



PRODUCT SPECIFICATION

REV**5****ECN No.****HYC12252**

DIMENSION

- 1.This specification covers 0.8mm pitch MINI PCI EXPRESS connector series.
- 2.The physical dimensions and the 0.8mm pitch MINI PCI EXPRESS connector are shown in drawing.

MATERIAL AND FINISH

- 1.Housing: High temperature thermoplastic, UL 94V-0 , black or white color.
- 2.Contact: Copper Alloy, Nickel-plating over all, Gold Plating on contact area & solder area.
- 3.Pegs : Copper Alloy , Tin plated on solder area.

OPERATING PERFORMANCE

- 1.Operation Temperature: -55℃ to 85℃
- 2.Voltage Rating: 25 V
- 3.Current Rating: 0.5 A

ELECTRICAL PERFORMANCE

Test item	Test condition	Requirements
Examination of product	• Visual inspection • EIA-364-18	• No physical damage
Contact resistance	• Mate connectors: apply a current of 10mA(max) at open circuit voltage of 20mVvoltage(max) EIA-364-23	• 55mΩ MAX.per contact
Insulation resistance	• Applying 500VDC between adjacent contacts of unmated and unmount connectors EIA-364-21	• 500MΩ MIN
Dielectric withstanding voltage	• Measured by applying 500VAC for one minute between adjacent contacts of unmated connector assemblies. EIA-364-20	• No breakdown or flash • Current leakage:1mA

HOAUC CO., LTD**PRODUCT NAME:****0.8mm PITCH MINI PCI EXPRESS CONNECTOR****DOCUMENT No:****SP-AAA-PCI-049****REV:****5****PAGE:****1 OF 4****APPROVED BY:**

Barney 12/13'12

CHECKED BY:

Vito 12/13'12

WRITTEN BY:

Tracy 12/13'12



PRODUCT SPECIFICATION

REV**ECN No.****5****HYC12252**

MECHANICAL PERFORMANCE

Test item	Test condition	Requirements
Vibration test (Random)	Subject mated connectors and vibrate per EIA 364-28 test Condition.VII test condition letter D(15 minutes in each of 3 mutually perpendicular directions)	- No electrical discontinuity greater than 1 microsecond. $\Delta R=20m\Omega$ Max.(Final)
Mechanical shock	Subject mated connector to 50Gs, half-sine shock pulses of 11 millisecond duration, 3 drops in each direction applied along the 3 mutually perpendicular planes total 18 shock. EIA-364-27 test condition A	- No electrical discontinuity greater than 1 microsecond $\Delta R=20m\Omega$ Max.(Final) - No physical damage
Durability (repeated mate/un-mate)	Repeat insertion the PCB to the connector and extraction PCB from the connector for 50 cycles. EIA-364-09	$\Delta R=20m\Omega$ Max.(Final)
Mating and Unmating force	- insert the card at the specified angle - Rotate the card into position - Reverse the installation sequence to unmating EIA-364-13	2.3Kgf MAX

HOAUC CO., LTD**TITLE:****0.8mm PITCH MINI PCI EXPRESS CONNECTOR****DOCUMENT No:****SP-AAA-PCI-049****REV:****5****PAGE:****2 OF 4****APPROVED BY:**

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ENVIRONMENTAL PERFORMANCE

Test item	Test condition	Requirements
Humidity (steady state)	Expose the mates connectors to $40\pm 2^{\circ}\text{C}$, relative humidity 90~95% RH for 96 hours. EIA-364-31	- Contact resistance: $\Delta R=20\text{m}\Omega$ Max. - Insulation resistance: $500\text{M}\Omega$ Min. - No physical damage.
Thermal shock	Expose the connectors to $-55^{\circ}\text{C}/30\text{min.}$ and $85^{\circ}\text{C}/30\text{min.}$ (Repeat 10 cycles)---EIA-364-32 condition I	- Contact resistance: $\Delta R=20\text{m}\Omega$ Max.(Final) - No physical damage.
Solder ability	Solder temperature: $250\pm 10^{\circ}\text{C}$ Immersion Duration: $3\pm 0.5\text{sec.}$	Wet solder coverage: 95%Min
Salt spray	- Subject the connector to 5% salt-solution concentration at 35°C for 24 hours. - EIA-364-26	Contact resistance: $\Delta \text{LLCR}=20\text{m}\Omega$ Max. (Final)
Resistance to soldering heat	EIA -364-56 Max. peak temperature of 260°C (infrared reflow soldering) 350°C within 5 second (soldering iron)	Show no Physical damage
Temperature life	Mate PCB module and subject to $85\pm 3^{\circ}\text{C}$ for 96 hours EIA-364-17 condition A	Contact resistance: $\Delta R=20\text{m}\Omega$ Max.(Final)

