



HARWIN

Test Report Summary

HT06008

General Testing of
Kontrol (M55 Series) Connectors



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Double Row Connector Range

1. Introduction

1.1. Description and Purpose

Double Row Kontrol (M55 Series) is a range of board-to-board and cable-to-board 1.27mm pitch connectors, with polarised and shrouded housings, hold-down SMT or through hole retention board fixings, location pegs, and a choice of orientation and connector heights in both male plug and female receptacle products.

The Double Row Kontrol range is designed to perform as an improved specification connector over existing 1.27mm pitch (M50 and M52 series) connectors, whilst still maintaining the compact size. The following tests were carried out to confirm the requirements of this design intent.

1.2. Conclusion

The following data has been collated from Harwin Test report numbers 1559, 1695, 1702, 1746, QA000109, and QA000307. The results were used to define the Component Specification for the Double Row Kontrol range. The tests indicate that the product fulfils the criteria of an improved connection system over the existing 1.27mm connector products.

NOTE: Some results mention a 24-contact connector - these connectors were manufactured during the product development phase, but were not added to the final launch product sizes. Additional data related to later product releases can also be found on Test Reports QA000705 and QA000735 but are not included here as they gave similar results within specifications set out below.

2. Test Requirements

2.1. Specification Parameters

Tests were carried out in general accordance with EIA 364 standards. The list of tests covered in this summary are as follows:

| Testing Standard | Description of Test | Section |
|------------------|---|---------|
| EIA-364-23B | Contact Resistance | 3.1 |
| EIA-364-20C | Dielectric Withstanding Voltage | 3.2 |
| EIA-364-21C | Insulation Resistance | 3.3 |
| EIA-364-70A | Temperature Rise Versus Current | 3.4 |
| EIA-364-32C | Thermal Shock (Temperature Cycling) | 3.5 |
| EIA-364-17B | Temperature Life | 3.6 |
| EIA-364-26B | Salt Spray | 3.7 |
| EIA-364-31B | Humidity | 3.8 |
| EIA-364-28D | Vibration | 3.9 |
| EIA-364-13C | Durability, Insertion and Withdrawal Forces | 3.10 |
| EIA-364-29C | Contact Retention Force | 3.11 |
| n/a | PCB Retention Force | 3.12 |
| n/a | Plating Finish Thicknesses | 3.13 |
| n/a | Frequency Range | 3.14 |

2.2. Test Samples

The test samples selected for each test will be detailed within the test method.

3. Test Methods and Results

3.1. Contact Resistance: EIA-364-23B

Methodology: The following combinations were tested:

- Right-Angle-to-Right-Angle: 26-contact connectors, taking results of 5 different sets of pins for initial contact resistance.
- Straight-to-Straight: 26-contact connectors, taking results of 5 different sets of pins for initial contact resistance.
- Cable-to-Straight: 12-contact connectors were measured, taking results from all pins for initial contact resistance.

Specification: 25mΩ maximum.

Results:

| Male Plug | Female Receptacle | Average (mΩ) | Maximum (mΩ) | Minimum (mΩ) |
|--|--|--------------|--------------|--------------|
| M55-7102642R <i>Right-Angle Connector</i> | M55-6102642R <i>Right-Angle Connector</i> | 17.7 | 18.7 | 17.2 |
| M55-7002642R <i>Straight Connector</i> | M55-6002642R <i>Straight Connector</i> | 12.2 | 12.7 | 11.7 |
| M55-7021242R <i>Straight Connector</i> | M55-8001242-0150A <i>Cable Assembly</i> | 12.6 | 15.7 | 10.3 |

3.2. Dielectric Withstanding Voltage: EIA-364-20C

Methodology: Combinations of 26 & 12-contact connectors were tested to Condition I (sea level altitude), Method B.

Results:

| Male Plug | Female Receptacle | Condition | Result |
|--|--|----------------------|---------------------|
| M55-7102642R <i>Right-Angle Connector</i> | M55-6102642R <i>Right-Angle Connector</i> | 500V AC for 1 minute | PASS (no breakdown) |
| M55-7002642R <i>Straight Connector</i> | M55-6002642R <i>Straight Connector</i> | 500V AC for 1 minute | PASS (no breakdown) |
| M55-7021242R <i>Straight Connector</i> | M55-8001242-0150A <i>Cable Assembly</i> | 500V AC for 1 minute | PASS (no breakdown) |
| M55-7001242R <i>Straight Connector</i> | M55-8201242 <i>Cable Connector</i> | 500V AC for 1 minute | PASS (no breakdown) |

3.3. Insulation Resistance: EIA-364-21C

Methodology: The following combinations were tested:

- PCB Connectors: 26-contact connectors, tested to 10GΩ by stimulating adjacent pins at a voltage difference of 500V DC for 1 minute
- Cable Connectors/Assembly: 12-contact connectors, tested to 1GΩ by stimulating adjacent pins at a voltage difference of 500V DC for 1 minute.

