

# NOVASTACK® 35-HDP

Part No. Plug: 20697-0\*\*E-01#-# Receptacle: 20698-0\*\*E-01#

## Product Specification

Qualification Test Report No. TR-16014

7	S24230	June 11, 2024	Y.Fukumoto	-	S.Suzuki
6	S22156	April 13, 2022	H.Lu	Y.Shimizu	M.Takemoto
5	S21674	December 20, 2021	S.Shigekoshi	M.Muro	H.Ikari
4	S21583	November 5, 2021	Y.Kuribayashi	S.Suzuki	Y.Hashimoto
Rev.	ECN	Date	Prepared by	Checked by	Approved by

## 1. Scope

This Product Specification defines the test conditions and the performances of the NOVASTACK 35-HDP Connector .

## 2. Product Name and Parts No.

### 2.1 Product Name

NOVASTACK 35-HDP

### 2.2 Parts No.

Plug: 20697-0\*\*E-01#-#

Receptacle: 20698-0\*\*E-01#

## 3. Rating

### 3.1 Operating Conditions

Amperage: Signal contact ... 0.3A AC/DC (per contact)

12.0A AC/DC (total)

Power contact ... 2.2A AC/DC (per contact)

8.8A AC/DC (total)

Voltage: 60V AC (r.m.s) / DC (per contact)

Operating temperature: 233 to 358K(-40°C to +85°C)

(Containing temperature rise by current)

Operating humidity: 85% max.

### 3.2 Storage Conditions

Storage temperature: 248 to 333K(-25°C to 60°C)

Storage humidity: 85% max. (Non-condensing)

## 4. Test and Performance

### Test Condition

This initial test is equal to it's at shipping condition and unless otherwise specified, all tests and measurements shall be performed under the following conditions in accordance with MIL-STD-202G.

Temperature... 288K to 308K (15°C to 35°C)

Pressure... 866hPa to 1066hPa (650mmHg to 800mmHg)

Relative humidity... 45 to 75%R.H.

4.1. Electrical Performance

1. Contact resistance	
Reference standard:	MIL-STD-202G, Method 307
Test conditions:	Solder the receptacle connector to the test board and mate the plug connector together, then measure the contact resistance as shown in Fig.1 by the four terminal methods. Apply the low level condition of 20mV MAX. DC for the open circuit voltage and 100mA DC for the closed circuit current.
Pass criteria:	<p><u>Signal contact</u> Initial : 40mΩMAX. After testing : <math>\Delta R</math> 40mΩ MAX.</p> <p><u>Power contact</u> Initial : 20mΩMAX. After testing : <math>\Delta R</math> 20mΩ MAX.</p> <p><u>GND</u> Initial : 20mΩMAX. After testing : <math>\Delta R</math> 20mΩ MAX.</p>

2. Insulation resistance	
Reference standard:	MIL-STD-202G, Method 302
Test conditions:	Mate the plug and receptacle connector together, and then apply DC 250 V between the neighboring contacts and contact to the shell.
Pass criteria:	Initial: 1000 MΩ MIN. After testing: 500 MΩ MIN.

3. Dielectric withstanding voltage	
Reference standard:	MIL-STD-202G, Method 301
Test conditions:	Mate the receptacle and plug connector together, then apply AC 250V(rms) between the neighboring contacts and contact to the shell for a minute.
Pass criteria:	No abnormalities such as creeping discharge, flashover, insulator breakdown occur.

4. Temperature rising	
Reference standard:	-
Test conditions:	Mate the plug and receptacle connector together and then apply rating current per contact.
Pass criteria:	Over ambient $\Delta T$ 30°C MAX.

**4.2. Mechanical Performance**

<b>1. Mating force and Un-mating force</b>	
Reference standard:	-
Test conditions:	Solder the plug and receptacle connector to the test board, then place the board and plug on push-on/pull-off machine, measure of initial and mating/unmating 30 cycles at a speed 25±3mm/min. along the mating axis.
Pass criteria:	<p>Mating</p> <p>16P : 32.0N MAX. 28P : 32.0N MAX. 34P : 38.0N MAX. 42P : 46.0N MAX. 56P : 60.0N MAX. 62P : 66.0N MAX.</p> <p>Un-mating</p> <p>16P : 3.2M MIN. 28P : 3.2M MIN. 34P : 3.8N MIN. 42P : 4.6N MIN. 56P : 6.0N MIN. 62P : 6.6N MIN.</p>

<b>2. Durability</b>	
Reference standard:	-
Test conditions:	Solder the plug and receptacle connector to the test board, then place the board and plug on the push-on/pull-off machine, and repeat mating and unmating 30cycles at a speed 25±3mm/min. along the mating axis.
Pass criteria:	Contact resistance: Shall meet 4.1.1

<b>3. Contact retention force</b>	
Reference standard:	-
Test conditions:	Place the connector on the push-on/pull-off machine, then apply force on the contact head and push the contact along the direction opposite to the contact insertion at a speed of 25±3mm/min. Measure the force when the contact dislodges the connector.
Pass criteria:	Plug contact retention force: 0.6N MIN. Receptacle contact retention force: 0.1N MIN.

