

Test Verification of Conformity

Verification Number: 19012807BKK-001

On the basis of the referenced test report(s), sample(s) tested of the below product have been found to comply with the standards harmonized with the directives listed on this verification at the time the tests were carried out. Other standards and Directives may be relevant to the product. This verification is part of the full test report(s) and should be read in conjunction with it <them>.

Once compliance with all product relevant e_{mark} mark directives are verified, including any relevant e.g. risk assessment and production control, the manufacturer may indicate compliance by signing a Declaration of Conformity themselves and applying the mark to products identical to the tested sample(s).

Applicant Name & Address: Product Description:	Toshiba Carrier (Thailand) Co., Ltd. 144/9 Moo5 Bangkadi Industrial Park, Tivanon Rd. T. Bangkadi, A. Muang, Pathumthani 12000 THAILAND Air conditioner
Ratings & Principle	220-240Va.c.; 50Hz
Characteristics:	
Models/Type References:	See page 2/2
Brand Name(s):	Toshiba
Standard(s)/Directive(s):	EN 55014-1: 2017
	EN 55014-2: 2015
	EN 61000-3-2: 2014
	EN 61000-3-3: 2013
	Part of requirements as specified in 2014/30/EU, EMC Directives
Verification Issuing Office	Intertek Testing Services (Thailand) Ltd.
Name & Address:	1285/5 Prachachuen Road, Wong-Sawang Sub-District,
	Bangsue District, Bangkok 10800
Test Report Number(s):	19012807ВКК-001
Additional information in Appe	ndix.

 $\mathcal{O}\mathcal{O}$

Signature

Name: Chairat Saeheng Position: Reviewer Date: 14 March 2019

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APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 19012807BKK-001

Model cover by this VOC

Test model Indoor / Outdoor	Model (Indoor / Outdoor)	Туре	Brand	Voltage (V), Ampere (A)	Frequency (Hz)	Capacity BTU	
	RAS-B10J2KVRG-E / RAS-10J2AVRG-E RAS-10J2KVRG-TR /			220-240Va.c.; 6.75A; Class I		8500	
RAS-B13J2KVRG-E / RAS-13J2AVRG-E	RAS-10J2AVRG-TR RAS-B13J2KVRG-E / RAS-13J2AVRG-E			220-240Va.c.;		11900	
	RAS-13J2KVRG-TR / RAS-13J2AVRG-TR RAS-B16J2KVRG-E /			7.35A; Class I		11900	
RAS-B16J2KVRG-E / RAS-16J2AVRG-E	RAS-16J2AVRG-E RAS-16J2KVRG-TR / RAS-16J2AVRG-TR	-			220-240Va.c.; 8.95A; Class I		15600
RAS-B22J2KVRG-E /	RAS-18J2KVRG-E / RAS-18J2AVRG-E RAS-18J2KVRG-TR / RAS-18J2AVRG-TR	Heat pump	TOSHIBA	220-240Va.c.; 9.50A; Class I	50 -	17000	
RAS-22J2AVRG-E	RAS-B22J2KVRG-E / RAS-22J2AVRG-E RAS-22J2KVRG-TR / RAS-22J2AVRG-TR			220-240Va.c.; 10.50A; Class I		20800	
RAS-B24J2KVRG-E / RAS-24J2AVRG-E	RAS-B24J2KVRG-E / RAS-24J2AVRG-E RAS-24J2KVRG-TR / RAS-24J2AVRG-TR				220-240Va.c.; 12.80A; Class I		23800

Signature

Name: Chairat Saeheng Position: Reviewer Date: 14 March 2019

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EMC TEST REPORT

Report No. Issue Date Client's Reference Number Product Description	:	19012807BKK-001 14 March 2019 00946476 Air Conditioner
Model/Type	:	Indoor unit / Outdoor unit: RAS-B13J2KVRG-E / RAS-13J2AVRG-E RAS-B16J2KVRG-E / RAS-16J2AVRG-E RAS-B22J2KVRG-E / RAS-22J2AVRG-E RAS-B24J2KVRG-E / RAS-24J2AVRG-E
Manufacturer	:	Toshiba Carrier (Thailand) Co., Ltd.
Address	:	144/9 Moo 5, Bangkadi Industrial Park, Tivanon Road, Tambol Bangkadi, Amphur Muang, Pathumthani 12000, THAILAND.
Test Conclusion	:	Comply Non-comply

SUMMARY

The equipment comply with the requirements according to the following standards: EN 55014-1: 2017 EN 55014-2: 2015 EN 61000-3-2: 2014 EN 61000-3-3: 2013

Approved By:

Prepared & Checked By:

Worraphob Charoenwong

Chairat Saeheng

Reviewer

Test Engineer, EMC Laboratory

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1. GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

EUT Air Conditioner : Description of EUT:

RAS-B13J2KVRG-E / RAS-13J2AVRG-E, RAS-B16J2KVRG-E / RAS-16J2AVRG-E, RAS-B22J2KVRG-E / RAS-22J2AVRG-E and RAS-B24J2KVRG-E / RAS-24J2AVRG-E

are sets of 1 Phase Air conditioner, Wall-mount type, Heat pump unit.

Critical component in EUT:

Model Indoor / Outdoor	Compressor model	Indoor unit PCB model	Outdoor unit PCB model	Wireless remote model
RAS-B13J2KVRG-E / RAS-13J2AVRG-E	KSK89D53UFZ		WP-032	WH-TB03LE
RAS-B16J2KVRG-E / RAS-16J2AVRG-E	KSN108D22UFZ	WP-048		WH-IBUSLE
RAS-B22J2KVRG-E / RAS-22J2AVRG-E	KTN130D30UFZ	VVP-046	WP-030	WH-TB01LE
RAS-B24J2KVRG-E / RAS-24J2AVRG-E	DX151A1T-30N			

Model RAS-B13J2KVRG-E / RAS-13J2AVRG-E and RAS-B24J2KVRG-E / RAS-24J2AVRG-E have been selected to test full and model RAS-B16J2KVRG-E / RAS-16J2AVRG-E and

RAS-B22J2KVRG-E / RAS-22J2AVRG-E have been selected to test partial to confirmed EMC compliance with test conducted emission and disturbance power. The result not have any difference to impact EMC compliance characteristic of PCB model even though use smaller compressor.

The EMC compliance of EUT can be found in this report and represents also the compliance of others model in family as shown in Appendix III.

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EUT Model	:	Indoor unit / Outdoo RAS-B13J2KVRG-E RAS-B16J2KVRG-E RAS-B22J2KVRG-E RAS-B24J2KVRG-E	/ RAS-13J2A\ / RAS-16J2A\ / RAS-22J2A\	/RG-E /RG-E
Rating	:	RAS-B13J2KVRG-E 220-240Va.c., 50Hz		-
		RAS-B16J2KVRG-E 220-240Va.c., 50Hz		
		RAS-B22J2KVRG-E 220-240Va.c., 50Hz		
		RAS-B24J2KVRG-E 220-240Va.c., 50Hz		
Main supply cord	:	Fixed Appliance for	all model	
Clock Frequency	:	10.00MHz for all mo	del	
Data line	:	N/A		
Control line	:	N/A		



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1.2 Description of Customer

Applicant	:	Toshiba Carrier (Thailand) Co., Ltd.
Address	:	144/9 Moo 5, Bangkadi Industrial Park, Tivanon Road, Tambol Bangkadi, Amphur Muang, Pathumthani 12000, THAILAND.
Telephone	:	02-021-3100#3445
Manufacturer	:	same as applicant
Address	:	same as applicant

1.3 Description of Test Handling

Sample received date	:	21 February 2019
Test date	:	11 February – 8 March 2019
Test Facility	:	Intertek Testing Services (Thailand) Ltd.
		Electrical and Electronics Product Test Center (PTEC)
Tester	:	Worraphob Charoenwong, Namo Laoprasert
Remark	:	Following tests subcontract to ILAC accredited laboratory: Electrostatic Discharge Injection Current up to 230MHz



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2. TEST SPECIFICATIONS

2.1 Mode of operation during the test / Test peripherals used

Within this test report, EUT has been measured with the temperature controller setting at the lowest position when in cooling mode, and at the highest position when in heating mode (if any).

The ambient temperature is defined at the temperature of the air flow to the indoor unit. The ambient temperature for testing is 15 ±5 °C when the EUT is operating in heating mode and 30 ±5 °C when it is operating in cooling mode. If it is impractical to keep the ambient temperature within this range, another temperature is also permissible, provided that the equipment operates in a stable manner (shall lie within 15 - 35°C).

Selected Test Supply 230Va.c.; 50Hz. for all models No test peripherals used.



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2.2 Test Instruments

	Equipment	Type/Model	Manu.	I.D.
\square	EMI Receiver	ESR7	Rodge and Schwarz	E5-026
\boxtimes	LISN	NSLK8127	Schwarzbeck	E5-032
\boxtimes	Absorbing clamp	AMZ41	Schaffner	E5-004
\boxtimes	Click Analyzer	DIA1512D	Schaffner	E5-002
\boxtimes	Voltage probe	TK 9420	Schwarzbeck	E5-025
\square	Harmonics-Flicker- Dips/Interrupt Test System	Profline2105	Ametek	E5-030
\boxtimes	ESD Generator	NSG438	TESEQ	1226
\boxtimes	EM clamp	KEMZ 801AS50	TESEQ	38662
\boxtimes	Compact immunity test system	NSG 4070B-30	TESEQ	39604
\boxtimes	Dual directional coupler	DCP 0100A	TESEQ	40093
\boxtimes	Power Amplifier	CBA400M-110	TESEQ	T44431
\square	Current injection probe	CIP 9136A	TESEQ	35442
\boxtimes	Coupling/Decoupling network	CDN M332S	TESEQ	37751
\boxtimes	EFT, Surge, Dips Generator	NSG3040	TESEQ	E5-017
\square	Single Supply Source for PQT Testing	INA 6501	TESEQ	E5-021

 \boxtimes Test equipment applicable in this test report

Test equipment not-applicable in this test report

2.3 Software

	Software	Manu.	Version
1	EMC Calculator	-	2018.07
2	DIS9966	Schaffner	2.5.0.0



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2.4 Uncertainty Application

Uncertainty of Measurement applied according to CISPR 16-4-2. Reference Ucispr in the table as followed used as a reference value for the judgment.

Test Method	Ucispr	U_{Lab}
	(dB)	(dB)
Conducted disturbance at mains port using AMN	3.4	4.25
(150kHz - 30MHz)		
Continuous disturbance power (30MHz - 300MHz)	4.5	3.46
Radiated disturbance (30MHz - 1000MHz)	6.3	S ¹

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

- a) If U_{lab} is less than or equal to U_{cispr} in Table, then the test report may either state the value of U_{lab} or state that U_{lab} is less than U_{cispr} .
 - Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
 - Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
- b) If U_{lab} exceeds U_{cispr} of Table, then the test report shall contain the value of U_{lab} (in dB) for the measurement instrumentation actually used for the measurements.
 - Compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
 - Non-compliance is deemed to occur if any measured disturbance level, increased by (U_{lab} – U_{cispr}), exceeds the disturbance limit.

¹ Refer to subcontractor uncertainty of measurement, if applicable.



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2.5 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service (Thailand) Limited.

Reference standard	Frequency		Test Method	Test Verdict
EN 55014-1	150kHz to 30MHz		Mains Terminal Continuous Disturbance Voltage	Pass
	30MHz to		Load Terminal Continuous Disturbance Voltage	Pass
			Mains Terminal Discontinuous Disturbance Voltage/Click	Pass
			Continuous Disturbance Power (30MHz - 300MHz)	Pass
			Radiated Disturbance (30MHz - 1000MHz)	N/A (Note 1)
EN 61000-3-2	·	\square	Harmonic Current Emission	Pass
EN 61000-3-3		\square	Voltage Fluctuation and Flicker	Pass
EN 55014-2		\square	Electrostatic Discharge	Pass
Category II			RF Electromagnetic Field	N/A
		\square	Fast Transients	Pass
		\square	Surges	Pass
		\square	Injected Current up 230MHz	Pass
			Injected Current up 80MHz	N/A
		\square	Voltage Dips	Pass

Test topic applicable in this test report

Test topic not-applicable in this test report

Remark:

Note 1: Not applicable, due to the EUT that contains clock frequency of less than 30MHz.



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EMISSION TEST

EN 55014-1: 2017

3. Mains/Load/Control Terminal Continuous Disturbance Voltage

Test conclusion:	\boxtimes Pass	🗌 Fail
Operating Condition:	EUT is warmed up at leas	st 15 minutes before measurement.

Lowest temperature setting, maximum fan speed.

3.1 Test Method

- □ Test equipment as shown in the table in topic 2.2 is connected as shown in figure 1 topic 3.1.1 to measurement terminal Continuous Disturbance Voltage.
- □ EUT is configured by follow the particular requirement in the reference standards, if available. If the particular requirements are not specified, EUT shall be configured with appropriate load to maximize the disturbance signal.
- □ Mains terminal disturbance is measure at line to earth and neutral to earth.
- Pre-scan shall be done over the whole range of frequency as specified by the standard.
- At least 6 worst peaks which are closet to the limit(s) shall be selected to do the Final scan.
- □ Final scan shall be done by reduce the span zooming in to the selected peak and fine tune to the exact frequency which give the highest disturbance value. Re-measure at that frequency with peak detector and other detector according to the limit(s) applied.



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3.1.1 Test Set up

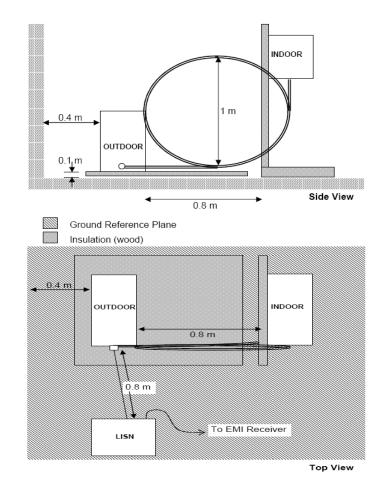


Figure 1: Drawing of Main Terminal Continuous Disturbance Voltage Measurement



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3.1.2 Limit

Table 1: Lim	Table 1: Limit for 50Ω/50µH LISN V-network								
Frequency	range	Main termi	nals Limits	Load terminals Limits					
(MHz	<u>z</u>)	dB(μv)	dB(μv)				
		Quasi-peak	Average	Quasi-peak	Average				
0.15 - (0.5	66 - 56 *	59 - 46 *	80	70				
0.5 -	5	56	46	74	64				
5 - 3	0	60	50	74	64				
Note:		s the limit decreasing to 0.5MHz.	g linearly with the log	garithm of the freque	ncy in the range				
	receiver w both limits	2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.							

