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TEST REPORT For FCC

Test Report No.	:	2008110010
Date of Issue	:	Novermber 29, 2008
FCC ID	:	WF5MP-300BT
Model/Type No.	:	MP-300BT and LK-P35B
Kind of Product	:	Mobile Printer
Applicant	:	SEWOO TECH CO.,LTD.
Applicant Address	:	Doosung Bd.689-20,Kumjung-dong,kunpo-si,Kyunggi-do, 435-862,Korea
Manufacturer	:	SEWOO TECH CO.,LTD.
Manufacturer Address	:	Doosung Bd.689-20,Kumjung-dong,kunpo-si,Kyunggi-do, 435-862,Korea
Contact Person	:	Hyung Hee Han / Senior Engineer
Telephone	:	+82-31-459-8200
Received Date	:	October 10, 2008
Test period	:	Start : October 17, 2008 End : November 04, 2008
Test Results	:	☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

Tested by

Kyu-Chul, Shin
Test Engineer
Date: November 04, 2008

Reviewed by

Young-Joon, Park
Technical Manager
Date: November 04, 2008

REPORT REVISION HISTORY

Date	Revision	Page No
November 04, 2008	Issued (2008110010)	All

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1.0 General Product Description

Equipment model name	: MP-300BT
Serial number	: Prototype
EUT condition	: Pre-production, not damaged
Antenna type	: Chip antenna Gain 3.5dBi
Frequency Range	: 2402 ~ 2480 MHz(Bluetooth)
RF output power	: 1.58 dBm Peak Conducted (GFSK)
Number of channels	: 79(Bluetooth)
Type of Modulation(Data Rate)	: GFSK
Power Source	: Li-Polymer Battery (DC 7.4V)

1.1 Tested Frequency

	LOW	MID	HIGH
Frequency (MHz)	2402	2441	2480

1.2 Tested Mode

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- Following channel(s) was (were) selected for the final test as listed below.

Tested Ch	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5

1.3 Model Differences

MP-300BT and LK-P35B are identical to each other only except for model designations at requests of a buyer.

1.4 Device Modifications

The following modifications were necessary for compliance:
Not applicable

1.5 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
SWITCHING POWER ADAPTOR	Dongguan Shilong Fuhwa Electronic Co., Ltd.	UE09WCP-084080SPC	UE080823HKSD1-R
Personal Computer	Samsung Electronics Co,. Ltd.	DB-P73	BL5497DQ300097T
LCD Monitor	Innocom Technology(Shenzhen) Co., Ltd.	SE198WFPf	CN-ORR716-72872-81T-OWG
USB Mouse	SAMSUNG ELECTRO-MECHANICS	OMS3CB	OMS3CBGGDRT0303009878
PS/2 Mouse	KYE SYSTEMS CORP.	N3+ Optical	K045205991
PS/2 Keyboard	Hewlett-Packard Company	5219	BN5017686
Notebook	TOSHIBA CORPORATION	PSL48K-00L00K	Z7037782R
DC POWER SUPPLY	Agilent Technologies	E3632A	MY40000004

1.6 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.7 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.8 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	**FCC**	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	93250
JAPAN	**VCCI**	10 meter Open Area Test Site and one conducted site.	R-948, C-986
KOREA	**KCC**	EMI (10 meter Open Area Test Site and two conducted sites) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	No. 51, KR0025
International	**KOLAS**	EMC	
Europe	**GLAS**	EMC EN 55011, EN 55022, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 50130-4, EN 55024, EN 61204-3, EN 60601-1-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11	No.13000796-02

2.0 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	Carrier Frequency Separation	> 25 kHz	Conducted	C
15.247(a)	Number of Hopping Frequencies	> 75 hops		C
15.247(a)	20 dB Bandwidth	< 1 MHz		C
15.247	Dwell Time	< 0.4 seconds		C
15.247(b)	Transmitter Output Power	< 1Watt		C
15.247(d)	Conducted Spurious emission	> 20 dBc		C
15.247(d)	Band Edge	> 20 dBc		C
15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)	Radiated	C
15.207	AC Conducted Emissions	EN 55022	Line Conducted	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:
- FCC Part 15.247, ANSI C63.4-2003

2.1 Technical Characteristic Test

2.1.1 Carrier Frequency Separation

Test Location

RF Test Room

Test Procedures

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.
After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:
Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)
RBW = 30 kHz (≥ 1% of the span) Sweep = auto
VBW = 30 kHz (≥ RBW) Detector function = peak
Trace = max hold

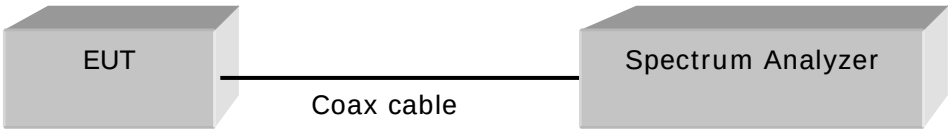


Figure 1 : Measurement setup for the carrier frequency seperation

Limit

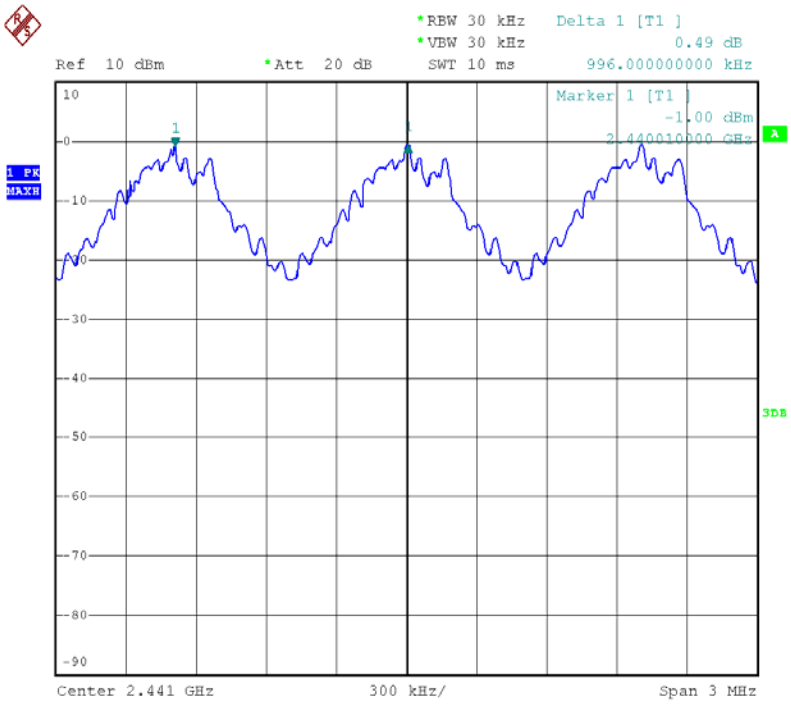
The EUT shall have hopping channel carrier frequencies separated minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Test Results

Channel	Adjacent Hopping Channel Separation (kHz)	Minimum Bandwidth (kHz)	Result
2441MHz	996.0	25	Complies

See next pages for actual measured spectrum plots.

