



▪ NII WLAN

TEST REPORT

Report No: KST-FCR-140005

Applicant	Name	Bluebird Inc.
	Address	(Dogok-dong, SEI Tower 13,14) 39, Eonjuro30-gil, Gangnam-gu, Seoul, South Korea
Manufacturer	Name	Bluebird Inc.
	Address	(Dogok-dong, SEI Tower 13,14) 39, Eonjuro30-gil, Gangnam-gu, Seoul, South Korea
Equipment	Name	Handheld Mobile Computer
	Model No	BM180
	Brand	None
	FCC ID	SS4BM180M
Test Standard	FCC CFR 47, Part 15. Subpart C-15.407 FCC KDB 789033 D01 General UNII Test procedures v01r03	
Test Date(s)	2014. 07. 28 ~ 2014. 08. 12	
Issue Date	2014. 08. 13	
Test Result	Compliance	
Note	This equipment contained the certified module for GSM850/1900, WCDMA Band II/V and not certified modules for WLAN 802.11abgn, Bluetooth 4.0, NFC.	

Supplementary Information

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with measurement procedures specified in ANSI C 63.10-2009.

We attest to the accuracy of data and all measurements reported herein were performed by KOSTEC Co., Ltd. and were made under Chief Engineer's supervision. We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by Mi Young, Lee

Approved by Gyeong Hyeon, Park

Signature

Signature

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1. GENERAL INFORMATION

1.1 Test Facility

Test laboratory and address

KOSTEC Co., Ltd.

128(175-20,Annyeong-dong)406-gil sejaro, Hwaseong-si Gyeonggi-do, Korea

The open area field test site and conducted measurement facility are used for these testing. This site at was fully described in a reports submitted to the Federal Communications Commission (FCC).

The details of these reports have been found to be in complies with the requirements of Section 2.948 of the FCC Rules on November 14, 2002. The facility also complies with the radiated and conducted test site criteria set forth in ANSI C 63.10-2009.

The Federal Communications Commission (FCC) has the reports on file and KOSTEC Co., Ltd. is listed under FCC Registration No.525762. The test site has been approved by the FCC for public use and is List in the FCC Public Access Link CORES (Commission Registration System)

Registration information

KCC (Korea Communications Commission) Number : KR0041

KOLAS(Korea Laboratory Accreditation Scheme) Number : 232

FCC Registration Number(FRN) : 525762

VCCI Registration Number : R-1657 / C –1763

IC Registration Site Number : 8305A-1

1.2 Location



2. EQUIPMENT DESCRIPTION

The product specification described herein was declared by manufacturer. And refer to user's manual for the details.

Equipment Name	Handheld Mobile Computer
Model No	BM180
Usage	Handheld Mobile Computer
Serial Number	Proto type
Data connection Type	OFDM
Modulation type	GSM: GMSK, 8PSK WCDMA: QPSK 802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth 2.1 BDR (1Mbps) : GFSK Bluetooth 2.1 EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth 2.1 EDR (3Mbps) : 8-DPSK Bluetooth 4.0 LE: GFSK NFC: ASK
Max average output	6.10 dBm*
Operated Frequency	GSM 850: 824.2 MHz - 848.8 MHz GSM1900: 1850.2 MHz - 1909.8 MHz WCDMA Band II: 1 852.4 MHz - 1 907.6 MHz WCDMA Band V: 826.4 MHz - 846.6 MHz 802.11b/g: 2 412 MHz - 2 462 MHz 802.11a: 5 180 MHz - 5 240 MHz (UNII Band I) 5 745 MHz - 5 825 MHz (UNII Band IV) 802.11n(HT20): 2 412 MHz - 2 462 MHz 5 180 MHz - 5 240 MHz (UNII Band I) 5 745 MHz - 5 825 MHz (UNII Band IV) 802.11n(HT40): 2 422 MHz - 2 452 MHz 5 190 MHz - 5 230 MHz (UNII Band I) 5 755 MHz - 5 795 MHz (UNII Band IV) Bluetooth: 2 402 MHz - 2 480 MHz NFC: 13.561 MHz
Channel Number	4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
Operation temperature	- 20℃ ~ + 55℃
Power Source	AC/DC adapter Input : AC 100-240 V, 0.3 A, 50 - 60 Hz Output : DC 5 V, 1.0 A Battery : Li-ion DC 3.7 V
Antenna Description	Type : Internal PCB Antenna

FCC ID	SS4BM180M
Remark	<p>1. The data rates used when evaluating the WLAN transmitter were the lowest data rates for each mode. The device was operating at its maximum output power at the lowest data rate for all measurements.</p> <p>2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.</p> <p>3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.</p> <p>4. For WLAN: The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.25GHz, and 5.725~5.850GHz frequencies band. For the 2400 ~ 2483.5MHz and 5.725~5.850GHz RF parameters were recorded in another test report.</p> <p>5. The above DUT's information was declared by manufacturer. Please refer to the specifications or user manual for more detailed description.</p>

* it is maximum average conducted power in only 5.15 ~ 5.25 GHz band.

3. SYSTEM CONFIGURATION FOR TEST

3.1 Characteristics of equipment

The Equipment Under Test (EUT) contains the following capabilities:
GSM850/1900, WCDMA Band II/V, WLAN 802.11abgn, Bluetooth 4.0, NFC.

The test data contained in this report pertains only to the emissions due to the WLAN(5.15 ~ 5.25 GHz band.)transmitter of the EUT.

3.2 Used peripherals list

Description	Model No.	Serial No.	Manufacture	Remark
Battery	EG-520	-	Egen	Li-ion 3.7 V
AC/DC adapter	PSAI05R-050Q CH	-	Phihong (Dongguan) Electronics Co.,Ltd	For EUT
Note book	Pavilion g4	-	HP	
AC adapter	PPP012H-S	F12941123031251	CHICONY POWER TECHNOLOGY(SUZHOU) CO., LTD	For note book

3.3 Product Modification

N/A

3.4 Operating Mode

* Constantly transmitting with a modulated carrier at maximum power/widest bandwidth on the bottom, middle and top channels as required using the supported data rates/modulation types.

* The EUT has one transmit/receive RF port. RF cables and attenuators connecting the test equipment to the EUT ports were calibrated before use and the calibration data incorporated into the conducted measurement results.

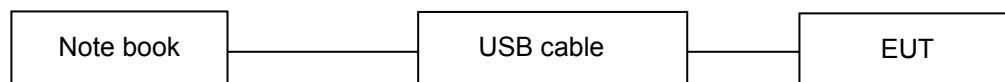
* Radiated emissions tests were performed with all unused ports terminated.

3.5 Test Setup of EUT

The measurements were taken in continuous transmit mode using the TEST MODE.

For controlling the EUT as TEST MODE using test program, test program were provided by the applicant.

The test utility for WLAN is GRCT.



3.6 Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

■ TX Power setting value during test

Band	Mode	TX Power setting value
5.15 ~ 5.25 GHz	802.11a	6 for CH 1~6, 4 for CH 7~11
	802.11n(HT20&40)	6 for CH 1~6, 4 for CH 7~11

3.7 Table for Carrier Frequencies

5.15 ~ 5.25 GHz band, 20MHz		5.15 ~ 5.25 GHz, 40MHz	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5 180	38	5 190
40	5 200	46	5 230
44	5 220		
48	5 240		

3.8 Duty Cycle Of Test signal

Duty cycle is < 98%, duty factor shall be considered.

