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**Apex 150 and Apex 2.8 mm
14 Way Hybrid Connector**

**DV/PV DVP&R
SAE/USCAR-2, Rev. 4**

ESR #AM-030127A; Test Request #05-126 series

Assembly Numbers

Female Connector -55251400/ 55251400N

Male Connector - 54251400

PBT3309 HR/ black and natural

July 29, 2005



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Executive Summary:

The FCI Automotive 14 Way Hybrid Connector Apex 150 and Apex 2.8 mm system PASSED all required SAE/ USCAR 2, Revision 4, test requirements for the combined DV/ PV test program.

The completed DVP&R follows.

Apex 150 & 2.8mm Apex, 14 Way Hybrid Connector System- DV/PV Level Testing, USCAR-2

FCI Design Verification Plan and Report
 Apex 150 & 2.8mm Apex Terminal Systems
 14 Way Hybrid Connector System
FCI USCAR 2, Rev 4 Test Specification



| Procedure or Standard | Test Description | Timing | | Quantity | | Results | | | | Acceptance Criteria | Notes | |
|-----------------------|--|---------|---------|----------|------|---------|--------|--------|-----------|---------------------|-------|--|
| | | Start | Compl. | conn | term | Avg. | Max. | Min. | Pass/Fail | | | |
| 5.9.5 | Connector System Mechanical Tests Flow Chart | | | | | | | | | | | |
| 5.4.1 | Seq. ID D Terminal- Connector Insertion/ Extraction | | | | | | | | | | | |
| | Apex 150 female- 16 AWG wire | 4/21/05 | 4/26/05 | 1 | 10 | 8.13 | 9.75 | 6.55 | Pass | ≤ 30N | | |
| | Insertion w/ removal of prev. term. | 4/21/05 | 4/26/05 | 1 | 10 | 10.21 | 13.25 | 7.95 | Pass | ≤ 30N | | |
| | Insertion w/ removal of prev. term. | 4/21/05 | 4/26/05 | 1 | 10 | 127.90 | 137.00 | 116.00 | Pass | ≥ 85N | | |
| | Removal w/wedge | 4/21/05 | 4/26/05 | 1 | 10 | 121.80 | 133.00 | 111.00 | Pass | ≥ 45N | | |
| | Removal w/wedge | 4/21/05 | 4/26/05 | 1 | 10 | 123.90 | 133.00 | 115.00 | Pass | ≥ 70N | | |
| | Moisture conditioned removals | | | | | | | | | | | |
| | Apex 150 female- 22 AWG wire | | | | | | | | | | | |
| | Insertion w/ removal of prev. term. | 4/21/05 | 4/26/05 | 1 | 10 | 8.78 | 10.15 | 7.20 | Pass | ≤ 30N | | |
| | Insertion w/ removal of prev. term. | 4/21/05 | 4/26/05 | 1 | 10 | 10.78 | 12.45 | 7.75 | Pass | ≤ 30N | | |
| | Apex 150 male- 16 AWG wire | | | | | | | | | | | |
| | Insertion w/ removal of prev. term. | 4/21/05 | 4/26/05 | 1 | 10 | 10.22 | 11.25 | 9.55 | Pass | ≤ 30N | | |
| | Insertion w/ removal of prev. term. | 4/21/05 | 4/26/05 | 1 | 10 | 11.93 | 13.15 | 10.70 | Pass | ≤ 30N | | |
| | Removal w/wedge | 4/21/05 | 4/26/05 | 1 | 10 | 112.20 | 119.00 | 108.00 | Pass | ≥ 85N | | |
| | Removal w/wedge | 4/21/05 | 4/26/05 | 1 | 10 | 111.30 | 115.00 | 107.00 | Pass | ≥ 45N | | |
| | Moisture conditioned removals | 4/21/05 | 4/26/05 | 1 | 10 | 103.00 | 118.00 | 86.00 | Pass | ≥ 70N | | |
| | Apex 150 male- 22 AWG wire | | | | | | | | | | | |
| | Insertion w/ removal of prev. term. | 4/21/05 | 4/26/05 | 1 | 10 | 10.24 | 11.50 | 8.50 | Pass | ≤ 30N | | |
| | Insertion w/ removal of prev. term. | 4/21/05 | 4/26/05 | 1 | 10 | 13.78 | 20.90 | 11.25 | Pass | ≤ 30N | | |
| | 2.8mm Apex female- 12 AWG wire | | | | | | | | | | | |
| | Insertion w/ removal of prev. term. | 6/21/05 | 6/22/05 | 3 | 12 | 13.22 | 15.00 | 11.90 | Pass | ≤ 30N | | |
| | Insertion w/ removal of prev. term. | 6/21/05 | 6/22/05 | 3 | 12 | 15.85 | 20.50 | 12.00 | Pass | ≤ 30N | | |
| | Terminal push-thru | 6/21/05 | 6/22/05 | 6 | 24 | | | | Pass | No push thru ≤ 50N | | |
| | Removal w/wedge | 6/21/05 | 6/22/05 | 3 | 12 | 142.08 | 150.00 | 135.00 | Pass | ≥ 90N | | |
| | Removal w/wedge | 6/21/05 | 6/22/05 | 3 | 12 | 104.25 | 121.00 | 92.00 | Pass | ≥ 60N | | |
| | Moisture conditioned removals | 6/21/05 | 6/22/05 | 3 | 12 | 136.25 | 140.00 | 130.00 | Pass | ≥ 90N | | |

