

AC342
Application Note
CQFP to CLGA Adapter Socket



Microsemi Corporate Headquarters
One Enterprise, Aliso Viejo,
CA 92656 USA
Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Sales: +1 (949) 380-6136
Fax: +1 (949) 215-4996
E-mail: sales.support@microsemi.com
www.microsemi.com

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Contents

1	Revision History	1
1.1	Revision 2.0	1
1.2	Revision 1.0	1
2	CQFP to CLGA Adapter Socket	2
2.1	Introduction	2
2.2	CQ to LG Adapter Socket	2
2.3	CQ to LG Adapter Socket Assembly Procedure	4
2.3.1	Step 1	4
2.3.2	Step 2	5
2.3.3	Step 3	5
2.3.4	Step 4	6
2.3.5	Step 5	6
2.3.6	Step 6	6
2.4	CQ352 to LG1272 Adapter Socket Outline	7
2.5	Reflow Profile	8
2.6	CQ to LG Adapter Pin Mapping List	9
2.7	Prototyped Product, Adapter, and PCB Design Matrix	9

Figures

Figure 1	CQ352 to LG1272 Adapter Socket Parts	3
Figure 2	CQ352 to LG1272 Ceramic Adapter: Top View, Bottom View, and Orientation	4
Figure 3	CQ352 to LG1272 Adapter Trim and Form	4
Figure 4	Assembling Socket Housing to CQ352 to LG1272 Adapter	5
Figure 5	Reflowing Adapter to PCB	5
Figure 6	Placing Socket Interposer into Adapter Assembly	6
Figure 7	Placing LG1272 Package into Adapter Assembly	6
Figure 8	Place and Tighten Socket Lid Using Eight Screws and Optional Alignment Pins	7
Figure 9	CQ352 to LG1272 Adapter Socket Outline (unit: mm)	7
Figure 10	Sample Temperature Profile for I/R or Convection Reflow	8

Tables

Table 1	Adapter Socket Part Number	2
Table 2	CQFP to FBGA Adapter Pin Mapping List	9
Table 3	Prototyping Design Matrix	9

1 Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision 2.0

In revision 2.0 of this document, a recommendation to use a torque limit screwdriver was added in [CQ to LG Adapter Socket Assembly Procedure](#), page 4.

1.2 Revision 1.0

Revision 1.0 was the first publication of this document.

2 CQFP to CLGA Adapter Socket

2.1 Introduction

RTAX-S/SL is a designed-for-space, metal-to-metal antifuse FPGA family by Microsemi. It is a derivative of the Axcelerator® family with up to two million system gates. These FPGAs provide designers with nearly 500K ASIC gates, with error detection and correction (EDAC) protected static RAM. Microsemi offers RTAX-S/SL devices in two package types: ceramic column grid array (CCGA or CG) and ceramic quad flat pack (CQFP or CQ).

Microsemi has developed CQ to LG and CG to LG adapter sockets for prototyping RTAX-S/SL devices in both CCGA and CGFP packages. These CQ to LG and CG to LG adapter sockets use the ceramic land grid array (CLGA) package as a prototyping vehicle. This document provides information about assembling the CQ to LG adapter socket.

2.2 CQ to LG Adapter Socket

The CQ to LG adapter socket has an LG configuration on the top and a CQ configuration on the bottom. The adapter socket enables customers to use an LG package during prototyping, and then switch to an equivalent CQFP package for production. There is one CQ to LG adapter socket available. The top and bottom ordering part numbers are listed in the following table.

