1.0 Reference and Address			
Report Number	105635781CHI-001	Original Issued: 5-Aug-2024	Revised: None
Standard(s)	Emergency Responder Communication Enhancement Systems [ANSI/CAN/UL 2524:2024 Ed.3]		

Applicant	Westell Inc	Manufacturer 1	**Westell Inc.**
Address	750 North Commons Drive Aurora, IL 60504	Address	750 North Commons Drive Aurora, IL 60504
Country	USA	Country	USA
Contact	Joe Gage Dave Laszewski	Contact	Joe Gage Dave Laszewski
Phone	(630) 375-4724 (630) 375-4173	Phone	(630) 375-4724 (630) 375-4173
FAX	NA	FAX	NA
Email	jgage@westell.com Dlaszewski@westell.com	Email	jgage@westell.com Dlaszewski@westell.com

Manufacturer 2	**RF Morecom Corea**
Address	Room #5F (534-537), Room #8F (839-840), 11, Seocheon-ro 201beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, 17111
Country	Republic of Korea
Contact	Jini Kim Walid Regaya
Phone	+82-10-8895-6951 514-917-6427
FAX	82-31-455-3833
Email	jinikim@rfmkorea.com walid@rfmkorea.com

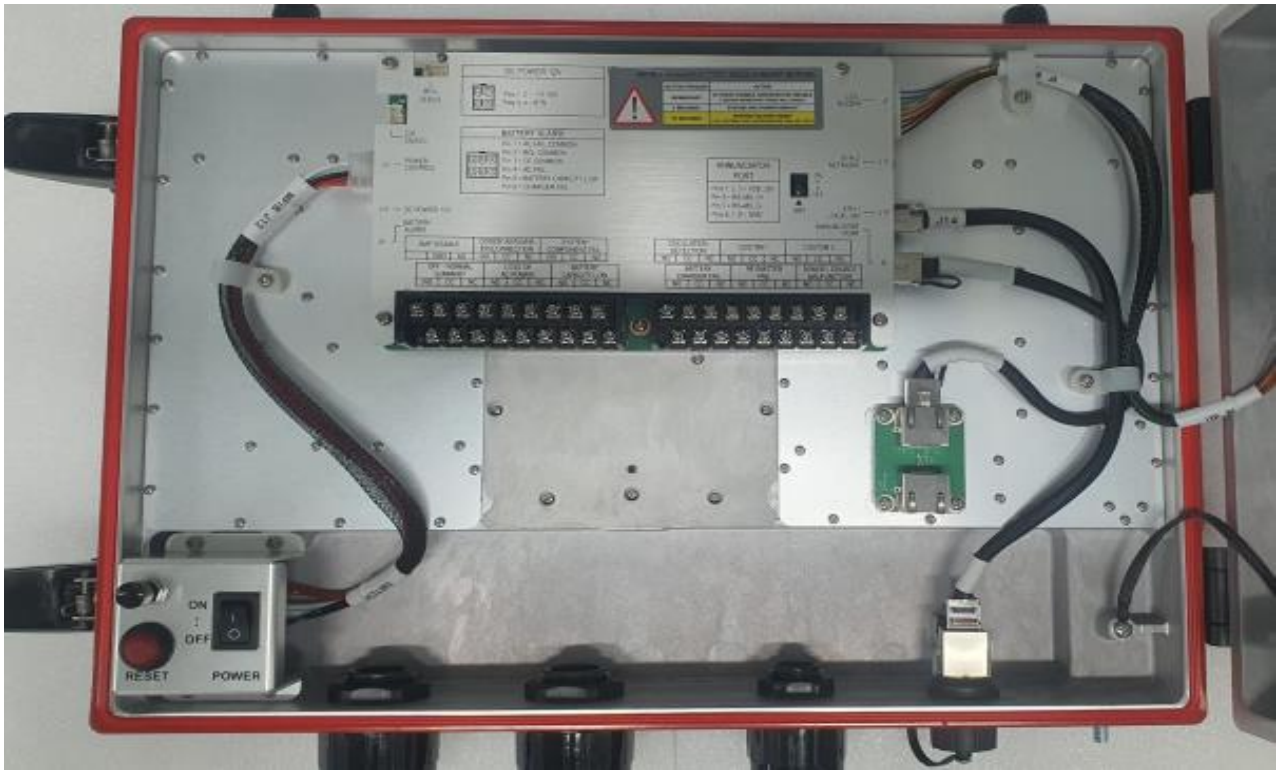
2.0 Product Description	
Product	Public Safety Bi-directional Amplifier
Brand name	Westell ProtectLink
Description	The product covered by this report is a commercial, indoor use, permanently connected, Public Safety Signal Booster that enhances in-building RF signal coverage for public safety radio with batteries as a secondary power source.
Models	CS45-727-827-A0, CS19-BBU-004.
Model Similarity	CS45-727-827-A0 is the BDA. CS19-BBU-004 is the battery cabinet.
Ratings	CS45-727-827-A0: 12.4 VDC, 3.9A. CS19-BBU-004: Input: 120 VAC, 60 Hz, 1 A; Battery back up: 12Vdc, 100AH.
Other Ratings	NA

