RF TEST REPORT

Test report No.:	**EMC- FCC- R0049**
FCC ID:	**OYUFINGER007SR**
Type of equipment:	**RFID & Biometrics Access Controller**
Basic Model:	**FINGER007SR**
Varient Model:	**FINGER006SR**
Applicant:	**IDTECH Co.,Ltd.**
FCC Rule Part(s):	**FCC Part 15 Subpart C 2008**
Frequency Range:	**13.5604 MHz**
Test result:	**Complied**

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: August 8, 2011 ~ August 10 , 2011

Issued date: August 11 , 2011

Tested by: SON, MIN GI

Approved by: KIM, CHANG MIN

[Contents]

82-1, JEIL-RI, YANGJI-MYUN, CHURINGU, YONGIN-CITY, KYUNGGI-DO, KOREA 449-825
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1. Client information

Applicant : IDTECH Co.,Ltd.
Address : 5F,Ace Techno Tower B/D, 684-1 Deungchon-Dong, Gangseo-Gu,Seoul 157-030,Korea
Telephone number : +82-2-2659-0005
Facsimile number : +82-2-2659-0086
Contact person : Sin Young Ha / yhshin@idteck.com

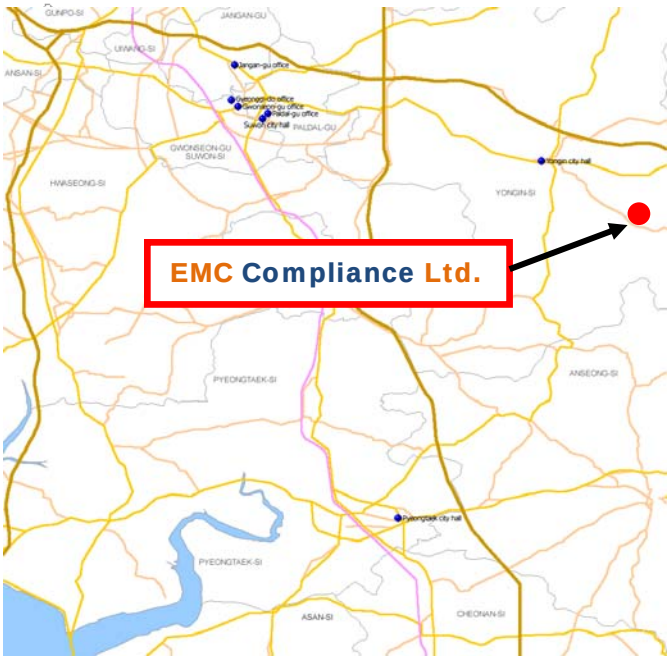
Manufacturer: IDTECH Co.,Ltd.
Address : 5F,Ace Techno Tower B/D, 684-1 Deungchon-Dong, Gangseo-Gu,Seoul 157-030,Korea

2. Laboratory information

Address
EMC Compliance Ltd.
82-1, JEIL-RI, YANGJI-MYUN, CHURINGU, YONGIN-CITY, KYUNGGI-DO, KOREA 449-825
Telephone Number: 82 31 336 9919 Facsimile Number: 82 31 336 4767

Certificate
CBTL Testing Laboratory, KOLAS NO.: 231
FCC Filing No.: KR0040
VCCI Registration No.: C-1713, R-1606, T-258

SITE MAP



3. Description of E.U.T.

3.1 Basic description

Applicant :	IDTECH Co.,Ltd.
Address of Applicant:	5F,Ace Techno Tower B/D, 684-1 Deungchon-Dong,Gangseo-Gu,Seoul 157-030,Korea
Manufacturer:	IDTECH Co.,Ltd.
Address of Manufacturer:	5F,Ace Techno Tower B/D, 684-1 Deungchon-Dong,Gangseo-Gu,Seoul 157-030,Korea
Type of equipment:	Stand-alone radio equipment
Basic Model:	FINGER007SR
Varient model:	FINGER006SR
Serial number:	Engineering Sample