TEST CONDITIONS

The tests shall be carried out under the conditions as the referring.

(1). Temperature: $15\sim 35^{\circ}\text{C}$.

(2). Humidity: 45~75%

PACKAGE

All parts shall be packaged and packed to protect against physical damage, corrosion and deterioration during shipment and storage.

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PRODUCT SPECIFICATION

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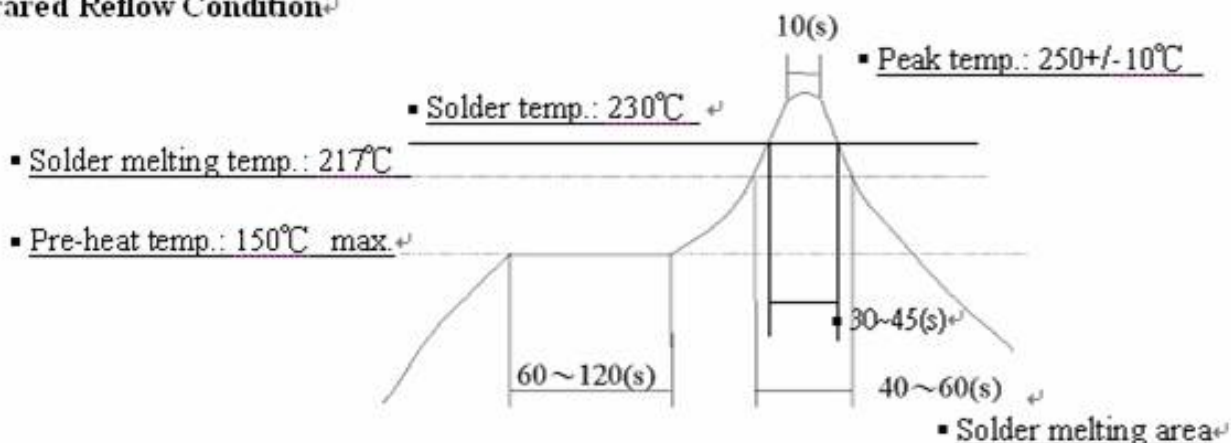
HYC12525

TEST SEQUENCE:

Test or Examination	Test Group							
	A	B	C	D	E	F	G	H
Examination of Product	1,5	1,9	1,5	1,8	1,3	1,5	1,5	1,3
Contact Resistance	2,4	2,6	2,4			2,4	2,4	
Insulation Resistance				2,6				
Dielectric Withstanding Voltage				3,7				
Vibration	3							
Durability (Repeated)		5						
Mating force		3,7						
Unmating force		4,8						
Solder ability					2			
Humidity (Steady State)				5				
Thermal Shock				4				
Mechanical shock			3					
Temperature life						3		
Salt spray							3	
Resistance to Soldering Heat								2

RECOMMENDED INFORARED REFLOW CONDITION

▪ Infrared Reflow Condition



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PRODUCT NAME:

0.8mm PITCH MINI PCI EXPRESS CONNECTOR

DOCUMENT No:

SP-AAA-PCI-049

REV:

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PAGE:

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APPROVED BY:

Barney 12/13'12

CHECKED BY:

Vito 12/13'12

WRITTEN BY:

Tracy 12/13'12



PRODUCT RELIABILITY TEST REPORT

Report No.P201102001

Product: 0.8mm PITCH MINI PCI
Part No:
Test Object: Product Reliability Test
Sample Quantity: 40PCS
Test Environment: 20°C 53%RH
Date of Test : Feb.01,2011~ Feb.28,2011

