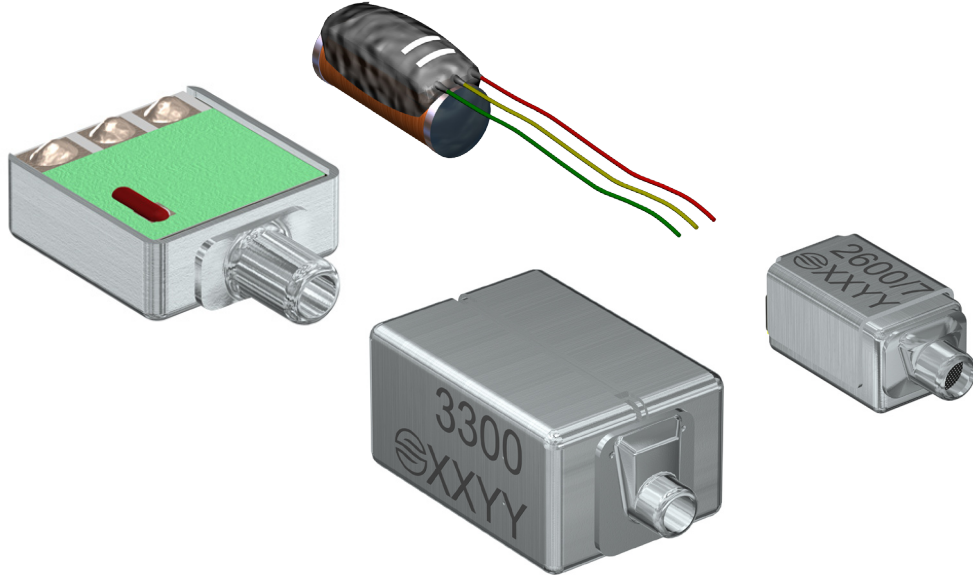


Application Note



Soldering RoHS Compatible Transducers Mixing Leaded and Lead Free Solder in Production

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History Revision

Revision Number/Date	Status	Change from last revision
0.6 / Aug. 05	Preliminary	First released version
0.7 / Aug. 05	Preliminary	Removed some typographic errors
1.0 / Sep. 05	Released	Updated: chapter 1; 3.1 (moved matrix to chapter 4, and included reference to 8000 AN); 4.1 and 4.2 (solder temperatures and solder tips)
2.0 / Jul. 07	Released	Updated after final implementation of lead free solder
MT5026.C (07/08)	Released	No technical updates
004/OCT-29-2009	Released	No technical updates

Application Note

1. Introduction

As part of our introduction of the environment quality system, according ISO14001, Sonion has followed the global environmental initiatives to reduce the level of hazardous materials contained in electronic components and systems. We have implemented standards for hazardous materials that comply with European Union directives (RoHS and WEEE) and the initiatives of Asian corporations.

As a part of these standards it was decided that lead should be eliminated from electronics by July 1, 2006.

In the second half of 2005, the Sonion transducer production lines has switched to a RoHS compatible, lead free production, one by one. From January 1st, 2006, all lines have been switched.

Chapter 2 of this application note describes the features of the new lead free solder. The way it should be used in applications is presented in chapter 3. The new lead free solder process prescriptions are given in chapter 4.2. We recognize that mixing leaded and lead free transducers and solder-processes will be nearly impossible to avoid. Therefore, a large part of the application note (chapters 2.3 and 4.3 to 4.18) will handle the different mixtures possible, and how to get the best solder joint quality.

2. Lead Free Solder

Sonion has standardized its lead free solder on the tin-silver-copper alloy SAC305, containing 96.5% tin (Sn), 3.0% silver (Ag) and 0.5% copper (Cu). Out of the many different lead free solders available and tested this solder proved to have the best compatibility with our products. The choice for SAC305 is also supported by the fact that the IPC (the Association Connecting Electronics Industries, www.ipc.org) declared the SAC305 as the lead free alloy of choice for the electronics industries.

The SAC305 solder has a melting temperature of 217°C (423°F), which is about 30°C (86°F) higher than standard leaded solder. This has its effects all over the soldering process, for instance on the solder-iron temperature, the solder time and the use of flux. The recommended processes-parameters for Sonion transducers to use are treated in chapter 4 in this application note.

