



TEST REPORT SUMMARY

(Short Report)

CLIENT:	IPC INTERNATIONAL INC 3000 Lakeside Drive Suite 105N Bannockburn, IL 60015 Attention: Glenna Carrell Phone: /
REFERENCE:	IPC-4101E-WAM1/42, IPC-TM-650 2.4.8C, 2.4.8.3A, 2.5.17.1A, 2.6.2.1A, 2.5.6B, 2.5.5.9, 2.4.4B, 2.4.4.1A, 2.5.1B, 2.4.13.1, 2.5.6.2A, 2.4.24C, 2.3.4.2A, 2.4.39A, 2.3.1.1, 2.6.16, IPC J-STD-003C, UL94
TEST ITEM:	Peel Strength, Volume Resistivity and Surface Resistivity, Moisture Absorption, Dielectric Breakdown, Permittivity and Loss Tangent at 1 MHz, Flexural Strength, Arc Resistance, Thermal Stress, Electric Strength, Horizontal Burning Test, Glass Transition Temperature (TMA), Dimensional Stability, Solderability, Chemical Resistance, Metal Surface Cleanability, Pressure Cooker Test
SAMPLE:	CCL
TEST MATERIAL:	37N 0410C H1/H1, 37N 0080C H1/H1
SPECIFICATION:	IPC-4101E-WAM1/42
TEST RESULTS:	The specimens were tested by the indicated test methods within this report. The actual detailed test results are enclosed.
DATE OF REPORT:	21 March 2023
REPORT No.:	37201E

"INTEGRITY, HONESTY AND KNOWLEDGE"

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SUMMARIZED TEST RESULTS:

Test Item	Thin	Thick
Peel Strength	Pass	Pass
Volume Resistivity	Pass	Pass
Surface Resistivity	Pass	Pass
Moisture Absorption	/	Pass
Dielectric Breakdown	/	Pass
Permittivity at 1 MHz	Pass	Pass
Loss Tangent at 1 MHz	Pass	Pass
Flexural Strength	/	Pass
Arc Resistance	Pass	Pass
Thermal Stress	Pass	Pass
Electric Strength	Pass	/
Horizontal Burning Test	Pass	Pass
Glass Transition Temperature (TMA)	/	Pass
Dimensional Stability	Pass	Pass
Solderability	Pass	Pass
Chemical Resistance	See test page	See test page
Metal Surface Cleanability	/	See test page
Pressure Cooker Test	/	See test page



Peel Strength

REFERENCE

IPC-4101E-WAM1 Specification for Base Materials for Rigid and Multilayer Printed Boards

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

IPC-TM-650 2.4.8.3A Peel Strength of Matallic Clad Laminates at Elevated

RESULTS

Table 1 Peel Strength After Thermal Stress Thin

Sample Designation	CCL		Sample Identification	37N 0080C H1/H1
Test Date	2023-03-02		Ambient	22°C, 49%RH
Sample No.	Peel Strength (N/mm)			
	Top Lengthwise	Top Crosswise	Bottom Lengthwise	Bottom Crosswise
37201-21-1	1.40			
37201-21-2	1.38			
37201-21-3		1.44		
37201-21-4		1.47		
37201-21-5			1.31	
37201-21-6			1.35	
37201-21-7				1.42
37201-21-8				1.44
Average	1.39	1.46	1.33	1.43
Requirement	≥ 0.90			



Table 2 Peel Strength After Thermal Stress Thick

Sample Designation	CCL		Sample Identification	37N 0410C H1/H1
Test Date	2023-03-02		Ambient	24°C, 49%RH
Sample No.	Peel Strength (N/mm)			
	Top Lengthwise	Top Crosswise	Bottom Lengthwise	Bottom Crosswise
37201-4-1	1.52			
37201-4-2	1.53			
37201-4-3		1.52		
37201-4-4		1.55		
37201-4-5			1.60	
37201-4-6			1.57	
37201-4-7				1.57
37201-4-8				1.57
Average	1.52	1.54	1.58	1.57
Requirement	≥0.90			



