

FCC 47 CFR PART 15 SUBPART B TEST REPORT

Test Report No. : OT-242-RED-018
Reception No. : 2310003224
Applicant : TY MODULE KOREA Co., Ltd.
Address : 43,Jayumuyeok3-gil,Masanhoewon-gu, Changwon-si,Gyeongsangnam-do,Korea
Manufacturer : TY MODULE KOREA CO.,LTD.
Address : 43,Jayumuyeok3-gil,Masanhoewon-gu, Changwon-si,Gyeongsangnam-do,Korea
Use of Report : FCC Supplier's Declaration of Conformity
Type of Equipment : ESS DC/DC CONVERTER
Model Name : TYDD25W2LB01
Multiple Model Name : N/A
FCC ID : 2BEXETYDD25W2LB01
Serial number : -
Total page of Report : 33 pages (including this page)
Date of Incoming : October 6, 2023
Test Period : January 16, 2024 ~ January 16, 2024
Date of Issuing : February 5, 2024

SUMMARY

The equipment complies with the requirement of

ANSI C63.4a: 2017 / FCC Part 15 Subpart B (CLASS B Digital devices & peripherals)

This test report contains only the results of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.

Reviewed by:

Sang-Hyun, Jeong / Senior Engineer
ONETECH Corp.

Approved by:

Seung-Hyun, Park / Senior Manager
ONETECH Corp.

박승현

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Revision History

Rev. No.	Issued Report No.	Issued Date	Revisions	Section Effected
0	OT-242-RED-018	February 05, 2024	Initial Release	All

* Please contact us (e-mail: info@onetech.co.kr) for verification of this test report.

1. APPLICANT AND MANUFACTURER INFORMATION

- Applicant TY MODULE KOREA Co., Ltd.
- Address 43,Jayumuyeok3-gil,Masanhoewon-gu, Changwon-si,Gyeongsangnam-do,Korea
- Manufacturer TY MODULE KOREA CO.,LTD.
- Address 43,Jayumuyeok3-gil,Masanhoewon-gu, Changwon-si,Gyeongsangnam-do,Korea
- Factory TY MODULE KOREA Co., Ltd.
- Address 43, Jayumuyeok 3-gil, Masanhoewon-gu, Changwon-si, Gyeongnam, Korea

EQUIPMENT CLASS	CLASS B Digital devices & peripherals
E.U.T. DESCRIPTION	ESS DC/DC CONVERTER
MEASUREMENT PROCEDURES	ANSI C63.4a: 2017
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Supplier's Declaration of Conformity (SDoC)
STANDARDS	FCC Part 15, Section 15.101 (Class B)
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	3 m Semi anechoic chamber

ONETECH Corp. tested the above equipment in accordance with the requirements set forth in the above standard. The test results show that equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

2 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025 by Radio Research Agency as accreditation body. The Onetech Corp. is accredited for measuring devices subject to Declaration of Conformity (DOC) under Parts 15 & 18 as a Conformity Assessment Body (CAB) with designation number KR0013.

These measurement tests were conducted at Onetech Corp.

The 10 m semi anechoic chamber and conducted measurement facilities are located at

- 1) 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea
- 2) 12-5, Jinsaegol-gil 75 beon-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea



3. PRODUCT INFORMATION

3.1 Description of EUT

The TY MODULE KOREA Co., Ltd. , Model TYDD25W2LB01 (referred to as the EUT in this report) is a ESS DC/DC CONVERTER. Product specification described herein was obtained from product data sheet or user's manual.

Type of Equipment	ESS DC/DC CONVERTER
LIST OF EACH OSC. or CRY. FREQ. (FREQ. \geq 1 MHz)	Below 108 MHz
P. C. Board name	SMPS Board
Number of Layer	2Layer
ELECTRICAL RATING	Input rating: DC250V ~ 999V / 0.100A / 25KHz, Output rating: 24V / 0.85A / 20W
EXTERNAL CONNECTOR	DC IN, DC OUT
FCC ID	2BEXETYDD25W2LB01

3.2 Model Differences

-. The following lists consist of the added model and their differences.

