PCN - 13 071

Issue Date: August 08 2013

Product Name:	PCI EXPRESS EDGE CARD Connector			
	PCI-e Through Hole & Press Fit type			
Product Manager:	Jeff Wu			
Subject:	Notification of Planned Change			
Distribution:	General			
Type of Change:	Materials Change			
Change Description:	GXT plating process is to be applied on existing PCI-e Through Hole & Press Fit type connectors. There will not be any change on product Form, Fit or Function and the PCI-e Through Hole & Press Fit type connector will continue to meet the existing product specification.			
Reason for Change:	While maintaining performance, changing to GXT as the preferred plating option strengthens FCI's position in the markeplace by allowing continued competitive pricing in the wake of the highly volatile precious metals market. This change will not affect the product performance.			
Affected Parts:	As attached.			
Effective Date of Change:	February	15	2014	*Special Note: For EOL PCN's, if no last time buy orders are received within 180 days after issue date, FCI reserves the right to terminate production at any time at its discretion. MOQ and lead time will be negotiated at time of order placement and will be dependent upon material availability. FCI will make every effort to meet customer order requests. Orders placed within the 180-day window, and susequently cancelled, will be subject to cancellation charges.*
Last Time Buy Date:	N/A	N/A	N/A	
Last Disty Return Date:	N/A	N/A	N/A	
Last Time Shipment Date	N/A	N/A	N/A	
Datasheet Attached?	N/A			
Qual/Test Data Attached?	Yes			
Samples Availability Date:	August	08	2013	
Available Alternatives?	N/A			
Questions?	*Contact your local FCI Representative, or*			
	Jeff Wu / Product Manager			
	+86 769 88669322 / jeff.wu@fci.com			

Item Number
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10124782-10002TLF

AP Product Test Lab.
FCI Electronics Division
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LABORATORY TEST REPORT

REPORT NO.	DATE OF REPORT	DATES TESTED	TESTED BY	
DL-2013-04-019-CR Rev. B	**23/Jul/2013**	**15/Apr/2013-17/Jun/2013**	**Chao Li / Lily Yin**	
REQUESTOR	TITLE		Prepared By/Title	Approved By/Title
WL Zhang	**PCI Express Press-fit Connector Qualification Testing**		**Lily Yin** Lab Test Tech.	**Gentle Zeng** Asst. Lab Mgr.

1. PURPOSE

Qualification testing was conducted on PCI Express press-fit connector to assess the conformance to product specification. Testing was performed in accordance with FCI product specification GS-12-584 (Rev. D, Mar-02, 2012).

2. CONCLUSION

The test results showed that the PCI Express press-fit connector met the specified requirements of FCI product specification GS-12-584 (Rev. D, Mar-02, 2012).

3. SAMPLE DESCRIPTION

3.1 The samples were received at the laboratory on 06 Mar 2013.

3.2 Prior to testing, the samples were examined at low magnification and judged to be acceptable for testing.

3.3 Test sample information:

Table 1 Identity of Submitted Test Samples

Item	Description	Part #	Lot #	Base Mat'l	Plating Type	Housing Mat'l	Quantity
1	PCI Express press-fit Connector	10082378-11103TLF	N/A	Copper alloy	15u" GXT	High performance resin	55pcs
2	LLCR Test Board	10094372	1313	Cu	Tin	FR-4	40pcs
3	Vibration/Current Rating Test Board	10123607	1313	Cu	Tin	FR-4	10pcs
4	LLCR Test Card	10123642-001	1309	Cu	Au	FR-4	50pcs

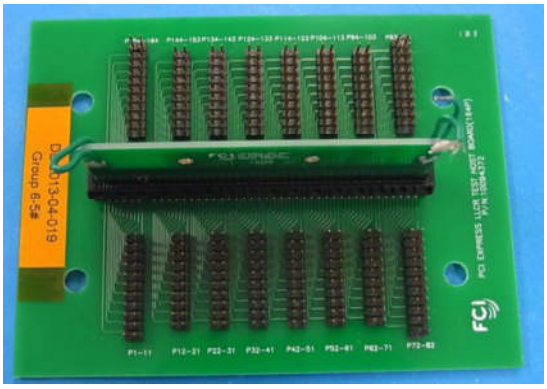


Figure1: PCI Express Press-fit connector mounted on test board and mated with module card

4. TEST DESCRIPTIONS

Testing was conducted in accordance with the FCI product specification GS-12-584. The test items and sequences list in the table below.

Test Description	PAR	Test Group & Sequence							
		1	2	3	4	5	6	7	8
Visual Examination	3.1.1	1,8	1,11	1,8	1,12	1,7	1,3	1	1
Durability	3.1.2					4			
Durability(Pre-conditioning)	3.1.3	3	3	3	3				
Reseating	3.1.4	6	8		10				
Insertion/Withdrawal force	3.1.5 3.1.6							2	
LLCR	3.2.1	2,5,7	2,5,8,10	2,5,7	2,5,7,9,11	3,5			
Insulation resistance	3.2.2		7						
Dielectric Withstanding Voltage	3.2.3					2,6			
Current Rating	3.2.6						2		
Vibration	3.3.1			6					
Temperature Life	3.3.2	4							
Temperature Life(pre-conditioning)	3.3.3			4	4				
Thermal Shock	3.3.4		4						
Cycling temperature & Humidity	3.3.5		6						
MFG	3.3.6				6				
Thermal disturbance	3.3.7				8				
EON insertion and retention force	3.1.8 3.1.9								2
Sample Quantity		5	10	10	5	10	5	5	5

