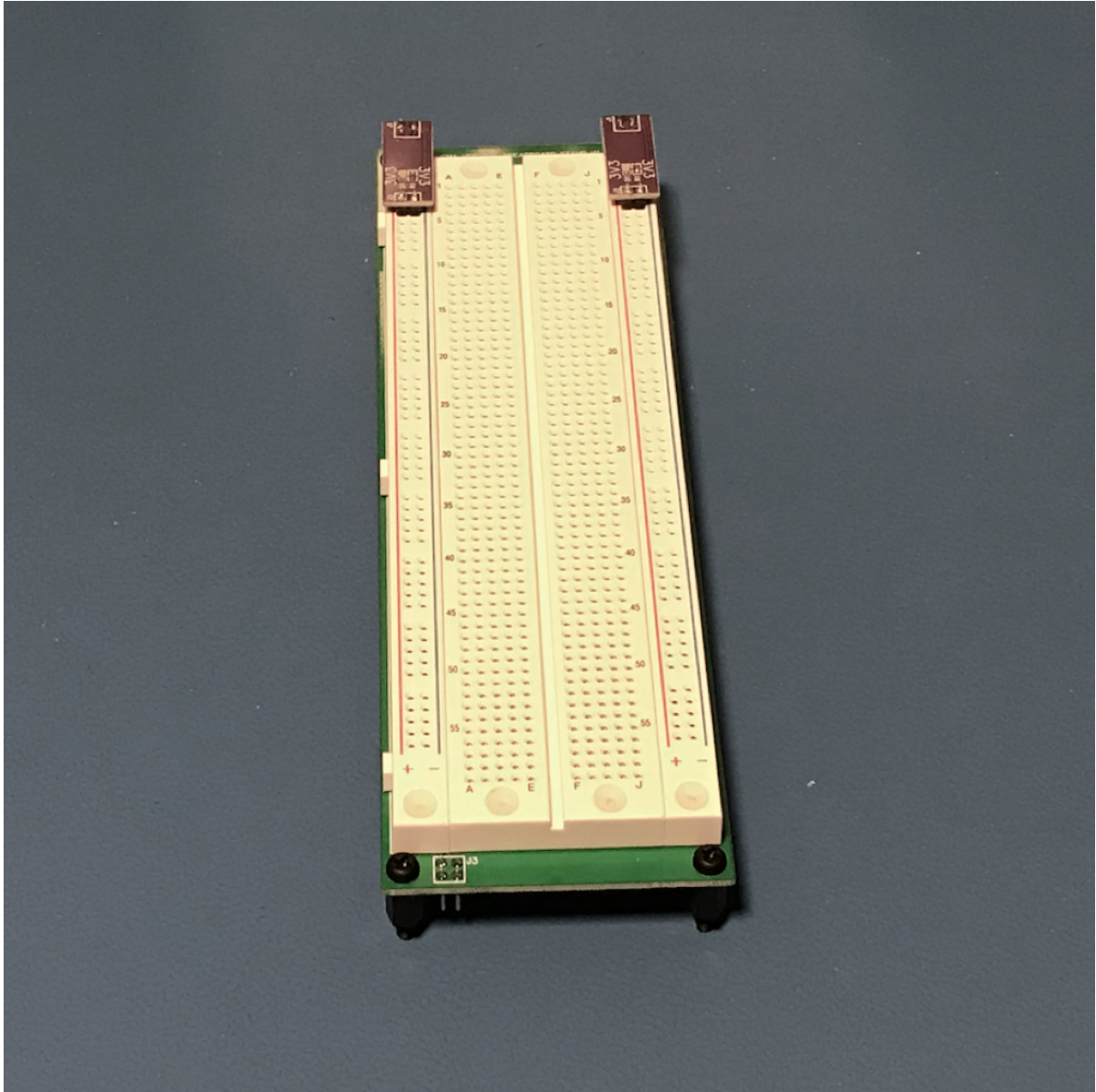


# ASSEMBLY INSTRUCTIONS

## 1012A Vertical Breadboard Stamp



Document control number: 1012-8010

Document date: 2022-12-24

Document revision: 1.0.0-draft.3

ABSTRACT: This document provides instructions on how to assembly and test a 1012A vertical breadboard stamp. A complete bill of materials is included as an annex.

Suggestions and corrections should be directed to <http://www.github.com/dslik/protonema/issues>

Serial number:

Assembly date:

Assembled by:

## 12 USAGE

13 Copyright © 2022 David Slik (VE7FIM). All other trademarks or registered trademarks are the property of their  
14 respective owners.

15 This source describes Open Hardware and is licensed under the CERN-OHL-S v2.

16 You may redistribute and modify this source and make products using it under the terms of the CERN-OHL-S v2  
17 ([https://ohwr.org/cern\\_ohl\\_s\\_v2.txt](https://ohwr.org/cern_ohl_s_v2.txt)).

18 This source is distributed WITHOUT ANY EXPRESS OR IMPLIED WARRANTY, INCLUDING OF MER-  
19 CHANTABILITY, SATISFACTORY QUALITY AND FITNESS FOR A PARTICULAR PURPOSE. Please see the  
20 CERN-OHL-S v2 for applicable conditions.

21 Source location: <https://github.com/dslik/protonema/tree/main/stamps/1012A>

22 As per CERN-OHL-S v2 section 4, the following notice shall be displayed on product packaging and in the product  
23 documentation:

24 "Based on the Protonema Electronics Prototyping and Learning System by David Slik -  
25 <https://www.github.com/dslik/protonema/>"

26 All code fragments, scripts, and sample code in this document are made available under the following license:

27 BSD 3-Clause Software License

28 Copyright (c) 2022, David Slik (VE7FIM).

29 Redistribution and use in source and binary forms, with or without modification, are permitted provided that the  
30 following conditions are met:

31 \* Redistributions of source code must retain the above copyright notice, this list of conditions and the following  
32 disclaimer.

33 \* Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following  
34 disclaimer in the documentation and/or other materials provided with the distribution.

35 \* Neither the name of David Slik (VE7FIM) nor the names of its contributors may be used to endorse or promote  
36 products derived from this software without specific prior written permission.

37 THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY  
38 EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF  
39 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL  
40 THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPE-  
41 CIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT  
42 OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION)  
43 HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR  
44 TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFT-  
45 WARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

## 46 DISCLAIMER

47 The information contained in this publication is subject to change without notice. The author makes no warranty  
48 of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability  
49 and fitness for a particular purpose. The author shall not be liable for errors contained herein or for incidental or  
50 consequential damages in connection with the furnishing, performance, or use of this document.

51

## Revision history

Table 1: Document Revisions

Version	Date	Change	Approver
1.0.0-draft.1	2022-10-28	Initial draft (missing packaging photos)	D. Slik
1.0.0-draft.2	2022-11-22	Added packaging photos (missing sticker photos)	D. Slik
1.0.0-draft.3	2022-12-24	Added remainder of packaging photos	D. Slik

# Table of contents

52

53	<b>I 1012A assembly instructions</b>	<b>1</b>
54	<b>Section 1: Overview</b>	<b>2</b>
55	<b>Section 2: Prerequisites</b>	<b>3</b>
56	2.1 Required safety training . . . . .	3
57	2.2 Required skills training . . . . .	4
58	<b>Section 3: Preparation</b>	<b>5</b>
59	3.1 Workspace . . . . .	5
60	3.2 Project consumables . . . . .	6
61	3.3 Project tools . . . . .	7
62	3.4 Parts preparation . . . . .	10
63	3.4.1 PCBs and PCBAs . . . . .	10
64	3.4.2 Loose components . . . . .	11
65	3.4.3 Packaging materials . . . . .	14
66	<b>Section 4: Assembly</b>	<b>16</b>
67	4.1 1012A assembly . . . . .	16
68	<b>Section 5: Test</b>	<b>20</b>
69	5.1 Visual inspection . . . . .	20
70	5.2 QC final check . . . . .	21
71	5.3 QC PASS . . . . .	22
72	5.4 QC FAIL . . . . .	23
73	<b>Section 6: Packaging</b>	<b>24</b>
74	6.1 1012A packing . . . . .	24
75	<b>Section 7: Clean-up</b>	<b>27</b>
76	7.1 Consumables . . . . .	27
77	7.2 Tools . . . . .	27
78	7.3 Workspace . . . . .	29
79	<b>Section 8: Record keeping</b>	<b>30</b>
80	8.1 1012A record keeping . . . . .	30
81	<b>Section 9: Process improvement</b>	<b>32</b>
82	9.1 Feedback . . . . .	32
83	<b>II 1012A Annexes</b>	<b>33</b>
84	<b>Section 10: Printed Circuit Boards</b>	<b>34</b>
85	10.1 1012-0101 PCB . . . . .	34
86	<b>Section 11: Bill of materials</b>	<b>37</b>
87	11.1 1012A Vertical Breadboard Stamp . . . . .	37
88	11.2 1012A Packaging . . . . .	37
89	<b>Section 12: Reduction of Hazardous Materials</b>	<b>39</b>
90	12.1 MG Chemicals 4900 . . . . .	40
91	12.2 JLC lead-free PCB . . . . .	41
92	12.3 Global Specialties GS-630 . . . . .	42
93	12.4 Global Specialties GS-090 . . . . .	43
94	12.5 Molex 0010897041 . . . . .	44
95	12.6 Connfly DS1023-2*2SF11 . . . . .	45
96	12.7 M3 16mm Nylon Screw . . . . .	46
97	12.8 M3 11mm Nylon Standoff . . . . .	47

