



SPIiPlusEC MPU Only

Installation Guide

September 2020

Document Revision: 3.03

SPiiPlusEC MPU Only

Release Date: September 2020

COPYRIGHT

© ACS Motion Control Ltd., 2020. All rights reserved.

Changes are periodically made to the information in this document. Changes are published as release notes and later incorporated into revisions of this document.

No part of this document may be reproduced in any form without prior written permission from ACS Motion Control.

TRADEMARKS

ACS Motion Control, SPiiPlus, PEG, MARK, ServoBoost, NetworkBoost and NanoPWN are trademarks of ACS Motion Control Ltd.

EtherCAT is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Any other companies and product names mentioned herein may be the trademarks of their respective owners.

www.acsmotioncontrol.com

support@acsmotioncontrol.com

sales@acsmotioncontrol.com

NOTICE

The information in this document is deemed to be correct at the time of publishing. ACS Motion Control reserves the right to change specifications without notice. ACS Motion Control is not responsible for incidental, consequential, or special damages of any kind in connection with using this document.

Revision History






Date	Revision	Description
November 2020	3.03	CTIME Table
September 2020	3.02	Corrected pinout of power supply
March 2019	2.70	Corrected part number of mating connector Added Real-time Performance Mode
January 2018	1.30	Updated ordering options
January 2018	1.20	Added reference to COM2 for running the MMI Application Studio Upgrade and Recovery Wizard Recovery Task
July 2017	1.10	Removed SPiiPlus ADK Suite software disc from package contents
March 2017	1.00	First release

Conventions Used in this Guide

Text Formats

Format	Description
Bold	Names of GUI objects or commands
BOLD + UPPERCASE	ACSPL+ variables and commands
Monospace + grey background	Code example
<i>Italic</i>	Names of other documents
Blue	Hyperlink
[]	In commands indicates optional item(s)
	In commands indicates either/or items

Flagged Text

	Note - includes additional information or programming tips.
	Caution - describes a condition that may result in damage to equipment.
	Warning - describes a condition that may result in serious bodily injury or death.
	Model - highlights a specification, procedure, condition, or statement that depends on the product model
	Advanced - indicates a topic for advanced users.

Related Documents

Documents listed in the following table provide additional information related to this document.

Authorized users can download the latest versions of the documents from

www.acsmotioncontrol.com/downloads.

Document	Description
<i>SPiiPlus ACSPL+ Programmer's Guide</i>	Provides practical instruction on how to use ACSPL+ to program your motion controller.
<i>SPiiPlus Variable and Reference Guide</i>	Describes all of the variables and GUIs available in the ACSPL+ programming language.
<i>SPiiPlus MMI Application Studio User Guide</i>	Explains how to use the SPiiPlus MMI Application Studio and associated monitoring tools.
<i>EtherCAT Network Diagnostics</i>	An application note describing how to perform diagnostics of the EtherCAT network.
<i>SPiiPlus Setup Guide</i>	Provides guidance on how to configure and adjust the SPiiPlus systems to work with supported types of motors and feedback devices.

Table of Contents

1. Introduction	8
1.1 Overview	8
1.1.1 Description	8
1.1.2 Communication Channels	8
1.1.3 Connectors	9
1.1.4 Order Part Number	10
1.1.5 Package Content	11
2. Mounting and cooling the SPiiPlusEC MPU	12
2.1 Mounting	12
2.2 Cooling	12
3. Connector Descriptions	14
3.1 Power Supply	14
3.2 COM1, COM2	15
3.3 ETH1, ETH2, ETH3	16
4. Specifications	18
4.1 Power Supply	18
4.2 Performance	18
4.3 EtherCAT Cycle Rate	19
4.4 Environmental	20
4.5 Dimensions	20
4.6 Compliance with Standards	20

List Of Figures

Figure 2-1. SPiiPlusEC MPU interface	8
Figure 2-2. SPiiPlusEC MPU Only connections	9
Figure 2-3. Label with orderd P/N example	10
Figure 2-4. Dimensional diagram	12

