



Test Report



(Declaration of Conformity)

for

Electromagnetic Compatibility

of

Product : **DC/DC CONVERTER**

Trade Name :



Model Number : THR 3-2411WI; THR 3-2412WI; THR 3-2413WI;
THR 3-2422WI; THR 3-2423WI; THR 3-4811WI;
THR 3-4812WI; THR 3-4813WI; THR 3-4822WI;
THR 3-4823WI; THR 3-7211WI; THR 3-7212WI;
THR 3-7213WI; THR 3-7222WI; THR 3-7223WI

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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Statement of Compliance

Applicant: TRACO ELECTRONIC AG
Manufacturer: TRACO ELECTRONIC AG
Product: DC/DC CONVERTER
Model No.: THR 3-2411WI; THR 3-2412WI; THR 3-2413WI; THR 3-2422WI;
THR 3-2423WI; THR 3-4811WI; THR 3-4812WI; THR 3-4813WI;
THR 3-4822WI; THR 3-4823WI; THR 3-7211WI; THR 3-7212WI;
THR 3-7213WI; THR 3-7222WI; THR 3-7223WI

Tested Power Voltage: DC 24 V; DC 48 V; DC 110 V

Date of Final Test: Apr. 23, 2018

Revision of Report: Rev. 01

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: 2020/05/15

Project Engineer:

Sam Lin

Sam Chang

Approved:

Edison Lee

Edison Lee



1 General Information

1.1 Description of Equipment Under Test

Product	: DC/DC CONVERTER
Model Number	: THR 3-2411WI; THR 3-2412WI; THR 3-2413WI; THR 3-2422WI; THR 3-2423WI; THR 3-4811WI; THR 3-4812WI; THR 3-4813WI; THR 3-4822WI; THR 3-4823WI; THR 3-7211WI; THR 3-7212WI; THR 3-7213WI; THR 3-7222WI; THR 3-7223WI
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	: Aug. 04 ~ Sep. 06, 2017 (For 17A080204E-E) Apr. 23, 2018 (For 18A042301E-E)
Additional Description	: 1.) The test models are “ THR 3-2411WI; THR 3-2423WI; THR 3-4811WI; THR 3-4823WI; THR 3-7211WI; THR 3-7223WI ” 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.:17A080204E-E; 18A042301E-E 4.) For more detail specification about EUT, please refer to the user’s manual.

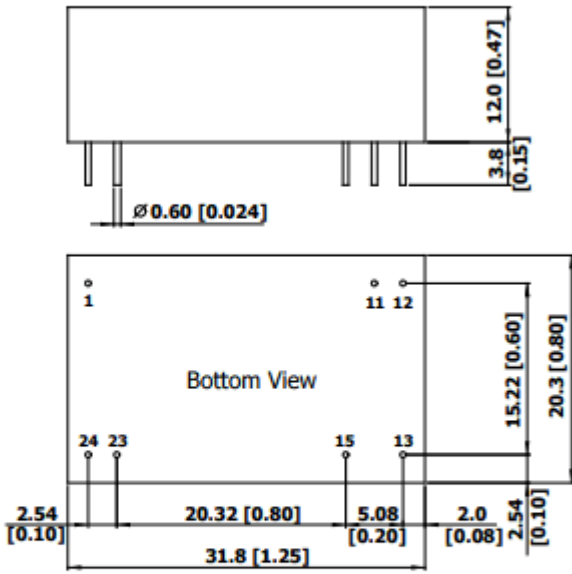


1.2 Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage
		Max.
	VDC	VDC
THR 3-2411WI	24 (9~36)	5
THR 3-2412WI		12
THR 3-2413WI		15
THR 3-2422WI		±12
THR 3-2423WI		±15
THR 3-4811WI	48 (18~75)	5
THR 3-4812WI		12
THR 3-4813WI		15
THR 3-4822WI		±12
THR 3-4823WI		±15
THR 3-7211WI	110 (40~160)	5
THR 3-7212WI		12
THR 3-7213WI		15
THR 3-7222WI		±12
THR 3-7223WI		±15



1.3 Package Specifications

Package Specifications																										
Mechanical Dimensions		Pin Connections																								
 <p>The drawing shows a top view and a bottom view of the package. The top view shows a rectangular package with dimensions 31.8 mm (1.25 inches) by 20.3 mm (0.80 inches). The bottom view shows the pin locations and dimensions. The pin locations are: Pin 1 at the top left, Pin 11 and 12 at the top right, Pin 24 and 23 at the bottom left, and Pin 15 and 13 at the bottom right. The dimensions are: 12.0 mm (0.47 inches) for the top width, 3.8 mm (0.15 inches) for the top height, 0.60 mm (0.024 inches) for the pin diameter, 2.54 mm (0.10 inches) for the pin pitch, 20.32 mm (0.80 inches) for the pin pitch, 5.08 mm (0.20 inches) for the pin pitch, 2.0 mm (0.08 inches) for the pin pitch, 2.54 mm (0.10 inches) for the pin pitch, 31.8 mm (1.25 inches) for the total width, 15.22 mm (0.60 inches) for the pin pitch, and 20.3 mm (0.80 inches) for the total height.</p>		<table><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>11</td><td>No Pin</td><td>Common</td></tr><tr><td>12</td><td>-Vout</td><td>No Pin</td></tr><tr><td>13</td><td>+Vout</td><td>-Vout</td></tr><tr><td>15</td><td>No Pin</td><td>+Vout</td></tr><tr><td>23</td><td>-Vin</td><td>-Vin</td></tr><tr><td>24</td><td>-Vin</td><td>-Vin</td></tr></tbody></table>	Pin	Single Output	Dual Output	1	+Vin	+Vin	11	No Pin	Common	12	-Vout	No Pin	13	+Vout	-Vout	15	No Pin	+Vout	23	-Vin	-Vin	24	-Vin	-Vin
Pin	Single Output	Dual Output																								
1	+Vin	+Vin																								
11	No Pin	Common																								
12	-Vout	No Pin																								
13	+Vout	-Vout																								
15	No Pin	+Vout																								
23	-Vin	-Vin																								
24	-Vin	-Vin																								
<ul style="list-style-type: none">▶ All dimensions in mm (inches)▶ Tolerance: X.X±0.5 (X.XX±0.02) X.XX±0.25 (X.XXX±0.01)▶ Pin diameter $\varnothing 0.6 \pm 0.05$ (0.024±0.002)																										
Physical Characteristics																										
Case Size	:	31.8x20.3x12.0mm (1.25x0.8x0.47 inches)																								
Case Material	:	Non-Conductive Black Plastic (flammability to UL 94V-0 rated)																								
Pin Material	:	Tinned Copper																								
Weight	:	15.4g																								



1.4 Details of Tested Supporting System

1.4.1 LOAD (Model No.: THR 3-2411WI)

FULL LOAD WATT : 3 W (5 Vdc, 0.6 A)

1.4.2 LOAD (Model No.: THR 3-2423WI)

FULL LOAD WATT : 3 W (30 Vdc, 0.1 A)

1.4.3 LOAD (Model No.: THR 3-4811WI)

FULL LOAD WATT : 3 W (5 Vdc, 0.6 A)

1.4.4 LOAD (Model No.: THR 3-4823WI)

FULL LOAD WATT : 3 W (30 Vdc, 0.1 A)

1.4.5 LOAD (Model No.: THR 3-7211WI)

FULL LOAD WATT : 3 W (5 Vdc, 0.6 A)

1.4.6 LOAD (Model No.: THR 3-7223WI)

FULL LOAD WATT : 3 W (30 Vdc, 0.1 A)

1.4.7 Test Cable

Power Cable : Non-shielded, Detachable, 1.2 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
	Radiated Emissions (FM Receivers)	Enclosure Port	Annex A.2	CISPR 16-1-4	Not Applicable

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)	2.98 dB
Conducted Emission - AAN (ISN-T4) (150 kHz to 30 MHz)	3.70 dB
Conducted Emission - AAN (ISN-T8) (150 kHz to 30 MHz)	3.70 dB
Conducted Emission - CP (9 kHz to 30 MHz)	3.06 dB
Conducted Emission - VP (9 kHz to 30 MHz)	2.42 dB
Radiated Emission - LAS (2 m Loop) (9 kHz to 30 MHz)	3.26 dB
Disturbance Power (30 MHz to 300 MHz)	4.04 dB
OATS 1:	
Radiated Emission Test (30 MHz to 1 GHz)	4.84 dB
Radiated Emission Test (1 GHz to 6 GHz)	4.84 dB
OATS 3:	
Radiated Emission Test (30 MHz to 1 GHz)	4.70 dB
OATS 5:	
Radiated Emission Test (30 MHz to 1 GHz)	4.70 dB
Chamber 3:	
Radiated Emission Test (9 kHz to 30 MHz)	3.12 dB
Radiated Emission Test (30 MHz to 1 GHz)	4.86 dB
Radiated Emission Test (1 GHz to 6 GHz)	4.78 dB
Induced Current Density (20 kHz to 10 MHz)	1.82 dB
Conducted Immunity Room:	
Conducted Immunity Test / CDN-M2	1.30 dB
Conducted Immunity Test / CDN-M3	1.30 dB
Conducted Immunity Test / EM Clamp	3.16 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 3-2411WI)
- Mode 2: Full Load (Model No.: THR 3-2423WI)
- Mode 3: Full Load (Model No.: THR 3-4811WI)
- Mode 4: Full Load (Model No.: THR 3-4823WI)
- Mode 5: Full Load (Model No.: THR 3-7211WI)
- Mode 6: Full Load (Model No.: THR 3-7223WI)

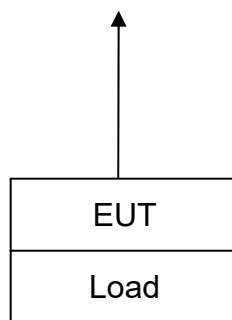
1.8.2 After preliminary test, EUT was selected the worst-case for the final testing.

The test modes are:

- For Emission: Mode 1 ~ 6
- For Immunity: Mode 1

1.9 Configuration of EUT Setup

Connected to mains



1.10 EFT & Surge Solution

To meet EN61000-4-4 & EN61000-4-5, an external capacitor across the input pins is required. Suggested capacitor as below:

Model	Input Voltage		
	24V _{in}	48V _{in}	110V _{in}
THR 3 Series	CHEMI-CON KY Series 470uF/50V	CHEMI-CON KY Series 330uF/100V	CHEMI-CON KXG Series 220uF/250V

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 Confirm all functions are normal.
- 1.11.4 Execute the test.

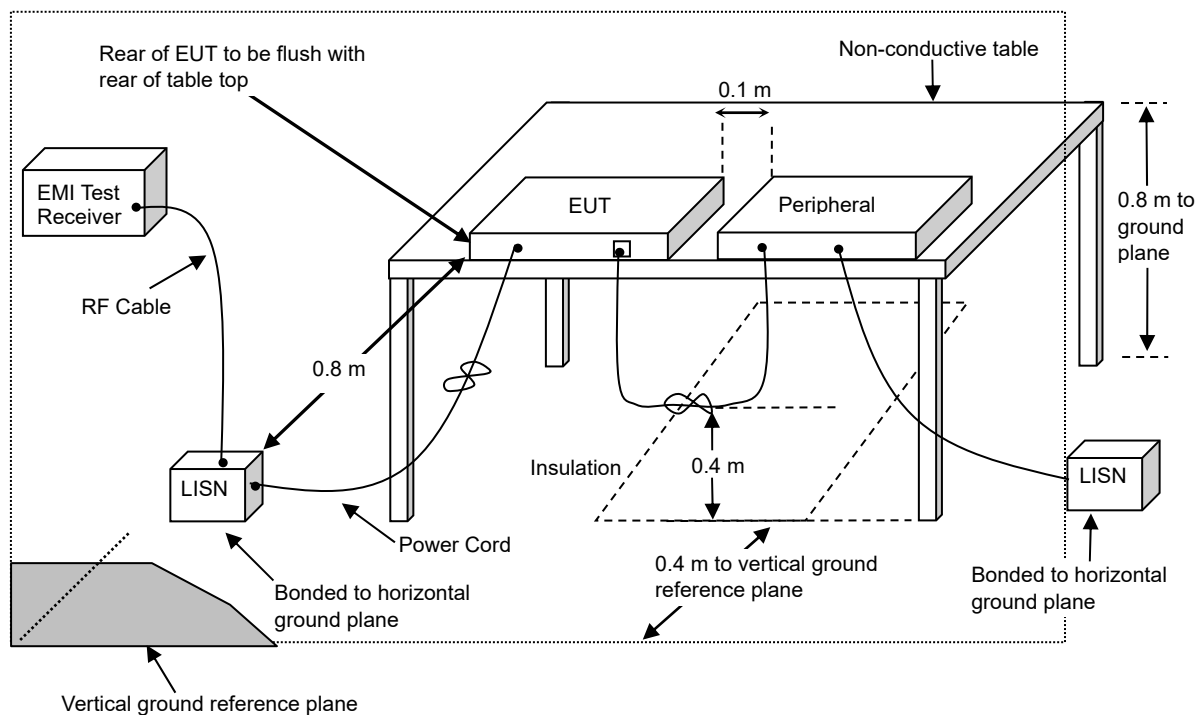
2 Power Line Conducted Emission Measurement

2.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100127	2017/11/07
RF Cable	IETC	CBL68	CBL68	2018/07/31
L.I.S.N.	Schwarzbeck	NNLK8121	8121417	2018/03/24
L.I.S.N.	Schaffner	MN2050D	1598	2017/08/09
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 3-2411WI

RATING: DC 24 V

COMMENT: Test Mode: Mode 1: Full Load (Model No.: THR 3-2411WI)

OPERATOR: Ceres

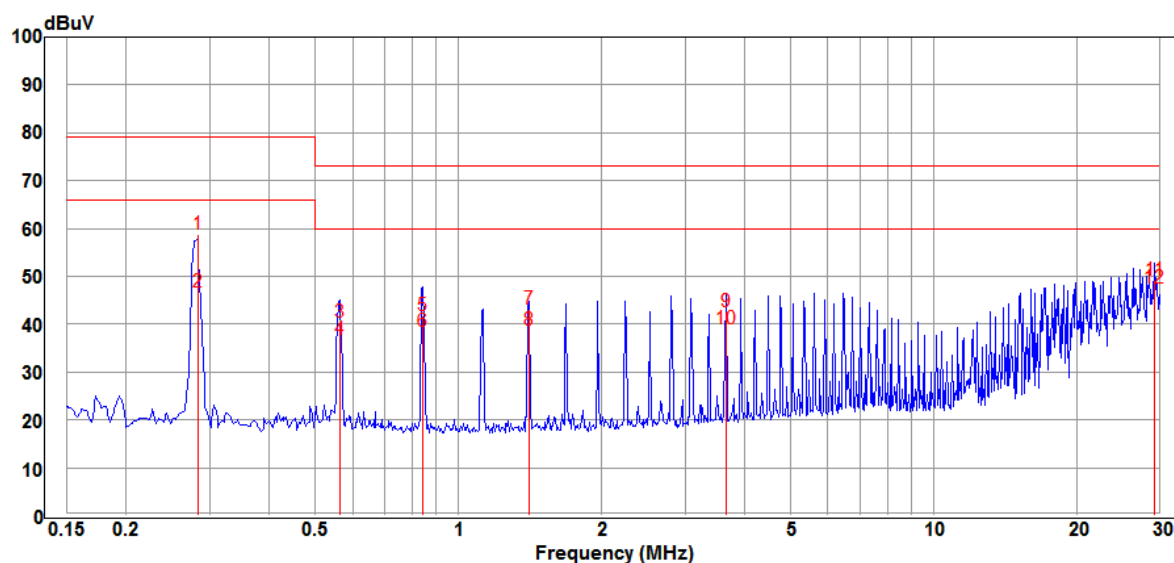
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 25.9°C / 60%

Data:1

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2833	48.58	10.27	58.85	79.00	-20.15	QP
2	0.2833	36.34	10.27	46.61	66.00	-19.39	Average
3	0.5641	30.00	10.30	40.30	73.00	-32.70	QP
4	0.5641	26.58	10.30	36.88	60.00	-23.12	Average
5	0.8438	31.44	10.32	41.76	73.00	-31.24	QP
6	0.8438	28.15	10.32	38.47	60.00	-21.53	Average
7	1.4110	32.83	10.39	43.22	73.00	-29.78	QP
8	1.4110	28.33	10.39	38.72	60.00	-21.28	Average
9	3.6610	32.18	10.54	42.72	73.00	-30.28	QP
10	3.6610	28.57	10.54	39.11	60.00	-20.89	Average
11	29.2160	37.61	11.57	49.18	73.00	-23.82	QP
12	29.2160	35.90	11.57	47.47	60.00	-12.53	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-2411WI

RATING: DC 24 V

COMMENT: Test Mode: Mode 1: Full Load (Model No.: THR 3-2411WI)

OPERATOR: Ceres

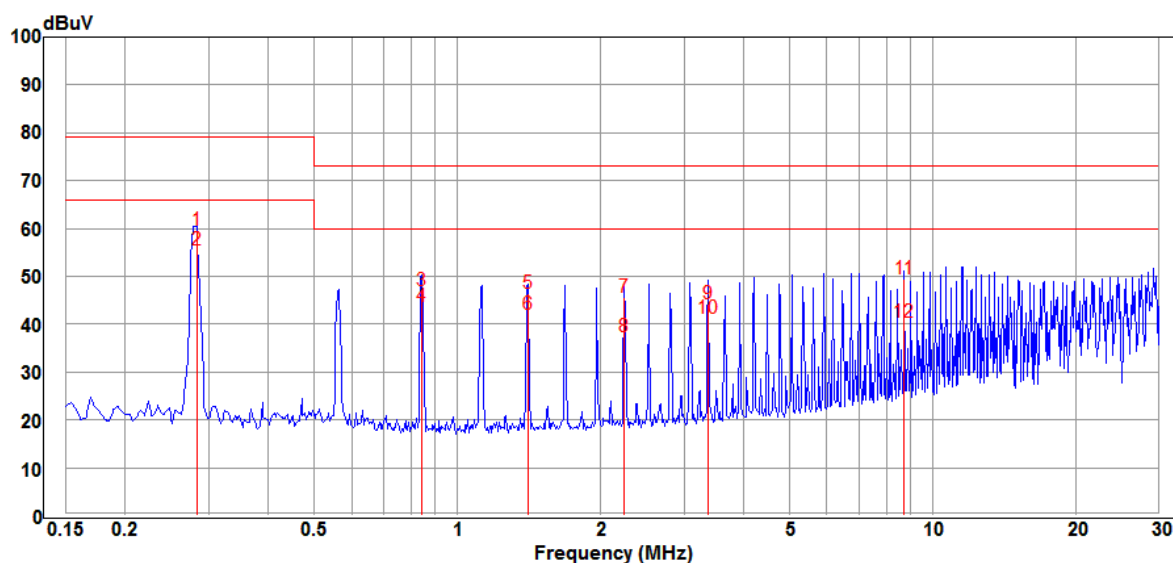
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 25.9°C / 60%

