Echelon Corporation
Package Qualification Report

RoHS Compliant PL 3120®-E4T10 and PL 3150®-L10 Power Line Smart Transceivers

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Component-Level Tests

PL 3120-E4T10 Power Line Smart Transceiver

Test	Conditions	Sample Size (units)	Results
Preconditioning**	JEDEC 020 Rev. C Level 3 192 hours @30ºC/60% R.H. 260ºC reflow (3x)	100	0 failures
Temperature Cycling**	-65 to +150ºC 1000 cycles (With preconditioning above)	48	0 failures
Pressure Pot**	2 atm pressure 121ºC/100% R.H. 168 hours	50	0 failures
High Temperature Storage**	150ºC 1000 hours	50	0 failures
Thermal Shock**	-65 to +150ºC 500 shocks	50	0 failures
Tin Whiskers*	25ºC (approx.) 60% R.H. (approx.)	3 unreflowed 1 reflowed	-No whiskers >10µm through 2000 hours. -No observed additional growth after 3000 hours. Observations made with optical microscope and SEM.

*Tests performed by Echelon.
**Tests conducted by part manufacturer on similarly constructed parts from the same package family.

Component-Level Tests

PL 3150-L10 Power Line Smart Transceiver

No material changes were made except in lead-plating material to enable a RoHS PL 3150-L10 part. Therefore, only a subset of the normal component qualification tests was performed.

Test	Conditions	Sample Size	Results
Preconditioning**	JEDEC 020 Rev. C Level 3 192 hours @30°C/60% R.H. 260°C reflow (3x)	80	0 failures
Pressure Pot**	2 atm pressure 121°C/100% R.H. 168 hours	50	0 failures
Temperature Humidity Bias**	85°C/85% R.H. 1000 hours	30	0 failures
Tin Whiskers*	25°C (approx.) 60% R.H. (approx.)	3 unreflowed 1 reflowed	-No whiskers >10µm through 2000 hours. -No observed additional growth after 3000 hours. Observations made with optical microscope and SEM.

*Tests performed by Echelon.
** Tests conducted by part manufacturer on similarly constructed parts from the same package family.

Second-Level Interconnect Tests

PL 3120-E4T10 Power Line Smart Transceiver

Test	Conditions	Sample Size	Results
HALT	85ºC/85% R.H. 1000 hours	24	0 failures
HASS	-50 to +95ºC 10ºC/minute 59-minute dwells 50 hours	20	0 failures
Second-Level Interconnect Temperature Cycling	0 to +90ºC 1.45 cycles/hour 5-minute dwells 1000 cycles Sn-Ag-Cu solder	44	0 failures found: -Functional test -Lead pull test* -Cross-sections* -CSAM*
Second-Level Interconnect Temperature Cycling (for backward compatibility in non-RoHS processes)	0 to +90ºC 1.45 cycles/hour 5-minute dwells 1000 cycles Sn-Pb solder	20	0 failures found: -Functional test -Lead pull test* -Cross-sections* -CSAM*

*Results based on a sampling of the total units tested.

Second-Level Interconnect Tests

The pure Sn plating for both the PL 3120-E4T10 and PL 3150-L10 is from a similar technology. Therefore, most testing was done on the PL 3120-E4T10 Smart Transceiver and the data was shared with the PL 3150-L10.

PL 3150-L10 Power Line Smart Transceiver

Test	Conditions	Sample Size	Results
Second-Level Interconnect Temperature Cycling	0 to +90ºC 1.45 cycles/hour 5-minute dwells 1000 cycles	44	0 failures found:* -Lead pull test -Cross-sections -CSAM
Second-Level Interconnect Temperature Cycling	0 to +90ºC 1.45 cycles/hour 5-minute dwells 1000 cycles	10	0 failures found:* -Lead pull test -Cross-sections -CSAM

*Results based on a sampling of the total units tested.

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