98	12.9 M3 5mm Nylon Screw . . . . .	48
99	12.10 M3 Nylon Bolt . . . . .	49

# List of Figures

101	Fig. 1:	Assembly Desk . . . . .	5
102	Fig. 2:	1 pair ESD gloves . . . . .	6
103	Fig. 3:	1 spool MG Chemicals 4900 Lead Free No-Clean Wire Solder Sn96.2Ag2.8Cu0.4 (96.2/2.8/0.4) 20 AWG . . . . .	6
104	Fig. 4:	Tools Container . . . . .	7
105	Fig. 5:	Hozan F-23 components tray . . . . .	7
106	Fig. 6:	1mm flat-head screwdriver . . . . .	8
107	Fig. 7:	3mm Phillips adjustable torque screwdriver . . . . .	8
108	Fig. 8:	ESD tweezers . . . . .	8
109	Fig. 9:	Fine-tipped Sharpie marker . . . . .	9
110	Fig. 10:	Sissors . . . . .	9
111	Fig. 11:	1x 1012-0101 v1.0 - Vertical Breadboard Stamp PCB . . . . .	10
112	Fig. 12:	1x GS-630A - 630 Tie-Point Solderless Breadboard . . . . .	11
113	Fig. 13:	1x GS-090 - 90 Tie-Point Solderless Breadboard (2 pieces) . . . . .	11
114	Fig. 14:	1x 0010897041 - Straight 2x4 2.54mm Black Pin Header . . . . .	11
115	Fig. 15:	2x DS1023-2*2SF11 - 2.54mm by 2.54mm Straight 2x2P Female Headers . . . . .	12
116	Fig. 16:	8x M3 15mm White Nylon Phillips Socket Flat Head Screws . . . . .	12
117	Fig. 17:	12x M3 Black Nylon Nuts . . . . .	12
118	Fig. 18:	4x M3 5mm Black Nylon Phillips Socket Button Head Screws . . . . .	13
119	Fig. 19:	4x M3 11mm+6 Black Nylon Standoffs . . . . .	13
120	Fig. 20:	1x QC Sticker . . . . .	14
121	Fig. 21:	1x Long size anti-static bag . . . . .	14
122	Fig. 22:	1x Small size anti-static bag . . . . .	14
123	Fig. 23:	1x Packing box with foam inserts . . . . .	15
124	Fig. 24:	2x 1012A Stickers . . . . .	15
125	Fig. 25:	Roll of packing tape . . . . .	15
126			
127	Fig. 26:	1012-0101 PCB with rear-mounted connector soldered on. . . . .	16
128	Fig. 27:	1012-0101 PCB with front-mounted connectors soldered on. . . . .	16
129	Fig. 28:	Breadboard with screwdriver used to make holes in the adhesive backing. . . . .	17
130	Fig. 29:	Breadboard with eight screws. . . . .	17
131	Fig. 30:	Breadboard with protective paper removed. . . . .	17
132	Fig. 31:	1012-0101 PCB with aligned breadboard. . . . .	18
133	Fig. 32:	1012-0101 PCB with attached breadboard. . . . .	18
134	Fig. 33:	1012-0101 PCB with nuts attached to breadboard screws. . . . .	18
135	Fig. 34:	1012-0101 PCB with short screws attached to corner standoffs. . . . .	19
136	Fig. 35:	Powered 1012-0101 PCB with illuminated 1012-0201 and 1012-0301 power bridges . . . . .	21
137	Fig. 36:	1012A with QC Passed sticker . . . . .	22
138	Fig. 37:	1012A in anti-static bag. . . . .	23
139	Fig. 38:	1012A in QC Fail bin. . . . .	23
140	Fig. 39:	1012A in anti-static bag. . . . .	24
141	Fig. 40:	Anti-static bag with nylon nuts in the small anti-static bag. . . . .	24
142	Fig. 41:	1012A in anti-static bag with sticker. . . . .	25
143	Fig. 42:	Example photographs of the sealed bag with the serial number written on the sticker . . . . .	25
144	Fig. 43:	1012A in box. . . . .	25
145	Fig. 44:	1012A in box, sealed with ESD tape. . . . .	26
146	Fig. 45:	1012A in box with sticker. . . . .	26
147	Fig. 46:	1012A in box with sticker with serial number. . . . .	26
148	Fig. 47:	Clean assembly workstation . . . . .	29
149	Fig. 48:	Example of serial number on document cover . . . . .	30
150	Fig. 49:	1012-0101 PCB Front . . . . .	35
151	Fig. 50:	1012-0101 PCB Rear . . . . .	36

# List of Tables

152

153	Table 1:	Document Revisions . . . . .	ii
154	Table 2:	Safety training . . . . .	3
155	Table 3:	Skills training . . . . .	4
156	Table 4:	Prepare workspace . . . . .	5
157	Table 5:	Assembly consumables . . . . .	6
158	Table 6:	Assembly tools . . . . .	7
159	Table 7:	PCBs and PCBAs . . . . .	10
160	Table 8:	Loose components . . . . .	11
161	Table 9:	Packaging materials . . . . .	14
162	Table 10:	1012A assembly steps . . . . .	16
163	Table 11:	1012A visual inspection . . . . .	20
164	Table 12:	1012A QC final check . . . . .	21
165	Table 13:	1012A QC approval . . . . .	22
166	Table 14:	1012A QC fail . . . . .	23
167	Table 15:	1012A packaging . . . . .	24
168	Table 16:	Consumables cleanup . . . . .	27
169	Table 17:	Tools cleanup . . . . .	27
170	Table 18:	Workspace cleanup . . . . .	29
171	Table 19:	1012A record keeping . . . . .	30
172	Table 20:	1012-0101 PCB . . . . .	35
173	Table 21:	1012A parts . . . . .	37
174	Table 22:	1012A packing parts . . . . .	37
175	Table 23:	MG Chemicals 4900 RoHS Compliance . . . . .	40
176	Table 24:	JLC PCB RoHS Compliance . . . . .	41
177	Table 25:	Global Specialties GS-630 . . . . .	42
178	Table 26:	Global Specialties GS-090 . . . . .	43
179	Table 27:	Molex 0010897041 RoHS Compliance . . . . .	44
180	Table 28:	Connfly DS1023-2*2SF11 Compliance . . . . .	45
181	Table 29:	M3 15mm Nylon Screw RoHS Compliance . . . . .	46
182	Table 30:	M3 11mm Nylon Standoff RoHS Compliance . . . . .	47
183	Table 31:	M3 5mm Nylon Screw RoHS Compliance . . . . .	48
184	Table 32:	M3 Nylon Bolt RoHS Compliance . . . . .	49

## Part I

# 1012A assembly instructions

# Section 1

## Overview

This document describes the materials, processes, outcomes and verifications required to successfully assemble and test a 1012A vertical breadboard stamp, a sub-component of the Protonema electronics prototyping and learning system.

A first-time reader should carefully review section 2 - prerequisites, and section 3 - preparation before beginning the assembly process.

This document serves both as instructions and as a record of the assembly of the product. When you finish each step in this document, sign your name (or apply your stamp) in the "Signature/Stamp" box on the right to provide a record of completion.

When things go wrong, this document provides guidance for common issues that have been encountered in the past. When this document does not provide guidance, please contact your quality management representative, who will help you fill out an exception report. These reports help improve process quality and product quality, and these reports are incorporated into future revisions of this document.

Always remember: If you are unable to successfully complete these instructions, that means the processes supporting you (including this document) have failed you. Our processes are built for your success, and by improving our processes, we help everyone succeed.

## Section 2





# Prerequisites

### 2.1 Required safety training

The following safety training units must be completed before assembling this product.

By signing (or applying your stamp) on the right, you indicate that you have completed the following training:

Table 2: Safety training






Item #	Description	Signature/Stamp
1	0102-0100 - Safety reporting policies and procedures training Key topics: Understanding policies and procedures around how to identify, contain and report a safety-related issue in the workplace, including damaged or malfunctioning equipment, leaks, spills, and other occupational hazards.	
2	0102-0101 - Material safety data sheets training Key topics: Understanding how to read material safety data sheets (MSDS) for materials you will be handling during product assembly, how they can affect your health and the health of the environment, how to safely handle and dispose of them, and what to do if there is a spill or accidental exposure.	
3	0102-0102 - Solder handling and disposal policies and procedures training Key topics: Understanding policies and procedures related to handling solder and solder paste, stencil cleaning, and solder disposal.	
4	0102-0105 - Electro-static discharge controls policies and procedures training Key topics: Understanding policies and procedures related to protecting equipment and components from electro-static discharge, including clothing, protective equipment, material handling and labelling.	

## 2.2 Required skills training

The following skills training units must be completed before assembling this product.

By signing (or applying your stamp) on the right, you indicate that you have completed the following training:

Table 3: Skills training

Item #	Description	Signature/Stamp
1	0103-0202 - ANSI/ESD S20.20 Electro-static discharge controls Key topics: Understanding of ESD safety, the ESD control program, equipment and personnel grounding, EPAs, packaging and marking.	
2	0103-0203 - General components handling Key topics: Understanding of safe component handling, including reeled components, components in JEDEC trays, and loose components. Includes avoiding contamination, moisture control, and component inventory management.	
3	0103-0414 - 5040-XTS reflow station Key topics: Safe and effective use of the 5040-XTS reflow station, including use of the pre-heater, the hot air system, and the soldering iron. Covers inspection and verification, cleaning, preferred settings and best practice techniques.	
4	0103-0301 - IPC-A-610G - Acceptability of electronic assemblies Key topics: Covers visual acceptability requirements for electronic assemblies, including handling considerations, hardware installation, component placement, soldering, terminal connections, wiring, marking and cleanliness.	
5	0103-0302 - IPC-J-STD-001F - Soldered electrical connections Key topics: Covers soldering materials, general soldering and assembly requirements, wire and terminal connections, through-hole mounting, surface mounting of components, cleaning process requirements, PCB requirements, coatings and product assurance.	

212

Section 3

213

Preparation

214

3.1 Workspace

215

Before starting assembly, check out an assembly desk for a minimum of one hour. A single unit can be assembled

216

in ten minutes, with an additional ten minutes per additional unit.

