KTL Test Report:	8R00471
Applicant:	Agilis Communications Tech. Pte Ltd. Singapore Technologies Building 100 Jurong East Street 21, Level 4 Singapore 609602
Equipment Under Test: (E.U.T.)	BB100 Automatic Door Activator
FCC ID:	M2EBB100
In Accordance With:	**FCC Part 15, Subpart C** For Operation Within The Bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz, 24075-24175 MHz Intentional Radiators Used As Field Disturbance Sensors Excluding Perimeter Protection Systems
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	
	Russell Grant, Senior Technologist
Date:	
Total Number of Pages:	

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Agilis Communications Tech. PTE Ltd.

Model No.: BB100

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.245. All tests were conducted using measurement procedure ANSI C63.4-1992. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

F	D	S

Equipment Code

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
Tom Tidwell

Summary Of Test Data

Name of Test	Paragraph Number	Results
Radiated Emissions	15.231(b)	Complies
Powerline Conducted Emissions	15.207	Complies

Footnotes For N/A's:

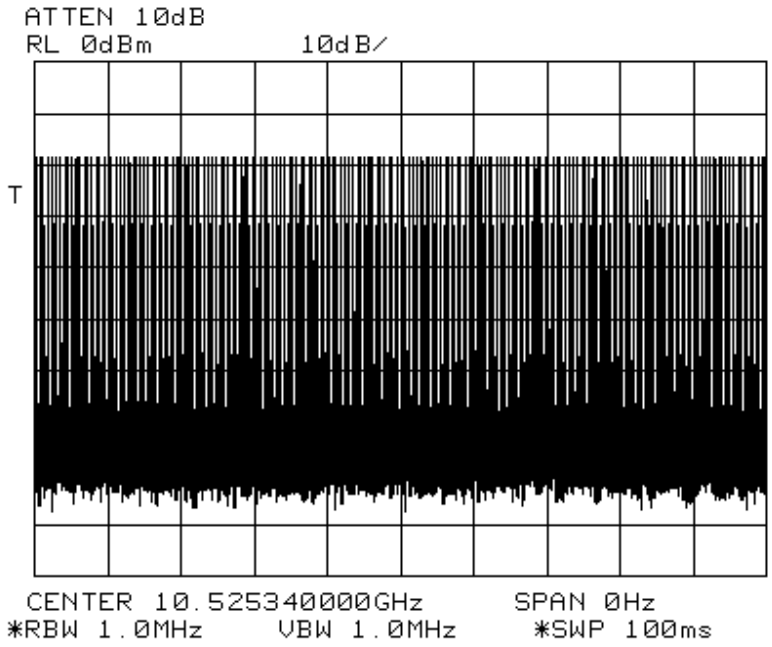
Test Conditions:

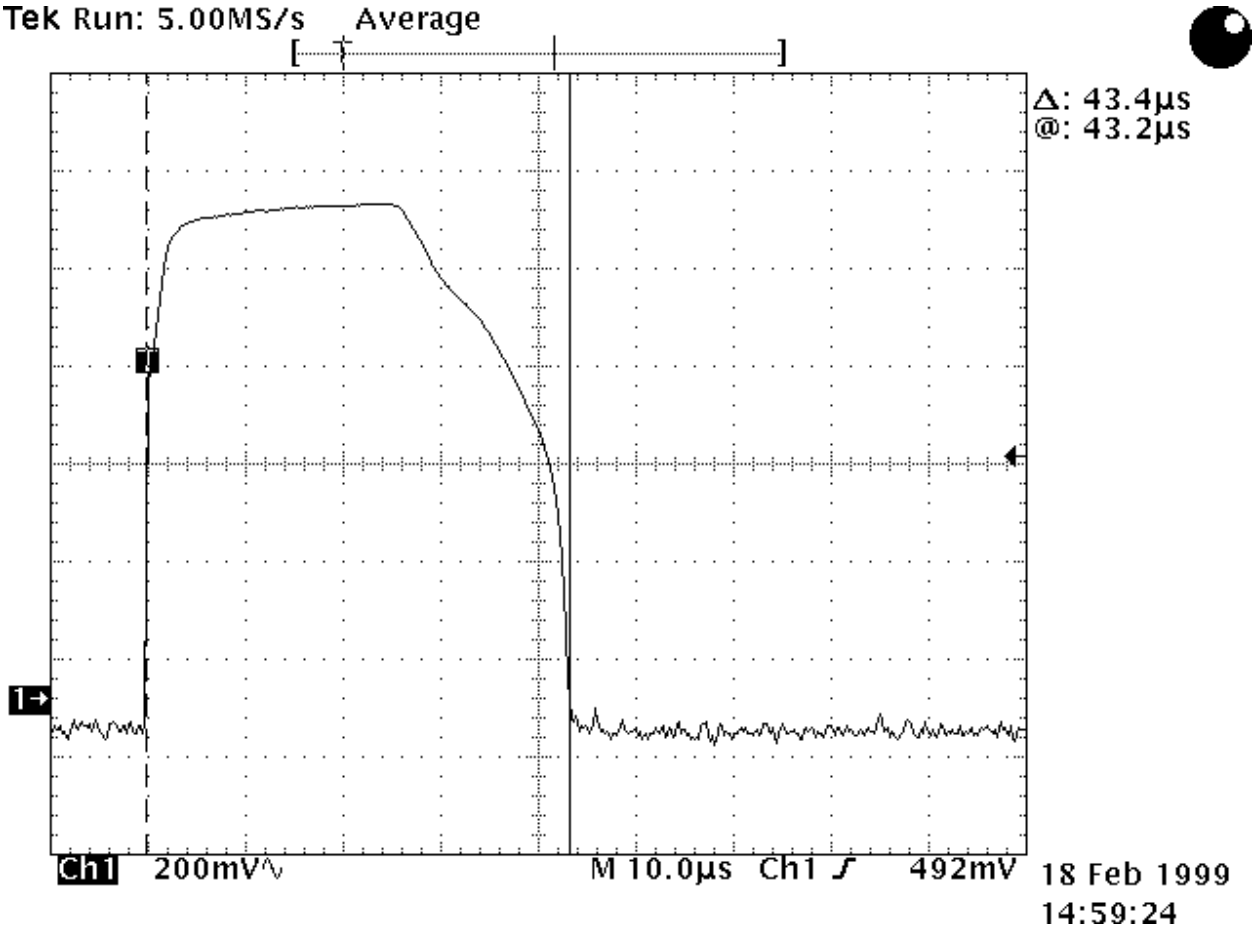
Indoor	Temperature:	20 °C
	Humidity:	30 %
Outdoor	Temperature:	Not Applicable
	Humidity:	Not Applicable