Application Note

2.1. Lead Free Solder Joint Appearance

Lead free solder joints are less 'shiny' than the well-known leaded solder joints. Also the wetting is less. However, lead free solder joints have the same qualities as leaded solder joints. The following figures show some (good) leaded and lead free solder joints.

Figure 1:

Solder pads with leaded solder

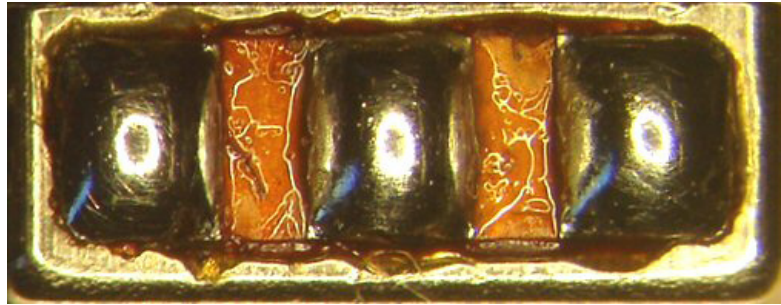


Figure 2:

Solder pads with lead free solder



2.2. Use of Flux

Flux is added to the soldering process to remove the oxidation from surface to solder, and from solder itself. The flux consists of a carrier (usually alcohol), one or more solids (which react with the oxides) and an activator (a resin (natural) or rosin (chemical)). Figure 3 shows a general de-oxidization process of a flux.

A flux should start working at a temperature just below the melting point of the solder it is used with. As the melting temperature of a lead free solder is usually higher than that of a leaded solder, a lead free solder needs a specially designed flux that works at a higher temperature. Also, as lead free solders are known to oxidize faster than leaded solders, the fluxes for lead free solder are more aggressive than fluxes for leaded solder.

The amount of flux should be chosen so that all flux has been used at the end of a soldering operation, as any residues left are still corrosive. On the other hand, the solder processes should not continue after the flux has run out to prevent oxidation of the surface by the oxygen in the air. As a rule of thumb 2-5 vol% flux is needed (where the solder volume is 100%), depending on the soldering time.

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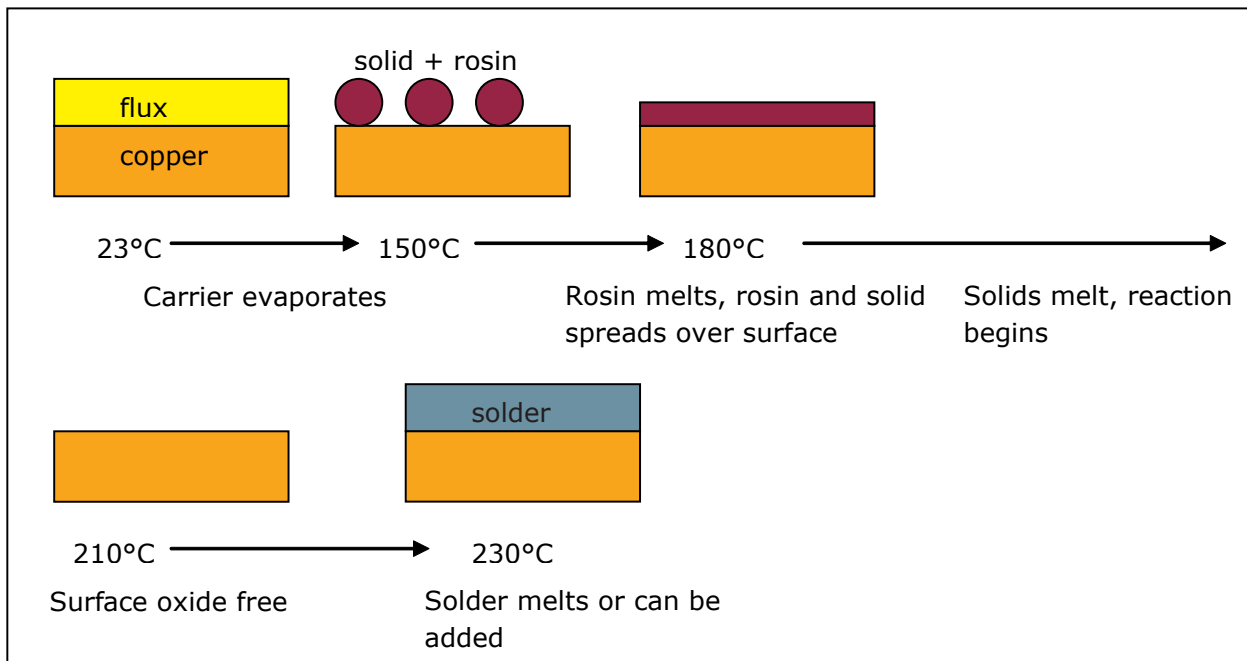