List of Tables

Table 2-1. SPiiPlusEC MPU Only connections	9
Table 2-2. Configuration as indicated by P/N	10

Table 2-3. Power supply connector pinout	14
Table 2-4. COM1, COM2 connector pinout	15
Table 2-5. ETH1, ETH2, ETH3 connector pinout	17
Table 2-6. CTIME Values for SPiiPlusEC (Rev. B and later) Controller	19

1. Introduction

This document describes the installation information for the SPiiPlusEC MPU including electrical interfacing, device compatibility, mounting, and ventilation.

SPiiPlusEC MPU is supported by ACS Motion Control' firmware SPiiPlusNT-SC Ver. 2.27 and higher.

1.1 Overview

This section provides an overview of the SPiiPlusEC MPU (SPiiPlus External Controller), the available product options and associated kits and accessories.

1.1.1 Description

The SPiiPlusEC MPU is a single board motion processing unit. It is equipped with a powerful MPU (Intel® Atom™ N2600 1.6 GHz) and provides enhanced processing power.

The SPiiPlusEC MPU supports these features:

- > Processing power for 8 axes at 5kHz.
- > Two EtherCAT ports to support network failure detection and recovery (*NetworkBoost™*).
- > One Ethernet host communication, up to 1GbE.
- > Two RS232 serial communication ports.

Figure 2-1 shows the interfaces for the SPiiPlusEC MPU:

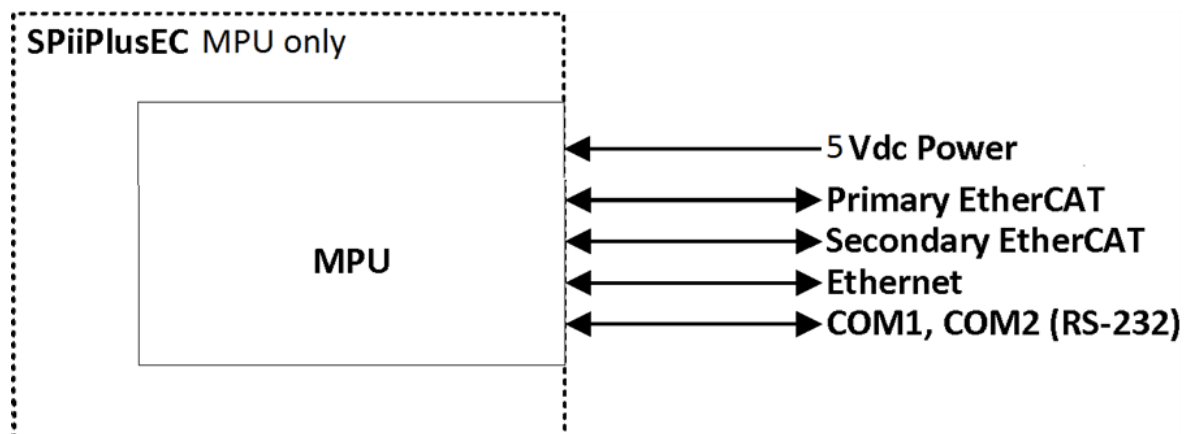


Figure 2-1. SPiiPlusEC MPU interface

1.1.2 Communication Channels

The SPiiPlusEC MPU supports the following Ethernet communication ports:

- > Connection to host computer using TCP/IP protocol
- > Connection to real-time network components using EtherCAT protocol



Optionally, you can use RS232 serial communication port for communications with the host.

1.1.3 Connectors

Figure 2-2 shows and Table 2-1 describes the connections on the MPU board. For connector specifications see [Connector Descriptions](#).