3.2 General description

Frequency	13.5604 MHz
Type of Modulation	ASK
Number of Channels	1 channel
Type of Antenna	Integral (PCB Loop antenna)
Power supply	DC 12 V / Max.300mA
Extreme Power supply	Lower voltage: DC 10.2 V, Upper voltage: DC 13.8V
Operating temperature	-20 ℃ ~ 50 ℃
Dimension	161.5*134*48.5 (W*H*D)
Weight	525g
Reading Time(card)	30ms
Input port	4 ports (Exit Button, Door Sensor, Aux# 1, Aux#2)
Output port	2 ports (FORM-C Relay Output (COM, NO, NC) / DC12V~18V, Rating Max.2A)
LED indicator	7 Array LED Indicators (Red, Green and Yellow)
Beeper	Piezo buzzer

3.3 Test frequency

	Frequency
Low frequency	**-**
Middle frequency	**13.5604 MHz**
High frequency	**-**

4. Summary of test results

4.1 Standards & results

Rule Reference	Parameter	Status
15.225 (a)	**In-band Emission**	**C**
15.225 (b)	**In-band Emission**	**C**
15.225 (c)	**In-band Emission**	**C**
15.225 (d) **15.209**	**Out-of –band Emission**	**C**
15.225 (e)	**Frequency Stability Tolerance**	**C**
15.207	**Conducted Emissions**	**NA***

Note: C=complies
NC= Not complies
NT=Not tested
NA=Not Applicable

*The test is not applicable since the EUT is not the device that is designed to be connected to the public utility(AC) power line.

4.2 Uncertainty

Measurement Item	Combined Standard Uncertainty Uc	Expanded Uncertainty U = KUc (K = 2)
Conducted RF power	± 0.272 dB	± 0.544 dB
Radiated disturbance	± 1.943 dB	± 3.886 dB
Conducted disturbance	± 1.265 dB	± 2.53 dB

5. Test results

5.1 In-band Emission (15.225 (a))

5.1.1 Minimum Standard

15.225 (a) The field strength of any emission within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

5.1.2 Measurement Procedure

Test Procedure The Radiated Electric Field Strength intensity has been measured on semi anechoic chamber with a ground plane and at a distance of 3m.

Frequency : From 9kHz to 30MHz at distance 3m The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

Frequency : From 30MHz to 1GHz at distance 3m The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.(15.35(a))

below 1GHz : quasi-peak

* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)
[Limit at 3m]=[Limit at 300m]-40 x log(3[m]/300[m])
[Limit at 3m]=[Limit at 30m]-40 x log (3[m]/30[m])

5.1.3 Test Result

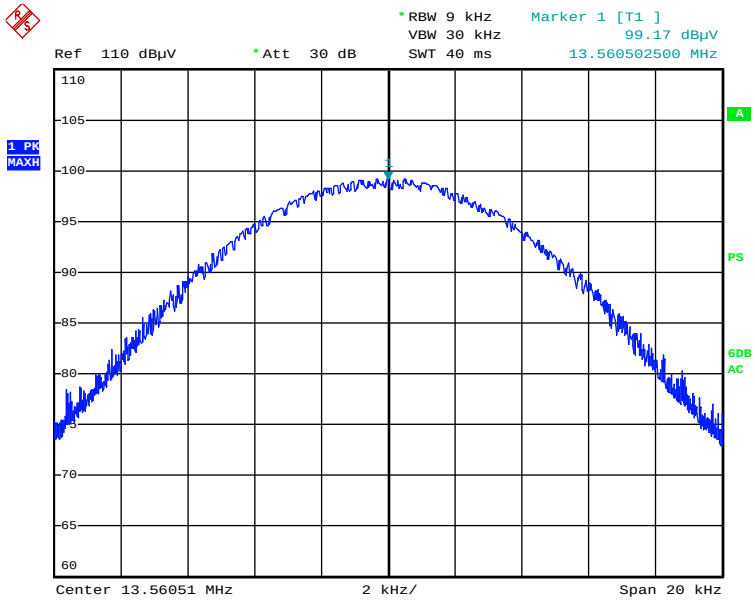
- Complies

EUT	RFID Reader		
Operating Frequency	13.5604 MHz	**Model Name**	FINGER007SR
Operating Mode	Transmitter Mode	**Modulation Technology**	ASK
Environmental Condition	23℃/45%	**Test Channel**	1ch
Tested By	Mingi Son	**Power Rate**	12V DC

