

TEST REPORT

STANDARD : FCC Part15B Class B -Peripherals-

Applicant	Testing Laboratory
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Equipment Type	144 MHz FM TRANSCEIVER
Trademark	KENWOOD
Model(s)	TH-K20A
Serial No.	00000006
Equipment Authorization	Certification
FCC ID	K44441200
Report Number	JT11080004
Report Issue Date	August 29, 2011

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Approved by 
Kazuo Gokita
[Manager]

Tested by 
Atsuyuki Morishima



TABLE OF CONTENTS

	Page
SECTION 1. GENERAL INFORMATION	3
SECTION 2. SUMMARY OF TEST RESULTS	4
SECTION 3. EQUIPMENT UNDER TEST	5
SECTION 4. SUPPORT EQUIPMENT.....	6
SECTION 5. USED CABLE(S).....	7
SECTION 6. TEST CONFIGURATION	8
SECTION 7. OPERATING CONDITION	9
SECTION 8. UNCERTAINTY	10
SECTION 9. EVALUATION OF TEST RESULTS	11
SECTION 10. LIST OF MEASURING INSTRUMENTS.....	14
ANNEX	15

SECTION 1. GENERAL INFORMATION

Test Performed

EUT Received	August 8, 2011
Date of Test	From August 22, 2011 to August 23, 2011
Standard Applied	FCC Part15B Class B -Peripherals-
Test methods	ANSI C63.4-2003
Deviation from Standard(s)	None

Qualifications of Testing Laboratory

Accreditation	Scope	Lab. Code	Remarks
VLAC	EMC Testing	VLAC-008-5	JAPAN
BSMI	EMC Testing	SL2-IN-E-6017, SL2-AI-E-6017	TAIWAN
Filing			
VCCI	EMC Testing	R-257, C-260, C-284, T-1736, T-1737, G-124 R-258, C-261, C-285, T-1738, T-1739 R-259, C-262, T-1740, G-125	JAPAN
FCC	EMC Testing	Designation Number : JP0011	USA
IC	EMC Testing	2042P-1, 2042P-2	CANADA
SAUDI ARABIA	EMC Testing	N/A	

Abbreviations

EUT	Equipment Under Test	DoC	Declaration of Conformity
AMN	Artificial Mains Network	ISN	Impedance Stabilization Network
LISN	Line Impedance Stabilization Network	Q-P	Quasi-peak
AMP	Amplifier	AVG	Average
ATT	Attenuator	PK	Peak
ANT	Antenna	Cal	Calibration
BBA	Broadband Antenna	N/A	Not applicable or Not available
DIP	Dipole Antenna	LCD	Liquid-Crystal Display
AE	Associated Equipment	HDMI	High-Definition Multimedia Interface

SECTION 2. SUMMARY OF TEST RESULTS

See Section9 for the detailed result.

Standard Applied	FCC Part15B Class B -Peripherals-	
Test Item	Minimum margin	Remarks
Radiated disturbance	1.0 dB (1536.35 MHz) [AVG] PC mode	

Note : Conducted Emission Test is not required because the EUT is connected to battery.

SECTION 3. EQUIPMENT UNDER TEST

The equipment under test (EUT) consisted of the following apparatus.

3.1 System Configuration

Symbol	Item	Model No.	Serial No.	Manufacturer
A	144 MHz FM TRANSCEIVER	TH-K20A	00000006	KENWOOD
Rated Power : DC7.5 V(DC6.0-9.0 V), 0.25 A max.				
Supplied Power : DC7.5 V				
Condition of Equipment	Prototype			
Type	Tabletop			
Suppression Devices	No Modifications by the laboratory were made to the device			

3.2 Overview of EUT

Frequency Ranges	136-174 MHz
Receiver Type	Double Conversion
Model of Operation	F3E

3.3 Intermediate Frequencies

1st	38.85 MHz (upper)
2nd	450 kHz (lower)

3.4 Port(s)/Connector(s)

Port Name	Connector Type	Connector Pin	Remarks
Microphone	3.5 ϕ	3pin	
Speaker	2.5 ϕ	3pin	
Antenna	SMA	2pin	

3.5 Highest Frequency Generated / Used

Base Clock	Operating Frequency	Board Name	Remarks
212.85 MHz	212.85 MHz	TX RX UNIT	

SECTION 4. SUPPORT EQUIPMENT

The EUT was supported by the following equipment during the test.

