



Report # A2260674243101002

TEST REPORT SUMMARY

(Short Report)

CLIENT:

IPC INTERNATIONAL INC
3000 Lakeside Drive Suite 105N Bannockburn, IL 60015
Attention: Mr. Tanya Vena
Phone: /

REFERENCE:

IPC-4101F-2026/126, IPC-TM-650 2.3.1.1, 2.3.4.2A, 2.4.4B, 2.4.8C,
2.4.8.3A, 2.4.13.1, 2.4.24C, 2.4.24.1, 2.4.24.6, 2.4.25D, 2.4.39,
2.5.1B, 2.5.5.9, 2.5.6B, 2.5.6.2A, 2.5.17.1A, 2.6.2.1A, 2.6.16, UL94,
IPC J-STD-003D-2022, Customer Technical Requirements

TEST ITEM:

Peel Strength, Volume Resistivity, Surface Resistivity, Moisture
Absorption, Dielectric Breakdown, Permittivity and Loss Tangent,
Flexural Strength, Arc Resistance, Thermal Stress, Electric Strength,
Vertical Burning Test, Glass Transition Temperature, Decomposition
Temperature, Z-Axis CTE (TMA), Time to Delamination,
Dimensional Stability, Solderability, Chemical Resistance, Metal
Surface Cleanability, Pressure Cooker Test

SAMPLE:

CCL

TEST MATERIAL:

EM-371(Z)

SPECIFICATION:

IPC-4101F-2026/126

TEST RESULTS:

The specimens were tested by the indicated test methods within this
report. The actual detailed test results are enclosed.

DATE OF REPORT:

04 September 2026

REPORT No.:

A2260674243101002

"INTEGRITY, HONESTY AND KNOWLEDGE"

MICROTEK (CHANGZHOU) PRODUCT SERVICES CO., LTD

NO.19 XINKE ROAD • ELECTRONIC-TECHNOLOGY • CHANGZHOU, JIANGSU, CHINA 213031 •

Tel: 86 519 85487818 • Email: microtek@thetestlab.cn • WWW.THETESTLAB.CN

**SUMMARIZED TEST RESULTS:**

<u>Test Item</u>	<u>Thin</u>	<u>Thick</u>
Peel Strength	Pass	Pass
Volume Resistivity	Pass	Pass
Surface Resistivity	Pass	Pass
Moisture Absorption	--	Pass
Dielectric Breakdown	--	Pass
Permittivity at 1 MHz, 1 GHz	Pass	Pass
Loss Tangent at 1 MHz, 1 GHz	Pass	Pass
Flexural Strength	--	Pass
Arc Resistance	Pass	Pass
Thermal Stress	Pass	Pass
Electric Strength	Pass	--
Vertical Burning	Pass	Pass
Glass Transition Temperature	--	Pass
Decomposition Temperature	--	Pass
Z-Axis CTE (TMA)	--	Pass
Time to Delamination	--	Pass
Dimensional Stability	Pass	Pass
Solderability	--	Pass
Chemical Resistance	Report Only	Report Only
Metal Surfaces Cleanability	--	Report Only
Pressure Cooker Test	--	Report Only



Peel Strength

REFERENCE

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.4.8C Peel Strength of Metallic Clad Laminates

IPC-TM-650 2.4.8.3A Peel Strength of Metallic Clad Laminates at Elevated (Hot Air Mothed)

RESULTS

Table 1 Peel Strength After Thermal Stress Thin

Sample Designation		CCL		Sample Identification	EM-371(Z)
Test Date		2026-08-21		Ambient	22 °C, 52% RH
Short No.		Peel Strength (N/mm)			
		Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
61628-25	1	1.49			
	2	1.49			
	3		1.49		
	4		1.50		
	5			1.56	
	6			1.54	
	7				1.57
	8				1.57
Average		1.49	1.49	1.55	1.57
Requirement		≥0.80			