Frequency	Reading (dBuV)	Correction Factor	field strength dBμV/m at 3 m
13.5604 MHz	99.17	-21.8	77.37
Maximum Level(dBuV/m)			77.37
Limit(dBuV/m) at 3m			124 dBuV/m
margin			46.63
Uncertainty			±3.8dB

Note: Field strength limit was calculated with 40dB/dec

5.1.4 Test Plot



5.2 In-band Emission (15.225 (b)(c))

5.2.1 Regulation

15.225 (b) With in the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed ***334 microvolts/meter at 30 meters.

15.225 (c) With in the bands 13.110-13.410 MHz and 13.710-14.010 MHz, the field strength of any emissions shall not exceed ***106 microvolts/meter at 30 meters.

5.2.2 Test Result

- Complied

Measurement Distance: 3m

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(μV)]	Pol. [V/H]	Factor [dB]	Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin [dB]
QP DATA							
13.568	9	90.9	V	-21.8	90.47	69.1	21.37
13.351	9	77.0	H	-21.8	80.51	55.2	25.31

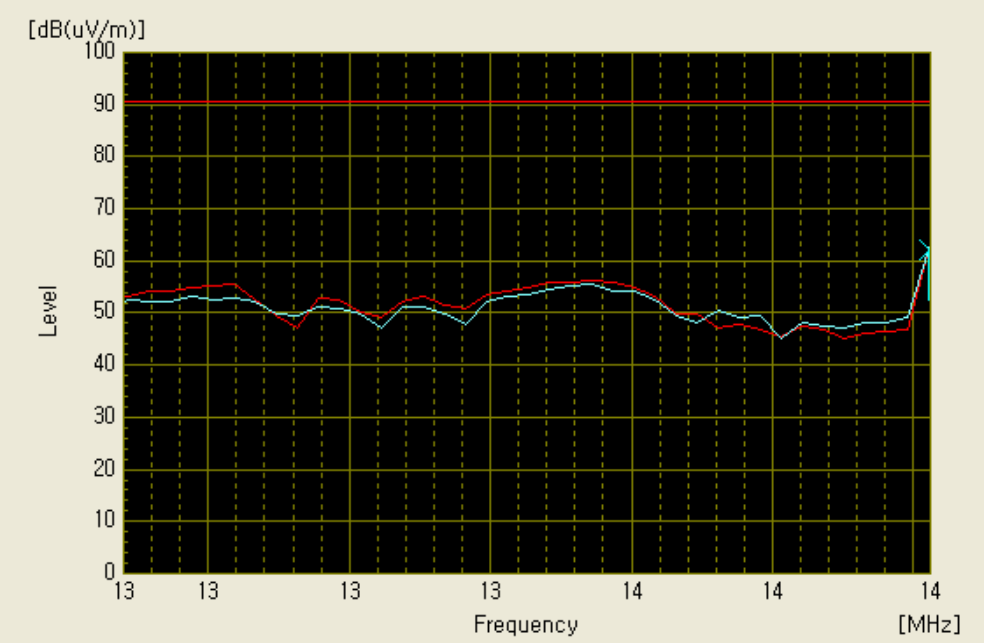
Margin (dB) = Limit – Actual
[Resultl = Reading – Amp Gain + Attenuator + AF + CL]
1. H = Horizontal, V = Vertical Polarization
2. ATT = Attenuation (10dB pad and/or Insertion Loss of HPF), AF/CL = Antenna Factor and Cable Loss

