baseline real-time target machine

Education

User Manual

v3.3

speedgoat
real-time simulation and testing

+41 26 670 75 50 | support@speedgoat.com | www.speedgoat.com

Contents

Document Version History

Version Number	Document Action	Author	Date
2.0	Introduction of new template	BeSc	24 January 2019
2.1	Added power consumption information	JeGr	17 December 2018
2.2	General updates	JeGr	03 April 2019
3.0	Amendments to reflect MATLAB R2020a and earlier, and MATLAB R2020b and later workflows Updated info on limited power input, ambient conditions, and I/O module connectors	BeSc PeBa	24 March 2021
3.1	Updated humidity data in section 5.1 and enclosure dimensions in section 5.2	BeSc	21 June 2021
3.2	Added compliance information	PeBa	20 September 2021
3.3	Section 5.6: Changed SSD storage size from 32 to 64 GB	BeSc	21 December 2023

This symbol is placed on Baseline real-time target machines close to potential sources of hazard. This manual provides information about the potential hazards and what safety measures to take.

1 Introduction

The Baseline real-time target machine with an Intel® 2.0 GHz quad core CPU and optional FPGAs is the Speedgoat entry-level solution to real-time simulation and testing using MATLAB® and Simulink®. This light, rugged and high-performance target machine is the perfect solution for running complex models requiring just a few hundred I/O channels.

It can be used as a real-time development platform in a broad range of application areas and industries such as the aerospace, automotive, machinery, electricity, consumer electronics', medical devices' and robotics' industries.

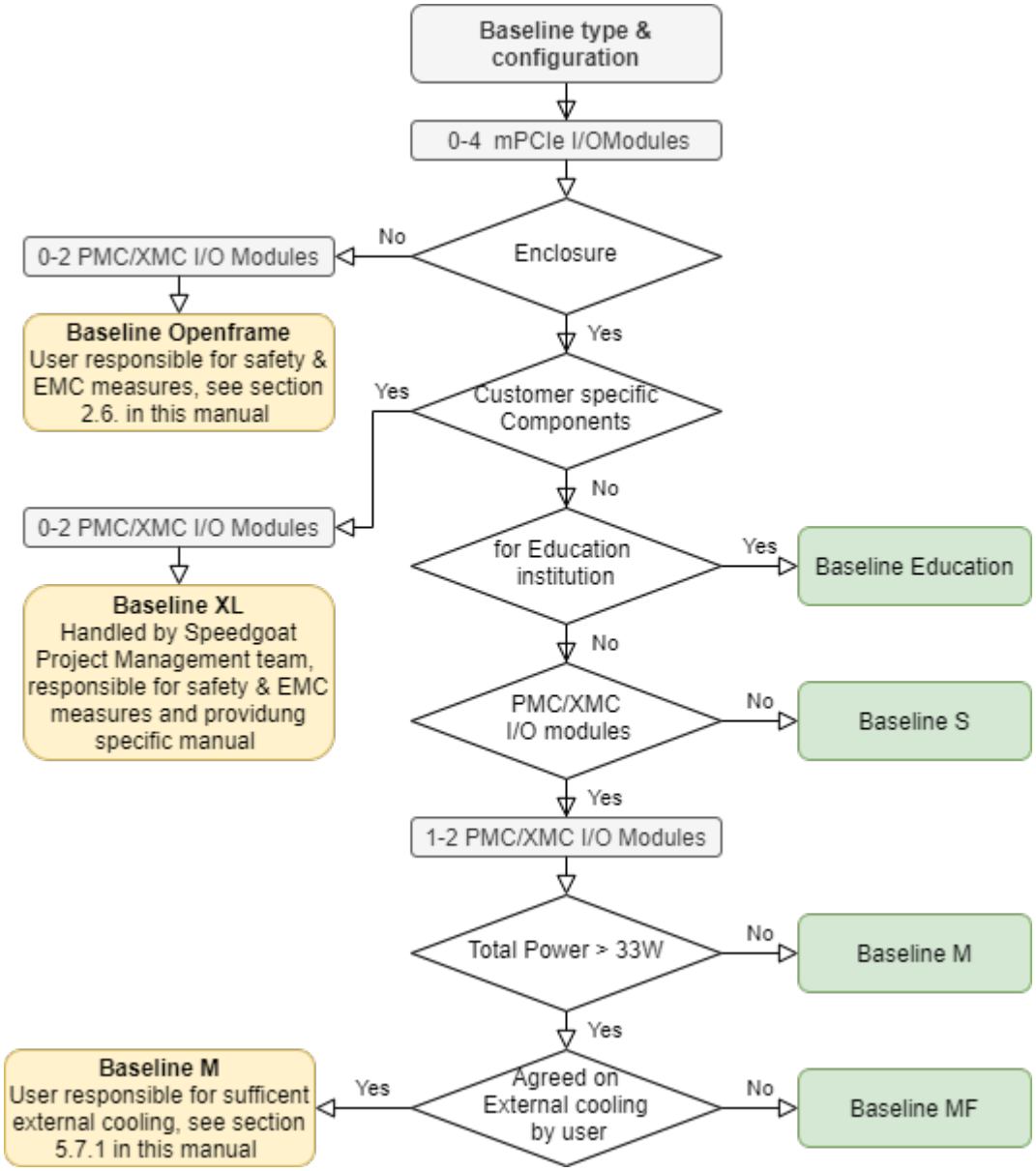
With a rugged enclosure and M12 connectors, this target machine can readily be moved around: it can be used for office, in-vehicle and even offshore operations. The enclosure is designed to withstand high levels of shock and vibration, and has a passive heatsink for silent fanless operation. The Baseline has capacity for up to six I/O modules covering the latest FPGAs (Xilinx® Artix®-7 and Kintex®-7) and a wide range of I/O connectivity.

1.1. Type and Configuration Information

The product is available in six types. This manual covers the Baseline Education.

Configuration is realized by inserting up to one I/O module offering a wide range of I/O connectivity.

Product	Type	Description
Baseline real-time target machine	Baseline S	Small, max. 4 I/O modules
Baseline real-time target machine	Baseline M	Medium, max. 6 I/O modules
Baseline real-time target machine	Baseline MF	Medium with internal fan, max. 6 I/O modules, if total power is > 33 W
Baseline real-time target machine	Baseline XL	X-large, max. 6 I/O modules + customer specific, handled by Speedgoat Project Management
Baseline real-time target machine	Baseline Education	Identical to Baseline S
Baseline real-time target machine	Baseline Openframe	No enclosure, max. 6 I/O modules
Options	**Type**	**Description**
Extended Temperature	For all types	Intel Atom 1.91 GHz instead of Intel Celeron 2.00 GHz
Configuration: 0-6 I/O Modules from the Following Groups		
IO1xx: Analog I/O		
IO2xx: Digital I/O		
IO3xx: FPGA modules		
IO4xx: Position sensors		
IO5xx: Serial communication		
IO6xx: Fieldbuses, not Ethernet based		
IO7xx: Ethernet-based protocols		
IO8xx: Other protocols		
IO90x: Shared Memory		



1.2. Contact Information for Support

Manufacturer: Speedgoat GmbH
Waldeggstrasse 30
CH-3097 Liebefeld

www.speedgoat.com

Sales Email: sales@speedgoat.ch
Support Email: support@speedgoat.ch

Phone:
Switzerland +41 26 670 75 50
USA +1 508 233 2650
Germany +49 5139 97780 50

2 Handling and Operating Instructions

2.1. Intended Use

The Baseline real-time target machine has been designed, developed, and manufactured for use in industrial environments. Exceptionally stringent safety precautions must be taken if there are any serious risks or hazards that could lead to death, injury or serious physical damage or loss of any kind. In particular, such risks and hazards include the following use cases: monitoring nuclear reactions in nuclear power plants; flight control or flight safety systems; controls of mass transportation systems, medical life support systems and weapons systems.

