



EMC COMPLIANCE TEST REPORT

Technical Statement of Conformity
in accordance with the council directive 2004/108/EC

The Product

Equipment Under Test	: DC-DC Converter
Model Number	: TEQ200-7218WIR
Product Series	: please refer to Appendix 1 (Page 39)
Report Number	: HA140602-SACE
Issue Date	: 31-OCT-2014
Test Result	: Compliance

is produced by
TRACO ELECTRONIC AG
Sihlbruggstrasse 111 CH-6340 Baar Switzerland



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Verification

Applicant : TRACO ELECTRONIC AG
Manufacturer : POWER MATE TECHNOLOGY CO., LTD.
Equipment Under Test : DC-DC Converter
Model Number : TEQ200-7218WIR
Product Series : please refer to Appendix 1 (Page 39)
Sample Received Date : 03-SEP-2014
Test Standard :

Emission: <input checked="" type="checkbox"/> EN 55022:2010 Class A	Immunity: <input checked="" type="checkbox"/> EN 55024:2010 <input checked="" type="checkbox"/> IEC 61000-4-2:2008 <input checked="" type="checkbox"/> IEC 61000-4-3:2006+A1:2007+A2:2010 <input checked="" type="checkbox"/> IEC 61000-4-4:2012 <input checked="" type="checkbox"/> IEC 61000-4-5:2005 <input checked="" type="checkbox"/> IEC 61000-4-6:2008
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Remark:

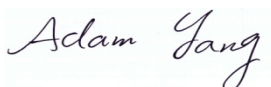
This report is a copy of test report No. HA140602-CE. The original report details the results of the test carried out on one sample. This report shows the EUT is technically compliant with the EN 55022 and EN 55024 official requirements. This report applies to the above sample only and shall not be reproduced in part without written approval of *HongAn Technology Co., Ltd.*



Documented by: _____ **Date:** 2014-10-31
Zoe Chen / ADM. Dept. Staff



Tested by: _____ **Date:** 2014-09-16
Ben Chen / ENG. Dept. Staff



Approved by: _____ **Date:** 2014-10-31
Adam Yang / SEC. Manager

Summary of Test Result – Emission

Test Standard	Test Item	Test Result	Remark
EN55022 Class A	Conducted Emission	Pass	Highest Emission L: 1.01MHz, A.V. 45.93dBuV, Margin -14.07dB N: 20.76MHz, A.V. 48.84dBuV, Margin -11.16dB
EN55022 Class A	Radiated Emission (Below 1GHz)	Pass	Highest Emission H: 101.22MHz, 33.40dBuV, Margin -6.60dB Antenna Height 400cm, Turntable Angle 85° V: 56.62MHz, 30.85dBuV, Margin -9.15dB Antenna Height 100cm, Turntable Angle 183°
EN55022	Radiated Emission (1 ~ 6 GHz)	N/A	The highest frequency of the internal sources of the EUT is less than 108MHz, the measurement shall only be made up to 1GHz. Hence, the test item is not required.

Measurement Uncertainty – Emission

The following measurement uncertainty has been calculated for Emission Tests performed on the EUT as specified in CISPR 16-4-2:

Test Item		Uncertainty
Conducted Emission		$\pm 3.67\text{dB}$
Radiated Emission	Below 1GHz	$\pm 4.84\text{dB}$
	1 ~ 6 GHz	$\pm 4.96\text{dB}$

This reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, providing a level of confidence of approximately 95%.

Summary of Test Result – Immunity

Test Standard	Test Item	Performance Criteria	Observed Result Class	Test Result
IEC61000-4-2	Electrostatic Discharge	B	A	Pass
IEC61000-4-3	Radiated Susceptibility	A	A	Pass
IEC61000-4-4	Electrical Fast Transient	B	A	Pass
IEC61000-4-5	Surge	B	A	Pass
IEC61000-4-6	Conducted Susceptibility	A	A	Pass

Measurement Uncertainty – Immunity

It has been demonstrated that the test equipments for the above Immunity Tests meet the specified requirements in the standard with at least a 95% confidence.

1 General Description

1.1 Description of Equipment Under Test (EUT)

Equipment Under Test	:	DC-DC Converter
Model Number	:	TEQ200-7218WIR
Product Series	:	please refer to Appendix 1 (Page 39)
Applicant	:	TRACO ELECTRONIC AG
Address of Applicant	:	Sihlbruggstrasse 111 CH-6340 Baar Switzerland
Manufacturer	:	POWER MATE TECHNOLOGY CO., LTD.
Address of Manufacturer	:	NO.36, ROAD 22ND, TAICHUNG INDUSTRIAL PARK, TAICHUNG, TAIWAN, R.O.C.
Power Supply	:	DC 72 V <input type="checkbox"/> Shielded <input checked="" type="checkbox"/> Non-Shielded <input checked="" type="checkbox"/> Detachable, 0.5m <input type="checkbox"/> Un-Detachable <input type="checkbox"/> w Ferrite Core <input checked="" type="checkbox"/> w/o Ferrite Core
I/O Port	:	N/A
Data Cable	:	N/A
Description of EUT	:	<p>Dimensions : 10cm (L) X 9cm (W) X 9cm (H)</p> <p>Highest Frequency of the Internal Source : 250kHz</p> <p>Position : <input checked="" type="checkbox"/>Table-top / <input type="checkbox"/>Floor-standing</p> <p>Intended Function : The EUT is a DC-DC Converter.</p> <p>Product Variance : The manufacturer declares that the main test sample is the most advanced product in the series. The other series products have less function than the main test sample.</p> <p>Note: Reference details accompanying user manual.</p>

1.2 Test Facility

All the Conducted and Radiated Emission Tests and Immunity Tests are performed at No. 15-1, Cweishuh Keng, Cweipin Village, Linkou, New Taipei City, Taiwan, R.O.C.

1.3 Test Instruments

1.3.1 Instruments Used for Emission Measurement

Instrument Name	Manufacture Mode	Model Number	Serial Number	Last Cal. Date	Next Cal. Date	Test Item
LISN	EMCO	3810/2NM	9702-1818	04-Mar-2014	04-Mar-2015	Conducted Emission
LISN	EMCO	3810/2NM	9702-1821	18-Aug-2014	18-Aug-2015	Conducted Emission
LISN	Rolf Heine Hochfrequenz- technik	NNB-4/32T	00001	04-Mar-2014	04-Mar-2015	Conducted Emission
RF Current Probe	FCC	F-33-4	53	17-May-2014	17-May-2015	Conducted Emission
Impedance Stabilization Network (ISN)	TESEQGMBH	ISN T800	30838	16-Jun-2014	16-Jun-2015	Conducted Emission
EMI Receiver	R&S	ESCI	100931	17-Jul-2014	17-Jul-2015	Conducted Emission, Radiation Emission
Spectrum Analyzer	ADVANTEST	R3172	101202158	08-Aug-2014	08-Aug-2015	Radiated Emission
Preamplifier	CHASE	CPA 9231A	0405	23-Aug-2014	23-Aug-2015	Radiated Emission
Preamplifier	HD	HD17187	004	26-May-2014	26-May-2015	Radiated Emission
Bilog Antenna	TESEQ	CBL6111D	25769	25-Feb-2014	25-Feb-2015	Radiated Emission
Bilog Antenna	TESEQ	CBL6111D	38521	01-Jul-2014	01-Jul-2015	Radiated Emission
Double-Ridged Waveguide Horn	EMCO	3115	9912-5992	22-May-2014	22-May-2015	Radiated Emission
Harmonics /Flicker Module	EMC PARTNER	Harmonics-1000	HAR1000-38	20-Mar-2014	20-Mar-2015	Harmonics

※ The test equipments used are calibrated and can be traced to National ITRI and International Standards.

1.3.2 Instruments Used for Immunity Measurement

Instrument Name	Manufacture Mode	Model Number	Serial Number	Last Cal. Date	Next Cal. Date	Test Item
ESD Simulator	KeyTek	MZ-15/EC	9805460	30-Jul-2014	30-Jul-2015	ESD
Power Generator, Mains Coupler/ Decoupler	KeyTek	EMC Pro	0002255	05-Mar-2014	05-Mar-2015	EFT. Surge, Magnetic Field, Dip
Wide Band Amplifier	ifi	CMX50	D019-0200	19-Feb-2014	19-Feb-2015	RS,CS
RF Amplifier	ar	15S1G3	306578	19-Feb-2014	19-Feb-2015	RS
Double-Ridged Waveguide Horn	EMCO	3115	9912-5992	22-May-2014	22-May-2015	RS
Signal Generator	HP	HP8648C	3623A03457	19-Feb-2014	19-Feb-2015	RS,CS
Bilog Antenna	EMCO	3142	9710-1221	19-Feb-2014	19-Feb-2015	RS
CDN	FCC	FCC-801-M3-32A	2019	21-Feb-2014	21-Feb-2015	CS
CDN	FCC	FCC-801-M3-32A	20116	21-Feb-2014	21-Feb-2015	CS
EM Injection clamp	FCC	F-2031-23mm	337	21-Feb-2014	21-Feb-2015	CS
Magnetic Field Immunity Loop	FCC	F-1000-4-819 /10-L-1M	9953	05-Mar-2014	05-Mar-2015	MF

※ The test equipments used are calibrated and can be traced to National ITRI and International Standards.

1.4 Test Methodology

All Emission Tests were performed according to the procedures specified in EN 55022.

All Immunity Tests were performed according to the procedures specified in EN 55024.

1.5 Auxiliary Equipments

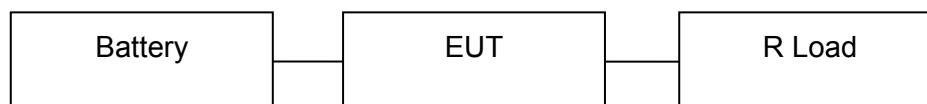
1.5.1 Provided by HongAn Technology Co., Ltd.

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Description	
						Data Cable	Power Cable
O1	Battery	WP12-12	N/A	CE Mark	KUNG LONG	N/A	N/A

1.5.2 Provided by the Manufacturer

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Description	
						Data Cable	Power Cable
01	R Load	N/A	N/A	N/A	N/A	N/A	N/A

1.6 Block Diagram



1.7 Identifying the Final Test Mode (Worst Case)

Pretest Mode of EUT:

1. Model No. TEQ75-2416WIR
2. Model No. TEQ100-2415WIR
3. Model No. TEQ200-4815WIR
4. Model No. TEQ200-7218WIR

Note: After pre-test, we identified that Model No. TEQ200-7218WIR (the worst case) was most likely to cause maximum disturbance and most likely to be susceptible to disturbance. Therefore, the Final EMC Assessment was performed for the worst case.

1.8 Final Test Mode

Operation Mode on Model No. TEQ200-7218WIR

1.9 Condition of Power Supply

DC 72 V

1.10 EUT Configuration

1. Setup the EUT as shown in Sec.1.6 Block Diagram.
2. Turn on the power of all equipments.
3. Activate the selected Final Test Mode shown in Sec. 1.7.

1.11 Immunity Performance Classification

Class	Class Criterion
A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.
B	After the test, the equipment shall continue to operate as intended without operator intervention.
C	Lost of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the user in accordance with the manufacturer's instructions.

2 Conducted Emission Test

2.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

2.2 Test Configuration and Procedure

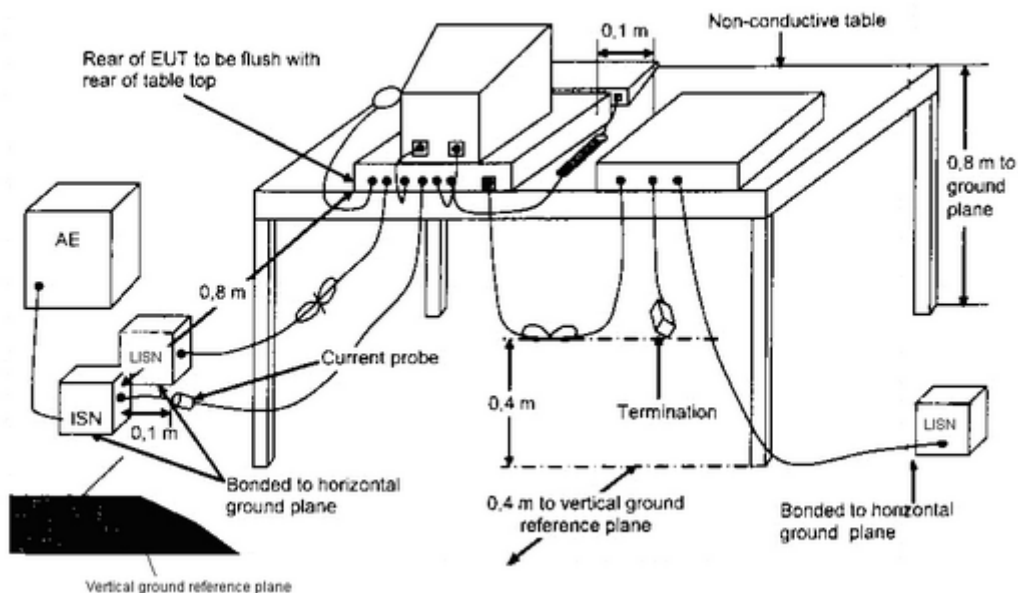


Table-top Equipment

- The EUT was placed on a non-conductive table which was 80 cm above the horizontal coupling plane. The rear of the EUT was 40 cm from the vertical coupling plane.
- The excess interface cables were folded at the cable center into a bundle no longer than 40 cm, so that the bundles were on the table.
- The EUT was connected to the main power through a L.I.S.N. This set up provided 50 ohm / 50 μ H coupling impedance for the measuring equipment.
- All auxiliary equipment received power from a second L.I.S.N.
- The conducted emissions were measured between the Line Phase and the PE ground and between the Neutral Phase and the PE ground using an EMI Receiver.
- The values were recorded.