* The spurious emission at the frequency does not fall in the restricted bands.
** The measured result is within the test standard limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance.
*** 20 log 334+40 log (30/3)
20 log 106+40 log (30/3)

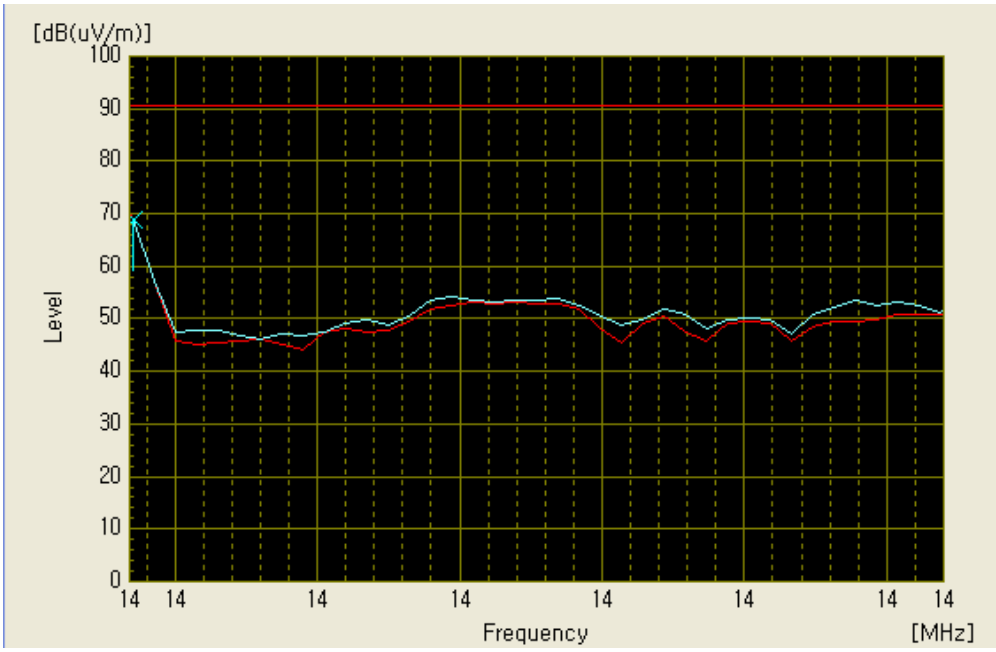
NOTE: All emissions not reported were more than 20 dB below the specified limit or in the noise floor.

