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# PRODUCT SPECIFICATION

## .093 SERIES PLUG AND RECEPTACLE POWER CONNECTORS

### 1.0 SCOPE

This Product Specification covers the 5.03 mm (.198 inch) centerline connector series using pin and socket terminals terminated with 14 to 24 AWG wire using crimp technology with tin plating.

### 2.0 PRODUCT DESCRIPTION

#### 2.1 PRODUCT NAME AND SERIES NUMBER(S)

<u>PRODUCT NAME</u>	<u>SERIES NUMBER</u>
Plug Housing, 1-circuit	1619-1P
Receptacle Housing, 1-circuit	1619-1R
Plug Housing, 2-circuit	1545-P*
Receptacle Housing, 2-circuit	1545-R*
Plug Housing, 3-circuit	1396-P*
Receptacle Housing, 3-circuit	1396-R*
Plug Housing, 4-circuit (in-line)	1490-P*
Receptacle Housing, 4-circuit (in-line)	1490-R*
Plug Housing, 4-circuit (2 x 2)	2163-P*
Receptacle Housing, 4-circuit (2 x 2)	2163-R*
Plug Housing, 5-circuit	1653-P*
Receptacle Housing, 5-circuit	1653-R*
Plug Housing, 6-circuit	1261-P*
Receptacle Housing, 6-circuit	1261-R*
Plug Housing, 9-circuit	1292-P*
Receptacle Housing, 9-circuit	1292-R*
Plug Housing, 12-circuit	1360-P*
Receptacle Housing, 12-circuit	1360-R*
Socket Terminal, 14-18 AWG	1189
Pin Terminal, 14-18 AWG	1190
Socket Terminal, 18-22 AWG	1380
Pin Terminal, 18-22 AWG	1381
Socket Terminal, 22-24 AWG	2870
Pin Terminal, 22-24 AWG	2871
Socket Terminal, 14-18 AWG, (P-B)	4550
Socket Terminal, 18-22 AWG, (P-B)	2151

#### 2.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKINGS

Housings are molded of UL 94V-2 rated PA66.

Terminals are tin-plated brass or phosphor-bronze.

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

<u>REVISION:</u> <b>A</b>	<u>ECR/ECN INFORMATION:</u> EC No: <b>UCR#2002-0324</b> DATE: <b>2001 / 10/ 04</b>	<u>TITLE:</u> <b>PRODUCT SPECIFICATION STANDARD .093 SERIES PLUGS &amp; RECEPTACLES</b>	<u>SHEET No.</u> <b>1 of 3</b>
<u>DOCUMENT NUMBER:</u> <b>PS-43660-9999</b>	<u>CREATED / REVISED BY:</u> <b>BWIRKUS 10/4/01</b>	<u>CHECKED BY:</u> <b>BWIRKUS 10/4/01</b>	<u>APPROVED BY:</u> <b>SFRY 10/5/01</b>



# PRODUCT SPECIFICATION

## 2.3 SAFETY AGENCY APPROVALS

UL File #E29179  
CSA File #E29179  
TUV License #R75107

## 3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

See the appropriate sales drawings for necessary referenced documents and specifications.

## 4.0 RATINGS

### 4.1 VOLTAGE

250 Volts AC (RMS)

### 4.2 CURRENT AND APPLICABLE WIRES

AWG	Circuit Size	Amps
14	3	14
14	9	11
18	3	10
18	9	7
22	3	7
22	9	5

### 4.3 TEMPERATURE

Operating: - 55°C to + 105°C

## 5.0 PERFORMANCE

### 5.1 ELECTRICAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	Contact Resistance (Low Level)	Mate connectors: apply a maximum voltage of 20 mV and a current of 20 mA. (Measurement locations in Section 7.0)	10 milliohms MAXIMUM [initial]
2	Dielectric Withstanding Voltage	Mate connectors: apply a voltage of 2000 VAC for 1 minute between adjacent terminals and between terminals to ground.	No breakdown; current leakage < 500 mA
3	Temperature Rise (via Current Cycling)	Mate connectors, measuring the temperature rise at 60 minute intervals during 96 hours of steady state at rated current; followed by 240 hours of current cycling (45 minutes ON and 15 minutes OFF per hour) with measurements made during last 5 minute period of each ON cycle; followed by 96 hours of steady state at rated current with measurements taken at 60 minute intervals.	Temperature rise: +30°C MAXIMUM

