FCC RADIO TEST REPORT

FCC ID	:	**UZ7FX9600**
Equipment	:	**RFID READER**
Brand Name	:	**ZEBRA**
Model Name	:	**FX9600**
Applicant	:	**Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Manufacturer	:	**Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Standard	:	**FCC Part 15 Subpart C §15.247**

The product was received on Oct. 18, 2021 and testing was started from May 16, 2024 to Jun. 22, 2024. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory
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History of this test report

Report No.	Version	Description	Issue Date
FR442926	01	Initial issue of report	Jun. 27, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.247(a)(1)	Number of Channels	Not Required	-
-	15.247(a)(1)	Hopping Channel Separation	Not Required	-
-	15.247(a)(1)	Dwell Time of Each Channel	Not Required	-
-	15.247(a)(1)	20dB Bandwidth	Not Required	-
-	2.1049	99% Occupied Bandwidth	Not Required	-
3.1	15.247(b)(1)	Output Power	Pass	-
-	15.247(d)	Conducted Band Edges	Not Required	-
-	15.247(d)	Conducted Spurious Emission	Not Required	-
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	4.17 dB under the limit at 2706.90 MHz
-	15.207	AC Conducted Emission	Not Required	-
3.3	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Note:

1. Not required means after assessing, test items are not necessary to carry out.
2. This is a variant report by adding external antenna. All the test cases were performed on original report which can be referred to Sporton Report Number FR751510. Based on the original report, the test cases were verified.

Conformity Assessment Condition:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account. 2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”.
Disclaimer:
The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Wei Chen

Report Producer: Ming Chen

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	RFID READER
Brand Name	Zebra
Model Name	FX9600
Sample 1	EUT with 8 antenna port
Sample 2	EUT with 4 antenna port
FCC ID	UZ7FX9600
EUT supports Radios application	UHF RFID
HW Version	0.0.5.0
SW Version	OS version : 2.2.10.0 Radio Firmware : 2.4.2.0 Radio RF Board : 13.0.0.0
MFD	30SEP17
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories				
Adapter	**Brand Name**	Zebra	**Part Number**	PWR-BGA24V78W0WW
POE	**Brand Name**	Zebra	**Part Number**	AP-PSBIAS-2P3-ATR
Power cable	**Brand Name**	Zebra	**Part Number**	301105-419
Antenna	**Brand Name**	SMART LABEL SOLUTIONS	**Model Number**	SLS 10000050-ETSI
Antenna RF cable	**Brand Name**	Zebra	**Part Number**	CBLRD-1B40006801

1.2 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Frequency Range	902.75 MHz ~ 927.25 MHz
Number of Channels	50
Maximum Output Power to Antenna	27.38 dBm (0.5470 W)
Antenna Type / Gain	Omni directional Multi Linear Patch Antenna (a.k.a. Wave) with gain 8.6 dBi
Type of Modulation	ASK

Remark: The above EUT's information was declared by manufacturer. Please refer to Disclaimer in report summary.

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	TH05-HY, 03CH11-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

TW3786

1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r01
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
902.75-927.25 MHz	1	902.75	28	916.25
	2	903.25	29	916.75
	3	903.75	30	917.25
	4	904.25	31	917.75
	5	904.75	32	918.25
	6	905.25	33	918.75
	7	905.75	34	919.25
	8	906.25	35	919.75
	9	906.75	36	920.25
	10	907.25	37	920.75
	11	907.75	38	921.25
	12	908.25	39	921.75
	13	908.75	40	922.25
	14	909.25	41	922.75
	15	909.75	42	923.25
	16	910.25	43	923.75
	17	910.75	44	924.25
	18	911.25	45	924.75
	19	911.75	46	925.25
	20	912.25	47	925.75
	21	912.75	48	926.25
	22	913.25	49	926.75
	23	913.75	50	927.25
	24	914.25		
	25	914.75		
	26	915.25		
	27	915.75		

2.2 Test Mode

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and only the worst case emissions were reported in this report.

b. AC power line Conducted Emission was tested under maximum output power.