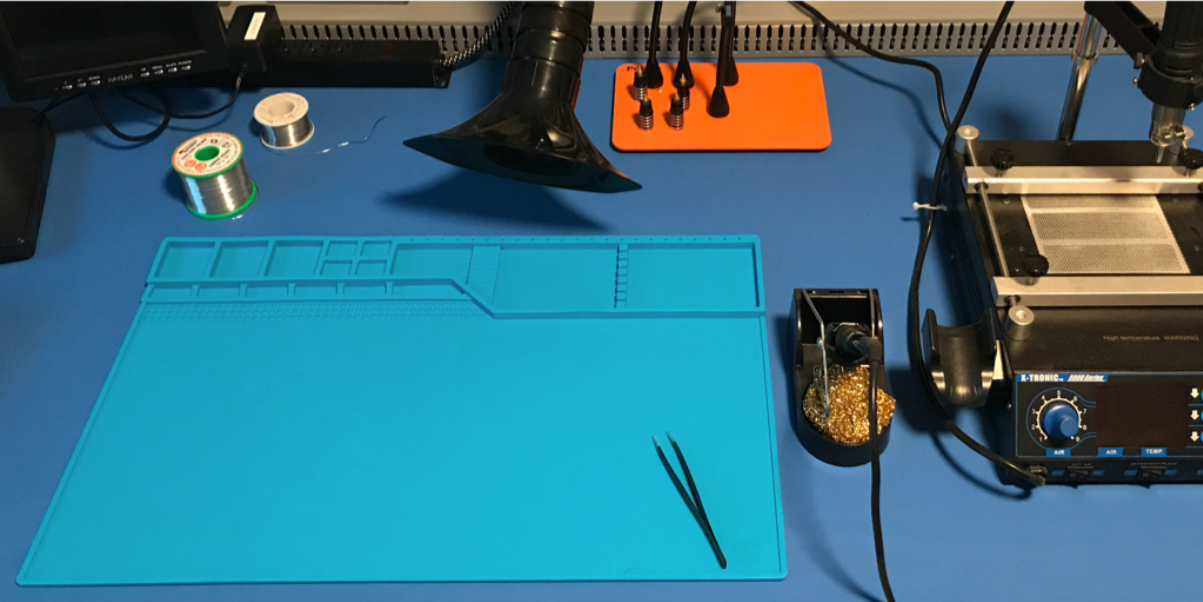


Fig. 1: Assembly Desk

Table 4: Prepare workspace

Step	Description	Signature/Stamp
3.1.1	Verify that the workspace has a clean assembly mat and anti-static mat, and that the cleaning record has been signed since last use.	<div>Stamp or sign here</div>
3.1.2	Verify that the HEPA fume extractor turns on, and you can feel air suction from the nozzle.	<div>Stamp or sign here</div>

continues on next page

Table 4 – continued from previous page

Step	Description	Signature/Stamp
3.1.3	Verify that the 5040-XTS rework station soldering iron tip is not worn down. If it is worn down, obtain a new 900M-T-I tip from the stores department.	<div>Stamp or sign here</div>

3.2 Project consumables

Obtain each of the below consumable items from the stores department:

Table 5: Assembly consumables

Item #	Description	Signature/Stamp
3.2.1	<div></div> <div>Fig. 2: 1 pair ESD gloves If you prefer to use your own pair of ESD gloves, make sure they are tested before use.</div>	<div>Stamp or sign here</div>
3.2.2	<div></div> <div>Fig. 3: 1 spool MG Chemicals 4900 Lead Free No-Clean Wire Solder Sn96.2Ag2.8Cu0.4 (96.2/2.8/0.4) 20 AWG</div>	<div>Stamp or sign here</div>

### 3.3 Project tools

Obtain a tools container labelled “1XXX Assembly Tools” from the 1XXX section of the stores supply shelf. At your assembly desk, use Table 6 to verify that all the required tools are present.

If any required tools are missing, return all tools and the tools container to the stores department, and obtain another tools container.

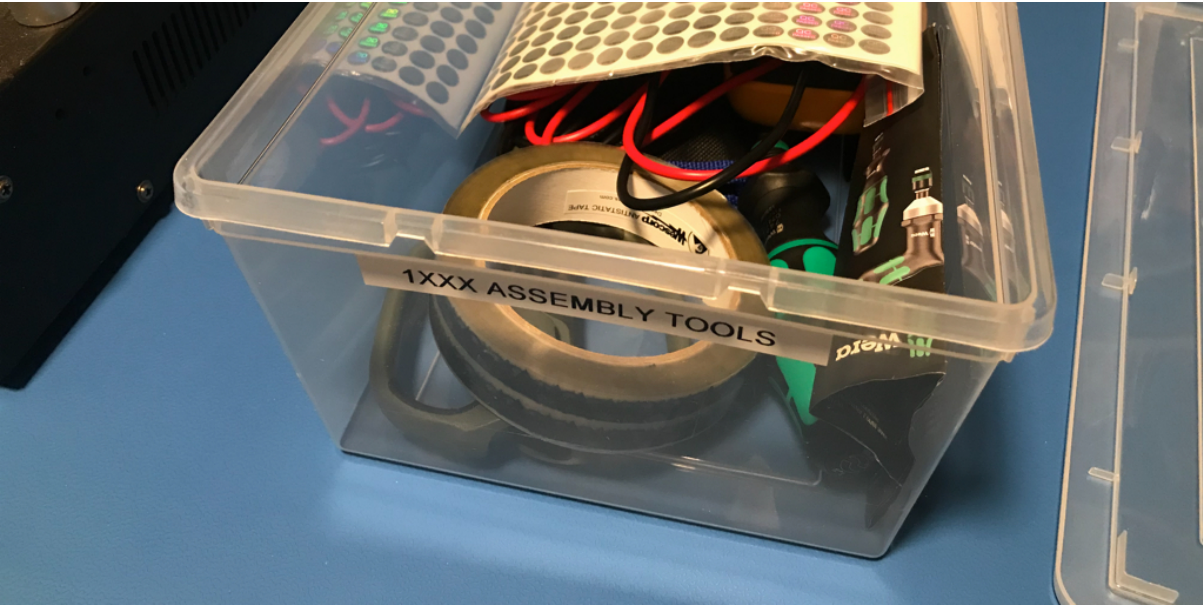



Fig. 4: Tools Container







Remove each of the following tools from the tools container, and place them on the anti-static mat of the assembly desk:

Table 6: Assembly tools

Item #	Description	Signature/Stamp
3.3.1	<div><p>Fig. 5: Hozan F-23 components tray</p></div>	<div>Stamp or sign here</div>


continues on next page

Table 6 – continued from previous page

Item #	Description	Signature/Stamp
3.3.2	 <p>Fig. 6: 1mm flat-head screwdriver</p>	
3.3.3	 <p>Fig. 7: 3mm Phillips adjustable torque screwdriver</p>	
3.3.4	 <p>Fig. 8: ESD tweezers</p>	

continues on next page

Table 6 – continued from previous page

Item #	Description	Signature/Stamp
3.3.5	 Fig. 9: Fine-tipped Sharpie marker	
3.3.6	 Fig. 10: Sissors	

3.4 Parts preparation

3.4.1 PCBs and PCBAs

NOTICE: All PCBs and PCBAs must be handled with gloves to prevent marking with skin oils.

NOTICE: PCBs are removed from manufacturer packaging only when needed.

Table 7: PCBs and PCBAs



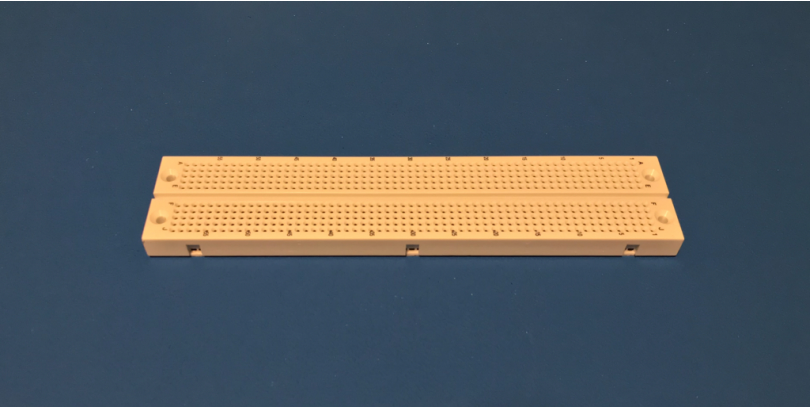

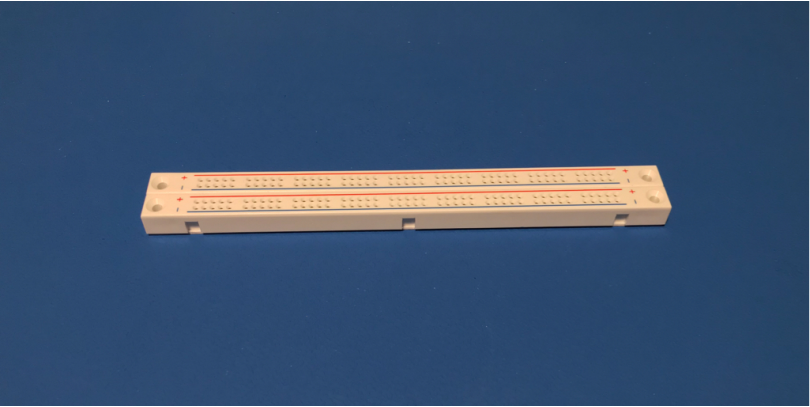



Item #	Description	Signature/Stamp
3.4.1.1	No marking required 	

Fig. 11: 1x 1012-0101 v1.0 - Vertical Breadboard Stamp PCB

3.4.2 Loose components



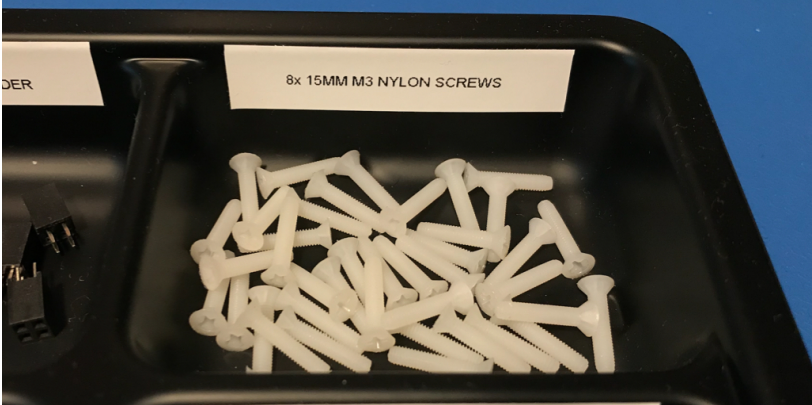



All loose components are stored on the shelf labelled “1XXX Components”. Take the components tray and obtain the following quantities of the following parts:

Table 8: Loose components

Item #	Description	Signature/Stamp
3.4.2.1	No marking required 	
3.4.2.2	No marking required 	
3.4.2.3	No marking required 	





continues on next page

Table 8 – continued from previous page

Item #	Description	Signature/Stamp
3.4.2.4	No marking required  Fig. 15: 2x DS1023-2*2SF11 - 2.54mm by 2.54mm Straight 2x2P Female Headers	
3.4.2.5	No marking required  Fig. 16: 8x M3 15mm White Nylon Phillips Socket Flat Head Screws	
3.4.2.6	No marking required  Fig. 17: 12x M3 Black Nylon Nuts	

continues on next page

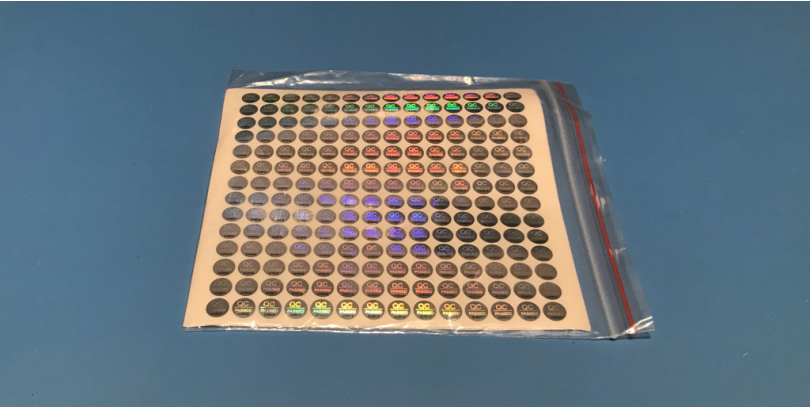





Table 8 – continued from previous page

Item #	Description	Signature/Stamp
3.4.2.7	No marking required 	
	Fig. 18: 4x M3 5mm Black Nylon Phillips Socket Button Head Screws	
3.4.2.8	No marking required 	
	Fig. 19: 4x M3 11mm+6 Black Nylon Standoffs	

3.4.3 Packaging materials

All packaging materials are stored on the shelf labelled “1XXX Components”. Take the packaging box and obtain the following quantities of the following materials:

Table 9: Packaging materials

Item #	Description	Signature/Stamp
3.4.3.1	No marking required  Fig. 20: 1x QC Sticker	
3.4.3.2	No marking required  Fig. 21: 1x Long size anti-static bag	
3.4.3.3	No marking required  Fig. 22: 1x Small size anti-static bag	

continues on next page

Table 9 – continued from previous page

Item #	Description	Signature/Stamp
3.4.3.4	No marking required  <p>Fig. 23: 1x Packing box with foam inserts</p>	Stamp or sign here
3.4.3.5	No marking required  <p>Fig. 24: 2x 1012A Stickers</p>	Stamp or sign here
3.4.3.6	No marking required  <p>Fig. 25: Roll of packing tape</p>	Stamp or sign here

236

Section 4

237

Assembly

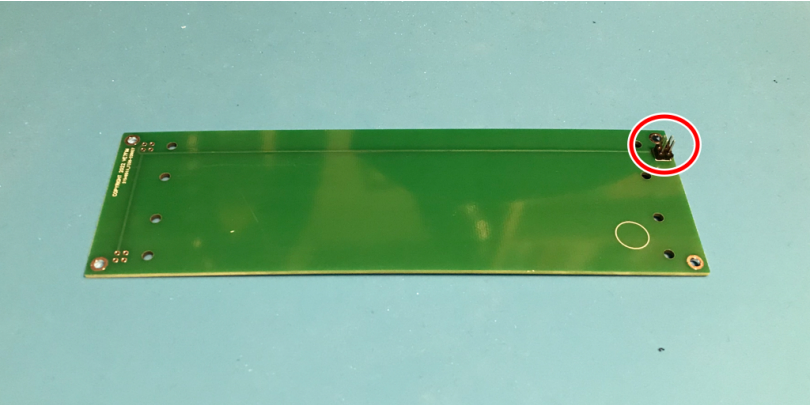
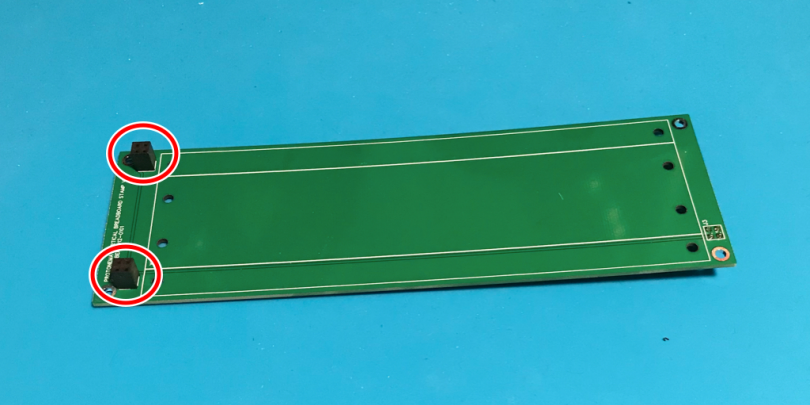
238

4.1 1012A assembly

239

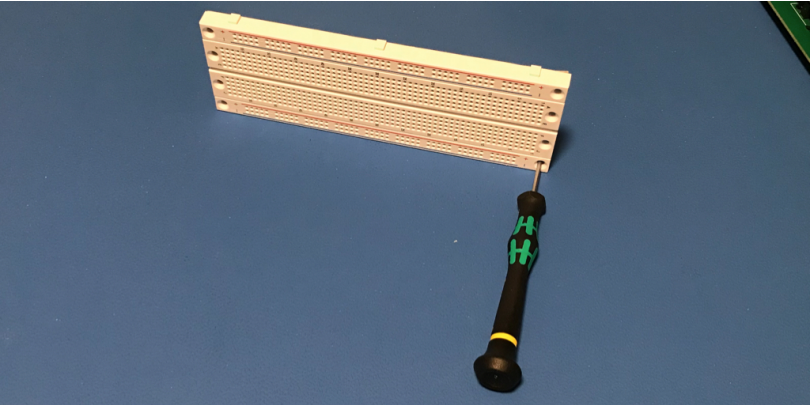
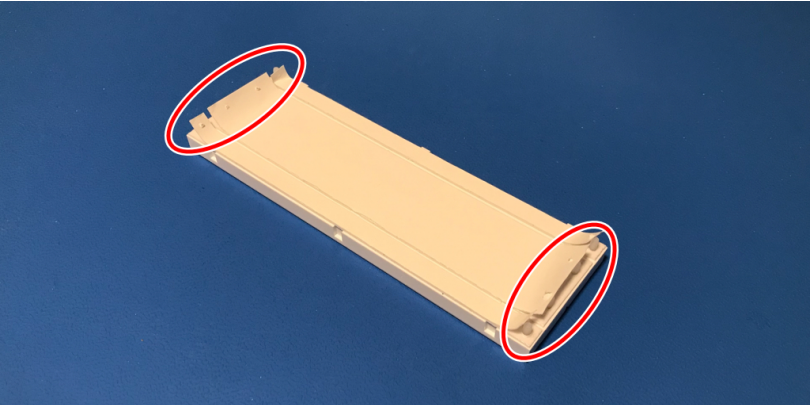
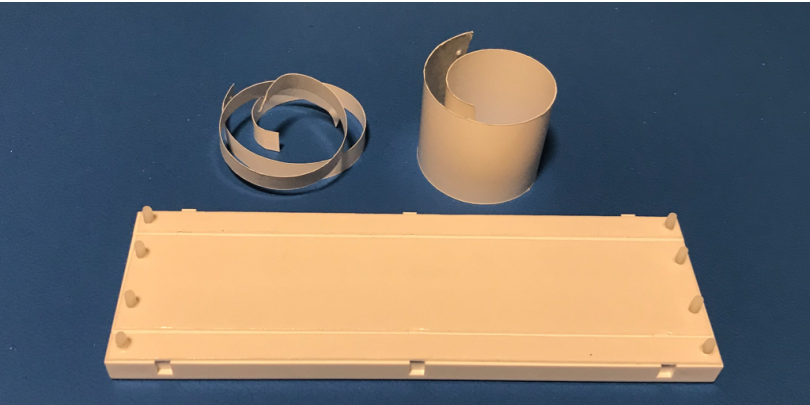
This assembly step takes 5 minutes.

