




## Product Change Notification

<b>PCN Date:</b>	November 21, 2019	
<b>Supplier Name:</b>	Pulse Electronics	
<b>Pulse PCN No.</b>	PCN-100000202, Revision A	
<b>Description of Change</b>	Change the solder paste to LOCTITE GC 3W from LOCTITE WS300.	
<b>Reason for Change</b>	Supplier HENKEL EOL the solder paste LOCTITE300, recommend new solder paste LOCTITE GC 3W.	
<b>Summary of Changes</b>	<b>Present</b>	<b>New</b>
	No fit, form, function change.  Solder paste: WS300  LOCTITE WS 300-TDS.pdf	No fit, form, function change.  Solder paste: GC 3W  GC 3W-TDS.pdf
<b>Traceability guidelines</b>	By data code	
<b>Qualification Data File name(s)</b>	 H5400NL Reliability Report	
<b>Customer Part Number</b>	<b>Pulse Part Number</b>	<b>PCN Effectivity Date</b>
	H5200ANL H5200NL H5200NLT H5201NL H5201NLT H5220NLT H5400ANL H5400ANLT H5400NL H5400NLT H5401NL H5610NLT H6200NL H6400NL H6400NLT H6600NLT HX5200NL HX5200NLT HX5201NL HX5201NL HX5400NL	Feb 21th, 2020

	HX5400NLT HX5401NL HX5401NLT HX5610NL HX5610NLT HX6400NL HX6400NLT HX6400NLT TX1631NL TX1680NL TX1681NL TX1682NL TX1684NL	
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**Customer:** Generic

**Originator:** Raymond Tan

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## Reliability Report \_ H5400NL

Rev A: 5/28/2019

Rev B: 11/22/2019

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## H5400NL Test Summary (Revision: B)

### 1. PURPOSE

This is an internal Pulse Qualification Plan to verify new source Realm (Henkel agent) and new part from Henkel to support 083-2018.001. PN H5400NL were chosen for qualification test. Testing data will be reviewed after each environmental testing.

### 2. SCOPE

H5400NL are produced with SIGMA material and tested in MPO.

### 3. REFERENCES

H5400NL released TLA documents.

### 4. TEST SUMMARY AS BELOW:

TEST Description	Reference	Sample size	Test conditions/Remarks	Result	Remarks
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	15	1000 Hrs @ 105C, Unpowered.	pass	Appendix 1
Temperature Cycling	JESD22 Method JA-104	15	200cycles (-40C to125C), Measurement at 24±4 hours after test conclusion.	pass	Appendix 2
Temp. Humidity	MIL-STD-202 Method 103	15	1000 hours 85C/85%RH. Unpowered.	pass	Appendix 3
Resistance to Soldering Heat	MIL-STD-202 Method 210	15	Condition B No pre-heat of samples. Procedure 1 for Leaded with solder within 1.5mm of device body.	pass	Appendix 4
X-ray audit	N/A	10	Check if air bubble>25% area in solder ball.	pass	Appendix 5

Rev A: Initial released 5/28/2019

Rev B: Adding X-ray audit result 11/22/2019



# Appendix 1

## H5400NL High Temperature Exposure 1000hrs Electrical Test Data

Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	1-2	2-3	4-5	5-6	24-23	23-22	21-20	20-19	7-8	8-9
<b>Unit</b>	m	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	1500	650	650
<b>LowLimit</b>	150	150	150	150	150	150	150	150	100	100
<b>Average =</b>	787.10	703.13	803.23	776.23	773.83	747.04	932.13	762.21	319.21	321.65
<b>STD DEV =</b>	11.01	13.51	17.53	10.34	19.72	22.33	28.65	18.83	6.84	7.81
<b>Cpu</b>	21.57	19.67	13.25	23.32	12.27	11.24	6.61	13.06	16.11	14.01
<b>Cpl</b>	19.28	13.65	12.42	20.18	10.54	8.91	9.10	10.83	10.68	9.46
<b>Cpk</b>	19.28	13.65	12.42	20.18	10.54	8.91	6.61	10.83	10.68	9.46
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	765.578	675.19	795.834	773.519	742.439	710.933	901.789	740.809	315.395	317.99
2	792.965	710.752	796.37	770.639	745.021	715.879	916.154	753.921	324.931	317.098
3	791.175	705.534	796.627	782.331	783.034	757.437	924.339	773.378	311.272	334.589
4	792.322	704.387	820.714	789.934	788.878	781.123	1015.249	744.833	319.894	327.435
5	795.886	710.014	808.7	774.919	788.837	763.148	925.567	772.895	319.972	318.874
6	814.658	721.588	806.699	790.484	790.724	758.973	911.677	750.115	317.262	335.079
7	782.722	699.04	773.092	749.631	821.487	799.887	932.019	766.131	337.509	335.507
8	788.572	724.468	814.869	789.374	765.048	730.107	933.586	748.085	312.405	313.708
9	794.742	720.394	793.398	771.775	774.67	736.265	944.366	762.098	315.391	311.598
10	786.035	701.929	808.182	771.646	757.096	740.836	978.03	819.295	325.674	321.259
11	773.06	681.219	793.851	767.935	758.377	742.874	934.734	770	319.356	320.338
12	780.473	701.505	795.791	770.319	784.462	750.713	921.631	757.711	324.958	323.449
13	787.94	700.755	797.948	776.849	764.928	743.376	904.925	743.634	315.21	320.477
14	783.705	702.654	791.672	777.443	763.382	742.353	929.794	774.866	309.192	315.022
15	776.727	687.569	854.696	786.702	779.034	731.698	908.038	755.32	319.735	312.377



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	10-11	11-12	18-17	17-16	15-14	14-13	1-3	4-6	24-22	19-21
<b>Unit</b>	m	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	1500	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	700	700	700	700
<b>Average =</b>	440.43	431.30	446.90	312.70	327.81	315.67	934.29	1,010.71	974.65	1,128.61
<b>STD DEV =</b>	28.34	21.26	6.14	8.76	28.06	28.13	13.48	23.09	18.10	26.20
<b>Cpu</b>	2.46	3.43	11.03	12.83	3.83	3.96	13.99	7.06	9.67	4.73
<b>Cpl</b>	4.00	5.19	18.83	8.09	2.71	2.56	5.80	4.49	5.06	5.45
<b>Cpk</b>	2.46	3.43	11.03	8.09	2.71	2.56	5.80	4.49	5.06	4.73
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	424.118	407.82	441.866	308.564	302.546	300.404	907.012	1004.141	934.7	1101.556
2	442.76	420.989	445.995	310.284	307.174	299.782	943.882	996.6	942.865	1118.314
3	434.331	415.533	444.715	306.489	418.441	414.422	942.97	1007.468	982.553	1115.592
4	431.309	426.573	444.241	312.999	315.244	312.228	925.316	997.004	1002.298	1215.047
5	432.162	415.358	462.681	309.393	321.924	321.048	944.088	1017.675	984.358	1128.995
6	423.407	419.47	451.308	310.974	323.871	304.685	959.231	1033.588	998.706	1112.709
7	428.105	424.949	445.281	316.193	326.403	308.267	915.905	977.409	968.55	1118.006
8	418.216	412.231	448.875	305.719	313.565	296.524	951.958	1003.351	971.122	1137.721
9	430.991	422.024	440.384	308.151	307.814	298.723	941.079	1010.615	969.374	1144.897
10	439.318	425.931	450.856	315.563	320.162	298.211	939.226	1018.976	973.645	1138.32
11	421.519	422.667	439.009	308.185	341.528	316.223	924.56	995.467	972.619	1121.406
12	445.846	467.299	440.934	304.458	311.49	321.908	926.397	992.698	995.994	1126.479
13	461.547	457.032	445.738	341.993	359.447	330.765	933.284	1016.115	963.46	1105.171
14	433.986	449.527	456.485	319.038	314.49	305.788	936.612	1007.02	972.861	1135.3
15	538.855	482.045	445.103	312.547	333.082	306.016	922.883	1082.492	986.647	1109.672



Parameter	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	7-9	10-12	16-18	13-15	7-9	10-12	16-18	13-15	25-26	26-27
<b>Unit</b>	m	m	m	m	u	u	u	u	m	m
<b>HighLimit</b>	650	650	650	650	700	700	700	700	1500	1500
<b>LowLimit</b>	100	100	100	100	380	380	380	380	150	150
<b>Average =</b>	337.10	346.15	449.58	327.44	484.35	488.18	493.30	493.84	779.78	748.95
<b>STD DEV =</b>	8.94	36.27	9.20	12.12	14.49	27.04	20.56	22.00	22.97	8.88
<b>Cpu</b>	11.67	2.79	7.26	8.87	4.96	2.61	3.35	3.12	10.45	28.19
<b>Cpl</b>	8.84	2.26	12.67	6.25	2.40	1.33	1.84	1.72	9.14	22.48
<b>Cpk</b>	8.84	2.26	7.26	6.25	2.40	1.33	1.84	1.72	9.14	22.48
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	328.179	321.012	448.244	302.556	465.492	493.144	455.35	457.851	769.82	748.794
2	344.155	337.357	452.991	314.175	481.071	468.975	497.823	457.453	752.149	729.32
3	343.418	332.522	439.653	326.732	493.485	470.52	470.849	525.581	766.137	743.928
4	353.262	346.499	444.794	325.734	464.129	535.214	469.457	480.566	805.282	762.394
5	336.35	331.781	454.159	342.26	481.757	523.813	509.634	510.417	767.721	739.374
6	349.236	329.049	456.764	335.441	485.985	470.357	496.823	467.227	770.691	754.254
7	322.58	328.242	441.26	339.618	495.616	479.813	504.342	487.992	799.551	739.576
8	329.226	317.246	444.357	312.386	463.254	495.034	507.446	503.544	767.567	746.146
9	327.315	328.357	444.298	314.649	493.727	435.638	490.564	514.305	766.951	742.836
10	346.541	343.402	456.851	323.155	480.169	497.111	514.921	487.214	775.649	754.226
11	332.067	332.105	439.404	340.178	466.732	514.721	518.55	522.05	774.811	751.346
12	343.52	401.761	441.909	333.098	509.926	506.328	463.149	480.136	771.355	755.758
13	337.685	340.377	475.827	336.694	481.275	449.95	525.566	523.849	772.969	752.922
14	327.432	340.229	455.133	321.587	506.525	513.308	481.367	494.384	851.181	748.828
15	335.604	462.339	448.021	343.275	496.137	468.828	493.603	495.029	784.815	764.532



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	28-29	29-30	48-47	47-46	45-44	44-43	31-32	32-33	34-35
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	650	650	650
<b>LowLimit</b>	150	150	150	150	150	150	100	100	100
<b>Average =</b>	788.33	757.24	781.31	758.61	807.45	775.14	324.59	337.25	336.58
<b>STD DEV =</b>	8.01	11.45	16.87	20.35	15.02	18.77	13.99	44.16	28.73
<b>Cpu</b>	29.63	21.63	14.20	12.14	15.37	12.87	7.76	2.36	3.64
<b>Cpl</b>	26.58	17.68	12.47	9.97	14.59	11.10	5.35	1.79	2.74
<b>Cpk</b>	26.58	17.68	12.47	9.97	14.59	11.10	5.35	1.79	2.74
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	795.959	762.616	767.331	740.698	789.601	752.143	310.537	316.014	318.6
2	773.671	734.865	766.322	732.962	777.418	741.031	304.845	304.677	325.391
3	783.709	747.289	750.021	728.715	793.366	759.993	318.594	331.648	314.24
4	791.966	751.334	791.317	769.33	813.973	765.122	317.045	328.624	354.703
5	790.377	749.649	787.464	759.939	789.327	759.929	312.576	318.167	330.234
6	805.476	785.778	785.514	760.863	813.599	783.333	317.299	322.116	310.491
7	784.863	751.045	779.456	769.343	798.542	760.817	339.946	358.971	329.206
8	778.722	765.186	760.679	728.448	831.618	811.853	319.393	324.152	338.227
9	799.891	761.531	822.173	795.224	817.428	775.031	314.366	310.828	353.93
10	787.301	755.685	773.037	746.598	816.42	797.105	323.332	329.534	318.074
11	784.379	753.933	785.233	763.623	806.929	792.493	324.164	318.522	314.335
12	784.389	749.817	772.884	744.518	826.365	780.502	347.142	350.561	335.023
13	793.854	771.708	792.137	781.991	824.414	796.46	357.117	319.567	346.168
14	789.445	762.661	787.194	769.678	811.986	784.13	327.15	330.761	328.523
15	780.994	755.515	798.886	787.164	800.743	767.148	335.275	494.588	431.618



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	35-36	42-41	41-40	39-38	38-37	25-27	28-30	48-46	45-43
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	1500	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	700	700	700	700
<b>Average =</b>	312.59	326.26	332.75	196.65	327.77	991.60	983.06	992.63	981.96
<b>STD DEV =</b>	11.91	8.03	41.69	12.88	25.38	27.05	11.12	14.40	13.35
<b>Cpu</b>	9.44	13.44	2.54	11.74	4.23	6.26	15.49	11.75	12.93
<b>Cpl</b>	5.95	9.40	1.86	2.50	2.99	3.59	8.48	6.77	7.04
<b>Cpk</b>	5.95	9.40	1.86	2.50	2.99	3.59	8.48	6.77	7.04
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	299.849	317.666	314.184	197.83	310.102	983.781	982.619	981.712	969.64
2	312.537	324.558	324.437	186.712	319.365	951.022	972.283	977.905	952.803
3	333.259	311.293	316.891	184.082	300.335	981.252	988.321	965.281	968.358
4	308.939	335.576	348.979	209.549	326.249	1006.089	976.795	1010.324	983.068
5	315.695	329.39	312.29	190.353	315.927	972.946	982.406	1005.131	968.257
6	299.053	328.618	319.308	188.467	302.979	984.376	1000.6	997.789	993.761
7	303.792	327.096	321.435	195.374	345.306	1017.793	961.593	992.741	974.097
8	341.158	321.024	313.451	183.265	312.049	968.028	988.269	969.672	972.549
9	321.585	337.402	323.962	183.696	337.351	976.262	983.957	1003.991	987.316
10	309.028	313.413	315.372	204.605	322.966	996.366	986.633	986.333	996.332
11	320.062	336.877	323.507	235.531	383.52	991.443	974.747	995.007	994.274
12	312.416	329.833	331.065	199.335	307.055	994.069	982.226	986.972	1002.832
13	300.352	331.257	484.771	199.875	301.877	985.679	1006.555	1006.216	990.271
14	310.103	331.754	330.208	198.021	362.798	1075.311	989.829	1017.358	992.698
15	301.004	318.162	311.446	193.113	368.617	989.552	969.104	993.062	983.109



Parameter	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL	DCR
<b>Condition:</b>									
<b>Pins</b>	31-33	34-36	42-40	39-37	31-33	34-36	40-42	37-39	49-50
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	700	700	700	700	1500
<b>LowLimit</b>	100	100	100	100	380	380	380	380	150
<b>Average =</b>	338.62	333.13	340.73	200.28	487.57	489.56	514.05	499.27	867.45
<b>STD DEV =</b>	41.03	31.24	42.50	27.78	20.86	20.28	25.14	14.83	8.64
<b>Cpu</b>	2.53	3.38	2.43	5.40	3.39	3.46	2.47	4.51	24.41
<b>Cpl</b>	1.94	2.49	1.89	1.20	1.72	1.80	1.78	2.68	27.69
<b>Cpk</b>	1.94	2.49	1.89	1.20	1.72	1.80	1.78	2.68	24.41
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	318.925	297.87	319.221	175.387	499.999	497.769	471.119	475.321	871.062
2	305.737	321.4	311.506	196.583	479.675	441.761	501.304	486.084	861.788
3	345.32	331.043	316.487	167.951	498.951	492.487	531.115	516.006	872.704
4	312.985	340.32	347.56	202.743	507.982	508.355	529.561	480.589	877.633
5	318.069	313.004	328.865	181.767	462.976	504.483	553.837	480.343	862.493
6	331.333	299.742	328.91	176.535	458.775	459.064	531.719	506.334	856.217
7	344.229	321.388	327.152	230.493	483.112	501.172	523.909	498.903	863.603
8	315.879	360.678	320.215	174.006	494.636	493.133	474.988	515.352	874.34
9	320.886	362.644	350.287	214.674	487.305	504.174	507.026	516.892	877.303
10	333.137	316.634	321.016	188.47	532.846	519.555	511.742	502.39	864.034
11	325.704	316.515	348.416	257.32	498.961	464.866	505.121	481.363	865.288
12	320.443	334.569	347.987	178.419	504.172	492.428	494.426	492.211	862.414
13	364.38	330.5	492.483	184.914	456.54	486.933	558.791	517.014	858.459
14	340.306	321.456	334.732	225.218	489.101	503.043	528.485	507.333	857.016
15	481.971	429.168	316.113	249.756	458.561	474.2	487.674	512.947	887.47



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	50-51	52-53	53-54	72-71	71-70	69-68	68-67	55-56	56-57
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	650	650
<b>LowLimit</b>	150	150	150	150	150	150	150	100	100
<b>Average =</b>	825.09	899.08	861.12	857.23	843.51	863.58	843.96	391.55	393.18
<b>STD DEV =</b>	12.62	15.91	10.62	14.84	14.52	10.38	13.90	9.36	12.21
<b>Cpu</b>	17.83	12.59	20.06	14.44	15.07	20.44	15.73	9.20	7.01
<b>Cpl</b>	17.84	15.69	22.33	15.88	15.92	22.92	16.64	10.38	8.01
<b>Cpk</b>	17.83	12.59	20.06	14.44	15.07	20.44	15.73	9.20	7.01
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	826.245	888.744	865.948	854.69	850.759	850.519	836.404	395.446	397.979
2	812.139	881.733	850.488	836.739	823.015	853.22	829.523	387.271	382.487
3	832.861	891.306	875.459	865.439	839.781	877.996	852.257	384.367	375.042
4	837.444	946.57	858.222	868.969	854.906	876.598	873.194	408.95	410.321
5	821.662	913.898	880.751	856.782	845.489	852.266	818.788	394.081	386.3
6	817.522	897.153	864.88	868.041	848.177	872.957	861.149	399.56	394.918
7	814.781	899.623	876.389	842.467	822.778	858.633	844.661	380.931	396.519
8	856.105	894.183	862.238	851.801	842.873	867.729	852.876	388.526	390.561
9	824.275	906.751	847.058	849.591	845.631	855.653	830.536	384.8	406.282
10	818.102	896.75	857.612	862.828	850.664	860.333	845.193	376.841	373.94
11	812.937	915.126	846.34	851.807	837.829	869.738	852.458	403.758	406.05
12	820.311	892.239	867.531	835.857	819.774	869.808	835.741	406.672	415.702
13	810.095	886.675	847.225	865.226	852.087	875.029	850.638	390.499	381.58
14	826.188	892.578	862.06	850.624	838.769	869.327	849.475	389.375	394.29
15	845.643	882.883	854.555	897.543	880.168	843.853	826.543	382.144	385.683

Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	58-59	59-60	65-66	65-64	63-62	62-61	49-51	52-54	72-70
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	700	700	700
<b>Average =</b>	404.66	409.74	392.59	389.13	403.90	406.21	1,053.13	1,092.39	1,077.22
<b>STD DEV =</b>	14.27	24.35	8.92	5.29	17.81	14.35	13.11	14.99	13.84
<b>Cpu</b>	5.73	3.29	9.61	16.44	4.61	5.66	11.36	9.06	10.18
<b>Cpl</b>	7.12	4.24	10.93	18.22	5.69	7.11	8.98	8.72	9.09
<b>Cpk</b>	5.73	3.29	9.61	16.44	4.61	5.66	8.98	8.72	9.09
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	395.89	391.169	390.044	385.412	414.906	418.54	1052.1	1089.333	1087.747
2	397.977	418.932	391.356	390.63	381.481	390.783	1041.631	1074.294	1060.536
3	406.556	394.768	380.09	377.977	383.871	395.002	1063.221	1110.099	1090.915
4	401.104	405.999	392.386	389.287	416.281	421.384	1065.765	1130.623	1077.294
5	403.079	437.863	394.944	394.438	415.211	403.227	1050.883	1105.542	1083.667
6	399.138	404.485	401.62	394.128	410.261	430.127	1041.369	1095.011	1092.521
7	398.835	393.405	384.784	381.002	427.127	435.79	1041.913	1085.252	1060.51
8	408.31	406.592	390.548	393.247	390.686	402.31	1092.51	1085.454	1079.516
9	453.945	459.369	416.101	393.991	389.027	395.321	1054.824	1091.738	1091.376
10	390.699	384.843	389.536	383.713	398.006	395.306	1051.047	1097.121	1092.503
11	391.357	384.804	405.178	396.528	449.353	409.976	1039.843	1104.584	1056.491
12	408.341	402.234	385.81	390.528	388.667	395.837	1049.936	1086.551	1053.536
13	407.81	401.059	385.646	389.671	398.157	392.715	1041.692	1076.19	1089.54
14	401.453	395.274	385.206	384.266	393.739	390.847	1059.074	1081.53	1077.505
15	405.452	465.27	395.579	392.184	401.775	416.021	1051.079	1072.51	1064.582

Parameter	DCR	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL
<b>Condition:</b>									
<b>Pins</b>	69-67	55-57	58-60	66-64	63-61	55-57	58-60	64-66	61-63
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	650	650	650	650	700	700	700	700
<b>LowLimit</b>	700	100	100	100	100	380	380	380	380
<b>Average =</b>	1,064.51	388.51	416.71	408.03	425.66	478.29	494.16	521.42	521.55
<b>STD DEV =</b>	13.54	12.47	22.95	8.66	21.83	23.30	17.90	12.64	16.73
<b>Cpu</b>	10.72	6.99	3.39	9.31	3.43	3.17	3.83	4.71	3.55
<b>Cpl</b>	8.98	7.71	4.60	11.85	4.97	1.41	2.13	3.73	2.82
<b>Cpk</b>	8.98	6.99	3.39	9.31	3.43	1.41	2.13	3.73	2.82
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	1055.287	387.354	394.829	399.144	415.618	485.757	494.062	515.832	531.108
2	1056.869	376.663	432.688	409.177	403.507	488.961	492.15	539.447	530.483
3	1080.332	375.613	422.703	392.989	414.821	486.081	494.339	530.885	512.565
4	1087.351	387.583	409.379	412.144	420.669	469.739	514.582	521.017	531.681
5	1042.065	390.588	461.503	423.597	449.608	498.709	471.297	527.704	549.252
6	1073.136	383.334	419.285	418.029	425.418	469.313	481.687	517.706	503.622
7	1063.564	378.407	408.263	398.487	426.03	470.112	486.763	509.546	504.838
8	1074.423	389.88	390.477	402.871	430.483	481.039	496.551	501.876	508.587
9	1053.557	402.453	425.055	420.145	407.793	466.887	495.298	553.713	503.714
10	1062.461	368.271	396.112	403.617	415.507	460.323	488.238	515.865	524.252
11	1066.612	417.489	397.972	410.775	491.086	459.684	506.983	505.504	509.529
12	1068.983	406.21	417.058	407.613	406.88	463.893	472.101	526.092	500.351
13	1084.283	385.111	396.872	407.209	415.891	492.294	484.279	519.188	556.97
14	1058.176	397.081	407.154	398.178	413.292	437.109	486.895	517.713	523.19
15	1040.516	381.637	471.271	416.453	448.261	544.402	547.156	519.192	533.105



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	73-74	74-75	76-77	77-78	91-92	92-93	94-95	95-96	79-80
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	1500	650
<b>LowLimit</b>	150	150	150	150	150	150	150	150	100
<b>Average =</b>	859.78	829.86	867.06	825.74	830.32	854.16	838.80	862.36	396.01
<b>STD DEV =</b>	10.38	14.65	11.59	15.40	7.04	18.69	8.60	7.51	9.08
<b>Cpu</b>	20.56	15.25	18.21	14.60	31.72	11.52	25.63	28.32	9.33
<b>Cpl</b>	22.79	15.47	20.63	14.63	32.22	12.56	26.70	31.64	10.87
<b>Cpk</b>	20.56	15.25	18.21	14.60	31.72	11.52	25.63	28.32	9.33
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	865.295	828.509	850.897	802	828.922	852.664	833.544	851.445	410.462
2	857.224	828.92	855.024	818.608	826.793	848.93	831.784	859.776	395.763
3	852.849	815.182	861.396	814.73	818.197	831.428	837.664	861.926	392.89
4	852.288	820.837	880.64	833.108	838.6	863.248	845.319	868.511	413.321
5	880.595	847.072	873.373	821.207	834.732	850.428	838.559	860.25	399.403
6	866.324	839.31	860.36	825.253	830.823	847.987	839.456	855.438	385.962
7	865.638	861.368	860.068	827.819	843.19	917.509	847.28	873.429	399.608
8	861.471	827.115	860.786	824.358	818.767	840.655	825.026	849.65	383.726
9	850.861	824.133	880.756	826.77	828.973	848.83	842.208	864.474	393.957
10	862.948	830.498	880.439	830.116	828.903	854.081	835.058	862.516	391.328
11	870.819	856.554	892.815	874.865	826.681	851.811	852.845	875.453	390.195
12	834.105	808.405	860.465	823.395	822.663	844.276	837.865	862.8	393.327
13	860.231	823.255	867.49	830.616	834.357	851.403	845.625	869.749	388.468
14	851.523	815.38	866.276	823.994	840.009	865.172	849.5	867.132	389.274
15	864.578	821.294	855.06	809.23	833.231	844.002	820.327	852.804	412.482



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	80-81	82-83	83-84	85-86	86-87	88-89	89-90	73-75	76-78
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	650	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	100	700	700
<b>Average =</b>	373.42	408.65	413.71	396.18	402.25	381.62	382.33	1,060.73	1,052.05
<b>STD DEV =</b>	8.65	10.87	19.10	19.34	21.24	11.13	6.67	16.91	16.65
<b>Cpu</b>	10.65	7.40	4.12	4.38	3.89	8.04	13.37	8.66	8.97
<b>Cpl</b>	10.53	9.46	5.47	5.11	4.74	8.43	14.10	7.11	7.05
<b>Cpk</b>	10.53	7.40	4.12	4.38	3.89	8.04	13.37	7.11	7.05
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	388.145	418.45	408.674	453.995	460.513	391.622	388.931	1056.415	1026.37
2	387.422	408.945	410.132	390.642	381.647	379.652	385.107	1053.292	1043.102
3	368.912	400.909	475.568	386.497	424.745	369.467	376.983	1042.104	1045.416
4	372.957	402.307	398.944	378.628	378.146	378.035	384.999	1064.358	1046.002
5	370.138	409.428	409.925	387.433	386.405	382.942	376.306	1083.682	1039.857
6	367.119	409.977	407.731	389.909	396.624	378.43	394.092	1073.819	1054.039
7	390.166	392.244	419.431	382.822	384.279	385.387	384.604	1091.928	1051.395
8	360.648	397.679	394.017	379.719	387.284	375.26	374.13	1050.8	1057.747
9	373.803	425.699	433.382	391.473	386.346	416.672	383.64	1046.929	1056.63
10	371.536	409.069	406.185	411.466	415.262	372.613	384.01	1068.032	1066.229
11	366.587	430.456	403.996	394.694	410.822	386.577	388.258	1081.404	1103.019
12	367.338	397.153	422.485	384.626	394.257	384.001	374.666	1028.011	1040.874
13	375.82	400.094	402.433	425.278	423.668	369.505	373.435	1059.387	1056.892
14	376.875	422.683	412.405	394.44	404.145	376.856	391.68	1043.493	1054.469
15	363.894	404.682	400.406	391.023	399.64	377.28	374.037	1067.352	1038.687





Parameter	DCR	DCR	DCR	DCR	DCR	DCR	OCL	OCL	OCL
<b>Condition:</b>									
<b>Pins</b>	96-94	93-91	79-81	82-84	90-88	85-87	79-81	82-84	85-87
<b>Unit</b>	m	m	m	m	m	m	u	u	u
<b>HighLimit</b>	1500	1500	650	650	650	650	700	700	700
<b>LowLimit</b>	700	700	100	100	100	100	380	380	380
<b>Average =</b>	1,068.58	1,061.53	378.53	404.16	388.07	415.60	471.80	482.44	494.10
<b>STD DEV =</b>	9.00	20.91	10.97	18.69	14.14	14.25	17.10	16.88	20.70
<b>Cpu</b>	15.97	6.99	8.25	4.38	6.17	5.48	4.45	4.30	3.32
<b>Cpl</b>	13.64	5.76	8.46	5.42	6.79	7.38	1.79	2.02	1.84
<b>Cpk</b>	13.64	5.76	8.25	4.38	6.17	5.48	1.79	2.02	1.84
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	1055.638	1052.212	378.726	406.217	388.656	403.256	481.393	491.066	518.158
2	1061.215	1047.109	392.423	400.608	389.549	414.026	481.613	490.876	502.376
3	1061.029	1044.942	370.301	461.28	379.579	449.045	474.653	489.038	494.704
4	1080.854	1065.998	391.977	394.373	383.623	400.1	461.29	465.741	468.849
5	1069.768	1052.22	372.375	403.947	385.906	405.956	489.65	450.661	471.518
6	1068.339	1052.645	359.653	392.429	404.326	425.829	484.376	478.213	488.836
7	1078.599	1132.539	399.782	404.379	399.957	406.661	467.515	459.921	490.348
8	1055.376	1047.291	361.435	383.153	376.187	403.722	475.711	466.126	460.89
9	1077.677	1067.065	380.182	391.262	431.494	416.726	426.761	500.8	499.645
10	1071.866	1057.458	372.586	395.656	384.218	403.947	467.906	518.125	499.028
11	1078.321	1062.604	374.456	421.216	382.193	445.287	440.922	479.627	493.655
12	1063.623	1043.451	376.546	412.718	382.108	411.16	475.216	483.429	470.552
13	1071.939	1056.471	375.332	387.152	371.817	410.758	476.11	474.172	490.04
14	1079.145	1069.822	381.399	418.043	383.203	414.697	493.242	498.309	537.41
15	1055.358	1071.052	390.762	389.997	378.278	422.805	480.694	490.558	525.519



Parameter	OCL	Hipot
Condition:		
Pins	88-90	
Unit	u	
HighLimit	700	
LowLimit	380	
Average =	513.37	2250VDC/
STD DEV =	16.97	60s/2mA
Cpu	3.67	
Cpl	2.62	
Cpk	2.62	
DATA	-	
1	524.731	Pass
2	520.367	Pass
3	511.791	Pass
4	495.698	Pass
5	516.475	Pass
6	506.927	Pass
7	515.858	Pass
8	502.813	Pass
9	515.874	Pass
10	485.612	Pass
11	509.887	Pass
12	542.941	Pass
13	482.037	Pass
14	541.714	Pass
15	527.764	Pass



## Appendix 2

### H5400NL Temperature Cycling 100cycles Electrical Test Data

Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	1-2	2-3	4-5	5-6	24-23	23-22	21-20	20-19	7-8	8-9
<b>Unit</b>	m	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	1500	650	650
<b>LowLimit</b>	150	150	150	150	150	150	150	150	100	100
<b>Average =</b>	791.18	704.51	808.47	762.45	883.22	850.44	936.26	775.30	316.93	324.31
<b>STD DEV =</b>	15.48	15.80	62.92	14.15	12.23	12.52	20.11	19.80	10.08	19.51
<b>Cpu</b>	15.27	16.78	3.66	17.37	16.81	17.29	9.34	12.20	11.02	5.56
<b>Cpl</b>	13.81	11.70	3.49	14.42	19.98	18.65	13.03	10.53	7.17	3.83
<b>Cpk</b>	13.81	11.70	3.49	14.42	16.81	17.29	9.34	10.53	7.17	3.83
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	793.873	690.255	780.309	757.455	882.614	848.252	909.891	755.469	310.705	316.807
2	778.491	690.751	771.826	742.313	889.038	833.462	914.504	749.812	303.086	308.104
3	789.9	705.108	796.176	771.963	882.761	864.686	929.696	774.641	306.988	312.067
4	777.446	705.871	799.742	764.239	878.75	857.439	924.365	767.481	323.65	319.155
5	777.789	689.743	792.705	761.273	893.449	848.203	917.989	754.414	315.834	314.353
6	777.51	693.124	786.389	756.322	872.144	836.425	911.96	751.498	313.484	313.975
7	807.384	717.442	798.444	763.885	855.145	839.849	958.697	794.087	310.754	315.277
8	808.618	745.195	846.13	803.129	896.754	856.904	943.446	799.159	329.205	355.751
9	773.258	688.582	782.961	764.587	884.462	861.919	954.296	790.876	329.675	314.867
10	814.237	703.846	1033.481	767.488	910.521	883.046	950.917	789.955	314.377	322.135
11	783.639	717.088	795.335	778.133	874.52	854.109	952.1	767.166	315.671	322.69
12	810.076	728.272	815.627	754.31	883.964	844.98	914.68	760.229	336.165	381.62
13	784.86	702.231	770.053	747.379	874.526	841.733	936.857	766.984	304.719	316.179
14	773.421	691.839	774.52	753.341	878.198	839.554	944.471	789.618	308.858	310.27
15	817.235	698.262	783.387	750.949	891.391	846.085	979.979	818.037	330.809	341.456



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	10-11	11-12	18-17	17-16	15-14	14-13	1-3	4-6	24-22	19-21
<b>Unit</b>	m	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	1500	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	700	700	700	700
<b>Average =</b>	426.64	423.30	463.09	327.93	331.76	310.54	945.67	1,004.97	980.87	1,123.44
<b>STD DEV =</b>	5.23	20.82	21.01	20.28	48.39	9.99	24.07	63.75	10.79	21.14
<b>Cpu</b>	14.23	3.63	2.97	5.29	2.19	11.33	7.68	2.59	16.03	5.94
<b>Cpl</b>	20.81	5.18	5.76	3.75	1.60	7.03	3.40	1.59	8.67	6.68
<b>Cpk</b>	14.23	3.63	2.97	3.75	1.60	7.03	3.40	1.59	8.67	5.94
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	419.878	414.591	453.997	316.186	311.616	301.361	941.078	981.688	986.438	1111.467
2	424.469	414.124	521.35	379.609	313.908	304.446	920.281	965.401	987.97	1096.709
3	428.583	419.321	444.739	309.873	319.608	308.285	931.546	993.236	987.906	1122.141
4	423.999	414.681	440.574	304.189	312.789	316.112	939.163	992.561	992.743	1102.576
5	429.172	416.499	451.686	310.952	324.636	311.812	919.917	988.346	987.909	1118.595
6	424.847	409.014	444.028	312.69	318.054	300.457	931.699	980.53	970.291	1105.767
7	428.517	422.073	459.825	329.286	354.576	318.698	954.674	997.27	959.684	1117.58
8	434.12	449.902	461.227	326.322	319.682	337.579	1001.539	1039.178	976.944	1153.047
9	422.925	421.013	501.771	367.017	508.695	308.449	923.081	986.431	974.579	1119.236
10	435.593	412.083	458.986	326.418	317.419	309.845	966.549	1233.081	993.091	1168.855
11	428.127	412.629	469.437	334.899	312.055	301.285	943.964	990.087	971.663	1156.523
12	432.167	492.341	470.742	328.34	320.923	325.288	989.606	1014.975	979.675	1106.798
13	417.364	410.481	451.734	315.562	312.449	300.548	935.375	959.112	971.54	1111.55
14	419.37	413.252	457.292	318.416	311.147	308.532	924.27	978.114	971.635	1145.703
15	430.478	427.563	458.9	339.123	318.852	305.431	962.379	974.552	1000.94	1115.021



Parameter	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	7-9	10-12	16-18	13-15	7-9	10-12	16-18	13-15	25-26	26-27
<b>Unit</b>	m	m	m	m	u	u	u	u	m	m
<b>HighLimit</b>	650	650	650	650	700	700	700	700	1500	1500
<b>LowLimit</b>	100	100	100	100	380	380	380	380	150	150
<b>Average =</b>	336.75	334.21	445.98	339.79	513.57	523.03	529.62	528.90	897.00	864.13
<b>STD DEV =</b>	18.59	23.58	8.98	48.10	10.79	16.37	15.49	13.62	18.88	22.48
<b>Cpu</b>	5.62	4.46	7.57	2.15	5.76	3.60	3.67	4.19	10.64	9.43
<b>Cpl</b>	4.25	3.31	12.84	1.66	4.13	2.91	3.22	3.64	13.19	10.59
<b>Cpk</b>	4.25	3.31	7.57	1.66	4.13	2.91	3.22	3.64	10.64	9.43
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	334.993	316.406	431.43	318.793	519.765	522.163	537.304	541.766	870.568	850.727
2	320.693	324.628	435.642	319.892	524.497	532	536.759	521.632	889.662	864.713
3	320.365	337.022	447.171	321.663	526.608	522.612	554.339	524.595	891.586	866.66
4	346.833	315.544	434.207	318.956	516.135	536.286	544.926	533.14	888.931	864.301
5	332.966	331.777	449.557	322.152	516.667	537.114	524.044	538.159	902.648	884.486
6	326.679	324.071	437.16	324.727	510.182	521.308	539.106	508.749	882.729	857.96
7	330.808	331.672	443.193	365.642	515.148	533.837	504.939	536.134	872.936	848.463
8	354.563	353.363	457.857	341.765	519.111	528.036	524.211	544.7	952.943	812.82
9	344.985	329.843	455.922	513.151	512.759	510.177	545.915	542.597	910.073	926.364
10	330.989	334.245	449.839	324.153	523.5	509.843	533.651	509.23	899.22	868.611
11	332.555	326.994	447.328	317.119	500.791	529.42	519.843	519.379	889.792	856.488
12	396.48	415.175	446.817	343.738	508.007	550.225	510.555	543.445	895.37	870.668
13	320.384	318.006	449.613	315.618	487.212	483.552	535.796	504.458	896.519	857.51
14	326.904	319.827	439.557	321.139	498.196	497.25	496.963	543.508	896.995	863.113
15	330.997	334.505	464.476	328.328	525.045	531.673	535.901	521.969	915.089	869.123



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	28-29	29-30	48-47	47-46	45-44	44-43	31-32	32-33	34-35
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	650	650	650
<b>LowLimit</b>	150	150	150	150	150	150	100	100	100
<b>Average =</b>	804.02	770.14	779.25	875.50	846.89	825.65	333.13	327.57	332.57
<b>STD DEV =</b>	21.46	21.36	17.37	17.50	108.50	120.14	15.86	10.93	21.43
<b>Cpu</b>	10.81	11.39	13.83	11.90	2.01	1.87	6.66	9.84	4.94
<b>Cpl</b>	10.16	9.68	12.08	13.82	2.14	1.87	4.90	6.94	3.62
<b>Cpk</b>	10.16	9.68	12.08	11.90	2.01	1.87	4.90	6.94	3.62
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	767.74	735.805	758.28	864.379	803.931	771.093	327.516	313.069	318.984
2	776.282	747.134	773.269	870.435	794.546	764.601	330.645	319.46	314.043
3	802.345	762.66	777.267	871.564	814.332	788.27	322.857	322.248	346.202
4	792.025	754.762	820.286	907.979	883.295	889.997	321.059	320.426	319.798
5	825.246	791.296	772.002	864.84	803.122	767.032	312.08	314.329	336.374
6	777.84	746.579	764.146	853.959	812.7	788.188	323.569	321.073	322.947
7	815.284	756.936	756.96	852.297	822.506	814.884	347.927	351.115	312.105
8	839.432	811.383	787.334	881.827	848.723	816.696	334.809	335.155	378.976
9	829.618	795.845	783.317	904.489	1244.029	1259.765	320.667	315.622	380.216
10	798.404	778.969	778.758	877.382	818.178	787.004	366.964	327.655	315.434
11	803.593	777.335	776.71	861.14	801.279	769.028	323.917	334.395	319.88
12	822.483	798.345	815.851	907.513	840.853	826.067	343.585	346.252	318.869
13	789.417	760.622	782.421	866.054	805.611	782.956	325.734	326.532	327.661
14	789.791	755.516	773.308	869.288	811.728	780.138	328.414	331.429	325.793
15	830.751	778.926	768.767	879.335	798.482	779.059	367.154	334.743	351.338



