



RADIO EXPOSURE TEST REPORT

FCC ID : ZPNUNIVERSALTABSD
Equipment : 77GHz TA BSD Radar Module
Brand Name : Cub
Model Name : A009-007
Applicant : CUB ELECPARTS INC
No.6,Lane 546, Sec. 6, Changlu Road, Fuhsin Township,
Changhua County, Taiwan 506
Manufacturer : CUB ELECPARTS INC
No.6,Lane 546, Sec. 6, Changlu Road, Fuhsin Township,
Changhua County, Taiwan 506
Standard : 47 CFR Part 2.1091

The product was received on Oct. 11, 2023, and testing was started from Nov. 29, 2023 and completed on Nov. 30, 2020. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown 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. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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Photographs of EUT v01



TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB-A1_2 Ver1.1



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

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/manufacture 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 chapter "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: Sam Chen

Report Producer: Cathy Chiu



1 General Description

1.1 EUT General Information

RF General Information			
Frequency Range (GHz)	Operating Frequency Range (GHz)	Operating Frequency (GHz)	Modulation Type
76-81	76.15-76.75	76.45	FMCW

1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
					TX	RX
1	Cub	CUBT76500	Microstrip Antenna	N/A	11.71	-
2	Cub	CUBT76500	Microstrip Antenna	N/A	-	13.9

Note: The above information was declared by manufacturer.

1.3 Host Information

Host No.	Model Name of Host	Amount of Module	Accessories	Description
1	B122-009NA1-A3	1	Equip with the same accessories.	All the models are identical except for the exterior of EUT, the housing of EUT, amount of modules, and accessories.
2	B122-010NA1-A3	2		
3	B122-009NA1-A2	1		
4	B122-010NA1-A2	2		
5	B122-073NA1-A0	1	Equip with the same accessories.	
6	B122-072NA1-A0	2		
7	B122-075NA1-A0	1		
8	B122-074NA1-A0	2		

Note 1: The EUT is a limited module. The EUT was installed to the above host to perform all the tests.

Note 2: The above information was declared by manufacturer.

1.4 Accessories

N/A



1.5 Accessories of Host

Item	Equipment Name	Brand	Model	Remark
1	Controller 1	Cub	C001-007NA1	*1
2	Controller 2	Cub	C001-025NA1-A0	*1
3	Controller 3	Cub	C001-022NA1-A0	*1
4	Info cable 1	Cub	25-300065-01	Non-shielded*1, 0.5m
5	Info cable 2	Cub	25-360139-01	Non-shielded*1, 0.5m
6	Cable 1	Cub	25-360	Non-shielded*1, 4.5m
7	Cable 2	Cub	25-360047-01	Non-shielded*1, 6m
8	Cable 3	Cub	25-300066-01	Non-shielded*1, 4.5m
9	Cable 4	Cub	25-360287	Non-shielded*1, 4.5m
10	Cable 5	Cub	25-360286	Non-shielded*1, 4.5m
11	Cable 6	Cub	25-360302-00	Non-shielded*1, 3m
12	Cable 7	Cub	25-360301-20	Non-shielded*1, 12m
13	Cable 8	Cub	25-360276	Non-shielded*1, 4.5m
14	Cable 9	Cub	TA25-300032	Non-shielded*1, 4.2m
15	Cable 10	Cub	25-300657-00	Non-shielded*1, 0.2m
16	Cable 11	Cub	25-360277	Non-shielded*1, 3m
17	Cable 12	Cub	250360278	Non-shielded*1, 3.5m
18	Cable 13	Cub	TA25-360003	Non-shielded*1, 12m
19	Buzzer 1	Cub	44-1000	Non-shielded*1, 4m
20	Buzzer 2	Cub	44-100008-01	Non-shielded*1, 0.1m
21	Switch	Cub	A009-004NA1-A2	Non-shielded*1, 0.2m
22	Indicator_BSD 1	Cub	C200-00	Non-shielded*2, 1.5m
23	Indicator_BSD 2	Cub	C200-012NA1-A0	Non-shielded*2, 2m
24	Indicator_BSD 3	Cub	C200-0010NA-A1	Non-shielded*1, 1.5m
25	Indicator_BSD 4	Cub	C200-0010NA-A2	Non-shielded*1, 1.5m
26	Indicator_turn 1	Cub	C200-006NA1-A0	Non-shielded*1, 1.5m
27	Indicator_turn 2	Cub	C200-006NA4-A0	Non-shielded*1, 2.5m
28	Light sensor	Cub	C901-001NA1-A0	Non-shielded*1, 2m

Note: For accessories set 1: The difference between info cable 1 & info cable 2 is only I/O port, there is only info cable 2 tested and recorded in this report.



