

Prüfbericht-Nr.: Test report no.:	CN22SYO5 001	Auftrags-Nr.: Order no.:	168374467	Seite 1 von 18 Page 1 of 18	
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2022-05-26		
Auftraggeber: Client:	Intelbras Industria de Telecomunicacao Eletronica Brasileira Rodovia BR 101 KM 210 Area Industrial Sao Jose Brazil				
Prüfgegenstand: Test item:	Impacta exchanges				
Bezeichnung / Typ-Nr.: Identification / Type no.:	Impacta 220				
Auftrags-Inhalt: Order content:	Test Report				
Prüfgrundlage: Test specification:	FCC CFR Title 47, Part 15, Subpart B				
Wareneingangsdatum: Date of sample receipt:	2022-06-27	Please refer to Photo Document			
Prüfmuster-Nr.: Test sample no:	A003285007-001 A003285010-001 A003285800-001~013				
Prüfzeitraum: Testing period:	2022-07-14 – 2022-08-03				
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.				
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.				
Prüfergebnis*: Test result*:	Pass				
geprüft von: tested by:		genehmigt von: authorized by:			
Datum: Date:	2022-08-30 Signed by: Bell Hu	Ausstellungsdatum: Issue date:	2022-08-30 Signed by: Lin Lin		
Stellung / Position:	Project Manager	Stellung / Position:	Reviewer		
Sonstiges / Other:	FCC ID: 2A76R-IMPACTA220				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged				
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend 3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = ausreichend N/A = nicht anwendbar 4 = sufficient N/A = not applicable	5 = mangelhaft N/T = nicht getestet 5 = poor N/T = not tested
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good	3 = satisfactory	4 = sufficient	5 = poor
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

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Test Summary

5.1.1 CONDUCTED EMISSION ON AC MAINS

RESULT: Pass

5.1.2 RADIATED EMISSIONS

RESULT: Pass

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1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Accreditation Designation No.: CN1260

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Conducted Emission				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESR3	102680	2023-02-27
Artificial Mains Network	R&S	ENV216	101445	2023-02-27
Artificial Mains Network	R&S	ENV432	101546	2023-02-27
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A
Radiated Emission (3m chamber)				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
3m SAC	ETS-Lindgren	SAC3	CT001632-Q1362	2024-04-26
EMI Test Receiver	R&S	ESR7	102111	2022-12-01
Horn Antenna	R&S	HF907	102706	2022-08-07
Preamplifier (1-18GHz)	FIT	SCU-18F	180077	2022-08-13
Trilog-Broadband antenna	SCHWARZBECK	VULB9168	0945	2022-12-12
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty
Radiated Emission (3m SAC), 30MHz to 1000MHz	± 4.52 dB
Radiated Emission (3m SAC), above 1000MHz	± 4.37 dB
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	± 3.70 dB / ± 3.30 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is an Impacta exchanges.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	Impacta exchanges
Type Designation:	Impacta 220
FCC ID:	2A76R-IMPACTA220
Operating Voltage:	AC 120V, 60Hz
Operating Temperature Range:	0 °C ~ +45 °C
Equipement Class:	Class A digital device (JAD)

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Normal working
- B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- User Manual
- ID Label and Location Info
- Schematics
- Operation Description
- Block Diagram
- PCB Layout

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.4: 2014.

According to clause 3.1, all tests were performed on model Impacta 220 in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 3: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N	Remark
Smart terminal	Intelbras	TI5000	N/A	Connecting with Impacta 220