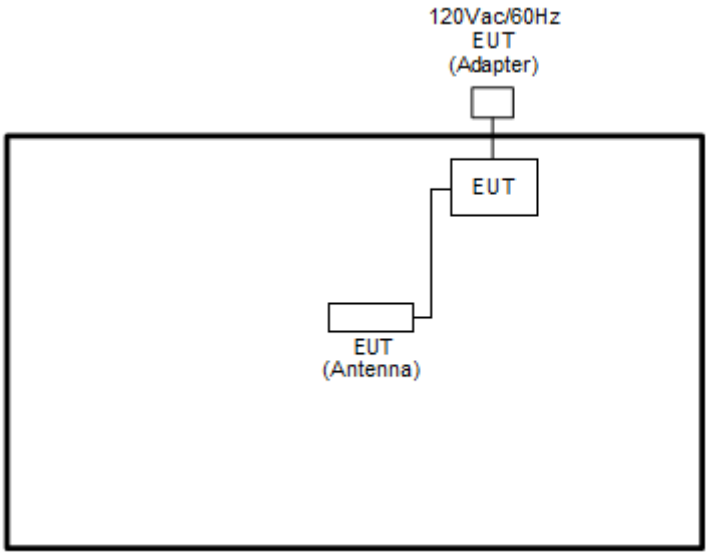
The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	**UHF RFID**
Conducted Test Cases	Mode 1: UHF RFID Tx 902.3 MHz Mode 2: UHF RFID Tx 914.5 MHz Mode 3: UHF RFID Tx 927.25 MHz
Radiated Test Cases	Mode 1: UHF RFID Tx 902.3 MHz Mode 2: UHF RFID Tx 914.5 MHz Mode 3: UHF RFID Tx 927.25 MHz

Remark: For Radiated Test Cases, the tests were performed with Sample 1.

2.3 Connection Diagram of Test System

<Radiated Spurious Emission Mode>



2.4 EUT Operation Test Setup

The RF test items, an engineering test program “Putty” was provided and enabled to make EUT transmitting signals.

2.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 Output Power Measurement

3.1.1 Limit of Output Power

Section 15.247 (a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions: (1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

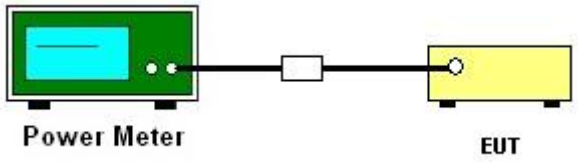
3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of Output Power

Test Mode :	UHF RFID	Temperature :	20~25℃
Test Engineer :	Shiming Liu	Relative Humidity :	50~56%

Port 1

Frequency (MHz)	RF Power (dBm)		
	UHF	Max. Limits (dBm)	Pass/Fail
902.3	26.39	30.00	Pass
914.5	27.35	30.00	Pass
927.75	24.45	30.00	Pass

Port 2

Frequency (MHz)	RF Power (dBm)		
	UHF	Max. Limits (dBm)	Pass/Fail
902.3	26.36	30.00	Pass
914.5	27.23	30.00	Pass
927.75	24.42	30.00	Pass

Port 3

Frequency (MHz)	RF Power (dBm)		
	UHF	Max. Limits (dBm)	Pass/Fail
902.3	26.28	30.00	Pass
914.5	27.32	30.00	Pass
927.75	24.42	30.00	Pass

Port 4

Frequency (MHz)	RF Power (dBm)		
	UHF	Max. Limits (dBm)	Pass/Fail
902.3	26.39	30.00	Pass
914.5	27.33	30.00	Pass
927.75	24.47	30.00	Pass

Port 5

Frequency (MHz)	RF Power (dBm)		
	UHF	Max. Limits (dBm)	Pass/Fail
902.3	26.40	30.00	Pass
914.5	27.37	30.00	Pass
927.75	24.40	30.00	Pass

