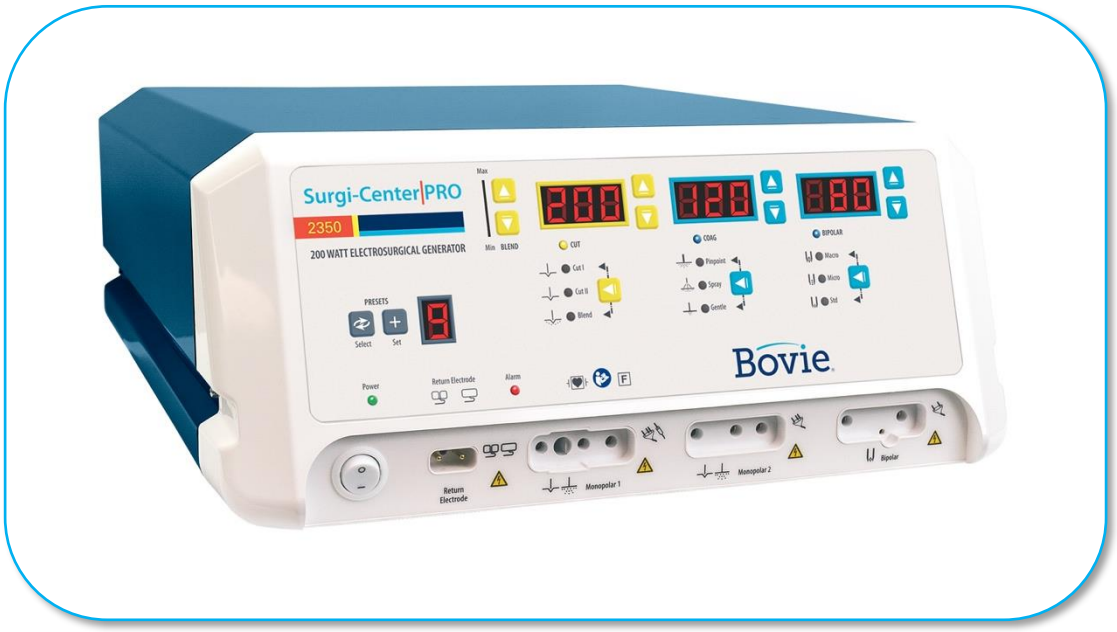
Bovie®



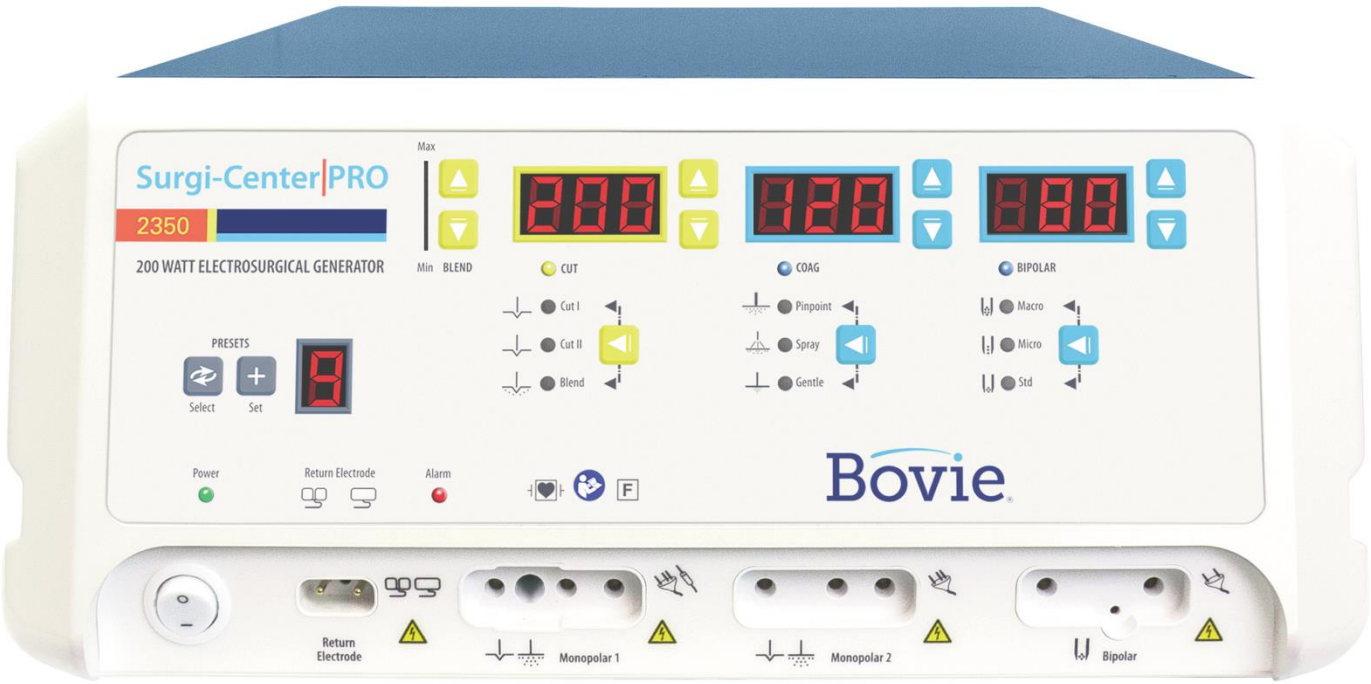
BOVIE® SURGI-CENTER | PRO

Electrosurgical generator

Service Guide

Bovie

Intro



SERVICE GUIDE

This Service Guide and the equipment it describes are for qualified technicians who maintain and repair the Bovie® Surgi-Center│PRO Electrosurgical Generator. Additional User information is available in the Bovie® Surgi-Center│PRO User's Guide.

This document covers technical descriptions of the Bovie® Surgi-Center│PRO including its physical appearance, all operator controls and indications, operational specifications, component functional descriptions (module level), diagrams of the electronic circuits used, and troubleshooting guidelines (with chart comparisons).

The Bovie® Surgi-Center│PRO was constructed with the highest quality components. In the unlikely event that your generator fails within four years of purchase date, Symmetry Surgical will warranty the product and effect factory repairs. Please refer to Appendix A, Warranty for what is covered, length of coverage, and "How to Receive a Return Authorization Number," in Section 8.

Equipment Covered in this Manual

Bovie® Surgi-Center│PRO:
Reference No: A2350

For Information Contact

Symmetry Surgical Inc. • 3034 Owen Drive, Antioch, TN 37013 USA
Phone 1-888-364-7004
www.symmetrysurgical.com

Bovie Part Number - MC-55-232-002_4-EN

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 Bovie® Surgi-Center│PRO, please refer to the User's Guide for standard operating precautions.

APPLICABLE SAFETY STANDARDS

PART 1 ANSI/AAMI ES60601-1:2005 + C1:2009 + A2:2010 + A1:2012
CAN/CSA-C22.2 No. 60601-1:08 + C2:2011

PART 2 ANSI/AAMI 60601-2-2:2009 and CAN/CSA-C22.2 No. 60601-2-2:09

CONVENTIONS USED IN THIS GUIDE

WARNING:

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

CAUTION:

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.

TABLE OF CONTENTS

LIST OF FIGURES

THE BOVIE® SURGI-CENTER | PRO

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.

FUNCTIONAL DESCRIPTION

The Bovie® Surgi-Center│PRO Electrosurgical Generator is used to deliver RF energy via an assortment of surgical devices to cut and coagulate different kinds of tissue.

The Bovie® Surgi-Center│PRO includes digital technology. This new technology is evident in the self-checking circuitry and error code readouts. The unit offers monopolar and bipolar electrosurgical operations.

The following are Bovie® Surgi-Center│PRO key advantages and benefits:

• Power capabilities
Up to 200 watts of pure cut in the Cut 1 mode @ 300 Ω
Up to 200 watts of pure cut in the Cut II mode @ 300 Ω
Up to 200 watts of Blend @ 300 Ω
Up to 120 watts of Pinpoint/Spray Coagulation @ 500 Ω
Up to 120 watts of Gentle Coagulation @ 125 Ω
Up to 50-80 watts of Bipolar @ 50-100 Ω
Up to 225 watts of Bovie® Bipolar @ 25 Ω

• Two Cut Modes, Cut I & Cut II
Two cut modes give the surgeon flexibility to cut all types of tissue without losing performance.
Cut I generates constant output power over a wide range of impedances. Refer to Section 3, Technical Specifications section of this guide.
Cut II is a softer cut that generates constant output power with a lower voltage over a small range of impedances suggested for laparoscopic procedures. Refer to Section 3, Technical Specifications section of this guide.

• Four Levels of Blend
The Blend mode is a combination of cutting and hemostasis. The Bovie® Surgi-Center│PRO gives the surgeon freedom to adjust the desired level of hemostasis. A level setting of 1 is minimal blend with maximum cutting effect. A level setting of 4 is maximum hemostasis (blend) with minimal cutting effect. This adjustment is easily achieved by a incremental 4-level adjustment.
Refer to Section 2, Controls, Indicators, and Receptacles, Cut and Blend Controls. The Blend mode improves the rate of targeted tissue desiccation without increasing the power delivered by the generator.

• Three levels of coagulation: Pinpoint, Spray and Gentle Coagulation

- Pinpoint provides precise control of bleeding in localized areas.
- Spray provides greater control of bleeding in highly vascular tissue over broad surface areas.
- The Gentle Coagulation Mode provides delicate coagulation.

• Macro Bipolar Mode
The Macro Bipolar Mode provides bipolar cutting or rapid coagulation. Power remains constant over a wide range of tissue types.

• Micro Bipolar Mode
The Micro Bipolar Mode provides precise Bipolar coagulation effects.

• Standard Bipolar Mode
The Standard Bipolar Mode provides power for conventional Bipolar output.

• Presets
The surgeon can store 10 user-defined RF presets and 6 interface Set-Up Preferences presets for easy recall of frequently used settings.

• Return electrode sensing and contact quality monitoring
The Bovie® Surgi-Center│PRO incorporates a return electrode contact quality monitoring system (Bovie NEM™). This system detects the type of return electrode: solid or split. The system also continually monitors the contact quality between the patient and the split return electrode. This feature is designed to minimize patient burns at the return electrode site.

NOTICES:
The Bovie NEM™ system recommends that you use a split return electrode.

Before activation, pad placement and visual verification of the split return electrode (split pad) indicator on the front panel is recommended. After connecting the split pad to the generator and placing the split pad securely to the patient, give the unit 3 seconds to recognize the split pad. The split pad indicator will illuminate green. If the split pad and cord are attached to the generator without secure contact to the patient, the alarm indicator will illuminate red.

• FDFS™ (Fast Digital Feedback System)
The FDFS™ (Fast Digital Feedback System) measures voltage and current at 5,000 times a second and immediately adjusts the power to varying impedance during the electrosurgical procedure. The unit's digital technology senses and responds to changes in tissue density. Unlike analog, this feature reduces the need to adjust power settings manually with varying tissue impedance.

• User-Friendly Design
Digital interface with membrane switch feature selection.

• Three Front Panel Accessory Connections and Two Rear Panel Footswitch Connections
These connectors accept the latest monopolar and bipolar instruments. Refer to Section 2, Controls, Indicators, and Receptacles to learn more. Monopolar 1 connector accepts a standard 3-pin monopolar connector or adaptor (A1255A) for foot-controlled accessories. Monopolar 2 connector accepts a standard 3-pin monopolar connector for connecting standard monopolar accessories to the generator. The front panel also allows for a standard Bipolar accessory.
The rear panel monopolar footswitch connector accepts a Bovie® Monopolar Footswitch (BV-1253B). The rear panel bipolar footswitch connector accepts a Bovie® Bipolar Footswitch (BV-1254B).

• Memory
The unit automatically powers up to the last activated mode and power settings.

• Isolated RF output
This minimizes the potential of alternate site burns.

• Self diagnostics
These diagnostics continually monitor the unit to ensure proper performance.

UNIT DESCRIPTION

The Bovie® Surgi-Center│PRO is a self-contained unit, consisting of the main enclosure and power cord. The main components incorporated in the generator include:

- Front Panel Components Power switch; membrane switches to control power output and mode selection; receptacles for connecting electrosurgical accessories; and indicators that show the current settings, patient return electrode status, and footswitch status.
- Rear Panel Components Volume control; bipolar and monopolar footswitch receptacles; power cable receptacle and fuse holder; equipotential grounding stud; and remote accessory receptacle.
- Internal Components Display board; main board; speaker board; relay board; power supply; and cables.

SAFETY PRECAUTIONS WHEN REPAIRING THE GENERATOR

Before servicing the Bovie® Surgi-Center│PRO, it is important that you read, understand, and follow the instructions supplied with the generator. Also, be familiar with any other equipment used to install, test, adjust, or repair the generator.

General Warnings, Cautions, and Notices

To promote the safe use of the Bovie® Surgi-Center│PRO, 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.

CAUTIONS:
Do not stack equipment on top of the generator or place the generator on top of any electrical equipment. These configurations are unstable and/or do not allow adequate cooling.
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.

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.

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.

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-control 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

WARNING:
Non-flammable agents should be used for cleaning and disinfection wherever possible.
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.

CONTROLS, INDICATORS, AND RECEPTACLES

This section describes:

- The Front and Rear Panels
- Controls, Indicators, Receptacles, and Ports

FRONT PANEL

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

Symbols on the Front Panel

Refer to the following table for descriptions of symbols found on the front panel of the Bovie® Surgi-Center|PRO.

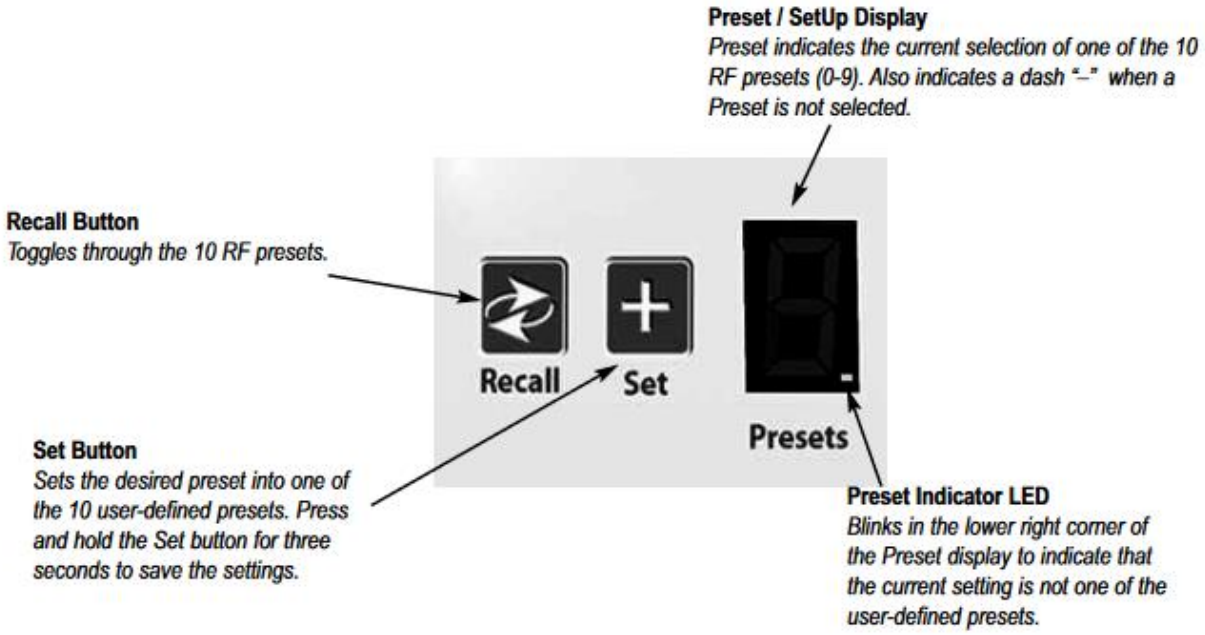
SYMBOLS	DESCRIPTION
Cut Controls	
	Cut mode (Cut I and Cut II)
	Blend mode
Coag Controls	
	Pinpoint Mode
	Spray Mode
	Gentle Mode
Bipolar Controls	
	Macro Bipolar Mode
	Micro Bipolar Mode
	Standard Bipolar Mode

Symbols on the Front Panel Continued

Refer to the following table for descriptions of symbols found on the front panel of the Bovie® Surgi-Center│PRO.

SYMBOLS	DESCRIPTION
Selection	
	Select / Toggle / Adjust Settings
	Recall
	Set
Indicators	
	Split Return Electrode
	Solid Return Electrode
Regulatory Symbology	
	Mandatory: Refer to instruction manual / guide
	Defibrillator Proof Type CF Equipment
	RF Isolated – patient connections are isolated from earth at high frequency.
	Warning: Dangerous voltage
Power Switch and Receptacles	
	Power OFF
	Power ON
	Return Electrode (Split)
	Return Electrode (Solid)
	Monopolar Handpiece 1 - (for 3-pin monopolar connection)
	Monopolar Handpiece 1 - (for single plug monopolar connection)
	Monopolar Handpiece 2
	Bipolar Handpiece

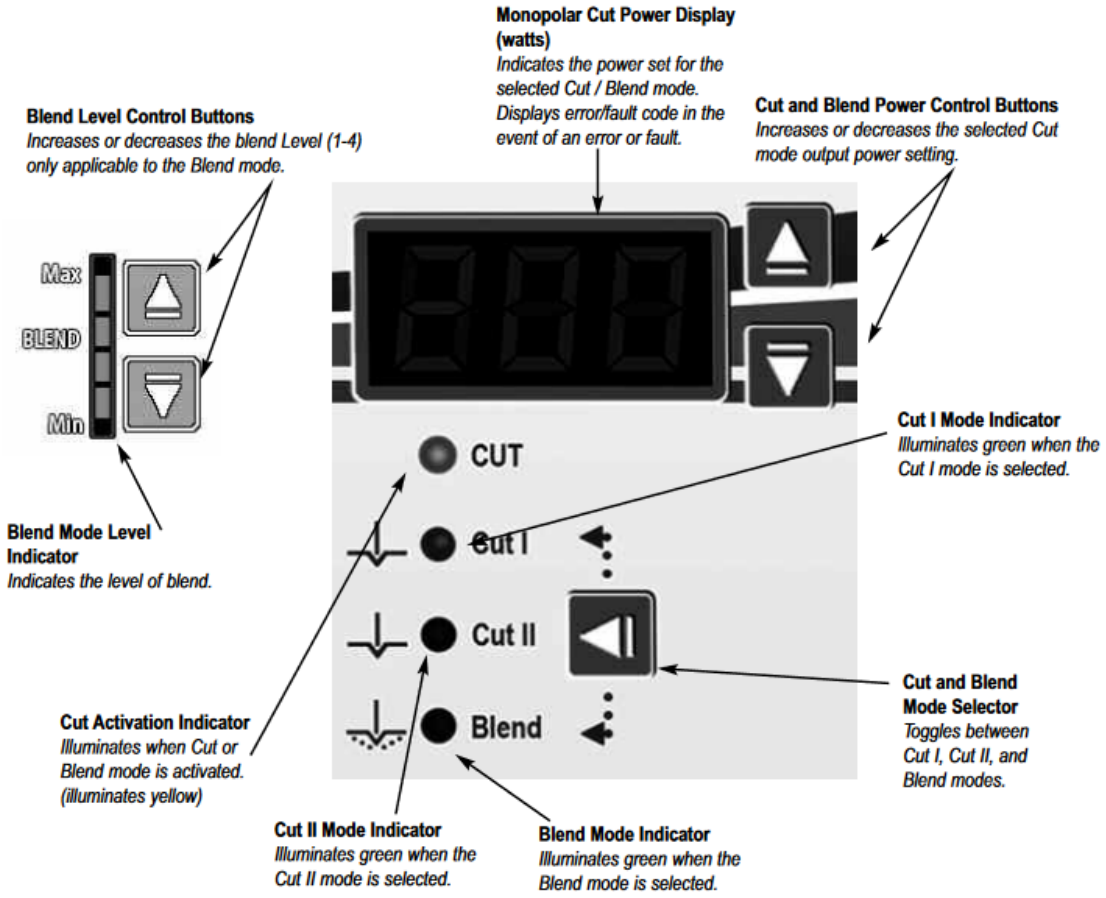
PRESET CONTROLS



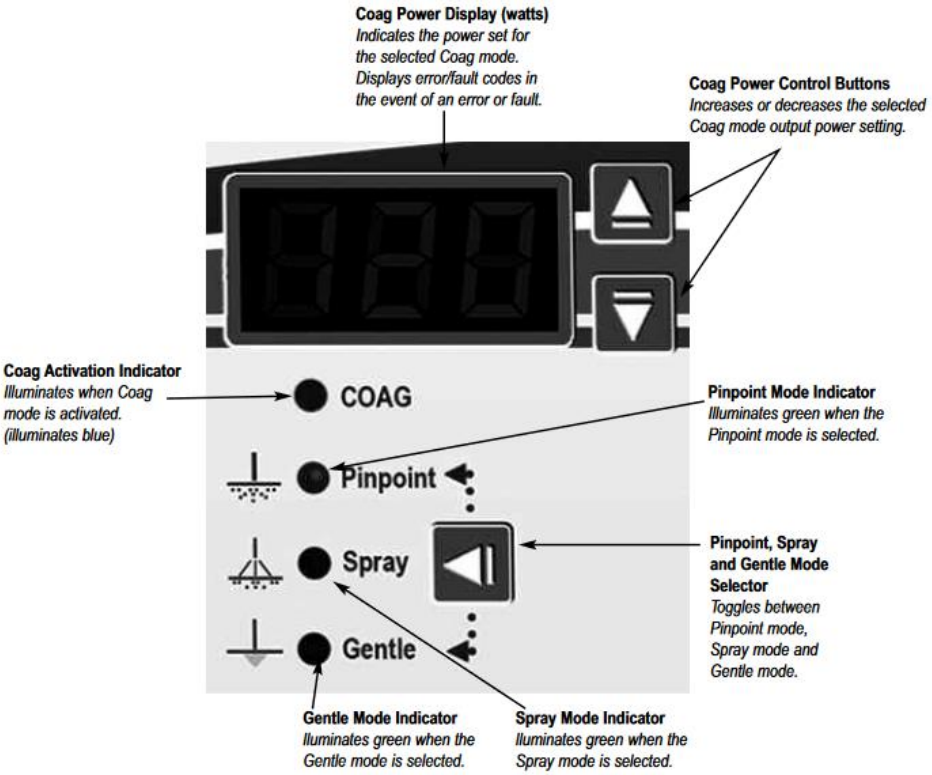
NOTICES:
The Bovie. Surgi-Center│PRO incorporates 10 RF presets that are factory set to zero watts and can be programmed to your preferred settings.

Set and Recall are disabled while the unit is activated.

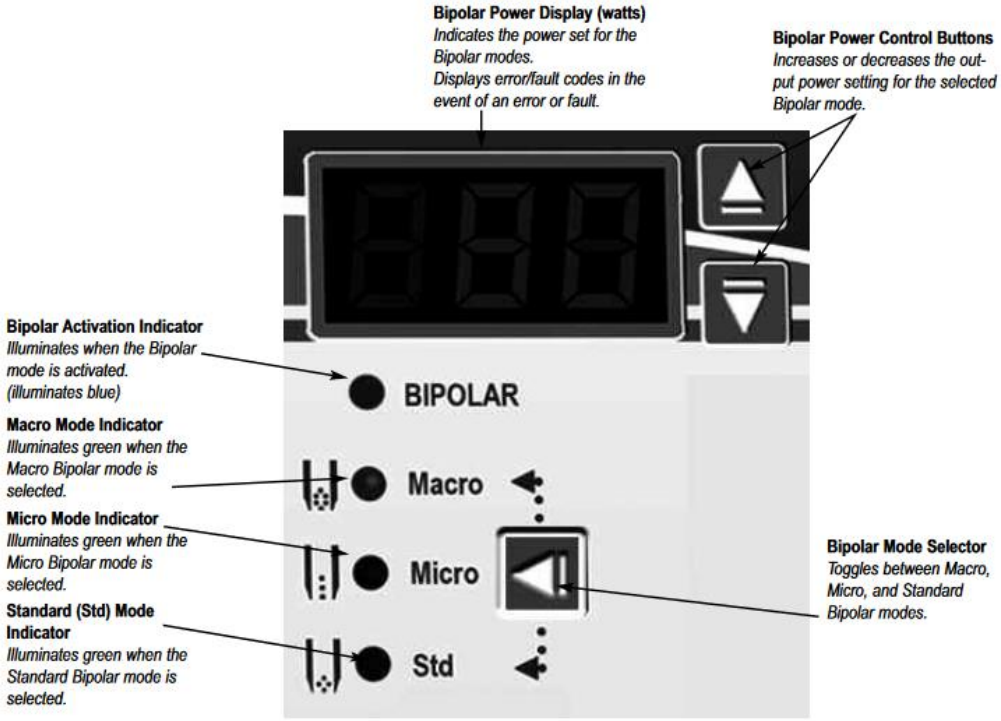
MONOPOLAR POWER OUTPUT MODES



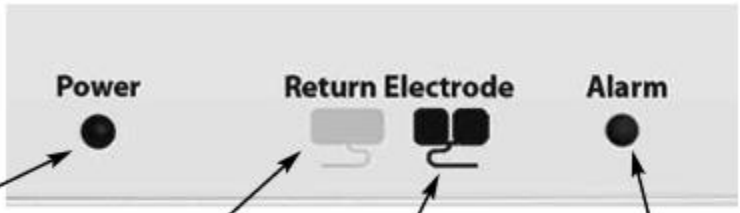
COAG CONTROLS



BIPOLAR POWER OUTPUT MODES



INDICATORS



Power Indicator
Illuminates green when the main power is on.

Solid Return Electrode Indicator
Illuminates green when the system detects a single plate.

Solid pad indicator only detects that a pad is connected to the unit. The unit does not monitor pad placement on the patient.

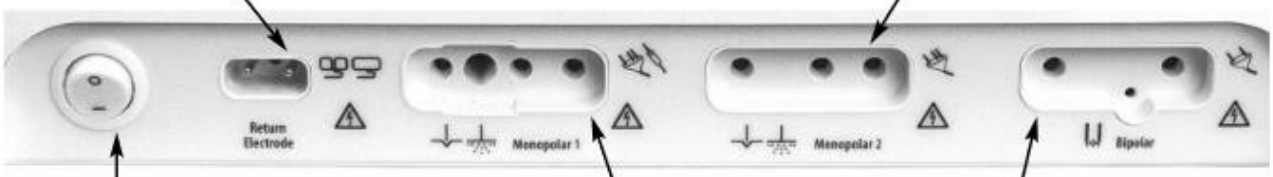
Split Return Electrode Indicator
Illuminates green when the system detects a split plate is properly placed on the patient.

Alarm Indicator
Illuminates red when the system detects a return electrode alarm condition.

POWER SWITCH AND RECEPTACLES

Return Electrode Receptacle
Accepts a standard return electrode plug.

Monopolar 2 Handswitching Receptacle
Accepts standard 3-pin handpieces. Connect handswitching accessories.



Power On/Off Switch
Turns the unit on or off.

Monopolar 1 Handswitching/ Footswitching Receptacle
Monopolar 1 connector accepts a standard 3-pin monopolar connector or adaptor (A1255A) for foot-controlled accessories.

Bipolar Receptacle
Accepts standard cables for bipolar handpieces. Connect bipolar accessories.

REAR PANEL

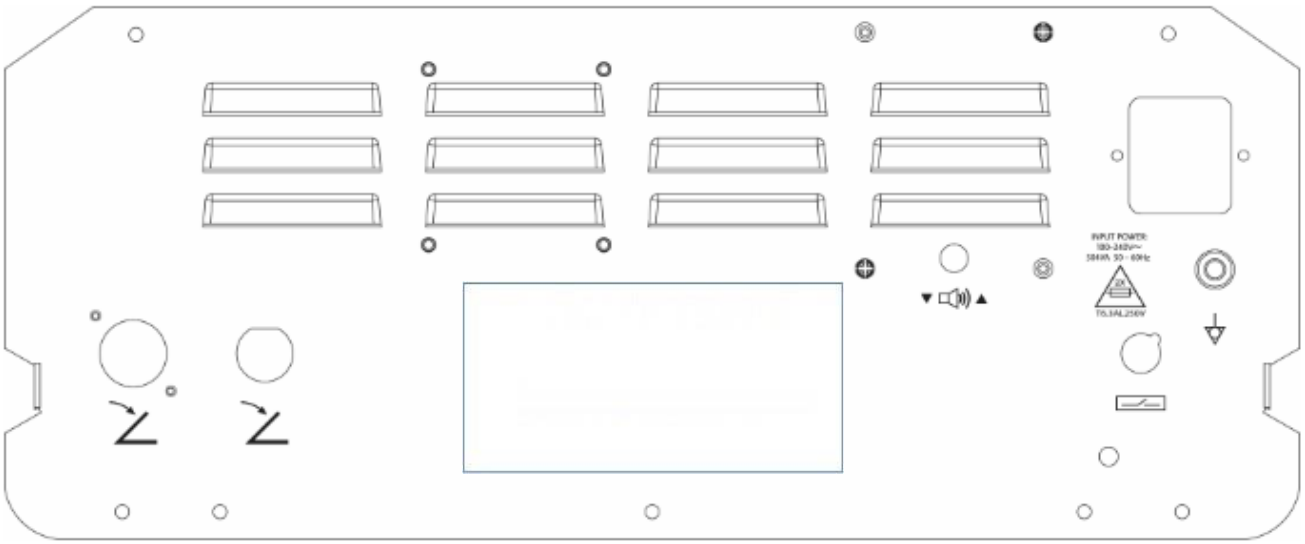


Figure 2 – 2 Layout of connectors and controls on the rear panel

Symbols on the Rear Panel

Refer to the following table for descriptions of symbols found on the rear panel of the Bovie® Surgi-Center|PRO.

SYMBOLS	DESCRIPTION
	Equipotential Ground Stud
MD	Medical Device
UDI	Unique Device Identifier
REF	Reference Number
SN	Serial Number
	Caution
▼ ▲	Volume Control
	Fuse Enclosed
	Relay Connector
	Monopolar Footswitch Input Jack (Far left)
	Bipolar Footswitch Input Jack
	Manufacturer
	Caution, Consult Accompanying Documents
	Do Not Dispose of Unit in Municipal Waste Stream.

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 Symmetry Surgical. 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

Input Voltage	100-240V~ ± 10%
Mains line frequency range (nominal):	50 – 60 Hz
Power consumption:	504 VA
Fuses (two):	6.3 A (slow blow)

Duty Cycle

Under maximum power settings and rated load conditions (Cut I, 200 watt @ 300 ohm load), the generator is suitable for activation times of 10 seconds ON followed by 30 seconds OFF for 30 minutes.

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

Dimensions and Weight

Width	37.5 cm (14.75 in.)	**Depth**	46 cm (18.1 in.)
Height	16.5 cm (6.5 in.)	**Weight**	< 9.07 kg (< 20 lbs)

Operating Parameters

Ambient temperature range	10° to 40° C
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
Relative humidity	10% to 75%, non-condensing
Atmospheric pressure	50kPa to 106kPa

The device should be stored and used in a room temperature of approximately 77° F/25° C.

Audio Volume

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

Activation Tone

Volume (adjustable)	≥ 40 dBA
Frequency	All Cut Modes: 610 Hz ± 25 Hz All Coagulation Modes: 910 Hz ± 25 Hz Simultaneous Spray Mode: 1667 Hz ± 50 Hz All Bipolar Modes: 910 Hz ± 25 Hz
Duration	Continuous while the generator is activated

Alert Tone

Volume (not adjustable)	> 65 dBA

Fault Tone

Volume (not adjustable)	> 65 dBA
Audio Fault Tone	2.4 kHz 450 milliseconds / 1.2 kHz 450 milliseconds

Return Electrode Sensing

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

Solid	Trip resistance: 0 Ω to 8 Ω ± 1 Ω Continuous measurement: Once the system establishes the solid return electrode resistance, an increase to 20 Ω - 25 Ω in resistance will cause an alert. When the alert condition exists, the system deactivates output power.
Split	Trip resistance: 10 Ω ± 5 Ω to 135 Ω ± 10 Ω Continuous measurement: Once the system establishes the split return electrode resistance, an increase of 40% in resistance will cause an alert. When the alert condition exists, the system deactivates output power.

High Frequency (RF) Leakage Current

Bipolar Micro, Macro leakage current	< 63 mA $_{rms}$
Bipolar Standard leakage current	< 50 mA $_{rms}$
Monopolar RF leakage current	< 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)
Equipment protection against electric shock by (Earthed) additional protection to basic insulation through means of connecting exposed conductive parts to the protective Earth in the fixed wiring of the installation.

Type CF Equipment (IEC 60601-1) / Defibrillator Proof

The Bovie® Surgi-Center|PRO provides a high degree of protection against electric shock, particularly regarding allowable leakage currents. It is type CF equipment. Patient connections are isolated from earth and resist the effects of defibrillator discharge.

Spill Resistance (IEC 60601-2-2)
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 a Bovie® Surgi-Center|PRO, 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 Bovie® Surgi-Center|PRO complies with the appropriate IEC 60601-1-2 and IEC 60601-2-2 specifications regarding electromagnetic compatibility.

Voltage Transients (Emergency Generator Mains Transfer)
The Bovie® Surgi-Center|PRO operates in a safe manner when the transfer is made between line AC and an emergency generator voltage source.

OUTPUT CHARACTERISTICS

Maximum Output for Monopolar and Bipolar Modes

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

Mode	Max Power	Rated Load	Output Frequency	Repetition Rate	Duty Cycle	Vpeak Max	Crest Factor* (Rated Load)
Cut I	200 W	300 Ω	490 kHz ± 4.9 kHz	N/A	N/A	1000V	1.7 ± 20%
Cut II	200 W	300 Ω	490 kHz ± 4.9 kHz	N/A	N/A	750V	1.7 ± 20%
Blend (1)	200 W	300 Ω	490 kHz ± 4.9 kHz	30 kHz ± 5 kHz	75% duty cycle	1320V	1.8 ± 20%
Blend (2)	200 W	300 Ω	490 kHz ± 4.9 kHz	30 kHz ± 5 kHz	62.5% duty cycle	1475V	2.0 ± 20%
Blend (3)	200 W	300 Ω	490 kHz ± 4.9 kHz	30 kHz ± 5 kHz	50% duty cycle	1650V	2.2 ± 20%
Blend (4)	200 W	300 Ω	490 kHz ± 4.9 kHz	30 kHz ± 5 kHz	37.5% duty cycle	1870V	2.4 ± 20%
Pinpoint Coag	120 W	500 Ω	490 kHz ± 4.9 kHz	30 kHz ± 5 kHz	25% duty cycle	1800V	3.1 ± 20%
Spray Coag	120 W	500 Ω	350 to 450 kHz	20 to 45 kHz	5.9 to 14.2% duty cycle	4000V	6.0 ± 20%
Gentle Coag	120 W	125 Ω	490 kHz ± 4.9 kHz	N/A	N/A	450V	1.6 ± 20%
Macro Bipolar	80 W	100 Ω	490 kHz ± 4.9 kHz	N/A	N/A	600V	1.5 ± 20%
Micro Bipolar	80 W	100 Ω	490 kHz ± 4.9 kHz	N/A	N/A	500V	1.5 ± 20%
Standard Bipolar	80 W	50 Ω	490 kHz ± 4.9 kHz	N/A	N/A	250V	1.5 ± 20%

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

EMC COMPLIANCE

Special precautions should be taken regarding the Bovie® Surgi-Center|PRO. 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.

Understand that only the Accessories supplied with or ordered from Bovie® 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 Bovie® Surgi-Center|PRO The Bovie® Surgi-Center|PRO and its accessories are not suitable for interconnection with other equipment.

Portable and mobile RF communications equipment can affect Medical Electrical Equipment. The Bovie® Surgi-Center│PRO should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, the Bovie® Surgi-Center│PRO should be observed to verify normal operation in the configuration in which it will be used.

Recommended separation distances between portable and mobile RF communications equipment and the Bovie® Surgi-Center│PRO

The Bovie® Surgi-Center│PRO is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Bovie® Surgi- Center│PRO can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Bovie® Surgi-Center│PRO as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	separation distance according to frequency of transmitter		
	150 kHz to 80 MHz $d = [\frac{3.5}{V_1}]\sqrt{P}$	80 MHz to 800 MHz $d = [\frac{3.5}{E_1}]\sqrt{P}$	800 MHz to 2.5 GHz $d = [\frac{7}{E_1}]\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.
NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Guidance and manufacturer's declaration – electromagnetic emissions

The Bovie® Surgi-Center│PRO is intended for use in the electromagnetic environment listed below. The customer or the user of the Bovie® Surgi-Center│PRO should assure that is used in such an environment.

Emissions test	**Compliance**	**Electromagnetic environment – guidance**
RF Emissions CISPR 11	Group 2	The Bovie® Surgi-Center│PRO must emit electromagnetic energy in order to perform its intended function. Nearby electronic equipment may be affected.
RF Emissions CISPR 11	Class A	The Bovie® Surgi-Center│PRO 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	

Guidance and manufacturer's declaration – electromagnetic immunity			
The Bovie® Surgi-Center|PRO is intended for use in the electromagnetic environment listed below. The customer or the user of the Bovie® Surgi-Center|PRO should assure that is is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % U_t (<95 % dip in U_t) for 0.5 cycle <40 % U_t (<60 % dip in U_t) for 5 cycles 70 % U_t (<30 % dip in U_t) for 25 cycles <5 % U_t (>95 % dip in U_t) for 5 sec	<5 % U_t (<95 % dip in U_t) for 0.5 cycle <40 % U_t (<60 % dip in U_t) for 5 cycles 70 % U_t (<30 % dip in U_t) for 25 cycles <5 % U_t (>95 % dip in U_t) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Bovie® Surgi-Center|PRO requires continued operation during power mains interruptions, it is recommended that the Bovie® Surgi-Center|PRO be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_t is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration – electromagnetic immunity continued...			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the Bovie® Surgi-Center| PRO, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = [\frac{3.5}{V_1}]\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = [\frac{3.5}{E_1}]\sqrt{P}$ 80 MHz to 800 MHz $d = [\frac{7}{E_1}]\sqrt{P}$ 800 MHz to 2.5 GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m) Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol. 
NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicated theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location which the Bovie® Surgi-Center| PRO is used exceeds the applicable RF compliance level above, the Bovie® Surgi-Center| PRO should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Bovie® Surgi-Center| PRO . [b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V_1] V/m.			

OUTPUT POWER CURVES

Figures 3–1 through 3–3 illustrate power setting versus maximum voltage (Vpeak). Figure 3–4 illustrates output power versus power setting for all modes. Figures 3–5 through 3–13 illustrate specific output power delivered to a range of load resistances for each mode.