Table 3 Peel Strength At Elevated Temperature Thin

Sample Designation	CCL		Sample Identification	37N 0080C H1/H1
Test Date	2023-03-10		Ambient	26°C, 47%RH
Sample No.	Peel Strength (N/mm)			
	Top Lengthwise	Top Crosswise	Bottom Lengthwise	Bottom Crosswise
37201-21-9	1.10			
37201-21-10	1.08			
37201-21-11		1.19		
37201-21-12		1.08		
37201-21-13			1.07	
37201-21-14			1.10	
37201-21-15				1.10
37201-21-16				1.13
Average	1.09	1.14	1.09	1.12
Requirement	≥ 0.70			



Table 4 Peel Strength At Elevated Temperature Thick

Sample Designation	CCL			Sample Identification	37N 0410C H1/H1
Test Date	2023-03-10			Ambient	26°C, 47%RH
Sample No.	Peel Strength (N/mm)				
	Top Lengthwise	Top Crosswise	Bottom Lengthwise	Bottom Crosswise	
37201-4-9	1.11				
37201-4-10	1.14				
37201-4-11		1.12			
37201-4-12		1.14			
37201-4-13			1.16		
37201-4-14			1.14		
37201-4-15				1.14	
37201-4-16				1.16	
Average	1.12	1.13	1.15	1.15	
Requirement	≥ 0.70				



Table 5 Peel Strength After Process Solutions Thin

Sample Designation	CCL		Sample Identification	37N 0080C H1/H1
Test Date	2023-03-04		Ambient	20°C, 47%RH
Sample No.	Peel Strength (N/mm)			
	Top Lengthwise	Top Crosswise	Bottom Lengthwise	Bottom Crosswise
37201-20-1	1.47			
37201-20-2	1.52			
37201-20-3		1.44		
37201-20-4		1.43		
37201-20-5			1.49	
37201-20-6			1.44	
37201-20-7				1.48
37201-20-8				1.46
Average	1.49	1.43	1.46	1.47
Requirement	≥ 0.80			



Table 6 Peel Strength After Process Solutions Thick

Sample Designation	CCL			Sample Identification	37N 0410C H1/H1
Test Date	2023-03-04			Ambient	20°C, 47%RH
Sample No.	Peel Strength (N/mm)				
	Top Lengthwise	Top Crosswise	Bottom Lengthwise	Bottom Crosswise	
37201-5-1	1.56				
37201-5-2	1.58				
37201-5-3		1.56			
37201-5-4		1.62			
37201-5-5			1.61		
37201-5-6			1.59		
37201-5-7				1.64	
37201-5-8				1.65	
Average	1.57	1.59	1.60	1.65	
Requirement	≥ 0.95				



Table 7 Peel Strength Thin (Low Profile Copper Foil)

Sample Designation	/	Sample Identification	/	
Test Date	/	Ambient	/	
Sample No.	Peel Strength (N/mm)			
	Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
No Requirement for IPC-4101E-WAM1/42				

Table 8 Peel Strength Thick (Low Profile Copper Foil)

Sample Designation	/	Sample Identification	/	
Test Date	/	Ambient	/	
Sample No.	Peel Strength (N/mm)			
	Top Crosswise	Top Lengthwise	Bottom Crosswise	Bottom Lengthwise
No Requirement for IPC-4101E-WAM1/42				



Volume and Surface Resistivity

REFERENCE

IPC-4101E-WAM1 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 Thin (Humidity Conditioning)

Sample Designation	CCL		Sample Identification	37N 0080C H1/H1	
Test Date	2023-02-27~2023-03-06		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)
37201-22-1	0.0229	4.6E+04	1.5E+07	2.0E+05	4.5E+07
37201-22-2	0.0231	7.0E+04	2.3E+07	2.5E+05	5.6E+07
37201-22-3	0.0229	3.2E+04	1.0E+07	2.0E+05	4.5E+07
Average		/	1.6E+07	/	4.9E+07
Requirement		/	$\geq 10^4$	/	$\geq 6.0 \times 10^4$

Table 10 Volume and Surface Resistivity Thin (At Elevated Temperature)

Sample Designation	CCL		Sample Identification	37N 0080C H1/H1	
Test Date	2023-03-08~2023-03-09		Ambient	24 °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)
37201-23-1	0.0228	1.2E+04	3.9E+06	1.8E+04	4.1E+06
37201-23-2	0.0227	1.6E+04	5.2E+06	2.0E+04	4.6E+06
37201-23-3	0.0228	2.0E+04	6.4E+06	1.8E+04	4.1E+06
Average		/	5.2E+06	/	4.2E+06
Requirement		/	$\geq 10^4$	/	$\geq 6.0 \times 10^4$