Port 6

Frequency (MHz)	RF Power (dBm)		
	UHF	Max. Limits (dBm)	Pass/Fail
902.3	26.41	30.00	Pass
914.5	27.38	30.00	Pass
927.75	24.50	30.00	Pass

Port 7

Frequency (MHz)	RF Power (dBm)		
	UHF	Max. Limits (dBm)	Pass/Fail
902.3	26.30	30.00	Pass
914.5	27.37	30.00	Pass
927.75	24.44	30.00	Pass

Port 8

Frequency (MHz)	RF Power (dBm)		
	UHF	Max. Limits (dBm)	Pass/Fail
902.3	26.22	30.00	Pass
914.5	27.35	30.00	Pass
927.75	24.45	30.00	Pass

3.1.6 Test Result of Average Power (Reporting Only)

Test Mode :	UHF RFID	Temperature :	20~25℃
Test Engineer :	Shiming Liu	Relative Humidity :	50~56%

Port 1

Frequency (MHz)	RF Power (dBm)
	UHF
902.3	24.17
914.5	25.16
927.75	22.33

Port 2

Frequency (MHz)	RF Power (dBm)
	UHF
902.3	24.15
914.5	25.10
927.75	22.30

Port 3

Frequency (MHz)	RF Power (dBm)
	UHF
902.3	24.05
914.5	25.11
927.75	22.31

Port 4

Frequency (MHz)	RF Power (dBm)
	UHF
902.3	24.17
914.5	25.11
927.75	22.33

Port 5

Frequency (MHz)	RF Power (dBm)
	UHF
902.3	24.17
914.5	25.15
927.75	22.30

Port 6

Frequency (MHz)	RF Power (dBm)
	UHF
902.3	24.18
914.5	25.20
927.75	22.35

Port 7

Frequency (MHz)	RF Power (dBm)
	UHF
902.3	24.00
914.5	25.19
927.75	22.30

Port 8

Frequency (MHz)	RF Power (dBm)
	UHF
902.3	23.94
914.5	25.12
927.75	22.33

3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2 Measuring Instruments

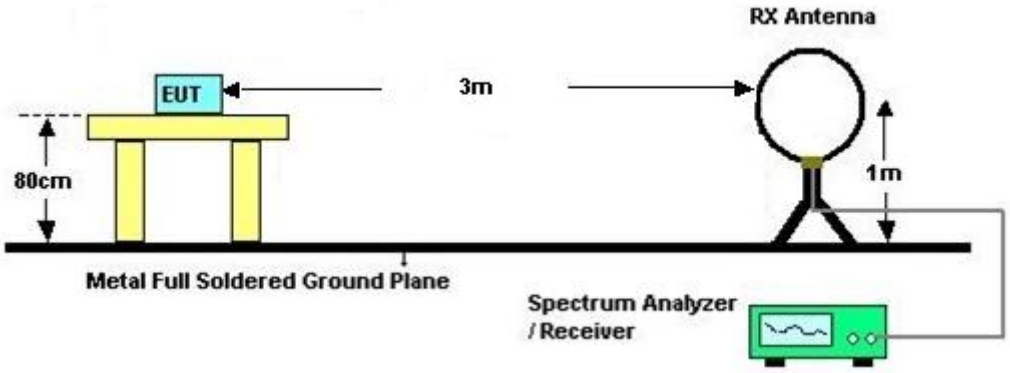
Please refer to the measuring equipment list in this test report.

