Assembly Recommendations

Purpose

This application note describes Teledyne-e2v recommendations to assemble EV12AQ600 and EV12AQ605 products on PCB (Printed Circuit Board).

Product Information

EV12AQ600 is supplied with either 90Pb/10Sn (EV12AQ600 xGHy) or SAC305 (EV12AQ600xSHy) solder balls.

EV12AQ605 is supplied with SAC305 solder balls only.

For more details, please refer to the EV12AQ600 product datasheet (available on Teledyne-e2v website).

In this document, EV12AQ60x is either EV12AQ600 or EV12AQ605

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1. Package information

EV12AQ60x module terminations can be supplied in two different solders balls:

- High Lead 90Pb/10Sn solder for a leaded assemby
- Lead free SAC 305 for a Pb-free assembly

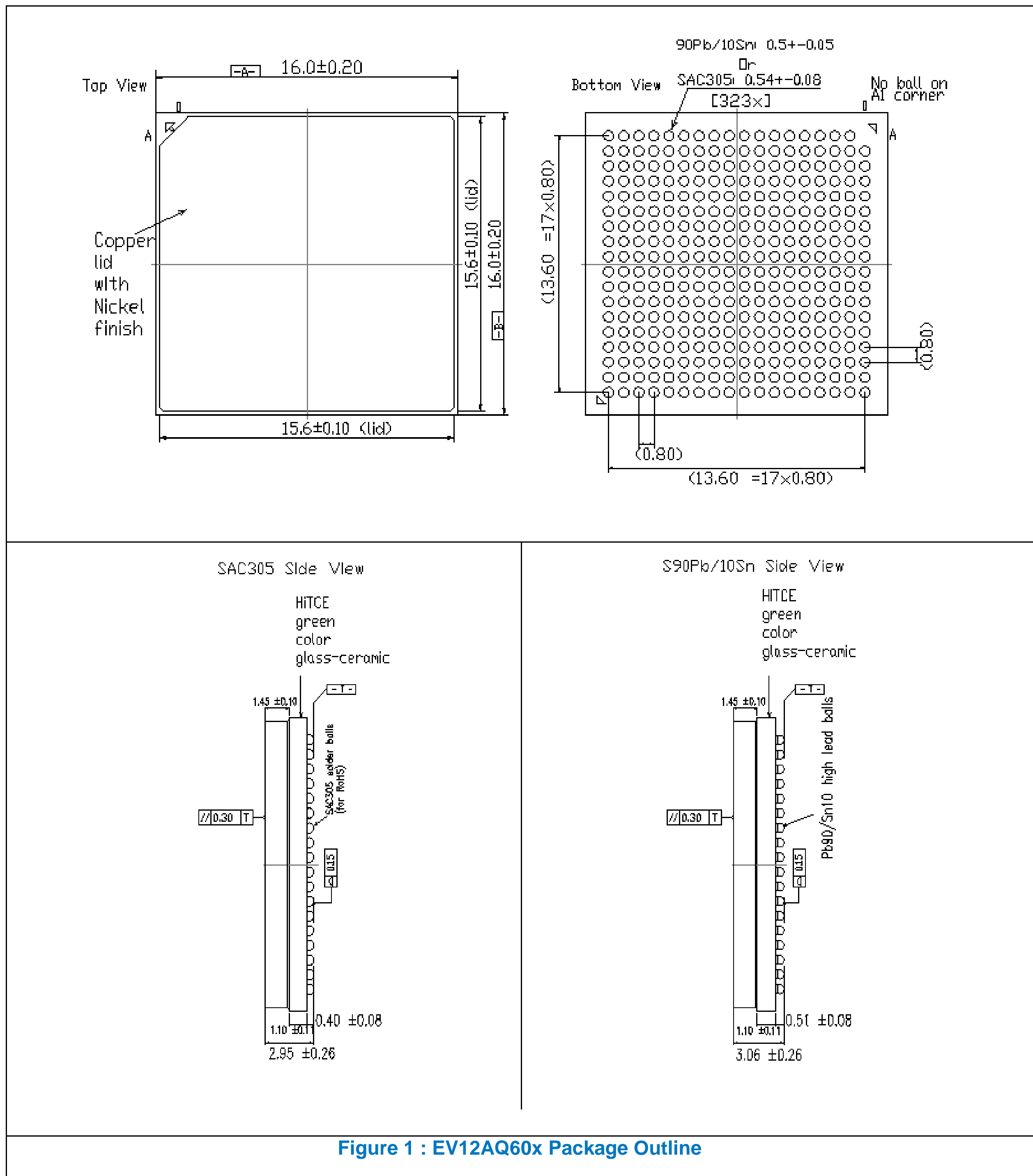

Figure 1 : EV12AQ60x Package Outline

