

PART NO. 28713591		SHT. 0 OF 13	APTIV ADVANCED SAFETY & USER EXPERIENCE			
DATE	SYMBOL	REVISION - UPDATE DOCUMENTATION ONLY		AUTHORITY	DR.	AP.
19AP21	A	RELEASED-PRODUCTION		1080654278	KS	KA

REFERENCE INFORMATION (add sheets if necessary)

NON-STANDARD DRAWING IDENTIFIER: AMO-MHA-AP002

NON-STANDARD DRAWING REVISION SYMBOL(S): 2021.04.12
(Include revision for all sheets)

NUMBER OF NON-STANDARD DRAWING COVER SHEETS: 1


NUMBER OF NON-STANDARD DRAWING SHEETS: 12

NUMBER OF ADDITIONS TO COVER SHEET: 0

TOTAL NUMBER OF SHEETS: 13

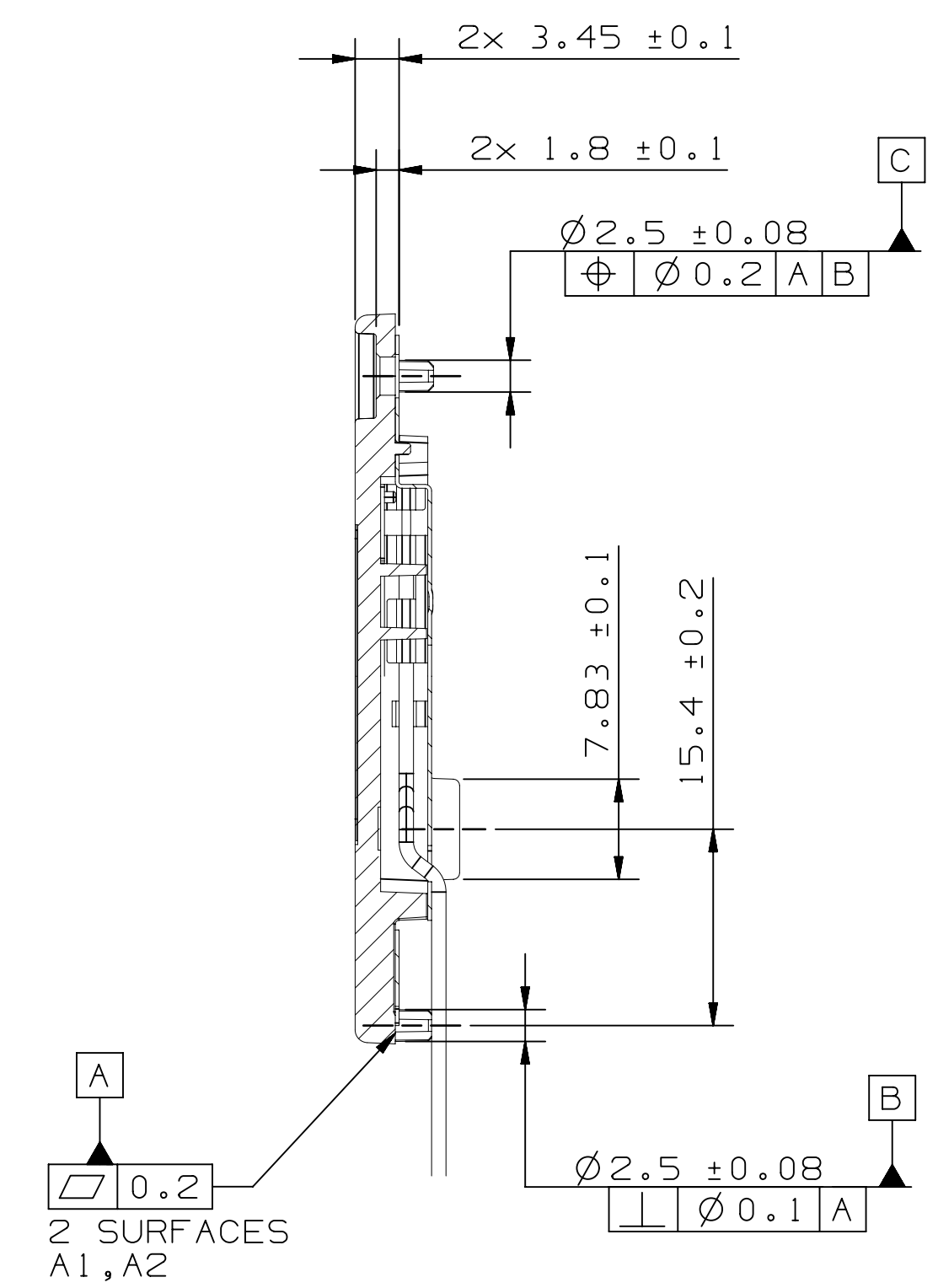
NON-STANDARD DRAWING SOURCE (IF CSD, ENTER CUSTOMER) AMOTECH

ADDITIONAL INFORMATION:

