Bovie®

A952, A942

Electrosurgical Generator and High-Frequency Desiccator

Service Guide

Bovie

Intro

SERVICE GUIDE FOR DERM (A942 SERIES) & BANTAM PRO (A952) SERIES OF GENERATORS

PREFACE

This Service Guide and the equipment it describes are for qualified technicians who maintain and repair the DERM (A942) & Bantam Pro (A952) series of Generators and High Frequency Desiccators. Additional User information is available in the DERM & A952 series User's Guides.

This document covers technical descriptions of the Bantam Pro including its physical appearance, all operator controls and indicators, operational specifications, component functional descriptions (module level), diagrams of the electronic circuits used, and troubleshooting guidelines (with chart comparisons).

The DERM & A952 series were constructed with the highest quality components. In the unlikely event that your generator/desiccator fails within 4 years of purchase date, Aspen Surgical Products will warranty the product and effect factory repairs. Please refer to Appendix A Warranty for what is covered, how long, and how to Obtain a Return Goods Authorization Number, in Section 8.

Equipment Covered in this Manual

DERM & A952 series of Generators and High Frequency Desiccators:

Model Numbers	CE Applicability
A942	CE 2797
A952	CE 2797
22-A942	-
22-A952	-
570-0583	-
570-0582	-

For Information Call

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Safety Precautions when Operating the Generator

The safe and effective use of electrosurgery depends to a large degree on factors solely under the control of the operator. There is no substitute for a properly trained and vigilant medical staff. It is important that they read, understand, and follow the operating instructions supplied with this electrosurgical equipment.

To promote the safe use of the DERM & A952 series of Generators and High Frequency Desiccators, please refer to each User's Guides for standard operating precautions.

Applicable Safety Standards

Conforms To
ANSI/AAMI STD ES60601-1
IEC STD 60601-1-6 & 60101-2-2
Certified To
CAN/CSA STD C22.2 No. 60601-1

Conventions Used in this Guide

WARNING:

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTIONS:

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE:
Indicates an operating tip, a maintenance suggestion, or a hazard that may result in product damage.

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BOARD DRAWINGS AND SCHEMATICS

THE BANTAM PRO (A952) AND DERM (A942) ELECTROSURGICAL GENERATORS

This section includes the following information:

- Functional Description
- Unit Description
- Safety Precautions When Repairing the Generator

CAUTIONS:
Read all warnings, cautions, and instructions provided with this generator before using including those contained within this service guide document and the associated User Guide provided with each unit which are specific for the intended generator application of Human Use or Veterinary Use.
Read the instructions, warnings, and cautions provided with electrosurgical accessories before using. Specific instructions are not included in this manual.
Any serious incident that has occurred in relation to the device should be reported to Aspen Surgical Products, the governing body, and the Competent authority of the member state in which the incident occurred

FUNCTIONAL DESCRIPTION

The Bantam Pro and DERM 942 is a multipurpose Electrosurgical generator/desiccator for use in physician's offices and surgi-centers. They provide unsurpassed performance, flexibility, reliability, and user convenience in one compact package.

The units include digital technology. This new technology is evident in the self-checking circuitry and error code readouts. The Bantam Pro (generator/desiccator) and DERM 942 (desiccator) offer monopolar and bipolar electrosurgical operations.
The following are key advantages and benefits.

Power Capabilities A952	A952 Up to 50 watts of Cut @ 500 Ω Up to 50 watts of Blend @ 800 Ω Up to 50 watts of Coagulation @ 1000 Ω Up to 40 watts of Fulguration @ 1000 Ω Up to 40 watts of Bipolar @ 200 Ω Up to 40 watts of Micro Bipolar @50 Ω
Power Capabilities A942	A942 Up to 40 watts of Coagulation @ 1000 Ω Up to 40 watts of Bipolar @ 200 Ω
Two Levels of Coagulation (A952 Only)	Coagulation - provides precise control of bleeding in localized areas. Fulguration - provides greater control of bleeding in highly vascular tissue over broad surface areas.
Two Levels of Bipolar (A952 Only)	Bipolar - provides precise Bipolar coagulation effects. Micro Bipolar - provides power for conventional Bipolar output.
Self Diagnostics	These diagnostics continually monitor the unit to ensure proper performance. Whenever a problem is detected, medical personnel receive audible alarm responses, and the output is suspended until the alarm condition is cleared.
Isolated RF output for Cut, Blend, or Coagulation Modes	This minimizes the potential of alternate site burns.
Ground Referenced RF Output for Fulguration Mode (A952 Only)	This output allows flexibility to use the generator without a return electrode in fulguration mode.

UNIT DESCRIPTION

The Bantam Pro and DERM 942are self-contained units, consisting of the main enclosure and power cord. The main components incorporated in the generator include:

- FRONT PANEL COMPONENTS Dial for controlling power output; receptacles for connecting electrosurgical accessories: switches and indicators (A952 only) for Cut, Blend, Coagulation, Fulguration, Bipolar and Micro Bipolar selection. Monopolar handpiece receptacle, Patient Plate receptacle, Bipolar cord receptacle (A952 and A942) , Footswitch receptacle, and digital indicator that show the current power settings.
- REAR PANEL COMPONENTS Volume control
- OTHER COMPONENTS Power switch (located on side of unit) and power cable receptacle (located on bottom of unit).
- INTERNAL COMPONENTS Main PCB, Barrier PCB, Line transformer
- SOFTWARE/FIRMWARE VERSION The firmware revision level can be verified on a label located on the main PCB board inside the unit.

SAFETY PRECAUTIONS WHEN REPAIRING THE GENERATOR

Before servicing the Bantam Pro and DERM 942 it is important that you read, understand, and follow the instructions supplied with it. Also, be familiar with any other equipment used to install, test, adjust, or repair this generator.

General Warnings, Cautions, and Notices

To promote the safe use of the Bovie® Specialist | PRO Electrosurgical Generator, please refer to the User's Guide for standard operating precautions. Read all warnings, cautions, and instructions provided with this generator before using including those contained within this service guide document and the associated User Guide provided with each unit which are specific for the intended generator application of Human Use or Veterinary Use

WARNINGS:

Use the generator only if the self-test has been completed as described. Otherwise, inaccurate power outputs may result.

The instrument receptacles on this generator are designed to accept only one instrument at a time. Do not attempt to connect more than one instrument at a time into a given receptacle. Doing so will cause simultaneous activation of the instrument.

Possibly Hazardous Voltage inside the unit! Disconnect power cord from the power source or unplug the power cord from the unit's power inlet to isolate the internal circuits from the supply mains.

CAUTIONS:

Do not stack equipment on top of the generator or place the generator on top of electrical equipment. These configurations are unstable and/or do not allow adequate cooling. The unit is designed to be wall mounted or mounted on a mobile stand.

Provide as much distance as possible between the electrosurgical generator and other electronic equipment (such as monitors). An activated electrosurgical generator may cause electrical interference with them.

Do not turn the activation tone down to an inaudible level. The activation tone alerts the surgical team when an accessory is active.

NOTICES:
If required by local codes, connect the generator to the hospital equalization (grounding) connector with an equipotential cable.

Connect the power cord to a wall receptacle having the correct voltage. Otherwise, product damage may result.

Electrosurgical equipment and accessories are intended to be used by health professional educated in their use.

Active Accessories

WARNINGS:
Shock Hazard – Do not connect wet accessories to the generator.
Shock Hazard – Ensure that all accessories and adapters are correctly connected and that no metal is exposed.

CAUTIONS:

Accessories must be connected to the proper receptacle type. In particular, bipolar accessories must be connected to the Bipolar instrument receptacle only. Improper connection may result in inadvertent generator activation.

Set power levels to the lowest setting before testing an accessory.

Reusable devices are provided non-sterile and must be processed prior to use to include first use. Processing is defined on specific Instructions provided with each device.

Single Use Devices Only: Reusing or reprocessing single use devices may cause damage to the device which in turn may cause unnecessary harm to the user and/or patient. Reuse or reprocessing is not recommended.

After Use or upon determining product can no longer be used due to wear or damage, safely discard in accordance with established procedures for biohazardous waste.

Notice: For applicable IFU/additional information: Visit https://www.aspensurgical.com/Resources/Documents/IFUs

Please refer to the manufacturer of the generator for warnings, precautions, contra-indications, undesirable side-effect, measures to be taken, and limitations of use for the electrosurgical system and accessories.

Fire / Explosion Hazards

WARNINGS:
Explosion Hazard – Do not install the generator in the presence of flammable anesthetics, gases, liquids, or objects.
Fire Hazard – Do not place active accessories near or in contact with flammable materials (such as gauze or surgical drapes). Electrosurgical accessories that are activated or hot from use can cause a fire. Use a holster to hold electrosurgical accessories safely away from personnel and flammable materials.
Fire Hazard – Do not use extension cords.
Fire Hazard – For continued protection against fire hazard, replace fuses only with fuses of the same type and rating as the original fuse.
Residual Risks and Adverse Reactions/Adverse effects associated with the use of this device may include thermal damage, shock, or electrocution, burns, fire, biohazard (from smoke). Additionally, accessories include risks associated with patient contact including unintended cut, allergic reaction, and infection.
Due to concerns about the carcinogenic and infectious potential of electrosurgical byproducts (such as tissue smoke plume and aerosols which may include toxic gasses and vapors, live and dead cellular material, and viruses), protective eyewear, filtration masks, and effective smoke evacuation equipment should be used in both open and laparoscopic procedures. Contact Aspen Surgical Products at customerservice@aspensurgical.com for additional information or to inquire about our smoke evacuation solutions.

Generator Electric Shock Hazards

WARNINGS:
Connect the generator power cord to a properly grounded receptacle. Do not use power plug adapters.
Do not connect a wet power cord to the generator or to the wall receptacle.
To allow stored energy to dissipate after power is disconnected (caps discharge), wait at least five minutes before replacing parts.
Always turn off and unplug the generator before cleaning.
Do not touch any exposed wiring or conductive surfaces while the generator is disassembled and energized. Never wear a grounding strap when working on an energized generator.
When taking troubleshooting measurements use appropriate precautions such as using isolated tools and equipment, using the “one hand rule,” etc.
Potentially lethal AC and DC voltages are present in the AC line circuitry, high voltage DC circuitry, and associated mounting and heat sink hardware described in this manual. These potentials are not isolated from the AC line. Take appropriate precautions when testing and troubleshooting this area of the generator.
High frequency, high voltage signals that can cause severe burns are present in the RF output stage and in the associated mounting and heat sink hardware. Take appropriate precautions when testing and troubleshooting this area of the generator.

Servicing

CAUTIONS:
Read all warnings, cautions, and instructions provided with this generator before servicing including those contained within this service guide document and the associated User Guide provided with each unit which are specific for the intended generator application of Human Use or Veterinary Use..
The generator contains electrostatic-sensitive components. When repairing the generator, work at a static-controlled workstation. Wear a grounding strap when handling electrostatic-sensitive components, except when working on an energized generator. Handle circuit boards by their nonconductive edges. Use an anti-static container for transport of electrostatic-sensitive components and circuit boards.

Cleaning

NOTICE:
Do not clean the generator with abrasive cleaning or disinfectant compounds, solvents, or other materials that could scratch the panels or damage the generator.

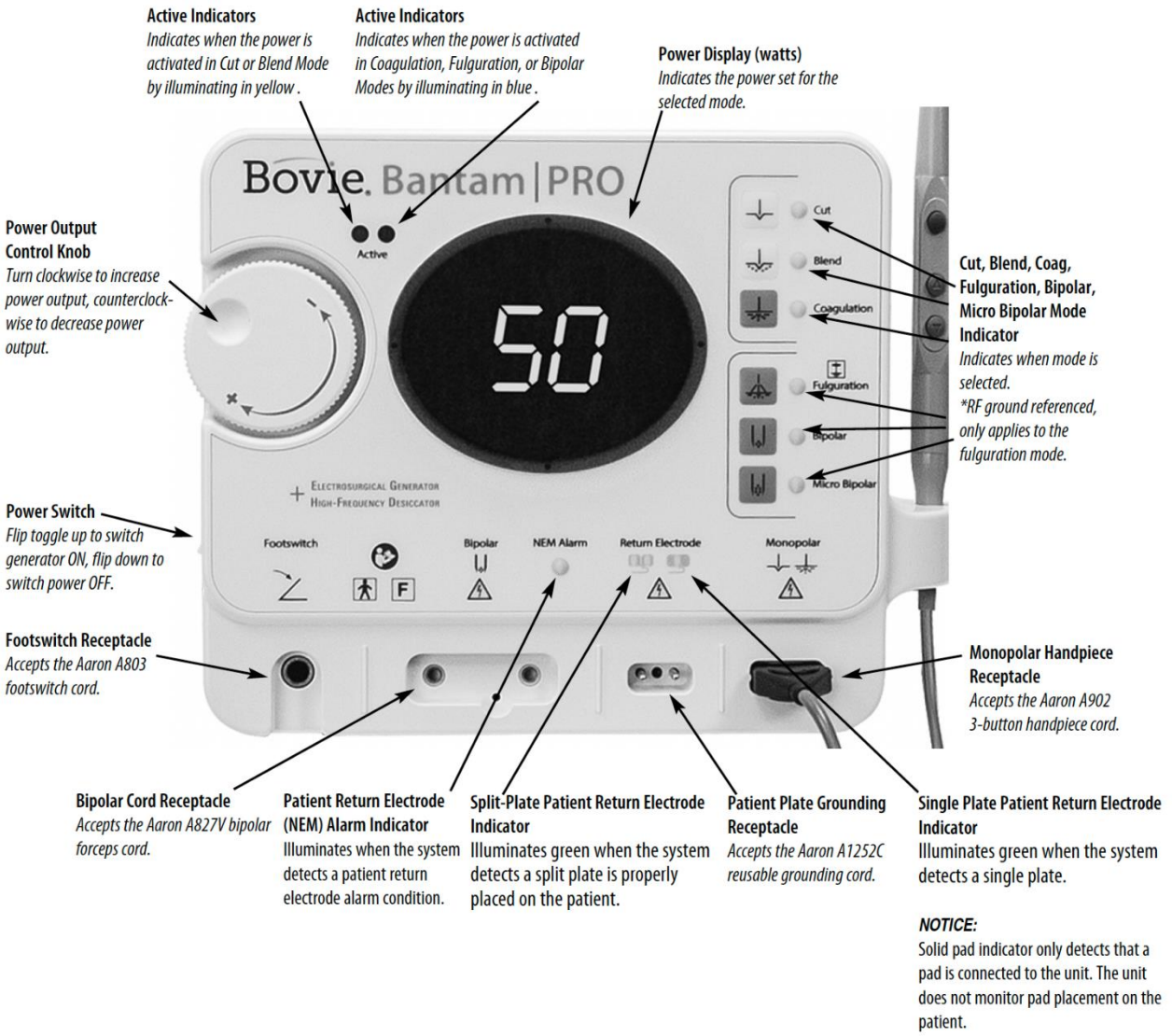
CONTROLS, INDICATORS, AND RECEPTACLES

This section describes:

- Controls, Indicators, and Receptacles on the Front, Rear, Bottom and Side Panels

FRONT PANEL A952

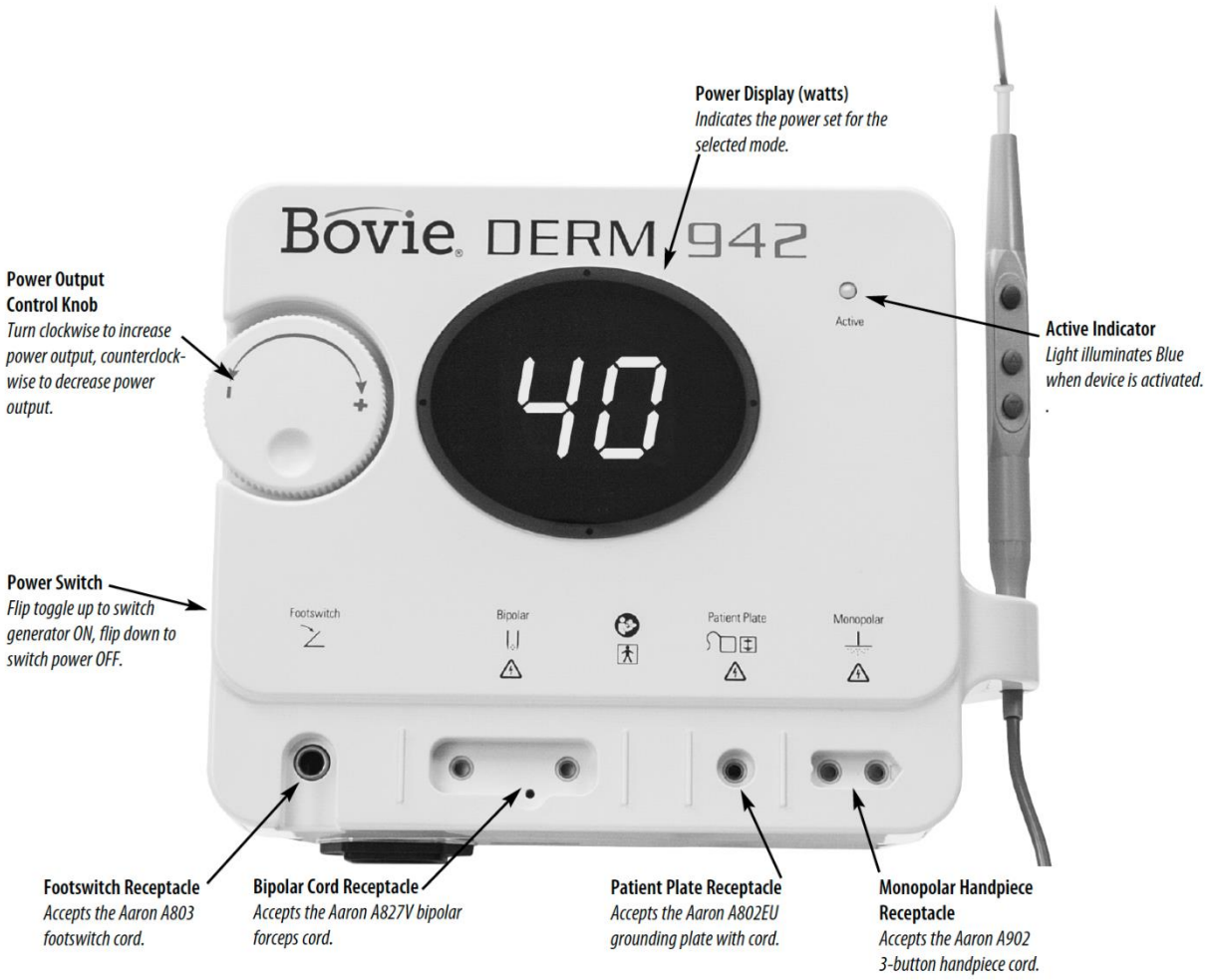
Figure 2 – 1. Layout of controls, indicators, and receptacles on the front panel



NOTICE:
A return electrode is not required for the fulguration mode. The patient plate alarm is not used for this mode. Procedures may be performed without the use of a return electrode.

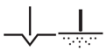
FRONT PANEL A942

Figure 2 – 2. Layout of controls, indicators, and receptacles on the front panel



Symbols on the Front Panel

The following table lists descriptions for symbols found on the front panel of the Bantam Pro (A952), DERM 942 (A942).

SYMBOLS	DESCRIPTION
Generator Controls	
	Cut mode (A952)
	Blend mode (A952)
	Coagulation mode (A952)
High Frequency Desiccator Controls	
	Bipolar mode (A952, A942)
	Micro Bipolar mode (A952)
	Fulguration mode (A952)
Indicators, Warnings	
	RF ground referenced to earth
	Type BF applied part.
	RF Isolated – Patient connections are isolated from earth at high frequency. (A952, A942)
	Mandatory: Refer to instruction manual / guide
	Warning - dangerous voltage
Connectors	
	Monopolar handpiece (A952)
	Monopolar handpiece (A942)
	Patient return electrode (A952)
	Patient plate (A942)
	Footswitch
	Bipolar forceps (A952, A942)

REAR AND SIDE PANELS

Figure 2 – 4. Layout of controls and indicators on the rear and side panel A952

Figure 2 – 5. Layout of controls and indicators on the rear and side panel A942

Symbols on the Rear and Side Panels

SYMBOLS	DESCRIPTION
○	Power Off
—	Power On
MD	Medical Device
UDI	Unique Device Identifier
SN	Serial Number

REF	Reference Number
	Caution
▼  ▲	Volume Control
	✱ Do not dispose of this device in the unsorted municipal waste stream.
	Caution, Consult Accompanying Documents
	Manufacturer
	Fuse Symbol

NOTICE:
Please note that infected medical devices must be disposed of as medical/biohazard waste and cannot be included in used electronic equipment disposal/recycling programs. In addition, certain electronic products must be returned directly to Aspen Surgical Products. Contact your Bovie® sales representative for return instructions.

TECHNICAL SPECIFICATIONS

All specifications are nominal and subject to change without notice. A specification referred to as “typical” is within ± 20% of a stated value at room temperature (25° C / 77° F) and a nominal input power voltage.

PERFORMANCE CHARACTERISTICS

Input Power

100 – 240 VAC
Mains line frequency range (nominal): 50 – 60 Hz
Power consumption: MAX. 1.1 A~
Fuses (two): T 1.25AH 250V 5 x 20mm (Slow Blow)

Duty Cycle

Under maximum power settings and rated load conditions (Cut, 50 watt @ 500 ohm load), the generator is suitable for activation times of 10 seconds on, 30 seconds off for one hour.

The internal temperature of the unit is continuously monitored. If the temperature rises above 75° C, the alarm will sound and output power will be deactivated.

Dimensions and Weight

Width	228 mm (8.98 in.)	**Depth**	105 cm (4.13 in.)
Height	188 mm (7.40 in.)	**Weight**	< 2.26 kg (< 5 lbs)

Operating Parameters

Ambient temperature range	10° to 40° C (50° to 104° F)
Relative humidity	30% to 75%, non-condensing
Atmospheric pressure	70kPa to 106kPa
Warm-up time	If transported or stored at temperatures outside the operating temperature range, allow one hour for the generator to reach room temperature before use.

Transport

Ambient temperature range	-40° to +70° C
Relative humidity	10% to 100%, including condensation
Atmospheric pressure	50kPa to 106kPa

Storage

Ambient temperature range	10° to 30° C (68° to 86° F)
Relative humidity	10% to 75%, non-condensing
Atmospheric pressure	50kPa to 106kPa

Audio Volume

The audio levels stated below are for activation tones (bipolar, cut and coag) and alarm tones (return electrode and system alarms) at a distance of one meter. Alarm tones meet the requirements for IEC 60601-2-2.

Activation Tone

Volume (adjustable)	40 to > 65 dBa
Frequency	Cut: 610 Hz ± 25 Hz Blend: 610 Hz ± 25 Hz Fulguration: 910 Hz ± 25 Hz Micro Bipolar: 910 Hz ± 25 Hz Bipolar: 910 Hz ± 25 Hz
Duration	Continuous while the generator is activated

Alarm Tone

Volume (not adjustable)	> 65 dBa at a distance of one meter
Frequency	2.44 kHz / 490 ms / 1.22 kHz / 490 ms

Return Electrode Sensing

The system presents audible and visible alarms when it senses no return electrode.

Single Plate	Trip resistance: 0 Ω to 8 Ω ± 1 Ω Continuous measurement: Once the system establishes the single-plate electrode resistance, an increase of 20 Ω ± 2 Ω in resistance will cause an alarm. When the alarm condition exists, the system deactivates output power.
Split Plate	Trip resistance: 10 Ω ± 1 Ω to 135 Ω ± 2 Ω Continuous measurement: Once the system establishes the split-plate electrode resistance, an increase of (35 ± 5)% in resistance will cause an alarm. When the alarm condition exists, the system deactivates output power.

Low Frequency (50-60 Hz) Leakage Current

Enclosure source current, ground open	< 500 µA 220 - 240 VAC
	< 300 µA 90 - 120 VAC
Source current, patient leads, all outputs	Normal polarity, intact ground: < 10 µA Normal polarity, ground open: < 50 µA Reverse polarity, ground open: < 50 µA
Sink current at high line, all inputs	< 50 µA

High Frequency (RF) Leakage Current

Bipolar RF leakage current	< 44 mA $_{rms}$
Monopolar RF leakage current (additional tolerance)	< 150 mA $_{rms}$

Operating Conditions
RF energy is generated and passed through an interconnecting cable to an accessory where the energy is delivered to cut, coagulate and ablate tissue.

STANDARDS AND IEC CLASSIFICATIONS

Class I Equipment (IEC 60601-1)
Accessible conductive parts cannot become live in the event of a basic insulation failure because of the way in which they are connected to the protective earth conductor.

Type BF Equipment (IEC 60601-1)

The DERM &A952 series provide a high degree of protection against electric shock, particularly regarding allowable leakage currents. It is type BF equipment.

Ingress Protection Rating (EN 60529)
This equipment is rated IPX0. It is protected against spillage (EN 60601-2-2), i.e the generator enclosure is constructed so that liquid spillage in normal use does not wet electrical insulation or other components which, when wet, are likely to affect adversely the safety of the generator.

Electromagnetic Interference
When other equipment is placed on or beneath an activated DERM & A952 series generator, the unit can be activated without interference. The generator minimizes electromagnetic interference to video equipment used in the operating room.

Electromagnetic Compatibility (IEC 60601-1-2 and IEC 60601-2-2)
The DERM & A952 series of generators complies with the appropriate IEC 60601-1-2 and IEC 60601-2-2 specifications regarding electromagnetic compatibility.

Voltage Transients (Emergency Generator Mains Transfer)
The DERM & A952 series of generators operates in a safe manner when the transfer is made between line AC and an emergency generator voltage source.

EMC COMPLIANCE

Special precautions should be taken regarding the DERM and A952. Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in this manual.

WARNINGS:
Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and other equipment should be observed to verify that they are operating normally.
Use of accessories and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.
Portable RF communications (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the DERM and A952, including cables specified by Aspen Surgical Products. Otherwise, degradation of the performance of DERM and A952 could result.

Understand that only the Accessories supplied with or ordered from Aspen Surgical Products should be used with your device. The use of accessories, transducers, and cables other than those specified, may result in increased Emissions or decreased Immunity of the DERM and A952. The DERM and A952 and its accessories are not suitable for interconnection with other equipment.

The DERM and A952 is suitable for use in all establishments other than domestic and those directly connected to the public low voltage power supply network that supplies buildings used in domestic purposes.

For the purposes of EN60601-1-2, the DERM and A952 has the following essential performance: There shall be no increase in HF power or change in HF operating modes.

If an ESD event occurs the generator may fault into a safe mode and display an error code. In this event output power is disabled. To clear the error code, reset the generator by turning power off and then on.

The DERM and A952 must emit electromagnetic energy in order to perform its intended function. Nearby electronic equipment may be affected.

The DERM and A952 is intended for use in the electromagnetic environment listed below. The customer or the user of the should assure that it is used in such an environment. - electromagnetic emissions

Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF Emissions CISPR 11	Group 2	The DERM and A952 must emit electromagnetic energy in order to perform its intended function. Nearby electronic equipment may be affected.
RF Emissions CISPR 11	Class A	The DERM and A952 is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used in domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

The DERM and A952 is intended for use in the electromagnetic environment listed below. The customer or the user of the DERM and A952 should assure that it is used in such an environment. - electromagnetic immunity

Immunity Test	Compliance Test Level
IEC 61000-4-2, Electro-Static Discharge	8kV Contact 15kV Air
IEC 61000-4-3, Radiated Immunity	10V/m 80MHz – 1000MHz 10V/m 1.4GHz – 2.7GHz(1)
IEC 61000-4-4, Electric Fast Transients Immunity IEC 61000-3-2	2kV, AC Mains
IEC 61000-4-5, Surge Immunity	1kV Line-Line 2kV Line-PE
IEC 61000-4-6, Conducted Immunity	6Vrms, 150kHz – 30MHz
RIEC 61000-4-8, Power Frequency Magnetic Field Immunity	30A/m, 50 and 60Hz
IEC 61000-4-11, Voltage Dips & Interruptions	<5 % UT (>95 % dip in UT) for 0,5 cycle and 1.0 cycle 70 % UT (30 % dip in UT) for 25/30 cycles <5 % UT (>95 % dip in UT) for 250/300 cycles

NOTICE:
For the purposes of EN60601-1-2 the DERM & A952 series has an essential performance which is that there shall be no component failure, change in operating mode or false alarm, the delivered power shall remain within +/-20% of the set power and there shall be no reset or interruption of the HF power unless this is clearly indicated on the product.

OUTPUT CHARACTERISTICS

Maximum Output for Monopolar and Bipolar Modes for the A952 Series

Power readouts agree with actual power into rated load to within 20% or 5 watts, whichever is greater..

Mode	Output Power	Output Frequency	Repetition Rate	Open Circuit Vpeak max	Crest Factor* (@ 800 Ω)
Cut	50 W @ 500 Ω	343 kHz ± 10%	N / A	1600V	2.2 ± 20%
Blend	50 W @ 800 Ω	368 kHz ± 10%	46 kHz ± 10%	2100V	3.5 ± 20%
Coagulation	50 W @ 1000 Ω	340 kHz ± 10%	49 kHz ± 10%	2900V	5.2 ± 20%
Fulguration	40 W @ 1000 Ω	410 kHz ± 20%	21 kHz ± 10%	6300V	9.5 ± 20%
Bipolar	40 W @ 200 Ω	368 kHz ± 10%	37 kHz ± 10%	950V	5.5 ± 20%
Micro Bipolar	40 W @ 50 Ω	338 kHz ± 10%	N / A	300V	2.6 ± 20%

* an indication of a waveform's ability to coagulate bleeders without a cutting effect

Maximum Output for Monopolar and Bipolar Modes for the A942 Series

Power readouts agree with actual power into rated load to within 20% or 5 watts, whichever is greater.

Mode	Output Power	Output Frequency	Repetition Rate	Open Circuit Vpeak max	Crest Factor* at rated load
Fulguration	40 W @ 1000 Ω	410 kHz ± 20%	21 kHz ± 10%	6300V	9.5 ± 20%
Bipolar	40 W @ 200 Ω	368 kHz ± 10%	37 kHz ± 10%	950V	5.5 ± 20%

* An indication of a waveform's ability to coagulate bleeders without a cutting effect

OUTPUT POWER CURVES

Figure 3–1 through 3–4 illustrates output voltage (Vpeak) versus power setting. Figure 3–5 illustrates output power versus power setting for all modes. Figures 3–6 through 3–11 illustrate specific output power delivered to a range of load resistances for each mode. Figures 3–12 through 3–19 illustrate outpur wavefrms as viewed on an oscilloscope.