Table 11 Volume and Surface resistivity Thick (Humidity Conditioning)

Sample Designation	CCL		Sample Identification	37N 0410C H1/H1	
Test Date	2023-02-27~2023-03-06		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)	(M Ω)	(M Ω)	(M Ω)	(M Ω -cm)
37201-7-1	0.1029	1.2E+06	3.9E+08	1.4E+06	7.0E+07
37201-7-2	0.1022	1.0E+06	3.2E+08	1.2E+06	6.1E+07
37201-7-3	0.1032	1.6E+06	5.2E+08	2.0E+06	1.0E+08
Average		/	4.1E+08	/	7.7E+07
Requirement		/	$\geq 10^6$	/	$\geq 10^6$

Table 12 Volume and Surface resistivity Thick (At Elevated Temperature)

Sample Designation	CCL		Sample Identification	37N 0410C H1/H1	
Test Date	2023-03-08~2023-03-09		Ambient	24 °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)	(M Ω)	(M Ω)	(M Ω)	(M Ω -cm)
37201-8-1	0.1030	1.4E+05	4.0E+06	4.6E+04	1.1E+07
37201-8-2	0.1026	2.5E+05	7.1E+06	3.2E+04	8.0E+06
37201-8-3	0.1027	1.6E+05	4.5E+06	4.8E+04	1.2E+07
Average		/	5.2E+06	/	1.0E+07
Requirement		/	$\geq 10^6$	/	$\geq 10^6$



Moisture Absorption

REFERENCE

IPC-4101E-WAM1 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	37N 0410C H1/H1
Test Date	2023-02-27~2023-02-28		Ambient	(20~22) °C, (50~52)% RH
Sample No.	mass(g)		increasing weight percent of mass(%)	
	m ₁	m ₂		
37201-15-1	4.3243	4.3401	0.37	
37201-15-2	4.3854	4.4020	0.38	
37201-15-3	4.3019	4.3182	0.38	
Average			0.38	
Requirement			≤1.0	



Dielectric Breakdown

REFERENCE

IPC-4101E-WAM1 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 Thick

Sample Designation		CCL	Sample Identification	37N 0410C H1/H1
Test Date		2023-03-04~2023-03-06	Ambient	23 °C, 50% RH
Sample No.		Thickness (mm)	Breakdown Voltage (kV)	Minimum Voltage (kV)
37201-9-1	Machine direction	0.973	44.9+N.B	44+N.B
37201-9-2		0.968	44.0+N.B	
37201-9-3	Transverse direction	0.970	44.1+N.B	
37201-9-4		0.965	44.5+N.B	
Requirement				≥40



Permittivity and Loss Tangent

REFERENCE

IPC-4101E-WAM1 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 1.5 GHz

RESULTS

Table 15 Permittivity and Loss Tangent

Sample Designation	CCL		Sample Identification	see table below	
Test Date	2023-02-27~2023-02-28		Ambient	20 °C,50% RH	
Sample No.	Sample Identification	test frequency	thickness(mm)	permittivity	loss tangent
37201-29-1	37N 0080C H1/H1	1 MHz	0.235	3.6	0.012
37201-29-2			0.234	3.8	0.012
37201-29-3			0.232	3.8	0.012
Average				3.7	0.012
Requirement				≤5.4	≤0.035
37201-15-4	37N 0410C H1/H1	1 MHz	1.029	4.0	0.008
37201-15-5			1.027	3.9	0.008
37201-15-6			1.019	4.0	0.008
Average				4.0	0.008
Requirement				≤5.4	≤0.035



Flexural Strength

REFERENCE

IPC-4101E-WAM1 Specification for Base Materials for Rigid and Multilayer Printed Boards

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

IPC-TM-650 2.4.4.1A Flexural Strength of Laminates (at Elevated Temperature)

RESULTS

Table 16 Flexural Strength (At Ambient Temperature)