5. TEST METHODS/REQUIREMENTS

Test Items	Test method	Condition	Requirement
Visual Examination	EIA-364-18B	10x magnification	No detrimental condition
Durability	EIA-364-09C	50cycles, 25.4mm/min	No damage
Durability (Pre-conditioning)	EIA-364-09C	20cycles, 25.4mm/min	No damage
Reseating	GS-12-584D	Item 3.1.4, Manually mated and unmated 3cycles	No damage
Insertion/Withdrawal force	EIA-364-13E	Speed: 25.4mm/min Insertion force with 1.70mm steel card Withdrawal force with 1.44mm steel card	Insertion force： =1.15N*82pair =94.3N max Withdrawal force： =0.15g*82pair=12.3N min
LLCR	EIA-364-23C	20mV, 100mA Max	Initial: LLCR≤30mΩ After test: ΔR≤10mΩ
Insulation resistance	EIA-364-21D	Unmated 100V DC, 2minute,	≥1000MΩ
Dielectric Withstanding Voltage	EIA-364-20D	Unmated 300V AC, 1minute,	No evidence of arc-over, insulation breakdown
Current Rating	EIA-364-70B	Method 2	$\Delta T \leq 30^0$C@1.1A
Vibration	EIA-364-28F	Test condition VII, letter D, 5-500Hz, 3.10g RMS, 15minutes per axis (45minutes total)	No damage No discontinuity > 1μs
Temperature Life	EIA-364-17B	Method A, 105^{0}C, 168hours	No damage
Temperature Life (pre-conditioning)	EIA-364-17B	Method A, 105^{0}C, 92hours	No damage
Thermal Shock	EIA-364-32F	-55 to +85^{0}C 1hour/cycle total 10cycles	No damage
Cyclic Temp and Humidity	EIA-364-31C	EIA-364-1000, Test group 2 25^{0}C 80%RH~ 65^{0}C 50%RH 4hours/cycles, total 24cycles.	No damage
MFG	EIA-364-65B	Class IIA, 10days unmated for 160hours, then mated for remaining 80hours	No damage
Thermal disturbance	EIA-364-1000	EIA-364-1000 Group4, step 7 15~85^{0}C, 2hours/cycles,10cycles	No damage
EON insertion force	EIA-364-05B	PTH diameter: 0.62mm Speed: 25mm/min	≤4.54kgf
EON retention force	EIA-364-05B	PTH diameter: 0.78mm Speed: 25mm/min	≥0.67kgf

6. TEST RESULTS

GROUP # 1 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	LLCR	≤30mΩ	Initial LLCR	≤16.5mΩ	Pass
3	Durability (pre-conditioning)	No damage	Durability (pre-conditioning)	No damage	Pass
4	Temperature Life	No damage	Temperature Life	No damage	Pass
5	LLCR	ΔR≤10mΩ	After Temperature Life	≤8.4mΩ	Pass
6	Reseating	No damage	Reseating	No damage	Pass
7	LLCR	ΔR≤10mΩ	Final LLCR	≤7.8mΩ	Pass
8	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 2 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	LLCR	≤30mΩ	Initial LLCR	≤14.9mΩ	Pass
3	Durability (pre-conditioning)	No damage	Durability (pre-conditioning)	No damage	Pass
4	Thermal Shock	No damage	Thermal Shock	No damage	Pass
5	LLCR	ΔR≤10mΩ	After Thermal Shock	≤8.4mΩ	Pass
6	Cyclic Temp and Humidity	No damage	Cyclic Temp and Humidity	No damage	Pass
7	IR	≥1000MΩ	After Cyclic Temp and Humidity	≥735000MΩ	Pass
8	LLCR	ΔR≤10mΩ	After Cyclic Temp and Humidity	≤8.0mΩ	Pass
9	Reseating	No damage	Reseating	No damage	Pass
10	LLCR	ΔR≤10mΩ	Final LLCR	≤7.9mΩ	Pass
11	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 3 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	LLCR	≤30mΩ	Initial LLCR	≤15.5mΩ	Pass
3	Durability (pre-conditioning)	No damage	Durability (pre-conditioning)	No damage	Pass
4	Temperature Life (pre-conditioning)	No damage	Temperature Life (pre-conditioning)	No damage	Pass
5	LLCR	ΔR≤10mΩ	After Pre-conditioning	≤6.9mΩ	Pass
6	Vibration	No damage No discontinuity > 1µs	Vibration	No damage No discontinuity > 1µs	Pass
7	LLCR	ΔR≤10mΩ	Final LLCR	≤7.2mΩ	Pass
8	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 4 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	LLCR	≤30mΩ	Initial LLCR	≤16.5mΩ	Pass
3	Durability (pre-conditioning)	No damage	Durability (pre-conditioning)	No damage	Pass
4	Temperature Life (pre-conditioning)	No damage	Temperature Life (pre-conditioning)	No damage	Pass
5	LLCR	ΔR≤10mΩ	After Pre-conditioning	≤6.2mΩ	Pass
6	MFG	No damage	MFG	No damage	Pass
7	LLCR	ΔR≤10mΩ	After MFG	≤9.8mΩ	Pass
8	Thermal disturbance	No damage	Thermal disturbance	No damage	Pass
9	LLCR	ΔR≤10mΩ	After Thermal disturbance	≤8.9mΩ	Pass
10	Reseating	No damage	Reseating	No damage	Pass
11	LLCR	ΔR≤10mΩ	Final LLCR	≤9.2mΩ	Pass
12	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 5 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	DWV	No evidence of arc-over, breakdown Leakage current:≤5mA	Initial DWV	No arc-over or insulation breakdown	Pass
3	LLCR	≤30mΩ	Initial LLCR	≤17.2mΩ	Pass
4	Durability	No damage	Durability	No damage	Pass
5	LLCR	ΔR≤10mΩ	Final LLCR (After Durability)	≤7.7mΩ	Pass
6	DWV	No evidence of arc-over, breakdown Leakage current:≤5mA	Final DWV (After Durability)	No arc-over or insulation breakdown	Pass
7	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 6 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	Current rating	ΔT ≤ 30°C @1.1A current	Current rating	Maximum ΔT 23.8°C@1.1A	Pass
3	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 7 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	Insertion force	≤94.3N	Insertion force	≤58.1N	Pass
	Withdrawal force	≥12.3N	Withdrawal force	≥14.9N	Pass

GROUP # 8 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	EON insertion force [1]	≤4.54kgf	EON insertion force	≤1.780kgf	Pass
	EON retention force [2]	≥0.67kgf	EON retention force	≥0.717kgf	Pass

1. EON insertion force tested with the PTH of diameter between 0.61~0.62mm.
2. EON retention force tested with the PTH of diameter between 0.68~071mm.

