

Appendix C

GLM Results for the Branch Water and Salt Fog Tests

Table C.1 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HCLV PTH	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	6.916	0.045	0.071	-0.063	-0.034	-0.006	-0.014	-0.78
Benzimidazole Immersion Ag Immersion Au/Pd					-0.114	0.135		
Parylene Silicone Urethane	-0.122	-0.142		0.111		-0.212		
Flux							-0.078	
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene	0.113		-0.155					
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone		0.164				0.280		
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane					0.181			
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux							0.127	-1.43
Parylene*Flux Silicone*Flux Urethane*Flux	0.146			-0.198				
	-0.086	0.154		0.105		0.346	0.167	
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux		0.240			0.310	-0.320		-2.50
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux				0.255				
Model R ²	37.4%	9.6%	5.6%	11.2%	7.9%	14.0%	9.2%	7.2%
Standard Deviation	0.148	0.217	0.208	0.209	0.204	0.209	0.205	2.25

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.2 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HCLV SMT	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	7.194	-0.022	-0.070	-0.185	-0.141	-0.205	-0.209	-0.56
Benzimidazole								-2.04
Immersion Ag								-3.11
Immersion Au/Pd				-0.055				
Parylene								
Silicone								
Urethane			0.121	0.233	0.216	0.257	0.227	
Flux								
Benzi*Parylene								
Imm Ag*Parylene								3.50
Imm Au/Pd*Parylene								
Benzi*Silicone								
Imm Ag*Silicone								
Imm Au/Pd*Silicone								
Benzi*Urethane								
Imm Ag* Urethane								
Imm Au/Pd* Urethane								
Benzi*Flux		-0.037	-0.130					
Imm Ag*Flux								
Imm Au/Pd*Flux	0.074		-0.100		-0.117			
Parylene*Flux								
Silicone*Flux								
Urethane*Flux								
Benzi*Parylene*Flux			0.200					
Imm Ag*Parylene*Flux			-0.170					
Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux			0.200					
Imm Ag*Silicone*Flux								
Imm Au/Pd*Silicone*Flux								
Benzi*Urethane*Flux								
Imm Ag*Urethane*Flux								
Imm Au/Pd*Urethane*Flux								
Model R ²	5.0%	0.5%	15.6%	32.6%	34.0%	41.6%	33.4%	10.5%
Standard Deviation	0.108	0.162	0.175	0.150	0.141	0.132	0.139	3.89

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.3 Significant Coefficients for the GLM Analyses by Test Time
(all units are in terms of \log_{10})

Electrical Response: HVLC PTH	Branch Water							Salt Fog
	Pre- Test	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	0.7055	2.859	0.7022	0.870	0.7022	0.033	0.7019	0.559
Benzimidazole	-0.0028							
Immersion Ag	-0.0023							
Immersion Au/Pd	-0.0024							
Parylene		-1.70		-0.56		1.98		
Silicone		-0.63				0.81		
Urethane	-0.0030	-1.05	-0.0018	1.79	-0.0020	1.32	-0.0015	
Flux	-0.0037	-1.55						
Benzi*Parylene					0.0036			
Imm Ag*Parylene							0.0018	
Imm Au/Pd*Parylene				0.96				
Benzi*Silicone								
Imm Ag*Silicone			0.0010			1.54		
Imm Au/Pd*Silicone								
Benzi*Urethane								
Imm Ag* Urethane				-1.01				
Imm Au/Pd* Urethane								
Benzi*Flux	0.0031							
Imm Ag*Flux	0.0029				0.0013	1.55		
Imm Au/Pd*Flux	0.0028							
Parylene*Flux		1.40						0.82
Silicone*Flux		1.58						
Urethane*Flux	0.0015	1.82						
Benzi*Parylene*Flux					-0.0034			
Imm Ag*Parylene*Flux					-0.0025	-1.98	-0.0029	
Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux								
Imm Ag*Silicone*Flux						-3.13		
Imm Au/Pd*Silicone*Flux								
Benzi*Urethane*Flux								
Imm Ag*Urethane*Flux								
Imm Au/Pd*Urethane*Flux								
Model R ²	37.0%	27.4%	26.2%	32.6%	25.0%	33.8%	17.1%	5.0%
Standard Deviation	0.0019	0.998	0.0014	1.15	0.0020	1.13	0.0017	1.19

*All GLM analyses including Pre-Test were based on logarithms. Logs were used to ameliorate the influence of extreme measurements on the GLM during the BW and SF tests.