Carrier Frequency Separation



2.1.2 Number of Hopping Frequencies

Test Location

RF Test Room

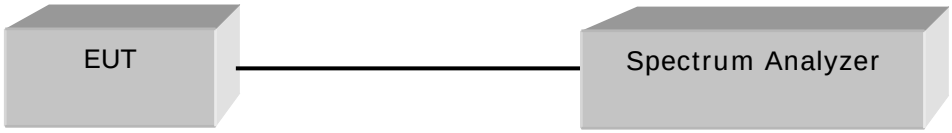
Test Procedures

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Frequency range 1:Start = 2389.5 MHz, Stop = 2439.5 MHz
2:Start = 2439.5 MHz, Stop = 2489.5 MHz

Span = 50 MHz
RBW = 300 kHz (≥ 1% of the span) Sweep = auto
VBW = 300 kHz (≥ RBW) Detector function = peak
Trace = max hold



Limit

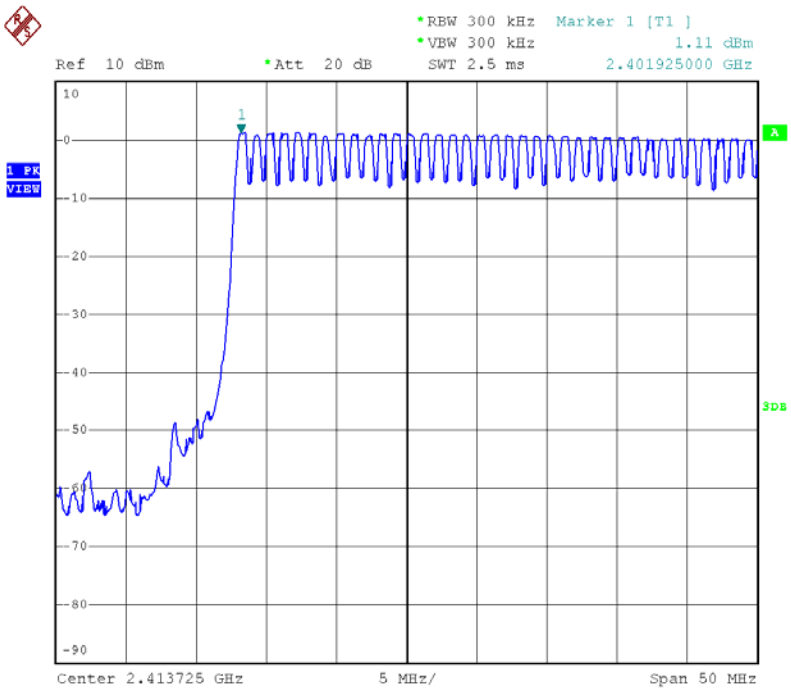
The EUT in the 2400-2483.5 MHz band shall use at least 75 channels.

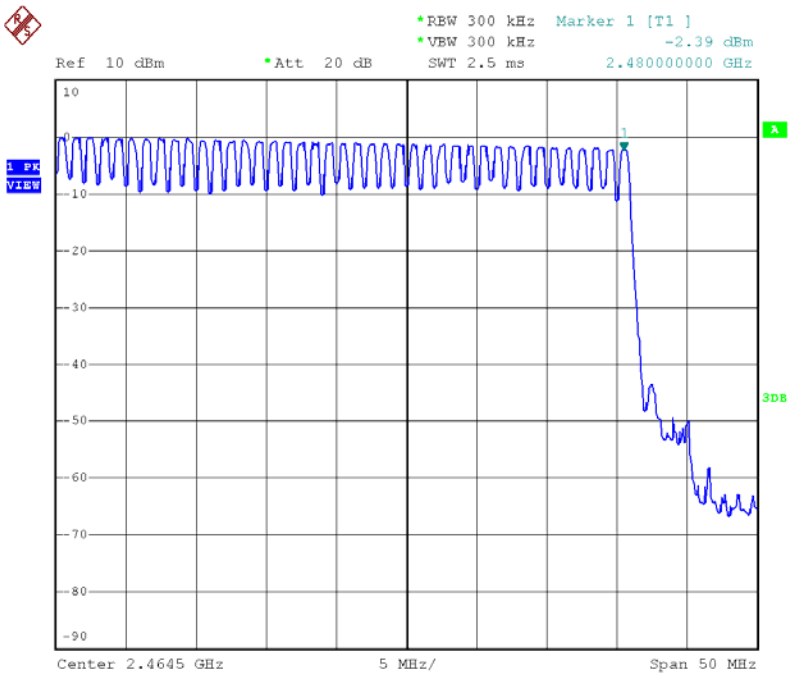
Test Results

Total number of Hopping Channels	Result
79	Complies

See next pages for actual measured spectrum plots.

Number of Hopping Frequencies





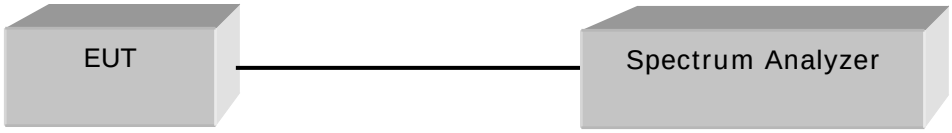
2.1.3 20 dB bandwidth

Test Location
RF Test Room

Test Procedures

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.
After the trace being stable, Use the marker-to peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:
Center frequency = the highest, middle and the lowest channels
Span = 2 MHz (approximately 2 or 3 times of the 20 dB bandwidth)
RBW = 30 kHz (≥ 1% of the span) Sweep = auto
VBW = 30 kHz (≥ RBW) Detector function = peak
Trace = max hold



Limit

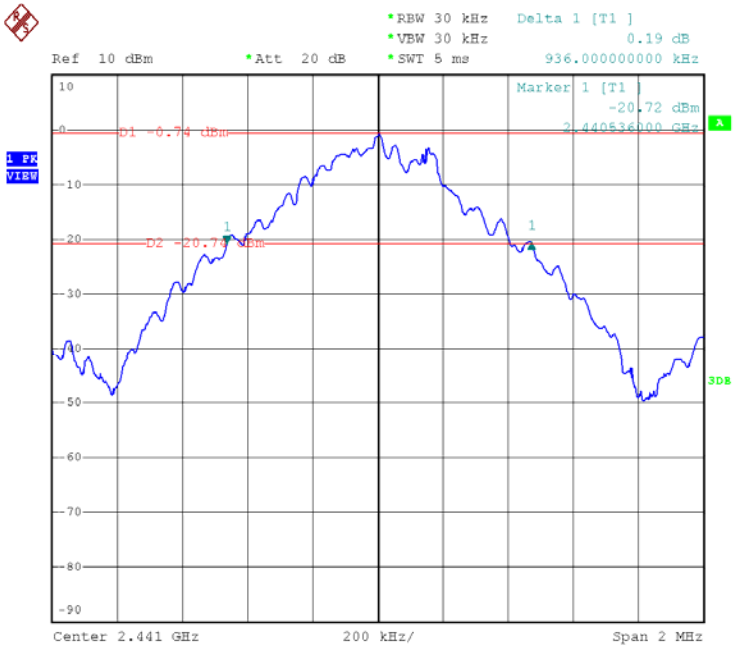
The Transmitter shall have a maximum 20 dB bandwidth of 1 MHz.

Test Results

Frequency (MHz)	Channel Number.	Measured Bandwidth (MHz)	Result
2441	39	0.936	Complies

See next pages for actual measured spectrum plots.

20 dB Bandwidth



2.1.4 Time of Occupancy (Dwell Time)

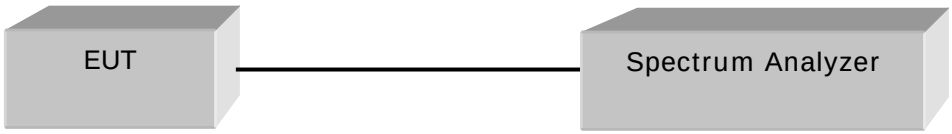
Test Location

RF Test Room

Test Procedures

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.