5.2.3 Test Plot

13.410-13.553 MHz

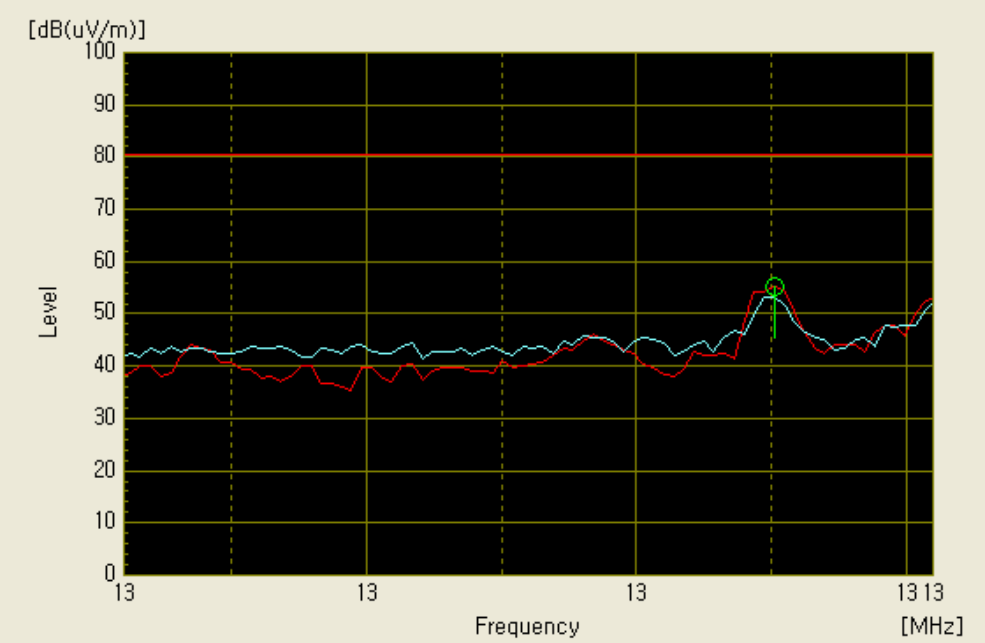


13.567-13.710 MHz

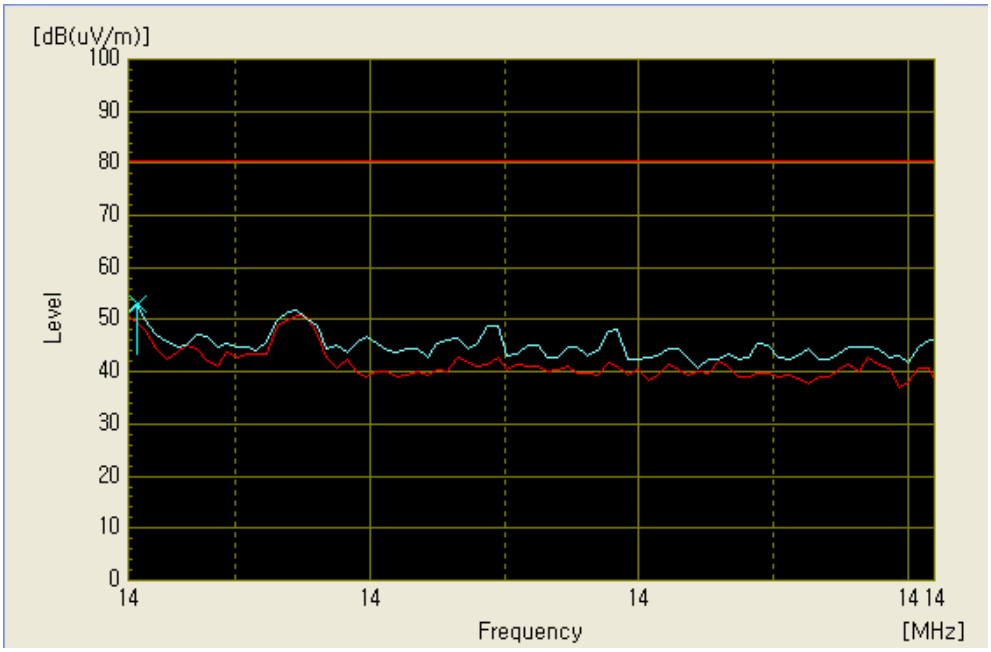


5.2.3 Test Plot

13.110-13.410 MHz



13.710-14.010 MHz



5.3 Out-of-band Emission (15.225 (d),15.209)

5.3.1 Regulation

15.225 (d) The Field Strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in 15.209

Frequency (MHz)	Field Strength (uV/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30(29.54dBuV/m)	30
30.0-88.0	100(40 dBuV/m)	3
88-216	150(43.5 dBuV/m)	3
216-960	200 (46 dBuV/m)	3
Above 960	500 (53.98 dBuV/m)	

5.3.2 Measurement Procedure

The spurious emissions from the EuT will be measured on an open area test site in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna.
The antenna was positioned 3, 10 or 30 meters horizontally from the EuT.
Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions.
In the case where larger measuring distances are required the results will extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2].

The final measurement will be performed with an EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used according to Section 15.209 (d) [2].