3.0 Product Photographs

Photo 1 - Enclosure CS45-727-827-A0 front view

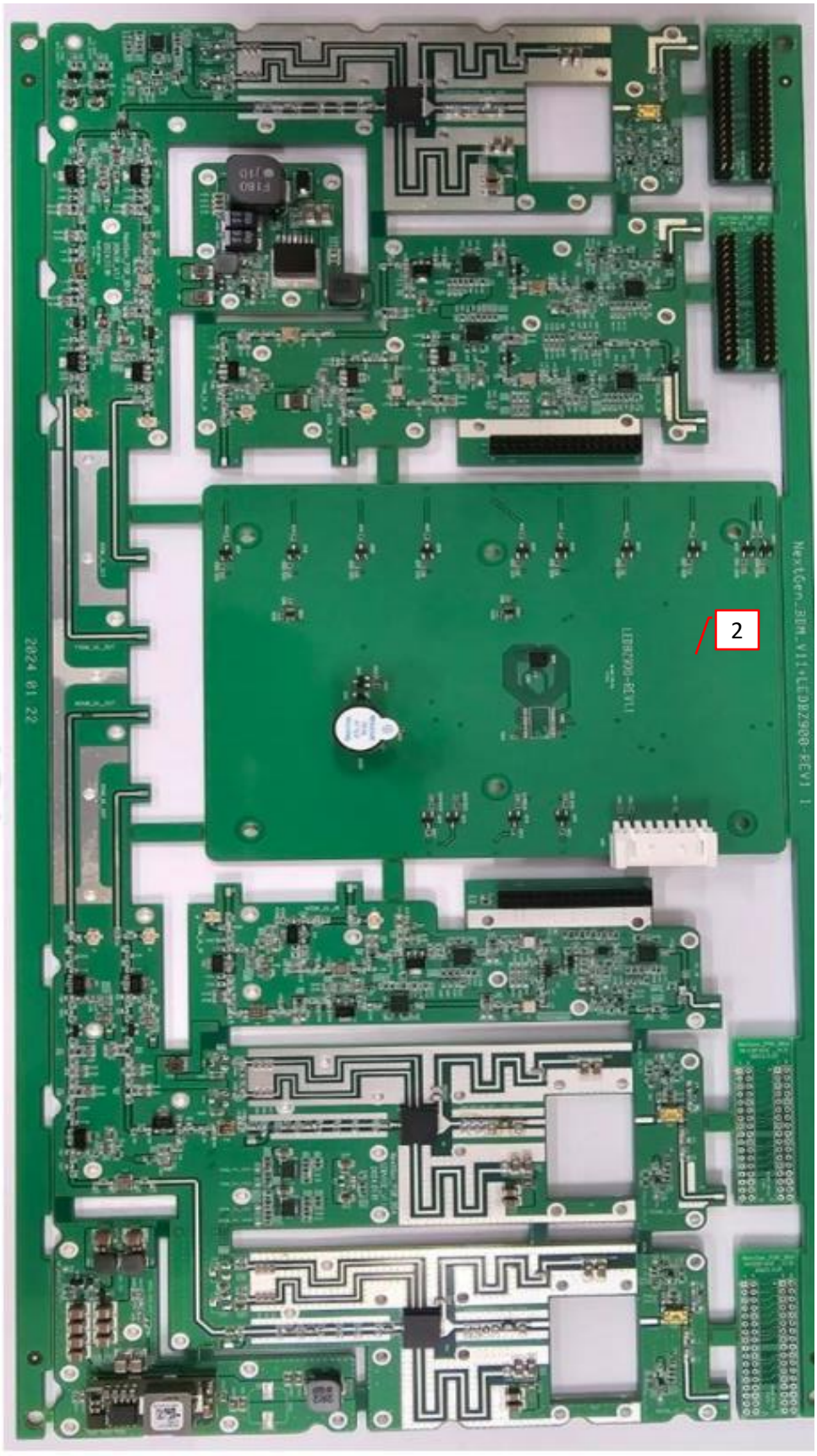
3.0 Product Photographs

Photo 2 - Internal view of CS45-727-827-A0



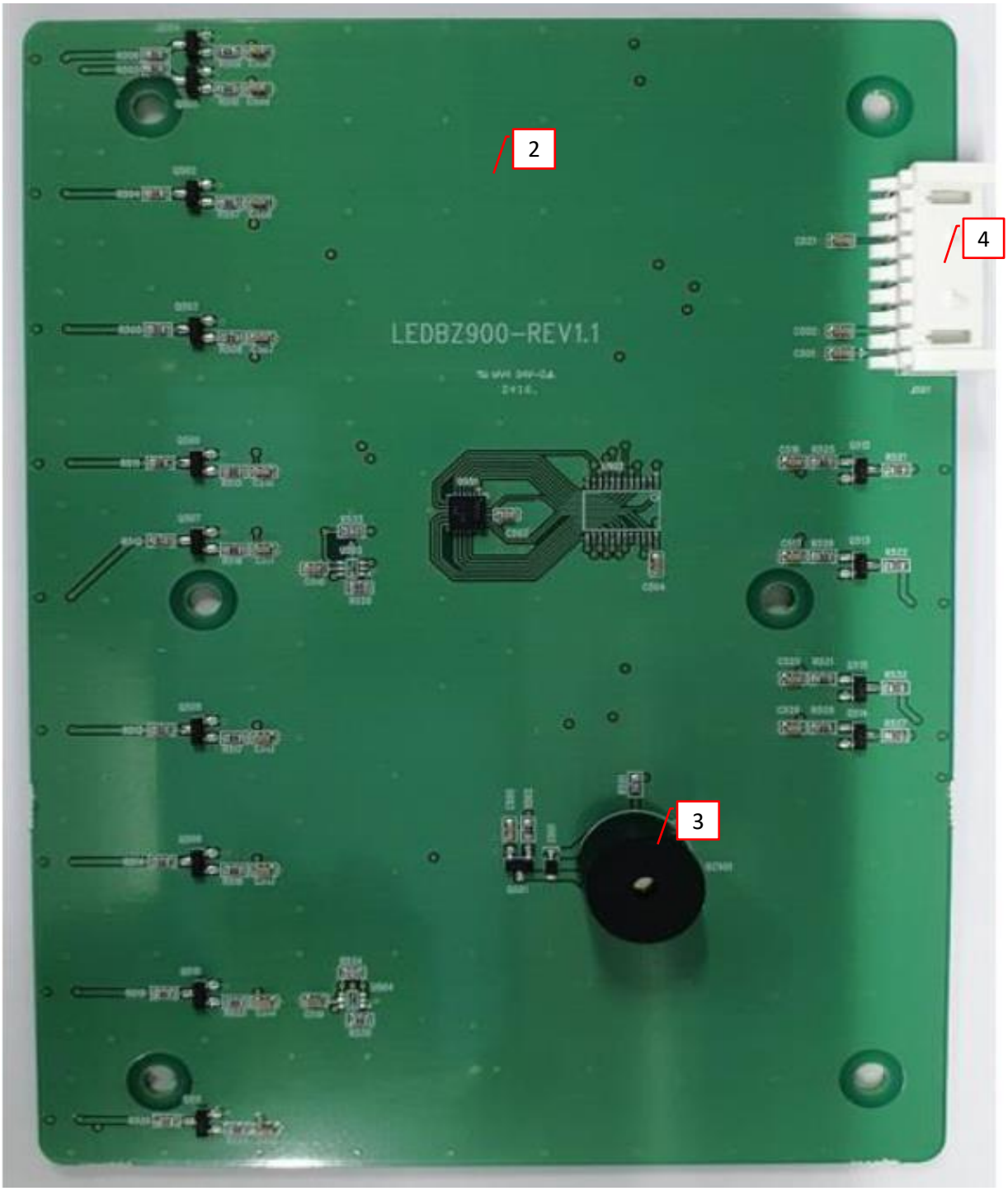
3.0 Product Photographs

Photo 3 - BDM RF board



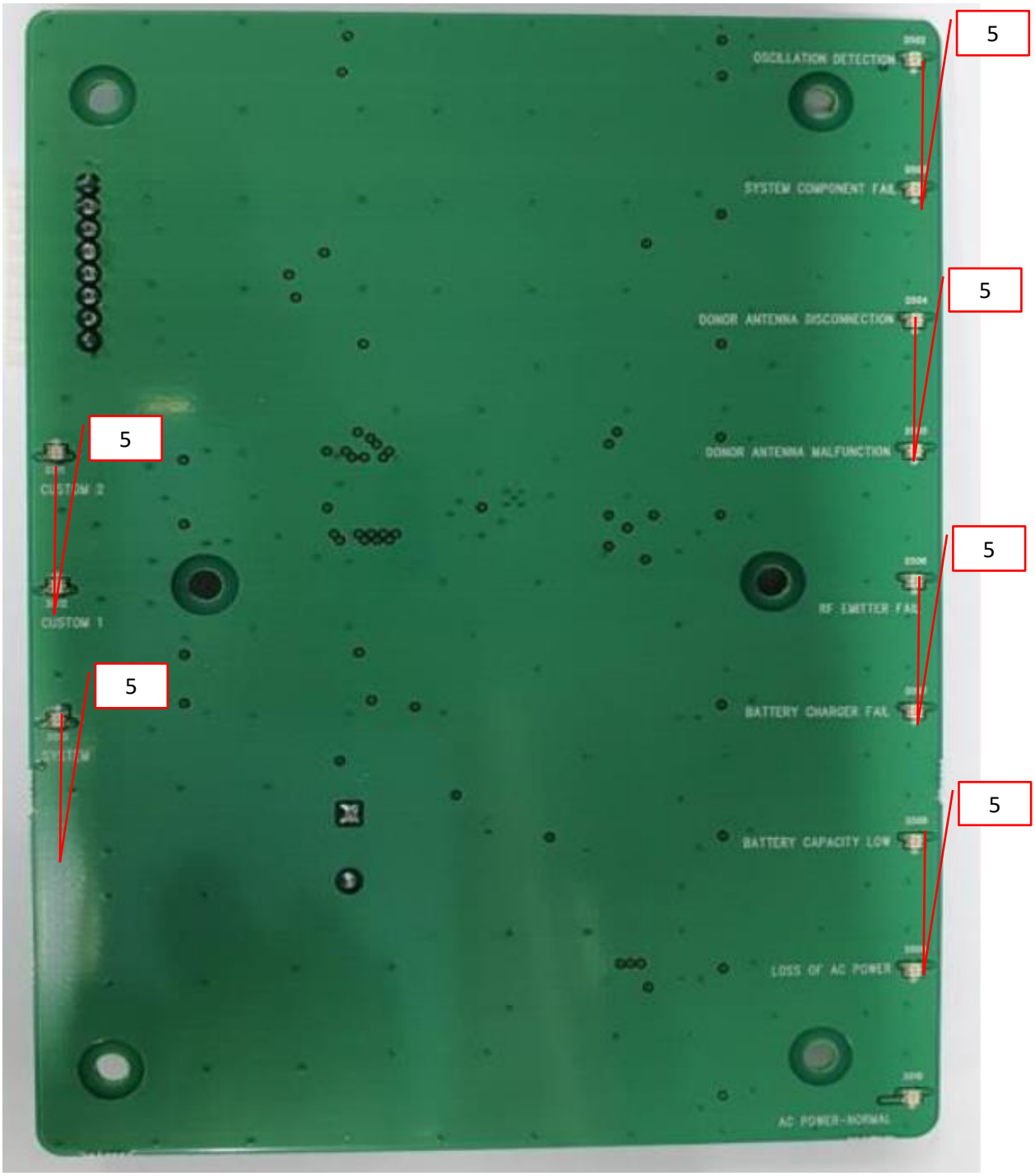
3.0 Product Photographs

Photo 4 - Top LED board - LEDBZ900



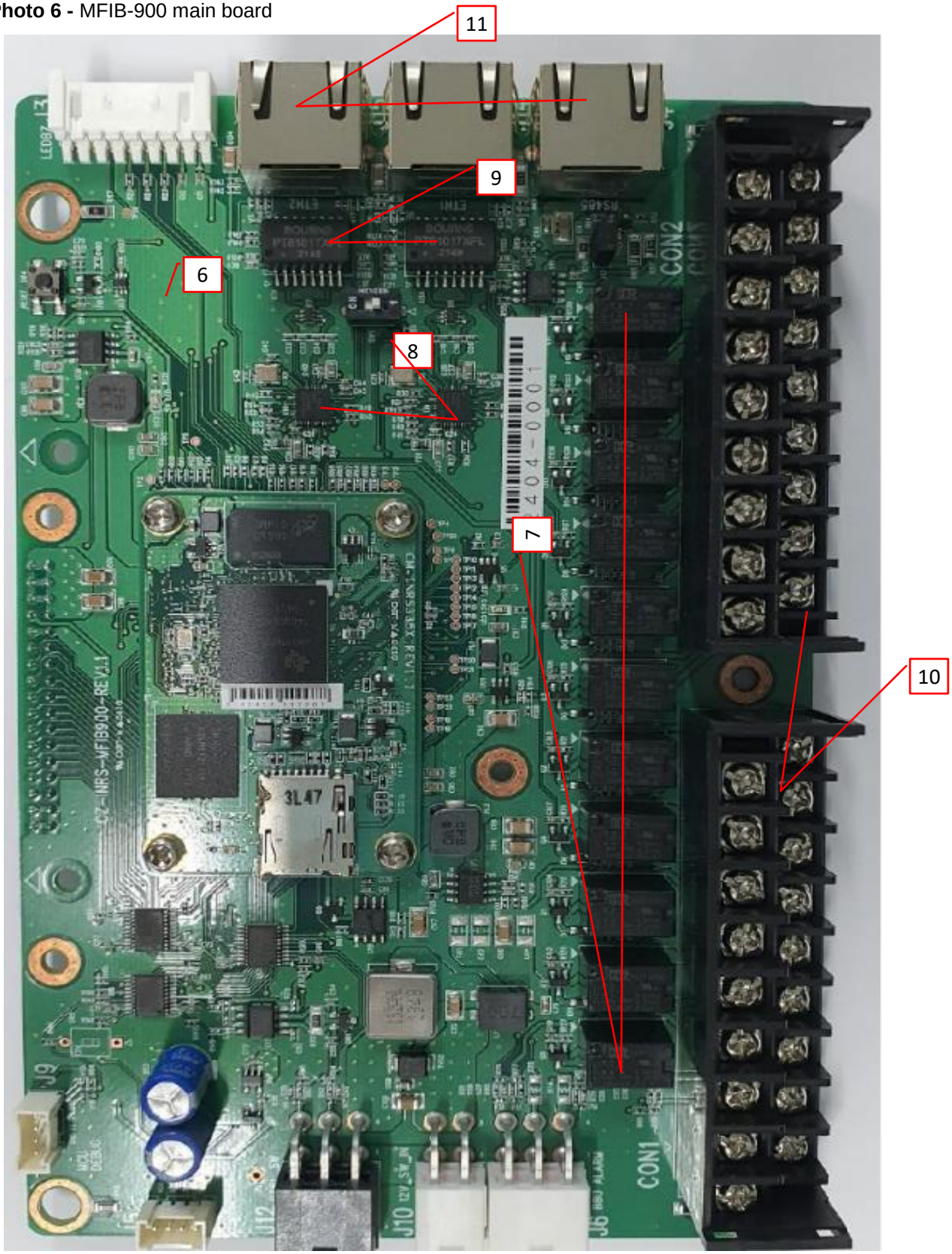
3.0 Product Photographs

Photo 5 - Bottom LED board - LEDBZ900



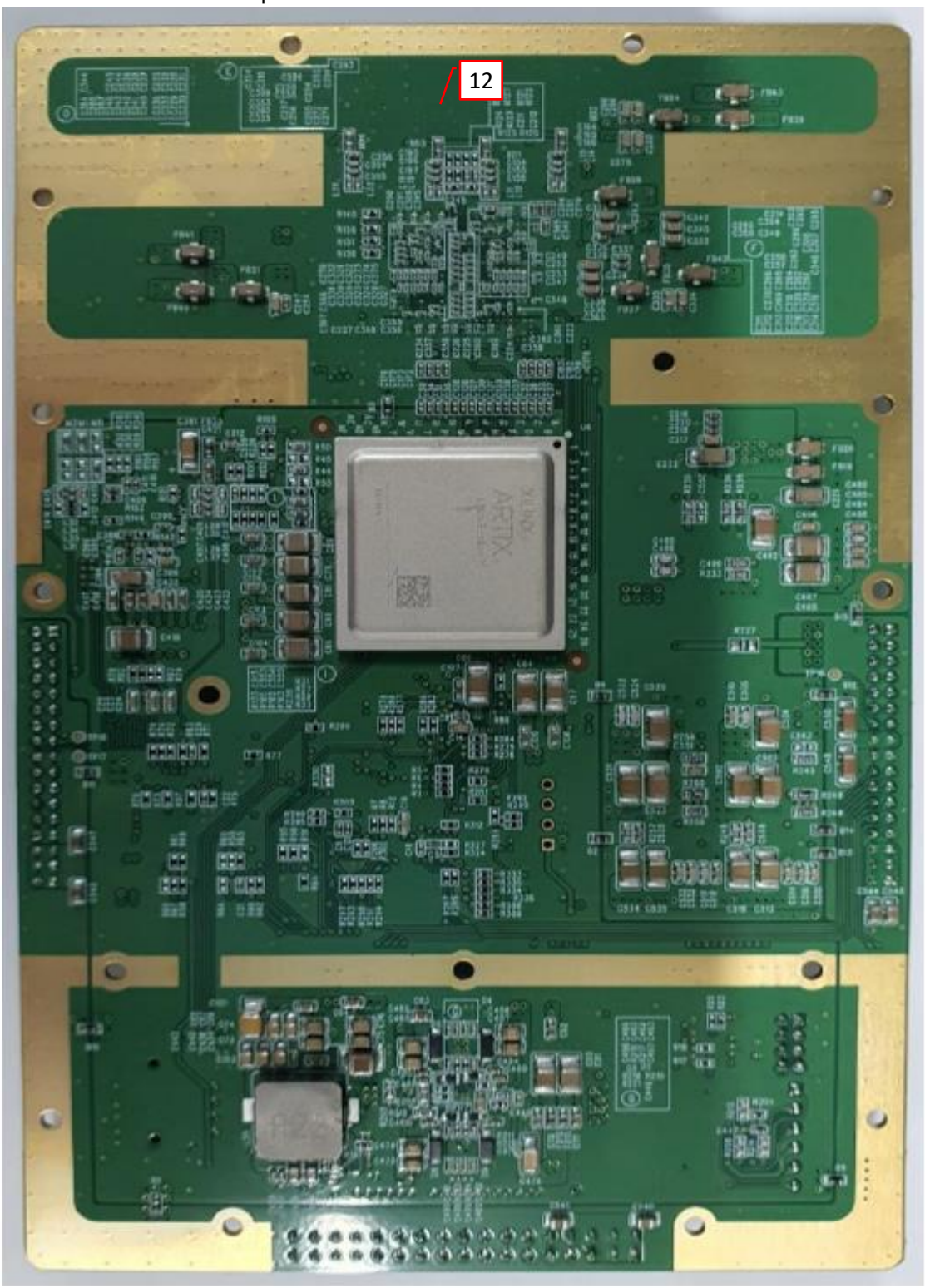
3.0 Product Photographs

Photo 6 - MFIB-900 main board



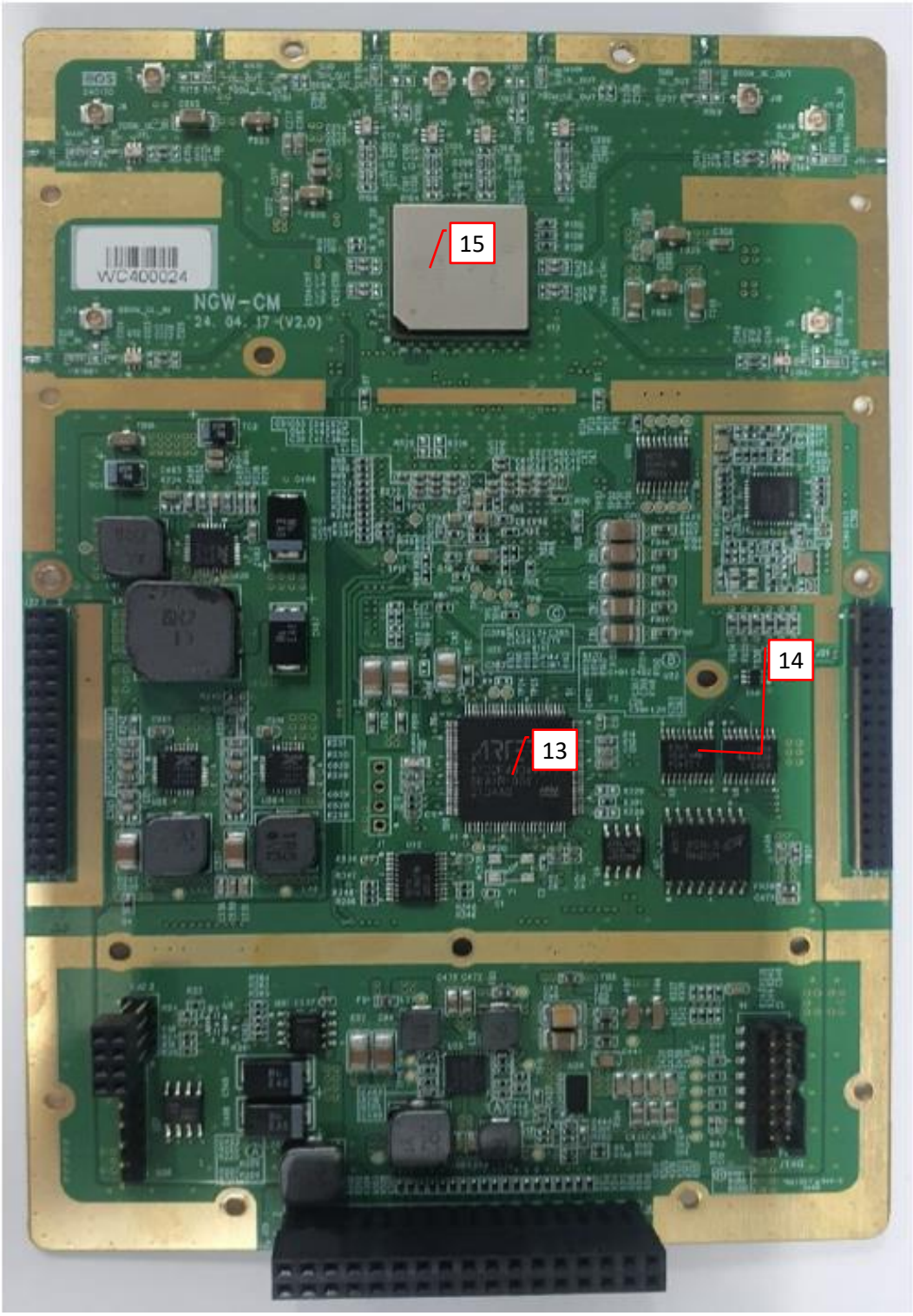
3.0 Product Photographs

Photo 7 - CM PBA board top



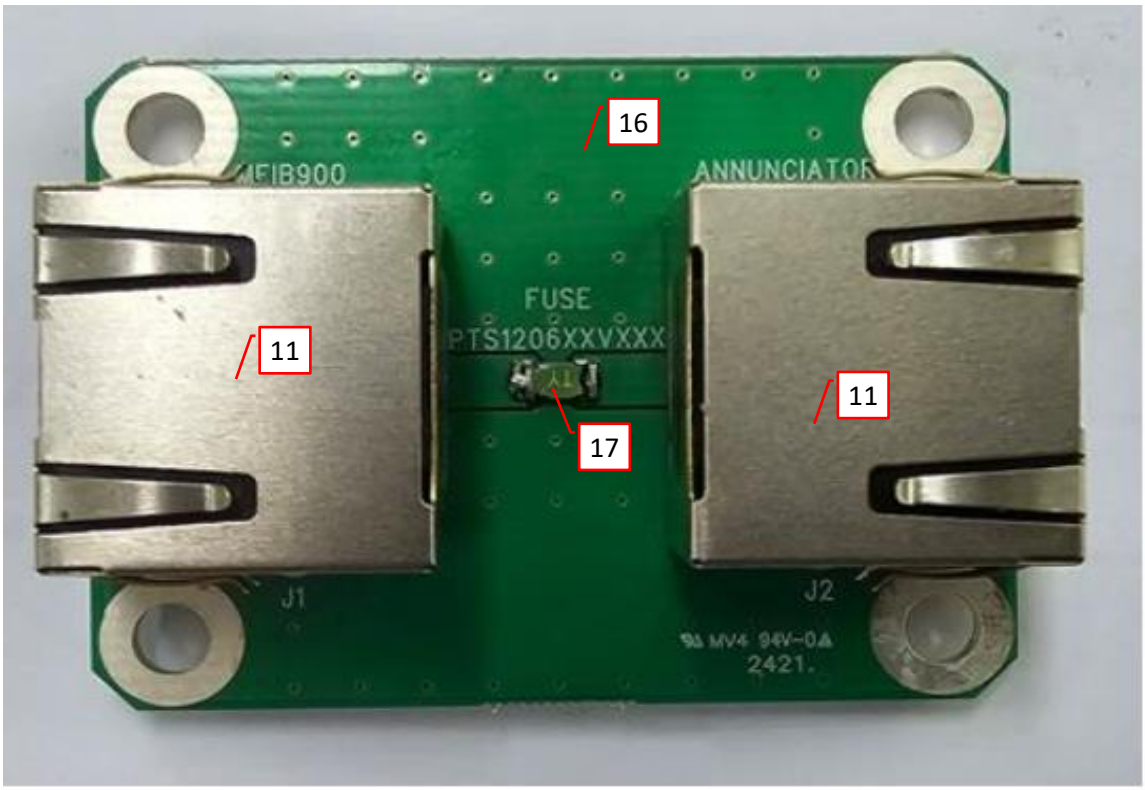
3.0 Product Photographs

Photo 8 - CM PBA board Bottom



3.0 Product Photographs

Photo 9 - RA protection board

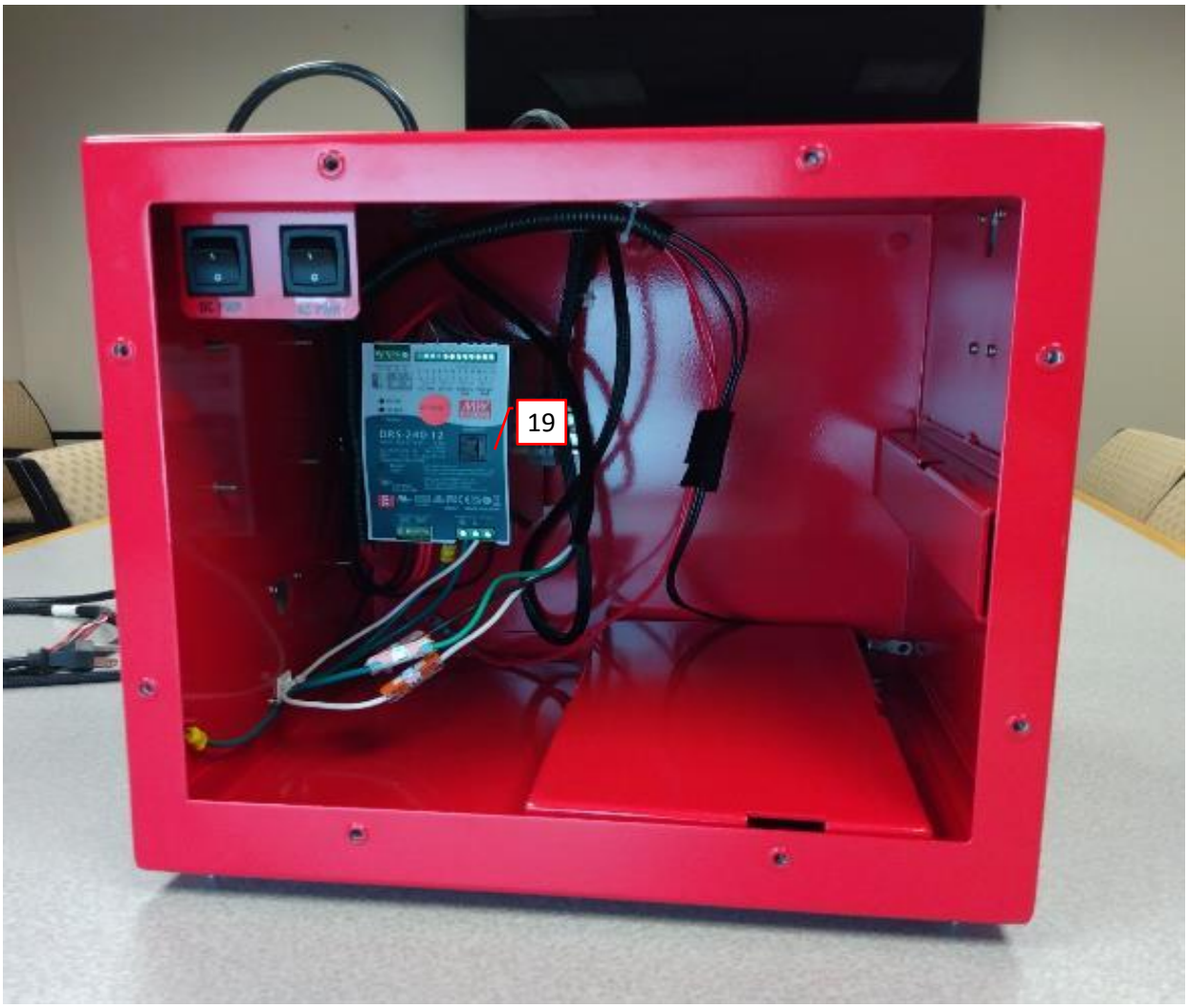


3.0 Product Photographs

Photo 10 - External view of CS19-BBU-004

3.0 Product Photographs

Photo 11 - Internal view of CS19-BBU-004