MF: 2005

Applications: Class 3, sealed

PN: See last page

REPORT DATE 7/26/05

CONCURRENCE

PLAN DATE 3/26/05

DVP NUMBER FCI/PEL-14WH/0604-05126

DEPT

PLAN ORIGINATOR Frank Holub

MANAGER APPYL

REPORTING ENGR Frank Holub

Apex 150 & 2.8mm Apex, 14 Way Hybrid Connector System- DV/PV Level Testing, USCAR-2

Design Verification Plan and Report
Apex 150 & 2.8mm Apex Terminal Systems
14 Way Hybrid Connector System



USCAR 2, Rev 4 Test Specification

MY: 2006 Applications: Class 3, sealed

| | |
|---------------------------------------|-------------------------------|
| DVP NUMBER: F01NPEL-14WayHybrid-05126 | DEPT |
| PLAN DATE: 3/28/05 | PLAN ORIGINATOR: Frank Houlib |
| CONCURRENCE | MANAGER: APFVL |
| REPORT DATE: 7/28/05 | REPORTING ENGR: Frank Houlib |

| Procedure or Standard | Test Description | Timing | | Quantity | | Results | | | | Acceptance Criteria | Notes |
|-----------------------|--|---------|---------|----------|------|---------|--------|--------|-----------|------------------------------------|-------|
| | | Start | Compl. | conn | term | Avg. | Max. | Min. | Pass/Fail | | |
| 5.4.2. | 2.8mm Apex female- 18 AWG wire Insertion w/ removal of prev. term. Insertion w/ removal of prev. term. 2.8mm Apex male- 12 AWG wire Insertion w/ removal of prev. term. Insertion w/ removal of prev. term. Terminal push-thru Removal w/wedge Removal w/ wedge Moisture conditioned removals 2.8mm Apex male- 18 AWG wire Insertion w/ removal of prev. term. Insertion w/ removal of prev. term. | 6/22/05 | 6/22/05 | 3 | 12 | 11.83 | 14.45 | 9.20 | Pass | ≤ 30N | |
| | | 6/22/05 | 6/22/05 | 3 | 12 | 14.05 | 15.50 | 11.45 | Pass | ≤ 30N | |
| | | 6/22/05 | 6/23/05 | 3 | 12 | 22.97 | 25.30 | 20.30 | Pass | ≤ 30N | |
| | | 6/22/05 | 6/23/05 | 3 | 12 | 24.19 | 26.40 | 20.95 | Pass | ≤ 30N | |
| | | 6/22/05 | 6/23/05 | 6 | 24 | | | | Pass | No push thru ≤ 50N | |
| | | 6/22/05 | 6/23/05 | 3 | 12 | 137.58 | 146.00 | 130.00 | Pass | ≥ 90N | |
| | | 6/22/05 | 6/23/05 | 3 | 12 | 132.17 | 138.00 | 125.00 | Pass | ≥ 60N | |
| | | 6/22/05 | 6/23/05 | 3 | 12 | 134.50 | 144.00 | 122.00 | Pass | ≥ 90N | |
| | | 6/22/05 | 6/22/05 | 3 | 12 | 9.04 | 10.50 | 8.05 | Pass | ≤ 50N | |
| | | 6/22/05 | 6/22/05 | 3 | 12 | 9.37 | 10.25 | 8.30 | Pass | ≤ 30N | |
| 5.4.4. | Seq. ID G Connector-Connector Engage/ Disengage Mate with primary lock Unmate with primary lock Unmate without primary lock Unlatching force Unlatching force with CPA | 6/8/05 | 6/24/05 | 10 | 140 | 65.60 | 74.16 | 59.86 | Pass | ≤ 75N | |
| | | 6/8/05 | 6/24/05 | 5 | 70 | 240.62 | 245.21 | 236.18 | Pass | ≥ 110N | |
| | | 6/8/05 | 6/24/05 | 5 | 70 | 54.86 | 61.11 | 43.62 | Pass | ≤ 75N | |
| | | 6/8/05 | 6/24/05 | 5 | 70 | 39.67 | 40.24 | 39.12 | Pass | > 10N & ≤ 70N | |
| | | 6/8/05 | 6/24/05 | 5 | 70 | | | | Pass | ≥ 50N | |
| 5.4.4. | Seq. ID H Polarization Feature Effectiveness Incorrect orientation mating 90° rotated 180° rotated 270° rotated | 6/20/05 | 6/20/05 | 4 | 0 | | | | Pass | No mating with 220N applied force. | |
| | | 6/20/05 | 6/20/05 | 4 | 0 | | | | Pass | | |
| | | 6/20/05 | 6/20/05 | 4 | 0 | | | | Pass | | |
| | | 6/20/05 | 6/20/05 | 4 | 0 | | | | Pass | | |



