

*Technical Publication*

**CL-1306R2**

**Summit P/N 09743-005 Rev. A**

# **Central Listings**

**Mobile X-ray Unit**



## REVISION HISTORY

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REVISION	DATE	REASON FOR CHANGE
0	SEP 08, 2021	First Edition.
1	DEC 20, 2021	Addition of new Boards: UARC Board, GPIO Trolley Board, GPIO Head Board and Capacitive Switch Board.
2	SEP 13, 2022	Addition of new Board: RFID Board.

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This Document is the English original version, edited and supplied by the manufacturer.

The Revision state of this Document is indicated in the code number shown at the bottom of this page.

## ADVISORY SYMBOLS

The following advisory symbols will be used throughout this manual. Their application and meaning are described below.



***DANGERS ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEADED OR AVOIDED WILL CAUSE SERIOUS PERSONAL INJURY OR DEATH.***



**ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEADED OR AVOIDED COULD CAUSE SERIOUS PERSONAL INJURY, OR CATASTROPHIC DAMAGE OF EQUIPMENT OR DATA.**



***Advise of conditions or situations that if not heeded or avoided could cause personal injury or damage to equipment or data.***

Note 

***Alert readers to pertinent facts and conditions. Notes represent information that is important to know but which do not necessarily relate to possible injury or damage to equipment.***

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## SECTION 1      PRELIMINARY CONSIDERATIONS

Note 

*This Mobile Unit has been configured, calibrated and tested by the Manufacturer.*

*No service intervention is necessary since the system is ready for normal operation.*

*None of the procedures indicated in this chapter of the Service Manual should be necessary upon first run, unless esteemed otherwise.*

Note 

*Configuration and Calibration should only be performed by Service Engineers who are specialized in servicing this specific Mobile Unit.*

Note 

*Before performing the Configuration and Calibration, verify that the Unit has been connected to the mains for at least eight (8) hours. This will ensure a complete and full Battery charging.*

The required tools and test equipments are listed on the Startup Primer document of this Service Manual.

**Mobile X-ray Unit**

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Central Listing

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## **SECTION 2            CENTRAL LISTINGS**

This section is a compilation of the main components (Test Points, Connectors, LEDs, Switches and Fuses) of the electronic boards of the Mobile Unit.

Each drawing is accompanied by several tables including the most used components of the respective board. To find any component press “Ctrl + F”, enter the component reference (e.g. TP2) and press “Enter”.

### **2.1    LIST OF BOARDS**

The following list includes the boards which contain components that may require access during service procedures:

- Universal Advanced Rotor Control Board (UARC) - A3615-XX
- Advanced Control Board (ACB) - A3678-XX
- Advanced Digital Motion Control Board (ADMC) - A3686-XX
- RFID Board - A9598-XX
- GPIO Trolley Board - A40001-XX
- GPIO Head Board - A40004-XX
- Capacitive Switch Board - A40024-XX

**Mobile X-ray Unit**

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Central Listing

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2.2 UNIVERSAL ADVANCED ROTOR CONTROL BOARD (UARC) - A3615-03


Note  Any switch, jumper, led, or test point not listed in these tables are for manufacturer's internal use.

Table 2-1  
UARC Board (A3615-03) - Jumpers and Switches

JUMPERS AND SWITCHES				LOCATION IN BOARD
REFERENCE	POSITION	DESCRIPTION	DEFAULT VALUE	
SW1	Pulsed = Reset Mode Released = Normal Mode	Board Reset for Board Reprogramming	Push-button Released	B1
S2-1	OFF = Normal Use ON = Factory Use	OFF = SafetyBrake_SW_Disabled ON = SafetyBrake_SW_Enabled	Always in OFF	A2
S2-2	OFF = Normal Use ON = Factory Use	OFF = Error_Inhibit_SW_Disabled ON = Error_Inhibit_SW_Enabled	Always in OFF	A2
S2-3	OFF = Normal Use ON = Factory Use	OFF = Self_Status_Report_Disabled ON = Self_Status_Report_Enabled	Always in OFF	A2
S2-4	OFF = Normal Use ON = Factory Use	OFF = Demo_Mode_OFF (Power is applied to the Tube) ON = Demo_Mode_ON (Power is not applied to the Tube)	Always in OFF	A2
S2-5	OFF = Normal Use ON = Factory Use	OFF = DC-BUS_SW_Disabled (Compensate DC-BUS with Power Duty Cycle to obtain the same Current Waveform) ON = DC-BUS_SW_Enabled (Keep DC-BUS in nominal value based on 400V as default)	Always in OFF	A2
S2-6	OFF = Normal Use ON = Factory Use	OFF = Tube_TempSensor_Enabled ON = Tube_TempSensor_Disabled	Always in OFF	A2
S2-8	OFF = Normal Use ON = Factory Use	OFF = Bootloader_SW_Disabled ON = Bootloader_SW_Enabled	Always in OFF	A2

A3615-03  
UNIVERSAL ADVANCED ROTOR CONTROL BOARD (UARC)

**Table 2-2**  
**UARC Board (A3615-03) - Leds**

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	STATUS IN NORMAL USE	
DS3 = LED [0] in LED Bank	N/A	LED ON = State.0	Normal Mode	A1
DS4 = LED [1] in LED Bank	N/A	LED ON = State.1	Normal Mode	A1
DS5 = LED [2] in LED Bank	N/A	LED ON = State.2	Normal Mode	A1
DS6 = LED [3] in LED Bank	N/A	LED ON = Bit3 (Rotor Running Current at Low Speed State)	Normal Mode	A1
DS7 = LED [4] in LED Bank	N/A	LED ON = Bit4 (Rotor Running Current at Hight Speed State)	Normal Mode	A1
DS8= LED [5] in LED Bank	N/A	LED ON = Bit5 (Erasing EEPROM if LED is Blinking)	Normal Mode	A1
DS9 = LED [6] in LED Bank	N/A	LED Blinks (T = 1s) = Board Heartbeat	Normal Mode	A1
DS10 = LED [7] in LED Bank	N/A	LED OFF	Normal Mode	A1
DS3 = LED [0] in LED Bank	N/A	LED ON = Error.0	Error Mode	A1
DS4 = LED [1] in LED Bank	N/A	LED ON = Error.1	Error Mode	A1
DS5 = LED [2] in LED Bank	N/A	LED ON = Error.2	Error Mode	A1
DS6 = LED [3] in LED Bank	N/A	LED ON = Error.3	Error Mode	A1
DS7 = LED [4] in LED Bank	N/A	LED ON = Error.4	Error Mode	A1
DS8 = LED [5] in LED Bank	N/A	LED ON = Error.5	Error Mode	A1
DS9 = LED [6] in LED Bank	N/A	LED ON = Error.6	Error Mode	A1
DS10 = LED [7] in LED Bank	N/A	LED ON	Error Mode	A1
DS3 = LED [0] in LED Bank	N/A	LED Blinks (T = 1s) = State.0	Demo Mode	A1
DS4 = LED [1] in LED Bank	N/A	LED Blinks (T = 1s) = State.1	Demo Mode	A1
DS5 = LED [2] in LED Bank	N/A	LED Blinks (T = 1s) = State.2	Demo Mode	A1
DS6= LED [3] in LED Bank	N/A	LED ON = Bit3 (Rotor Running Current at Low Speed State)	Demo Mode	A1
DS7 = LED [4] in LED Bank	N/A	LED ON = Bit4 (Rotor Running Current at High Speed State)	Demo Mode	A1
DS8 = LED [5] in LED Bank	N/A	LED ON = Bit5 (Erasing EEPROM if LED is Blinking)	Demo Mode	A1
DS9 = LED [6] in LED Bank	N/A	LED Blinks (T = 1s) = Board Heartbeat	Demo Mode	A1
DS10 = LED [7] in LED Bank	N/A	LED OFF	Demo Mode	A1