4.0 Critical Components						
Photo #	Item no.[1]	Name	Manufacturer/ trademark[2]	Type / model[2]	Technical data and securement means	Mark(s) of conformity[3]
1	1	Enclosure	Dabotech	ProtectLink BDA	Aluminum, painted, with hinged door. Overall dimensions 279.4 W x 381 L x 119 H. About 3.22mm thickness. See Illustration 1 items 1 - 3.	NR
3, 4	2	PCB of BDM RF board	Various	LEDBZ900-Rev1.1	UL94-V0, Approved to UL 796. Verify Type/model on PCB.	UR
4	3	Buzzer	CUI Devices	CMI-1295-0585T	Internally Driven Magnetic 5 V 30mA 2.3kHz 85dB @ 5V, 10cm Through Hole PC Pins	NR
4	4	Connector	Molex	53426-0810	Wire to Board Connector, Current Rating : 3.0A, Locking Ramp, UL94 V-0, Temperature : -40°C ~ +105°C	UR
5	5	LEDs	Longsum	19-223-R6G6C-A11-2T	LED GREEN, SMT, 1608	NR
6	6	PCB of MFIB-900 main board	Various	CZ-MFIB900-Rev1.1	UL94-V0, Approved to UL 796. Verify Type/model on PCB.	UR
6	7	Relays	HANKUK RELAY	HR92-DC05	Universal 2 changeover signal switching relay, 1 Form C, Coil Voltage : 5V, Coil PWR : Standard, Switching Current (Max) : 2 A	UR