Model Name	Differences	Tested
None		

1. Applicant consigns only basic model to test, therefore this test report just guarantees the units which have been tested.
2. The Applicant/manufacture is responsible for the compliance of all variants.

3.3 Support Equipment

The model numbers for all the equipments that were used in the tested system is:

Description	Model	Manufacturer	Connected to
LOAD	N/A	N/A	EUT
75 kW DC Simulator	DC Simulator	DESTIN POWER	EUT

3.4 System Configuration

DEVICE TYPE	MODEL/PART NUMBER	MANUFACTURER
ESS DC/DC CONVERTER	TYDD25W2LB01	TY MODULE KOREA CO.,LTD.

3.5 Cable Description for the EUT

Cable	Shielded	Ferrite Bead	Metal Shell	Length (m)	Connected to
DC IN	N	N	N	1.5	75 kW DC Simulator
DC OUT	N	N	N	0.3	LOAD

3.6 Equipment Modifications

None

4. TEST SUMMARY

4.1 Test standards and results

Test Items	Applied Standards	Results
Conducted Disturbance	ANSI C63.4a: 2017	N/A
Radiated Disturbance	ANSI C63.4a: 2017	C
C=Comply N/C=Not Comply N/T=Not Tested N/A=Not Applicable		

4.2 Test Condition

The test conditions of the noted test mode(s) in this test report are;
Checked the EUT's operation through LED

5. FINAL RESULT OF MEASUREMENT

Exploratory measurement was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Conducted Disturbance

5.1.1 Operating environment

Ambient temperature : °C

Relative humidity : %

5.1.2 Test set-up

The EUT and other support equipment were placed on a non-conductive table, 0.8 m height above the reference ground plane. The power of EUT was fed through a $50\ \Omega$ / $50\ \mu\text{H}$ + $5\ \Omega$ LISN. The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

5.1.3 Measurement uncertainty

Conducted emission, quasi-peak detection : 2.2 dB

Conducted emission, CISPR-average detection : 2.2 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k = 2$.

5.1.4 Limit

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	CISPR Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50
* Decreases with the logarithm of the frequency		

5.1.5 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.	Interval
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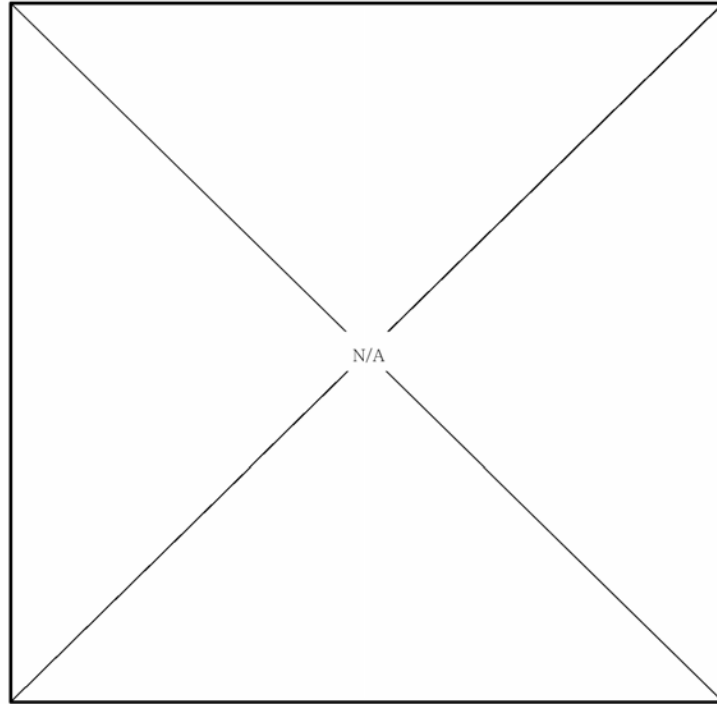
* S/W used in the test :

All test equipment used is calibrated on a regular basis.

