



## Product Change Notice

**Issue Date: 24th August 2004**

**Type of Change(s):**

Please be advised that Agilent Technologies is making the following product change on the effective date noted for the products listed below:

- A) Introduction of Lead Free (Pb-Free) products.
- B) Pb-Free product identification.

**Parts Affected:**

All Seven Segment Display, Annunciator and Cluster part numbers as listed below.

<b>Seven Segment Display</b>	<b>Annunciator</b>	<b>Clusters</b>
5082-76xx	HLCP-A/B/C/D/E/F/G/H/J100	HDSM-4xxx
HDSP-3xxx	HDSP-48xx	HDSM-5xxx
HDSP-4xxx	HLMP-2xxx	HDSP-56xC
HDSP-5xxx	QDSP-4985	HDSP-A22x
HDSP-7xxx	QLCP-A/B/Cxxx	HDSP-A23D
HDSP-8xxx	QLCP-M0xx	HDSP-A4xC
HDSP-Axxx	QLMP-2xxx	QDSM-5xxx
HDSP-Bxxx		QDSP-399G
HDSP-Exxx		QDSP-497G
HDSP-Fxxx		QDSP-498G
HDSP-Gxxx		QDSP-499G
HDSP-Hxxx		HDSP-43xG
HDSP-Kxxx		HDSP-BxxG
HDSP-Mxxx		HDSP-B0xE
HDSP-Nxxx		
HDSP-Rxxx		
HDSP-Sxxx		
HDSP-Uxxx		
QDSC-A000		
QDSP-302G		
QDSP-525G		
QDSP-7xxx		
QDSP-A586		
QDSP-Fxxx		
QDSP-G545		
QDSP-H225		
QDSP-K580		
QDSP-Sxxx		
QDSP-U239		

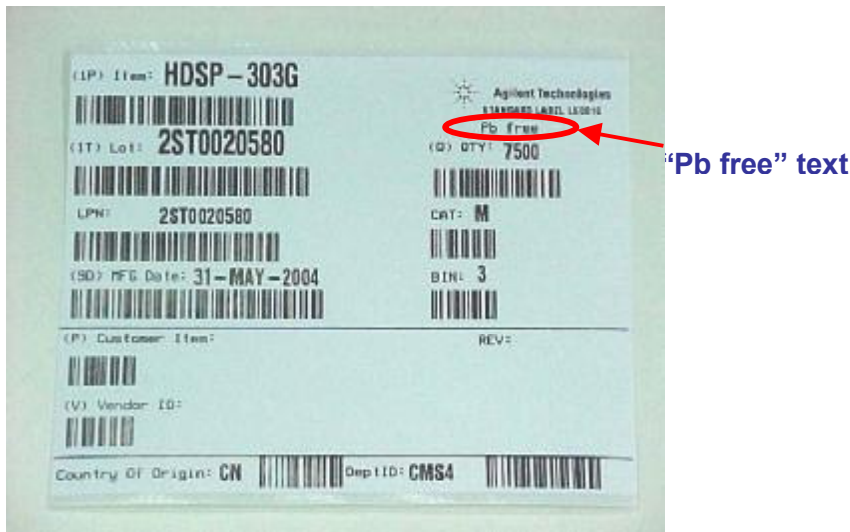
**Description and Extent of Changes:**

A) **Introduction of Lead-Free (Pb-Free) products**

The extent of change will cover the change of product content and terminal finishing, that will be manufactured using lead-free solder material and system. The Pb free products are compatible to Agilent recommended soldering system below and the existing profile as published in Agilent application note AN1027 that is illustrated in the following page.

B) **Pb-free Product Identification**

“Pb free” text will be added onto the mother label to indicate Pb-free products. A sample label is shown below.



**Reasons for Change:**

Pb-free products are introduced in anticipation to the EU Directive on the Restriction on the use of certain Hazardous Substances in Electrical & Electronic Equipment (RoHS).