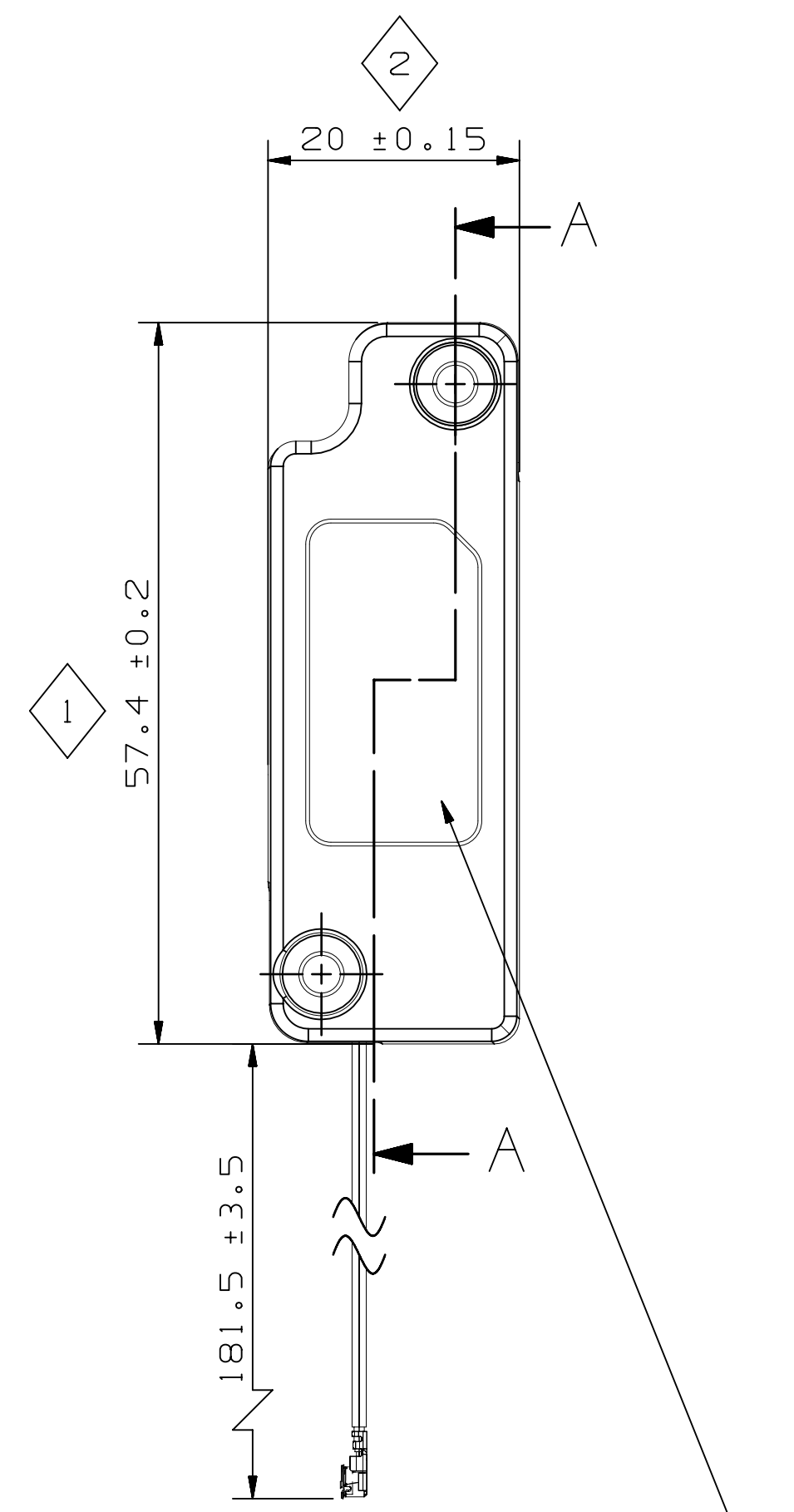
KEY CHARACTERISTICS		DR KRZYSZTOF STARZYK		DATE 19AP21
YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>		Appv KRZYSZTOF ADAMCZYK		DATE 19AP21
 ADVANCED SAFETY & USER EXPERIENCE		Appv SIMON LI		DATE 19AP21
		Appv SYLWESTER SZCZACHOR		DATE 19AP21
		FIRST USED		
DOCUMENT DATA STORAGE:		DOC. MAN.		28749780
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		ANT-DHU1.0 WIFI 2		
		PART NO		SHT OF
		28713591		0 13

DESIGNATED CHARACTERISTICS				QC1	KPC		
0	LAST NO USED	K OR Q	FIT/FUNCTION	CI	FF		
2	0	TOTAL ON DRAWING	IN SYMBOL INDICATES CHECKPOINT				
KPC	QC1	SAFETY/COMPLIANCE		SC			
NO	NO	TYPE	DESCRIPTION	RATIONALE	ZONE	SH	PTS
1		FF	LENGHT	PROCESS METRIC	F9	-	-
2		FF	LENGHT	PROCESS METRIC	GB	-	-

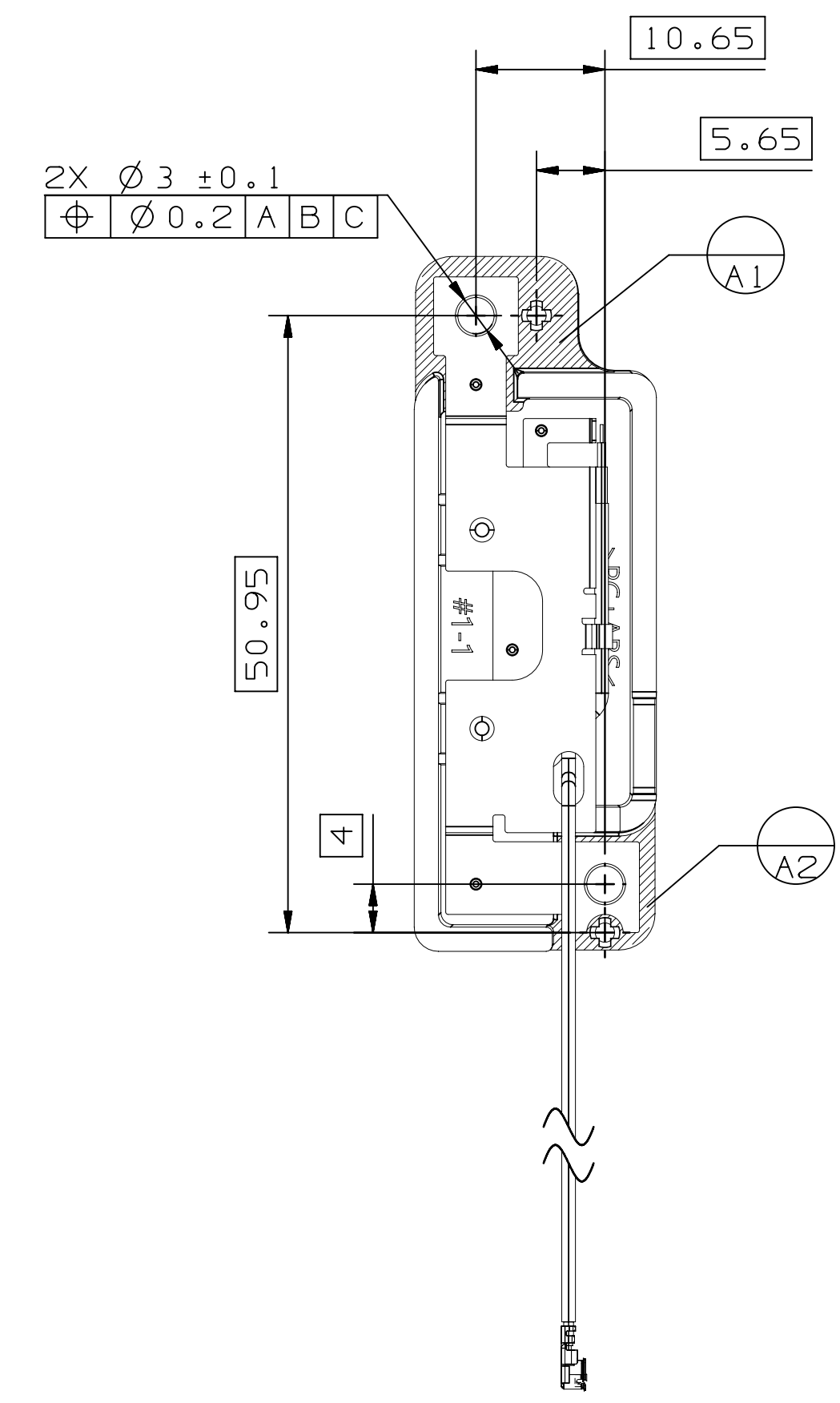
DWG STATUS					ZONE	REVISION HISTORY			AUTH	DR	APVD1	APVD2
DATE	STG	REV	N/P	CHG								
19AP21	-	A	-	-	-	RELEASED-PRODUCTION			1080654278	KS	KA	SL



