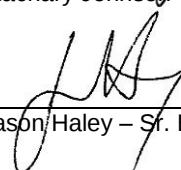




Test Report

Curtis-Straus LLC, a wholly owned subsidiary of BV CPS

Report No	ER0115-8
Client	Hanchett Entry Systems, Inc.
Address	10027 S. 51st Street Suite 102 Phoenix, AZ 85044
Phone	623-582-4626
Items tested	Aperio V3 Wireless Reader (Model: R100-V3)
FCC ID	VC3-R100V3
IC	7160A-R100V3
FRN	0026838094
Equipment Type	Digital Transmission System
Equipment Code	DTS
Emission Designator	2M84F1D
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.247, ISSED Canada RSS-247 Issue 1
Test Dates	February 24 to March 24 and August 3, 2017
Results	As detailed within this report
Prepared by	 Zachary Johnson – EMC Engineer
Authorized by	 Jason Haley – Sr. EMC Supervisor
Issue Date	<u>12/11/2017</u>
Conditions of Issue	This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 22 of this report.

Curtis-Straus LLC is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.



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Form Final Report REV 12-07-15



Summary and Test Methodology

This test report supports a “Limited Modular Approval” certification application for Aperio V3 Wireless Reader (Model: R100-V3) operating under:

CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 1

EUT is an RFID reader module that communicates reading activity to a remote unit over the 2405MHz - 2480MHz frequency band.

All testing was performed according to the following rules/procedures/documents;

CFR 47 Part 15.247, RSS-247 Issue 1, RSS-Gen Issue 4, FCC KDB 558074 D01 DTS Measurement Guidance v03r05 and ANSI C63.10-2013.

Emissions were maximized around 3 orthogonal planes (X, Y and Z).

EUT operating voltage is 3V DC via 2xAA batteries. It has an internal PCB surface mount antenna with 3.45dBi gain.

The following bandwidths were used during emissions testing.

Frequency	RBW	VBW
30MHz-1GHz	120kHz	1MHz
1GHz-25GHz	1MHz	3MHz

3 channels were tested as follows:

- 2405MHz: Low Channel
- 2440MHz: Mid Channel
- 2480MHz: High Channel

The environmental conditions during testing are documented on the associated data tables.

We found that the product complied with the requirements above without modification. Test sample was received in good condition.

Product Tested - Configuration Documentation

EUT Configuration										
Work Order:	R0115									
Company:	AssaAbloy									
Company Address:	10027 S. 51st St. Ste. 102									
	Phoenix, AZ 85044									
Contact:	Baruch Spence									
	MN			PN			SN			
EUT:	R100-V3			--			Test Sample 1			
EUT Description:	Aperio V3 Wireless Reader									
EUT Max Frequency:	2480MHz									
Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	in/out	under test	comment
Software Operating Mode Description:										
The EUT is a battery powered RFID reader which dumps collected data over 2.4GHz.										



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Statement of Conformity

Aperio V3 Wireless Reader (Model: R100-V3) complied with the following requirements:

RSS-GEN	RSP-100	RSS 247	Part 15	Comments
6.3			15.15(b)	There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.
	3.1		15.19	The label is shown in the label exhibit.
	3.2		15.21	Information to the user is shown in the instruction manual exhibit.
			15.27	No special accessories are required for compliance.
3, 6.1, 6.5			15.31	The EUT was tested in accordance with the measurement standards in this section.
6.13			15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
8.1			15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
8.3			15.203	The antenna for this device is an internal PCB surface mount antenna with 3.45dBi gain.
8.10			15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209 or RSS-Gen as applicable
8.8			15.207	N/A. EUT is battery powered.
			15.247	The unit complies with the requirements of 15.247
		RSS 247		The unit complies with the requirements of RSS-247
6.6				Occupied Bandwidth measurements were made.

Test Results

Bandwidth

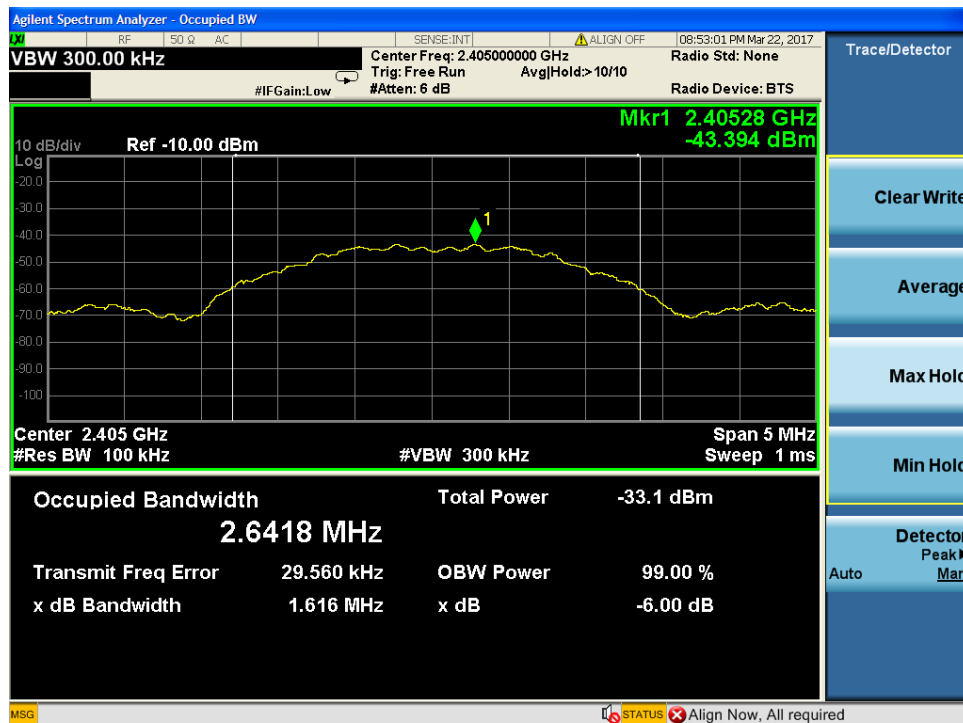
Limit: The minimum 6 dB bandwidth shall be at least 500 kHz.

