DOMINANT™
Opto Technologies
Innovating Illumination

RELIABILITY REPORT
Mini DomiLED
InGaN White: DNW-EJG-QR2

Title: Mini DomiLED InGaN White in DNW-EJG-QR2 Product Qualification

Sample History: All parts were built and tested in DOMINANT Opto Technologies Sdn. Bhd.

Qualification Plan: All units are to be pre-conditioned before proceeding to the respective test

	Conditions
• Pre-conditioning as per JEDEC Level 2 requirement (JESD22-A113) • IR re-flow soldering on FR4 board	• Bake @ 125°C, 24 hrs • Storage @ 85°C/60% RH, 168 hrs • 3xIR re-flow soldering at 260°C/10 sec. min. (JEDEC)

Failure Criteria:

• Electrical Failures	• Vf shift >= 20% • Ir > 2x standard limits
• Light Output Degradation	• % Iv shift >= ±50%
• Visual Failures	• Broken or damaged package or lead • Solderability < 95% wetting • Dimension out of tolerance
• Corrosion Test	• Visible black spots on metallic surface
• Pull Test	• Pull Strength < 3gf • Reference: MIL-STD-750

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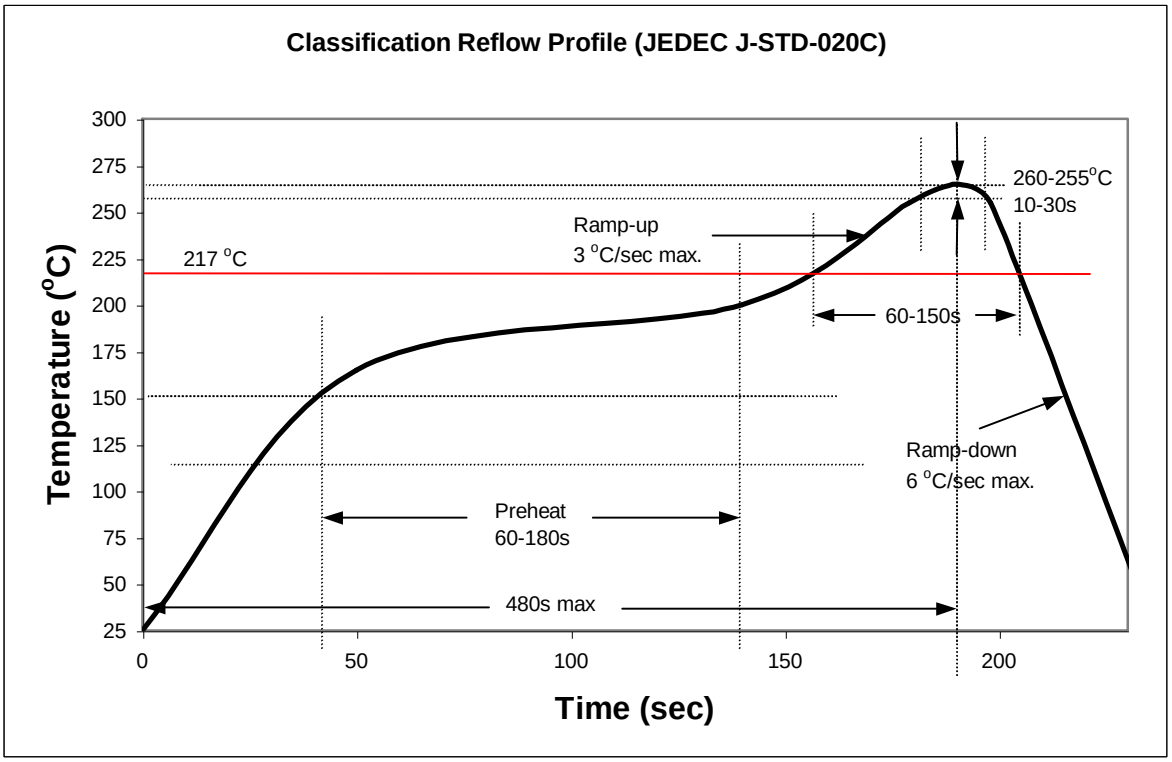
Recommended Pb Free IR-Reflow Soldering Profile



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Reliability Test Matrix:

IR/Convection Re-Flow Process at Peak Temperature 260°C for 10 seconds

Pre-conditioning @ 85°C/60% RH for 168 hours

Device: DNW-EJG

Result: No. of failure(s)

No	Test Type	Stress Condition	S/S	Test Point	Vf	Iv
1	High Temperature Operating Life Test (HTOL) JESD22-A108	a) IR re-flow soldering • Ta = 70°C • If = 20mA	80	0 hrs 168 hrs 504 hrs 1000 hrs	0/80 0/80 0/80 0/80	0/80 0/80 0/80 0/80
2	Intermittent Operating Life Test (IOL) MIL-STD-750 (Method 1037)	a) Pre-conditioning b) IR re-flow soldering • Ta = 25°C • 2 mins On, 2 mins Off • If = 20mA	80	0 hrs 168 hrs 504 hrs 1000 hrs	0/80 0/80 0/80 0/80	0/80 0/80 0/80 0/80
3	Wet High Temperature Reverse Biased Test (WHTRB) JESD22-A101	a) Pre-conditioning b) IR re-flow soldering • Ta = 85°C, 85% RH • VR = 4V	80	0 hrs 168 hrs 504 hrs 1000 hrs	0/80 0/80 0/80 0/80	0/80 0/80 0/80 0/80
4	Wet High Temperature Operating Life Test (WHTOL) JESD22-A101	a) Pre-conditioning b) IR re-flow soldering • Ta = 85°C, 85% RH • If = 1mA	80	0 hrs 168 hrs 504 hrs 1000 hrs	0/80 0/80 0/80 0/80	0/80 0/80 0/80 0/80
5	Low Temperature Storage Test (LTS) JESD22-A119	a) IR re-flow soldering • Ta = -40°C	80	0 hrs 168 hrs 504 hrs 1000 hrs	0/80 0/80 0/80 0/80	0/80 0/80 0/80 0/80
6	High Temperature Storage Test (HTS) JESD22-A103	a) IR re-flow soldering • Ta = 100°C	80	0 hrs 168 hrs 504 hrs 1000 hrs	0/80 0/80 0/80 0/80	0/80 0/80 0/80 0/80
7	Thermal Shock Test (TSK) JESD22-A106	a) Pre-conditioning b) IR re-flow soldering • -40°C to 100°C, 15 min dwell, < 10 sec transfer	80	0 X 100 X 500 X 1000 X	0/80 0/80 0/80 0/80	0/80 0/80 0/80 0/80

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Result: No. of failure(s)

No	Test Type	Stress Condition	S/S	Test Point	Vf	Iv
7a	Temperature Cycling Hot Test (TCHT) JESD22-A104 MIL-STD-750 Method 2037	• 125°C Test after test 8. • Decap and wire pull on all wires from 5 devices.	80	-	Pass	Pass
7b	Wire Bond Integrity (WBI) MIL-STD-750 Method 2037	a) IR re-flow soldering • Ta = 125°C b) Decap and wire pull on all wires from 5 devices	5	500hrs	-	-
8	Resistance to Soldering Heat Test (RTSH) JESD22-A111 MIL-STD-202G	a) Pre-conditioning • T solder = 260°C, • 1X (dipping)	30	0 X 1 X	0/30 0/30	0/30 0/30
9	Electrostatic Discharge (ESD) – HBM AEC Q101-001, Q101-005, JESD22-A114	a) 1500Ω 100pF, ±1000V b) 1500Ω 100pF, ±2000V	30 30	-	Pass	Pass
10	Electrostatic Discharge (ESD) – MM AEC Q101-001, Q101-005, JESD22-A115	a) 0Ω 200pF, ±100V b) 0Ω 200pF, ±200V	30 30	-	Pass	Pass
11	Electrostatic Discharge (ESD) – CDM AEC Q101-001, Q101-005 JESD22-C101	a) ±1000V	30	-	Pass	Pass
12	Terminal Strength Test MIL-STD-750 Method 2036	Force: 10N for 10 seconds	30	-	Pass	Pass

Conclusions: All qualified test are according to AEC-Q101 REV D standard.

All qualification samples passed.

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Reference Device: DNW-EJG

Corrosion Test

Device: DNW-EJG

Result: No. of failure(s)

No	Test Type	Stress Condition	S/S	Test Point	Vf	Iv
1	Hydrogen Sulphide Test (H2S) IEC 60068-2-43	a) IR re-flow soldering • H_2S 15PPM, 40°C/90%RH	3	0 hrs 168 hrs 336 hrs	0/3 0/3 0/3	0/3 0/3 0/3
			3	0 hrs 168 hrs 336 hrs	0/3 0/3 0/3	0/3 0/3 0/3
			3	0 hrs 168 hrs 336 hrs	0/3 0/3 0/3	0/3 0/3 0/3
2	Flowing Mixed Gas Test (FMG) IEC 60068-2-60	a) IR re-flow soldering • Method 4 • 25°C, 75% RH	3	0 hrs 168 hrs 336 hrs 504 hrs	0/3 0/3 0/3 0/3	0/3 0/3 0/3 0/3
			3	0 hrs 168 hrs 336 hrs 504 hrs	0/3 0/3 0/3 0/3	0/3 0/3 0/3 0/3
			3	0 hrs 168 hrs 336 hrs 504 hrs	0/3 0/3 0/3 0/3	0/3 0/3 0/3 0/3

Conclusions: All qualification samples passed.

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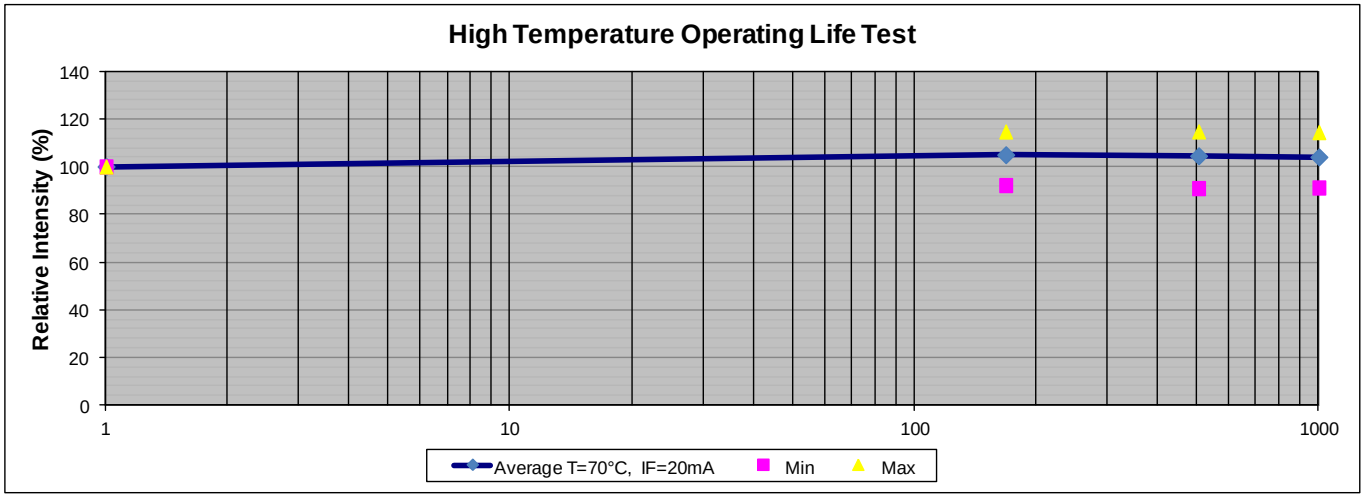
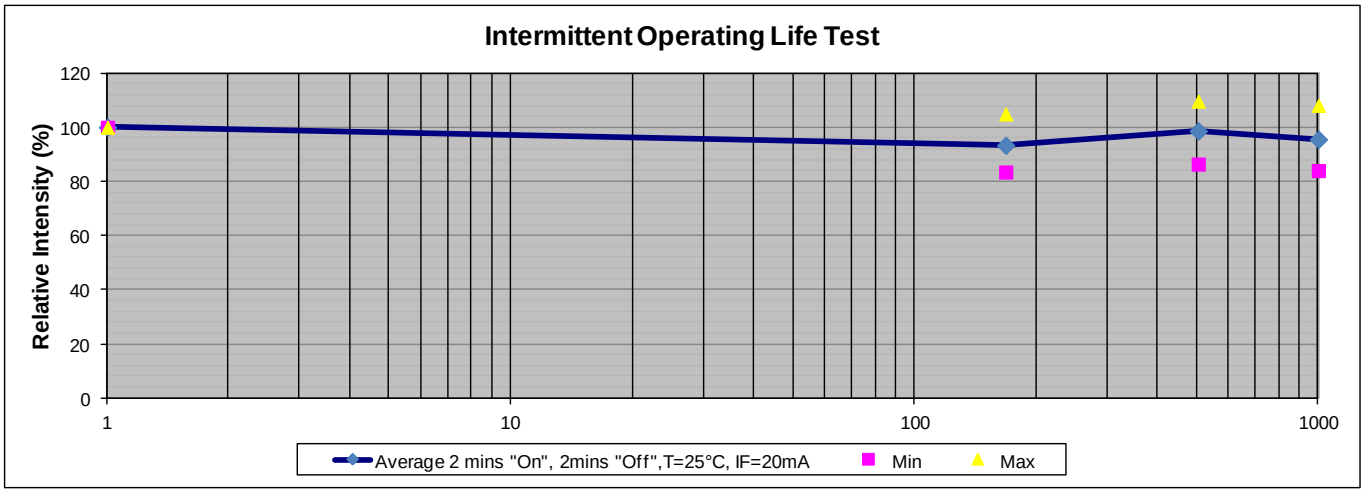
Iv Degradation Data



Note:

168hrs max = 14.698% 504hrs max = 14.727% 1000hrs max = 14.434%

168hrs min = -7.806% 504hrs min = -9.083% 1000hrs min = -8.832%



Note:

168hrs max = 4.916% 504hrs max = 9.651% 1000hrs max = 8.079%

168hrs min = -16.523% 504hrs min = -13.594% 1000hrs min = -15.980%

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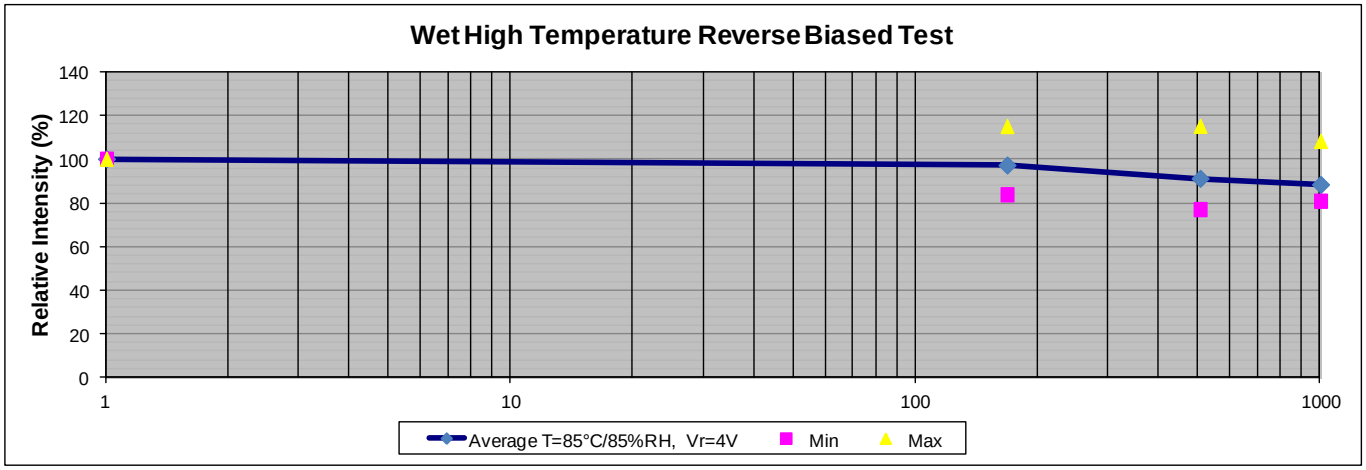
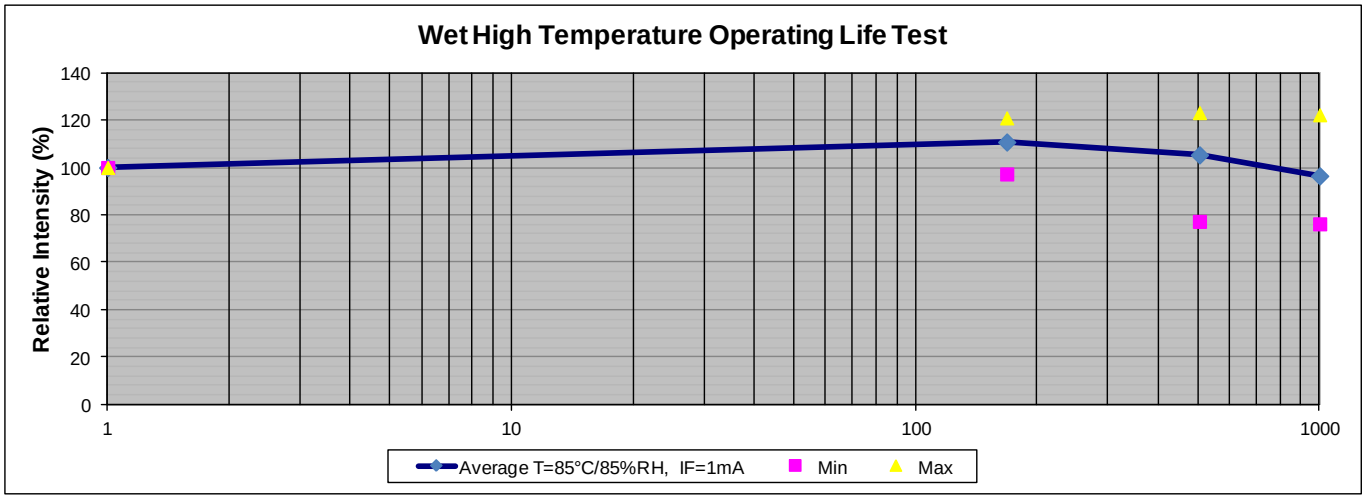
Reference Device: DNW-EJG



Note:

168hrs max = 15.004% 504hrs max = 15.094% 1000hrs max = 8.181%

168hrs min = -16.302% 504hrs min = -23.097% 1000hrs min = -19.257%



Note:

168hrs max = 20.963% 504hrs max = 23.194% 1000hrs max = 22.276%

168hrs min = -2.719% 504hrs min = -22.747% 1000hrs min = -23.785%

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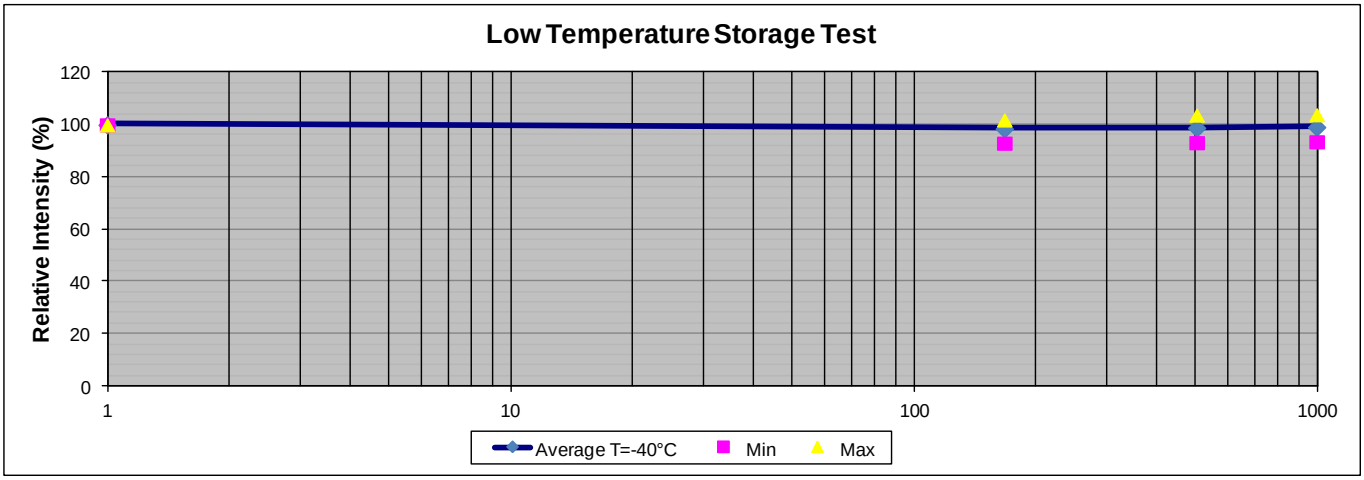
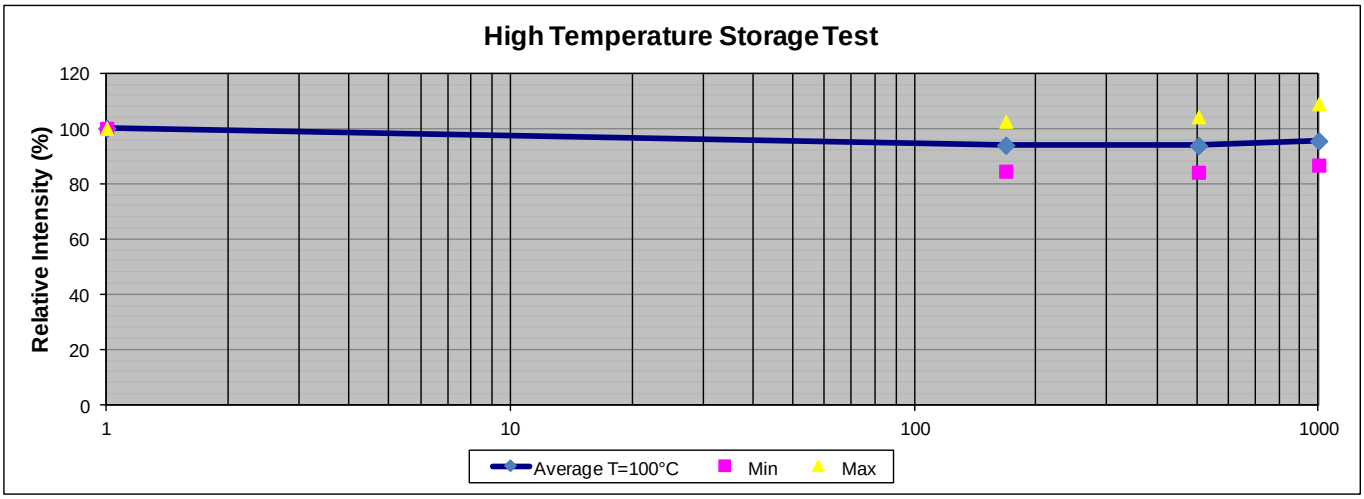


Note:

168hrs max = 1.881%　　504hrs max = 3.741%　　1000hrs max = 3.866%

168hrs min = -7.004%　　504hrs min = -6.818%　　1000hrs min = -6.464%



Note:

168hrs max = 2.567%　　504hrs max = 4.188%　　1000hrs max = 8.867%

168hrs min = -15.520%　　504hrs min = -15.890%　　1000hrs min = -13.312%

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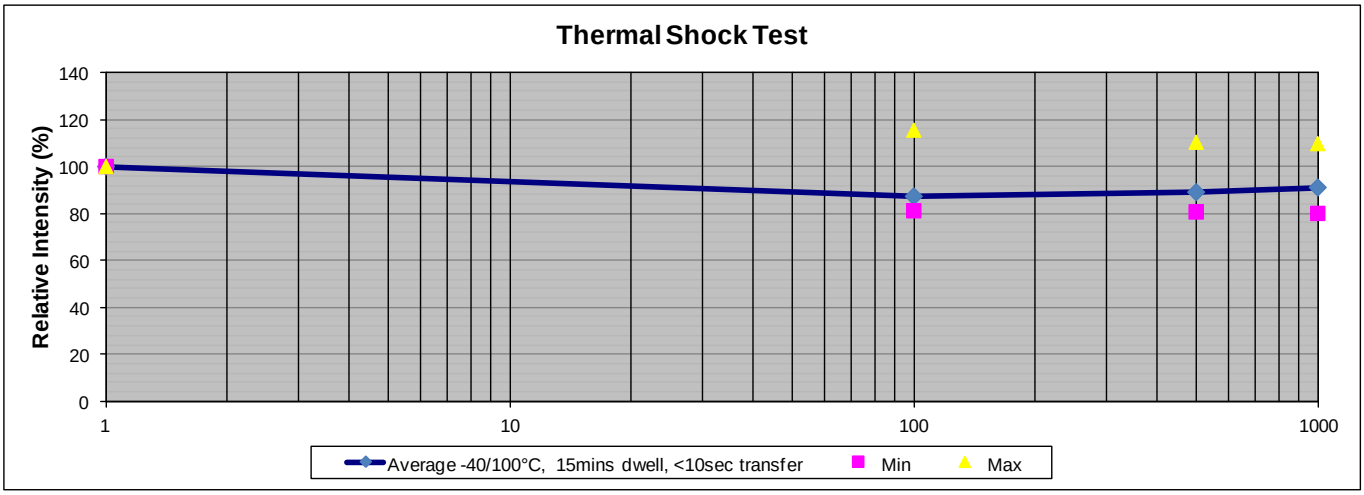
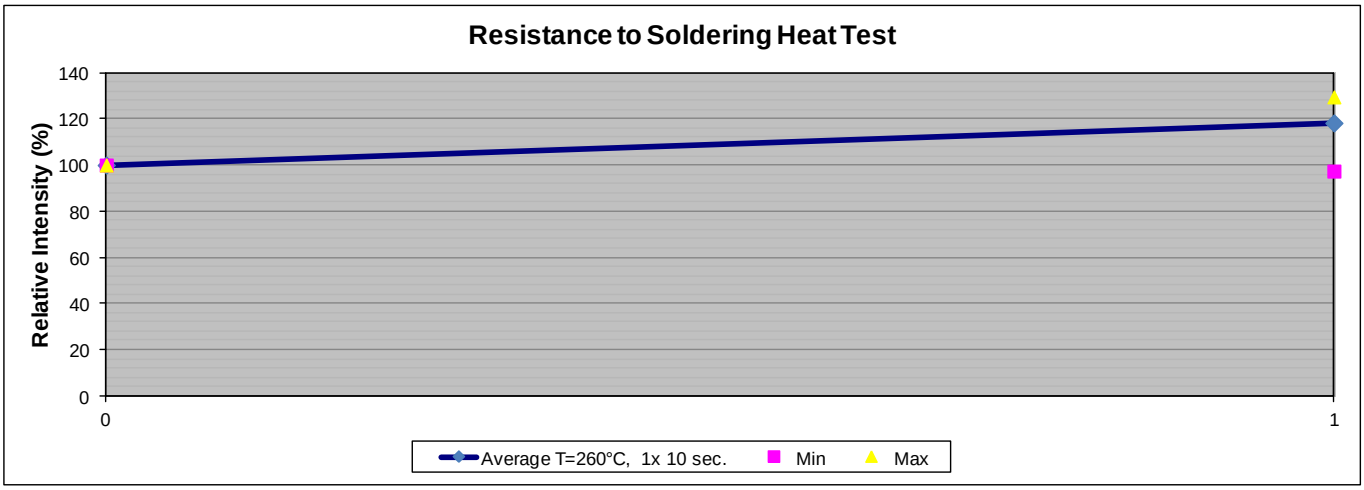


Note:

100X max = 15.499% 500X max = 10.339% 1000X max = 9.747%

100X min = -18.846% 500X min = -19.351% 1000X min = -19.959%



Note:

1X max = 29.540%

1X min = -2.613%

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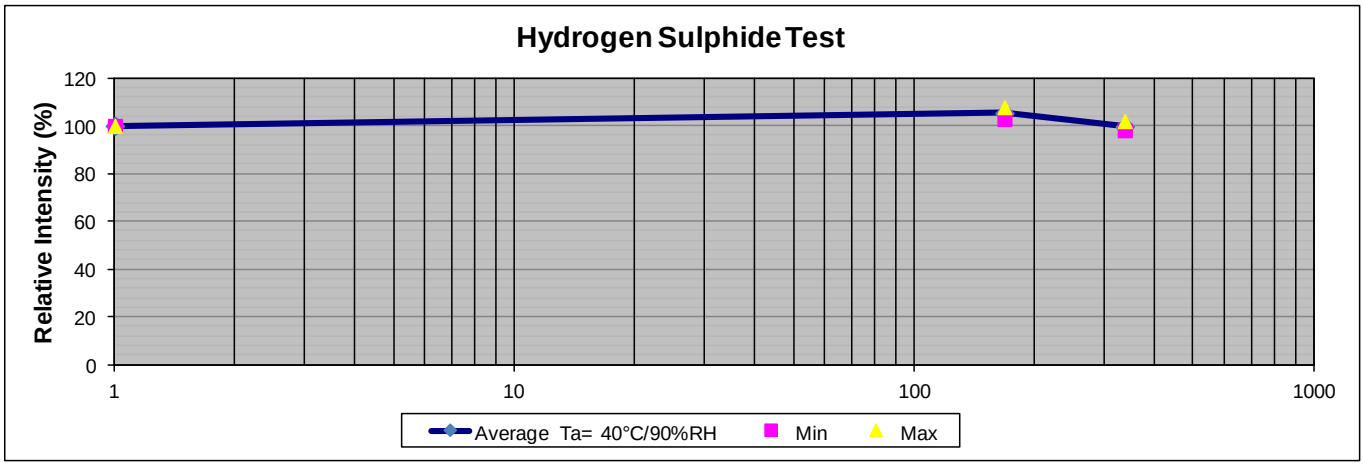
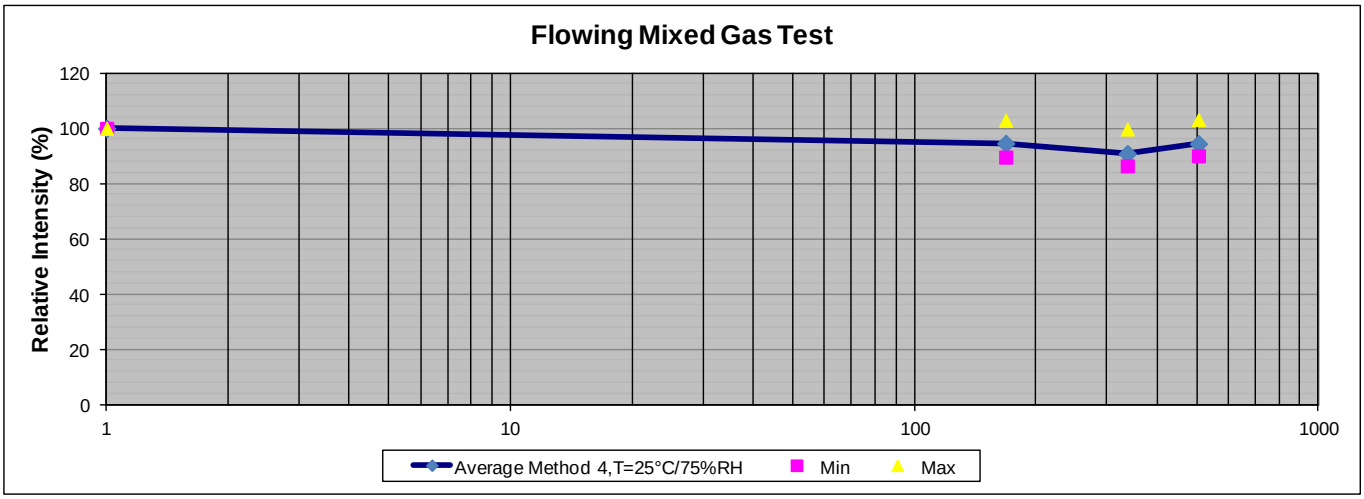
Reference Device: DNW-EJG



Note:

168hrs max = 7.820% 336hrs max = 2.007%

168hrs min = 2.918% 336hrs min = -1.827%



Note:

168hrs max = 2.924% 336hrs max = -0.244% 504hrs max = 3.208%

168hrs min = -10.417% 336hrs min = -13.593% 504hrs min = -9.937%

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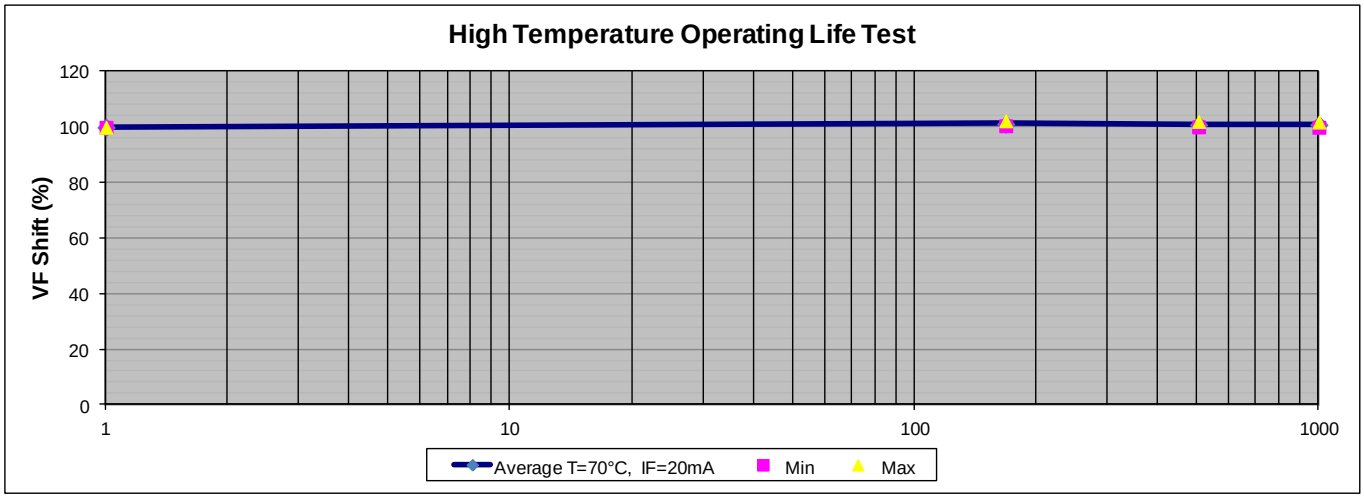
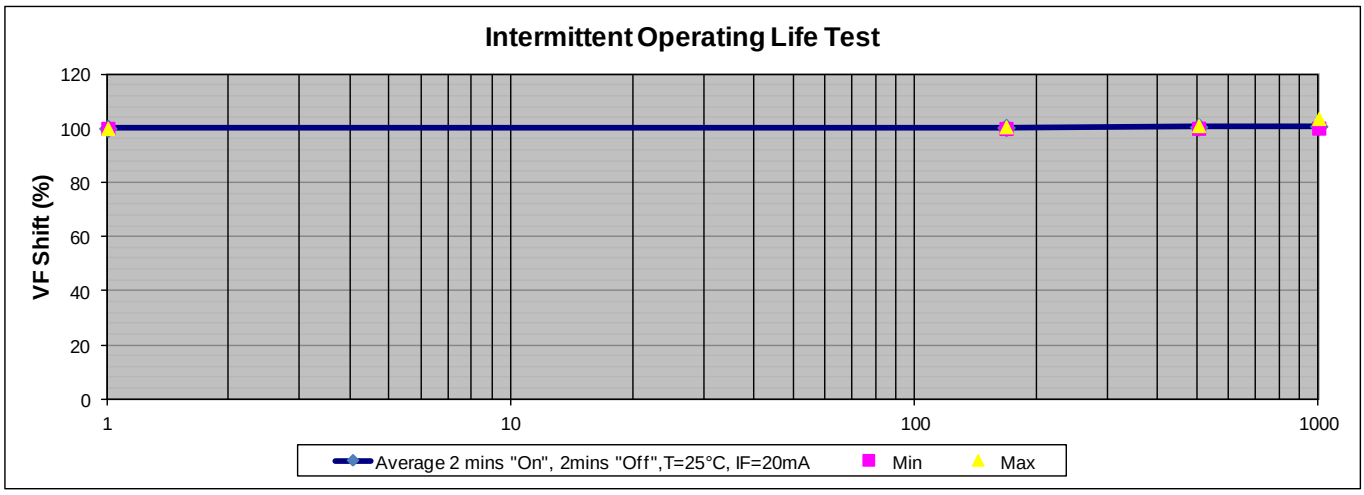
Vf Shift Data



Note:

168hrs max = 2.332% 504hrs max = 2.108% 1000hrs max = 1.895%

168hrs min = 0.559% 504hrs min = 0.166% 1000hrs min = 0.000%



Note:

168hrs max = 0.580% 504hrs max = 1.029% 1000hrs max = 3.642%

168hrs min = -0.033% 504hrs min = 0.033% 1000hrs min = 0.099%

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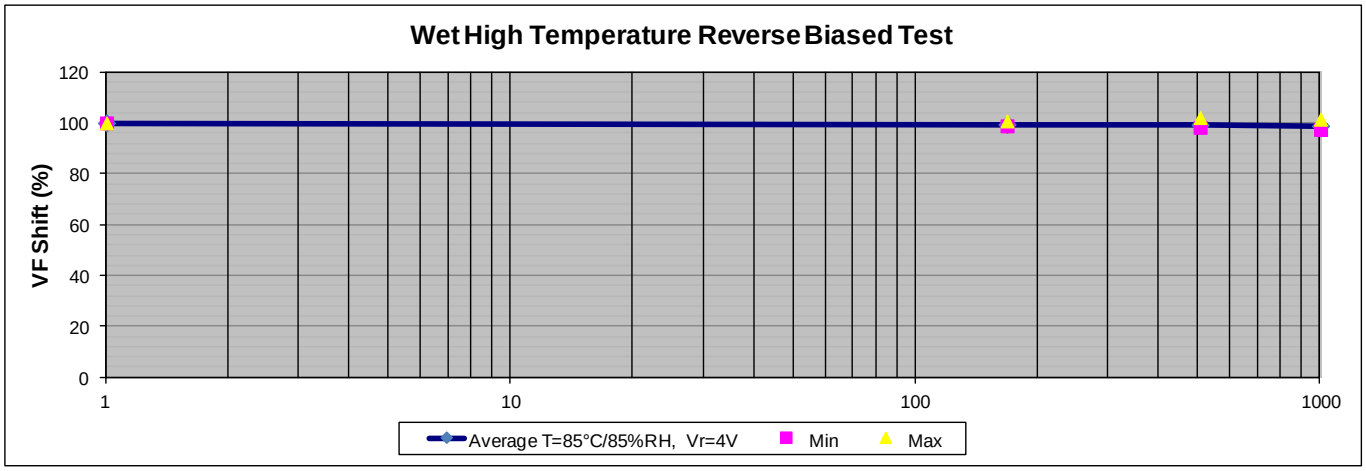
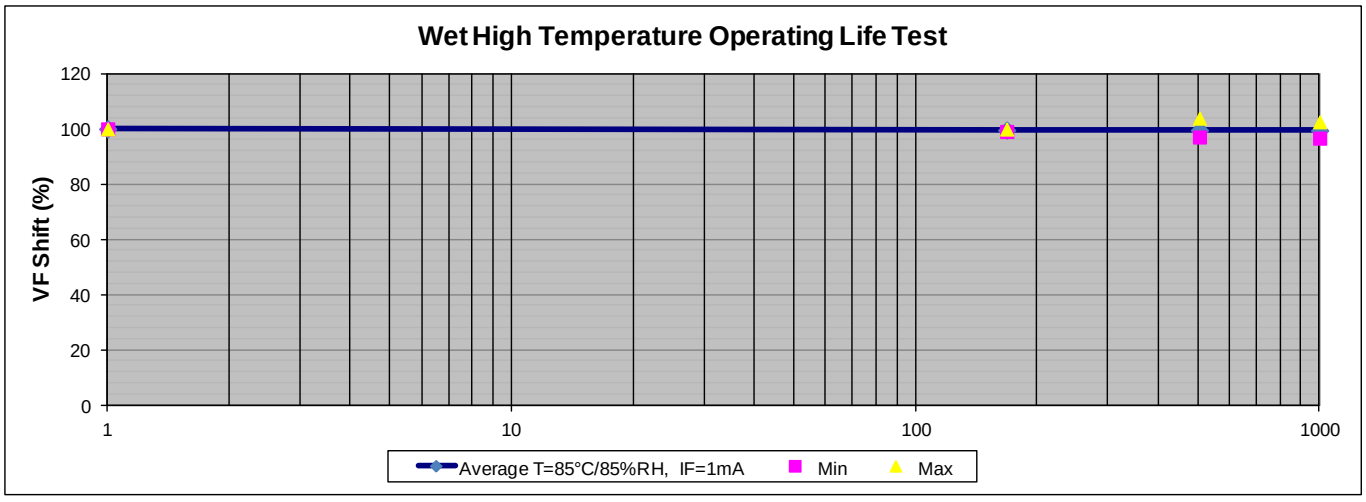
Reference Device: DNW-EJG



Note:

168hrs max = 0.771% 504hrs max = 2.095% 1000hrs max = 1.456%

168hrs min = -1.141% 504hrs min = -1.744% 1000hrs min = -2.600%



Note:

168hrs max = -0.070% 504hrs max = 3.880% 1000hrs max = 2.559%

168hrs min = -0.938% 504hrs min = -2.929% 1000hrs min = -3.362%

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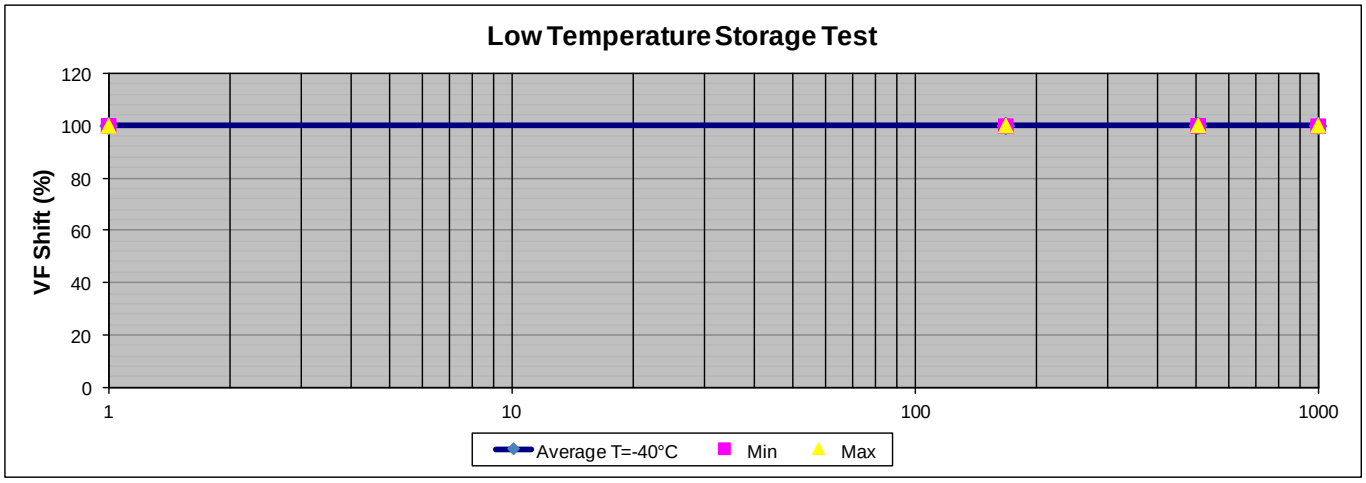
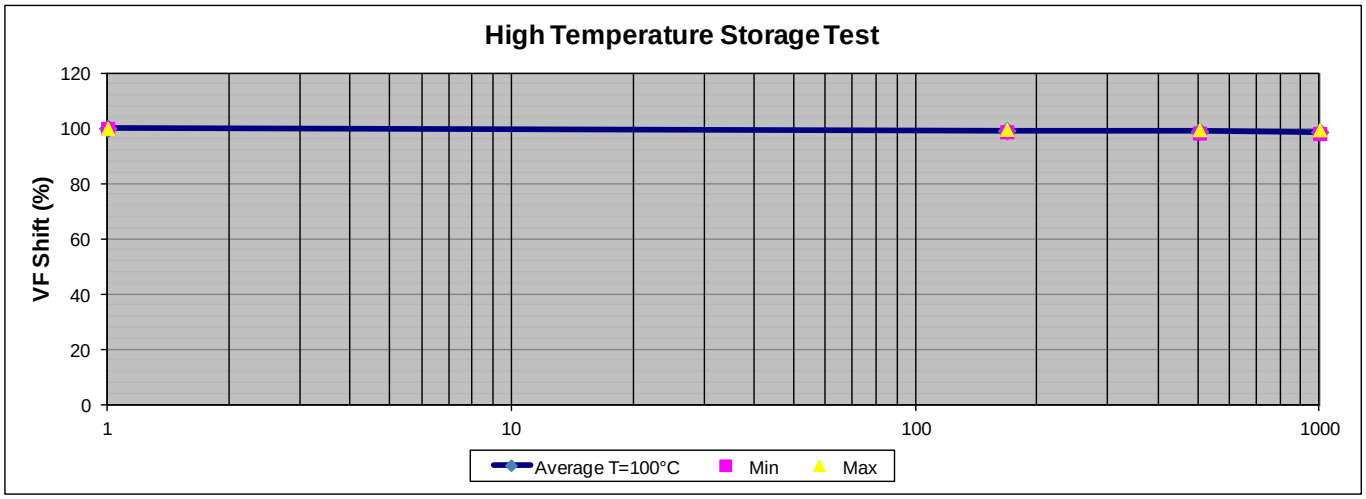


Note:

168hrs max = 0.099% 504hrs max = 0.224% 1000hrs max = 0.066%

168hrs min = -0.098% 504hrs min = -0.032% 1000hrs min = -0.130%



Note:

168hrs max = -0.359% 504hrs max = -0.490% 1000hrs max = -0.523%

168hrs min = -1.238% 504hrs min = -1.692% 1000hrs min = -1.872%

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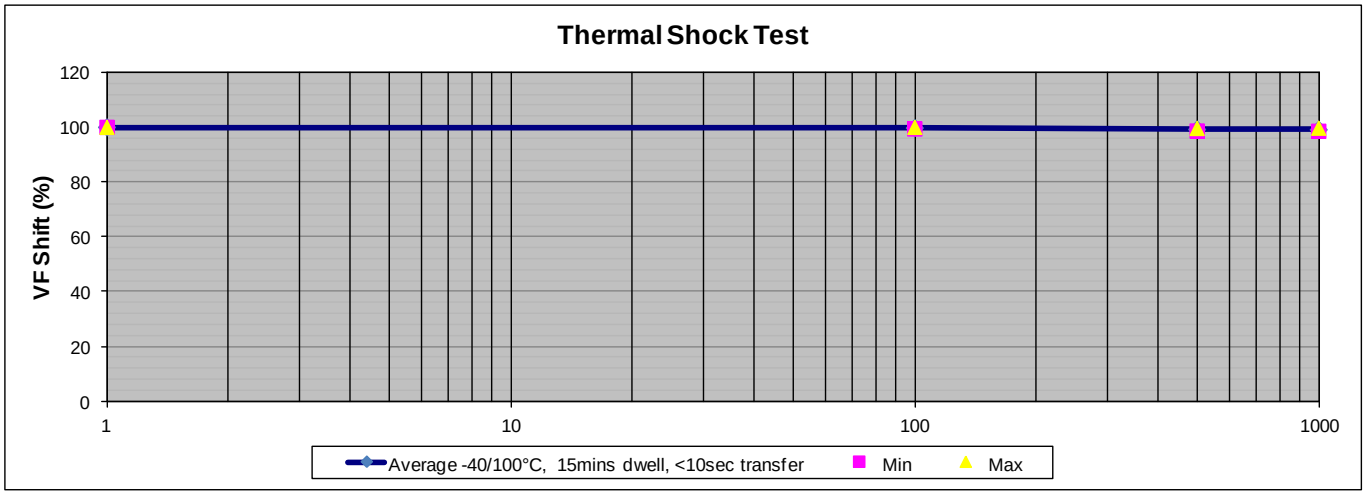
Reference Device: DNW-EJG



Note:

100X max = 0.000%

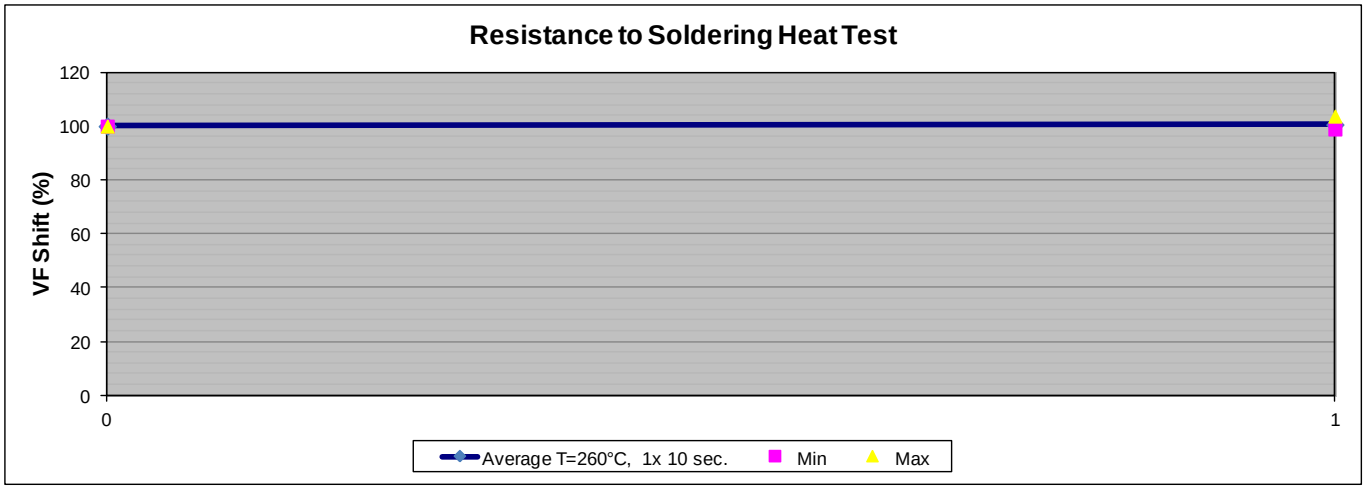
500X max = -0.398%

1000X max = -0.294%

100X min = -0.572%

500X min = -1.335%

1000X min = -1.431%



Note:

1X max = 3.727%

1X min = -1.051%

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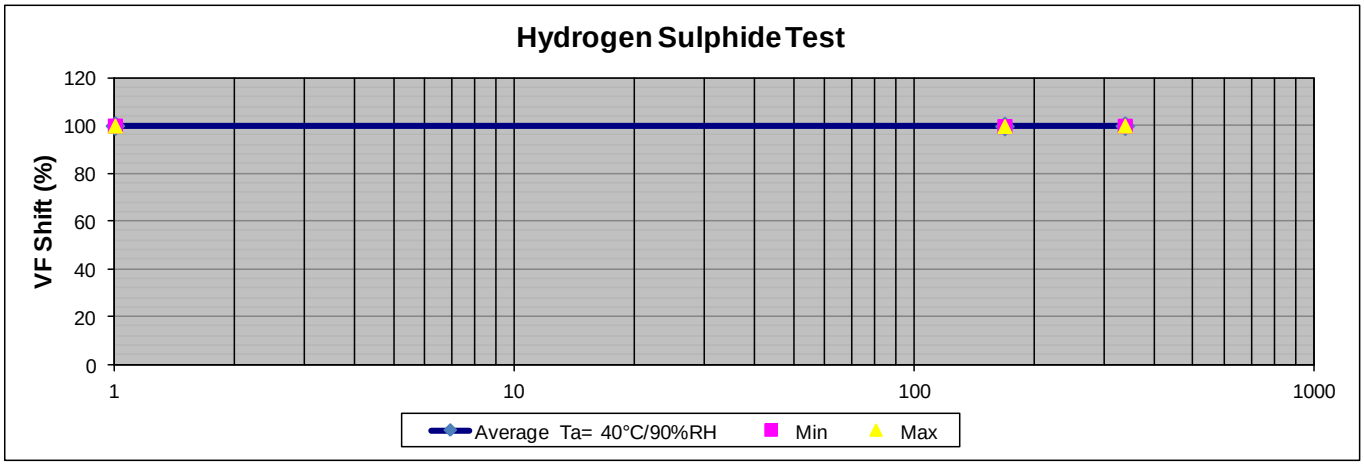
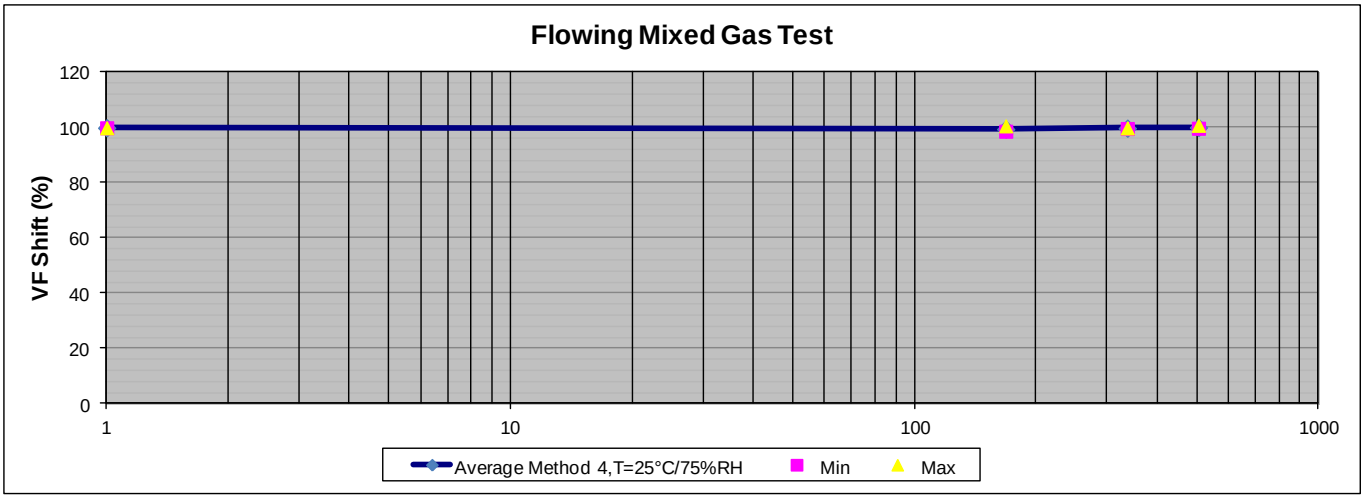


Note:

168hrs max = -0.159% 336hrs max = 0.026%

168hrs min = -0.204% 336hrs min = -0.077%



Note:

168hrs max = 0.707% 336hrs max = -0.032% 504hrs max = 0.912%

168hrs min = -1.239% 336hrs min = -0.256% 504hrs min = -0.160%

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Corrosion Test

H2S

Before	After 336 hours

Observation: No black spots observed on metallic surface.

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FMG

Before	After 504 hours

Observation: No black spots observed on metallic surface.