Statistical summary of LLCR measurements are given in appendix A.

Detailed results of card insertion and retention force testing are given in appendix B.

7. EQUIPMENT

Item	Manufacturer	ID Number	Last Cal.	Cal. Due
Microscope	Nikon (SMZ645)	1019652	N/C	N/A
Milliohmmeter	Agilent (4338B)	DG-Q-0268	04-Jan-2013	03-Jan-2014
Milliohmmeter	Agilent (4338A)	DG-Q-0026	04-Jan-2013	03-Jan-2014
Pin Gauge	EISEN (EP-0B)	DG-Q-0039	22-Aug-2012	21-Aug-2013
Dry heat oven	Heraeus (UT6060)	DG-Q-0053	04-Jan-2013	03-Jan-2014
Thermal shock chamber	Weiss (TS120)	DG-Q-0255	22-Aug-2012	21-Aug-2013
Climatic test chamber	Weiss (C-180/40 Eco)	DG-Q-0195	04-Jan-2013	03-Jan-2014
Universal force tester	SE (1220HS)	DG-Q-0246	20-Aug-2012	19-Aug-2013
Hydra data logger	Fluke (2625)	DG-Q-0087	04-Jan-2013	03-Jan-2014
Regulated power supply	Manson (SDP2210)	DG-Q-0248	04-Jan-2013	03-Jan-2014
High pot tester	GW instek (GPT-715)	DG-Q-0218	20-Aug-2012	19-Aug-2013
High Resistance Meter	Agilent (4339B)	DG-Q-0029	04-Jan-2013	03-Jan-2014
Temperature and Humidity chamber	Votsch (VC4018)	DG-Q-0045	04-Jan-2013	03-Jan-2014
Vibration testing system	Shin Ken (G5150N)	DG-Q-0166	20-Mar-2013	19-Mar-2015
Event detector	NAC(NM11A)	DG-Q-0311	13-May-2013	12-May-2014
MFG chamber	Yamasaki (GH-180-VL)	DG-Q-0097	13-May-2013	12-May-2014
Micro balance	Mettler Toledo (XP26DR)	DG-Q-0079	13-May-2013	12-May-2014

N/C=Not Calibrated
N/A=Not Applicable

8. REVISION RECORD

Revision Level	Affected Pages	Description	Revision Date
A	All	Original Release	12/Jul-2013
B	1	Revised samples description	23/Jul-2013

Appendix A: Statistical Summary of LLCR measurements (Unit: mΩ)

Items	Group 1			Group 2			
	Initial LLCR	ΔR After temperature life	ΔR After Reseating	Initial LLCR	ΔR After Thermal shock	ΔR After Humidity	ΔR After Reseating
Min	11.5	-2.7	-0.9	11.5	-1.8	-1.2	-1.6
Max	16.5	8.4	7.8	14.9	8.4	8.0	7.9
Average	13.1	2.0	1.2	13.1	0.3	0.6	0.6
Stdev	0.7	1.3	0.8	0.6	0.7	0.7	0.6

Items	Group 4					Group 5	
	Initial LLCR	ΔR After Pre-conditioning	ΔR After MFG	ΔR After Thermal Disturbance	ΔR After Reseating	Initial LLCR	ΔR After Durability
Min	11.6	-2.4	-1.8	-1.9	-2.1	12.0	-3.4
Max	16.5	6.2	9.8	8.9	9.2	17.2	7.7
Average	13.3	1.1	1.8	1.8	1.8	13.9	0.3
Stdev	0.7	1.0	1.6	1.5	1.6	0.8	0.9

Items	Group 3		
	Initial LLCR	ΔR After Pre-conditioning	ΔR After Vibration
Min	11.2	-1.8	-2.4
Max	15.5	6.9	7.2
Average	13.2	1.1	1.2
Stdev	0.6	1.0	0.9

Appendix B: Insertion and Withdrawal force measurements and curves (Unit: N)

Sample	Group 7 insertion and Withdrawal force			
	1.44mm steel gage		1.70mm steel gage	
	Insertion force	Withdrawal force	Insertion force	Withdrawal force
1	40.7	14.9	58.1	20.7
2	45.5	15.7	54.4	20.1
3	42.4	16.3	56.2	18.3
4	41.5	15.0	56.5	19.2
5	40.8	15.0	57.8	18.7
Min	40.7	14.9	54.4	18.3
Max	45.5	16.3	58.1	20.7
Average	42.2	15.4	56.6	19.4
Stdev	2.0	0.6	1.5	1.0