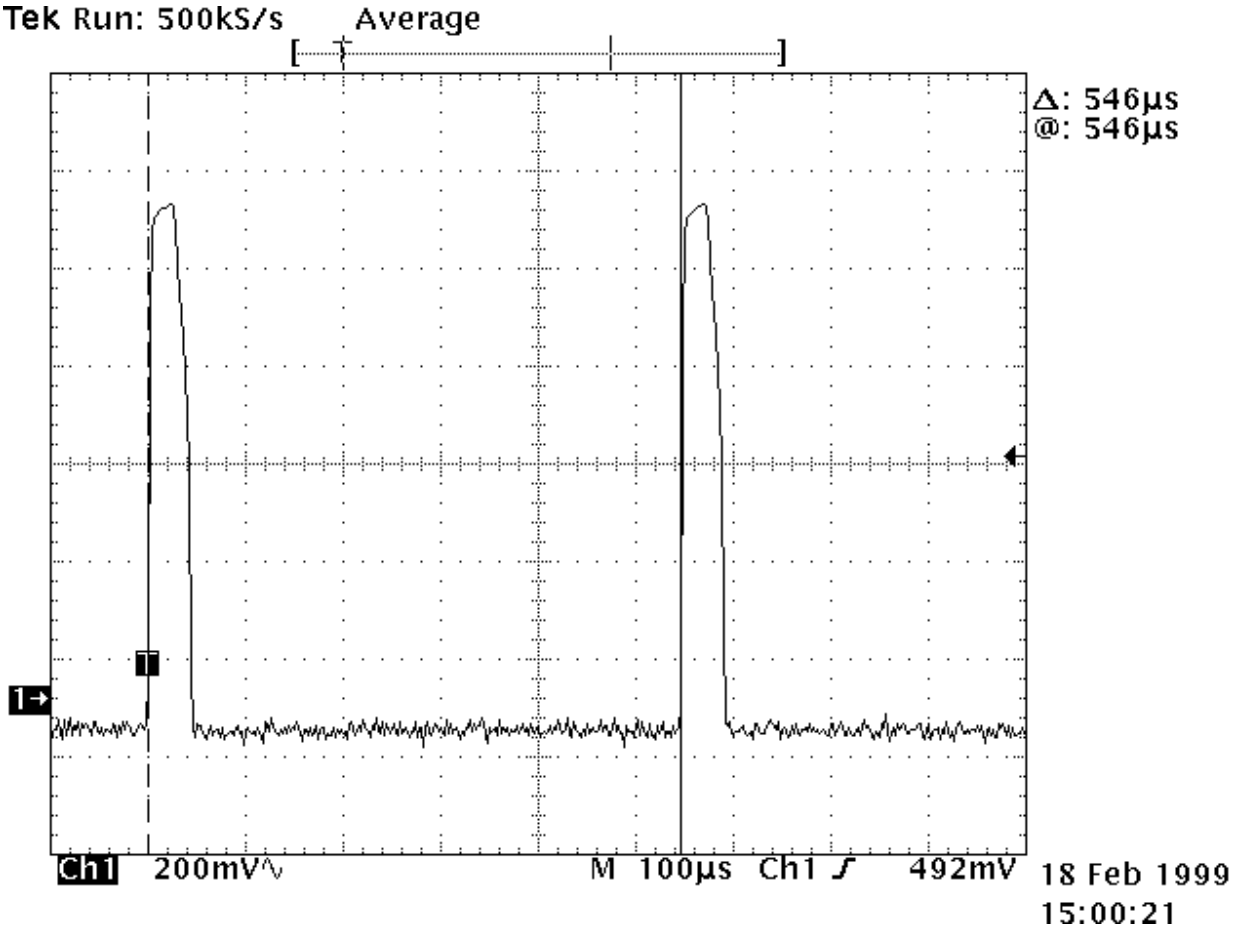
Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Range:	10.525 GHz
Operating Frequency(ies) of Sample:	10.525 GHz
Type of Emission:	Pulsed Carrier
Emission Designator:	PON
Supply Power Requirement:	12-24 VAC / Vdc
Duty Cycle Calculation:	20 log (43.4 / 546) = -22.0 dB See attached graphs.


ATTEN 10dB
RL 0dBm
10dB/
T
CENTER 10.525340000GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 100ms


Tek Run: 5.00MS/s Average
Δ: 43.4µs
@: 43.2µs
Ch1 200mV
M 10.0µs Ch1 ƒ 492mV
18 Feb 1999
14:59:24


Tek Run: 500kS/s Average
Δ: 546µs
@: 546µs
Ch1 200mV
M 100µs Ch1 ƒ 492mV
18 Feb 1999
15:00:21

Description of E.U.T.

The E.U.T. is a 10.525 GHz motion detector used for opening doors.

Modifications Incorporated in E.U.T.

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

Theory of Operation

Justification

The E.U.T. was configured for testing as per typical installation.

The following combinations were investigated to establish worst case configuration:

(1) Three axis.