Figure 3 – 1 Power setting versus maximum voltage (Vpeak) CUT

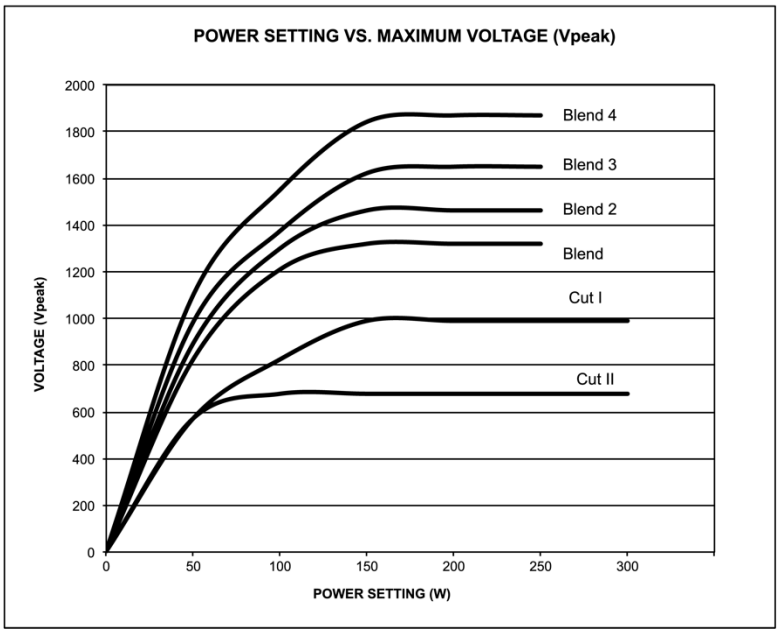


Figure 3 – 2 Power setting versus maximum voltage (Vpeak) COAG

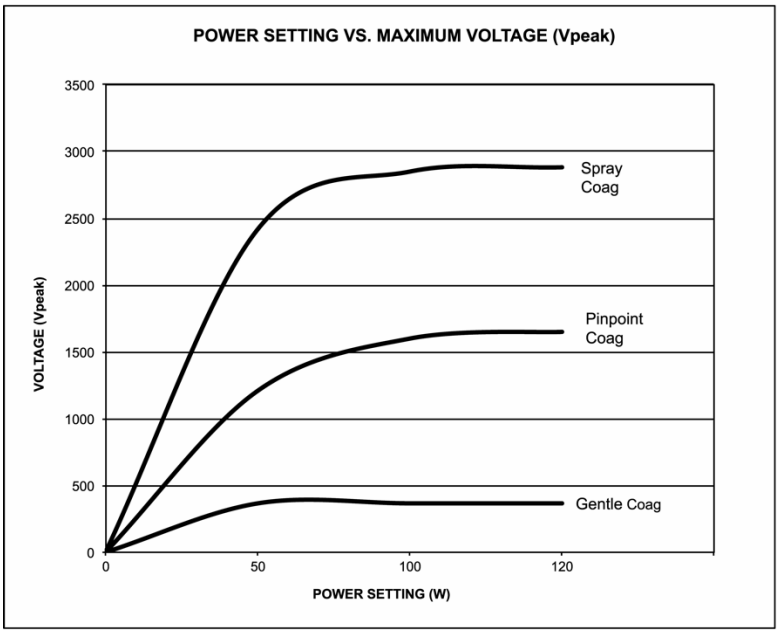


Figure 3 – 3 Power setting versus maximum voltage (Vpeak) BIPOLAR Macro, Micro and Standard

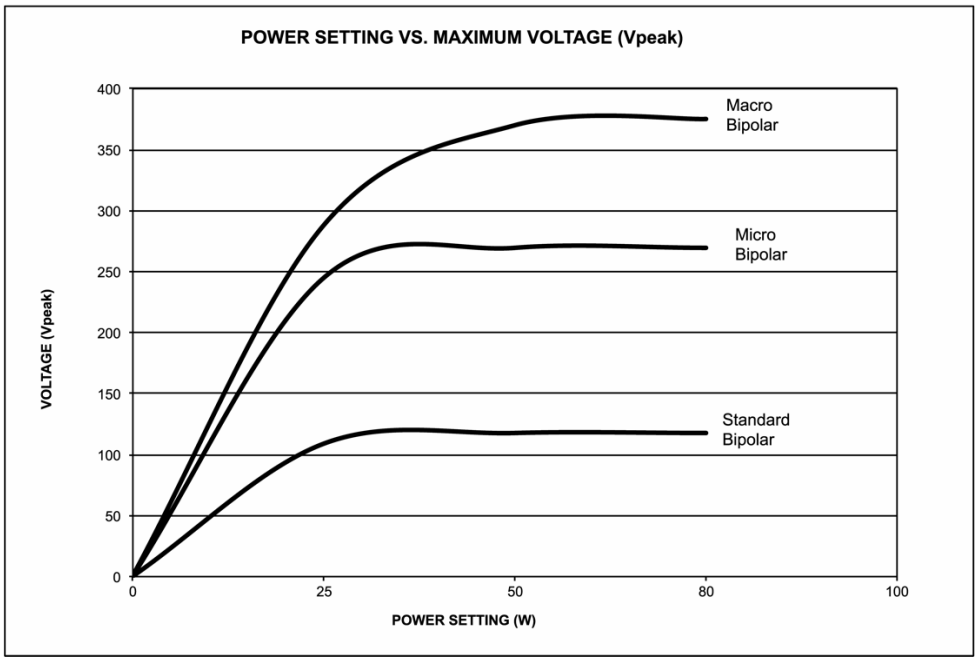


Figure 3 – 4 Output power all modes versus power setting at rated loads

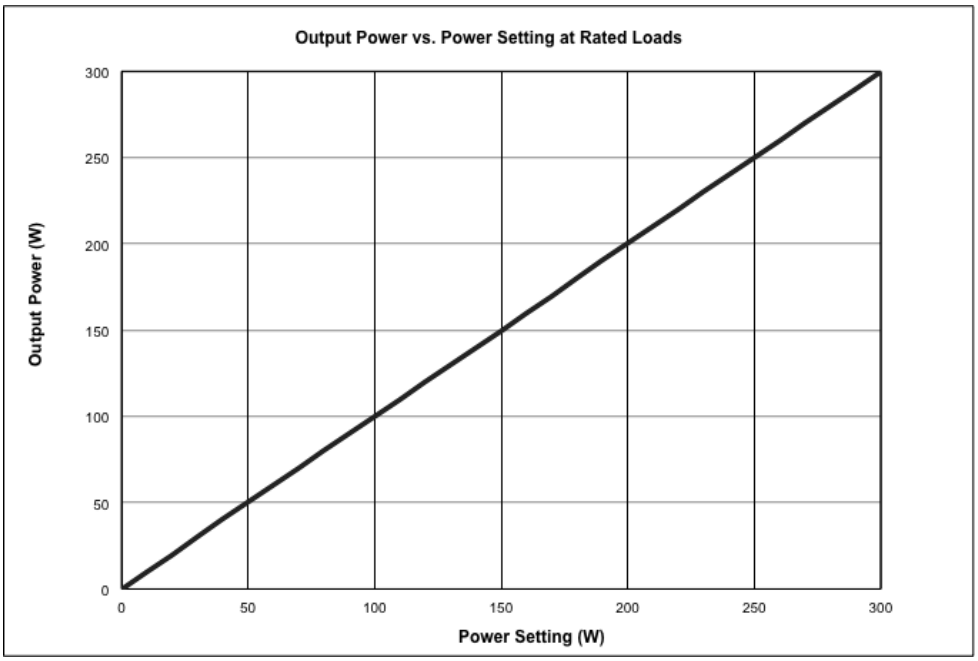


Figure 3 – 5 Output power versus impedance for Cut I mode

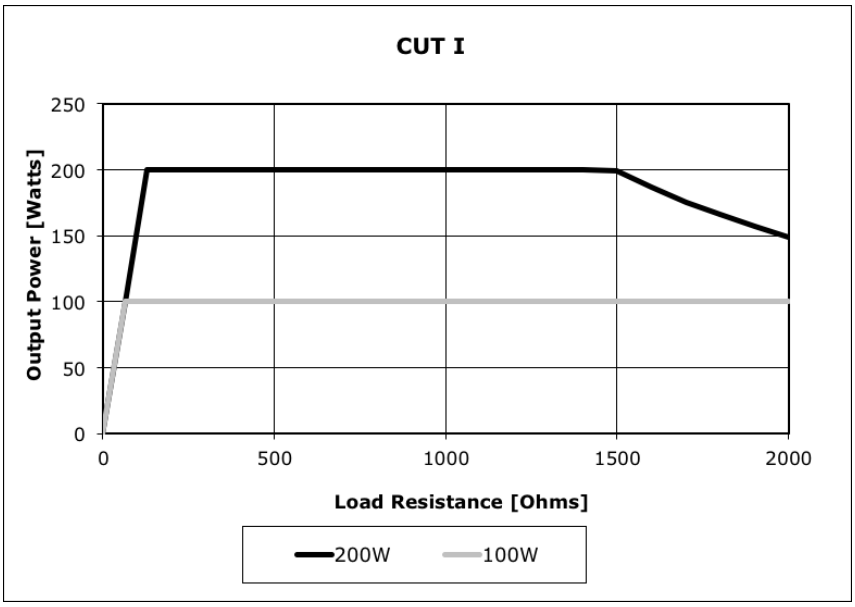


Figure 3 – 6 Output power versus impedance for Cut II mode

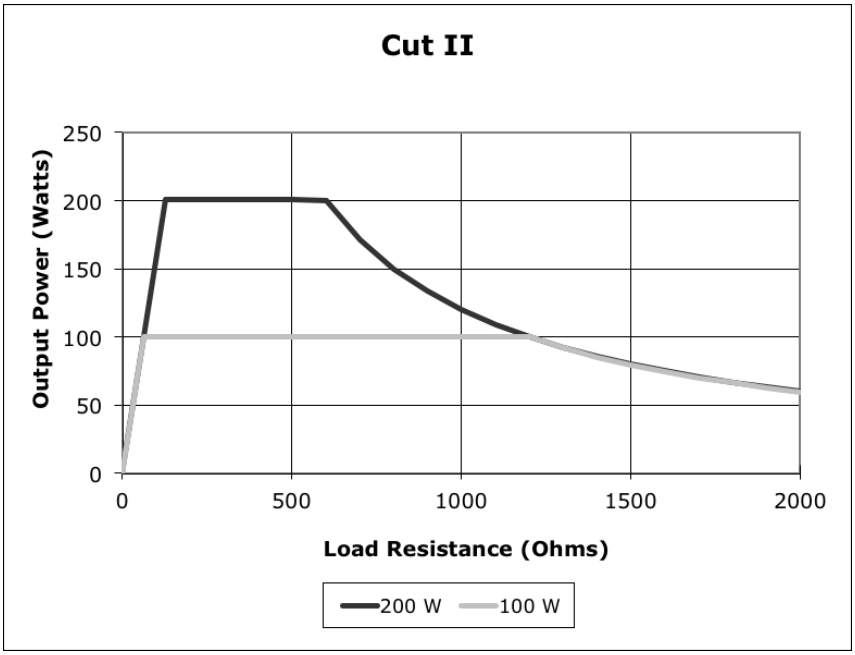


Figure 3 – 7 Output power versus impedance for Blend (1, 2, 3, 4) mode

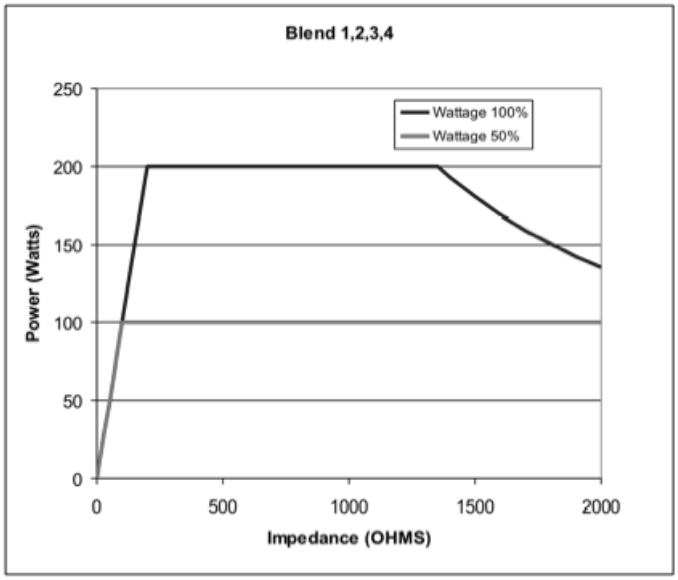


Figure 3 – 8 Output power vs impedance for Pinpoint mode

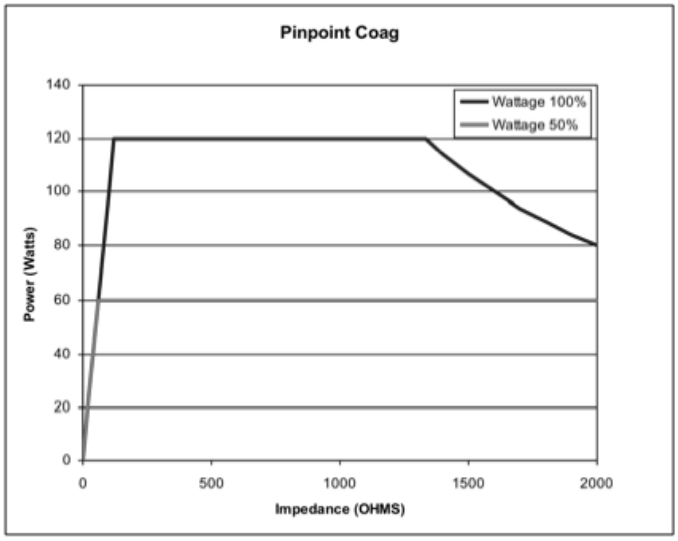


Figure 3– 9 Output power vs impedance for Spray mode

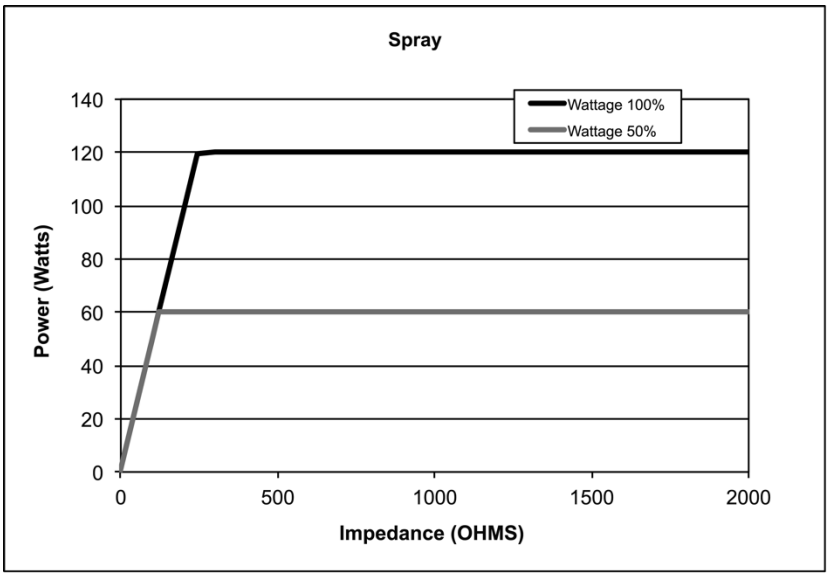


Figure 3 – 10 Output power vs impedance for Gentle Coagulation mode

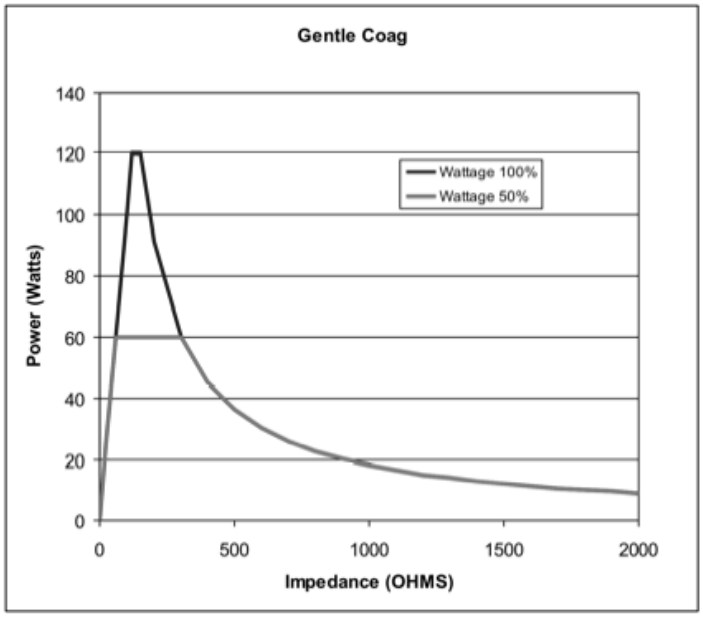


Figure 3– 11 Output power vs impedance for Macro Bipolar mode

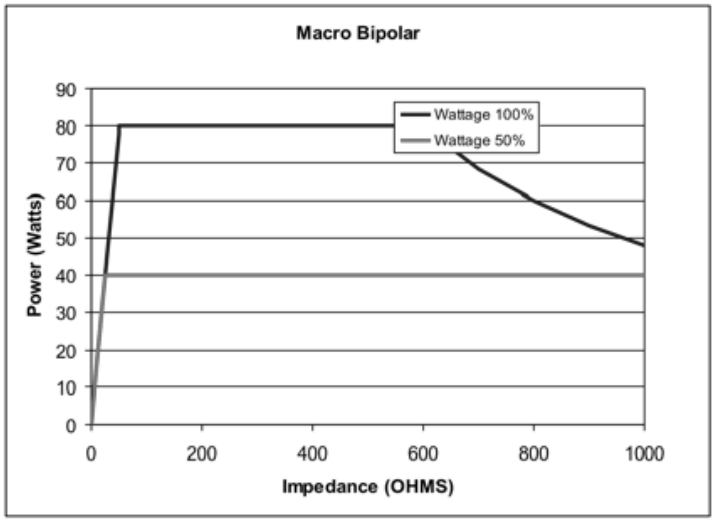


Figure 3– 12 Output power vs impedance for Micro Bipolar mode

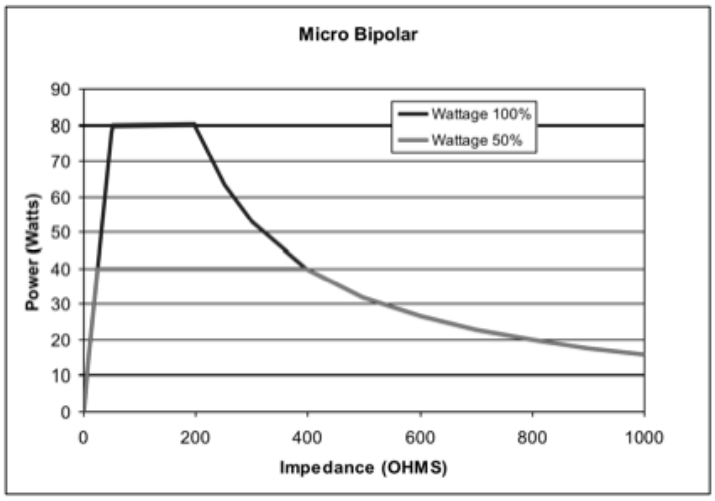


Figure 3– 13 Output power vs impedance for Standard Bipolar mode

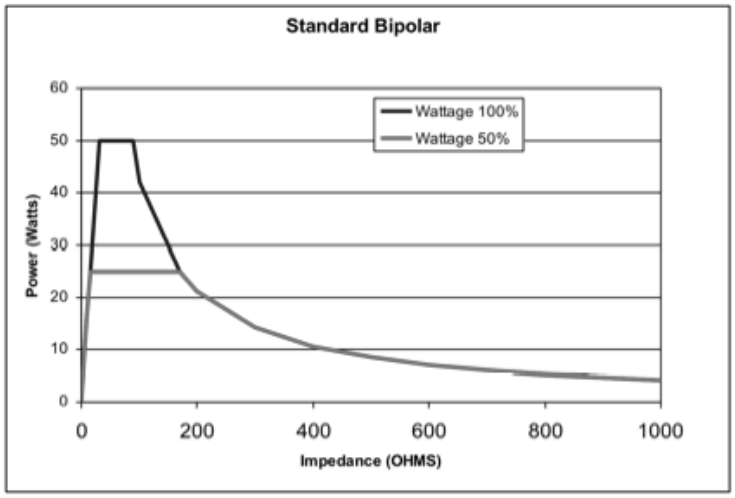


Figure 3– 14 Cut I Output Waveform (300 Ohm Load)

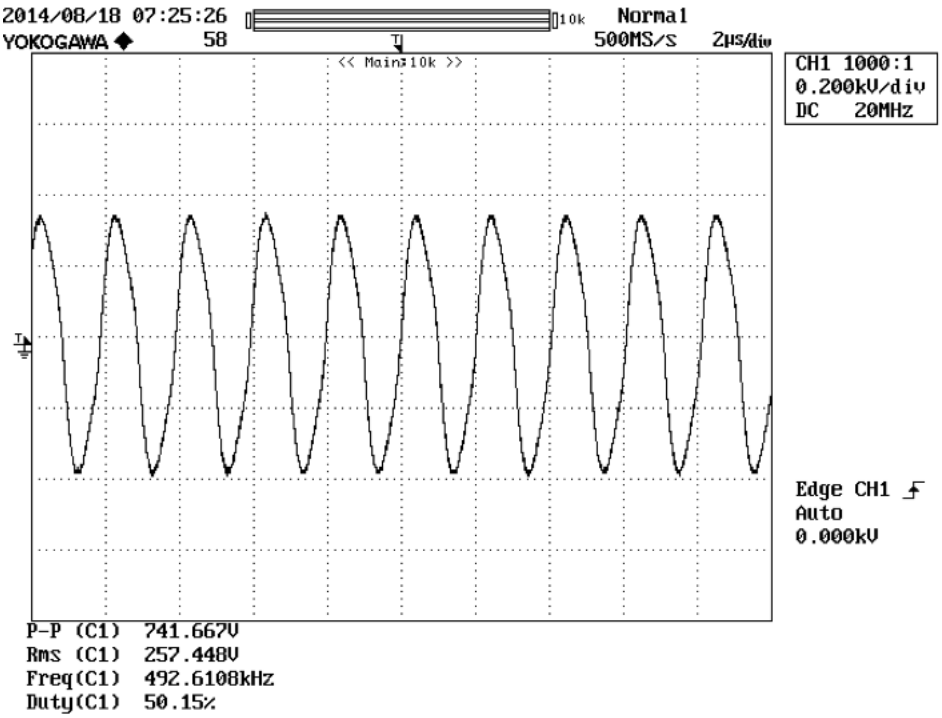


Figure 3– 15 Cut II Output Waveform (300 Ohm Load)

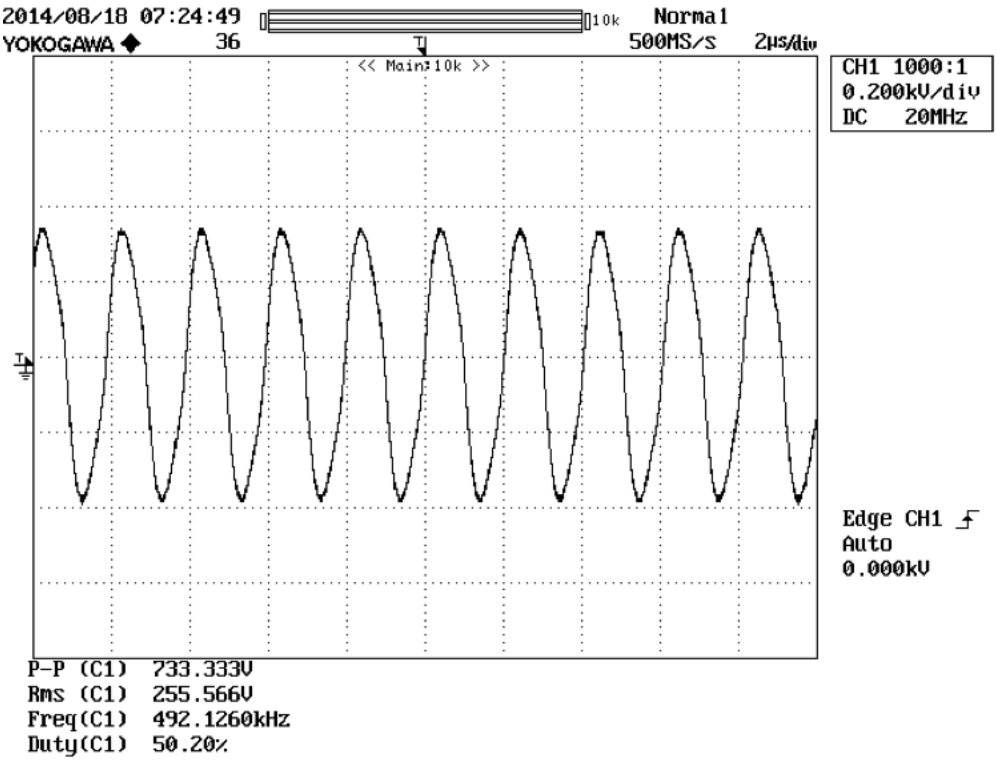


Figure 3– 16 Blend 1 Output Waveform (2000 Ohm Load)

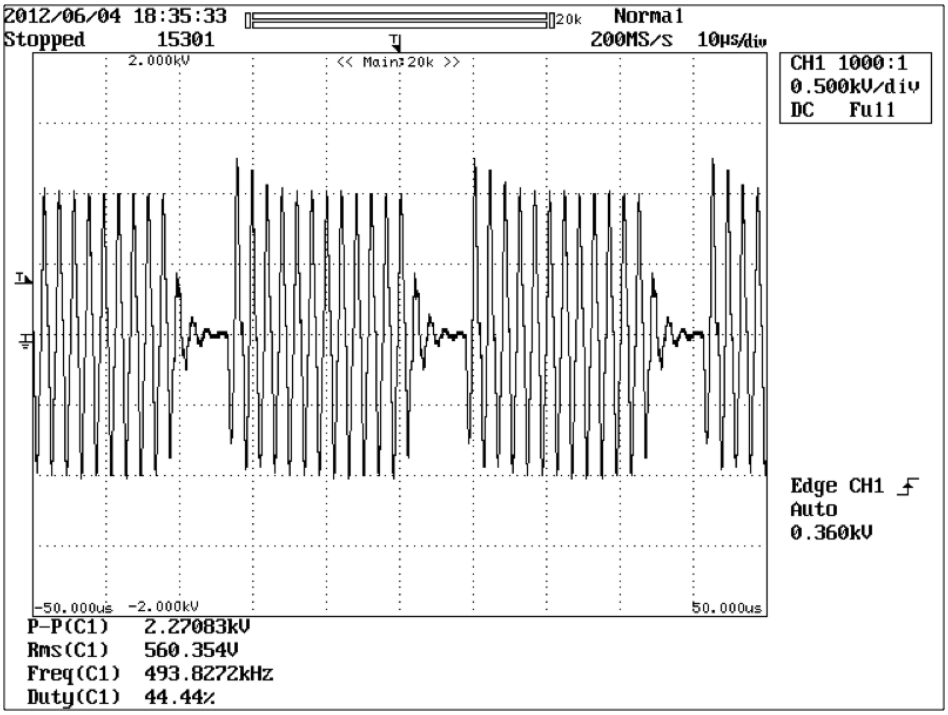


Figure 3– 17 Blend 2 Output Waveform (2000 Ohm Load)

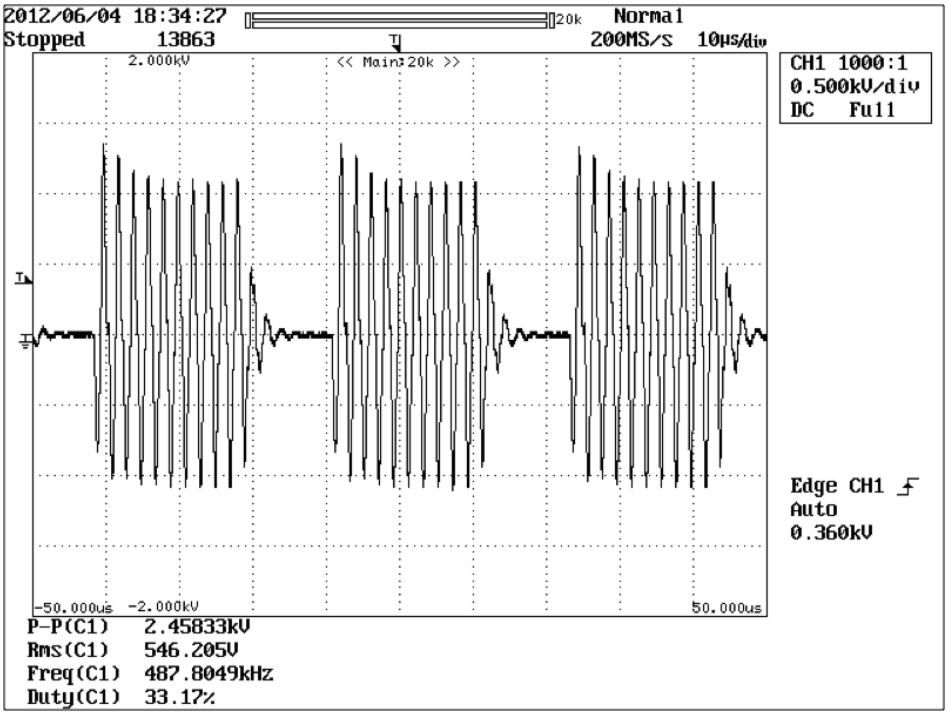


Figure 3– 18 Blend 3 Output Waveform (2000 Ohm Load)

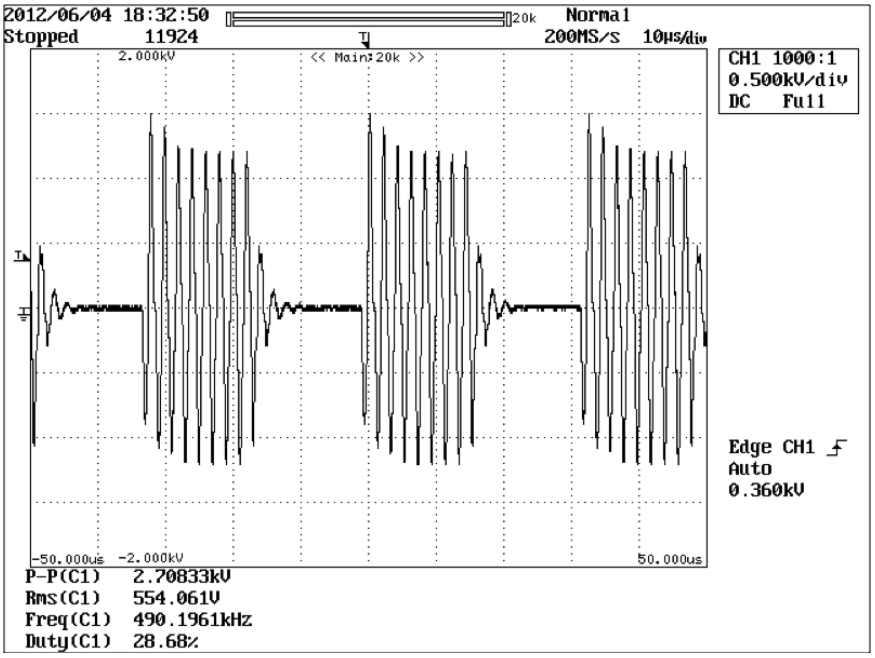


Figure 3– 19 Blend 4 Output Waveform (2000 Ohm Load)

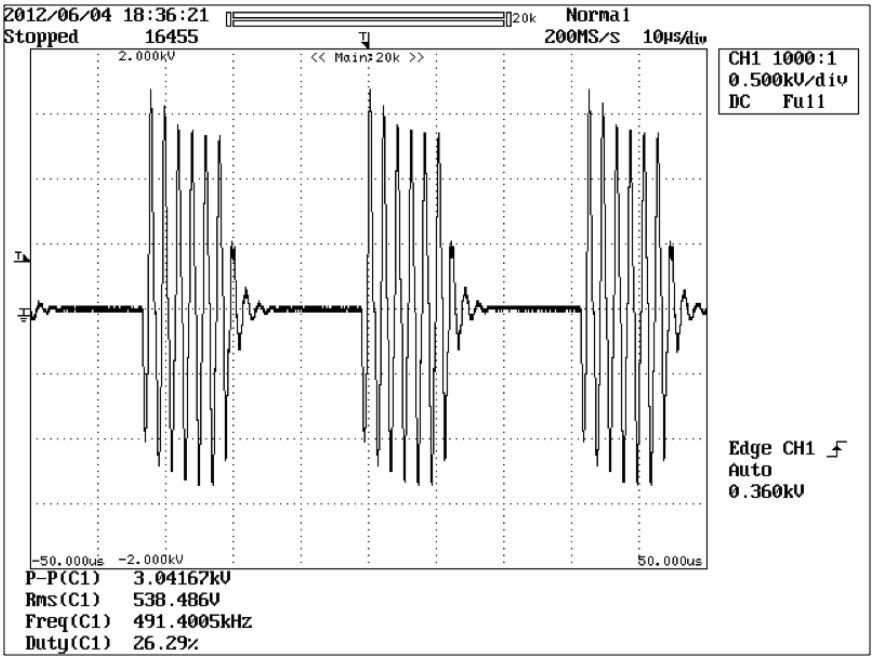


Figure 3– 20 Pinpoint Coagulation Output Waveform (2000 Ohm Load)

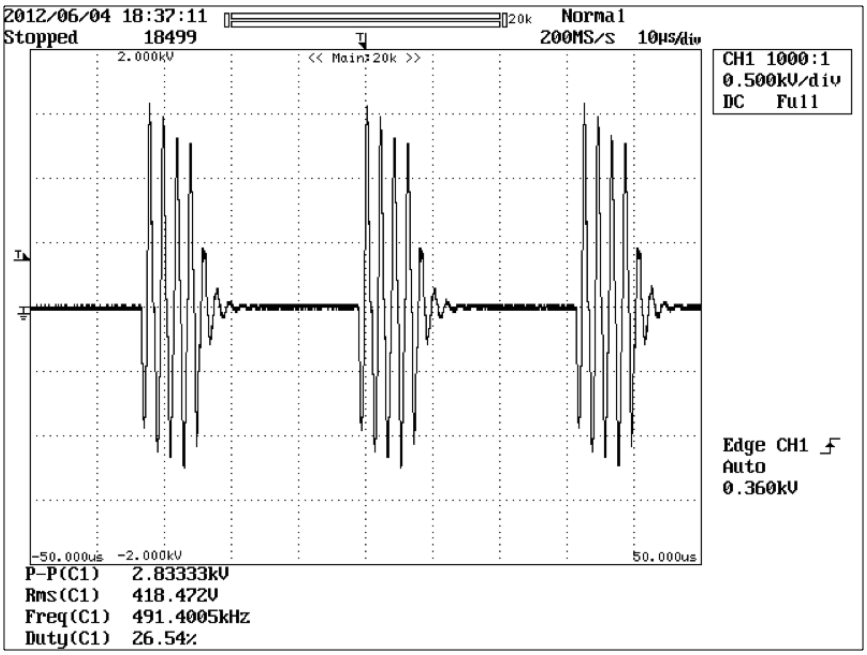


Figure 3– 21 Spray Coagulation Output Waveform (2000 Ohm Load)

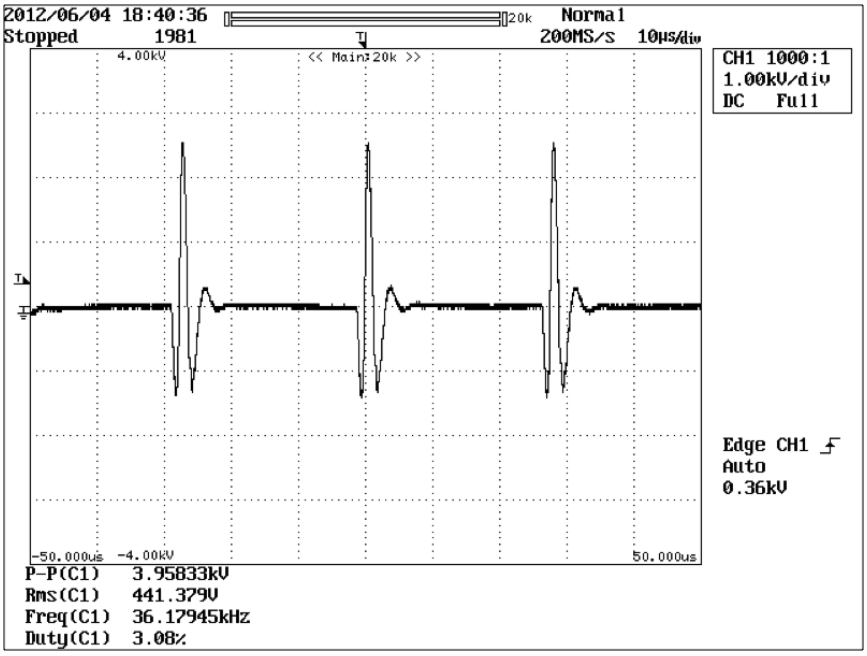


Figure 3– 22 Spray Coagulation Output Waveform (3000 Ohm Load)

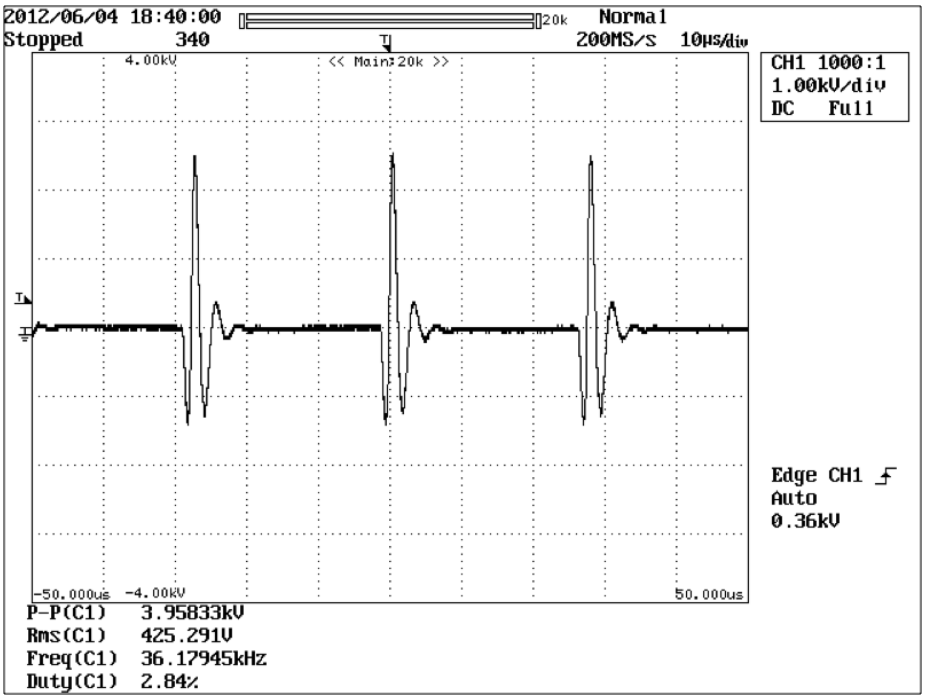


Figure 3– 23 Gentle Coagulation Output Waveform (100 Ohm Load

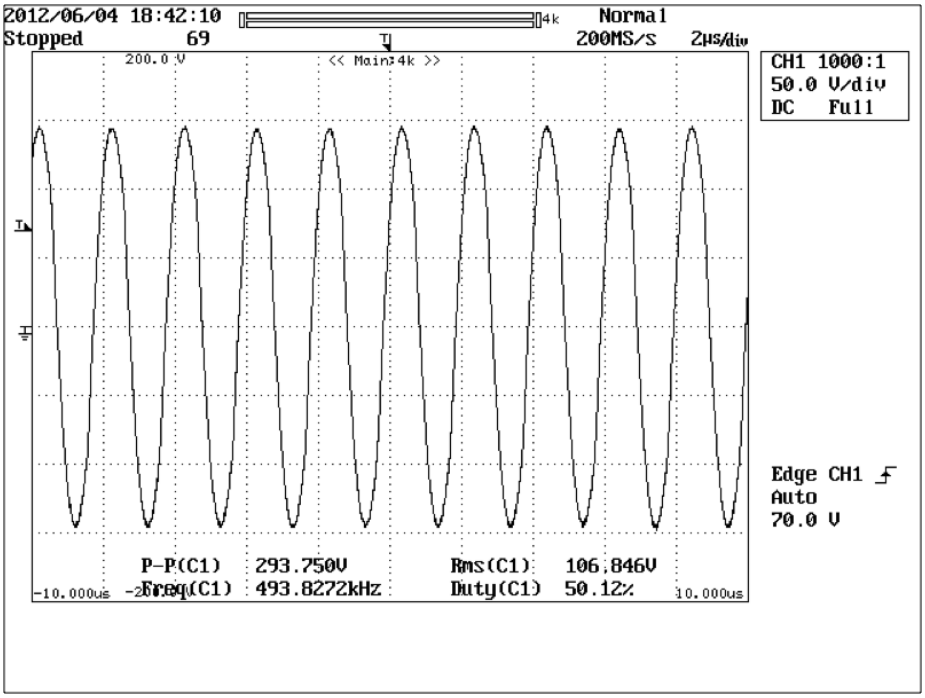


Figure 3– 24 Macro Bipolar Output Waveform (1000 Ohm Load)