Data:2

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2833	49.48	10.23	59.71	79.00	-19.29	QP
2	0.2833	45.25	10.23	55.48	66.00	-10.52	Average
3	0.8438	36.70	10.29	46.99	73.00	-26.01	QP
4	0.8438	33.45	10.29	43.74	60.00	-16.26	Average
5	1.4110	35.97	10.36	46.33	73.00	-26.67	QP
6	1.4110	31.59	10.36	41.95	60.00	-18.05	Average
7	2.2490	35.24	10.45	45.69	73.00	-27.31	QP
8	2.2490	26.99	10.45	37.44	60.00	-22.56	Average
9	3.3810	33.75	10.51	44.26	73.00	-28.74	QP
10	3.3810	30.69	10.51	41.20	60.00	-18.80	Average
11	8.7290	38.69	10.79	49.48	73.00	-23.52	QP
12	8.7290	29.59	10.79	40.38	60.00	-19.62	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-2423WI

RATING: DC 24 V

COMMENT: Test Mode: Mode 2: Full Load (Model No.: THR 3-2423WI)

OPERATOR: Ceres

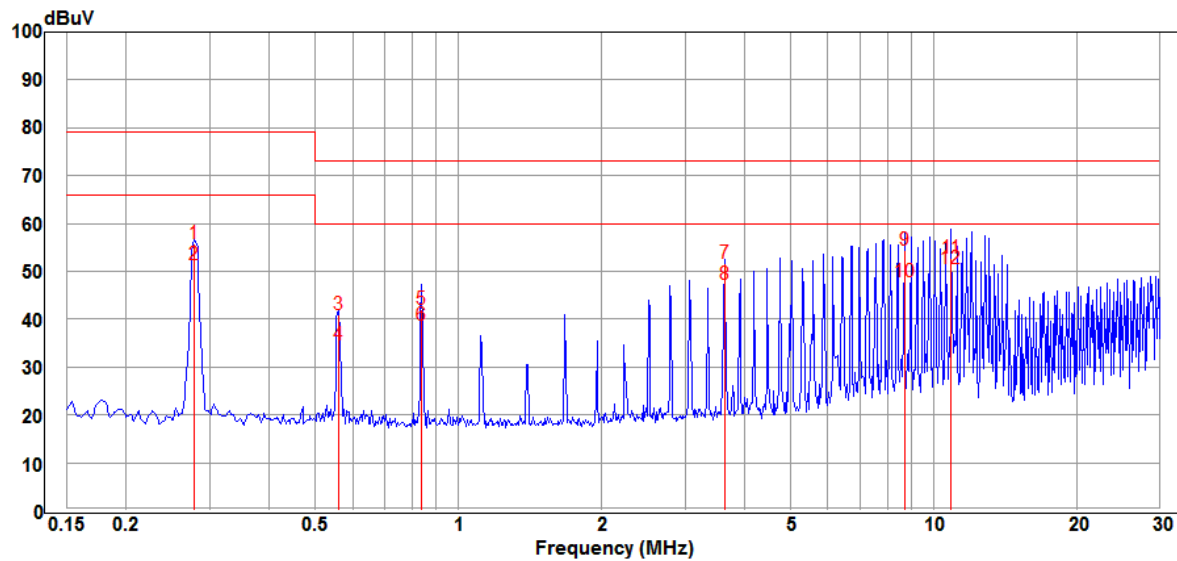
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 25.9°C / 60%

Data:3

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2788	45.40	10.27	55.67	79.00	-23.33	QP
2	0.2788	41.10	10.27	51.37	66.00	-14.63	Average
3	0.5611	30.61	10.30	40.91	73.00	-32.09	QP
4	0.5611	24.21	10.30	34.51	60.00	-25.49	Average
5	0.8393	31.80	10.32	42.12	73.00	-30.88	QP
6	0.8393	28.42	10.32	38.74	60.00	-21.26	Average
7	3.6420	41.21	10.54	51.75	73.00	-21.25	QP
8	3.6420	36.70	10.54	47.24	60.00	-12.76	Average
9	8.6830	43.60	10.77	54.37	73.00	-18.63	QP
10	8.6830	37.00	10.77	47.77	60.00	-12.23	Average
11	10.9050	41.87	10.77	52.64	73.00	-20.36	QP
12	10.9050	39.77	10.77	50.54	60.00	-9.46	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-2423WI

RATING: DC 24 V

COMMENT: Test Mode: Mode 2: Full Load (Model No.: THR 3-2423WI)

OPERATOR: Ceres

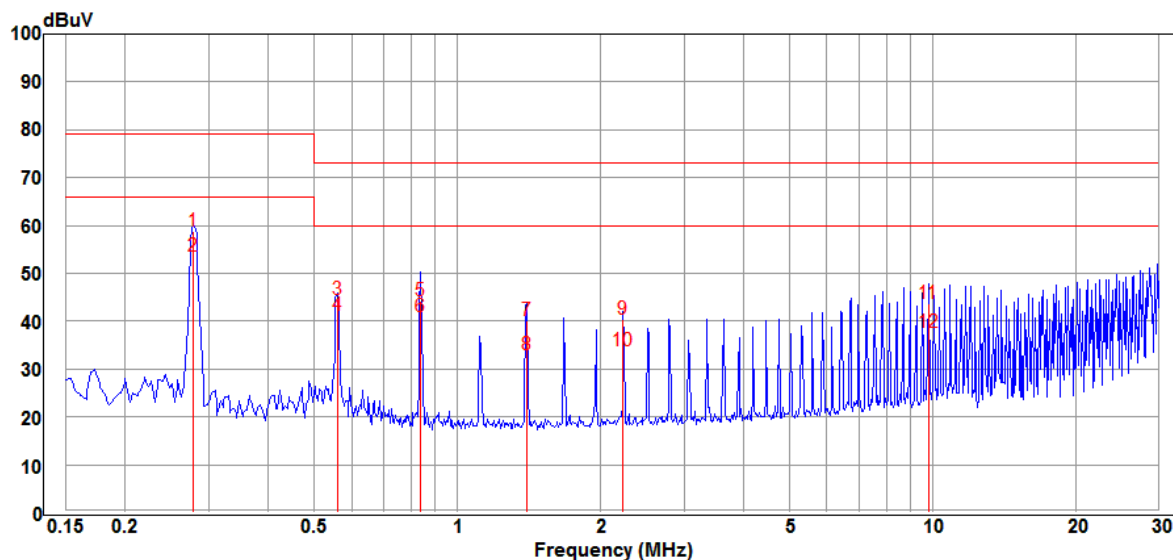
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 25.9°C / 60%

Data:4

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2788	48.60	10.23	58.83	79.00	-20.17	QP
2	0.2788	43.27	10.23	53.50	66.00	-12.50	Average
3	0.5611	34.35	10.27	44.62	73.00	-28.38	QP
4	0.5611	30.90	10.27	41.17	60.00	-18.83	Average
5	0.8393	34.00	10.29	44.29	73.00	-28.71	QP
6	0.8393	30.66	10.29	40.95	60.00	-19.05	Average
7	1.4030	29.75	10.36	40.11	73.00	-32.89	QP
8	1.4030	22.58	10.36	32.94	60.00	-27.06	Average
9	2.2370	29.84	10.45	40.29	73.00	-32.71	QP
10	2.2370	23.45	10.45	33.90	60.00	-26.10	Average
11	9.8090	32.99	10.79	43.78	73.00	-29.22	QP
12	9.8090	26.99	10.79	37.78	60.00	-22.22	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-4811WI

RATING: DC 48 V

COMMENT: Test Mode: Mode 3: Full Load (Model No.: THR 3-4811WI)

OPERATOR: Sam

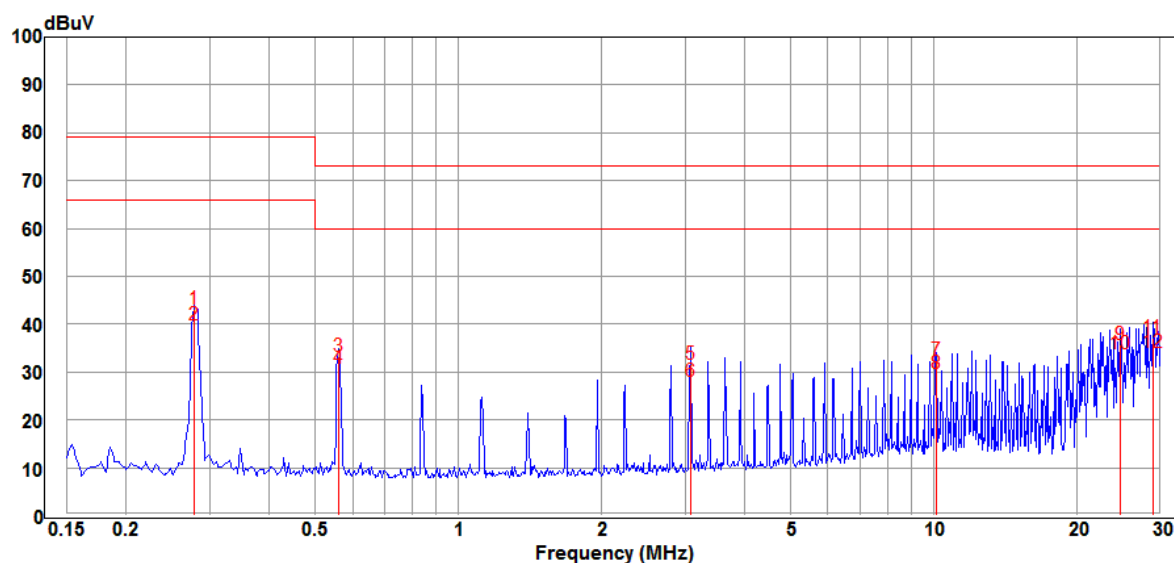
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 24°C / 50%

Data:8

2017-08-08



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2788	32.87	10.27	43.14	79.00	-35.86	QP
2	0.2788	29.62	10.27	39.89	66.00	-26.11	Average
3	0.5611	22.82	10.30	33.12	73.00	-39.88	QP
4	0.5611	20.55	10.30	30.85	60.00	-29.15	Average
5	3.0900	20.99	10.53	31.52	73.00	-41.48	QP
6	3.0900	17.46	10.53	27.99	60.00	-32.01	Average
7	10.1250	21.64	10.76	32.40	73.00	-40.60	QP
8	10.1250	18.98	10.76	29.74	60.00	-30.26	Average
9	24.6590	24.23	11.47	35.70	73.00	-37.30	QP
10	24.6590	22.40	11.47	33.87	60.00	-26.13	Average
11	28.9080	25.44	11.56	37.00	73.00	-36.00	QP
12	28.9080	22.60	11.56	34.16	60.00	-25.84	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-4811WI

RATING: DC 48 V

COMMENT: Test Mode: Mode 3: Full Load (Model No.: THR 3-4811WI)

OPERATOR: Sam

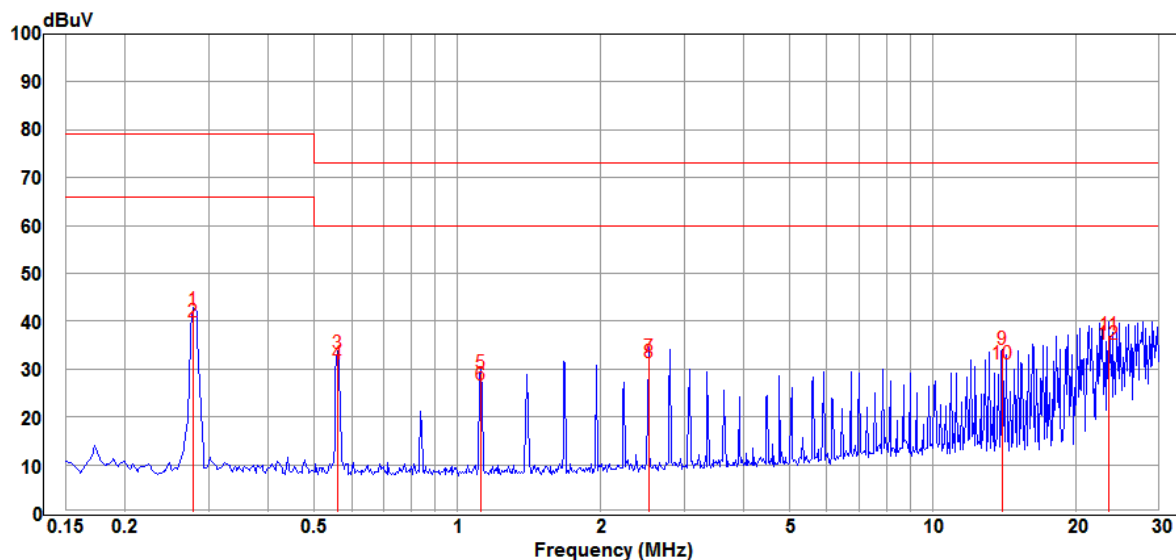
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 24°C / 50%

Data:7

2017-08-08



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2788	31.97	10.23	42.20	79.00	-36.80	QP
2	0.2788	29.71	10.23	39.94	66.00	-26.06	Average
3	0.5611	22.95	10.27	33.22	73.00	-39.78	QP
4	0.5611	20.67	10.27	30.94	60.00	-29.06	Average
5	1.1230	18.74	10.32	29.06	73.00	-43.94	QP
6	1.1230	16.42	10.32	26.74	60.00	-33.26	Average
7	2.5270	22.02	10.46	32.48	73.00	-40.52	QP
8	2.5270	20.74	10.46	31.20	60.00	-28.80	Average
9	14.0630	23.22	10.86	34.08	73.00	-38.92	QP
10	14.0630	20.26	10.86	31.12	60.00	-28.88	Average
11	23.5110	25.64	11.44	37.08	73.00	-35.92	QP
12	23.5110	23.87	11.44	35.31	60.00	-24.69	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-4823WI

RATING: DC 48 V

COMMENT: Test Mode: Mode 4: Full Load (Model No.: THR 3-4823WI)

OPERATOR: Sam

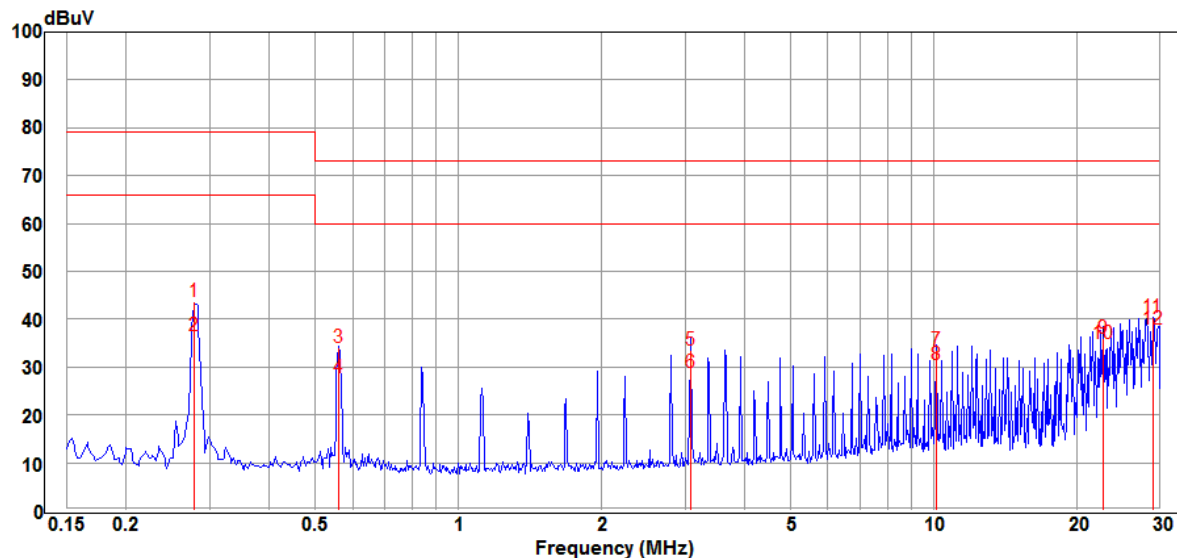
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 24°C / 50%

Data:5

2017-08-08



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2788	33.46	10.27	43.73	79.00	-35.27	QP
2	0.2788	26.24	10.27	36.51	66.00	-29.49	Average
3	0.5611	23.68	10.30	33.98	73.00	-39.02	QP
4	0.5611	17.38	10.30	27.68	60.00	-32.32	Average
5	3.0900	22.98	10.53	33.51	73.00	-39.49	QP
6	3.0900	18.45	10.53	28.98	60.00	-31.02	Average
7	10.1250	22.83	10.76	33.59	73.00	-39.41	QP
8	10.1250	19.71	10.76	30.47	60.00	-29.53	Average
9	22.7750	24.56	11.35	35.91	73.00	-37.09	QP
10	22.7750	23.55	11.35	34.90	60.00	-25.10	Average
11	28.9080	28.88	11.56	40.44	73.00	-32.56	QP
12	28.9080	26.30	11.56	37.86	60.00	-22.14	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-4823WI

RATING: DC 48 V

COMMENT: Test Mode: Mode 4: Full Load (Model No.: THR 3-4823WI)