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	35-36	42-41	41-40	39-38	38-37	25-27	28-30	48-46	45-43
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	1500	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	700	700	700	700
<b>Average =</b>	312.55	343.30	350.44	199.26	322.12	1,005.30	994.83	1,107.18	992.99
<b>STD DEV =</b>	18.10	21.20	21.29	9.17	15.83	36.51	15.51	17.26	19.89
<b>Cpu</b>	6.21	4.82	4.69	16.39	6.90	4.52	10.86	7.59	8.50
<b>Cpl</b>	3.91	3.83	3.92	3.61	4.68	2.79	6.34	7.86	4.91
<b>Cpk</b>	3.91	3.83	3.92	3.61	4.68	2.79	6.34	7.59	4.91
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	293.109	318.741	323.897	187.007	300.336	968.778	962.775	1098.621	971.378
2	298.279	331.84	331.326	185.216	323.914	1000.022	974.903	1097.823	973.312
3	347.952	332.659	363.278	201.822	308.693	997.648	1003.713	1108.806	987.497
4	299.725	387.75	381.126	208.332	320.138	993.453	985.496	1138.394	1024.078
5	316.101	329.712	334.036	205.714	318.088	986.393	996.283	1086.515	973.257
6	305.902	318.053	320.61	200.436	303.874	984.382	977.523	1093.996	997.438
7	306.097	336.834	347.601	191.641	309.16	971.241	1016.132	1078.781	985.152
8	355.427	384.352	393.487	199.545	316.315	1108.818	997.031	1104.061	1002.01
9	307.07	359.101	366.973	192.595	336.548	1071.659	1004.881	1136.331	1045.714
10	297.059	354.058	343.673	209.716	329.324	999.114	1016.712	1110.347	1000.325
11	309.122	331.239	330.414	194.879	305.824	989.172	990.171	1098.288	974.712
12	309.212	332.577	355.617	199.768	361.316	991.807	1007.789	1138.209	1003.185
13	308.461	353.908	358.707	217.853	337.544	995.681	988.604	1104.096	982.246
14	299.757	322.009	333.263	207.084	323.003	991.668	986.241	1105.431	981.047
15	335.028	356.668	372.655	187.29	337.795	1029.706	1014.237	1108.042	993.486



Parameter	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL	DCR
<b>Condition:</b>									
<b>Pins</b>	31-33	34-36	42-40	39-37	31-33	34-36	40-42	37-39	49-50
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	700	700	700	700	1500
<b>LowLimit</b>	100	100	100	100	380	380	380	380	150
<b>Average =</b>	335.57	325.65	341.22	195.87	516.08	520.57	544.62	539.45	884.43
<b>STD DEV =</b>	15.94	28.83	16.32	21.77	16.20	17.55	10.47	15.33	38.04
<b>Cpu</b>	6.58	3.75	6.31	6.95	3.79	3.41	4.94	3.49	5.39
<b>Cpl</b>	4.93	2.61	4.93	1.47	2.80	2.67	5.24	3.47	6.44
<b>Cpk</b>	4.93	2.61	4.93	1.47	2.80	2.67	4.94	3.47	5.39
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	324.985	305.488	322.056	178	527.912	505.093	523.417	559.972	865.254
2	339.579	305.116	333.765	200.936	525.045	525.325	550.922	543.164	882.933
3	330.173	371.379	369.486	188.12	530.592	498.513	532.847	548.352	862.194
4	324.31	307.865	349.824	178.578	529.102	511.069	544.359	554.915	865.869
5	314.343	311.101	329.33	176.091	495.603	526.123	549.572	548.359	888.708
6	324.477	318.704	315.964	175.09	517.451	536.183	533.233	556.61	880.294
7	319.529	312.128	325.305	189.006	524.955	555.361	558.475	504.659	881.895
8	348.487	395.3	332.101	180.868	510.484	488.101	546.881	548.508	844.554
9	323.789	378.625	351.128	215.791	502.259	529.21	547.446	526.188	893.433
10	366.031	302.457	366.894	182.084	508.01	525.106	555.259	539.731	1012.348
11	342.824	316.941	335.226	177.331	473.284	541.221	552.282	546.807	892.908
12	340.857	310.112	348.41	248.391	525.044	513.226	529.68	521.554	863.007
13	337.385	318.948	337.754	231.808	536.435	530.06	557.923	517.461	858.998
14	325.482	312.103	333.885	203.765	507.088	497.37	536.997	532.019	911.829
15	371.279	318.528	367.123	212.198	527.92	526.557	549.942	543.383	862.181





Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	50-51	52-53	53-54	72-71	71-70	69-68	68-67	55-56	56-57
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	650	650
<b>LowLimit</b>	150	150	150	150	150	150	150	100	100
<b>Average =</b>	843.95	927.32	886.75	870.42	853.73	885.04	869.68	453.76	443.64
<b>STD DEV =</b>	25.57	38.51	29.39	22.51	29.78	38.29	40.27	50.17	44.16
<b>Cpu</b>	8.55	4.96	6.96	9.32	7.23	5.35	5.22	1.30	1.56
<b>Cpl</b>	9.04	6.73	8.36	10.67	7.88	6.40	5.96	2.35	2.59
<b>Cpk</b>	8.55	4.96	6.96	9.32	7.23	5.35	5.22	1.30	1.56
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	826.033	980.879	950.553	843.654	837.003	1023.595	975.338	493.008	479.163
2	890.104	955.257	928.767	881.134	869.898	885.836	840.662	406.221	398.995
3	829.666	907.017	871.316	862.463	831.359	870.576	868.98	420.953	428.838
4	827.394	901.274	859.864	861.992	832.269	886.263	841.108	453.907	468.398
5	852.931	892.835	869.386	856.675	841.587	879.284	841.3	387.74	404.294
6	833.087	914.433	868.667	856.397	833.481	858.768	840.125	425.481	410.985
7	842.333	976.195	924.785	862.649	840.356	868.255	867.862	453.325	443.276
8	806.299	891.657	861.769	855.911	835.052	885.049	871.342	393.901	423.864
9	881.973	1010.057	916.607	867.745	886.636	885.491	842.253	564.129	505.291
10	892.916	898.551	882.735	851.64	840.087	863.507	830.121	499.241	538.113
11	847.544	930.377	909.732	878.555	903.129	878.197	857.567	467.209	460.527
12	824.442	897.289	864.644	887.937	849.812	880.8	875.448	509.241	497.134
13	816.575	882.449	864.578	850.529	822.74	881.95	932.753	399.366	408.091
14	832.2	965.308	864.049	923.401	851.243	855.058	840.715	425.347	388.959
15	855.708	906.248	863.849	915.64	931.334	873.002	919.686	507.313	398.619



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	58-59	59-60	65-66	65-64	63-62	62-61	49-51	52-54	72-70
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	700	700	700
<b>Average =</b>	443.87	413.50	422.10	425.55	403.45	417.87	1,068.55	1,107.89	1,094.56
<b>STD DEV =</b>	42.18	23.84	51.97	37.33	18.42	22.19	25.89	31.44	24.53
<b>Cpu</b>	1.63	3.31	1.46	2.00	4.46	3.49	5.55	4.16	5.51
<b>Cpl</b>	2.72	4.38	2.07	2.91	5.49	4.78	4.74	4.32	5.36
<b>Cpk</b>	1.63	3.31	1.46	2.00	4.46	3.49	4.74	4.16	5.36
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	414.675	475.614	425.171	435.934	388.263	399.699	1047.184	1074.968	1080.324
2	514.418	449.018	388.173	425.846	403.737	398.052	1107.271	1102.767	1122.948
3	449.348	415.629	410.858	397.363	394.332	400.924	1051.351	1100.441	1072.922
4	420.019	398.881	389.351	398.476	405.86	428.777	1057.411	1099.619	1072.435
5	442.528	417.62	390.835	418.51	400.562	433.238	1063.194	1095.377	1086.012
6	421.436	385.837	393.75	399.421	384.62	402.079	1046.979	1109.205	1079.477
7	420.416	412.107	421.904	431.186	454.388	472.558	1062.886	1096.688	1077.231
8	406.488	395.81	391.499	396.001	389.092	401.151	1034.483	1085.968	1065.582
9	416.272	428.538	460.575	449.142	394.351	403.931	1100.947	1195.768	1118.143
10	411.897	393.35	396.569	435.858	387.291	392.245	1123.406	1122.365	1084.409
11	412.001	382.746	484.133	434.423	393.721	399.935	1066.96	1143.531	1122.699
12	438.643	420.464	587.096	547.908	395.293	441.296	1051.297	1083.518	1099.816
13	431.838	418.686	411.548	422.199	422.264	423.668	1039.906	1078.822	1065.951
14	542.019	415.552	384.137	388.545	407.568	443.604	1094.41	1147.019	1137.395
15	516.031	392.702	395.966	402.472	430.428	426.925	1080.63	1082.222	1133.083



Parameter	DCR	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL
<b>Condition:</b>									
<b>Pins</b>	69-67	55-57	58-60	66-64	63-61	55-57	58-60	64-66	61-63
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	650	650	650	650	700	700	700	700
<b>LowLimit</b>	700	100	100	100	100	380	380	380	380
<b>Average =</b>	1,096.90	421.37	448.34	434.17	428.16	524.39	509.95	551.81	542.36
<b>STD DEV =</b>	30.72	33.42	50.80	24.11	14.19	18.16	15.26	11.12	16.60
<b>Cpu</b>	4.37	2.28	1.32	2.98	5.21	3.22	4.15	4.44	3.17
<b>Cpl</b>	4.31	3.21	2.29	4.62	7.71	2.65	2.84	5.15	3.26
<b>Cpk</b>	4.31	2.28	1.32	2.98	5.21	2.65	2.84	4.44	3.17
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	1074.17	414.72	485.381	406.876	417.854	537.605	510.021	564.943	551.564
2	1087.265	398.401	562.404	441.53	435.868	518.533	488.308	557.928	566.929
3	1094.715	414.165	426.034	425.277	420.653	518.381	518.277	547.055	536.03
4	1088.502	410.652	415.061	414.981	453.528	525.645	507.658	526.715	552.476
5	1083.581	401.468	422.842	437.721	448.728	527.671	521.481	549.74	526.996
6	1063.51	394.261	415.902	407.307	415.452	538.66	537.84	551.485	570.499
7	1097.373	405.238	409.979	434.999	426.562	531.687	496.912	545.917	542.331
8	1101.136	420.003	410.101	414.816	411.115	471.582	508.363	562.181	543.826
9	1090.256	508.396	433.852	458.505	424.487	519.106	516.67	544.288	536.151
10	1063.301	445.842	410.689	451.796	406.395	531.18	495.506	569.933	519.475
11	1088.574	399.01	408.984	456.606	427.257	542.518	520.872	539.192	528.963
12	1108.669	411.387	436.937	484.39	444.366	512.34	510.016	540.858	516.297
13	1185.302	386.372	425.54	460.279	413.209	555.828	490.574	562.787	548.986
14	1078.8	421.208	549.295	393.612	445.259	515.123	536.753	555.08	528.011
15	1148.289	489.394	512.134	423.867	431.601	519.987	490.005	559.03	566.913



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	73-74	74-75	76-77	77-78	91-92	92-93	94-95	95-96	79-80
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	1500	650
<b>LowLimit</b>	150	150	150	150	150	150	150	150	100
<b>Average =</b>	896.82	844.52	874.65	842.08	841.76	858.93	852.34	874.64	430.59
<b>STD DEV =</b>	65.33	23.09	18.27	19.69	11.67	10.53	28.08	26.85	64.88
<b>Cpu</b>	3.08	9.46	11.41	11.14	18.81	20.30	7.69	7.76	1.13
<b>Cpl</b>	3.81	10.03	13.22	11.72	19.77	22.45	8.34	9.00	1.70
<b>Cpk</b>	3.08	9.46	11.41	11.14	18.81	20.30	7.69	7.76	1.13
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	856.719	832.384	872.104	828.722	838.607	845.149	914.605	905.849	401.181
2	891.301	847.883	844.564	822.699	844.994	861.489	834.158	860.817	399.943
3	865.421	838.528	872.286	846.647	831.956	870.891	829.681	864.491	412.804
4	875.836	834.561	880.197	828.827	836.677	857.818	837.153	866.756	416.34
5	904.017	864.974	872.129	832.428	835.258	856.992	832.393	857.727	416.007
6	861.599	833.315	891.893	883.36	827.848	856.584	822.395	846.185	391.816
7	879.307	842.143	915.005	877.954	842.677	863.92	852.847	881.166	405.165
8	855.948	819.113	880.812	842.734	858.945	880.117	849.136	866.795	402.721
9	868.96	825.126	879.644	873.186	850.017	851.976	844.992	863.934	508.642
10	874.716	824.731	865.222	836.916	826.181	863.232	843.767	870.119	407.016
11	912.286	840.028	851.552	826.024	840.557	851.549	851.78	868.885	401.647
12	911.906	908.889	858.997	834.255	857.9	868.327	921.058	962.398	649.776
13	871.43	829.761	897.142	843.84	822.378	835.222	837.896	881.338	394.08
14	1131.911	844.984	886.876	836.668	855.68	854.78	841.22	865.319	445.429
15	890.942	881.402	851.392	816.89	856.748	865.929	872.055	857.863	406.244



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	80-81	82-83	83-84	85-86	86-87	88-89	89-90	73-75	76-78
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	650	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	100	700	700
<b>Average =</b>	413.07	445.78	423.89	395.88	393.28	385.05	393.79	1,095.15	1,059.40
<b>STD DEV =</b>	69.95	57.32	33.89	12.90	16.94	11.16	18.69	66.75	18.06
<b>Cpu</b>	1.13	1.19	2.22	6.57	5.05	7.92	4.57	2.02	8.13
<b>Cpl</b>	1.49	2.01	3.19	7.65	5.77	8.52	5.24	1.97	6.63
<b>Cpk</b>	1.13	1.19	2.22	6.57	5.05	7.92	4.57	1.97	6.63
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	386.576	407.95	407.988	382.531	383.012	374.094	374.058	1063.567	1066.128
2	369.683	423.902	423.304	385.541	386.736	382.066	395.009	1073.293	1039.33
3	375.864	411.467	407.093	388.473	390.058	380.422	379.54	1049.463	1058.384
4	419.006	416.692	412.782	390.752	376.473	391.42	391.97	1071.412	1071.198
5	377.999	421.8	441.253	398.809	391.839	381.569	384.092	1076.992	1038.534
6	373.439	394.97	401.368	395.865	396.273	370.928	387.689	1063.119	1051.874
7	374.248	625.094	545.673	395.819	382.732	391.711	401.152	1078.721	1052.073
8	378.29	421.049	402.451	395.04	387.387	380.471	389.175	1047.569	1078.942
9	415.437	446.897	420.957	400.448	403.291	388.859	397.533	1052.818	1098.718
10	446.698	467.434	415.168	435.169	438.835	382.59	380.033	1065.625	1051.802
11	380.202	418.712	412.754	412.026	413.673	380.827	391.114	1123.84	1045.674
12	618.557	434.642	417.739	389.458	383.556	418.385	457.9	1164.408	1050.178
13	371.66	437.133	411.588	382.783	376.055	385.511	391.446	1066.58	1072.534
14	538.882	533.147	415.371	398.379	413.608	394.475	400.408	1317.46	1083.555
15	369.538	425.803	422.934	387.146	375.659	372.378	385.688	1112.435	1032.138



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	OCL	OCL	OCL
<b>Condition:</b>									
<b>Pins</b>	96-94	93-91	79-81	82-84	90-88	85-87	79-81	82-84	85-87
<b>Unit</b>	m	m	m	m	m	m	u	u	u
<b>HighLimit</b>	1500	1500	650	650	650	650	700	700	700
<b>LowLimit</b>	700	700	100	100	100	100	380	380	380
<b>Average =</b>	1,078.03	1,071.97	414.48	427.76	389.78	415.40	514.48	511.40	524.59
<b>STD DEV =</b>	14.76	8.57	56.04	29.95	17.62	10.24	12.20	14.80	13.54
<b>Cpu</b>	9.53	16.65	1.40	2.47	4.92	7.64	5.07	4.25	4.32
<b>Cpl</b>	8.54	14.47	1.87	3.65	5.48	10.27	3.67	2.96	3.56
<b>Cpk</b>	8.54	14.47	1.40	2.47	4.92	7.64	3.67	2.96	3.56
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	1103.812	1065.032	370.446	406.539	380.617	404.791	510.436	521.798	523.549
2	1067.448	1079.364	383.41	406.75	390.16	416.325	519.869	508.418	537.101
3	1062.155	1082.031	396.518	405.775	386.764	409.572	502.123	502.954	515.249
4	1077.851	1072.703	399.617	407.152	391.626	409.793	514.536	487.732	521.402
5	1058.826	1063.942	401.596	432.507	380.852	413.056	539.696	494.121	518.092
6	1047.873	1073.634	368.577	384.584	388.266	410.088	496.172	530.047	495.772
7	1074.009	1073.733	383.82	479.641	389.854	417.823	519.488	519.207	545.412
8	1085.93	1075.565	382.386	405.963	397.589	419.541	523.174	530.863	534.374
9	1077.391	1077.777	485.293	449.363	386.533	430.919	492.314	501.351	518.923
10	1078.583	1075.941	446.03	454.499	378.278	406.174	519.951	502.395	525.732
11	1078.427	1070.49	381.081	407.389	379.413	422.981	517.551	499.097	517.611
12	1094.419	1061.276	483.123	436.604	450.205	416.779	511.969	518.729	545.419
13	1086.316	1048.896	373.331	435.912	369.936	403.685	529.605	542.857	529.046
14	1076.204	1079.485	573.276	494.857	396.05	442.641	501.216	503.698	504.403
15	1101.239	1079.607	388.705	408.935	380.56	406.874	519.13	507.751	536.814



<b>Parameter</b>	OCL	Hipot
<b>Condition:</b>		
<b>Pins</b>	88-90	
<b>Unit</b>	u	
<b>HighLimit</b>	700	
<b>LowLimit</b>	380	
<b>Average =</b>	545.63	2250VDC/
<b>STD DEV =</b>	15.79	60s/2mA
<b>Cpu</b>	3.26	
<b>Cpl</b>	3.50	
<b>Cpk</b>	3.26	
<b>DATA</b>	-	
1	576.008	Pass
2	557.16	Pass
3	536.149	Pass
4	535.354	Pass
5	544.344	Pass
6	541.975	Pass
7	559.96	Pass
8	553.949	Pass
9	555.755	Pass
10	550.474	Pass
11	532.1	Pass
12	519.162	Pass
13	514.026	Pass
14	549.039	Pass
15	558.957	Pass