SECTION A - A
SCALE 2:1



PART MARKING / LABEL
ACCORDING TO THE TABLE 1



MARKING REQUIREMENTS:

MARKING MUST BE PERMANENT.
MARKING MUST BE READABLE.
MARKING SHALL BE PRE-APPROVED BY APTIV ENGINEERING.

TABLE 1 - LABEL SPECIFICATION (LASER MARKING/LABEL)

ATTRIBUTE	DESCRIPTION	FORMAT	STANDARD
HUMAN READABLE INFORMATION	APTIV P/N P P P P P P P (REF. PER DRAWING)	CHARACTER SIZE MIN 1.2 mm	
CODE	CONTENT: "P P P P P P P D D M M Y Y S S S S" - "P P P P P P P" APTIV P/N - "DD" DAY OF ASSEMBLY - "MM" MONTH OF ASSEMBLY - "YY" THE LAST TWO DIGIT OF CALENDAR YEAR - "SSSS" SERIAL NUMBER RESET EVERY DAY TO 0001 (0001-9999)	P P P P P P P D D M M Y Y S S S S	DATA MATRIX ECC200
		QUIET ZONE CIRCUMFERENCIAL	MIN. 2 CELL WIDTH
		CELL SIZE	0.25-0.35 mm
		SYMBOL SIZE	16 x 16 SQUARE MATRIX
LABEL BODY	SERIAL NUMBER APTIV PART NUMBER DATA MATRIX CODE	DDMMYYSSSS P P P P P P P P	

ALL JOINTS FORMED BY STAKING NEED TO BE TIGHT MAKING INTIMATE CONTACT WITH THE MATING PARTS.
JOINTS NEED TO BE OF SUFFICIENT CONTACT TO NOT CREATE SQUEAKS OR OTHER NOISE.
ALL JOINTS NEED TO BE UNIFORM IN SIZE, SHAPE, STRENGTH AND ARE NOT TO EXCEED TOLERANCES NOTED ON THE DRAWING.
FLASH IS PERMISSIBLE AS LONG AS IT DOESN'T EXCEED TOLERANCES NOTED ON THE DRAWING.
THE STAKING PROCESS SHALL NOT LEAVE MATERIAL STRINGS OR ANY OTHER DEBRIS.
ALL JOINTS MUST BE COMPLETED WITHOUT DAMAGE.
THE STAKING PROCESS CANNOT DAMAGE THE RETAINER, DECORATIVE RING, GRAD RING, OR FRONT SHOW SURFACE IN ANYWAY.

FIRST USED
28749780
REFERENCE
N/A
REPLACES
DK 333308
REPLACED BY
N/A

UNLESS OTHERWISE SPECIFIED
THIS DOCUMENT IS IN ACCORDANCE WITH ASME Y14.5-2009.

ALL DIMENSIONS ARE IN MILLIMETERS
ZERO PLACE DECIMALS ±N/A
ONE PLACE DECIMALS ±N/A
TWO PLACE DECIMALS ±N/A

ANGLES ±N/A DEGREE

THIRD ANGLE PROJECTION

DO NOT SCALE
USE MATH DATA

NX
NX V11.0

• APTIV •

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DR	KRZYSZTOF STARZYK	DATE	19AP21
APVD1	KRZYSZTOF ADAMCZYK		19AP21
APVD2	SIMON LI		19AP21
APVD3	SYLWESTER SZCZACHOR		19AP21
APVD4			
APVD5			