Table C.4 Significant Coefficients for the GLM Analyses by Test Time
(all units are in terms of log₁₀)

Electrical Response: HVLC SMT	Branch Water							Salt Fog
	Pre- Test	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	0.6944	1.47	0.6945	3.30	0.696	0.54	0.698	1.26
Benzimidazole								-1.67
Immersion Ag					0.380	0.72	0.340	-1.92
Immersion Au/Pd						0.63		-0.72
Parylene				-2.50		1.50		
Silicone		1.34		-2.08				
Urethane	0.0050	0.63	0.0055	-2.44		1.91		
Flux		0.92						
Benzi*Parylene								1.57
Imm Ag*Parylene					-0.382		-0.343	1.15
Imm Au/Pd*Parylene								
Benzi*Silicone								
Imm Ag*Silicone					-0.382	-0.75	-0.343	
Imm Au/Pd*Silicone						-0.79		
Benzi*Urethane								
Imm Ag* Urethane					-0.377	-1.91	-0.338	1.68
Imm Au/Pd* Urethane								
Benzi*Flux			0.0411					
Imm Ag*Flux					-0.382		-0.343	
Imm Au/Pd*Flux								
Parylene*Flux		-1.06				-0.81		
Silicone*Flux		-1.02						
Urethane*Flux		-1.30						
Benzi*Parylene*Flux			-0.0408			1.53		
Imm Ag*Parylene*Flux					0.382		0.344	
Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux			-0.0402					
Imm Ag*Silicone*Flux					0.382		0.343	
Imm Au/Pd*Silicone*Flux								
Benzi*Urethane*Flux			-0.0415					
Imm Ag*Urethane*Flux	0.0027				0.385	1.24	0.346	
Imm Au/Pd*Urethane*Flux								
Model R ²	65.1%	28.8%	44.0%	57.6%	48.0%	52.4%	35.0%	26.9%
Standard Deviation	0.0017	0.883	0.0078	0.892	0.065	0.913	0.084	1.21

*All GLM analyses including Pre-Test were based on logarithms. Logs were used to ameliorate the influence of extreme measurements on the GLM during the BW and SF tests.

Table C.5 Significant Coefficients for the GLM Analyses by Test Time
 (units in the first column are *ns*, all others are percentages)

Electrical Response: HSD PTH	Branch Water							Salt Fog
	Pre-Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	13.03	47.17	0.415	11.02	1.54	5.16	0.67	36.68
Benzimidazole Immersion Ag Immersion Au/Pd								
Parylene Silicone Urethane				-5.04 -6.11 24.76		-2.00 -2.43 31.60		
Flux	4.22	-13.0	0.46		-1.95			-37.23
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene								
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone		-8.8						
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane	-0.23 -0.28 -0.35						1.14 1.88 1.99	4.20
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux								
Parylene*Flux Silicone*Flux Urethane*Flux						2.11		
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux								
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux								
Model R ² Standard Deviation	98.1% 0.25	24.2% 10.2	1.3% 1.62	95.0% 2.90	9.4% 1.98	92.0% 4.07	14.8% 1.64	96.0% 3.39

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.6 Significant Coefficients for the GLM Analyses by Test Time
 (units in the first column are *ns*, all others are percentages)

Electrical Response: HSD SMT	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	5.03	91.27	1.58	7.48	3.13	9.96	1.99	36.68
Benzimidazole		28.6						
Immersion Ag		29.2						
Immersion Au/Pd								
Parylene						-3.10		
Silicone	0.06							
Urethane	4.14			58.53		54.36	2.47	-37.88
Flux	-0.07	26.7						
Benzi*Parylene								
Imm Ag*Parylene								
Imm Au/Pd*Parylene								
Benzi*Silicone						-3.83		
Imm Ag*Silicone		-26				-3.24		
Imm Au/Pd*Silicone				-2.8				
Benzi*Urethane		-59				3.9		
Imm Ag* Urethane		-55				8.4		2.60
Imm Au/Pd* Urethane	-0.21		-1.36	5.6				
Benzi*Flux		-32						
Imm Ag*Flux		-25						
Imm Au/Pd*Flux				2.8				
Parylene*Flux								
Silicone*Flux								
Urethane*Flux	0.14	-55						
Benzi*Parylene*Flux								
Imm Ag*Parylene*Flux								
Imm Au/Pd*Parylene*Flux				-4.2				
Benzi*Silicone*Flux								
Imm Ag*Silicone*Flux								
Imm Au/Pd*Silicone*Flux						-4.1		
Benzi*Urethane*Flux		64						
Imm Ag*Urethane*Flux		51				-6.1		5.60
Imm Au/Pd*Urethane*Flux	0.26			-9.5	-3.7			
Model R ²	99.4%	39.2%	1.4%	98.7%	4.3%	98.6%	19.2%	96.1%
Standard Deviation	0.140	27.5	2.28	2.91	3.14	2.80	2.22	3.36