2.2. Environmental Conditions

The Baseline real-time target machine has been designed for use under the following ambient conditions:

Application area	Indoor only	
Altitude	Max. 2000 m above sea level	
Ambient temperature	0 °C – 40 °C	
Relative humidity	10 – 90 % r.H. non-condensing	
Supply voltage	100-240 V_{AC} ±10% / 50-60 Hz / 2 A	8 - 36 V_{DC} / 70 W
Overvoltage category	II (with external power supply)	
Pollution degree	2	

2.3. Installation

For desktop operation, stand the Baseline real-time target machine on the clear, plastic feet.

Bear in mind that the heatsink may get hot and that air must be able to flow through it.

Consult the Baseline - Installation Manual for instructions on securely installing the machine. The installation manual is available on the Speedgoat Customer Portal.

IMPORTANT: The installer of a system in which the Baseline real-time target machine is integrated is solely responsible for the safety of this system.

2.4. Maintenance, Repair and Cleaning

Maintenance and repairs must be carried out by Speedgoat. Contact Speedgoat Support when this is necessary.

Users must regularly check for any visible signs of damage on the Baseline real-time target machine. Users are not required to carry out any additional maintenance.

Cleaning: disconnect the Baseline real-time target machine and clean the device using an appropriate cloth and cleaning agent (Isopropanol 70%).

2.5. Protection Against Electrostatic Discharge

Electrical components that can be damaged by electrostatic discharge (ESD) must be handled appropriately.

Electrical components with an enclosure do not require special ESD packaging but must also be handled appropriately:

- Do not touch the connector contacts on the connected cables
- Do not touch the contact tips on the circuit boards

Electrical components without an enclosure must be protected by ESD-suitable packaging. The following guidelines must also be observed:

- Any persons handling electrical components or devices featuring installed electrical components must be grounded
- Components must only be handled on the narrow side or front plate
- Components must be stored in a suitable medium (ESD packaging, conductive foam, and so on)
- Metallic surfaces are not suitable storage surfaces
- Components must not be subjected to electrostatic discharge (for example, through the use of charged plastics)
- Ensure a minimum distance of 10 cm from monitors and TV sets
- Measurement devices and equipment must be grounded

ESD-protective measures for handling individual components are fully integrated at Speedgoat (conductive floors, footwear, wrist straps and so on).

Customers must implement these increased ESD-protective measures when handling I/O modules or Openframe target machines.

2.6. Safety Precautions, Transport and Installation

Electronic devices are never completely failsafe. If the system fails, the user is responsible for ensuring that any other connected devices, for example, motors, are brought to a secure state.

Safety precautions relevant to industrial control systems (for example, the provision of safety devices such as emergency stop circuits, and so on) must be observed in accordance with applicable national and international regulations. The same applies for all other devices connected to the system, such as drives.

Only qualified personnel must carry out tasks such as the installation, commissioning and servicing of target machines and peripheral devices. Qualified personnel are those with the appropriate qualifications (for example, IEC 60364) and who are familiar with the transport, mounting, installation, commissioning and operation of target machines and peripheral devices. National accident prevention regulations must be observed.

Safety notices, connection descriptions (information label and documentation) and limit values listed in the technical data must be read carefully before installation and commissioning and must be observed.

To operate, it may be necessary for certain parts to carry dangerous voltage levels over 42 VDC. Touching one of these parts can result in a life-threatening electric shock. This could lead to death, severe injury or damage to equipment.

During transport and storage, target machines and peripheral devices must be protected against undue stress (mechanical loads, temperature, humidity, aggressive atmospheres, and so on). Use in very dusty environments should be also avoided. Dust accumulation on the target machines and peripheral devices can affect functionality.

The presence of aggressive gases can lead to malfunctions. When combined with high temperature and humidity, aggressive gases, for example, sulfur, nitrogen and chlorine components, can induce chemical reactions that can damage electronic components very quickly. Blackened cable ends on existing equipment indicate the presence of aggressive gases.

3 Setup

Place your Baseline real-time target machine on a stable desk or install it on DIN rails using the DIN rail clips provided.

3.1. Monitor

You can connect one DisplayPort monitor to your target machine. The monitor is only required to migrate your target or for debugging operations.

If you do use a monitor, connect it before powering up the target machine. Make sure that the monitor is well connected and do not unplug it during model execution.

MATLAB R2020a and earlier: You can use Target Scopes in the Simulink model to visualize signals and parameters at execution time. If you do not use a monitor during real-time operations, you could run the kernel in text mode to improve performance.

If you do use a monitor, connect it before powering up the target machine. Make sure that the monitor is well connected and do not unplug it during model execution. This could have an impact on the application stability and in some particular cases, crash the system. If this problem occurs, you must restart the target machine.

3.2. Keyboard

You can use PS/2 or USB keyboards. The system is configured for the standard US-layout.

The keyboard is only required to migrate your target or for debugging operations.

MATLAB R2020b and later: Use Ctrl + Alt + 2 to switch from the statusmonitor to the second shell.

MATLAB R2020a and earlier: To activate the command line interface once you have a target application running, type C on the attached keyboard. For a list of commands available in the Simulink Real-Time environment, please refer to the Simulink Real-Time documentation.

3.3. Power Supply

Connect the provided power supply to the power input at the rear of the target machine. For the technical specification of the input voltage range, please refer to section 5.4 Power Input.

For more information about the power connectors, refer to section 5.9 Power Connectors.

The input power must be limited for safety reasons according to standard IEC 61010-1 section 9.4 (limited-energy circuit). This can be achieved by:

- Limiting the input power to a maximum 100 W or
- Using an overcurrent protection device disconnecting in less than 120s $Current\ [A] = \frac{125[VA]}{Supply\ Volatge\ [V]}$

Speedgoat recommends using the external power supply delivered optionally with the machine (EDAC Power Electronics AC/DC Adapter EA10681V-240).

Alternatively, a Limited Power Source (LPS) power supply according to standards IEC 60950-1 or IEC 62368-1 Annex Q can be used.

DC-/GND must be connected to PE (protective earth).