Duty cycle = Tx on/(Tx on+ Tx off)

Duty factor = 10*log(1/duty cycle)

Band	Mode	Duty cycle	Note
5.15 ~ 5.25 GHz	802.11a	> 98 %	
	802.11n(HT20)	> 98 %	
	802.11n(HT40)	> 98 %	

3.8 Used Test Equipment List

No.	Instrument	Model	S/N	Manufacturer	Due to cal date	Cal interval	used
1	T & H Chamber	EY-101	90E14260	TABAI ESPEC	2014.10.05	1 year	<input checked="" type="checkbox"/>
2	Constant switch Tester	DS-COT	None	Dong sung Ele.	N/A	N/A	<input type="checkbox"/>
3	Vibration Tester	70UA	L90016	IDEX Co.,Ltd	N/A	N/A	<input type="checkbox"/>
4	Vibration Meter	VM-6360	N225098	LANDTEK	2015.04.04	18 month	<input type="checkbox"/>
5	Falling Tester	SWD-8000	None	Sinwoo	N/A	N/A	<input type="checkbox"/>
6	Spectrum Analyzer	8563E	3846A10662	Agilent Technology	2015.02.07	1 year	<input checked="" type="checkbox"/>
7	Spectrum Analyzer	8593E	3710A02859	Agilent Technology	2015.02.07	1 year	<input type="checkbox"/>
8	Spectrum Analyzer	FSV30	20-353063	Rohde& Schwarz	2015.02.07	1 year	<input checked="" type="checkbox"/>
9	EMI Test Receiver	ESCI7	100823	Rohde& Schwarz	2015.02.05	1 year	<input checked="" type="checkbox"/>
10	EMI Test Receiver	ESI	834000/002	Rohde& Schwarz	2015.02.05	1 year	<input checked="" type="checkbox"/>
11	Vector Signal Analyzer	89441A	3416A02620	Agilent Technology	2015.02.07	1 year	<input type="checkbox"/>
12	Network Analyzer	8753ES	US39172348	AGILENT	2014.10.05	1 year	<input type="checkbox"/>
13	EPM Series Power meter	E4418B	GB39512547	Agilent Technology	2015.02.07	1 year	<input checked="" type="checkbox"/>
14	RF Power Sensor	E9300A	MY41496631	Agilent Technology	2015.02.07	1 year	<input checked="" type="checkbox"/>
15	Microwave Frequency Counter	5352B	2908A00480	Agilent Technology	2015.02.07	1 year	<input type="checkbox"/>
16	Modulation Analyzer	8901A	3538A07071	Agilent Technology	2015.02.07	1 year	<input type="checkbox"/>
17	Audio Analyzer	8903B	3514A16919	Agilent Technology	2015.02.07	1 year	<input type="checkbox"/>
18	Audio Telephone Analyzer	DD-5601CID	520010281	CREDIX	2015.02.07	1 year	<input type="checkbox"/>
19	Digital storage Oscilloscope	TDS3052	B015962	Tektronix	2014.10.05	1 year	<input type="checkbox"/>
20	ESG-D Series Signal Generator	E4436B	US39260458	Agilent Technology	2015.02.07	1 year	<input checked="" type="checkbox"/>
21	ESG Vector Signal Generator	E4438C	MY42083133	Agilent Technology	2014.10.05	1 year	<input type="checkbox"/>
22	Vector Signal Generator	SMBV100A	257557	Rohde & Schwarz	2015.01.21	1 year	<input type="checkbox"/>
23	Tracking Source	85645A	070521-A1	Agilent Technology	2015.02.07	1 year	<input type="checkbox"/>
24	Signal Generator	SML03	100692	Rohde& Schwarz	2015.02.07	1 year	<input type="checkbox"/>
25	SLIDAC	None	0207-4	Myoung sung Ele.	2015.02.07	1 year	<input type="checkbox"/>
26	DC Power supply	DRP-5030	9028029	Digital Electronic Co.,Ltd	2015.02.07	1 year	<input type="checkbox"/>
27	DC Power supply	6038A	3440A12674	Agilent Technology	2015.02.07	1 year	<input type="checkbox"/>
28	DC Power supply	E3610A	KR24104505	Agilent Technology	2015.02.07	1 year	<input checked="" type="checkbox"/>
29	DC Power supply	UP-3005T	68	Unicon Co.,Ltd	2015.02.07	1 year	<input type="checkbox"/>
30	DC Power Supply	SM 3004-D	114701000117	DELTAELEKTRONIKA	2015.02.07	1 year	<input type="checkbox"/>
31	Dummy Load	8173	3780	Bird Electronic Co., Corp	2015.02.07	1 year	<input type="checkbox"/>
32	Attenuator	50FH-030-500	140410 9433	JEW Industries Inc.	2015.02.07	1 year	<input type="checkbox"/>
33	Attenuator	765-20	9703	Narda	2014.10.05	1 year	<input type="checkbox"/>
34	Attenuator	8498A	3318A09485	HP	2015.02.07	1 year	<input type="checkbox"/>
35	Step Attenuator	8494B	3308A32809	HP	2015.02.07	1 year	<input type="checkbox"/>
36	Step Attenuator	8495D	3308A01464	HP	2015.02.07	1 year	<input type="checkbox"/>
37	Power divider	11636B	51212	HP	2014.10.05	1 year	<input checked="" type="checkbox"/>
38	3Way Power divider	KPDSU3W	00070365	KMW	2015.02.07	1 year	<input type="checkbox"/>
39	Band rejection filter	WTR-BRF2442-84NN	09020001	WAVE TECH Co.,LTD	2015.02.07	1 year	<input type="checkbox"/>
40	White noise audio filter	ST31EQ	101902	SoundTech	2014.10.05	1 year	<input type="checkbox"/>
41	Dual directional coupler	778D	17693	HEWLETT PACKARD	2015.02.07	1 year	<input type="checkbox"/>
42	Dual directional coupler	772D	2839A00924	HEWLETT PACKARD	2015.02.07	1 year	<input type="checkbox"/>
43	Band rejection filter	3TNF-0006	26	DOVER Tech	2015.02.07	1 year	<input type="checkbox"/>
44	Band rejection filter	3TNF-0008	317	DOVER Tech	2015.02.07	1 year	<input type="checkbox"/>
45	Band rejection filter	3TNF-0007	311	DOVER Tech	2015.02.07	1 year	<input type="checkbox"/>
46	Highpass Filter	WHJS1100-10EF	1	WAINWRIGHT	2015.02.07	1 year	<input type="checkbox"/>
47	Highpass Filter	WHJS3000-10EF	1	WAINWRIGHT	2015.02.07	1 year	<input type="checkbox"/>
48	Radio Communication Alalyzer	MT8815A	6200429622	ANRITSU	2015.02.07	1 year	<input type="checkbox"/>
49	CDMA Mobile Station Test Set	E8285A	US40081298	AGILENT	2015.02.07	1 year	<input type="checkbox"/>
50	WideBand Radio Communication Tester	CMW500	102276	Rohde & Schwarz	2015.04.10	1 year	<input type="checkbox"/>

No.	Instrument	Model	S/N	Manufacturer	Due to cal date	Cal interval	used
51	RF Up/Down Converter	DCP-1780	980901003	CREDIX	2015.02.07	1 year	<input type="checkbox"/>
52	DECT Test set	8923B	3829U00364	HP	2015.02.07	1 year	<input type="checkbox"/>
53	DECT Test set	CMD60	840677/005	Rohde & Schwarz	2014.12.04	1 year	<input type="checkbox"/>
54	Loop Antenna	6502	9203-0493	EMCO	2015.05.31	2 year	<input checked="" type="checkbox"/>
55	Dipole Antenna	HZ-12	100005	Rohde & Schwarz	2016.07.01	2 year	<input type="checkbox"/>
56	Dipole Antenna	HZ-13	100007	Rohde & Schwarz	2016.07.01	2 year	<input type="checkbox"/>
57	BiconiLog Antenna	HL562	100076	Rohde & Schwarz	2014.12.10	2 year	<input checked="" type="checkbox"/>
58	Horn Antenna	3115	9605-4834	EMCO	2016.06.16	2 year	<input checked="" type="checkbox"/>
59	Horn Antenna	3115	2996	EMCO	2016.02.26	2 year	<input type="checkbox"/>
60	Horn Antenna	BBHA9170	BBHA9170152	SCHWARZBECK	2015.05.27	2 year	<input checked="" type="checkbox"/>
61	Signal Generator	SMT-06	100552	Rohde & Schwarz	2015.02.07	1 year	<input type="checkbox"/>
62	HYGRO-Thermograph	NSII-Q	1611545	SATO	2014.10.05	1 year	<input type="checkbox"/>
63	Barometer	7612	81134	SATO	2016.01.20	2 year	<input type="checkbox"/>
64	Multi meter	DM-313	S60901832	LG Precision Co.,Ltd	2015.02.07	1 year	<input type="checkbox"/>
65	Antenna Mast(OSA)	AT14	None	Daeil EMC	N/A	N/A	<input type="checkbox"/>
66	Turn table(OSA)	None	None	Daeil EMC	N/A	N/A	<input type="checkbox"/>
67	RF Amplifier(OSA)	8447D	2944A07881	AGILENT	2015.02.04	1 year	<input type="checkbox"/>
68	Antenna Master(3)	AT13	None	AUDIX	N/A	N/A	<input checked="" type="checkbox"/>
69	Turn Table(3)	None	None	AUDIX	N/A	N/A	<input checked="" type="checkbox"/>
70	PREAMPLIFIER(3)	8449B	3008A02577	Agilent	2015.02.05	1 year	<input checked="" type="checkbox"/>
71	Antenna Master(10)	MA4000-EP	None	inno systems GmbH	N/A	N/A	<input checked="" type="checkbox"/>
72	Turn Table(10)	None	None	inno systems GmbH	N/A	N/A	<input checked="" type="checkbox"/>
73	AMPLIFIER(10)	TK-PA6S	120009	TESTEK	2015.02.05	1 year	<input type="checkbox"/>
74	Vernier Calipers	None	8280373	Mitutoyo	2014.10.05	1 year	<input type="checkbox"/>

