

NCC

低功率射頻器材型式試驗報告

產品名稱 : LF-Band RFID READER/WRITER
型號 : ITS-LRW210
廠牌 : NITTOKU
申請者 : NITTOKU CO.,LTD
申請者地址 : 2-292-1, Azuma-cho, Omiya-ku, Saitama City,
Saitama, 330-0841, Japan
測試標準 : LP0002 (109 版)
參考法規 : ANSI C63.10-2013
測試結果 : 符合
接收日期 : 2020/11/17
測試日期 : 2020/11/18 ~ 2020/11/19

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修訂紀錄

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1. 一般資訊

申請者	NITTOKU CO.,LTD
申請者地址	2-292-1, Azuma-cho, Omiya-ku, Saitama City, Saitama, 330-0841, Japan
製造商	NITTOKU CO.,LTD
製造商地址	2-292-1, Azuma-cho, Omiya-ku, Saitama City, Saitama, 330-0841, Japan
實驗室	台灣曼瑞檢測科技有限公司
實驗室地址	33377 台灣桃園市龜山區復興二路 38 號
實驗室資訊	1. MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm. 2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada. 3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.
實驗室測試環境條件	溫度 (°C) : 20-35 / 濕度 (%RH) : 30-65

2. 產品描述

2.1 產品資訊

產品名稱	LF-Band RFID READER/WRITER
產品型號	ITS-LRW210
廠牌	NITTOKU
頻率範圍	134.2kHz
測試電壓	DC 24V

2.2 產品規格

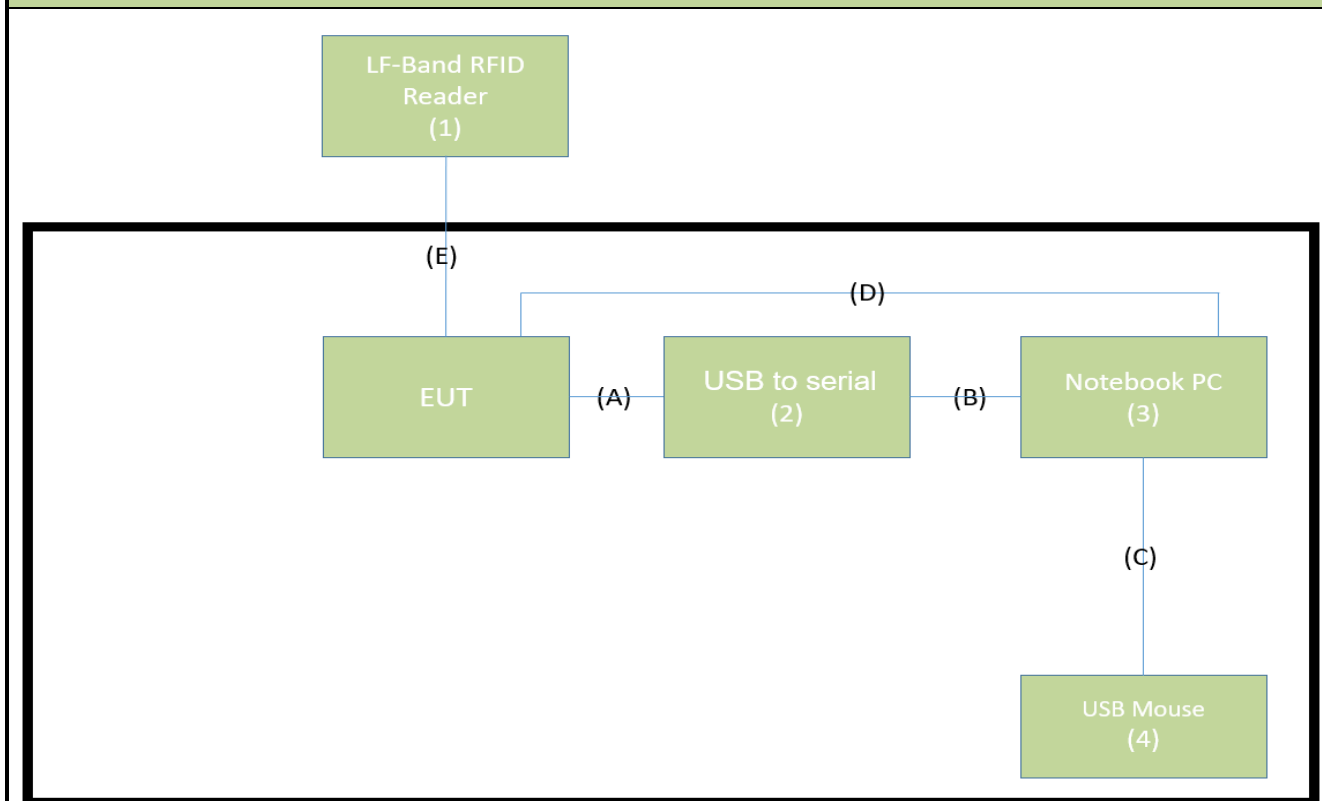
Type of modulation	FSK
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2.3 測試模式

Test Mode	Mode 1: Normal function, TX-134.2kHz with Antenna (ITS-LANT30S-3)
	Mode 2: Normal function, TX-134.2kHz with Antenna (ITS-LANT30S-1)

2.4 測試配置

待測物測試配置圖



Signal Cable Type		Signal Cable Description
A	RS-232 Cable	Shielded, 1.5m
B	USB to serial cable	Shielded, 0.5m
C	USB Mouse Cable	Shielded, 1.6m
D	Lan Cable	Non-Shielded, 3.0m
E	RS-485 Cable	Non-Shielded, 1.0m