Table 2 Peel Strength After Thermal Stress Thick

Sample Designation		CCL		Sample Identification	EM-371(Z)
Test Date		2026-08-21		Ambient	22 °C, 52% RH
Short No.		Peel Strength (N/mm)			
		Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
61628-58	1	1.59			
	2	1.60			
	3		1.56		
	4		1.58		
	5			1.52	
	6			1.53	
	7				1.53
	8				1.56
Average		1.59	1.57	1.52	1.54
Requirement		≥ 1.05			



Table 3 Peel Strength(At Elevated Temperature) Thin

Sample Designation		CCL		Sample Identification	EM-371(Z)
Test Date		2026-08-27		Ambient	23 °C, 52 %RH
Short No.		Peel Strength (N/mm)			
		Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
61628-26	1	1.24			
	2	1.23			
	3		1.23		
	4		1.25		
	5			1.27	
	6			1.28	
	7				1.29
	8				1.29
Average		1.24	1.24	1.28	1.29
Requirement		≥0.70			



Table 4 Peel Strength(At Elevated Temperature) Thick

Sample Designation		CCL		Sample Identification	EM-371(Z)
Test Date		2026-08-27		Ambient	23 °C, 52 %RH
Short No.		Peel Strength (N/mm)			
		Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
61628-59	1	1.30			
	2	1.30			
	3		1.31		
	4		1.30		
	5			1.23	
	6			1.26	
	7				1.25
	8				1.25
Average		1.30	1.31	1.24	1.25
Requirement		≥ 0.70			



Table 5 Peel Strength(After Process Solution) Thin

Sample Designation		CCL		Sample Identification	EM-371 (Z)
Test Date		2026-08-21		Ambient	22 °C, 52% RH
Short No.		Peel Strength (N/mm)			
		Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
61628-27	1	1.53			
	2	1.50			
	3		1.54		
	4		1.51		
	5			1.57	
	6			1.54	
	7				1.54
	8				1.56
Average		1.52	1.53	1.55	1.55
Requirement		≥ 0.55			



Table 6 Peel Strength(After Process Solution) Thick

Sample Designation		CCL		Sample Identification	EM-371 (Z)
Test Date		2026-08-21		Ambient	22 °C, 52% RH
Short No.		Peel Strength (N/mm)			
		Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
61628-60	1	1.54			
	2	1.52			
	3		1.52		
	4		1.50		
	5			1.46	
	6			1.47	
	7				1.51
	8				1.51
Average		1.53	1.51	1.47	1.51
Requirement		≥0.80			



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Table 7 Peel Strength Low Profile Copper Foil Thin

Sample Designation	/		Sample Identification	/
Test Date	/		Ambient	/
Short No.	Peel Strength (N/mm)			
	Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
No Requirement				



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Table 8 Peel Strength Low Profile Copper Foil Thick

Sample Designation	/		Sample Identification	/
Test Date	/		Ambient	/
Short No.	Peel Strength (N/mm)			
	Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
No Requirement				



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Volume and Surface Resistivity

REFERENCE

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.5.17.1A Volume and Surface Resistivity of Dielectric Materials

RESULTS

Table 9 Volume and Surface resistivity Humidity Conditioning Thin

Sample Designation	CCL		Sample Identification	EM-371(Z)	
Test Date	2026-08-21~2026-08-25		Ambient	22 °C, 50% RH	
Sample No.	Average Thickness T	Surface Resistance R'	Surface Resistivity $r'=R'P/D_4$	Volume Resistance R	Volume Resistivity $r=RA/T$
	(cm)	(MΩ)	(MΩ)	(MΩ)	(MΩ·cm)
61628-15-1	0.0386	3.6E+03	1.1E+06	4.4E+04	5.9E+06
61628-15-2	0.0387	4.5E+03	1.4E+06	3.6E+04	4.8E+06
61628-15-3	0.0388	5.2E+03	1.7E+06	2.9E+04	3.9E+06
Average		/	1.4E+06	/	4.9E+06
Requirement		/	$\geq 10^4$	/	$\geq 10^6$

