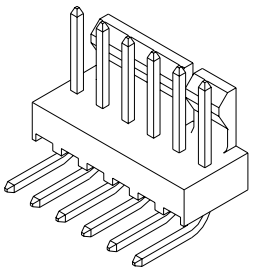
FEATURES AND SPECIFICATIONS

2.54mm (.100") Pitch KK® Solid Header

7478

Right Angle Friction Lock



Features and Benefits
- Sizes 2 to 28 circuits
- Friction lock provides passive lock to connector with ramp
- 7478 with voids is 7832 Series
- Various pin lengths available
- End-to-end stackable
- Edge mount only

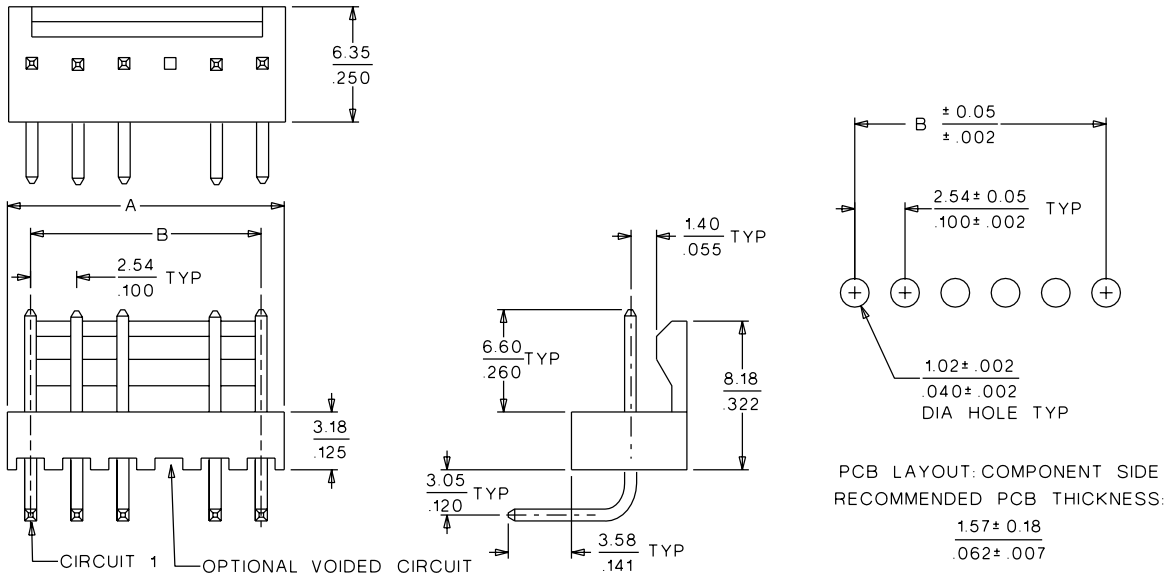
Reference Information
Product Specification: PS-10-07
Packaging: Bag
UL File No.: E29179
CSA File No.: LR19980
Mates With: 2695, 4455, 6471, 7720 and 7880
Designed In: Inches

Electrical
Voltage: 250V
Current: 4.0A
Contact Resistance: 20mΩ max.
Dielectric Withstanding Voltage: 1500V
Insulation Resistance: 50K MΩ min.

Mechanical
Durability:
Tin—25 cycles max.
Gold—100 cycles max.

Physical
Housing: Red nylon, UL 94V-0
Contact: Brass, 0.64mm (.025") square
Plating: See Table
Operating Temperature: 0 to +75˚C

CATALOG DRAWING (FOR REFERENCE ONLY)