A3615-03  
UNIVERSAL ADVANCED ROTOR CONTROL BOARD (UARC)

**Table 2-2 (Cont.)  
UARC Board (A3615-03) - Leds**

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	STATUS IN NORMAL USE	
DS3 = LED [0] in LED Bank	N/A	LED ON = State.0	Disabled Hardware Error Mode	A1
DS4 = LED [1] in LED Bank	N/A	LED ON = State.1	Disabled Hardware Error Mode	A1
DS5 = LED [2] in LED Bank	N/A	LED ON = State.2	Disabled Hardware Error Mode	A1
DS6 = LED [3] in LED Bank	N/A	LED ON = Bit3 (Rotor Running Current at Low Speed State)	Disabled Hardware Error Mode	A1
DS7 = LED [4] in LED Bank	N/A	LED ON = Bit4 (Rotor Running Current at High Speed State)	Disabled Hardware Error Mode	A1
DS8 = LED [5] in LED Bank	N/A	LED ON = Bit5 (Erasing EEPROM if LED is Blinking)	Disabled Hardware Error Mode	A1
DS9 = LED [6] in LED Bank	N/A	LED Blinks (T = 1s) = Board Heartbeat	Disabled Hardware Error Mode	A1
DS10 = LED [7] in LED Bank	N/A	LED ON	Disabled Hardware Error Mode	A1
DS3 = LED [0] in LED Bank	N/A	LED OFF	Bootloader Mode	A1
DS4 = LED [1] in LED Bank	N/A	LED OFF	Bootloader Mode	A1
DS5 = LED [2] in LED Bank	N/A	LED OFF	Bootloader Mode	A1
DS6 = LED [3] in LED Bank	N/A	LED OFF	Bootloader Mode	A1
DS7 = LED [4] in LED Bank	N/A	LED OFF	Bootloader Mode	A1
DS8 = LED [5] in LED Bank	N/A	LED OFF	Bootloader Mode	A1
DS9 = LED [6] in LED Bank	N/A	LED Blinks (T = 1s) = Board Heartbeat	Bootloader Mode	A1
DS10 = LED [7] in LED Bank	N/A	LED OFF	Bootloader Mode	A1

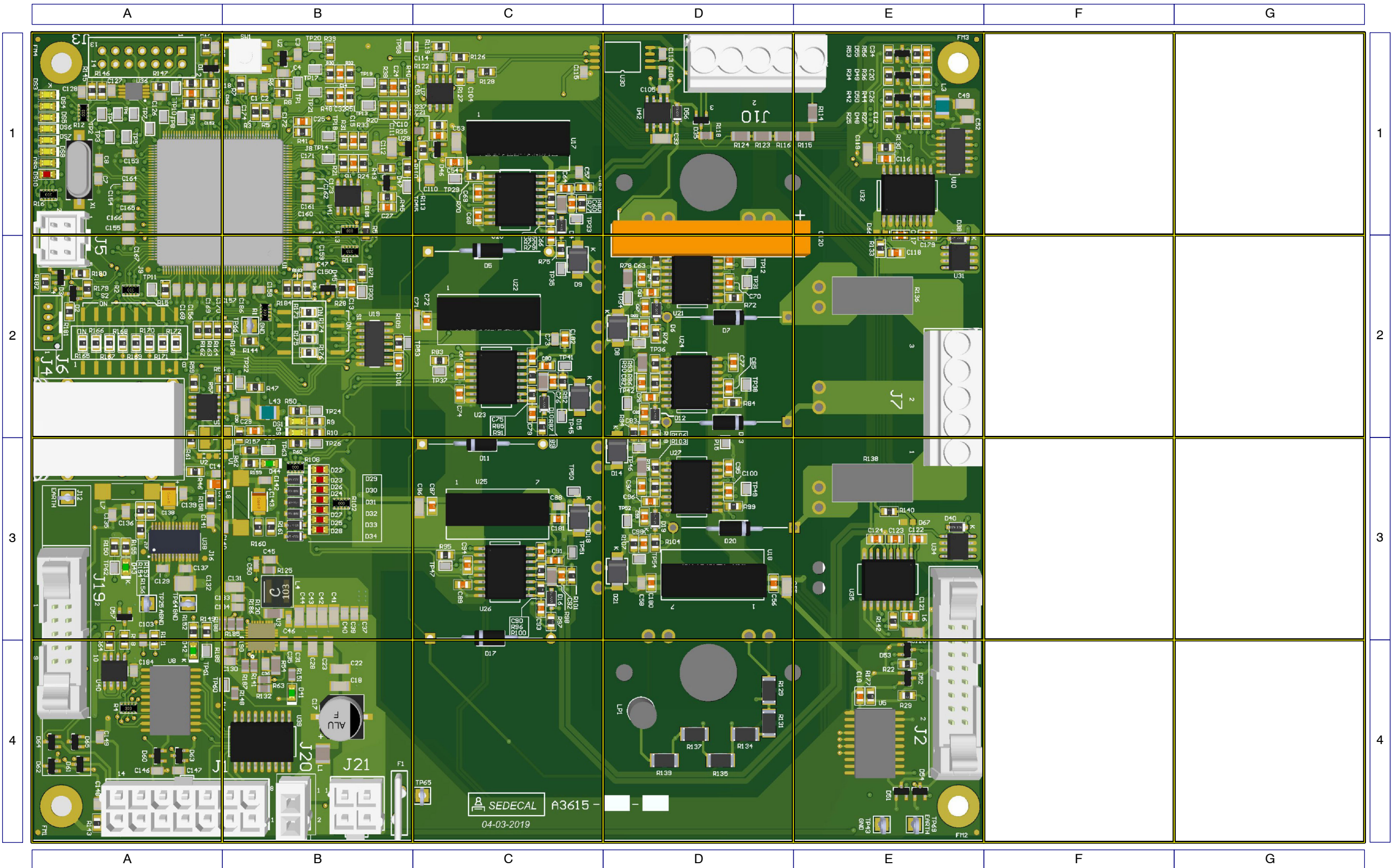
A3615-03  
UNIVERSAL ADVANCED ROTOR CONTROL BOARD (UARC)

**Table 2-3**  
**UARC Board (A3615-03) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP25	GND	GND	A3
TP43	GND	GND	E4
TP58	N/A	DC BUS Voltage Ratio 200 V/V	B1
TP64	GND	GND	A3
TP66	GND	GND	B2
TP69	EARTH	EARTH	E4


A3615-03  
UNIVERSAL ADVANCED ROTOR CONTROL BOARD (UARC)

**A3615-03  
UNIVERSAL ADVANCED ROTOR CONTROL BOARD (UARC)**



A3615-03  
UNIVERSAL ADVANCED ROTOR CONTROL BOARD (UARC)

**2.3 ADVANCED CONTROL BOARD (ACB) - A3678-03**

Note  Any switch, jumper, led, or test point not listed in these tables are for manufacturer's internal use.

