

EVALUATION REPORT

FCC / ISED

APPLICANT

Safetrust Inc

MODEL NAME

SA350

FCC ID

2ANI5SA350

ISED ID

23133-SA350

REPORT NUMBER

HA200512-SFT-001-R09

TEST REPORT**Date of Issue**
October 28, 2022**Test Site**
Hyundai C-Tech, Inc. dba HCT America, Inc.
1726 Ringwood Ave, San Jose, CA 95131, USA

Applicant	Safetrust Inc
Applicant Address	8116 Mill Creek Rd, Fremont, CA 94539, U.S.A.
FCC ID	2ANI5SA350
ISED ID	23133-SA350
Model Name	SA350
EUT Type	SABRE RELAY
Modulation Type	DSSS / CCK, OFDM
FCC Classification	Digital Transmission System (DTS)
FCC Rule Part(s)	Part 15.247
ISED Rule Part(s)	RSS-247 Issue 2 (February 2017) RSS-Gen Issue 5 Amd 2 (February 2021)
Test Procedure	ANSI C63.10-2013, KDB 558074 D01 v05r02

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures required. The results of testing in this report apply only to the product which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Hyundai C-Tech, Inc. dba HCT America, Inc. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

Tested By

Yongsoo Park

Test Engineer

Reviewed By

Sunwoo Kim

Technical Manager

REVISION HISTORY

The revision history for this document is shown in table.

TEST REPORT NO.	DATE	DESCRIPTION
HA200512-SFT-001-R09	October 28, 2022	Initial Issue

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1. GENERAL INFORMATION

EUT DESCRIPTION

Base Model	SA350	
EUT Type	SABRE RELAY	
Serial Number	SN1	
Power Supply	7 – 25 V d.c.	
RF Specification	WIFI 2.4 GHz	IEEE 802.11b/g/n (HT20/40) : ESP32
	BLE (MCU)	1 Mbps : nRF52840
	BLE (MESH)	1 Mbps : nRF52832
Transmitter Chain	WIFI 2.4 GHz : SISO Bluetooth LE : SISO	
Operating Environment	Indoor and outdoor	
Operating Temperature	-35 °C ~ 65 °C	
Modulation Type	WIFI 2.4 GHz	DSSS/CCK (802.11b), OFDM (802.11g/n HT20/40)
	BLE (MCU)	GFSK
	BLE (MESH)	GFSK
Antenna Specification ¹⁾	Antenna Type : Chip antenna Peak Gain : 2.0 dBi	
Firmware Version ²⁾	STF 591	
Hardware Version ²⁾	BRD52-4 RELAY REV 02	
Date(s) of Tests	October 24, 2022 ~ October 25, 2022	

Note :

1. Antenna information is based on the document provided.
2. Firmware and Hardware Versions are provided by the client.

2. MODEL DIFFERENCES

Models SA300 (INLINE, FCC ID : 2ANI5SA300) & SA350 (RELAY, FCC ID : 2ANI5SA350) share the same circuit board (PCB), with only a Form C relay added to make the SA350 (RELAY) version. The main board including the RF circuitry is identical between two models.

Model	Items
SA300	It was designed to inject BLE data through existing building low voltage wires to a controller device, which decides to open a door
SA350	With the Form C relay addition, if the BLE data is recognized (i.e. user), the relay is triggered which can release a parking gate or similar access barrier.

3. REFERENCE DETAIL SECTION

SPOT CHECK ITEMS		
Reference FCC ID	Equipment Class	Items
2ANI5SA350	DTS	Radiated Spurious Emission
		Radiated Restricted Band Edges

REFERENCE TEST DATA			
Reference FCC ID	Equipment Class	Reference Test Report No.	Section
2ANI5SA300	DTS	HA200512-SFT-001-R01	All sections
	DTS	HA220512-SFT-001-R03	All sections