ORDERING INFORMATION AND DIMENSIONS

Circuits	Order No.		Dimension	
	Tin	Gold	A	B
2	• 22-05-3021	• 22-12-2024	5.08 (.200)	2.54 (.100)
3	• 22-05-3031	• 22-12-2034	7.62 (.300)	5.08 (.200)
4	• 22-05-3041	• 22-12-2044	10.16 (.400)	7.62 (.300)
5	• 22-05-3051	• 22-12-2054	12.70 (.500)	10.16 (.400)
6	• 22-05-3061	• 22-12-2064	15.24 (.600)	12.70 (.500)
7	• 22-05-3071	• 22-12-2074	17.78 (.700)	15.24 (.600)
8	• 22-05-3081	• 22-12-2084	20.32 (.800)	17.78 (.700)
9	• 22-05-3091	• 22-12-2094	22.86 (.900)	20.32 (.800)
10	• 22-05-3101	• 22-12-2104	25.40 (1.000)	22.86 (.900)
11	• 22-05-3111	• 22-12-2114	27.94 (1.100)	25.40 (1.000)
12	• 22-05-3121	• 22-12-2124	30.48 (1.200)	27.94 (1.100)
13	• 22-05-3131	• 22-12-2134	33.02 (1.300)	30.48 (1.200)
14	• 22-05-3141	• 22-12-2144	35.56 (1.400)	33.02 (1.300)
15	• 22-05-3151	• 22-12-2154	38.10 (1.500)	35.56 (1.400)

Circuits	Order No.		Dimension	
	Tin	Gold	A	B
16	• 22-05-3161	• 22-12-2164	40.64 (1.600)	38.10 (1.500)
17	• 22-05-3171	• 22-12-2174	43.18 (1.700)	40.64 (1.600)
18	• 22-05-3181	• 22-12-2184	45.72 (1.800)	43.18 (1.700)
19	• 22-05-3191	• 22-12-2194	48.26 (1.900)	45.72 (1.800)
20	• 22-05-3201	• 22-12-2204	50.80 (2.000)	48.26 (1.900)
21	• 22-05-3211	• 22-12-2214	53.34 (2.100)	50.80 (2.000)
22	• 22-05-3221	• 22-12-2224	55.88 (2.200)	53.34 (2.100)
23	• 22-05-3231	• 22-12-2234	58.42 (2.300)	55.88 (2.200)
24	• 22-05-3241	• 22-12-2244	60.96 (2.400)	58.42 (2.300)
25	• 22-05-3251	• 22-12-2254	63.50 (2.500)	60.96 (2.400)
26	22-05-3261	22-12-2264	66.04 (2.600)	63.50 (2.500)
27	22-05-3271	22-12-2274	68.58 (2.700)	66.04 (2.600)
28	22-05-3281	22-12-2284	71.12 (2.800)	68.58 (2.700)

• US Standard Product, available through Molex franchised distributors

Note: Circuit 1 designation is used to orient the header to locate the voided circuit. Review mating connector to assure correct mating orientation.

PRODUCT SPECIFICATION

1.0 SCOPE

This Product Specification covers the 2.54 mm (.100 inch) centerline (pitch) 0.64 mm (.025) square pin headers when mated with either printed circuit board (PCB) connectors or connectors terminated with 22 to 28 AWG wire using crimp technology.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBERS

Crimp Terminals: 2759, 41572, 6459
Crimp Housings: 2695
PCB Connectors: 4455, 42625
Headers: 4030, 4094, 6373, 7478, 42225, 42226, 42227, 42228, 42152, 42153, 42375, 42376, 42377, 42624.
Other products conforming to this specification are noted on the individual drawings.

2.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKINGS

Terminal Material: Brass or Phos. Bronze (for Max performance use phos bronze material.)
Housing: Nylon or Polyester
Pins: Brass or Phos. Bronze
For more information on dimensions, materials, and plating see the individual drawings.

2.3 SAFETY AGENCY APPROVALS

UL File Number …….. E29179
CSA ……...LR19980

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

None

4.0 RATINGS

4.1 VOLTAGE

250 Volts

4.2 CURRENT AND APPLICABLE WIRES

(Current is dependent on connector size, contact material, plating, ambient temperature, printed circuit board characteristics and related factors. Actual current rating is application dependent and should be evaluated for each application.)