[15.247(a) (2)]

MEASUREMENTS / RESULTS

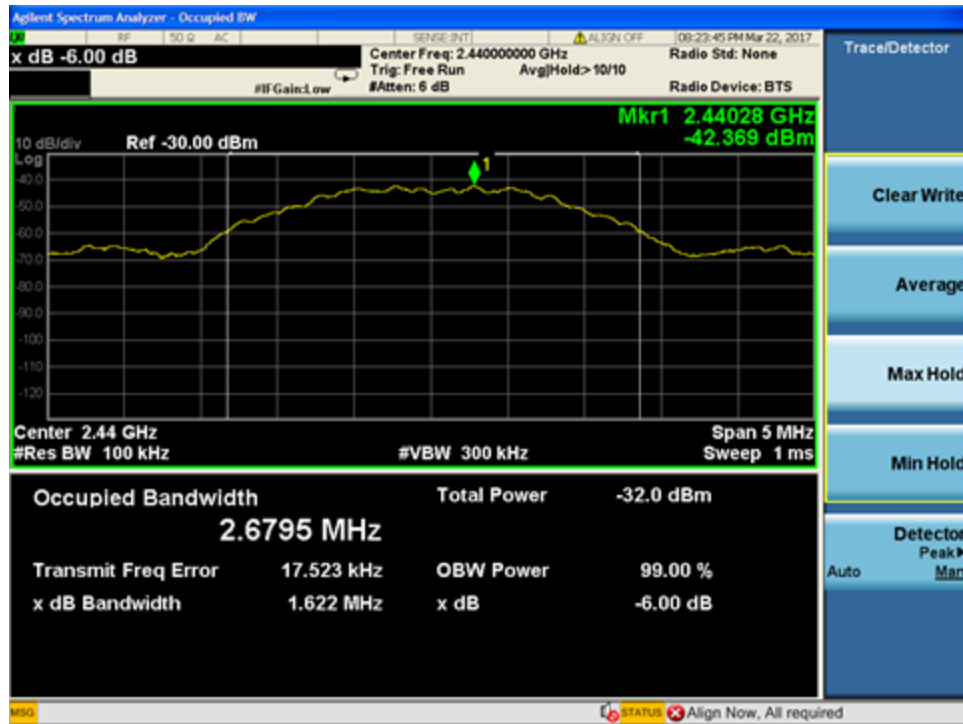
6dB Bandwidth				
Date: 6/19/2017 & 8/3/2017		Company: Assa Abloy		Work Order: R0115
Engineer: Zac Johnson		EUT Desc: R100		EUT Operating Voltage/Frequency: 3V DC
Temp: 24.8°C / 24.8°C		Humidity: 50% / 46%		Pressure: 999mBar / 1004mBar
				Battery
Frequency Range: 2405-2475MHz			Measurement Distance: 3 m	
Notes:			EUT Tx Freq: 2440MHz	
Frequency (MHz)	Reading (KHz)	6dB BW		
		Limit (KHz)	Margin (KHz)	Result (Pass/Fail)
2405	1616	≥500	-1116	Pass
2440	1622	≥500	-1122	Pass
2480	1629	≥500	-1129	Pass
Test Site: EMI Chamber 2		Cable 1: 2286 cbl		Cable 2: ---
Analyzer: 1199509 SA		Preamp: None		Cable 3: ---
CSsoft Radiated Emissions Calculator		v 1.017.156		Antenna: ---
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor				Preselector: ---
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PLOTS