Figure 3 – 1. A952 - Output voltage (Vpeak) vs. power setting (Monopolar)

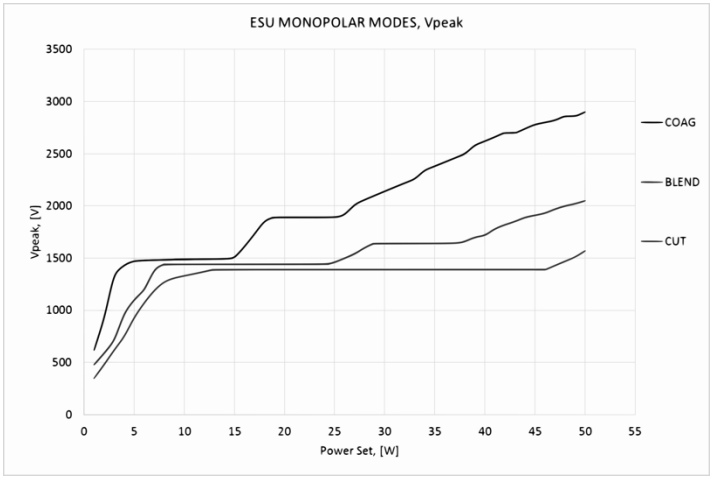


Figure 3 – 2. Series - Output voltage (Vpeak) vs. power setting (Fulguration)

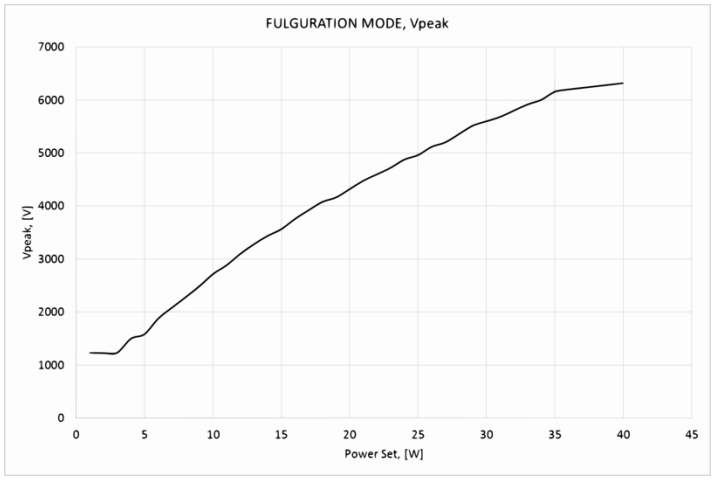


Figure 3 – 3. Series - Output voltage (Vpeak) vs. power setting (Bipolar)

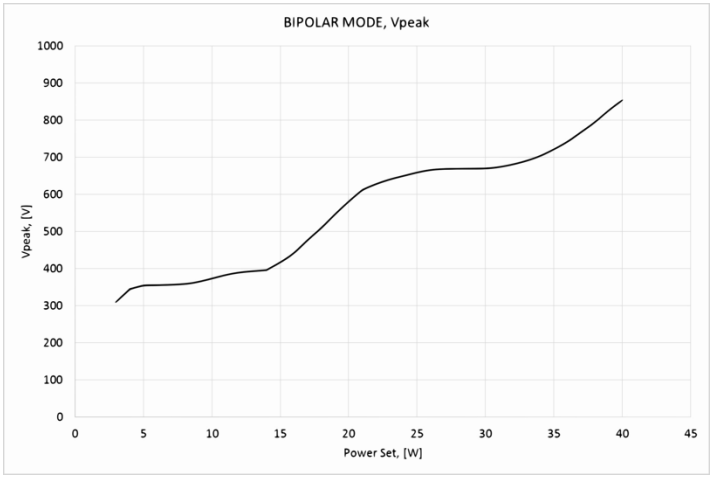


Figure 3 – 4. A952 - Output voltage (Vpeak) vs. power setting (Micro Bipolar)

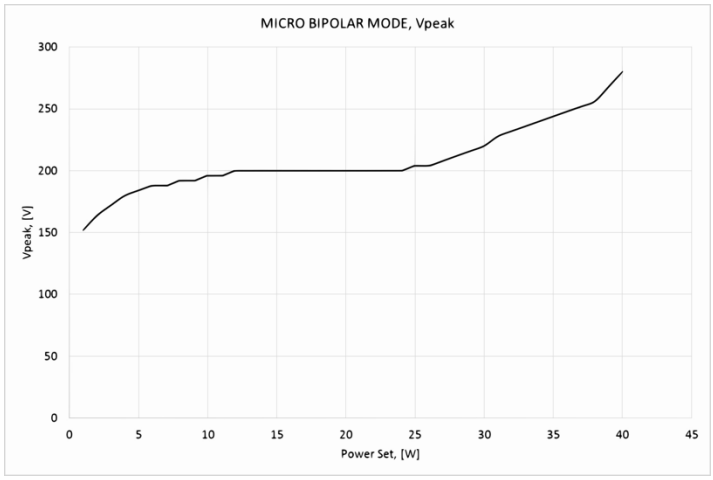


Figure 3 – 5. Series - Output power versus power setting at rated load for all modes