Exercise Program

The E.U.T. exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

Exercise Mode:

(1) Tx

Section 3. Equipment Configuration

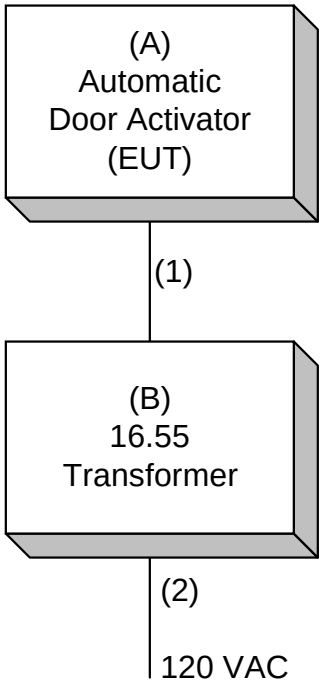
Equipment Configuration List:

Item	Description	Model No.	Serial.	Rev.
(A)	Automatic Door Activator (EUT)	BB100	None	
(B)	Transformer	None	None	

Inter-connection Cables:

Item	Description	Length (m)
(1)	2 Conductor Power Cord	2.0
(2)	2 Conductor Power Cord	1.0

Configuration of the Equipment Under Test (E.U.T)



Section 4. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.245
TESTED BY: Tom Tidwell	DATE: March 11, 1999

Minimum Standard: See Annex B

Test Results: Complies. The worst-case emission level is 69.6 dBµV/m @ 3m at 31575 MHz. This is 18.4 dB below the specification limit.

Test Data: See attached table.

Above 1 GHz a spectrum analyzer and low noise amplifier are used to measure emission levels. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was 3 MHz.

In the case of handheld equipment, the E.U.T. is rotated in three planes to obtain worst-case results.

Test Data - Radiated Emissions

Test Distance (meters) : 1		Range:		Receiver: 8564E		RBW(kHz): 1 MHz		Detector: Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Duty Cycle (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
10525	H	V			80.2	40.6	-20.0	-9.5	91.3	128	36.7 (1)
10525	H	H			80.5	40.6	-20.0	-9.5	91.6	128	36.4 (1)
21050	H	V			38.5	44.2	-20.0	-15.6	47.1	88	40.9 (2)
21050	H	H			38.4	44.2	-20.0	-15.6	47.0	88	41.0 (2)
31575	H	V			50.0	49.1	-20.0	-9.5	69.6	88	18.4 (1)
31575	H	H			46.7	49.1	-20.0	-9.5	66.3	88	21.7 (1)
42100	H	V			47.1	49.6	-20.0	-15.6	61.1	88	26.9 (2)
42100	H	H			47.0	49.6	-20.0	-15.6	61.0	88	27.0 (2)
52625	H	V			43.3	41.1	-20.0	-21.6	42.8	88	45.2 (3)
52625	H	H			43.6	41.1	-20.0	-21.6	43.1	88	44.9 (3)

Notes:
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Re-measured using dipole antenna.
** Includes cable loss when amplifier is not used.
*** Includes cable loss.
( ) Denotes failing emission level.
(1) Measured @ 1 m
(2) Measured @ 0.5m
(3) Measured @ 0.25m

Radiated Photographs (Worst Case Configuration)

Front View

Section 5. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY: Tom Tidwell	DATE: March 11, 1999

Minimum Standard:

Frequency(MHz)	**Maximum Powerline Conducted RF Voltage**	
	µV	**dBµV**
0.45 - 30.0	250	48

Test Results: Complies. See attached graphs and table.

Test Data: See attached table and graphs.

Method Of Measurement: (Procedure ANSI C63.4-1992)

Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak detector. Any emissions that are close to the limit are measured using a test receiver with 10 kHz bandwidth, CISPR Quasi-Peak detector.