Results:

| Connector | Type | Specification | Result (initial) | Result after humidity test |
|-------------------|-----------------------------------|---------------|------------------|----------------------------|
| M55-6102642R | Right-Angle Male Plug | 10GΩ | PASS | PASS |
| M55-7102642R | Right-Angle Female Receptacle | 10GΩ | PASS | PASS |
| M55-6002642R | Straight Male Plug | 10GΩ | PASS | PASS |
| M55-7002642R | Straight Male Plug | 10GΩ | PASS | PASS |
| M55-8001242-0150A | Female Receptacle Cable Assembly | 1GΩ | PASS | PASS |
| M55-8201242 | Female Receptacle Cable Connector | 1GΩ | PASS | PASS |

3.4. Temperature Rise Versus Current: EIA-364-70A, Method 2

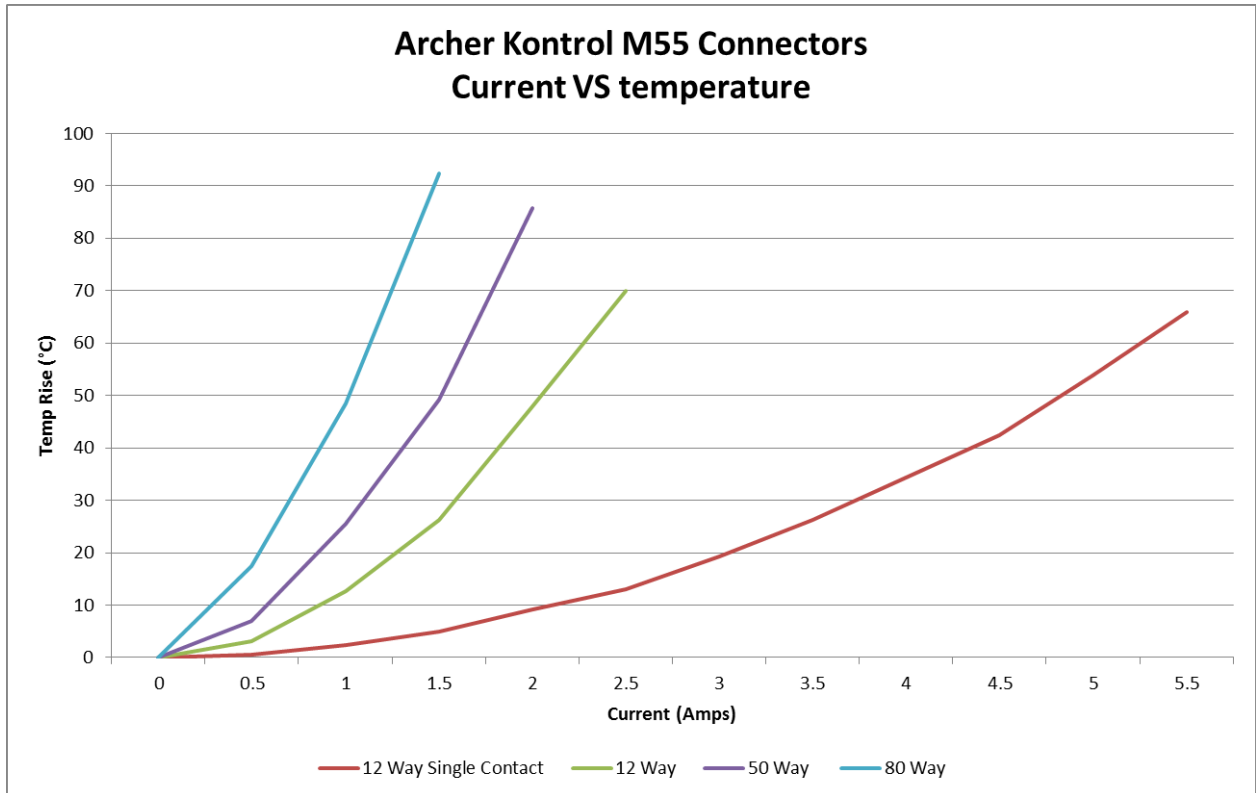
3.4.1. Straight PCB Connectors

Methodology: The test demonstrates the current carrying capability of a single pin, 12-contact, 50-contact and 80-contact connectors at elevated ambient temperatures. Each mating pair was soldered to a PCB to create a circuit in series. 0.5A increments were applied and the temperature rise above ambient recorded in each case. The test was stopped at either 4A or until a 60°C rise was recorded.

Results:

| Number of contacts | Male Plug | Female Receptacle | Assembly Resistance ‡ (Ω) | |
|----------------------------|--------------|-------------------|---------------------------|-------------------|
| | | | Pre-conditioning | Post-conditioning |
| Single Pin (on 12-contact) | M55-7021242R | M55-6021242R | 0.046 | 0.046 |
| 12 | M55-7021242R | M55-6021242R | 0.201 | 0.2 |
| 50 | M55-7025042R | M55-6025042R | 0.890 | 0.9 |
| 80 | M55-7028042R | M55-6028042R | 1.560 | 1.57 |

‡ Assembly Resistance includes both the resistance of the contacts, PCB, and connecting wires to the test equipment.



3.4.2. Cable Connectors

Methodology: The test demonstrates the current carrying capability of a 26-contact connector at elevated ambient temperatures. The mating pair was soldered to a PCB to create a circuit in series. 0.5A was applied and the temperature rise above ambient recorded.

Results:

| Male Plug | Female Receptacle | Temperature Rise (°C) | | | | | | Average |
|--------------|-------------------|-----------------------|-------|-------|-------|-------|-------|--------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | |
| M55-7022642R | M55-8002642-0150A | 13.89 | 15.41 | 11.03 | 12.99 | 11.87 | 12.91 | 13.02 |

3.5. Thermal Shock to EIA-364-32C, Condition III

3.5.1. Straight PCB Connectors

Methodology: A mated pair of M55-6002442R and M55-7002442R (24-way straight PCB connectors) were used for the test. Contact resistance before and after the thermal shock conditioning were measured, and the difference calculated. The results shown in the table are the results over 10 pins.

Specification: The change in Contact Resistance must be less than 10mΩ, and the connectors must show no evidence of physical damage.

Results:

| Change in Contact Resistance (mΩ) | | | Visual Inspection |
|-----------------------------------|---------|---------|-------------------|
| Average | Maximum | Minimum | |
| 0.77 | 1.64 | 0.08 | PASS |

3.5.2. Cable Connectors

Methodology: Six mated pairs of M55-8002642-0150A (26-contact female receptacle cable assembly) and M55-7022642R (26-contact straight male plug PCB connectors) were used for the test. Contact resistance before and after the thermal shock conditioning were measured, and the difference calculated. The results shown in the table are the results over 10 pins.