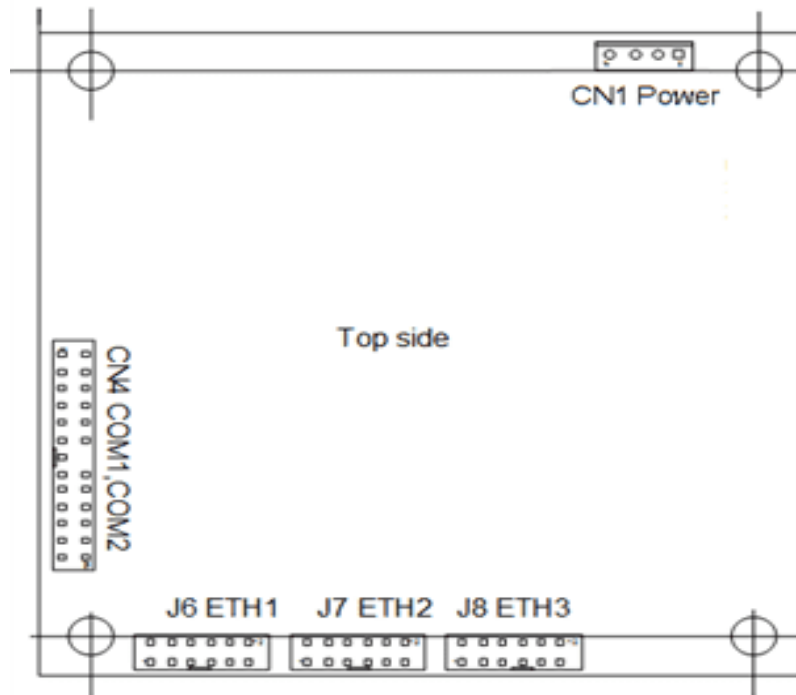


Figure 2-2. SPIIPlusEC MPU Only connections

Table 2-1. SPIIPlusEC MPU Only connections

Connector	Name	Type
CN1	Power	4-pin shrouded header
CN4	COM1 COM2 *see note	2 x 10-pin shrouded header
J6	ETH1	2 x 6-pin shrouded header
J7	ETH2	2 x 6-pin shrouded header
J8	ETH3	2 x 6-pin shrouded header



*When necessary, use RS232 communications on port COM2 to run the MMI Application Studio Upgrade and Recovery Wizard Recovery Task (see the MMI Application Studio User Guide for details).

1.1.4 Order Part Number

The ordering part number (P/N) contains several characters (see [Figure 2-3](#)) that each specify a configuration characteristic ordered for the SPiiPlusEC MPU, as described in [Table 2-2](#).

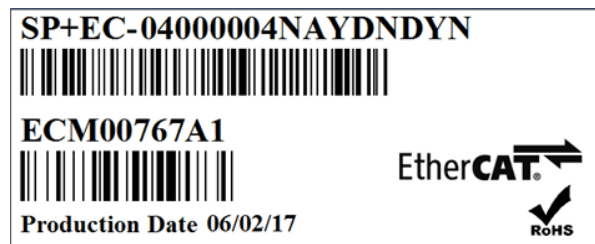


Figure 2-3. Label with ordered P/N example

Table 2-2. Configuration as indicated by P/N

SPiiPlusEC MPU Ordering Options	Field	Example User Selection	Available Ordering Option Values
Maximum number of axes	1	04	2,4,8,16,32,64
ECAT 3rd party Servo Drive	2	00	Up to the maximum number of axes
ECAT 3rd party Step Motor Drive (open & closed loop)	3	00	Up to the maximum number of axes
ECAT 3rd party IO EtherCAT node	4	32	32,64
G-Code	5	N	None (N), G-code only (G)
ServoBoost™ , number of axes supported	6	A	0(N), 4(A), 8(B), 12(C),...60(P), 64(Q)
Input shaping	7	Y	Yes (Y), No (N)
Maximum MPU cycle rate (kHz)	8	D	Default (D), 4kHz (4), 5kHz (5)
NetworkBoost™ - flexible configuration	9	N	None (N), NetworkBoost (A), Flexible configuration (B), Both (C)
Number of ACSPL+ buffers/tasks	10	D	Default* (D), 16(A), 32(B), 64 (C)
MPU board only	11	Y	Yes (Y), No (N)

