



報告編號 : 4788842173-TW-R0-V0

頁碼 : 1 of 30

報告發行日期 : 2020/2/3

低功率射頻電機試驗報告

產品名稱 : VW MQBAB2020 INSTRUMENT CLUSTER AND IMMOBILIZER
SYSTEM

型號 : Medium 5C

申請廠商 : Visteon Electronics Germany GmbH

申請者地址 : Visteonstrasse 4-10 50170 Kerpen, Germany

製造廠商 : Visteon Electronics Germany GmbH

製造商地址 : Visteonstrasse 4-10 50170 Kerpen, Germany

實驗室名稱 : 優力國際安全認證有限公司

實驗室地址 : 新竹縣竹東鎮中興路四段 372-7 號 B 戶、E 戶

試驗受理日期 : 108 年 1 月 3 日

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待測物接收日期 : 108 年 6 月 26 日

依據標準 : 低功率射頻電機技術規 (LP0002) 107 年 1 月版



備註:

1. 此份報告未經優力國際安全認證有限公司書面同意，不得部分複製。
2. 本測試報告僅對受測之樣品負責。
3. 本測試報告需加負責人簽名始可生效。
4. 此案產品內外觀照請參考報告編號 4788842173-EP。

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認可報告之試驗機構

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認證編號：3398

認證有效期間：2017.08.29 ~ 2020.08.28

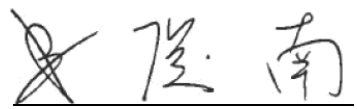
認可能量範圍：低功率射頻電機技術規範(LP0002)

報告製作者：


辛姿伶

，日期： 109 年 2 月 3 日

審核與授權者：


吳俊南

，日期： 109 年 2 月 3 日

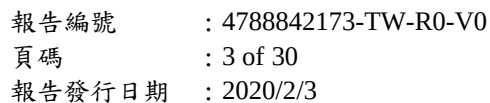
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原始報告編號: 4788842173-TW-R0-V0

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測試項目與結果判定總表

項次	測試項目	適用規範	結果判定
1	場強輻射	低功率射頻電機技術規範 2.8 節	合格
2	電源線傳導干擾	低功率射頻電機技術規範 2.3 節	Note

Note : The EUT consumes DC power, so the test is not required.



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1. 一般資料

1.1 產品描述

產 品 名 稱	VW MQBAB2020 INSTRUMENT CLUSTER AND IMMOBILIZER SYSTEM
廠 牌	Visteon
型 號	Medium 5C
額 定 電 壓	12Vdc from car battery
頻率使用範圍	125 kHz
最大電場強度	79.86 dBuV/m (Peak) @ 3m
天 線 型 態	見註 1

註:

1. 此待測設備搭配測試的天線，其資料如下：

天線	天線型式	天線型號	Part number	接頭型式	增益 (dBi)
Ant 1	Air Coil	Kostal Air Coil	2Q0.953.254	N/A	0
Ant 2	Mechanical Lock Coil NSS (BASIC)+WFS5c	HUF	2G0.905.855	N/A	0

Note :

- 適用規範請見本報告 3.1 節第 (2) 的規定。
- 依據測試數據結果，符合低功率射頻電機技術規範之要求。
- 此天線資訊由客戶提供，詳請參閱製造商的產品規格或使用手冊。

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2. 此報告中待測物輻射測試模式評估如下表：

模式	測試狀態
模式 1	125kHz TX
模式 2	125kHz RX

- 針對客戶提供兩款天線類型之測試評估，已預掃描輻射由 Antenna 1 (最差情況)確定。
- 發射模式：
1 GHz以下之輻射量測以模式1進行量測。
- 接收模式：
1 GHz以下之輻射量測以模式2進行量測。

3. 此待測設備，經評估三個正交軸方位評估測試擺設方式：平躺、垂直、側放，其中以側放擁有最大場強輻射量測干擾值，故以此擺放方式進行最終量測，並將測試結果紀錄。



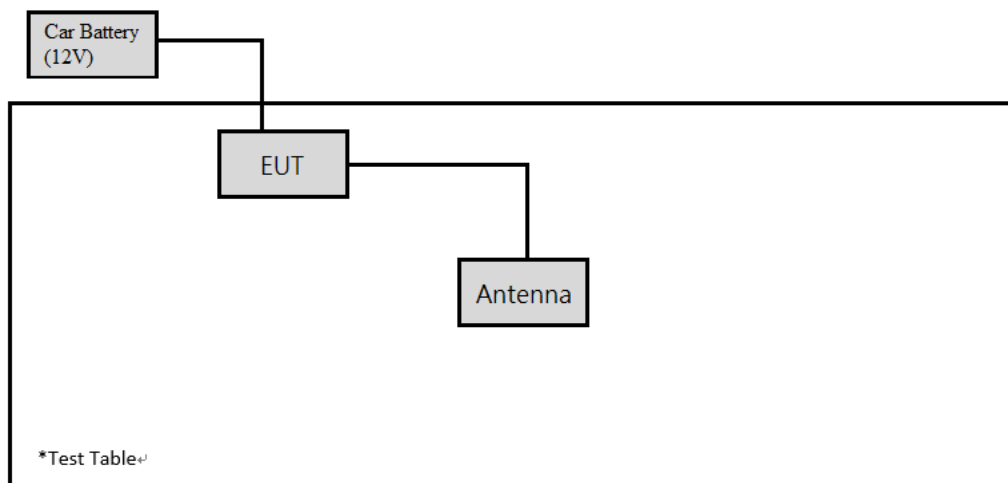
1.2 補助測試之週邊設備

待測設備於受測時均接上其所屬的配件或一般用途之相關設備；下列輔助設備或配件測試中所使用的配備，以形成一個代表待測物實際運作的受測系統。

裝置名稱	廠牌	型號	序號	Remark
Car Battery (12V)	YUASA	YCT-60B24L(S)-CMFII	7H26B1	N/A
Cable	Visteon	N/A	N/A	Length:0.8m