OPERATOR: Sam

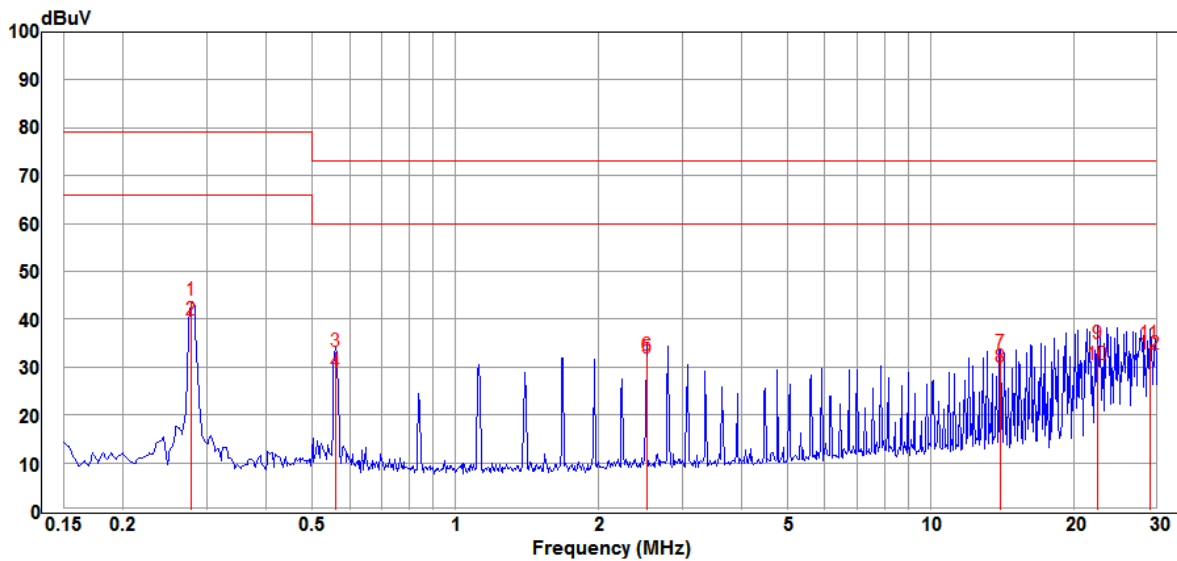
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 24°C / 50%

Data:6

2017-08-08



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.2788	33.84	10.23	44.07	79.00	-34.93	QP
2	0.2788	29.48	10.23	39.71	66.00	-26.29	Average
3	0.5611	22.97	10.27	33.24	73.00	-39.76	QP
4	0.5611	18.56	10.27	28.83	60.00	-31.17	Average
5	2.5270	21.33	10.46	31.79	73.00	-41.21	QP
6	2.5270	21.96	10.46	32.42	60.00	-27.58	Average
7	14.0630	22.22	10.86	33.08	73.00	-39.92	QP
8	14.0630	19.13	10.86	29.99	60.00	-30.01	Average
9	22.4160	23.48	11.38	34.86	73.00	-38.14	QP
10	22.4160	19.12	11.38	30.50	60.00	-29.50	Average
11	28.9080	23.38	11.60	34.98	73.00	-38.02	QP
12	28.9080	20.97	11.60	32.57	60.00	-27.43	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-7211WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 5: Full Load (Model No.: THR 3-7211WI)

OPERATOR: Scott

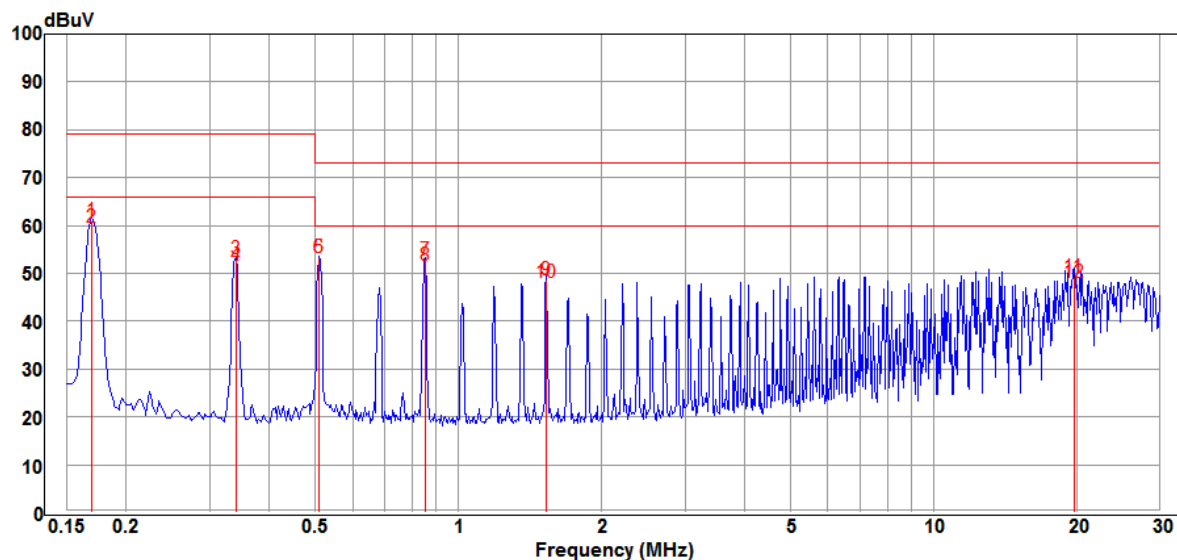
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 25.3°C / 40%

Data:9

2017-08-09



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.1694	50.67	10.25	60.92	79.00	-18.08	QP
2	0.1694	49.48	10.25	59.73	66.00	-6.27	Average
3	0.3410	42.65	10.28	52.93	79.00	-26.07	QP
4	0.3410	41.48	10.28	51.76	66.00	-14.24	Average
5	0.5101	43.03	10.30	53.33	73.00	-19.67	QP
6	0.5101	42.88	10.30	53.18	60.00	-6.82	Average
7	0.8528	42.56	10.32	52.88	73.00	-20.12	QP
8	0.8528	41.40	10.32	51.72	60.00	-8.28	Average
9	1.5350	38.11	10.40	48.51	73.00	-24.49	QP
10	1.5350	37.77	10.40	48.17	60.00	-11.83	Average
11	19.7400	38.00	11.13	49.13	73.00	-23.87	QP
12	19.7400	37.00	11.13	48.13	60.00	-11.87	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-7211WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 5: Full Load (Model No.: THR 3-7211WI)

OPERATOR: Scott

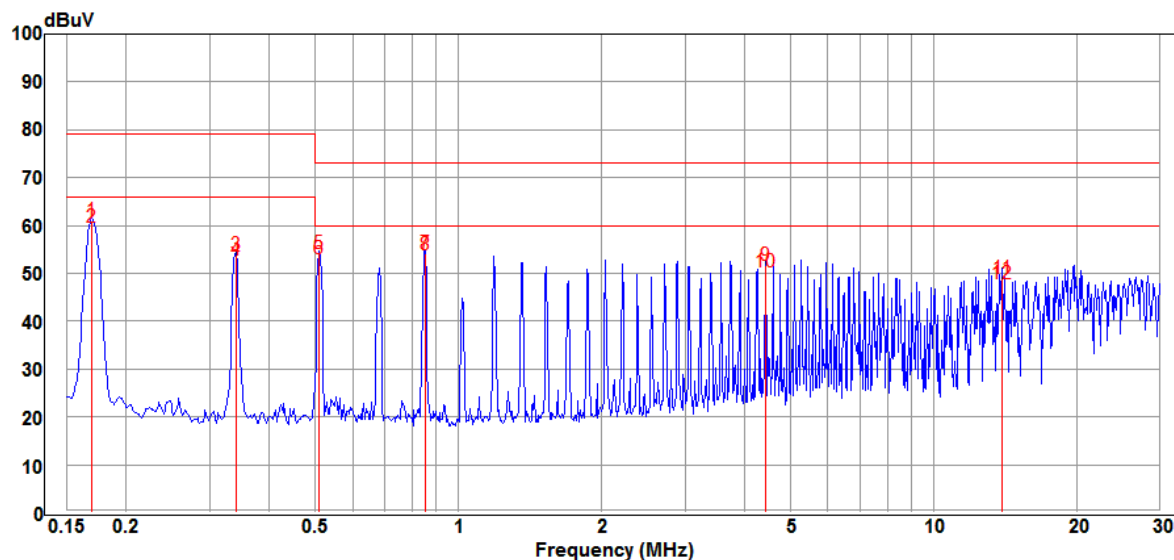
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 25.3°C / 40%

Data:10

2017-08-09



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.1694	50.71	10.21	60.92	79.00	-18.08	QP
2	0.1694	49.48	10.21	59.69	66.00	-6.31	Average
3	0.3410	43.57	10.24	53.81	79.00	-25.19	QP
4	0.3410	42.43	10.24	52.67	66.00	-13.33	Average
5	0.5101	43.87	10.27	54.14	73.00	-18.86	QP
6	0.5101	42.66	10.27	52.93	60.00	-7.07	Average
7	0.8528	43.94	10.29	54.23	73.00	-18.77	QP
8	0.8528	43.69	10.29	53.98	60.00	-6.02	Average
9	4.4300	41.08	10.55	51.63	73.00	-21.37	QP
10	4.4300	39.67	10.55	50.22	60.00	-9.78	Average
11	13.9890	37.99	10.86	48.85	73.00	-24.15	QP
12	13.9890	36.99	10.86	47.85	60.00	-12.15	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-7223WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 6: Full Load (Model No.: THR 3-7223WI)

OPERATOR: Scott

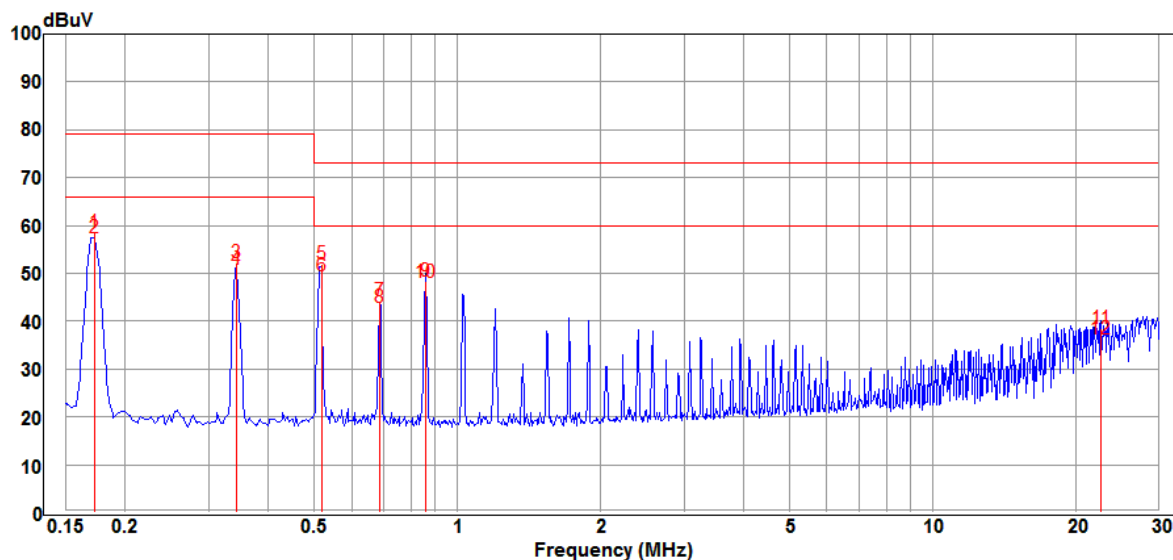
TEST SITE: Conducted 1

POLARIZATION: Line

TEMP/HUM: 25.3°C / 40%

Data:12

2017-08-09



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.1731	48.25	10.26	58.51	79.00	-20.49	QP
2	0.1731	47.14	10.26	57.40	66.00	-8.60	Average
3	0.3446	41.87	10.28	52.15	79.00	-26.85	QP
4	0.3446	40.57	10.28	50.85	66.00	-15.15	Average
5	0.5182	41.50	10.30	51.80	73.00	-21.20	QP
6	0.5182	39.27	10.30	49.57	60.00	-10.43	Average
7	0.6863	34.05	10.32	44.37	73.00	-28.63	QP
8	0.6863	32.63	10.32	42.95	60.00	-17.05	Average
9	0.8573	38.14	10.32	48.46	73.00	-24.54	QP
10	0.8573	37.88	10.32	48.20	60.00	-11.80	Average
11	22.6550	27.00	11.34	38.34	73.00	-34.66	QP
12	22.6550	25.00	11.34	36.34	60.00	-23.66	Average



Power Line Conducted Test Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-7223WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 6: Full Load (Model No.: THR 3-7223WI)

OPERATOR: Scott

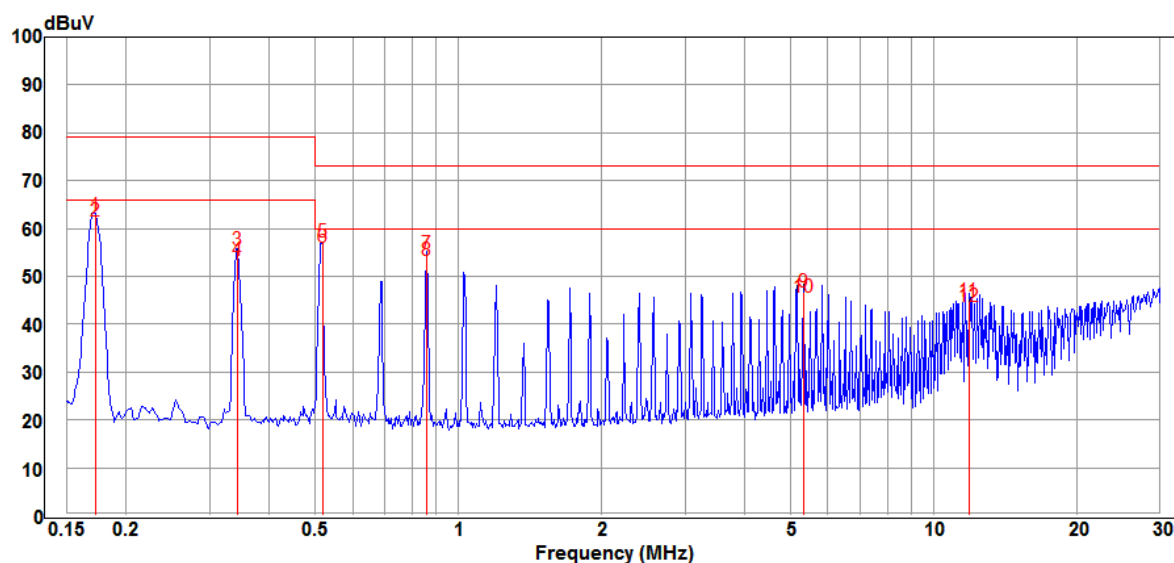
TEST SITE: Conducted 1

POLARIZATION: Neutral

TEMP/HUM: 25.3°C / 40%

Data:11

2017-08-09



Item Mark	Freq. MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Remark
1	0.1731	52.49	10.22	62.71	79.00	-16.29	QP
2	0.1731	51.28	10.22	61.50	66.00	-4.50	Average
3	0.3446	45.21	10.24	55.45	79.00	-23.55	QP
4	0.3446	43.01	10.24	53.25	66.00	-12.75	Average
5	0.5182	46.87	10.27	57.14	73.00	-15.86	QP
6	0.5182	45.69	10.27	55.96	60.00	-4.04	Average
7	0.8573	44.35	10.29	54.64	73.00	-18.36	QP
8	0.8573	43.12	10.29	53.41	60.00	-6.59	Average
9	5.3330	36.00	10.61	46.61	73.00	-26.39	QP
10	5.3330	35.00	10.61	45.61	60.00	-14.39	Average
11	11.8700	34.00	10.82	44.82	73.00	-28.18	QP
12	11.8700	33.00	10.82	43.82	60.00	-16.18	Average

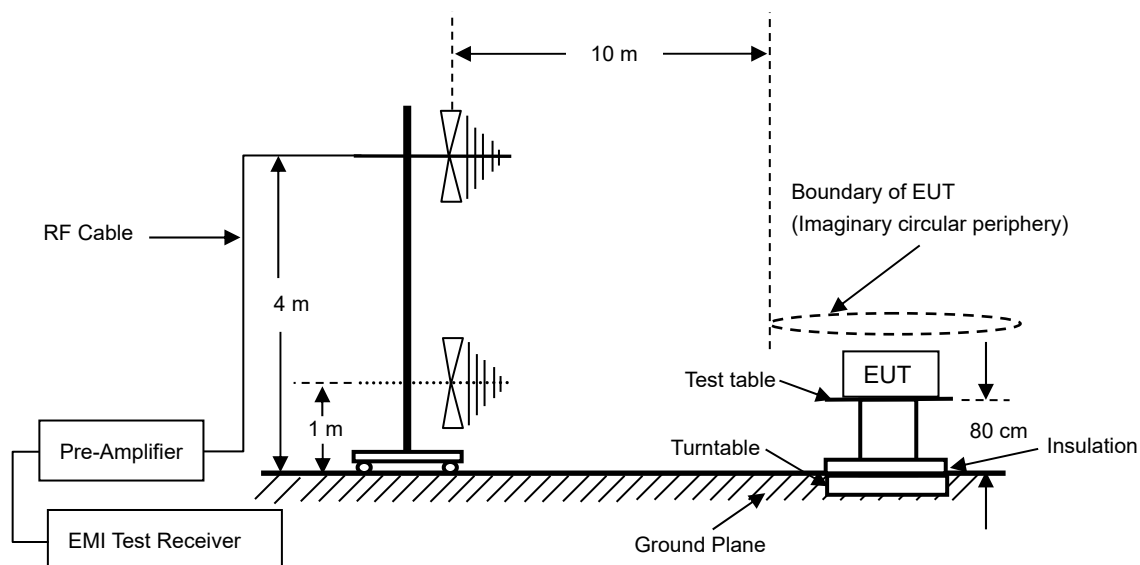
3 Radiated Emission Measurement (Below 1GHz)

3.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESVS10	826148/011	2017/10/19
Biconical Antenna	Schwarzbeck	VHBB 9124 & BBA 9106	9124-743	2018/07/26
Log Antenna	Schwarzbeck	VUSLP 9111B	911B-146	2018/07/26
Pre-Amplifier	Agilent	8447D	2944A09703	2018/07/31
RF Cable	EMCI	EMC8D-NM-NM-25000	140105	2018/07/31
RF Cable	Mini-Circuits	CBL-3FL-NMNM	CBL56	2018/07/31
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

