



Test Report



(Declaration of Conformity)

for

Electromagnetic Compatibility

of

Product : **DC/DC CONVERTER**

Trade Name : 

Model Number : THR 40-7211WI; THR 40-7212WI; THR 40-7213WI;
THR 40-7215WI; THR 40-72154WI;
THR 40-7222WI; THR 40-7223WI

Prepared for

TRACO ELECTRONIC AG

SIHLBRUGGSTRASSE 111 CH-6340 BAAR, SWITZERLAND

Prepared by

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Remark :

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The test result in this report is only subjected to the test sample.



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12 Photographs of EUT

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12.1 Model Number: THR 40 Series

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Statement of Compliance

Applicant: TRACO ELECTRONIC AG
Manufacturer: TRACO ELECTRONIC AG
Product: DC/DC CONVERTER
Model No.: THR 40-7211WI; THR 40-7212WI; THR 40-7213WI;
 THR 40-7215WI; THR 40-72154WI; THR 40-7222WI;
 THR 40-7223WI
Tested Power Voltage: DC 110 V
Date of Final Test: May 14, 2020
Revision of Report: Rev. 02

Measurement Procedures and Standards Used :

Emission:

EN 55032: 2015+AC: 2016

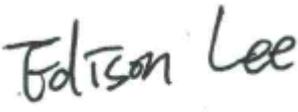
Immunity:

- EN 55024: 2010+A1: 2015
- EN 55035: 2017
 - IEC 61000-4-2: 2008
 - IEC 61000-4-3: 2006+A1: 2007+A2: 2010
 - IEC 61000-4-4: 2012
 - IEC 61000-4-5: 2014+A1: 2017
 - IEC 61000-4-6: 2013+COR1: 2015
 - IEC 61000-4-8: 2009
 - IEC 61000-4-11: 2004+A1: 2017

The measurement results in this test report were performed at Interocean EMC Technology Corp. the responsibility of measurement result is only subjected to the tested sample. This report shows the EUT is technically compliance with the above official standards. This report shall not be partial reproduced without written approval by Interocean EMC Technology Corporation. Statement of Conformity: Judgment of conformity is based on test result, regardless of measurement uncertainty.

Report Issued: 2020/06/09

Project Engineer: 
 Albert Zeng

Approved: 
 Edison Lee



1 General Information

1.1 Description of Equipment Under Test

- Product** : DC/DC CONVERTER
- Model Number** : THR 40-7211WI; THR 40-7212WI; THR 40-7213WI; THR 40-7215WI;
THR 40-72154WI; THR 40-7222WI; THR 40-7223WI
- Applicant** : **TRACO ELECTRONIC AG**
SIHLBRUGGSTRASSE 111 CH-6340 BAAR, SWITZERLAND
- Manufacturer** : **TRACO ELECTRONIC AG**
SIHLBRUGGSTRASSE 111 CH-6340 BAAR, SWITZERLAND
- Power Supply** : Please refer to section 1.2 Model Selection Guide.
- Date of Test** : Dec. 31, 2019 ~ May 14, 2020
- Additional Description** : 1.) The test models are “**THR 40-7211WI; THR 40-7212WI; THR 40-7213WI; THR 40-7215WI; THR 40-72154WI; THR 40-7222WI; THR 40-7223WI**” and included in this report.
2.) The difference for all models included in this report, the details are as section **1.2 Model Selection Guide**.
3.) All the test data presented in this report are the test data of the original file No.:19A122302E-E
4.) For more detail specification about EUT, please refer to the user’s manual.



1.2 Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current (Max.)
Standard	VDC	VDC	mA
THR 40-7211WI	110 (36 ~ 160)	5	8000
THR 40-7212WI		12	3330
THR 40-7213WI		15	2670
THR 40-7215WI		24	1670
THR 40-72154WI		54	741
THR 40-7222WI		±12	±1670
THR 40-7223WI		±15	±1330



1.3 Package Specifications

Package Specifications																						
<p>Mechanical Dimensions</p>	<p>Pin Connections</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Pin</th> <th>Single Output</th> <th>Dual Output</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+Vin</td> <td>+Vin</td> </tr> <tr> <td>2</td> <td>-Vin</td> <td>-Vin</td> </tr> <tr> <td>3</td> <td>Remote On/Off</td> <td>Remote On/Off</td> </tr> <tr> <td>4</td> <td>+Vout</td> <td>+Vout</td> </tr> <tr> <td>5</td> <td>-Vout</td> <td>Common</td> </tr> <tr> <td>6</td> <td>Trim</td> <td>-Vout</td> </tr> </tbody> </table> <p> ▶ All dimensions in mm (inches) ▶ Tolerance: X.X±0.75 (X.XX±0.03) X.XX±0.25 (X.XXX±0.01) ▶ Pin diameter ⇔ 1.0 ±0.05 (0.04±0.002) </p>	Pin	Single Output	Dual Output	1	+Vin	+Vin	2	-Vin	-Vin	3	Remote On/Off	Remote On/Off	4	+Vout	+Vout	5	-Vout	Common	6	Trim	-Vout
Pin	Single Output	Dual Output																				
1	+Vin	+Vin																				
2	-Vin	-Vin																				
3	Remote On/Off	Remote On/Off																				
4	+Vout	+Vout																				
5	-Vout	Common																				
6	Trim	-Vout																				

Physical Characteristics	
Case Size	: 50.8x25.4x11.0 mm (2.0x1.0x0.43 inches)
Case Material	: Red Copper, Powder Coating
Base Material	: FR4 PCB (flammability to UL 94V-0 rated)
Insulated Frame Material	: Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Pin Material	: Tinned Copper
Potting Material	: Epoxy (flammability to UL 94V-0 rated)
Weight	: 43.02g



1.4 Details of Tested Supporting System

- 1.4.1 LOAD (Model No.: THR 40-7211WI)
FULL LOAD WATT : 40 W (5 Vdc, 8 A)

- 1.4.2 LOAD (Model No.: THR 40-7212WI)
FULL LOAD WATT : 39.96 W (12 Vdc, 3.33 A)

- 1.4.3 LOAD (Model No.: THR 40-7213WI)
FULL LOAD WATT : 40.05 W (15 Vdc, 2.67 A)

- 1.4.4 LOAD (Model No.: THR 40-7215WI)
FULL LOAD WATT : 40.08 W (24 Vdc, 1.67 A)

- 1.4.5 LOAD (Model No.: THR 40-72154WI)
FULL LOAD WATT : 40.014 W (54 Vdc, 0.741 A)

- 1.4.6 LOAD (Model No.: THR 40-7222WI)
FULL LOAD WATT : 40.08 W (± 12 Vdc, ± 1.67 A)

- 1.4.7 LOAD (Model No.: THR 40-7223WI)
FULL LOAD WATT : 39.9 W (± 15 Vdc, ± 1.33 A)

- 1.4.8 Fixture
Manufacturer : TRACO ELECTRONIC AG

- 1.4.9 Test Cable
Power Cable : Non-shielded, Detachable, 1.0 m, w/o core
EUT to Load Cable : Non-shielded, Detachable, 0.3 m, w/o core



1.5 Test Facility

- Site Description** : Conducted 1 OATS 1 EMS Room
- Name of Firm** : Interocean EMC Technology Corp.
- Company web** : <http://www.ietc.com.tw>
- Location** : No. 5-2, Lin 1, Tin-Fu, Lin-Kou Dist., New Taipei City, Taiwan 244, R.O.C.
- Site Filing** :
- Federal Communication Commissions – USA
Designation No.: TW1020 (Test Firm Registration #: 651092)
Designation No.: TW1113 (Test Firm Registration #: 959554)
 - Innovation, Science and Economic Development Canada (ISED)
CAB identifier: TW1113 (Ref. No 14962756)
 - Voluntary Control Council for Interference by Information Technology Equipment (VCCI) – Japan
Member No.: 1349
Registration No. (Conducted Room): C-11094
Registration No. (Conducted Room): T-11562
Registration No. (OATS 1): R-11040
 - Registration No. (Chamber 3): G-20080
- Site Accreditation** :
- Bureau of Standards and Metrology and Inspection (BSMI) – Taiwan, R.O.C.
Accreditation No.:
SL2-IN-E-0026 for CNS 13438 / CISPR 22
SL2-R1-E-0026 for CNS 13439 / CISPR 13
SL2-R2-E-0026 for CNS 13439 / CISPR 13
SL2-L1-E-0026 for CNS 14115 / CISPR 15
 - Taiwan Accreditation Foundation (TAF)
Accreditation No.: 1113
 - American Association for Laboratory Accreditation (A2LA)
Certificate Number: 4891.01
 - Vehicle Safety Certification Center (VSCC)
Approval No.: TW16-11

**1.6 Summary of Test Results**

1.6.1 Test program according EN 55032

Emission test equipment intended	
<input checked="" type="checkbox"/>	Class A
<input type="checkbox"/>	Class B

Report Clause	Phenomenon	Application	Reference Clause(s)	Reference Standard	Result
2	Power Line Conducted Emission	Mains Power Port	Annex A.3	CISPR 16-2-1	PASS
	Asymmetric Mode Conducted Emissions	Wired Network Ports	Annex A.3	CISPR 16-2-1	Not Applicable
	Asymmetric Mode Conducted Emissions	Optical Fibre Ports	Annex A.3	--	Not Applicable
	Asymmetric Mode Conducted Emissions	Broadcast Receiver Tuner Ports	Annex A.3	--	Not Applicable
	Asymmetric Mode Conducted Emissions	Antenna Ports	Annex A.3	--	Not Applicable
	Conducted Differential Voltage Emissions	TV Broadcast Receiver Tuner Ports	Annex A.3	--	Not Applicable
	Conducted Differential Voltage Emissions	RF Modulator Output Ports	Annex A.3	--	Not Applicable
	Conducted Differential Voltage Emissions	FM Broadcast Receiver Tuner Ports	Annex A.3	--	Not Applicable
3	Radiated Emission (Below 1 GHz)	Enclosure Port	Annex A.2	CISPR 16-1-4	PASS
	Radiated Emission (Above 1 GHz)	Enclosure Port	Annex A.2	CISPR 16-1-4	Not Applicable ^a
	Radiated Emissions (FM Receivers)	Enclosure Port	Annex A.2	CISPR 16-1-4	Not Applicable

Note: ^a The highest frequency of the internal sources of the EUT is less than 108 MHz; this measurement does not need to test.

1.6.2 Test program according EN 61000-3-2

Report Clause	Phenomenon	Application	Reference Clause	Reference standard	Result
	Harmonic current emissions	AC power port	5	--	Not Applicable

1.6.3 Test program according EN 61000-3-3

Report Clause	Phenomenon	Application	Reference Clause	Reference standard	Result
	Voltage changes, voltage fluctuations and flicker	AC power port	5	--	Not Applicable



1.6.4 Test program according EN 55024

Report Clause	Phenomenon	Application	Reference Clause(s)	Reference standard	Result
5	Electrostatic discharge (ESD)	Enclosure port	4.2.1	IEC 61000-4-2	PASS
6	Radio-frequency electromagnetic field	Enclosure port	4.2.3.1	IEC 61000-4-3	PASS
7	Fast transients	DC power port	4.2.2	IEC 61000-4-4	PASS
8	Surges	DC power port	4.2.5	IEC 61000-4-5	PASS
9	Radio-frequency continuous conducted	DC power port	4.2.3.2	IEC 61000-4-6	PASS
10	Power-frequency magnetic field	Enclosure port	4.2.4	IEC 61000-4-8	PASS
	Voltage dips and interruptions	AC power port	4.2.6	IEC 61000-4-11	Not Applicable

1.6.5 Test program according EN 55035

Report Clause	Phenomenon	Application	Reference Clause(s)	Reference standard	Result
5	Electrostatic discharge (ESD)	Enclosure port	4.2.1 Table1	IEC 61000-4-2	PASS
6	Radio-frequency electromagnetic field	Enclosure port	4.2.2.2 Table1	IEC 61000-4-3	PASS
7	Fast transients	DC network power	4.2.4 Table2 Table3	IEC 61000-4-4	PASS
8	Surges	DC network power	4.2.5 Table2 Table3	IEC 61000-4-5	PASS
9	Radio-frequency continuous conducted	DC network power	4.2.2.3 Table2 Table3	IEC 61000-4-6	PASS
10	Power-frequency magnetic field	Enclosure port	4.2.3 Table1	IEC 61000-4-8	PASS
	Voltage dips and interruptions	AC mains power port	4.2.6 Table4	IEC 61000-4-11	Not Applicable
	Broadband impulsive conducted disturbances	xDSL port	4.2.7 Table2	--	Not Applicable

**1.7 Measurement Uncertainty**

Item	Value
Conduction 1:	
Conducted Emission - AMN (9 kHz to 30 MHz)	3.0 dB
Conducted Emission - AAN (ISN T800) (150 kHz to 30 MHz)	3.3 dB
Conducted Emission - CP (9 kHz to 30 MHz)	3.1 dB
Radiated Emission - LAS (2 m Loop) (9 kHz to 30 MHz)	3.3 dB
Antenna Power (30 MHz to 2150 MHz)	2.1 dB
Conduction 2:	
Conducted Emission - VP (9 kHz to 30 MHz)	2.5 dB
Disturbance Power (30 MHz to 300 MHz)	4.1 dB
OATS 1:	
Radiated Emission Test (30 MHz to 200 MHz)	4.6 dB
Radiated Emission Test (200 MHz to 1 GHz)	4.7 dB
Radiated Emission Test (1 GHz to 6 GHz)	4.9 dB
OATS 3:	
Radiated Emission Test (30 MHz to 200 MHz)	4.8 dB
Radiated Emission Test (200 MHz to 1 GHz)	4.7 dB
Chamber 3:	
Radiated Emission Test (9 kHz to 30 MHz)	3.2 dB
Radiated Emission Test (30 MHz to 200 MHz)	4.6 dB
Radiated Emission Test (200 MHz to 1 GHz) (Antenna: without tilting)	5.9 dB
Radiated Emission Test (1 GHz to 6 GHz)	4.8 dB
Induced Current Density (20 kHz to 10 MHz)	1.9 dB
The 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%	

1.8 Measured Mode

1.8.1 The test modes for preliminary test are as following:

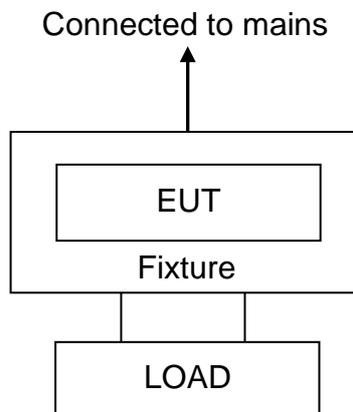
- Mode 1: Full Load (Model No.: THR 40-7211WI)
- Mode 2: Full Load (Model No.: THR 40-7212WI)
- Mode 3: Full Load (Model No.: THR 40-7213WI)
- Mode 4: Full Load (Model No.: THR 40-7215WI)
- Mode 5: Full Load (Model No.: THR 40-72154WI)
- Mode 6: Full Load (Model No.: THR 40-7222WI)
- Mode 7: Full Load (Model No.: THR 40-7223WI)

1.8.2 After preliminary test, EUT was selected the worst-case for the final testing.

The test modes are:

- For Emission: Mode 1 ~ 7
- For Immunity: Mode 1
- Only for EFT & Surge: Mode 2, 4, 5, 7
- Emission, EFT & Surge and part of Immunity are with external components according to total solution (1.10)

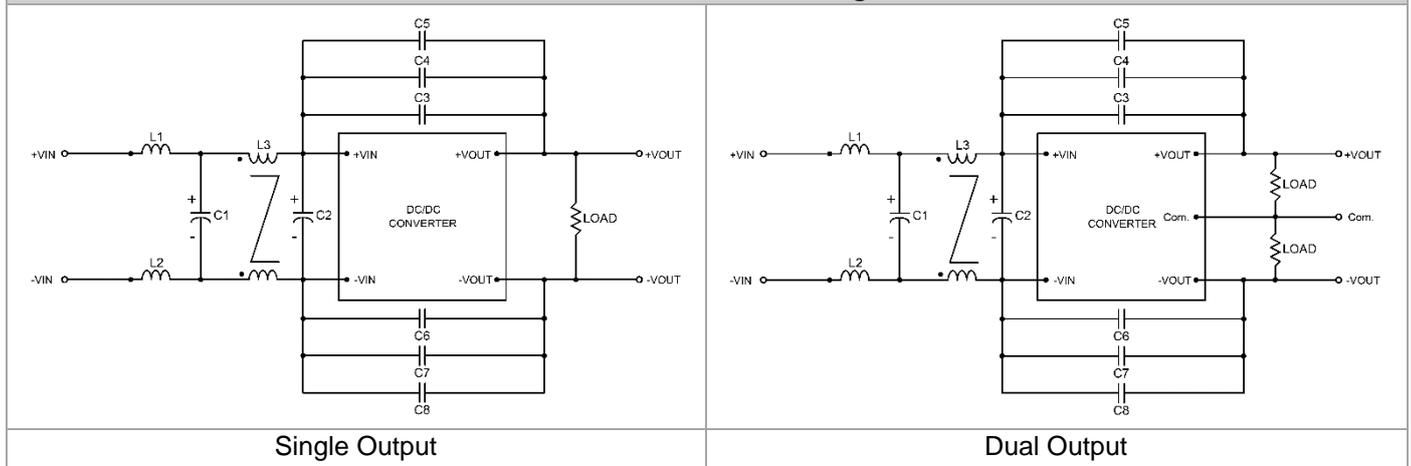
1.9 Configuration of EUT Setup





1.10 Total Solution

External Filter meets EMI EN 55032 , class A; EMS meets EFT/Surge



Model	L1, L2	C1	L3	C2	C3, C6	C4, C5, C7, C8
THR 40 Series	7427512	390 μ F/200V CHEMI-CON KXJ Series	9mH/5A 7448030509	47 μ F/400V CHEMI-CON KMQ Series	4700pF/ Y1 Cap.	2200pF/ Y1 Cap.

1.11 Test Step of EUT

- 1.11.1 Set the EUT and peripheral as above.
- 1.11.2 Turn on the power of all equipments.
- 1.11.3 Execute the test.

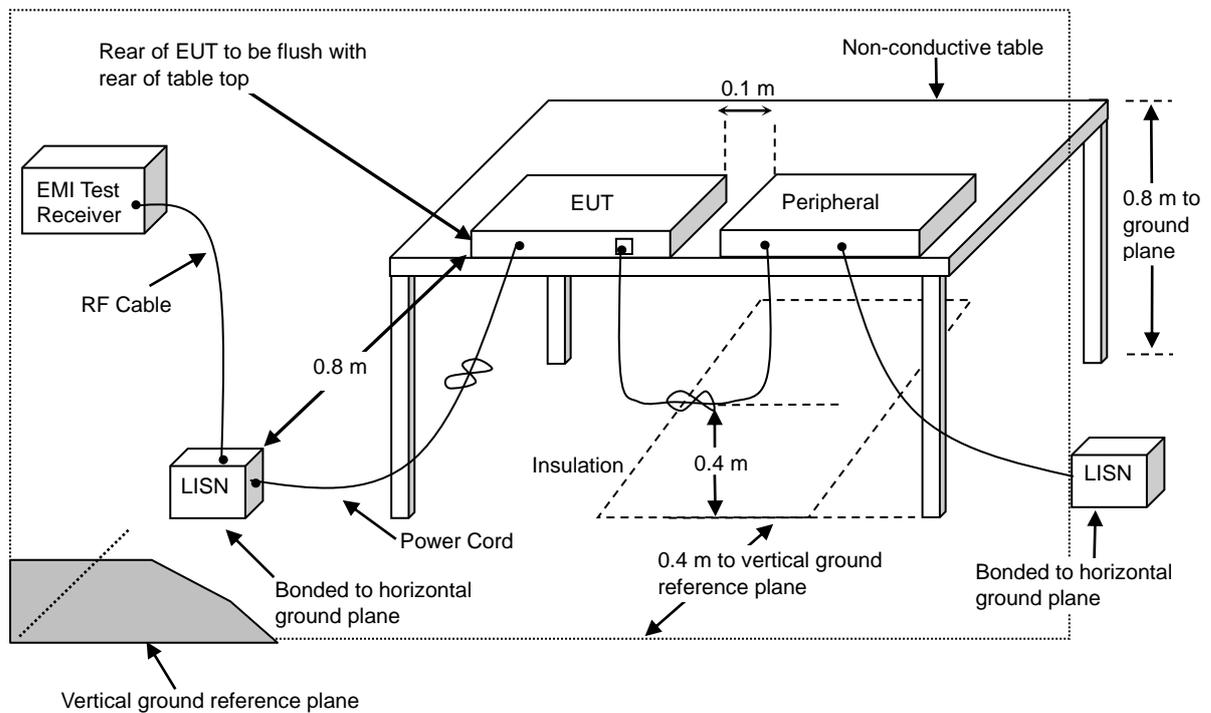
2 Power Line Conducted Emission Measurement (with EMI Solution)

2.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100127	2020/11/20
RF Cable	IETC	CBL68	CBL68	2020/07/29
L.I.S.N.	Schwarzbeck	NNLK8121	8121417	2020/03/21
L.I.S.N.	Schaffner	MN2050D	1598	2020/08/15
Measurement Software	AUDIX-e3			

Note: The above equipments are within the valid calibration period.

2.2 Block Diagram of Test Configuration



2.3 Conducted Limits

Frequency (MHz)	☒ Class A (dB μ V)		☐ Class B (dB μ V)	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 to 0.50	79	66	66 to 56	56 to 46
0.50 to 5.0	73	60	56	46
5.0 to 30	73	60	60	50



2.4 Instrument Configuration

- 2.4.1 Set the EMI test receiver frequency range from 150 kHz to 30 MHz.
- 2.4.2 Set the EMI test receiver bandwidth at 9 kHz.
- 2.4.3 Set the EMI test receiver detector as Quasi-Peak (Q.P.) and Average (AV).