**Table 2-4  
ACB Board (A3678-03) - Jumpers and Switches**

JUMPERS AND SWITCHES				LOCATION IN BOARD
REFERENCE	POSITION	DESCRIPTION	DEFAULT VALUE	
SW1-1	ON = Bootloader Mode OFF = Application Mode	Microcontroller Boot Force the Entry in Software Update Mode	Always in OFF	B1
SW1-2	ON = Bootloader Mode OFF = Application Mode	DSP Boot (DSP = Digital Signal Processor) Force the Entry in Software Update Mode	Always in OFF	B1
SW2	N/A	FPGA Board Reprogramming Button (FPGA = Field-Programmable Gate Array)	N/A	D3
SW3-7	N/A	Non-Filaments Mode	Always in OFF	B2
SW3-8	N/A	Demo Mode	Always in OFF	B2
SW4	N/A	Board Reset Switch	N/A	B2

A3678-03  
ADVANCED CONTROL BOARD (ACB)

**Table 2-5  
ACB Board (A3678-03) - Leds**

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
DS1	Yellow	Blinking = Microcontroller Software Running	LED Blinking	B1
DS2	Red	OFF = Microcontroller No Error ON = Microcontroller Error	LED OFF	B1
DS5	Yellow	OFF = Handswitch Collimator Light Button Released ON = Handswitch Collimator Light Button Pressed	LED ON / OFF	A3

**Table 2-5 (Cont.)  
ACB Board (A3678-03) - Leds**

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
DS6	Yellow	OFF = Handswitch Exposure Button Released ON = Handswitch Exposure Button Pressed	LED ON / OFF	A3
DS7	Yellow	OFF = Handswitch Preparation Button Released ON = Handswitch Preparation Button Pressed	LED ON / OFF	A3
DS8	Green	+24 V OK	LED ON	E3
DS9	Green	+5 V OK	LED ON	E4
DS10	Green	-5 V OK	LED ON	D4
DS11	Green	-15 V OK	LED ON	E2
DS12	Green	+15 V OK	LED ON	E2
DS13	Blue	FPGA Programmed (FPGA = Field-Programmable Gate Array)	LED ON	D3
DS15	Red	OFF = DSP No Error ON = DSP Error (DSP = Digital Signal Processor)	LED OFF	D1
DS16	Yellow	Blinking = DSP Software Running	LED Blinking	D2
DS17	Yellow	Board Status	LED ON	D2
DS18	Yellow	Board Status	LED ON	C2
DS19	Yellow	Board Status	LED ON	C2
DS20	Yellow	Board Status	LED ON	C2
DS21	Yellow	Board Status	LED ON	C2
DS22	Yellow	Board Status	LED ON	C2
DS23	Yellow	Board Status	LED ON	C2
DS24	Yellow	Board Status	LED ON	C2
DS25	Yellow	OFF = Main Inverter Bridge 1 Disabled ON = Main Inverter Bridge 1 Enabled	LED ON / OFF	C1
DS26	Yellow	OFF = Main Inverter Bridge 2 Disabled ON = Main Inverter Bridge 2 Enabled	LED ON / OFF	C1
DS27	Yellow	OFF = Small Filament Converter Disabled ON = Small Filament Converter Enabled	LED ON / OFF	F3

**A3678-03  
ADVANCED CONTROL BOARD (ACB)**

**Table 2-5 (Cont.)  
ACB Board (A3678-03) - Leds**

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
DS28	Yellow	OFF = Large Filament Converter Disabled ON = Large Filament Converter Enabled	LED ON / OFF	F3
DS29	Red	OFF = FPGA No Error ON = FPGA Error	LED OFF	C2
DS30	Yellow	Blinking = FPGA Software Running	LED Blinking	C2

**Table 2-6  
ACB Board (A3678-03) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TPS1	N/A	mA Measurement with mAs-meter	G1
TPS2	N/A	mA Measurement with mAs-meter	F1
TP6	N/A	Scope	D4
TP7	0 V --> Button Pressed +3.3 V --> Button Released	Handswitch Collimator Light Signal	B3
TP8	0 V --> Exposition Pressed +3.3 V --> Exposition Released	Handswitch Exposition Signal	B3
TP9	0 V --> Preparation Pressed +3.3 V --> Preparation Released	Handswitch Preparation Signal	B3
TP14	0 V --> Ok +3.3 V --> Error	IGBT Fault Bridge 1 (Q1Q2)	C2
TP15	0 V --> Ok +3.3 V --> Error	IGBT Fault Bridge 2 (Q3Q4)	D2
TP22	1 V = 40 A Ratio in the Main Inverter during the X-ray Exposition	Main Inverter Current (1 V = 40 A)	G2
TP23	3.3 V = 396 Arms Ratio in the Main Inverter during the X-ray Exposition	Main Inverter DC Current (3.3 V = 396 Arms)	G2
TP26	-12 V = -75 kV Ratio in the Cathode	kV- (Cathode) Voltage	G1
TP27	1 V = 50.75 kV Ratio in the Tube	X-ray Tube kV Voltage	F1

A3678-03  
ADVANCED CONTROL BOARD (ACB)

**Table 2-6 (Cont.)  
ACB Board (A3678-03) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP29	-12 V = -75 kV Ratio in the Cathode	kV- (Cathode) Voltage	G1
TP30	12 V = 75 kV Ratio in the Anode	kV+ (Anode) Voltage	G1
TP31	1 V = 12 kV Ratio of Imbalance between Anode and Cathode	X-ray Tube kV Voltage Unbalance	F1
TP32	12 V = 75 kV Ratio in the Anode	kV+ (Anode) Voltage	G1
TP37	Depends on the Selected Scale. See Electrical Diagram	mA of the Positive Side of the High Voltage Transformer	F1
TP40	Depends on the Selected Scale. See Electrical Diagram	mA of the Positive Side of the High Voltage Transformer	F1
TP41	Depends on the Selected Scale. See Electrical Diagram	mA of the Positive Side of the High Voltage Transformer	F1
TP44	Depends on the Selected Scale. See Electrical Diagram	mA Unbalance	E1
TP45	Depends on the Selected Scale. See Electrical Diagram	mA of the Negative Side of the High Voltage Transformer	F1
TP46	Depends on the Selected Scale. See Electrical Diagram	mA Current	E1
TP47	+24 V	+24 V Supply	E4
TP48	+5 V	+5 V Supply	E4
TP49	GND	GND	C4
TP50	GND	GND	G2
TP51	GND	GND	D3
TP52	GND	GND	B1
TP53	GND	GND	D2
TP54	GND	GND	E4
TP55	+3.3 V	+3.3 V Supply	D3
TP56	+1.2 V	+1.2 V Supply	D4
TP58	-5 V	-5 V Supply	D4
TP59	+15 V	+15 V Supply	E2