5.1.6 Test data

- Test Date :
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Test Result : N/A
- Remarks : Margin (dB) = Limit – Level (Result)
The Result level in below table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

Tested by : KOO BAN SEOK /



5.2 Radiated Disturbance

5.2.1 Operating environment

Ambient temperature : 21.9 °C
Relative humidity : 47.8 %

5.2.2 Test set-up

The radiated emissions measurements were on the 10 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive table, 0.8 m height above the reference ground plane.

The frequency spectrum from 30 MHz to 40 000 MHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

5.2.3 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 1 000 MHz : ±4.7 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k = 2$.

5.2.4 Limit

-. FCC Part 15 Subpart B

Frequency of Emission (MHz)	Resolution bandwidth	Field strength @ 3 m (dBμV/m)
		Quasi-peak
30 ~ 88	120 kHz	40.0
88 ~ 216		43.5
216 ~ 960		46.0
Above 960		54.0

5.2.5 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.	Interval
■	ESU	Rohde & Schwarz	EMI Test Receiver	100261	March 6, 2023	1Y
■	310N	Sonoma Instrument	Amplifier	392756	October 16, 2023	1Y
■	HLP-2008	TDK	Hybrid Antenna	131316	March 7, 2023	2Y
■	CO3000	Innco Systems GmbH	Controller	1026/40960617/ P	N/A	N/A
■	DT2000-2T	Innco Systems GmbH	Turn Table	N/A	N/A	N/A
■	MA-4640-XPET	Innco Systems GmbH	Antenna Master	MA4640/652/43 100318/P	N/A	N/A

* S/W used in the test : Radiated Emission Measurement software / Version 2.00.0202
All test equipment used is calibrated on a regular basis.

5.2.6 Test data

- Test Date : January 16, 2024

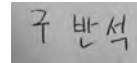
- Resolution bandwidth : 120 kHz (30 MHz - 1 000 MHz)

- Frequency range : 30 MHz ~ 1 000 MHz

- Measurement distance : 3 m

- Test Result : PASS

- Remarks : Margin (dB) = Limit – Result
Result = Reading value + Antenna Factor + Loss – Gain
Loss and Gain in below table means Cable Loss and Pre-amplifier gain.



Tested by : KOO BAN SEOK / Engineer

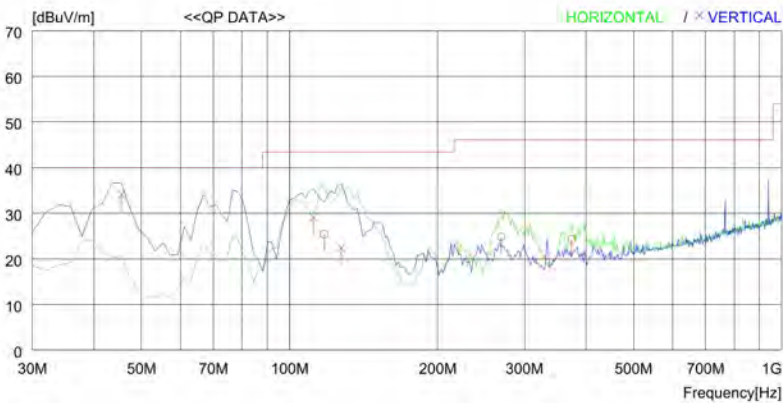
DC 250 V

RADIATED EMISSION

2024.01.16

Trade Name : TY MODULE KOREA CO.,LTD. AGR No. : 2310003224
Model Name : TYDD25W2LB01 Power Supply : DC 250 V
Serial No. : Temp / Humi : 21.9 °C, 47.8 % R.H.
Mode : Operator : KOO BAN SEOK

LIMIT : FCC Part15 Subpart.B Class B (3m)