**Effect of Change on Fit, Form, Function, Quality, or Reliability:**

This change affects Fit, Form and Function of the product in the following manner:

1) **Soldering system and profile**

Pb-free products are compatible with the following systems and conditions:

Product Family	Product Terminal Finish	Compatible Soldering system
Seven Segment Displays	96.5%Sn-3.0%Ag-0.5%Cu	63%Sn-37%Pb, 96.5%Sn-3.5%Ag
Annunciators	96.5%Sn-3.0%Ag-0.5%Cu	63%Sn-37%Pb, 96.5%Sn-3.5%Ag
Clusters	Pure Sn	63%Sn-37%Pb, 96.5%Sn-3.5%Ag

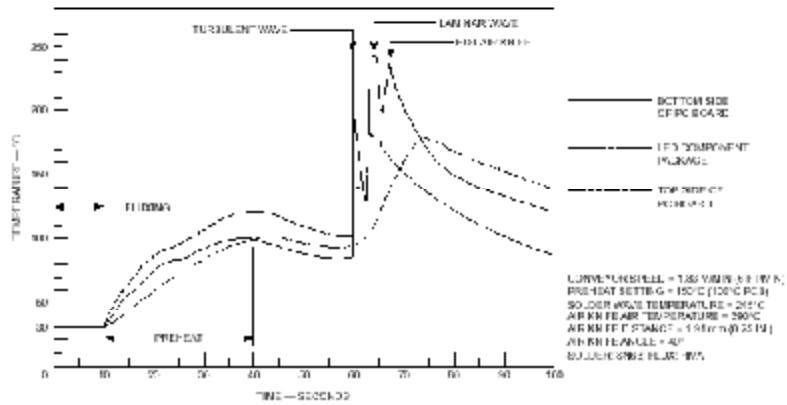


Figure 16. Sample Temperature Profile of a Wave Solder Process

**Wave Soldering Profile for Seven Segment Displays, Annunciators and Clusters**  
**(applicable to both SnPb and SnAg Agilent recommended soldering system)**

**2) Quality & Reliability Performance**

Qualification has been completed for the affected parts listed above. The quality and reliability results are as tabulated below.

**Seven Segment Displays**

Test Type	Sample Size	Test Condition	Test Results
Wet Hot Temperature Storage Life	30	85°C/85%RH	Passed up to 1000hrs
Steam Aging	30	Steam aging at 100°C, 100%RH, followed by visual inspection	Passed up to 36hrs
Temperature Cycling	400	-55°C to 100°C, 15min dwell, 5min transfer	Passed up to 100x
Solderability	30	Steam aging 12hrs @ 100°C, 100%RH, followed by 1x solder dipping	No failure at 1x dipping; solder coverage >95%

**Annunciators**

Test Type	Sample Size	Test Condition	Test Results
Wet Hot Temperature Storage Life	10	85°C/85%RH	Passed up to 1000hrs
Steam Aging	10	Steam aging at 100°C, 100%RH, followed by visual inspection	Passed up to 36hrs
Temperature Cycling	200	-55°C to 100°C, 15min dwell, 5min transfer	Passed up to 100x
Solderability	10	Steam aging 12hrs @ 100°C, 100%RH, followed by 1x solder dipping	No failure at 1x dipping; solder coverage >95%

**Clusters**

<b>Test Type</b>	<b>Sample Size</b>	<b>Test Condition</b>	<b>Test Results</b>
Wet Hot Temperature Storage Life	60	85°C/85%RH	Passed up to 1000hrs
Steam Aging	30	Steam aging at 100°C, 100%RH, followed by visual inspection	Passed up to 36hrs
Temperature Cycling	600	-40°C to 85°C, 15min dwell, 5min transfer	Passed up to 100x
Solderability	20	Steam aging 12hrs @ 100°C, 100%RH, followed by 1x solder dipping	No failure at 1x dipping; solder coverage >95%
Solder Joint Reliability	20	16hrs steam aging, followed by 100x TMCL	Passed with no visual reject at solder joint

**Effective Date of Change:**

- 1) 24<sup>th</sup> Nov 2004 :
  - Agilent will start the manufacturing conversion to Pb-free products.
  - Shipment to Distributors and Direct Customers may contain mixture of both leaded and lead-free versions with proper labels.
  - However, within a shipping box there will not be a mixture of both leaded and lead-free versions.
- 2) Transition period (24<sup>th</sup> Nov 2004 – 24<sup>th</sup> May 2005)
  - All 100% Pb-free products will be identified with a “Pb-free” text/marking , which will be indicated on the mother label. (See page-2[B]).
  - Agilent shipment to Distributors and Direct Customers will be fully leadfree after 24<sup>th</sup> May 2005.
  - Shipment from Agilent Distributors may still contain mixture of leaded and lead-free parts until all the leaded inventories are fully depleted.