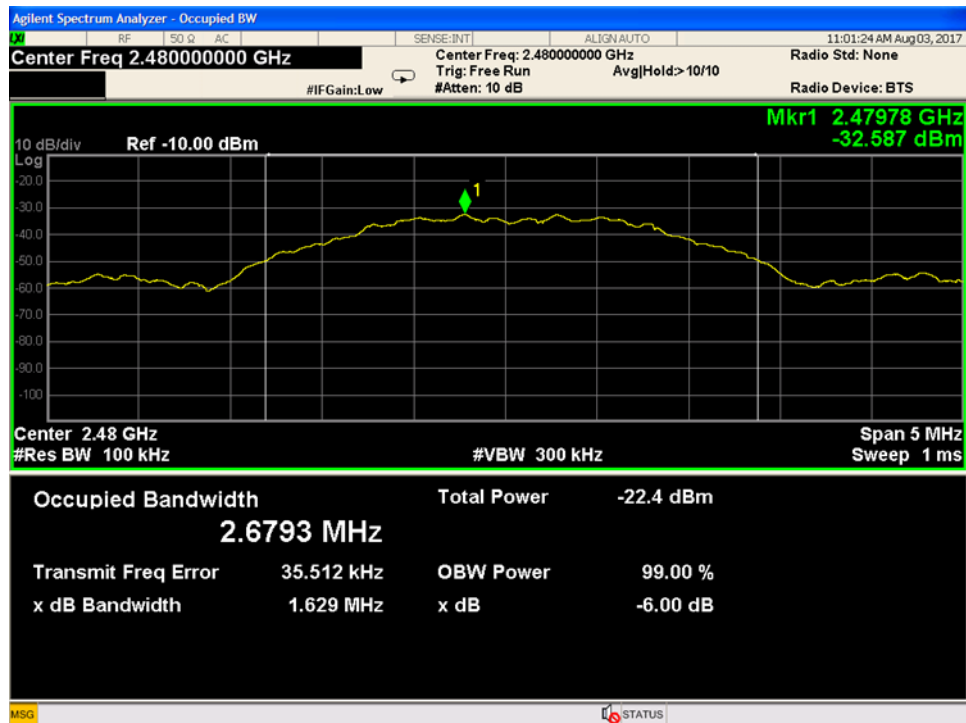


Low Channel DTS Bandwidth





Middle Channel DTS Bandwidth



High Channel DTS Bandwidth

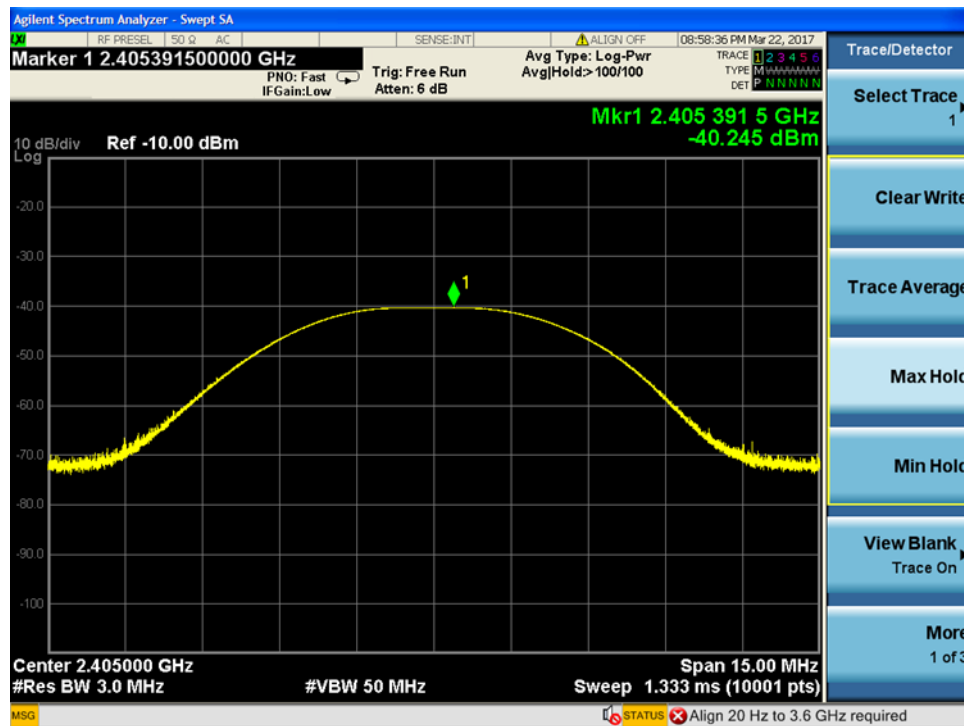
Peak Power

LIMIT: 1 Watt Conducted Output Power
[15.247(b) (3)]

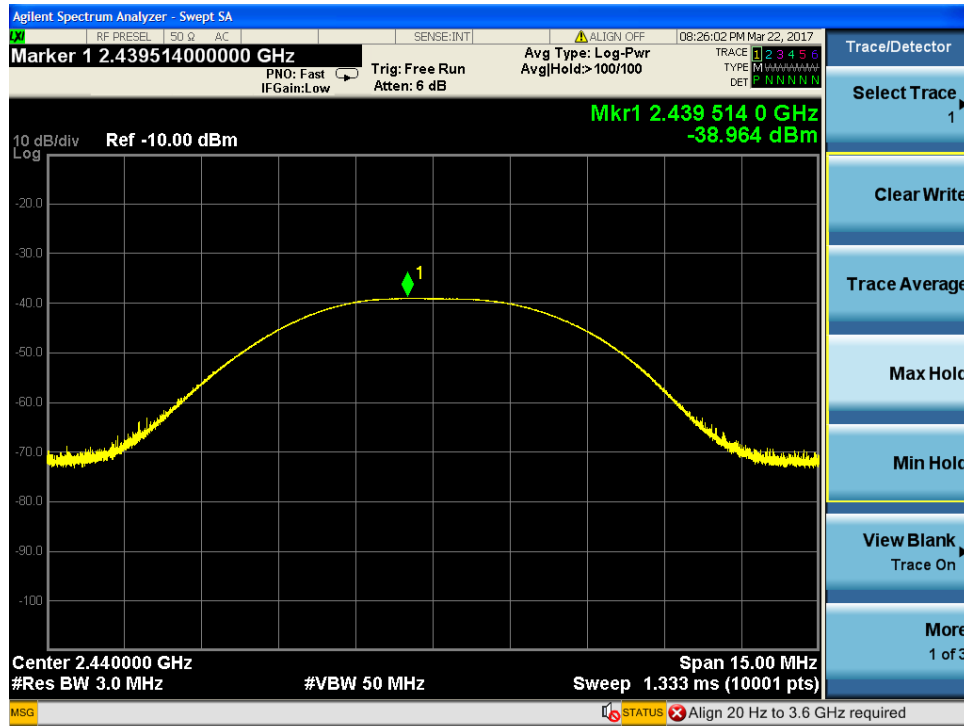
MEASUREMENTS / RESULTS

EIRP									
Date: 6/19/2017 & 8/3/2017		Company: Assa Abloy				Work Order: R0115			
Engineer: Zac Johnson		EUT Desc: R100				EUT Operating Voltage/Frequency: 3V DC			
Temp: 24.8°C / 24.8°C		Humidity: 50% / 46%		Pressure: 999mBar / 1004mBar		Battery			
Frequency Range: 2405-2480 MHz				Measurement Type: Conducted Antenna Port					
Notes: Tested Channel 26 on separate date with different attenuator									
Frequency	Peak Reading	Cable Loss	Attenuator Loss	Peak Output Power	EUT Antenna Gain	EIRP	Limit	Margin	Result
(MHz)	(dBm)	(dB)	(dB)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)	(Pass/Fail)
2405.0	-40.24	1.88	39.99	1.63	3.45	5.08	10.00	-4.92	Pass
2440.0	-38.96	1.88	39.99	2.91	3.45	6.36	10.00	-3.64	Pass
2480.0	-30.10	1.88	29.61	1.39	3.45	4.84	10.00	-5.16	Pass
Test Site: EMI Chamber 2		Cable 1: 2286 cbl							
Analyzer: 1199509 SA									

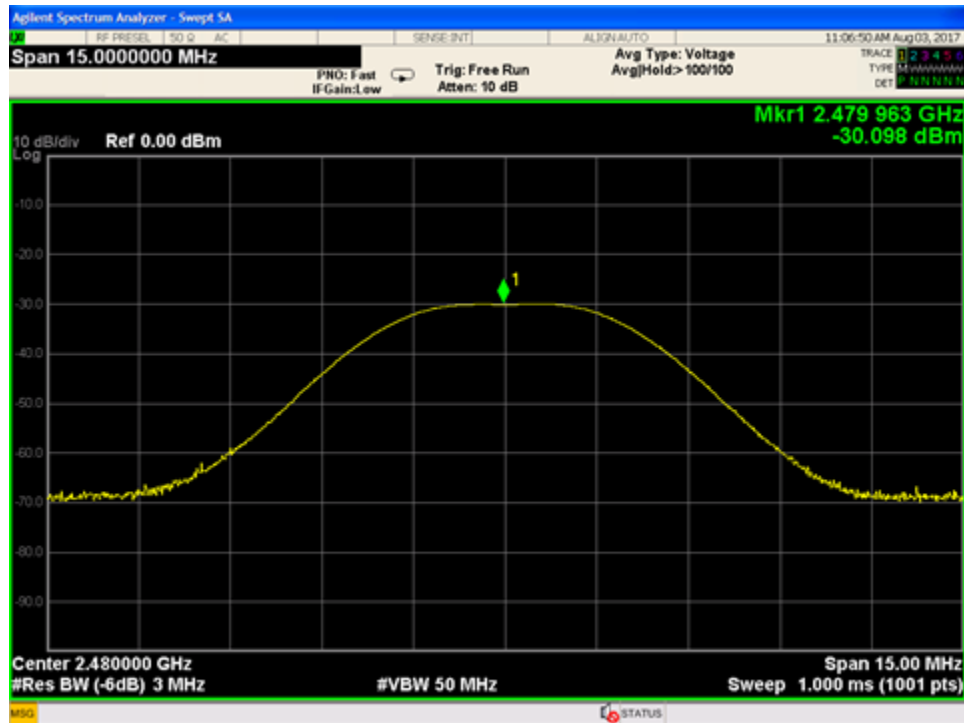
PLOTS



Low Channel Peak Output Power



Middle Channel Peak Output Power



High Channel Peak Output Power

Radiated Spurious Emissions

Limits: Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). [15.247(d)]

