

Product/Process Change Notifications



PCN - 20 007 R2

Amphenol Information Communication and Commercial Products Group

www.amphenol-icc.com

Release Date: April 24 2020

Product Name:	Millipacs		
	Millipacs All Versions		
Product Manager:	Jibu Babu		
Subject:	Notification of Change with Immediate Effectivity		
Distribution:	All Customers		
Type of Change:	Materials Change		
Change Description:	As notified earlier vide PCN 20007 dtd February 25th, 2020 and PCN 20007 R1 dtd March 3rd , 2020 we are adding GXT + as approved plating material for 2mm Millipacs meeting the product performance specifications. PCN 20007 R2 Revision is to notify that we will assign " new Part numbers for GXT + plating products ".		
Reason for Change:	<p>Reason for GXT+ Plating introduction: Palladium prices have increased significantly over the last several years causing drastic increase in cost of production. We are reviewing the current product pricing. To reduce the impact of palladium metal price spiral on the cost of production, we are implementing GXT+ plating in our process. Your approval for supplies with GXT+ plating will help to limit the product price increase.</p> <p>Reason for new part numbers for GXT+ plating: New Part numbers are assigned for GXT+ plating to ensure traceability in supply chain. See PCN20007 R2 Affected Parts.xls file , "Alternative Parts" column for new Part numbers.</p>		
Affected Parts:	See attached PCN20007 R2 Affected Parts.xls file		
Effective Date of Change:	May 10, 2020	<i>Note: PCN Revision R2 is to update previous PCN20007 R1 March 3, 2020 for following changes.</i>	
Last Time Buy Date:	NA	<i>1. PCN20007 R2 Affected Parts.xls - removed 88 part numbers from PCN20007 R1 Affected Parts.xls file.</i>	
Last Disty Return Date:	NA	<i>2. PCN20007 R2 Affected Parts.xls - added Alternate Part numbers for the new GXT+ plating specification.</i>	
Last Time Shipment Date	NA	<i>3. PCN Effective date revised to May 10, 2020.</i>	
Datasheet Attached?	Select		
Qual/Test Data Attached?	NA		
Samples Availability Date:	April	20	2020
Available Alternatives?	Select		
Questions?	Contact your local AICC Representative, or Product Manager Jibu Babu 914843391946 / Jibu.Babu@fci.com		

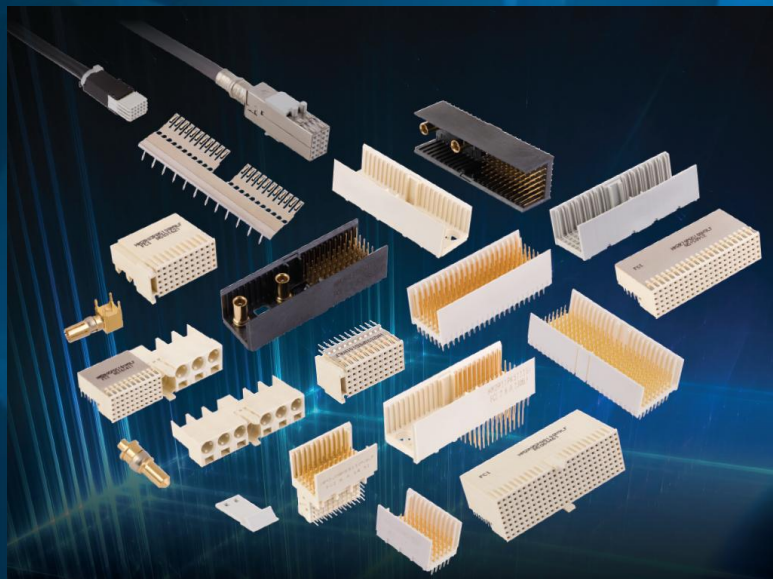
Note:

Customers should contact Product Manager (or their local AICC Representative) directly regarding any concern on the PCN. Lack of any such customer feedback within three weeks of PCN release date will be interpreted as non-objection .