SPiiPlusEC MPU Ordering Options	Field	Example User Selection	Available Ordering Option Values
XL Scan (unit per scanner)	12	N	None(N), 1,2,...9,10(A),11(B),12(C),13(D),14(E),15(F),16(G)

An example Part Number of SP+EC04000004NAYDNDYN, would be set for the configuration described in the following table:

Field		1	2	3	4	5	6	7	8	9	10	11	12
PN	SP+EC	04	00	00	32	N	A	Y	D	N	D	Y	N

* Default number of ACSPL+ buffers/tasks is a function of the number of axis specified (field 1).

Up to 8 axes - 10 buffers, 16 axes - 16 buffers, 32 axes - 32 buffers, 64 axes - 64 buffers

1.1.5 Package Content

The SPiiPlusEC MPU package contains the following items:

- > SPiiPlusEC MPU

2. Mounting and cooling the SPiiPlusEC MPU

2.1 Mounting

When planning the mounting location of the SPiiPlusEC MPU, take into account the following:

- > Unit dimensions (95.9 x 90.2 x 1.6 mm (6.22 x 1.771 x 4.881 in))
- > Allow sufficient clearance

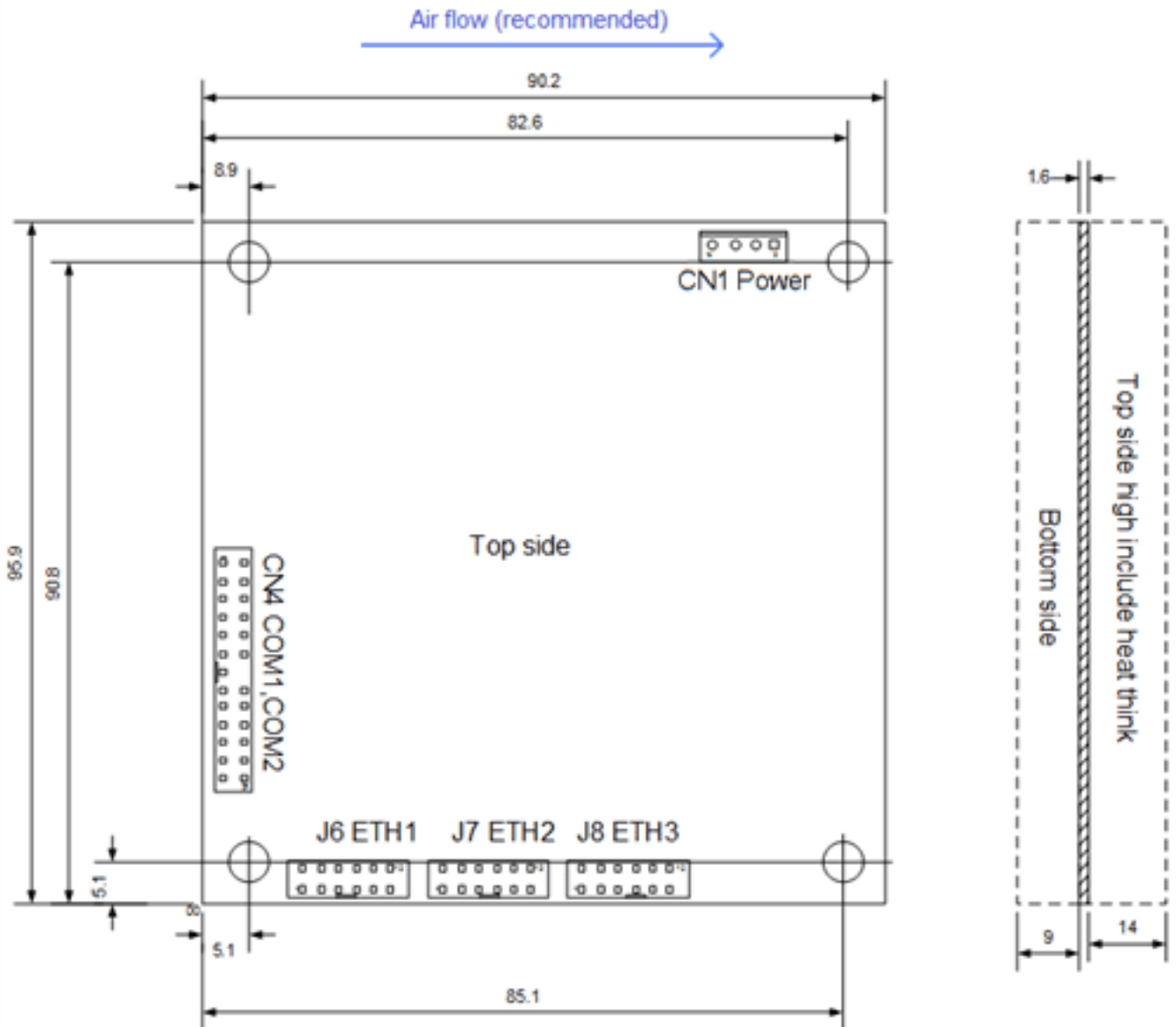


Figure 2-4. Dimensional diagram

2.2 Cooling

For cooling the SPiiPlusEC MPU, take into account the following:

- > The SPiiPlusEC MPU operates in a temperature range of 0°C to +55°C.

- > 10.8 CFM max velocity-controlled fan

3. Connector Descriptions

The following sections describe the specifications of each connector.

3.1 Power Supply

Label: CN1

Connector	
Manufacturer	AMP
Type	Post header Vertical mount 2.5 mm pitch 4 position