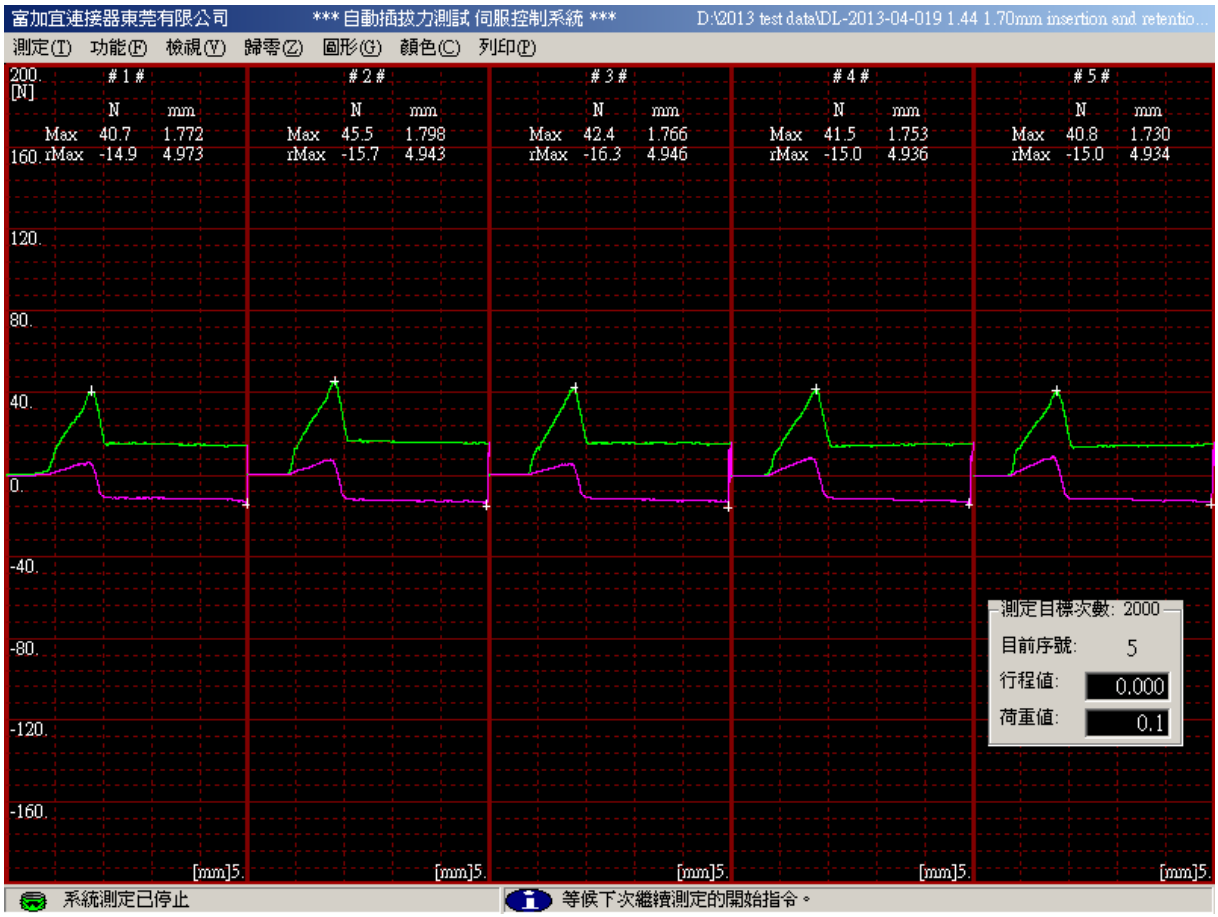


Figure 2: Insertion and withdrawal force tested with 1.44mm steel gage

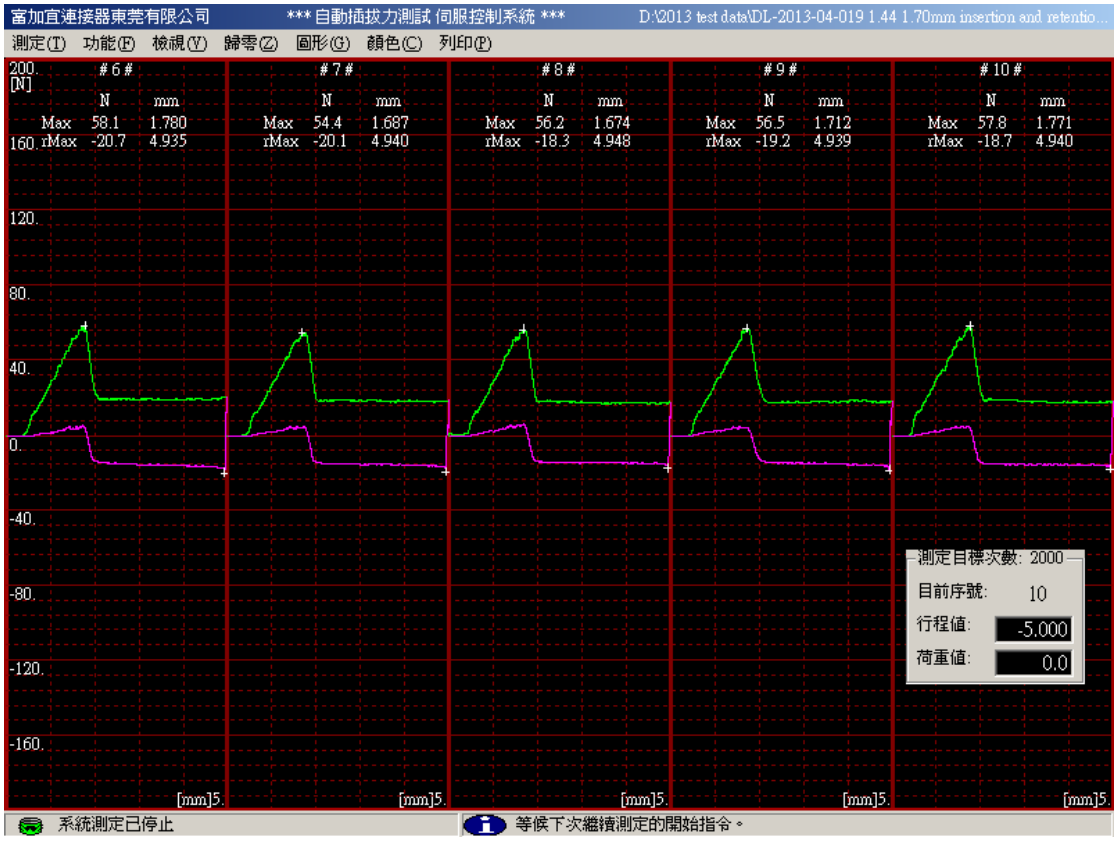


Figure 3: Insertion and withdrawal force tested with 1.70mm steel gage

****** End of Report ******

AP Product Test Lab.
FCI Electronics Division
Nanwei, Qisha, Shatian Town, Dongguan City, Guangdong, PRC