AWG	Amps (Max)	Outside Insulation Diameter
22	4.00	See Drawings
24	3.75	See Drawings
26	3.50	See Drawings
28	3.00	See Drawings

4.3 TEMPERATURE (ambient + 30° temp rise)

Operating: 0°C to +75°C
Nonoperating: - 40°C to +105°C

5.0 PERFORMANCE

5.1 ELECTRICAL REQUIREMENTS

DESCRIPTION	TEST CONDITION	REQUIREMENT
Contact Resistance (Low Level)	Mate connectors: apply a maximum voltage of 20 mV and a current of 100 mA.	10 milliohms MAXIMUM [initial]
Contact Resistance of Wire Termination (Low Level)	Terminate the applicable wire to the terminal and measure wire using a voltage of 20 mV and a current of 100 mA.	2 milliohms MAXIMUM [initial]
Insulation Resistance	Unmate & unmount connectors: apply a voltage of 500 VDC between adjacent terminals and between terminals to ground.	1000 Megohms MINIMUM
Dielectric Withstanding Voltage	Unmate connectors: apply a voltage of {two times the rated voltage plus 1000 volts} VAC for 1 minute between adjacent terminals and between terminals to ground.	No breakdown
Capacitance	Measure between adjacent terminals at 1 MHz.	2 picofarads MAXIMUM
Temperature Rise (via Current Cycling)	Mate connectors: measure the temperature rise at the rated current after: 1) 96 hours (steady state) 2) 240 hours (45 minutes ON and 15 minutes OFF per hour) 3) 96 hours (steady state)	Temperature rise: +30°C MAXIMUM

5.2 MECHANICAL REQUIREMENTS

DESCRIPTION	TEST CONDITION	REQUIREMENT
Connector Mate and Unmate Forces	Per circuit when mated to an .025 Sq. pin. Mate and unmate connector (male to female) at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	1.95 N (0.438 lbf) MAXIMUM insertion force & 0.56 N (0.125 lbf) MINIMUM withdrawal force
Terminal Retention Force (in Housing)	Axial pullout force on the terminal in the housing at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute. (Forces will change with platings and materials.)	17.8 N (4.0 lbf) MINIMUM withdrawal force
Terminal Insertion Force (into Housing)	Apply an axial insertion force on the terminal at a rate of 25 ± 6 mm (1 ± ¼ inch). (Forces will change with platings and materials.)	6.67 N (1.5 lbf) MAXIMUM insertion force
Durability	Mate connectors up to 25 cycles at a maximum rate of 10 cycles per minute prior to Environmental Tests.	10 milliohms MAXIMUM (change from initial)
Vibration (Random)	Mate connectors and vibrate per EIA 364-28, test condition VII.	10 milliohms MAXIMUM (change from initial) & Discontinuity < 1 microsecond
Shock (Mechanical)	Mate connectors and shock at 50 g's with ½ sine wave (11 milliseconds) shocks in the ±X,±Y,±Z axes (18 shocks total).	10 milliohms MAXIMUM (change from initial]) & Discontinuity < 1 microsecond
Wire Pullout Force (Axial)	Apply an axial pullout force on the wire at a rate of 25 ± 6 mm (1 ± ¼ inch). (For maximum performance use Molex application tooling with stranded tinned copper wire)	22 awg = 44 N (10 lbf) 24 awg = 35 N (8 lbf) 26 awg = 26 N (6 lbf) 28 awg = 17 N (4 lbf) 30 awg = 13 N (3 lbf)
Normal Force	Apply a perpendicular force.	2.94 N (300 grams) average