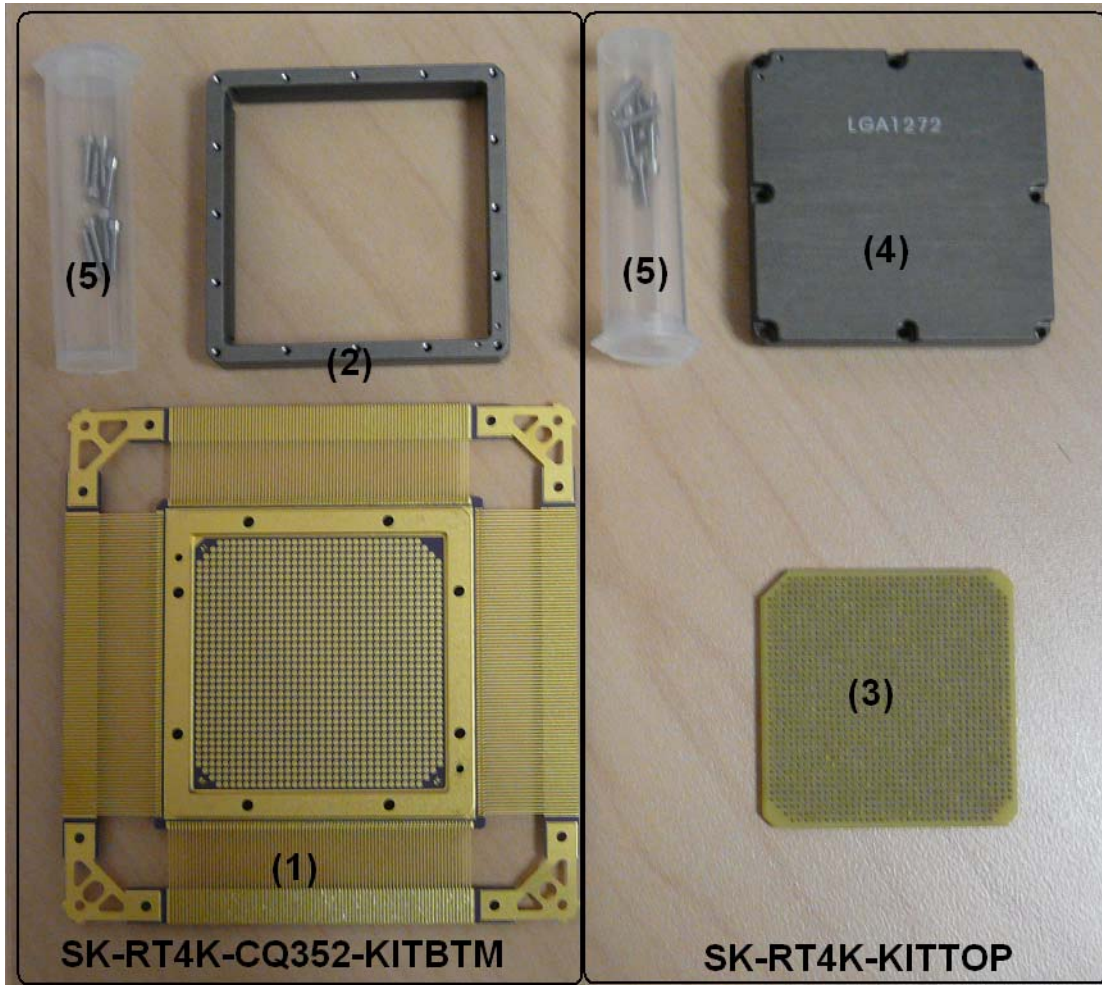
Table 1 • Adapter Socket Part Number

Adapter Socket	Ordering Part Number	Prototyped and Prototype Device
CQ352 to LG1272	SK-RT4K-KITTOP and SK-RT4K-CQ352-KITBTM	For prototyping RTAX4000S/SL-CQ352 using RTAX4000S/SL-LG1272 package

The following figure shows the CQ352 to LG1272 adapter socket parts.

