



SPECIFICATION

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SPEC. NO.: PS-55907-XXXXXX-XXX

REVISION: 0

PRODUCT NAME: 0.5 mm PITCH USB TYPE C CONN.

PRODUCT NO: 54926, 54927, 55907, 55910, 55912, 55914,
55915, 55933, 55937, 55939, 55940 series

| | | |
|--|---|--|
| PREPARED: Jason Chan DATE: 2016.03.17 | CHECKED: Ryan Liu DATE: 2016.03.17 | APPROVED: K.HISATOMI DATE: 2016.03.17 |
|--|---|--|



Aces P/N: **55907 series**

TITLE: **0.5 MM PITCH USB TYPE C CONN.**

RELEASE DATE: 2015.12.24

REVISION: 4

ECN No: 1512378

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1 Revision History

| Rev. | ECN # | Revision Description | Prepared | Date |
|------|-------------|--|----------|------------|
| 1 | ECN-1404374 | New product specification | Jerry | 2015.01.09 |
| 2 | ECN-1507364 | USB Type C 1.1 SPEC UPDATE | Jerry | 2015.07.21 |
| 3 | ECN-1509145 | According to USB Connector and Cable assembly Compliance Document – Revision 1.0RC update. | Ray | 2015.09.15 |
| 4 | ECN-1512378 | Modify Mixed flowing gas test time. | Ray | 2015.12.24 |
| O | ECN-1603243 | Final product specification | Jason | 2016.03.17 |
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2 SCOPE

This specification covers performance, tests and quality requirements for 0.5mm pitch USB Type C connector.

Aces' P/N: Receptacle : 54926 , 55907, 55910 , 55912 , 55914, 55933, 55939, 55940, 55915

SERIES

Plug : 54927,55937 SERIES

3 APPLICABLE DOCUMENTS

USB Serial Bus 3.0 Specification

EIA-364 : ELECTRONICS INDUSTRIES ASSOCIATION

4 REQUIREMENTS

4.1 Design and Construction

Product shall be of design, construction and physical dimensions specified on applicable product drawing.

4.2 Materials and Finish

4.2.1 Contact: High performance Copper alloy

Plated: (a) Contact Area: 2u" Au. + 30u" NiPd or Au 30u"

(b) Solder Tail: Matte Tin

(c) Under plate: Nickel-plated over all or Matte Tin over Nickel.

4.2.2 Housing: Thermoplastic, High temp. UL94 V-0

4.2.3 Shell: Stainless steel

4.3 Ratings

4.3.1 Rated voltage: AC 20 V

4.3.2 Current:

4.3.2.1 5 Amps . For All VBUS pins .

4.3.2.2 1.25Amps . For Vconn pins and GND

4.3.2.3 0.25Amps . For the other pins

4.3.4 Operating Temperature : -40°C to +85°C



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5 PRIMARY QUALIFICATION APPROVAL TESTING

| Teat Group | Title | Number of Specimens | |
|----------------|---|---------------------|-----------------------------|
| | | Receptacle | Plug |
| Teat Group A | Reliability test EIA 364-1000.01 | 5pcs | 5pcs |
| Teat Group B-1 | Mechanical test | B1-3 only ,8 pcs | B1-3 only ,8 pcs |
| Teat Group B-2 | USB 2.0 and Low speed signal of cable and adaptor | N/A | N/A |
| Teat Group B-3 | USB Super Speed signal of cable and adaptor | N/A | N/A |
| Teat Group B-4 | Shielding Effectiveness of cable and adaptor | N/A | N/A |
| Teat Group B-5 | Critical Dimensions | 3 | 3 |
| Teat Group B-6 | Connector Pair Current Rating | 3 | 3 |
| Teat Group B-7 | Plug connector Wrenching test | N/A | B7-1 ,3 pcs B7-4 ,12 pcs |

