

Prüfbericht-Nr.: Test report no.:	CN22L8D1 001	Auftrags-Nr.: Order no.:	168374470	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 68i			
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 – 2022-08-21			
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:	x <u>Bell Hu</u> Signed by: Bell Hu		genehmigt von: authorized by:	x <u>Lin Lin</u> Signed by: Lin Lin
Datum: Date:	2022-08-30		Ausstellungsdatum: Issue date:	2022-08-30
Stellung / Position:	Project Manager		Stellung / Position:	Reviewer
Sonstiges / Other:	FCC ID: 2A76R-IMPACTA68I			
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 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet * Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
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. 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.				

Prüfbericht - Nr.: CN22L8D1 001
Test Report No.:

Seite 2 von 18
Page 2 of 18

Test Summary

5.1.1 CONDUCTED EMISSION ON AC MAINS

RESULT: Pass

5.1.2 RADIATED EMISSIONS

RESULT: Pass

Table of Contents

1	GENERAL REMARKS	4
1.1	COMPLEMENTARY MATERIALS	4
2	TEST SITES	5
2.1	TEST FACILITIES	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	5
2.3	TRACEABILITY	5
2.4	CALIBRATION	5
2.5	MEASUREMENT UNCERTAINTY.....	6
2.6	LOCATION OF ORIGINAL DATA.....	6
2.7	STATUS OF FACILITY USED FOR TESTING.....	6
3	GENERAL PRODUCT INFORMATION	7
3.1	PRODUCT FUNCTION AND INTENDED USE.....	7
3.2	RATINGS AND SYSTEM DETAILS	7
3.3	INDEPENDENT OPERATION MODES	7
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	7
3.5	SUBMITTED DOCUMENTS.....	7
4	TEST SET-UP AND OPERATION MODES	8
4.1	PRINCIPLE OF CONFIGURATION SELECTION	8
4.2	TEST OPERATION AND TEST SOFTWARE.....	8
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	8
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	8
4.5	TEST SETUP DIAGRAM	9
5	TEST RESULTS	10
5.1.1	<i>Conducted Emission on AC Mains.....</i>	<i>10</i>
5.1.2	<i>Radiated Emissions.....</i>	<i>13</i>
6	PHOTOGRAPHS OF THE TEST SET-UP	18
7	LIST OF TABLES.....	18

Prüfbericht - Nr.: CN22L8D1 001
Test Report No.:

Seite 4 von 18
Page 4 of 18

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 68i
FCC ID:	2A76R-IMPACTA68I
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 68i 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 68i

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)