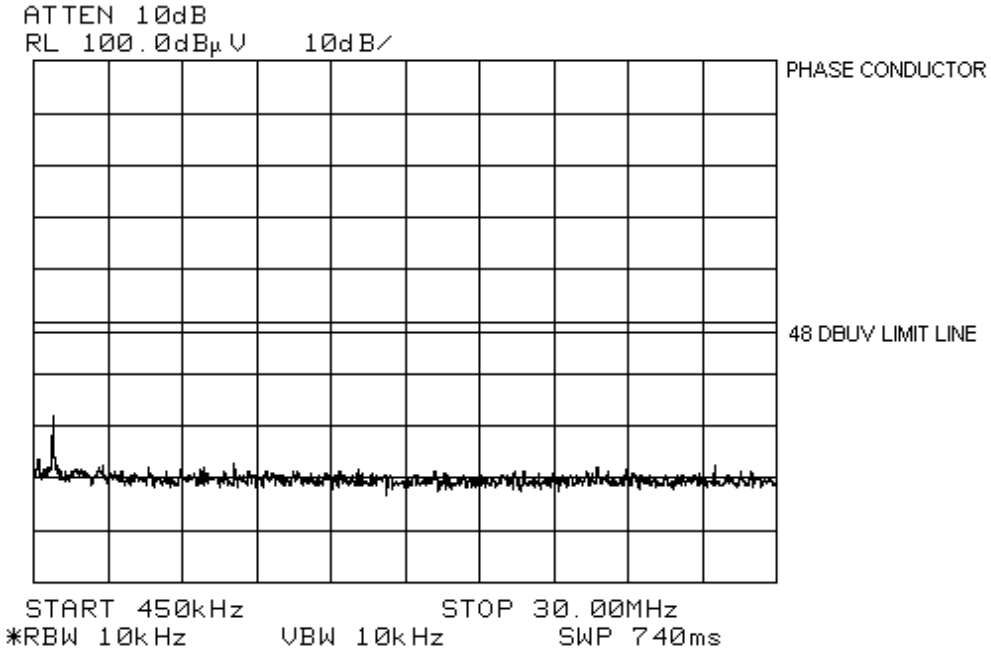
Broadband emissions are identified by switching the receiver detector function from Quasi-Peak to Average. If the amplitude of the emission drops by 6 dB or more then the emission is classified as broadband and the Quasi-Peak level is reduced by a factor of 13 dB.

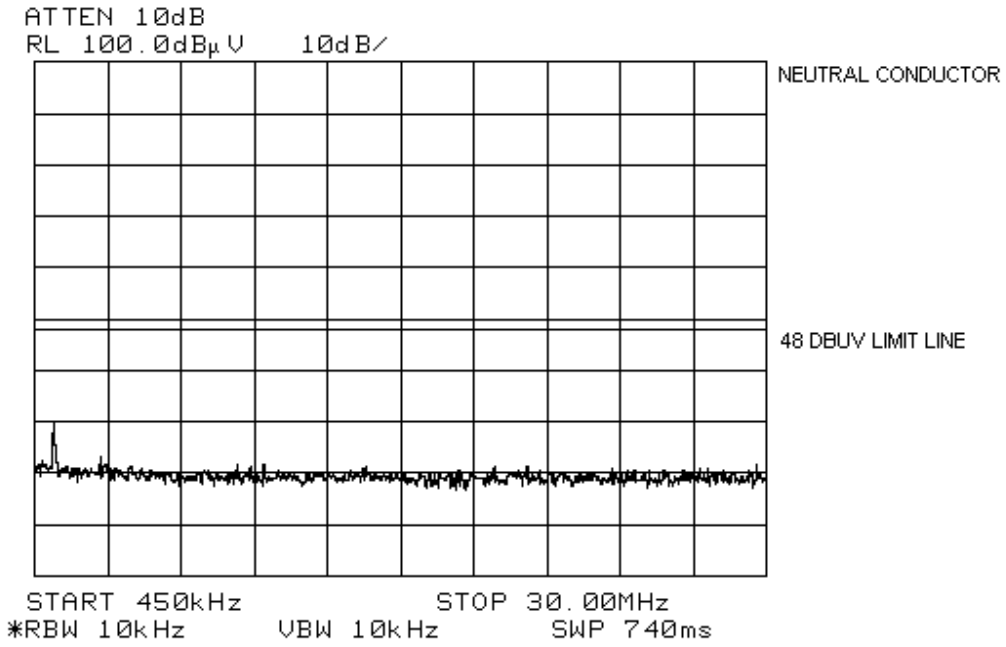
All emissions within 10 dB of limit have been recorded.