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3.2 Test Result

3.2.1 Test Environment

26.0°C Temperature:

Humidity

54.0%RH

3.2.2 Test Port

Main terminal for Line to Ground and Neutral to Ground.

The EUT cable has been fix to 0.8 m in length for testing.

3.2.3 Scanning trace and Final measurement

Main Terminal:

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Freq List (MHz)	QP Level (dB(µV))	QP Limit (dB(µV))	QP Margin (dB)	AV Level (dB(µV))	AV Limit (dB(µV))	AV Margin (dB)	Path
0.4020	46.50	57.81	-11.31	37.60	48.35	-10.75	N-PE
0.1620	52.90	65.36	-12.46	45.70	58.16	-12.46	N-PE
5.9940	42.80	60.00	-17.20	37.50	50.00	-12.50	N-PE
6.1580	42.70	60.00	-17.30	37.30	50.00	-12.70	L-PE
19.6620	42.50	60.00	-17.50	35.90	50.00	-14.10	L-PE
0.1660	53.20	65.15	-11.95	43.20	57.90	-14.70	L-PE

The test result shown are 6 worst measurement result and sort by average margin. The scanning result of the emission spectrum are shown in Appendix I.

Freq List (MHz)	QP Level (dB(µV))	QP Limit (dB(µV))	QP Margin (dB)	AV Level (dB(µV))	AV Limit (dB(µV))	AV Margin (dB)	Path
0.4540	46.10	56.80	-10.70	38.30	47.04	-8.74	L-PE
0.4460	44.80	56.94	-12.14	35.30	47.23	-11.93	N-PE
5.2300	41.80	60.00	-18.20	33.40	50.00	-16.60	L-PE
5.1780	40.80	60.00	-19.20	32.10	50.00	-17.90	N-PE
1.2220	34.40	56.00	-21.60	27.60	46.00	-18.40	N-PE
0.8420	32.80	56.00	-23.20	25.20	46.00	-20.80	L-PE

RAS-B16J2KVRG-E / RAS-16J2AVRG-E



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RAS-B22J2KVRG-E / RAS-22J2AVRG-E

Freq List (MHz)	QP Level (dB(µV))	QP Limit (dB(µV))	QP Margin (dB)	AV Level (dB(µV))	AV Limit (dB(µV))	AV Margin (dB)	Path
0.4540	45.60	56.80	-11.20	37.90	47.04	-9.14	L-PE
4.9220	41.20	56.00	-14.80	34.90	46.00	-11.10	L-PE
0.4580	43.70	56.72	-13.02	34.70	46.94	-12.24	N-PE
6.1100	44.00	60.00	-16.00	37.00	50.00	-13.00	N-PE
0.4100	43.10	57.64	-14.54	34.90	48.14	-13.24	N-PE
6.2900	43.20	60.00	-16.80	36.60	50.00	-13.40	L-PE

The test result shown are 6 worst measurement result and sort by average margin. The scanning result of the emission spectrum are shown in Appendix I.

RAS-B24J2KVRG-E / RAS-24J2AVRG-E

Freq List (MHz)	QP Level (dB(µV))	QP Limit (dB(µV))	QP Margin (dB)	AV Level (dB(µV))	AV Limit (dB(µV))	AV Margin (dB)	Path
0.4540	47.40	56.80	-9.40	40.60	47.04	-6.44	L-PE
3.7780	44.30	56.00	-11.70	38.40	46.00	-7.60	L-PE
0.4540	45.90	56.80	-10.90	38.60	47.04	-8.44	N-PE
4.9580	43.10	56.00	-12.90	37.10	46.00	-8.90	L-PE
5.1260	44.70	60.00	-15.30	38.80	50.00	-11.20	N-PE
0.2740	44.30	60.99	-16.69	38.20	52.49	-14.29	N-PE



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Load Terminal:

RAS-B13J2KVRG-E / RAS-13J2AVRG-E



Freq List (MHz)	QP Level (dB(µV))	QP Limit (dB(µV))	QP Margin (dB)	AV Level (dB(µV))	AV Limit (dB(µV))	AV Margin (dB)	Path
0.1660	68.20	80.00	-11.80	55.50	70.00	-14.50	3-PE
29.9980	52.90	74.00	-21.10	46.80	64.00	-17.20	1-PE
19.4020	52.10	74.00	-21.90	45.60	64.00	-18.40	1-PE
4.6660	49.70	74.00	-24.30	44.70	64.00	-19.30	2-PE
4.7460	48.50	74.00	-25.50	43.70	64.00	-20.30	3-PE
28.0780	49.60	74.00	-24.40	43.00	64.00	-21.00	2-PE



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RAS-B16J2KVRG-E / RAS-16J2AVRG-E



Freq List (MHz)	QP Level (dB(µV))	QP Limit (dB(µV))	QP Margin (dB)	AV Level (dB(µV))	AV Limit (dB(µV))	AV Margin (dB)	Path
0.1740	75.30	80.00	-4.70	65.50	70.00	-4.50	3-PE
0.5300	59.80	74.00	-14.20	51.90	64.00	-12.10	3-PE
4.2260	49.30	74.00	-24.70	44.40	64.00	-19.60	2-PE
4.3260	46.90	74.00	-27.10	41.80	64.00	-22.20	1-PE
28.0580	47.10	74.00	-26.90	40.30	64.00	-23.70	2-PE
0.4460	47.50	80.00	-32.50	38.90	70.00	-31.10	1-PE



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RAS-B22J2KVRG-E / RAS-22J2AVRG-E



Freq List (MHz)	QP Level (dB(µV))	QP Limit (dB(µV))	QP Margin (dB)	AV Level (dB(µV))	AV Limit (dB(µV))	AV Margin (dB)	Path
0.1620	77.80	80.00	-2.20	68.60	70.00	-1.40	3-PE
0.1940	75.20	80.00	-4.80	66.10	70.00	-3.90	3-PE
14.9980	50.10	74.00	-23.90	44.30	64.00	-19.70	1-PE
14.9220	48.10	74.00	-25.90	42.50	64.00	-21.50	2-PE
7.8820	49.70	74.00	-24.30	42.40	64.00	-21.60	1-PE
27.6620	47.70	74.00	-26.30	40.40	64.00	-23.60	2-PE



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RAS-B24J2KVRG-E / RAS-24J2AVRG-E



Freq List (MHz)	QP Level (dB(µV))	QP Limit (dB(µV))	QP Margin (dB)	AV Level (dB(µV))	AV Limit (dB(µV))	AV Margin (dB)	Path
0.1660	73.30	80.00	-6.70	64.50	70.00	-5.50	3-PE
0.2140	65.90	80.00	-14.10	57.40	70.00	-12.60	3-PE
4.0220	52.00	74.00	-22.00	46.50	64.00	-17.50	2-PE
3.7780	49.90	74.00	-24.10	44.50	64.00	-19.50	1-PE
0.5340	49.90	74.00	-24.10	43.60	64.00	-20.40	1-PE
1.8180	48.20	74.00	-25.80	42.70	64.00	-21.30	2-PE



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4. Continuous Disturbance Power

Test conclusion:	🛛 Pass	🗌 Fail
Operating Condition:	EUT is warmed up at leas	t 15 minutes before measurement
	Lowest temperature settin	ıg, maximum fan speed.

4.1 Test Method

- Test equipment as shown in the table in topic 2.2 is connected as shown in figure 2 topic 4.1.1 to measurement Continuous Disturbance Power.
- □ EUT is configured by follow the particular requirement in the reference standards, if available. If the particular requirements are not specified, EUT shall be configured with appropriate load to maximize the disturbance signal.
- □ Continuous disturbance power is measure over the 6m length cable by prescan 2m a time. The pre-scan is done at 0.1m (the closet to EUT), 3m and 5m.
- Pre-scan shall be done over the whole range of frequency as specified by the standard. One worst trace will be selected to report as a pre-scan trace.
- At least 6 worst peaks which are closet to the limit(s) shall be selected to do the Final scan. The selection will do base on the 3 scanning results as mention above. Different frequency will be selected.
- □ Final scan shall be done by reduce the span zooming in to the selected peak and fine tune to the exact frequency which give the highest disturbance value. Re-measure at that frequency with peak detector and other detector according to the limit(s) applied.



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4.1.1 Test Set up

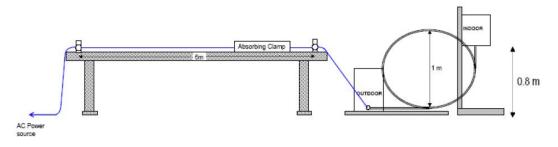


Figure 2: Drawing of Continuous Disturbance Power Measurement

4.1.2 Limit

Table 2: Allowable limit for noise power (Continuous noise)

Frequ	iency (MHz)	Quasi-peak dB(pW)	Average dB(pW)					
3	30 - 300	00 45 - 55* 35 - 45*						
Note:	1. * means the lin	nit increasing linearly with the frequence	Sy.					
	 If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement with the receiver with average detector need not be carried out. 							



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4.2 Test Result

4.2.1 Test Environment

30.0°C Temperature:

Humidity

56.0%RH

4.2.2 Test Port

Around the power cable which has been extended to 6m.

4.2.3 Scanning trace and Final measurement

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Freq List (MHz)	QP Level (dB(pW))	QP Limit (dB(pW))	QP Margin (dB)	AV Level (dB(pW))	AV Limit (dB(pW))	AV Margin (dB)	Sensor
82.6800	44.60	46.95	-2.35	29.80	36.95	-7.15	Inter-con OD
122.0400	45.50	48.40	-2.90	26.30	38.40	-12.10	Inter-con OD
84.6000	40.60	47.02	-6.42	26.80	37.02	-10.22	Inter-con ID
81.5600	40.30	46.90	-6.60	27.50	36.90	-9.40	Main
144.9200	39.70	49.25	-9.55	24.80	39.25	-14.45	Inter-con ID
68.4000	36.60	46.42	-9.82	24.80	36.42	-11.62	Main

The test result shown are 6 worst measurement result and sort by quasi-peak margin. The scanning result of the emission spectrum are shown in Appendix I.

RAS-B16J2KVRG-E / RAS-16J2AVRG-E

Freq List (MHz)	QP Level (dB(pW))	QP Limit (dB(pW))	QP Margin (dB)	AV Level (dB(pW))	AV Limit (dB(pW))	AV Margin (dB)	Sensor
82.0400	40.30	46.92	-6.62	27.00	36.92	-9.92	Inter-con OD
38.8000	37.70	45.32	-7.62	24.90	35.32	-10.42	Inter-con OD
77.8400	39.00	46.77	-7.77	22.20	36.77	-14.57	Main
90.2400	39.00	47.23	-8.23	25.90	37.23	-11.33	Main
38.7600	34.30	45.32	-11.02	21.50	35.32	-13.82	Inter-con ID
87.7200	34.60	47.13	-12.53	20.80	37.13	-16.33	Inter-con ID

The test result shown are 6 worst measurement result and sort by quasi-peak margin.

The scanning result of the emission spectrum are shown in Appendix I.



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RAS-B22J2KVRG-E / RAS-22J2AVRG-E

Freq List (MHz)	QP Level (dB(pW))	QP Limit (dB(pW))	QP Margin (dB)	AV Level (dB(pW))	AV Limit (dB(pW))	AV Margin (dB)	Sensor
87.2800	46.10	47.12	-1.02	31.70	37.12	-5.42	Inter-con ID
80.6800	45.30	46.87	-1.57	31.40	36.87	-5.47	Main
37.0000	43.60	45.25	-1.65	29.10	35.25	-6.15	Main
92.6800	43.30	47.32	-4.02	28.90	37.32	-8.42	Inter-con OD
37.3600	41.00	45.27	-4.27	27.50	35.27	-7.77	Inter-con OD
96.4400	41.90	47.46	-5.56	27.70	37.46	-9.76	Inter-con ID

The test result shown are 6 worst measurement result and sort by quasi-peak margin.

The scanning result of the emission spectrum are shown in Appendix I.

RAS-B24J2KVRG-E / RAS-24J2AVRG-E

Freq List (MHz)	QP Level (dB(pW))	QP Limit (dB(pW))	QP Margin (dB)	AV Level (dB(pW))	AV Limit (dB(pW))	AV Margin (dB)	Sensor
86.8000	46.30	47.10	-0.80	31.90	37.10	-5.20	Inter-con OD
85.6400	46.00	47.06	-1.06	31.80	37.06	-5.26	Inter-con ID
79.5200	44.90	46.83	-1.93	30.80	36.83	-6.03	Main
88.7200	44.30	47.17	-2.87	29.80	37.17	-7.37	Main
79.2400	43.80	46.82	-3.02	29.50	36.82	-7.32	Inter-con ID
80.8800	42.10	46.88	-4.78	28.20	36.88	-8.68	Inter-con OD

The test result shown are 6 worst measurement result and sort by quasi-peak margin. The scanning result of the emission spectrum are shown in Appendix I.

Remark:

Main	=	Clamp on Main Cable, sensor head to Main.
Inter-con ID	=	Clamp on Inter-connecting cable, sensor head to Indoor.
Inter-con OD	=	Clamp on Inter-connecting cable, sensor head to Outdoor.



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5. Main Terminal Discontinuous Disturbance Voltage

 \boxtimes Pass Test conclusion: 🗌 Fail EUT is warmed up at least 15 minutes before measurement. Operating Condition: Lowest temperature setting, maximum fan speed.

5.1 Test Method

- □ Test equipment as shown in the table in topic 2.2 is connected as shown in figure 3 topic 5.1.1 to measurement Discontinuous Disturbance at Main Terminal.
- □ EUT is configured by follow the particular requirement in the reference standards, if available. If the particular requirements are not specified, EUT shall be configured with appropriate load to maximize the disturbance signal.
- □ The observation time is based on the EUT (ensure that cycle of operation shall be fully complete) or 120 minutes.
- Main Terminal Discontinuous Disturbance (Click) is measured by Discontinuous Disturbance Analyzer with the limit specified in 5.1.2 for the defined observation time.
- □ Test and conclusion of test result shall be referred to the flow chart in CISPR 14-1.



Total Quality. Assured.