SUBSTANCES OF CONCERN AND RECYCLED CONTENT PER APTIV 10949001

MATERIAL

SEE ITEM LIST

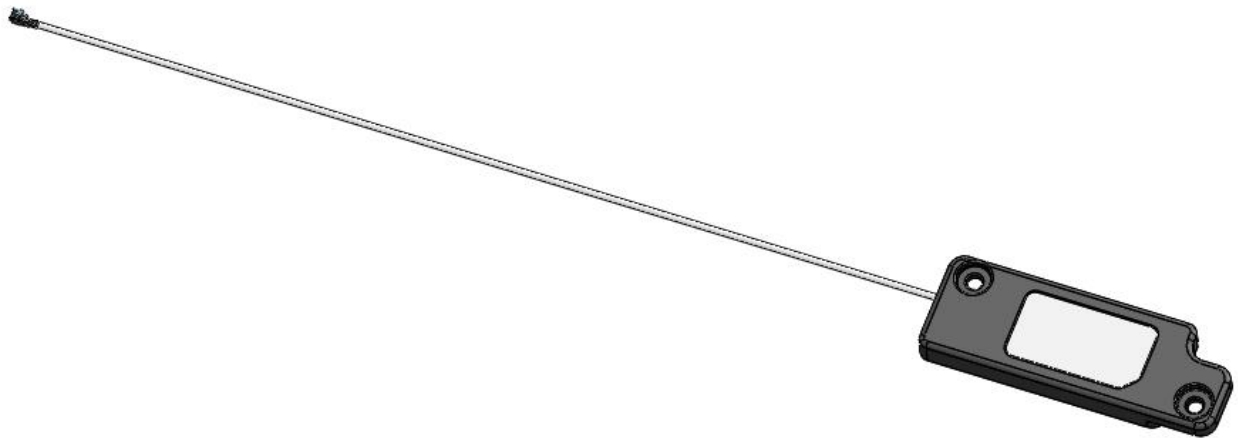
DRAWING NAME
ANT-DHUI.0 WIFI 2

DRAWING NUMBER
28713591

SIZE	SCALE	FRAME NO	SHEET NO	STG	REV	N/P
A1	(2:1)	1 OF 1	1 OF 1	-	A	-

DATASHEET

Type	Cable assembly antenna
Application	WiFi
Customer P/N	28713591
AMOTECH P/N	AMO-MHA-AP002



2021. 04. 12

AMOTECH

History

Rev. No	Date	Title	Contents	Page
0	2021.04.12		New published	

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1. Specification

1.1 Electrical Specifications

No	Item		Specification			Unit
			Min	Typical	Max	
1	Operating Frequency		2400		2485	MHz
			5150		5850	MHz
2	VSWR	Low Band	1	1.3	3.0	
		High Band	1	1.6	3.0	
3	Efficiency	Low Band		52		%
		High Band		23		%
4	Peak gain	Low Band		1.4		dBi
		High Band		2.5		dBi
5	Polarization		Linear			
6	Impedance [Ω]		Nominal 50			

※ Notice

- a. Measured data is based on Customer's SET, DHU1 unit.
- b. Antenna could be changed to applied other SET condition.

1.2 Mechanical Specifications

No	Item	Specification	Remark
1	Dimensions (L x W x H)	238.9 mm x 20 mm x 8.5 mm	
2	Cable	Ø1.13 mm, 225.5 mm, White color	
3	RF connector	IPEX MHF I	
3	Unit weight	6 g	

1.3 Appearance & material

- Drawing

NO.	DATE	REVISIONS	ECD NO.	DRAW	CHECK	APPROVE
1	2021.04.06	INITIAL RELEASE				

TABLE 1 (LABEL SPECIFICATION)			
ATTRIBUTE	DESCRIPTION	FORMAT	STANDARD
HUMAN READABLE INFORMATION	APPLY P.N. PPPPPPP (REF. PER DRAWING)	CHARACTER SIZE MIN. 1.2mm	
CODE	CONTENT : "PPPPPPPPDDMMYYSSSS"		DATA MATRIX ECC2D10
	- "PPPPPPPP" APPLY P.N.		
	- "DD" DAY OF ASSEMBLY		
	- "MM" MONTH OF ASSEMBLY	PPPPPPPPDDMMYYSSSS	
	- "YY" THE LAST TWO DIGIT OF CALENDER YEAR		
	- "SSSS" SERIAL NUMBER RESET TO 0001 (0001-9999)		
	QUIET ZONE CIRCUMFERENTIAL	MIN. 2 CELL WIDTH	
	CELL SIZE	0.25x0.35 mm	
	SYMBOL SIZE	16 x 16 SQUARE MATRIX	
LABEL BODY	Line 1: Serial No.	DDMMYYSSSS	
	Line 2: Apply Part No.	PPPPPPPP	
	Line 3: Data matrix code		

SECTION A/A

ISOMETRIC VIEW

PART LABEL
(According to 'TABLE 1')

DETAIL "X"

DETAIL "X"
SCALE: 2/1

Exploded View

4	Label	1	PolyPropylene (T=0.1mm)	WHITE		
3	Carrier (WIFI2)	1	PCBASS (E.G. LURPOX GPC0085F4)	BLACK		
2	Press Antenna (WIFI)	1	German silver (T=0.3mm)	-		
1	Cable Assembly	1	1) 1.13mm diameter Cable 2) RF Connector (IPEX_MF)	WHITE		

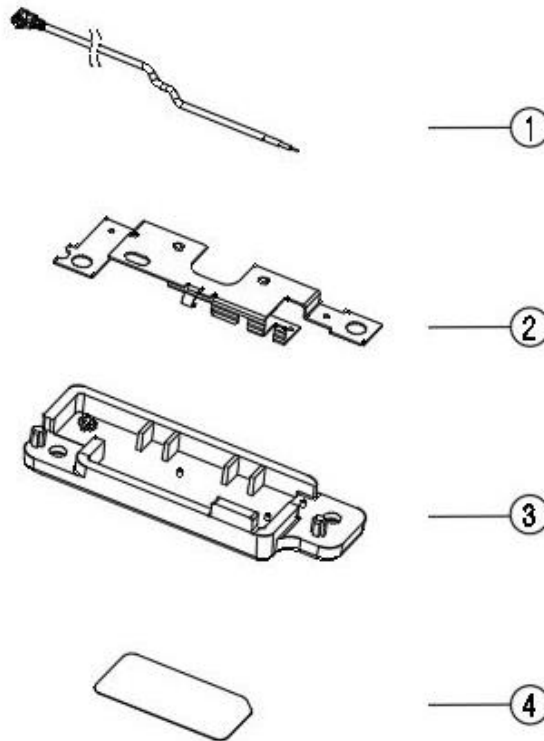
NO.	PART NAME	QTY	MATERIAL	COLOR / FINISH	NOTE	DRAWING NO.	
MODEL NAME	IHUS		SCALE	1 : 1	DESIGNED	CHECKED	APPROVED
PART NAME	WIFI_2		UNIT	mm	8H.MANG	HS_Song	GY_Song
PART NO.	AMO-MHA-AP002		SHEET NO.	1/1			
DRAWING NO.	MPOP-WA-014-00		SIZE		2021.04.06	2021.04.06	2021.04.06
MATERIAL			PROJECTION				
DESCRIPTION							