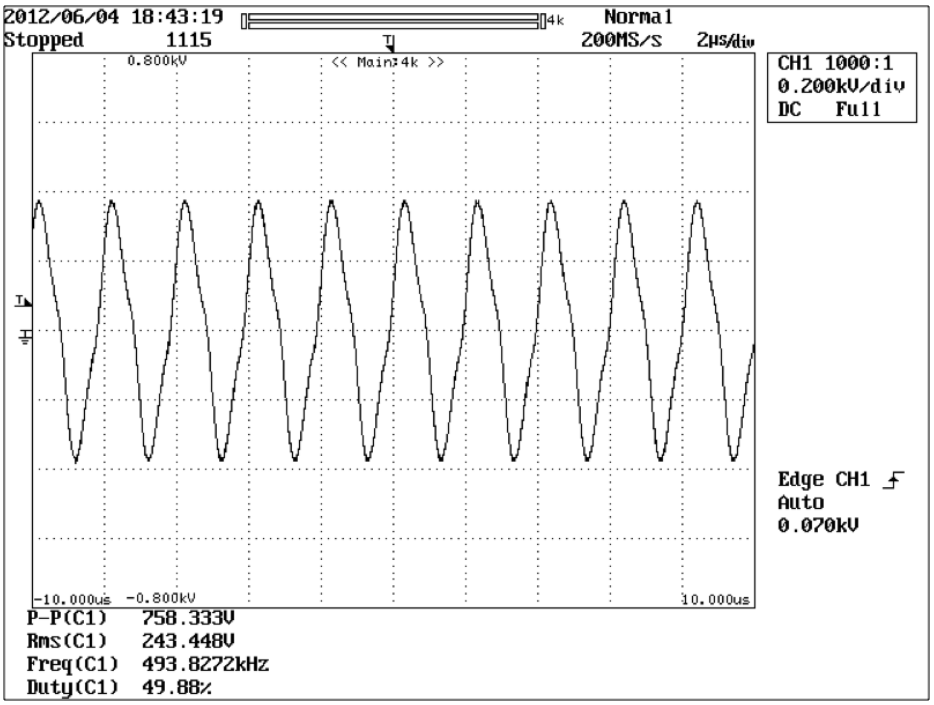


Figure 3– 25 Micro Bipolar Output Waveform (800 Ohm Load)

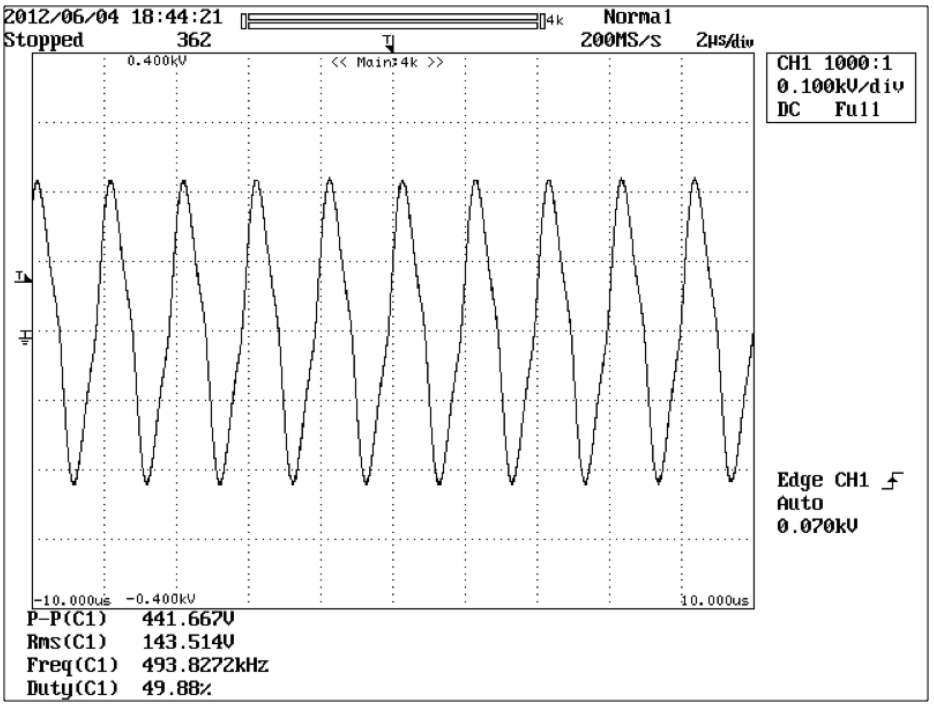
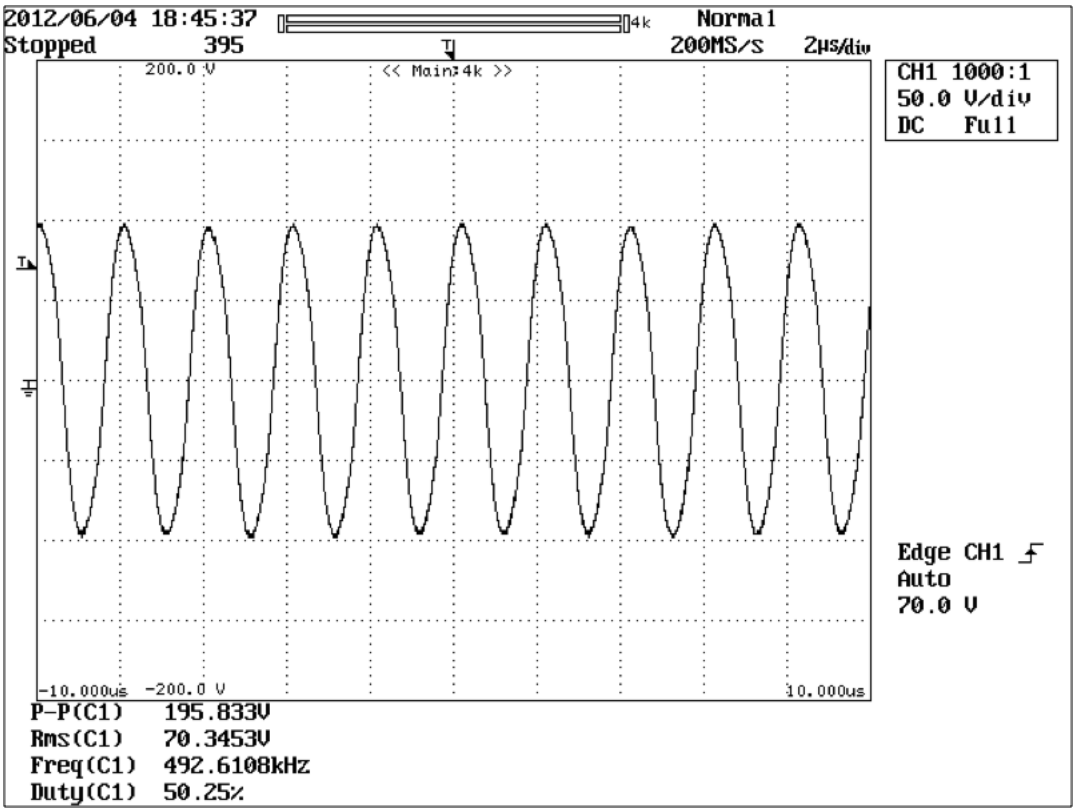


Figure 3– 26 Standard Bipolar Output Waveform (200 Ohm Load)



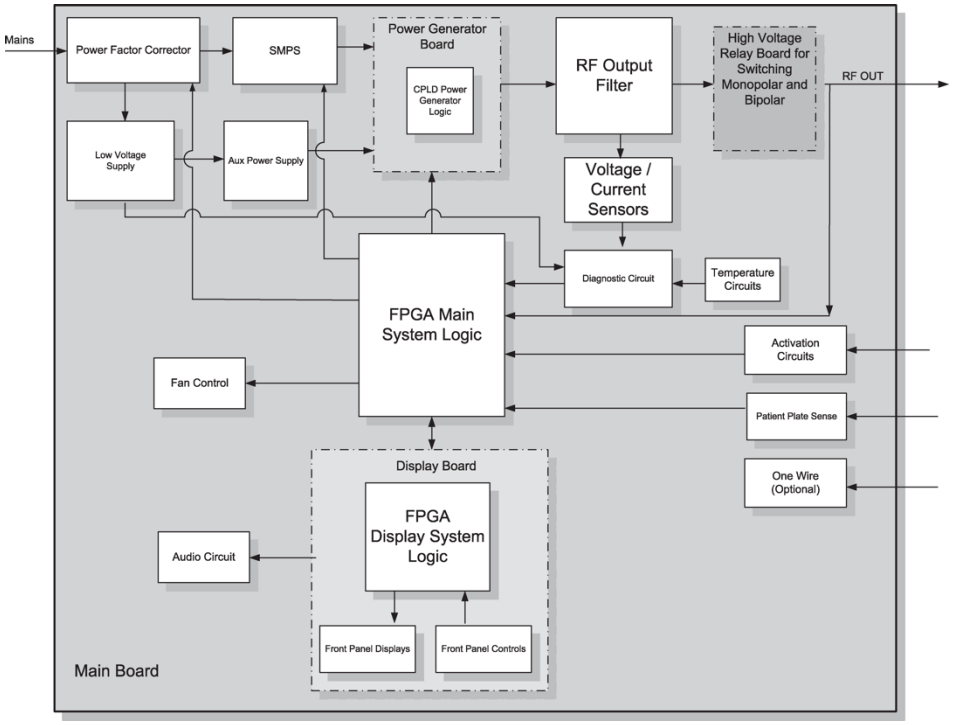
THEORY OF OPERATION

This section contains the following information

- Block Diagram
- Functional Overview of Key Circuits
- Controls and Indicators
- Bovie® Surgi-Center│PRO Control Signal Inputs and Outputs

BLOCK DIAGRAM

Figure 4 – 1 Functional Block Diagram of the Bovie® Surgi-Center│PRO system.



FUNCTIONAL OVERVIEW OF KEY CIRCUITS

The following descriptions highlight the main circuits in the Bovie® Surgi-Center│PRO.

CONTROLS AND INDICATORS

The front panel overlay contains 13 membrane function switches. Each membrane switch is used to toggle between modes, presets, and power settings. The overlay interfaces with the display PCB to control user requests.

FUNCTIONAL OVERVIEW OF MAIN BOARD

The Bovie® Surgi-Center│PRO ESU has several circuits that can be grouped by its contribution to the power generation. These are High Power Circuits, Low Power Supply Circuits, Digital Control Circuits and Measurement & Monitoring Circuits.

FUNCTIONAL OVERVIEW OF HIGH POWER CIRCUITS - MAIN BOARD

The High Power Circuits are responsible for the generation of power, applied to the patient. The maximum power is 300W in CUT mode. The maximum peak voltage is achieved in Fulguration – 3200V, the maximum current is in Bovie® Bipolar Mode – 3A.

MAIN BOARD POWER FACTOR CORRECTOR

The PFC is built over active, boost topology, and is using an IGBT as an active element. The PFC is working with universal input mains voltage 100V-240V, and is producing an output V=380V. During stand-by mode, the PFC is disabled, in order to minimize the EMI. The working Power Factor is between 0.95-0.99. The circuit has an over voltage protection varistor, common-mode filter for noise reduction and fuse.

MAIN BOARD FULL BRIDGE SMPS

The SMPS, which is fed by the PFC, is built over the full-bridge topology and is digitally controlled by pulse width Modulation (PWM) to provide variable power supply for the Bovie® Surgi-Center│PRO Power Generator. The value of the output voltage is directly connected with the current value of the patient's tissue impedance, due to the closed-loop system. The SMPS operates at 100 kHz and the output voltage varies between 16V -232V.

MAIN BOARD PUSH PULL POWER GENERATOR

The Power Generator is built as a push-pull MOSFET amplifier, The generator is using a combination of transformers, which effectively is increasing the leakage inductance, which forms filter and impedance matching circuit with the output winding capacitance. This substantially increases the ability of the generator to work with high currents and output high voltages. The generator has short-circuit protection, implemented by cycle-by-cycle current limiting circuit. The generator is having a damping circuit which is working for all modulated modes – BLEND, PINPOINT, and FULGURATION. This circuit effectively suppresses the ringing in the pauses of the modulation circuit by dissipating energy a resistor. The ringing is due to energy stored (and not exhausted) in the resonant tank, formed by the transformer primary inductance and the push-pull transistors output capacitance.

The power generator has relays – they are switching the number of the primary turns in FULGURATION mode, thus increasing the transformer ratio to get higher peak voltage in the output. The power Generator is working at 492 kHz, and the damping circuit- at 1MHz.

HIGH VOLTAGE RELAYS AND MODE OUTPUT SELECT

The Power Generator output is fed to the relay board, where the mode selection HV relays are and the VI sensors (voltage and current sensors). Then the output is directed to the HV relays on the main Board, where the power is directed to the desired accessory output – Monopolar 1, Monopolar 2 or Bipolar.

LOW VOLTAGE FLYBACK SMPS AND VOLTAGE REGULATORS

The low voltage power supply is a flyback, universal mains input SMPS, with maximum power output of 30W. Together with the linear voltage regulators, the flyback LVSMPS provides several DC voltages - 16V, 12V, -12V, 5V, 3.3V and 1.2V. These voltages are used to provide power supply to the analog and digital circuit on the main board.

SMPS DRIVER CIRCUIT

The SMPS driver circuit is used to provide the proper timing and proper PWM for the High Power SMPS. The driver generates 2 signals – SMPS_DRV1 and SMPS_DRV2 at 100 kHz.

POWER GENERATOR DRIVER CIRCUIT

The PG driver circuit is used to provide the proper timing and proper PWM for the Power Generator. The driver generates 2 signals – RF_DRV1 and RF_DRV2 at 492 kHz. The damping driver works at 1MHz (4 consecutive pulses).

OPTOISOLATED RELAY CONTROL INTERFACE

The signals that control the HV voltage relays are optoisolated for better noise immunity. The block is using a relay decoder circuit to generate all relay control codes for different modes of operation and different output accessory. Each combination is unique and is used to redirect the power to the proper output, with respect to the current activation request.

AUDIO CONTROL CIRCUIT

The circuit controls the speaker of the Bovie® Surgi-Center│PRO with different activation tones and alarm tones. The control signals are generated from the display board. The volume for the activation tones maybe adjusted from the rear of the Bovie® Surgi-Center│PRO.

NOTICE:
Alarm volume cannot be adjusted up or down.

AUXILIARY RELAY OUTPUT

The Auxiliary Relay output is implemented with the relay K1, which is closing its contacts for every power activation and 3 seconds after the activation is terminated. The connector is connected to the rear of the Bovie® Surgi-Center│PRO.

HANDLE ACTIVATION AND FOOT-CONTROL RECOGNITION CIRCUITS

They provide the user with handle power activation capabilities. The handle activation circuits are implemented with Activation Module. It has 4 separate activation circuits – 2 for Monopolar 1 accessory, and 2 for Monopolar 2 accessory.

The recognition circuit is used to detect whether there is a foot-control accessory, plugged in the Monopolar 1 connector.

FOOTSWITCH ACTIVATION AND FOOT-SWITCH RECOGNITION CIRCUITS

They provide the user with footswitch power activation capabilities. The footswitch activation circuits are implemented with Activation Module. It has 4 separate activation circuits which include 2 for Monopolar Footswitch, and 2 for Bipolar accessory – Activation and recognition.

The recognition circuit for Monopolar Footswitch is implemented with a Colpitz Oscillator circuit.

NEM MONITORING CIRCUIT

The circuit is continually monitoring the quality of the contact between the patient and the split return electrode. This helps to eliminate patient burns at the return electrode side. The circuit also detects whether split or non-split electrode is attached to the system. The NEM circuit is working with dedicated voltage regulators 8.5V and -8.5V.

TEMPERATURE SENSING CIRCUITS AND DC VOLTAGE MONITORING

The diagnostic circuit in Bovie® Surgi-Center│PRO is implemented with an 8 channel ADC. If the temperature exceeds some critical temperature, then an alarm triggers and the power activation is stopped. The diagnostic circuit monitors also the critical DC voltages: 3.3V, 5V, 8.5V, -8.5V.

FPGA CONTROL BLOCK

The block is using Field programmable Gate Array Logic. It performs all control and monitoring operations in the Bovie® Surgi-Center│PRO. A system Clock Circuit provides the basic clock frequency of 20MHz. The clock frequencies for the SMPS control are derived from the in-chip PLL (phased-locked loop) of 160MHz. The FPGA calculates in real-time the RMS values of the load current and voltage and controls the SMPS PWM in order to keep the predefined mode power curves (see below) and current power settings.

HIGH SPEED ANALOG-TO-DIGITAL CONVERTERS

The block is used to perform analog to digital conversion of the analog signals that are coming from voltage and current sensors. There are 2 identical measurement circuits (main and backup) which are essential for the safety of the closed-loop control system. The ADCs are working at 5MHz clock frequency. The main ADC has a 10 bit resolution, and the backup ADC -8 bit. Both ADCs are working with differential, symmetrical input for better noise immunity.

1-WIRE INTERFACE BLOCK (OPTIONAL CIRCUIT)

The block is optional for Bovie® Surgi-Center│PRO and is designated to control a future smart Bipolar Accessory. The 1-wire signal that goes to the Bipolar accessory is isolated from the FPGA with a 1-wire module. The module provides also auxiliary 5V power supply.

MULTI-BUTTON HANDLE SUPPORT (OPTIONAL CIRCUIT)

The block is optional for Bovie® Surgi-Center│PRO and is designated to control a future smart Monopolar Accessory, that has more than 2 buttons (for example Power Up and Power Down buttons) The most important is that this type of control is not increasing the number of the control wires in the Monopolar Accessory- they remain three.

VOLTAGE MAIN AND BACKUP SENSOR
The block is used measure the output voltage. The signal VS_Scale is used to scale the voltage sensor output by a factor of 2, thus optimizing the dynamic response and resolution. The scaling is working only for the main sensor and not for the backup sensor.

CURRENT MAIN AND BACKUP SENSOR
The block is used measure the output current. The signal CS_Scale is used to scale the current sensor output by a factor of 2, thus optimizing the dynamic response and resolution. The scaling is working only for the main sensor and not for the backup one.

CONTROLS AND INDICATORS
The Bovie® Surgi-Center│PRO controls and indicators are listed below:

- MEMBRANE SWITCHES Toggle between modes, settings and selections.
- DISPLAYS Three separate displays (Cut, Coag, & Bipolar) indicate the power in watts.
- PRESETS Recall (select), set, and view physician selected power settings saved in the 10-memory mode and power set feature.
- MODE INDICATORS
- POWER CONTROL SWITCHES These membrane switches adjust the output power for each mode.
- POWER SWITCH A double pole single throw switch that snaps into the front bezel. This switch supplies the AC mains current to the generator.

BOVIE® Surgi-Center│PRO CONTROL SIGNAL INPUTS AND OUTPUTS
The following table lists the important input and output signals. From a troubleshooting standpoint, the absence (and presence) of these signals will assist in isolating problems.

Continued on following pages.

PFC_ON	This is an output signal from the system logic to the Power Factor Corrector Circuit. Used to toggle the PFC circuit on and off.
SMPS_RANGE	This is an output signal from the system logic to the SMPS to control the output voltage range.
SMPS_DRV	This is an output signal from the system logic that generates the drive signals for the SMPS.
SMPS_DRV1	This is an output signal from the system logic that generates the drive signals for the SMPS.

DISP_RST	This is a communication signal from the system logic to the display system logic.
DISP_INT	This is a communication signal from the system logic to the display system logic.
DISP_CLK	This is a communication signal from the system logic to the display system logic.
DISP_DIN	This is a communication signal from the system logic to the display system logic.
DISP_DOUT	This is a communication signal from the system logic to the display system logic.
DISP_SELECT	This is a communication signal from the system logic to the display system logic.
DISP_INT_CLR	This is a communication signal from the system logic to the display system logic.
TEMP_1	This is an input signal from temperature sensor 1 to the system logic. Used to monitor the internal temperature of the unit.
TEMP_2	This is an input signal from temperature sensor 2 to the system logic. Used to monitor the internal temperature of the unit.
I_TRANS_1	This is an input signal from the current sensor to the system logic. Used to monitor the output current of the unit.
I_TRANS_2	This is an input signal from the current sensor to the system logic. Used to monitor the output current of the unit.
I_TRANS_3	This is an input signal from the current sensor to the system logic. Used to monitor the output current of the unit.
IB_TRANS_1	This is an input signal from the backup current sensor to the system logic. Used to monitor the output current of the unit.
IB_TRANS_2	This is an input signal from the backup current sensor to the system logic. Used to monitor the output current of the unit.
IB_TRANS_3	This is an input signal from the backup current sensor to the system logic. Used to monitor the output current of the unit.
V_TRANS_1	This is an input signal from the voltage sensor to the system logic. Used to monitor the output voltage of the unit.
V_TRANS_2	This is an input signal from the voltage sensor to the system logic. Used to monitor the output voltage of the unit.
V_TRANS_3	This is an input signal from the voltage sensor to the system logic. Used to monitor the output voltage of the unit.
VB_TRANS_1	This is an input signal from the backup voltage sensor to the system logic. Used to monitor the output voltage of the unit.
VB_TRANS_2	This is an input signal from the backup voltage sensor to the system logic. Used to monitor the output voltage of the unit.
VB_TRANS_3	This is an input signal from the backup voltage sensor to the system logic. Used to monitor the output voltage of the unit.

VS_SCALE	This is an output signal from the system logic for scaling the voltage sensors.
CS_SCALE	This is an output signal from the system logic for scaling the current sensors
PUMP_DIN	Reserved.
PUMP_SCLK	Reserved.
PUMP_CS	Reserved.
AUX_SWITCH	These are output signals from the system logic to control the bipolar display.
FAN_CTRL	This is an output signal from the system logic to the fan circiut. Used to toggle the fan on and off.
RF_DRV1	This is an output signal from the system logic that generates the driving signal for the output stage.
RF_DRV2	This is an output signal from the system logic that generates the driving signal for the output stage.
RF_DAMP	This is an output signal from the system logic to control the damping of the output.
CUT/COAG	This is an output signal that defines the modulation signal to the output stage.
RELAY_CABLE_CHECK	This is an input signal that monitors the presense of the Relay Cable.
NEM_T1	This is a input signal from the NEM circuit to the system logic for monitoring the NEM status.
NEM_T2	This is a input signal from the NEM circuit to the system logic for monitoring the NEM status.
OUT_RLY_LO_FPGA	This is an output signal from the system logic to configure the output relays.
MONOBIPOLAR_MODE_FPGA	This is an output signal from the system logic to configure the output relays.
HANDLE_OUT_RLY_FPGA	This is an output signal from the system logic to configure the output relays.
FOOTC_OUT_RLY_FPGA	This is an output signal from the system logic to configure the output relays.

HNDL1_COAG	This is an input signal from the activation module for sensing activation requests from handle 1 coagulation.
HNDL1_CUT	This is an input signal from the activation module for sensing activation requests from handle 1 cut.
HNDL1_UPDN	Reserved
HNDL2_COAG	This is an input signal from the activation module for sensing activation requests from handle 2 coagulation.
HNDL2_ UPDN	Reserved
HNDL2_CUT	This is an input signal from the activation module for sensing activation requests from handle 2 cut.
FSW_BI_RECG	This is an input signal from the activation module for sensing the presence of a connected bipolar footswitch.
FSW_BIPOLAR_ACT	This is an input signal from the activation module for sensing activation requests from the bipolar footswitch.
FOOTC_RECG	This is an input signal from the activation module for sensing the presence of a connected footcontrolled monopolar accessory.
FOOT_COAG	This is an input signal from the activation module for sensing activation requests from the monopolar footswitch coag.
FSW_MONO_RECG	This is an input signal from the activation module for sensing the presence of a connected monopolar footswitch.
FOOT_CUT	This is an input signal from the activation module for sensing activation requests from the monopolar footswitch cut.
SS_EXT_IN	Reserved Communication Signal
SCLK_EXT_OUT	Reserved Communication Signal
TXRX_ENA	Reserved Communication Signal
DIN_SPI_GC	Reserved Communication Signal
DOUT_SPI_GC	Reserved Communication Signal
SCLK_SPI_GC	Reserved Communication Signal
SS_SPI_GC	Reserved Communication Signal

DISABLE_1W	This is an output signal from the system logic to toggle the 1-wire module on and off..
1_WIRE_TX	This is an output signal from the system logic to transmit date to the 1-wire module.
1_WIRE_RX	This is an input signal from the 1-wire module to the system logic to receive data.
CS_SCALE	This is an output signal from the system logic for scaling the voltage sensors.
VS_SCALE	This is an output signal from the system logic for scaling the current sensors.
IB_TRANS_1	This is an output signal from the backup current sensor to the system logic. Used to monitor the output current of the unit.
IB_TRANS_2	This is an output signal from the backup current sensor to the system logic. Used to monitor the output current of the unit.
IB_TRANS_3	This is an output signal from the backup current sensor to the system logic. Used to monitor the output current of the unit.
VB_TRANS_1	This is an output signal from the backup voltage sensor to the system logic. Used to monitor the output voltage of the unit.
VB_TRANS_2	This is an output signal from the backup voltage sensor to the system logic. Used to monitor the output voltage of the unit.
VB_TRANS_3	This is an output signal from the backup voltage sensor to the system logic. Used to monitor the output voltage of the unit.
I_TRANS_3	This is an output signal from the current sensor to the system logic. Used to monitor the output current of the unit.
I_TRANS_2	This is an output signal from the current sensor to the system logic. Used to monitor the output current of the unit.
I_TRANS_1	This is an output signal from the current sensor to the system logic. Used to monitor the output current of the unit.
V_TRANS_1	This is an output signal from the current sensor to the system logic. Used to monitor the output current of the unit.
V_TRANS_2	This is an output signal from the current sensor to the system logic. Used to monitor the output current of the unit.
V_TRANS_3	This is an output signal from the current sensor to the system logic. Used to monitor the output current of the unit.
DISP_B1_DP	This is an output signal from the system logic to control the Bipolar Display.
DISP_B1_G	This is an output signal from the system logic to control the Bipolar Display.
DISP_B1_F	This is an output signal from the system logic to control the Bipolar Display.

DISP_B1_E	This is an output signal from the system logic to control the Bipolar Display.
DISP_B1_D	This is an output signal from the system logic to control the Bipolar Display.
DISP_B1_C	This is an output signal from the system logic to control the Bipolar Display.
DISP_B1_B	This is an output signal from the system logic to control the Bipolar Display.
DISP_B1_A	This is an output signal from the system logic to control the Bipolar Display.
DISP_B2_DP	This is an output signal from the system logic to control the Bipolar Display.
DISP_B2_G	This is an output signal from the system logic to control the Bipolar Display.
DISP_B2_F	This is an output signal from the system logic to control the Bipolar Display.
DISP_B2_E	This is an output signal from the system logic to control the Bipolar Display.
DISP_B2_D	This is an output signal from the system logic to control the Bipolar Display.
IDISP_B2_C	This is an output signal from the system logic to control the Bipolar Display.
DISP_B2_B	This is an output signal from the system logic to control the Bipolar Display.
DISP_B2_A	This is an output signal from the system logic to control the Bipolar Display.
DISP_B3_DP	This is an output signal from the system logic to control the Bipolar Display.
DISP_B3_G	This is an output signal from the system logic to control the Bipolar Display.
DISP_B3_F	This is an output signal from the system logic to control the Bipolar Display.
DISP_B3_E	This is an output signal from the system logic to control the Bipolar Display.
DISP_B3_D	This is an output signal from the system logic to control the Bipolar Display.
DISP_B3_C	This is an output signal from the system logic to control the Bipolar Display.
DISP_B3_B	This is an output signal from the system logic to control the Bipolar Display.
DISP_B3_A	This is an output signal from the system logic to control the Bipolar Display.
DISP_A1_A	This is an output signal from the system logic to control the Cut Display.
DISP_A1_B	This is an output signal from the system logic to control the Cut Display.
DISP_A1_C	This is an output signal from the system logic to control the Cut Display.
DISP_A1_D	This is an output signal from the system logic to control the Cut Display.
DISP_A1_E	This is an output signal from the system logic to control the Cut Display.
DISP_A1_F	This is an output signal from the system logic to control the Cut Display.
DISP_A1_G	This is an output signal from the system logic to control the Cut Display.
DISP_A1_DP	This is an output signal from the system logic to control the Cut Display.
DISP_A2_A	This is an output signal from the system logic to control the Cut Display.
DISP_A2_B	This is an output signal from the system logic to control the Cut Display.
DISP_A2_C	This is an output signal from the system logic to control the Cut Display.
DISP_A2_D	This is an output signal from the system logic to control the Cut Display.
DISP_A2_E	This is an output signal from the system logic to control the Cut Display.
DISP_A2_F	This is an output signal from the system logic to control the Cut Display.

DISP_A1_G	This is an output signal from the system logic to control the Cut Display.
DISP_A1_DP	This is an output signal from the system logic to control the Cut Display.
DISP_A2_A	This is an output signal from the system logic to control the Cut Display.
DISP_A2_B	This is an output signal from the system logic to control the Cut Display.
DISP_A2_C	This is an output signal from the system logic to control the Cut Display.
DISP_A2_D	This is an output signal from the system logic to control the Cut Display.
DISP_A2_E	This is an output signal from the system logic to control the Cut Display.
DISP_A2_F	This is an output signal from the system logic to control the Cut Display.
DISP_A2_G	This is an output signal from the system logic to control the Cut Display.
DISP_A2_DP	This is an output signal from the system logic to control the Cut Display.
DISP_A3_A	This is an output signal from the system logic to control the Cut Display.
DISP_A3_B	This is an output signal from the system logic to control the Cut Display.
DISP_A3_C	This is an output signal from the system logic to control the Cut Display.
DISP_A3_D	This is an output signal from the system logic to control the Cut Display.
DISP_A3_E	This is an output signal from the system logic to control the Cut Display.
DISP_A3_F	This is an output signal from the system logic to control the Cut Display.
DISP_A3_G	This is an output signal from the system logic to control the Cut Display.
DISP_A3_DP	This is an output signal from the system logic to control the Cut Display.
DISP_C1_A	This is an output signal from the system logic to control the Coag Display.
DISP_C1_B	This is an output signal from the system logic to control the Coag Display.
DISP_C1_C	This is an output signal from the system logic to control the Coag Display.
DISP_C1_D	This is an output signal from the system logic to control the Coag Display.
DISP_C1_E	This is an output signal from the system logic to control the Coag Display.
DISP_C1_F	This is an output signal from the system logic to control the Coag Display.
DISP_C1_G	This is an output signal from the system logic to control the Coag Display.
DISP_C1_DP	This is an output signal from the system logic to control the Coag Display.
DISP_C2_A	This is an output signal from the system logic to control the Coag Display.
DISP_C2_B	This is an output signal from the system logic to control the Coag Display.
DISP_C2_C	This is an output signal from the system logic to control the Coag Display.
DISP_C2_D	This is an output signal from the system logic to control the Coag Display.
DISP_C2_E	This is an output signal from the system logic to control the Coag Display.
DISP_C2_F	This is an output signal from the system logic to control the Coag Display.
DISP_C2_G	This is an output signal from the system logic to control the Coag Display.

DISP_C2_DP	This is an output signal from the system logic to control the Coag Display.
DISP_C3_A	This is an output signal from the system logic to control the Coag Display.
DISP_C3_B	This is an output signal from the system logic to control the Coag Display.
DISP_C3_C	This is an output signal from the system logic to control the Coag Display.
DISP_C3_D	This is an output signal from the system logic to control the Coag Display.
DISP_C3_E	This is an output signal from the system logic to control the Coag Display.
DISP_C3_A F	This is an output signal from the system logic to control the Coag Display.
DISP_C3_G	This is an output signal from the system logic to control the Coag Display.
DISP_C3_DP	This is an output signal from the system logic to control the Coag Display.
DISP_D_A	This is an output signal from the system logic to control the Memory Display.
DISP_D_B	This is an output signal from the system logic to control the Memory Display.
DISP_D_C	This is an output signal from the system logic to control the Memory Display.
DISP_D_D	This is an output signal from the system logic to control the Memory Display.
DISP_D_E	This is an output signal from the system logic to control the Memory Display.
DISP_D_F	This is an output signal from the system logic to control the Memory Display.
DISP_D_G	This is an output signal from the system logic to control the Memory Display.
DISP_D_DP	This is an output signal from the system logic to control the Memory Display.
ALARM_IND	This is an output signal from the system logic to control the Alarm indicator.
SPLIT_IND	This is an output signal from the system logic to control the Split Pad indicator
NON_SPLIT_IND	This is an output signal from the system logic to control the Solid Pad indicator.
BI_MICRO_IND	This is an output signal from the system logic to control the Micro Bipolar indicator.
BI_MACRO_IND	This is an output signal from the system logic to control the Macro Bipolar indicator.
BI_STANDARD_IND	This is an output signal from the system logic to control the Standard Bipolar indicator.
CUT_II_IND	This is an output signal from the system logic to control the Cut II indicator.
CUT_I_IND	This is an output signal from the system logic to control the Cut I indicator.
CUT_BLEND_IND	This is an output signal from the system logic to control the Blend indicator.

CUT_ACT_IND	This is an output signal from the system logic to control the Cut Activation indicator.
COAG_ACT_IND	This is an output signal from the system logic to control the Coag Activation indicator.
COAG_ACT_IND	This is an input signal from the backup voltage sensor to the control logic. Used to monitor the output voltage of the unit.
BIP_ACT_IND	This is an output signal from the system logic to control the Bipolar Activation indicator.
FULG_IND	This is an output signal from the system logic to control the Spray indicator.
COAG_IND	This is an output signal from the system logic to control the Pinpoint indicator.
SOFT_IND	This is an output signal from the system logic to control the Monopolar Footswitch indicator.
MONO_FOOT_IND	This is an output signal from the system logic to control the Gentle indicator.
BIP_FOOT_IND	This is an output signal from the system logic to control the Blend Bar indicator.
BLEND_10	Reserved
BLEND_9	Reserved
BLEND_8	Reserved
BLEND_7	Reserved
BLEND_6	Reserved
BLEND_5	Reserved
BLEND_4	This is an output signal from the system logic to control the Bipolar Footswitch indicator.
BLEND_3	This is an output signal from the system logic to control the Bipolar Footswitch indicator.
BLEND_2	This is an output signal from the system logic to control the Bipolar Footswitch indicator.
BLEND_1	This is an output signal from the system logic to control the Bipolar Footswitch indicator.

AUD_DRV	This is an output signal from the system logic to the audio circuit for controlling the alarm tone.
ALM_DRV	This is an output signal from the system logic to the audio circuit for controlling the activation tone.
COMM_RST	This is a communication signal from the system logic to the display system logic.
COMM_INT	This is a communication signal from the system logic to the display system logic.
SPI_COMM_CLK	This is a communication signal from the system logic to the display system logic.
SPI_COMM_DOUT	This is a communication signal from the system logic to the display system logic.
SPI_COMM_DIN	This is a communication signal from the system logic to the display system logic.
SPI_COMM_SEL	This is a communication signal from the system logic to the display system logic.
COMM_INT_CLR	This is a communication signal from the system logic to the display system logic.
RESERVE_SEL	Reserved
BI_MODE_SEL	This is an input signal to the system logic from the front panel overlay to toggle between Bipolar modes.
BLEND_UP_SEL	This is an input signal to the system logic from the blend up switch from the front panel overlay.
BLEND_DOWN_SEL	This is an input signal to the system logic from the blend down switch from the front panel overlay.
CUT_DOWN_SEL	This is an input signal to the system logic from the cut down switch from the front panel overlay.
CUT_UP_SEL	This is an input signal to the system logic from the cut up switch from the front panel overlay.
COAG_MODE_SEL	This is an input signal to the system logic from the front panel overlay to toggle between Coag modes.
CUT_MODE_SEL	This is an input signal to the system logic from the front panel overlay to toggle between Cut modes.
SET_SEL	This is an input signal to the system logic from the set switch front panel overlay.
RECALL_SEL	This is an input signal to the system logic from the reset switch front panel overlay.
COAG_UP_SEL	This is an input signal to the system logic from the coag up switch from the front panel overlay.
COAG_DN_SEL	This is an input signal to the system logic from the coag down switch from the front panel overlay.
BIP_DOWN_SEL	This is an input signal to the system logic from the bipolar down switch from the front panel overlay.
BIP_U_SEL	This is an input signal to the system logic from the bipolar up switch from the front panel overlay.

MAINTAINING THE BOVIE® SURGI-CENTER | PRO

This section covers the following topics:

- Cleaning
- Periodic Inspection
- Fuse Replacement

Symmetry Surgical 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.

CLEANING

After each use, clean the unit.

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.

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

2. 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. Do not sterilize the generator.

PERIODIC INSPECTION

Every six months, visually inspect the generator 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 rear 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 rear panel.
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 (T6.3AL250V) 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.

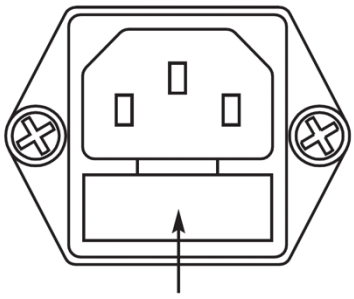


Figure 5 – 1 Fuse holder

FUSE REPLACEMENT ON THE MAIN PCB

Additional fuses for the unit reside on the Main PCB. Fuse values are indicated in the table below.
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 rear panel.
3. Remove the six screws that secure the cover panel to the unit.
4. Lift off the top cover panel.
5. Disconnect ground cable from the top cover.
6. Remove the two fuses using a fuse pulling tool.
7. Replace the fuses with the same values as listed below.
8. Reinstall the cover by connecting the ground cable to the cover, positioning the cover over the chassis, and securing the six screws.

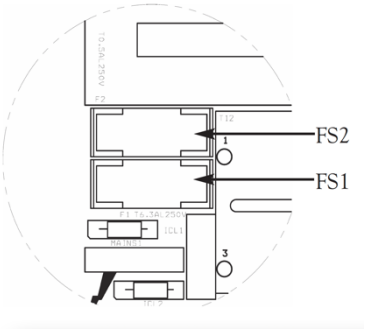


Figure 5 – 2 Fuse location

Main PCB Fuse Information

	FS1	**FS2**
VAC	250 VAC	250 VAC
AMPS	6.3 A	0.5 A
Slize	5 x 20 mm	5 x 20 mm
Type	Slow Blow	Slow Blow

OPERATING THE BOVIE® SURGI-CENTER | PRO

- Please refer to the User Guide for standard operating instructions, safety precautions and warnings.

TROUBLESHOOTING

This section includes unit verification checks and error code descriptions including actions to take to resolve them.