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5.1.1 Test Set up

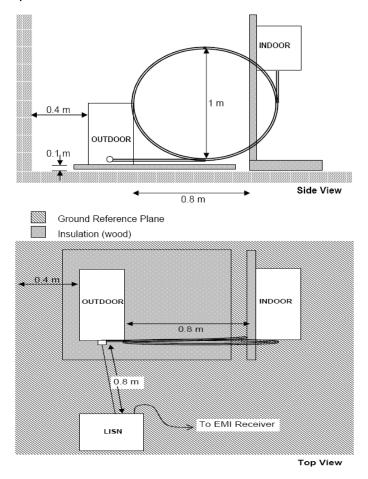


Figure 3: Drawing of Main Terminal Discontinuous Disturbance Voltage Measurement

5.1.2 Limit

The limit for Discontinue Disturbance depend on the average number of click per minute, Click rate *N*. There are two methods for determining the click rate:

 \boxtimes by measuring the number of clicks

by counting the number of switching operations.

Table 3: Allowable limits for discontinuous noise terminal voltage

Frequency range	0.15	0.5	1.4	30
Limit	66	56	56	60

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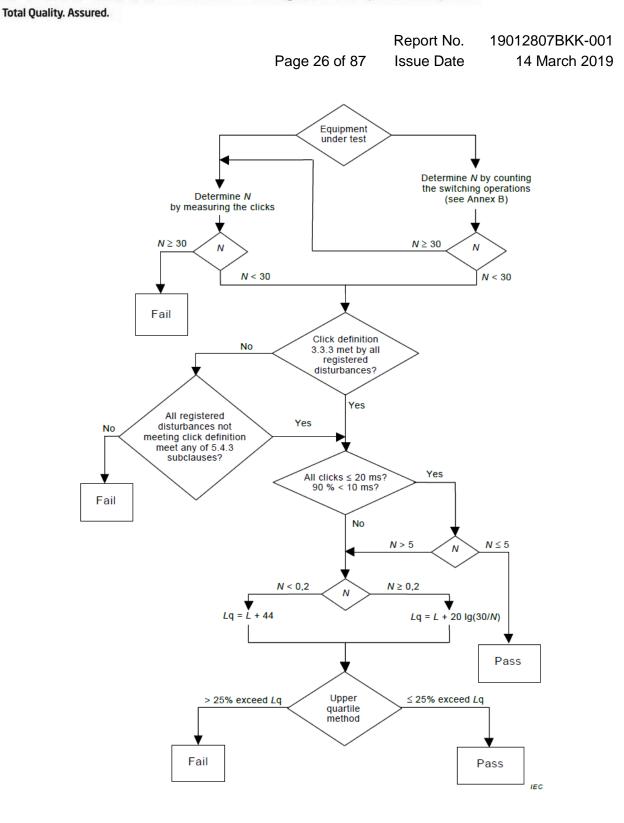


Figure 4: Flow Diagram for DIA (Refer CISPR 14-1)



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5.2 Test Result

5.2.1 Test Environment

26.0°C Temperature:

Humidity

54.0%RH

5.2.2 Test Port

Main terminal for Line to Ground.

5.2.3 Measurement result

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

EUT Opera	tion mode:	g, max	k fan	EUT configuration:			CISPR	CISPR 14-1		
EUT Interfa	ice:	Mains								
Frequenc	First measu	rement	Dete	rmine the li	mit	L _q – Quas	si-pea	k		
y (MHz)	Limit <i>L</i> (dB(µV))	Numbo clicks N1		f Time of measureme nt <i>T</i> (min)		Click rate		te Increasing ratio		Limit <i>L</i> q (dB(µV))
0.15	66	0		120		0.00		-		-
0.5	56	0		120		0.00		-		-
1.4	56	0		120		0.00		-		-
30	60	0		120	120 0.00		-			-
Second me	asurement w	vith Lim	it = <i>L</i> q	(Upper qua	artile	e method)):			
Frequenc	Limit– Quas	si-peak								
y (MHz)	Limit Lq (dB(µV))		Num	ber of click	(s –	N2	auth	nber o lorize (s N2		Verdict
0.15	-		-				-			Pass
0.5	-		-				-			Pass
1.4	-					-			Pass	
30	-		-	-			-			Pass
	Supplementary information: N not more than 5 and no long click.									



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RAS-B24J2KVRG-E / RAS-24J2AVRG-E

EUT Opera	tion mode:	oling, max fan eed			EUT configuration:			CISPR 14-1		
EUT Interfa	ice:	: Mains								
Frequenc	First measurement: Determine the limit L_q – Quasi-peak									
y (MHz)	Limit <i>L</i> (dB(µV))	Number of clicks – N1				Click rate N		Increasing ratio		Limit <i>L</i> q (dB(µV))
0.15	66	0		120		0.00		-		-
0.5	56	0		120		0.00		-		-
1.4	56	0		120		0.00 -		-		-
30	60	0		120		0.00 -			-	
Second me	asurement w	vith Limi	$it = L_q$	(Upper qua	artile	e method)):			
Frequenc	Limit– Quas	si-peak								
y (MHz)	Limit Lq (dB(µV))		Num	ber of click	(S —	N2	auth	nber o Iorize (s N2		Verdict
0.15	-		-				-			Pass
0.5	-		-				-			Pass
1.4	-		-				-			Pass
30							-			Pass
	Supplementary information: N not more than 5 and no long click.									



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6. Radiated Disturbance

Test conclusion:	Pass
Operating Condition:	N/A

🗌 Fail

6.1 Test Method

- □ The Radiated Disturbance measurements were performed with EMI receiver to measure the emissions characteristic and to identify the frequency of emission that has the highest amplitude related to the EUT configuration. EUT configuration, cable configuration of operation are determined for product the maximum level of emission.
- □ Test equipment as shown in the table in topic 2.2 is connected as shown in figure 5 topic 6.1.1 to measurement Radiated Disturbance.
- □ EUT was placed on the 80 cm height non-metallic table on 1 m radius turntable.
- □ The Bi-log antenna (30MHz 1000MHz) was used for received the noise of EUT and put on the antenna mast, which they were inside the semi-anechoic chamber. The testing method and EUT setup were performed according to CISPR 14-1.



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6.1.1 Test Set up

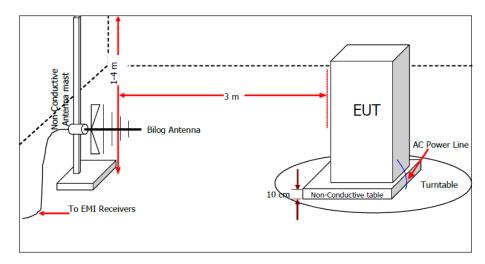


Figure 5: Drawing of Radiated Disturbance Measurement

6.1.2 Limit

Table 4: Radiated Disturbance limits in the frequency range 30MHz - 1000MHz

F	requency range (MHz)	Quasi-peak limits (SAC) dB(µV/m)					
	30 - 230	30					
	230 - 1000	37					
Note:	Measurement may be made at closer, down to 3m. An inverse proportionality factor 20 dB per decade shall be used to normalize the measured data to the specified distance for determining compliance. SAC = semi-anechoic chamber						



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6.2 Test Result

6.2.1 Test Environment

Temperature:

Humidity

-%RH

6.2.2 Test port: Enclosure

6.2.3 Scanning trace and Final measurement

-°C

N/A



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Harmonics Current Emission EN 61000-3-2: 2014

7. Harmonics Current Emission

Test conclusion:					
Operating Condition:					

 \boxtimes Pass Fail EUT is warmed up at least 15 minutes before measurement. Lowest temperature setting, maximum fan speed.

7.1 Test set up drawing

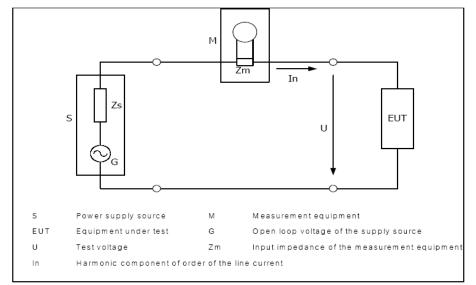


Figure 6: Harmonic Current Emission Measurement System



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7.2 Limits

Harmonic Current Emission Limits (Class A equipment)						
Harmonic order	Maximum permissible					
(n)	Harmonic current					
	(A)					
Odd harmonics						
3	2.30					
5	1.14					
7	0.77					
9	0.40					
11	0.33					
13	0.21					
$15 \le n \le 39$	0.15					
	n					
Eve	n harmonics					
2	1.08					
4	0.43					
6	0.30					
$8 \le n \le 40$	0.28 8					
	n					



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7.3 Test Result

Harmonic Current Emission

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Phase	:	L	Measured Iref (A)	:	4.458
THC/Iref (%)	:	2.038	Limit (%)	:	49.200
PWHC/I _{ref} (%)	:	0.110	Limit (%)	:	0.251

Harm#	Harm(arg)	100%Limit	%of Limit	Harm(max)	150%Limit	%of Limit	Status
2	0.004	1.080	N/A	Ò.00Ś	1.620	N/A	Pass
3	1.357	2.300	59.0	1.367	3.450	39.6	Pass
4	0.004	0.430	N/A	0.006	0.645	N/A	Pass
5	0.273	1.140	24.0	0.281	1.710	16.4	Pass
6	0.003	0.300	N/A	0.005	0.450	N/A	Pass
7	0.278	0.770	36.1	0.281	1.155	24.3	Pass
8	0.004	0.230	N/A	0.005	0.345	N/A	Pass
9	0.189	0.400	47.2	0.193	0.600	32.2	Pass
10	0.003	0.184	N/A	0.005	0.276	N/A	Pass
11	0.181	0.330	54.7	0.186	0.495	37.6	Pass
12	0.003	0.153	N/A	0.005	0.230	N/A	Pass
13	0.144	0.210	68.6	0.149	0.315	47.4	Pass
14	0.003	0.131	N/A	0.004	0.197	N/A	Pass
15	0.116	0.150	77.1	0.118	0.225	52.6	Pass
16	0.003	0.115	N/A	0.004	0.173	N/A	Pass
17	0.079	0.132	60.1	0.084	0.198	42.3	Pass
18	0.003	0.102	N/A	0.004	0.153	N/A	Pass
19	0.031	0.118	26.4	0.033	0.178	18.3	Pass
20	0.003	0.092	N/A	0.004	0.138	N/A	Pass
21	0.066	0.107	61.7	0.069	0.161	43.1	Pass
22	0.003	0.084	N/A	0.004	0.125	N/A	Pass
24	0.002	0.077	N/A	0.004	0.115	N/A	Pass
24	0.002	0.077	N/A	0.004	0.115	N/A	Pass
25	0.048	0.090	53.3	0.049	0.135	36.6	Pass
26	0.003	0.071	N/A	0.004	0.107	N/A	Pass
27	0.032	0.083	38.4	0.035	0.125	28.0	Pass
28	0.002	0.066	N/A	0.004	0.099	N/A	Pass
29	0.019	0.078	N/A	0.021	0.116	N/A	Pass
30	0.002	0.061	N/A	0.003	0.092	N/A	Pass
31	0.014	0.073	N/A	0.016	0.109	N/A	Pass
32	0.002	0.058	N/A	0.003	0.086	N/A	Pass
33	0.017	0.068	N/A	0.019	0.102	N/A	Pass
34	0.002	0.054	N/A	0.004	0.081	N/A	Pass
35	0.016	0.064	N/A	0.017	0.096	N/A	Pass
36	0.002	0.051	N/A	0.003	0.077	N/A	Pass
37	0.019	0.061	N/A	0.020	0.091	N/A	Pass
38	0.002	0.048	N/A	0.003	0.073	N/A	Pass
39	0.017	0.058	N/A	0.019	0.087	N/A	Pass
40	0.002	0.046	N/A	0.003	0.069	N/A	Pass



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Phase	:	L	Measured Iref (A)	:	8.132
THC/Iref (%)	:	2.030	Limit (%)	:	25.600
PWHC/Iref (%)	:	0.106	Limit (%)	:	0.251

Horm	# Horm(org)	100%Limit	%of Limit		150%Limit	%of Limit	Ctotuo
Harm	(0)	1.080	%01 Limit N/A	Harm(max) 0.049	1.620	%01 Limit N/A	Status Pass
	2 0.039 3 0.779	2.300	33.9	0.049	3.450	23.0	Pass
	4 0.015	0.430	53.9 N/A	0.018	0.645	23.0 N/A	Pass
	5 0.991	1.140	87.0	0.995	1.710	58.2	Pass
	6 0.002	0.300	N/A	0.004	0.450	N/A	Pass
	7 0.644	0.300	83.7	0.648	1.155	56.1	Pass
	8 0.005	0.230	N/A	0.048	0.345	N/A	Pass
	9 0.151	0.400	37.7	0.153	0.600	25.4	Pass
1		0.400	N/A	0.005	0.000	23.4 N/A	Pass
1		0.330	42.0	0.005	0.276	28.9	Pass
1		0.330	42.0 N/A	0.005	0.495	28.9 N/A	Pass
1		0.210	58.3	0.124	0.230	39.5	Pass
1		0.131	N/A	0.002	0.197	N/A	Pass
1		0.150	69.8	0.105	0.225	46.7	Pass
1		0.115	N/A	0.003	0.173	N/A	Pass
1		0.132	51.8	0.071	0.198	35.8	Pass
1		0.102	N/A	0.005	0.153	N/A	Pass
1		0.118	N/A	0.037	0.178	N/A	Pass
2		0.092	N/A	0.002	0.138	N/A	Pass
2		0.107	67.4	0.072	0.161	45.1	Pass
2		0.084	N/A	0.001	0.125	N/A	Pass
2		0.098	N/A	0.025	0.147	N/A	Pass
2		0.077	N/A	0.002	0.115	N/A	Pass
2		0.090	N/A	0.037	0.135	N/A	Pass
2		0.071	N/A	0.003	0.107	N/A	Pass
2		0.083	N/A	0.028	0.125	N/A	Pass
2	8 0.001	0.066	N/A	0.002	0.099	N/A	Pass
2	9 0.032	0.078	N/A	0.033	0.116	N/A	Pass
3		0.061	N/A	0.001	0.092	N/A	Pass
3		0.073	N/A	0.024	0.109	N/A	Pass
3	2 0.002	0.058	N/A	0.002	0.086	N/A	Pass
3	3 0.008	0.068	N/A	0.009	0.102	N/A	Pass
3	4 0.001	0.054	N/A	0.001	0.081	N/A	Pass
3	5 0.017	0.064	N/A	0.018	0.096	N/A	Pass
3	6 0.001	0.051	N/A	0.001	0.077	N/A	Pass
3		0.061	N/A	0.011	0.091	N/A	Pass
3		0.048	N/A	0.001	0.073	N/A	Pass
3		0.058	N/A	0.041	0.087	N/A	Pass
4	0 0.003	0.046	N/A	0.004	0.069	N/A	Pass



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Voltage Fluctuation and Flicker EN 61000-3-3: 2013

8. Voltage Fluctuation and Flicker

Test conclusion:	🛛 Pass	🗌 Fail
Operating Condition:	EUT is warmed up at least	15 minutes before measurement.
	Lowest temperature setting	g, maximum fan speed.

