FlashRunner 2.0 “Eurocard”

High-Performance, Compact Standalone In-System Programmer

User’s Manual

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In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate prevention measures.

Attaching additional wiring to this product or modifying the product operation from the factory default as shipped may effect its performance and cause interference with other apparatus in the immediate vicinity. If such interference is detected, suitable mitigating measures should be taken.

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1 Before Starting

Note: *updated version of FlashRunner System Software is available on SMH Technologies website (www.smh-tech.com). Please check it out before continuing reading this documentation.*

1.1 Important Notice to Users

While every effort has been made to ensure the accuracy of all information in this document, SMH Technologies assumes no liability to any party for any loss or damage caused by errors or omissions or by statements of any kind in this document, its updates, supplements, or special editions, whether such errors are omissions or statements resulting from negligence, accidents, or any other cause.

1.2 Safety

Note: *Keep FlashRunner 2.0 "Eurocard" always in a well-ventilated area in order to prevent product overheating, which could affect product performace and, if mantained for long time, it could damage product hardware components.*

FlashRunner 2.0 "Eurocard" is a low-voltage device. However, when integrating it inside an automatic test equipment or when interfacing it with other systems, take all precautions in order to avoid electrical shocks due to, for example, different ground references.

Make all connections to the target system before applying power to the instrument.

To protect FlashRunner 2.0 “Eurocard” against electrostatic discharge (ESD), always connect yourself to ground (e.g. via wrist straps) when handling the instrument.

Always store FlashRunner 2.0 “Eurocard” inside an antistatic bag when not in use.

Disclaimer: *when integrating FlashRunner 2.0 “Eurocard” please pay attention to place it in a well ventilated area in order to avoid overheating related damages.*
FlashRunner 2.0 “Eurocard” has been designed in order to reach
90 °C (194 °F) in normal operating conditions over its ends.

1.3 Getting Technical Support

SMH Technologies is continuously working to improve FlashRunner 2.0 “Eurocard” firmware and to release programming algorithms for new devices. SMH Technologies offers a fast and knowledgeable technical support to all of its customers and is always available to solve specific problems or meet specific needs.

To get in touch with SMH Technologies, please refer to the contact information below.

Phone: +39 0434 421111

Fax: +39 0434 639021

Technical Support: support@smh-tech.com

1.4 Additional Documentation

This user’s manual provides information about how to setup FlashRunner 2.0 “Eurocard” and its hardware characteristics.

For information about FlashRunner 2.0 “Eurocard” commands and their syntax, please refer to the FlashRunner 2.0 Programmer’s Manual, included (in PDF format) in FlashRunner 2.0 setup.

2 Overview

2.1 What is FlashRunner 2.0 “Eurocard”?

FlashRunner 2.0 “Eurocard” is an EUROCARD 3U 220 stylised compact high-integration in-system gang programmer, based on the new and innovative FlashRunner 2.0 cutting-edge technology. FlashRunner 2.0 “Eurocard” is designed for programming multi-PCB panel assemblies, with microcontroller, eMMC and NAND memories. This means:

- Extremely fast programming (the fastest in-system programming system on the market);
- Standalone operations for easy ATE integration
- Brand new Graphical User Interface focused on Setup, Production and Security features
- Compact and robust design for production environments.

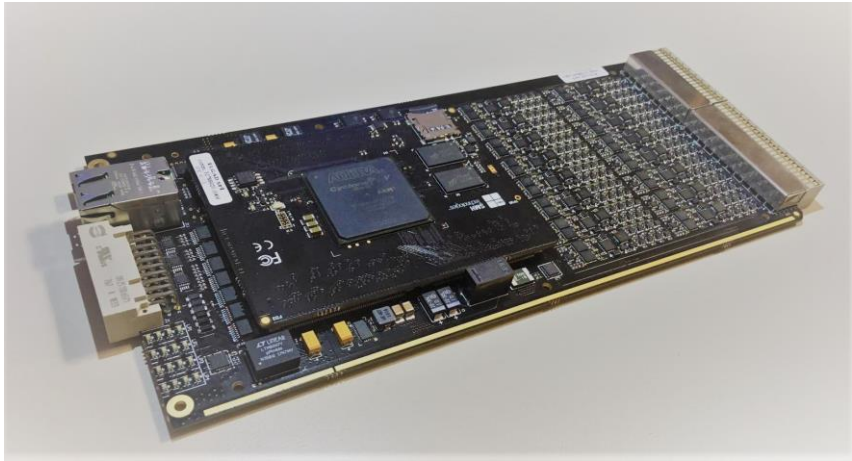

Illustration 1: FlashRunner 2.0 “Eurocard”

FlashRunner 2.0 “Eurocard” is composed of a carrier board which hosts up to 16 programming channels. This carrier complies to EUROCARD standard (1U, 220mm) for easy rack integration. The engine board on top of it is a System on Module enclosing FlashRunner 2.0 core technology in a compact and easy to integrate format.

FlashRunner 2.0 “Eurocard” comes in one hardware solution, enabling 16 channel for device programming.