2.3 Test Limit

EN55022

☒ Limits for conducted disturbance at the mains ports.

Frequency (MHz)	<input checked="" type="checkbox"/> Class A		<input type="checkbox"/> Class B	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 ~ 0.50	79	66	66 to 56	56 to 46
0.50 ~ 5.0	73	60	56	46
5.0 ~ 30	73	60	60	50

The EMI Receiver bandwidth was set at 9 kHz.

☐ Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0.15MHz to 30MHz for **Class A** equipment.

Frequency range MHz	Voltage Limits dB (μV)		Current Limits dB (μA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	97 ~ 87	84 ~ 74	53 ~ 43	40 ~ 30
0.5 ~ 30	87	74	43	30

☐ Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0.15MHz to 30MHz for **Class B** equipment.

Frequency range MHz	Voltage Limits dB (μV)		Current Limits dB (μA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	84 ~ 74	74 ~ 64	40 ~ 30	30 ~ 20
0.5 ~ 30	74	54	30	20

2.4 Test Result

PASS

The final test data are shown on the following page(s)

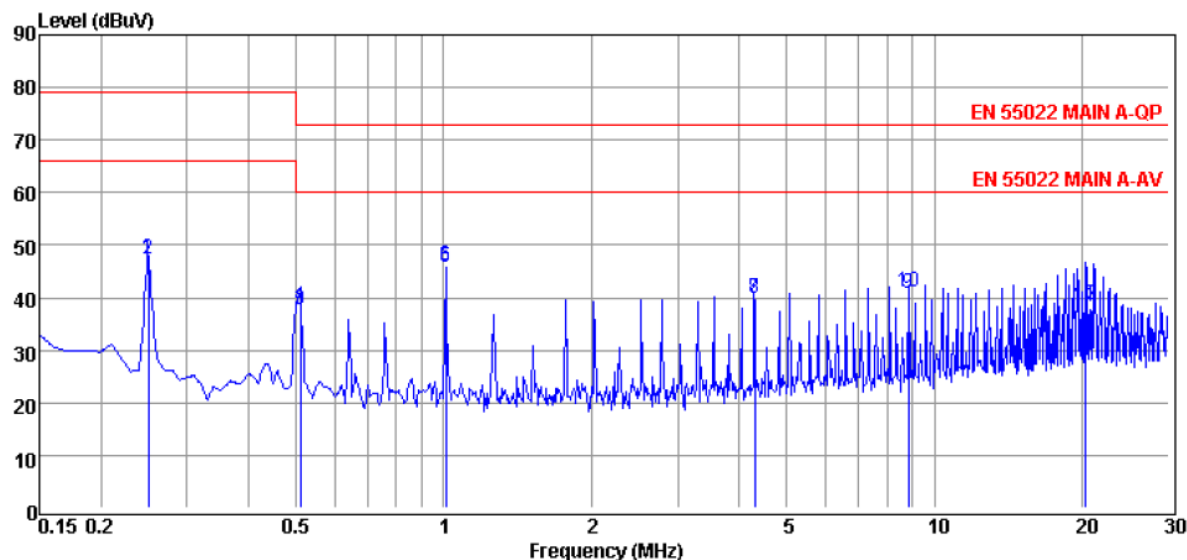
Conducted Emission Test Data

Test Date : 2014-09-16

Power Line : Line

Temperature : 24°C

Humidity : 55%



No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV	Limit dBμV	Margin dB	Power Line	Remark
1	0.25	47.30	0.09	47.39	66.00	-18.61	LINE	Average
2	0.25	47.40	0.09	47.49	79.00	-31.51	LINE	QP
3	0.51	37.60	0.10	37.70	60.00	-22.30	LINE	Average
4	0.51	38.10	0.10	38.20	73.00	-34.80	LINE	QP
5	1.01	45.80	0.13	45.93	60.00	-14.07	LINE	Average
6	1.01	45.90	0.13	46.03	73.00	-26.97	LINE	QP
7	4.30	39.40	0.35	39.75	60.00	-20.25	LINE	Average
8	4.30	39.50	0.35	39.85	73.00	-33.15	LINE	QP
9	8.86	40.20	0.66	40.86	60.00	-19.14	LINE	Average
10	8.86	40.30	0.66	40.96	73.00	-32.04	LINE	QP
11	20.25	37.10	1.29	38.39	60.00	-21.61	LINE	Average
12	20.25	37.20	1.29	38.49	73.00	-34.51	LINE	QP

Remark : All readings are Quasi-Peak and Average values.

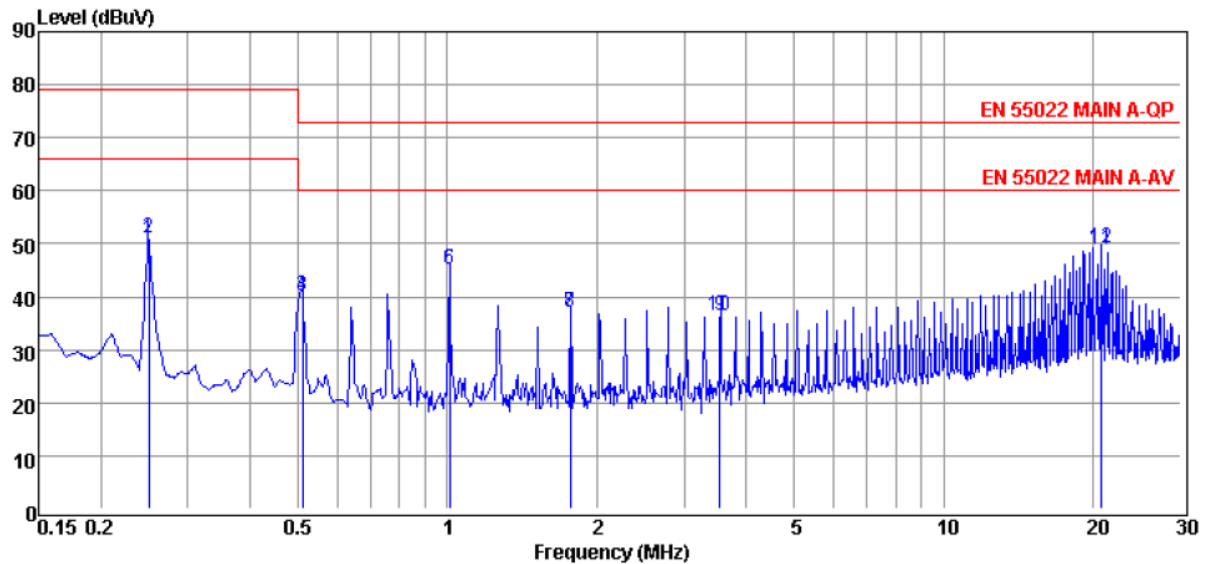
Conducted Emission Test Data

Test Date : 2014-09-16

Power Line : Neutral

Temperature : 24°C

Humidity : 55%



No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV	Limit dBμV	Margin dB	Power Line	Remark
1	0.25	50.80	0.06	50.86	66.00	-15.14	NEUTRAL	Average
2	0.25	50.90	0.06	50.96	79.00	-28.04	NEUTRAL	QP
3	0.51	40.00	0.07	40.07	60.00	-19.93	NEUTRAL	Average
4	0.51	40.20	0.07	40.27	73.00	-32.73	NEUTRAL	QP
5	1.01	45.00	0.11	45.11	60.00	-14.89	NEUTRAL	Average
6	1.01	45.10	0.11	45.21	73.00	-27.79	NEUTRAL	QP
7	1.77	36.80	0.17	36.97	60.00	-23.03	NEUTRAL	Average
8	1.77	36.90	0.17	37.07	73.00	-35.93	NEUTRAL	QP
9	3.54	36.00	0.29	36.29	60.00	-23.71	NEUTRAL	Average
10	3.54	36.30	0.29	36.59	73.00	-36.41	NEUTRAL	QP
11	20.76	47.40	1.44	48.84	60.00	-11.16	NEUTRAL	Average
12	20.76	47.80	1.44	49.24	73.00	-23.76	NEUTRAL	QP

Remark : All readings are Quasi-Peak and Average values.

3 Radiated Emission Test – Below 1 GHz

3.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

3.2 Test Configuration and Procedure

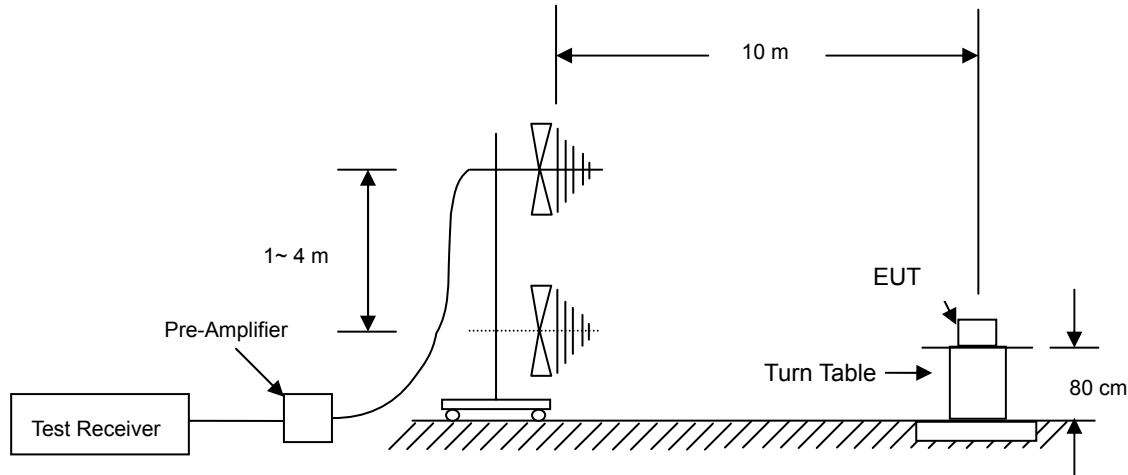


Table-top Equipment

- The EUT was placed on a non-conductive turntable which was 80 cm above the horizontal ground plane. The EUT was set 10 m away from the receiving antenna that was mounted on a non-conductive mast.
- Main cables draped to the ground plane and were routed to the mains power outlet. The mains power outlet was bonded to and did not protrude above the ground plane.
- The antenna was adjusted between 1 m and 4 m in height above the ground plane and the Antenna-to-EUT azimuth was also varied during the measurements to find the top 6 maximum meter readings within the frequency range limit as indicated in Sec 3.3.
- The radiated emissions were measured when the Antenna-to-EUT polarization was set horizontally and vertically.
- The values were recorded.

3.3 Test Limit

☒ EN 55022

Frequency (MHz)	<input checked="" type="checkbox"/> Class A	<input type="checkbox"/> Class B
	Quasi-Peak (dBuV/m)	Quasi-Peak (dBuV/m)
30 ~ 230	40.0	30.0
230 ~ 1000	47.0	37.0

The EMI test receiver bandwidth was set at 120 kHz.

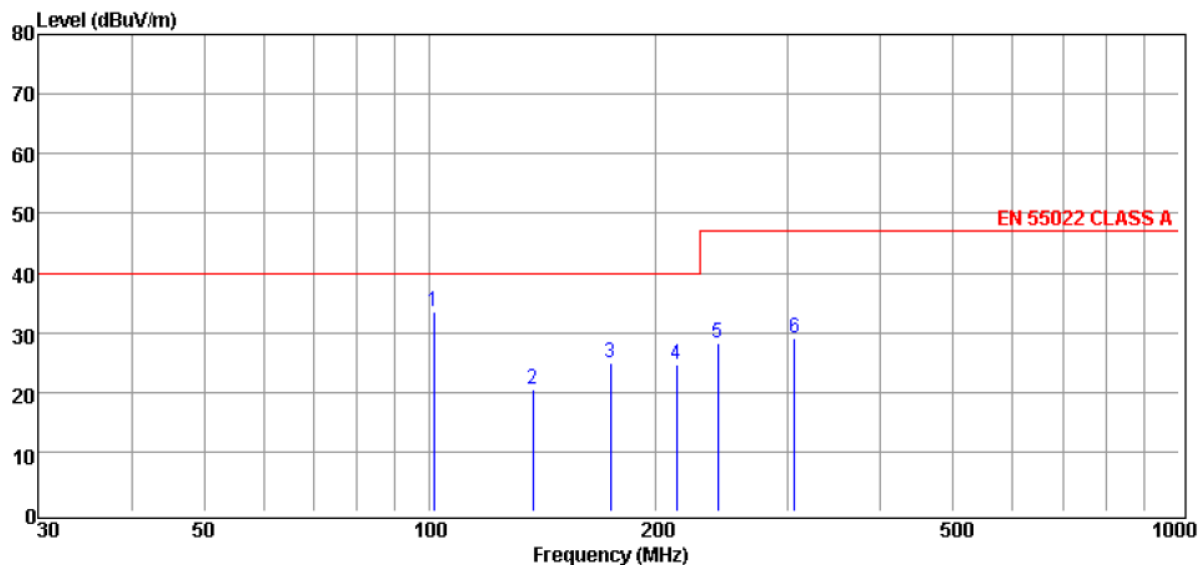
3.4 Test Result

PASS

The final test data are shown on the following page(s).