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.7 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF PTH 50 MHz	Branch Water							Salt Fog
	Pre-Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	-0.263	-0.154	0.014	1.649	0.015	-0.154	0.028	-1.18
Benzimidazole		0.031				0.040		-36.6
Immersion Ag		0.053			0.034			-36.9
Immersion Au/Pd	0.015	0.044			0.030			
Parylene		0.132				0.188		
Silicone		0.232				0.286		
Urethane		0.262		1.220	0.035	0.270	0.037	
Flux						0.058		
Benzi*Parylene							-0.098	34.9
Imm Ag*Parylene								29.1
Imm Au/Pd*Parylene								
Benzi*Silicone								33.4
Imm Ag*Silicone								19.3
Imm Au/Pd*Silicone								
Benzi*Urethane			-0.046					32.1
Imm Ag* Urethane		-0.060			-0.045			21.3
Imm Au/Pd* Urethane		-0.036						-31.4
Benzi*Flux								
Imm Ag*Flux								13.0
Imm Au/Pd*Flux								
Parylene*Flux								
Silicone*Flux				-2.010	-0.033	-0.199		
Urethane*Flux								
Benzi*Parylene*Flux							0.099	
Imm Ag*Parylene*Flux								
Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux					0.058	0.179		
Imm Ag*Silicone*Flux					0.051	0.170		
Imm Au/Pd*Silicone*Flux				3.10		0.139	-0.094	
Benzi*Urethane*Flux			0.060					-26.6
Imm Ag*Urethane*Flux								
Imm Au/Pd*Urethane*Flux			-0.070					
Model R ²	4.2%	87.6%	11.2%	8.0%	24.4%	58.5%	15.9%	50.5%
Standard Deviation	0.032	0.038	0.042	2.97	0.039	0.099	0.071	13.8

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.8 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF PTH f(-3dB)	Branch Water							Salt Fog 83 Cycles
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	249.7	-14.13	0.488	-8.91	-0.15	-10.34	0.803	-14.94
Benzimidazole Immersion Ag Immersion Au/Pd								-122 -76
Parylene	3.18	13.1				14.8		
Silicone		18.7	-4.17		-3.3	12.8	-2.05	
Urethane		22.5	-5.81		-2.6	24.1		
Flux								
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene								107
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone								121
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane				23.0				135 -113
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux			-4.8					116 81
Parylene*Flux Silicone*Flux Urethane*Flux							3.3	-46
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux	-5.30						-5.7	-161
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux			7.4			10.2		-142
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux			9.1					-170
Model R ²	7.2%	66.5%	22.3%	1.2%	7.7%	49.6%	7.9%	30.1%
Standard Deviation	5.12	6.10	4.72	49.7	5.26	8.97	5.10	70.7

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.9 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF PTH f(-40dB)	Branch Water							Salt Fog
	Pre-Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	83 Cycles
Constant	442.4	0.76	-0.12	1.00	-0.15	-3.27	-2.96	24.81
Benzimidazole Immersion Ag Immersion Au/Pd								
Parylene Silicone Urethane						3.7		
Flux	-3.1	-2.9	-2.6	-2.4		6.4		
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene				5.2				
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone				-3.6				
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane	-5.8			-5.3 -5.1 -5.6	-4.9		-5.2	
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux		-3.8			-5.7	-3.5	-5.9	
Parylene*Flux Silicone*Flux Urethane*Flux					-5.0 -3.3		-3.4 -3.5	
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux				-8.2				
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux	6.7	11.0	5.9		14.0	8.5	12.7	
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux	8.9	7.9 6.2			8.0 8.5		8.2 8.7	158
Model R ²	11.6%	19.3%	7.8%	20.1%	18.6%	19.9%	14.3%	1.7%
Standard Deviation	5.34	4.83	5.24	4.84	4.80	5.73	5.22	213