Specification: The Contact Resistance must be less than 1,000mΩ, and the connectors must show no evidence of physical damage.

Results:

| Pre-Conditioning (mΩ) | | | Post-Conditioning (mΩ) | | | Visual Inspection |
|-----------------------|-------|---------|------------------------|-------|---------|-------------------|
| Max | Min | Average | Max | Min | Average | |
| 128.9 | 106.7 | 111.2 | 154.2 | 117.9 | 132.3 | PASS |

3.6. Temperature Life: EIA-364-17B, Condition 5, Method A

Methodology: The mated pair of connectors were subject to 96 hours at 125±2°C.

Specifications:

- PCB Connectors: change in Contact Resistance must be less than 10mΩ, and the connectors must show no evidence of physical damage
- Cable Connectors/Assembly: Contact Resistance must be less than 1,000mΩ

Results:

| Pre-Conditioning (mΩ) | | | Post-Conditioning (mΩ) | | | Visual Inspection |
|-----------------------|-------|---------|------------------------|-------|---------|-------------------|
| Max | Min | Average | Max | Min | Average | |
| 131.1 | 117.2 | 123.3 | 143.3 | 128.9 | 134.1 | PASS |

3.7. Salt Spray: EIA-364-26B

3.7.1. PCB Connectors

Methodology: A mated pair of connectors were measured for contact resistance, then subjected to 24 hours continuous exposure to a 5% salt spray concentration, with ambient temperature at 35 +1/-2°C.

Specification: The change in Contact Resistance must be less than 10mΩ, and the connectors must show no evidence of physical damage.

Results:

| Change in Contact Resistance (mΩ) | | | Visual Inspection |
|-----------------------------------|---------|---------|-------------------|
| Average | Maximum | Minimum | |
| 0.72 | 1.30 | 0.30 | PASS |

3.7.2. Cable Connectors

Methodology: A mated pair of connectors were measured for contact resistance, then subjected to 24 hours continuous exposure to a 5% salt spray concentration, with ambient temperature at 35 +1/-2°C.

Specification: The Contact Resistance must be less than 1,000mΩ, and the connectors must show no evidence of physical damage.

Results:

| Pre-Conditioning (mΩ) | | | Post-Conditioning (mΩ) | | | Visual Inspection |
|-----------------------|-------|---------|------------------------|-------|---------|-------------------|
| Max | Min | Average | Max | Min | Average | |
| 128.9 | 106.7 | 111.2 | 154.2 | 117.9 | 132.3 | PASS |

3.8. Humidity: EIA-364-31B, Condition A

3.8.1. PCB Connectors

Methodology: A mated pair of connectors were measured for contact resistance, then subjected to 96 hours at relative humidity of 90-95%, 40±-2°C.

Specification: The change in Contact Resistance must be less than 10mΩ, and the connectors must show no evidence of physical damage. Insulation Resistance and Dielectric Withstanding Voltage are also checked after the exposure test, to >1,000MΩ and 500V AC for 1 minute respectively.

Results:

| Change in Contact Resistance (mΩ) | | | Visual Inspection | Insulation Resistance | Dielectric Withstanding Voltage |
|-----------------------------------|---------|---------|-------------------|-----------------------|---------------------------------|
| Average | Maximum | Minimum | | | |
| 0.84 | 1.40 | 0.30 | PASS | PASS | PASS |

3.8.2. Cable Connectors

Methodology: A mated pair of connectors were measured for contact resistance, then subjected to 96 hours at relative humidity of 90-95%, 40±-2°C.

Specification: The Contact Resistance must be less than 1,000mΩ, and the connectors must show no evidence of physical damage. Insulation Resistance and Dielectric Withstanding Voltage are also checked after the exposure test, to >5MΩ and 300V AC for 1 minute respectively.

Results:

| Pre-Conditioning (mΩ) | | | Post-Conditioning (mΩ) | | | Visual Inspection | Insulation Resistance | Dielectric Withstanding Voltage |
|-----------------------|-------|---------|------------------------|-------|---------|-------------------|-----------------------|---------------------------------|
| Max | Min | Average | Max | Min | Average | | | |
| 128.9 | 106.7 | 111.2 | 154.2 | 117.9 | 132.3 | PASS | PASS | PASS |

3.9. Vibration: EIA-364-28D

Methodology: Test conditions:

- Amplitude: 1.52mm peak to peak
- Sweep: 10 to 2,000 to 10Hz in 20 minutes
- Acceleration: 196.1m/s² (20G) at peak
- Duration: 4 hours in each axis, 12 hours total

Test samples:

- Mated pair of M55-6022442R and M55-7022442R (24-contact straight PCB male plugs and female receptacles), soldered to a PCB
- Mated pair of M55-6102442R and M55-7102442R (24-contact right-angle PCB male plugs and female receptacles), soldered to a PCB
- Mated pair of M55-8002642-0150A (26-contact female receptacle cable assembly), and two M55-7022642R (26-contact straight PCB male plugs) soldered to a PCB

Results:

- No evidence of physical damage and meets the electrical requirements.
- No discontinuity measured.

