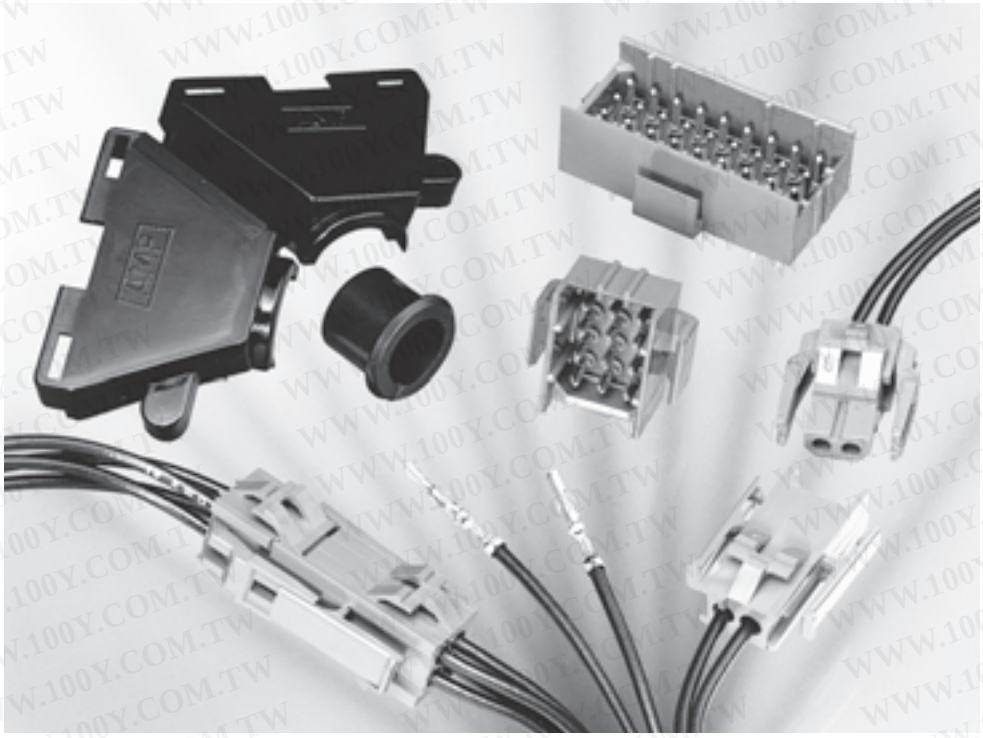
(MR) Miniature Rectangular Connectors (Continued)

Product Facts

- Housings positively lock to help prevent accidental disengagement
- Either cap or plug housing can be mounted in same rectangular panel cutout without additional hardware
- UL94V-0 housings
- Plug and cap design includes molded-in polarizing feature for proper mating
- Numbered cavities for easy circuit identification
- Egg crate design of plug half fully encloses socket contacts, reducing shock hazard
- Molded skirt extension on cap protects pin contacts
- Strain reliefs for 6 through 36 positions are available
- Choice of tin or gold plated contacts
- Not for interrupting current
- Socket solder tail contacts available for hot side PC Board mounting
- High density achieved through .165 [4.19] contact centerline spacing
- Extraction tool removes both pins and sockets
- Contacts accept 26-18 AWG [.12-.8 mm²] wire sizes and insulation diameters of .025-.115 [.635-2.92]
- Same applicator crimps pins and sockets
- Vertical PC Board pin headers are available
- Pin header standoffs on housings at board interface facilitates gas venting and cooling during soldering
- Recognized under the Component Program of Underwriters Laboratories Inc., File No. E28476
- Certified by Canadian Standards Association, File No. LR 7189



Performance Characteristics

The Miniature Rectangular Connector performance characteristics found on pages 103-104 are based on free hanging and panel mount connectors, loaded with contacts crimped on stranded wire.

Dielectric Withstanding Voltage
2.5 KVAC between adjacent circuits

Insulation Resistance—
1500 megohms minimum initial between adjacent circuits

Voltage Rating—250 V AC

Connector Mating—
Split Pin — 1.0 lb. max. per circuit

Connector Unmating—
Split Pin — .25 lb. min. per circuit

Contact Insertion Force—
1.75 lb. max. per contact

Contact Retention—10 lb. min. per contact

Durability—25 cycles, mating and unmating

Technical Documents

Product Specifications

108-1022 (MR) Miniature Rectangular Connectors

108-1078 (MR) Miniature Rectangular Headers

Application Specification

114-1014 (MR) Miniature Rectangular Contacts

Instruction Sheet

408-3231 Pin, Socket, Housing, Contacts, and Accessories

Catalog 82181
Revised 5-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

(MR) Miniature Rectangular Connectors (Continued)

Performance Characteristics
(Continued)

Maximum Current—Maximum current rating of Miniature Rectangular connectors is limited by the maximum operating temperature of the housings which is 105°C including the temperature rise of the contacts which is a maximum of 30°C. There are several variables which have a direct effect on this maximum current-carrying capability for a given connector and must be considered for each application. These variables are:

Wire Size—Larger diameter wire will carry more current since it has less internal resistance to current flow and thus generates less heat. Longer wire lengths also enhance current-carrying capabilities since the wire conducts heat away from the connector.