The spectrum analyzer is set to:
Center frequency = the highest, middle, and the lowest channels
Span = zero
RBW = 1 MHz Trace = max hold
VBW = 1 MHz (≥ RBW) Detector function = peak
Sweep = as necessary to capture the entire dwell time per hopping channel



Limit

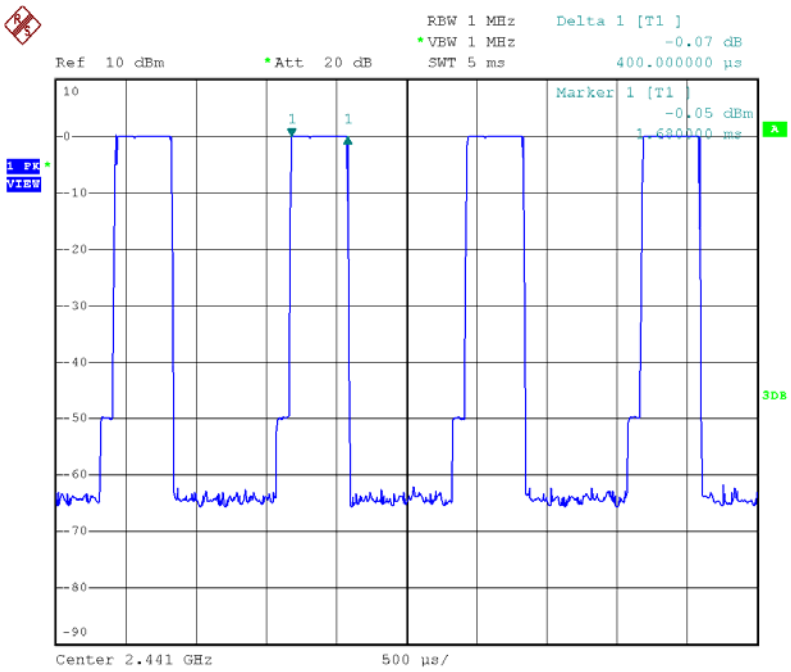
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test Results

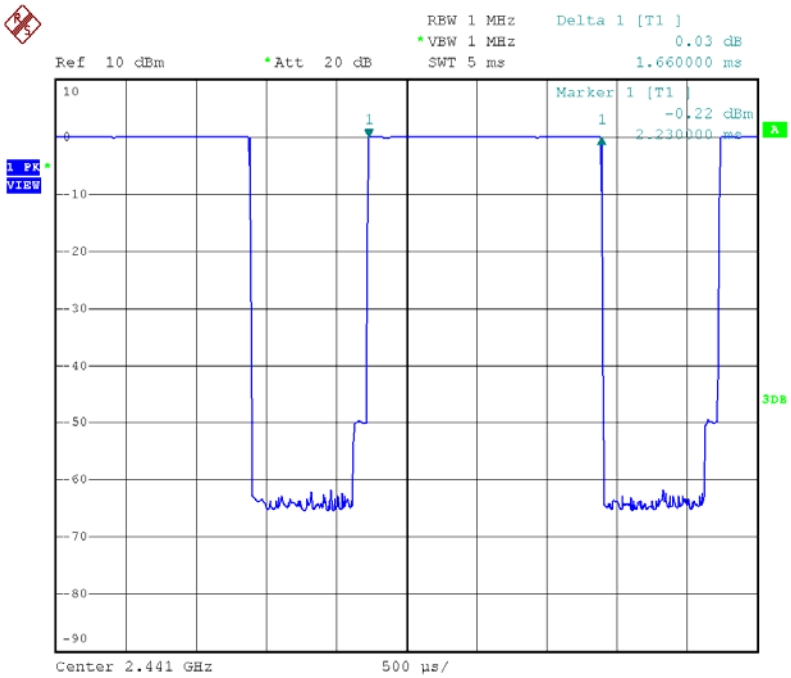
Channel Number	Channel Frequency (MHz)	Packet Type	Test Results	
			Dwell Time (ms)	Result
39	2441	DH 1	128.04	Complies
		DH 3	267.53	Complies
		DH 5	308.82	Complies

See next pages for actual measured spectrum plots.

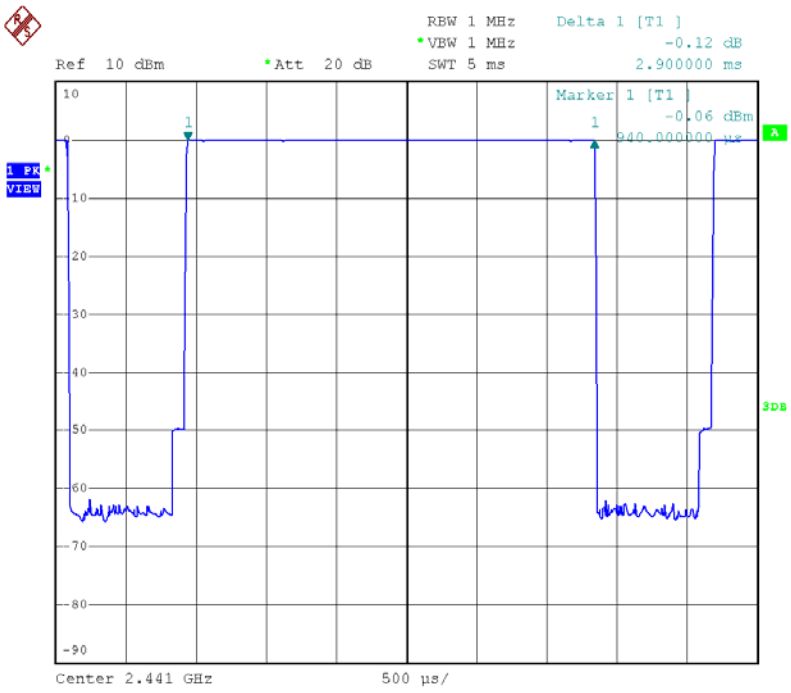
Time of Occupancy for PACKET Type DH 1



Time of Occupancy for PACKET Type DH 3



Time of Occupancy for PACKET Type DH 5



2.1.5 Maximum peak Conducted Output Power

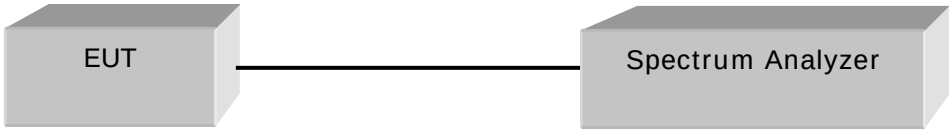
Test Location

RF Test Room

Test Procedures

The maximum peak conducted output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:
Center frequency = the highest, middle, and the lowest channels
Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)
RBW = 1 MHz (greater than the 20 dB bandwidth of the emission being measured)
VBW = 1 MHz (≥ RBW) Detector function = peak
Trace = max hold Sweep = auto