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-2411WI

TEST DISTANCE : 10 m

RATING: DC 24 V

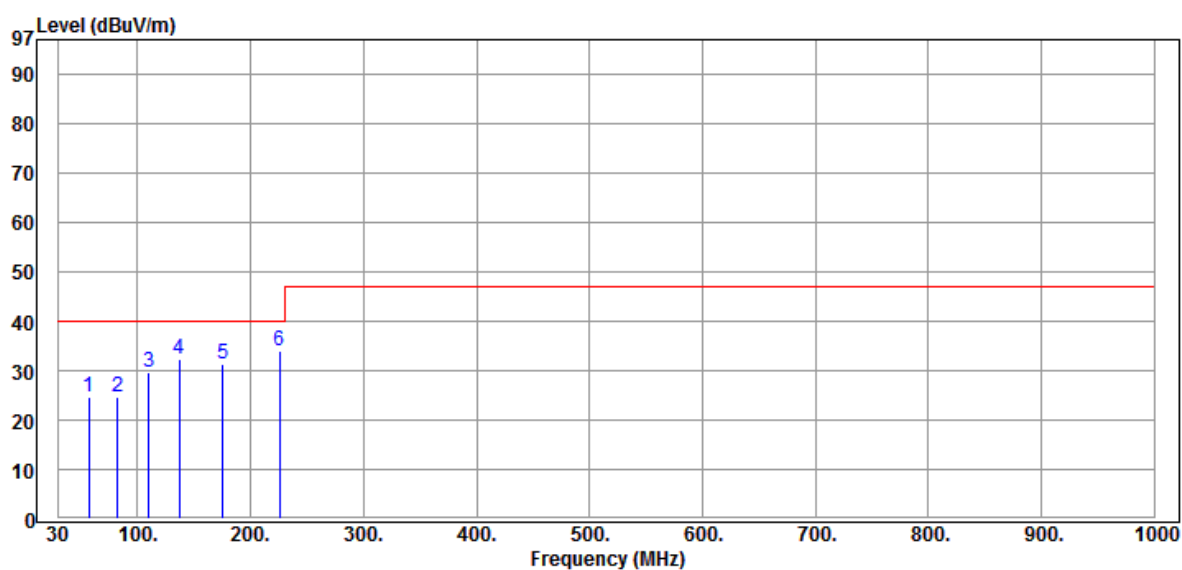
POLARIZATION : HORIZONTAL

COMMENT: Test Mode: Mode 1: Full Load (Model No.: THR 3-2411WI)

TEMP/HUM : 27.8°C / 43%

Data: 19

2017-09-06



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	56.960	41.20	-16.50	24.70	40.00	-15.30	QP
2	82.520	43.19	-18.46	24.73	40.00	-15.27	QP
3	109.600	43.20	-13.59	29.61	40.00	-10.39	QP
4	136.800	42.80	-10.55	32.25	40.00	-7.75	QP
5	175.800	40.21	-8.91	31.30	40.00	-8.70	QP
6	225.900	41.19	-7.14	34.05	40.00	-5.95	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-2411WI

TEST DISTANCE : 10 m

RATING: DC 24 V

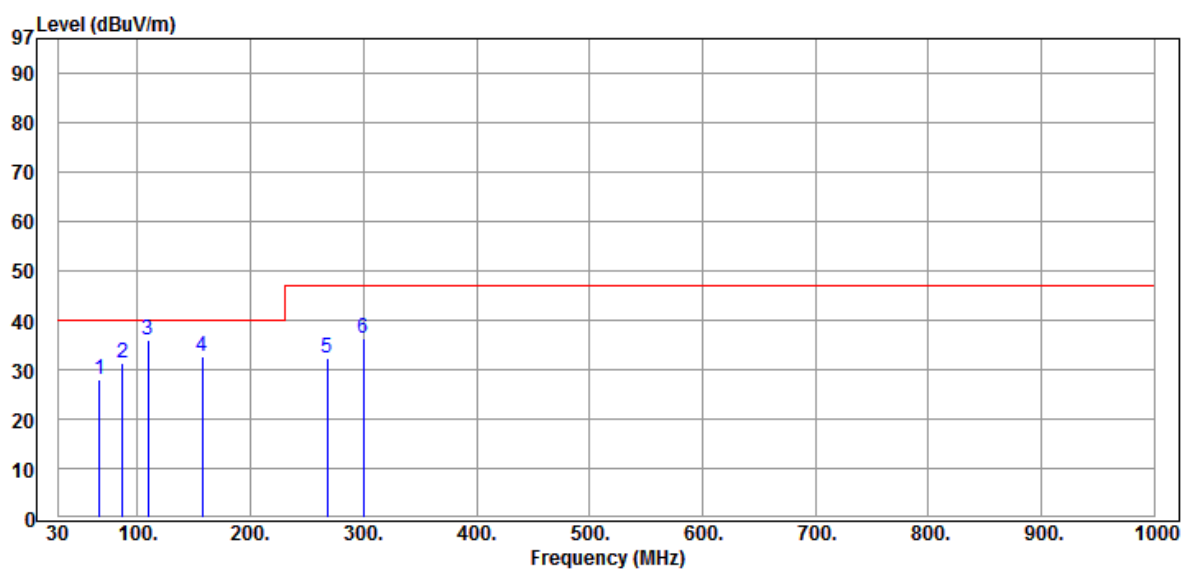
POLARIZATION : VERTICAL

COMMENT: Test Mode: Mode 1: Full Load (Model No.: THR 3-2411WI)

TEMP/HUM : 27.8°C / 43%

Data: 18

2017-09-06



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	66.630	46.53	-18.48	28.05	40.00	-11.95	QP
2	87.000	48.90	-17.63	31.27	40.00	-8.73	QP
3	109.020	49.80	-13.67	36.13	40.00	-3.87	QP
4	156.900	42.50	-9.69	32.81	40.00	-7.19	QP
5	268.200	38.20	-5.76	32.44	47.00	-14.56	QP
6	299.800	40.20	-3.86	36.34	47.00	-10.66	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-2423WI

TEST DISTANCE : 10 m

RATING: DC 24 V

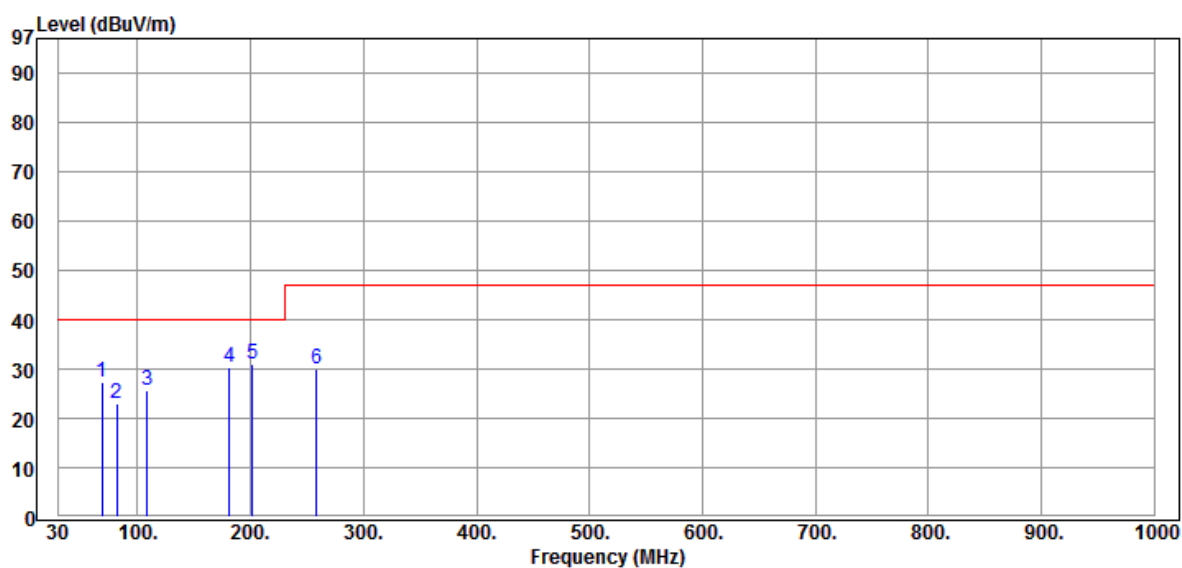
POLARIZATION : HORIZONTAL

COMMENT: Test Mode: Mode 2: Full Load (Model No.: THR 3-2423WI)

TEMP/HUM : 25.3°C/ 53%

Data:8

2017-08-04



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	68.590	43.50	-16.26	27.24	40.00	-12.76	QP
2	81.810	39.30	-16.17	23.13	40.00	-16.87	QP
3	108.830	40.60	-14.87	25.73	40.00	-14.27	QP
4	181.000	39.71	-9.33	30.38	40.00	-9.62	QP
5	201.900	40.30	-9.16	31.14	40.00	-8.86	QP
6	258.500	37.00	-7.03	29.97	47.00	-17.03	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-2423WI

TEST DISTANCE : 10 m

RATING: DC 24 V

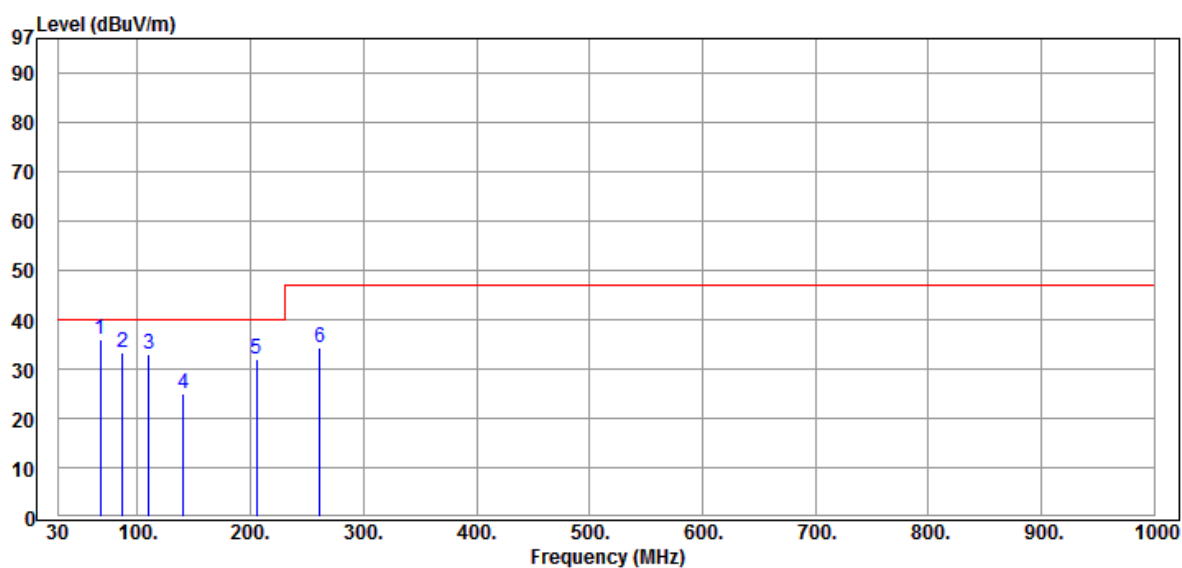
POLARIZATION : VERTICAL

COMMENT: Test Mode: Mode 2: Full Load (Model No.: THR 3-2423WI)

TEMP/HUM : 25.3°C/ 53%

Data:9

2017-08-04



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	67.110	52.29	-16.17	36.12	40.00	-3.88	QP
2	86.370	49.21	-16.01	33.20	40.00	-6.80	QP
3	110.120	47.69	-14.83	32.86	40.00	-7.14	QP
4	140.290	38.00	-12.92	25.08	40.00	-14.92	QP
5	205.200	41.08	-9.05	32.03	40.00	-7.97	QP
6	261.700	41.19	-6.81	34.38	47.00	-12.62	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-4811WI

TEST DISTANCE : 10 m

RATING: DC 48 V

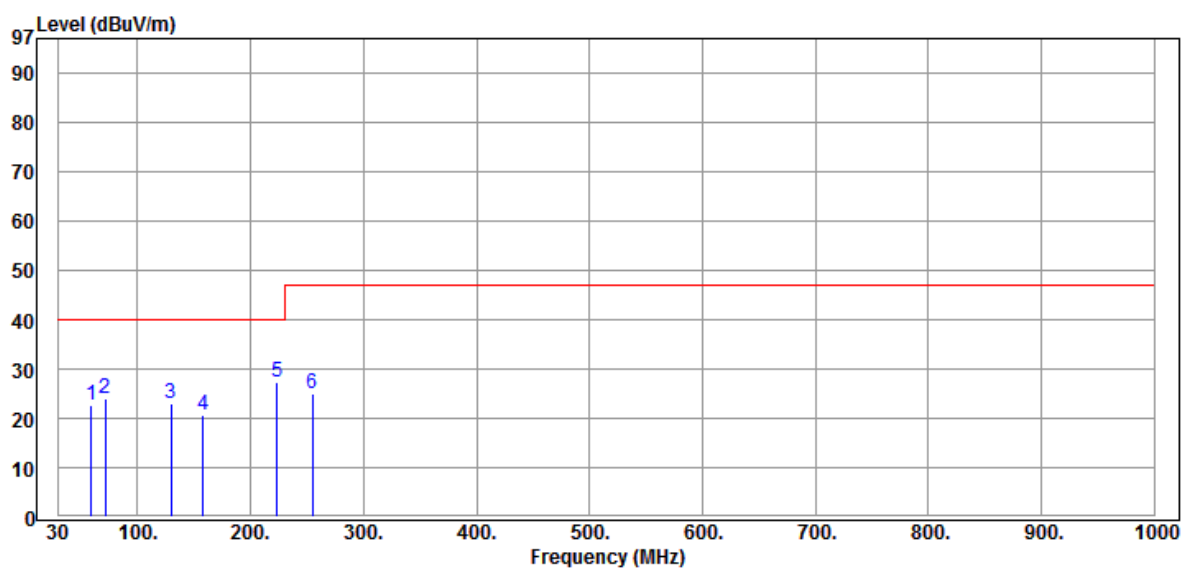
POLARIZATION : HORIZONTAL

COMMENT: Test Mode: Mode 3: Full Load (Model No.: THR 3-4811WI)

TEMP/HUM : 25.3°C/ 53%

Data:11

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	58.670	38.30	-15.73	22.57	40.00	-17.43	QP
2	71.100	40.30	-16.32	23.98	40.00	-16.02	QP
3	129.800	36.69	-13.65	23.04	40.00	-16.96	QP
4	157.700	33.50	-12.69	20.81	40.00	-19.19	QP
5	223.400	36.00	-8.82	27.18	40.00	-12.82	QP
6	254.600	32.10	-7.24	24.86	47.00	-22.14	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-4811WI

TEST DISTANCE : 10 m

RATING: DC 48 V

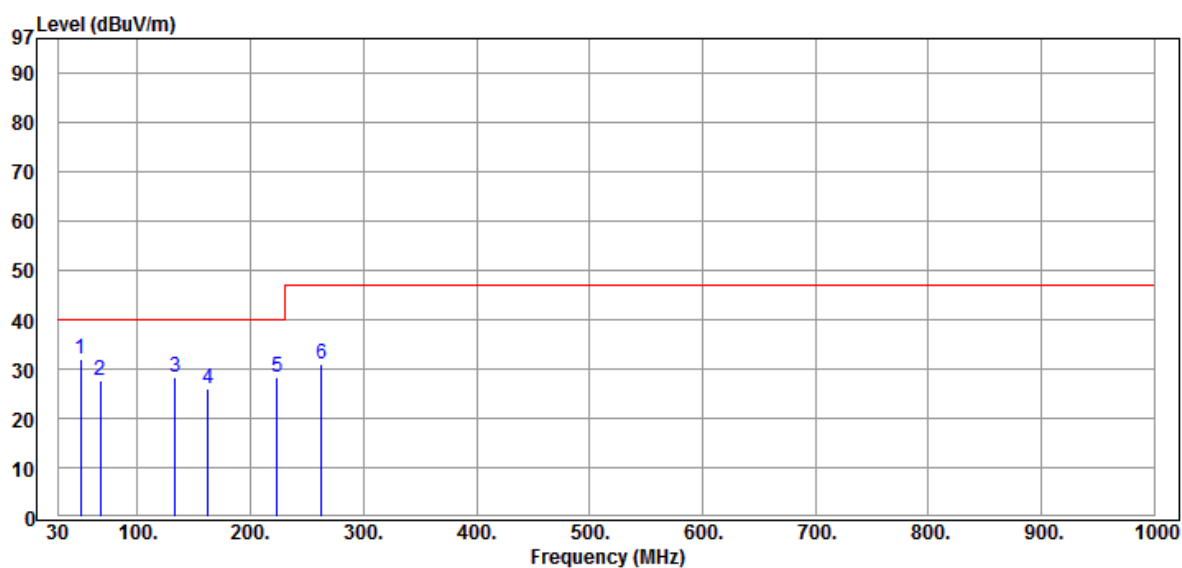
POLARIZATION : VERTICAL

COMMENT: Test Mode: Mode 3: Full Load (Model No.: THR 3-4811WI)

TEMP/HUM : 25.3°C/ 53%

Data: 10

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	49.440	47.00	-15.15	31.85	40.00	-8.15	QP
2	67.170	43.70	-16.18	27.52	40.00	-12.48	QP
3	133.020	41.60	-13.43	28.17	40.00	-11.83	QP
4	162.000	38.60	-12.67	25.93	40.00	-14.07	QP
5	223.700	36.99	-8.81	28.18	40.00	-11.82	QP
6	263.000	37.80	-6.72	31.08	47.00	-15.92	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-4823WI

TEST DISTANCE : 10 m

RATING: DC 48 V

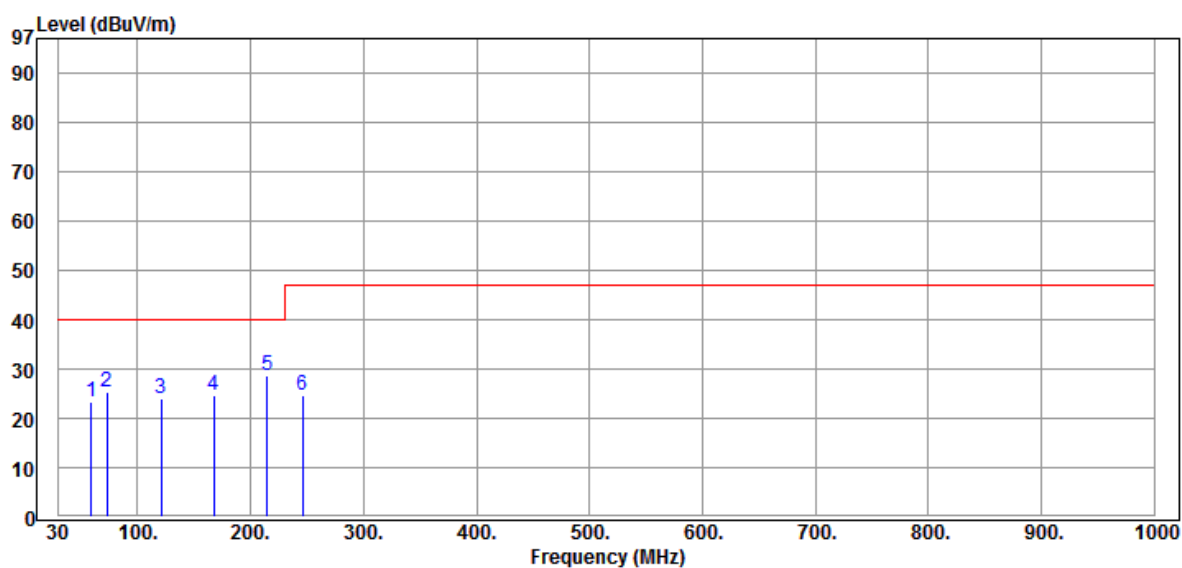
POLARIZATION : HORIZONTAL

COMMENT: Test Mode: Mode 4: Full Load (Model No.: THR 3-4823WI)

