



PRODUCT SPECIFICATION

MINI-FIT SR. SERIES

1.0 SCOPE

This specification covers the 10.00 mm / (.394 in.) centerline tin and gold, silver plated connector series, single and dual row versions in wire to wire and wire to printed circuit board applications. This product performance is optimized for stranded tinned wire termination.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND PART NUMBER

<u>Product Name</u>	<u>Part Number</u>
Female Terminal	42815-****
Male Terminal	42817-****
Receptacle (single row)	42816-****
Plug (single row)	42818-****
Vertical Header (single row)	42819-****
Right Angle Header (single row)	42820-****
Receptacle (dual row)	43914-****
TPA (dual row)	43980-****
Vertical Header (dual row)	43915-****
Panel Mount Plug (dual row)	43938-****
Right Angle Header (single row, 260°C reflow capable (with gold and silver plating only))	46984-****
Vertical Header (single row, 260°C reflow capable (with gold and silver plating only))	46986-****

2.2 DIMENSIONS, MATERIALS PLATINGS & MARKINGS.

See the appropriate sales drawings for the information on dimensions, materials, platings and markings.

2.3 SAFETY AGENCY APPROVALS

File Numbers:
UL File #E29179
CSA Certificate #LR 19980-555
TUV Certificate #R 72131193

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

See sales drawings and the other sections of this specification for the necessary referenced documents and specifications.

Application Specification: AS-42815-001

REVISION: B4	ECR/ECN INFORMATION: EC No: UCP2016-2078 DATE: 18 NOV 2015	TITLE: PRODUCT SPECIFICATION FOR MINI-FIT SR. CONNECTOR SYSTEM	SHEET No. 1 of 9
DOCUMENT NUMBER: PS-42815-001	CREATED / REVISED BY: M.COLE	CHECKED BY: B. ANDERSON	APPROVED BY: B. PISZCZOR



PRODUCT SPECIFICATION

4.0 RATINGS

4.1 SAFETY AGENCY RATINGS

Series	Voltage (VAC (RMS) / VDC)			Current (A)				
	UL	CSA	TUV	UL	CSA		TUV	
				14AWG	12 AWG	10AWG	12AWG	10AWG
42818, 43914	600V	600V	600V	N/A	23A	30A	23A	33A
42816, 42819, 42820	600V	600V	250V	17A	23A	30A	23A	33A
43915	600V	600V	None	N/A	23A	30A	None	None
43938	None	600V	600V	N/A	23A	30A	23A	33A

4.2 MOLEX CURRENT RATINGS

Molex rating is established based on MIL-W-5088 max. current capacity guidelines for copper conductors and test data summary TS-42815-001 section 5.3.7. Test data is based on 30 deg. C temperature rise using UL 1015 tinned stranded copper wire.

Single Row Product

	2ckt. W to W	2ckt. W to PCB**	4ckt. W to W	4ckt. W to PCB**	6ckt W to W	6ckt. W to PCB**
8 AWG	50A	48A	46A	44A	45A	37A
10 AWG	33A	33A	33A	33A	33A	33A
12 AWG	23A	23A	23A	23A	23A	23A
14 AWG	17A	17A	17A	17A	17A	17A
16 AWG	13A	13A	13A	13A	13A	13A

	2ckt. W to W	2ckt. W to PCB**	4ckt. W to W	4ckt. W to PCB**	6ckt W to W	6ckt. W to PCB**
6mm ²	35A	-	-	-	-	-
5mm ²	35A	-	-	-	-	-

REVISION: B4	ECR/ECN INFORMATION: EC No.:UCP2016-2078 DATE:18 NOV 2015	TITLE: PRODUCT SPECIFICATION FOR MINI-FIT SR. CONNECTOR SYSTEM	SHEET No. 2 of 9
DOCUMENT NUMBER: PS-42815-001	CREATED / REVISED BY: M.COLE	CHECKED BY: B. ANDERSON	APPROVED BY: B. PISZCZOR



PRODUCT SPECIFICATION

4.2 MOLEX CURRENT RATINGS (continued)

	2ckt. W to W	2ckt. W to PCB**	4ckt. W to W	4ckt. W to PCB**	6ckt W to W	6ckt. W to PCB**
12AWG Double Crimp	40A (20A per wire)	40A (20A per wire)	-	-	-	-

Dual Row Product

	6ckt. W to W	6ckt. W to PCB**	10ckt. W to W	10ckt. W to PCB**	14ckt W to W	14ckt. W to PCB**
8 AWG	43A	37A	40A	36.5A	38A	36A
10 AWG	32A	31A	31.5A	29.5A	29A	28A
12 AWG	23A	23A	23A	22.5A	23A	22A
14 AWG	17A	17A	17A	16.5A	17A	16A
16 AWG	13A	13A	13A	12.5A	13A	12A

**PCB trace design may greatly affect temperature rise results.

Ratings shown represent *MAXIMUM* current carrying capacity of a fully loaded connector with all circuits powered. Ratings are based on a 30°C maximum temperature rise limit over ambient (room temperature). Testing conducted with tinned copper conductor stranded wire. Above charts are intended as a guideline. Current rating is application dependent. Appropriate de-rating is required depending on factors such as higher ambient temperature, smaller copper weight of PCB traces, gross heating from adjacent modules or components and other factors that influence connector performance.