Apex 150 & 2.8mm Apex, 14 Way Hybrid Connector System- DV/PV Level Testing, USCAR-2

Design Verification Plan and Report
Apex 150 & 2.8mm Apex Terminal Systems
14 Way Hybrid Connector System



USCAR 2, Rev 4 Test Specification

MY: 2006 Applications: Class 3, sealed

| | |
|-------------------------------------|----------------------------|
| DVP NUMBER FCI/PEL-14WayHybrid05128 | DEPT |
| PLAN DATE 3/29/05 | PLAN ORIGINATOR Frank Hobb |
| CONCURRENCE | MANAGER APPVL |
| REPORT DATE 7/28/05 | REPORTING ENGR Frank Hobb |

| Procedure or Standard | Test Description | Timing | | Quantity | | Results | | | | Acceptance Criteria | Notes | |
|-----------------------|---|---------|---------|----------|------|---------|--------|--------|-----------|---------------------|-------|--|
| | | Start | Compl. | conn | term | Avg. | Max. | Min. | Pass/Fail | | | |
| 5.4.5 | Seq. ID E Misc. Components Engage/ Disengage | | | | | | | | | | | |
| | Female CPA | | | | | | | | | | | |
| | Insert to locked | 7/20/05 | 7/20/05 | 10 | 0 | 105.10 | 125.00 | 99.00 | Pass | >60N | | |
| | Pre-stage to locked | 7/20/05 | 7/20/05 | 10 | 0 | 13.00 | 14.00 | 12.00 | Pass | ≤ 22N | | |
| | Locked to pre-stage | 7/20/05 | 7/20/05 | 10 | 0 | 13.00 | 14.00 | 12.00 | Pass | 10-30N | | |
| | Fully removed | 7/21/05 | 7/21/05 | 10 | 0 | 257.00 | 265.00 | 246.00 | Pass | ≥ 30N | | |
| | Female Wedge (TPA) | | | | | | | | | | | |
| | Pre-stage to locked | 6/17/05 | 6/20/05 | 10 | 140 | 43.10 | 48.00 | 38.00 | Pass | ≤ 60N | | |
| | Locked to pre-stage | 6/20/05 | 6/20/05 | 10 | 140 | 32.40 | 38.00 | 28.00 | Pass | ≤ 60N | | |
| | Fully removed | 6/20/05 | 6/20/05 | 10 | 140 | 158.30 | 172.00 | 149.00 | Pass | ≥ 25N | | |
| | Male Wedge (TPA) | | | | | | | | | | | |
| | Pre-stage to locked with terminals | 6/28/05 | 6/29/05 | 10 | 140 | 45.25 | 48.54 | 38.75 | Pass | ≤ 60N | | |
| | Locked to pre-stage | 6/29/05 | 6/29/05 | 10 | 140 | 32.20 | 45.00 | 25.00 | Pass | ≤ 60N | | |
| | Fully removed | 6/29/05 | 6/29/05 | 10 | 140 | 54.40 | 80.00 | 40.00 | Pass | ≥ 25N | | |
| | Pre-stage to locked without terminals | 6/29/05 | 6/29/05 | 10 | 0 | 43.33 | 48.19 | 32.97 | Pass | ≥ 15N | | |
| | TCI - Male | | | | | | | | | | | |
| | Fully removed | 6/27/05 | 6/27/05 | 10 | 0 | 152.70 | 171.00 | 120.00 | Pass | ≥ 75N | | |
| | Seal Retainer | | | | | | | | | | | |
| | Removal | 6/24/05 | 6/24/05 | 10 | 0 | 278.20 | 335.00 | 172.00 | Pass | ≥ 110N | | |
| 5.4.7 | Seq. ID F Connector-Connector Audible Click | | | | | | | | | | | |
| | Unconditioned | 6/27/05 | 6/27/05 | 4 | 56 | 16.20 | 17.20 | 14.50 | Pass | ≥ 7dB above amb. | | |
| | Conditioned | 6/27/05 | 6/27/05 | 4 | 56 | 13.53 | 14.50 | 12.50 | Pass | ≥ 5dB above amb. | | |