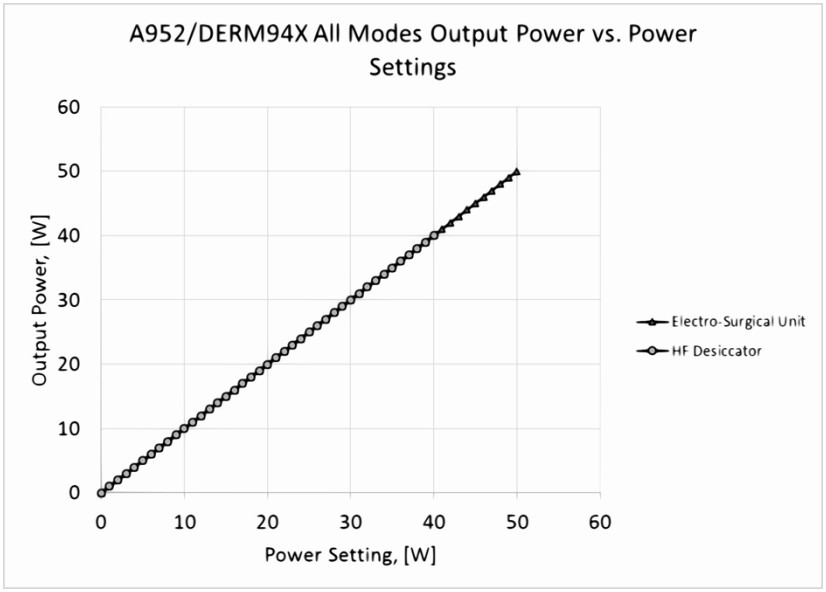


Figure 3 – 6 A952 - Output power vs impedance for Cut mode

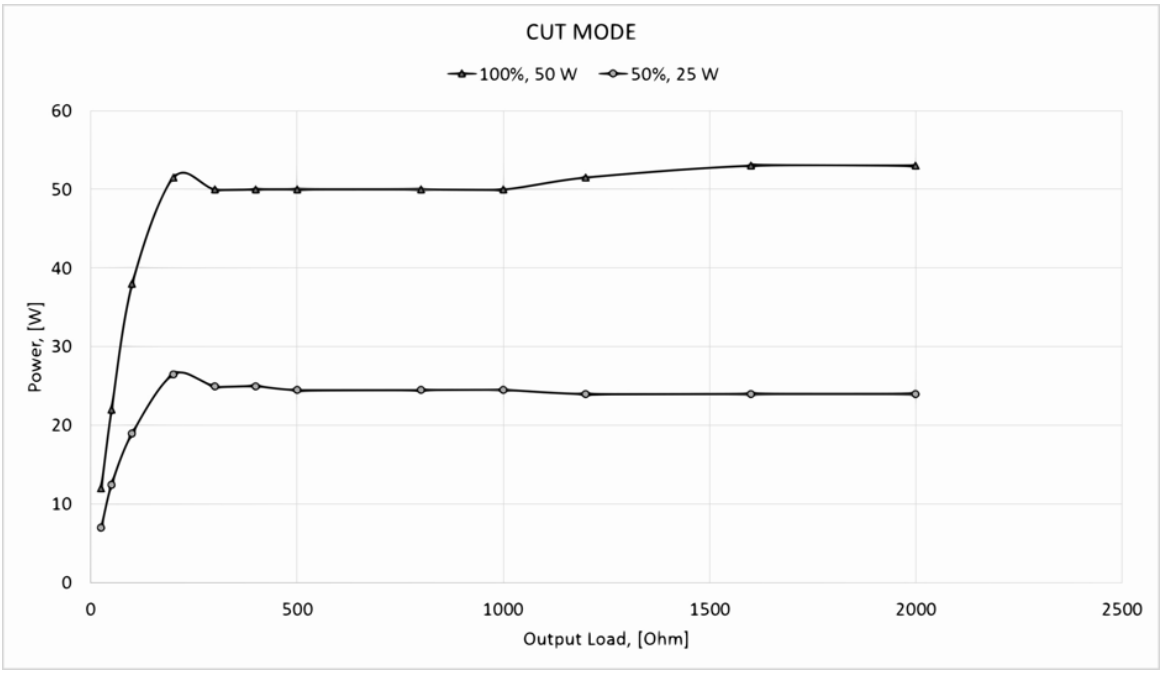


Figure 3 – 7 A952 - Output power vs impedance for Blend mode

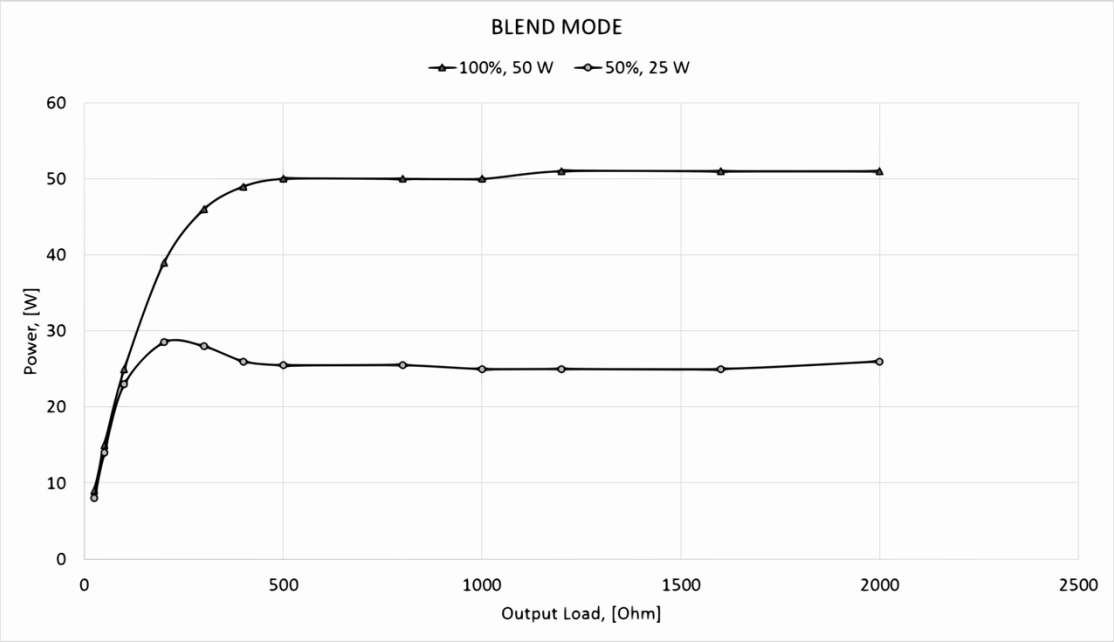


Figure 3 – 8 A952 - Output power versus impedance for Coagulation modes

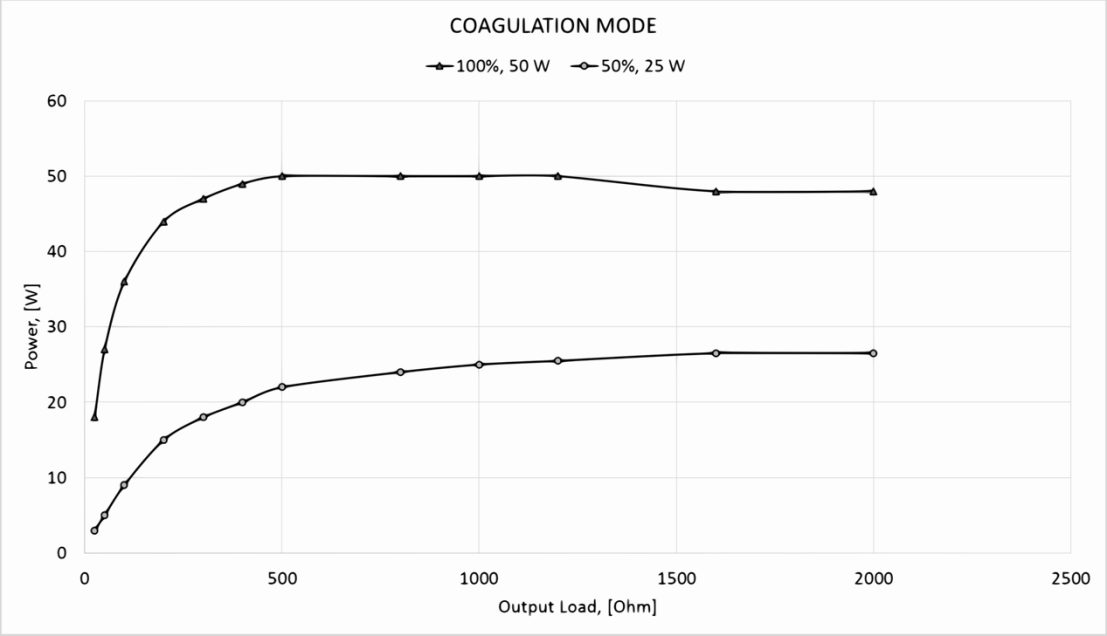


Figure 3 – 9 Series - Output power versus impedance for Fulguration mode

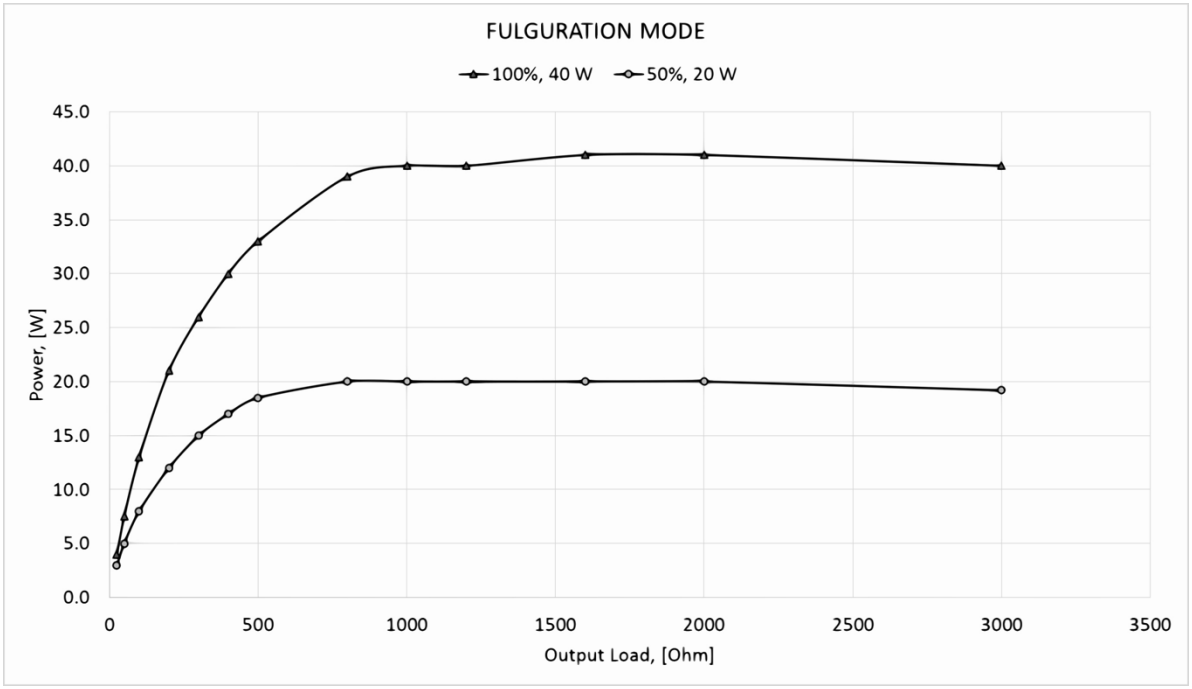


Figure 3 – 10. Series - Output power vs impedance for Bipolar mode

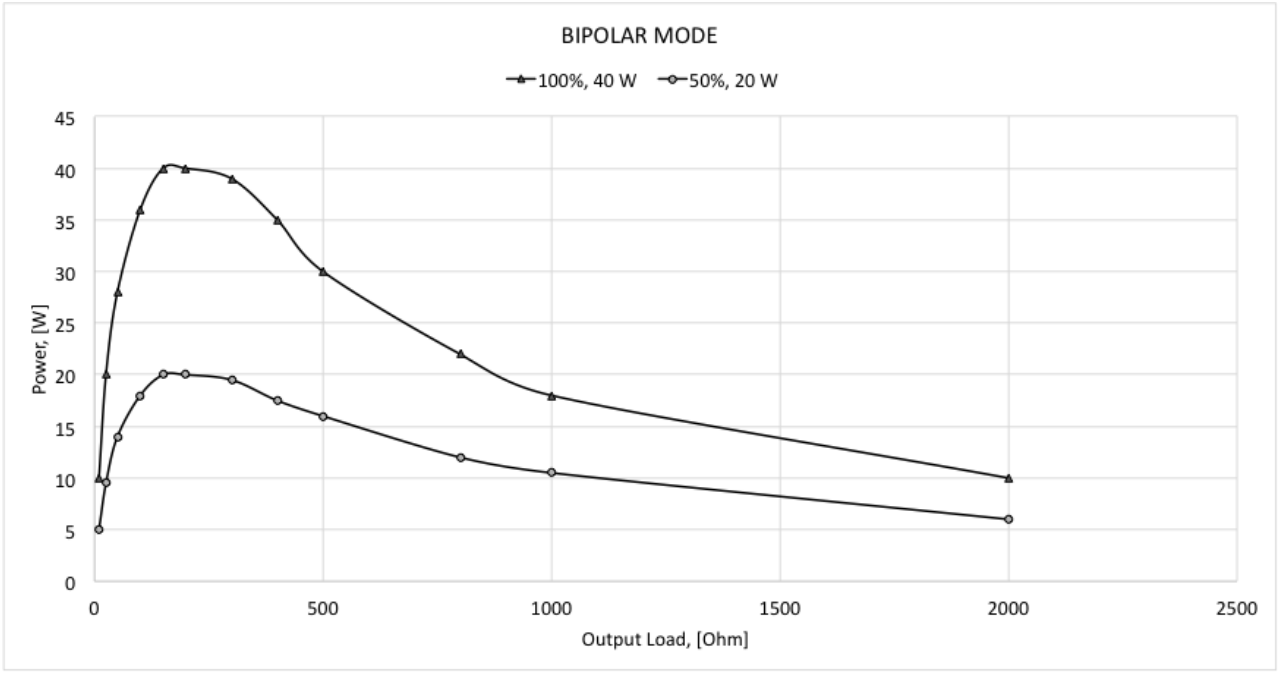


Figure 3 – 11. A952 - Output power vs impedance for Micro Bipolar mode

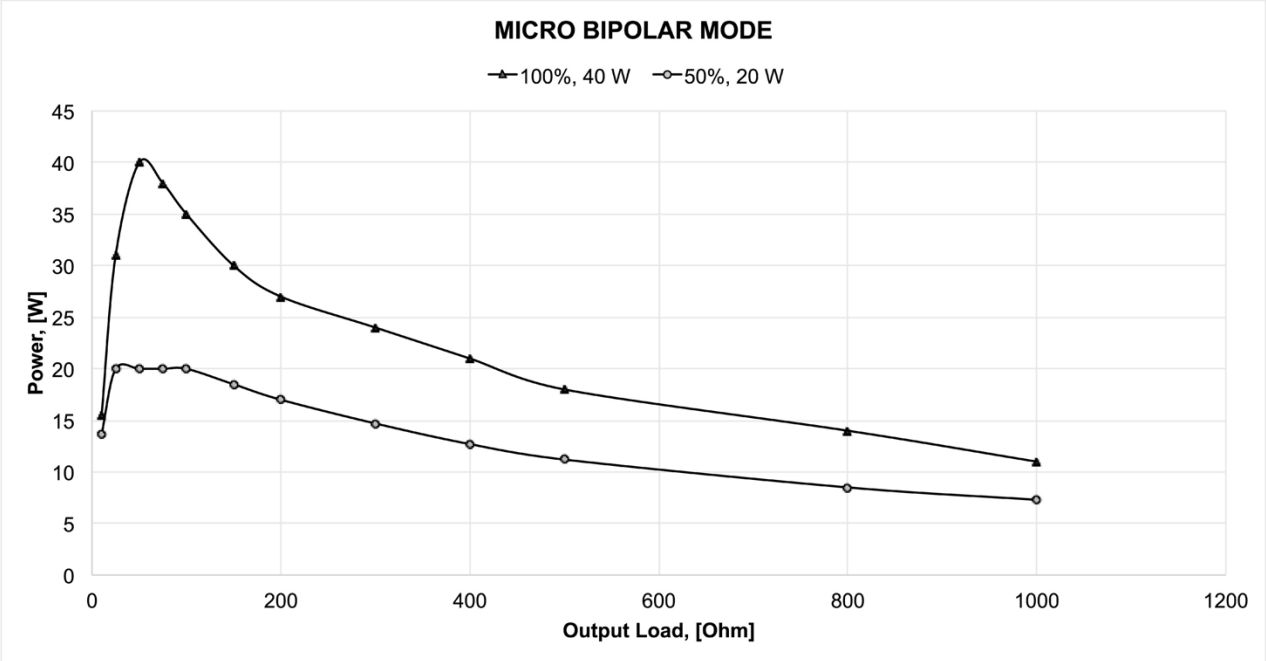


Figure 3 – 12. A952 - Waveform @500 Ohm, 50W

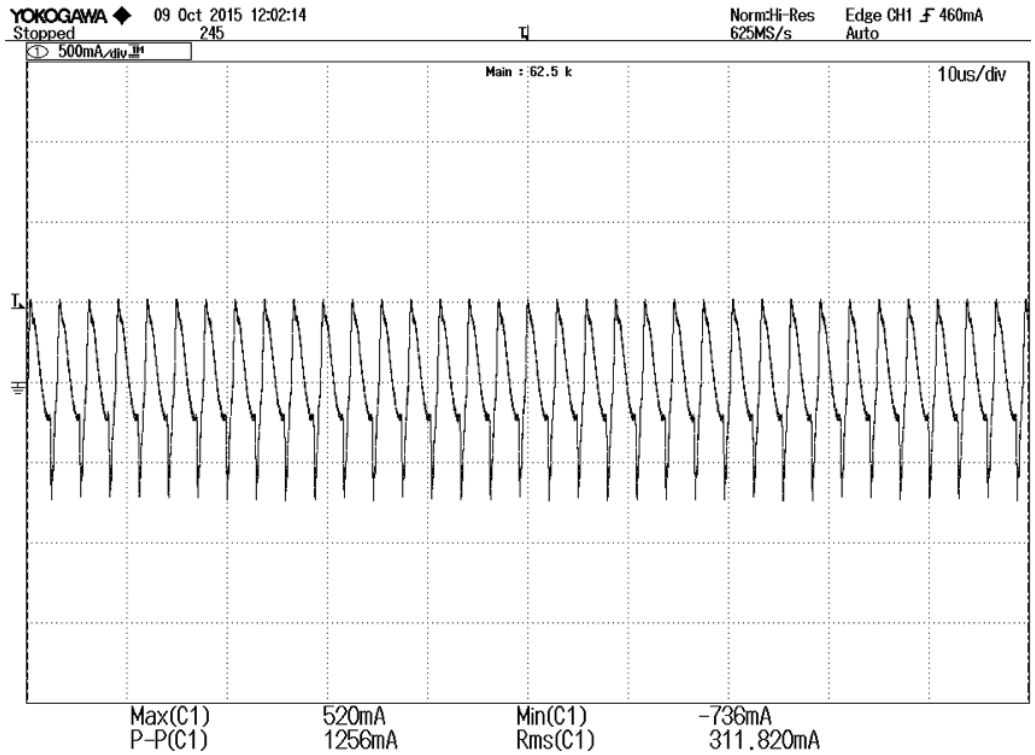


Figure 3 – 13. A952 - Blend Waveform @800 Ohm, 50W

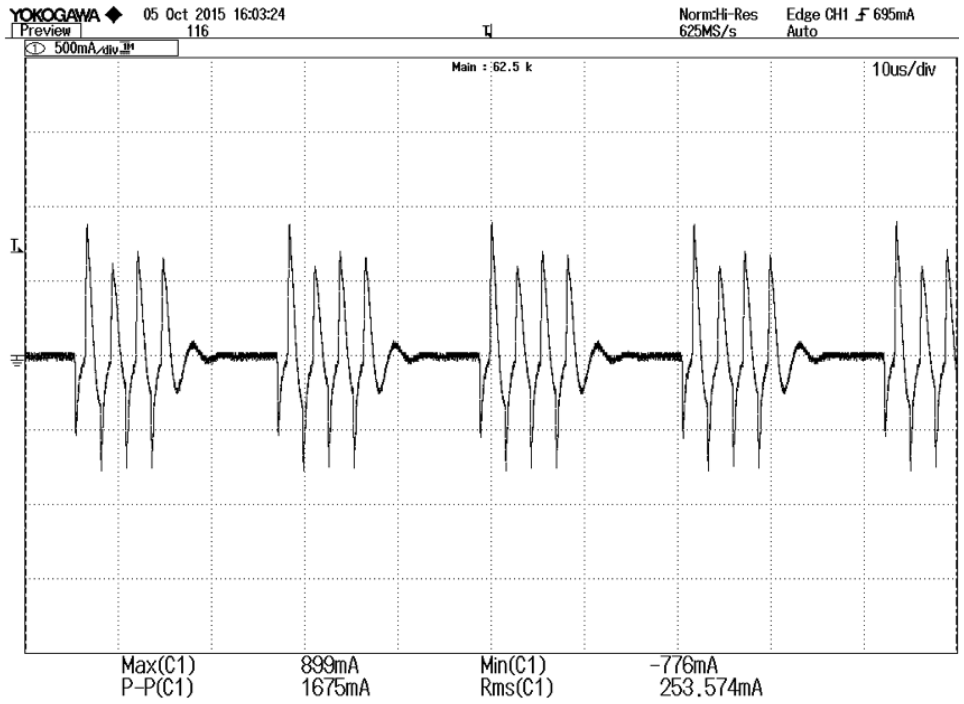


Figure 3 – 14. A952 - Coagulation Waveform @1000 Ohm, 50W

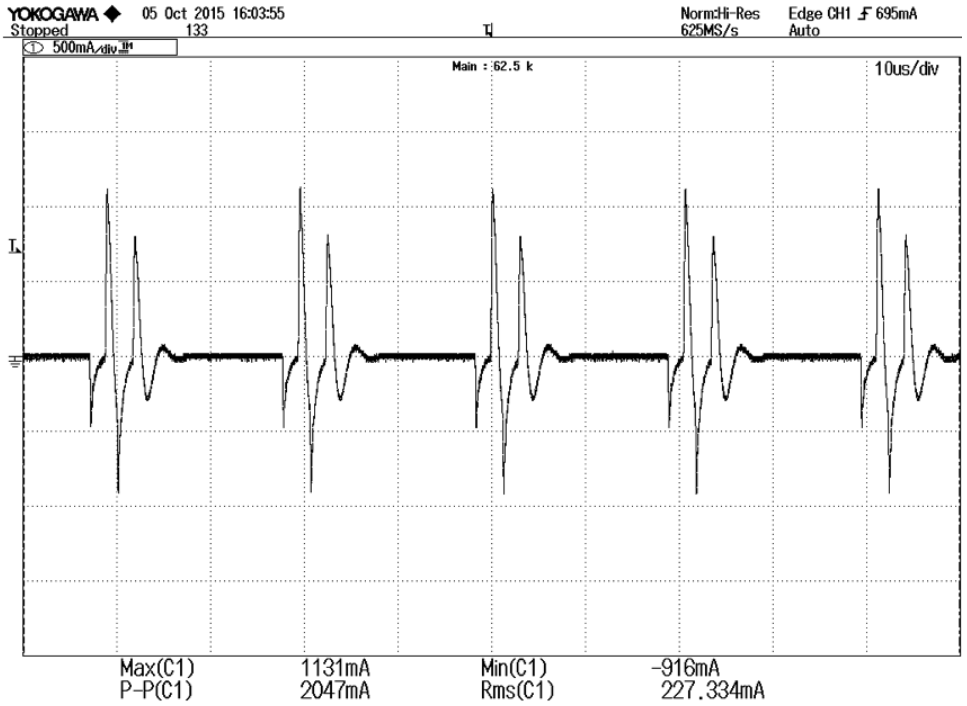


Figure 3 – 15. A952 - Micro Bipolar Waveform @50 Ohm, 40W

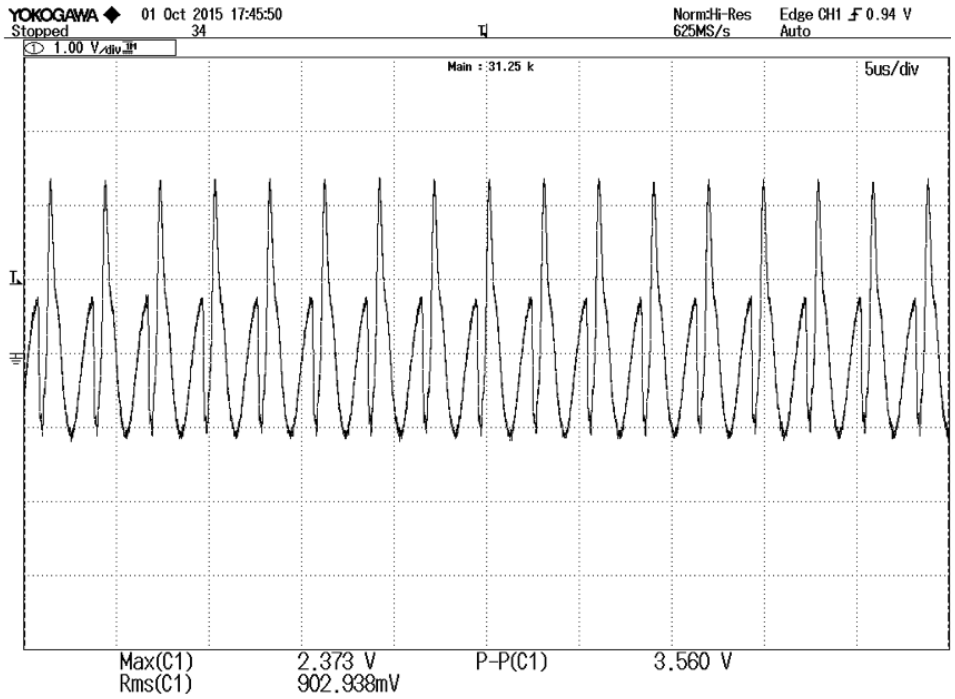


Figure 3 – 16. Series - Monopolar Fulguration Waveform @1000 Ohm, 40W

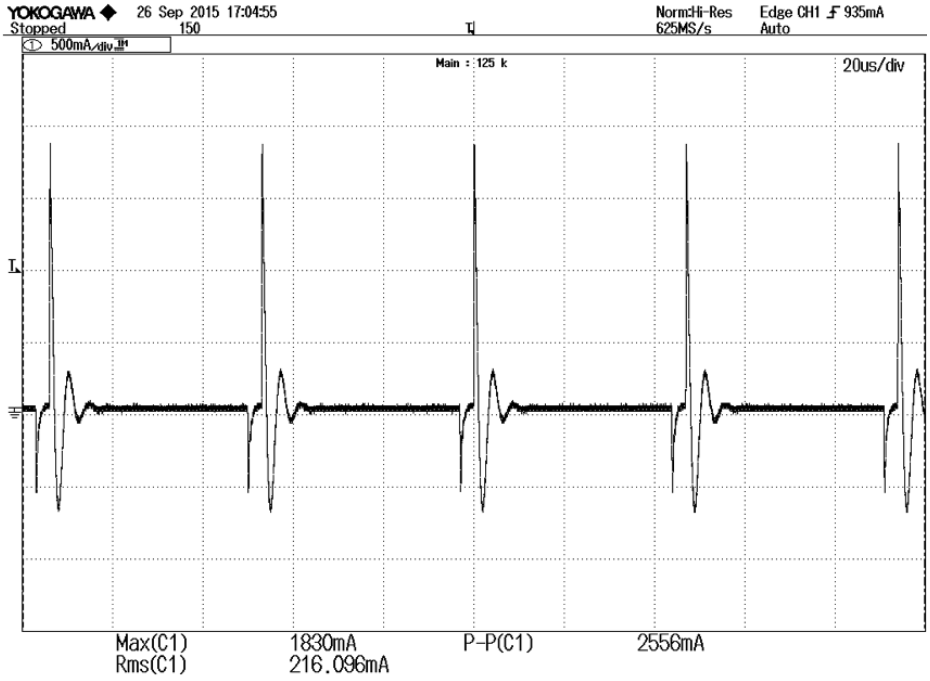


Figure 3 – 17. Monopolar Fulguration RF Frequency Measurement

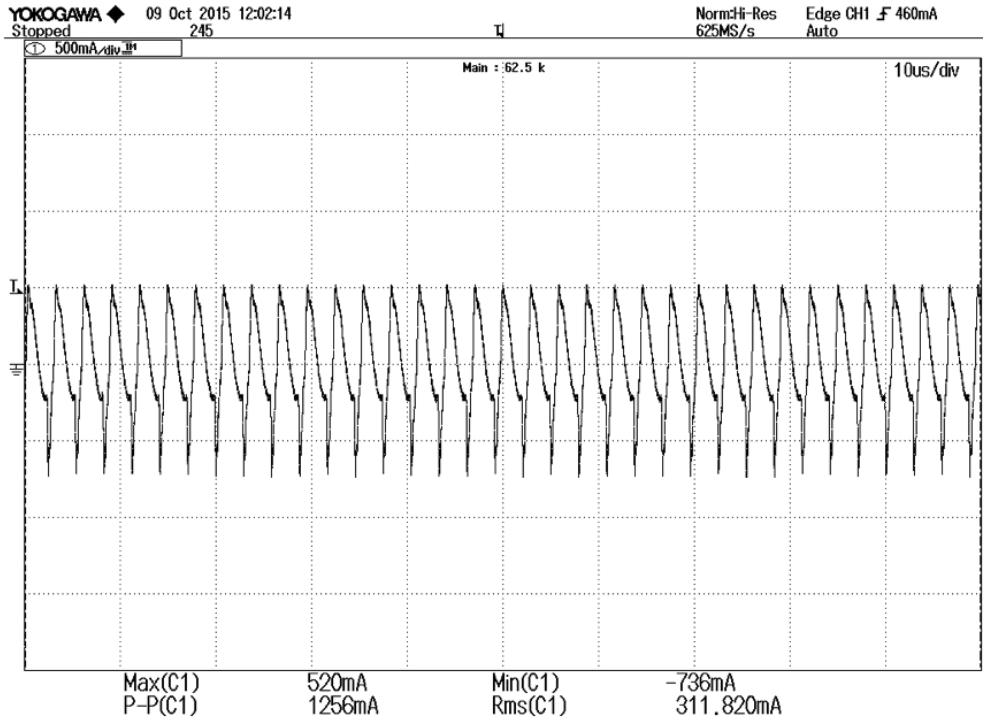


Figure 3 – 18. Series - Bipolar Waveform @200 Ohm, 40W

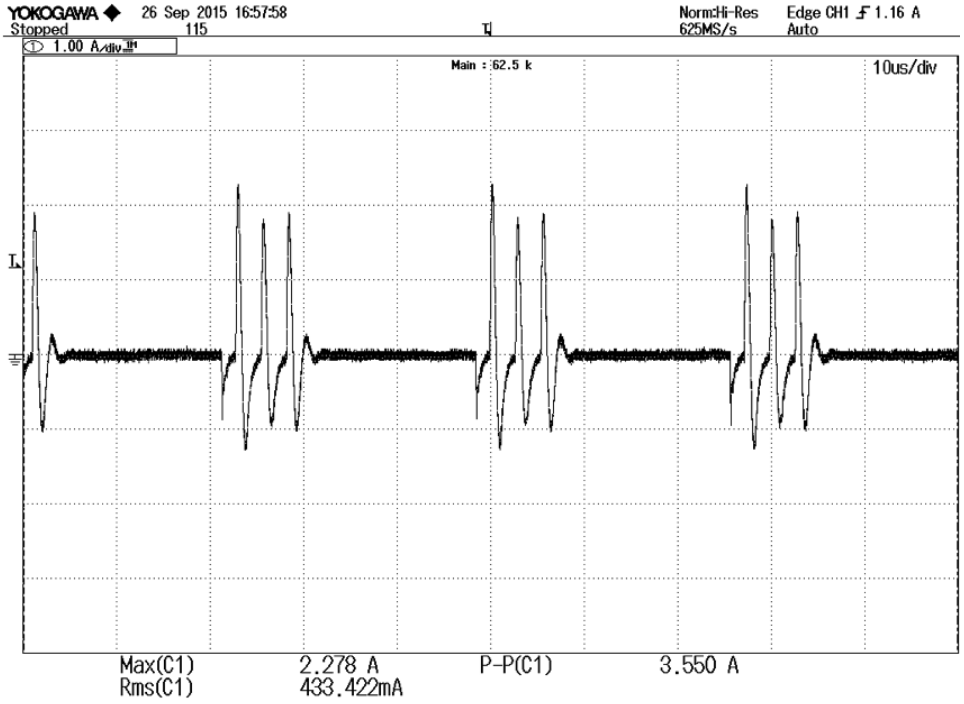


Figure 3 – 19. Series - Desiccator Monopolar Fulguration RF Frequency Measurement

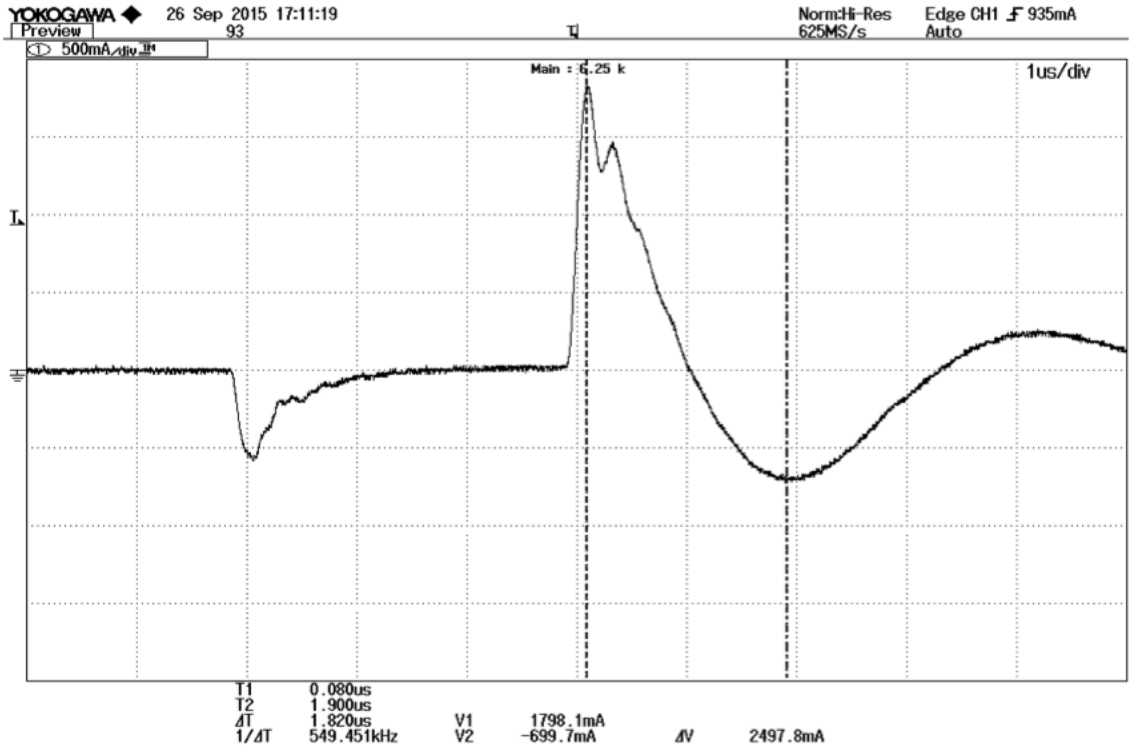
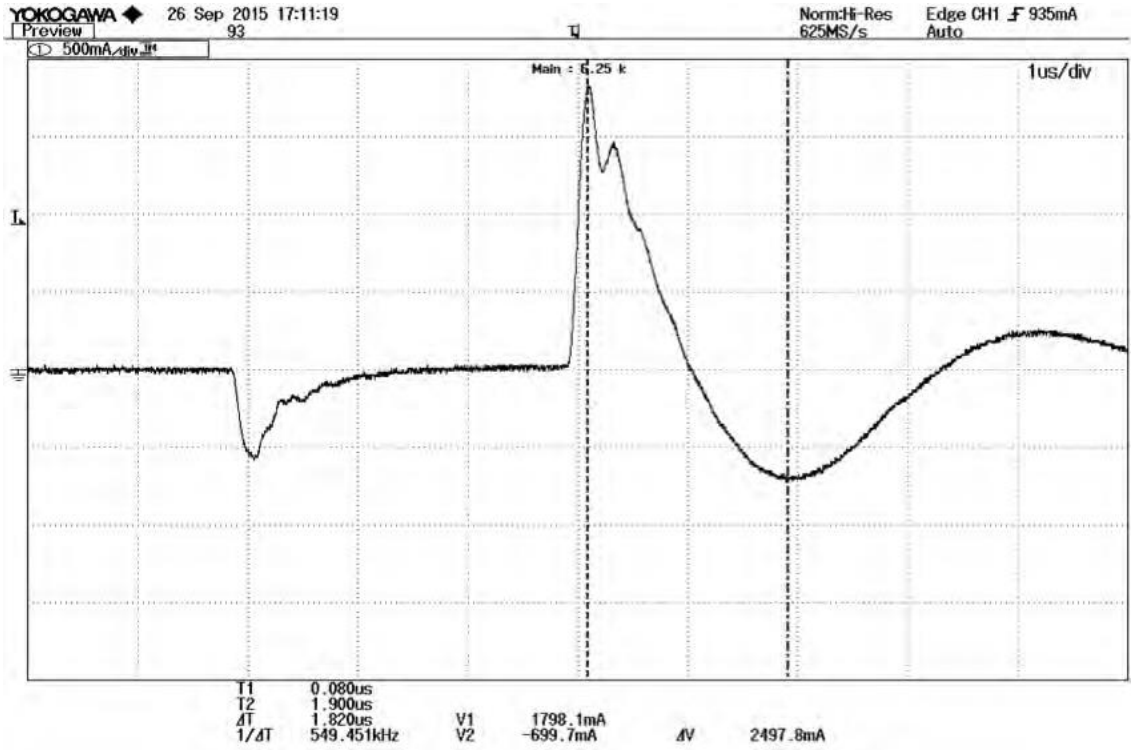


Figure 3 – 19. Series - Desiccator Monopolar Fulguration RF Frequency Measurement



THEORY OF OPERATION

This section includes the following information:

- Block Diagram
- Functional Overview of Key Circuits
- System Logic
- Bantam Pro Control Signal Inputs and Outputs

BLOCK DIAGRAM

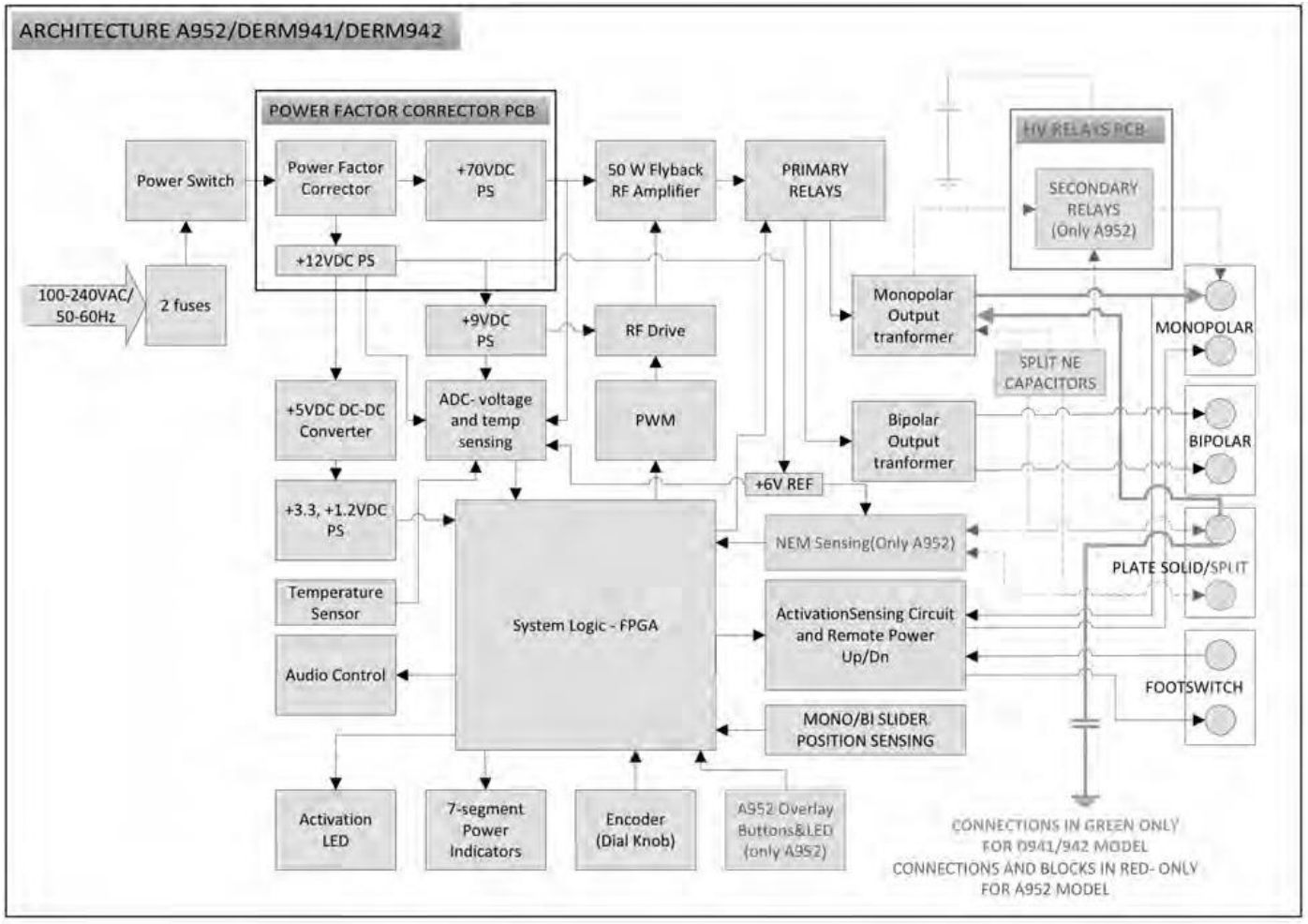


Figure 4 – 1 Functional block diagram of the Bantam Pro and DERM 942 systems

FUNCTIONAL OVERVIEW OF KEY CIRCUITS

The following descriptions highlight the main circuits in the Bantam Pro and DERM 942.

Power Factor Correction Circuit (PFC)

The Power Factor Correction Circuit ensures higher power factor of the unit. The circuit is used to actively correct the power factor of the unit. The PFC also works with mains universal power supply input of 100 to 240 volts.

+70V DC Power Supply

The PFC output voltage is used to generate the RF output power. The power supply delivers a regulated DC output for the RF output. The nominal DC voltage is 69VDC ± 3V. All other DC voltages are derived from this power supply. The PFC is a separate PCB module.

• The +9 VDC circuit supplies power for the activation circuit, the audio circuit, the 7-segment display and Blue Activation LED, and the RF drive circuit. This circuit turns on and off the power MOSFETS for the RF output power.

• The +3.3 VDC and +1.2 VDC circuit supplies power for the logic system, and all temperature sensors.

• The +12 VDC circuit supplies power for the NEM circuit and primary/secondary relays the audio circuit. and the RF drive circuit. This circuit turns on and off the power MOSFETS for the RF output power.

• The +5 VDC supplies power for the ADC converter.

• The +6VDCref circuit supplies power for the NEM circuit, and is derived from +12VDC .

Monopolar/Bipolar Slider Position Sensing

The unit can recognise whether monopolar or bipolar accessory is plugged-in by sensing the position of the corresponding plug-in slider (monopolar or bipolar). Upon request for activation, if there is not plugged-in accessory in the corresponding output connector, the unit will not power the corresponding output – Monopolar or Bipolar- and will display fault conditions F6 or F7. The circuit does not allow both monopolar and bipolar accessories to be plugged-in at the same time - immediate fault F8 will display.

The recognition circuit is implemented with reflective optocouplers which are emitting constantly a recognition infrared light (typical 930nm) signal. Once the accessory (Monopolar or Bipolar) is plugged-in, the Monopolar or Bipolar slider moves to the desired position, shading the corresponding reflective optocoupler, so the emitting signal is reflected back to optocoupler's receiver.

Audio Control Circuit

The audio control circuit is used by the system logic to generate activation tones and alarm tones. Volume for the activation tones may be adjusted from the back panel of the unit, where the speaker is located.

NOTICE:
Alarm volume cannot be adjusted up or down.

Analog DC & Temperature Sensing Circuit

The unit incorporates an analog-to digital converter (ADC) to continually monitor the power supply voltages for +9 VDC, +12 VDC and+70 VDC . If this voltage is not within limits, the system displays Error Code E2 (+70V), or Error Code E4(+9V), or Error Code E6 (+12V) and disables the RF output. The ADC is also used by the system logic to monitor the internal temperature of the unit. If the temperature rises above 75° C, the system displays an Error Code E5 and disables the RF output.

Patient Return Electrode Sensing Circuit

The Patient Return Electrode Sensing Module or NEM (neutral electrode monitoring) circuit senses and sends signals to the system logic that displays which type of patient return electrode is attached to the patient.

When you connect a single plate patient return electrode to the unit, the Pad Sensing Module will detect if the resistance is below 25 Ω. If it is, the Bantam Pro and DERM 942will display the green single plate LED on the front of the unit.

When you connect a split plate patient return electrode to a patient, and the Pad Sensing Module detects a resistance between 10 and 135 Ω, then the Bantam Pro and DERM 942will display the green split plate LED on the front of the unit.

The Pad Sensing Module constantly monitors the patient contact quality. If the impedance changes by a specific amount, then the unit will display an alarm, and immediately de-activate the RF output power.

WARNING:

Patient Return Electrode contact quality is only monitored when a split plate patient return electrode is attached to the patient.

50W RF Amplifier Circuit

The RF Amplifier Circuit generates the RF output energy that is delivered to the patient. It is a single-ended, flyback power amplifier incorporating two power MOSFETs, and two step-up transformers - monopolar and bipolar.

The initial RF drive pulse is generated by the digital PWM circuit and the system logic unit. When the RF drive pulse turns the power MOSFETs "ON," current flows from the +70V DC Power Supply through one of the output transformers, depending on which mode the unit is in- monopolar or bipolar, through the clamping diodes, and then through the MOSFETs to high voltage ground.

The energy developed by the "ON" time is stored in an LC tank circuit. When the MOSFETs are OFF the energy is delivered to the patient through the output capacitors. A longer "ON" time develops more energy in the LC tank circuit; therefore, more energy is delivered to the patient.

Overlay Buttons & LED Circuit
The overlay buttons circuit is used to switch the Bantam Pro and DERM 942between each of the four-monopolar modes and two bipolar modes. Selection of the modes is accomplished through the membrane switches on the front panel.

Primary Relays / Secondary Relays
The monopolar / bipolar Primary Relays are controled by the system logic and define which output transformer to use to deliver the RF output to the patient. The Secondary Relays are high voltage relays, used to switch and isolate between different configurations of the secondary windings of the monopolar transformer.

Controls and Indicators
The Bantam Pro and DERM 942 controls and indicators are listed below:

- MEMBRANE SWITCHES Toggle between modes and output power increments.
- DISPLAYS Seven segment displays indicate the output power in watts, or indicate any error or fault condition of the unit.
- MODE INDICATORS Green LEDs indicate the present mode of the unit.
- POWER SWITCH A single pole single throw switch that snaps into the left side of the back panel. This switch supplies the AC mains current to the generator.

Digital PWM Circuit
The Digital Pulse Width Modulation (PWM) Circuit controls the output power of the unit. This digitally controlled signal is used by the system logic to provide a precise signal to the RF drive.

The pulse width is determined by power setting (generated by the user) on the front of the unit.

When a power is selected, the system logic determines what the pulse width needs to be to deliver the requested output.

SYSTEM LOGIC
The system logic uses a Field Programmable Gate Array as the “brain” of the Bantam Pro and DERM 942. This system interprets all of the inputs and delivers the correct corresponding outputs.

Every operation of the unit is controlled from this system.

A System Clock Circuit, composed of an oscillator, provides the basic operating frequency of 20 MHz.

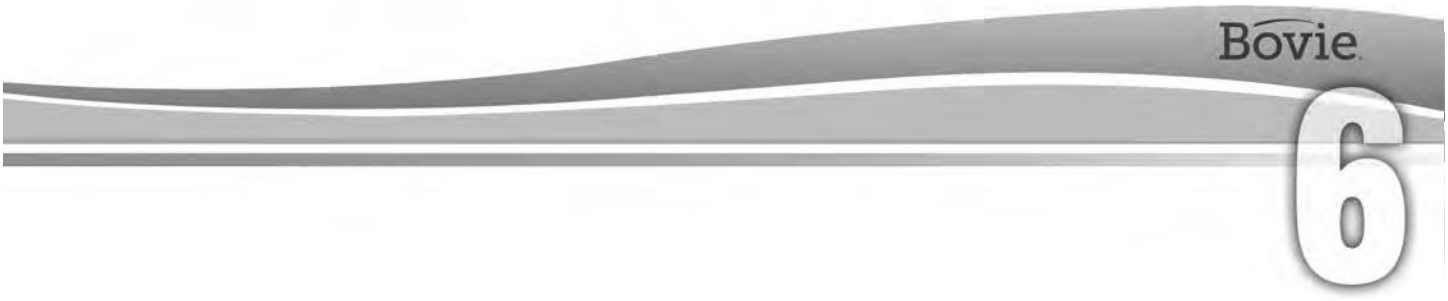
The Reset Circuit provides a single pulse at the time the Bantam Pro and DERM 942 is turned on. This pulse resets the Field Programmable Gate Array to ensure proper operation.

CONTROL SIGNAL INPUTS AND OUTPUTS

The following table lists additional input and output signals. From a troubleshooting standpoint, the absence (and presence) of these signals will help you isolate problems.

SIGNAL	DESCRIPTION	SIGNAL TYPE	PCA LOCATION
MONOPOLAR_ACT	THIS IS THE POWER GENERATOR OUTPUT SIGNAL IN MONOPOLAR MODE THAT IS GOING TO THE MONOPOLAR ACCESSORY	OUTPUT, ANALOG	MAIN BOARD
MONOPOLAR_RET1	THIS IS THE CONNECTION TO THE FIRST ELECTRODE OF THE SPLIT RETURN ELECTRODE THAT IS ATTACHED TO THE PATIENT	INPUT, ANALOG	MAIN BOARD
MONOPOLAR_RET2	THIS IS THE SIGNAL CONNECTION TO THE SECOND ELECTRODE OF THE SPLIT RETURN ELECTRODE	INPUT, ANALOG	MAIN BOARD
BIPOLAR_ACT	THIS IS THE POWER GENERATOR OUTPUT SIGNAL IN BIPOLAR MODE THAT IS GOING TO THE ACTIVE ELECTRODE OF THE BIPOLAR ACCESSORY	OUTPUT, ANALOG	MAIN BOARD
BIPOLAR_RET	THIS IS THE POWER GENERATOR OUTPUT SIGNAL IN BIPOLAR MODE THAT IS GOING TO THE RETURN ELECTRODE OF THE BIPOLAR ACCESSORY	INPUT, ANALOG	MAIN BOARD
FSW_SWITCH	THIS IS THE SIGNAL CONNECTED TO THE FOOTSWITCH LINE	INPUT, ANALOG	MAIN BOARD
HNDL_SWITCH	THIS IS THE SIGNAL CONNECTED TO THE HANDLE SWITCHES LINE	INPUT, ANALOG	MAIN BOARD
RF_DRIVE	THIS IS AN OUTPUT SIGNAL FROM THE DIGITAL PWM CIRCUIT THAT CONTROLS THE PULSE WIDTH DURATION FOR THE RF DRIVE.	OUTPUT, DIGITAL	MAIN BOARD
RF_DRIVE_EN	THIS IS AN OUTPUT SIGNAL FROM THE SYSTEM LOGIC THAT ENABLES/DISABLES THE RF DRIVER CIRCUIT.	OUTPUT, DIGITAL	MAIN BOARD
RQST_RECG	RECOGNITION REQUEST FROM THE ACTIVATION/ POWER UP/POWER DOWN CIRCUIT. THE SYSTEM LOGIC DEFINES WHAT IS THE REQUEST (FOR ACTIVATION, FOR POWER UP OR POWER DOWN) AFTER ANALYSING THE DUTY CYCLE OF THIS SIGNAL	INPUT, DIGITAL	MAIN BOARD
HI/LO PWR	THIS IS A SIGNAL THAT CONTROLS WHICH POWER SUPPLY VOLTAGE TO USE FOR THE POWER GENERATOR - 70V OR 12V. 12V IS USED ONLY FOR POWER LEVELS BELOW 1W IN FULGURATION MODE AND BIPOLAR MODE.	OUTPUT, DIGITAL	MAIN BOARD
MONO/BI	THIS IS A SIGNAL THAT CONTROLS WHICH POWER TRANSFORMER TO USE WITH THE SINGLE-ENDED FLYBACK POWER GENERATOR BASED ON THE USER SELECTION- WHETHER IT WORKS IN MONOPOLAR OR BIPOLAR MODE (ONLY FOR A952/DERM942)	OUTPUT, DIGITAL	MAIN BOARD
MONO_PLUGGED	THIS IS SIGNAL THAT IS ACTIVE WHEN MONOPOLAR ACCESSORY IS PLUGGED-IN AND IS USED FOR ACCESSORY RECOGNITION	INPUT, DIGITAL	MAIN BOARD
BI_PLUGGED	THIS IS SIGNAL THAT IS ACTIVE WHEN MONOPOLAR ACCESSORY IS PLUGGED-IN AND IS USED FOR ACCESSORY RECOGNITION	INPUT, DIGITAL	MAIN BOARD
FULG_RLY (A952 Only)	THIS IS A SIGNAL THAT CONTROLS THE FULGURATION MODE RELAY WHEN THE SELECTED MODE IS FULGURATION MODE (MONOPOLAR)	OUTPUT, DIGITAL	MAIN BOARD, RELAY BOARD
CUT_RLY (A952 Only)	THIS IS A SIGNAL THAT CONTROLS THE CUT MODE RELAY WHEN THE SELECTED MODE IS CUT MODE (MONOPOLAR)	OUTPUT, DIGITAL	MAIN BOARD, RELAY BOARD
GNDREF_RLY A952 Only)	THIS IS A SIGNAL THAT MAKES THE OUTPUT AC GROUND-REFERENCED - ONLY IN FULGURATION MODE, ALLOWS THE USER TO WORK WITHOUT RETURN ELECTRODE	OUTPUT, DIGITAL	MAIN BOARD
RLY _CABLE_CHECK	THIS SIGNAL CHECKS THE PRESENCE OF THE CABLE CONNECTION BETWEEN MAIN BOARD AND RELAY BOARD	INPUT, DIGITAL	MAIN BOARD, RELAY BOARD
ENCODER1_REQ	THIS IS A SIGNAL THAT IS COMING FROM THE DIAL ENCODER WHEN THE USER IS INCREASING THE POWER SETTING	INPUT, DIGITAL	MAIN BOARD
ENCODER2_REQ	THIS IS A SIGNAL THAT IS COMING FROM THE DIAL ENCODER WHEN THE USER IS DECREASING THE POWER SETTING	INPUT, DIGITAL	MAIN BOARD
SPKR_DRV1	THIS IS A SIGNAL THAT CONTROLS THE SPEAKER DURING ACTIVATION MODE	OUTPUT, DIGITAL	MAIN BOARD
SPKR_DRV2	THIS IS A SIGNAL THAT CONTROLS THE SPEAKER DURING ERROR CONDITIONS AND FAULT CONDITIONS (DURING ALARM THE VOLUME IS AT MAXIMUM)	OUTPUT, DIGITAL	MAIN BOARD

SIGNAL	DESCRIPTION	SIGNAL TYPE	PCA LOCATION
VOL_CNTRL	THIS SIGNAL IS COMING FROM THE VOLUME SWITCH, LOCATED ON THE BACK PANEL. BASED ON THE CURRENT SWITCH POSITION, THE SYSTEM LOGIC DEFINES HOW TO CONTROL THE SPEAKER - WITH HIGH VOLUME OR LOW VOLUME	INPUT, DIGITAL	MAIN BOARD
NEM_T1 (A952 Only)	THIS IS AN ISOLATED SIGNAL USED IN CONJUNCTION TO NEM_T2 TO MEASURE RETURN ELECTRODE CONTACT IMPEDANCE	PASSIVE, ANALOG	MAIN BOARD
NEM_T2 (A952 Only)	THIS IS AN ISOLATED SIGNAL USED IN CONJUNCTION TO NEM_T1 TO MEASURE RETURN ELECTRODE CONTACT IMPEDANCE	PASSIVE, ANALOG	MAIN BOARD



MAINTAINENCE

This section covers the following topics:

- Cleaning
- Periodic Inspection
- Servicing and Repair

Aspen Surgical Products recommends that you complete periodic inspection and performance testing. Perform inspections and performance testing every six months. A qualified biomedical technician should conduct this testing to ensure that the unit is operating effectively and safely. After the unit has passed the preliminary functional test, it is ready for performance testing. A qualified biomedical engineer who is thoroughly familiar with electrosurgical devices should conduct this testing. The testing should include checking all modes of operation for proper function and power output.