TECHNICAL VERIFICATION CHECKS

Follow these steps to check the functionality of the Bovie® Surgi-Center│PRO.

Start-up Verification
Upon start-up, the Bovie® Surgi-Center│PRO should display the following:

All LEDs and seven-segment displays will illuminate “8’s” for approximately 1 to 2 seconds. The display will indicate the last preset setting, and its relevant mode and power level settings.

If the display does not illuminate or indicate the proper information, verify that the power cord is properly attached to the power receptacle.
If the display responds positively, proceed to footswitch verification.

Monopolar and Bipolar Footswitch Verification
The monopolar and bipolar footswitch indicators should light only when the proper footswitch is connected to the rear of the unit.

If the display does not illuminate or indicate the proper information, verify that the power cord is properly attached to the power receptacle.

Mode Selection and Indicators
Each power setting from zero to the maximum for that mode must be present and adjust up or down without any missed numbers. Verify by adjusting each mode to an increased power. Refer to the list below for power increments:

Monopolar Cut/Coag. Increments:

- 1 Watt Increments from 0 – 49 Watts
- 2 Watt Increments from 50 - 100 Watts
- 5 Watt Increments from 105 – 200 Watts

Bipolar Increments:

- 1 Watt Increments from 0 – 50 Watts
- 2 Watt Increments from 52 – 80 Watts

Each segment on the Blend bar must illuminate and move up or down without any missed segments. Verify by pressing the Blend amount control button on the front of the unit.

Indicators
Refer to the table on the next page that specifies each mode and its corresponding LED color.

The amber Cut LED illuminates when either the Cut I, Cut II, and Blend modes are activated, a blue Coag LED illuminates when either the Pinpoint Coag or Fulguration Coag modes are activated and a blue Bipolar LED illuminates when the Bipolar mode is activated.

1. Verify that when the unit is turned on that all the LEDs illuminate and are the correct color.
2. Verify that all the segments on the blend display can be turned on and off using the arrow keys.
3. Verify that all the output modes can be selected and that the appropriate LEDs illuminate.
4. Verify that the monopolar footswitch LED illuminates when a monopolar footswitch is connected to the monopolar footswitch receptacles on the back of the unit.
5. Verify that the bipolar footswitch LED illuminates when a bipolar footswitch is connected to the bipolar footswitch jack on the back of the unit.

The following table specifies each mode and its corresponding LED color.

Mode	LED Color
Cut I	Green
Cut II	Green
Blend Modes	Green
Pinpoint Coagulation	Green
Spray Coagulation	Green
Gentle Coagulation	Green
Bipolar Modes (Macro, Micro, Standard)	Green
Cut Activation	Yellow
Coag. Activation	Blue
Bipolar Activation	Blue
Blend Bar	Green Segments (10)
Power	Green
Auto Bipolar	Green
Presets	Green
Single Pad	Green
Split Pad	Green
Alarm	Red

RECOMMENDED EQUIPMENT FOR TROUBLESHOOTING

The following equipment enables you to troubleshoot and inspect the Bovie® Surgi-Center│PRO.

- 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, 500 ohms, 800 ohms, 1000 ohms (minimum 150 watts)
- Oscilloscope (dual channel) at 100 MHz
- Oscilloscope probes, (2) 10X and 1000X
- Bovie footswitches (monopolar, bipolar)
- Monopolar instruments (handswitch and footswitch)
- Bovie cable
- Standard technician's tool kit
- Return electrode cable
- Miscellaneous test leads and cables

TROUBLESHOOTING THE BOVIE® SURGI-CENTER│PRO

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 Bovie® Surgi-Center│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. Check fuses. Refer to Section 5.
5. Replace fuses if necessary. Refer to Fuse Replacement in Section 5.

Inspecting the Receptacles

Equipment required:

- Bovie footswitches (monopolar, bipolar)
- Bipolar cable
- Monopolar instruments (handswitch and footswitch)
- Return electrode cable

Bipolar procedure:

1. Turn off the generator.
2. Disconnect the power cord.
3. Check the footswitch receptacles on the rear of the unit for obvious signs of obstruction and damage.
4. Check for a secure fit by inserting the footswitch connectors into footswitch receptacles.
   If the footswitch receptacles are damaged, replace the footswitch connector assembly.
5. Check the bipolar receptacle on the front of the unit for obstruction or damage.
6. Insert a bipolar cable into the bipolar receptacle on the front of the unit. Verify a secure fit.
   If the bipolar receptacle is damaged, replace the bipolar connector assembly.

Monopolar procedure:

1. Turn off the generator.
2. Disconnect the power cord.
3. Check the monopolar handpiece receptacle on the front of the unit for obstruction or damage.
4. Insert a handswitching pencil into the monopolar handpiece receptacle on the front of the unit. Verify a secure fit.
   If the monopolar handpiece receptacle is damaged, replace the monopolar handpiece assembly.
5. Check the monopolar foot controlled receptacle on the front of the unit for obstruction or damage.

6. Insert a monopolar foot controlled handpiece into the monopolar foot control receptacle on the front of the unit. Verify a secure fit. If the monopolar foot controlled receptacle is damaged, replace the connector assembly.
7. Check the Return Electrode receptacle on the front of the unit for a broken pin or an obstruction.
8. Insert a return electrode cable into the return electrode receptacle. Verify a secure fit. If the return electrode receptacle on the front of the unit is damaged, replace the return electrode receptacle assembly.

   Refer to your User's Guide, Section 3, Confirming Modes, to verify the receptacles and the accessories connected to them are functioning properly.

Inspecting Internal Components

CAUTIONS:
The generator contains electrostatic-sensitive (ESS) components. When repairing 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 six screws that secure the cover to the chassis.
2. Lift the cover off the chassis. Save the cover and screws for later reinstallation.
3. Disconnect ground cable from the top cover.
4. Visually inspect and verify that all connectors are firmly seated and locked into the connectors.
5. Inspect each board for damaged components, wires, cracks and corrosion.
6. Reinstall the cover by connecting the ground cable to the cover, positioning the cover over the chassis, and Securing six screws.

The Bovie® Surgi-Center│PRO includes automatic self-diagnostics. If the diagnostics detect an error or fault, the system displays an appropriate code,sounds an audible tone, and deactivates the unit output power.

The following tables list the codes, describes the errors or faults, and recommends actions from what is listed below to take to resolve the error or fault.

All error codes are displayed in the Bipolar display. If the unit displays any other error code, it requires service. Power off unit and call 1-800-251-3000 or Int'l Phone 1-615-964-5532.

NOTICE:
If the unit does not power on and nothing is displayed in the Bipolar display, check fuses as described in Section 5 of this guide.

SYSTEM FAULT CODE MESSAGES

Fault messages (F) indicate improper unit setup or faulty accessories.

Fault Code	Description	Recommended Action
F1	Cut button on handpiece 1 is depressed during power up.	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 Bovie® customer service at 1-800-251-3000 or Int'l Phone 1-615-964-5532.
F2	Coag button on handpiece 1 is depressed during power up.	
F3	Cut button on handpiece 2 is depressed during power up.	
F4	Coag button on handpiece 2 is depressed during power up.	
F5	Cut pedal on monopolar footswitch is depressed during power up.	
F6	Coag pedal on monopolar footswitch is depressed during power up.	
F7	Bipolar pedal on bipolar footswitch is depressed during power up.	
F8	Bipolar activation button is depressed during power up.	
F9	Simultaneous activation from a footswitch or handpiece or any combination. *This does not apply to activation of the spray mode.*	
F10	Activation request of a monopolar or bipolar footswitch when no footswitch connection or Bovie® approved footswitch is detected.	
F11	Activation request of a monopolar handpiece 1 when no monopolar footcontrolled handpiece connected to the monopolar handpiece connector 1.	

SYSTEM FATAL ERROR MESSAGES

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

Error Code	Description	Recommended Action
E1	Output Current out of Specification, Digital Check	1. Turn the unit off (for Temperature Errors, let unit cool for 20 minutes). 2. Turn the unit on. 3. If the error code reappears, record the number and contact Bovie® customer service at 1-800-251-3000 or Int'l Phone 1-615-964-5532.
E4	DC Voltage Error	
E5	Temperature Sense Error 1	
E6	Temperature Sense Error 2	
E7	NEM / Autobipolar Error	
E8	NEM Calibration Error	
E9	A/D Error	
E10	Watch Dog Error	
E11	Relay Board Cable Sense Error	
E12	Dosage Error	

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 Cause	Recommended Action
Generator is on and the accessory is activated, but the generator does not deliver output power.	An error condition exists	1. Check the bipolar displays for an error code number. 2. Note the number and refer to the error codes descriptions in this section.
	Main board malfunction	1. Check and connect all connections from main board to display board. 2. Replace main board.
Footswitch will not activate output.	Malfunctioning or damaged footswitch receptacle	Replace the Footswitch connector assembly.
	Footswitch activation signal lost on main board.	1. Check/connect loose cable. 2. Replace the main board.
	Sensing circuit malfunction	Replace the display board.
Continuous monitor Interference	Faulty chassis-to-ground connections	1. Check and correct the chassis ground connections for the monitor and, if applicable, for the generator. 2. Check other electrical equipment in the room for defective grounds.
	Electrical equipment is grounded to different objects rather than a common ground.	Plug all electrical equipment into line power at the same location.
	The generator may respond to the resulting voltage differences between grounded objects.	
	Malfunctioning monitor	Replace the monitor.
Interference with other devices only when generator is active	Metal-to-metal sparking	Check all connections to the generator, patient return electrode, and accessories.
	High settings used for fulguration	Use lower power settings for fulguration or select the Coagulation mode.

Situation	Possible Cause	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 cord.
	Fuses blown	1. Check fuses. If necessary, replace fuse(s).
	Loose or disconnected internal cables	2. If a problem persists, use a backup generator. Check all internal connections.
	Faulty power switch	Replace the power switch.
	Faulty power supply	Replace power supply.
Generator is on, but will not activate.	An alarm condition exists.	Check the display for an error code. Note the number and refer to the Error Code list.
	Loose or disconnected internal cables	Check and connect all internal cables.
	Main board malfunction	1. Check and connect all connections from main board to display board. 2. Replace main board.
	Display board malfunction	Replace the display board.
	Relay board malfunction	Replace the relay board.
	Disconnected or faulty handpiece	Check or replace handpiece.
	Disconnected or faulty footswitch(s)	Check or connect faulty footswitch.
Activation and/or alarm tones do not sound; speaker is malfunctioning.	Loose or disconnected cable between main board and speaker board	Check/connect all connections from the speaker board to the main board.
	Main board malfunction	1. Check/connect all connections from the main board to the display board.
		2. Replace the main board.
	Display board malfunction	Replace the display board.
	Speaker board malfunction	Replace the speaker board.

Situation	Possible Cause	Recommended Action
Interference with other devices only when generator is activated	Electrically inconsistent ground wires in the operating room	Verify that all ground wires are as short as possible and go to the same grounded metal.
	If interference continues when the generator is activated, the monitor is responding to radiated frequencies.	Check with the manufacturer of the monitor. Some manufacturers offer choke filters for use in monitor leads. The filters reduce interference when the generator is activated and minimize the potential for an electrosurgical burn at the site of the monitor electrode.
Pacemaker interference	Intermittent connections or metal-tometal sparking	1. Check all connections to the generator. 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, is possible. If you must use a monopolar instrument, place the return electrode as close as possible to the surgical site. 2. Make sure the current path from the surgical site to the 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 plate, and active electrodes.
	Can occur during coagulation	Use a lower setting for the Fulguration mode or select the Coagulation mode.
	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.
Blank or confusing LED display	Display board malfunction	Replace the display board.
Mode buttons do not operate properly when pressed.	Damaged front panel overlay	Replace front panel overlay.
	Loose or disconnected internal cable	Check/connect overlay cable to display board.
	Power supply malfunction	Replace the power supply.
	Main board malfunction	Replace the main board.

Situation	Possible Cause	Recommended Action
Generator is on and the accessory is activated, but the 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.
	Display board malfunction	Replace the display board.
	Main board malfunction	Replace the main board.
	Relay board malfunction	Replace the relay board.
	NEM alarm	1. Check/connect the Return Electrode connection to the patient and connection to the generator. 2. Replace Return Electrode

TEST POINTS

Test Point	Description	Location On PCA
TP1	+3.3V DC power supply	TOP/BOTTOM SIDE
TP2	+5V DC POWER SUPPLY	TOP/BOTTOM SIDE
TP3	+12V DC POWER SUPPLY	TOP/BOTTOM SIDE
TP4	-12V DC POWER SUPPLY	TOP/BOTTOM SIDE
TP5	DIGITAL GROUND	TOP/BOTTOM SIDE
TP6	*NOT USED*	*N/A*
TP7	*NOT USED*	*N/A*
TP8	+16V DC POWER SUPPLY	TOP/BOTTOM SIDE
TP9	GROUND FOR +16V DC	TOP/BOTTOM SIDE
TP10	COOLING FAN OUTPUT (OPTIONAL)	TOP/BOTTOM SIDE
TP11	+12VR DC POWER SUPPLY (POWER FOR THE RELAY BOARD)	TOP/BOTTOM SIDE
TP12	*NOT USED*	*N/A*
TP13	*NOT USED*	*N/A*
TP14	ACTIVATION REQUEST FOOTSWITCH-COAG	TOP/BOTTOM SIDE
TP15	ACTIVATION REQUEST FOOTSWITCH-CUT	TOP/BOTTOM SIDE
TP16	ACTIVATION REQUEST MONOPOLAR 1-CUT	TOP/BOTTOM SIDE
TP17	ACTIVATION REQUEST FOOTSWITCH-COAG	TOP/BOTTOM SIDE
TP18	BACKUP CURRENT SENSING SIGNAL 3	TOP/BOTTOM SIDE
TP19	BACKUP CURRENT SENSING SIGNAL 2 (REFERENCE)	TOP/BOTTOM SIDE
TP20	BACKUP CURRENT SENSING SIGNAL 1	TOP/BOTTOM SIDE
TP21	BACKUP VOLTAGE SENSING SIGNAL 1	TOP/BOTTOM SIDE
TP22	BACKUP VOLTAGE SENSING SIGNAL 2 (REFERENCE)	TOP/BOTTOM SIDE
TP23	BACKUP VOLTAGE SENSING SIGNAL 3	TOP/BOTTOM SIDE
TP24	MAIN VOLTAGE SENSING SIGNAL 1	TOP/BOTTOM SIDE
TP25	MAIN VOLTAGE SENSING SIGNAL 2 (REFERENCE)	TOP/BOTTOM SIDE
TP26	MAIN VOLTAGE SENSING SIGNAL 3	TOP/BOTTOM SIDE
TP27	MAIN CURRENT SENSING SIGNAL 1	TOP/BOTTOM SIDE
TP28	MAIN CURRENT SENSING SIGNAL 2 (REFERENCE)	TOP/BOTTOM SIDE
TP29	MAIN CURRENT SENSING SIGNAL 3	TOP/BOTTOM SIDE
TP30	SPI CLOCK AUTOBIPOLAR CIRCUIT	TOP/BOTTOM SIDE
TP31	SPI DATA OUT AUTOBIPOLAR CIRCUIT	TOP/BOTTOM SIDE
TP32	SPI SELECT AUTOBIPOLAR CIRCUIT	TOP/BOTTOM SIDE
TP33	AUTOBIPOLAR CLOCK GENERATOR	TOP/BOTTOM SIDE
TP34	AUTOBIPOLAR MODE SELECT	TOP/BOTTOM SIDE
TP35	AUXILIARY RELAY SWITCH	TOP/BOTTOM SIDE
TP36	VOLTAGE SENSOR SCALE	TOP/BOTTOM SIDE
TP37	CURRENT SENSOR SCALE	TOP/BOTTOM SIDE
TP38	NEUTRAL ELECTRODE MONITORING (NEM) CIRCUIT (TERMINAL 1)	TOP/BOTTOM SIDE

TEST POINTS – CONT.

Test Point	Description	Location On PCA
TP39	NEUTRAL ELECTRODE MONITORING (NEM) CIRCUIT (TERMINAL 2)	TOP/BOTTOM SIDE
TP40	1-WIRE RECEIVE (RX)	TOP/BOTTOM SIDE
TP41	1-WIRE TRANSMIT (TX)	TOP/BOTTOM SIDE
TP42	DISPLAY CONTROL - SPI DATA IN	TOP/BOTTOM SIDE
TP43	DISPLAY CONTROL -SPI DATA OUT	TOP/BOTTOM SIDE
TP44	DISPLAY CONTROL -SPI CLOCK	TOP/BOTTOM SIDE
TP45	DISPLAY CONTROL - SPI SELECT	TOP/BOTTOM SIDE
TP46	DISPLAY CONTROL - CLEAR INTERRUPT	TOP/BOTTOM SIDE
TP47	DISPLAY CONTROL- INTERRUPT	TOP/BOTTOM SIDE
TP48	DISPLAY CONTROL RESET	TOP/BOTTOM SIDE
TP49	TEMP SENSOR 2	TOP/BOTTOM SIDE
TP50	TEMP SENSOR 1	TOP/BOTTOM SIDE
TP51	POWER FACTOR CONTROL ENABLE/DISABLE	TOP/BOTTOM SIDE
TP52	1.2V DC POWER SUPPLY (FPGA CORE VOLTAGE)	TOP/BOTTOM SIDE
TP53	1-WIRE DISABLE	TOP/BOTTOM SIDE
TP54	RF DRIVER SIGNAL 1 (FPGA)	TOP/BOTTOM SIDE
TP55	RF DRIVER SIGNAL 2 (FPGA)	TOP/BOTTOM SIDE
TP56	RELAY BOARD CABLE CHECK	TOP/BOTTOM SIDE
TP57	OUTPUT STAGE PRIMARY RELAY CONTROL-CUT/COAG	TOP/BOTTOM SIDE
TP58	SMPS RANGE CONTROL	TOP/BOTTOM SIDE
TP59	OUTPUT RELAY LOWER TRAFO WINDING CONTROL (FPGA)	TOP/BOTTOM SIDE
TP60	OUTPUT RELAY MONOPOLAR/BIPOLAR CONTROL (FPGA)	TOP/BOTTOM SIDE
TP61	OUTPUT RELAY HANDLE CONTROL (FPGA)	TOP/BOTTOM SIDE
TP62	OUTPUT RELAY FOOT CONTROL (FPGA)	TOP/BOTTOM SIDE
TP63	ENABLE/DISABLE SERIAL COMMUNICATION (OPTIONAL)	TOP/BOTTOM SIDE
TP64	SPI CLOCK CONTROL-MASTER (OPTIONAL)	TOP/BOTTOM SIDE
TP65	SPI DATA OUT CONTROL/SERIAL TX -MASTER (OPTIONAL)	TOP/BOTTOM SIDE
TP66	SPI SLAVE SELECT -MASTER (OPTIONAL)	TOP/BOTTOM SIDE
TP67	SPI CLOCK CONTROL-SLAVE (OPTIONAL)	TOP/BOTTOM SIDE
TP68	SPI DATA IN CONTROL/SERIAL TX -SLAVE(OPTIONAL)	TOP/BOTTOM SIDE
TP69	SPI SLAVE SELECT -SLAVE (OPTIONAL)	TOP/BOTTOM SIDE
TP70	ACTIVATION REQUEST MONOPOLAR 2-COAG	TOP/BOTTOM SIDE
TP71	ACTIVATION REQUEST MONOPOLAR 2-CUT	TOP/BOTTOM SIDE
TP72	MONOPOLAR FOOTSWITCH RECOGNITION REQUEST	TOP/BOTTOM SIDE
TP73	BIPOLAR FOOTSWITCH RECOGNITION REQUEST	TOP/BOTTOM SIDE
TP74	ACTIVATION REQUEST BIPOLAR FOOTSWITCH	TOP/BOTTOM SIDE
TP75	NEGATIVE VOLTAGE RECTIFIER OUTPUT (NON-REGULATED)	TOP/BOTTOM SIDE
TP76	*NOT USED*	*N/A*
TP77*	**DRAIN OUTPUT OF VIPER53 - LOW POWER SPMS**	**TOP/BOTTOM SIDE**

TEST POINTS – CONT.

Test Point	Description	Location On PCA
TP78	+6V TR1 WINDING VOLTAGE	TOP/BOTTOM SIDE
TP79**	**PRIMARY (MAINS) GROUND-LOW POWER SPMS**	**TOP/BOTTOM SIDE**
TP80**	**POWER FACTOR CONTROL Q3 DRAIN VOLTAGE**	**TOP/BOTTOM SIDE**
TP81**	**DC POWER SUPPLY OF PFC CONTROLLER (+14V)**	**TOP/BOTTOM SIDE**
TP82**	**PFC OUTPUT VOLTAGE +380V DC**	**TOP/BOTTOM SIDE**
TP83	*NOT USED*	*N/A*
TP84**	**PFC – GROUND**	**TOP/BOTTOM SIDE**
TP85**	**PFC – GROUND**	**TOP/BOTTOM SIDE**
TP86	SMPS DRIVER SIGNAL	TOP/BOTTOM SIDE
TP87	SMPS OUTPUT - VOLTAGE 16-232V	TOP/BOTTOM SIDE
TP88	DIGITAL GROUND	TOP/BOTTOM SIDE
TP89*, **	**PFC - GROUND (SMPS PRIMARY (MAINS) SECTION)**	**TOP SIDE ONLY**
TP90	SMPS OUTPUT -GROUND	TOP/BOTTOM SIDE
TP91	SMPS DRIVER 1 SIGNAL	TOP/BOTTOM SIDE
TP92	RF DRIVER U18 POWER SUPPLY (+12V DC)	TOP/BOTTOM SIDE
TP93	POWER GENERATOR DC VOLTAGE (SMPS OUTPUT VOLTAGE)	TOP/BOTTOM SIDE
TP94	RF DRIVER SIGNAL (U18 INPUT)	TOP/BOTTOM SIDE
TP95*	DIGITAL GROUND (DRIVER)	TOP SIDE ONLY
TP96	DRAIN VT5 POWER GENERATOR	TOP/BOTTOM SIDE
TP97	RF DRIVER U19 POWER SUPPLY (+12V DC)	TOP/BOTTOM SIDE
TP98	VT5 GATE VOLTAGE -POWER GENERATOR	TOP/BOTTOM SIDE
TP99	RF DRIVER SIGNAL (U19 INPUT)	TOP/BOTTOM SIDE
TP100	VT7 GATE VOLTAGE -POWER GENERATOR	TOP/BOTTOM SIDE
TP101	DRAIN VT7 POWER GENERATOR	TOP/BOTTOM SIDE
TP102	DIGITAL GROUND (DRIVER)	TOP/BOTTOM SIDE
TP103	RF DRIVER U20 POWER SUPPLY (+12V DC)- RF DAMPING	TOP/BOTTOM SIDE
TP104	POWER GENERATOR GROUND (SMPS OUTPUT GROUND)	TOP/BOTTOM SIDE
TP105*	POWER GENERATOR GROUND (SMPS OUTPUT GROUND)	TOP SIDE ONLY
TP106	RF DRIVER FOR POWER GENERATOR RF DAMPING	TOP/BOTTOM SIDE
TP107	GATE VT6 - POWER GENERATOR RF DAMPING CONTROL	TOP/BOTTOM SIDE
TP108	*NOT USED*	*N/A*
TP109	*NOT USED*	*N/A*
TP110	*NOT USED*	*N/A*
TP111	FOOTCONTROL PLUGGED-IN RECOGNITION REQUEST	TOP/BOTTOM SIDE

NOTES:
***** - SINGLE LOOP TEST POINTS FOR PROBE ATTACHEMENT, ALL OTHER TEST POINTS ARE TEST PCB PADS
** -**ELECTRIC SHOCK HAZARD! -THE TEST POINTS IN BOLD ARE LOCATED IN THE MAINS CIRCUIT (100-240V AC), WHERE DANGEROUS HIGH VOLTAGES ARE PRESENT! USE EXTREME CAUTION AND ISOLATED FROM EARTH INSTRUMENTS (FOR INSTANCE ISOLATION MAINS TRANSFORMERS) FOR SIGNAL MEASUREMENTS IN THIS AREA!**

REPAIR POLICY AND PROCEDURES

Refer to this section for information on:

- Responsibility of the Manufacturer
- Returning the Generator for Service

RESPONSIBILITY OF THE MANUFACTURER

Bovie® 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 Symmetry Surgical 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 Symmetry Surgical instructions for use.

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 Bovie Medical Corporation. Contact your Symmetry Surgical representative for return instructions.

For warranty information, refer to Appendix A - *Warranty.*

RETURNING THE GENERATOR FOR SERVICE

Before you return the generator, call your Symmetry Surgical representative for assistance. If instructed to send the generator to Symmetry Surgical, first obtain a Returned Goods Authorization Number. Then, clean the Generator and package securely to ensure proper protection of the unit. So as to aid in the processing of the unit, please be sure to include a reference to the Bovie® Return Goods Authorization Number on the outside of the box and ship directly to Symmetry Surgical.

Step 1 – Obtain a Returned Goods Authorization Number

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

- Hospital / clinic name / customer number
- Telephone number/fax number
- Department / address, city, state, and zip code
- Model number / Serial number
- Description of the problem
- Type of repair to be done
- P.O. 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.

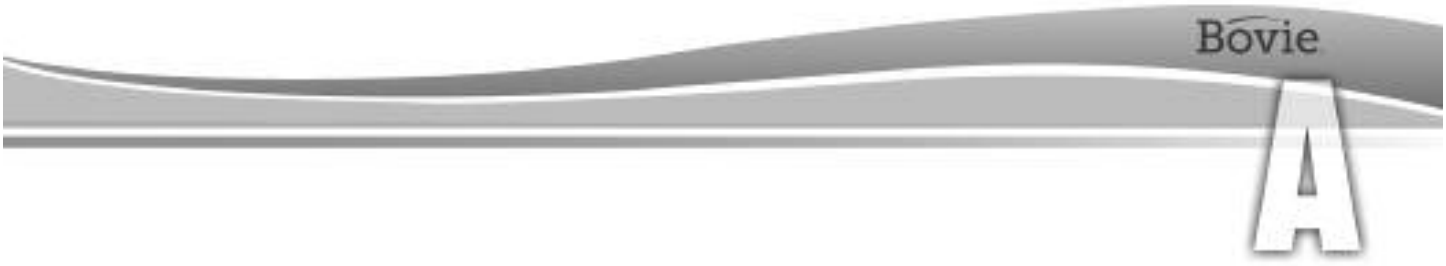
B. Thoroughly wipe all surfaces of the generator and power cord with a mild cleaning solution or disinfectant and a damp cloth. Follow the procedures approved by your institution or use a validated infection control procedure. Do not allow fluids to enter the chassis. You cannot sterilize the generator.

Step 3 – Ship the Generator

A.Attach a tag to the generator that includes the Returned Goods Authorization Number and the information (hospital, phone number, etc.) listed in Step 1 – *Obtain a Returned Goods Authorization Number.*

B. Be sure the generator is completely dry before you pack it for shipment. Although the preference is to have the Generator repackaged
using its original packaging, Bovie understands that this may not always be possible. If necessary, contact Customer Service for the proper packaging to ship the unit. Please be sure to include a reference of the Bovie Return Goods Authorization Number on the outside of the box/container.

C. Ship the generator, prepaid, to the address given to you by the Symmetry Surgical Service Center.



WARRANTY

Symmetry Surgical, 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.

Symmetry Surgical's 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 Symmetry Surgical's 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 Symmetry Surgical
Corporation's factory in a way so as, in Symmetry Surgical's judgment, to affect its stability or reliability, or which has been subjected to misuse, neglect, or accident.

The warranty periods for Symmetry Surgical products are as follows:

- Electrosurgical Generators: 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
- Handpiece: 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 Symmetry Surgical.

Symmetry Surgical neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale or use of any of Symmetry Surgical's products.

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

Symmetry Surgical 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 Tennessee, USA.

The sole forum for resolving disputes arising under or relating in any way to this warranty is the District Court of the County of Davidson, State of Tennessee, USA.

Symmetry Surgical, 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, & ASSEMBLIES

HOW TO ORDER PARTS FROM SYMMETRY SURGICAL

Once you have determined what parts you need from the drawings and Bill of Materials, contact our Technical Service Department by calling 1-800-251-3000 or Int'l Phone 1-615-964-5532.

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.

BOVIE® SURGI-CENTER│PRO DESIGN BREAKDOWN AND DRAWING REFERENCE

PCB ASSEMBLIES	
P/N	**Description**
20-160-002	IDS-210/A2350 Relay Board Top
20-159-002	IDS-210/A2350 Main PCB Assembly
20-161-001	IDS-210/A2350 PCB Assembly Display
20-045-003	IDS-210/A2350 PCB Assembly Speaker
20-166-002	IDS-210/A2350 PCB Assembly Power Supply
Enclosure	
P/N	**Description**
10-180-001	IDS-210/A2350 Relay Board Top
10-181-001	IDS-210/A2350 Bottom Right Frame Rail
10-182-001	IDS-210/A2350 Top Left Frame Rail
10-183-001	IDS-210/A2350 Top Right Frame Rail
10-172-001	IDS-210 Bottom Plate
10-176-001	Main PCB Support IDS-210 Gas Hybrid
10-173-001	IDS-210/A2350 Top Cover
10-196-001	EMI Filter Mounting Plate
10-174-001	IDS-210/A2350 Back Plate
CABLES	
P/N	**Description**
21-078-001	24PIN Cable Assembly
25-101-001	Cable Assembly Female 0.050"x0.05" 20P 6.00"
25-102-002	Cable Assembly Female 0.050"x0.050" 10P 3.00"
25-111-001	Cable Assembly A1450 Relay/Main 120mm GRN
25-111-002	Cable Assembly A1450 Relay/Main 120mm RED
25-124-001	Cable Assembly Monopolar Footswitch Control
25-125-001	Cable Assembly Bipolar Footswitch Control
25-126-001	Cable Assembly Relay Output IDS-210/A2350

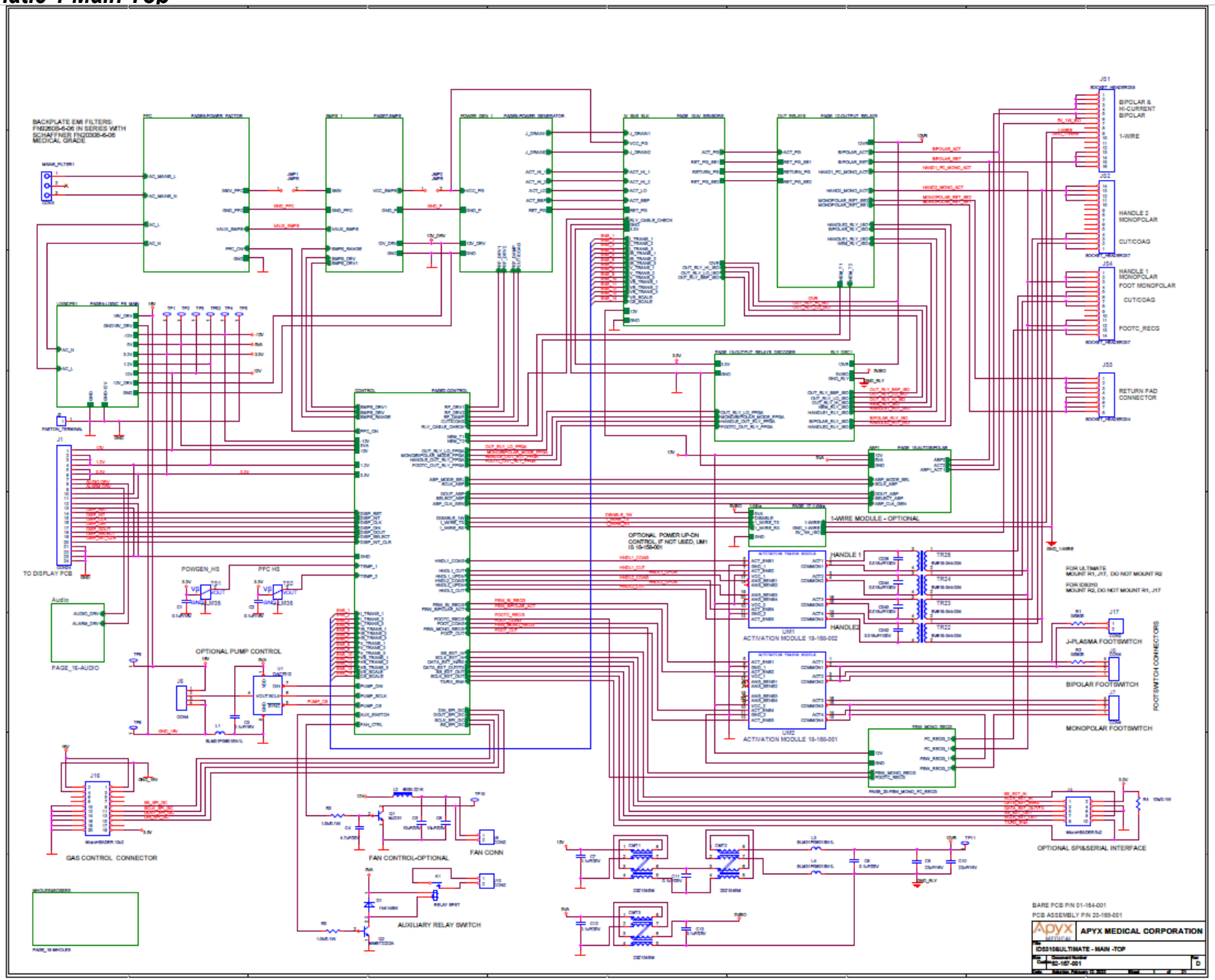
CABLES	
P/N	**Description**
25-127-001	Cable Ground 10” Long
25-127-002	Cable Ground 13” Long
25-133-001	Cable EMI Filters Connection
21-061-002	Cable Ground 6” Long Flagged ¼
25-123-001	Cable Assembly Power Harness
MISC.	
P/N	**Description**
11-161-001	Gasket 0.021” Think Urethane Foam
07-215-001	Switch Non-Illuminated Round Rocker
15-344-001	Overlay Display A2350
15-345-001	Overlay Front Connector A2350
04-148-035	Stud, Ground DIN 42801 35mm L

A2350 DRAWING AND SCHEMATIC PACKAGE

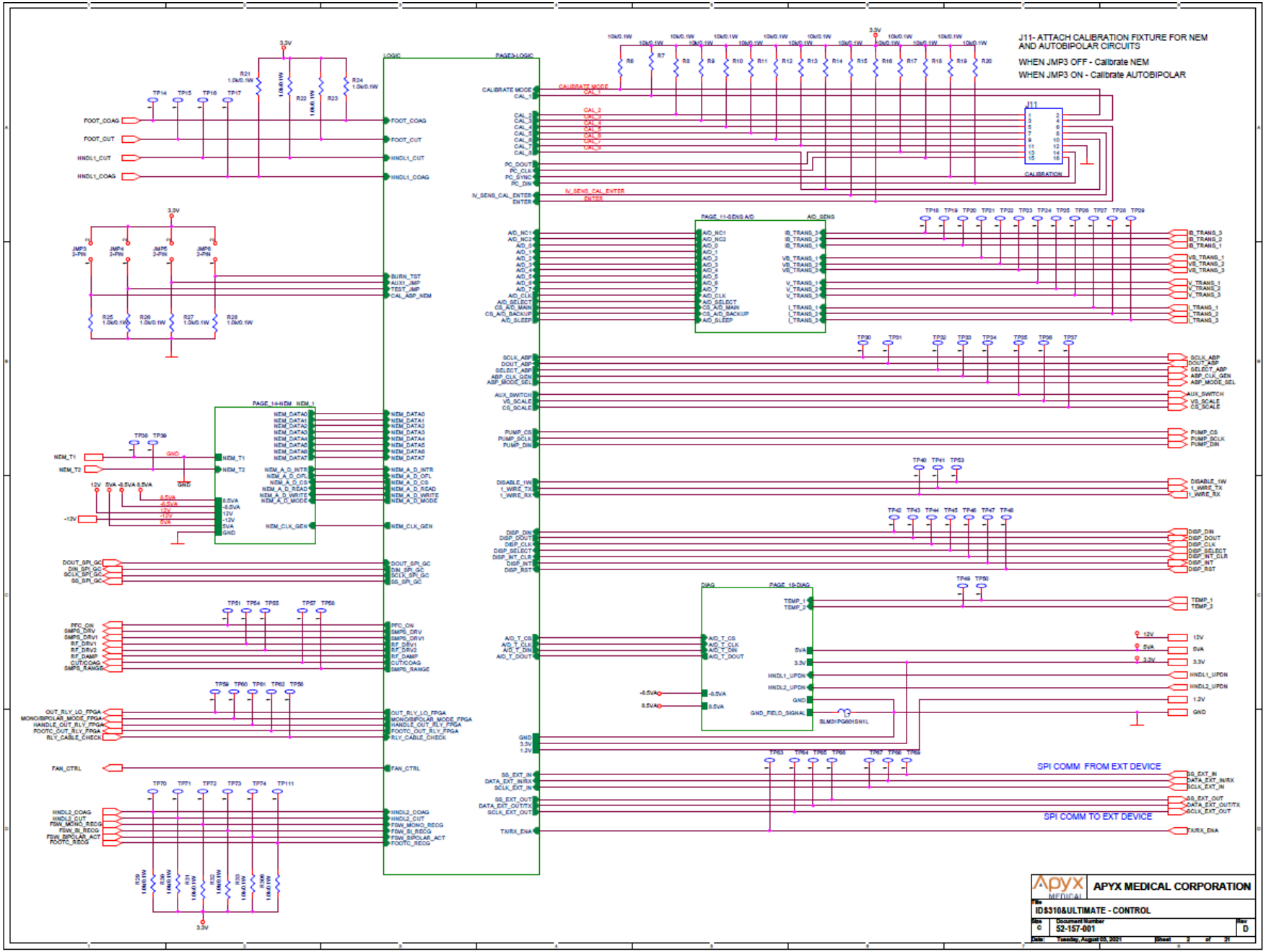
Following tri-folds.

NOTICE:
The title blocks of the following drawings and schematics refer to the generator series titled IDS-310 and J-Plasma Hybrid. The Bovie® Surgi-Center│PRO is part of this series.