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DOCUMENT NUMBER: <b>PS-43660-9999</b>	CREATED / REVISED BY: <b>BWIRKUS 10/4/01</b>	CHECKED BY: <b>BWIRKUS 10/4/01</b>	APPROVED BY: <b>SFRY 10/5/01</b>



# PRODUCT SPECIFICATION

## 5.2 MECHANICAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
4	Connector Mate and Unmate Forces	Mate and unmate connector (male to female) at a rate of $25 \pm 6$ mm ( $1 \pm \frac{1}{4}$ inch) per minute for a total of 25 cycles. Initial mate forces to be measured. Unmate forces to be measured after 25 cycles.	<b>15.6 N (3.5 lbf)</b> MAXIMUM insertion force <b>4.4 N (1 lbf)</b> MINIMUM withdrawal force
5	Terminal Retention Force (in Housing)	Axial pullout force on the terminal in the housing at a rate of $25 \pm 6$ mm ( $1 \pm \frac{1}{4}$ inch) per minute.	<b>89 N (20 lbf)</b> MINIMUM retention force
6	Wire Pullout Force (Axial)	Apply an axial pullout force on the wire at a rate of $25 \pm 6$ mm ( $1 \pm \frac{1}{4}$ inch).	MINIMUM pullout forces: 14 AWG <b>178 N (40 lbf)</b> 16 AWG <b>156 N (35 lbf)</b> 18 AWG <b>133 N (30 lbf)</b> 20 AWG <b>89 N (20 lbf)</b> 22 AWG <b>62 N (14 lbf)</b> 24 AWG <b>36 N (8 lbf)</b>
7	Terminal Insertion Force (into Housing)	Apply an axial insertion force on the terminal at a rate of $25 \pm 6$ mm ( $1 \pm \frac{1}{4}$ inch).	<b>22N (5 lbf)</b> MAXIMUM insertion force

## 5.3 ENVIRONMENTAL REQUIREMENTS

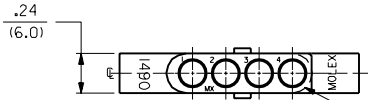
ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
8	Thermal Cycling	Mate connectors; expose to temperature cycling between $-25^{\circ}\text{C}$ and $70^{\circ}\text{C}$ for 500 cycles with a dwell time of 30 minutes at each extreme. Measurements to be taken initially and after every 100 cycles.	<b>10 milliohms</b> MAXIMUM (change from initial) & Visual: No Damage

## 6.0 PACKAGING

Parts shall be packaged to protect against damage during handling, transit and storage. See the appropriate sales drawings for additional information on packaging requirements.

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UCR#2002-0324</b> DATE: <b>2001 / 10 / 04</b>	TITLE: <b>PRODUCT SPECIFICATION STANDARD .093 SERIES PLUGS &amp; RECEPTACLES</b>	SHEET No. <b>3 of 3</b>
DOCUMENT NUMBER: <b>PS-43660-9999</b>	CREATED / REVISED BY: <b>BWIRKUS 10/4/01</b>	CHECKED BY: <b>BWIRKUS 10/4/01</b>	APPROVED BY: <b>SFRY 10/5/01</b>

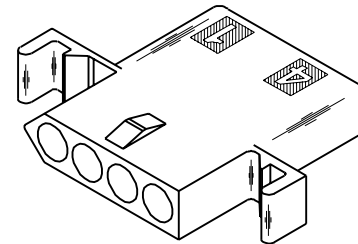
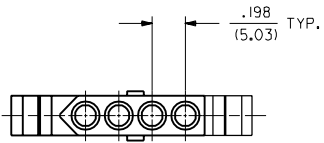
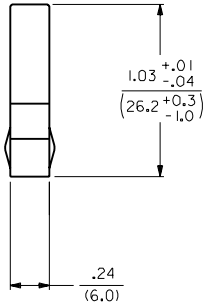
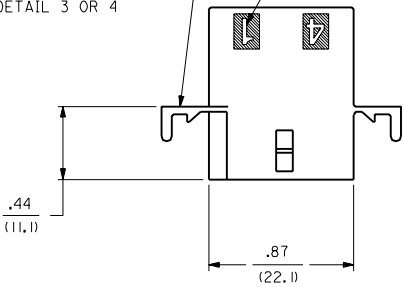
RECEPTACLE



