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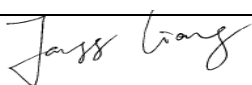
EMC Test report for Frost free refrigerator freezer
Models Refer to section 1.1

Guangzhou, date of issue: 2018-09-03

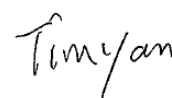
Author Jazz Liang

By order of Hisense Ronshen (Guangdong) Refrigerator Co.,Ltd at Foshan, Guangdong, China

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Reviewed : Tim Yan

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CONTENTS

	page
1	Test description..... 3
1.1	Model description..... 4
1.2	Environment..... 16
1.3	Classification..... 16
2	Summary 17
2.1	Applied standards 17
2.2	Overview of results 17
3	General Information 18
3.1	Product Information..... 18
3.2	Customer Information..... 18
3.3	Test data..... 19
3.4	Overview of measurement uncertainty 19
3.5	Equipment list 20
4	Emission test results 21
4.1	Mains conducted disturbance voltage 21
4.2	Click Disturbances 46
4.3	Disturbance power 49
4.4	Radiated emission (30MHz-1GHz) 62
4.5	Harmonic currents..... 64
4.6	Voltage fluctuations (Flicker) 73
5	Immunity Test Results..... 75
5.1	Electrostatic discharge immunity 75
5.2	Electrical Fast Transient immunity..... 76
5.3	Surge transient immunity 77
5.4	RF Conducted immunity..... 78
5.5	Power supply interruptions and dips..... 79
6	Identification of the equipment under test..... 80
7	Product Internal Photos..... 82

1 TEST DESCRIPTION

This report is based on report 4345534.50, in this updated, add new models as list below table 1 in section 1.1. And the new models are identical to original model RD-41WC4SC1, except for the cold storage room.

After technical reviewed, there is no addition test for EMC.

The conclusion and results stated in this test report are based on a non-recurrent examination of sample(s) provided by the applicant.

1.1 Model description

The apparatus as supplied for the test is frost free refrigerator freezer intended for residential use. The products contain electronic circuitry and with earth connection.

Base on client's declaration,

1, all models are identical except for the temperature controller location, the location of condenser, water dispenser and compressor such as list below:

Model	Temperature controller location	The location of condenser	Have water dispenser	Compressor
RD-40WC4SB2, RB400N4EG2,RB400N4EY2	On the door face	Inside	Yes	LR88CY1 HXZ140A
RB413N4GW2, RD-41WC4SB2,	On the door face	Inside	No	LR88CY1 HXZ140A
RD-40WC4SD2	On the door face	Outside	Yes	LR88CY1
RD-44WC4SC2, RB438N4AG2,RB438N4AC2, RB438N4AW2,RB438N4AB2, RB438N4AT2,RB438N4AY2,R B438N4FG2,RB438N4FC2,R B438N4FC2,RB438N4FB2,RB 438N4FT2,RB438N4FY2	On the door face	Inside	Yes	LR88CY1 HXZ140A
RB400N4CG2,RB400N4FY2, RB400N4FC2,RB400N4CC2, RD-40WC4SA2, RB400N4CW2	In the fresh compartment	Inside	Yes	LR88CY1 HXZ140A
RB413N4HT2, RD-41WC4SA2	In the fresh compartment	Inside	No	LR88CY1 HXZ140A
RD-44WC4SA2, RB438N4EG2,RB438N4EC2, RB438N4EW2,RB438N4EB2, RB438N4ET2,RB438N4EY2	In the fresh compartment	Inside	Yes	LR88CY1 HXZ140A
RD-41WC4SA1	In the fresh compartment	Inside	No	HU155CY1 HYB81MKUa
RD-41WC4SC1	In the fresh compartment	Inside	Yes	HU155CY1
RD-40WC4SB1,	On the door face	Inside	Yes	HU155CY1
RD-41WC4SB1,	On the door face	Inside	No	HU155CY1

RD-44WC4SC1	On the door face	Inside	Yes	HU155CY1 HYB81MKUa
RB406N4WC1,RD-41WC4S1	On the door face	Inside	No	HYB81MKUa HU155CY1
RB406N4AD2, RB406N4AW2, RD-41WC4SC2	In the fresh compartment	Inside	No	HXZ140A
RB412N4A*1 (*=A-Z), RD-43WC4SA1	On the door face	Inside	No	HYB81MKUa
RB412N4WW1,RB412N4WF1, RB412N4WI1, RB412N4WD1, RD-43WC4SW1	On the door face	Inside	Yes	HYB81MKUa
RB406N4AW1,RB406N4AD1, RD-41WC4SE1,RB406N4AF1	In the fresh compartment	Inside	No	PZ85E1C 3
RB406N4WD1, RD-41WC4SF1, B406N4WF1	In the fresh compartment	Inside	Yes	PZ85E1C 3
RD-44WC4SF1, RB438N4WF1	In the fresh compartment	Inside	Yes	HYB81MKUa HU155CY1

Remark:

* stand for "A-Z": which indicates different display panel of the models

2, all models have transformer XZM-EF2096, and alternative transformer EE20-12

3, the new models RD-41WC4SA1, RD-41WC4SC1 are identical except for that RD-41WC4SC1 with water box on the door face but RD-41WC4SA1 without. And the two new models are identical to series 1# except for appearance.

4, add alternative compressor HU155CY.

5, model RD-40WC4SD2 was identical to model RB400N4EG2 except for the condenser pipe position such as figure 4.

6, add alternative compressor HYB81MKUa

7, add alternative compressor HXZ140A

8, add alternative power PCB 1.

9, add alternative control PCB 2.

10, add alternative compressor PZ85E1C 3

After technical reviewed,

- 1) model RD-40WC4SA2 with transformer XZM-EF2096, RD-40WC4SA2 with transformer EE20-12, RD-40WC4SB2 with transformer XZM-EF2096, RD-40WC4SB2 with transformer EE20-12 was chosen for full test, model RD-41WC4SA1 (compressor HU155CY1) was chosen for repeat conducted emission, disturbance power test for compliance verification,
- 2) model RD-40WC4SD2 was chosen to repeat ESD for compliance verification,

- 3) model RD-41WC4SA1 (alternative compressor HYB81MKUa) with alternative power PCB1 was chosen to repeat conducted emission, disturbance power, EMS for compliance verification.
- 4) model RD-44WC4SC2 (original compressor LR88CY1) with alternative power PCB1 was chosen to repeat conducted emission, disturbance power, EMS for compliance verification.
- 5) model RD-40WC4SA2(alternative compressor HXZ140A) was chosen to repeat conducted emission, disturbance power for compliance verification.
- 6) model RB406N4AD2 (compressor HXZ140A) with alternative power PCB2 was chosen to repeat conducted emission, disturbance power, EMS for compliance verification.
- 7) model RD-44WC4SC1 (compressor HYB81MKUa) was chosen to repeat conducted emission, disturbance power for compliance verification.
- 8) model RB406N4WC1 (compressor HYB81MKUa) was chosen to repeat conducted emission, disturbance power for compliance verification.
- 9) model RB406N4AW1 (compressor PZ85E1C 3) was chosen to repeat conducted emission, disturbance power test for compliance verification.

and the corresponding data are representative of the other models.



Figure 1 model RD-40WC4SA2



Figure 2 model RD-40WC4SB2



Figure 3 model RD-41WC4SA1



Figure 4 model RD-40WC4SD2



Figure 5 model RB406N4AD2



Figure 6 model RB406N4WC1



Figure 7 model RD-44WC4SC1



Figure 8 model RB406N4AW1



Figure 9 model RB406N4WD1

The Operating Modes as stated in the User Manual are on mode and off mode.

1.2 Environment

The requirements and standards apply to equipment intended for use in:

√	Residential (domestic) environment
√	Commercial and light-industrial environment
	Industrial environment
	Medical environment

1.3 Classification

The standard EN 55014-2 is subdivided in four categories. For each category, the specific immunity requirements are formulated.

	Category 1	Apparatus containing no electronic control circuitry
√	Category 2	Apparatus containing electronic control circuitry with no internal clock or oscillator frequency higher than 15 MHz.
	Category 3	Battery powered apparatus containing electronic control circuitry with no internal clock higher than 15 MHz.
	Category 4	All other apparatus.

2 SUMMARY

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

2.1 Applied standards

Standard	Year	Title
EN 55014-1	2006	Emission – Electrical motor-operated and thermal appliances for household and similar purposes, electrical tools and similar electrical apparatus
A1	2009	
A2	2011	
EN 55014-2	2015	Immunity – Household appliances, electric tools and similar.
EN 61000-3-2	2014	Limits for harmonic currents emissions
EN 61000-3-3	2013	Limitation of voltage fluctuations and flicker

2.2 Overview of results

Emission tests	Result
Mains conducted disturbance voltage	PASS
Discontinuous disturbance (clicks) on AC power leads	PASS
Disturbance power	PASS
Radiated emission (30 MHz – 1 GHz)	PASS
Harmonic current emission	PASS
Limitation of voltage fluctuations (flicker)	PASS

Immunity tests-EN 55014-2	Result
Electrostatic Discharges (ESD)	PASS
Electrical fast transient (EFT) / Burst transients	PASS
Surge transients	PASS
Conducted RF disturbances	PASS
Power supply voltage interruptions & dips	PASS

3 GENERAL INFORMATION

3.1 Product Information

Equipment under test	Frost free refrigerator freezer
Trade mark	Hisense
Test type(s)	RD-40WC4SA2 with transformer XZM-EF2096, RD-40WC4SA2 with transformer EE20-12, RD-40WC4SB2 with transformer XZM-EF2096, RD-40WC4SB2 with transformer EE20-12, RD-41WC4SA1 (compressor HU155CY1), RD-40WC4SD2, RD-41WC4SA1 (alternative compressor HYB81MKUa) with alternative power PCB1 RD-44WC4SC2 (original compressor LR88CY1) with alternative power PCB1 RD-40WC4SA2(compressor HXZ140A) RB406N4AD2 (compressor HXZ140A) with alternative power PCB2 RD-44WC4SC1 (compressor HYB81MKUa) RB406N4WC1 (compressor HYB81MKUa)
Represented type(s)	Refer to section 1.1
U nominal	220-240 Vac, 50 Hz, Class I
P rated	Defrost: 180 W LED lamp: Max. 1.5 W

3.2 Customer Information

Applicant / Manufacturer	Hisense Ronshen (Guangdong) Refrigerator Co.,Ltd.
Address	No.8 Ronggang Road Ronggui Shunde Foshan Guangdong, China

Factory	Hisense Ronshen (Yangzhou) Refrigerator Co., Ltd.
Address	No.9, 19, Hongyang Road, Yangzhou, jiangsu, China

3.3 Test data

Location	Quietek Corporation – Suzhou EMC laboratory
Address	No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China.
Location	DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch
Address	Building A3, No.3 Qiyun Road, Science City, Guangzhou Hi-Tech Industrial Development Zone, Guangzhou, P.R. China
Date	2016-12-12 to 2017-01-10
Supervised by	Jazz Liang
Location	Quietek Corporation – Suzhou EMC laboratory
Address	No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China.
Date	2017-03-09 to 2017-04-13
Supervised by	Jazz Liang
Location	DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch
Address	Building A3, No.3 Qiyun Road, Science City, Guangzhou Hi-Tech Industrial Development Zone, Guangzhou, P.R. China
Date	2018-03-20 to 2018-04-19
Supervised by	Jazz Liang
Date	2018-05-03 to 2018-05-10
Supervised by	Jazz Liang

3.4 Overview of measurement uncertainty

Measurement	Uncertainty
Mains disturbance voltage (150 kHz – 30 MHz)	2,82 dB
Disturbance power (30 MHz– 300 MHz)	3,76 dB

3.5 Equipment list

Location: DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch

Item	Instrumentation	Manufacturer	Model No.	Serial No.	Dekra No.	Cal. Interval
1	EMI Receiver	R&S	ESCI	101206	G/L858	2018/11/02
2	LISN	R&S	ENV216	101336	G/L859	2018/11/02
3	Shielding Room	Changzhou Feite	/	/	G/L861	2018/07/05
4	Clamp	MDS21	TESEQ	4085	G/L863	2018/11/05
5	POWER SOURCE	California Instruments	500LiX-CTS-400	1132A00193	G/L862	2018/11/02
6	Analyzer	California Instruments	PACS-A	1132A00193	G/L862	2018/11/02
7	ESD Generator	TESEQ	NSG435	6513	G/L867	2018/11/05
8	Signal Generator	TESEQ	NSG3040	1821	G/L868	2018/09/07
9	STEPTRANSFORMER	TESEQ	INA6501	/	G/L868	2018/09/07
10	Signal Generator	TESEQ	NSG4070	31446	G/L870	2019/01/01
11	CDN	TESEQ	M016	31564	G/L870	2019/01/01
12	EM-Koppelzange	TESEQ	KEMZ801	31493	G/L870	2019/01/01
13	6dB	TESEQ	ATN6075	30789	G/L870	2019/01/01
14	Multi-Channel Discontinuous Interference Analyzer	DIA1512D	TESEQ	28300	G/L871	2018/11/02
15	LISN	R&S	ENV216	101336	G/L860	2018/11/02

4 EMISSION TEST RESULTS

4.1 Mains conducted disturbance voltage

Standard	EN 55014-1		
Frequency [MHz]	Limits		
	QP [dB(μV)]		AV [dB(μV)]
0,15 – 0,50	66 – 56 *)	59 – 46 *)	
0,50 – 5,0	56	46	
5,0 – 30,0	60	50	

*) Limits decreasing linearly with the logarithm of the frequency

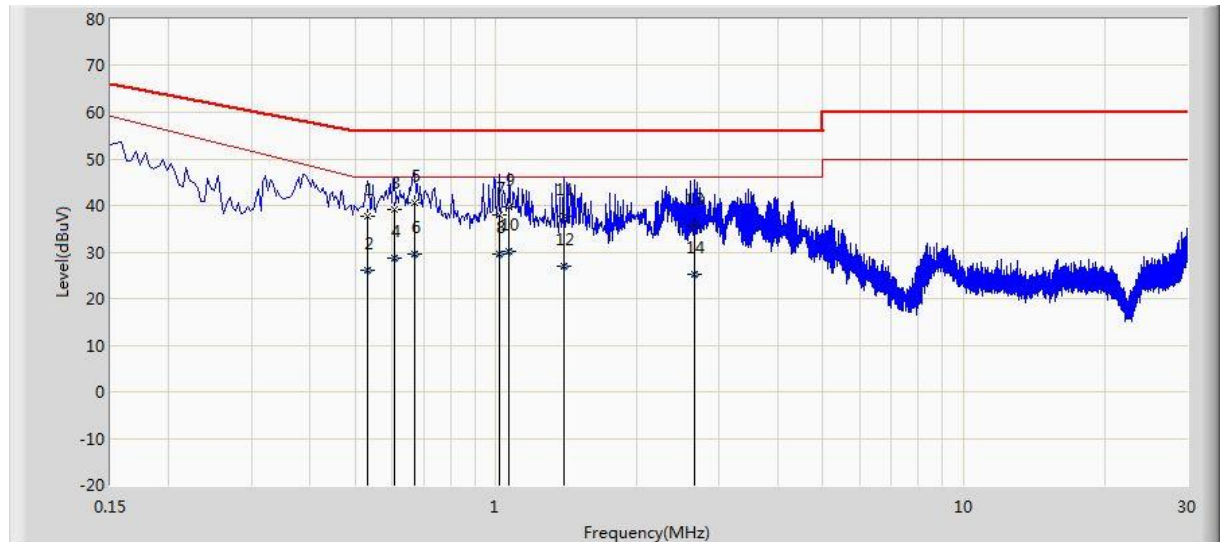
Port	AC mains
Test method	LISN
Mode	On mode
Test voltage	264 Vac, 50 Hz (worst Voltage in pre-scan)

Condition:

Ambient temperature	25 °C
Relative Humidity air	50%

Results of model RD-40WC4SA2 with transformer XZM-EF2096

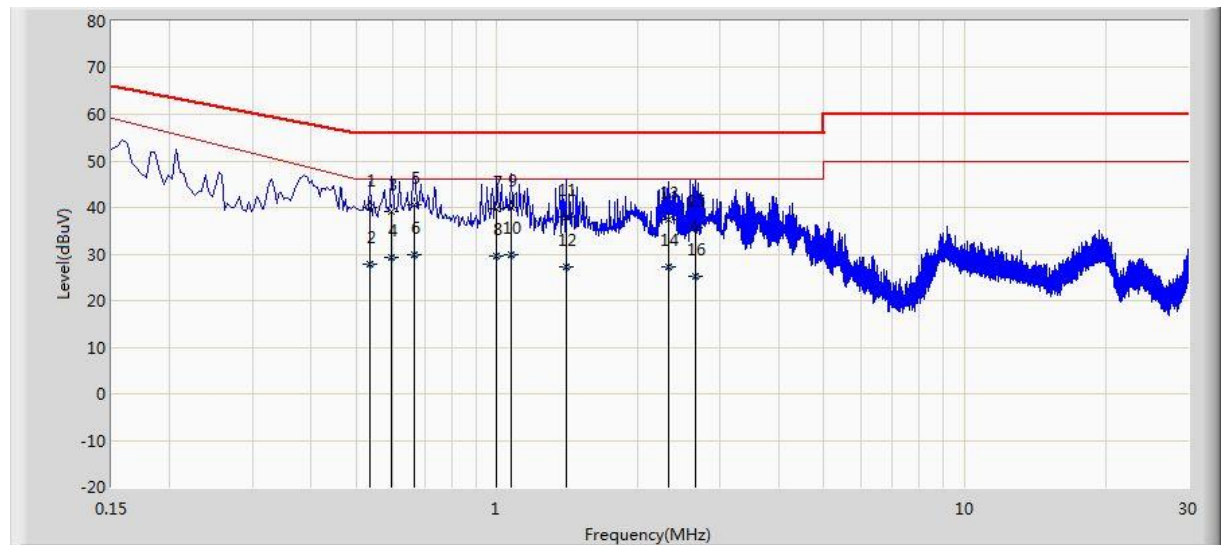
Live



Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
0.530	37.807	28.159	-18.193	56.000	9.600	0.048	0.000	QP
0.530	26.225	16.577	-19.775	46.000	9.600	0.048	0.000	AV
0.606	38.987	29.340	-17.013	56.000	9.600	0.047	0.000	QP
0.606	28.666	19.019	-17.334	46.000	9.600	0.047	0.000	AV
0.670	40.642	30.994	-15.358	56.000	9.600	0.048	0.000	QP
0.670	29.566	19.918	-16.434	46.000	9.600	0.048	0.000	AV
1.014	37.956	28.276	-18.044	56.000	9.610	0.070	0.000	QP
1.014	29.494	19.814	-16.506	46.000	9.610	0.070	0.000	AV
1.066	39.788	30.114	-16.212	56.000	9.610	0.064	0.000	QP
1.066	30.066	20.392	-15.934	46.000	9.610	0.064	0.000	AV
1.398	37.768	28.083	-18.232	56.000	9.610	0.075	0.000	QP
1.398	26.995	17.310	-19.005	46.000	9.610	0.075	0.000	AV
2.658	35.710	25.983	-20.290	56.000	9.621	0.106	0.000	QP
2.658	25.082	15.355	-20.918	46.000	9.621	0.106	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral

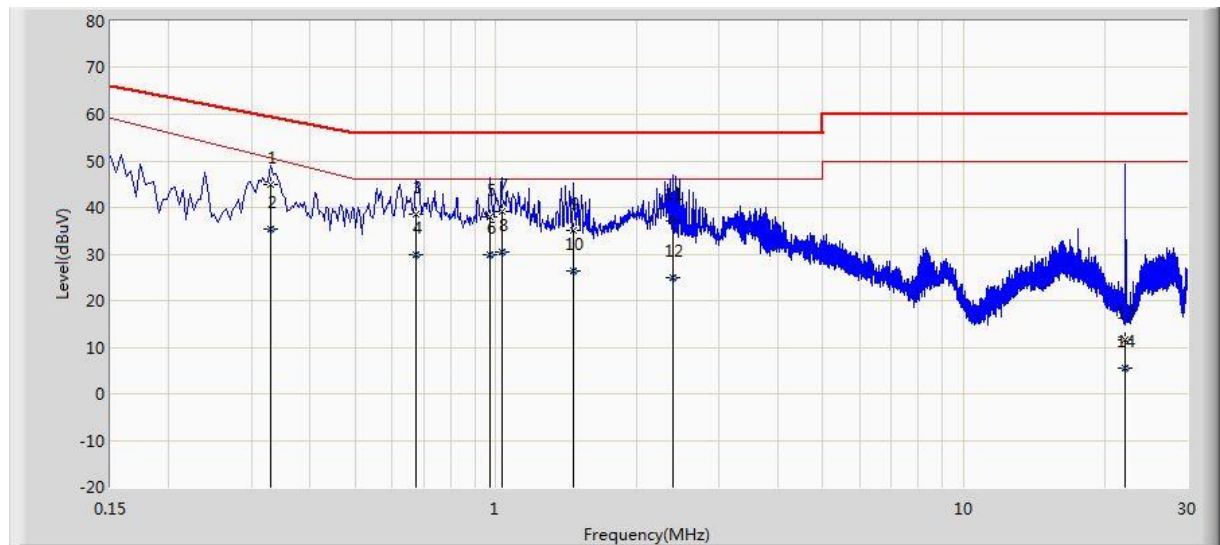


Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
0.534	40.088	30.448	-15.912	56.000	9.590	0.049	0.000	QP
0.534	27.891	18.252	-18.109	46.000	9.590	0.049	0.000	AV
0.594	38.987	29.349	-17.013	56.000	9.590	0.047	0.000	QP
0.594	29.290	19.653	-16.710	46.000	9.590	0.047	0.000	AV
0.666	40.650	31.011	-15.350	56.000	9.590	0.048	0.000	QP
0.666	29.846	20.208	-16.154	46.000	9.590	0.048	0.000	AV
0.998	39.665	30.012	-16.335	56.000	9.590	0.063	0.000	QP
0.998	29.554	19.901	-16.446	46.000	9.590	0.063	0.000	AV
1.074	40.069	30.411	-15.931	56.000	9.592	0.066	0.000	QP
1.074	29.994	20.337	-16.006	46.000	9.592	0.066	0.000	AV
1.406	37.993	28.318	-18.007	56.000	9.598	0.077	0.000	QP
1.406	27.185	17.511	-18.815	46.000	9.598	0.077	0.000	AV
2.334	37.361	27.648	-18.639	56.000	9.615	0.099	0.000	QP
2.334	27.364	17.651	-18.636	46.000	9.615	0.099	0.000	AV
2.658	35.748	26.023	-20.252	56.000	9.619	0.106	0.000	QP
2.658	25.199	15.475	-20.801	46.000	9.619	0.106	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RD-40WC4SA2 with transformer EE20-12

