



SK TECH CO., LTD.

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FCC- Certificate of Compliance

Test Report No.:	SKTFCE-091029-097		
NVLAP CODE :	200220-0		
Applicant :	HYUNDAI IT CORP		
Applicant Address:	1229,In-ri, Apo-eup, Gimcheon, Gyeongsangbuk-do, 740-860,KOREA		
Manufacturer :	HYUNDAI IT CORP		
Manufacturer Address:	1229,In-ri, Apo-eup, Gimcheon, Gyeongsangbuk-do, 740-860,KOREA		
Product:	19 inch TFT LCD Touch Monitor		
Model No.:	G90TR	FCC ID:	PJIG90TR
Buyer Model/ Multi Model No.:	G190TR	Serial No.:	N/A
Receipt No.:	SKTEU09-1069	Date of receipt:	Oct. 14, 2009
Date of Issue:	Oct. 29, 2009		
Testing location:	SK TECH CO., LTD. 820-2, Wolmoon-Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea		
Test Standards:	ANSI C63.4 / 2003		
Rule Parts:	FCC part 15 Subpart B /This Class A Digital device complies with Canadian ICES-003		
Equipment Class :	Class B Digital Devices		
Test Result:	The above mentioned product has been tested and passed.		
Tested by: H.P. Kim / Engineer	Approved by: S.H. Yoon / Manager & Chief Engineer		
			
Signature	Signature		
Other Aspects :			
Abbreviations :	- OK, Pass = passed - Fail = failed - N/A = not applicable		


 •This test report should not be reproduced except in full, without the written approval of our laboratory.
 •This test result is based on a single evaluation of one sample of the above mentioned.
 •This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.



NVLAP Lab. Code: 200220-0



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1. General

This equipment has been shown to be capable of compliance with the applicable technical standards and was tested in accordance with the measurement procedures as indicated in this report.

We attest to the accuracy of data. All measurements reported herein were performed by SK Tech 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.

2. Test Site

SK TECH Co., Ltd.

2.1 Location

820-2, Wolmoon Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, KOREA

The test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories. This laboratory is recognized as a Conformity Assessment Body (CAB) for CAB's Designation Number: **KR0007** by FCC, is accredited by NVLAP for NVLAP Lab. Code: **200220-0** and DATech for DAR-Registration No.**DAT-P-076/97-02** and KOLAS for Accreditation No.:**KT191**.



2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Type	S/N	Calibrated until	Calibration Interval
EMI Receiver	ESHS10	862970/019	07.2010	1 year
Artificial Mains Network	ESH3-Z5	836679/018	07.2010	1 year
EMI TEST Receiver	ESPI	101206	07.2010	1 year
Amplifier	8447F	3113A05153	07.2010	1 year
Trilog-Broadband Antenna	VULB9168	9168-230	07.2010	1 year
Antenna Turntable Driver	5907	91X518	N/A	-
Antenna Turntable controller	5906	91X519	N/A	-
EMI Receiver	ESVS10	834468/008	07.2010	1 year
4-WIRE ISN	ENY41	836077/005	03.2010	1 year
Horn Antenna (1G~18G)	3115	836077/005	03.2010	1 year
Pre-Amplifier	AFS44-00101800-25-10P-44	1116321	10.2010	1 year

2.3 Test Date

Date of Application : Oct. 29, 2009

Date of Test : Oct. 26, 2009 ~ Oct. 27, 2009

2.4 Test Environment

See each test item's description.



3. Summary of test results

The following table represents the list of measurements required under the FCC CFR47 Part 15.107 and 15.109

FCC Rules	Test Requirements	Result	Remark
15.107	AC conducted Emission	Pass	
15.109(a)	Radiated Emission	Pass	

Note 1: Test results reported in this document relate only to the items tested

Note 2: The required tests demonstrated compliance as per client declaration of test configuration, monitoring

Note 3: Test results apply only to the item(s) tested

*** EMI Suppression Device(s)**

EMI suppression device(s) added and/or modified during testing:

- none



4. Description of the tested samples

The EUT is a highly ergonomic color display unit.