Connector Size—In general, the more circuits in a connector, the less current can be carried.

Ambient Temperature—The higher the ambient temperature, the less current can be carried in any given connector.

Printed Wiring Board Conductor Size—The finished trace conductor width and thickness should be maximized to allow for the greatest current-carrying capacity and heat dissipation.

Miniature Rectangular connectors also will withstand the following tests:

Vibration—10-55-10 cycles per minute at .06 inch total excursion

Physical Shock—18 drops, 50 G sawtooth at 10 milliseconds

Housing Panel Retention—50 lb. min.

Housing Lock Strength—20 lb. min.

Thermal Shock— -55°C to +85°C

Temperature-Humidity Cycling—25°C to 65°C at 95 RH

Corrosion—48 hr. at 5% salt concentration

Related Product Data

Product Specifications

108-1022 (MR) Miniature Rectangular Connectors

108-1078 (MR) Miniature Rectangular Headers

Current Rating Verification for 30°C Maximum Temperature Rise 100% Energized

Wire-to-Wire MR Calculated Current Table

Number of Circuits	Wire Gauge				
	18	20	22	24	26
2	9.00	8.00	6.50	5.50	5.00
3	8.50	7.00	6.00	5.00	4.50
4	7.00	6.50	5.50	5.00	4.00
6	6.00	6.00	5.00	4.00	4.00
9	5.00	5.00	4.00	4.00	3.50
12	4.50	4.50	4.00	3.50	3.00
15	4.50	4.00	3.50	3.00	2.50
20	4.00	4.00	3.50	3.00	2.50
24	4.00	3.50	3.00	2.50	2.00
36	3.50	3.00	2.50	2.00	2.00

Values are based on initial Temperature Rise versus Current Testing and are intended to be a guide in the selection of a connector family. All applications should be tested by the end user. The values listed are per circuit for fully loaded housings being 100% energized. **Note:** All combinations were not tested and this chart contains interpolated and extrapolated values.

Minimum Wire Lengths for T-Rise vs. Current Testing

AWG	Min. Length (in.)	AWG	Min. Length (in.)
30	2.6	18	9.4
28	3.2	16	11.3
26	4.1	14	13.7
24	5.1	12	16.4
20	7.8	10	19.3

Note: If wire lengths used are less than those listed above, the current-carrying ability of the system will be reduced due to less heat being conducted away from the connector. The customer should fully test all applications.

Wire-to-Board

Due to the vast differences in trace geometry and printed circuit board configurations, we are unable to provide a separate current carrying chart for our printed circuit board header products. However, the above Wire-to-Wire charts may be used as a guideline for headers if the trace width and thickness is equal to the listed wire gauge. For vertical headers, only 95% of the Wire-to-Wire value should be used. For right-angle headers, only 75% of the Wire-to-Wire value should be used. The charted values are only a tool for connector selection and will require the customer to fully test their application.

Termination Resistance/Contact Crimp Tensile Force

Wire Size		Termination Resistance		Contact Crimp Tensile Force	
AWG	mm²	Test Current (Amps)	Resistance Milliohms (Max. Init.)	Force (Min.) lbs.	Force (Min.) N
26	.12	1	5.00	5	22
24	.2	1.5	5.00	8	36
22	.3	3	4.50	14	62
20	.5	4.5	4.00	14	62
18	.8	6	4.00	30	133

Note: This is the total resistance between wire crimps of a mated pin and socket.

(MR) Miniature Rectangular Connectors (Continued)

(MR) Miniature Rectangular Connector Mating Combinations

Connector Part Number				Mating Connector Part Number			
Number of Circuits	Flammability Rating	Style	Pin Housing (Cap) Part No.	Socket Housing (Plug) Part No.	PC Board Vertical Pin Headers		
					Plating	.062 Board	.120 Board
2	UL94V-0	In-Line	1-640507-0	1-640517-0	Tin	640497-1	640497-3
					Duplex[1]	2-640497-2	2-640497-4
3	UL94V-0	In-Line	1-640508-0	1-640518-0	Tin	640498-1	640498-3
					Duplex[1]	2-640498-2	2-640498-4
4	UL94V-0	Matrix	1-640509-0	1-640519-0	Tin	640499-1	640499-3
					Duplex[1]	2-640499-2	2-640499-4
6	UL94V-0	Matrix	1-640510-0	1-640520-0	Tin	640500-1	640500-3
					Duplex[1]	2-640500-2	2-640500-4
9	UL94V-0	Matrix	1-640511-0	1-640521-0	Tin	640501-1	640501-3
					Duplex[1]	2-640501-2	2-640501-4
12	UL94V-0	Matrix	1-640512-0	1-640522-0	Tin	640502-1	640502-3
					Duplex[1]	2-640502-2	2-640502-4
15	UL94V-0	Matrix	1-640513-0	1-640523-0	Tin	640503-1	640503-3
					Duplex[1]	2-640503-2	2-640503-4
20	UL94V-0	Matrix	1-640514-0	1-640524-0	Tin	640504-1	640504-3
					Duplex[1]	2-640504-2	2-640504-4
24	UL94V-0	Matrix	1-640515-0	1-640525-0	Tin	640505-1	640505-3
					Duplex[1]	2-640505-2	2-640505-4
36	UL94V-0	Matrix	1-640516-0	1-640526-0	Tin	640506-1	640506-3
					Duplex[1]	2-640506-2	2-640506-4