Limit

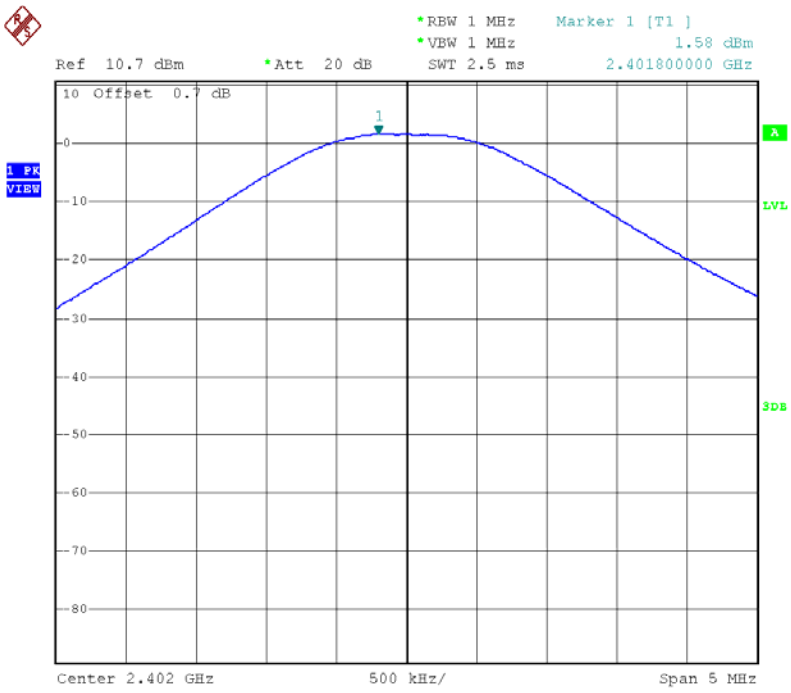
< 1 W

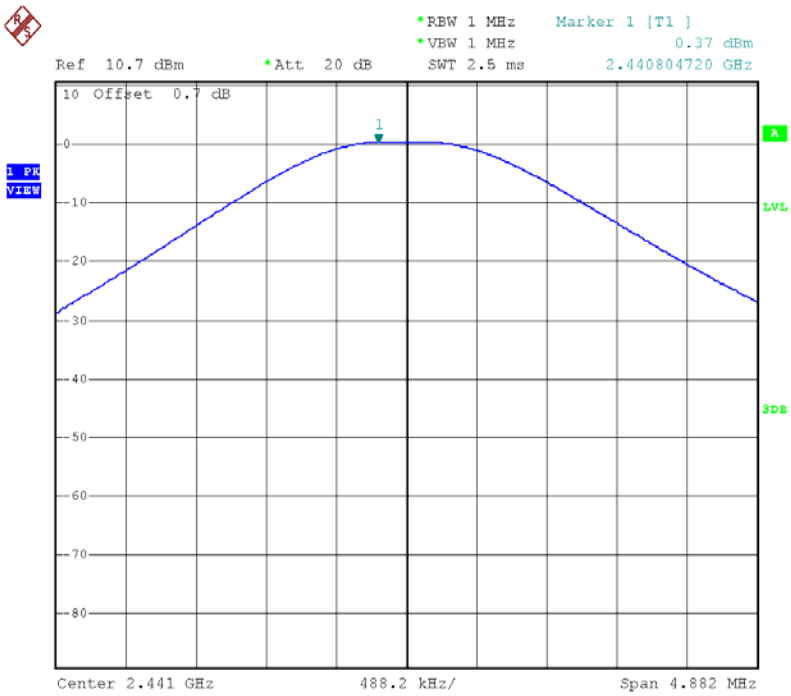
Test Results

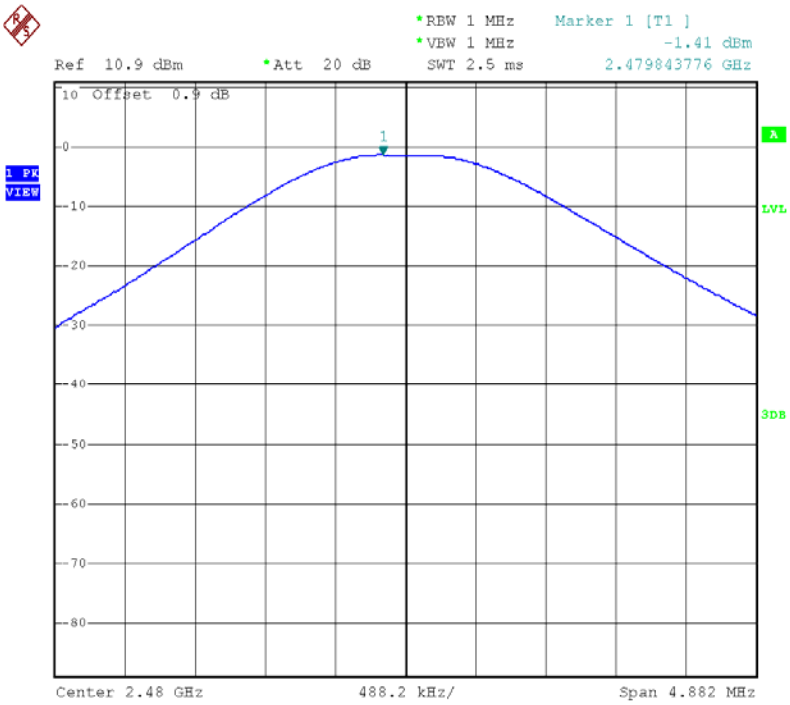
Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	1.58	1.44	Complies
2441	39	0.37	1.09	Complies
2480	78	-1.41	0.72	Complies

See next pages for actual measured spectrum plots.

Maximum peak Conducted Output Power







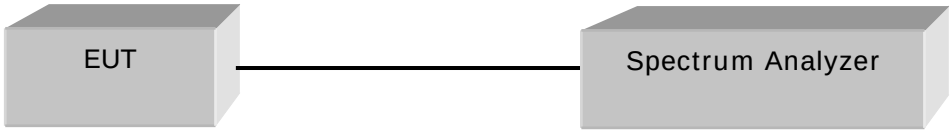
2.1.6 Band-edge

Test Location
RF Test Room

Test Procedures

The bandwidth at 20 dB down from the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:
Center frequency = the highest, middle, and the lowest channels
RBW = 100 kHz
VBW = 100 kHz (≥ RBW)
Span = 100 MHz
Detector function = peak
Trace = max hold
Sweep = auto