Accessories Set	Content of Accessories	Remark
1	Controller 1, Info cable 1, Info cable 2, Cable 1, Cable 2, Cable 3, Buzzer 1, Switch, Indicator_BSD 1 and Indicator_turn 1	Used for Host 1~4
2	Controller 2, Cable 4, Cable 5, Cable 6, Cable 7 and Indicator_BSD 2	Used for Host 1~4
3	Controller 3, Info cable 1, Cable 8, Cable 9, Cable 10, Cable 11, Cable 12, Cable 13, Buzzer 2, Switch, Indicator_BSD 3, Indicator_BSD 4, Indicator_turn 2 and Light sensor	Used for Host 5~8

1.6 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA001350

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding mobile host 5 ~ 8 and its accessories set. (Please refer to section 1.3 for detail information.)	MPE
2. Adding accessories set 2 for mobile host 1 ~ 4. (Please refer to section 1.5 for detail information.)	After evaluating, it does not affect the test.

1.7 Testing Location

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu (TAF: 3787)	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) TEL: 886-3-656-9065 FAX: 886-3-656-9085 Test site Designation No. TW3787 with FCC. Conformity Assessment Body Identifier (CABID) TW3787 with ISCED.



2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance

R between the person and the antenna / radiating structure, where $R > \lambda / 2 \pi$.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.
Note: R is in meters, f is in MHz.	



2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	Test Freq. (GHz)	EIRP-Average (dBm)	Tune-up	EIRP-Average (mW)	Power Density(S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Result
Host 1	76.45	9.10	9.60	9.13	0.00182	1.00	PASS
Host 2	76.45	9.14	9.64	9.21	0.00183	1.00	PASS
Host 3	76.45	9.23	9.73	9.41	0.00187	1.00	PASS
Host 4	76.45	8.65	9.15	8.23	0.00164	1.00	PASS
Host 5	76.45	8.01	8.51	7.10	0.00141	1.00	PASS
Host 6	76.45	8.00	8.50	7.09	0.00141	1.00	PASS
Host 7	76.45	8.16	8.66	7.35	0.00146	1.00	PASS
Host 8	76.45	7.24	7.74	5.95	0.00118	1.00	PASS

MPE Exemption Option C								
Mode	Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
Host 1	76450	0.0006	0.2	9.60	7.45	0.006	0.768	Complies
Host 2	76450	0.0006		9.64	7.49	0.006	0.768	Complies
Host 3	76450	0.0006		9.73	7.08	0.005	0.768	Complies
Host 4	76450	0.0006		9.15	7.00	0.005	0.768	Complies
Host 5	76450	0.0006		8.51	6.36	0.004	0.768	Complies
Host 6	76450	0.0006		8.50	6.35	0.004	0.768	Complies
Host 7	76450	0.0006		8.66	6.51	0.004	0.768	Complies
Host 8	76450	0.0006		7.74	5.59	0.004	0.768	Complies

**Simultaneous Transmission Analysis Mode:****Host 2 (module*2)**

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
76450	0.2	9.64	7.49	0.006	0.768	0.01	<= 1
76450		9.64	7.49	0.006	0.768		

Host 4 (module*2)

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
76450	0.2	9.15	7.00	0.005	0.768	0.01	<= 1
76450		9.15	7.00	0.005	0.768		

Host 6 (module*2)

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
76450	0.2	8.50	6.35	0.004	0.768	0.01	<= 1
76450		8.50	6.35	0.004	0.768		

Host 8 (module*2)

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
76450	0.2	7.74	5.59	0.004	0.768	0.01	<= 1
76450		7.74	5.59	0.004	0.768		

Note: The above antenna gain was declared by manufacturer.

————THE END————