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

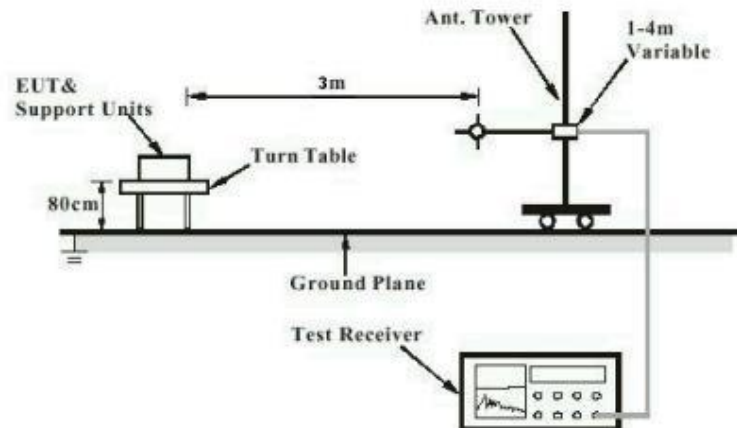


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

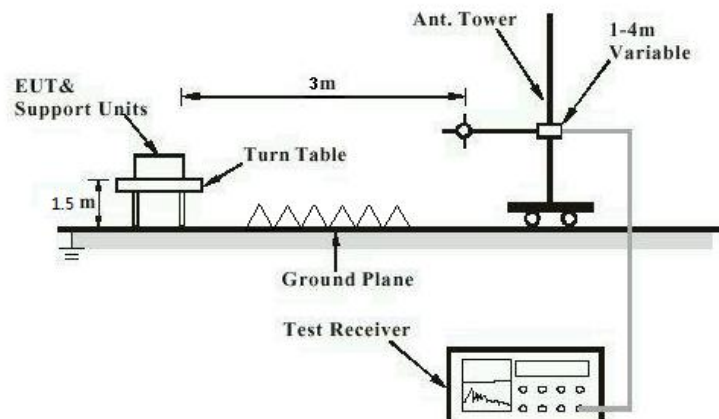
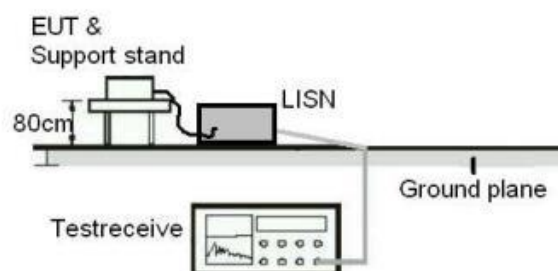


Diagram of Measurement Configuration for Mains Conduction Measurement



5 Test Results

5.1.1 Conducted Emission on AC Mains

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.107(a)
Basic standard	: ANSI C63.4:2014
Frequency range	: 0.15 – 30MHz
Classification	: Class A
Limits	: FCC Part 15.107(a)
Kind of test site	: Shielded Room

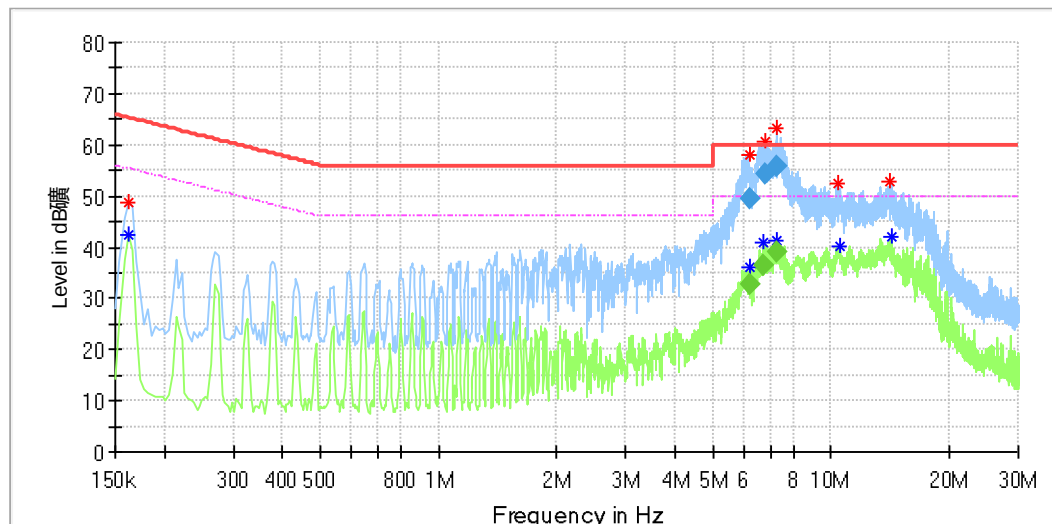
Test Setup

Date of testing	: 2022-07-14
Input voltage	: AC 120V, 60Hz
Operation mode	: A
Ambient temperature	: 24.1 °C
Relative humidity	: 52.8 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the following plots.