Table 10: 1012A assembly steps

Step #	Description	Signature/Stamp
4.1	Solder J3 onto the 1012-0101 PCB. <div></div> <div>Fig. 26: 1012-0101 PCB with rear-mounted connector soldered on.</div>	<div>Stamp or sign here</div>
4.2	Solder J1 and J2 onto the 1012-0101 PCB. Note that if the connectors are rectangular, they should be aligned with the longer side facing the longer side of the PCB, as shown below. <div></div> <div>Fig. 27: 1012-0101 PCB with front-mounted connectors soldered on.</div>	<div>Stamp or sign here</div>

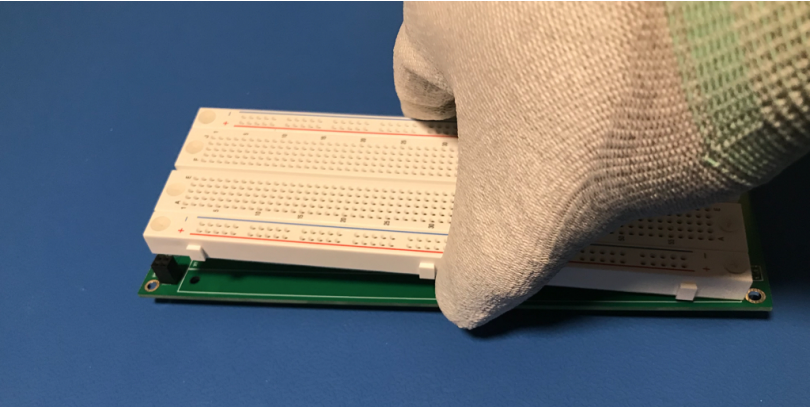
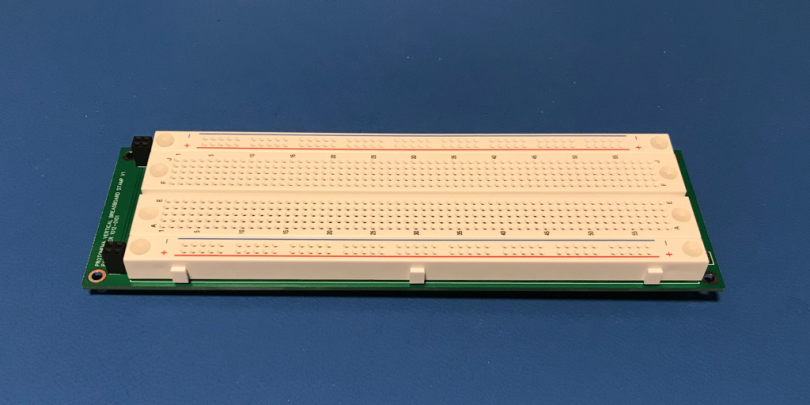
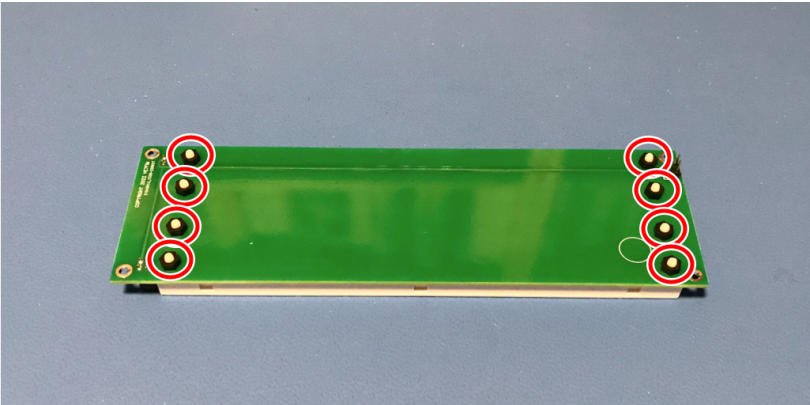
continues on next page

Table 10 – continued from previous page

Step #	Description	Signature/Stamp
4.3	<p>Snap the two distribution strips (X2, X3) on to each side of the main breadboard (X1). Using the slotted screwdriver, make eight holes in the adhesive backing of the breadboard.</p>  <p>Fig. 28: Breadboard with screwdriver used to make holes in the adhesive backing.</p>	<div>Stamp or sign here</div>
4.4	<p>Push the eight white screw through the adhesive layer from the front of the breadboard. While pushing the screw through, you may need to prevent the adhesive from peeling off by holding it with the screwdriver.</p>  <p>Fig. 29: Breadboard with eight screws.</p>	<div>Stamp or sign here</div>
4.5	<p>Remove the protective paper from the breadboard's adhesive layer.</p>  <p>Fig. 30: Breadboard with protective paper removed.</p>	<div>Stamp or sign here</div>

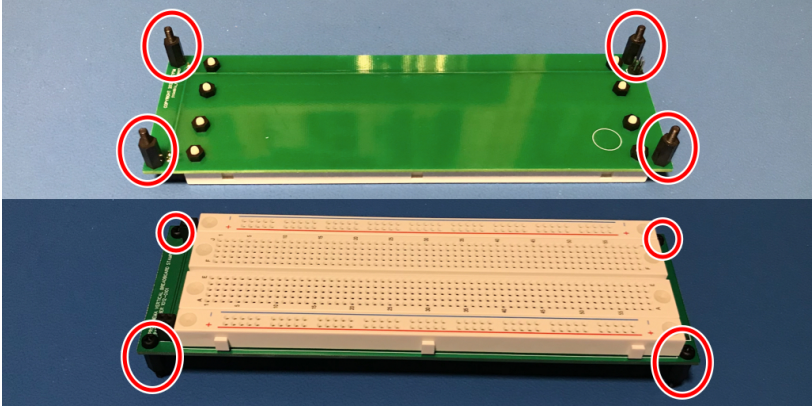
continues on next page

Table 10 – continued from previous page

Step #	Description	Signature/Stamp
4.6	<p>Align the eight screws with the 1012-0101 PCB, making sure that the text on the breadboard is aligned with the text on the PCB.</p> 	<p>Stamp or sign here</p>
4.7	<p>Attach the breadboard to the 1012-0101 PCB by pushing it evenly against the PCB.</p> 	<p>Stamp or sign here</p>
4.8	<p>Screw eight nuts onto the rear of the eight breadboard screws. Do not screw too tightly (finger-tighten only).</p> 	<p>Stamp or sign here</p>

continues on next page

Table 10 – continued from previous page

Step #	Description	Signature/Stamp
4.8	<p>Screw four short screws into four standoffs for each of the four corners of the breadboard. Do not screw too tightly (finger-tighten only).</p>  <p>Fig. 34: 1012-0101 PCB with short screws attached to corner standoffs.</p>	<p>Stamp or sign here</p>

240

Section 5

241

Test

242

5.1 Visual inspection

243

This test process takes 2 minutes.

Table 11: 1012A visual inspection

Step #	Description	Signature/Stamp
1	Verify that there are no loose parts.	<div>Stamp or sign here</div>
2	Verify that there are no visible fingerprints.	<div>Stamp or sign here</div>

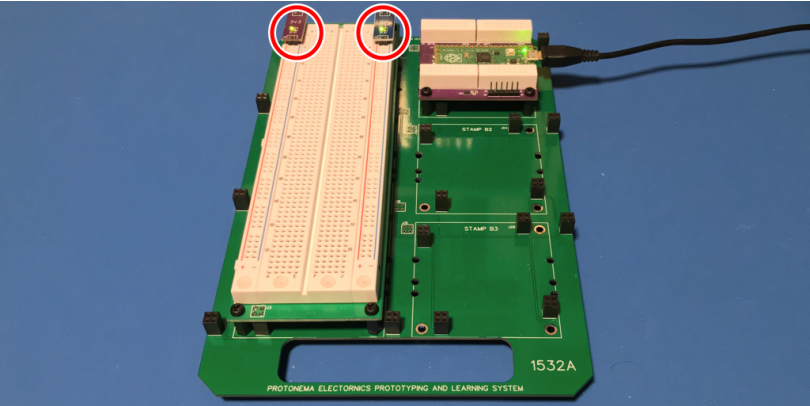
244

5.2 QC final check

245

This test process takes 2 minutes.

Table 12: 1012A QC final check

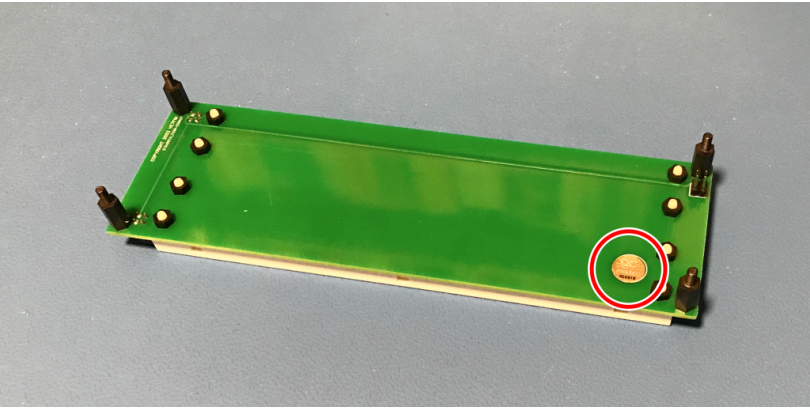
Step #	Description	Signature/Stamp
1	<p>Connect the 1012A to a baseboard, and connect power. Using a 1012-0201 and a 1012-0301 power bridge board, verify 5V and 3.3V for each breadboard power rail.</p> <p>If test does not pass, write down the unexpected behaviour in the "Signature/Stamp" column on the right.</p> <div></div> <p>Fig. 35: Powered 1012-0101 PCB with illuminated 1012-0201 and 1012-0301 power bridges</p>	<div><div>Stamp or sign here</div></div>

5.3 QC PASS

Only perform these steps if all QC checks have passed.

This test process takes 1 minutes.

Table 13: 1012A QC approval

Step #	Description	Signature/Stamp
1	<p>Using the tweezers, affix QC Passed sticker in location shown below, then write down the serial number from the QC sticker below the "Signature/Stamp" in the column to the right.</p>  <p>Fig. 36: 1012A with QC Passed sticker</p>	<p>Stamp or sign here</p>
2	<p>Take two photographs, one of the front of the 1012A, and one of the back of the 1012A.</p>	<p>Stamp or sign here</p>

5.4 QC FAIL

Only perform these steps if any QC check have failed.  
This test process takes 2 minutes.

Table 14: 1012A QC fail

Step #	Description	Signature/Stamp
1	<div>Place the 1012A module in the anti-static bag.</div> <div></div> <div>Fig. 37: 1012A in anti-static bag.</div>	<div>Stamp or sign here</div>
2	<div>Take an A4 plastic bag, and place the 1012A, along with this document, in the "QC Fail" bin</div> <div></div> <div>Fig. 38: 1012A in QC Fail bin.</div>	<div>Stamp or sign here</div>

252

Section 6

253

Packaging

254

6.1 1012A packing

255








This packaging process takes 3 minutes.