5.3 ENVIRONMENTAL REQUIREMENTS

DESCRIPTION	TEST CONDITION	REQUIREMENT
Shock (Thermal)	Mate connectors; expose to 5 cycles of: Temperature °C — Duration (Minutes) -40 +0/-3 — 30 +25 ±10 — 5 MAXIMUM +105 +3/-0 — 30 +25 ±10 — 5 MAXIMUM	10 milliohms MAXIMUM (change from initial) & Visual: No Damage
Thermal Aging	Mate connectors; expose to: 96 hours at 105 ± 2°C	10 milliohms MAXIMUM (change from initial]) & Visual: No Damage
Humidity (Steady State)	Mate connectors: expose to a temperature of 40 ± 2°C with a relative humidity of 90-95% for 96 hours. Note: Remove surface moisture and air dry for 1 hour prior to measurements.	10 milliohms MAXIMUM (change from initial) & Dielectric Withstanding Voltage: No Breakdown at 500 VAC & Insulation Resistance: 1000 Megohms MINIMUM & Visual: No Damage
Humidity (Cyclic)	Mate connectors: cycle per EIA-364-31: 24 cycles at temperature 25 ± 3°C at 80 ± 5% relative humidity and 65 ± 3°C at 50 ± 5% relative humidity; dwell time of 1.0 hour; ramp time of 0.5 hours. {Note: Remove surface moisture and air dry for 1 hour prior to measurements.}	10 milliohms MAXIMUM (change from initial) & Dielectric Withstanding Voltage: No Breakdown at 500 VAC & Insulation Resistance: 1000 Megohms MINIMUM & Visual: No Damage
Solderability	Per SMES-152	Solder coverage: 95% MINIMUM (per SMES-152)

5.3 ENVIRONMENTAL REQUIREMENTS

DESCRIPTION	TEST CONDITION	REQUIREMENT
Solder Resistance	Dip connector terminal tails in solder: Solder Duration: 5 ± 0.5 seconds; Solder Temperature: 230 ± 5°C	Visual: No Damage to insulator material
Salt Spray	Mate connectors: Duration: 48 hours exposure; Atmosphere: salt spray from a 5% solution; Temperature: 35 +1/-2°C	10 milliohms MAXIMUM (change from initial) & Visual: No Damage
Cold Resistance	Mate connectors: Duration: 96 hours; Temperature: -40 ± 3°C	10 milliohms MAXIMUM (change from initial) & Visual: No Damage
Corrosive Atmosphere: Flowing Mixed Gas (FMG)	Mate connectors: Test per EIA-364-65, method 2A	10 milliohms MAXIMUM (change from initial) & Visual: No Damage

6.0 PACKAGING

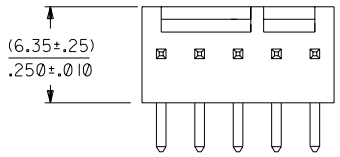
Parts shall be packaged to protect against damage during handling, transit and storage.