Symbol	Item	Model No.	Serial No.	Manufacturer	FCC ID
B	Programming cable	KPG-46A	None	KENWOOD	N/A
C	USB Adapter	KCT-53U	None	KENWOOD	K44403500
D	Li-ion Battery	KNB-63L	None	KENWOOD	N/A
E	Dummy Antenna	CT-01	None	TME	N/A
F	Computer	DMC	FXYKV1X	DELL	DoC
G	LCD Monitor	E176FPb	None	DELL	DoC
H	Keyboard	SK-8115	None	DELL	DoC
I	Mouse	MO56UOA	E1900IT0	DELL	DoC
J	Printer	C8154AL	TH71Q5Z0GT	HEWLETT PACKARD	DoC
K	AC Adapter	0957-2171	E151B100TC02L	HEWLETT PACKARD	N/A
Supplied Power:					
F, G, K	AC120 V, 60 Hz				
E	50ohms				

SECTION 5. USED CABLE(S)

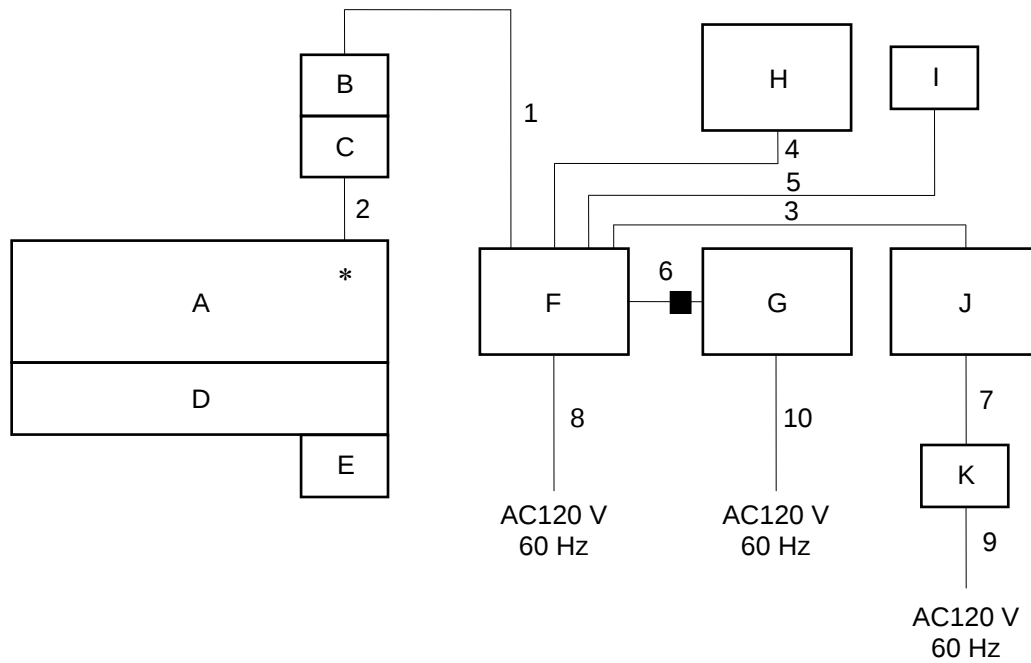
The following cable(s) was used for the test.