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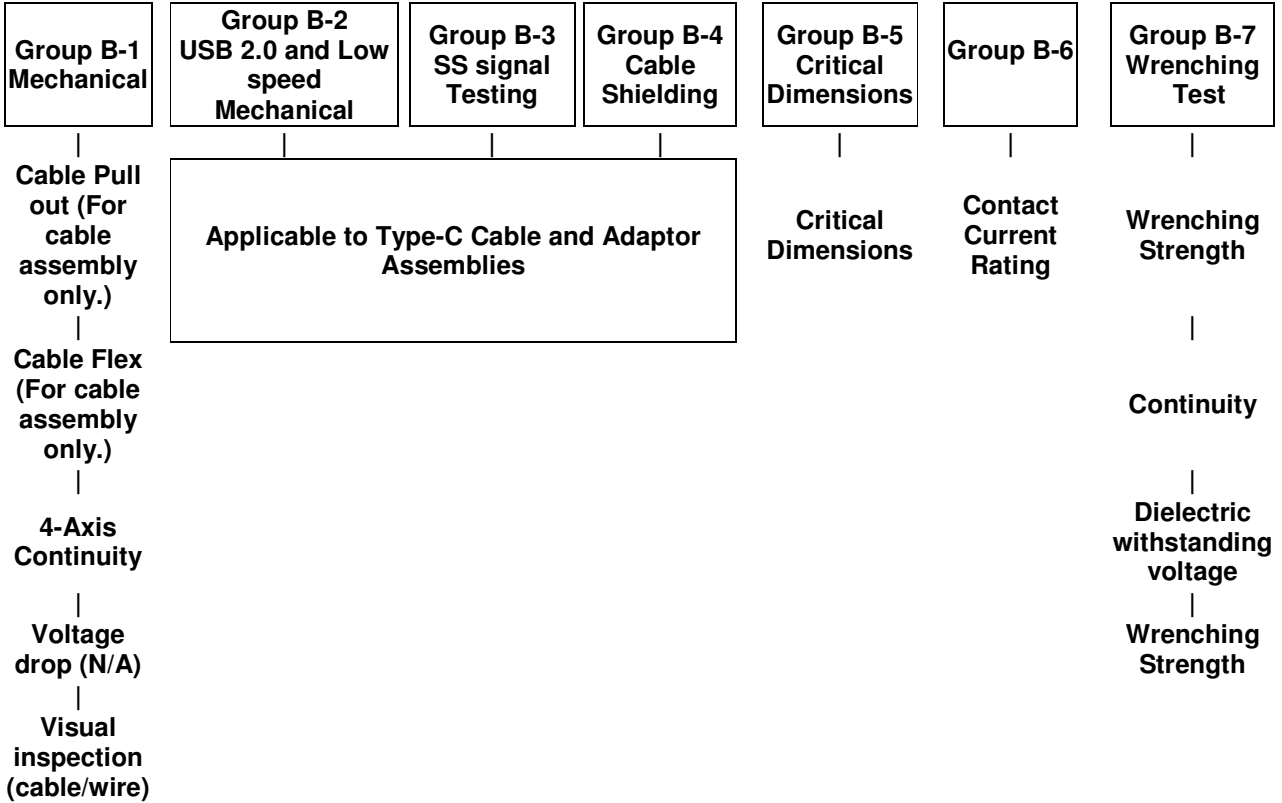
5.1 Test Group A_EIA 364-1000.1

| Group 1 5 sample | Group 2 5 sample | Group 3 5 sample | Group 4 5 sample | Group 7 5 sample |
|-----------------------------|--|-----------------------|------------------------|---------------------------------------|
| Examination | Examination | Examination | Examination | Dielectric withstanding voltage |
| LLCR | LLCR | LLCR | LLCR | LLCR |
| Durability (50cyc) | Durability (50cyc) | Durability (50cyc) | Durability (50cyc) | Insertion Force |
| Temperature life (120hr) | Thermal Shock | Temp Life (72hr) | Temp Life (72hr) | Extraction Force |
| LLCR | LLCR | LLCR | LLCR | Durability |
| Reseating(3cyc) | Cyclic temperature and Humidity | Vibration | Mixed flowing gas | Extraction Force |
| LLCR | LLCR | LLCR | LLCR | Durability (10k) |
| | Reseating(3cyc) | | Thermal Disturbance | Extraction Force |
| | LLCR | | LLCR | LLCR |
| | | | Reseating(3cyc) | Dielectric withstanding voltage |
| | | | LLCR | Insulation Resistance |