4.3 TEMPERATURES

Operating: -40 Degrees C to +105 Degrees C

Non-operating: -40 Degrees C to +105 Degrees C

(Including 30 degrees C terminal temperature at full current)

REVISION: B4	ECR/ECN INFORMATION: EC No:UCP2016-2078 DATE:18 NOV 2015	TITLE: PRODUCT SPECIFICATION FOR MINI-FIT SR. CONNECTOR SYSTEM	SHEET No. 3 of 9
DOCUMENT NUMBER: PS-42815-001	CREATED / REVISED BY: M.COLE	CHECKED BY: B. ANDERSON	APPROVED BY: B. PISZCZOR



PRODUCT SPECIFICATION

5.0 PERFORMANCE

5.1 ELECTRICAL PERFORMANCE

Section	Item	Test Condition	Requirement
5.1.1	Initial Contact Resistance (low level)	Mate connectors, measure by dry circuit, 20mV max., 100mA. Wire resistance shall be removed from the measured value.	1.5 mOhm max. (tin) 1.0 mOhm max. (gold) 1.5 mOhm max. (silver)
5.1.2	Insulation Resistance	Mate connectors, apply 500V DC between adjacent terminal or ground.	1000 M Ohm min.
5.1.3	Dielectric Strength	Mate connectors, apply 2200V AC for 1 minute between adjacent terminal or ground.	No breakdown
5.1.4	Contact Resistance (rated)	Measure contact resistance at rated current.	1.5 mOhm max. (tin) 1.0 mOhm max. (gold) 1.5 mOhm max. (silver)
5.1.5	Contact Resistance on Crimp	Crimp the wire to the terminal, measure crimp resistance by dry circuit, 20mV max., 100mA	1.0 mOhm max.

REVISION: B4	ECR/ECN INFORMATION: EC No:UCP2016-2078 DATE:18 NOV 2015	TITLE: PRODUCT SPECIFICATION FOR MINI-FIT SR. CONNECTOR SYSTEM	SHEET No. 4 of 9
DOCUMENT NUMBER: PS-42815-001	CREATED / REVISED BY: M.COLE	CHECKED BY: B. ANDERSON	APPROVED BY: B. PISZCZOR



PRODUCT SPECIFICATION

5.2 MECHANICAL PERFORMANCE

Section	Item	Test Condition	Requirement
5.2.1	Contact Insertion and Withdrawal	Insert and withdraw a contact at a speed rate of 25 +/- 6mm / minute	Max. Insertion = 3Kg Min. Withdrawal = 0.25Kg
5.2.2	Connector Insertion and Withdrawal	Insert and withdraw a connector at a rate of 25 +/- 6mm / minute	Max. Insertion = 3.0Kg/ckt. Min. Withdrawal = 0.25Kg/ckt.
5.2.3	Terminal Insertion Force	Insert the crimped terminal into the housing.	Max. Insertion = 7.0Kg
5.2.4	Crimp Terminal Retention Force	Apply axial pull out force at a speed rate of 25 +/- 6mm / minute on the terminal assembled in the housing and with the TPA cover installed.	Min. Retention = 10Kg
5.2.5	Header Terminal Retention Force	Apply axial pull out force at a speed rate of 25 +/- 6mm / minute on the terminal assembled in the housing.	Min. Retention = 2.0Kg
5.2.6	Wire Pull Out Force	Mount the crimped terminal, apply an axial pull out force on the wire at a speed rate of 25 +/- 6mm / minute.	16AWG = 14Kg 14AWG = 23Kg 12AWG = 31Kg 10AWG = 36Kg 8AWG = 40Kg
5.2.7	Normal Force	Apply a perpendicular force at a speed rate of 25 +/- 6mm / minute.	200 g min.
5.2.8	PCB Insertion and Withdrawal Force	Apply force perpendicular to the housing at a speed rate of 25 +/- 6mm minute as shown.	Insertion = 2Kg max. Withdrawal = 1Kg min.
5.2.9	Panel Insertion & Withdrawal	Insert and withdraw a connector at a speed rate of 25 +/- 6mm / minute	Insertion = 5Kg max. Withdrawal = 10Kg min.