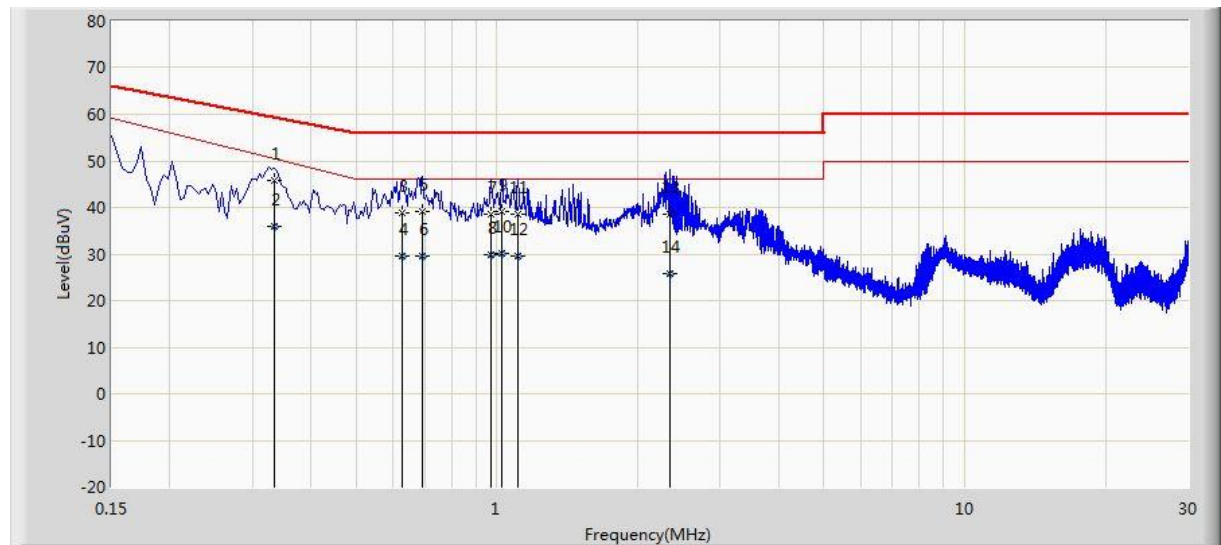
Live



Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
0.330	44.989	35.356	-14.462	59.451	9.600	0.033	0.000	QP
0.330	35.506	25.873	-14.980	50.487	9.600	0.033	0.000	AV
0.674	38.636	28.988	-17.364	56.000	9.600	0.049	0.000	QP
0.674	29.832	20.183	-16.168	46.000	9.600	0.049	0.000	AV
0.974	38.090	28.421	-17.910	56.000	9.609	0.060	0.000	QP
0.974	29.816	20.147	-16.184	46.000	9.609	0.060	0.000	AV
1.030	39.072	29.396	-16.928	56.000	9.610	0.066	0.000	QP
1.030	30.496	20.820	-15.504	46.000	9.610	0.066	0.000	AV
1.466	35.041	25.358	-20.959	56.000	9.610	0.074	0.000	QP
1.466	26.232	16.548	-19.768	46.000	9.610	0.074	0.000	AV
2.382	37.044	27.329	-18.956	56.000	9.616	0.098	0.000	QP
2.382	24.852	15.138	-21.148	46.000	9.616	0.098	0.000	AV
22.194	11.501	0.904	-48.499	60.000	10.284	0.313	0.000	QP
22.194	5.616	-4.981	-44.384	50.000	10.284	0.313	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral

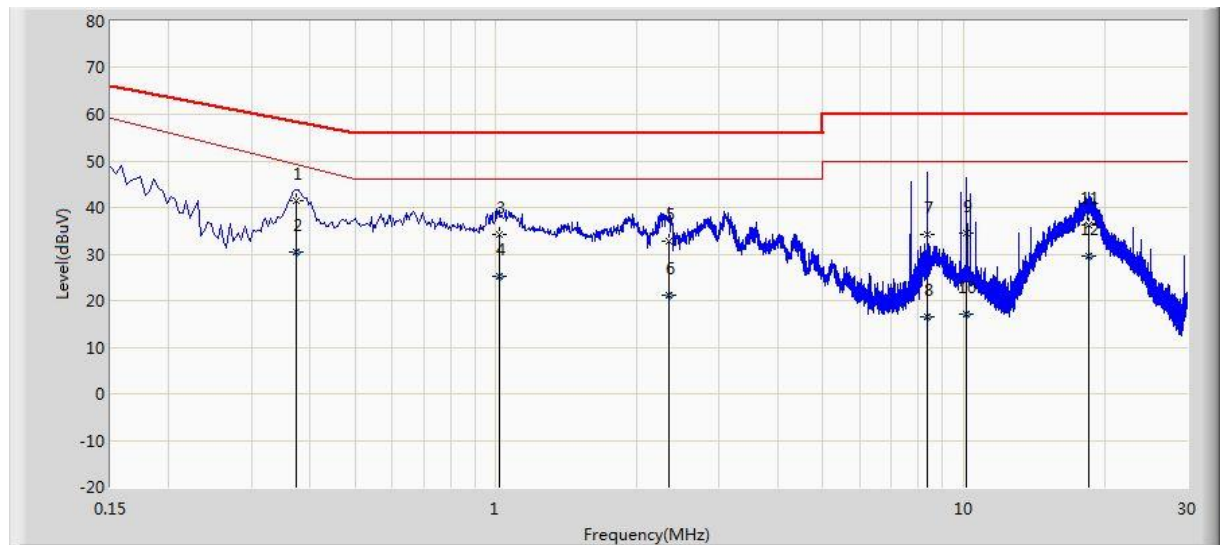


Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
0.334	45.823	36.194	-13.528	59.351	9.595	0.033	0.000	QP
0.334	36.084	26.456	-14.272	50.356	9.595	0.033	0.000	AV
0.626	38.971	29.337	-17.029	56.000	9.590	0.044	0.000	QP
0.626	29.447	19.813	-16.553	46.000	9.590	0.044	0.000	AV
0.694	39.102	29.461	-16.898	56.000	9.590	0.050	0.000	QP
0.694	29.424	19.784	-16.576	46.000	9.590	0.050	0.000	AV
0.974	38.692	29.042	-17.308	56.000	9.590	0.060	0.000	QP
0.974	29.971	20.321	-16.029	46.000	9.590	0.060	0.000	AV
1.026	39.099	29.441	-16.901	56.000	9.591	0.067	0.000	QP
1.026	30.248	20.590	-15.752	46.000	9.591	0.067	0.000	AV
1.106	38.661	29.010	-17.339	56.000	9.592	0.059	0.000	QP
1.106	29.558	19.907	-16.442	46.000	9.592	0.059	0.000	AV
2.342	38.467	28.752	-17.533	56.000	9.615	0.100	0.000	QP
2.342	25.904	16.190	-20.096	46.000	9.615	0.100	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RD-40WC4SB2 with transformer XZM-EF2096

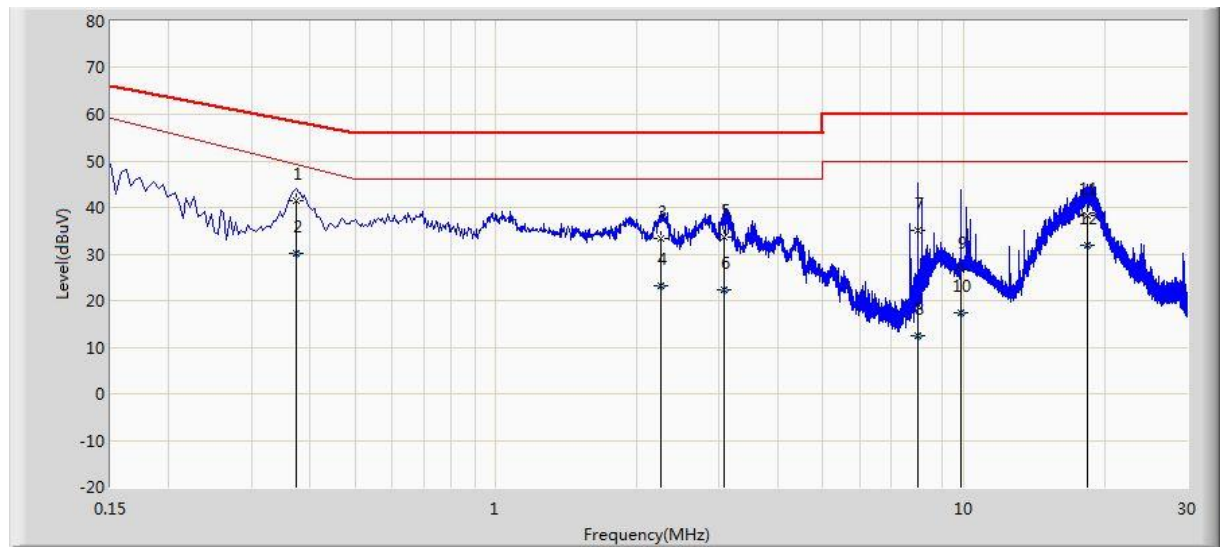
Live



Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
0.374	41.441	31.803	-16.971	58.412	9.600	0.038	0.000	QP
0.374	30.431	20.793	-18.704	49.135	9.600	0.038	0.000	AV
1.014	34.160	24.479	-21.840	56.000	9.610	0.070	0.000	QP
1.014	25.305	15.625	-20.695	46.000	9.610	0.070	0.000	AV
2.350	32.670	22.954	-23.330	56.000	9.616	0.101	0.000	QP
2.350	21.254	11.537	-24.746	46.000	9.616	0.101	0.000	AV
8.366	34.068	24.153	-25.932	60.000	9.732	0.184	0.000	QP
8.366	16.425	6.509	-33.575	50.000	9.732	0.184	0.000	AV
10.158	34.503	24.520	-25.497	60.000	9.774	0.208	0.000	QP
10.158	17.128	7.146	-32.872	50.000	9.774	0.208	0.000	AV
18.482	36.349	26.001	-23.651	60.000	10.067	0.282	0.000	QP
18.482	29.547	19.199	-20.453	50.000	10.067	0.282	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral

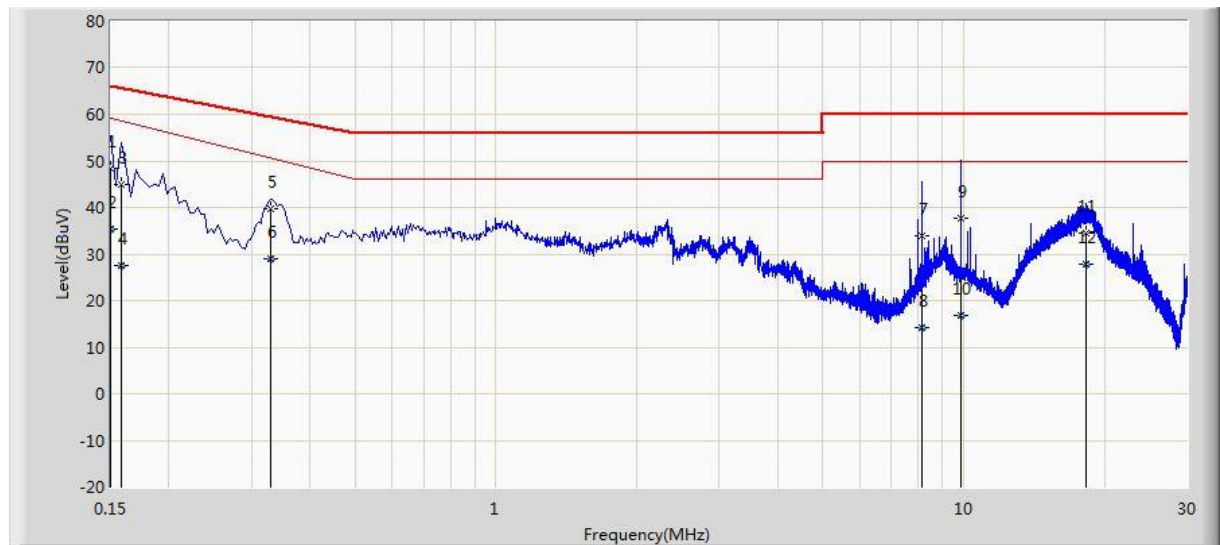


Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
0.374	41.360	31.728	-17.052	58.412	9.594	0.038	0.000	QP
0.374	30.012	20.380	-19.123	49.135	9.594	0.038	0.000	AV
2.246	33.428	23.721	-22.572	56.000	9.613	0.094	0.000	QP
2.246	23.066	13.359	-22.934	46.000	9.613	0.094	0.000	AV
3.074	33.493	23.756	-22.507	56.000	9.624	0.113	0.000	QP
3.074	22.424	12.687	-23.576	46.000	9.624	0.113	0.000	AV
7.962	34.961	25.048	-25.039	60.000	9.729	0.184	0.000	QP
7.962	12.518	2.605	-37.482	50.000	9.729	0.184	0.000	AV
9.846	26.595	16.606	-33.405	60.000	9.785	0.203	0.000	QP
9.846	17.276	7.287	-32.724	50.000	9.785	0.203	0.000	AV
18.394	38.378	27.986	-21.622	60.000	10.109	0.284	0.000	QP
18.394	31.816	21.424	-18.184	50.000	10.109	0.284	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RD-40WC4SB2 with transformer EE20-12

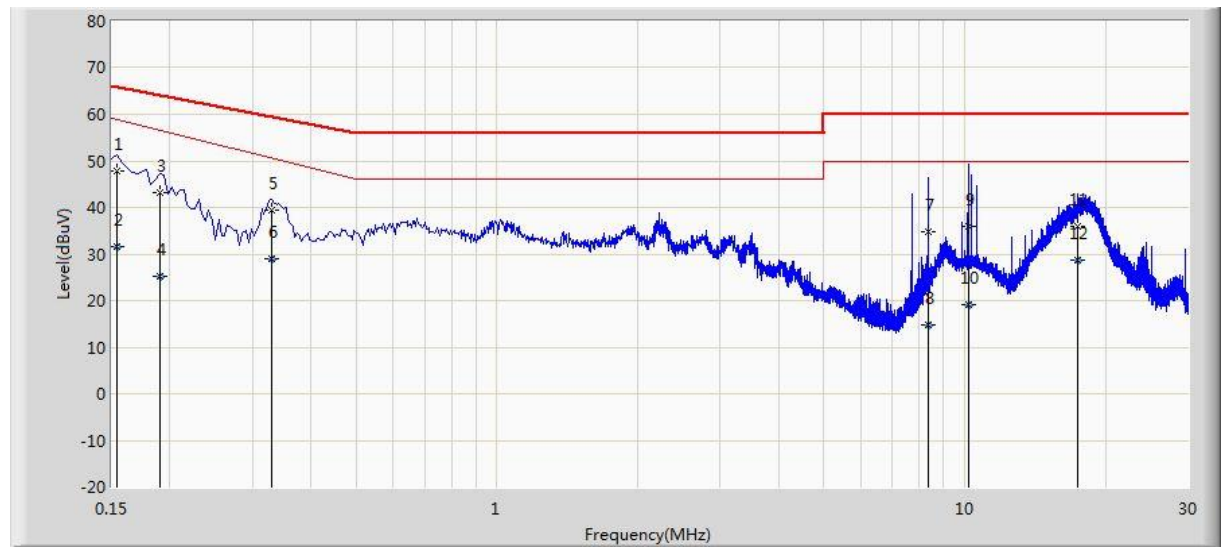
Live



Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
0.150	48.371	38.741	-17.629	66.000	9.610	0.021	0.000	QP
0.150	35.402	25.771	-23.598	59.000	9.610	0.021	0.000	AV
0.158	45.008	35.378	-20.560	65.568	9.608	0.022	0.000	QP
0.158	27.611	17.981	-30.828	58.439	9.608	0.022	0.000	AV
0.330	39.582	29.949	-19.869	59.451	9.600	0.033	0.000	QP
0.330	28.969	19.336	-21.517	50.487	9.600	0.033	0.000	AV
8.126	34.020	24.112	-25.980	60.000	9.727	0.182	0.000	QP
8.126	14.317	4.408	-35.683	50.000	9.727	0.182	0.000	AV
9.850	37.803	27.834	-22.197	60.000	9.766	0.203	0.000	QP
9.850	16.736	6.767	-33.264	50.000	9.766	0.203	0.000	AV
18.242	34.592	24.255	-25.408	60.000	10.056	0.281	0.000	QP
18.242	27.701	17.364	-22.299	50.000	10.056	0.281	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral

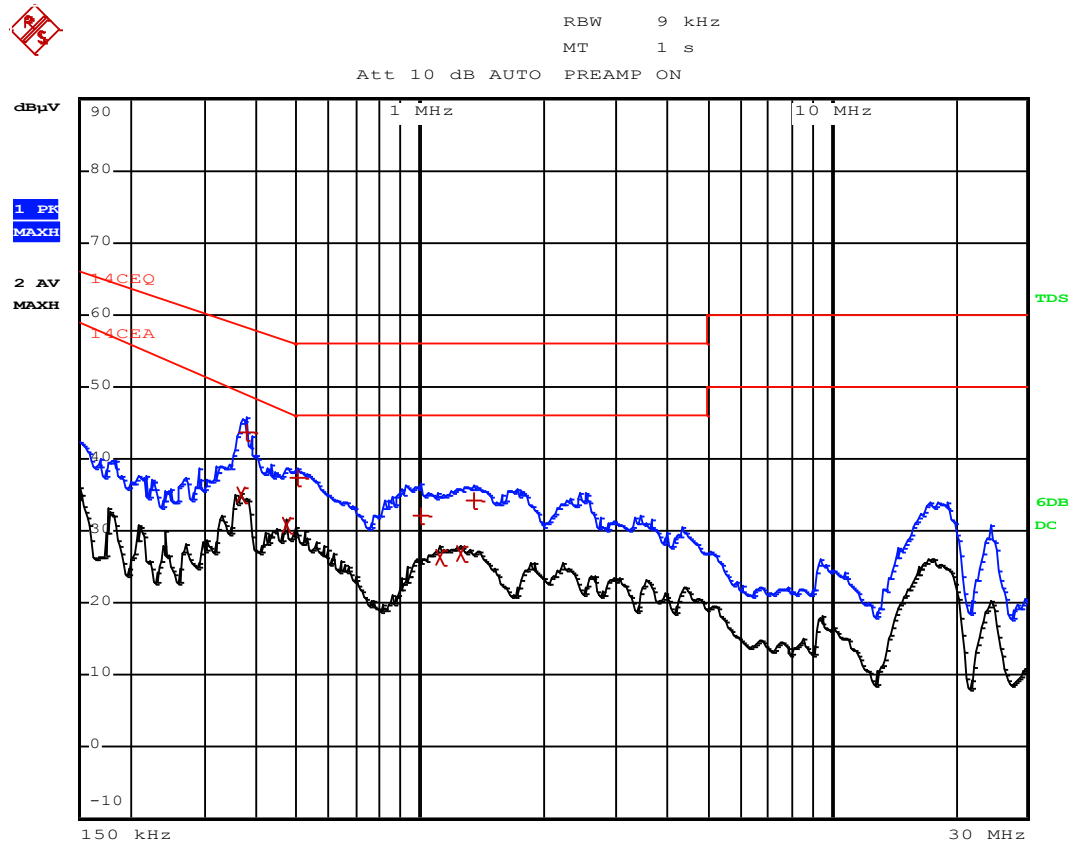


Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
0.154	47.724	38.110	-18.057	65.781	9.593	0.022	0.000	QP
0.154	31.573	21.958	-27.143	58.716	9.593	0.022	0.000	AV
0.190	43.101	33.475	-20.936	64.037	9.598	0.028	0.000	QP
0.190	25.356	15.731	-31.091	56.448	9.598	0.028	0.000	AV
0.330	39.473	29.844	-19.978	59.451	9.595	0.033	0.000	QP
0.330	28.957	19.329	-21.529	50.487	9.595	0.033	0.000	AV
8.370	34.809	24.884	-25.191	60.000	9.741	0.185	0.000	QP
8.370	14.893	4.967	-35.107	50.000	9.741	0.185	0.000	AV
10.162	35.799	25.796	-24.201	60.000	9.796	0.208	0.000	QP
10.162	19.183	9.180	-30.817	50.000	9.796	0.208	0.000	AV
17.478	35.937	25.591	-24.063	60.000	10.069	0.277	0.000	QP
17.478	28.596	18.250	-21.404	50.000	10.069	0.277	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RD-41WC4SA1 (compressor HU155CY1)

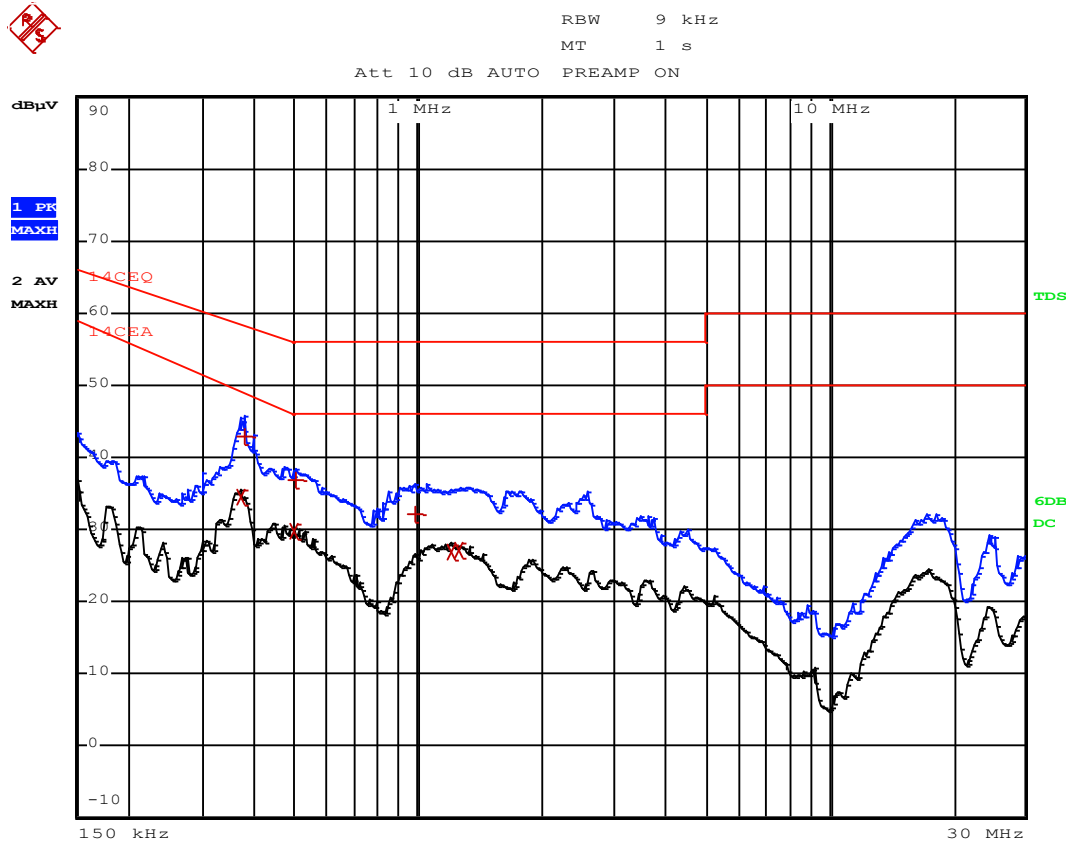
Live



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
2 Average	366 kHz	35.02	-14.34
1 Quasi Peak	378 kHz	43.66	-14.66
2 Average	470 kHz	30.69	-15.97
1 Quasi Peak	502 kHz	37.34	-18.65
2 Average	1.262 MHz	26.86	-19.13
2 Average	1.114 MHz	26.38	-19.61
1 Quasi Peak	1.358 MHz	34.26	-21.73
1 Quasi Peak	1.002 MHz	32.05	-23.94