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	FACTOR	[dB]	[dB]	[dBuV/m][dBuV/m]	[dB]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	117.475	37.7	18.2	1.6	32.1	25.4	43.5	18.1	300	208
2	269.099	36.2	18.2	2.5	32.1	24.8	46.0	21.2	200	0
3	374.068	33.2	20.2	3.0	32.1	24.3	46.0	21.7	100	359
----- Vertical -----										
4	45.551	50.5	14.6	1.0	32.1	34.0	40.0	6.0	100	0
5	111.643	42.4	17.2	1.6	32.1	29.1	43.5	14.4	100	235
6	127.194	34.0	18.8	1.7	32.1	22.4	43.5	21.1	100	235

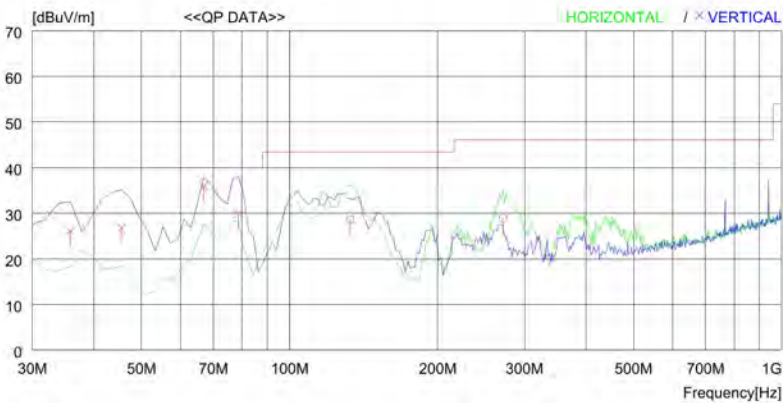
DC 1000 V

RADIATED EMISSION

2024.01.16

Trade Name : TY MODULE KOREA CO.,LTD. AGR No. : 2310003224
Model Name : TYDD25W2LB01 Power Supply : DC 1000 V
Serial No. : Temp / Humi : 21.9 °C, 47.8 % R.H.
Mode : Operator : KOO BAN SEOK

LIMIT : FCC Part15 Subpart.B Class B (3m)



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	FACTOR	[dB]	[dB]	[dBuV/m][dBuV/m]	[dB]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	133.026	40.0	19.0	1.7	32.1	28.6	43.5	14.9	300	12
2	271.042	40.2	18.3	2.5	32.1	28.9	46.0	17.1	200	359
----- Vertical -----										
3	66.934	54.1	12.8	1.2	32.1	36.0	40.0	4.0	200	8
4	78.597	47.4	13.2	1.3	32.0	29.9	40.0	10.1	100	273
5	35.832	38.5	18.8	0.9	32.1	26.1	40.0	13.9	100	194
6	45.551	43.2	14.6	1.0	32.1	26.7	40.0	13.3	100	116