No.	Name	Length (m)	Shield	Metal Connector	Ferrite Core
1	PC connection cable (PG-4Y)	1.05	Yes	No	
2	USB Adapter (KCT-53U)	0.30	Yes	Yes	
3	Centronics cable	2.40	Yes	Yes	
4	Keyboard cable	2.00	Yes	Yes	
5	Mouse cable	1.90	Yes	Yes	
6	Video cable	1.80	Yes	Yes	Fixed x 1
7	Power cable for Printer(J) (DC)	1.70	No	No	
8	Power cable for Computer(F) (AC)	1.90	No	No	
9	Power cable for Printer(J) (AC)	0.90	No	No	
10	Power cable for LCD(G) (AC)	1.75	No	No	

Note : Cable No.6 is supplied together with LCD Monitor(G).

SECTION 6. TEST CONFIGURATION

* : EUT
■ : Ferrite core



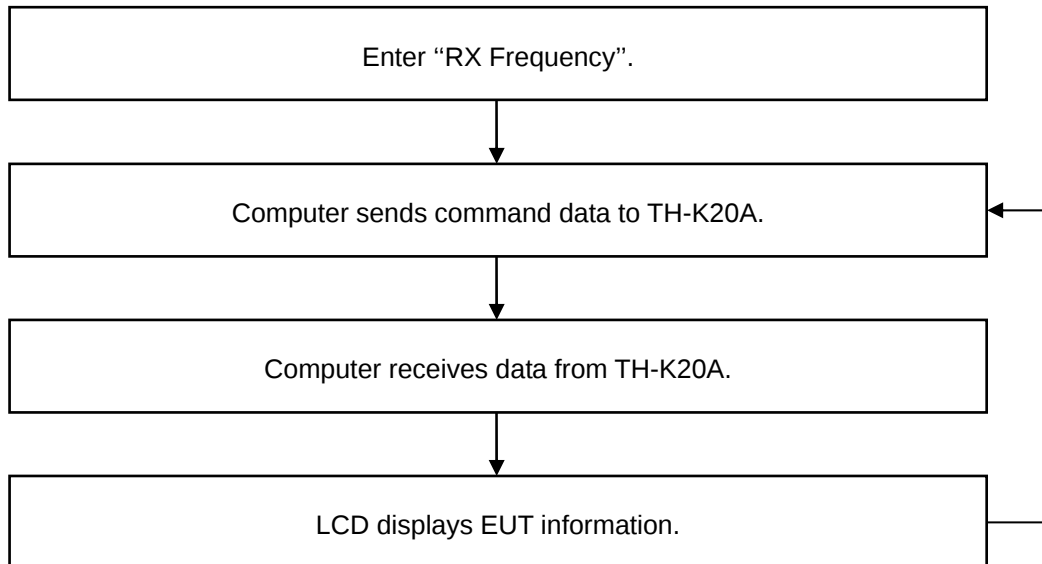
The symbols and numbers assigned to the equipments and cables on this diagram correspond to the ones in Sections 3 to 5.

SECTION 7. OPERATING CONDITION

The test was carried out under the following mode.

PC mode

Cycle time for operation: Continuity



SECTION 8. UNCERTAINTY

Traceability to national standard in SI units is ensured with these values.
Compliance with the limits in this standard are determined without in consideration of the measurement uncertainty of the measurement instrumentation.

Radiated disturbance at 3m	U _{lab} [k = 2]	U _{cispr}
30 MHz – 1000 MHz	+/- 3.52 dB	5.2 dB
CISPR22	N/A	
Above 1 GHz ANCI 63.4	+/- 4.26 dB	
Radiated disturbance at 10m		
30 MHz – 1000 MHz	+/- 3.98 dB	5.1 dB
Above 1 GHz	+/- 4.26 dB	
Radiated disturbance at 30m		
	N/A	5.2 dB
Conducted disturbance at mains terminals		
9 kHz – 150 kHz	+/- 2.76 dB	4.0 dB
150 kHz – 30 MHz		3.6 dB
Conducted disturbance at telecommunication ports (ISN)		
150 kHz – 30 MHz	+/- 2.76 dB	Nil
Conducted disturbance at telecommunication ports (Capacitive Voltage Probe)		
150 kHz – 30 MHz	+/- 3.10 dB	Nil
Conducted disturbance at telecommunication ports (Current Probe)		
150 kHz – 30 MHz	+/- 2.86 dB	Nil
Conducted disturbance at terminals		
150 kHz – 30 MHz	+/- 2.79 dB	Nil
Disturbance power		
30 MHz – 300 MHz	+/- 3.00 dB	4.5 dB
Conducted Power on Antenna Port		
30 MHz – 1000 MHz	+/- 2.90 dB	Nil
Above 1 GHz	+/- 1.60 dB	