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2. Motherboard pads configuration

In general, printed circuit **board** (PCB) pad solderable diameter should match the package pad diameter i.e 500µm diameter.

Both solder mask finishings (NSMD / SMD) can be used on motherboard. However, Teledyne-e2v does recommend NSMD finish as it is the most common type of motherboard pad in the industry.

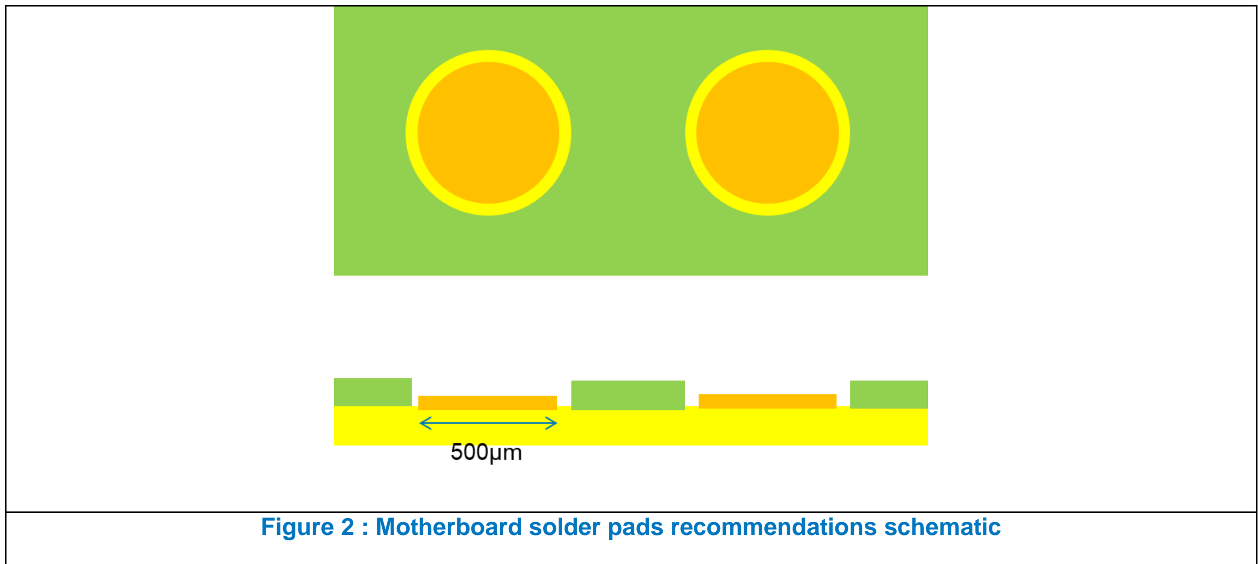

Figure 2 : Motherboard solder pads recommendations schematic

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3. Pre-Assembly Handling

EV12AQ60x is supplied in Jedec Tray. EV12AQ60x is a moisture sensitive and rated at MSL3 following JEDEC moisture sensitivity specifications in J-STD-020. Allowable Time out of Dry Pack is 168h. Above this time range re-bake of EV12AQ60x device is required.