The final level, expressed in dBµV/m, is arrived at by taking the reading from the EMI receiver (Level dBµV) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit. The resolution bandwidth during the measurement is as follows:
9 kHz – 150 kHz: ResBW: 200 Hz
150 kHz – 30 MHz: ResBW: 9 kHz

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5.3.3 Test Result
-Complied

Measurement Distance: 3m

-below 30MHz

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(μV)]	Pol. [V/H]	Factor [dB]	Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin [dB]
QP DATA.							
11.993	9	69.1	V	-21.7	69.5	47.4	22.1
16.830	9	66.1	V	-22.0	69.5	44.1	25.4

-Above 30MHz

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(μV)]	Pol. [V/H]	Factor [dB]	Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin [dB]
QP DATA.							
39.997	120	39.7	V	-15.7	40.0	24.0	16.0
89.601	120	51.2	H	19.8	43.5	31.4	12.1
244.086	120	54.7	V	-16.5	46.0	38.2	8.2
257.646	120	55.1	H	-16.3	46.0	38.8	7.2
432.015	120	48.8	H	-11.4	46.0	37.4	8.6

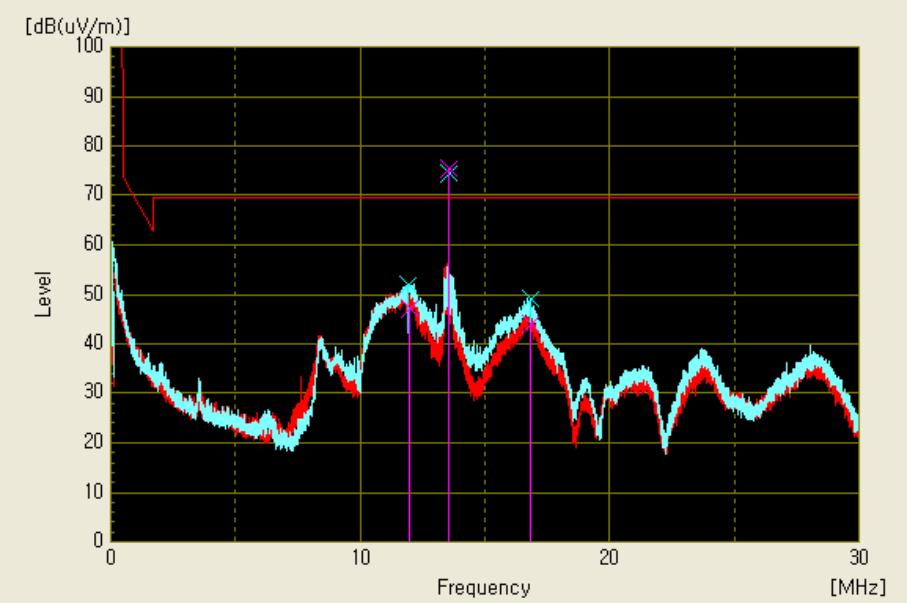
Margin (dB) = Limit – Actual
[Resultl = Reading – Amp Gain + Attenuator + AF + CL]
1. H = Horizontal, V = Vertical Polarization
2. ATT = Attenuation (10dB pad and/or Insertion Loss of HPF), AF/CL = Antenna Factor and Cable Loss

* The spurious emission at the frequency does not fall in the restricted bands.
** The measured result is within the test standard limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance.

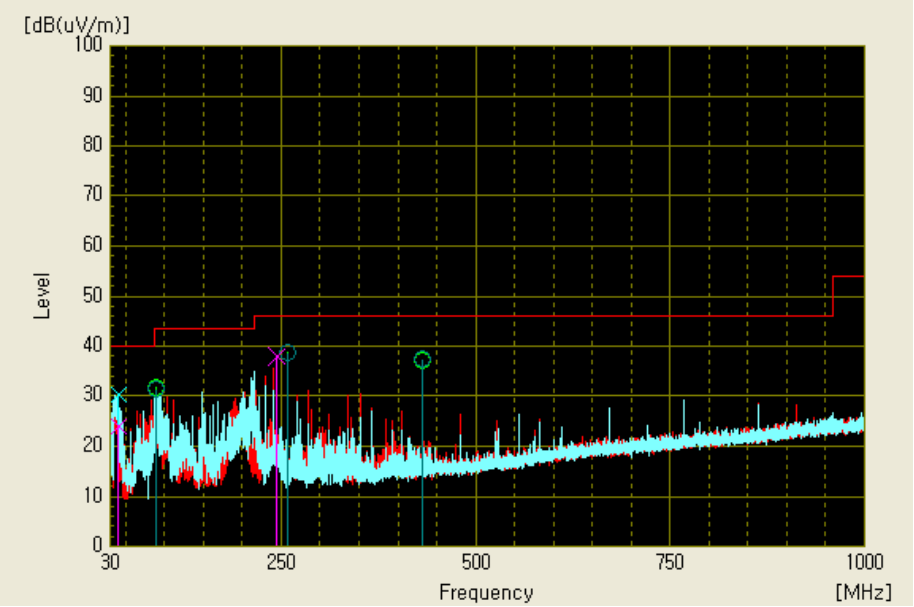
NOTE: All emissions not reported were more than 20 dB below the specified limit or in the noise floor.