**Qualification Data:**

Qualification data has been generated and approved (See page-3&4: Quality & Reliability Performance).

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These changes have been reviewed and approved by Agilent Technologies engineers and managers per Agilent Technologies procedure: Change Control and Customer Notification, A-5962-6052-80.

Please contact your Agilent field sales engineer or Contact Center (<http://www.agilent.com/view/contactus>) for any questions or support requirements. Please return any response as soon as possible, but not to exceed 30 days.



## Product Change Notice

PCN: A-04-004-475413-0A

Issue Date: 24 May 2004

### Type of Change(s):

This PCN served as a notification to the customers that Agilent Technologies intended to include a “Pb-free” marking on product labels for existing products that do not contain lead (Pb).

### Parts Affected:

ChipLED
HSMA-C1xx
HSMA-C1xx-xxxxx
HSMA-C2xx
HSMA-L640
HSMA-S6xx
HSMA-S6xx-xxxxx
HSMB-C1xx
HSMC-C1xx
HSMC-C2xx
HSMC-L640
HSMC-S6xx
HSMD-C1xx
HSMD-C2xx
HSMD-C660
HSMD-L640
HSMD-S6xx
HSME-C1xx
HSME-C2xx
HSMF-C1xx
HSMF-C1xx-xxxxx
HSMF-C6xx
HSMG-C1xx
HSMG-C1xx-xxxxx
HSMG-C2xx
HSMG-C6xx
HSMG-C660#S02
HSMG-L640
HSMH-C1xx
HSMH-C1xx-xxxxx
HSMH-C2xx
HSMH-C660
HSMH-L640
HSML-C1xx
HSML-C1xx-xxxxx
HSML-C2xx
HSML-L640
HSMM-C1xx
HSMM-C2xx
HSMN-C1xx

ChipLED
HSMN-C1xx-xxxxx
HSMN-C2xx
HSMQ-C1xx
HSMR-C1xx
HSMR-C1xx-xxxxx
HSMS-C1xx
HSMS-C1xx-xxxxx
HSMS-C2xx
HSMS-C660
HSMS-L640
HSMW-B1xx
HSMW-C1xx
HSMW-C2xx
HSMY-C1xx
HSMY-C2xx
HSMY-C660
HSMY-L640
HSMZ-C1xx
HSMZ-C2xx
Q SMA-C1xx
Q SMA-S6xx
QSMC-C1xx
QSMC-L6xx
QSME-C1xx
QSME-C2xx
QSMF-C1xx
QSMG-C1xx
QSMH-C1xx
QSMJ-S6xx
QSMN-C1xx
QSMQ-C1xx
QSMR-C1xx
QSMR-C1xx-xxxxx
QSMR-C2xx
QSMS-C1xx
QSMW-C1xx
QSMW-C2xx
QSMY-C1xx

PLCC
HSMA-Axxx-xxxxx
HSMB-Axxx-xxxxx
HSMC-Axxx-xxxxx
HSMD-Axxx-xxxxx
HSME-Axxx-xxxxx
HSMF-Axxx-xxxxx
HSMG-Axxx-xxxxx
HSMH-Axxx-xxxxx
HSML-Axxx-xxxxx
HSMM-Axxx-xxxxx
HSMN-Axxx-xxxxx
HSMS-Axxx-xxxxx
HSMU-Axxx-xxxxx
HSMV-Axxx-xxxxx
HSMW-Axxx-xxxxx
HSMY-Axxx-xxxxx
HSMZ-Axxx-xxxxx
Q SMA-Axxx-xxxxx
QSMC-Axxx-xxxxx
QSME-Axxx-xxxxx
QSMF-Axxx-xxxxx
QSMG-Axxx-xxxxx
QSML-Axxx-xxxxx
QSMN-Axxx-xxxxx
QSMS-Axxx-xxxxx
QSMW-Axxx-xxxxx

Godzilla
HSMA-C540-xxxxx
HSMC-C540-xxxxx
HSMM-C540-xxxxx
HSMM-C540-xxxxx
HSMN-C540-xxxxx
HSMU-C540-xxxxx
QSMU-C4A9-xxxxx
QSMZ-C4A9-xxxxx



## Product Change Notice

PCN: A-04-004-475413-0A

Issue Date: 24 May 2004

### Description and Extent of Change:

The Pb-free marking is an additional indication that these Agilent products contain no lead (Pb) and does not affect the form, fit and function of the product. All listed Agilent products contain no lead since product release. No changes have been made on the product itself.