ALTERNATE CONFIGURATION

OPTIONAL MOUNTING EAR (2 PL.)  
(STD. MOUNTING EAR SHOWN)  
SEE DETAIL 3 OR 4

CIRCUIT I.D.  $\triangle$

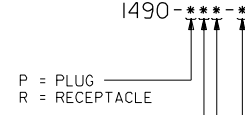


RECEPTACLE HOUSING

DIMENSIONS SHOWN (METRIC) INCH		UNLESS OTHERWISE SPECIFIED TOLERANCES: ANGULAR ± .004 TO		REVISIONS		REVISIONS		REVISIONS		REVISIONS		REVISIONS		REVISIONS		REVISIONS		REVISIONS			
INCH	METRIC	INCH	METRIC	NO.	DATE	BY	CHKD.	DATE	BY	CHKD.	DATE	BY	CHKD.	DATE	BY	CHKD.	DATE	BY	CHKD.		
3 PLACE ± .010	---			T		SEE SHT. 1															
2 PLACE ± .014	± 0.25			S		SEE SHT. 1															
1 PLACE ---	± 0.35			R		SEE SHT. 1															
				P		SEE SHT. 1															
DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS		DRAWN BY: CEP		SCALE: 2 : 1		APP'D. BY: RAS		FILE NAME: SD1490X2.DWG		PART NO.: M093		DRAWING NO.: 60532		SHEET NO.: 2		DATE: 3/10/88		U.S.A.		MOLLEX INCORPORATED	
SEE CHART		TITLE: .093/(2.36) HOUSING, PLUG AND RECEPTACLE, 4 CKT. ± .198/(5.03) CTRS.		SD-1490-		THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION.		DIV: CP		SIZE: C		MOLLEX INCORPORATED		U.S.A.		MOLLEX INCORPORATED		U.S.A.		MOLLEX INCORPORATED	

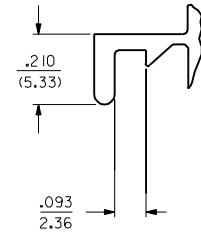
PLUG		RECEPTACLE	
PART NO.	ENG. NO.	PART NO.	ENG. NO.
03-09-2041	I490-P	03-09-1041	I490-R
03-09-2042	I490-P1	03-09-1042	I490-R1
03-09-7041	I490-PBK	03-09-6041	I490-RBK
03-09-7042	I490-P1BK	03-09-6042	I490-R1BK
PRELIMINARY	I490-P2	03-09-1043	I490-R2
03-09-3042	I490-P1BU	03-09-6043	I490-RBU
		03-09-6045	I490-RGN

**LEGEND:**

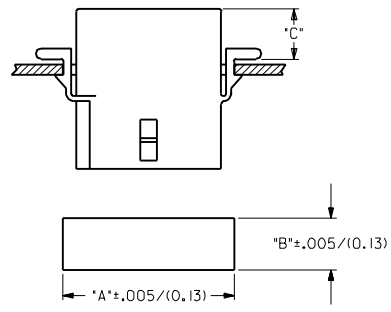


- BLANK = WITH STANDARD EARS  
 1 = WITHOUT EARS  
 2 = WITH PREBENT EARS, PER DETAIL 4

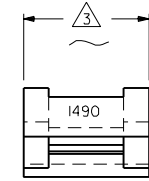
- COLOR: BLANK=NATURAL COLOR  
 AM=AMBER BK=BLACK BU=BLUE  
 BN=BROWN CY=GRAY GN=GREEN  
 OR=ORANGE RD=RED YW=YELLOW  
 BLANK = MATERIAL CODE A



**DETAIL 3**  
 .093/(2.36) STANDARD MOUNTING EAR  
 (SCALE 4:1)



HOUSING	DIM. "A"	DIM. "B"	DIM. "C"
PLUG	1.131/(28.73)	.375/(9.52)	.36/(9.1)
RECEPTACLE	1.038/(26.36)	.312/(7.92)	.37/(9.4)



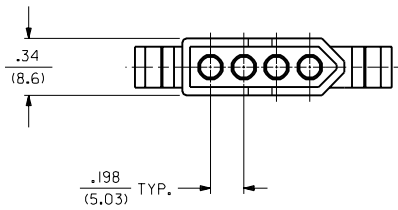
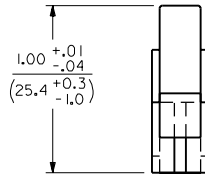
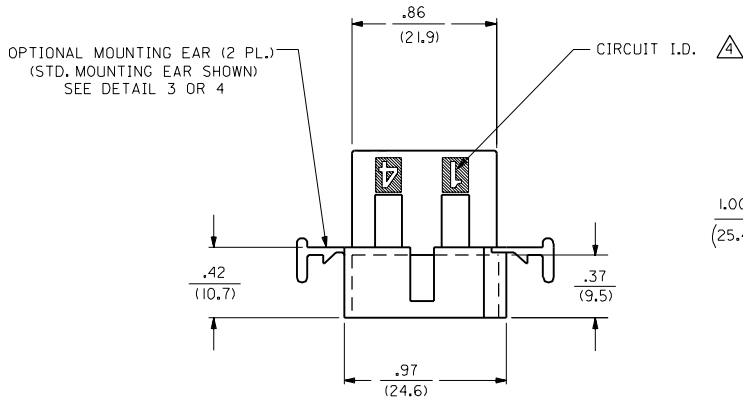
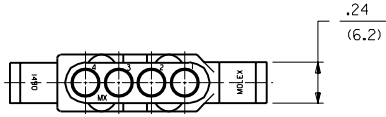
**DETAIL 4**  
 .093/(2.36) PREBENT MOUNTING EAR  
 (SCALE 4:1)