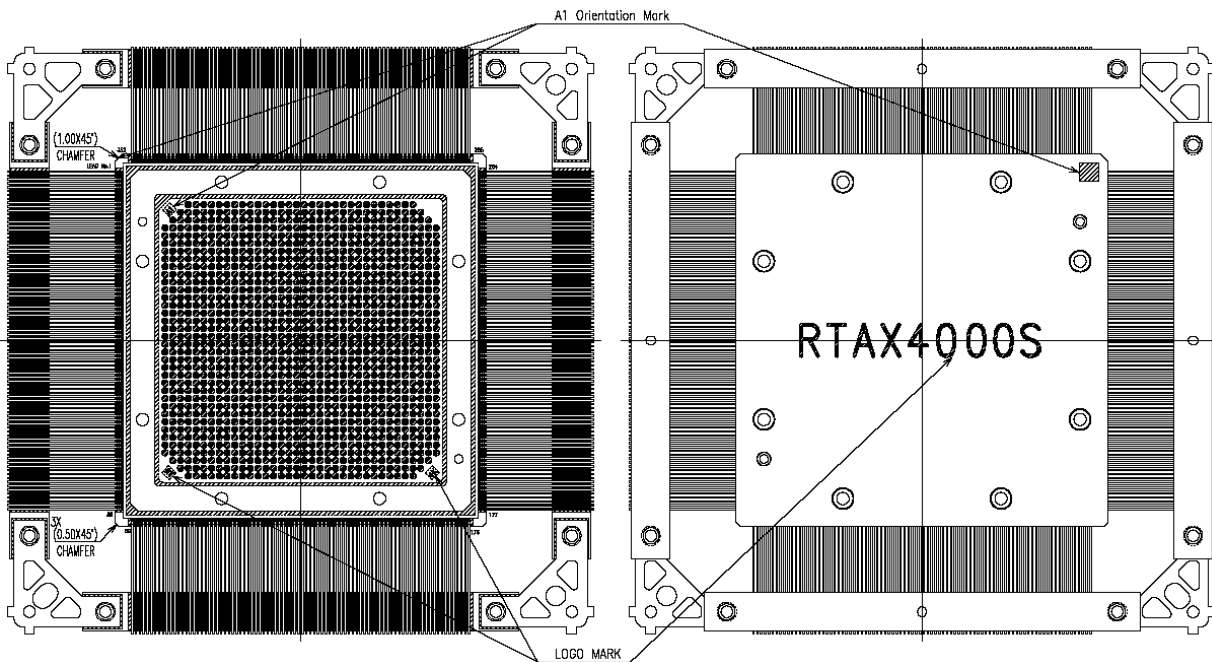
- The kit top (SK-RT4K-KITTOP) contains an interposer (3), a socket lid (4), and eight screws (5).
- The kit bottom (SK-RT4K-CQ352-KITBTM) contains a ceramic adapter (1)—a unique adapter for RTAX4000S/SL, socket housing (2), and eight screws (5).

Figure 1 • CQ352 to LG1272 Adapter Socket Parts



The following figure shows the top-view, bottom-view, and orientation of the RTAX4000S/SL CQ352 to LG1272 adapter.

Figure 2 • CQ352 to LG1272 Ceramic Adapter: Top View, Bottom View, and Orientation



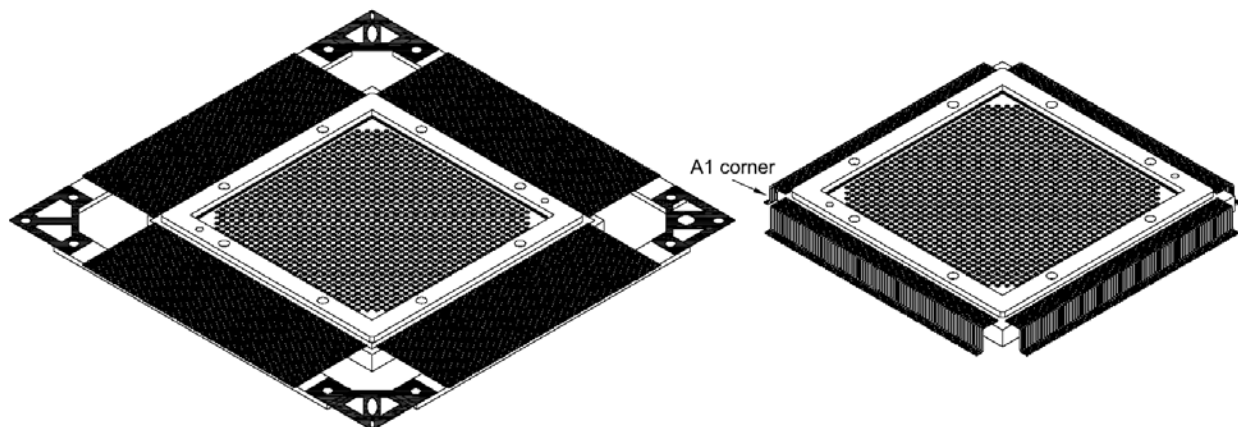
2.3 CQ to LG Adapter Socket Assembly Procedure

2.3.1 Step 1

Trim and form the CQ ceramic adapter.

Note: Do not reflow the adapter to the circuit board until the housing has been attached.