1.3 測試架構圖

依照客戶提供測試設置說明文件 “Instruction guide MQBAB2020.pdf”，該文件用於啟用連續傳輸或接收模式。



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2. 量測儀器及測試配置說明

2.1 量測設備

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	Nov. 8, 2018	1 year
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	Nov. 8, 2018	1 year
Loop Antenna	ETS lindgren	6502	00213440	Dec. 11, 2018	1 year
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	Jan. 14, 2019	1 year
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	Jan. 30, 2019	1 year
RF Cable (9 KHz~18 GHz)	UltraPhase & EMC Instrument	A1K50-UP0358-A1K50-1500&EMC106-NM-SM-2500/7000	170111-4&170219/170102	Jan. 29, 2019	1 year

UL Software

Software	Test Item	Version
EZ EMC	Radiated measurement	1.1.4.2

2.2 測試應用參考標準

本報告中記錄的測試程序參照如下：

ANSI C63.10-2013

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2.3 量測不確定度

此報告中關於量測之符合性聲明，採用 ISO Guide 98-4 的 8.2.4 與 8.2.5 章節中描述的準確度方法為判定規則。

下列量測不確定水準是參照量測儀器 CISPR 16-4-2 所規定之不確定度。

Test Item	Measurement Frequency Range	K	U(dB)
Radiated disturbance below 30MHz	9 kHz - 30 MHz	2	2.2
Radiated disturbance below 1 GHz	30 MHz ~ 1 GHz	2	5.3

2.4 試驗環境

產品測試時之實驗室環境條件如下：

測試項目	環境條件	輸入功率	測試日期	測試人員
場強輻射	22~24 °C, 57~62 % RH	DC 12V	2019/11/4 ~ 2019/11/6	陳哲偉

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3. 適用規範

3.1 規範要求

(1) 傳導之規定

依據國家通訊傳播委員會低功率射頻電機技術規範之 2.3 節，電源傳導干擾之限制要求如下：

頻率(MHz)	傳導限制值 (dBuV)	
	準峰值(Quasi-peak)	平均值(Average)
0.15-0.5	66-56 (註)	56-46 (註)
0.5-5	56	46
5-30	60	50

(註)：隨頻率之對數遞減。

(2) 天線之規定

低功率射頻電機之發射機或收發信機所使用之天線，除本規範章節中另有規外，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。



(3) 輻射之要求

依據 NCC 低功率射頻電機技術規範第 2.8 節之規定,除本規範各章節另有放寬規定者外,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, uV/m)	測距(公尺)
0.009 - 0.490 (含)	2,400/f(kHz)	300
0.490 (不含) - 1.705 (含)	24,000/f(kHz)	30
1.705 (不含) - 30 (不含)	30	30
30 (含) - 88 (含)	100	3
88 (不含)- 216 (含)	150	3
216 (不含)- 960 (含)	200	3
960 (不含)以上	500	3



(4) 限制使用之頻帶

除本規範另有規定外，任何低功率射頻電機之主波皆不得使用下表所列各頻段之頻率；低功率射頻電機落於下表所列頻段之混附發射，其電場強度必須符合 2.8 之限制規定。

頻率(MHz)	頻率(MHz)	頻率(MHz)
0.090~0.110	240.00~285.00	3332.0~3339.0
0.490~0.510	322.00~335.40	3345.8~3358.0
2.172~2.198	399.90~410.00	3500.0~4400.0
3.013~3.033	485.00~510.00	4500.0~5250.0
4.115~4.198	608.00~614.00	5350.0~5460.0
5.670~5.690	703.00~748.00	7250.0~7750.0
6.200~6.300	758.00~803.00	8025.0~8500.0
8.230~8.400	825.00~915.00	9000.0~9200.0
12.265~12.600	930.00~1240.0	9300.0~9500.0
13.340~13.430	1300.0~1427.0	10600~12700
14.965~15.020	1435.0~1626.5	13250~13400
16.700~16.755	1660.0~1785.0	14470~14500
19.965~20.020	1805.0~1880.0	15350~16200
25.500~25.700	1885.0~1900.0	17700~21400
37.475~38.275	1905.0~1985.0	22010~23120
73.500~75.400	2010.0~2025.0	23600~24000
108.00~138.00	2110.0~2170.0	31200~31800
149.90~150.05	2200.0~2300.0	36430~36500
156.70~156.90	2310.0~2390.0	38600 以上
162.01~167.17	2483.5~2900.0	-
167.72~173.20	3260.0~3267.0	-

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4. 測試項目

4.1 場強輻射

4.1.1 適用標準

請見本報告 3.1 節第 (3)、(4) 的規定。

4.1.2 測試方法

在半電波暗室，將待測物置於 0.8 米高的非金屬桌面，使其操作在工作狀態。接收天線置於 3 米距離。桌面要 360 度旋轉，另外接收天線從離地 1 米至 4 米升降變化，以找出最大的輻射電場強度，接收天線分別置於水平、垂直極化各執行測試一次。