HM2P07PDE120N9L1LF	1
HM2P07PDE129N9LLF	2
HM2P07PDG1A1N9L1LF	3
HM2P07PDG1A1N9LLF	4
HM2P07PDG3U9N9LLF	5
HM2P07PDG3W0N9L1LF	6
HM2P07PDH3C5N9LLF	7
HM2P07PDN1Y0N9LLF	8
HM2P07PDP221N9L1LF	9
HM2P07PDP221N9LLF	10
HM2P07PDP231N9LLF	11
HM2P07PDP251N9L1LF	12
HM2P07PDP251N9LLF	13
HM2P07PDP255N9L1LF	14
HM2P07PDP255N9LLF	15
HM2P07PDP261N9L1LF	16
HM2P07PDP261N9LLF	17
HM2P07PDP265N9L1LF	18
HM2P07PDP265N9LLF	19
HM2P07PDP2C5N9LLF	20
HM2P07PDP2F5N9LLF	21
HM2P07PDW240N9L1LF	22
HM2P07PKE124GFLLF	23
HM2P07PKP248GFL1LF	24
HM2P07PKP275GFL1LF	25
HM2P07PKP2G5GFLLF	26
HM2P07PKP2H5GFLLF	27
HM2P07PKW260GFL1LF	28
HM2P08PD5110N9LLF	29
HM2P08PDE120N9L1LF	30
HM2P08PDE121N9L1LF	31
HM2P08PDE121N9LLF	32
HM2P08PDP285N9L1LF	33
HM2P08PDP285N9LLF	34
HM2P08PDP2K5N9LLF	35
HM2P08PDW250N9L1LF	36
HM2P08PKE128GFL1LF	37
HM2P08PKH3E5GFLLF	38
HM2P08PKP285GFL1LF	39
HM2P08PKP2L5GFLLF	40
HM2P08PKP2M5GFLLF	41
HM2P08PNH3W5GFLLF	42
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HM2P09PDE121N9L1LF	46
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HM2P09PDP291N9LLF	49
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HM2P11PDN260N9L1LF	53
HM2P65PD5110N9L1LF	54
HM2P65PD5111N9L1LF	55
HM2P65PDE120N9L1LF	56
HM2P65PDE121N9LLF	57
HM2P65PDE1R0N9L1LF	58
HM2P65PDM3P5N9LLF	59
HM2P66PD5110N9LLF	60
HM2P66PD5111N9LLF	61
HM2P66PD5115N9LLF	62
HM2P66PDE120N9LLF	63
HM2P66PDH321N9LLF	64
HM2P66PDH325N9LLF	65
HM2P66PK5114GFLLF	66
HM2P70PDE121N9LLF	67
HM2P70PKE124GFLLF	68
HM2P70PKG315GFLLF	69
HM2P70PKT165GFLLF	70
HM2P71PKS1L5GFLLF	71
HM2P87PDJ1M0N9L1LF	72

HM2P87PDJ1M1N9L1LF	73
HM2P87PDJ1M1N9LLF	74
HM2P89PD8110N9L1LF	75
HM2P91PDJ1M0N9L1LF	76
HM2P91PDJ1M1N9L1LF	77
HM2PN1PDF3R5N9LLF	78
HM2PN1PNF3N5GFLLF	79
HM2PN1PNF3P5GFLLF	80
HM2PN1PNL3Y5GFLLF	81
HM2PN2PDE129N9LLF	82
HM2PN2PMA1U5GFLLF	83
HM2PN2PNF3U5GFLLF	84
HM2PN3PDE3J5N9LLF	85
HM2S01PE5100N9L1LF	86
HM2ZA404LF	87
HM2ZA506LF	88

Millipacs Product Line GXT+ Plating Upgrade



February 2020

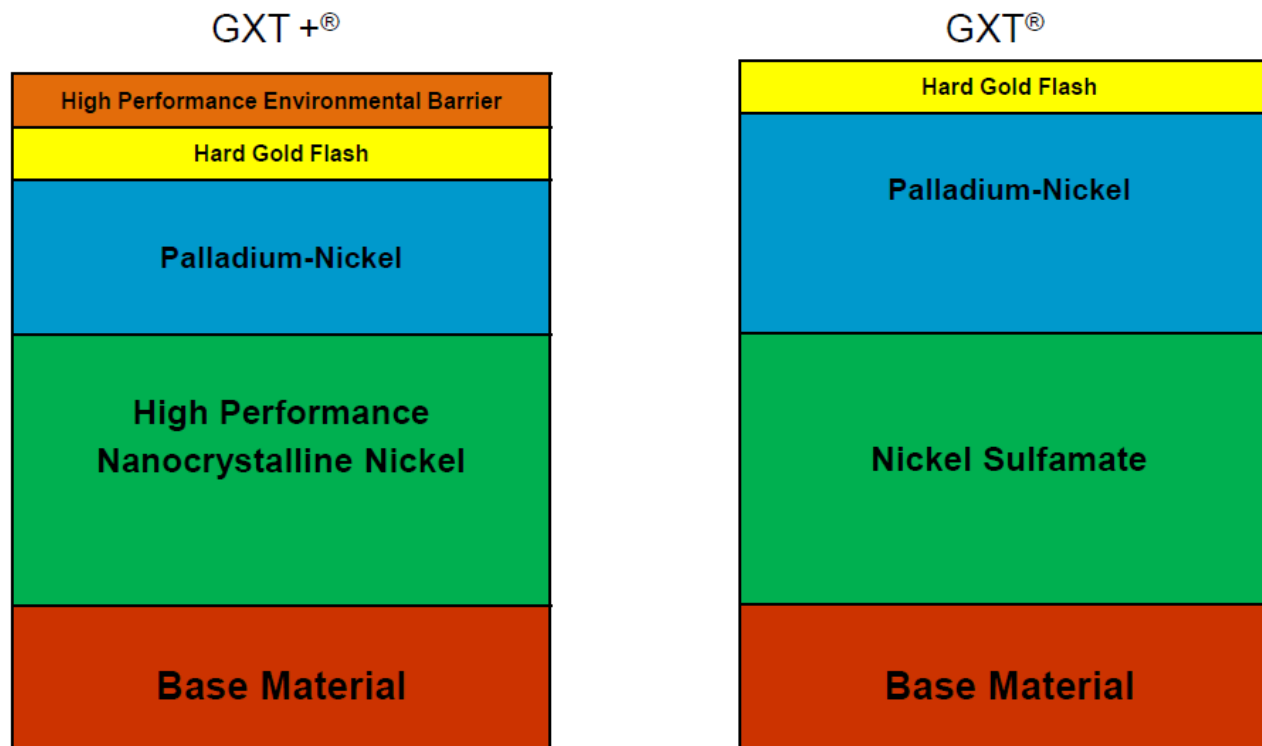
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FCi Basics