2.5 測試周邊

待測裝置測試時，其搭配系統測試時之週邊裝置包括如下：

No.	周邊名稱	廠牌	型號	序號	電源線
1	LF-Band RFID Reader	NITTOKU	ITS-LRW210	N/A	N/A
2	USB to serial	ELECOM	UC-SGT1	N/A	N/A
3	Notebook PC	Lenovo	ThinkPad T450	PC0BH4FR	Non-shielded, 0.8m
4	USB Mouse	Lenovo	M-U0025-O	HS427HA10UV	N/A

2.6 操作程序

1.	使用 DC 電源供應器(DC 24V)供電並接上周邊: LF-Band RFID Reader
2.	接上 RS-232 Cable, USB to serial cable, Lan Cable, RS-485 Cable
2.	使用"ITS-LRW210 V1.0.0.0" (Power Setting: default)
3.	Start test.

3. 測試設備明細

電源傳導 – SR2

儀器名稱	廠牌	型號	財產編號	校正年限	校正有效日期
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 年	2021/3/26
Two-Line V-Network	R&S	ENV216	MRTTWA00020	1 年	2021/4/24
EMI Test Receiver	R&S	ESR3	MRTTWA00045	1 年	2021/5/26

輻射干擾 – AC1

儀器名稱	廠牌	型號	財產編號	校正年限	校正有效日期
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 年	2021/4/27
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 年	2021/10/5
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 年	2021/3/25

EMI 測試軟體

軟體名稱	廠牌	版本
e3	Audix	9.160520a
EMI	Quietek	V3

4. 量測不確定度

電源傳導量測-電源線 (Conducted Emission- Power Line)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 2.53dB
電源傳導量測-通訊埠 (Conducted Emission- Impedance Stabilization Network Measurement)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 3.96dB
輻射干擾量測 (Radiated Spurious Emission)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 3.92dB (Below 30M)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.25dB (30M~1G)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.40dB (1G~18G)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.45dB (18G~40G)

5. 測試結果

產品名稱 **LF-Band RFID READER/WRITER**
型號 **ITS-LRW210**

法規章節	量測項目	限制值	測試結果	測試數據
3.3	電源傳導	低功率射頻器材技術規範 3.3 節	N/A	第 5.1 章節
3.2	天線之要求	低功率射頻器材技術規範 3.2 節	符合	第 5.2 章節
3.6	輻射電場強度	低功率射頻器材技術規範 3.6 節	符合	第 5.3 章節

備註 1：符合性的判定是基於測試結果符合規範的限制值或客戶的宣告要求，測試結果的判定是不考慮測量不確定度的值。

備註 2：此待測物電源輸入為 DC 24V，因此不需測試電源傳導。

5.1.4 電源傳導測試結果

備註：此待測物電源輸入為 DC 24V，因此不需測試電源傳導。

5.2 天線之要求

5.2.1 限制要求

依據國家通訊傳播委員會低功率射頻器材技術規範之第3.2節規定，低功率射頻器材之發射機或收發信機所使用之天線，應為全固定、半固定式或以獨特之耦合(unique coupling)方式連接機體。製造者可設計供使用者因損壞而替換之天線，但不得設計或使用原認證以外之天線或可供引接各類電纜之標準天線插座或電氣連接頭，如：BNC、F type、N type、M type、UG type、RCA、SMA、SMB...等及其他各類工業或通訊標準接頭。

5.2.2 天線樣式

此 LF-Band RFID READER/WRITER 其天線為 Loop Antenna Type

Antenna List

No.	Brand	Part No.	Length
1	NITTOKU	ITS-LANT30S-1	1m
2	NITTOKU	ITS-LANT30S-3	3m

5.3 輻射電場強度

5.3.1 量測方法

待測物置於非導體桌面（落地型產品置於地上），受測物使用交流電源時，將其與任何配件設備之電源線連接至位於旋轉桌的交流電源。受測物使用電池時，測試時應裝置新電池或充電完全的電池。受測物與配件設備之電源線無須束綁，桌面上受測設備的所有電源線由桌子的後緣垂下沿旋轉桌表面接至交流插座。落地型設備的交流電源線可以方便的型態走線。桌面可 360 度旋轉，接收天線置於距待測物 3m 距離，高度可在 1 至 4 公尺間變動，以量測待測物之最大輻射電場強度，接收天線並應於水平及垂直極化方向各量測一次。（待測物擺設方式根據 ANSI C63.10-2013 版本，待測物放置桌中心，1G 以下擺設高度為 80cm/1G 以上擺設高度為 150cm）

- (1) 任一頻率小於或等於 1000 MHz 之訊號,使用 CISPR 準峰值檢波器
- (2) 任一頻率大於 1000 MHz 之訊號，使用平均值檢波器測量，當規定之發射限制值為平均值時(含 1000 MHz 以下)，受測訊號藉由峰值檢波器(RBW:1MHz,VBW:3MHz)所測量之峰值，亦須符合峰值發射限制值，其峰值發射限制值為最大容許平均值加 20 dB。