EUT Information

EUT Name: Impacta exchanges
Order No: 168374467
Model: Impacta 220
Test mode: ON, Normal working
Test Voltage: AC 120V/50Hz
Test By:/Review By: Kevin Zhou/Gary Chen
Test Standard: FCC Part 15B
Tem./Hum./Pressure: 24.1°C/52.8%/101kPa
Remark: SR2



Critical Freqs

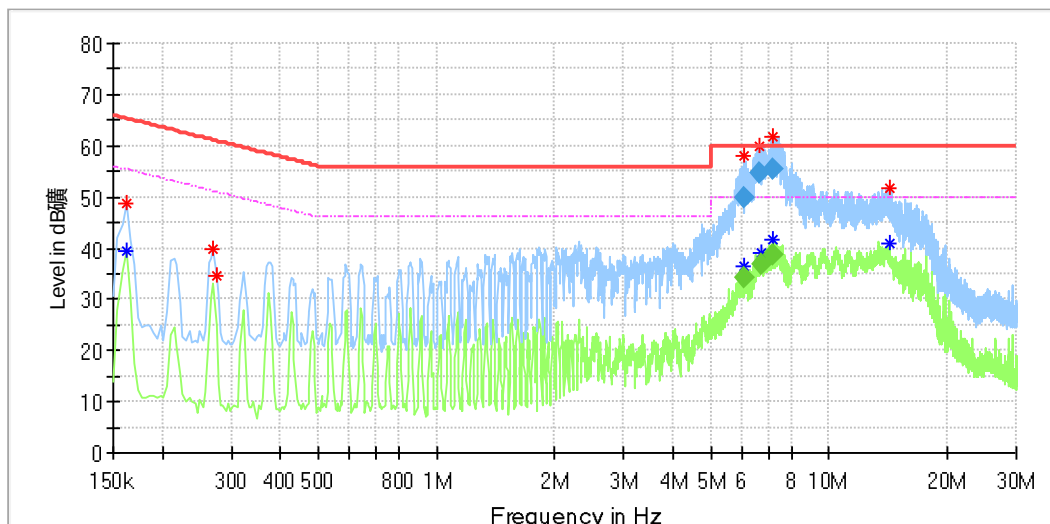
Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.162000	48.88	---	65.36	16.48	L1	9.9
0.162000	---	42.51	55.36	12.85	L1	9.9
6.178500	57.99	---	60.00	2.01	L1	10.3
6.234500	---	36.28	50.00	13.72	L1	10.3
6.698500	---	40.92	50.00	9.08	L1	10.3
6.777500	60.82	---	60.00	-0.82	L1	10.3
7.282500	---	41.48	50.00	8.52	L1	10.3
7.285500	63.19	---	60.00	-3.19	L1	10.3
10.394000	52.49	---	60.00	7.51	L1	10.3
10.526000	---	40.14	50.00	9.86	L1	10.3
14.050000	52.74	---	60.00	7.26	L1	10.4
14.214000	---	41.89	50.00	8.11	L1	10.4

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
6.178500	49.52	---	60.00	10.48	3000.0	9.000	L1	10.3
6.234500	---	32.83	50.00	17.17	3000.0	9.000	L1	10.3
6.698500	---	36.63	50.00	13.37	3000.0	9.000	L1	10.3
6.777500	54.27	---	60.00	5.73	3000.0	9.000	L1	10.3
7.282500	---	39.04	50.00	10.96	3000.0	9.000	L1	10.3
7.285500	55.97	---	60.00	4.03	3000.0	9.000	L1	10.3

EUT Information

EUT Name: Impacta exchanges
Order No: 168374467
Model: Impacta 220
Test mode: ON, Normal working
Test Voltage: AC 120V/50Hz
Test By:/Review By: Kevin Zhou/Gary Chen
Test Standard: FCC Part 15B
Tem./Hum./Pressure: 24.1°C/52.8%/101kPa
Remark: SR2



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.162000	48.68	---	65.36	16.68	N	9.8
0.162000	---	39.58	55.36	15.78	N	9.8
0.270000	39.90	---	61.12	21.22	N	9.8
0.274000	34.62	---	61.00	26.38	N	9.8
6.077500	---	36.55	50.00	13.45	N	9.9
6.098500	57.87	---	60.00	2.13	N	9.9
6.622500	60.06	---	60.00	-0.06	N	10.0
6.690500	---	39.03	50.00	10.97	N	10.0
7.169500	---	41.74	50.00	8.26	N	10.0
7.178500	61.91	---	60.00	-1.91	N	10.0
14.274000	51.82	---	60.00	8.18	N	10.1
14.274000	---	41.10	50.00	8.90	N	10.1