LABORATORY TEST REPORT

REPORT NO.	DATE OF REPORT	DATES TESTED	TESTED BY	
DL-2013-04-018-CR Rev. B	**23/Jul/2013**	**15/Apr/2013-17/Jun/2013**	**Chao Li / Lily Yin**	
REQUESTOR	TITLE		Prepared By/Title	Approved By/Title
WL Zhang	**PCI Express STB Connector Qualification Testing**		**Lily Yin** Lab Test Tech.	**Gentle Zeng** Asst. Lab Mgr.

1. PURPOSE

Qualification testing was conducted on PCI Express STB connector to assess the conformance to product specification. Testing was performed in accordance with FCI product specification GS-12-233 (Rev. H, Jul-08, 2008).

2. CONCLUSION

The test results showed that the PCI Express STB Connector met the specified requirements of FCI product specification GS-12-233 (Rev. H, Jul-08, 2008).

3. SAMPLE DESCRIPTION

3.1 The samples were received at the laboratory on 05 Mar 2013.

3.2 Prior to testing, the samples were examined at low magnification and judged to be acceptable for testing.

3.3 Test sample information:

Table 1 Identity of Submitted Test Samples

Item	Description	Part #	Lot #	Base Mat'l	Plating Type	Housing Mat'l	Quantity
1	PCI Express STB Connector	10018783-10103TLF	N/A	Copper alloy	15u" GXT	High performance resin	45pcs
2	LLCR Test Board	10094372	1313	Cu	Tin	FR-4	21pcs
3	Vibration/Current Rating Test Board	10123607	1313	Cu	Tin	FR-4	7pcs
4	LLCR Test Card	10123642-001	1309	Cu	Au	FR-4	42pcs

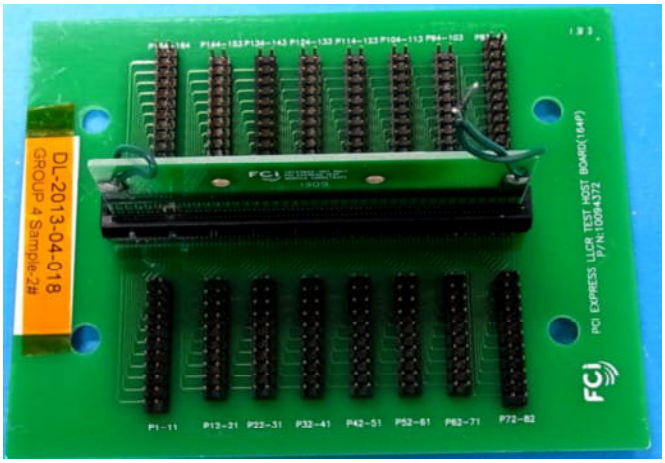


Figure1: PCI Express STB connector soldered on test board and mated with module card

4. TEST DESCRIPTIONS

Testing was conducted in accordance with the FCI product specification GS-12-233H. The test items and sequences list in the table below.

Test Description	PAR	Test Group & Sequence							
		1	2	3	4	5	7	8	9
Visual Examination	3.1	1,8	1,11	1,8	1,12	1	1,7	1,3	1,3
Insertion/Withdrawal force	3.2					3			
Contact Retention	3.3					5			
Board retention and insertion force	3.4					2			
Solderability	3.5					4			
LLCR	4.1	2,5,7	2,5,8,10	2,5,7	2,5,7,9,11		3,5		
Insulation Resistance	4.2		7						
Dielectric Withstanding Voltage	4.3						2,6		
Contact Current Rating	4.4							2	
Thermal Shock	5.1		4		8				
Humidity	5.2		6						
Temperature Life(pre-conditioning)	5.3			4	4				
Temperature Life	5.4	4							
Vibration	5.5			6					
Durability(Pre-conditioning)	5.6	3	3	3	3				
Durability	5.7						4		
MFG	5.8				6				
Reseating	5.9	6	9		10				
Resistance to soldering heat	5.10								2
Sample Quantity		5	8	8	5	7	6	3	3