4. SUMMARY TEST RESULTS

Description of Test	FCC Rule	Reference Clause	Used	Test Result
Transmit Power	15.407(a)(1)	Clause 5.1	<input checked="" type="checkbox"/>	Compliance
Peak power spectral density	15.407(a)(1)	Clause 5.2	<input checked="" type="checkbox"/>	Compliance
Emission Bandwidth	15.407(a)(1)	Clause 5.3	<input checked="" type="checkbox"/>	Compliance
Peak Excursion	15.407(a)(6)	Clause 5.4	<input checked="" type="checkbox"/>	Compliance
Frequency Stability	15.407(g)	Clause 5.5	<input checked="" type="checkbox"/>	Compliance
Spurious RF radiated emissions	15.407(b)(1) / 15.209	Clause 5.6	<input checked="" type="checkbox"/>	Compliance
Antenna requirement	15.203	Clause 5.7	<input checked="" type="checkbox"/>	Compliance
AC Power Conducted emissions	15.407(b)(6) / 15.207	Clause 5.8	<input checked="" type="checkbox"/>	Compliance
<p>Compliance/pass : The EUT complies with the essential requirements in the standard.</p> <p>Not Compliance : The EUT does not comply with the essential requirements in the standard.</p> <p>N/A : The test was not applicable in the standard.</p>				

5. MEASUREMENT RESULTS

5.1 Transmit Power

5.1.1 Standard Applicable [FCC §15.407(a)(1)]

For the 5.15-5.25 GHz band, the maximum conducted output power shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz.

5.1.2 Test Environment conditions

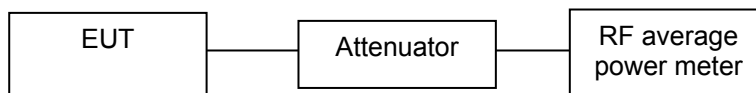
- Ambient temperature : (22 - 23) °C
- Relative Humidity : (58 - 67) % R.H.

5.1.3 Measurement Procedure

The transmitter output was connected to the power meter with an attenuator. The Transmit power was measured and recorded with the RF average power meter. EUT was programmed to be in continuously transmitting mode. Duty factor is not added to measured value.

All conducted power tests were performed using the power meter in accordance with FCC KDB 789033 v01 Section E.3.a Measurement Procedure Method PM.

5.1.4 Test setup



5.1.5 Measurement Result

802.11a

Channel	Frequency [MHz]	Average Power [dBm]	Average Power [mW]	Limit [dBm]	Test Results
36	5 180	6.00	3.98	17*	Compliance
44	5 220	5.99	3.97	17	Compliance
48	5 240	6.03	4.01	17	Compliance

* Other limit level is 17.57 dBm; 4 dBm + 10log(22.75)

802.11n(HT20)

Channel	Frequency [MHz]	Average Power [dBm]	Average Power [mW]	Limit [dBm]	Test Results
36	5 180	6.03	4.01	17	Compliance
44	5 220	5.83	3.83	17	Compliance
48	5 240	6.10	4.07	17	Compliance

* Other limit level is 17.65 dBm; 4 dBm + 10log(23.15)

802.11n(HT40)

Channel	Frequency [MHz]	Average Power [dBm]	Average Power [mW]	Limit [dBm]	Test Results
38	5 190	5.86	3.86	17	Compliance
46	5 230	6.02	4.00	17	Compliance

* Other limit level is 20.68 dBm; 4 dBm + 10log(46.61)

5.1.6 Limit

Freq Band	Limit
5.150 ~ 5.250 GHz	The lesser of 50 mW (17 dBm) or 4 dBm + 10logB
5.250 ~ 5.350 GHz	The lesser of 250 mW (24 dBm) or 11 dBm + 10logB
5.470 ~ 5.725 GHz	The lesser of 250 mW (24 dBm) or 11 dBm + 10logB
Where B is the 26 dB emission bandwidth in MHz.	

5.2 Peak power spectral density

5.2.1 Standard Applicable [15.407(a)(1)]

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band.

5.2.2 Test Environment conditions

- Ambient temperature : (22 - 23) °C,
- Relative Humidity : (58 - 67) % R.H.

5.2.3 Measurement Procedure

The power spectral density conducted from the intentional radiator was measured with a spectrum analyzer connected to the antenna terminal, while EUT had 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. The indicated level is the peak power spectral density.

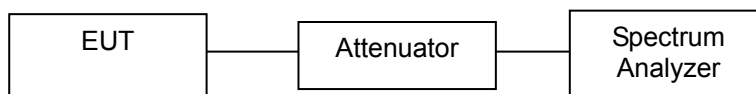
All conducted power tests were performed using a test receiver in accordance with FCC KDB 789033 v01 Section E.2 b Measurement Procedure Method SA-1.

The spectrum analyzer is set to the as follows :

- Span : set span to encompass the entire EBW of the signal
- RBW : 1 MHz
- VBW : ≥ 3 MHz
- number of point in sweep: ≥ 2 Span/RBW
- Sweep time : auto
- Detector function : RMS
- Trace : Free run

Trace average at least 100 traces in power averaging mode. And record the max value

5.2.4 Test setup



5.2.5 Measurement Result

802.11a

Channel	Frequency [MHz]	Result Value [dBm]	Limit [dBm]	Test Results
36	5 180	-19.09	4	Compliance
44	5 220	-20.03	4	Compliance
48	5 240	-16.34	4	Compliance

802.11n(HT20)

Channel	Frequency [MHz]	Result Value [dBm]	Limit [dBm]	Test Results
36	5 180	-16.95	4	Compliance
44	5 220	-16.11	4	Compliance
48	5 240	-15.92	4	Compliance

802.11n(HT40)

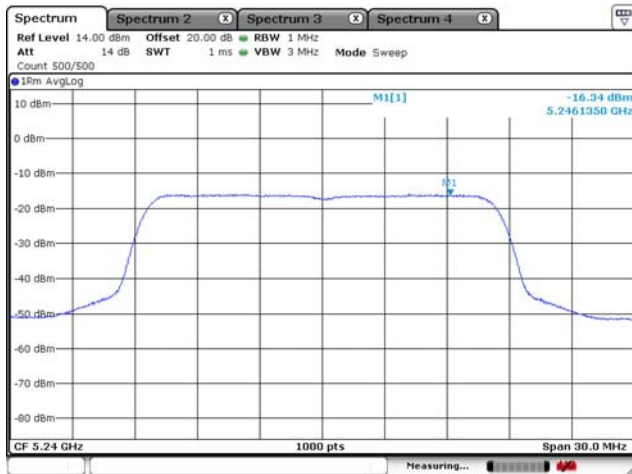
Channel	Frequency [MHz]	Result Value [dBm]	Limit [dBm]	Test Results
38	5 190	-19.84	4	Compliance
46	5 230	-18.21	4	Compliance

5.2.6 Limit

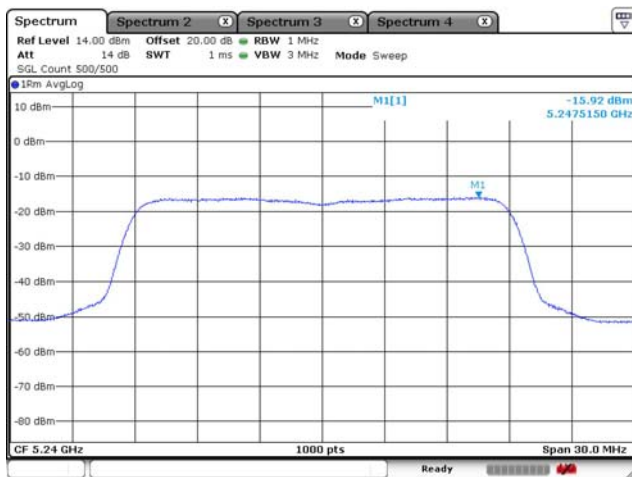
Freq Band	Limit
5.150 ~ 5.250 GHz	The lesser of 4 dBm