**NOTES:**

- MATERIAL CODES:  
A = NYLON 6/6, 94V-2
- THIS PART COMPLIES WITH MOLEX PRODUCT SPEC. 02-09.
- FOR DIMENSION SEE SHEET 1 AND 2.
- CIRCUIT I.D. NUMBERS ON HOUSING APPEAR ON PARTS FROM TOOLS BUILT AFTER 8/7/91.

DIMENSIONS SHOWN (METRIC) INCH		▽ = 0		▽ = 0		REVISE ONLY ON CAD SYSTEM	
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE AS FOLLOWS							
INCH		METRIC		INCH		METRIC	
3 PLACE	± .010	---	---	---	---	---	---
2 PLACE	± .014	± 0.25	---	---	---	---	---
1 PLACE	---	± 0.35	---	---	---	---	---
DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS							
DRWG. BY	CEP	CHK'D. BY	RW	FILE NAME	SD1490X3	DRWG. NO.	SD-1490-
APP'D. BY	RAS	SCALE	2 : 1	SEE CHART		DATE 3/10/88	
LTR. REVISIONS		LTR. REVISIONS		THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION		DIN. SIZE CP C	

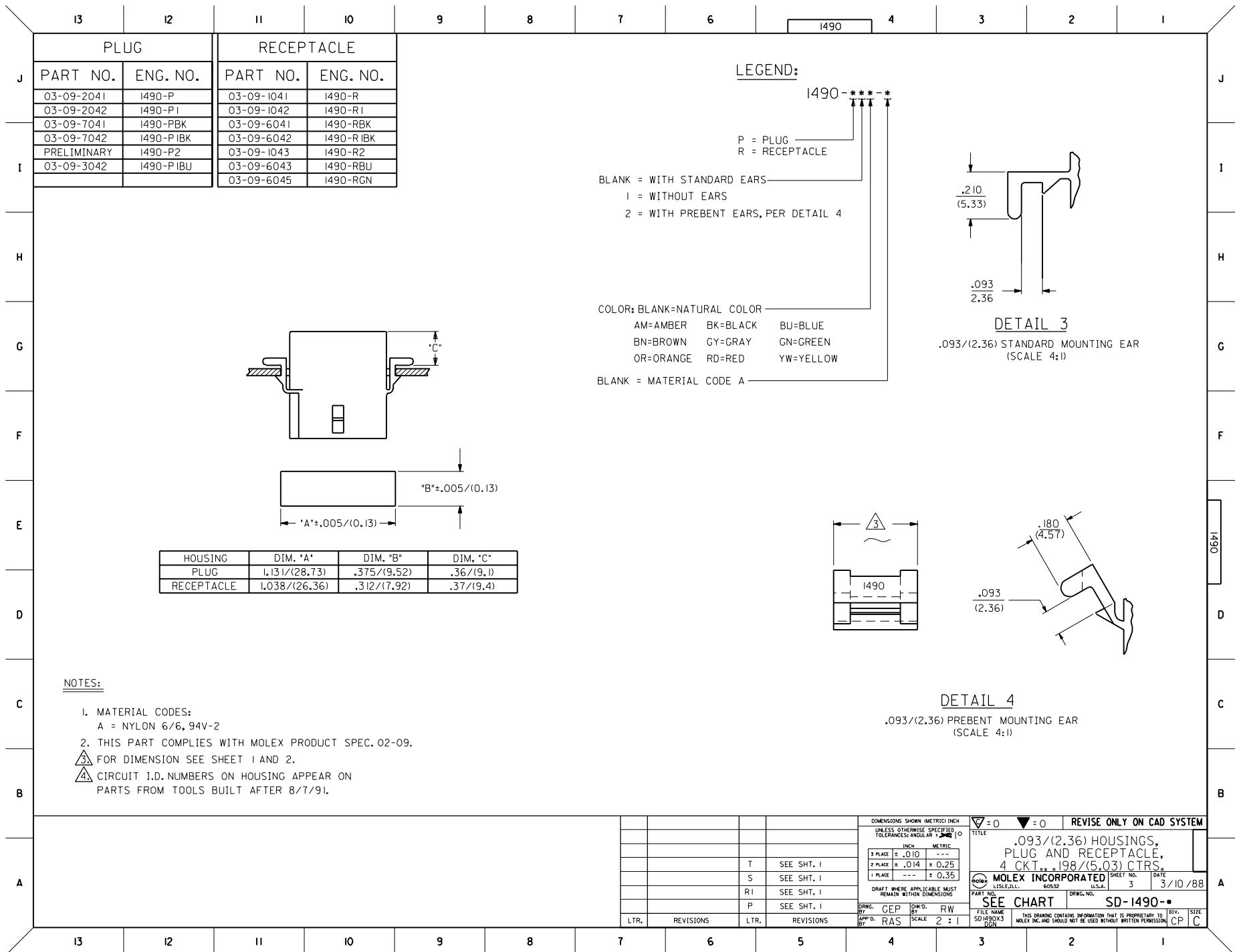
PLUG



PLUG HOUSING

T	3	T
S	2	T
RI	1	T
R		
P		
MFG.	SH.	REV.
	LTR.	REVISIONS