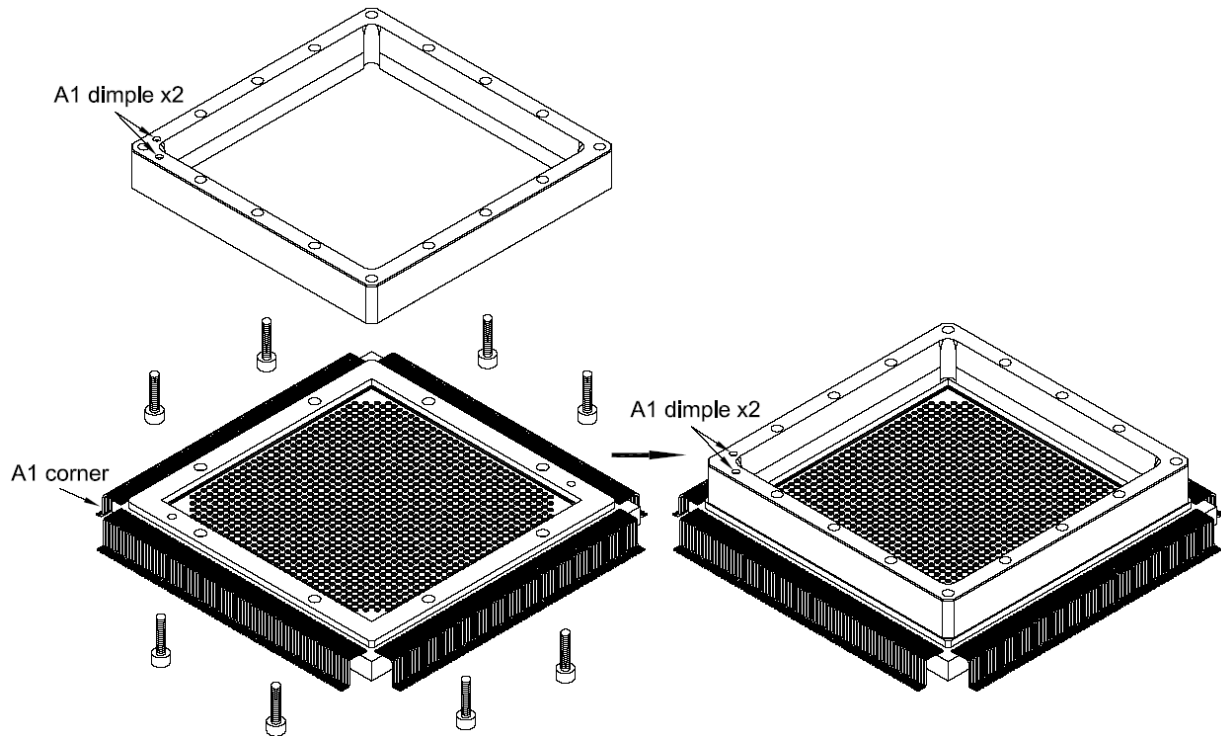
Figure 3 • CQ352 to LG1272 Adapter Trim and Form



2.3.2 Step 2

Assemble the socket housing onto the adapter using eight of the screws provided in the kit. It is recommended to use a torque limit screwdriver with the setting 1.3 to 2.0 lb-in.