NOTICE:
The units are a programmable electrical medical system (PEMS). The firmware revision level of the ESU can be located on a label inside the unit by the responsible Service personnel.

CLEANING THE UNIT

After each use, clean the unit.

WARNING:

Electric Shock Hazard - Always turn off and unplug the generator before cleaning.

NOTICE:
Do not clean the unit with abrasive cleaning or disinfectant compounds, solvents, or other materials that could scratch the panels or damage the generator.

1. Turn off the unit and unplug the power cord from the wall outlet.
2. Thoroughly wipe all surfaces of the unit and power cord with a mild cleaning solution or disinfectant and a damp cloth. Follow the procedures approved by your institution or use a validated infection control procedure.
   Do not allow fluids to enter the chassis. Do not sterilize the generator.

PERIODIC INSPECTION

Every six months, visually inspect the unit for signs of wear or damage. In particular, look for any of the following problems:

- Damage to the power cord
- Damage to the power cable receptacle
- Obvious damage to the unit
- Damage to any receptacle
- Accumulation of lint or debris in or around the unit

FUSE REPLACEMENT

Fuses for the unit reside directly below the Power Cable Receptacle on the bottom of the unit.

To replace the fuses, follow this procedure:

1. Unplug the power cord from the wall outlet.
2. Remove the power cord from the Power Cable Receptacle on the bottom of the unit.
3. To release the fuse drawer, insert a small flathead screwdriver into the slot on the drawer below the power cord receptacle. Then, slide the drawer out.
4. Remove the two fuses (T1.25AH, 250V) and replace them with new fuses with the same values.
5. Insert the fuse holder into the Power Cable Receptacle.

NOTICE:
If the unit does not display an error and does not power on, check fuses.

SERVICING AND REPAIR

It is recommended that all Bovie® parts be returned to an authorized Aspen Surgical Products service center. On request, Aspen Surgical Products will provide circuits diagrams, component part lists, descriptions and instructions to assist service personnel in parts repair.

For warranty and repair work, please contact Aspen Surgical Products and obtain a Return Materials Authorization number (RMA). Place the number so that it can be seen on the exterior of the package and ship per the provided instructions. A return without an RMA may not be accepted.

TROUBLESHOOTING

This section includes error code descriptions and actions to take to resolve them.

RECOMMENDED EQUIPMENT FOR TROUBLESHOOTING

The following equipment enables you to troubleshoot and repair the Bantam Pro and DERM 942:

- Digital multimeter with leads
- Electrosurgical analyzer or a true RMS voltmeter such as a Fluke 8920A
- Wideband current transformer such as a Pearson 4100
- Non-inductive RF load resistors 200 ohms, 1000 ohms
- Oscilloscope (dual channel) at 100 MHz
- Oscilloscope probes, (2) 10X and 1000X
- Bovie footswitch
- Bovie handswitching pencil (single use or reusable)
- Standard technician's tool kit
- Miscellaneous test leads and cables.

TROUBLESHOOTING THE BANTAM PRO AND DERM 942

If the generator is not functioning properly, use the information in this section to perform the following activities:

- Identify and correct the malfunction.
- If an error code was displayed, take the appropriate action(s) to correct the error condition.

Inspecting the Generator

If the Bantam Pro malfunctions, check for obvious conditions that may have caused the problem.

1. Check the generator for visible signs of physical damage.
2. Verify that all accessory cords are properly connected.
3. Check the power cord. Replace the power cord if you find exposed wires, cracks, frayed insulation, or a damaged connector.
4. Remove the back panel and inspect all internal connections.
5. Verify that the fuses are firmly seated and are not blown.
6. You may need to replace the fuses if the generator fails to start up. Refer to Section 6, Maintenance, Replacing Fuses.

Inspecting the Receptacles

Equipment required:

- Footswitch
- Bipolar cable
- Monopolar instruments
- Return electrode cable.

Procedure:

1. Turn off the generator.
2. Disconnect the power cord from the wall receptacle.
3. Check the Footswitch receptacle on the front of the unit for obvious signs of obstruction and damage.
4. Check for a secure fit by inserting the footswitch connector into Footswitch receptacle.
5. Check the Bipolar receptacle on the front of the unit for obstruction or damage.
6. Insert a bipolar cable into the Bipolar receptacle (A952, A942) on the front of the unit. Verify a secure fit.
7. Check the Monopolar handpiece receptacle on the front of the unit for obstruction or damage.
8. Insert a monopolar handpiece into the Monopolar handpiece receptacle on the front of the unit. Verify a secure fit.
9. Check the Patient Plate receptacle on the front of the unit for obstruction or damage.
10. Insert a return electrode cable into the Patient Plate receptacle. Verify a secure fit.

Inspecting Internal Components

CAUTIONS:
The generator contains electrostatic-sensitive (ESS) components. When servicing the generator, work at a static-control workstation.
Wear a grounding strap when handling electrostatic-sensitive components.
Handle circuit boards by their nonconductive edges.
Use an anti-static container for transport of electrostatic-sensitive components and circuit boards.

To inspect the internal components, follow this procedure:

1. Remove the four screws that secure the back panel to the unit.
2. Lift the back off the chassis.
3. Visually inspect and verify that all connectors are firmly seated.
4. Inspect the board for damaged components, wires, cracks and corrosion.
5. Reinstall the back panel by positioning the panel over the enclosure, and securing the four screws.

UNDERSTANDING ERROR / FAULT CODES AND AUDIO TONES

The Bantam Pro and DERM 942includes automatic, perpetual self-diagnostics. If the diagnostics detect an error, the system displays an error code, sounds an audible tone, and deactivates the output power.

Most error codes result from faults in accessories attached to the unit. The following table lists the error codes, describes the error, and recommends actions to take to resolve the error.

All error codes are displayed on the display. If the unit displays any other error code, it requires service. Power off unit and call 888-364-7004.

NOTICE:
If the unit does not power on and nothing is displayed in the Bipolar display, check fuses as described in Section 6 of this guide.

SYSTEM FATAL ERROR MESSAGES

Error messages (E) indicate internal problems with the unit.

Error Code	Description	Recommended Action
E0	Multiple Errors	1. Turn the unit off (for Temperature Error, let unit cool for 20 minutes). 2. Turn the unit on. 3. If the error code reappears, record the number and contact Aspen Surgical Products customer service at 888-364-7004.
E1	Activation Calibration Error	
E2	DC Supply over Voltage Detection on VDD of Power Generator	
E3	Pulse Width	
E4	DC Supply over Voltage Detection on +9VDC	
E5	Temperature Sense Error- Power Generator	
E6	DC Supply over Voltage Detection on +12VDC	
E7 (A952 only)	DC Voltage Reference over Voltage Detection on +6VDC	
E8 (A952 only)	NEM Calibration Error	
E9 (A952 only)	Relay cable is not properly attached	

SYSTEM FAULT CODE MESSAGES

Fault messages (F) indicate improper unit setup or faulty accessories. The following table lists fault codes, their meaning and recommended actions to be taken to resolve the faults. The faults are resettable, i.e it is not necessary to switch unit off and on again to reset the fault condition.

Fault Code	Description	Recommended Action
F1	Activation on Power-Up Fault	1. If the fault code appears, disconnect all accessories. Turn off, then turn on the generator again. 2. If the problem persists, replace the handpiece or footswitchand repeat the restart. 3. If the fault code reappears, record the number and contact Aspen Surgical Products customer service at 888-364-7004.
F2	RF Power-Up Button on Power-Up Fault	
F3	RF Power Down Button on Power-Up Fault	
F4	RF Power Down and UP Buttons Fault	
F5	Duty Cycle On Time Fault	
F6	Monopolar Handle Not Plugged-In Fault	
F7 (A952 & A942 only)	Bipolar Cable Not Plugged-In Fault	
F8	Monopolar and Bipolar Cables Plugged-In	

CORRECTING COMMON PROBLEMS

If a solution is not readily apparent, use the table below to help identify and correct specific malfunctions. After you correct the malfunction, verify that the generator successfully completes the self-test.

Situation	Possible Causes	Recommended Action
Generator does not respond when turned on.	Disconnected power cord, faulty wall receptacle, or faulty power cord	1. Check power cord connections (generator and wall receptacle). 2. Connect the power cord to a functional wall receptacle. If necessary, replace the power cord.
	PFC board malfunction	Replace the PFC board.
	Fuses blown	1. Check fuses. If Necessary, replace fuse(s). 2. If a problem persists, use a backup generator.
	Loose or disconnected internal cables	Check all internal connections.
	Faulty power switch	Replace the power switch.
Generator is on, but will not activate.	An alarm condition exists.	Check the display for an error code. Note the number and refer to Error Code list.
	Loose or disconnected internal cables	Check and correct all internal connections.
	Faulty power switch	Replace the power switch.
	Main board malfunction	Replace the main board.
Activation and / or alarm tones do not sound; speaker is malfunctioning.	Loose or disconnected cable between main board and back panel	Check / connect all connections from the speaker board to the main board.
	Main board malfunction	Check / connect cable from the main board to the back panel.
		Replace the main board.

Situation	Possible Cause	Recommended Action
Blank or confusing LED display	Loose or disconnected internal cables	Check and correct all internal connections.
	Main board malfunction	Replace the main board.
Generator is on and the accessory is activated, but generator does not deliver output.	Malfunctioning footswitch or handswitching instrument	1. Turn off the generator. Check and correct all accessory connections. 2. Turn on the generator. 3. Replace the accessory if it continues to malfunction.
	Power set too low	Increase the power setting.
	An error condition exists	1. Check the display for an error code number. 2. Note the number and refer to the error codes descriptions in this section.
	Main board malfunction	Replace the main board.
	PFC board malfunction	Replace the PFC board.
	RF output stage malfunction	1. Troubleshoot the RF output stage as described below: 2. On the main board, verify output pulses (TP1) during activation. 3. If pulses are not present replace the Main board. Check the power MOSFETs for failure (typically fail as shorted).
	Loose or disconnected internal cables	Check and correct all internal connections.
Footswitch will not activate output.	Malfunctioning or damaged footswitch receptacle	Replace the Footswitch connector assembly.
	Footswitch activation signal lost on main board	Replace the main board.

Situation	Possible Cause	Recommended Action
Pacemaker interference	Intermittent connections or metal-to-metal sparking	1. Check all connections to the generator. 2. It may be necessary to re-program the pacemaker.
	Current traveling from active to return electrode during monopolar Electrosurgery is passing too close to pacemaker.	1. Use bipolar instruments, if possible. If you must use a monopolar instrument, place the patient return electrode as close as possible to the surgical site. 2. Make sure the current path from the surgical site to the patient return electrode does not pass through the vicinity of the heart or the site where the pacemaker is implanted. 3. Always monitor patients with pacemakers during surgery and keep a defibrillator available. 4. Consult the pacemaker manufacturer or hospital. 5. Contact the Cardiology Department for further information when use of electrosurgical appliances is planned on patients with cardiac pacemakers.
Abnormal neuromuscular stimulation (stop surgery immediately)	Metal-to-metal sparking	Check all connections to the generator, patient return electrode, and active electrodes.
	Can occur during coag	Use a lower power setting for Coag.
	Abnormal 50 Hz - 60 Hz leakage currents	Inside the generator, carefully inspect for damage that may cause shorting between the AC line voltage and connected patient components.

MAIN BOARD TEST POINTS

Test Point	DESCRIPTION	PCA	Location on PCA
TP1	POWER GENERATOR MOSFETS DRAINS	MAIN BOARD	TOP/BOTTOM SIDE
TP2	POWER GENERATOR GROUND	MAIN BOARD	TOP SIDE ONLY
TP3	RF DRIVER SIGNAL	MAIN BOARD	TOP/BOTTOM SIDE
TP4	NOT USED	N/A	N/A
TP5	NOT USED	N/A	N/A
TP6	NOT USED	N/A	N/A
TP7	VDDP (+70V) POWER SUPPLY – POWER GENERATOR (FILTERED)	MAIN BOARD	TOP SIDE ONLY
TP8	+5V DC POWER SUPPLY	MAIN BOARD	TOP/BOTTOM SIDE
TP9	+3.3V DC POWER SUPPLY	MAIN BOARD	TOP/BOTTOM SIDE
TP10	1.2V_FPGA DC POWER SUPPLY	MAIN BOARD	TOP/BOTTOM SIDE
TP11	+12V DC POWER SUPPLY	MAIN BOARD	TOP/BOTTOM SIDE
TP12	DIGITAL GROUND	MAIN BOARD	TOP SIDE ONLY
TP13	+9V_DRV DC POWER SUPPLY FOR THE RF DRIVERS	MAIN BOARD	BOTTOM SIDE ONLY
TP14	DIGITAL GROUND	MAIN BOARD	BOTTOM SIDE ONLY

REPAIR POLICY AND PROCEDURES

Refer to this section for information on:

- The Manufacturer's Responsibility
- Returning the Generator for Service

RESPONSIBILITY OF THE MANUFACTURER

Aspen Surgical Products is responsible for the safety, reliability, and performance of the generator only under the following circumstances:

- The user has followed the installation and setup procedures in this user's guide.
- Persons authorized by Aspen Surgical Products performed assembly operation, readjustments, modifications, or repairs.
- The electrical installation of the relevant room complies with local codes and regulatory requirements, such as IEC and BSI.
- Equipment use is in accordance with the Aspen Surgical Products (Aspen Surgical Products) instructions for use.

For warranty information, refer to Appendix A – Warranty.

RETURNING THE GENERATOR FOR SERVICE

Before you return the generator, call your Aspen Surgical Products representative for assistance. If instructed to send the generator to a Aspen Surgical Products provided address, first obtain a Returned Materials Authorization Number. Then clean the Generator and ship it per instructions for service.

Step 1 – Obtain a Returned Materials Authorization Number

Call the Aspen Surgical Products Customer Service Center to obtain a Returned Materials Authorization Number. Have the following information ready when you call:

- Hospital / clinic name / customer number
- Telephone number
- Department / address, city, state, and zip code
- Model number
- Serial number / Lot Number
- Description of the problem
- Type of repair to be done / PO Number

Step 2 – Clean the Generator

WARNING:

Electric Shock Hazard - Always turn off and unplug the generator before cleaning.

NOTICE:
Do not clean the generator with abrasive cleaning or disinfectant compounds, solvents, or other materials that could scratch the panels or damage the generator.

A. Turn off the generator, and unplug the power cord from the wall outlet.

B. Thoroughly wipe all surfaces of the generator and power cord with a mild cleaning solution or disinfectant and a damp cloth. Follow the procedures approved by your institution or use a validated infection control procedure. Do not allow fluids to enter the chassis. You cannot sterilize the generator.

Step 3 – Ship the Generator

A. Attach a tag to the generator that includes the Returned Materials Authorization Number and the information (hospital, phone number, etc.) listed in Step 1 – Obtain a Returned Materials Authorization Number.
B. Be sure the generator is completely dry before you pack it for shipment. Package it in its original shipping container, if available.
C. Ship the generator, prepaid, to the address given to you by Aspen Surgical Products.

WARRANTY

Aspen Surgical Products warrants each product manufactured by it to be free from defects in material and workmanship under normal use and service for the period(s) set forth below.

Aspen Surgical Products obligation under this warranty is limited to the repair or replacement, at its sole option, of any product, or part thereof, which has been returned to it or its Distributor within the applicable time period shown below after delivery of the product to the original purchaser, and which examination discloses, to Aspen Surgical Products satisfaction, that the product is indeed, defective.

This warranty does not apply to any product, or part thereof, which has been repaired or altered outside Aspen Surgical Products factory in a way so as, in Aspen Surgical Products judgment, to affect its stability or reliability, or which has been subjected to misuse, neglect, or accident.

The warranty periods for Aspen Surgical Products are as follows:

- Electrosurgical Generators/High Frequency Desiccators: Four years from date of shipment
- Mounting Fixtures (all models): Two years from date of shipment
- Footswitches (all models): One year from date of shipment
- Patient Return Electrodes: Shelf life only as stated on packaging
- Sterile Single Use Accessories: Only as stated on packaging

This warranty is in lieu of all other warranties, express or implied, including without limitation, the warranties of merchantability and fitness for a particular purpose, and of all other obligations or liabilities on the part of Aspen Surgical Products.

Aspen Surgical Products neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale or use of any of Aspen Surgical Products.

Notwithstanding any other provision herein or in any other document or communication, Aspen Surgical Products liability with respect to this agreement and products sold hereunder shall be limited to the aggregate purchase price for the goods sold by Aspen Surgical Products to the customer.

Aspen Surgical Products disclaims any liability hereunder or elsewhere in connection with the sale of this product, for indirect or consequential damages.

This warranty and the rights and obligations hereunder shall be construed under and governed by the laws of the State of Michigan, USA.

The sole forum for resolving disputes arising under or relating in any way to this warranty is the Federal District Court serving Kent County Michigan, USA.

Aspen Surgical Products, its dealers, and representatives reserve the right to make changes in equipment built and/or sold by them at any time without incurring any obligation to make the same or similar changes on equipment previously built and / or sold by them.

BOARD DRAWINGS, SCHEMATICS, AND ASSEMBLIES

This supplement contains the assembly drawings, and schematics for the following printed circuit boards:

- Main Circuits
- Relays
- Silkscreens
- Assemblies

HOW TO ORDER PARTS FROM ASPEN SURGICAL PRODUCTS

Once you have determined what parts you need from the drawings and Bill of Materials, call our Technical Service Department.

Our trained staff will verify the part numbers and arrange immediate delivery. The Technical Service Department can relay cost information, determine parts availability, and suggest any assembly updates available.

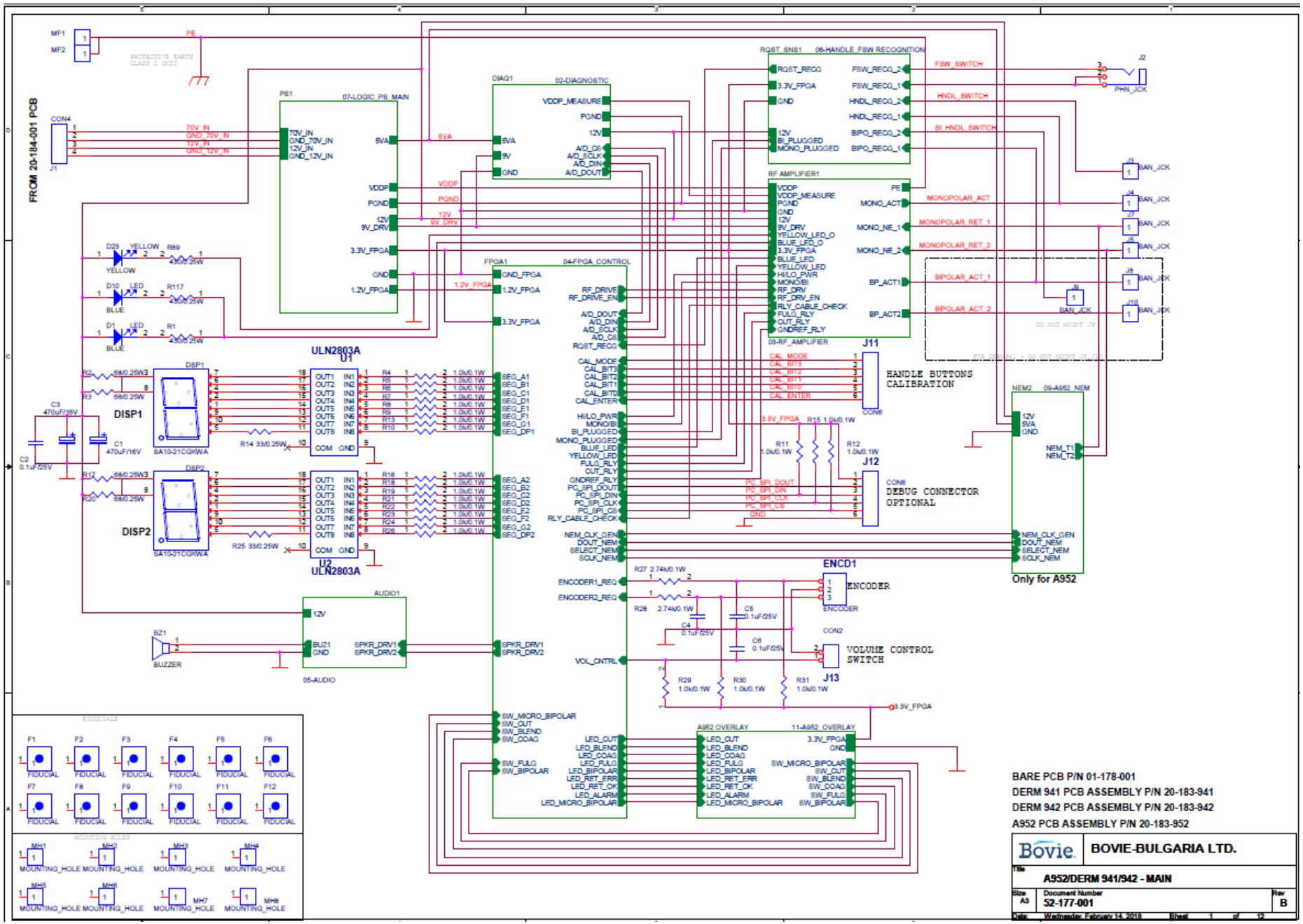
A952/A942 DESIGN BREAKDOWN AND DRAWING REFERENCE

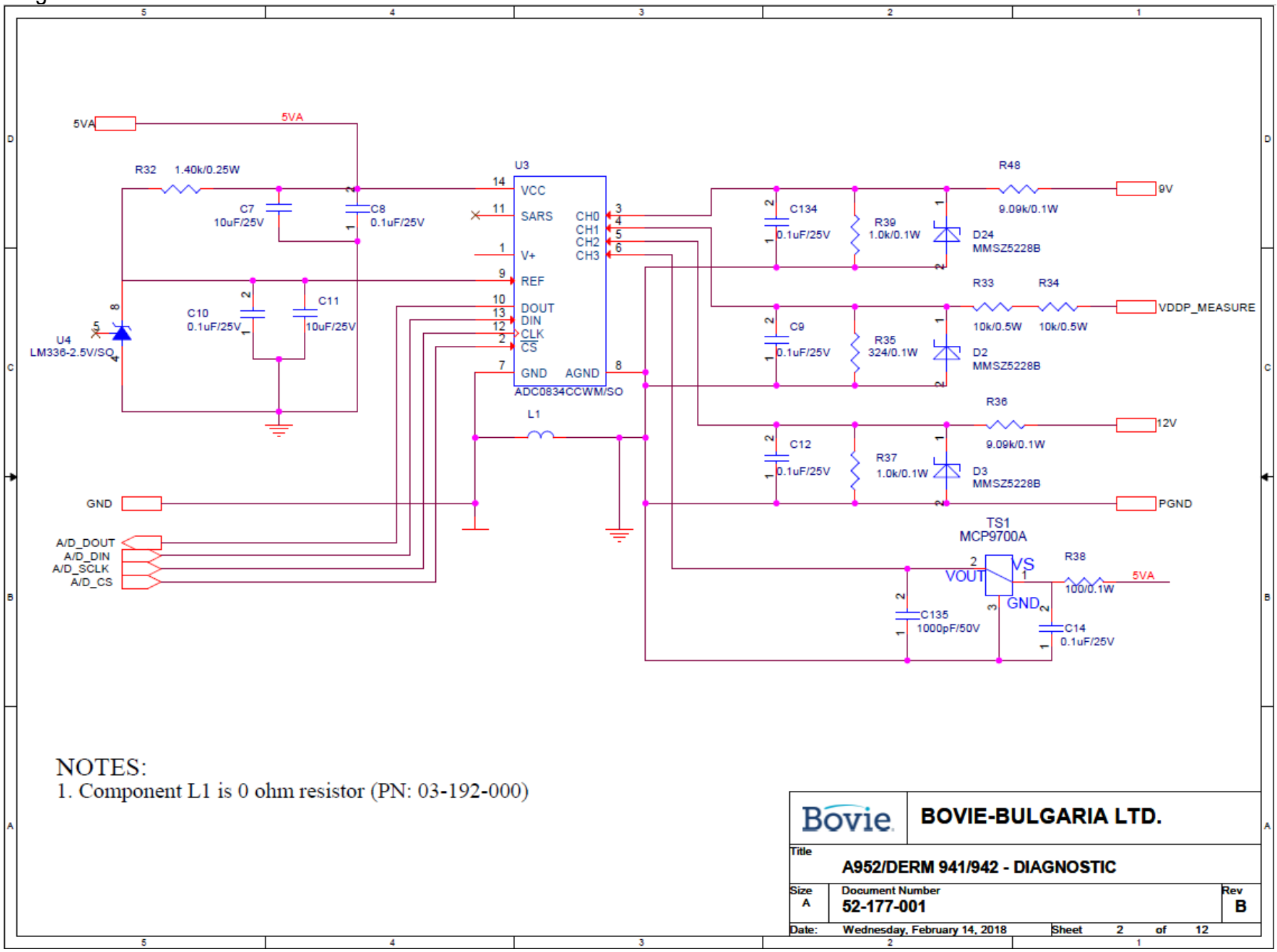
PCB BOARD ASSEMBLIES	
P/N	**Description**
20-183-952	Main PCB Assembly A952
20-183-942	Main PCB Assembly A942
ENCLOSURE	
P/N	**Description**
06-303-001	Front Panel A952
06-302-001	Front Panel A942
06-300-002	Back Panel A952
06-300-001	Back Panel A942
FUSES	
P/N	**Description**
02-349-250	Fuse 250 V, 5x20 mm Time Lag Ceramic
CABLE ASSEMBLY	
P/N	**Description**
25-141-002	Sound Switch
25-154-001	Power Harness
MISCELLANEOUS	
P/N	**Description**
07-244-002	Power Entry Inlet
15-399-001	Overlay, A952
07-215-001	Round Rocker Switch
02-180-001	Encoder
06-275-002	Encoder Knob

A952, A942 DRAWING AND SCHEMATIC PACKAGE

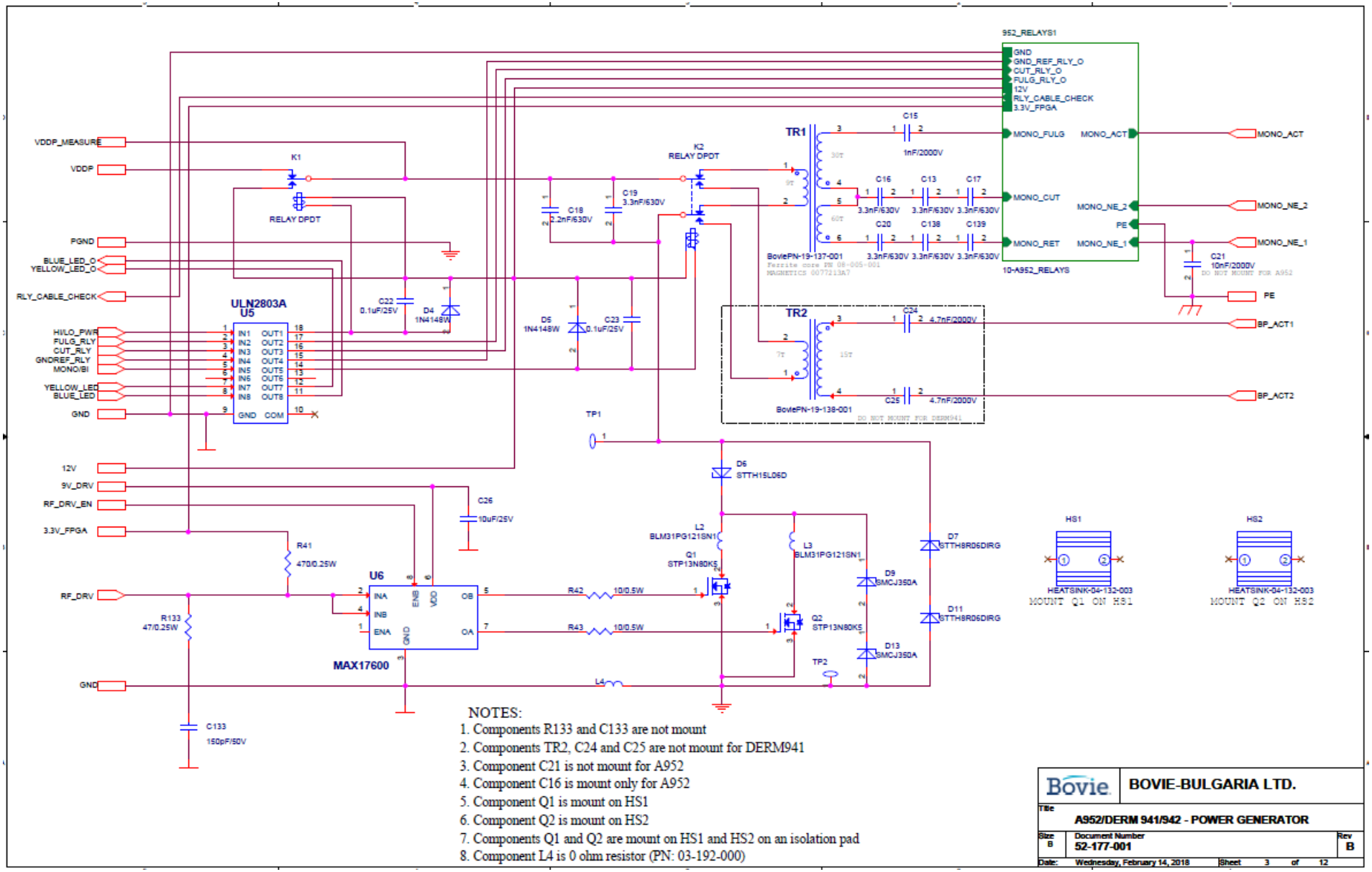
Following tri-folds

Main Board


FROM 20-184-001 PCB
07-LOGIC_PS_MAIN
02-DIAGNOSTIC
06-HANDLE_FSW RECOGNITION
04-FPGA_CONTROL
08-RF_AMPLIFIER
ULN2803A
DISP1
DISP2
HANDLE BUTTONS CALIBRATION
DEBUG CONNECTOR OPTIONAL
ENCODER
VOLUME CONTROL SWITCH
Only for A952
BARE PCB P/N 01-178-001
DERM 941 PCB ASSEMBLY P/N 20-183-941
DERM 942 PCB ASSEMBLY P/N 20-183-942
A952 PCB ASSEMBLY P/N 20-183-952
BOVIE-BULGARIA LTD.
A952/DERM 941/942 - MAIN
52-177-001