Apex 150 & 2.8mm Apex, 14 Way Hybrid Connector System- DV/PV Level Testing, USCAR-2

FCI Design Verification Plan and Report
Apex 150 & 2.8mm Apex Terminal Systems
14 Way Hybrid Connector System
FCI USCAR 2, Rev 4 Test Specification

| | |
|------------------------------------|------------------------------|
| DVP NUMBER: F0NPEL-14WHybrid-05126 | DEPT |
| PLAN DATE: 3/29/05 | PLAN ORIGINATOR: Frank Holub |
| CONCURRENCE | MANAGER: APPVL |
| REPORT DATE: 7/26/05 | REPORTING ENGR: Frank Holub |

| Procedure or Standard | Test Description | Timing | | Quantity | | Results | | | | Acceptance Criteria | Notes | |
|-----------------------|---|---------|---------|----------|------|---------|--------|--------|-----------|---------------------|---------------------|------------------|
| | | Start | Compl. | conn | term | Avg. | Max. | Min. | Pass/Fail | | | |
| 5.4.8 | Seq. ID 1 Connector Drop Test Female connector- visual inspection | | | | | | | | | | | |
| | Orientation 1 | 6/20/05 | 6/20/05 | 3 | 0 | | | | | Pass | **see last page | |
| | Orientation 2 | 6/20/05 | 6/20/05 | 3 | 0 | | | | | Pass | **see last page | |
| | Orientation 3 | 6/20/05 | 6/20/05 | 3 | 0 | | | | | Pass | **see last page | |
| | Male connector- visual inspection | | | | | | | | | | | |
| | Orientation 1 | 6/20/05 | 6/21/05 | 3 | 0 | | | | | Pass | **see last page | |
| | Orientation 2 | 6/20/05 | 6/21/05 | 3 | 0 | | | | | Pass | **see last page | |
| | Orientation 3 | 6/20/05 | 6/21/05 | 3 | 0 | | | | | Pass | **see last page | |
| 5.4.9 | Seq. ID J Cavity Damage Susceptibility | | | | | | | | | | | |
| | Male wedge sealing | 6/29/05 | 6/29/05 | 5 | 5 | | | | | Pass | Must not seat < 80N | |
| | Apex 150 male terminal removal w/wedge | 6/29/05 | 6/29/05 | 5 | 5 | 105.60 | 109.00 | 103.00 | | Pass | ≥ 85N | |
| | 2.8mm Apex male terminal removal w/wedge | 6/29/05 | 6/29/05 | 5 | 5 | 132.80 | 140.00 | 127.00 | | Pass | ≥ 90N | |
| | Female wedge sealing | 6/30/05 | 6/30/05 | 5 | 5 | | | | | Pass | Must not seat < 80N | |
| | Apex 150 female terminal removal w/wedge | 6/30/05 | 6/30/05 | 5 | 5 | 120.00 | 128.00 | 114.00 | | Pass | ≥ 85N | |
| | 2.8mm Apex female terminal removal w/wedge | 6/30/05 | 6/30/05 | 5 | 5 | 132.60 | 138.00 | 128.00 | | Pass | ≥ 90N | |
| 5.7.2 | Seq. ID L Connector Mounting Feature Mechanical Strength | | | | | | | | | | | |
| | Force applied from top | 4/27/05 | 4/27/05 | 5 | 0 | | | | | Pass | Must not break | Type 1 clip slot |
| | Force applied from bottom | 4/27/05 | 4/27/05 | 5 | 0 | | | | | Pass | when 50N is applied | |
| | Force applied from right side | 4/27/05 | 4/27/05 | 5 | 0 | | | | | Pass | | |
| | Force applied from left side | 4/27/05 | 4/27/05 | 5 | 0 | | | | | Pass | | |