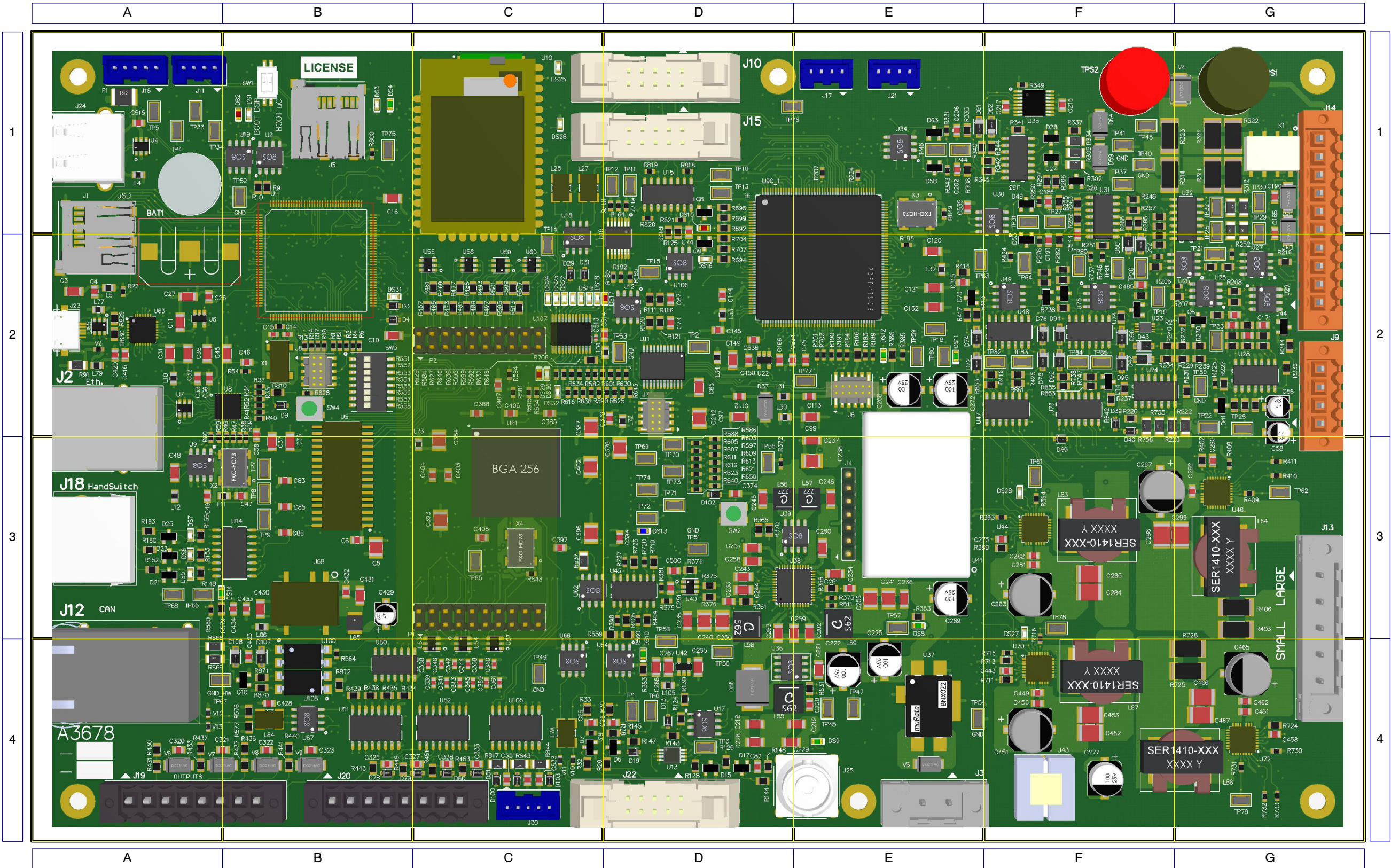
A3678-03  
ADVANCED CONTROL BOARD (ACB)

**Table 2-6 (Cont.)  
ACB Board (A3678-03) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP60	-15 V	-15 V Supply	E2
TP63	3 V = 11.5 Arms Ratio in the Primary of the Large Filament	Large Filament RMS Current (+3 V = 11.5 Arms)	E2
TP64	3 V = 17 Vrms Ratio in the Inverter Output of the Large Filament	Large Filament RMS Voltage (+3 V = 17 Vrms)	F2
TP65	0 V --> Preparation Pressed +3.3 V --> Preparation Released	Microcontroller Preparation Signal	C3
TP66	+5 V	+5V_HSW	A3
TP68	GND	GND_HSW	A3
TP70	0 V = Main Inverter Disabled 3.3 V = Main Inverter Enabled	TZ2 Signal = Enable kV Inverter	D3
TP75	0 V --> Exposition Pressed +3.3 V --> Exposition Released	Microcontroller Exposition Signal	B1
TP80	3 V = 11.5 Arms Ratio in the Primary of the Small Filament	Small Filament RMS Current (+3 V = 11.5 Arms)	F2
TP81	3 V = 17 Vrms Ratio in the Inverter Output of the Small Filament	Small Filament RMS Voltage (+3 V = 17 Vrms)	F2

A3678-03  
ADVANCED CONTROL BOARD (ACB)

A3678-03  
ADVANCED CONTROL BOARD (ACB)



A3678-03  
ADVANCED CONTROL BOARD (ACB)

2.4 ADVANCED DIGITAL MOTION CONTROL BOARD (ADMC) - A3686-03


Note  Any switch, jumper, led, or test point not listed in these tables are for manufacturer's internal use.

Table 2-7  
ADMC Board (A3686-03) - Jumpers and Switches

JUMPERS AND SWITCHES				LOCATION IN BOARD
REFERENCE	POSITION	DESCRIPTION	DEFAULT VALUE	
SW1	Pulsed = Reset Mode Released = Normal Mode	Board Reset for Board Reprogramming	Push-button Released	C2
SW2-3	ON = Release Brakes OFF = Normal Mode	Release Brakes in the Equipment	Always in OFF	B2
SW2-8	ON = Application Mode OFF = Bootloader Mode	Bootloader. Force the Entry in Software Update Mode	Always in ON	B2

Table 2-8  
ADMC Board (A3686-03) - Leds

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
DS1	Green	+24 V	LED ON = +24 V Present	A4
DS2	Green	+5 V	LED ON = +5 V Present	A3
DS3	Blue	FPGA Programmed (FPGA = Field-Programmable Gate Array)	LED ON	B2
DS4	Yellow	Left Brake Status	LED ON = Left Brake Released LED OFF = Left Brake Active	C1
DS5	Yellow	Right Brake Status	LED ON = Right Brake Released LED OFF = Right Brake Active	C4
DS6	Yellow	Software Running	LED Blinking	E2
DS7	Red	Error Indicator	LED ON = Error LED OFF = No Errors	E2

A3686-03  
ADVANCED DIGITAL MOTION CONTROL BOARD (ADMC)

**Table 2-8 (Cont.)  
ADMC Board (A3686-03) - Leds**

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
DS8	Red	FPGA Error Indicator or Mains Connection Indicator	LED ON = FPGA Error or Connected to Mains LED OFF = No Error or Not Connected to Mains	B2
DS9	Yellow	Left Force Sensor Pressed	LED ON = Sensor Pressed LED OFF = Sensor Released	A1
DS10	Yellow	Left Force Sensor Pressed	LED ON = Sensor Pressed LED OFF = Sensor Released	A1
DS11	Yellow	Right Force Sensor Pressed	LED ON = Sensor Pressed LED OFF = Sensor Released	A4
DS12	Yellow	Right Force Sensor Pressed	LED ON = Sensor Pressed LED OFF = Sensor Released	A4
DS13	Yellow	Proximity Sensor Information	LED ON = Pulse Width, Inversely Proportional to Distance of Detected Object	A3
DS14	Yellow	Proximity Sensor Information	LED ON = Pulse Width, Inversely Proportional to Distance of Detected Object	A3
DS15	Yellow	Status LED 1	N/A	E2
DS16	Yellow	Status LED 3	N/A	E2
DS17	Yellow	Status LED 5	N/A	E2
DS18	Yellow	FPGA Running	LED Blinking	B2
DS19	Yellow	Main Deadman Pressed	LED ON = Pressed LED OFF = Not Pressed	A1
DS20	Yellow	Proximity Sensor Information	LED OFF (Not Used)	A3
DS21	Yellow	Status LED 0	N/A	E2
DS22	Yellow	Status LED 2	N/A	E2
DS23	Yellow	Status LED 4	N/A	E2
DS24	Green	+15 VISO_LEFT	LED ON = +15 VISO_LEFT Present	D1
DS25	Green	+5 VISO_LEFT	LED ON = +5 VISO_LEFT Present	D2
DS26	Orange	UDC LEFT > 60 V	LED ON = UDC LEFT > 60 V	E1
DS27	Green	+15 VISO_RIGHT	LED ON = +15 VISO_RIGHT Present	D3
DS28	Green	+5 VISO_RIGHT	LED ON = +5 VISO_RIGHT Present	D4
DS29	Orange	UDC RIGHT > 60 V	LED ON = UDC RIGHT > 60 V	E4

A3686-03  
ADVANCED DIGITAL MOTION CONTROL BOARD (ADMC)