Tolerance Table (K5 D 0401)	
	(12) 13 14 15 16
over	12 13 14 15 16
0	0.10 0.14 0.16 0.40 0.50
3	0.12 0.18 0.30 0.48 0.75
6	0.15 0.22 0.36 0.56 0.90
10	0.18 0.27 0.43 0.70 1.10
18	0.21 0.33 0.52 0.84 1.30
30	0.25 0.39 0.62 1.00 1.50
50	0.30 0.46 0.74 1.20 1.80
80	0.35 0.54 0.87 1.40 2.20
120	0.40 0.63 1.00 1.60 2.50
180	0.46 0.72 1.15 1.80 2.90

- Note
- This product must comply Amotech corporation's respective inspection standards.
 - ★ marked respects are importantly managing measurements.
 - ◆ marked respects are Special Characteristics(SC).
 - ◆ marked dimensions satisfy Cpk values of 1.67 or higher.
 - Refer to 2D data no dimensions, unless otherwise specified.

- Material information

No	Description	Material
①	RF Cable	RF Cable & connector
②	Press antenna	German silver (Thickness 0.3 mm)
③	Carrier	PC+ABS (LG LUPOY GP5008BFH)
④	Label	PolyPropylene (Thickness 0.1 mm)



- Product label information



DD	MM	YY	SSSS
[A] <u> </u>	<u> </u>	<u> </u>	<u> </u>
Date	Month	Year	Serial number

[B] Customer P/N

[C] Data Matrix Code

※ Matrix code will contain [B]+[A].

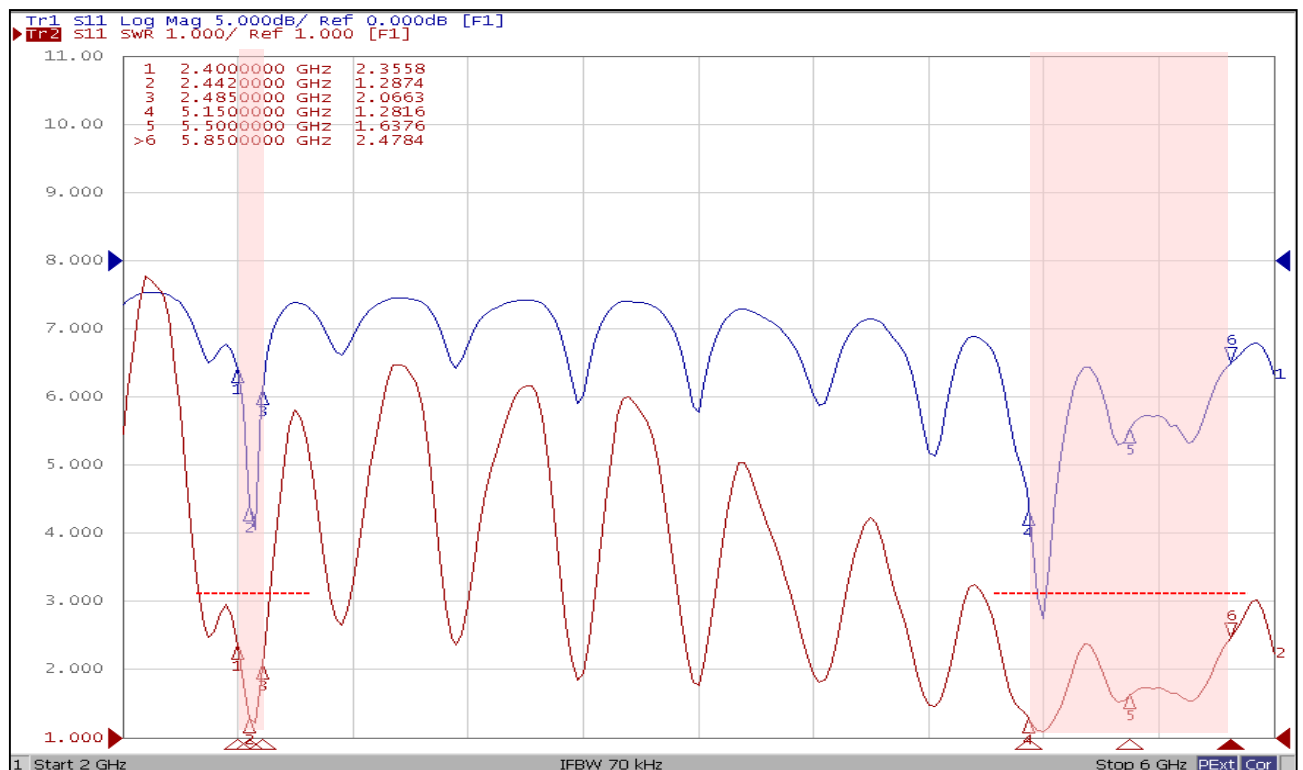
2. Measurement

2.1 Measured VSWR

AMO-MHA-AP002



Antenna on the customer's SET



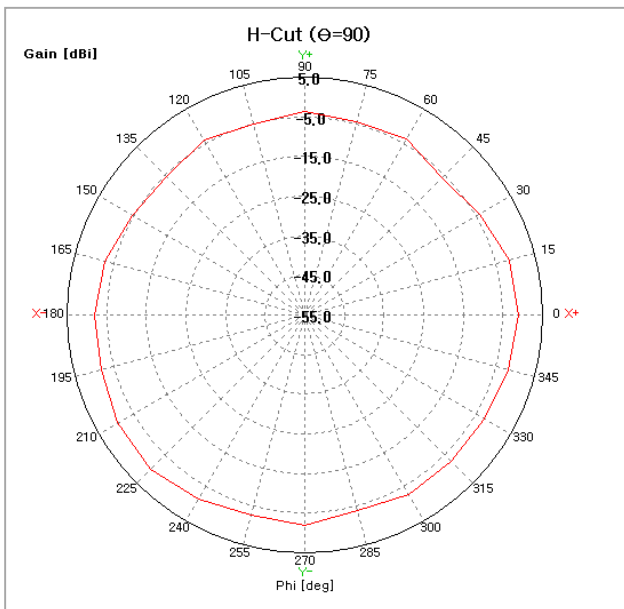
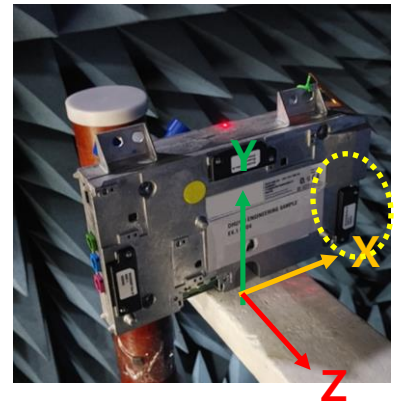
Measured VSWR on the customer's SET