5.2.7 Test Plot

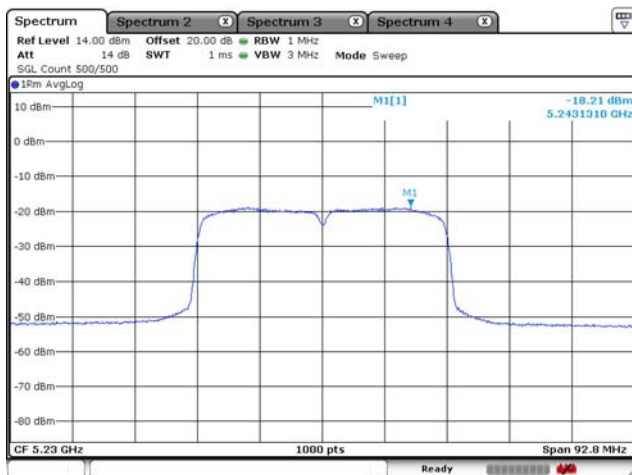
802.11a



802.11n(HT20)



802.11n(HT40)



5.3 Emission Bandwidth

5.3.1 Standard Applicable [FCC §15.407(a)(1)]

5.3.2 Test Environment conditions

- Ambient temperature : (22 - 23) °C,
- Relative Humidity : (58 - 67) % R.H.

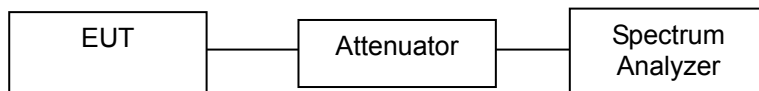
5.3.3 Measurement Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

The spectrum analyzer is set to the as follows :

- RBW : >1% of the emission bandwidth
- VBW : >3 x RBW
- Sweep : auto
- Detector function : peak
- Trace : max hold

5.3.4 Test setup



5.3.5 Measurement Result

802.11a

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]	Limit [MHz]	Test Results
36	5 180	22.75	17.40	-	Compliance
44	5 220	22.51	17.20	-	Compliance
48	5 240	22.28	17.15	-	Compliance

802.11n(HT20)

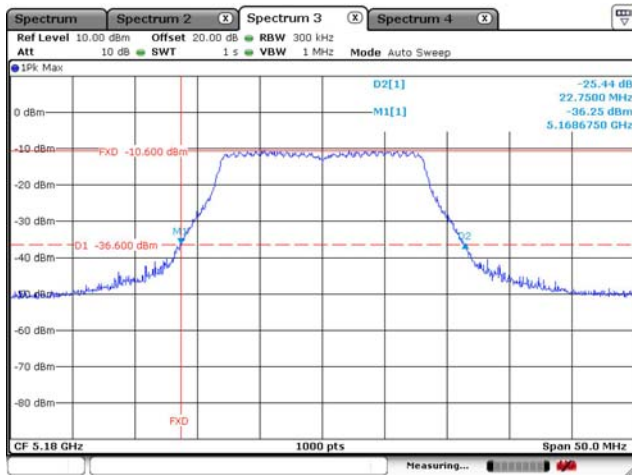
Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]	Limit [MHz]	Test Results
36	5 180	23.00	18.15	-	Compliance
44	5 220	23.15	18.15	-	Compliance
48	5 240	23.01	18.15	-	Compliance

802.11n(HT40)

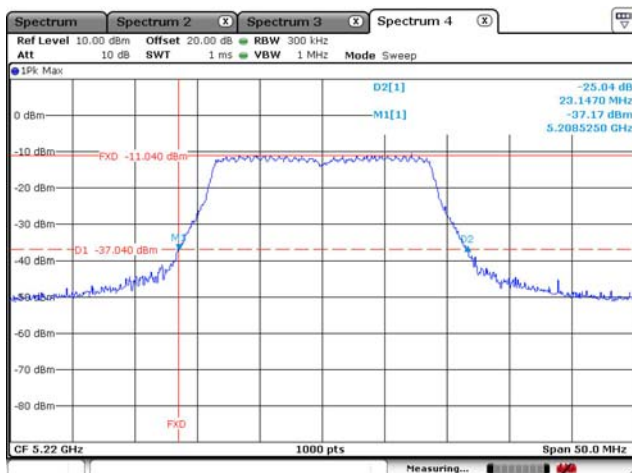
Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]	Limit [MHz]	Test Results
38	5 190	45.68	37.20	-	Compliance
46	5 230	46.61	37.08	-	Compliance

5.3.6 Test Plot (26 dB band width)

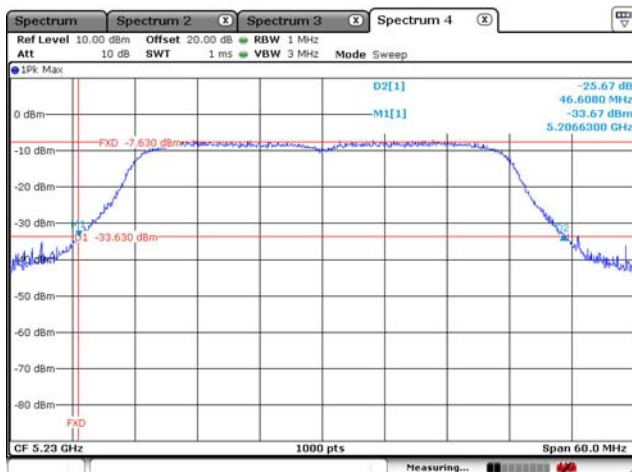
802.11a



802.11n(HT20)

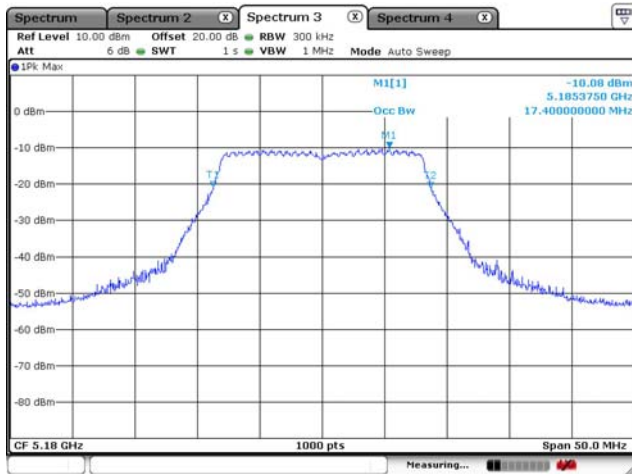


802.11n(HT40)

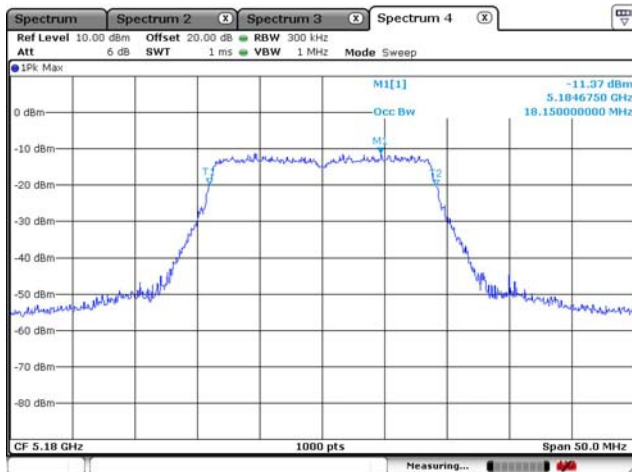


Test Plot (99 % band width)

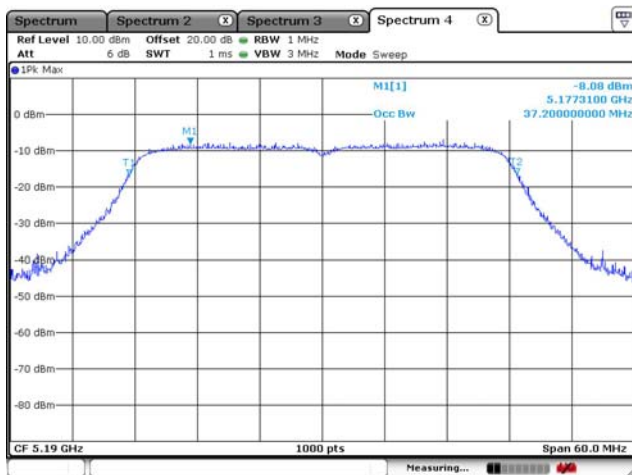
802.11a



802.11n(HT20)



802.11n(HT40)



5.4 Peak Excursion

5.4.1 Standard Applicable [FCC §15.407(a)(6)]

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

5.4.2 Test Environment conditions

- Ambient temperature : (22 - 23) °C ,
- Relative Humidity : (58 - 67) % R.H.