**Table 2-9**  
**ADMC Board (A3686-03) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP1	+3.3 V	+3.3 V Supply	B4
TP2	+1.2 V	+1.2 V Supply	B3
TP3	+1.9 V	+1.9 V Supply	B3
TP4	GND	Ground Reference in Board	B4
TP5	GND	Ground Reference in Board	B4
TP6	GND	Ground Reference in Board	A1
TP7	GND	Ground Reference in Board	B1
TP8	+24 V	+24 V Supply	B4
TP9	+5 V	+5 V Supply	B3
TP10	0 V --> -7 A 1.5 V --> 0 A 3 V --> +7 A	Motor Current Phase U RIGHT	C4
TP11	0 V --> -7 A 1.5 V --> 0 A 3 V --> +7 A	Motor Current Phase U LEFT	C1
TP12	0 V --> -7 A 1.5 V --> 0 A 3 V --> +7 A	Motor Current Phase W RIGHT	C4
TP13	0 V --> -7 A 1.5 V --> 0 A 3 V --> +7 A	Motor Current Phase W LEFT	C1
TP23	+3 V --> Ok > 4 V --> Broken Cable < 2 V --> Detected Collision	Bumper	A2
TP24	0 V --> 0 kg 3 V --> 2.5 kg	Force Sensor 1 LEFT	A1
TP25	0 V --> 0 kg 3 V --> 2.5 kg	Force Sensor 2 LEFT	B1
TP26	0 V --> 0 kg 3 V --> 2.5 kg	Force Sensor 1 RIGHT	A4
TP27	0 V --> 0 kg 3 V --> 2.5 kg	Force Sensor 2 RIGHT	A4

A3686-03  
ADVANCED DIGITAL MOTION CONTROL BOARD (ADMC)

**Table 2-9 (Cont.)  
ADMC Board (A3686-03) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP39	+15 V ISO	+15 VISO_LEFT	D1
TP40	+5 V ISO	+5 VISO_LEFT	D2
TP41	GND ISO	GND_ISO_LEFT	E2
TP42	GND ISO	GND_ISO_LEFT	D2
TP43	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_LEFT	D2
TP44	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_LEFT	D2
TP45	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_LEFT	E2
TP46	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_LEFT	E2
TP47	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_LEFT	E2
TP48	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_LEFT	D2
TP49	Approx. 1.125 V --> 40 °C 1.8 V --> 75 °C 2.475 V --> 110 °C	Temperature IGBT Module LEFT	C2
TP50	0 V --> UDC_LEFT = 0 V 3 V --> UDC_LEFT = 500 V	UDC Measurement LEFT	C2
TP51	+15 V ISO	+15 VISO_RIGHT	C3
TP52	+5 V ISO	+5 VISO_RIGHT	D3
TP54	GND ISO	GND_ISO_RIGHT	E3
TP55	GND ISO	GND_ISO_RIGHT	D3
TP57	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_RIGHT	D3
TP58	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_RIGHT	D3
TP59	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_RIGHT	D3

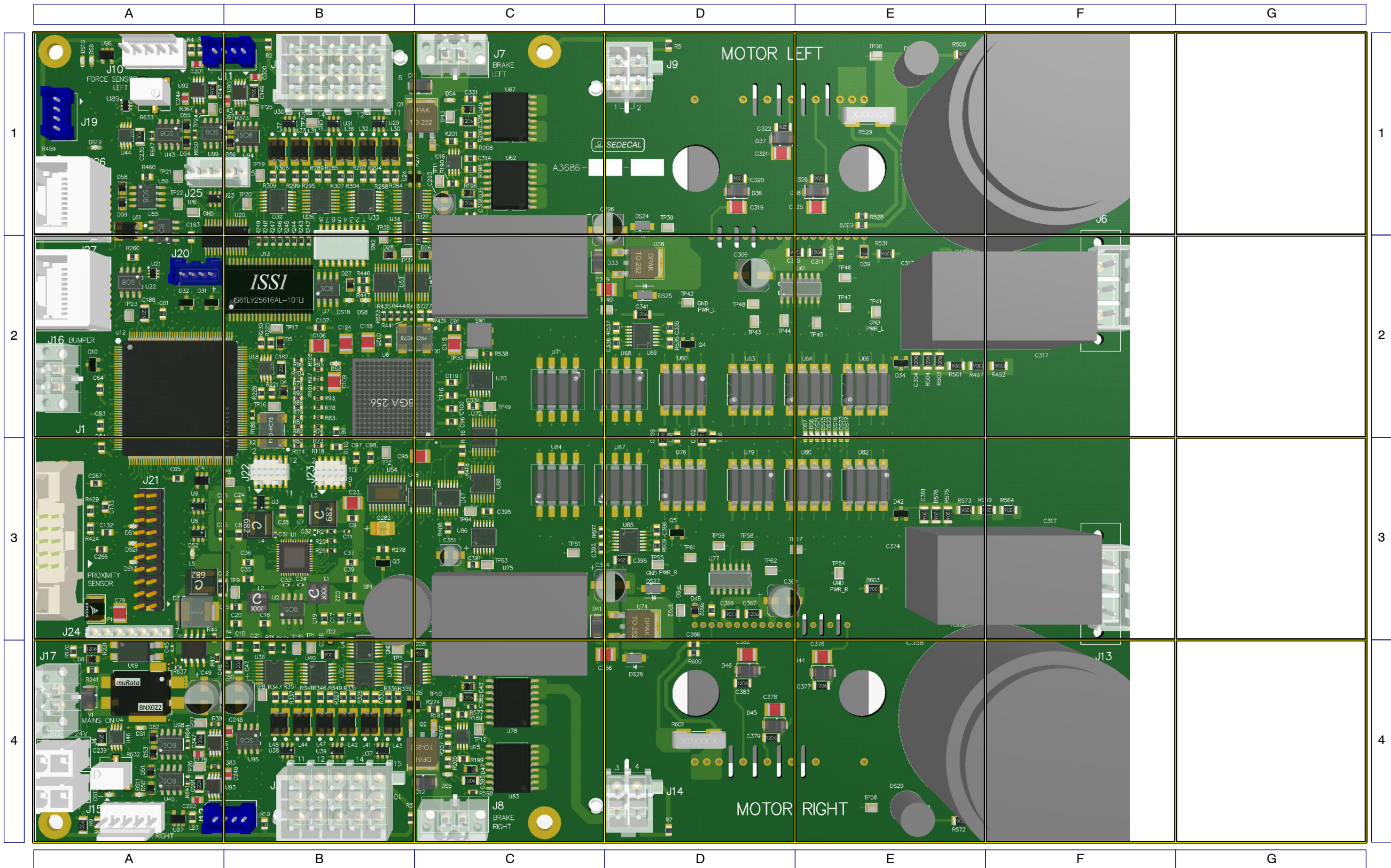
A3686-03  
ADVANCED DIGITAL MOTION CONTROL BOARD (ADMC)

**Table 2-9 (Cont.)**  
**ADMC Board (A3686-03) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP60	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_RIGHT	D3
TP 61	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_RIGHT	D3
TP62	0 V = IGBT OFF 5 V = IGBT ON	IGBT_PWM_ISO_RIGHT	D3
TP63	Approx. 1.125 V --> 40 °C 1.8 V --> 75 °C 2.475 V --> 110 °C	Temperature IGBT Module RIGHT	C3
TP64	0 V --> UDC_RIGHT = 0 V 3 V --> UDC_RIGHT = 500 V	UDC Measurement RIGHT	C3

**A3686-03**  
**ADVANCED DIGITAL MOTION CONTROL BOARD (ADMC)**

**A3686-03**  
**ADVANCED DIGITAL MOTION CONTROL BOARD (ADMC)**



2.5 RFID BOARD - A9598-03


Note  Any switch, jumper, led, or test point not listed in these tables are for manufacturer's internal use.