In all of the above configurations, each ISP channel is composed of:

- Eight digital, bidirectional lines;
- Two power lines;
- Ground lines over the ISP connectors shield

2.1.1 General features

- Fastest programming algorithms (as fast as target device’s memory technology limit), approved by silicon manufacturers;
- 16 parallel and independent channels
- Easy ATE integration;
- Easy EUROCARD Rack integration.
- Standalone operations

- Controllable by ATE through optoisolated LAN and USB, or parallel control lines;
- Supports most ISP protocols (BDM, JTAG, SPI, I2C, MON, ICC, SCI, UART, etc.);
- Flexible, fully configurable;
- Compact and robust design for production environments;
- 10Mbyte/sec host data transfer.

2.1.2 Hardware features

- ISP lines:
    - 8 digital I/O lines;
    - 2 programmable output voltages; 1 ground line per power line;
- 1 GBytes on-board RAM memory;
- On-board timekeeper and calendar for time-stamped log file;
- LAN Communication Interface
- Optoisolated USB communication interface.
- Optoisolated ATE interface for standalone operations
- Programming voltage measure of each channel
- Programming current measure of each channel

2.1.3 Software features

- Linux based operating system;
- FlashRunner 2.0 WorkBench: the new user friendly Graphical User Interface (Windows, Linux and Mac compatible)
- Controllable by any host system through a terminal utility and simple ASCII protocol;
- Up to 32 hardware-selectable projects in Standalone Mode, unlimited software-selectable projects in Host Mode;
- Interface Library DLL to control the instrument from within user written applications;
- Optional customer binary file cryptography to ensure antipiracy protection

- Log file and production report file;
- Erase, blank check, program, read, verify, oscillator trimming, etc.

2.2 Package Checklist

The FlashRunner 2.0 “Eurocard” package includes the following items:

- FlashRunner 2.0 “Eurocard” unit;
- Power supply unit;
- An Ethernet cross cable;
- An USB cable;
- Quick start guide

2.3 Hardware Overview

2.3.1 Power Supply

FlashRunner 2.0 “Eurocard” is powered through 15V-90W power supply connected to dedicated pins over the ISP connector.

2.3.2 ATE Control Connector

ATE Control DIN Connector are used by an ATE system in order to control FlashRunner 2.0 “Eurocard” instead of communicating with the instrument through the USB or LAN port. You can define and start project, and check result. For more information please check chapter 4.3.

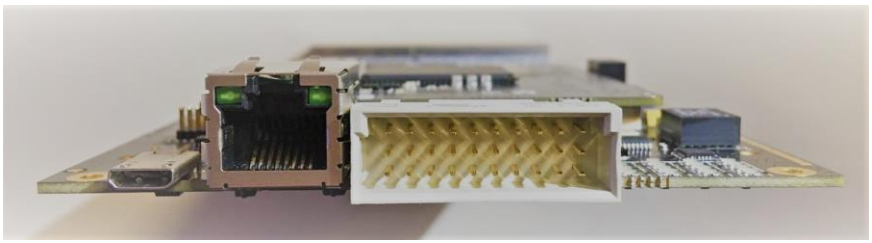

Illustration 2: View of the USB connector, LAN Connector and ATE control connector

2.3.3 LAN Connector

LAN Connector is used to communicate with host PC system. Use provided cross cable to connect FlashRunner 2.0 “Eurocard” with your PC. For more information check chapter 2.3.3 and check related documentation on FlashRunner 2.0 Programmer's Manual in order to correctly setup your host PC system

2.3.4 USB Connector

Alternatively, communication with the host PC can be done with the micro USB connector. Use the provided USB cable to connect FlashRunner 2.0 “Eurocard” with your PC. For more information check chapter 2.3.4 and check related documentation on FlashRunner 2.0 Programmer’s Manual in order to correctly setup your host PC system

2.3.5 ISP Connectors

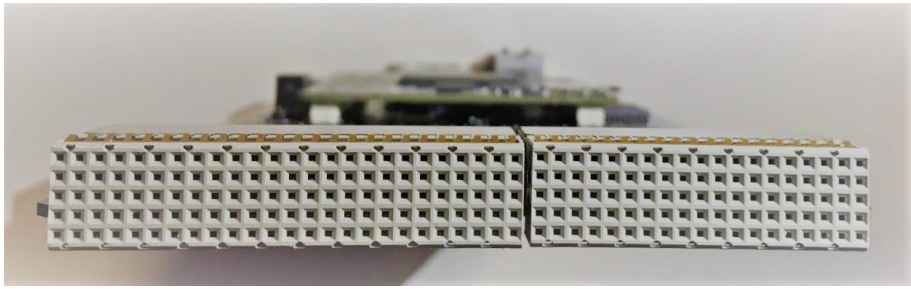

Illustration 3: The “ISP” DIN connectors group ISP output lines on FlashRunner 2.0 “Eurocard”

ISP signals are providede through High Density “CompactPCI” style connectors. For ISP detailed information check chapter 2.3.5.

2.3.6 LEDs

- POWER/STATUS: the instrument is turned on when the LED is red, when status is on it will turn orange. Blinking when indication system warnings
- BUSY: turned on when a project is running
- CHANNEL 1..16 : programming result. Green: programming successful, Red: programming failed

For more information about LEDs please check chapter 2.3.6

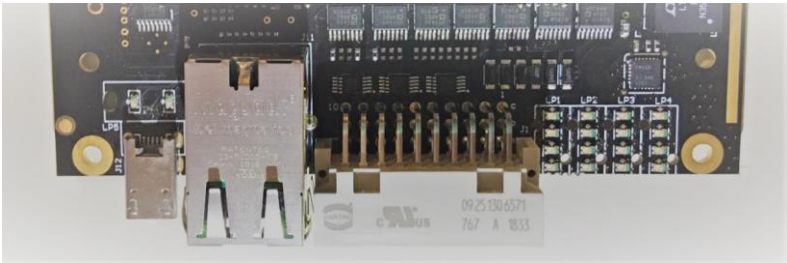

Illustration 4: FlashRunner 2.0 “Eurocard” LED view

2.4 Programming Drivers and Licenses

FlashRunner 2.0 “Eurocard” includes programming drivers for several devices. In order to program a specific device, however, a specific license file for that device, that family or that silicon producer must be purchased.