6	8	Micro transceiver	Microchip Technology	KSZ8081RNBIA	ETHERNET Transceiver, Full Duplex, RMII, Vcc: 1.8V or 2.5V or 3.3V, 32-QFN, (-)40°C ~ (+)85°C.	NR

4.0 Critical Components						
Photo #	Item no.[1]	Name	Manufacturer/ trademark[2]	Type / model[2]	Technical data and securement means	Mark(s) of conformity[3]
6	9	Transformer	GROUP-TEK	HST-0041SXAR	10/100BASE-TX TRANSFORMER, 12.7 mm x 7.25 mm, Turns Ratio : Tx- 1CT:1CT, Rx- 1CT:1CT, Primary (PIN1-3,PIN6-8) inductance(Lp) (Min) : 350uH (@100KHz, 0.1Vrms, 8mA DC Bias), Insertion Loss (Max) : -1.0 dB (@0.3 ~ 100MHz), OP-Temperature : (-)40 °C ~ (+)85 °C	NR
			Bourns	PT61017XPEL	10/100BASE-TX TRANSFORMER, 12.8 mm x 6.9 mm, Turns Ratio : Tx- 1CT:1CT, Rx- 1CT:1CT, Primary (PIN1-3,PIN6-8) inductance(Lp) (Min) : 350uH (@100KHz, 0.2Vrms, 8mA DC Bias), Insertion Loss (Max) : -1.15 dB (@0.3 ~ 100MHz), Primary (PIN1-3,PIN6-8) DCR (Max) : 0.6 Ω, Secondary(PIN16-14,PIN11-9) DCR (Max) : 1.1 Ω, OP-Temperature : (-)40 °C ~ (+)85 °C	NR