Test Item:

Qualification Group	Pass / Fail	Comments
Test Group A	Pass	
Test Group B	Pass	
Test Group C	Pass	
Test Group D	Pass	
Test Group E	Pass	
Test Group F	Pass	
Test Group G	Pass	
Test Group H	Pass	

Approved By:Jerry.Dong

Checked By:Leo.Tan

By :Ying-ying.Sun



PRODUCT RELIABILITY TEST REPORT

Report No.P201102001

1. Test Sequence:

Test or Examination	Test Group							
	A	B	C	D	E	F	G	H
Examination of Product	1,5	1,9	1,5	1,8	1,3	1,5	1,5	1,3
Contact Resistance	2,4	2,6	2,4			2,4	2,4	
Insulation Resistance				2,6				
Dielectric Withstanding Voltage				3,7				
Vibration	3							
Durability (Repeated)		5						
Mating force		3,7						
Unmating force		4,8						
Solder ability					2			
Humidity (Steady State)				5				
Thermal Shock				4				
Mechanical shock			3					
Temperature life						3		
Salt spray							3	
Resistance to Soldering Heat								2

2. Test Item & Condition & Requirements:

ITEM		Test Condition	Requirements
1	Examination of product	- Visual inspection - EIA-364-18	No physical damage
2	Contact resistance	Mate connectors: apply a current of 10mA(max) at open circuit voltage of 20mVvoltage(max) EIA-364-23	55mΩ MAX.per contact
3	Insulation resistance	Applying 500VDC between adjacent contacts of unmated and unmount connectors EIA-364-21	500MΩ MIN



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4	Dielectric withstanding voltage	Measured by applying 500VAC for one minute between adjacent contacts of unmated connector assemblies. EIA-364-20	No breakdown or flash Current leakage:1mA
5	Vibration test (Random)	Subject mated connectors and vibrate per EIA 364-28 test Condition.VII test condition letter D(15 minutes in each of 3 mutually perpendicular directions)	No electrical discontinuity greater than 1 microsecond. $\Delta R=20m\Omega$ Max.(Final)
6	Mechanical shock	Subject mated connector to 50Gs,half-sine shock pulses of 11 millisecond duration,3drops in each direction applied along the 3 mutually perpendicular planes total 18 shock. EIA-364-27 test condition A	No electrical discontinuity greater than 1 microsecond $\Delta R=20m\Omega$ Max.(Final) No physical damage
7	Durability (repeated mate/un-mate)	Repeat insertion the PCB to the connector and extraction PCB from the connector for 50 cycles. EIA-364-09	$\Delta R=20m\Omega$ Max.(Final)
8	Mating and Unmating force	insert the card at the specified angle Rotate the card into position Reverse the installation sequence to unmating EIA-364-13	2.3 Kgf MAX
9	Humidity (steady state)	Expose the mates connectors to $40\pm 2^{\circ}\text{C}$,relative humidity 90~95% RH for 96 hours.EIA-364-31	Contact resistance: $\Delta R=20m\Omega$ Max. Insulation resistance:500M Ω Min. No physical damage.
10	Thermal shock	Expose the connectors to $-55^{\circ}\text{C}/30\text{min.}$ and $85^{\circ}\text{C}/30\text{min.}$ (Repeat 10 cycles)---EIA-364-32 condition I	Contactresistance: $\Delta LLCR=20m\Omega$ No physical damage.
11	Solder ability	Solder temperature: $250\pm 10^{\circ}\text{C}$ Immersion Duration: $3\pm 0.5\text{sec.}$	Wet solder coverage: 95%Min



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12	Salt spray	Subject the connector to 5% salt-solution concentration at 35°C for 24 hours. EIA-364-26	Contact resistance: Δ LLCR=20m Ω Max.(Final)
13	Resistance to soldering heat	EIA -364-56Max. peak temperature of 260°C (infrared reflow soldering)350°C within 5 second (soldering iron)	Show no Physical damage
14	Temperature life	Mate PCB module and subject to 85 $\pm$ 3°C for 96 hours EIA-364-17 condition A	Contact resistance: Δ R=20m Ω Max.(Final)
15	Rework Temperture	350°C 3~5s seconds for” Solder iron Max” ,temperature of Component by reword process	No Damage