> **Note:** *FlashRunner 2.0 “Eurocard” comes already preinstalled with the license(s) you specified at the moment of purchase. You can purchase additional licenses at any future moment.*

Programming drivers and license files are stored inside FlashRunner 2.0 “Eurocard” storage memory (see the FlashRunner 2.0 Programmer’s Manual for more information).

There are several type of licensing:

- Single device license: only that single device programming is enabled
- Family license: only a single device family programming is enabled
- Silicon Producer license: only a single device silicon producer is enabled

2.4.1 Installing New Licenses

When you buy an additional license for a specific device, you will get a license file (.lic);

If you ordered a new device development, you will also receive:

- A driver file (.so)

For detailed information on how to update FlashRunner 2.0 “Eurocard” please check FlashRunner 2.0 Programmer’s Manual.

2.5 Channel Upgrade Licenses

If you would like to upgrade from FR2.0A4 to FR2.0A8, or from FR2.0A12 to FR2.0A16, you could purchase a Channel Upgrade License. Please ask our Sales Team (sales@smh-tech.com).

2.6 Upgrading the Firmware

FlashRunner 2.0 “Eurocard” firmware can be easily upgraded using the FlashRunner 2.0 WorkBench software. For more information, please refer to the FlashRunner 2.0 Programmer’s Manual.

3 System Setup

3.1 Overview

Note: *Keep FlashRunner 2.0 "Eurocard" always in a well-ventilated area in order to prevent product overheating, which could affect product performace and, if mantained for long time, it could damage product hardware components.*

This chapter will explain how to set up FlashRunner 2.0 "Eurocard" for the first time. The new FR2.0 WorkBench project Wizard allow an easy and fast system setup.

When moving FlashRunner 2.0 "Eurocard" to the production environment, you can take full advantage of the FR2.0 WorkBench GUI Production Tool (Host mode) or let the instrument to be controlled through the "ATE Control" interface (Standalone mode).

For more information about Standalone mode and Host mode, see the FlashRunner 2.0 Programmer's Manual.

3.2 Software Setup

Please refer to "System Setup/Upgrade" chapter of FlashRunner 2.0 Programmer's Manual.

3.3 Hardware Setup

To set up FlashRunner 2.0 "Eurocard", you must follow the steps below with the following order:

- Interface FlashRunner 2.0 “Eurocard” with your test/programming equipment;
- Connect FlashRunner 2.0 “Eurocard” to host PC system (if you use it in Host Mode);
- Providing sufficient air flow is **mandatory**. Ensure an air flow of at least 1,5 m^3/min.
- Power up FlashRunner 2.0 “Eurocard”;
- Set up LAN settings (if you use the Ethernet connection);

3.3.1 Interfacing with your Test/Programming equipment

Build one or more ISP interfaces to connect FlashRunner 2.0 “Eurocard” ISP connectors to your target board(s). Wire up all the required connections (power, oscillator, ISP signals) to target microcontrollers using PinMap tool/datasheet (for more details please check related chapter on FlashRunner 2.0 Programmer’s Manual).

3.3.2 Connecting to the Host PC System

You can connect FlashRunner 2.0 “Eurocard” to the host system through either the USB or LAN port.

FlashRunner 2.0 “Eurocard” comes with a USB cable and an Ethernet cross cable to connect directly to a host PC.

3.3.3 Powering Up

Power up FlashRunner 2.0 “Eurocard” by connecting included power supply or compatible to DC_POWER pins.

3.3.4 Setting Up LAN Settings

If you connected FlashRunner 2.0 “Eurocard” to the host PC using the Ethernet connection, you need to set up the FlashRunner 2.0 “Eurocard” IP address. To learn how to set up the FlashRunner 2.0 “Eurocard” address, please refer to the FlashRunner 2.0 Programmer’s Manual.

4 Connectors

4.1 Overview

FlashRunner 2.0 “Eurocard” connects to your programming/testing system through:

- “ISP” connectors: 192 way, 5 rows, CompactPCI (millipacs), pitch = 2.00mm (female)
- “ATE CONTROL” connector: 30 way, 3 rows, DIN41612, pitch = 2.54mm (male)
- Additionally, a micro USB and Ethernet connectors are provided to interface fully with the ATE system.

4.2 ISP Connectors

“ISP” connectors group signals needed to program up to 16 target devices (depending on the FlashRunner 2.0 “Eurocard” model). These connectors are CompactPCI compatible with several input/output lines and power lines.

Note: *ISP and I/O signals are not optoisolated and are referenced to GND (power supply ground).*

Additionally, in order to avoid undesired current loops between FlashRunner 2.0 power supply and target board, a power supply with a floating output (ground not referenced to the earth potential) should be used.