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral

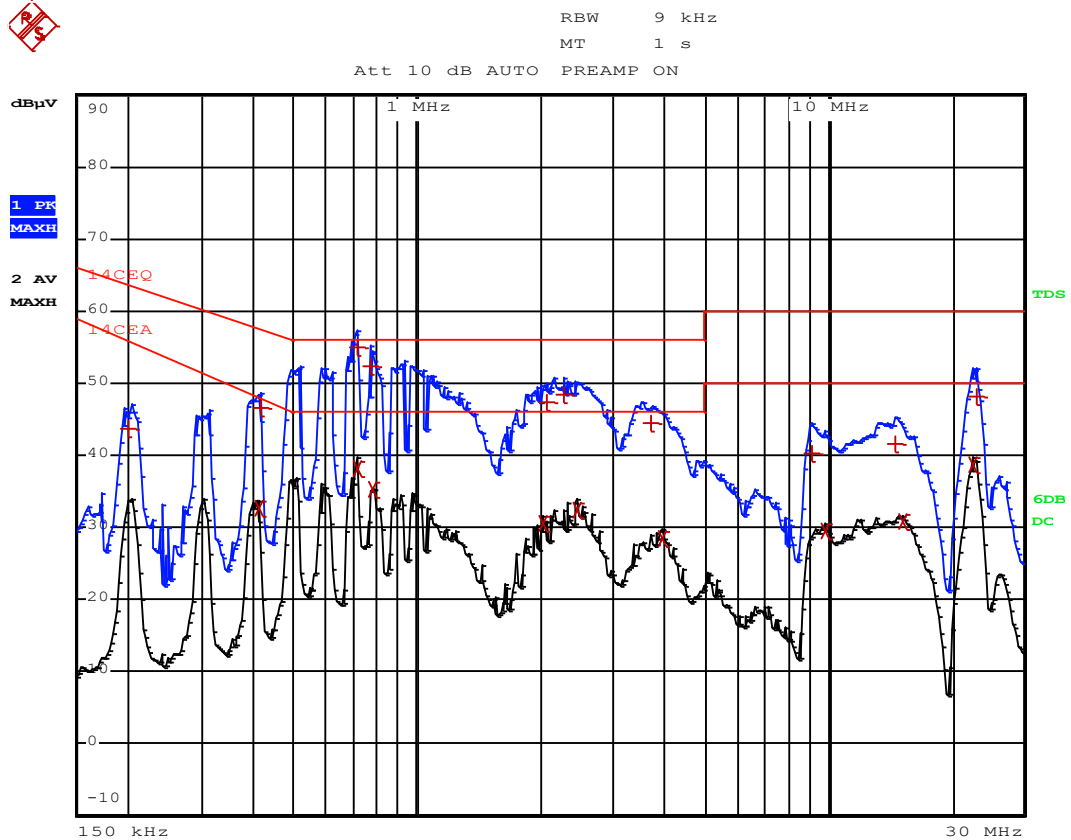


EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
2 Average	370 kHz	34.45	-14.79
1 Quasi Peak	378 kHz	42.93	-15.39
2 Average	498 kHz	29.85	-16.18
2 Average	1.254 MHz	27.11	-18.88
2 Average	1.206 MHz	27.00	-18.99
1 Quasi Peak	502 kHz	36.93	-19.07
1 Quasi Peak	982 kHz	32.05	-23.94

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RD-41WC4SA1 (alternative compressor HYB81MKUa) with alternative power PCB1

Live



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	718 kHz	54.84	-1.15
1 Quasi Peak	774 kHz	52.26	-3.73
1 Quasi Peak	2.274 MHz	48.48	-7.51
2 Average	718 kHz	38.21	-7.78
1 Quasi Peak	2.066 MHz	47.39	-8.60
2 Average	778 kHz	35.26	-10.73
1 Quasi Peak	414 kHz	46.48	-11.08
2 Average	22.63 MHz	38.60	-11.39
1 Quasi Peak	3.722 MHz	44.50	-11.49
1 Quasi Peak	22.942 MHz	48.20	-11.79
2 Average	2.462 MHz	32.40	-13.59
2 Average	410 kHz	32.63	-15.50
2 Average	2.034 MHz	30.47	-15.52
2 Average	3.966 MHz	28.33	-17.66
1 Quasi Peak	14.586 MHz	41.66	-18.33
2 Average	15.19 MHz	30.80	-19.19
1 Quasi Peak	9.186 MHz	40.33	-19.66
1 Quasi Peak	202 kHz	43.73	-19.78
2 Average	9.87 MHz	29.51	-20.48

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

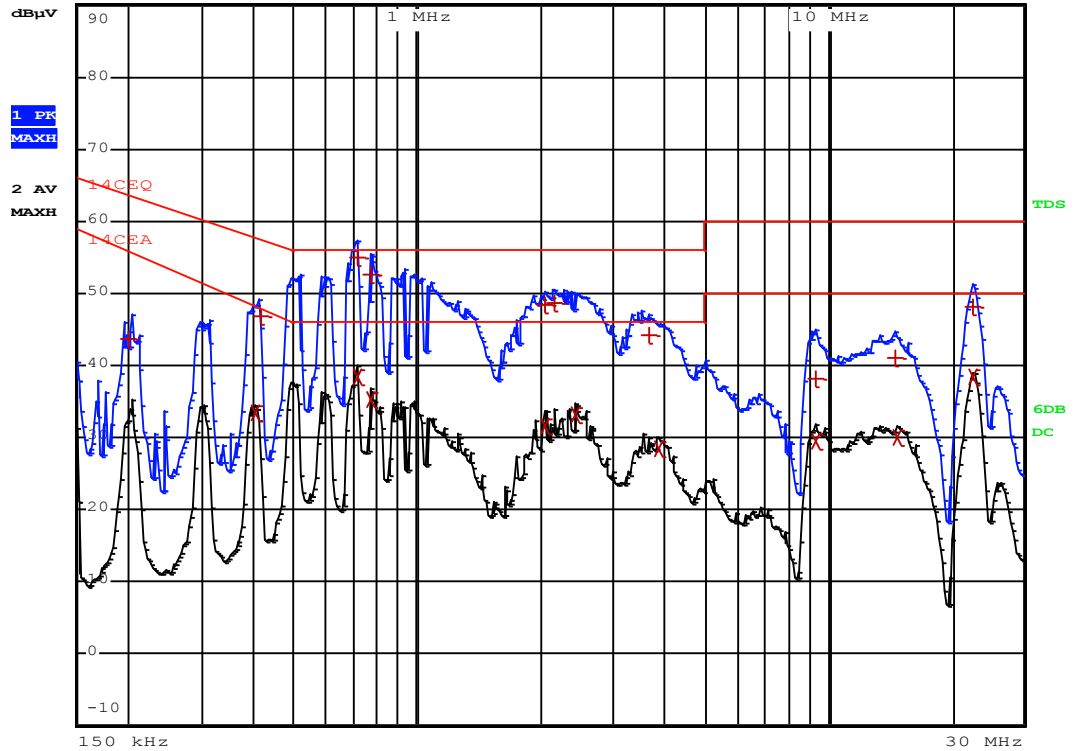
Neutral



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP ON

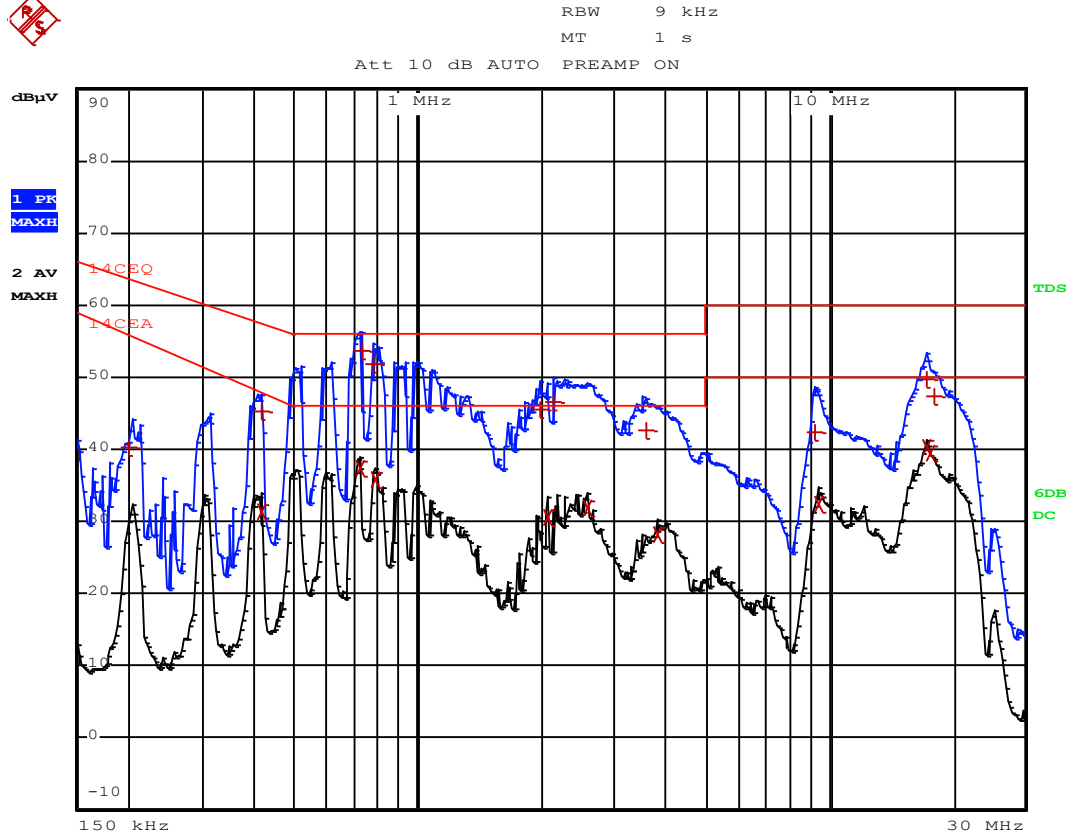


EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	718 kHz	54.98	-1.01
1 Quasi Peak	774 kHz	52.47	-3.52
1 Quasi Peak	2.17 MHz	48.73	-7.26
2 Average	718 kHz	38.47	-7.52
1 Quasi Peak	2.05 MHz	48.27	-7.72
2 Average	774 kHz	35.33	-10.66
1 Quasi Peak	414 kHz	46.80	-10.76
2 Average	22.53 MHz	38.34	-11.65
1 Quasi Peak	22.626 MHz	48.24	-11.75
1 Quasi Peak	3.658 MHz	44.14	-11.85
2 Average	2.418 MHz	33.10	-12.89
2 Average	2.05 MHz	31.49	-14.50
2 Average	402 kHz	33.48	-14.87
2 Average	3.866 MHz	28.49	-17.50
1 Quasi Peak	14.542 MHz	40.98	-19.01
2 Average	14.798 MHz	30.12	-19.87
1 Quasi Peak	202 kHz	43.57	-19.94
2 Average	9.378 MHz	29.59	-20.40
1 Quasi Peak	9.334 MHz	38.16	-21.84

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RD-44WC4SC2 (original compressor LR88CY1) with alternative power PCB1

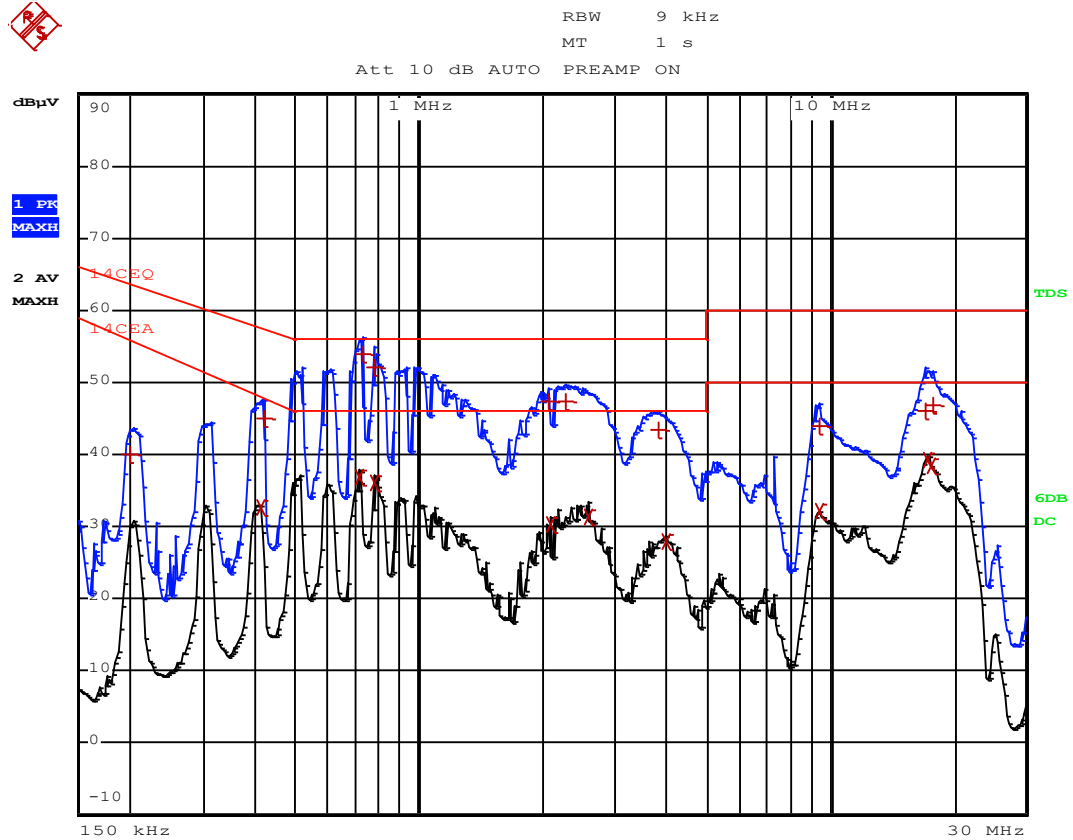
Live



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	730 kHz	53.61	-2.38
1 Quasi Peak	778 kHz	51.80	-4.19
2 Average	722 kHz	37.28	-8.72
1 Quasi Peak	2.15 MHz	46.57	-9.42
2 Average	17.246 MHz	40.23	-9.76
2 Average	790 kHz	35.86	-10.13
1 Quasi Peak	17.346 MHz	49.69	-10.30
1 Quasi Peak	1.978 MHz	45.43	-10.56
2 Average	17.694 MHz	39.41	-10.58
1 Quasi Peak	414 kHz	45.22	-12.34
1 Quasi Peak	18.07 MHz	47.31	-12.68
1 Quasi Peak	3.614 MHz	42.70	-13.29
2 Average	2.582 MHz	31.86	-14.13
2 Average	2.066 MHz	30.64	-15.35
2 Average	414 kHz	31.45	-16.58
2 Average	9.438 MHz	32.51	-17.49
1 Quasi Peak	9.266 MHz	42.39	-17.60
2 Average	3.854 MHz	28.24	-17.75
1 Quasi Peak	202 kHz	40.23	-23.29

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral

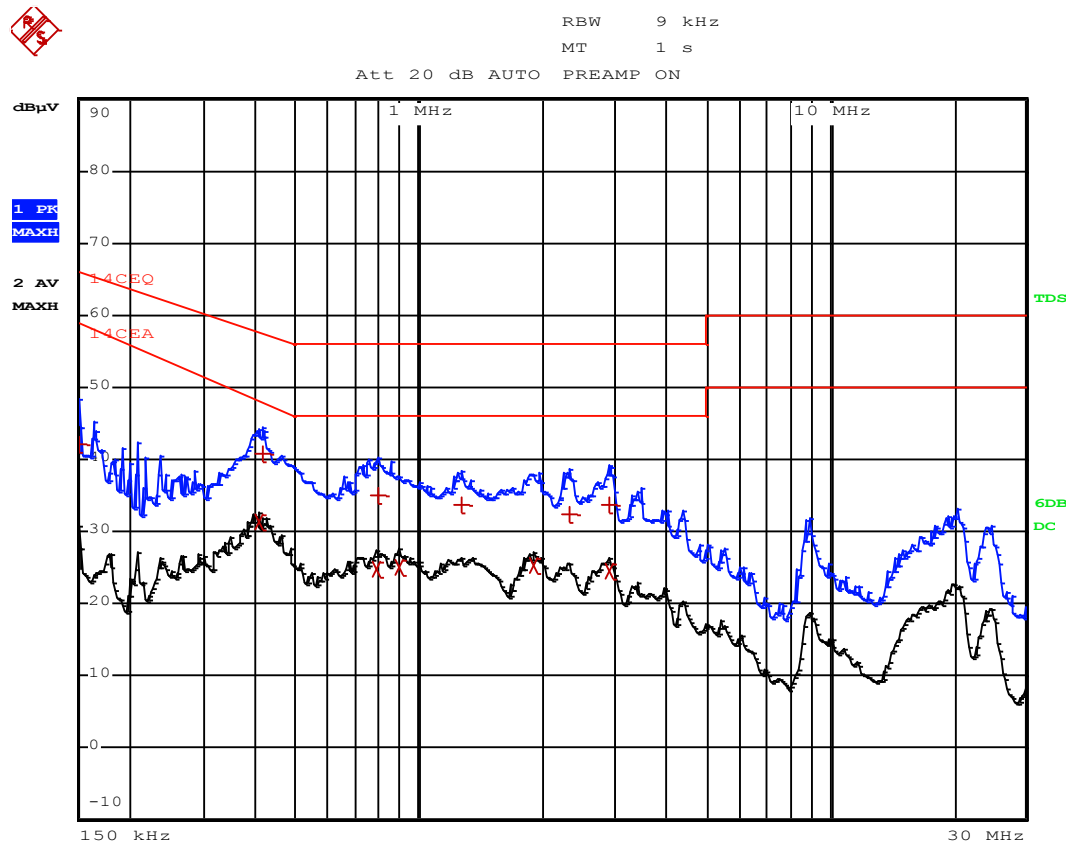


EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	730 kHz	53.85	-2.14
1 Quasi Peak	782 kHz	52.03	-3.96
1 Quasi Peak	2.066 MHz	47.39	-8.60
1 Quasi Peak	2.29 MHz	47.34	-8.65
2 Average	718 kHz	36.97	-9.02
2 Average	782 kHz	36.14	-9.85
2 Average	17.25 MHz	39.12	-10.87
2 Average	17.698 MHz	38.48	-11.51
1 Quasi Peak	418 kHz	45.02	-12.46
1 Quasi Peak	3.822 MHz	43.52	-12.47
1 Quasi Peak	17.778 MHz	46.79	-13.20
1 Quasi Peak	17.186 MHz	46.03	-13.96
2 Average	2.582 MHz	31.44	-14.55
2 Average	410 kHz	32.66	-15.47
2 Average	2.086 MHz	30.25	-15.74
1 Quasi Peak	9.442 MHz	43.91	-16.09
2 Average	9.442 MHz	32.12	-17.87
2 Average	3.998 MHz	27.90	-18.09
1 Quasi Peak	202 kHz	40.01	-23.51

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RD-40WC4SA2 (alternative compressor HXZ140A)

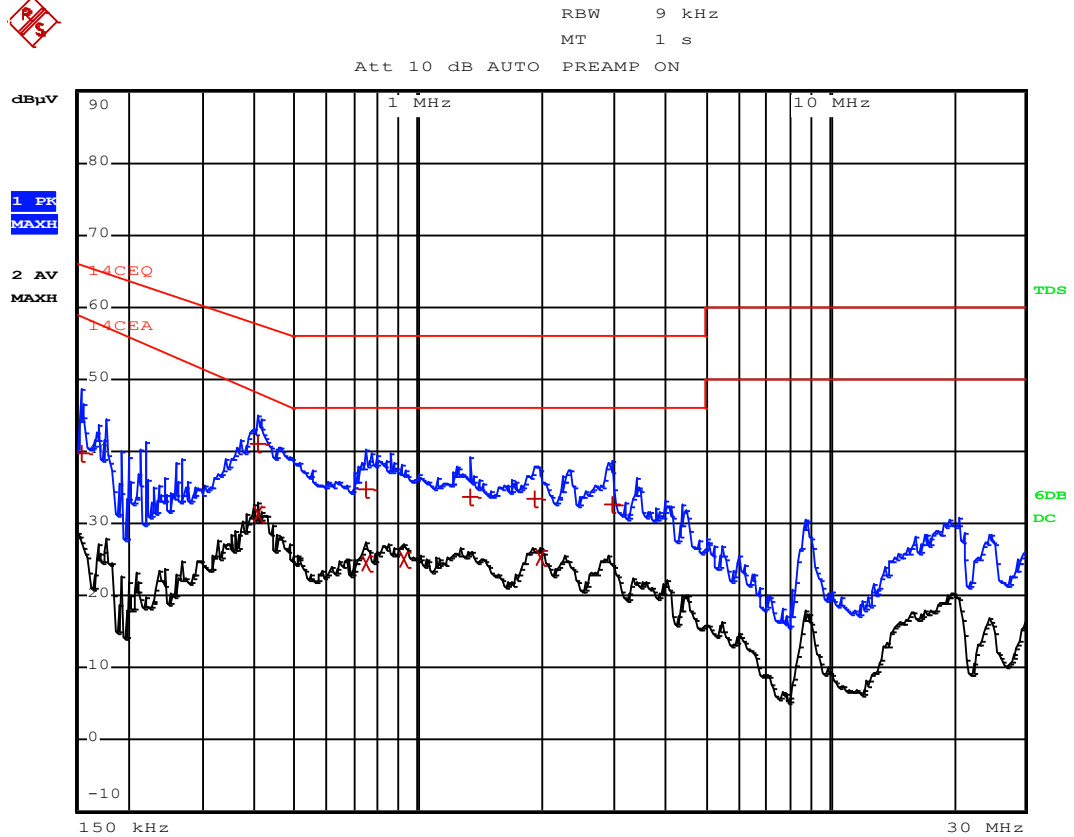
Live



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	414 kHz	40.85	-16.71
2 Average	406 kHz	31.38	-16.86
2 Average	1.914 MHz	25.33	-20.66
2 Average	894 kHz	24.99	-21.00
1 Quasi Peak	794 kHz	34.98	-21.01
2 Average	790 kHz	24.78	-21.21
2 Average	2.906 MHz	24.47	-21.52
1 Quasi Peak	2.91 MHz	33.76	-22.24
1 Quasi Peak	1.278 MHz	33.64	-22.35
1 Quasi Peak	2.318 MHz	32.30	-23.69
1 Quasi Peak	150 kHz	42.06	-23.93