REVISION: B4	ECR/ECN INFORMATION: EC No.:UCP2016-2078 DATE:18 NOV 2015	TITLE: PRODUCT SPECIFICATION FOR MINI-FIT SR. CONNECTOR SYSTEM	SHEET No. 5 of 9
DOCUMENT NUMBER: PS-42815-001	CREATED / REVISED BY: M.COLE	CHECKED BY: B. ANDERSON	APPROVED BY: B. PISZCZOR



PRODUCT SPECIFICATION

5.2 MECHANICAL PERFORMANCE (continued)

Section	Item	Test Condition	Requirement
5.2.10	Latch Yield Strength (only 43914 receptacle w/ 43938 plug)	Insert and withdraw connector housings (30 times) and pull apart at a speed rate of 25 +/- 6mm / minute	Yield = 7.0Kg min.
5.2.10A	Latch Yield Strength (all other)	Insert and withdraw connector housings (30 times) and pull apart at a speed rate of 25 +/- 6mm / minute	Yield = 10.0Kg min.
5.2.11	Durability (tin)	Insert and withdraw connectors (30 times) at a maximum rate of 10 cycles per minute prior to environmental tests.	Contact Res. change = 1.0mOhm max.
5.2.11A	Durability (gold)	Insert and withdraw connectors (100 times) at a maximum rate of 10 cycles per minute prior to environmental tests.	Contact Res. change = 1.0mOhm max.
5.2.11B	Durability (silver)	Insert and withdraw connectors (30 times) at a maximum rate of 10 cycles per minute prior to environmental tests.	Contact Res. change = 1.0 mOhm max.
5.2.12A	Vibration with lubrication (tin) (Nyogel 760G)	10-500HZ with a G Level of 10 Duration: 9 hours.	Contact Res change =. 1.0mOhm max Discontinuity not greater than 1 microsecond
5.2.12B	Vibration without lubrication (gold)	10-500HZ with a G Level of 10 Duration: 9 hours.	Contact Res change =. 1.0mOhm max Discontinuity not greater than 1 microsecond
5.2.12 C	Vibration with lubrication (silver)	10-500HZ with a G Level of 10 Duration: 9 hours.	Contact Res change = 1.0 mOhm max Discontinuity not greater than 1 microsecond

REVISION: B4	ECR/ECN INFORMATION: EC No:UCP2016-2078 DATE:18 NOV 2015	TITLE: PRODUCT SPECIFICATION FOR MINI-FIT SR. CONNECTOR SYSTEM	SHEET No. 6 of 9
DOCUMENT NUMBER: PS-42815-001	CREATED / REVISED BY: M.COLE	CHECKED BY: B. ANDERSON	APPROVED BY: B. PISZCZOR



PRODUCT SPECIFICATION

5.2.13	Mechanical Shock	50 G, 11ms, Half-Sine Shock Pulse.	Contact Res. change = 1.0mOhm max. Discontinuity not greater than 1 microsecond
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* **NOTE:** Thermal cycling, vibration and other factors can cause micro-motion within a mated connection. Micro-motion without lubricant could lead to fretting corrosion on tin plating. Due to the many factors that may be present in an application, Molex highly recommends the use of lubrication with Mini-Fit Sr tin-plated terminals for reliability assurance. See AS-42815-001 for more information

5.3 ENVIRONMENTAL PERFORMANCE

Section	Item	Test Condition	Requirement
5.3.1	Cold Resistance	-40 +/- 3 degrees C for 96 hrs.	Appearance: No damage Contact Res. change = 1.0mOhm max.
5.3.2	Thermal Shock	Mate connectors, expose to 25 cycles of: -40 +0/-3 deg. C for 30 minutes +25 +/- 10 deg. C for 5 minutes max. +105 +3/-0 deg. C for 30 minutes +25 +/- 10 deg. C for 5 minutes max.	Appearance: No damage Contact Res. change = 1.0mOhm max.
5.3.3	Thermal Aging	Mate connectors, expose to 240 hours at 105 +/- 2 deg. C	Appearance: No damage Contact Res. change = 1.0mOhm max
5.3.4	Humidity (Steady State)	Mate connectors, expose to a temperature of 40 +/- 2 deg. C with a relative humidity of 90% to 95% for 96 hours.	Appearance: No damage Contact Res. change = 1.0mOhm max Dielectric withstanding voltage: No breakdown Insul. res: 1000M Ohm min.