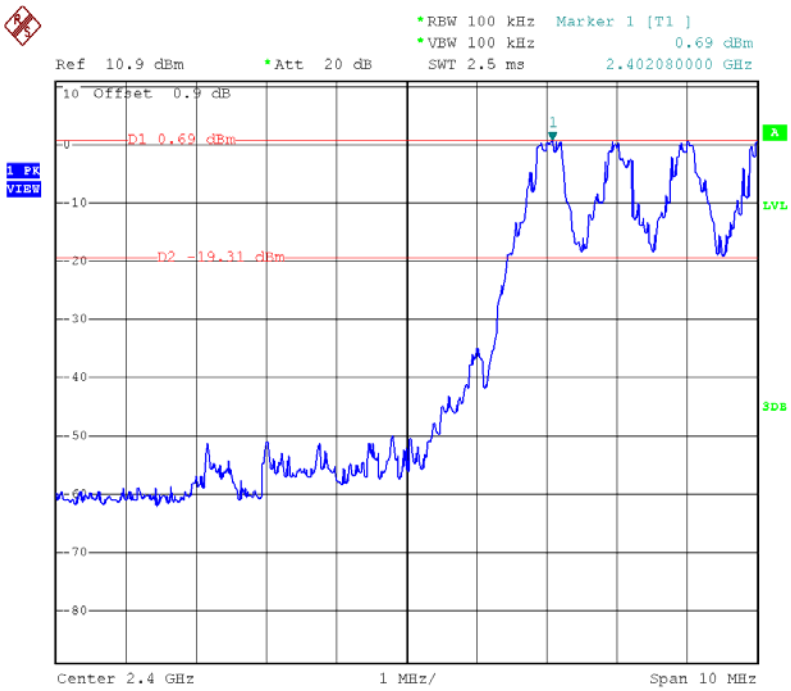
Limit

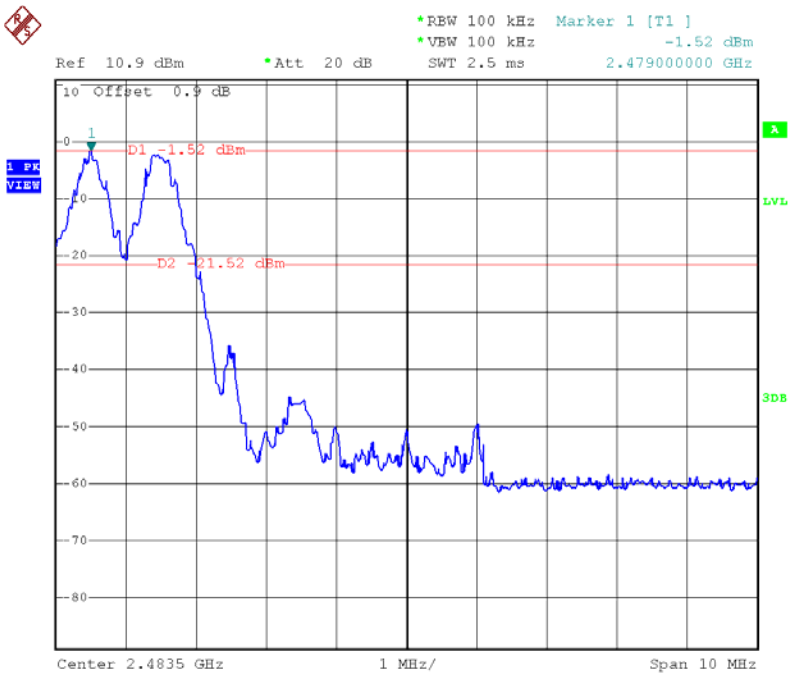
> 20 dBc

Test Results

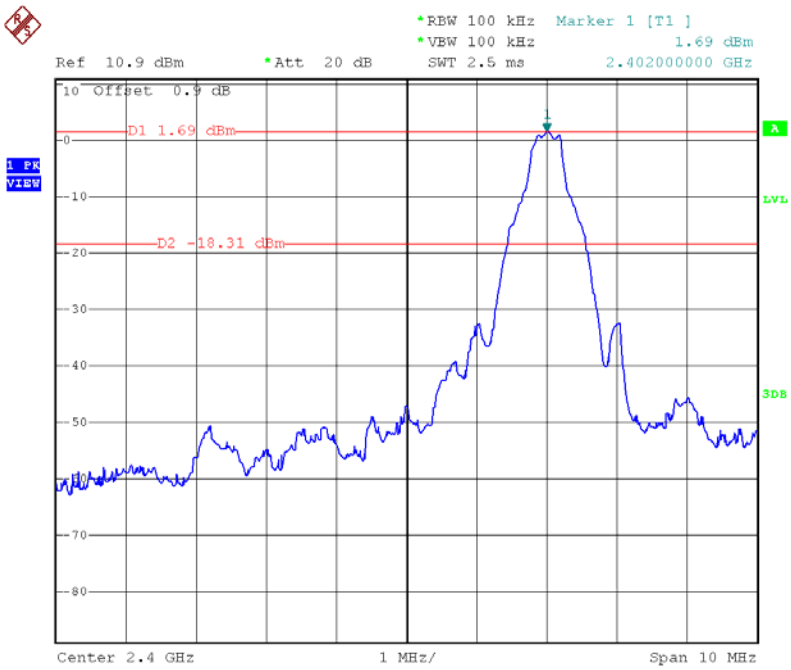
All conducted emission in any 100 kHz bandwidth outside of the spectrum band was at least 20 dB lower than the highest inband spectral density.
Therefore the applying equipment meets the requirement.
See next pages for actual measured spectrum plots.

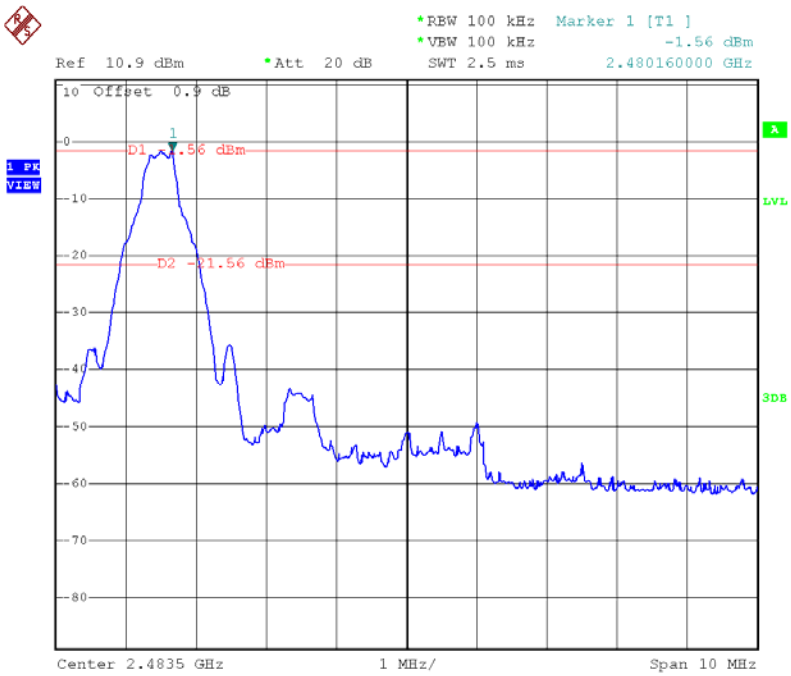
Band – edge (With Hopping)