P/N	171825-4
	
Mating connector	
Manufacturer	AMP
Type	Socket
P/N	172142-4
	

Table 2-3. Power supply connector pinout

Pin	Description
1	+5V
2	GND
3	GND

Pin	Description
4	Fan speed monitoring input

3.2 COM1, COM2

RS232 Communications Ports

Label: CN4

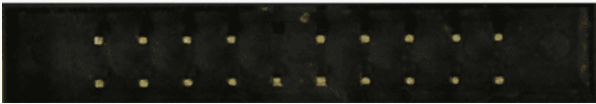
Connector	
Manufacturer	Amtek
Type	SMT Box header Vertical dual row 2.0 mm pitch
P/N	BH2M-26GB U
	
Mating Connector	
Manufacturer	Any - industry standard connector
Type	Socket
P/N	NA

Table 2-4. COM1, COM2 connector pinout

Pin	Description
1	RS232_DCD1
2	RS232_DSR1
3	RS232_RXD1
4	RS232_RTS1
5	RS232_TXD1
6	RS232_CTS1

Pin	Description
7	RS232_DTR1
8	RS232_RI1
9	DGND
10	NC
11	RS232_DCD2
12	RS232_DSR2
13	RS232_RXD2
14	RS232_RTS2
15	RS232_TXD2
16	RS232_CTS2
17	RS232_DTR2
18	RI2
19	DGND
20	NC

3.3 ETH1, ETH2, ETH3

Labels: J6 ETH1, J7 ETH2, J8 ETH3

Connector	
Manufacturer	Molex
Type	SMT Shrouded Header Vertical dual row 2.00mm pitch
P/N	87832-1208
	

Mating Connector	
Manufacturer	Molex
Type	Socket
P/N	51110-1256



Table 2-5. ETH1, ETH2, ETH3 connector pinout

Pin	Description
1	GND (virtual)
2	Speed1000 LED# - cahode(-)
3	LAN#_TX1+ [MDI_PLUS(0)]
4	LAN#_TX1- [MDI_MINUS(0)]
5	LAN#_RX1+ {MDI_PLUS(1)}
6	LAN#_TX2- [MDI_MINUS(2)]
7	Active LED# - cathode(-)
8	LAN#_RX1- {MDI_MINUS(1)}
9	LAN#_TX2+ [MDI_PLUS(2)]
10	Speed100 LED# - cahode(-)
11	LAN#_RX2+ {MDI_PLUS(3)}
12	LAN#_RX2- {MDI_MINUS(3)}