TEMP/HUM : 25.3°C/ 53%

Data: 12

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	58.960	39.20	-15.75	23.45	40.00	-16.55	QP
2	72.520	41.80	-16.31	25.49	40.00	-14.51	QP
3	120.970	38.30	-14.37	23.93	40.00	-16.07	QP
4	167.710	37.20	-12.57	24.63	40.00	-15.37	QP
5	214.600	37.50	-8.90	28.60	40.00	-11.40	QP
6	245.700	32.40	-7.78	24.62	47.00	-22.38	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-4823WI

TEST DISTANCE : 10 m

RATING: DC 48 V

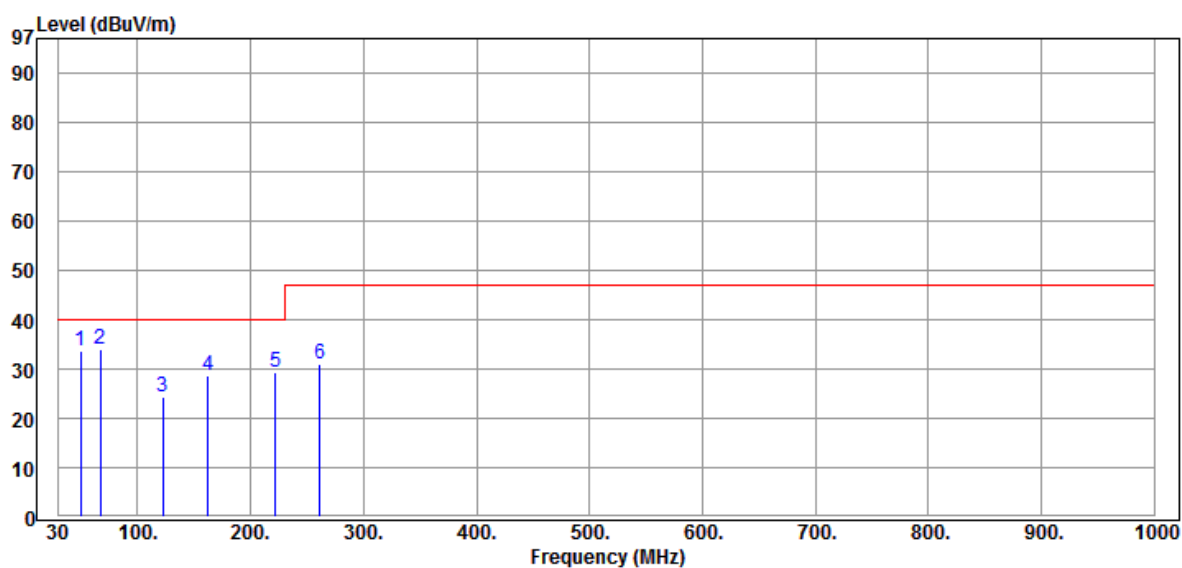
POLARIZATION : VERTICAL

COMMENT: Test Mode: Mode 4: Full Load (Model No.: THR 3-4823WI)

TEMP/HUM : 25.3°C/ 53%

Data: 13

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	49.660	49.00	-15.18	33.82	40.00	-6.18	QP
2	66.710	50.00	-16.16	33.84	40.00	-6.16	QP
3	122.260	38.70	-14.27	24.43	40.00	-15.57	QP
4	162.000	41.41	-12.67	28.74	40.00	-11.26	QP
5	222.000	38.11	-8.86	29.25	40.00	-10.75	QP
6	261.700	37.79	-6.81	30.98	47.00	-16.02	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

EUT: DC/DC CONVERTER

MODEL: THR 3-7211WI

RATING: DC 110 V

COMMENT: Test Mode: Mode 5: Full Load (Model No.: THR 3-7211WI)

OPERATOR : Sam

TEST SITE : OATS 1

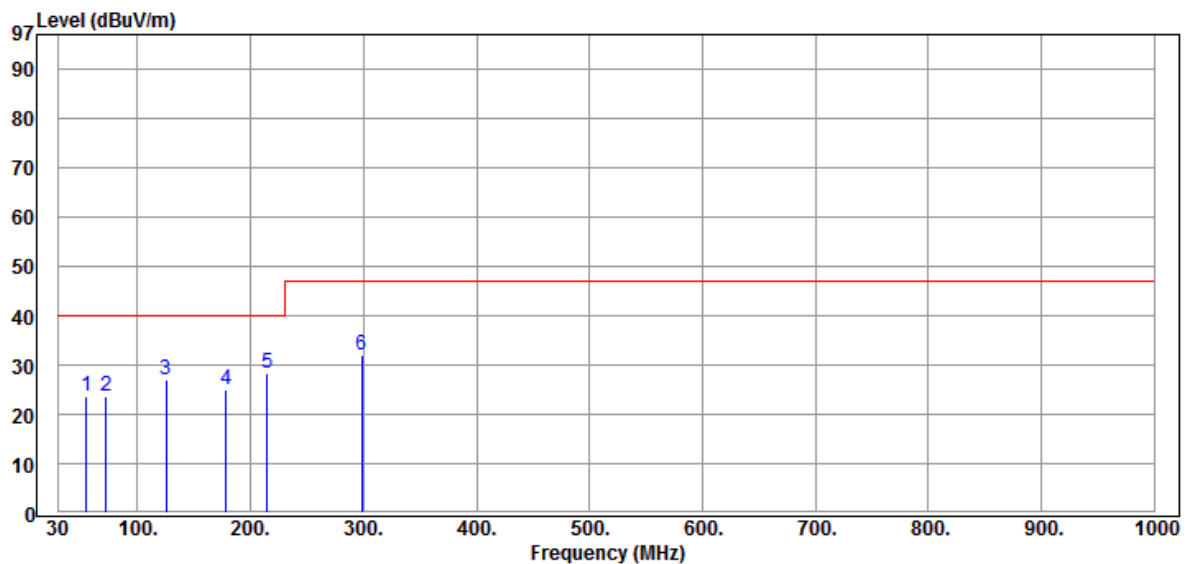
TEST DISTANCE : 10 m

POLARIZATION : HORIZONTAL

TEMP/HUM : 25.3°C/ 53%

Data: 15

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	54.740	39.10	-15.49	23.61	40.00	-16.39	QP
2	72.180	39.90	-16.31	23.59	40.00	-16.41	QP
3	125.020	41.08	-14.04	27.04	40.00	-12.96	QP
4	178.290	36.70	-11.61	25.09	40.00	-14.91	QP
5	215.000	37.40	-8.90	28.50	40.00	-11.50	QP
6	298.300	36.50	-4.59	31.91	47.00	-15.09	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-7211WI

TEST DISTANCE : 10 m

RATING: DC 110 V

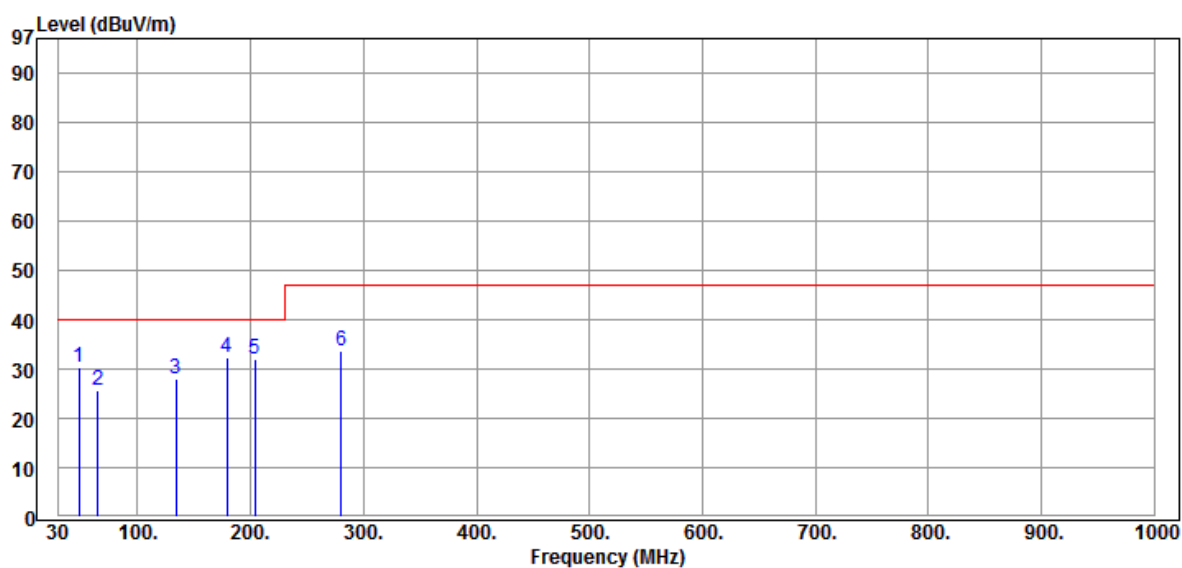
POLARIZATION : VERTICAL

COMMENT: Test Mode: Mode 5: Full Load (Model No.: THR 3-7211WI)

TEMP/HUM : 25.3°C/ 53%

Data: 14

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	47.780	45.20	-14.98	30.22	40.00	-9.78	QP
2	64.660	41.70	-16.05	25.65	40.00	-14.35	QP
3	133.670	41.40	-13.38	28.02	40.00	-11.98	QP
4	179.120	43.90	-11.52	32.38	40.00	-7.62	QP
5	204.100	41.11	-9.10	32.01	40.00	-7.99	QP
6	280.400	39.10	-5.56	33.54	47.00	-13.46	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-7223WI

TEST DISTANCE : 10 m

RATING: DC 110 V

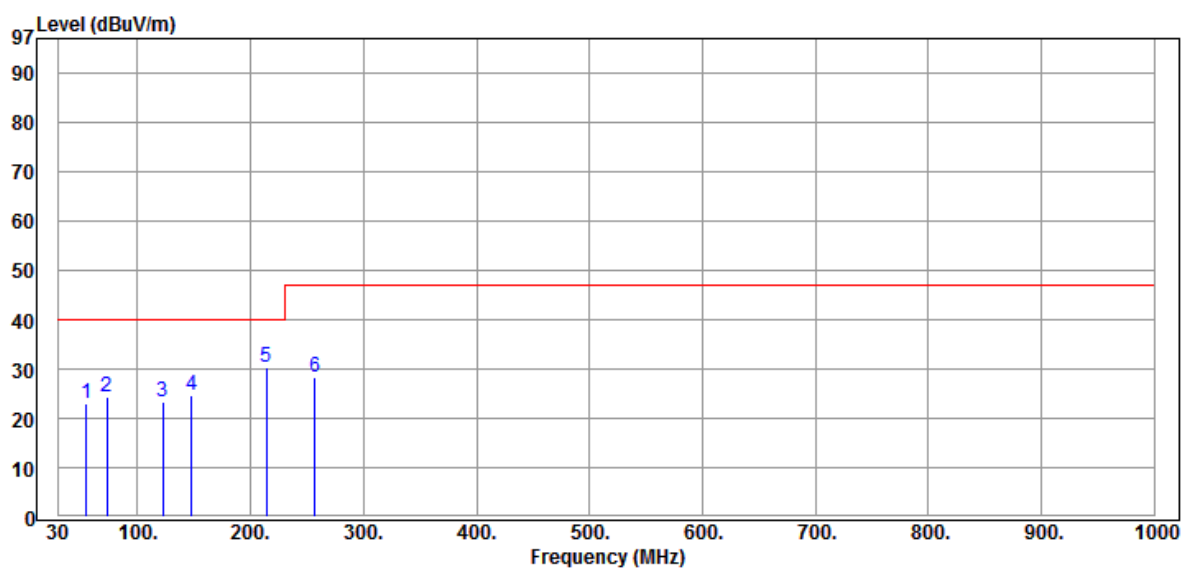
POLARIZATION : HORIZONTAL

COMMENT: Test Mode: Mode 6: Full Load (Model No.: THR 3-7223WI)

TEMP/HUM : 25.3°C/ 53%

Data: 16

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	54.510	38.61	-15.49	23.12	40.00	-16.88	QP
2	72.690	40.50	-16.31	24.19	40.00	-15.81	QP
3	122.540	37.70	-14.24	23.46	40.00	-16.54	QP
4	147.930	37.30	-12.70	24.60	40.00	-15.40	QP
5	214.100	39.11	-8.91	30.20	40.00	-9.80	QP
6	256.800	35.40	-7.12	28.28	47.00	-18.72	QP



Radiated Emission Measurement Data

CLIENT: TRACO ELECTRONIC AG

OPERATOR : Sam

EUT: DC/DC CONVERTER

TEST SITE : OATS 1

MODEL: THR 3-7223WI

TEST DISTANCE : 10 m

RATING: DC 110 V

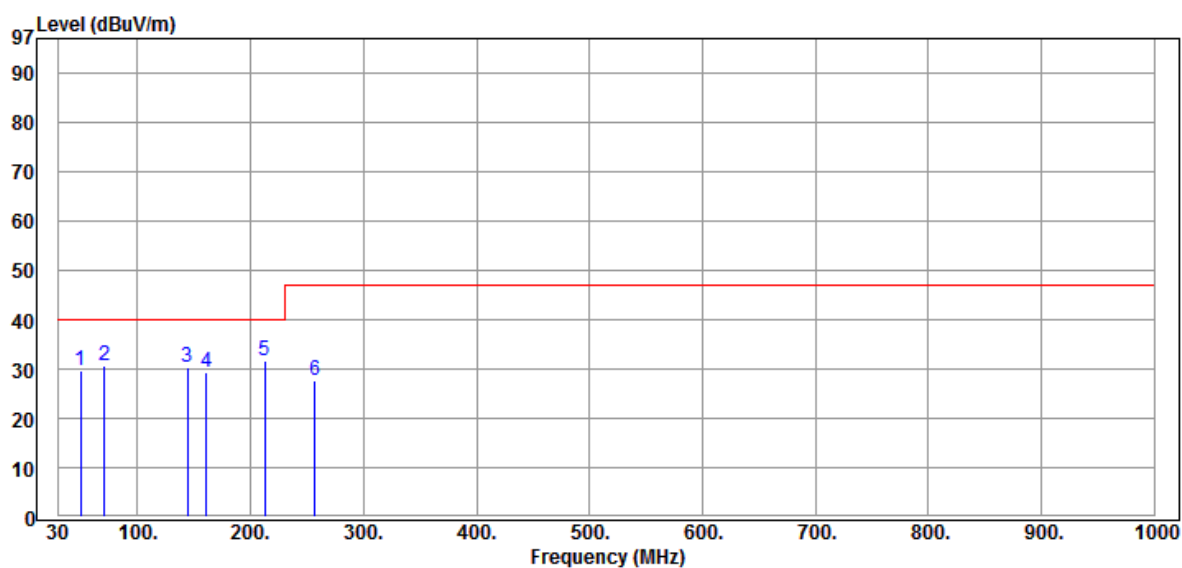
POLARIZATION : VERTICAL

COMMENT: Test Mode: Mode 6: Full Load (Model No.: THR 3-7223WI)

TEMP/HUM : 25.3°C/ 53%

Data: 17

2017-08-07



Item Mark	Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark
1	49.200	44.90	-15.13	29.77	40.00	-10.23	QP
2	70.470	47.09	-16.32	30.77	40.00	-9.23	QP
3	144.430	43.28	-12.80	30.48	40.00	-9.52	QP
4	160.990	41.90	-12.69	29.21	40.00	-10.79	QP
5	212.900	40.60	-8.90	31.70	40.00	-8.30	QP
6	257.200	34.81	-7.11	27.70	47.00	-19.30	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

The particular performance criteria which are specified in the normative annexes B~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 B Data processing equipment:

(Read, write and storage of data; Data display; Data input; Data printing; Data processing)

Annex C Local area networks (LAN)

Annex D Printers and plotters

Annex E Copying machines

Annex F Automatic teller machines (ATM)

Annex G Point of sale terminals (POST)

Annex H xDSL Terminal equipment

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

Criterion	Description
A	<p>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.</p> <p>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.</p>
B	<p>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.</p> <p>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.</p> <p>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.</p>
C	<p>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.</p> <p>Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

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

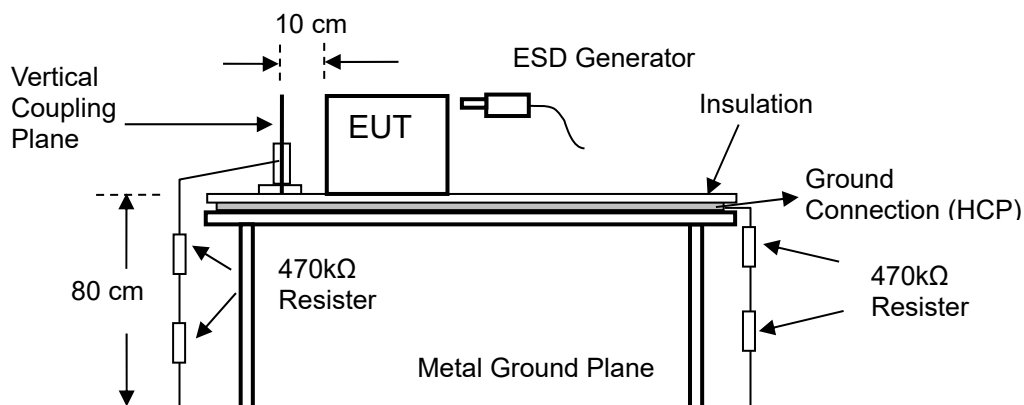
5 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