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

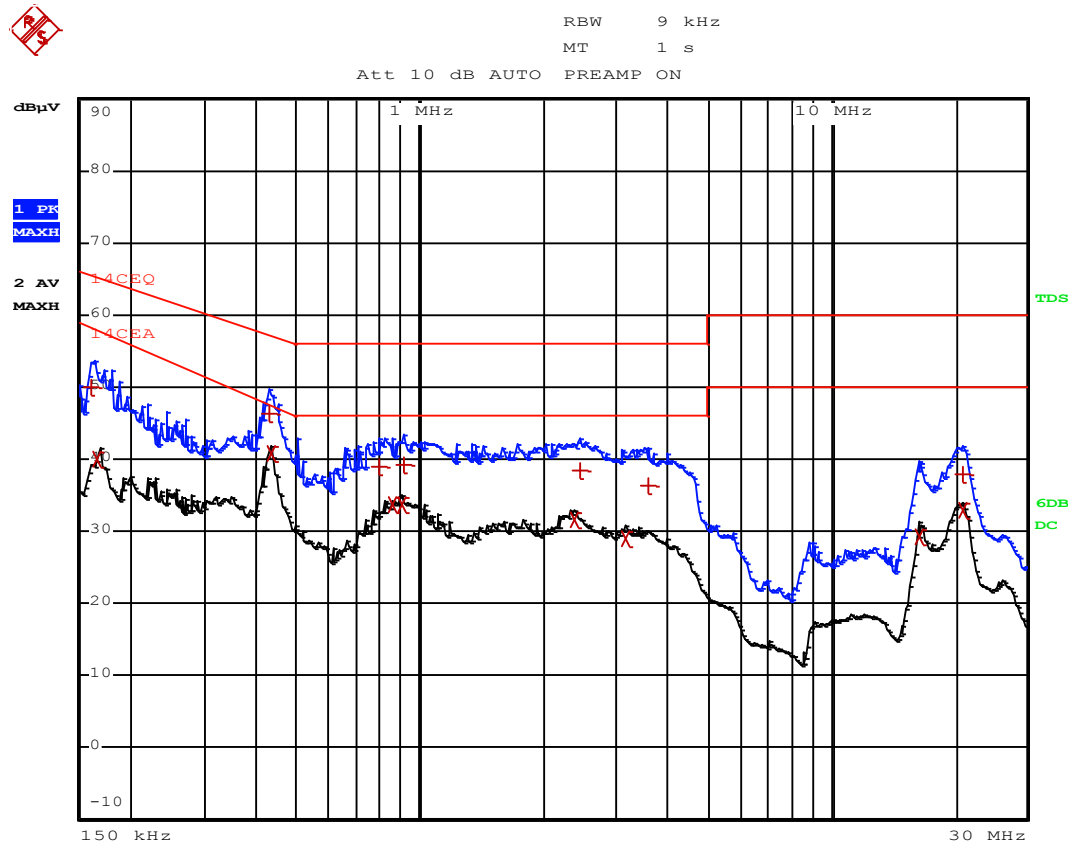
Neutral



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	406 kHz	40.95	-16.77
2 Average	406 kHz	31.28	-16.95
2 Average	1.978 MHz	25.30	-20.69
2 Average	926 kHz	25.15	-20.84
1 Quasi Peak	750 kHz	34.62	-21.37
2 Average	750 kHz	24.52	-21.47
1 Quasi Peak	1.346 MHz	33.64	-22.35
1 Quasi Peak	1.93 MHz	33.37	-22.62
1 Quasi Peak	2.966 MHz	32.65	-23.35
1 Quasi Peak	154 kHz	39.63	-26.15

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RB406N4AD2 (compressor HXZ140A) with alternative power PCB2 Live



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
2 Average	434 kHz	40.75	-6.77
1 Quasi Peak	430 kHz	46.36	-10.89
2 Average	902 kHz	33.76	-12.23
2 Average	858 kHz	33.59	-12.40
2 Average	2.382 MHz	31.64	-14.35
1 Quasi Peak	162 kHz	49.87	-15.48
1 Quasi Peak	910 kHz	39.28	-16.71
2 Average	3.178 MHz	28.99	-17.00
2 Average	20.934 MHz	32.92	-17.07
1 Quasi Peak	794 kHz	38.84	-17.15
1 Quasi Peak	2.446 MHz	38.36	-17.63
2 Average	166 kHz	39.88	-18.01
1 Quasi Peak	3.606 MHz	36.27	-19.73
2 Average	16.442 MHz	29.34	-20.65
1 Quasi Peak	20.97 MHz	37.94	-22.05

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

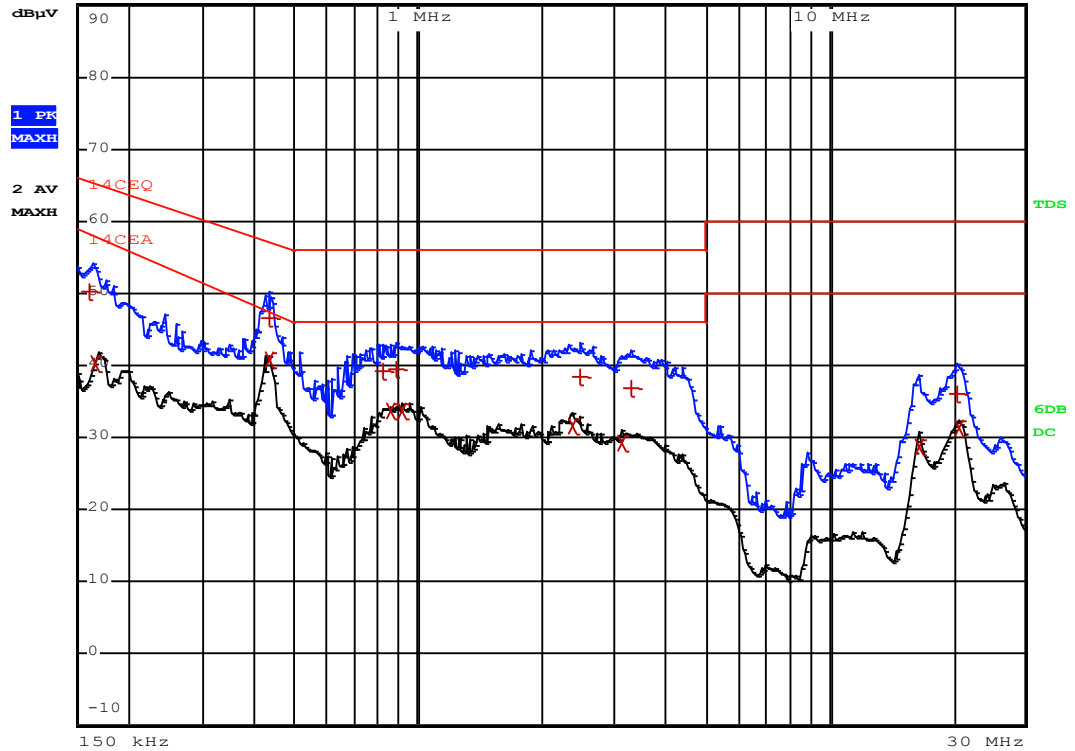
Neutral



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP ON

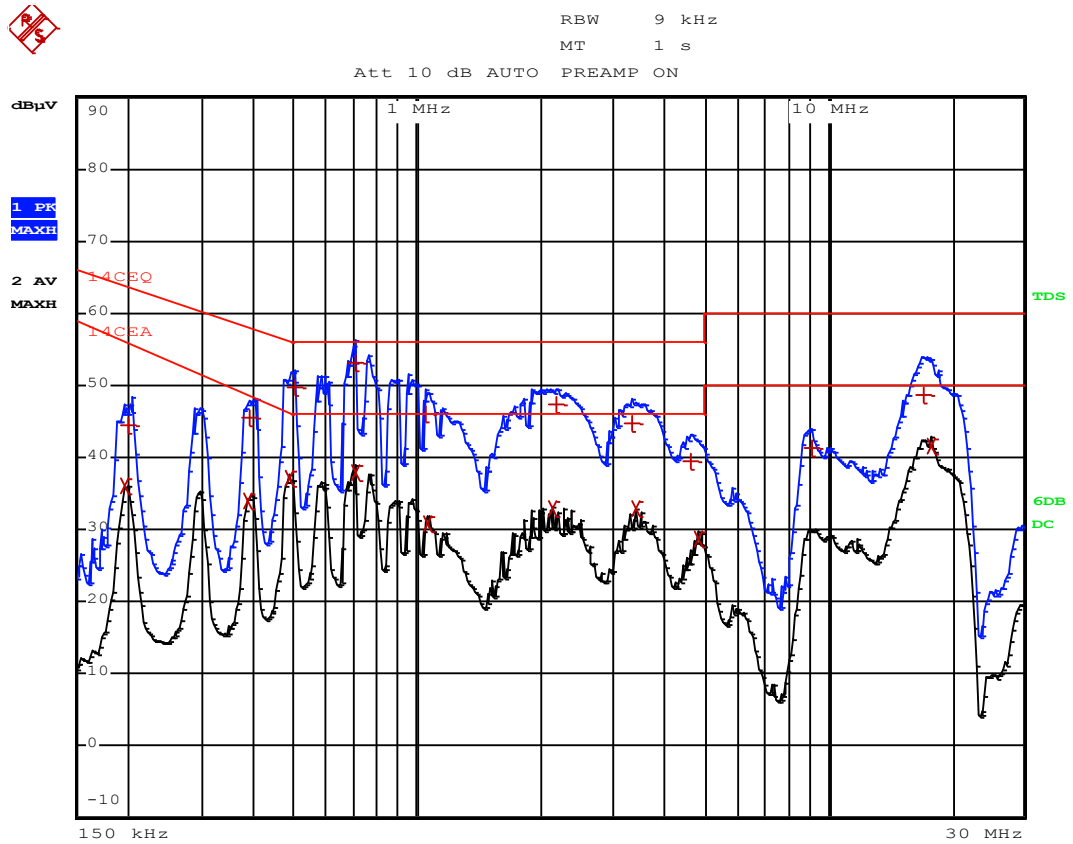


EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
2 Average	434 kHz	40.79	-6.72
1 Quasi Peak	434 kHz	46.58	-10.59
2 Average	862 kHz	33.79	-12.20
2 Average	918 kHz	33.77	-12.22
2 Average	2.39 MHz	31.70	-14.29
1 Quasi Peak	162 kHz	50.13	-15.22
1 Quasi Peak	890 kHz	39.56	-16.43
2 Average	3.15 MHz	29.34	-16.66
1 Quasi Peak	826 kHz	39.33	-16.66
1 Quasi Peak	2.486 MHz	38.48	-17.51
2 Average	166 kHz	40.35	-17.55
2 Average	20.662 MHz	31.21	-18.79

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RD-44WC4SC1 (compressor HYB81MKUa)

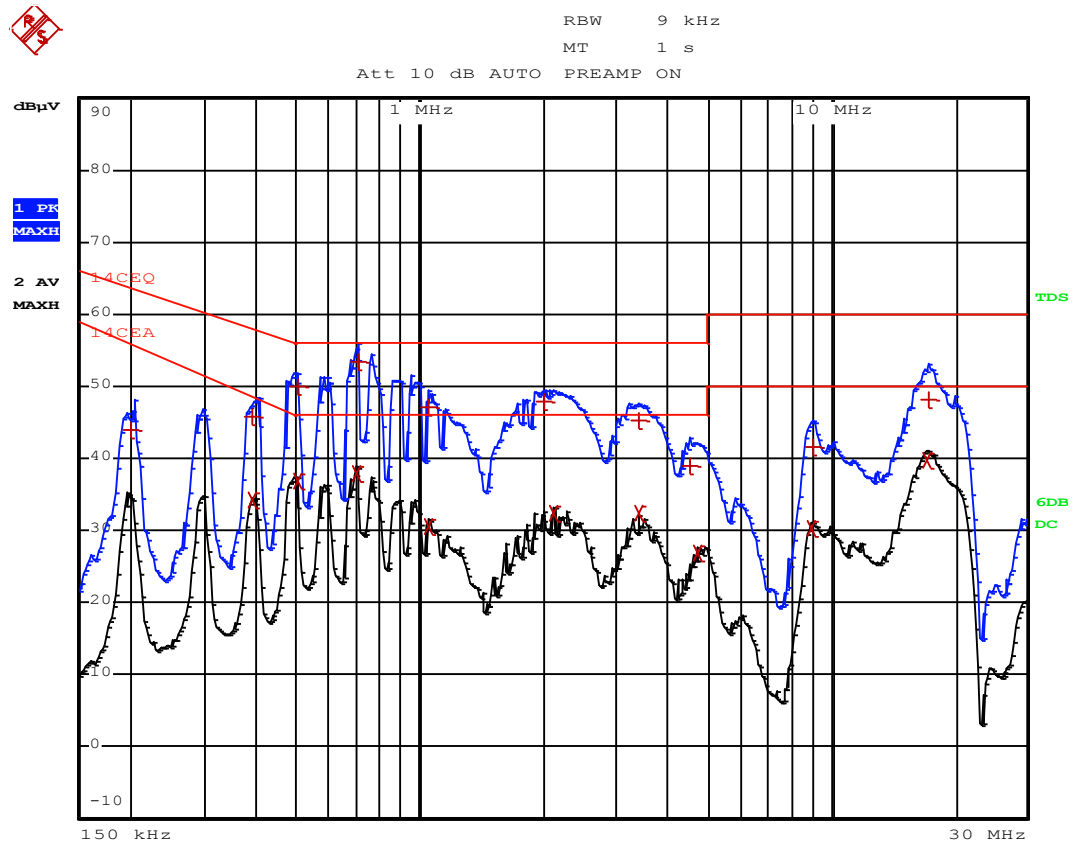
Live



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	710 kHz	53.25	-2.74
1 Quasi Peak	506 kHz	49.83	-6.17
2 Average	706 kHz	37.81	-8.18
2 Average	17.79 MHz	41.68	-8.31
1 Quasi Peak	2.182 MHz	47.40	-8.59
2 Average	486 kHz	37.07	-9.22
1 Quasi Peak	1.046 MHz	46.08	-9.91
1 Quasi Peak	17.118 MHz	48.75	-11.24
1 Quasi Peak	3.342 MHz	44.71	-11.28
1 Quasi Peak	390 kHz	45.50	-12.55
2 Average	3.414 MHz	32.85	-13.14
2 Average	2.13 MHz	32.84	-13.15
2 Average	386 kHz	34.02	-14.77
2 Average	1.066 MHz	30.84	-15.15
1 Quasi Peak	4.658 MHz	39.51	-16.48
2 Average	4.838 MHz	28.75	-17.24
1 Quasi Peak	9.106 MHz	41.31	-18.68
1 Quasi Peak	202 kHz	44.47	-19.05
2 Average	198 kHz	35.98	-20.02

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral

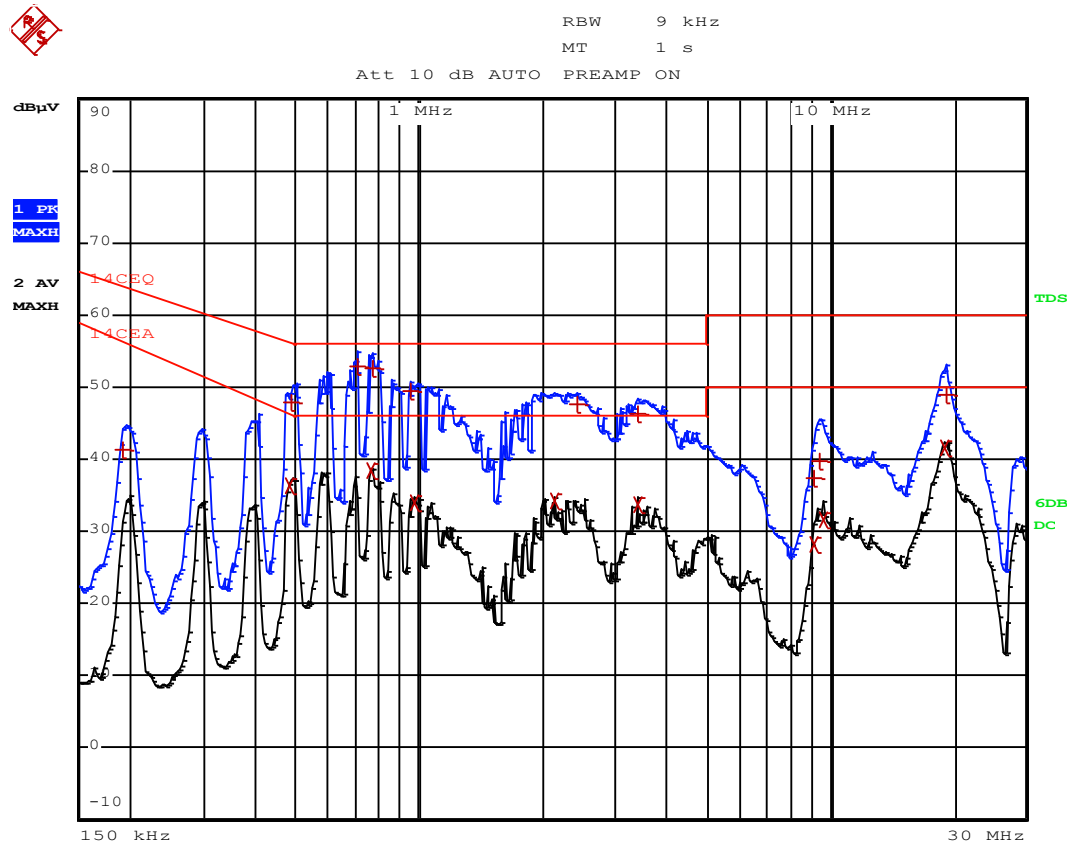


EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	710 kHz	53.36	-2.63
1 Quasi Peak	502 kHz	49.94	-6.05
2 Average	698 kHz	37.98	-8.01
1 Quasi Peak	2.01 MHz	47.86	-8.13
1 Quasi Peak	1.054 MHz	46.98	-9.01
2 Average	502 kHz	36.72	-9.27
2 Average	17.126 MHz	39.63	-10.36
1 Quasi Peak	3.418 MHz	45.34	-10.65
1 Quasi Peak	17.318 MHz	48.23	-11.76
1 Quasi Peak	390 kHz	45.64	-12.41
2 Average	3.414 MHz	32.36	-13.63
2 Average	2.11 MHz	32.28	-13.71
2 Average	390 kHz	34.29	-14.38

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RB406N4WC1 (compressor HYB81MKUa)

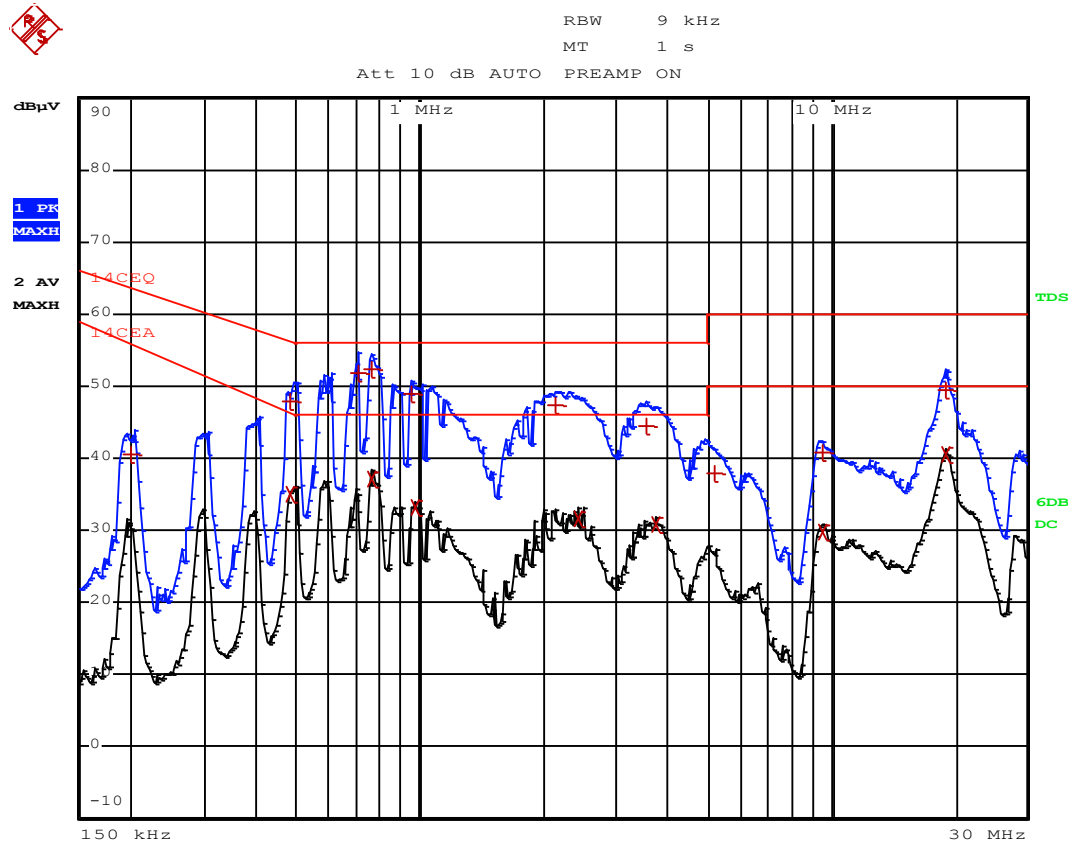
Live



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	710 kHz	52.82	-3.18
1 Quasi Peak	774 kHz	52.61	-3.38
1 Quasi Peak	958 kHz	49.38	-6.61
2 Average	762 kHz	38.29	-7.70
1 Quasi Peak	486 kHz	47.99	-8.23
2 Average	18.918 MHz	41.58	-8.41
1 Quasi Peak	2.418 MHz	47.52	-8.47
1 Quasi Peak	3.414 MHz	46.28	-9.71
2 Average	482 kHz	36.43	-9.96
1 Quasi Peak	19.19 MHz	48.82	-11.17
2 Average	2.13 MHz	34.18	-11.81
2 Average	974 kHz	33.99	-12.00
2 Average	3.414 MHz	33.64	-12.35
2 Average	9.67 MHz	31.71	-18.28