頻譜設定如下：

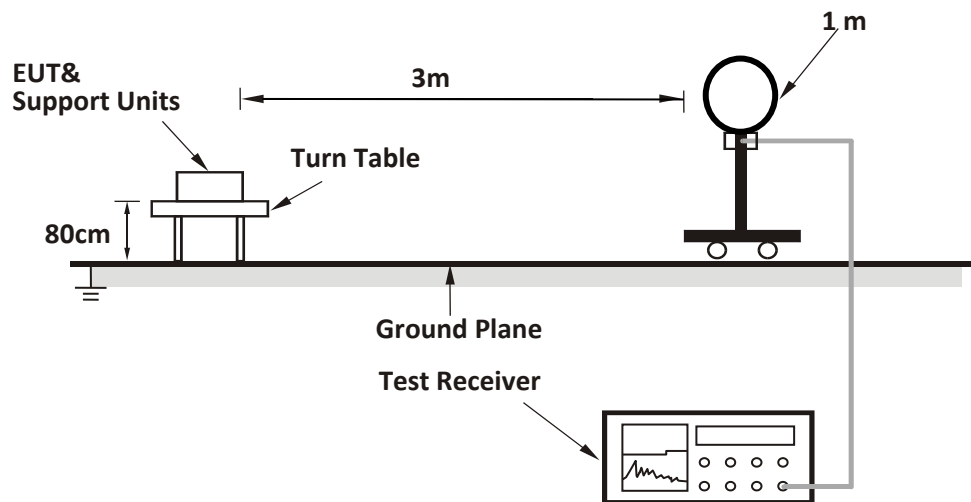
Peak

頻率範圍	RBW	VBW
9 kHz~150 kHz	200 Hz	600 Hz
150 kHz~30 MHz	10 kHz	30 kHz
30 MHz~1 GHz	120 kHz	360 kHz

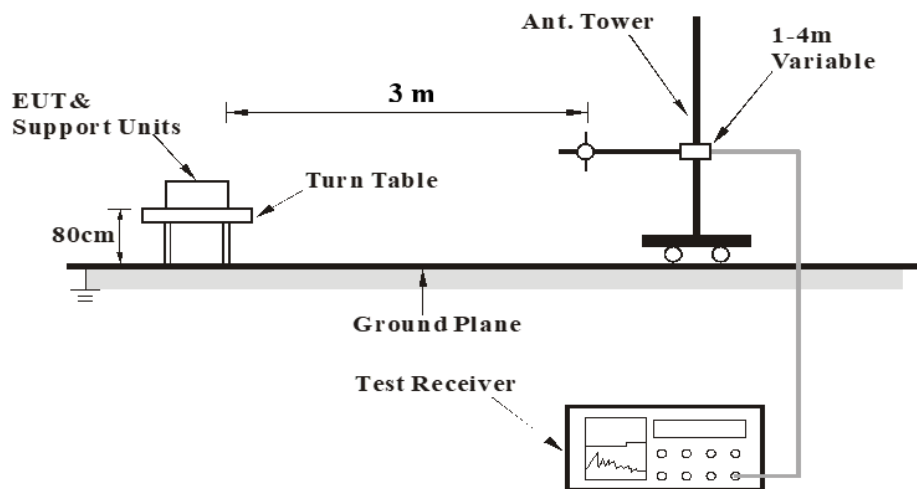
Note: Quasi-Peak RBW = 120 kHz

4.1.3 測試配置圖

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



For the actual test configuration, please refer to the Appendix I.

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4.1.4 場強之計算公式

結果值 Result value (dBuV/m) = 機器讀值 Reading value (dBuV/m) + 校正因子
Correction Factor (dB/m)

餘裕度 Margin(dB) = 結果值 Result value (dBuV/m) - 限制值 Limit value (dBuV/m)

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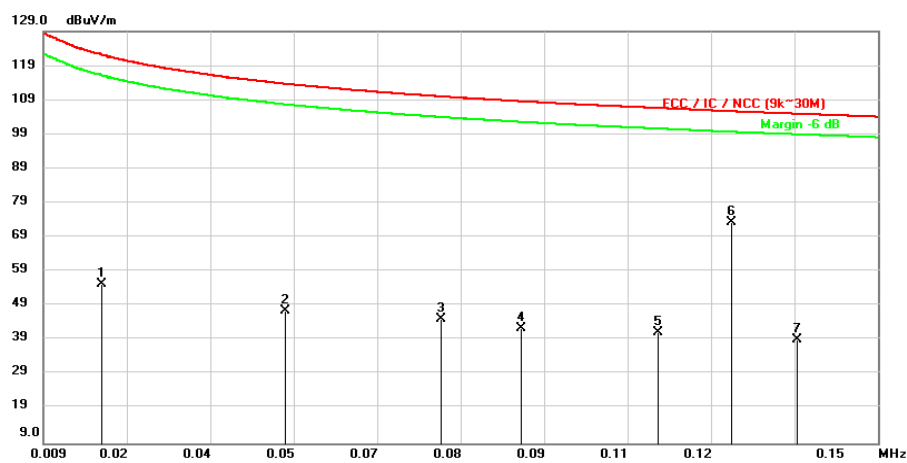