3.2.3 Test Procedures

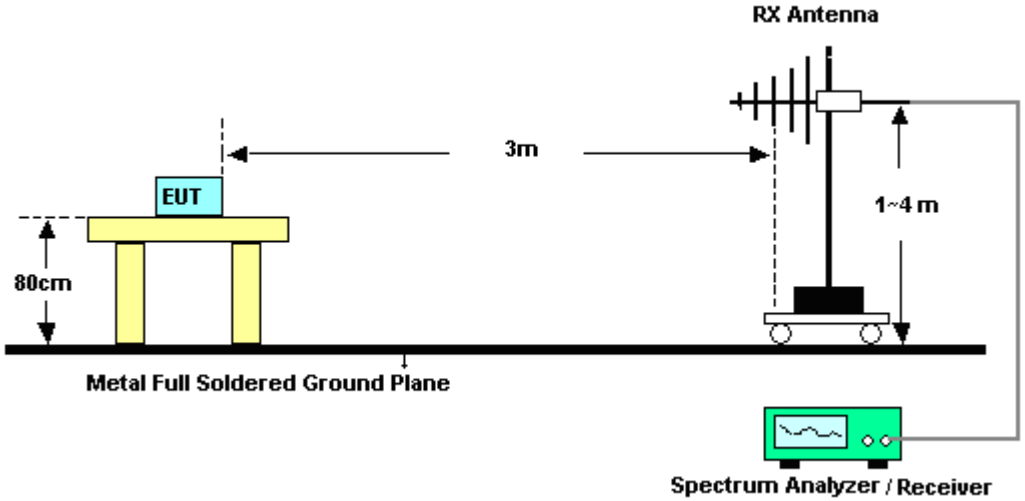
1. The EUT is placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
2. The EUT is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT is arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set the maximum power setting and enable the EUT to transmit continuously.
5. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW = 100 kHz for f < 1 GHz, RBW = 1 MHz for f>1 GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement: use duty cycle correction factor method per 15.35(c).
   Duty cycle = On time/100 milliseconds
   On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$
   Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
   Average Emission Level = Peak Emission Level + 20*log (Duty cycle)
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
7. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as "-".
8. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as "-".

3.2.4 Test Setup

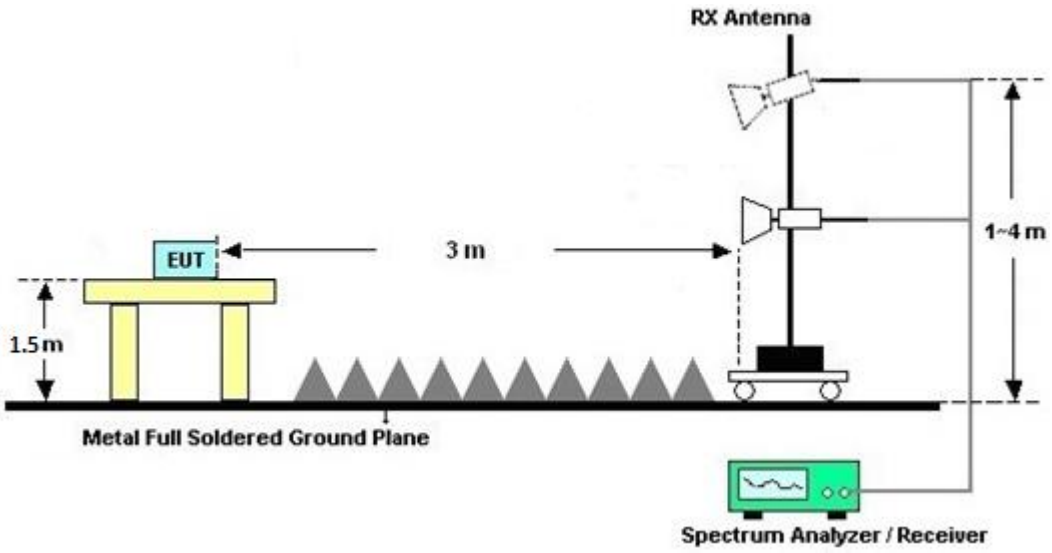
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B.

3.2.7 Duty Cycle

Please refer to Appendix C.

3.2.8 Test Result of Radiated Spurious Emission

Please refer to Appendix A and B.