6. SAMPLE CALCULATIONS

$$\text{dB}\mu\text{V} = 20 \text{ Log}_{10} (\mu\text{V})$$

$$\text{Margin} = \text{Limit} - \text{Result}$$

- Example 1: 45.551 MHz

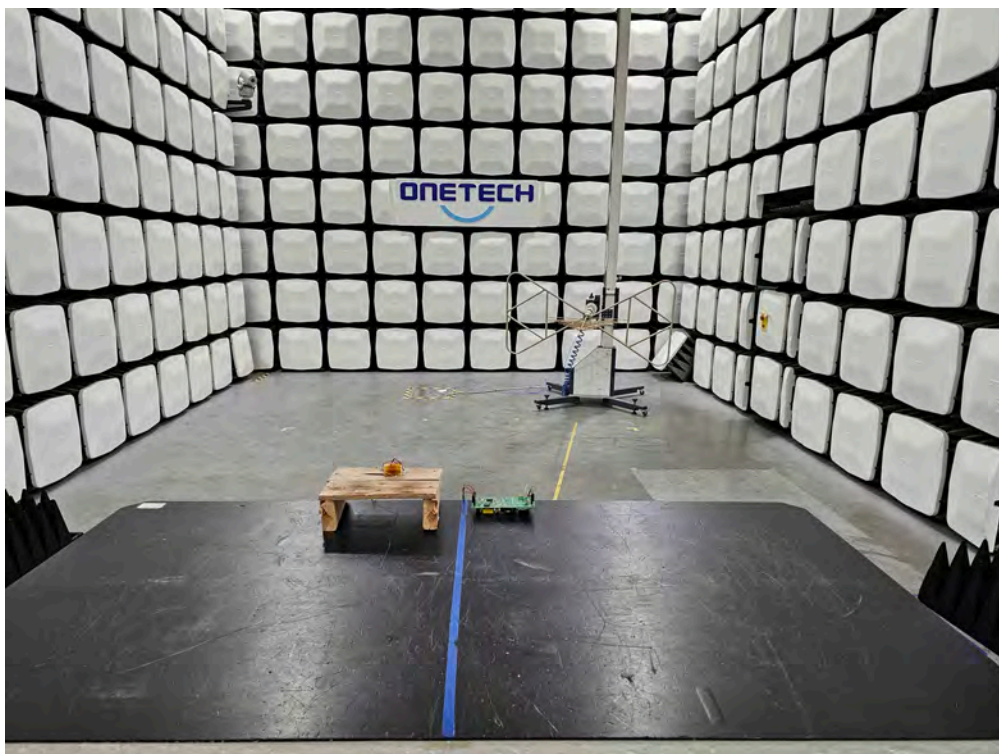
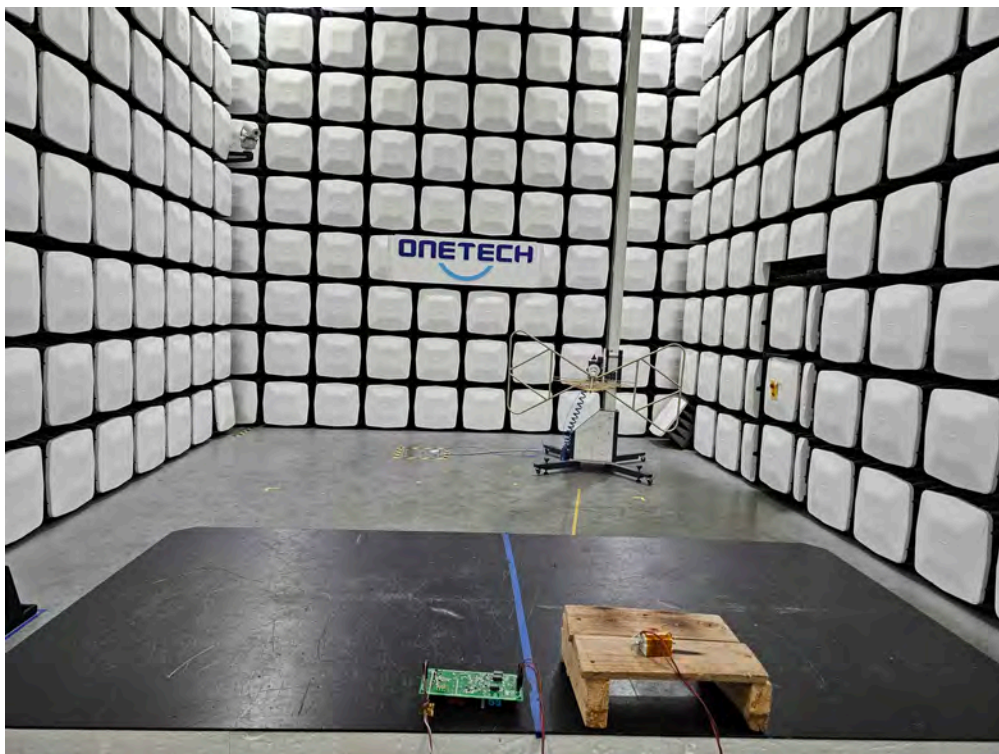
Class B Limit	= 40.0 dB μ V (Peak)
Reading	= 43.2 dB μ V
Correction Factor	= Cable Loss + Pulse Limiter
	= -16.5 dB
Total	= 26.7 dB μ V
Margin	= 40.0 dB μ V – 26.7 dB μ V
	= 13.3 dB