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.10 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF SMT 50 MHz	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	-0.248	-0.125	0.0018	2.3	0.013	-0.124	0.0013	-6.182
Benzimidazole		0.036	0.0117			0.060	0.0168	
Immersion Ag	0.018		0.0213		0.020	0.060	0.0257	-46.7
Immersion Au/Pd		0.034	0.0104				0.0115	
Parylene		0.117				0.165		
Silicone		0.219	-0.0130			0.201		
Urethane		0.244	0.0335		0.0260	0.258	0.0362	
Flux								
Benzi*Parylene								
Imm Ag*Parylene								51.8
Imm Au/Pd*Parylene								
Benzi*Silicone				-3.7				
Imm Ag*Silicone								34.7
Imm Au/Pd*Silicone					-0.066			
Benzi*Urethane							-0.0173	
Imm Ag* Urethane	-0.025	-0.053	-0.0299		-0.040		-0.0352	49.6
Imm Au/Pd* Urethane								
Benzi*Flux								
Imm Ag*Flux		0.058				-0.044		
Imm Au/Pd*Flux						0.054		
Parylene*Flux								
Silicone*Flux				-3.0	-0.103			
Urethane*Flux								
Benzi*Parylene*Flux								
Imm Ag*Parylene*Flux								
Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux				7.6	0.110			
Imm Ag*Silicone*Flux					0.099			
Imm Au/Pd*Silicone*Flux	0.032				0.187	0.093		
Benzi*Urethane*Flux								
Imm Ag*Urethane*Flux								
Imm Au/Pd*Urethane*Flux								
Model R ²	8.6%	69.5%	48.3%	8.6%	31.0%	70.7%	41.5%	30.6%
Standard Deviation	0.030	0.065	0.017	3.5	0.039	0.069	0.0163	17.9

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.11 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF SMT f(-3dB)	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	83 Cycles
Constant	278.5	-5.08	0.09	-10.6	-0.11	-5.78	-0.186	-23.69
Benzimidazole Immersion Ag Immersion Au/Pd		0.77			0.90		-0.71	
			-0.37	4.1			-0.63	
Parylene Silicone Urethane		4.98				6.1		
		7.95	-1.25		-1.80	7.8	-1.37	
	-1.68	8.67	3.18		3.25	9.7	3.36	
Flux								
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene					-1.64			
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone					5.00		0.94	125
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane	1.22		1.28				2.02	147
				-6.8				-94
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux								
Parylene*Flux Silicone*Flux Urethane*Flux								
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux			-1.03					
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux			-0.98		-5.50			-194
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux								143
Model R ²	28.0%	80.3%	81.2%	4.2%	46.7%	34.5%	82.2%	15.0%
Standard Deviation	1.04	1.74	0.91	8.8	2.09	5.10	0.93	135

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.12 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF SMT f(-40dB)	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	668.0	-4.11	-4.36	1.87	-3.21	-7.93	-3.99	-69.91
Benzimidazole	-5.7		-7.9	-6.5	-7.2		-8.3	
Immersion Ag	-11.3	-9.7	-12.1	-7.6	-11.2		-12.4	-275
Immersion Au/Pd	-8.0	-8.4	-11.6	-11.6	-11.2	-8.7	-12.2	
Parylene			3.3		3.0	9.3	2.9	
Silicone		-10.8						
Urethane	-10.3	-15.2	-3.3			6.9	-4.0	
Flux								
Benzi*Parylene								
Imm Ag*Parylene						-8.3		358
Imm Au/Pd*Parylene								
Benzi*Silicone								
Imm Ag*Silicone		15.9						240
Imm Au/Pd*Silicone		14.4	9.0	22.7		10.5		
Benzi*Urethane								
Imm Ag* Urethane	16.5	13.0	18.5		15.0		18.5	340
Imm Au/Pd* Urethane				10.1				
Benzi*Flux		-6.0						
Imm Ag*Flux								
Imm Au/Pd*Flux	-5.0							
Parylene*Flux								
Silicone*Flux								
Urethane*Flux								
Benzi*Parylene*Flux								
Imm Ag*Parylene*Flux								
Imm Au/Pd*Parylene*Flux	7.3							
Benzi*Silicone*Flux	-5.8							
Imm Ag*Silicone*Flux		-16.9						
Imm Au/Pd*Silicone*Flux		-14.3	-9.5	-20.8				
Benzi*Urethane*Flux	10.2	15.1	12.3		9.6		11.9	
Imm Ag*Urethane*Flux								
Imm Au/Pd*Urethane*Flux								
Model R ²	46.9%	35.1%	48.4%	14.0%	44.6%	16.0%	49.6%	10.8%
Standard Deviation	5.99	9.39	6.08	11.9	6.16	10.8	6.00	215