An example of the new label format with the Pb-free marking is as shown in Figure 1 & Figure 2.

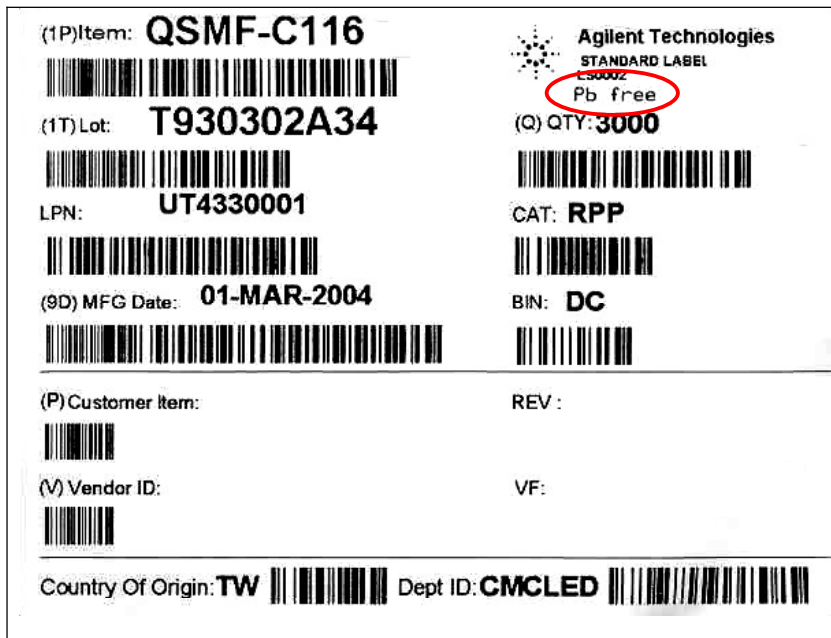


Figure 1. Agilent mother label (to be stick on the MBB)

### Reason for Change:

Agilent intends to standardize the label information for the products listed.

### Effect of Change on Fit, Form, Function, Quality, or Reliability:

No effect on form, fit, function, quality or reliability on the products.

### Effective Date of Change:

This change will be implemented starting from 28<sup>th</sup> June 2004.

Please contact your Agilent field sales engineer for further details or support requirements.  
Return any response as soon as possible within 30 days.

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End of Document

*These changes have been reviewed and approved per Agilent Technologies procedure: Change Control and Customer Notification, A-5962-6052-80.*

## Product Change Notice

Issue Date: 20th February 2004

### Type of Change(s):

Please be advised that Agilent Technologies is making the following product change on the effective date noted for the products listed below:

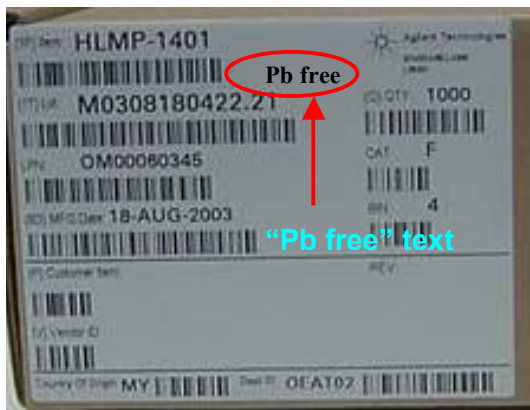
- A) Introduction of Lead Free (Pb-Free) products.
- B) Pb-Free product identification.

### Agilent Part Numbers Affected:

All Through Hole Lamps (except those listed in the Appendix), Subminiature Lamps (Polyled) and Smart Alphanumeric Displays.

### Description and Extent of Changes:

- A) Introduction of Lead-Free (Pb-Free) products  
Agilent Technologies will make available Lead-Free (Pb-free) products starting from 24th May 2004. The extent of change will cover most of the Agilent Technologies semiconductor products whereby the terminal finishing will be manufactured using lead-free solder material and system. The Pb free products are compatible to Agilent recommended soldering system and profile as stated below.  
For further information, kindly contact Agilent Sales personnel or distributor.
- B) Pb-free Product Identification  
“Pb free” text will be added onto the mother label to indicate Pb-free products. A sample label is shown below.