The DC cable used to connect the LPS and the Baseline real-time target machine must not exceed 3 m and must only be used for this purpose.

3.4. Power On/Off

The system will power up as soon as the power supply is connected to the power input.
When the power LED is blue, the system is correctly powered on.

The system usually takes a few seconds to load the Simulink Real-Time kernel stored in the target machine main drive. Once the kernel is loaded, kernel information will appear on the target screen.

To power off the system, unplug the power connector or press the green power button.

4 Software

4.1. Installation and Configuration

Please refer to the MathWorks help documentation: Get Started with Simulink Real-Time.

Refer also to the Speedgoat Tools help documentation which provides information on configuring your real-time target machine's software installation, Ethernet ports and Ethernet I/O modules. This documentation also has a section on the Speedgoat API which is a MATLAB function package.

4.2. Driver Block Manuals

When you install the Speedgoat I/O Blockset, the installer sets up help for the blocks in the MATLAB Help browser. To view the Speedgoat Help documentation, type speedgoat.doc or open the MATLAB Help browser and go to the home page. At the bottom-right of the home page, under Supplemental Software, click Simulink Real-Time - Speedgoat. The Speedgoat Help documentation opens in the current window.

PDF driver block manuals for all of your installed I/O modules are available for download in the Speedgoat Customer Portal on the Speedgoat website.

MATLAB R2020a and earlier

Installation and Configuration

Refer to the Software Configuration Guide (type `speedgoat.doc` in the MATLAB Command Window) to complete the configuration of the real-time target machine.

The guide covers the following topics:

MathWorks software and Speedgoat I/O Blockset installation
Ethernet communications' link
Kernel configuration and transfer

The Software Configuration Guide also contains additional information on transferring the Simulink Real-Time kernel version for the respective MathWorks software release to your target machine and changing your target machine's IP settings.

For more information about the Simulink Real-Time software and drivers for the installed I/O modules, refer to the relevant I/O module hardware reference manual. These manuals are available on the Speedgoat Customer Portal.

Simulink Real-Time Kernel

Speedgoat Real-Time target machines are optimized for use with Simulink Real-Time.
By default, Speedgoat pre-installs the Simulink Real-Time kernel on your target machine. However, to work with Simulink Real-Time, a valid Simulink Real-Time license from MathWorks is required.

This real-time target machine is compatible with MATLAB release R2016a or later.

Kernel version	6.4 or later
IP address	192.168.7.1
Port	22222
Subnet mask	255.255.255.0
Gateway	255.255.255.255
TCP/IP driver	INTEL_I210

USB Support	Disabled
Multicore CPU	Enabled
Graphics mode	Enabled

Further information on how to transfer the Simulink Real-Time kernel version for the respective MathWorks software release to your target machine and to change the IP settings of your target machine is available in the Software Configuration Guide.

For more information about the Simulink-Real-Time software and drivers for the installed I/O modules, refer to the individual I/O Module User Manuals and Simulink Driver Block Manuals. These are available at www.speedgoat.com/help.

Kernel Settings

Use the **Real-Time Kernel Configuration and Transfer** tool when a new kernel is required, for example, to change the target's IP address. More information about this tool is available at https://www.speedgoat.com/help/page/configuration/refentry_ref_target_setup

When the target driver and ethernet index are set manually, the following settings are required to define the top-left Ethernet port as the host-link.

Target driver	I210
Ethernet index	3

5 Technical Specifications

5.1. Baseline Real-Time Target Machine

The Baseline real-time target machine meets the specifications described in this manual and is designed, manufactured, assembled, and tested in Switzerland.

Product name	Baseline real-time target machine
Type	Baseline Education
Country of origin	Switzerland
Operating temperature of components	0 °C to +60 °C (32 °F to +140 °F) ExtTemp (item ID 107110) -40 °C to +85 °C (-40 °F to +185 °F)
Humidity	10 % to 90 %
Weight	2.6 kg

5.2. Enclosure

Dimensions	Width: 210 mm Depth: 190 mm Height: 80 mm
Fans	Fanless design. Passive cooling

5.3. External Power Supply

Manufacturer	EA10681V-240
Product	AC/DC switching adapter EA10681V-240
AC input	100-240 V AC, 2 A, 50-60 Hz
DC output	24 V DC, 3A max

5.4. Power Input

Input voltage range	8 to 36 VDC (12 V ± 33 % to 30 V ± 20 %)
Input power	70W

The input power must be limited for safety reasons according to standard IEC 61010-1 section 9.4 (limited-energy circuit). This can be achieved by:

- Limiting input power to a maximum 100 W or
- Using overcurrent protection devices disconnecting in less than 120s

$$Current\ [A] = \frac{125[VA]}{Supply\ Volatge\ [V]}$$

Speedgoat recommends using the external power supply delivered optionally with the machine (EDAC Power Electronics AC/DC Adapter EA10681V-240).

Alternatively, a Limited Power Source (LPS) power supply according to standards IEC 60950-1 or IEC 62368-1 Annex Q can be used.

DC-/GND must be connected to PE (protective earth).

The DC cable used to connect the LPS and the Baseline real-time target machine must not exceed 3 m and must only be used for this purpose.

5.5. Mainboard

Revision type	REV 4
CPU	Intel Celeron® J1900, Quad Core, 2 GHz, 2 MiB L2 Cache
CPU Option	Intel AtomTM E3845, Quad Core.1.91 GHz, 2 MiB L2 Cache (ItemID 107110)
Chipset	Integrated
System memory	4 GiB DDR3 Non-ECC Bundle
Graphics (standard)	Intel HD Graphics, 688 – 854 MHz
Ethernet	4x Intel I210 PCI Express Gigabit Ethernet controllers
Serial ATA	1x mSATA 2.0
mPCIe slots	4x mPCIe slots
PCI bus clock	33/66 MHz
Accessible I/O ports	1x PS/2 keyboard 1x USB 3.0/2.0/1.1 2x USB 2.0/1.1 2x RS232 1x DisplayPort 4x Gigabit Ethernet ports (3x external RJ45, 1x internal FCI) 1x Ignition (with power and reset control)
BIOS	AMI BIOS

5.6. SSD Storage

Manufacturer	Advantech
Product	SQF-SMSM4-32G-S9E
Size	64 GB SSD
Options	128 GB SSD (ItemID 107251) 256 GB SSD (ItemID 107252)

5.7. Thermal Design

5.7.1. Passive Cooling

The Baseline real-time target machine is convection cooled by the heat sink surrounding the device. All relevant internal heat sources are thermally connected to the aluminum chassis.

There are no fans inside the machine. For heat dissipation, convection-cooled systems require a constant airflow around the enclosure. Do not place this unit in a closed box without air circulation.