Table 15: 1012A packaging

Step #	Description	Signature/Stamp
6.1.1	Place the 1012A module in the anti-static bag. <div></div> <div>Fig. 39: 1012A in anti-static bag.</div>	<div>Stamp or sign here</div>
6.1.2	Place four nylon nuts in a small anti-static bag, and add the bottom of the bag to the bag the 1012A module is in. <div></div> <div>Fig. 40: Anti-static bag with nylon nuts in the small anti-static bag.</div>	<div>Stamp or sign here</div>

continues on next page

Table 15 – continued from previous page

Step #	Description	Signature/Stamp
6.1.3	Seal the anti-static bag with a 1012A sticker. 	
6.1.4	Using the Sharpie pen, Write down the serial number of the 1012A on the sticker, at the end of the line listing the 1012A. 	
6.1.5	Place 1012A bag in the box on top of the bottom foam padding. 	
6.1.6	Take a photograph of the 1012A in the box.	

continues on next page

Table 15 – continued from previous page

Step #	Description	Signature/Stamp
6.1.7	Using the ESD tape, secure the lid of the box. 	Stamp or sign here
6.1.8	Affix a 1012A sticker to the lid of the box. 	Stamp or sign here
6.1.9	Using the Sharpie pen, Write down the serial number of the 1012A on the sticker, at the end of the line listing the 1012A. 	Stamp or sign here
6.1.10	Take a photograph of the sealed 1012A box.	Stamp or sign here

Section 7

Clean-up

7.1 Consumables

This packaging process takes 5 minutes.

Table 16: Consumables cleanup

Step #	Description	Signature/Stamp
1	If the ESD gloves have contacted solder paste, or are soiled, they shall be disposed of in the standard waste bin.	<div>Stamp or sign here</div>
2	If there is unused solder wire on the spool, it shall be returned to stores.	<div>Stamp or sign here</div>
3	Loose component packaging shall be disposed of in the standard waste bin.	<div>Stamp or sign here</div>

7.2 Tools




This cleanup process takes 5 minutes.

Table 17: Tools cleanup

Step #	Description	Signature/Stamp
1	All tools shall be returned to the assembly tools container, and returned to the stores supply shelf.  If any tools are damaged or worn, return the container to stores, and let the manager know which tool is damaged or worn.	<div>Stamp or sign here</div>

continues on next page

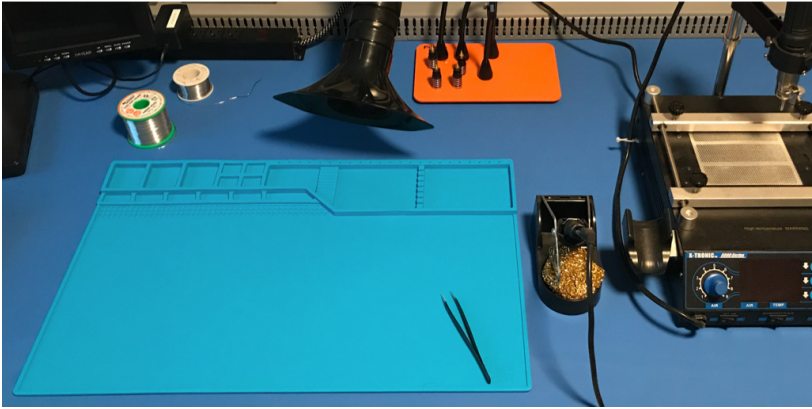
Table 17 – continued from previous page

Step #	Description	Signature/Stamp
2	Remove this document from the springback binder.	
3	Print a new copy of this document, and insert it into the springback binder that this document was originally in.	
4	Return the springback binder with the newly printed document to the 1012A section of the store supply shelf.	

7.3 Workspace

This packaging process takes 5 minutes.

Table 18: Workspace cleanup

Step #	Description	Signature/Stamp
1	<div><p>Make sure that the workspace is clean and as it was when you started the assembly.</p><p>Fig. 47: Clean assembly workstation</p></div>	<div>Stamp or sign here</div>

264

## Section 8

265






# Record keeping

266

### 8.1 1012A record keeping



267

This packaging process takes 5 minutes.

Table 19: 1012A record keeping		
Step #	Description	Signature/Stamp
1	<div>Write the serial number, the date, and your first and last name in large print on the bottom of the front cover of this document.</div> <div></div> <div>Fig. 48: Example of serial number on document cover</div>	<div></div>
2	<div>Create a new folder under the 1012A folder, named with the serial number.</div>	<div></div>
3	<div>Copy all photos taken during the asseby process into the newly created folder in step #2.</div>	<div></div>
4	<div>Remove this document from the binding clamps, scan the document, and save the scanned PDF into the newly created folder in step #2, with the name "1012A-SNAAAAAA.pdf", where AAAAAA is replaced with the serial number.</div>	<div></div>

continues on next page

Table 19 – continued from previous page

Step #	Description	Signature/Stamp
5	Three-hole punch the document, then file it at the end of the current month's assembly records binder.	
6	Add an entry to the assembly records binder, "<Date> - 1012A - SN# AAAAAA - <Your Name>", where <Date> is replaced with today's date in ISO-8601 YYYY-MM-DD, where AAAAAA is replaced with the serial number of the 1012A, and where <Your Name> is replaced with your first and last name.	

## Section 9

# Process improvement

### 9.1 Feedback

Please submit an issue to the [Protonema Issue Repository](http://www.github.com/dslik/protonema/issues) (<http://www.github.com/dslik/protonema/issues>) if you encounter any of the below situations:

- Error in this document
- Unclear directions
- Suggested process improvements
- Results of QC failure investigations
- Tool change suggestions

Quality processes and documentation is a team effort. This document would not exist without the participation and contributions of the entire assembly team.

Thank you for reading this assembly instructions document.

End of document.

## Part II

# 1012A Annexes

## Section 10

# Printed Circuit Boards

### 10.1 1012-0101 PCB

Table 20: 1012-0101 PCB

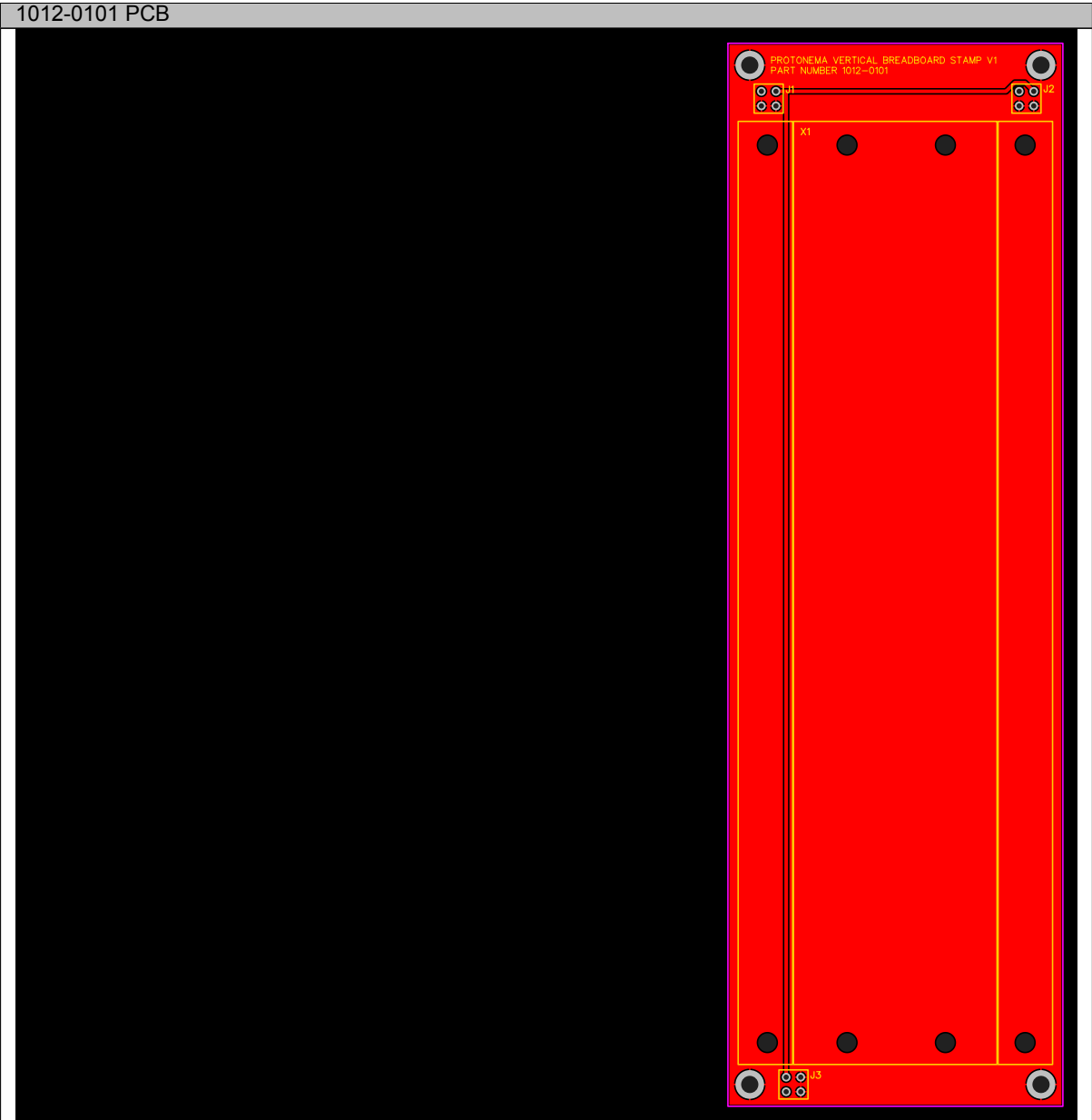
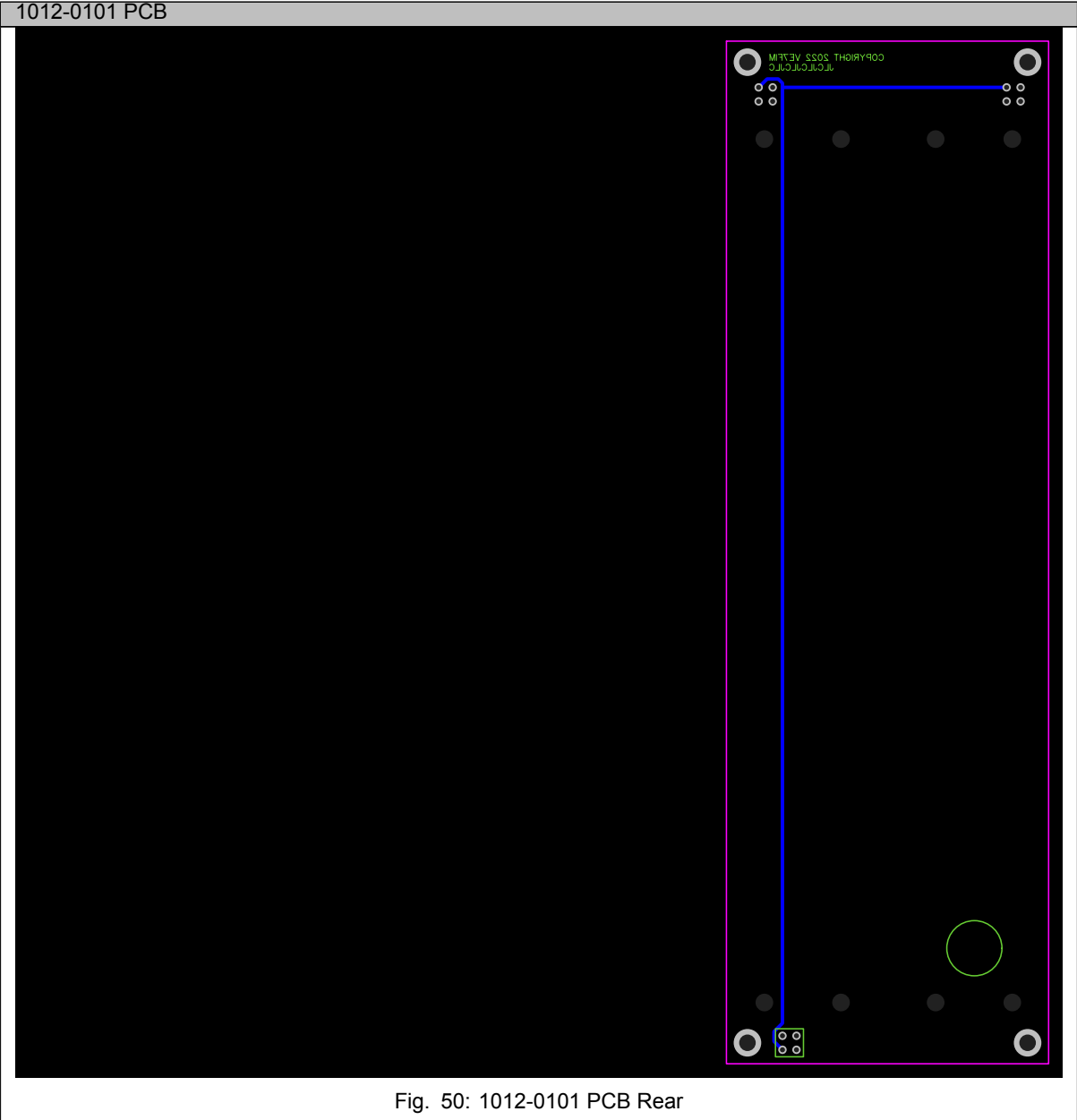