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
6.077500	---	34.07	50.00	15.93	3000.0	9.000	N	9.9
6.098500	49.75	---	60.00	10.25	3000.0	9.000	N	9.9
6.622500	54.56	---	60.00	5.44	3000.0	9.000	N	10.0
6.690500	---	36.91	50.00	13.09	3000.0	9.000	N	10.0
7.169500	---	38.73	50.00	11.27	3000.0	9.000	N	10.0
7.178500	55.28	---	60.00	4.72	3000.0	9.000	N	10.0

5.1.2 Radiated Emissions

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.109(a)
Basic standard	: ANSI C63.4:2014
Frequency range	: 30MHz to 5 th harmonic of the highest frequency
Classification	: Class A
Limits	: FCC Part 15.109(a)
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

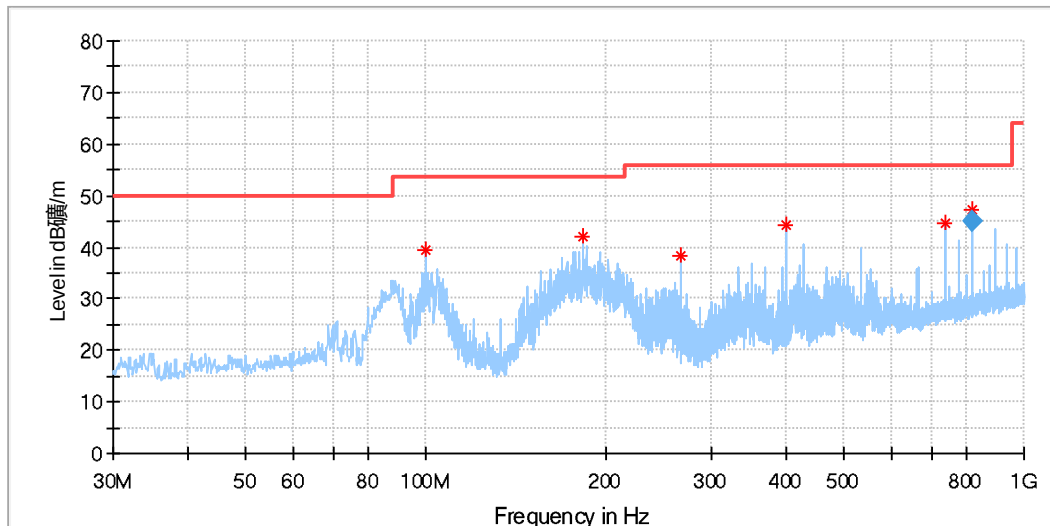
Date of testing	: 2022-07-26 to 2022-08-03
Input voltage	: AC 120V, 60Hz
Operation mode	: A
Ambient temperature	: Refer to test result
Relative humidity	: Refer to test result
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the following plots.

As for above 6GHz, only the noise-floors, thus no record for it.

EUT Information

EUT Name:	Impacta exchanges
Order No:	168374467 30
Model:	Impacta 220
Test Mode:	ON, Normal working
Test Voltage:	AC 120V/60Hz
Standard:	FCC Part 15B
Test By:/Review By:	Kevin Zhou/Gary Chen
Tem./Hum./Pressure:	24.1°C/50.8%/101kPa
Remark:	3m chamber



Critical_Freqs

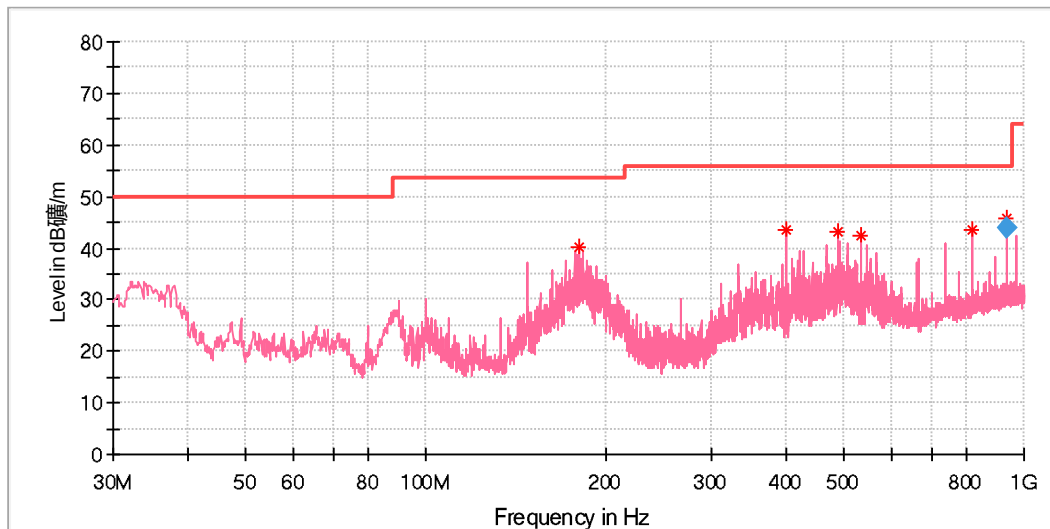
Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
99.840000	39.46	53.50	14.04	200.0	H	203.0	17.1
182.872000	42.20	53.50	11.30	200.0	H	51.0	18.7
266.583000	38.28	56.00	17.72	100.0	H	192.0	20.4
399.861000	44.11	56.00	11.89	100.0	H	350.0	23.3
739.361000	44.81	56.00	11.19	100.0	H	334.0	30.2
817.135000	47.09	56.00	8.91	100.0	H	326.0	30.5