**Note, channel 26 tested separately, all data which is noted to include a notch filter has the factor accounted for in the raw reading

Radiated Emissions Table														
Date: 8/2/2017 & 2/28/2017				Company: Assa Abloy				Work Order: R0115						
Engineer: Zac Johnson				EUT Desc: R100				EUT Operating Voltage/Frequency: 3V DC						
Temp: 24.8 / 22.9				Humidity: 46% / 25%				Pressure: 1004mBar / 1020mBar						
Frequency Range: 1-6GHz										Measurement Distance: 3 m				
Notes: Tested on 2 dates due to channel change, newest date has values listed first										EUT Max Freq: 2480MHz				
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
H	2483.5	35.1	17.8	0.0	28.6	3.2	66.9	49.6	74.0	-7.1	Pass	54.0	-4.4	Pass
H	2390.0	14.3	14.3	0.0	28.1	3.2	45.6	45.6	74.0	-28.4	Pass	54.0	-8.4	Pass
Table Result:				Pass by -4.4 dB				Worst Freq:				2483.5 MHz		
Test Site: EMI Chamber 1				Cable 1: Asset #2051 / 2052				Cable 2: Asset #2054 / 2053				Cable 3: ---		
Analyzer: A2093 SA				Preamp: none				Antenna: Black Horn / Yellow / Horn				Preselector: ---		
CSsoft Radiated Emissions Calculator v 1.017.188														
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														
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Rev. 7/29/2017

Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2093 MXE EMI Receiver	20Hz-26.5GHz	N9038A	Agilent	MY51210181	2093	I	8/9/2017	8/9/2016
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz	1685	I	12/21/2018	12/21/2016
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Black Horn	1-18GHz	3115	EMCO	9703-5148	56	I	8/29/2018	8/29/2016
Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2084		HTC-1	HDE		2084	II	3/23/2018	3/23/2017
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2051	9kHz - 18GHz		Florida RF			II	3/5/2018	3/5/2017
Asset #2054	9kHz - 18GHz		Florida RF			II	10/30/2017	10/30/2016

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Rev. 2/26/2017

Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2093 MXE EMI Receiver	20Hz-26.5GHz	N9038A	Agilent	MY51210181	2093	I	8/9/2017	8/9/2016
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz		I	4/29/2017	4/29/2015
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Yellow Horn	1-18GHz	3115	EMCO	9608-4898	37	I	8/9/2018	8/6/2016
Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2081		HTC-1	HDE		2081	II	4/5/2017	4/5/2016
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2052	9kHz - 18GHz		Florida RF			II	3/2/2017	3/2/2016
Asset #2053	9kHz - 18GHz		Florida RF			II	10/1/2017	10/30/2016

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



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Radiated Emissions Table

Date: 27-Feb-17			Company: Assa Abloy				Work Order: R0115					
Engineer: Zac Johnson			EUT Desc: R100				EUT Operating Voltage/Frequency: 3V DC					
Temp: 23.7C			Humidity: 26%		Pressure: 1017				Battery			
Frequency Range: 30-1000MHz							Measurement Distance: 3 m					
Notes: Worst Case Orientation Y												
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	---			FCC Class B		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
V	67.8	36.6	25.4	7.9	0.5	19.6	---	---	---	40.0	-20.4	Pass
V	98.9	33.8	25.4	9.4	0.6	18.4	---	---	---	43.5	-25.1	Pass
H	149.3	34.0	25.4	12.2	0.9	21.7	---	---	---	43.5	-21.8	Pass
V	151.2	36.6	25.4	12.2	0.9	24.3	---	---	---	43.5	-19.2	Pass
V	164.8	39.5	25.5	12.0	0.8	26.8	---	---	---	43.5	-16.7	Pass
H	339.4	38.0	25.6	14.1	1.2	27.7	---	---	---	46.0	-18.3	Pass
H	353.0	34.1	25.6	14.3	1.1	23.9	---	---	---	46.0	-22.1	Pass
H	522.8	34.0	25.6	17.7	1.5	27.6	---	---	---	46.0	-18.4	Pass
Table Result: Pass by -16.7 dB Worst Freq: 164.8 MHz												
Test Site: EMI Chamber 1			Cable 1: Asset #2051				Cable 2: Asset #2054			Cable 3: ---		
Analyzer: Rental SA#2			Preamp: Red-Brown				Antenna: Red-White			Preselector: ---		
CSsoft Radiated Emissions Calculator			v 1.017.183									
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor												
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Radiated Emissions Table

Date: 24-Mar-17		Company: Assa Abloy						Work Order: R0115							
Engineer: Zac Johnson		EUT Desc: R100						EUT Operating Voltage/Frequency: 3V DC							
Temp: 22.9C		Humidity: 25%						Pressure: 1021			Battery				
Frequency Range: 1GHz - 6GHz									Measurement Distance: 3 m						
Notes: Worst case orientation Y DCCF = -17.3dB									EUT Max Freq: 2475MHz						
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average			
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	
Low Channel V	4810.0	53.5	36.2	37.0	33.0	6.1	55.6	38.3	74.0	-18.4	Pass	54.0	-15.7	Pass	
Center Channel V	4880.0	50.8	33.5	37.1	33.0	5.9	52.6	35.3	74.0	-21.4	Pass	54.0	-18.7	Pass	
				37.1	33.1	5.8	54.0	36.7	74.0	-20.0	Pass	54.0	-17.3	Pass	
High Channel V	4950.0	52.2	34.9	37.1	33.1	5.8	54.0	36.7	74.0	-20.0	Pass	54.0	-17.3	Pass	
Table Result:				Pass		by		-15.7 dB		Worst Freq:				4810.0 MHz	
Test Site: EMI Chamber 2		Cable 1: Asset #2053						Cable 2: Asset #2052			Cable 3: ---				
Analyzer: Rental SA#2		Preamp: Asset #2111						Antenna: Orange Horn			Preselector: ---				
CSsoft Radiated Emissions Calculator v1.017.185															
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor															
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Radiated Emissions Table