EIA test groups A-5 and A-6 do not apply to this connector

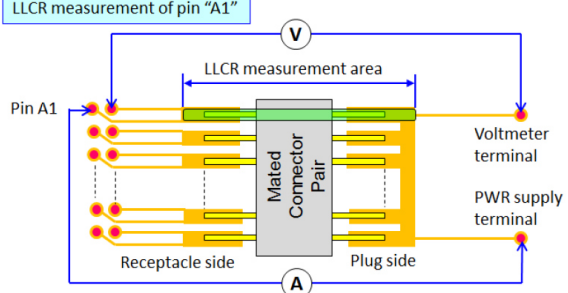


5.2 Test Group B



6 GROUP TEST METHOD

Test Group A-1 (required for all connectors)

| Item | Test | Test procedure | Test criteria |
|------|------------------------------|--|---|
| 1 | Low level contact resistance | <p>EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. Measure at 20 mV (Max) open circuit at 100 mA.</p> <p>LLCR measurement of pin "A1"</p>  | 40 milliohms max for all contacts. Baseline measurement. |
| 2 | Durability (preconditioning) | EIA-364-09 Perform 50 unplug/plug cycles. | No evidence of physical damage |
| 3 | Temperature life | EIA-364-17, method A 105° C without applied voltage for 120 hours. | None |
| 4 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. |
| 5 | Reseating | Manually unplug/plug the connector or socket. Perform 3 such cycles. | No evidence of physical damage |
| 6 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. |



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Test Group A-2 (required for all connectors)

| Item | Test | Test procedure | Test criteria | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|-------------------------------------|--|---|------------------|--|-----------------|---------------|---|----|--------|-----|---|-----|-------|----|---|----|--------|----|---|-----|-------|----|--|--|----|--|------|
| 1 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 40 milliohms max for all contacts. Baseline measurement. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Durability (preconditioning) | EIA-364-09 Perform 50 unplug/plug cycles. | No evidence of physical damage | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Thermal shock | EIA-364-32, test condition I 10 cycles with the exception of exposure times. Place a thermocouple in the center of the largest mass component of the connector that is in the center of the test chamber to insure that the contacts reach the temperature extremes before ramping to the other temperature. <table border="1" data-bbox="528 1066 863 1503"> <thead> <tr> <th rowspan="2">Step</th> <th colspan="2">Test condition I</th> </tr> <tr> <th>Temperature, °C</th> <th>Time, minutes</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1</td> <td>+0</td> <td rowspan="2">30 min</td> </tr> <tr> <td>-55</td> </tr> <tr> <td rowspan="2">2</td> <td>+10</td> <td rowspan="2">5 max</td> </tr> <tr> <td>25</td> </tr> <tr> <td rowspan="2">3</td> <td>+3</td> <td rowspan="2">30 min</td> </tr> <tr> <td>85</td> </tr> <tr> <td rowspan="2">4</td> <td>+10</td> <td rowspan="2">5 max</td> </tr> <tr> <td>25</td> </tr> <tr> <td></td> <td></td> <td>-5</td> <td></td> </tr> </tbody> </table> | Step | Test condition I | | Temperature, °C | Time, minutes | 1 | +0 | 30 min | -55 | 2 | +10 | 5 max | 25 | 3 | +3 | 30 min | 85 | 4 | +10 | 5 max | 25 | | | -5 | | None |
| Step | Test condition I | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Temperature, °C | Time, minutes | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | +0 | 30 min | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -55 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | +10 | 5 max | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | +3 | 30 min | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 85 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | +10 | 5 max | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | -5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. | | | | | | | | | | | | | | | | | | | | | | | | | |