3.10. Durability, Insertion and Withdrawal Forces: EIA-364-13C

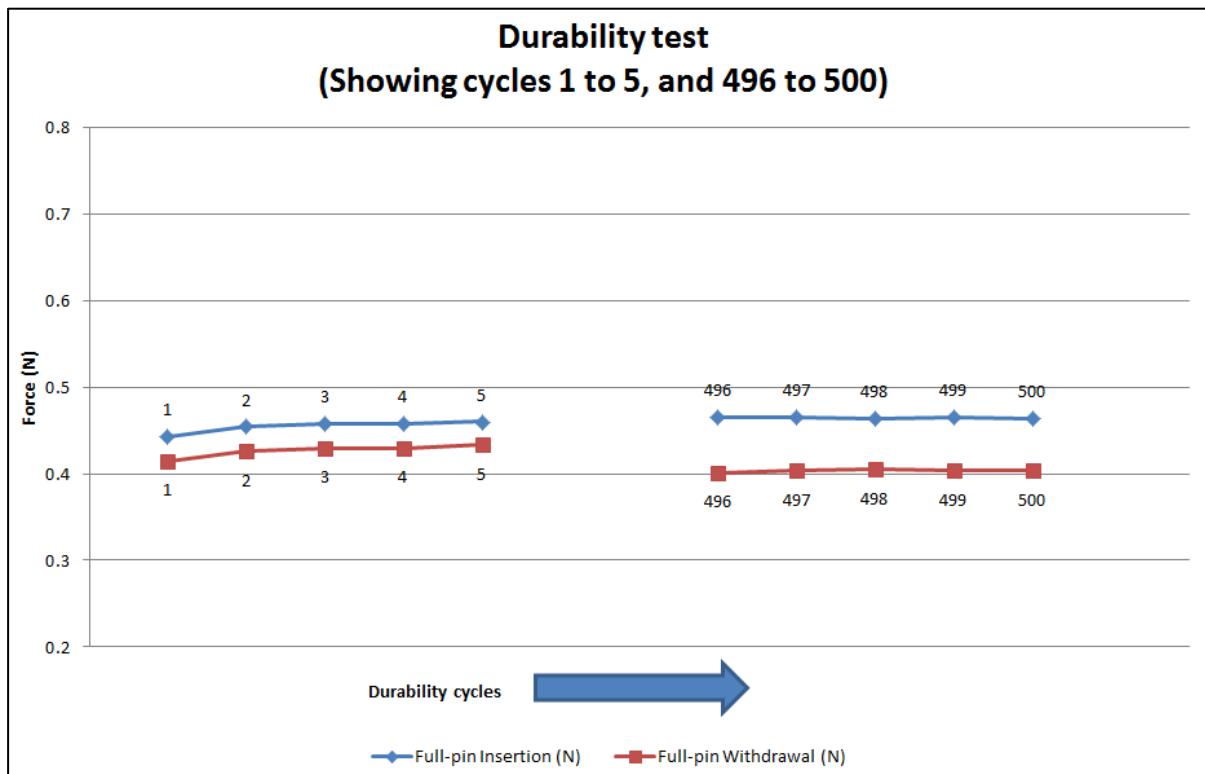
3.10.1. Straight PCB Connectors

Methodology: A mating pair of 26-contact connectors (M55-6022642R and M55-7022642R) was used during this test. Insertion and withdrawal forces per pin were measured during the first 5 mating cycles. The parts were then mated 500 times, with further force measurements for insertion and withdrawal carried out on the last 5 cycles.

Specification: 0.8N max insertion force per contact, 0.2N min withdrawal force per contact

Results:

| Force per pin (N) | Average | Maximum | Minimum | Result |
|-------------------|-------------|---------|---------|--------|
| Insertion | 0.46 | 0.47 | 0.44 | PASS |
| Withdrawal | 0.41 | 0.43 | 0.40 | PASS |