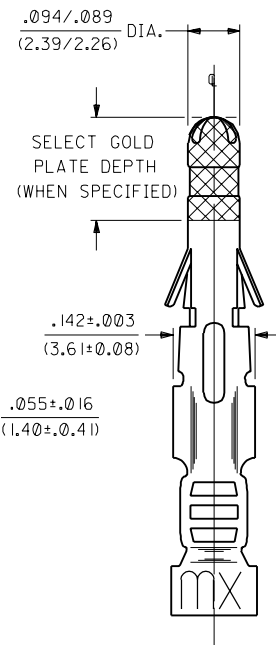
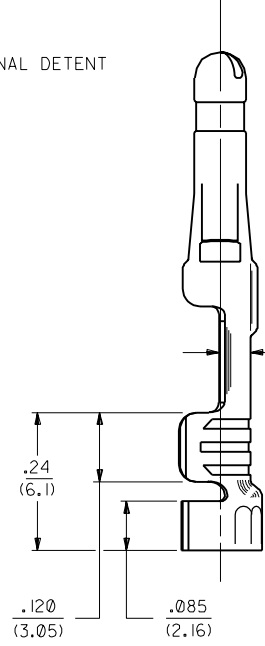
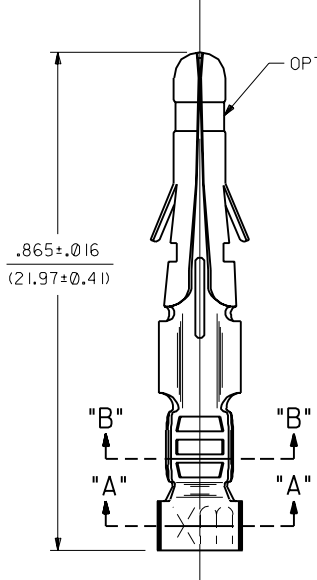
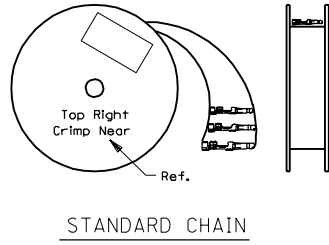
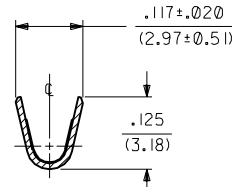
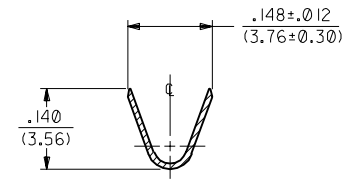
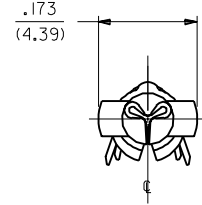
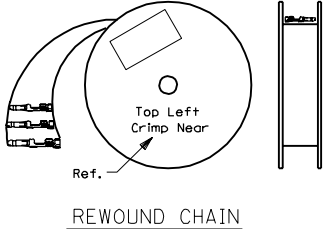
DIMENSIONS SHOWN (METRIC) INCH		▽ = 0	▼ = 0	REVISE ONLY ON CAD SYSTEM
UNLESS OTHERWISE SPECIFIED TOLERANCES: ANGULAR ± .004		TITLE		
INCH METRIC		.093/(2.36) HOUSING, PLUG AND RECEPTACLE, 4 CKT. ± .198/(5.03) CTRS.		
3 PLACE ± .010	---	PART NO. MOLEX INCORPORATED SHEET NO. DATE		
2 PLACE ± .014	± 0.25	L15LEJLL. 60532 U.S.A. 1 OF 3 3 / 9 / 88		
1 PLACE ---	± 0.35	SEE CHART DRWG. NO. SD-1490-*		
DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS		THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION.		
DRWG. BY: CEP	CHKD. BY: RW	FILE NAME: SD1490X1.DWG	SCALE: 2 : 1	SIZE: CP
APP'D. BY: RAS				