**Reasons for Change:**

Pb-free products are introduced in response to the EU Directive on the Restriction on the use of certain Hazardous Substances in Electrical & Electronic Equipment (RoHS).

**Effect of Change on Fit, Form, Function, Quality, or Reliability:**

This change affects Fit, Form and Function of the product in the following manner:

**1) Soldering system**

Pb-free products may compatible with the following systems and conditions:

<b>Product Family</b>	<b>Part Number</b>	<b>Product Terminal Finish</b>	<b>Compatible Soldering system</b>	<b>Recommended Soldering Profile</b>
Through Hole Lamp	All (except those listed in Appendix)	96.5%Sn-3.0%Ag-0.5%Cu	63%Sn-37%Pb, 96.5%Sn-3.5%Ag	Refer to wave soldering profile (figure 1)
Smart Alphanumeric Display	HDSP-076x HDSP-077x HDSP-078x HDSP-079x HDSP-086x HDSP-088x HDSP-096x HDSP-098x HDSP-200x HDSP-2012 HDSP-2245 HDSP-23xx HCMS-2353 HDSP-213x HDSP-2179 QCMS-23xx	96.5%Sn-3.0%Ag-0.5%Cu	63%Sn-37%Pb, 96.5%Sn-3.5%Ag	Refer to wave soldering profile (figure 1)
	HCMS-29xx HCMS-39xx HDLx-1414 HDLx-2416 HDLx-3416 HDSP-21xx HDSP-2203 HDSP-25xx HPDL-1414 HPDL-2416 QCMS-29xx QDSP-21xx QDSP-22xx QDSP-2535 QDSP-2Yxx QDSP-66xx	98%Sn-2%Cu	63%Sn-37%Pb, 96.5%Sn-3.5%Ag	Refer to wave soldering profile (figure 1)
Through Hole Subminiature Lamp (PolyLED)	All	Pure Sn	63%Sn-37%Pb, 96.5%Sn-3.5%Ag	Refer to wave soldering profile (figure 1)
Surface Mount Subminiature Lamp (PolyLED)	All	Pure Sn	63%Sn-37%Pb 96.5%Sn-3.5%Ag	Refer to SnPb IR reflow profile (figure 2) Refer to Pb-free IR reflow profile (figure 3)

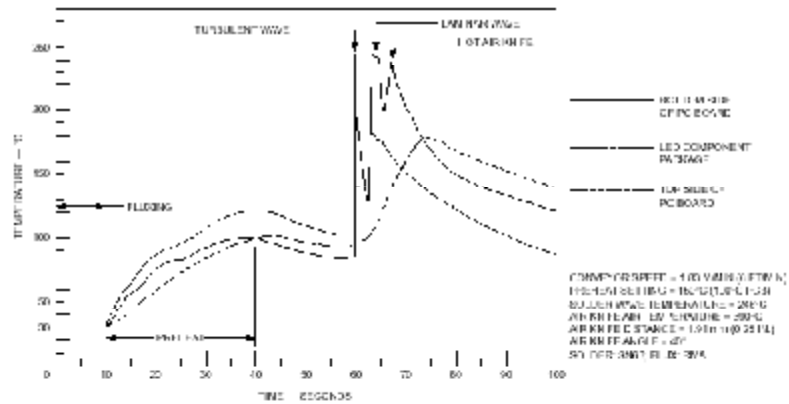
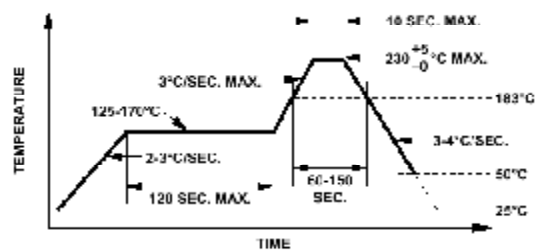