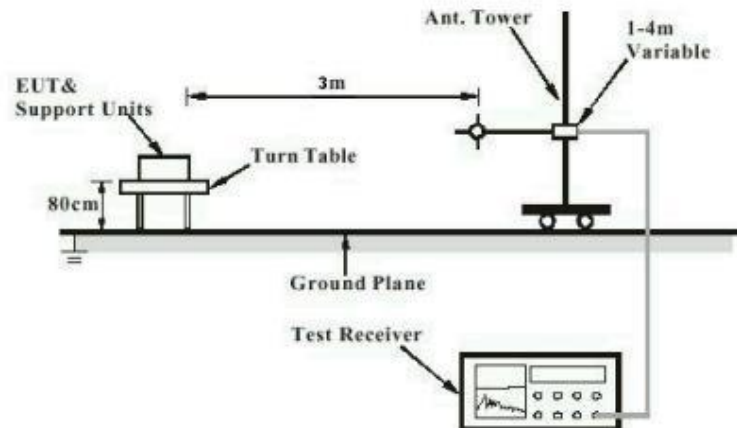


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

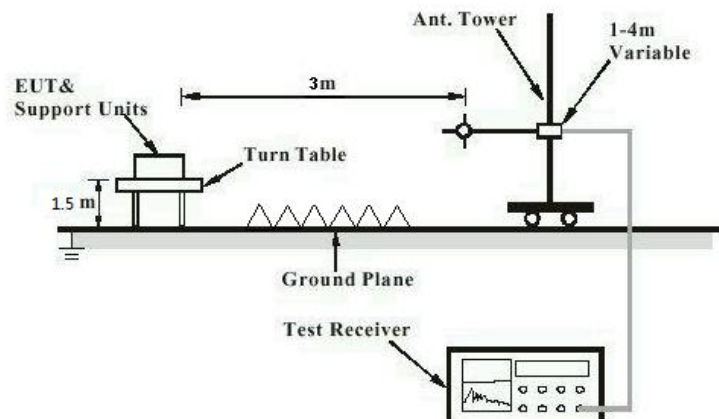
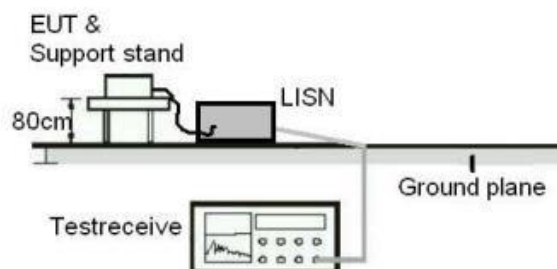


Diagram of Measurement Configuration for Mains Conduction Measurement



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

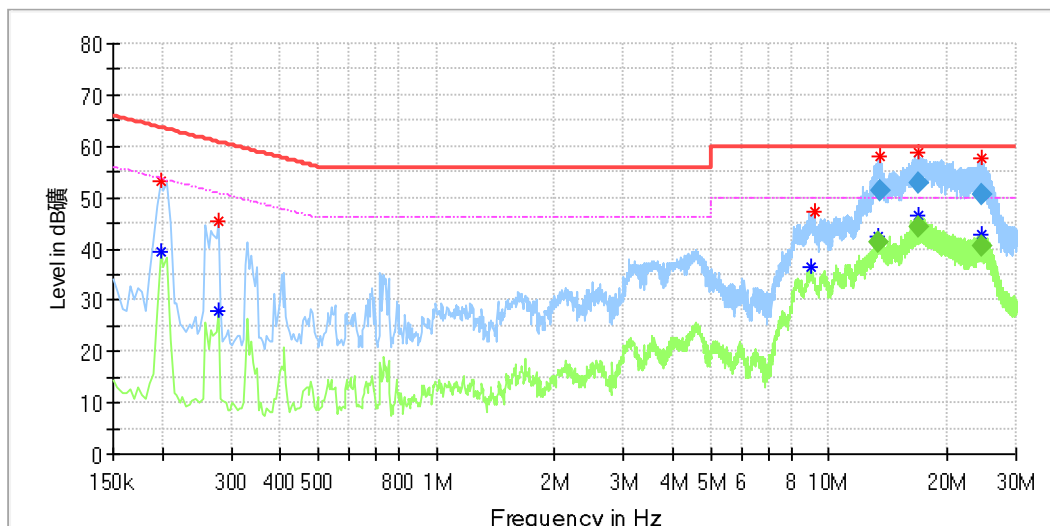
Test Setup

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 68i
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

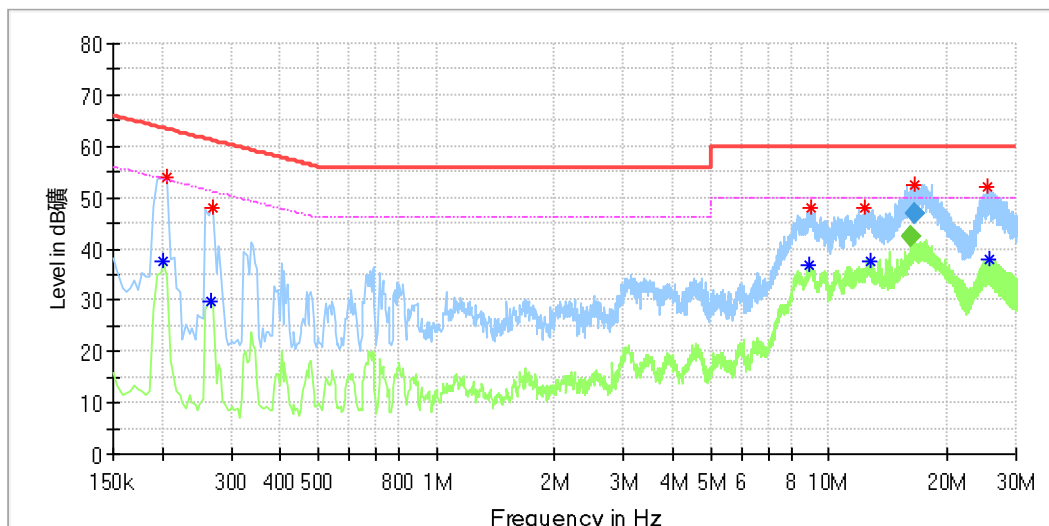
Frequency (MHz)	MaxPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.198000	---	39.34	53.69	14.35	L1	9.9
0.198000	53.38	---	63.69	10.31	L1	9.9
0.278000	45.30	---	60.88	15.58	L1	9.9
0.278000	---	27.79	50.88	23.09	L1	9.9
9.002000	---	36.29	50.00	13.71	L1	10.3
9.174000	47.28	---	60.00	12.72	L1	10.3
13.293500	---	42.55	50.00	7.45	L1	10.4
13.557500	58.14	---	60.00	1.86	L1	10.4
16.893500	58.69	---	60.00	1.31	L1	10.4
16.961500	---	46.33	50.00	3.67	L1	10.4
24.433500	---	42.89	50.00	7.11	L1	10.4
24.529500	57.55	---	60.00	2.45	L1	10.4