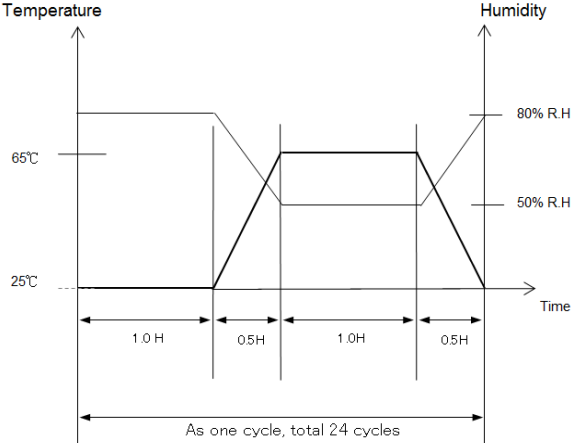
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| | | | |
|---|--|---|--------------------------------|
| 5 | Cyclic temperature and humidity | <p>EIA-364-31 Cycle the connector between 25 °C ±3 °C at 80 % ±3% RH and 65 °C ±3 °C at 50 % ±3% RH. Ramp times should be 0.5 hour and dwell times should be 1.0 hour. Dwell times start when the temperature and humidity have stabilized within the specified levels. Perform 24 such cycles.</p>  | None |
| 6 | Low level contact resistance | <p>EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle.</p> | 50 milliohms max. |
| 7 | Reseating | <p>Manually unplug/plug the connector or socket. Perform 3 such cycles.</p> | No evidence of physical damage |
| 8 | Low level contact resistance | <p>EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle.</p> | 50 milliohms max. |

Test Group A-3 (required for all connectors)

| Item | Test | Test procedure | Test criteria |
|------|-------------------------------------|---|--|
| 1 | Low level contact resistance | <p>EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle.</p> | 40 milliohms max for all contacts. Baseline measurement. |
| 2 | Durability (preconditioning) | <p>EIA-364-09 Perform 50 unplug/plug cycles.</p> | No evidence of physical damage |

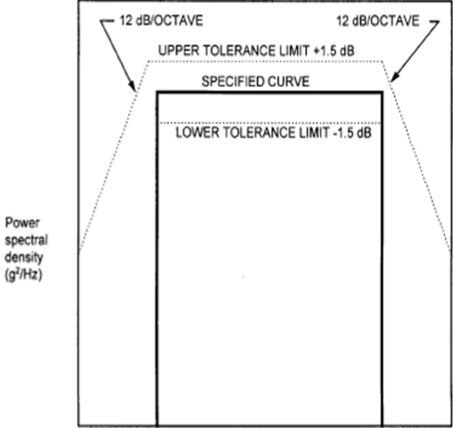
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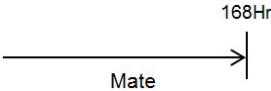
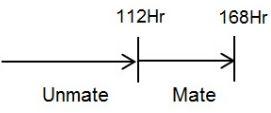
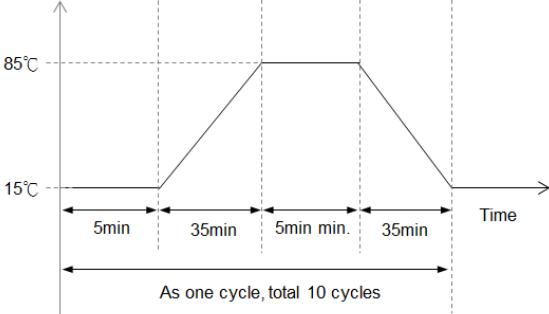
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| | | | |
|---|---|--|-------------------|
| 3 | Temperature life (preconditioning) | EIA-364-17, method A 105° C without applied voltage for 72 hours when used as preconditioning. | None |
| 4 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. |
| 5 | Vibration | EIA-364-28, test condition VII, test condition letter D 15 minutes in each of 3 mutually perpendicular directions. Both mating halves should be rigidly fixed so as not to contribute to the relative motion of one contact against another. The method of fixturing should be detailed in the test report.  | None |
| 6 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. |