	Basic Model	Multi Listing Model
Model Name	G90TR	G190TR
Brand	HYUNDAI	GUMMI
Box	Hyundai Standard	Gummi Standard
Back Label	"	"

4.1 Rating and Physical Characteristics

LCD	19"viewable, Diagonal, Pixel pitch 0.294mm, A-Si TFT
Display area	376.32(H) x 301.056(V) mm
Number of color	16.7 million colors
Input signals	R.G.B Analog, 15 pin D-sub / Digital TMDS(DVI-D)
Frequency rate	Horizontal : 31.0 to 80.0KHz, Vertical : 56 to 76Hz
Maximum bandwidth	135 MHz
Maximum resolution	Analog : 1280 x 1024@75Hz, Digital TMDS : 1280 x 1024@75Hz
Recommended resolution	1280 x 1024@60Hz
Input voltage	DC 12V 3.5A
Power consumption	36W(Typ.)
Power management	VESA DPMS
Plug & Play	VESA DDC 1/2B
OSD menu	BRIGHTNESS, CONTRAST, COLOR CONTROL, H/V-POSITION, CLOCK PHASE, AUTO COLOR, LANGUAGE, AUTO ADJUST, AUDIO, OSD H/V-POSITION, OSD TIMER, RECALL, INPUT SELECT
Audio system	2ch x 2 watts / Ear Phone Jack
VESA FPMPMI	100 mm x 100 mm screw mounting
Safety and EMC	FCC Class B, NRTL, TUV, CB, CE
Operating Temperature	5 ~ 350 C
Weight	6Kg unpacked, 7.5Kg packed
Dimensions (W X H X D mm)	472 X 406 X 157 mm

4.2 Submitted Documents

N/A



5. Measurement Conditions

Operating voltage of the EUT is supplied from AC & DC Adaptor.

The rating of the AC/DC Adaptor is 12V / 3.5A output.

5.1 Modes of Operation

The EUT is connected to PC by interface cable.

The EUT is tested in the mode of windows media player displaying "H" on the screen.

5.2 Additional Equipments

Equipment	Manufacturer	Model No.	Serial No.
EUT Adaptor	SI TECH	SAD04212-UV	0803002039AB
PC	Samsung Electronics	DP-P73	AG4947APA00009X
Printer	P.T INDONESIA EPSON IND.	EPSON STYLUS C41 Plus	EUNY09010
Keyboard	LOGITECH INC	Y-BP62a	N/A
Mouse	Microsoft Corporation	IntelliMouse Optical USB and PS/2 Compatible	N/A
Head set	CAMAC	CMK-500MV	N/A