5.3.2 限制要求

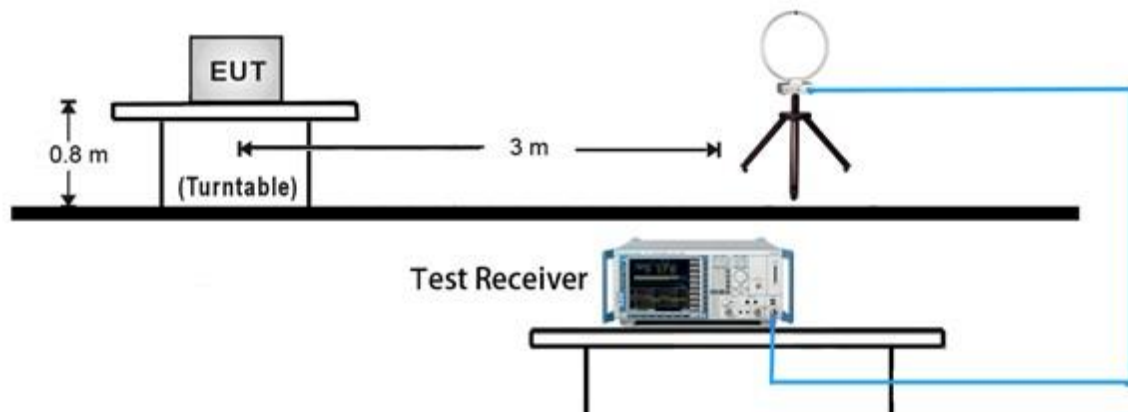
其電場強度不得超過下表之限值，且其不必要之發射皆不得大於主波發射強度。各頻段重疊處，以較嚴格之限制值為準。

頻率(f) (MHz)	電場強度 (微伏特/公尺, $\mu\text{V/m}$)	測距 (公尺)
$0.009 \leq f \leq 0.490$	$2400/f(\text{kHz})$	300
$0.490 < f \leq 1.705$	$24000/f(\text{kHz})$	30
$1.705 < f < 30$	30	30
$30 \leq f \leq 88$	100	3
$88 < f \leq 216$	150	3
$216 < f \leq 960$	200	3
$960 < f$	500	3

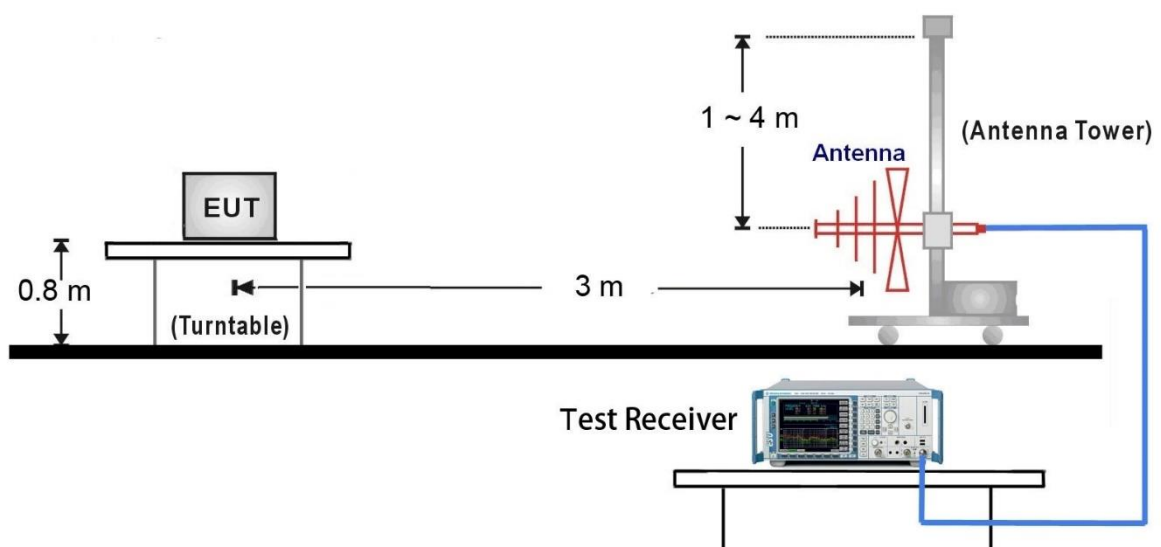
上表規定之電場強度，發射頻率在 9 kHz~90 kHz、110 kHz~490 kHz 及 1000MHz 以上者，其量測應以平均值檢波器為基準，且須符合低功率射頻器材技術規範第 6.14.節之規定；其他發射頻率，應以 CISPR 準峰值(quasi-peak) 檢波器測量；非以上表所指定之距離測量時，應符合第 6.5 節之規定，而輻射發射之量測頻率範圍須符合低功率射頻器材技術規範第 6.12 節之規定。