Final Result

Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
13.293500	---	41.25	50.00	8.75	3000.0	9.000	L1	10.4
13.557500	51.39	---	60.00	8.61	3000.0	9.000	L1	10.4
16.893500	52.73	---	60.00	7.27	3000.0	9.000	L1	10.4
16.961500	---	44.29	50.00	5.71	3000.0	9.000	L1	10.4
24.433500	---	40.69	50.00	9.31	3000.0	9.000	L1	10.4
24.529500	50.79	---	60.00	9.21	3000.0	9.000	L1	10.4

EUT Information

EUT Name: Impacta exchanges
 Order No: 168374467
 Model: Impacta 68i
 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 (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.202000	---	37.63	53.53	15.90	N	9.8
0.206000	54.13	---	63.37	9.24	N	9.8
0.266000	---	29.62	51.24	21.62	N	9.8
0.270000	47.91	---	61.12	13.20	N	9.8
8.918000	---	36.68	50.00	13.32	N	10.0
9.042000	47.85	---	60.00	12.15	N	10.0
12.374000	47.98	---	60.00	12.02	N	10.1
12.750000	---	37.77	50.00	12.23	N	10.1
16.229500	---	42.65	50.00	7.35	N	10.2
16.537500	52.58	---	60.00	7.42	N	10.2
25.342000	52.09	---	60.00	7.91	N	10.3
25.578000	---	38.06	50.00	11.94	N	10.3

Final Result

Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
16.229500	---	42.38	50.00	7.62	3000.0	9.000	N	10.2
16.537500	47.01	---	60.00	12.99	3000.0	9.000	N	10.2