Amphenol ICC

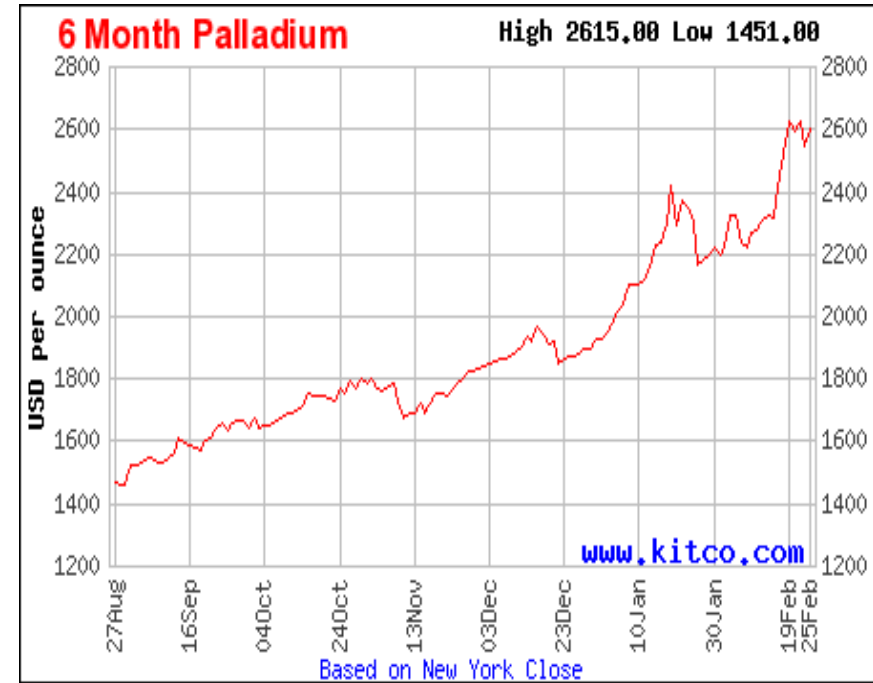
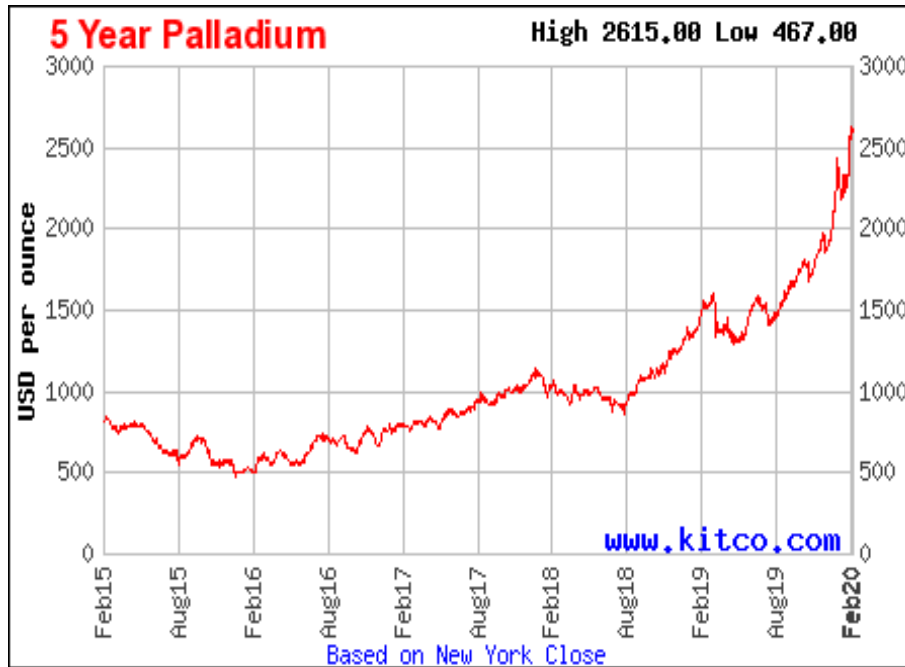
Overview of GXT & GXT+ Plating

- GXT ® plating is developed more than 30 years ago and was widely used in Millipacs, DIN, Metral, Dsub and other products of Amphenol Basics, HSBP and Consumer Product Portfolio.
- GXT +® plating was developed in 2012 as an upgrade version of current GXT plating. This plating type has been used by many other Amphenol product lines for years.
- Same as GXT ® plating, GXT+® plating also passed all internal and industry standard performance spec. As a conclusion, there is no product performance change between two plating types.
- Plating line is upgraded to handle production of GXT+
- No PN change is proposed with GXT+® supplies



- **GXT+® uses a nanocrystalline Ni deposit that replaces the current Ni layer**
- **The thickness of the hard gold layer remains the same.**
- **Reduction of the PdNi deposit and a high performance environmental barrier is applied.**