DIMENSIONS SHOWN (METRIC) INCH		▽ = 0 ▽ = 0		REVISE ONLY ON CAD SYSTEM	
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE AS FOLLOWS					
INCH		METRIC			
3 PLACE	± .010	---	---	---	---
2 PLACE	± .014	± 0.25	---	---	---
1 PLACE	---	± 0.35	---	---	---
DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS					
DRWG. BY	CEP	CHK'D. BY	RW		
APP'D. BY	RAS	SCALE	2 : 1		
LTR. REVISIONS		LTR. REVISIONS			
				TITLE	
				.093/(2.36) HOUSINGS, PLUG AND RECEPTACLE, 4 CKT., .198/(5.03) CTRS.	
				MOLEX INCORPORATED	
				LITTLEFALL, N.J. 07643 U.S.A.	
				SHEET NO. 3 DATE 3/10/88	
				PART NO. SD-1490-*	
				SEE CHART	
				DRWG. NO. CP 1 C	



PART NO.	ENG. NO.
02-09-2118	1380-(P90)IL
02-09-2116	1380-(P90)I
02-09-2127	1380-(P90)I1
02-09-2156	1380-(P914)L
02-09-2157	1380-(P914)
NOT TOOLED	1380-(563)IL
02-09-6135	1380-(563)
02-09-6126	1380-(591)IL
02-09-6125	1380-(591)
02-09-6124	1380-(558)IL
02-09-6121	1380-(558)
02-09-6123	1380-(550)IL
02-09-6122	1380-(550)
NOT TOOLED	1380-(603)IL
02-09-6136	1380-(603)
02-09-2159	1380-(P914)A
02-09-2147	1380-(102)IL
02-09-2148	1380-(102)
02-09-2119	1380-A(P90)IL
02-09-2117	1380-A(P90)I



**LEGEND**

1380-\*(\*\*\*)\*

OPTIONAL DETENT  
BLANK = WITH DETENT  
A = WITHOUT DETENT

P = PREPLATE  
BLANK = POSTPLATE

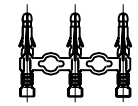
FORM  
BLANK = STD. CHAIN  
A = REWOUND CHAIN  
L = LOOSE  
I = STD. CHAIN WITH INTERLEAF PAPER

FINISH CODE

**NOTES:**

- MATERIAL: BRASS, ALLOY #C26000
- FINISH:
  - 901 HOT TIN DIP .000020/(0.0005) MIN.
  - 914 HOT TIN-LEAD DIP .000040/(0.0010) MIN.
  - 102 TIN PLATE .000200/(0.0050) MIN. OVER .000100/(0.0025) MIN. COPPER OVERALL.
  - 558 SELECT GOLD PLATE .000030/(0.0007) MIN. IN CONTACT AREA, OVER .000050/(0.0012) MIN. NICKEL OVERALL WITH .000010/(0.00025) MAX. GOLD FLASH OVERALL.
  - 591 SELECT GOLD PLATE .000050/(0.0012) MIN. IN CONTACT AREA, OVER .000050/(0.0012) MIN. NICKEL OVERALL WITH .000010/(0.00025) MAX. GOLD FLASH OVERALL.
  - 550 SELECT GOLD PLATE .000015/(0.0003) MIN. IN CONTACT AREA, OVER .000030/(0.0007) MIN. NICKEL OVERALL WITH .000010/(0.00025) MAX. GOLD FLASH OVERALL.
  - 563 SELECT GOLD PLATE .000030/(0.0007) MIN. IN CONTACT AREA, .000100/(0.0025) MIN. TIN-LEAD IN CRIMP AREA OVER .000050/(0.0012) MIN. NICKEL OVERALL.
  - 603 SELECT GOLD PLATE .000030/(0.0007) MIN. IN CONTACT AREA, .000100/(0.0025) MIN. TIN-LEAD IN CRIMP AREA OVER .000050/(0.0012) MIN. NICKEL OVERALL WITH .000010/(0.00025) MAX. SELECT GOLD FLASH.
- THIS PART CONFORMS TO PRODUCT SPECIFICATION 02-09.
- TERMINAL FOR USE WITH .093/(2.36) SERIES HOUSINGS AND WILL ACCEPT 18 THRU 22 AWG
- INSERTION FORCE: 3.5 LBS. MAX. WHEN TERMINAL IS INSERTED INTO AN .093 SERIES HOUSING.
- TERMINAL RETENTION: 20 LBS. MIN. FROM HOUSING.