Radiated Emission Test Data

Test Date : 2014-09-16 Polarization : Horizontal
 Temperature : 26°C Humidity : 50%



No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV/m	Limit dBμV/m	Margin dB	Height cm	Angle deg	Antenna Pol.	Remark
1	101.22	52.41	-19.01	33.40	40.00	-6.60	400	85	HORIZONTAL	QP
2	137.16	37.14	-16.79	20.35	40.00	-19.65	396	197	HORIZONTAL	QP
3	174.42	44.34	-19.29	25.05	40.00	-14.95	394	212	HORIZONTAL	QP
4	213.80	44.23	-19.70	24.53	40.00	-15.47	390	63	HORIZONTAL	QP
5	242.20	45.84	-17.54	28.30	47.00	-18.70	360	108	HORIZONTAL	QP
6	307.20	44.15	-14.96	29.19	47.00	-17.81	270	169	HORIZONTAL	QP

Remark : All readings are Quasi-Peak values.

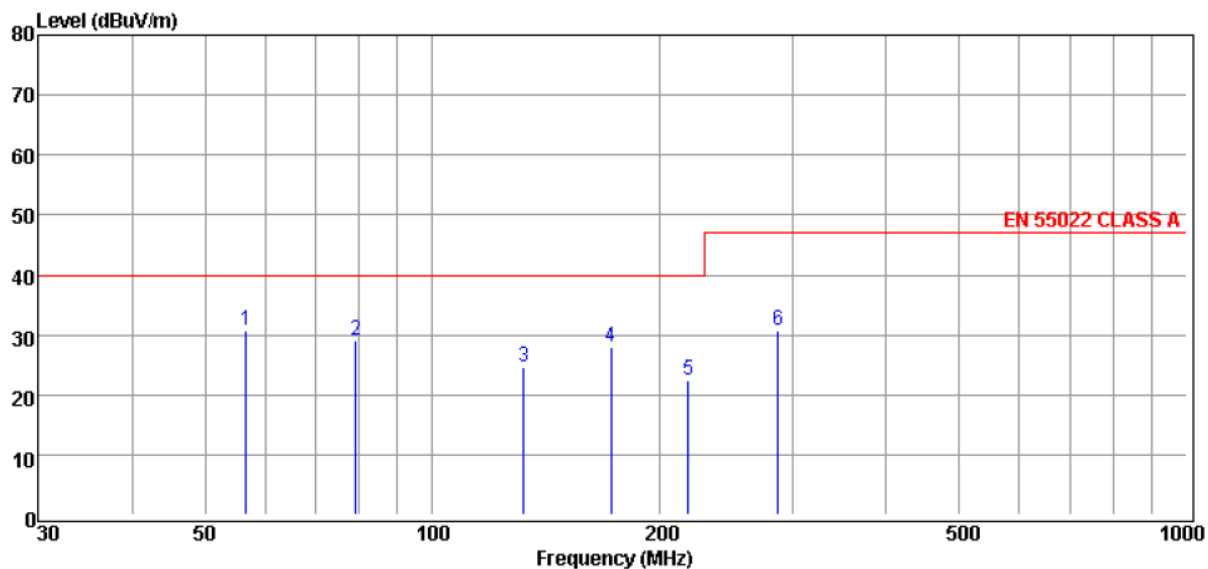
Radiated Emission Test Data

Test Date : 2014-09-16

Polarization : Vertical

Temperature : 26°C

Humidity : 50%



Remark : All readings are Quasi-Peak values.

4 Radiated Emission Test – 1 ~ 6 GHz

4.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

4.2 Test Configuration and Procedure

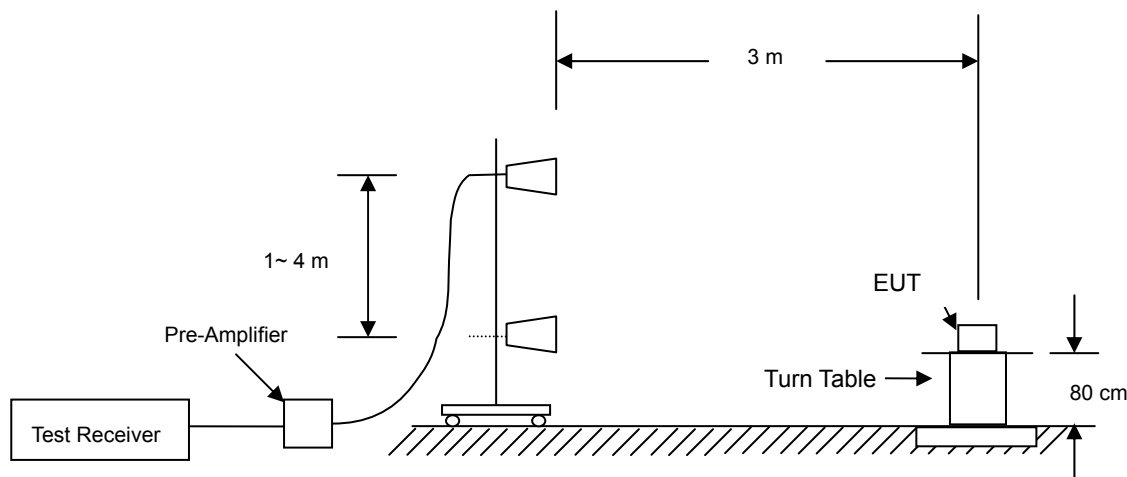


Table-top Equipment

- The EUT was placed on a non-conductive turntable which was 80cm above the horizontal ground plane. The EUT was set 3m away from the receiving antenna that was mounted on a non-conductive mast.
- Main cables draped to the ground plane and were routed to the mains power outlet. The mains power outlet was bonded to and did not protrude above the ground plane.
- The antenna was adjusted between 1m and 4m in height above the ground plane and the Antenna-to-EUT azimuth was also varied during the measurements to find the top 6 maximum meter readings within the frequency range limit as indicated in Sec 4.3.
- The radiated emissions were measured when the Antenna-to-EUT polarization was set horizontally and vertically.
- The values were recorded.

4.3 Test Limit

☐ EN55022 Class A ITE at a measurement distance of 3m

Frequency GHz	Average limit dB(μ V/m)	Peak limit dB(μ V/m)
1 to 3	56	76
3 to 6	60	80
NOTE The lower limit applies at the transition frequency.		

☐ EN55022 Class B ITE at a measurement distance of 3m

Frequency GHz	Average limit dB(μ V/m)	Peak limit dB(μ V/m)
1 to 3	50	70
3 to 6	54	74
NOTE The lower limit applies at the transition frequency.		

4.4 Test Result

Not applicable

※The highest frequency of the internal sources of the EUT is less than 108MHz. Hence, above 1GHz Radiated Measurement shall not be made.

5 Electrostatic Discharge Immunity Test

5.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

5.2 Test Configuration and Procedure

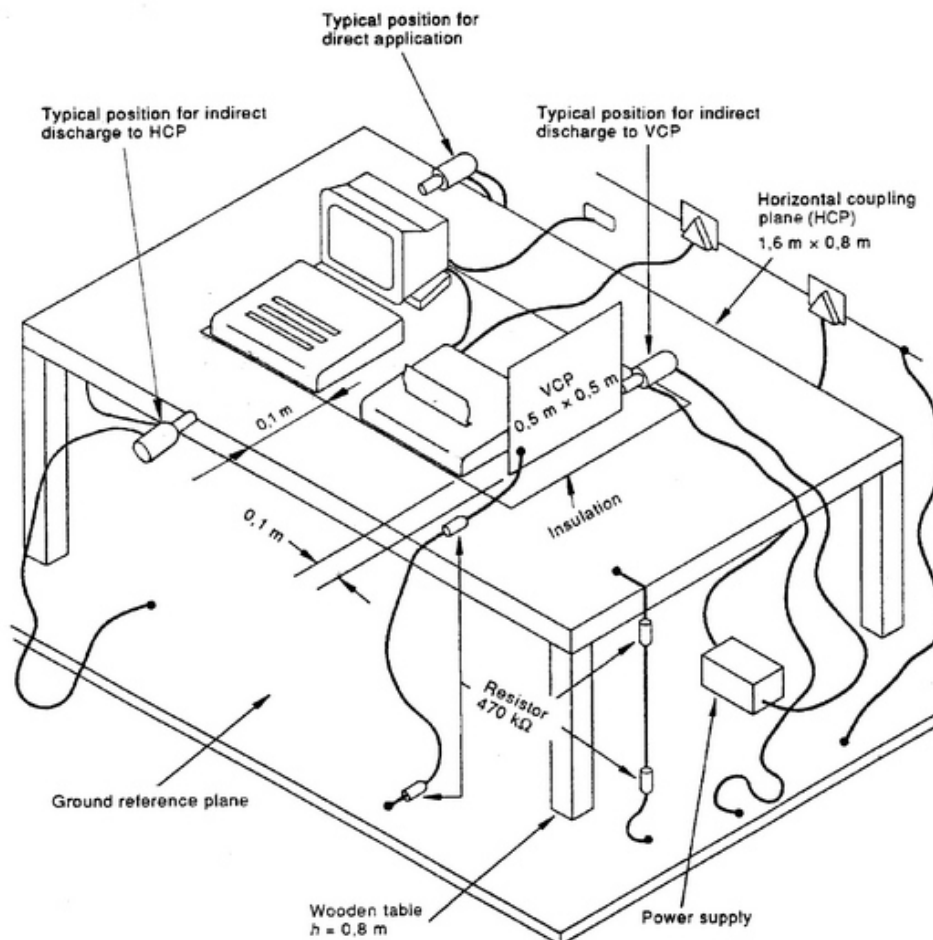


Table-top Equipment

- The EUT was located on a 0.8 m high wooden table standing on the ground reference plane with a 1.6 * 0.8 m horizontal coupling plane on the top. The EUT and cables was isolated from the coupling plane by an insulating support 0.5 mm thick.
- In Contact Discharge, the EUT was exposed to minimum 200 discharges, 100 each at negative and positive polarity on the selected test points (the selected test points were marked with red labels on the EUT)
- In Air Discharge, the EUT exposed to minimum of 10 single discharges on the selected test points.
- The result was observed and analyzed.

5.3 Test Result

5.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
26°C	45%RH	1010mbar

5.3.2 Observation of Direct Discharge

Test Points: 1. Surface of Case. 2. Junction of Case.

Type of Discharge	Test Specifications				Performance Required by EN55024	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of Discharge			
Air Discharge	2,4,8 (kV)	±	1~2	25/ per point	B	A	Pass
Contact Discharge	2,4,6 (kV)	±	1~2	25/ per point	B	A	Pass
Remarks	1. No temporary degradation or loss of function has been observed throughout the entire time interval of air discharge. 2. No temporary degradation or loss of function has been observed throughout the entire time interval of contact discharge.						

The Performance Requirement Class Criterion is defined in Sec. 1.10.

5.3.3 Observation of Indirect Discharge

Test Points: 1. Front Side. 2. Rear Side. 3. Left Side. 4. Right Side.

Type of Discharge	Test Specifications				Performance Required by EN55024	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of Discharge			
HCP Application	2,4 (kV)	±	1~4	25/ per point	B	A	Pass
VCP Application	2,4 (kV)	±	1~4	25/ per point	B	A	Pass
Remarks	1. No temporary degradation or loss of function has been observed throughout the entire time interval of HCP application. 2. No temporary degradation or loss of function has been observed throughout the entire time interval of VCP application.						

The Performance Requirement Class Criterion is defined in Sec. 1.10.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

6 Radio-frequency, Electromagnetic Field Immunity Test

6.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

6.2 Test Configuration and Procedure

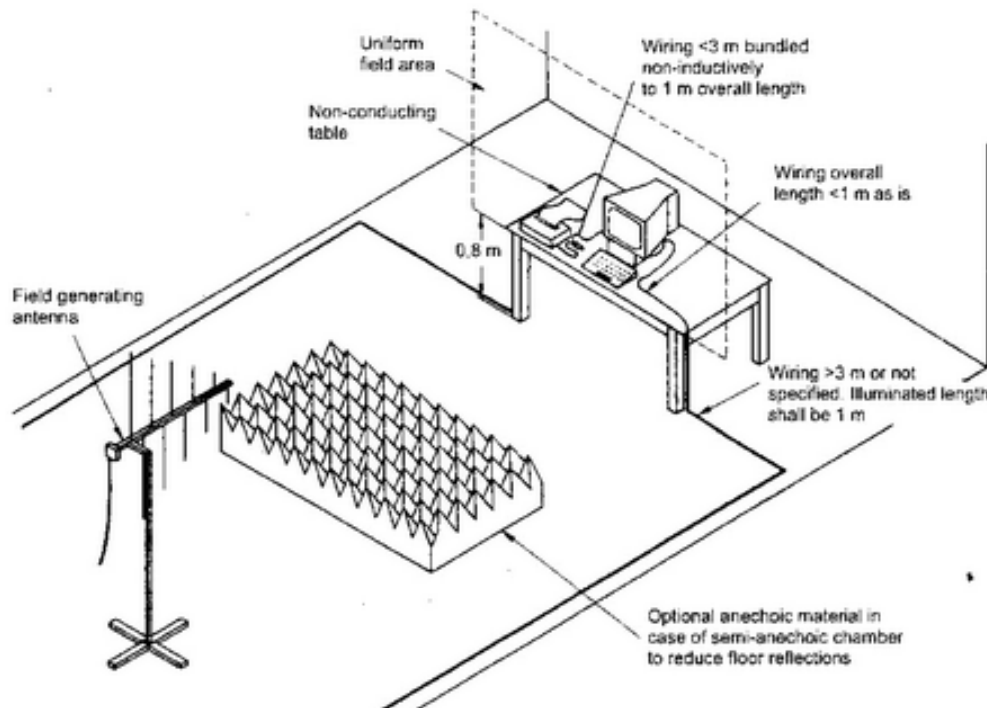


Table-top Equipment

- The field calibration was executed to create a uniform field area (UFA), 3 m away from the antenna, to ensure the validity of the test results.
- The EUT was placed on a non-conductive table 0.8 m high in the UFA.
- The EUT was then connected to power and signal wires according to relevant installation instruction.
- The EUT was positioned so that the four sides of the EUT were exposed to the electromagnetic field in sequence. In each position, the performance of the EUT was investigated and monitored by a CCD camera..