4. SUMMARY OF THE SPOT CHECK RESULTS

Equipment Class	Test Item	Mode	Channel Frequency (MHz)	SA300 Result [dBuV/m]			SA350 Result [dBuV/m]			Difference [dB]		
				QP	AV	PK	QP	AV	PK	QP	AV	PK
DTS	Radiated Spurious Emission	BLE MCU	2440	-	45.7	54.8	-	47.7	53.3	-	+2.0	-1.5
		BLE MESH	2440	-	50.8	58.1	-	48.9	57.4	-	-1.9	-0.7
		WIFI 2.4 GHz	2437	-	48.1	63.5	-	50.2	66.5	-	+2.1	+3.0
	Radiated Restricted Band Edges	BLE MCU	2480	-	37.7	50.7	-	35.5	48.0	-	-2.2	-2.7
		BLE MESH	2480	-	32.5	45.3	-	33.7	42.4	-	+1.2	+2.9
		WIFI 2.4 GHz	2452	-	41.0	60.8	-	42.7	61.1	-	+1.7	+0.3

Note :

No unique peak found compared to the original model below 1 GHz

5. SPOT CHECK RESULTS

5.1. DTS

Radiated Spurious Emission

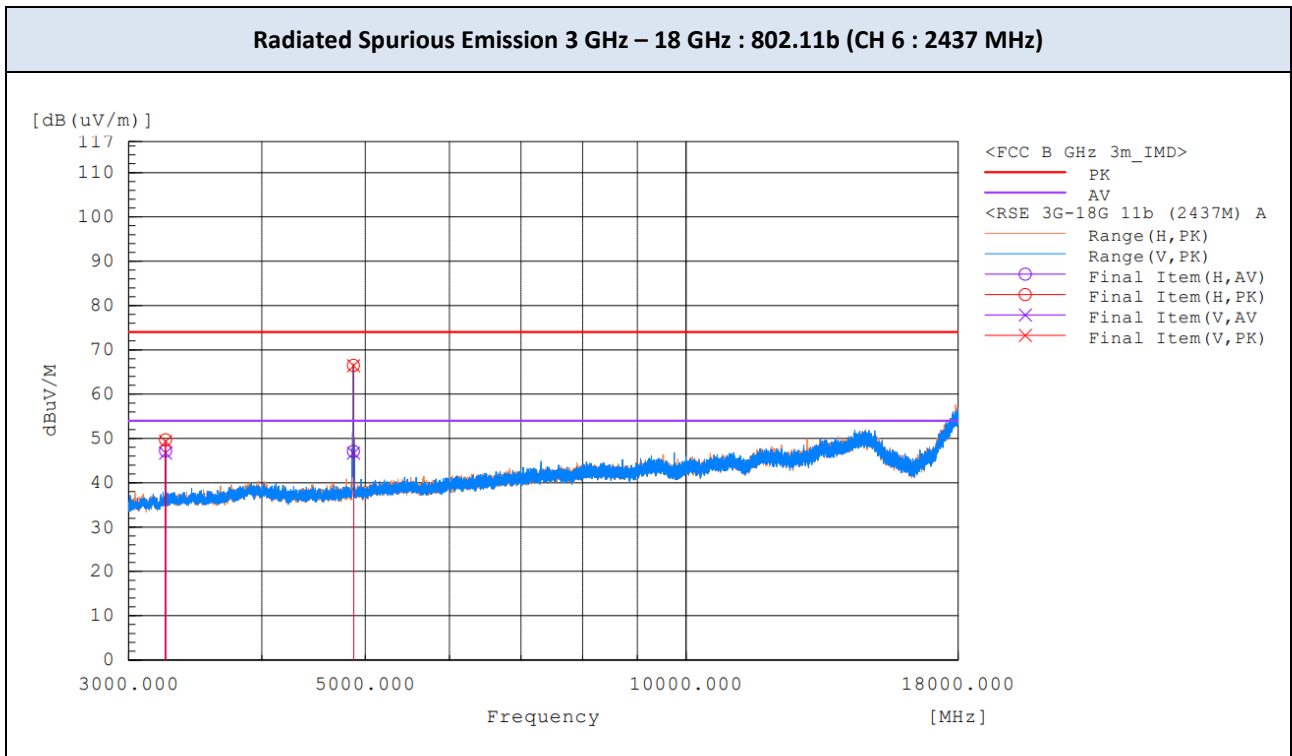
Test Mode 802.11b
 Operating Frequency 2437 MHz (CH 6)

Frequency (MHz)	Polarization	Reading (dBuV)		Factor (dB)		Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		AV	PK	Corr. ¹⁾	Duty	AV	PK	AV	PK	AV	PK
3249.299	H	56.0	58.5	-8.8	-	47.2	49.7	54	74	6.8	24.3
3249.306	V	55.5	58.1	-8.8	-	46.7	49.3	54	74	7.3	24.7
4873.917	H	53.0	72.4	-5.9	3.1	50.2	66.5	54	74	3.8	7.5
4873.919	V	52.6	72.3	-5.9	3.1	49.8	66.4	54	74	4.2	7.6

Note :

1. Correction Factor: Antenna Factor + Cable loss + Pre-amplifier Gain
2. AV Level = Measured Power(dBm) + Correction Factor(dB) + Duty Cycle Factor(dB).