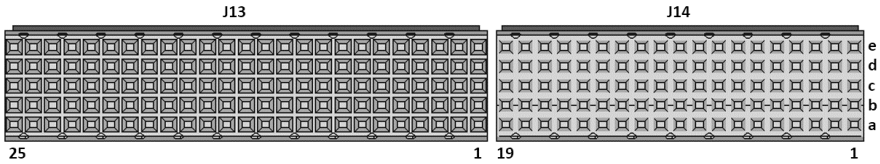

Illustration 5: ISP Connectors

Table 1: ISP Connector Signals (J13)

Pin #	Signal Name	Description
A25	DC_POWER	DC 15V Power
A24	DC_POWER	DC 15V Power
A23	DC_GND	DC Ground (referred to Power supply)
A22	DC_GND	DC Ground (referred to Power supply)
A21	DC_GND	DC Ground (referred to Power supply)
A20	DIO0_CH1	ISP Channel 1: Digital input/output 0
A19	DIO5_CH1	ISP Channel 1: Digital input/output 5
A18	DIO0_CH2	ISP Channel 2: Digital input/output 0
A17	DIO5_CH2	ISP Channel 2: Digital input/output 5
A16	DIO0_CH3	ISP Channel 3: Digital input/output 0
A15	DIO5_CH3	ISP Channel 3: Digital input/output 5
A14	DIO0_CH4	ISP Channel 4: Digital input/output 0
A13	DIO5_CH4	ISP Channel 4: Digital input/output 5
A12	DIO0_CH5	ISP Channel 5: Digital input/output 0
A11	DIO5_CH5	ISP Channel 5: Digital input/output 5
A10	DIO0_CH6	ISP Channel 6: Digital input/output 0
A9	DIO5_CH6	ISP Channel 6: Digital input/output 5
A8	DIO0_CH7	ISP Channel 7: Digital input/output 0
A7	DIO5_CH7	ISP Channel 7: Digital input/output 5
A6	DIO0_CH8	ISP Channel 8: Digital input/output 0
A5	DIO5_CH8	ISP Channel 8: Digital input/output 5
A4	DIO0_CH9	ISP Channel 9: Digital input/output 0
A3	DIO5_CH9	ISP Channel 9: Digital input/output 5
A2	DIO0_CH10	ISP Channel 10: Digital input/output 0
A1	DIO5_CH10	ISP Channel 10: Digital input/output 5
B25	DC_POWER	DC 15V Power
B24	DC_POWER	DC 15V Power
B23	DC_GND	DC Ground (referred to Power supply)
B22	DC_GND	DC Ground (referred to Power supply)
B21	DC_GND	DC Ground (referred to Power supply)

Pin #	Signal Name	Description
B20	DIO1_CH1	ISP Channel 1: Digital input/output 1
B19	DIO6_CH1	ISP Channel 1: Digital input/output 6
B18	DIO1_CH2	ISP Channel 2: Digital input/output 1
B17	DIO6_CH2	ISP Channel 2: Digital input/output 6
B16	DIO1_CH3	ISP Channel 3: Digital input/output 1
B15	DIO6_CH3	ISP Channel 3: Digital input/output 6
B14	DIO1_CH4	ISP Channel 4: Digital input/output 1
B13	DIO6_CH4	ISP Channel 4: Digital input/output 6
B12	DIO1_CH5	ISP Channel 5: Digital input/output 1
B11	DIO6_CH5	ISP Channel 5: Digital input/output 6
B10	DIO1_CH6	ISP Channel 6: Digital input/output 1
B9	DIO6_CH6	ISP Channel 6: Digital input/output 6
B8	DIO1_CH7	ISP Channel 7: Digital input/output 1
B7	DIO6_CH7	ISP Channel 7: Digital input/output 6
B6	DIO1_CH8	ISP Channel 8: Digital input/output 1
B5	DIO6_CH8	ISP Channel 8: Digital input/output 6
B4	DIO1_CH9	ISP Channel 9: Digital input/output 1
B3	DIO6_CH9	ISP Channel 9: Digital input/output 6
B2	DIO1_CH10	ISP Channel 10: Digital input/output 1
B1	DIO6_CH10	ISP Channel 10: Digital input/output 6
C25	DC_POWER	DC 15V Power
C24	DC_POWER	DC 15V Power
C23	DC_GND	DC Ground (referred to Power supply)
C22	DC_GND	DC Ground (referred to Power supply)
C21	DC_GND	DC Ground (referred to Power supply)
C20	DIO2_CH1	ISP Channel 1: Digital input/output 2
C19	DIO7_CH1	ISP Channel 1: Digital input/output 7
C18	DIO2_CH2	ISP Channel 2: Digital input/output 2
C17	DIO7_CH2	ISP Channel 2: Digital input/output 7
C16	DIO2_CH3	ISP Channel 3: Digital input/output 2
C15	DIO7_CH3	ISP Channel 3: Digital input/output 7
C14	DIO2_CH4	ISP Channel 4: Digital input/output 2
C13	DIO7_CH4	ISP Channel 4: Digital input/output 7
C12	DIO2_CH5	ISP Channel 5: Digital input/output 2
C11	DIO7_CH5	ISP Channel 5: Digital input/output 7
C10	DIO2_CH6	ISP Channel 6: Digital input/output 2
C9	DIO7_CH6	ISP Channel 6: Digital input/output 7
C8	DIO2_CH7	ISP Channel 7: Digital input/output 2
C7	DIO7_CH7	ISP Channel 7: Digital input/output 7
C6	DIO2_CH8	ISP Channel 8: Digital input/output 2
C5	DIO7_CH8	ISP Channel 8: Digital input/output 7
C4	DIO2_CH9	ISP Channel 9: Digital input/output 2