Figure 4 • Assembling Socket Housing to CQ352 to LG1272 Adapter

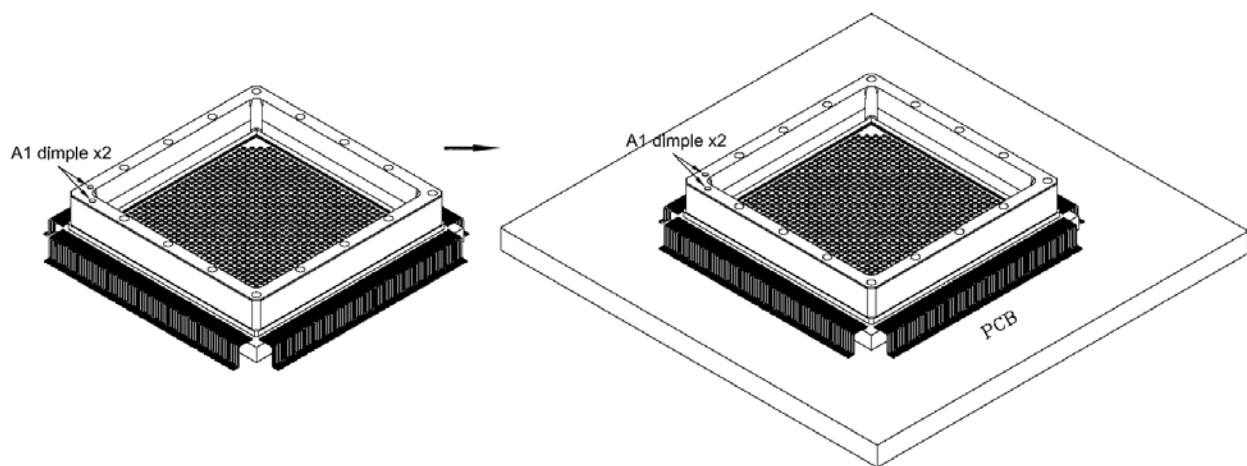


2.3.3 Step 3

Reflow the adapter (with socket housing mounted on it) to the printed circuit board (PCB).

Note: Since reflow profiles heavily depend upon the size of the board and its components, perform reflow process optimization for better results.

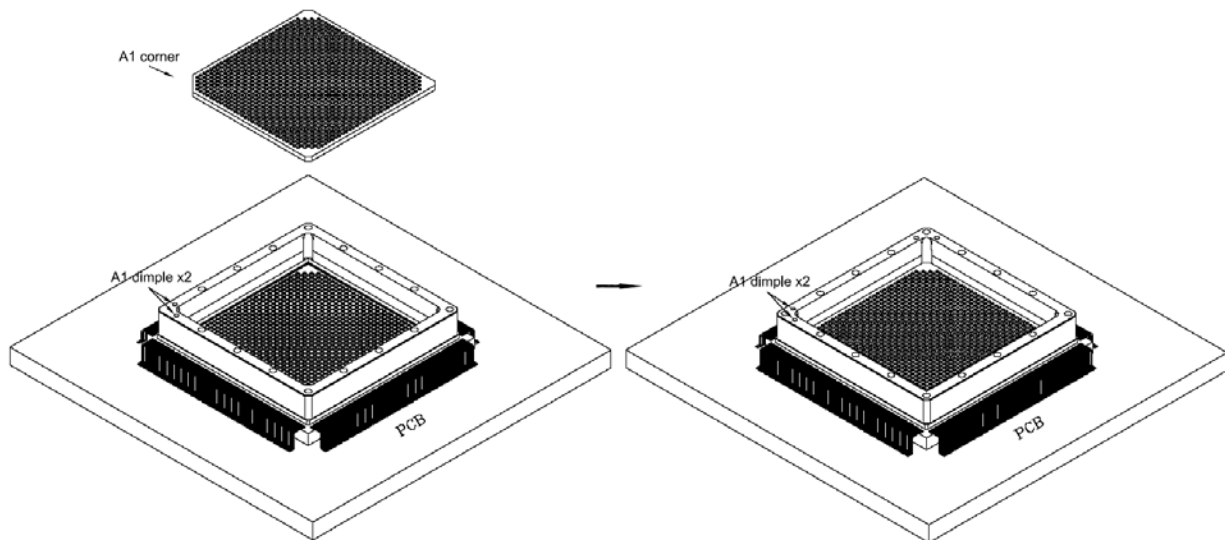
Figure 5 • Reflowing Adapter to PCB



2.3.4 Step 4

Place the socket interposer into the adapter.