Table 2-10  
RFID Board (A9598-03) - Jumpers and Switches

JUMPERS AND SWITCHES				LOCATION IN BOARD
REFERENCE	POSITION	DESCRIPTION	DEFAULT VALUE	
SW1-1	OFF = Normal Mode ON = MCU Recovery	NMI. Only if the MCU program fails.	Always in OFF	B4
SW1-2	OFF = Application Mode ON = Bootloader Mode	Bootloader. Force the entry in Software Update Mode. If the Bootloader Mode is activated, the DS1 and DS2 LEDs will blink alternately.	Always in OFF	B4
SW1-3	OFF = [Powering system selection] ON = [Powering system selection]	Powering system selection: Keypad Mode: SW1-3 ON + SW1-4 OFF RFID Mode: SW1-3 OFF + SW1-4 OFF Button Mode: SW1-4 ON	Configurable according to the position of the switches.	B4
SW1-4	OFF = N/A ON = Button Mode as powering system			B4

A9598-03  
RFID BOARD

Table 2-11  
RFID Board (A9598-03) - Leds

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
DS1	Red	Software status.	LED OFF = Ok LED ON = Error	B2
DS2	Yellow	Software running.	LED Blinking	B2
DS3	Green	+5V	LED ON = +5V present	A4
DS4	Green	+3.3V	LED ON = + 3.3 V present	B4

**Table 2-12**  
**RFID Board (A9598-03) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP1	+5 V	+5 V supply.	A4
TP2	+3.3 V	+3.3 V supply.	A4
TP3	GND	Ground Reference in Board.	A4
TP4	GND	Ground Reference in Board.	A1
TP5	GND	Ground Reference in Board.	B1

A9598-03  
RFID BOARD



2.6 GPIO TROLLEY BOARD - A40001-06


Note  Any switch, jumper, led, or test point not listed in these tables are for manufacturer's internal use.

Table 2-13  
GPIO Trolley Board (A40001-06) - Jumpers and Switches

JUMPERS AND SWITCHES				LOCATION IN BOARD
REFERENCE	POSITION	DESCRIPTION	DEFAULT VALUE	
SW1	ON = Technical Service Mode	Starter for the Service	Always in ON (Fixed)	G2
SW2-1	ON = Application Running OFF = Bootloader Running	Bootloader	Always in ON (Fixed)	D2
SW3-1	OFF	Internal Debug	Always in OFF (Fixed)	D1
SW3-2	OFF	Internal Debug	Always in OFF (Fixed)	D1
SW3-3	OFF	Internal Debug	Always in OFF (Fixed)	D1
SW3-4	OFF	Internal Debug	Always in OFF (Fixed)	D1
SW4	ON	Microcontroller Reset	Always in OFF (Fixed)	E2
SW5-1	ON = Brakes and Parking Released	Brakes and Parking Emergency	Always in OFF (Fixed)	D2

A40001-06  
GPIO TROLLEY BOARD

Table 2-14  
GPIO Trolley Board (A40001-06) - Leds

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
D16	Yellow	PC State	LED ON = PC ON LED OFF = PC OFF	D1
D28	Yellow	Pulsed Technical Service Switch	LED OFF	F1
D35	Green	+24V from Mains	LED ON	E2

**Table 2-11 (Cont.)  
GPIO Trolley Board (A40001-06) - Leds**

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
D36	Yellow	Microcontroller Software Running	LED Blinking	E2
D37	Red	Microcontroller Error State	LED ON = Error LED OFF = No Errors	E2
D38	Green	+5V Ok	LED ON	E1
D39	Yellow	Charging Startup Battery	LED OFF	E2
D40	Yellow	Pulsed ON/OFF Switch (RFID, Keyboard or Switch)	LED OFF	F1
D41	Green	+24 V from Power Supply	LED ON	D2
D42	Yellow	Excited ON/OFF Relay	LED OFF	F2
D43	Yellow	Bus Voltage	LED OFF	C1
D44	Yellow	Charging Remote Control Battery	LED OFF	F2
D47	Yellow	Released Parking	LED OFF	G1
D48	Yellow	Released Brakes	LED OFF	F1
D49	Yellow	Precharge ON	LED OFF	A1
D50	Yellow	Contactors ON	LED OFF	E1
D51	Yellow	Contactors ON	LED OFF	F1
D60	Yellow	PC Control	LED ON = PC Control ON LED OFF = PC Control OFF	D1