<b>4. Vibration</b>	
Reference standard:	MIL-STD-202G, Method 201A
Test conditions:	Solder the plug and receptacle connector to the test board, then mate plug connector, and place them on the vibrator. Then apply the following vibration. During the testing, run 100mA DC to check electrical discontinuity. Frequency: 10Hz→55Hz→10Hz/approx. 1min. Directions: 3 mutually perpendicular direction. Total Amplitude: 1.52mm Sweep duration: 2 hours for each direction, a total of 6 hours.
Pass criteria:	Contact resistance: Shall meet 4.1.1. Electrical discontinuity: No electrical discontinuity greater than 1µs shall occur. Appearance: No abnormality adversely affecting the performance shall occur.

5. Shock							
Reference standard:	MIL-STD-202G, Method 213B, Condition A.						
Test conditions:	<p>Solder the plug and receptacle connector to the test board, then mate plug connector, and place them on the shock machine. Then apply the following shock.</p> <table> <tr> <td>MAX.G: 50G</td> <td>Directions: 6 mutually perpendicular direction</td> </tr> <tr> <td>Duration: 11msec</td> <td>Cycle: 3 cycles about each direction</td> </tr> <tr> <td>Wave Form: Half Sinusoidal</td> <td></td> </tr> </table>	MAX.G: 50G	Directions: 6 mutually perpendicular direction	Duration: 11msec	Cycle: 3 cycles about each direction	Wave Form: Half Sinusoidal	
MAX.G: 50G	Directions: 6 mutually perpendicular direction						
Duration: 11msec	Cycle: 3 cycles about each direction						
Wave Form: Half Sinusoidal							
Pass criteria:	<p>Contact resistance: Shall meet 4.1.1.</p> <p>Electrical discontinuity: No electrical discontinuity greater than 1<math>\mu</math>s shall occur.</p> <p>Appearance: No abnormality adversely affecting the performance shall occur.</p>						

## 4.3. Environmental Performance

1. Thermal shock	
Reference standard:	MIL-STD-202G, Method 107G, Condition A.
Test conditions:	Solder the plug and receptacle connector to the test board, then mate plug and receptacle connector, and expose them to the following environment. Temperature: 218K(-55°C),30min.→358K(85°C),30min. Transition time: 5min. MAX. No. of cycles: 5 cycles
Pass criteria:	Contact resistance: Shall meet 4.1.1. Insulation resistance: Shall meet 4.1.2. Dielectric withstanding voltage: Shall meet 4.1.3. Appearance: No abnormality adversely affecting the performance shall occur.

2. High temperature life	
Reference standard:	MIL-STD-202G, Method 108A, Condition B.
Test conditions:	Solder the plug and receptacle connector to the test board, then mate plug and receptacle connector, and expose them to the following environment. Temperature: 358±2K (85±2°C) Duration: 250 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Contact retention force: Shall meet 4.2.3. Appearance: No abnormality adversely affecting the performance shall occur.

3. Humidity(Steady state)	
Reference standard:	MIL-STD-202G, Method 103B, Condition A.
Test conditions:	Solder the plug and receptacle connector to the test board, then mate plug and receptacle connector, and expose them to the following environment. Temperature: 313±2K (40±2°C) Humidity: 90 to 95%RH Duration: 240 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Insulation resistance: Shall meet 4.1.2. Dielectric withstanding voltage: Shall meet 4.1.3. Appearance: No abnormality adversely affecting the performance shall occur.

4. Humidity(Cycling)	
Reference standard:	MIL-STD-202G, Method 106G.
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature: 298[263] to 338K (25[-10] to 65°C) Humidity: 90 to 98%RH Duration: 10cycles (240hours)
Pass criteria:	Contact resistance: Shall meet 4.1.1. Insulation resistance: Shall meet 4.1.2. Dielectric withstanding voltage: Shall meet 4.1.3. Appearance: No abnormality adversely affecting the performance shall occur.

## 5. Salt water spray

Reference standard:	MIL-STD-202G, Method 101E, Condition B.
Test conditions:	Solder the plug and receptacle connector to the test board, then mate plug and receptacle connector, and expose them to the following environment. Temperature: $308\pm 2\text{K}$ ( $35\pm 2^\circ\text{C}$ ) Salt water density: $5\pm 1\%$ [by weight] Duration: 48 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Appearance: No abnormality adversely affecting the performance shall occur.