Test Group A-4 (required for all connectors)

| Item | Test | Test procedure | Test criteria |
|------|-------------------------------------|---|---|
| 1 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 40 milliohms max for all contacts. Baseline measurement. |
| 2 | Durability (preconditioning) | EIA-364-09 Perform 50 unplug/plug cycles. | No evidence of physical damage |

| 3 | Temperature life (preconditioning) | EIA-364-17, method A 105° C without applied voltage for 72 hours when used as preconditioning. | None | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|---|---|--------------------|-----------------|------------------|-----------------|--|--|--|----------|-------------|--------------------|--|--|--|-------|---|----|-----------------|-----------------|------------------|-----------------|----|------|------|------|--------|------|--------|------|
| 4 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Mixed flowing gas | <p>EIA-364-65, class IIA</p> <p>-Mate state (5pcs)</p>  <p>-Unmate state (5pcs)</p>  <table border="1" data-bbox="531 1070 1145 1205"> <thead> <tr> <th rowspan="2">Environmental</th> <th colspan="2">Relative</th> <th colspan="4">Rollutant</th> </tr> <tr> <th>Humidity</th> <th>Temperature</th> <th colspan="4">Concentration, ppb</th> </tr> <tr> <th>Class</th> <th>%</th> <th>°C</th> <th>Cl₂</th> <th>NO₂</th> <th>H₂S</th> <th>SO₂</th> </tr> </thead> <tbody> <tr> <td>II</td> <td>70±2</td> <td>30±1</td> <td>10±3</td> <td>200±50</td> <td>10±5</td> <td>100±20</td> </tr> </tbody> </table> | Environmental | Relative | | Rollutant | | | | Humidity | Temperature | Concentration, ppb | | | | Class | % | °C | Cl ₂ | NO ₂ | H ₂ S | SO ₂ | II | 70±2 | 30±1 | 10±3 | 200±50 | 10±5 | 100±20 | None |
| Environmental | Relative | | | Rollutant | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Humidity | Temperature | Concentration, ppb | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Class | % | °C | Cl ₂ | NO ₂ | H ₂ S | SO ₂ | | | | | | | | | | | | | | | | | | | | | | | | |
| II | 70±2 | 30±1 | 10±3 | 200±50 | 10±5 | 100±20 | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Thermal disturbance | <p>Cycle the connector or socket between 15 °C ± 3 °C and 85 °C ± 3 °C, as measured on the part. Ramps should be a minimum of 2 °C per minute, and dwell times should insure that the contacts reach the temperature extremes (a minimum of 5 minutes). Humidity is not controlled. Perform 10 such cycles.</p> <p>Temperature</p>  | None | | | | | | | | | | | | | | | | | | | | | | | | | | | |



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| | | | |
|-----------|-------------------------------------|---|--------------------------------|
| 8 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. |
| 9 | Reseating | Manually unplug/plug the connector or socket. Perform 3 such cycles. | No evidence of physical damage |
| 10 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. |