2.5 Configuration of Measurement

- 2.5.1 The EUT was placed on a non-conductive table whose total height equaled 80 cm and vertical conducting plane located 40 cm to the rear of the EUT.
- 2.5.2 The EUT was connected to the main power through Line Impedance Stabilization Networks (LISN). This setup provided a 50 ohm / 50 μ H coupling impedance for the measuring equipment. The auxiliary equipment was also connected to the main power through a LISN that provided a 50 ohm/50 μ H coupling impedance with 50 ohm termination. (Refer to the block diagram of the test setup and photographs.)
- 2.5.3 The conducted disturbance was measured between the phase lead and the reference ground, and between the neutral lead and reference ground. The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.
- 2.5.4 The identification of the frequency of highest disturbance with respect to the limit was found by investigating disturbances at a number of significant frequencies. The probable frequency of maximum disturbance had been found and that the associated cable and EUT configuration and mode of operation had been identified.

2.6 Test Result

PASS.

The final test data is shown as following pages.

Factor = Insertion Loss + Cable Loss

Level = Reading + Factor

Margin = Level - Limit



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7211WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 1: Full Load (Model No.: THR 40-7211WI)

OPERATOR: Albert

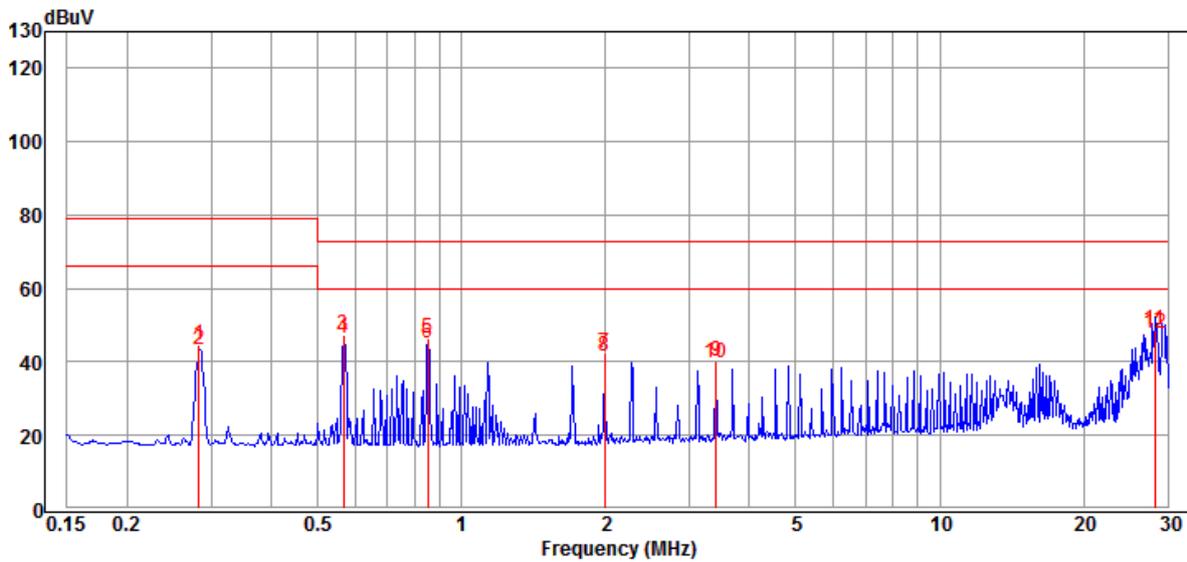
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 18.6°C / 51%

Data:5

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2833	34.42	10.12	44.54	79.00	-34.46	QP
2	0.2833	33.29	10.12	43.41	66.00	-22.59	Average
3	0.5671	37.39	10.13	47.52	73.00	-25.48	QP
4	0.5671	36.24	10.13	46.37	60.00	-13.63	Average
5	0.8528	36.34	10.14	46.48	73.00	-26.52	QP
6	0.8528	35.17	10.14	45.31	60.00	-14.69	Average
7	1.9910	32.38	10.22	42.60	73.00	-30.40	QP
8	1.9910	31.28	10.22	41.50	60.00	-18.50	Average
9	3.4120	30.10	10.28	40.38	73.00	-32.62	QP
10	3.4120	29.30	10.28	39.58	60.00	-20.42	Average
11	28.1520	37.39	11.43	48.82	73.00	-24.18	QP
12	28.1520	36.30	11.43	47.73	60.00	-12.27	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7211WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 1: Full Load (Model No.: THR 40-7211WI)

OPERATOR: Albert

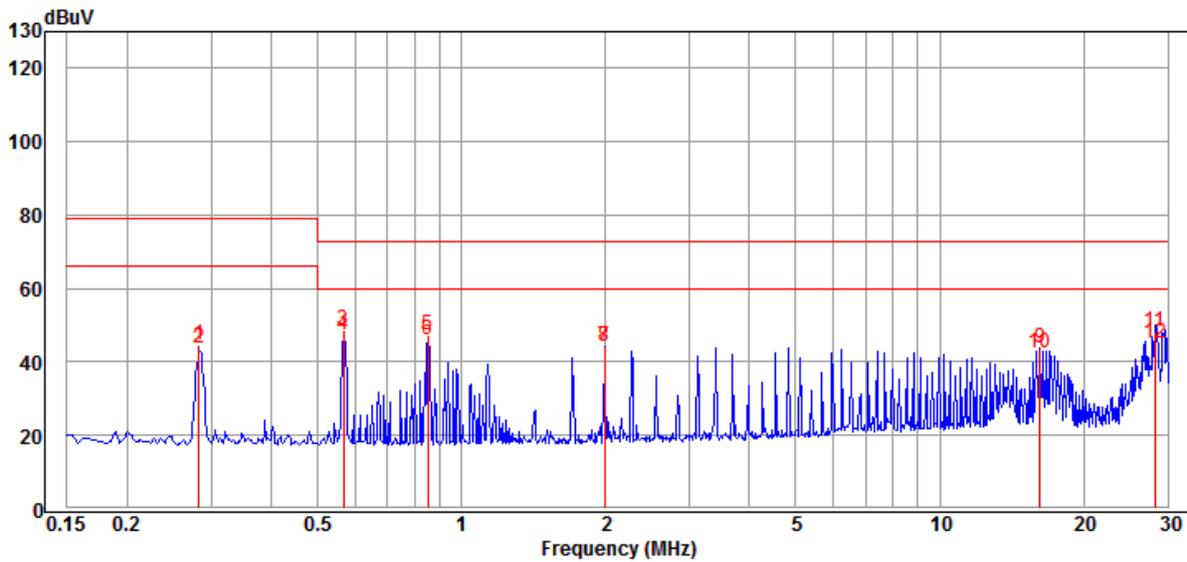
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 18.6°C / 51%

Data:6

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2833	34.58	10.12	44.70	79.00	-34.30	QP
2	0.2833	33.49	10.12	43.61	66.00	-22.39	Average
3	0.5671	38.41	10.12	48.53	73.00	-24.47	QP
4	0.5671	37.27	10.12	47.39	60.00	-12.61	Average
5	0.8528	37.36	10.13	47.49	73.00	-25.51	QP
6	0.8528	36.07	10.13	46.20	60.00	-13.80	Average
7	1.9910	34.03	10.20	44.23	73.00	-28.77	QP
8	1.9910	33.81	10.20	44.01	60.00	-15.99	Average
9	16.2130	33.10	10.63	43.73	73.00	-29.27	QP
10	16.2130	31.90	10.63	42.53	60.00	-17.47	Average
11	28.1520	36.78	11.29	48.07	73.00	-24.93	QP
12	28.1520	33.93	11.29	45.22	60.00	-14.78	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7212WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 2: Full Load (Model No.: THR 40-7212WI)

OPERATOR: Ivan

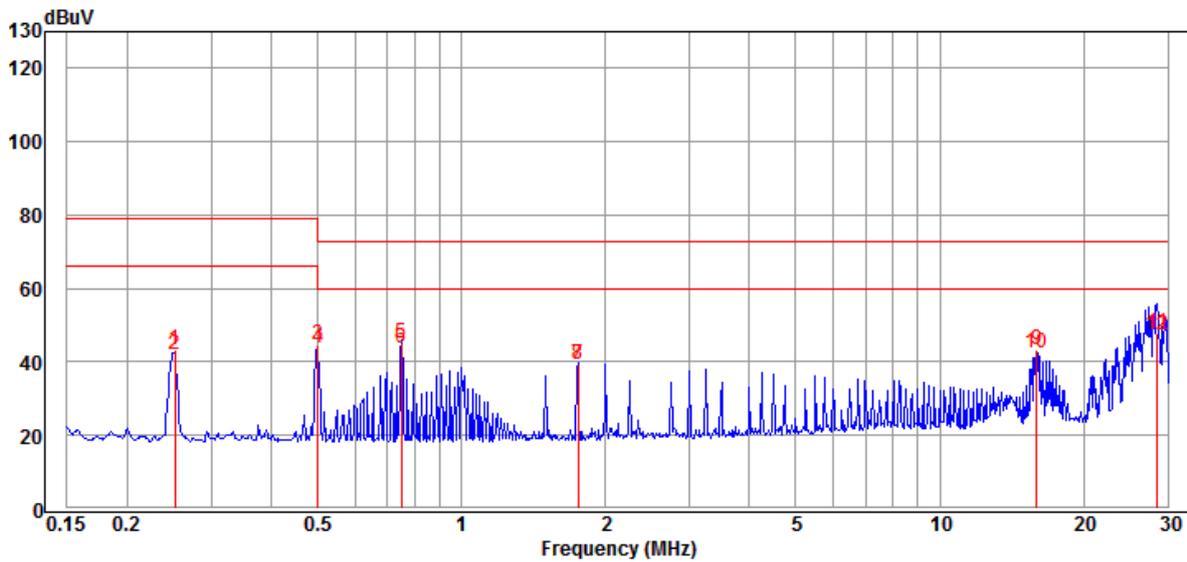
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 18.6°C / 51%

Data:7

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2521	33.20	10.12	43.32	79.00	-35.68	QP
2	0.2521	32.05	10.12	42.17	66.00	-23.83	Average
3	0.5020	34.73	10.12	44.85	73.00	-28.15	QP
4	0.5020	33.48	10.12	43.60	60.00	-16.40	Average
5	0.7509	34.99	10.13	45.12	73.00	-27.88	QP
6	0.7509	33.77	10.13	43.90	60.00	-16.10	Average
7	1.7530	29.11	10.21	39.32	73.00	-33.68	QP
8	1.7530	28.90	10.21	39.11	60.00	-20.89	Average
9	15.9700	32.70	10.72	43.42	73.00	-29.58	QP
10	15.9700	31.81	10.72	42.53	60.00	-17.47	Average
11	28.4520	36.48	11.45	47.93	73.00	-25.07	QP
12	28.4520	35.87	11.45	47.32	60.00	-12.68	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7212WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 2: Full Load (Model No.: THR 40-7212WI)

OPERATOR: Ivan

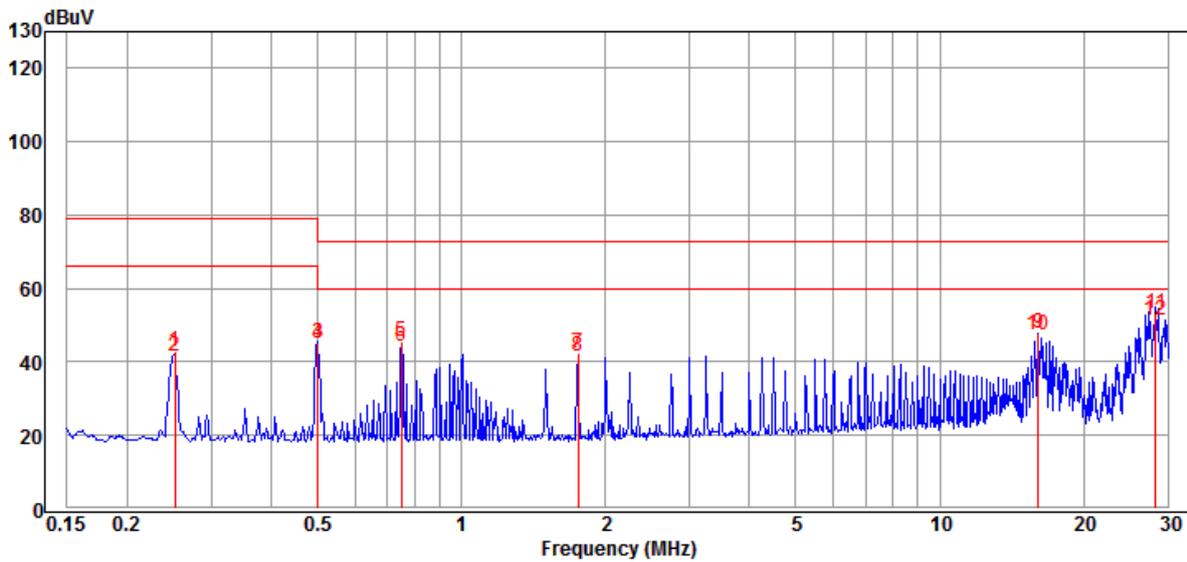
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 18.6°C / 51%

Data:8

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2521	32.57	10.12	42.69	79.00	-36.31	QP
2	0.2521	31.35	10.12	41.47	66.00	-24.53	Average
3	0.5020	35.12	10.12	45.24	73.00	-27.76	QP
4	0.5020	34.97	10.12	45.09	60.00	-14.91	Average
5	0.7509	35.55	10.13	45.68	73.00	-27.32	QP
6	0.7509	34.30	10.13	44.43	60.00	-15.57	Average
7	1.7530	32.44	10.19	42.63	73.00	-30.37	QP
8	1.7530	31.30	10.19	41.49	60.00	-18.51	Average
9	16.0550	37.32	10.62	47.94	73.00	-25.06	QP
10	16.0550	36.52	10.62	47.14	60.00	-12.86	Average
11	28.3020	41.94	11.30	53.24	73.00	-19.76	QP
12	28.3020	40.13	11.30	51.43	60.00	-8.57	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7213WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 3: Full Load (Model No.: THR 40-7213WI)

OPERATOR: Ivan

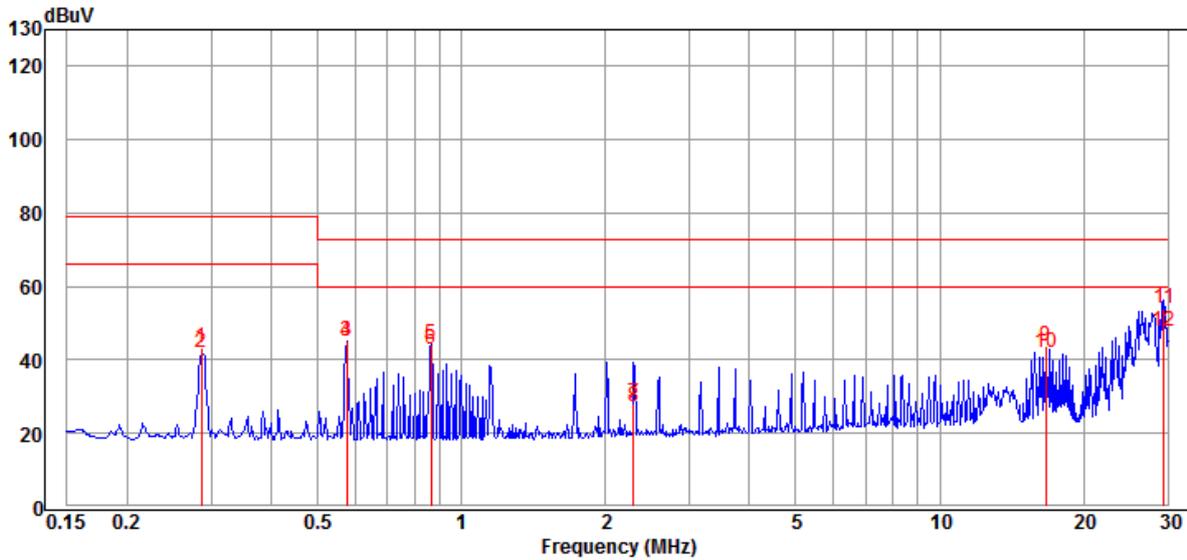
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 18.6°C / 51%

Data:9

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2863	33.23	10.12	43.35	79.00	-35.65	QP
2	0.2863	32.08	10.12	42.20	66.00	-23.80	Average
3	0.5762	35.14	10.13	45.27	73.00	-27.73	QP
4	0.5762	34.97	10.13	45.10	60.00	-14.90	Average
5	0.8664	33.93	10.14	44.07	73.00	-28.93	QP
6	0.8664	32.65	10.14	42.79	60.00	-17.21	Average
7	2.2970	18.11	10.25	28.36	73.00	-44.64	QP
8	2.2970	17.10	10.25	27.35	60.00	-32.65	Average
9	16.6610	32.95	10.78	43.73	73.00	-29.27	QP
10	16.6610	31.34	10.78	42.12	60.00	-17.88	Average
11	29.3710	42.55	11.46	54.01	73.00	-18.99	QP
12	29.3710	36.26	11.46	47.72	60.00	-12.28	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7213WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 3: Full Load (Model No.: THR 40-7213WI)

OPERATOR: Ivan

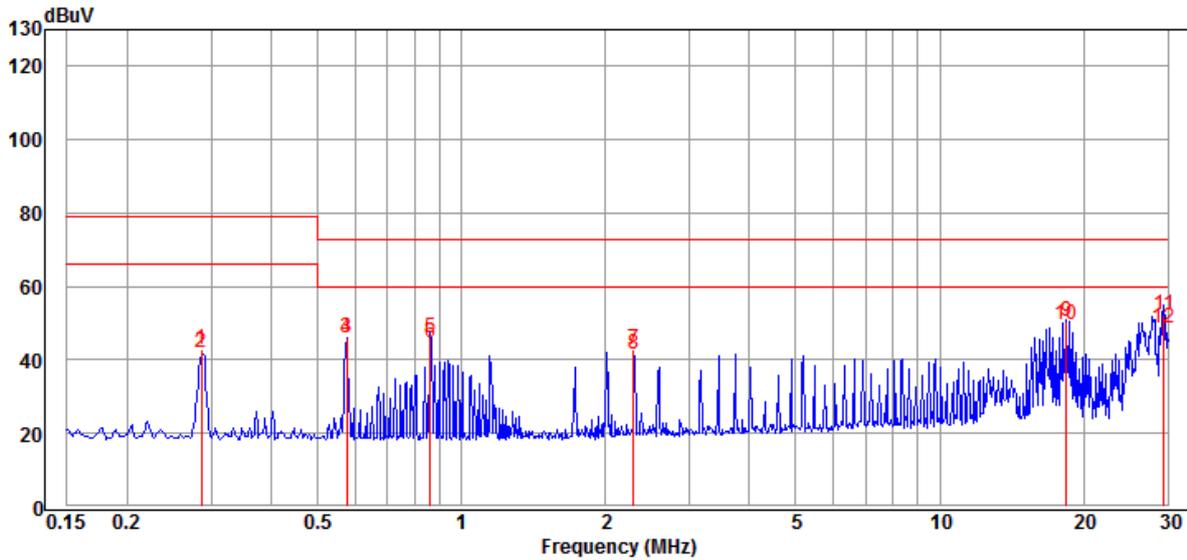
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 18.6°C / 51%

Data:10

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2863	32.86	10.12	42.98	79.00	-36.02	QP
2	0.2863	31.69	10.12	41.81	66.00	-24.19	Average
3	0.5762	36.03	10.12	46.15	73.00	-26.85	QP
4	0.5762	35.88	10.12	46.00	60.00	-14.00	Average
5	0.8619	35.77	10.13	45.90	73.00	-27.10	QP
6	0.8619	34.44	10.13	44.57	60.00	-15.43	Average
7	2.2970	32.74	10.23	42.97	73.00	-30.03	QP
8	2.2970	31.15	10.23	41.38	60.00	-18.62	Average
9	18.4260	39.55	10.79	50.34	73.00	-22.66	QP
10	18.4260	38.73	10.79	49.52	60.00	-10.48	Average
11	29.3710	40.80	11.33	52.13	73.00	-20.87	QP
12	29.3710	37.35	11.33	48.68	60.00	-11.32	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7215WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 4: Full Load (Model No.: THR 40-7215WI)

OPERATOR: Ivan

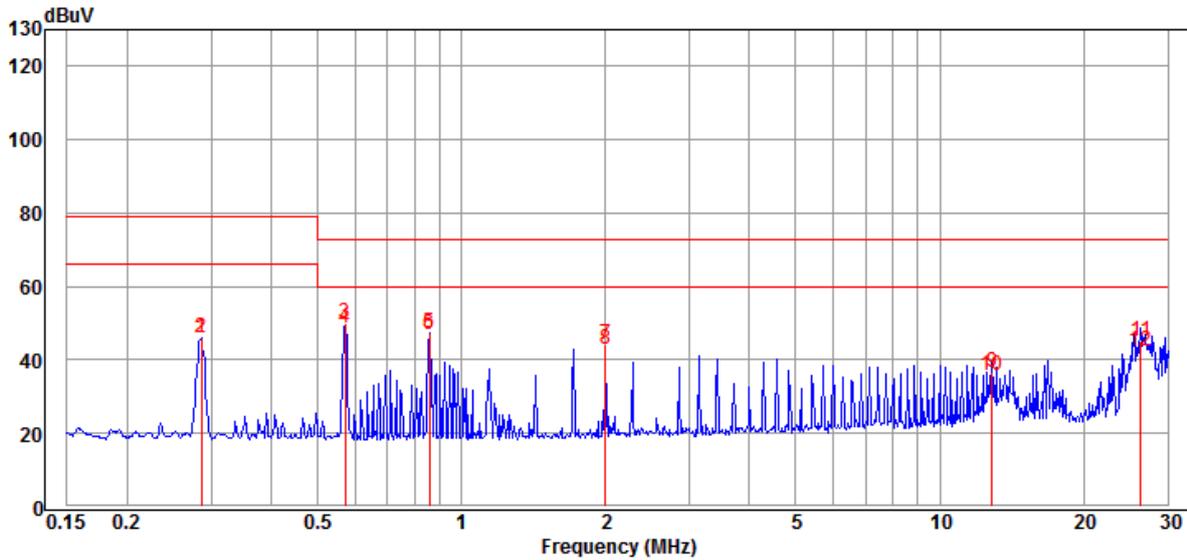
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 18.6°C / 51%