Pin #	Signal Name	Description
C3	DIO7_CH9	ISP Channel 9: Digital input/output 7
C2	DIO2_CH10	ISP Channel 10: Digital input/output 2
C1	DIO7_CH10	ISP Channel 10: Digital input/output 7
D25	DC_POWER	DC 15V Power
D24	DC_POWER	DC 15V Power
D23	DC_GND	DC Ground (referred to Power supply)
D22	DC_GND	DC Ground (referred to Power supply)
D21	DC_GND	DC Ground (referred to Power supply)
D20	DIO3_CH1	ISP Channel 1: Digital input/output 3
D19	VPROG0_CH1	ISP Channel 1: Programmable voltage 0
D18	DIO3_CH2	ISP Channel 2: Digital input/output 3
D17	VPROG0_CH2	ISP Channel 2: Programmable voltage 0
D16	DIO3_CH3	ISP Channel 3: Digital input/output 3
D15	VPROG0_CH3	ISP Channel 3: Programmable voltage 0
D14	DIO3_CH4	ISP Channel 4: Digital input/output 3
D13	VPROG0_CH4	ISP Channel 4: Programmable voltage 0
D12	DIO3_CH5	ISP Channel 5: Digital input/output 3
D11	VPROG0_CH5	ISP Channel 5: Programmable voltage 0
D10	DIO3_CH6	ISP Channel 6: Digital input/output 3
D9	VPROG0_CH6	ISP Channel 6: Programmable voltage 0
D8	DIO3_CH7	ISP Channel 7: Digital input/output 3
D7	VPROG0_CH7	ISP Channel 7: Programmable voltage 0
D6	DIO3_CH8	ISP Channel 8: Digital input/output 3
D5	VPROG0_CH8	ISP Channel 8: Programmable voltage 0
D4	DIO3_CH9	ISP Channel 9: Digital input/output 3
D3	VPROG0_CH9	ISP Channel 9: Programmable voltage 0
D2	DIO3_CH10	ISP Channel 10: Digital input/output 3
D1	VPROG0_CH10	ISP Channel 10: Programmable voltage 0
E25	DC_POWER	DC 15V Power
E24	DC_POWER	DC 15V Power
E23	DC_GND	DC Ground (referred to Power supply)
E22	DC_GND	DC Ground (referred to Power supply)
E21	DC_GND	DC Ground (referred to Power supply)
E20	DIO4_CH1	ISP Channel 1: Digital input/output 4
E19	VPROG1_CH1	ISP Channel 1: Programmable voltage 1
E18	DIO4_CH2	ISP Channel 2: Digital input/output 4
E17	VPROG1_CH2	ISP Channel 2: Programmable voltage 1
E16	DIO4_CH3	ISP Channel 3: Digital input/output 4
E15	VPROG1_CH3	ISP Channel 3: Programmable voltage 1
E14	DIO4_CH4	ISP Channel 4: Digital input/output 4
E13	VPROG1_CH4	ISP Channel 4: Programmable voltage 1
E12	DIO4_CH5	ISP Channel 5: Digital input/output 4

Pin #	Signal Name	Description
E11	VPROG1_CH5	ISP Channel 5: Programmable voltage 1
E10	DIO4_CH6	ISP Channel 6: Digital input/output 4
E9	VPROG1_CH6	ISP Channel 6: Programmable voltage 1
E8	DIO4_CH7	ISP Channel 7: Digital input/output 4
E7	VPROG1_CH7	ISP Channel 7: Programmable voltage 1
E6	DIO4_CH8	ISP Channel 8: Digital input/output 4
E5	VPROG1_CH8	ISP Channel 8: Programmable voltage 1
E4	DIO4_CH9	ISP Channel 9: Digital input/output 4
E3	VPROG1_CH9	ISP Channel 9: Programmable voltage 1
E2	DIO4_CH10	ISP Channel 10: Digital input/output 4
E1	VPROG1_CH10	ISP Channel 10: Programmable voltage 1

Table 2: ISP Connector Signals (J14)

Pin #	Signal Name	Description
A19	DIO0_CH11	ISP Channel 11: Digital input/output 0
A18	DIO5_CH11	ISP Channel 11: Digital input/output 5
A17	DIO0_CH12	ISP Channel 12: Digital input/output 0
A16	DIO5_CH12	ISP Channel 12: Digital input/output 5
A15	DIO0_CH13	ISP Channel 13: Digital input/output 0
A14	DIO5_CH13	ISP Channel 13: Digital input/output 5
A13	DIO0_CH14	ISP Channel 14: Digital input/output 0
A12	DIO5_CH14	ISP Channel 14: Digital input/output 5
A11	DIO0_CH15	ISP Channel 15: Digital input/output 0
A10	DIO5_CH15	ISP Channel 15: Digital input/output 5
A9	DIO0_CH16	ISP Channel 16: Digital input/output 0
A8	DIO5_CH16	ISP Channel 16: Digital input/output 5
A7	GND	ISP Ground
A6	GND	ISP Ground
A5	GND	ISP Ground
A4	RLY_ON_CH1	ISP Channel 1: Relay Barrier Driver Output
A3	RLY_ON_CH2	ISP Channel 2: Relay Barrier Driver Output
A2	RLY_ON_CH7	ISP Channel 7: Relay Barrier Driver Output
A1	RLY_ON_CH12	ISP Channel 12: Relay Barrier Driver Output
B19	DIO1_CH11	ISP Channel 11: Digital input/output 1
B18	DIO6_CH11	ISP Channel 11: Digital input/output 6
B17	DIO1_CH12	ISP Channel 12: Digital input/output 1
B16	DIO6_CH12	ISP Channel 12: Digital input/output 6
B15	DIO1_CH13	ISP Channel 13: Digital input/output 1
B14	DIO6_CH13	ISP Channel 13: Digital input/output 6
B13	DIO1_CH14	ISP Channel 14: Digital input/output 1