5.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
ESD Simulator	EMC PARTNER	ESD3000	276	2018/05/01

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:

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: 24.0 °C ; Humidity: 40 % ; Atmospheric: 986 hPa ; Test Engineer: Sam

Mode 1: Full Load (Model No.: THR 3-2411WI)

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: 24.0 °C ; Humidity: 40 % ; Atmospheric: 986 hPa ; Test Engineer: Sam

Mode 1: Full Load (Model No.: THR 3-2411WI)

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

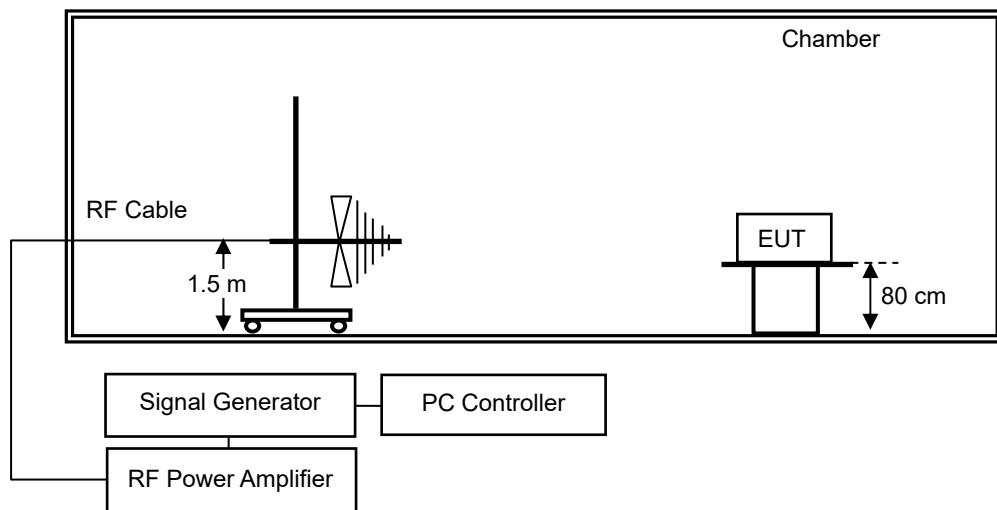
6 Radio-frequency, Electromagnetic field Immunity Test (IEC 61000-4-3)

6.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Signal Generator	KEYSIGHT	N5171B	MY53051802	2018/03/07
Power Amplifier	R&K	A080M102-5555R	B30850	2018/04/27
Power Amplifier	R&K	A701M402-4747R	B35850	2018/04/27
Power Amplifier	R&K	GA252M602-4747R	B60243	2018/04/27
Log Antenna	Schwarzbeck	VULP 9118 G Special	9118GS912	2018/04/27
Horn Antenna	Schwarzbeck	BBHA 9120 E	BBHA9120E 586	2018/04/27

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: 10 V/m, 80 % AM (1 kHz),
Spot frequency: 1800 MHz, Field strength: 10 V/m, 80 %AM (1 kHz),
Spot frequency: 2600 MHz, Field strength: 10 V/m, 80 %AM (1 kHz),
Spot frequency: 3500 MHz, Field strength: 10 V/m, 80 %AM (1 kHz),
Spot frequency: 5000 MHz, Field strength: 10 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: 25.0 °C ; Humidity: 41 % ; Atmospheric: 986 hPa ; Test Engineer: Mark

Mode 1: Full Load (Model No.: THR 3-2411WI)

Frequency range: 80 to 1000 MHz, Field strength: 10 V/m, 80 % AM (1 kHz)

Performance criterion: ☒ **A** ☐ **B** ☐ **C**



The performance criterion after tested EN 55035:

Temperature: 25.0 °C ; Humidity: 41 % ; Atmospheric: 986 hPa ; Test Engineer: Mark

Mode 1: Full Load (Model No.: THR 3-2411WI)

Frequency range: **80** to **1000** MHz, Field strength: **10** V/m, 80 % AM (1 kHz)

Performance criterion: ☒ **A** ☐ **B** ☐ **C**

Spot frequency: **1800** MHz, Field strength: **10** V/m, 80 % AM (1 kHz)

Performance criterion: ☒ **A** ☐ **B** ☐ **C**

Spot frequency: **2600** MHz, Field strength: **10** V/m, 80 % AM (1 kHz)

Performance criterion: ☒ **A** ☐ **B** ☐ **C**

Spot frequency: **3500** MHz, Field strength: **10** V/m, 80 % AM (1 kHz)

Performance criterion: ☒ **A** ☐ **B** ☐ **C**

Spot frequency: **5000** MHz, Field strength: **10** V/m, 80 % AM (1 kHz)

Performance criterion: ☒ **A** ☐ **B** ☐ **C**

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

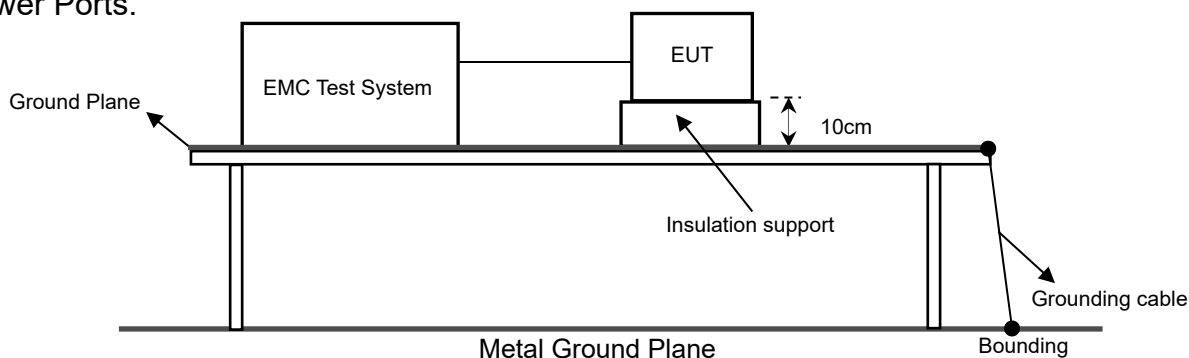
7.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMC Test System	EMC PARTNER	TRANSIENT-2000	812	2018/03/09

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 m×1 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: 24.0 °C ; Humidity: 39 % ; Atmospheric: 986 hPa ; Test Engineer: Mark

Mode 1: Full Load (Model No.: THR 3-2411WI)

☒ ± 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

Note: Add 470µF/ 50V at input.

The performance criterion after tested EN 55035:

Temperature: 24.0 °C ; Humidity: 39 % ; Atmospheric: 986 hPa ; Test Engineer: Mark

Mode 1: Full Load (Model No.: THR 3-2411WI)

☒ ± 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

Note: Add 470µF/ 50V at input.



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

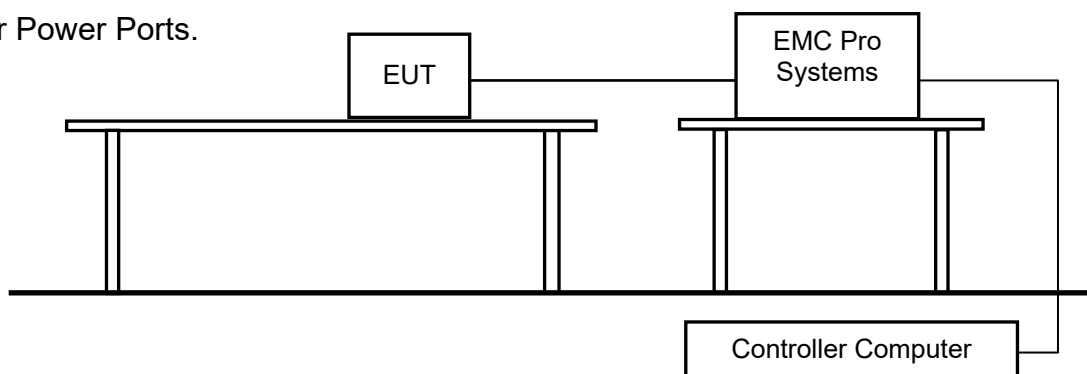
8.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMC Pro Systems	KeyTek	EMC Pro	0003234	2018/04/26

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: ± 0.5 kV (peak): line to earth, 1.2/50 (8/20) Tr/Th μ s

Performance criterion: **B**

- ☐ Analogue/digital data 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.

☐ Analogue/digital data 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**

8.3.3 According to special request by client

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

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: 25.0 $^{\circ}$ C ; Humidity: 42 % ; Atmospheric: 985 hPa ; Test Engineer: Edison

Mode 1: Full Load (Model No.: THR 3-2411WI)

☒ ± 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**

Note: Add 470 μ F/ 200V at input.



The performance criterion after tested EN 55035:

Temperature: 25.0 °C ; Humidity: 42 % ; Atmospheric: 985 hPa ; Test Engineer: Edison

Mode 1: Full Load (Model No.: THR 3-2411WI)

☒ ± 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**

Note: Add 470µF/ 200V at input.

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

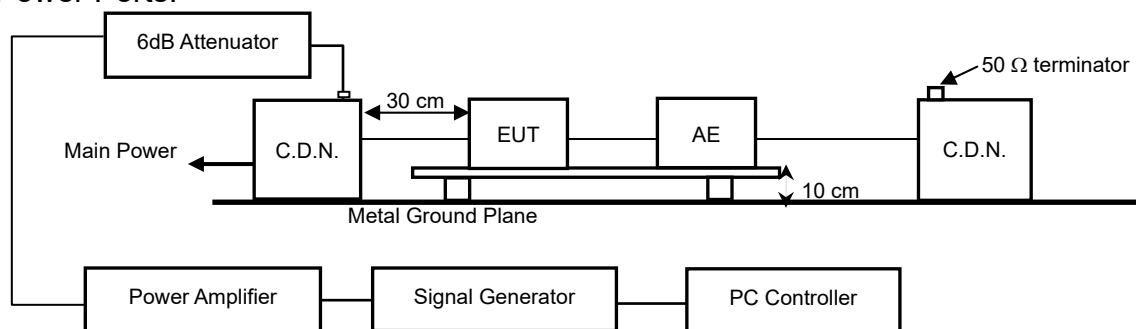
9.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Signal Generator	Marconi Instruments	2024	112246/087	2018/05/15
RF Power Amplifier	R&K	A009K101-5050R	B30850	2018/02/04
Attenuator	Microwave Device Inc.	MA-5250/6N	001052	2018/02/04
C.D.N	FCC	FCC-801-M3-25A	01030	2018/03/09
C.D.N	SCHAFFNER	M216	16394	2018/03/09

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);

☒ 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: 24.0 °C ; Humidity: 38 % ; Atmospheric: 986 hPa ; Test Engineer: Sam

Mode 1: Full Load (Model No.: THR 3-2411WI)

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: 24.0 °C ; Humidity: 38 % ; Atmospheric: 986 hPa ; Test Engineer: Sam

Mode 1: Full Load (Model No.: THR 3-2411WI)

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

☒ DC network power port.

Performance criterion: ☒ **A** ☐ **B** ☐ **C**

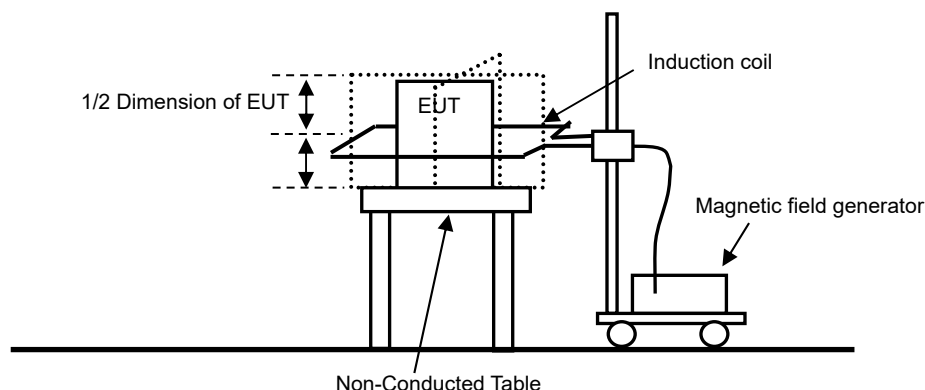
10 Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8)

10.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Magnetic field generator	PMM	PMM1008	0000J00301	2018/07/06

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: 3 A/m (60 Sec.), 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: 25.0 °C ; Humidity: 40 % ; Atmospheric: 986 hPa ; Test Engineer: Sam

Mode 1: Full Load (Model No.: THR 3-2411WI)

Power Frequency is 50 Hz, Magnetic field strength: 3 A/m

Performance criterion: ☒ A ☐ B ☐ C

Temperature: 24.9 °C ; Humidity: 51 % ; Atmospheric: 997 hPa ; Test Engineer: Edison

Mode 1: Full Load (Model No.: THR 3-2411WI)

Power Frequency is 50 Hz, Magnetic field strength: 100 A/m

Performance criterion: ☒ A ☐ B ☐ C

Power Frequency is 50 Hz, Magnetic field strength: 1000 A/m

Performance criterion: ☒ A ☐ B ☐ C

The performance criterion after tested EN 55035:

Temperature: 25.0 °C ; Humidity: 40 % ; Atmospheric: 986 hPa ; Test Engineer: Sam

Mode 1: Full Load (Model No.: THR 3-2411WI)

Power Frequency is 50 Hz, Magnetic field strength: 3 A/m

Performance criterion: ☒ A ☐ B ☐ C

Temperature: 24.9 °C ; Humidity: 51 % ; Atmospheric: 997 hPa ; Test Engineer: Edison

Mode 1: Full Load (Model No.: THR 3-2411WI)

Power Frequency is 50 Hz, Magnetic field strength: 100 A/m

Performance criterion: ☒ A ☐ B ☐ C

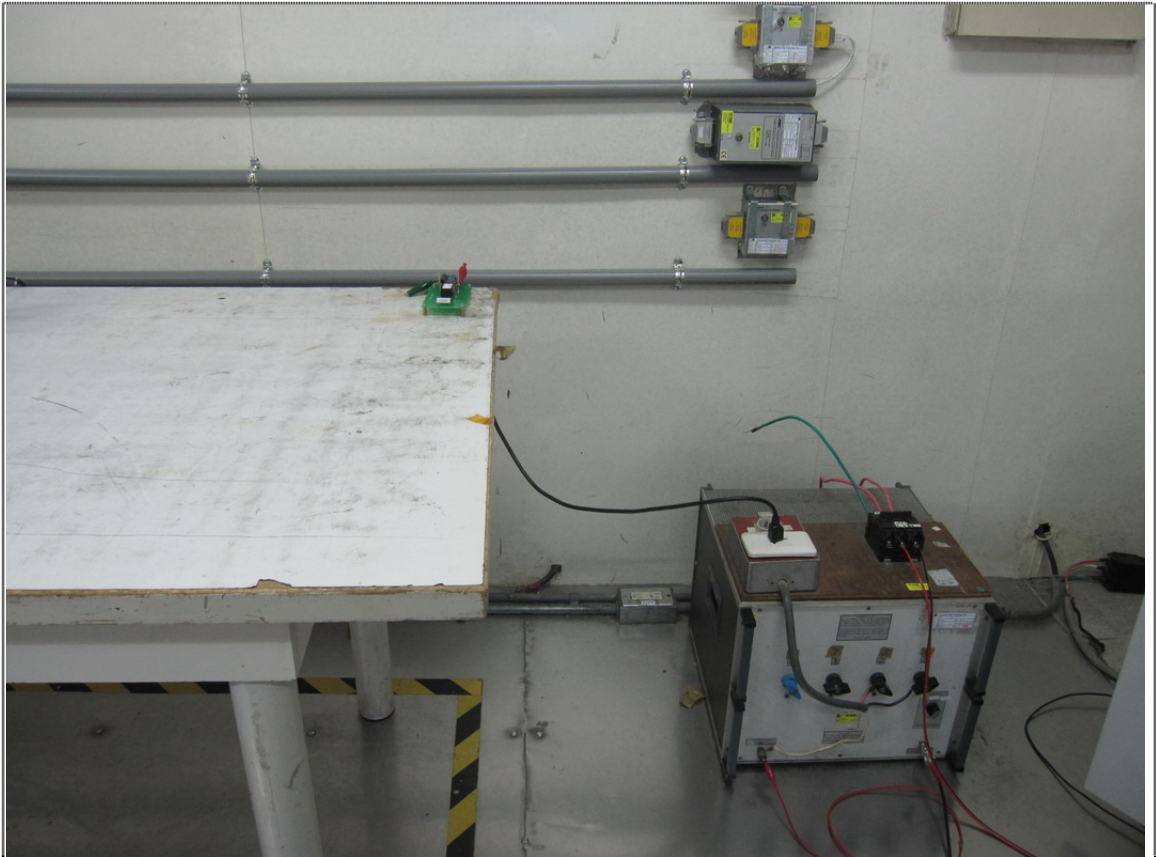
Power Frequency is 50 Hz, Magnetic field strength: 1000 A/m