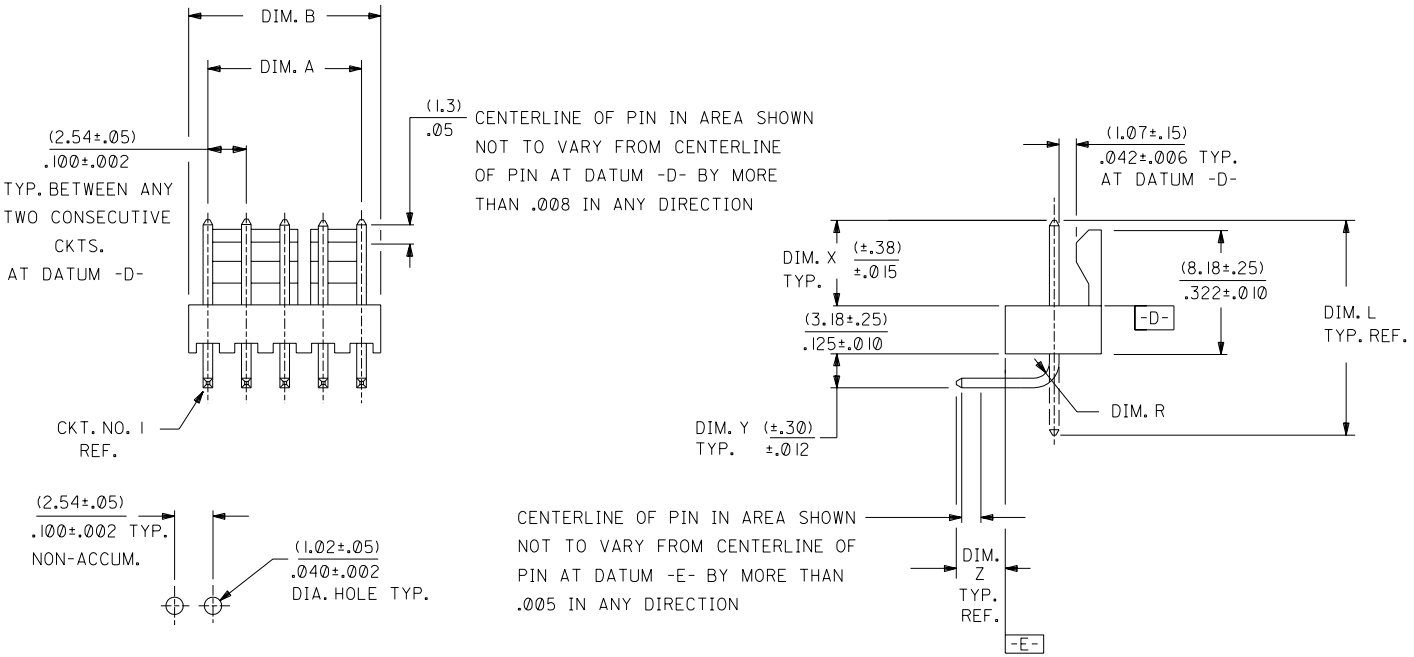
7.0 GAGES AND FIXTURES

8.0 OTHER

NOTES:

1. MATERIAL: NYLON, UL 94V-0, COLOR-WHITE
2. PARTS ARE STACKABLE END TO END ON (2.54)/.100 CENTERS.
3. PIN PUSH OUT FORCE: 2 LBS. MIN.
5. PARTS CONFORM TO PROD. SPEC. 10-07
8. CIRCUIT ONE DESIGNATION IS USED TO DEFINE VOID LOCATION. CIRCUIT ONE OF HEADER AND HOUSING MAY NOT BE ALIGNED





RECOMMENDED P.C. BOARD HOLE LAYOUT

NO. OF CKTS.	DIM. A	DIM. B
28	(68.58± .25) 2.700± .010	(71.12/ 70.61) 2.800/ 2.780
27	(66.04± .25) 2.600± .010	(68.58/ 68.07) 2.700/ 2.680
26	(63.50± .25) 2.500± .010	(66.04/ 65.53) 2.600/ 2.580
25	(60.96± .25) 2.400± .010	(63.50/ 62.99) 2.500/ 2.480
24	(58.42± .25) 2.300± .010	(60.96/ 60.45) 2.400/ 2.380
23	(55.88± .23) 2.200± .009	(58.42/ 57.96) 2.300/ 2.282
22	(53.34± .23) 2.100± .009	(55.88/ 55.42) 2.200/ 2.182
21	(50.80± .23) 2.000± .009	(53.34/ 52.88) 2.100/ 2.082
20	(48.26± .23) 1.900± .009	(50.80/ 50.34) 2.000/ 1.982
19	(45.72± .23) 1.800± .009	(48.26/ 47.80) 1.900/ 1.882
18	(43.18± .20) 1.700± .008	(45.72/ 45.31) 1.800/ 1.784
17	(40.64± .20) 1.600± .008	(43.18/ 42.77) 1.700/ 1.684
16	(38.10± .20) 1.500± .008	(40.64/ 40.23) 1.600/ 1.584
15	(35.56± .20) 1.400± .008	(38.10/ 37.69) 1.500/ 1.484
14	(33.02 ± .18) 1.300± .007	(35.56/ 35.20) 1.400/ 1.386
13	(30.48 ± .18) 1.200± .007	(33.02/ 32.66) 1.300/ 1.286
12	(27.94 ± .18) 1.100± .007	(30.48/ 30.12) 1.200/ 1.186
11	(25.40 ± .18) 1.000± .007	(27.94/ 27.58) 1.100/ 1.086
10	(22.86 ± .15) .900 ± .006	(25.40/ 25.04) 1.000/ .986
9	(20.32 ± .15) .800 ± .006	(22.86/ 22.50) .900 / .886
8	(17.78 ± .15) .700 ± .006	(20.32/ 19.96) .800 / .786
7	(15.24 ± .13) .600 ± .005	(17.78/ 17.42) .700 / .686
6	(12.70 ± .13) .500 ± .005	(15.24/ 14.88) .600 / .586
5	(10.16 ± .13) .400 ± .005	(12.70/ 12.40) .500 / .488
4	(7.62 ± .13) .300 ± .005	(10.16/ 9.86) .400 / .388
3	(5.08 ± .10) .200 ± .004	(7.62 / 7.32) .300 / .288
2	(2.54 ± .05) .100 ± .002	(5.08 / 4.78) .200 / .188

MFG.	SH.	REV.
7		W2
6		W
5		P
4		W1
3		G
2		G
1		Y1

A-7478-N * * *

NO. OF CKTS.