Pin #	Signal Name	Description
B12	DIO6_CH14	ISP Channel 14: Digital input/output 6
B11	DIO1_CH15	ISP Channel 15: Digital input/output 1
B10	DIO6_CH15	ISP Channel 15: Digital input/output 6
B9	DIO1_CH16	ISP Channel 16: Digital input/output 1
B8	DIO6_CH16	ISP Channel 16: Digital input/output 6
B7	GND	ISP Ground
B6	GND	ISP Ground
B5	GND	ISP Ground
B4	GND	ISP Ground
B3	RLY_ON_CH3	ISP Channel 4: Digital input/output 3 Ground
B2	RLY_ON_CH8	ISP Channel 4: Digital input/output 5
B1	RLY_ON_CH13	ISP Channel 4: Digital input/output 6 Ground
C19	DIO2_CH11	ISP Channel 11: Digital input/output 2
C18	DIO7_CH11	ISP Channel 11: Digital input/output 7
C17	DIO2_CH12	ISP Channel 12: Digital input/output 2
C16	DIO7_CH12	ISP Channel 12: Digital input/output 7
C15	DIO2_CH13	ISP Channel 13: Digital input/output 2
C14	DIO7_CH13	ISP Channel 13: Digital input/output 7
C13	DIO2_CH14	ISP Channel 14: Digital input/output 2
C12	DIO7_CH14	ISP Channel 14: Digital input/output 7
C11	DIO2_CH15	ISP Channel 15: Digital input/output 2
C10	DIO7_CH15	ISP Channel 15: Digital input/output 7
C9	DIO2_CH16	ISP Channel 16: Digital input/output 2
C8	DIO7_CH16	ISP Channel 16: Digital input/output 7
C7	GND	ISP Ground
C6	GND	ISP Ground
C5	GND	ISP Ground
C4	GND	ISP Ground
C3	RLY_ON_CH4	ISP Channel 4: Relay Barrier Driver Output
C2	RLY_ON_CH9	ISP Channel 9: Relay Barrier Driver Output
C1	RLY_ON_CH14	ISP Channel 14: Relay Barrier Driver Output
D19	DIO3_CH11	ISP Channel 11: Digital input/output 3
D18	VPROG0_CH11	ISP Channel 11: Programmable voltage 0
D17	DIO3_CH12	ISP Channel 12: Digital input/output 3
D16	VPROG0_CH12	ISP Channel 12: Programmable voltage 0
D15	DIO3_CH13	ISP Channel 13: Digital input/output 3
D14	VPROG0_CH13	ISP Channel 13: Programmable voltage 0
D13	DIO3_CH14	ISP Channel 14: Digital input/output 3
D12	VPROG0_CH14	ISP Channel 14: Programmable voltage 0
D11	DIO3_CH15	ISP Channel 15: Digital input/output 3
D10	VPROG0_CH15	ISP Channel 15: Programmable voltage 0
D9	DIO3_CH16	ISP Channel 16: Digital input/output 3

Pin #	Signal Name	Description
D8	VPROG0_CH16	ISP Channel 16: Programmable voltage 0
D7	GND	ISP Ground
D6	GND	ISP Ground
D5	GND	ISP Ground
D4	GND	ISP Ground
D3	RLY_ON_CH5	ISP Channel 5: Relay Barrier Driver Output
D2	RLY_ON_CH10	ISP Channel 10: Relay Barrier Driver Output
D1	RLY_ON_CH15	ISP Channel 15: Relay Barrier Driver Output
E19	DIO4_CH11	ISP Channel 11: Digital input/output 4
E18	VPROG1_CH11	ISP Channel 11: Programmable voltage 1
E17	DIO4_CH12	ISP Channel 12: Digital input/output 4
E16	VPROG1_CH12	ISP Channel 12: Programmable voltage 1
E15	DIO4_CH13	ISP Channel 13: Digital input/output 4
E14	VPROG1_CH13	ISP Channel 13: Programmable voltage 1
E13	DIO4_CH14	ISP Channel 14: Digital input/output 4
E12	VPROG1_CH14	ISP Channel 14: Programmable voltage 1
E11	DIO4_CH15	ISP Channel 15: Digital input/output 4
E10	VPROG1_CH15	ISP Channel 15: Programmable voltage 1
E9	DIO4_CH16	ISP Channel 16: Digital input/output 4
E8	VPROG1_CH16	ISP Channel 16: Programmable voltage 1
E7	GND	ISP Ground
E6	GND	ISP Ground
E5	GND	ISP Ground
E4	GND	ISP Ground
E3	RLY_ON_CH6	ISP Channel 6: Relay Barrier Driver Output
E2	RLY_ON_CH11	ISP Channel 11: Relay Barrier Driver Output
E1	RLY_ON_CH16	ISP Channel 16: Relay Barrier Driver Output

4.3 ATE Control Connector

ATE Control Connector is used to communicate with the host system and for integration with automatic programming/testing equipment (ATE).