2.2 Measured data of Radiation Gain

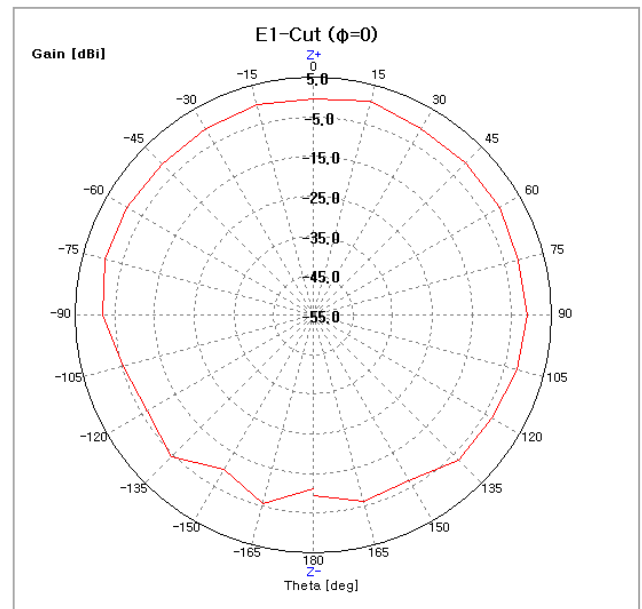
- Antenna gain table on the SET

Frequency [MHz]	Efficiency [%]	Avg. Gain [dBi]	Peak Gain [dBi]
2400	39.2	-4.1	0.4
2442	51.9	-2.8	1.4
2485	31.1	-5.1	-0.9

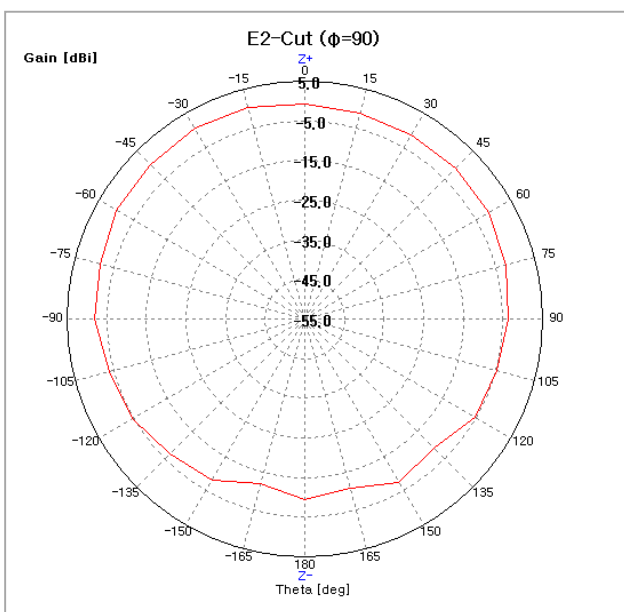
Measured SET @3D chamber



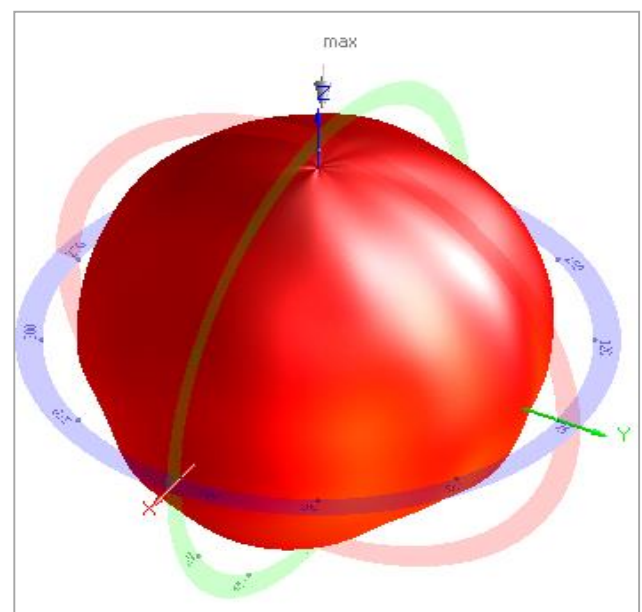
XY plane @2442 MHz



ZX plane @2442 MHz



YZ plane @2442 MHz

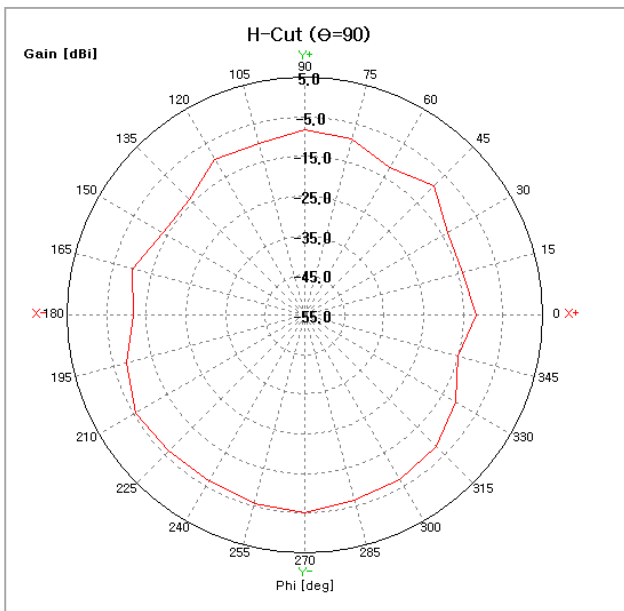
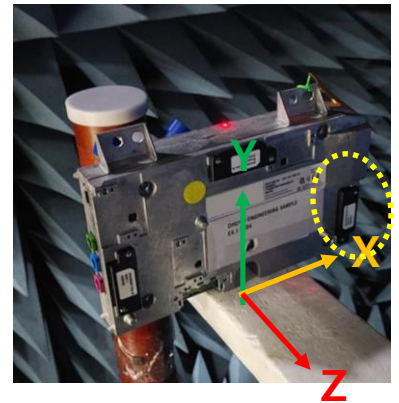