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.13 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF TLC 50 MHz Forward	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	-38.98	16.85	0.84	17.65	0.73	1.47	0.52	4.43
Benzimidazole	1.38	-5.7		-4.1				
Immersion Ag	1.78	-6.6						
Immersion Au/Pd	1.49							
Parylene		-9.1		-8.3				
Silicone	-6.09	-15.5		-7.5	0.99	1.04	1.22	
Urethane	-2.86	-16.4	1.28	-17.2				
Flux								
Benzi*Parylene								
Imm Ag*Parylene								
Imm Au/Pd*Parylene	-1.86					0.90	1.39	
Benzi*Silicone	2.58					-1.17		
Imm Ag*Silicone	2.84	9.2				-1.31		
Imm Au/Pd*Silicone	1.71				-2.00	-2.19	-2.12	
Benzi*Urethane	1.72							
Imm Ag* Urethane	-2.31	8.6						9.5
Imm Au/Pd* Urethane						1.87		
Benzi*Flux		7.3						
Imm Ag*Flux				-6.3				
Imm Au/Pd*Flux								
Parylene*Flux	-1.06							
Silicone*Flux					1.62			
Urethane*Flux								
Benzi*Parylene*Flux		-8.5						
Imm Ag*Parylene*Flux								
Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux		-9.1			-2.20			
Imm Ag*Silicone*Flux		-9.7			-2.13			
Imm Au/Pd*Silicone*Flux							3.1	
Benzi*Urethane*Flux								
Imm Ag*Urethane*Flux				9.0		1.25		
Imm Au/Pd*Urethane*Flux	1.61		-1.97			-2.05		
Model R ²	78.1%	53.0%	7.4%	53.4%	17.5%	20.9%	10.5%	3.1%
Standard Deviation	1.18	6.71	1.99	5.91	1.26	1.20	1.98	13.0

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.14 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF TLC 500 MHz Forward	Branch Water							Salt Fog
	Pre-Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	-18.06	8.17	-0.24	9.72	-0.11	0.23	-0.21	0.05
Benzimidazole	-0.32	-3.6						
Immersion Ag	-0.50							-2.45
Immersion Au/Pd	-0.36			-3.6				
Parylene		-11.6		-10.5	-0.31			
Silicone	-2.46	-11.6		-10.8		-0.32		
Urethane	-1.64	-17.8	0.60	-18.9				
Flux								
Benzi*Parylene	-0.95							
Imm Ag*Parylene	-1.05	-5.2						
Imm Au/Pd*Parylene	-0.86							
Benzi*Silicone				-5.6				
Imm Ag*Silicone								3.1
Imm Au/Pd*Silicone					-0.84	-0.82	-0.66	
Benzi*Urethane		7.1				-0.75		
Imm Ag* Urethane	0.85							
Imm Au/Pd* Urethane								
Benzi*Flux								
Imm Ag*Flux								2.4
Imm Au/Pd*Flux				5.7				
Parylene*Flux								
Silicone*Flux					0.52		1.28	
Urethane*Flux						-0.57		
Benzi*Parylene*Flux								
Imm Ag*Parylene*Flux								
Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux					-0.75		-1.40	5.6
Imm Ag*Silicone*Flux					-0.85		-1.08	
Imm Au/Pd*Silicone*Flux						1.42		
Benzi*Urethane*Flux	0.48					1.24		
Imm Ag*Urethane*Flux								
Imm Au/Pd*Urethane*Flux								
Model R ²	87.3%	51.2%	6.5%	52.6%	12.6%	19.4%	12.3%	13.2%
Standard Deviation	0.38	6.30	0.99	6.82	0.60	0.60	0.75	3.56