6	10	Terminal Connector	BEE-RYONG ELECTRONICS CO.,LTD.	BR-762C2-18P	Terminal Block, 7.62mm pitch, 2 Row, PCB Type, Straight, UL Cert., 18 Pin, Rating : 250V 10A, Contact Resistance : Less than 8 mΩ, Insulation Resistance : More Than 100MΩ DC 500V, Withstand Voltage : AC2000V Per Minute, Temperature : -40°C ~ +85°C, Wire Size / Range : AWG18~26, Wire Binding Screw : M3×6	UR
6, 9	11	RJ 45 Connector	GROUP-TEK	XW-601-18-B-3	RJ45 Connector, Right Angle, 2 LED	NR
7	12	PCB of CM PBA	Various	Various	UL94-V0, Approved to UL 796. Verify Type/model on PCB.	UR
8	13	Microcontroller	Artery	AT32F403AVGT7	32-bit ARM® Cortex®-M4 core, Flash size 1024 KB, 100 pin LQFP 14x14 mm, -40°C ~ 105°C.	NR

4.0 Critical Components						
Photo #	Item no.[1]	Name	Manufacturer/ trademark[2]	Type / model[2]	Technical data and securement means	Mark(s) of conformity[3]
8	14	Transceivers	TI	SN74LVC245A PWR	Bus Transceivers Tri-State Octal Bus, TSSOP20, -40°C ~ 105°C.	NR
8	15	Quad-Channel RF Transceiver	TI	BGA400	Operating temperature -40°C ~ 85°C.	NR