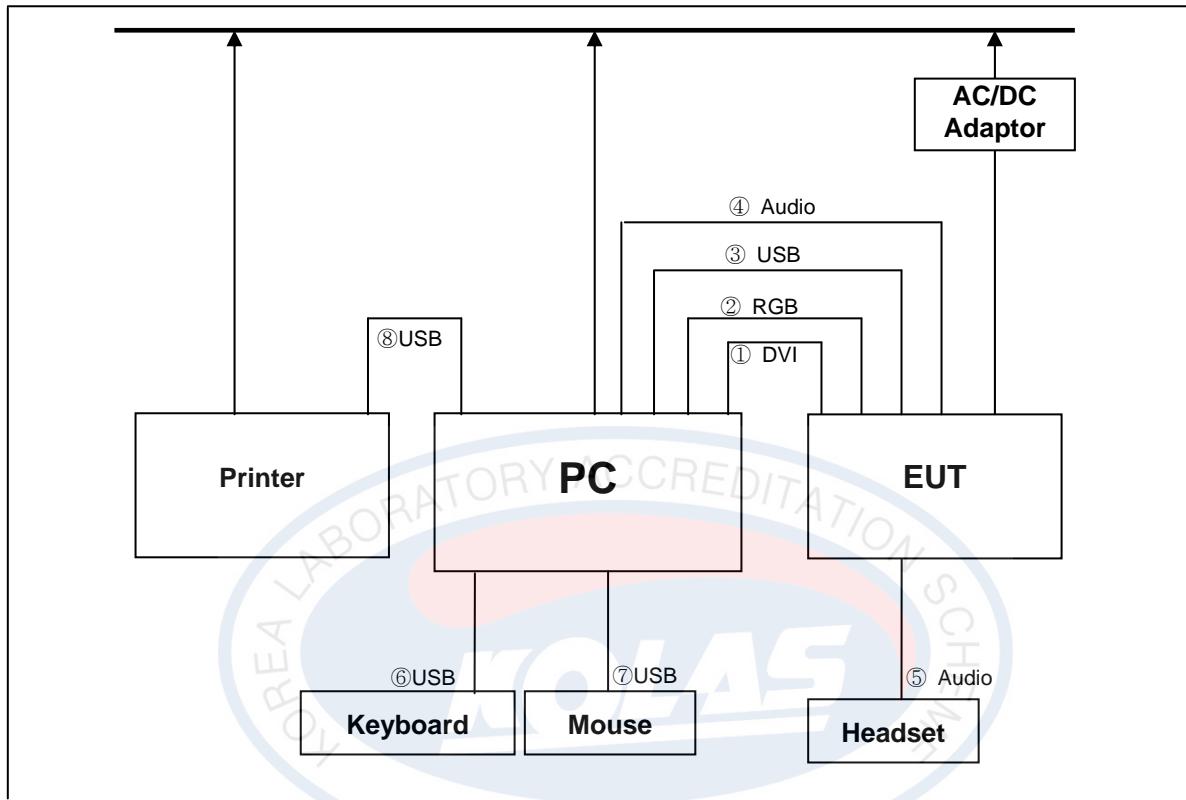
5.3 Type of Used Cables

#	START		END		Cable	
	Name	I/O Port	Name	I/O Port	Length	Shielded / Unshielded
1	EUT	DVI	PC		1.5	Shielded
2		RGB	PC		1.5	Shielded
3		USB	PC		1.2	Shielded
4		Audio	PC		1.5	Shielded
5		Audio	Headset		2.0	Shielded
6	PC	USB	Keyboard		1.2	Shielded
7		USB	Mouse		1.5	Shielded
8		USB	Printer		1.5	Shielded



5.4 Test Setup

The test setup photographs showed the external supply connections and Interfaces



[System Block Diagram of Test Configuration]



5.5 Uncertainty

1) Radiated disturbances from 30 MHz to 1000 MHz at a distance of 3m and 10 m

Expanded Uncertainty

$$U = k * U_c(x_i) = 2 * 2.10 = 4.20 \text{ dB}$$

The coverage factor $k = 2$ yields approximately a 95% level of confidence.

2) Conducted disturbance from 150 KHz to 30 MHz using a 50 Ω/50 uH AMN

Expanded uncertainty

$$U = k * U_c(x_i) = 2 * 1.57 = 3.14 \text{ dB}$$

The coverage factor $k = 2$ yields approximately a 95% level of confidence.

※ When the measured emission is positioned within the range of the uncertainty of measurement from the emission limit, the uncertainty of measurement shall be concerned as follow.

Compliance or non-compliance with a disturbance limit shall be determined in the following manner.

If U_{lab} is less than or equal to U_{cispr}

- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr}

- compliance is deemed to occur if no measured disturbance, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

※ If the measurement value is lower or equal to the limit, the EUT is considered to pass the test.



6. Test Results

6.1 Conducted Emissions

Result

PASS

The line-conducted facility is located inside a 2.6 M x 3. 6M x 7.0 M shielded enclosure. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 604-05. A 1 m x 1.5 m wooden table 80 cm. high is placed 40 cm. away from the vertical wall and 1.5 m away from the side wall of the shielded room. ROHDE & SCHWARZ Model ESH3-Z5 (10 kHz-30 MHz) 50 ohm/50 uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room. The EUT is powered from the ROHDE & SCHWARZ LISN and the support equipment is powered from the ROHDE & SCHWARZ LISN. Power to the LISNs is filtered by a high-current high-insertion loss Lindgren enclosures power line filters (100 dB 14 kHz-10 GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the ROHDE & SCHWARZ LISN. All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150 kHz to 30 MHz with 100 msec. sweep time. The frequency producing the maximum level was reexamined using EMI/field Intensity Meter (ESHS 10) and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode. The bandwidth of the receiver was set to 10 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in photograph of conducted test. Each EME reported was calibrated using self-calibrating mode.

● Test Environment

Room temperature : 23 °C
Relative Humidity : 34 % R.H.