Measurement Data:

Conductor	Frequency (MHz)	CISPR (dBµV)	Average (dBµV)	BB/NB	BB Correction Value	Result (dBµV)

NOT APPLICABLE


ATTEN 10dB
RL 100.0dBµV 10dB/
PHASE CONDUCTOR
48 DBUV LIMIT LINE
START 450kHz
STOP 30.00MHz
*RBW 10kHz
VBW 10kHz
SWP 740ms

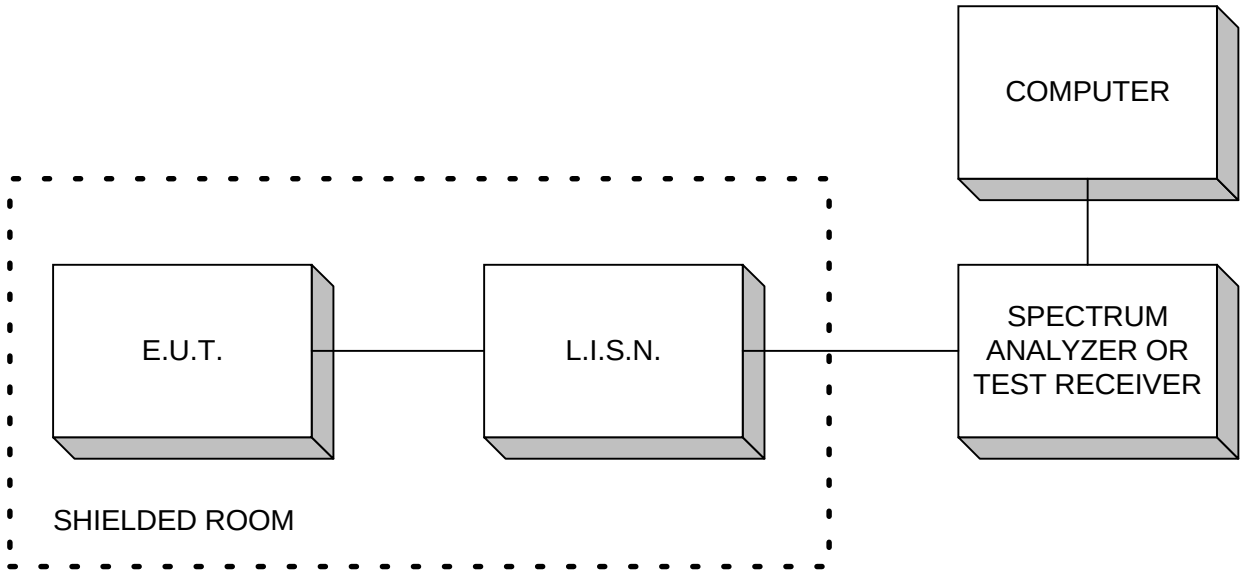

ATTEN 10dB
RL 100.0dBµV 10dB/
NEUTRAL CONDUCTOR
48 DBUV LIMIT LINE
START 450kHz
STOP 30.00MHz
*RBW 10kHz
VBW 10kHz
SWP 740ms

Conducted Photographs (Worst Case Configuration)