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

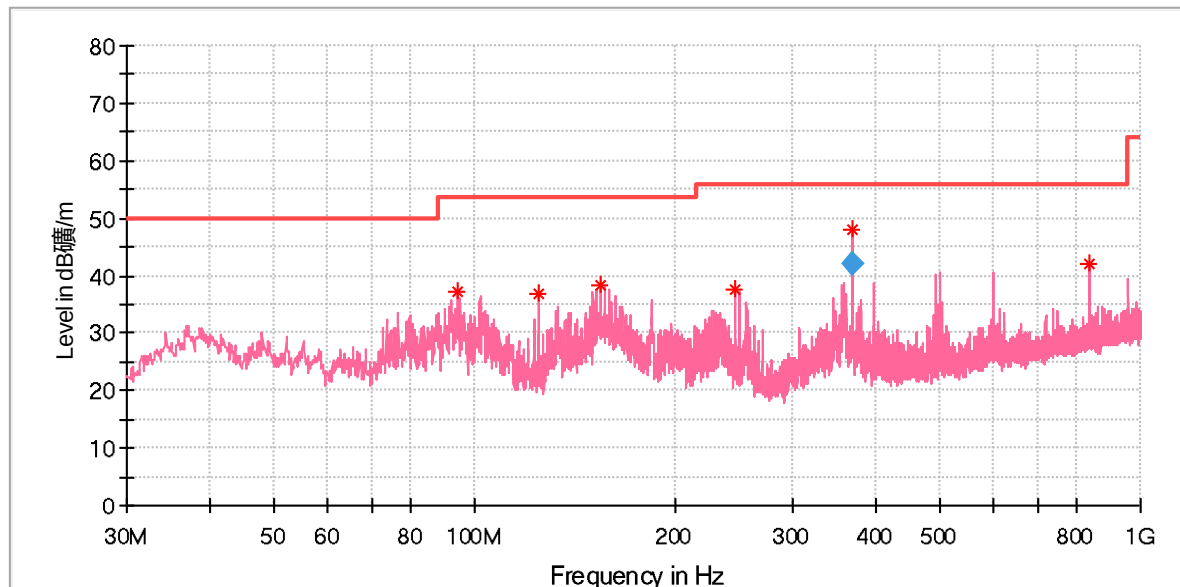
Test Setup

Date of testing	: 2022-07-26 to 2022-08-21
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 68i
 Test Mode: ON, Normal working
 Test Voltage: AC 120V/60Hz
 Standard: FCC Part 15
 Test By:/Review By: Kevin Zhou/Gary Chen
 Tem./Hum./Pressure: 24.1° C/55.3%/101kPa
 Remark: 3m chamber



Critical Freqs

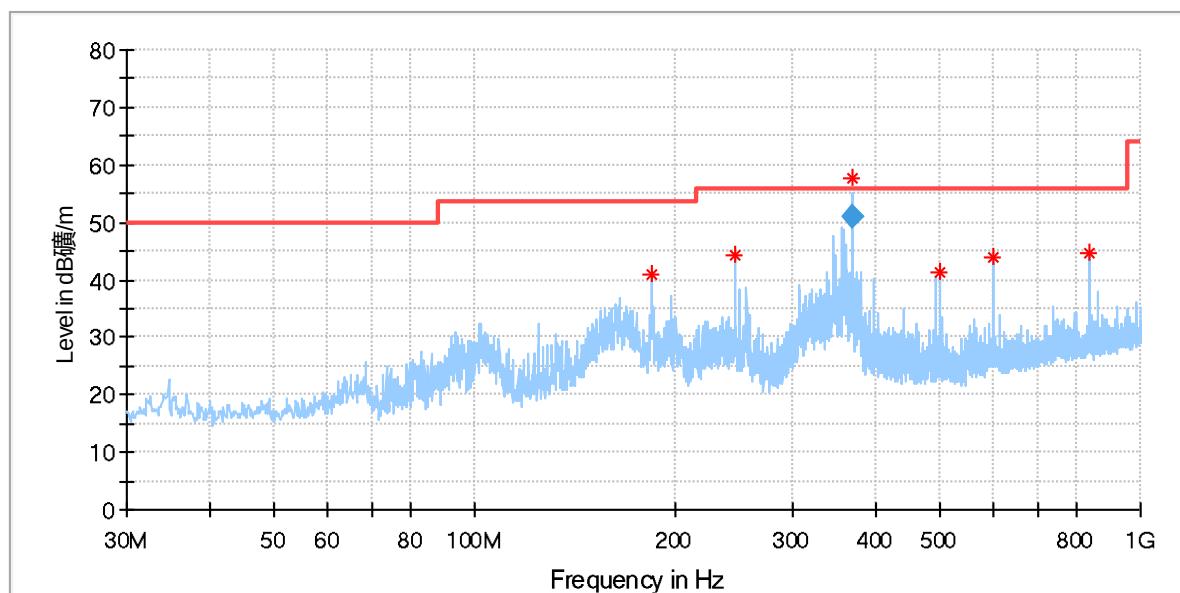
Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
94.408000	37.03	53.50	16.47	100.0	V	77.0	16.2
124.963000	36.96	53.50	16.54	100.0	V	85.0	19.1
154.548000	38.43	53.50	15.07	100.0	V	272.0	21.4
245.728000	37.52	56.00	18.48	100.0	V	152.0	18.6
368.590000	48.03	56.00	7.73	100.0	V	124.0	22.9
840.047000	42.03	56.00	13.97	100.0	V	149.0	31.3

Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
368.590000	41.92	56.00	14.08	1000.0	120.000	100.0	V	124.0	22.9

EUT Information

EUT Name: Impacta exchanges
 Order No: 168374467 30
 Model: Impacta 68i
 Test Mode: ON, Normal working
 Test Voltage: AC 120V/60Hz
 Standard: FCC Part 15
 Test By:/Review By: Kevin Zhou/Gary Chen
 Tem./Hum./Pressure: 24.1° C/55.3%/101kPa
 Remark: 3m chamber



Critical Freqs

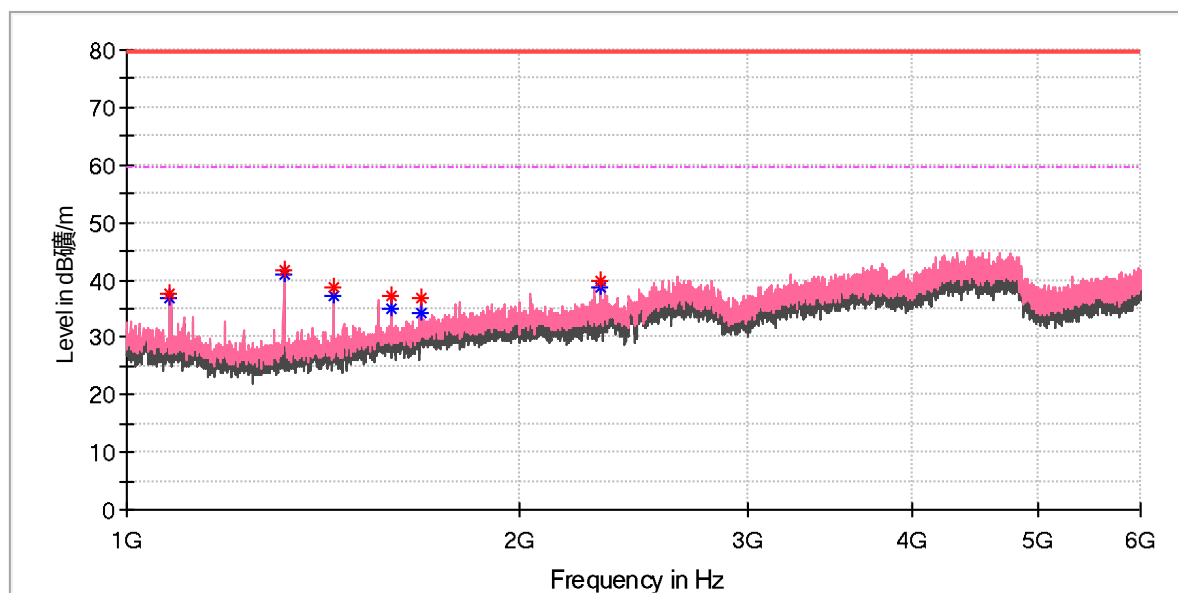
Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
183.939000	40.80	53.50	12.70	200.0	H	289.0	18.5
245.728000	44.15	56.00	11.85	100.0	H	20.0	18.6
368.590000	57.60	56.00	-1.60	100.0	H	255.0	22.9
499.965000	41.39	56.00	14.61	100.0	H	118.0	25.6
599.972000	43.97	56.00	12.03	100.0	H	153.0	28.1
840.047000	44.73	56.00	11.27	100.0	H	137.0	31.3

Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
368.590000	51.05	56.00	4.95	1000.0	120.000	100.0	H	255.0	22.9

EUT Information

EUT Name: Impacta exchanges
Order No: 168374467 30
Model: Impacta 68i
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