The above expanded instrumentation uncertainty, U_{lab}, is estimated in accordance with CISPR 16-4-2.

SECTION 9. EVALUATION OF TEST RESULTS

Location	Tochigi No.2 Test Site
Test Engineer	Atsuyuki Morishima

Frequency Range of Measurements

	Required Measurement Frequency Range	Measured Frequency Range
Radiated	30 – 2000 MHz	30 – 2000 MHz

Test Procedure

Item	Document number
Radiated disturbance	RJP-EM003

Setting for the Measuring instruments

Frequency [MHz]	Instrument	Detector	Resolution Bandwidth	Video Bandwidth
0.15 – 30	Receiver	Quasi Peak	10 kHz	N/A
		Average	10 kHz	N/A
30 – 1000	Receiver	Quasi Peak	120 kHz	N/A
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
		Average	1 MHz	10 Hz

< Measurement data correction >

* Radiated disturbance

Emission Level [dBμV/m] = Meter Reading [dBμV] + Factor [dB/m]

Margin [dB] = Limit [dBμV/m] - Emission Level [dBμV/m]

* Factor = Antenna Factor + Cable Loss - Amplifier Gain + ATT
(– Distance Conversion Factor)

Radiated disturbance
30 MHz – 1000 MHz

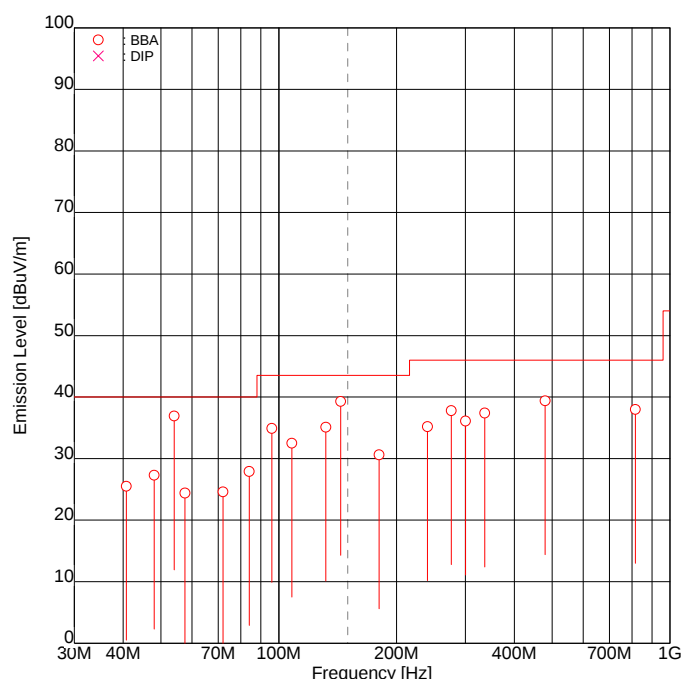
Intertek Japan K.K.