5VA
5VA
R32 1.40k/0.25W
C7
10uF/25V
C8
0.1uF/25V
U3
VCC
SARS
V+
REF
DOUT
DIN
CLK
CS
GND
AGND
CH0
CH1
CH2
CH3
ADC0834CCWM/SO
C10
0.1uF/25V
C11
10uF/25V
U4
LM336-2.5V/SO
L1
GND
A/D_DOUT
A/D_DIN
A/D_SCLK
A/D_CS
C134
0.1uF/25V
R39
1.0k/0.1W
D24
MMSZ5228B
R48
9.09k/0.1W
9V
C9
0.1uF/25V
R35
324/0.1W
D2
MMSZ5228B
R33
R34
10k/0.5W
10k/0.5W
VDDP_MEASURE
C12
0.1uF/25V
R37
1.0k/0.1W
D3
MMSZ5228B
R36
9.09k/0.1W
12V
PGND
TS1
MCP9700A
VOUT
VS
GND
R38
100/0.1W
5VA
C135
1000pF/50V
C14
0.1uF/25V
NOTES:
1. Component L1 is 0 ohm resistor (PN: 03-192-000)
Bovie
BOVIE-BULGARIA LTD.
Title
A952/DERM 941/942 - DIAGNOSTIC
Size
A
Document Number
52-177-001
Rev
B
Date:
Wednesday, February 14, 2018
Sheet
2
of
12

Power Generator

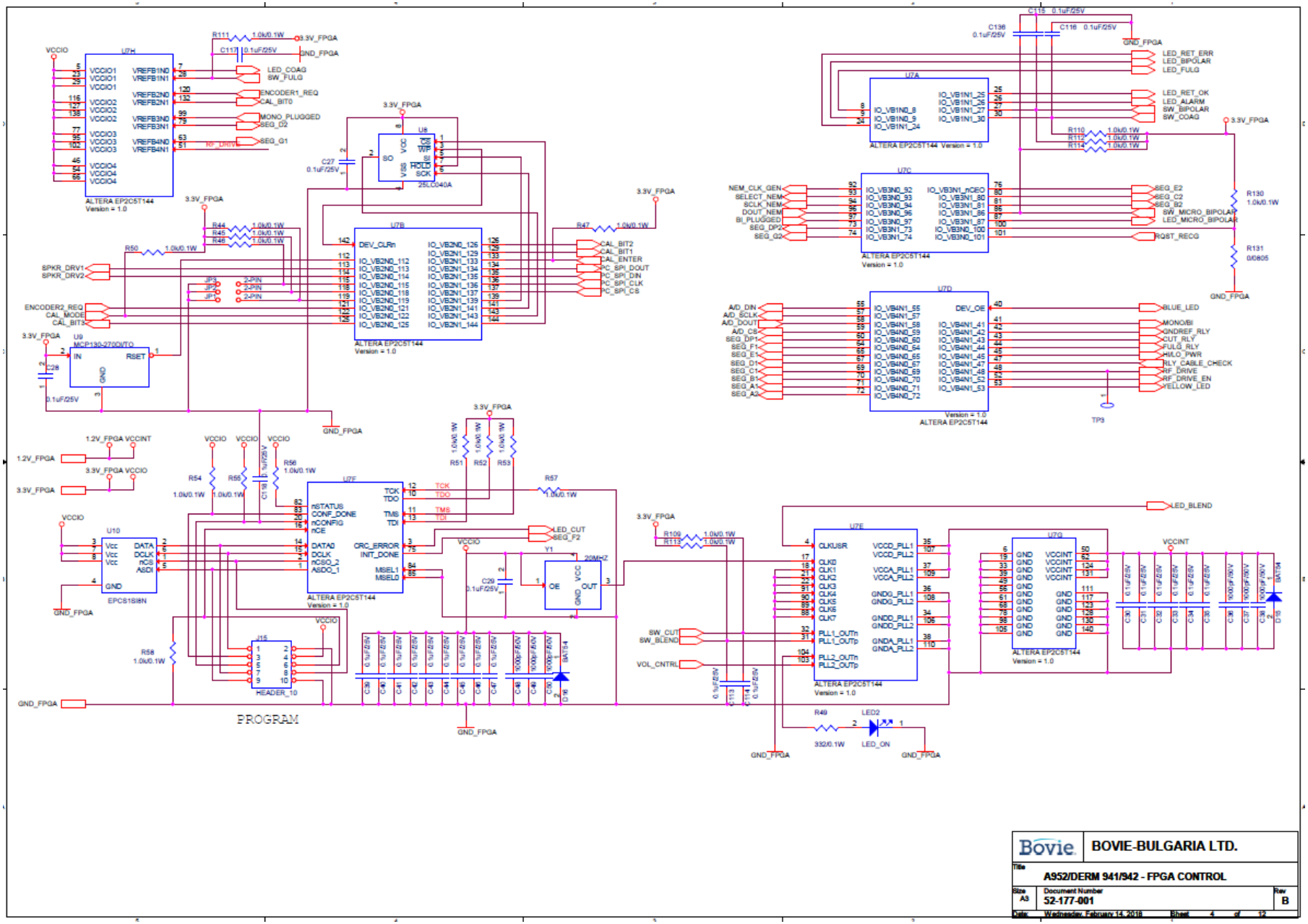


NOTES:

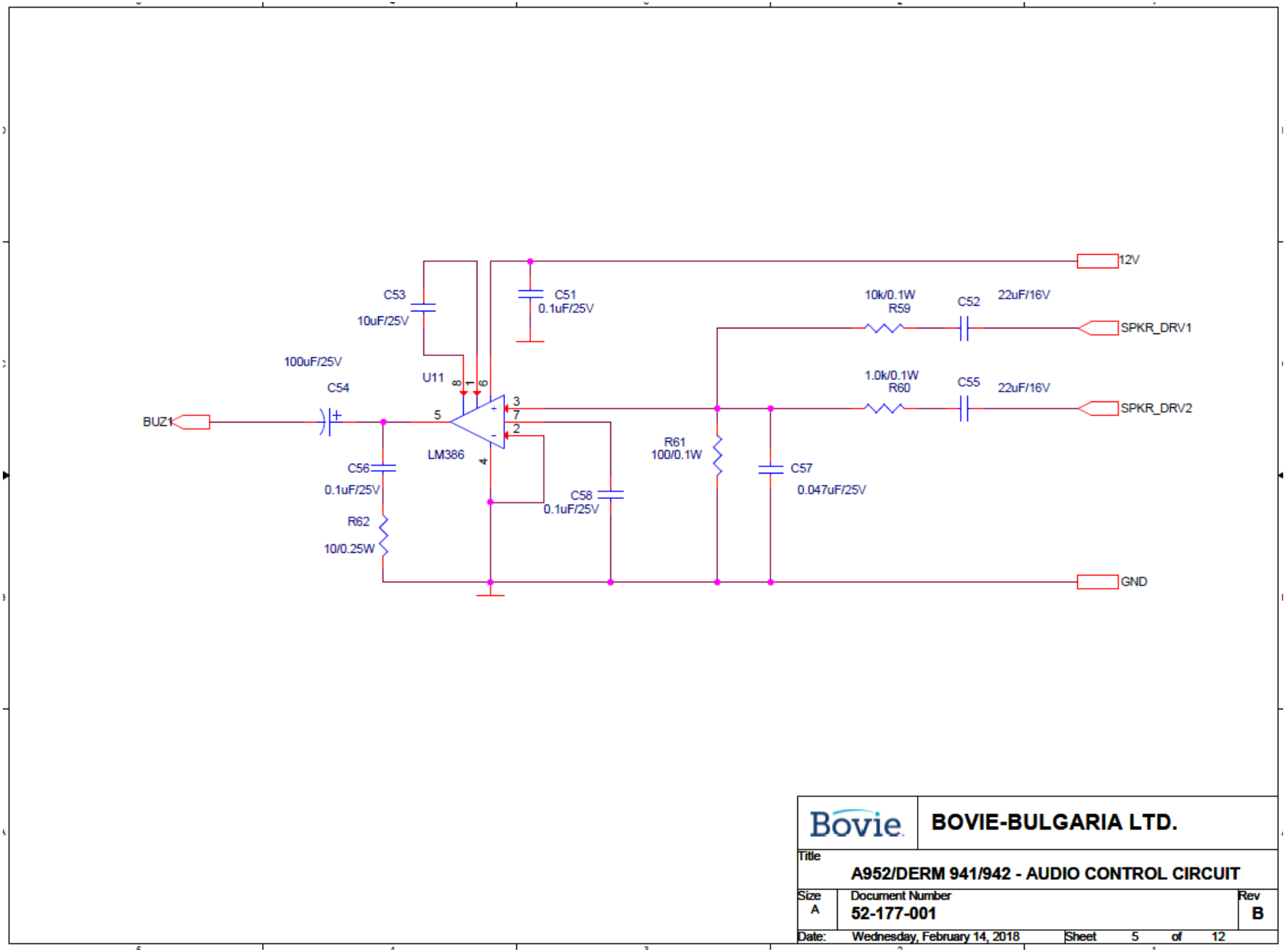
1. Components R133 and C133 are not mount
2. Components TR2, C24 and C25 are not mount for DERM941
3. Component C21 is not mount for A952
4. Component C16 is mount only for A952
5. Component Q1 is mount on HS1
6. Component Q2 is mount on HS2
7. Components Q1 and Q2 are mount on HS1 and HS2 on an isolation pad
8. Component L4 is 0 ohm resistor (PN: 03-192-000)

Bovie	BOVIE-BULGARIA LTD.	
Title	A952/DERM 941/942 - POWER GENERATOR	
Size B	Document Number 52-177-001	Rev B
Date: Wednesday, February 14, 2018	Sheet 3 of 12	

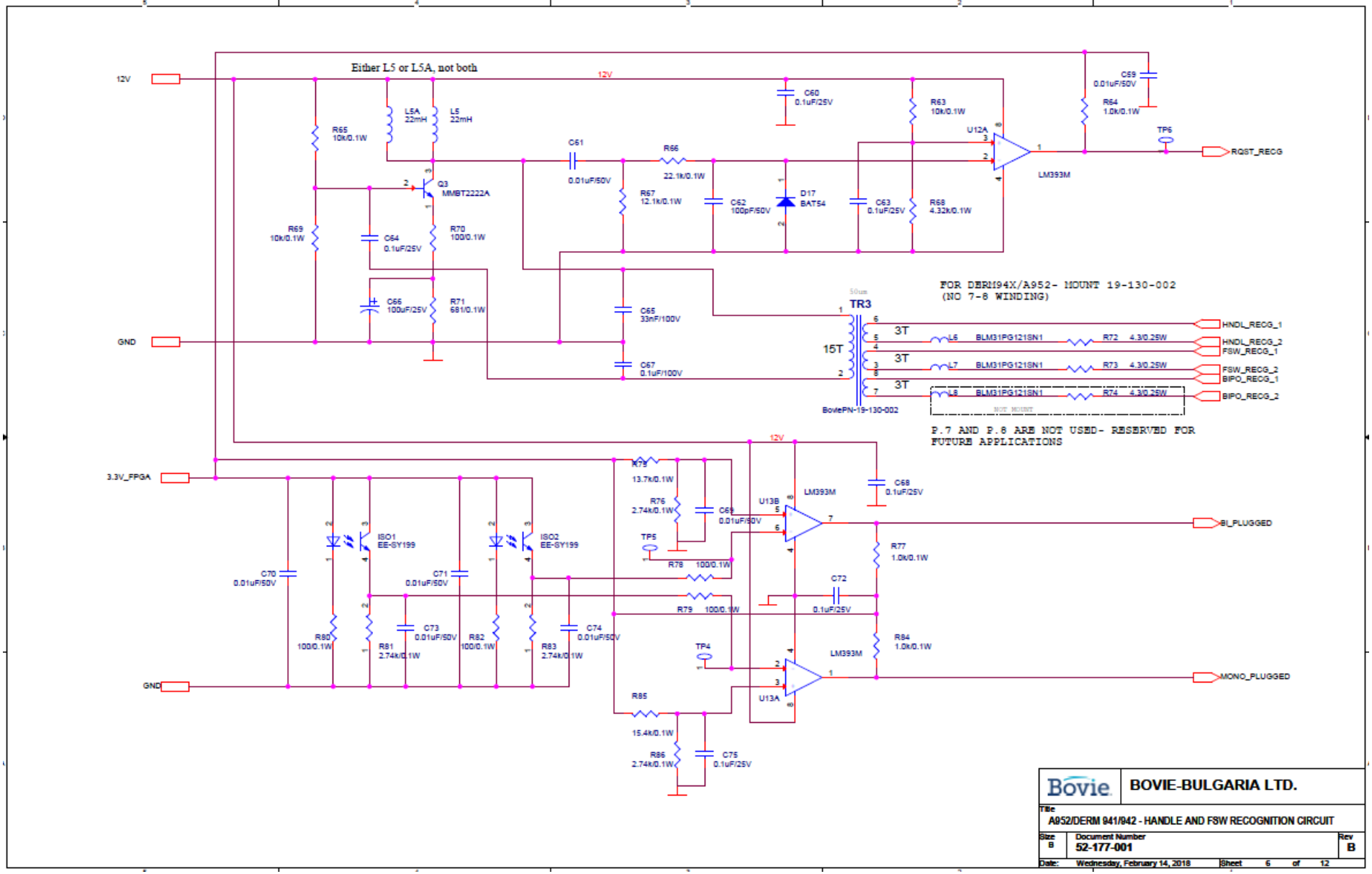
FPGA Control



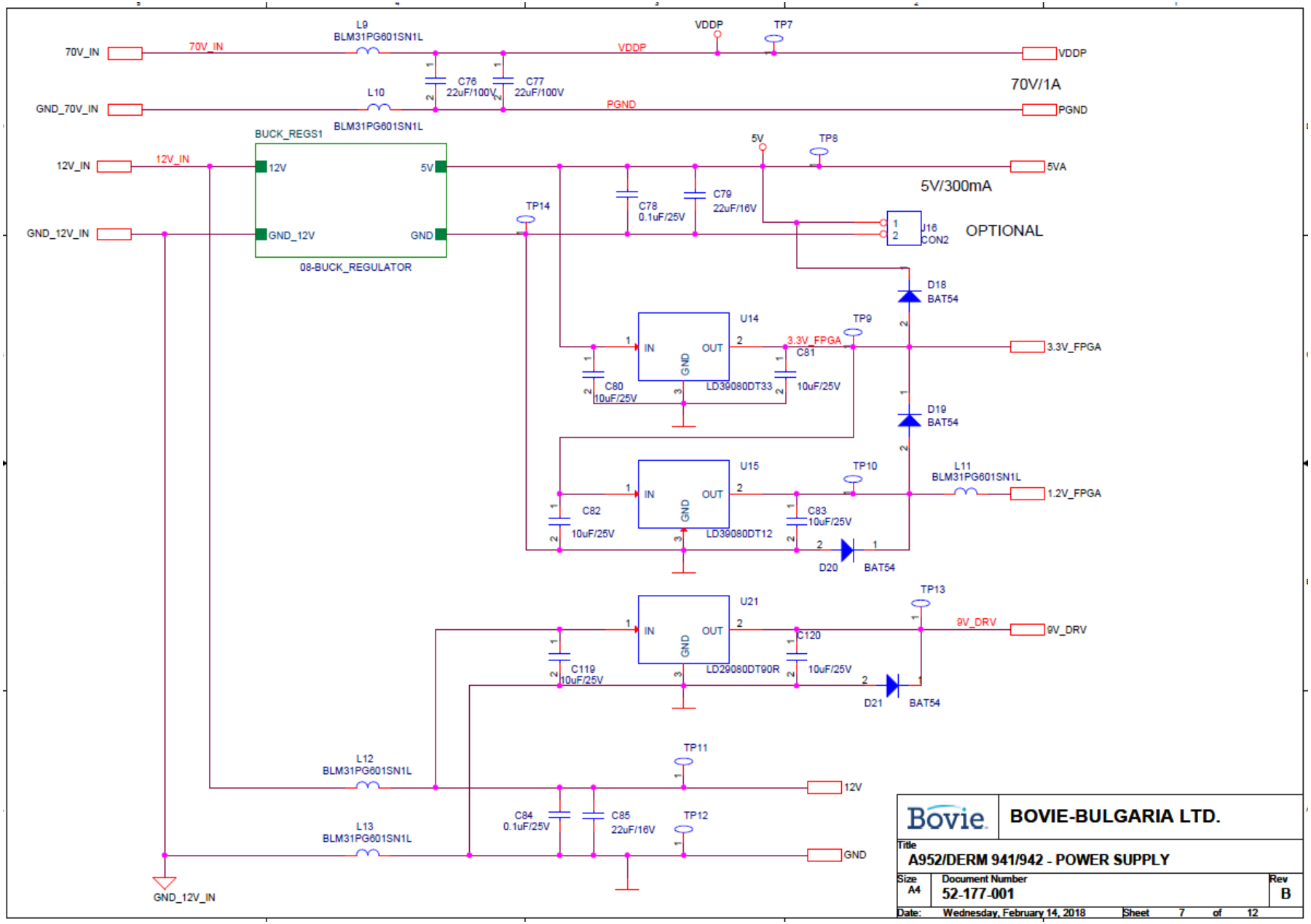
Audio Control Circuit



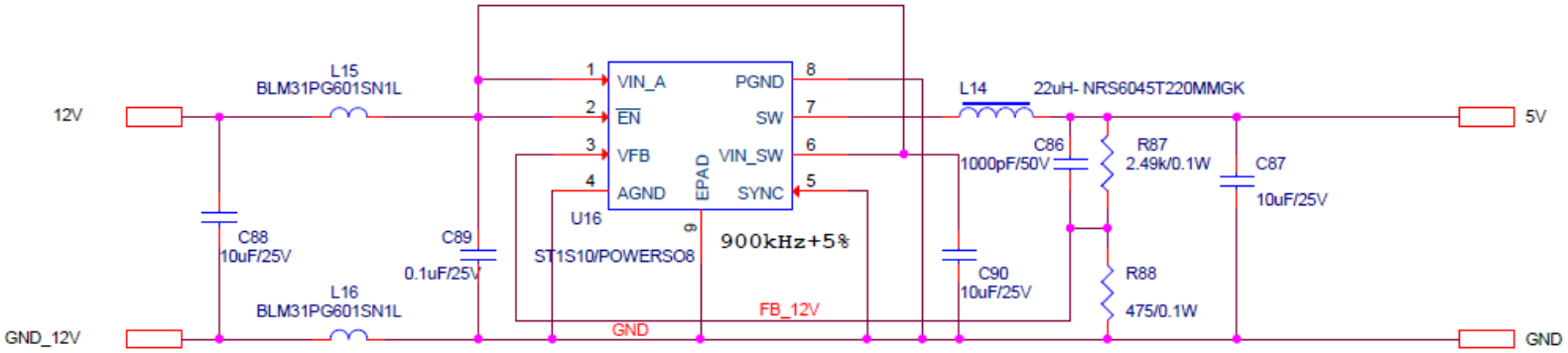
Handle and FSW Recognition Circuit



Power Supply

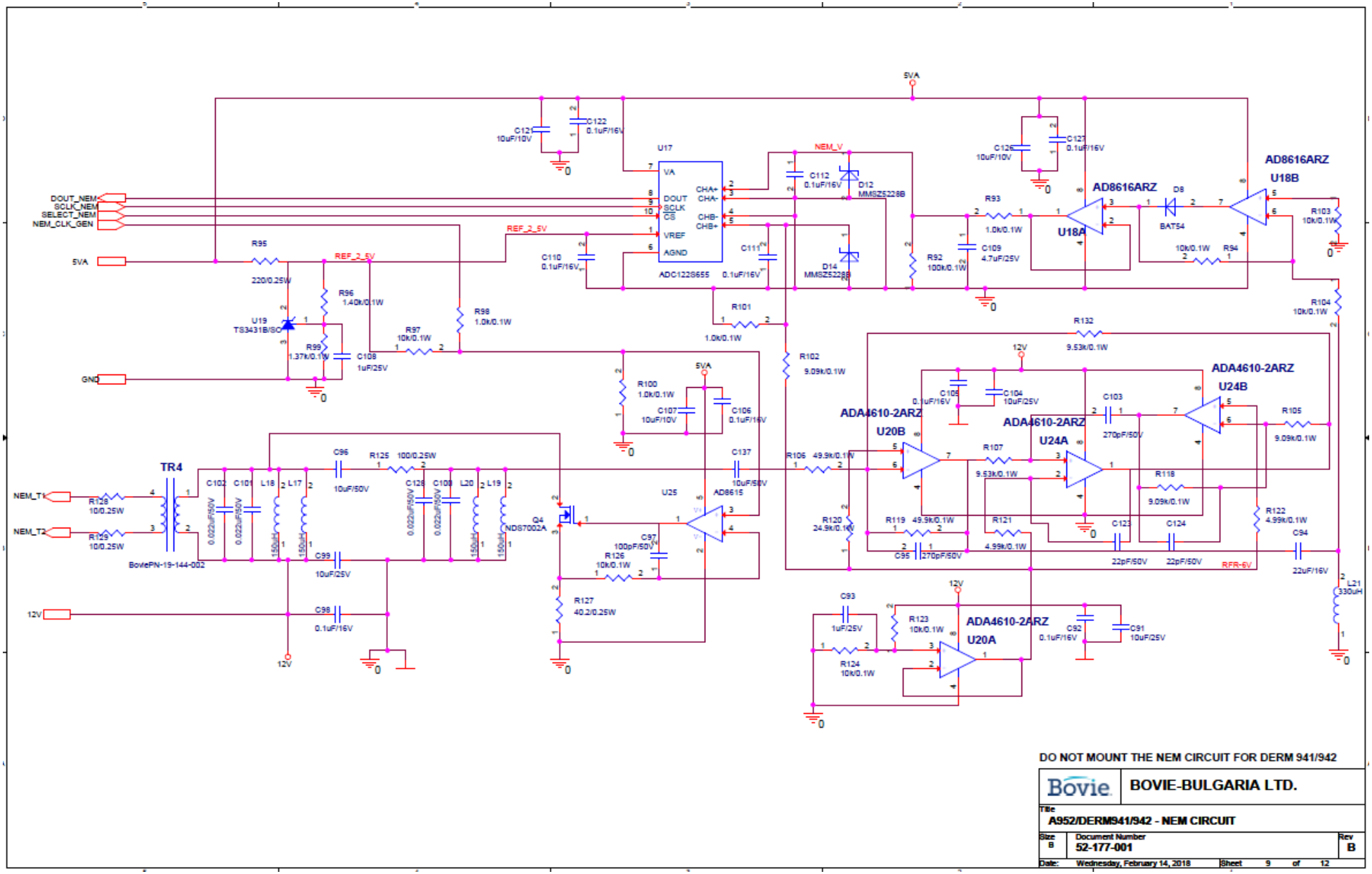


5V Buck Regulator



Bovie	BOVIE-BULGARIA LTD.	
Title: A952/DERM 941/942 - 5V BUCK REGULATOR		
Size: A	Document Number: 52-177-001	Rev: B
Date: Wednesday, February 14, 2018	Sheet 8 of 12	

NEM Circuit


DOUT_NEM
SCLK_NEM
SELECT_NEM
NEM_CLK_GEN
5VA
GND
REF_2_5V
NEM_V
U17
ADC1228655
U18A
U18B
AD8616ARZ
U19
TS3431BIST
U20A
U20B
U24A
U24B
ADA4610-2ARZ
U25
AD8615
TR4
BovePN-19-144-002
Q4
NDS7002A
D12
D14
MMSZ5228B
D8
BAT54
NEM_T1
NEM_T2
12V
RFR-5V
DO NOT MOUNT THE NEM CIRCUIT FOR DERM 941/942
BOVIE-BULGARIA LTD.
A952/DERM941/942 - NEM CIRCUIT
Document Number
52-177-001
Rev
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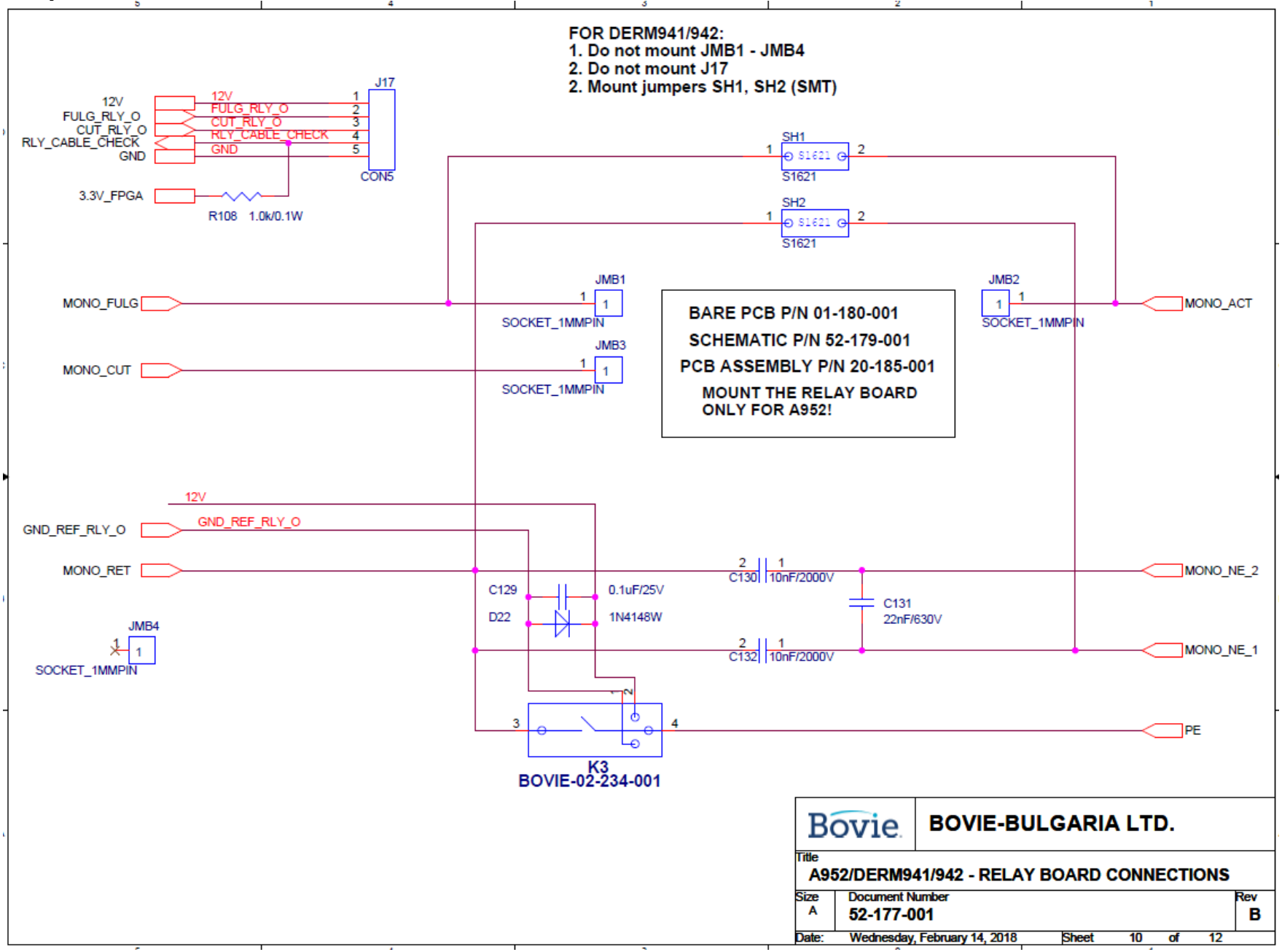
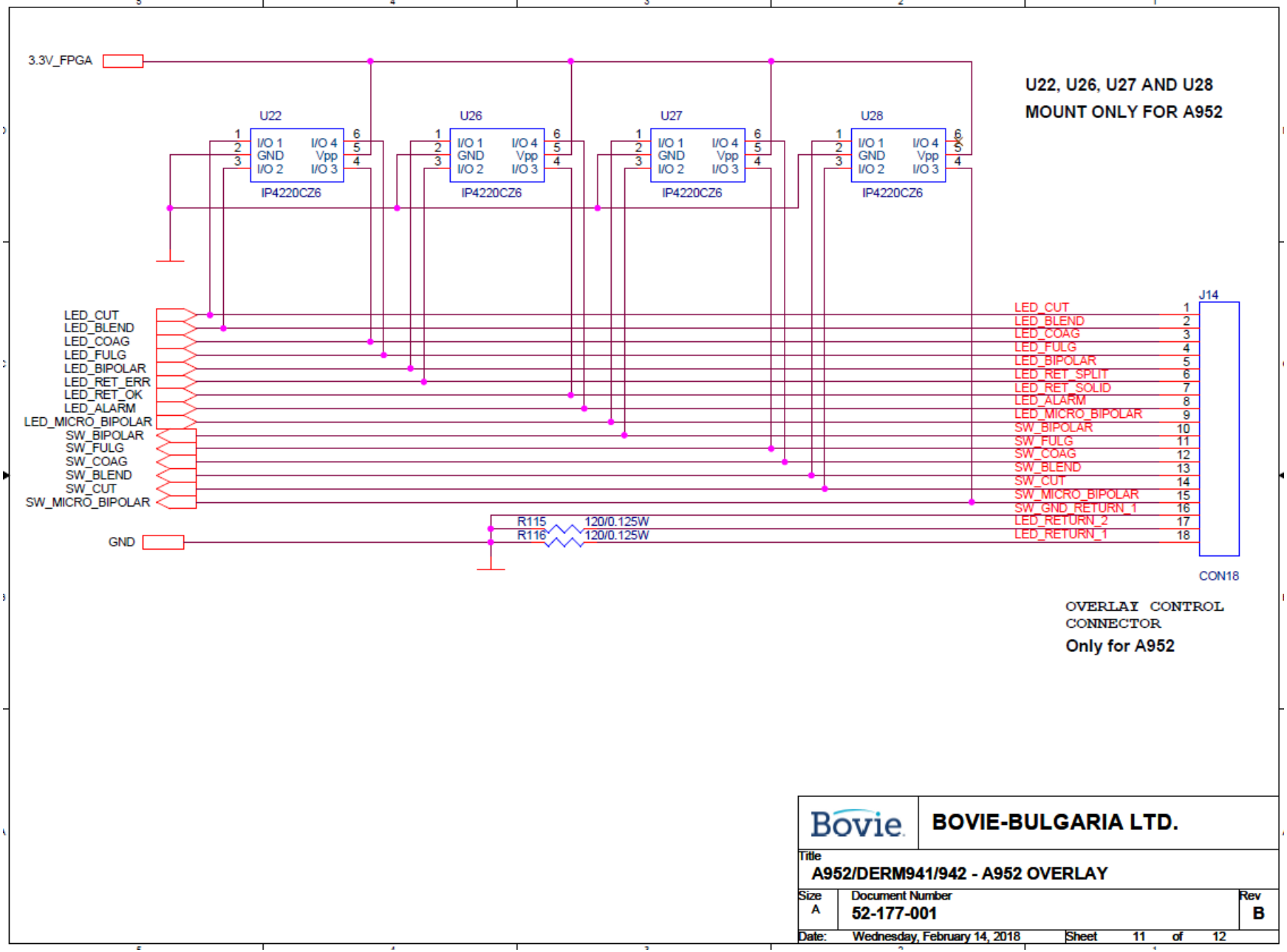
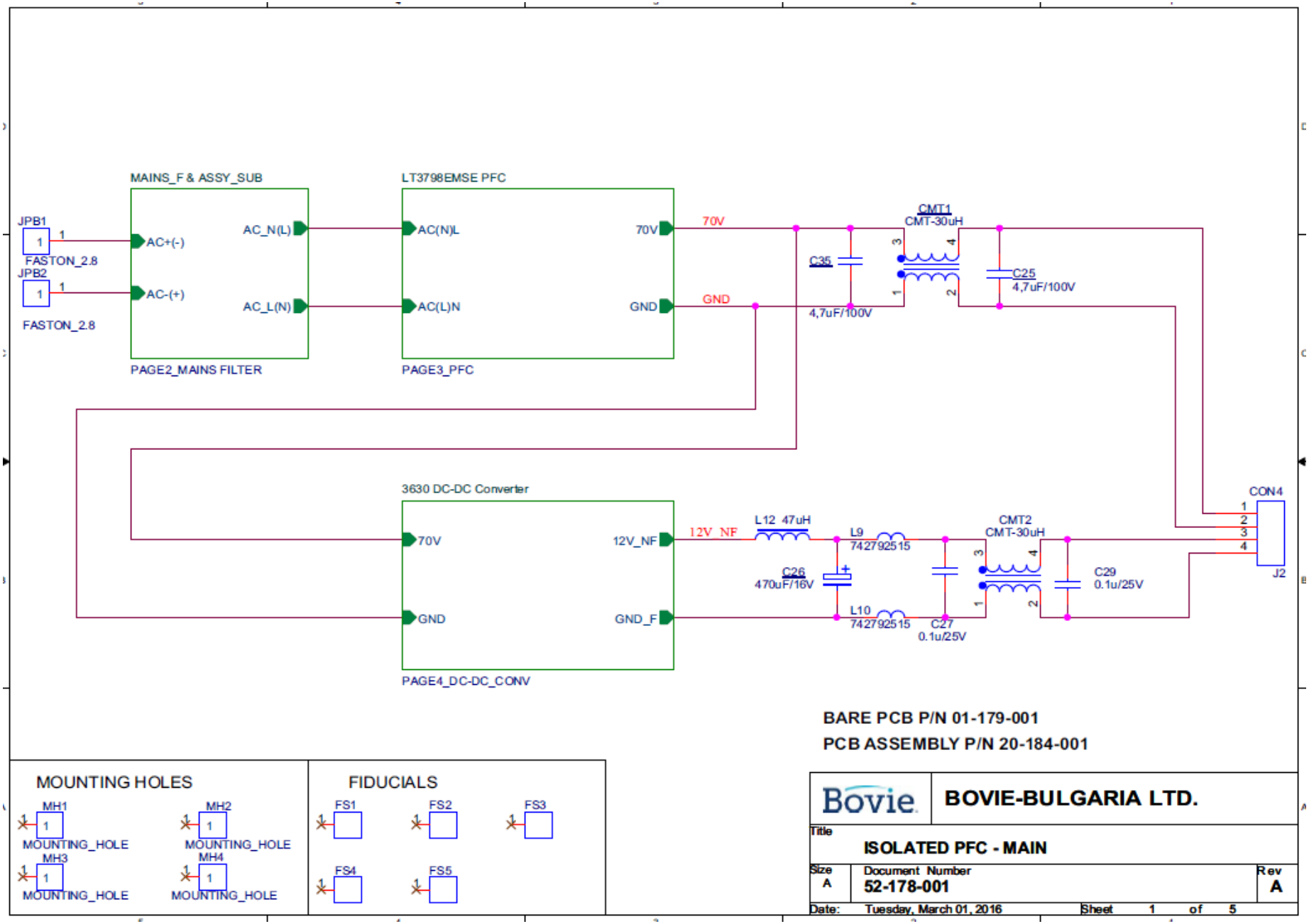
Relay Board Connections