### Appendix 3

#### H5400NL Temperature Humidity1000hrs Electrical Test Data

Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	1-2	2-3	4-5	5-6	24-23	23-22	21-20	20-19	7-8	8-9
<b>Unit</b>	m	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	1500	650	650
<b>LowLimit</b>	150	150	150	150	150	150	150	150	100	100
<b>Average =</b>	800.06	705.20	815.59	777.94	774.05	745.97	934.92	801.26	327.89	329.79
<b>STD DEV =</b>	32.84	17.70	41.79	24.30	24.95	24.02	26.79	101.18	24.95	26.17
<b>Cpu</b>	7.10	14.97	5.46	9.90	9.70	10.46	7.03	2.30	4.30	4.08
<b>Cpl</b>	6.60	10.46	5.31	8.61	8.34	8.34	9.77	2.15	3.04	2.93
<b>Cpk</b>	6.60	10.46	5.31	8.61	8.34	8.27	7.03	2.15	3.04	2.93
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	779.259	703.583	785.588	763.519	752.647	718.347	978.366	816.187	318.786	322.384
2	798.312	704.531	786.074	763.653	785.147	733.223	937.179	771.432	307.819	316.773
3	769.581	683.742	792.3	758.662	756.22	727.627	918.047	768.17	336.203	310.108
4	885.863	722.218	816.154	790.679	767.978	748.572	986.109	1168.364	311.8	311.67
5	830.869	687.298	780.806	766.317	787.753	748.204	906.434	751.863	302.547	308.299
6	784.122	700.326	776.821	746.831	754.946	727.781	924.966	756.149	335.217	337.09
7	777.266	691.659	805.493	772.938	759.826	734.244	911.385	753.682	313.331	322.483
8	788.851	714.55	799.948	786.053	786.006	779.388	937.824	784.837	323.919	321.47
9	804.849	750.058	857.111	803.011	851.217	817.671	984.206	842.821	353.205	368.251
10	859.712	707.168	937.484	737.455	756.811	749.122	911.376	776.19	407.664	412
11	773.056	687.714	839.313	802.467	760.463	728.93	899.983	746.059	314.669	315.686
12	771.471	681.528	791.807	767.229	753.506	745.805	933.697	763.787	312.674	315.623
13	792.631	706.164	789.817	785.49	760.187	738.435	931.77	776.184	316.213	322.931
14	804.949	725.093	810.408	786.884	789.421	758.293	919.975	757.61	335.185	333.164
15	780.149	712.389	864.75	837.916	788.692	733.981	942.476	785.581	329.046	328.983





Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	10-11	11-12	18-17	17-16	15-14	14-13	1-3	4-6	24-22	19-21
<b>Unit</b>	m	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	1500	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	700	700	700	700
<b>Average =</b>	450.62	438.83	447.29	315.11	314.20	306.30	945.45	1,015.70	975.66	1,145.64
<b>STD DEV =</b>	55.29	25.04	9.39	16.60	5.04	6.38	29.87	41.24	21.43	92.21
<b>Cpu</b>	1.20	2.81	7.20	6.72	22.22	17.96	6.19	3.91	8.16	1.28
<b>Cpl</b>	2.11	4.51	12.33	4.32	14.17	10.78	2.74	2.55	4.29	1.61
<b>Cpk</b>	1.20	2.81	7.20	4.32	14.17	10.78	2.74	2.55	4.29	1.28
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	443.788	419.925	434.97	301.995	320.8	306.061	935.159	987.658	934.858	1133.803
2	434.791	429.219	434.638	305.516	312.205	305.566	952.95	991.881	1000.728	1109.102
3	432.987	431.387	444.823	309.576	308.284	309.769	904.37	992.189	962.938	1125.72
4	437.477	444.116	457.224	327.664	315.989	299.55	1024.392	1015.804	965.868	1485.825
5	439.253	468.662	442.913	302.524	308.449	310.65	965.265	995.985	988.62	1104.655
6	414.255	425.3	436.646	300.659	316.166	306.126	924.144	971.641	945.056	1118.959
7	435.852	418.91	450.966	367.885	308.923	304.828	920.709	993.807	963.428	1106.525
8	424.395	421.037	463.285	316.148	318.56	300.163	940.359	1011.087	993.627	1137.296
9	436.974	498.118	449.086	309.369	324.222	298.406	985.356	1016.631	1022.11	1160.778
10	427.881	410.037	465.724	326.513	311.03	305.632	973.821	1140.033	970.233	1120.95
11	648.768	476.69	447.804	315.161	319.973	298.695	923.214	1084.398	971.291	1103.42
12	418.119	418.55	440.724	301.167	312.383	309.046	920.329	999.453	981.894	1122.812
13	457.513	441.987	454.022	319.24	316.778	303.282	942.741	1015.982	973.414	1134.281
14	482.099	418.163	447.704	319.596	312.32	324.065	929.444	1020.868	965.165	1119.168
15	425.127	460.352	438.796	303.58	306.868	312.687	939.524	998.083	995.707	1101.29



Parameter	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	7-9	10-12	16-18	13-15	7-9	10-12	16-18	13-15	25-26	26-27
<b>Unit</b>	m	m	m	m	u	u	u	u	m	m
<b>HighLimit</b>	650	650	650	650	700	700	700	700	1500	1500
<b>LowLimit</b>	100	100	100	100	380	380	380	380	150	150
<b>Average =</b>	335.98	365.27	446.03	321.32	487.70	493.67	485.78	487.97	772.34	746.60
<b>STD DEV =</b>	11.70	64.06	14.37	5.78	9.60	17.51	22.48	16.27	8.84	7.42
<b>Cpu</b>	8.94	1.48	4.73	18.96	7.37	3.93	3.18	4.34	27.43	33.84
<b>Cpl</b>	6.72	1.38	8.02	12.77	3.74	2.16	1.57	2.21	23.46	26.80
<b>Cpk</b>	6.72	1.38	4.73	12.77	3.74	2.16	1.57	2.21	23.46	26.80
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	330.08	353.733	426.23	325.854	496.081	469.649	440.658	499.909	770.544	740.497
2	328.078	352.949	438.68	321.086	477.94	502.569	486.092	478.085	767.049	745.062
3	348.779	351.029	433.313	319.872	472.885	514.314	502.392	479.844	764.459	743.247
4	325.686	365.539	440.015	324.627	479.389	489.342	479.7	484.468	759.16	740.111
5	317.469	358.386	443.7	320.174	482.865	495.509	531.705	499.936	771.665	761.523
6	366.346	328.332	433.593	313.694	472.892	495.366	462.323	488.613	775.53	758.263
7	324.775	323.854	485.009	315.765	482.241	519.384	518.553	480.323	764.827	746.246
8	343.075	333.313	466.931	324.295	480.593	480.905	472.779	451.428	762.027	741.478
9	345.878	420.553	442.584	327.747	495.708	478.887	472.781	517.877	781.326	735.694
10	338.348	323.94	441.058	314.211	495.264	516.122	480.982	476.275	788.193	734.965
11	338.254	585.119	447.112	326.285	496.522	469.284	491.807	494.41	771.784	751.629
12	327.894	322.901	438.998	312.141	491.416	502.317	479.512	499.566	790.36	751.82
13	328.323	321.403	457.183	318.281	505.852	519.204	486.831	497.363	768.688	750.678
14	339.519	375.306	455.734	333.874	491.093	474.087	467.701	505.831	779.768	746.241
15	337.209	362.633	440.303	321.859	494.809	478.169	512.908	465.583	769.755	751.525



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	28-29	29-30	48-47	47-46	45-44	44-43	31-32	32-33	34-35
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	650	650	650
<b>LowLimit</b>	150	150	150	150	150	150	100	100	100
<b>Average =</b>	784.93	754.47	798.80	767.42	811.21	781.31	325.51	333.08	320.36
<b>STD DEV =</b>	9.86	6.81	57.75	22.80	49.12	49.54	19.97	28.87	12.13
<b>Cpu</b>	24.18	36.48	4.05	10.71	4.67	4.84	5.42	3.66	9.06
<b>Cpl</b>	21.47	29.58	3.74	9.03	4.49	4.25	3.76	2.69	6.05
<b>Cpk</b>	21.47	29.58	3.74	9.03	4.49	4.25	3.76	2.69	6.05
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	778.442	752.255	782.135	770.241	991.443	960.442	322.731	347.339	314.151
2	789.767	755.757	846.236	838.332	791.932	760.668	324.088	325.143	317.609
3	766.519	737.276	782.529	757.985	806.455	771.449	337.211	310.44	308.259
4	787.01	755.859	788.103	764.269	800.636	759.519	311.835	309.3	315.505
5	785.494	745.28	778.076	751.732	804.758	788.737	317.385	332.272	312.55
6	803.809	760.594	765.43	766.271	804.995	784.436	320.519	331.526	318.057
7	777.887	751.578	794.038	756.848	820.831	791.296	335.261	335.867	329.945
8	772.979	751.63	776.334	759.452	798.23	768.683	306.609	325.121	304.509
9	788.192	759.28	780.038	793.927	796.979	772.892	393.113	351.934	328.802
10	796.392	761.114	763.694	759.237	782.8	746.716	318.493	312.896	353.534
11	773.215	750.18	780.702	775.192	796.834	764.213	318.945	429.794	338.187
12	787.312	753.312	766.647	733.506	793.395	761.718	318.953	312.73	312.471
13	793.316	764.174	1002.573	767.212	806.53	779.763	329.402	333.421	317.457
14	795.069	762.855	800.852	765.566	790.967	758.139	321.933	328.203	317.936
15	778.515	755.93	774.644	751.507	781.401	751.048	306.18	310.154	316.384



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	35-36	42-41	41-40	39-38	38-37	25-27	28-30	48-46	45-43
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	1500	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	700	700	700	700
<b>Average =</b>	328.24	325.88	330.14	193.52	306.80	986.16	978.57	1,010.46	977.83
<b>STD DEV =</b>	55.75	11.97	15.09	13.12	14.31	9.71	12.75	58.99	16.42
<b>Cpu</b>	1.92	9.03	7.06	11.60	7.99	17.64	13.63	2.77	10.60
<b>Cpl</b>	1.36	6.29	5.08	2.38	4.82	9.82	7.28	1.75	5.64
<b>Cpk</b>	1.36	6.29	5.08	2.38	4.82	9.82	7.28	1.75	5.64
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	305.738	318.453	320.711	193.129	314.809	977.117	982.234	1000.538	1020.507
2	321.389	343.391	345.626	188.13	306.455	985.162	973.492	1000.932	966.378
3	304.679	315.07	316.99	208.971	316.013	979.427	966.142	977.181	976.966
4	326.333	313.299	324.511	190.607	308.62	971.195	982.455	971.389	981.112
5	297.229	320.384	328.236	185.046	296.531	981.355	982.918	997.166	982.163
6	314.301	323.099	331.798	188.877	302.804	999.408	1012.735	1000.139	993.312
7	334.719	323.171	321.71	184.043	304.131	986.776	981.702	1010.992	993.543
8	318.058	360.97	370.059	190.509	301.021	968.967	969.079	990.279	958.331
9	334.858	318.414	331.473	193.04	302.949	993.849	973.122	1035.154	980.481
10	304.559	328.473	321.266	184.852	291.809	996.954	986.565	994.074	957.16
11	316.059	319.282	311.333	235.167	317.262	982.904	960.541	993.857	978.161
12	531.916	327.895	318.676	196.215	349.094	1005.018	985.663	974.422	967.557
13	317.977	334.255	332.169	195.645	311.291	991.192	990.468	1223.779	987.198
14	300.623	319.144	354.487	192.02	291.537	986.289	964.616	1002.355	968.825
15	295.161	322.901	323.084	176.504	287.653	986.828	966.835	984.646	955.736

Parameter	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL	DCR
<b>Condition:</b>									
<b>Pins</b>	31-33	34-36	42-40	39-37	31-33	34-36	40-42	37-39	49-50
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	700	700	700	700	1500
<b>LowLimit</b>	100	100	100	100	380	380	380	380	150
<b>Average =</b>	345.22	335.49	329.95	188.13	480.78	490.22	513.03	502.16	874.74
<b>STD DEV =</b>	35.67	53.93	7.82	20.09	13.01	14.90	25.20	17.16	21.91
<b>Cpu</b>	2.85	1.94	13.64	7.66	5.62	4.69	2.47	3.84	9.51
<b>Cpl</b>	2.29	1.46	9.80	1.46	2.58	2.47	1.76	2.37	11.03
<b>Cpk</b>	2.29	1.46	9.80	1.46	2.58	2.47	1.76	2.37	9.51
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	350.834	309.587	325.992	190.843	484.955	471.948	516.212	502.212	835.421
2	332.369	327.184	334.776	183.754	490.033	508.822	532.555	515.829	908.883
3	343.692	302.221	323.645	209.18	491.373	488.234	512.603	498.693	883.826
4	314.629	337.184	326.441	188.229	447.857	503.011	536.193	500.33	899.963
5	340.554	293.62	337.566	173.941	479.813	470.349	542.464	456.589	858.036
6	343.311	319.296	333.659	169.22	483.028	506.201	526.596	519.665	854.125
7	354.131	354.011	329.051	180.778	468.492	506.844	533.656	504.503	855.768
8	320.765	316.117	328.481	184.863	495.758	507.162	457.035	494.475	889.055
9	420.31	357.176	334.829	187.04	482.813	472.886	508.34	500.213	904.331
10	320.782	356.325	323.77	169.177	487.335	500.502	470.214	533.53	858.217
11	438.586	313.975	321.363	242.994	456.73	472.074	487.105	509.81	885.448
12	315.8	523.248	333.951	211.735	481.045	482.576	500.964	499.191	846.712
13	342.04	312.415	331.29	194.631	492.446	504.168	530.885	505.772	865.067
14	329.338	301.097	349.393	176.882	490.568	483.89	541.381	513.371	888.816
15	311.097	308.939	315.104	158.711	479.494	474.67	499.25	478.205	887.397



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	50-51	52-53	53-54	72-71	71-70	69-68	68-67	55-56	56-57
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	650	650
<b>LowLimit</b>	150	150	150	150	150	150	150	100	100
<b>Average =</b>	827.29	884.40	852.72	850.86	842.59	864.09	842.03	400.73	397.28
<b>STD DEV =</b>	24.16	16.76	13.95	12.91	19.02	9.67	12.05	33.42	27.68
<b>Cpu</b>	9.28	12.24	15.46	16.76	11.52	21.92	18.20	2.49	3.04
<b>Cpl</b>	9.34	14.60	16.79	18.10	12.14	24.62	19.14	3.00	3.58
<b>Cpk</b>	9.28	12.24	15.46	16.76	11.52	21.92	18.20	2.49	3.04
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	796.026	887.939	862.951	838.449	851.565	868.982	852.155	403.674	393.349
2	831.931	876.279	834.265	836.087	822.805	871.831	862.289	384.448	420.031
3	847.775	882.047	850.7	852.56	831.375	869.366	835.334	381.714	378.489
4	857.173	881.296	849.608	861.775	846.536	872.281	845.205	381.086	387.579
5	810.753	883.676	850.475	844.685	822.101	849.445	814.513	379.731	381.965
6	808.884	867.926	833.681	837.608	820.484	861.656	842.997	394.552	397.442
7	818.986	867.624	845.04	875.763	862.779	870.671	848.689	393.554	383.426
8	838.88	884.498	881.564	863.119	846.746	862.077	858.18	426.063	420.772
9	886.474	941.241	882.461	876.377	865.279	876.541	851.542	375.518	378.784
10	799.547	880.474	839.882	836.907	822.637	852.951	833	377.271	378.336
11	843.598	877.553	851.205	842.248	826.343	843.544	827.544	381.092	397.383
12	804.067	871.312	854.671	850.951	841.028	866.274	837.957	391.647	378.901
13	809.361	892.579	858.131	856.421	873.562	854.302	833.641	393.782	391.448
14	817.189	889.828	854.22	844.9	876.573	876.457	849.788	507.243	488.162
15	838.66	881.71	841.948	845.041	829.029	864.999	837.684	439.635	383.124



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	58-59	59-60	65-66	65-64	63-62	62-61	49-51	52-54	72-70
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	700	700	700
<b>Average =</b>	407.95	444.53	396.66	390.30	394.91	406.04	1,056.55	1,075.35	1,074.23
<b>STD DEV =</b>	26.78	49.59	17.39	10.57	13.75	13.36	25.75	19.73	17.03
<b>Cpu</b>	3.01	1.38	4.86	8.19	6.19	6.09	5.74	7.17	8.33
<b>Cpl</b>	3.83	2.32	5.69	9.15	7.15	7.64	4.62	6.34	7.33
<b>Cpk</b>	3.01	1.38	4.86	8.19	6.19	6.09	4.62	6.34	7.33
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	401.025	391.755	433.833	387.309	393.869	397.392	1025.775	1073.734	1084.332
2	395.109	405.45	384.586	391.544	387.397	396.453	1092.437	1059.941	1045.964
3	390.774	391.666	381.127	381.077	386.998	398.567	1084.653	1069.925	1080.699
4	504.171	436.484	380.271	382.416	387.615	399.724	1069.841	1069.029	1073.352
5	419.035	441.512	405.364	382.583	380.81	399.463	1036.413	1076.857	1058.662
6	398.513	398.561	413.322	394.087	388.329	392.066	1036.94	1053.016	1051.29
7	404.121	470.176	406.273	398.333	418.45	439.664	1039.108	1062.916	1087.894
8	395.039	499.267	383.071	386.892	383.284	405.775	1062.855	1100.28	1077.051
9	409.334	419.163	433.2	425.686	397.655	411.39	1121.089	1138.426	1076.068
10	393.823	406.012	381.874	388.62	402.056	397.498	1036.619	1070.226	1061.136
11	410.14	471.727	390.307	384.555	386.155	428.834	1042.947	1070.283	1061.539
12	390.649	399.706	386.261	382.219	433.859	394.548	1031.662	1070.983	1070.832
13	404.073	474.062	386.58	386.542	387.63	400.418	1051.162	1080.804	1105.889
14	401.191	571.021	395.003	391.128	391.311	406.642	1068.615	1070.969	1107.187
15	402.257	491.384	388.856	391.479	398.278	422.189	1048.125	1062.848	1071.595



Parameter	DCR	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL
<b>Condition:</b>									
<b>Pins</b>	69-67	55-57	58-60	66-64	63-61	55-57	58-60	64-66	61-63
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	650	650	650	650	700	700	700	700
<b>LowLimit</b>	700	100	100	100	100	380	380	380	380
<b>Average =</b>	1,064.53	392.45	452.14	407.69	427.52	482.70	480.28	513.31	512.66
<b>STD DEV =</b>	13.04	17.31	50.04	13.99	21.99	21.15	23.21	12.56	13.72
<b>Cpu</b>	11.13	4.96	1.32	5.78	3.37	3.42	3.16	4.95	4.55
<b>Cpl</b>	9.32	5.63	2.35	7.33	4.97	1.62	1.44	3.54	3.22
<b>Cpk</b>	9.32	4.96	1.32	5.78	3.37	1.62	1.44	3.54	3.22
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	1077.891	398.115	413.5	442.735	415.199	467.825	474.42	510.826	521.138
2	1083.728	412.679	420.84	399.065	416.138	498.519	449.361	498.554	514.869
3	1072.337	375.016	398.431	390.641	409.013	502.387	491.879	508.872	497.739
4	1072.875	378.827	447.754	394.507	416.323	480.677	486.437	516.298	521.524
5	1040.95	372.382	430.233	415.412	414.859	468.096	456.202	501.829	514.672
6	1063.392	390.932	406.512	425.388	411.105	477.442	478.098	501.131	499.426
7	1067.529	392.004	477.38	410.376	487.014	472.579	500.663	524.49	506.62
8	1075.122	426.437	507.508	403.358	418.686	488.844	451.09	485.215	503.064
9	1062.887	373.957	417.476	425.464	406.297	480.792	468.213	514.062	526.542
10	1048.336	369.318	415.524	394.411	433.02	484.482	472.698	526.814	535.708
11	1038.132	391.172	466.849	407.511	445.011	542.055	545.938	517.391	529.422
12	1068.88	382.489	401.065	398.618	455.76	476.821	463.426	535.11	485.282
13	1062.196	397.927	493.238	401.039	418.49	439.652	487.885	515.619	526.577
14	1076.813	403.519	577.527	395.899	413.864	475.851	483.494	514.745	500.03
15	1056.901	421.998	508.226	410.9	452.049	484.408	494.381	528.704	507.262





Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	73-74	74-75	76-77	77-78	91-92	92-93	94-95	95-96	79-80
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	1500	650
<b>LowLimit</b>	150	150	150	150	150	150	150	150	100
<b>Average =</b>	864.95	839.61	872.61	832.97	831.32	850.45	845.90	868.22	409.54
<b>STD DEV =</b>	10.26	19.07	27.60	27.64	10.42	10.40	17.34	17.26	26.91
<b>Cpu</b>	20.64	11.54	7.58	8.04	21.38	20.82	12.57	12.20	2.98
<b>Cpl</b>	23.23	12.05	8.73	8.24	21.79	22.45	13.37	13.87	3.83
<b>Cpk</b>	20.64	11.54	7.58	8.04	21.38	20.82	12.57	12.20	2.98
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	863.828	836.587	882.598	830.211	830.602	851.279	872.251	899.298	466.659
2	879.817	839.678	960.933	920.882	822.553	839.104	827.715	851.254	390.429
3	858.419	832.479	894.717	861.6	835.263	856.541	857.676	865.309	383.696
4	867.084	851.476	852.929	811.557	828.93	845.953	827.385	866.112	410.227
5	871.267	832.347	870.452	832.049	825.228	842.031	833.036	849.236	395.216
6	864.624	825.263	860.204	820.336	838.26	855.298	834.059	858.558	386.407
7	875.552	843.231	863.094	823.807	822.1	847.917	837.123	863.719	399.092
8	857.468	814.965	861.314	824.362	829.161	837.346	832.661	858.23	393.921
9	859.141	841.018	873.996	832.182	807.538	828.326	846.114	850.59	394.26
10	843.391	816.59	845.956	811.117	830.692	847.751	838.667	861.089	418.555
11	848.489	822.624	850.651	811.665	844.883	857.289	827.164	854.291	406.142
12	862.295	837.475	855.601	815.347	832.213	854.185	877.667	898.684	390.373
13	878.164	896.245	877.957	836.097	848.007	866.239	846.024	870.814	394.955
14	876.801	848.263	850.116	810.772	848.536	864.562	877.07	901.301	464.927
15	867.91	855.955	888.629	852.512	825.78	862.983	853.89	874.79	448.256



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	80-81	82-83	83-84	85-86	86-87	88-89	89-90	73-75	76-78
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	650	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	100	700	700
<b>Average =</b>	377.02	414.33	414.12	396.40	413.49	380.82	382.20	1,067.19	1,045.43
<b>STD DEV =</b>	18.19	8.60	6.29	28.79	40.42	12.98	8.98	21.95	12.58
<b>Cpu</b>	5.00	9.13	12.50	2.94	1.95	6.91	9.94	6.57	12.04
<b>Cpl</b>	5.08	12.18	16.65	3.43	2.59	7.21	10.48	5.58	9.15
<b>Cpk</b>	5.00	9.13	12.50	2.94	1.95	6.91	9.94	5.58	9.15
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	420.805	422.411	416.583	497.895	527.415	388.978	391.138	1046.943	1044.816
2	373.573	413.451	407.277	387.107	400.266	382.941	377.618	1056.608	1053.341
3	368.361	423.547	409.012	378.405	395.819	370.514	374.87	1052.983	1040.252
4	370.828	411.614	422.753	384.682	384.263	383.171	379.007	1077.678	1037.254
5	371.018	421.499	422.851	421.642	476.126	421.641	395.554	1066.01	1044.088
6	364.391	402.698	426.601	385.769	416.286	379.11	379.905	1060.477	1044.656
7	375.288	412.793	408.219	391.915	381.411	374.714	375.165	1069.076	1048.94
8	373.006	427.101	417.62	380.98	396.626	380.253	370.559	1044.365	1053.466
9	369.283	409.637	418.565	384.473	380.651	363.905	388.546	1066.569	1047.071
10	363.299	396.885	403.889	391.919	404.948	368.464	369.231	1047.249	1029.828
11	366.531	408.277	410.391	382.16	460.179	376.386	375.754	1056.242	1032.348
12	374.228	403.469	410.226	388.712	394.183	378.511	383.27	1060.865	1030.666
13	371.347	422.101	412.443	391.107	387.209	391.724	401.976	1135.812	1072.561
14	368.921	420.186	413.063	393.711	405.303	378.278	387.984	1080.006	1032.283
15	424.376	419.23	412.367	385.518	391.703	373.776	382.439	1087	1069.828



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	OCL	OCL	OCL
<b>Condition:</b>									
<b>Pins</b>	96-94	93-91	79-81	82-84	90-88	85-87	79-81	82-84	85-87
<b>Unit</b>	m	m	m	m	m	m	u	u	u
<b>HighLimit</b>	1500	1500	650	650	650	650	700	700	700
<b>LowLimit</b>	700	700	100	100	100	100	380	380	380
<b>Average =</b>	1,071.70	1,057.80	388.20	406.10	384.91	427.87	485.05	490.46	494.47
<b>STD DEV =</b>	9.65	13.16	23.13	10.86	14.51	23.31	17.33	18.62	23.13
<b>Cpu</b>	14.79	11.20	3.77	7.48	6.09	3.18	4.13	3.75	2.96
<b>Cpl</b>	12.84	9.06	4.15	9.39	6.55	4.69	2.02	1.98	1.65
<b>Cpk</b>	12.84	9.06	3.77	7.48	6.09	3.18	2.02	1.98	1.65
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	1092.974	1051.047	439.192	388.465	380.846	443.234	511.464	505.9	490.587
2	1057.583	1048.449	379.89	396.981	387.039	427.069	508.413	460.154	488.35
3	1074.566	1063.293	368.842	419.845	369.815	420.042	492.235	524.79	495.438
4	1068.055	1056.224	396.844	404.219	380.176	408.078	472.998	469.705	471.046
5	1067.026	1051.94	378.184	417.865	432.772	471.082	499.883	490.619	504.564
6	1066.361	1062.206	368.12	421.43	390.84	448.653	458.53	521.587	477.617
7	1081.002	1046.388	382.516	409.124	378.515	406.858	500.096	488.167	502.157
8	1068.745	1060.53	373.245	415.722	383.082	420.031	460.25	485.563	489.692
9	1070.662	1023.008	372.945	399.822	384.474	405.012	498.849	482.805	518.855
10	1066.604	1061.08	396.725	388.741	365.674	418.901	460.369	512.845	515
11	1054.696	1081.519	388.012	403.452	375.353	486.417	476.829	489.852	522.831
12	1066.902	1057.909	375.323	393.865	380.852	411.815	481.943	473.002	473.58
13	1080.296	1077.286	378.084	419.724	390.271	416.769	494.303	501.166	540.632
14	1083.684	1066.329	447.087	409.688	386.261	419.671	467.89	474.878	445.59
15	1076.346	1059.827	377.93	402.631	387.617	414.458	491.744	475.911	481.173



Parameter	OCL	Hipot
<b>Condition:</b>		
<b>Pins</b>	88-90	
<b>Unit</b>	u	
<b>HighLimit</b>	700	
<b>LowLimit</b>	380	
<b>Average =</b>	507.64	2250VDC/
<b>STD DEV =</b>	16.41	60s/2mA
<b>Cpu</b>	3.91	
<b>Cpl</b>	2.59	
<b>Cpk</b>	2.59	
<b>DATA</b>	-	
1	491.269	Pass
2	524.97	Pass
3	507.554	Pass
4	523.199	Pass
5	495.53	Pass
6	518.021	Pass
7	494.817	Pass
8	511.04	Pass
9	484.121	Pass
10	491.319	Pass
11	528.009	Pass
12	493.378	Pass
13	543.793	Pass
14	507.237	Pass
15	500.366	Pass



## Appendix 4

### H5400NL Resistance To Soldering Heat Electrical Test Data

Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	1-2	2-3	4-5	5-6	24-23	23-22	21-20	20-19	7-8	8-9
<b>Unit</b>	m	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	1500	650	650
<b>LowLimit</b>	150	150	150	150	150	150	150	150	100	100
<b>Average =</b>	782.24	696.36	795.27	778.08	876.69	853.19	916.35	758.90	319.16	325.64
<b>STD DEV =</b>	14.68	11.77	17.95	31.50	11.01	15.17	10.55	14.30	14.80	15.92
<b>Cpu</b>	16.29	22.76	13.09	7.64	18.87	14.21	18.44	17.28	7.45	6.79
<b>Cpl</b>	14.35	15.47	11.99	6.65	22.00	15.45	24.21	14.20	4.94	4.72
<b>Cpk</b>	14.35	15.47	11.99	6.65	18.87	14.21	18.44	14.20	4.94	4.72
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	781.545	692.881	785.795	760.133	885.758	877.576	917.129	749.156	316.761	328.081
2	828.212	713.012	801.056	772.936	899.679	885.024	904.69	752.287	311.113	313.428
3	788.936	723.163	843.271	779.684	880.163	853.182	937.797	785.541	339.472	341.23
4	786.675	707.441	819.776	794.02	877.818	854.434	921.527	758.852	345.735	346.841
5	766.82	681.445	776.026	747.057	865.693	841.316	899.713	739.76	303.035	305.867
6	778.199	689.968	775.075	747.836	864.091	839.168	918.316	760.054	307.393	318.478
7	787.602	701.351	791.463	762.683	873.833	856.278	934.934	785.427	316.329	324.713
8	767.603	683.94	807.604	847.748	882.441	841.924	918.302	756.461	352.269	367.364
9	790.169	705.156	793.015	773.735	875.969	864.15	909.501	761.419	309.546	309.56
10	784.677	699.583	796.221	772.219	889.745	851.714	920.883	762.356	307.046	318.266
11	767.355	688.287	778.287	782.926	867.706	844.95	912.422	765.986	320.862	317.867
12	784.718	699.569	791.243	758.774	877.799	846.405	914.313	747.717	310.792	313.712
13	775.802	692.16	789.488	770.921	853.875	828.56	898.827	729.663	327.742	338.702
14	768.318	682.076	805.621	854.226	884.874	872.451	915.858	768.364	313.319	323.822
15	777.027	685.404	775.105	746.285	870.874	840.739	921.062	760.454	306.053	316.659

Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	10-11	11-12	18-17	17-16	15-14	14-13	1-3	4-6	24-22	19-21
<b>Unit</b>	m	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	1500	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	700	700	700	700
<b>Average =</b>	429.12	415.09	452.08	316.18	316.48	323.19	930.65	1,003.11	979.68	1,116.75
<b>STD DEV =</b>	7.07	6.40	15.12	8.97	11.82	48.85	21.00	27.03	17.63	16.21
<b>Cpu</b>	10.42	12.24	4.36	12.40	9.40	2.23	9.04	6.13	9.84	7.88
<b>Cpl</b>	15.52	16.41	7.76	8.03	6.10	1.52	3.66	3.74	5.29	8.57
<b>Cpk</b>	10.42	12.24	4.36	8.03	6.10	1.52	3.66	3.74	5.29	7.88
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	425.97	429.612	439.557	306.128	307.178	305.737	930.714	989.193	1007.659	1114.314
2	425.131	409.172	439.381	303.923	329.915	329.495	989.421	1002.101	1012.23	1106.576
3	431.605	413.077	500.453	320.932	323.832	313.814	963.782	1045.09	981.779	1151.233
4	446.083	413.159	453.591	325.175	340.618	310.447	944.92	987.398	973.634	1120.012
5	421.462	407.704	442.838	305.198	311.11	297.89	913.059	975.657	962.004	1083.961
6	416.636	415.348	444.683	307.536	308.135	299.634	919.654	977.462	959.456	1111.143
7	422.382	425.824	457.202	318.238	323.667	313.019	931.782	992.474	979.389	1139.602
8	430.887	409.277	460.325	325.812	325.007	321.573	910.133	1062.897	985.012	1109.393
9	427.89	415.004	440.298	314.541	307.341	298.429	939.553	997.398	992.921	1115.501
10	431.528	410.39	447.739	319.282	304.545	502.577	919.516	1004.008	991.507	1124.643
11	438.817	407.473	446.085	312.653	310.931	312.522	912.918	1001.926	968.206	1126.636
12	432.794	414.614	460.44	335.399	308.008	309.491	929.685	986.114	972.656	1112.638
13	434.141	420.35	462.038	324.743	336.213	326.717	919.607	994.115	946.52	1092.19
14	427.198	413.397	440.57	316.637	306.917	303.271	914.069	1053.802	995.741	1129.39
15	424.318	421.877	445.963	306.564	303.817	303.268	920.952	976.963	966.515	1113.977



Parameter	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL	DCR	DCR
<b>Condition:</b>										
<b>Pins</b>	7-9	10-12	16-18	13-15	7-9	10-12	16-18	13-15	25-26	26-27
<b>Unit</b>	m	m	m	m	u	u	u	u	m	m
<b>HighLimit</b>	650	650	650	650	700	700	700	700	1500	1500
<b>LowLimit</b>	100	100	100	100	380	380	380	380	150	150
<b>Average =</b>	333.09	327.04	453.77	336.96	500.18	498.50	511.72	515.13	887.64	860.81
<b>STD DEV =</b>	11.32	9.38	15.53	47.43	11.69	10.44	17.63	14.65	10.03	8.53
<b>Cpu</b>	9.33	11.48	4.21	2.20	5.70	6.43	3.56	4.21	20.34	24.98
<b>Cpl</b>	6.86	8.07	7.59	1.67	3.43	3.78	2.49	3.07	24.51	27.78
<b>Cpk</b>	6.86	8.07	4.21	1.67	3.43	3.78	2.49	3.07	20.34	24.98
<b>DATA</b>	-	-	-	-	-	-	-	-	-	-
1	337.954	331.49	443.257	309.254	496.462	500.061	482.487	515.802	882.3	865.218
2	321.976	316.21	435.166	338.633	500.788	507.847	506.25	505.451	887.14	865.206
3	361.449	326.184	503.917	328.9	501.262	474.231	525.179	506.789	872.993	843.115
4	337.294	348.497	449.623	345.922	511.983	518.777	505.796	511.152	897.986	877.912
5	311.452	317.166	442.411	314.469	467.705	502.072	514.1	503.25	877.889	853.737
6	331.556	315.482	445.48	313.932	504.053	494.117	488.189	488.682	879.759	849.453
7	335.198	333.354	454.912	344.396	517.633	497.492	541.019	535.312	893.196	862.466
8	345.97	325.007	453.381	331.372	505.793	497.377	522.557	510.416	901.251	869.498
9	324.132	326.308	449.292	309.813	503.751	490.546	521.046	518.402	886.706	868.291
10	328.835	328.594	461.242	508.551	508.183	507.155	515.864	523.155	891.016	868.229
11	339.924	336.012	453.903	325.555	483.353	487.76	506.899	534.202	887.402	859.572
12	324.684	331.51	468.608	320.481	495.327	490.912	544.77	537.557	883.641	858.304
13	339.557	332.733	445.442	336.716	494.932	509.098	494.022	524.864	877.748	857.307
14	330.05	327.583	453.998	311.926	508.734	506.443	517.378	522.816	912.849	860.668
15	326.314	309.446	445.845	314.526	502.723	493.579	490.185	489.166	882.67	853.183



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	28-29	29-30	48-47	47-46	45-44	44-43	31-32	32-33	34-35
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	650	650	650
<b>LowLimit</b>	150	150	150	150	150	150	100	100	100
<b>Average =</b>	794.62	763.26	779.01	866.81	808.43	779.96	329.99	336.54	334.91
<b>STD DEV =</b>	12.73	14.29	13.12	12.86	16.79	17.06	11.15	32.74	7.35
<b>Cpu</b>	18.47	17.19	18.32	16.41	13.73	14.07	9.57	3.19	14.29
<b>Cpl</b>	16.88	14.31	15.99	18.58	13.07	12.31	6.88	2.41	10.65
<b>Cpk</b>	16.88	14.31	15.99	16.41	13.07	12.31	6.88	2.41	10.65
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	784.98	749.105	768.335	856.044	797.972	763.975	340.415	348.91	336.573
2	783.401	758.976	772.553	856.626	817.492	774.082	332.987	323.534	336.013
3	798.494	765.227	803.555	865.257	804.879	785.665	336.468	330.908	336.005
4	788.017	765.24	786.896	882.601	790.13	780.162	348.764	328.726	337.513
5	776.759	746.724	779.815	866.189	808.248	779.253	328.842	327.899	340.044
6	784.417	750.618	757.742	845.613	795.686	762.105	317.071	322.059	329.37
7	794.336	754.244	787.947	885.892	827.755	802.014	337.819	328.818	322.193
8	819.289	796.801	806.305	883.057	857.892	824.564	352.165	456.259	340.922
9	778.82	752.576	775.665	872.184	813.054	777.644	330.367	327.076	330.147
10	800.093	766.298	774.094	868.184	802.159	768.636	319.372	320.293	341.569
11	795.634	754.048	769.699	850.193	820.443	800.141	321.024	327.323	348.054
12	805.917	776.322	782.913	881.224	797.368	769.193	316.999	321.089	328.117
13	812.031	777.909	783.431	865.276	796.313	784.053	326.145	335.973	344.952
14	812.32	784.262	774.748	875.449	802.819	769.456	327.04	328.022	326.778
15	784.771	750.548	761.473	848.379	794.231	758.43	314.302	321.266	325.393





Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	35-36	42-41	41-40	39-38	38-37	25-27	28-30	48-46	45-43
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	1500	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	700	700	700	700
<b>Average =</b>	314.36	325.49	328.05	199.57	313.44	985.75	982.35	1,107.26	986.70
<b>STD DEV =</b>	12.53	10.75	10.57	29.64	23.87	11.83	9.22	16.79	15.31
<b>Cpu</b>	8.93	10.06	10.16	5.07	4.70	14.48	18.71	7.80	11.18
<b>Cpl</b>	5.70	6.99	7.19	1.12	2.98	8.05	10.20	8.09	6.24
<b>Cpk</b>	5.70	6.99	7.19	1.12	2.98	8.05	10.20	7.80	6.24
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	322.376	321.889	329.981	189.867	298.867	980.858	976.777	1096.448	973.238
2	308.751	318.274	318.918	190.317	304.349	973.665	968.487	1091.093	990.883
3	317.509	320.564	345.823	254.633	315.38	965.361	993.911	1130.17	998.416
4	348.388	329.999	339.641	192.39	305.35	1000.418	974.812	1123.793	975.707
5	321.774	327.827	321.815	190.341	317.809	980.948	974.56	1102.355	993.999
6	312.031	323.815	319.023	185.216	312.062	973.71	979.646	1080.907	974.022
7	310.467	323.65	319.089	183.003	313.024	1001.239	987.56	1124.049	1010.728
8	295.028	362.005	351.96	198.166	315.601	992.283	1006.945	1133.662	1022.602
9	308.384	327.947	332.203	185.032	308.578	992.248	976.428	1102.267	989.128
10	303.527	312.09	319.129	179.155	295.583	992.421	980.253	1112.311	990.703
11	320.064	321.862	334.618	190.085	302.021	977.406	983.227	1084.225	971.245
12	301.141	325.263	329.557	186.457	303.874	980.637	992.15	1121.277	968.012
13	328.185	319.839	321.959	289.8	398.885	982.447	982.316	1107.383	991.628
14	305.013	319.006	317.242	182.084	296.415	1011.017	980.559	1114.506	981.181
15	312.726	328.248	319.769	197.066	313.768	981.544	977.595	1084.387	969.007