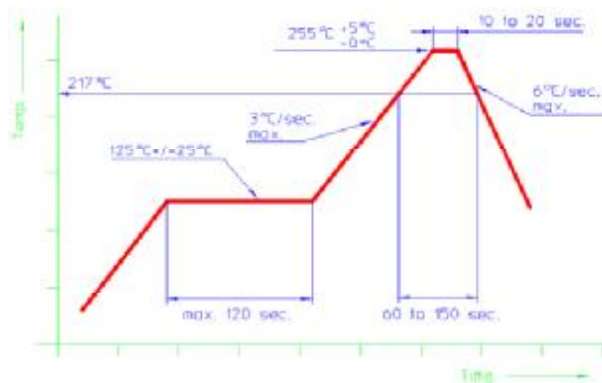
Figure 16. Sample Temperature Profile of a Wave Solder Process

**Figure 1 : Wave Soldering Profile**



**Recommended Reflow Soldering Profile.**  
 Wait until device has cooled to room temperature before handling.

**Figure 2 : SnPb IR Reflow Profile**



**Figure 3 : Pb-Free IR Reflow Profile**

## 2) Quality & Reliability Performance

Please refer to the respective attachments below on the selected product performance.

### Through Hole LED



Lamps.doc

### Smart Alphanumeric Display



"Smart Display.doc"

### SMT PolyLED



"SMT PolyLED.doc"

### Through Hole PolyLED



"TH PolyLED.doc"

### Effective Date of Change:

- 1) 24<sup>th</sup> May 2004 :
  - Agilent will start the manufacturing conversion to Pb-free products.
  - Shipment may contain mixture of both leaded and lead-free versions with proper labels.
- 2) Transition period ( 24<sup>th</sup> May 2004 – 24<sup>th</sup> Nov. 2004 )
  - All 100% Pb-free products will be identified with a “Pb-free” text/marking , which will be indicated on the mother label. ( See page-1[B] ).
  - Agilent shipment to Distributors and Direct Customers will be fully leadfree after 24<sup>th</sup> Nov 2004.
  - Shipment from Agilent Distributors may still contain mixture of leaded and lead-free parts until all the leaded inventory are fully depleted.

**Appendix:**

Listed below through hole lamps' part numbers that are excluded from Pb free conversion.

HLMP-CB18-XXXXX	HLMP-CE18-XXXXX	HLMP-CM18-XXXXX	HLMP-CW18-XXXXX	HLMP-HB59-XXXXX
HLMP-CB19-XXXXX	HLMP-CE19-XXXXX	HLMP-CM19-XXXXX	HLMP-CW19-XXXXX	HLMP-HM59-XXXXX
HLMP-CB28-XXXXX	HLMP-CE28-XXXXX	HLMP-CM28-XXXXX	HLMP-CW28-XXXXX	
HLMP-CB29-XXXXX	HLMP-CE29-XXXXX	HLMP-CM29-XXXXX	HLMP-CW29-XXXXX	
HLMP-CB38-XXXXX		HLMP-CM38-XXXXX	HLMP-CW38-XXXXX	
HLMP-CB39-XXXXX		HLMP-CM39-XXXXX	HLMP-CW39-XXXXX	
			HLMP-CW78-XXXXX	
			HLMP-CW79-XXXXX	

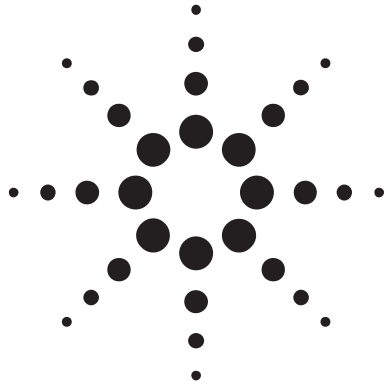
Please contact your Agilent field sales engineer for further details or support requirements.  
Return any response as soon as possible within 90 days.

Thank you for your continuous attention to these changes.

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These changes have been reviewed and approved by Agilent Technologies engineers and managers per Agilent Technologies procedure: Change Control and Customer Notification, A-5962-6052-80.

Please contact your Agilent field sales engineer or Contact Center (<http://www.agilent.com/view/contactus>) for any questions or support requirements.