9	16	PCB of Remote annuciator protection	Various	Various	UL94-V0, Approved to UL 796. Verify Type/model on PCB.	UR
9	17	Fuse	Eaton	PTS120660V010	PTC RESET FUSE 60V 100MA 1206.	NR
10	18	Battery backup enclosure	Westell Inc.	080-501907	Aluminum, painted, with hinged door. Overall dimensions 300.48 W x 387.7 L x 309.8 H. About 2mm thickness (Door thickness 2.4mm) . See Illustrations 1 items 4 - 7.	NR
11	19	Power supply	Mean Well	DRS-240-12	Operating temperature -40°C ~ 85°C. Input voltage 90-305Vac, Output voltage 12Vdc, 0-20A current range, battery current 15.4A.	UR
11	20	Battery (Not shown)	NP power	NPD12V-100Ah	12Vdc 100ah. Lead acid battery.	UR
			Zeus	PC55-12M	12Vdc 55aH. Lead acid battery.	UR
11	21	Firmware (not shown)	Westell Inc.	Ver 1.00	Verify Firmware type.	NR
11	22	Marking material (not shown)	Various	Various	UL 969 Marking Labelling System, See section 6 item item 7 for additional information.	UR

NOTES:

1) Not all item numbers are indicated (called out) in the photos, as their location is obvious.