4.1.5 測試結果

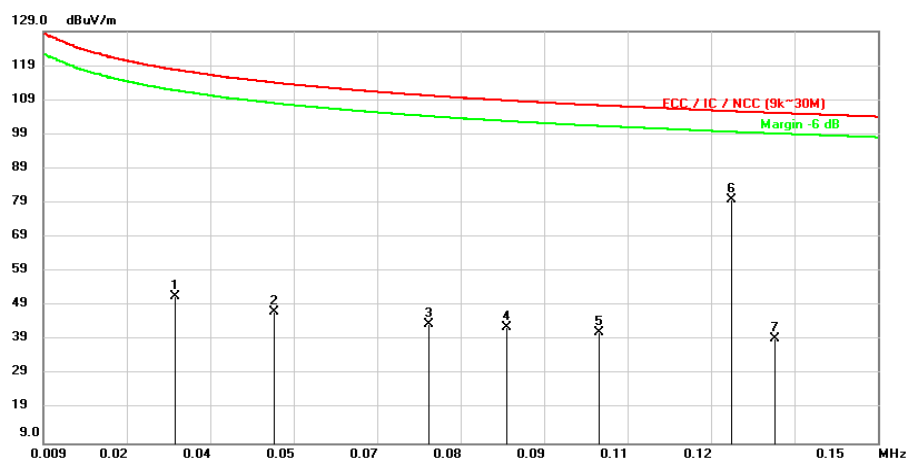
發射模式

EUT Test Condition		Measurement Detail	
Mode 1	125kHz TX	Frequency Range	9kHz ~ 0.15 MHz

0° Horizontal



90° Horizontal



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Antenna Polarity & Test Distance: 0° Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	0.0189	38.16	17.30	55.46	122.12	-66.66	peak
-	0.0498	34.57	12.92	47.49	113.66	-66.17	peak
-	0.0761	32.72	12.51	45.23	109.99	-64.76	peak
-	0.0898	30.16	12.29	42.45	108.54	-66.09	peak
-	0.1128	29.30	12.09	41.39	106.61	-65.22	peak
@	0.1250	61.43	12.06	73.49	105.66	-32.17	peak
-	0.1363	26.96	12.15	39.11	104.95	-65.84	peak
Antenna Polarity & Test Distance: 90° Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	0.0313	37.53	14.29	51.82	117.73	-65.91	peak
-	0.0479	34.34	13.06	47.40	114.03	-66.63	peak
-	0.0739	31.24	12.54	43.78	110.25	-66.47	peak
-	0.0873	30.49	12.33	42.82	108.80	-65.98	peak
-	0.1029	29.24	12.14	41.38	107.38	-66.00	peak
@	0.1250	67.80	12.06	79.86	105.66	-25.80	peak
-	0.1327	27.30	12.14	39.44	105.18	-65.74	peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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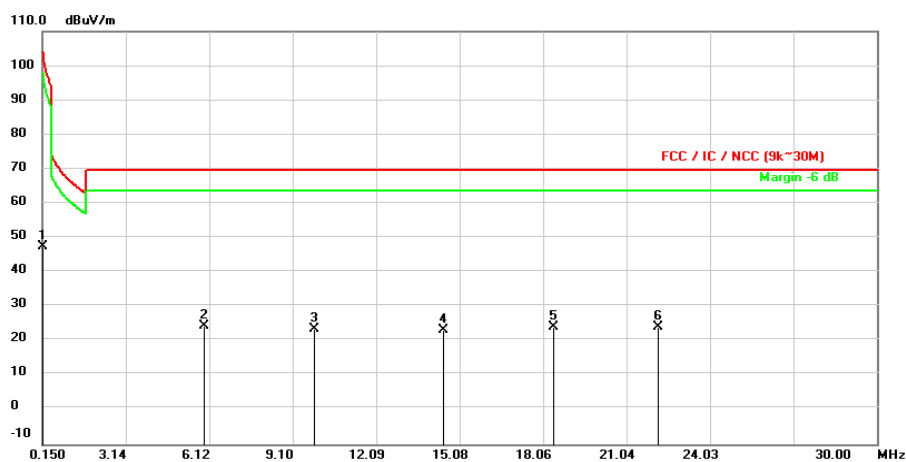
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EUT Test Condition		Measurement Detail	
Mode 1	125kHz TX	Frequency Range	0.15MHz ~ 30 MHz

0° Horizontal



90° Horizontal



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Antenna Polarity & Test Distance: 0° Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	0.1570	36.41	12.13	48.54	103.70	-55.16	peak
-	4.4235	13.09	11.52	24.61	69.54	-44.93	peak
-	10.2632	16.27	11.62	27.89	69.54	-41.65	peak
-	12.5129	14.24	11.54	25.78	69.54	-43.76	peak
-	18.6411	12.53	11.37	23.90	69.54	-45.64	peak
-	25.9056	14.51	10.24	24.75	69.54	-44.79	peak
Antenna Polarity & Test Distance: 90° Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	0.1550	35.46	12.14	47.60	103.81	-56.21	peak
-	5.9260	12.79	11.63	24.42	69.54	-45.12	peak
-	9.8751	11.91	11.63	23.54	69.54	-46.00	peak
-	14.5357	11.79	11.48	23.27	69.54	-46.27	peak
-	18.4341	12.79	11.38	24.17	69.54	-45.37	peak
-	22.1712	13.11	10.93	24.04	69.54	-45.50	peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