8.1 Test set-up drawing

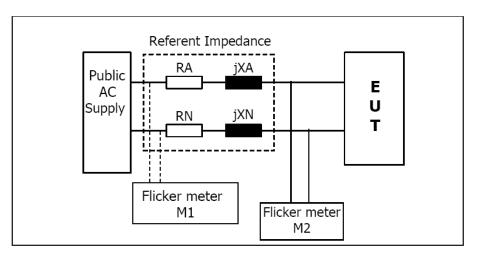


Figure 7: Drawing of Voltage Fluctuation and Flicker Measurement



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8.2 Test Result

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Measurement Description	Measurement Result	Limit
Pst	0.149	1.000
Plt	0.126	0.650
dc[%]	0.00	3.30
dmax[%]	0.00	4.00
T-max [ms]	0.00	500.00

Measurement Description	Measurement Result	Limit
Pst	0.176	1.000
Plt	0.135	0.650
dc[%]	0.00	3.30
dmax[%]	0.00	4.00
T-max [ms]	0.00	500.0



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Immunity Test EN 55014-2: 2015

Appliance Classification: Category II

Appliance shall fulfill the following immunity requirements

	Test Description	Performance criteria required
\boxtimes	ESD Immunity	В
	RF Electromagnetic Field	A
\boxtimes	EFT/Burst Immunity	В
\boxtimes	Surge Immunity	В
\boxtimes	Injected current up to 230MHz	А
	Injected current up to 80MHz	А
\boxtimes	Voltage dips	C

Performance criteria of test specification

Function	Criteria	During Test	After Test
Data storage	A	No loss or change of storage data	No loss or change of storage data
	В	loss or change of storage data can automatic recovered without operator resetting	No loss or change of storage data
	С	loss or change of storage data can recovered by operator resetting	No loss or change of storage data
Display	A	The display can show latest status	The display can show latest status
	В	The display cannot show latest status but can automatic recovered without operator resetting	The display can show latest status
	С	The display cannot show latest status recovered can be obtained by operator resetting	The display can show latest status

Test Verdict

Criterion A: Normal Performance within limits specified by the manufacturer, requestor or purchaser. Criterion B: Continue to operate as intended after the test. Not degradation of performance or loss of function. During the test degradation of performance is allowed, however no change of actual operating state or stored date.

Criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.



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9. Electrostatic Discharge



В Test Requirement:

9.1 Test set-up drawing

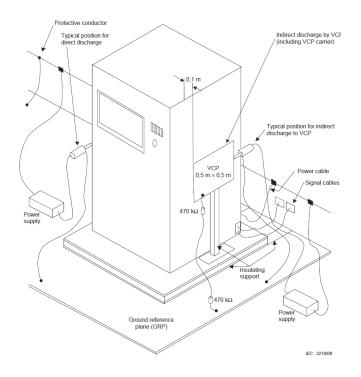


Figure 8: Drawing of ESD test set-up

9.2 Test Level

Port	Test Specification	Test set-up
Enclosure	±8kV Air Discharge	IEC 61000-4-2
	±4kV Contact Discharge	



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9.3 Test Result



Figure 9: ESD test point Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E



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Figure 9: ESD test point Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E (Cont.)

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Test point	Test voltage (kV)	Test type	Observation	Test Verdict
	/No. of Discharge			
A1-A7	±8/10	Air	Normal	В
C8-C15	±4/10	Contact	Normal	В
Indirect	±4/10	Contact	Normal	В



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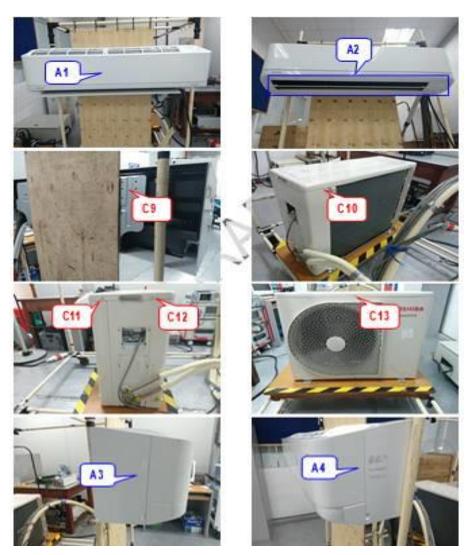


Figure 10: ESD test point Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E



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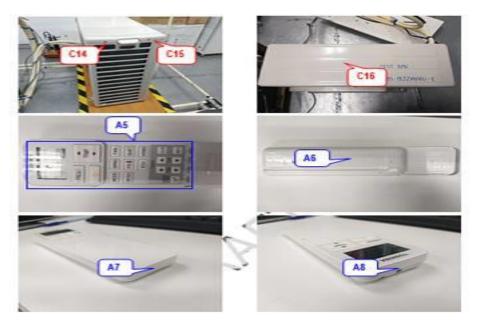


Figure 10: ESD test point Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E (Cont.)

Test point	Test voltage (kV)	Test type	Observation	Test Verdict
	/No. of Discharge			
A1-A8	±8/10	Air	Normal	В
C9-C16	±4/10	Contact	Normal	В
Indirect	±4/10	Contact	Normal	В



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Fail

10. RF Electromagnetic Field

Te	st c	onc	lusic	n:	🗌 Pass
			~		

Monitoring Condition: N/A

-

Test Requirement:

10.1 Test set-up drawing

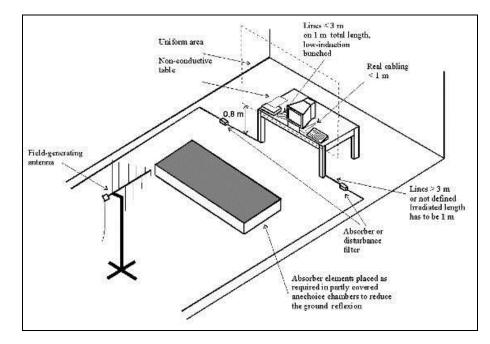


Figure 11: Drawing of RF Electromagnetic Field test set-up

10.2 Test Level

Port	Tes	Test set-up		
Enclosure	80MHz - 1000 MHz	3V/m(r.m.s.) (unmodulated)	1kHz 80%AM	IEC 61000-4-3



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11.3 Test Result

Test Environment

Temperature:

-°C

Humidity

-%RH

N/A



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11. Fast Transients

Test result:	🖂 Pass	🗌 Fail
Monitoring Condition	EUT and its display unit shall fur operation.	nction appropriately as normal
Test Requirement:	В	

11.1 Test set-up drawing

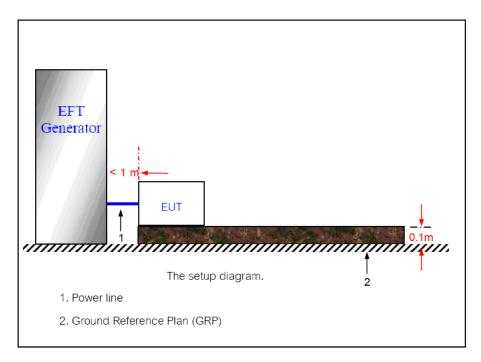


Figure 12: Drawing of Fast Transients test set-up

11.2 Test Level

Port	Test Specification		Test set-up
Signal lines & control lines	0.5kV(peak)	5/50 ns (t _r /T _d)	IEC 61000-4-4
Input & output d.c. power ports		5kHz repetition	
Input & output a.c. power ports	1kV(peak)	frequency	



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11.3 Test Result

Test Environment

Temperature:

Humidity

55.0%RH

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

25.0°C

Coupling path	Test Specification	Observation	Test Verdict
L to G	1kV(peak)	Normal	В
N to G	1kV(peak)	Normal	В
PE to G	1kV(peak)	Normal	В
L, N, PE to G	1kV(peak)	Normal	В

Coupling path	Test Specification	Observation	Test Verdict
L to G	1kV(peak)	Normal	В
N to G	1kV(peak)	Normal	В
PE to G	1kV(peak)	Normal	В
L, N, PE to G	1kV(peak)	Normal	В



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12. Surges

Test result	🛛 Pass	🗌 Fail
Monitoring Condition	EUT and its display unit sh operation.	all function appropriately as normal
Test Requirement:	В	

12.1 Test set-up drawing

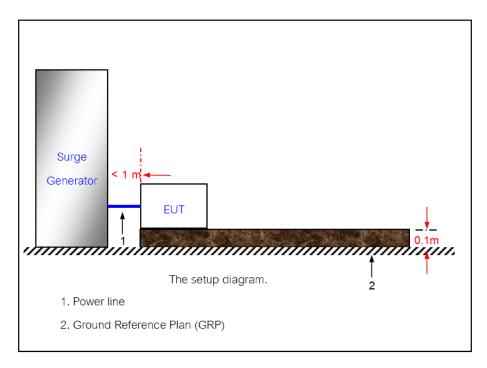


Figure 13: Drawing of Surges test set-up

12.2 Test Level

Port	Test Spec	Test set-up	
Input a.c. power ports	1.2/50 (8/20) Τ _r /Τ _d μs		IEC 61000-4-5
	Phase-Phase ± 1kV		
	Phase-Neutral ± 1kV		
	Phase-Earth ± 2kV		
	Neutral-Earth	$\pm 2 kV$	



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12.3 Test Result

Test Environment

Humidity Temperature: 25.0°C 55.0%RH

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Coupling path	Test Level	No. of surge/pole	Phase Angle	Observation	Test Verdict
L-N	\pm 1kV	5	0°,90°, 180°,	Normal	В
L-PE	$\pm 2 kV$	5	270°	Normal	В
N-PE	$\pm 2 kV$	5		Normal	В

Coupling path	Test Level	No. of surge/pole	Phase Angle	Observation	Test Verdict
L-N	$\pm 1 kV$	5	0°,90°, 180°,	Normal	В
L-PE	$\pm 2kV$	5	270°	Normal	В
N-PE	$\pm 2 kV$	5		Normal	В



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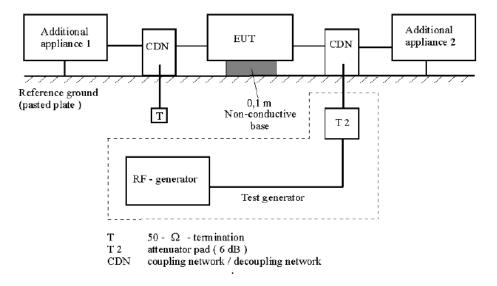
13. Injected Current up to 230MHz

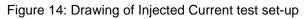
Test conclusion: \boxtimes Pass 🗌 Fail Monitoring Condition: EUT and its display unit shall function appropriately as normal operation.

Test Requirement:

А

13.1 Test set-up drawing





13.2 Test Level

Environmental Phenomenon: RF Current common mode 1kHz, 80%AM

Port	Test Specification	Test set-up
Signal lines & control lines	0.15MHz - 230MHz 1V(r.m.s)(unmodulated)	IEC 61000-4-6
	150Ω source impedance	
Input & output d.c. power ports	0.15MHz - 230MHz	
	1V(r.m.s)(unmodulated)	
	150 Ω source impedance	
Input & output a.c. power ports	0.15MHz - 230MHz	
	3V(r.m.s)(unmodulated)	
	150 Ω source impedance	



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13.3 Test Result

Test Environment

Humidity Temperature: 25.0°C 55.0%RH

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Coupling path	Test Level	Frequency	Test specification	Observation	Test Verdict
Input a.c. power port	3V	0.15 - 230MHz	1kHz, 80% AM	Normal	A

Coupling path	Test Level	Frequency	Test specification	Observation	Test Verdict
Input a.c. power port	3V	0.15 - 230MHz	1kHz, 80% AM	Normal	A



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🗌 Fail

14. Injected Current up to 80MHz

Test conclusion: Pass N/A

Monitoring Condition:

_

Test Requirement:

14.1 Test set-up drawing

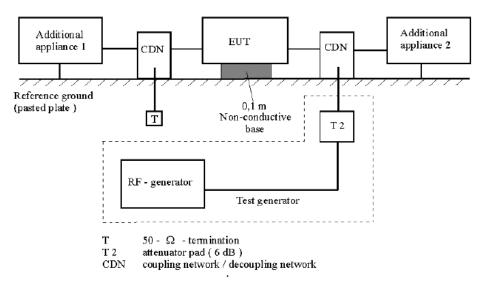


Figure 15: Drawing of Injected Current test set-up

14.2 Test Level

Environmental Phenomenon: RF Current common mode 1kHz, 80%AM

Port	Test Specification	Test set-up
Signal lines & Control lines	0.15MHz - 80MHz	IEC 61000-4-6
	1V(r.m.s)(unmodulated)	
	150 Ω source impedance	
Input & Output d.c. power ports	0.15MHz - 80MHz	
	1V(r.m.s)(unmodulated)	
	150 Ω source impedance	
Input & Output a.c. power ports	0.15MHz - 80MHz	
	3V(r.m.s)(unmodulated)	
	150 Ω source impedance	



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14.3 Test Result				
Test Environment				
Temperature:	-°C	Humi	dity	-%RH
1	N/A			



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15. Voltage dips

Test result	🛛 Pass	🗌 Fail
Monitoring Condition:	EUT and its display uni operation.	t shall function appropriately as normal
Test Requirement:	С	

15.1 Test set-up drawing

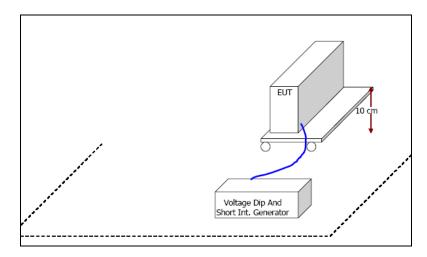


Figure 16: Drawing of Voltage Dips test set-up

15.2 Test Level

Port	Phenome	Phenomena		Duration (in period of the rated frequency) 50Hz / 60Hz	Test set-up
Input	Voltage 100		0	0.5 / 0.5	IEC 61000-4-11
a.c.	dips in %V⊤	60	40	10 / 12	Voltage change shall
power ports	30		70	25 / 30	occur at zero crossing
V_T is the ra	ited voltage of th	e EUT			



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15.3 Test Result

Test Environment

Humidity Temperature: 25.0°C 55.0%RH

RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Port	Input voltage	Reduction (%)	Duration (ms)	Observation	Test Verdict
Input a.c.	230V	100	10	Normal	С
power port	50Hz	60	200	Normal	С
		30	500	Normal	С