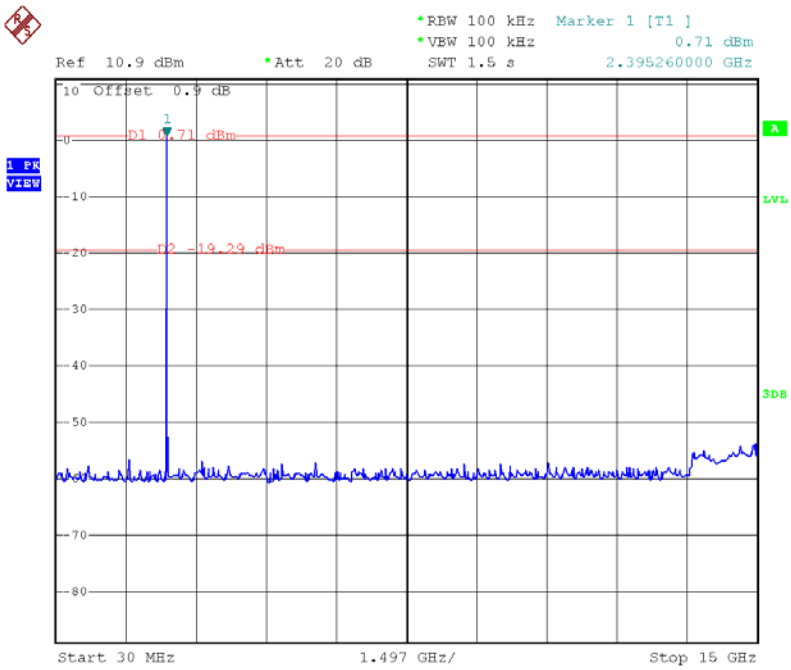


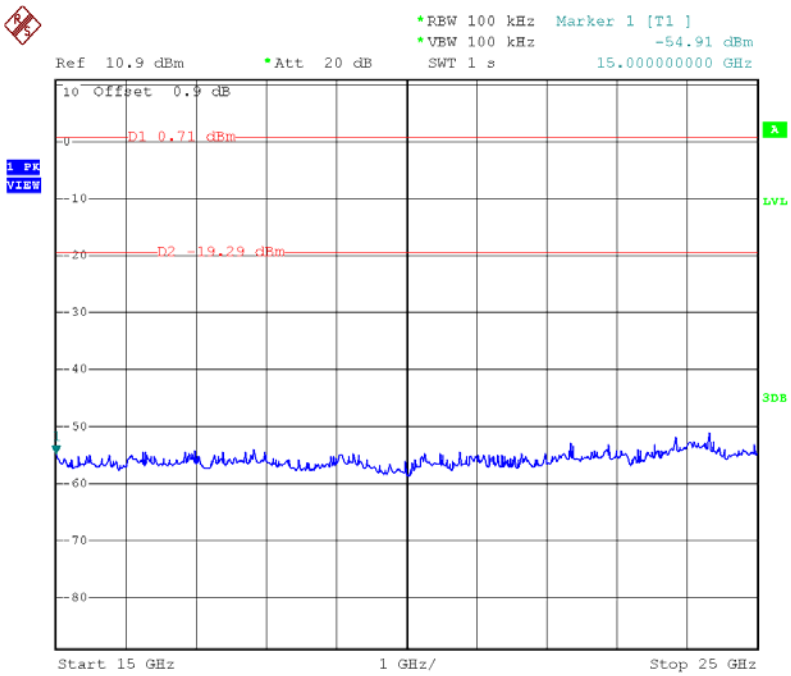
Band – edge (Without Hopping)



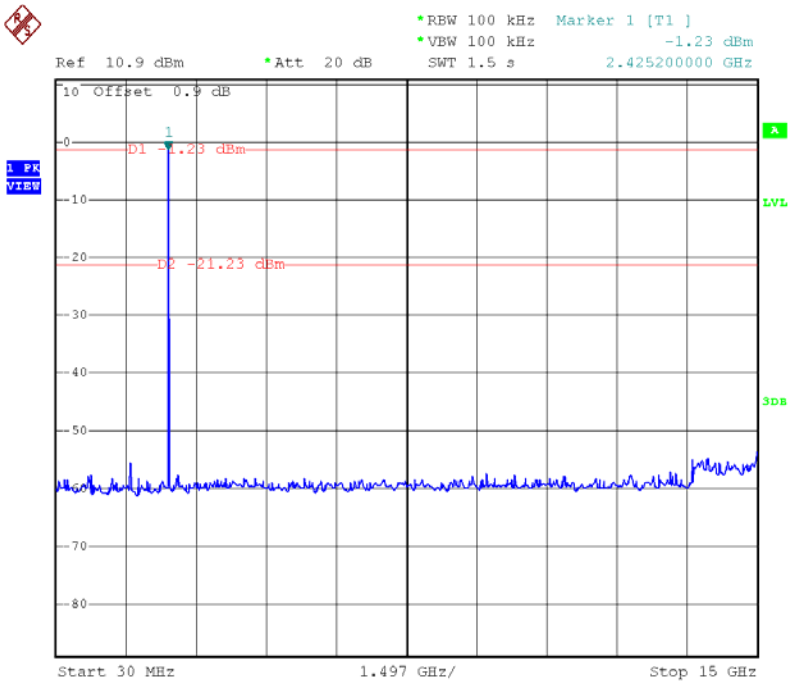


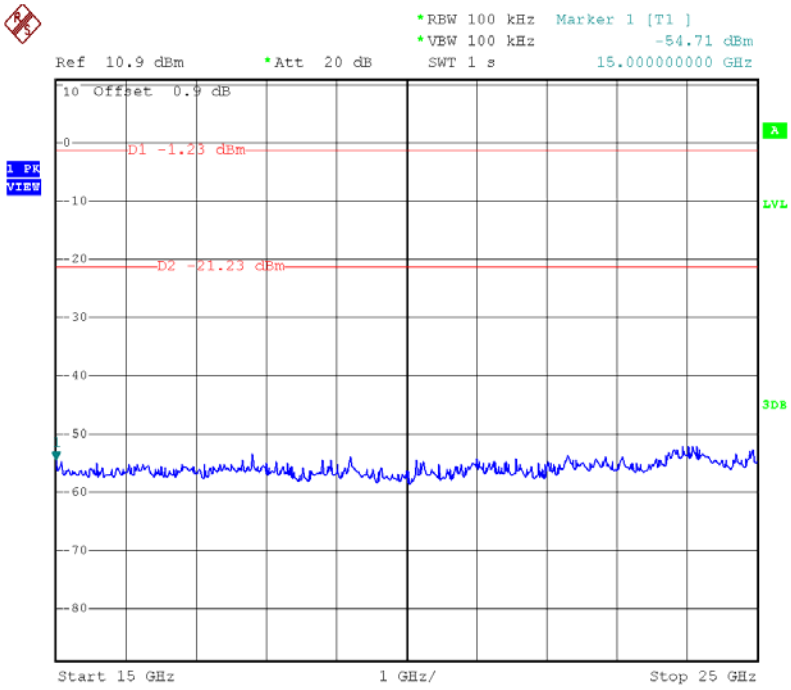
Band – edge (at 20 dB blow) – Low channel
Frequency Range = 30 MHz ~ 10th harmonic