Apex 150 & 2.8mm Apex, 14 Way Hybrid Connector System- DV/PV Level Testing, USCAR-2

Design Verification Plan and Report
Apex 150 & 2.8mm Apex Terminal Systems
14 Way Hybrid Connector System



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USCAR 2, Rev 4 Test Specification

MY: 2005 Applications: Class 3, sealed

PN: See last page

| | |
|---------------------------------|-----------------------------|
| DVP NUMBER F01NFEL-14WHYH-06126 | DEPT. |
| PLAN DATE 3/29/05 | PLAN ORIGINATOR Frank Holub |
| CONCURRENCE | MANAGER APPVL |
| REPORT DATE 7/28/05 | REPORTING ENGR Frank Holub |

Test Report

| Procedure or Standard | Test Description | Timing | | Quantity | | Results | | | | Acceptance Criteria | Notes | |
|-----------------------|--|---------|---------|----------|------|---------|-------|-------|-----------|---------------------|-----------------|-----------------|
| | | Start | Compl. | conn | term | Avg. | Max. | Min. | Pass/Fail | | | |
| 5.9.6 | Connector System Electrical Tests Flow Chart | | | | | | | | | | | |
| 5.4.6 | Seq. ID M | | | | | | | | | | | |
| 5.1.9 | Vibration-Mechanical Shock | 6/16/05 | 6/29/05 | 5 | 70 | | | | | Pass | no loss > 1µs | Profile- engine |
| 5.3.1 | Apex 150 terminals | 6/15/05 | 6/15/05 | 5 | 50 | 0.929 | 1.360 | 0.745 | | Pass | ≤ 10.0 mΩ | |
| 5.3.1 | Pre-test dry circuit | 6/30/05 | 6/30/05 | 5 | 50 | 1.227 | 1.915 | 0.745 | | Pass | ≤ 10.0 mΩ | |
| 5.3.2 | Post-test voltage drop | 6/30/05 | 6/30/05 | 5 | 50 | 1.449 | 2.133 | 1.043 | | Pass | ≤ 10.0 mΩ | 6.13 A applied |
| 5.3.1 | 2.8mm Apex terminals | 6/15/05 | 6/15/05 | 5 | 20 | 0.459 | 0.635 | 0.415 | | Pass | ≤ 5.0 mΩ | |
| 5.3.1 | Pre-test dry circuit | 6/30/05 | 6/30/05 | 5 | 20 | 0.615 | 0.890 | 0.465 | | Pass | ≤ 5.0 mΩ | |
| 5.3.2 | Post-test voltage drop | 6/30/05 | 6/30/05 | 5 | 20 | 0.587 | 0.714 | 0.480 | | Pass | ≤ 5.0 mΩ | 15.3 A applied |
| 5.1.8 | Visual inspection | 6/30/05 | 6/30/05 | 10 | 140 | | | | | Pass | **see last page | Visual |
| 5.6.1 | Seq. ID N | | | | | | | | | | | |
| 5.1.9 | Thermal Shock | 6/27/05 | 7/2/05 | 5 | 70 | | | | | Pass | no loss > 1µs | 125°C maximum |
| 5.3.1 | Apex 150 terminals | 6/23/05 | 6/23/05 | 5 | 50 | 0.926 | 1.120 | 0.800 | | Pass | ≤ 10.0 mΩ | |
| 5.3.1 | Pre-test dry circuit | 7/5/05 | 7/5/05 | 5 | 50 | 1.359 | 1.820 | 1.030 | | Pass | ≤ 10.0 mΩ | |
| 5.3.2 | Post-test voltage drop | 7/5/05 | 7/5/05 | 5 | 50 | 1.835 | 2.914 | 1.294 | | Pass | ≤ 10.0 mΩ | 6.13 A applied |
| 5.3.1 | 2.8mm Apex terminals | 6/23/05 | 6/23/05 | 5 | 20 | 0.403 | 0.455 | 0.350 | | Pass | ≤ 5.0 mΩ | |
| 5.3.1 | Pre-test dry circuit | 7/5/05 | 7/5/05 | 5 | 20 | 0.670 | 0.880 | 0.560 | | Pass | ≤ 5.0 mΩ | |
| 5.3.2 | Post-test voltage drop | 7/5/05 | 7/5/05 | 5 | 20 | 0.809 | 1.374 | 0.611 | | Pass | ≤ 5.0 mΩ | 15.3 A applied |
| 5.1.8 | Visual inspection | 7/5/05 | 7/5/05 | 10 | 140 | | | | | Pass | **see last page | Visual |