Table 10 Volume and Surface Resistivity at Elevated Temperature Humidity Thin

Sample Designation	CCL		Sample Identification	EM-371(Z)	
Test Date	2026-08-26~2026-08-27		Ambient	23 °C, 53% RH	
Sample No.	Average Thickness T	Surface Resistance R'	Surface Resistivity $r'=R'P/D_4$	Volume Resistance R	Volume Resistivity $r=RA/T$
	(cm)	(MΩ)	(MΩ)	(MΩ)	(MΩ·cm)
61628-15-4	0.0387	1.5E+05	4.8E+07	5.7E+05	7.6E+07
61628-15-5	0.0387	2.3E+05	7.3E+07	1.0E+06	1.4E+08
61628-15-6	0.0386	2.8E+05	8.9E+07	9.1E+05	1.2E+08
Average		/	7.0E+07	/	1.1E+08
Requirement		/	$\geq 10^3$	/	$\geq 10^3$



Table 11 Volume and Surface Resistivity Humidity Conditioning Thick

Sample Designation	CCL		Sample Identification	EM-371(Z)	
Test Date	2026-08-19~2026-08-26		Ambient	21 °C, 50% RH	
Sample No.	Average Thickness T	Surface Resistance R'	Surface Resistivity $r=R'P/D_4$	Volume Resistance R	Volume Resistivity $r=RA/T$
	(cm)	(MΩ)	(MΩ)	(MΩ)	(MΩ·cm)
61628-43-1	0.0794	1.6E+04	4.4E+05	1.3E+04	4.3E+06
61628-43-2	0.0794	2.3E+04	6.5E+05	9.6E+03	3.1E+06
61628-43-3	0.0793	2.6E+04	7.4E+05	1.8E+04	5.9E+06
Average		/	6.1E+05	/	4.4E+06
Requirement		/	$\geq 10^4$	/	$\geq 10^4$

Table 12 Volume and Surface Resistivity at Elevated Temperature Humidity Thick

Sample Designation	CCL		Sample Identification	EM-371(Z)	
Test Date	2026-08-26~2026-08-27		Ambient	23°C, 53% RH	
Sample No.	Average Thickness T	Surface Resistance R'	Surface Resistivity $r=RP/D_4$	Volume Resistance R	Volume Resistivity $r=RA/T$
	(cm)	(MΩ)	(MΩ)	(MΩ)	(MΩ·cm)
61628-44-1	0.0794	4.4E+05	1.2E+07	1.9E+06	6.0E+08
61628-44-2	0.0793	5.3E+05	1.5E+07	1.4E+06	4.5E+08
61628-44-3	0.0792	6.6E+05	1.9E+07	9.8E+05	3.2E+08
Average		/	1.5E+07	/	4.6E+08
Requirement		/	$\geq 10^3$	/	$\geq 10^3$

**Moisture Absorption****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.6.2.1A Water Absorption, Metal Clad Plastic Laminates

RESULTS**Table 13 Moisture Absorption**

Sample Designation	CCL		Sample Identification	EM-371(Z)
Test Date	2026-08-18~2026-08-20		Ambient	(23~24) °C, (58~60)% RH
Sample No.	mass(g)		increasing weight percent of mass(%)	
	m ₁	m ₂		
61628-53-7	3.9204	3.9288	0.21	
61628-53-8	3.9225	3.9312	0.22	
61628-53-9	3.9275	3.9363	0.22	
Average			0.22	
Requirement			≤0.5	

**Dielectric Breakdown****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.5.6B Dielectric Breakdown of Rigid Printed Wiring Material

RESULTS**Table 14 Dielectric Breakdown**

Sample Designation		CCL	Sample Identification	EM-371(Z)
Test Date		2026-08-25~2026-08-27	Ambient	23 °C, 53% RH
Sample No.		Thickness (mm)	Voltage (kV)	Minimum Voltage (kV)
61628-45-1	Machine direction	0.789	45.8+N.B	45+N.B
61628-45-2		0.790	45.4+N.B	
61628-45-3	Transverse direction	0.789	45.9+N.B	
61628-45-4		0.788	45.8+N.B	
Requirement				≥40



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Permittivity and Loss Tangent

REFERENCE

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.5.5.9 Permittivity and Loss Tangent, Parallel Plate, 1MHz to 1.5GHz