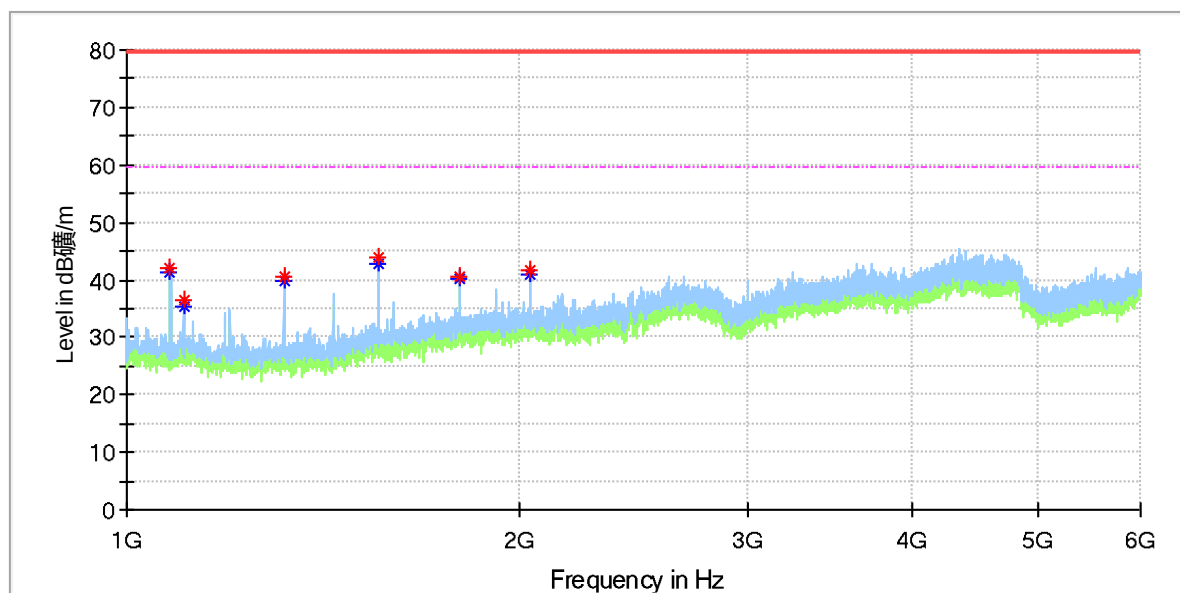


Critical Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1080.000000	37.58	---	79.50	41.92	100.0	V	220.0	-12.8
1080.000000	---	36.84	59.50	22.66	100.0	V	220.0	-12.8
1320.000000	41.57	---	79.50	37.93	100.0	V	147.0	-13.4
1320.000000	---	41.03	59.50	18.47	100.0	V	147.0	-13.4
1440.000000	38.70	---	79.50	40.81	100.0	V	158.0	-12.6
1440.000000	---	37.38	59.50	22.12	100.0	V	158.0	-12.6
1594.500000	37.10	---	79.50	42.40	100.0	V	0.0	-10.3
1594.500000	---	35.06	59.50	24.44	100.0	V	0.0	-10.3
1680.000000	36.87	---	79.50	42.63	100.0	V	202.0	-9.5
1680.000000	---	34.38	59.50	25.12	100.0	V	202.0	-9.5
2312.500000	39.71	---	79.50	39.79	100.0	V	325.0	-6.5
2312.500000	---	38.68	59.50	20.82	100.0	V	325.0	-6.5

EUT Information

EUT Name: Impacta exchanges
Order No: 168374467 30
Model: Impacta 68i
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 (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1080.000000	42.04	---	79.50	37.46	100.0	H	144.0	-12.8
1080.000000	---	41.45	59.50	18.05	100.0	H	144.0	-12.8
1105.500000	36.63	---	79.50	42.87	100.0	H	293.0	-12.3
1106.000000	---	35.23	59.50	24.27	100.0	H	293.0	-12.3
1320.000000	40.57	---	79.50	38.93	100.0	H	230.0	-13.4
1320.000000	---	39.80	59.50	19.70	100.0	H	230.0	-13.4
1560.000000	---	42.93	59.50	16.57	100.0	H	230.0	-10.6
1560.000000	43.83	---	79.50	35.67	100.0	H	230.0	-10.6
1800.000000	---	40.33	59.50	19.17	100.0	H	195.0	-8.4
1800.000000	40.73	---	79.50	38.77	100.0	H	195.0	-8.4
2040.000000	41.69	---	79.50	37.81	100.0	H	207.0	-7.1
2040.500000	---	40.86	59.50	18.64	100.0	H	207.0	-7.2

6 Photographs of the Test Set-Up

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

7 List of Tables

Table 1: List of Test and Measurement Equipment.....	5
Table 2: Technical Specification of EUT	7
Table 3: Auxiliary Equipment Used during Test	8