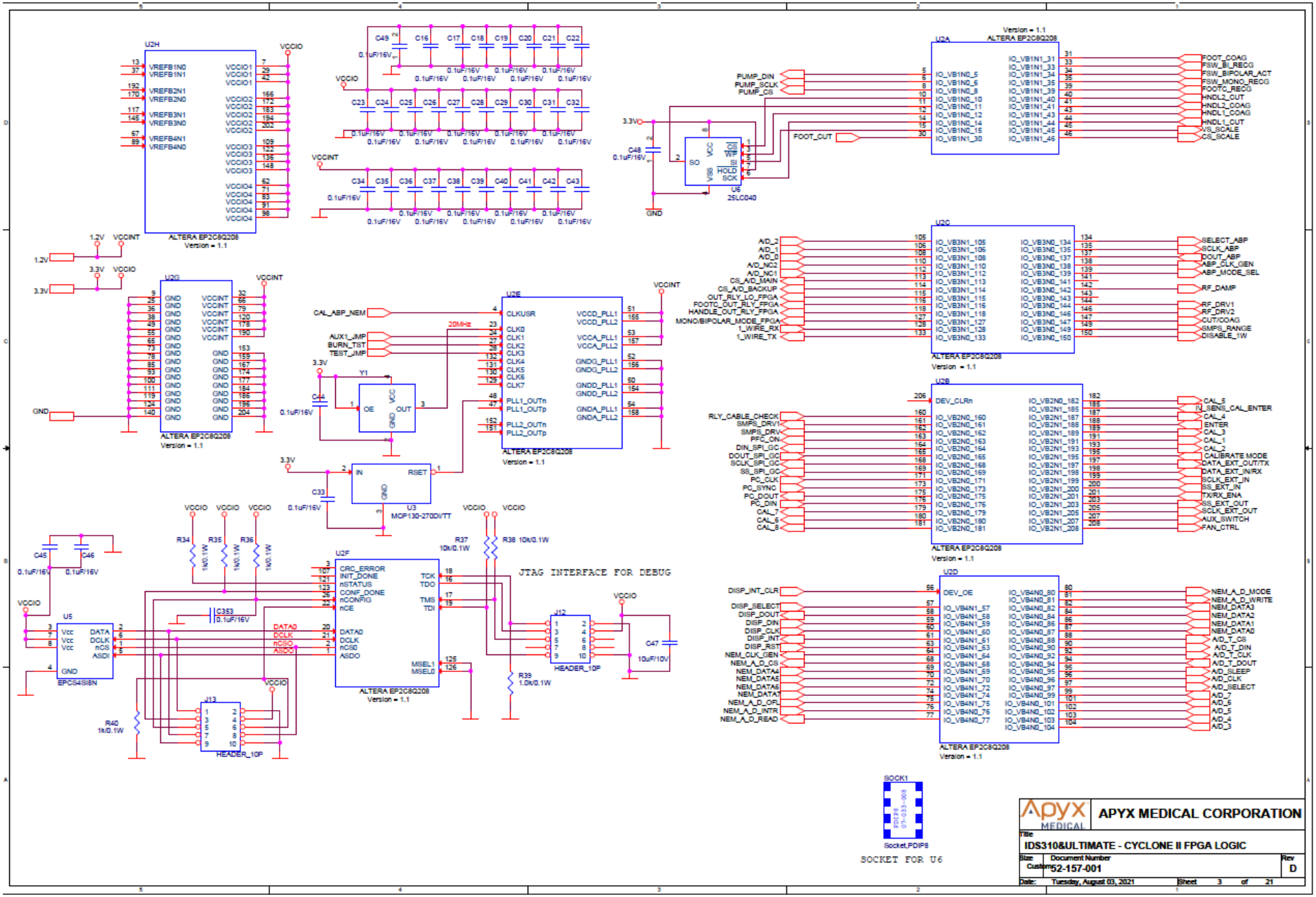
Schematic 1 Main Top



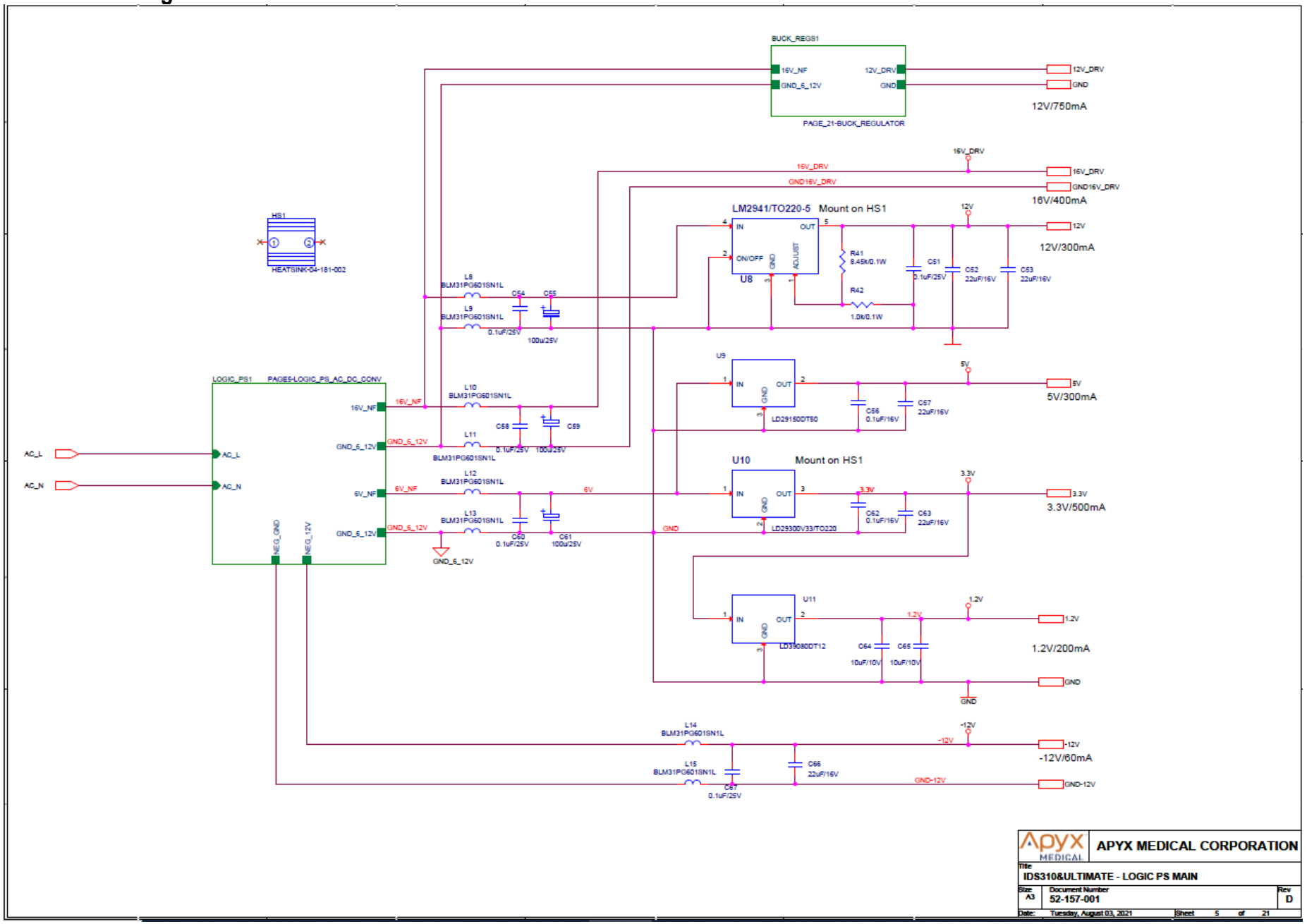
Schematic 2 Control


J11- ATTACH CALIBRATION FIXTURE FOR NEM AND AUTOBIPOLAR CIRCUITS
WHEN JMP3 OFF - Calibrate NEM
WHEN JMP3 ON - Calibrate AUTOBIPOLAR
SPI COMM FROM EXT DEVICE
SPI COMM TO EXT DEVICE
APYX MEDICAL CORPORATION
ID$310&ULTIMATE - CONTROL
52-157-001