Data:11

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2863	36.02	10.12	46.14	79.00	-32.86	QP
2	0.2863	35.89	10.12	46.01	66.00	-19.99	Average
3	0.5731	39.86	10.13	49.99	73.00	-23.01	QP
4	0.5731	38.74	10.13	48.87	60.00	-11.13	Average
5	0.8573	37.09	10.14	47.23	73.00	-25.77	QP
6	0.8573	36.93	10.14	47.07	60.00	-12.93	Average
7	2.0010	33.99	10.22	44.21	73.00	-28.79	QP
8	2.0010	32.79	10.22	43.01	60.00	-16.99	Average
9	12.8520	26.24	10.57	36.81	73.00	-36.19	QP
10	12.8520	25.28	10.57	35.85	60.00	-24.15	Average
11	26.2780	33.52	11.39	44.91	73.00	-28.09	QP
12	26.2780	31.15	11.39	42.54	60.00	-17.46	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7215WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 4: Full Load (Model No.: THR 40-7215WI)

OPERATOR: Ivan

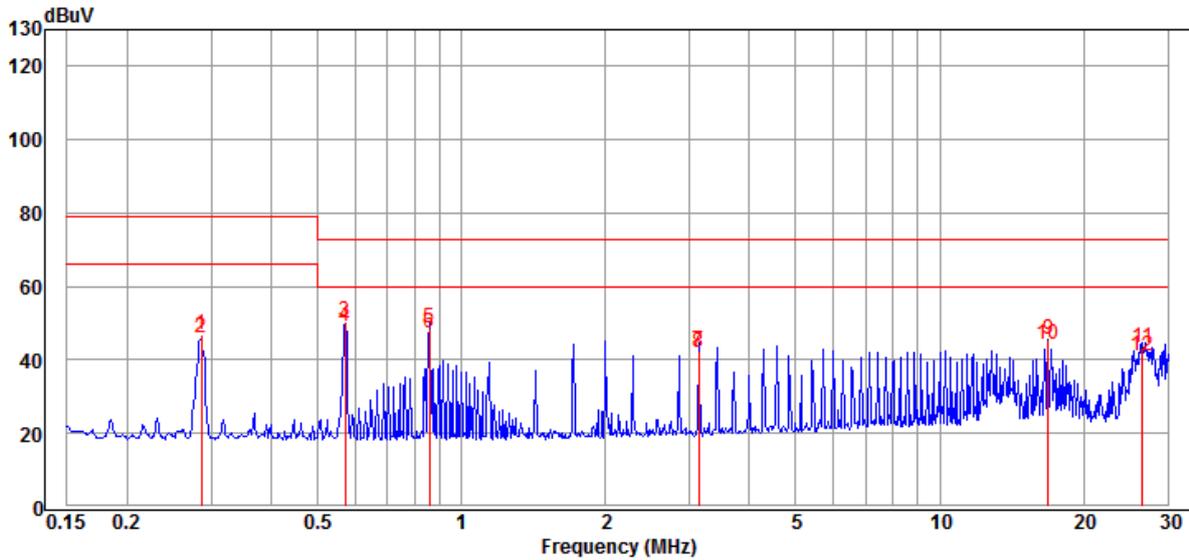
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 18.6°C / 51%

Data:12

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2863	36.94	10.12	47.06	79.00	-31.94	QP
2	0.2863	35.74	10.12	45.86	66.00	-20.14	Average
3	0.5731	40.40	10.12	50.52	73.00	-22.48	QP
4	0.5731	39.15	10.12	49.27	60.00	-10.73	Average
5	0.8573	38.60	10.13	48.73	73.00	-24.27	QP
6	0.8573	37.30	10.13	47.43	60.00	-12.57	Average
7	3.1400	32.18	10.26	42.44	73.00	-30.56	QP
8	3.1400	31.68	10.26	41.94	60.00	-18.06	Average
9	16.8390	34.79	10.68	45.47	73.00	-27.53	QP
10	16.8390	33.58	10.68	44.26	60.00	-15.74	Average
11	26.5580	32.14	11.23	43.37	73.00	-29.63	QP
12	26.5580	29.87	11.23	41.10	60.00	-18.90	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL:THR 40-72154WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 5: Full Load (Model No.: THR 40-72154WI)

OPERATOR: Ivan

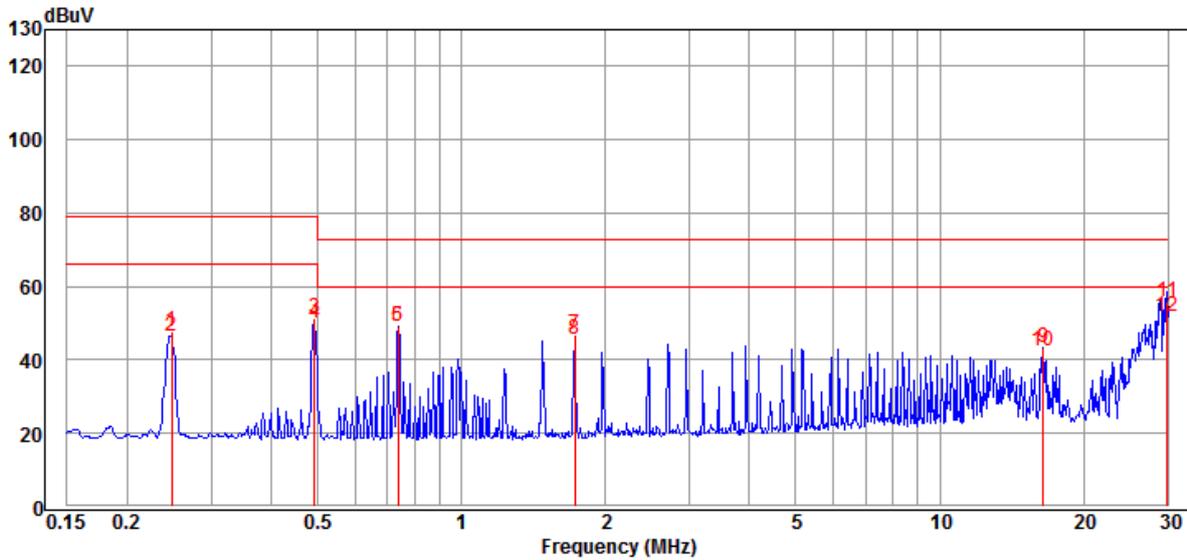
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 18.6°C / 51%

Data:13

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2481	37.60	10.12	47.72	79.00	-31.28	QP
2	0.2481	36.42	10.12	46.54	66.00	-19.46	Average
3	0.4941	41.26	10.12	51.38	79.00	-27.62	QP
4	0.4941	40.13	10.12	50.25	66.00	-15.75	Average
5	0.7391	39.11	10.13	49.24	73.00	-23.76	QP
6	0.7391	38.86	10.13	48.99	60.00	-11.01	Average
7	1.7250	36.58	10.21	46.79	73.00	-26.21	QP
8	1.7250	35.34	10.21	45.55	60.00	-14.45	Average
9	16.4860	32.35	10.77	43.12	73.00	-29.88	QP
10	16.4860	31.66	10.77	42.43	60.00	-17.57	Average
11	29.8410	44.31	11.48	55.79	73.00	-17.21	QP
12	29.8410	40.32	11.48	51.80	60.00	-8.20	Average



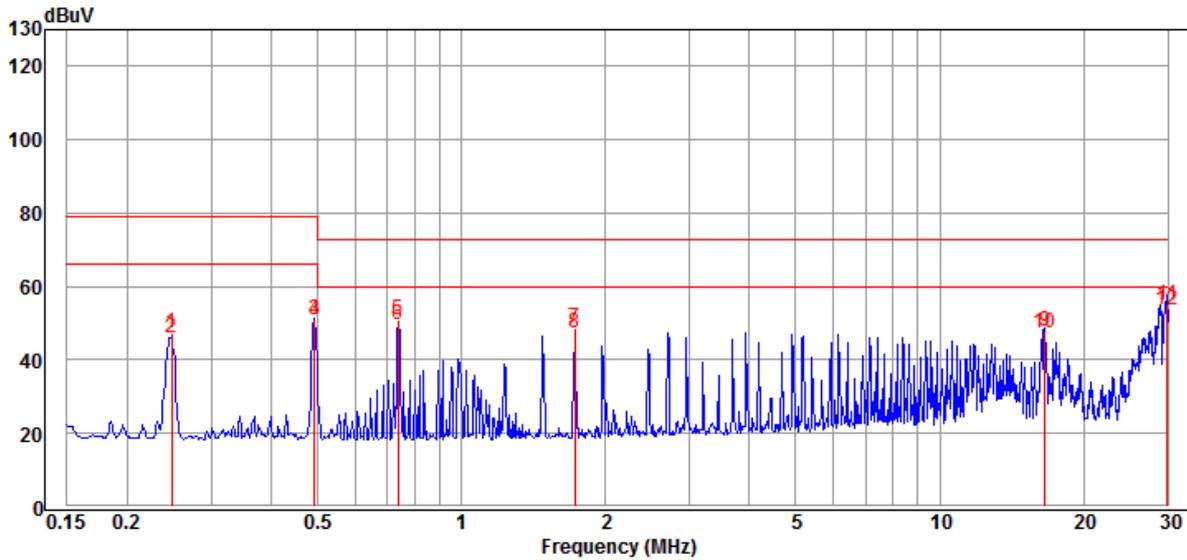
Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG
EUT: DC/DC CONVERTER
MODEL:THR 40-72154WI
RATING: DC 110 V
COMMENT: Test Mode: Mode 5: Full Load (Model No.: THR 40-72154WI)

OPERATOR: Ivan
TEST SITE: Conducted 1
POLARIZATION: Neutral
TEMP/HUM: 18.6°C / 51%

Data:14

2019-12-31



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2481	37.23	10.12	47.35	79.00	-31.65	QP
2	0.2481	36.08	10.12	46.20	66.00	-19.80	Average
3	0.4941	41.02	10.12	51.14	79.00	-27.86	QP
4	0.4941	40.87	10.12	50.99	66.00	-15.01	Average
5	0.7391	40.61	10.13	50.74	73.00	-22.26	QP
6	0.7391	39.54	10.13	49.67	60.00	-10.33	Average
7	1.7250	38.30	10.19	48.49	73.00	-24.51	QP
8	1.7250	37.01	10.19	47.20	60.00	-12.80	Average
9	16.5730	37.07	10.66	47.73	73.00	-25.27	QP
10	16.5730	36.62	10.66	47.28	60.00	-12.72	Average
11	29.8410	43.76	11.36	55.12	73.00	-17.88	QP
12	29.8410	42.07	11.36	53.43	60.00	-6.57	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7222WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 6: Full Load (Model No.: THR 40-7222WI)

OPERATOR: Ivan

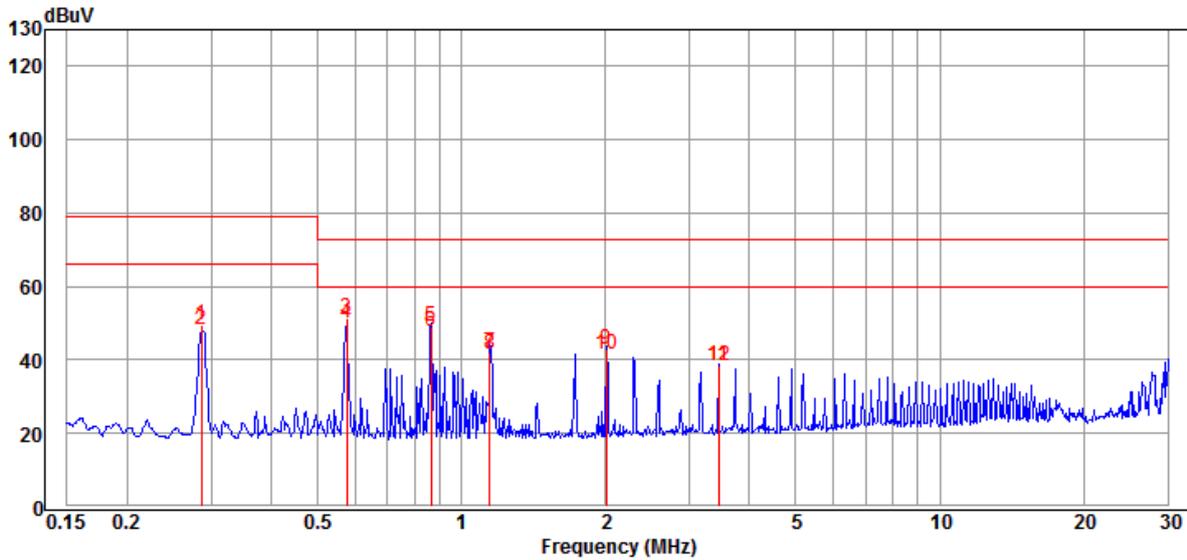
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 18.6°C / 51%

Data:15

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2863	39.30	10.12	49.42	79.00	-29.58	QP
2	0.2863	38.05	10.12	48.17	66.00	-17.83	Average
3	0.5762	41.29	10.13	51.42	73.00	-21.58	QP
4	0.5762	40.04	10.13	50.17	60.00	-9.83	Average
5	0.8664	38.94	10.14	49.08	73.00	-23.92	QP
6	0.8664	37.73	10.14	47.87	60.00	-12.13	Average
7	1.1470	32.05	10.15	42.20	73.00	-30.80	QP
8	1.1470	31.36	10.15	41.51	60.00	-18.49	Average
9	2.0120	32.44	10.22	42.66	73.00	-30.34	QP
10	2.0120	31.32	10.22	41.54	60.00	-18.46	Average
11	3.4540	28.33	10.28	38.61	73.00	-34.39	QP
12	3.4540	27.98	10.28	38.26	60.00	-21.74	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7222WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 6: Full Load (Model No.: THR 40-7222WI)

OPERATOR: Ivan

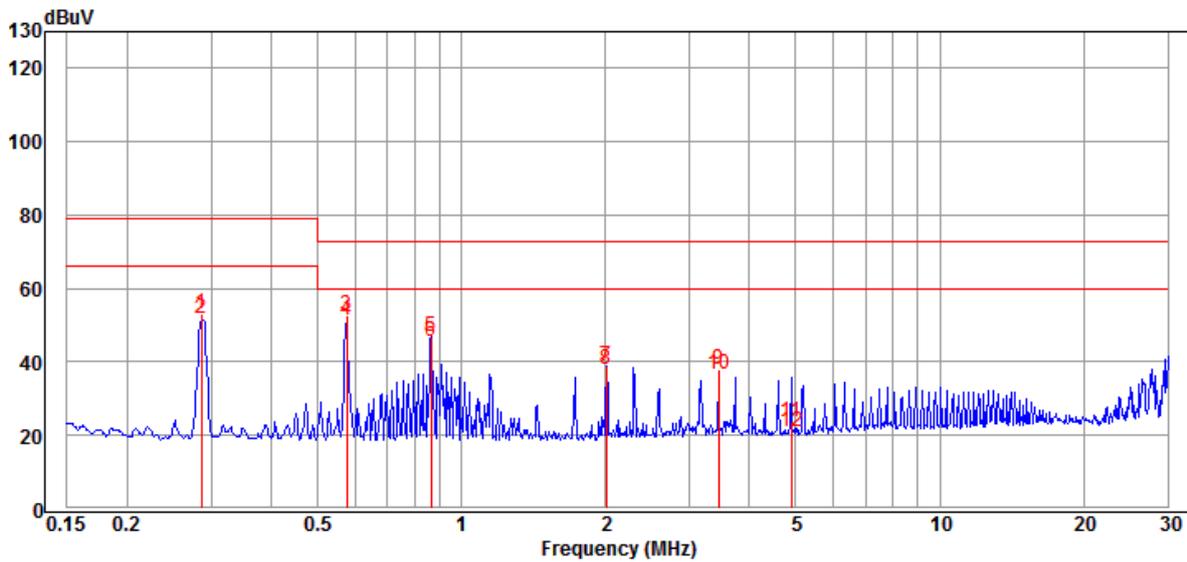
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 18.6°C / 51%

Data:16

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2863	42.91	10.12	53.03	79.00	-25.97	QP
2	0.2863	41.73	10.12	51.85	66.00	-14.15	Average
3	0.5762	42.37	10.12	52.49	73.00	-20.51	QP
4	0.5762	41.18	10.12	51.30	60.00	-8.70	Average
5	0.8664	36.64	10.13	46.77	73.00	-26.23	QP
6	0.8664	35.32	10.13	45.45	60.00	-14.55	Average
7	2.0120	28.80	10.20	39.00	73.00	-34.00	QP
8	2.0120	27.56	10.20	37.76	60.00	-22.24	Average
9	3.4540	27.62	10.26	37.88	73.00	-35.12	QP
10	3.4540	26.17	10.26	36.43	60.00	-23.57	Average
11	4.9000	13.17	10.30	23.47	73.00	-49.53	QP
12	4.9000	10.85	10.30	21.15	60.00	-38.85	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7223WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 7: Full Load (Model No.: THR 40-7223WI)

OPERATOR: Ivan

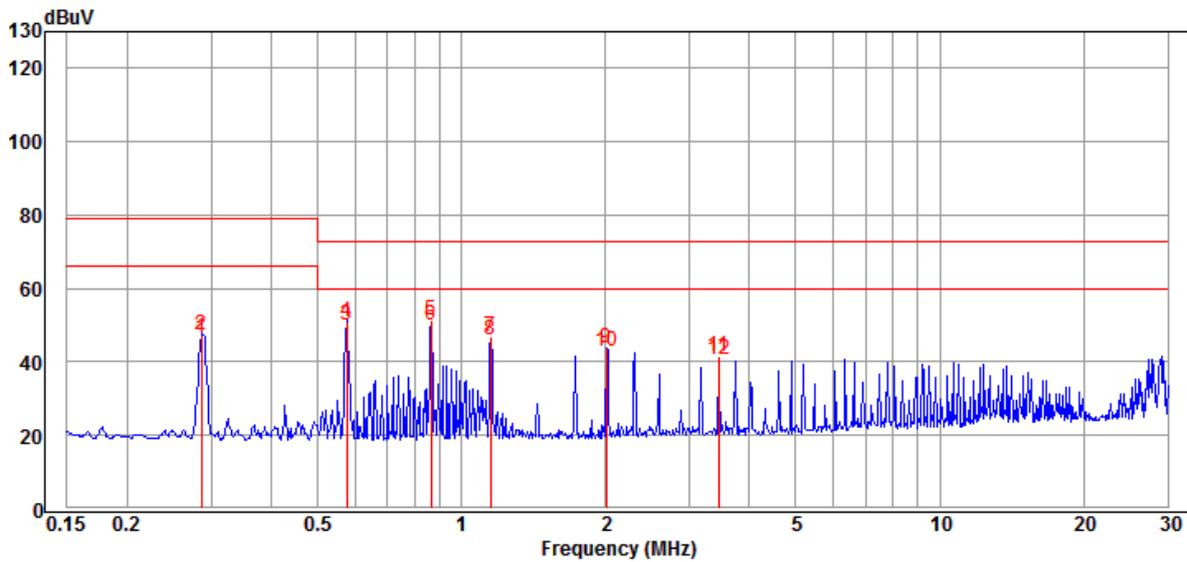
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 18.6°C / 51%

Data:17

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2863	36.36	10.12	46.48	79.00	-32.52	QP
2	0.2863	37.16	10.12	47.28	66.00	-18.72	Average
3	0.5762	39.99	10.13	50.12	73.00	-22.88	QP
4	0.5762	40.86	10.13	50.99	60.00	-9.01	Average
5	0.8664	41.16	10.14	51.30	73.00	-21.70	QP
6	0.8664	40.01	10.14	50.15	60.00	-9.85	Average
7	1.1530	36.90	10.15	47.05	73.00	-25.95	QP
8	1.1530	35.65	10.15	45.80	60.00	-14.20	Average
9	2.0120	33.42	10.22	43.64	73.00	-29.36	QP
10	2.0120	32.60	10.22	42.82	60.00	-17.18	Average
11	3.4540	31.19	10.28	41.47	73.00	-31.53	QP
12	3.4540	30.41	10.28	40.69	60.00	-19.31	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7223WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 7: Full Load (Model No.: THR 40-7223WI)

OPERATOR: Ivan

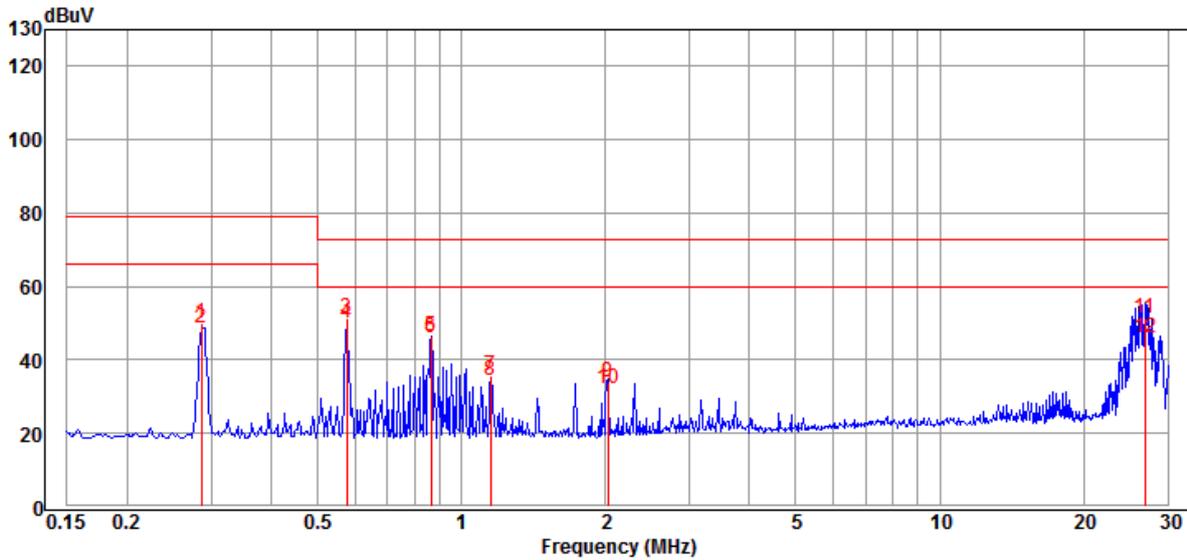
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 18.6°C / 51%

Data:18

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2863	39.77	10.12	49.89	79.00	-29.11	QP
2	0.2863	38.65	10.12	48.77	66.00	-17.23	Average
3	0.5762	41.17	10.12	51.29	73.00	-21.71	QP
4	0.5762	40.04	10.12	50.16	60.00	-9.84	Average
5	0.8664	36.20	10.13	46.33	73.00	-26.67	QP
6	0.8664	35.92	10.13	46.05	60.00	-13.95	Average
7	1.1530	25.81	10.14	35.95	73.00	-37.05	QP
8	1.1530	24.40	10.14	34.54	60.00	-25.46	Average
9	2.0230	23.78	10.20	33.98	73.00	-39.02	QP
10	2.0230	22.15	10.20	32.35	60.00	-27.65	Average
11	26.8410	39.93	11.24	51.17	73.00	-21.83	QP
12	26.8410	34.65	11.24	45.89	60.00	-14.11	Average

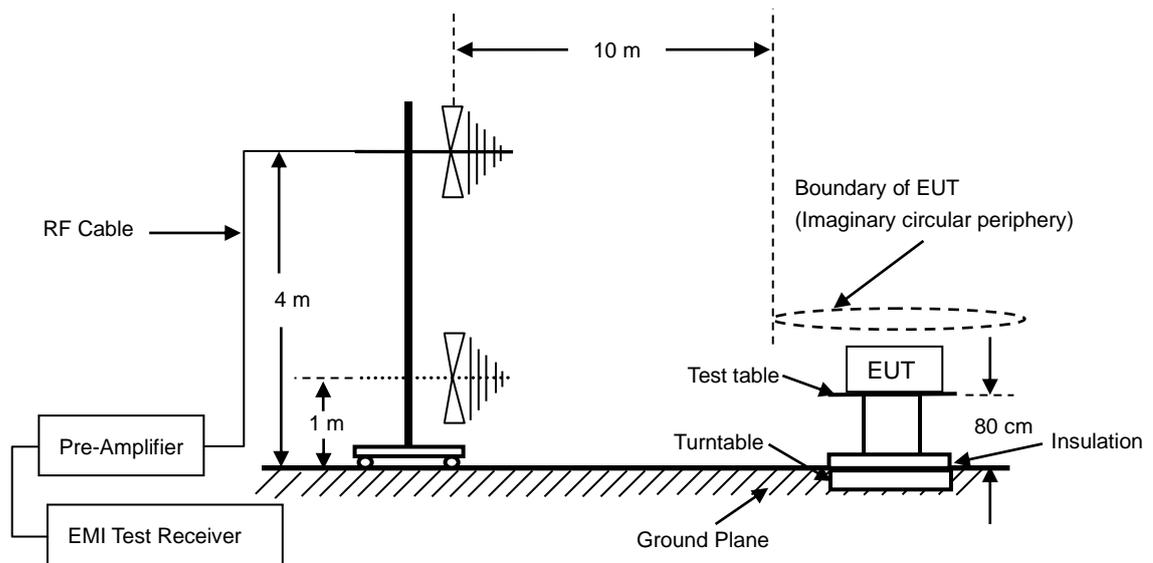
3 Radiated Emission Measurement (Below 1GHz) (with EMI Solution)

3.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCI	101116	2020/03/24
Biconical Antenna	Schwarzbeck	VHA 9103 & BBA 9106	VHA 9103-2418	2020/08/14
Log Antenna	Schwarzbeck	UHALP 9108-A	9108-A 0739	2020/08/14
Pre-Amplifier	Agilent	8447D	2944A09703	2020/07/29
RF Cable	EMCI	EMC8D-NM-NM-25000	140105	2020/07/29
RF Cable	Mini-Circuits	CBL-3FL-NMNM	CBL56	2020/07/29
Measurement Software	AUDIX-e3			

Note: The above equipments are within the valid calibration period.