Note: *all control signals are referenced to GND_I, separate from GND. This allows a host system to safely communicate with FlashRunner 2.0 even when the target boards have different ground reference compared to the host system's (and it's not possible to connect them together).*

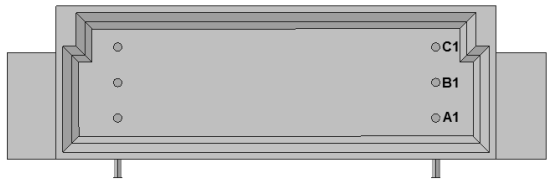

Illustration 6: ATE CONTROL Connector

Table 3: Control Connector Signals

Pin #	Signal Name	Description
A1	SEL0	Project selection 0 (input, referenced to GND_I)
A2	SEL1	Project selection 1 (input, referenced to GND_I)
A3	SEL2	Project selection 2 (input, referenced to GND_I)
A4	SEL3	Project selection 3 (input, referenced to GND_I)
A5	SEL4	Project selection 4 (input, referenced to GND_I)
A6	GND_I	Ground
A7	PASS/FAIL1	Programming channel 1 PASS/FAIL (output , referenced to GND_I)
A8	PASS/FAIL2	Programming channel 2 PASS/FAIL (output , referenced to GND_I)
A9	PASS/FAIL3	Programming channel 3 PASS/FAIL (output , referenced to GND_I)
A10	PASS/FAIL4	Programming channel 4 PASS/FAIL (output , referenced to GND_I)
B1	START	Selected Project START (input , referenced to GND_I, active low)
B2	5V_I_FUSE	5V output (output, fuse-protected, referenced to GND_I)
B3	5V_I_FUSE	5V output (output, fuse-protected, referenced to GND_I)
B4	GND_I	Ground
B5	GND_I	Ground
B6	GND_I	Ground
B7	PASS/FAIL5	Programming channel 5 PASS/FAIL (output , referenced to GND_I)
B8	PASS/FAIL6	Programming channel 6 PASS/FAIL (output , referenced to GND_I)
B9	PASS/FAIL7	Programming channel 47PASS/FAIL (output , referenced to GND_I)
B10	PASS/FAIL8	Programming channel 8 PASS/FAIL (output , referenced to GND_I)
C1	GND_I	Ground
C2	PASS/FAIL9	Programming channel 9 PASS/FAIL (output , referenced to GND_I)

Pin #	Signal Name	Description
C3	PASS/FAIL10	Programming channel 10 PASS/FAIL (output , referenced to GND_I)
C4	PASS/FAIL11	Programming channel 11 PASS/FAIL (output , referenced to GND_I)
C5	PASS/FAIL12	Programming channel 12 PASS/FAIL (output , referenced to GND_I)
C6	BUSY	Selected Project BUSY (output, referenced to GND_I, active low)
C7	PASS/FAIL13	Programming channel 13 PASS/FAIL (output , referenced to GND_I)
C8	PASS/FAIL14	Programming channel 14 PASS/FAIL (output , referenced to GND_I)
C9	PASS/FAIL15	Programming channel 15 PASS/FAIL (output , referenced to GND_I)
C10	PASS/FAIL16	Programming channel 16 PASS/FAIL (output , referenced to GND_I)

4.4 USB Connector

The USB-B connector can be used to communicate with the ATE system.

Note: *USB signals are referenced to GND_USB, separate from GND, and from GND_I.*

5 Technical Specifications

5.1 Absolute Maximum Ratings

Table 4.1: Absolute Maximum Ratings

Parameter	Value
"POWER" Connector	
Supply voltage on line POWER (reference GND)	+15V
"ATE CONTROL" Connector	
Maximum input voltage on lines START, SEL[4..0], SG[1..0]	-2V to +20V
Maximum current on lines BUSY, PASS, FAIL	±10mA
"ISP GROUP" Connectors	
Maximum input voltage on lines DIO/AO[1..0], DIO[6..2], CLKOUT	-1V to +5.5V
Maximum current on lines DIO	±24mA
Maximum current on line VPROG0	150 mA
Maximum current on line VPROG1	200 mA
"Relay Barrier"	
Coil Supply Voltage	15V
"RLY_ON" signal Voltage	3.3V
Maximum current on lines RLY_ON	±10mA