6.3 Test Result

6.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
26°C	45%RH	1010mbar

6.3.2 Observation of Test – Antenna Polarization: Horizontal

Type of Modulation	Test Specifications				Performance Required by EN55024	Observed Result	Verdict
	Field Strength	Frequency Range	Modulation	EUT Position (°)			
Amplitude Modulation	20V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	0	A	A	Pass
Amplitude Modulation	20V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	90	A	A	Pass
Amplitude Modulation	20V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	180	A	A	Pass
Amplitude Modulation	20V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	270	A	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.						

The Performance Requirement Class Criterion is defined in Sec. 1.10.

6.3.3 Observation of Test – Antenna Polarization: Vertical

Type of Modulation	Test Specifications				Performance Required by EN55024	Observed Result	Verdict
	Field Strength	Frequency Range	Modulation	EUT Position (°)			
Amplitude Modulation	20V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	0	A	A	Pass
Amplitude Modulation	20V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	90	A	A	Pass
Amplitude Modulation	20V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	180	A	A	Pass
Amplitude Modulation	20V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	270	A	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.						

The Performance Requirement Class Criterion is defined in Sec. 1.10.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

7 Electrical Fast Transient Test

7.1 Test Instrument

Refer to Sec. 1.3 Test Instruments.

7.2 Test Configuration and Procedure

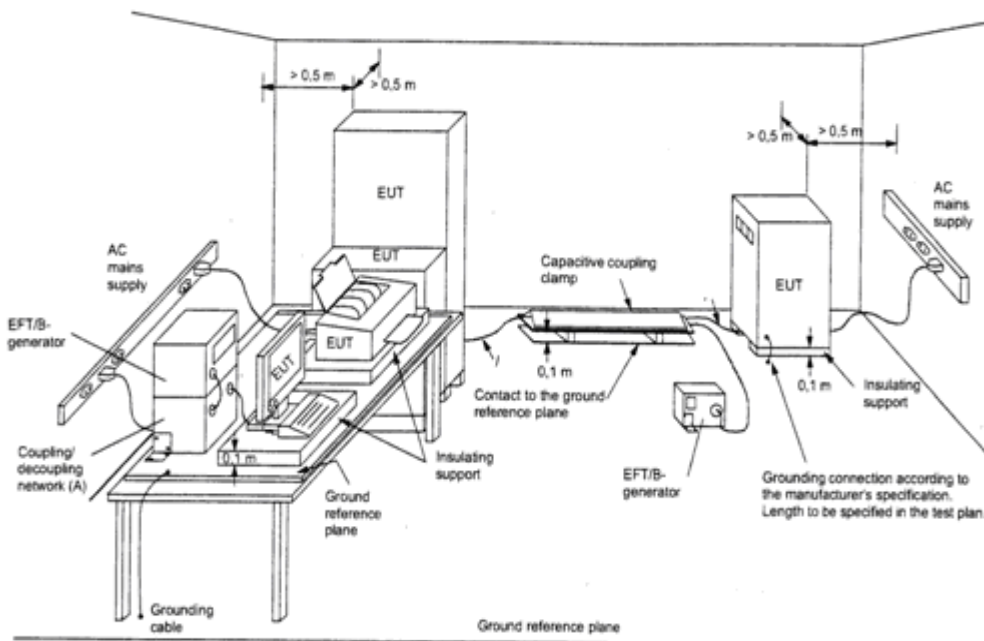


Table-top Equipment

- The EUT was placed on a table of 0.8 m height above the 1 * 1 m metallic ground reference plane, which projected beyond the EUT by at least 0.1 m on all sides.
- The ground plane was connected to the protective earth.
- The distance between the EUT and all other conductive structures, except the ground plane beneath the EUT was more than 0.5 m.
- The length of the signal and power lines between the coupling device and the EUT was 0.5 m.
- All cables to the EUT were placed on the insulation support 0.1 m above the ground reference plane.
- The EUT was connected to the power mains through a coupling device that directly coupled the EFT interference signal. Each of the Line, Neutral and Protective Earth conductors was injected with burst for 1 minute. The test time was broken down into six 10 s bursts separated by a 10 s pause for avoiding synchronization. Both voltage polarities were applied for each test level.
- Operating condition was shown on the monitor and observed.

7.3 Test Result

7.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
26°C	45%RH	1010mbar

7.3.2 Observation of Power Supply Port

Coupling Selection	Test Specifications				Performance Required by EN 55024	Observed Result	Verdict
	Voltage (kV)	Test Duration (Sec)	Repetition Rate (kHz)	Tr/ Td (nS)			
L	±2	60	5	5/50	B	A	Pass
N	±2	60	5	5/50	B	A	Pass
L + N	±2	60	5	5/50	B	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.						

The Performance Requirement Class Criterion is defined in Sec. 1.10.

7.3.3 Observation of I/O, communication ports (Applicable only to cable length >3m)

There was no I/O and communication cable longer than 3 meter; therefore, no test has been required.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

8 Surge Immunity Test

8.1 Test Instrument

Refer to Sec. 1.3 Test Instruments.

8.2 Test Configuration and Procedure

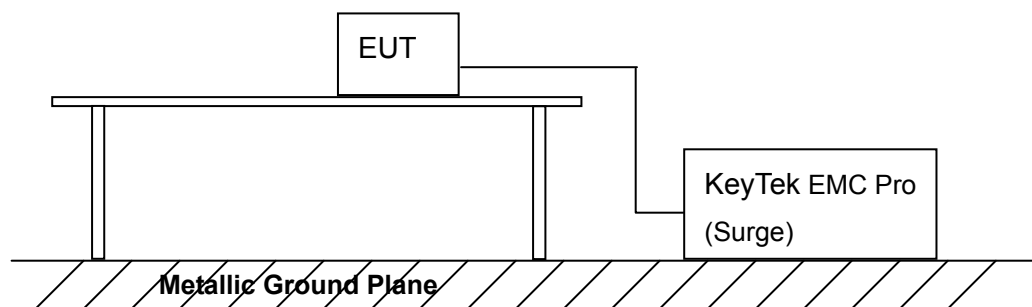


Table-top Equipment

- The EUT was placed on a table of 0.8 m height above the 1 * 1 m metallic ground reference plane, which projected beyond the EUT by at least 0.1 m on all sides.
- The ground plane was connected to the protective earth.
- The length of power cord between the coupling device and the EUT is less than 2 m (provided by the manufacturer).
- The EUT was connected to the power mains through a coupling device that directly couples the Surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).
- The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.
- Operating condition was shown on the monitor and observed.

8.3 Test Result

8.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
26°C	45%RH	1010mbar

8.3.2 Observation of Power Supply Port

Coupling Selection	Test Specifications			Performance Required by EN 55024	Observed Result	Verdict
	Voltage (kV)	Min. of Surge at Each Polarity	Repetition Rate (per min)			
L ► N	±0.5, 1	5	1	B	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.					
Note	Phase Shifting: 0°, 90°, 180°, 270°, 360° Resistance: 2Ω Tr/Th: 1,2/50(8/20)μs					

The Performance Requirement Class Criterion is defined in Sec. 1.10.

- 8.3.3 Observation of other supply/ signal lines: (Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables)
N/A

PASS

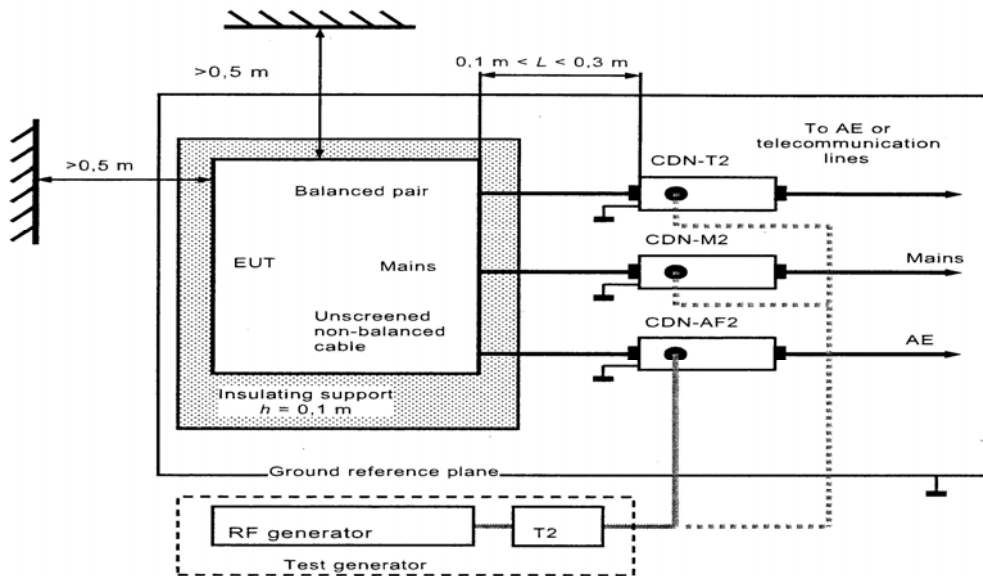
The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

9 Radio-frequency, Conducted Disturbances Immunity Test

9.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

9.2 Test Configuration and Procedure



- The EUT was placed on an insulating support of 0.1 m height above a ground reference plane. All cables exiting the EUT was supported at a height of 30 mm above the ground reference plane.
- The EUT was connected to the power mains through a Coupling and Decoupling Networks (CDN).
- The CDN was located 0.3 m from the EUT as indicated in the diagram above.
- The test was performed with the test generator connected to each of the CDN in turn while the other non-excited RF input ports of the coupling devices were terminated by a 50 Ω terminator.
- The conducted disturbance was applied on the EUT from 150 kHz to 80 MHz using the signal levels established during the setting process. .
- Operating condition was shown on the monitor and observed.

9.3 Test Result

9.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
20°C	45%RH	1010mbar

9.3.2 Observation of Test

Type of Modulation	Test Specifications			Performance Required by EN 55024	Observed Result	Verdict
	Voltage Level (emf) U_0	Frequency Range	Modulation			
Amplitude Modulation	10V/ 140dB μ V	0.15 to 80MHz	80%, 1kHz, sinusoidal	A	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.					

The Performance Requirement Class Criterion is defined in Sec. 1.10.