Parameter	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL	DCR
<b>Condition:</b>									
<b>Pins</b>	31-33	34-36	42-40	39-37	31-33	34-36	40-42	37-39	49-50
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	700	700	700	700	1500
<b>LowLimit</b>	100	100	100	100	380	380	380	380	150
<b>Average =</b>	341.15	322.74	330.48	183.68	500.33	486.21	530.71	521.70	875.20
<b>STD DEV =</b>	27.73	14.92	8.23	17.74	15.19	13.95	17.80	13.13	14.54
<b>Cpu</b>	3.71	7.31	12.94	8.76	4.38	5.11	3.17	4.53	14.32
<b>Cpl</b>	2.90	4.98	9.33	1.57	2.64	2.54	2.82	3.60	16.62
<b>Cpk</b>	2.90	4.98	9.33	1.57	2.64	2.54	2.82	3.60	14.32
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	337.8	341.187	335.891	183.395	489.005	502.861	532.028	513.159	860.223
2	336.725	313.078	323.458	174.495	497.931	478.841	530.673	511.784	869.822
3	332.654	327.662	350.397	237.912	508.632	489.838	566.375	554.14	870.612
4	359.455	363.699	329.279	184.753	499.546	480.403	532.416	532.705	860.007
5	328.942	313.771	326.567	191.476	500.715	505.123	522.87	522.227	877.873
6	323.546	307.675	323.628	173.718	478.948	472.186	501.465	522.126	875.918
7	355.093	315.146	327.652	187.022	506.867	470.648	555.158	521.961	864.263
8	435.264	328.124	342.766	200.628	492.924	508.881	525.33	517.239	893.742
9	338.086	316.134	325.993	177.788	540.935	508.125	518.126	519.185	861.91
10	331.586	325.347	319.087	167.71	514.209	471.769	522.778	521.824	914.921
11	315.28	339.314	337.945	174.837	504.336	491.847	553.724	492.349	867.628
12	324.441	311.338	328.762	173.253	496.999	480.718	545.962	538.822	881.618
13	346.276	306.708	324.02	195.334	480.891	490.009	530.266	514.643	870.18
14	331.371	317.159	325.005	170.252	511.161	470.787	522.461	524.105	891.443
15	320.774	314.723	336.697	162.649	481.887	471.131	501.054	519.302	867.803



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	50-51	52-53	53-54	72-71	71-70	69-68	68-67	55-56	56-57
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	650	650
<b>LowLimit</b>	150	150	150	150	150	150	150	100	100
<b>Average =</b>	834.83	892.03	862.68	853.63	834.53	868.49	848.14	401.02	397.62
<b>STD DEV =</b>	18.75	14.64	18.36	14.66	15.37	19.83	22.18	13.35	12.96
<b>Cpu</b>	11.82	13.84	11.57	14.70	14.43	10.62	9.80	6.22	6.49
<b>Cpl</b>	12.17	16.89	12.94	16.00	14.85	12.08	10.49	7.51	7.65
<b>Cpk</b>	11.82	13.84	11.57	14.70	14.43	10.62	9.80	6.22	6.49
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	825.768	888.359	865.153	850.55	829.744	858.233	823.171	404.895	407.43
2	826.771	880.79	849.152	848.406	831.522	843.718	814.322	391.798	389.76
3	871.9	899.324	874.666	868.488	861.065	907.856	883.166	415.277	406.199
4	819.17	894.329	870.009	875.177	862.201	846.191	826.662	395.025	400.18
5	830.322	886.282	858.761	860.844	841.323	891.654	881.186	413.727	400.665
6	829.001	885.307	844.382	851.076	839.84	891.921	872.658	395.164	380.372
7	814.615	874.078	848.547	849.356	834.221	862.517	839.32	403.661	402.55
8	860.483	928.939	919.515	866.298	848.031	876.275	875.779	434.718	419.648
9	821.557	876.596	840.065	880.571	823.777	842.829	829.981	396.681	422.531
10	872.589	885.989	854.422	829.866	808.628	850.264	828.833	398.787	398.124
11	822.136	890.758	861.514	841.103	827.855	862.478	840.829	373.744	379.323
12	839.661	883.719	850.717	854.553	831.415	864.464	841.743	391.563	385.421
13	816.667	922.156	874.979	842.083	828.782	883.168	861.036	405.688	401.558
14	847.519	892.864	866.274	827.908	805.792	854.797	837.563	403.945	389.861
15	824.363	890.907	862.108	858.244	843.736	890.964	865.831	390.56	380.727



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	58-59	59-60	65-66	65-64	63-62	62-61	49-51	52-54	72-70
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	1500	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	700	700	700
<b>Average =</b>	409.19	395.69	392.78	396.05	404.69	414.85	1,058.48	1,082.47	1,069.89
<b>STD DEV =</b>	11.72	12.26	8.48	8.44	15.81	22.40	14.24	18.01	16.34
<b>Cpu</b>	6.85	6.91	10.11	10.03	5.17	3.50	10.33	7.73	8.77
<b>Cpl</b>	8.80	8.04	11.51	11.70	6.42	4.69	8.39	7.08	7.55
<b>Cpk</b>	6.85	6.91	10.11	10.03	5.17	3.50	8.39	7.08	7.55
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	409.73	399.351	392.188	386.378	382.311	417.723	1049.113	1077.878	1070.468
2	406.695	390.177	389.085	398.648	400.422	413.4	1051.887	1069.71	1061.115
3	412.877	419.757	416.16	410.854	414.814	442.107	1092.292	1100.324	1089.205
4	389.786	394.896	385.982	388.612	406.142	413.268	1049.927	1083.3	1069.418
5	424.396	404.297	393.09	401.568	393.38	401.608	1067.53	1080.096	1076.128
6	411.918	391.736	394.161	398.105	429.086	417.08	1067.673	1069.013	1075.174
7	403.861	426.031	386.589	391.803	390.027	399.884	1056.524	1066.407	1068.475
8	410.385	381.703	387.082	408.176	403.379	402.883	1082.569	1138.771	1085.178
9	439.563	387.454	389.067	391.194	437.638	399.224	1049.492	1070.39	1104.366
10	395.529	382.544	382.275	383.364	398.52	404.867	1031.899	1076.303	1038.748
11	410.245	389.339	393.672	401.74	394.728	467.017	1054.517	1073.524	1060.588
12	393.319	385.066	387.305	384.511	387.936	387.182	1062.916	1070.144	1079.668
13	413.676	392.076	408.037	406.722	412.19	396.407	1056.002	1100.138	1058.43
14	405.884	392.398	391.295	391.026	392.996	401.822	1047.783	1083.185	1041.976
15	409.951	398.587	395.731	398.098	426.789	458.234	1057.021	1077.831	1069.461



Parameter	DCR	DCR	DCR	DCR	DCR	OCL	OCL	OCL	OCL
<b>Condition:</b>									
<b>Pins</b>	69-67	55-57	58-60	66-64	63-61	55-57	58-60	64-66	61-63
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	650	650	650	650	700	700	700	700
<b>LowLimit</b>	700	100	100	100	100	380	380	380	380
<b>Average =</b>	1,065.59	400.68	411.00	412.10	433.98	498.11	491.31	521.33	530.34
<b>STD DEV =</b>	23.33	17.47	12.47	9.20	22.34	11.98	12.62	15.50	12.74
<b>Cpu</b>	6.21	4.76	6.39	8.62	3.22	5.62	5.51	3.84	4.44
<b>Cpl</b>	5.22	5.74	8.32	11.31	4.98	3.29	2.94	3.04	3.93
<b>Cpk</b>	5.22	4.76	6.39	8.62	3.22	3.29	2.94	3.04	3.93
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	1040.264	390.505	399.254	407.325	430.758	504.495	484.772	533.783	506.51
2	1031.682	392.651	406.089	415.79	435.333	510.012	491.08	545.799	535.108
3	1104.403	416.233	428.46	427.289	442.289	468.276	499.941	527.114	538.339
4	1044.819	408.079	401.501	404.347	412.331	504.471	490.539	517.303	548.922
5	1080.917	427.967	417.448	417.807	419.073	492.424	505.468	529.395	527.712
6	1089.741	390.011	408.394	418.395	443.162	489.281	481.474	506.635	526.478
7	1061.741	421.971	422.478	412.848	426.365	500.898	479.542	513.576	514.906
8	1109.406	404.511	414.424	413.98	426.499	503.201	517.064	522.499	517.221
9	1050.253	430.297	438.132	403.675	455.948	517.307	482.593	536.027	538.685
10	1039.764	398.821	395.068	396.649	411.487	503.882	496.688	500.712	544.312
11	1057.435	369.769	414.883	422.677	489.649	497.441	496.224	549.023	531.563
12	1067.717	383.839	393.508	401.819	407.723	504.517	500.8	505.051	513.461
13	1073.566	397.412	412.835	419.874	432.397	480.393	464.428	528.451	543.465
14	1048.055	403.052	395.731	397.983	409.238	505.822	500.07	499.842	545.37
15	1084.02	375.149	416.868	421.011	467.462	489.26	478.982	504.811	523.033



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	73-74	74-75	76-77	77-78	91-92	92-93	94-95	95-96	79-80
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	1500	1500	1500	1500	1500	1500	1500	1500	650
<b>LowLimit</b>	150	150	150	150	150	150	150	150	100
<b>Average =</b>	865.93	831.50	863.83	824.67	839.33	865.22	841.05	862.14	403.22
<b>STD DEV =</b>	13.00	8.29	6.99	6.65	8.26	20.65	10.65	7.80	9.91
<b>Cpu</b>	16.25	26.87	30.36	33.83	26.66	10.25	20.62	27.26	8.30
<b>Cpl</b>	18.35	27.39	34.06	33.80	27.81	11.55	21.63	30.44	10.20
<b>Cpk</b>	16.25	26.87	30.36	33.80	26.66	10.25	20.62	27.26	8.30
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	855.606	824.711	866.969	826.566	815.861	927.86	831.974	857.074	403.845
2	857.166	832.583	869.025	816.15	839.289	858.128	843.576	869.959	393.012
3	864.511	829.629	869.559	822.005	834.752	851.94	867.792	861.748	431.416
4	871.001	832.709	864.052	837.598	837.637	854.676	832.884	856.704	413.419
5	869.066	824.794	857.449	815.593	837.038	853.688	837.401	861.989	404.964
6	845.796	820.235	870.765	831.308	842.953	872.082	837.117	858.828	396.953
7	889.795	846.264	859.768	820.64	840.615	856.052	837.482	865.607	400.976
8	885.833	849.549	871.795	820.908	849.094	878.312	837.515	861.262	394.454
9	875.772	837.733	857.254	821.309	833.721	852.647	842.867	859.78	390.043
10	858.448	821.543	861.166	831.288	845.332	843.675	825.929	850.618	401.148
11	850.607	823.404	865.847	823.283	850.939	874.988	837.764	861.527	396.868
12	860.756	826.797	852.098	825.101	831.579	848.24	857.651	882.541	404.621
13	886.727	837.499	850.075	814.761	846.453	889.065	843.673	861.409	398.072
14	858.746	832.571	868.071	831.711	841.325	854.558	829.814	851.157	405.669
15	859.185	832.407	873.539	831.872	843.427	862.342	852.26	871.943	412.796



Parameter	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR	DCR
<b>Condition:</b>									
<b>Pins</b>	80-81	82-83	83-84	85-86	86-87	88-89	89-90	73-75	76-78
<b>Unit</b>	m	m	m	m	m	m	m	m	m
<b>HighLimit</b>	650	650	650	650	650	650	650	1500	1500
<b>LowLimit</b>	100	100	100	100	100	100	100	700	700
<b>Average =</b>	382.76	405.21	409.82	397.78	400.21	380.37	384.84	1,062.32	1,048.11
<b>STD DEV =</b>	15.29	5.58	9.18	12.58	13.51	5.88	6.74	11.29	7.74
<b>Cpu</b>	5.83	14.63	8.72	6.68	6.17	15.28	13.12	12.92	19.45
<b>Cpl</b>	6.17	18.25	11.25	7.89	7.41	15.88	14.09	10.70	14.98
<b>Cpk</b>	5.83	14.63	8.72	6.68	6.17	15.28	13.12	10.70	14.98
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	382.605	407.321	406.308	382.184	423.678	391.185	384.278	1053.002	1057.853
2	366.615	399.397	401.611	388.706	382.848	369.17	379.285	1054.159	1048.647
3	406.617	407.762	421.306	391.821	387.102	378.074	383.169	1058.696	1053.091
4	406.629	400.795	413.249	395.784	397.794	385.691	386.644	1068.378	1047.425
5	383.206	414.758	426.735	431.682	428.779	377.42	384.637	1062.284	1030.301
6	385.277	401.558	404.059	402.791	397.208	385.343	381.069	1041.26	1052.316
7	381.821	414.746	413.726	398.673	390.769	381.165	386.636	1077.06	1045.67
8	416.921	403.552	416.563	388.892	390.53	388.525	388.937	1087.85	1041.627
9	368.028	399.993	406.103	409.746	406.257	378.342	387.932	1060.566	1047.517
10	369.515	398.623	398.875	390.165	391.192	378.545	374.451	1053.168	1057.548
11	369.516	413.612	413.02	386.926	386.923	370.98	386.172	1049.579	1042.965
12	386.469	401.521	398.361	390.537	416.258	381.643	380.785	1068.128	1046.089
13	376.534	409.415	404.149	416.132	411.003	375.063	402.139	1072.57	1037.207
14	367.166	399.613	398.457	391.685	396.831	379.916	374.051	1064.978	1058.942
15	374.541	405.452	424.812	400.959	395.93	384.505	392.453	1063.159	1054.451

Parameter	DCR	DCR	DCR	DCR	DCR	DCR	OCL	OCL	OCL
<b>Condition:</b>									
<b>Pins</b>	96-94	93-91	79-81	82-84	90-88	85-87	79-81	82-84	85-87
<b>Unit</b>	m	m	m	m	m	m	u	u	u
<b>HighLimit</b>	1500	1500	650	650	650	650	700	700	700
<b>LowLimit</b>	700	700	100	100	100	100	380	380	380
<b>Average =</b>	1,067.86	1,073.51	383.75	396.28	389.72	417.89	492.84	500.51	495.29
<b>STD DEV =</b>	12.90	19.92	12.17	9.69	10.00	7.86	17.96	14.77	18.35
<b>Cpu</b>	11.17	7.14	7.29	8.72	8.68	9.84	3.84	4.50	3.72
<b>Cpl</b>	9.51	6.25	7.77	10.19	9.66	13.48	2.09	2.72	2.09
<b>Cpk</b>	9.51	6.25	7.29	8.72	8.68	9.84	2.09	2.72	2.09
<b>DATA</b>	-	-	-	-	-	-	-	-	-
1	1060.711	1134.25	383.857	388.495	406.195	440.947	464.117	485.793	462.281
2	1063.506	1061.606	369.172	386.732	377.872	408.062	474.844	507.858	510.385
3	1095.456	1057.297	384.23	394.989	379.389	414.664	484.366	478.692	495.891
4	1062.217	1068.875	383.124	402.605	399.427	413.471	514.429	508.714	510.025
5	1075.262	1053.178	379.765	405.697	380.817	413.971	524.153	502.212	505.379
6	1059.104	1081.254	377.432	389.136	394.031	417.856	480.782	491.375	494.071
7	1068.382	1052.708	390.926	413.069	390.418	418.631	494.482	506.551	512.226
8	1068.19	1071.359	418.784	408.747	406.507	422.29	501.537	527.271	488.965
9	1073.027	1058.641	368.29	387.912	387.303	414.892	465.14	470.444	515.132
10	1046.141	1070.911	381.312	386.146	378.03	413.896	495.676	503.008	467.399
11	1062.463	1072.804	375.396	404.649	384.957	410.009	492.917	515.143	474.813
12	1092.613	1072.43	392.687	384.036	382.161	426.099	500.25	507.345	502.325
13	1074.284	1099.454	371.053	398.056	403.588	411.571	523.932	514.302	523.811
14	1050.098	1077.202	385.775	385.966	381.159	417.947	495.201	504.118	470.202
15	1066.463	1070.675	394.469	407.993	394.001	424.105	480.762	484.854	496.443



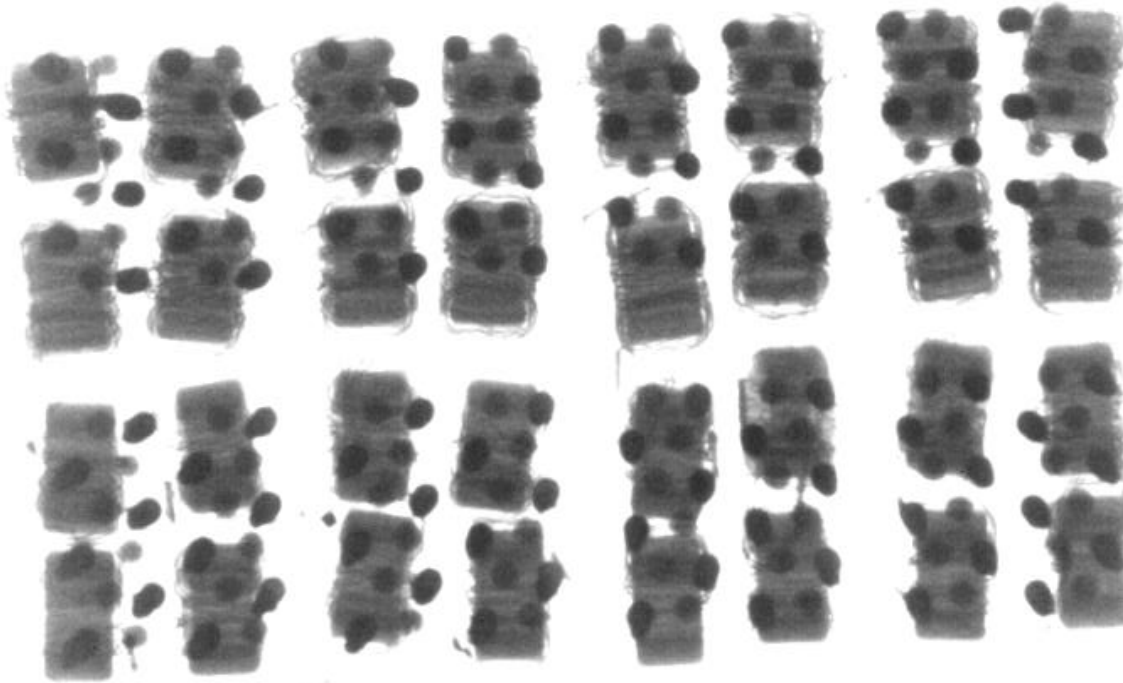


<b>Parameter</b>	OCL	Hipot
<b>Condition:</b>		
<b>Pins</b>	88-90	
<b>Unit</b>	u	
<b>HighLimit</b>	700	
<b>LowLimit</b>	380	
<b>Average =</b>	532.73	2250VDC/
<b>STD DEV =</b>	12.11	60s/2mA
<b>Cpu</b>	4.60	
<b>Cpl</b>	4.20	
<b>Cpk</b>	4.20	
<b>DATA</b>	-	
1	533.427	Pass
2	549.408	Pass
3	524.565	Pass
4	534.937	Pass
5	522.819	Pass
6	525.765	Pass
7	520.951	Pass
8	504.652	Pass
9	537.237	Pass
10	532.191	Pass
11	552.155	Pass
12	545.436	Pass
13	546.675	Pass
14	532.62	Pass
15	528.044	Pass

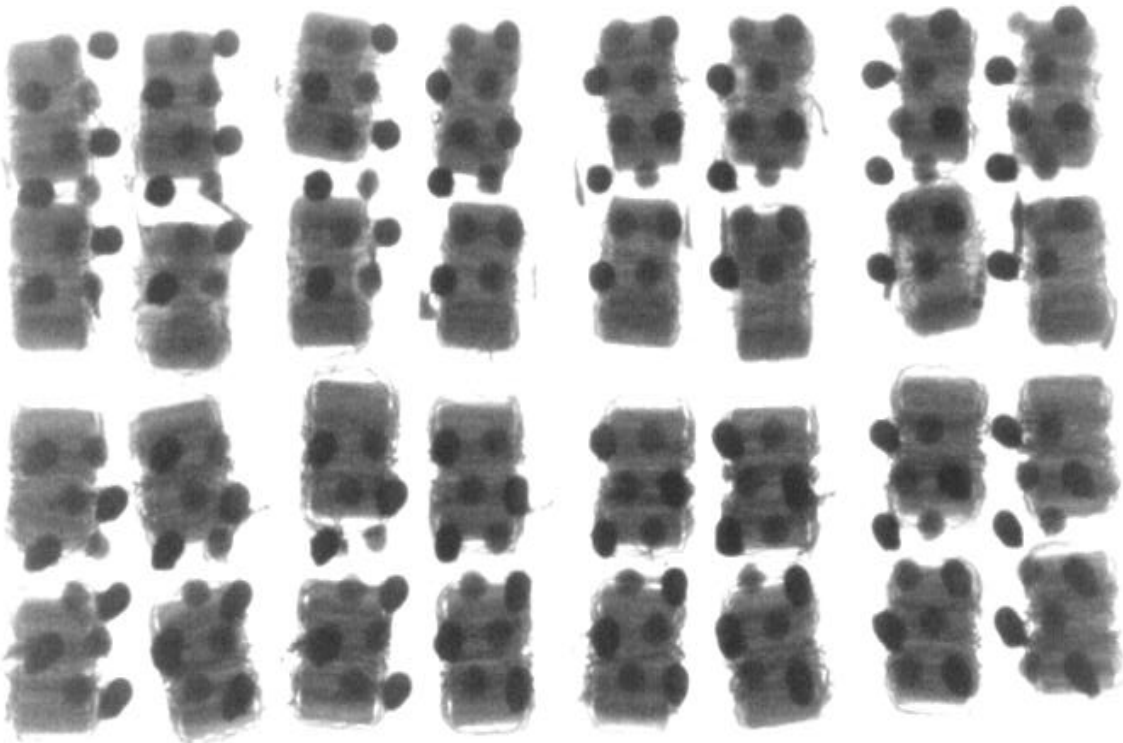
## Appendix 4 H5400NL X-ray Audit Result

Sampling Tested 10pcs samples and no air bubble > 25% area was found.