5.2 DC Characteristics and Functional Operating Range

Table 4.2: DC Characteristics and Functional Operating Range

Parameter	Condition	Value		
		Min	Typ	Max
"ATE CONTROL" Connector				
V_{IL} (input low voltage) on lines START, SEL[4..0]		0V	-	0.8V
V_{IH} (input high voltage) on lines START, SEL[4..0]		2.4V	-	15V
V_{OL} (output low voltage) on lines BUSY, FAIL, PASS	I_{OL} = 4mA	-	-	0.8V
V_{OH} (output high voltage) on lines BUSY, FAIL, PASS		4.5V	-	5V
"ISP" Connectors				
V_{IL} (input low voltage) on lines DIO		-	-	$0.3V_{PROG0}$
V_{IH} (input high voltage) on lines DIO	Configured as digital lines	$0.7V_{PROG0}$	-	V_{PROG0}
V_{OL} (output low voltage) on lines DIO, CLKOUT	Configured as digital lines, V_{PROG0} = 3V, I_{OL} = 12mA	-	-	0.36V
V_{OH} (output high voltage) on lines DIO, CLKOUT	Configured as digital lines, V_{PROG0} = 3V, I_{OH} = 12mA	2.56V	-	-
V_{OL} (output low voltage) on lines DIO, CLKOUT	Configured as digital lines, V_{PROG0} = 5.5V, I_{OL} = 24mA	-	-	0.36V
V_{OH} (output high voltage) on lines DIO, CLKOUT	Configured as digital lines, V_{PROG0} = 5.5V, I_{OH} = 24mA	4.86V	-	-
I_{OH} current (source) on lines DIO	Configured as input with active pull-ups	-	3.8mA	-
VPROG0 output voltage		1.65V	-	5.5V
VPROG0 current (source)		-	-	150mA
VPROG1 output voltage		9V	-	13.5V
VPROG1 current (source)		-	-	200mA
"POWER" Connector				
Supply voltage		15V	-	15V
Power consumption		-	-	5A

Note: *Keep FlashRunner 2.0 "Eurocard" always in a well-ventilated area in order to prevent product overheating, which could affect product performace and, if mantained for long time, it could damage product hardware components. Do not operate outside of indicated ranges.*

5.3 AC Characteristics (TBW)

Table 4.3: AC Characteristics

Parameter	Condition		Value		
			Min	Typ	Max
t_{RISE} on lines DIO[6..2], DIO[1..0], CLKOUT when configured as digital output push-pull	V_{PROG0} = 1.8V	Load: 470Ω//100pF (see figure 4.1a)	-	40ns	-
	V_{PROG0} = 3.3V		-	30ns	-
	V_{PROG0} = 5V		-	25ns	-
t_{FALL} on lines DIO[6..2], DIO[1..0], CLKOUT when configured as digital output push-pull	V_{PROG0} = 1.8V	Load: 470Ω//100pF (see figure 4.1a)	-	35ns	-
	V_{PROG0} = 3.3V		-	25ns	-
	V_{PROG0} = 5V		-	25ns	-
	V_{PROG1} = 12V		-	20µs	-
	V_{PROG1} = 14.5V		-	30µs	-
t_{RISE} on line VPROG0	V_{PROG0} = 0-1.8V	Load: 15Ω//10mF (see figure 4.1a)	-	10ms	-
	V_{PROG0} = 0-3.3V	Load: 22Ω//10mF (see figure 4.1a)	-	15ms	-
	V_{PROG0} = 0-5.5V	Load: 22Ω//10mF (see figure 4.1a)	-	20ms	-
t_{FALL} on line VPROG0	V_{PROG0} = 1.8-0V	Load: 10mF (see figure 41b)	-	300ms	-
	V_{PROG0} = 3.3-0V		-	350ms	-
	V_{PROG0} = 5.5-0V		-	350ms	-
t_{RISE} on line VPROG1	V_{PROG1} = 0-3V	Load: 10Ω//1mF (see figure 4.1a)	-	1.3ms	-
	V_{PROG1} = 0-5V	Load: 47Ω//1mF (see figure 4.1a)	-	1.8ms	-
	V_{PROG1} = 0-14.5V	Load: 94Ω//1mF (see figure 4.1a)	-	13ms	-
t_{FALL} on line VPROG1	V_{PROG1} = 3-0V	Load: 1mF (see figure 4.1b)	-	18ms	-
	V_{PROG1} = 5-0V		-	30ms	-
	V_{PROG1} = 14.5-0V		-	45ms	-
CLKOUT frequency			0MHz	-	25MHz

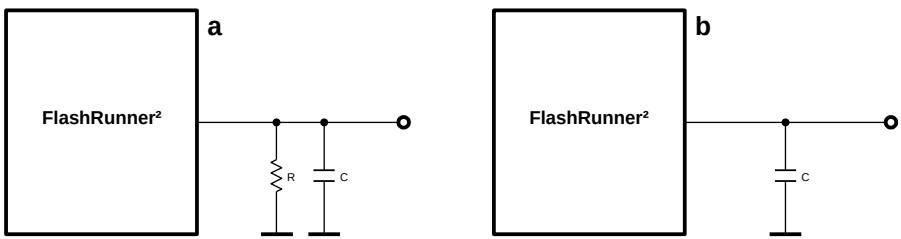

Illustration 7: Load Conditions

5.4 Physical and Environmental Specifications

Table 4.6: Physical and Environmental Specifications

Parameter	Value
Dimensions, open frame version	220 x 100 x 10 mm
Dimensions, case version	TBD
	-
“ISP” connectors type	192 way, 5 row, CpmpactPCI, pitch = 2.00mm (female)
“ATE CONTROL” connector type	30 way, 3 row, DIN41612, pitch = 2.54mm (male)
“USB” connector type	USB-B micro receptable
“LAN” connector type	RJ-45 connector
“POWER” connector type	Dedicated DC_POWER and DC_GND on ISP connector
Operating temperature	0-50°C
Operating humidity	90% max (without condensation)
Storage temperature	0-70°C
Storage humidity	90% max (without condensation)
EMC (EMI/EMS)	CE, FCC
Sd card size	Up to 200 GB, by default mounts 2GB