Date: 02-Aug-17		Company: Assa Abloy						Work Order: R0115							
Engineer: Zac Johnson		EUT Desc: R100						EUT Operating Voltage/Frequency: 3V DC							
Temp: 24.8		Humidity: 46%						Pressure: 1004mBar							
Frequency Range: 1-6GHz									Measurement Distance: 3 m						
Notes: Channel 26 2400-2500MHz Notch Filter Used									EUT Max Freq: 2480MHz						
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average			
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	
V	4959.0	52.7	35.4	37.1	33.3	6.2	55.1	37.8	74.0	-18.9	Pass	54.0	-16.2	Pass	
H	4959.0	48.1	30.8	37.1	33.3	6.2	50.5	33.2	74.0	-23.5	Pass	54.0	-20.8	Pass	
Table Result:				Pass		by		-16.2 dB		Worst Freq:				4959.0 MHz	
Test Site: EMI Chamber 1				Cable 1: Asset #2051				Cable 2: Asset #2054				Cable 3: ---			
Analyzer: Rental SA#1				Preamp: Asset #2111				Antenna: Black Horn				Preselector: ---			
CSsoft Radiated Emissions Calculator v 1.017.188															
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor															
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Radiated Emissions Table

Date: 28-Feb-17		Company: Assa Abloy				Work Order: R0115								
Engineer: Zac Johnson		EUT Desc: R100				EUT Operating Voltage/Frequency: 3V DC								
Temp: 22.9C		Humidity: 25%				Pressure: 1020		Battery						
Frequency Range: 6GHz-18GHz						Measurement Distance: 1 m								
Notes: Worst case orientation Y DCCF = -17.3dB						EUT Max Freq: 2475MHz								
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
Low Channel H	7215.0	20.4	3.1	0.0	37.2	6.4	64.0	46.7	83.5	-19.5	Pass	63.5	-16.8	---
Center Channel H	7320.0	27.0	9.7	0.0	37.6	6.3	70.9	53.6	83.5	-12.6	Pass	63.5	-9.9	---
									---	---	---	---	---	---
High Channel H	7425.0	22.3	5.0	0.0	37.6	6.3	66.2	48.9	83.5	-17.3	Pass	63.5	-14.6	---
Table Result: Pass by -9.9 dB Worst Freq: 7320.0 MHz														
Test Site: EMI Chamber 1		Cable 1: Asset #2051				Cable 2: Asset #2054				Cable 3: ---				
Analyzer: Rental SA#2		Preamp: none				Antenna: Orange Horn				Preselector: ---				
CSsoft Radiated Emissions Calculator v 1.017.183														
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														
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Radiated Emissions Table

Date: 02-Aug-17		Company: Assa Abloy				Work Order: R0115									
Engineer: Zac Johnson		EUT Desc: R100				EUT Operating Voltage/Frequency: 3V DC									
Temp: 24.8		Humidity: 46%				Pressure: 1004mBar									
Frequency Range: 6-18GHz						Measurement Distance: 3 m									
Notes: Channel 26				EUT Max Freq: 2480MHz											
2400-2500MHz Notch Filter Used															
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average			
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	
V	7440.0	51.6	34.3	36.9	37.8	8.5	61.0	43.7	83.5	-22.5	Pass	63.5	-19.8	Pass	
H	7440.0	56.3	39.0	36.9	37.8	8.5	65.7	48.4	83.5	-17.8	Pass	63.5	-15.1	Pass	
Table Result:		Pass		by		-15.1 dB		Worst Freq:		7440.0 MHz					
Test Site: EMI Chamber 1				Cable 1: Asset #2051				Cable 2: Asset #2054				Cable 3: Asset #1522			
Analyzer: Rental SA#2				Preamp: Asset #2111				Antenna: Black Horn				Preselector: ---			
CSsoft Radiated Emissions Calculator v 1.017.188															
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor															
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Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2093 MXE EMI Receiver	20Hz-26.5GHz	N9038A	Agilent	MY51210181	2093	I	8/9/2017	8/9/2016
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz		II	3/21/2017	3/21/2015
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz		I	5/23/2017	5/23/2015
Preamps / Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Red-White	0.009-2000MHz	ZFL-1000-LN	CS	N/A	1258	II	10/30/2017	10/30/2016
A#2111 HF Preamp	0.5-18GHz	PAM-118A	COM-POWER	551063	2111	II	11/5/2017	11/5/2016
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Red-Brown Bilog	30-2000MHz	JB1	Sunol	A0032406	1218	I	1/13/2019	1/13/2017
Orange Horn	1-18GHz	3115	EMCO	0004-6123	390	I	10/13/2018	10/13/2016
Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2080		HTC-1	HDE		2080	II	4/5/2017	4/5/2016
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #1505	9kHz - 18GHz		Florida RF			II	3/2/2017	3/2/2016
Asset #2051	9kHz - 18GHz		Florida RF			II	3/2/2017	3/2/2016
Asset #2054	9kHz - 18GHz		Florida RF			II	10/1/2017	10/30/2016

Test equipment 30MHz to 18GHz

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Spectrum Analyzers / Receivers / Preselectors 2093 MXE EMI Receiver	Range 20Hz-26.5GHz	MN N9038A	Mfr Agilent	SN MY51210181	Asset 2093	Cat I	Calibration Due 8/9/2017	Calibrated on 8/9/2016
Radiated Emissions Sites EMI Chamber 1	FCC Code 719150	IC Code 2762A-6	VCCI Code A-0015	Range 1-18GHz	Asset 1685	Cat I	Calibration Due 12/21/2018	Calibrated on 12/21/2016
Preamps / Couplers Attenuators / Filters 2111 HF Preamp 2116 BRF	Range 0.5-18GHz 0.009-18000MHz	MN PAM-118A BRM50702	Mfr COM-POWER Micro-Tronics	SN 551063 G226	Asset 2111 2116	Cat II II	Calibration Due 11/5/2017 11/26/2017	Calibrated on 11/5/2016 11/26/2016
Antennas Black Horn	Range 1-18GHz	MN 3115	Mfr EMCO	SN 9703-5148	Asset 56	Cat I	Calibration Due 8/29/2018	Calibrated on 8/29/2016
Meteorological Meters Weather Clock (Pressure Only) TH A#2084		MN BA928 HTC-1	Mfr Oregon Scientific HDE	SN C3166-1	Asset 831 2084	Cat I II	Calibration Due 4/28/2018 3/23/2018	Calibrated on 4/28/2016 3/23/2017
Cables Asset #1522 Asset #2051 Asset #2054	Range 9kHz - 18GHz 9kHz - 18GHz 9kHz - 18GHz		Mfr Florida RF Florida RF Florida RF			Cat II II II	Calibration Due 2/11/2018 3/5/2018 10/30/2017	Calibrated on 2/11/2017 3/5/2017 10/30/2016