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

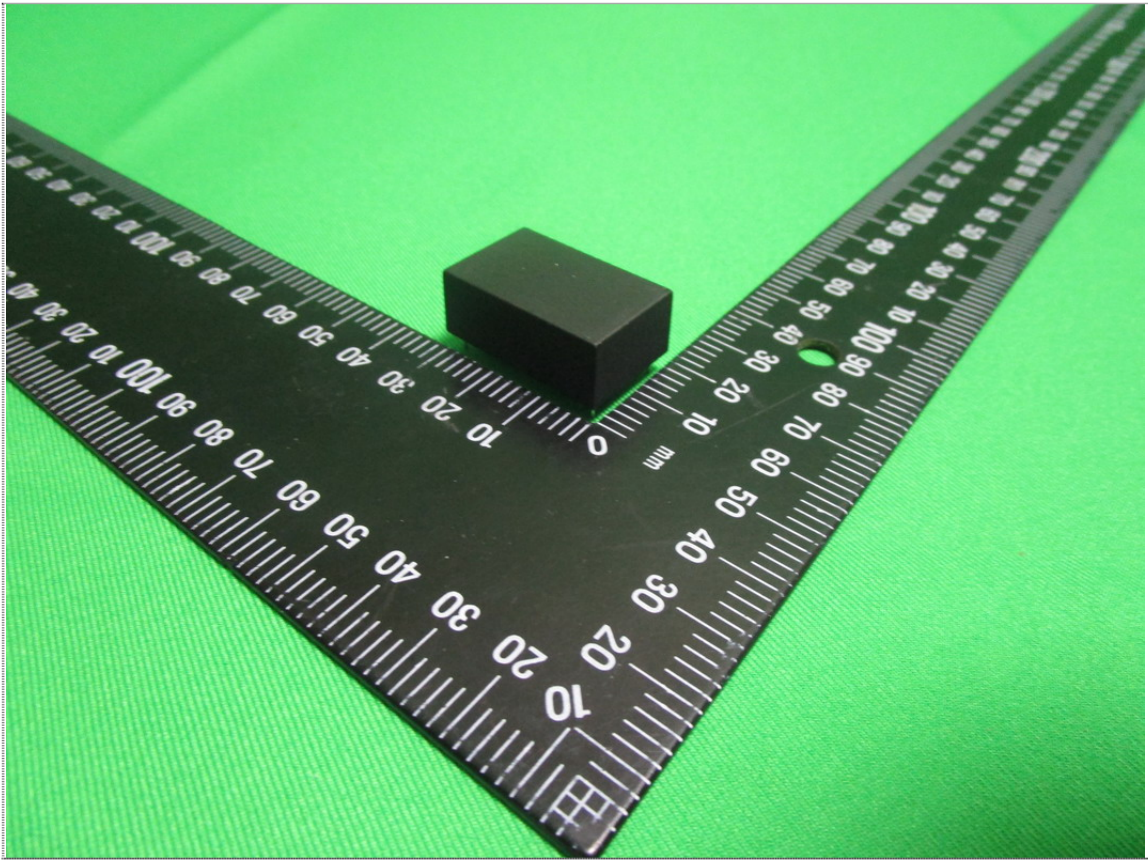


Rear View

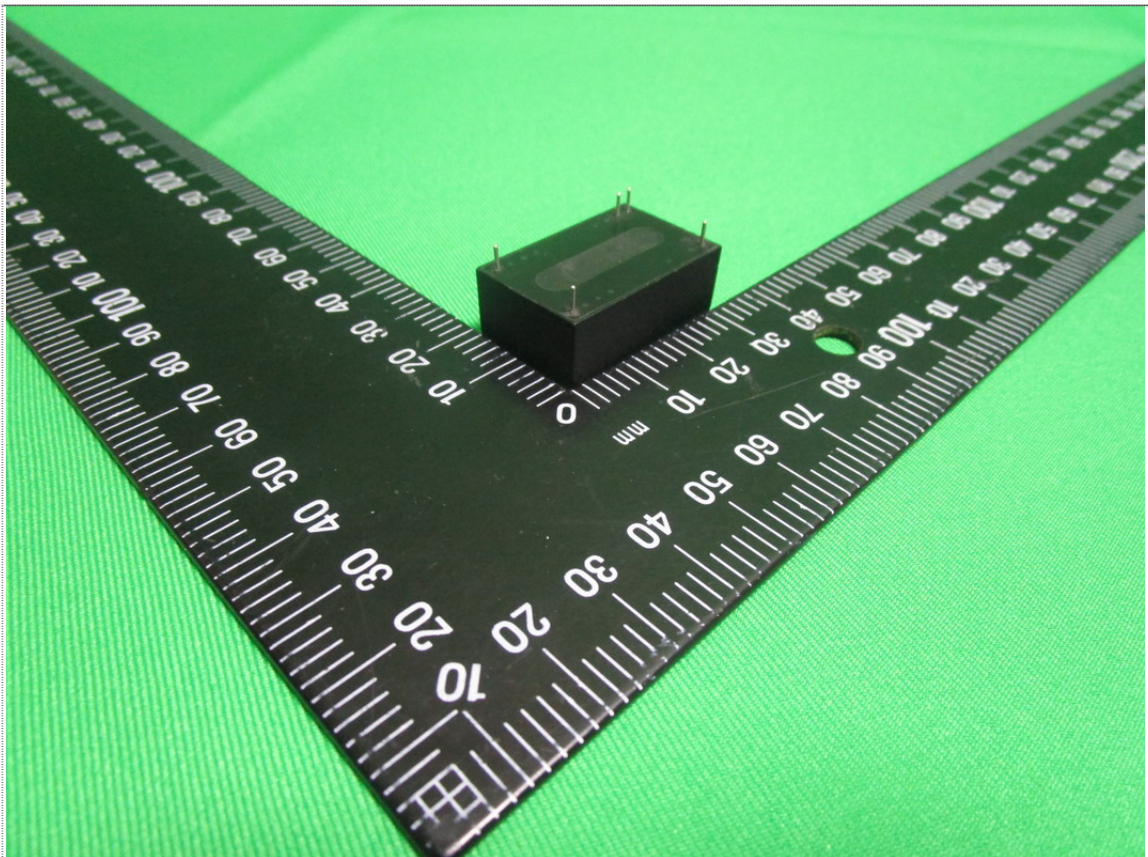


12 Photographs of EUT

12.1 Model Number: THR 3-2411WI



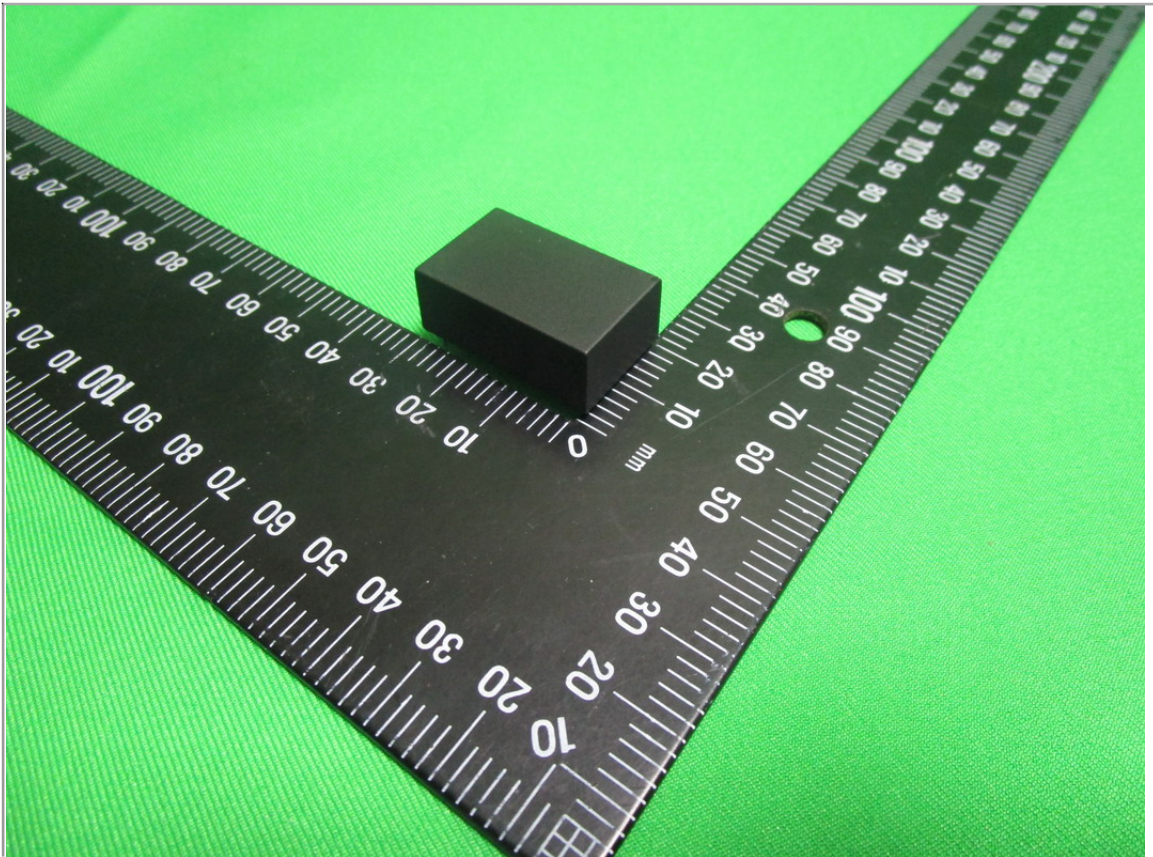
Front View of EUT



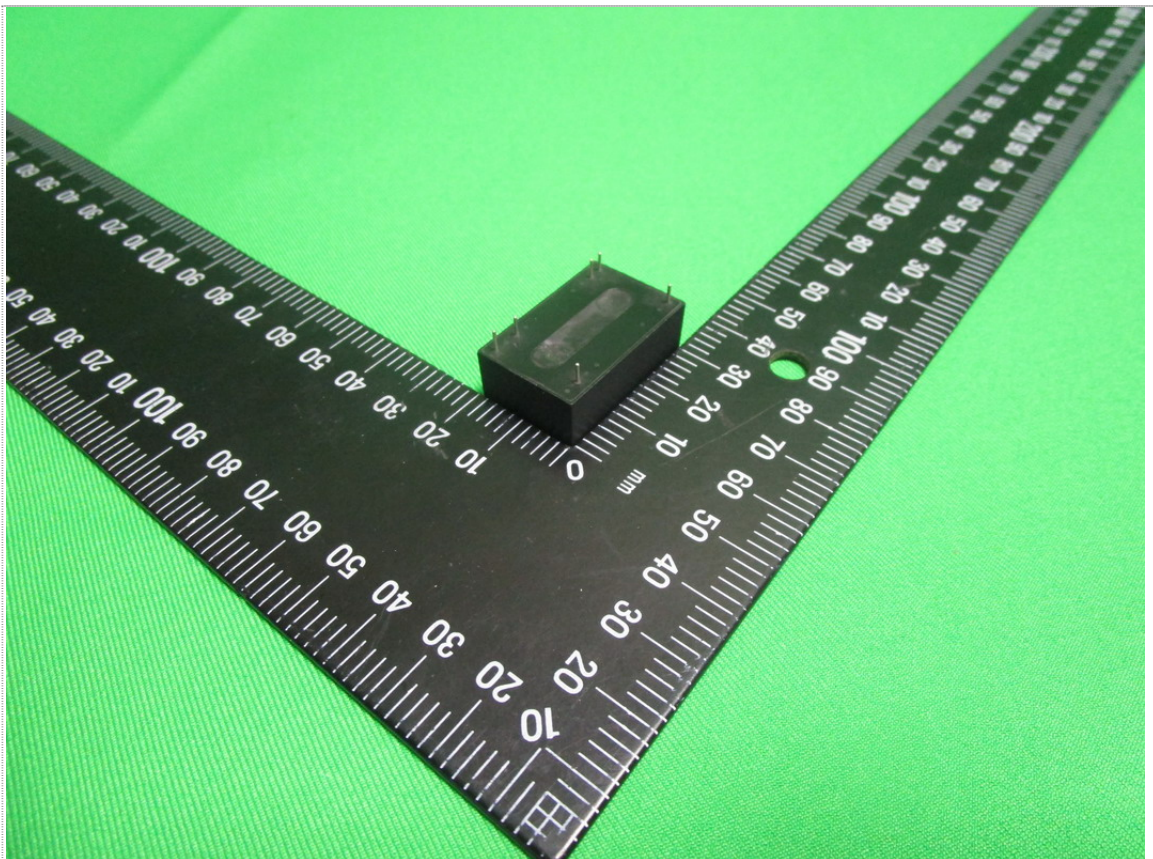
Rear View of EUT



12.2 Model Number: THR 3-2423WI

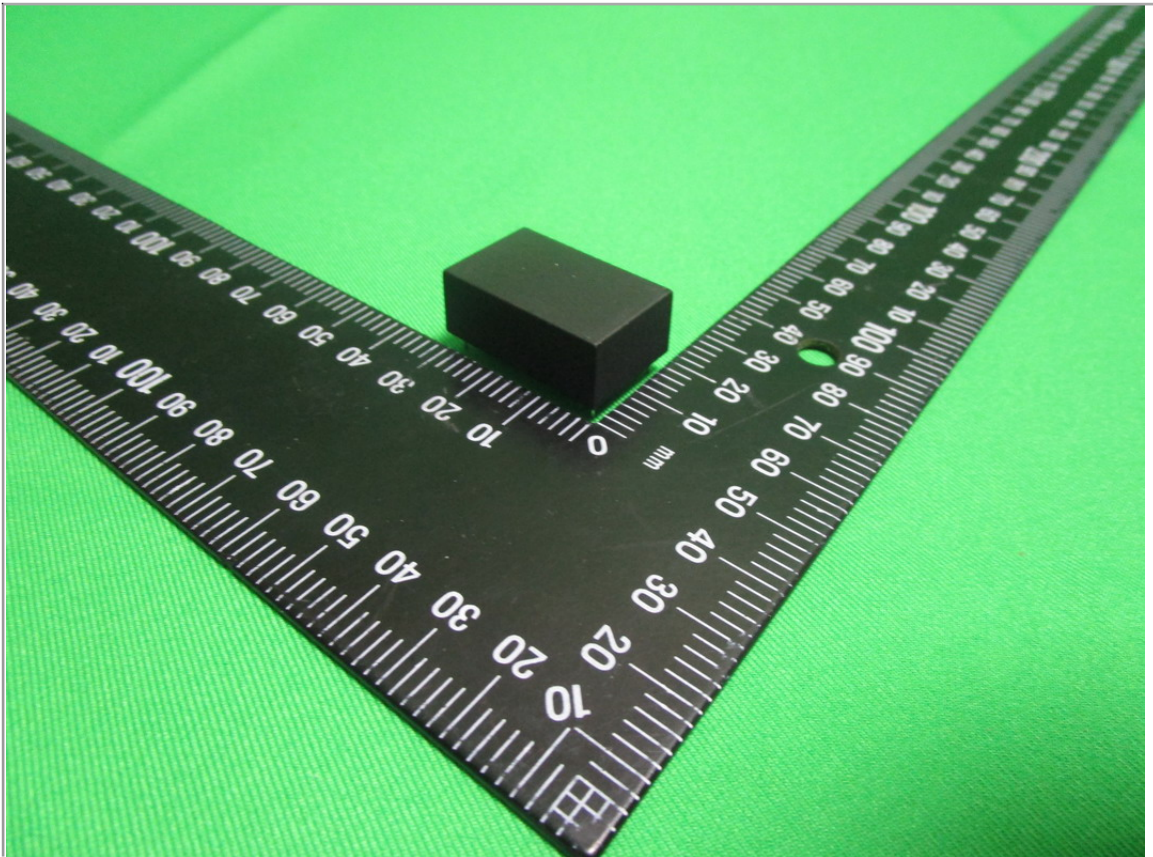


Front View of EUT

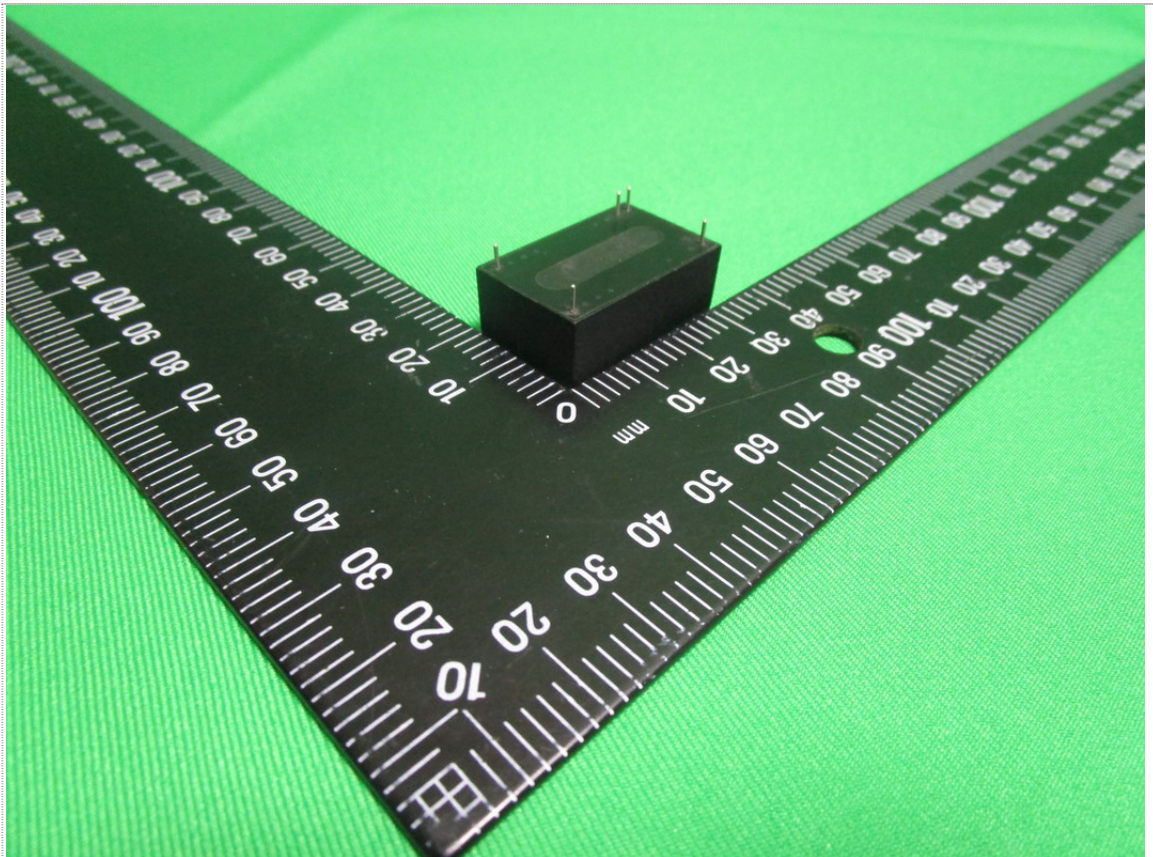


Rear View of EUT

12.3 Model Number: THR 3-4811WI