- Example 2: 66.934 MHz

Class B Limit	= 40.0 dB μ V/m (Quasi-peak)
Reading	= 54.1 dB μ V
Correction Factor	= Antenna Factor (12.8 dB/m) + Cable Loss (1.2 dB) – Amp. Gain (32.1 dB)
	= -18.1 dB
Total	= 36.0 dB μ V/m
Margin	= 40.0 dB μ V/m – 36.0 dB μ V/m
	= 4.0 dB

APPENDIX A

[TEST SET UP PHOTOGRAPHS]

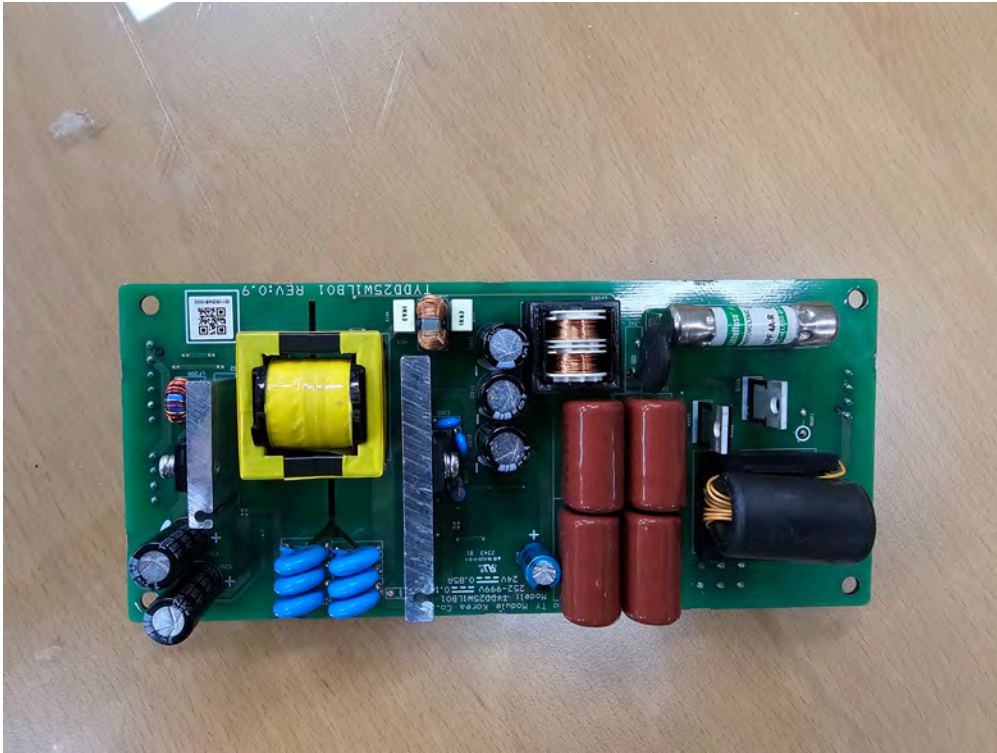