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral

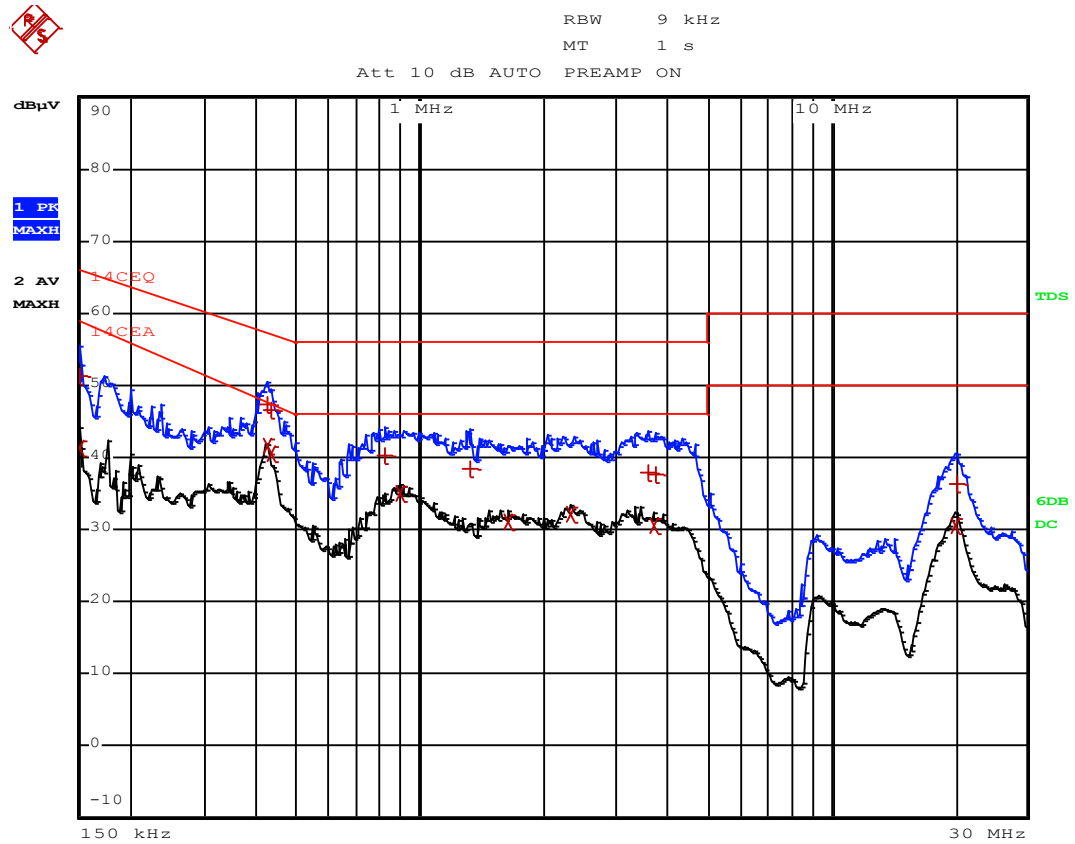


EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	766 kHz	52.41	-3.59
1 Quasi Peak	710 kHz	51.68	-4.31
1 Quasi Peak	958 kHz	48.80	-7.19
1 Quasi Peak	486 kHz	47.76	-8.47
1 Quasi Peak	2.13 MHz	47.41	-8.58
2 Average	766 kHz	37.23	-8.76
2 Average	18.922 MHz	40.62	-9.37
1 Quasi Peak	18.998 MHz	49.33	-10.66
2 Average	486 kHz	35.08	-11.21
1 Quasi Peak	3.55 MHz	44.48	-11.51
2 Average	970 kHz	33.07	-12.93
2 Average	2.418 MHz	31.52	-14.47

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RB406N4AW1 (compressor PZ85E1C 3)

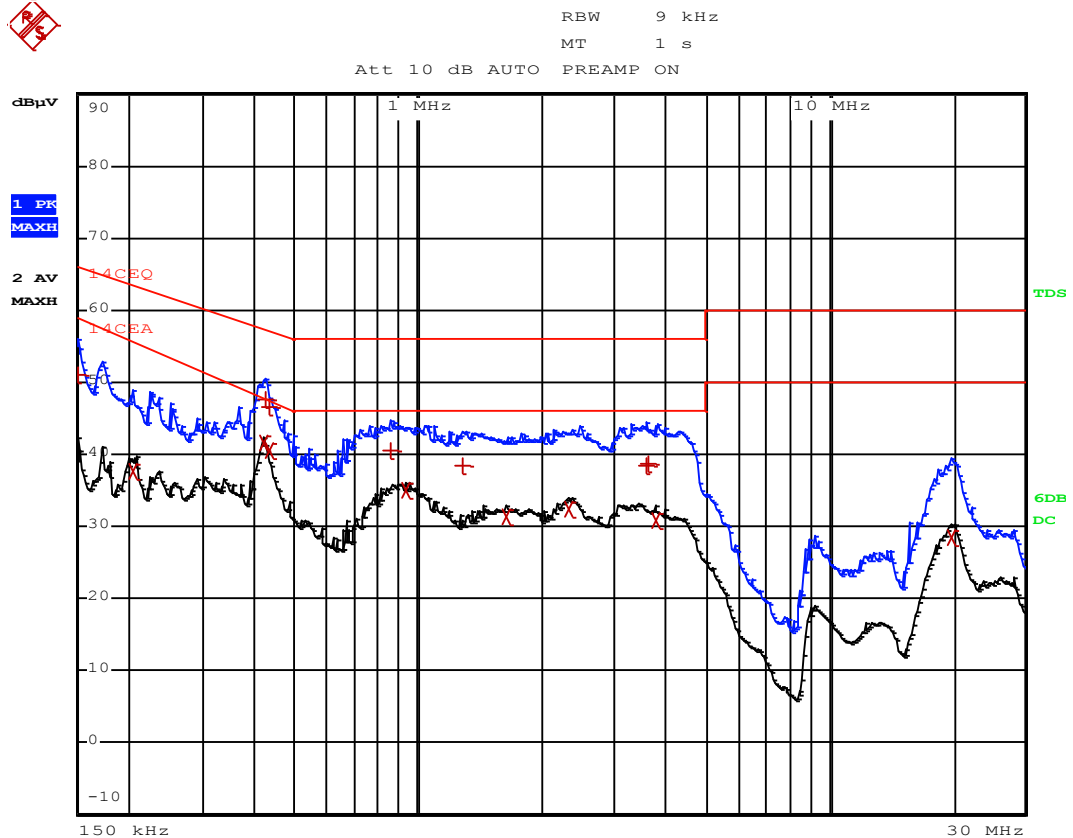
Live



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
2 Average	426 kHz	41.52	-6.20
2 Average	434 kHz	40.41	-7.10
1 Quasi Peak	426 kHz	47.33	-9.99
1 Quasi Peak	434 kHz	46.58	-10.59
2 Average	894 kHz	35.02	-10.97
2 Average	2.334 MHz	32.06	-13.94
1 Quasi Peak	150 kHz	51.31	-14.68
2 Average	1.642 MHz	31.14	-14.85
2 Average	3.702 MHz	30.48	-15.52
1 Quasi Peak	826 kHz	40.30	-15.69
1 Quasi Peak	1.33 MHz	38.45	-17.54

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14CEQ		
Trace2:	14CEA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
2 Average	418 kHz	41.56	-6.36
2 Average	434 kHz	40.39	-7.13
1 Quasi Peak	422 kHz	47.65	-9.75
1 Quasi Peak	434 kHz	46.65	-10.51
2 Average	934 kHz	34.94	-11.05
2 Average	2.318 MHz	32.34	-13.65
2 Average	1.638 MHz	31.37	-14.62
1 Quasi Peak	150 kHz	51.12	-14.87
2 Average	3.802 MHz	30.79	-15.21
1 Quasi Peak	862 kHz	40.52	-15.47
1 Quasi Peak	3.614 MHz	38.60	-17.39
1 Quasi Peak	1.29 MHz	38.51	-17.48
1 Quasi Peak	3.59 MHz	38.41	-17.59
2 Average	206 kHz	37.75	-17.81
2 Average	19.906 MHz	28.39	-21.60

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Refer to chapter 6 for the test set-up.

Conclusion:

PASS

4.2 Click Disturbances

Standard	EN 55014-1
Port	AC Mains
Mode	On mode

Condition:

Ambient temperature	25 °C
Relative Humidity air	50%

Results of model RD-40WC4SA2 with transformer XZM-EF2096

Description	Frequency [MHz]			
	0,15	0,50	1,40	30,0
Switching operations	18	18	18	18
Observation time T in minutes	120,0	120,0	120,0	120,0
Number of short clicks	1	0	0	0
Number of long clicks	0	0	0	0
Total of clicks (n)	1	0	0	0
Click rate N: $(n \cdot f)/T$; $f=0,5$	0,01	0,00	0,00	0,00
Raise limit with $20 \cdot \log(30/N)$ [dB]	N/A	N/A	N/A	N/A

	The amplitudes of the observed disturbances were all below the limit for continuous disturbance, these are not considered to be clicks.
√	The calculated click rate N is not more than 5 times per minute and all the clicks are classified as short ($t \leq 10$ ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.

Results of model RD-40WC4SA2 with transformer EE20-12

Description	Frequency [MHz]			
	0,15	0,50	1,40	30,0
Switching operations	18	18	18	18
Observation time T in minutes	120,0	120,0	120,0	120,0
Number of short clicks	1	0	0	0
Number of long clicks	0	0	0	0
Total of clicks (n)	1	0	0	0
Click rate N: $(n \cdot f)/T$; $f=0,5$	0,01	0,00	0,00	0,00
Raise limit with $20 \cdot \log(30/N)$ [dB]	N/A	N/A	N/A	N/A

	The amplitudes of the observed disturbances were all below the limit for continuous disturbance, these are not considered to be clicks.
√	The calculated click rate N is not more than 5 times per minute and all the clicks are classified as short ($t \leq 10$ ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.

Results of model RD-40WC4SB2 with transformer XZM-EF2096

Description	Frequency [MHz]			
	0,15	0,50	1,40	30,0
Switching operations	18	18	18	18
Observation time T in minutes	120,0	120,0	120,0	120,0
Number of short clicks	1	0	0	0
Number of long clicks	0	0	0	0
Total of clicks (n)	1	0	0	0
Click rate N: $(n \cdot f)/T$; $f=0,5$	0,01	0,00	0,00	0,00
Raise limit with $20 \cdot \log(30/N)$ [dB]	N/A	N/A	N/A	N/A

	The amplitudes of the observed disturbances were all below the limit for continuous disturbance, these are not considered to be clicks.
√	The calculated click rate N is not more than 5 times per minute and all the clicks are classified as short ($t \leq 10$ ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.

Results of model RD-40WC4SB2 with transformer EE20-12

Description	Frequency [MHz]			
	0,15	0,50	1,40	30,0
Switching operations	18	18	18	18
Observation time T in minutes	120,0	120,0	120,0	120,0
Number of short clicks	1	0	0	0
Number of long clicks	0	0	0	0
Total of clicks (n)	1	0	0	0
Click rate N: $(n \cdot f)/T$; $f=0,5$	0,01	0,00	0,00	0,00
Raise limit with $20 \cdot \log(30/N)$ [dB]	N/A	N/A	N/A	N/A

	The amplitudes of the observed disturbances were all below the limit for continuous disturbance, these are not considered to be clicks.
√	The calculated click rate N is not more than 5 times per minute and all the clicks are classified as short ($t \leq 10$ ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.

Conclusion:
PASS

4.3 Disturbance power

Standard	EN 55014-1	
Frequency [MHz]	Limits	
	QP [dB(Pw)]	AV [dB(pW)]
30 – 300	45 – 55 *)	35 – 45 *)

*) Limits increasing linearly with the frequency

Port	AC Mains
Mode	On mode
Test voltage	264 Vac, 50 Hz (worst Voltage in pre-scan)

Condition:

Ambient temperature	25 °C
Relative Humidity air	50%

Results of model RD-40WC4SA2 with transformer XZM-EF2096



Frequency (MHz)	Measure Level (dBpW)	Reading Level (dBpW)	Over Limit (dB)	Limit (dBpW)	Probe (dB)	Cable (dB)	Amp (dB)	Type
32.910	27.562	2.400	-17.546	45.108	18.483	6.679	0.000	QP
32.910	20.762	-4.400	-14.346	35.108	18.483	6.679	0.000	AV
48.690	32.941	9.000	-12.751	45.692	17.200	6.741	0.000	QP
48.690	18.441	-5.500	-17.251	35.692	17.200	6.741	0.000	AV
83.100	31.428	8.600	-15.539	46.967	15.924	6.903	0.000	QP
83.100	18.628	-4.200	-18.339	36.967	15.924	6.903	0.000	AV
113.220	34.515	11.700	-13.567	48.082	15.764	7.050	0.000	QP
113.220	24.815	2.000	-13.267	38.082	15.764	7.050	0.000	AV
134.280	24.731	1.100	-24.131	48.862	16.485	7.146	0.000	QP
134.280	15.631	-8.000	-23.231	38.862	16.485	7.146	0.000	AV
233.340	28.080	3.100	-24.451	52.531	16.999	7.981	0.000	QP
233.340	27.980	3.000	-14.551	42.531	16.999	7.981	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RD-40WC4SA2 with transformer EE20-12



Frequency (MHz)	Measure Level (dBpW)	Reading Level (dBpW)	Over Limit (dB)	Limit (dBpW)	Probe (dB)	Cable (dB)	Amp (dB)	Type
33.180	32.151	7.000	-12.966	45.118	18.472	6.679	0.000	QP
33.180	21.751	-3.400	-13.366	35.118	18.472	6.679	0.000	AV
37.620	31.768	7.300	-13.514	45.282	17.772	6.696	0.000	QP
37.620	19.068	-5.400	-16.214	35.282	17.772	6.696	0.000	AV
48.840	29.242	5.300	-16.456	45.698	17.200	6.742	0.000	QP
48.840	15.542	-8.400	-20.156	35.698	17.200	6.742	0.000	AV
86.880	25.911	3.100	-21.195	47.107	15.887	6.924	0.000	QP
86.880	13.911	-8.900	-23.195	37.107	15.887	6.924	0.000	AV
117.510	28.684	5.800	-19.557	48.241	15.800	7.084	0.000	QP
117.510	16.484	-6.400	-21.757	38.241	15.800	7.084	0.000	AV
233.340	29.580	4.600	-22.951	52.531	16.999	7.981	0.000	QP
233.340	29.680	4.700	-12.851	42.531	16.999	7.981	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

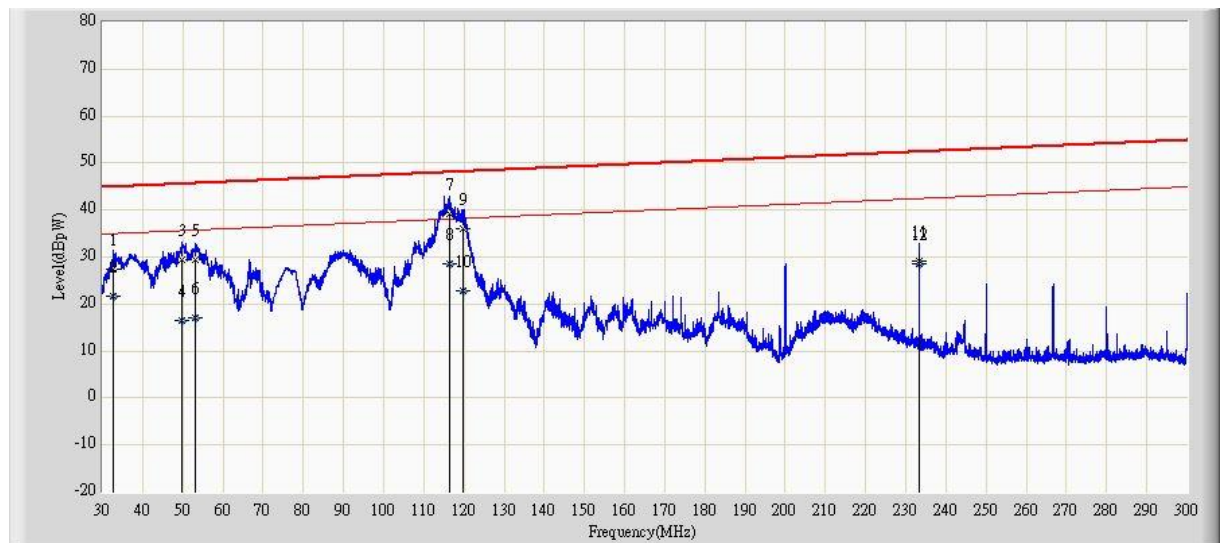
Results of model RD-40WC4SB2 with transformer XZM-EF2096



Frequency (MHz)	Measure Level (dBpW)	Reading Level (dBpW)	Over Limit (dB)	Limit (dBpW)	Probe (dB)	Cable (dB)	Amp (dB)	Type
40.860	30.009	6.100	-15.393	45.402	17.200	6.709	0.000	QP
40.860	22.609	-1.300	-12.793	35.402	17.200	6.709	0.000	AV
48.420	31.140	7.200	-14.542	45.682	17.200	6.740	0.000	QP
48.420	18.440	-5.500	-17.242	35.682	17.200	6.740	0.000	AV
53.790	33.788	9.900	-12.093	45.881	17.124	6.764	0.000	QP
53.790	20.088	-3.800	-15.793	35.881	17.124	6.764	0.000	AV
88.110	25.542	2.800	-21.611	47.152	15.813	6.928	0.000	QP
88.110	21.442	-1.300	-15.711	37.152	15.813	6.928	0.000	AV
116.040	38.573	15.700	-9.614	48.187	15.800	7.073	0.000	QP
116.040	29.473	6.600	-8.714	38.187	15.800	7.073	0.000	AV
233.340	28.780	3.800	-23.751	52.531	16.999	7.981	0.000	QP
233.340	28.280	3.300	-14.251	42.531	16.999	7.981	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

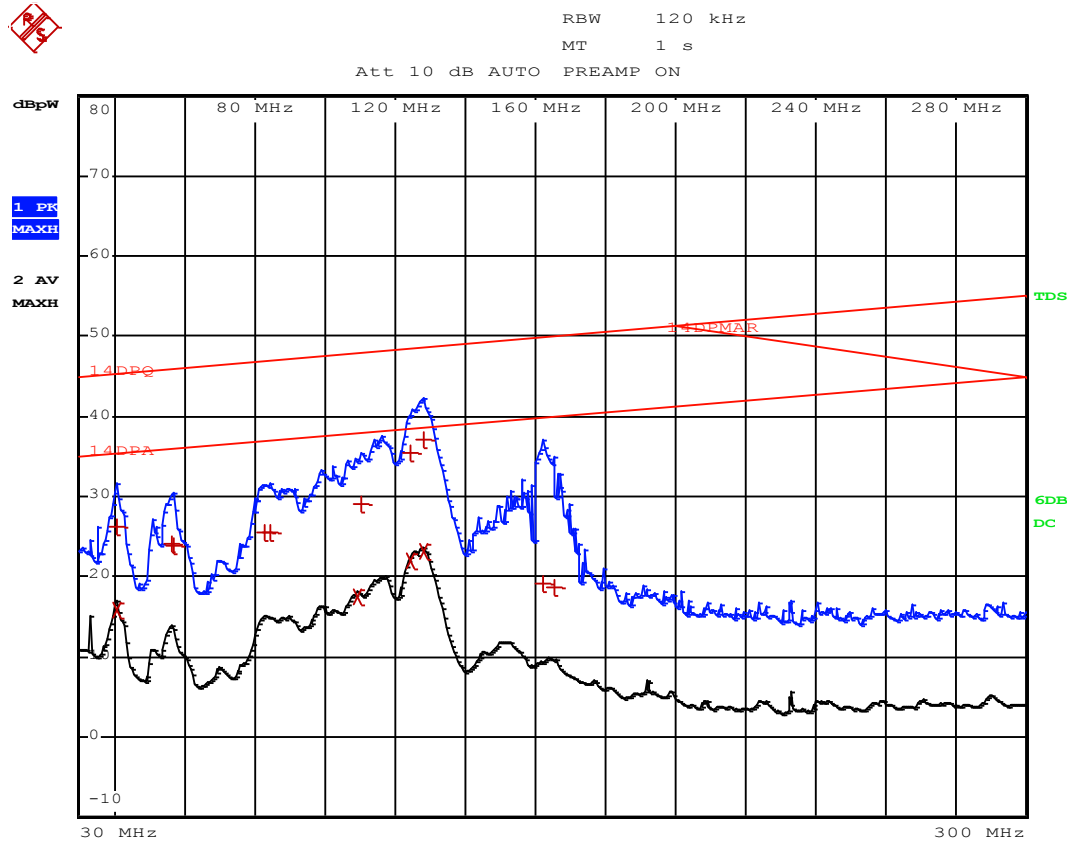
Results of model RD-40WC4SB2 with transformer EE20-12



Frequency (MHz)	Measure Level (dBpW)	Reading Level (dBpW)	Over Limit (dB)	Limit (dBpW)	Probe (dB)	Cable (dB)	Amp (dB)	Type
32.580	27.374	2.200	-17.721	45.096	18.497	6.678	0.000	QP
32.580	21.774	-3.400	-13.321	35.096	18.497	6.678	0.000	AV
49.830	29.446	5.500	-16.288	45.734	17.200	6.746	0.000	QP
49.830	16.446	-7.500	-19.288	35.734	17.200	6.746	0.000	AV
53.280	29.496	5.600	-16.366	45.862	17.135	6.761	0.000	QP
53.280	17.096	-6.800	-18.766	35.862	17.135	6.761	0.000	AV
116.460	39.275	16.400	-8.927	48.202	15.800	7.075	0.000	QP
116.460	28.675	5.800	-9.527	38.202	15.800	7.075	0.000	AV
119.820	36.101	13.200	-12.225	48.327	15.800	7.101	0.000	QP
119.820	22.701	-0.200	-15.625	38.327	15.800	7.101	0.000	AV
233.340	29.080	4.100	-23.451	52.531	16.999	7.981	0.000	QP
233.340	28.580	3.600	-13.951	42.531	16.999	7.981	0.000	AV

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

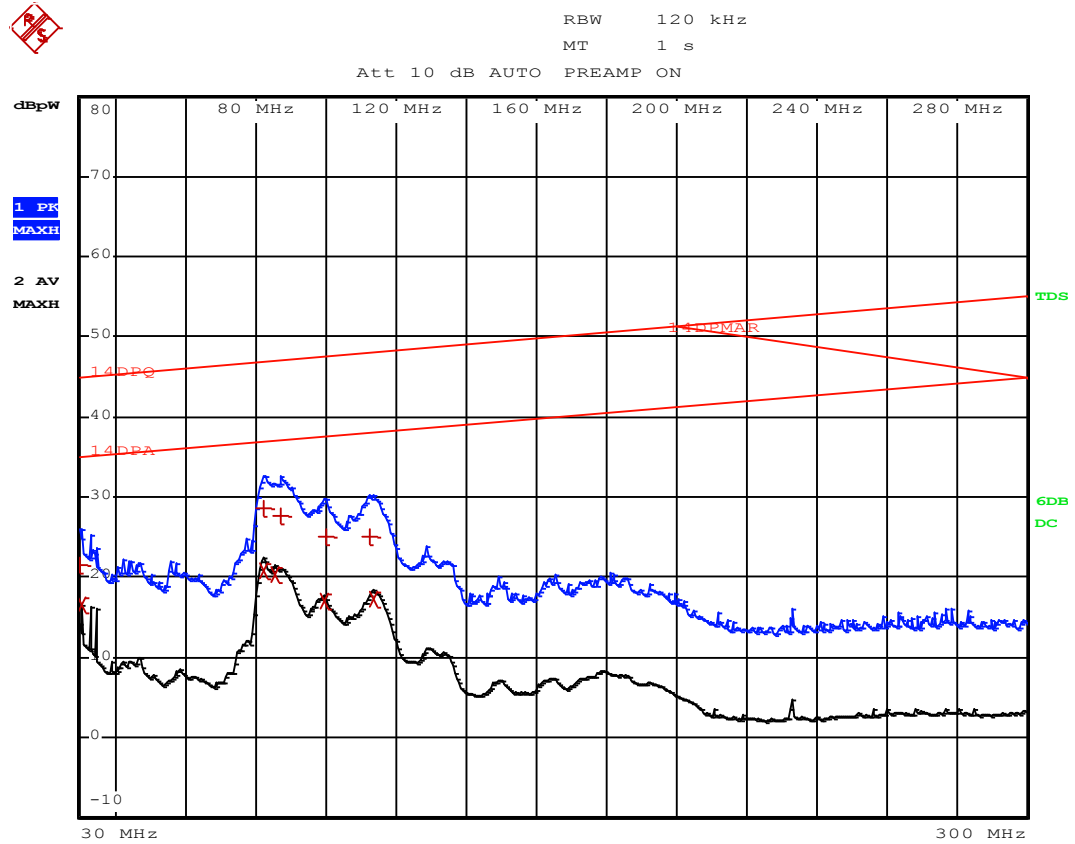
Results of model RD-41WC4SA1 (compressor HU155CY1)