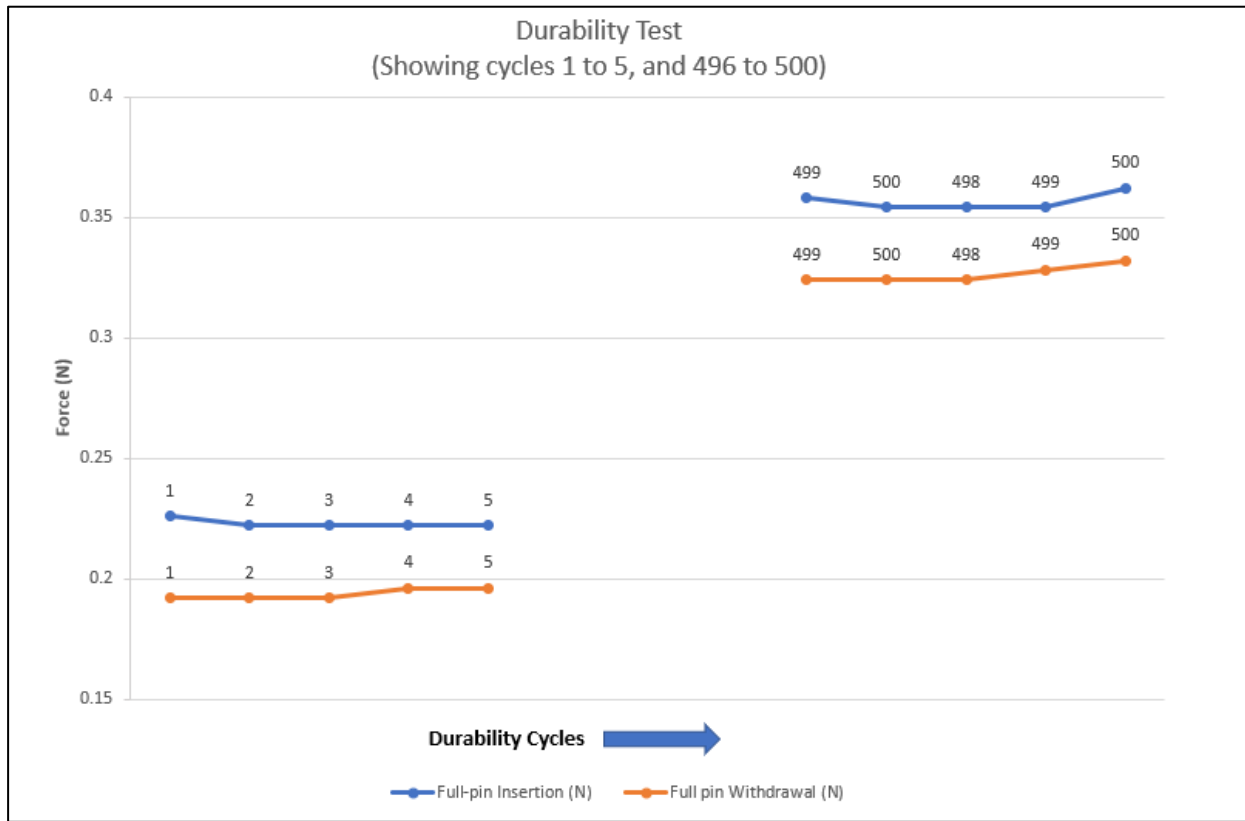


3.10.2. Cable Connectors

Methodology: 26-contact connectors M55-8002642-0150A (female receptacle cable assembly) and M55-7022642R (straight PCB male plug) was used during this test. Insertion and withdrawal forces per pin were measured during the first 5 mating cycles. The parts were then mated 500 times, with further force measurements for insertion and withdrawal carried out on the last 5 cycles.

Results:

| Force per pin (N) | Average | Maximum | Minimum | Result |
|-------------------|---------|---------|---------|--------|
| Insertion | 0.29 | 0.36 | 0.22 | PASS |
| Withdrawal | 0.26 | 0.33 | 0.19 | PASS |



3.11. Contact Retention Force: EIA-364-29C

Methodology: A sample of each type of gender and orientation of connector was tested for individual contact retention in the housing.

Specification: 3.9N minimum. The contacts are extracted at 25.4mm/minute.

Results:

| Connector type | Average (N) | Maximum (N) | Minimum (N) | Result |
|-------------------------------|-------------|-------------|-------------|--------|
| Right-Angle Female Receptacle | 11.3 | 11.9 | 10.4 | PASS |
| Straight Female Receptacle | 12.1 | 13.5 | 11.3 | PASS |
| Right-Angle Male Plug | 11.9 | 14.0 | 11.1 | PASS |
| Straight Male Plug | 19.7 | 21.3 | 17.8 | PASS |

3.12. PCB Retention Force

Methodology: Samples of 26-way, right-angle female receptacles with SMT and through hole retention (THR) hold down tabs were tested for PCB retention. Force was applied to the front of each connector to determine the peeling force.

Specification: No specification was set, test performed to compare hold down tab variants.

Results: Data from QA000705

| Hold down tab type | Average (N) | Maximum (N) | Minimum (N) |
|--------------------|-------------|-------------|-------------|
| SMT | 2.22 | 2.49 | 1.97 |
| THR | 5.06 | 5.28 | 4.83 |

3.13. Plating Finish Thicknesses

Methodology: Plating thicknesses were checked at various key areas of the contacts.

Results:

| Inspection area | Required min thickness (µm) | Average (µm) | Maximum (µm) | Minimum (µm) | Result |
|---|-----------------------------|--------------|--------------|--------------|--------|
| Contact area, Gold | 0.025 | 0.030 | 0.042 | 0.026 | PASS |
| Contact area, Nickel underplating | 2 | 2.48 | 3.19 | 2.17 | PASS |
| Solder area, Tin | 2.5 | 2.72 | 3.00 | 2.55 | PASS |
| SMT Hold-down retainer, Tin | 2.5 | 3.07 | 3.25 | 2.80 | PASS |
| SMT Hold-down retainer, Nickel underplating | 1 | 1.39 | 1.51 | 1.27 | PASS |