[1]Duplex Finish — Plated with .000030 [.000762] min. gold in mating area, matte tin on solder tail end over .000050 [.00127] min. nickel underplate on entire contact.

Note: **All part numbers are RoHS Compliant.**

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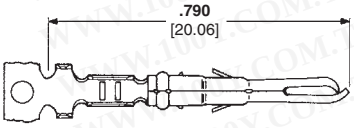
(MR) Miniature Rectangular Connectors (Continued)

Contacts

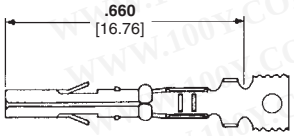
Pin diameter .068 [1.73]

Material

Phosphor bronze
Stock thickness .008 [.203]



Live Split Pin



Standard Socket

Wire Size Range AWG [mm²]	Ins. Dia. Range	Finish	Contact Part Numbers				HDM Applicator Part No.	Hand Tool Part No.
			Live Split Pin		Standard Socket			
			Strip Form	Loose Piece	Strip Form	Loose Piece		
26-24 [.12-.2]	**.025-.050** .635-1.27	Pre-tin	350968-1	640579-1	794000-1	794001-1	466352-1[3] 466352-2[3] 466352-3[3]	91534-1
		Select Gold[1]	350968-2	640579-2	794000-2	794001-2		
26-18[2] [.12-.8]	**.050-.115** 1.27-2.92	Pre-tin	350967-1	640545-1	641294-1	641300-1	466351-1[3] 466351-2[3] 466351-4[3]	91526-1
		Select Gold[1]	350967-2	640545-2	641294-2	641300-2		

[1]Select Gold Finish—Plated with .000030 min. [.000762] gold in mating area over .000050 [.00127] min. nickel underplate on entire contact.
[2]1650 CMA maximum.
[3]HDM Applicator part number ending in -1 is used on AMPOMATOR CLS Machine with T or G Terminators, -2 is used on AMP-O-LECTRIC Model K Machine, -3 or -4 is used on AMP-O-LECTRIC Model G Machine. See pages 201-204 for further information.

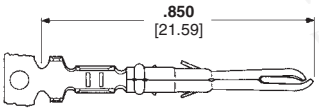
Grounding Pins

(Mate first, break last, not for interrupting current)

Pin diameter .068 [1.73]
Stock thickness .008 [.203]

Material

Phosphor bronze



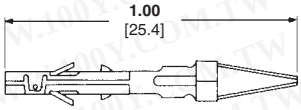
Wire Size Range AWG [mm²]	Ins. Dia. Range	Finish	Grounding Pin Part Numbers		HDM Applicator Part No.	Hand Tool Part No.
			Strip Form	Loose Piece		
26-18[2] [.12-.8]	**.050-.115** 1.27-2.92	Pre-tin	350969-1	640580-1	466351-1[3] 466351-2[3] 466351-4[3]	91526-1
		Select Gold[1]	350969-2	640580-2		

[1]Select Gold Finish—Plated with .000030 [.000762] min. gold in mating area over .000050 [.00127] min. nickel underplate on entire contact.
[2]1650 CMA maximum.
[3]HDM Applicator part number ending in -1 is used on AMPOMATOR CLS Machine with T or G Terminators, -2 is used on AMP-O-LECTRIC Model K Machine, -3 or -4 is used on AMP-O-LECTRIC Model G Machine. See pages 201-204 for further information.

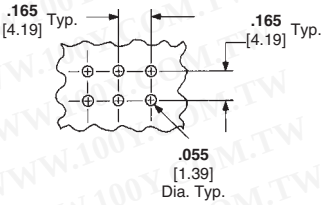
Solder Tail Socket

Material and Finish

Phosphor bronze, pre-tin
Stock thickness .008 [.203]



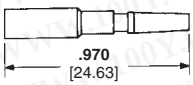
Part Number 350838-1
Note: Recommended for use with MR Socket Housings



Recommended PC Board Hole Layout
.062 [1.57] or .093 [2.36] thick board

Keying Plug

IS 408-3231



Part Number 350591-1
UL94V-0 Nylon material
Note: Use in socket housings only.