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14DPQ		
Trace2:	14DPA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBpW	DELTA LIMIT dB
1 Quasi Peak	128.32 MHz	37.04	-11.60
1 Quasi Peak	124.36 MHz	35.57	-12.91
2 Average	128.16 MHz	23.12	-15.50
2 Average	124.44 MHz	21.94	-16.55
1 Quasi Peak	110.56 MHz	29.04	-18.94
1 Quasi Peak	41 MHz	26.19	-19.21
2 Average	40.76 MHz	15.82	-19.57
2 Average	109.32 MHz	17.63	-20.30
1 Quasi Peak	82.72 MHz	25.58	-21.36
1 Quasi Peak	84.68 MHz	25.65	-21.36
1 Quasi Peak	56.52 MHz	24.05	-21.92
1 Quasi Peak	57.04 MHz	23.84	-22.15
1 Quasi Peak	162.52 MHz	19.27	-30.63
1 Quasi Peak	165.24 MHz	18.67	-31.33

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

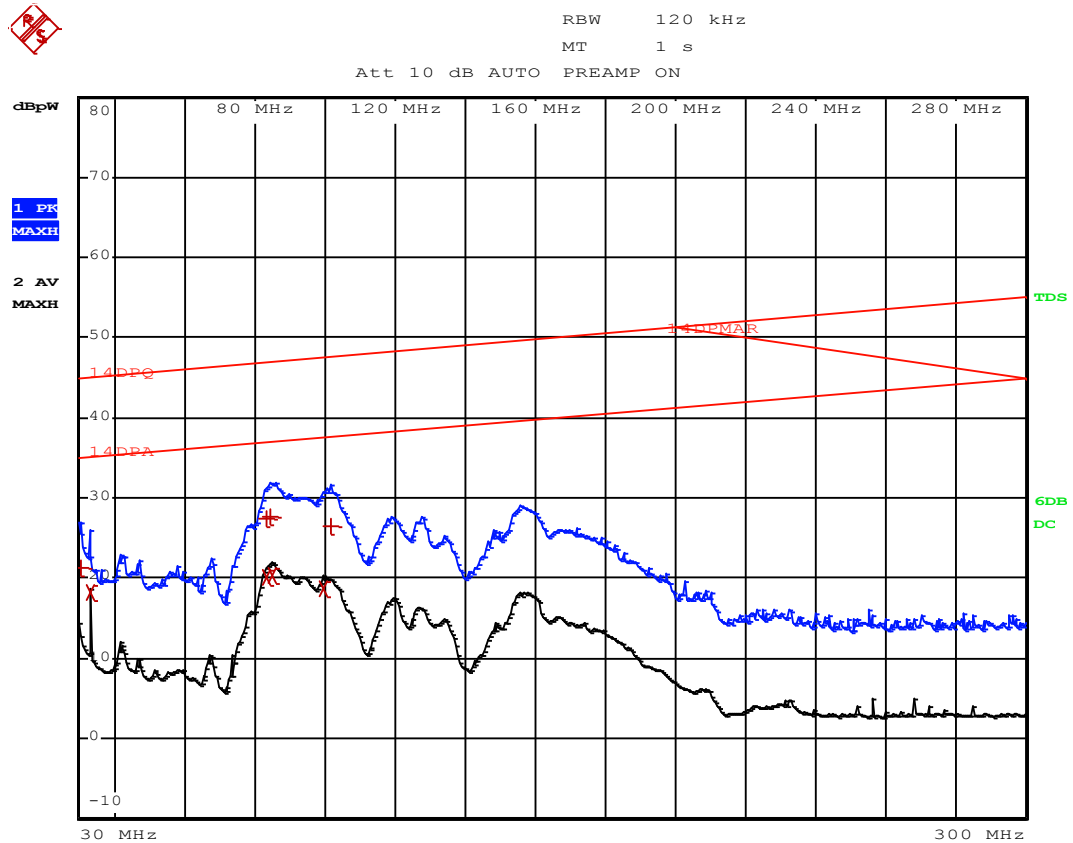
Results of model RD-41WC4SA1 (alternative compressor HYB81MKUa) with alternative power PCB1



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14DPQ		
Trace2:	14DPA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBpW	DELTA LIMIT dB
1 Quasi Peak	30.2 MHz	21.63	-23.37
2 Average	30.72 MHz	16.51	-18.51
1 Quasi Peak	82.28 MHz	28.68	-18.24
2 Average	82.6 MHz	20.89	-16.05
2 Average	85.48 MHz	20.34	-16.71
1 Quasi Peak	87.44 MHz	27.60	-19.52
2 Average	99.64 MHz	16.95	-20.62
1 Quasi Peak	100.04 MHz	24.99	-22.59
1 Quasi Peak	112.44 MHz	24.97	-23.08
2 Average	113.52 MHz	17.30	-20.79

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

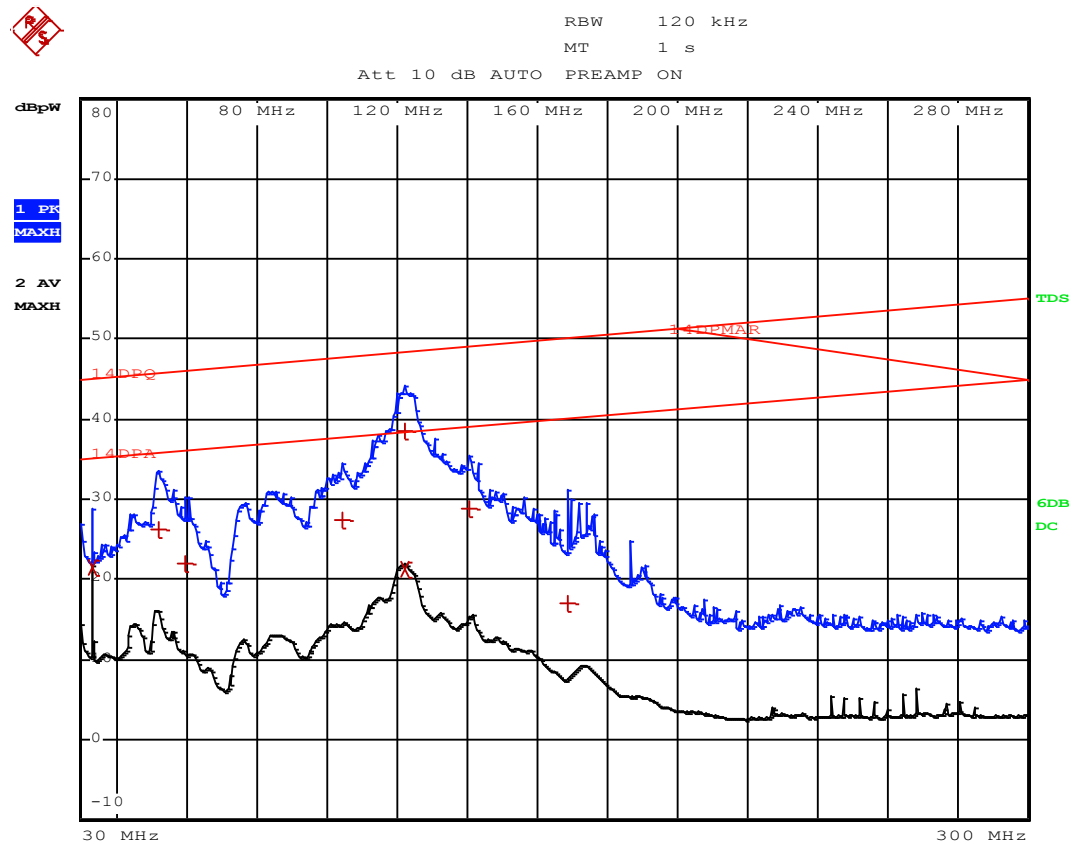
Results of model RD-44WC4SC2 (original compressor LR88CY1) with alternative power PCB1



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14DPQ		
Trace2:	14DPA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBpW	DELTA LIMIT dB
1 Quasi Peak	30.4 MHz	21.32	-23.68
2 Average	33.32 MHz	18.29	-16.82
2 Average	83.64 MHz	20.02	-16.96
1 Quasi Peak	83.72 MHz	27.48	-19.50
1 Quasi Peak	84.36 MHz	27.79	-19.22
2 Average	85.24 MHz	20.47	-16.57
2 Average	99.52 MHz	18.71	-18.86
1 Quasi Peak	101.92 MHz	26.38	-21.28

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

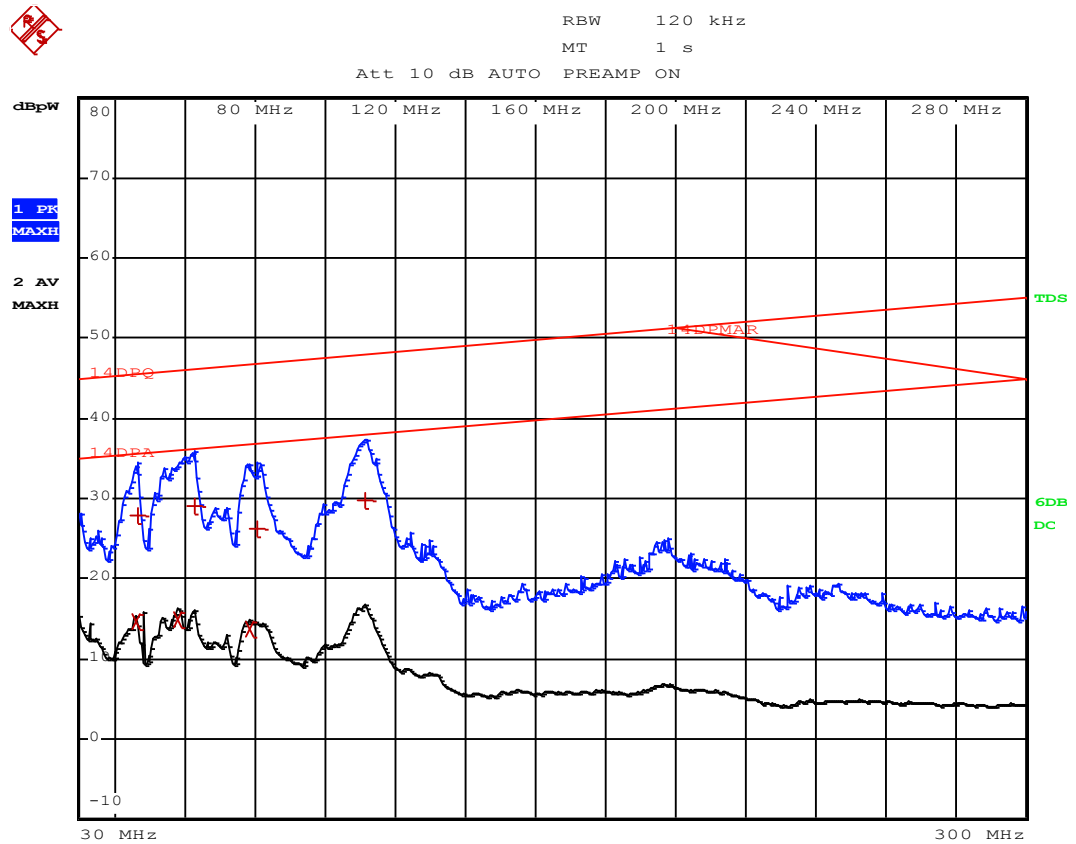
Results of model RD-40WC4SA2 (alternative compressor HXZ140A)



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14DPQ		
Trace2:	14DPA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBpW	DELTA LIMIT dB
1 Quasi Peak	122.04 MHz	38.43	-9.97
2 Average	33.32 MHz	21.54	-13.58
2 Average	122.4 MHz	21.31	-17.10
1 Quasi Peak	52.08 MHz	26.21	-19.60
1 Quasi Peak	140.52 MHz	28.84	-20.24
1 Quasi Peak	104.64 MHz	27.34	-20.42
1 Quasi Peak	59.6 MHz	21.96	-24.13
1 Quasi Peak	169 MHz	17.14	-33.00

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

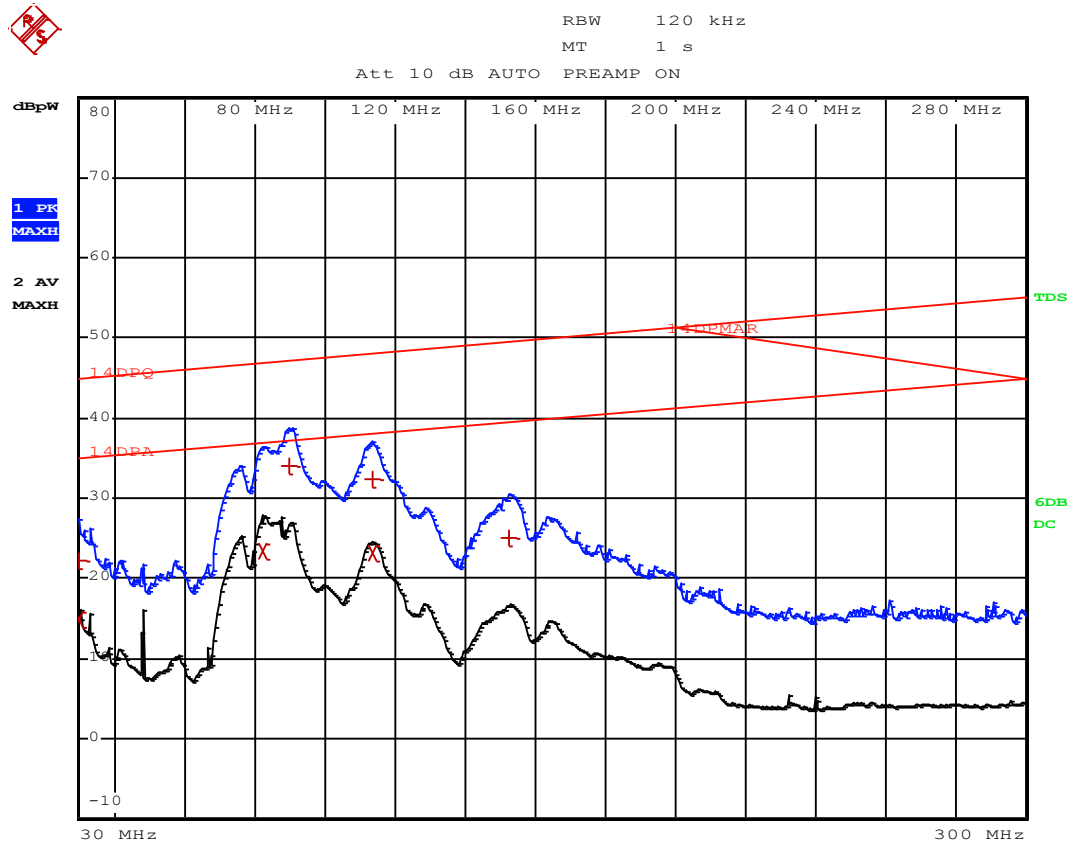
Results of model RB406N4AD2 (compressor HXZ140A) with alternative power PCB2



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14DPQ		
Trace2:	14DPA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBpW	DELTA LIMIT dB
1 Quasi Peak	62.88 MHz	28.97	-17.23
1 Quasi Peak	46.52 MHz	27.82	-17.79
1 Quasi Peak	111.56 MHz	29.81	-18.20
1 Quasi Peak	80.56 MHz	26.35	-20.51
2 Average	46.16 MHz	14.72	-20.87
2 Average	58.2 MHz	14.95	-21.08
2 Average	78.36 MHz	13.63	-23.15

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

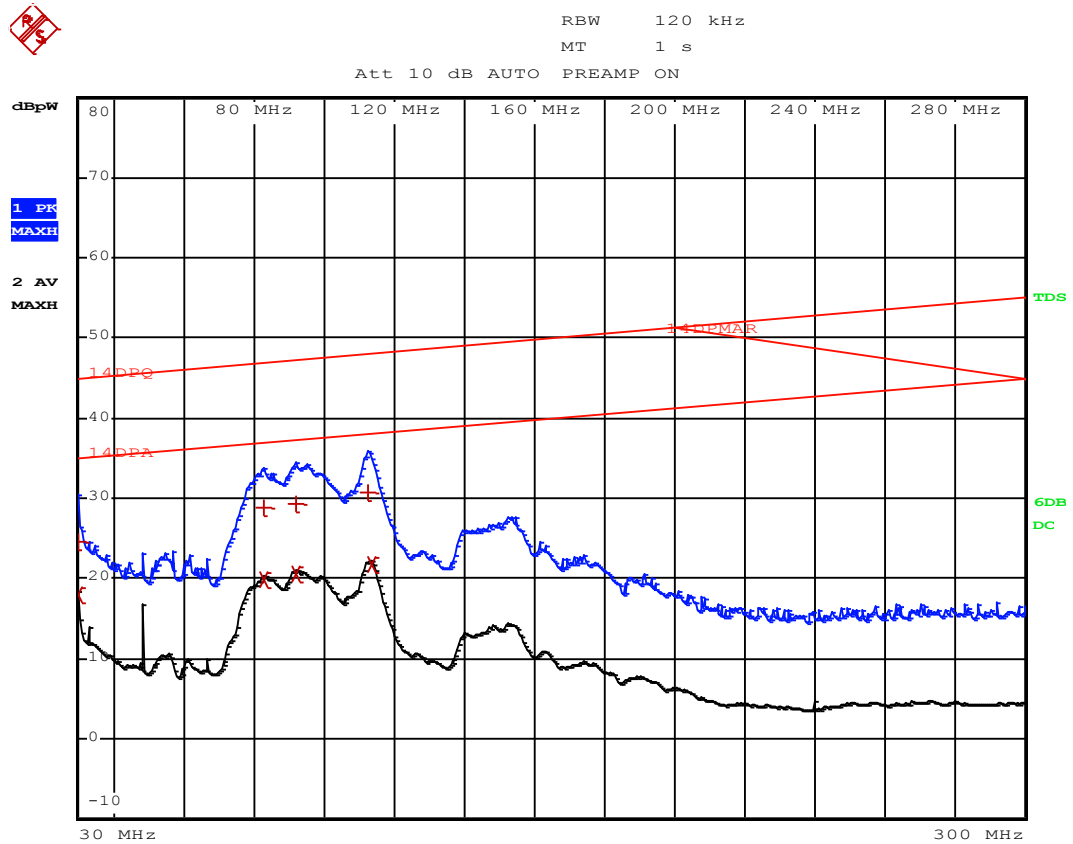
Results of model RD-44WC4SC1 (compressor HYB81MKUa)



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14DPQ		
Trace2:	14DPA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBpW	DELTA LIMIT dB
1 Quasi Peak	90 MHz	34.09	-13.12
2 Average	82.52 MHz	23.48	-13.45
2 Average	113.6 MHz	23.13	-14.96
1 Quasi Peak	113.92 MHz	32.43	-15.67
2 Average	30 MHz	14.95	-20.04
1 Quasi Peak	30 MHz	22.34	-22.65
1 Quasi Peak	152.64 MHz	25.17	-24.36

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

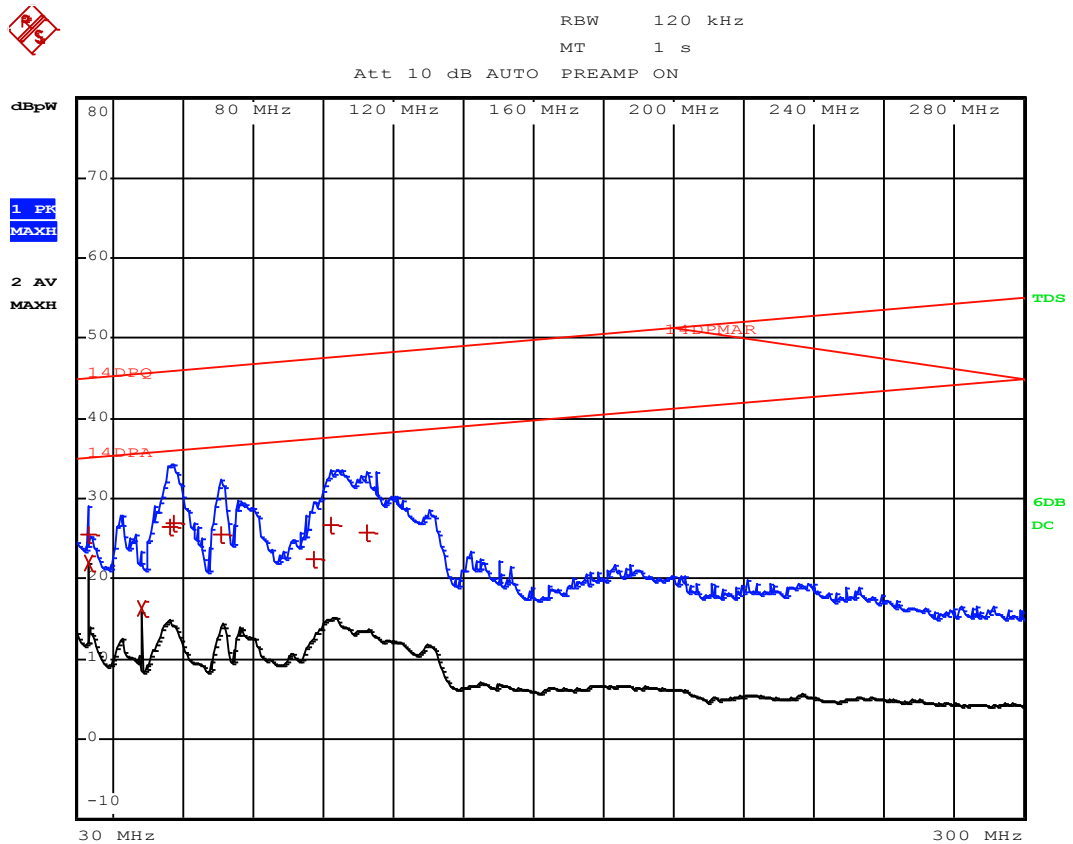
Results of model RB406N4WC1 (compressor HYB81MKUa)



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14DPQ		
Trace2:	14DPA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBpW	DELTA LIMIT dB
2 Average	113.72 MHz	21.86	-16.23
2 Average	91.92 MHz	20.54	-16.74
2 Average	30 MHz	18.10	-16.89
2 Average	82.96 MHz	19.98	-16.97
1 Quasi Peak	112.84 MHz	30.70	-17.36
1 Quasi Peak	92.16 MHz	29.34	-17.95
1 Quasi Peak	82.84 MHz	28.79	-18.16
1 Quasi Peak	30.12 MHz	24.55	-20.45

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results of model RB406N4AW1 (compressor PZ85E1C 3)



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	14DPQ		
Trace2:	14DPA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBpW	DELTA LIMIT dB
1 Quasi Peak	33.32 MHz	25.53	-19.58
2 Average	33.32 MHz	21.89	-13.23
2 Average	48.36 MHz	16.37	-19.30
1 Quasi Peak	56.36 MHz	26.52	-19.45
1 Quasi Peak	57.52 MHz	27.07	-18.94
1 Quasi Peak	71.08 MHz	25.59	-20.93
1 Quasi Peak	97.24 MHz	22.56	-24.93
1 Quasi Peak	102.2 MHz	26.82	-20.84
1 Quasi Peak	112.4 MHz	25.84	-22.20

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Refer to chapter 6 for the test set-up.