3D radiation pattern @2442 MHz

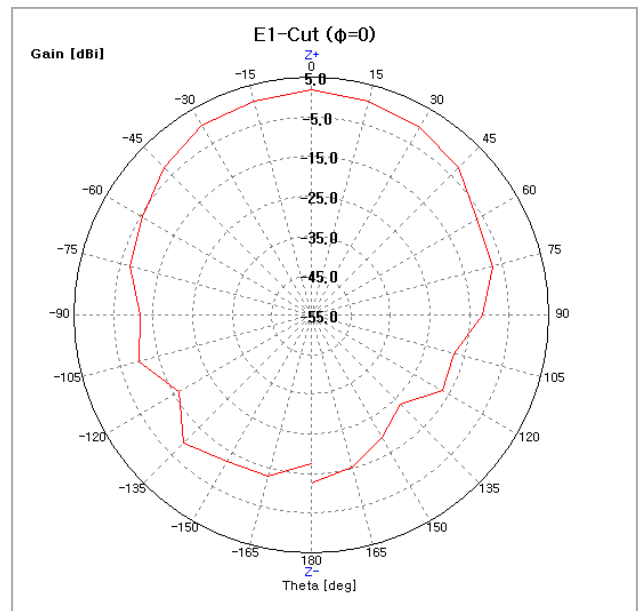
- Antenna gain table on the SET

Frequency [MHz]	Efficiency [%]	Avg. Gain [dBi]	Peak Gain [dBi]
5150	26.6	-5.7	2.6
5500	23.3	-6.3	2.5
5850	26.9	-5.7	2.2