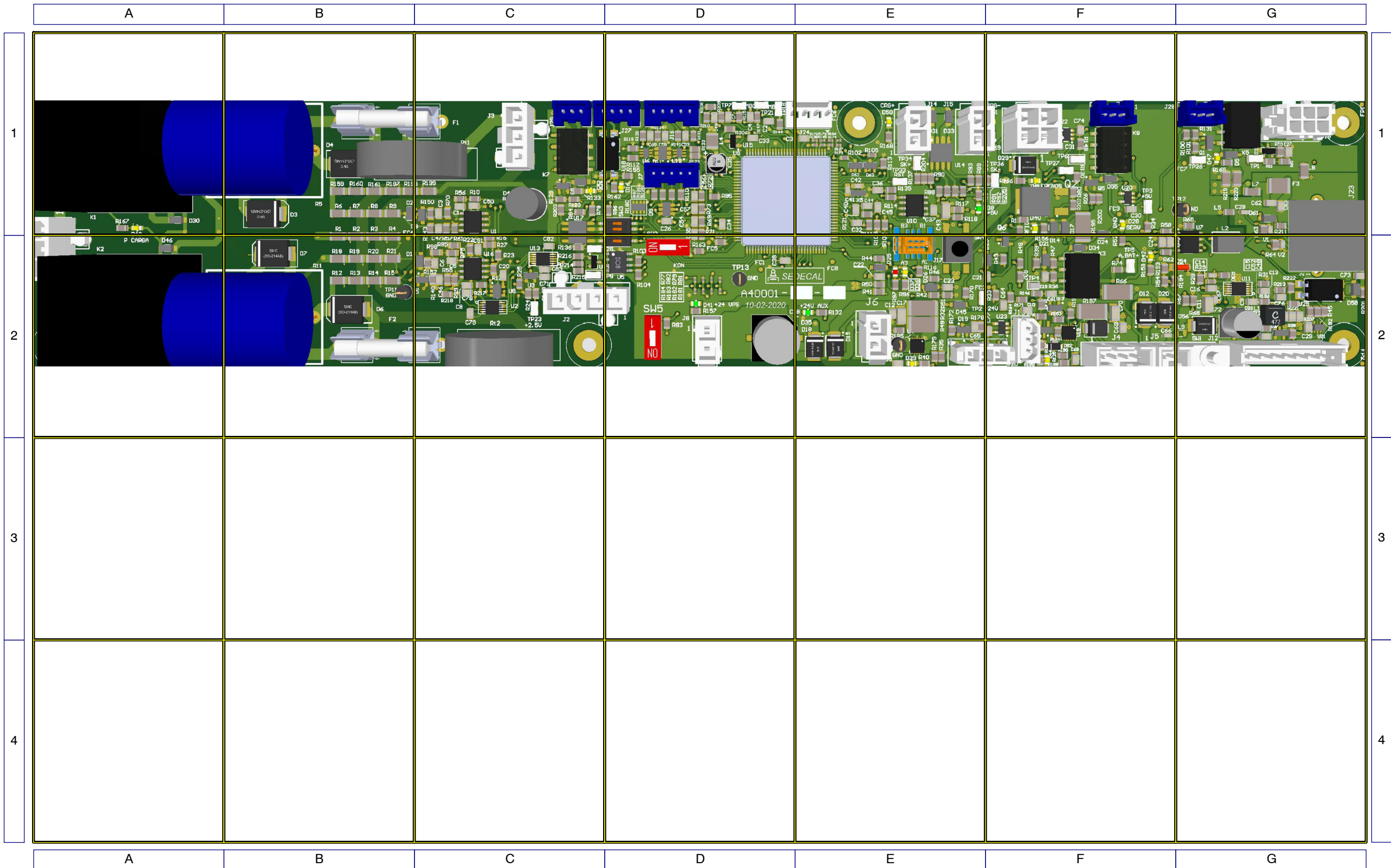
A40001-06  
GPIO TROLLEY BOARD

**Table 2-15**  
**GPIO Trolley Board (A40001-06) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP1	N/A	Parking State	G1
TP2	+24 V	+24 V Supply	E2
TP3	+5 V	+5 V Supply	F1
TP4	N/A	Remote Control State	F2
TP5	N/A	Starter Battery Voltage	F2
TP6	N/A	External Signal to Activate Contactors	F1
TP7	N/A	Battery Voltage Measurement for Generator	D1
TP11	GND	Ground Reference in Board	B2
TP12	GND	Ground Reference in Board	G1
TP13	GND	Ground Reference in Board	D2
TP14	GND	Ground Reference in Board	F2
TP18	N/A	Bus Voltage Measurement	D1
TP21	N/A	Battery Voltage Measurement for Movements	D1
TP26	N/A	Parking Control	G1
TP27	N/A	Brakes Control	F1
TP28	N/A	Precharge Control	C2
TP33	N/A	Microcontroller Reset	E1
TP34	N/A	Bus Positive Side Contactor Control	E1
TP36	N/A	Bus Negative Side Contactor Control	F1

A40001-06  
GPIO TROLLEY BOARD

A40001-06  
GPIO TROLLEY BOARD



A40001-06  
GPIO TROLLEY BOARD

2.7 GPIO HEAD BOARD - A40004-04


Note  Any switch, jumper, led, or test point not listed in these tables are for manufacturer's internal use.

Table 2-16  
GPIO Head Board (A40004-04) - Jumpers and Switches

JUMPERS AND SWITCHES				LOCATION IN BOARD
REFERENCE	POSITION	DESCRIPTION	DEFAULT VALUE	
SW1-1	ON = Application Running OFF = Bootloader Running	Bootloader	Always in ON (Fixed)	B2
S1	N/A	UNUSED	N/A	D1
SW2-1	ON OFF	CAN ID Identifier	OFF	B2
SW2-2	ON OFF	CAN ID Identifier	OFF	B2
SW2-3	ON OFF	CAN ID Identifier	ON	B2
SW2-4	ON OFF	CAN ID Identifier	OFF	B2
SW2-5	ON OFF	CAN ID Identifier	ON	B2
SW2-6	ON OFF	CAN ID Identifier	OFF	B2
SW2-7	ON OFF	CAN ID Identifier	OFF	B2
SW2-8	ON OFF	CAN ID Identifier	OFF	B2
SW3	ON = Reprogrammed Board	Program FPGA	Always in OFF (Fixed)	B1
SW4-1	ON = More Sensibility OFF	Adjustment of Sensibility of the Capacitive Handle Sensor	OFF	E2
SW4-2	ON = More Sensibility OFF	Adjustment of Sensibility of the Capacitive Handle Sensor	OFF	E2
SW5	ON = Debug	Debug FPGA	Always in OFF (Fixed)	C1

A40004-04  
GPIO HEAD BOARD

**Table 2-13 (Cont.)  
GPIO Head Board (A40004-04) - Jumpers and Switches**

JUMPERS AND SWITCHES				LOCATION IN BOARD
REFERENCE	POSITION	DESCRIPTION	DEFAULT VALUE	
SW6-1	ON = Less Sensibility OFF	Adjustment of Sensibility of the Capacitive Handle Sensor	OFF	E2
SW6-2	ON = Less Sensibility OFF	Adjustment of Sensibility of the Capacitive Handle Sensor	OFF	E2

**Table 2-17  
GPIO Head Board (A40004-04) - Leds**

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
D1	Yellow Blinking	UC SW Running	N/A	B3
D2	Red	UC Error / UC No Errors	LED ON/OFF	B3
D4	Blue	FPGA Programmed	LED ON	D1
D6	Green	24 V OK	LED ON	A1
D7	Green	5 V OK	LED ON	A1
D11	Green	12 V (for the Screen) OK	LED ON	E3
D19	Yellow	Active Capacitive Handle Sensor	N/A	E1
D25	Yellow	Head Brakes	LED OFF	A2
D28	Yellow	Telescope Brake	LED OFF	A2
D29	Green	15 V OK	LED ON	E2
D33	Yellow	Semaphone	LED OFF	A2
D35	Yellow	Semaphone	LED OFF	A3
D37	Yellow	Semaphone	LED OFF	A2
D53	Yellow	Collimator Lamp	LED OFF	A4
D54	Yellow	FPGA Alive	LED OFF	B1

A40004-04  
GPIO HEAD BOARD

**Table 2-14 (Cont.)  
GPIO Head Board (A40004-04) - Leds**

LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
D55	Yellow	GPIO Error Code	N/A	B1
D56	Yellow	GPIO Error Code	N/A	B1
D57	Yellow	GPIO Error Code	N/A	B1
D58	Yellow	GPIO Error Code	N/A	B1
D59	Yellow	GPIO Error Code	N/A	B1
D60	Yellow	GPIO Error Code	N/A	B1
D61	Yellow	GPIO Error Code	N/A	B1
D62	Red	FPGA Error	LED OFF	B1

**Table 2-18  
GPIO Head Board (A40004-04) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP1	N/A	Microcontroller Reset	B3
TP2	+5 V	Supply	B1
TP3	N/A	Collimator Motor Sleep	A3
TP4	N/A	Left Capacitive Switch Button	E2
TP5	N/A	Collimator Motor Enable	A3
TP6	N/A	Positioning Buttons	C4
TP7	GND	Ground Reference in Board	E4
TP8	GND	Ground Reference in Board	D3
TP9	GND	Ground Reference in Board	D3/E3
TP10	N/A	Capacitive Handle Sensor Oscillator Input Pin	E1

A40004-04  
GPIO HEAD BOARD


**Table 2-15 (Cont.)  
GPIO Head Board (A40004-04) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP11	N/A	Capacitive Handle Sensor Oscillator Output Pin	E1
TP12	+2.5 V	Supply	B1/C1
TP13	+1.2 V	Supply	C1
TP14	+3.3 V	Supply	B2/C2
TP15	N/A	Monoblock Fan	A1
TP16	N/A	Monoblock Thermostat	B2
TP17	N/A	Collimator Opto	B3
TP18	N/A	Collimator Lamp	A4/B4
TP19	N/A	Watch Dog Capacitive Handle Sensor	E1
TP20	N/A	Telescope Brake	A1/A2
TP21	N/A	Collimator Motor Direction	A3
TP23	N/A	Head Brakes	A1/A2
TP24	0 V / +3.3 V	Collimator Motor Home	A3
TP25	N/A	Collimator Motor Step	B3
TP26	N/A	Collimator Motor Reset	B3
TP27	+15 V	Supply (Isolation)	E1
TP28	N/A	CAN Signal	C4
TP29	N/A	Collimator Motor Sync	B3
TP30	N/A	Right Capacitive Switch Button	E4
TP31	0 V	0 V Isolation	E1
TP32	N/A	Right Brakes Button	E3/E4
TP33	N/A	Left Brakes Button	E2
TP35	N/A	Enable Screen	D3
TP37	N/A	Collimator Analogic Potentiometer 1	B4
TP38	N/A	Collimator Analogic Potentiometer 2	B4

A40004-04  
GPIO HEAD BOARD




**2.8 CAPACITIVE SWITCH BOARD - A40024-04**

Note  Any switch, jumper, led, or test point not listed in these tables are for manufacturer's internal use.