Final_Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
817.135000	44.97	56.00	11.03	1000.0	120.000	100.0	H	326.0	30.5

EUT Information

EUT Name:	Impacta exchanges
Order No:	168374467 30
Model:	Impacta 220
Test Mode:	ON, Normal working
Test Voltage:	AC 120V/60Hz
Standard:	FCC Part 15B
Test By:/Review By:	Kevin Zhou/Gary Chen
Tem./Hum./Pressure:	24.1°C/50.8%/101kPa
Remark:	3m chamber



Critical Freqs

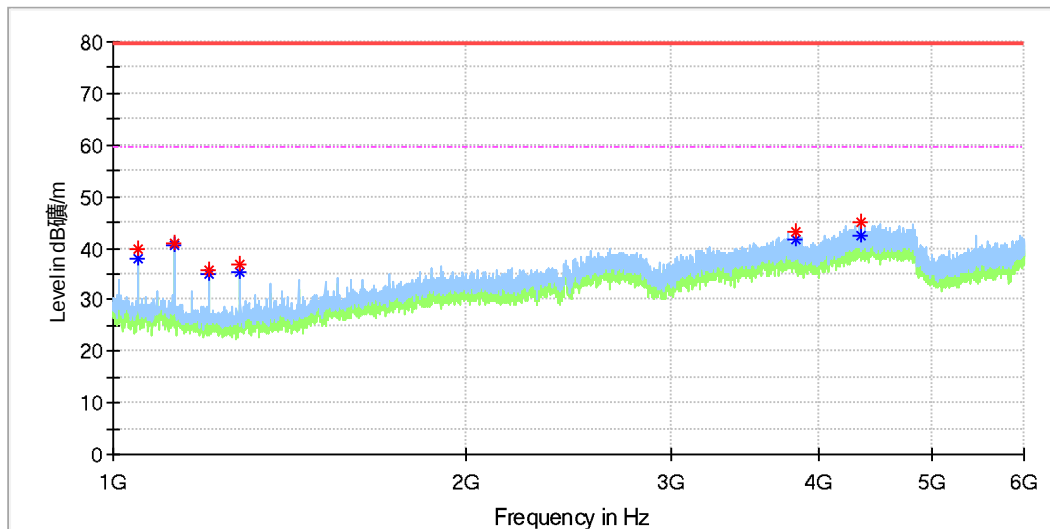
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
180.738000	40.27	53.50	13.23	200.0	V	130.0	19.2
399.958000	43.53	56.00	12.47	200.0	V	136.0	23.3
488.810000	43.07	56.00	12.93	100.0	V	218.0	24.9
533.236000	42.38	56.00	13.62	200.0	V	115.0	25.3
817.155000	43.69	56.00	12.31	100.0	V	184.0	30.5
933.147000	45.76	56.00	10.24	100.0	V	141.0	32.1

Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
933.147000	44.04	56.00	11.96	1000.0	120.000	100.0	V	141.0	32.1

EUT Information

EUT Name: Impacta exchanges
Order No: 168374467 30
Model: Impacta 220
Test Mode: ON, Normal working
Test Voltage: AC 120V/60Hz
Standard: FCC Part 15B
Test By:/Review By: Kevin Zhou/Gary Chen
Tem./Hum./Pressure: 24.1°C/51.3%/101kPa
Remark: 3m chamber