Figure 3: De-oxidization process of flux (for a leaded solder process)

2.3. Mixing of Leaded and Lead Free Solder

Preferably, leaded and lead free solder should not be mixed.

However, mixing can occur when, for instance, old products are being repaired in a lead free production, or when leaded wires are soldered into a lead free product. Any mixing of leaded and lead free solder will have several effects on the solder joint, like intermetallics and internal stresses. The severity of the effect depends on the amount of leaded or lead free solder added. In chapter 4 is described how a specific soldering operation between leaded and lead free solder should be performed to get the best possible quality.

2.3.1 Intermetallics

Intermetallics are combinations of metals and they appear at any contact surface between different metals, e.g. copper-solder and leaded to lead free solder. A small amount of intermetallics will make the connection between the metals stronger, but too much will weaken the connection again. As intermetallics grow according the diffusion process, joint strength might change over time.

When adding leaded to lead free solder (or the other way around), the solders don't usually mix, unless the volume of one of the solders is much lower <1% than the other. On the contact surface intermetallics appear, see Figure 4.

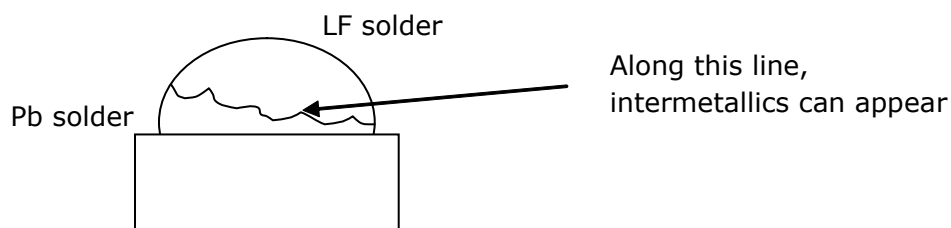


Figure 4: Example of contact surface between leaded and lead free solder

Application Note

2.3.2 Internal Stresses

When lead free solder is contaminated by lead, lower melting phases are formed. Adding only 1% of lead will drop solidus from 217°C (423°F) to 179°C (354°F). This will effect in a longer solidifying time. Also, the concentration of lead will not be equally divided over the solder ball. This causes one part of the solder to solidify before the other and this can effect in intermetallic fractions in the solder and/or internal stresses in the solder joint.

2.3.3 Melting Temperature when Mixing

The lead free solder has a higher melting temperature than the leaded solder. For a good solder joint consisting of both solder types all the solder should melt completely. The solder temperature (and time) should therefore be chosen equal to the temperature of soldering lead free solder.

(Please note that the complete solder ball and e.g. the solder on a connection wire should have a temperature above the melting point of lead free solder. Notice that there is usually a temperature difference between the solder tip on the soldering iron and the temperature of the solder ball).

2.3.4 Use of Flux when Mixing

For both lead free soldering as for any combination of leaded and lead free solder, we recommend using a flux designed for lead free solders because the recommended temperature is that of lead free solders.

A flux is designed to be active in a certain temperature range, belonging to a specific solder. As lead free solder has a higher melting point the activation temperature of the lead free flux is also higher. When heated above the temperature range the flux will burn (faster) and therefore flux for leaded solder should not be used for lead free and mixtures.

2.4 Leaching

Lead free solder shows higher leaching of metals than leaded solder; in liquid stage it dissolves metals (of for instance connection plates or copper wires) much better and faster.

Therefore, adding lead free solder to a solderpad is increasing the amount of leaching. Where needed, the Sonion solderpads (either on hybrids, connection plates or flex prints) have been improved to withstand the leaching and to guarantee the same quality in pad adhesion.

The increased leaching (and oxidation) of lead free solders can also be noticed on the higher rate of degradation of solder tips.