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Reliability Test Data:

High Temperature Operating Life Test

T=70°C, IF= 20mA

Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
1	3.089	171.29	3.12	1.00	172.08	0.46	3.107	0.58	167.77	-2.05	3.108	0.62	168.24	-1.78
2	3.113	185.35	3.146	1.06	201.6	8.77	3.131	0.58	199.58	7.68	3.13	0.55	199.45	7.61
3	3.116	148.82	3.148	1.03	161.95	8.82	3.142	0.83	159.88	7.43	3.143	0.87	158.98	6.83
4	3.028	156.6	3.055	0.89	172.37	10.07	3.047	0.63	173.2	10.60	3.039	0.36	171.37	9.43
5	3.03	171.13	3.051	0.69	167.18	-2.31	3.048	0.59	165.93	-3.04	3.05	0.66	164.12	-4.10
6	3.079	157.97	3.115	1.17	154.62	-2.12	3.108	0.94	153.56	-2.79	3.107	0.91	152.12	-3.70
7	3.12	165.67	3.163	1.38	159.84	-3.52	3.154	1.09	160.3	-3.24	3.159	1.25	159.2	-3.91
8	3.136	183.59	3.189	1.69	199.64	8.74	3.175	1.24	201.75	9.89	3.176	1.28	200.61	9.27
9	3.041	160.14	3.06	0.62	166.04	3.68	3.053	0.39	161.68	0.96	3.056	0.49	159.34	-0.50
10	3.078	157.55	3.106	0.91	168.14	6.72	3.102	0.78	166.89	5.93	3.105	0.88	166.19	5.48
11	3.065	187.4	3.11	1.47	194.32	3.69	3.105	1.31	187.48	0.04	3.099	1.11	189.72	1.24
12	3.152	153.49	3.201	1.55	159.27	3.77	3.193	1.30	159.59	3.97	3.197	1.43	157.93	2.89
13	3.041	181.32	3.07	0.95	170.13	-6.17	3.064	0.76	170.18	-6.14	3.068	0.89	169.76	-6.38
14	3.148	179.5	3.203	1.75	195.71	9.03	3.196	1.52	197.36	9.95	3.192	1.40	196.31	9.36
15	3.042	155.37	3.062	0.66	166.46	7.14	3.056	0.46	167.41	7.75	3.058	0.53	167.5	7.81
16	3.053	142.29	3.076	0.75	156.51	9.99	3.07	0.56	154.98	8.92	3.072	0.62	154.98	8.92
17	3.027	186.18	3.053	0.86	202	8.50	3.043	0.53	202.8	8.93	3.034	0.23	198.67	6.71
18	3.146	183.56	3.206	1.91	190.37	3.71	3.198	1.65	193.16	5.23	3.194	1.53	190.69	3.88
19	3.031	168.66	3.056	0.82	180.01	6.73	3.089	1.91	179.52	6.44	3.043	0.40	176.41	4.60
20	3.101	154.55	3.128	0.87	164.5	6.44	3.121	0.64	167.12	8.13	3.124	0.74	167.07	8.10
21	3.121	153.6	3.151	0.96	161.67	5.25	3.14	0.61	161.1	4.88	3.142	0.67	163.6	6.51
22	3.117	179.17	3.164	1.51	197.06	9.98	3.148	0.99	197.73	10.36	3.139	0.71	195.75	9.25
23	3.13	156.28	3.167	1.18	156.7	0.27	3.16	0.96	157.65	0.88	3.165	1.12	156.56	0.18
24	3.037	147.47	3.06	0.76	168.59	14.32	3.054	0.56	166.8	13.11	3.054	0.56	165.38	12.14
25	3.074	151.83	3.097	0.75	156.3	2.94	3.095	0.68	158.36	4.30	3.098	0.78	158.76	4.56
26	3.027	188.87	3.053	0.86	202.84	7.40	3.046	0.63	204.24	8.14	3.046	0.63	203.71	7.86
27	3.129	185	3.179	1.60	200.9	8.59	3.173	1.41	197.46	6.74	3.174	1.44	196.79	6.37
28	3.071	178.35	3.106	1.14	173.85	-2.52	3.099	0.91	174.89	-1.94	3.102	1.01	173.47	-2.74
29	3.112	183.8	3.139	0.87	199.05	8.30	3.126	0.45	200.48	9.08	3.12	0.26	199.6	8.60
30	3.124	183.08	3.155	0.99	200.87	9.72	3.151	0.86	201.03	9.80	3.146	0.70	199.47	8.95
31	3.015	189.64	3.034	0.63	198.94	4.90	3.02	0.17	194.71	2.67	3.015	0.00	193	1.77
32	3.125	182.94	3.166	1.31	180.86	-1.14	3.153	0.90	181.32	-0.89	3.153	0.90	180.97	-1.08
33	3.066	182.2	3.107	1.34	199.7	9.60	3.101	1.14	201.12	10.38	3.098	1.04	199.25	9.36
34	3.139	166.55	3.164	0.80	164.87	-1.01	3.155	0.51	166.66	0.07	3.154	0.48	164.72	-1.10
35	3.06	186.04	3.099	1.27	199.85	7.42	3.092	1.05	201.44	8.28	3.09	0.98	200.97	8.03
36	3.121	153.66	3.164	1.38	160.33	4.34	3.158	1.19	159.47	3.78	3.163	1.35	158.16	2.93
37	3.079	171.61	3.113	1.10	191.96	11.86	3.112	1.07	169.98	-0.95	3.115	1.17	169.4	-1.29
38	3.116	166.96	3.145	0.93	168.34	0.83	3.138	0.71	169.75	1.67	3.138	0.71	167.55	0.35
39	3.127	171.54	3.164	1.18	166.27	-3.07	3.159	1.02	168.61	-1.71	3.162	1.12	168.62	-1.70
40	3.116	179.67	3.167	1.64	174.4	-2.93	3.162	1.48	176.53	-1.75	3.167	1.64	178.66	-0.56

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Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
41	3.113	178.24	3.16	1.51	165.01	-7.42	3.155	1.35	165.63	-7.07	3.159	1.48	162.69	-8.72
42	3.078	180.74	3.104	0.84	198.21	9.67	3.09	0.39	200.85	11.13	3.091	0.42	198.96	10.08
43	3.113	165.97	3.147	1.09	186.82	12.56	3.143	0.96	161.52	-2.68	3.146	1.06	158.42	-4.55
44	3.114	154.01	3.139	0.80	159.81	3.77	3.129	0.48	160.75	4.38	3.133	0.61	160.79	4.40
45	3.146	155.89	3.19	1.40	154.53	-0.87	3.183	1.18	151.26	-2.97	3.188	1.34	149.88	-3.86
46	3.117	179.75	3.166	1.57	194.33	8.11	3.149	1.03	194.17	8.02	3.15	1.06	193.76	7.79
47	3.064	155.54	3.087	0.75	166.18	6.84	3.073	0.29	167.11	7.44	3.077	0.42	165.51	6.41
48	3.135	149.52	3.174	1.24	157.95	5.64	3.168	1.05	160.54	7.37	3.173	1.21	160.3	7.21
49	3.022	178.84	3.052	0.99	164.88	-7.81	3.045	0.76	164.14	-8.22	3.049	0.89	166.45	-6.93
50	3.104	180.26	3.153	1.58	186.92	3.69	3.145	1.32	182.84	1.43	3.151	1.51	183.52	1.81
51	3.027	155.74	3.046	0.63	160.65	3.15	3.039	0.40	158.75	1.93	3.045	0.59	158.71	1.91
52	3.132	159.34	3.171	1.25	163.58	2.66	3.166	1.09	163.84	2.82	3.171	1.25	165.22	3.69
53	3.122	157.8	3.155	1.06	165.98	5.18	3.146	0.77	166.47	5.49	3.147	0.80	167.9	6.40
54	3.11	158.38	3.149	1.25	163.13	3.00	3.143	1.06	163.19	3.04	3.147	1.19	163.39	3.16
55	3.041	146.49	3.06	0.62	159.54	8.91	3.055	0.46	160.15	9.32	3.057	0.53	158.72	8.35
56	3.038	145.2	3.06	0.72	160.07	10.24	3.053	0.49	159.2	9.64	3.054	0.53	158.77	9.35
57	3.067	159.11	3.094	0.88	166.93	4.91	3.088	0.68	167.26	5.12	3.093	0.85	168.13	5.67
58	3.093	180.17	3.138	1.45	195.98	8.78	3.133	1.29	194.51	7.96	3.142	1.58	186.1	3.29
59	3.117	139.98	3.157	1.28	156.16	11.56	3.153	1.15	153.63	9.75	3.16	1.38	149.8	7.02
60	3.111	151.16	3.14	0.93	157.99	4.52	3.13	0.61	157.51	4.20	3.135	0.77	157.99	4.52
61	3.124	175.98	3.173	1.57	183.17	4.09	3.168	1.41	187.1	6.32	3.173	1.57	185.69	5.52
62	3.081	168.97	3.104	0.75	186.05	10.11	3.094	0.42	191.16	13.13	3.095	0.45	191.67	13.43
63	3.042	158.98	3.062	0.66	167.86	5.59	3.056	0.46	167.97	5.65	3.059	0.56	167.36	5.27
64	3.084	153.47	3.115	1.01	170.13	10.86	3.108	0.78	170.77	11.27	3.112	0.91	171.23	11.57
65	3.131	183.85	3.204	2.33	204.99	11.50	3.197	2.11	204.23	11.09	3.187	1.79	204.21	11.07
66	3.079	174.94	3.117	1.23	168.5	-3.68	3.112	1.07	159.05	-9.08	3.118	1.27	159.49	-8.83
67	3.114	186.52	3.143	0.93	200.29	7.38	3.132	0.58	201.26	7.90	3.132	0.58	199.61	7.02
68	3.089	158.98	3.118	0.94	166.08	4.47	3.11	0.68	166.64	4.82	3.115	0.84	166.48	4.72
69	3.123	186.17	3.183	1.92	201.27	8.11	3.173	1.60	203	9.04	3.163	1.28	202.23	8.63
70	3.042	153.35	3.059	0.56	162.66	6.07	3.055	0.43	162.35	5.87	3.058	0.53	161.7	5.45
71	3.123	184.59	3.169	1.47	173.86	-5.81	3.164	1.31	173.02	-6.27	3.167	1.41	172.99	-6.28
72	3.064	189.93	3.097	1.08	202.72	6.73	3.09	0.85	204.92	7.89	3.086	0.72	203.55	7.17
73	3.13	146.81	3.166	1.15	158.09	7.68	3.154	0.77	154.28	5.09	3.154	0.77	152.79	4.07
74	3.166	179.26	3.229	1.99	173.15	-3.41	3.222	1.77	173.38	-3.28	3.226	1.90	172.36	-3.85
75	3.089	151.47	3.115	0.84	152.57	0.73	3.11	0.68	149.73	-1.15	3.114	0.81	149.01	-1.62
76	3.139	188.07	3.197	1.85	200.8	6.77	3.187	1.53	203.28	8.09	3.179	1.27	203	7.94
77	3.13	177.84	3.166	1.15	192.1	8.02	3.139	0.29	191.67	7.78	3.14	0.32	192.83	8.43
78	3.073	170.57	3.113	1.30	195.64	14.70	3.101	0.91	195.69	14.73	3.097	0.78	195.19	14.43
79	3.137	149.57	3.171	1.08	160.56	7.35	3.16	0.73	160.88	7.56	3.164	0.86	161.1	7.71
80	3.178	158.73	3.217	1.23	163.98	3.31	3.196	0.57	162.81	2.57	3.196	0.57	161.77	1.92
Average				1.139		4.936		0.892		4.483		0.908		4.012
Min				0.559		-7.806		0.166		-9.083		0.000		-8.832
Max				2.332		14.698		2.108		14.727		1.895		14.434

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Intermittent Operating Life Test

2 mins "On", 2mins "Off", IF=20mA

Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
1	3.066	154.29	3.077	0.36	157.87	2.32	3.083	0.55	169.18	9.65	3.078	0.39	165.75	7.43
2	3.114	173.11	3.124	0.32	158.78	-8.28	3.133	0.61	172.24	-0.50	3.133	0.61	167.45	-3.27
3	3.079	194.23	3.088	0.29	171.33	-11.79	3.097	0.58	193.95	-0.14	3.094	0.49	189.72	-2.32
4	3.107	191.69	3.121	0.45	197.69	3.13	3.138	1.00	204.74	6.81	3.14	1.06	200.44	4.56
5	3.09	182.08	3.105	0.49	157.72	-13.38	3.113	0.74	189.28	3.95	3.108	0.58	186.02	2.16
6	3.154	194.05	3.171	0.54	173.93	-10.37	3.181	0.86	174.03	-10.32	3.183	0.92	167.02	-13.93
7	3.025	187.51	3.032	0.23	170.54	-9.05	3.036	0.36	179.5	-4.27	3.036	0.36	172.39	-8.06
8	3.11	174.9	3.122	0.39	157.69	-9.84	3.129	0.61	176.14	0.71	3.13	0.64	169.43	-3.13
9	3.138	180.37	3.151	0.41	163.12	-9.56	3.155	0.54	183.17	1.55	3.156	0.57	163.27	-9.48
10	3.039	201.46	3.043	0.13	198.59	-1.42	3.045	0.20	195.19	-3.11	3.046	0.23	189.57	-5.90
11	3.056	193.63	3.071	0.49	202.73	4.70	3.077	0.69	204.17	5.44	3.077	0.69	196.77	1.62
12	3.077	185.32	3.09	0.42	158.94	-14.23	3.099	0.71	172.4	-6.97	3.098	0.68	158.48	-14.48
13	3.027	192.76	3.038	0.36	173.8	-9.84	3.043	0.53	183.55	-4.78	3.04	0.43	183.1	-5.01
14	3.096	179.13	3.113	0.55	175.06	-2.27	3.122	0.84	173.5	-3.14	3.121	0.81	165.46	-7.63
15	3.048	161.06	3.054	0.20	156.76	-2.67	3.059	0.36	163.14	1.29	3.057	0.30	161.49	0.27
16	3.085	186.9	3.098	0.42	162.39	-13.11	3.1	0.49	166.61	-10.86	3.103	0.58	162.85	-12.87
17	3.083	185.41	3.095	0.39	167.72	-9.54	3.095	0.39	160.29	-13.55	3.102	0.62	159.78	-13.82
18	3.067	167.91	3.082	0.49	168.53	0.37	3.082	0.49	168.27	0.21	3.082	0.49	166.05	-1.11
19	3.137	189.82	3.149	0.38	159.01	-16.23	3.159	0.70	174.19	-8.23	3.164	0.86	170.29	-10.29
20	3.153	162.51	3.165	0.38	161.91	-0.37	3.18	0.86	177.92	9.48	3.184	0.98	173.02	6.47
21	3.12	185.5	3.132	0.38	193.16	4.13	3.141	0.67	196.39	5.87	3.149	0.93	170.74	-7.96
22	3.126	177.78	3.137	0.35	186.52	4.92	3.148	0.70	165.93	-6.67	3.151	0.80	159.62	-10.21
23	3.12	159.01	3.129	0.29	148.61	-6.54	3.136	0.51	153.5	-3.47	3.138	0.58	152.53	-4.08
24	3.122	187.46	3.133	0.35	159.59	-14.87	3.14	0.58	169.45	-9.61	3.145	0.74	166.56	-11.15
25	3.12	182.61	3.131	0.35	158.33	-13.30	3.139	0.61	163.24	-10.61	3.143	0.74	160.09	-12.33
26	3.158	178.96	3.171	0.41	156.68	-12.45	3.177	0.60	173.81	-2.88	3.185	0.85	166.4	-7.02
27	3.088	186.66	3.101	0.42	170.83	-8.48	3.106	0.58	189.06	1.29	3.11	0.71	182.78	-2.08
28	3.095	157.46	3.102	0.23	148.35	-5.79	3.107	0.39	157.6	0.09	3.11	0.48	155.67	-1.14
29	3.034	159.86	3.036	0.07	154.32	-3.47	3.042	0.26	163.28	2.14	3.041	0.23	154.23	-3.52
30	3.081	189.05	3.092	0.36	172.78	-8.61	3.109	0.91	196.93	4.17	3.109	0.91	190.12	0.57
31	3.03	187.38	3.038	0.26	176.37	-5.88	3.045	0.50	180.07	-3.90	3.044	0.46	172.29	-8.05
32	3.084	173.61	3.094	0.32	162.76	-6.25	3.1	0.52	185.12	6.63	3.099	0.49	181.97	4.82
33	3.05	185.41	3.059	0.30	192.19	3.66	3.064	0.46	176.51	-4.80	3.063	0.43	170.07	-8.27
34	3.108	182.1	3.12	0.39	186.14	2.22	3.132	0.77	181.2	-0.49	3.135	0.87	170.76	-6.23
35	3.061	191.71	3.071	0.33	160.49	-16.29	3.077	0.52	189.69	-1.05	3.077	0.52	181.32	-5.42
36	3.1	175.28	3.108	0.26	157.78	-9.98	3.114	0.45	177.56	1.30	3.115	0.48	167.31	-4.55
37	3.04	188.08	3.053	0.43	158.96	-15.48	3.056	0.53	178.65	-5.01	3.06	0.66	171.82	-8.65
38	3.112	190.52	3.128	0.51	162.8	-14.55	3.134	0.71	187.9	-1.38	3.211	3.18	164.42	-13.70
39	3.076	166.86	3.08	0.13	151.8	-9.03	3.087	0.36	166.17	-0.41	3.15	2.41	161.13	-3.43
40	3.088	193.35	3.099	0.36	169.75	-12.21	3.106	0.58	179.58	-7.12	3.184	3.11	180.64	-6.57

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Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
41	3.073	160.25	3.08	0.23	148.09	-7.59	3.081	0.26	157.5	-1.72	3.112	1.27	156.11	-2.58
42	3.113	187.23	3.125	0.39	191.94	2.52	3.132	0.61	192.1	2.60	3.142	0.93	157.31	-15.98
43	3.018	195.19	3.021	0.10	189.08	-3.13	3.02	0.07	195.57	0.19	3.028	0.33	183.86	-5.80
44	3.089	156.1	3.098	0.29	157.24	0.73	3.106	0.55	168.35	7.85	3.191	3.30	162.93	4.38
45	3.103	189.92	3.119	0.52	166.17	-12.51	3.121	0.58	186.46	-1.82	3.216	3.64	169.46	-10.77
46	3.05	157.99	3.054	0.13	147.68	-6.53	3.055	0.16	156.54	-0.92	3.085	1.15	154.82	-2.01
47	3.027	188.12	3.034	0.23	166.35	-11.57	3.039	0.40	184.84	-1.74	3.041	0.46	174.2	-7.40
48	3.064	181.63	3.069	0.16	155.04	-14.64	3.074	0.33	185.61	2.19	3.078	0.46	180.46	-0.64
49	3.096	166.03	3.102	0.19	151.56	-8.72	3.108	0.39	153.33	-7.65	3.112	0.52	154.36	-7.03
50	3.081	186.76	3.096	0.49	158.5	-15.13	3.101	0.65	178.35	-4.50	3.105	0.78	170.93	-8.48
51	3.108	180.75	3.122	0.45	184.77	2.22	3.136	0.90	190.07	5.16	3.14	1.03	186.09	2.95
52	3.105	164.36	3.112	0.23	152.41	-7.27	3.118	0.42	160.16	-2.56	3.122	0.55	157.24	-4.33
53	3.114	158.05	3.118	0.13	150.59	-4.72	3.125	0.35	163.79	3.63	3.13	0.51	160.67	1.66
54	3.077	182.11	3.087	0.32	152.02	-16.52	3.093	0.52	173.22	-4.88	3.095	0.58	168.67	-7.38
55	3.149	179.7	3.164	0.48	158.6	-11.74	3.175	0.83	180.54	0.47	3.176	0.86	176.79	-1.62
56	3.029	187.14	3.036	0.23	168.38	-10.02	3.039	0.33	176.02	-5.94	3.041	0.40	174.28	-6.87
57	3.059	197.41	3.065	0.20	200.96	1.80	3.074	0.49	171.11	-13.32	3.072	0.42	183.32	-7.14
58	3.117	176.43	3.127	0.32	152.36	-13.64	3.138	0.67	167.81	-4.89	3.139	0.71	161.49	-8.47
59	3.112	163.95	3.12	0.26	163.2	-0.46	3.13	0.58	161.64	-1.41	3.131	0.61	158.12	-3.56
60	3.113	156.38	3.12	0.22	155.09	-0.82	3.129	0.51	162.46	3.89	3.129	0.51	160.21	2.45
61	3.11	183.65	3.127	0.55	187.04	1.85	3.142	1.03	187.16	1.91	3.145	1.13	182.88	-0.42
62	3.035	192.5	3.043	0.26	161.84	-15.93	3.049	0.46	166.35	-13.58	3.047	0.40	178.67	-7.18
63	3.157	190.38	3.171	0.44	168.1	-11.70	3.182	0.79	174.22	-8.49	3.18	0.73	169.27	-11.09
64	3.105	190.36	3.118	0.42	192.5	1.12	3.133	0.90	182.31	-4.23	3.134	0.93	174.88	-8.13
65	3.058	149.15	3.064	0.20	149.77	0.42	3.071	0.43	163.34	9.51	3.07	0.39	161.2	8.08
66	3.108	160.01	3.117	0.29	162.35	1.46	3.122	0.45	165.33	3.32	3.127	0.61	162.74	1.71
67	3.034	164.12	3.034	0.00	150.87	-8.07	3.036	0.07	165.92	1.10	3.04	0.20	164.59	0.29
68	3.105	186.94	3.119	0.45	159.5	-14.68	3.124	0.61	165.29	-11.58	3.131	0.84	161.42	-13.65
69	3.072	189.06	3.086	0.46	157.92	-16.47	3.09	0.59	163.36	-13.59	3.094	0.72	161.25	-14.71
70	3.02	205.43	3.024	0.13	212.2	3.30	3.026	0.20	214.44	4.39	3.029	0.30	200.55	-2.38
71	3.082	157.35	3.09	0.26	154.25	-1.97	3.095	0.42	165.05	4.89	3.1	0.58	166.16	5.60
72	3.106	187.12	3.124	0.58	159.63	-14.69	3.13	0.77	170.9	-8.67	3.135	0.93	166.89	-10.81
73	3.066	192.93	3.075	0.29	196.79	2.00	3.084	0.59	184.33	-4.46	3.089	0.75	180.72	-6.33
74	3.074	152.54	3.081	0.23	153.21	0.44	3.085	0.36	160.33	5.11	3.088	0.46	157.77	3.43
75	3.101	151.08	3.112	0.35	152.46	0.91	3.115	0.45	161.96	7.20	3.121	0.64	158.13	4.67
76	3.029	173.91	3.029	0.00	154.14	-11.37	3.03	0.03	186.04	6.97	3.034	0.17	181.95	4.62
77	3.02	157.27	3.019	-0.03	153.64	-2.31	3.021	0.03	164.19	4.40	3.023	0.10	161.56	2.73
78	3.092	186.95	3.108	0.52	164.57	-11.97	3.113	0.68	187.81	0.46	3.12	0.91	181.69	-2.81
79	3.072	175.85	3.08	0.26	168.38	-4.25	3.085	0.42	182.88	4.00	3.09	0.59	171.22	-2.63
80	3.055	182.08	3.066	0.36	156.95	-13.80	3.071	0.52	166.78	-8.40	3.074	0.62	162.8	-10.59
Average				0.322		-6.664		0.534		-1.347		0.786		-4.450
Min				-0.033		-16.523		0.033		-13.594		0.099		-15.980
Max				0.580		4.916		1.029		9.651		3.642		8.079