RESULTS

Table 15 Permittivity and Loss Tangent

Sample Designation	CCL		Sample Identification	EM-371(Z)
Test Date	2026-08-18~2026-08-20		Ambient	23 ℃, 56% RH
Sample No.	Test Frequency	Sample Thickness (mm)	Permittivity	Loss Tangent
61628-24-1	1 MHz	0.390	4.8	0.011
61628-24-2		0.389	4.6	0.010
61628-24-3		0.390	4.7	0.010
Average		0.390	4.7	0.010
Requirement			≤5.4	≤0.035
61628-53-1	1 MHz	0.792	5.1	0.010
61628-53-2		0.795	5.1	0.010
61628-53-3		0.792	5.1	0.010
Average		0.793	5.1	0.010
Requirement			≤5.4	≤0.035
61628-24-4	1 GHz	0.392	4.8	0.010
61628-24-5		0.390	4.7	0.009
61628-24-6		0.390	4.8	0.008
Average		0.391	4.8	0.009
Requirement			≤5.2	≤0.035
61628-53-4	1 GHz	0.796	4.9	0.010
61628-53-5		0.796	4.9	0.010
61628-53-6		0.797	4.9	0.009
Average		0.796	4.9	0.010
Requirement			≤5.2	≤0.035



Flexural Strength

REFERENCE

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.4.4B Flexural Strength of Laminates (at Ambient Temperature)

RESULTS

Table 16 Flexural Strength Test

Sample Designation	CCL		Sample Identification		EM-371(Z)		
Test Date	2026-08-21		Ambient		22 °C, 52% RH		
Short No.	Span	Width	Thickness	Load	Flexural Strength S	Average	Requirement
	L	b	d	P			
	(mm)	(mm)	(mm)	(N)	(N/mm ²)	(N/mm ²)	(N/mm ²)
61628-57-1 (Crosswise)	25.40	25.53	0.801	184.807	430	438	≥345
61628-57-2 (Crosswise)		25.54	0.800	190.994	445		
61628-57-3 (Lengthwise)		25.55	0.802	248.134	575	579	≥415
61628-57-4 (Lengthwise)		25.57	0.801	250.955	583		

**Arc Resistance****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.5.1B Arc Resistance of Printed Wiring Material

RESULTS**Table 17 Arc Resistance**

Sample Designation		CCL	Sample Identification	EM-371(Z)	
Test Date		2026-08-25~2026-08-27	Ambient	23 °C, 50% RH	
Sample No.		Thickness	Times	Average	Requirement
		(mm)	(s)	(s)	(s)
61628-17-5	Thin	0.387	181	181	≥60
61628-17-6		0.387	181		
61628-17-7		0.388	181		
61628-45-6	Thick	0.789	181	181	
61628-45-7		0.789	181		
61628-45-8		0.788	181		



Thermal Stress

REFERENCE

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.4.13.1 Thermal Stress of Laminates

RESULTS

Table 18 Thermal Stress

Sample Designation	CCL			Sample Identification	EM-371(Z)
Test Date	2026-08-28			Ambient	23 °C, 52%RH
Sample No.				Test result	
61628-18-1	Etched	Top	Thin	No evidence of blistering, delamination, wrinkling and cracking	
61628-18-2				No evidence of blistering, delamination, wrinkling and cracking	
61628-18-3				No evidence of blistering, delamination, wrinkling and cracking	
61628-18-4		Bottom		No evidence of blistering, delamination, wrinkling and cracking	
61628-18-5				No evidence of blistering, delamination, wrinkling and cracking	
61628-18-6				No evidence of blistering, delamination, wrinkling and cracking	
61628-21-1	Unetched	Top		No evidence of blistering, delamination, wrinkling and cracking	
61628-21-2				No evidence of blistering, delamination, wrinkling and cracking	
61628-21-3				No evidence of blistering, delamination, wrinkling and cracking	
61628-21-4		Bottom		No evidence of blistering, delamination, wrinkling and cracking	
61628-21-5				No evidence of blistering, delamination, wrinkling and cracking	
61628-21-6				No evidence of blistering, delamination, wrinkling and cracking	
61628-48-1	Etched	Top	Thick	No evidence of blistering, delamination, wrinkling and cracking	
61628-48-2				No evidence of blistering, delamination, wrinkling and cracking	
61628-48-3				No evidence of blistering, delamination, wrinkling and cracking	
61628-48-4		Bottom		No evidence of blistering, delamination, wrinkling and cracking	
61628-48-5				No evidence of blistering, delamination, wrinkling and cracking	
61628-48-6				No evidence of blistering, delamination, wrinkling and cracking	
61628-51-1	Unetched	Top		No evidence of blistering, delamination, wrinkling and cracking	
61628-51-2				No evidence of blistering, delamination, wrinkling and cracking	
61628-51-3				No evidence of blistering, delamination, wrinkling and cracking	
61628-51-4		Bottom		No evidence of blistering, delamination, wrinkling and cracking	
61628-51-5				No evidence of blistering, delamination, wrinkling and cracking	
61628-51-6				No evidence of blistering, delamination, wrinkling and cracking	