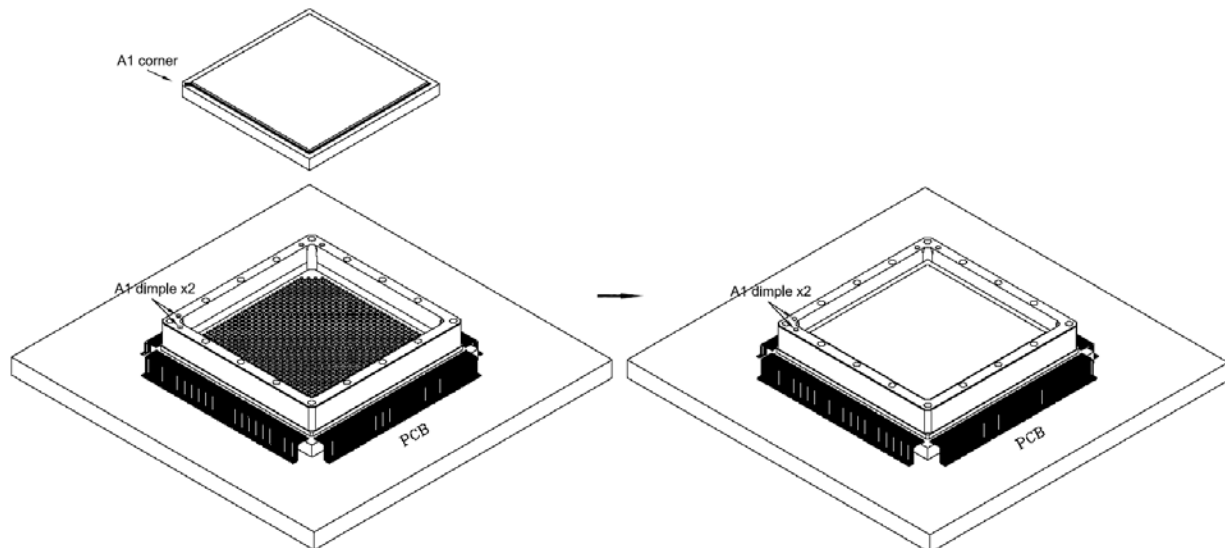
Figure 6 • Placing Socket Interposer into Adapter Assembly



2.3.5 Step 5

Place the LG1272 package into the adapter.

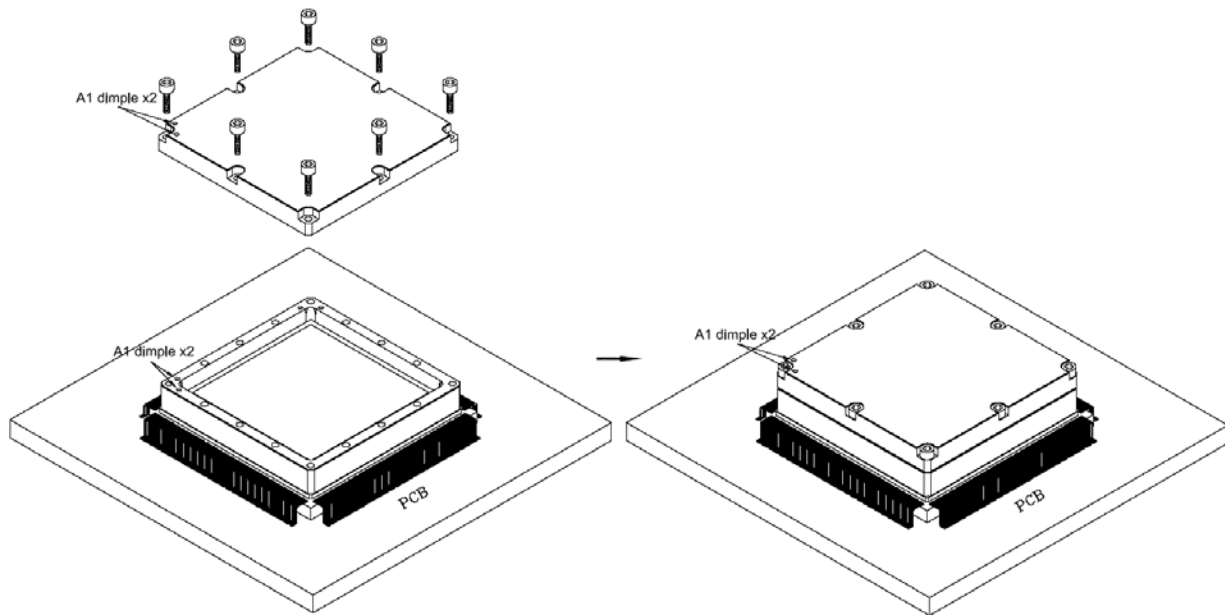
Figure 7 • Placing LG1272 Package into Adapter Assembly



2.3.6 Step 6

Place the socket lid on the socket housing, and tighten the socket lid using the remaining eight screws. It is recommended to use a torque limit screwdriver with the setting 1.3 to 2.0 lb-in.