5.3.3 測試架構圖

Under 30MHz Test Setup

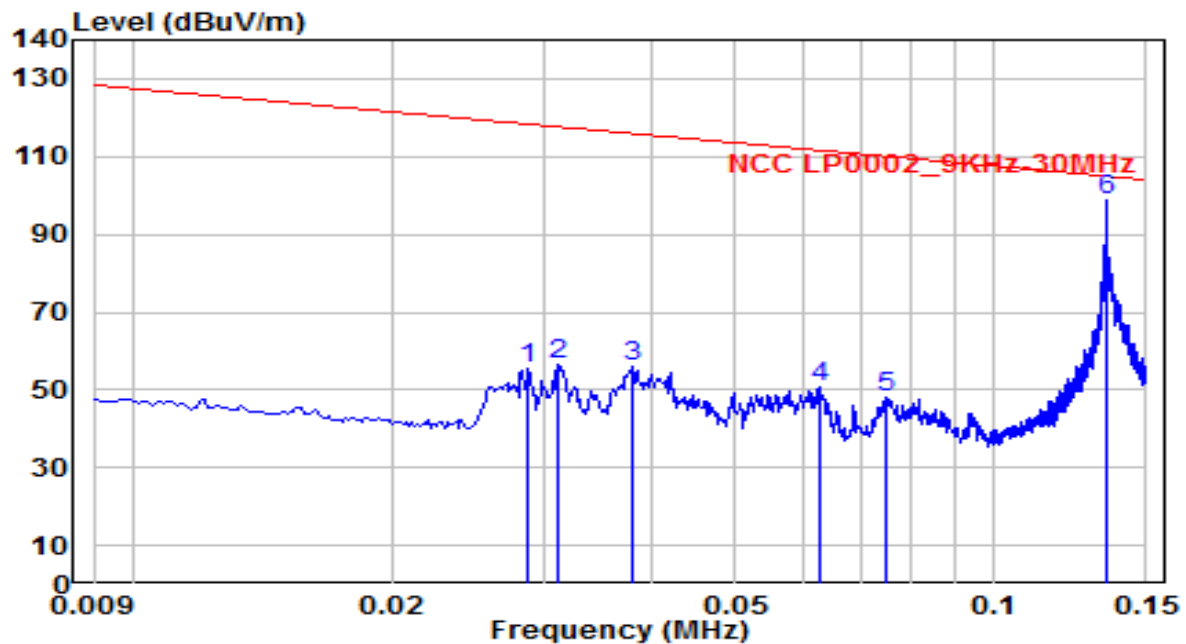


Under 1GHz Test Setup



5.3.4 輻射電場強度測試結果

EUT	LF-Band RFID READER/WRITER	Date of Test	2020-11-19
Factor	FMZB 1519B	Temp. / Humidity	25°C /58%
Polarity	--	Site / Test Engineer	AC1 / Jay
Test Mode	TX_RFID-134.2kHz with Antenna (ITS-LANT30S-3)	Test Voltage	DC 24V

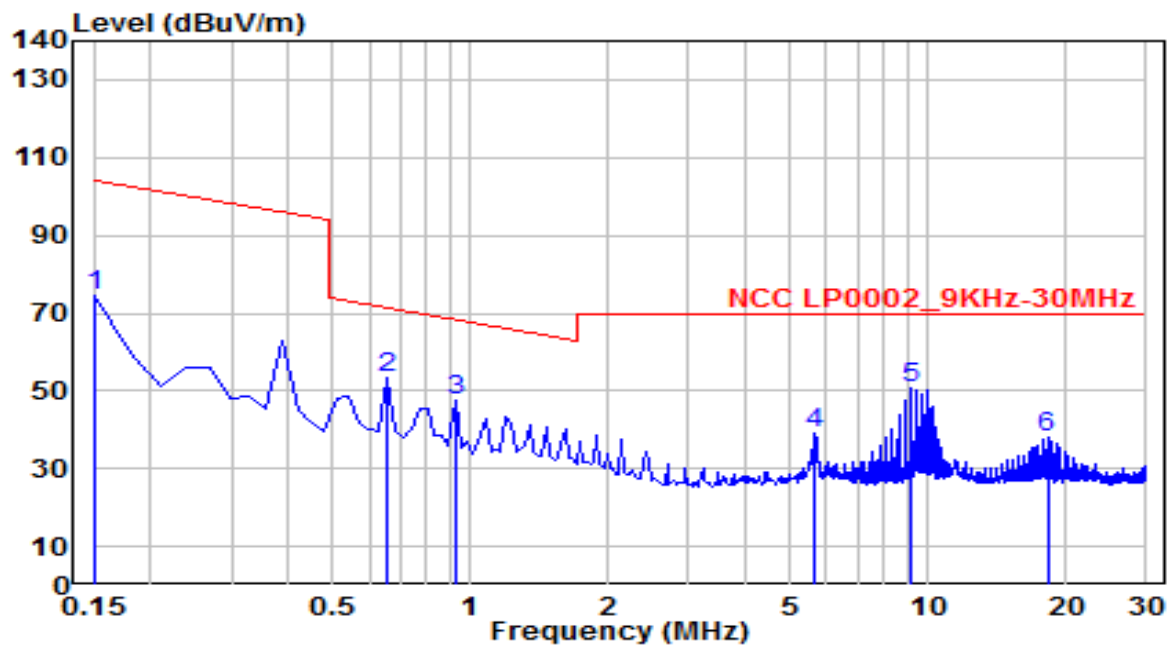


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	0.029	35.84	19.55	55.39	-63.03	118.42	100	0	Peak
2	0.031	36.78	19.57	56.35	-61.38	117.73	100	0	Peak
3	0.038	36.53	19.33	55.87	-60.15	116.02	100	0	Peak
4	0.063	32.11	18.76	50.87	-60.80	111.67	100	0	Peak
5	0.075	29.73	18.61	48.34	-61.78	110.11	100	0	Peak
6	* 0.135	80.58	18.36	98.94	-6.06	105.00	100	0	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	LF-Band RFID READER/WRITER	Date of Test	2020-11-19
Factor	FMZB 1519B	Temp. / Humidity	25°C /58%
Polarity	--	Site / Test Engineer	AC1 / Jay
Test Mode	TX_RFID-134.2kHz with Antenna (ITS-LANT30S-3)	Test Voltage	DC 24V