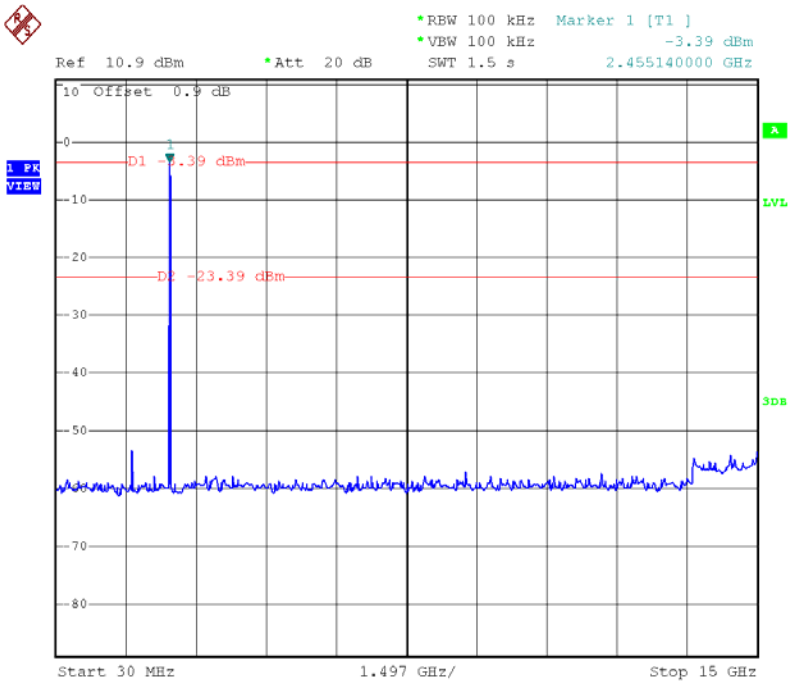


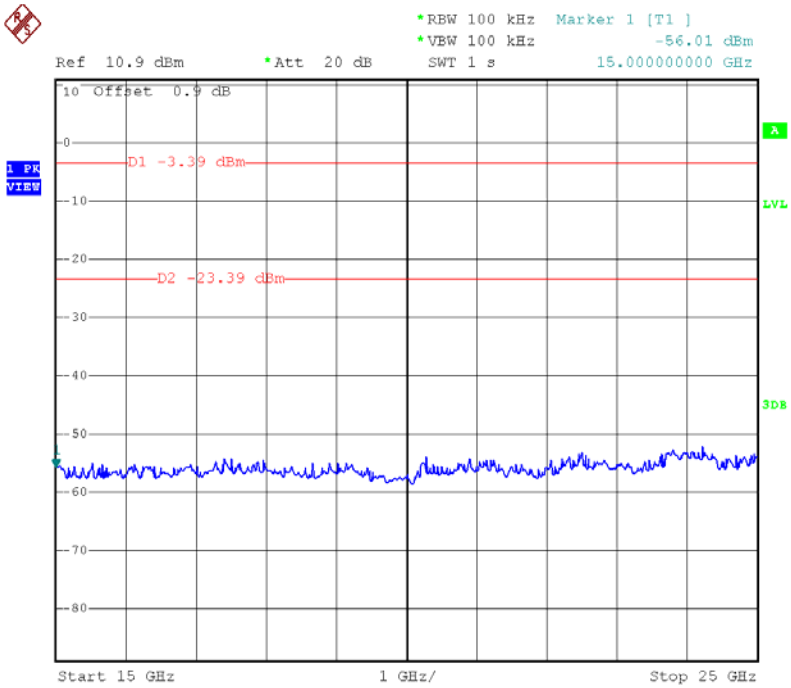
Band – edge (at 20 dB blow) – Mid channel
Frequency Range = 30 MHz ~ 10th harmonic





Band – edge (at 20 dB blow) – High channel
Frequency Range = 30 MHz ~ 10th harmonic





2.1.7 Field Strength of Emissions

Test Location

☒ Testing was performed at a test distance of 3 meter Open Area Test Site

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

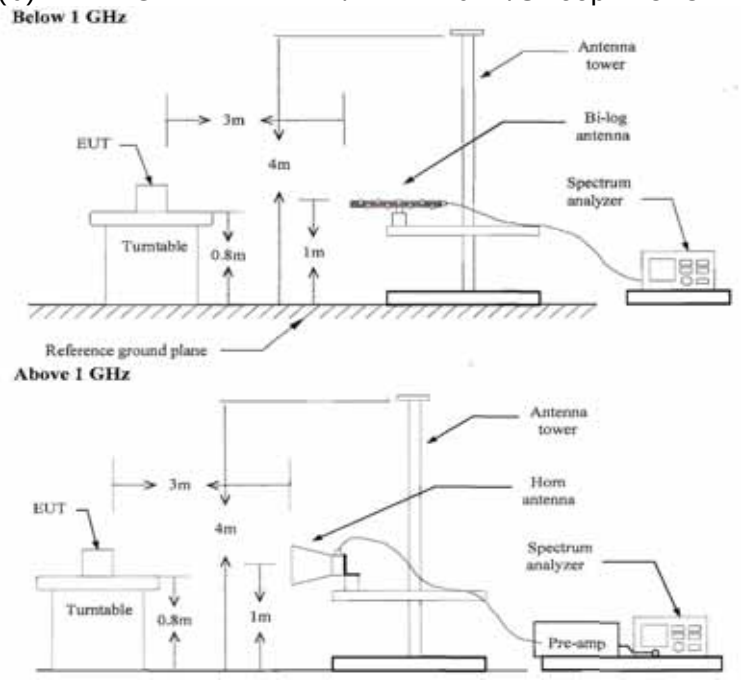
Below 1GHz :

RBW=100KHz/VBW=300KHz/Sweep=AUTO

Above 1GHz:

(a) PEAK:RBW=VBW=1MHz/Sweep=AUTO

(b) AVERAGE:RBW=1MHz/VBW=10Hz/Sweep=AUTO



Limit

- **15.209(a)**

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m
30-88	100**	40
88-216	150**	43.5
216-960	200**	46
Above 960	500	54

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Test Results

EUT	Mobile Printer	Measurement Detail	
Model	MP-300BT	Frequency Range	Below 1000MHz
Channel	Normal linking	Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
672.37	38.0	8.0	Quasi-Peak

Test Data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
54.84	20.8	V	1.0	6.2	0.3	40.0	27.3	12.7
95.50	16.3	H	4.0	9.3	0.8	43.5	26.4	17.1
371.00	22.5	V	1.0	12.7	2.7	46.0	37.9	8.1
430.10	16.0	V	3.0	14.1	3.0	46.0	33.1	12.9
666.72	13.6	H	2.0	18.2	3.9	46.0	35.7	10.3
672.37	15.9	H	2.0	18.2	3.9	46.0	38.0	8.0

H : Horizontal, V : Vertical

Test Results

EUT	Mobile Printer	Measurement Detail	
Model	MP-300BT	Frequency Range	1-25GHz
Channel	Channel 0	Detector function	Average/Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Average/Peak

Test Data

Frequency [MHz]	Reading A/P [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits/ Detector A/P [dBuV/m]	Result A/P [dBuV/m]
				Antenna	Amp.Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

* No emissions were detected at a level greater than 20dB below limit

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
No emissions were detected at a level greater than 20dB below limit.									

Test Results

EUT	Mobile Printer	Measurement Detail	
Model	MP-300BT	Frequency Range	1-25GHz
Channel	Channel 39	Detector function	Average/Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Average/Peak

Test Data

Frequency [MHz]	Reading A/P [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits/ Detector A/P [dBuV/m]	Result A/P [dBuV/m]
				Antenna	Amp.Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

* No emissions were detected at a level greater than 20dB below limit

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
No emissions were detected at a level greater than 20dB below limit.									

Test Results

EUT	Mobile Printer	Measurement Detail	
Model	MP-300BT	Frequency Range	1-25GHz
Channel	Channel 78	Detector function	Average/Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Average/Peak

Test Data

Frequency [MHz]	Reading A/P [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits/ Detector A/P [dBuV/m]	Result A/P [dBuV/m]
				Antenna	Amp.Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

* No emissions were detected at a level greater than 20dB below limit

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
No emissions were detected at a level greater than 20dB below limit.									

2.1.8 AC Conducted Emissions

Test Location
Shielded Room

Frequency Range of Measurement
150 kHz to 30 MHz

Instrument Settings
IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- **15.207(a)**

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency.

Test Results
The requirements are:

☒ Complies

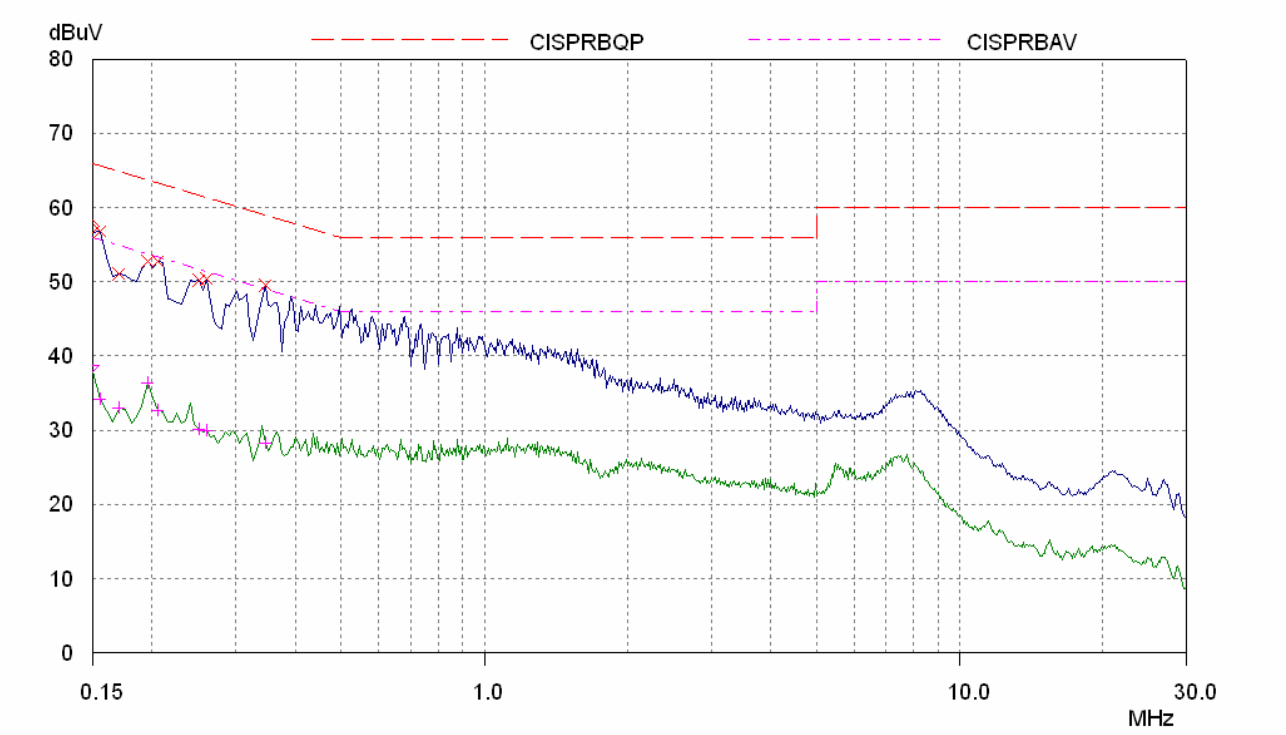
Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
0.16	56.8	8.9	Quasi-peak