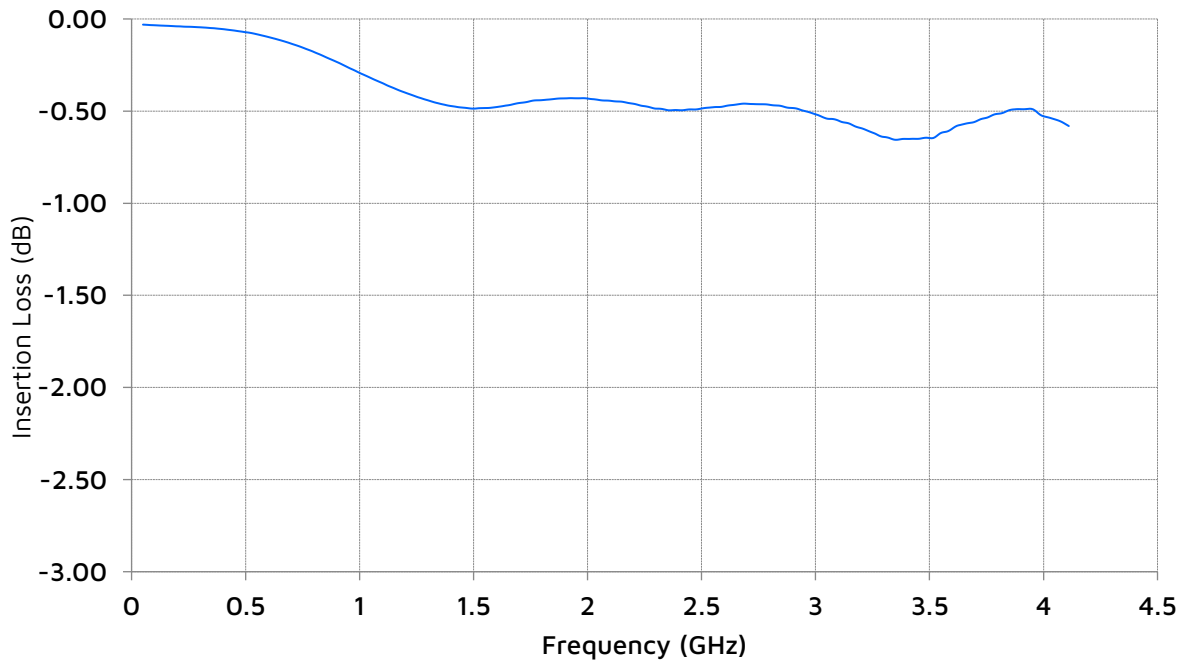
3.14. Frequency Range

Methodology: A selection of 50-contact connectors (Straight: M55-6005042R, M55-7005042R; Right-Angle: M55-6105042R, M55-7105042R) were mounted to specially made test boards, which were attached to a network analyser. The network analyser created signal to measure insertion loss for a differential signal, and Near End Cross Talk (NEXT) in 3 different arrangements.

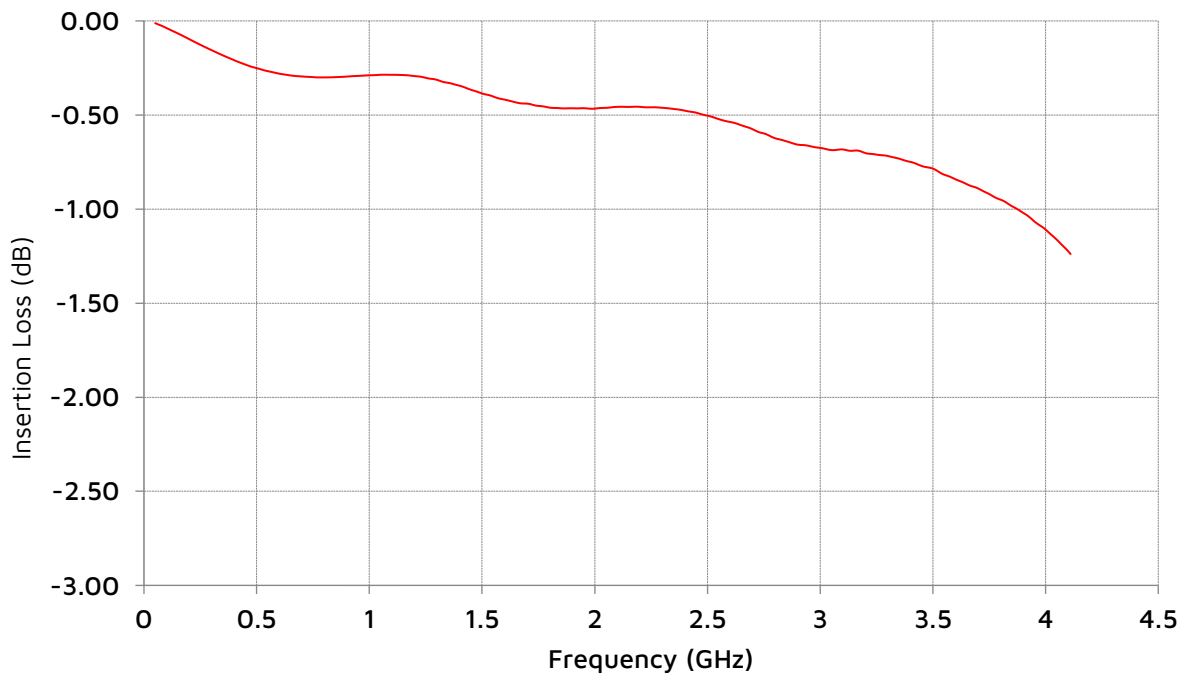
For more detail on this test and further explanation on the conclusion, see Test Report 1746.

