TIMCO ENGINEERING, Inc.

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FCC PART 15 B SUBPART B

RECEIVER TEST REPORT

Applicant	ROCKWELL COLLINS, INC.
Address	1300 WILSON BLVD. SUITE 200 ARLINGTON VA 22209 USA
FCC ID	AJK8222532
Product Description	GLU2100 LANDING UNIT RECEIVER
Date Sample Received	10/17/2017
Date Tested	10/18/2017
Tested By	Tim Royer
Approved By	Sid Sanders
Test Results	☒ PASS ☐ FAIL

Report Number	Version Number	Description	Issue Date
1821UT17TestReport	Rev1	Initial Issue	10/24/2017
	Rev2	Revised report – new test set up photo added	12/7/2017
	Rev2	Updated Power Information	12/13/2017

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:

☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.

☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669

Tested by:
Name and Title: Tim Royer, Project Manager/Testing Engineer

Sr. EMC Engineer
EMC-003838-NE

Date: 10/24/2017

Reviewed and approved by: _____
Name and Title: Sid Sanders Engineer

Date: 10/27/2017

REPORT SUMMARY

Disclaimer	The test results only relate to the item tested.
Applicable Rule(s)	Pt 15.109, ANSI C63.4: 2013
Related Report	None

TEST ENVIRONMENT

Test Facility	**Timco Engineering, Inc. 849 NW State Road 45 Newberry, FL 32669 USA.**
Test Condition in the laboratory	Temperature: 26ºC Relative humidity: 50%

TEST SETUP SUMMARY

Test Setup Diagram/ Description	The EUT was placed on the turntable per setup per ANSI C63.4: 2013. A test set up photo is provided for clarification.
Deviation from the standard/procedure	No deviation
Modification of EUT	No modification

RESULTS SUMMARY

FCC Rules 15.109 Radiated Emissions	Pass
FCC Rules 15.107- AC Powerline Conducted Emissions	N/A

EUT SPECIFICATION

EUT Description	LANDING UNIT RECEIVER
FCC ID	AJK8222532
EUT Power Source	☒ 115Vac/400Hz Single Phase
	☐ DC Power
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☐ Fixed
	☒ Mobile
	☐ Portable
Laboratory Test Conditions	Temperature: 26ºC Humidity: 55%
Modifications to EUT:	☒ No ☐ Yes (explanation below)

TEST PROCEDURES

Radiation Interference: The test procedure used was ANSI C63.4 using a spectrum analyzer with a preselector. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The video bandwidth was always greater than or equal to the RBW.

The frequency was scanned from 30 MHz to 12.5 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The EUT was measured in three (3) orthogonal planes when necessary.

Formula of Conversion Factors: The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer plus the coax loss. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:

Freq (MHz)	Meter Reading	+ ACF	+CL	= FS
33	20 dBµV	+ 10.36 dB/m	+0.40 dB	=30.36 dBµV/m @ 3m

ANSI C63.4 Measurement Procedures: The unit under test was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and verticals planes.

RADIATED SPURIOUS EMISSIONS

Rules Part No.: 15.109, IC RSS-GEN 7.1

Requirements:

Frequency MHz	Limits
30 – 88	40.0 dBµV/m measured @ 3 meters
88 – 216	43.5 dBµV/m measured @ 3 meters
216 – 960	46.0 dBµV/m measured @ 3 meters
Above 960	54.0 dBµV/m measured @ 3 meters

Measurement Procedure: The test procedure used was ANSI C63.4 using a spectrum analyzer with a preselector. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The video bandwidth was always greater than or equal to the RBW.

The frequency was scanned from 30 MHz to 5.0 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The EUT was measured in three (3) orthogonal planes when applicable.

RADIATED SPURIOUS EMISSIONS
TEST DATA: 30–200 MHZ VERTICAL PLOT

ROHDE&SCHWARZ

18.Oct 17 10:48

Test Spec CISPR 22 Radiated Disturbances

Polarity
Vertical

Stepped Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 200 MHz
Detector: Trace 1: MAX PEAK
Transducer: TDS_01

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	200.000000 MHz	40.00 kHz	120.00 kHz	50 µs	Auto	20 dB	INPUT1

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Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

TEST DATA: 30–200 MHZ VERTICAL PLOT CONT.