3.Test Equipment:

Name	Model
Micro-ohmmeter	Keithley5802
Withstanding voltage & insulation auto tester	Zentech9052
Unmating/mating Tester	1220S
Thermal shock test chamber	CHANGHONG-SH-T-601
Temperature& humidity cycling chamber	Giant GTH-150-70-2P-V
Salt spray tester	Giant GSST-108
Vibration tester	King Design-9363EM-600F2K-40N120
Mechanical shock tester	King Design-DP-1200-ST-250
IR Reflow	JIAZE-PS-2000
Soldering machine	POT-1500

4. Test Results:

Group:A



PRODUCT RELIABILITY TEST REPORT

Report No.P201102001

Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass /fail
1 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass
2 LLCR	17.5	16.8	15.6	18.7	15.5	mΩ	Pass
3 Vibration	Normal	Normal	Normal	Normal	Normal		Pass
4 LLCR	16.9	20.1	19.2	17.6	19.7	mΩ	Pass
5 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass

Group:B

Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass /fail
1 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass
2 LLCR	16.8	19.4	17.4	17.6	15.8	mΩ	Pass
3 Mating force	0.52	0.53	0.49	0.47	0.52	kgf	Pass
4 Durability (Repeated)	Normal	Normal	Normal	Normal	Normal		Pass
5 LLCR	21.1	20.6	19.9	18.7	20.4	mΩ	Pass
6 Mating force	0.46	0.49	0.45	0.50	0.51	kgf	Pass
7 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass

Group:C

Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass /fail
1 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass
2 LLCR	15.9	15.1	17.5	18.2	16.7	mΩ	Pass
3 Mechanical shock	Normal	Normal	Normal	Normal	Normal		Pass
4 LLCR	20.1	20.9	21.6	20.4	19.9	mΩ	Pass
5 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass

Group:D



PRODUCT RELIABILITY TEST REPORT

Report No.P201102001

Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass /fail
1 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass
2 Insulation Resistance	Normal	Normal	Normal	Normal	Normal		Pass
3 Dielectric Withstanding Voltage	Normal	Normal	Normal	Normal	Normal		Pass
4 Thermal Shock	Normal	Normal	Normal	Normal	Normal		Pass
5 Humidity (Steady State)	Normal	Normal	Normal	Normal	Normal		Pass
6 Insulation Resistance	Normal	Normal	Normal	Normal	Normal		Pass
7 Dielectric Withstanding Voltage	Normal	Normal	Normal	Normal	Normal		Pass
8 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass

Group:E

Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass /fail
1 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass
2 Solder ability	Normal	Normal	Normal	Normal	Normal		Pass
3 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass

Group:F

Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass /fail
1 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass
2 LLCR	16.8	17.4	17.9	15.9	18.7	mΩ	Pass
3 Temperature life	Normal	Normal	Normal	Normal	Normal		Pass
4 LLCR	21.6	20.6	19.7	19.4	19.2	mΩ	Pass
5 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass

Group:G

Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass /fail
1 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass
2 LLCR	16.4	17.2	16.5	16.1	17.1	mΩ	Pass
3 Salt spray	Normal	Normal	Normal	Normal	Normal		Pass
4 LLCR	18.3	18.9	20.3	21.6	19.8	mΩ	Pass
5 Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass

Group:H



PRODUCT RELIABILITY TEST REPORT

Report No.P201102001

Examination step/ item		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass /fail
1	Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass
2	Resistance to Soldering Heat	Normal	Normal	Normal	Normal	Normal		Pass
3	Examination of Product	Normal	Normal	Normal	Normal	Normal		Pass