REVISION: B4	ECR/ECN INFORMATION: EC No: UCP2016-2078 DATE: 18 NOV 2015	TITLE: PRODUCT SPECIFICATION FOR MINI-FIT SR. CONNECTOR SYSTEM	SHEET No. 7 of 9
DOCUMENT NUMBER: PS-42815-001	CREATED / REVISED BY: M.COLE	CHECKED BY: B. ANDERSON	APPROVED BY: B. PISZCZOR



PRODUCT SPECIFICATION

5.3 ENVIRONMENTAL PERFORMANCE (cont.)

Section	Item	Test Condition	Requirement
5.3.5	Humidity (cyclic) (Tin and Gold Plated parts)	Mate connectors, expose to 25 cycles at 90% to 95% relative humidity with a transition time of 2.5 hrs. between extremes. +25 +/- 10 deg. C for 5 minutes max. +65 +3/-0 deg. C for 30 minutes	Appearance: No damage Contact Res. change = 2.0mOhm max Dielectric withstanding voltage: No breakdown Insul. res: 1000M Ohm min.
5.3.5A	Cyclic Temperature & Humidity-Silver	Mate connectors: cycle per EIA-364-31: 24 cycles at temperature $25 \pm 3^{\circ}\text{C}$ at $80 \pm 5\%$ relative humidity and $65 \pm 3^{\circ}\text{C}$ at $50 \pm 5\%$ relative humidity; dwell time of 1.0 hour; ramp time of 0.5 hours.	Appearance: No damage Contact Res. change = 1.0 mOhm max Dielectric withstanding voltage: No breakdown Insul. res: 1000M Ohm min.
5.3.6	Immunity to Fretting Corrosion with lubrication. (tin) (Nyogel 760G)	Mate connectors, expose to 500 cycles with a max. transition time of 5 minutes between extremes. +25 +/- 10 deg. C for 30 minutes +70 +3/-0 deg. C for 30 minutes	Appearance: No damage Contact Res. change = 1.0mOhm max
5.3.6 A	Immunity to Fretting Corrosion with lubrication. Silver	Mate connectors, expose to 500 cycles with a max. transition time of 5 minutes between extremes. +15 +/- 3 deg. C for 30 minutes +85 +/-3 deg. C for 30 minutes	Appearance: No damage Contact Res. change = 1.0mOhm max
5.3.7	Temp. Rise & Current Cycling	Mate the connectors and measure the temperature rise at the rated current for 96 hrs., 45 minutes ON and 15 minutes OFF for 240 hrs., and an additional 96 hrs. of steady-state current.	Max. Temp. Rise = 30deg. C Per EIA 364 and CSA requirement
5.3.8	Solderability**	Per SMES-152	Solder coverage: 95% MINIMUM (per SMES-152)

REVISION: B4	ECR/ECN INFORMATION: EC No:UCP2016-2078 DATE:18 NOV 2015	TITLE: PRODUCT SPECIFICATION FOR MINI-FIT SR. CONNECTOR SYSTEM	SHEET No. 8 of 9
DOCUMENT NUMBER: PS-42815-001	CREATED / REVISED BY: M.COLE	CHECKED BY: B. ANDERSON	APPROVED BY: B. PISZCZOR



PRODUCT SPECIFICATION

5.3.9	Reflow Solder Heat Resistance	Reflow solder process: 235°C max per AS-40000-5013	Appearance: No damage Dimensional: Conformance to sales drawing requirements.
5.3.9A	Reflow Solder Heat Resistance: applicable to 46984 & 46986 with gold & Silver plating ONLY	Reflow solder process: 260°C max per AS-40000-5013	Appearance: No damage Dimensional: Conformance to sales drawing requirements.
5.3.10	Wave Solder Heat Resistance **	Dip header terminal tails in solder: Solder Duration: 3 +/- 0.5 seconds Solder Temperature.: 260 +/- 5 deg. C Per AS-40000-5013	Appearance: No damage
5.3.11	Resistance to Solvents	Solvent: flourinert FC-70 (3M Corp.) Solvent temp: Boiling temp. Immersion time: 120 +/- 5 seconds Solvent: Alpha 1003 (Alpha Metal) Solvent: Isopropyl Alcohol Solvent Temp.: Boiling temp. Immersion time: 240 +/- 5 seconds Repeat in solvent 5 times. Rinse with deionized water between cycles.	Appearance: No damage

****NOTE:** This product is compatible with lead-free hand soldering temperatures. Always mate header to receptacle or plug to receptacle only with like metal plating option. (Ex: Silver- Silver, Gold to Gold and Tin-Tin)

REVISION: B4	ECR/ECN INFORMATION: EC No: UCP2016-2078 DATE: 18 NOV 2015	TITLE: PRODUCT SPECIFICATION FOR MINI-FIT SR. CONNECTOR SYSTEM	SHEET No. 9 of 9
DOCUMENT NUMBER: PS-42815-001	CREATED / REVISED BY: M.COLE	CHECKED BY: B. ANDERSON	APPROVED BY: B. PISZCZOR