Sample Designation	CCL		Sample Identification		37N 0410C H1/H1		
Test Date	2023-03-07		Ambient		21°C, 46%RH		
Sample No.	Span	Load	Width	Thickness	Flexural Strength S	Average	Requirement
	L	P	b	d			
	(mm)	(N)	(mm)	(mm)			
37201-6-1 (Length Direction)	25.40	309.611	25.46	1.036	432	432	≥415
37201-6-2 (Length Direction)		314.505	25.47	1.042	433		
37201-6-3 (Cross Direction)		232.417	25.40	1.030	329	335	≥325
37201-6-4 (Cross Direction)		246.314	25.48	1.040	341		



Table 17 Flexural Strength (At Elevated Temperature)

Sample Designation	CCL		Sample Identification		37N 0410C H1/H1		
Test Date	2023-03-07		Ambient		21°C, 46%RH		
Sample No.	Span	Load	Width	Thickness	Flexural Strength S	Average	Requirement
	L	P	b	d			
	(mm)	(N)	(mm)	(mm)			
37201-6-5 (Length Direction)	25.40	304.942	25.41	1.030	431	420	≥311
37201-6-6 (Length Direction)		315.932	25.42	1.034	443		
37201-6-7 (Length Direction)		280.050	25.51	1.019	403		
37201-6-8 (Length Direction)		279.885	25.39	1.023	401		



Arc Resistance

REFERENCE

IPC-4101E-WAM1 Specification for Base Materials for Rigid and Multilayer Printed Boards
 IPC-TM-650 2.5.1B Arc Resistance of Printed Wiring Material

RESULTS

Table 18 Arc Resistance

Sample Designation	CCL		Sample Identification	See the table below	
Test Date	2023-03-04~2023-03-06		Ambient	23 °C, 50% RH	
Sample No.	Sample Identification	Thickness	Times	Average	Requirement
		(mm)	(s)	(s)	(s)
37201-9-5	37N 0410C H1/H1	0.969	135	134	≥ 120
37201-9-6		0.980	134		
37201-9-7		0.967	133		
37201-25-4	37N 0080C H1/H1	0.228	129	129	
37201-25-5		0.228	129		
37201-25-6		0.229	130		

**Thermal Stress****REFERENCE**

IPC-4101E-WAM1 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-TM-650 2.4.13.1 Thermal Stress of Laminates

**RESULTS****Table 19 Thermal Stress**

Sample Designation	CCL		Sample Identification	See the table below
Test Date	2023-03-08		Ambient	22°C, 48% RH
Sample No.			Sample Identification	Test result
37201-26-1	Etched	Top	37N 0080C H1/H1 (Thin)	No obvious blister, delamination, wrinkling or cracking.
37201-26-2				No obvious blister, delamination, wrinkling or cracking.
37201-26-3				No obvious blister, delamination, wrinkling or cracking.
37201-26-4		Bottom		No obvious blister, delamination, wrinkling or cracking.
37201-26-5				No obvious blister, delamination, wrinkling or cracking.
37201-26-6				No obvious blister, delamination, wrinkling or cracking.
37201-27-1	Unetched	Top		No obvious blister, delamination, wrinkling or cracking.
37201-27-2				No obvious blister, delamination, wrinkling or cracking.
37201-27-3				No obvious blister, delamination, wrinkling or cracking.
37201-27-4		Bottom		No obvious blister, delamination, wrinkling or cracking.
37201-27-5				No obvious blister, delamination, wrinkling or cracking.
37201-27-6				No obvious blister, delamination, wrinkling or cracking.
37201-11-1	Etched	Top	37N 0410C H1/H1 (Thick)	No obvious blister, delamination, wrinkling or cracking.
37201-11-2				No obvious blister, delamination, wrinkling or cracking.
37201-11-3				No obvious blister, delamination, wrinkling or cracking.
37201-11-4		Bottom		No obvious blister, delamination, wrinkling or cracking.
37201-11-5				No obvious blister, delamination, wrinkling or cracking.
37201-11-6				No obvious blister, delamination, wrinkling or cracking.
37201-12-1	Unetched	Top		No obvious blister, delamination, wrinkling or cracking.
37201-12-2				No obvious blister, delamination, wrinkling or cracking.
37201-12-3				No obvious blister, delamination, wrinkling or cracking.
37201-12-4		Bottom		No obvious blister, delamination, wrinkling or cracking.
37201-12-5				No obvious blister, delamination, wrinkling or cracking.
37201-12-6				No obvious blister, delamination, wrinkling or cracking.