5.4.3 Measurement Procedure

The spectrum analyzer is set to the as follows

- Span : Set span to encompass the entire emission bandwidth (EBW) of the signal.
- RBW : 1 MHz
- VBW : 3 MHz
- Sweep : auto
- Detector function : peak
- Trace : max hold(Allow the sweeps to continue until the trace stabilizes.)

Use the peak search function to find and measure the peak of the spectrum.(PPSD) refer 5.2.3

Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

Measured value = Peak-max-hold spectrum to the maximum of the average spectrum for continuous transmission. Since the duty cycle is < 98 %, duty factor is required to average spectrum Peak exclusion = Measured value – duty factor

5.4.4 Test setup

Please refer 5.2.4

5.4.5 Measurement Result

802.11a

Channel	Frequency [MHz]	Measured Peak Excursion [MHz]	Duty factor[dB]	Peak Excursion [dB]	Limit [MHz]	Test Results
36	5 180	12.18	-	12.18	13	Compliance
44	5 220	10.80	-	10.80	13	Compliance
48	5 240	11.20	-	11.20	13	Compliance

802.11n(HT20)

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	Duty factor[dB]	Peak Excursion [dB]	Limit [MHz]	Test Results
36	5 180	10.21	-	10.21	13	Compliance
44	5 220	10.43	-	10.43	13	Compliance
48	5 240	10.99	-	10.99	13	Compliance

802.11n(HT40)

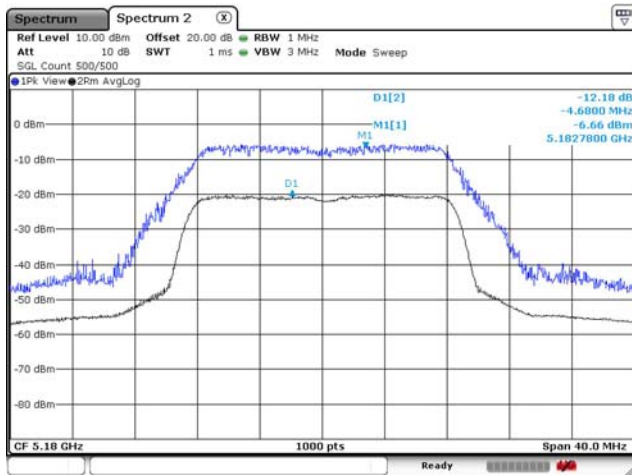
Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	Duty factor[dB]	Peak Excursion [dB]	Limit [MHz]	Test Results
38	5 190	10.94	-	10.94	13	Compliance
46	5 230	10.46	-	10.46	13	Compliance

5.4.6 Limit

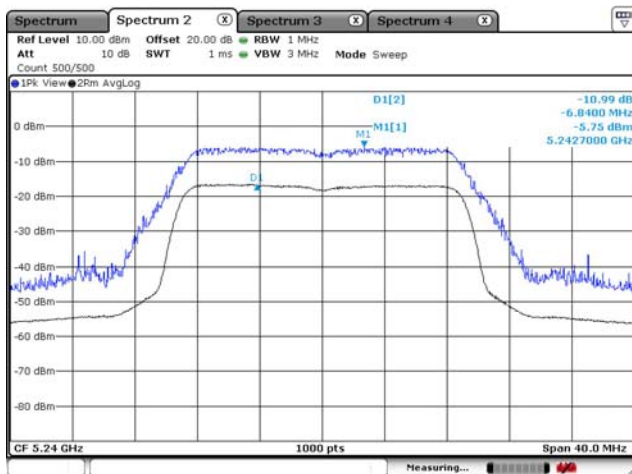
Freq Band	Limit
5.150 ~ 5.250 GHz	Shall not exceed 13 dB

5.4.7 Test Plot

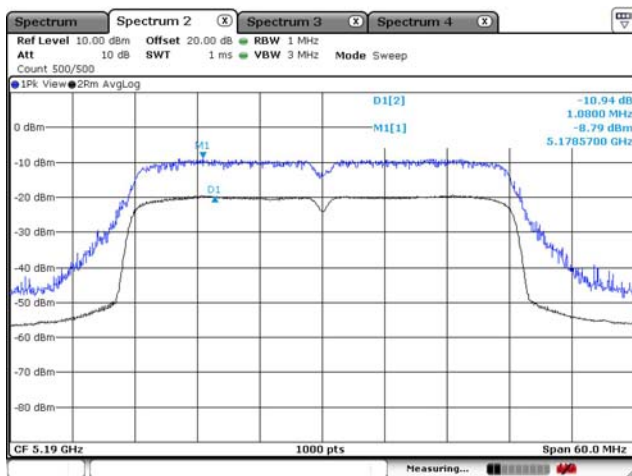
802.11a



802.11n(HT20)



802.11n(HT40)



5.5 Frequency Stability

5.5.1 Standard Applicable [FCC §15.407(g)]

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

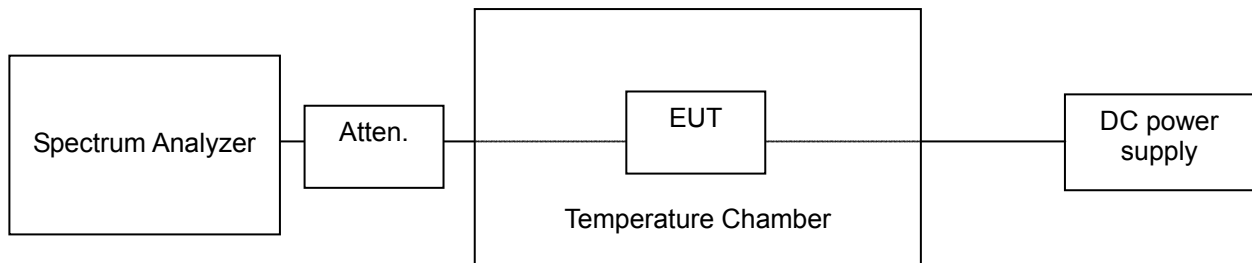
5.5.2 Test Environment conditions

- Ambient temperature : (22 - 23) °C ,
- Relative Humidity : (58 - 67) % R.H.

5.5.3 Measurement Procedure

1. The EUT is installed in an environment test chamber with external power source.
2. Set the chamber to operate at 50 centigrade and external power source to output at nominal voltage of EUT
3. A sufficient stabilization period at each temperature is used prior to each frequency measurement.
4. When temperature is stabled, measure the frequency stability after 2, 5, and 10 minutes.
5. The test shall be performed under -30 to 50 centigrade and 85 to 115 percent of the nominal voltage. Change setting of chamber and external power source to complete all conditions.

5.5.4 Test setup



5.5.5 Measurement Result

Operating Frequency: 5 220 MHz

Temp (°C)	Power Supply	0 minute	2 minutes	5 minutes	10 minutes
		Freq Drift(ppm)	Freq Drift(ppm)	Freq Drift(ppm)	Freq Drift(ppm)
50	120(Vnom)	3.34	3.21	3.18	3.05
40	120(Vnom)	3.13	3.02	2.97	2.91
30	120(Vnom)	2.86	2.81	2.75	2.62
20	120(Vnom)	2.12	2.03	2.00	2.02
10	120(Vnom)	2.03	2.01	1.99	1.96
0	120(Vnom)	-2.86	-2.75	-2.63	-2.58
-10	120(Vnom)	-3.13	-3.08	-3.03	-2.97
-20	120(Vnom)	-2.67	-2.52	-2.43	-2.31
20	102(Vmin)	2.09	2.06	2.05	2.03
20	138(Vmax)	2.24	2.20	2.20	2.16

5.6 Spurious RF Radiated emissions

5.6.1 Standard Applicable [FCC §15.407(b)(1)]

Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209.