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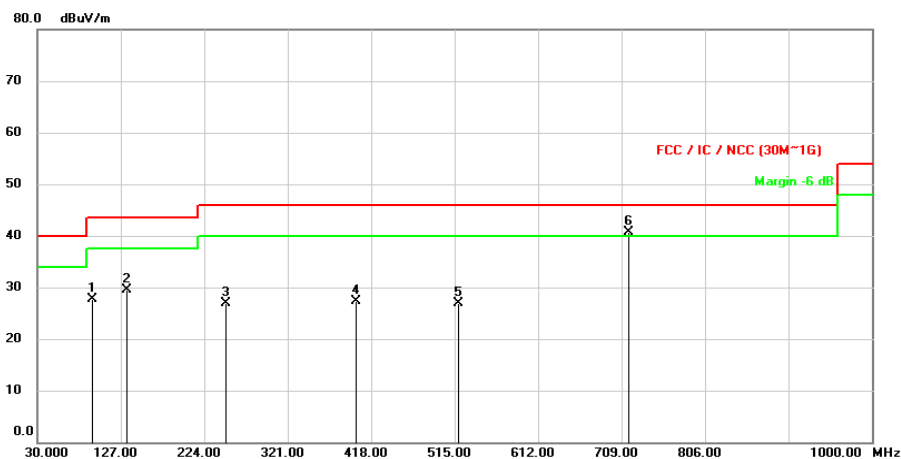
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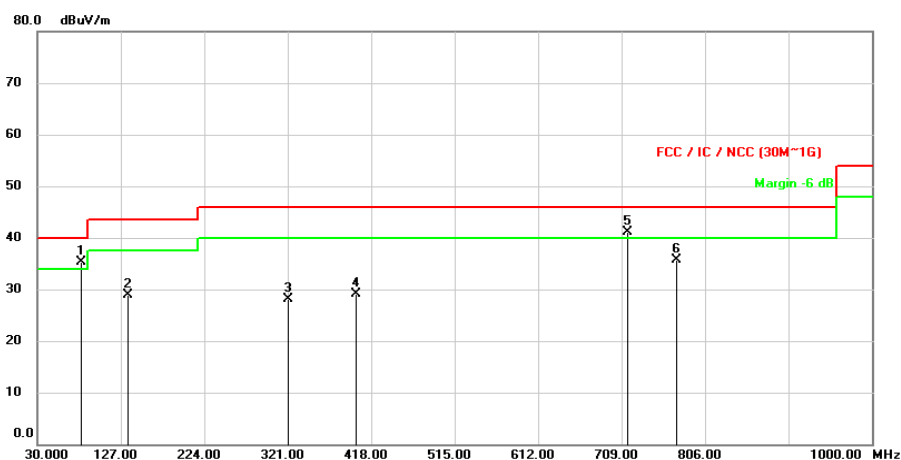
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EUT Test Condition		Measurement Detail	
Mode 1	125kHz TX	Frequency Range	30MHz ~ 1 GHz

Horizontal



Vertical



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Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	94.7960	48.63	-20.99	27.64	43.50	-15.86	peak
-	133.8870	45.87	-16.46	29.41	43.50	-14.09	peak
-	249.7050	42.67	-15.76	26.91	46.00	-19.09	peak
-	400.1197	38.83	-11.50	27.33	46.00	-18.67	peak
-	520.1733	35.93	-8.99	26.94	46.00	-19.06	peak
-	716.9863	45.92	-5.18	40.74	46.00	-5.26	peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	80.0197	55.09	-19.74	35.35	40.00	-4.65	peak
-	135.1480	45.22	-16.31	28.91	43.50	-14.59	peak
-	320.0623	41.72	-13.52	28.20	46.00	-17.80	peak
-	400.1197	40.69	-11.50	29.19	46.00	-16.81	peak
-	716.5660	46.31	-5.19	41.12	46.00	-4.88	peak
-	772.7937	39.96	-4.28	35.68	46.00	-10.32	peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

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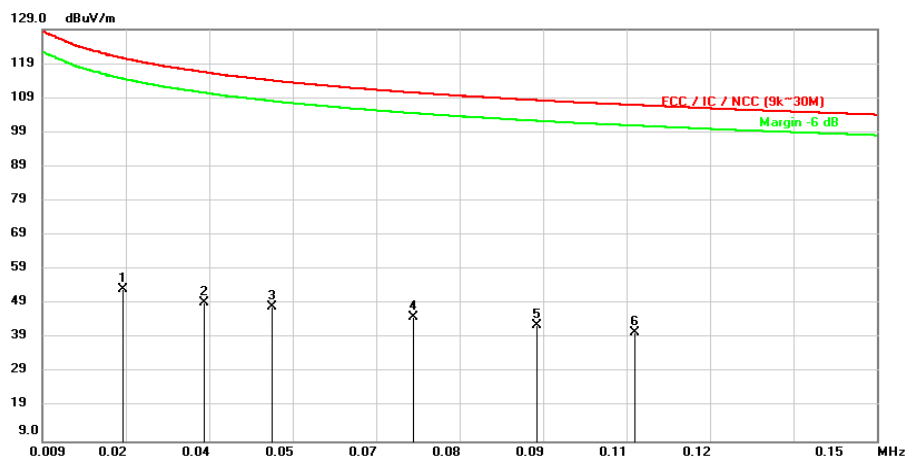
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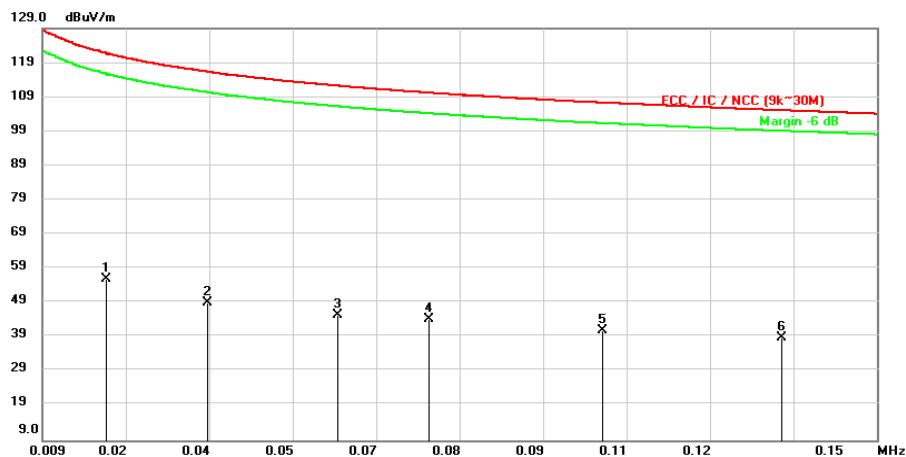
接收模式