Apex 150 & 2.8mm Apex, 14 Way Hybrid Connector System- DV/PV Level Testing, USCAR-2

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 USCAR 2, Rev 4 Test Specification

| Procedure or Standard | Seq. ID O | Test Description | Timing | | Quantity | | Results | | | | Acceptance Criteria | Notes |
|-----------------------|-----------|--|---------|---------|----------|------|---------|-------|-------|-----------|---------------------|-------------------------------------|
| | | | Start | Compl. | conn | term | Avg. | Max. | Min. | Pass/Fail | | |
| | 5.6.2 | Temperature Humidity Cycling | | | | | | | | | | |
| | | Apex 150 terminals | | | | | | | | | | 125°C maximum |
| | 5.3.1 | Pre-test dry circuit | 6/8/05 | 6/8/05 | 10 | 100 | 0.804 | 0.870 | 0.735 | Pass | | ≤ 10.0 mΩ |
| | 5.3.1 | Post-test dry circuit | 6/27/05 | 6/27/05 | 10 | 100 | 1.105 | 1.320 | 0.880 | Pass | | ≤ 10.0 mΩ |
| | 5.3.2 | Post-test voltage drop | 6/28/05 | 6/28/05 | 10 | 100 | 1.725 | 2.797 | 1.185 | Pass | | 6.13 A applied |
| | | 2.8mm Apex terminals | | | | | | | | | | |
| | 5.3.1 | Pre-test dry circuit | 6/8/05 | 6/8/05 | 10 | 40 | 0.333 | 0.370 | 0.295 | Pass | | ≤ 5.0 mΩ |
| | 5.3.1 | Post-test dry circuit | 6/27/05 | 6/27/05 | 10 | 40 | 0.575 | 0.685 | 0.420 | Pass | | ≤ 5.0 mΩ |
| | 5.3.2 | Post-test voltage drop | 6/28/05 | 6/28/05 | 10 | 40 | 1.214 | 1.883 | 0.852 | Pass | | 15.3 A applied |
| | 5.5.1 | Isolation resistance | 6/28/05 | 6/28/05 | 10 | 140 | | | | Pass | | ≥ 100MΩ |
| | 5.1.8 | Visual inspection | 6/28/05 | 6/28/05 | 10 | 140 | | | | Pass | | **see last page |
| | 5.4.1 | Terminal-connector extraction | 6/29/05 | 6/29/05 | 3 | 42 | | | | Pass | | ≥ 50N |
| | 5.6.3 | High Temperature Exposure | | | | | | | | | | 125°C maximum |
| | 5.3.1 | Pre-test dry circuit | 6/8/05 | 6/8/05 | 10 | 140 | | | | Pass | | (dep. on term size) See data sheets |
| | 5.3.1 | Post-test dry circuit | 6/25/05 | 6/25/05 | 10 | 140 | | | | Pass | | (dep. on term size) See data sheets |
| | 5.3.2 | Post-test voltage drop | 6/25/05 | 6/25/05 | 10 | 140 | | | | Pass | | (dep. on term size) See data sheets |
| | 5.1.8 | Visual inspection | 6/25/05 | 6/25/05 | 10 | 140 | | | | Pass | | **see last page |
| | 5.9.7 | Connector System Environmental Test Flow Chart | | | | | | | | | | |
| | 5.6.4 | Fluid Resistance | | | | | | | | | | |
| | | Pre-test isolation resistance | 6/8/05 | 6/8/05 | 8 | 112 | | | | Pass | | ≥ 100MΩ |
| | | Gasoline | | | | | | | | | | |
| | 5.5.1 | Isolation resistance | 6/8/05 | 7/5/05 | 1 | 14 | | | | Pass | | ≥ 100MΩ |
| | 5.1.8 | Visual inspection | 7/5/05 | 7/5/05 | 1 | 14 | | | | Pass | | No ingress of fluid |
| | | Diesel Fuel | | | | | | | | | | |
| | 5.5.1 | Isolation resistance | 6/8/05 | 7/5/05 | 1 | 14 | | | | Pass | | ≥ 100MΩ |
| | 5.1.8 | Visual inspection | 7/5/05 | 7/5/05 | 1 | 14 | | | | Pass | | No ingress of fluid |
| | | Engine oil | | | | | | | | | | |
| | 5.5.1 | Isolation resistance | 6/8/05 | 7/5/05 | 1 | 14 | | | | Pass | | ≥ 100MΩ |
| | 5.1.8 | Visual inspection | 7/5/05 | 7/5/05 | 1 | 14 | | | | Pass | | No ingress of fluid |
| | | Ethanol | | | | | | | | | | |
| | 5.5.1 | Isolation resistance | 6/8/05 | 7/5/05 | 1 | 14 | | | | Pass | | ≥ 100MΩ |
| | 5.1.8 | Visual inspection | 7/5/05 | 7/5/05 | 1 | 14 | | | | Pass | | No ingress of fluid |