# Recommended Reflow Profile for Agilent's Lead-Free Plastic Isolation products

## Application Brief

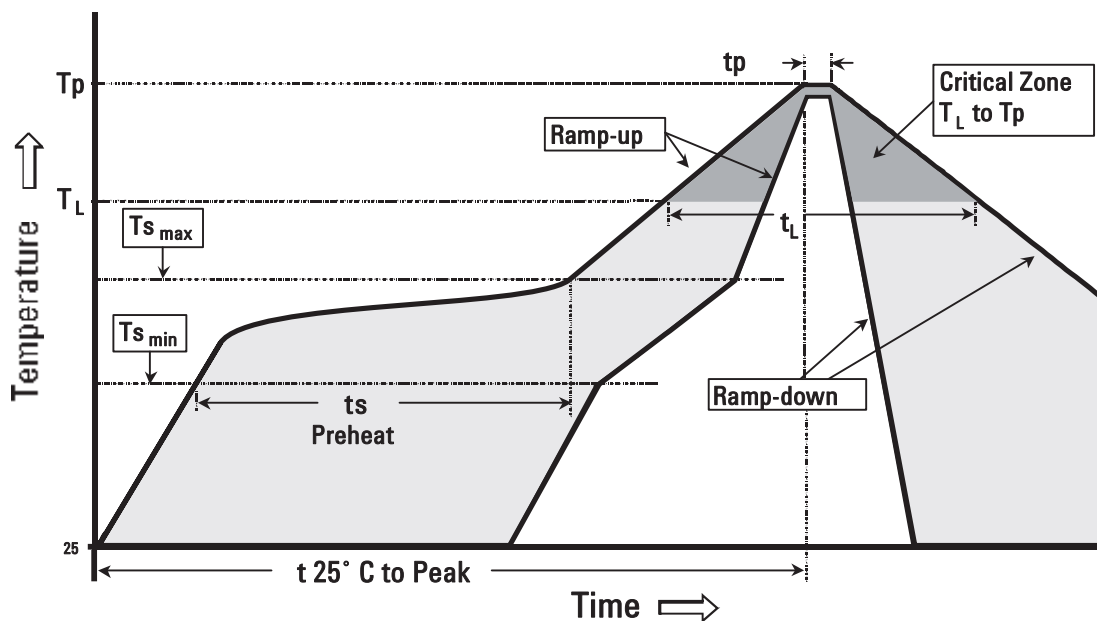
(As per J-STD-020C)

The lead-free finish used by Agilent plastic isolation products is pure matte tin (Sn). This is because pure matte tin provides a stable plating that is highly compatible with existing tin-lead (SnPb) solder processes and also lead-free processes, such as those using a SnAgCu solder. Pure matte tin is a good choice from a manufacturing perspective. It

is easier to control than plating of a multi-element alloy with a fixed composition. Pure matte tin has had significant use in the electronics industry and the plating chemistry is well understood.

The reflow profiles investigated and recommended by Agilent Technologies for plastic isolation products are based

on JEDEC/IPC standard J-STD-020 revision C to ensure that all packages can be successfully and reliably assembled. Figure 1 illustrates the range of temperature profiles compliant to the JEDEC standard J-STD-020 revision C. Table 1 lists the reflow parameters and peak temperatures as recommended by JEDEC.



**Table 1. Lead-Free Reflow Profile Recommendation (IPC/JEDEC J-STD-020C)**

<b>Reflow Parameter</b>	<b>Lead-Free Assembly</b>	
Average ramp-up rate (Liquidus Temperature ( $T_{S(max)}$ ) to Peak)	3°C/ second max	
Preheat	Temperature Min ( $T_{S(min)}$ )	150°C
	Temperature Max ( $T_{S(max)}$ )	200°C
	Time (min to max) ( $t_s$ )	60-180 seconds
$T_{S(max)}$ to $T_L$ Ramp-up Rate	3°C/second max	
Time maintained above:	Temperature ( $T_L$ )	217°C
	Time ( $t_L$ )	60-150 seconds
Peak Temperature ( $T_P$ )	260 +0/-5°C	
Time within 5 °C of actual Peak temperature ( $t_P$ )	20-40 seconds	
Ramp-down Rate	6°C/second max	
Time 25 °C to Peak Temperature	8 minutes max	

Note 1: All temperatures refer to topside of the package, measured on the package body surface.

#### Reference

1. JEDEC/Electronic Industries Alliance, Inc, "Moisture/Reflow Sensitivity Classification for Non-hermetic Solid State Surface Mount Devices (IPC/JEDEC J-STD-020C)," July 2004.