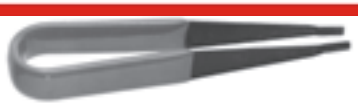
Related Product Data

Product Specification
108-1022 (MR) Miniature Rectangular Connectors

Application Specification
114-1014 (MR) Miniature Rectangular Contacts

Performance Characteristics—pages 103-104
Housings—pages 107-108
Technical Documents—pages 103 and 199-200
Application Tooling—pages 201-204

Contact Extraction Tool
Part No. 455822-2
IS 408-9570



Contact Insertion Tool
(For inserting contacts applied to small diameter wire)
Part No. 455830-1
IS 408-7984

Note: All part numbers are RoHS Compliant.

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(MR) Miniature Rectangular Connectors (Continued)

Housings

Free Hanging or Panel Mount

.165 [4.19] Centerline spacing

Material

Nylon, Natural (Color—Brick Red)

Flammability Rating—UL94V-0

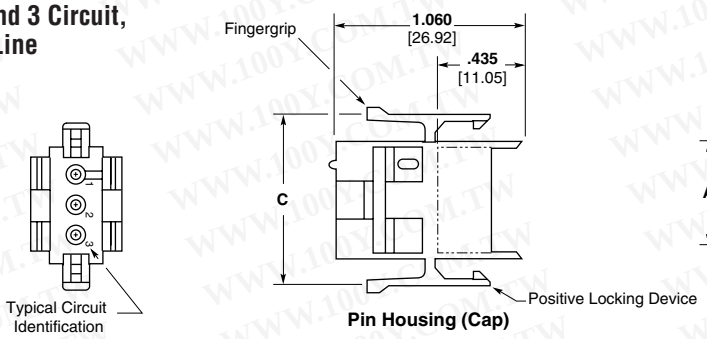
Related Product Data

Product Specification

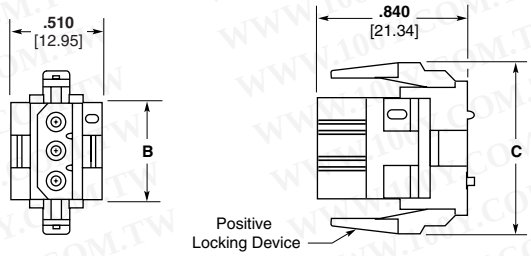
108-1022 (MR) Miniature Rectangular Connectors

Performance Characteristics—pages 103-104
Panel Cutout Recommendations—page 109
Contacts—page 106
Keying Plug—page 106
Strain Reliefs—page 110
Commoning Bars—page 110
Technical Documents—pages 103 and 199-200
Mating Headers—pages 111-112

2 and 3 Circuit, In-Line



Pin Housing (Cap)

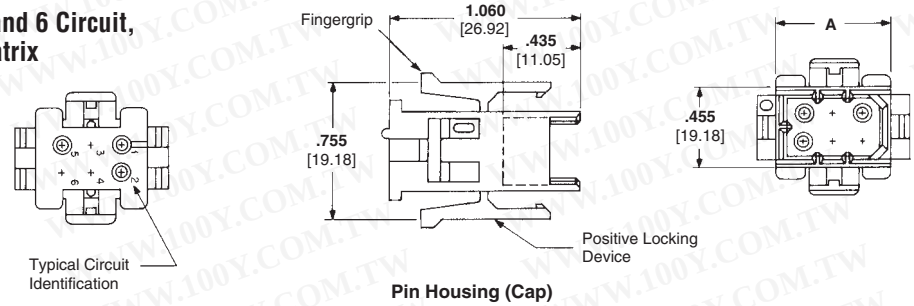


Socket Housing (Plug)

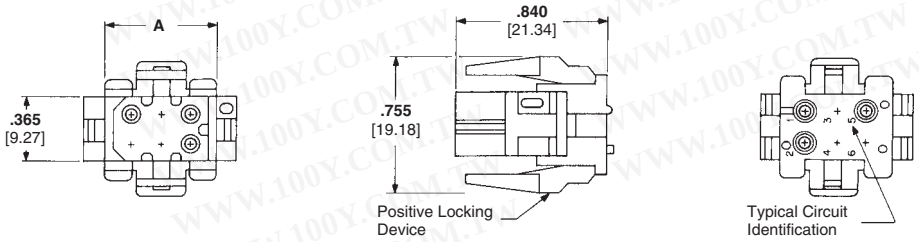
Number of Circuits	Dimensions			Part Numbers	
	A	B	C	Pin Housing (Cap)	Socket Housing (Plug)
2	.455 11.56	.365 9.27	.755 19.18	1-640507-0	1-640517-0
3	.620 15.75	.530 13.46	.920 23.37	1-640508-0	1-640518-0

Note: All part numbers are RoHS Compliant.