3.2 Block Diagram of Test Configuration



3.3 Radiated Limits

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



3.4 Instrument Configuration

- 3.4.1 Set the EMI test receiver frequency range from 30 MHz to 1000 MHz.
- 3.4.2 Set the EMI test receiver bandwidth at 120 kHz.
- 3.4.3 Set the EMI test receiver detector as Quasi-Peak (Q.P.).

3.5 Configuration of Measurement

- 3.5.1 The EUT was placed on a non-conductive table whose total height equaled 80cm. The turntable can rotate 360 degree to determine the position of the maximum emission level.
- 3.5.2 The EUT was set 10 meters away from the receiving antenna that was mounted on a non-conductive mast. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level.
- 3.5.3 The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.
- 3.5.4 The identification of the frequency of highest emission with respect to the limit was found by investigating emissions at a number of significant frequencies. The probable frequency of maximum emission had been found and that the associated cable and EUT configuration and mode of operation had been identified.

3.6 Test Result

PASS.

The final test data is shown as following pages.

Factor = Antenna Factor + Cable Loss - Preamplifier Gain

Level = Reading + Factor

Margin = Level - Limit



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7211WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 1: Full Load (Model No.: THR 40-7211WI)

OPERATOR : Sam

TEST SITE : OATS 1

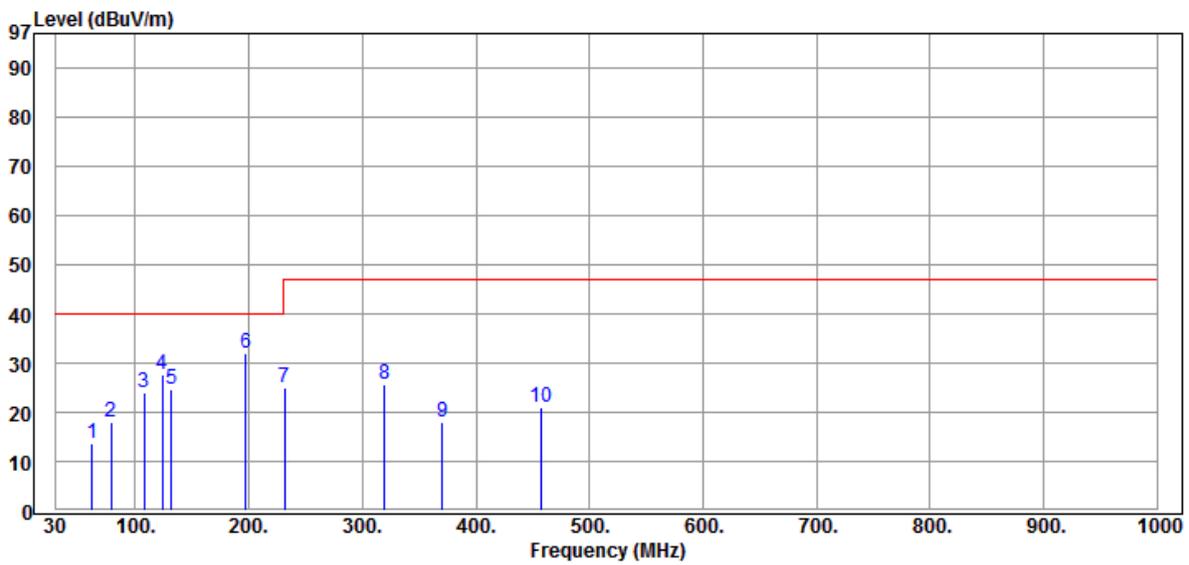
TEST DISTANCE : 10 m

POLARIZATION : HORIZONTAL

TEMP/HUM : 24.1°C/ 34%

Data:5

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	62.120	34.50	-20.79	13.71	40.00	-26.29	QP
2	78.920	39.80	-21.83	17.97	40.00	-22.03	QP
3	108.120	40.83	-16.84	23.99	40.00	-16.01	QP
4	123.920	42.45	-14.83	27.62	40.00	-12.38	QP
5	131.920	38.78	-14.17	24.61	40.00	-15.39	QP
6	197.320	42.78	-10.65	32.13	40.00	-7.87	QP
7	231.720	35.60	-10.54	25.06	47.00	-21.94	QP
8	319.600	37.61	-11.92	25.69	47.00	-21.31	QP
9	370.600	28.92	-10.76	18.16	47.00	-28.84	QP
10	458.200	29.49	-8.36	21.13	47.00	-25.87	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7211WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 1: Full Load (Model No.: THR 40-7211WI)

OPERATOR : Sam

TEST SITE : OATS 1

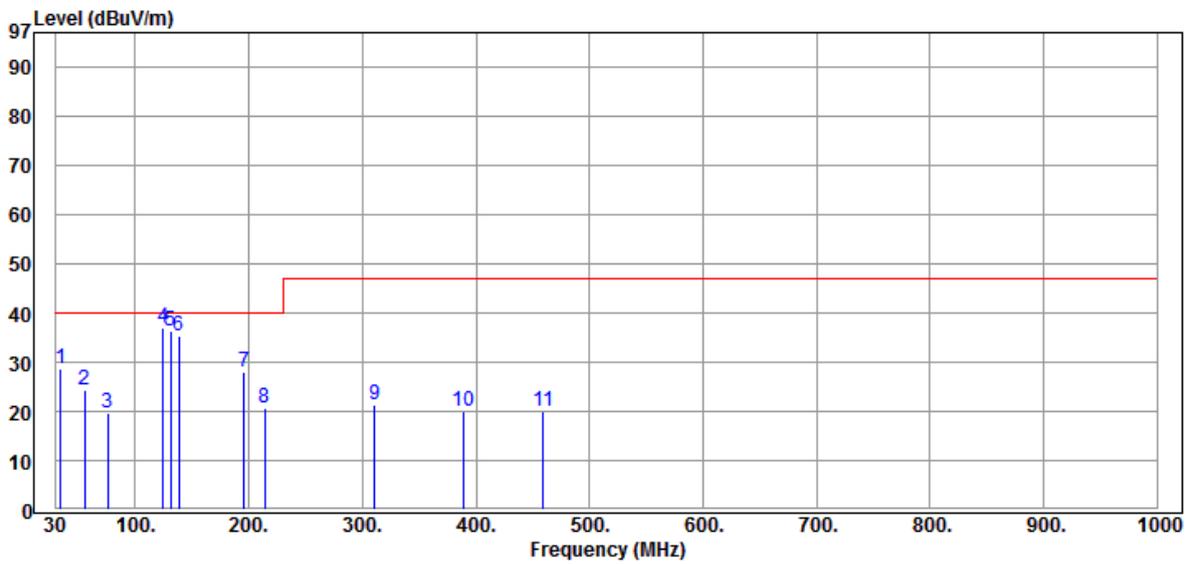
TEST DISTANCE : 10 m

POLARIZATION : VERTICAL

TEMP/HUM : 24.1°C/ 34%

Data:4

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	34.380	41.02	-12.29	28.73	40.00	-11.27	QP
2	55.092	43.34	-19.16	24.18	40.00	-15.82	QP
3	75.513	41.70	-21.91	19.79	40.00	-20.21	QP
4	124.362	51.80	-14.80	37.00	40.00	-3.00	QP
5	131.318	50.41	-14.23	36.18	40.00	-3.82	QP
6	138.118	49.10	-13.67	35.43	40.00	-4.57	QP
7	195.718	38.70	-10.66	28.04	40.00	-11.96	QP
8	213.918	31.60	-10.79	20.81	40.00	-19.19	QP
9	311.200	33.65	-12.26	21.39	47.00	-25.61	QP
10	389.400	30.03	-9.99	20.04	47.00	-26.96	QP
11	459.600	28.25	-8.31	19.94	47.00	-27.06	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7212WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 2: Full Load (Model No.: THR 40-7212WI)

OPERATOR : Sam

TEST SITE : OATS 1

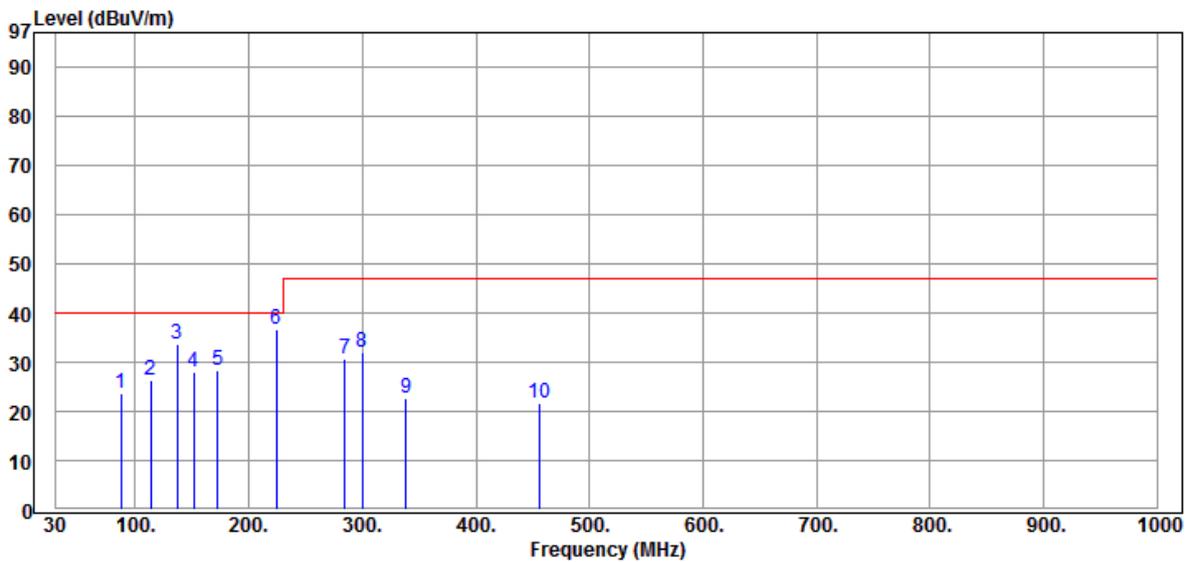
TEST DISTANCE : 10 m

POLARIZATION : HORIZONTAL

TEMP/HUM : 24.1°C/ 34%

Data:7

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	87.280	44.30	-20.78	23.52	40.00	-16.48	QP
2	113.240	42.37	-16.08	26.29	40.00	-13.71	QP
3	137.100	47.36	-13.76	33.60	40.00	-6.40	QP
4	151.200	41.01	-13.07	27.94	40.00	-12.06	QP
5	172.240	40.18	-11.90	28.28	40.00	-11.72	QP
6	224.240	47.61	-10.97	36.64	40.00	-3.36	QP
7	284.840	38.93	-8.11	30.82	47.00	-16.18	QP
8	300.000	39.01	-7.00	32.01	47.00	-14.99	QP
9	338.200	34.44	-11.67	22.77	47.00	-24.23	QP
10	456.600	30.02	-8.41	21.61	47.00	-25.39	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7212WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 2: Full Load (Model No.: THR 40-7212WI)

OPERATOR : Sam

TEST SITE : OATS 1

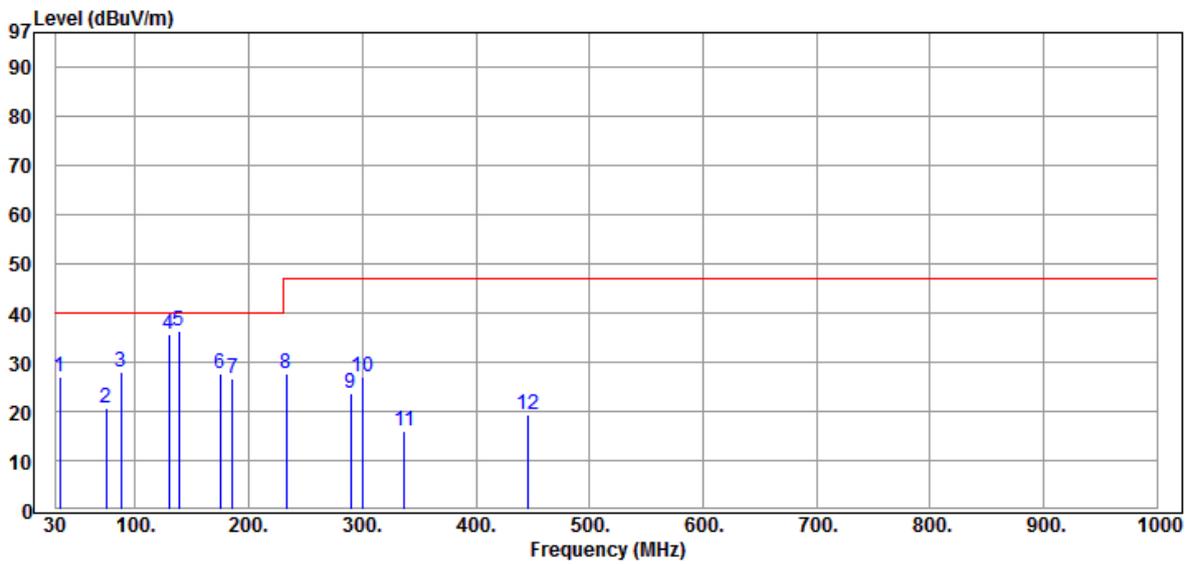
TEST DISTANCE : 10 m

POLARIZATION : VERTICAL

TEMP/HUM : 24.1°C/ 34%

Data:6

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	33.740	39.20	-12.07	27.13	40.00	-12.87	QP
2	74.140	42.64	-21.94	20.70	40.00	-19.30	QP
3	87.640	48.63	-20.72	27.91	40.00	-12.09	QP
4	129.800	50.14	-14.36	35.78	40.00	-4.22	QP
5	138.400	49.98	-13.64	36.34	40.00	-3.66	QP
6	175.000	39.31	-11.75	27.56	40.00	-12.44	QP
7	185.800	37.68	-11.04	26.64	40.00	-13.36	QP
8	232.600	38.11	-10.49	27.62	47.00	-19.38	QP
9	289.800	31.63	-7.85	23.78	47.00	-23.22	QP
10	300.000	34.01	-7.00	27.01	47.00	-19.99	QP
11	336.800	27.59	-11.69	15.90	47.00	-31.10	QP
12	445.600	28.10	-8.73	19.37	47.00	-27.63	QP



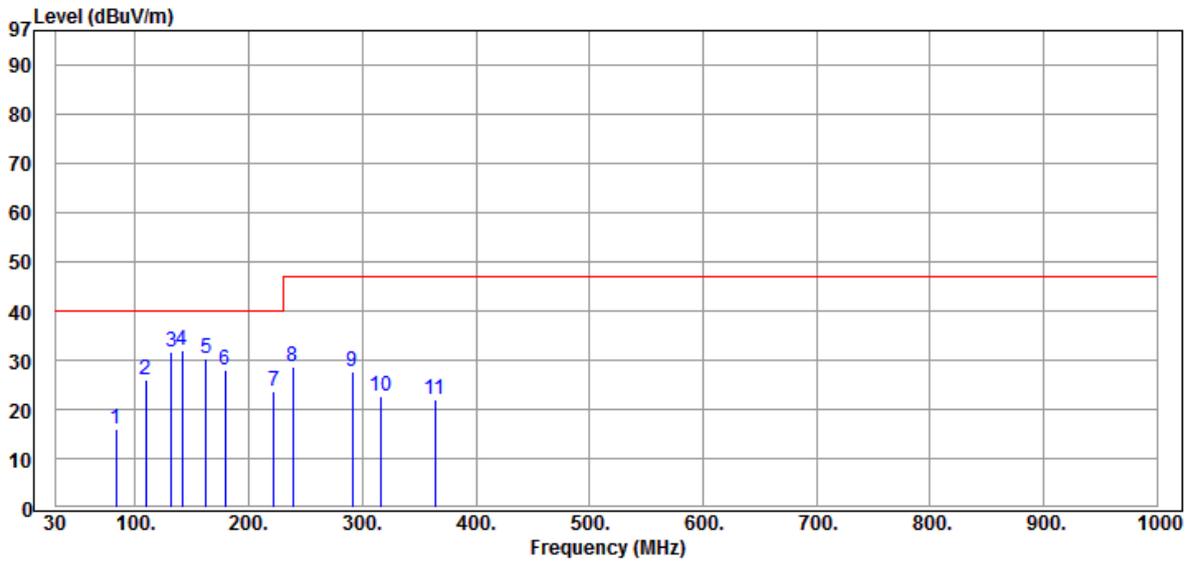
Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG
 EUT: DC/DC CONVERTER
 MODEL: THR 40-7213WI
 RATING: DC 110 V
 COMMENT: Test Mode: Mode 3: Full Load (Model No.: THR 40-7213WI)

OPERATOR : Sam
 TEST SITE : OATS 1
 TEST DISTANCE : 10 m
 POLARIZATION : HORIZONTAL
 TEMP/HUM : 24.1°C/ 34%

Data:9

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	82.840	37.51	-21.40	16.11	40.00	-23.89	QP
2	109.100	42.79	-16.67	26.12	40.00	-13.88	QP
3	131.800	45.87	-14.19	31.68	40.00	-8.32	QP
4	141.000	45.62	-13.47	32.15	40.00	-7.85	QP
5	162.200	42.86	-12.44	30.42	40.00	-9.58	QP
6	178.800	39.41	-11.55	27.86	40.00	-12.14	QP
7	222.400	34.77	-10.98	23.79	40.00	-16.21	QP
8	238.800	38.82	-10.14	28.68	47.00	-18.32	QP
9	291.200	35.25	-7.74	27.51	47.00	-19.49	QP
10	316.200	34.72	-12.06	22.66	47.00	-24.34	QP
11	364.200	33.06	-11.04	22.02	47.00	-24.98	QP



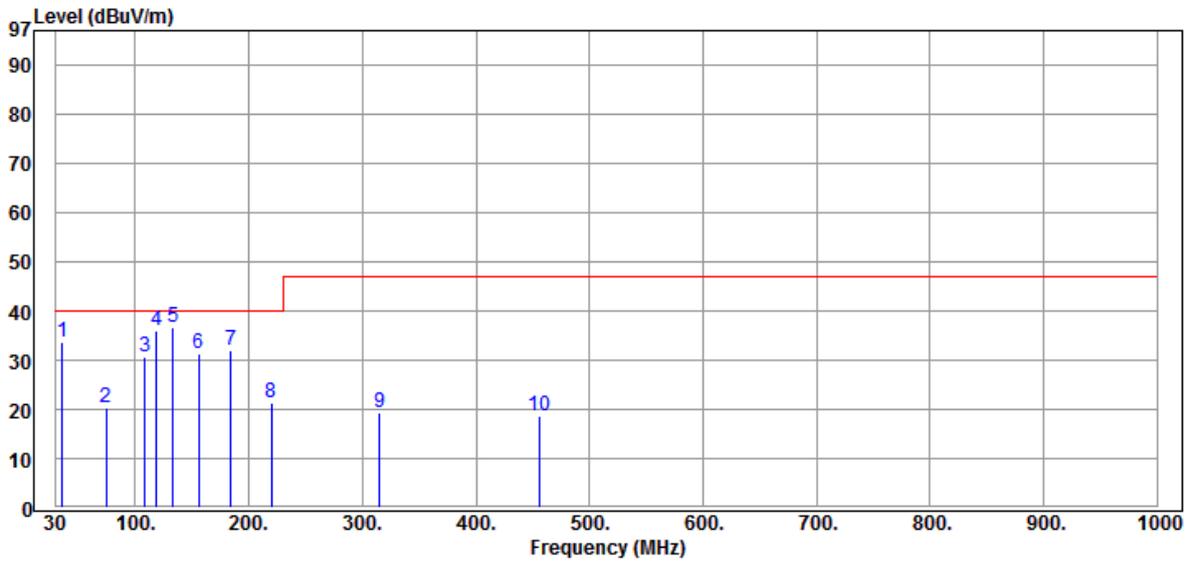
Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG
EUT: DC/DC CONVERTER
MODEL: THR 40-7213WI
RATING: DC 110 V
COMMENT: Test Mode: Mode 3: Full Load (Model No.: THR 40-7213WI)