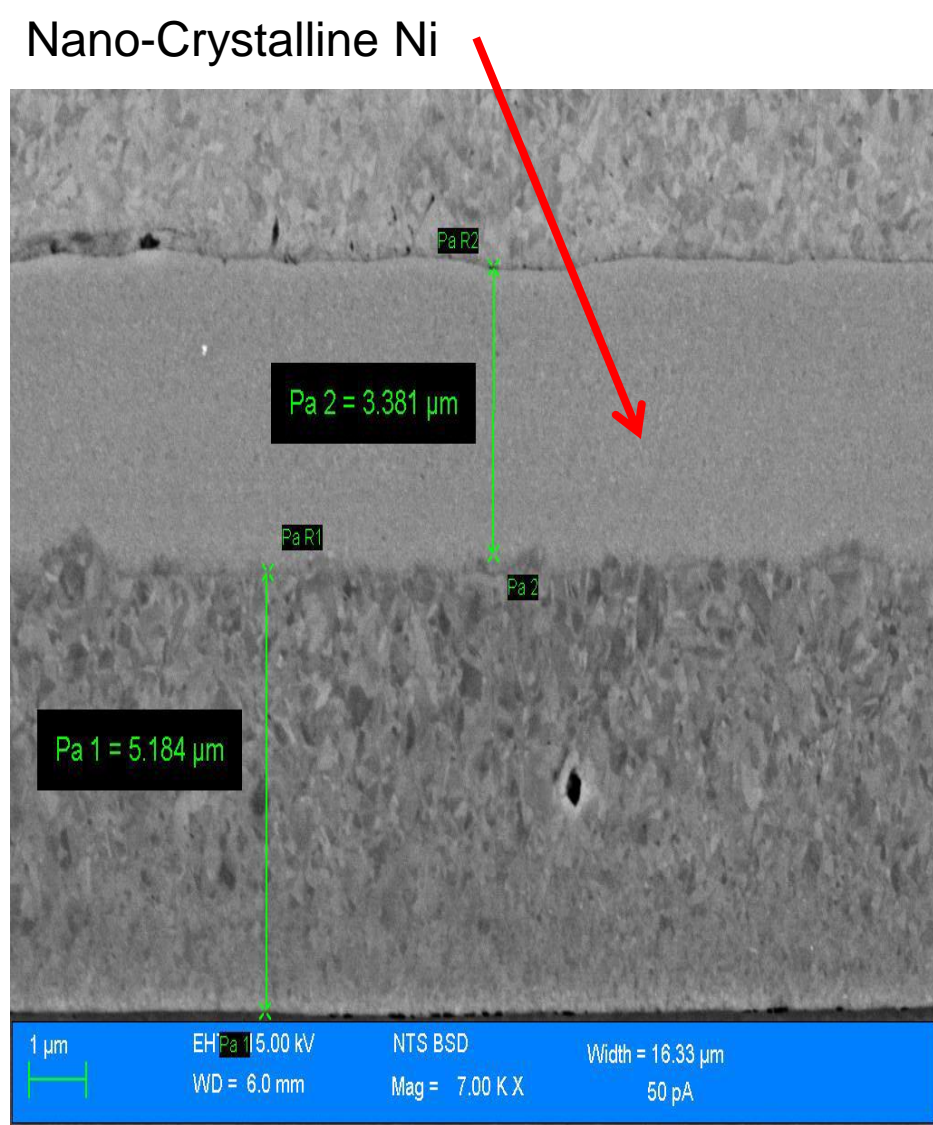
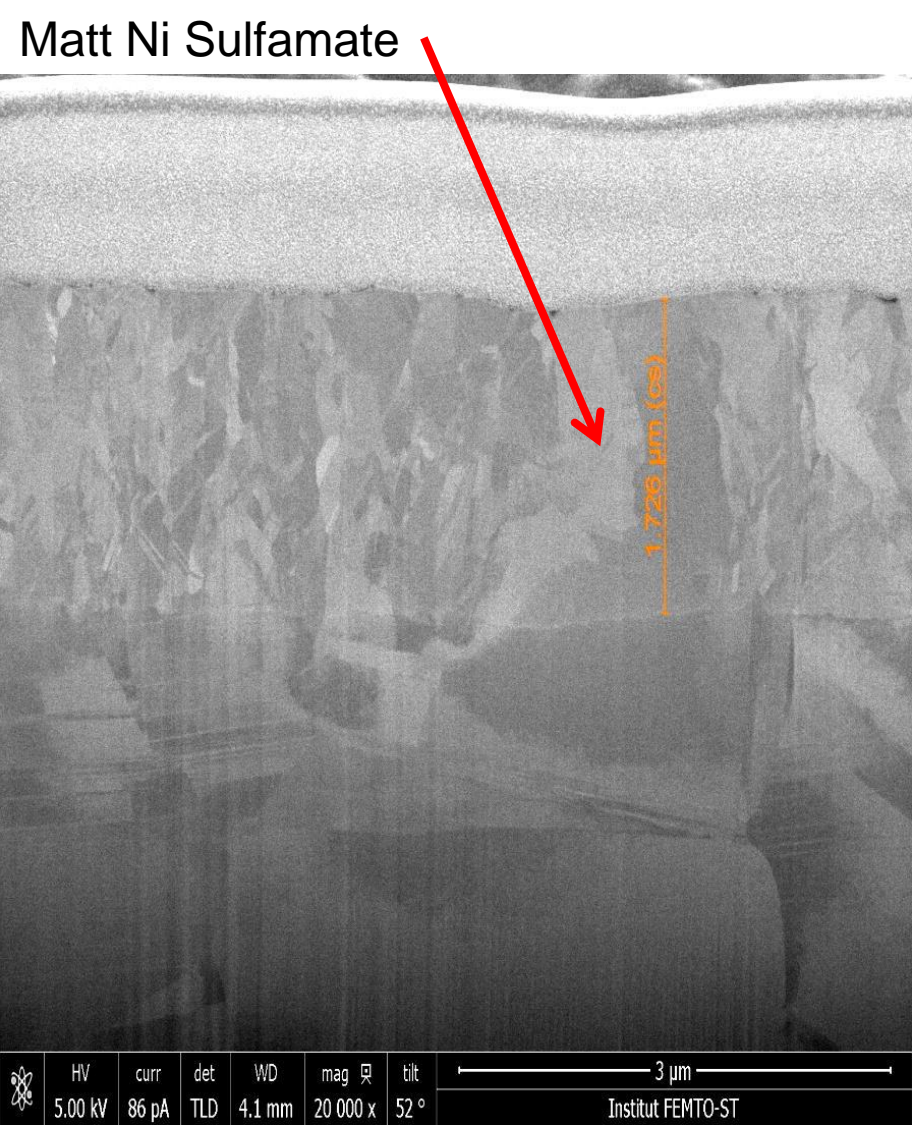
Palladium price spiral