4 and 6 Circuit, Matrix



Pin Housing (Cap)



Socket Housing (Plug)

Number of Circuits	A Dim.	Part Numbers	
		Pin Housing (Cap)	Socket Housing (Plug)
4	.455 11.56	1-640509-0	1-640519-0
6	.620 15.75	1-640510-0	1-640520-0

Note: All part numbers are RoHS Compliant.

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UK: 44-208-420-8341

(MR) Miniature Rectangular Connectors (Continued)

Housings

Free Hanging or Panel Mount

.165 [4.19] Centerline spacing

Material

Nylon, Natural (Color—Brick Red)

Flammability Rating—UL94V-0

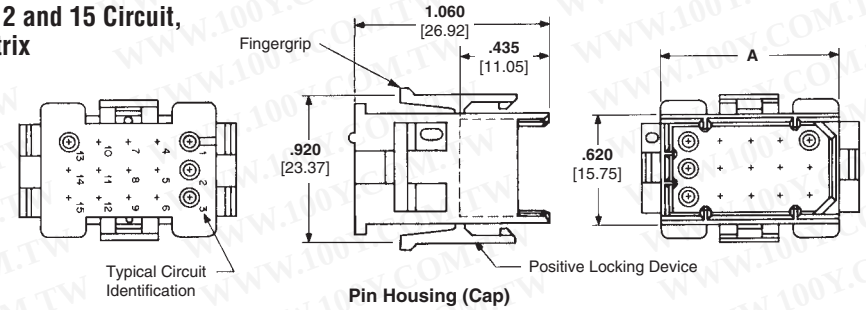
Related Product Data

Product Specification

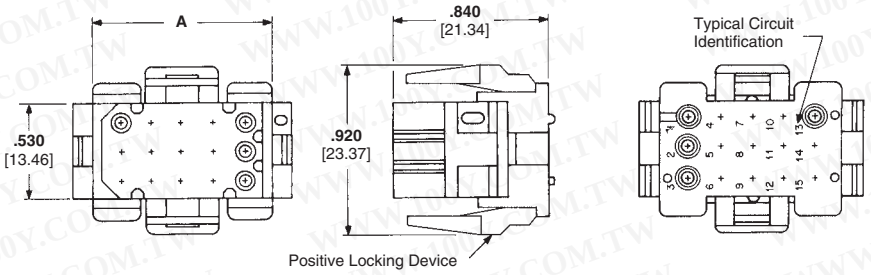
108-1022 (MR) Miniature Rectangular Connectors

Performance Characteristics—pages 103-104
Panel Cutout Recommendations—page 109
Contacts—page 106
Keying Plug—page 106
Strain Reliefs—page 110
Commoning Bars—page 110
Technical Documents—pages 103 and 199-200
Mating Headers—pages 111-112

9, 12 and 15 Circuit, Matrix

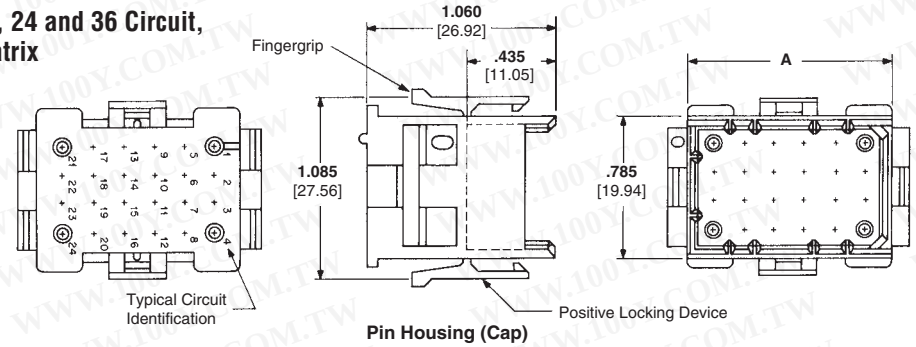


Pin Housing (Cap)

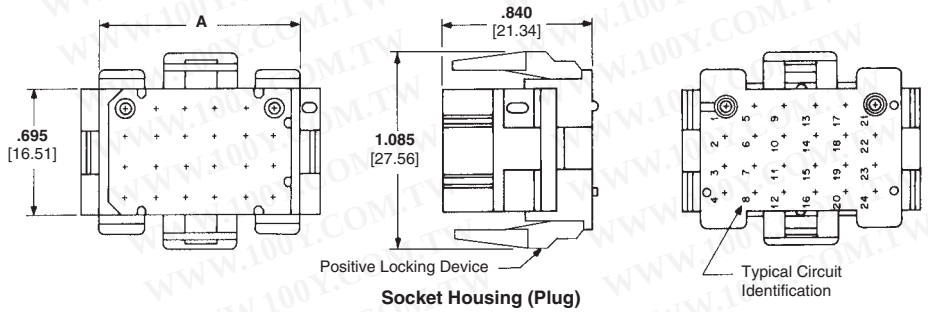


Socket Housing (Plug)

20, 24 and 36 Circuit, Matrix



Pin Housing (Cap)