3.3 Antenna Requirements

3.3.1 Standard Applicable

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 07, 2023	May 16, 2024~ Jun. 05, 2024	Nov. 06, 2024	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	1036004	N/A	Jul. 27, 2023	May 16, 2024~ Jun. 05, 2024	Jul. 26, 2024	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Jul. 27, 2023	May 16, 2024~ Jun. 05, 2024	Jul. 26, 2024	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV3044	101466	10HZ~44GHZ	Jan. 24, 2024	May 16, 2024~ Jun. 05, 2024	Jan. 23, 2025	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 12, 2023	May 25, 2024~ Jun. 22, 2024	Sep. 11, 2024	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 07, 2023	May 25, 2024~ Jun. 22, 2024	Oct. 06, 2024	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-01620	1GHz~18GHz	Aug. 17, 2023	May 25, 2024~ Jun. 22, 2024	Aug. 16, 2024	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 08, 2023	May 25, 2024~ Jun. 22, 2024	Dec. 07, 2024	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Mar. 25, 2024	May 25, 2024~ Jun. 22, 2024	Mar. 24, 2025	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055007	1GHz~18GHz	Jun. 14, 2023	May 25, 2024~ Jun. 22, 2024	Jun. 13, 2024	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055007	1GHz~18GHz	Jun. 13, 2024	May 25, 2024~ Jun. 22, 2024	Jun. 12, 2025	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 05, 2023	May 25, 2024~ Jun. 22, 2024	Oct. 04, 2024	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY55420170	20MHz~8.4GHz	Aug. 03, 2023	May 25, 2024~ Jun. 22, 2024	Aug. 02, 2024	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	May 25, 2024~ Jun. 22, 2024	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	May 25, 2024~ Jun. 22, 2024	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	May 25, 2024~ Jun. 22, 2024	N/A	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	May 25, 2024~ Jun. 22, 2024	N/A	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz~40GHz	Mar. 06, 2024	May 25, 2024~ Jun. 22, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801595/2	30MHz~40GHz	Mar. 06, 2024	May 25, 2024~ Jun. 22, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9K~30M	Mar. 06, 2024	May 25, 2024~ Jun. 22, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	30M~40G	Mar. 06, 2024	May 25, 2024~ Jun. 22, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTM-303B	TP140325	N/A	Dec. 08, 2023	May 25, 2024~ Jun. 22, 2024	Dec. 07, 2024	Radiation (03CH11-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN11	1.53G Low Pass	Sep. 11, 2023	May 25, 2024~ Jun. 22, 2024	Sep. 10, 2024	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-900-1000-15000-60SS	SN12	1GHz High Pass Filter	Sep. 11, 2023	May 25, 2024~ Jun. 22, 2024	Sep. 10, 2024	Radiation (03CH11-HY)

5 Measurement Uncertainty

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**6.1 dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.3 dB**

Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.3 dB**

Appendix A. Radiated Spurious Emission

Test Engineer :	Yuan Lee, Fu Chen and Troye Hsieh	Temperature :	20~20.7°C
		Relative Humidity :	53~66%

RFID

RFID (LF @ 3m)

RFID	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		30.81	31.56	-8.44	40	29.73	23.74	10.54	32.45	-	-	P	H
		205.23	33.22	-10.28	43.5	38.82	14.93	11.81	32.34	-	-	P	H
		284.07	32.5	-13.5	46	33.38	18.78	12.25	31.91	-	-	P	H
		794.9	37.45	-8.55	46	26.71	28.23	14.03	31.52	200	305	Q	H
		855.1	38.13	-7.87	46	26.56	29.12	14.08	31.63	100	98	Q	H
	*	902.3	126.52	-	-	114.74	28.96	14.3	31.48	150	341	P	H
		971.3	44.72	-9.28	54	29.86	31.12	14.48	30.74	-	-	P	H
RFID													
902.3MHz		34.32	29.58	-10.42	40	29.36	22.17	10.45	32.4	200	280	Q	V
		175.26	30.83	-12.67	43.5	36.23	14.99	11.63	32.02	-	-	P	V
		284.88	31.25	-14.75	46	32.1	18.81	12.25	31.91	-	-	P	V
		768.3	38.67	-7.33	46	28.24	28.07	13.89	31.53	200	64	Q	V
		806.1	39.42	-6.58	46	28.81	28.09	14.05	31.53	100	96	Q	V
	*	902.3	128.76	-	-	116.98	28.96	14.3	31.48	113	360	P	V
		970.6	45.25	-8.75	54	30.4	31.12	14.48	30.75	-	-	P	V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. Non restricted band limit is radio frequency level down 20db.
4. The emission position marked as “-” means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.