Port	Input voltage	Reduction (%)	Duration (ms)	Observation	Test Verdict
Input a.c.	230V	100	10	Normal	С
power port	50Hz	60	200	Normal	С
		30	500	Normal	С



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APPENDIX I: EMISSION SPECTRUM

The following pages have shown the emission spectrum resulting from;

- 1. Main Terminal Continuous Disturbance Voltage measurement
- 2. Load Terminal Continuous Disturbance Voltage measurement
- 3. Continuous Power Disturbance measurement

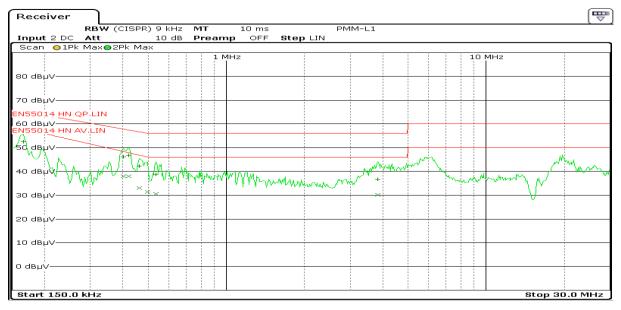


Figure AI.1: Main Terminal Disturbance Voltage, Line to Ground; Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E

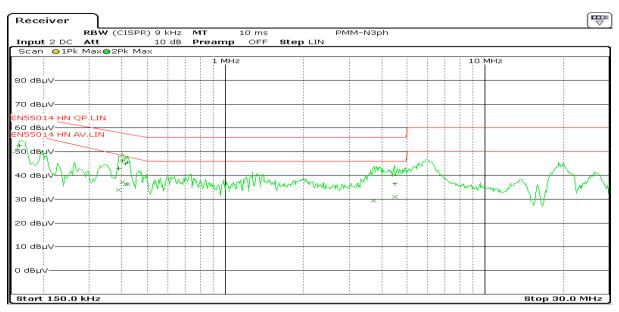


Figure AI.2: Main Terminal Disturbance Voltage, Neutral to Ground; Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E



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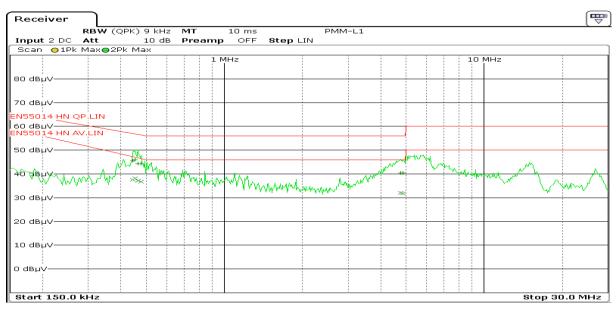


Figure AI.3: Main Terminal Disturbance Voltage, Line to Ground; Model: RAS-B16J2KVRG-E / RAS-16J2AVRG-E

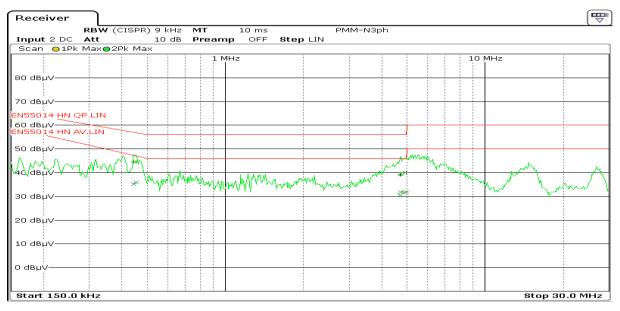


Figure AI.4: Main Terminal Disturbance Voltage, Neutral to Ground; Model: RAS-B16J2KVRG-E / RAS-16J2AVRG-E



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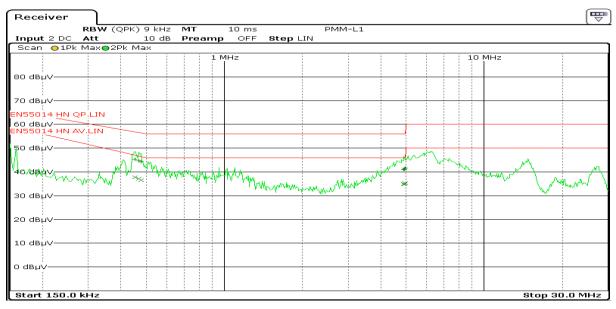


Figure AI.5: Main Terminal Disturbance Voltage, Line to Ground; Model: RAS-B22J2KVRG-E / RAS-22J2AVRG-E

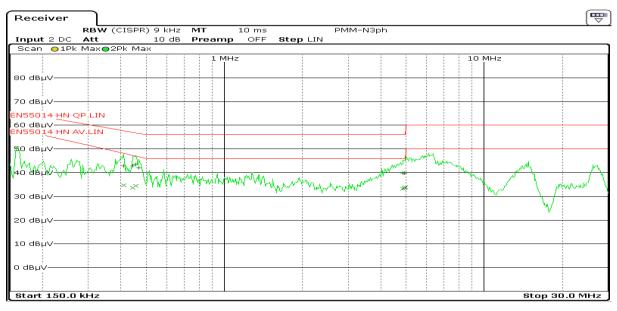


Figure AI.6: Main Terminal Disturbance Voltage, Neutral to Ground; Model: RAS-B22J2KVRG-E / RAS-22J2AVRG-E



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Receiver		Ŧ
RE	W (QPK) 9 kHz MT 10 ms PMM-L1	_
Input 2 DC At		_
🛛 Scan 🔾 1Pk Ma		
	1 MHz 10 MHz	
80 dBµV		_
70 dBµV		_
EN55014 HN QP.L		
60 dBuV EN55014 HN AV.L	N N N N N N N N N N N N N N N N N N N	_
50 dBµV	Allel a war and a second and a second and a second a se	_
~3.76KAMM	WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW	<u>م</u>
	×* * Ummon Man	\mathbb{N}
30 dвµV		
20 dBµV		-
10 dBµV		_
Start 150.0 kH	z Stop 30.0 MH	z

Figure AI.7: Main Terminal Disturbance Voltage, Line to Ground Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E

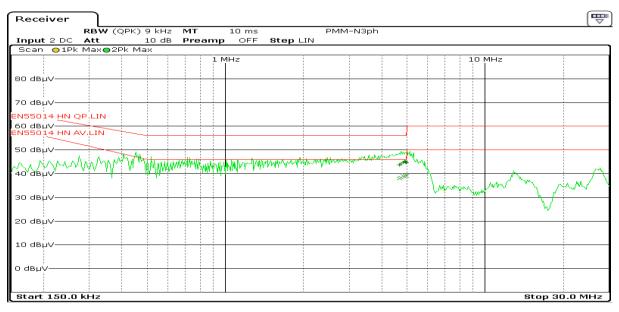


Figure AI.8: Main Terminal Disturbance Voltage, Neutral to Ground; Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E



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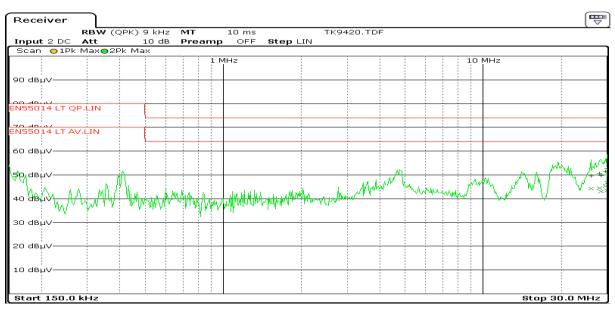


Figure AI.9: Load Terminal Disturbance Voltage, Terminal 1 to Ground; Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E

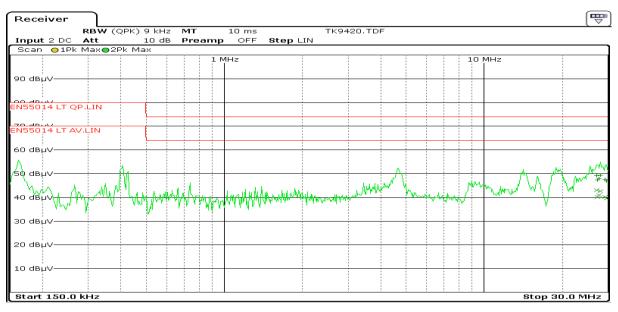


Figure Al.10: Load Terminal Disturbance Voltage, Terminal 2 to Ground; Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E



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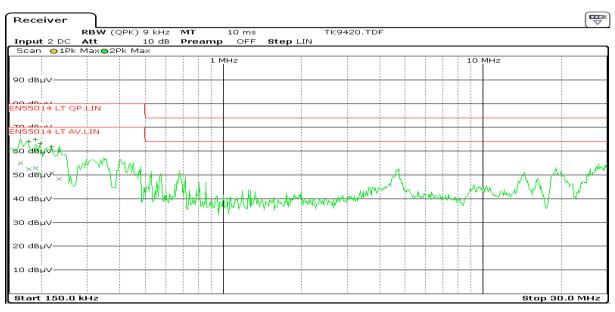


Figure AI.11: Load Terminal Disturbance Voltage, Terminal 3 to Ground; Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E

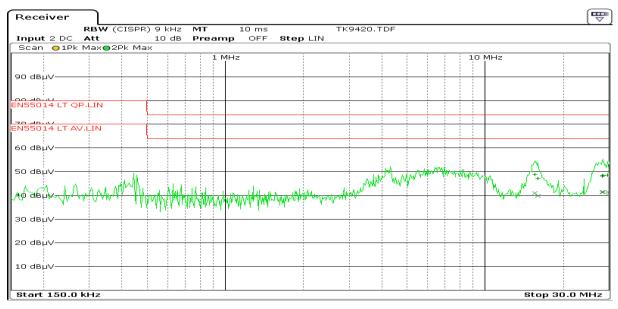


Figure Al.12: Load Terminal Disturbance Voltage, Terminal 1 to Ground; Model: RAS-B16J2KVRG-E / RAS-16J2AVRG-E



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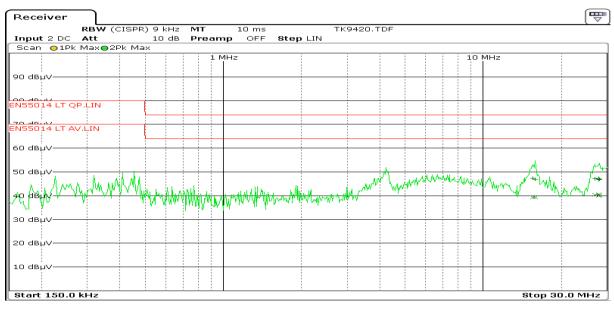


Figure AI.13: Load Terminal Disturbance Voltage, Terminal 2 to Ground; Model: RAS-B16J2KVRG-E / RAS-16J2AVRG-E

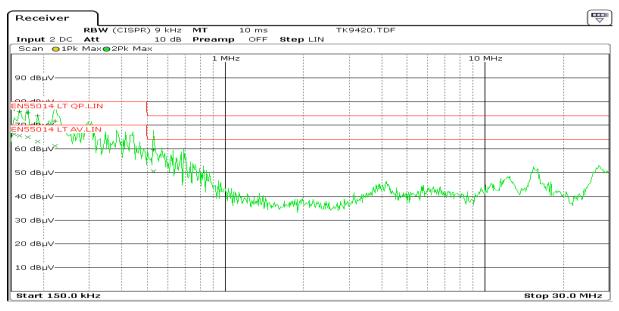


Figure Al.14: Load Terminal Disturbance Voltage, Terminal 3 to Ground; Model: RAS-B16J2KVRG-E / RAS-16J2AVRG-E



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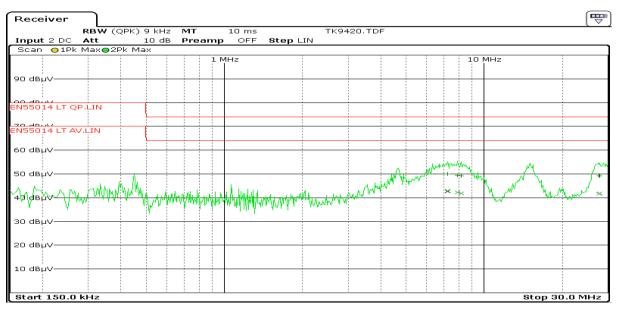


Figure AI.15: Load Terminal Disturbance Voltage, Terminal 1 to Ground; Model: RAS-B22J2KVRG-E / RAS-22J2AVRG-E

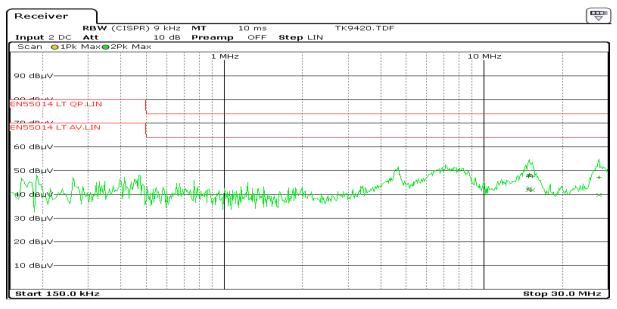


Figure Al.16: Load Terminal Disturbance Voltage, Terminal 2 to Ground; Model: RAS-B22J2KVRG-E / RAS-22J2AVRG-E



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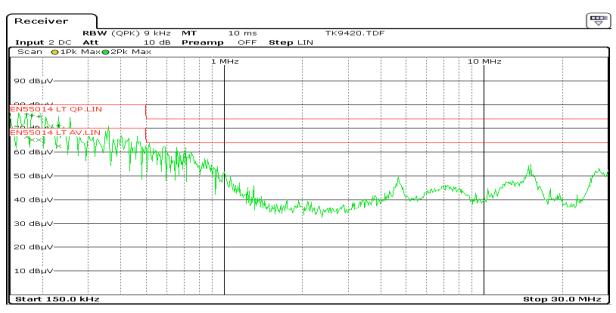


Figure AI.17: Load Terminal Disturbance Voltage, Terminal 3 to Ground; Model: RAS-B22J2KVRG-E / RAS-22J2AVRG-E

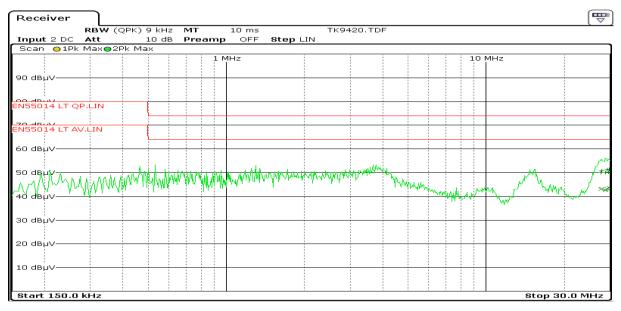


Figure Al.18: Load Terminal Disturbance Voltage, Terminal 1 to Ground; Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E