Socket Housing (Plug)

Number of Circuits	A Dim.	Part Numbers	
		Pin Housing (Cap)	Socket Housing (Plug)
9	**.620** [15.75]	1-640511-0	1-640521-0
12	**.785** [19.94]	1-640512-0	1-640522-0
15	**.950** [24.13]	1-640513-0	1-640523-0
20	**.950** [24.13]	1-640514-0	1-640524-0
24	**1.115** [28.32]	1-640515-0	1-640525-0
36	**1.610** [40.89]	1-640516-0	1-640526-0

Note: **All part numbers are RoHS Compliant.**

(MR) Miniature Rectangular Connectors (Continued)

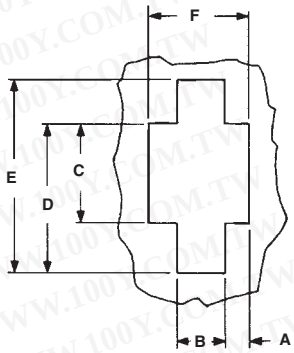
Recommended Panel Cutouts for Pin and Socket Housings

Related Product Data

Product Specification

108-1022 (MR) Miniature Rectangular Connectors

Housings— pages 107-108
Technical Documents— pages 103 and 199-200



View is from housing entry side

Panel Thickness .068 [1.75] Max.

Number of Circuits	Panel Cutout Dimensions					
	A	B	C	D	E	F
2	**.105** 2.67	**.220** 5.59	**.475** 12.07	**.630** 16.00	**.785** 19.94	**.430** 10.92
3	**.105** 2.67	**.220** 5.59	**.640** 16.26	**.795** 20.19	**.950** 24.13	**.430** 10.92
4	**.157** 3.99	**.280** 5.28	**.475** 12.07	**.630** 16.00	**.785** 19.94	**.595** 15.11
6	**.208** 5.28	**.345** 8.76	**.475** 12.07	**.630** 16.00	**.785** 19.94	**.760** 19.30
9	**.208** 5.28	**.345** 8.76	**.640** 16.26	**.795** 20.19	**.950** 24.13	**.760** 19.30
12	**.225** 5.72	**.475** 12.07	**.640** 16.26	**.795** 20.19	**.950** 24.13	**.925** 23.50
15	**.308** 7.82	**.475** 12.07	**.640** 16.26	**.795** 20.19	**.950** 24.13	**1.090** 27.69
20	**.308** 7.82	**.475** 12.07	**.805** 20.45	**.960** 24.38	**1.115** 28.32	**1.090** 27.69
24	**.390** 9.91	**.475** 12.07	**.805** 20.45	**.960** 24.38	**1.115** 28.32	**1.255** 31.88
36	**.625** 15.86	**.500** 12.70	**.800** 20.32	**.950** 24.13	**1.100** 27.94	**1.750** 44.45

Notes:
1. When mounted in a .060 [1.52] thick panel, the cap's mating end extends .800 [20.32] beyond the panel front; wire end extends .220 [55.88] from the panel rear. Plug mating end extends .580 [14.73] beyond the panel front; wire end extends .220 [55.88] from the panel rear.
2. The panel should be punched so that the housing enters the panel in the same direction as the punch for ease of assembly.

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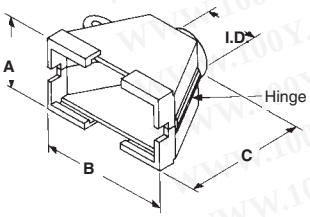
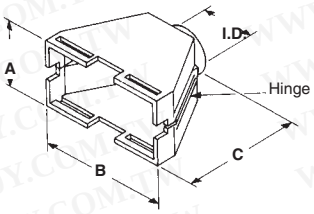
Strain Reliefs
One Piece — Clam Shell
(Illustrated in closed position)
IS 408-3231

Material
Nylon, Natural (Color—Brick Red)

Flammability Rating — UL94V-0



6, 9, 12, 15 and 20 Circuit



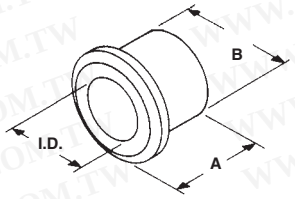
24 and 36 Circuit

Number of Circuits	Dimensions				Part Numbers
	I.D.	A	B	C	
6	.374 9.50	.634 16.10	.760 19.30	1.000 25.4	350373-1
9	.420 10.67	.800 20.32	.760 19.30	1.000 25.4	350522-1
12	.420 10.67	.790 20.07	.925 23.50	1.000 25.4	350374-1
15	.420 10.67	.790 20.07	1.090 27.69	1.000 25.4	350523-1
20	.560 14.22	.960 24.38	1.090 27.69	1.280 23.51	480634-1
24	.560 14.22	.900 22.86	1.255 31.88	1.280 23.51	350524-1
36	.560 14.22	.900 22.86	1.750 44.45	1.280 23.51	480594-1

Notes:
1. These strain reliefs can be used with either pin or socket housings.
2. **Customer supplied:** One No. 6 Panhead Type B self-taping screw, 3/8 long. Plating is optional to conform to customer requirements.
3. Strain reliefs are also available in UL94V-2 nylon, black in color. To order strain reliefs in this material use the appropriate dash numbers: 1-XXXXXX-9.