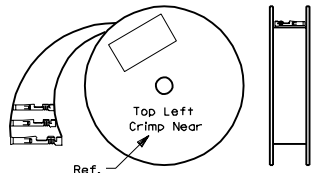
CHAIN FORM  
FULL SCALE



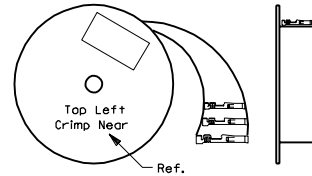
BT	ADD -IP9011 ECN #2001-0905 4-4-01 BW
BS1	REVISED ECN# UCR1999-0518 STAMBAUGH 99-2-9
BS	CARRIER CUTOFF ECR #U1 0223 1-4-91 RW
BR	ADDED OPT. DETENT ECR U8 1706 GEP 7-15-88 RW
BP	REV. & REDRAWN ECR 10490 GEP 11-6-87 RW

DIMENSIONS SHOWN (METRIC) INCH		▽ = 0		▼ = 0		REVISE ONLY ON CAD SYSTEM	
UNLESS OTHERWISE SPECIFIED TOLERANCES ANGULAR ± 1/2°		TITLE		CRIMP TERMINAL, MALE		SHEET NO. DATE	
3 PLACE ± .010 ---		1 PLACE ± .014 ± 0.25		FOR 18 THRU 22 AWG WIRE		1 OF 1 11 / 6 / 87	
2 PLACE ± .014 ± 0.25		1 PLACE --- ± 0.35		MOLEX INCORPORATED		U.S.A.	
DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS		PART NO.		SD-1380-		DRWG. NO.	
DRWG. BY: GEP		CHK'D. BY: RW		SCALE: 6 : 1		DIV. CP	
APP'D. BY: RAS		FILE NAME: SD1380X1		THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION.		SIZE: CP	

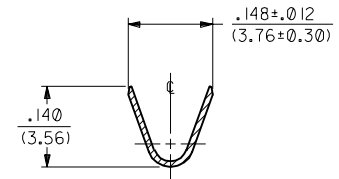
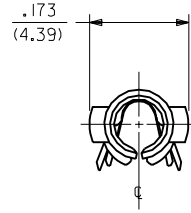
PART NO.	ENG. NO.
02-09-1119	1381-A(P90)IL
02-09-1117	1381-A(P90)I
02-09-1115	1381-A(P90)II



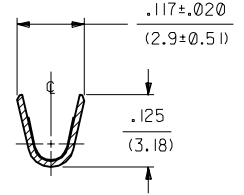
REWOUND CHAIN



STANDARD CHAIN



SECT. "A-A"



SECT. "B-B"