EUT Test Condition		Measurement Detail	
Mode 2	125kHz RX	Frequency Range	9kHz ~ 0.15 MHz

0° Horizontal



90° Horizontal



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Antenna Polarity & Test Distance: 0° Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	0.0226	36.82	16.32	53.14	120.58	-67.44	peak
-	0.0363	35.35	13.92	49.27	116.48	-67.21	peak
-	0.0477	35.05	13.07	48.12	114.07	-65.95	peak
-	0.0718	32.47	12.57	45.04	110.49	-65.45	peak
-	0.0926	30.45	12.25	42.70	108.28	-65.58	peak
-	0.1089	28.61	12.14	40.75	106.91	-66.16	peak
Antenna Polarity & Test Distance: 90° Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	0.0195	38.77	17.15	55.92	121.82	-65.90	peak
-	0.0369	35.22	13.88	49.10	116.34	-67.24	peak
-	0.0589	32.72	12.76	45.48	112.21	-66.73	peak
-	0.0741	31.81	12.53	44.34	110.22	-65.88	peak
-	0.1037	28.83	12.13	40.96	107.31	-66.35	peak
-	0.1340	26.69	12.14	38.83	105.10	-66.27	peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

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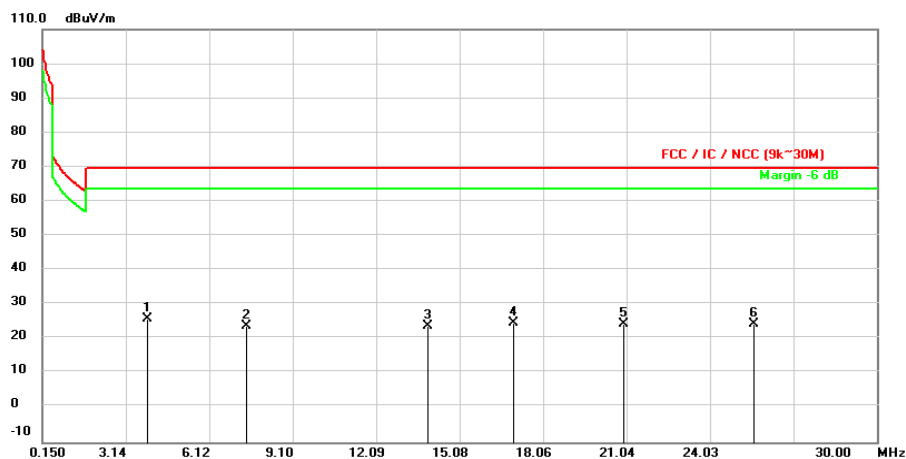
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EUT Test Condition		Measurement Detail	
Mode 2	125kHz RX	Frequency Range	0.15MHz ~ 30 MHz

0° Horizontal



90° Horizontal



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報告發行日期 : 2020/2/3

Antenna Polarity & Test Distance: 0° Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	3.9061	14.44	11.42	25.86	69.54	-43.68	peak
-	7.4135	12.03	11.63	23.66	69.54	-45.88	peak
-	13.9337	12.15	11.50	23.65	69.54	-45.89	peak
-	17.0242	13.20	11.41	24.61	69.54	-44.93	peak
-	20.9475	13.18	11.16	24.34	69.54	-45.20	peak
-	25.5892	13.94	10.30	24.24	69.54	-45.30	peak
Antenna Polarity & Test Distance: 90° Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	5.8315	12.76	11.63	24.39	69.54	-45.15	peak
-	8.1975	12.71	11.63	24.34	69.54	-45.20	peak
-	13.9307	13.08	11.50	24.58	69.54	-44.96	peak
-	18.2053	11.88	11.38	23.26	69.54	-46.28	peak
-	21.9017	11.93	10.98	22.91	69.54	-46.63	peak
-	25.5205	14.38	10.31	24.69	69.54	-44.85	peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