#### **www.agilent.com/ semiconductors**

For product information and a complete list of distributors, please go to our web site.

For technical assistance call:

Americas/Canada: +1 (800) 235-0312  
or (408) 654-8675

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China: 10800 650 0017

Hong Kong: (+65) 6756 2394

India, Australia, New Zealand: (+65) 6755 1939

Japan: (+81 3) 3335-8152(Domestic/International), or 0120-61-1280(Domestic Only)

Korea: (+65) 6755 1989

Singapore, Malaysia, Vietnam, Thailand, Philippines, Indonesia: (+65) 6755 2044

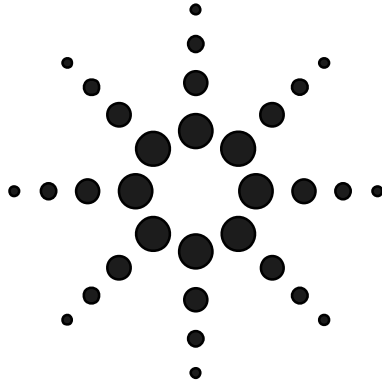
Taiwan: (+65) 6755 1843

Data subject to change.

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December 14, 2004  
2004-2124



**Agilent Technologies**



# Agilent Regulatory Guide for Plastic Isolation Products Lead-Free Reliability Tests

## Reliability Requirements

Agilent Isolation Products Division conducts a variety of reliability stresses to qualify lead-free components. Industry Standard J-STD-020 is preferred for this lead-free initiative. Qualification tests are summarized below:

### 1. Compatibility Study With Pb-free Soldering Condition

- Soldering condition: +260 °C, 45 sec

### 2. Pb-free Material Qualification

- Material Chosen: Pure Tin (Sn)
- Qualification Tests:
  - Preconditioning: 3X Reflow (Agilent Profile) + 20 Temperature Cycles
  - Temperature Cycling, -55 °C to +125 °C
  - Temperature Cycling, -65 °C to +150 °C
  - High Temperature Operating Life Test,  $T_A = +125\text{ °C}$
  - Pressure Cooker Test\*,  $T_A = +121\text{ °C}$ , RH=100%
  - High Temperature Storage Test\*,  $T_A = +175\text{ °C}$
  - High Temperature and Humidity Test\*,  $T_A = +85\text{ °C}$ , RH=85%
  - Temperature and Humidity Test\*,  $T_A = +60\text{ °C}$ , RH=90%

\*whisker tests

## [www.agilent.com/ semiconductors](http://www.agilent.com/semiconductors)

For product information and a complete list of distributors, please go to our web site.

For technical assistance call:

Americas/Canada: +1 (800) 235-0312 or  
(916) 788-6763

Europe: +49 (0) 6441 92460

China: 10800 650 0017

Hong Kong: (+85) 6756 2394

India, Australia, New Zealand: (+65) 6755 1939

Japan: (+81 3) 3335-8152(Domestic/International), or  
0120-61-1280(Domestic Only)

Korea: (+85) 6755 1989

Singapore, Malaysia, Vietnam, Thailand, Philippines,

Indonesia: (+65) 6755 2044

Taiwan: (+85) 6755 1943

Data subject to change.

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July 30, 2003

5988-9977EN



Agilent Technologies

# SPG Product Pb free conversion summary

Product family	Currently Active p/n		Pb free product information					
	Part description	Current Product Part number	Current p/n Pb free as of Jan 2004?	Pb version continued availability	When product Available for order?	Pb free product p/n	Terminal Finish	Other info
SSD	Navigation Sensor	HDNS-2000	yes	not available			Au flash	
	Navigation Sensor	ADNS-2051	yes	not available			Au flash	
	Navigation Sensor	ADNS-2030	yes	not available			Au flash	
	Navigation Sensor	ADNS-2610	yes	not available			Au flash	
	Navigation Sensor	ADNS-2620	yes	not available			Au flash	
	Navigation Sensor	ADNS-2001	yes	not available			Au flash	
	Navigation Sensor	ADNS-610	yes	not available			Au flash	
	Optical Lens	HDNS-2'00	yes	not available			Au flash	
	Optical Lens	HDNS-2100#001	yes	not available			Au flash	
	LED Clip	HDNS-2200	yes	not available			Au flash	
	LEN Clip	HDNS-2200#001	yes	not available			Au flash	