Supplement 1: Test Data, Conducted Disturbance

<Quasi-Peak>

Frequency (MHz)	Reading (dBuV)	Line	C/F (dB)	C/L (dB)	Actual (dBuV)	Limit (dBuV)	Margin (dB)
0.180	59.58	N	0.28	0.05	59.91	64.48	4.57
0.241	52.45	N	0.28	0.05	52.78	62.05	9.27
0.301	46.22	N	0.28	0.05	46.55	60.20	13.65
0.544	42.67	N	0.27	0.06	43.00	56.00	13.00
1.214	48.50	N	0.26	0.09	48.85	56.00	7.15
14.207	38.82	N	0.75	0.29	39.86	60.00	20.14

<Average>

Frequency (MHz)	Reading (dBuV)	Line	C/F (dB)	C/L (dB)	Actual (dBuV)	Limit (dBuV)	Margin (dB)
0.180	46.42	N	0.28	0.05	46.75	54.48	7.73
0.241	39.37	N	0.28	0.05	39.70	52.05	12.35
0.301	33.68	N	0.28	0.05	34.01	50.20	16.19
0.544	33.16	N	0.27	0.06	33.49	46.00	12.51
1.214	37.29	N	0.26	0.09	37.64	46.00	8.36
14.207	30.85	N	0.75	0.29	31.89	50.00	18.11

* Note)

* C/F = Correction Factor

* C/L = Cable Loss

* LINE: L = Line-PE, N = Neutral-PE

* Margin Calculation

Margin (Q.P) = Limit - Actual

[Actual (Q.P) = Reading (Q.P) + C/F + C/L]



Supplement 2: Spectral Diagram, LINE – PE

SK TECH Co., Ltd.
CONDUCTED DISTURBANCE

26 Oct 2009 15:31

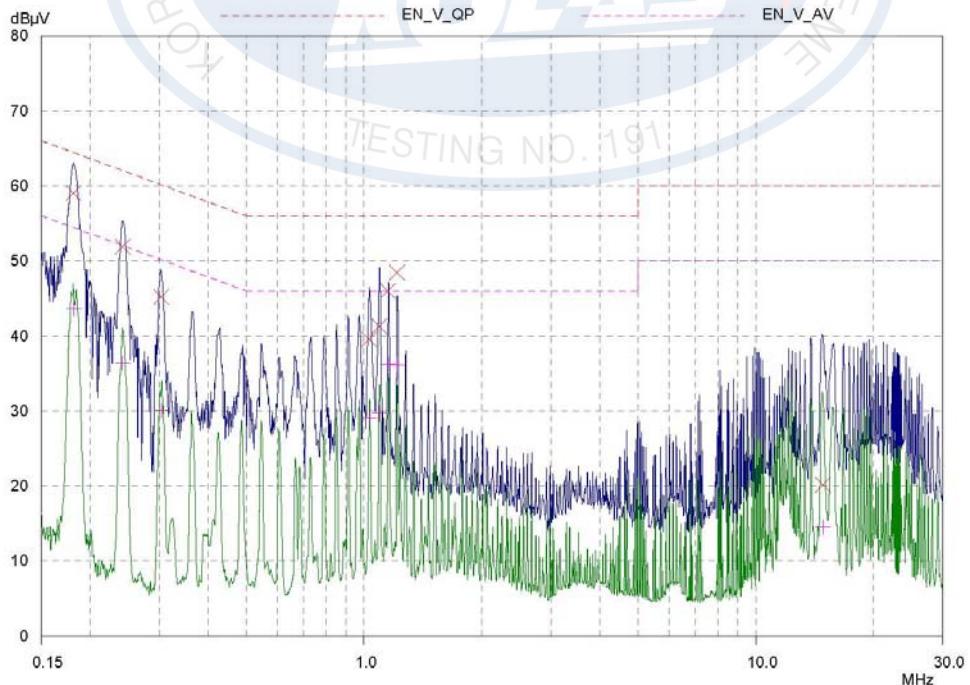
EUT: G90TR
Manuf:
Op Cond:
Operator:
Test Spec: FCC Part15 Subpart B
Comment: LINE-PE

Result File: 90tr_I.dat : G90TR

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	0.4%	10kHz	PK+AV	20msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 35 dB





Supplement 3: Spectral Diagram, NEUTRAL – PE

SK TECH Co., Ltd.
CONDUCTED DISTURBANCE

26 Oct 2009 15:52

EUT: G90TR
Manuf:
Op Cond:
Operator:
Test Spec: FCC Part15 Subpart B
Comment: NEUTRAL-PE