3. Soldering Sonion Transducers

This chapter describes the general notes for soldering to Sonion transducers. The general handling notes and heat sink for the 8000 microphone can be found in the '8000 Microphone - Product Handling and Soldering Recommendations' application note on the Sonion website (www.sonion.com).

3.1 Solder Type

We assume that the leaded solders used are either Sn/Pb or Sn/Pb/Ag alloys, and the lead free solders are Sn/Ag/Cu alloys (e.g. SAC305). Sonion products only use the solders mentioned (on solderpads accessible for the customer). If any information on other solders/combinations is needed please contact your Sonion representative.

3.2 Solder Temperature and Solder Time

The solder temperature and time recommended for leaded and lead free soldering are noted in chapters 4.1 and 4.2.

For any mixtures of leaded and lead free we recommend the higher temperature and time of the lead free solder (except where noted otherwise), as described in chapters 4.3 to 4.18. The higher temperature and time will guarantee that all solder melts during the soldering operation.

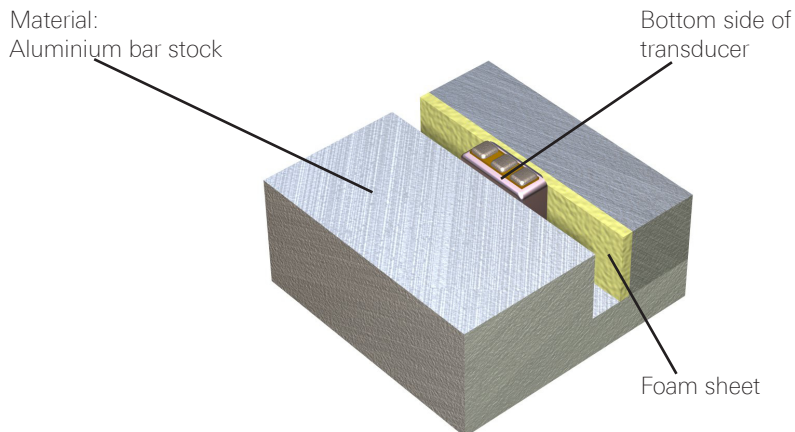
3.3 Use of a Heat Sink

Sonion highly recommends using heat sinks to dissipate the heat from the transducers, especially now that lead free solder needs higher temperatures to melt. When placing a transducer in a heat sink fixture it is important not to press the sides with excessive force as this may cause damage. Place the transducer in a heat sink, terminal pads up. See the figures on the next page for more details.

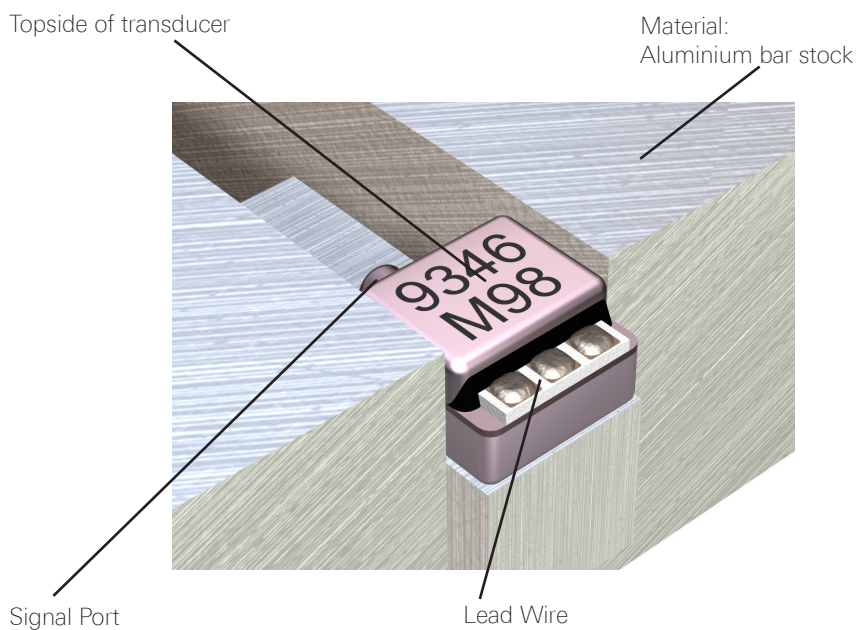
Application Note

Warning: When soldering on the transducer the spout (of a receiver or microphone) must not be blocked. This is to prevent pressure increase due to expanding air.