9.3.3 Observation of I/O, communication ports (Applicable only to cable length >3m)

There was no I/O and communication cable longer than 3 meter; therefore, no test has been required.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

10 Photographs of Test

10.1 Conducted Emission Test



Front View



Rear View

10.2 Radiated Emission Test – Below 1 GHz

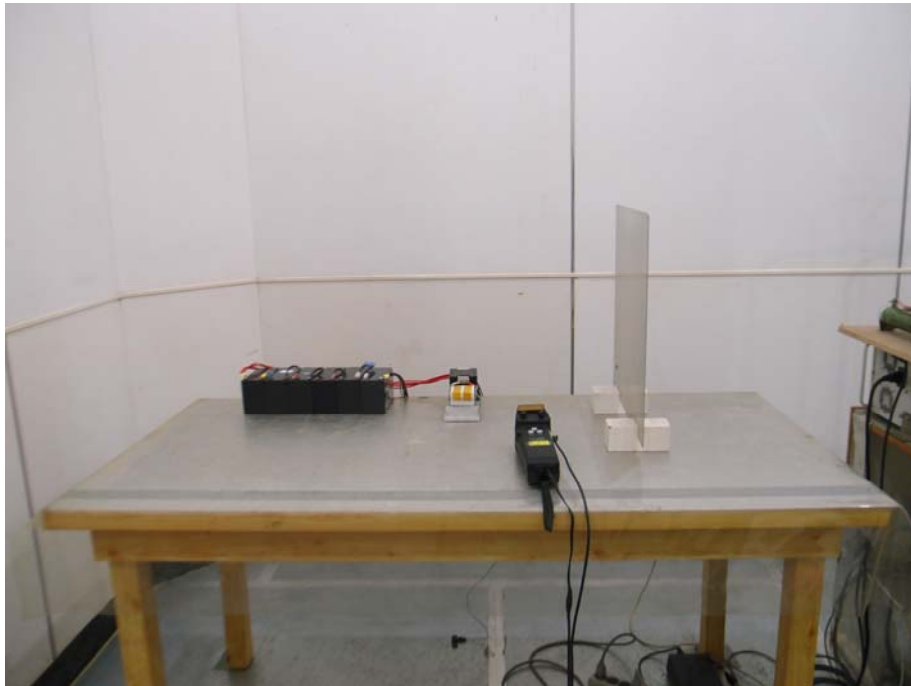


Front View

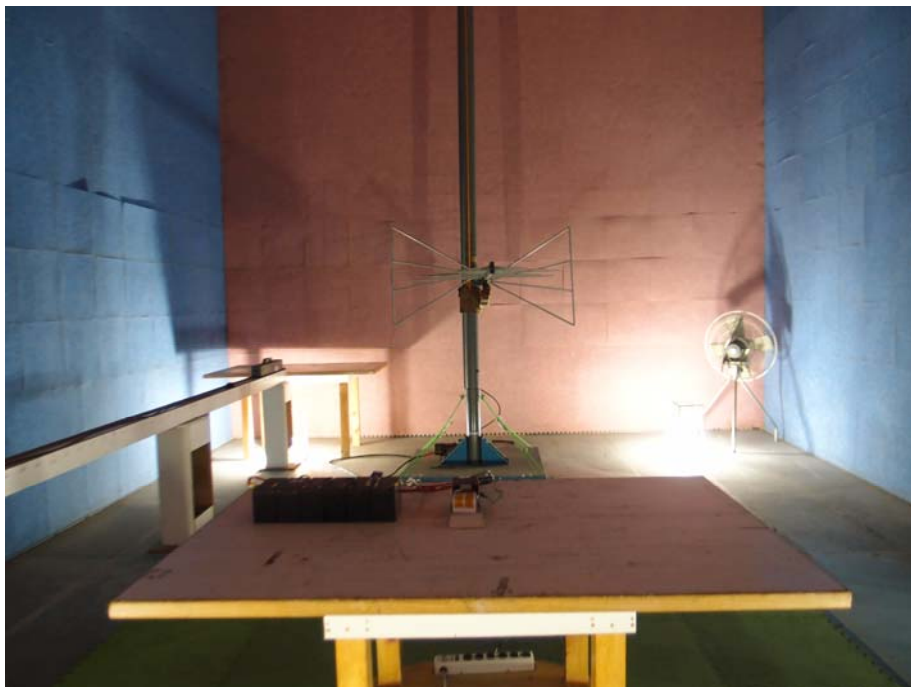


Rear View

10.3 Electrostatic Discharge Immunity Test



10.4 Radio-frequency, Electromagnetic Field Immunity Test



10.5 Electrical Fast Transient / Burst Immunity Test



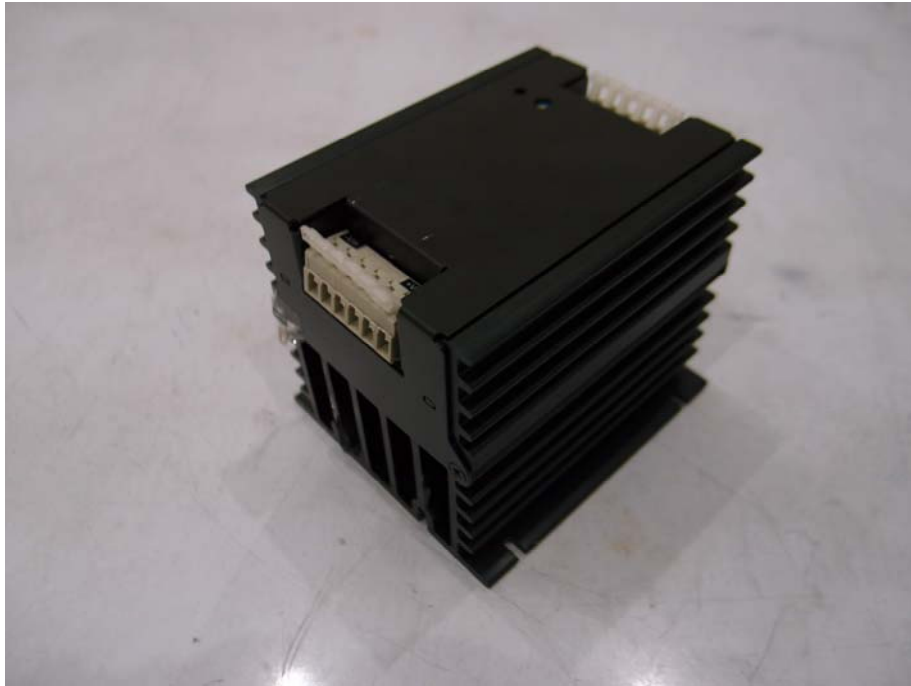
10.6 Surge Immunity Test



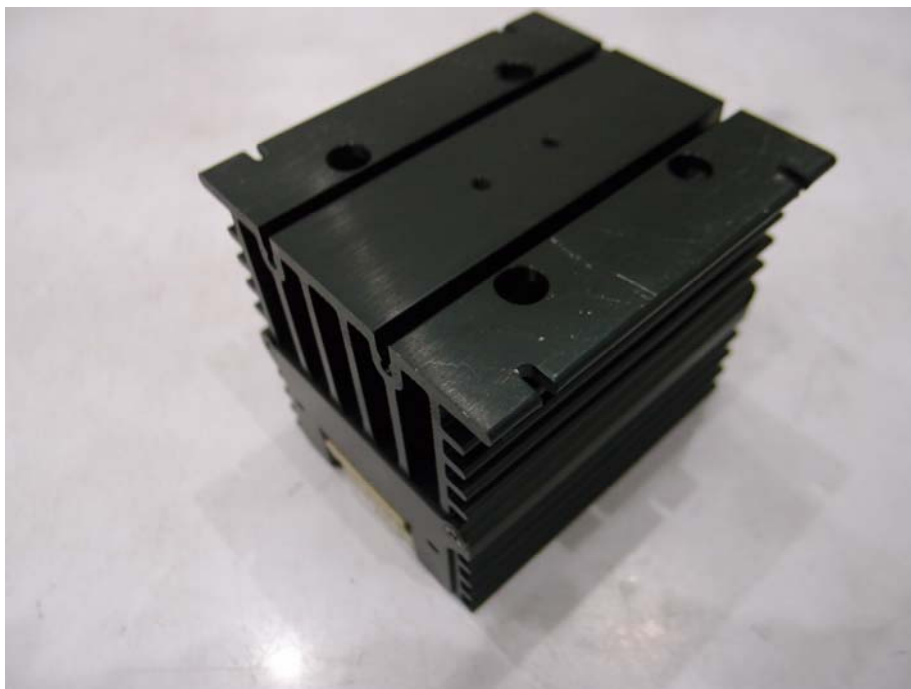
10.7 Radio-frequency, Conducted Disturbances Immunity Test



11 Photographs of EUT



Front View of the EUT



Rear View of the EUT

12 Photographs of ESD Test Points



View of ESD Test Points

13 Appendix 1

13.1 Product Series

TEQ75-2412WIR,	TEQ75-2415WIR,	TEQ75-2416WIR,	TEQ75-2418WIR,
TEQ75-4812WIR,	TEQ75-4815WIR,	TEQ75-4816WIR,	TEQ75-4818WIR,
TEQ75-7212WIR,	TEQ75-7215WIR,	TEQ75-7216WIR,	TEQ75-7218WIR,
TEQ100-2412WIR,	TEQ100-2415WIR,	TEQ100-2416WIR,	TEQ100-2418WIR,
TEQ100-4812WIR,	TEQ100-4815WIR,	TEQ100-4816WIR,	TEQ100-4818WIR,
TEQ100-7212WIR,	TEQ100-7215WIR,	TEQ100-7216WIR,	TEQ100-7218WIR,
TEQ160-4812WIR,	TEQ160-4815WIR,	TEQ160-4816WIR,	TEQ160-4818WIR,
TEQ160-7212WIR,	TEQ160-7215WIR,	TEQ160-7216WIR,	TEQ160-7218WIR,
TEQ200-4812WIR,	TEQ200-4815WIR,	TEQ200-4816WIR,	TEQ200-4818WIR,
TEQ200-7212WIR,	TEQ200-7215WIR,	TEQ200-7216WIR	

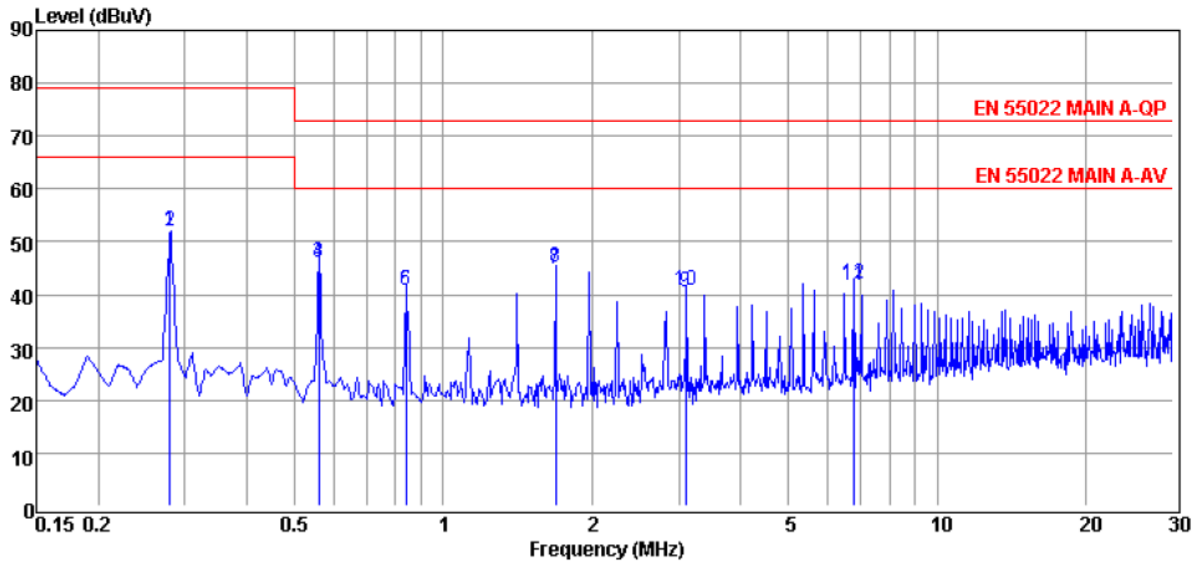
Contents

1	Appendix 2	2
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1 Appendix 2

Conducted Emission Test Data - TEQ75-2416WIR

Test Date : 2014-09-16 Power Line : Line
 Temperature : 24°C Humidity : 55%

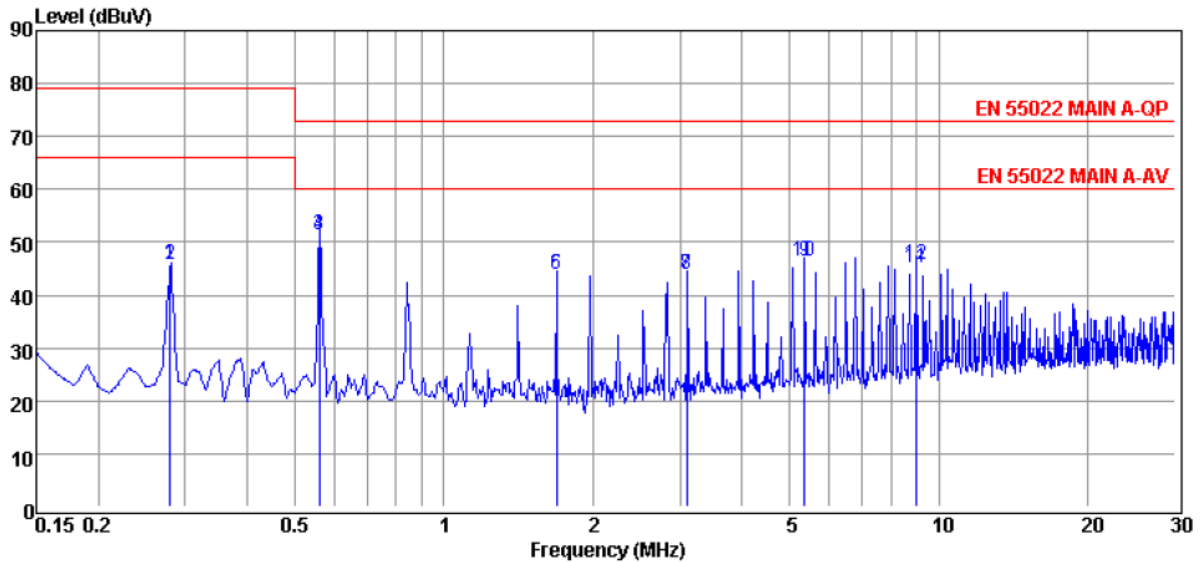


No.	Freq MHz	Reading dBuV	C.F dB	Result dBuV	Limit dBuV	Margin dB	Power Line	Remark
1	0.28	51.80	0.09	51.89	66.00	-14.11	LINE	Average
2	0.28	52.00	0.09	52.09	79.00	-26.91	LINE	QP
3	0.56	46.00	0.10	46.10	60.00	-13.90	LINE	Average
4	0.56	46.10	0.10	46.20	73.00	-26.80	LINE	QP
5	0.84	40.70	0.12	40.82	60.00	-19.18	LINE	Average
6	0.84	40.80	0.12	40.92	73.00	-32.08	LINE	QP
7	1.69	44.79	0.19	44.98	60.00	-15.02	LINE	Average
8	1.69	44.89	0.19	45.08	73.00	-27.92	LINE	QP
9	3.10	40.30	0.28	40.58	60.00	-19.42	LINE	Average
10	3.10	40.40	0.28	40.68	73.00	-32.32	LINE	QP
11	6.76	41.30	0.54	41.84	60.00	-18.16	LINE	Average
12	6.76	41.50	0.54	42.04	73.00	-30.96	LINE	QP

Remark : All readings are Quasi-Peak and Average values.