Apex 150 & 2.8mm Apex, 14 Way Hybrid Connector System- DV/PV Level Testing, USCAR-2

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MY: 2006 Applications: Class 3, sealed

P/N: See last page

| | |
|----------------------------------|-----------------------------|
| DVP NUMBER FCNPEL-14WHYH26-05126 | DEPT |
| PLAN DATE 3/23/05 | PLAN ORIGINATOR Frank Hobbs |
| CONCURRENCE | MANAGER APPVL |
| REPORT DATE 7/26/05 | REPORTING ENGR Frank Hobbs |

| Procedure or Standard | Test Description | Timing | | Quantity | | Results | | | Acceptance Criteria | Notes | |
|---|--|---------|---------|----------|------|---------|------|------|---------------------|--------------------------------|-----------|
| | | Start | Compl. | conn | term | Avg. | Max. | Min. | | | Pass/Fail |
| | | | | | | | | | | | |
| 5.5.1 | Power steering fluid isolation resistance | 6/8/05 | 7/5/05 | 1 | 14 | | | | Pass | ≥ 100MΩ | |
| 5.1.8 | Visual inspection | 7/5/05 | 7/5/05 | 1 | 14 | | | | Pass | No ingress of fluid | |
| 5.5.1 | Automatic transmission fluid isolation resistance | 6/8/05 | 7/5/05 | 1 | 14 | | | | Pass | ≥ 100MΩ | |
| 5.1.8 | Visual inspection | 7/5/05 | 7/5/05 | 1 | 14 | | | | Pass | No ingress of fluid | |
| 5.5.1 | Engine coolant isolation resistance | 6/8/05 | 7/5/05 | 1 | 14 | | | | Pass | ≥ 100MΩ | |
| 5.1.8 | Visual inspection | 7/5/05 | 7/5/05 | 1 | 14 | | | | Pass | No ingress of fluid | |
| 5.5.1 | Brake fluid isolation resistance | 6/8/05 | 7/5/05 | 1 | 14 | | | | Pass | ≥ 100MΩ | |
| 5.1.8 | Visual inspection | 7/5/05 | 7/5/05 | 1 | 14 | | | | Pass | No ingress of fluid | |
| Seq. ID R & S | | | | | | | | | | | |
| Temperature Humidity Cycling/ Submersion/ Pressure Vacuum Leak | | | | | | | | | | | |
| 5.5.1 | Pre-test isolation resistance | 6/8/05 | 6/8/05 | 10 | 140 | | | | Pass | ≥ 100MΩ | |
| 5.5.1 | Post-temperature/humidity cycling isolation resistance | 6/25/05 | 6/25/05 | 10 | 140 | | | | Pass | ≥ 100MΩ | |
| 5.5.1 | Post-submersion isolation resistance | 6/25/05 | 6/25/05 | 10 | 140 | | | | Pass | ≥ 100MΩ | |
| 5.6.6 | Pressure | 6/29/05 | 6/29/05 | 10 | 140 | | | | Pass | No bubbles 28kPa | |
| 5.5.1 | Post- pressure/vacuum isolation resistance | 6/29/05 | 6/29/05 | 10 | 140 | | | | Pass | No ingress of fluid ≥ 100MΩ | |
| 5.1.8 | Visual inspection | 6/29/05 | 6/29/05 | 10 | 140 | | | | Pass | No ingress of fluid | |
| Seq. ID T & U | | | | | | | | | | | |
| High Temperature Exposure/ Submersion/ Pressure Vacuum Leak | | | | | | | | | | | |
| 5.5.1 | Pre-test isolation resistance | 6/10/05 | 6/10/05 | | | | | | Pass | ≥ 100MΩ | |
| 5.5.1 | Post-temperature/humidity cycling isolation resistance | 7/26/05 | 7/26/05 | | | | | | Pass | ≥ 100MΩ | |
| 5.5.1 | Post-submersion isolation resistance | 7/26/05 | 7/26/05 | | | | | | Pass | ≥ 100MΩ | |
| 5.6.6 | Pressure | 7/26/05 | 7/26/05 | | | | | | Pass | No bubbles 28kPa | |
| 5.6.6 | Vacuum | 7/26/05 | 7/26/05 | | | | | | Pass | No ingress of fluid | |
| 5.5.1 | Post- pressure/vacuum isolation resistance | 7/26/05 | 7/26/05 | | | | | | Pass | ≥ 100MΩ | |
| 5.1.8 | Visual inspection | 7/26/05 | 7/26/05 | | | | | | Pass | No ingress of fluid | |