When operating above the maximum ambient temperature defined in section 2.2, the target machine can become hot. However, the temperature may still be acceptable for the electronic components; for example, an automatic shutdown of the complete unit is only required if the CPU temperature exceeds 125 °C. For many other components, a shutdown is required if the temperature exceeds 85 °C.
In such extreme conditions, follow these instructions:

- Do not touch the chassis with bare skin
- Keep the machine away from heat-sensitive objects
- Install external ventilation to ensure airflow through the silver fins

For most applications, despite the machine getting warm, you will still be able to handle it without any risk of injury.

5.7.2. Over Temperature Shutdown Procedure

The internal temperature is measured in several locations. If an over temperature is detected, the supervision shuts down the system.

After a shutdown, please press the power button once. Solely cycling the power input will not restart the machine.

5.8. LED Status Indicators

5.8.1. Power LED

The **Power** LED indicates the power state.

LED Behavior	Explanation
ON (Blue)	The machine is in ACPI power state S0 (Working) and the CPU temperature is below 100 °C

5.8.2. SSD LED

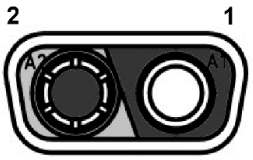
The **SSD** LED monitors the hard drive (SSD) activity.

LED Behavior	Explanation
Blinking (Blue)	The mSATA SSD is active.

5.9. Power Connectors

5.9.1. Power Input Connector

Pin	Description
1	Positive DC input voltage
2	Ground for DC input voltage



One of each of the components in the table below is required to assemble a complete mating connector:

Component	Item ID	Manufacturer/Supplier
Metal shell	970-009-040R011	NorComp/Mouser
Connector	302W2CPXX99A10X	CONEC/Mouser
High Power Contact M	131C11029X	CONEC/Mouser
High Power Contact F	132C11029X	CONEC/Mouser

5.9.2. 5 V Output Pins

If the Baseline is delivered with an I/O module providing a 5 V output, the 5 V are provided by the mainboard through internal cabling. The power distribution switch on the mainboard has the following characteristics.

- Thermal and short-circuit protection
- 1 A continuous current
- 1.9 A current limit
- 0.6 ms typical rise time

All 5 V outputs are connected in parallel, meaning the current is split up between the outputs.

5.10. Standard I/O Connectors

The following I/O connectors can be used with Simulink Real-Time.

All the connectors are ESD protected.

5.10.1. Keyboard

Port	Supported Mode
Keyboard	Standard PS/2 keyboard input for BIOS, Bootloader, DOS, and Simulink Real-Time/shell (depending on configuration)

5.10.2. Video

Port	Signal Supported
DisplayPort	Supports resolutions up to 2560x1600 at 60 Hz Dual mode DisplayPort supports external passive DisplayPort to DVI, DisplayPort to VGA or DisplayPort to HDMI adapters

Only one monitor can be used. Simulink Real-Time (**MATLAB R2020a and earlier**) requires a minimum 1280x1024x16-bit resolution standard VESA monitor for the graphics mode.

5.10.3. Ethernet Controllers

Port	Bus Index[a]	Controller	Driver	Usage
FCI LAN	0	Intel I210	I210	Not externally accessible
ETH 1	1	Intel I210	I210	Communication protocols
ETH 2	2	Intel I210	I210	Communication protocols
Host Link	3	Intel I210	I210	Host Link

[a] **MATLAB R2020a and earlier:** the Bus index indicates the order in which the Ethernet controllers are numbered on the PCI Bus. For the Bus/Slot configuration of your real-time target machine, refer to the Configuration and Testing Information document.

5.10.4. Supported Functionality

Please refer to the Ethernet Interfaces page in the Speedgoat Help documentation.

MATLAB R2020a and earlier: Refer to the Speedgoat Help documentation in your MATLAB installation. Navigate to the **Ethernet, UDP and PTP** page in the **Communication Protocols** section.

5.10.5. Serial I/O

The Baseline real-time target machine by default provides 2 x RS232 ports. Drivers for on-board serial communication are available in the `slrealtimelib` (`slrtlib` for **MATLAB R2020a and earlier**) library.

Port	Address	IRQ line	Standards supported
COM 1	0x3F8	4	RS232
COM 2	0x2F8	3	RS232

Supports transfer rates for on-board serial ports up to 115.2 kBaud. For faster baud rates with RS232 and RS422/RS485 support, dedicated I/O modules are available from Speedgoat.

5.10.6. USB Support

USB ports are available for the following use cases:

- USB keyboard
- USB UVC webcams. USB 3.0 UVC webcams are supported from MATLAB R2017a up to and including MATLAB R2020a.

MATLAB R2020a and earlier: For USB support to work it must be enabled in the kernel options of the **Real-Time Kernel Configuration and Transfer** tool. Note also that leveraging USB support may introduce additional latencies.

Port	Supported Mode
USB 2.0	2 ports supporting USB 1.1 and USB 2.0
USB 3.0	1 port supporting USB 1.1, USB 2.0 and USB 3.0

5.10.7. I/O Module Connectors

The Baseline Education machine will have different I/O module connectors depending on the I/O module installed.

Connector type	Used for	Max. cable length
M12 17-pin	Digital and Analog Input FPGA functions	< 3 m
D-Sub 9-pin	Serial (RS232/RS422/RS485) Communication busses (CAN, PROFIBUS, etc.)	< 30 m
RJ45	Ethernet & Ethernet based Industrial protocols	> 30 m

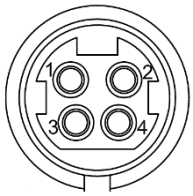
All the connectors are ESD protected.

The pin mapping of the I/O module connectors is described in the I/O module driver block manual or in the I/O module hardware reference manual, which are available on the Speedgoat Customer Portal.

5.10.8. Ignition: Remote Power State Control

The ignition port enables connection to an external ignition key switch to start and stop the machine. It also allows external power- and reset-buttons to be connected.
To use this function, switch it on in the BIOS settings. The default configuration is off.

Pin	Signal
1	Ignition Input
2	Power Button Input
3	Reset Button Input
4	GND (Power Connector 0V)



The Mini-DIN connector counterpart with interlock is available, for example, from Mouser (806-KPPX-4P).

5.10.9. Using the Ignition Input

To activate the target machine, connect the ignition input pin 1 to GND pin 4 using a key switch or toggle switch. To deactivate the machine, leave pin 1 unconnected.

Optionally, the active level for the ignition signal can be inverted by changing both jumper JP1 and JP6 next to the ignition connector on the mainboard to position 1.

5.10.10. Using the Power Button Input

To control the machine with a remote button, simply connect pin 2 and pin 4 to an open push button.

5.10.11. Using the Reset Button Input

To reset the machine with a remote button, simply connect pin 3 and pin 4 to an open push button. A reset button is generally not required, as pressing the power button twice has the same effect.

6 BIOS Configuration

BIOS Vendor	American Megatrends
Version	BT9A3B76.21A
Build date	07/18/2017

6.1. Recommended Speedgoat BIOS Settings

Each Baseline real-time target machine is optimized to provide best real-time performance with Simulink Real-Time. We therefore strongly recommend that the BIOS settings below are not changed. Doing so may reduce real-time performance and change the IRQ assignments.