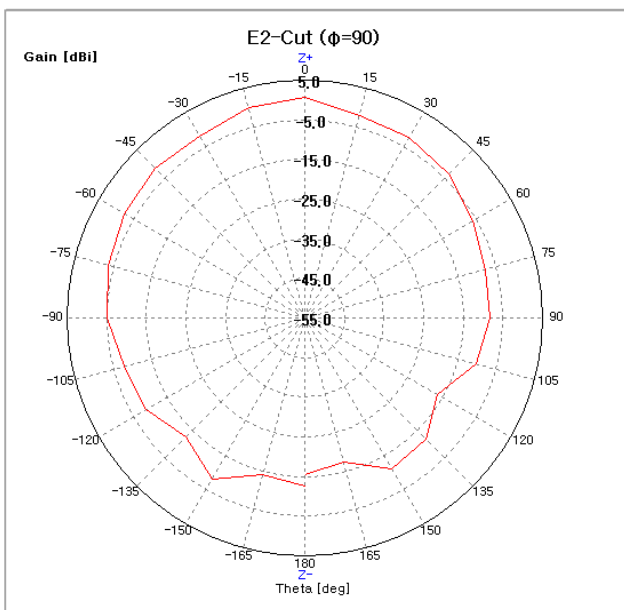
Measured SET @3D chamber



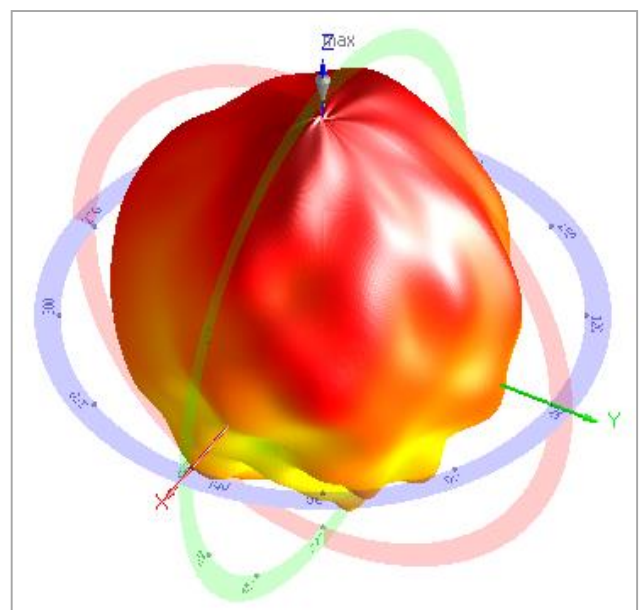
XY plane @5500 MHz



ZX plane @5500 MHz



YZ plane @5500 MHz

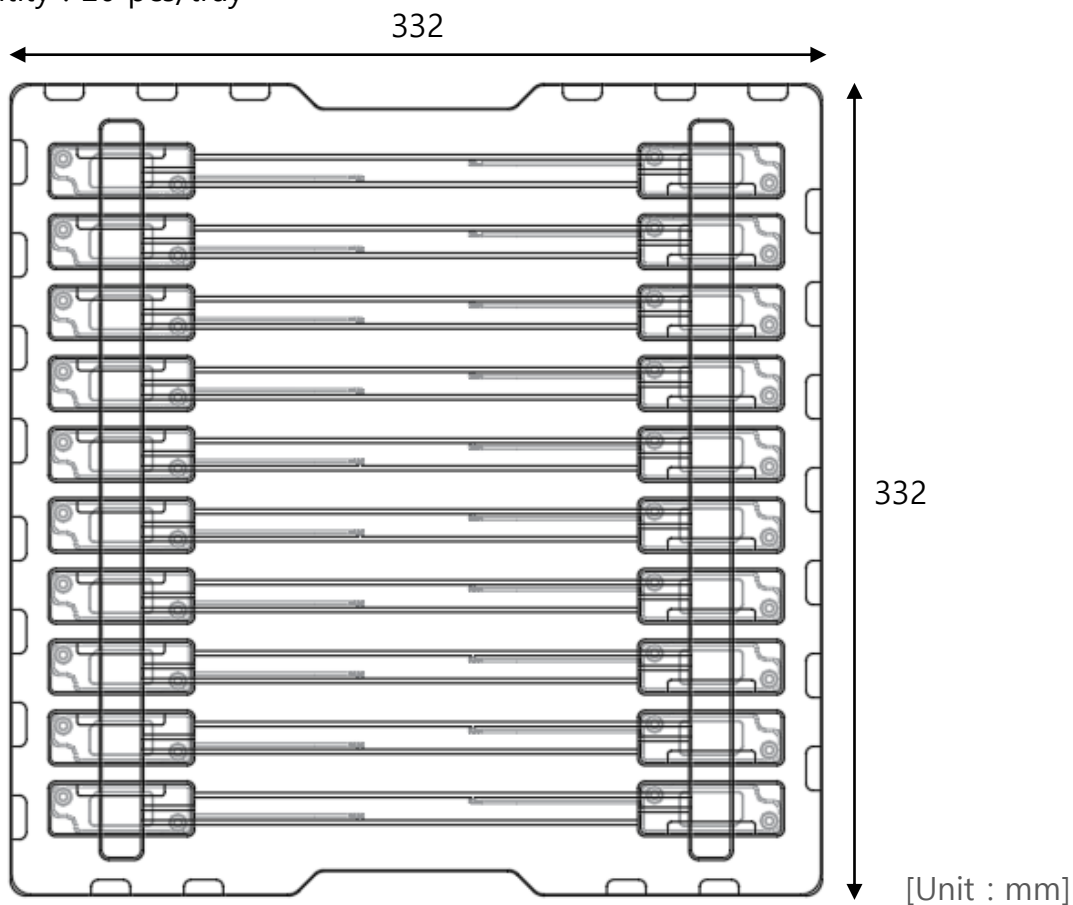


3D radiation pattern @5500 MHz

3. Packaging

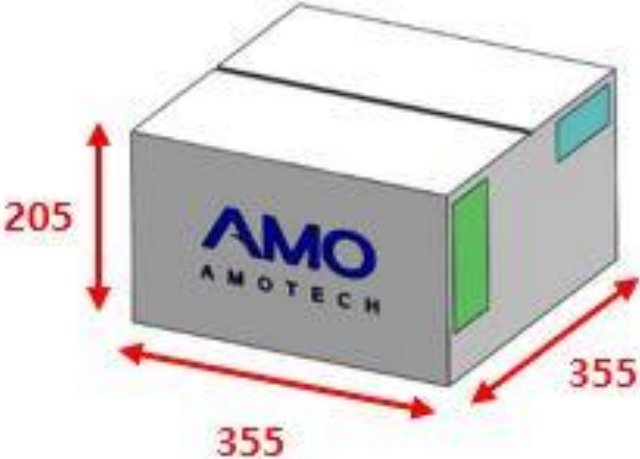
3.1 Tray Packing

- Tray size : 332 x 332 mm
- Material : PET
- Quantity : 20 pcs/tray



3.2 Carton box

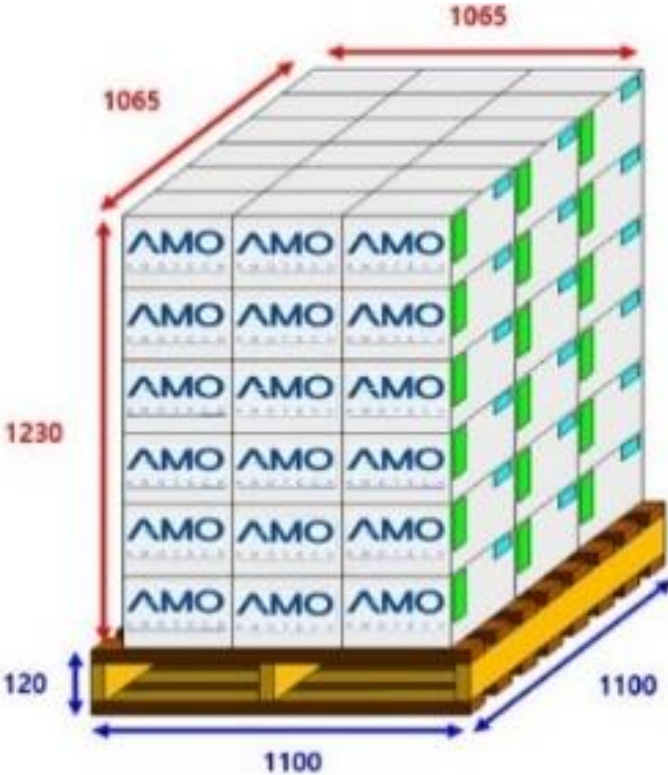
- Box size : 355 x 355 x 205 mm
- Quantity : 340 pcs/box



[Unit : mm]

3.3 Pallet

- Pallet size : 1,100 x 1,100 x 120 mm
- Quantity : 18,360 pcs/pallet



[Unit : mm]

4. Reliability Test Conditions

No	Item	Test Condition	Test Requirements
1	High temperature storage	1. Temperature : +85 °C 2. Time : 504 hours	1. No visual damage 2. Within electric spec (VSWR)
2	Low temperature storage	1. Temperature : -40 °C 2. Time : 24 hours	1. No visual damage 2. Within electric spec (VSWR)
3	Temperature cycling	1. Step 1 : +85 °C, 20 min Step 2 : -40 °C, 20 min 2. Number of cycle : 200	1. No visual damage 2. Within electric spec (VSWR)
4	Humidity	1. Step 1 : -10 °C, 24 hours Step 2 : +65 °C, 24 hours 2. Humidity : 93 %RH 3. Number of cycle : 10	1. No visual damage 2. Within electric spec (VSWR)
5	Free fall (=drop)	1. Drop height : 1 m 2. Impact surface : concrete 3. Test cycle : for each of 3 DUTs one drop in both direction of each dimensional axis (1st DUT : ±X, 2nd DUT : ±Y, 3rd DUT : ±Z)	1. No visual damage 2. Within electric spec (VSWR)
6	Vibration	1. Step : 5-55-5 Hz 1octave/min 2. Amplitude = 1.5 mm 3. Acceleration = 2 g 4. Hold time = 2 hours 5. Direction : Z direction (up & Down)	1. No visual damage 2. Within electric spec (VSWR)