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Test equipment 1GHz to 18GHz Channel 26 Only

Radiated Emissions Table															
Date: 01-Mar-17				Company: Assa Abloy						Work Order: R0115					
Engineer: Zac Johnson				EUT Desc: R100						EUT Operating Voltage/Frequency: 3V DC					
Temp: 22.2C				Humidity: 33%						Pressure: 985					
										Battery					
Frequency Range: 18GHz-25GHz								Measurement Distance: 0.1 m							
Notes: Worst case orientation Y								EUT Max Freq: 2475MHz							
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dBm)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average			
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	
No Emissions Found					---	---	---			---		---	---	---	
Table Result:				Pass		by		--- dB		Worst Freq:				--- MHz	
Test Site: EMI Chamber 2				Cable 1: EMIR-HIGH-07						Cable 2: ---				Cable 3: ---	
Analyzer: Rental SA#2				Preamp: 18-26.5GHz						Antenna: 18-26.5GHz Horn				Preselector: ---	
CSsoft Radiated Emissions Calculator v 1.017.183														Copyright Curtis-Straus LLC 200	
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor															

Spectrum Analyzers / Receivers / Preselectors 2093 MXE EMI Receiver	Range 20Hz-26.5GHz	MN N9038A	Mfr Agilent	SN MY51210181	Asset 2093	Cat I	Calibration Due 8/9/2017	Calibrated on 8/9/2016
Radiated Emissions Sites EMI Chamber 2	FCC Code 719150	IC Code 2762A-7	VCCI Code A-0015	Range 1-18GHz		Cat I	Calibration Due 4/29/2017	Calibrated on 4/29/2015
Preamps / Couplers Attenuators / Filters HF (Yellow)	Range 18-26.5GHz	MN AFS4-18002650-60-8P-4	Mfr CS	SN 467559	Asset 1266	Cat II	Calibration Due 9/16/2017	Calibrated on 9/16/2016
Antennas HF (White) Horn	Range 18-26.5GHz	MN 801-WLM	Mfr Waveline	SN 758	Asset 758	Cat III	Calibration Due Verify before Use	Calibrated on date of test
Meteorological Meters Weather Clock (Pressure Only) TH A#2081		MN BA928 HTC-1	Mfr Oregon Scientific HDE	SN C3166-1	Asset 831 2081	Cat I II	Calibration Due 4/28/2018 4/5/2017	Calibrated on 4/28/2016 4/5/2016
Cables REM-High-07	Range 1 - 26.5GHz		Mfr TRU			Cat II	Calibration Due 8/14/2017	Calibrated on 8/14/2016

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Radiated Emissions Table

Date: 02-Aug-17		Company: Assa Abloy						Work Order: R0115												
Engineer: Zac Johnson		EUT Desc: R100						EUT Operating Voltage/Frequency: 3V DC												
Temp: 24.8		Humidity: 46%						Pressure: 1004mBar												
Frequency Range: 18-26.5GHz								Measurement Distance: 3 m												
Notes: Channel 26								EUT Max Freq: 2480MHz												
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average								
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)						
H / V	No Emissions Found			---	---	---	---	---	---	---	---	---	---							
Table Result: Pass by --- dB Worst Freq: --- MHz																				
Test Site: EMI Chamber 1					Cable 1: Asset #2329					Cable 2: ---					Cable 3: ---					
Analyzer: Rental SA#3					Preamp: 18-26.5GHz					Antenna: 18-26.5GHz Horn					Preselector: ---					
CSsoft Radiated Emissions Calculator v 1.017.188																				
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																				
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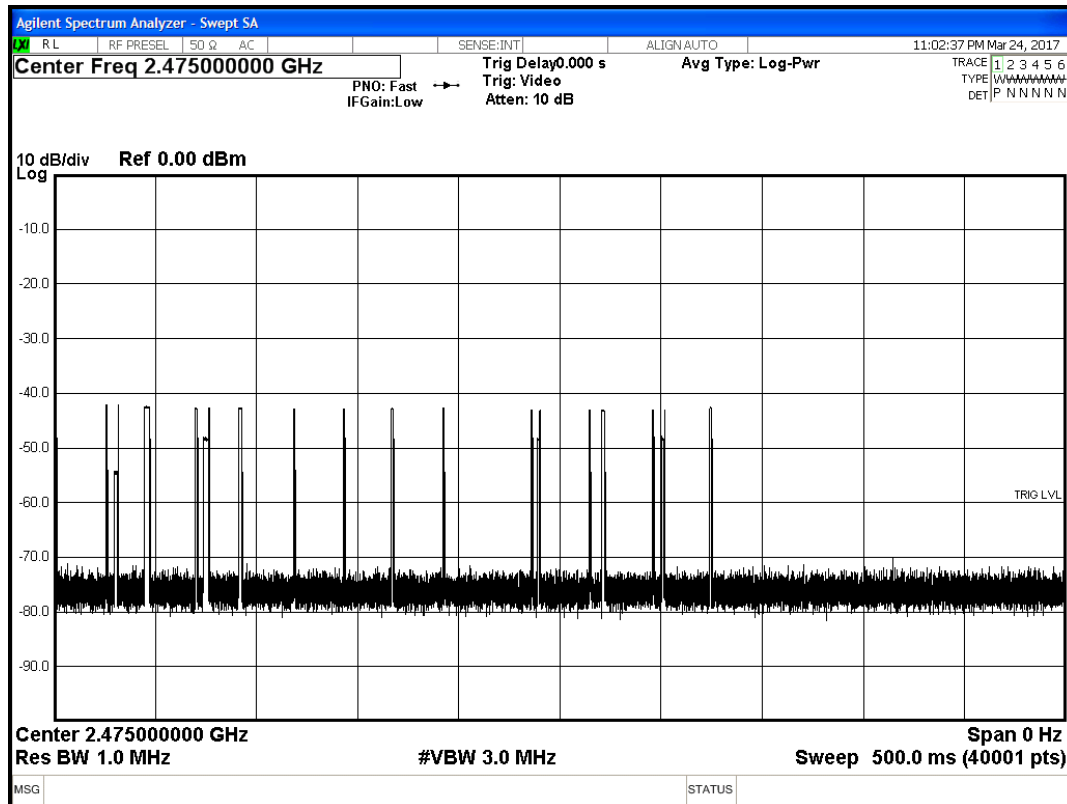
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Spectrum Analyzers / Receivers / Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental EXA Signal Analyzer(1118473)		9KHz-26.5GHz	N9010A-526;N	AT	MY51170076	1118473	I	5/19/2018	5/19/2017
Radiated Emissions Sites		FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 1		719150	2762A-6	A-0015	1-18GHz	1685	I	12/21/2018	12/21/2016
Preamps / Couplers Attenuators / Filters		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF (Yellow)		18-26.5GHz	AFS4-18002650-60-8P-4	CS	467559	1266	II	9/16/2017	9/16/2016
Antennas		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF (White) Horn		18-26.5GHz	801-WLM	Waveline	758	758	III	Verify before Use	date of test
Meteorological Meters			MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)			BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2084			HTC-1	HDE		2084	II	3/23/2018	3/23/2017
Cables		Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2329		1 - 26.5GHz	PE350-120	Pasternack	1545		II	Damaged	