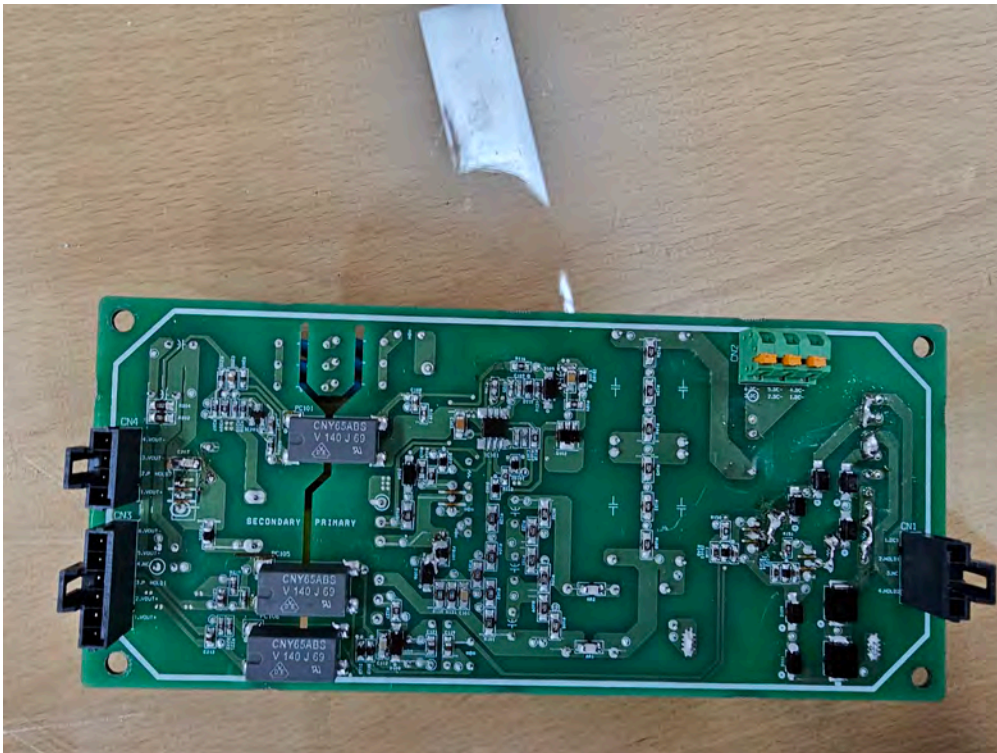
Radiated Disturbance

APPENDIX B

[PHOTOGRAPHS OF EUT]

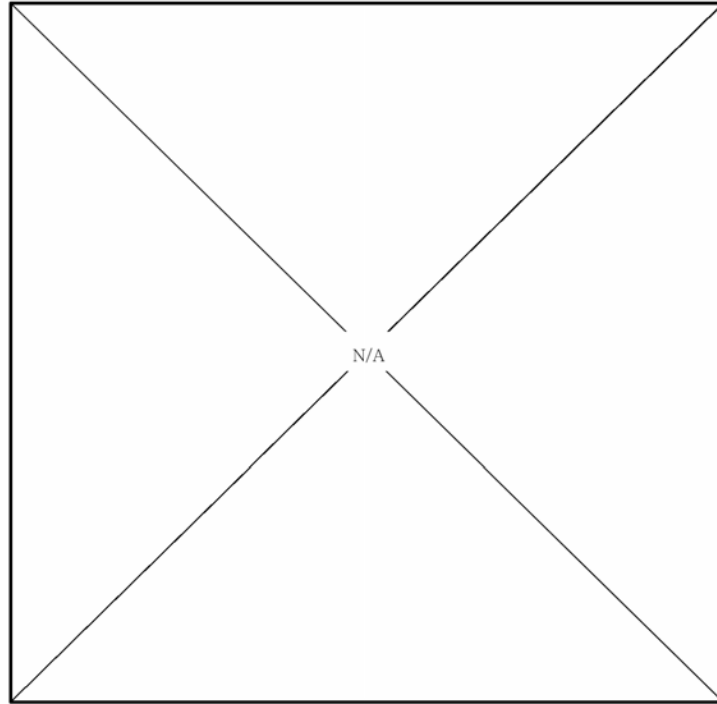
Radiated Disturbance





APPENDIX C

[INTERNAL PHOTOGRAPHS]



APPENDIX D

[DECLARATION OF CONFORMITY]

SUPPLIER's DECLARATION OF CONFORMITY

Per FCC §2.1077 Compliance information.