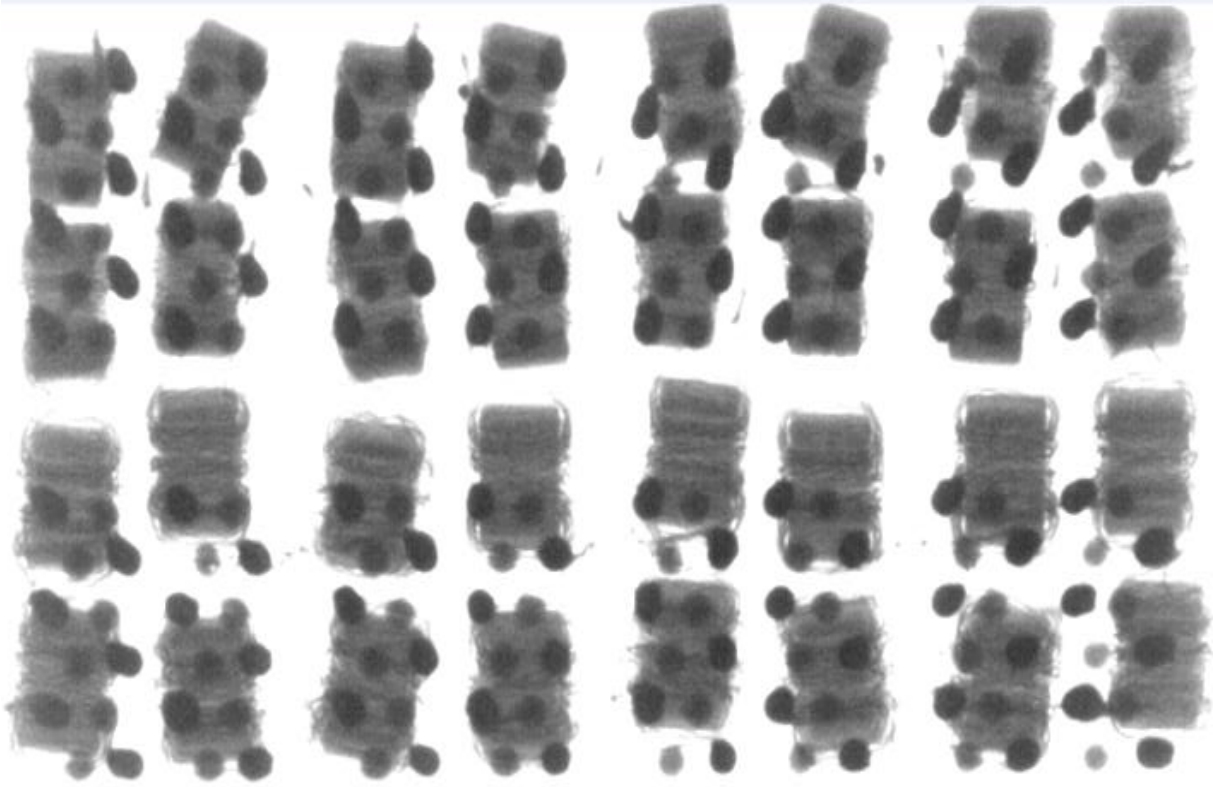
Sampe 1#



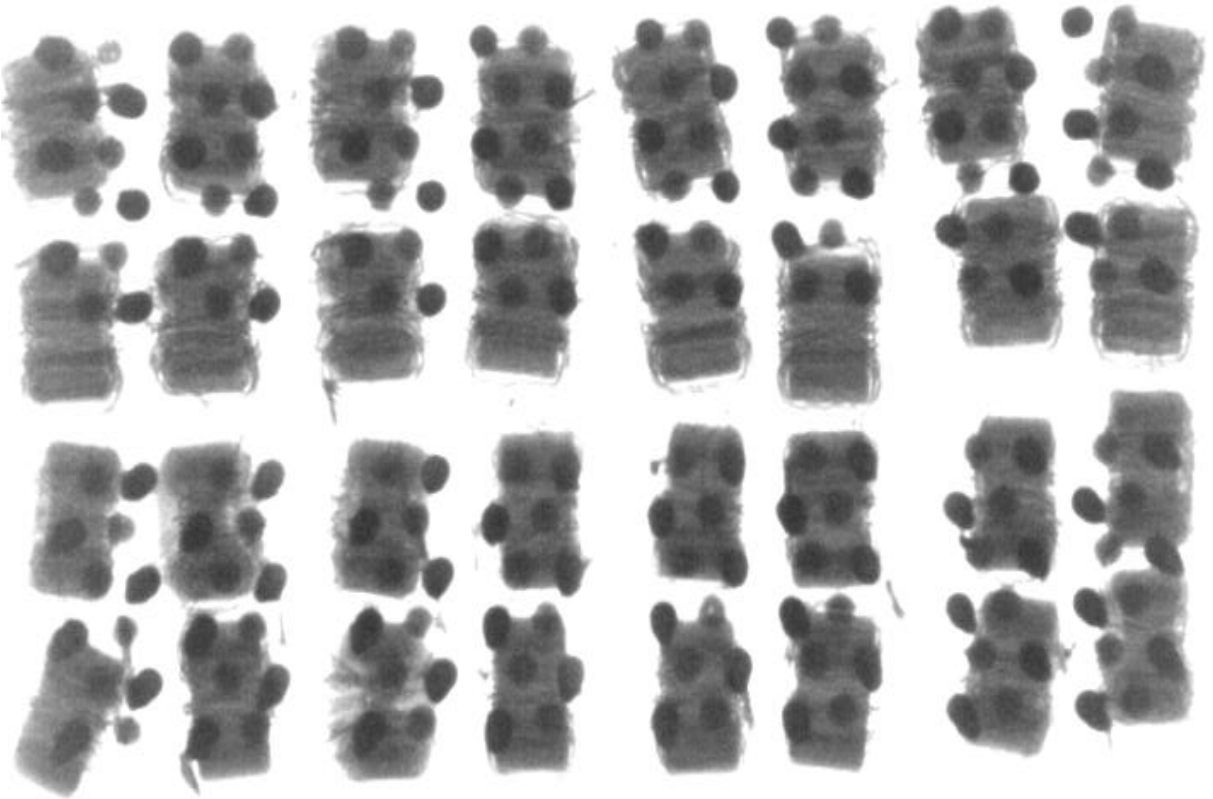
Sampe 2#



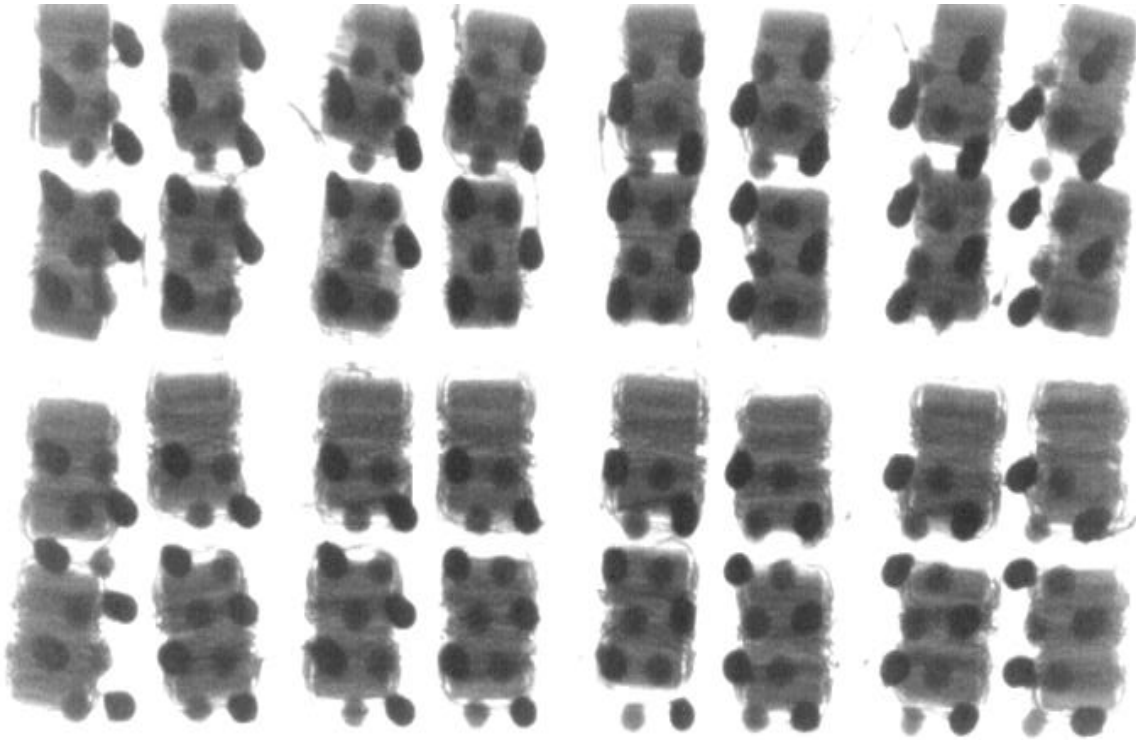
Sampe 3#



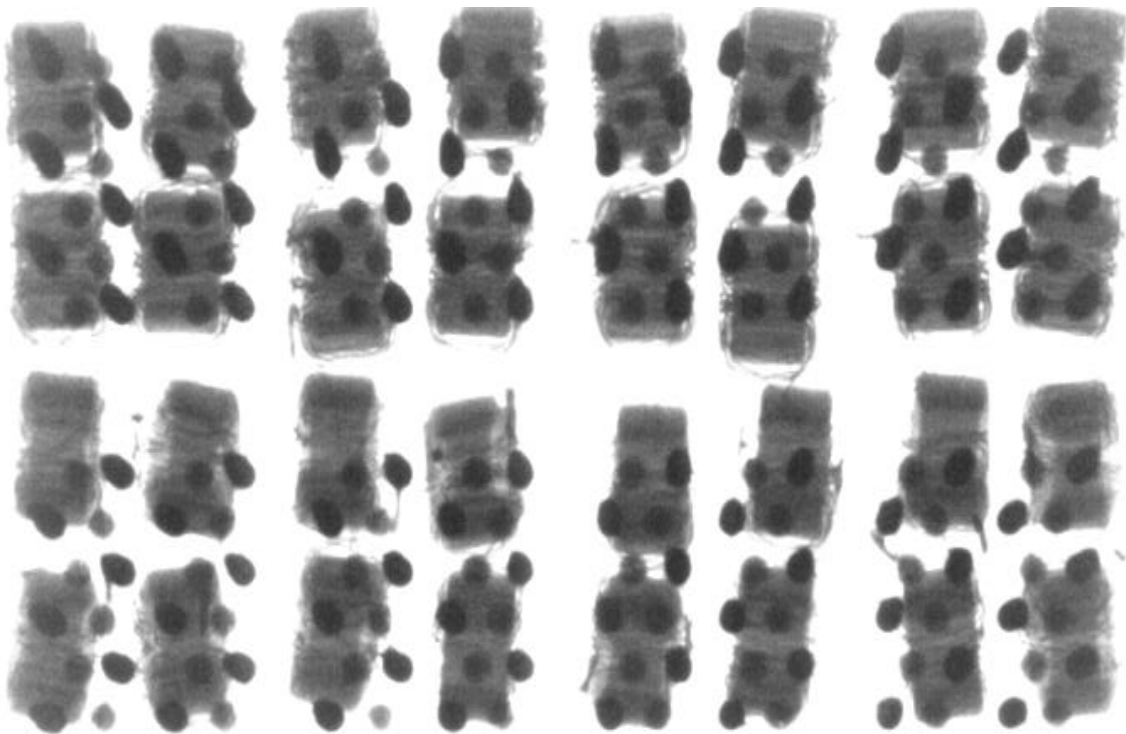
Sampe 4#



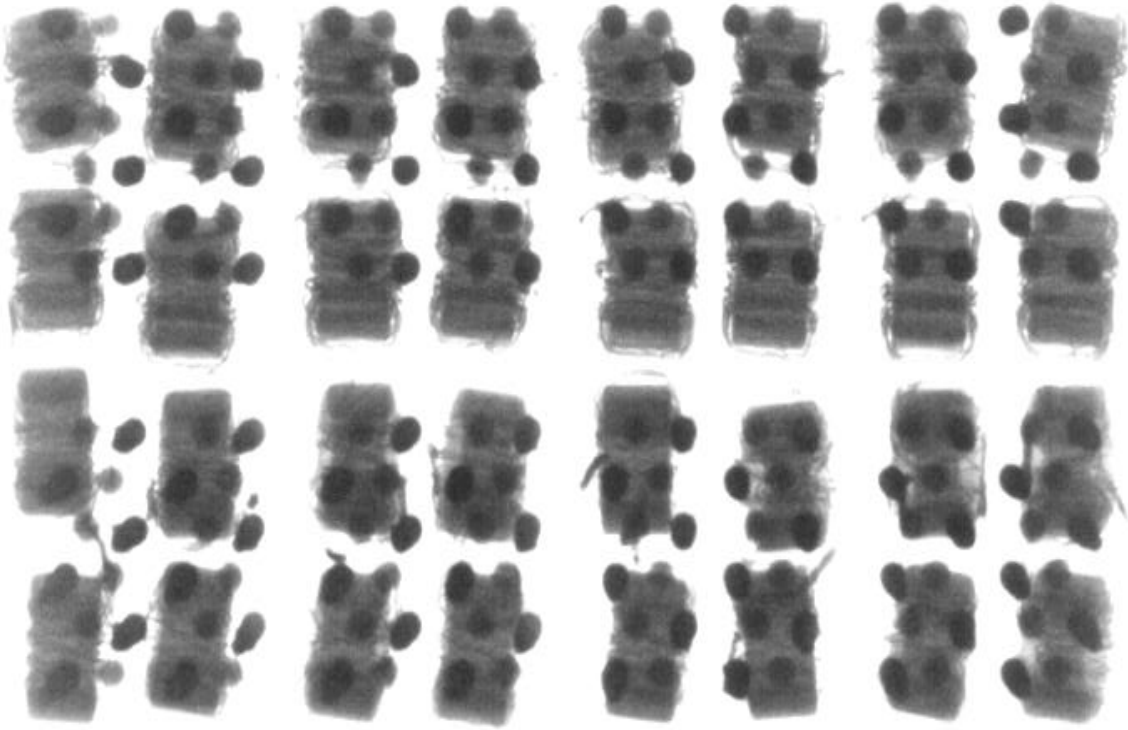
Sampe 5#



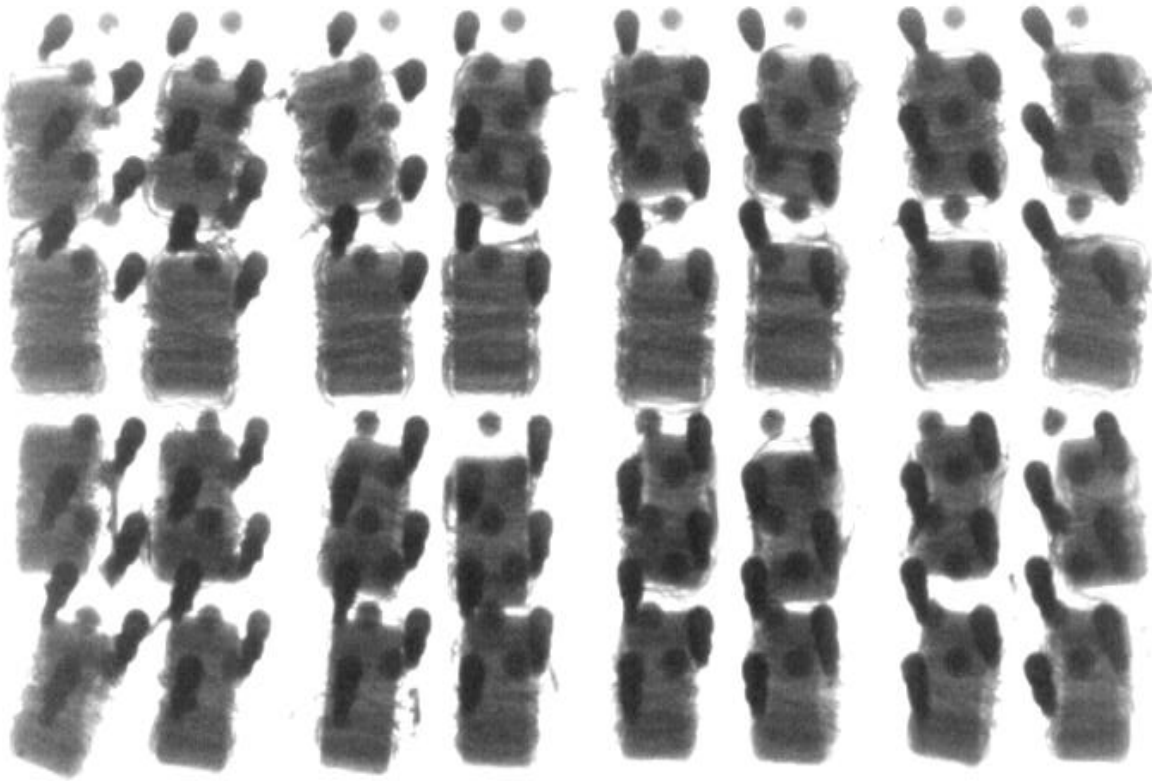
Sampe 6#



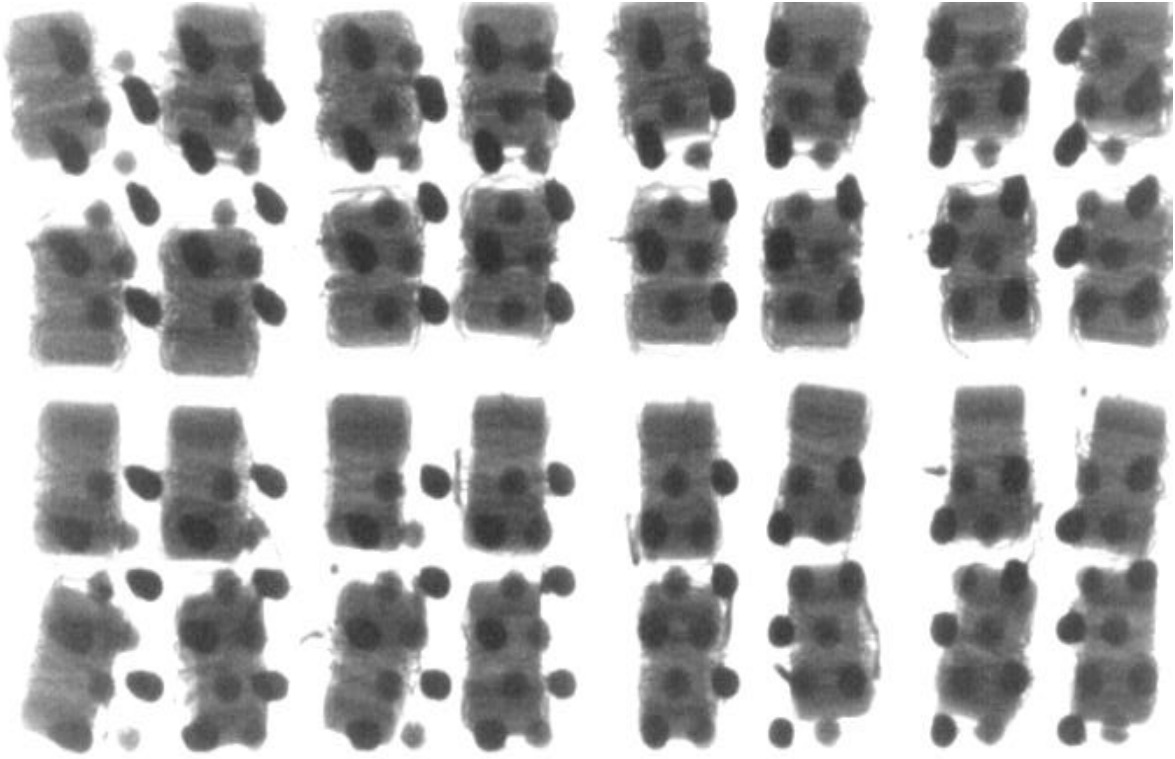
Sampe 7#



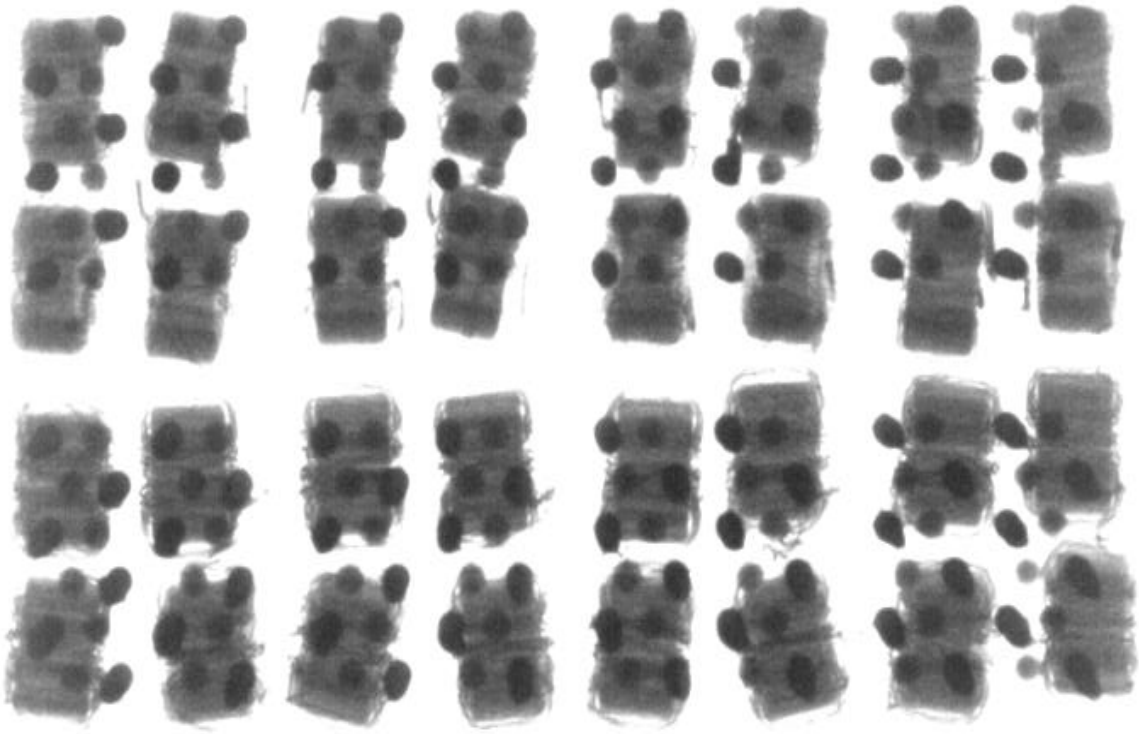
Sampe 8#



Sampe 9#



Sampe 10#



# LOCTITE GC 3W

January 2016

## PRODUCT DESCRIPTION

LOCTITE GC 3W provides the following product characteristics:

<b>Technology</b>	Solder paste
<b>Application</b>	Pb-free soldering, Halogen-free, Water Washable flux

LOCTITE GC 3W is a halogen free, water-washable, Pb-free solder paste specially formulated to provide excellent humidity resistance. LOCTITE GC 3W shows excellent solderability when reflowed in both air and nitrogen across a wide range of challenging surface finishes including OSP-Cu, ENIG and Silver.

## FEATURES AND BENEFITS

- Water washable, Pb-free solder paste
- Halogen-free flux: passes IC with pretreatment IPC-TM-650 2.3.34/EN14582
- Halogen-free flux classification: ORM0 to ANSI/J-STD-004 Rev.
- Formulated so residues can be cleaned with deionized water
- Humidity resistance: excellent coalescence after 24 hours exposure to 27°C/80% RH
- Excellent resistance to solder balling, initially and after exposure to humidity
- Suitable for fine pitch, high speed printing up to 150 mms<sup>-1</sup> (6"/s)
- Excellent paste transfer efficiency after extended abandon times
- Excellent paste transfer efficiency after extended printing time
- Humidity Resistance: Enhanced tack time
- Suitable for single and double side reflow

## TYPICAL PROPERTIES

### Solder Powder

Careful control of the atomisation process for production of solder powders for LOCTITE GC 3W solder pastes ensures that the solder powder is produced to a quality level that exceeds J-STD-006, EN 29453 requirements for sphericity, size distribution, impurities and oxide levels.

Minimum order requirements may apply to certain alloys and powder sizes, for availability contact your local technical service helpdesk.

All solder powders are RoHS compliant.

### Particle Size Distribution (PSD) (J-STD-005A)

#### Type 3 Powder

<b>Powder Description</b>	T3
<b>Powder Particle Size Distribution</b>	25 to 45 µm
<b>Henkel Former Description</b>	AGS

#### Type 4 Powder

<b>Powder Description</b>	T4
<b>Powder Particle Size Distribution</b>	20 to 38 µm
<b>Henkel Former Description</b>	DAP

### Solder Alloy (J-STD 006)

<b>LOCTITE Code</b>	SAC305
<b>Henkel Former Description</b>	97SC
<b>Melting Point (°C)</b>	217

### Solder Paste Typical Properties

#### Based on Type 3 powder

Metal Content, %	89.5
Brookfield Viscosity @ 25°C, mPa.s Spindle TF, Speed 5 rpm, after 2 minutes	595,000
Malcom Viscosity @ 25 °C, Pa.s Speed 10 rpm	150
Thixotropic Index (Ti) Ti = log (1.8/18 s <sup>-1</sup> )	0.45
Useful stencil life, hours	>24
IPC Slump, mm <u>25°C, 15 minutes</u>	
0.33 x 2.0 mm pads	0.2
0.63 x 2.0 mm pads	0.33
IPC Slump, mm <u>182°C, 15 minutes</u>	
0.33 x 2.0 mm pads	0.2
0.63 x 2.0 mm pads	0.33

#### Based on Type 4 powder

Metal Content, %	89.5
Brookfield Viscosity @ 25 °C, Pa.s Spindle TF, speed 5 rpm, after 2 minutes	784,000
Malcom Viscosity @ 25 °C, Pa.s Speed 10 rpm	180
Thixotropic Index (Ti) Ti = log (1.8/18 s <sup>-1</sup> )	0.48
Useful stencil life, hours	>24
IPC Slump, mm <u>25°C, 15 minutes</u>	
0.33 x 2.0 mm pads	0.2
0.63 x 2.0 mm pads	0.33
IPC Slump, mm <u>182°C, 15 minutes</u>	
0.33 x 2.03 mm pads	0.2
0.63 x 2.03 mm pads	0.33

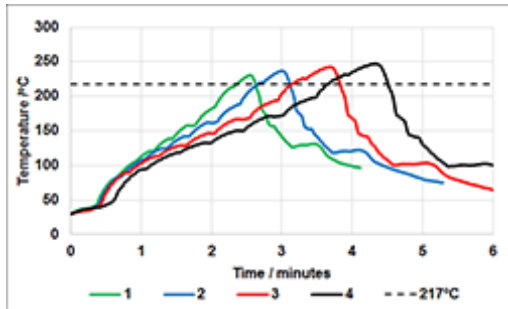
## DIRECTIONS FOR USE

### Printing:

- Printing at speeds up to 150 mm.s<sup>-1</sup> (6"/s) can be achieved using typical stencils and metal squeegees.
- Sufficient pressure should be applied to achieve a clean wipe of the stencil topside surface.
- Under laboratory conditions acceptable print quality on 0.5 mm ball devices and 0.4 mm QFP patterns has been achieved after printer down times of 4 hours without requiring a knead cycle.

**Reflow:**

- Reflow has been assessed using a typical convection reflow oven.
- Optimal aerobic reflow can be achieved by ramping to a peak temperature of 225 to 250°C at 0.8 to 1.5°C/second and with a soak above the reflow temperature (217°C) for 20 to 50 seconds.
- Example profiles that have shown good performance- for reflow and subsequent cleaning- are presented below. Reflow soldering can also be carried out in a nitrogen atmosphere.



**Cleaning:**

- The post-soldering residues of LOCTITE GC 3W solder paste must be removed by cleaning.
- Cleaning can be performed using spray in air/ spray under immersion or ultrasonic cleaning methods.
- The post-soldering residues are designed to be removed from assemblies in an aqueous cleaner without the use of rinse aids and/or saponifiers, typically using water at 40 to 60°C with deionized water for the final rinse.

**RELIABILITY PROPERTIES**

**Flux Properties:**

LOCTITE GC 3W contains a stable water-washable resin system and slow evaporating solvents

Test	Specification	Results
Flux Corrosion	J-STD004B (2.6.15C)	Pass
Copper Mirror	J-STD004B (2.3.32D)	Pass (cleaned)
Surface Insulation Resistance (SIR)	J-STD004B (2.6.3.7)	Pass (cleaned)
	J-STD004B (2.6.3.3)	Pass (cleaned)
Electromigration (ECM)	J-STD004B (2.6.14.1)	Pass
Flux Activity Classification	J-STD004B	ORM0

**PACKAGING**

LOCTITE GC 3W is available in 500 gram jars and 600 grams Semco cartridge .

**Storage:**

**Optimal storage:** 0 to 25°C ± 1.5°C (32 to 77°F ± 1.5°F)

Storage information may be indicated on the product container labelling. Material removed from containers may be contaminated during use. Do not return products to the original container. Henkel Corporation cannot assume responsibility for product that has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Technical Service Center or Customer Service Representative.

**Shelf Life:**

Provided LOCTITE GC 3W is stored tightly sealed in the original container at 0 to 25°C ± 1.5°C (32 to 77°F ± 1.5°F), a minimum shelf life of 180 days can be expected.

**DATA RANGES**

The data contained herein may be reported as a typical value and/or a range. Values are based on actual test data and are verified on a periodic basis.

**GENERAL INFORMATION**

**For safe handling information on this product, consult the Material Safety Data Sheet (MSDS).**

**Not for Product Specifications**

The technical information contained herein is intended for reference only. Please contact Henkel Technologies Technical Service for assistance and recommendations on specifications for this product.

**Conversions**

- °C x 1.8) + 32 = °F
- kV/mm x 25.4 = V/mil
- mm / 25.4 = inches
- µm / 25.4 = mil
- N x 0.225 = lb
- N/mm x 5.71 = lb/in
- N/mm<sup>2</sup> x 145 = psi
- MPa x 145 = psi
- N·m x 8.851 = lb·in
- N·m x 0.738 = lb·ft
- N·mm x 0.142 = oz·in
- mPa·s = cP

**Disclaimer**

**Note:**

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Reference 0.2