5.3.4 Test Plot

below 30MHz



Above 30MHz



5.4 Frequency tolerance (15.225 (e))

5.4.1 Regulation

15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.4.2 Test Result

- Complied

VOLTAGE (%)	POWER (V)	TEMP (°C)	FREQ (Hz)	FREQ.DEV (Hz)	Deviation (%)
100	12	20	13560475	-75	0.00055%
		-20	13560538	-138	0.00102%
		-10	13560541	-141	0.00104%
		0	13560546	-146	0.00108%
		10	13560544	-144	0.00106%
		20	13560537	-137	0.00101%
		25	13560531	-131	0.00097%
		30	13560523	-123	0.00091%
		40	13560503	-103	0.00076%
		50	13560475	-75	0.00055%
85	10.2	20	13560473	-73	0.00054%
115	13.8	20	13560476	-76	0.00056%

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5.5 Conducted Emission- N/A

5.4.1 Regulation

According to §15.207(a), for an 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 frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50Ω 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.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Qausi-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.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

5.4.2 Measurement Procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASI-PEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

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6. Test equipment used for test

	Description	Manufacture	Model No.	Serial No.	Next Cal Date.
■	Temp & humidity chamber	taekwang	TK-04	TK001	11.12.10
■	Spectrum Analyzer	Agilent	E4407B	US39010142	11.11.01
■	Signal Generator	HP	E4432B	GB39340611	11.11.01
□	Modulation Analyzer	HP	8901B	3538A05527	11.11.08
□	Function Generator	Agilent	33250A	MY4006432	12.02.04
□	Audio Analyzer	HP	8903B	3729A19213	11.11.04
□	AC Power Supply	KIKUSUI	PCR2000W	GB001619	11.11.01
□	DC Power Supply	Tektronix	PS2521G	TW53135	11.11.01
■	DC Power Supply	Tektronix	PS2520G	TW50517	12.02.25
□	Dummy Load	BIRD	8141	7560	12.09.16
□	Dummy Load	BIRD	8401-025	799	12.09.16
□	EMI Test Receiver	R&S	ESCI	100710	11.12.01
■	EMI Test Receiver	R&S	ESCI	100001	12.07.11
□	Attenuator	HP	8494A	2631A09825	11.11.03
□	Attenuator	HP	8496A	3308A16640	11.11.03
□	Attenuator	HP	11581A	29738	11.11.03
□	Power sensor	Agilent	E9321A	US40390422	11.11.08
■	LOOP Antenna	EMCO	6502	9205-2745	13.05.22
■	BILOG Antenna	Schwarzbeck	VULB 9168	375	11.11.30
□	HORN Antenna	ETS	3115	00062589	11.12.22
□	Power Divider	Weinschel	1580-1	NX380	12.09.14
■	Exit Button	IDTECH Co.,Ltd.	EB10	-	-
■	Strike Lock	IDTECH Co.,Ltd.	IES130NO	-	-
■	Door Contact	IDTECH Co.,Ltd.	DCT100	-	-
■	Reader	IDTECH Co.,Ltd.	RF10	-	-

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