Heat Sink series 30, 100 and all receivers



Heat Sink series 6000, 9000 and all telecoils



Application Note

3.4 Soldering Steps

Sonion recommends the following steps for soldering:

1. Place the transducer in the appropriate heat sink, see chapter 3.3.
2. Add flux to the solderpad, or dip the pre-tinned part of the connection wire in liquid flux. Avoid excessive flux residue!
3. Lay tinned tip of connection wire on terminal pad.
4. Clean soldering iron tip on wet cellulose sponge.
5. Apply soldering iron tip to the connection wire and terminal pad simultaneously.
6. Keep soldering iron tip in contact with connection wire and terminal pad until solder flows making a good connection.
7. Remove solder iron tip and hold connection wire in place until solder solidifies.
8. Inspect connection to see that:
 - a. Solder has flowed smoothly over connection wire and terminal pad.
 - b. Solder has not bridged between adjacent terminal pads or between the terminal pad and the case.

It is recommended that the total time soldering iron tip is in contact with the connection wire and terminal does not exceed one second, and the temperature of the transducer does not exceed 80°C (176°F).

Application Note

4. Specific Solder Prescriptions per Combination

The following matrix presents the most common assemblies in which Sonion leaded and lead free transducers are being used.

Transducers	Connection Type	Solder Type	Solid Connection Wires		Litze Connection Wires		Rework		Adding Solder 50/50		Solderpad (copper)		Solderpad (hybrid)		Pretinning		
			Leaded	Lead Free	Leaded	Lead Free	Leaded	Lead Free	Leaded	Lead Free	Leaded	Lead Free	Leaded	Lead Free	Leaded	Lead Free	
Microphone (e.g. 9000 and 8000)	Hybrid	Leaded	1	5	1	6	1	18	1	18							
		Lead Free	7	2	8	2	9	2	15	2							
	Flexprint	Leaded	1	10	1	10	1	11	1	16							
		Lead Free	7	2	8	2	12	2	15	2							
Receiver/Microphone (e.g. 2600 and 100)	Connection plate	Leaded	1	10	1	10	1	11	1	16							
		Lead Free	7	2	8	2	12	2	15	2							
Telecoils	Solid connection wire	Leaded									1	7	1	7	1	17	
		Lead Free									13	2	14	2	17	2	
		No Solder									3	4	3	4	3	4	
Rework of telecoils	Solderpad	Leaded					1	11	1	16							
		Lead Free					12	2	15	2							
	Hybrid	Leaded					1	18	1	18							
		Lead Free					9	2	15	2							
Prepped transducers	Litze connection wire	Leaded									1	8	1	8	1	13	
		Lead Free									13	2	14	2	13	2	
	Solid connection wire	Leaded									1	7	1	7	1	17	
		Lead Free									13	2	14	2	17	2	
		No Solder									3	4	3	4	3	4	

- No problem
- Risk, tests ungoing or to be started
- High Risk, only allowable using special precautions, tests ungoing or to be started
- Not allowed, tests ungoing
- Not applicable
- X** Number relates to type of solder mixture, see application note for explanation

Application Note

On the vertical axis the Sonion transducers are given, split per transducer type, connection type and solder type. On the horizontal axis are the parts/operations that a customer might use and/or perform on the transducers.

In the matrix cells the color designates whether a certain combination presents no problem, is a risk or is not allowed. The risks are split in low and high.

The numbers in the cells refer to the list of solder prescriptions in this chapter (e.g. the solder prescription on how to solder a lead free litze connection wire to a leaded hybrid, with number 6 in the cell, is given in chapter 4.6). In the prescriptions is explained how a certain combination can be used with minimal risk and the best possible quality.

Combinations 1-4, green in the matrix, are allowed.

Combinations 5-14, yellow in the matrix, can introduce a minor quality risk.

Combinations 15-17, orange in the matrix, can introduce a medium quality risk.

Combination 18, red in the matrix, can introduce a major quality risk.

When determining the best temperatures for soldering the transducers were placed in a heat sink according the chapter 3.3. The soldering equipment (iron and tips) used is presented in the tables in chapter 4.1 (for leaded) and chapter 4.2 (for lead free and any combination leaded-lead free).