OPERATOR : Sam
TEST SITE : OATS 1
TEST DISTANCE : 10 m
POLARIZATION : VERTICAL
TEMP/HUM : 24.1°C/ 34%

Data:8

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	35.700	46.31	-12.77	33.54	40.00	-6.46	QP
2	74.600	42.16	-21.94	20.22	40.00	-19.78	QP
3	108.600	47.43	-16.75	30.68	40.00	-9.32	QP
4	118.450	51.22	-15.36	35.86	40.00	-4.14	QP
5	133.000	50.77	-14.09	36.68	40.00	-3.32	QP
6	155.800	44.25	-12.81	31.44	40.00	-8.56	QP
7	184.400	43.04	-11.15	31.89	40.00	-8.11	QP
8	220.000	32.44	-10.99	21.45	40.00	-18.55	QP
9	314.868	31.30	-12.11	19.19	47.00	-27.81	QP
10	455.600	27.16	-8.43	18.73	47.00	-28.27	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7215WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 4: Full Load (Model No.: THR 40-7215WI)

OPERATOR : Sam

TEST SITE : OATS 1

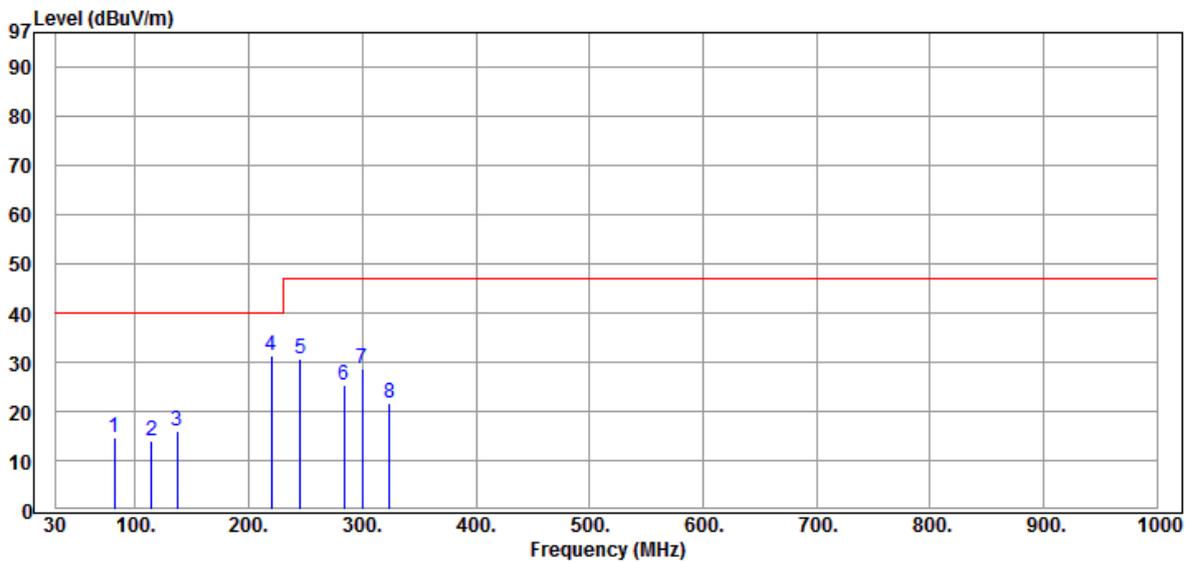
TEST DISTANCE : 10 m

POLARIZATION : HORIZONTAL

TEMP/HUM : 24.1°C/ 34%

Data:11

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	81.380	36.23	-21.61	14.62	40.00	-25.38	QP
2	114.200	29.98	-15.94	14.04	40.00	-25.96	QP
3	136.600	29.72	-13.79	15.93	40.00	-24.07	QP
4	220.000	42.32	-10.99	31.33	40.00	-8.67	QP
5	245.200	40.26	-9.73	30.53	47.00	-16.47	QP
6	283.600	33.42	-8.16	25.26	47.00	-21.74	QP
7	300.000	35.64	-7.00	28.64	47.00	-18.36	QP
8	324.200	33.32	-11.74	21.58	47.00	-25.42	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7215WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 4: Full Load (Model No.: THR 40-7215WI)

OPERATOR : Sam

TEST SITE : OATS 1

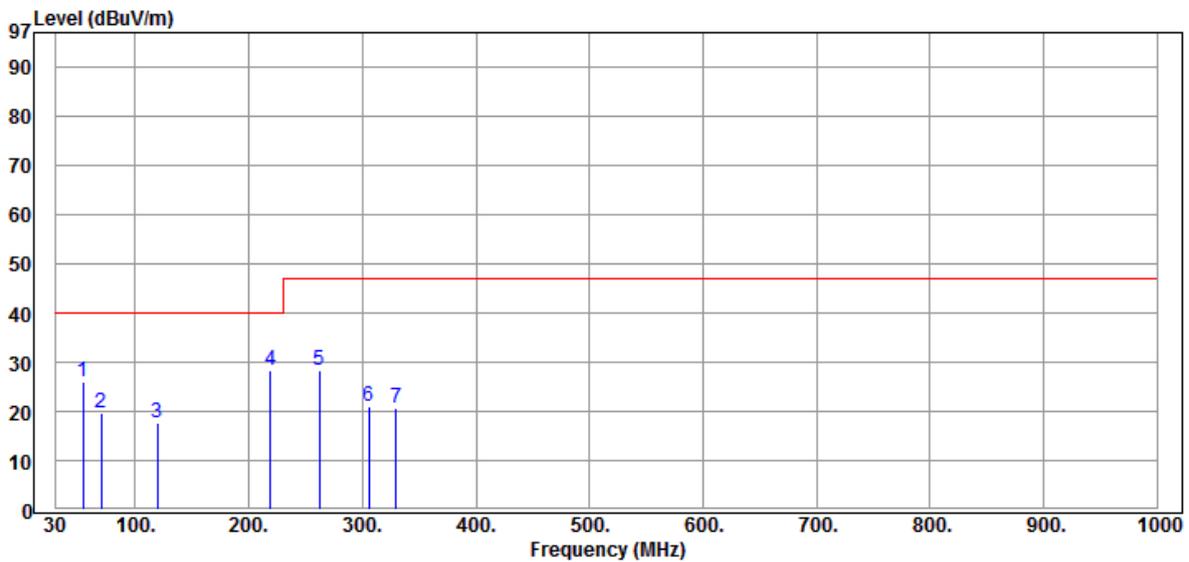
TEST DISTANCE : 10 m

POLARIZATION : VERTICAL

TEMP/HUM : 24.1°C/ 34%

Data:10

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	53.660	44.70	-18.78	25.92	40.00	-14.08	QP
2	69.660	41.51	-21.98	19.53	40.00	-20.47	QP
3	119.400	32.88	-15.24	17.64	40.00	-22.36	QP
4	219.000	39.44	-10.96	28.48	40.00	-11.52	QP
5	262.200	37.56	-9.20	28.36	47.00	-18.64	QP
6	305.800	33.35	-12.47	20.88	47.00	-26.12	QP
7	329.400	32.45	-11.70	20.75	47.00	-26.25	QP



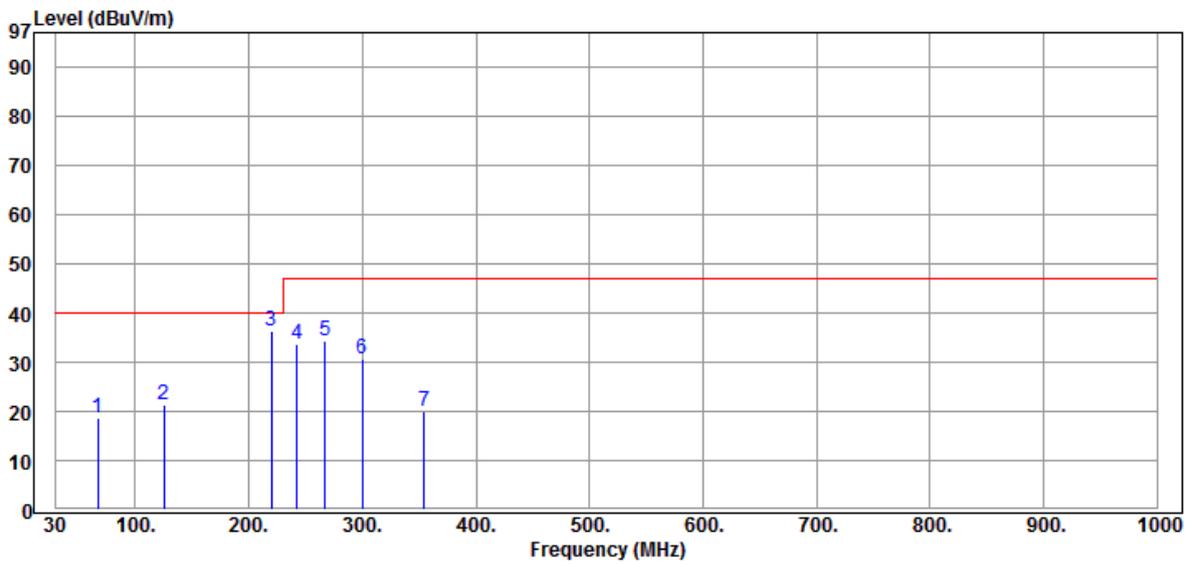
Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG
EUT: DC/DC CONVERTER
MODEL:THR 40-72154WI
RATING: DC 110 V
COMMENT: Test Mode: Mode 5: Full Load (Model No.: THR 40-72154WI)

OPERATOR : Sam
TEST SITE : OATS 1
TEST DISTANCE : 10 m
POLARIZATION : HORIZONTAL
TEMP/HUM : 24.1°C/ 34%

Data:13

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	66.700	40.01	-21.50	18.51	40.00	-21.49	QP
2	125.000	36.13	-14.74	21.39	40.00	-18.61	QP
3	220.200	47.44	-10.98	36.46	40.00	-3.54	QP
4	242.200	43.73	-9.93	33.80	47.00	-13.20	QP
5	267.400	43.30	-9.07	34.23	47.00	-12.77	QP
6	300.000	37.56	-7.00	30.56	47.00	-16.44	QP
7	354.200	31.44	-11.47	19.97	47.00	-27.03	QP



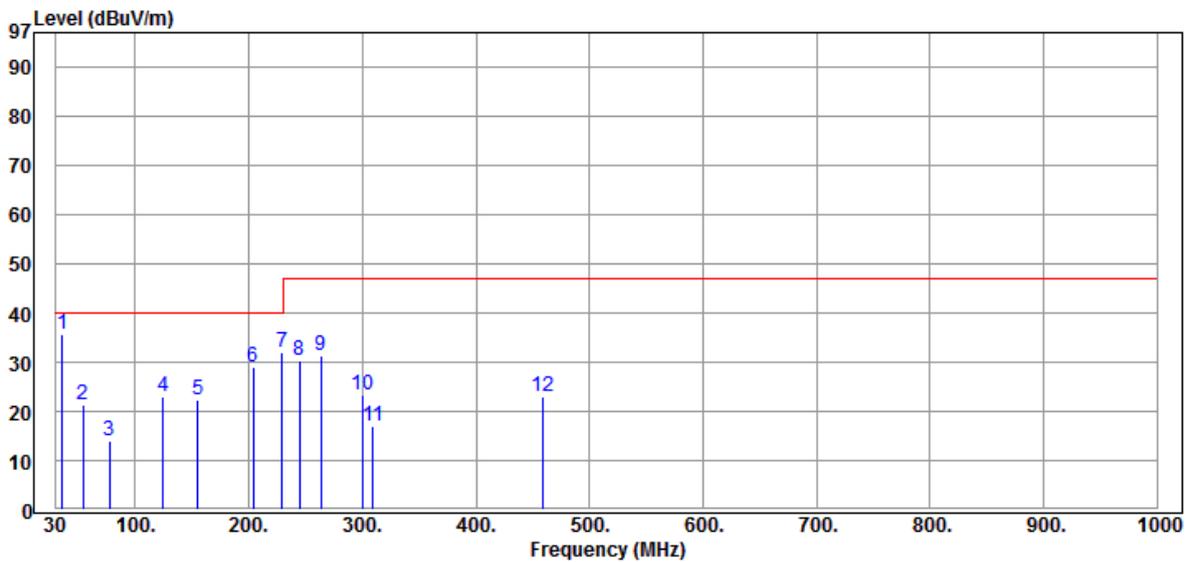
Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG
EUT: DC/DC CONVERTER
MODEL:THR 40-72154WI
RATING: DC 110 V
COMMENT: Test Mode: Mode 5: Full Load (Model No.: THR 40-72154WI)

OPERATOR : Sam
TEST SITE : OATS 1
TEST DISTANCE : 10 m
POLARIZATION : VERTICAL
TEMP/HUM : 24.1°C/ 34%

Data:12

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	35.580	48.46	-12.72	35.74	40.00	-4.26	QP
2	53.780	40.13	-18.82	21.31	40.00	-18.69	QP
3	76.980	35.78	-21.87	13.91	40.00	-26.09	QP
4	124.200	37.77	-14.80	22.97	40.00	-17.03	QP
5	155.400	35.30	-12.83	22.47	40.00	-17.53	QP
6	204.000	39.54	-10.63	28.91	40.00	-11.09	QP
7	229.000	42.67	-10.70	31.97	40.00	-8.03	QP
8	244.400	40.01	-9.79	30.22	47.00	-16.78	QP
9	263.800	40.42	-9.16	31.26	47.00	-15.74	QP
10	300.000	30.31	-7.00	23.31	47.00	-23.69	QP
11	309.600	29.22	-12.32	16.90	47.00	-30.10	QP
12	458.400	31.25	-8.35	22.90	47.00	-24.10	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7222WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 6: Full Load (Model No.: THR 40-7222WI)

OPERATOR : Sam

TEST SITE : OATS 1

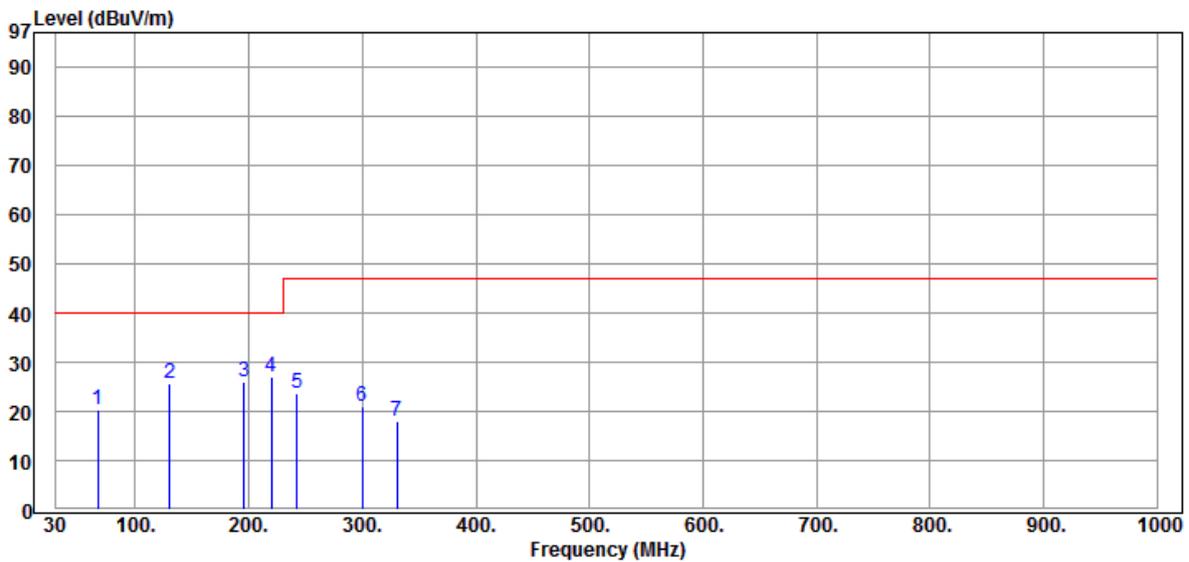
TEST DISTANCE : 10 m

POLARIZATION : HORIZONTAL

TEMP/HUM : 24.1°C/ 34%

Data:15

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	66.720	42.00	-21.51	20.49	40.00	-19.51	QP
2	130.500	40.12	-14.30	25.82	40.00	-14.18	QP
3	196.100	36.64	-10.66	25.98	40.00	-14.02	QP
4	219.700	37.83	-10.99	26.84	40.00	-13.16	QP
5	242.100	33.66	-9.94	23.72	47.00	-23.28	QP
6	300.000	28.15	-7.00	21.15	47.00	-25.85	QP
7	330.800	29.55	-11.70	17.85	47.00	-29.15	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7222WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 6: Full Load (Model No.: THR 40-7222WI)

OPERATOR : Sam

TEST SITE : OATS 1

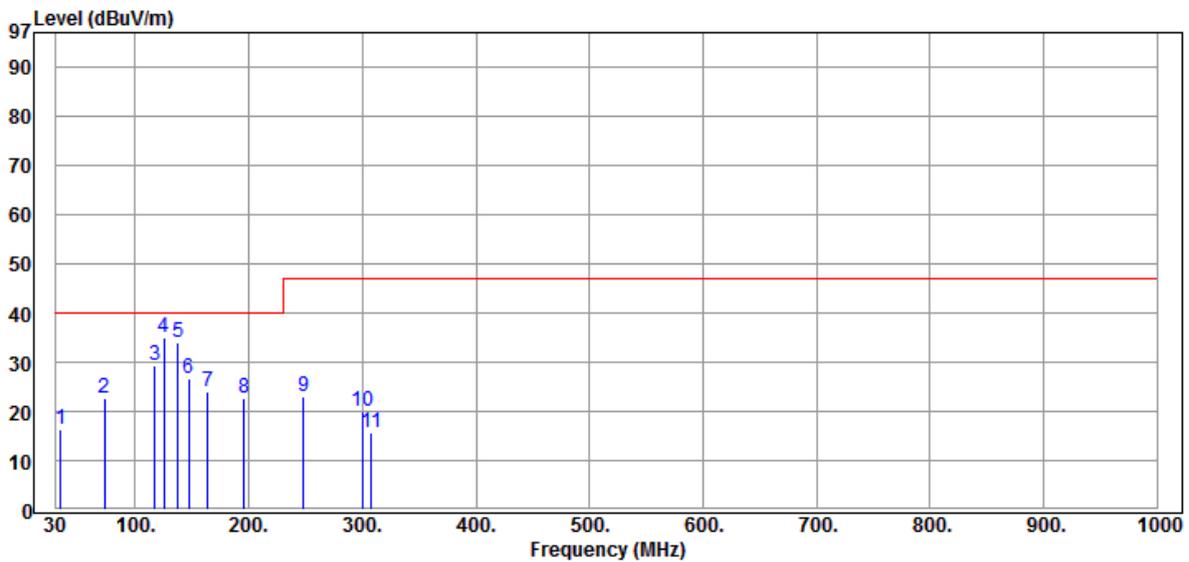
TEST DISTANCE : 10 m

POLARIZATION : VERTICAL

TEMP/HUM : 24.1°C/ 34%

Data:14

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	34.360	28.78	-12.29	16.49	40.00	-23.51	QP
2	72.960	44.63	-21.97	22.66	40.00	-17.34	QP
3	117.500	44.82	-15.50	29.32	40.00	-10.68	QP
4	125.300	49.69	-14.72	34.97	40.00	-5.03	QP
5	137.400	47.89	-13.73	34.16	40.00	-5.84	QP
6	146.800	39.89	-13.26	26.63	40.00	-13.37	QP
7	163.800	36.28	-12.35	23.93	40.00	-16.07	QP
8	195.800	33.18	-10.66	22.52	40.00	-17.48	QP
9	248.600	32.51	-9.51	23.00	47.00	-24.00	QP
10	300.000	27.16	-7.00	20.16	47.00	-26.84	QP
11	308.000	27.91	-12.38	15.53	47.00	-31.47	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7223WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 7: Full Load (Model No.: THR 40-7223WI)