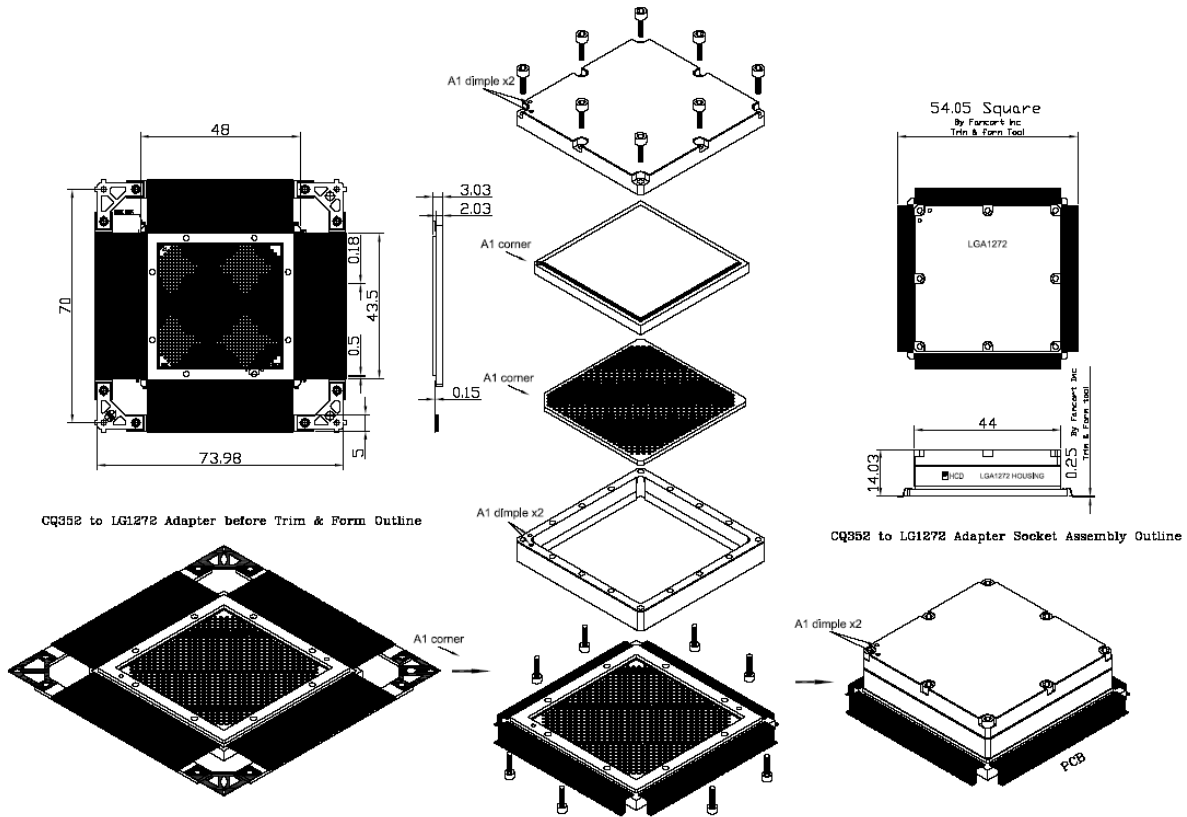
Figure 8 • Place and Tighten Socket Lid Using Eight Screws and Optional Alignment Pins



2.4 CQ352 to LG1272 Adapter Socket Outline

The following figure shows the CQ352 to LG1272 adapter socket outline.

Figure 9 • CQ352 to LG1272 Adapter Socket Outline (unit: mm)