Please note that when using other equipment, one might have to deviate from the recommended solder-temperatures and -times to get a good solder joint.

Application Note

4.1 Leaded Transducer in a Leaded Production

This is the situation before any change to lead free solder has taken place.

Required Tools	Recommendations	Additional Comments	Recommended Brands
Soldering Iron	Lower Power (25 Watts) with temperature control	Series 30 and 100 Microphones: 290 - 345°C (554 - 653°F)	Weller EC2002, Weller WTCP-S, Weller WSD80, Metcalf SP-PW1-20
		Series 6000, 8000, and 9000 Microphones: 350 - 370°C (662 - 734°F)	
		All Receiver Models: 350 - 370°C (662 - 734°F)	
Soldering Iron Tip	0.6 - 0.8 mm (0.024 - 0.031 inch)	Series 30, and 100 Microphones 0.8 mm (0.031 inch)	Weller
		Series 6000, 8000 and 9000 Microphones 0.6 mm (0.024 inch)	
		All Receiver Models 0.6 mm (0.024 inch)	
External Connection Wire	Pre-tinned wire	N/A	
Solder	No-clean solder	N/A	Multicore no-clean x39B Tin/lead/silver

Temperatures mentioned are settings on the soldering iron Weller WSD 80. Tip-temperature is usually 10-20°C lower. Transducers were placed in a heat sink (see chapter 3.3 and the 8000 Microphone - Product Handling and Soldering Recommendations application note on the Sonion web site)!

Application Note

4.2 Lead Free Transducer in a Lead Free Production

This is the ideal situation after the change to lead free components.

Required Tools	Recommendations	Additional Comments	Recommended Brands
Soldering Iron	Lower Power (25-60 Watts) with temperature control ESD safe	Series 100 Microphones: 340 - 350°C (644 - 662°F)	Weller EC2002, Weller WTCP-S, Weller WSD80, Metcal SP-PW1-20
		Series 6000, and 9000 Microphones: 350 - 400°C (662 - 752°F)	
		Series 8000 Microphones: 350 - 370°C (662 - 698°F)	
		All Receiver and Telecoil Models: 350 - 380°C (662 - 716°F)	
Soldering Iron Tip	Smallest tip possible	Series 30, and 100 Microphones 0.2 - 0.8 mm (0.008 - 0.031 inch)	Weller LT1S, Metcall
		Series 6000, 8000 and 9000 Micro- phones 0.2 - 0.6 mm (0.008 - 0.024 inch)	
		All Receiver and Telecoil Models 0.2 - 0.6 mm (0.008 - 0.024 inch)	
Solder	Lead Free Sn/Ag/Cu with no-clean flux	SAC305 with 1 - 2.2% flux (Sn 97.5%/Ag 3.0%/Cu 0.5%) diameter 0.25 - 0.5 mm	Kester: SAC305-275 flux Multicore: SAC305-crystal400 flux
Flux	Lead Free compatible, no-clean flux	Only add flux when needed. Flux can be added to the solderpad (using a flux pen or a syringe with tacky flux) or to the connection wire	Kester: 952-D6 Flux Pen TSF6591-1 Tacky Flux 186-5 Liquid Flux
Soldering time solderpads	1 s	Max: 2 s, dwell time: 10 s between solder operations	
Soldering time connection wires (>10 mm)	3 s	Time can be increased when connection wires are held with tweezers	

Temperatures mentioned are settings on the soldering iron Weller WSD 80 with LT S1 tip. Tip-temperature is usually 10-20°C lower. Transducers were placed in a heat sink (see chapter 3.3 and the 8000 Microphone - Product Handling and Soldering Recommendations application note on the Sonion web site!)

4.3 Solder-Free Transducers in a Leaded Production

Certain transducers (ATC, prepped parts) have connection wires without any solder. It is recommended that these are pre-tinned (at the required length) before use. This can be done by putting end of the connection wire in a solder bath (for instance a Weller W101) containing leaded solder, heated to 330°C (626°F).

Application Note

4.4 Solder-Free Transducers in a Lead Free Production

Certain transducers (ATC, prepped parts) have connection wires without any solder. It is recommended that these are pre-tinned (at the required length) before use. This can be done by putting the end of the connection wire in a solder bath (for instance a Weller W101) containing lead free solder, heated to 380°C (716°F).

