

# MPE REPORT

## FCC

APPLICANT

**Universal Electronics Inc**

MODEL NAME

**CO2ZB1**

FCC ID

**MG3- CO2ZB1**

REPORT NUMBER

**HA221020-UEI-010-R04**

# TEST REPORT

**Date of Issue**  
November 3, 2022

**Test Site**  
Hyundai C-Tech, Inc. dba HCT America, Inc.  
1726 Ringwood Ave, San Jose, CA 95131, USA

<b>Applicant</b>	Universal Electronics Inc
<b>Applicant Address</b>	201 East Sandpointe Ave 7 <sup>th</sup> Floor, Santa Ana, CA 92707, U.S.A.
<b>FCC ID</b>	MG3-CO2ZB1
<b>Model Name</b>	CO2ZB1
<b>EUT Type</b>	CO2 Sensor
<b>FCC Classification</b>	Digital Transmission System (DTS)
<b>FCC Rule Part(s)</b>	Part 1 (§1.1310), Part 2 (§2.1091)
<b>Test Procedure</b>	KDB 447498 D01 v06

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 in accordance with the procedures specified in §2.947. The results 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
HA221020-UEI-010-R04	November 3, 2022	Initial Issue

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## 1. EUT DESCRIPTION

<b>Model</b>	CO2ZB1
<b>EUT Type</b>	CO2 Sensor
<b>Power Supply</b>	6 V d.c. (4 x AA Alkaline Batteries)
<b>RF Specification</b>	IEEE 802.15.4
<b>Transmitter Chain</b>	1
<b>Antenna Specification <sup>1)</sup></b>	Antenna Type : PCB trace Peak Gain : 2.41 dBi
<b>Operating Environment</b>	Indoor
<b>Operating Temperature</b>	-10 °C ~ +50 °C

**Note(s) :**

1. Antenna information is based on the document provided.

## 2. INTRODUCTION

### 2.1. LIMIT

The limit for Maximum Permissible Exposure (MPE), specified in FCC Rule Part §1.1310 listed in the table below, shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation specified in §1.1310 (b)

Frequency Range (MHz)	E- Field Strength (V/m)	H- Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (Minutes)
<b>(A) Limits for Occupational / Controlled Exposure</b>				
0.3 – 3.0	614	1.63	*100	6
3.0 – 30	1842 / f	4.89 / f	*900 / f <sup>2</sup>	6
30 – 300	61.4	0.163	1.0	6
300 – 1,500	-	-	f / 300	6
1,500 – 100,000	-	-	5	6
<b>(B) Limits for General Population / Uncontrolled Exposure</b>				
0.3 – 1.34	614	1.63	*100	30
1.34 – 30	824 / f	2.19 / f	*180 / f <sup>2</sup>	30
30 – 300	27.5	0.073	0.2	30
300 – 1,500	-	-	f / 1500	30
1,500 – 100,000	-	-	1.0	30

f = frequency in MHz, \* = Plane-wave equivalent power density

### 2.2. MAXIMUM PERMISSIBLE EXPOSURE PREDICTION

Prediction of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S : Power density (mW/cm<sup>2</sup>)

P : Output power to antenna (mW)

G : Antenna gain in linear scale

R : Distance between the center of radiator and observation point (cm)

### 3. RESULT

#### 3.1. MPE Calculation

IEEE 802.15.4				
Frequency (MHz)	2405 - 2480	MHz		
MPE Limit (mW/cm <sup>2</sup> )	1	mW/cm <sup>2</sup>		
Distance (R)	20	Cm		
Output Power (P) <sup>1)</sup>	20.68	dBm	116.95	mW
Antenna Gain (G)	2.41	dBi	1.74	-
Power density (S) at distance 20 cm	<b>0.040526</b>	mW/cm <sup>2</sup>	at 20 cm separation distance	

**Note :**

1) Maximum output power including tune-up tolerance

#### 3.2. SUMMARY OF RESULTS

Mode	Frequency Range (MHz)	Ant Gain (dBi)	MPE Calculation (mW/cm <sup>2</sup> )	MPE Ratio (PD/MPE Limit)
IEEE 802.15.4	2405 – 2480	2.41	0.040526	0.040526

#### Sample Calculation

TOTAL MPE (20cm distance) =  $0.040526/1 = 0.040526 < 1.0$

**END OF TEST REPORT**