Palladium price changes over the last few months have been drastic. GXT +® plating use less Palladium, so this plating type will be less impacted by the Palladium price increase seen recently

- Improved corrosion resistance via reduced porosity due to the improved Ni grain structure.
- Improved Plating process control
- Similar or greater plating capacity

Nano-Crystalline-Grain Structure ≡ FCI Basics



Poly- α - Olefin Lube

- As a result of several years R & D, Amphenol has developed a high performance Poly- α - Olefin (PAO) lube to be capable to reduce Au & PdNi thickness w/o compromising product performance.
- The PAO lube has been used for more than 10 years by different product lines in Amphenol.
- **This study validates that PAO does not impact thermal stability, wear resistance, corrosion resistance and contact resistance of the finished product.**

Thermal stability – TGA test

- Thermal Gravimetric Analysis (TGA) has shown that the PAO lube is stable in elevated temperatures, as well as through a Lead-Free (LF) reflow process and over molding application.

Size: 31.6060 mg
Method: Polymer Decomposition
Comment: TGA2950 VG7548, Lot#2C13K05

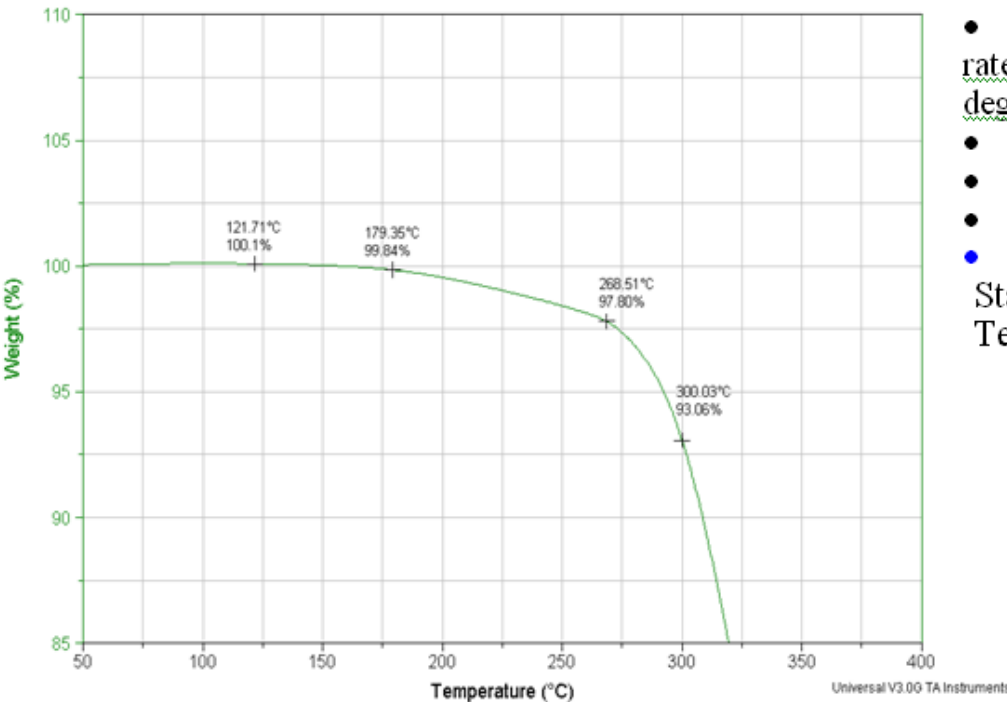
TGA

Operator: C. Rau
Run Date: 11-Dec-08 08:13

TESTS:

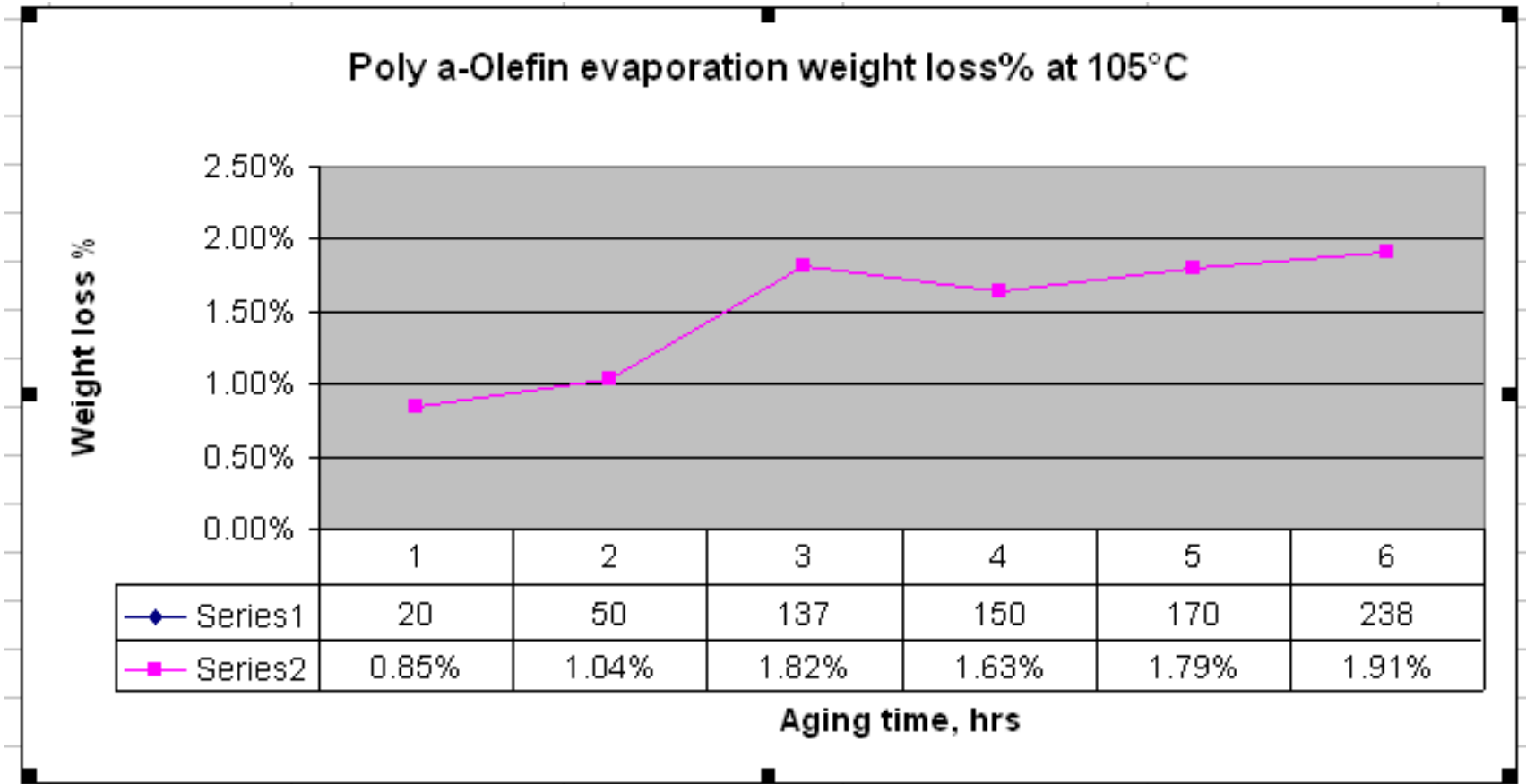
- ASTM method E1131-03 was followed with a Nitrogen flow rate of 40 mL/min, 5 minute isothermal, final temperature of 720 degrees centigrade and the parameters listed below:

	<u>Run 1</u>	<u>Run 2</u>	<u>Run 3</u>
• Sample size mg	22.97	48.65	31.61
• Heating Rate °C/min	5	20	20
• Test Data:			
Start of mass loss	122	146	122
Temperature °C			