RFID	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
RFID 914.5MHz		31.62	31.68	-8.32	40	30.24	23.37	10.51	32.44	-	-	P	H
		204.96	33.15	-10.35	43.5	38.76	14.92	11.81	32.34	-	-	P	H
		282.99	31.94	-14.06	46	32.87	18.75	12.24	31.92	-	-	P	H
		799.1	35.84	-10.16	46	25.11	28.2	14.05	31.52	150	350	Q	H
		866.3	35.69	-10.31	46	24.02	29.13	14.13	31.59	150	1	Q	H
	*	914.5	125.71	-	-	113.62	29.1	14.34	31.35	150	67	P	H
		959.4	39.56	-6.44	46	25.03	30.96	14.46	30.89	100	17	Q	H
		34.59	33.38	-6.62	40	33.24	22.09	10.45	32.4	-	-	P	V
		43.77	31.83	-8.17	40	36.08	17.48	10.56	32.29	-	-	P	V
		59.97	31.87	-8.13	40	41.52	11.79	10.67	32.11	-	-	P	V
		787.2	36.7	-9.3	46	26.1	28.13	13.99	31.52	200	359	Q	V
		876.1	37.97	-8.03	46	26.26	29.1	14.18	31.57	200	64	Q	V
	*	914.5	125.74	-	-	113.65	29.1	14.34	31.35	100	353	P	V
		957.3	40.49	-5.51	46	26.02	30.93	14.45	30.91	150	321	Q	V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. Non restricted band limit is radio frequency level down 20db.
4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.

RFID	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		30.27	32.65	-7.35	40	30.65	23.91	10.55	32.46	-	-	P	H
		204.69	33.11	-10.39	43.5	38.73	14.91	11.81	32.34	-	-	P	H
		279.21	32.13	-13.87	46	33.2	18.66	12.22	31.95	-	-	P	H
		762.7	36.71	-9.29	46	26.32	28.05	13.87	31.53	200	15	Q	H
		853.7	36.86	-9.14	46	25.32	29.09	14.08	31.63	168	0	Q	H
	*	927.25	127.47	-	-	114.9	29.42	14.38	31.23	200	350	P	H
		965.7	44.72	-9.28	54	29.95	31.11	14.47	30.81	-	-	P	H
RFID													
927.25MHz		34.32	29.25	-10.75	40	29.03	22.17	10.45	32.4	100	127	Q	V
		174.99	30.8	-12.7	43.5	36.18	15.01	11.63	32.02	-	-	P	V
		287.58	31.2	-14.8	46	31.93	18.89	12.27	31.89	-	-	P	V
		761.3	37.56	-8.44	46	27.2	28.03	13.86	31.53	150	356	Q	V
		883.8	38.85	-7.15	46	27.15	29.03	14.22	31.55	128	360	Q	V
	*	927.25	128.6	-	-	116.03	29.42	14.38	31.23	100	10	P	V
		965.7	45.61	-8.39	54	30.84	31.11	14.47	30.81	-	-	Q	V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. Non restricted band limit is radio frequency level down 20db.
4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.