OPERATOR : Sam

TEST SITE : OATS 1

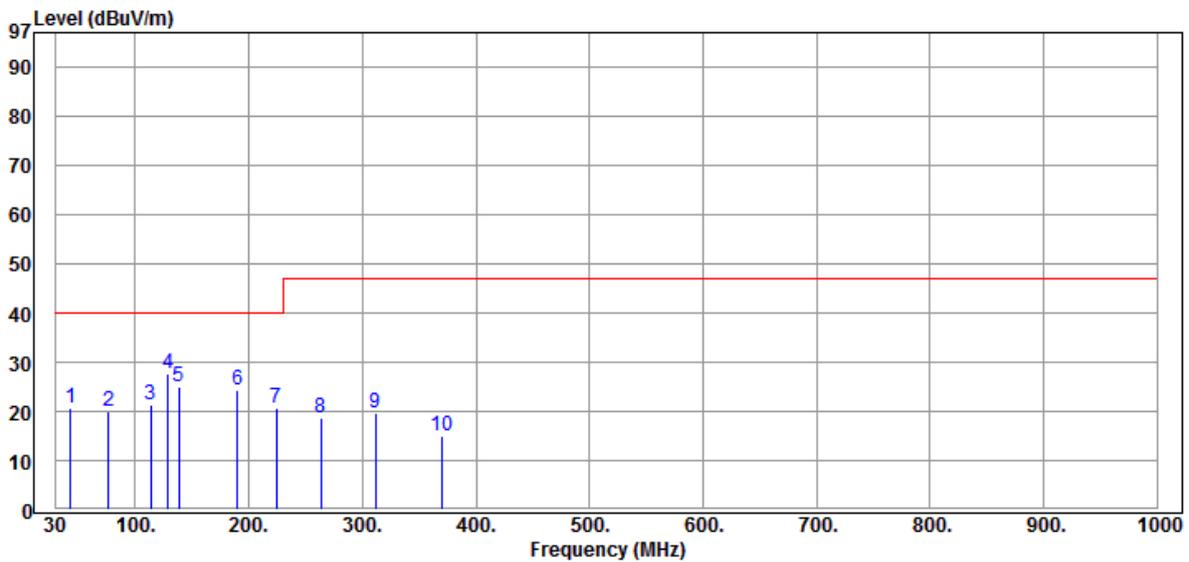
TEST DISTANCE : 10 m

POLARIZATION : HORIZONTAL

TEMP/HUM : 24.1°C/ 34%

Data:17

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	43.080	35.92	-15.42	20.50	40.00	-19.50	QP
2	76.380	41.91	-21.88	20.03	40.00	-19.97	QP
3	113.800	37.31	-16.01	21.30	40.00	-18.70	QP
4	129.200	42.02	-14.40	27.62	40.00	-12.38	QP
5	138.000	38.64	-13.68	24.96	40.00	-15.04	QP
6	190.000	35.08	-10.72	24.36	40.00	-15.64	QP
7	224.400	31.53	-10.97	20.56	40.00	-19.44	QP
8	263.200	28.00	-9.17	18.83	47.00	-28.17	QP
9	311.800	31.92	-12.23	19.69	47.00	-27.31	QP
10	370.400	25.73	-10.78	14.95	47.00	-32.05	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 40-7223WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 7: Full Load (Model No.: THR 40-7223WI)

OPERATOR : Sam

TEST SITE : OATS 1

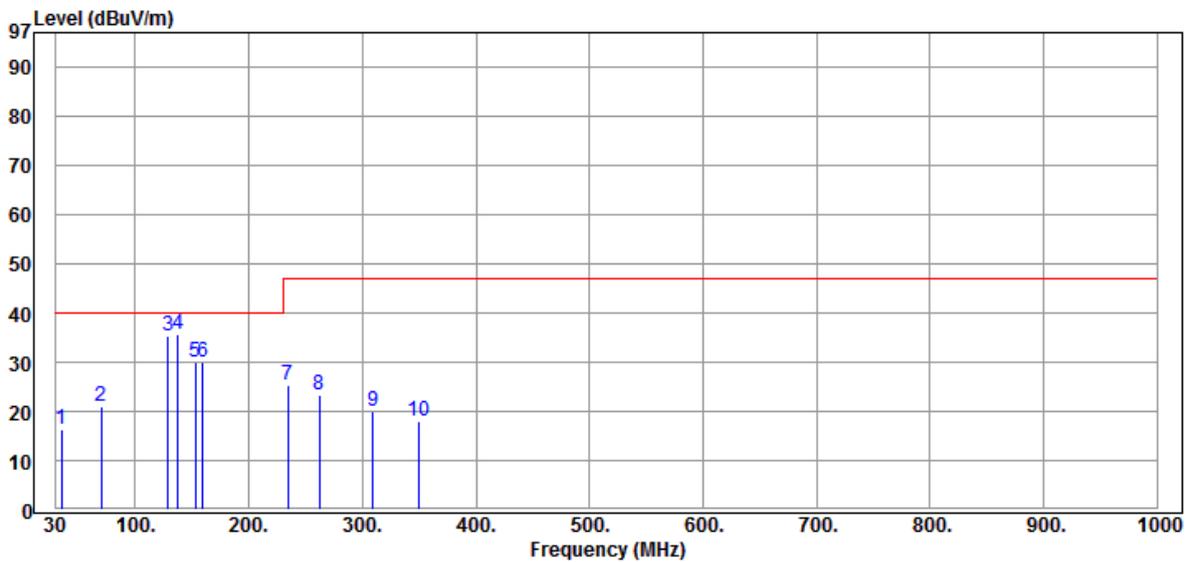
TEST DISTANCE : 10 m

POLARIZATION : VERTICAL

TEMP/HUM : 24.1°C/ 34%

Data:16

2020-01-02



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	34.620	28.66	-12.38	16.28	40.00	-23.72	QP
2	69.820	43.02	-22.00	21.02	40.00	-18.98	QP
3	128.760	49.76	-14.43	35.33	40.00	-4.67	QP
4	137.480	49.51	-13.73	35.78	40.00	-4.22	QP
5	153.100	42.83	-12.97	29.86	40.00	-10.14	QP
6	159.500	42.76	-12.60	30.16	40.00	-9.84	QP
7	234.700	35.70	-10.37	25.33	47.00	-21.67	QP
8	262.300	32.59	-9.20	23.39	47.00	-23.61	QP
9	309.200	32.17	-12.33	19.84	47.00	-27.16	QP
10	350.400	29.78	-11.64	18.14	47.00	-28.86	QP



4 Performance Criteria of Immunity Test

4.1 EN 55024

General performance criteria	
Criterion	Description
A	During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.
B	After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.
C	During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.
Particular performance criteria	
<p>The particular performance criteria which are specified in the normative annexes B~H take precedence over the corresponding parts of the general performance criteria.</p> <p>Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.</p> <p>Annex B Data processing equipment: (Read, write and storage of data; Data display; Data input; Data printing; Data processing)</p> <p>Annex C Local area networks (LAN)</p> <p>Annex D Printers and plotters</p> <p>Annex E Copying machines</p> <p>Annex F Automatic teller machines (ATM)</p> <p>Annex G Point of sale terminals (POST)</p> <p>Annex H xDSL Terminal equipment</p>	

**4.2 EN 55035****General performance criteria**

Criterion	Description
A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
B	During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, 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. The performance level may be replaced by a permissible loss of performance. If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
C	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Particular performance criteria

The particular performance criteria which are specified in the normative annexes A~H take precedence over the corresponding parts of the general performance criteria.

Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.

Annex A Broadcast reception function

Annex B Print functions

Annex C Scan function

Annex D Display and display output function

Annex E Musical tone generating function

Annex F Networking function

Annex G Audio output function

Annex H Telephony function

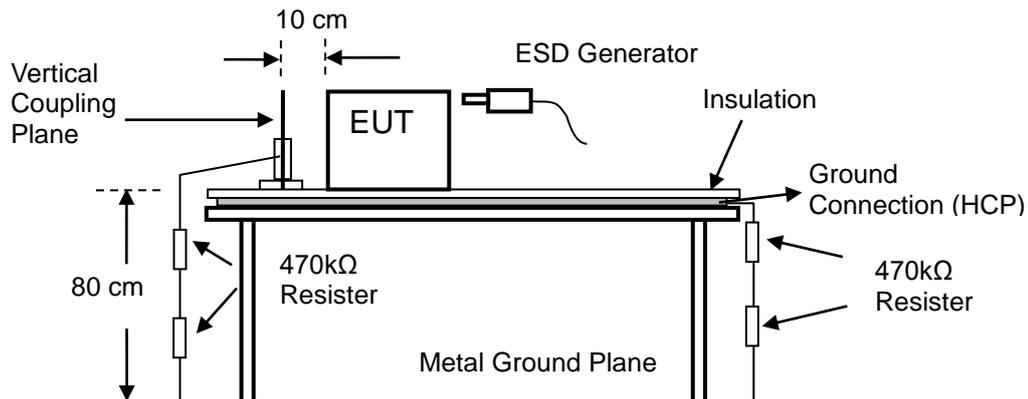
5 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

5.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
ESD Simulator	EMC PARTNER	ESD3000	276	2020/03/31

Note: The above equipments are within the valid calibration period.

5.2 Block Diagram of Test Configuration



5.3 Test Requirement

5.3.1 IEC 61000-4-2 (EN 55024) require:

Air discharge: ± 8 kV

Contact discharge: ± 4 kV

Performance criterion: **B**

5.3.2 IEC 61000-4-2 (EN 55035) require:

Air discharge: ± 8 kV

Contact discharge: ± 4 kV

Performance criterion: **B**

5.3.3 According to special request by client:

Air discharge: ± 8 kV

Contact discharge: ± 6 kV

Performance criterion: **A**

5.4 Configuration of Measurement

5.4.1 The test setup consists of the test generator, EUT and auxiliary instrumentation necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- Contact discharge to the conductive surfaces and to coupling planes;
- Air discharge at insulating surfaces.

5.4.2 The EUT shall be arranged in accordance with the manufacturer's instructions for installation.



5.5 Test Result

PASS.

The performance criterion after tested EN 55024:

Temperature: 22.3 °C ; Humidity: 49 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

Mode 1: Full Load (Model No.: THR 40-7211WI)

Air discharge ± 2 kV, ± 4 kV, ± 8 kV: A B C

Contact discharge ± 2 kV, ± 4 kV, ± 6 kV: A B C

Indirect discharge (HCP) ± 2 kV, ± 4 kV, ± 6 kV: A B C

Indirect discharge (VCP) ± 2 kV, ± 4 kV, ± 6 kV: A B C

The performance criterion after tested EN 55035:

Temperature: 22.3 °C ; Humidity: 49 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

Mode 1: Full Load (Model No.: THR 40-7211WI)

Air discharge ± 2 kV, ± 4 kV, ± 8 kV: A B C

Contact discharge ± 2 kV, ± 4 kV, ± 6 kV: A B C

Indirect discharge (HCP) ± 2 kV, ± 4 kV, ± 6 kV: A B C

Indirect discharge (VCP) ± 2 kV, ± 4 kV, ± 6 kV: A B C

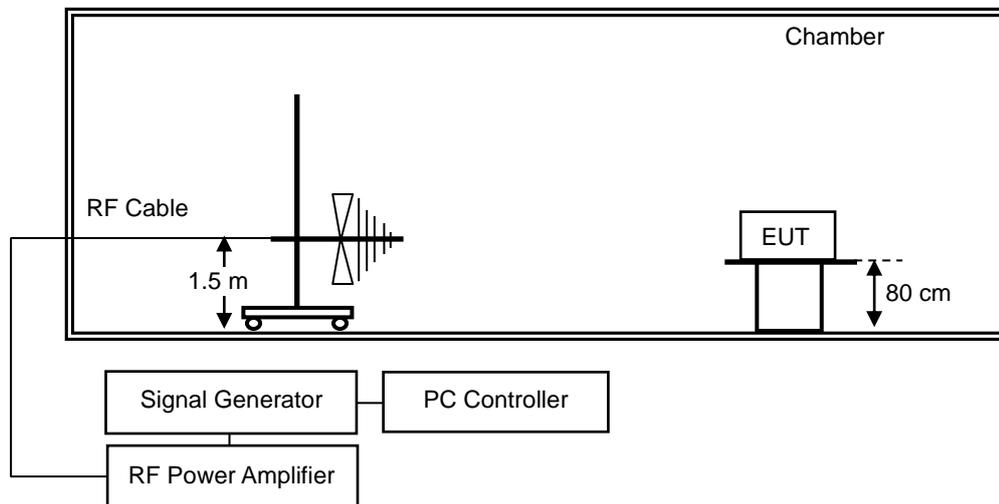
6 Radio-frequency, Electromagnetic field Immunity Test (IEC 61000-4-3)

6.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Signal Generator	KEYSIGHT	N5171B	MY53051802	2020/03/18
Power Amplifier	R&K	A080M102-5555R	B30850	2020/04/25
Power Amplifier	R&K	A701M402-4747R	B35850	2020/04/25
Power Amplifier	R&K	GA252M602-4747R	B60243	2020/04/25
Log Antenna	Schwarzbeck	VULP 9118 G Special	9118GS912	2020/04/25
Horn Antenna	Schwarzbeck	BBHA 9120 E	BBHA9120E 586	2020/04/25

Note: The above equipments are within the valid calibration period.

6.2 Block Diagram of Test Configuration



6.3 Test Requirement

6.3.1 IEC 61000-4-3 (EN 55024) require:

The frequency steps: 1 %, Log sweep, Dwell time: 3.0 sec.

Frequency range: 80 to 1000 MHz, Field strength: 3 V/m, 80 %AM (1 kHz)

Performance criterion: **A**

6.3.2 IEC 61000-4-3 (EN 55035) require:

The frequency steps: 1 %, Log sweep, Dwell time: 3.0 sec.

Frequency range: 80 to 1000 MHz, Field strength: 3 V/m, 80% AM (1 kHz)

Spot frequency: 1800 MHz, Field strength: 3 V/m, 80 % AM (1 kHz)

Spot frequency: 2600 MHz, Field strength: 3 V/m, 80 % AM (1 kHz)

Spot frequency: 3500 MHz, Field strength: 3 V/m, 80 % AM (1 kHz)

Spot frequency: 5000 MHz, Field strength: 3 V/m, 80 % AM (1 kHz)

Performance criterion: **A**



6.3.3 According to special request by client:

The frequency steps: 1 %, Log sweep, Dwell time: 3.0 sec.

Frequency range: 80 to 1000 MHz, Field strength: 20 V/m, 80 % AM (1 kHz)

Spot frequency: 1800 MHz, Field strength: 20 V/m, 80 %A M (1 kHz)

Spot frequency: 2600 MHz, Field strength: 20 V/m, 80 % AM (1 kHz)

Spot frequency: 3500 MHz, Field strength: 20 V/m, 80 % AM (1 kHz)

Spot frequency: 5000 MHz, Field strength: 20 V/m, 80 % AM (1 kHz)

Performance criterion: **A**

6.4 Configuration of Measurement

6.4.1 Before testing, the intensity of the established field strength was checked by placing the field sensor at a calibration grid point, and with the field generating antenna and cables in the same positions as used for the calibration, the forward and reverse power were measured. The forward power needed to give the calibrated field was evaluated.

6.4.2 The EUT was placed on a non-metallic table 0.8m above the reference ground plane (RGP) and was operated according to its specified operating mode.

6.4.3 Ferrite tiles/ absorbers were placed on the RGP between the EUT and the antenna to reduce the reflections from the RGP.

The distance between antenna and EUT is 1 meter.

6.5 Test Result

PASS.

The performance criterion after tested EN 55024:

Temperature: 21.9 °C ; Humidity: 47 % ; Atmospheric: 996 hPa ; Test Engineer: Scott

Mode 1: Full Load (Model No.: THR 40-7211WI)

Frequency range: **80** to **1000** MHz, Field strength: **3** V/m, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**

Frequency range: **80** to **1000** MHz, Field strength: **20** V/m, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**



The performance criterion after tested EN 55035:

Temperature: 21.9 °C ; Humidity: 47 % ; Atmospheric: 996 hPa ; Test Engineer: Scott

Mode 1: Full Load (Model No.: THR 40-7211WI)

- Frequency range: **80 to 1000 MHz**, Field strength: **3 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**
- Spot frequency: **1800 MHz**, Field strength: **3 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**
- Spot frequency: **2600 MHz**, Field strength: **3 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**
- Spot frequency: **3500 MHz**, Field strength: **3 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**
- Spot frequency: **5000 MHz**, Field strength: **3 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**

- Frequency range: **80 to 1000 MHz**, Field strength: **20 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**
- Spot frequency: **1800 MHz**, Field strength: **20 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**
- Spot frequency: **2600 MHz**, Field strength: **20 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**
- Spot frequency: **3500 MHz**, Field strength: **20 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**
- Spot frequency: **5000 MHz**, Field strength: **20 V/m**, 80 % AM (1 kHz),
Performance criterion: **A** **B** **C**

7 Electrical Fast Transient/Burst Immunity Test (IEC 61000-4-4) (with EFT Solution)

7.1 Instrument

(For Mode 1)

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMC Test System	EMC PARTNER	TRANSIENT-2000	812	2020/02/10

Note: The above equipments are within the valid calibration period.

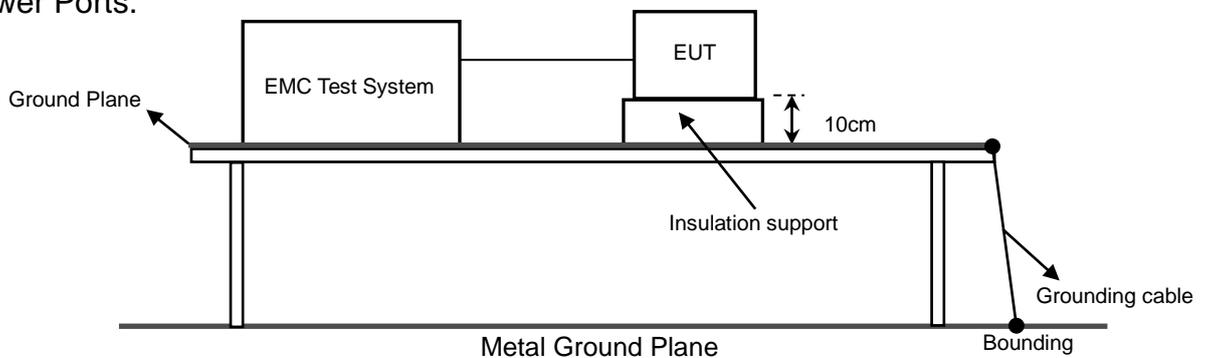
(For Mode 2, 4, 5, 7)

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMC Test System	EMC PARTNER	TRANSIENT-2000	812	2021/02/05

Note: The above equipments are within the valid calibration period.

7.2 Block Diagram of Test Configuration

For Power Ports.



7.3 Test Requirement

7.3.1 IEC 61000-4-4 (EN 55024) require:

5 kHz Repetition frequency

± 1.0 kV Input AC power ports.

± 0.5 kV Input DC power ports.

± 0.5 kV Signal ports.

± 0.5 kV Telecommunication ports.

Performance criterion: **B**

7.3.2 IEC 61000-4-4 (EN 55035) require:

5 kHz Repetition frequency

± 1.0 kV AC mains power ports.

± 0.5 kV DC network power ports.

± 0.5 kV analogue/digital data ports.

Performance criterion: **B**

7.3.3 According to special request by client:

5 kHz Repetition frequency

± 2.0 kV input DC power ports.

± 2.0 kV DC network power ports.

Performance criterion: **A**



7.4 Configuration of Measurement

- 7.4.1 The EUT and the auxiliary equipment were placed on a wooden table of 0.8 meters height. The size of ground plane is greater than 1 mx1 m and project beyond the EUT by at least 0.1 m on all sides. The ground plane is connected to the protective earth.
7.4.2 The EUT was connected to the power mains through a coupling device that directly couples the EFT interference signal. Each of the Line, Neutral and Protective Earth (PE) conductors was impressed with burst noise for 1 minute. Both the voltage polarities were applied for each test level. The length of the signal and power lines between the coupling device and the EUT shall be 0.5 m ± 0.05 m.

7.5 Test Result

PASS.

The performance criterion after tested EN 55024:

Temperature: 20.3 °C ; Humidity: 49 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

Mode 1: Full Load (Model No.: THR 40-7211WI)

- ± 0.5 kV input DC power port: Line Performance criterion: [X] A [] B [] C
± 0.5 kV input DC power port: Neutral Performance criterion: [X] A [] B [] C
± 0.5 kV input DC power port: Line + Neutral Performance criterion: [X] A [] B [] C
± 2.0 kV input DC power port: Line Performance criterion: [X] A [] B [] C
± 2.0 kV input DC power port: Neutral Performance criterion: [X] A [] B [] C
± 2.0 kV input DC power port: Line + Neutral Performance criterion: [X] A [] B [] C

Temperature: 23.5 °C ; Humidity: 55 % ; Atmospheric: 991 hPa ; Test Engineer: Albert

Mode 2: Full Load (Model No.: THR 40-7212WI)

- ± 2.0 kV input DC power port: Line Performance criterion: [X] A [] B [] C
± 2.0 kV input DC power port: Neutral Performance criterion: [X] A [] B [] C
± 2.0 kV input DC power port: Line + Neutral Performance criterion: [X] A [] B [] C

**Mode 4: Full Load (Model No.: THR 40-7215WI)**

- ± 2.0 kV input DC power port: Line
Performance criterion: A B C
- ± 2.0 kV input DC power port: Neutral
Performance criterion: A B C
- ± 2.0 kV input DC power port: Line + Neutral
Performance criterion: A B C

Mode 5: Full Load (Model No.: THR 40-72154WI)

- ± 2.0 kV input DC power port: Line
Performance criterion: A B C
- ± 2.0 kV input DC power port: Neutral
Performance criterion: A B C
- ± 2.0 kV input DC power port: Line + Neutral
Performance criterion: A B C

Mode 7: Full Load (Model No.: THR 40-7223WI)

- ± 2.0 kV input DC power port: Line
Performance criterion: A B C
- ± 2.0 kV input DC power port: Neutral
Performance criterion: A B C
- ± 2.0 kV input DC power port: Line + Neutral
Performance criterion: A B C

The performance criterion after tested EN 55035:

Temperature: 20.3 °C ; Humidity: 49 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

Mode 1: Full Load (Model No.: THR 40-7211WI)

- ± 0.5 kV input DC network power port: Line
Performance criterion: A B C
- ± 0.5 kV input DC network power port: Neutral
Performance criterion: A B C
- ± 0.5 kV input DC network power port: Line + Neutral
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Line
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Neutral
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Line + Neutral
Performance criterion: A B C



Temperature: 23.5 °C ; Humidity: 55 % ; Atmospheric: 991 hPa ; Test Engineer: Albert

Mode 2: Full Load (Model No.: THR 40-7212WI)

- ± 2.0 kV input DC network power port: Line
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Neutral
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Line + Neutral
Performance criterion: A B C

Mode 4: Full Load (Model No.: THR 40-7215WI)

- ± 2.0 kV input DC network power port: Line
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Neutral
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Line + Neutral
Performance criterion: A B C

Mode 5: Full Load (Model No.: THR 40-72154WI)

- ± 2.0 kV input DC network power port: Line
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Neutral
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Line + Neutral
Performance criterion: A B C

Mode 7: Full Load (Model No.: THR 40-7223WI)

- ± 2.0 kV input DC network power port: Line
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Neutral
Performance criterion: A B C
- ± 2.0 kV input DC network power port: Line + Neutral
Performance criterion: A B C



8 Surge Immunity Test (IEC 61000-4-5) (with Surge Solution)

8.1 Instrument

(For Mode 1)

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Surge Generator	KeyTek	EMC Pro	0003234	2020/03/26

Note: The above equipments are within the valid calibration period.