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Wet High Temperature Reverse Biased Test

85°C/85%RH, VR=4V

Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
1	3.067	178.95	3.047	-0.65	150.09	-16.13	3.038	-0.95	145.95	-18.44	3.023	-1.43	146.25	-18.27
2	3.088	179.79	3.071	-0.55	156.6	-12.90	3.061	-0.87	153.04	-14.88	3.064	-0.78	155.42	-13.55
3	3.146	157.72	3.116	-0.95	178.13	12.94	3.096	-1.59	173.05	9.72	3.079	-2.13	162.33	2.92
4	3.088	177.57	3.065	-0.74	178.89	0.74	3.05	-1.23	171.32	-3.52	3.056	-1.04	162.76	-8.34
5	3.112	174.62	3.088	-0.77	157.51	-9.80	3.111	-0.03	153.8	-11.92	3.063	-1.57	145.67	-16.58
6	3.118	173.52	3.098	-0.64	146.32	-15.68	3.092	-0.83	143.35	-17.39	3.067	-1.64	141.58	-18.41
7	3.08	176.83	3.067	-0.42	160.79	-9.07	3.065	-0.49	160.18	-9.42	3.082	0.06	152.43	-13.80
8	3.082	185.07	3.066	-0.52	163.36	-11.73	3.072	-0.32	157.36	-14.97	3.051	-1.01	150.33	-18.77
9	3.115	178.05	3.098	-0.55	182.14	2.30	3.088	-0.87	167.38	-5.99	3.095	-0.64	155.81	-12.49
10	3.114	178.32	3.138	0.77	160.62	-9.93	3.128	0.45	159.26	-10.69	3.087	-0.87	151.47	-15.06
11	3.096	181.95	3.082	-0.45	168.56	-7.36	3.07	-0.84	165.67	-8.95	3.065	-1.00	155.21	-14.70
12	3.107	175.95	3.085	-0.71	159.56	-9.32	3.065	-1.35	160.51	-8.78	3.028	-2.54	150.53	-14.45
13	3.076	152.86	3.062	-0.46	169.02	10.57	3.049	-0.88	120.5	-21.17	3.058	-0.59	123.95	-18.91
14	3.147	179.59	3.128	-0.60	178.9	-0.38	3.154	0.22	177.44	-1.20	3.165	0.57	154.81	-13.80
15	3.127	168.21	3.11	-0.54	150.76	-10.37	3.092	-1.12	148.45	-11.75	3.077	-1.60	141.37	-15.96
16	3.119	171.63	3.112	-0.22	156.69	-8.70	3.118	-0.03	149.25	-13.04	3.117	-0.06	143.09	-16.63
17	3.025	175.28	3.03	0.17	160.32	-8.53	3.048	0.76	159.2	-9.17	3.004	-0.69	148.88	-15.06
18	3.023	178.38	3.011	-0.40	149.3	-16.30	3.006	-0.56	156.3	-12.38	3.067	1.46	147.77	-17.16
19	3.091	179.16	3.062	-0.94	186.12	3.88	3.054	-1.20	144.3	-19.46	3.041	-1.62	148.96	-16.86
20	3.1	164.72	3.07	-0.97	176.9	7.39	3.064	-1.16	144.52	-12.26	3.061	-1.26	143.84	-12.68
21	3.145	176.81	3.124	-0.67	167.31	-5.37	3.125	-0.64	165.97	-6.13	3.14	-0.16	162.12	-8.31
22	3.147	173.13	3.126	-0.67	186.02	7.45	3.113	-1.08	177.53	2.54	3.094	-1.68	167.65	-3.17
23	3.084	180.08	3.069	-0.49	170.23	-5.47	3.062	-0.71	182.27	1.22	3.042	-1.36	172.49	-4.21
24	3.055	154.29	3.03	-0.82	157.82	2.29	3.019	-1.18	118.78	-23.02	3.007	-1.57	129.3	-16.20
25	3.143	175.21	3.121	-0.70	175	-0.12	3.103	-1.27	175.55	0.19	3.087	-1.78	164.21	-6.28
26	3.056	181.31	3.039	-0.56	156.84	-13.50	3.038	-0.59	156.41	-13.73	3.097	1.34	146.87	-19.00
27	3.121	178.14	3.103	-0.58	161.64	-9.26	3.082	-1.25	161.12	-9.55	3.07	-1.63	151.07	-15.20
28	3.084	156.57	3.055	-0.94	176.91	12.99	3.05	-1.10	174.26	11.30	3.075	-0.29	164.77	5.24
29	3.105	177.72	3.087	-0.58	159.23	-10.40	3.058	-1.51	156.06	-12.19	3.044	-1.96	147.71	-16.89
30	3.045	154.82	3.026	-0.62	142.93	-7.68	3.012	-1.08	141.96	-8.31	2.999	-1.51	146.74	-5.22
31	3.145	178.36	3.153	0.25	172.81	-3.11	3.12	-0.79	177.45	-0.51	3.15	0.16	167.46	-6.11
32	3.119	170.32	3.127	0.26	152.84	-10.26	3.075	-1.41	150.93	-11.38	3.057	-1.99	143.23	-15.91
33	3.109	170.17	3.091	-0.58	145.62	-14.43	3.079	-0.96	146.44	-13.94	3.061	-1.54	139.16	-18.22
34	3.162	149.99	3.148	-0.44	172.05	14.71	3.126	-1.14	172.63	15.09	3.132	-0.95	162.26	8.18
35	3.122	166.66	3.097	-0.80	167.14	0.29	3.104	-0.58	166.12	-0.32	3.062	-1.92	154.23	-7.46
36	3.046	176.84	3.015	-1.02	184.7	4.44	2.997	-1.61	158.34	-10.46	2.987	-1.94	152.55	-13.74
37	3.084	176.63	3.069	-0.49	169.56	-4.00	3.1	0.52	171.97	-2.64	3.048	-1.17	163.01	-7.71
38	3.056	170.27	3.039	-0.56	157.15	-7.71	3.04	-0.52	154.93	-9.01	3.015	-1.34	146.42	-14.01
39	3.079	156.75	3.058	-0.68	170.96	9.07	3.047	-1.04	172.88	10.29	3.041	-1.23	164.85	5.17
40	3.151	165.76	3.135	-0.51	174.4	5.21	3.134	-0.54	132.65	-19.97	3.139	-0.38	155.08	-6.44

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Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
41	3.071	165.83	3.05	-0.68	156.95	-5.35	3.062	-0.29	145.78	-12.09	3.087	0.52	140.08	-15.53
42	3.158	169.54	3.136	-0.70	144.44	-14.80	3.124	-1.08	143.5	-15.36	3.12	-1.20	140.26	-17.27
43	3.057	180.83	3.038	-0.62	151.98	-15.95	3.029	-0.92	148.93	-17.64	3.009	-1.57	149.72	-17.20
44	3.103	175.65	3.087	-0.52	179.75	2.33	3.079	-0.77	180.78	2.92	3.067	-1.16	170.82	-2.75
45	3.05	154.37	3.026	-0.79	130.4	-15.53	3.017	-1.08	127.84	-17.19	3.083	1.08	132.15	-14.39
46	3.116	175.91	3.099	-0.55	181.11	2.96	3.099	-0.55	153.04	-13.00	3.067	-1.57	144.23	-18.01
47	3.152	169.28	3.131	-0.67	151.85	-10.30	3.162	0.32	148.6	-12.22	3.125	-0.86	144.56	-14.60
48	3.093	173.07	3.072	-0.68	175.88	1.62	3.083	-0.32	177.49	2.55	3.067	-0.84	166.97	-3.52
49	3.125	173.55	3.104	-0.67	199.59	15.00	3.081	-1.41	149.46	-13.88	3.069	-1.79	141.4	-18.52
50	3.058	174.35	3.031	-0.88	157.74	-9.53	3.017	-1.34	157.84	-9.47	3.015	-1.41	148.79	-14.66
51	3.024	177.73	3.011	-0.43	176.92	-0.46	3.066	1.39	177.81	0.05	3.035	0.36	165.77	-6.73
52	3.155	169.59	3.132	-0.73	174.55	2.92	3.121	-1.08	130.42	-23.10	3.102	-1.68	149.24	-12.00
53	3.155	164.8	3.127	-0.89	178.29	8.19	3.148	-0.22	146.61	-11.04	3.097	-1.84	146.77	-10.94
54	3.151	170.58	3.13	-0.67	156.08	-8.50	3.144	-0.22	152.64	-10.52	3.196	1.43	143	-16.17
55	3.124	156.91	3.102	-0.70	165.62	5.55	3.113	-0.35	175.49	11.84	3.133	0.29	163.87	4.44
56	3.114	180.62	3.087	-0.87	179.56	-0.59	3.073	-1.32	179.58	-0.58	3.052	-1.99	168.21	-6.87
57	3.041	155.53	3.024	-0.56	168.62	8.42	3.011	-0.99	122.14	-21.47	3.001	-1.32	125.58	-19.26
58	3.159	177.33	3.135	-0.76	189.66	6.95	3.118	-1.30	153.62	-13.37	3.094	-2.06	152.23	-14.15
59	3.108	153.82	3.076	-1.03	160.57	4.39	3.066	-1.35	139.07	-9.59	3.049	-1.90	134.12	-12.81
60	3.087	147.36	3.068	-0.62	150.08	1.85	3.055	-1.04	122.48	-16.88	3.039	-1.55	131.01	-11.10
61	3.128	175.64	3.095	-1.05	151.32	-13.85	3.08	-1.53	147.78	-15.86	3.059	-2.21	149.81	-14.71
62	3.076	165.62	3.059	-0.55	172.43	4.11	3.048	-0.91	165.94	0.19	3.03	-1.50	159.38	-3.77
63	3.124	173.2	3.107	-0.54	160.62	-7.26	3.095	-0.93	167.26	-3.43	3.073	-1.63	159.37	-7.98
64	3.154	141.41	3.118	-1.14	130.32	-7.84	3.099	-1.74	129.67	-8.30	3.072	-2.60	136.24	-3.66
65	3.1	175.26	3.082	-0.58	178.69	1.96	3.067	-1.06	179.32	2.32	3.048	-1.68	170.62	-2.65
66	3.135	174.66	3.113	-0.70	153.16	-12.31	3.097	-1.21	150.56	-13.80	3.074	-1.95	148.84	-14.78
67	3.062	179.4	3.047	-0.49	151.77	-15.40	3.082	0.65	149.48	-16.68	3.025	-1.21	152.26	-15.13
68	3.184	174.47	3.159	-0.79	151.48	-13.18	3.134	-1.57	149.23	-14.47	3.11	-2.32	143.02	-18.03
69	3.115	171.67	3.108	-0.22	183.24	6.74	3.125	0.32	149.83	-12.72	3.085	-0.96	140.57	-18.12
70	3.095	168.77	3.08	-0.48	175.29	3.86	3.072	-0.74	134.71	-20.18	3.054	-1.32	145.04	-14.06
71	3.054	149.79	3.04	-0.46	160.34	7.04	3.026	-0.92	123.29	-17.69	3.015	-1.28	128.51	-14.21
72	3.101	177.69	3.087	-0.45	182.72	2.83	3.091	-0.32	173.91	-2.13	3.056	-1.45	163.65	-7.90
73	3.055	150.97	3.055	0.00	129.31	-14.35	3.119	2.09	130.3	-13.69	3.014	-1.34	128.25	-15.05
74	3.055	177.5	3.036	-0.62	185.03	4.24	3.058	0.10	175.01	-1.40	3.005	-1.64	165.55	-6.73
75	3.166	172.59	3.143	-0.73	157.8	-8.57	3.152	-0.44	151.84	-12.02	3.105	-1.93	143.48	-16.87
76	3.117	172.25	3.122	0.16	153.6	-10.83	3.134	0.55	152.34	-11.56	3.076	-1.32	140.34	-18.53
77	3.099	172.93	3.075	-0.77	188.36	8.92	3.062	-1.19	155.29	-10.20	3.034	-2.10	147.06	-14.96
78	3.047	181.78	3.024	-0.75	188.53	3.71	3.007	-1.31	176.72	-2.78	3.004	-1.41	168.63	-7.23
79	3.073	176.45	3.055	-0.59	183.07	3.75	3.025	-1.56	146.93	-16.73	3.025	-1.56	150.58	-14.66
80	3.048	176.92	3.022	-0.85	158.01	-10.69	3.01	-1.25	156.46	-11.56	2.997	-1.67	146.96	-16.93
Average				-0.587		-2.890		-0.729		-8.986		-1.168		-11.775
Min				-1.141		-16.302		-1.744		-23.097		-2.600		-19.257
Max				0.771		15.004		2.095		15.094		1.456		8.181

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Wet High Temperature Operating Life Test

85°C/85%RH, IF=1mA

Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
1	2.985	162.12	2.957	-0.94	173.34	6.92	2.956	-0.97	149.45	-7.82	2.961	-0.80	141.06	-12.99
2	2.896	143.81	2.885	-0.38	169.77	18.05	2.888	-0.28	162.56	13.04	2.908	0.41	147.46	2.54
3	2.957	163.97	2.944	-0.44	160.47	-2.13	2.937	-0.68	159.42	-2.77	2.93	-0.91	138.89	-15.30
4	2.949	145.56	2.931	-0.61	167.92	15.36	2.922	-0.92	148.21	1.82	2.918	-1.05	125.6	-13.71
5	2.962	154.69	2.951	-0.37	169.98	9.88	2.943	-0.64	139.9	-9.56	2.936	-0.88	137.6	-11.05
6	2.996	160.15	2.976	-0.67	171.62	7.16	2.963	-1.10	156.64	-2.19	2.962	-1.13	126.57	-20.97
7	2.892	149.94	2.883	-0.31	164.87	9.96	2.888	-0.14	154.84	3.27	2.966	2.56	136.45	-9.00
8	2.955	128.02	2.94	-0.51	137.13	7.12	2.934	-0.71	134.13	4.77	2.924	-1.05	113.94	-11.00
9	2.988	150.9	2.969	-0.64	163.22	8.16	2.963	-0.84	146.06	-3.21	2.949	-1.31	136.44	-9.58
10	2.98	156.34	2.967	-0.44	167.91	7.40	2.967	-0.44	154.07	-1.45	2.969	-0.37	133.54	-14.58
11	3.032	138.33	3.013	-0.63	142.35	2.91	3.017	-0.49	139.79	1.06	3.014	-0.59	119.27	-13.78
12	2.959	122.96	2.944	-0.51	144.37	17.41	2.942	-0.57	139.4	13.37	2.935	-0.81	140.16	13.99
13	2.947	98.94	2.933	-0.48	108.51	9.67	2.934	-0.44	105.42	6.55	2.924	-0.78	120.98	22.28
14	2.958	164.24	2.945	-0.44	176.67	7.57	2.941	-0.57	162.61	-0.99	2.941	-0.57	143.31	-12.74
15	2.939	117.7	2.932	-0.24	137.75	17.03	2.93	-0.31	142.65	21.20	2.925	-0.48	127.19	8.06
16	2.892	146.36	2.884	-0.28	170.65	16.60	2.886	-0.21	161.38	10.26	2.92	0.97	137.9	-5.78
17	2.95	133.33	2.933	-0.58	141.07	5.81	2.927	-0.78	152.14	14.11	2.926	-0.81	125.3	-6.02
18	2.992	121.94	2.98	-0.40	144.37	18.39	2.978	-0.47	142.74	17.06	3.003	0.37	126.95	4.11
19	2.941	114.37	2.93	-0.37	134.52	17.62	2.929	-0.41	132.95	16.25	2.994	1.80	126.05	10.21
20	2.972	123.77	2.957	-0.50	148.61	20.07	2.953	-0.64	139.41	12.64	2.947	-0.84	136.47	10.26
21	3.034	136.71	3.017	-0.56	142.79	4.45	3.019	-0.49	136.39	-0.23	3.021	-0.43	120.87	-11.59
22	2.968	126.66	2.957	-0.37	144.14	13.80	2.96	-0.27	141.31	11.57	2.968	0.00	125.85	-0.64
23	2.942	121.97	2.932	-0.34	143.88	17.96	2.927	-0.51	146.14	19.82	2.918	-0.82	127.58	4.60
24	2.875	111.48	2.873	-0.07	134.85	20.96	2.877	0.07	130.69	17.23	2.883	0.28	123.01	10.34
25	2.979	135.8	2.968	-0.37	148.6	9.43	2.942	-1.24	146.67	8.00	2.954	-0.84	140.64	3.56
26	2.963	128.62	2.949	-0.47	146.22	13.68	2.949	-0.47	139.63	8.56	2.958	-0.17	146.45	13.86
27	2.99	160.18	2.975	-0.50	173.14	8.09	3.106	3.88	148.62	-7.22	2.969	-0.70	152.18	-4.99
28	2.948	120.17	2.937	-0.37	144	19.83	2.937	-0.37	131.01	9.02	2.927	-0.71	125.48	4.42
29	2.937	160.46	2.928	-0.31	163.75	2.05	2.918	-0.65	151.47	-5.60	2.916	-0.72	137.85	-14.09
30	2.959	124.18	2.947	-0.41	142.78	14.98	2.966	0.24	141.9	14.27	2.935	-0.81	131.43	5.84
31	2.965	131.07	2.953	-0.40	144.38	10.15	2.94	-0.84	149.73	14.24	2.941	-0.81	126.27	-3.66
32	2.936	132.7	2.927	-0.31	141.66	6.75	2.924	-0.41	157.55	18.73	2.913	-0.78	138.49	4.36
33	2.955	130.53	2.943	-0.41	147.89	13.30	2.94	-0.51	146.5	12.23	2.934	-0.71	133.43	2.22
34	2.971	131.15	2.958	-0.44	145.08	10.62	2.947	-0.81	139.76	6.57	2.982	0.37	134.34	2.43
35	2.971	121.18	2.955	-0.54	142.45	17.55	3.024	1.78	148.78	22.78	2.939	-1.08	136.96	13.02
36	2.939	169.21	2.927	-0.41	164.61	-2.72	2.933	-0.20	130.72	-22.75	2.914	-0.85	139.56	-17.52
37	2.945	123.35	2.931	-0.48	137.51	11.48	2.915	-1.02	150.92	22.35	2.932	-0.44	127.93	3.71
38	2.964	133.48	2.949	-0.51	142.18	6.52	2.941	-0.78	144.83	8.50	2.934	-1.01	144.64	8.36
39	2.958	123.83	2.943	-0.51	143.51	15.89	2.957	-0.03	137.97	11.42	2.932	-0.88	124.95	0.90
40	2.928	126.03	2.916	-0.41	143.08	13.53	2.95	0.75	133.5	5.93	2.904	-0.82	138.69	10.05