RFID (Harmonic @ 3m)

RFID	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
RFID 902.3MHz		1804.6	40.7	-	-	70.59	25.1	6.91	61.9	300	22	P	H
		2706.9	53.35	-20.65	74	76.73	28.37	8.5	60.25	250	36	P	H
		2706.9	49.83	-4.17	54	73.21	28.37	8.5	60.25	250	36	A	H
		3609.2	37.62	-36.38	74	56.55	29.78	9.91	58.62	-	-	P	H
													H
													H
													H
													H
													H
													H
		1804.6	44.3	-	-	74.19	25.1	6.91	61.9	100	2	P	V
		2706.9	52.9	-21.1	74	76.28	28.37	8.5	60.25	250	56	P	V
		2706.9	49.56	-4.44	54	72.94	28.37	8.5	60.25	250	56	A	V
		3609.2	36.95	-37.05	74	55.88	29.78	9.91	58.62	-	-	P	V
													V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. Non restricted band limit is radio frequency level down 20db.
4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.

RFID	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		1829	49.79	-	-	79.46	25.19	7	61.86	150	42	P	H
		2743.5	47.5	-26.5	74	71.04	28.1	8.58	60.22	300	37	P	H
		2743.5	37.75	-16.25	54	61.29	28.1	8.58	60.22	300	37	A	H
		3658	37.34	-36.66	74	56.13	29.68	10.02	58.49	-	-	P	H
													H
													H
													H
													H
													H
													H
RFID 914.5MHz		1829	56.78	-	-	86.45	25.19	7	61.86	250	5	P	V
		2743.5	50.96	-23.04	74	74.5	28.1	8.58	60.22	250	8	P	V
		2743.5	47.49	-6.51	54	71.03	28.1	8.58	60.22	250	8	A	V
		3658	44.89	-29.11	74	63.68	29.68	10.02	58.49	200	6	P	V
		3658	38.81	-15.19	54	57.6	29.68	10.02	58.49	200	6	A	V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. Non restricted band limit is radio frequency level down 20db.
4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.

RFID	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		1854.5	52.4	-	-	81.68	25.44	7.09	61.81	200	43	P	H
		2781.75	44.83	-29.17	74	68.16	28.2	8.66	60.19	268	37	P	H
		2781.75	37.72	-16.28	54	61.05	28.2	8.66	60.19	268	37	A	H
		3709	37.41	-36.59	74	55.95	29.67	10.15	58.36	-	-	P	H
													H
													H
													H
RFID													H
927.25MHz		1854.5	58.96	-	-	88.24	25.44	7.09	61.81	200	4	P	V
		2781.75	53.75	-20.25	74	77.08	28.2	8.66	60.19	220	6	P	V
		2781.75	49.71	-4.29	54	73.04	28.2	8.66	60.19	220	6	A	V
		3709	44.41	-29.59	74	62.95	29.67	10.15	58.36	-	-	P	V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. Non restricted band limit is radio frequency level down 20db.
4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

BLE	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Margin (dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Margin (dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Margin (dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

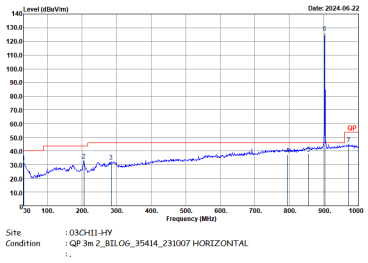
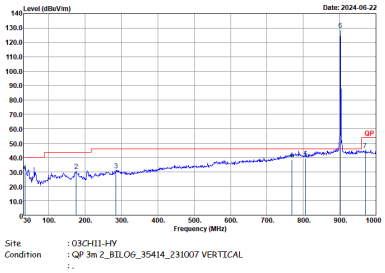
= -10.46(dB)

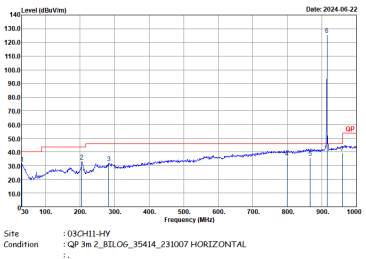
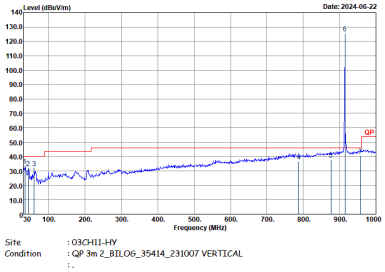
Both peak and average measured complies with the limit line, so test result is “PASS”.