Tochigi No.2 Test Site

Radiated Electric Field

APPLICANT : Kenwood Corporation
EUT NAME : 144MHz FM TRANSCEIVER
MODEL NO. : TH-K20A
SERIAL NO. : 00000006
TEST MODE : PC mode
POWER SOURCE : DC 7.5 V (Battery)
DATE TESTED : Aug 22 2011
FILE NO. : -
REGULATION : FCC Part15B Class B
TEST METHOD : ANSI C63.4-2003
DISTANCE : 3.00 [m]
TEMPERATURE : 21.0 [degC]
HUMIDITY : 75.0 [%]
NOTE :

ENGINEER : Atsuyuki Morishima



[No]	FREQUENCY [MHz]	ANT.	READING [dBuV]		FACTOR [dB/m]		EMISSION [dBuV/m]		LIMIT [dBuV/m]	MARGIN [dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	40.76	BBA	-	31.5	-6.0	-6.0	-	25.5	40.0	-	14.5
2	48.00	BBA	-	32.5	-5.2	-5.2	-	27.3	40.0	-	12.7
3	54.00	BBA	-	<u>42.1</u>	-5.2	-5.2	-	<u>36.9</u>	40.0	-	<u>3.1</u>
4	57.60	BBA	-	29.6	-5.2	-5.2	-	24.4	40.0	-	15.6
5	72.03	BBA	31.8	-	-7.2	-7.2	24.6	-	40.0	15.4	-
6	84.01	BBA	-	37.3	-9.4	-9.4	-	27.9	40.0	-	12.1
7	96.01	BBA	36.8	44.5	-9.6	-9.6	27.2	34.9	43.5	16.3	8.6
8	108.03	BBA	-	40.4	-7.9	-7.9	-	32.5	43.5	-	11.0
9	132.02	BBA	-	<u>40.2</u>	-5.1	-5.1	-	<u>35.1</u>	43.5	-	<u>8.4</u>
10	144.02	BBA	<u>43.6</u>	41.0	-4.3	-4.3	<u>39.3</u>	36.7	43.5	<u>4.2</u>	6.8
11	180.40	BBA	-	35.3	-4.7	-4.7	-	30.6	43.5	-	12.9
12	240.04	BBA	39.2	-	-4.0	-4.0	35.2	-	46.0	10.8	-
13	276.06	BBA	<u>39.9</u>	34.0	-2.1	-2.1	<u>37.8</u>	31.9	46.0	<u>8.2</u>	14.1
14	300.07	BBA	37.0	-	-0.9	-0.9	36.1	-	46.0	9.9	-
15	336.07	BBA	37.4	33.0	0.0	0.0	37.4	33.0	46.0	8.6	13.0
16	480.07	BBA	<u>36.5</u>	32.8	2.9	2.9	<u>39.4</u>	35.7	46.0	<u>6.6</u>	10.3
17	816.11	BBA	27.8	<u>28.1</u>	9.9	9.9	37.7	<u>38.0</u>	46.0	8.3	<u>8.0</u>

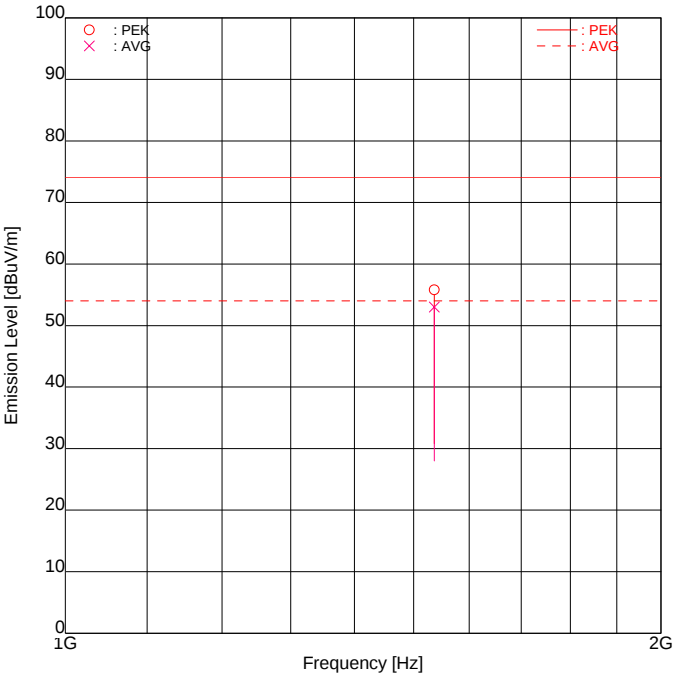
Higher six points are underlined.
Other frequencies : Below the FCC Part15B Class B limit
Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp)
ANT. : Used antenna(BBA = Broadband antenna, DIP = Dipole antenna)