4.5 Soldering Lead Free Solid Connection Wires to a Leaded Hybrid

When soldering lead free solid (copper) connection wires to a leaded hybrid, mixing of leaded/ lead free solder (see chapter 2.3) and leaching can introduce a quality risk.

Leaching

Metal layers in the solderpads of hybrids designed for lead free solder have been improved to guarantee the same quality in pad adhesion. Vice versa, adding lead free solder to a non-improved solderpad of a leaded hybrid is increasing the risk of leaching.

In case of adding a tinned solid connection wire to a lead free solderpad, the amount of leaded solder added is very small. Therefore, the risk of significant leaching is very small.

We recommend a soldering temperature of 380°C (716°F) (tip-temperature 360°C (680°F)), a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

4.6 Soldering Lead Free Litze Connection Wires to a Leaded Hybrid

When soldering lead free litze connection wires to a leaded hybrid, mixing of leaded/ lead free solder (medium risk, see chapter 2.3) and leaching (small/medium risk) can introduce a quality risk.

Leaching

Metal layers in the solderpads of hybrids designed for lead free solder have been improved to guarantee the same quality in pad adhesion. Vice versa, adding lead free solder to a non-improved solderpad of a leaded hybrid is increasing the risk of leaching.

In case of adding a tinned litze wire to a lead free solderpad, the amount of leaded solder added depends on the solder that is present between the strands of the litze. When the diameter of the litze is close to the height of the solder on the pad, the percentage of lead free solder added can be significant. Therefore, the risk of leaching is small/medium, depending on litze size.

We recommend a soldering temperature of 380°C (716°F) (tip-temperature 360°C (680°F)), a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

4.7 Soldering Leaded Solid Connection Wires to a Lead Free Hybrid, Flex Print or Connection Plate

When a solid wire with leaded solder is soldered into a lead free solder ball (on a hybrid, flex print or connection plate), the mixing of leaded and lead free solder can introduce a quality risk. As the amount of leaded solder around a solid connection wire is small, the leaded solder will probably dissolve completely in the lead free solder.

We recommend a soldering temperature of 400°C (752°F) (tip-temperature 380°C (716°F)) for the hybrids and 380°C (716°F) (tip-temperature 360°C (680°F)) for the flex or connection plates, a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

4.8 Soldering Leaded Litze Connection Wires to a Lead Free Hybrid, Flex Print or Connection Plate

This combination has the same drawbacks as combination 4.7. As tinned litze wires contain more solder than tinned solid wires, the risks on appearance of intermetallics and internal stresses is higher.

We recommend a soldering temperature of 400°C (752°F) (tip-temperature 380°C (716°F)) for the hybrids and 380°C (716°F) (tip-temperature 360°C (680°F)) for the flex or connection plates, a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

Application Note

4.9 Reworking a Lead Free Hybrid with Leaded solder

When removing lead free solder from a solderpad using solder wick, a thin layer of lead free solder will remain. If the layer is sufficiently thin, all lead free solder will dissolve in the new leaded solder ball, and the solder joint will be OK. However, if there is too much lead free solder left the solder will not dissolve completely and intermetallics and/or internal stresses can appear at the transition plane.

As the lead free solder will have to melt completely we recommend a soldering temperature of 380°C (716°F) (tip-temperature 360°C (680°F)), a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

4.10 Soldering Lead Free Solid or Litze Connection Wires to a Leaded Flex Print or Connection plate

When soldering lead free connection wires to a leaded flex or connection plate, the mixing of leaded and lead free solder can introduce a quality risk.

Leaching is no quality risk. The copper on Sonion connection plates has such a thickness (e.g. >35 µm) that leaching does not reduce the thickness significantly. A leaching test (10 cycles of 5 seconds soldering (at 360°C (680°F)) and 5 seconds dwell time) has shown no decrease in solderpad adhesion and/or reduction in solderpad size.