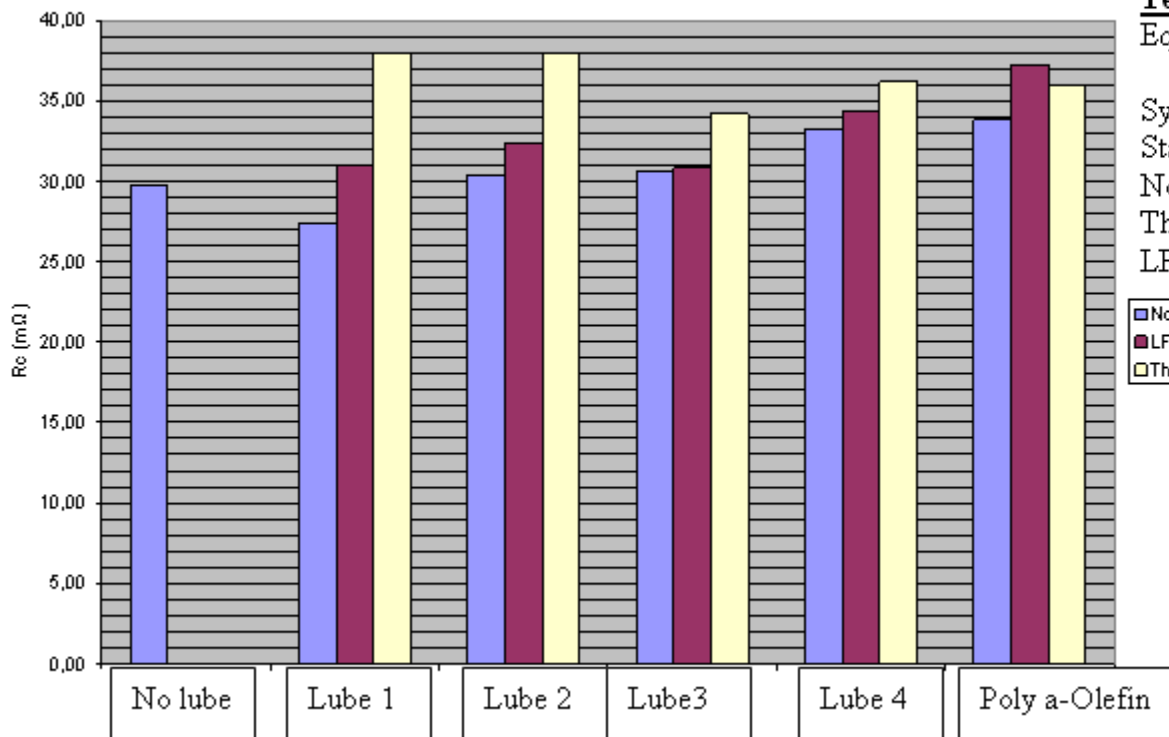
Thermal Stability – Evaporation Rate

- A thermal age test at 105°C for 238 hrs was conducted and the evaporation rate of this high performance Poly-a-Olefin lube is very low @ <2%. Refer to attached chart:



- Contact resistance impact from PAO after reflow & thermal aging conditions was evaluated. Measurements yielded results that were essentially equivalent to the four other surface treatments applied. Reflow treatment showed a slightly larger impact and a smaller impact from thermal aging. These affects are minimal and overall PAO is preferred for connector applications.

$R_{c(SH)} = f(\text{lubricant and post treatment})$



Test conditions for Contact Resistance measurements:
Equipment: Oscilating Tribotester from Tribotechnic with ohmmeter

System: Ball against plan

Static partner: 6 mm diameter Brass ball Hard gold plated

Normal Force: 5N

Thermal ageing: 105°C for 65 hours

LF Reflow: 245°C peak Temperature

■ No any post treatment
■ LF reflow
□ Thermal aging

Amphenol ICC

Thank You

LABORATORY TEST REPORT



REPORT NO. EL2012-09-019	DATE OF REPORT 25SEP2012	DATES TESTED 04AUG2009-27AUG2009	TESTED BY S. Khounevixay	
REQUESTOR N. Zuo	TITLE Millipacs® 15 µ" GXT™ (with lubricant) MFG & Durability Testing		Prepared By/Title J. Kopec Sr. Staff Eng.	Approved By/Title G. Staudt Staff Eng.

PURPOSE

This report summarizes the mixed flowing gas (MFG) and durability cycling testing performed on Millipacs header and receptacle connectors plated with 15 µ" GXT plating and lubricated with either PE-10 or PAO (poly alpha Olefin) lubricant.

CONCLUSIONS

All samples successfully met the Telcordia GR-1217-CORE low level contact resistance (LLCR) requirements following both MFG and durability (250 cycles) testing. All samples of both lubricant types were well below the maximum allowable increase in LLCR of 10 mΩ.

SAMPLE DESCRIPTION

Test samples consisted of 110 position Millipacs vertical headers and right angle receptacles plated with 0.38 µm GXT and lubricated with either PE-10 or PAO lubricant. Headers were mated to receptacles possessing the same lubricant only. The sample description table below describes the specific samples tested. Samples were received 8/3/09 and deemed suitable for testing by a member of the product test laboratory staff.

SAMPLE DESCRIPTION

Item	Description	Part #	Lot #	Base Mat'l	Plating Type µm/µ"
1	Millipacs receptacle with PE-10 lube	HM2P01PE5100N9LFA	P292623115	PBr	0.38/15
2	Millipacs header with PE-10 lube	HM2P07PD5110Z1A	P292623115	PBr	0.38/15
3	Millipacs receptacle with PAO lube	HM2P01PE5100N9LFB	P292702116	PBr	0.38/15
4	Millipacs header with PAO lube	HM2P07PD5110Z1B	P292623115	PBr	0.38/15
5	Millipacs receptacle LLCR test board	SK10027228 Rev. 1	0752	n/a	n/a
6	Millipacs header LLCR test board	SK10027227 Rev. 1	0752	n/a	n/a

TEST DESCRIPTIONS

MFG testing was performed in accordance with Telcordia GR-1217-CORE 12/08 and EIA-364-65A. The LLCR criterion of Telcordia GR-1217 (10 mΩ maximum increase) was applied to both the MFG and durability cycle test sequences. Sample size consisted of 5 mated pair connectors (550 total contacts) for both sample groups.

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TEST SEQUENCES

Test Description	Grp. 1	Grp. 2
Initial examination	1	1
LLCR	2,4,6,8,10,12	2,4
Durability cycles – 99x	3,11	
Durability cycles – 250x		3
MFG – 10 days unmated	5	
MFG 10 days mated	7	
Minor disturbance	9	
Final examination	13	

TEST METHODS/REQUIREMENTS

Item	Test Method	Condition	Requirement
LLCR	EIA-364-23C	20mV max 100 ma max	After test – 10 mΩ max. LLCR increase
Durability	EIA-364-09C	5"/minute	No damage
MFG	EIA-364-65A	Class IIIa, 10 days unmated, 10 days mated, 20 ppb Cl ₂ , 100 ppb H ₂ S, 200 ppb NO ₂ , 200 ppb SO ₂ , 30C, 70% rh	10 mΩ max ΔLLCR
Minor Disturbance	EIA-364-09C	5"/minute	0.004" max. displacement

TEST RESULTS

All samples of both PE10 and PAO lubricant sample groups successfully met the Telcordia LLCR requirements throughout the MFG and durability cycle test groups. The statistical summary for the MFG testing is summarized in appendix A.