6. H<sub>2</sub>S gas

Reference standard:	-
Test conditions:	Solder the plug and receptacle connector to the test board, then mate plug and receptacle connector, and expose them to the following environment. Temperature: $313\pm 2\text{K}$ ( $40\pm 2^\circ\text{C}$ ) Relative humidity: $80\pm 5\%$ RH Gas: H <sub>2</sub> S $3\pm 1$ ppm Duration: 48 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Appearance: No abnormality adversely affecting the performance shall occur.

4.4. Others

1. Solder ability	
Reference standard:	MIL-STD-202G, Method 208H
Test conditions:	Dip the solder tine of the contact in the solder bath at $518 \pm 5K(245 \pm 5^\circ C)$ for $5 \pm 0.5$ seconds after immersing the tine in the flux of RMA or R type for 5 to 10 seconds.
Pass criteria:	More than 95% of the dipped surface shall be evenly wet.
Pass criteria:	No abnormality adversely affecting the performance shall not occur.

2. Soldering heat resistance	
Reference standard:	-
Test conditions:	Reflow temperature as shown in Fig.2. The number of times of Reflow is within 2. Nitrogen reflow cannot correspond.

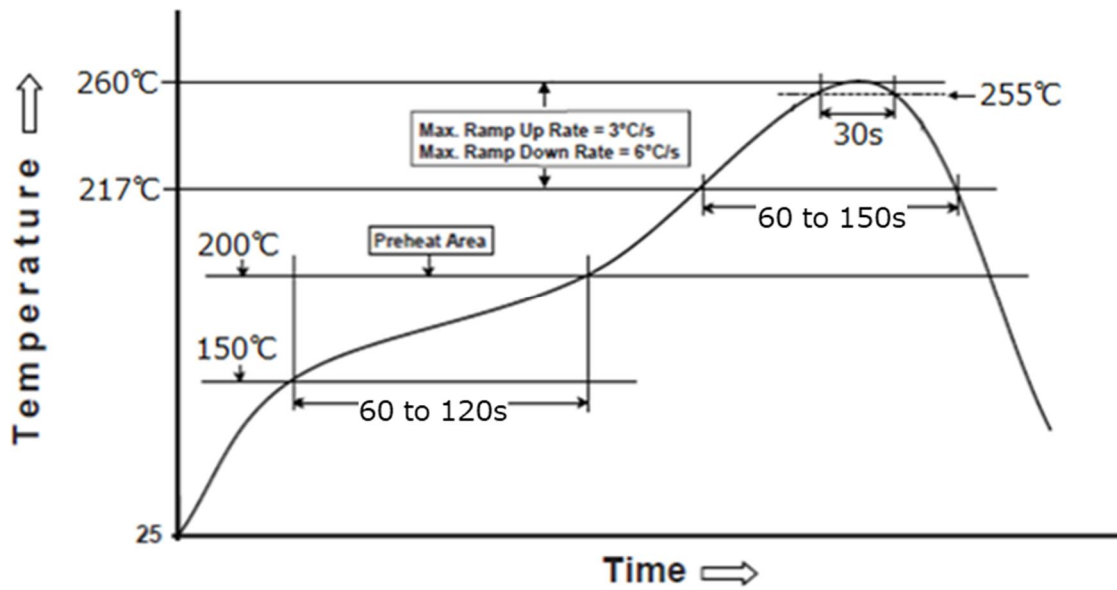


Fig.2

Pass criteria:	No abnormality adversely affecting the performance shall not occur.
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3. Solder iron	
Reference standard:	-
Test conditions:	Operating temperature : $613$ to $633K(350^\circ C \pm 10)$ Application time of soldering iron : $5 \pm 1$ sec. The number of times of application : 3time.
Pass criteria:	No abnormality adversely affecting the performance shall occur.



4.5. Test Sequence and Specimen Quantity

Table1 Test Sequence and Sample Quantity

Test Item	Group												
	A	B	C	D	E	F	G	H	J	K	L	M	
Contact Resistance	2,6		1,3,5	1,5	1,3	1,5	1,5,7	1,3	1,3				
Insulation Resistance				2,6		2,6	2,8						
D. W. Voltage				3,7		3,7	3,9						
Temperature Rising												1	
Mating Force	1,5												
Unmating Force	3,7												
Durability	4						4 (10cycles)						
Contact Retention Force		1,3											
Vibration			2										
Shock			4										
Thermal Shock				4									
High Temperature Life		2			2								
Humidity (Steady State)						4							
Humidity (Cycling)							6						
Salt Water Spray								2					
Gas (H <sub>2</sub> S)									2				
Solderability										1			
Soldering Heat Resistance											1		
Sample QTY.	5 pcs.	20 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	10 pcs.	10 pcs.	5 pcs.

※Numbers indicate sequence in which tests are performed.

5. Recommended Metal Mask

Refer to DWG NO.20697 (Plug), 20698 (Receptacle)