6.2. Advanced Tab

BIOS Setting	Default Value
PC Health Status	
CPU SmartFan	Disabled
WatchDog Configuration	
WatchDog1 function	Disabled
Super IO Configuration	
Serial Port 1 Config.	
Serial Port	Enabled
Change Settings	Auto
Serial Port 2 Config.	
Serial Port	Enabled
Change Settings	Auto
CPU Configuration	
Intel Virtualization Technology	Disabled
EIST	Disabled
SATA Configuration	
Serial-ATA (SATA)	Enabled
Serial-ATA Port 0	Enabled
Serial-ATA Port 1	Enabled
Network Stack Configuration	
Network Stack	Disabled
CSM Configuration	
CSM Support	Enabled
Boot option filter	UEFI and Legacy
Network	Do not launch
Storage	Legacy only
Video	Legacy only
Other PCI devices	UEFI only
USB Configuration	
Legacy USB Support	Disabled
USB Mass Storage Driver Support	Disabled
Security Configuration	
TXE HMRFPO	Disabled

6.3. Chipset Tab

BIOS Setting	Default Value
North Bridge	
Intel IDG Configuration	
Integrated Graphics	Enabled
LCD Control	
Primary IGFX Boot Display	VBIOS Default
LCD Panel Type	Type 3
LVDS Support	Disabled
Memory Configurations	
Memory ReMap	Disabled
South Bridge	
Azalia HD Audio	
Audio controller	Disabled
PCI Express Configuration	
PCI Express Port 0-3	Enabled
Speed	Auto
Restore AC Power Loss	Last State
Intel I210 controller	Enabled
Global SMI	Enabled
Legacy USB2 SMI	Disabled
SW SMI	Disabled
Sleep SMI	Disabled
Periodic SMI	Disabled
XHCI SMI	Disabled
SW SMI Timer	Disabled
Ignition	Off

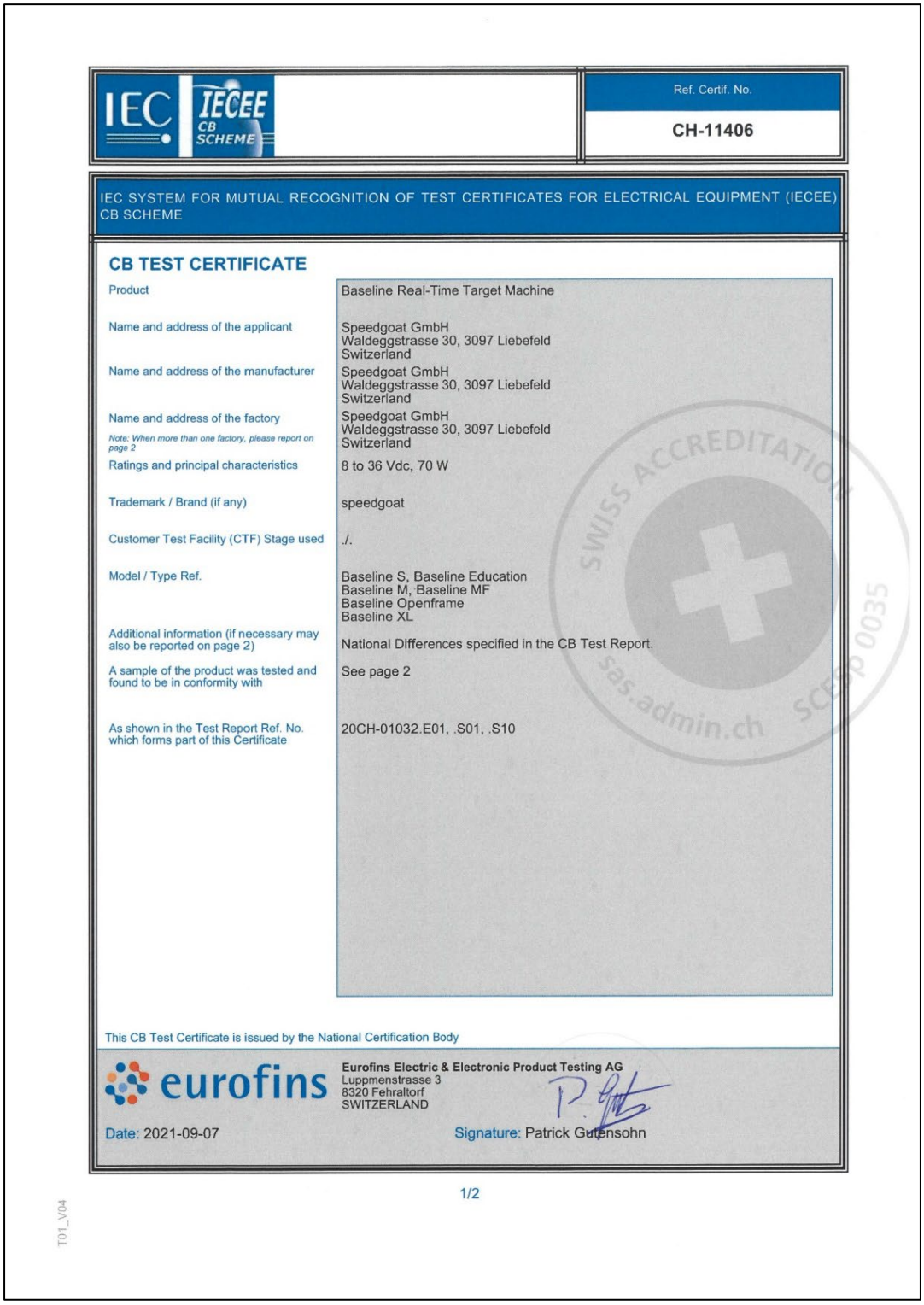
6.4. Boot Tab

BIOS Setting	Default Value
Setup Prompt Timeout	1
Bootup NumLock State	ON
Boot Option #1	SQF-SMSM4-32G-S9E
Hard Drive BBS Priorities	
Boot Option #1	SQF-SMSM4-32G-S9E

7 Compliance

The certificates and declarations of conformity apply to all types and configurations of the Baseline real-time target machine.