GROUP 1 MFG TEST RESULTS – PE10 SAMPLES

Step #	Test	Requirement	Step Description	Result	Comments
1	Visual Examination	No damage	Initial	No damage	Passed
2	LLCR	n/a	Initial	n/a	n/a
3	Durability	No damage	99 cycles	No damage	Passed
4	LLCR	10 mΩ max. LLCR increase	After 100 total cycles	1.45 m Ω max. increase	Passed
5	MFG – 10 days Unmated	No damage	10 days mated	No damage	Passed
6	LLCR	10 mΩ max. LLCR increase	After 10 days	2.48 m Ω max. increase	Passed
7	MFG – 10 days mated	No damage	10 days mated	No damage	Passed
8	LLCR	10 mΩ max. LLCR increase	After 10 days	3.36 m Ω max. increase	Passed
9	Minor Disturbance	No damage	After MFG	No damage	Passed
10	LLCR	10 mΩ max. LLCR increase	After 10 days	3.19 m Ω max. increase	Passed
11	Durability	No damage	99 cycles	No damage	Passed
12	LLCR	10 mΩ max. LLCR increase	After 200 total cycles	2.57 m Ω max. increase	Passed
13	Visual Examination	No damage	Final	No damage	Passed

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GROUP 1 MFG TEST RESULTS – PAO SAMPLES

Step #	Test	Requirement	Step Description	Result	Comments
1	Visual Examination	No damage	Initial	No damage	Passed
2	LLCR	n/a	Initial	n/a	n/a
3	Durability	No damage	99 cycles	No damage	Passed
4	LLCR	10 mΩ max. LLCR increase	After 100 total cycles	1.27 m Ω max. increase	Passed
5	MFG – 10 days Unmated	No damage	10 days mated	No damage	Passed
6	LLCR	10 mΩ max. LLCR increase	After 10 days	2.98 m Ω max. increase	Passed
7	MFG – 10 days mated	No damage	10 days mated	No damage	Passed
8	LLCR	10 mΩ max. LLCR increase	After 10 days	7.95 m Ω max. increase	Passed
9	Minor Disturbance	No damage	After MFG	No damage	Passed
10	LLCR	10 mΩ max. LLCR increase	After 10 days	4.46 m Ω max. increase	Passed
11	Durability	No damage	99 cycles	No damage	Passed
12	LLCR	10 mΩ max. LLCR increase	After 200 total cycles	4.97 m Ω max. increase	Passed
13	Visual Examination	No damage	Final	No damage	Passed

GROUP 2 DURABILITY TEST RESULTS – PE10 SAMPLES

Step #	Test	Requirement	Step Description	Result	Comments
1	Visual Examination	No damage	Initial	No damage	Passed
2	LLCR	n/a	Initial	n/a	n/a
3	Durability	No damage	250 cycles	No damage	Passed
4	LLCR	10 mΩ max. LLCR increase	After 100 total cycles	2.42 m Ω max. increase	Passed

GROUP 2 DURABILITY TEST RESULTS – PAO SAMPLES

Step #	Test	Requirement	Step Description	Result	Comments
1	Visual Examination	No damage	Initial	No damage	Passed
2	LLCR	n/a	Initial	n/a	n/a
3	Durability	No damage	250 cycles	No damage	Passed
4	LLCR	10 mΩ max. LLCR increase	After 100 total cycles	0.84 m Ω max. increase	Passed

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EQUIPMENT

Item	Manufacturer	ID Number	Last Cal.	Cal. Due
Micro-ohmmeter	Keithley	VG7024	DEC2008	DEC2009
Channel Scanner	Keithley	VG7100	N/C	N/C
Micro-ohmmeter	Keithley	VG6106	OCT2008	OCT2009
Channel Scanner	Keithley	VG7145	N/C	N/C
Compression/Tensile Tester	Instron	VG6463	SEP2008	SEP2009
MFG chamber	FCI	VG7537	CBU	CBU
N/C = not calibrated CBU = calibrate before use				

REVISION RECORD

Revision Level	Affected Pages	Description	Revision Date
A	All	Original Release	25SEP2012

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APPENDIX A – MFG LLCR STATISTICAL SUMMARY
Table A1 – PE10 MFG ΔLLCR SUMMARY (mΩ)

	Initial (actual)	100X	10 Days Unmated	10 Days Mated	Disturb	200X
AVE	14.51	-0.12	-0.14	-0.02	-0.05	-0.19
MIN	11.04	-2.05	-2.41	-2.95	-2.92	-2.50
MAX	17.76	1.45	2.48	3.36	3.19	2.57
STDEV	1.35	0.47	0.48	0.69	0.64	0.60
COUNT	550	550	550	550	550	550

Table A2 – PAO MFG ΔLLCR SUMMARY (mΩ)

	Initial (actual)	100X	10 Days Unmated	10 Days Mated	Disturb	200X
AVE	14.19	-0.19	0.13	0.67	0.50	0.50
MIN	11.81	-1.83	-1.94	-1.88	-1.70	-2.13
MAX	20.29	1.27	2.98	7.95	4.46	4.97
STDEV	1.26	0.30	0.50	1.16	0.88	0.84
COUNT	550	550	550	550	550	550