Fig. 49: 1012-0101 PCB Front

continues on next page

Table 20 – continued from previous page



## Section 11

# Bill of materials

## 11.1 1012A Vertical Breadboard Stamp

The parts required to assemble a 1012A are listed in [Table 21](#).

Table 21: 1012A parts

Reference Designation	Qty	Description	Manufacturer	Manufacturer Part Number	Supplier	Cost
1012-0101	1	Stamp PCB	JLPCB	Y339-2154951A	JL-CPCB	\$1.26 CAD
X1	1	630 Tie-Point Solderless Breadboard	Global Specialties	GS-630	Digikey	\$9.37
X2, X3	1	90 Tie-Point Solderless Breadboard (2 pieces)	Global Specialties	GS-090	Digikey	\$6.14
J3	1	Straight 2x4 2.54mm Black Pin Headers	Molex	0010897041	Digikey	\$0.68 CAD
J1, J2	3	2.54mm by 2.54mm Straight 2x2P Female Header	CONNFLY Elec	DS1023-2*2SF11	LCSC	\$0.23 CAD
MP1 - MP8	8	Screw - M3 15mm White Nylon Phillips Socket Flat Head	Order By Description			\$0.66 CAD
MP9 - MP16, MP25 - MP28	8	Nut - M3 Black Nylon	Order By Description			\$0.95 CAD
MP17 - MP20	4	Screw - M3 5mm Black Nylon Phillips Socket Button Head	Order By Description			\$0.25 CAD
MP21 - MP24	4	Standoff - M3 11mm+6 Black Nylon	Order By Description			\$0.30 CAD
SK1	1	QC Sticker	Order by Description			\$0.0094 CAD
Total						\$19.85 CAD

## 11.2 1012A Packaging

The parts required to package a 1012A are listed in [Table 22](#).

Table 22: 1012A packing parts

Reference Designation	Qty	Description	Manufacturer	Manufacturer Part Number	Supplier	Cost
N/A	1	Static Shielding Bag 5" X 10"	SCS	100510	Digikey	\$0.22 CAD
N/A	1	Static Shielding Bag 1.5" X 2.8" Ziplock	Order by Description			\$0.06 CAD

continues on next page

Table 22 – continued from previous page

Reference Designation	Qty	Description	Manufacturer	Manufacturer Part Number	Supplier	Cost
N/A	1	CORREC-PAK SHIPPER 9 X 7.5 X 1.5" ID	Conductive Containers, Inc.	3180-3	Digikey	\$11.83 CAD
1012-7001	2	1012A ESD Sticker	Jukebox Print			\$4.00 CAD
Total						\$13.04 CAD

## Section 12

# Reduction of Hazardous Materials

Compliance declarations, in BOM order.

## 12.1 MG Chemicals 4900

Table 23: MG Chemicals 4900 RoHS Compliance

Declaration for MG Chemicals 4900 -

<https://www.mgchemicals.com/downloads/msds/01%20English%20Can-USA%20SDS/sds-4900-4917.pdf>


ISO 9001:2015 Quality Management System

SAI Global File #004008

Burlington, Ontario, Canada

**SAC305 No CLEAN SOLDER WIRE****4900-4917**

**California Proposition 65** (Chemicals known to cause cancer or reproductive toxicity, USA)

This product does not contain any of the listed substances.

### Europe

**RoHS** (Restriction of Hazardous Substances Directive)

This product does not contain any lead, cadmium, mercury, hexavalent chromium, PBB's, PBDE's, DEHP, BBP, DBP, or DIBP and complies with European RoHS regulations.

**WEEE** (Waste Electrical and Electronic Equipment Directive)

This product is not a piece of electrical or electronics equipment, and is therefore not governed by this regulation.

### Section 16: Other Information

**SDS Prepared by** MG Chemical's Regulatory Department

**Date of Review** 06 March 2020

**Supersedes** 09 July 2019

**Reason for Changes:** Update to the emergency phone number information.

### Reference

1) ACGIH 2017 TLVs and BEIs: Based on the documentation of the threshold limit values for chemical substances and physical agents & biological exposure indices, American Conference of Governmental of Industrial Hygienist Cincinnati, OH (2017).

2) All toxicological data were checked against the RTECS (Registry of Toxic Effects of Chemical Substances®)

*Section continued on the next page*

Page **12** of **13**

Date of Revision: 06 March 2020 / Ver. 3.01

297

## 12.2 JLC lead-free PCB

Table 24: JLC PCB RoHS Compliance

Declaration for JLCPCB lead-free PCBs - <https://s3.amazonaws.com/helpscout.net/docs/assets/59f1de7804286313cffb22c/images/5d4d09562c7d3a036965d6a3/ROHS-Certificate-of-Compliance.jpg>

ROHS-Certificate-of-Compliance.jpg 566x800 pixels

2022-08-16, 23:45



<https://s3.amazonaws.com/helpscout.net/docs/assets/59f1de7804286...ages/5d4d09562c7d3a036965d6a3/ROHS-Certificate-of-Compliance.jpg>

Page 1 of 1

## 12.3 Global Specialties GS-630

Table 25: Global Specialties GS-630

Declaration for Global Specialties GS-630 - N/A



### Certificate of Compliance

This is to certify that all products and models manufactured or marketed by Cal Test Electronics, which include the following brand names:

- Cal Test Electronics
- Global Specialties
- Elditest

Are compliant to the Directive 2011/65/EU of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, and the Commission Delegation Directive (EU) 2015/863 of 31 March 2015, amending Annex II of Directive 2011/65/EU as regards to the list of restricted substances. This directive is introducing 4 new substances (Phthalates) to the original 6 restricted substances.

#### **Substances:**

1. Lead (Pb) <0.1% = < 1,000 ppm
2. Mercury (Hg) <0.1% = <1,000 ppm
3. Hexavalent Chromium (CR VI) <0.1% = <1,000 ppm
4. Cadmium (Cd) <0.01% = <100 ppm
5. Polybrominated Biphenyls (PBB) <0.1% = <1,000 ppm
6. Polybrominated Diphenyl Ethers (PBDE) <0.1% = <1,000 ppm
7. Bis(2-ethylhexyl) Phthalate (DEHP) <0.1% = <1,000 ppm
8. Butyl Benzyl Phthalate (BBP) <0.1% = <1,000 ppm
9. Dibutyl Phthalate (DBP) <0.1% = <1,000 ppm
10. Diisobutyl Phthalate (DIBP) <0.1% = <1,000 ppm

#### **Exemptions:**

1. Annex III, 6(c) – Copper alloy contains up to 4% lead by weight

Marco A. León

A handwritten signature in black ink, appearing to read 'Marco A. León'.

Cal Test Electronics, Inc.

13-FEB-2018

Cal Test Electronics  
22820 Savi Ranch Parkway  
Yorba Linda, CA 92887  
caltestelectronics.com

U.S. Toll Free: 800-572-1028  
Phone: 714-221-9330  
Fax: 714-921-9849  
info@caltestelectronics.com

## 12.4 Global Specialties GS-090

Table 26: Global Specialties GS-090

Declaration for Global Specialties GS-090 - N/A



### Certificate of Compliance

This is to certify that all products and models manufactured or marketed by Cal Test Electronics, which include the following brand names:

- Cal Test Electronics
- Global Specialties
- Elditest

Are compliant to the Directive 2011/65/EU of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, and the Commission Delegation Directive (EU) 2015/863 of 31 March 2015, amending Annex II of Directive 2011/65/EU as regards to the list of restricted substances. This directive is introducing 4 new substances (Phthalates) to the original 6 restricted substances.