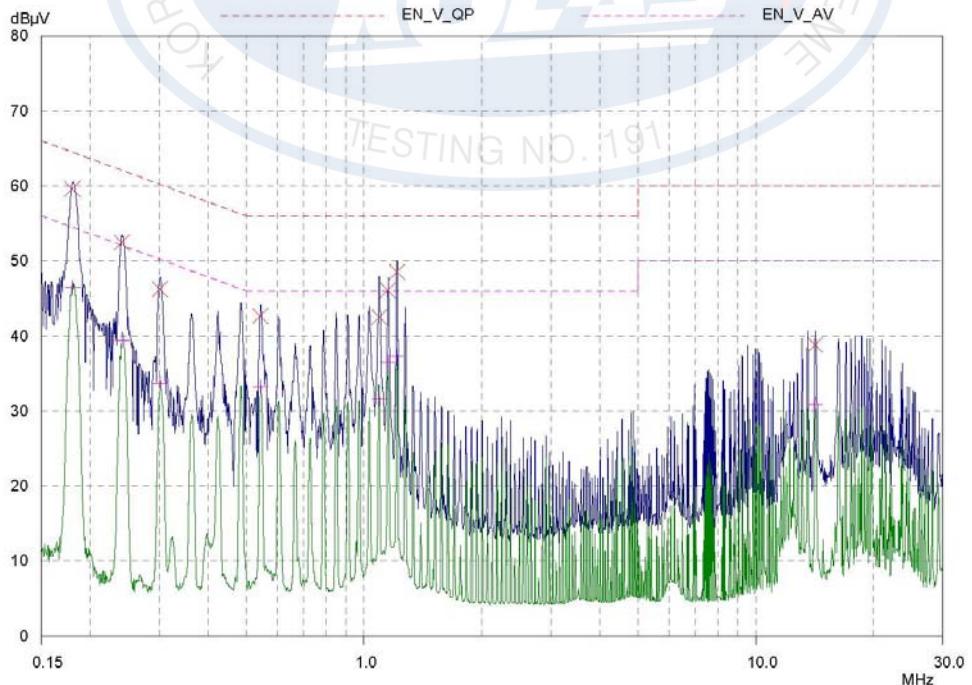
Result File: 90tr_n.dat : G90TR

Scan Settings

(1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	0.4%	10kHz	PK+AV	20msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 35 dB





6.2 Radiated Emissions

Result

PASS

Preliminary measurements were made indoors at 3 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 MHz to 1 GHz using Trilog-Broadband antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made outdoors at 10 meter test range using Trilog-Broadband Antenna.

The test equipment was placed on a wooden table situated on a area adjacent to the measurement area. Turntable was to protect from weather in the dome that made with FRP. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter(ESVS 10) and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100 kHz or 1 MHz depending on the frequency or type of signal. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic wooden table (1 m x 1.5 m). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 m to 4 m and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed, and/or support equipment, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in photograph of radiated emission test. Each EME reported was calibrated using self-calibrating mode.

● Test Environment

Room temperature : 24 °C
Relative Humidity : 38 % R.H.



Table 2: Test Data, Radiated Emissions

Frequency [MHz]	Reading [dBuV]	Pol.	Angle	Height [m]	Correction Factor		T-Fact [dB]	Data [dBuV/m]	Limits [dBuV/m]	Margin [dB]
324.01	24.5	V	352	1.0	13.3	1.7	15.0	39.5	46.4	6.9
372.00	18.6	H	24	2.8	14.4	1.8	16.2	34.8	46.4	11.6
384.01	17.8	V	161	1.0	14.6	1.8	16.4	34.2	46.4	12.2
476.43	20.1	V	259	1.0	16.7	2.1	18.8	38.9	46.4	7.5
482.19	18.5	V	186	1.0	16.8	2.1	18.9	37.4	46.4	9.0
725.06	16.3	H	233	1.0	21.0	2.5	23.5	39.8	46.4	6.6

NOTES:

1. All modes of operation were investigated and the worst-case emission was reported.
2. A frequency above 1GHz emission 20dB below than the permitted limit.
3. All other emission is non-significant.
4. Measurements using CISPR Quasi-Peak mode (below 1 GHz).
5. H = Horizontal, V = Vertical Polarization
6. Data = Real Reading + T - Factor (Antenna + Cable)
7. Margin = Limits – Data
8. Radiated Measurements at 10-meters

*The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is **120kHz** for Quasi-peak detection at frequency below 1GHz.

*The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is **1MHz** for Average detection at frequency above 1GHz