Apex 150 & 2.8mm Apex, 14 Way Hybrid Connector System- DV/PV Level Testing, USCAR-2

Design Verification Plan and Report
Apex 150 & 2.8mm Apex Terminal Systems
14 Way Hybrid Connector System



FCI

USCAR 2, Rev 4 Test Specification

Applicable: Class 3, sealed

| | |
|--------------------------------|-----------------------------|
| DVP NUMBER FCINPEL-14WHY-05126 | DEPT. |
| PLAN DATE 3/28/05 | PLAN ORIGINATOR Frank Holub |
| CONCURRENCE | MANAGER APPVL |
| REPORT DATE 7/28/05 | REPORTING ENGR Frank Holub |

| Procedure or Standard | Test Description | Timing | | Quantity | | | Results | | | Acceptance Criteria | Notes |
|-----------------------|------------------|--------|--------|----------|------|------|---------|------|-----------|---------------------|-------|
| | | Start | Compl. | conn | term | Avg. | Max. | Min. | Pass/Fail | | |

Comments and notes from testing.

ESR # AM030359
Test Request series 05-126

| | | | | | | | | | | | |
|--|--------------------------|--|--|--|--|--|--|--|--|--|--|
| PBT3309 HRI/ black and natural | | | | | | | | | | | |
| The part numbers included in this testing are: | | | | | | | | | | | |
| Female assembly numbers - 55251400/ 55251400N | | | | | | | | | | | |
| Male assembly number - 54251400 | | | | | | | | | | | |
| 54001625 | Female terminal 16/18 | | | | | | | | | | |
| 54001626 | Male Terminal 16/18 grip | | | | | | | | | | |
| 54002000 | Female Terminal 20/22 | | | | | | | | | | |
| 54002001 | Male Terminal 20/22 | | | | | | | | | | |
| 55251442 | Male Housing | | | | | | | | | | |
| 55251450 | Female Retainer | | | | | | | | | | |
| 55251488 | Female Housing | | | | | | | | | | |
| 55251498 | Female TPA | | | | | | | | | | |
| 55251499 | Male TC1 | | | | | | | | | | |
| 54251497 | Male end seal | | | | | | | | | | |
| 55251497 | Female end seal | | | | | | | | | | |
| 54241687 | Ring seal | | | | | | | | | | |

** No deterioration, cracks or deformities. All mechanisms function without breakage.
Seals remain servicable, functioning and have no tears.

USCAR 2, Rev 4, Temperature Class 3 in all elevated ambient testing

All testing conducted at the FCI NA Automotive Now Product Evaluation Laboratory