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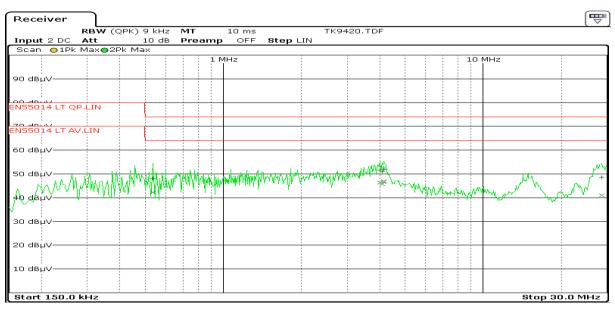


Figure AI.19: Load Terminal Disturbance Voltage, Terminal 2 to Ground; Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E

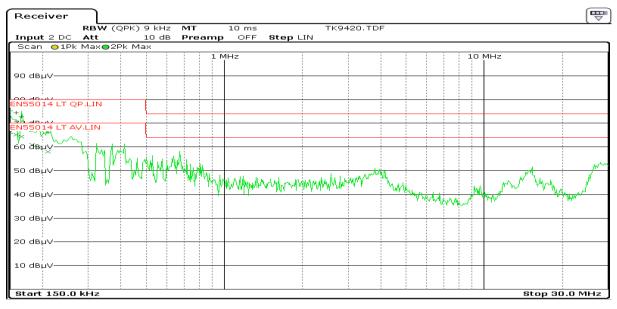


Figure Al.20: Load Terminal Disturbance Voltage, Terminal 3 to Ground; Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E



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Receive	er 📄)							
		BW (QPK) 12			.0 ms		1DS-21B	.TDF	
Input 2 D			10 dB	Preamp	OFF	Step LIN			
[Scan 😑:	1Pk Ma	xo2Pk Max	_						
90 dBpW-									
80 dBpW-									
70 dBpW-									
60 dBpW-									
50 dBpW- EN55014 P		.IN	 						
40 dBpW-		M							
	W AV.L	W M	Ν.	TAM	M	<u>_ Λ</u> _			Λ.,
alo belowi-	un N	×		V V	w f	WVM	when	. n	WINGM
20 dBpW-								and the second and the second of the	
10 dBpW-									
Start 30.	.0 MHz		1						Stop 300.0 MHz

Figure AI.21: Continuous Power Disturbance, Sensor to mains; Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Receive	:r"				
	RBW (QPK) 120			3.TDF	`
Input 2 [.0 dB Preamp OFF	Step LIN		
Scan O	1Pk Max <mark>o</mark> 2Pk Max				
90 dBpW-					
80 dBpW-					
70 dBpW-					
60 dBpW-					
50 dBpW- EN55014 P	W OP.LIN-A				
An danw-	I want the more	$/^+\Lambda_A$			
40 авруу- <u>е</u> м55014 р зо авруу-	WAYLIN-	WWW M	$ \sim 1/v_{c} $. A	man M
зо авр₩і- М		<u>,</u> × ↓	- the	M. Manshint	"Y To of
20 dBpW-	r		V ' M	v mayny v	NA M
10 dBpW-					
Start 30	.0 MHz	1	1	1	Stop 300.0 MHz

Figure Al.22: Continuous Power Disturbance, Sensor to Outdoor; Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E



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Receiv	er	ר									(₩
		RBW (QPK)			10 ms		MDS-21B	.TDF			
Input 2			10 dB	Preamp	OFF	Step LIN					
Scan 🧲)1Pk M	lax o 2Pk Max	<								
90 dBpW											
80 dBpW											
70 dBpW											
60 dBpW											
50 dBpW EN55014		.LIN									
		M			A						
		.LIN T	~ B	JMP	M	<u>م ۸</u>				0.00	
зо\авруй \л	and the		1 hr	× *		when I	1 Ann		no. A	MMMAM	\ AM
20 dBpW							Mary	derate and the second	and where		Υv
10 dBpW											
Start 30	0.0 MH	Iz								Stop 300.0 M	1Hz

Figure Al.23: Continuous Power Disturbance, Sensor to Indoor; Model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E

Receiv	er				
	RBW (QPK) 120	0 kHz MT 10 ms	AMZ41.T	DF	· · · · · · · · · · · · · · · · · · ·
		LO dB Preamp OFF	Step LIN		
Scan 🧲)1Pk Max⊜2Pk Max			-	
90 dBpW					
80 dBpW					
70 dBpW					
60 dBpW					
50 dBpW <u>EN</u> 55014	PW QP.LIN				
	PW AV.LIN	<u>h</u>			
So alery	. In My My ×	May	when a second		
20 dBpW	<u>larwa: Yuyo :</u>	~~~ ~ V	Marghan		and the second
10 dBpW					
Start 30	D.0 MHz				Stop 300.0 MHz

Figure Al.24: Continuous Power Disturbance, Sensor to mains; Model: RAS-B16J2KVRG-E / RAS-16J2AVRG-E



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Receiver]				
	RBW (CISPR) 1	.20 kHz MT	10 ms	AMZ41.TDF	×
Input 2 DC 👄		10 dB Preamp	OFF Step LI	V	
🛛 Scan 😐 1Pk M	laxo2Pk Max	-			
90 dBpW					
 80 dBpW					
70 dBpW					
60 dBpW					
50 dBpW EN55014 PW QP	.LIN	 			
40 (dBpW		h			
	w×	many way	Monorm.	. Manue	
20 dBpw	2 ⁴⁴	NWW FUR		www. White	hand have have have have have have have have
10 dBpW					
Start 30.0 MH	Iz				Stop 300.0 MHz

Figure Al.25: Continuous Power Disturbance, Sensor to Outdoor; Model: RAS-B16J2KVRG-E / RAS-16J2AVRG-E

Receiver	<u> </u>					
	RBW (CISPR) 1	20 kHz MT	10 ms	AMZ41.TD	DF	× - 4
Input 2 DO		10 dB Preamp	OFF Step LIN			
Scan 🔾 1	Pk Max ⊙ 2Pk Max					
90 dBpW —						
80 dвруу—						
70 dBpW-						
60 dBpW-						
50 dBpW-						
EN55014 PM	V QP.LIN					
	<u>~</u>					
40 dBpW- EN55014 PV	VAV.LIN	0				
	$\gamma \sim \gamma$	m.				
ုအရ dBb _b wy—		- Anna	A mark			
hue	MAN ×	- · · · · · · · · · · · · · · · · · · ·	Mr may under	maning	has a second second	when the when the start of the
20 dBpW			APM BACK	<u></u>	- A Dad - War - on the today and the	when when a support of a
						a second of a second
10 dBpW-						
	- BALL-					Stan 000 0 MU
Start 30.0 MHz Stop 300.0 MHz						

Figure Al.26: Continuous Power Disturbance, Sensor to Indoor; Model: RAS-B16J2KVRG-E / RAS-16J2AVRG-E



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40 HBpW ENSSO14 PW AV.LIN 20 dBpW 20 dBpW 10 dBpW	Receiver				
Scan 1Pk Max 90 dBpW 90 dBpW 80 dBpW 90 dBpW 70 dBpW 90 dBpW 60 dBpW 90 dBpW 90	RBW (QPK) 1	20 kHz MT 10 ms	AMZ41.T	DF	
90 dBpw 80 dBpw 70 dBpw 60 dBpw 50 dBpw ENSS014 PW QP.LIN 40 dBpw 20 dBpw 10 dBpw 10 dBpw		10 dB Preamp OFF	Step LIN		
80 dBpW Image: Constraint of the second se	Scan 👴 1Pk Max 🔵 2Pk Max]
80 dBpW Image: Constraint of the second se					
80 dBpW Image: Constraint of the second se					
70 dBpW 60 dBpW 60 dBpW 60 dBpW 50 dBpW 60 dBpW 60 dBpW 10 dBpW 10 dBpW 10 dBpW	90 dBpW				
70 dBpW 60 dBpW 60 dBpW 60 dBpW 50 dBpW 60 dBpW 60 dBpW 10 dBpW 10 dBpW 10 dBpW					
70 dBpW 60 dBpW 60 dBpW 60 dBpW 50 dBpW 60 dBpW 60 dBpW 10 dBpW 10 dBpW 10 dBpW	80 dBpW				
60 dBpW 50 dBpW 40 dBpW 40 dBpW 20 dBpW 20 dBpW 10 dBpW 10 dBpW					
60 dBpW 50 dBpW 40 dBpW 40 dBpW 20 dBpW 20 dBpW 10 dBpW 10 dBpW					
S0 dBpW ENSS014 PW QP.LIN 40 dBpW ENSS014 PW AV.LIN S0 dBpW 20 dBpW 10 dBpW					
S0 dBpW ENSS014 PW QP.LIN 40 dBpW ENSS014 PW AV.LIN S0 dBpW 20 dBpW 10 dBpW					
EN55014 PW QP.LIN 40 dBpW EN55014 PW AV.LIN 50 dBpW 20 dBpW 10 dBpW	60 dBpW				
EN55014 PW QP.LIN 40 dBpW EN55014 PW AV.LIN 50 dBpW 20 dBpW 10 dBpW					
EN55014 PW QP.LIN 40 dBpW EN55014 PW AV.LIN 50 dBpW 20 dBpW 10 dBpW	50 dBpW				
ENSSO14 PW AV.LIN X X X X X X X X X X X X X X X X X X X	EN55014 PW QP.LIN-M				
ENSSO14 PW AV.LIN X 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	$M_{m} \sim 10^{-10}$	N			
		<u>_</u>			
20 dBpW		1 Dec			
10 dBpW	VSO dBpwi /(XXXXX	- Var			
10 dBpW		- Must my	my and water		
10 dBpW	20 dBpW	× •	The second the second	M montale del Amara ana	and the second second
10 dBpW					man manager was a way
Start 30.0 MHZ Stop 300.0 MHZ	Start 30.0 MHz	1	I	1	Stop 300.0 MHz

Figure Al.27: Continuous Power Disturbance, Sensor to mains; Model: RAS-B22J2KVRG-E / RAS-22J2AVRG-E

Receive	er				
	RBW (CISPR) 1			TDF	× 4
	DC 👄 Att	10 dB Preamp OI	FF Step LIN		
Scan O)1Pk Max⊜2Pk Max				
90 dBpW					
80 dBpW-					
70 dBpW-					
60 dBpW					
50 dBpW					
EN55014 P	A (+)				
40 (BpW) EN55014 P	PW AV.LIN				
ap depu-	Anton	M			
	r yr ur	M. Marine Mar	Marina Muning	My Marganan	manuthan .
20 dBpW-			¥**		and the second and the second s
10 dBpW					
Start 30	0.0 MHz	1	1	1	Stop 300.0 MHz

Figure Al.28: Continuous Power Disturbance, Sensor to Outdoor; Model: RAS-B22J2KVRG-E / RAS-22J2AVRG-E



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Receiver					
	RBW (QPK) 120			DF	
Input 2 DC		.0 dB Preamp OFF	Step LIN		
Scan Olf	Pk Maxo2Pk Max				
90 dBpW					
80 dBpW-					
70 dBpw-					
co do su					
60 dBpW —					
50 dBpW—					
<u>EN</u> 55014 PM					
40/dBpw		h			
<u>EN55014 PM</u>	VAV.LIN	LN .			
bo debw	<u> </u>	1 Vm			
A. A. A. (.)	ላቢ /	1 de mont	month and a set the		
1 20 dврw—	· ·	Y NV	" Munn Which	mannaha and a bigg	monte have been de
20 abpvv —				Contract on the second s	when have been have about a
					~~
10 dBpW-					
Start 30.0	MHz	1	I	I	Stop 300.0 MHz
<u></u>					0.0p 000.0 MHz

Figure Al.29: Continuous Power Disturbance, Sensor to Indoor; Model: RAS-B22J2KVRG-E / RAS-22J2AVRG-E

Receiver					
	RBW (QPK) 120			TDF	* *
Input 2 D		0dB Preamp OFF	Step LIN		
Scan Ol	Pk Max o 2Pk Max				
90 dBpw-					
80 dBpw					
70 dBpW —					
60 dBpW —					
50 dBpW—					
<u>EN</u> 55014 PV	V QP.LIN				
46 dBpw-		\			
<u>E</u> N55014 PV	VAV.LIN	1 m			
Bo depw-f		\rightarrow	and they when the		
V. 4	W ^D	Jude Mar I	min		
20 dBpW—		Mana Ma	Manhahy	and the second of the second o	man the second second
				· · · · · · · · · · · · · · · · · · ·	and the second
10 dBpw —					
Start 30.0) MHz		1		Stop 300.0 MHz

Figure Al.30: Continuous Power Disturbance, Sensor to mains; Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E



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Receiver				
	W (CISPR) 120 kHz	MT 10 ms	AMZ41.TDF	
_ Input 2 DC 👄 Att		Preamp OFF St	ep LIN	
🕻 Scan 🔾 1Pk Max	●2Pk Max			
90 dBpW				
80 dBpW				
70 dBpW				
60 dBpW				
50 dBpW EN55014 PW QP.LI	N			
HO dBpW	, /* V \			
30 dBpw	<u> </u>	1	λ. Μ	
20 dBpW	W.	mann	with the stand with the second stand	man have a man have been and have a second and have been a second and have been a second and have been and have
10 dBpW				
Start 30.0 MHz				Stop 300.0 MHz

Figure Al.31: Continuous Power Disturbance, Sensor to Outdoor; Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E

Receive	er				
	RBW (QPK) 120	0 kHz MT 10 ms	AMZ41.T	DF	
		lodB Preamp OFF	Step LIN		
Scan 😑	1Pk Max o 2Pk Max			-	
90 dBpW					
80 dBpW·					
70 dBpW					
60 dBpW					
50 dBpW·					
	PW QP.LIN				
40(dBpW- EN55014 P	WAVILIN				
30 deptw	<u>∖ </u>				
Λ_{i}	V	Mar Com	we have a		n and the second states of the
20 dBpW		· · ·	- Aller where	Walan and and and and and a second	manymoniumpersident
10 dBpW·					
Start 30	.0 MHz				Stop 300.0 MHz

Figure AI.32: Continuous Power Disturbance, Sensor to Indoor; Model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E



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APPENDIX II: EUT PHOTOGRAPHS