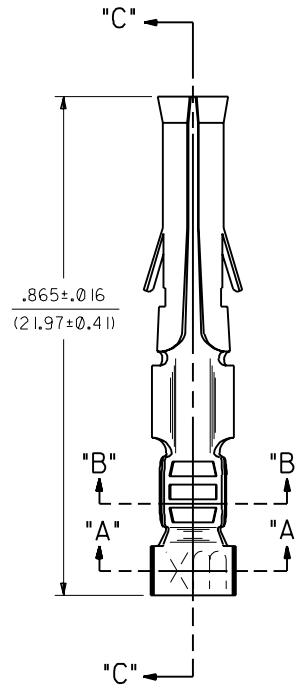
**LEGEND**

1381-A(\*\*\*\*)\*

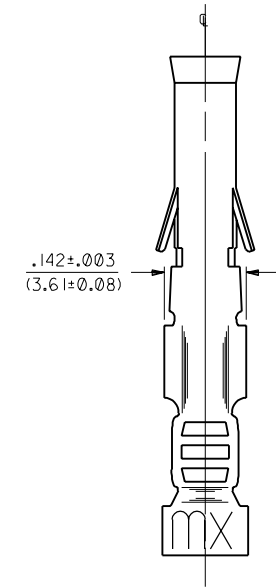
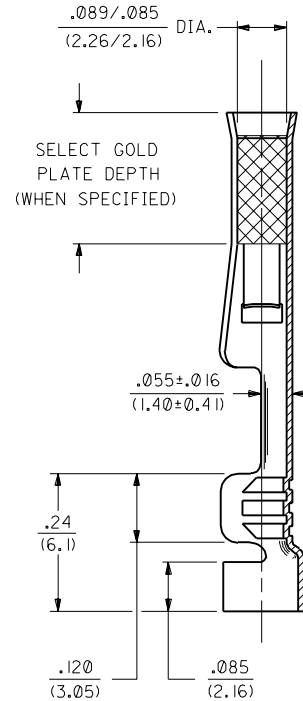
- FORM
  - BLANK = STD. CHAIN
  - A = REWOUND CHAIN
  - I = STD. CHAIN WITH INTERLEAF PAPER
  - L = LOOSE
  - FINISH CODE
- P = PREPLATE  
BLANK = POSTPLATE

**NOTES:**

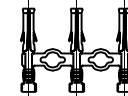
- MATERIAL: BRASS, ALLOY #26000
- FINISH:
  - 901 HOT TIN DIP .000020/(0.0005) MIN.
  - 914 HOT TIN-LEAD DIP .000040/(0.0010) MIN.
  - 102 TIN PLATE .000200/(0.0050) MIN. OVER .000100/(0.0025) MIN. COPPER OVERALL.
  - 575 SELECT GOLD PLATE .000050/(0.0012) MIN. IN CONTACT AREA, .000050/(0.0012) MIN. TIN-LEAD IN CRIMP AREA OVER .000050/(0.0012) MIN. NICKEL OVERALL.
  - 591 SELECT GOLD PLATE .000050/(0.0012) MIN. IN CONTACT AREA, OVER .000050/(0.0012) MIN. NICKEL OVERALL WITH .000010/(0.00025) MAX. GOLD FLASH OVERALL.
  - 550 SELECT GOLD PLATE .000015/(0.00038) MIN. IN CONTACT AREA, OVER .000030/(0.00076) MIN. NICKEL OVERALL WITH .000010/(0.00025) MAX. GOLD FLASH OVERALL.
  - 603 SELECT GOLD PLATE .000030/(0.00076) MIN. IN CONTACT AREA, .000100/(0.0025) MIN. TIN-LEAD IN CRIMP AREA OVER .000050/(0.0012) MIN. NICKEL OVERALL WITH .000010/(0.00025) MAX. SELECT GOLD FLASH.
- THIS PART CONFORMS TO PRODUCT SPECIFICATION 02-09.
- TERMINAL FOR USE WITH .093/(2.36) SERIES HOUSINGS AND WILL ACCEPT 18-22 AWG WIRE
- INSERTION FORCE: 3.5 LBS. MAX. WHEN TERMINAL IS INSERTED INTO AN .093 SERIES HOUSING.
- TERMINAL RETENTION: 20 LBS. MIN. FROM HOUSING.



SECT. "C-C"



CHAIN FORM  
FULL SCALE



DIMENSIONS SHOWN (METRIC) INCH	
3 PLACE ±	.010
2 PLACE ±	.014 ± 0.25
1 PLACE ---	± 0.35

DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS

REVISE ONLY ON CAD SYSTEM	
TITLE	CRIMP TERM., FEMALE .093/(2.36) DIA. FOR 18 THRU 22 AWG WIRE
FORM: MOLEX INCORPORATED	SHEET NO. DATE 11/2/95 RW
PART NO. SD-1381-I	DRWG. NO. 11/6/87
FILE NAME SD1381X1	THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION.

MFG. SH.	REV.	LTR.	REVISIONS
BV			ADD -(P90)I ECN#2001-0905 4/5/01 BW
BU			OBS. VER'S. PER ECR U6 0543 C/C 11/2/95 RW
BT			REVISE PER ECR U5 0799 C/C 2/10/95 RW
BS			CARRIER CUTOFF ECR #U1 0223 1-4-91 RW
BR			FINAL REL. (P575) ERO 28218 GEP 4-12-89 RW
BP			REV. & REDRAWN ECR 10490 GEP 11-6-87 RW