7.1. CB Certificate (International)



IEC IECEE CB SCHEME

Ref. Certif. No.
CH-11406

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

CB TEST CERTIFICATE

Product	Baseline Real-Time Target Machine
Name and address of the applicant	Speedgoat GmbH Waldeggstrasse 30, 3097 Liebefeld Switzerland
Name and address of the manufacturer	Speedgoat GmbH Waldeggstrasse 30, 3097 Liebefeld Switzerland
Name and address of the factory *Note: When more than one factory, please report on page 2*	Speedgoat GmbH Waldeggstrasse 30, 3097 Liebefeld Switzerland
Ratings and principal characteristics	8 to 36 Vdc, 70 W
Trademark / Brand (if any)	speedgoat
Customer Test Facility (CTF) Stage used	./.
Model / Type Ref.	Baseline S, Baseline Education Baseline M, Baseline MF Baseline Openframe Baseline XL
Additional information (if necessary may also be reported on page 2)	National Differences specified in the CB Test Report.
A sample of the product was tested and found to be in conformity with	See page 2
As shown in the Test Report Ref. No. which forms part of this Certificate	20CH-01032.E01, .S01, .S10

This CB Test Certificate is issued by the National Certification Body

eurofins

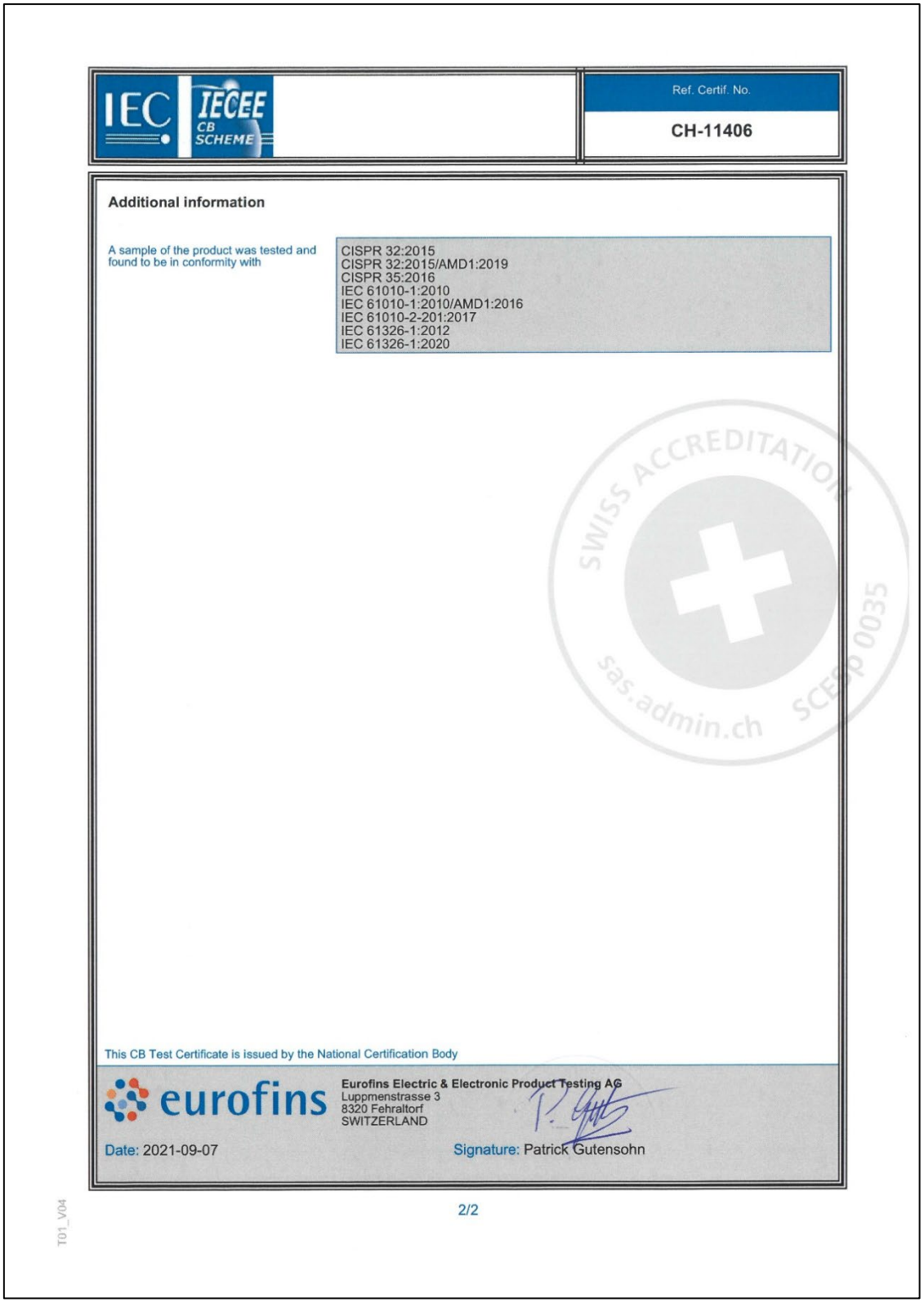
Eurofins Electric & Electronic Product Testing AG
Luppmenstrasse 3
8320 Fehraltorf
SWITZERLAND

Date: 2021-09-07

Signature: Patrick Gutensohn

1/2

T01_V04



IEC IECEE CB SCHEME

Ref. Certif. No.

CH-11406

Additional information

A sample of the product was tested and found to be in conformity with

CISPR 32:2015
CISPR 32:2015/AMD1:2019
CISPR 35:2016
IEC 61010-1:2010
IEC 61010-1:2010/AMD1:2016
IEC 61010-2-201:2017
IEC 61326-1:2012
IEC 61326-1:2020

This CB Test Certificate is issued by the National Certification Body

eurofins

Eurofins Electric & Electronic Product Testing AG
Luppmenstrasse 3
8320 Fehraltorf
SWITZERLAND

Date: 2021-09-07

Signature: Patrick Gutensohn

2/2

T01_V04

7.2. CE Declaration of Conformity (Europe)

speedgoat
real-time simulation and testing

Speedgoat GmbH
Waldeggstrasse 30
3097 Liebefeld
Switzerland

Phone: +41 26 670 75 50
Fax: +41 26 670 75 58
www.speedgoat.com

Declaration of CE Conformity

Product **Baseline real-time target machine**

Type Baseline S, Baseline Education, Baseline M, Baseline MF
Baseline Openframe, Baseline XL

Speedgoat GmbH, Switzerland as the manufacturer herewith declares on its sole responsibility that all above referenced product types comply with all relevant harmonized Union health, safety, and environmental legislations, as follows:

- ✓ EMC Directive 2014/30/EU
- ✓ Low Voltage Directive (LVD) 2014/35/EU
- ✓ RoHS 2 Directive 2011/65/EU incl. amendment 2015/863
- ✓ REACH Regulation EC No 1907/2006, SVHC 2021 list

Leveraged EMC and Safety Harmonized Standards

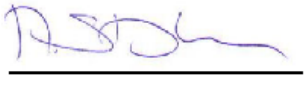
European Standards	Year	Description
IEC 61010-1:2010 including AMD1:2016	2010 2016	Safety of electrical equipment for measurement, control, and laboratory use. Including 2016 amendment.
IEC 61010-2-201:2017	2017	Safety of electrical equipment, focus on control equipment.
IEC 61326-1:2012 IEC 61326-1:2020	2012 2020	Immunity and emission for electromagnetic compatibility (EMC) of electrical equipment for measurement, control and laboratory use.
CISPR 32:2015 including AMD1:2019	2015 2019	Electromagnetic compatibility - Emission requirements. Including 2019 amendment.
CISPR 35:2016	2016	Electromagnetic compatibility - Immunity requirements.