TEST PLOTS



Radiated Spurious Emission

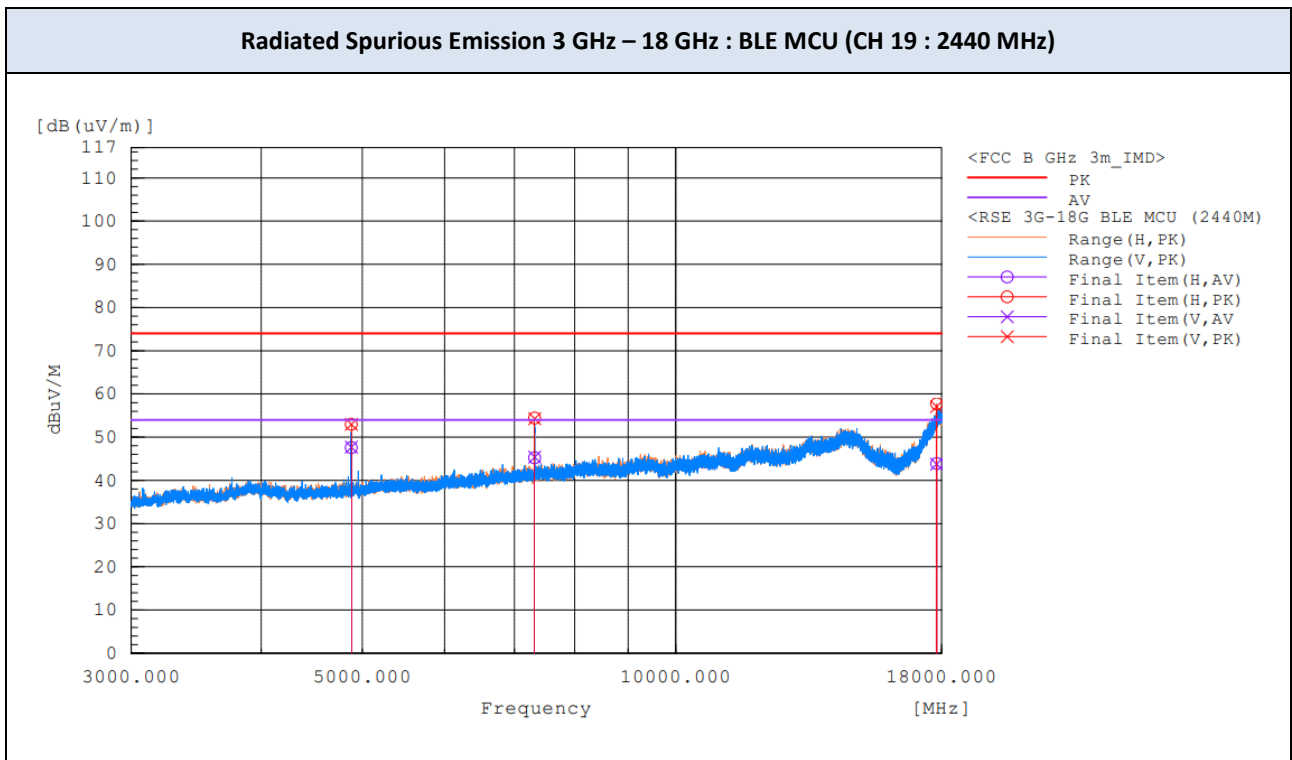
Test Mode BLE 1M (MCU)
 Operating Frequency 2440 MHz (CH 19)

Frequency (MHz)	Polarization	Reading (dBuV)		Factor (dB)		Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		AV	PK	Corr. ¹⁾	Duty	AV	PK	AV	PK	AV	PK
4880.114	V	53.6	58.9	-5.9	-	47.7	53.0	54	74	6.3	21.0
4880.232	H	53.5	58.9	-5.9	-	47.6	53.0	54	74	6.4	21.0
7319.681	H	45.5	54.7	-0.3	-	45.2	54.4	54	74	8.8	19.6
7320.769	V	45.7	54.6	-0.3	-	45.4	54.3	54	74	8.6	19.7