1000 MHz – 2000 MHz

Intertek Japan K.K.
Tochigi No.2 Test Site
Radiated Electric Field

APPLICANT : Kenwood Corporation
EUT NAME : 144MHz FM TRANSCEIVER
MODEL NO. : TH-K20A
SERIAL NO. : 00000006
TEST MODE : PC mode
POWER SOURCE : DC 7.5 V (Battery)
DATE TESTED : Aug 23 2011
FILE NO. : -
REGULATION : FCC Part15B Class B
TEST METHOD : ANSI C63.4-2003
DISTANCE : 3.00 [m]
TEMPERATURE : 21.0 [degC]
HUMIDITY : 68.0 [%]
NOTE :

ENGINEER : Atsuyuki Morishima



FREQUENCY [No]	MODE [MHz]		READING [dBuV]		FACTOR [dB]		EMISSION [dBuV/m]		LIMIT [dBuV/m]	MARGIN [dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	1536.35	PEK	54.2	<u>55.9</u>	-0.1	-0.1	54.1	<u>55.8</u>	74.0	19.9	<u>18.2</u>
2	1536.35	AVG	50.0	<u>53.1</u>	-0.1	-0.1	49.9	<u>53.0</u>	54.0	4.1	<u>1.0</u>

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SECTION 10. LIST OF MEASURING INSTRUMENTS

Test instruments are calibrated according to Quality Manual and Calibration Rules of Intertek Japan K.K.

Instrument	Model No.	Serial No.	Manufacturer	Cal. Interval	Effective period
Radiated disturbance					
Broad Band antenna	VULB9168	218	Schwarzbeck	1 Y	Mar, 2012
6dB Attenuator	CFA-01(NPJ-6)	None(F0200002)	TAMAGAWA	1 Y	May, 2012
Step Attenuator	8494B	2805A14563	Hewlett Packard	1 Y	May, 2012
Amplifier	8447D	2944A06342	Hewlett Packard	1 Y	May, 2012
Double ridged antenna	3115	9903-5699	EMCO	1 Y	May, 2012
6dB Attenuator	8493C	75550	Agilent	1 Y	Apr, 2012
Amplifier	8449B	3008A01182	Hewlett Packard	1 Y	Apr, 2012
Spectrum analyzer	8563E (Firmware Revision 971024)	3821A09565	Hewlett Packard	1 Y	May, 2012
Coaxial cable(R1)	5D-2W(10.0 m)	2R1001a	Intertek	1 Y	May, 2012
Coaxial cable(R2)	RG-177/U(20.0 m)	2R1002	Intertek	1 Y	May, 2012
Coaxial cable(R3)	RG-5A/U(1.3 m)	2R1003	Intertek	1 Y	May, 2012
Coaxial cable(R4)	RG-5A/U(0.2 m)	2R1004	Intertek	1 Y	May, 2012
Coaxial cable(R5)	5D-2W(0.7 m)	2R1005	Intertek	1 Y	May, 2012
Coaxial cable(R6)	5D-2W(0.2 m)	2R1006	Intertek	1 Y	May, 2012
Coaxial cable(R7)	5D-2W(1.7 m)	2R1007	Intertek	1 Y	May, 2012
Coaxial cable(R8)	5D-2W(6.0 m)	2R1008a	Intertek	1 Y	May, 2012
Coaxial cable(RG1)	SUCOFLEX(1.5 m)	290799/4	SUHNER	1 Y	Apr, 2012
Coaxial cable(RG2)	SUCOFLEX(6.0 m)	290800/4	SUHNER	1 Y	Apr, 2012
Site Attenuation				1 Y	Aug, 2011
Common					
Test receiver	ESS (Firmware Version 1.07)	842886/013	Rohde & Schwarz	1 Y	Jan, 2012
RF Switch	ACX-150	None(F02301501)	Intertek	1 Y	May, 2012
Testing Software	emiT (Version 3,0,0,0)				

ANNEX

TEST PROCEDURE(S)

Test was carried out under the following conditions.