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



Duty-Cycle Correction Factor



Software used to calculate duty-cycle over worst case 100ms window from trace data points of the plot above.

Duty-Cycle = 13.6%

DCCF = $20 \cdot \log(13.6/100) = -17.3\text{dB}$

Power Spectral Density

Limit: The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission. [15.247(e)]

MEASUREMENTS / RESULTS

Peak Power Spectral Density												
Date: 01-Mar-17			Company: Assa Abloy						Work Order: R0115			
Engineer: Zac Johnson			EUT Desc: R100						EUT Operating Voltage/Frequency: 3V DC			
Temp: 22.2°C			Humidity: 33%						Pressure: 985mbar			
									Battery			
Frequency Range: 2405-2475MHz								Measurement Distance: 3 m				
Notes: Per FCC KDB 558074 D01 DTS Meas Guidance v03r05 Section 10.2												
Antenna Polarization (H/V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	Adjusted ERP Reading (dBm)	Antenna Gain (dBi)	Adjusted Conducted Reading (dBm)	FCC 15.247		
										Limit (dBm)	Margin (dB)	Result (Pass/Fail)
H	2405	53.2	0.0	28.2	3.2	84.6	-10.6	3.45	-14.05	8.0	-22.05	Pass
H	2440	52.9	0.0	28.2	3.2	84.3	-10.9	3.45	-14.35	8.0	-22.35	Pass
Table Result: Pass by -21.95 dB Worst Freq: 2475.0 MHz												
Test Site: EMI Chamber 2			Cable 1: 2052 cbl						Cable 2: 2053 cbl			Cable 3: ---
Analyzer: 2093 SA			Preamp: None						Antenna: Yellow Horn			Preselector: ---
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor												
Adjusted EIRP = Adjusted Reading - 104.77 + 20*log(3)												
Adjusted Conducted Reading = Adjusted EIRP - Antenna Gain												

Peak Power Spectral Density							
Date: 8/3/2017		Company: Assa Abloy			Work Order: R0115		
Engineer: Zac Johnson		EUT: R100			Operating Voltage/Frequency: 3V DC		
Temp: 24.8°C		Humidity: 46%		Pressure: 1004mBar		Battery	
Frequency Range: 2402-2480 MHz				Measurement Type: Conducted			
Notes:							
Frequency	Peak Reading	Cable Loss	Attenuator Loss	Peak PSD	Limit	Margin	Result
(MHz)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
2480	-46.94	1.88	29.61	-15.45	8.0	-23.45	
Test Site: EMI Chamber 2		Cable 1: 2286 cbl		Attenuator: A2121 Pad			
Analyzer: 1199509 SA							
PSD(dBm) = Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dBm)							



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PSD Low Channel



PSD Mid Channel



PSD High Channel

Occupied Bandwidth

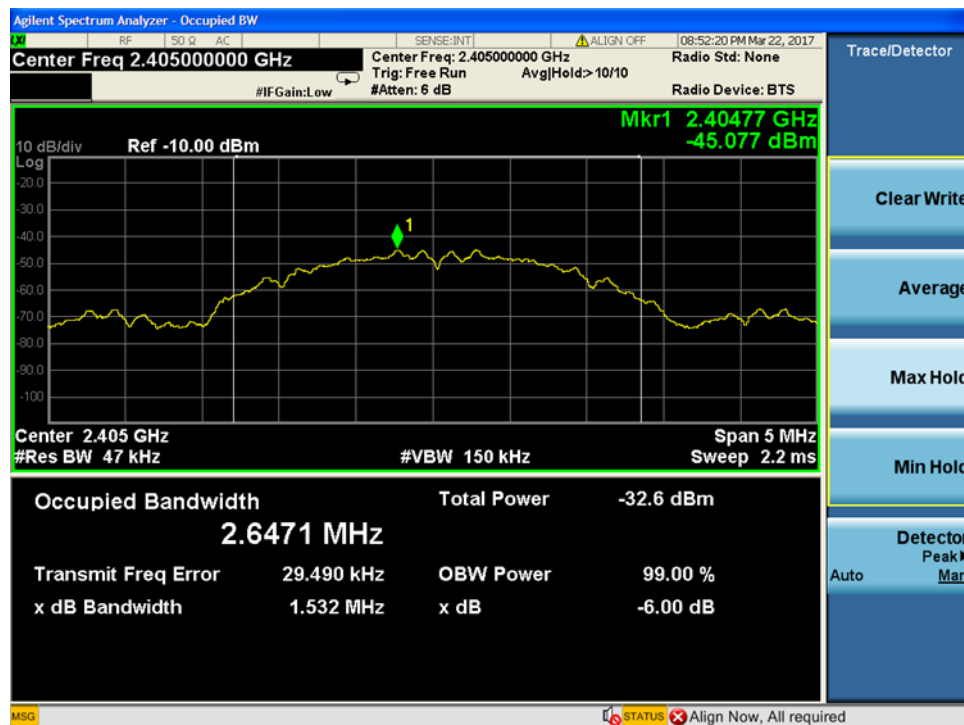
Requirement: When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