Note :

1. Correction Factor: Antenna Factor + Cable loss + Pre-amplifier Gain
2. BLE was set to transmit with 100% duty cycle.

TEST PLOTS



Radiated Spurious Emission

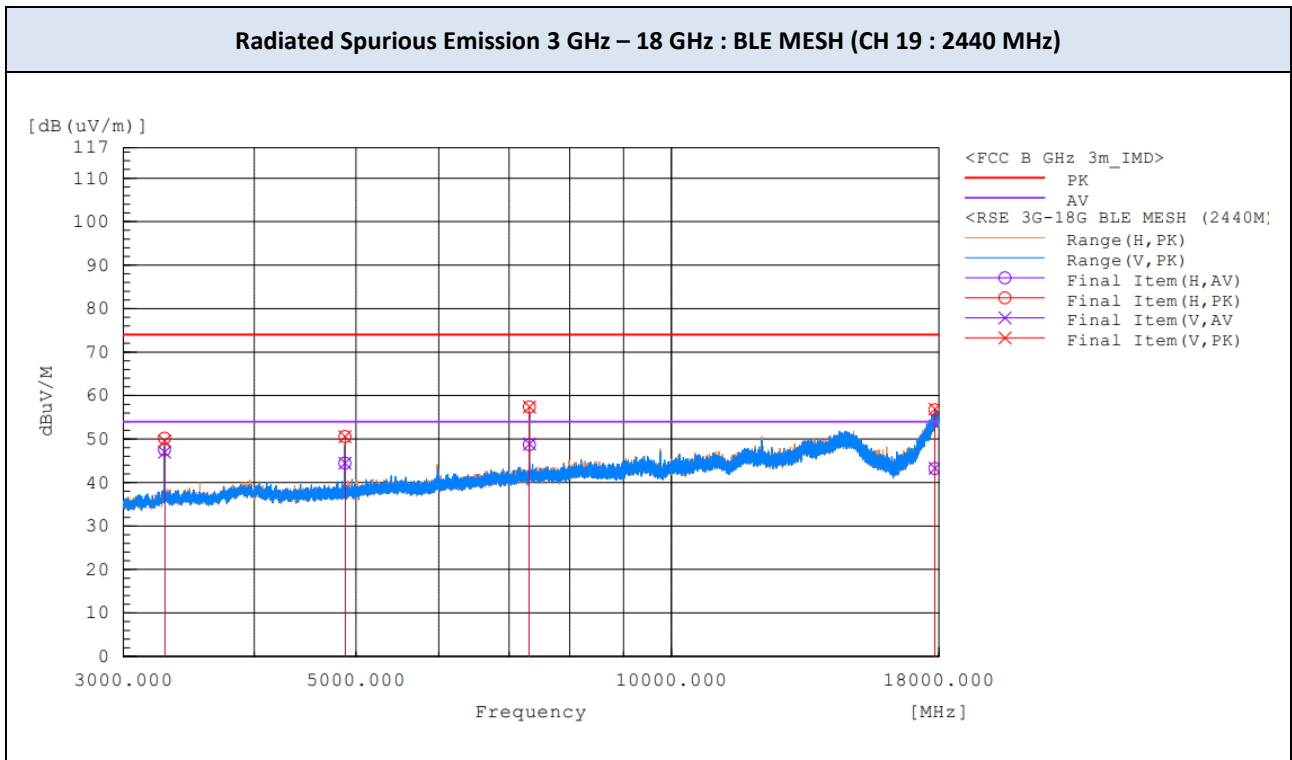
Test Mode BLE 1M (MESH)
 Operating Frequency 2440 MHz (CH 19)

Frequency (MHz)	Polarization	Reading (dBuV)		Factor (dB)		Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		AV	PK	Corr. ¹⁾	Duty	AV	PK	AV	PK	AV	PK
3282.636	H	56	58.7	-8.5	-	47.5	50.2	54	74	6.5	23.8
3282.655	V	55.5	58.1	-8.5	-	47.0	49.6	54	74	7.0	24.4
4880.147	V	50.4	56.5	-5.9	-	44.5	50.6	54	74	9.5	23.4
4880.173	H	50.4	56.5	-5.9	-	44.5	50.6	54	74	9.5	23.4
7319.665	V	49.2	57.7	-0.3	-	48.9	57.4	54	74	5.1	16.6
7319.864	H	49	57.7	-0.3	-	48.7	57.4	54	74	5.3	16.6