**Electric Strength****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.5.6.2A Electric Strength of Printed Wiring Material

RESULTS**Table 19 Electric Strength**

Sample Designation	CCL	Sample Identification	EM-371(Z)
Test Date	2026-08-25~2026-08-27	Ambient	23 °C, 53% RH
Sample No.	Average Thickness (mm)	Voltage (kV)	Electric Strength (kV/mm)
61628-17-1	0.389	14.38	36.97
61628-17-2	0.388	14.94	38.51
61628-17-3	0.389	14.93	38.38
Average			38
Requirement			≥30



Vertical Burning Test

REFERENCE

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

UL 94 Seventh Edition STANDARD FOR SAFETY Tests for Flammability of Plastic Materials for Parts in Devices and Appliances Section 8 50W (20 mm) Vertical Burning Test; V-0, V-1, or V-2

RESULTS

Table 20 Vertical Burning Test Thin

Sample Designation		CCL			Sample Identification		EM-371(Z)		
Test Date		2026-08-24~2026-08-27			Ambient		23 °C, 50% RH		
Pre-conditioning	Sample No.	Sample Thk (mm)	Afterflames (s)		Afterglow (s)	Sum of after flames (s)	Sum of afterflame and afterglow (s)	Did samples burn to the clamp?	Did the cotton ignite?
			(t ₁)	(t ₂)					
Condition A: 48 Hours (23±2) °C (50±10)% RH	61628-16-1	0.388	0	0	0	0	0	No	No
	61628-16-2	0.388	0	0	0	0	0	No	No
	61628-16-3	0.386	0	0	0	0	0	No	No
	61628-16-4	0.387	0	0	0	0	0	No	No
	61628-16-5	0.385	0	0	0	0	0	No	No
	Avg:	0.387	Max: 0			Sum: 0	Max: 0	Pass	Pass
Condition B: 24 Hours (125±2) °C	61628-16-6	0.386	0	0	0	0	0	No	No
	61628-16-7	0.387	0	0	0	0	0	No	No
	61628-16-8	0.387	0	0	0	0	0	No	No
	61628-16-9	0.385	0	0	0	0	0	No	No
	61628-16-10	0.387	0	0	0	0	0	No	No
	Avg:	0.386	Max: 0			Sum: 0	Max: 0	Pass	Pass
Results		V-0							
Requirement		V-0							



Table 21 Vertical Burning Test Thick

Sample Designation		CCL			Sample Identification		EM-371(Z)		
Test Date		2026-08-24~2026-08-27			Ambient		23 °C, 50% RH		
Pre-conditioning	Sample No.	Sample Thk (mm)	Afterflames (s)		Afterglow (s)	Sum of after flames (s)	Sum of afterflame and afterglow (s)	Did samples burn to the clamp?	Did the cotton ignite?
			(t ₁)	(t ₂)					
Condition A: 48 Hours (23±2) °C (50±10)% RH	61628-46-1	0.792	0	0	0	0	0	No	No
	61628-46-2	0.790	0	0	0	0	0	No	No
	61628-46-3	0.790	0	0	0	0	0	No	No
	61628-46-4	0.791	0	0	0	0	0	No	No
	61628-46-5	0.790	0	0	0	0	0	No	No
	Avg:	0.791	Max: 0			Sum: 0	Max: 0	Pass	Pass
Condition B: 24 Hours (125±2) °C	61628-46-6	0.790	0	0	0	0	0	No	No
	61628-46-7	0.790	0	0	0	0	0	No	No
	61628-46-8	0.791	0	0	0	0	0	No	No
	61628-46-9	0.792	0	0	0	0	0	No	No
	61628-46-10	0.791	0	0	0	0	0	No	No
	Avg:	0.791	Max: 0			Sum: 0	Max: 0	Pass	Pass
Results		V-0							
Requirement		V-0							