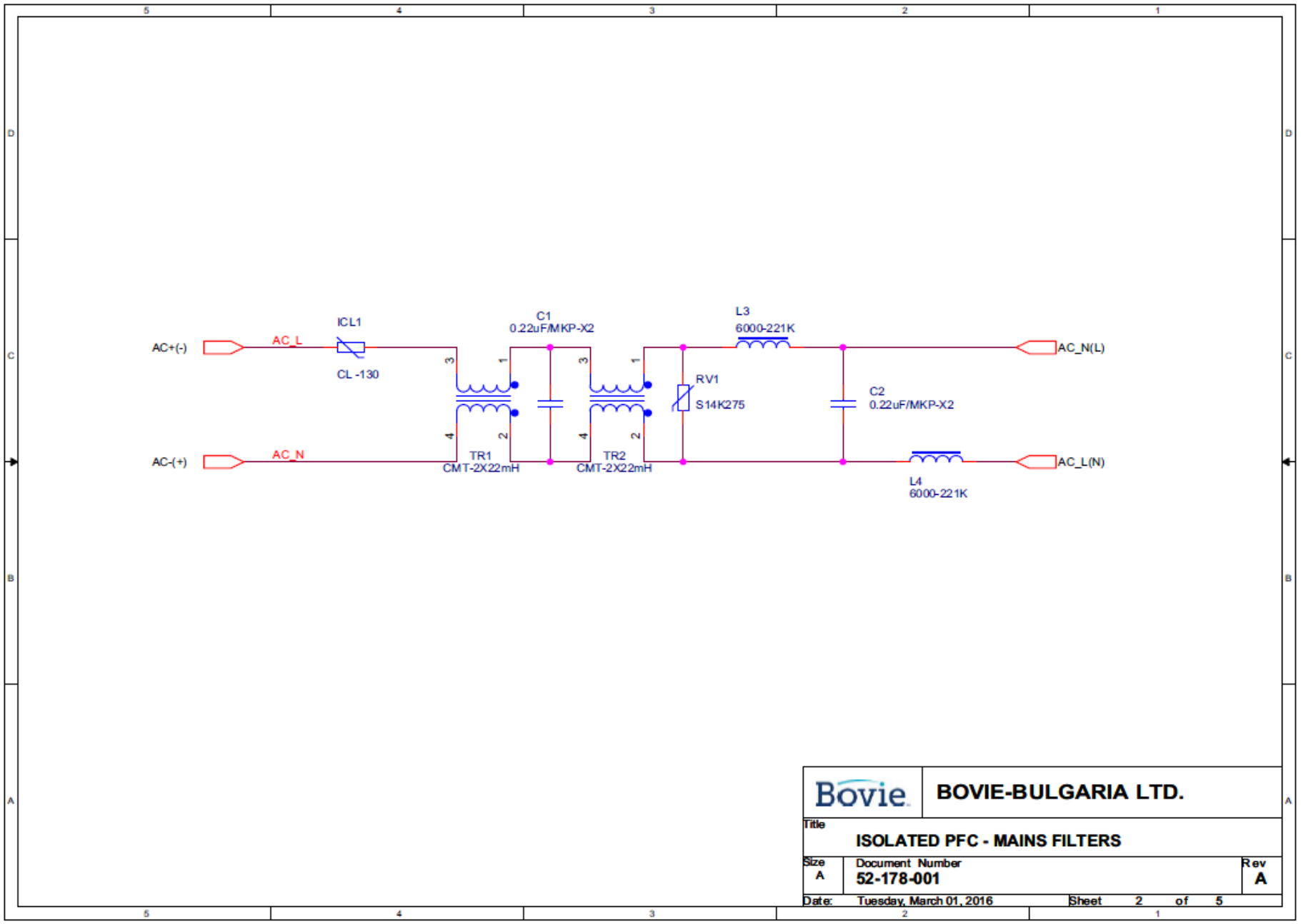


A952 Overlay (A952 Only)



Isolated PFC – Main




AC+(-)
AC_L
ICL1
CL -130
C1
0.22uF/MKP-X2
L3
6000-221K
AC_N(L)
RV1
S14K275
C2
0.22uF/MKP-X2
AC-(+)
AC_N
TR1
CMT-2X22mH
TR2
CMT-2X22mH
L4
6000-221K
AC_L(N)
BOVIE-BULGARIA LTD.
Title
ISOLATED PFC - MAINS FILTERS
Size
A
Document Number
52-178-001
Rev
A
Date: Tuesday, March 01, 2016
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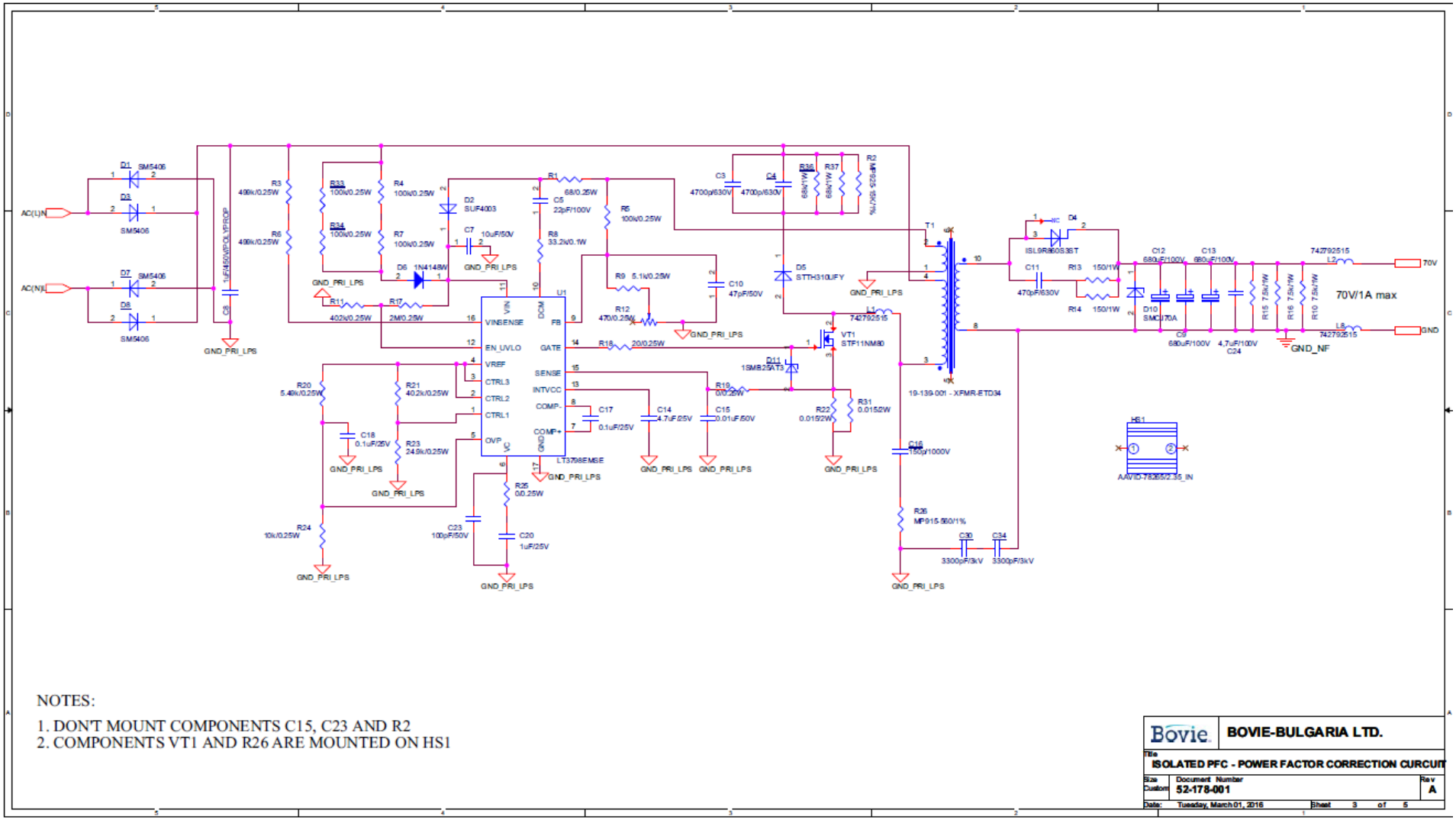
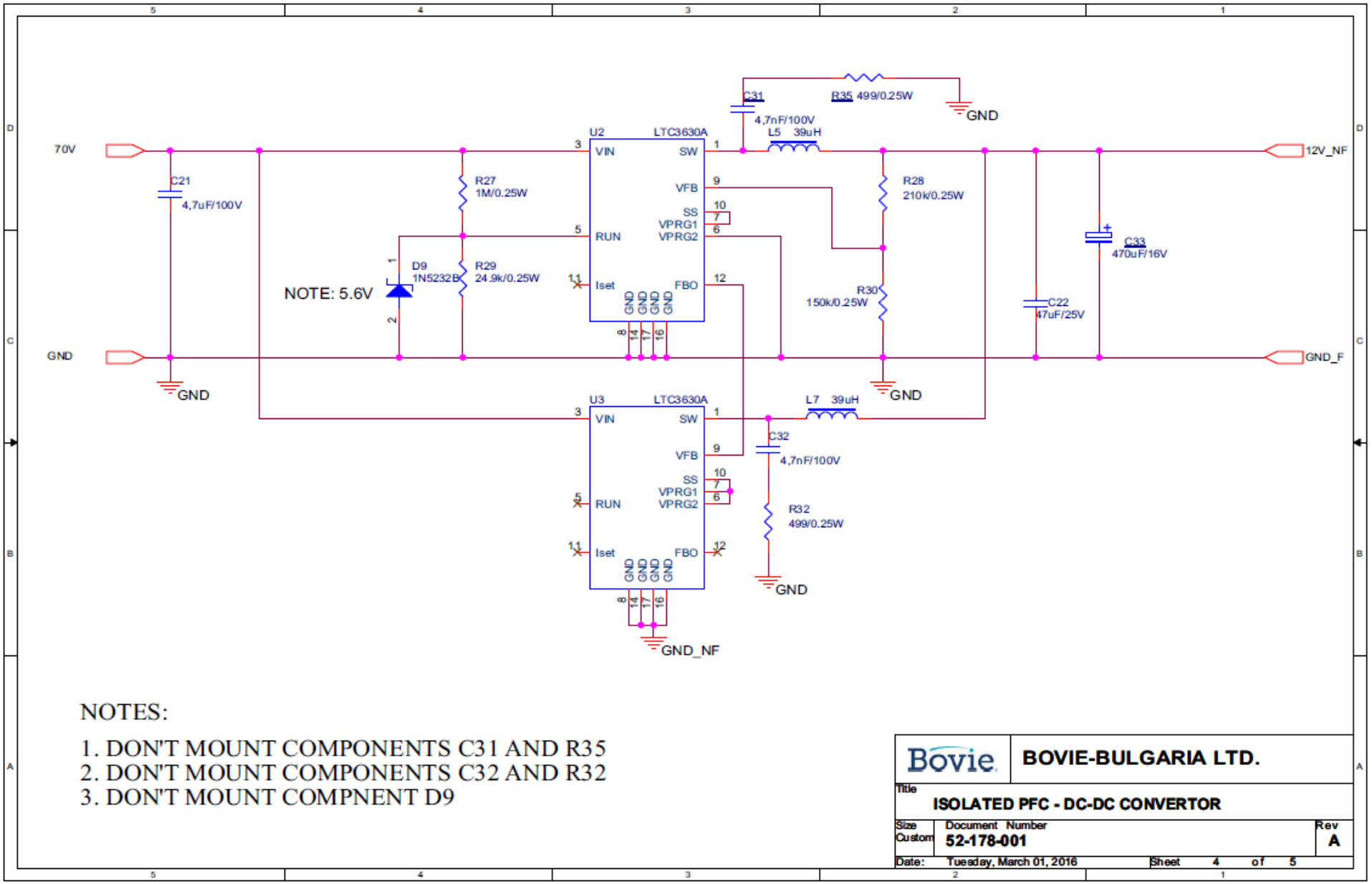
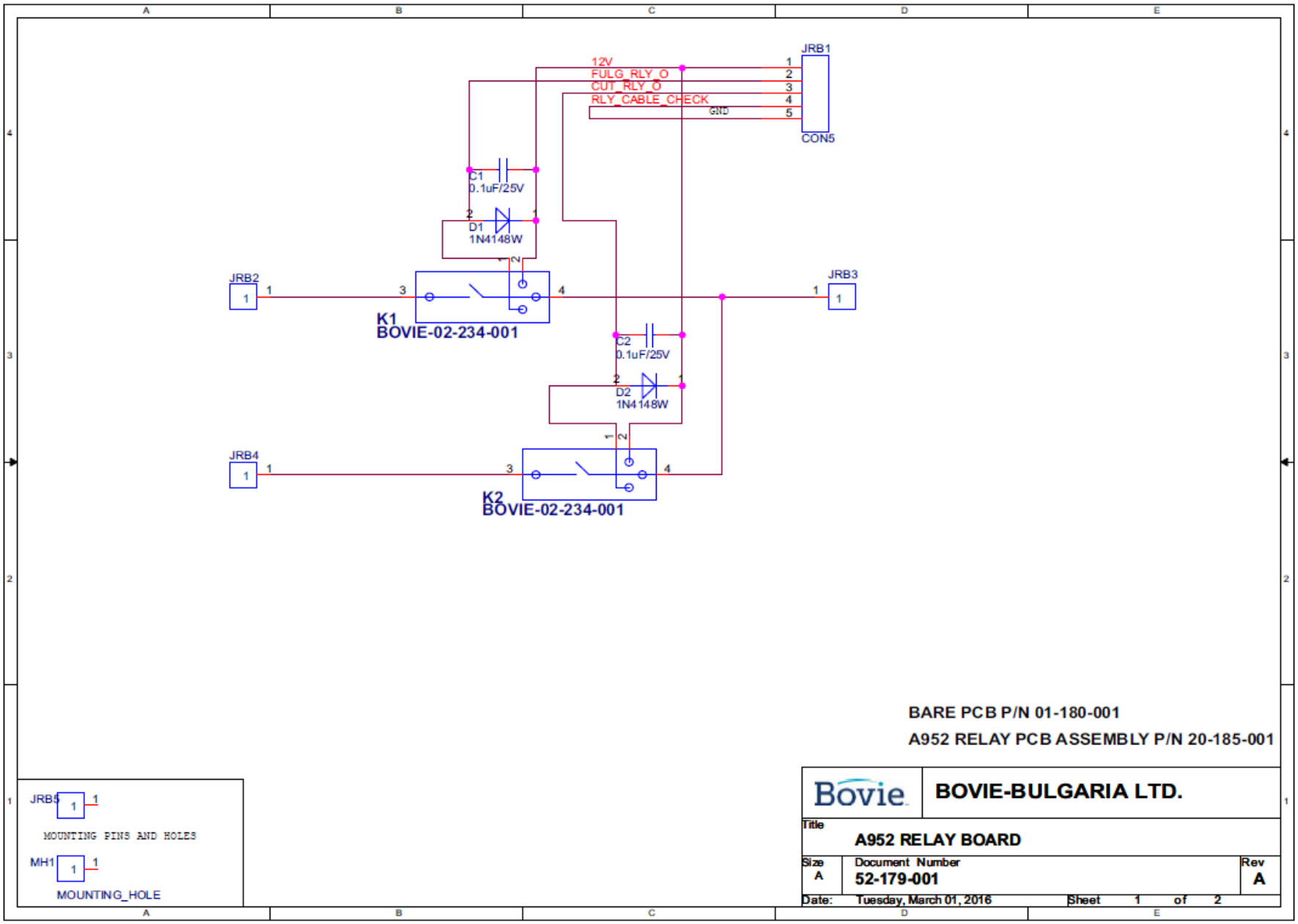
Power Factor Connector Circuit



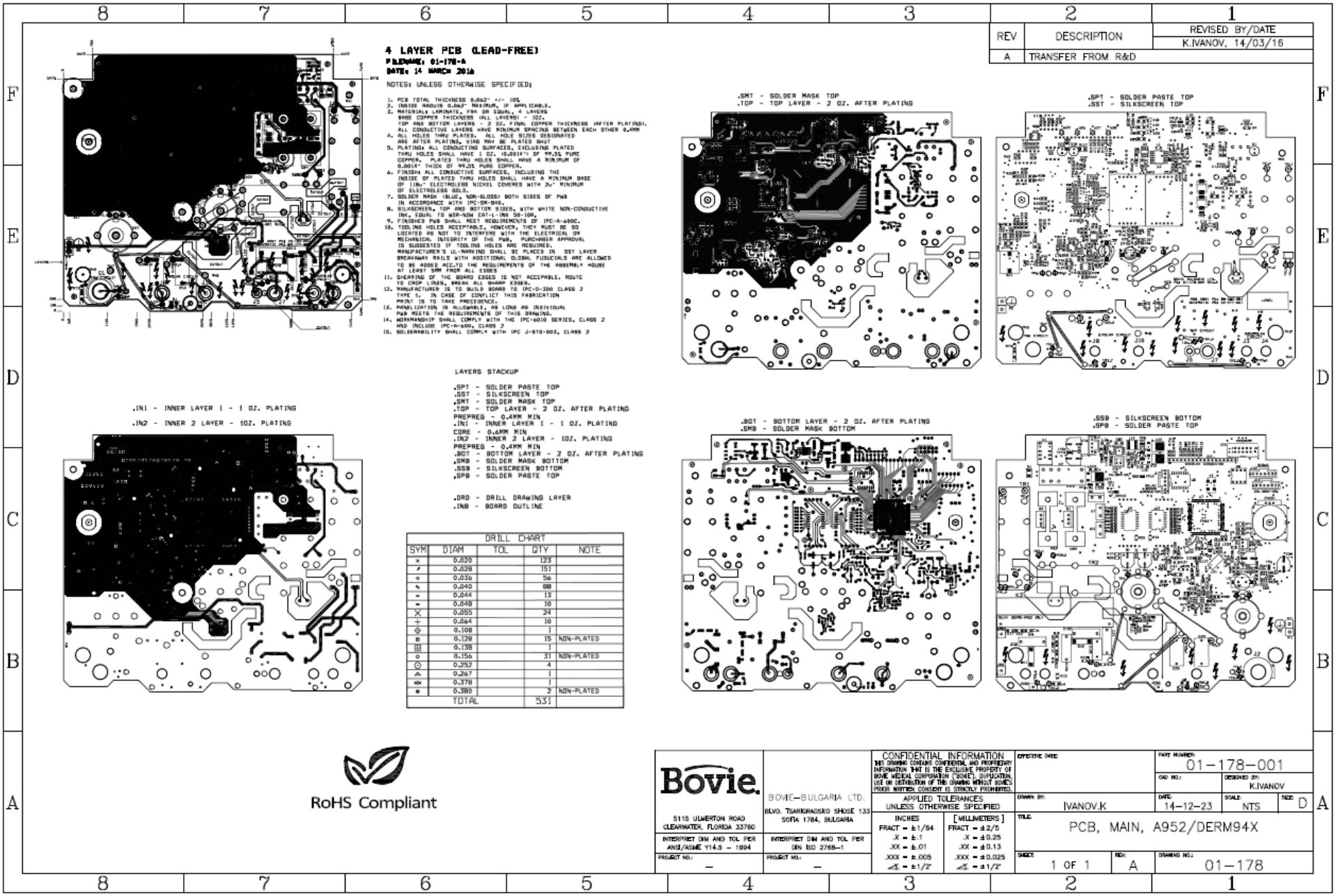
Isolated PFC DC-DC Converter



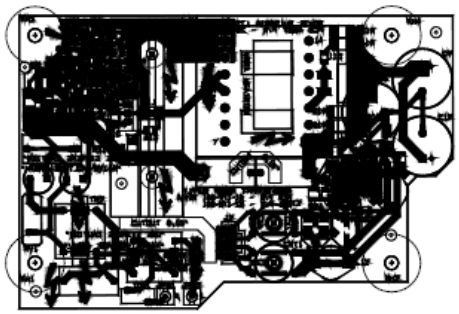
Relay PCB (A952 Only)



PCB Main Silk



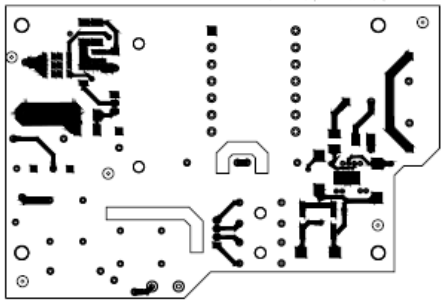
REV	DESCRIPTION	REVISED BY/DATE
A	TRANSFER FROM R&D	K.IVANOV, 02/03/16



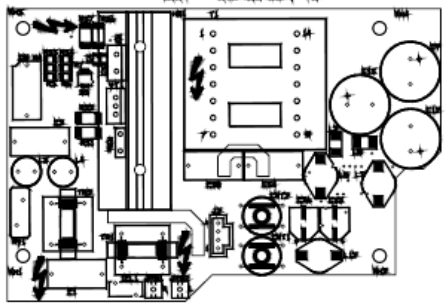
LAYERS STACKUP
.SPT - SOLDER PASTE TOP
.SST - SILKSCREEN TOP
.SMT - SOLDER MASK TOP
.TOP - TOP LAYER , 2 OZ. FINAL PLATING
PREPREG - MIN 0.4MM
.IN1 - INNER 1 LAYER , 1OZ. PLATING
CORE - MIN 0.4MM
.IN2 - INNER 2 LAYER , 1OZ. PLATING
PREPREG - MIN 0.4MM
.BOT - BOTTOM LAYER , 2 OZ. FINAL PLATING
.SMB - SOLDER MASK BOTTOM
.SSB - SILKSCREEN BOTTOM
.SPB - SOLDER PASTE BOTTOM

.DRL - DRILL LAYER
.IN4 - BOARD OUTLINE

.SMT - SOLDER MASK TOP
.TOP - TOP LAYER , 2 OZ. FINAL PLATING



.SPT - SOLDER PASTE TOP
.SST - SILKSCREEN TOP

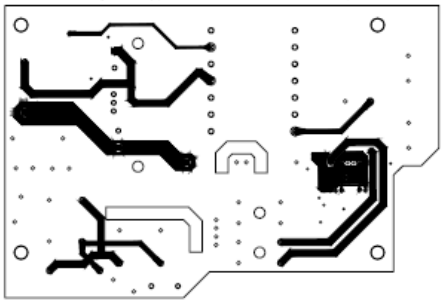


4 LAYER PCB (LEAD-FREE)
FILENAME: 01-179-A.MAX
DATE: 02 MARCH 2016

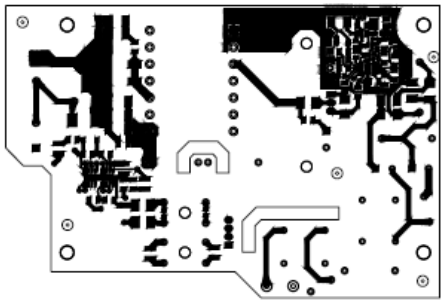
NOTES: UNLESS OTHERWISE SPECIFIED:

1. ENTIRE ASSEMBLY 0.062" MAXIMUM, IF APPLICABLE.
2. MATERIAL: 0.062" GLASS LAMINATE, FR4 OR EQUAL. 4 LAYERS
   MATERIAL BASE COPPER THICKNESS - 1OZ. INNER LAYERS
   MATERIAL BASE FINAL THICKNESS - TOP AND BOTTOM LAYERS - 2 OZ.
3. ALL HOLES THRU PLATED. ALL HOLE SIZES DESIGNATED ARE AFTER PLATING. VIAS MAY BE PLATED SHUT.
4. PLATING ALL CONDUCTIVE SURFACES, INCLUDING PLATED THRU HOLES SHALL HAVE A MINIMUM OF 0.001" THICK OF 99.9% PURE COPPER. PLATED THRU HOLES SHALL HAVE A MINIMUM OF 0.001" THICK OF 99.9% PURE COPPER.
5. FINISH: ALL EXPOSED CONDUCTIVE SURFACES, INCLUDING THE BARREL OF PLATED THRU HOLES, SHALL HAVE A MINIMUM BASE OF 150u" ELECTROLESS NICKEL FOLLOWED WITH A 30u" MINIMUM OF ELECTROLESS GOLD.
6. SOLDER MASK: BLUE, NON-CLEANED WITH RISES OF PWB IN ACCORDANCE WITH IPC-SM-840.
7. SILKSCREEN: TOP AND BOTTOM SIDE, WITH WHITE NON-CONDUCTIVE INK, EQUAL TO NON-VOC EMT-1-INK 300-10M.
8. FINISHED PWB SHALL MEET REQUIREMENTS OF IPC-6-6012.
9. TOOLING HOLES ACCEPTABLE, HOWEVER, THEY MUST BE NO LARGER AND NOT TO INTERFERE WITH THE ELECTRICAL OR MECHANICAL INTEGRITY OF THE PWB. MANUFACTURER APPROVAL OF MODIFIED IF TOOLING HOLES ARE MODIFIED.
   MANUFACTURER'S UL-MARKING SHALL BE PLACED IN 3RD LAYER BREAKAWAY RAILS WITH ADDITIONAL GLOBAL FIDUCIALS AND ALIGNED TO BE ADDED ACCORD TO THE REQUIREMENTS OF THE ASSEMBLY HOUSE GLOBAL FIDUCIALS MUST BE LOCATED AT 3MM FROM ALL EDGES
10. BREAKING OF THE BOARD EDGES IS NOT ACCEPTABLE. ROUTE TO CHIP LOADS, BREAK ALL SHARP EDGES.
11. MANUFACTURER IS TO BUILD BOARDS TO IPC-6-2000 CLASS 2 TYPE 1. IN CASE OF CONFLICT THIS FABRICATION PRINT IS TO TAKE PRECEDENCE.
12. PANELIZATION IS ALLOWABLE, AS LONG AS INDIVIDUAL PWB MEETS THE REQUIREMENTS OF THIS DRAWING.
13. WORKMANSHIP SHALL COMPLY WITH THE IPC-A610 REVISION, CLASS 2 AND INCLUDE IPC-A-600, CLASS 2
14. SOLDERABILITY SHALL COMPLY WITH IPC J-STD-003, CLASS 2

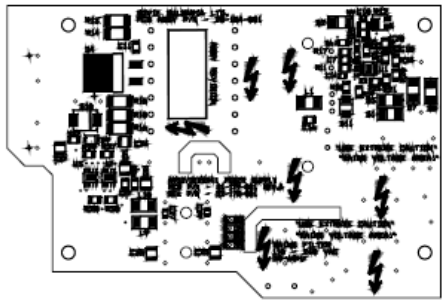
.IN1 - INNER 1 LAYER , 1OZ. PLATING
.IN2 - INNER 2 LAYER , 1OZ. PLATING



.BOT - BOTTOM LAYER , 2 OZ. FINAL PLATING
.SMB - SOLDER MASK BOTTOM



.SSB - SILKSCREEN BOTTOM
.SPB - SOLDER PASTE BOTTOM



DRILL CHART				
SYM	DIAM	TOL	QTY	NOTE
◈	0.028		20	
■	0.044		44	
▲	0.054		9	
●	0.064		14	
■	0.128		4	NON-PLATED
+	0.156		4	NON-PLATED
TOTAL			95	

RoHS Compliant

Bovie
5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760

BOVIE-BULGARIA LTD.
BLVD. TSARIGRADSKO SHOSE 133
SOFIA 1784, BULGARIA

INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 - 1994
PROJECT NO.: -

INTERPRET DIM AND TOL PER DIN ISO 2768-1
PROJECT NO.: -

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APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED

INCHES	[MILLIMETERS]
FRACT = ±1/64	FRACT = ±2/5
.X = ±.1	.X = ±0.25
.XX = ±.01	.XX = ±0.13
.XXX = ±.005	.XXX = ±0.025
∠ = ±1/2	∠ = ±1/2

EFFECTIVE DATE:

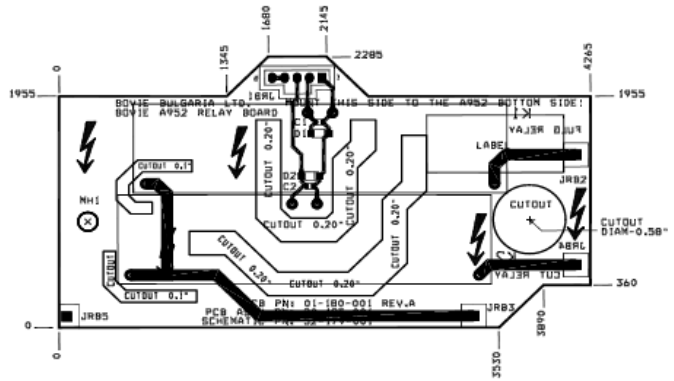
PART NUMBER: 01-179-001
CAD NO.:
DESIGNED BY: K.IVANOV
DRAWN BY: IVANOV.K
DATE: 14-11-11
SCALE: NTS
SIZE: D

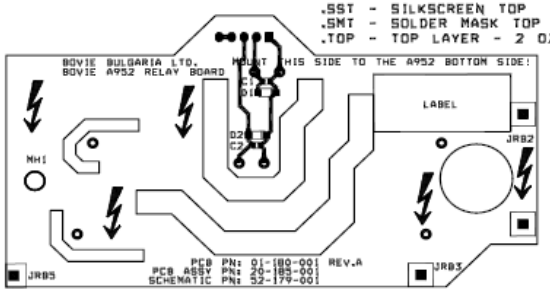
TITLE: PCB, POWER SUPPLY A952/DERM 94X

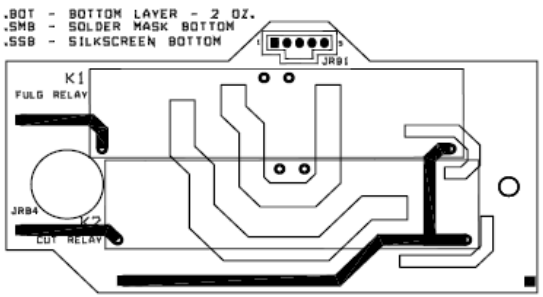
SHEET: 1 OF 1
REV: A
DRAWING NO.: 01-179

PCB Relay Board Silk

REV	DESCRIPTION	REVISED BY/DATE
A	TRANSFER FROM R&D	KIRIL IVANOV – 02/03/2016







LAYERS STACKUP

.SST - SILKSCREEN TOP
.SMT - SOLDER MASK TOP
.TOP - TOP LAYER - 2 OZ.
CORE - 0.6MM MIN
.BOT - BOTTOM LAYER - 2 OZ.
.SMB - SOLDER MASK BOTTOM
.SSB - SILKSCREEN BOTTOM

.DRD - DRILL DRAWING LAYER
.INB - BOARD OUTLINE

RoHS Compliant

2 LAYER PCB (LEAD-FREE)

FILENAME: 01-180-A
DATE: 02 MARCH 2016

NOTES: UNLESS OTHERWISE SPECIFIED;

1. PCB TOTAL THICKNESS - 0.062" +/- 10%
2. INSIDE RADUIS 0.062" MAXIMUM, IF APPLICABLE.
3. MATERIAL: LAMINATE, FR4 OR EQUAL, 2 LAYERS 2 OZ. FINAL COPPER THICKNESS (AFTER PLATING).
4. ALL HOLES THRU PLATED. ALL HOLE SIZES DESIGNATED ARE AFTER PLATING. VIAS MAY BE PLATED SHUT
5. PLATING: ALL CONDUCTING SURFACES, EXCLUDING PLATED THRU HOLES SHALL HAVE 1 OZ. (0.0014") OF 99.5% PURE COPPER. PLATED THRU HOLES SHALL HAVE A MINIMUM OF 0.0014" THICK OF 99.5% PURE COPPER.
6. FINISH: ALL CONDUCTIVE SURFACES, INCLUDING THE INSIDE OF PLATED THRU HOLES SHALL HAVE A MINIMUM BASE OF 118u" ELECTROLESS NICKEL COVERED WITH 2u" MINIMUM OF ELECTROLESS GOLD.
7. SOLDER MASK (BLUE, NON-GLOSS) BOTH SIDES OF PWB IN ACCORDANCE WITH IPC-SM-840.
8. SILKSCREEN, TOP AND BOTTOM SIDE, WITH WHITE NON-CONDUCTIVE INK, EQUAL TO WOR-NON CAT-L-INK 50-10R.
9. FINISHED PWB SHALL MEET REQUIREMENTS OF IPC-A-600C.
10. TOOLING HOLES ACCEPTABLE, HOWEVER, THEY MUST BE SO LOCATED AS NOT TO INTERFERE WITH THE ELECTRICAL OR MECHANICAL INTEGRITY OF THE PWB. PURCHASER APPROVAL IS SUGGESTED IF TOOLING HOLES ARE REQUIRED. MANUFACTURER'S UL-MARKING SHALL BE PLACED IN SST LAYER BREAKAWAY RAILS WITH ADDITIONAL GLOBAL FUDUCIALS ARE ALLOWED TO BE ADDED ACC.TO THE REQUIREMENTS OF THE ASSEMBLY HOUSE AT LEAST 5MM FROM ALL EDGES
11. SHEARING OF THE BOARD EDGES IS NOT ACCEPABLE. ROUTE TO CROP LINES, BREAK ALL SHARP EDGES.
12. MANUFACTURER IS TO BUILD BOARD TO IPC-D-300 CLASS 2 TYPE 1. IN CASE OF CONFLICT THIS FABRICATION PRINT IS TO TAKE PRECEDENCE.
13. PANELIZATION IS ALLOWABLE, AS LONG AS INDIVIDUAL PWB MEETS THE REQUIREMENTS OF THIS DRAWING.
14. WORKMANSHIP SHALL COMPLY WITH THE IPC-6010 SERIES, CLASS 2 AND INCLUDE IPC-A-600, CLASS 2
15. SOLDERABILITY SHALL COMPLY WITH IPC J-STD-003, CLASS 2

DRILL CHART

SYM	DIAM	TOL	QTY	NOTE
+	0.048		8	
⊠	0.052		9	
×	0.156		1	NON-PLATED
TOTAL			18	

Bovie.
5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760
INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 1994
PROJECT NO.: –

BOVIE–BULGARIA LTD.
BLVD. TSARIGRADSKO SHOSE 133
SOFIA 1784, BULGARIA
INTERPRET DIM AND TOL PER DIN ISO 2768–1
PROJECT NO.: –

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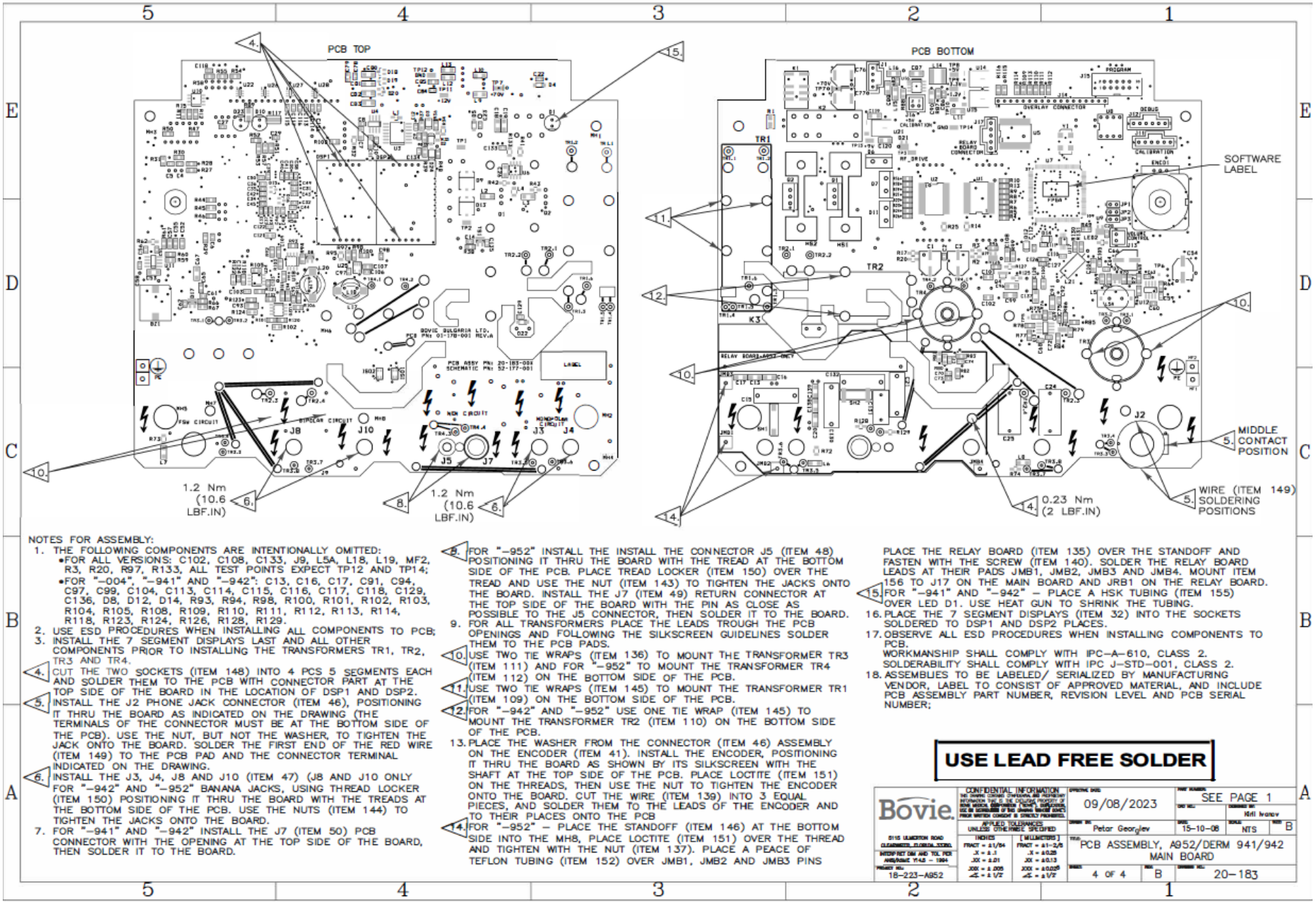
.X = ±.1	.X = ±0.25
.XX = ±.01	.XX = ±0.13
.XXX = ±.005	.XXX = ±0.025
∠ = ±1/2°	∠ = ±1/2°

EFFECTIVE DATE:
DRAWN BY: K.IVANOV
DATE: 14–12–22
TITLE: PCB, RELAY BOARD, A952
SHEET: 1 OF 1
REV: A
PART NUMBER: 01–180–001
CAD NO.:
DESIGNED BY: K.IVANOV
SCALE: NTS
SIZE: B
DRAWING NO.: 01–180

PCB Assembly Main Board



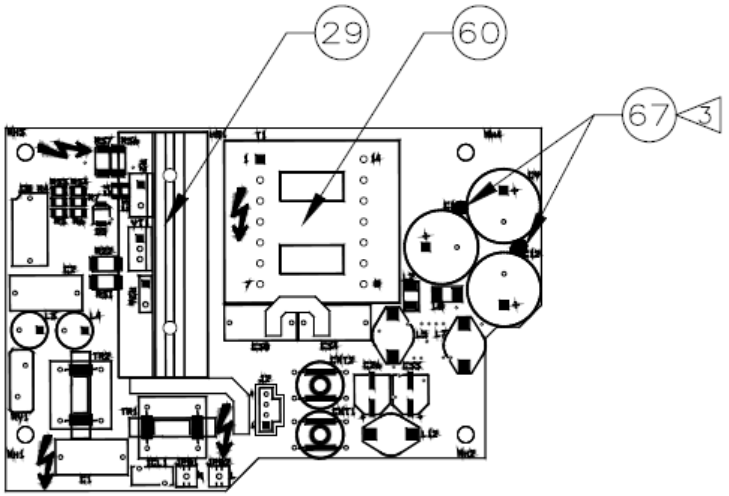
NOTES FOR ASSEMBLY:

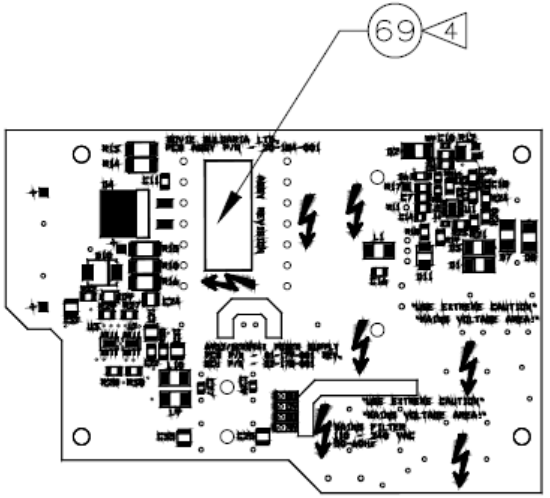
1. THE FOLLOWING COMPONENTS ARE INTENTIONALLY OMITTED:
   - FOR ALL VERSIONS: C102, C108, C133, J9, L5A, L18, L19, MF2, R3, R20, R97, R133, ALL TEST POINTS EXPECT TP12 AND TP14;
   - FOR "–004", "–941" AND "–942": C13, C16, C17, C91, C94, C97, C99, C104, C113, C114, C115, C116, C117, C118, C129, C136, D8, D12, D14, R93, R94, R98, R100, R101, R102, R103, R104, R105, R108, R109, R110, R111, R112, R113, R114, R118, R123, R124, R126, R128, R129.
2. USE ESD PROCEDURES WHEN INSTALLING ALL COMPONENTS TO PCB;
3. INSTALL THE 7 SEGMENT DISPLAYS LAST AND ALL OTHER COMPONENTS PRIOR TO INSTALLING THE TRANSFORMERS TR1, TR2, TR3 AND TR4.
4. CUT THE TWO SOCKETS (ITEM 148) INTO 4 PCS 5 SEGMENTS EACH AND SOLDER THEM TO THE PCB WITH CONNECTOR PART AT THE TOP SIDE OF THE BOARD IN THE LOCATION OF DSP1 AND DSP2.
5. INSTALL THE J2 PHONE JACK CONNECTOR (ITEM 46), POSITIONING IT THRU THE BOARD AS INDICATED ON THE DRAWING (THE TERMINALS OF THE CONNECTOR MUST BE AT THE BOTTOM SIDE OF THE PCB). USE THE NUT, BUT NOT THE WASHER, TO TIGHTEN THE JACK ONTO THE BOARD. SOLDER THE FIRST END OF THE RED WIRE (ITEM 149) TO THE PCB PAD AND THE CONNECTOR TERMINAL INDICATED ON THE DRAWING.
6. INSTALL THE J3, J4, J8 AND J10 (ITEM 47) (J8 AND J10 ONLY FOR "–942" AND "–952" BANANA JACKS, USING THREAD LOCKER (ITEM 150) POSITIONING IT THRU THE BOARD WITH THE TREADS AT THE BOTTOM SIDE OF THE PCB. USE THE NUTS (ITEM 144) TO TIGHTEN THE JACKS ONTO THE BOARD.
7. FOR "–941" AND "–942" INSTALL THE J7 (ITEM 50) PCB CONNECTOR WITH THE OPENING AT THE TOP SIDE OF THE BOARD, THEN SOLDER IT TO THE BOARD.
8. FOR "–952" INSTALL THE INSTALL THE CONNECTOR J5 (ITEM 48) POSITIONING IT THRU THE BOARD WITH THE TREAD AT THE BOTTOM SIDE OF THE PCB. PLACE TREAD LOCKER (ITEM 150) OVER THE TREAD AND USE THE NUT (ITEM 143) TO TIGHTEN THE JACKS ONTO THE BOARD. INSTALL THE J7 (ITEM 49) RETURN CONNECTOR AT THE TOP SIDE OF THE BOARD WITH THE PIN AS CLOSE AS POSSIBLE TO THE J5 CONNECTOR, THEN SOLDER IT TO THE BOARD.
9. FOR ALL TRANSFORMERS PLACE THE LEADS TROUGH THE PCB OPENINGS AND FOLLOWING THE SILKSCREEN GUIDELINES SOLDER THEM TO THE PCB PADS.
10. USE TWO TIE WRAPS (ITEM 136) TO MOUNT THE TRANSFORMER TR3 (ITEM 111) AND FOR "–952" TO MOUNT THE TRANSFORMER TR4 (ITEM 112) ON THE BOTTOM SIDE OF THE PCB.
11. USE TWO TIE WRAPS (ITEM 145) TO MOUNT THE TRANSFORMER TR1 (ITEM 109) ON THE BOTTOM SIDE OF THE PCB.
12. FOR "–942" AND "–952" USE ONE TIE WRAP (ITEM 145) TO MOUNT THE TRANSFORMER TR2 (ITEM 110) ON THE BOTTOM SIDE OF THE PCB.
13. PLACE THE WASHER FROM THE CONNECTOR (ITEM 46) ASSEMBLY ON THE ENCODER (ITEM 41). INSTALL THE ENCODER, POSITIONING IT THRU THE BOARD AS SHOWN BY ITS SILKSCREEN WITH THE SHAFT AT THE TOP SIDE OF THE PCB. PLACE LOCTITE (ITEM 151) ON THE THREADS, THEN USE THE NUT TO TIGHTEN THE ENCODER ONTO THE BOARD. CUT THE WIRE (ITEM 139) INTO 3 EQUAL PIECES, AND SOLDER THEM TO THE LEADS OF THE ENCODER AND TO THEIR PLACES ONTO THE PCB
14. FOR "–952" – PLACE THE STANDOFF (ITEM 146) AT THE BOTTOM SIDE INTO THE MH8, PLACE LOCTITE (ITEM 151) OVER THE THREAD AND TIGHTEN WITH THE NUT (ITEM 137). PLACE A PEACE OF TEFLON TUBING (ITEM 152) OVER JMB1, JMB2 AND JMB3 PINS
    PLACE THE RELAY BOARD (ITEM 135) OVER THE STANDOFF AND FASTEN WITH THE SCREW (ITEM 140). SOLDER THE RELAY BOARD LEADS AT THEIR PADS JMB1, JMB2, JMB3 AND JMB4. MOUNT ITEM 156 TO J17 ON THE MAIN BOARD AND JRB1 ON THE RELAY BOARD.
15. FOR "–941" AND "–942" – PLACE A HSK TUBING (ITEM 155) OVER LED D1. USE HEAT GUN TO SHRINK THE TUBING.
16. PLACE THE 7 SEGMENT DISPLAYS (ITEM 32) INTO THE SOCKETS SOLDERED TO DSP1 AND DSP2 PLACES.
17. OBSERVE ALL ESD PROCEDURES WHEN INSTALLING COMPONENTS TO PCB.
    WORKMANSHIP SHALL COMPLY WITH IPC–A–610, CLASS 2.
    SOLDERABILITY SHALL COMPLY WITH IPC J–STD–001, CLASS 2.
18. ASSEMBLIES TO BE LABELED/ SERIALIZED BY MANUFACTURING VENDOR, LABEL TO CONSIST OF APPROVED MATERIAL, AND INCLUDE PCB ASSEMBLY PART NUMBER, REVISION LEVEL AND PCB SERIAL NUMBER;

USE LEAD FREE SOLDER

Bovie	CONFIDENTIAL INFORMATION	09/08/2023	SEE PAGE 1
5115 ULMERTON ROAD CLEARWATER, FLORIDA 33760	APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED	Petar Georgiev	15–10–08
			Kiril Ivanov
		NTS	B
	PCB ASSEMBLY, A952/DERM 941/942 MAIN BOARD		
18–223–A952	4 OF 4	B	20–183

PCB Assembly Isolated PFC

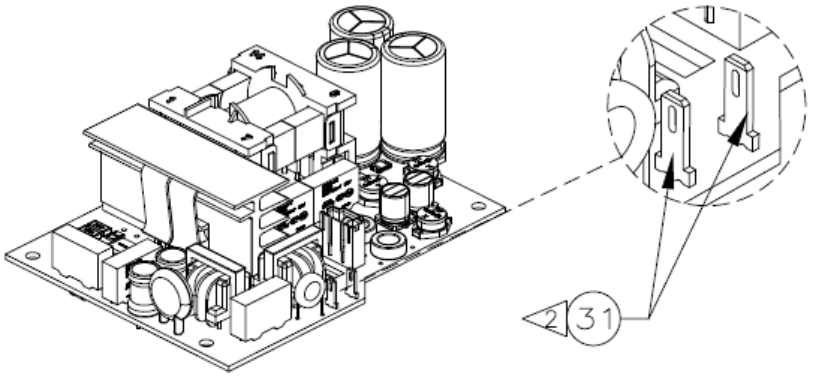




NOTES:

1. USE ESD PROCEDURES WHEN INSTALLING ALL COMPONENTS TO PCB.
2. SOLDER THE VERTICAL TERMINALS (ITEM 31) IN SHOWING DIRECTION.
3. PLACE BLACK SILICONE (ITEM 67) ON C9, C12 AND C13 AS SHOWN.
4. PLACE SERIAL NUMBER LABEL (ITEM 69) ON THE PCB IN THE LOCATION SHOWN. THE LABEL INCLUDE PCB ASSEMBLY PART NUMBER, REVISION LEVEL AND PCB SERIAL NUMBER.

WORKMANSHIP SHALL COMPLY WITH THE IPC-610 SERIES, CLASS 2 AND INCLUDE IPC-A-600, CLASS 2.
SOLDERABILITY SHALL COMPLY WITH IPC J-STD-003, CLASS 2



RoHS Compliant

USE LEAD FREE SOLDER

Bovie

5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760

INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 1994

PROJECT NO.: 18-223-A952

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INCHES	[MILLIMETERS]
FRACT = ±1/64	FRACT = ±2/5
.X = ±.1	.X = ±0.25
.XX = ±.01	.XX = ±0.13
.XXX = ±.005	.XXX = ±0.025
∠ = ±1/2°	∠ = ±1/2°

EFFECTIVE DATE: –

PART NUMBER: SEE PAGE 1

CAD NO.: –

DESIGNED BY: –

DRAWN BY: STANKO ZLATKOV

DATE: 09/10/2015

SCALE: NTS

SIZE: B

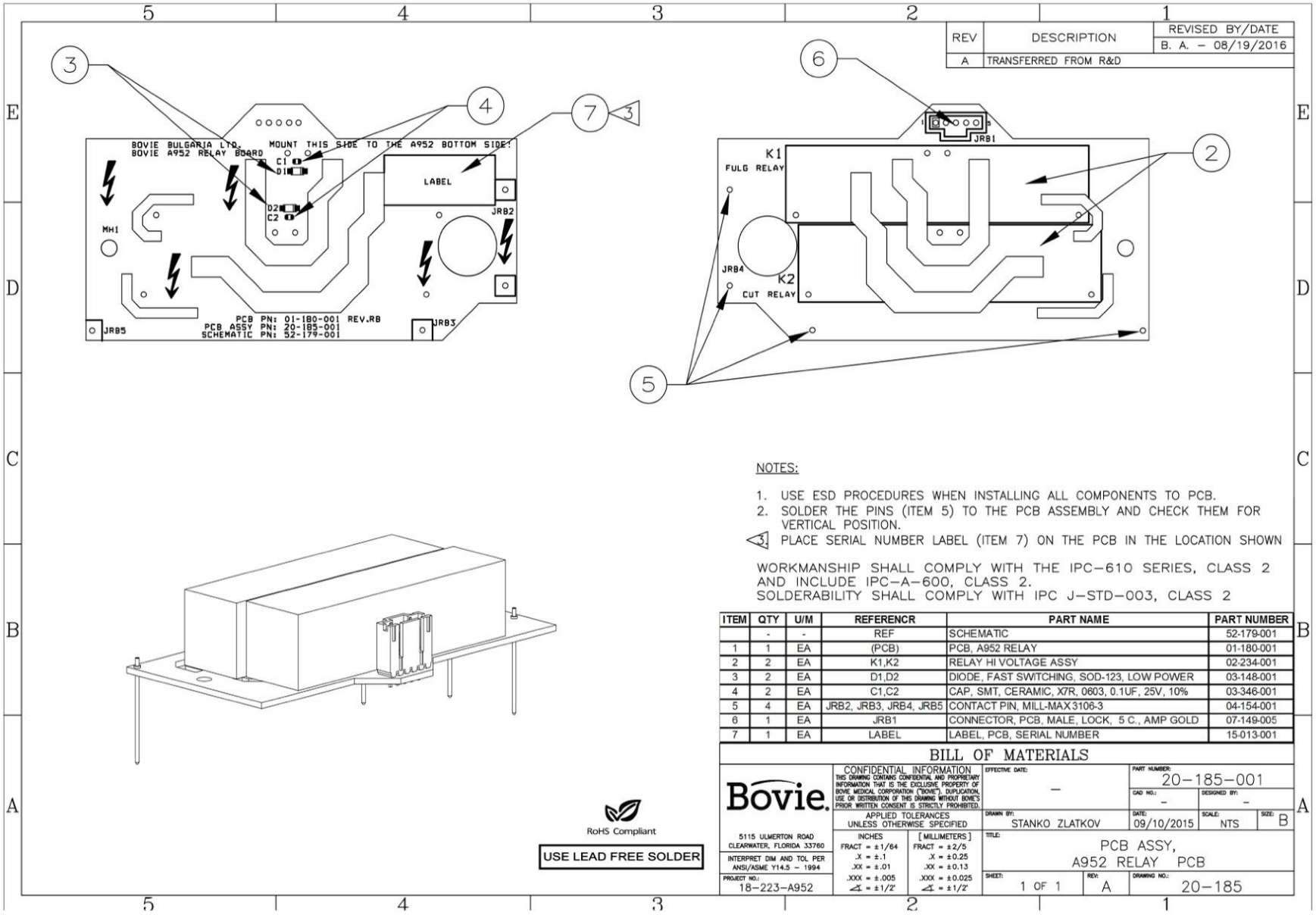
TITLE: PCB ASSY, ISOLATED PFC

SHEET: 2 OF 2

REV: A

DRAWING NO.: 20-184

PCB Assembly Relay (A952 Only)



ITEM	QTY	U/M	REFERENCR	PART NAME	PART NUMBER
	-	-	REF	SCHEMATIC	52-179-001
1	1	EA	(PCB)	PCB, A952 RELAY	01-180-001
2	2	EA	K1,K2	RELAY HI VOLTAGE ASSY	02-234-001
3	2	EA	D1,D2	DIODE, FAST SWITCHING, SOD-123, LOW POWER	03-148-001
4	2	EA	C1,C2	CAP, SMT, CERAMIC, X7R, 0603, 0.1UF, 25V, 10%	03-346-001
5	4	EA	JRB2, JRB3, JRB4, JRB5	CONTACT PIN, MILL-MAX 3106-3	04-154-001
6	1	EA	JRB1	CONNECTOR, PCB, MALE, LOCK, 5 C., AMP GOLD	07-149-005
7	1	EA	LABEL	LABEL, PCB, SERIAL NUMBER	15-013-001

Final Assembly Page One (BOM)

REV	DESCRIPTION	REVISED BY/DATE
D	CABLE, 25-152-001 AND 04-239-305 REMOVED. ITEM 30 WAS 11-089-001.	S.Z. - 06/26/2023

ITEM	QTY per P/N			U/M	PART NAME	PART NUMBER
	-941	-942	-952			
1	1	-	-	EA	PCB ASSEMBLY, DERM 941, MAIN BOARD	20-183-941
	-	1	-		PCB ASSEMBLY, DERM 942, MAIN BOARD	20-183-942
	-	-	1		PCB ASSEMBLY, A952, MAIN BOARD	20-183-952
2	1	1	1	EA	PCB ASSEMBLY, ISOLATED PFC	20-184-001
3	1	1	1	EA	DERM 94X & A952 ENCODER KNOB, ASSY	06-363-002
4	1	1	1	EA	DERM 101 AND 102 MOLDED WINDOW	06-276-001
5	1	1	-	EA	DERM 94X BACK PANEL	06-300-001
	-	-	1		A952 BACK PANEL	06-300-002
6	1	-	-	EA	DERM 941 FRONT PANEL	06-301-001
	-	1	-		DERM 942 FRONT PANEL	06-302-001
	-	-	1		A952 FRONT PANEL	06-303-001
7	-	1	1	EA	DERM 94X/A952 SLIDER, BIPOLAR MODE	06-304-001
8	1	1	1	EA	DERM 94X/A952 SLIDER, MONOPOLAR MODE	06-305-001
9	1	1	1	EA	WATER PROTECTOR, A952/DERM 94X	06-320-001
10	3	5	4	EA	SEAL, CONNECTORS A952/DERM94X	06-321-001
11	-	-	1	EA	SEAL, NEUTRAL CONNECTORS A952	06-322-001
12	1	1	1	EA	FIRE BARRIER, A952/DERM94X	06-337-001
13	1	1	1	EA	SWITCH, NON-ILLUM. ROUND ROCKER, RC, WHITE	07-215-001
14	1	1	1	EA	POWER ENTRY INLET, SCHAFFNER, 4A, MEDICAL	07-244-002
15	2	2	2	EA	FUSE, 5x20, 250V, TIME LAG, CERAMIC, 1.25A	02-349-250
16	15	15	15	EA	SCREW, PHIL PAN HD W/LOCKW., 6-32 x 5/16	04-005-104
17	2	2	2	EA	NUT W/LOCK WASHER 4-40	04-020-004
18	2	2	2	EA	SCREW, 4-40 X 1/2, FLAT HD, SST	04-078-001
19	1	1	1	EA	CABLE, PWR FILTER GND, FLAGGED, A952	25-083-003
20	1	1	1	EA	CABLE ASSY, WIRE ATTACHMENT SOUND SW, A952	25-141-002
21	1	1	1	EA	CABLE ASSY, INLET TO PW SWITCH, A952/D94X	25-153-001
22	1	1	1	EA	CABLE ASSY, POWER HARNESS, A952/DERM 94X	25-154-001
23	1	1	1	EA	CABLE ASSY, SMPS TO MAIN, A952/DERM 94X	25-155-001
24	1	1	1	EA	TIE WRAP	5113100136
25	1	1	1	EA	LABEL, BRADY, METTALLIZED, POLYESTER, 1"X0.5" REF: IMPRINT # IPL-HAZARDOUS VOLTAGE	23299
	1	1	1		LABEL, BRADY, METTALLIZED, POLYESTER, 1"X0.5" REF: IMPRINT # IPL-952_94X_FUSE	
26	1	-	-	EA	BRADY LABEL STOCK, REAR PANEL LABEL, WHITE REF: IMPRINT # IPL-A941	23360
	-	1	-		BRADY LABEL STOCK, REAR PANEL LABEL, WHITE REF: IMPRINT # IPL-A942	
	-	-	1		BRADY LABEL STOCK, REAR PANEL LABEL, WHITE REF: IMPRINT # IPL-A952	
27	-	-	1	EA	OVERLAY, A952 ESU	15-399-001
28	A/R	A/R	A/R	OZ	LOCTITE 495	11-026-006
29	A/R	A/R	A/R	OZ	LOCTITE, THREADLOCKER, MEDIUM STRENGTH	11-026-009
30	A/R	A/R	A/R	OZ	DOW CORNING 3145 CLEAR ADHESIVE/SEALANT	11-030-001
31	-	2	-	cm^2	PROTECTIVE PAD	11-060-001
32	A/R	A/R	A/R	OZ	SILICONE, LUBRICANT SPRAY	11-073-001

RoHS Compliant

ASSEMBLY, FINAL, A952	18-223-952
ASSEMBLY, FINAL, DERM 942	18-223-942
ASSEMBLY, FINAL, DERM 941	18-223-941
TITLE	PART NO.