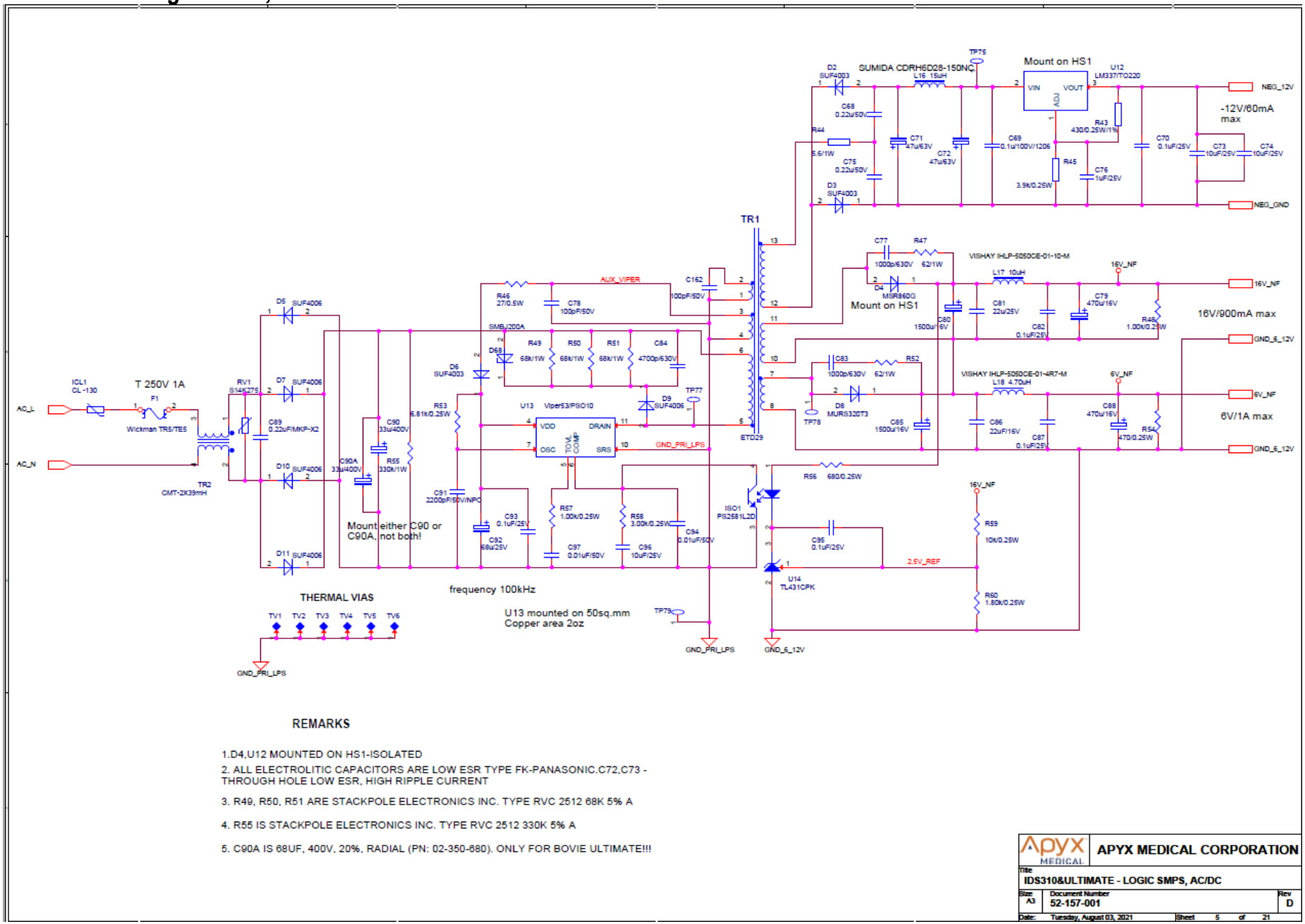
Schematic 3 Cyclone II FPGA Logic



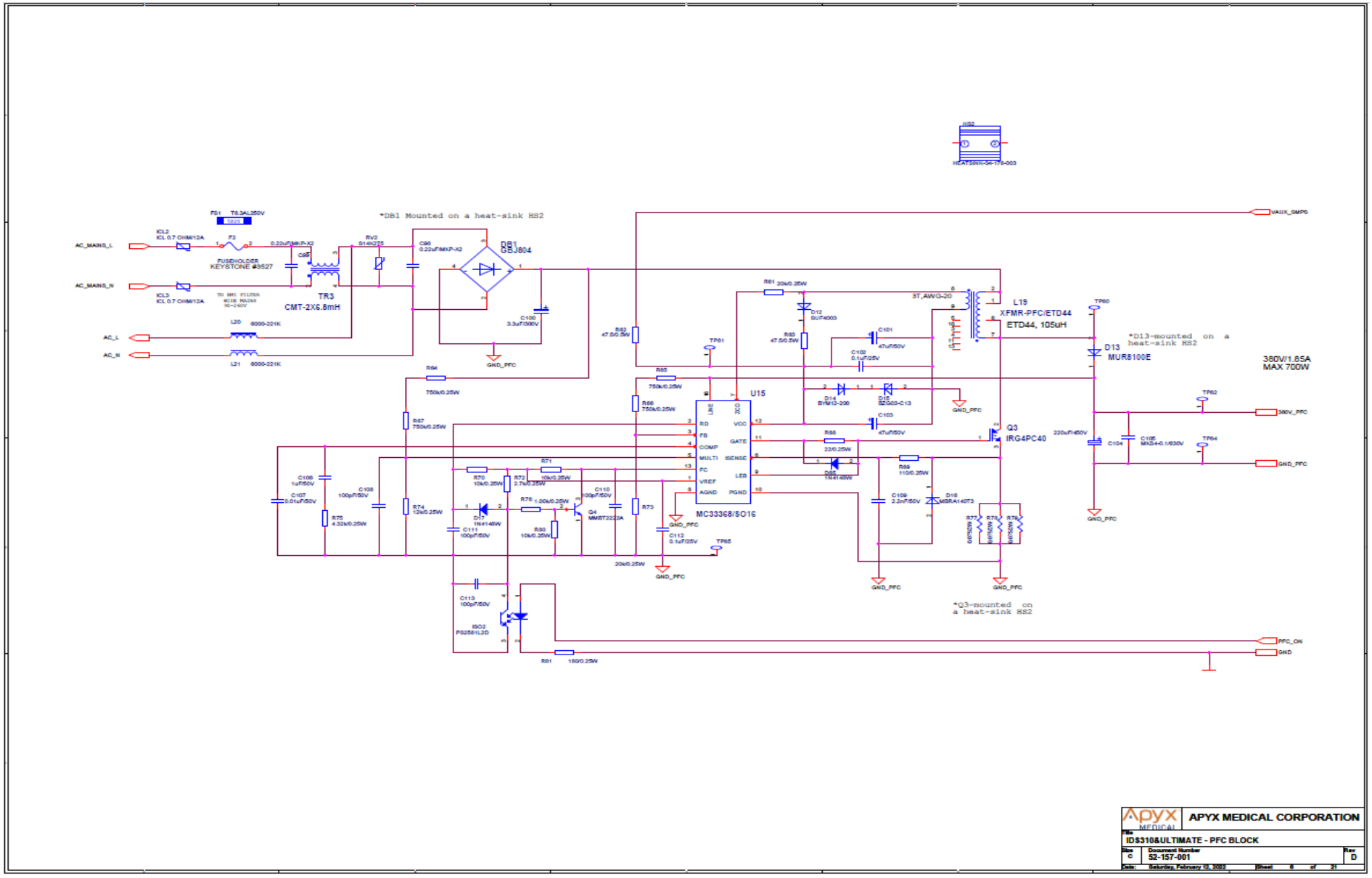
Schematic 4 Logic PS Main



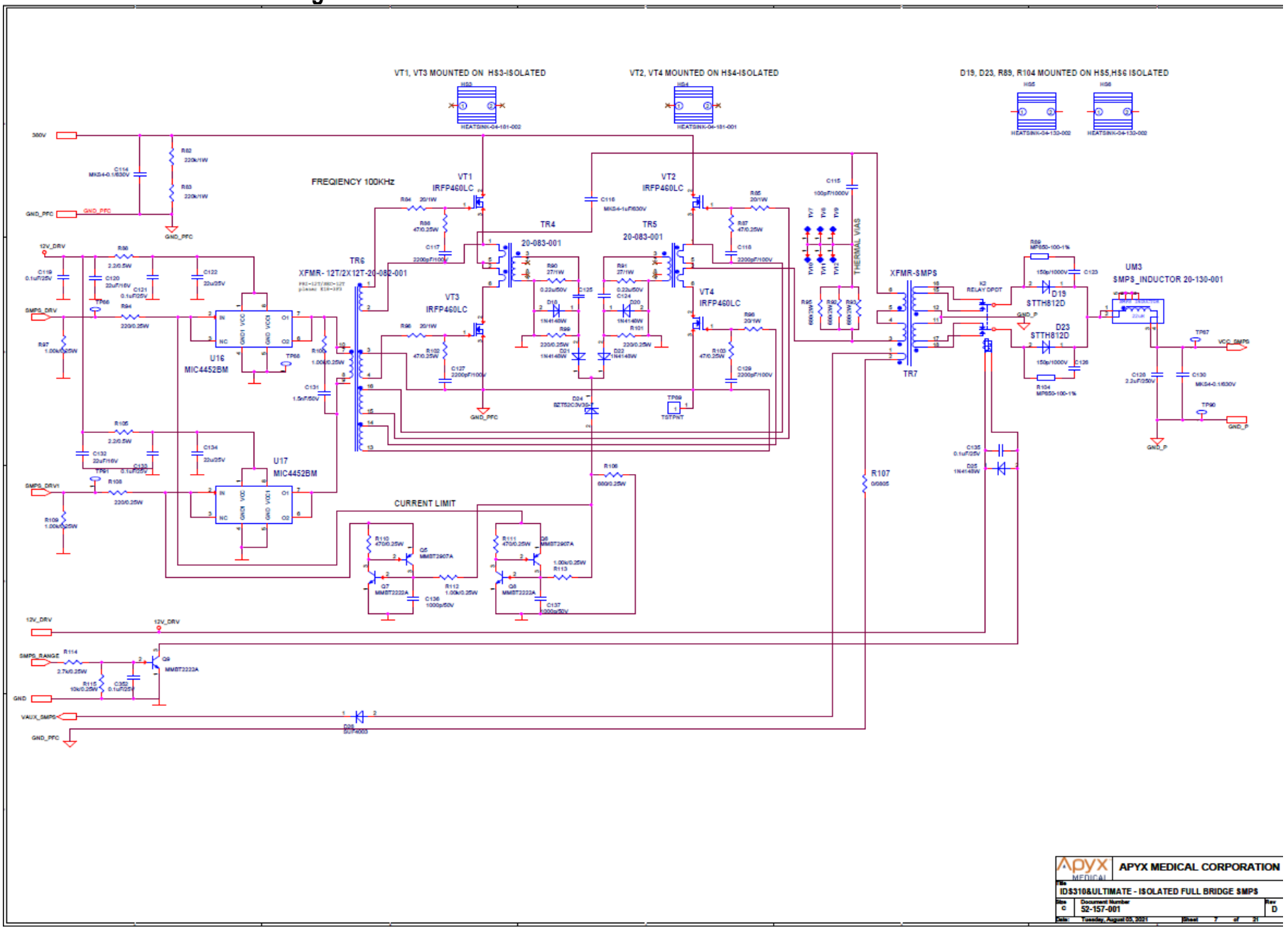
Schematic 5 Logic SMPS, AC/DC



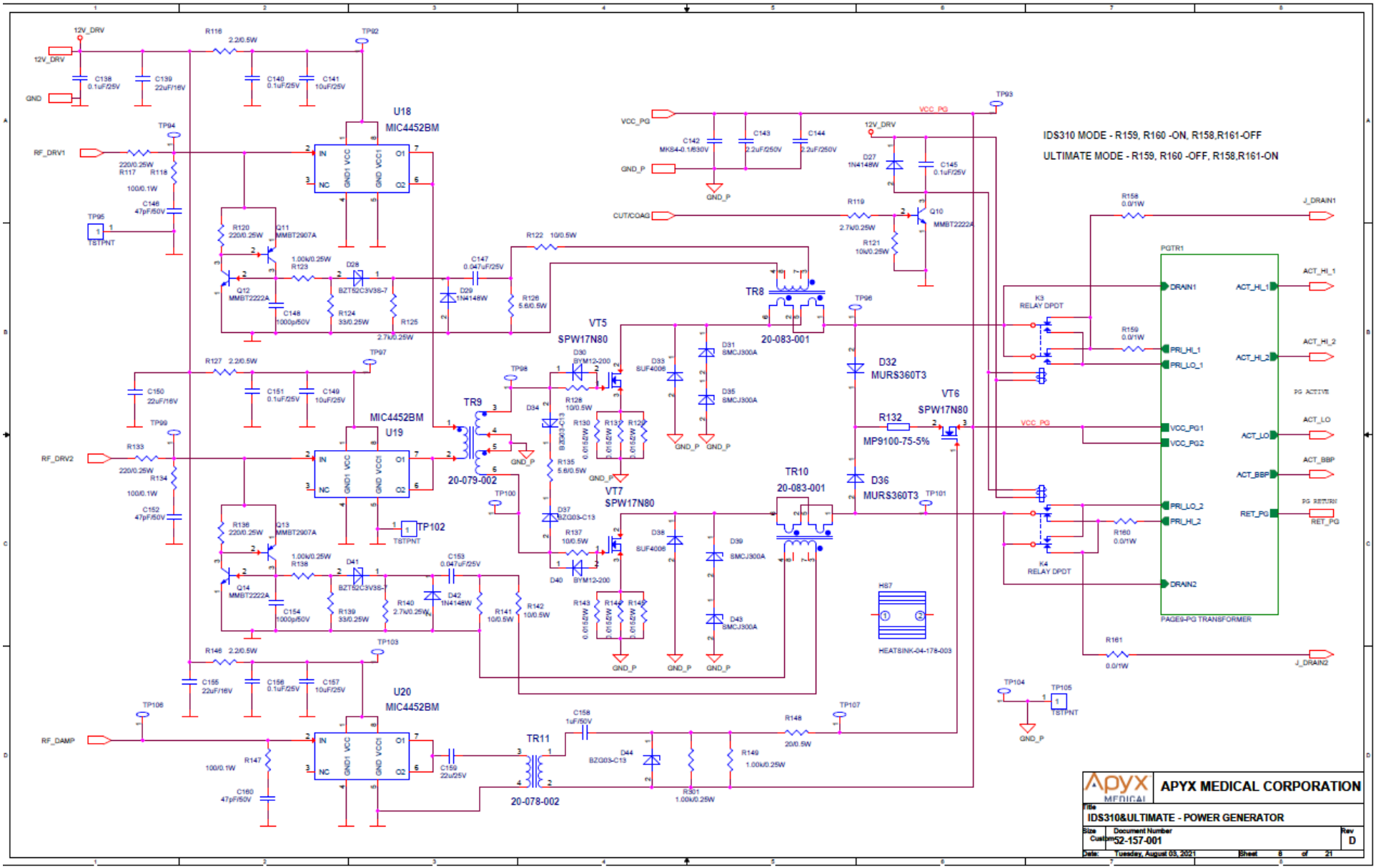
Schematic 6 PFC Block



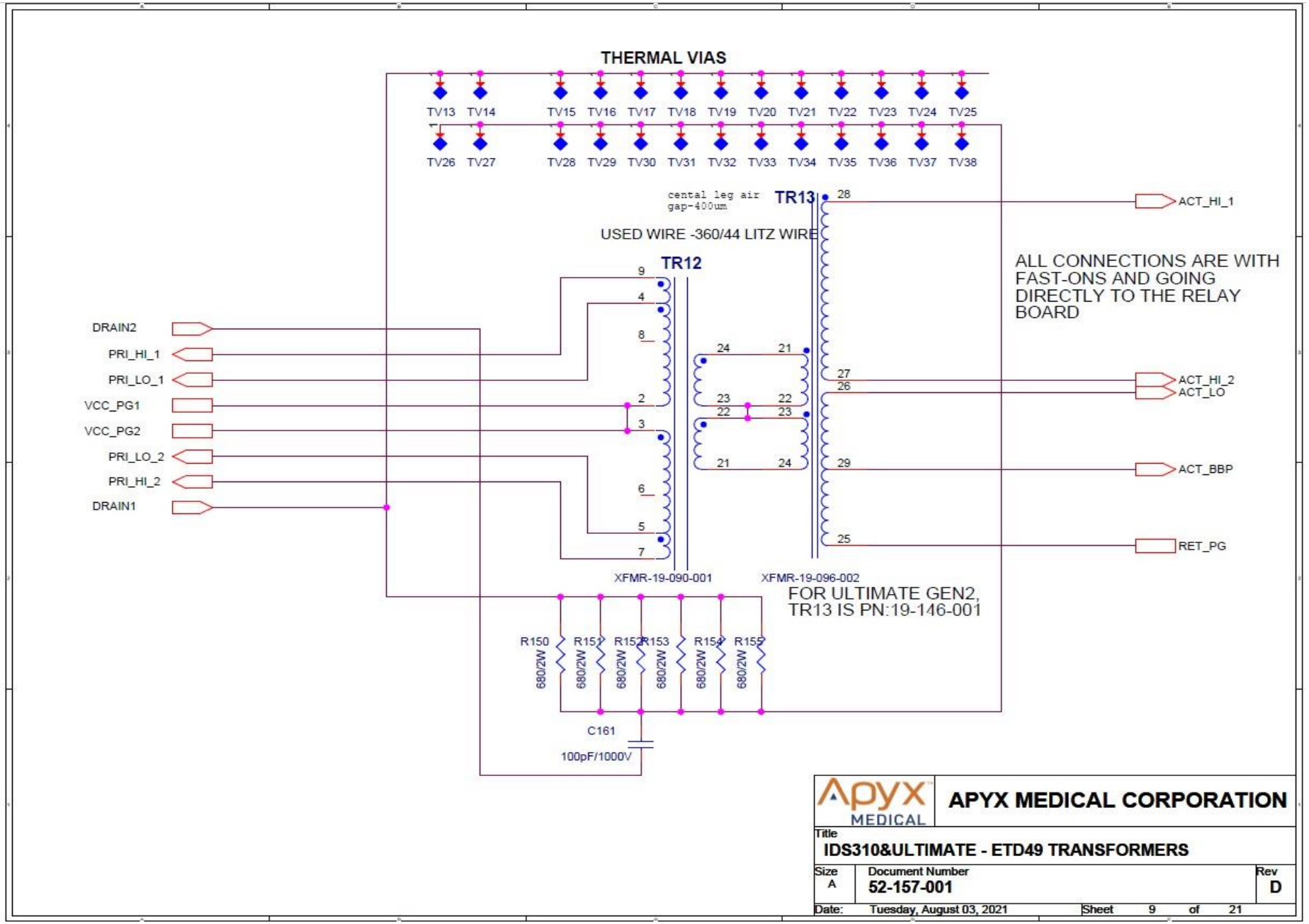
Schematic 7 Isolated Full Bridge SMPS



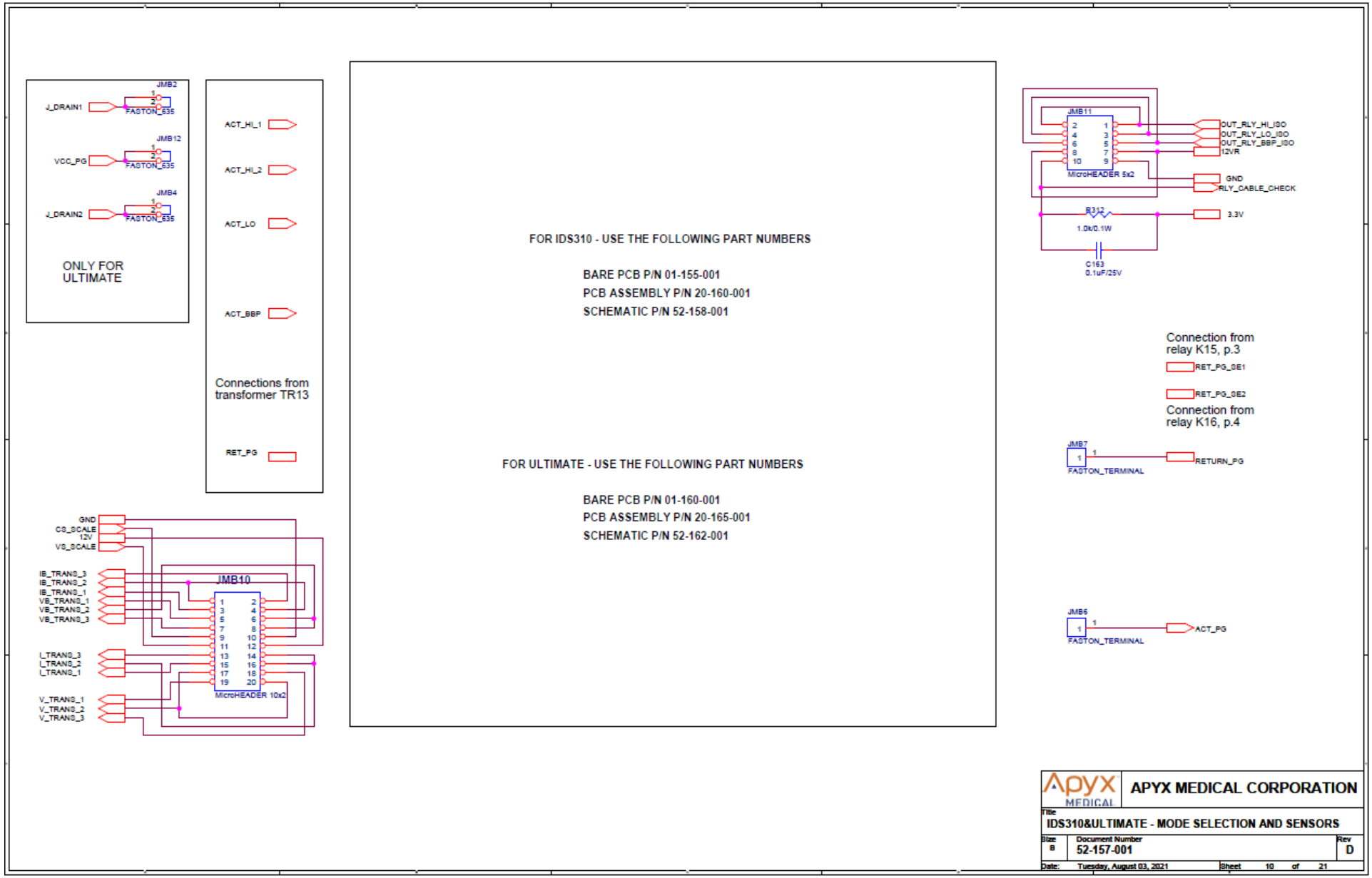
Schematic 8 Power Generator



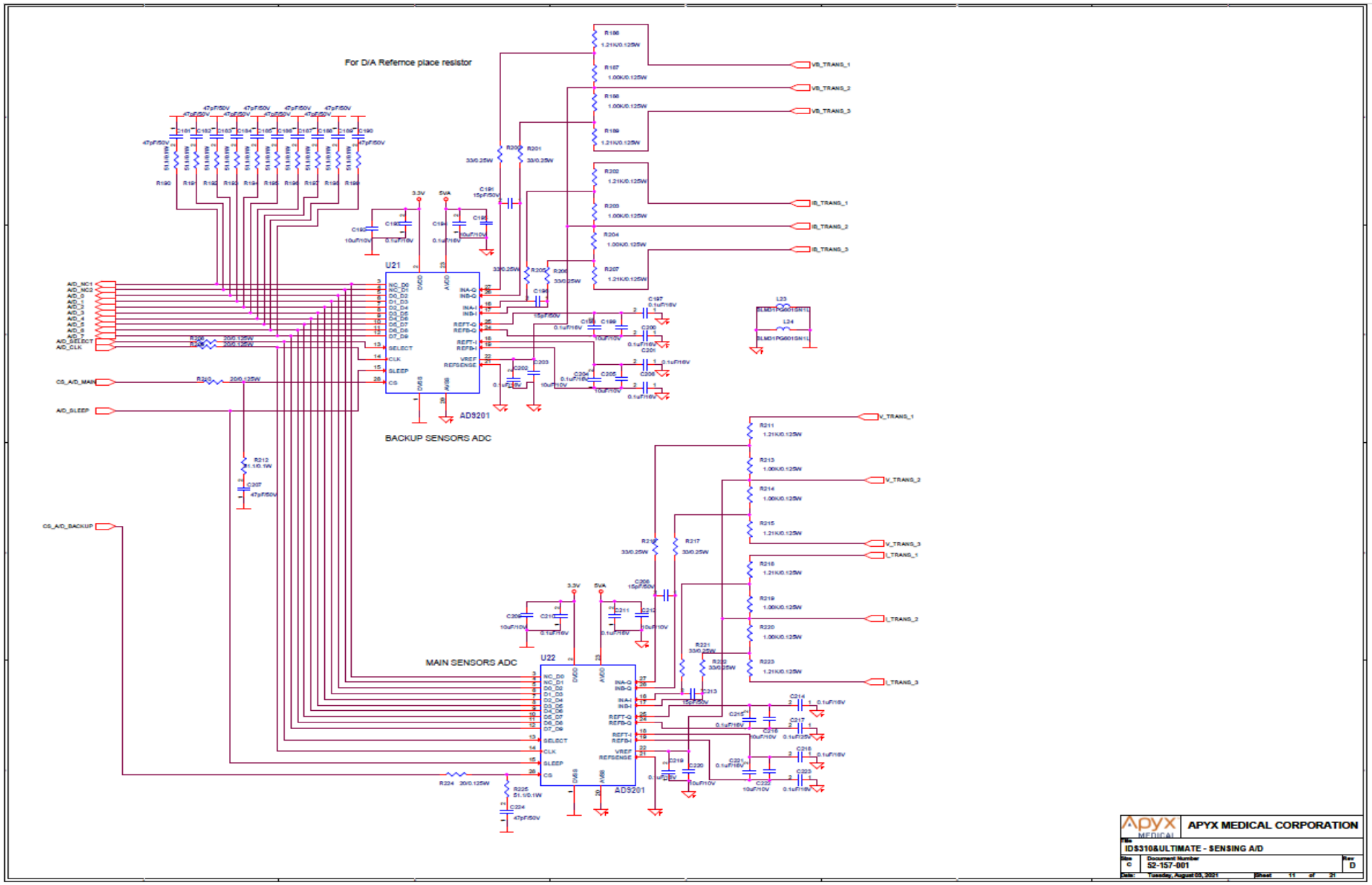
Schematic 9 ETD49 Transformers



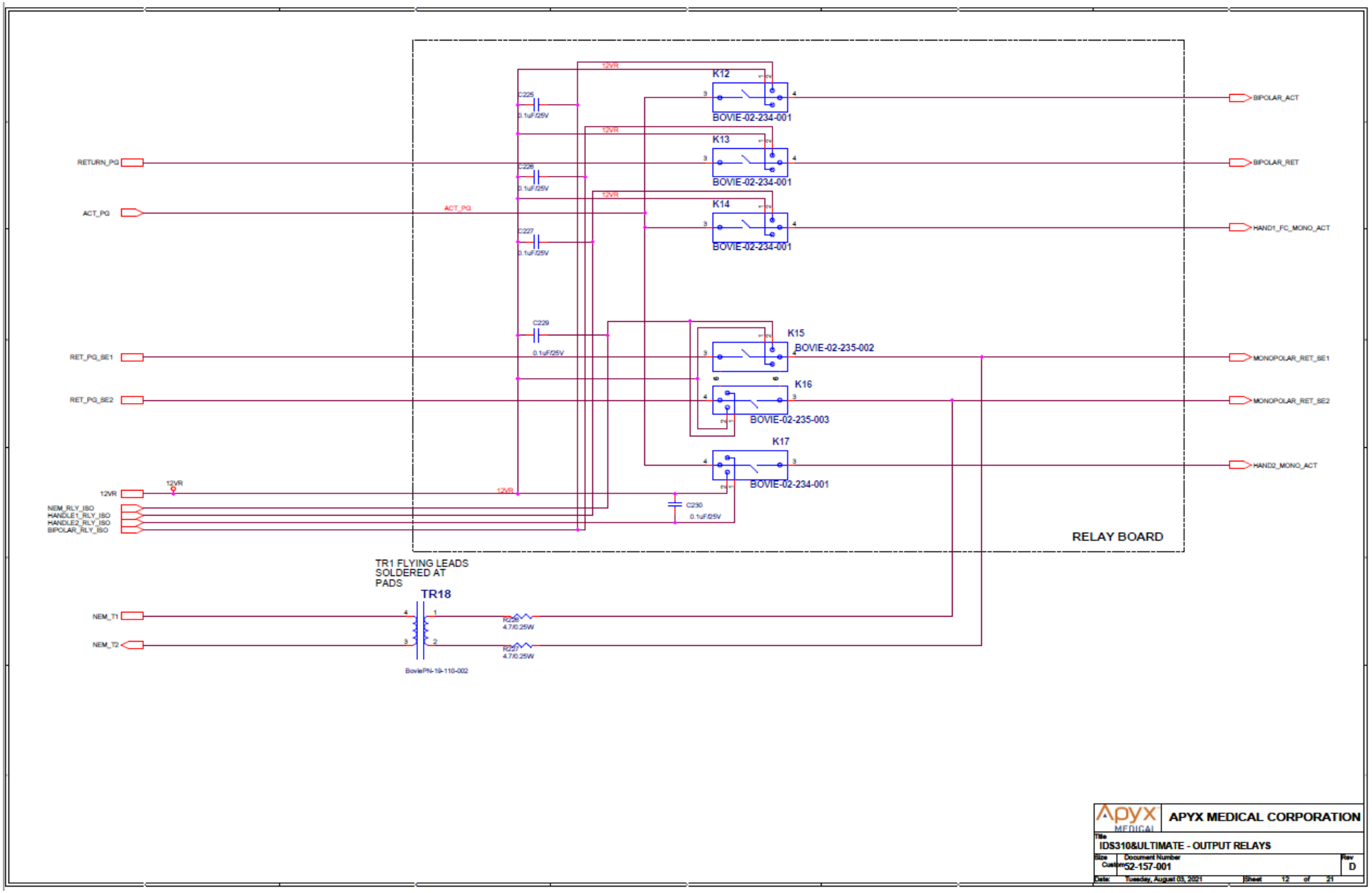
Schematic 10 Node Selection and Sensors



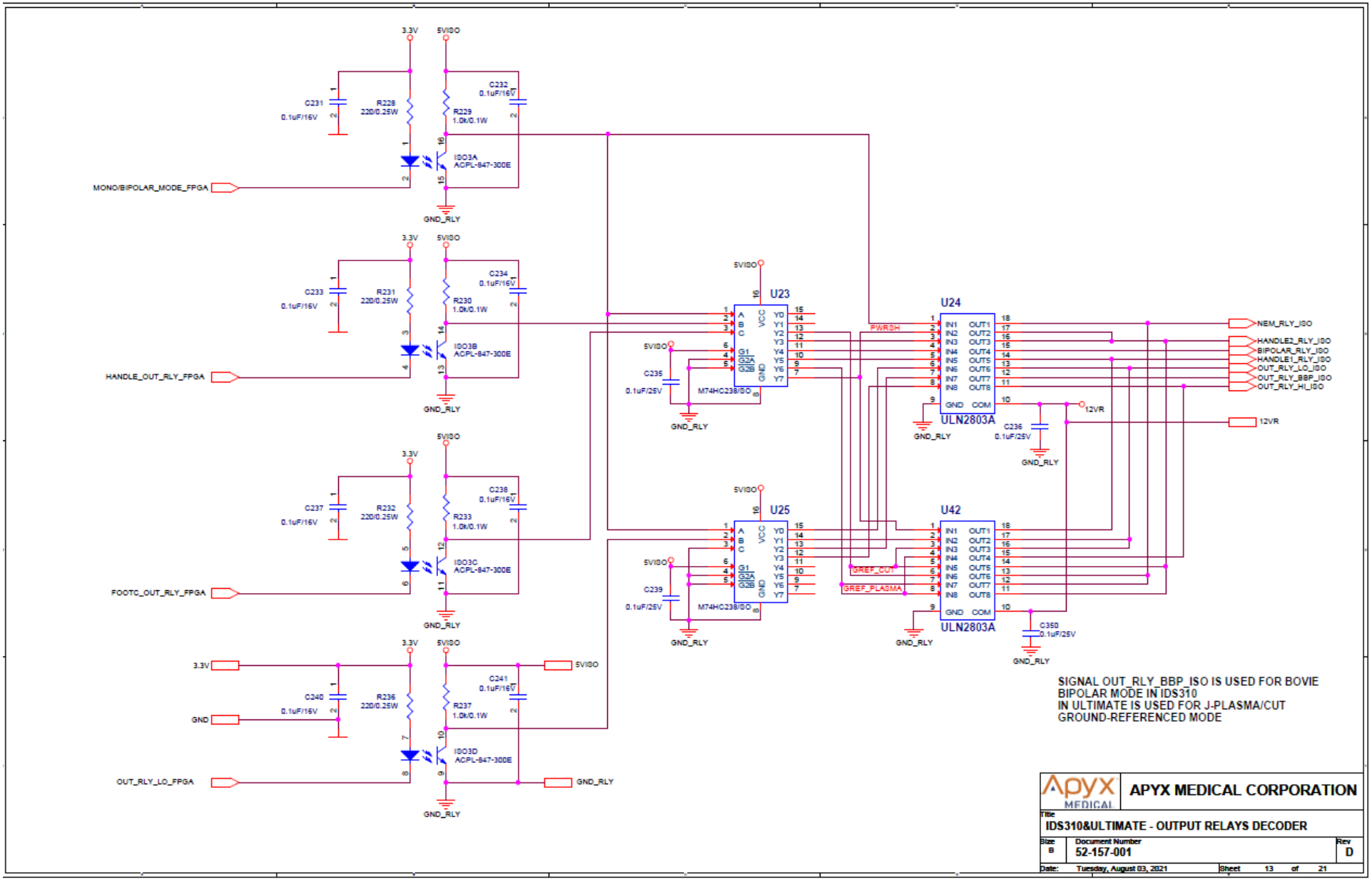
Schematic 11 Sensing A/D



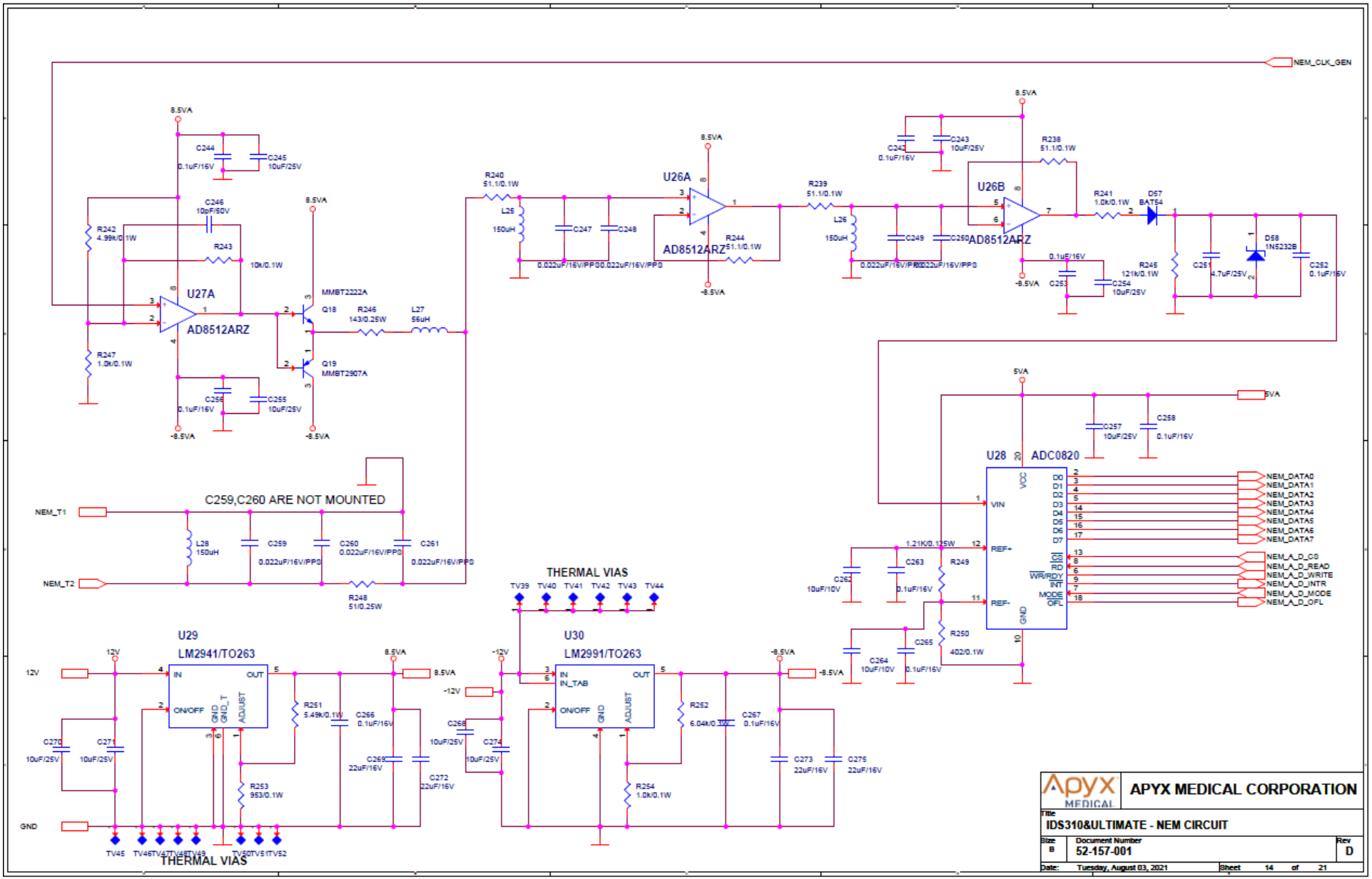
Schematic 12 Output Relays



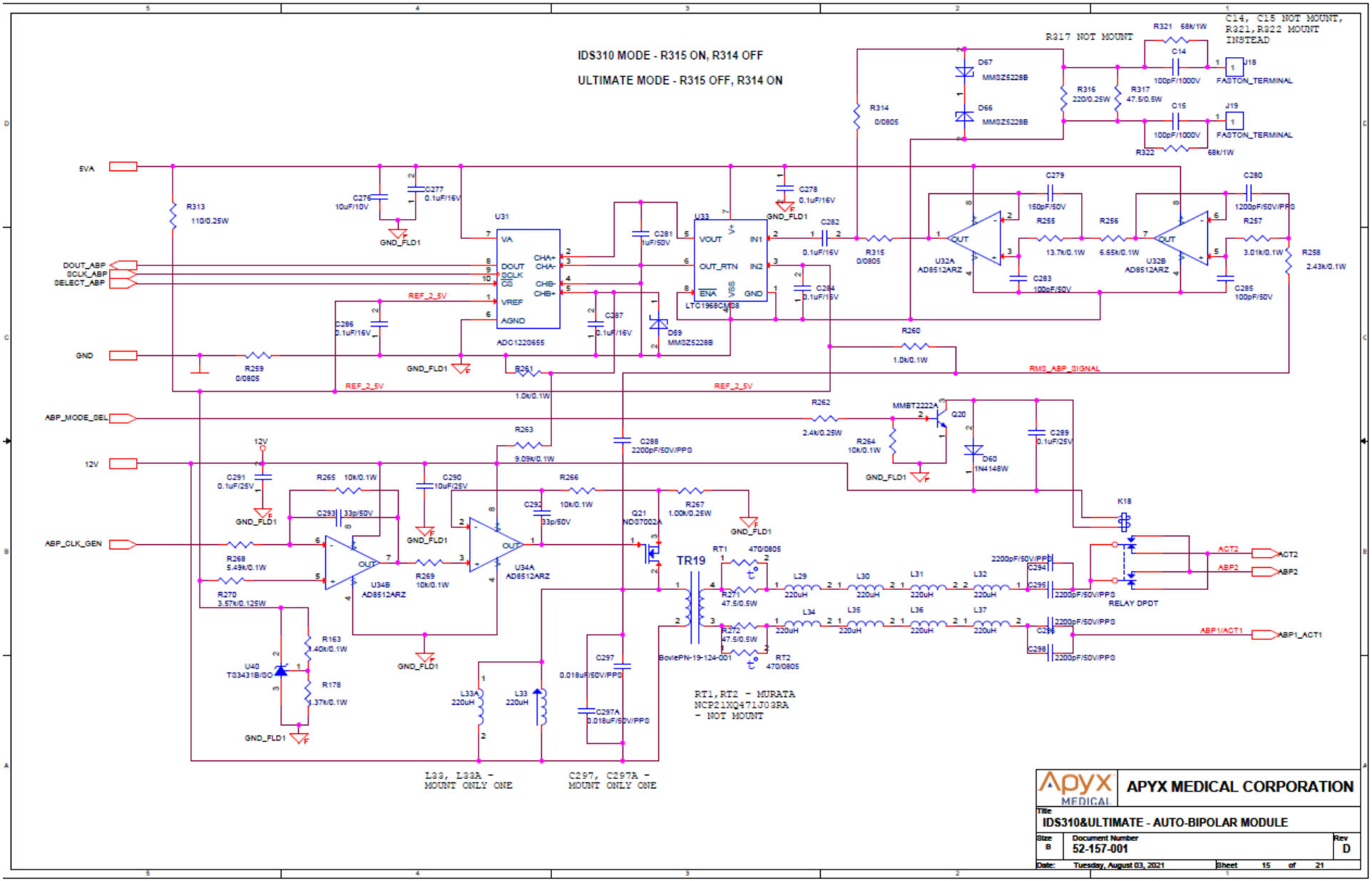
Schematic 13 Output Relays Decoder



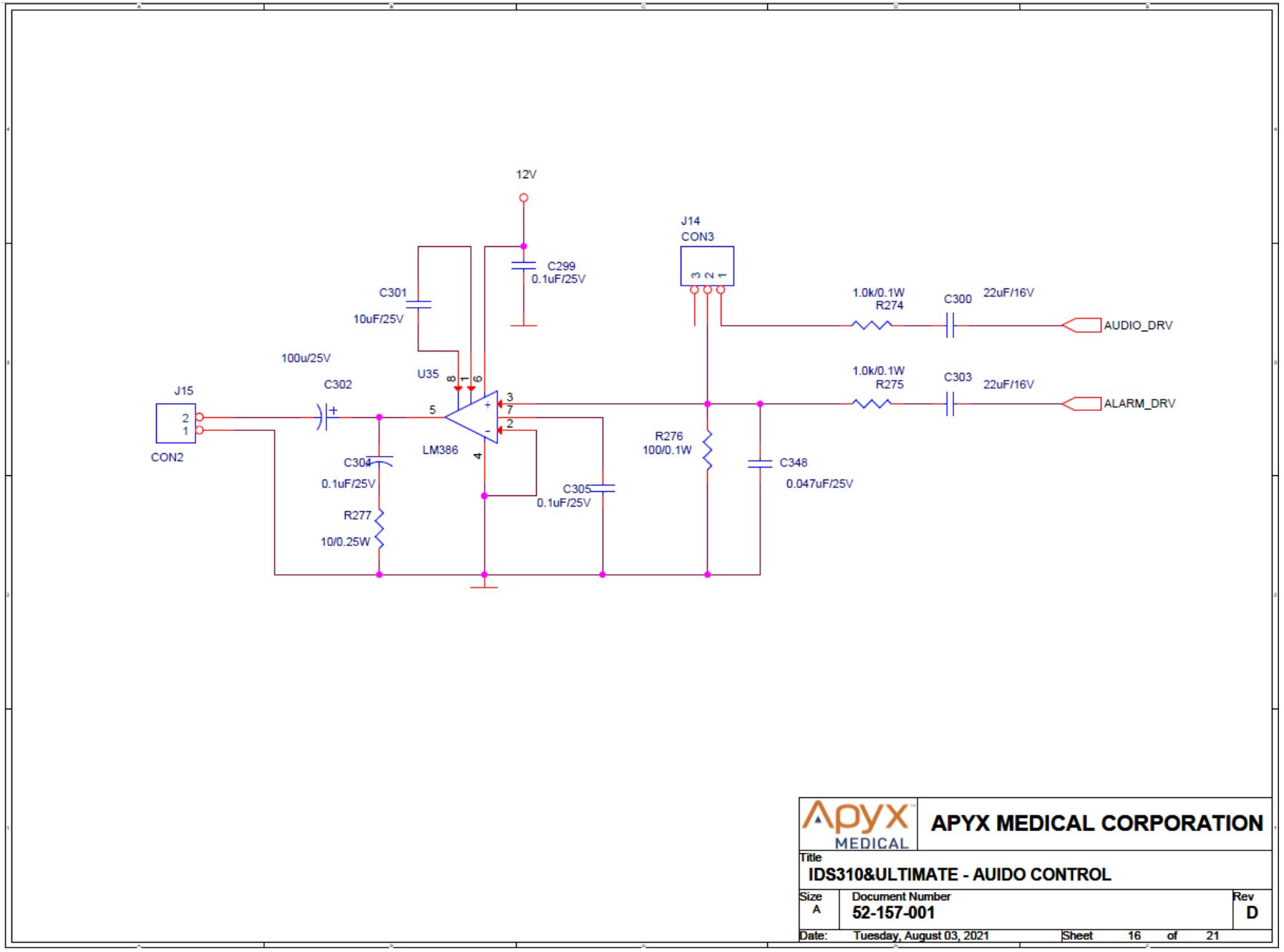
Schematic 14 NEM Circuit



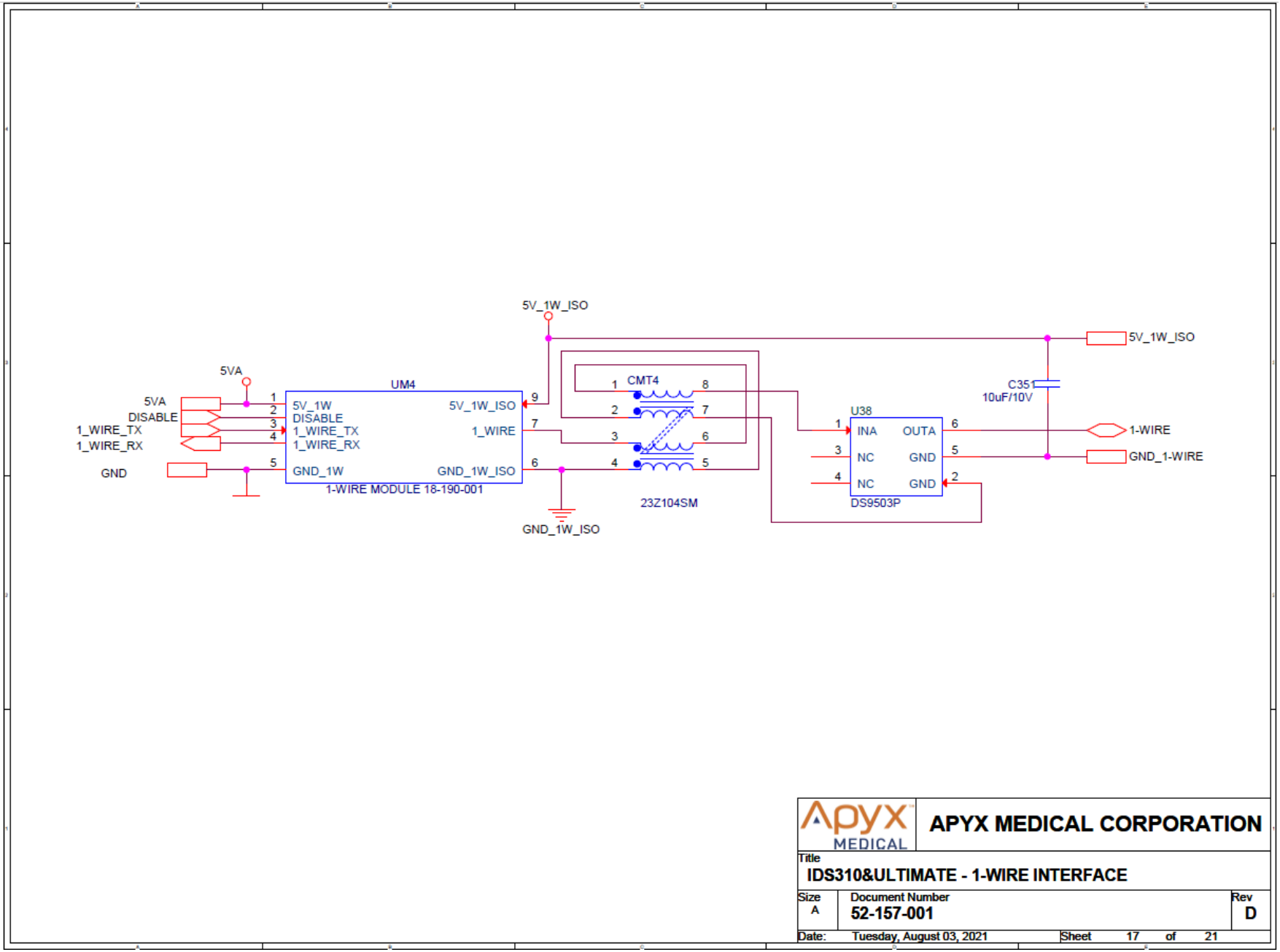
Schematic 15 Auto Bipolar Module



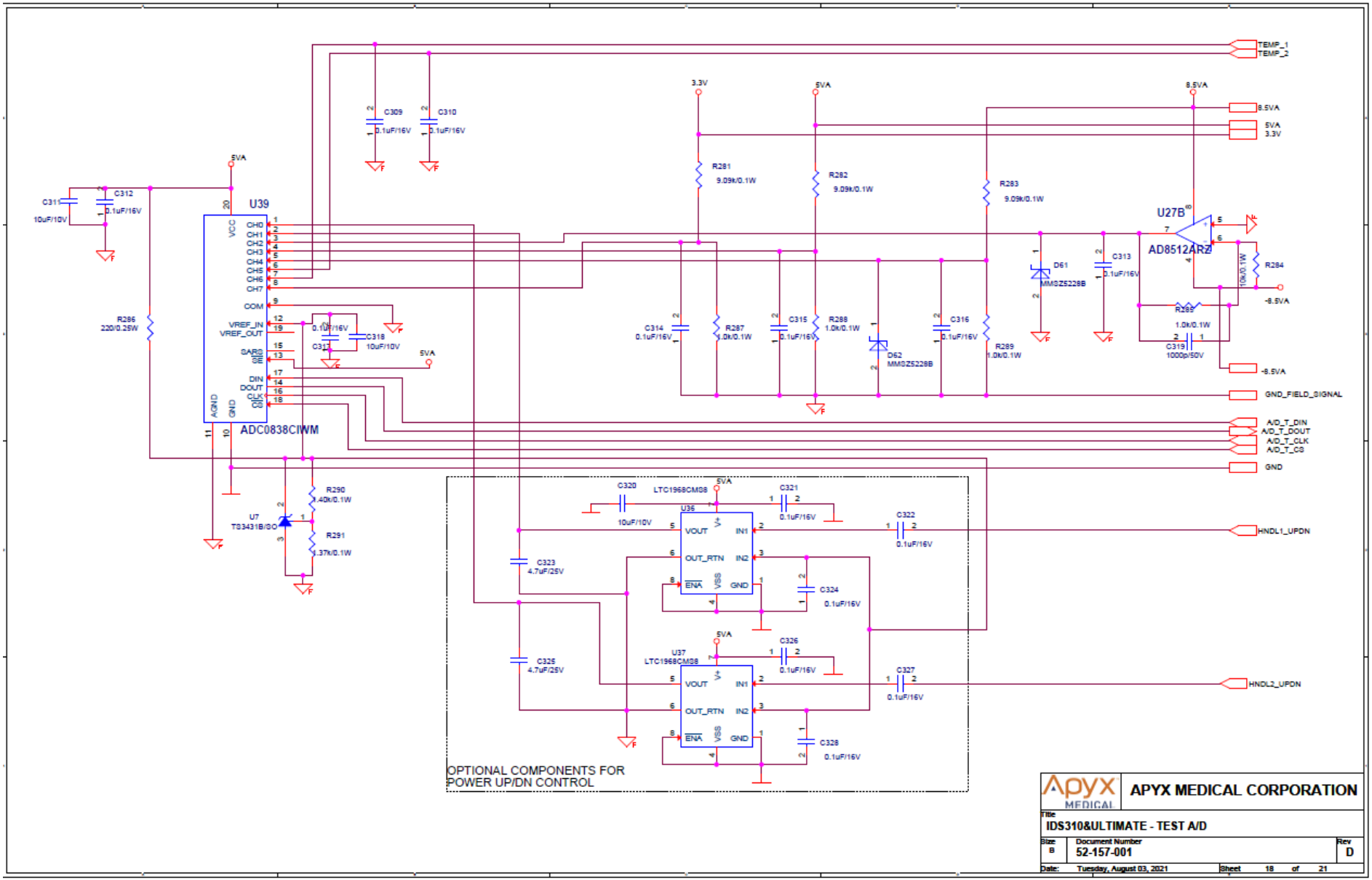
Schematic 16 Audio Control


12V
J14
CON3
C299
0.1uF/25V
C301
10uF/25V
100u/25V
U35
J15
C302
1.0k/0.1W
R274
C300
22uF/16V
AUDIO_DRV
1.0k/0.1W
R275
C303
22uF/16V
ALARM_DRV
CON2
LM386
C304
0.1uF/25V
R277
10/0.25W
C305
0.1uF/25V
R276
100/0.1W
C348
0.047uF/25V
APYX MEDICAL CORPORATION
IDS310&ULTIMATE - AUIDO CONTROL
Size
A
Document Number
52-157-001
Rev
D
Date: Tuesday, August 03, 2021
Sheet 16 of 21

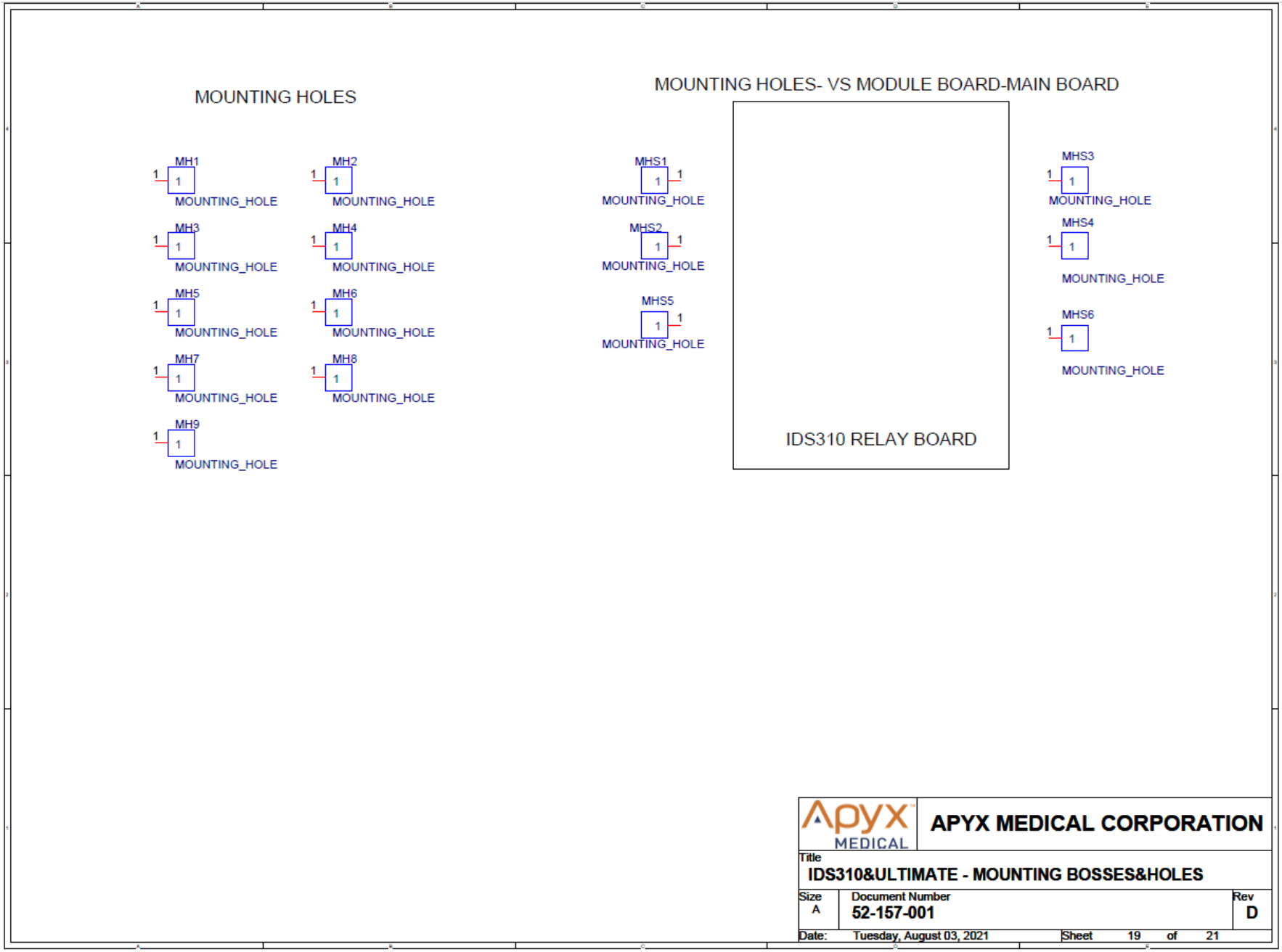
Schematic 17 1-Wire Interface



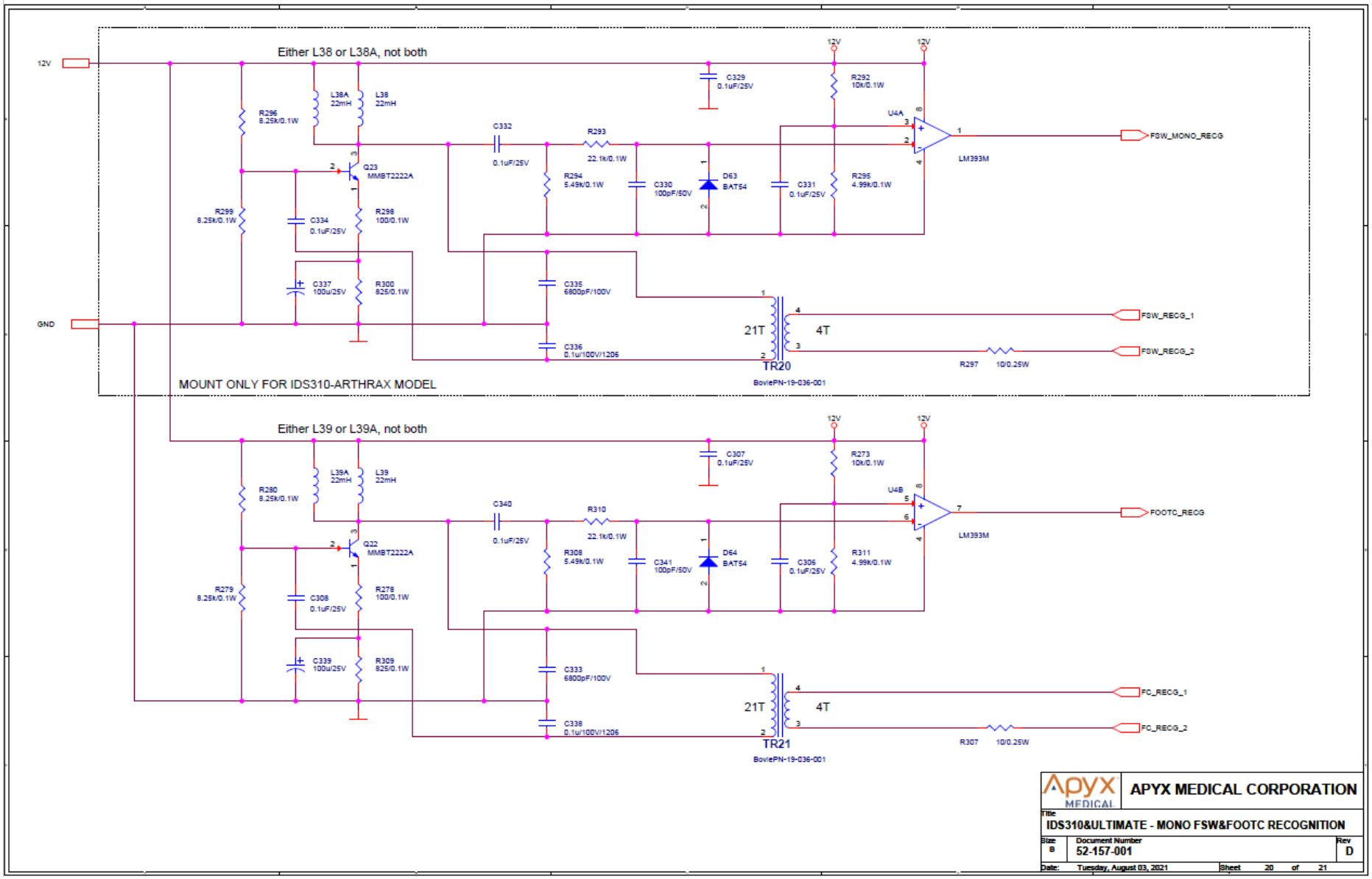
Schematic 18 Test A/D



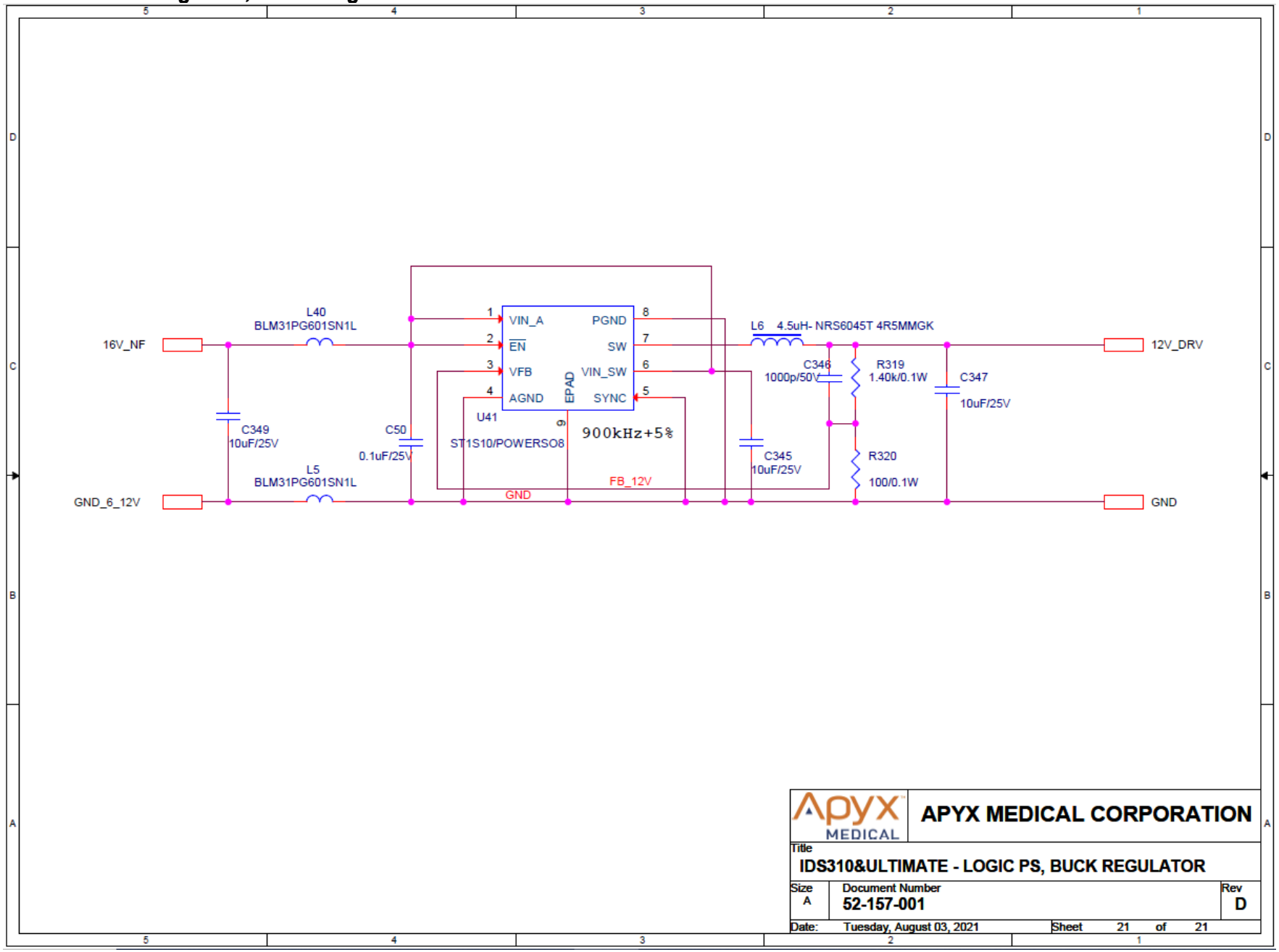
Schematic 19 Mounting Bosses and Holes



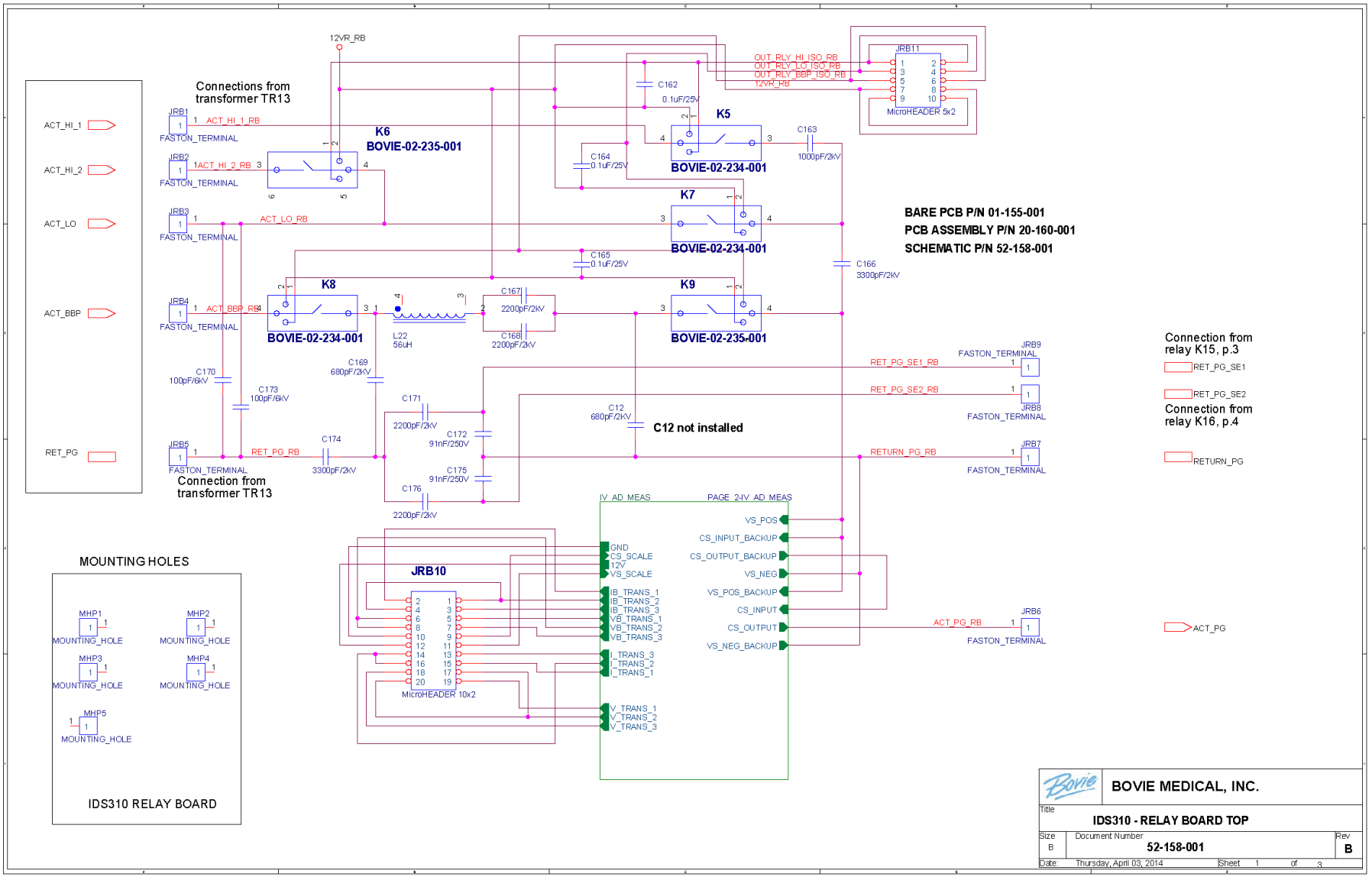
Schematic 20 Mono FSW & FOOTC Recognition