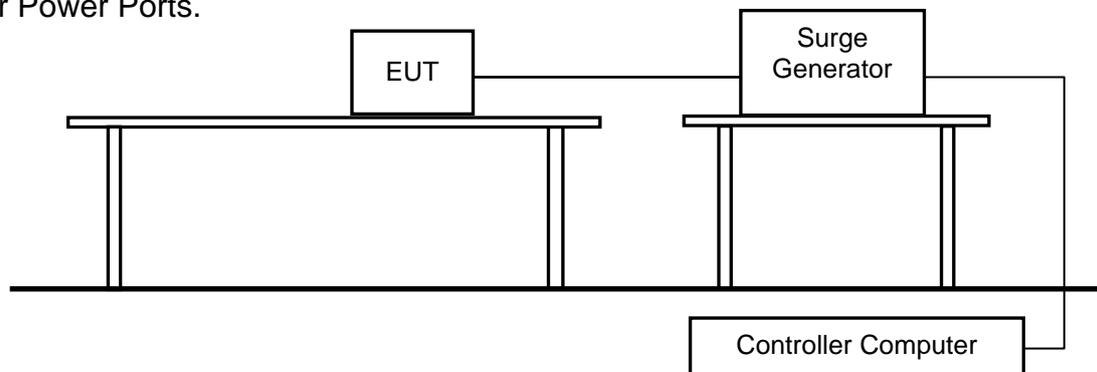
(For Mode 2, 4, 5, 7)

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Surge Generator	KeyTek	EMC Pro	0003234	2021/02/05

Note: The above equipments are within the valid calibration period.

8.2 Block Diagram of Test Configuration

For Power Ports.



8.3 Test Requirement

8.3.1 IEC 61000-4-5 (EN 55024) require:

- Input AC power ports:
 - Line to line: ± 1.0 kV (peak), 1.2/50 (8/20) Tr/Th μ s
 - Line to earth (ground): ± 2.0 kV (peak), 1.2/50 (8/20) Tr/Th μ s
- Input DC power ports: ± 0.5 kV (peak): Line to earth, 1.2/50 (8/20) Tr/Th μ s

Performance criterion: **B**

- Signal ports:
 - without primary protections: ± 1.0 kV (peak): 10/700 Tr/Th μ s
 - Primary protectors: ± 4.0 kV (peak): 10/700 Tr/Th μ s
- Telecommunication ports:
 - without primary protections: ± 1.0 kV (peak): 10/700 Tr/Th μ s
 - Primary protectors: ± 4.0 kV (peak): 10/700 Tr/Th μ s

Where the coupling network for the 10/700 μ s waveform affects the functioning of high speed data ports, the test shall be carried out using a 1.2/50 (8/20) μ s waveform and appropriate coupling network.

- Signal ports:
 - without primary protections: ± 1.0 kV (peak): 1.2/50 (8/20) Tr/Th μ s
 - Primary protectors: ± 4.0 kV (peak): 1.2/50 (8/20) Tr/Th μ s
- Telecommunication ports:
 - without primary protections: ± 1.0 kV (peak): 1.2/50 (8/20) Tr/Th μ s
 - Primary protectors: ± 4.0 kV (peak): 1.2/50 (8/20) Tr/Th μ s

Performance criterion: **C**

8.3.2 IEC 61000-4-5 (EN 55035) require:

- AC mains power ports:
 - Line to line: ± 1.0 kV (peak), 1.2/50 (8/20) Tr/Th μ s
 - Line to earth (ground): ± 2.0 kV (peak), 1.2/50 (8/20) Tr/Th μ s



DC network power ports: ± 0.5kV (peak): line to earth, 1.2/50 (8/20) Tr/Th µs

Performance criterion: **B**

Analogue/digital data ports:

without primary protections: ± 1.0 kV (peak): 10/700 Tr/Th µs

Primary protectors: ± 4.0 kV (peak): 10/700 Tr/Th µs

Where the coupling network for the 10/700 µs waveform affects the functioning of high speed data ports, the test shall be carried out using a 1.2/50 (8/20) µs waveform and appropriate coupling network.

Analogue/digital data ports:

without primary protections: ± 1.0 kV (peak): 1.2/50 (8/20) Tr/Th µs

Primary protectors: ± 4.0 kV (peak): 1.2/50 (8/20) Tr/Th µs

Performance criterion: **C**

8.3.3 According to special request by client:

Input DC power ports: Line to line: ± 2.0 kV (peak), 1.2/50 (8/20) Tr/Th µs

Performance criterion: **A**

DC network power ports: Line to line: ± 2.0 kV (peak), 1.2/50 (8/20) Tr/Th µs

Performance criterion: **A**

8.4 Configuration of Measurement

8.4.1 The EUT and support units were located on a wooden table 0.8 m away from ground floor.

8.4.2 The EUT was connected to the power mains through a coupling device that directly couples the Surge interference signal.

8.4.3 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.

8.5 Test Result

PASS.

The performance criterion after tested EN 55024:

Temperature: 21.3 °C ; Humidity: 51 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

Mode 1: Full Load (Model No.: THR 40-7211WI)

± 0.5 kV (peak) Input DC power port: Line to line

Performance criterion: **A** **B** **C**

± 1.0 kV (peak) Input DC power port: Line to line

Performance criterion: **A** **B** **C**

± 2.0 kV (peak) Input DC power port: Line to line

Performance criterion: **A** **B** **C**



Temperature: 25.6 °C ; Humidity: 51 % ; Atmospheric: 991 hPa ; Test Engineer: Albert

Mode 2: Full Load (Model No.: THR 40-7212WI)

- ± 0.5 kV (peak) Input DC power port: Line to line
Performance criterion: A B C
- ± 1.0 kV (peak) Input DC power port: Line to line
Performance criterion: A B C
- ± 2.0 kV (peak) Input DC power port: Line to line
Performance criterion: A B C

Mode 4: Full Load (Model No.: THR 40-7215WI)

- ± 0.5 kV (peak) Input DC power port: Line to line
Performance criterion: A B C
- ± 1.0 kV (peak) Input DC power port: Line to line
Performance criterion: A B C
- ± 2.0 kV (peak) Input DC power port: Line to line
Performance criterion: A B C

Mode 5: Full Load (Model No.: THR 40-72154WI)

- ± 0.5 kV (peak) Input DC power port: Line to line
Performance criterion: A B C
- ± 1.0 kV (peak) Input DC power port: Line to line
Performance criterion: A B C
- ± 2.0 kV (peak) Input DC power port: Line to line
Performance criterion: A B C

Mode 7: Full Load (Model No.: THR 40-7223WI)

- ± 0.5 kV (peak) Input DC power port: Line to line
Performance criterion: A B C
- ± 1.0 kV (peak) Input DC power port: Line to line
Performance criterion: A B C
- ± 2.0 kV (peak) Input DC power port: Line to line
Performance criterion: A B C

The performance criterion after tested EN 55035:

Temperature: 21.3 °C ; Humidity: 51 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

Mode 1: Full Load (Model No.: THR 40-7211WI)

- ± 0.5 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 1.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 2.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C



Temperature: 25.6 °C ; Humidity: 51 % ; Atmospheric: 991 hPa ; Test Engineer: Albert

Mode 2: Full Load (Model No.: THR 40-7212WI)

- ± 0.5 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 1.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 2.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C

Mode 4: Full Load (Model No.: THR 40-7215WI)

- ± 0.5 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 1.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 2.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C

Mode 5: Full Load (Model No.: THR 40-72154WI)

- ± 0.5 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 1.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 2.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C

Mode 7: Full Load (Model No.: THR 40-7223WI)

- ± 0.5 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 1.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C
- ± 2.0 kV (peak) DC network power port: Line to line
Performance criterion: A B C

9 Radio-frequency, Conducted Disturbances Immunity Test (IEC 61000-4-6)

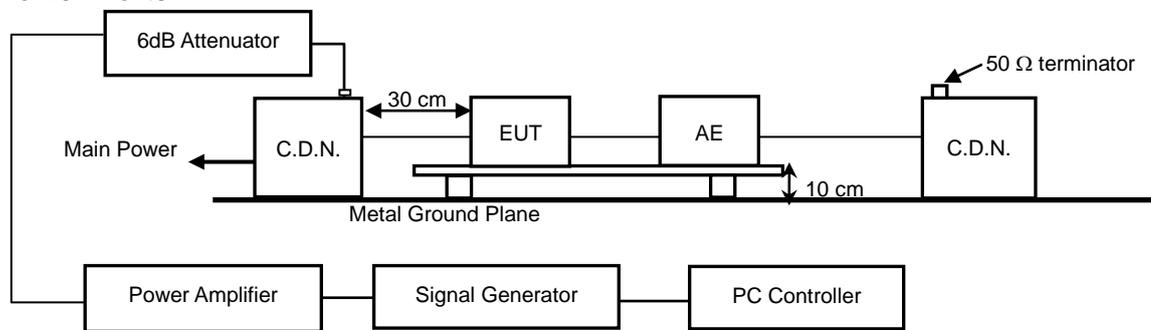
9.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Signal Generator	Marconi Instruments	2024	112246/087	2020/03/18
RF Power Amplifier	R&K	A009K101-5050R	B30850	2020/02/02
Attenuator	Microwave Device Inc.	MA-5250/6N	001052	2020/02/02
C.D.N	SCHAFFNER	M216	16394	2020/03/25
C.D.N	FCC	FCC-801-16A	2045	N.C.R.

Note: The above equipments are within the valid calibration period.

9.2 Block Diagram of Test Configuration

For Power Ports.



9.3 Test Requirement

9.3.1 IEC 61000-4-6 (EN 55024) require:

The frequency steps: 1 %, Log sweep, Dwell time: 3.0 sec.

Frequency Range is from 0.15 to 80 MHz.

Field strength: 3 V, 80 % AM (1 kHz)

- Input AC power ports.
- Input DC power ports.
- Signal ports.
- Telecommunication ports.

Performance criterion: **A**

9.3.2 IEC 61000-4-6 (EN 55035) require:

The frequency steps: 1%, Log sweep, Dwell time: 3.0 sec.

Frequency Range is from 0.15 to 10 MHz, Field strength: 3 V, 80 % AM (1 kHz)

Frequency Range is from 10 to 30 MHz, Field strength: 3 to 1 V, 80 % AM (1 kHz)

Frequency Range is from 30 to 80 MHz, Field strength: 1 V, 80 % AM (1 kHz)

- AC mains power ports.
- DC network power ports.
- analogue/digital data ports.

Performance criterion: **A**



9.3.3 According to special request by client:

Frequency Range is from 0.15 to 80 MHz, Field strength: 10 V, 80% AM (1 kHz);

Input DC power ports.

Performance criterion: **A**

Frequency Range is from 0.15 to 10 MHz, Field strength: 10 V, 80 % AM (1 kHz)

Frequency Range is from 10 to 30 MHz, Field strength: 10 V, 80 % AM (1 kHz)

Frequency Range is from 30 to 80 MHz, Field strength: 10 V, 80 % AM (1 kHz)

DC network power ports.

Performance criterion: **A**

9.4 Configuration of Measurement

9.4.1 The EUT was placed on a table of is 0.1 m height. In Semi-Anechoic chamber A Ground reference plane was placed on the table and a 0.1 meter insulating support was inserted between the EUT and Ground reference plane.

9.4.2 The EUT was connected to the power mains through a Coupling and Decoupling Networks (CDN).

9.4.3 The test was performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF input ports of the coupling devices were terminated by a 50 Ω terminator.

9.4.4 The frequency range was swept from 150 kHz to 80 MHz. Using the signal levels established during the setting process, and without the disturbance signal 80 % amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to switch coupling devices as necessary. The rate of sweep was less than 1.5×10⁻³ decades/s. And the step size of the frequency sweep was also less than 1 % of the start and thereafter

1 % of the preceding frequency value. The dwell time at each frequency was more than the time necessary for the EUT to be excited, and able to respond.

9.4.5 The EUT was fully excised during the testing and all the selected excise modes were fully interrogated for susceptibility.

9.5 Test Result

PASS.

The performance criterion after tested EN 55024:

Temperature: 22.5 °C ; Humidity: 46 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

Mode 1: Full Load (Model No.: THR 40-7211WI)

Frequency Range is from 0.15 to 80 MHz, Field strength: 3 V, 80% AM (1 kHz);

Input DC power port.

Performance criterion: **A** **B** **C**

Frequency Range is from 0.15 to 80 MHz, Field strength: 10 V, 80% AM (1 kHz);

Input DC power port.

Performance criterion: **A** **B** **C**



The performance criterion after tested EN 55035:

Temperature: 22.5 °C ; Humidity: 46 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

Mode 1: Full Load (Model No.: THR 40-7211WI)

Frequency Range is from **0.15** to **10** MHz, Field strength: 3 V, 80 % AM (1 kHz)

Frequency Range is from **10** to **30** MHz, Field strength: 3 to 1 V, 80 % AM (1 kHz)

Frequency Range is from **30** to **80** MHz, Field strength: 1 V, 80 % AM (1 kHz)

DC network power port.

Performance criterion: **A** **B** **C**

Frequency Range is from **0.15** to **10** MHz, Field strength: 10 V, 80% AM (1 kHz);

Frequency Range is from **10** to **30** MHz, Field strength: 10 V, 80% AM (1 kHz);

Frequency Range is from **30** to **80** MHz, Field strength: 10 V, 80% AM (1 kHz);

DC network power port.

Performance criterion: **A** **B** **C**

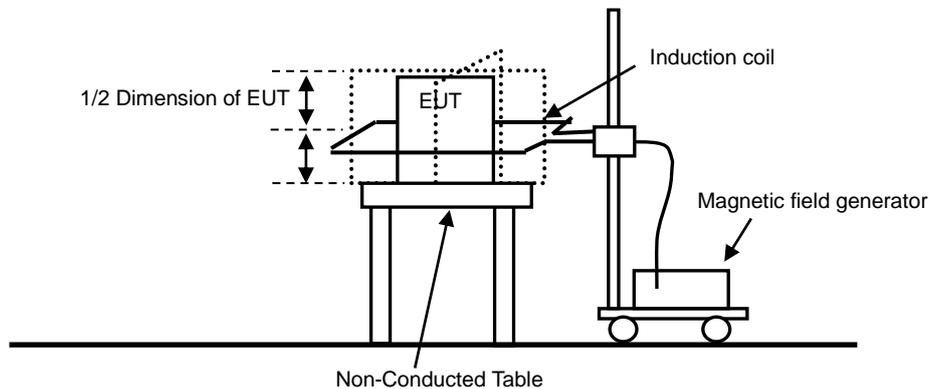
10 Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8)

10.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Magnetic field generator	PMM	PMM1008	0000J00301	2020/06/18

Note: The above equipments are within the valid calibration period.

10.2 Block Diagram of Test Configuration



10.3 Test Requirement

10.3.1 IEC 61000-4-8 (EN 55024) require:

Power Frequency is 50 Hz.

Magnetic field strength: 1 A/m (60 Sec.)

Performance criterion: **A**

10.3.2 IEC 61000-4-8 (EN 55035) require:

Power Frequency is 50 Hz.

Magnetic field strength: 1 A/m (60 Sec.)

Performance criterion: **A**

10.3.3 According to special request by client:

Power Frequency is 50 Hz.

Magnetic field strength: 100 A/m (60 Sec.), 1000 A/m (1 Sec.)

Performance criterion: **A**

10.4 Configuration of Measurement

10.4.1 The equipment is configured and connected to satisfy its functional requirements.

10.4.2 All cables shall be exposed to the magnetic field for 1 m of their length.

10.4.3 Different induction coils may be selected for testing in the different orthogonal directions.



10.5 Test Result

PASS.

The performance criterion after tested EN 55024:

Temperature: 18.9 °C ; Humidity: 50 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

Mode 1: Full Load (Model No.: THR 40-7211WI)

- Power Frequency is 50 Hz, Magnetic field strength: 1 A/m (60 Sec.)
Performance criterion: A B C
- Power Frequency is 50 Hz, Magnetic field strength: 100 A/m (60 Sec.)
Performance criterion: A B C
- Power Frequency is 50 Hz, Magnetic field strength: 1000 A/m (1 Sec.)
Performance criterion: A B C

The performance criterion after tested EN 55035:

Temperature: 18.9 °C ; Humidity: 50 % ; Atmospheric: 989 hPa ; Test Engineer: Albert

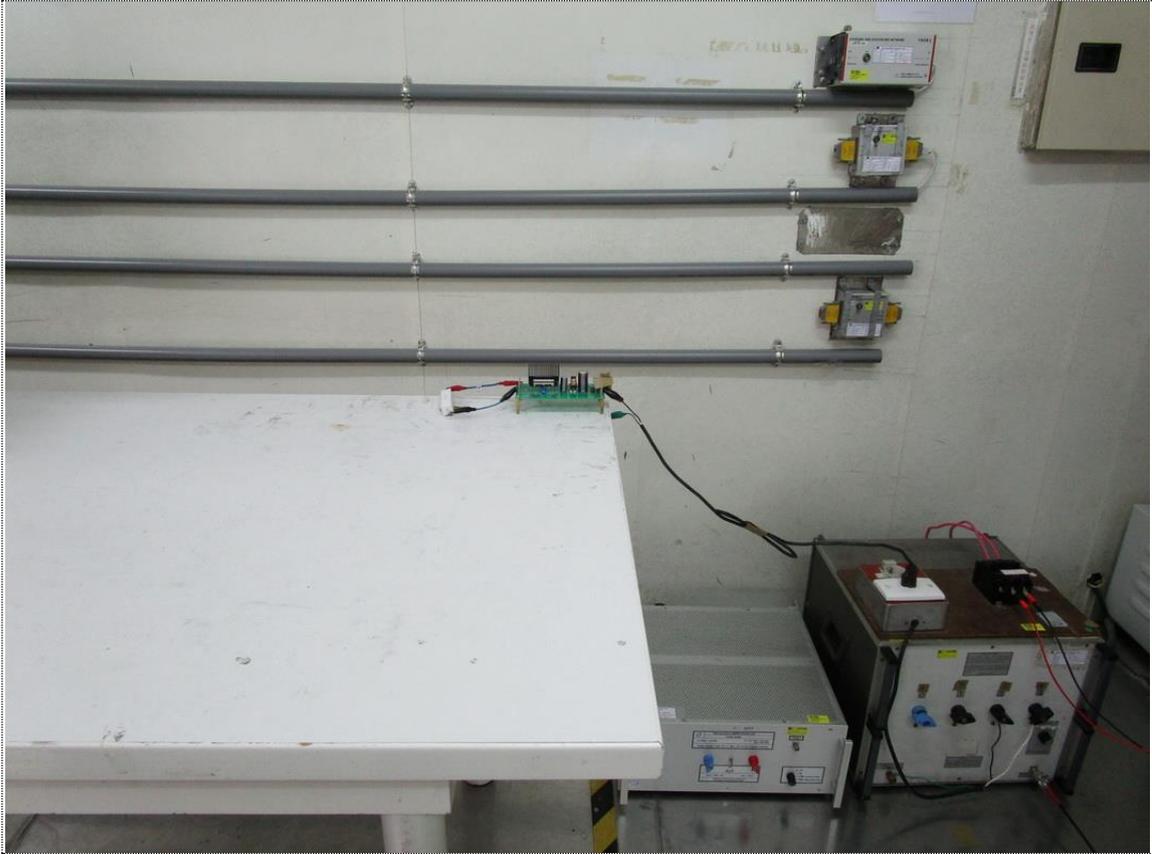
Mode 1: Full Load (Model No.: THR 40-7211WI)

- Power Frequency is 50 Hz, Magnetic field strength: 1 A/m (60 Sec.)
Performance criterion: A B C
- Power Frequency is 50 Hz, Magnetic field strength: 100 A/m (60 Sec.)
Performance criterion: A B C
- Power Frequency is 50 Hz, Magnetic field strength: 1000 A/m (1 Sec.)
Performance criterion: A B C