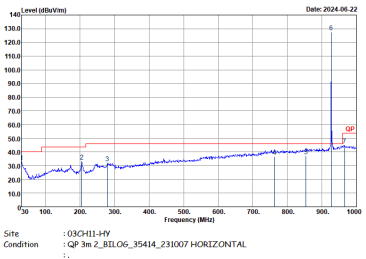
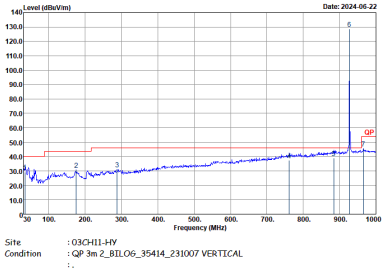
Appendix B. Radiated Spurious Emission Plots

Test Engineer :	Yuan Lee, Fu Chen and Troye Hsieh	**Temperature :**	20~20.7°C
		Relative Humidity :	53~66%

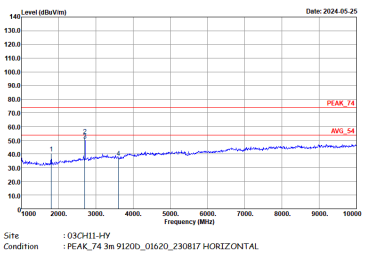
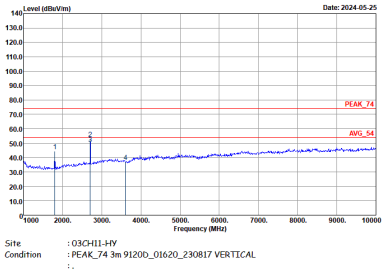
RFID (LF @ 3m)

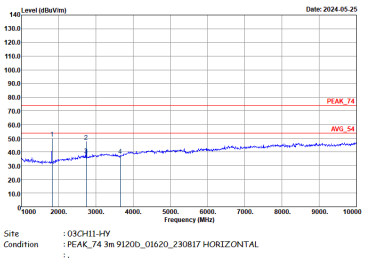
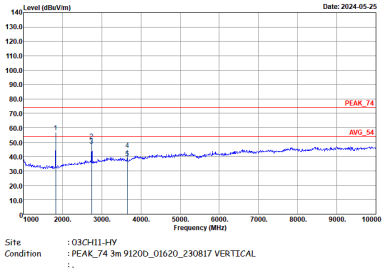
RFID	**RFID**	
	RFID 902.3MHz	
	Horizontal	**Vertical**
Peak **Avg.**		

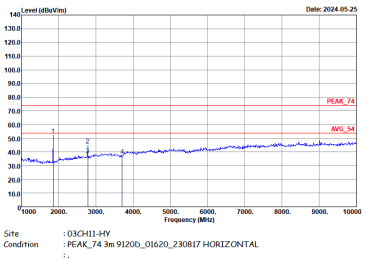
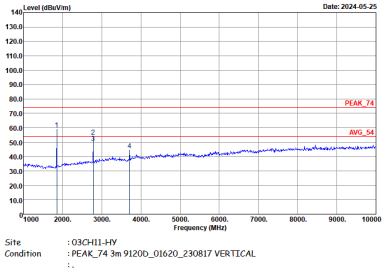
RFID	RFID	
	RFID 914.5MHz	
	Horizontal	Vertical
Peak Avg.		

RFID	RFID	
	RFID 927.25MHz	
	Horizontal	Vertical
Peak Avg.		

RFID (Harmonic @ 3m)

RFID	RFID	
	RFID 902.3MHz	
	Horizontal	Vertical
Peak Avg.		

RFID	RFID	
	RFID 914.5MHz	
	Horizontal	Vertical
Peak Avg.		

RFID	RFID	
	RFID 927.25MHz	
	Horizontal	Vertical
Peak Avg.		

Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
RFID	100	-	-	10Hz

UHF RFID