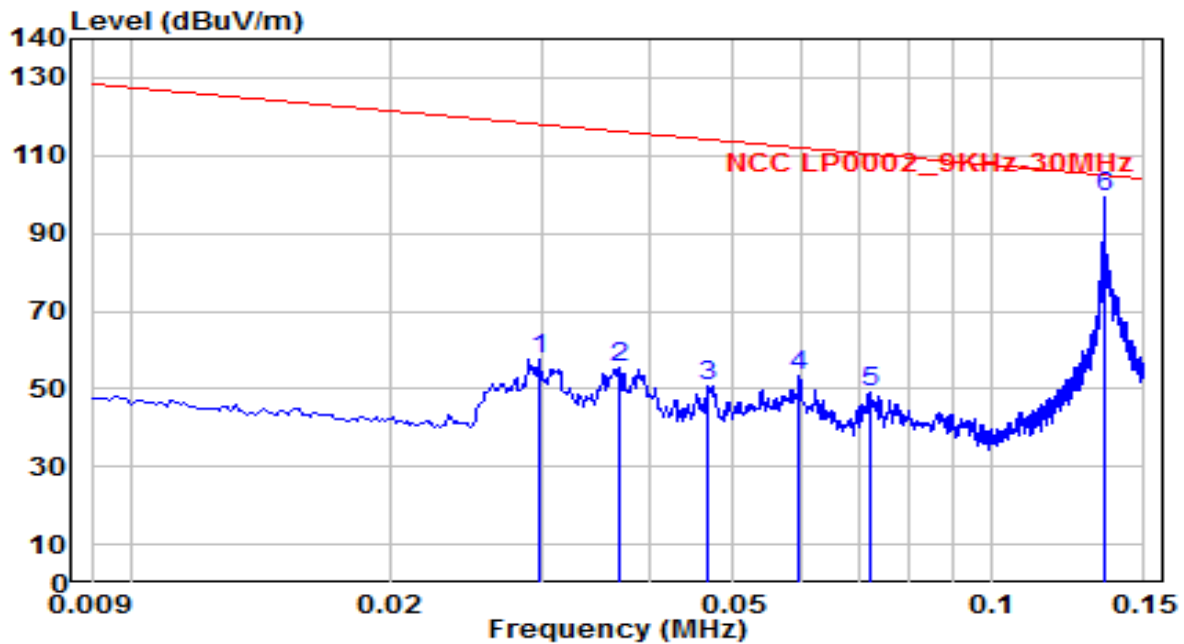


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	0.150	56.25	18.39	74.63	-29.45	104.08	100	0	Peak
2	* 0.657	34.61	18.71	53.32	-17.93	71.25	100	0	Peak
3	0.926	28.97	18.84	47.81	-20.48	68.29	100	0	Peak
4	5.672	19.29	19.58	38.87	-30.63	69.50	100	0	Peak
5	9.165	29.99	20.56	50.56	-18.94	69.50	100	0	Peak
6	18.239	16.86	21.38	38.24	-31.26	69.50	100	0	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	LF-Band RFID READER/WRITER	Date of Test	2020-11-19
Factor	FMZB 1519B	Temp. / Humidity	25°C /58%
Polarity	--	Site / Test Engineer	AC1 / Jay
Test Mode	TX_RFID-134.2kHz with Antenna (ITS-LANT30S-1)	Test Voltage	DC 24V