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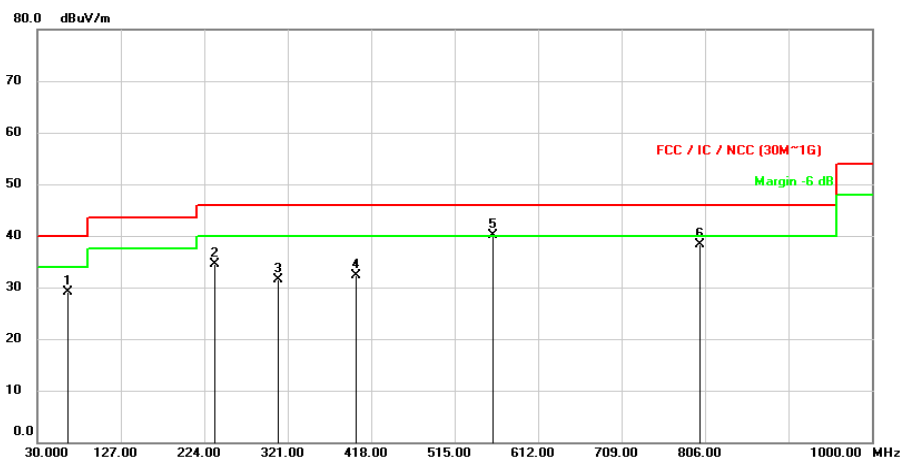
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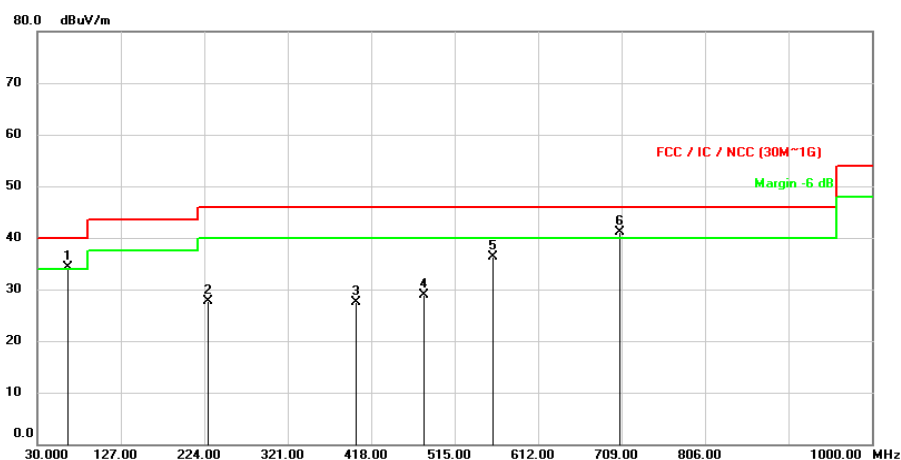
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EUT Test Condition		Measurement Detail	
Mode 2	125kHz RX	Frequency Range	30MHz ~ 1 GHz

Horizontal



Vertical



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Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	66.2779	45.86	-16.75	29.11	40.00	-10.89	peak
-	236.8040	50.53	-16.10	34.43	46.00	-11.57	peak
-	309.5862	45.47	-13.91	31.56	46.00	-14.44	peak
-	400.0227	43.72	-11.50	32.22	46.00	-13.78	peak
-	560.0080	48.11	-8.05	40.06	46.00	-5.94	peak
-	800.0183	42.25	-3.91	38.34	46.00	-7.66	peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	64.8877	50.76	-16.47	34.29	40.00	-5.71	peak
-	227.7507	44.66	-17.03	27.63	46.00	-18.37	peak
-	399.9903	38.95	-11.50	27.45	46.00	-18.55	peak
-	480.0153	38.61	-9.73	28.88	46.00	-17.12	peak
-	560.0403	44.39	-8.05	36.34	46.00	-9.66	peak
-	707.8360	46.43	-5.30	41.13	46.00	-4.87	peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

4.1.6 測試結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

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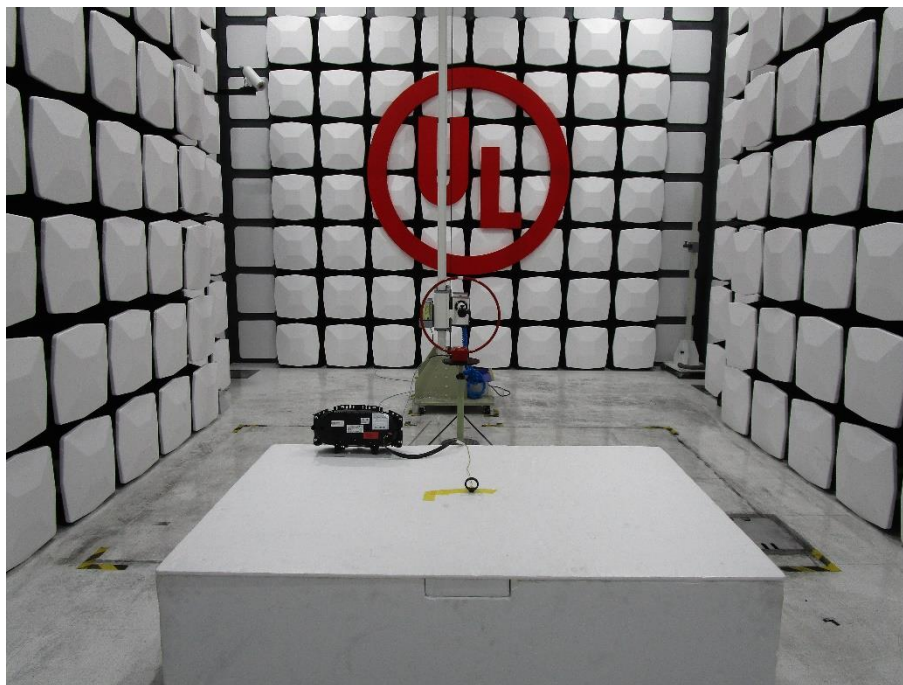
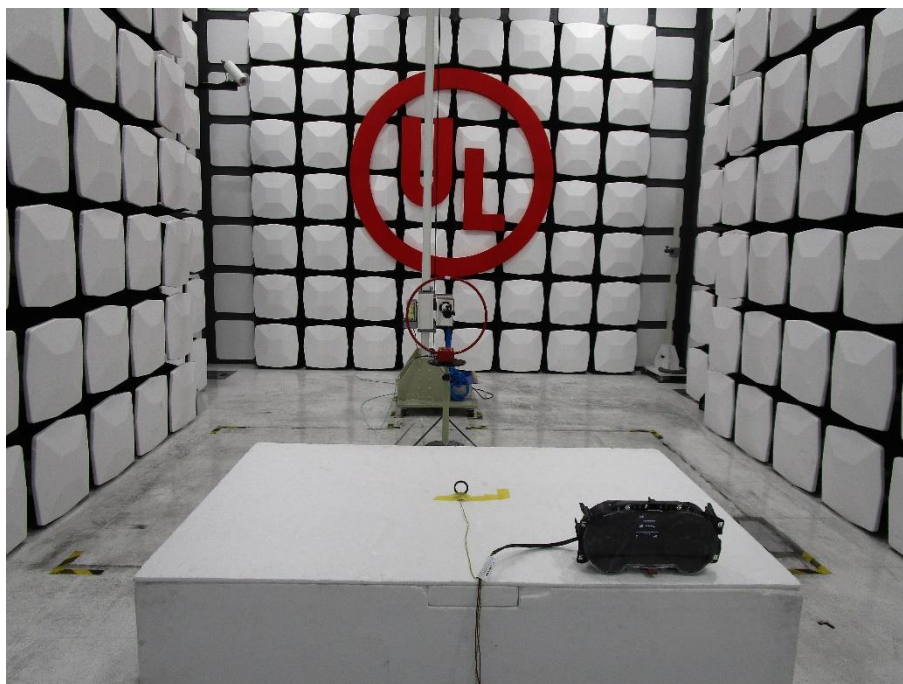
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附錄 1 場強輻射測試照