RoHS Conformity
Speedgoat herewith declares that all above referenced product types comply with RoHS 2 directive 2011/65/EU and amendment 2015/863.

REACH Conformity
Speedgoat is considered a "downstream user". All products are non-chemical goods. Under normal and foreseeable application, products shall not release any substances. Speedgoat will inform should a product contain any substances on the SVHC list with a concentration above 0.1% of product weight.

As per the certified Speedgoat management systems for quality (ISO9001), environmental (ISO14001), and health and safety (Swiss VSAS EKAS), Speedgoat installed procedures to continuously monitor and meet relevant legislation.

Liebefeld, 14. September 2021



Martin Stoller
CEO

7.3. UKCA Declaration of Conformity (United Kingdom)

speedgoat
real-time simulation and testing

Speedgoat GmbH
Waldeggstrasse 30
3097 Liebefeld
Switzerland

Phone: +41 26 670 75 50
Fax: +41 26 670 75 58
www.speedgoat.com

Declaration of UKCA Conformity

Product **Baseline real-time target machine**

Type Baseline S, Baseline Education, Baseline M, Baseline MF
Baseline Openframe, Baseline XL

Speedgoat GmbH, Switzerland as the manufacturer herewith declares on its sole responsibility that all above referenced product types comply with all relevant Statutory Instruments and their amendments as follows:

- ✓ 2016 No 1091 The Electromagnetic Compatibility Regulations 2016
- ✓ 2016 No 1101 The Electrical Equipment Safety Regulations 2016
- ✓ 2012 No 3032 The Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
- ✓ 2020 No 1577 The REACH etc. (Amendment etc.) (EU Exit) Regulations 2020

Leveraged EMC and Safety Harmonized Standards

European Standards	Year	Description
IEC 61010-1:2010	2010	Safety of electrical equipment for measurement, control,
including AMD1:2016	2016	and laboratory use. Including 2016 amendment.
IEC 61010-2-201:2017	2017	Safety of electrical equipment, focus on control equipment.
IEC 61326-1:2012	2012	Immunity and emission for electromagnetic compatibility
IEC 61326-1:2020	2020	(EMC) of electrical equipment for measurement, control and laboratory use.
CISPR 32:2015	2015	Electromagnetic compatibility - Emission requirements.
including AMD1:2019	2019	Including 2019 amendment.
CISPR 35:2016	2017	Electromagnetic compatibility - Immunity requirements.

RoHS Conformity
Speedgoat herewith declares that all above referenced product types comply with The Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 and their amendments.

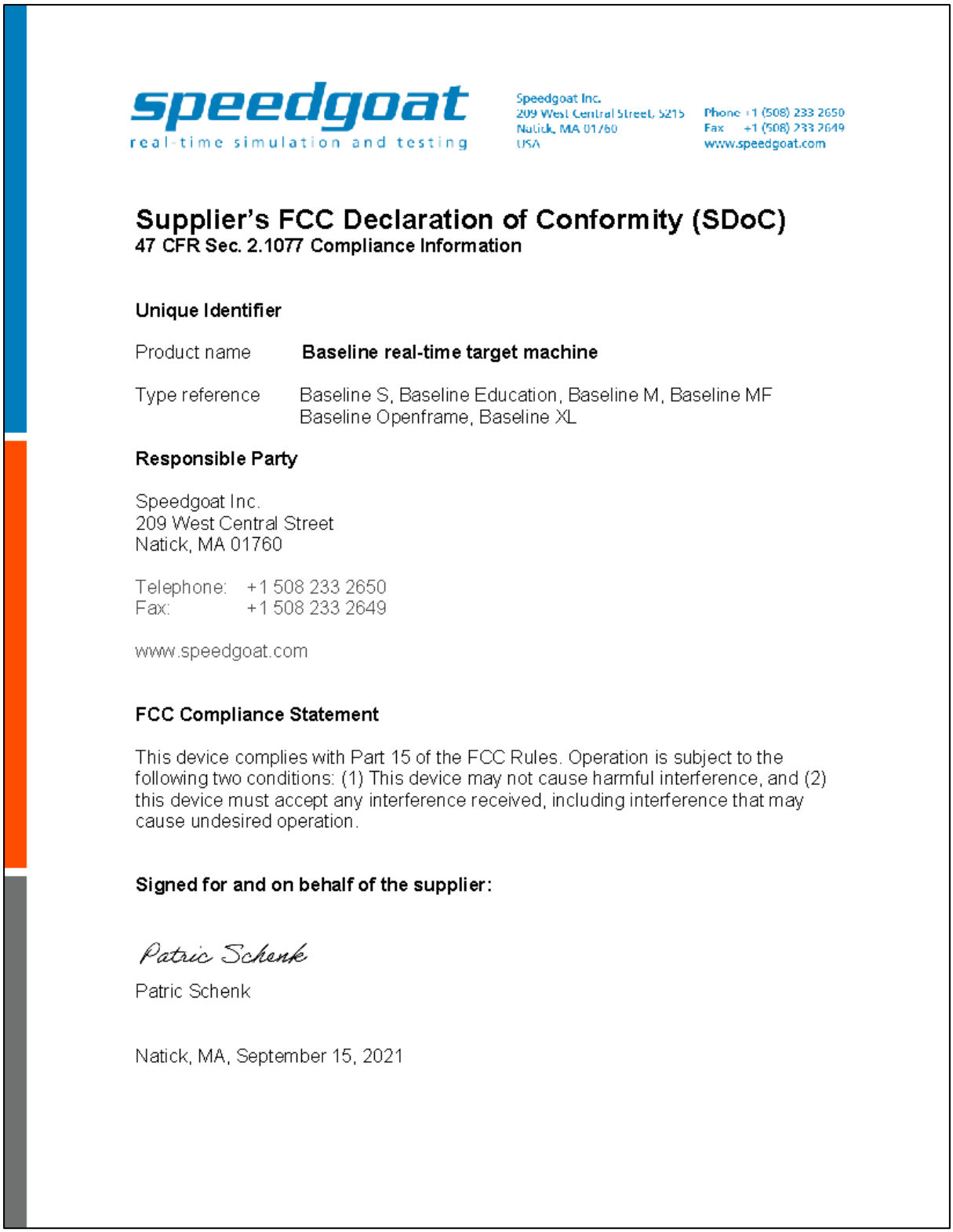
REACH Conformity
Speedgoat is considered a "downstream user". All products are non-chemical goods. Under normal and foreseeable application, products shall not release any substances. Speedgoat will inform should a product contain any substances on the SVHC list with a concentration above 0.1% of product weight.

As per the certified Speedgoat management systems for quality (ISO9001), environmental (ISO14001), and health and safety (Swiss VSAS EKAS), Speedgoat installed procedures to continuously monitor and meet relevant legislation.