5. TEST METHODS/REQUIREMENTS

Test Items	Test method	Condition	Requirement
Visual Examination	EIA-364-18B	10x magnification	No detrimental condition
Insertion/Withdrawal force	EIA-364-13E	Speed: 25.4mm/min Insertion force with 1.70mm steel card Withdrawal force with 1.44mm steel card	Insertion force: =1.15N*82pair =94.3N max Withdrawal force: =0.15g*82pair=12.3N min
Contact Retention	EIA-364-29C	Speed: 1.27mm/min	≥5N per contact
Board insertion force	EIA-364-05B	Speed: 25.4mm/min	≤7.45kgf
Solderability	S-STD-0002	Test method A1 255+/-5^{0}C, 5+/-0.5s Steam age for 1hour	Solder coverage≥95%
LLCR	EIA-364-23C	20mV, 100mA Max	Initial: LLCR≤30mΩ After test: ΔR≤10mΩ
Insulation Resistance	EIA-364-21D	Unmated 100V DC, 2minute	≥1000MΩ
Dielectric Withstanding Voltage	EIA-364-20D	Unmated 300V AC, 1minute	No evidence of arc-over, insulation breakdown
Contact Current Rating	EIA-364-70B	Method 2	ΔT≤30^{0}C@1.1A
Thermal Shock	EIA-364-32F	-55 to +85^{0}C 1hour/cycle total 10cycles	No damage
Cyclic Temp and Humidity	EIA-364-31C	EIA-364-1000.01, Test group 2 25^{0}C 80%RH~ 65^{0}C 50%RH 4hours/cycles, total 24cycles.	No damage
Temperature Life (pre-conditioning)	EIA-364-17B	Method A, 105^{0}C, 92hours	No damage
Temperature Life	EIA-364-17B	Method A, 105^{0}C, 168hours	No damage
Vibration	EIA-364-28F	Test condition VII, letter D, 20-500Hz, 3.10g RMS, 15minutes per axis (45minutes total)	No damage No discontinuity > 1μs
Durability (Pre-conditioning)	EIA-364-09C	20cycles, 500cycles/Hour	No damage
Durability	EIA-364-09C	50cycles, 500cycles/Hour	No damage
MFG	EIA-364-65B	Class IIA, 10days unmated for 160hours, then mated for remaining 80hours	No damage
Reseating	GS-12-233H	Item 5.9, Manually mated and unmated 3cycles	No damage
Resistance to soldering heat	EIA-364-56D	Procedure 3, test condition C 260+/-5^{0}C, 10+/-2s	No damage

6. TEST RESULTS

GROUP # 1 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	LLCR	≤30mΩ	Initial LLCR	≤15.2mΩ	Pass
3	Durability (pre-conditioning)	No damage	Durability (pre-conditioning)	No damage	Pass
4	Temperature Life	No damage	Temperature Life	No damage	Pass
5	LLCR	ΔR≤10mΩ	After Temperature Life	≤9.5mΩ	Pass
6	Reseating	No damage	Reseating	No damage	Pass
7	LLCR	ΔR≤10mΩ	Final LLCR	≤9.4mΩ	Pass
8	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 2 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	LLCR	≤30mΩ	Initial LLCR	≤16.5mΩ	Pass
3	Durability (pre-conditioning)	No damage	Durability (pre-conditioning)	No damage	Pass
4	Thermal Shock	No damage	Thermal Shock	No damage	Pass
5	LLCR	ΔR≤10mΩ	After Thermal Shock	≤6.4mΩ	Pass
6	Cyclic Temp and Humidity	No damage	Cyclic Temp and Humidity	No damage	Pass
7	IR	≥1000MΩ	After Cyclic Temp and Humidity	≥970000MΩ	Pass
8	LLCR	ΔR≤10mΩ	After Cyclic Temp and Humidity	≤7.6mΩ	Pass
9	Reseating	No damage	Reseating	No damage	Pass
10	LLCR	ΔR≤10mΩ	Final LLCR	≤7.9mΩ	Pass
11	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 3 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	LLCR	≤30mΩ	Initial LLCR	≤15.5mΩ	Pass
3	Durability (pre-conditioning)	No damage	Durability (pre-conditioning)	No damage	Pass
4	Temperature Life (pre-conditioning)	No damage	Temperature Life (pre-conditioning)	No damage	Pass
5	LLCR	ΔR≤10mΩ	After pre-conditioning	≤8.8mΩ	Pass
6	Vibration	No damage No discontinuity > 1µs	Vibration	No damage No discontinuity > 1µs	Pass
7	LLCR	ΔR≤10mΩ	Final LLCR	≤9.8mΩ	Pass
8	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 4 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	LLCR	≤30mΩ	Initial LLCR	≤15.6mΩ	Pass
3	Durability (pre-conditioning)	No damage	Durability (pre-conditioning)	No damage	Pass
4	Temperature Life (pre-conditioning)	No damage	Temperature Life (pre-conditioning)	No damage	Pass
5	LLCR	ΔR≤10mΩ	After pre-conditioning	≤7.6mΩ	Pass
6	MFG	No damage	MFG	No damage	Pass
7	LLCR	ΔR≤10mΩ	After MFG	≤9.5mΩ	Pass
8	Thermal Shock	No damage	Thermal Shock	No damage	Pass
9	LLCR	ΔR≤10mΩ	After Thermal Shock	≤9.5mΩ	Pass
10	Reseating	No damage	Reseating	No damage	Pass
11	LLCR	ΔR≤10mΩ	Final LLCR	≤9.4mΩ	Pass
12	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 5 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	Board insertion force	≤7.45kgf	Board insertion force	≤0.14kgf	Pass
3	Insertion force	≤94.3N	Insertion force	≤50.4N	Pass
	Withdrawal force	≥12.3N	Withdrawal force	≥17.2N	Pass
4	Solderability	Solder coverage≥95%	Solderability	Solder coverage >95%	Pass
5	Contact Retention	≥5N per contact	Contact Retention	≥10.4N per contact	Pass

GROUP # 7 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	DWV	No evidence of arc-over, breakdown Leakage current:≤5mA	Initial DWV	No arc-over or insulation breakdown	Pass
3	LLCR	≤30mΩ	Initial LLCR	≤18.7mΩ	Pass
4	Durability	No damage	Durability	No damage	Pass
5	LLCR	ΔR≤10mΩ	Final LLCR (After Durability)	≤8.8mΩ	Pass
6	DWV	No evidence of arc-over, breakdown Leakage current:≤5mA	Final DWV (After Durability)	No arc-over or insulation breakdown	Pass
7	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 8 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	Current rating	$\Delta T \leq 30°C$ @1.1A current	Current rating	Maximum ΔT 24.6°C@1.1A	Pass
3	Visual Examination	No detrimental condition	Final	No degradation	Pass

GROUP # 9 TEST RESULTS

Step	Test	Requirement	Step Description	Results	Comment
1	Visual Examination	No detrimental condition	Initial	No detriment	Pass
2	Resistance to soldering heat	No damage	Resistance to soldering heat	No damage	Pass
3	Visual Examination	No detrimental condition	Final	No degradation	Pass

Statistical summaries of LLCR measurements are given in appendix A.