9 kHz ~ 30 MHz



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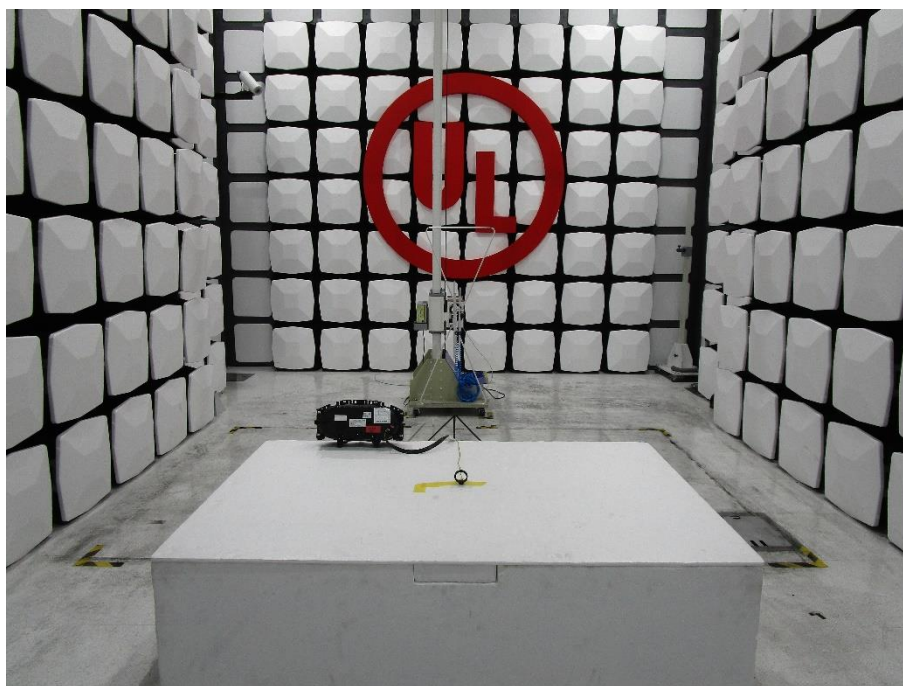
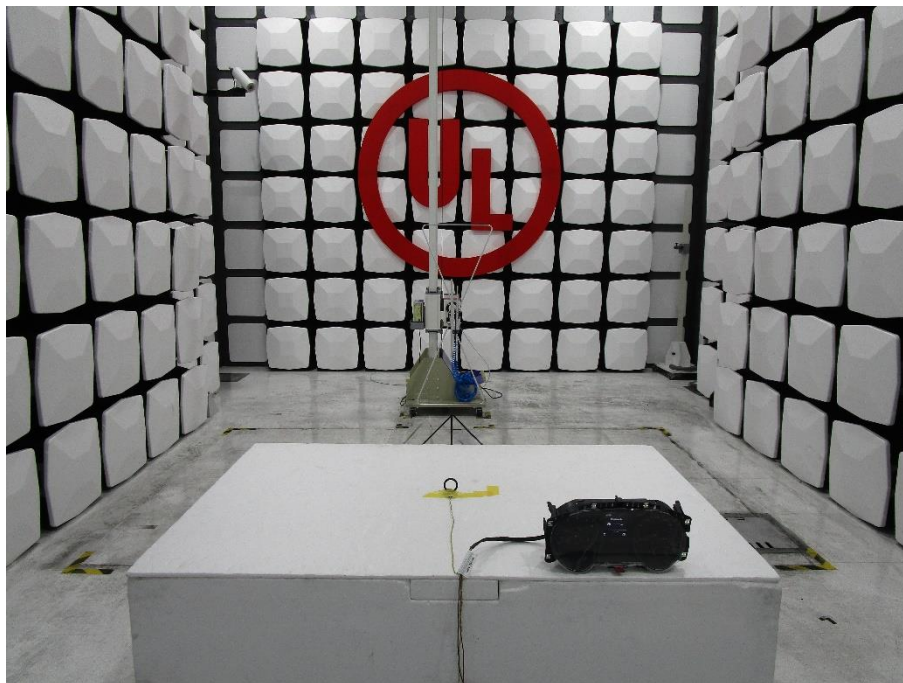
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30 MHz ~ 1 GHz



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