Liebefeld, 14. September 2021

Martin Stoller
CEO

7.4. FCC Supplier Declaration of Conformity (U.S.)



speedgoat
real-time simulation and testing

Speedgoat Inc.
209 West Central Street, 5215
Natick, MA 01760
USA
Phone +1 (508) 233 2650
Fax +1 (508) 233 2649
www.speedgoat.com

Supplier's FCC Declaration of Conformity (SDoC)
47 CFR Sec. 2.1077 Compliance Information

Unique Identifier

Product name **Baseline real-time target machine**

Type reference Baseline S, Baseline Education, Baseline M, Baseline MF
Baseline Openframe, Baseline XL

Responsible Party

Speedgoat Inc.
209 West Central Street
Natick, MA 01760

Telephone: +1 508 233 2650
Fax: +1 508 233 2649

www.speedgoat.com

FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Signed for and on behalf of the supplier:

Patric Schenk

Patric Schenk

Natick, MA, September 15, 2021

7.4.1. Important Information Related to FCC SDoC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: any changes or modifications not expressly approved by the responsible party could void the user's authority to operate this equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

8 Legal

As used herein, the term "Seller" shall mean Speedgoat GmbH, and term "Buyer" shall mean the person, firm or corporation executing a purchase order for "goods", sold by Seller (hereinafter "Products").

8.1. Limited Warranty

Seller warrants that the Products delivered hereunder shall be free from defects in workmanship and material under normal use and wear in accordance with Seller's instructions and specifications for a period of twenty-four (24) months from date of delivery to the Buyer, including component parts of Products sold as spare, replacement, maintenance or storage parts, which are also warranted for twenty-four (24) months from date of delivery, provided, however, in either case, that notice of any such defect is provided to Seller within thirty (30) days of its discovery by the Buyer. THE WARRANTY SET FORTH IN THIS SECTION SHALL BE IN LIEU OF ALL OTHER WARRANTIES, AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, AND FITNESS FOR ORDINARY PURPOSE USED OR PURPOSE INTENDED, ARE EXCLUDED. IN NO EVENT SHALL SELLER, ITS EMPLOYEES OR SUPPLIERS BE LIABLE, EITHER DIRECTLY OR BY WAY OF INDEMNIFICATION, TO BUYER OR ANY THIRD PARTY FOR (A) AN AMOUNT EXCEEDING THE PURCHASE PRICE OF THE PRODUCT IN QUESTION AND (B) ANY PUNITIVE, EXEMPLARY, SPECIAL, INDIRECT OR CONSEQUENTIAL LOSSES, DAMAGES OR INJURIES regardless of whether such claim is based upon delays in delivery or payment, breach of warranty, breach of contract, strict liability, negligence, or any theory now known or hereinafter adopted by legislation or by any court. Neither Seller nor its affiliates shall be liable for any damage or loss to exposure of Products and/or their packaging to the elements (including but not limited to rain, snow, sleet, sun, wind, floods, etc.); chemicals, corrosive solvents or soils; unauthorized or improper use, maintenance, storage or repair; due to any failure to follow Seller's manuals, warnings, notices or instructions; or due to any malfeasance, recklessness or negligence by Buyer, any employee or costumer of Buyer or any other third party.

EXCLUSIVE REMEDY: In any event, the Buyer's exclusive remedy hereunder is limited to the furnishing of replacement parts on an exchange basis, or, at the option of Seller, to the repair or replacement of defective Products or replacement parts at one of Seller's locations, but in either case only if the defective Product or part has been submitted to Seller during the period of warranty. The Buyer accepts and acknowledges that the foregoing allocation of risk is reflected in the purchase price.

The parties further agree that if any portion of the foregoing exclusion of damages is held to be voidable or void by reason of public policy or unenforceable for any other reason whatsoever, all remaining portions of the foregoing exclusion shall continue in effect.

THE WARRANTY SET FORTH ABOVE DOES NOT EXTEND TO: Any systems which have been damaged or rendered defective as a result of accident, misuse, or abuse; by the use of parts not manufactured, authorized or sold by Seller; by modification or as a result of service by anyone other than Seller; systems not containing original components or original replacement of components; damage during shipment, unless due to incorrect packaging by Seller; systems which fail or are damaged after delivery due to shipment, handling, storage, operation, use or maintenance in manner or environment not conforming to any published instructions or specifications issued by Seller.

In-warranty repaired or replacement parts or Products are covered by warranty only for the remaining unexpired portion of the original warranty period applicable to the repaired or replaced parts or Products. In other words, repair or replacement of Products or parts under warranty does not extend the original warranty period.

Products that are no longer part of the regular sales offering are considered EOL (end-of-life) and are repaired on a best-effort basis.

EXTENDED HARDWARE WARRANTY SERVICE

Extended Hardware Warranty Service is available as an option and must be purchased at the time the Products are purchased for which the warranty shall be extended.

The **Level One Hardware Warranty Service** extends the standard 24-month warranty period by 12 months resulting in a 36-month warranty period.

The **Level Two Hardware Warranty Service** extends the standard 24-month warranty period by 36 months resulting in a 60-month warranty period.

Hardware warranty terms exceeding the 60-month range are available on request.

8.2. Return

Buyer shall not return any Product without Seller's prior written consent. An R.M.A. (Return Material Authorization) number issued by Seller must accompany all returned material. An RMA number can be obtained by contacting the Seller's support department (support@speedgoat.com).

Within Warranty, Products returned and needing corrective repair are serviced at no-charge in accordance with the terms of Seller's Warranty policy.

Repairs on out of Warranty Products are performed at Buyer's expense.

Please pack the returned Products in their original shipping cartons, or in equivalent strong protective shipping cartons. Shipping costs from Buyer to Seller associated with warranty repairs or replacements shall be borne by the Buyer. Shipping costs for the return of repaired goods from Seller to Buyer shall be borne by Seller.

8.3. Systems Software Maintenance and Support Services

Delivery of Seller systems and hardware/software components by default include 12 months (1 year) of Systems Software Maintenance and Support Services.
Subscription to Systems Software Maintenance and Support Services includes access to Seller tools and driver software compatible with future releases of MathWorks software and professional technical support by phone and e-mail.

Subscription to Systems Software Maintenance and Support Services does not include free updates of existing custom implementations (FPGA bitstreams).

Software Maintenance and Support Renewal
For uninterrupted Systems Software Maintenance and Support Services in subsequent years Buyer may opt to renew its subscription annually to maintain its investment. Reinstatement if elapsed is possible on request, but incurs back maintenance charges of up to 6 months. Staying subscribed is the most cost-effective way to access latest advances and technical support.

8.4. Use of Speedgoat Software Including Tools and Drivers

LEGAL INFORMATION ABOUT THE USE OF SPEEDGOAT TOOLS AND DRIVERS: Speedgoat tools and drivers are optimized for hardware purchased from Seller and may be used only in conjunction with the hardware (serial no.) for which the tools and drivers were purchased for. Access to the Speedgoat tools and drivers is only available if the target machine component has active subscription to Systems Software Maintenance and Support Services.

Terms and Conditions for software components are defined in the Speedgoat End-User License Agreement (EULA).