§15.209. [Table 1] limits for radiated emissions measurements (distance at 3 m)

Frequency Band [MHz]	DISTANCE[Meters]	Limit [$\mu\text{V}/\text{m}$]	Limit [dB $\mu\text{V}/\text{m}$]	Detector
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)	Peak
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(F)	Peak
1.705 ~ 30.0	30	30	29.54	Peak
30 - 88	3	100 **	40.00	Quasi peak
88 - 216	3	150 **	43.52	Quasi peak
216 - 960	3	200 **	46.02	Quasi peak
Above 960	3	500	54.00	Average
Above 1000	3	74.0 dB(μV)/m (Peak), 54.0 dB(μV)/m (Average)		

** fundamental emissions from intentional radiators operation under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz, or 470-806 MHz. However, operation within these Frequency bands is permitted under other sections of this Part Section 15.231 and 15.241

§15.205. [Table 2] Restrict Band of Operation

Only spurious emissions are permitted in any of the frequency bands listed below ;			
[MHz]	[MHz]	[MHz]	[GHz]
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505**	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 - 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 - 1 427	8.025 - 8.
4.177 25 - 4.177 75	37.5 -38.25	1 435 - 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 - 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 - 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 -1 722.2	13.25 - 13.
6.311 75 - 6.312 25	123 - 138	2 200 - 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 - 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 - 2 500	17.7 - 21.4
8.376 25 - 8.38 6 75	156.7 - 156.9	2 690 - 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 - 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 - 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 - 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 - 4 400	Above 38.6

** Until February 1, 1999, this restricted band shall be 0.490-0.510

§15.407 (b)(1) EIRP Limit Un-restricted band emissions above 1GHz Limit		
Operating Band	EIRP Limit(dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBμV/m)
5.15 - 5.25 GHz	-27	68.2
5.25 - 5.35 GHz	-27	68.2
5.47 - 5.725 GHz	-27	68.2
5.725 - 5.825 GHz	5.715 5.725 GHz: -17	5.715 5.725 GHz: 78.2
	5.825 5.835 GHz: -17	5.825 5.835 GHz: 78.2
	Other un-restricted band: -27	Other un-restricted band: 68.2
Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength: $E = (1000000 \sqrt{30P}) / 3 \mu V/m$, Where P is the EIRP in Watts Therefore: -27 dBm/MHz = 68.23 dBμV/m		

5.6.2 Test Environment conditions

- Ambient temperature : (22 - 23) °C ,
- Relative Humidity : (58 - 67) % R.H.

5.6.3 Measurement Procedure

The measurements procedure of the transmitter radiated E-field is as following describe method.

The test is performed in a Shield chamber to determine the accurate frequencies, after maximum emissions level will be checked on a test chamber and measuring distance is 3 m from EUT to test antenna.

(The chamber is ensured that comply with at least 6 dB above the ambient noise level)

- ① The EUT was powered ON with continuously operating mode and placed on a 0.8 meter high non-conductive table on the reference ground plane.
 - ② The test antenna was used on Horn antenna for above 1 GHz, and if the below 1 GHz, broad-band antenna and Loop antenna were used for below 30 MHz and it's antenna positioned in both the horizontal and vertical plane was location at EUT during the test for maximized the emission measurement.
 - ③ The output of the test antenna will be connected to a measuring receiver, and it is set to tuned over the frequency range according to required standard
 - ④ The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure(according ANSI C63.10:2009 clause 4.2.3.2.3 procedure for average measure). Both PK and AV level test, PK detector is used.
 - ⑤ The fundamental frequency at which a relevant radiated signal component is detected, the test antenna will be raised and lowered through the specified range of heights in horizontal and vertical polarized orientation, until an maximum signal level is detected on the measuring receiver.
 - ⑥ The transmitter is position x,y,z axis on rotating through 360 degrees, until the maximum signal level is detected by the measuring receiver.
 - ⑦ The receiver is scanned from requested measuring frequency band and then the maximum meter reading is recorded. The radiated emissions were measured with required standard.
- The measurement results are obtained as described below:
 $Result(dB\mu V/m) = Reading(dB\mu V) + Antenna\ factor(dB/m) + CL(dB) + other\ applicable\ factor\ (dB)$
 - According to §15.33 (a)(1), Frequency range of radiated measurement is performed the tenth harmonic.

For the transmitter unwanted emissions shall be measured using following options below:

Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands.

Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands.

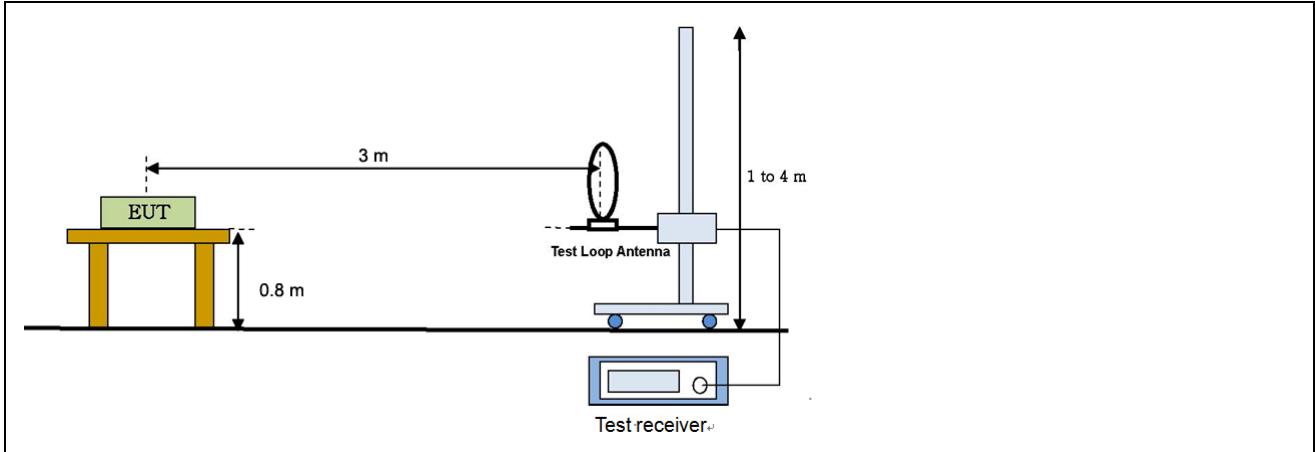
For the transmitter bandedge emissions shall be measured using following options below:
Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.

5.6.4 Measurement Uncertainty

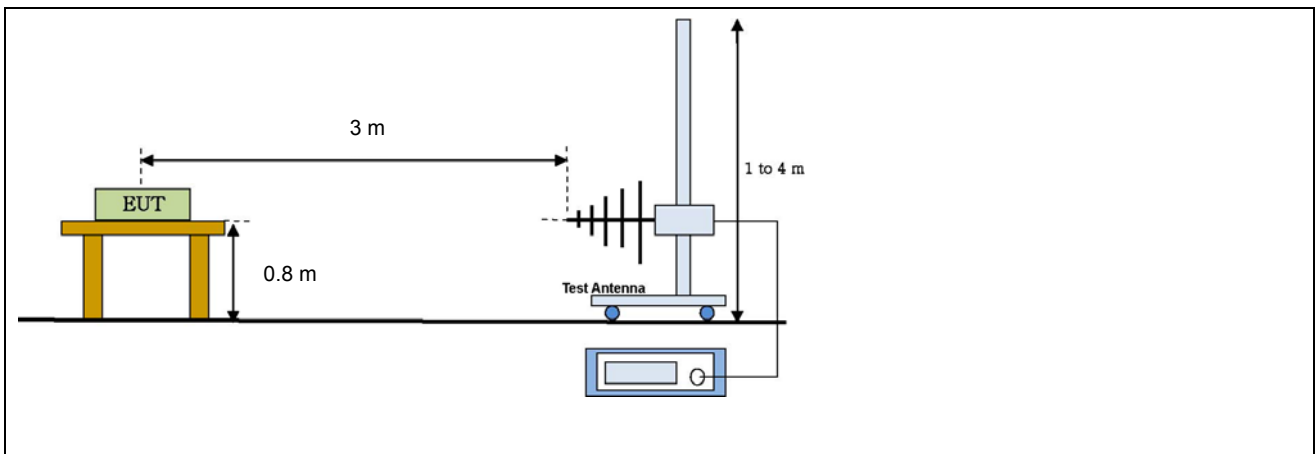
All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are test receiver, Cable loss, Antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, Antenna frequency interpolation, measurement distance variation, Site imperfection, mismatch, and system repeatability based on NIS 80,81, The measurement uncertainty level with a 95 % confidence level were apply to Uncertainty of a radiation emissions measurement at Chamber of KOSTEC is ± 6.0 dB