5. The LLCR raw data as follow

Group :A

NO.	A-Vibration									
	Initial					After- Vibration				
	A1	A2	A3	A4	A5	A1	A2	A3	A4	A5
1	18.9	18.1	15.6	16.5	18.6	22.3	21.6	19.7	18.9	21.9
2	15.6	17.3	14.8	15.7	16.9	19.4	23.5	19.2	20.1	19.1
3	14.6	16.0	19.4	18.5	16.8	18.4	18.1	22.1	21.8	20.3
4	18.3	16.9	15.8	18.2	17.1	21.6	19.2	18.7	20.3	21.6
5	15.2	18.4	14.9	16.1	19.7	18.8	20.3	21.2	20.4	19.4
6	16.1	14.4	16.2	18.4	18.2	22.7	21.4	18.9	21.6	21.7
7	15.7	21.4	18.9	18.2	15.7	17.9	22.9	20.1	21.5	19.6
8	14.6	15.3	17.8	14.9	16.9	21.7	23.4	19.4	19.8	19.3
9	16.5	15.8	17.1	18.6	18.2	18.9	18.5	21.3	17.9	23.3
10	17.9	16.2	16.9	14.9	18.4	20.3	20.5	19.8	19.5	22.2
11	14.9	18.2	18.4	16.3	15.1	17.6	20.3	17.9	19.6	18.0
12	16.8	17.3	15.8	15.8	14.1	22.8	22.4	17.9	18.3	21.1
13	19.4	18.4	16.9	18.4	15.8	23.7	21.9	18.0	20.3	20.4
14	17.6	16.3	17.3	17.6	16.7	19.7	20.3	20.9	21.2	18.9
15	16.2	16.5	15.4	17.2	17.1	21.0	19.8	21.7	19.7	21.3
16	14.7	18.2	19.4	19.4	17.0	21.6	21.5	22.6	24.2	19.4
17	16.8	17.4	15.9	19.0	18.2	19.4	16.9	21.6	22.1	21.5
18	15.9	14.3	18.3	17.1	19.4	19.9	19.6	21.7	20.3	21.4
19	17.6	17.4	16.2	18.4	14.9	20.8	19.7	19.8	20.7	18.3
20	16.8	17.6	17.3	16.8	19.5	16.8	20.8	20.3	19.4	20.9
21	16.8	19.4	14.9	20.9	17.6	19.7	21.3	19.6	22.8	18.0
22	17.3	14.9	18.4	15.4	18.2	16.2	17.5	20.5	17.8	21.1
23	15.8	16.4	17.3	18.1	18.8	20.6	21.4	21.3	20.2	18.0
24	17.1	16.1	19.2	19.4	17.2	21.1	18.6	19.5	21.5	19.3



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25	15.9	15.1	18.3	17.2	19.1	19.9	18.4	20.3	20.3	19.6
26	16.4	16.4	14.8	17.6	17.4	20.1	19.6	19.8	20.3	21.3
max	19.40	21.40	19.40	20.90	19.70	23.70	23.50	22.60	24.20	23.30
min	14.60	14.30	14.80	15.70	14.10	16.20	16.90	17.90	17.80	18.00
avg	16.52	16.91	16.97	17.48	17.41	20.11	20.36	20.15	20.40	20.27
stdev	1.28	1.60	1.50	1.50	1.46	1.86	1.76	1.30	1.45	1.46