Test Group A-7 (EIA test groups A-5 and A-6 do not apply to this connector)

| Item | Test | Test procedure | Test criteria |
|-------------|--|---|---|
| 1 | Dielectric withstanding voltage | EIA-364-20, 100 VAC (RMS) Perform 4 plug/unplug cycles. (Total:4 cycles) | No disruptive discharge Current leakage: 1 mA max. |
| 2 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 40 milliohms max. |
| 3 | Insertion force | EIA 364-13 At a maximum rate of 12.5 mm (0.492") per minute. (Total:5 cycles) | Within the range of 5 N to 20 N. |
| 4 | Extraction force | EIA 364-13 At a maximum rate of 12.5mm (0.492") per minute. (Total:6 cycles) | Within the range of 8 N to 20 N. |
| 5 | Durability | EIA 364-9 Perform 25 plug/unplug cycles. (Total:31 cycles) | No evidence of physical damage |
| 6 | Extraction force | EIA 364-13 At a maximum rate of 12.5mm (0.492") per minute (Total:32 cycles) | Within 8 N to 20 N. |



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| | | | |
|----|--|---|---|
| 7 | Durability | EIA 364-9 Perform 2,648 plug/unplug cycles. (Total:2500 cycles) Rotate the receptacle or plug 180° and perform 2,500 plug/unplug cycles. Cycle rate of 450 - 1250 cycles per hour (total of 10,000 plug/unplug cycles, flipping every 2,500 cycles). | No evidence of physical damage |
| 8 | Extraction force | EIA 364-13 At a maximum rate of 12.5mm (0.492") per minute | Within 6 N to 20 N. |
| 9 | Low level contact resistance | EIA-364-23 The measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. | 50 milliohms max. |
| 10 | Dielectric withstanding voltage | EIA-364-20, 100 VAC (RMS) | No disruptive discharge. Current leakage: 1 mA max. |
| 11 | Insulation Resistance | EIA 364-21. Mated and unmated connectors, apply 100 V DC between adjacent terminals. Applicable to both receptacle and plug. | A minimum of 100 MΩ insulation resistance is required between adjacent contacts of unmated and mated connectors |

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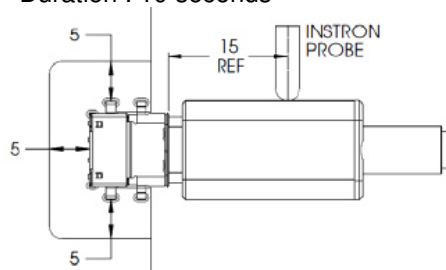
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Test Group B-1: Type-C Connector and Cable Assembly Mechanical Tests

| Item | Test | Test procedure | Test criteria | | | | | | | | | |
|---|--|--|---|--|--|-------------|----|------|----------|---|------|---|
| B1-3 | 4-Axis Continuity | <p>-The PCB shall be clamped on three sides of the receptacle no further than 5 mm away from the receptacle outline. - 5 mm ball tipped probe applied the force - Duration : 10 seconds</p>  <p style="text-align: center;">Force and Moment Requirements</p> <table border="1"> <thead> <tr> <th>Receptacle configuration with respect to mounting surface</th> <th>Force at 15 mm from receptacle shell mating edge (N)</th> <th>Moment with respect to receptacle shell mating edge (Nm)</th> </tr> </thead> <tbody> <tr> <td>Right angle</td> <td>20</td> <td>0.30</td> </tr> <tr> <td>Vertical</td> <td>8</td> <td>0.12</td> </tr> </tbody> </table> | Receptacle configuration with respect to mounting surface | Force at 15 mm from receptacle shell mating edge (N) | Moment with respect to receptacle shell mating edge (Nm) | Right angle | 20 | 0.30 | Vertical | 8 | 0.12 | <p>No discontinuities greater than 1 microsecond duration in any of the four orientations tested.</p> |
| Receptacle configuration with respect to mounting surface | Force at 15 mm from receptacle shell mating edge (N) | Moment with respect to receptacle shell mating edge (Nm) | | | | | | | | | | |
| Right angle | 20 | 0.30 | | | | | | | | | | |
| Vertical | 8 | 0.12 | | | | | | | | | | |

Test Group B-5: Critical Dimensions

| Item | Test | Test procedure | Test criteria |
|------|---------------------|----------------------|---------------|
| B5 | Critical Dimensions | See customer drawing | |

