# NOVASTACK® 35-HDP

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

## Product Specification

Qualification Test Report No. TR-16014

| Rev. | ECN | Date | Prepared by | Checked by | Approved by |
|---|---|---|---|---|---|
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| 8 | S25198 | May 9, 2025 | T.Matsunaga | - | S.Suzuki |
| 7 | S24230 | June 11, 2024 | Y.Fukumoto | - | S.Suzuki |
| 6 | S22156 | April 13, 2022 | H.Lu | Y.Shimizu | M.Takemoto |

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

## 3. Rating

### 3.1 Operating Conditions

Amperage: Signal contact … 0.3A AC/DC (per contact)
12.0A AC/DC (total)
Power contact … 2.2.A AC/DC (per contact)
8.8A AC/DC (total)
Voltage: 60V AC (r.m.s) / DC (per contact)
Operating temperature: 233 to 358K(-40℃ to +85℃)
(Containing temperature rise by current)
Operating humidity: 85% max.

### 3.2 Storage Conditions

Storage temperature: 248 to 333K(-25℃ to 60℃)
Storage humidity: 85% max. (Non-condensing)

## 4. Test and Performance

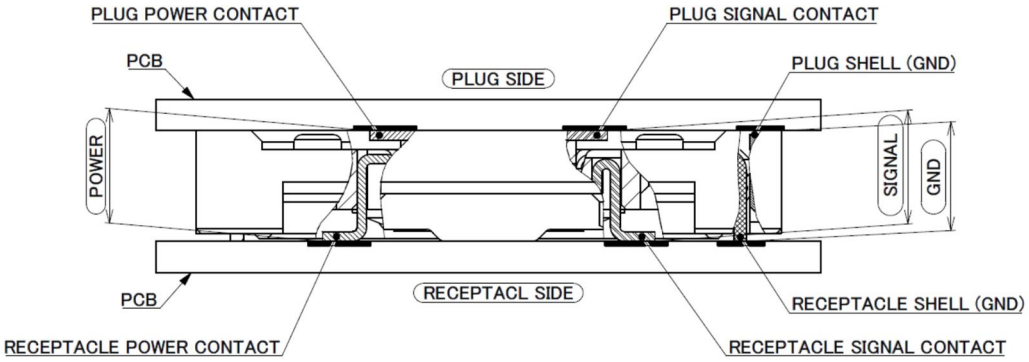
**Test Condition**

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℃ to 35℃）
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. |




Contact Resistance = $R_{AB}$

Fig.1

| | |
|---|---|
| Pass criteria: | Signal contact<br>Initial： 40mΩMAX.<br>After testing：⊿R 40mΩ MAX.<br>Power contact<br>Initial： 20mΩMAX.<br>After testing：⊿R 20mΩ MAX.<br>Shell<br>Initial： 20mΩMAX.<br>After testing：⊿R 20mΩ MAX. |

| 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 ⊿T30℃ MAX. |

**4.2. Mechanical Performance**

| 1. Mating force and Un-mating force | |
|---|---|
| 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: | Mating<br>Signal Contact16P＋Power Contact 4P： 32.0N MAX.<br>Signal Contact28P＋Power Contact 4P： 32.0N MAX.<br>Signal Contact34P＋Power Contact 4P： 38.0N MAX.<br>Signal Contact42P＋Power Contact 4P： 46.0N MAX.<br>Signal Contact56P＋Power Contact 4P： 60.0N MAX.<br>Signal Contact62P＋Power Contact 4P： 66.0N MAX.<br><br>Un-mating<br>Signal Contact16P＋Power Contact 4P： 3.2N MIN.<br>Signal Contact28P＋Power Contact 4P： 3.2N MIN.<br>Signal Contact34P＋Power Contact 4P： 3.8N MIN.<br>Signal Contact42P＋Power Contact 4P： 4.6N MIN.<br>Signal Contact56P＋Power Contact 4P： 6.0N MIN.<br>Signal Contact62P＋Power Contact 4P： 6.6N MIN. |

| 2. Durability | |
|---|---|
| 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 meet4.1.1 |

| 3. Contact retention force | |
|---|---|
| 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.<br>Receptacle contact retention force: 0.1N MIN. |

| 4. Vibration | |
|---|---|
| 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.<br>Frequency: 10Hz→55Hz→10Hz/approx. 1min.<br>Directions: 3 mutually perpendicular direction.<br>Total Amplitude: 1.52mm<br>Sweep duration: 2 hours for each direction, a total of 6 hours. |
| Pass criteria: | Contact resistance: Shall meet 4.1.1.<br>Electrical discontinuity: No electrical discontinuity greater than 1μs shall occur.<br>Appearance: No abnormality adversely affecting the performance shall occur. |

| 5. Shock | |
|---|---|
| Reference standard: | MIL-STD-202G, Method 213B, Condition A. |
| Test conditions: | 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.<br>MAX.G: 50G Directions: 6 mutually perpendicular direction<br>Duration: 11msec Cycle: 3 cycles about each direction<br>Wave Form: Half Sinusoidal |
| Pass criteria: | Contact resistance: Shall meet 4.1.1.<br>Electrical discontinuity: No electrical discontinuity greater than 1μs shall occur.<br>Appearance: No abnormality adversely affecting the performance shall occur. |