Electric Strength**REFERENCE**

IPC-4101E-WAM1 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 20 Electric Strength Thin**

Sample Designation	CCL	Sample Identification	37N 0080C H1/H1
Test Date	2023-03-04~2023-03-06	Ambient	23 °C, 50% RH
Sample No.	Average Thickness (mm)	Voltage (kV)	Electric Strength (kV/mm)
37201-25-1	0.229	12.1	52.84
37201-25-2	0.228	11.8	51.75
37201-25-3	0.227	11.5	50.66
Average			52
Requirement			≥30



Horizontal Burning Test

REFERENCE

IPC-4101E-WAM1 Specification for Base Materials for Rigid and Multilayer Printed Boards

UL94 STANDARD FOR SAFETY Tests for Flammability of Plastic Materials for Parts in Devices and Appliances Section 7 Horizontal Burning Test; HB

RESULTS

Table 21 Horizontal Burning Test Thin

Sample Designation	CCL		Sample Identification	37N 0080C H1/H1		
Test Date	2023-03-04~2023-03-10		Ambient	23 °C, 49% RH		
Sample No.	Sample Thk	Flame time Te	Burning time Tb	Combustion length L	Burning rate v	Note
	(mm)	(s)	(s)	(mm)	(mm/min)	
37201-26-7	0.227	30	0	0	/	1
37201-26-8	0.227	30	0	0	/	1
37201-26-9	0.226	30	0	0	/	1
Avg:	0.227	Flammability classification				HB
Requirement						HB
Note:	1.The test specimen did not burn more than 25mm mark line.					
	2.The sample was burned more than 25mm mark line, and no more than 100mm mark line.					
	3.Sample burning more than 100mm mark line.					
	4.Samples have any burning particles drop.					



Table 22 Horizontal Burning Test Thick

Sample Designation	CCL		Sample Identification	37N 0410C H1/H1		
Test Date	2023-03-04~2023-03-10		Ambient	23 °C, 49% RH		
Sample No.	Sample Thk	Flame time Te	Burning time Tb	Combustion length L	Burning rate v	Note
	(mm)	(s)	(s)	(mm)	(mm/min)	
37201-11-7	1.029	30	0	0	/	1
37201-11-8	1.032	30	0	0	/	1
37201-11-9	1.027	30	0	0	/	1
Avg:	1.029	Flammability classification				HB
Requirement						HB
Note:	1.The test specimen did not burn more than 25mm mark line.					
	2.The sample was burned more than 25mm mark line, and no more than 100mm mark line.					
	3.Sample burning more than 100mm mark line.					
	4.Samples have any burning particles drop.					



Glass Transition Temperature (TMA)

REFERENCE

IPC-4101E-WAM1 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 23 Glass Transition Temperature (TMA)

Sample Designation	CCL	Sample Identification	37N 0410C H1/H1
Test Date	2023-02-24~2023-02-27	Ambient	22 °C, 50% RH
Sample No.	Tg(°C)		
37201-15-7	210.49		
37201-15-8	210.15		
Requirement	≥200		



Dimensional Stability

REFERENCE

IPC-4101E-WAM1 Specification for Base Materials for Rigid and Multilayer Printed Boards

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

RESULTS

Table 24 Dimensional Stability Thin

Sample Designation	CCL		Sample Identification	37N 0080C H1/H1				
Test Date	2023-02-17~2023-02-28		Ambient	(20~22)°C,(48~50)% RH				
Sample No.	After Bake Process (ppm)				After Thermal Stress Process (ppm)			
	MD		TD		MD		TD	
37201-17	-177	-230	-224	-186	-403	-439	-338	-403
37201-18	-242	-234	-189	-197	-419	-371	-307	-477
37201-19	-193	-213	-256	-189	-383	-467	-362	-418
Average	-215		-207		-414		-384	
Requirement	-450~150							

Table 25 Dimensional Stability Thick

Sample Designation	CCL		Sample Identification	37N 0410C H1/H1				
Test Date	2023-02-17~2023-02-28		Ambient	(20~22)°C,(48~50)% RH				
Sample No.	After Bake Process (ppm)				After Thermal Stress Process (ppm)			
	MD		TD		MD		TD	
37201-1	-173	-214	-252	-244	-177	-230	-295	-288
37201-2	-129	-165	-256	-221	-149	-214	-287	-291
37201-3	-185	-173	-263	-233	-133	-201	-275	-229
Average	-173		-245		-184		-277	
Requirement	-300~300							