5.6.5 Test Configuration

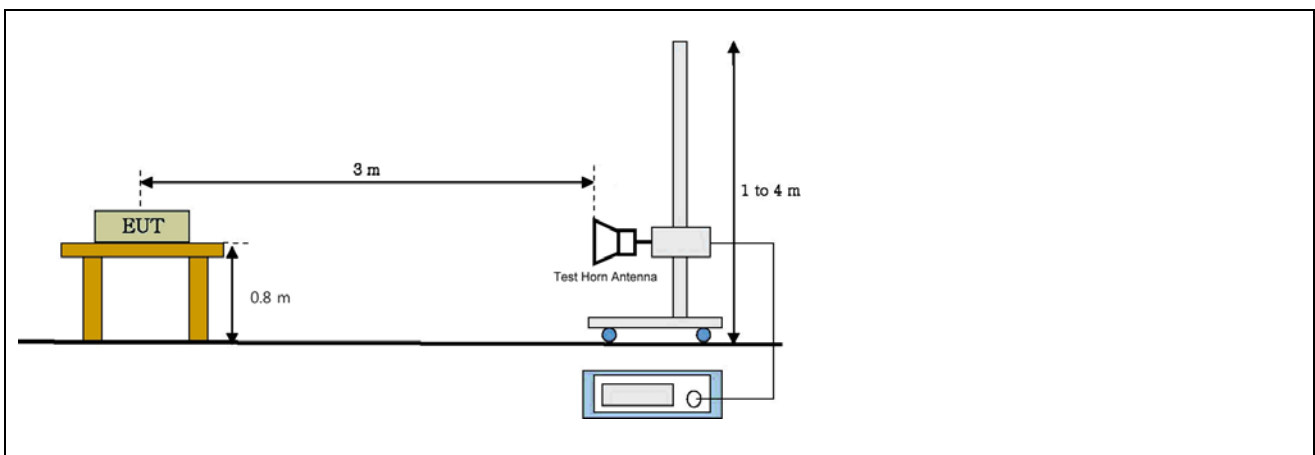
Radiated emission setup, Below 30 MHz



Radiated emission setup, Below 1 000 MHz



Radiated emission setup, Above 1 GHz



5.6.6 Measurement Result

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

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

Band	Mode	Tested channel	Modulation	Data rate	Tested frequency band
5.15 ~ 5.25 GHz	802.11a	36,40,48	OFDM	6 Mbps	Above 1 GHz
	802.11n(HT20)	36,40,48	OFDM	MCS0	
	802.11n(HT40)	38,46	OFDM	MCS0	
	802.11n(HT40)	46	OFDM	MCS0	Below 1 GHz

■ Un-restricted Band Emissions

802.11a CH 36(5 180 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
5.149	15.33	-4.52	120	1.0	V	33.86	3.82	53.00	33.15	68.2	48.5	15.2	15.35	Compliance

802.11a CH 48(5 240 MHz)

Restricted Band (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
5.253	26.53	8.46	120	1.0	V	33.86	3.82	64.20	46.13	68.2	48.5	4	2.37	Compliance

802.11n(HT20) CH 36(5 180 MHz)

Restricted Band (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
5.149	16.46	-4.81	120	1.0	V	33.86	3.82	54.13	32.86	68.2	48.5	14.07	15.64	Compliance

802.11n(HT20) CH 48(5 240 MHz)

Restricted Band (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
5.253	27.49	7.49	120	1.0	V	34.07	3.75	65.31	45.31	68.2	48.5	2.89	3.19	Compliance

802.11n(HT40) CH 38(5 190 MHz)

Restricted Band (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
5.149	15.45	-6.80	120	1.0	V	33.86	3.82	53.12	30.87	68.2	48.5	15.08	17.63	Compliance

802.11n(HT40) CH 46(5 230 MHz)

Restricted Band (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
5.253	26.30	3.52	120	1.0	V	34.07	3.75	64.12	41.34	68.2	48.5	4.08	7.16	Compliance

■ Unwanted Emissions

Above 1 GHz

802.11a CH 36(5 180 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
										74	54	-	-	Compliance

There are no spurious emissions.

802.11a CH 40(5 200 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	74	54	-	-	Compliance

There are no spurious emissions.

802.11a CH 48(5 240 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	74	54	-	-	Compliance

There are no spurious emissions.

802.11n(HT20) CH 36(5 180 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	74	54	-	-	Compliance

There are no spurious emissions.

802.11n(HT20) CH 40(5 200 MHz)

Freq (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	74	54	-	-	Compliance
There are no spurious emissions.														

802.11n(HT20) CH 48(5 240 MHz)

Freq (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	74	54	-	-	Compliance
There are no spurious emissions.														

802.11n(HT40) CH 38(5 190 MHz)

Freq (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	74	54	-	-	Compliance
There are no spurious emissions.														

802.11n(HT40) CH 46(5 230 MHz)

Freq (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL+Pre AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)		PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	74	54	-	-	Compliance
There are no spurious emissions.														

Below 1 GHz

802.11n(HT40) CH 46(5 230 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	Pre AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
38.95	19.30	120	1.0	V	15.10	1.21	-	35.60	40	4.4	Compliance
107.2	16.22	110	1.0	V	9.97	2.12	-	28.30	43.5	15.2	Compliance
160.02	27.86	120	1.0	V	8.46	2.63	-	38.96	43.5	4.54	Compliance
265.25	18.35	110	1.5	H	10.69	3.48	-	32.52	46	13.48	Compliance
432.12	13.43	120	1.8	H	15.02	4.57	-	33.02	46	12.98	Compliance

※ Note

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dB μ V/m(Average), 74 dB μ V/m(Peak), Attenuated more than 20 dB below the permissible value.
- It is not recorded on the report that the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to measured.
- For the below 30 MHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 40 GHz.

Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver,

Table (Deg) : Directional degree of Turn table,

Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor

Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB)

Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB)

Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)

5.7 Antenna requirement

5.7.1 Standard applicable [FCC §15.203, §15.407(a)(1)]

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

The use of a permanently attached antenna or of an antenna that user a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The manufacturer may design the unit So that broken antenna can be replaced by the user, but the Use of a standard antenna jack or electrical connector is prohibited.

And according to §15.407(a)(1), If transmitting antennas of di-rectional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spec-tral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.7.2 Antenna gain

Frequency Band	Gain [dBi]	Limit [dBi]	Results
5.7 GHz	3.51 dBi	≤ 6	Compliance

5.8 AC Power Conducted emissions

5.8.1 Standard Applicable [FCC §15.207(a)]

For intentional radiator that is designed to be connected to the public utility(AC)power line, the radio frequency. Voltage that is conducted back onto the AC power line on any frequencies hopping mode within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 uH/50 ohms line Impedance stabilization network(LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

§15.207 limits for AC line conducted emissions;

Frequency of Emission(MHz)	Conducted Limit (dB μ V)	
	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

5.8.2 Test Environment conditions

- Ambient temperature : (22 - 23) °C
- Relative Humidity : (58 - 67) % R.H.

5.8.3 Measurement Procedure

The measurements were performed in a shielded room. EUT was placed on a non-metallic table Height of 0.4 m above the reference ground plane. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. Each EUT power lead, except ground (safety) lead, was individually connected through a LISN to Input power source. Both lines of power cord, live and neutral, were measured.

5.8.4 Used equipment

Equipment	Model No.	Serial No.	Manufacturer	Next cal date	Cal interval	Used
Test receiver	ESCS30	100111	Rohde & Schwarz	2015.02.05	1 year	●
LISN	ESH3-Z5	100147	R&S	2015.02.05	1 year	●

*Test Program: " ESXS-K1 V2.2"

Measurement uncertainty

Conducted Emission measurement: 3.5 dB (CL: Approx 95%, $k=2$)

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

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

Mode	Tested channel	Modulation	Data rate
802.11n(HT40)	46	OFDM	MCS0

5.8.5 Measurement Result

Line. Live

Kostec Co., Ltd.