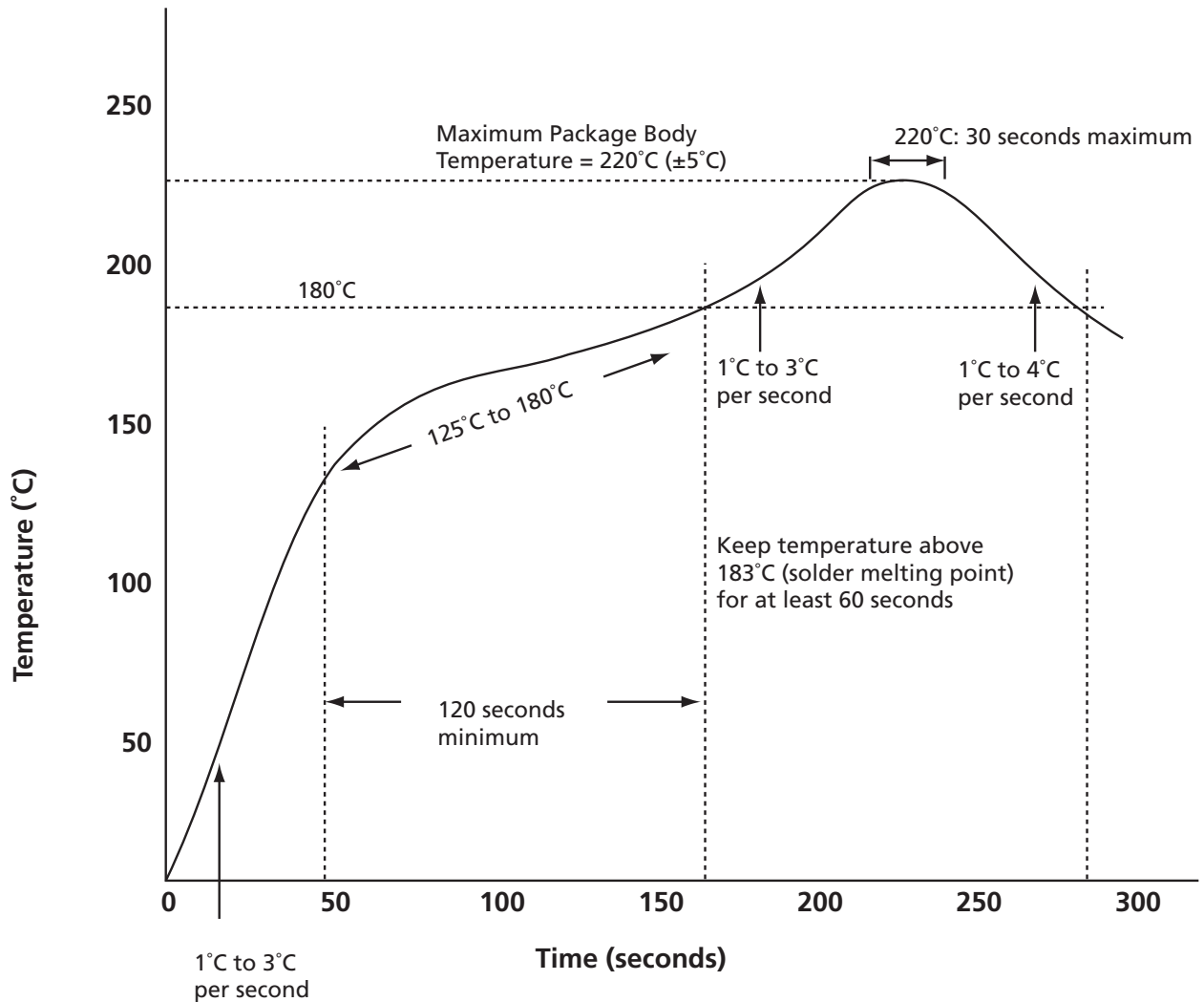


CQ352 to LG1272 Adapter Socket outline Drawing (Unit: mm)

2.5 Reflow Profile

Since reflow profile depends upon the size of the board and other components, end users must perform additional fine tuning from the general profile, as shown in the following figure.

Figure 10 • Sample Temperature Profile for I/R or Convection Reflow



Note: This temperature profile guideline is for reference only.

2.6 CQ to LG Adapter Pin Mapping List

The CQFP to FBGA adapter is routed from the FBGA package to match the existing die pad available to the CQFP device that is being prototyped. Contact Microsemi technical support for a detailed mapping list.

Table 2 • CQFP to FBGA Adapter Pin Mapping List

Adapter Socket	Ordering Part Number	Prototyped and Prototype Device	Document Number
CQ352 to LG1272	SK-RT4K-KITTOP and SKRT4K-CQ352-KITBTM	For prototyping RTAX4000S/SL-CQ352 using RTAX4000S/SL-LG1272 package	1-22-11051

2.7 Prototyped Product, Adapter, and PCB Design Matrix

Designing PCBs for specific products requires an understanding of which adapter socket works for the product. Each adapter socket is routed differently based on the Axcelerator device (or radiation tolerant equivalent derivative) that is being prototyped, and the commercial Axcelerator FG package used for prototyping. The following table lists device-PCB combinations that work.

Table 3 • Prototyping Design Matrix

Prototyped Product	Adapter Part Number	Prototype Vehicle	PCB Design
RTAX4000S/SL-CQ352	SK-RT4K-KITTOP and SK-RT4KCQ352-KITBTM	RTAX4000S/SL-LG1272	RTAX4000S/SL-CQ352