**Table 2-19  
Capacitive Switch Board (A40024-04) - Jumpers and Switches**

JUMPERS AND SWITCHES				LOCATION IN BOARD
REFERENCE	POSITION	DESCRIPTION	DEFAULT VALUE	
SW1-1 (Sensor A)	OFF = Default ON = Handlebar Sensitivity Variation	If only switch SW1-1 is turned ON, the sensitivity is increased by 20%. If switches SW1-1 and SW1-2 are turned ON, the maximum sensitivity (+40%) is set.	OFF (Maximum sensitivity as default setting).	D1
SW1-2 (Sensor A)	OFF = Default ON = Handlebar Sensitivity Variation	If only switch SW1-2 is turned ON, the sensitivity is increased by 20%. If switches SW1-1 and SW1-2 are turned ON, the maximum sensitivity (+40%) is set.	OFF (Maximum sensitivity as default setting).	D1
SW1-3 (Sensor A)	OFF = Default ON = Handlebar Sensitivity Variation	If only switch SW1-3 is turned ON, the sensitivity is decreased by 20%. If switches SW1-3 and SW1-4 are turned ON, the minimum sensitivity is set (-40%).	OFF (Maximum sensitivity as default setting).	D1
SW1-4 (Sensor A)	OFF = Default ON = Handlebar Sensitivity Variation	If only switch SW1-4 is turned ON, no changes are performed. If switches SW1-3 and SW1-4 are turned ON, the minimum sensitivity is set (-40%).	OFF (Maximum sensitivity as default setting).	D1
SW2-1 (Sensor B)	OFF = Default ON = Handlebar Sensitivity Variation	If only switch SW2-1 is turned ON, the sensitivity is increased by 20%. If switches SW2-1 and SW2-2 are turned ON, the maximum sensitivity (+40%) is set.	OFF (Maximum sensitivity as default setting).	D2
SW2-2 (Sensor B)	OFF = Default ON = Handlebar Sensitivity Variation	If only switch SW2-2 is turned ON, the sensitivity is increased by 20%. If switches SW2-1 and SW2-2 are turned ON, the maximum sensitivity (+40%) is set.	OFF (Maximum sensitivity as default setting).	D2
SW2-3 (Sensor B)	OFF = Default ON = Handlebar Sensitivity Variation	If only switch SW2-3 is turned ON, the sensitivity is decreased by 20%. If switches SW2-3 and SW2-4 are turned ON, the minimum sensitivity is set (-40%).	OFF (Maximum sensitivity as default setting).	D2
SW2-4 (Sensor B)	OFF = Default ON = Handlebar Sensitivity Variation	If only switch SW2-4 is turned ON, no changes are performed. If switches SW2-3 and SW2-4 are turned ON, the minimum sensitivity is set (-40%).	OFF (Maximum sensitivity as default setting).	D2

A40024-04  
CAPACITIVE SWITCH BOARD

Note  The set values must be the same for each of the switches (SW1 and SW2).

**Table 2-20**  
**Capacitive Switch Board (A40024-04) - Leds**

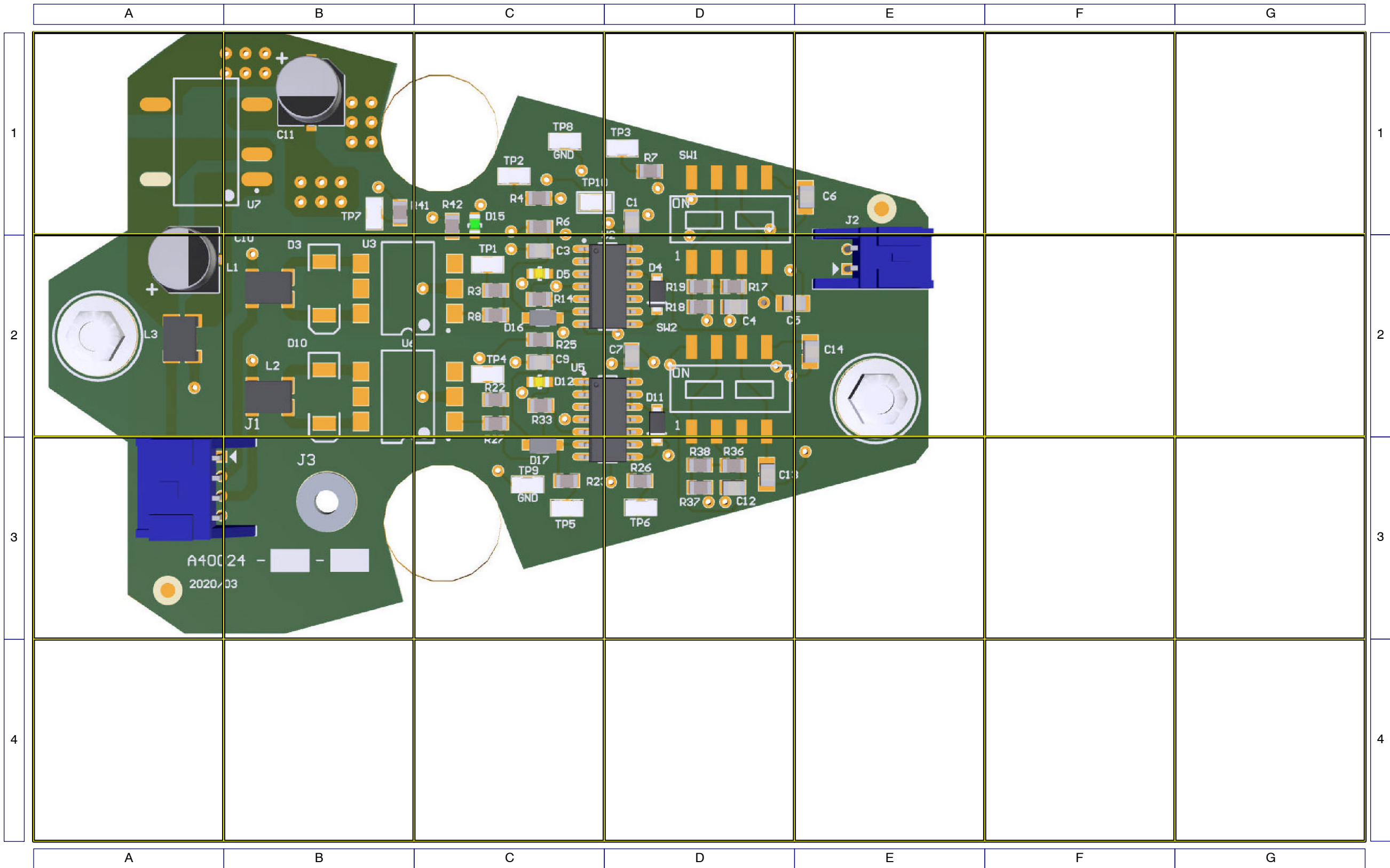
LEDS				LOCATION IN BOARD
REFERENCE	COLOR	DESCRIPTION	DEFAULT STATUS	
D5	Orange	Indicates that the handle has been activated (circuit A).	LED OFF= Sensor A not active LED ON= Sensor A active	C2
D12	Orange	Indicates that the handle has been activated (circuit B).	LED OFF= Sensor B not active LED ON= Sensor B active	C2
D15	Green	+15V	LED ON = +15V Present	C1

**Table 2-21**  
**Capacitive Switch Board (A40024-04) - Test Points**

TEST POINTS			LOCATION IN BOARD
REFERENCE	VALUE	DESCRIPTION	
TP1	15V --> Activated 0V --> No Activated	Sensor A	C2
TP4	15V --> Activated 0V --> No Activated	Sensor B	C2
TP7	+15 V	+15 V supply	B1
TP8	GND	Ground Reference in Board	C1
TP9	GND	Ground Reference in Board	C3
TP10	15V --> Normal operation 0V --> Error in the electronic of capacitive sensor (always disable the outputs of board)	Watch Dog (protection signal)	C1

A40024-04  
CAPACITIVE SWITCH BOARD

**A40024-04  
CAPACITIVE SWITCH BOARD**



A40024-04  
CAPACITIVE SWITCH BOARD