Outdoor unit: RAS-13J2AVRG-E



Indoor unit: RAS-B13J2KVRG-E

Figure All.1: EUT Photos model: RAS-B13J2KVRG-E / RAS-13J2AVRG-E



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Outdoor unit: RAS-16J2AVRG-E



Indoor unit: RAS-B16J2KVRG-E

Figure All.2: EUT Photos model: RAS-B16J2KVRG-E / RAS-16J2AVRG-E



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Outdoor unit: RAS-22J2AVRG-E



Indoor unit: RAS-B22J2KVRG-E

Figure All.3: EUT Photos model: RAS-B22J2KVRG-E / RAS-22J2AVRG-E



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Outdoor unit: RAS-24J2AVRG-E



Indoor unit: RAS-B24J2KVRG-E

Figure AII.4: EUT Photos model: RAS-B24J2KVRG-E / RAS-24J2AVRG-E



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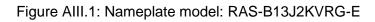
APPENDIX III: MODELS INFORMATION

Model cover by this report

Test model Indoor / Outdoor	Model (Indoor / Outdoor)	Туре	Brand	Voltage (V), Ampere (A)	Frequency (Hz)	Capacity BTU
	RAS-B10J2KVRG-E / RAS-10J2AVRG-E			220-240Va.c.;		8500
RAS-B13J2KVRG-E /	RAS-10J2KVRG-TR / RAS-10J2AVRG-TR			6.75A; Class I		8500
RAS-13J2AVRG-E	RAS-B13J2KVRG-E / RAS-13J2AVRG-E			220-240Va.c.;		11900
	RAS-13J2KVRG-TR / RAS-13J2AVRG-TR			7.35A; Class I		11900
RAS-B16J2KVRG-E /	RAS-B16J2KVRG-E / RAS-16J2AVRG-E			220-240Va.c.;		15600
RAS-16J2AVRG-E	RAS-16J2KVRG-TR / RAS-16J2AVRG-TR	Heat nump	TOSHIBA	8.95A; Class I	50	15600
	RAS-18J2KVRG-E / RAS-18J2AVRG-E	Heat pump	TUSHIDA	220-240Va.c.;	50	17000
RAS-B22J2KVRG-E /	RAS-18J2KVRG-TR / RAS-18J2AVRG-TR			9.50A; Class I		17000
RAS-22J2AVRG-E	RAS-B22J2KVRG-E / RAS-22J2AVRG-E			220-240Va.c.;		20800
	RAS-22J2KVRG-TR / RAS-22J2AVRG-TR			10.50A; Class I		20800
RAS-B24J2KVRG-E /	RAS-B24J2KVRG-E / RAS-24J2AVRG-E			220-240Va.c.;		23800
RAS-24J2AVRG-E	RAS-24J2KVRG-TR / RAS-24J2AVRG-TR			12.80A; Class I		23600



Report No. 19012807BKK-001 Page 77 of 87 Issue Date 14 March 2019 Details of specification, Please see attached Name of manufacturer TOSHIBA CARRIER (THAILAND) CO.,LTD. Address, city, country 1449 Moo S. Bangkadi Indusirial Park, Tivanon Road, Tambol Bangkadi, Amphur Muang, Pathumthani 12000, Thailand TOSHIBA specification sheet or label of outdoor unit. E EHC TOSHIBA CARRIER (THAILAND)CO.,LTD. AIR CONDITIONER MADE IN THAILAND RAS-B13J2KVRG-E i 220-240 V~ 50Hz Name of importer/Distributor in EU TOSHIBA CARRIER EUROPE S.A.S 0 10kg 45W Address, city, country Route de Thil 01120 Montluel FRANCE SERIAL NO. 92100003 107205088



Model : Serial No. Net weight	RA		J2AVI 52300 2	
Power sup	ply 2	20-24	40V~	50H
Power	Max.		1.58	0 kV
Current	Max.		7.3	5 /
COP.	Cool		3.3	
	Heat		3.8	
Capacity	Cool Heat		3.5	
Power	Cool	1.	05-1.0	
	Heat		08-1.0	
Current	Cool		09-4.6	
	Heat		22-4.8	
Capacity a under follo	ind input	were	e mea	sure
under iono		oor	Out	loor
	ter			np.
Continue	D.B.	W.B.	D.B.	W.B
Cooling Heating The WIRIN on top of t R32 MAXIMUM Hi 4.29 / Hi 42.9 /	D.B. 27°c 20°c NG DIAC he electr OPERAT Lo 2.26	W.B. 19°c 15°c BRAN ical p ING P MPa	D.B. 35°c 7°c 1 is loc arts b 0.6 RESS	W.B 24°c 6°c cateo oox. 7 kg
Heating The WIRIN on top of t R32 MAXIMUM Hi 4.29 /	D.B. 27°c 20°c NG DIAC he electr OPERAT Lo 2.26 Lo 22.6	W.B. 19°c 15°c BRAM ical p ING P MPa bar	D.B. 35°c 7°c 1 is loo parts b 0.6 RESS	W.B 24°c 6°c cateo oox. 7 kg
Heating The WIRIN on top of the R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENG CHARGELI PIPE LENG	D.B. 27°c 20°c NG DIAC he electr OPERAT Lo 2.26 Lo 22.6 TH SS PIPE TH	W.B. 19°c 15°c BRAM ical p ING P MPa bar LENC	D.B. 35°c 7°c 1 is loo arts b 0.6 RESS 2- 3TH 16-	W.B 24°C 6°C 00x. 7 kg URE -20 m 15 m
Heating The WIRIN on top of the R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENG CHARGELI	D.B. 27°c 20°c NG DIAC he electr OPERAT Lo 2.26 Lo 22.6 TH ESS PIPE TH DITIONAL	W.B. 19°c 15°c ING P MPa bar LENC	D.B. 35°c 7°c 1 is loo arts b 0.6 RESS 2. 5TH 16- RIGEF	W.B 24°C 6°C 00x. 7 kg URE -20 m 15 m
Heating The WIRIN on top of ti R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENG CHARGELI PIPE LENG :20g/m (AD PIPING HE	D.B. 27°c 20°c NG DIAC he electr OPERAT Lo 2.26 Lo 22.6 TH ESS PIPE TH DITIONAL	W.B. <u>19°c</u> <u>15°c</u> BRAM ical p ING P MPa bar LENC LENC FERE	D.B. 35°c 7°c 1 is loo barts b 0.6 RESS 2 3TH 16- RIGEF NCE	24°C 6°C 00x. 7 kg URE -20 m 15 m 20 m 12 m
Heating The WIRIN on top of ti R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENG CHARGELI PIPE LENG :20g/m (AD PIPING HE	D.B. 27°c 20°c NG DIAC he electr OPERAT Lo 2.26 Lo 22.6 TH ESS PIPE TH DITIONAL IGHT DIF	W.B. <u>19°c</u> <u>15°c</u> BRAM ical p ING P MPa bar LENC LENC FERE	D.B. 35°c 7°c 1 is loo barts b 0.6 RESS 2 3TH 16- RIGEF NCE	24°C 6°C 00x. 7 kg URE -20 m 15 m 20 m 12 m
Heating The WIRIN on top of tl R32 MAXIMUM Hi 4.29 / Hi 42.9 / Hi 42.9 / PIPE LENG CHARGELI PIPE LENG :20g/m (AD PIPING HE REF	D.B. 27°c 20°c NG DIAC he electr OPERAT Lo 2.26 Lo 22.6 TH ESS PIPE TH DITIONAL IGHT DIF	W.B. 19°c 15°c BRAM ical p ING P MPa bar LENC LENC LENC LENC	D.B. 35°c 7°c 1 is loo parts b 0.6 RESS 2 3TH 16- RIGEF NCE	W.B 24°c 6°c 20 m 15 m 20 m 20 m 20 m 12 m 21 m
Heating The WIRIN on top of tl R32 MAXIMUM Hi 4.29 / Hi 42.9 / Hi 42.9 / PIPE LENG CHARGELI PIPE LENG :20g/m (AD PIPING HE REF	D.B. 27°c 20°c 20°c 120°c NG DIAC he electr Lo 22.6 Lo 22.6 DTIONAL GHT DIF RIG	W.B. 19°c 15°c BRAM ical p ING P MPa bar LENC LENC LENC LENC	D.B. 35°c 7°c 1 is loo parts b 0.6 RESS 2 3TH 16- RIGEF NCE	W.B 24°c 6°c 20 m 15 m 20 m 20 m 20 m 12 m 21 m
Heating The WIRIN on top of tl R32 MAXIMUM Hi 4.29 / Hi 42.9 / Hi 42.9 / PIPE LENG CHARGELI PIPE LENG :20g/m (AD PIPING HE REF	D.B. 27°c 20°c 20°c 120°c NG DIAC he electr Lo 22.6 Lo 22.6 DTIONAL GHT DIF RIG	W.B. 19°c 15°c BRAM ical p ING P MPa bar LENC LENC LENC LENC	D.B. 35°c 7°c 1 is loo parts b 0.6 RESS 2 3TH 16- RIGEF NCE	W.B 24°c 6°c 20 m 15 m 20 m 20 m 20 m 12 m 21 m
Heating The WIRIN on top of tl R32 MAXIMUM Hi 4.29 / Hi 42.9 / Hi 42.9 / PIPE LENG CHARGELI PIPE LENG :20g/m (AD PIPING HE REF	DIACONSTRUCTION	W.B. 19°cc 15°cc BRAM ING F MPa bar LENC LREF FERE ER 22 Nated	D.B. 35°c 7°c 1 is loo parts b 0.6 RESS 2 3TH 16- RIGEF NCE	W.B 24°c 6°c catecox. 7 kg URE 20 m 15 m 12 m 12 m T

Figure AIII.2: Nameplate model: RAS-13J2AVRG-E



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Figure AIII.3: Nameplate model: RAS-B16J2KVRG-E

Model : Serial No. Net weight		\S-16\ E	52300	1000
Power sup	ply :	220-24	40V~	50Hz
Power	Max.			5 kW
Current	Max.		8.9	5 A
COP.	Cool		3.2	
	Heat		3.6	
Capacity	Cool		4.6	
Power	Heat	1	5.5 40-1.4	
ower	Heat		52-1.5	
Current	Cool		60-6.0	
	Heat	7.	10-6.5	0 A
Capacity a under follo	and inpu	it were	mea	sured
under iolic		door	Out	loor
	te	mp.	ter	np.
0	D.B.	W.B.	D.B.	W.B.
Cooling Heating		19°c 15°c	35°c 7°c	24°C
R32 MAXIMUM	he elect	trical p	0.8 RESS	oox. 0 kg
on top of t R32 MAXIMUM	OPERA Lo 2.20	trical p TING P 6 MPa	0.8 RESS	oox. 0 kg
on top of t R32 MAXIMUM Hi 4.29 /	he elect OPERA Lo 2.20 Lo 22.1	trical p TING P 6 MPa	0.8 0.8 RESS	oox. 0 kg URE
on top of t R32 MAXIMUM Hi 4.29 / Hi 42.9 /	DPERA Lo 2.20 Lo 22.0 3TH	trical p TING P 6 MPa 6 bar	0.8 RESS	oox. 0 kg
on top of t R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENC CHARGEL PIPE LENC	OPERA Lo 2.20 Lo 22. 3TH ESS PIPI	TING P 5 MPa 6 bar E LENC	0.8 RESS 2 3 3 3 1 3 1 6 1 6 1 6	0 kg URE -20 m -20 m
A constant of the constant of	OPERA Lo 2.20 Lo 22.3 3TH ESS PIPI STH DITIONA	TING P 5 MPa 6 bar E LENG	2- BTH 16- RIGEF	0 kg URE -20 m -20 m
on top of t R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENC CHARGEL PIPE LENC	OPERA Lo 2.20 Lo 22.3 3TH ESS PIPI STH DITIONA	TING P 5 MPa 6 bar E LENG	2- BTH 16- RIGEF	0 kg URE -20 m -20 m
on top of t R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENC CHARGEL PIPE LENC :20g/m (AD PIPING HE	OPERA Lo 2.20 Lo 22.3 3TH ESS PIPI STH DITIONA	TING P 5 MPa 6 bar E LENG AL REF FFERE	0.8 RESS 2- STH 16- RIGEF NCE	20 m 20 m 20 m 20 m 20 m 20 m 20 m 20 m
n top of t R32 MAXIMUM Hi 4.29 / PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPING HE	OPERA Lo 2.20 Lo 22.1 BTH ESS PIPI BTH DITIONA IGHT DII FRIG	TING P S MPa S bar E LENG AL REF FFERE ER 32	0.8 PRESS PR	-20 m 15 m 20 m 20 m 20 m 20 m 20 m 20 m 20 m
n top of t R32 MAXIMUM Hi 4.29 / PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPING HE	OPERA Lo 2.20 Lo 22.1 3TH ESS PIPI 5TH DITIONA IGHT DI	TING P S MPa S bar E LENG AL REF FFERE ER 32	0.8 PRESS PR	-20 m 15 m 20 m 20 m 20 m 20 m 20 m 20 m 20 m
n top of t R32 MAXIMUM Hi 4.29 / PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPING HE	OPERA Lo 2.20 Lo 22.1 BTH ESS PIPI BTH DITIONA IGHT DII FRIG	TING P S MPa S bar E LENG AL REF FFERE ER 32	0.8 PRESS PR	-20 m 15 m 20 m 20 m 20 m 20 m 20 m 20 m 20 m
n top of t R32 MAXIMUM Hi 4.29 / PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPING HE	OPERA Lo 2.20 Lo 22.1 BTH ESS PIPI BTH DITIONA IGHT DII FRIG	TING P S MPa S bar E LENG AL REF FFERE ER 32	0.8 PRESS PR	-20 m 15 m 20 m 20 m 20 m 20 m 20 m 20 m 20 m
n top of t R32 MAXIMUM Hi 4.29 / PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPE LENG CHARGEL PIPING HE	OPERA Lo 2.20 Lo 22.1 BTH ESS PIPI BTH DITIONA IGHT DII FRIG	TING P S MPa S bar E LENG AL REF FFERE ER 32	0.8 PRESS PR	-20 m 15 m 20 m 20 m 20 m 20 m 20 m 20 m 20 m
A top of to R32 MAXIMUM HI 4.29 / PIPE LENC CHARGEL PIPE LENC CHARGEL PIPE LENC CHARGEL PIPE LENC CHARGEL PIPE LENC CONTA	In a local control of the select of the sele	E LENC	22. 24. 35TH 16- RIGEF NCE AN gase gase	20 m 20 m 15 m 20 m 12 m 12 m 12 m 12 m