4. Specifications

4.1 Power Supply

Item	Description	Remarks
Input range	5Vdc±5%	In-rush current 4A not more than 10ms
Steady state current	2.2A max	

4.2 Performance

The following table details the SPIiPlusEC MPU processing rate:

Number of axes	Minimum C_Time [ms]	Maximum MPU cycle rate [kHz]
2, 4, 8	0.2	5
2, 4, 8, 16	0.25	4
2, 4, 8, 16, 32	0.5	2
2, 4, 8, 16, 32, 64	1	1

4.3 EtherCAT Cycle Rate

Table 2-6. CTIME Values for SPIIPlusEC (Rev. B and later) Controller

Controller	Number of Built-in Drives	Maximum Number of Axes	Default Number of Available ACSPL+ Buffers**	Maximum Number of Simultaneously Running		Controller Cycle Time					ServoBoost Supported
				Motors	ACSPL+ Buffers	1 (msec) 2 (msec)	0.50 (msec)***	0.25 (msec)*	0.20 (msec)*	Default Value (msec)	
SPIIPlus EC-02-...	-	2	10	2	10	√ ^(2,3)	√ ^(2,3,4)	√ ^(2,3,4)	√ ^(2,3,4)	0.5	√
SPIIPlus EC-04-...	-	4	10	4	10	√ ^(2,3)	√ ^(2,3,4)	√ ^(2,3,4)	√ ^(2,3,4)	0.5	√
SPIIPlus EC-08-...	-	8	10	8	10	√ ^(2,3)	√ ^(2,3,4)	√ ^(2,3,4)	√ ^(1,3,4)	0.5	√
SPIIPlus EC-16-...	-	16	16	16	16	√ ^(2,3)	√ ^(2,3,4)	√ ^(2,3,4)	-	0.5	√
SPIIPlus EC-32-...	-	32	32	32	32	√ ^(2,3)	√ ^(2,3,4)	√ ^(2,3,4)	-	0.5	√
SPIIPlus EC-64-...	-	64	64	64	64	√ ^(2,3)	√ ^(2,3,4)	-	-	1	√

⁽¹⁾ 2-axes Extended Segmented Motion (XSEG) with limitations: a. Segment length > 5 ms, b. IMM VEL = ... command shouldn't be used

⁽²⁾ 6-axes Extended Segmented Motion (XSEG) with limitation: Segment length > 1 ms. The user's responsibility is to ensure that the USAGE doesn't exceed 80%.

⁽³⁾ NetworkBoost (Ring Topology) with limitations: a. CTIME = 1 msec - up to 64 axes b. CTIME = 0.50 msec - up to 24 axes c. CTIME = 0.25 msec - up to 8 axes d. CTIME = 0.20 msec - up to 4 axes

⁽⁴⁾ BPTP/2 command limited to 4 axes or less

*Supported ordering option.

**Up to 64 buffers supported with ordering option.

*** 64 axes with Controller Cycle Time 0.50 (msec) supported with ordering option

4.4 Environmental

Temperature

Operation: 0°C to 55°C with air cooling

Storage: -20°C to +85°C

Relative humidity

Storage: 90%, non-condensing

4.5 Dimensions

- > PC104 form factor
- > 90.2 x 95.9 x 24.6 mm

4.6 Compliance with Standards

RoHS

Design complies with ROHS requirements.

Smarter



Motion

www.acsmotioncontrol.com
ACS Motion Control Ltd.

5 HaTnufa St.
Yokne'am Illit 2066717
Israel
Tel: (+972) (4) 654 6440 Fax: (+972) (4) 654 6443

Contact us: sales@acsmotioncontrol.com | www.acsmotioncontrol.com