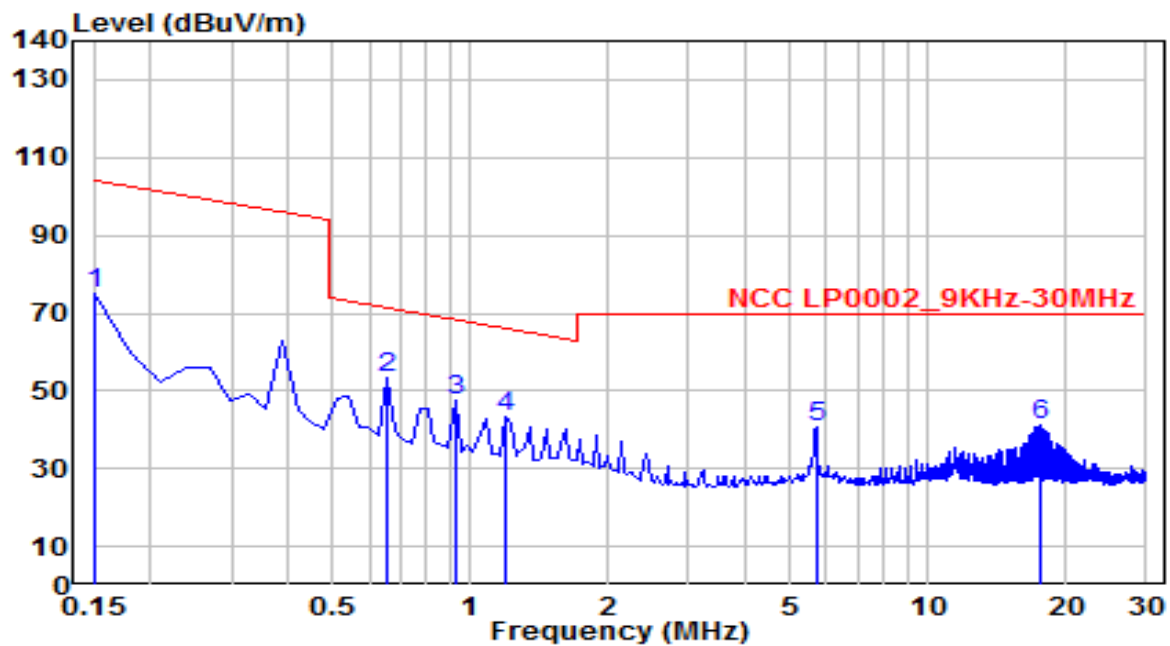


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	0.030	38.19	19.60	57.78	-60.35	118.13	100	0	Peak
2	0.037	35.86	19.37	55.23	-61.05	116.28	100	0	Peak
3	0.047	31.59	19.02	50.61	-63.58	114.19	100	0	Peak
4	0.060	34.52	18.79	53.32	-58.77	112.09	100	0	Peak
5	0.072	30.28	18.65	48.93	-61.53	110.46	100	0	Peak
6	*	80.70	18.36	99.06	-5.94	105.00	100	0	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	LF-Band RFID READER/WRITER	Date of Test	2020-11-19
Factor	FMZB 1519B	Temp. / Humidity	25°C /58%
Polarity	--	Site / Test Engineer	AC1 / Jay
Test Mode	TX_RFID-134.2kHz with Antenna (ITS-LANT30S-1)	Test Voltage	DC 24V

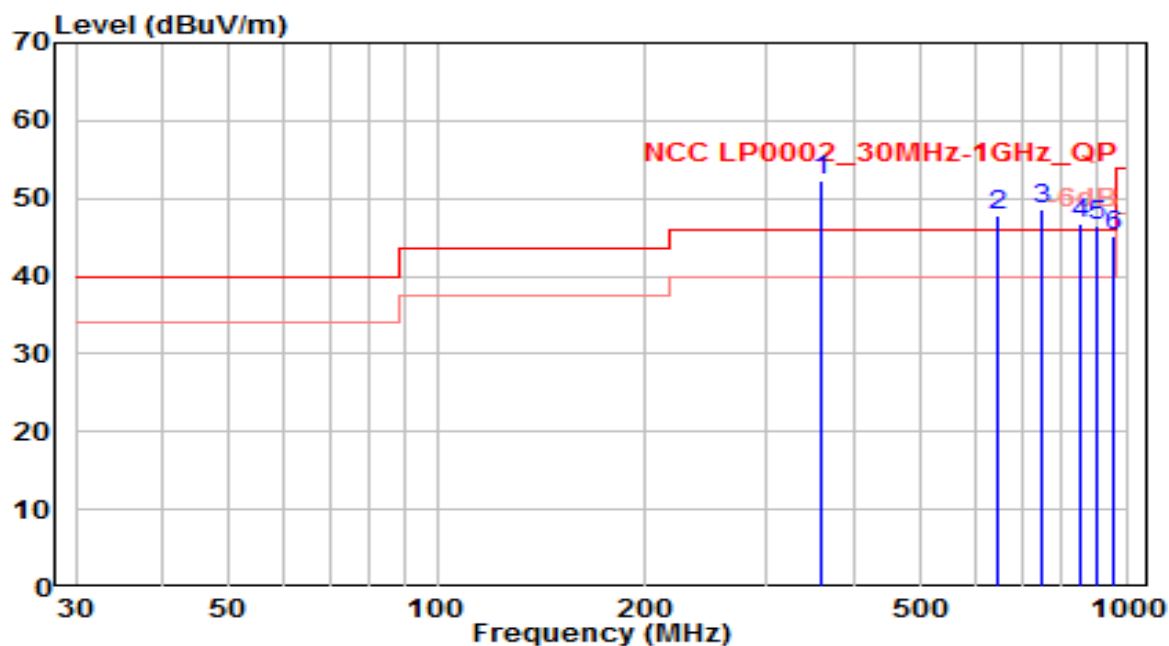


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	0.150	56.55	18.39	74.93	-29.15	104.08	100	0	Peak
2	* 0.657	34.76	18.71	53.47	-17.79	71.25	100	0	Peak
3	0.926	28.84	18.84	47.68	-20.61	68.29	100	0	Peak
4	1.195	24.49	18.87	43.36	-22.72	66.08	100	0	Peak
5	5.702	20.91	19.59	40.49	-29.01	69.50	100	0	Peak
6	17.672	19.78	21.35	41.13	-28.37	69.50	100	0	Peak

Note:

- "*", means this data is the worst emission level.
- C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
- Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	LF-Band RFID READER/WRITER	Date of Test	2020-11-19
Factor	VULB 9162	Temp. / Humidity	25°C /58%
Polarity	Horizontal	Site / Test Engineer	AC1 / Jay
Test Mode	TX_RFID-134.2kHz with Antenna (ITS-LANT30S-3)	Test Voltage	DC 24V