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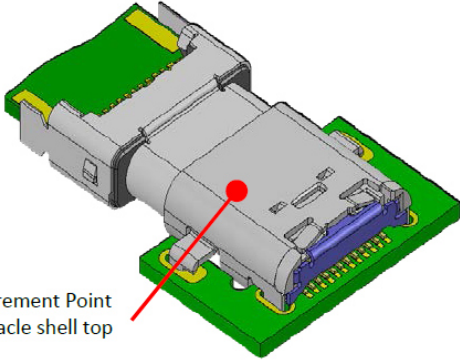
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Test Group B-6: Connector Pair Current Rating

| Item | Test | Test procedure | Test criteria |
|------|------------------------|---|---|
| B6 | Contact Current Rating | <p>Mate connector: measure the temperature rise at rated current after: 5A applied to All VBUS pins (pins A4,A9,B4 and B9) 1.25A applied to Vconn pin (B5) and GND pins. (pins A1,A12,B1, and B12) 0.25A applied to all the other contacts. The ambient condition is still air at 25° C (EIA-364-70 METHOD 2)</p>  <p>Measurement Point Receptacle shell top</p> | <p>When current is applied to the contacts, the temperature rise shall not exceed 30°C at the outside surface of the shell. This requirement applies to the USB Type-C connector mated pair only.</p> |

Current Rating Test PCB

| Item | Trace width (mm) | Trace length (mm) on each PCB | Thickness |
|--|------------------|-------------------------------|----------------------|
| Signal trace | 0.25 max. | 13 max. | 35 µm (1 oz. copper) |
| Ground trace | 1.57 max. | 38 max. | 35 µm (1 oz. copper) |
| V _{BUS} and V _{CONN} | 1.25 max. | 30 max. | 35 µm (1 oz. copper) |
| PCB | N/A | N/A | 0.80 - 1.20 mm |

TITLE: **0.5 MM PITCH USB TYPE C CONN.**

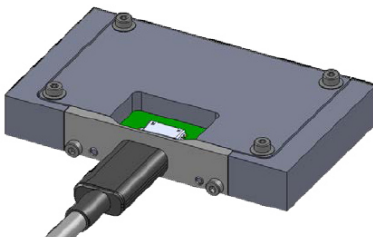
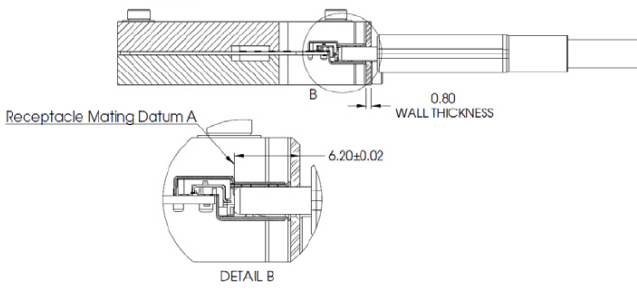
RELEASE DATE: 2015.12.24

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Test Group B-7: Plug Connector Wrenching Test

| Item | Test | Test procedure | Test criteria |
|------|---------------------------------|---|---|
| B7-1 | Wrenching Test | <ul style="list-style-type: none"> - Plug only - Direction: four directions (i.e., left, right, up, and down). - Duration: 10 seconds <p style="text-align: center;">Wrenching Strength Test Fixture</p>  | <p>The plug shall be mated with the continuity test fixture after the test forces have been applied to verify no damage has occurred that causes discontinuity or shorting.</p> |
| B7-2 | Continuity |  | <p>No plug damage: 0.75 Nm. No discontinuity or short after the test force applied.</p> |
| B7-3 | Dielectric withstanding voltage | Mated, 100 VAC (RMS) | No disruptive discharge. Current leakage: 1 mA max. |

7 INFRARED REFLOW CONDITION

7.1. Lead-free Process