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Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
41	2.977	130.92	2.963	-0.47	137.32	4.89	2.922	-1.85	155.65	18.89	2.962	-0.50	130.96	0.03
42	2.959	122.13	2.948	-0.37	141.42	15.79	2.924	-1.18	134.79	10.37	2.913	-1.55	139.56	14.27
43	3.016	132.06	3.001	-0.50	142.7	8.06	2.94	-2.52	132.84	0.59	2.985	-1.03	139.37	5.54
44	3.004	121.47	2.99	-0.47	142.27	17.12	2.916	-2.93	144.92	19.31	2.903	-3.36	139.21	14.60
45	2.966	121.04	2.945	-0.71	130.33	7.68	2.945	-0.71	142.61	17.82	2.934	-1.08	119.05	-1.64
46	2.955	175.36	2.943	-0.41	181.5	3.50	2.959	0.14	163.89	-6.54	2.941	-0.47	133.65	-23.79
47	2.989	175.37	2.973	-0.54	174.18	-0.68	2.999	0.33	142.16	-18.94	2.973	-0.54	134.93	-23.06
48	2.968	164.48	2.954	-0.47	174.82	6.29	2.992	0.81	136.07	-17.27	2.939	-0.98	134.77	-18.06
49	2.955	120.96	2.942	-0.44	143.15	18.34	2.973	0.61	113.91	-5.83	2.926	-0.98	134.1	10.86
50	2.985	124.19	2.975	-0.34	142.77	14.96	2.942	-1.44	116.14	-6.48	2.975	-0.34	138.1	11.20
51	2.949	152.31	2.932	-0.58	173.9	14.18	2.968	0.64	158.17	3.85	2.928	-0.71	144.11	-5.38
52	2.978	124.45	2.966	-0.40	142.4	14.42	2.938	-1.34	140.21	12.66	2.939	-1.31	138.03	10.91
53	2.973	156.08	2.956	-0.57	167.05	7.03	2.979	0.20	140.17	-10.19	2.946	-0.91	139.19	-10.82
54	3.03	123.39	3.018	-0.40	148.58	20.41	2.947	-2.74	135.88	10.12	3.02	-0.33	115.35	-6.52
55	2.947	165.97	2.931	-0.54	171.79	3.51	2.932	-0.51	168.32	1.42	2.92	-0.92	140.5	-15.35
56	2.948	172.18	2.936	-0.41	177.02	2.81	2.938	-0.34	144.04	-16.34	2.924	-0.81	144.37	-16.15
57	2.961	123.14	2.951	-0.34	142.48	15.71	3.028	2.26	138.14	12.18	2.954	-0.24	132.82	7.86
58	2.954	165.21	2.942	-0.41	173.81	5.21	2.949	-0.17	157.45	-4.70	2.93	-0.81	126.62	-23.36
59	2.937	150.61	2.931	-0.20	170.7	13.34	3.022	2.89	149.27	-0.89	2.921	-0.54	124.67	-17.22
60	2.965	131.26	2.952	-0.44	143.53	9.35	2.927	-1.28	159.83	21.77	2.934	-1.05	135.32	3.09
61	2.969	150.08	2.951	-0.61	173.83	15.82	2.932	-1.25	166.96	11.25	2.936	-1.11	144.21	-3.91
62	2.924	159.56	2.914	-0.34	165.72	3.86	2.963	1.33	158.76	-0.50	2.905	-0.65	138.44	-13.24
63	2.954	163.68	2.94	-0.47	177.62	8.52	2.925	-0.98	161.29	-1.46	2.951	-0.10	132.46	-19.07
64	2.965	118.66	2.95	-0.51	139.77	17.79	2.948	-0.57	143.63	21.04	2.934	-1.05	134.29	13.17
65	2.984	168.53	2.97	-0.47	176.08	4.48	2.943	-1.37	161.88	-3.95	2.963	-0.70	149.39	-11.36
66	2.963	132.53	2.951	-0.40	143.02	7.92	2.978	0.51	146.02	10.18	2.932	-1.05	136.31	2.85
67	2.976	156.06	2.96	-0.54	174.34	11.71	2.91	-2.22	154.46	-1.03	2.95	-0.87	138.09	-11.51
68	3.012	130.42	3.004	-0.27	147.7	13.25	2.937	-2.49	160.67	23.19	3	-0.40	135.36	3.79
69	2.974	134.56	2.958	-0.54	153.46	14.05	2.945	-0.98	135.02	0.34	2.937	-1.24	135.96	1.04
70	2.891	113.98	2.887	-0.14	136.74	19.97	2.97	2.73	133.79	17.38	2.894	0.10	128.89	13.08
71	2.954	117.2	2.943	-0.37	138.72	18.36	2.945	-0.30	144.34	23.16	2.951	-0.10	122.53	4.55
72	2.958	169.59	2.943	-0.51	170.64	0.62	2.958	0.00	161.8	-4.59	2.934	-0.81	142.14	-16.19
73	2.951	159.31	2.938	-0.44	166.62	4.59	3.004	1.80	147.79	-7.23	2.922	-0.98	132.79	-16.65
74	2.951	169.36	2.936	-0.51	171.89	1.49	2.95	-0.03	157.04	-7.27	2.969	0.61	129.53	-23.52
75	2.963	145.08	2.945	-0.61	164.79	13.59	2.89	-2.46	140.74	-2.99	2.937	-0.88	128.51	-11.42
76	2.952	148.74	2.94	-0.41	160.73	8.06	2.935	-0.58	160.61	7.98	2.959	0.24	131.27	-11.75
77	2.964	128.3	2.951	-0.44	144.56	12.67	2.933	-1.05	156.79	22.21	2.944	-0.67	131.35	2.38
78	3.004	154.9	2.986	-0.60	177.58	14.64	2.94	-2.13	157.19	1.48	3.006	0.07	118.17	-23.71
79	2.961	154.83	2.947	-0.47	166.58	7.59	2.94	-0.71	143.38	-7.40	2.943	-0.61	135.55	-12.45
80	3.021	150.23	3.001	-0.66	167.13	11.25	2.939	-2.71	152.3	1.38	3.056	1.16	127.53	-15.11
Average				-0.452		10.768		-0.451		5.347		-0.572		-3.523
Min				-0.938		-2.719		-2.929		-22.747		-3.362		-23.785
Max				-0.070		20.963		3.880		23.194		2.559		22.276

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Low Temperature Storage Test

T=-40°C

Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
1	3.081	179.81	3.08	-0.03	178.85	-0.53	3.081	0.00	179.25	-0.31	3.08	-0.03	178.62	-0.66
2	3.026	185.27	3.024	-0.07	180.14	-2.77	3.026	0.00	182.98	-1.24	3.023	-0.10	182.6	-1.44
3	3.115	181.47	3.114	-0.03	178.92	-1.41	3.116	0.03	180.63	-0.46	3.114	-0.03	180.46	-0.56
4	3.113	182.86	3.112	-0.03	181.88	-0.54	3.113	0.00	182.03	-0.45	3.111	-0.06	181.76	-0.60
5	3.113	186.34	3.11	-0.10	187.08	0.40	3.112	-0.03	188.81	1.33	3.111	-0.06	188.47	1.14
6	3.112	191.23	3.11	-0.06	188.37	-1.50	3.112	0.00	189.23	-1.05	3.11	-0.06	188.98	-1.18
7	3.072	148.84	3.071	-0.03	149.25	0.28	3.073	0.03	150.84	1.34	3.071	-0.03	150.96	1.42
8	3.13	166.25	3.131	0.03	155.73	-6.33	3.134	0.13	157.1	-5.50	3.13	0.00	156.56	-5.83
9	3.057	167.72	3.055	-0.07	164.25	-2.07	3.058	0.03	164.97	-1.64	3.054	-0.10	164.33	-2.02
10	3.087	170.84	3.085	-0.06	168.78	-1.21	3.087	0.00	168.92	-1.12	3.084	-0.10	168.02	-1.65
11	3.09	145.57	3.088	-0.06	145.1	-0.32	3.09	0.00	150.78	3.58	3.088	-0.06	150.16	3.15
12	3.048	184.32	3.046	-0.07	183.3	-0.55	3.048	0.00	183.68	-0.35	3.047	-0.03	182.92	-0.76
13	3.056	170.96	3.053	-0.10	171.11	0.09	3.056	0.00	172.35	0.81	3.056	0.00	171.75	0.46
14	3.084	168.23	3.086	0.06	160.92	-4.35	3.088	0.13	162.53	-3.39	3.085	0.03	161.79	-3.83
15	3.08	152.33	3.079	-0.03	147.43	-3.22	3.081	0.03	147.5	-3.17	3.082	0.06	148.1	-2.78
16	3.083	182.2	3.081	-0.06	180.88	-0.72	3.083	0.00	182.71	0.28	3.081	-0.06	182.46	0.14
17	3.098	145.42	3.096	-0.06	144.61	-0.56	3.099	0.03	145.84	0.29	3.098	0.00	146.21	0.54
18	3.108	170.01	3.106	-0.06	167.86	-1.26	3.109	0.03	167.36	-1.56	3.106	-0.06	167.34	-1.57
19	3.071	186.66	3.071	0.00	186.37	-0.16	3.073	0.07	186.72	0.03	3.071	0.00	186.98	0.17
20	3.09	151.77	3.089	-0.03	144.17	-5.01	3.092	0.06	146.38	-3.55	3.09	0.00	147.73	-2.66
21	3.066	175.93	3.064	-0.07	174.31	-0.92	3.067	0.03	174.28	-0.94	3.067	0.03	176.45	0.30
22	3.127	152	3.126	-0.03	143.36	-5.68	3.13	0.10	143.84	-5.37	3.129	0.06	145.16	-4.50
23	3.07	152.45	3.07	0.00	147.43	-3.29	3.073	0.10	147.98	-2.93	3.069	-0.03	150.84	-1.06
24	3.131	183.88	3.129	-0.06	182.89	-0.54	3.131	0.00	181.64	-1.22	3.128	-0.10	181.92	-1.07
25	3.088	142.16	3.085	-0.10	135.56	-4.64	3.089	0.03	138.12	-2.84	3.085	-0.10	139.81	-1.65
26	3.032	156.05	3.03	-0.07	153.38	-1.71	3.034	0.07	153.11	-1.88	3.03	-0.07	153.67	-1.53
27	3.109	152.38	3.107	-0.06	151.12	-0.83	3.11	0.03	151.23	-0.75	3.108	-0.03	151.88	-0.33
28	3.119	192.98	3.117	-0.06	192.18	-0.41	3.12	0.03	190.62	-1.22	3.116	-0.10	191.97	-0.52
29	3.067	175.25	3.065	-0.07	174.42	-0.47	3.067	0.00	173.95	-0.74	3.064	-0.10	174.76	-0.28
30	3.046	187.24	3.045	-0.03	186.82	-0.22	3.047	0.03	187.05	-0.10	3.044	-0.07	187.53	0.15
31	3.146	147.78	3.145	-0.03	140.92	-4.64	3.148	0.06	141.42	-4.30	3.144	-0.06	144.71	-2.08
32	3.081	143.56	3.08	-0.03	143.72	0.11	3.082	0.03	144.15	0.41	3.079	-0.06	145	1.00
33	3.118	170.41	3.116	-0.06	168.32	-1.23	3.12	0.06	164.89	-3.24	3.115	-0.10	169.21	-0.70
34	3.097	148.85	3.095	-0.06	142.85	-4.03	3.098	0.03	140.15	-5.84	3.095	-0.06	145.04	-2.56
35	3.093	153.12	3.092	-0.03	144.85	-5.40	3.094	0.03	142.68	-6.82	3.091	-0.06	147.32	-3.79
36	3.097	175.81	3.094	-0.10	175.25	-0.32	3.097	0.00	175.56	-0.14	3.093	-0.13	175.4	-0.23
37	3.104	161.49	3.104	0.00	153.07	-5.21	3.107	0.10	154.5	-4.33	3.103	-0.03	153.89	-4.71
38	3.093	171.57	3.09	-0.10	169.98	-0.93	3.093	0.00	171.77	0.12	3.089	-0.13	170.98	-0.34
39	3.105	186.35	3.103	-0.06	181.33	-2.69	3.106	0.03	183.84	-1.35	3.103	-0.06	182.98	-1.81
40	3.117	149.26	3.115	-0.06	147.61	-1.11	3.118	0.03	148.89	-0.25	3.116	-0.03	147.84	-0.95

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Reference Device: DNW-EJG

Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
41	3.093	178.38	3.09	-0.10	177.94	-0.25	3.094	0.03	178.75	0.21	3.09	-0.10	177.66	-0.40
42	3.119	169.02	3.121	0.06	158.03	-6.50	3.126	0.22	160.39	-5.11	3.121	0.06	159.81	-5.45
43	3.11	179.71	3.109	-0.03	179.76	0.03	3.114	0.13	181.1	0.77	3.108	-0.06	179.21	-0.28
44	3.102	179.51	3.099	-0.10	180.02	0.28	3.104	0.06	181	0.83	3.099	-0.10	178.94	-0.32
45	3.038	174.65	3.041	0.10	163.16	-6.58	3.044	0.20	164.21	-5.98	3.04	0.07	163.36	-6.46
46	3.117	169.02	3.114	-0.10	169.05	0.02	3.117	0.00	169.17	0.09	3.113	-0.13	168.04	-0.58
47	3.082	144.62	3.08	-0.06	147.34	1.88	3.084	0.06	150.03	3.74	3.081	-0.03	148.29	2.54
48	3.017	175.98	3.016	-0.03	175.91	-0.04	3.019	0.07	176.11	0.07	3.016	-0.03	175.56	-0.24
49	3.046	181.89	3.045	-0.03	183.32	0.79	3.048	0.07	183.79	1.04	3.046	0.00	184.61	1.50
50	3.094	156.36	3.093	-0.03	155.99	-0.24	3.097	0.10	157.2	0.54	3.092	-0.06	156.85	0.31
51	3.117	161.91	3.117	0.00	150.57	-7.00	3.12	0.10	155.72	-3.82	3.118	0.03	154.15	-4.79
52	3.117	186.55	3.115	-0.06	184.15	-1.29	3.119	0.06	185.99	-0.30	3.117	0.00	185.64	-0.49
53	3.131	147.12	3.129	-0.06	141.01	-4.15	3.133	0.06	142.56	-3.10	3.13	-0.03	144.17	-2.01
54	3.056	160.89	3.054	-0.07	161.12	0.14	3.058	0.07	161.83	0.58	3.055	-0.03	161.12	0.14
55	3.024	180.03	3.023	-0.03	179.07	-0.53	3.025	0.03	179.53	-0.28	3.022	-0.07	177.92	-1.17
56	3.149	180.74	3.148	-0.03	169.89	-6.00	3.151	0.06	172.17	-4.74	3.148	-0.03	170.79	-5.51
57	3.14	135.75	3.137	-0.10	137.1	0.99	3.141	0.03	136.82	0.79	3.139	-0.03	136.39	0.47
58	3.115	137.09	3.113	-0.06	135.31	-1.30	3.117	0.06	136.95	-0.10	3.113	-0.06	142.39	3.87
59	3.092	180.24	3.091	-0.03	179.22	-0.57	3.093	0.03	180.47	0.13	3.09	-0.06	179.12	-0.62
60	3.039	151.55	3.037	-0.07	150.29	-0.83	3.041	0.07	151.61	0.04	3.037	-0.07	150.3	-0.82
61	3.067	180.85	3.065	-0.07	180.12	-0.40	3.068	0.03	181.61	0.42	3.064	-0.10	180.15	-0.39
62	3.039	187.75	3.038	-0.03	184.76	-1.59	3.041	0.07	184.94	-1.50	3.038	-0.03	184.18	-1.90
63	3.091	179.42	3.089	-0.06	179.98	0.31	3.093	0.06	180.68	0.70	3.088	-0.10	179.2	-0.12
64	3.06	193.57	3.058	-0.07	192.77	-0.41	3.061	0.03	194.63	0.55	3.057	-0.10	193.66	0.05
65	3.145	138.1	3.142	-0.10	138.38	0.20	3.146	0.03	140.43	1.69	3.142	-0.10	139.32	0.88
66	3.043	170.39	3.041	-0.07	169.35	-0.61	3.044	0.03	173.9	2.06	3.04	-0.10	172.68	1.34
67	3.025	181.2	3.023	-0.07	183.32	1.17	3.026	0.03	185.31	2.27	3.023	-0.07	184.22	1.67
68	3.124	175.31	3.122	-0.06	174.43	-0.50	3.125	0.03	166.55	-5.00	3.121	-0.10	174.65	-0.38
69	3.138	179.88	3.135	-0.10	175.91	-2.21	3.139	0.03	169.5	-5.77	3.135	-0.10	179.18	-0.39
70	3.073	156.37	3.072	-0.03	156.25	-0.08	3.076	0.10	151.25	-3.27	3.073	0.00	158.11	1.11
71	3.142	150.64	3.141	-0.03	150.73	0.06	3.145	0.10	145.21	-3.60	3.144	0.06	150.11	-0.35
72	3.095	181.09	3.093	-0.06	178.87	-1.23	3.096	0.03	178.85	-1.24	3.092	-0.10	179.66	-0.79
73	3.072	179.46	3.071	-0.03	178.04	-0.79	3.075	0.10	178.58	-0.49	3.071	-0.03	179.46	0.00
74	3.16	153.31	3.159	-0.03	147.56	-3.75	3.163	0.09	148.06	-3.42	3.158	-0.06	149.54	-2.46
75	3.074	183.49	3.071	-0.10	183.63	0.08	3.075	0.03	184.4	0.50	3.07	-0.13	185.34	1.01
76	3.133	165.18	3.131	-0.06	165.28	0.06	3.134	0.03	165.38	0.12	3.13	-0.10	165.22	0.02
77	3.079	163.11	3.077	-0.06	163.53	0.26	3.08	0.03	163.46	0.21	3.075	-0.13	163.58	0.29
78	3.15	178.83	3.151	0.03	173.4	-3.04	3.155	0.16	173.36	-3.06	3.149	-0.03	172.14	-3.74
79	3.147	144.41	3.144	-0.10	146.65	1.55	3.148	0.03	147.75	2.31	3.143	-0.13	148.44	2.79
80	3.081	149.36	3.078	-0.10	148.69	-0.45	3.082	0.03	148	-0.91	3.078	-0.10	147.82	-1.03
Average				-0.050		-1.480		0.050		-1.149		-0.053		-0.848
Min				-0.098		-7.004		-0.032		-6.818		-0.130		-6.464
Max				0.099		1.881		0.224		3.741		0.066		3.866