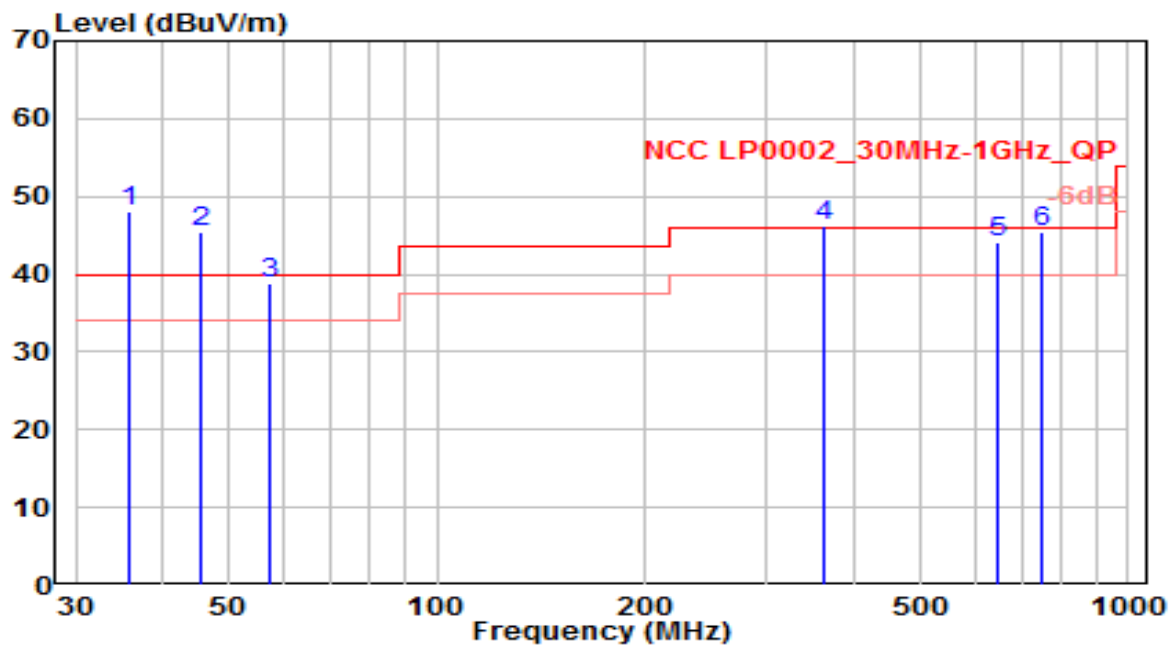


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	358.830	29.00	23.38	52.38	6.38	46.00	100	10	QP
2		649.830	19.20	28.61	47.81	1.81	46.00	100	120	QP
3		749.740	18.50	30.11	48.61	2.61	46.00	100	80	QP
4		850.620	15.20	31.49	46.69	0.69	46.00	100	80	QP
5		900.090	14.80	31.77	46.57	0.57	46.00	100	100	QP
6		950.530	12.90	32.17	45.07	-0.93	46.00	100	225	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. 某些頻率點的部分有超出限制值,經驗證過其非射頻模組所產生故判定為非故意輻射,其電場要求有符合 Class A 的定義,並檢附 CNS 13438 (Class A)報告佐證。

EUT	LF-Band RFID READER/WRITER	Date of Test	2020-11-19
Factor	VULB 9162	Temp. / Humidity	25°C /58%
Polarity	Vertical	Site / Test Engineer	AC1 / Jay
Test Mode	TX_RFID-134.2kHz with Antenna (ITS-LANT30S-3)	Test Voltage	DC 24V

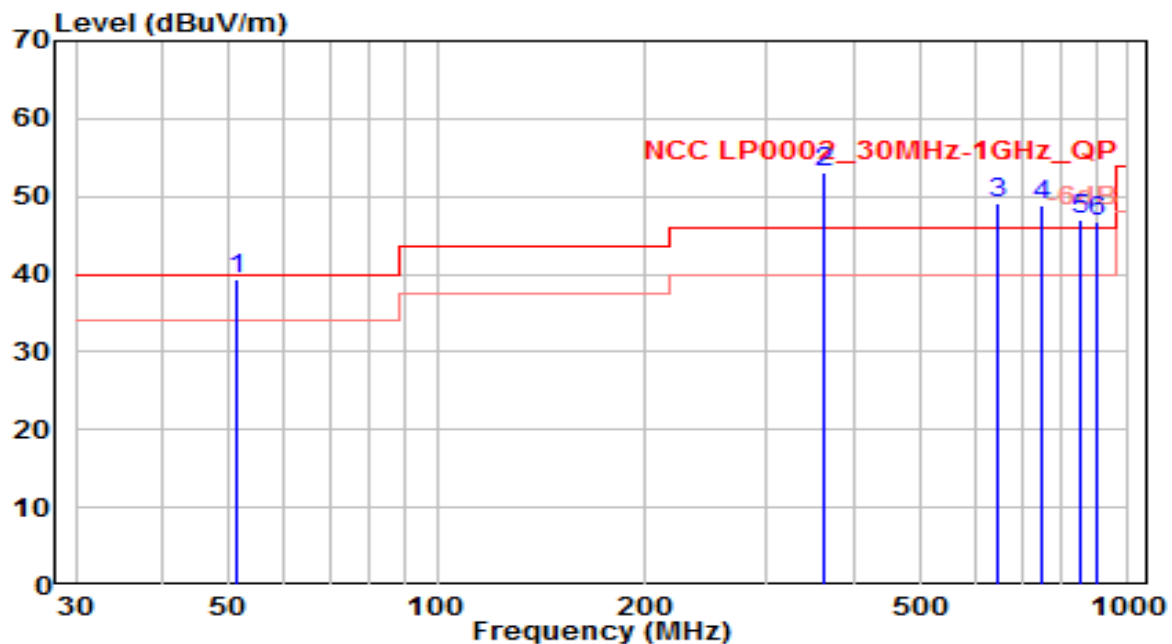


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	35.820	28.40	19.61	48.01	8.01	40.00	100	360	QP
2		45.520	23.60	21.83	45.43	5.43	40.00	100	330	QP
3		57.160	18.00	20.73	38.73	-1.27	40.00	100	315	QP
4		362.710	22.90	23.44	46.34	0.34	46.00	100	125	QP
5		649.830	15.40	28.61	44.01	-1.99	46.00	100	50	QP
6		749.740	15.30	30.11	45.41	-0.59	46.00	100	335	QP