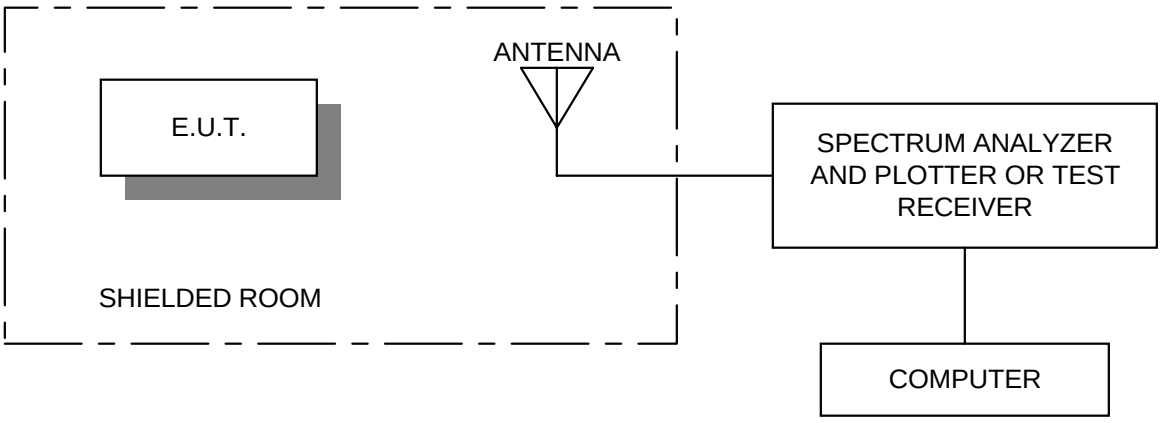
Front View

Section 6. Block Diagrams

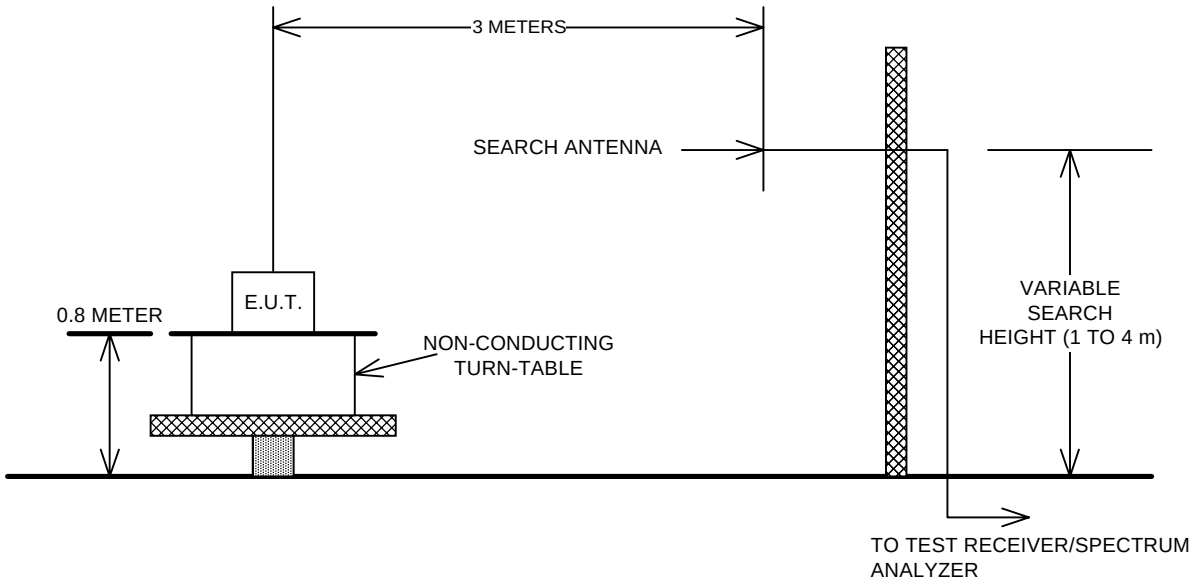
Conducted Emissions



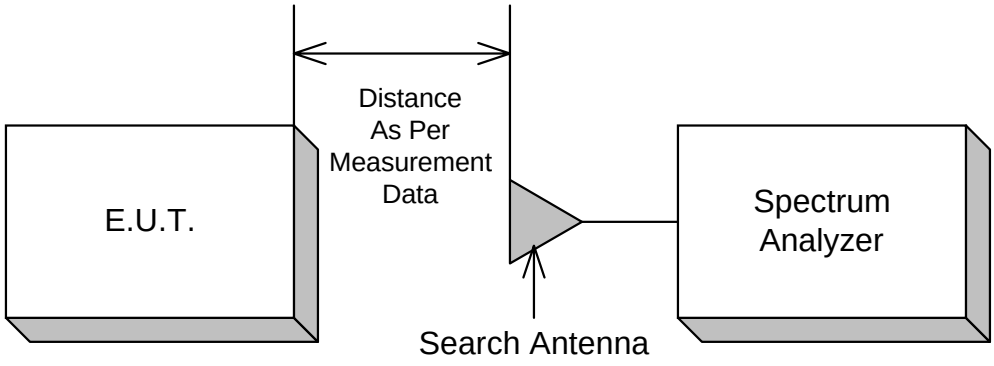
Radiated Prescan



Outdoor Test Site For Radiated Emissions



Indoor Measurement Setup for Emissions Above 10 GHz



Section 7. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	May 20/98	May 20/99	
3 Year	Standard Gain Horn	Electro-Metrics	SH-50/60-1	FA000479	July 29/97	July 29/00	
3 Year	Standard Gain Horn	Electro-Metrics	SH-50/60-2	FA000485	July 29/97	July 29/00	
3 Year	Standard Gain Horn	Millitech	SGH-19-RP000	021	Apr. 25/97	Apr. 25/00	
3 Year	Standard Gain Horn	Millitech	SGH-12-RP000	031	Apr. 25/97	Apr. 25/00	
3 Year	Millimeter Wave Mixer	Hewlett Packard	11970V	2521A01150	Feb. 25./97	Feb. 25./00	

NA: Not Applicable
NCR: No Cal Required

ANNEX A

RESTRICTED BANDS

Section A Restricted Bands of Operation

(a) Except as shown in paragraph (d) of this section , 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
0.49 - 0.51	16.69475-16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425-16.80475	960-1240	7.25-7.75
3.020 - 3.026	25.5-25.67	1300-1427	8.025-8.5
4.125 - 4.128	37.5-38.25	1435-1626.6	9.0-9.2
4.17725 - 4.17775	73-74.6	1645.5-1646.5	9.3-9.5
4.20725 - 4.20775	74.8-75.2	1660-1710	10.6-12.7
6.215 - 6.218	108-121.94	1718.8-1722.2	13.25-13.4
6.31175 - 6.31225	123-138	2220-2300	14.47-14.5
8.291 - 8.294	149.9-150.05	2310-2390	15.35-16.2
8.362 - 8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625 - 8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425 - 8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29 - 12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975 - 12.52025	240-285	3345.8-3358	36.43-36.5
12.57675 - 12.57725	322-335.4	3600-4400	Above 38.6
13.36 - 13.41			

ANNEX B

RADIATED EMISSION LIMITS

Radiated Emission Limits

§15.245 Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz and 24075-24175 MHz.

(a) Operation under the provision of this section is limited to intentional radiators used as field disturbance sensors, excluding perimeter protection systems.

(b) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength Of Fundamental (millivolts/meter)	Field Strength of Harmonics (millitvolts/meter)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

(1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

(i) For field disturbance sensors designed for use only within a building or to open building doors, 25 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment; vehicles such as fork-lifts that are intended primarily for use indoors or for very specialized operations. Or railroad locomotives, railroad cars and other equipment which travel on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g. putting a vehicle in reverse gear, activating a turn signal, etc.).

§15.245, continued

(2) Field strength limits are specified at a distance of 3 meters.

(3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

§15.209 Radiated Emission Limits, General Requirements

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (millivolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	2400/F (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3