18.Oct 17 10:48

Test Spec CISPR 22 Radiated Disturbances

Polarity
Vertical

Final Measurement

Meas Time: 1 s
Margin: 25 dB
Subranges: 6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	38.960000000 MHz	31.97	Quasi Peak	-8.03
1	41.600000000 MHz	26.49	Quasi Peak	-13.51
1	60.200000000 MHz	18.40	Quasi Peak	-21.60
1	81.200000000 MHz	14.22	Quasi Peak	-25.78
1	136.600000000 MHz	15.01	Quasi Peak	-28.49
1	150.880000000 MHz	15.84	Quasi Peak	-27.66

Page 2 of 2

Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

TEST DATA: 30–200 MHZ HORIZONTAL PLOT

ROHDE&SCHWARZ

18.Oct 17 10:47

Test Spec CISPR 22 Radiated Disturbances

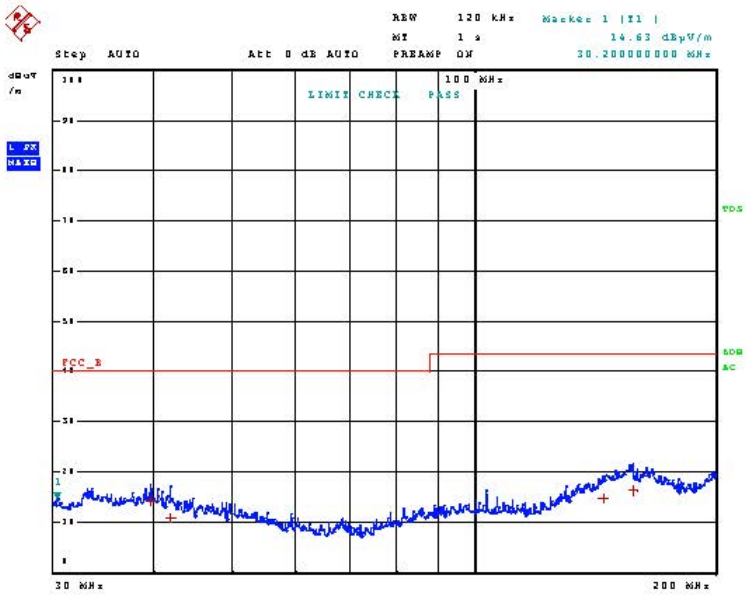
Polarity

Vertical

Stepped Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 200 MHz
Detector: Trace 1: MAX PEAK
Transducer: TDS_01

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	200.000000 MHz	40.00 kHz	120.00 kHz	50 µs	Auto	20 dB	INPUT1



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Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

TEST DATA: 30–200 MHZ HORIZONTAL PLOT CONT.

18.Oct 17 10:47

Test Spec CISPR 22 Radiated Disturbances

Polarity
Vertical

Final Measurement

Meas Time: 1 s
Margin: 25 dB
Subranges: 4

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	39.520000000 MHz	14.09	Quasi Peak	-25.91
1	41.840000000 MHz	10.91	Quasi Peak	-29.09
1	144.960000000 MHz	14.92	Quasi Peak	-28.58
1	157.640000000 MHz	16.31	Quasi Peak	-27.19

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Results Meets Requirements

RADIATED SPURIOUS EMISSIONS
TEST DATA: 200–1000 MHZ VERTICAL PLOT

ROHDE&SCHWARZ

18.Oct 17 10:34

Test Spec CISPR 22 Radiated Disturbances

Polarity

Horizontal

Time Domain Scan (1 Range)

Scan Start: 200 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: TDS_01

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
200.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	50 µs	Auto	20 dB	INPUT1

Page 1 of 2

Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

TEST DATA: 200–1000 MHZ VERTICAL PLOT CONT.

18.Oct 17 10:34

Test Spec CISPR 22 Radiated Disturbances

Polarity
Horizontal

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 3

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	491.570000000 MHz	30.52	Quasi Peak	-15.48
1	706.310000000 MHz	23.22	Quasi Peak	-22.78
1	959.060000000 MHz	27.32	Quasi Peak	-18.68

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Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