Conducted Emission Test Data - TEQ75-2416WIR

Test Date	: 2014-09-16	Power Line	: Neutral
Temperature	: 24°C	Humidity	: 55%

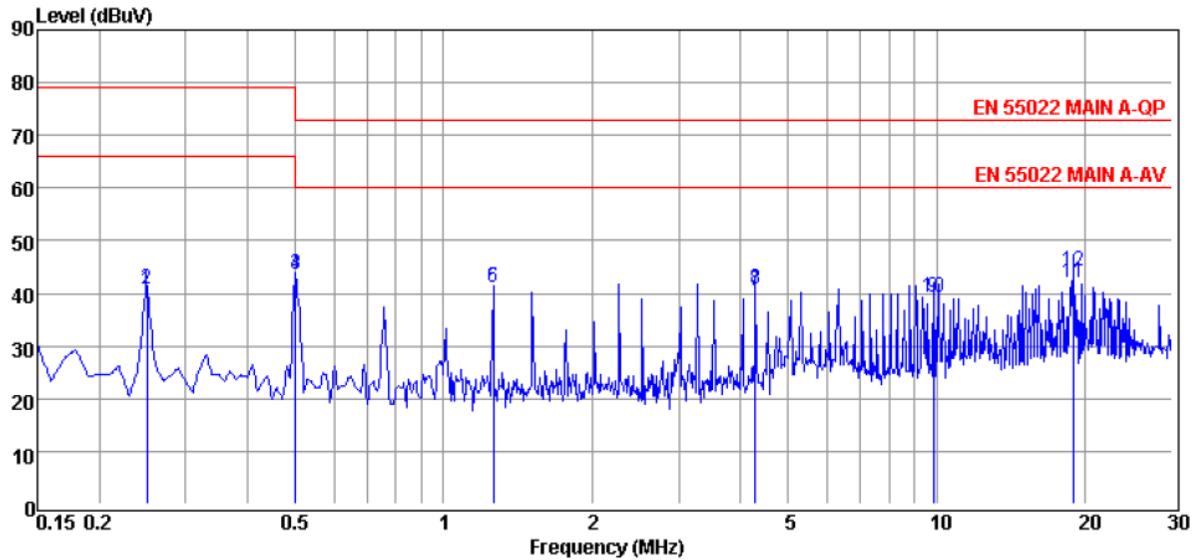


No.	Freq MHz	Reading dB μ V	C.F dB	Result dB μ V	Limit dB μ V	Margin dB	Power Line	Remark
1	0.28	45.70	0.06	45.76	66.00	-20.24	NEUTRAL	Average
2	0.28	45.80	0.06	45.86	79.00	-33.14	NEUTRAL	QP
3	0.56	51.22	0.07	51.29	60.00	-8.71	NEUTRAL	Average
4	0.56	51.32	0.07	51.39	73.00	-21.61	NEUTRAL	QP
5	1.69	43.71	0.17	43.88	60.00	-16.12	NEUTRAL	Average
6	1.69	43.81	0.17	43.98	73.00	-29.02	NEUTRAL	QP
7	3.10	43.62	0.26	43.88	60.00	-16.12	NEUTRAL	Average
8	3.10	43.72	0.26	43.98	73.00	-29.02	NEUTRAL	QP
9	5.35	45.88	0.44	46.32	60.00	-13.68	NEUTRAL	Average
10	5.35	45.98	0.44	46.42	73.00	-26.58	NEUTRAL	QP
11	9.01	44.51	0.68	45.19	60.00	-14.81	NEUTRAL	Average
12	9.01	45.11	0.68	45.79	73.00	-27.21	NEUTRAL	QP

Remark : All readings are Quasi-Peak and Average values.

Conducted Emission Test Data - TEQ100-2415WIR

Test Date	: 2014-09-16	Power Line	: Line
Temperature	: 24°C	Humidity	: 55%



No.	Freq MHz	Reading dB μ V	C.F dB	Result dB μ V	Limit dB μ V	Margin dB	Power Line	Remark
1	0.25	40.50	0.09	40.59	66.00	-25.41	LINE	Average
2	0.25	40.70	0.09	40.79	79.00	-38.21	LINE	QP
3	0.50	43.40	0.10	43.50	60.00	-16.50	LINE	Average
4	0.50	43.60	0.10	43.70	73.00	-29.30	LINE	QP
5	1.26	40.89	0.16	41.05	60.00	-18.95	LINE	Average
6	1.26	40.99	0.16	41.15	73.00	-31.85	LINE	QP
7	4.29	40.00	0.35	40.35	60.00	-19.65	LINE	Average
8	4.29	40.30	0.35	40.65	73.00	-32.35	LINE	QP
9	9.84	38.39	0.71	39.10	60.00	-20.90	LINE	Average
10	9.84	38.59	0.71	39.30	73.00	-33.70	LINE	QP
11	18.88	40.70	1.21	41.91	60.00	-18.09	LINE	Average
12	18.88	43.00	1.21	44.21	73.00	-28.79	LINE	QP

Remark : All readings are Quasi-Peak and Average values.

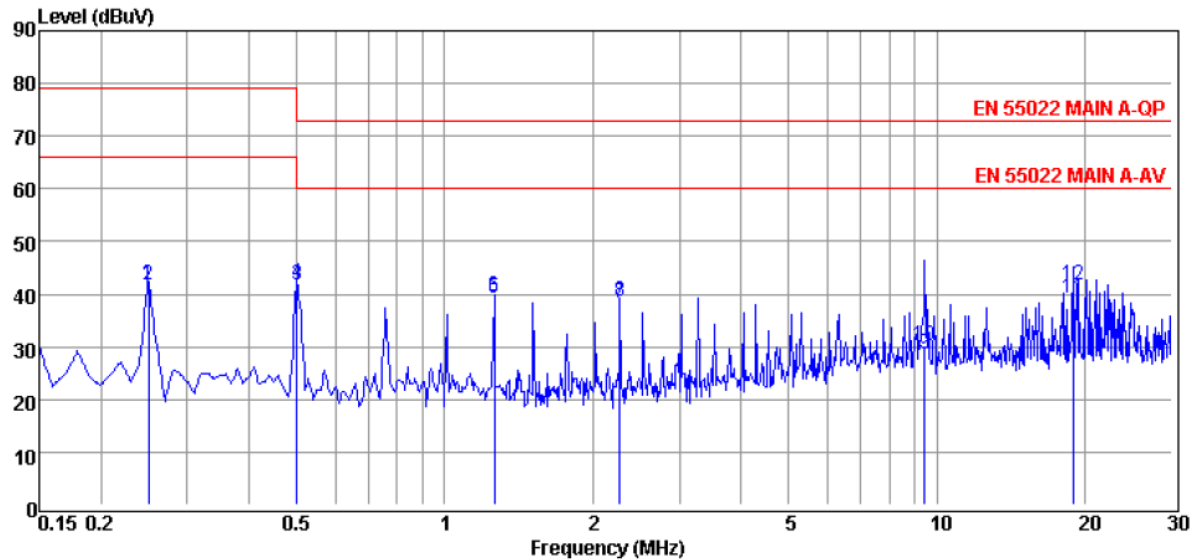
Conducted Emission Test Data - TEQ100-2415WIR

Test Date : 2014-09-16

Power Line : Neutral

Temperature : 24°C

Humidity : 55%

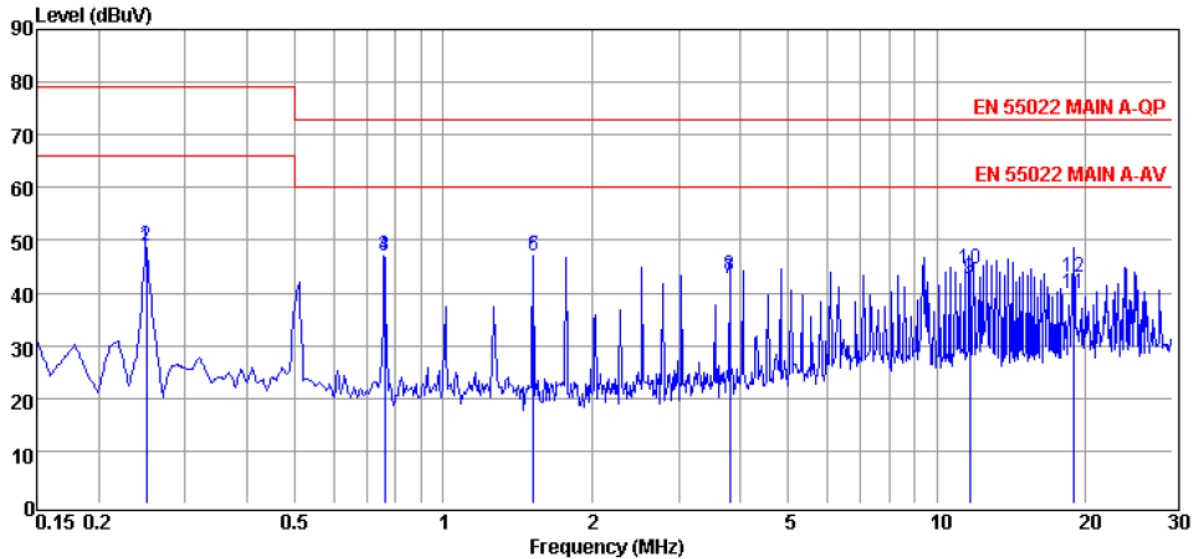


No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV	Limit dBμV	Margin dB	Power Line	Remark
1	0.25	41.60	0.06	41.66	66.00	-24.34	NEUTRAL	Average
2	0.25	41.80	0.06	41.86	79.00	-37.14	NEUTRAL	QP
3	0.50	41.81	0.07	41.88	60.00	-18.12	NEUTRAL	Average
4	0.50	42.11	0.07	42.18	73.00	-30.82	NEUTRAL	QP
5	1.26	39.21	0.14	39.35	60.00	-20.65	NEUTRAL	Average
6	1.26	39.31	0.14	39.45	73.00	-33.55	NEUTRAL	QP
7	2.27	38.22	0.20	38.42	60.00	-21.58	NEUTRAL	Average
8	2.27	38.32	0.20	38.52	73.00	-34.48	NEUTRAL	QP
9	9.45	28.10	0.70	28.80	60.00	-31.20	NEUTRAL	Average
10	9.45	29.60	0.70	30.30	73.00	-42.70	NEUTRAL	QP
11	18.88	37.94	1.30	39.24	60.00	-20.76	NEUTRAL	Average
12	18.88	40.54	1.30	41.84	73.00	-31.16	NEUTRAL	QP

Remark : All readings are Quasi-Peak and Average values.

Conducted Emission Test Data - TEQ200-4815WIR

Test Date : 2014-09-16 Power Line : Line
Temperature : 24°C Humidity : 55%

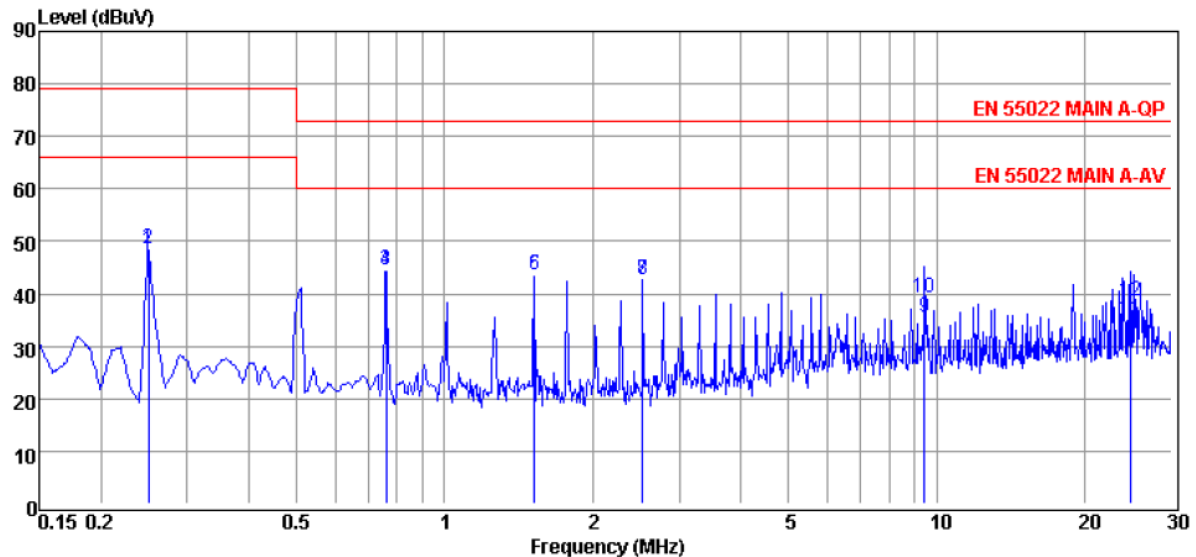


No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV	Limit dBμV	Margin dB	Power Line	Remark
1	0.25	48.60	0.09	48.69	66.00	-17.31	LINE	Average
2	0.25	48.80	0.09	48.89	79.00	-30.11	LINE	QP
3	0.76	46.80	0.12	46.92	60.00	-13.08	LINE	Average
4	0.76	46.90	0.12	47.02	73.00	-25.98	LINE	QP
5	1.52	46.80	0.17	46.97	60.00	-13.03	LINE	Average
6	1.52	46.90	0.17	47.07	73.00	-25.93	LINE	QP
7	3.80	42.50	0.31	42.81	60.00	-17.19	LINE	Average
8	3.80	42.90	0.31	43.21	73.00	-29.79	LINE	QP
9	11.65	41.70	0.82	42.52	60.00	-17.48	LINE	Average
10	11.65	43.80	0.82	44.62	73.00	-28.38	LINE	QP
11	18.88	38.60	1.21	39.81	60.00	-20.19	LINE	Average
12	18.88	41.70	1.21	42.91	73.00	-30.09	LINE	QP

Remark : All readings are Quasi-Peak and Average values.