Strain Relief
Adapting Grommets
IS 408-3231

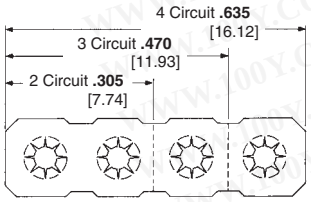
Material
Flexible PVC (55/75 Durometer) black color

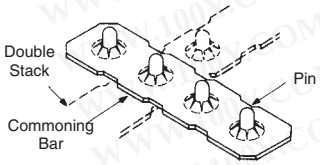


Number of Circuits	Dimensions			Part Numbers
	I.D.	A	B	
6	.156 3.96	.375 9.53	.375 9.53	2-350377-0
	.218 5.54	.375 9.53	.375 9.53	2-350376-0
	.296 7.52	.375 9.53	.375 9.53	2-350375-0
9, 12 & 15	.218 5.54	.375 9.53	.420 10.67	2-350378-1
	.250 6.35	.375 9.53	.420 10.67	2-350379-1
	.281 7.14	.375 9.53	.420 10.67	2-350380-1
20, 24 & 36	.437 11.10	.500 12.70	.562 14.27	2-380935-0
	.375 9.53	.500 12.70	.562 14.27	2-380936-0
	.312 7.92	.500 12.70	.562 14.27	2-380937-0

Commoning Bars
IS 408-3231

Material
Brass
Stock thickness .008 [.203]





Finish	Part Numbers		
	2 Circuit	3 Circuit	4 Circuit
Pre-tin	350020-1	350021-1	350022-1
Gold[1]	350020-2	350021-2	350022-2

[1]Gold Finish—Plated with .000030 [.000762] min. gold over .000050 [.00127] min. nickel underplate on entire contact.

Related Product Data
Housings—pages 107-108

Notes:
1. Commoning bars can be used to common adjacent pin contacts in any column or row. Maximum stack per pin is two.
2. The above illustrates the proper insertion of the Commoning Bar.
3. Use the mating socket housing to assemble the Commoning Bar onto the pins.

Commoning Bar Extraction Tool
Part No. 457306-1
IS 408-3231

Note: **All part numbers are RoHS Compliant.**

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(MR) Miniature Rectangular Connectors (Continued)

PC Board Vertical Pin Headers

.165 [4.19] Centerline spacing

Material

Housing — Nylon, Natural (Color—Brick Red)

Flammability Rating — UL94V-0

Contacts — Phosphor bronze

Solder tail diameter .040 [1.02]

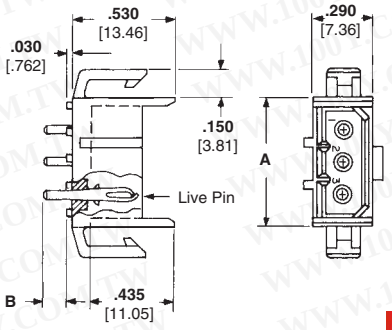
Related Product Data

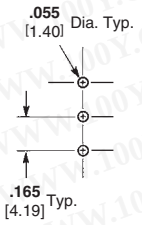
Product Specification

108-1078 (MR) Miniature Rectangular Headers

Dimensions A and B — page 112
Performance Characteristics— pages 103-104
Technical Documents— pages 103 and 199-200
Mating Socket Housings— pages 107-108

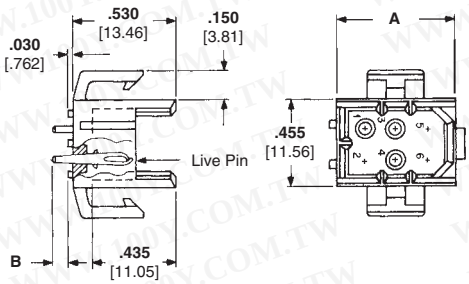
2 and 3 Circuit, In-Line

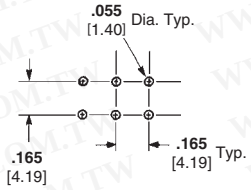




Recommended PC Board Hole Layout

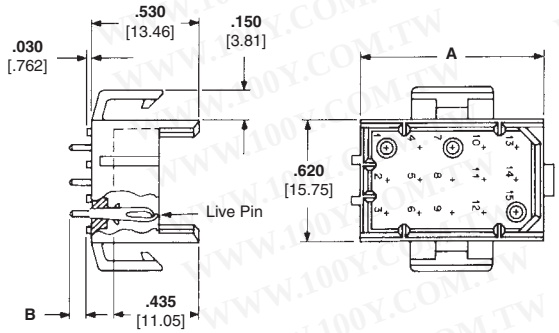
4 and 6 Circuit, Matrix

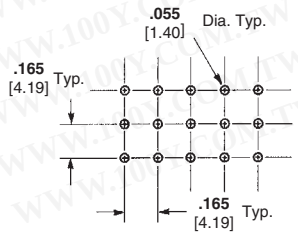




Recommended PC Board Hole Layout

9, 12 and 15 Circuit, Matrix





Recommended PC Board Hole Layout

High Density
.165 [4.20] Centerline

Catalog 82181
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(MR) Miniature Rectangular Connectors (Continued)