Note :

1. Correction Factor: Antenna Factor + Cable loss + Pre-amplifier Gain
2. BLE was set to transmit with 100% duty cycle.

TEST PLOTS



Radiated Restricted Band Edges

Test Mode 802.11n HT40
 Operating Frequency 2422 MHz (CH 3)

Frequency (MHz)	Polarization	Reading (dBuV)		Factor (dB)		Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		AV	PK	Corr. ¹⁾	Duty	AV	PK	AV	PK	AV	PK
2388.159	V	47.0	69.9	-11.1	3.2	39.1	58.8	54	74	14.9	15.2
2388.084	H	47.2	69.2	-11.1	3.2	39.3	58.1	54	74	14.7	15.9
2386.691	H	46.9	69.0	-11.2	3.2	38.9	57.8	54	74	15.1	16.2
2386.622	V	46.3	68.0	-11.2	3.2	38.3	56.8	54	74	15.7	17.2

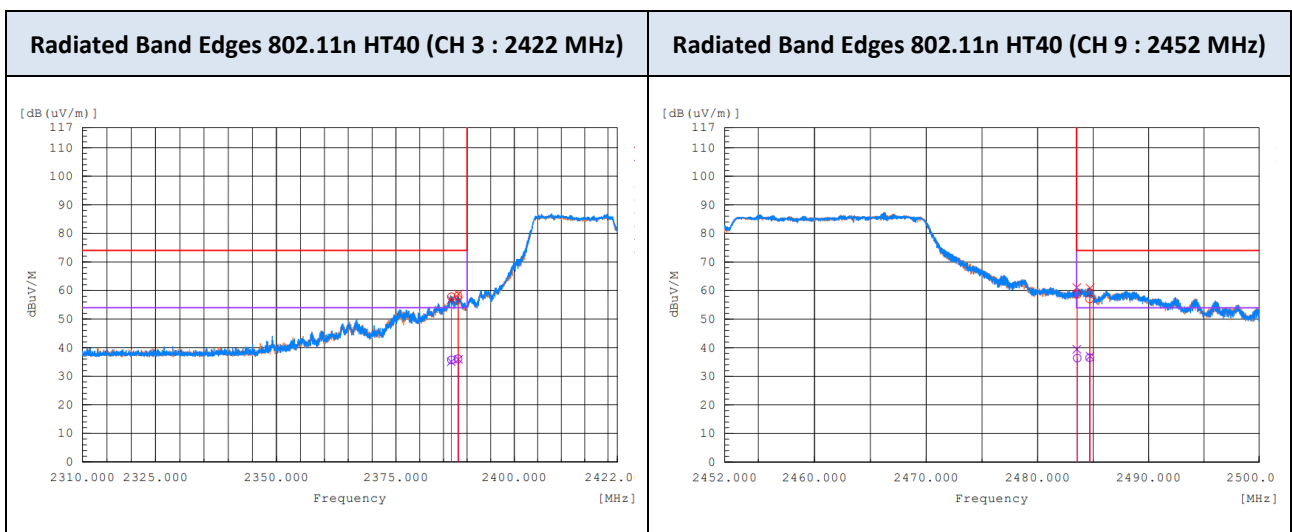
Test Mode 802.11n HT40
 Operating Frequency 2452 MHz (CH 9)

Frequency (MHz)	Polarization	Reading (dBuV)		Factor (dB)		Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		AV	PK	Corr. ¹⁾	Duty	AV	PK	AV	PK	AV	PK
2483.520	V	50.1	71.7	-10.6	3.2	42.7	61.1	54	74	11.3	12.9
2483.567	H	47.0	69.3	-10.6	3.2	39.6	58.7	54	74	14.4	15.3
2484.707	V	47.7	71.5	-10.6	3.2	40.3	60.9	54	74	13.7	13.1
2484.672	H	47.1	67.7	-10.6	3.2	39.7	57.1	54	74	14.3	16.9

Note :

1. Correction Factor: Antenna Factor + Cable loss + Pre-amplifier Gain
2. AV Level = Measured Power(dBm) + Correction Factor(dB) + Duty Cycle Factor(dB).