#### **Substances:**

1. Lead (Pb) <0.1% = < 1,000 ppm
2. Mercury (Hg) <0.1% = <1,000 ppm
3. Hexavalent Chromium (CR VI) <0.1% = <1,000 ppm
4. Cadmium (Cd) <0.01% = <100 ppm
5. Polybrominated Biphenyls (PBB) <0.1% = <1,000 ppm
6. Polybrominated Diphenyl Ethers (PBDE) <0.1% = <1,000 ppm
7. Bis(2-ethylhexyl) Phthalate (DEHP) <0.1% = <1,000 ppm
8. Butyl Benzyl Phthalate (BBP) <0.1% = <1,000 ppm
9. Dibutyl Phthalate (DBP) <0.1% = <1,000 ppm
10. Diisobutyl Phthalate (DIBP) <0.1% = <1,000 ppm

#### **Exemptions:**

1. Annex III, 6(c) – Copper alloy contains up to 4% lead by weight

Marco A. León

A handwritten signature in black ink, appearing to read 'Marco A. León'.

Cal Test Electronics, Inc.

13-FEB-2018

Cal Test Electronics  
22820 Savi Ranch Parkway  
Yorba Linda, CA 92887  
caltestelectronics.com

U.S. Toll Free: 800-572-1028  
Phone: 714-221-9330  
Fax: 714-921-9849  
info@caltestelectronics.com

## 12.5 Molex 0010897041

Table 27: Molex 0010897041 RoHS Compliance

Declaration for Molex 0010897041 - [https://www.molex.com/datasheets/rohspdf/0010897041\\_rohs.pdf](https://www.molex.com/datasheets/rohspdf/0010897041_rohs.pdf)**RoHS Certificate of Compliance**

07/11/2022

Molex is committed to managing the use of chemical substances in accordance with governmental regulations, industry standards, and customer-specific requirements in order to protect the environment. For each part listed, this document provides:

• **EU RoHS Compliance Status.** EU RoHS status is declared per Directive 2011/65/EU and its subsequent amendments, including the Directive EU 2015/863 which additionally prohibited four phthalates. Homogeneous materials of parts that are compliant to this legislation have less than 0.1% by weight each of lead, mercury, hexavalent chromium, PBB, PBDE, DBP, BBP, DIBP, DEHP, and 0.01% by weight of cadmium. In situations where an exemption applies, the preceding limits, corresponding to the exempted substance(s), may be higher.

Molex's sole liability for incorrectly certifying a product shall be either replacement of the Molex product or, alternatively and in the sole discretion of Molex, return of the purchase price paid for the relevant Molex product.

For additional information regarding Molex's environmental initiatives and further explanation of this information, please visit [www.molex.com](http://www.molex.com)

Haim Eliyahu  
Director, Global Product Stewardship

**Table A**

Molex Part Number	Part Description	RoHS Compliance Status
0010897041	2.54mm Pitch C-Grid Breakaway Header, Dual Row, Vertical, High Temperature, 4 Circuits, Tin (Sn) Plating, 2.72mm PC Tail Length	Compliant

301

## 12.6 Connfly DS1023-2\*2SF11

Table 28: Connfly DS1023-2\*2SF11 Compliance

Declaration for Connfly DS1023-2\*2SF11 -

<http://en.connfly.group/static/upload/image/ico/RoHS□□□Connectors□.jpg>


 <b>Verification of Conformity</b> Certificate No.: 19ZCTC0926005RC			
<b>Applicant</b>	: CONNFLY ELECTRONIC CO., LTD		
<b>Address</b>	: No. 125 ZhanTeng Road East Industry Zone KuangYan Town CiXi NingBo China P.C. 315333		
<b>Manufacturer</b>	: CONNFLY ELECTRONIC CO., LTD		
<b>Address</b>	: No. 125 ZhanTeng Road East Industry Zone KuangYan Town CiXi NingBo China P.C. 315333		
<b>Product</b>	: Connectors		
<b>Brand Name</b>	: CONNFLY		
<b>Model No.</b>	: DS Series		

Requirement	Applied Standards	Document Evidence	Result
RoHS Directive	2011/65/EU 2015/863	Test Report: 19ZCTC0926005RR	Conform
RoHS Standards	IEC 62321:2013		


  

RoHS

  
**Jack Yang**  
 Oct. 17, 2019  
 APPROVED

**Remark:** The Certificate of compliance is based on a test procedure or an evaluation of the above-mentioned product. This is to certify that the above-mentioned product is in compliance with the RoHS Directive (2011/65/EU) and its subsequent amendments EU No. (2015/863) of the European parliament on the Restriction of the use of certain Hazardous Substances (Lead (Pb); Mercury (Hg); cadmium (Cd); Hexavalent chromium (Cr); polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs); Hexabromocyclododecane (HBCDD); Bis-(2-ethylhexyl) Phthalate (DEHP); Benzylbutyl Phthalate (BBP); Dibutyl Phthalate (DBP)) in Electrical and Electronic equipment. This certificate can be checked for validity at [www.renzhengjiance.com](http://www.renzhengjiance.com)

**Shenzhen ZCT Technology Co., Ltd.**  
 3/F., Building 5, Hongsheng Industrial Zone, Bao'an Road, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China.  
 ☎ : 400-869-8965 ☎ : 86-755-23702323, ✉ : admin@renzhengjiance.com, 🌐 : http://www.renzhengjiance.com.

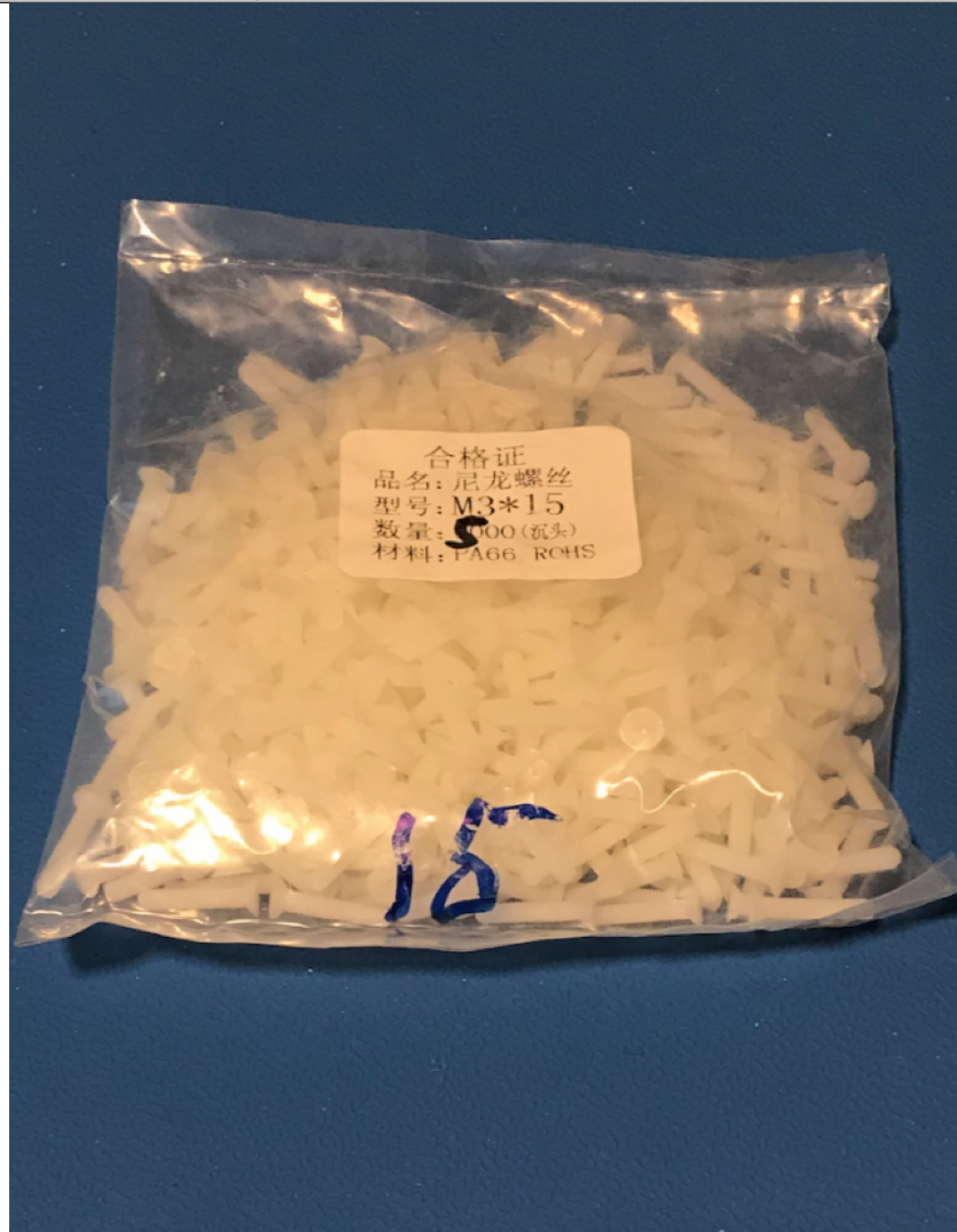


302

## 12.7 M3 16mm Nylon Screw

Table 29: M3 15mm Nylon Screw RoHS Compliance

Declaration for M3 15mm Nylon Screw - N/A



12.8 M3 11mm Nylon Standoff

Table 30: M3 11mm Nylon Standoff RoHS Compliance

Declaration for M3 11mm Nylon Standoff - N/A


12.9 M3 5mm Nylon Screw

Table 31: M3 5mm Nylon Screw RoHS Compliance

Declaration for M5 8mm Nylon Screw - N/A


12.10 M3 Nylon Bolt

Table 32: M3 Nylon Bolt RoHS Compliance

Declaration for M3 Nylon Bolt - N/A