**Glass Transition Temperature****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.4.25D Glass Transition Temperature and Cure Factor by DSC

RESULTS**Table 22 Glass Transition Temperature**

Sample Designation	CCL	Sample Identification	EM-371(Z)
Test Date	2026-08-18~2026-08-19	Ambient	24 °C, 58% RH
Sample Number	61628-41-2		
Element	Measurement (°C)		Requirement
Tg1	187.60		≥170
Tg2	188.56		/
Cure Factor ΔT_g	0.96		/

**Decomposition Temperature****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.4.24.6 Decomposition Temperature (Td) of Laminate Material Using TGA

RESULTS**Table 23 Decomposition Temperature**

Sample Designation	CCL	Sample Identification	EM-371(Z)
Test Date	2026-08-18~2026-08-19	Ambient	24 °C, 58% RH
Sample Number	Decomposition temperature (°C)		
	mass loss at 5%		
61628-53-12	364.14		
Requirement	≥340		

**Z-Axis CTE (TMA)****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.4.24C Glass Transition Temperature and Z-Axis Thermal Expansion
by TMA**RESULTS****Table 24 Z-Axis CTE (TMA)**

Sample Designation	CCL		Sample Identification	EM-371(Z)	
Test Date	2026-08-18~2026-08-19		Ambient	24 °C, 58% RH	
Sample Number	Z-CTE($\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$)			PTE (%)	Tg($^{\circ}\text{C}$)
	(50~100) $^{\circ}\text{C}$	(220~260) $^{\circ}\text{C}$	(50~260) $^{\circ}\text{C}$	(50~260) $^{\circ}\text{C}$	
61628-53-10	29.61	153.6	77.73	1.63	180.26
61628-53-11	13.66	161.8	70.70	1.48	182.54
Requirement	≤ 60	≤ 300	/	≤ 3.0	≥ 170

**Time to Delamination****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.4.24.1 Time to Delamination (TMA Method)

RESULTS**Table 25 Time to Delamination**

Sample Designation	CCL	Sample Identification	EM-371(Z)	
Test Date	2026-08-18~2026-09-04	Ambient	(23~24) °C, (58~64)% RH	
Sample No.	Test Item	Time of Reversible Event (min)	Time of Delaminate (min)	Requirement (min)
61628-41-1	T260	/	>30	≥30
61628-41-7		/	>30	
61628-41-2	T288	/	>15	≥15
61628-41-8		/	>15	
61628-41-3	T300	/	>2	≥2
61628-41-9		/	>2	



Dimensional Stability

REFERENCES

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.4.39A Dimensional Stability, Glass Reinforced Thin Laminates

RESULTS

Table 26 Dimensional Stability Thin

Sample Designation		CCL		Sample Identification		EM-371(Z)		
Test Date		2026-08-12~2026-08-21		Ambient		(22~23)℃,(52~53) % RH		
Short No.	After Bake Process (ppm)				After Thermal Stress Process (ppm)			
	MD		TD		MD		TD	
61628-28	189	173	134	177	113	84	31	43
61628-29	186	205	216	181	129	121	59	63
61628-30	186	177	122	162	73	129	16	59
Average	186		165		108		45	
Requirement	-300~300							

Table 27 Dimensional Stability Thick

Sample Designation		CCL		Sample Identification		EM-371(Z)		
Test Date		2026-08-12~2026-08-21		Ambient		(22~23)°C,(52~53) % RH		
Short No.	After Bake Process (ppm)				After Thermal Stress Process (ppm)			
	MD		TD		MD		TD	
61628-54	157	141	161	142	40	64	138	99
61628-55	125	153	142	154	24	56	130	75
61628-56	133	153	153	161	69	60	98	91
Average	144		152		52		105	
Requirement	-300~300							