Conducted Emission Test Data - TEQ200-4815WIR

Test Date : 2014-09-16 Power Line : Neutral
Temperature : 24°C Humidity : 55%

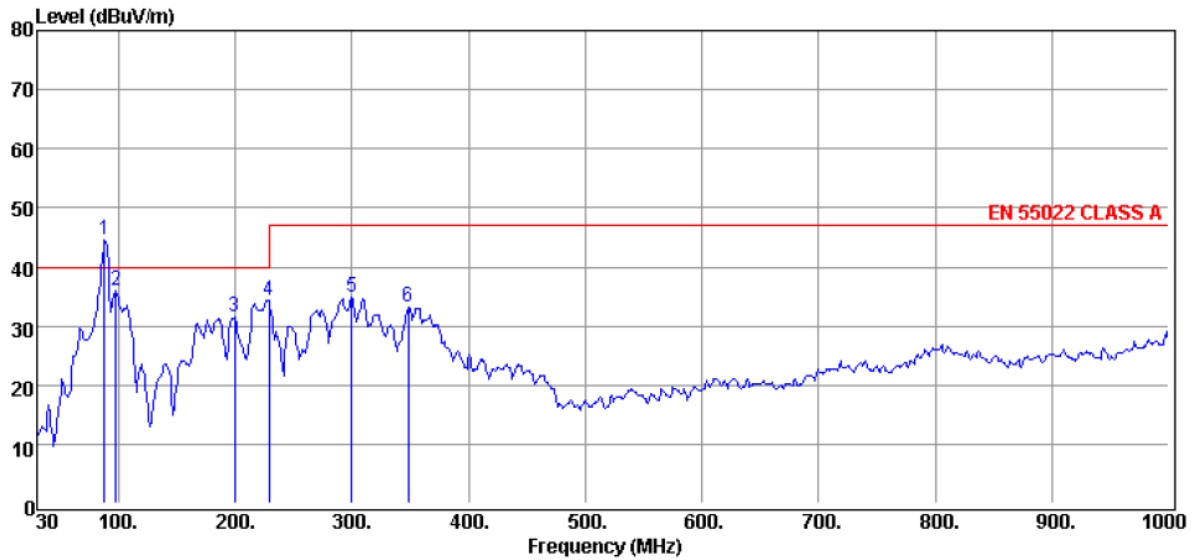


No.	Freq MHz	Reading dB μ V	C.F dB	Result dB μ V	Limit dB μ V	Margin dB	Power Line	Remark
1	0.25	48.30	0.06	48.36	66.00	-17.64	NEUTRAL	Average
2	0.25	48.50	0.06	48.56	79.00	-30.44	NEUTRAL	QP
3	0.76	44.39	0.10	44.49	60.00	-15.51	NEUTRAL	Average
4	0.76	44.49	0.10	44.59	73.00	-28.41	NEUTRAL	QP
5	1.52	43.30	0.15	43.45	60.00	-16.55	NEUTRAL	Average
6	1.52	43.40	0.15	43.55	73.00	-29.45	NEUTRAL	QP
7	2.53	42.29	0.23	42.52	60.00	-17.48	NEUTRAL	Average
8	2.53	42.39	0.23	42.62	73.00	-30.38	NEUTRAL	QP
9	9.44	34.70	0.70	35.40	60.00	-24.60	NEUTRAL	Average
10	9.44	38.50	0.70	39.20	73.00	-33.80	NEUTRAL	QP
11	24.80	33.50	1.80	35.30	60.00	-24.70	NEUTRAL	Average
12	24.80	36.90	1.80	38.70	73.00	-34.30	NEUTRAL	QP

Remark : All readings are Quasi-Peak and Average values.

Radiated Emission Test Data - TEQ200-7218WIR

Test Date : 2014-09-16 Polarization : Horizontal
 Temperature : 26°C Humidity : 50%

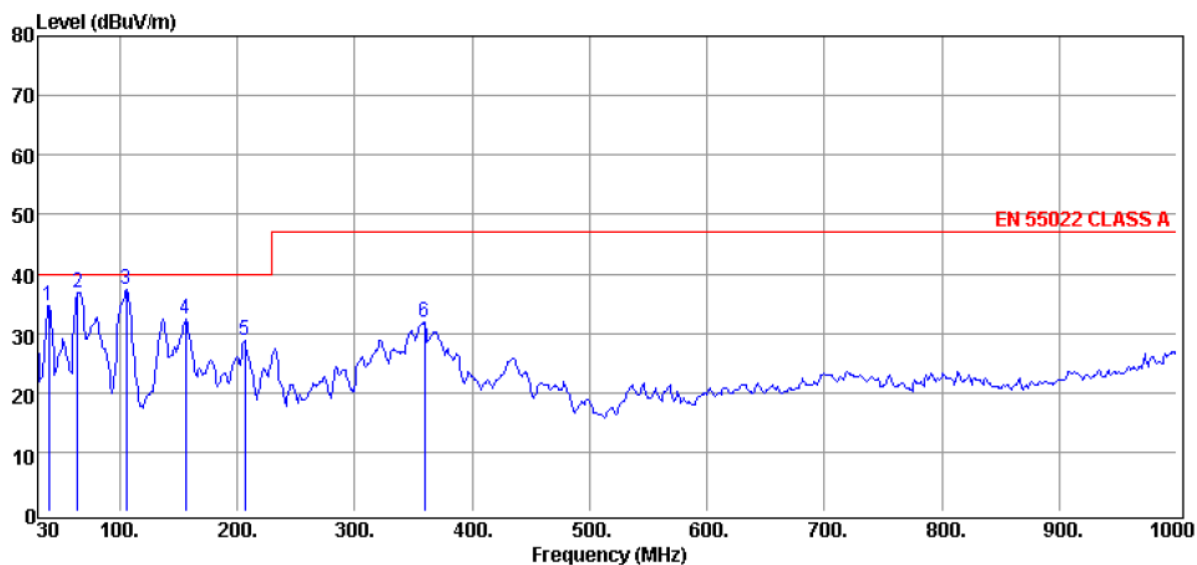


No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	88.20	62.80	-18.21	44.59	40.00	4.59	HORIZONTAL	Peak
2	97.90	61.80	-25.68	36.12	40.00	-3.88	HORIZONTAL	Peak
3	199.75	50.36	-18.92	31.44	40.00	-8.56	HORIZONTAL	Peak
4	228.85	53.58	-19.23	34.35	40.00	-5.65	HORIZONTAL	Peak
5	299.66	51.09	-16.30	34.79	47.00	-12.21	HORIZONTAL	Peak
6	348.16	47.88	-14.72	33.16	47.00	-13.84	HORIZONTAL	Peak

Remark : All readings are Quasi-Peak values.

Radiated Emission Test Data - TEQ200-7218WIR

Test Date : 2014-09-16 Polarization : Vertical
 Temperature : 26°C Humidity : 50%

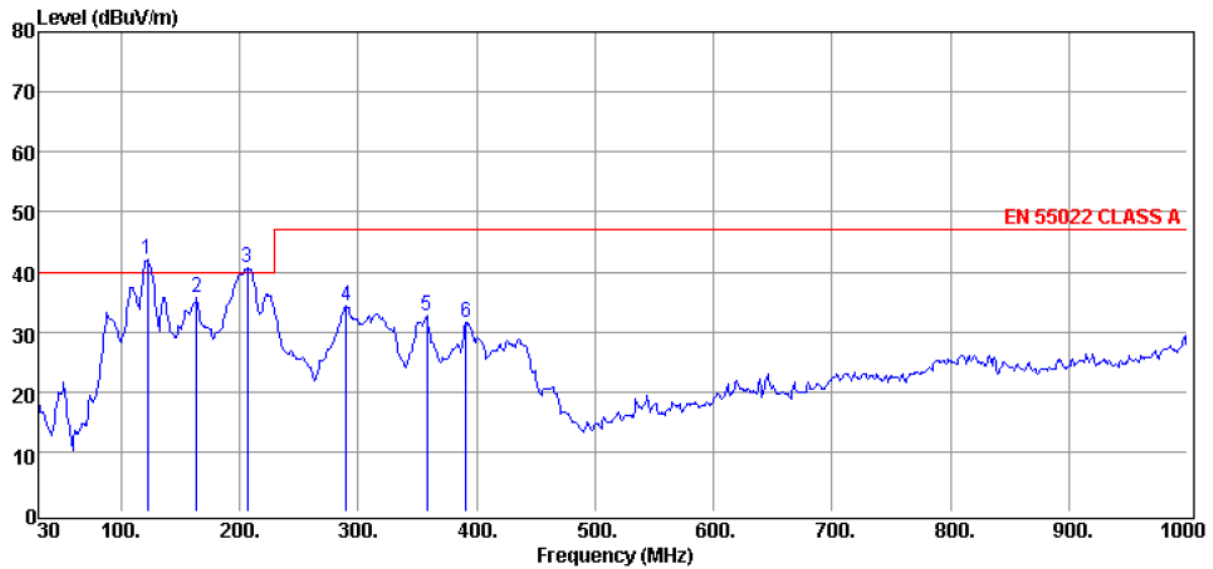


No.	Freq MHz	Reading dB μ V	C.F dB	Result dB μ V/m	Limit dB μ V/m	Margin dB	Antenna Pol.	Remark
1	39.70	59.14	-24.48	34.66	40.00	-5.34	VERTICAL	Peak
2	63.95	60.08	-23.17	36.91	40.00	-3.09	VERTICAL	Peak
3	105.66	60.08	-22.77	37.31	40.00	-2.69	VERTICAL	Peak
4	156.10	49.79	-17.32	32.47	40.00	-7.53	VERTICAL	Peak
5	206.54	47.38	-18.54	28.84	40.00	-11.16	VERTICAL	Peak
6	359.80	48.68	-16.79	31.89	47.00	-15.11	VERTICAL	Peak

Remark : All readings are Quasi-Peak values.

Radiated Emission Test Data - TEQ75-2416WIR

Test Date : 2014-09-16 Polarization : Horizontal
 Temperature : 26°C Humidity : 50%

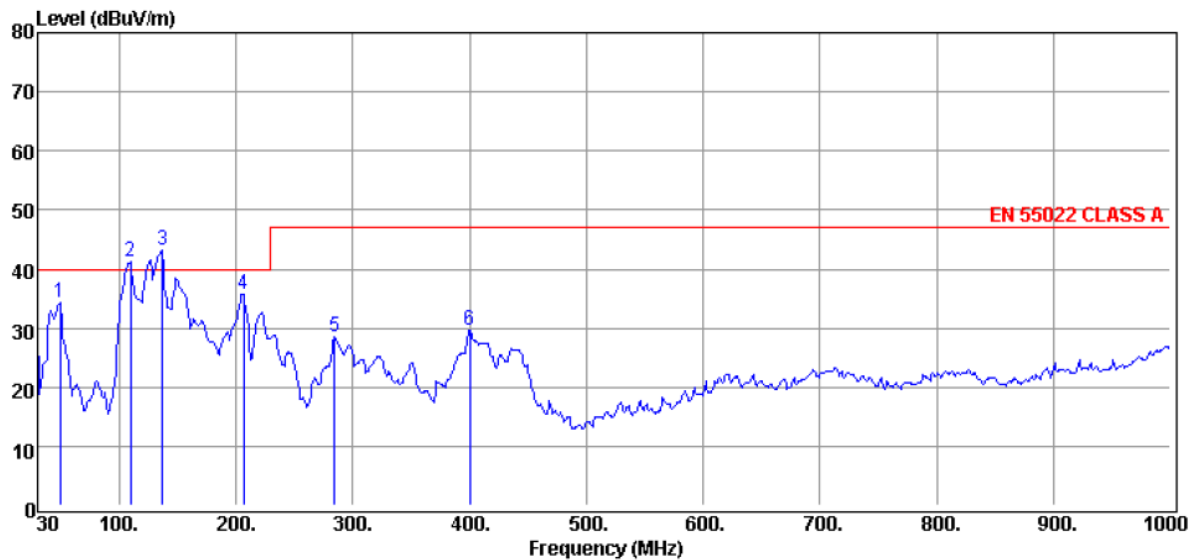


No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	122.15	70.71	-28.72	41.99	40.00	1.99	HORIZONTAL	Peak
2	163.86	59.75	-24.17	35.58	40.00	-4.42	HORIZONTAL	Peak
3	206.54	59.68	-19.05	40.63	40.00	0.63	HORIZONTAL	Peak
4	289.96	51.26	-16.95	34.31	47.00	-12.69	HORIZONTAL	Peak
5	357.86	46.95	-14.38	32.57	47.00	-14.43	HORIZONTAL	Peak
6	390.84	44.72	-13.19	31.53	47.00	-15.47	HORIZONTAL	Peak

Remark : All readings are Quasi-Peak values.