Note:

- "*", means this data is the worst emission level.
- C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
- Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- 某些頻率點的部分有超出限制值,經驗證過其非射頻模組所產生故判定為非故意輻射,其電場要求有符合 Class A 的定義,並檢附 CNS 13438 (Class A)報告佐證。

EUT	LF-Band RFID READER/WRITER	Date of Test	2020-11-19
Factor	VULB 9162	Temp. / Humidity	25°C /58%
Polarity	Horizontal	Site / Test Engineer	AC1 / Jay
Test Mode	TX_RFID-134.2kHz with Antenna (ITS-LANT30S-1)	Test Voltage	DC 24V

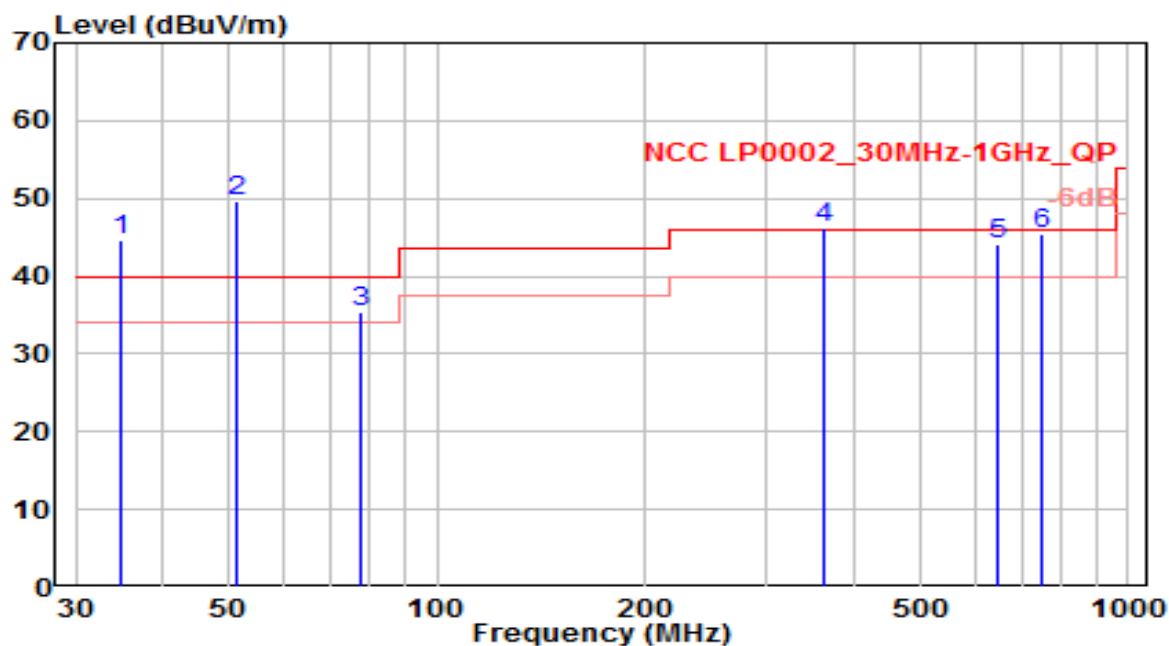


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	51.340	17.50	21.80	39.30	-0.70	40.00	100	135	QP
2	* 363.680	29.60	23.46	53.06	7.06	46.00	100	0	QP
3	649.830	20.60	28.61	49.21	3.21	46.00	100	130	QP
4	749.740	18.70	30.11	48.81	2.81	46.00	100	60	QP
5	850.620	15.60	31.49	47.09	1.09	46.00	100	60	QP
6	900.090	15.00	31.77	46.77	0.77	46.00	100	100	QP

Note:

- " *", means this data is the worst emission level.
- C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
- Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- 某些頻率點的部分有超出限制值,經驗證過其非射頻模組所產生故判定為非故意輻射,其電場要求有符合 Class A 的定義,並檢附 CNS 13438 (Class A)報告佐證。

EUT	LF-Band RFID READER/WRITER	Date of Test	2020-11-19
Factor	VULB 9162	Temp. / Humidity	25°C /58%
Polarity	Vertical	Site / Test Engineer	AC1 / Jay
Test Mode	TX_RFID-134.2kHz with Antenna (ITS-LANT30S-1)	Test Voltage	DC 24V



No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	34.850	25.30	19.29	44.59	4.59	40.00	100	60	QP
2	* 51.340	27.80	21.80	49.60	9.60	40.00	100	60	QP
3	77.530	20.30	15.00	35.30	-4.70	40.00	100	320	QP
4	363.680	22.80	23.46	46.26	0.26	46.00	100	125	QP
5	649.830	15.60	28.61	44.21	-1.79	46.00	100	50	QP
6	749.740	15.30	30.11	45.41	-0.59	46.00	100	330	QP

Note:

- "*", means this data is the worst emission level.
- C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
- Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- 某些頻率點的部分有超出限制值,經驗證過其非射頻模組所產生故判定為非故意輻射,其電場要求有符合 Class A 的定義,並檢附 CNS 13438 (Class A)報告佐證。

The End