**Solderability****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC J-STD-003D-2022 Solderability Tests for Printed Boards Section 4.2.1 Edge Dip Test

RESULTS**Table 28 Solderability Thin**

Sample Designation	/	Sample Identification	/
Test Date	/	Ambient	/
Sample No.	Test result		
No Requirement			

Table 29 Solderability Thick

Sample Designation	CCL	Sample Identification	EM-371(Z)
Test Date	2026-08-28	Ambient	23 °C, 52% RH
Sample No.	Test result		
61628-50-1	Sample surface exhibits good wetting		
61628-50-2	Sample surface exhibits good wetting		
61628-50-3	Sample surface exhibits good wetting		



Chemical Resistance

REFERENCE

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.3.4.2A Chemical Resistance of Laminates, Prepreg, and Coated Foil Products, by Solvent Exposure

RESULTS

Table 30 Chemical Resistance

Sample Designation	CCL			Sample Identification	EM-371(Z)	
Test Date	2026-08-31~2026-09-01			Ambient	23 °C, 60% RH	
Sample No.	Thickness (mm)	Weight (mg)		Increase Weight (mg)	Appearance Inspection	
		W ₁	W ₂		After Bake	After Immerse in the Solvent
61628-19-1	0.388	1986.3	1988.0	1.7	no any change	no any change
61628-19-2	0.386	1988.9	1990.8	1.9	no any change	no any change
61628-19-3	0.388	1986.5	1988.7	2.2	no any change	no any change
Average				1.9	/	
61628-49-1	0.791	4080.0	4084.2	4.2	no any change	no any change
61628-49-2	0.792	4071.5	4075.9	4.4	no any change	no any change
61628-49-3	0.793	4081.2	4085.6	4.4	no any change	no any change
Average				4.3	/	

**Metal Surface Cleanability****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.3.1.1 Chemical Cleaning of Metal-Clad Laminate

RESULTS**Table 31 Metal Surface Cleanability**

Sample Designation	CCL	Sample Identification	EM-371(Z)
Test Date	2026-08-31~2026-09-01	Ambient	23 °C, 62% RH
Sample Number	Test Result		
61628-41-4	The metal cladding on the test specimen shall be cleaned to a uniform matte finish. Deionized or distilled water poured on the metal surface does not bead or form puddles.		
61628-41-5	The metal cladding on the test specimen shall be cleaned to a uniform matte finish. Deionized or distilled water poured on the metal surface does not bead or form puddles.		
61628-41-6	The metal cladding on the test specimen shall be cleaned to a uniform matte finish. Deionized or distilled water poured on the metal surface does not bead or form puddles.		
Requirements	The metal cladding on the test specimen shall be cleaned to a uniform matte finish. Deionized or distilled water poured on the metal surface does not bead or form puddles.		

**Pressure Cooker Test****REFERENCE**

Customer Technical Requirement

IPC-4101F-2026 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.6.16 Pressure Vessel Method for Glass Epoxy Laminate Integrity

RESULTS**Table 32 Pressure Cooker Test**

Sample Designation	CCL	Sample Identification	EM-371(Z)
Test Date	2026-08-28	Ambient	23 °C, 52% RH
Sample No.	Test result		
61628-47-1	Grade 5: The sample have no measles, blisters, or surface erosion.		
61628-47-2	Grade 5: The sample have no measles, blisters, or surface erosion.		
61628-47-3	Grade 5: The sample have no measles, blisters, or surface erosion.		
61628-47-4	Grade 5: The sample have no measles, blisters, or surface erosion.		
61628-47-5	Grade 5: The sample have no measles, blisters, or surface erosion.		



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Edited by:

Lucas Lu

Lucas Lu

Date: 2026-09-04

Reviewed by:

Jocelyn Zhang

Jocelyn Zhang

Date: 2026-09-04

Approved by:

Mary Yang

Mary Yang

Date: 2026-09-04