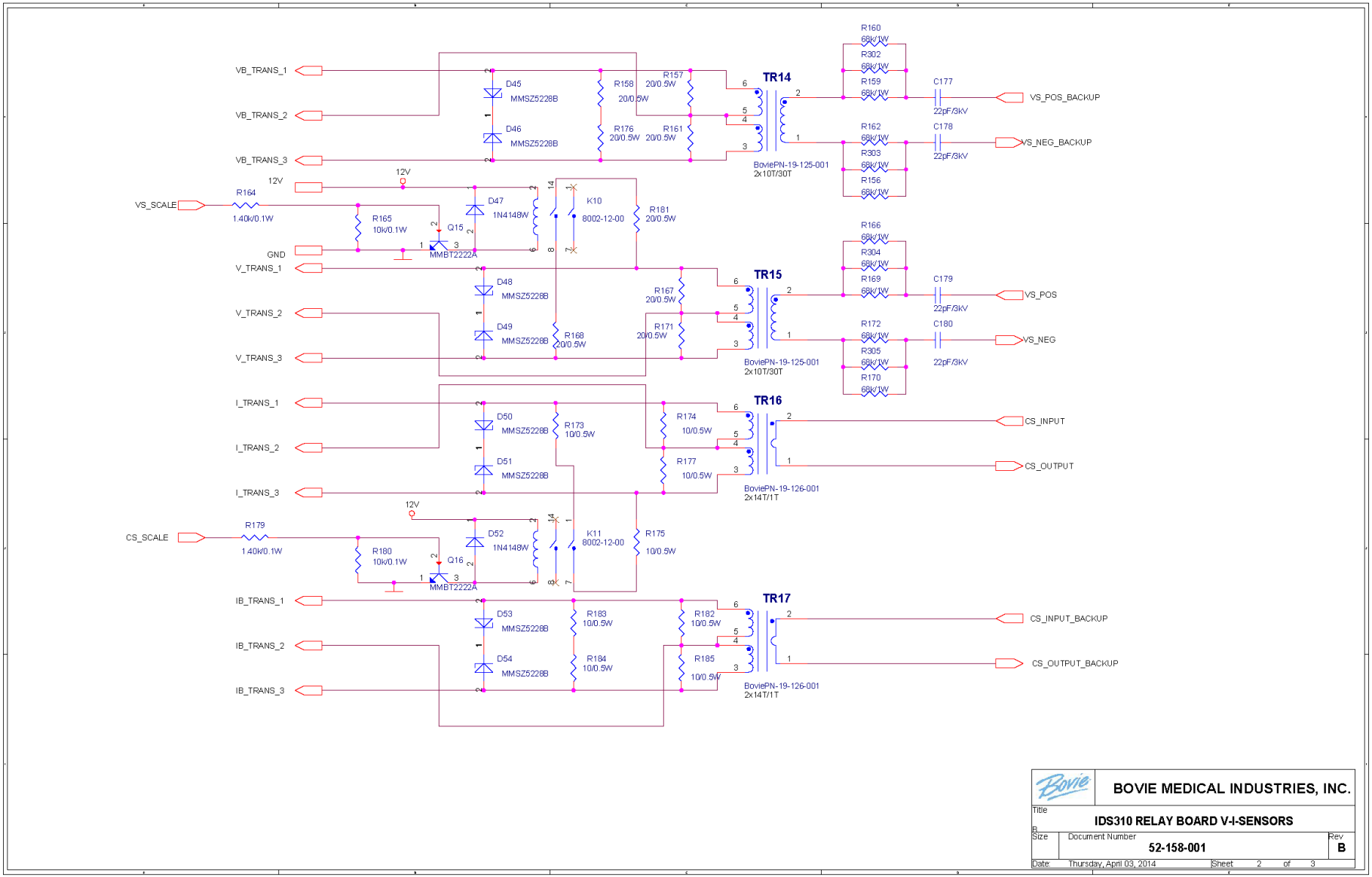
Schematic 21 Logic PS, Buck Regulator



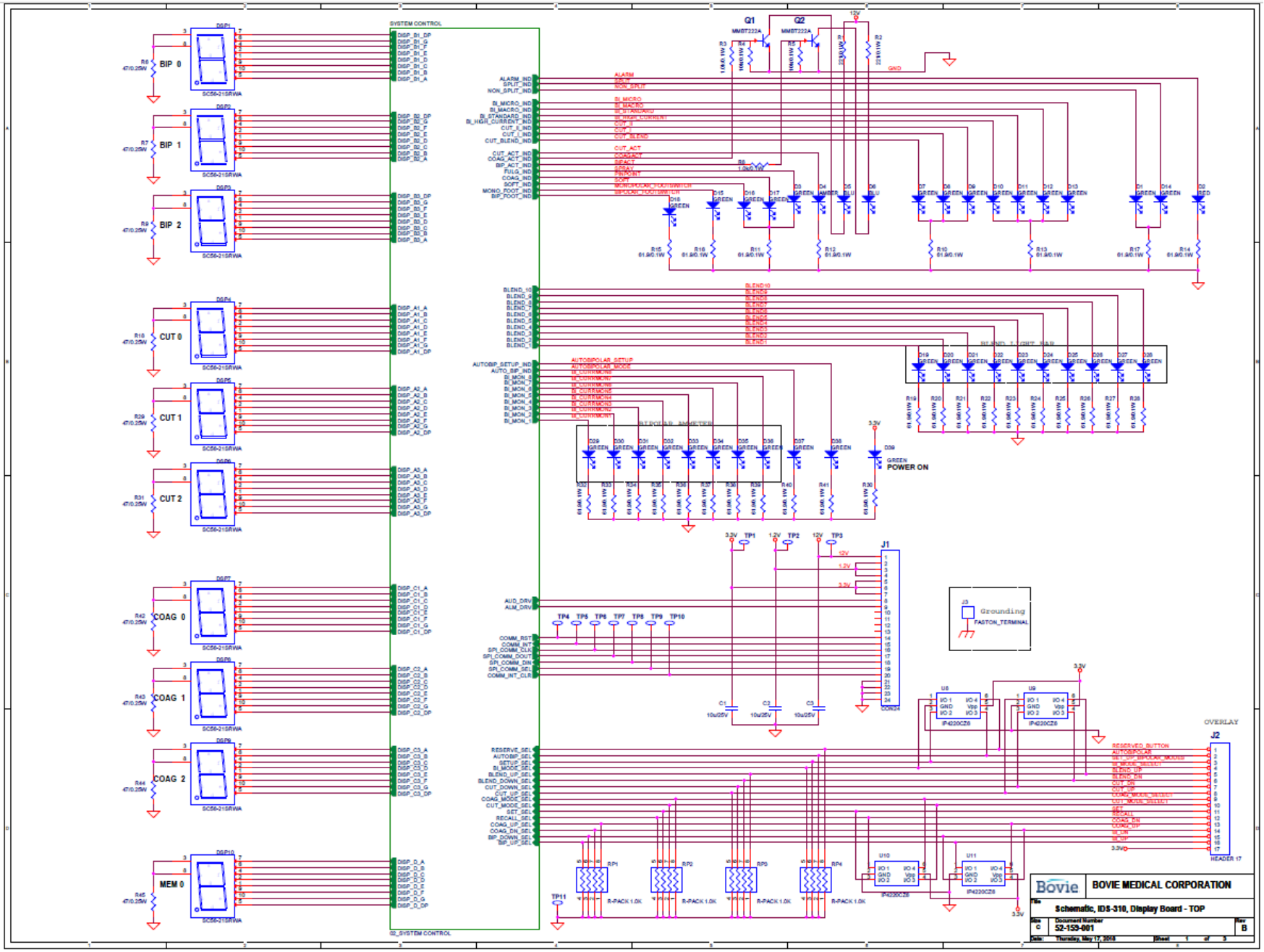
Schematic 22 Relay Board Top


ACT_HI_1
ACT_HI_2
ACT_LO
ACT_BBP
RET_PG
Connections from transformer TR13
12VR_RB
JRB1
ACT_HI_1_RB
FASTON_TERMINAL
JRB2
ACT_HI_2_RB
JRB3
ACT_LO_RB
JRB4
ACT_BBP_RB
JRB5
RET_PG_RB
K6
BOVIE-02-235-001
K5
BOVIE-02-234-001
K7
BOVIE-02-234-001
K8
BOVIE-02-234-001
K9
BOVIE-02-235-001
L22
56uH
C162
0.1uF/25V
C163
1000pF/2kV
C164
0.1uF/25V
C165
0.1uF/25V
C166
3300pF/2kV
C167
2200pF/2kV
C168
2200pF/2kV
C169
680pF/2KV
C170
100pF/6kV
C171
2200pF/2kV
C172
91nF/250V
C173
100pF/6kV
C174
3300pF/2kV
C175
91nF/250V
C176
2200pF/2kV
C12
680pF/2kV
C12 not installed
OUT_RLY_HI_ISO_RB
OUT_RLY_LO_ISO_RB
OUT_RLY_BBP_ISO_RB
12VR_RB
JRB11
MicroHEADER 5x2
BARE PCB P/N 01-155-001
PCB ASSEMBLY P/N 20-160-001
SCHEMATIC P/N 52-158-001
Connection from transformer TR13
Connection from relay K15, p.3
RET_PG_SE1
RET_PG_SE2
Connection from relay K16, p.4
RETURN_PG
ACT_PG
RET_PG_SE1_RB
RET_PG_SE2_RB
RETURN_PG_RB
ACT_PG_RB
JRB9
JRB8
JRB7
JRB6
FASTON_TERMINAL
IV_AD_MEAS
PAGE_2-IV_AD_MEAS
GND
CS_SCALE
I2V
VS_SCALE
IB_TRANS_1
IB_TRANS_2
IB_TRANS_3
VB_TRANS_1
VB_TRANS_2
VB_TRANS_3
I_TRANS_3
I_TRANS_2
I_TRANS_1
V_TRANS_1
V_TRANS_2
V_TRANS_3
VS_POS
CS_INPUT_BACKUP
CS_OUTPUT_BACKUP
VS_NEG
VS_POS_BACKUP
CS_INPUT
CS_OUTPUT
VS_NEG_BACKUP
JRB10
MicroHEADER 10x2
MOUNTING HOLES
MHP1
MHP2
MHP3
MHP4
MHP5
MOUNTING_HOLE
IDS310 RELAY BOARD
BOVIE MEDICAL, INC.
Title
IDS310 - RELAY BOARD TOP
Size
B
Document Number
52-158-001
Rev
B
Date: Thursday, April 03, 2014
Sheet 1 of 3

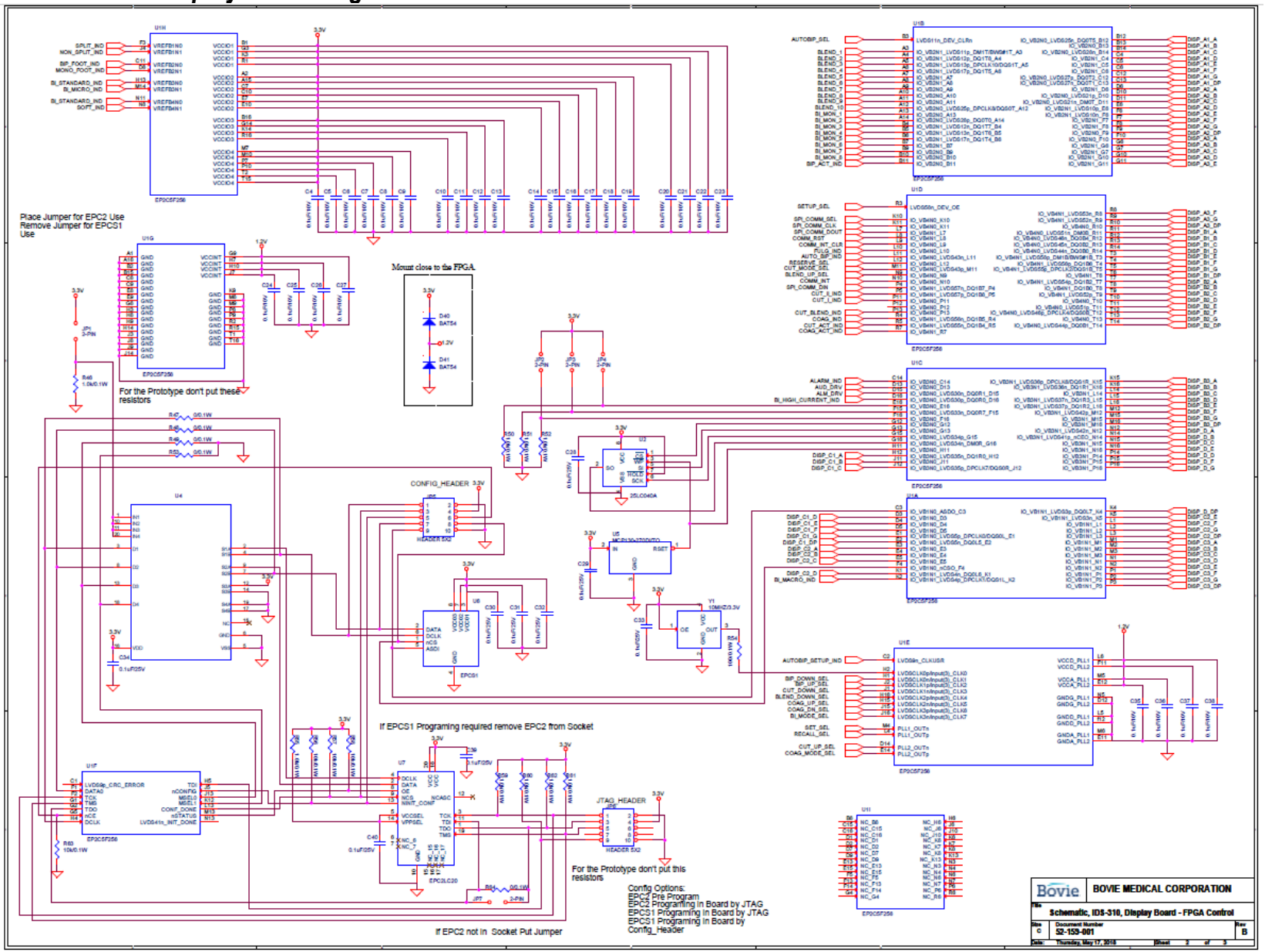
Schematic 23 Relay Board V-I-Sensors



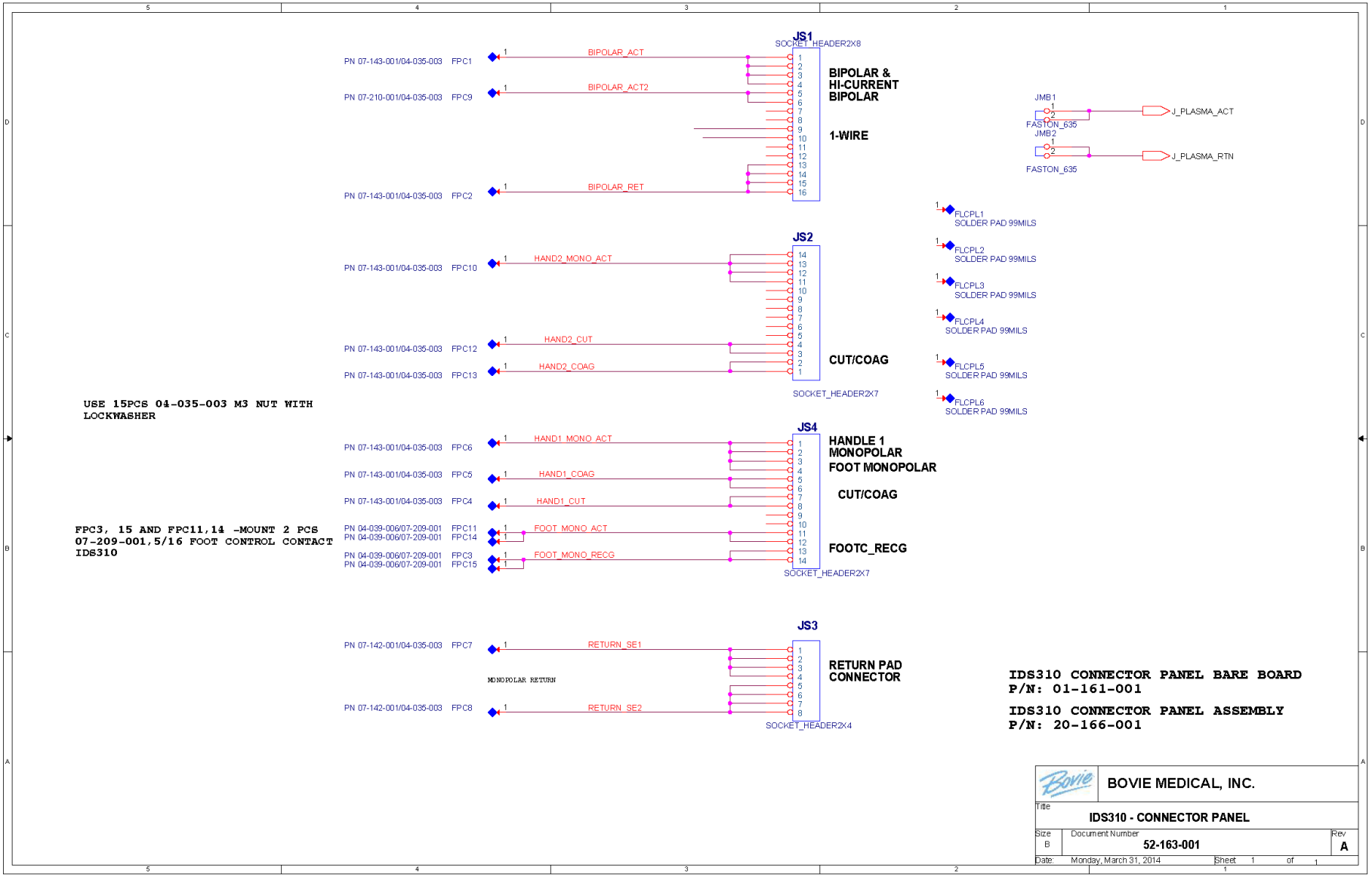
Schematic 24 Display Board Page 1


BIP 0
BIP 1
BIP 2
CUT 0
CUT 1
CUT 2
COAG 0
COAG 1
COAG 2
MEM 0
SYSTEM CONTROL
POWER ON
Grounding
FASTON_TERMINAL
OVERLAY
BOVIE MEDICAL CORPORATION
Schematic, IDS-310, Display Board - TOP
Document Number
52-153-001
Rev
B
Thursday, May 17, 2018

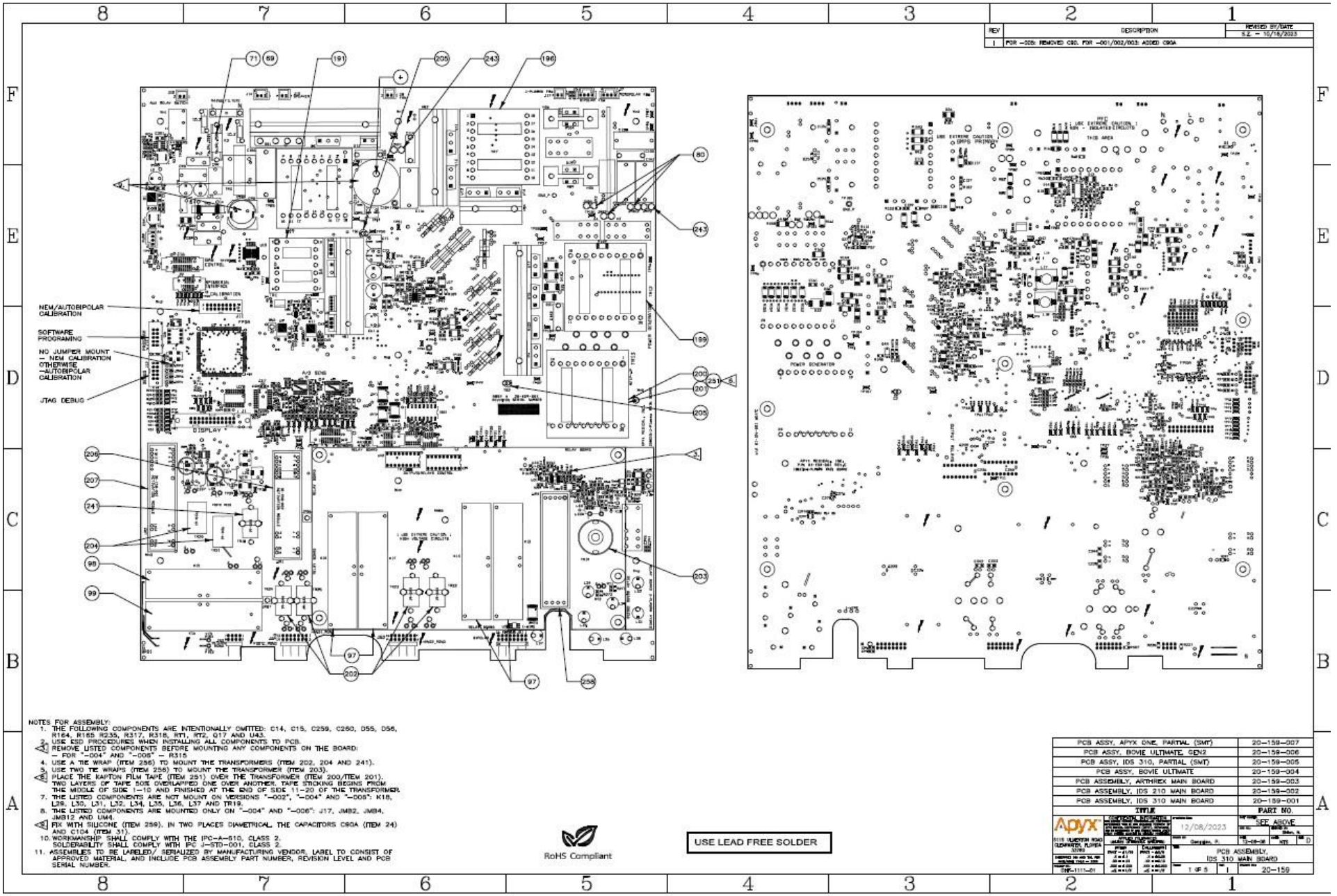
Schematic 25 Display Board Page 2



Schematic 26 Connector Panel



Printed Circuit Board 1 Relay Board Top



REV	DESCRIPTION	REVISED BY/DATE
I	FOR –005: REMOVED C80. FOR –001/002/003: ADDED C90A	S.Z. – 10/16/2023

NOTES FOR ASSEMBLY:
1. THE FOLLOWING COMPONENTS ARE INTENTIONALLY OMITTED: C14, C15, C259, C260, D55, D56, R164, R165 R235, R317, R318, RT1, RT2, Q17 AND U43.
2. USE ESD PROCEDURES WHEN INSTALLING ALL COMPONENTS TO PCB.
3. REMOVE LISTED COMPONENTS BEFORE MOUNTING ANY COMPONENTS ON THE BOARD:
   — FOR "–004" AND "–005" — R315
4. USE A TIE WRAP (ITEM 256) TO MOUNT THE TRANSFORMERS (ITEM 202, 204 AND 241).
5. USE TWO TIE WRAPS (ITEM 256) TO MOUNT THE TRANSFORMER (ITEM 203).
6. PLACE THE KAPTON FILM TAPE (ITEM 251) OVER THE TRANSFORMER (ITEM 200/ITEM 201). TWO LAYERS OF TAPE MUST OVERLAPPED ONE OVER ANOTHER. TAPE STICKING BEGINS FROM THE MIDDLE OF SIDE 1–10 AND FINISHED AT THE END OF SIDE 11–20 OF THE TRANSFORMER.
7. THE LISTED COMPONENTS ARE NOT MOUNT ON VERSIONS "–002", "–004" AND "–005": K18, L28, L30, L31, L32, L34, L35, L36, L37 AND TR19.
8. THE LISTED COMPONENTS ARE MOUNTED ONLY ON "–004" AND "–006": J17, JMB2, JMB4, JMB12 AND U44.
9. FIX WITH SILICONE (ITEM 259), IN TWO PLACES DIAMETRICAL, THE CAPACITORS C90A (ITEM 24) AND C104 (ITEM 31).
10. WORKMANSHIP SHALL COMPLY WITH THE IPC–A–610, CLASS 2. SOLDERABILITY SHALL COMPLY WITH IPC J–STD–001, CLASS 2.
11. 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.

RoHS Compliant

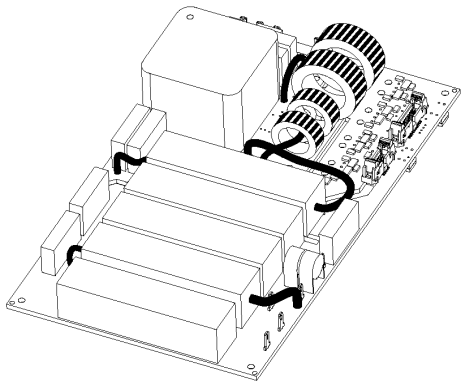
USE LEAD FREE SOLDER

PCB ASSY, APYX ONE, PARTIAL (SMT)	20–159–007
PCB ASSY, BOVIE ULTIMATE, GEN2	20–159–006
PCB ASSY, IDS 310, PARTIAL (SMT)	20–159–005
PCB ASSY, BOVIE ULTIMATE	20–159–004
PCB ASSEMBLY, ARTHREX MAIN BOARD	20–159–003
PCB ASSEMBLY, IDS 210 MAIN BOARD	20–159–002
PCB ASSEMBLY, IDS 310 MAIN BOARD	20–159–001
TITLE	PART NO.
PCB ASSEMBLY, IDS 310 MAIN BOARD	SEE ABOVE
12/08/2023	20–159

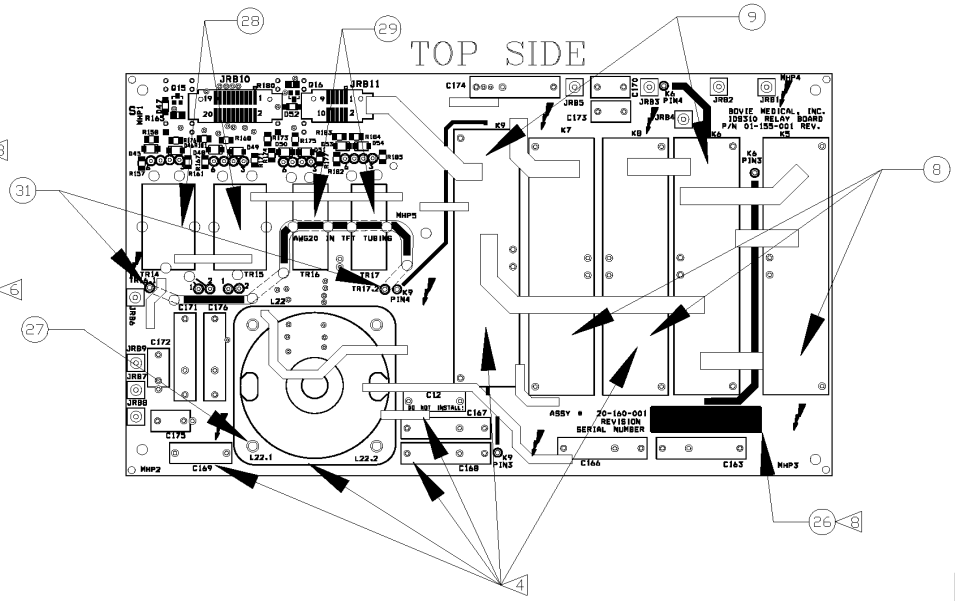
Printed Circuit Board 2 Main Board

NOTES:
1. OBSERVE ALL ESD PROCEDURES WHEN INSTALLING COMPONENTS TO PCB.
2. USE TIE WRAP (ITEM 30) TO SECURE TRANSFORMERS T14, T15, T16 AND T17 TO PCB. ROUTE ALL TRANSFORMER LEADS THROUGH THEIR NECESSARY STRAIN RELIEF HOLES AS INDICATED AND SOLDER THE ENDS. (EACH LEAD AND LOCATION ARE NUMERICALLY IDENTIFIED).
3. STRIP THE ENDS OF THE GREEN WIRE (ITEM 31) AT 1/8" AND PLACE THE TUBING (ITEM 25) OVER IT. SOLDER ONE END OF THE GREEN WIRE TO TR16.1 AND PASS THE OTHER TROUGH STRAIN RELIEF HOLES AND TRANSFORMERS TR16 AND TR17. SOLDER TO TR17.2.
4. OMIT COMPONENTS C167, C168, C169, K8, K9 AND L22 FOR "-002".
5. FOR "-001:
   ON THE HV RELAY (ITEM 9, K9), TRIM THE LEADS GOING INTO K9 PIN3 AND K9 PIN4 AND SOLDER THEM. ON THE HV RELAY (ITEM 9, K6), TRIM THE LEADS GOING INTO K6 PIN3 AND K6 PIN4 AND SOLDER THEM.
   FOR "-002:
   ON THE HV RELAY (ITEM 9, K6), TRIM THE LEADS GOING INTO K6 PIN3 AND K6 PIN4 AND SOLDER THEM.
6. SOLDER INDUCTOR 56uH (ITEM 27) TO ITS PLACE. OBSERVE THE ORIENTATION OF MARKED PIN1 AS SHOWN.
7. SOLDER ALL THROUGH HOLE COMPONENTS ON THEIR PLACES.
8. PLACE SERIAL NUMBER LABEL (ITEM 26) ON THE PCB IN THE LOCATION SHOWN.

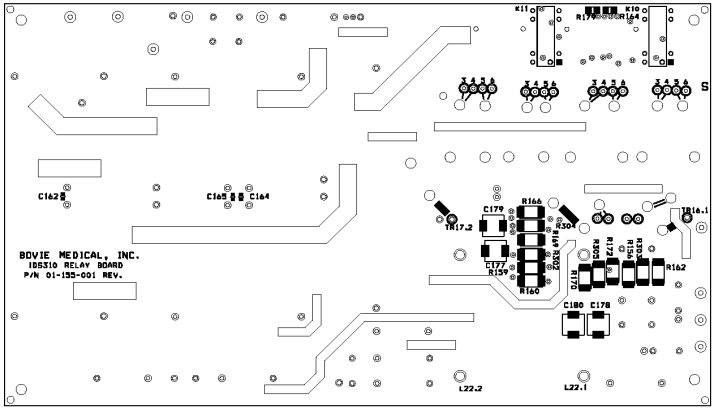
WORKMANSHIP SHALL COMPLY WITH THE IPC-A-610 SERIES, CLASS 2 AND INCLUDE IPC-A-600, CLASS 2.
SOLDERABILITY SHALL COMPLY WITH IPC J-STD-003, CLASS 2.



TOP SIDE



BOTTOM SIDE



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Bovie®
5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760

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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°

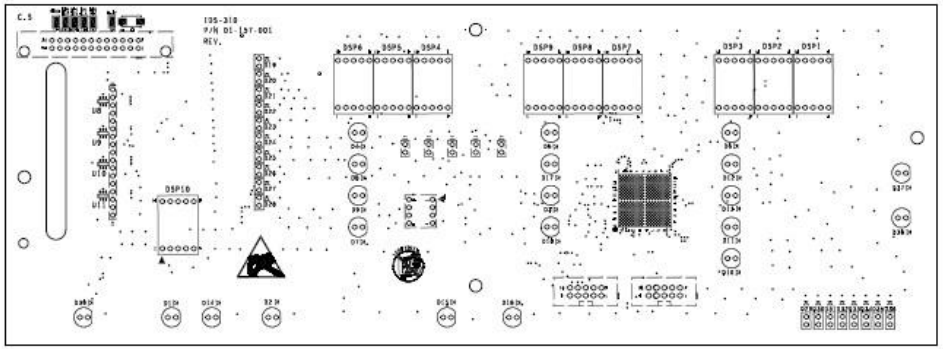
INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 1994

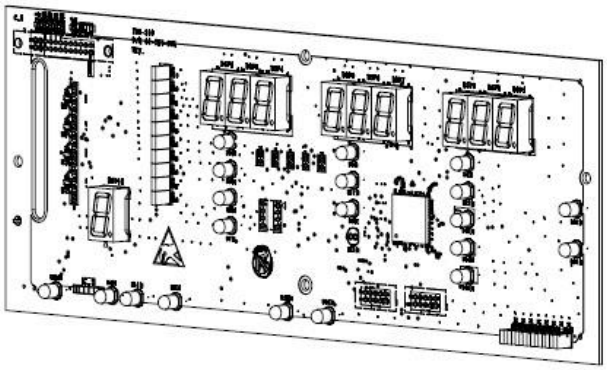
PROJECT NO.: –

EFFECTIVE DATE: 5/29/2014
PART NUMBER: SEE PAGE 1
CAD NO.:
DESIGNED BY: S.Z
DRAWN BY: S. ZLATKOV
DATE: 2012/06/14
SCALE: NTS
SIZE: B
TITLE: IDS 310, RELAY BOARD TOP
SHEET: 2 OF 2
REV: B
DRAWING NO.: 20-160

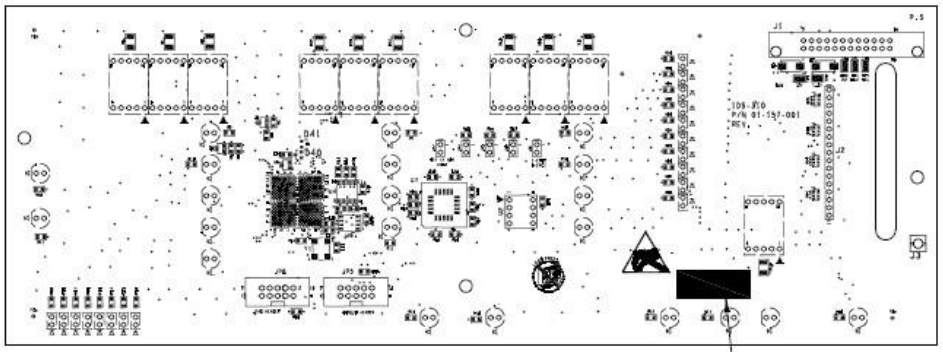
Printed Circuit Board 3 Display Board

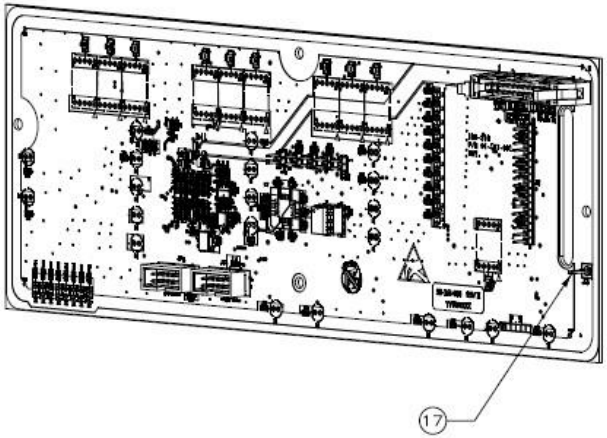
PCB DISPLAY SIDE





PCB HEADER SIDE





NOTES:

1. WORKMANSHIP SHALL COMPLY WITH THE IPC-610 SERIES, CLASS 2. SOLDERABILITY SHALL COMPLY WITH IPC J-STD-001, CLASS 2.
2. LABELING TO BE PERFORMED BY MFG VENDOR. LABEL TO CONSIST OF APPROVED MATERIAL AND INCLUDE PART NUMBER, REVISION LEVEL, AND LOT NUMBER. LOT NUMBER WILL BE TRACEABLE TO THE PRODUCTION WORK ORDER. LABEL MUST BE LEGIBLE AND NOT SMEAR, FROM HEAT OR ALCOHOL WIPE DOWNS. FLAG-TYPE OR PAPER LABELS ARE NOT ALLOWED.
3. CERTIFICATE OF CONFORMANCE REQUIRED TO INCLUDE DECLARATION OF RoHS COMPLIANCE.

USE LEAD FREE SOLDER

RoHS Compliant

Bovie

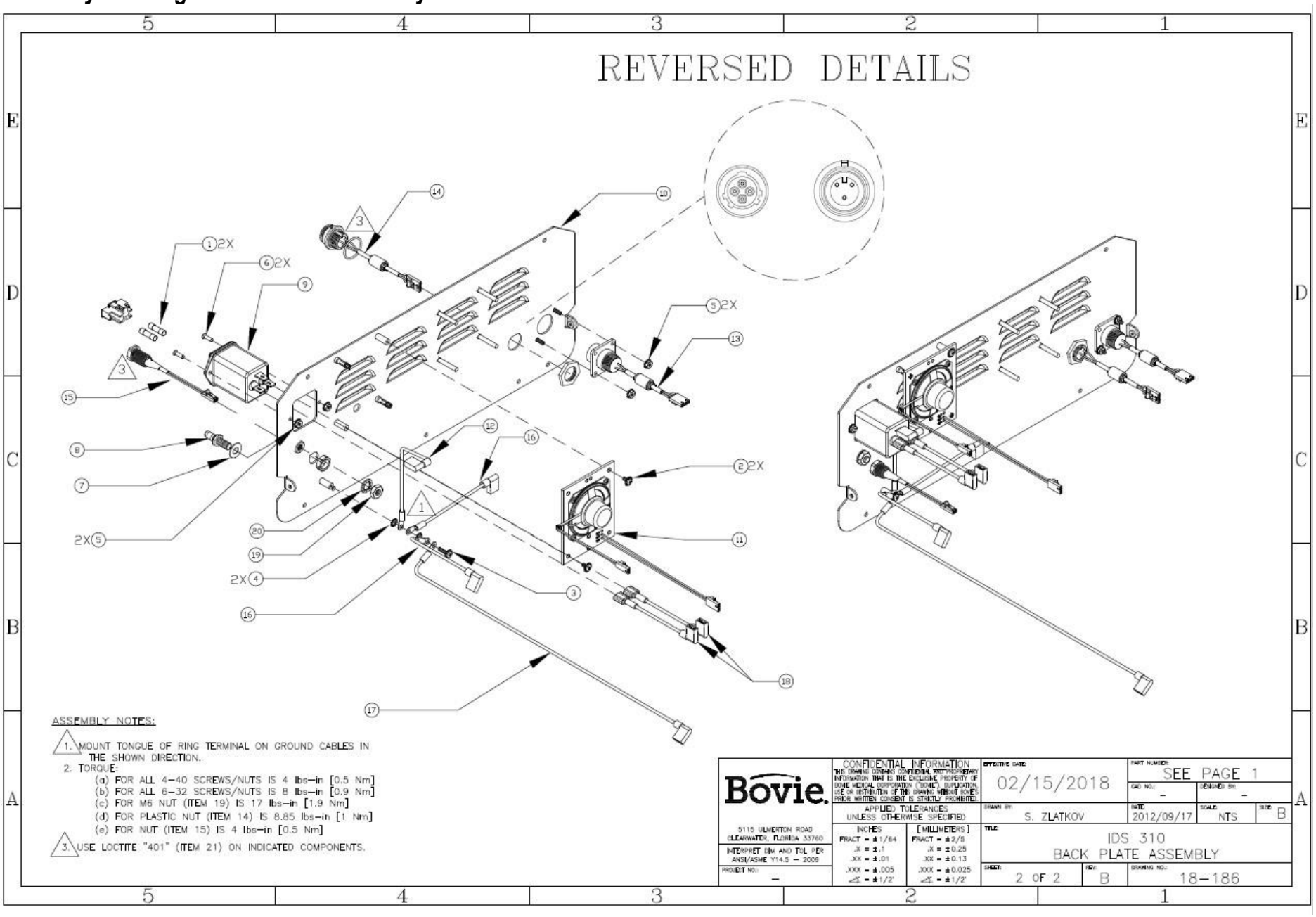
CONFIDENTIAL INFORMATION

APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED

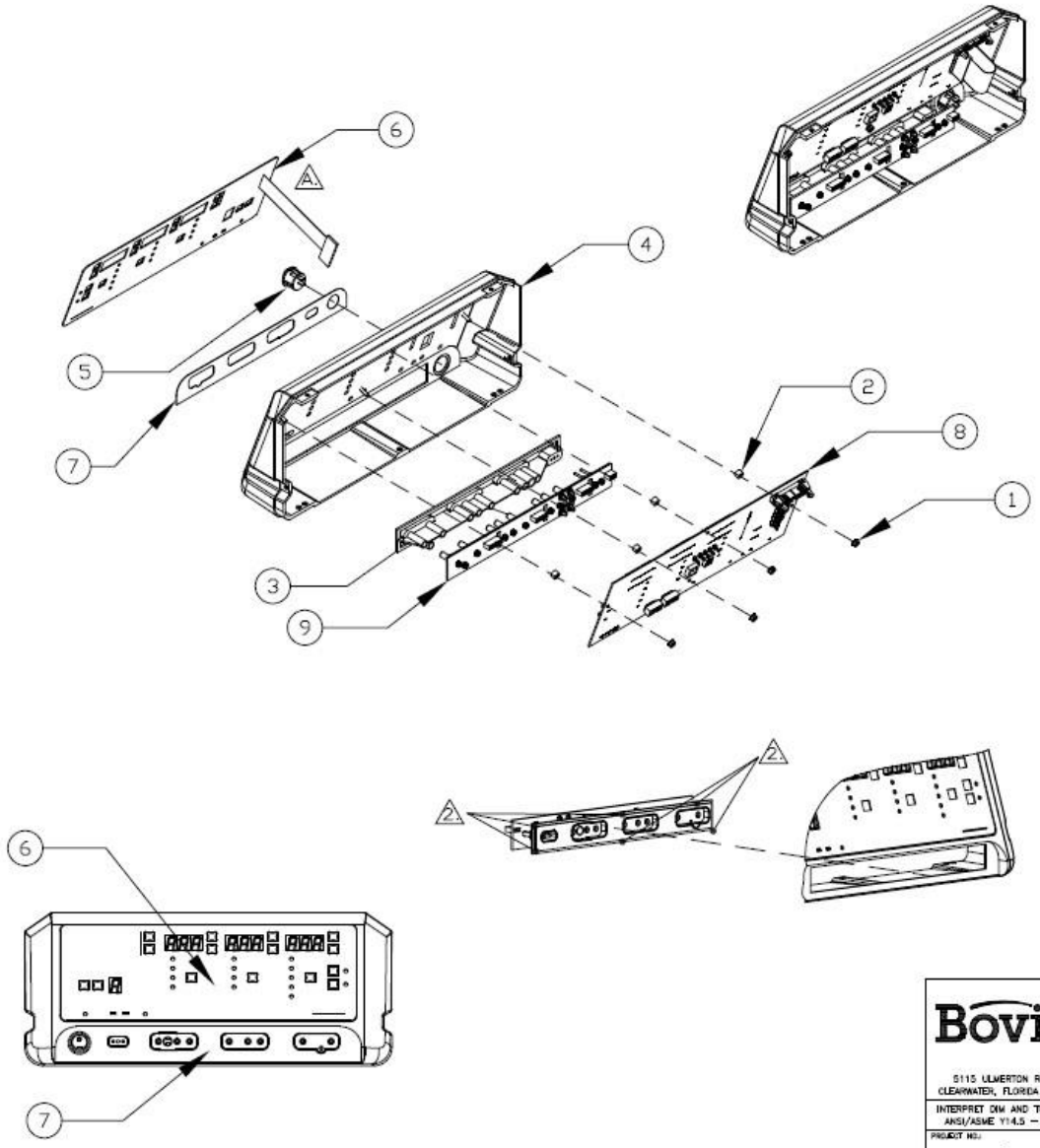
INCHES	[MILLIMETERS]
FRACT ± 1/64	FRACT ± 0.5
.X ± 0.1	.X ± 0.25
.XX ± 0.01	.XX ± 0.13
.XXX ± 0.005	.XXX ± 0.025
ANGLES ± 1/2°	ANGLES ± 1/2°

EFFECTIVE DATE	01/12/2023
PART NUMBER	SEE PAGE 1
CAD NO.	
DESIGNED BY	-
DRAWN BY	W. SEMBACH
DATE	2/8/2012
SCALE	NTS
SIZE	C
TITLE	PCB ASSEMBLY, IDS-310 DISPLAY BOARD
SHEET	2 OF 2
REV.	E
DRAWING NO.	20-161

Assembly Drawing 1 Back Plate Assembly



Assembly Drawing 2 Front Housing Assembly



REV	DESCRIPTION	REVISED BY/DATE
		B. AVRAMOV – 01/11/2018
E	ADDED "–003" AND "–610".	