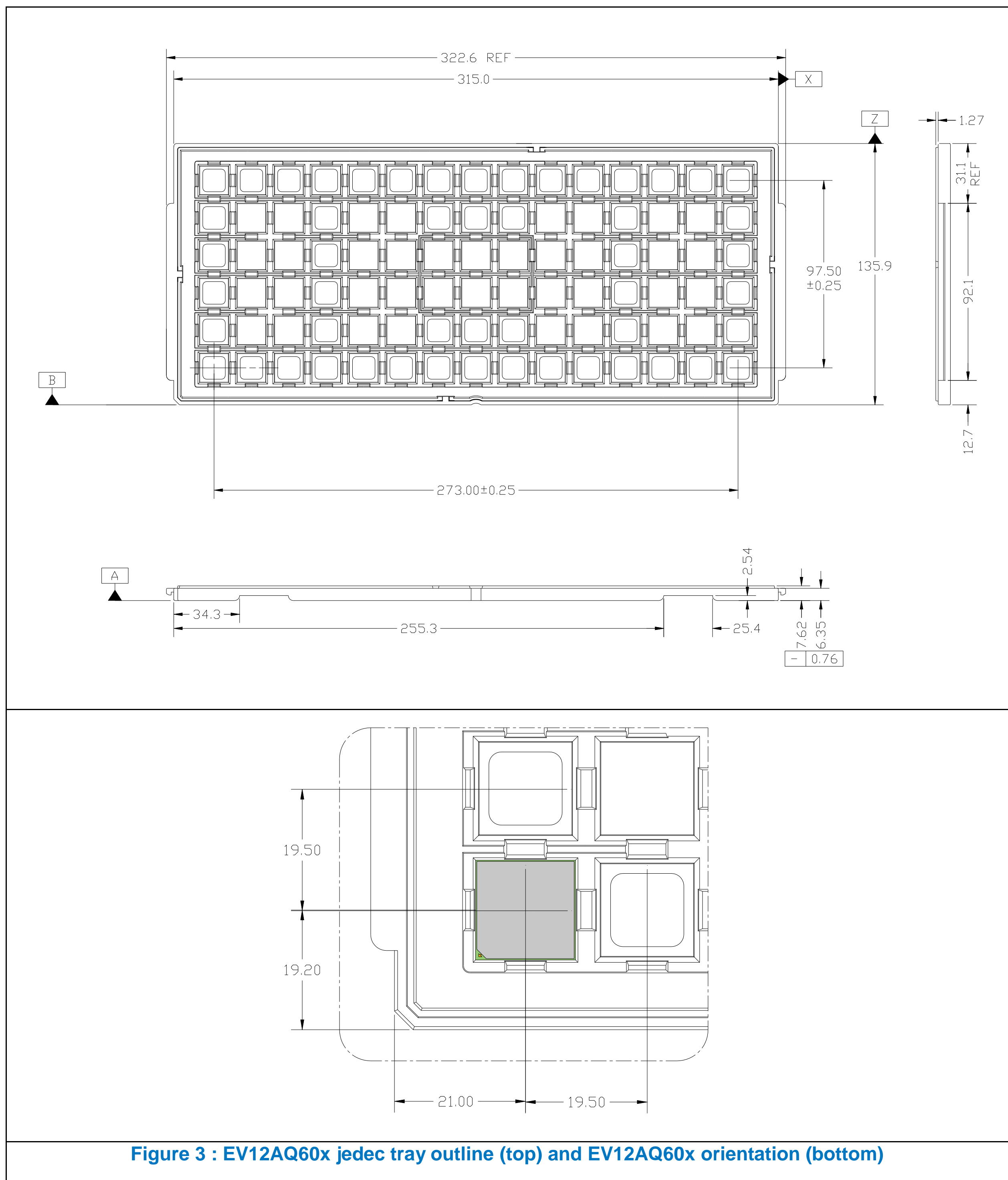

Figure 3 : EV12AQ60x jedec tray outline (top) and EV12AQ60x orientation (bottom)

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4. Pb90/Sn10 : Solder paste deposition recommendations

Sn63 Leaded solder paste deposition has to be used when the EV12AQ60x is supplied with 90Pb/10Sn solder bumps. The lead solder paste should have the following characteristics:

- Halide-free flux qualification rosin based (ROL0) according to ANSI/J-STD-004.
- Solder paste with type 3 (20-45µm) particles is recommended
- “No clean” solder paste is recommended.