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.15 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF TLC 1 GHz Forward	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	83 Cycles
Constant	-12.61	4.47	0.139	6.30	0.116	-1.31	-0.068	0.216
Benzimidazole Immersion Ag Immersion Au/Pd				-3.6				
Parylene Silicone Urethane	-2.35 -1.23	-9.3 -8.5 -12.2		-8.2 -10.3 -14.8		1.64 1.28 1.34		
Flux								
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene	-0.92 -0.97 -1.15							
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone					-0.76			
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane								
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux								
Parylene*Flux Silicone*Flux Urethane*Flux								
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux								2.7
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux								-4.3 -4.7
Model R ² Standard Deviation	83.6% 0.41	42.9% 5.30	12.9% 0.755	41.3% 6.76	10.0% 0.720	17.3% 1.39	4.1% 1.26	14.6% 2.97

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.16 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF TLC Rev Null Freq	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	651.4	21.76	7.484	-24.17	7.453	-34.81	6.635	-151.2
Benzimidazole	-4.6				1.37	6.1		
Immersion Ag	-3.8					7.2		
Immersion Au/Pd								
Parylene		-69.0		-81	-2.37	20.0		
Silicone	-17.4	-34.2	2.35		1.56	38.8	2.59	120
Urethane	-16.8	-40.9	-7.26		-6.88	45.3	-4.84	
Flux								
Benzi*Parylene	-4.1				4.60			
Imm Ag*Parylene	-6.5				3.70			
Imm Au/Pd*Parylene	-4.2					5.8		
Benzi*Silicone								
Imm Ag*Silicone	4.3			-166		-5.1		
Imm Au/Pd*Silicone	5.0		-7.10	-249	-4.60		-4.5	
Benzi*Urethane						-6.0		
Imm Ag* Urethane						-7.8		
Imm Au/Pd* Urethane	-3.8							
Benzi*Flux								
Imm Ag*Flux								
Imm Au/Pd*Flux								
Parylene*Flux								
Silicone*Flux				-101			2.8	
Urethane*Flux								
Benzi*Parylene*Flux			-4.40		-4.60			
Imm Ag*Parylene*Flux								
Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux								
Imm Ag*Silicone*Flux				224			-4.8	
Imm Au/Pd*Silicone*Flux			5.10	195				
Benzi*Urethane*Flux	6.4		-4.70					
Imm Ag*Urethane*Flux								
Imm Au/Pd*Urethane*Flux			-4.60					
Model R ²	83.2%	39.7%	54.8%	18.1%	54.8%	91.1%	42.8%	4.0%
Standard Deviation	3.68	30.5	3.88	134	3.08	5.38	3.35	257

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.17 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: HF TLC Rev Null Resp	Branch Water							Salt Fog
	Pre- Test*	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	-48.59	18.86	-2.10	12.2	-0.24	16.04	-2.12	6.26
Benzimidazole Immersion Ag Immersion Au/Pd								9.4
	8.2	-6.5			-12.0		-8.3	
Parylene Silicone Urethane						-4.7		
	6.3	-13.7	-4.7		-10.5	-23.6	-4.7	
	6.6	-13.2		-6.9		-19.1		
Flux	4.3		-4.8		-10.8		-4.1	
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene								
		-10.0	-6.6		-8.8		-6.9	
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone								-14.1
	-10.3				20.1		11.1	
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane								
	-10.1							
	-14.1				20.6		10.7	
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux								
		-8.4						
	-8.0				12.8			-9.9
Parylene*Flux Silicone*Flux Urethane*Flux								
	-5.3				8.8			
	-12.0	12.1	9.1		13.5			
					12.1		6.4	6.5
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux								
							17.7	
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux								17.0
	12.5				-20.2			
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux								
	9.4							
	10.2	-12.0						
	18.1				-18.3			
Model R ²	29.5%	31.2%	18.4%	5.4%	29.2%	58.7%	22.0%	11.1%
Standard Deviation	5.08	10.3	9.26	12.6	9.11	8.30	8.85	13.0

*The Pre-Test column contains estimated coefficients for the raw Pre-Test measurements. The remaining columns contain the estimated coefficients for the deltas defined in Section 3.3.