NOTES:
1. TORQUE FOR ALL 6–32 NUTS IS 7 lbs–in (0.8 Nm).
2. APPLY A LAYER OF ITEM 10 AROUND THE CONNECTOR PANEL AS SHOWN AND FIX IT ON THE FRONT HOUSING.

ASSEMBLY INSTRUCTIONS:
A. PEEL OFF ADHESIVE BACKING ON ITEM 6 (*IMPORTANT* ALSO PEEL OFF THE SMALL PIECE OF ADHESIVE BEHIND THE FLEX CABLE.), SLIDE DISPLAY CABLE THRU SLOT IN THE UPPER HALF OF FRONT HOUSING, AFFIX ITEM 6 TO THE UPPER HALF OF FRONT HOUSING.
B. PEEL OFF ADHESIVE BACKING ON ITEM 7 AND AFFIX TO THE LOWER HALF OF FRONT PANEL.
C. ATTACH DISPLAY PCB (ITEM 8) WITH STANDOFFS (ITEM 2) TO FRONT HOUSING MOLDING (ITEM 4).
D. ATTACH OVERLAY FLEX CABLE ONTO BACK OF THE DISPLAY PCB.

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BILL OF MATERIALS

ITEM	QTY per P/N -001	-002	-003	-310	-210	-335	-235	-410	-510	-610	U/M	PART NAME	PART NUMBER
1	4	4	4	4	4	4	4	4	4	4	EA	NUT, HEX, W/LOCKWASHER 6-32	04-020-006
2	4	4	4	4	4	4	4	4	4	4	EA	STANDOFFS FOR DISPLAY PCB	05-040-250
3	0	1	0	1	1	0	0	1	1	0	EA	IDS 310 CONNECTOR PANEL, O-SHAPE	05-237-003
	1	0	1	0	0	1	1	0	0	1		A3350 CONNECTOR PANEL, O-SHAPE	05-237-004
4	0	1	0	1	1	0	0	1	1	0	EA	IDS 310 SERIES FRONT HOUSING	06-238-010
	1	0	1	0	0	1	1	0	0	1		A3350 SERIES FRONT HOUSING	06-238-335
5	1	0	1	0	0	1	1	0	0	1	EA	SWITCH, NON-ILLUMINATED ROUND ROCKER, RC SERIES, WHITE	07-215-001
	0	1	0	1	1	0	0	1	1	0		SWITCH, NON-ILLUMINATED ROUND ROCKER, RC SERIES, BLACK	07-215-002
6	0	0	0	1	0	0	0	0	0	0	EA	OVERLAY, DISPLAY, IDS 310	15-337-001
	0	0	0	0	1	0	0	0	0	0		OVERLAY, DISPLAY, IDS 210	15-343-001
	0	0	0	0	0	0	1	0	0	0		OVERLAY, DISPLAY, A2350	15-344-001
	0	0	0	0	0	1	0	0	0	0		OVERLAY, DISPLAY, A3350	15-345-001
	0	0	0	0	0	0	0	0	1	0		OVERLAY, DISPLAY, ESU-1	15-377-001
	0	0	0	0	0	0	0	1	0	0		OVERLAY, DISPLAY, IDS 310T	15-378-001
	0	0	0	0	0	0	0	0	0	1		OVERLAY, DISPLAY TOP, APPLIED MEDICAL EM010	15-446-001
7	0	0	0	1	1	0	0	1	1	0	EA	CONNECTOR PANEL OVERLAY, IDS 310,210	15-338-001
	0	0	0	0	0	1	1	0	0	0		CONNECTOR PANEL OVERLAY, A2350, A3350	15-345-001
	0	0	0	0	0	0	0	0	0	1		OVERLAY, BOTTOM, APPLIED MEDICAL, EM010	15-447-001
8	0	0	0	1	1	1	1	1	1	1	EA	PCB ASSY, IDS310, DISPLAY BOARD	20-161-001
9	1	1	1	1	1	1	1	1	1	1	EA	PCB ASSY, IDS310 CONNECTOR PANEL O-SHAPE	20-166-002
10	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	OZ	LOCTITE 495 INSTANT ADHESIVE	11-026-006

APPLIED MEDICAL HOUSING ASSY.	18–187–610
ESU–1 FRONT HOUSING ASSY.	18–187–510
IDS 310T FRONT HOUSING ASSY.	18–187–410
A2350 FRONT HOUSING ASSY.	18–187–235
A3350 FRONT HOUSING ASSY.	18–187–335
IDS 210 FRONT HOUSING ASSY.	18–187–210
IDS 310 FRONT HOUSING ASSY.	18–187–310
APPLIED MEDICAL FRONT HOUSING PARTIAL ASSY.	18–187–003
IDS SERIES FRONT HOUSING PARTIAL ASSY.	18–187–002
AARON SERIES FRONT HOUSING PARTIAL ASSY.	18–187–001

Bovie.
5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760
INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 2009
PROJECT NO.: –

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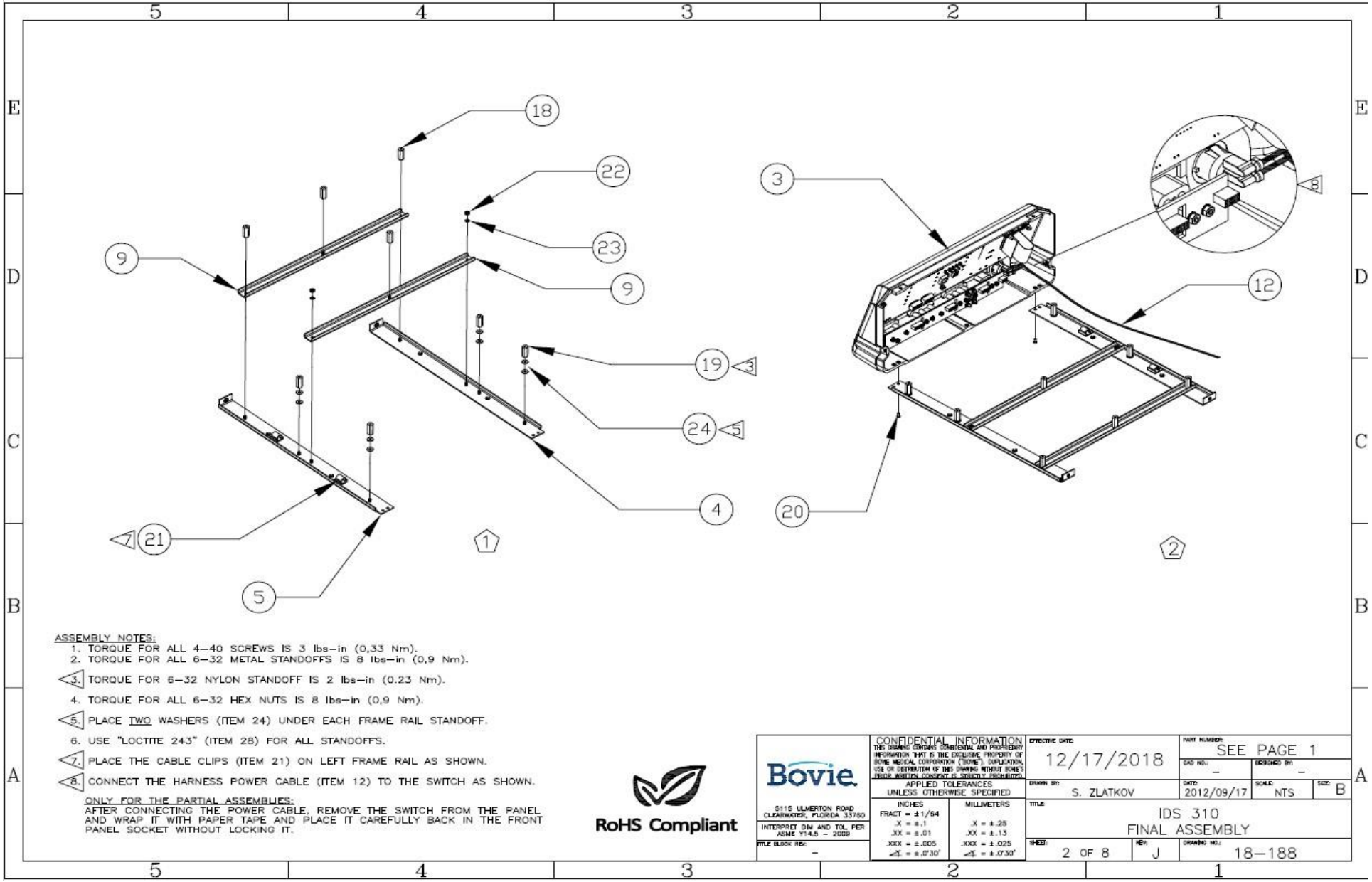
APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED

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: 02/15/2018
PART NUMBER: SEE ABOVE
CAD NO.:
REVISED BY:
DRAWN BY: S. ZLATKOV
DATE: 2012/09/17
SCALE: NTS
SIZE: B
TITLE: IDS 310 FRONT HOUSING ASSEMBLY
SHEET: 1 OF 1
REV: E
DRAWING NO.: 18–187

Assembly Drawing 3 Final Assembly 1



ASSEMBLY NOTES:
1. TORQUE FOR ALL 4–40 SCREWS IS 3 lbs–in (0,33 Nm).
2. TORQUE FOR ALL 6–32 METAL STANDOFFS IS 8 lbs–in (0,9 Nm).
3. TORQUE FOR 6–32 NYLON STANDOFF IS 2 lbs–in (0.23 Nm).
4. TORQUE FOR ALL 6–32 HEX NUTS IS 8 lbs–in (0,9 Nm).
5. PLACE TWO WASHERS (ITEM 24) UNDER EACH FRAME RAIL STANDOFF.
6. USE "LOCTITE 243" (ITEM 28) FOR ALL STANDOFFS.
7. PLACE THE CABLE CLIPS (ITEM 21) ON LEFT FRAME RAIL AS SHOWN.
8. CONNECT THE HARNESS POWER CABLE (ITEM 12) TO THE SWITCH AS SHOWN.

ONLY FOR THE PARTIAL ASSEMBLIES:
AFTER CONNECTING THE POWER CABLE, REMOVE THE SWITCH FROM THE PANEL AND WRAP IT WITH PAPER TAPE AND PLACE IT CAREFULLY BACK IN THE FRONT PANEL SOCKET WITHOUT LOCKING IT.

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5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760
INTERPRET DIM AND TOL PER ASME Y14.5 – 2009
TITLE BLOCK REV: –

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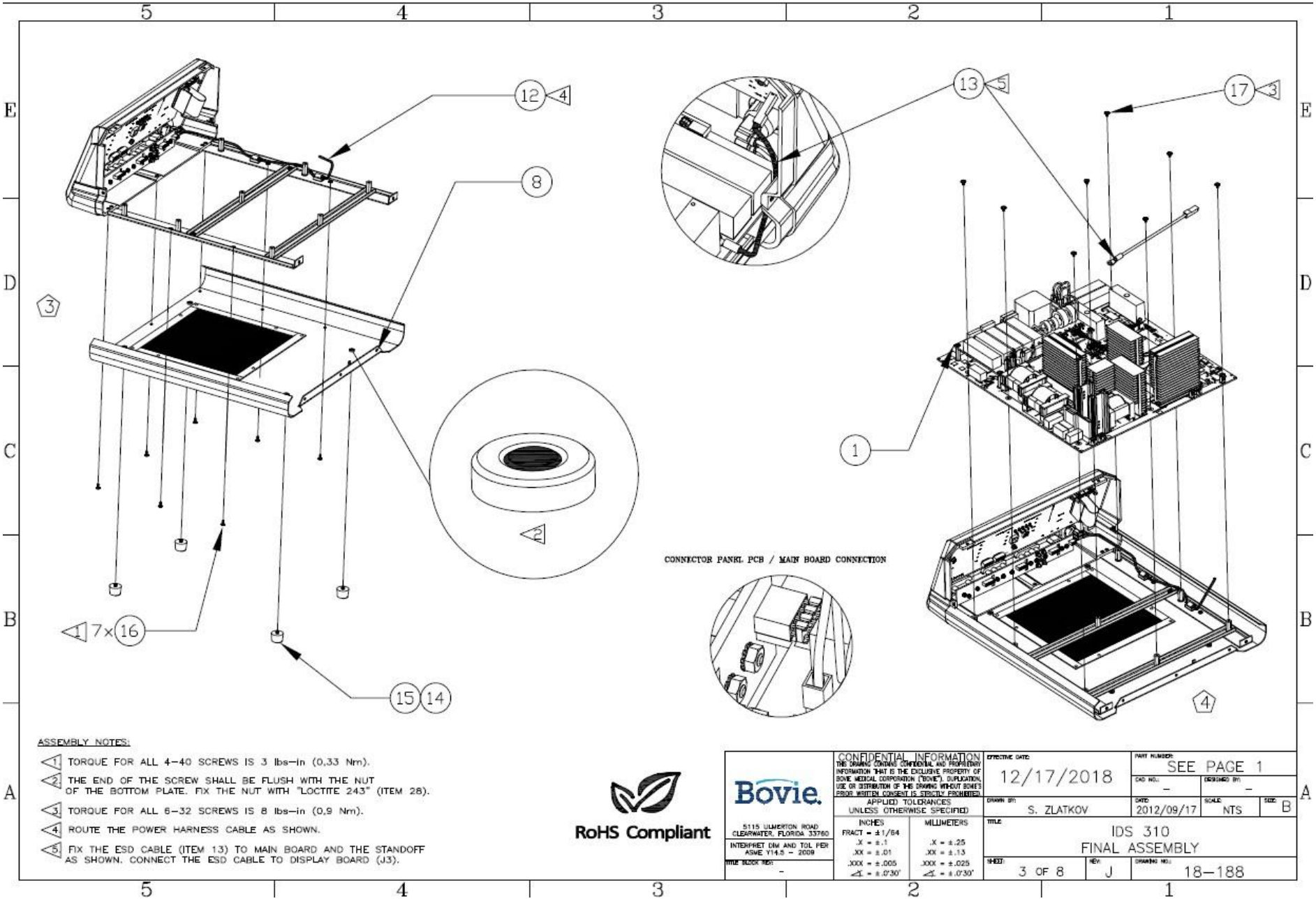
APPLIED TOLERANCES
UNLESS OTHERWISE SPECIFIED

INCHES	MILLIMETERS
FRACT = ±1/64	
.X = ±.1	.X = ±.25
.XX = ±.01	.XX = ±.13
.XXX = ±.005	.XXX = ±.025
∠ = ±.0'30'	∠ = ±.0'30'

EFFECTIVE DATE: 12/17/2018
DRAWN BY: S. ZLATKOV
DATE: 2012/09/17
PART NUMBER: SEE PAGE 1
CAD NO.: –
DESIGNED BY: –
SCALE: NTS
SIZE: B
TITLE: IDS 310 FINAL ASSEMBLY
SHEET: 2 OF 8
REV: J
DRAWING NO.: 18–188

Assembly Drawing 4 Final Assembly 2



ASSEMBLY NOTES:

1. TORQUE FOR ALL 4-40 SCREWS IS 3 lbs-in (0,33 Nm).
2. THE END OF THE SCREW SHALL BE FLUSH WITH THE NUT OF THE BOTTOM PLATE. FIX THE NUT WITH "LOCTITE 243" (ITEM 28).
3. TORQUE FOR ALL 6-32 SCREWS IS 8 lbs-in (0,9 Nm).
4. ROUTE THE POWER HARNESS CABLE AS SHOWN.
5. FIX THE ESD CABLE (ITEM 13) TO MAIN BOARD AND THE STANDOFF AS SHOWN. CONNECT THE ESD CABLE TO DISPLAY BOARD (J3).

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CLEARWATER, FLORIDA 33760

INTERPRET DIM AND TOL PER ASME Y14.5 – 2009

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UNLESS OTHERWISE SPECIFIED

INCHES	MILLIMETERS
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.X = ±.1	.X = ±.25
.XX = ±.01	.XX = ±.13
.XXX = ±.005	.XXX = ±.025
∠ = ±.0'30'	∠ = ±.0'30'

EFFECTIVE DATE: 12/17/2018

PART NUMBER: SEE PAGE 1

CAD NO.: –

DESIGNED BY: –

DRAWN BY: S. ZLATKOV

DATE: 2012/09/17

SCALE: NTS

SIZE: B

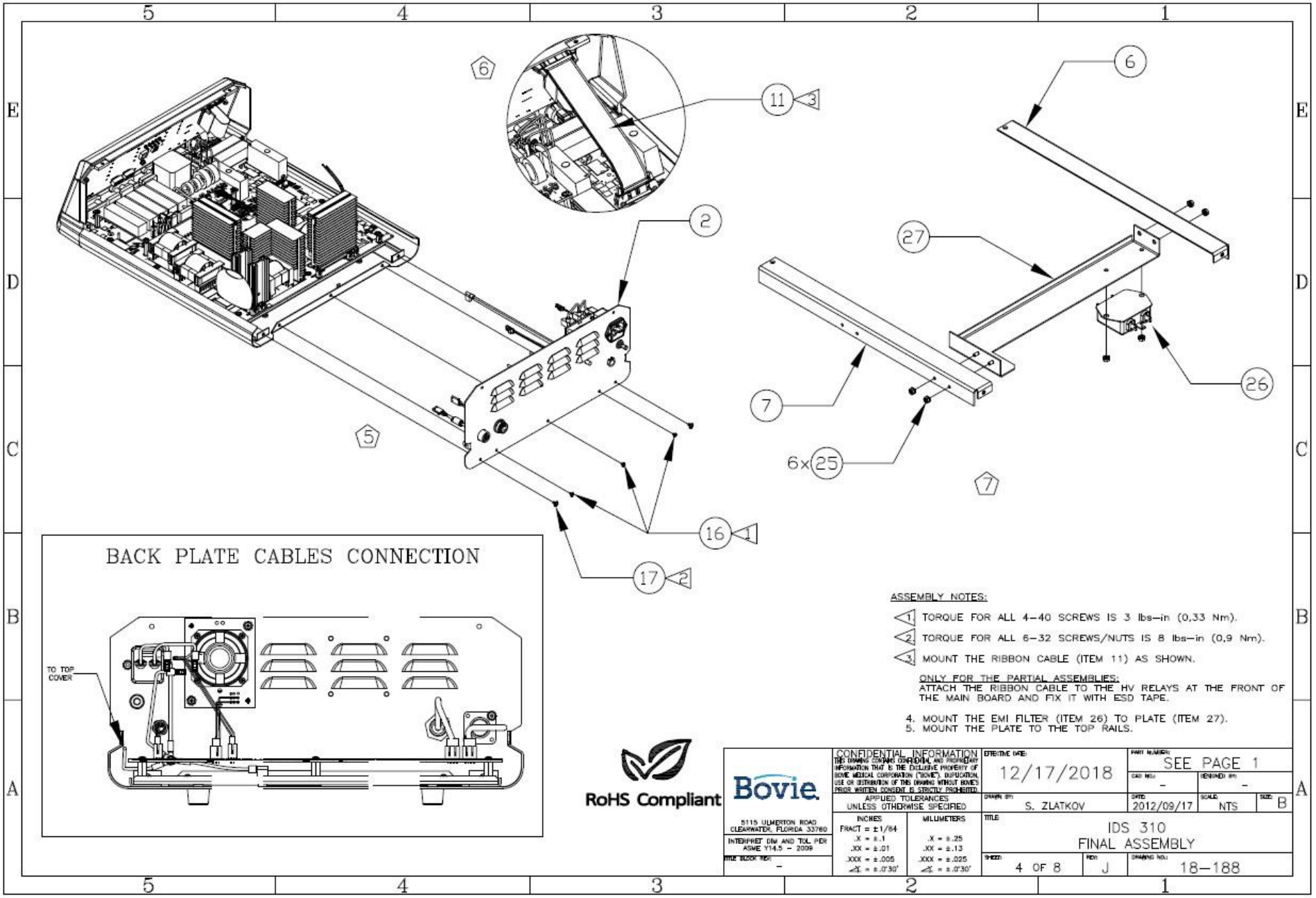
TITLE: IDS 310 FINAL ASSEMBLY

SHEET: 3 OF 8

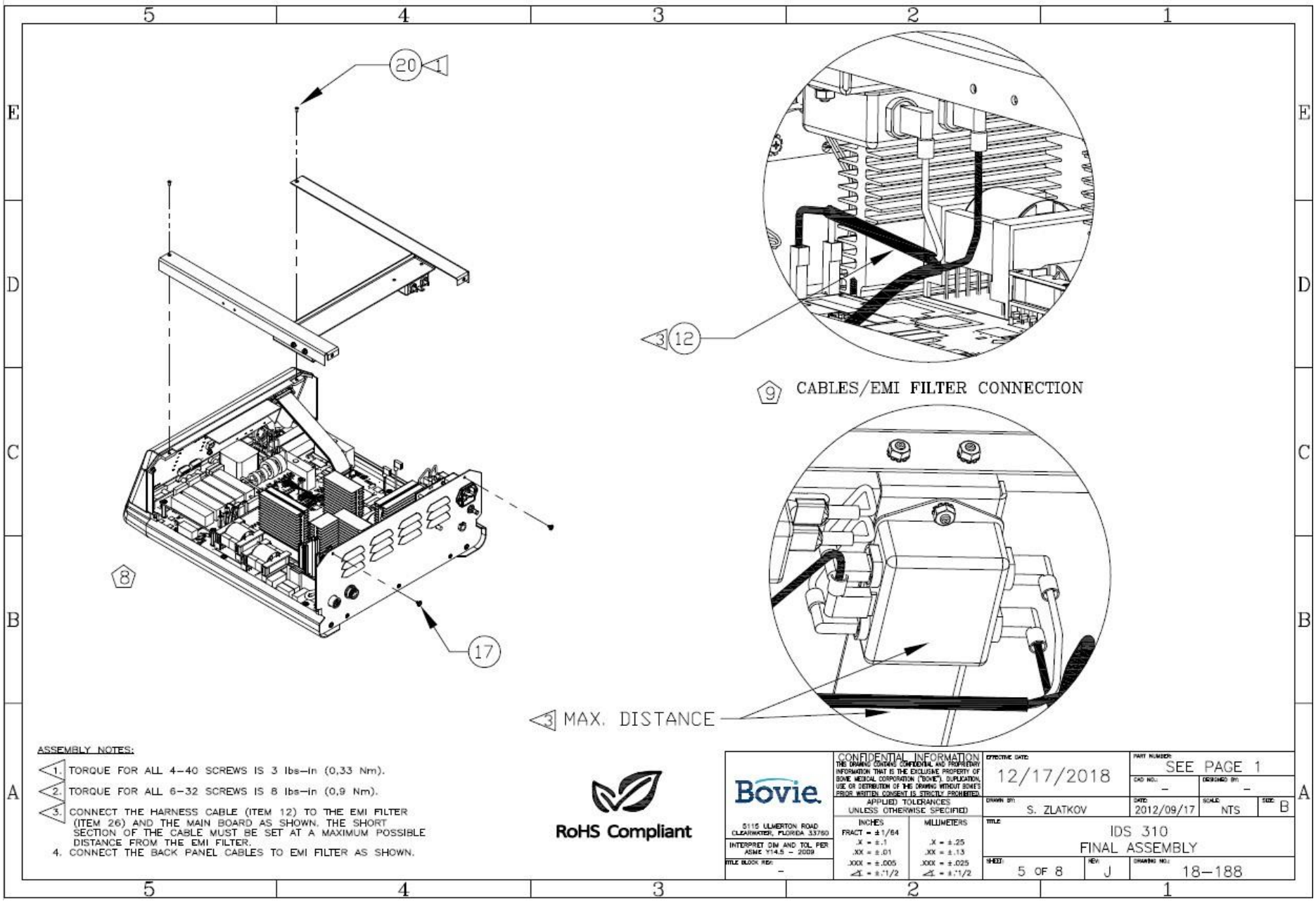
REV: J

DRAWING NO.: 18-188

Assembly Drawing 5 Final Assembly 3



Assembly Drawing 6 Final Assembly 4



ASSEMBLY NOTES:

1. TORQUE FOR ALL 4-40 SCREWS IS 3 lbs-in (0,33 Nm).
2. TORQUE FOR ALL 6-32 SCREWS IS 8 lbs-in (0,9 Nm).
3. CONNECT THE HARNESS CABLE (ITEM 12) TO THE EMI FILTER (ITEM 26) AND THE MAIN BOARD AS SHOWN. THE SHORT SECTION OF THE CABLE MUST BE SET AT A MAXIMUM POSSIBLE DISTANCE FROM THE EMI FILTER.
4. CONNECT THE BACK PANEL CABLES TO EMI FILTER AS SHOWN.

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∠ = ±1/2	∠ = ±1/2

INTERPRET DIM AND TOL PER ASME Y14.5 – 2009

TITLE BLOCK REV: –

EFFECTIVE DATE: 12/17/2018

PART NUMBER: SEE PAGE 1

CAD NO.: –

DESIGNED BY: –

DRAWN BY: S. ZLATKOV

DATE: 2012/09/17

SCALE: NTS

SIZE: B

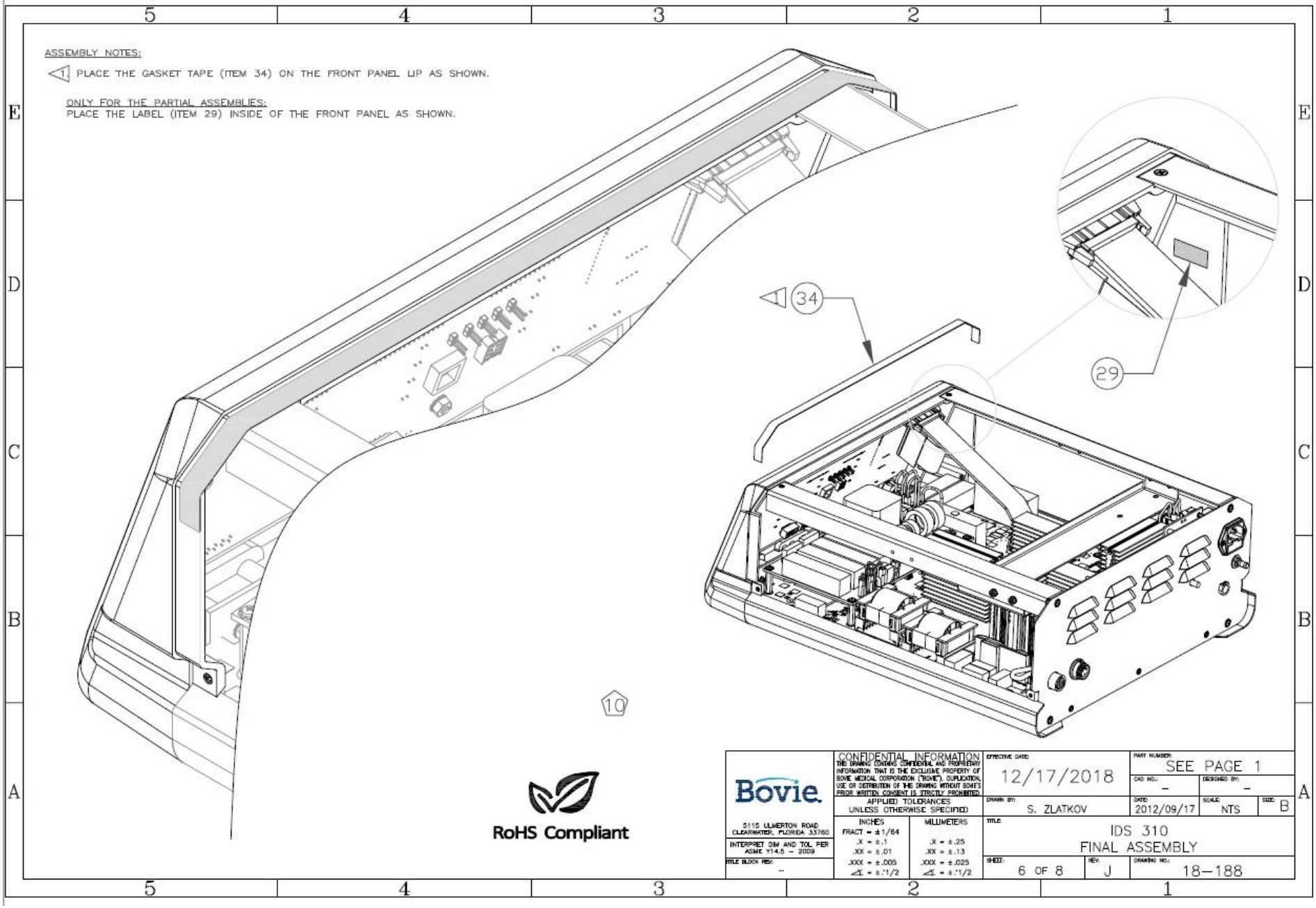
TITLE: IDS 310 FINAL ASSEMBLY

SHEET: 5 OF 8

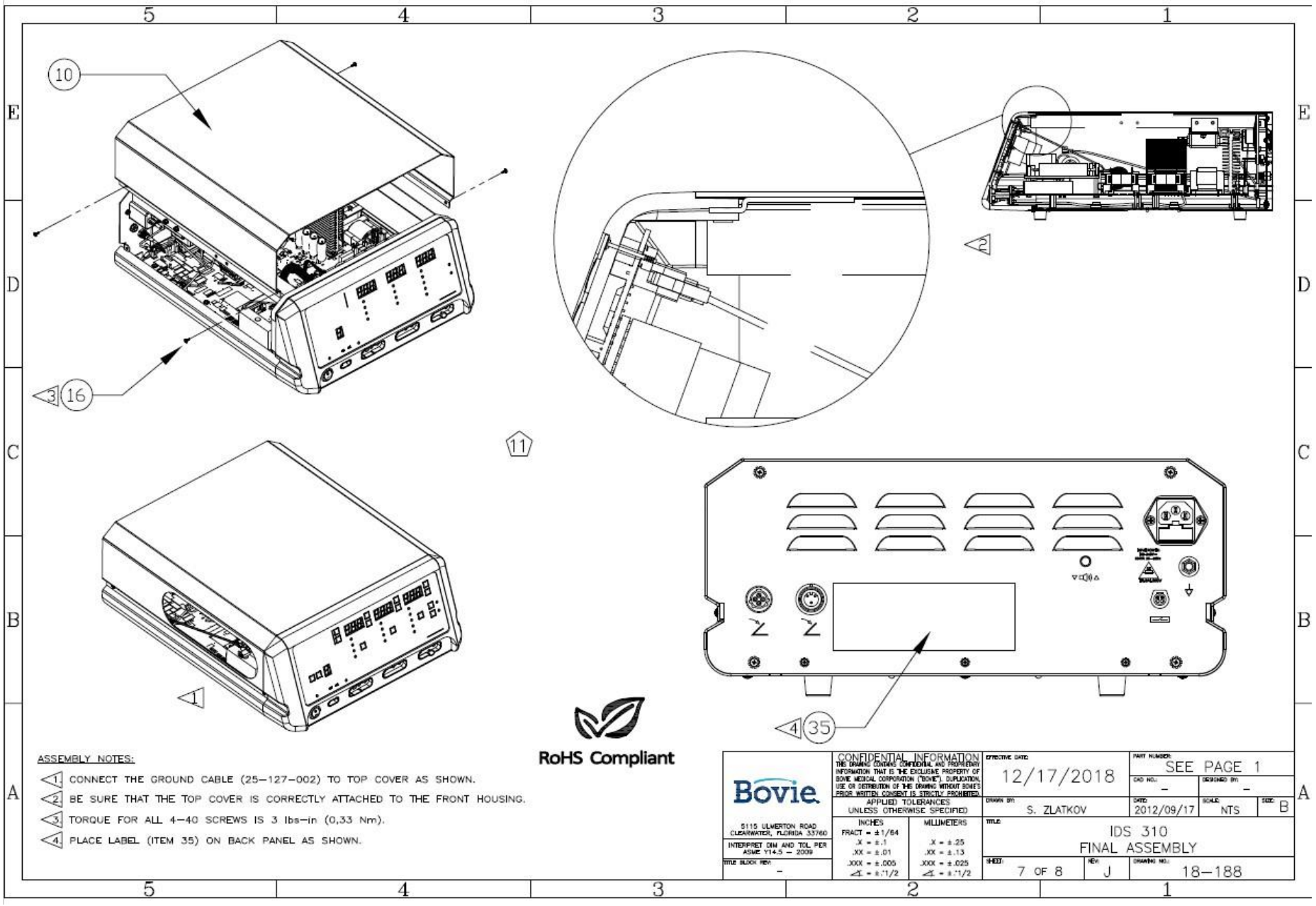
REV: J

DRAWING NO.: 18–188

Assembly Drawing 7 Final Assembly 5



Assembly Drawing 8 Final Assembly 6

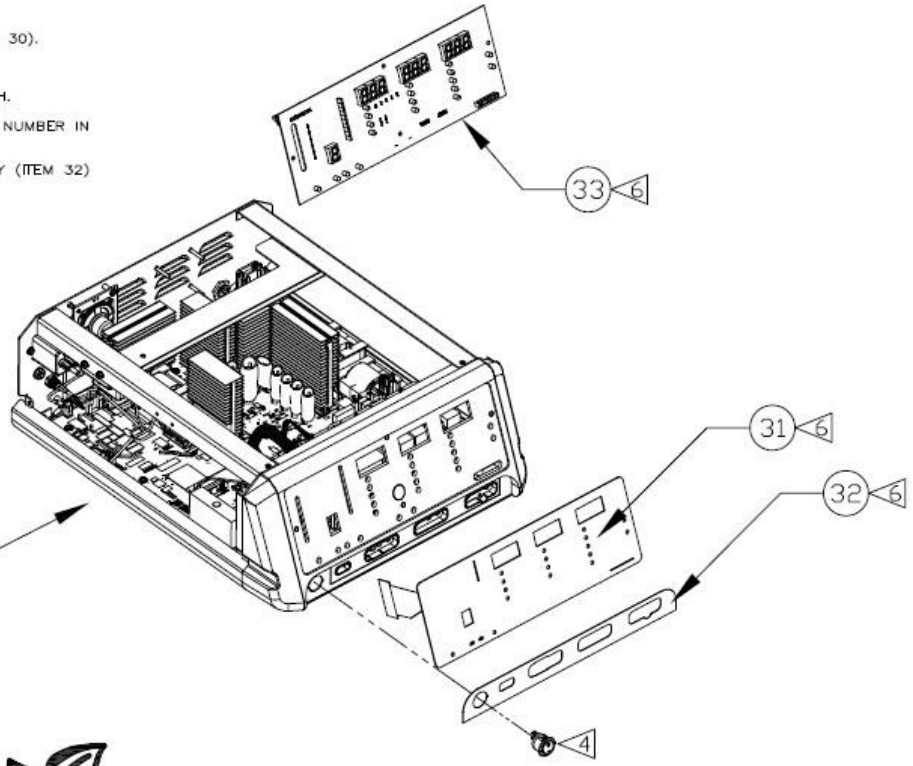


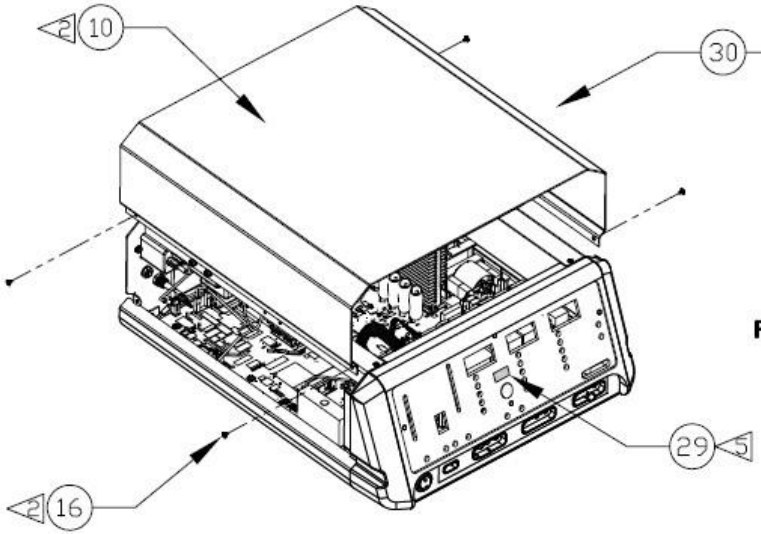
Assembly Drawing 9 Final Assembly 7

INSTRUCTIONS FOR MAKING FULL ASSEMBLY FROM PARTIAL ASSEMBLY

ASSEMBLY NOTES:

1. FOLLOWING WI-0575.
2. REMOVE THE SCREWS (ITEM 16) AND THE TOP COVER (ITEM 10) FROM PARTIAL ASSEMBLY (ITEM 30).
3. REMOVE THE FOUR SCREWS (04-020-006) FROM THE BACK SIDE OF FRONT PANEL.
4. REMOVE THE SWITCH FROM THE CONNECTOR PANEL. REMOVE THE PAPER TAPE FROM THE SWITCH.
5. REMOVE THE POLYESTER LABEL (ITEM 29) FROM THE FRONT PANEL. RECORD THE LABEL SERIAL NUMBER IN THE CORRESPONDING PRODUCTION ROUTER.
6. MOUNT THE DISPLAY BOARD (ITEM 33), DISPLAY OVERLAY (ITEM 31), CONNECTOR PANEL OVERLAY (ITEM 32) AND THE SWITCH ACCORDING TO DWG 18-187 AND WI#18-187.
7. CONNECT THE GROUND CABLE (ITEM 13) TO THE DISPLAY BOARD AS SHOWN ON PAGE 2.
8. CONNECT THE RIBBON CABLE (ITEM 11) TO THE DISPLAY BOARD AS SHOWN ON PAGE 4.
9. MOUNT THE GASKET (ITEM 34) AS SHOWN ON PAGE 6.
10. MOUNT THE TOP COVER AS SHOWN ON PAGE 7.
11. PLACE THE LABEL (ITEM 35) AS SHOWN ON PAGE 7.





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INTERPRET DIM AND TOL PER ASME Y14.5 – 2009	APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED	DRAWN BY: S. ZLATKOV	CAD NO.: – / DESIGNED BY: –	DATE: 2012/09/17 / SCALE: NTS / SIZE: B
TITLE BLOCK REV: –	INCHES: FRACT = ±1/64, .X = ±.1, .XX = ±.01, .XXX = ±.005, ∠ = ±1/2 / MILLIMETERS: .X = ±.25, .XX = ±.13, .XXX = ±.025, ∠ = ±1/2	TITLE: IDS 310 FINAL ASSEMBLY		
		SHEET: 8 OF 8	REV: J	DRAWING NO.: 18-188

CH REP

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2024-03-31

EC REP

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