A stencil with no reduction (i.e 500µm diameter) on the apertures and a thickness between 100 and 150µm is recommended. 175µm thickness with an electro-polish finishing can also be selected.

“Head in pillow” defect can easily occur if a leaded solder paste is used with SAC305 solder bumps. Teledyne E2V do not recommend such configuration.

5. SAC305 Type : Solder paste deposition recommendations

Lead free solder paste deposition has to be used when the EV12AQ60x is supplied with SAC305 solder bumps. The lead solder paste should have the following characteristics:

- Halide-free flux qualification rosined based (ROL0) according to ANSI/J-STD-004.
- Solder paste with type 3 (20-45µm) particles is recommended
- “No clean” solder paste is recommended.

A stencil with no reduction (i.e 500µm diameter) on the apertures and a thickness between 100 and 150µm is recommended. 175µm thickness with an electro-polish finishing can also be selected.

6. Pick & Place recommendations

In order to minimize the X,Y offset, Teledyne e2V is recommending to use automatic pick & place machine (with a placement accuracy head of at least +-50µm) and to use the lead recognition capabilities of such placement system, not the outline centering .

Handling of EV12AQ60x module should be done using the lid top surface. Compliant (such as rubber) or hard type nozzle is advised. In order to ensure an optimal stability while handling a large nozzle diameter as 15mm diameter is advised.