We recommend a soldering temperature of 380°C (716°F) (tip-temperature 360°C (680°F)), a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

4.11 Reworking a Leaded Flex Print or Connection Plate with Lead Free Solder

When removing leaded solder from a solderpad using solder wick, a thin layer of leaded solder will remain. If the layer is sufficiently thin enough, all leaded solder will dissolve in the new lead free solder ball, and the solder joint will be OK. However, if there is too much leaded solder left the solder will not dissolve completely and intermetallics and/or internal stresses can appear at the transition plane.

Leaching is no quality risk. The copper on Sonion connection plates has such a thickness (e.g. >35 µm) that leaching does not reduce the thickness significantly. A leaching test (10 cycles of 5 seconds soldering (at 360°C (680°F)) and 5 seconds dwell time) has shown no decrease in solderpad adhesion and/or reduction in solderpad size.

We recommend a soldering temperature of 380°C (716°F) (tip-temperature 360°C (680°F)), a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

Application Note

4.12 Reworking a Lead free Flex Print or Connection Plate with Leaded Solder

When removing lead free solder from a solderpad using solder wick, a thin layer of lead free solder will remain. If the layer is sufficiently thin enough, all lead free solder will dissolve in the new leaded solder ball, and the solder joint will be OK. However, if there is too much lead free solder left the solder will not dissolve completely and intermetallics and/or internal stresses can appear at the transition plane.

As the lead free solder will have to melt completely we recommend a soldering temperature of 380°C (716°F) (tip-temperature 360°C (680°F)), a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

4.13 Soldering a Lead Free Solid Connection Wire or Litze Wire on a Leaded (Customer's) Solderpad

When soldering lead free solid connection wire or litze wire on a (customer's) solderpad, mixing of leaded/ lead free solder and leaching can introduce a quality risk.

Leaching

Usually the copper on standard solderpads has such a thickness (e.g. >35 um) that leaching does not reduce the thickness significantly. However, a leaching test is recommended.

As the lead free solder will have to melt completely we recommend a soldering temperature of 380°C (716°F) (tip-temperature 360°C (680°F)), a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

4.14 Soldering a Lead Free Solid Connection Wire or Litze Wire on a Leaded (Customer's) Hybrid

When soldering lead free solid connection wire or litze wire on a (customer's) hybrid, mixing of leaded/ lead free solder and leaching can introduce a quality risk.

Leaching

For hybrids, it is recommended to study the leaching by doing a repeated soldering test, and, when needed, improve the metal layers of the hybrid.

As the lead free solder will have to melt completely we recommend a soldering temperature of 380°C (716°F) (tip-temperature 360°C (680°F)), a soldering time of 1 second and the use of a lead free flux (e.g. the Kester TSF6591-1 Tacky Flux).

4.15 Adding Leaded Solder to a Lead Free Hybrid, Flex Print or Connection Plate in 50/50 Ratio

This operation is not recommended.

When adding leaded solder to a lead free solder ball in a (for example) 50/50 ratio, intermetallics and internal stresses will always appear in the solder ball, as the solders will not mix completely.

Creation of a nice round solder ball is very difficult because of the different solidifying temperatures of both solders, and therefore the risk on shortcuts is also higher.

4.16 Adding Lead Free Solder to a Leaded Hybrid, Flex Print or Connection Plate in 50/50 Ratio

This operation is not recommended.

When adding lead free solder to a leaded solder ball in a (for example) 50/50 ratio, intermetallics and internal stresses will always appear in the solder ball, as the solders will not mix completely.

Creation of a nice round solder ball is very difficult because of the different solidifying temperatures of both solders, and therefore the risk on shortcuts is also higher.

Application Note

4.17 Pre-tinning of Connection Wires

When tinning connection wires one has to take care that the solder present on the connection wire does not pollute the solder bath used for tinning. Small percentages of 'pollution' can change the solidifying temperature significantly. The increased leaching of lead free solder does also affect the copper of the connection wires. When tinning too long the copper diameter will decrease and the connection wire strength might decrease.

4.18 Adding or Reworking a Leaded Hybrid with Lead Free Solder

This operation can introduce a significant quality risk.

Metal layers in the solderpads of hybrids designed for lead free solder have been improved to guarantee the same quality in pad adhesion. Vice versa, adding lead free solder to a non-improved solderpad of a (leaded) hybrid will increase the leaching of the metal of the solderpad into the solder. The effect is that the pad adhesion decreases, and in worst case the pad adhesion can drop below the required level. Also the outer contour of the solderpad might be reduced.