TEST PLOTS



Radiated Restricted Band Edges

Test Mode BLE 1M (MCU)
 Operating Frequency 2402 MHz (CH 0)

Frequency (MHz)	Polarization	Reading (dBuV)		Factor (dB)		Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		AV	PK	Corr. ¹⁾	Duty	AV	PK	AV	PK	AV	PK
2389.642	H	37.3	50.8	-11.1	-	26.2	39.7	54	74	27.8	34.3
2389.988	V	37.2	50.5	-11.1	-	26.1	39.4	54	74	27.9	34.6

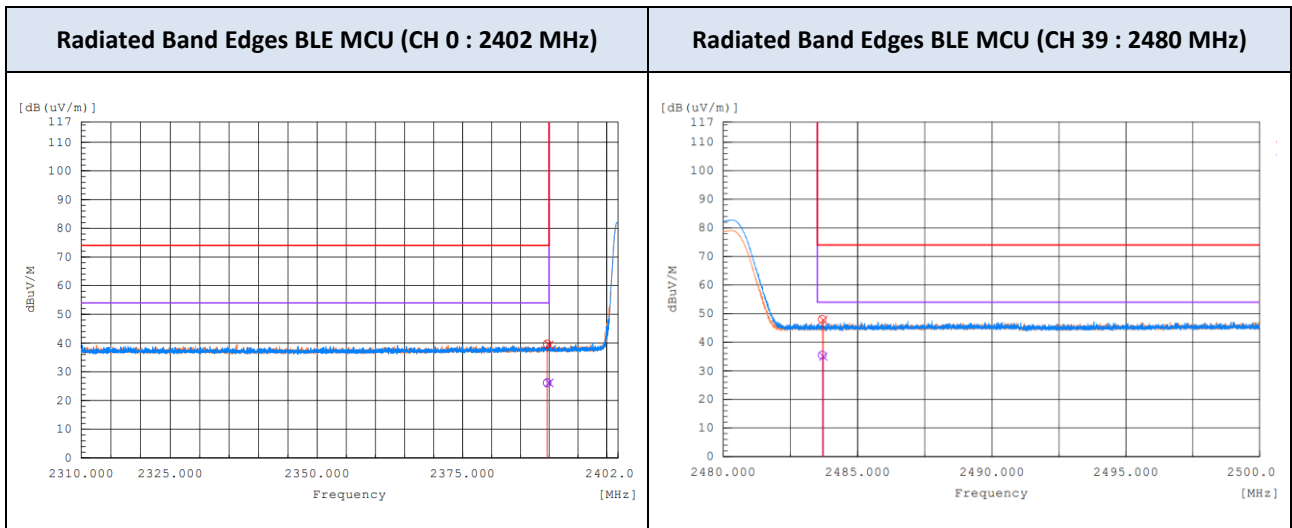
Test Mode BLE 1M (MCU)
 Operating Frequency 2480 MHz (CH 39)

Frequency (MHz)	Polarization	Reading (dBuV)		Factor (dB)		Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		AV	PK	Corr. ¹⁾	Duty	AV	PK	AV	PK	AV	PK
2483.675	H	46.1	58.6	-10.6	-	35.5	48.0	54	74	18.5	26.0
2483.713	V	45.6	58.4	-10.6	-	35.0	47.8	54	74	19.0	26.2

Note :

1. Correction Factor: Antenna Factor + Cable loss + Preamplifier Gain
2. BLE was set to transmit with 100% duty cycle

TEST PLOTS



Radiated Restricted Band Edges

Test Mode BLE 1M (MESH)
 Operating Frequency 2402 MHz (CH 0)

Frequency (MHz)	Polarization	Reading (dBuV)		Factor (dB)		Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		AV	PK	Corr. ¹⁾	Duty	AV	PK	AV	PK	AV	PK
2338.048	V	43.7	52.8	-11.5	-	32.2	41.3	54	74	21.8	32.7
2338.055	H	45.2	53.6	-11.5	-	33.7	42.1	54	74	20.3	31.9
2389.369	H	37.3	51.4	-11.1	-	26.2	40.3	54	74	27.8	33.7
2389.580	V	37.4	50.6	-11.1	-	26.3	39.5	54	74	27.7	34.5