3.14.1. Insertion Loss

Straight to Straight: M55-6005042R, M55-7005042R

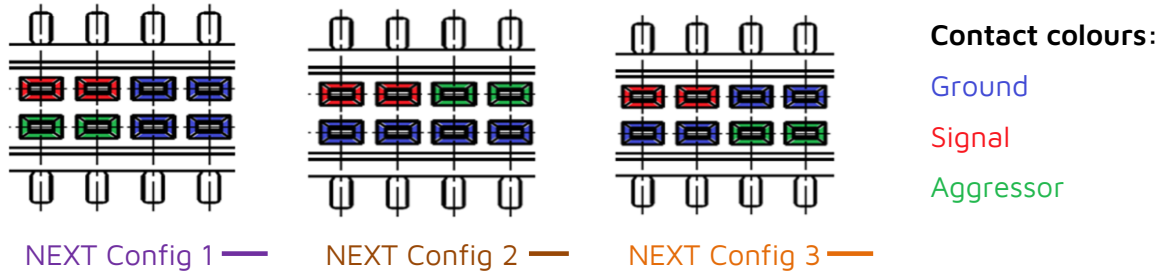


Right-Angle to Right-Angle: M55-6005042R, M55-7105042R

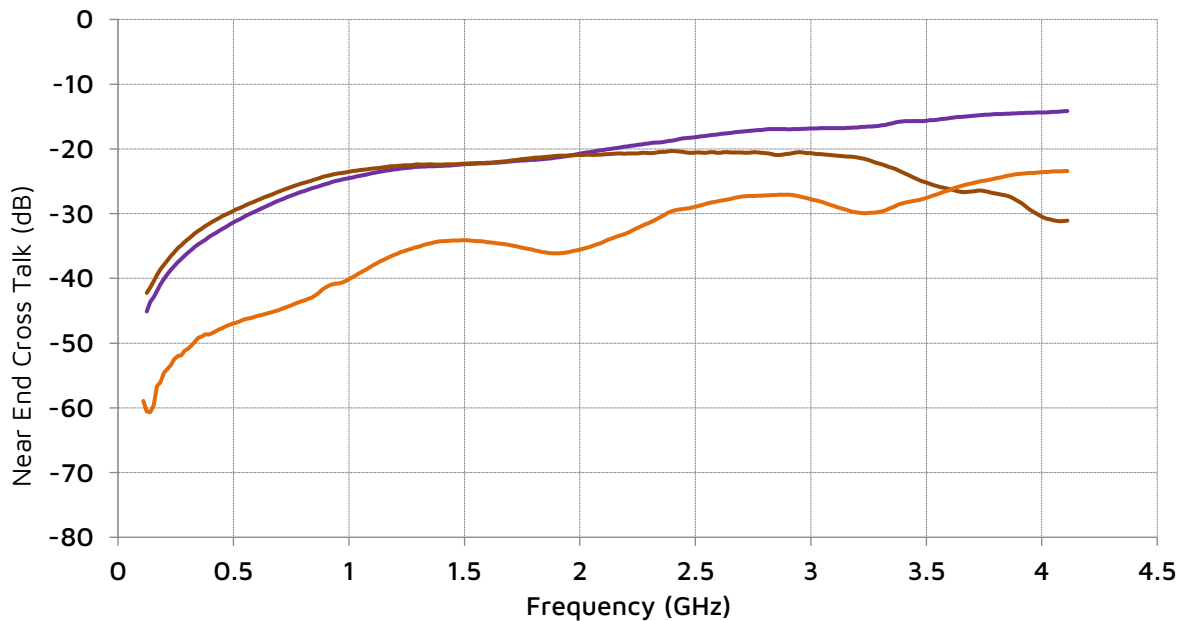


3.14.2. Near End Cross Talk (NEXT)

Methodology: Three different combinations of cross talk were measured with differential signals:



Results:



From the results in these two tests, common 'rules of thumb' are applied to establish a data rate:

- Double the signal bandwidth (Hz) for the data rate in Bits per second. For example, a 1GHz bandwidth would mean a 2Gbit/s signal can be transmitted through a connector.
- The bandwidth cut-off frequency of a connector is at -3dB (half the power) on insertion loss.
- Bandwidth of a connector is also limited when a neighbouring transmission line has crosstalk at -20dB (1/10th the voltage) into the signal line.

The conclusion is drawn that a conservative estimate (to the nearest integer) establishes a data rate of 3Gbit/s for this connector system.

Single Row Connector Range

1. Introduction

1.1. Description and Purpose

Kontrol Single Row (M55 Series) is a range of board-to-board, cable-to-board, and cable to cable 1.27mm pitch connectors, with polarized and shrouded housings, hold-down SMT board fixing, location pegs, and a choice of orientations in the SMT male plug connectors.

The Kontrol Single Row range is designed to perform as an expansion to the existing Kontrol Double Row range with a smaller form factor. The following tests were carried out to confirm the connectors conform to the wider Kontrol range.

1.2. Conclusion

The results from product testing were used to define the Component Specification for the Kontrol Single Row range. The tests indicate that the product performs in-line with key specifications of the wider Kontrol range.

2. Test Requirements

2.1. Specification Parameters

Tests were carried out in general accordance with EIA 364 standards. The list of tests covered in this summary are as follows:

| Testing Standard | Description of Test | Section | Page No. |
|------------------|-------------------------------------|---------|----------|
| EIA-364-23B | Contact Resistance | 3.1 | 13 |
| EIA-364-20C | Dielectric Withstanding Voltage | 3.2 | 13 |
| EIA-364-21C | Insulation Resistance | 3.3 | 13 |
| EIA-364-32C | Thermal Shock (Temperature Cycling) | 3.4 | 14 |
| EIA-364-17B | Temperature Life | 3.5 | 14 |
| EIA-364-26B | Salt Spray | 3.6 | 15 |
| EIA-364-31B | Humidity | 3.7 | 15 |
| EIA-364-28D | Vibration | 3.8 | 16 |

2.2. Test Samples

The test samples selected for each test will be detailed within the test method.

3. Test Methods and Results

3.1. Contact Resistance: EIA-364-23B

Methodology: The following combinations were tested:

- Right-Angle-to-Right-Angle: 6-contact connectors, taking results of 5 different sets of pins for initial contact resistance.
- Cable-to-Cable: 6-contact connectors were measured, taking results from all pins for initial contact resistance.

Specification: 25mΩ maximum.

Results:

| Male Plug | Female Receptacle | Average (mΩ) | Maximum (mΩ) | Minimum (mΩ) |
|--|--|--------------|--------------|--------------|
| M55-3100642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 2.8 | 3.2 | 2.4 |
| M55-5000642-0150A <i>Cable Assembly</i> | M55-4000642-0150A <i>Cable Assembly</i> | 5.9 | 6.3 | 5.6 |

3.2. Dielectric Withstanding Voltage: EIA-364-20C

Methodology: Combinations of 6-contact connectors were tested to Condition I (sea level altitude), Method B.

Results:

| Male Plug | Female Receptacle | Condition | Result |
|--|--|----------------------|---------------------|
| M55-3100642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 500V AC for 1 minute | PASS (no breakdown) |
| M55-3000642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 500V AC for 1 minute | PASS (no breakdown) |
| M55-5000642-0150A <i>Cable Assembly</i> | M55-4000642-0150A <i>Cable Assembly</i> | 500V AC for 1 minute | PASS (no breakdown) |

3.3. Insulation Resistance: EIA-364-21C

Methodology: The following combinations were tested:

- PCB Connectors: 6-contact connectors, tested to 1GΩ by stimulating adjacent pins at a voltage difference of 500V DC for 1 minute
- Cable Connectors/Assembly: 6-contact connectors, tested to 1GΩ by stimulating adjacent pins at a voltage difference of 500V DC for 1 minute.