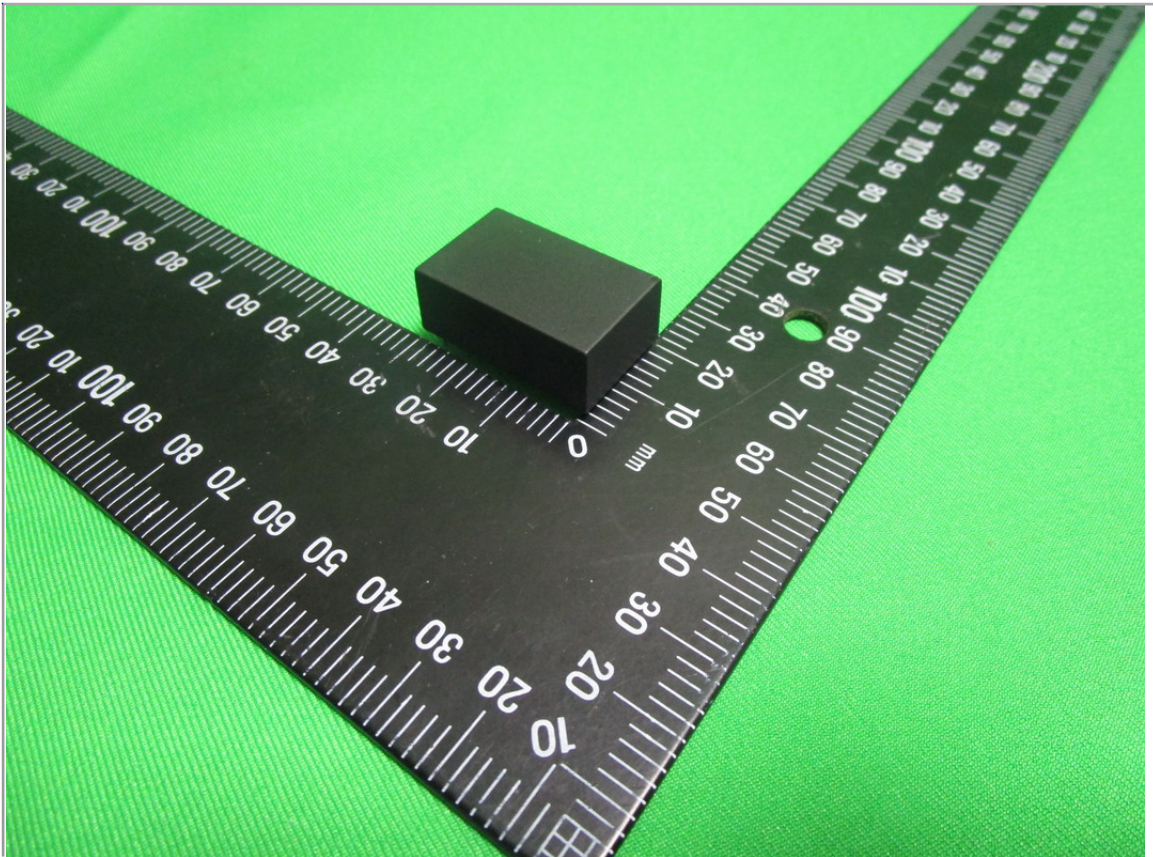
Front View of EUT



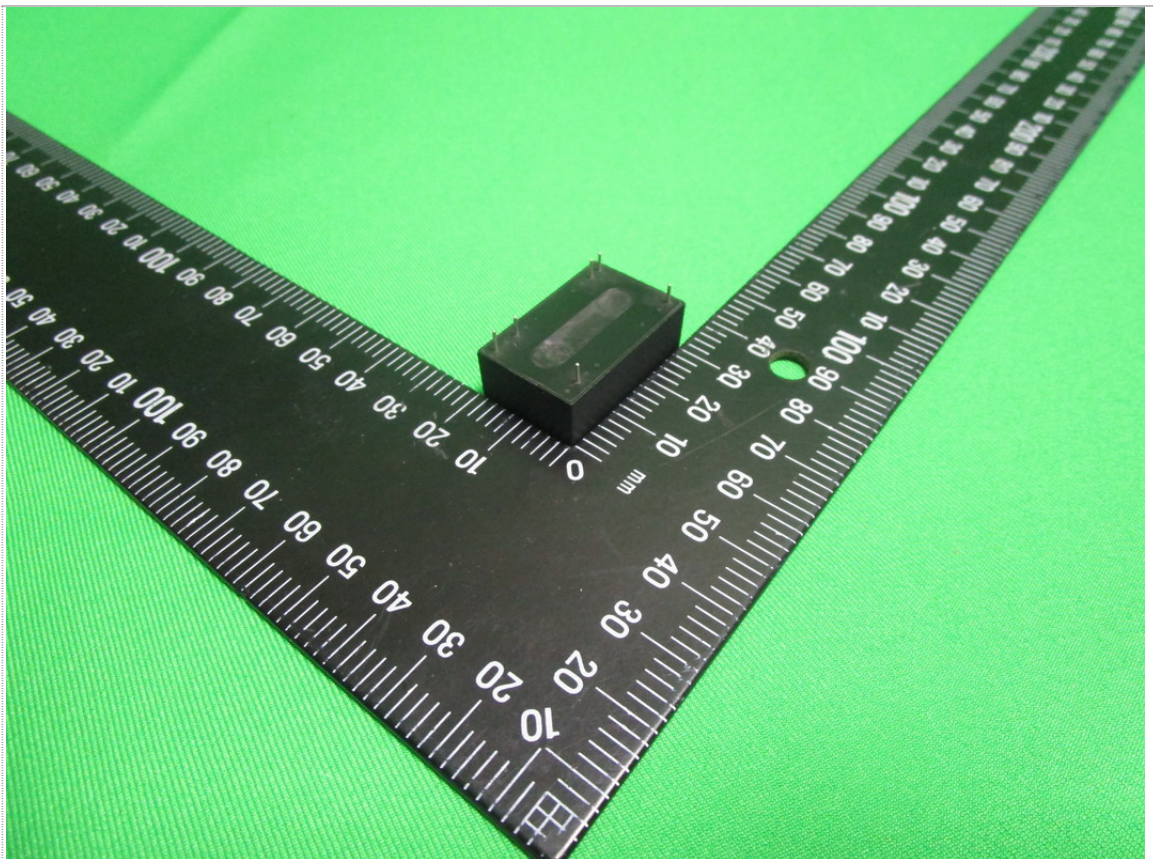
Rear View of EUT



12.4 Model Number: THR 3-4823WI

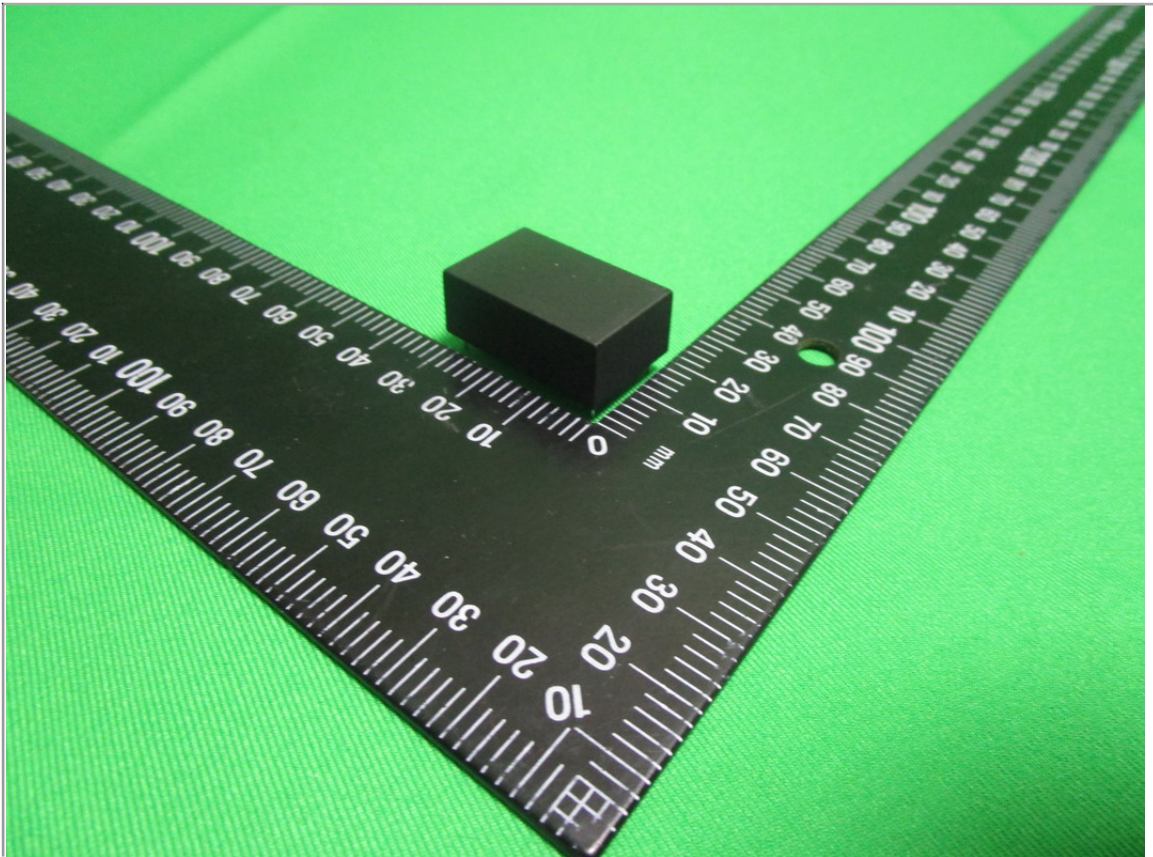


Front View of EUT

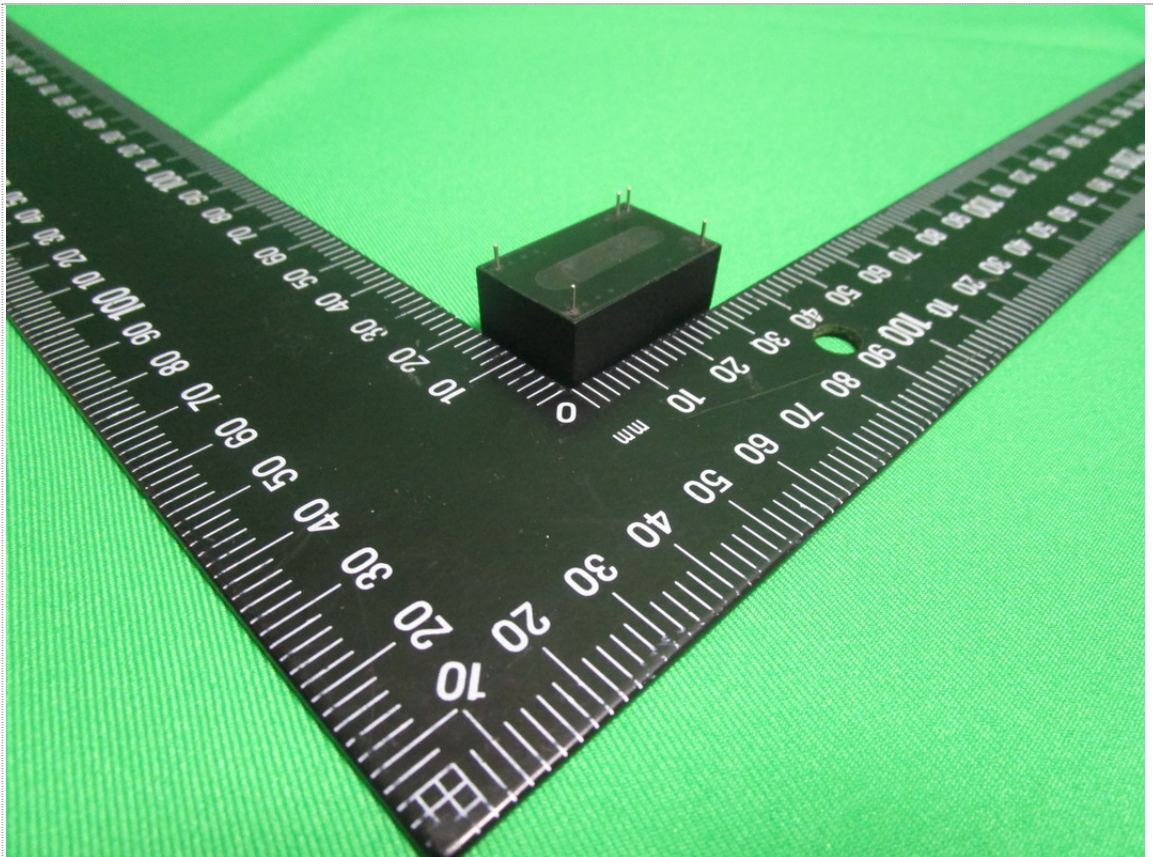


Rear View of EUT

12.5 Model Number: THR 3-7211WI



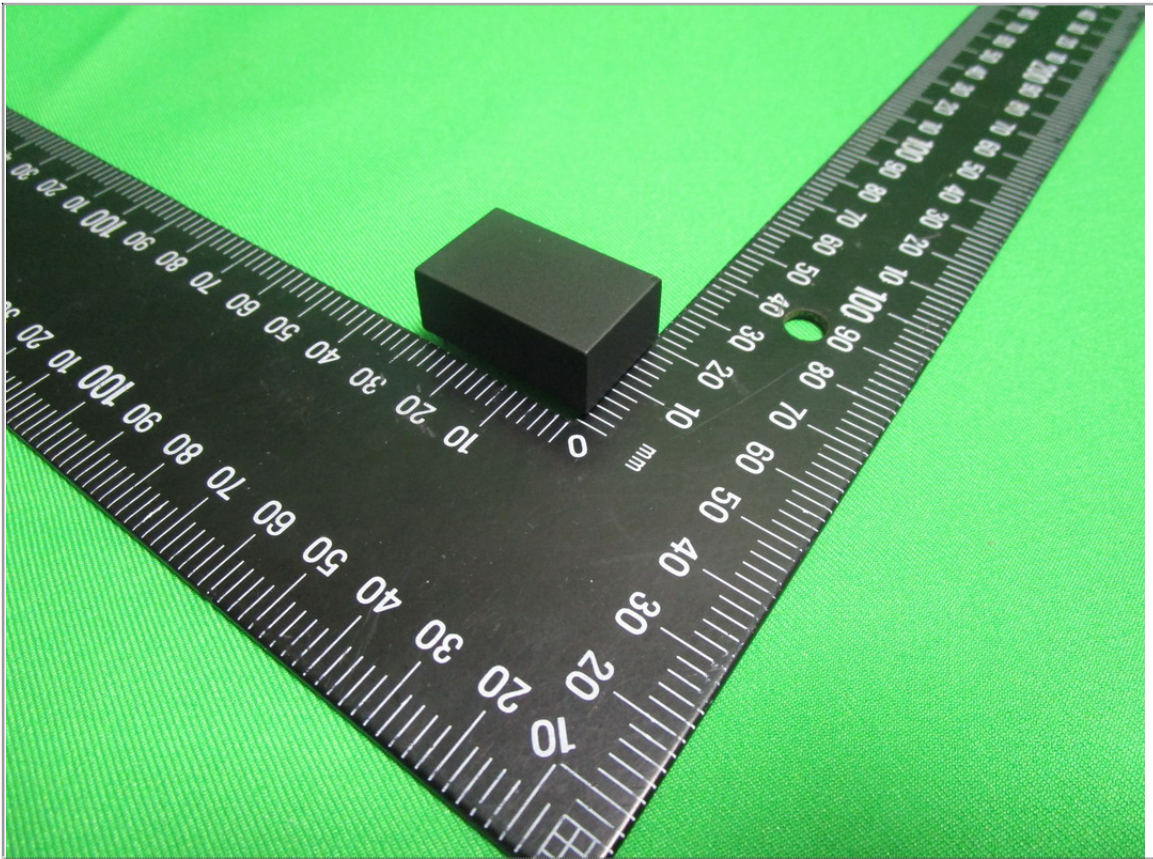
Front View of EUT



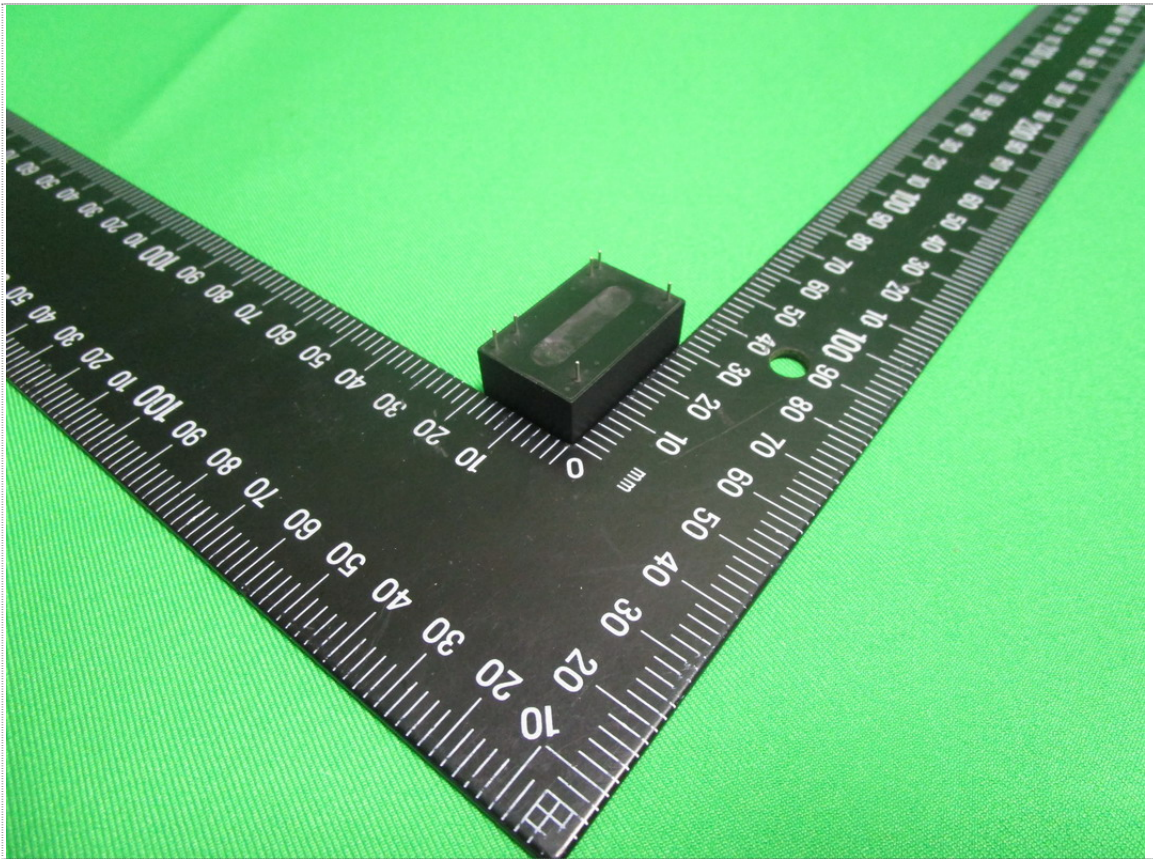
Rear View of EUT



12.6 Model Number: THR 3-7223WI



Front View of EUT



Rear View of EUT