11 Photographs of Test

11.1 Conducted Emission Measurement



Front View



Rear View

11.2 Radiated Emission Measurement

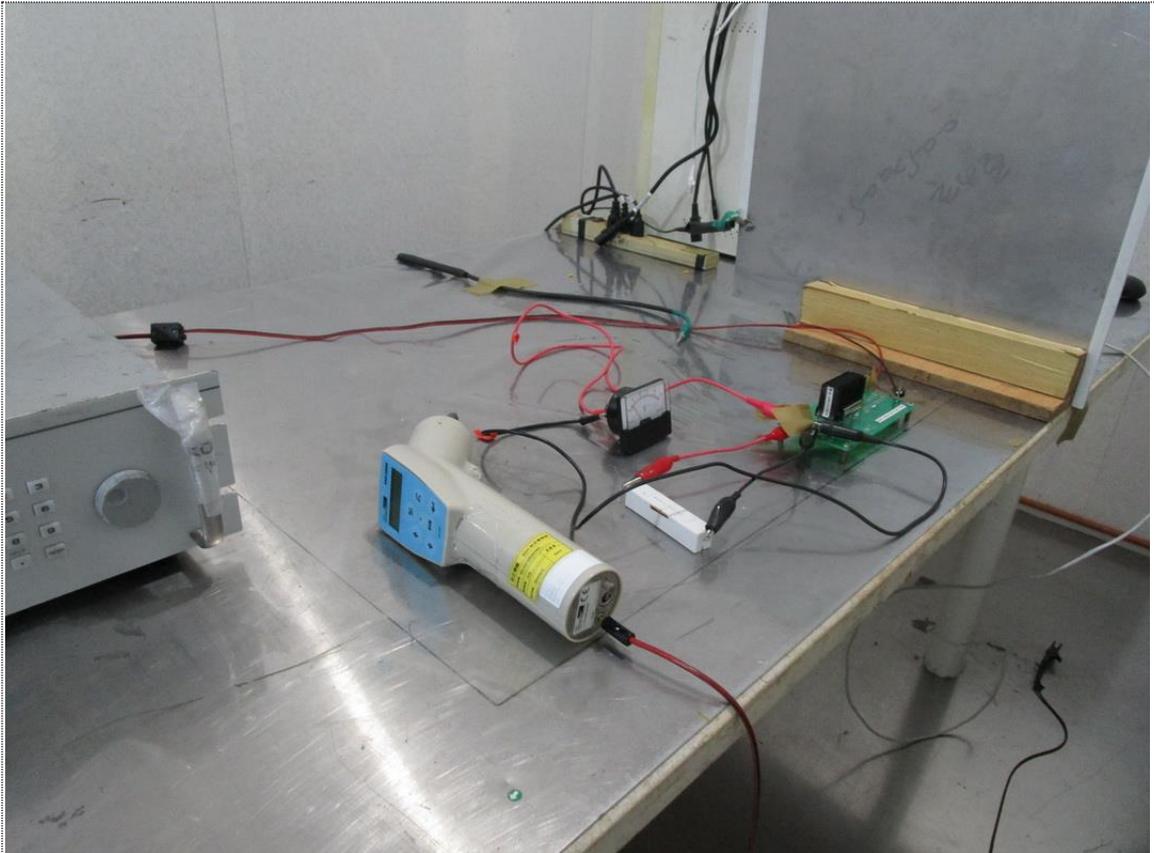


Front View

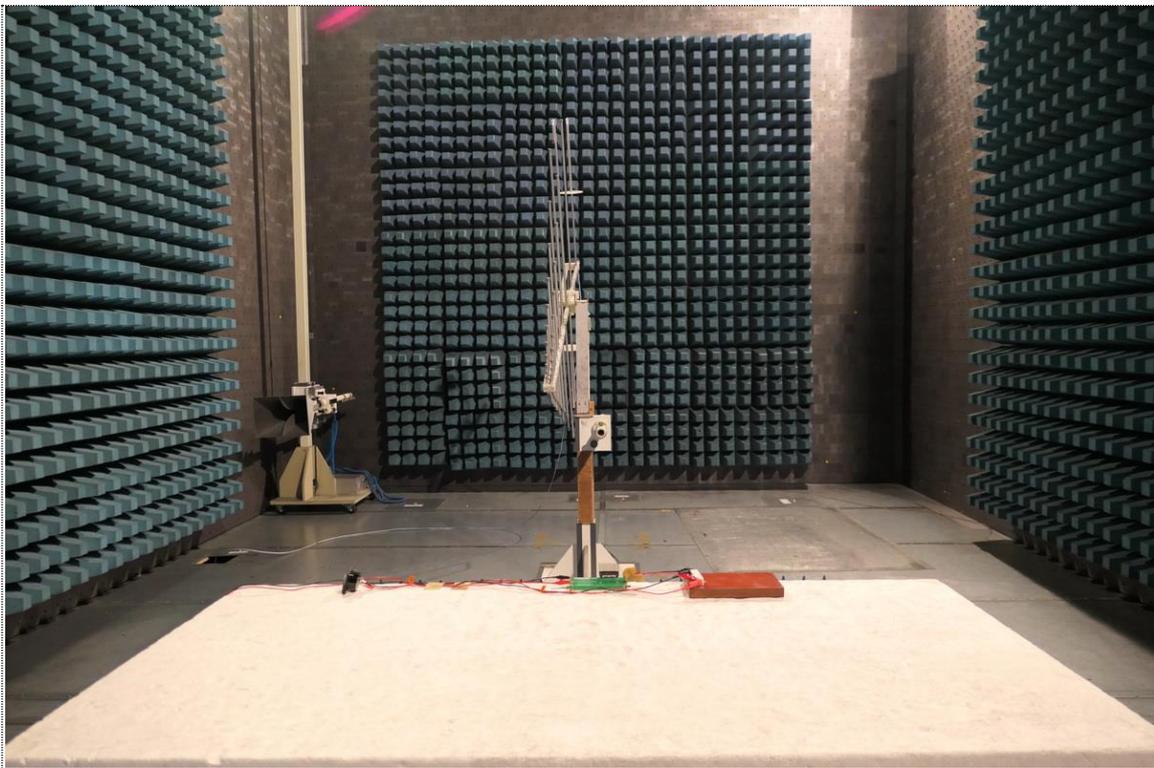


Rear View

11.3 Electrostatic Discharge Immunity Test (IEC 61000-4-2)



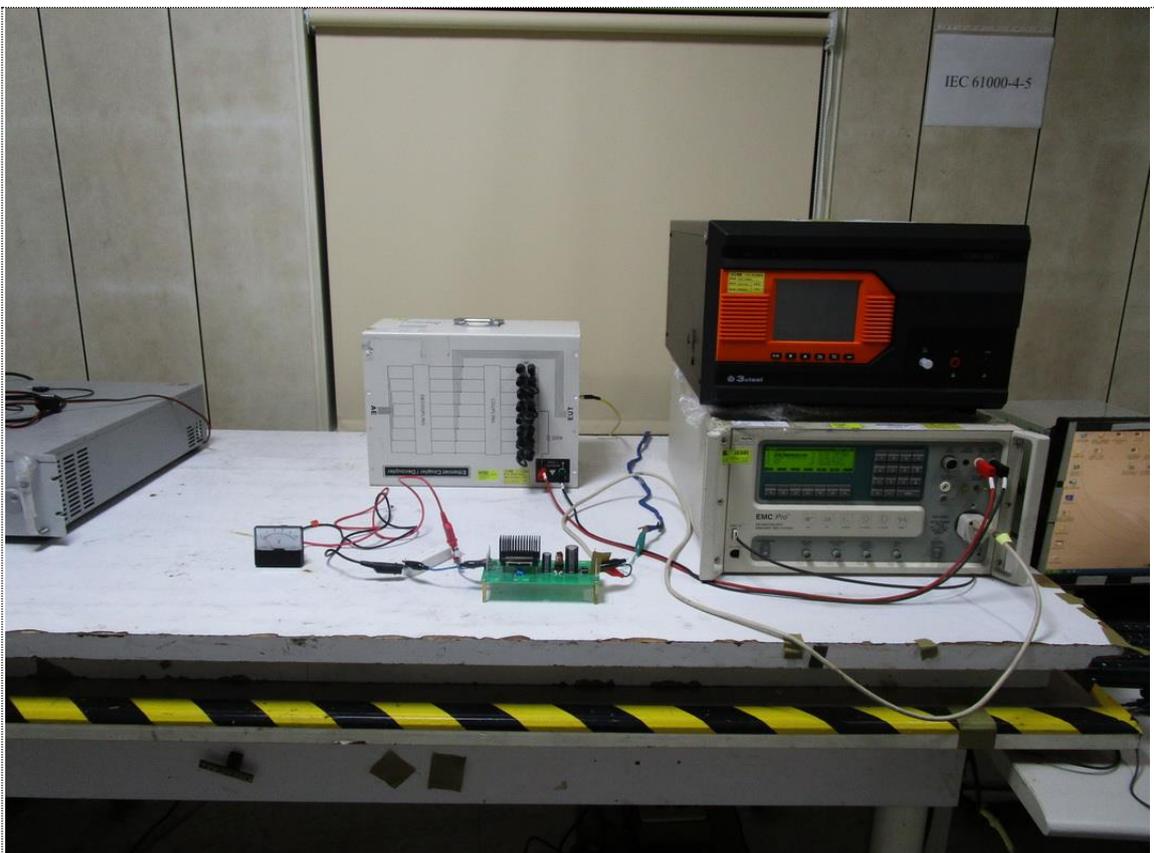
11.4 Radio-Frequency, Electromagnetic Field Immunity Test (IEC 61000-4-3)



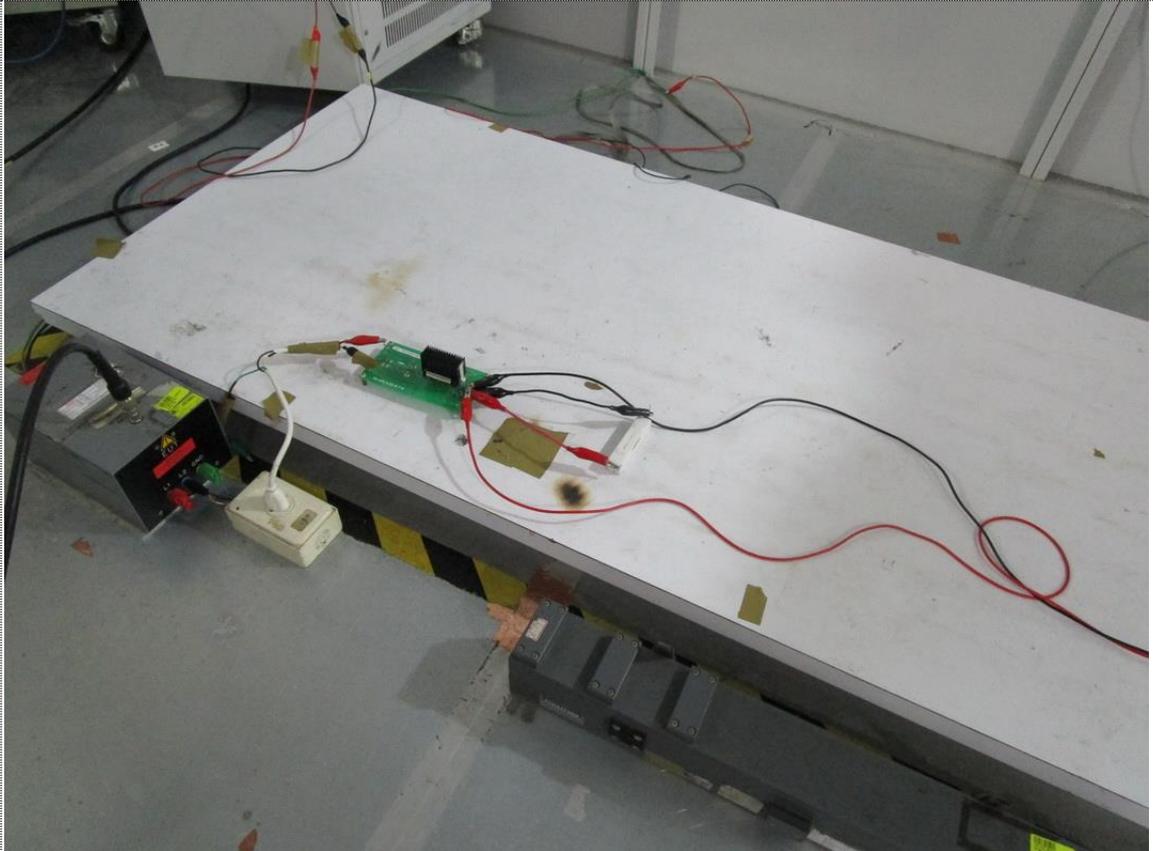
11.5 Fast transients Immunity Test (IEC 61000-4-4)



11.6 Surge Immunity Test (IEC 61000-4-5)



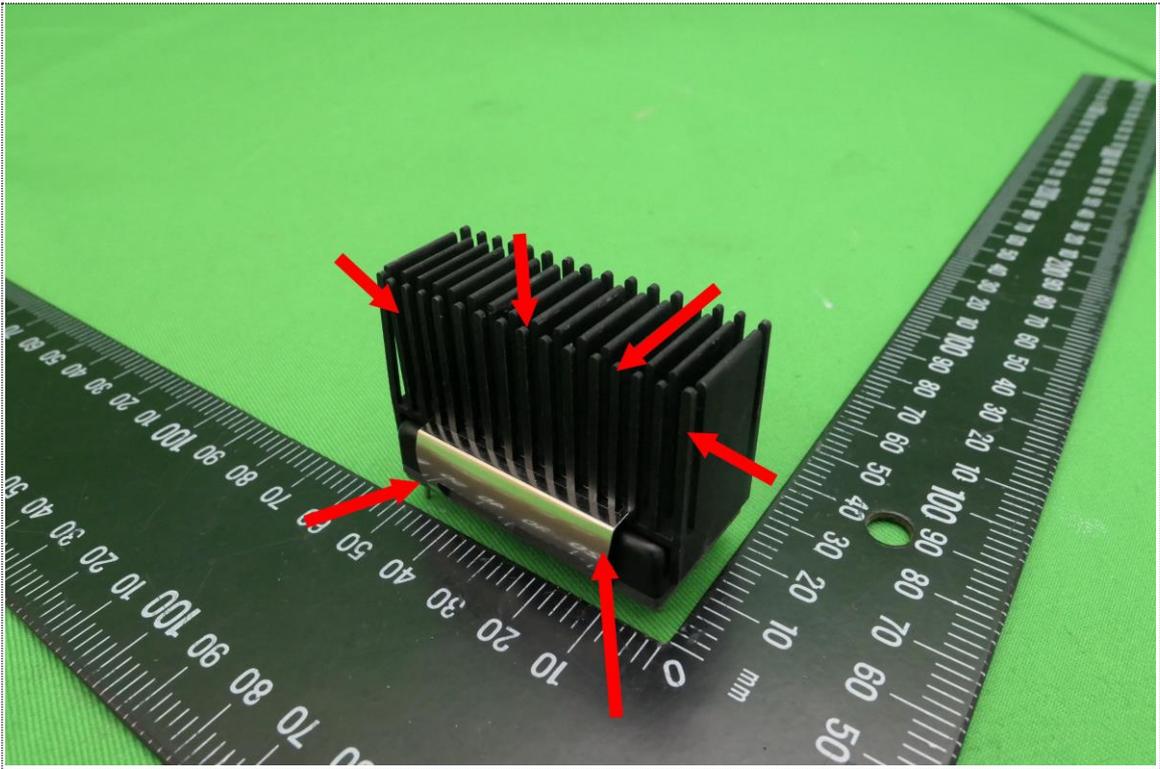
11.7 Radio-Frequency Continuous Conducted Immunity Test (IEC 61000-4-6)



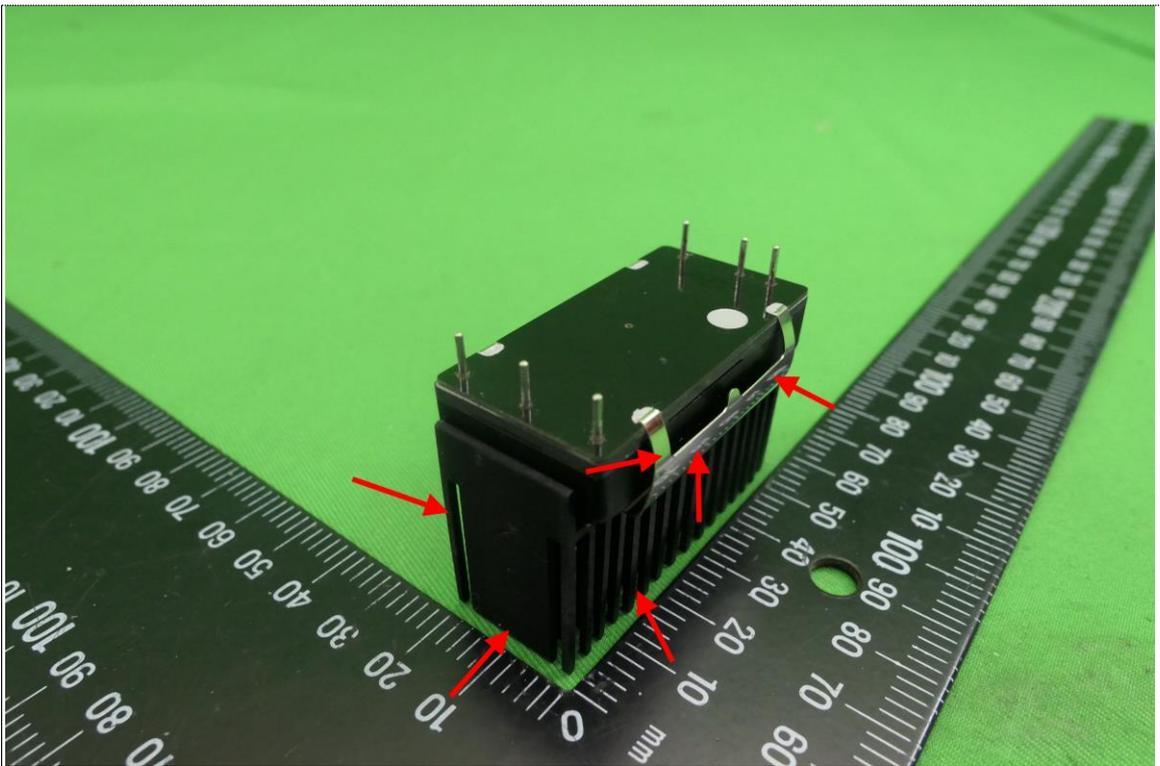
11.8 Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8)



11.9 Electrostatic Discharge Test Point



View of Discharge Point -1 (Red: Contact Discharge)



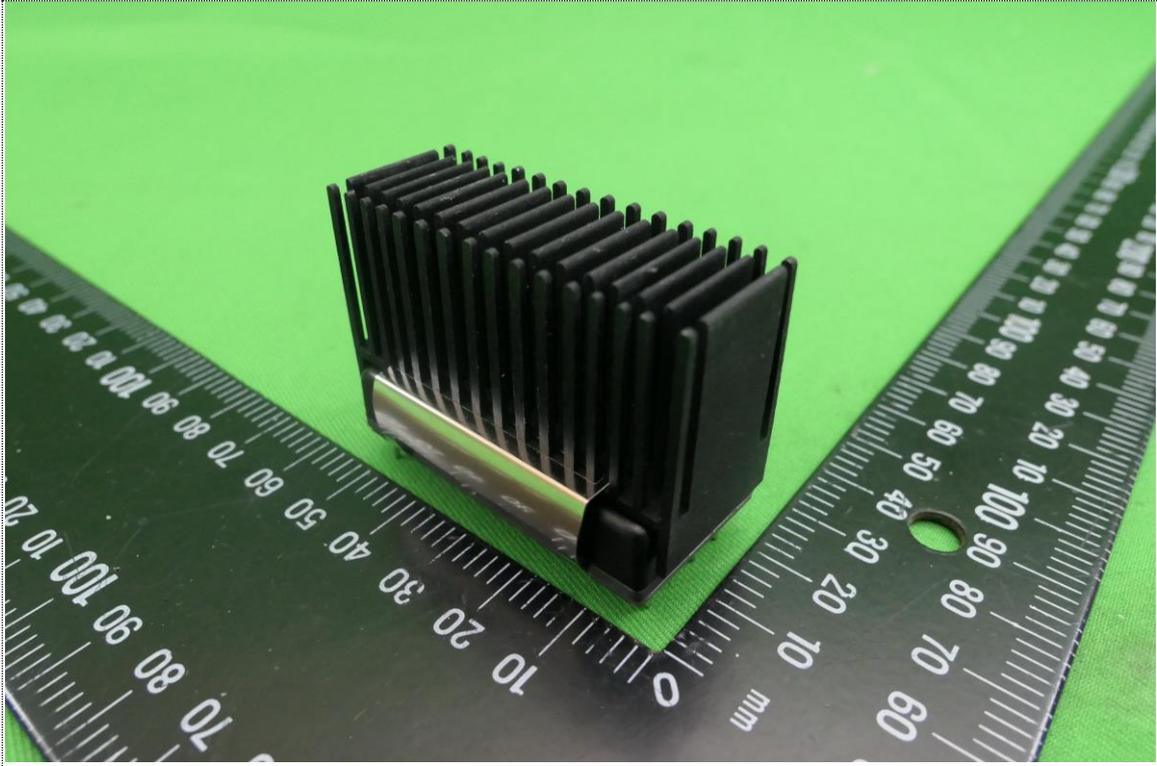
View of Discharge Point -2 (Red: Contact Discharge)

Note: Discharge points are arrow-highlighted in above photos; any surface without arrow is not being discharged electrostatic.

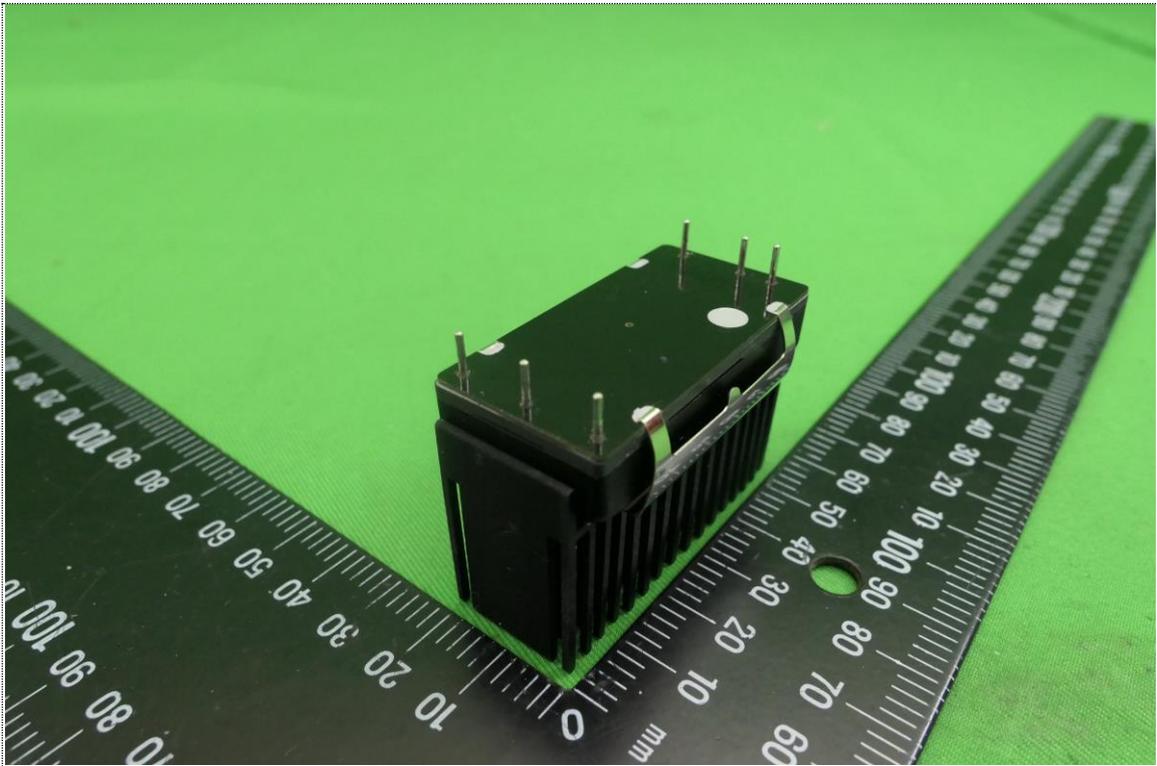


12 Photographs of EUT

12.1 Model Number: THR 40 Series



Front View of EUT



Rear View of EUT