PC Board Vertical Pin Headers

.165 [4.19] Centerline spacing

Material

Housing — Nylon, Natural (Color–Brick Red)

Flammability Rating — UL94V-0

Contacts — Phosphor bronze

Solder tail diameter .040 [1.02]

Related Product Data

Product Specification

108-1078 (MR) Miniature Rectangular Headers

Dimensions (2 and 3 Circuit, In-Line; 4, 6, 9, 12 and 15 Circuit, Matrix) — page 112

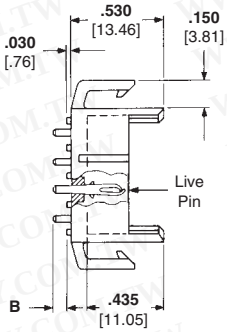
Performance Characteristics— pages 103-104

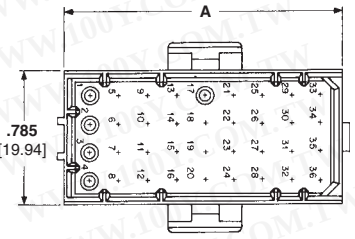
Vertical Pin Headers and Recommended PC Board Hole Layouts—pages 111-112

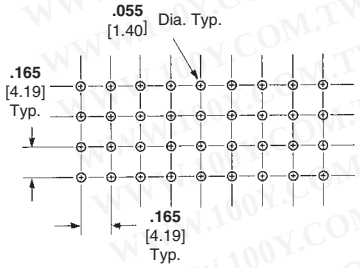
Technical Documents— pages 103 and 199-200

Mating Socket Housings— pages 107-108

20, 24 and 36 Circuit, Matrix







Recommended PC Board Hole Layout

Number of Circuits	Board Thickness	Dimensions A	Dimensions B	Header Part Numbers Tin Finish	Header Part Numbers Duplex Finish[1]	Mates with Socket Housing Part No.
2 In-Line	**.062** 1.57	**.455** 11.56	**.120** 3.05	640497-1	2-640497-2	1-640517-0
	.120 3.05	**.455** 11.56	**.180** 4.57	640497-3	2-640497-4	
3 In-Line	**.062** 1.57	**.620** 15.75	**.120** 3.05	640498-1	2-640498-2	1-640518-0
	.120 3.05	**.620** 15.75	**.180** 4.57	640498-3	2-640498-4	
4	**.062** 1.57	**.455** 11.56	**.120** 3.05	640499-1	2-640499-2	1-640519-0
	.120 3.05	**.455** 11.55	**.180** 4.57	640499-3	2-640499-4	
6	**.062** 1.57	**.620** 15.75	**.120** 3.05	640500-1	2-640500-2	1-640520-0
	.120 3.05	**.620** 15.75	**.180** 4.57	640500-3	2-640500-4	
9	**.062** 1.57	**.620** 15.75	**.120** 3.05	640501-1	2-640501-2	1-640521-0
	.120 3.05	**.620** 15.75	**.180** 4.57	640501-3	2-640501-4	
12	**.062** 1.57	**.785** 19.94	**.120** 3.05	640502-1	2-640502-2	1-640522-0
	.120 3.05	**.785** 19.94	**.180** 4.57	640502-3	2-640502-4	
15	**.062** 1.57	**.950** 24.13	**.120** 3.05	640503-1	2-640503-2	1-640523-0
	.120 3.05	**.950** 24.13	**.180** 4.57	640503-3	2-640503-4	
20	**.062** 1.57	**.950** 24.13	**.120** 3.05	640504-1	2-640504-2	1-640524-0
	.120 3.05	**.950** 24.13	**.180** 4.57	640504-3	2-640504-4	
24	**.062** 1.57	**1.115** 28.32	**.120** 3.05	640505-1	2-640505-2	1-640525-0
	.120 3.05	**1.115** 28.32	**.180** 4.57	640505-3	2-640505-4	
36	**.062** 1.57	**1.610** 40.89	**.120** 3.05	640506-1	2-640506-2	1-640526-0
	.120 3.05	**1.610** 40.89	**.180** 4.57	640506-3	2-640506-4	

[1]Duplex Finish — Plated with .000030 [.000762] min. gold in mating area, matte tin on solder tail end over .000050 [.00127] min. nickel underplate on entire contact.

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