Radiated Emission Test Data - TEQ75-2416WIR

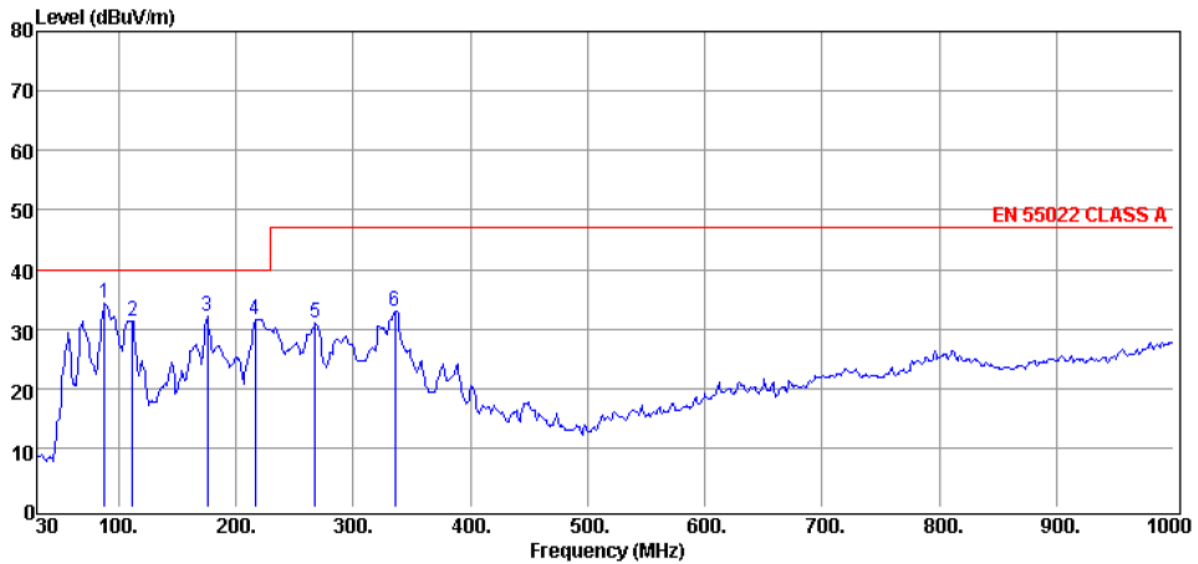
Test Date : 2014-09-16 Polarization : Vertical
 Temperature : 26°C Humidity : 50%



Remark : All readings are Quasi-Peak values.

Radiated Emission Test Data - TEQ100-2415WIR

Test Date : 2014-09-16 Polarization : Horizontal
 Temperature : 26°C Humidity : 50%

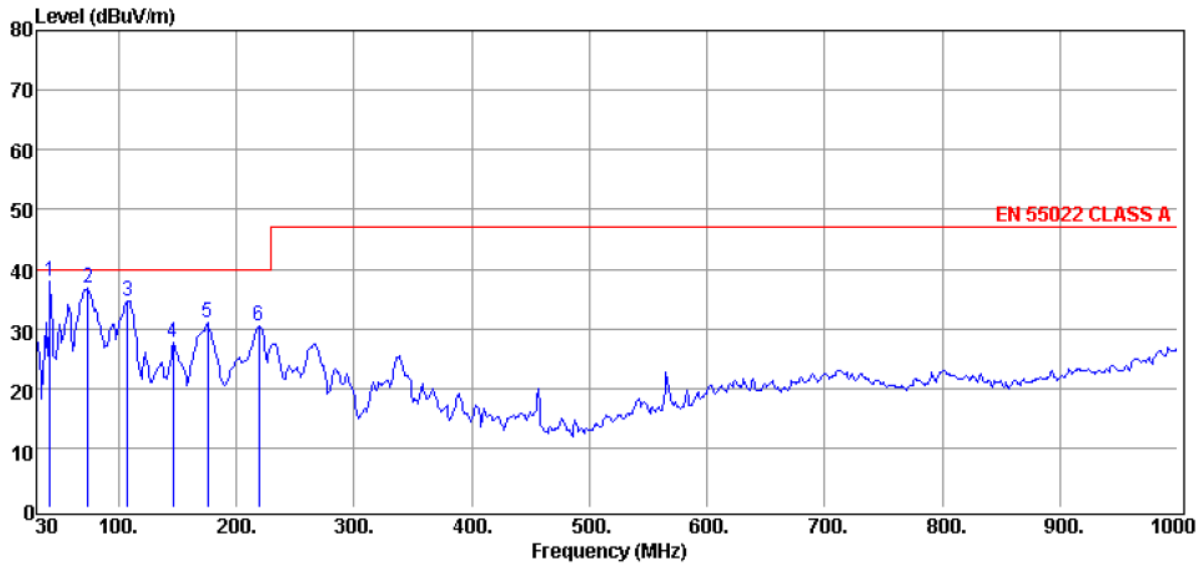


No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	88.20	52.60	-18.21	34.39	40.00	-5.61	HORIZONTAL	Peak
2	111.48	59.84	-28.63	31.21	40.00	-8.79	HORIZONTAL	Peak
3	175.50	54.98	-22.84	32.14	40.00	-7.86	HORIZONTAL	Peak
4	216.24	50.63	-19.11	31.52	40.00	-8.48	HORIZONTAL	Peak
5	267.65	49.22	-18.32	30.90	47.00	-16.10	HORIZONTAL	Peak
6	335.55	48.09	-15.14	32.95	47.00	-14.05	HORIZONTAL	Peak

Remark : All readings are Quasi-Peak values.

Radiated Emission Test Data - TEQ100-2415WIR

Test Date : 2014-09-16 Polarization : Vertical
 Temperature : 26°C Humidity : 50%

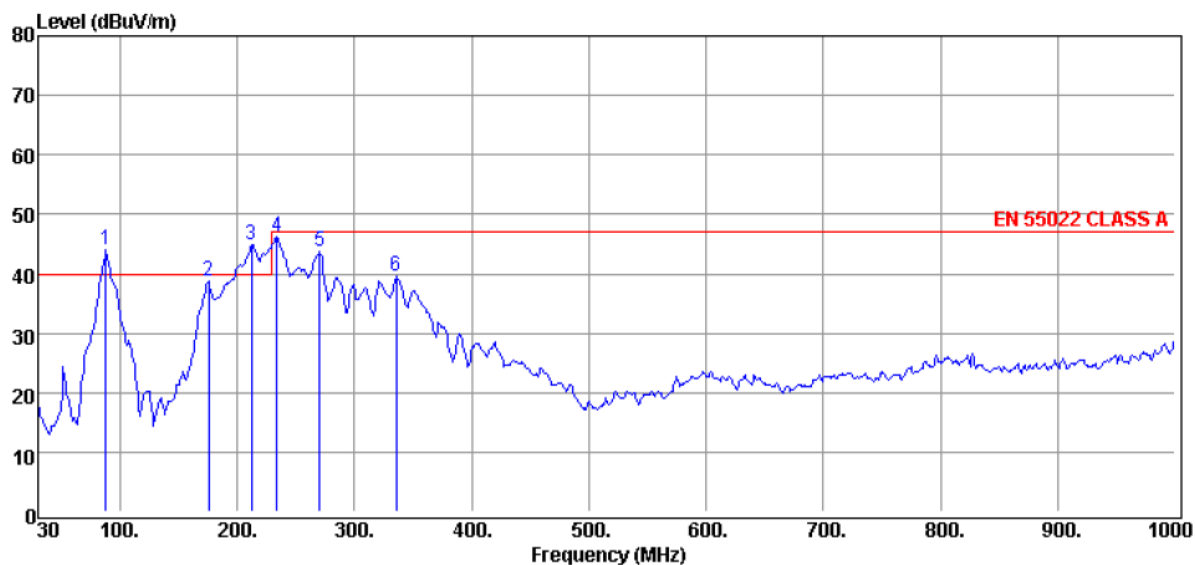


No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	41.64	62.87	-24.84	38.03	40.00	-1.97	VERTICAL	Peak
2	73.65	57.72	-21.00	36.72	40.00	-3.28	VERTICAL	Peak
3	107.60	57.77	-23.04	34.73	40.00	-5.27	VERTICAL	Peak
4	146.40	43.67	-16.05	27.62	40.00	-12.38	VERTICAL	Peak
5	175.50	50.43	-19.50	30.93	40.00	-9.07	VERTICAL	Peak
6	219.15	48.87	-18.42	30.45	40.00	-9.55	VERTICAL	Peak

Remark : All readings are Quasi-Peak values.

Radiated Emission Test Data - TEQ200-4815WIR

Test Date : 2014-09-16 Polarization : Horizontal
 Temperature : 26°C Humidity : 50%

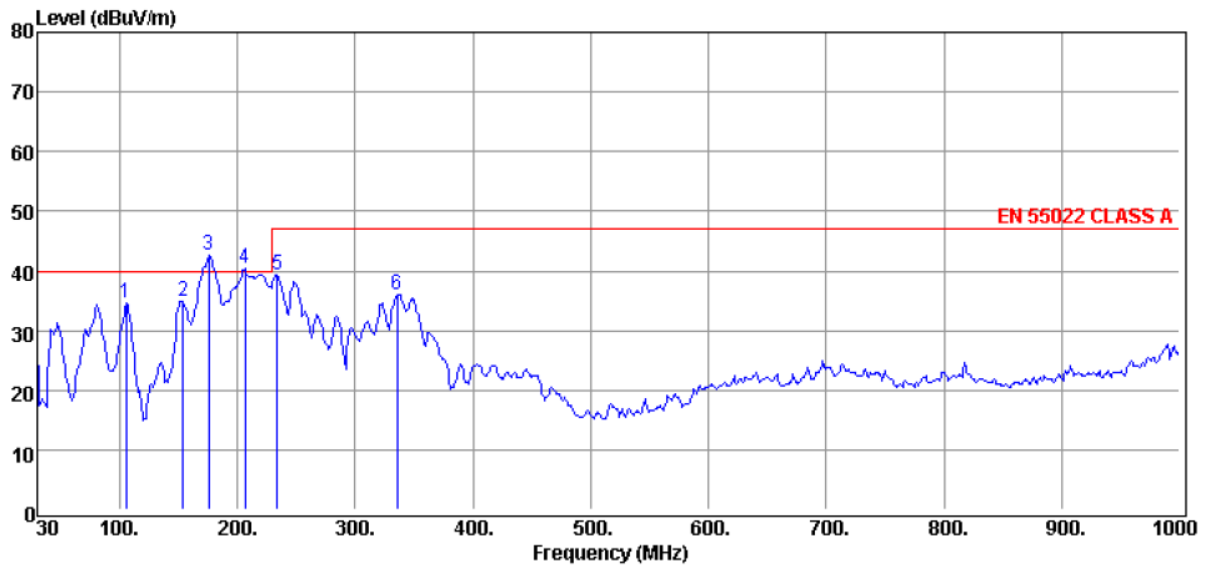


No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	88.20	62.18	-18.21	43.97	40.00	3.97	HORIZONTAL	Peak
2	175.50	61.49	-22.84	38.65	40.00	-1.35	HORIZONTAL	Peak
3	212.36	63.95	-19.11	44.84	40.00	4.84	HORIZONTAL	Peak
4	233.70	65.52	-19.27	46.25	47.00	-0.75	HORIZONTAL	Peak
5	270.56	61.78	-18.14	43.64	47.00	-3.36	HORIZONTAL	Peak
6	335.55	54.76	-15.14	39.62	47.00	-7.38	HORIZONTAL	Peak

Remark : All readings are Quasi-Peak values.

Radiated Emission Test Data - TEQ200-4815WIR

Test Date : 2014-09-16 Polarization : Vertical
 Temperature : 26°C Humidity : 50%



No.	Freq MHz	Reading dBμV	C.F dB	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	105.66	57.44	-22.77	34.67	40.00	-5.33	VERTICAL	Peak
2	154.16	51.46	-16.69	34.77	40.00	-5.23	VERTICAL	Peak
3	175.50	62.01	-19.50	42.51	40.00	2.51	VERTICAL	Peak
4	206.54	58.83	-18.54	40.29	40.00	0.29	VERTICAL	Peak
5	233.70	57.81	-18.40	39.41	47.00	-7.59	VERTICAL	Peak
6	335.55	53.84	-17.86	35.98	47.00	-11.02	VERTICAL	Peak

Remark : All readings are Quasi-Peak values.