Radiated disturbance

Test setup as per standard

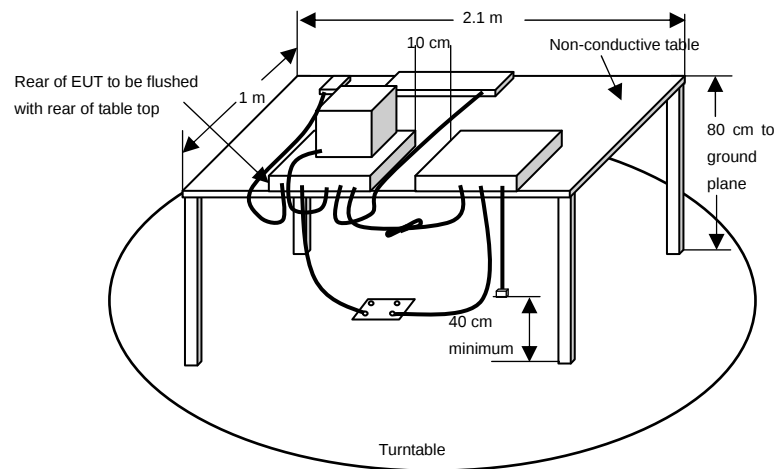
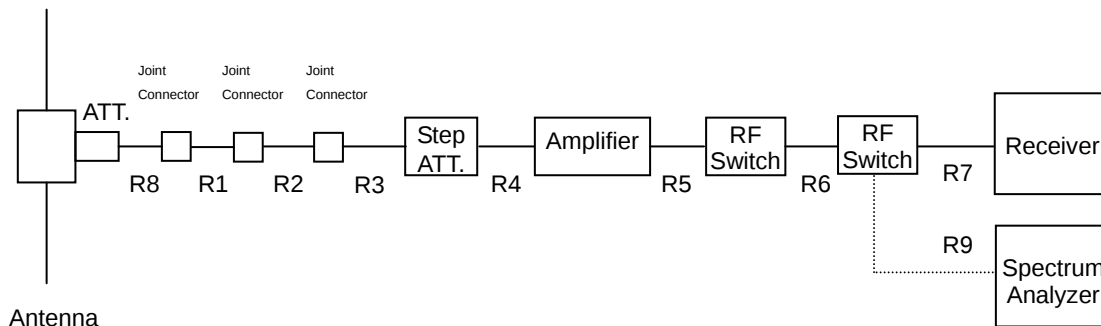
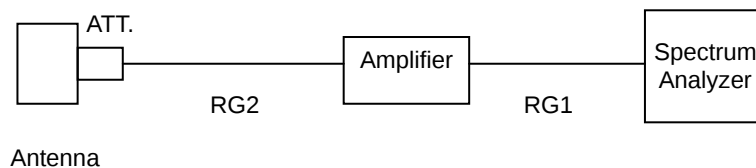


Diagram of the measuring instruments (30 – 1000 MHz)



Above 1GHz



[Preliminary Measurement]

EUT is tested on all operating conditions.

The spectrum analyzer is set max-hold mode and swept during turntable was rotated 0 to 360 degree, And find the worst emission conditions in configuration, operating mode, or ambient noise notation.

[Final Measurement]

The EUT operated in the worst emission condition found by the preliminary test.

The turntable azimuth (EUT direction) and antenna height are adjusted the position so that maximum field strength is obtained for each frequency spectrum to be measured.

The equipment and cables are arranged or manipulated within the range of the test standard in the above condition. At least six highest spectrums are measured by the test receiver (quasi-peak) and spectrum analyzer (peak and average). When the uncertain result was obtained (30 – 1000 MHz), the measurement is retried by using the half wave dipole antenna instead of the broadband antenna.