Conclusion:

PASS

4.4 Radiated emission (30MHz-1GHz)

Requirements

Standard	EN 55014-1
Testing method	SAC
Measuring distance	3 meters

Frequency [MHz]	Limits – QP [dB(μV/m)]
30 – 230	40
230 – 1000	47

Or

Margin requirements when performing disturbance power measurement

Standard	EN 55014-1
Frequency [MHz]	Margin - QP [dB(pW)]
200,0– 300,0	0 – 10 *)

*) margin limits increasing linearly with the frequency

And

Maximum Clock Frequency	< 30 MHz
-------------------------	----------

Port	Enclosure
Mode	On mode

Results

Frequency [MHz]	Margin - QP [dB(pW)]	
	Level – requirement margin	Limit
200,0– 300,0	More than 10 dB Below the limit	

And

Maximum Clock Frequency	< 30 MHz
-------------------------	----------

Remark:

The disturbance power margin of 200 – 300 MHz is more than 10 dB below the limit; and the maximum clock frequency of the product is less than 30 MHz, therefore, this product is fulfil the relevant requirements of this standard without further testing.

Conclusion:**PASS**

4.5 Harmonic currents

Standard	EN 61000-3-2
Port	AC Mains supply
Voltage	230 Vac
Mode	On mode

√	Class A	All apparatus not classified as Class B, C or D
	Class B	Portable tools
	Class C	Lighting equipment
	Class D	Personal computers, television receivers, refrigerators and freezers having one or more variable-speed to control compressor motor(s)

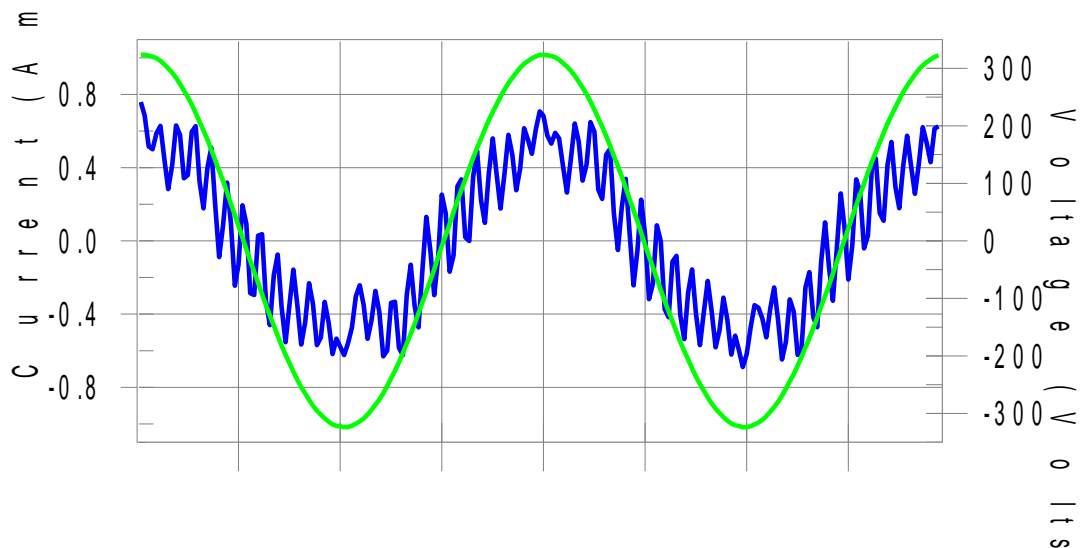
Condition:

Ambient temperature	25 °C
Relative Humidity air	50%

Results of model RD-40WC4SA2 with transformer XZM-EF2096

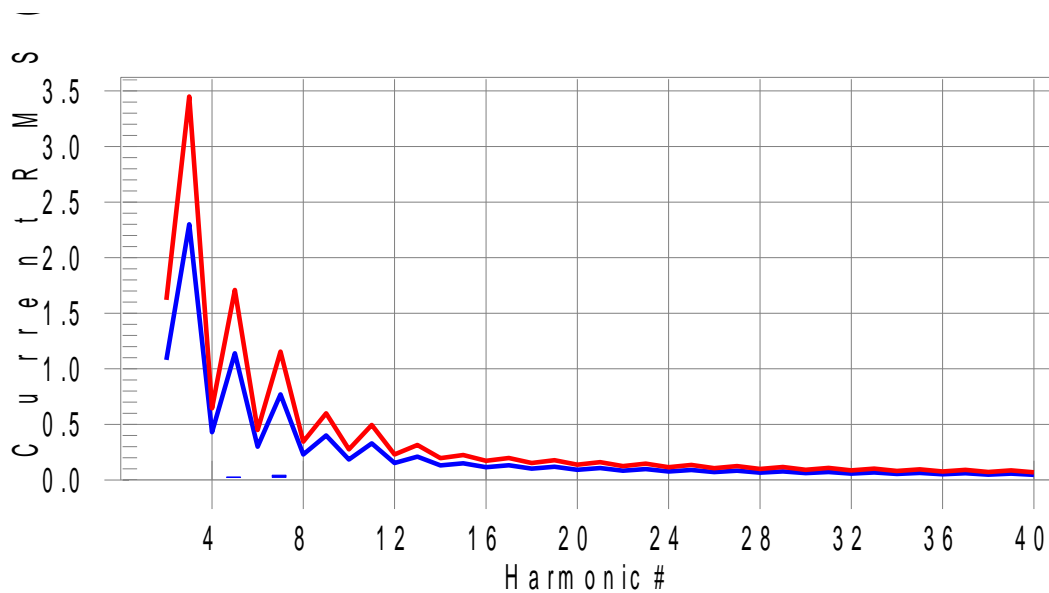
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonic was #7 with 3.8% of the limit.

Test Result: Pass Source qualification: Normal
 THC(A): 0.060 I-THD(%): 16.3 POHC(A): 0.000 POHC Limit(A): 0.251

Highest parameter values during test:

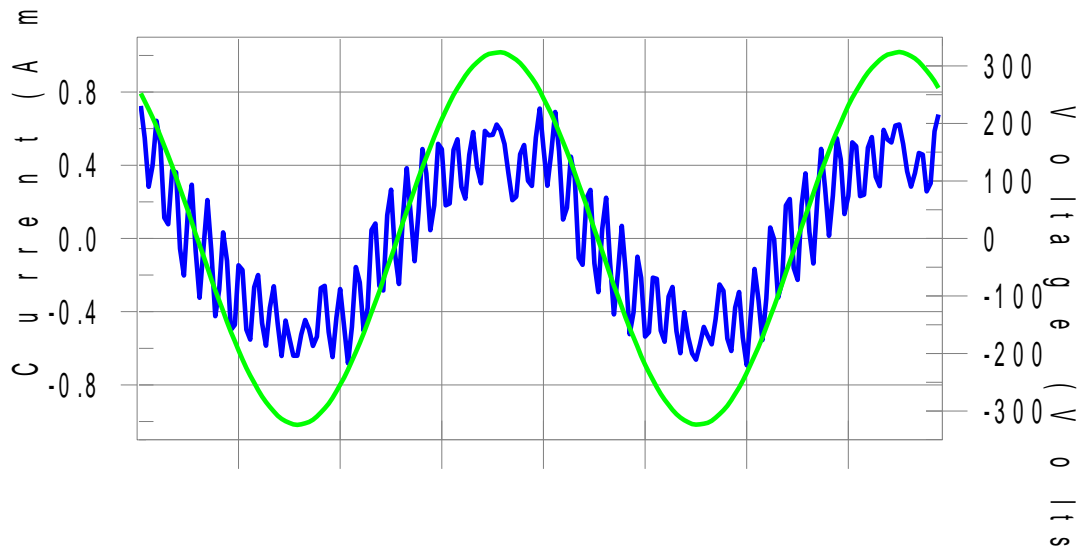
V_RMS (Volts): 229.03	Frequency(Hz): 50.00
I_Peak (Amps): 0.759	I_RMS (Amps): 0.411
I_Fund (Amps): 0.379	Crest Factor: 1.899
Power (Watts): 86.8	Power Factor: 0.926

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.011	1.080	1.1	0.013	1.620	0.8	Pass
3	0.022	2.300	0.9	0.025	3.450	0.7	Pass
4	0.005	0.430	1.2	0.005	0.645	0.8	Pass
5	0.025	1.140	2.2	0.027	1.710	1.6	Pass
6	0.004	0.300	N/A	0.004	0.450	N/A	Pass
7	0.042	0.770	5.4	0.043	1.155	3.8	Pass
8	0.002	0.230	N/A	0.002	0.345	N/A	Pass
9	0.016	0.400	4.0	0.017	0.600	2.8	Pass
10	0.002	0.184	N/A	0.002	0.276	N/A	Pass
11	0.012	0.330	3.7	0.013	0.495	2.6	Pass
12	0.001	0.153	N/A	0.002	0.230	N/A	Pass
13	0.008	0.210	3.8	0.008	0.315	2.6	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.005	0.150	3.4	0.005	0.225	2.3	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.004	0.132	N/A	0.004	0.198	N/A	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.003	0.118	N/A	0.003	0.178	N/A	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.003	0.107	N/A	0.003	0.161	N/A	Pass
22	0.001	0.084	N/A	0.001	0.125	N/A	Pass
23	0.003	0.098	N/A	0.003	0.147	N/A	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.003	0.090	N/A	0.003	0.135	N/A	Pass
26	0.001	0.071	N/A	0.001	0.107	N/A	Pass
27	0.003	0.083	N/A	0.003	0.125	N/A	Pass
28	0.001	0.066	N/A	0.001	0.099	N/A	Pass
29	0.003	0.078	N/A	0.003	0.116	N/A	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.003	0.073	N/A	0.003	0.109	N/A	Pass
32	0.001	0.058	N/A	0.001	0.086	N/A	Pass
33	0.003	0.068	N/A	0.003	0.102	N/A	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.002	0.064	N/A	0.002	0.096	N/A	Pass
36	0.001	0.051	N/A	0.001	0.077	N/A	Pass
37	0.002	0.061	N/A	0.002	0.091	N/A	Pass
38	0.001	0.048	N/A	0.001	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.000	0.046	N/A	0.001	0.069	N/A	Pass

Results of model RD-40WC4SA2 with transformer EE20-12

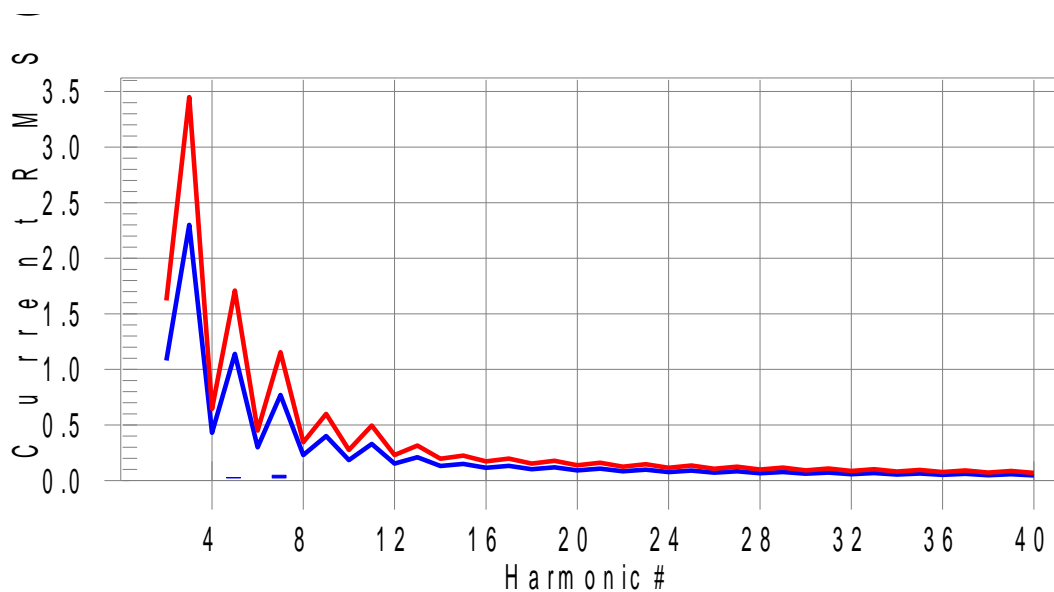
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonic was #7 with 4.5% of the limit.

Test Result: Pass **Source qualification: Normal**
THC(A): 0.065 **I-THD(%): 18.6** **POHC(A): 0.000** **POHC Limit(A): 0.251**

Highest parameter values during test:

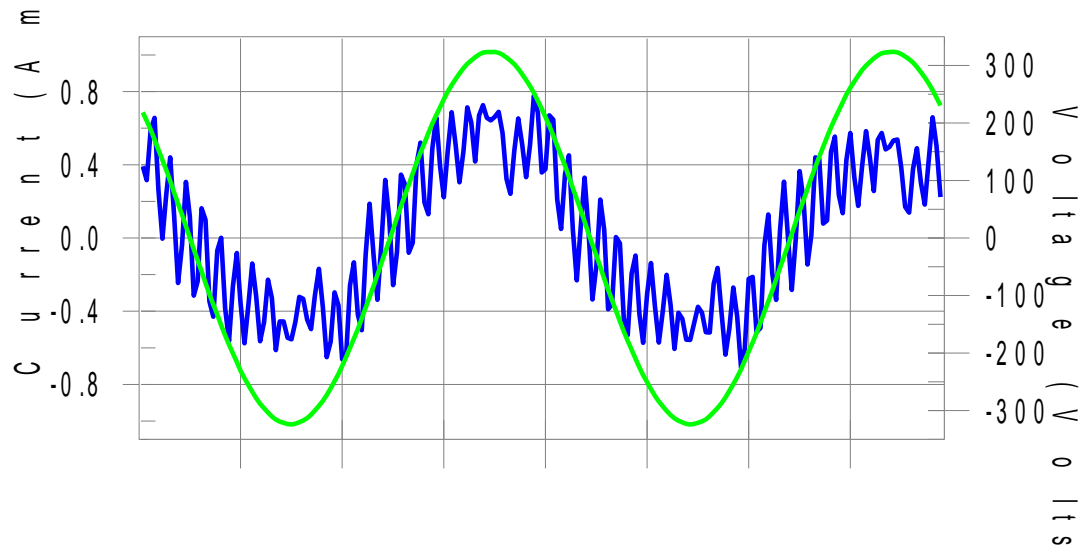
V_RMS (Volts):	229.04	Frequency(Hz):	50.00
I_Peak (Amps):	0.737	I_RMS (Amps):	0.402
I_Fund (Amps):	0.363	Crest Factor:	1.865
Power (Watts):	83.2	Power Factor:	0.905

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.010	1.080	1.0	0.012	1.620	0.7	Pass
3	0.022	2.300	0.9	0.023	3.450	0.7	Pass
4	0.005	0.430	N/A	0.005	0.645	N/A	Pass
5	0.028	1.140	2.4	0.031	1.710	1.8	Pass
6	0.004	0.300	N/A	0.005	0.450	N/A	Pass
7	0.048	0.770	6.2	0.051	1.155	4.5	Pass
8	0.002	0.230	N/A	0.002	0.345	N/A	Pass
9	0.017	0.400	4.2	0.019	0.600	3.1	Pass
10	0.002	0.184	N/A	0.002	0.276	N/A	Pass
11	0.013	0.330	3.9	0.014	0.495	2.8	Pass
12	0.001	0.153	N/A	0.002	0.230	N/A	Pass
13	0.008	0.210	3.8	0.009	0.315	2.7	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.004	0.150	N/A	0.004	0.225	N/A	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.003	0.132	N/A	0.003	0.198	N/A	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.002	0.118	N/A	0.002	0.178	N/A	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.002	0.107	N/A	0.002	0.161	N/A	Pass
22	0.001	0.084	N/A	0.001	0.125	N/A	Pass
23	0.002	0.098	N/A	0.002	0.147	N/A	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.002	0.090	N/A	0.003	0.135	N/A	Pass
26	0.001	0.071	N/A	0.001	0.107	N/A	Pass
27	0.003	0.083	N/A	0.003	0.125	N/A	Pass
28	0.001	0.066	N/A	0.001	0.099	N/A	Pass
29	0.003	0.078	N/A	0.003	0.116	N/A	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.002	0.073	N/A	0.002	0.109	N/A	Pass
32	0.001	0.058	N/A	0.001	0.086	N/A	Pass
33	0.002	0.068	N/A	0.002	0.102	N/A	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.002	0.064	N/A	0.002	0.096	N/A	Pass
36	0.001	0.051	N/A	0.001	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.001	0.048	N/A	0.001	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.000	0.046	N/A	0.001	0.069	N/A	Pass

Results of model RD-40WC4SB2 with transformer XZM-EF2096

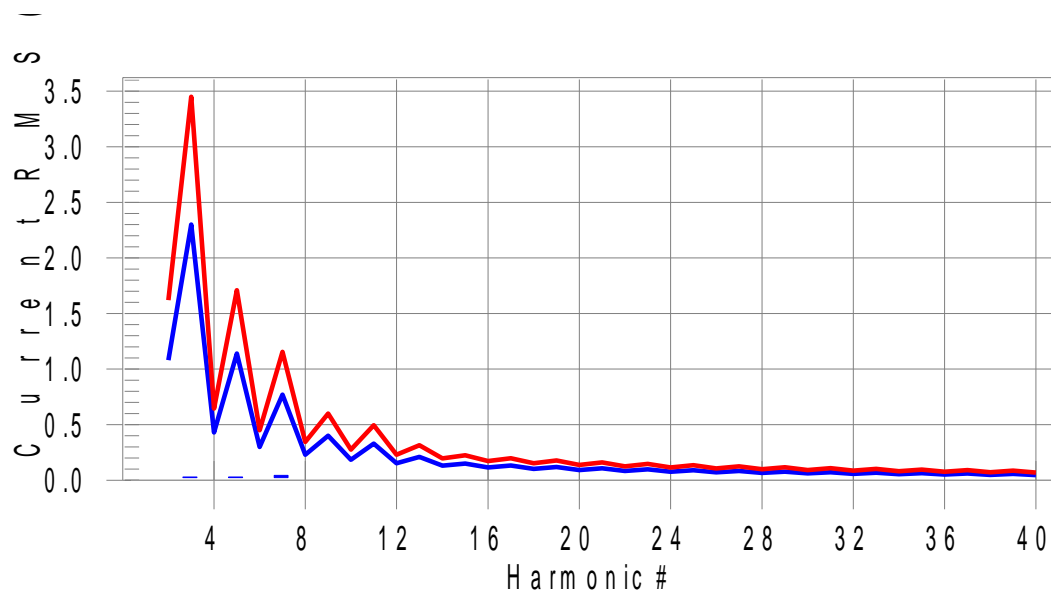
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonic was #7 with 4.0% of the limit.

Test Result: Pass Source qualification: Normal
 THC(A): 0.063 I-THD(%): 18.6 POHC(A): 0.000 POHC Limit(A): 0.251

Highest parameter values during test:

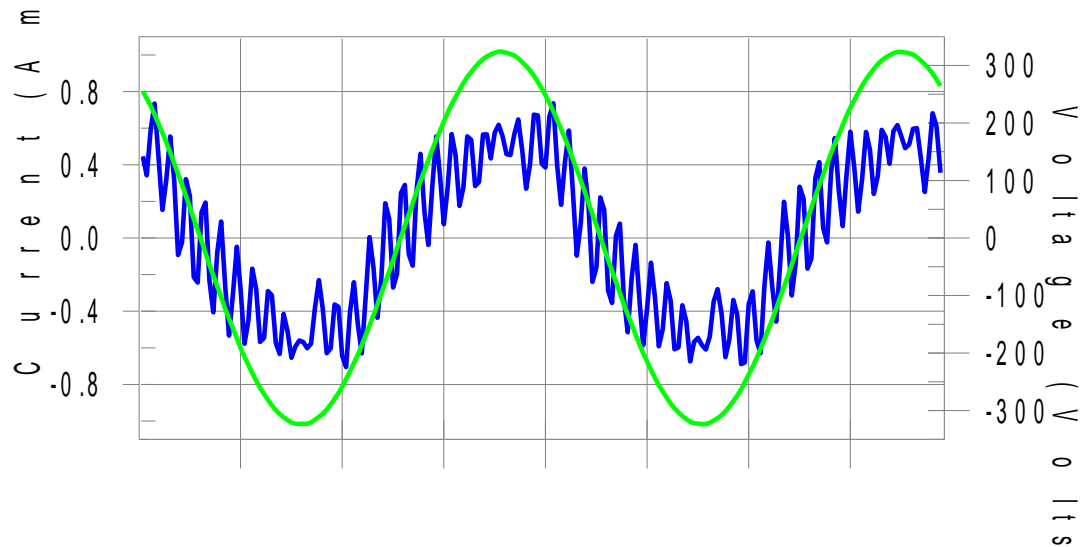
V_RMS (Volts): 229.06 Frequency(Hz): 50.00
 I_Peak (Amps): 0.802 I_RMS (Amps): 0.395
 I_Fund (Amps): 0.349 Crest Factor: 2.043
 Power (Watts): 79.9 Power Factor: 0.889

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.010	1.080	0.9	0.011	1.620	0.7	Pass
3	0.029	2.300	1.2	0.032	3.450	0.9	Pass
4	0.005	0.430	1.2	0.006	0.645	0.9	Pass
5	0.029	1.140	2.5	0.031	1.710	1.8	Pass
6	0.004	0.300	N/A	0.004	0.450	N/A	Pass
7	0.044	0.770	5.7	0.046	1.155	4.0	Pass
8	0.002	0.230	N/A	0.002	0.345	N/A	Pass
9	0.012	0.400	3.0	0.013	0.600	2.2	Pass
10	0.001	0.184	N/A	0.002	0.276	N/A	Pass
11	0.009	0.330	2.8	0.010	0.495	2.1	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.005	0.210	2.6	0.006	0.315	1.9	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.002	0.150	N/A	0.002	0.225	N/A	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.001	0.132	N/A	0.001	0.198	N/A	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.001	0.118	N/A	0.001	0.178	N/A	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.001	0.107	N/A	0.001	0.161	N/A	Pass
22	0.001	0.084	N/A	0.001	0.125	N/A	Pass
23	0.001	0.098	N/A	0.001	0.147	N/A	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.001	0.090	N/A	0.001	0.135	N/A	Pass
26	0.001	0.071	N/A	0.001	0.107	N/A	Pass
27	0.001	0.083	N/A	0.001	0.125	N/A	Pass
28	0.001	0.066	N/A	0.001	0.099	N/A	Pass
29	0.001	0.078	N/A	0.001	0.116	N/A	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.001	0.073	N/A	0.001	0.109	N/A	Pass
32	0.001	0.058	N/A	0.001	0.086	N/A	Pass
33	0.001	0.068	N/A	0.001	0.102	N/A	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.001	0.064	N/A	0.001	0.096	N/A	Pass
36	0.001	0.051	N/A	0.001	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.001	0.048	N/A	0.001	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.000	0.046	N/A	0.001	0.069	N/A	Pass

Results of model RD-40WC4SB2 with transformer EE20-12

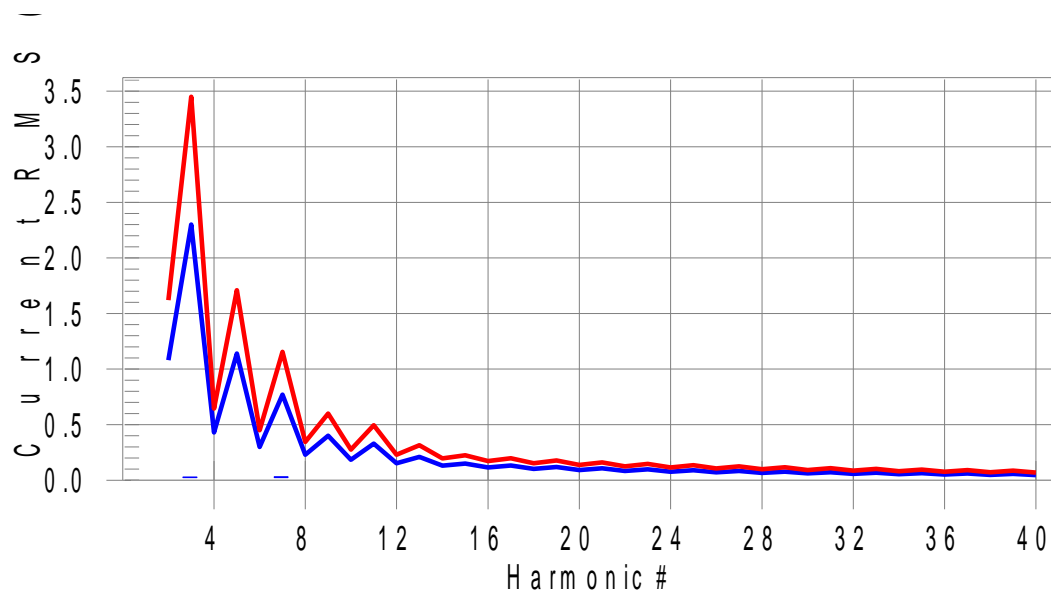
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonic was #7 with 3.0% of the limit.