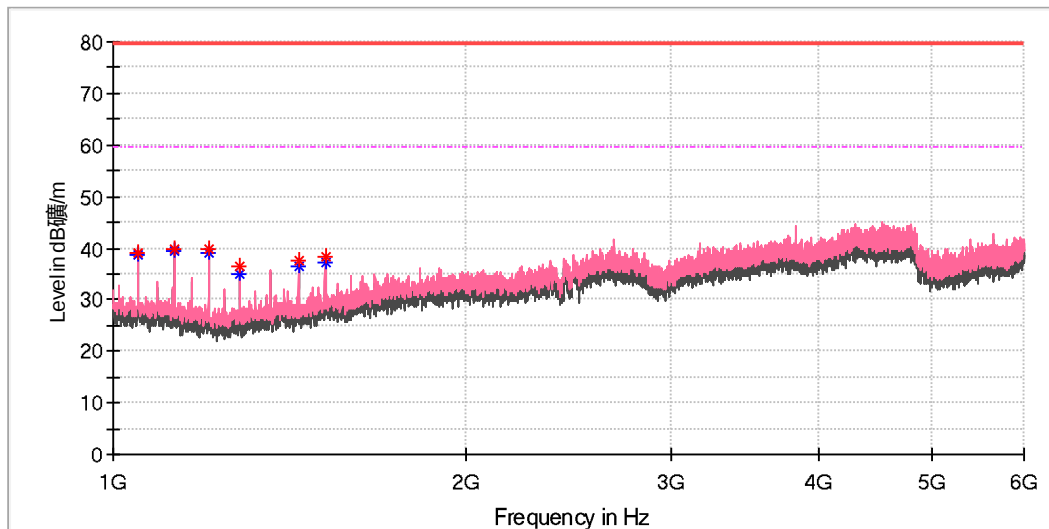


Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1050.500000	39.86	---	79.50	39.64	100.0	H	150.0	-13.2
1050.500000	---	37.80	59.50	21.70	100.0	H	150.0	-13.2
1128.500000	40.86	---	79.50	38.64	100.0	H	155.0	-13.1
1128.500000	---	40.46	59.50	19.04	100.0	H	155.0	-13.1
1206.500000	35.66	---	79.50	43.84	100.0	H	230.0	-14.0
1206.500000	---	35.06	59.50	24.44	100.0	H	230.0	-14.0
1284.500000	36.95	---	79.50	42.55	100.0	H	139.0	-14.0
1284.500000	---	35.24	59.50	24.26	100.0	H	139.0	-14.0
3829.000000	43.14	---	79.50	36.36	100.0	H	132.0	0.0
3829.000000	---	41.50	59.50	18.00	100.0	H	132.0	0.0
4358.000000	44.97	---	79.50	34.53	100.0	H	343.0	2.1
4358.000000	---	42.40	59.50	17.10	100.0	H	343.0	2.1

EUT Information

EUT Name: Impacta exchanges
Order No: 168374467 30
Model: Impacta 220
Test Mode: ON, Normal working
Test Voltage: AC 120V/60Hz
Standard: FCC Part 15B
Test By:/Review By: Kevin Zhou/Gary Chen
Tem./Hum./Pressure: 24.1°C/51.3%/101kPa
Remark: 3m chamber



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1050.500000	---	38.67	59.50	20.83	100.0	V	270.0	-13.2
1051.000000	38.97	---	79.50	40.53	100.0	V	120.0	-13.2
1128.500000	39.78	---	79.50	39.72	100.0	V	252.0	-13.1
1128.500000	---	39.30	59.50	20.20	100.0	V	252.0	-13.1
1206.500000	39.69	---	79.50	39.81	100.0	V	274.0	-14.0
1206.500000	---	38.93	59.50	20.57	100.0	V	274.0	-14.0
1284.500000	36.60	---	79.50	42.90	100.0	V	194.0	-14.0
1284.500000	---	35.02	59.50	24.48	100.0	V	194.0	-14.0
1440.000000	37.58	---	79.50	41.92	100.0	V	297.0	-12.6
1440.000000	---	36.41	59.50	23.09	100.0	V	297.0	-12.6
1517.500000	38.22	---	79.50	41.28	100.0	V	304.0	-11.0
1517.500000	---	37.12	59.50	22.38	100.0	V	304.0	-11.0

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

7 List of Tables

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