Detailed results of card insertion and retention force testing are given in appendix B.

7. EQUIPMENT

Item	Manufacturer	ID Number	Last Cal.	Cal. Due
Microscope	Nikon (SMZ645)	1019652	N/C	N/A
Milliohmmeter	Agilent (4338B)	DG-Q-0268	04-Jan-2013	03-Jan-2014
Milliohmmeter	Agilent (4338A)	DG-Q-0026	04-Jan-2013	03-Jan-2014
Dry heat oven	Heraeus (UT6060)	DG-Q-0053	04-Jan-2013	03-Jan-2014
Thermal shock chamber	Weiss (TS120)	DG-Q-0255	22-Aug-2012	21-Aug-2013
Climatic test chamber	Weiss (C-180/40 Eco)	DG-Q-0195	04-Jan-2013	03-Jan-2014
Universal force tester	SE (1220HS)	DG-Q-0246	20-Aug-2012	19-Aug-2013
Hydra data logger	Fluke (2625)	DG-Q-0087	04-Jan-2013	03-Jan-2014
Digital DC power supply	DaXian (DX3005DS)	DG-Q-0071	20-Aug-2012	19-Aug-2013
High pot tester	GW instek (GPT-715)	DG-Q-0218	20-Aug-2012	19-Aug-2013
High Resistance Meter	Agilent (4339B)	DG-Q-0029	04-Jan-2013	03-Jan-2014
Steam aging chamber	Asli (AS-9728)	DG-Q-0259	04-Jan-2013	03-Jan-2014
Wetting balance tester	Multicore Solders (MUSTII SN2153)	DG-Q-0310	13-May-2013	12-May-2014
Solder dip pot	HANSTAR (CM-141)	DG-Q-0004	13-May-2013	12-May-2014
Thermal shock chamber	Votsch (VT 7012 S2)	DG-Q-0190	13-May-2013	12-May-2014
Vibration testing system	Shin Ken (G5150N)	DG-Q-0166	20-Mar-2013	19-Mar-2015
Event detector	NAC(NM11A)	DG-Q-0311	13-May-2013	12-May-2014
MFG chamber	Yamasaki (GH-180-VL)	DG-Q-0097	13-May-2013	12-May-2014
Micro balance	Mettler Toledo (XP26DR)	DG-Q-0079	13-May-2013	12-May-2014

N/C=Not Calibrated
N/A=Not Applicable

8. REVISION RECORD

Revision Level	Affected Pages	Description	Revision Date
A	All	Original Release	12/Jul/2013
B	Page 1	Revised sample description	23/Jul/2013

Appendix A: Statistical Summary of LLCR measurements (Unit: mΩ)

Items	Group 1			Group 2			
	Initial LLCR	ΔR After temperature life	ΔR After Reseating	Initial LLCR	ΔR After Thermal shock	ΔR After Humidity	ΔR After Reseating
Min	10.2	-0.5	-1.1	9.6	-1.5	-1.6	-1.9
Max	15.2	9.5	9.4	16.5	6.4	7.6	7.9
Average	12.2	2.8	2.3	12.2	0.5	0.7	0.7
Stdev	0.7	1.7	1.6	0.8	0.9	1.1	1.1

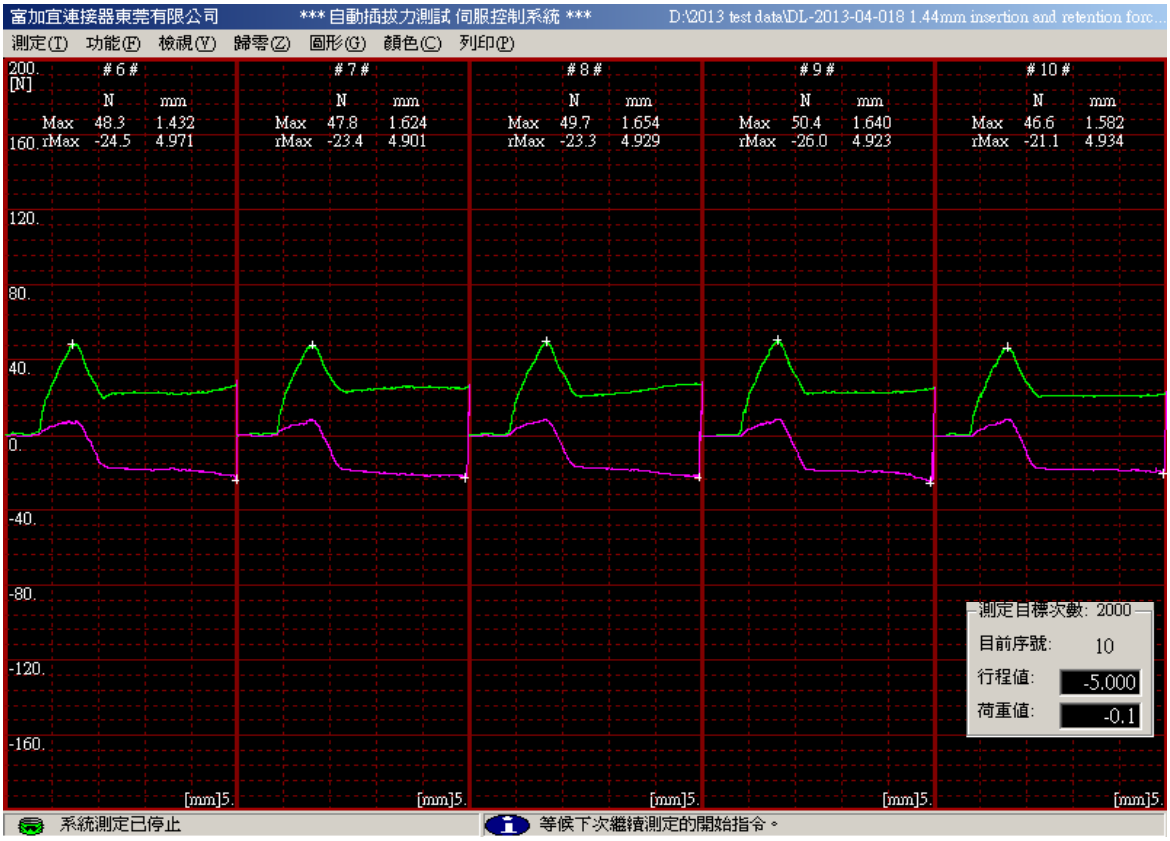
Items	Group 4					Group 7	
	Initial LLCR	ΔR After temperature life (Pre-conditioning)	ΔR After MFG	ΔR After Thermal shock	ΔR After Reseating	Initial LLCR	ΔR After Durability
Min	10.2	-1.7	-1.5	-1.7	-2.1	10.1	-1.2
Max	15.6	7.6	9.5	9.5	9.4	18.7	8.8
Average	12.0	2.1	3.2	2.5	2.3	11.8	1.0
Stdev	0.8	1.4	1.9	1.5	1.6	0.7	1.4