Figure AIII.4: Nameplate model: RAS-16J2AVRG-E



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Figure AIII.5: Nameplate model: RAS-B22J2KVRG-E

	į		2300 3	
Power sup	ply 2	20-24	10V~	50Hz
Power	Max.			0 KW
Current	Max.		10.5	0 4
COP.	Cool		3.0	
-	Heat		3.6	
Capacity	Cool Heat		6.1 7.0	
Power	Cool	1	99-1.9	
	Heat		94-1.9	
Current	Cool		20-8.4	
	Heat	9.	30-8.5	0 A
Capacity a				sure
under follo		oor	Outo	loor
	ter	np.	ter	np.
	D.B.		D.B.	W.B.
Cooling Heating		<u>19°c</u> 15°c	35°c 7°c	24°c
Treating	20 0	15 0	10	00
R32 MAXIMUM Hi 4.29 /	OPERAT Lo 2.26			
MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENC CHARGEL PIPE LENC :20g/m (AD	Lo 2.26 Lo 22.6 TH ESS PIPE	MPa bar LENG	2- STH 16- RIGER	20 m 15 m 20 m 20 m
MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENG CHARGEL PIPE LENG :20g/m (AD PIPING HE	Lo 2.26 Lo 22.6 3TH ESS PIPE TH DITIONAL IGHT DIF	MPa bar LENG L REF	RESS 2- STH 16- RIGER NCE	20 m 15 m 20 m 20 m 20 m 212 m
MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENG CHARGEL PIPE LENG :20g/m (AD PIPING HE	Lo 2.26 Lo 22.6 TH ESS PIPE	MPa bar LENG L REF	RESS 2- STH 16- RIGER NCE	20 m 15 m 20 m 20 m 20 m 212 m
MAXIMUM Hi 4.29 / PIPE LENC CHARGEL PIPE LENC :20g/m (AD PIPING HE REF	Lo 2.26 Lo 22.6 3TH ESS PIPE TH DITIONAL IGHT DIF	MPa bar LENG LREF FERE ER	2- STH 16- RIGER NCE	20 m 15 m 20 m ANT) 12 m
MAXIMUM Hi 4.29 / PIPE LENC CHARGEL PIPE LENC :20g/m (AD PIPING HE REF	Lo 2.26 Lo 22.6 TH ESS PIPE DITIONA IGHT DIF	MPa bar LENG LREF FERE ER	2- STH 16- RIGER NCE	20 m 15 m 20 m ANT) 12 m
MAXIMUM Hi 4.29 / PIPE LENC CHARGEL PIPE LENC :20g/m (AD PIPING HE REF	Lo 2.26 Lo 22.6 TH ESS PIPE DITIONA IGHT DIF	MPa bar LENG LREF FERE ER	2- STH 16- RIGER NCE	20 m 15 m 20 m ANT) 12 m
MAXIMUM Hi 4.29 / PIPE LENC CHARGEL PIPE LENC :20g/m (AD PIPING HE REF	Lo 2.26 Lo 22.6 TH ESS PIPE DITIONA IGHT DIF	MPa bar LENG LREF FERE ER	2- STH 16- RIGER NCE	20 m 15 m 20 m ANT 12 m

Figure AIII.6: Nameplate model: RAS-22J2AVRG-E



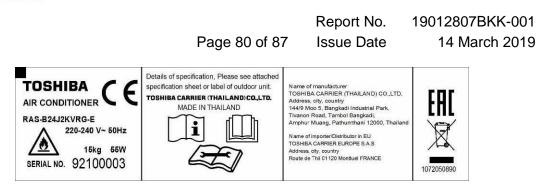


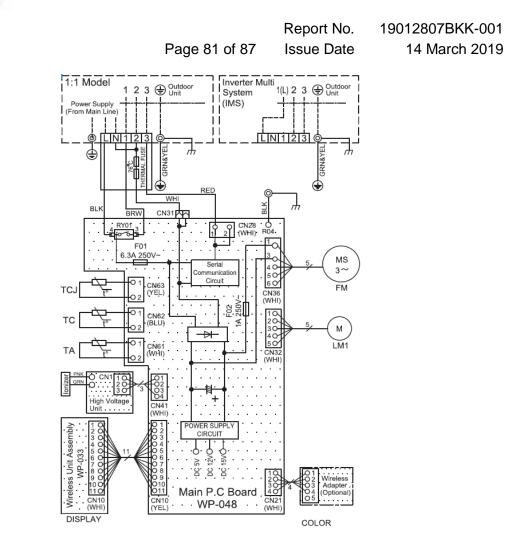
Figure AIII.7: Nameplate model: RAS-B24J2KVRG-E

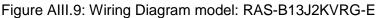
AIR CO Model : Serial No. Net weight	RA	S-24		000
Power sup	ply :	220-24	40V~	50H
Power	Max.		2.67	
Current	Max.		12.8	0
COP.	Cool		3.1	
	Heat		3.3	
Capacity	Cool Heat		7.0	0 kV
Power	Cool	2	25-2.2	
- onor	Heat		41-2.4	
Current	Cool	10.	50-9.7	0
	Heat	11.3	0-10.3	0
Capacity a	and inpu	t were	e mea	sure
under folk		toor	Outo	loor
		mp.		np.
	D.B.	W.B.	D.B.	W.B
Cooling	27°c	19°c	35°c	24°0
Heating The WIRII on top of 1 R32 MAXIMUM	27°c 20°c NG DIA the elect	19°c 15°c GRAN rical p	35°c 7°c 1 is loo arts b 1.1 RESS	24°c 6°c cateo oox.
Heating The WIRII on top of t R32	27°c 20°c NG DIA the elect OPERA Lo 2.20 Lo 22.0 3TH ESS PIPI 3TH DITIONA	19°c 15°c GRAN rical p 1NG P 3 MPa 3 bar 5 bar 5 LENC	35°c 7°c 1 is loo parts b 1.1 RESS 2- GTH 16- RIGER	24°c 6°c cateo oox. 4 kg URE 20 m 15 m 20 m
Heating The WIRII on top of I R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENG CHARGEL PIPE LENG :20g/m (AD PIPING HE	27°c 20°c NG DIA the elect OPERA Lo 2.20 Lo 22.0 3TH ESS PIPI 3TH DITIONA	19°c 15°c GRAM rical p ING P S MPa S bar E LENG L REF	35°c 7°c 1 is loo parts b 1.1- RESS 2- 0TH 16- RIGER NCE	24°c 6°c 00x. 4 kg URE 20 m 20 m 20 m 20 m 20 m
Heating The WIRII on top of 1 R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENC :20g/m (AD PIPING HE REI	27°c 20°c NG DIA the elect OPERA Lo 2.20 Lo 22.1 3TH ESS PIPI 3TH DITIONA IGHT DII	19°c 15°c GRAM Irical p IING P S MPa S bar E LENC L REF FFERE ER	35°c 7°c 1 is loo parts b 1.1 PRESS 2- STH 16- RIGER NCE	24°c 6°c cated oox. 4 kg URE 20 m 20 m ANT 15 m
Heating The WIRII on top of 1 R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENC :20g/m (AD PIPING HE REI	27°c 20°c NG DIA the elect OPERA Lo 2.22 Lo 22.1 3TH ESS PIPI 3TH DITIONA IGHT DII	19°c 15°c GRAM Irical p IING P S MPa S bar E LENC L REF FFERE ER	35°c 7°c 1 is loo parts b 1.1 PRESS 2- STH 16- RIGER NCE	24°c 6°c cated oox. 4 kg URE 20 m 20 m ANT 15 m
Heating The WIRII on top of 1 R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENC :20g/m (AD PIPING HE REI	27°c 20°c NG DIA the elect OPERA Lo 2.22 Lo 22.1 3TH ESS PIPI 3TH DITIONA IGHT DII	19°c 15°c GRAM Irical p IING P S MPa S bar E LENC L REF FFERE ER	35°c 7°c 1 is loo parts b 1.1 PRESS 2- STH 16- RIGER NCE	24°c 6°c cate oox. 4 k URE 20 n 15 n 20 n ANT 15 m
Heating The WIRII on top of 1 R32 MAXIMUM Hi 4.29 / Hi 42.9 / PIPE LENC :20g/m (AD PIPING HE REI	27°c 20°c NG DIA the elect OPERA Lo 2.22 Lo 22.1 3TH ESS PIPI 3TH DITIONA IGHT DII	19°c 15°c GRAM Irical p IING P S MPa S bar E LENC L REF FFERE ER	35°c 7°c 1 is loo parts b 1.1 PRESS 2- STH 16- RIGER NCE	24°c 6°c cate oox. 4 k URE 20 n 15 n 20 n ANT 15 m
Heating The WIRII on top of 1 MAXIMUM HI 4.29 / HI 42.9 / HI 42.9 / PIPE LENK CHARGEL PIPE LENK 200/m (AL PIPING HE Conta	OPERA Lo 2.20 Lo 2.20 STH DESS PIPI STH DITIONA IGHT DII FRIG	19°C C	335°c C 7°c C 7°c C 1 is loo C 1 is lo	24°c 6°c cate cox. 4 k URE 20 n 15 n 20 n 15 n 5 n 5 n 5 n 1 15 n

Figure AIII.8: Nameplate model: RAS-24J2AVRG-E



Total Quality. Assured.





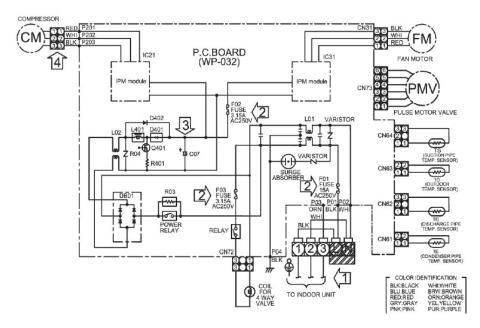
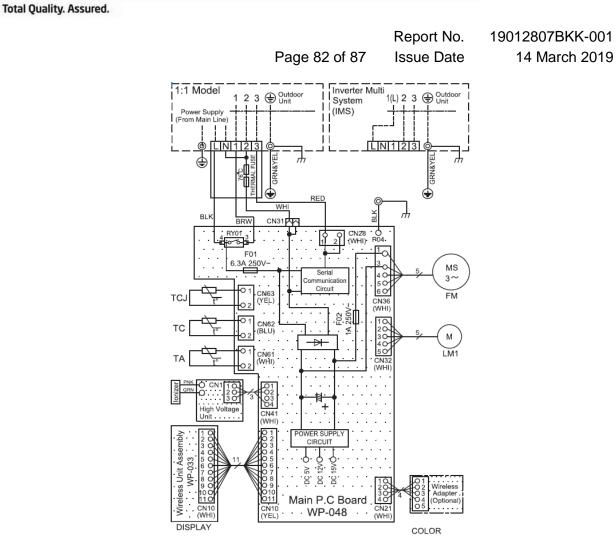
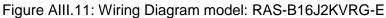


Figure AIII.10: Wiring Diagram model: RAS-13J2AVRG-E







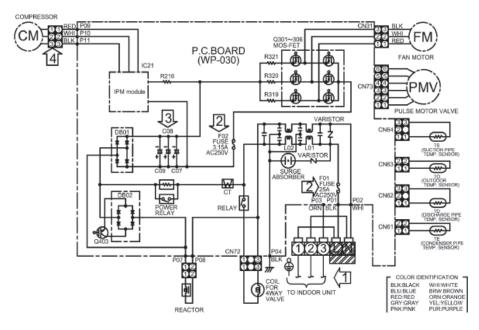


Figure AIII.12: Wiring Diagram model: RAS-16J2AVRG-E

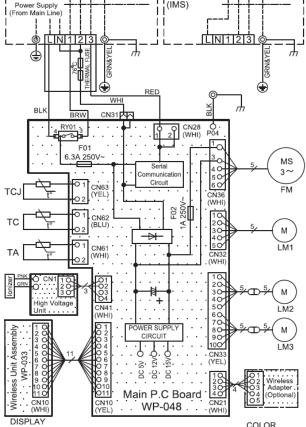


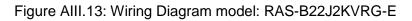


1:1 Model

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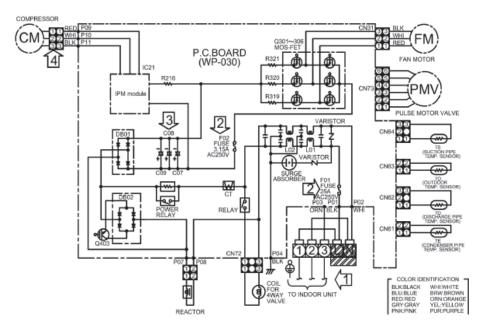
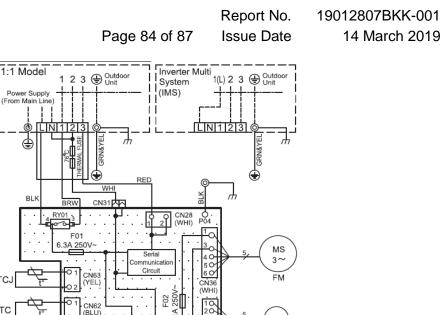


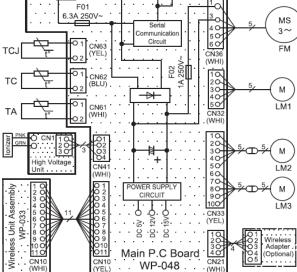
Figure AIII.14: Wiring Diagram model: RAS-22J2AVRG-E







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COLOR

Figure AIII.15: Wiring Diagram model: RAS-B24J2KVRG-E

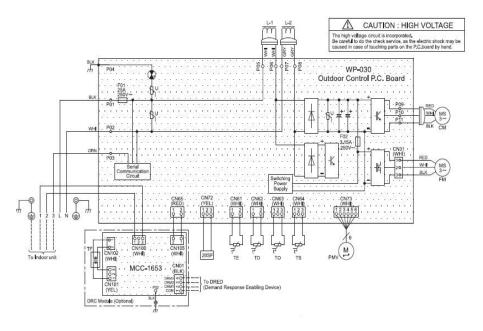


Figure AIII.16: Wiring Diagram model: RAS-24J2AVRG-E

DISPLAY



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APPENDIX IV: PHOTO OF TEST SET UP



Figure AIV.1: Mains Terminal Continuous/Discontinuous Disturbance Voltage test set-up



Figure AIV.2: Continuous Disturbance Power test set-up



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Figure AIV.3: Harmonic Current Emission, Voltage Fluctuation and Flicker test set-up



Figure AIV.4: Electrostatic Discharge, Injection Current test set-up



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Figure AIV.5: Fast Transients, Surges, Voltage dips test set-up