2) “Various“ means any type, from any manufacturer that complies with the "Technical data and securement means" and meets the "Mark(s) of conformity" can be used.

3) Indicates specific marks to be verified, which assures the agreed level of surveillance for the component. "NR" - indicates Unlisted and only visual examination is necessary. "See 5.0" indicates Unlisted components or assemblies to be evaluated periodically refer to section 5.0 for details.

5.0 Critical Unlisted CEC Components

No Unlisted CEC components are used in this report.

6.0 Critical Features

Recognized Component - A component part, which has been previously evaluated by an accredited certification body with restrictions and must be evaluated as part of the basic product considering the restrictions as specified by the Conditions of Acceptability.

Listed Component - A component part, which has been previously Listed or Certified by an accredited Certification Organization with no restrictions and is used in the intended application within its ratings.

Unlisted Component - A part that has not been previously evaluated to the appropriate designated component standard. It may also be a Listed or Recognized component that is being used outside of its evaluated Listing or component recognition.

Critical Features/Components - An essential part, material, subassembly, system, software, or accessory of a product that has a direct bearing on the product's conformance to applicable requirements of the product standard.

Construction Details - For specific construction details, reference should be made to the photographs and descriptions. All dimensions are approximate unless specified as exact or within a tolerance. In addition to the specific construction details described in this Report, the following general requirements also apply.

1. Spacing - In primary circuits, 6.4 mm minimum spacing are maintained through air and over surfaces of insulating material between current-carrying parts of opposite polarity and 6.4 mm minimum between such current-carrying parts and dead-metal parts or low voltage isolated circuits.
2. Mechanical Assembly - Components such as switches, fuseholders, connectors, wiring terminals and display lamps are mounted and prevented from shifting or rotating by the use of lockwashers, starwashers, or other mounting format that prevents turning of the component.
3. Corrosion Protection - All ferrous metal parts are protected against corrosion by painting, plating or the equivalent.
4. Accessibility of Live Parts - All uninsulated live parts in primary circuitry are housed within a <metal or non-metallic> enclosure constructed with no openings other than those specifically described in Sections 4 and 5.
5. Grounding - All exposed dead-metal parts and all dead-metal parts within the enclosure that are exposed are connected to the <grounding lead of the power supply cord or the equipment grounding terminal.
6. Internal Wiring - Internal wiring is routed away from sharp or moving parts. Internal wiring leads terminating in soldered connections are made mechanically secure prior to soldering. Recognized Component separable (quick disconnect) connectors of the positive detent type, closed loop connectors, or other types specifically described in the text of this report are also acceptable as internal wiring terminals. At points where internal wiring passes through metal walls or partitions, the wiring insulation is protected against abrasion or damage by plastic bushings or grommets. All wiring is minimum 24 AWG, with a minimum rating of 300V, 105°C.
7. Markings - The product is marked on a labeling system as described in item no. 22 of Section 4.0 as follows and as shown in Illustration 2:
   1. Applicant;
   2. Model number;
   3. Electrical ratings, in volts, amperes, or watts, and frequency for a cord-connected product;
   4. The following indication: Install in Accordance with the applicable National Fire Protection Association Installation Standard for each type of control unit, such as NFPA 1221;
   5. Reference to an installation wiring diagram, when not attached to the unit, by drawing number and issue date and/or revision level;
   6. The intended installation environment (indoor) and location (dry);
   7. Indication of Firmware version (can be found inside the unit);
   8. Indicate of the rated prevailing installation ambient air temperature: 25°C (77°F).
8. Cautionary Markings - None.
9. Installation, Operating and Safety Instructions - Instructions for installation and use of this product are provided by the manufacturer. Refer to Illustration 1, item 8, for details.

7.0 Illustrations

Illustration 1 - Table of controlled drawings that must be available

Item #	Document #	Rev #	Issue Date	Title/Description	Comments to field representative
1	IRS2302-A001A	1	-	BDA0.5 Outdrawing	Verify Document #
2	KH-69	-	-	Free stop Hinge	Verify Document #
3	WS-500F	-	-	Draw Latch	Verify Document #
4	521-007387	C	-	BBU Door panel	Verify Document # and rev #
5	51-007390	B	-	BBU Bracket, switch mounting	Verify Document # and rev #
6	521-007389	B	-	BBU Bracket, battery shelf	Verify Document # and rev #
7	521-007388	A	-	NG-BBU Wall mount bracket	Verify Document # and rev #
8	030-102038	A	7/1/2024	ProtectLink CS45-727-827-A0 Public Safety Bi-directional Amplifier Installation and Users Guide	Verify Document #, Rev #, and Issue Date
9	-	V1.3	5/23/2024	BDA BOM	Verify Rev # and issue date

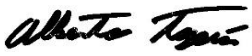
Illustration 2 - Marking Label Drawing for Model CS45-727-827-A0

S.W. Ver 1.00

Install in accordance with applicable NFPA installation standards: NFPA 1221, NFPA 70, NFPA 1, NFPA 101 and NFPA 72. Use installation instructions 030-102038, dated July, 2024. Install in an indoor dry location with a prevailing temperature of 25C.

8.0 Test Summary					
Evaluation Period	2/1/2024 - 8/5/2024			Project No.	G105635781
Sample Rec. Date	16-Jan-2024	Condition	Prototype	Sample ID.	AH011620241040 14-1
Test Location	Westell Inc., 750 N. Commons Dr., Aurora, IL 60504				
Test Procedure	Witnessed Manufacturer Testing (WMT) - Level 2				
Determination of the result includes consideration of measurement uncertainty from the test equipment and methods. The product was tested as indicated below with results in conformance to the relevant test criteria.					
The following tests were performed:					

Test Description	UL 2524 3rd Ed		
Performance – General	29		
Operation Tests – General	30		
Operation	31		
Power Supplies	32		
Monitoring for Integrity	33		
Charging Current Test	34		
Electrical Ratings Test	35		
Jarring Test	36		
Variable Voltage Test	45		
Variable Ambient and Humidity Test	46		
Externally Induced Supply-Line Transients Test	47.2		
Internally Induced Transients Test	47.3		

8.1 Signatures			
A representative sample of the product covered by this report has been evaluated and found to comply with the applicable requirements of the standards indicated in Section 1.0.			
Completed by:	Alberto Tapia	Reviewed by:	Rob Cole
Title:	Project Engineer	Title:	Staff Engineer
Signature:		Signature:	