Group :B

NO.	B-Durability									
	Initial					After- Durability				
	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
1	16.3	16.7	15.9	19.2	16.1	20.1	19.1	18.3	20.1	20.4
2	16.0	18.5	16.4	15.6	15.6	21.9	20.3	19.6	19.1	20.4
3	14.6	14.6	18.6	17.8	16.1	19.3	19.1	21.9	19.8	17.5
4	15.4	18.4	14.9	16.9	18.4	20.2	20.7	20.7	19.9	22.9
5	16.2	15.9	18.3	17.8	16.3	17.6	19.7	20.4	21.2	20.1
6	15.8	19.3	18.2	16.8	16.4	17.5	21.0	20.6	22.8	21.3
7	14.8	19.7	17.6	16.9	15.8	19.9	20.3	22.4	18.9	17.2
8	19.3	17.2	15.8	15.2	16.4	21.6	19.5	20.1	19.7	19.4
9	15.1	16.4	16.4	18.3	17.5	21.6	21.6	20.4	20.9	19.8
10	20.8	17.6	18.3	14.1	18.2	22.6	19.9	19.6	20.3	22.7
11	15.2	18.8	20.1	17.8	16.3	23.2	19.8	22.8	20.1	19.4
12	16.3	18.2	17.8	16.1	17.6	20.3	21.4	19.4	21.5	19.7
13	17.1	17.9	19.1	15.5	16.1	18.9	19.4	22.4	18.4	19.3
14	18.1	15.6	17.3	19.4	19.4	20.4	18.0	20.3	19.5	20.6
15	14.5	16.6	16.1	18.3	16.0	20.1	20.4	18.8	20.8	20.2
16	19.3	18.5	17.9	20.1	15.6	21.2	21.4	21.2	18.9	19.4
17	16.3	16.5	16.9	22.3	15.4	20.3	17.9	20.8	24.6	18.6
18	17.3	16.5	18.7	16.7	19.1	19.8	19.0	19.6	18.3	20.1
19	17.2	17.9	15.7	18.6	18.2	22.0	19.4	22.5	20.5	20.8
20	20.9	18.9	17.8	16.7	17.7	20.3	20.8	19.4	21.6	20.3
21	16.8	16.2	17.6	17.2	16.9	18.5	19.1	19.6	19.6	19.6
22	14.8	17.0	16.3	15.8	16.8	17.9	19.6	18.7	19.5	22.4
23	19.5	16.8	18.7	16.7	15.3	22.8	20.9	21.5	21.6	18.4
24	16.9	18.2	16.4	14.9	15.9	21.5	18.8	20.9	17.6	19.4



PRODUCT RELIABILITY TEST REPORT

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25	16.2	17.8	17.7	15.7	16.2	19.5	20.9	20.4	18.9	19.9
26	18.9	15.2	16.6	15.6	16.4	20.3	19.9	21.4	19.4	21.6
max	20.90	19.70	20.10	22.30	19.40	23.20	21.60	22.80	24.60	22.90
min	14.50	14.60	14.90	15.60	15.30	17.50	17.90	18.30	17.60	17.20
avg	16.91	17.34	17.35	17.15	16.76	20.36	19.92	20.53	20.13	20.05
stdev	1.87	1.30	1.24	1.81	1.15	1.54	1.00	1.23	1.50	1.38

Group :C

NO.	C- Mechanical shock									
	Initial					After- Mechanical shock				
	C1	C2	C3	C4	C5	C1	C2	C3	C4	C5
1	17.6	17.3	17.1	17.1	19.4	20.9	21.6	18.9	19.7	20.1
2	19.4	16.9	14.6	16.1	15.3	23.3	21.3	20.0	20.3	21.7
3	16.4	20.5	19.2	20.4	19.0	18.9	20.6	22.1	23.5	22.3
4	15.2	14.5	15.8	15.3	15.1	20.1	21.5	20.1	21.6	19.6
5	17.3	15.8	18.3	19.6	18.1	21.3	19.4	20.6	22.4	20.2
6	19.6	14.9	16.4	17.9	16.1	23.4	21.7	21.0	19.4	19.2
7	17.0	17.8	20.1	18.5	19.7	19.6	18.1	23.1	22.4	22.9
8	17.2	16.8	16.1	15.2	16.7	21.4	19.2	22.2	18.9	18.7
9	18.0	16.2	18.2	18.7	15.8	21.6	20.3	21.5	21.1	19.2
10	16.4	18.4	15.2	15.6	15.8	18.0	21.7	20.1	18.0	19.9
11	21.5	15.0	19.2	20.4	17.8	20.3	21.9	20.5	21.0	19.9
12	16.5	16.1	16.2	16.3	16.4	22.5	19.1	20.3	20.6	23.6
13	16.8	18.3	18.2	17.6	17.7	19.6	20.1	18.9	20.3	19.6
14	15.2	15.1	16.3	20.1	18.9	19.4	20.3	22.2	21.9	19.3
15	14.9	18.2	20.7	18.3	18.6	20.4	21.1	23.0	20.6	19.5
16	18.8	17.1	15.9	19.2	19.4	20.8	20.9	19.4	23.4	20.3
17	20.1	18.3	18.8	16.9	16.9	21.6	21.4	21.0	20.9	20.6
18	15.6	16.7	14.6	17.8	16.3	19.3	19.4	19.8	20.4	21.0
19	20.4	17.9	16.9	17.8	17.1	20.3	20.3	20.1	21.4	19.4
20	18.5	18.1	14.9	18.1	16.4	19.1	20.4	20.8	22.2	18.2
21	16.0	17.6	18.5	17.3	19.1	18.4	20.1	20.6	19.6	20.5
22	14.9	18.0	18.4	15.9	16.8	19.4	21.2	21.7	21.4	21.7
23	17.8	17.6	20.9	17.7	15.8	20.1	19.9	22.4	21.6	20.3
24	17.1	19.1	19.4	18.7	17.0	20.6	21.6	20.6	20.1	20.6