TEST DATA: 200–1000 MHZ HORIZONTAL PLOT

ROHDE&SCHWARZ

18.Oct 17 10:36

Test Spec CISPR 22 Radiated Disturbances

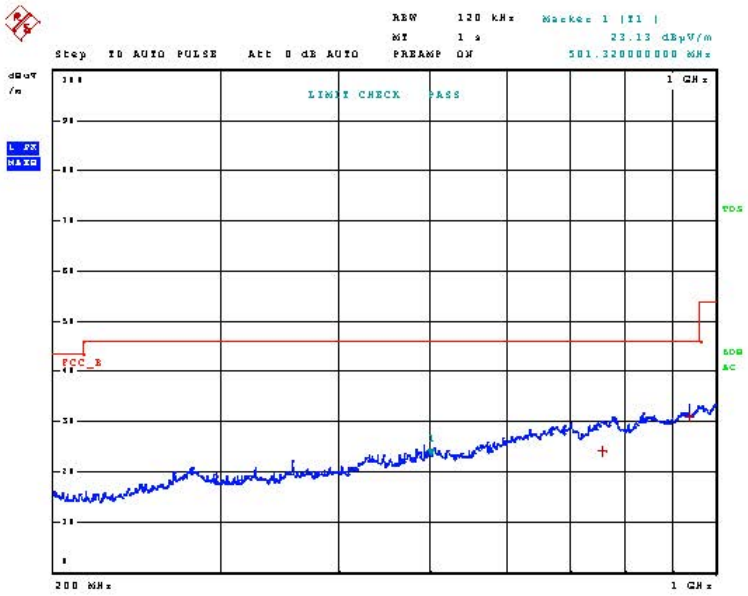
Polarity

Horizontal

Time Domain Scan (1 Range)

Scan Start: 200 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: TDS_01

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
200.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	50 µs	Auto	20 dB	INPUT1



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Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

TEST DATA: 200–1000 MHZ HORIZONTAL PLOT CONT.

18.Oct 17 10:36

Test Spec CISPR 22 Radiated Disturbances

Polarity
Horizontal

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 2

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	758.060000000 MHz	24.11	Quasi Peak	-21.89
1	938.450000000 MHz	31.00	Quasi Peak	-15.00

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Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

TEST DATA: 1–12.5 GHZ VERTICAL PLOT

18.Oct 17 10:05

Final Measurement

Meas Time: 500 ms
Margin: 40 dB
Subranges: 16

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.312000000 GHz	24.68	CISPR Averag	-29.32
2	1.312000000 GHz	37.19	Max Peak	
1	1.866500000 GHz	26.66	CISPR Averag	-27.34
2	1.866500000 GHz	39.83	Max Peak	
1	2.567250000 GHz	27.22	CISPR Averag	-26.78
2	2.567250000 GHz	40.29	Max Peak	
1	3.048000000 GHz	28.44	CISPR Averag	-25.56
2	3.048000000 GHz	41.21	Max Peak	
1	3.596250000 GHz	29.89	CISPR Averag	-24.11
2	3.596250000 GHz	42.91	Max Peak	
1	5.223000000 GHz	30.04	CISPR Averag	-23.96
2	5.223000000 GHz	42.86	Max Peak	
1	7.085000000 GHz	31.68	CISPR Averag	-22.32
2	7.085000000 GHz	44.23	Max Peak	
1	11.172250000 GHz	33.54	CISPR Averag	-20.46
2	11.172250000 GHz	46.30	Max Peak	

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Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

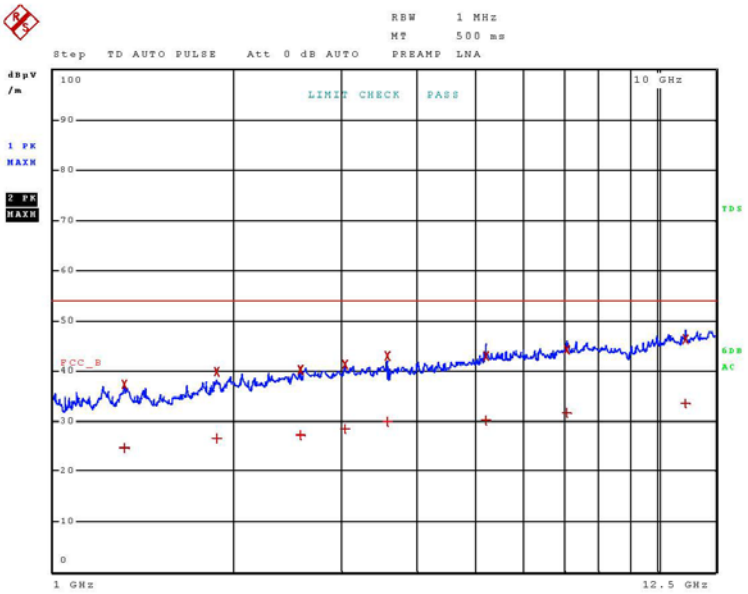
TEST DATA: 1–12.5 GHZ VERTICAL PLOT CONT.