Results:

| Connector | Type | Specification | Result (initial) | Result after humidity test |
|-------------------|----------------------------------|---------------|------------------|----------------------------|
| M55-3100642R | Right-Angle Male Plug | 1GΩ | PASS | PASS |
| M55-2100642R | Right-Angle Female Receptacle | 1GΩ | PASS | PASS |
| M55-3000642R | Straight Male Plug | 1GΩ | PASS | PASS |
| M55-5000642-0150A | Male Plug Cable Assembly | 1GΩ | PASS | PASS |
| M55-4000642-0150A | Female Receptacle Cable Assembly | 1GΩ | PASS | PASS |

3.4. Thermal Shock to EIA-364-32C, Condition III

3.4.1. Straight PCB Connectors

Methodology: A mated pair of connectors/cables were used for each test. Contact resistance before and after the thermal shock conditioning were measured, and the difference calculated. The results shown in the table are the results over 5 pins.

Specification: The change in Contact Resistance must be less than 10mΩ, and the connectors must show no evidence of physical damage.

Results:

| Male Plug | Female Receptacle | Change in Contact Resistance (mΩ) | | | Visual Inspection |
|--|--|-----------------------------------|------|------|-------------------|
| | | Avg | Max | Min | |
| M55-3100642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 0.10 | 0.15 | 0.05 | PASS |
| M55-3000642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 0.25 | 0.43 | 0.10 | PASS |
| M55-5000642-0150A <i>Cable Assembly</i> | M55-4000642-0150A <i>Cable Assembly</i> | 0.36 | 0.77 | 0.08 | PASS |

3.5. Temperature Life: EIA-364-17B, Condition 5, Method A

Methodology: The mated pair of connectors/cables were subject to 96 hours at 125±2°C.

Specifications: The change in Contact Resistance must be less than 10mΩ, and the connectors must show no evidence of physical damage

Results:

| Male Plug | Female Receptacle | Change in Contact Resistance (mΩ) | | | Visual Inspection |
|--|--|-----------------------------------|------|------|-------------------|
| | | Avg | Max | Min | |
| M55-3100642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 0.30 | 0.53 | 0.20 | PASS |
| M55-3000642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 0.44 | 0.93 | 0.15 | PASS |
| M55-5000642-0150A <i>Cable Assembly</i> | M55-4000642-0150A <i>Cable Assembly</i> | 0.14 | 0.23 | 0.08 | PASS |

3.6. Salt Spray: EIA-364-26B

3.6.1. PCB Connectors

Methodology: The mated pair of connectors/cables were measured for contact resistance, then subjected to 24 hours continuous exposure to a 5% salt spray concentration, with ambient temperature at 35 +1/-2°C.

Specification: The change in Contact Resistance must be less than 10mΩ, and the connectors must show no evidence of physical damage.

Results:

| Male Plug | Female Receptacle | Change in Contact Resistance (mΩ) | | | Visual Inspection |
|--|--|-----------------------------------|------|------|-------------------|
| | | Avg | Max | Min | |
| M55-3100642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 0.31 | 0.54 | 0.12 | PASS |
| M55-3000642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 0.33 | 0.61 | 0.07 | PASS |
| M55-5000642-0150A <i>Cable Assembly</i> | M55-4000642-0150A <i>Cable Assembly</i> | 0.28 | 0.47 | 0.12 | PASS |

3.7. Humidity: EIA-364-31B, Condition A

3.7.1. PCB Connectors

Methodology: The mated pair of connectors/cables were measured for contact resistance, then subjected to 96 hours at relative humidity of 90-95%, 40±2°C.

Specification: The change in Contact Resistance must be less than 10mΩ, and the connectors must show no evidence of physical damage. Insulation Resistance and Dielectric Withstanding Voltage are also checked after the exposure test, to 1,000MΩ and 500V AC for 1 minute respectively.

Results:

| Male Plug | Female Receptacle | Change in Contact Resistance (mΩ) | | | Visual Inspection | Insulation Resistance | Dielectric Withstanding Voltage |
|--|--|-----------------------------------|------|------|-------------------|-----------------------|---------------------------------|
| | | Avg | Max | Min | | | |
| M55-3100642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 0.34 | 0.62 | 0.04 | PASS | PASS | PASS |
| M55-3000642R <i>Right-Angle Connector</i> | M55-2100642R <i>Right-Angle Connector</i> | 0.19 | 0.31 | 0.02 | PASS | PASS | PASS |
| M55-5000642-0150A <i>Cable Assembly</i> | M55-4000642-0150A <i>Cable Assembly</i> | 0.27 | 0.40 | 0.11 | PASS | PASS | PASS |



3.8. Vibration: EIA-364-28D

Methodology: Test conditions:

- Amplitude: 1.52mm peak to peak
- Sweep: 10 to 2,000 to 10Hz in 20 minutes
- Acceleration: 196.1m/s² (20G) at peak
- Duration: 4 hours in each axis, 12 hours total

Test samples:

- Mated pair of M55-3100642R and M55-2100642R (6-contact male plug and female receptacle right-angle PCB connectors), soldered to a PCB
- Mated pair of M55-3000642R and M55-2100642R (6-contact straight male plug and right-angle female receptacle PCB connectors), soldered to a PCB
- Mated pair of M55-4000642-0150A (6-contact female receptacle cable assembly), and M55-3000642R (6-contact straight PCB male plug) soldered to a PCB

Results:

- No evidence of physical damage and meets the electrical requirements.
- No discontinuity measured.