Table C.18 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: 10-Mil Pads	Branch Water							Salt Fog
	Pre- Test	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	11.81	6.02	12.77	4.03	11.20	4.07	9.89	5.45
Benzimidazole Immersion Ag Immersion Au/Pd	0.32		-0.51		1.70 -1.41			
Parylene Silicone Urethane	1.57 0.70	2.31 3.10 5.18	-0.66	6.88 4.84 6.97	1.93 0.80 1.56	2.91 1.28 6.97	1.30 2.27 2.82	2.68 4.21 4.10
Flux	1.49							
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene			1.39		-4.14 1.55			
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone		1.08			-1.21 1.87			
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane		-1.90			-1.73 1.42	-1.06		
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux					3.73			
Parylene*Flux Silicone*Flux Urethane*Flux	-1.53 -2.27 -1.52					2.89	0.98	
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux					1.72 -3.33			
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux					-4.40	-3.55 -2.46 -3.55		
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux				-2.03	-3.86			
Model R ² Standard Deviation	68.5% 0.57	61.1% 1.45	13.8% 1.14	75.1% 1.64	48.4% 0.94	79.3% 1.34	36.7% 1.45	49.7% 1.73

Table C.19 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: PGA A	Branch Water							Salt Fog
	Pre- Test	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	10.73	5.52	12.99	4.07	12.96	5.01	12.55	6.33
Benzimidazole	1.06							
Immersion Ag	0.49							
Immersion Au/Pd	0.45							
Parylene	0.85	1.71	-0.51	4.91	-1.62	1.95	-1.02	
Silicone	0.36	3.15	-0.88		-0.77	4.94	-0.52	
Urethane	0.49	2.87	-1.47	4.91	-1.32	6.62	-0.91	
Flux	2.27	0.81		0.72				
Benzi*Parylene	-0.62							
Imm Ag*Parylene			-0.79				-0.87	
Imm Au/Pd*Parylene					0.92			
Benzi*Silicone								1.45
Imm Ag*Silicone						-2.25		1.50
Imm Au/Pd*Silicone								
Benzi*Urethane	-0.73							
Imm Ag* Urethane								
Imm Au/Pd* Urethane				1.23				2.63
Benzi*Flux	-0.60							
Imm Ag*Flux	-0.68							
Imm Au/Pd*Flux	-0.60		0.48					
Parylene*Flux	-1.26			-1.31				
Silicone*Flux	-2.42	-3.03		-1.00	-0.47	-3.15		1.19
Urethane*Flux	-1.75							
Benzi*Parylene*Flux								
Imm Ag*Parylene*Flux			1.42		1.67		2.04	
Imm Au/Pd*Parylene*Flux	-0.99							
Benzi*Silicone*Flux		2.33				3.26		
Imm Ag*Silicone*Flux						3.90		
Imm Au/Pd*Silicone*Flux		2.62	-0.99					
Benzi*Urethane*Flux								
Imm Ag*Urethane*Flux								
Imm Au/Pd*Urethane*Flux								-2.90
Model R ²	74.4%	42.1%	46.3%	78.2%	44.6%	70.9%	27.2%	14.7%
Standard Deviation	0.41	1.48	0.66	1.38	0.70	1.66	0.78	2.09

Table C.20 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: PGA B	Branch Water							Salt Fog
	Pre- Test	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	9.92	6.89	12.08	4.58	11.29	5.00	11.48	5.91
Benzimidazole	1.30	-1.64			0.39			
Immersion Ag	1.14							
Immersion Au/Pd	1.58							
Parylene	1.29		-0.73	2.41	-1.42	0.98	-1.27	
Silicone						3.67		
Urethane	1.38		-0.82	5.40		6.40		
Flux	3.08	-0.73	-1.51					
Benzi*Parylene	-0.58	1.92			-0.81			
Imm Ag*Parylene	-0.59							
Imm Au/Pd*Parylene	-1.44							
Benzi*Silicone	0.65	2.15						2.22
Imm Ag*Silicone	0.59					1.98		1.85
Imm Au/Pd*Silicone								
Benzi*Urethane	-1.33	1.40						
Imm Ag* Urethane	-1.29							
Imm Au/Pd* Urethane	-1.58							
Benzi*Flux	-0.93	1.15	2.60					
Imm Ag*Flux	-1.49	0.72	2.36	1.28				
Imm Au/Pd*Flux	-1.47		2.40					
Parylene*Flux	-1.91	1.08	2.45					
Silicone*Flux	-2.25							1.44
Urethane*Flux	-3.02	2.25	1.69					
Benzi*Parylene*Flux		-2.06	-3.42					
Imm Ag*Parylene*Flux			-2.36					
Imm Au/Pd*Parylene*Flux			-2.60					
Benzi*Silicone*Flux	-0.85		-2.05					
Imm Ag*Silicone*Flux			-1.56	-1.41		-2.46		
Imm Au/Pd*Silicone*Flux			-1.93					
Benzi*Urethane*Flux	0.95		-2.66					
Imm Ag*Urethane*Flux	1.64		-2.42					
Imm Au/Pd*Urethane*Flux	1.54	-1.40	-2.47					
Model R ²	87.6%	33.7%	33.1%	79.2%	40.0%	75.6%	26.9%	20.6%
Standard Deviation	0.31	1.21	0.94	1.19	0.90	1.47	0.91	1.94