Test Data

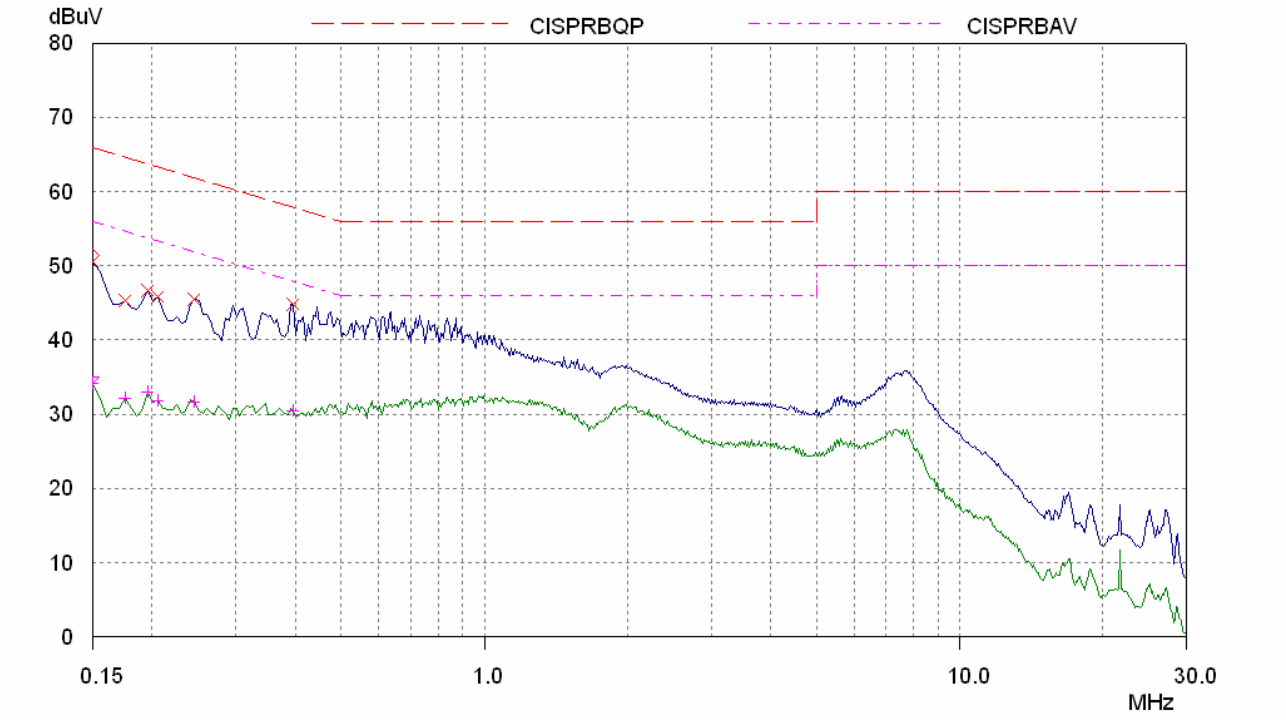
Frequency	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]
0.16	0.1	0.4	H	65.7	56.3	56.8	8.9	55.7	33.7	34.2	21.5
0.20	0.1	0.4	H	63.8	52.2	52.7	11.1	53.8	35.9	36.4	17.5
0.21	0.1	0.5	H	63.4	52.2	52.8	10.6	53.4	32.0	32.6	20.8
0.25	0.1	0.4	H	61.8	49.8	50.3	11.5	51.8	29.6	30.1	21.6
0.26	0.1	0.4	H	61.4	50.0	50.5	11.0	51.4	29.5	30.0	21.5
0.35	0.1	0.6	H	59.1	48.8	49.5	9.6	49.1	27.5	28.2	20.9

H : HOT, N : NEUTRAL

[HOT]



[NEUTRAL]



APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Spectrum Analyzer	HP	E4403B	US39440619	2009-09-03
2	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2009-10-31
3	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2009-03-07
4	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2010-06-12
5	LOOP ANTENNA	EMCO	6502	9107-2652	2010-10-17
6	LOOP ANTENNA	EMCO	6502	9607-3020	2010-03-06
7	System Power Supply	HP	6032A	3440A-10521	2009-07-07
8	EPM Series Power Meter	HP	E4418A	GB38272734	2009-10-31
9	Power Sensor	HP	8481A	331BA92056	2009-10-31
10	Audio Analyzer	HP	8903B	2747A03432	2009-11-03
11	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2009-10-31
12	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2009-10-31
13	Modulation Analyzer	HP	8901B	3438A05228	2009-11-03
14	Attenuator	HP	8494A	3308A33351	2009-10-31
15	Temp&Humi Chamber	Kunpoong	KP-1000	2002KP050041	2009-01-21
16	Temp&Humi Chamber	Kunpoong	KP-RC2000	2002KP650042	2009-01-21
17	EMC Analyzer	Agilent	E7403A	MY42000054	2009-09-03
18	Horn Antenna	ETS-Lindgren	3115	00078894	2008-11-29
19	Horn Antenna	ETS-Lindgren	3115	00078895	2008-11-29
20	Horn Antenna	ETS-Lindgren	3116	00062504	2008-11-27
21	Horn Antenna	ETS-Lindgren	3116	00062916	2008-11-27
22	Dipole Antenna	SCHWARZBECK	VHA 9103	VHA91032557	2009-11-27
23	Dipole Antenna	SCHWARZBECK	UHA 9105	UHA91052417	2009-11-27
24	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2009-02-28
25	PREAMPLIFIER	Agilent	8449B	3008A02307	2009-10-31
26	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2009-02-09
27	Band Reject Filter	Wainwright Instruments	WRCG824	-	2009-04-16
28	Band Reject Filter	Wainwright Instruments	WRCG1750	-	2009-04-16
29	Field Strength Meter	Rohde & Schwarz	ESHS30	862024/001	2009-03-04
30	LISN	Rohde & Schwarz	ESH3-Z5	100207	2008-12-20
31	LISN	EMCO	3825/2	9206-1971	2008-12-20
32	DC POWER SUPPLY	Agilent	E3632A	MY40000004	2009-07-07