**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.<br>Temperature: 218K(-55℃),30min.→358K(85℃),30min.<br>Transition time: 5min. MAX.<br>No. of cycles: 5 cycles |
| Pass criteria: | Contact resistance: Shall meet 4.1.1.<br>Insulation resistance: Shall meet 4.1.2.<br>Dielectric withstanding voltage: Shall meet 4.1.3.<br>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.<br>Temperature: 358±2K (85±2℃)<br>Duration: 250 hours |
| Pass criteria: | Contact resistance: Shall meet 4.1.1.<br>Contact retention force: Shall meet 4.2.3.<br>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.<br>Temperature: 313±2K (40±2℃)<br>Humidity: 90 to 95%RH<br>Duration: 240 hours |
| Pass criteria: | Contact resistance: Shall meet 4.1.1.<br>Insulation resistance: Shall meet 4.1.2.<br>Dielectric withstanding voltage: Shall meet 4.1.3.<br>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.<br>Temperature: 298[263] to 338K (25[-10] to 65℃)<br>Humidity: 90 to 98%RH<br>Duration: 10cycles (240hours) |
| Pass criteria: | Contact resistance: Shall meet 4.1.1.<br>Insulation resistance: Shall meet 4.1.2.<br>Dielectric withstanding voltage: Shall meet 4.1.3.<br>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.<br>Temperature: 308±2K (35±2℃)<br>Salt water density: 5±1% [by weight]<br>Duration: 48 hours |
| Pass criteria: | Contact resistance: Shall meet 4.1.1.<br>Appearance: No abnormality adversely affecting the performance shall occur. |

| 6. $H_2S$ 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.<br>Temperature: 313±2K (40±2℃)<br>Relative humidity: 80±5%RH<br>Gas: $H_2S$ 3±1ppm<br>Duration: 48 hours |
| Pass criteria: | Contact resistance: Shall meet 4.1.1.<br>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±5K(245±5℃)for 5±0.5seconds 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.<br>Nitrogen reflow cannot correspond. |

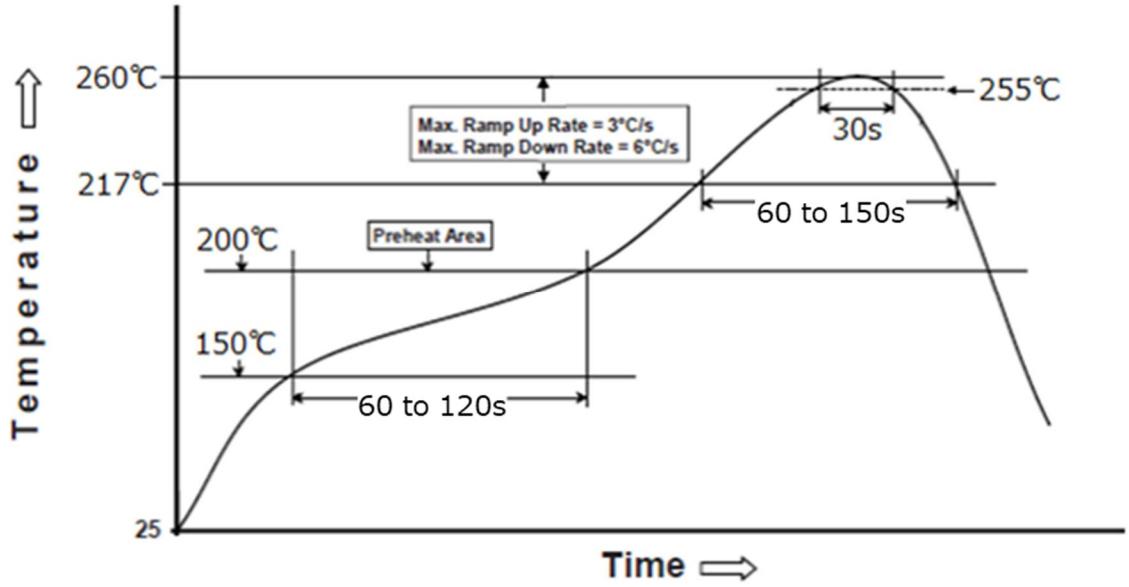



Fig.2

| | |
|---|---|
| Pass criteria: | No abnormality adversely affecting the performance shall not occur. |

| 3. Solder iron | |
|---|---|
| Reference standard: | - |
| Test conditions: | Operating temperature ：613 to 633K (350℃±10)<br>Application time of soldering iron ：5±1sec.<br>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 (10cydes) | | | | | |
| 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 ($H_2S$) | | | | | | | | | 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. | 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)