9.0 Correlation Page For Multiple Listings	
The following products, which are identical to those identified in this report except for model number and Listee name, are authorized to bear the ETL label under provisions of the Intertek Multiple Listing Program.	
BASIC LISTEE	Westell Inc
Address	750 North Commons Drive Aurora, IL 60504
Country	USA
Product	Public Safety Bi-directional Amplifier

MULTIPLE LISTEE 1	None
Address	
Country	
Brand Name	
ASSOCIATED MANUFACTURER	
Address	
Country	

MULTIPLE LISTEE 1 MODELS	BASIC LISTEE MODELS

MULTIPLE LISTEE 2	None
Address	
Country	
Brand Name	
ASSOCIATED MANUFACTURER	
Address	
Country	

MULTIPLE LISTEE 2 MODELS	BASIC LISTEE MODELS

MULTIPLE LISTEE 3	None
Address	
Country	
Brand Name	
ASSOCIATED MANUFACTURER	
Address	
Country	

MULTIPLE LISTEE 3 MODELS	BASIC LISTEE MODELS

10.0 General Information

The Applicant and Manufacturer have agreed to produce, test and label ETL Listed products in accordance with the requirements of this Report. The Manufacturer has also agreed to notify Intertek and to request authorization prior to using alternate parts, components or materials.

COMPONENTS

Components used shall be those itemized in this Intertek report covering the product, including any amendments and/or revisions.

LISTING MARK

The ETL Listing mark applied to the products shall either be separable in form, such as labels purchased from Intertek, or on a product nameplate or other media only as specifically authorized by Intertek. Use of the mark is subject to the control of Intertek.

The mark must include the following four items:

1) applicable country identifiers "US" and/or "C" or "US", "C" and "EU"
2) the word "Listed" or "Classified" or "Recognized Component" (whichever is appropriate)
3) a control number issued by Intertek
4) a product descriptor that identifies the standards used for certification. Example:

For US standards, the words, “Conforms to” shall appear with the standard number along with the word, “Standard” or “Std.” Example: “Conforms to ANSI/UL Std. XX.”

For Canadian standards, the words “Certified to CAN/CSA Standard CXX No. XX.” shall be used, or abbreviated, “Cert. to CAN/CSA Std. CXX No. XX.”

Can be used together when both standards are used.

If all standards on the ATM have the same standard title, the shared title or its abbreviation may be used in place of the examples above. Example: "Medical Electrical Equipment" or "MEE"; "Information Technology Equipment" or "ITE"; "Audio/Video Information And Communication Technology Equipment" or "A/V ICTE".

Note: A facsimile must be submitted to Intertek, Attn: Follow-up Services for approval prior to use. The facsimile need not have a control number. A control number will be issued **after signed Certification Agreements** have been received by the Follow-up Services office, approval of the facsimile of your proposed Listing Mark, satisfactory completion of the Listing Report, and scheduling of a factory assessment in your facility.

MANUFACTURING AND PRODUCTION TESTS

Manufacturing and Production Tests shall be performed as required in this Report.

FOLLOW-UP SERVICE

Periodic unannounced audits of the manufacturing facility (and any locations authorized to apply the mark) shall be scheduled by Intertek. An audit report shall be issued after each visit. Special attention will be given to the following:

1. Conformance of the manufactured product to the descriptions in this Report.
2. Conformance of the use of the ETL mark with the requirements of this Report and the Certification Agreement.
3. Manufacturing changes.
4. Performance of specified Manufacturing and Production Tests.

In the event that the Intertek representative identifies non-conformance(s) to any provision of this Report, the Applicant shall take one or more of the following actions:

1. Correct the non-conformance.
2. Remove the ETL Mark from non-conforming product.
3. Contact the issuing product safety evaluation center for instructions.

10.1 Evaluation of Unlisted Components

Because Unlisted Components are uncontrolled, and they do not fall under a third party follow up program, Intertek may require these components to be tested and/or evaluated at least once annually, more often for certain components, as part of the independent certification process. The Unlisted Components in Section 5.0 require testing and/or evaluation as indicated.

The Applicant will be notified, in writing, via the applicable contact methods, as defined in Section 1.0, when these components must be selected and sent to Component Evaluation Center (CEC) for re-evaluation.

Due to particular testing requirements, some components may be requested to be shipped to specific labs. Thus, specific shipment destination(s) for each sample will be provided in the written notification.

Managing CEC Location:
Intertek Testing Services NA Inc.
ETL Component Evaluation Center
1717 Arlingate Ln.
Columbus, Ohio 43228 USA
Attn: CEC Safety
Sample Disposition: Due to the destructive nature of the testing, all samples will be discarded at the conclusion of testing unless, the manufacturer specifically requests the return of the samples. The request for return must accompany the initial component shipment.

11.0 Manufacturing and Production Tests

The manufacturer agrees to conduct the following Manufacturing and Production Tests as specified:

Required Tests

Dielectric Voltage Withstand Test
Grounding Continuity Test

11.1 Dielectric Voltage Withstand Test

Method

One hundred percent of production of the products covered by this Report shall be subjected to a routine production line dielectric withstand test.

The test shall be conducted on products, which are fully assembled. Prior to applying the test potential, all switches, contactors, relays, etc., should be closed so that all primary circuits are energized by the test potential. If all primary circuits cannot be tested at one time, then separate applications of the test potential shall be made.

The test voltage specified below shall be applied between primary circuits and accessible dead-metal parts. The test voltage may be gradually increased to the specified value but must be maintained at the specified value for one second or one minute as required.

Test Equipment

The test equipment shall incorporate a transformer with an essentially sinusoidal output, a means to indicate the applied test potential, and an audible and/or visual indicator of dielectric breakdown.
The test equipment shall incorporate a voltmeter in the output circuit to indicate directly the applied test potential if the rated output of the test equipment is less than 500VA.
If the rated output of the test equipment is 500VA or more, the applied test potential may be indicated by either:
1 - a voltmeter in the primary circuit;
2 - a selector switch marked to indicate the test potential; or
3 - a marking in a readily visible location to indicate the test potential for test equipment having a single test potential output.
In cases 2 and 3, the test equipment shall include a lamp or other visual means to indicate that the test potential is present at the test equipment output. All test equipment shall be maintained in current calibration.

Products Requiring Dielectric Voltage Withstand Test:

Product	Test Voltage	Test Time
CS19-BBU-004	1000V AC or 1414V DC	60 s 60s

11.2 Grounding Continuity Test
Method Each product listed below shall be subjected to a test to determine that there is continuity between accessible dead-metal parts of the product and the grounding pin or blade of the attachment plug. If all accessible dead metal is connected, only a single test need be performed. A visual or audible device (ohmmeter, buzzer, etc.) may be used to indicate grounding continuity.
Products Requiring Grounding Continuity Test:
All products covered by this Report.

12.0 Revision Summary				
The following changes are in compliance with the declaration of Section 8.1:				
Date/ Proj # Site ID	Project Handler/ Reviewer	Section	Item	Description of Change
				None