Table C.21 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: Gull Wing	Branch Water							Salt Fog
	Pre- Test	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	
Constant	11.84	4.12	12.19	5.36	11.27	3.94	11.48	5.81
Benzimidazole Immersion Ag Immersion Au/Pd	1.01				-0.45		-1.06 -0.63	
Parylene Silicone Urethane		4.07	1.06	5.92 4.66		3.56		2.47 3.49
Flux	0.46		-0.65		-0.49			
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene	1.27 0.54				1.45		2.23 1.83	
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone				-1.31				
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane	-1.28					2.89 1.74	1.69	3.20
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux			-0.82				-1.21	
Parylene*Flux Silicone*Flux Urethane*Flux	-0.77					1.00		
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux		2.28	1.68		1.47			
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux	-1.67 -0.84						2.12	
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux						-4.14	-2.2	
Model R ² Standard Deviation	52.4% 0.59	69.0% 1.30	48.5% 1.15	63.5% 1.69	19.2% 1.03	64.8% 1.17	41.8 1.42	38.6% 1.96

Table C.22 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: Stranded Wire 1	Branch Water							Salt Fog
	Pre- Test	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	83 Cycles
Constant	11.64	0.0044	0.0033	0.0018	0.0010	0.0007	0.0031	0.013
Benzimidazole Immersion Ag Immersion Au/Pd								
Parylene Silicone Urethane					0.0017			
Flux	2.23	-0.0038	-0.0026	-0.0010			-0.0018	
Flux							-0.0047	
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene								
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone								
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane	-1.27							0.074
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux								0.045
Parylene*Flux Silicone*Flux Urethane*Flux				-0.0011	-0.0027		-0.0015	
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux								
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux					-0.0048			
Model R ²	22.4%	46.7%	15.9%	6.7%	11.1%	5.1%	6.4%	6.3%
Standard Deviation	1.63	0.0018	0.0026	0.0018	0.0031	0.0022	0.0043	0.086

Table C.23 Significant Coefficients for the GLM Analyses by Test Time

Electrical Response: Stranded Wire 2	Branch Water							Salt Fog
	Pre- Test	Vertical Position	Post Vertical Test	Horiz: Backside Up	Post Horiz Test	Horiz: Comps Up	Post Comps Up	83 Cycles
Constant	25.35	-0.0004	-0.0014	-0.0020	-0.0019	-0.0027	-0.0019	0.004
Benzimidazole Immersion Ag Immersion Au/Pd								
Parylene Silicone Urethane						0.0032	0.0046	
Flux								
Benzi*Parylene Imm Ag*Parylene Imm Au/Pd*Parylene								
Benzi*Silicone Imm Ag*Silicone Imm Au/Pd*Silicone								
Benzi*Urethane Imm Ag* Urethane Imm Au/Pd* Urethane								0.127
Benzi*Flux Imm Ag*Flux Imm Au/Pd*Flux								0.062
Parylene*Flux Silicone*Flux Urethane*Flux		-0.0036	-0.0039		-0.0029	-0.0065	-0.0088	-0.050
Benzi*Parylene*Flux Imm Ag*Parylene*Flux Imm Au/Pd*Parylene*Flux								
Benzi*Silicone*Flux Imm Ag*Silicone*Flux Imm Au/Pd*Silicone*Flux								
Benzi*Urethane*Flux Imm Ag*Urethane*Flux Imm Au/Pd*Urethane*Flux	9.80		-0.0055	-0.0110	-0.0070			0.114
Model R ²	10.2%	5.7%	13.5%	8.9%	12.7%	10.2%	14.5%	16.5%
Standard Deviation	5.10	0.00488	0.0050	0.0062	0.0050	0.0049	0.0054	0.076