[RSS-GEN 6.6]

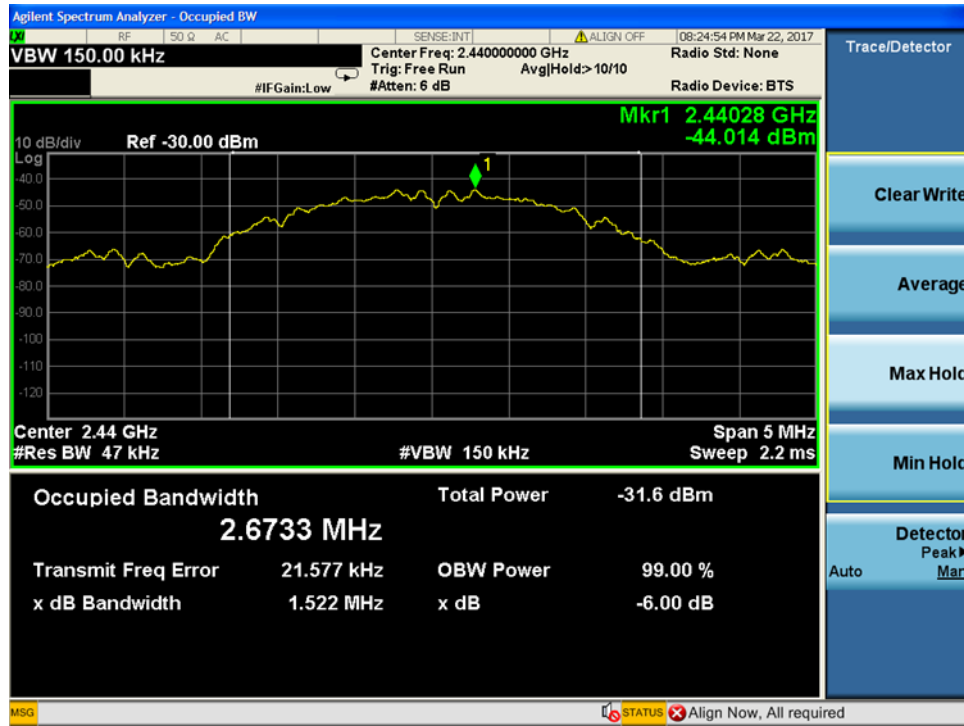
MEASUREMENTS / RESULTS

99% Occupied Bandwidth			
Date: 6/19/2017 & 8/3/2017		Company: Assa Abloy	
Engineer: Zac Johnson		EUT Desc: R100	
Temp: 24.8°C / 24.8°C		Humidity: 50% / 46%	
		Pressure: 999mBar / 1004mBar	
		Battery	
Frequency Range: 2405-2480MHz		Measurement Distance: 3 m	
Notes:		EUT Tx Freq: 2440MHz	
Frequency	Occupied Bandwidth - Reading		
(MHz)	(KHz)		
2405	2647		
2440	2673		
2480	2693		
Test Site: EMI Chamber 2		Cable 1: 2286 cbl	
Analyzer: 1199509 SA		Cable 2: ---	
		Cable 3: ---	
CSsoft Radiated Emissions Calculator v 1.017.156		Preselector: ---	
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor			
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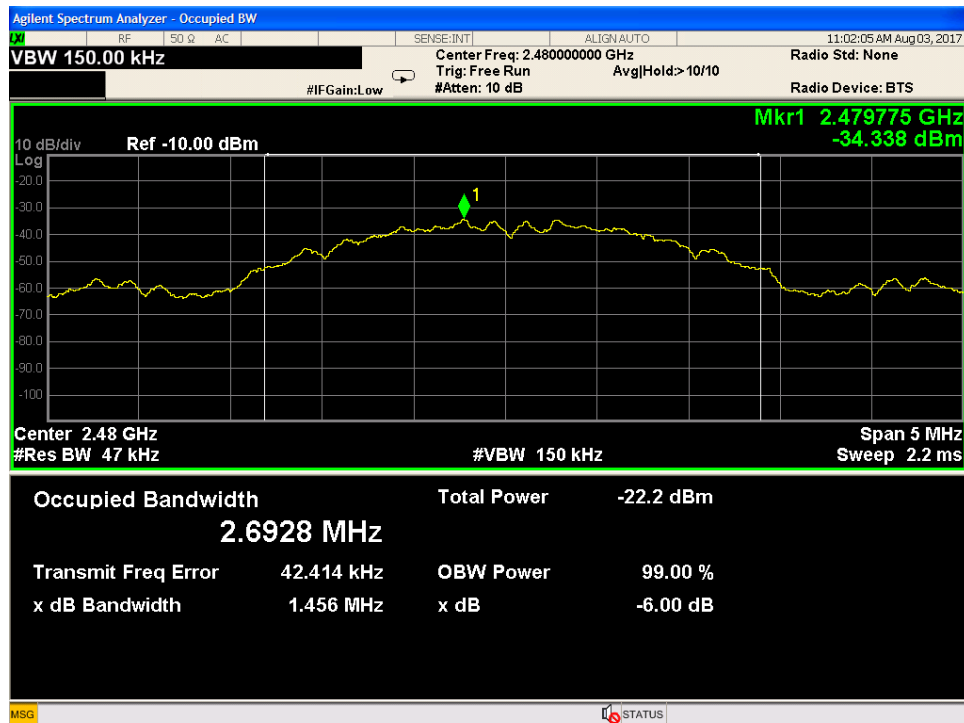
PLOTS



Occupied Bandwidth Low Channel



Occupied Bandwidth Center Channel



Occupied Bandwidth High Channel

Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radiated Emissions (30-1000MHz)		
NIST	5.6dB	N/A
CISPR	4.6dB	5.2dB (Ucisprr)
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions		
NIST	3.9dB	N/A
CISPR	3.6dB	3.6dB (Ucisprr)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation:		
• Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4% 0.3dB	5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		

Conditions of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS," "MTL," "ACTS," "MTL-ACTS" and CURTIS-STRAUS (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only where such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.
14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.



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15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B) NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.\$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

The complete list of the Approved Subcontractors Curtis-Straus may use to delegate the performance of work can be provided upon request.
Rev.160009121(2)_#684340 v14CS