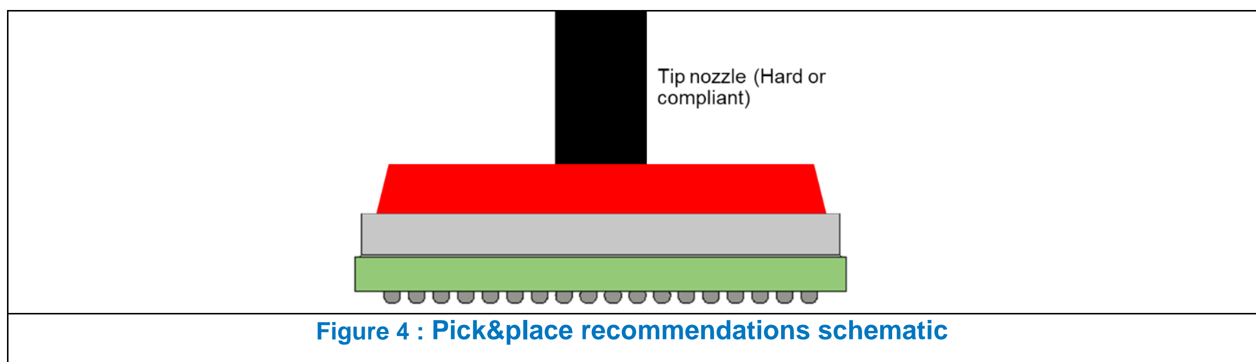

Figure 4 : Pick&place recommendations schematic

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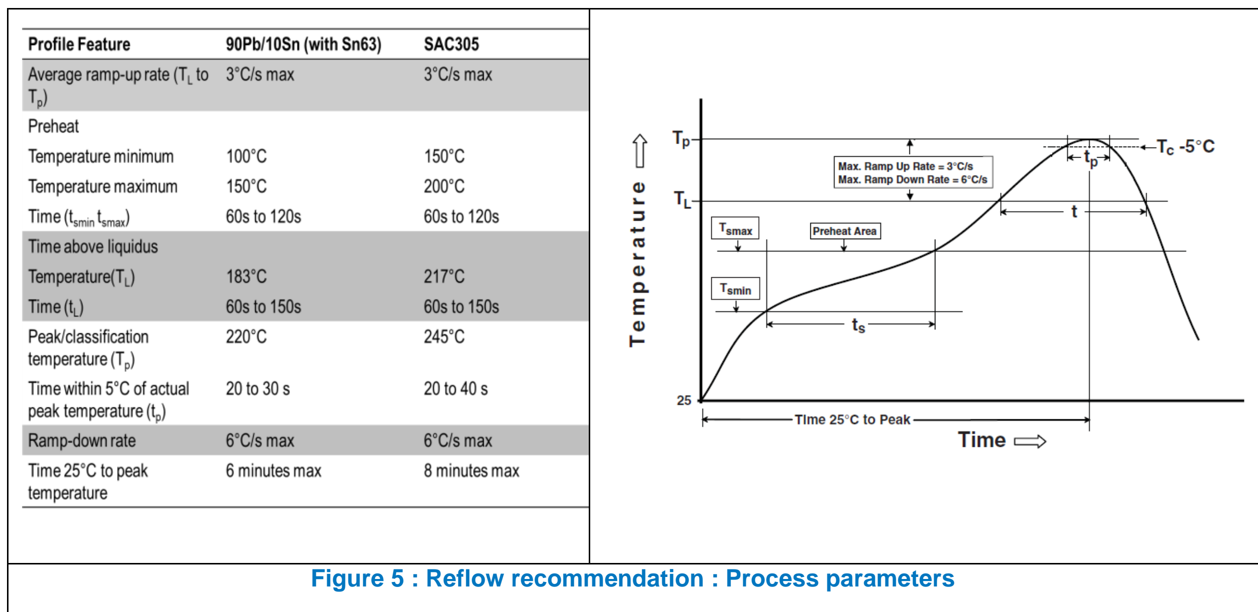
7. Reflow recommendations

The below temperature profile for moisture sensitivity characterization is based on the IPC/JEDEC joint industry standard: J-STD-020

During reflow, using a nitrogen atmosphere inside the oven is recommended in order to maximise solder joint reliability.

Before thermal assembly, carefully check that all other devices can withstand a 245°C peak temperature in case of lead free assembly.



Profile Feature	90Pb/10Sn (with Sn63)	SAC305
Average ramp-up rate (T_L to T_p)	3°C/s max	3°C/s max
Preheat		
Temperature minimum	100°C	150°C
Temperature maximum	150°C	200°C
Time (t_{smin} t_{smax})	60s to 120s	60s to 120s
Time above liquidus		
Temperature(T_L)	183°C	217°C
Time (t_L)	60s to 150s	60s to 150s
Peak/classification temperature (T_p)	220°C	245°C
Time within 5°C of actual peak temperature (t_p)	20 to 30 s	20 to 40 s
Ramp-down rate	6°C/s max	6°C/s max
Time 25°C to peak temperature	6 minutes max	8 minutes max

Figure 5 : Reflow recommendation : Process parameters

The thermocouple should be embed close to EV12AQ60x module under the device center in order to maximise the profile accuracy. Thermocouple has to be glued with thermally conductive adhesive.

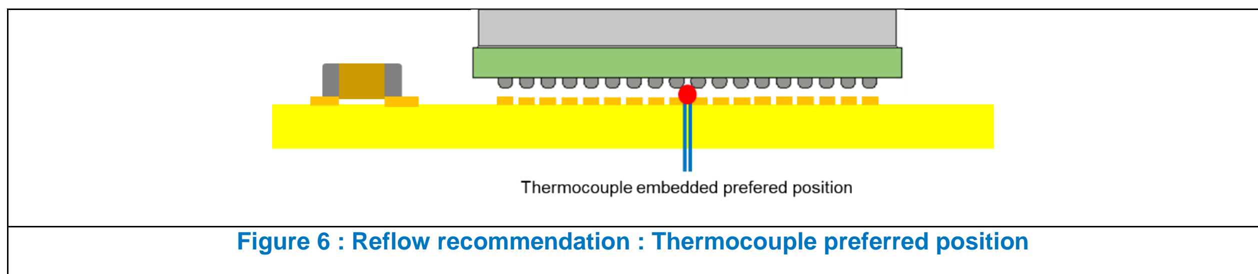


Figure 6 : Reflow recommendation : Thermocouple preferred position

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Related documents

EV12AQ600 Datasheet available on the Product Webpage (https://www.teledyne-e2v.com/products/semiconductors/adc/ev12aq600/)

Revision History

Version	Date	Revision
A	28/06/2019	Initial release

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