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High Temperature Storage Test

T=100°C

Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
1	3.06	195.86	3.049	-0.36	194.04	-0.93	3.045	-0.49	192	-1.97	3.044	-0.52	194.15	-0.87
2	3.123	152.17	3.093	-0.96	137.79	-9.45	3.078	-1.44	135.36	-11.05	3.071	-1.67	138.26	-9.14
3	3.057	168.06	3.039	-0.59	153.2	-8.84	3.032	-0.82	150.86	-10.23	3.026	-1.01	154.34	-8.16
4	3.118	182.76	3.091	-0.87	178.3	-2.44	3.08	-1.22	178.66	-2.24	3.075	-1.38	180.79	-1.08
5	3.044	155.56	3.025	-0.62	146.47	-5.84	3.019	-0.82	144.65	-7.01	3.014	-0.99	146.81	-5.62
6	3.126	152.54	3.101	-0.80	139.5	-8.55	3.093	-1.06	138.97	-8.90	3.09	-1.15	141.01	-7.56
7	3.101	140.28	3.073	-0.90	132.12	-5.82	3.064	-1.19	131.22	-6.46	3.059	-1.35	132.68	-5.42
8	3.037	144.9	3.013	-0.79	142.86	-1.41	3.007	-0.99	143.68	-0.84	3.002	-1.15	144.71	-0.13
9	3.092	188.41	3.062	-0.97	183.92	-2.38	3.053	-1.26	184.78	-1.93	3.047	-1.46	186.61	-0.96
10	3.054	180.97	3.039	-0.49	161.88	-10.55	3.032	-0.72	163.57	-9.61	3.027	-0.88	169.29	-6.45
11	3.088	174.72	3.069	-0.62	154.34	-11.66	3.062	-0.84	155.6	-10.94	3.058	-0.97	161.09	-7.80
12	3.06	184.12	3.034	-0.85	173.9	-5.55	3.025	-1.14	173.95	-5.52	3.02	-1.31	175.26	-4.81
13	3.076	146.48	3.052	-0.78	137.82	-5.91	3.046	-0.98	137.04	-6.44	3.042	-1.11	139.4	-4.83
14	3.163	150.95	3.128	-1.11	136.75	-9.41	3.117	-1.45	136.39	-9.65	3.111	-1.64	138.83	-8.03
15	3.067	191.22	3.044	-0.75	186.58	-2.43	3.04	-0.88	186.55	-2.44	3.037	-0.98	188.26	-1.55
16	3.135	188.26	3.102	-1.05	186.79	-0.78	3.098	-1.18	176	-6.51	3.092	-1.37	178.68	-5.09
17	3.127	179.01	3.099	-0.90	158.79	-11.30	3.089	-1.22	164.68	-8.01	3.082	-1.44	168.83	-5.69
18	3.139	187.06	3.107	-1.02	181.74	-2.84	3.097	-1.34	181	-3.24	3.091	-1.53	182.9	-2.22
19	3.071	151.13	3.04	-1.01	155.01	2.57	3.03	-1.34	157.46	4.19	3.024	-1.53	164.53	8.87
20	3.071	177.55	3.045	-0.85	162.7	-8.36	3.034	-1.20	165.76	-6.64	3.029	-1.37	171.4	-3.46
21	3.042	153.87	3.017	-0.82	146.47	-4.81	3.011	-1.02	146.22	-4.97	3.007	-1.15	149.12	-3.09
22	3.104	175.75	3.068	-1.16	175.54	-0.12	3.058	-1.48	174.15	-0.91	3.051	-1.71	177.22	0.84
23	3.11	187.73	3.084	-0.84	174.56	-7.02	3.073	-1.19	178.74	-4.79	3.068	-1.35	184	-1.99
24	3.09	182.48	3.065	-0.81	179.32	-1.73	3.058	-1.04	179.89	-1.42	3.054	-1.17	181.59	-0.49
25	3.089	193.02	3.066	-0.74	188	-2.60	3.06	-0.94	186.86	-3.19	3.055	-1.10	189.03	-2.07
26	3.101	183.7	3.068	-1.06	179.41	-2.34	3.057	-1.42	176.22	-4.07	3.051	-1.61	178.36	-2.91
27	3.141	177.43	3.103	-1.21	174.64	-1.57	3.092	-1.56	173.68	-2.11	3.084	-1.81	176.23	-0.68
28	3.095	191.74	3.063	-1.03	186.48	-2.74	3.054	-1.32	186.71	-2.62	3.047	-1.55	189.19	-1.33
29	3.027	185.97	3.01	-0.56	182.95	-1.62	3.006	-0.69	182.64	-1.79	3.002	-0.83	184.39	-0.85
30	3.1	182.03	3.073	-0.87	176.64	-2.96	3.065	-1.13	176.12	-3.25	3.06	-1.29	178.33	-2.03
31	3.065	137.35	3.039	-0.85	133.94	-2.48	3.032	-1.08	134.49	-2.08	3.027	-1.24	136.24	-0.81
32	3.053	175.95	3.032	-0.69	160.47	-8.80	3.024	-0.95	155.89	-11.40	3.019	-1.11	161.73	-8.08
33	3.156	177.66	3.128	-0.89	150.85	-15.09	3.115	-1.30	149.43	-15.89	3.109	-1.49	154.01	-13.31
34	3.033	176.09	3.013	-0.66	148.76	-15.52	3.004	-0.96	151.02	-14.24	3	-1.09	155.15	-11.89
35	3.133	178.77	3.095	-1.21	169.13	-5.39	3.08	-1.69	169.55	-5.16	3.075	-1.85	173.59	-2.90
36	3.088	178.83	3.054	-1.10	175.95	-1.61	3.043	-1.46	174.1	-2.64	3.037	-1.65	176.18	-1.48
37	3.095	175.84	3.067	-0.90	159.67	-9.20	3.059	-1.16	159.4	-9.35	3.055	-1.29	163.66	-6.93
38	3.15	165	3.113	-1.17	146.63	-11.13	3.101	-1.56	147.37	-10.68	3.097	-1.68	150.03	-9.07
39	3.102	155.07	3.067	-1.13	136.25	-12.14	3.054	-1.55	135.78	-12.44	3.048	-1.74	137.22	-11.51
40	3.09	183.92	3.055	-1.13	176.65	-3.95	3.045	-1.46	175.86	-4.38	3.039	-1.65	178.5	-2.95

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Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV	1000 hrs	Delta VF	1000 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
41	3.06	181.79	3.039	-0.69	160.76	-11.57	3.03	-0.98	163.65	-9.98	3.027	-1.08	167.84	-7.67
42	3.048	162.45	3.022	-0.85	149.52	-7.96	3.012	-1.18	149.07	-8.24	3.008	-1.31	152.04	-6.41
43	3.051	164.59	3.026	-0.82	157.72	-4.17	3.014	-1.21	157.34	-4.40	3.009	-1.38	159.31	-3.21
44	3.073	164.03	3.045	-0.91	147.88	-9.85	3.035	-1.24	149.54	-8.83	3.03	-1.40	151.99	-7.34
45	3.049	158.66	3.03	-0.62	148.16	-6.62	3.025	-0.79	149.11	-6.02	3.021	-0.92	150.21	-5.33
46	3.127	147.28	3.092	-1.12	134.75	-8.51	3.079	-1.54	135.74	-7.84	3.071	-1.79	138.98	-5.64
47	3.083	194.23	3.053	-0.97	188.52	-2.94	3.043	-1.30	188.21	-3.10	3.036	-1.52	190.04	-2.16
48	3.034	138.79	3.013	-0.69	137.93	-0.62	3.006	-0.92	137.14	-1.19	3.002	-1.05	138.31	-0.35
49	3.033	138.79	3.015	-0.59	134.51	-3.08	3.012	-0.69	133.59	-3.75	3.01	-0.76	135.46	-2.40
50	3.105	178.98	3.073	-1.03	172.63	-3.55	3.066	-1.26	175.2	-2.11	3.057	-1.55	177.64	-0.75
51	3.071	146.56	3.05	-0.68	140.86	-3.89	3.044	-0.88	140.38	-4.22	3.042	-0.94	142.68	-2.65
52	3.111	182.42	3.092	-0.61	159.07	-12.80	3.084	-0.87	158.62	-13.05	3.078	-1.06	160.82	-11.84
53	3.092	143.12	3.063	-0.94	140.03	-2.16	3.053	-1.26	137.83	-3.70	3.047	-1.46	140.6	-1.76
54	3.146	179.13	3.119	-0.86	155.15	-13.39	3.112	-1.08	154.74	-13.62	3.106	-1.27	160.89	-10.18
55	3.088	144.54	3.065	-0.74	133.94	-7.33	3.06	-0.91	133.76	-7.46	3.055	-1.07	136.7	-5.42
56	3.065	183.52	3.049	-0.52	159.4	-13.14	3.042	-0.75	159.55	-13.06	3.038	-0.88	161.83	-11.82
57	3.112	154.42	3.081	-1.00	137.42	-11.01	3.069	-1.38	139.47	-9.68	3.064	-1.54	142.56	-7.68
58	3.115	172.4	3.087	-0.90	168.62	-2.19	3.078	-1.19	168.01	-2.55	3.075	-1.28	169.72	-1.55
59	3.069	180.89	3.044	-0.81	177.44	-1.91	3.035	-1.11	174.95	-3.28	3.03	-1.27	178.15	-1.51
60	3.049	142.6	3.026	-0.75	135.1	-5.26	3.019	-0.98	134.66	-5.57	3.015	-1.12	136.65	-4.17
61	3.062	184.31	3.039	-0.75	157.78	-14.39	3.03	-1.05	157.08	-14.77	3.024	-1.24	161.7	-12.27
62	3.109	145.03	3.076	-1.06	138.78	-4.31	3.067	-1.35	139.09	-4.10	3.062	-1.51	141.22	-2.63
63	3.084	146.58	3.06	-0.78	144.26	-1.58	3.055	-0.94	145.29	-0.88	3.05	-1.10	148.21	1.11
64	3.1	187.52	3.068	-1.03	183.97	-1.89	3.06	-1.29	184.33	-1.70	3.051	-1.58	186.52	-0.53
65	3.151	151.82	3.112	-1.24	145.31	-4.29	3.099	-1.65	145.56	-4.12	3.092	-1.87	146.94	-3.21
66	3.036	140.68	3.013	-0.76	138.45	-1.59	3.007	-0.96	137.29	-2.41	3.005	-1.02	138.78	-1.35
67	3.122	150.77	3.088	-1.09	141.39	-6.22	3.078	-1.41	142.71	-5.35	3.072	-1.60	145.87	-3.25
68	3.117	140.69	3.083	-1.09	133.52	-5.10	3.075	-1.35	133.11	-5.39	3.068	-1.57	134.66	-4.29
69	3.043	179.7	3.026	-0.56	161.2	-10.29	3.021	-0.72	160.96	-10.43	3.018	-0.82	165.76	-7.76
70	3.032	180.81	3.014	-0.59	171.8	-4.98	3.01	-0.73	170.74	-5.57	3.007	-0.82	172.19	-4.77
71	3.112	177.03	3.08	-1.03	169.28	-4.38	3.069	-1.38	168.75	-4.68	3.063	-1.57	171.36	-3.20
72	3.068	174.49	3.04	-0.91	148.94	-14.64	3.032	-1.17	150.52	-13.74	3.026	-1.37	152.44	-12.64
73	3.1	179.2	3.075	-0.81	173.03	-3.44	3.068	-1.03	175.57	-2.03	3.063	-1.19	178.88	-0.18
74	3.133	148.98	3.103	-0.96	136.72	-8.23	3.093	-1.28	136.52	-8.36	3.089	-1.40	138.73	-6.88
75	3.091	175.09	3.07	-0.68	152.43	-12.94	3.062	-0.94	153.07	-12.58	3.059	-1.04	156.71	-10.50
76	3.1	146.63	3.076	-0.77	141.86	-3.25	3.068	-1.03	141.38	-3.58	3.064	-1.16	144.78	-1.26
77	3.047	160.79	3.022	-0.82	141.28	-12.13	3.011	-1.18	140.36	-12.71	3.006	-1.35	141.46	-12.02
78	3.023	174.38	3.004	-0.63	157.45	-9.71	2.994	-0.96	155.43	-10.87	2.99	-1.09	158.92	-8.87
79	3.077	147.17	3.05	-0.88	143.74	-2.33	3.039	-1.23	143.48	-2.51	3.033	-1.43	146.27	-0.61
80	3.035	153.77	3.018	-0.56	141.37	-8.06	3.014	-0.69	141.41	-8.04	3.01	-0.82	144.67	-5.92
Average				-0.853		-6.130		-1.130		-6.228		-1.293		-4.555
Min				-1.238		-15.520		-1.692		-15.890		-1.872		-13.312
Max				-0.359		2.567		-0.490		4.188		-0.523		8.867

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Thermal Shock Test

-40°C to 100°C, 15 min dwell, < 10 sec transfer

Unit no.	0 X	0 X	100 X	Delta VF	100 X	Delta IV	500 X	Delta VF	500 X	Delta IV	1000 X	Delta VF	1000 X	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
1	3.061	188.97	3.048	-0.42	155.9	-17.50	3.035	-0.85	158.62	-16.06	3.03	-1.01	158.41	-16.17
2	3.041	163.16	3.031	-0.33	151.17	-7.35	3.019	-0.72	159.71	-2.11	3.013	-0.92	166.8	2.23
3	3.149	161.36	3.133	-0.51	157.05	-2.67	3.115	-1.08	144.57	-10.41	3.111	-1.21	144	-10.76
4	3.08	186.97	3.074	-0.19	152.22	-18.59	3.056	-0.78	157.88	-15.56	3.053	-0.88	160.25	-14.29
5	3.073	193.3	3.066	-0.23	159.83	-17.32	3.053	-0.65	164.19	-15.06	3.052	-0.68	185.56	-4.00
6	3.147	182.19	3.135	-0.38	157.73	-13.43	3.115	-1.02	150.77	-17.25	3.109	-1.21	147.05	-19.29
7	3.08	185.29	3.072	-0.26	155.79	-15.92	3.055	-0.81	155.27	-16.20	3.052	-0.91	153.34	-17.24
8	3.141	182.57	3.134	-0.22	149.65	-18.03	3.114	-0.86	147.24	-19.35	3.11	-0.99	146.13	-19.96
9	3.05	171.34	3.043	-0.23	156.63	-8.59	3.027	-0.75	157.36	-8.16	3.026	-0.79	159.35	-7.00
10	3.074	153.12	3.069	-0.16	144.88	-5.38	3.047	-0.88	145.04	-5.28	3.045	-0.94	139.62	-8.82
11	3.165	187.63	3.156	-0.28	152.27	-18.85	3.131	-1.07	161.96	-13.68	3.13	-1.11	175.13	-6.66
12	3.123	190.41	3.117	-0.19	155.99	-18.08	3.096	-0.86	163.9	-13.92	3.096	-0.86	165.12	-13.28
13	3.117	183.46	3.105	-0.38	156.73	-14.57	3.08	-1.19	161.93	-11.74	3.079	-1.22	157.24	-14.29
14	3.143	164.51	3.13	-0.41	154.5	-6.08	3.115	-0.89	156.23	-5.03	3.107	-1.15	168.44	2.39
15	3.113	168.98	3.1	-0.42	155.09	-8.22	3.083	-0.96	161.52	-4.41	3.079	-1.09	160.76	-4.86
16	3.074	189.29	3.066	-0.26	155.26	-17.98	3.049	-0.81	159.53	-15.72	3.045	-0.94	161.8	-14.52
17	3.127	184.99	3.12	-0.22	153.98	-16.76	3.103	-0.77	154.7	-16.37	3.098	-0.93	153.84	-16.84
18	3.148	155.84	3.139	-0.29	147.5	-5.35	3.121	-0.86	155.28	-0.36	3.115	-1.05	148.73	-4.56
19	3.12	189.4	3.108	-0.38	157.7	-16.74	3.09	-0.96	159.99	-15.53	3.086	-1.09	162.63	-14.13
20	3.145	165.54	3.127	-0.57	150.44	-9.12	3.103	-1.34	154.45	-6.70	3.1	-1.43	155.45	-6.10
21	3.159	187.32	3.147	-0.38	158.47	-15.40	3.127	-1.01	162.1	-13.46	3.126	-1.04	157.22	-16.07
22	3.119	169.1	3.105	-0.45	158.14	-6.48	3.09	-0.93	162.92	-3.65	3.083	-1.15	164.89	-2.49
23	3.044	181.35	3.037	-0.23	155.29	-14.37	3.024	-0.66	157.51	-13.15	3.02	-0.79	167.71	-7.52
24	3.138	182.54	3.13	-0.25	150.13	-17.76	3.11	-0.89	150.37	-17.62	3.105	-1.05	162.63	-10.91
25	3.122	153.23	3.11	-0.38	150.46	-1.81	3.095	-0.86	151.75	-0.97	3.092	-0.96	160.27	4.59
26	3.117	177.87	3.105	-0.38	157.56	-11.42	3.09	-0.87	154.98	-12.87	3.083	-1.09	171.61	-3.52
27	3.151	191.39	3.139	-0.38	155.64	-18.68	3.122	-0.92	159.52	-16.65	3.118	-1.05	156.61	-18.17
28	3.105	193.63	3.096	-0.29	157.66	-18.58	3.081	-0.77	164.19	-15.20	3.078	-0.87	168.32	-13.07
29	3.105	192.63	3.096	-0.29	157.82	-18.07	3.082	-0.74	163.9	-14.91	3.078	-0.87	173.7	-9.83
30	3.015	183.14	3.012	-0.10	154.44	-15.67	3.001	-0.46	154.54	-15.62	2.997	-0.60	151.19	-17.45
31	3.134	187.79	3.122	-0.38	153.23	-18.40	3.1	-1.08	156.85	-16.48	3.094	-1.28	159.05	-15.30
32	3.07	182.09	3.063	-0.23	155.27	-14.73	3.05	-0.65	158.79	-12.80	3.048	-0.72	168.5	-7.46
33	3.102	191.53	3.097	-0.16	159.24	-16.86	3.08	-0.71	165.51	-13.59	3.077	-0.81	169.06	-11.73
34	3.013	184.02	3.01	-0.10	156.39	-15.01	3.001	-0.40	158.43	-13.91	3.001	-0.40	165.87	-9.86
35	3.028	190.82	3.021	-0.23	166.97	-12.50	3.013	-0.50	158.18	-17.11	3.017	-0.36	154.87	-18.84
36	3.052	185.06	3.045	-0.23	153.07	-17.29	3.034	-0.59	156.81	-15.27	3.027	-0.82	161.03	-12.98
37	3.116	186.92	3.108	-0.26	153.34	-17.96	3.09	-0.83	153.59	-17.83	3.093	-0.74	150.22	-19.63
38	3.066	191.64	3.059	-0.23	161.3	-15.83	3.045	-0.68	163.05	-14.92	3.057	-0.29	163.08	-14.90
39	3.134	184.65	3.128	-0.19	155.84	-15.60	3.109	-0.80	154.11	-16.54	3.106	-0.89	148.22	-19.73
40	3.107	187.58	3.102	-0.16	154.16	-17.82	3.086	-0.68	158.28	-15.62	3.084	-0.74	162.15	-13.56