# LOCTITE WS 300

July 2016

## PRODUCT DESCRIPTION

LOCTITE WS 300 provides the following product characteristics:

<b>Application</b>	Water-Wash Soldering
<b>Technology</b>	Lead-Free Solder Paste

LOCTITE WS 300 is a lead-free water washable solder paste for printing and reflow in air or nitrogen atmospheres where process yield is critical. LOCTITE WS 300 solder paste offers excellent open time and good soldering activity over a wide range of reflow profiles and surface finishes. LOCTITE WS 300 is available with 96SC & 97SC SnAgCu alloys. Other Pb-free alloys may be available on request.

## FEATURES AND BENEFITS

- Effective over a wide range of printer cycle times and print speeds
- Excellent printer open time and between print abandon time
- Long component tack time
- Excellent slump resistance
- Effective over a wide range of reflow profiles in air or nitrogen
- Residues removed with de-ionized water rinse processing

## TYPICAL PROPERTIES

### Solder Paste Typical Properties

Alloys	96SC, 97SC
Alloy melting range, °C	217
Powder Size Coding	AGS
IPC Equivalent (ANSI/J-STD 005)	Type 3
Powder Particle Size, µm	45-20
Metal Loading (Weight %)	88
Malcom Viscosity at 6 s <sup>-1</sup> @ 25°C, P	1,450
Brookfield Viscosity TF spindle, 25°C, 5rpm after 2 minutes, mPa·s	590,000
Thixotropic Index (Ti), 25°C (Ti = log(viscosity @ 1.8s <sup>-1</sup> / viscosity @ 18s <sup>-1</sup> ))	0.66
Slump, J-STD-005, mm <i>RT, 15 minutes</i>	IPC A21 Pattern
0.33 x 2.03 mm pads	0.15
0.63 x 2.03 mm pads	0.33
<i>150°C, 15 minutes</i>	
0.33 x 2.03 mm pads	0.15
0.63 x 2.03 mm pads	0.33
Initial tack force, gF	39.5

Alloy	97SC
Alloy melting range, °C	217
Powder Size Coding	DAP
IPC Equivalent	Type 4
Powder Particle Size, µm	38-15
Metal Loading (Weight %)	88
Malcom Viscosity @ 25°C, Pa.s @ Shear Rate of 6 s <sup>-1</sup>	1,525
Slump, J-STD-005, mm <i>RT, 15 minutes</i>	IPC A21 Pattern
0.33 x 2.03 mm pads	0.15
0.63 x 2.03 mm pads	0.33
<i>150°C, 15 minutes</i>	
0.33 x 2.03 mm pads	0.15
0.63 x 2.03 mm pads	0.33
Initial tack force, gF	39.5

Alloy	96SC
Alloy melting range, °C	217
Powder Size Coding	AGS
IPC Equivalent	Type 3
Powder Particle Size, µm	45-20
Metal Loading (Weight %)	84
Malcom Viscosity @ 25°C, Pa.s @ Shear Rate of 6 s <sup>-1</sup>	430
Brookfield Viscosity @ 25°C, mPa.s Spindle TF, Speed 5 rpm, 2 minutes	292,000
Thixotropic Index (Ti) Ti = log (1.8/18 s <sup>-1</sup> )	0.68

### Solder Powder:

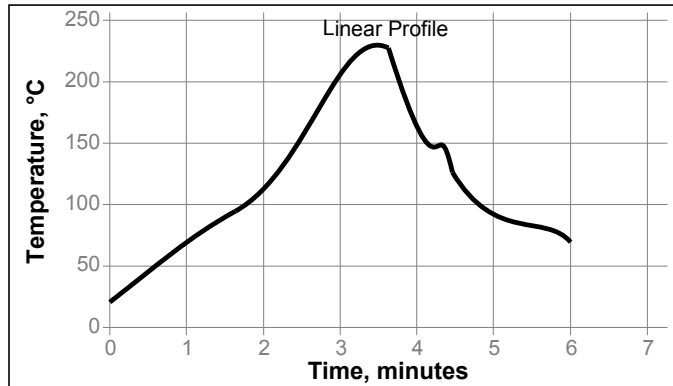
Careful control of the atomisation process for production of solder powders for LOCTITE WS 300 solder pastes ensures that the solder powder is produced to a quality level that exceeds IPC/J-STD-006 & EN29453 requirements for sphericity, size distribution, impurities and oxide levels. Minimum order requirements may apply to certain alloys and powder sizes.

## DIRECTIONS FOR USE

### Reflow:

LOCTITE WS 300 has been formulated for reflow in air over a wide range of temperature profiles. A minimum peak temperature of 230-235°C is required. The diagram below shows a reflow profile that has been used successfully. Other profiles may also give good results, depending on board design factors.

**NOTE:** If boards and/or component leads carrying tin/lead finishes are reflowed with this lead-free solder paste, reflow profiles with lower peak temperatures may possibly be used. The resulting joints will have the same solidification temperature as and similar reliability performance to the Sn62 alloy. This combination of materials is perfectly acceptable but of course does not yield a lead-free assembly.



Due to the higher melting point of lead-free alloy relative to Sn62/63, reflow places increased demands on paste thermal stability. High air flow rates give as even a temperature distribution as possible. However, across the board, this may contribute to exhaustion of paste activity. LOCTITE WS 300 combines excellent printing characteristics with tolerance of hot profiles and high air flow rates, although extreme (long & hot) profiles may still give sub-optimal reflow and cleaning in some oven types.

As with all solder pastes, reflow may be carried out in nitrogen if this is installed and this is likely to lessen the effects of long hot profiles and high gas circulation rates.

#### Application:

LOCTITE WS 300 lead-free solder paste is designed for high volume stencil printing applications with component lead pitches down to 0.4 mm with the AGS (Type 3) powder size. Conventional metal blade squeegees may be used with a contact angle of 60° and sweep speeds of 25 mm sec<sup>-1</sup> up to 150 mm sec<sup>-1</sup>. The best printing performance will be obtained under these conditions. The product can, in some cases, tolerate slow print cycle times because the material resists drying on the stencil and therefore blocking the stencil apertures. There are various methods for testing the ability of a paste to perform after an extended idle time on the stencil and each can produce different times before printing deteriorates. In a real process environment, the paste was left idle for more than 1 hour and still produced a perfect first print.

#### Component Placement:

The paste shows good tack behavior and is capable of holding components in place before reflow. Components may be placed several hours after printing, although this is naturally dependent on the ambient conditions.

#### Cleaning:

LOCTITE WS 300 residues are designed to be removed from assemblies in an aqueous cleaner without the use of any additional chemistries and/or saponifiers. Incomplete removal of the residues can lead to reduced reliability of the device. Hot deionised water is the preferred cleaning agent. Residues are easily removed in batch and in-line aqueous cleaners even up to 3 days after reflow. Cleaning of some assemblies is best conducted in an ultrasonic bath. Tap water is not recommended for rinsing since ionic impurities present in tap water can lead to reduced reliability of the assembly.

## RELIABILITY PROPERTIES

### Solder Paste Medium:

LOCTITE WS 300 medium contains stable resin system and includes solvents with high boiling ranges. The formulation has been tested to the requirements of the following specifications.

Test	Specification	Results
Surface Insulation Resistance (cleaned)	ANSI/J-STD-004	Pass
Electromigration (cleaned)	Telcordia GR-78-Core	Pass
	Telcordia GR-78-Core	Pass

## STORAGE AND SHELF LIFE

### Shelf Life:

Provided LOCTITE WS 300 is stored tightly sealed in the original container at 0 to 10°C, a minimum shelf life of 183 days can be expected. Cold packed air shipment is recommended to minimize the time the containers are exposed to higher temperatures.

LOCTITE WS 300 solder paste has been formulated to reduce separation on storage to a minimum but should it occur, gentle stirring for 15 seconds will return the product to its correct rheological performance.

## DATA RANGES

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## GENERAL INFORMATION

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