18.Oct 17 10:05

Time Domain Scan (1 Range)

Scan Start: 1 GHz
Scan Stop: 12.5 GHz
Detector: Trace 1: MAX PEAK Trace 2: MAX PEAK
Transducer: TDS_01

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
1.000000 GHz	12.500000 GHz	250.00 kHz	1.00 MHz	100 µs	Auto	35 dB	INPUT1



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Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

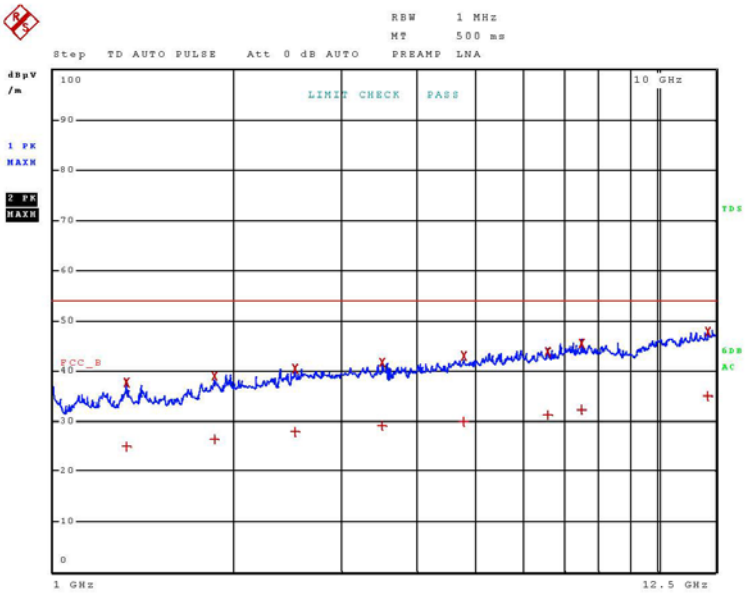
TEST DATA: 1–12.5 GHZ HORIZONTAL PLOT.

18.Oct 17 10:03

Time Domain Scan (1 Range)

Scan Start: 1 GHz
Scan Stop: 12.5 GHz
Detector: Trace 1: MAX PEAK Trace 2: MAX PEAK
Transducer: TDS_01

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
1.000000 GHz	12.500000 GHz	250.00 kHz	1.00 MHz	100 µs	Auto	35 dB	INPUT1



Results Meets Requirements

RADIATED SPURIOUS EMISSIONS

TEST DATA: 1–12.5 GHZ HORIZONTAL PLOT CONT.

18.Oct 17 10:03

Final Measurement

Meas Time: 500 ms
Margin: 40 dB
Subranges: 16

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.322500000 GHz	24.86	CISPR Averag	-29.14
2	1.322500000 GHz	37.69	Max Peak	
1	1.849250000 GHz	26.29	CISPR Averag	-27.71
2	1.849250000 GHz	39.02	Max Peak	
1	2.511750000 GHz	27.93	CISPR Averag	-26.07
2	2.511750000 GHz	40.35	Max Peak	
1	3.505500000 GHz	29.03	CISPR Averag	-24.97
2	3.505500000 GHz	41.70	Max Peak	
1	4.781250000 GHz	29.91	CISPR Averag	-24.09
2	4.781250000 GHz	43.05	Max Peak	
1	6.591250000 GHz	31.27	CISPR Averag	-22.73
2	6.591250000 GHz	43.76	Max Peak	
1	7.507250000 GHz	32.30	CISPR Averag	-21.70
2	7.507250000 GHz	45.43	Max Peak	
1	12.151750000 GHz	35.08	CISPR Averag	-18.92
2	12.151750000 GHz	47.78	Max Peak	

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Results Meets Requirements

TEST EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
CHAMBER	Panashield	3M	N/A	04/25/16	12/31/17
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	03/01/17	03/01/19
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Coaxial Cable - Chamber 3 cable set (Primary)	Micro-Coax	Chamber 3 cable set (Primary)	KMKM-0244-01; KMKM-0670-00; KFKF-0198-01	08/09/16	08/09/18
Band Reject Filter 2.4 GHz	Micro-Tronics	BRM50702-02	-G042	09/27/16	09/27/18
Antenna: Double-Ridged Horn 18-40 GHz	EMCO	3116	9011-2145	11/18/15	11/18/17
Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	01/04/16	01/04/18

***EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3