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Unit no.	0 X	0 X	100 X	Delta VF	100 X	Delta IV	500 X	Delta VF	500 X	Delta IV	1000 X	Delta VF	1000 X	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
41	3.085	189.48	3.078	-0.23	155.82	-17.76	3.063	-0.71	155.17	-18.11	3.061	-0.78	151.82	-19.88
42	3.044	155.08	3.04	-0.13	149.55	-3.57	3.024	-0.66	160.25	3.33	3.023	-0.69	163.74	5.58
43	3.161	168.13	3.148	-0.41	152.14	-9.51	3.128	-1.04	156.28	-7.05	3.126	-1.11	160.37	-4.62
44	3.061	191.58	3.058	-0.10	158.75	-17.14	3.045	-0.52	163.34	-14.74	3.045	-0.52	169.8	-11.37
45	3.157	190.17	3.147	-0.32	159.43	-16.16	3.125	-1.01	159.38	-16.19	3.121	-1.14	161.75	-14.94
46	3.097	181.78	3.093	-0.13	149.95	-17.51	3.077	-0.65	152.59	-16.06	3.073	-0.77	147.91	-18.63
47	3.094	186.16	3.091	-0.10	154.93	-16.78	3.075	-0.61	154.83	-16.83	3.074	-0.65	154.93	-16.78
48	3.147	187.37	3.141	-0.19	153.42	-18.12	3.124	-0.73	162.26	-13.40	3.119	-0.89	161.34	-13.89
49	3.045	161.89	3.042	-0.10	146.27	-9.65	3.028	-0.56	153.53	-5.16	3.02	-0.82	164.24	1.45
50	3.059	184.68	3.055	-0.13	161.9	-12.33	3.041	-0.59	163.53	-11.45	3.046	-0.42	167.48	-9.31
51	3.052	194.36	3.049	-0.10	164.67	-15.28	3.036	-0.52	166.11	-14.53	3.034	-0.59	169.71	-12.68
52	3.112	152.72	3.109	-0.10	147.05	-3.71	3.095	-0.55	153.98	0.83	3.089	-0.74	164.63	7.80
53	3.071	187.83	3.068	-0.10	158.03	-15.87	3.056	-0.49	161.37	-14.09	3.051	-0.65	169.74	-9.63
54	3.109	193.01	3.102	-0.23	163.27	-15.41	3.086	-0.74	174.68	-9.50	3.081	-0.90	177.33	-8.12
55	3.047	190.05	3.046	-0.03	160.21	-15.70	3.033	-0.46	162.07	-14.72	3.03	-0.56	172.14	-9.42
56	3.087	193.05	3.081	-0.19	159.5	-17.38	3.063	-0.78	164.3	-14.89	3.062	-0.81	167.49	-13.24
57	3.108	158	3.096	-0.39	154.92	-1.95	3.076	-1.03	161.36	2.13	3.075	-1.06	165.72	4.89
58	3.148	150.76	3.14	-0.25	149.41	-0.90	3.118	-0.95	155.23	2.96	3.118	-0.95	158.31	5.01
59	3.136	188.33	3.129	-0.22	157.63	-16.30	3.108	-0.89	161.38	-14.31	3.104	-1.02	166.66	-11.51
60	3.052	194.9	3.051	-0.03	162.84	-16.45	3.038	-0.46	174.31	-10.56	3.038	-0.46	180.01	-7.64
61	3.043	196.93	3.039	-0.13	164.51	-16.46	3.024	-0.62	170.65	-13.34	3.023	-0.66	177.21	-10.01
62	3.085	171.73	3.079	-0.19	156.77	-8.71	3.065	-0.65	159.19	-7.30	3.065	-0.65	162.87	-5.16
63	3.029	157.38	3.018	-0.36	165.05	4.87	3.008	-0.69	165.75	5.32	3.003	-0.86	172.72	9.75
64	3.063	166.46	3.059	-0.13	152.72	-8.25	3.041	-0.72	160.09	-3.83	3.038	-0.82	165.3	-0.70
65	3.06	180.52	3.056	-0.13	150.37	-16.70	3.043	-0.56	145.92	-19.17	3.042	-0.59	152.68	-15.42
66	3.133	172.72	3.12	-0.41	153.41	-11.18	3.103	-0.96	160.66	-6.98	3.102	-0.99	170.5	-1.29
67	3.11	187.84	3.103	-0.23	160.63	-14.49	3.087	-0.74	161.33	-14.11	3.079	-1.00	166.63	-11.29
68	3.096	164.68	3.091	-0.16	148.17	-10.03	3.074	-0.71	155.59	-5.52	3.07	-0.84	161.81	-1.74
69	3.074	190.84	3.067	-0.23	159.2	-16.58	3.052	-0.72	159.38	-16.49	3.05	-0.78	159.76	-16.29
70	3.128	160.02	3.116	-0.38	150.97	-5.66	3.096	-1.02	158.3	-1.07	3.092	-1.15	166.48	4.04
71	3.101	188.07	3.094	-0.23	155.1	-17.53	3.08	-0.68	159.27	-15.31	3.076	-0.81	160.29	-14.77
72	3.083	184	3.08	-0.10	152.57	-17.08	3.059	-0.78	156.52	-14.93	3.052	-1.01	160.3	-12.88
73	3.116	188.04	3.106	-0.32	157.15	-16.43	3.086	-0.96	160.73	-14.52	3.082	-1.09	165.25	-12.12
74	3.145	190.22	3.135	-0.32	163.78	-13.90	3.113	-1.02	161.79	-14.95	3.107	-1.21	170.3	-10.47
75	3.122	160.84	3.113	-0.29	147.05	-8.57	3.092	-0.96	158.01	-1.76	3.087	-1.12	167.26	3.99
76	3.053	151.17	3.053	0.00	174.6	15.50	3.037	-0.52	166.8	10.34	3.036	-0.56	158.83	5.07
77	3.033	163.42	3.026	-0.23	160.34	-1.88	3.016	-0.56	161.9	-0.93	3.011	-0.73	157.9	-3.38
78	3.163	183.78	3.152	-0.35	153.57	-16.44	3.129	-1.07	168.37	-8.39	3.123	-1.26	166.86	-9.21
79	3.115	184.48	3.107	-0.26	154.37	-16.32	3.087	-0.90	157.82	-14.45	3.081	-1.09	170.38	-7.64
80	3.087	162.12	3.072	-0.49	153.75	-5.16	3.06	-0.87	152.99	-5.63	3.053	-1.10	159.49	-1.62
Average				-0.251		-12.690		-0.785		-10.905		-0.884		-8.934
Min				-0.572		-18.846		-1.335		-19.351		-1.431		-19.959
Max				0.000		15.499		-0.398		10.339		-0.294		9.747

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Temperature Cycling Hot Test (TCHT)

Wire Pull Test (Specification Limit as per MIL-STD-750: minimum 3gf)

N-Pad

Unit #	Result (gf)	CODE	Remark
#1	21.66	3	PASS
#2	25.13	3	PASS
#3	23.83	3	PASS
#4	24.70	3	PASS
#5	24.54	3	PASS
Average	23.97		
Std Dev	1.37		
Max	25.13		
Min	21.66		

P-Pad

Unit #	Result (gf)	CODE	Remark
#1	18.50	2	PASS
#2	18.80	3	PASS
#3	20.29	2	PASS
#4	21.47	2	PASS
#5	19.74	3	PASS
Average	19.76		
Std Dev	1.20		
Max	21.47		
Min	18.50		

Conclusion: Based on this wire pull result, this part number/lot has Passed the Wire Pull test.

Coding break types in the wire pull test:

Code 1: Lifted 1st ball bond
Code 2: Broken neck
Code 3: Break at mid span of wire
Code 4: Break at heel of stitch bond
Code 5: Lifted stitch bond

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Reference Device: DNW-EJG

Wire Bond Integrity (WBI)

Wire Pull Test (Specification Limit as per MIL-STD-750 : minimum 3gf)

N-Pad

Unit #	Result (gf)	CODE	Remark
#1	23.69	3	PASS
#2	24.18	3	PASS
#3	25.02	3	PASS
#4	24.26	3	PASS
#5	23.43	3	PASS
Average	0.61		
Std Dev	24.12		
Max	25.02		
Min	23.43		

P-Pad

Unit #	Result (gf)	CODE	Remark
#1	20.8	3	PASS
#2	20.53	2	PASS
#3	18.18	2	PASS
#4	20.46	2	PASS
#5	17.25	2	PASS
Average	1.62		
Std Dev	19.44		
Max	20.8		
Min	17.25		

Conclusion: Based on this wire pull result, this part number/lot has Passed the Wire Pull Test.

Coding break types in the wire pull test:

Code 1: Lifted 1st ball bond
Code 2: Broken neck
Code 3: Break at mid span of wire
Code 4: Break at heel of stitch bond
Code 5: Lifted stitch bond

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Resistance to Soldering Heat Test

T=260°C

Unit no.	0 X	0 X	1 X	Delta VF	1 X	Delta IV
	VF	IV	VF	%	IV	%
1	3.044	143.92	3.046	0.07	181.44	26.07
2	3.096	140.74	3.117	0.68	172.56	22.61
3	3.075	139.32	3.086	0.36	161.49	15.91
4	3.041	137.94	3.043	0.07	135.91	-1.47
5	3.129	136.64	3.133	0.13	133.07	-2.61
6	3.08	135.69	3.083	0.10	166.06	22.38
7	3.116	137.82	3.122	0.19	159.82	15.96
8	3.097	140.41	3.109	0.39	181.65	29.37
9	3.039	142.27	3.044	0.16	176.7	24.20
10	3.102	137.44	3.115	0.42	178.04	29.54
11	3.094	139.03	3.115	0.68	154.15	10.88
12	3.035	132.68	3.052	0.56	150.45	13.39
13	3.012	134.19	3.026	0.46	170.36	26.95
14	3.091	136.61	3.13	1.26	172.96	26.61
15	3.087	138.85	3.108	0.68	176.98	27.46
16	3.14	137.4	3.107	-1.05	157.8	14.85
17	3.059	137.14	3.173	3.73	161.61	17.84
18	3.085	137.95	3.085	0.00	169.96	23.20
19	3.075	134.96	3.104	0.94	169.18	25.36
20	3.051	136.13	3.096	1.47	147.74	8.53
21	3.073	134.89	3.079	0.20	169.6	25.73
22	3.1	136.91	3.086	-0.45	174.42	27.40
23	3.068	136.88	3.118	1.63	175.17	27.97
24	3.051	141.59	3.079	0.92	170.62	20.50
25	3.105	136.18	3.124	0.61	138.02	1.35
26	3.014	138.11	3.032	0.60	144.51	4.63
27	3.065	140.53	3.075	0.33	165.01	17.42
28	3.108	139.2	3.141	1.06	154.31	10.85
29	3.078	139.82	3.092	0.45	157.58	12.70
30	3.115	140.32	3.145	0.96	171.59	22.28
Average				0.587		18.263
Min				-1.051		-2.613
Max				3.727		29.540

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Reference Device: DNW-EJG

Hydrogen Sulphide Test

40°C/90%RH, 15ppm

Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	336 hrs	Delta VF	336 hrs	Delta IV
	VF	IV(lm)	VF	%	IV(lm)	%	VF	%	IV(lm)	%
1	3.030	0.380	3.025	-0.165	0.401	5.501	3.031	0.026	0.381	0.263
2	3.076	0.365	3.071	-0.159	0.391	7.117	3.076	0.020	0.371	1.478
3	3.131	0.372	3.124	-0.204	0.392	5.545	3.128	-0.077	0.370	-0.431
4	3.091	0.329	3.085	-0.188	0.354	7.662	3.091	0.003	0.336	2.007
5	3.158	0.331	3.152	-0.177	0.357	7.820	3.158	0.003	0.331	0.030
6	3.134	0.369	3.128	-0.195	0.384	4.203	3.132	-0.077	0.364	-1.193
7	3.065	0.356	3.059	-0.186	0.368	3.256	3.064	-0.036	0.352	-1.179
8	3.116	0.372	3.110	-0.202	0.386	3.652	3.114	-0.048	0.366	-1.638
9	3.166	0.367	3.161	-0.171	0.377	2.918	3.166	-0.003	0.360	-1.827
Average				-0.183		5.297		-0.021		-0.277
Min				-0.204		2.918		-0.077		-1.827
Max				-0.159		7.820		0.026		2.007

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Flowing Mixed Gas Test

Method 4 25°C/75%RH

Unit no.	0 hrs	0 hrs	168 hrs	Delta VF	168 hrs	Delta IV	336 hrs	Delta VF	336 hrs	Delta IV	504 hrs	Delta VF	504 hrs	Delta IV
	VF	IV	VF	%	IV	%	VF	%	IV	%	VF	%	IV	%
1	3.044	159.8	3.04	-0.13	144.98	-9.27	3.039	-0.16	138.7	-13.20	3.043	-0.03	143.92	-9.94
2	3.069	180.7	3.066	-0.10	168.24	-6.90	3.066	-0.10	159.57	-11.69	3.097	0.91	168.94	-6.51
3	3.129	176.13	3.115	-0.45	181.28	2.92	3.121	-0.26	175.7	-0.24	3.145	0.51	181.78	3.21
4	3.101	168.6	3.091	-0.32	151.06	-10.40	3.094	-0.23	146.89	-12.88	3.114	0.42	153.46	-8.98
5	3.147	187.94	3.108	-1.24	179.88	-4.29	3.143	-0.13	177.24	-5.69	3.142	-0.16	181.48	-3.44
6	3.096	171.93	3.078	-0.58	154.02	-10.42	3.094	-0.06	162.3	-5.60	3.092	-0.13	167.35	-2.66
7	3.097	177.62	3.063	-1.10	166.6	-6.20	3.096	-0.03	162.61	-8.45	3.095	-0.06	170.44	-4.04
8	3.129	154.09	3.097	-1.02	154.97	0.57	3.125	-0.13	137.11	-11.02	3.124	-0.16	141.79	-7.98
9	3.11	173.33	3.132	0.71	164.66	-5.00	3.106	-0.13	149.77	-13.59	3.106	-0.13	156.68	-9.61
Average				-0.470		-5.443		-0.136		-9.153		0.130		-5.550
Min				-1.239		-10.417		-0.256		-13.593		-0.160		-9.937
Max				0.707		2.924		-0.032		-0.244		0.912		3.208

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Electrostatic Discharge (ESD) Testing Report

Human Body Model (HBM)

Sample	± 1000V	± 2000V
#01	PASS	PASS
#02	PASS	PASS
#03	PASS	PASS
#04	PASS	PASS
#05	PASS	PASS
#06	PASS	PASS
#07	PASS	PASS
#08	PASS	PASS
#09	PASS	PASS
#10	PASS	PASS
#11	PASS	PASS
#12	PASS	PASS
#13	PASS	PASS
#14	PASS	PASS
#15	PASS	PASS
#16	PASS	PASS
#17	PASS	PASS
#18	PASS	PASS
#19	PASS	PASS
#20	PASS	PASS
#21	PASS	PASS
#22	PASS	PASS
#23	PASS	PASS
#24	PASS	PASS
#25	PASS	PASS
#26	PASS	PASS
#27	PASS	PASS
#28	PASS	PASS
#29	PASS	PASS
#30	PASS	PASS

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Reference Device: DNW-EJG

Electrostatic Discharge (ESD) Testing Report

Machine Model (MM)

Sample	± 100V	± 200V
#01	PASS	PASS
#02	PASS	PASS
#03	PASS	PASS
#04	PASS	PASS
#05	PASS	PASS
#06	PASS	PASS
#07	PASS	PASS
#08	PASS	PASS
#09	PASS	PASS
#10	PASS	PASS
#11	PASS	PASS
#12	PASS	PASS
#13	PASS	PASS
#14	PASS	PASS
#15	PASS	PASS
#16	PASS	PASS
#17	PASS	PASS
#18	PASS	PASS
#19	PASS	PASS
#20	PASS	PASS
#21	PASS	PASS
#22	PASS	PASS
#23	PASS	PASS
#24	PASS	PASS
#25	PASS	PASS
#26	PASS	PASS
#27	PASS	PASS
#28	PASS	PASS
#29	PASS	PASS
#30	PASS	PASS

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Electrostatic Discharge (ESD) Testing Report

Charge Device Model (CDM)

Sample	± 250V	± 500V	± 1000V
#01	PASS	PASS	PASS
#02	PASS	PASS	PASS
#03	PASS	PASS	PASS
#04	PASS	PASS	PASS
#05	PASS	PASS	PASS
#06	PASS	PASS	PASS
#07	PASS	PASS	PASS
#08	PASS	PASS	PASS
#09	PASS	PASS	PASS
#10	PASS	PASS	PASS
#11	PASS	PASS	PASS
#12	PASS	PASS	PASS
#13	PASS	PASS	PASS
#14	PASS	PASS	PASS
#15	PASS	PASS	PASS
#16	PASS	PASS	PASS
#17	PASS	PASS	PASS
#18	PASS	PASS	PASS
#19	PASS	PASS	PASS
#20	PASS	PASS	PASS
#21	PASS	PASS	PASS
#22	PASS	PASS	PASS
#23	PASS	PASS	PASS
#24	PASS	PASS	PASS
#25	PASS	PASS	PASS
#26	PASS	PASS	PASS
#27	PASS	PASS	PASS
#28	PASS	PASS	PASS
#29	PASS	PASS	PASS
#30	PASS	PASS	PASS

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Reference Device: DNW-EJG