01 Aug 2014 17:01

Conducted Emission

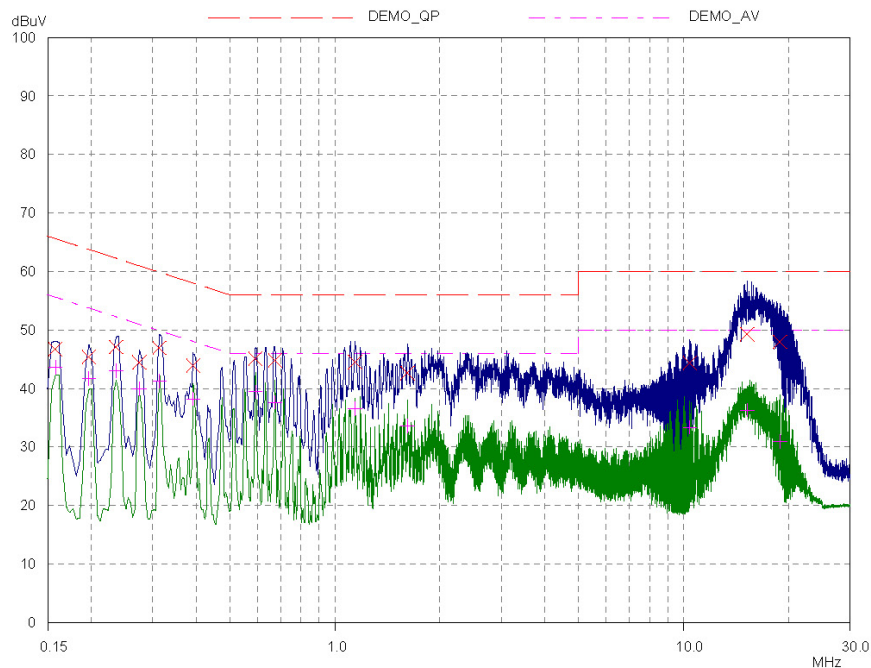
EUT: BM180
 Manuf: Bluebird Inc.
 Op Cond: a.c. 120 V, 60 Hz
 Operator:
 Test Spec:
 Comment: Live
 RF EMC_NII
 Result File: 0920_I.dat : New Measurement

Scan Settings (1 Range)

Frequencies			Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	10msec	15 dB	OFF	60dB	

Transducer	No.	Start	Stop	Name
	12	9kHz	30MHz	CNEFactor

Final Measurement: Detectors: X QP / + AV
 Meas Time: 1sec
 Subranges: 25
 Acc Margin: 50 dB



PAGE 1

Line. Live

Kostec Co., Ltd.

01 Aug 2014 17:01

Conducted Emission

EUT: BM180
Manuf: Bluebird Inc.
Op Cond: a.c. 120 V, 60 Hz
Operator:
Test Spec:
Comment: Live
RF EMC_NII
Result File: 0920_I.dat : New Measurement

Scan Settings (1 Range)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	10msec	15 dB

Transducer	No.	Start	Stop	Name
	12	9kHz	30MHz	CNEFactor

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 25
Acc Margin: 50 dB

Final Measurement Results

Frequency MHz	QP Level dBuV	QP Limit dBuV	QP Delta dB
0.15781	46.68	65.58	18.90
0.19687	45.33	63.74	18.41
0.23593	47.07	62.24	15.17
0.275	44.43	60.97	16.54
0.31406	46.94	59.86	12.92
0.39218	43.90	58.02	14.12
0.5914	45.05	56.00	10.95
0.67343	44.75	56.00	11.25
1.14218	44.49	56.00	11.51
1.61484	42.58	56.00	13.42
10.42343	44.39	60.00	15.61
15.22421	49.23	60.00	10.77
18.87656	47.93	60.00	12.07

Frequency MHz	AV Level dBuV	AV Limit dBuV	AV Delta dB
0.15781	43.59	55.58	11.99
0.19687	41.71	53.74	12.03
0.23593	43.00	52.24	9.24
0.275	39.95	50.97	11.02
0.31406	41.22	49.86	8.64
0.39218	38.21	48.02	9.81
0.5914	39.43	46.00	6.57
0.67343	37.63	46.00	8.37
1.14218	36.53	46.00	9.47
1.61484	33.56	46.00	12.44
10.42343	33.36	50.00	16.64
15.22421	36.31	50.00	13.69
18.87656	30.90	50.00	19.10

* limit exceeded

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Line. Neutral

Kostec Co., Ltd.

01 Aug 2014 16:45

Conducted Emission

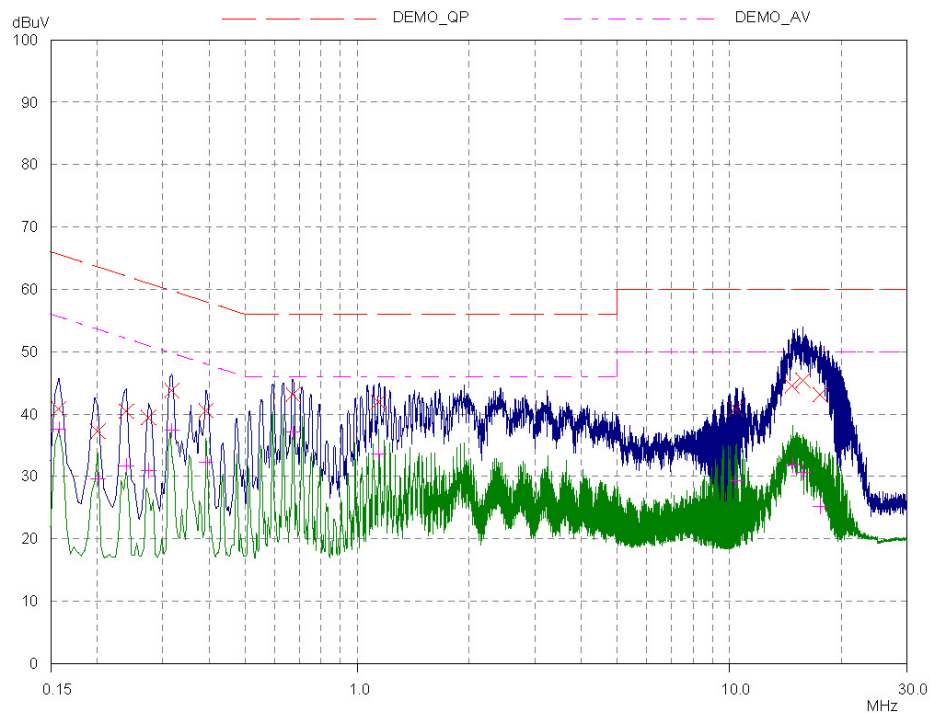
EUT: BM180
 Manuf: Bluebird Inc.
 Op Cond: a.c. 120 V, 60 Hz
 Operator:
 Test Spec:
 Comment: Neutral
 RF EMC_NII
 Result File: 0920_n.dat : New Measurement

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preampl	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	10msec	15 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	12	9kHz	30MHz	CNEFactor

Final Measurement: Detectors: X QP / + AV
 Meas Time: 1sec
 Subranges: 25
 Acc Margin: 50 dB



Line. Neutral

Kostec Co., Ltd.

01 Aug 2014 16:45

Conducted Emission

EUT: BM180
Manuf: Bluebird Inc.
Op Cond: a.c. 120 V, 60 Hz
Operator:
Test Spec:
Comment: Neutral
RF EMC_NII
Result File: 0920_n.dat : New Measurement

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	10msec	15 dB	OFF	60dB

Transducer No. Start Stop Name
12 9kHz 30MHz CNEFactor

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 25
Acc Margin: 50 dB

Final Measurement Results

Frequency MHz	QP Level dBuV	QP Limit dBuV	QP Delta dB
0.15781	40.85	65.58	24.73
0.20078	37.22	63.58	26.36
0.23984	40.42	62.10	21.68
0.275	39.46	60.97	21.51
0.31796	43.81	59.76	15.95
0.39218	40.56	58.02	17.46
0.67343	43.10	56.00	12.90
1.14218	41.92	56.00	14.08
10.42734	40.84	60.00	19.16
14.77109	44.52	60.00	15.48
15.77109	45.38	60.00	14.62
17.525	43.10	60.00	16.90

Frequency MHz	AV Level dBuV	AV Limit dBuV	AV Delta dB
0.15781	37.53	55.58	18.05
0.20078	29.65	53.58	23.93
0.23984	31.73	52.10	20.37
0.275	30.91	50.97	20.06
0.31796	37.37	49.76	12.39
0.39218	32.20	48.02	15.82
0.67343	37.09	46.00	8.91
1.14218	33.60	46.00	12.40
10.42734	29.31	50.00	20.69
14.77109	31.79	50.00	18.21
15.77109	30.65	50.00	19.35
17.525	25.19	50.00	24.81

* limit exceeded

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