Trig: Free Run #Atten: 30 dB	118 1 Mar 198	1	DET P NNNN	
dB/div		Offset 1.8 dB 20.00 dBm					ΔMkr3 3	3.750 ms 0.00 dB	Auto Tur
9				01	Δ2, 3 <u>Δ</u> 4			}	Center Fr 2.402000000 G
10									Start Fr 2.40200000 G
1.0	-	hay			المهر	herring		t y myn	Stop Fr 2.40200000 G
enter 2. es BW 1		00000 GHz Iz	#\	/BW 3	.0 MHz	Swee	p 15.00 ms	Span 0 Hz (1001 pts)	CF Sto 1.000000 M
R MODE T		×	2.940 ms	(4)	-0.25 dB	INCTION FUNCTION V	VIDTH FUNC	TION VALUE	<u>Auto</u> M
Δ2 F Δ4 F	t	(Δ) (Δ)	2.940 ms 2.940 ms 3.750 ms 2.940 ms	-	5.56 dBm 0.00 dB 5.56 dBm				Freq Offs
5 7 3 9									
								2	1

Dwell Time_8DPSK_3M_DH5_2441MHz



Dwell Time_8DPSK_3M_DH5_2480MHz

R	rum Analyzer	UR AC		SENSE:INT	ALIGNAUTO	03:18:43 PM Sep 05, 2019	
	reg 2.480				Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6	Frequency
			PNO: Fast ** IFGain:Low	#Atten: 30 dB		DETPNNNNN	
dB/div	Ref Offse Ref 20.0				۵	Mkr3 3.750 ms 0.01 dB	Auto Tu
0				142,344			Center Fr 2.480000000 G
							2.400000000
1.0							Start Fr 2.480000000 G
1.0			_				2.48000000 G
1.0		myan		hhou	hypeka.d	Marine	Stop Fr
1.0		_					2.480000000 G
	48000000 1.0 MHz	0 GHz	#VB	V 3.0 MHz	Sweep 1	Span 0 Hz 5.00 ms (1001 pts)	CF St 1.000000 N Auto N
	RC SCL t (Δ)	×	2.940 ms (Δ		INCTION FUNCTION WIDTH	FUNCTION VALUE	Auto N
2 F Δ4	t t (Δ) t		3.720 ms 3.760 ms (Δ 3.720 ms	3.26 dBm			Freq Offe
5							
1				14		>	
					Ko STATUS	i i	

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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

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

~ End of Report ~

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