VERSION LETTER CHANGES WHEN PIN NO. OR PRESS DIM. CHANGES

SECONDARY OPERATIONS		
CODE	PACKAGE	
BLANK	BULK	

PLATING

(102) TIN 200 M.I. MIN OVER COPPER
(501) GOLD 20 M.I. MIN OVER NICKEL
(503) GOLD 30 M.I. MIN OVER NICKEL
FOR ADDITIONAL INFORMATION SEE SDES-88.

LTR.	REVISIONS	LTR.	REVISIONS
		Y1	REV BOW UCP2003-1610 1/22/2003 SAMIEC
		Y	WAS M340 UCR2002-0662 12/9/2002 SAMIEC

DIMENSIONS SHOWN (METRIC) INCH
UNLESS OTHERWISE SPECIFIED TOLERANCES: ANGULAR ± 1/2°

	INCH	METRIC
3 PLACE	±.015	
2 PLACE	±.010	± 0.25
1 PLACE		± 0.36

DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS

DRWG. BY | CHK'D. BY | APP'D. BY LENZ | SCALE :

▽ = 0 ▼ = 0 REVISE ONLY ON CAD SYSTEM

TITLE: FRICTION LOCK HEADER ASS'Y (2.54)/.100¢ BENT SQ. PINS 7478 SERIES DWG.

molex MOLEX INCORPORATED LISLE,ILL. 60532 U.S.A. | SHEET NO. 1 OF 7 | DATE 07/30/87

PART NO. SEE CHART | DRWG. NO. SDA-7478

FILE NAME S7478X1 | | DIV. KK | SIZE C

7478-

ENG. NO.	PIN NO.	DIM. L	DIM. X	DIM. Z	DIM. Y	DIM. W	DIM. R
A-7478-NA102	2766-4102	(18.69) .736	(6.60) .260	(3.58) .141	(3.05) .120	90°	(1.17) .046
A-7478-NA501	2766-4501	(18.69) .736	(6.60) .260	(3.58) .141	(3.05) .120	90°	(1.17) .046

ENG. NO.	PIN NO.	DIM. L	DIM. X	DIM. Z	DIM. Y	DIM. W	DIM. T

LTR.	REVISIONS	LTR.	REVISIONS
____	SEE SHEET 1	____	SEE SHEET 1
____	SEE SHEET 1	____	SEE SHEET 1
____	SEE SHEET 1	____	SEE SHEET 1
____	SEE SHEET 1	____	SEE SHEET 1
____	SEE SHEET 1	____	SEE SHEET 1
____	SEE SHEET 1	____	SEE SHEET 1
____	SEE SHEET 1	G	SEE SHEET 1

DIMENSIONS SHOWN (METRIC) INCH

UNLESS OTHERWISE SPECIFIED TOLERANCES: ANGULAR ± 1/2°

	INCH	METRIC
3 PLACE	±	
2 PLACE	±	±
1 PLACE		±

DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS

DRWG. BY GUZIK | CHK'D. BY PATEL

APP'D. BY LENZ | SCALE :

REVISE ONLY ON CAD SYSTEM

TITLE: FRICTION LOCK HEADER ASS'Y (2.54) x .100 CL BENT SQ. PINS 7478 SERIES DWG.

MOLEX INCORPORATED LISLE, ILL. 60532 U.S.A.