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25	16.9	20.0	19.3	16.8	18.6	21.5	21.5	20.4	20.6	18.4
26	16.8	17.1	19.2	15.1	14.8	20.3	19.3	19.6	21.4	19.6
max	21.50	20.50	20.90	20.40	19.70	23.40	21.90	23.10	23.50	23.60
min	14.90	14.50	14.60	15.30	14.80	18.00	18.10	18.90	18.00	18.20
avg	17.38	17.28	17.63	17.63	17.25	20.47	20.53	20.80	20.95	20.24
tdev	1.76	1.50	1.90	1.58	1.48	1.36	1.02	1.17	1.29	1.32

Group :F

NO.	F-Temperature Life									
	Initial					After- Temperature Life				
	F1	F2	F3	F4	F5	F1	F2	F3	F4	F5
1	16.5	15.5	16.1	17.1	15.4	20.3	21.0	21.5	20.9	19.6
2	17.4	18.5	18.9	16.1	19.3	18.5	21.4	21.9	19.4	21.1
3	15.1	15.8	14.9	15.4	18.1	21.4	22.7	20.6	18.4	21.7
4	15.3	20.1	17.3	19.5	18.4	19.1	23.6	20.1	22.4	20.1
5	15.1	15.2	16.2	18.7	16.8	19.8	16.9	19.6	20.9	21.6
6	19.3	17.5	15.8	15.6	16.6	17.8	20.6	18.9	20.1	19.2
7	17.9	16.9	16.1	17.2	15.5	21.1	17.5	20.6	21.4	19.0
8	18.4	15.8	18.2	15.6	17.4	19.1	18.6	18.7	18.8	20.4
9	16.8	17.2	15.7	16.2	15.2	18.9	19.1	22.1	19.1	18.6
10	16.3	18.1	15.3	18.6	21.4	19.7	21.2	17.1	22.6	23.6
11	16.2	16.9	16.1	14.9	19.8	22.9	17.8	20.4	18.1	21.3
12	18.3	16.1	21.8	13.8	16.3	15.4	20.2	19.8	17.3	20.1
13	20.1	18.1	19.7	18.1	16.8	25.1	18.1	18.6	20.3	19.2
14	16.5	17.5	18.3	18.2	18.8	19.1	20.5	20.9	20.0	20.3
15	16.9	17.6	16.2	15.4	18.1	19.7	19.9	21.3	19.4	20.6
16	14.8	17.2	19.5	15.7	20.0	18.2	20.1	21.6	18.2	19.6
17	18.7	17.1	17.1	16.7	17.1	22.4	18.2	20.3	18.0	20.5
18	14.2	16.8	15.7	18.2	18.2	19.6	19.6	18.8	20.5	20.9
19	14.6	16.9	16.9	19.4	16.1	19.0	18.7	20.1	17.9	18.1
20	18.2	19.5	16.9	17.6	15.4	21.3	22.4	20.6	20.1	19.2
21	15.9	17.6	17.2	16.5	18.3	20.3	20.5	18.2	19.2	20.8
22	20.9	16.8	17.2	18.4	15.2	20.6	19.7	20.6	21.2	20.6
23	16.5	17.1	18.0	16.9	15.0	18.3	20.4	19.1	20.3	18.2
24	19.6	18.5	17.1	15.6	18.3	21.4	18.4	19.8	18.2	20.6