Test Result: Pass Source qualification: Normal
 THC(A): 0.053 I-THD(%): 14.0 POHC(A): 0.000 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts): 229.05	Frequency(Hz): 50.00
I_Peak (Amps): 0.783	I_RMS (Amps): 0.424
I_Fund (Amps): 0.385	Crest Factor: 1.859
Power (Watts): 88.2	Power Factor: 0.912

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.012	1.080	1.2	0.014	1.620	0.8	Pass
3	0.030	2.300	1.3	0.032	3.450	0.9	Pass
4	0.005	0.430	1.2	0.006	0.645	1.0	Pass
5	0.022	1.140	1.9	0.024	1.710	1.4	Pass
6	0.004	0.300	N/A	0.006	0.450	N/A	Pass
7	0.032	0.770	4.2	0.034	1.155	3.0	Pass
8	0.002	0.230	N/A	0.003	0.345	N/A	Pass
9	0.009	0.400	2.4	0.010	0.600	1.7	Pass
10	0.001	0.184	N/A	0.001	0.276	N/A	Pass
11	0.007	0.330	2.1	0.007	0.495	1.5	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.004	0.210	N/A	0.004	0.315	N/A	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.001	0.150	N/A	0.001	0.225	N/A	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.001	0.132	N/A	0.001	0.198	N/A	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.001	0.118	N/A	0.001	0.178	N/A	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.001	0.107	N/A	0.001	0.161	N/A	Pass
22	0.001	0.084	N/A	0.001	0.125	N/A	Pass
23	0.001	0.098	N/A	0.001	0.147	N/A	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.001	0.090	N/A	0.001	0.135	N/A	Pass
26	0.001	0.071	N/A	0.001	0.107	N/A	Pass
27	0.001	0.083	N/A	0.001	0.125	N/A	Pass
28	0.001	0.066	N/A	0.001	0.099	N/A	Pass
29	0.001	0.078	N/A	0.001	0.116	N/A	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.001	0.073	N/A	0.001	0.109	N/A	Pass
32	0.001	0.058	N/A	0.001	0.086	N/A	Pass
33	0.001	0.068	N/A	0.001	0.102	N/A	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.001	0.064	N/A	0.001	0.096	N/A	Pass
36	0.001	0.051	N/A	0.001	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.001	0.048	N/A	0.001	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.001	0.046	N/A	0.001	0.069	N/A	Pass

Conclusion:

PASS

4.6 Voltage fluctuations (Flicker)

Standard	EN 61000-3-3
Port	AC Mains supply
Voltage	230 Vac
Mode	On mode

Equipment intended to be connected to 230/400 V, 50 Hz supply systems may not produce voltage fluctuations in the supply systems due to variation of the input current above the limits as stated below.

P_{ST}	Not applicable
P_{LT}	Not applicable
$T_{max} > 3.3\%$	≤ 500 ms
d_C	$\leq 3,3\%$
d_{MAX}	$\leq 4\%$

Remark:

P_{ST} and P_{LT} requirements shall not be applied to voltage caused by manual switching.

Condition:

Ambient temperature	25 °C
Relative Humidity air	50%

Results of model RD-40WC4SA2 with transformer XZM-EF2096

Observation Time T_P	10 minutes
T_{max}	0,0 ms
Maximum voltage change d_{MAX}	1,73 %
Relative Voltage change d_C	0,84 %
Short term flicker P_{ST}	Not applicable
Long term flicker P_{LT}	Not applicable

Results of model RD-40WC4SA2 with transformer EE20-12

Observation Time T_P	10 minutes
T_{max}	0,0 ms
Maximum voltage change d_{MAX}	1,87 %
Relative Voltage change d_C	0,00 %
Short term flicker P_{ST}	Not applicable
Long term flicker P_{LT}	Not applicable

Results of model RD-40WC4SB2 with transformer XZM-EF2096

Observation Time T_P	10 minutes
Tmax	0,0 ms
Maximum voltage change d_{MAX}	-0,05 %
Relative Voltage change d_C	0,00 %
Short term flicker P_{ST}	Not applicable
Long term flicker P_{LT}	Not applicable

Results of model RD-40WC4SB2 with transformer EE20-12

Observation Time T_P	10 minutes
Tmax	0,0 ms
Maximum voltage change d_{MAX}	-0,05 %
Relative Voltage change d_C	0,00 %
Short term flicker P_{ST}	Not applicable
Long term flicker P_{LT}	Not applicable

Conclusion:**Pass**

5 IMMUNITY TEST RESULTS

5.1 Electrostatic discharge immunity

Electrostatic discharges (ESD) are the result of persons or objects that accumulate static electricity due to for instance walking on synthetic carpets. The ESD can influence the operation of equipment or damage its electronics, either by a direct discharge or indirectly by coupling or radiation. Both effects are simulated during the tests.

Requirements

Standard	EN 55014-2
Basic standard	EN 61000-4-2
Port	Enclosure
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.
Air discharges	8 kV
Contact discharges	4 kV
Mode	On mode

Condition:

Ambient temperature	25 °C
Relative Humidity air	50%
Atmospheric pressure	101 kPa

Performed tests of model refer section 1.1

Air discharges		4 kV	√	8 kV		15 kV		kV
Contact discharges		2 kV	√	4 kV		8 kV		kV
Via coupling planes		Horizontal			√	Vertical		
Polarity	√	Positive			√	Negative		
Set-up		Table-top			√	Floor standing		

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

5.2 Electrical Fast Transient immunity

The EFT immunity test simulates disturbances by bursts of very short transients caused for example by switching off loads such as an AC motor or bouncing relay contacts. The transients are likely to disturb electronics but less likely to cause damage.

Requirements

Standard	EN 55014-2			
Basic standard	EN 61000-4-4			
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.			
Pulse characteristics	5/50 ns			
Peak Voltage; Port	1 kV; AC input power port 0,5 kV; DC input output power port 0,5 kV; Signal lines			
Repetition frequency	√	5 kHz		2,5 kHz

Condition:

Ambient temperature	25 °C
Relative Humidity air	50%

Performed tests of model refer section 1.1

Tested Voltage; Port	1 kV; AC input power port			
Mode	On mode			
Injection method	√	CDN		Capacitive clamp
Polarity	√	Positive	√	Negative
Set-up		Table-top	√	Floor standing

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

5.3 Surge transient immunity

The surge transient immunity test simulates the surges that are caused by overvoltages due to indirect (induced) lightning transients. The pulse is a slow transient with high-energy contents and due to its long duration may cause damage to an unprotected EUT.

Requirements

Standard	EN 55014-2
Basic standard	EN 61000-4-5
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.
Pulse characteristics	1,2/50 μ s
Peak Voltage; Port	1 kV; AC input power port (line to line) 2 kV; AC input power port (line to earth)

Condition:

Ambient temperature	25 °C
Relative Humidity air	50%

Performed tests of model refer section 1.1

Tested Voltage; Port	1 kV; AC input power port (line to line) 2 kV; AC input power port (line to earth)			
Mode	On mode			
Polarity	√	Positive	√	Negative

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

5.4 RF Conducted immunity

During this test the immunity of the equipment for induced or conducted electromagnetic fields is checked. Fields generated by radio and other transmitters cause RF voltages in long cables like the mains network. This test reproduces these induced disturbing voltages by injecting them to the EUT via the cabling.

Requirements

Standard	EN 55014-2
Basic standard	EN 61000-4-6
Performance criterion	A; Operation as intended
Frequency range	0,15 – 230 MHz
Modulation	1 kHz – 80% AM
Test level; Port	3 V; AC input output power port 1 V; DC input output power port 1 V; Signal lines

Condition:

Ambient temperature	25 °C
Relative Humidity air	50%

Performed tests of model refer section 1.1

Tested level; Port	3 V; AC input power port		
Mode	On mode		
Frequency range	0,15 – 230 MHz		
Dwell time	3 second		
Injection method	√	CDN-M3	EM clamp

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

5.5 Power supply interruptions and dips

Requirements

Basic standard	EN 61000-4-11
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed. C; Temporary, self-recoverable loss of function is allowed.

Standard	EN 55014-2			
AC input power port			50 Hz	60 Hz
	C	$U_{NOM} - 30\%$	(25 periods)	(30 periods)
	C	$U_{NOM} - 60\%$	(10 periods)	(12 periods)
	C	$U_{NOM} - 100\%$	(0,5 period)	(0,5 period)

Condition:

Ambient temperature	25 °C
Relative Humidity air	50%

Performed tests of model refer section 1.1

Tested voltage	AC input power port, 230 Vac			
Mode	On mode			
AC input power port			50 Hz	60 Hz
		$U_{NOM} - 30\%$	(25 periods)	N/A
		$U_{NOM} - 60\%$	(10 periods)	
		$U_{NOM} - 100\%$	(0,5 period)	

Observations

During the test temporary loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

6 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

The photograph shows the tested device.



Figure 10 Mains conducted disturbance voltage test setup



Figure 11 Disturbance Power test setup

7 PRODUCT INTERNAL PHOTOS

Models of the temperature controller location in the fresh compartment



the temperature controller



Alternative the temperature controller



Models of the temperature controller location on the door face





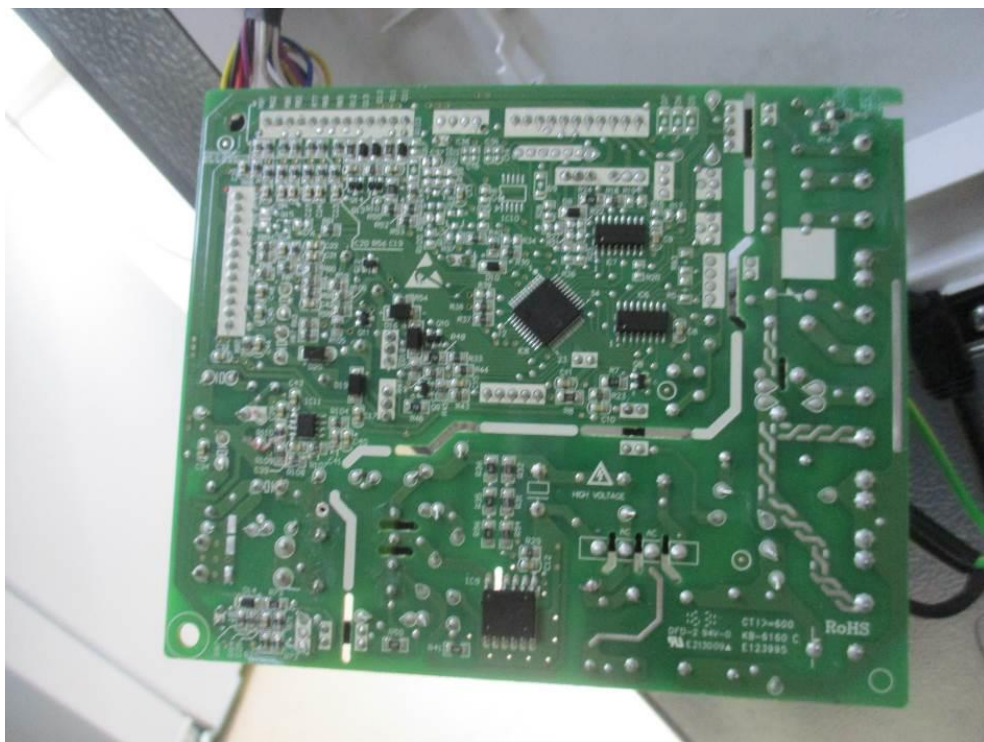




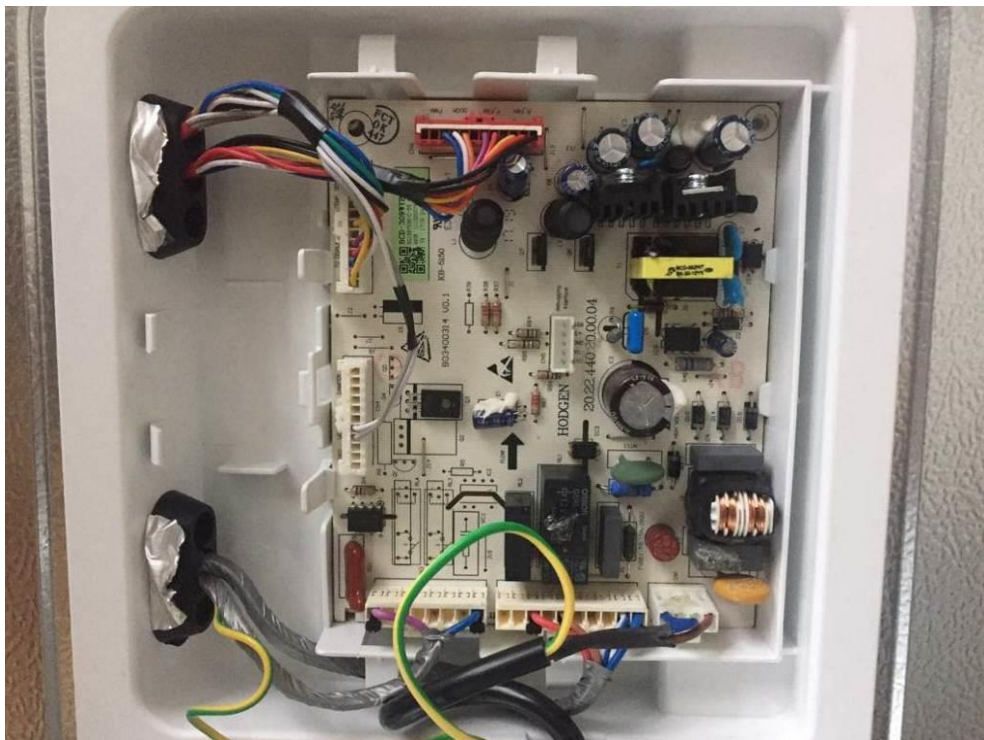
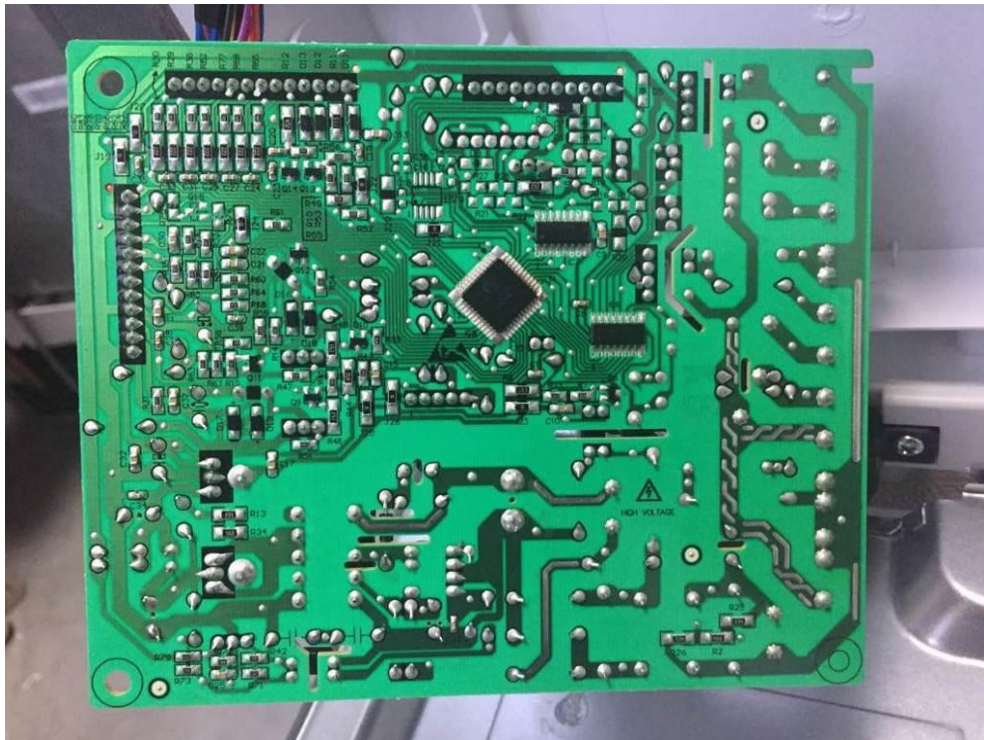
Motor



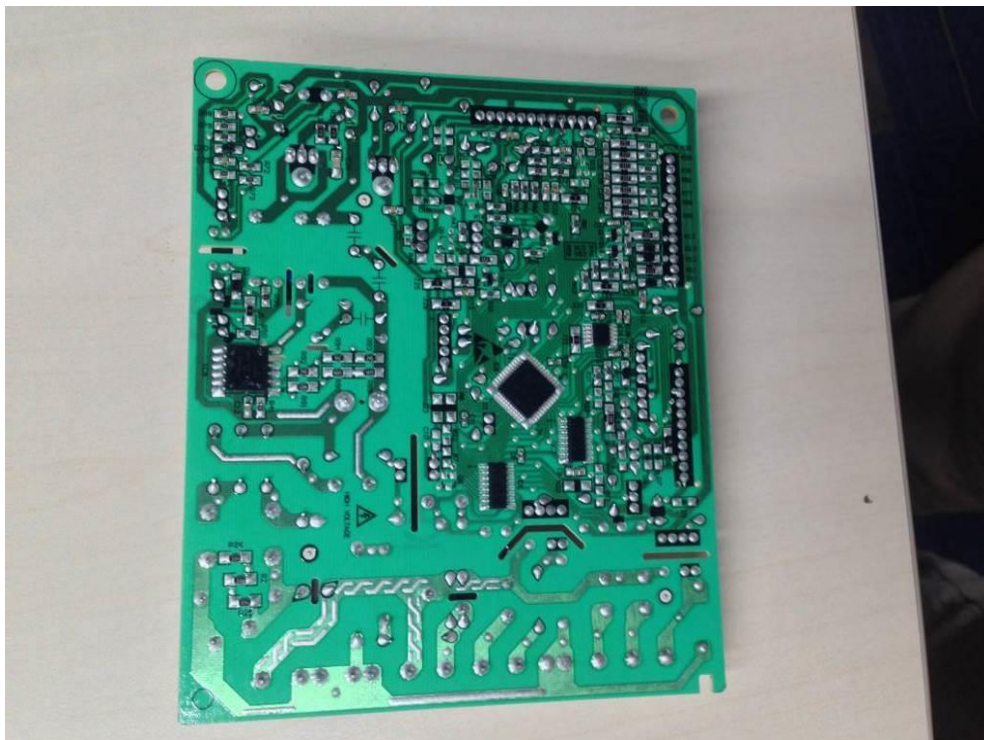
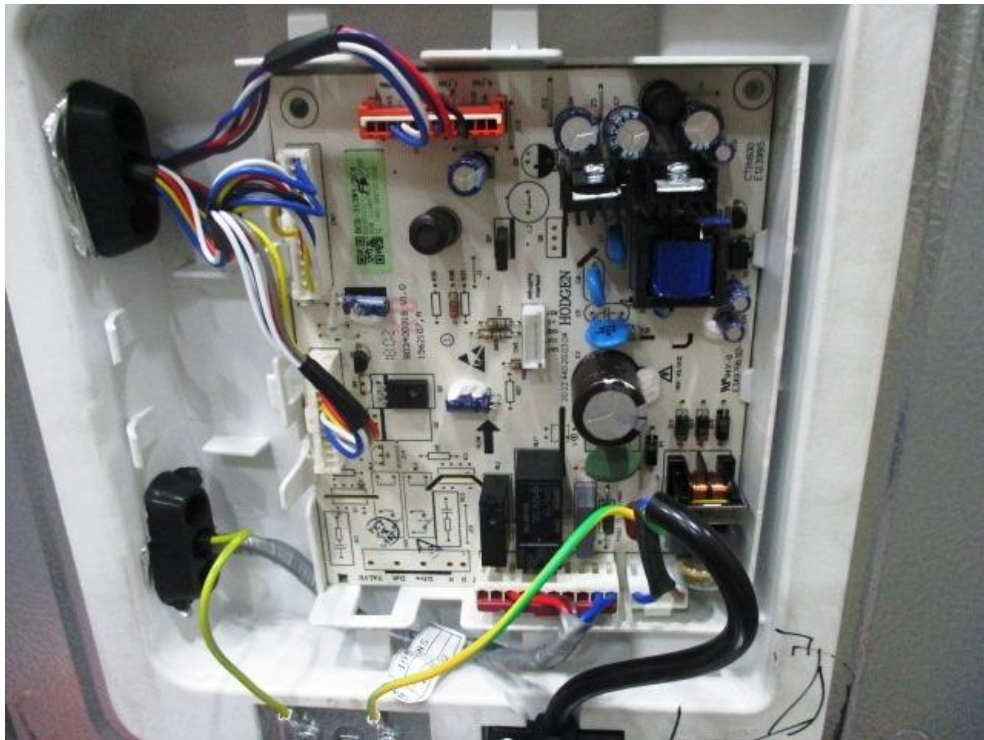
Capacitor



Main PCB



Alternative Main PCB1



Alternative Main PCB2



Compressor LR88CY1



Compressor HU155CY1



Compressor HYB81MKUa



Compressor HXZ140A



Compressor PZ85E1C 3

--- END- ---