Solderability (Edge Dip Test)

REFERENCE

IPC-4101E-WAM1 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC J-STD-003C Solderability Tests for Printed Boards 4.2.1 Edge Dip Test

RESULTS

Table 26 Solderability (Edge Dip Test)

Sample Designation	CCL	Sample Identification	See the table below
Test Date	2023-03-09	Ambient	23 °C, 51% RH
Sample No.	Sample Identification	Test result	
37201-27-7	37N 0080C H1/H1(Thin)	Sample surface exhibit good wetting	
37201-12-7	37N 0410C H1/H1(Thick)	Sample surface exhibit good wetting	



Chemical Resistance

REFERENCE

IPC-4101E-WAM1 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 27 Chemical Resistance

Sample Designation	CCL				Sample Identification	See table below	
Test Date	2023-03-07				Ambient	25°C, 48% RH	
Sample No.	Sample Identification	Thickness (mm)	Weight (mg)		Increase Weight (mg)	Appearance Inspection	
			W ₁	W ₂	W ₂ -W ₁	After Bake	After Immerse in the Solvent
37201-29-4	37N 0080C H1/H1	0.231	956.3	959.9	3.6	no any change	no any change
37201-29-5		0.232	982.2	986.7	4.5	no any change	no any change
37201-29-6		0.230	973.7	977.7	4.0	no any change	no any change
Average					4.0	/	
37201-15-9	37N 0410C H1/H1	1.041	4177.1	4181.6	4.5	no any change	no any change
37201-15-10		1.029	4175.1	4179.5	4.4	no any change	no any change
37201-15-11		1.039	4140.8	4145.4	4.6	no any change	no any change
Average					4.5	/	



Metal Surface Cleanability

REFERENCE

IPC-4101E-WAM1 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 28 Metal Surface Cleanability

Sample Designation	CCL	Sample Identification	See table below
Test Date	2023-03-07	Ambient	25 °C, 48% RH
Sample No.	Sample Identification	Test Result	
37201-29-4	37N 0410C H1/H1	A uniform matte finish formed on the metal cladding of the test specimen. No bead or puddles formed on the metal surface after pouring deionized water on it	
37201-29-5		A uniform matte finish formed on the metal cladding of the test specimen. No bead or puddles formed on the metal surface after pouring deionized water on it	
37201-29-6		A uniform matte finish formed on the metal cladding of the test specimen. No bead or puddles formed on the metal surface after pouring deionized water on it	
37201-15-9	37N 0080C H1/H1	A uniform matte finish formed on the metal cladding of the test specimen. No bead or puddles formed on the metal surface after pouring deionized water on it	
37201-15-10		A uniform matte finish formed on the metal cladding of the test specimen. No bead or puddles formed on the metal surface after pouring deionized water on it	
37201-15-11		A uniform matte finish formed on the metal cladding of the test specimen. No bead or puddles formed on the metal surface after pouring deionized water on it	
Requirements		A uniform matte finish formed on the metal cladding of the test specimen. No bead or puddles formed on the metal surface after pouring deionized water on it	



Pressure Cooker Test

REFERENCE

IPC-4101E-WAM1 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 29 Pressure Cooker Test Thick

Sample Designation	CCL	Sample Identification	37N 0410C H1/H1
Test Date	2023-03-10	Ambient	24 °C, 50% RH
Sample No.	Test result		
37201-10-1	Grade 5: No measles, blisters and surface erosion.		
37201-10-2	Grade 5: No measles, blisters and surface erosion.		
37201-10-3	Grade 5: No measles, blisters and surface erosion.		
37201-10-4	Grade 5: No measles, blisters and surface erosion.		
37201-10-5	Grade 5: No measles, blisters and surface erosion.		



Report # 37201ES

CERTIFICATE OF CONFORMANCE

Microtek (Changzhou) Laboratories certifies that the test equipment used complies with the calibration requirements of correlation criterion and that the data contained in this report is accurate within the tolerance limitation of this equipment.

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Edited by:

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