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25	16.2	15.8	17.5	18.3	18.1	19.3	21.6	19.6	20.9	18.3
26	19.4	16.9	16.1	15.1	18.2	20.3	19.7	18.1	17.9	19.1
max	20.90	20.10	21.80	19.50	21.40	25.10	23.60	22.10	22.60	23.60
min	14.20	15.20	14.90	13.80	15.00	15.40	16.90	17.10	17.30	18.10
avg	17.12	17.19	17.15	16.88	17.45	19.98	19.94	19.96	19.67	20.09
stdev	1.83	1.16	1.56	1.52	1.68	1.90	1.66	1.26	1.45	1.26

Group :G

NO.	G- Salt spray									
	Initial					After- Salt spray				
	G1	G2	G3	G4	G5	G1	G2	G3	G4	G5
1	16.5	14.8	15.4	18.1	15.3	18.2	20.3	20.5	19.4	19.8
2	16.3	18.5	15.9	18.6	18.1	19.8	20.6	21.1	20.5	22.4
3	16.9	15.2	15.5	15.0	16.2	19.7	21.9	20.3	18.6	21.6
4	18.0	18.6	17.5	19.2	18.0	18.1	19.9	20.1	21.9	20.6
5	17.9	16.3	16.7	16.9	18.3	16.9	21.5	21.3	18.0	19.4
6	14.8	17.9	18.9	16.4	17.6	18.2	19.6	21.5	18.9	19.0
7	16.9	14.9	15.2	20.3	15.9	19.4	19.1	19.4	20.3	18.6
8	20.3	18.1	18.8	17.8	17.1	23.9	22.1	21.7	20.5	20.2
9	15.5	18.5	16.2	19.9	16.4	20.3	20.6	19.4	20.5	20.3
10	19.3	16.3	20.5	16.9	17.6	22.4	18.6	23.6	21.9	20.3
11	18.2	21.3	15.3	15.2	14.9	19.4	22.1	19.8	21.6	18.3
12	18.0	16.7	17.9	18.2	18.9	19.7	20.9	20.3	20.9	20.1
13	20.8	19.6	18.6	16.5	16.5	20.3	20.3	21.3	22.7	23.5
14	16.7	19.1	16.8	15.0	15.2	20.1	22.3	20.9	18.5	19.5
15	17.6	16.6	18.4	14.9	14.2	17.6	19.4	21.4	19.4	25.3
16	15.9	18.0	15.7	14.5	16.7	23.8	20.3	21.5	17.6	19.5
17	15.2	15.6	18.5	16.1	16.7	17.4	19.4	21.1	21.5	20.3
18	16.4	15.9	19.5	15.7	18.3	17.3	18.4	22.4	19.5	20.8
19	15.9	17.2	17.6	15.8	14.6	16.8	19.9	21.1	19.2	21.6
20	17.8	16.1	16.9	17.0	18.0	20.5	21.4	22.4	20.3	20.3
21	19.4	18.2	15.2	18.7	17.2	19.4	21.3	20.9	22.3	21.0
22	18.3	17.1	18.0	15.8	17.7	19.4	20.9	21.4	18.6	20.4
23	20.1	15.2	20.1	19.6	17.7	21.6	18.2	23.2	22.1	19.5
24	19.5	15.4	15.8	20.1	18.7	20.3	20.7	20.3	21.4	21.8



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25	15.2	19.0	16.8	15.6	16.2	19.5	21.5	20.2	18.9	23.1
26	15.3	19.8	20.9	18.6	16.8	19.1	20.9	19.1	19.8	19.2
max	20.80	21.30	20.90	20.30	18.90	23.90	22.30	23.60	22.70	25.30
min	14.80	14.80	15.20	14.50	14.20	16.80	18.20	19.10	17.60	18.30
avg	17.41	17.30	17.41	17.17	16.88	19.58	20.47	21.01	20.18	20.63
stdev	1.73	1.72	1.72	1.80	1.29	1.86	1.16	1.10	1.44	1.60