Bovie

5115 Ulmerton Road
Clearwater, Florida 33760

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.XXX = ±.005	.XXX = ±0.025
ANGLES = ±1/2°	ANGLES = ±1/2°

INTERPRET DIM AND TOL PER ASME/ANSI Y14.5 - 1994

PROJECT NO. –

EFFECTIVE DATE: 09/08/2023

DRAWN BY: Petar Georgiev

PART NUMBER: SEE ABOVE

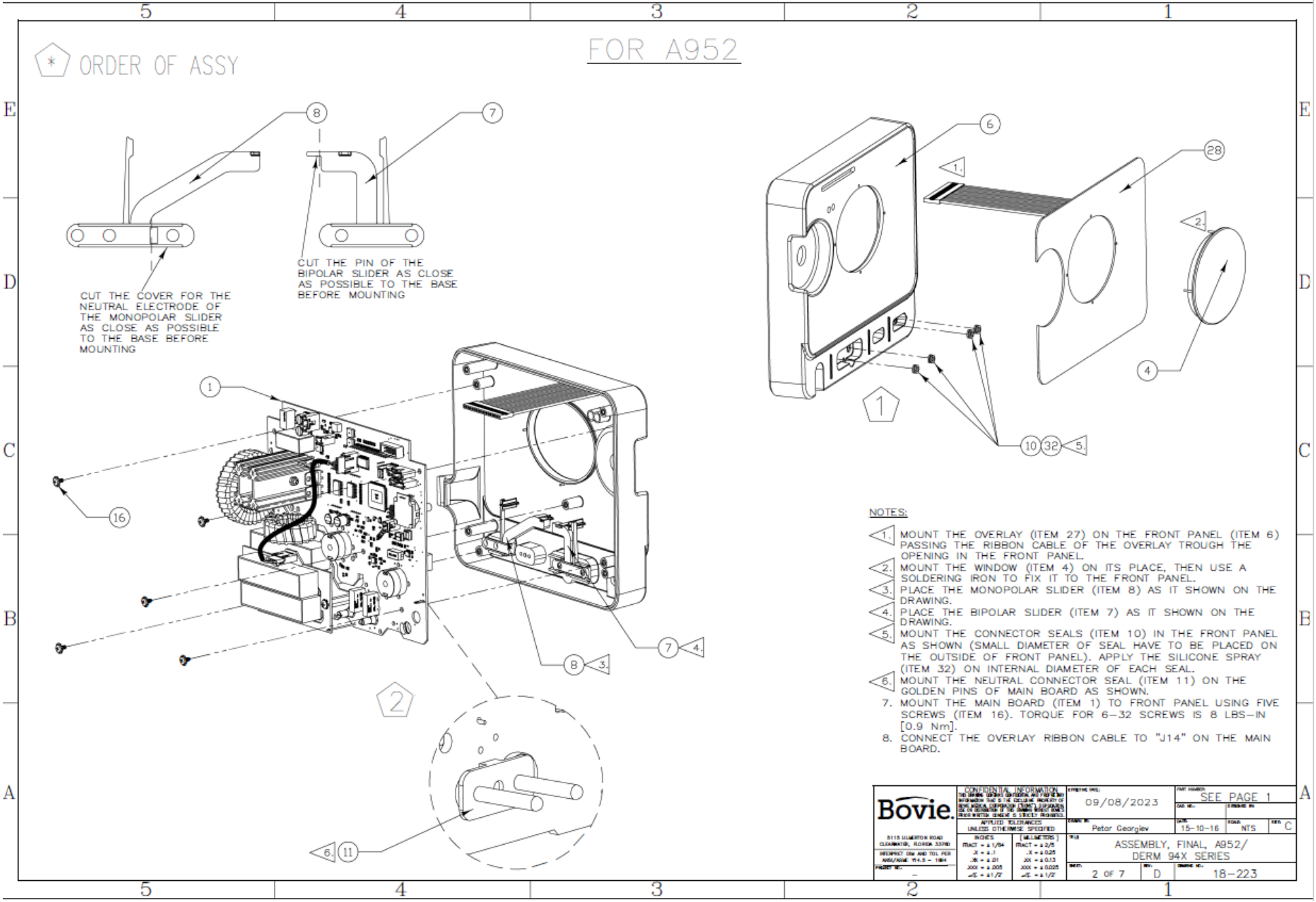
DWG NO. | DESIGNED BY:

DATE: 15-10-18 | SCALE: NTS | REV: A

TITLE: ASSEMBLY, FINAL, A952/ DERM 94X SERIES

SHEET: 1 OF 7 | REV: D

DRAWING NO.: 18-223


ORDER OF ASSY
FOR A952
CUT THE COVER FOR THE NEUTRAL ELECTRODE OF THE MONOPOLAR SLIDER AS CLOSE AS POSSIBLE TO THE BASE BEFORE MOUNTING
CUT THE PIN OF THE BIPOLAR SLIDER AS CLOSE AS POSSIBLE TO THE BASE BEFORE MOUNTING
NOTES:
1. MOUNT THE OVERLAY (ITEM 27) ON THE FRONT PANEL (ITEM 6) PASSING THE RIBBON CABLE OF THE OVERLAY TROUGH THE OPENING IN THE FRONT PANEL.
2. MOUNT THE WINDOW (ITEM 4) ON ITS PLACE, THEN USE A SOLDERING IRON TO FIX IT TO THE FRONT PANEL.
3. PLACE THE MONOPOLAR SLIDER (ITEM 8) AS IT SHOWN ON THE DRAWING.
4. PLACE THE BIPOLAR SLIDER (ITEM 7) AS IT SHOWN ON THE DRAWING.
5. MOUNT THE CONNECTOR SEALS (ITEM 10) IN THE FRONT PANEL AS SHOWN (SMALL DIAMETER OF SEAL HAVE TO BE PLACED ON THE OUTSIDE OF FRONT PANEL). APPLY THE SILICONE SPRAY (ITEM 32) ON INTERNAL DIAMETER OF EACH SEAL.
6. MOUNT THE NEUTRAL CONNECTOR SEAL (ITEM 11) ON THE GOLDEN PINS OF MAIN BOARD AS SHOWN.
7. MOUNT THE MAIN BOARD (ITEM 1) TO FRONT PANEL USING FIVE SCREWS (ITEM 16). TORQUE FOR 6-32 SCREWS IS 8 LBS-IN [0.9 Nm].
8. CONNECT THE OVERLAY RIBBON CABLE TO "J14" ON THE MAIN BOARD.
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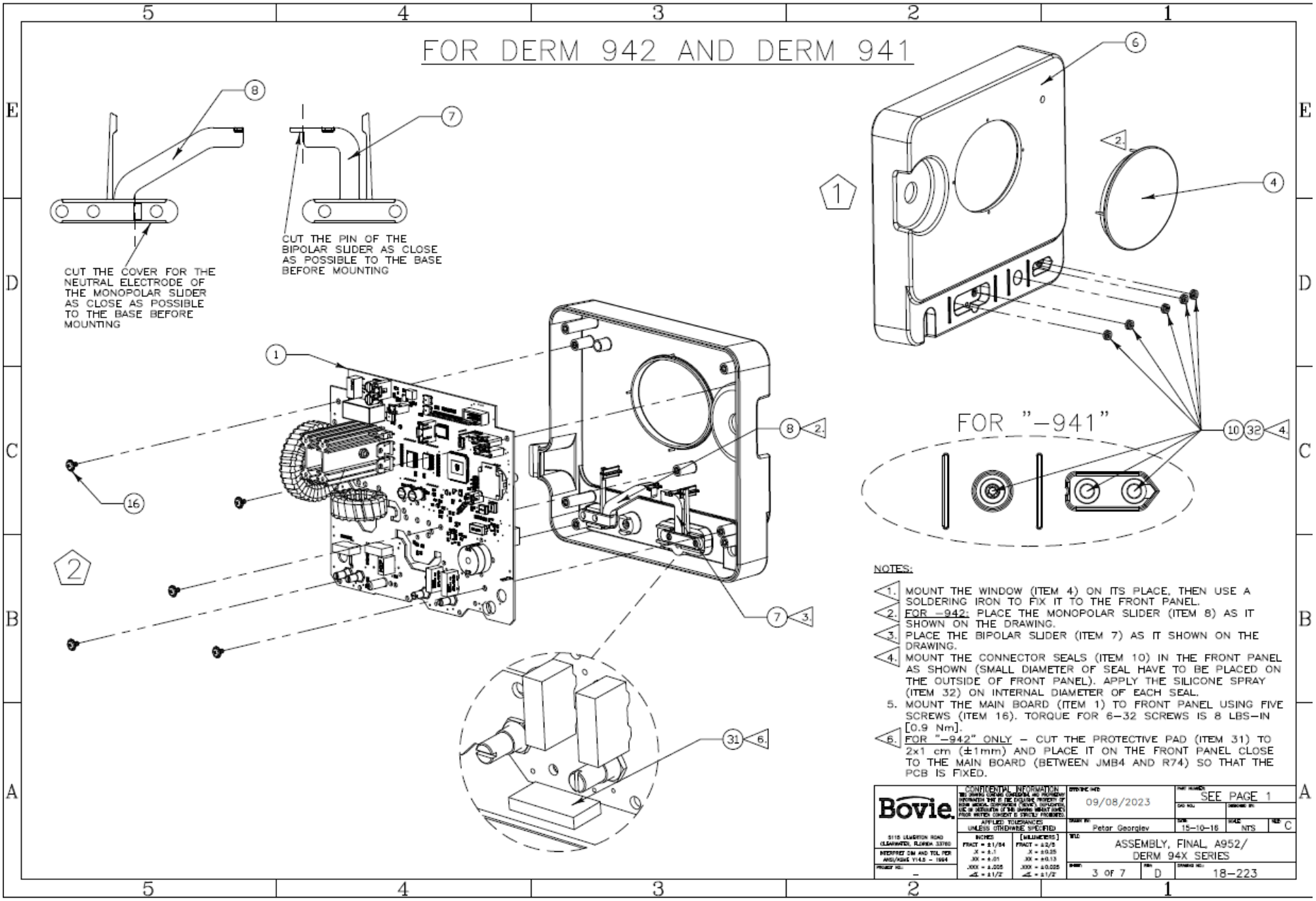
FOR DERM 942 AND DERM 941
CUT THE COVER FOR THE NEUTRAL ELECTRODE OF THE MONOPOLAR SLIDER AS CLOSE AS POSSIBLE TO THE BASE BEFORE MOUNTING
CUT THE PIN OF THE BIPOLAR SLIDER AS CLOSE AS POSSIBLE TO THE BASE BEFORE MOUNTING
FOR "-941"
NOTES:
1. MOUNT THE WINDOW (ITEM 4) ON ITS PLACE, THEN USE A SOLDERING IRON TO FIX IT TO THE FRONT PANEL.
2. FOR -942: PLACE THE MONOPOLAR SLIDER (ITEM 8) AS IT SHOWN ON THE DRAWING.
3. PLACE THE BIPOLAR SLIDER (ITEM 7) AS IT SHOWN ON THE DRAWING.
4. MOUNT THE CONNECTOR SEALS (ITEM 10) IN THE FRONT PANEL AS SHOWN (SMALL DIAMETER OF SEAL HAVE TO BE PLACED ON THE OUTSIDE OF FRONT PANEL). APPLY THE SILICONE SPRAY (ITEM 32) ON INTERNAL DIAMETER OF EACH SEAL.
5. MOUNT THE MAIN BOARD (ITEM 1) TO FRONT PANEL USING FIVE SCREWS (ITEM 16). TORQUE FOR 6-32 SCREWS IS 8 LBS-IN [0.9 Nm].
6. FOR "-942" ONLY - CUT THE PROTECTIVE PAD (ITEM 31) TO 2x1 cm (±1mm) AND PLACE IT ON THE FRONT PANEL CLOSE TO THE MAIN BOARD (BETWEEN JMB4 AND R74) SO THAT THE PCB IS FIXED.
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Petar Georgiev
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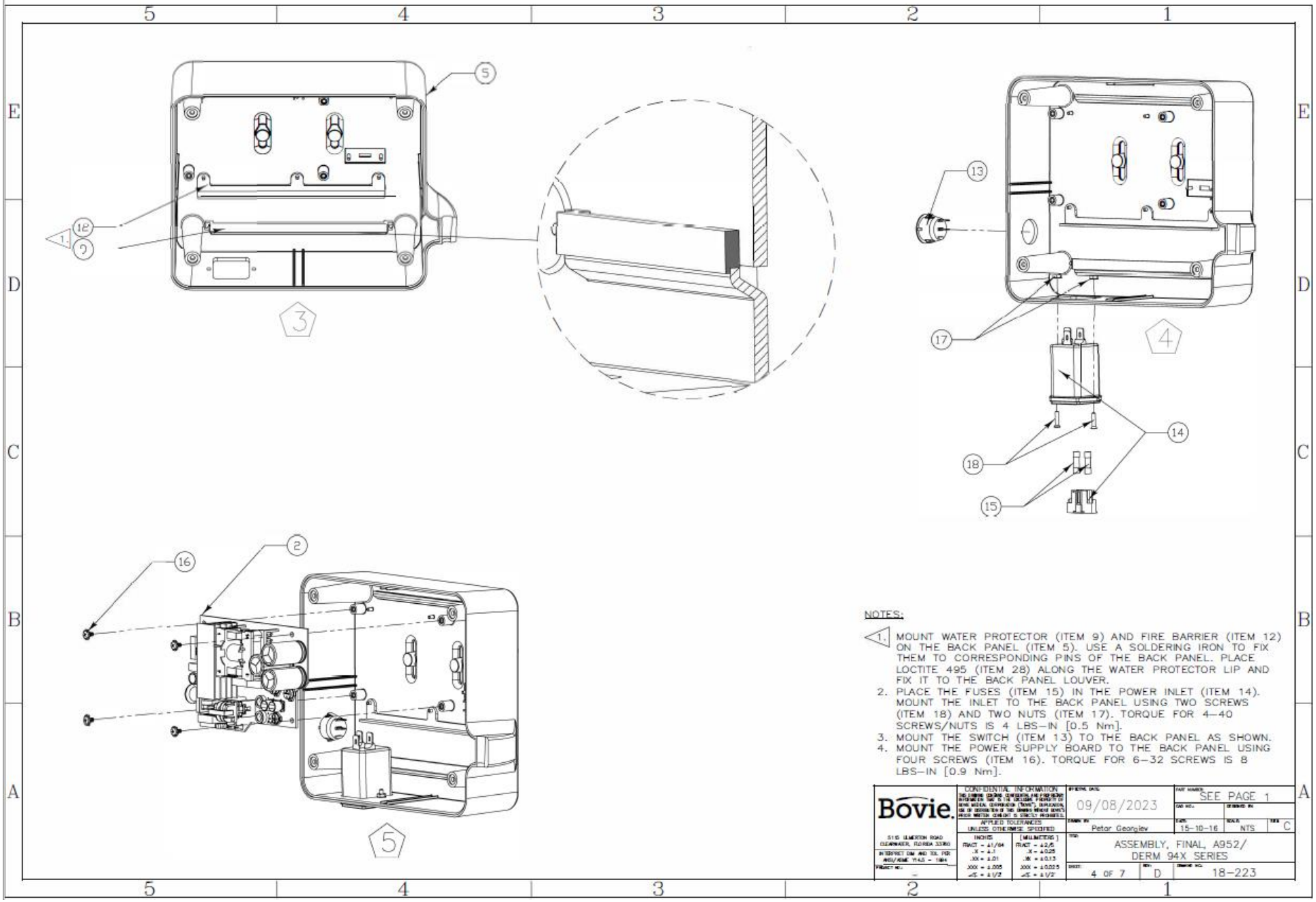
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NOTES:
1. MOUNT WATER PROTECTOR (ITEM 9) AND FIRE BARRIER (ITEM 12) ON THE BACK PANEL (ITEM 5). USE A SOLDERING IRON TO FIX THEM TO CORRESPONDING PINS OF THE BACK PANEL. PLACE LOCTITE 495 (ITEM 28) ALONG THE WATER PROTECTOR LIP AND FIX IT TO THE BACK PANEL LOUVER.
2. PLACE THE FUSES (ITEM 15) IN THE POWER INLET (ITEM 14). MOUNT THE INLET TO THE BACK PANEL USING TWO SCREWS (ITEM 18) AND TWO NUTS (ITEM 17). TORQUE FOR 4–40 SCREWS/NUTS IS 4 LBS–IN [0.5 Nm].
3. MOUNT THE SWITCH (ITEM 13) TO THE BACK PANEL AS SHOWN.
4. MOUNT THE POWER SUPPLY BOARD TO THE BACK PANEL USING FOUR SCREWS (ITEM 16). TORQUE FOR 6–32 SCREWS IS 8 LBS–IN [0.9 Nm].
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APPLIED TOLERANCES
UNLESS OTHERWISE SPECIFIED
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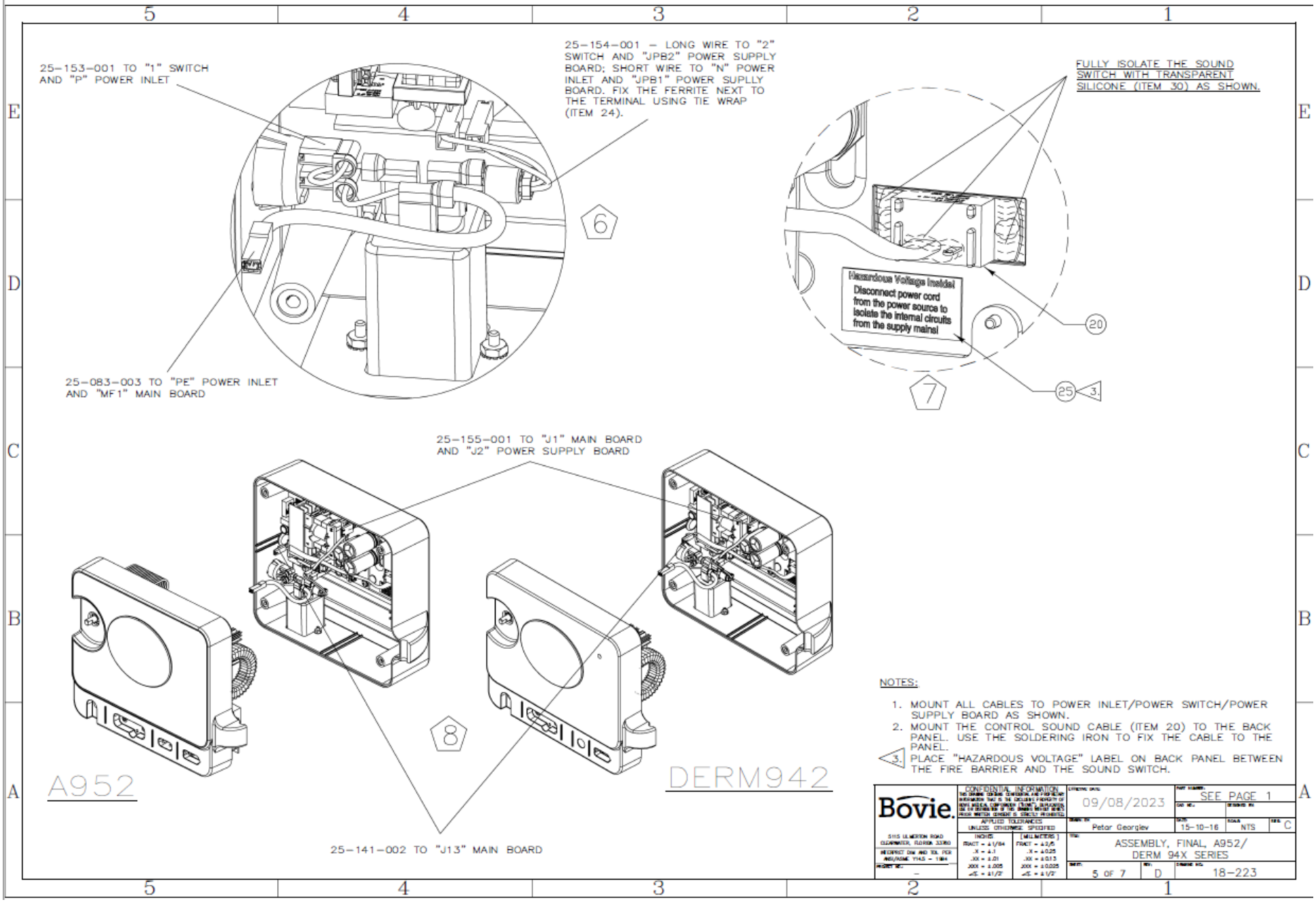
Final Assembly Page Five



NOTES:

1. MOUNT ALL CABLES TO POWER INLET/POWER SWITCH/POWER SUPPLY BOARD AS SHOWN.
2. MOUNT THE CONTROL SOUND CABLE (ITEM 20) TO THE BACK PANEL. USE THE SOLDERING IRON TO FIX THE CABLE TO THE PANEL.
3. PLACE "HAZARDOUS VOLTAGE" LABEL ON BACK PANEL BETWEEN THE FIRE BARRIER AND THE SOUND SWITCH.

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APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED

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TITLE	ASSEMBLY, FINAL, A952/ DERM 94X SERIES
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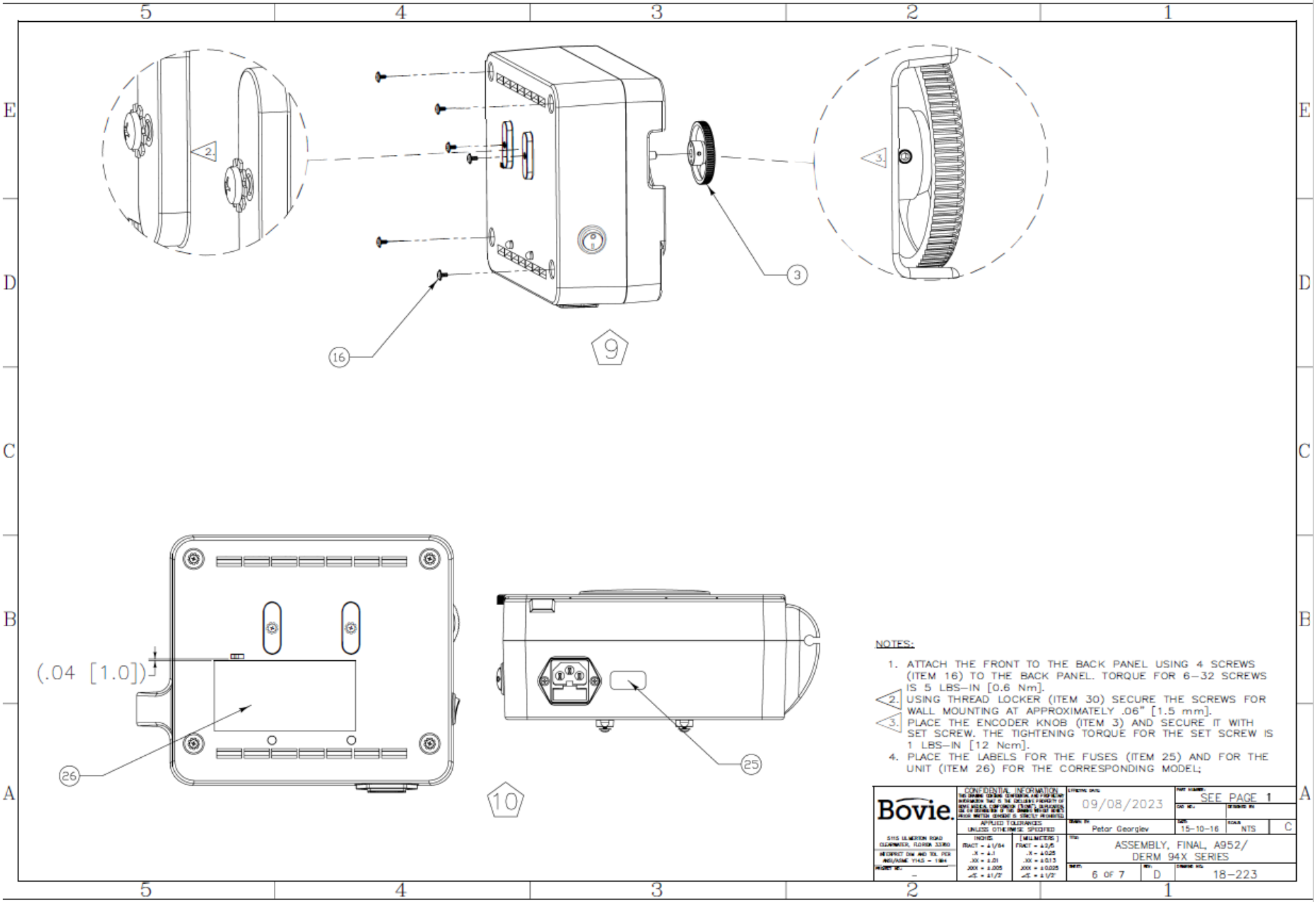

NOTES:

1. ATTACH THE FRONT TO THE BACK PANEL USING 4 SCREWS (ITEM 16) TO THE BACK PANEL. TORQUE FOR 6–32 SCREWS IS 5 LBS–IN [0.6 Nm].
2. USING THREAD LOCKER (ITEM 30) SECURE THE SCREWS FOR WALL MOUNTING AT APPROXIMATELY .06" [1.5 mm].
3. PLACE THE ENCODER KNOB (ITEM 3) AND SECURE IT WITH SET SCREW. THE TIGHTENING TORQUE FOR THE SET SCREW IS 1 LBS–IN [12 Ncm].
4. PLACE THE LABELS FOR THE FUSES (ITEM 25) AND FOR THE UNIT (ITEM 26) FOR THE CORRESPONDING MODEL;

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APPLIED TOLERANCES
UNLESS OTHERWISE SPECIFIED

	INCHES	[MILLIMETERS]
	FRACT ± 1/64	FRACT ± 0.5
	.X ± 0.1	.X ± 0.25
	.XX ± 0.01	.XX ± 0.13
	.XXX ± 0.005	.XXX ± 0.025
	∠S ± 1/2°	∠S ± 1/2°

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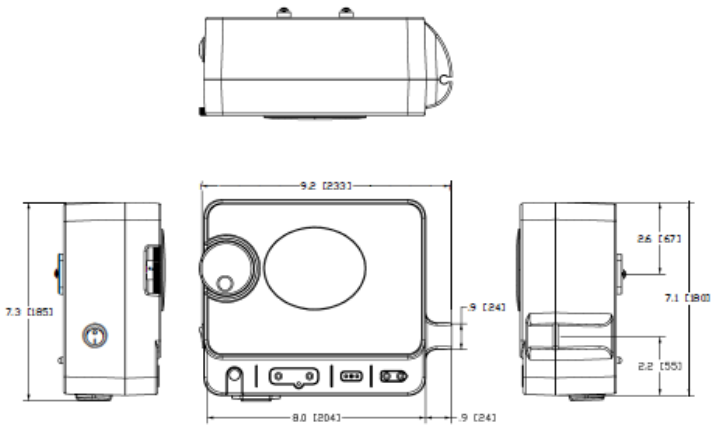
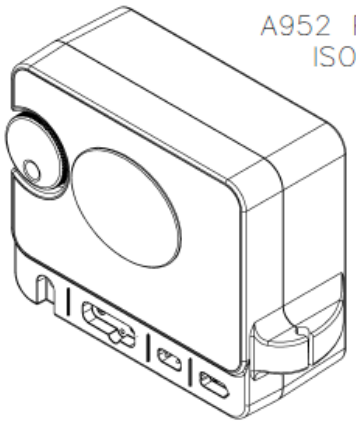
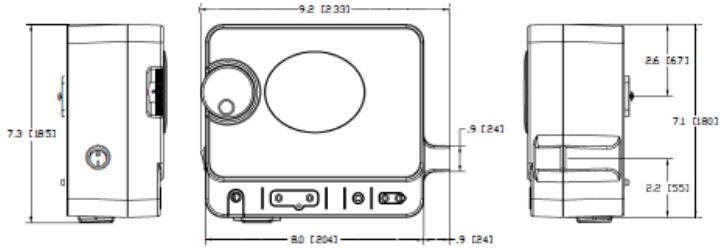
A952
PN:18–223–952



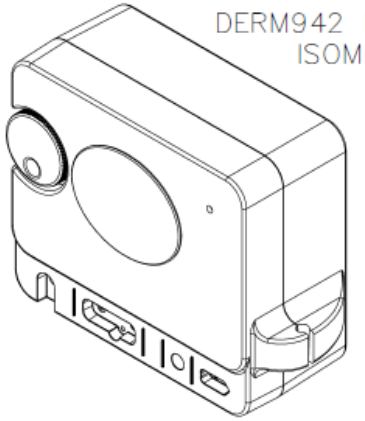
A952 PN:18–223–952
ISOMETRIC VIEW



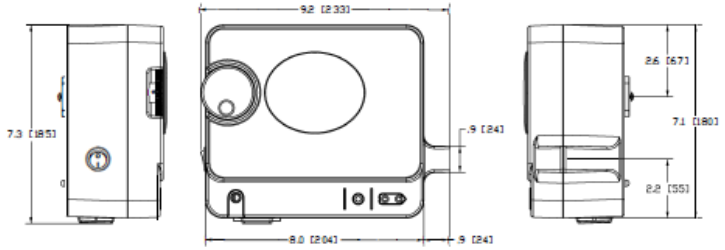
DERM 942
PN:18–223–942

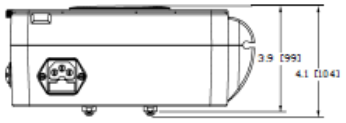


DERM942 PN:18–223–942
ISOMETRIC VIEW



DERM 941
PN:18–223–941





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5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760

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UNLESS OTHERWISE SPECIFIED

	INCHES	[MILLIMETERS]
FRACT	±1/64	±2/5
.X	±.1	±0.25
.XX	±.01	±0.13
.XXX	±.005	±0.025
ANG	±1/2°	±1/2°

INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 1994

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