Items	Group 3		
	Initial LLCR	ΔR After temperature life (Pre-conditioning)	ΔR After Vibration
Min	10.2	-1.0	-1.3
Max	15.5	8.8	9.8
Average	11.7	2.0	2.3
Stdev	0.7	1.4	1.8

Appendix B: Insertion and Withdrawal force measurements and curves (Unit: N)

Sample	Group 5 insertion and Withdrawal force			
	1.44mm steel gage		1.70mm steel gage	
	insertion force	Withdrawal force	insertion force	Withdrawal force
1	33.8	18.2	48.3	24.5
2	34.3	18.5	47.8	23.4
3	34.2	17.2	49.7	23.3
4	35.3	21.9	50.4	26
5	32.8	17.3	46.6	21.1
Min	32.8	17.2	46.6	21.1
Max	35.3	21.9	50.4	26.0
Average	34.1	18.6	48.6	23.7
Stdev	0.9	1.9	1.5	1.8

Insertion and withdrawal force tested with 1.44mm steel gage



Insertion and withdrawal force tested with 1.70mm steel gage

****** End of Report ******

PCN	Item Number	Change	Effective Date	Last Time Buy Date	Last Disty return date	Replacement Part	Alternate Part	Comments
PCN13071	10018783-00002MLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-00101TLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-00103TLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-00111TLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-00112TLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-00113TLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-00200MLF	MATERIALS CHANGE	15-Feb-14					
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PCN13071	10018783-00201TLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-00203TLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-02201TLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-10000MLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-10000TLF	MATERIALS CHANGE	15-Feb-14					
PCN13071	10018783-10001MLF	MATERIALS CHANGE	15-Feb-14					
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PCN13071	10018783-10113YLF	MATERIALS CHANGE	15-Feb-14					
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PCN13071	10018784-10000TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10001MLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10018784-10002TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10018784-10012MLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10018784-10013MLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10013TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10100TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10101TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10102TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10103TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10110TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10111TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10112TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10113MLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10113TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10200TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10201TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10202MLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10202TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10203TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10210TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10211TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10212TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-10213TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11000TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11001TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11002TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11003TLF	MATERIALS CHANGE	15-Feb-14

PCN13071	10018784-11010TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11011TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11012TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11013TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11100TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11101TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10018784-11202MLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10018784-11212TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10018784-11213TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10027747-11010TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10027747-11110TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10027747-11210TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10036767-10000TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10036767-10200TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10037901-11010TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10037901-11100TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10037901-11110TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10037901-11210TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10054652-10010TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10054652-10020TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10054652-10110TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10054652-10210TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10054652-10220TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10057596-10010TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10057596-10020TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10057596-10110TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10057596-10120TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10063960-10010NLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10063960-10010TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10063960-10020TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10063960-10110TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10063960-10120TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10063960-10210TLF	MATERIALS CHANGE	15-Feb-14

PCN13071	10063960-10220TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10066356-10010TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10066356-10020TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10066356-10110TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10066356-10210TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10082378-10000TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-10001TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-10002TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-10003TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10082378-10201TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-10202TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-10303T	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-11000TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-11001TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10082378-11103TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10082378-11203TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-11301T	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-11302T	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-11303T	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-11311T	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-11312T	MATERIALS CHANGE	15-Feb-14
PCN13071	10082378-11313T	MATERIALS CHANGE	15-Feb-14
PCN13071	10086666-10012TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10086666-10013TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10092852-10302T	MATERIALS CHANGE	15-Feb-14
PCN13071	10092852-10303T	MATERIALS CHANGE	15-Feb-14
PCN13071	10092852-11002TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10092852-11011TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10092852-11012TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10092852-11302T	MATERIALS CHANGE	15-Feb-14

PCN13071	10092852-11303T	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-00002MLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10000ALF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10000TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10001MLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10002MLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10002RLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10002TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10002WLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10003TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10030TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10033TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10033ZLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10101TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10103TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10112TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10133TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10143TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10200MLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10201MLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-10233TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-11003TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10108777-11021TLF	MATERIALS CHANGE	15-Feb-14
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PCN13071	10108777-11112TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-11123TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10108777-11141TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10116975-11000TLF	MATERIALS CHANGE	15-Feb-14
PCN13071	10124782-10002TLF	MATERIALS CHANGE	15-Feb-14