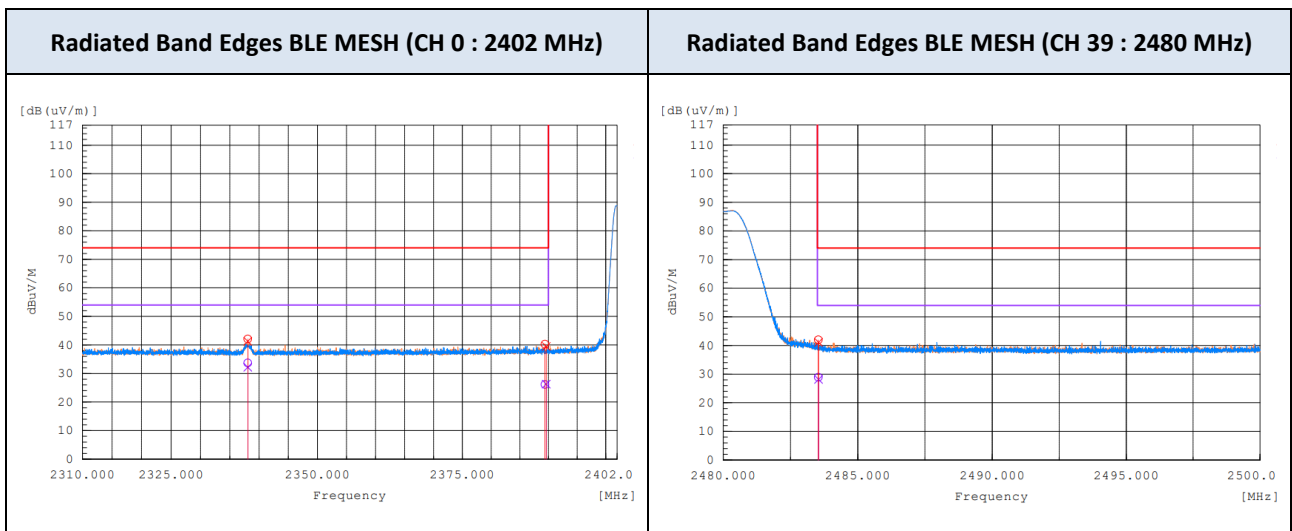
Test Mode BLE 1M (MESH)
 Operating Frequency 2480 MHz (CH 39)

Frequency (MHz)	Polarization	Reading (dBuV)		Factor (dB)		Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		AV	PK	Corr. ¹⁾	Duty	AV	PK	AV	PK	AV	PK
2483.533	H	39.5	52.6	-10.6	-	28.9	42.0	54	74	25.1	32.0
2483.536	V	38.8	51.7	-10.6	-	28.2	41.1	54	74	25.8	32.9

Note :

1. Correction Factor: Antenna Factor + Cable loss + Pre-amplifier Gain
3. BLE was set to transmit with 100% duty cycle

TEST PLOTS



6. LIST OF TEST EQUIPMENT

No.	Instrument	Model No.	Calibration Due (mm/dd/yy)	Manufacture	Serial No.
<input checked="" type="checkbox"/>	Signal Analyzer (20 Hz ~ 40.0 GHz)	ESU40	12/03/2022	Rohde & Schwarz	100529
<input checked="" type="checkbox"/>	Signal Analyzer (1 Hz ~ 40.0 GHz)	ESW44	10/25/2023	Rohde & Schwarz	102015
<input checked="" type="checkbox"/>	Horn Antenna (1 GHz ~ 18 GHz)	DRH-118	01/28/2023	Sunol	A061616
<input checked="" type="checkbox"/>	LNA (1 GHz ~ 18 GHz)	PAM-118A	06/21/2023	Com-Power	18040074
<input checked="" type="checkbox"/>	High Pass Filter	WHK10-2520- 3000-18000-40EF	01/13/2023	Wainwright	9
<input type="checkbox"/>	High Pass Filter	WHKX8-6090- 7000-18000-40SS	01/13/2023	Wainwright	23

Note :

1. All the equipment listed above was properly calibrated before using for the test. Any equipment which is past due on calibration is used after calibration is completed or the equipment is used before calibration due.

APPENDIX A. TEST SETUP PHOTOS

The setup photos are provided as a separate document.

APPENDIX B. PHOTOGRAPHS OF EUT

B.1. EXTERNAL PHOTOS

The external photos are provided as a separate document.

B.2. INTERNAL PHOTOS

The internal photos are provided as a separate document.

END OF TEST REPORT