SHEET NO. 2 | DATE 07/10/87

PART NO. SEE CHART

DRWG. NO. SDA-7478

FILE NAME S7478X2

DIV. KK | SIZE C

7478

A-7478-NA102			A-7478-NA501																
PART NO.		ENG. NO.	PART NO.		ENG. NO.	PART NO.	ENG. NO.	PART NO.	ENG. NO.	PART NO.	ENG. NO.	PART NO.	ENG. NO.						
22-05-3021	•	A-7478-2A102	22-12-2024	•	A-7478-2A501														
22-05-3031	•	A-7478-3A102	22-12-2034	•	A-7478-3A501														
22-05-3041	•	A-7478-4A102	22-12-2044	•	A-7478-4A501														
22-05-3051	•	A-7478-5A102	22-12-2054	•	A-7478-5A501														
22-05-3061	•	A-7478-6A102	22-12-2064	•	A-7478-6A501														
22-05-3071	•	A-7478-7A102	22-12-2074	•	A-7478-7A501														
22-05-3081	•	A-7478-8A102	22-12-2084	•	A-7478-8A501														
22-05-3091	•	A-7478-9A102	22-12-2094	•	A-7478-9A501														
22-05-3101	•	A-7478-10A102	22-12-2104	•	A-7478-10A501														
22-05-3111	•	A-7478-11A102	22-12-2114	•	A-7478-11A501														
22-05-3121	•	A-7478-12A102	22-12-2124	•	A-7478-12A501														
22-05-3131	•	A-7478-13A102	22-12-2134	•	A-7478-13A501														
22-05-3141	•	A-7478-14A102	22-12-2144	•	A-7478-14A501														
22-05-3151	•	A-7478-15A102	22-12-2154	•	A-7478-15A501														
22-05-3161	•	A-7478-16A102	22-12-2164	•	A-7478-16A501														
22-05-3171	•	A-7478-17A102	22-12-2174	•	A-7478-17A501														
22-05-3181	•	A-7478-18A102	22-12-2184	•	A-7478-18A501														
22-05-3191	•	A-7478-19A102	22-12-2194	•	A-7478-19A501														
22-05-3201	•	A-7478-20A102	22-12-2204	•	A-7478-20A501														
22-05-3211	•	A-7478-21A102	22-12-2214	•	A-7478-21A501														
22-05-3221	•	A-7478-22A102	22-12-2224	•	A-7478-22A501														
22-05-3231	•	A-7478-23A102	22-12-2234	•	A-7478-23A501														
22-05-3241	•	A-7478-24A102	22-12-2244	•	A-7478-24A501														
22-05-3251	•	A-7478-25A102	22-12-2254	•	A-7478-25A501														
22-05-3261	•	A-7478-26A102	22-12-2264	•	A-7478-26A501														
22-05-3271	•	A-7478-27A102	22-12-2274	•	A-7478-27A501														
22-05-3281	•	A-7478-28A102	22-12-2284	•	A-7478-28A501														

LTR.	REVISIONS	LTR.	REVISIONS
	SEE SHEET 1		SEE SHEET 1
	SEE SHEET 1		SEE SHEET 1
	SEE SHEET 1		SEE SHEET 1
	SEE SHEET 1		SEE SHEET 1
	SEE SHEET 1		SEE SHEET 1
	SEE SHEET 1		SEE SHEET 1
	SEE SHEET 1	G	SEE SHEET 1

DIMENSIONS SHOWN (METRIC) INCH

UNLESS OTHERWISE SPECIFIED TOLERANCES: ANGULAR ± 1/2°

	INCH	METRIC
3 PLACE	±	
2 PLACE	±	±
1 PLACE		±

DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS

DRWG. BY GUZIK | CHK'D. BY PATEL | APP'D. BY LENZ | SCALE 2:

▽ = ▼ = REVISE ONLY ON CAD SYSTEM

TITLE: FRICTION LOCK HEADER ASS'Y (2.54)/.100¢ BENT SQ. PINS 7478 SERIES DWG.

MOLEX INCORPORATED LISLE,ILL. 60532 U.S.A. | SHEET NO. 3 | DATE 07/10/87

PART NO. SEE CHART | DRWG. NO. SD A-7478

FILE NAME S7478X3

DIV. KK | SIZE C

7478