Trade Name: TY MODULE KOREA Co., Ltd.

Model Number: TYDD25W2LB01

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful Interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:

Address: 43, Jayumuyeok 3-gil, Masanhoewon-gu,
Changwon-si, Gyeongnam, Korea

E-mail:

We hereby declare that the equipment bearing the trade and model number specified above was tested conforming to the applicable FCC rules under the most accurate measurement standards possible, and that the necessary steps have been taken and are in force to assure that production units equipment will continue to comply with the Commission's requirements.



Signature

February 5, 2024

Date

APPENDIX E
[LABELLING REQUIREMENTS]
[INFORMATION TO THE USER IN USER'S MANUAL]

LABELLING REQUIREMENTS

FCC Part 15 SUBPART B § 15.19 Labeling requirements

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or Supplier's Declaration of Conformity shall be labeled as follows:

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under part 73 of this chapter, land mobile operation under part 90 of this chapter, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is impracticable to label it with the statement specified under paragraph (a) of this section in a font that is four-point or larger, and the device does not have a display that can show electronic labeling, then the information required by this paragraph shall be placed in the user manual and must also either be placed on the device packaging or on a removable label attached to the device.

For FCC Certification

If the device is subject to Certification: (1) Section 2.925 contains information on identification of the equipment; (2) include a label bearing an FCC Identifier (FCC ID) (Section 2.926) and (3) include the appropriate compliance statement in Section 15.19(a). If the labelling area is considered too small and therefore it is impractical (smaller than the palm of the hand) to display the compliance statement, then the statement may be placed in the user manual or product packaging. However, the device must still be labelled with the FCC ID. If the device is unquestionably too small for the FCC ID to be readable (smaller than 4-6 points), the FCC ID may be placed in the user manual. However, it must be determined that the device itself is too small – the label area allocated to the FCC ID may not be reduced because of over crowded identification of other product and regulatory information. Justification for placing the FCC ID in the manual must be submitted with the initial application for certification for review and approval.

For FCC Supplier's Declaration of Conformity (SDOC)

(a) If a product must be tested and authorized under Supplier's Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

(1) Identification of the product, e.g., name and model number;

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A compliance statement as applicable, e.g., for devices subject to part 15 of this chapter as specified in §15.19(a)(3) of this chapter, that the product complies with the rules; and

(3) The identification, by name, address and telephone number or Internet contact information, of the responsible party, as defined in §2.909. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

(b) If a product is assembled from modular components (e.g., enclosures, power supplies and CPU boards) that, by themselves, are authorized under a Supplier's Declaration of Conformity and/or a grant of certification, and the assembled product is also subject to authorization under Supplier's Declaration of Conformity but, in accordance with the applicable regulations, does not require additional testing, the product shall be supplied, at the time of marketing or importation, with a compliance information statement containing the following information:

(1) Identification of the assembled product, e.g., name and model number.

(2) Identification of the modular components used in the assembly. A modular component authorized under Supplier's Declaration of Conformity shall be identified as specified in paragraph (a)(1) of this section. A modular component authorized under a grant of certification shall be identified by name and model number (if applicable) along with the FCC Identifier number.

(3) A statement that the product complies with part 15 of this chapter.

(4) The identification, by name, address and telephone number or Internet contact information, of the responsible party who assembled the product from modular components, as defined in §2.909. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

(5) Copies of the compliance information statements for each modular component used in the system that is authorized under Supplier's Declaration of Conformity.

(c) The compliance information statement shall be included in the user's manual or as a separate sheet. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form. The information may be provided electronically as permitted in §2.935.

PROPOSED LABEL

The label included following statement will be attached on product or the compliance statement can be observed in a prominent location in the instruction manual.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INFORMATION TO THE USER IN USER'S MANUAL

For FCC: The instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

For a **Class A** digital device or peripheral

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

For a **Class B** digital device or peripheral

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.