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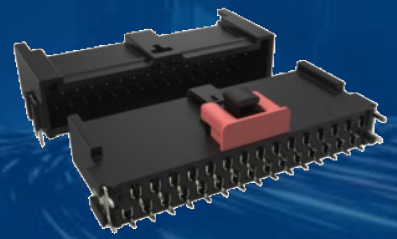
FlexLock™ Product Presentation



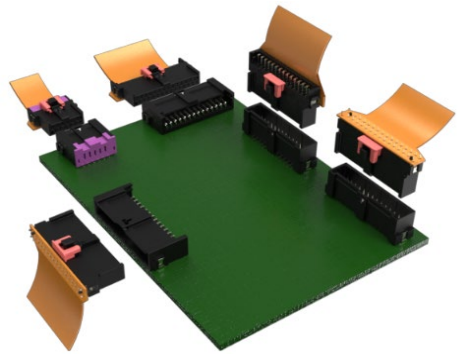
FCi Basics

Agenda: FlexLock™

- Value Proposition
- Product Overview
- Product Specifications
- Features & Benefits
- Part Numbers
- Markets & Application

FlexLock™ Value Proposition

- The FlexLock™ flex-to-board and flex-to-wire connector's Compact Design addresses the growing demand for Battery Management System (BMS) and connects flexible printed circuits to the BMS, which monitors and manages the output, (dis)charging and provides notifications on the status of the battery pack.
- FlexLock™ is an alternative to discrete WtB solutions and overcomes the need for complex, bulky wiring harnesses and enables simple layouts to reduce weight.
- FlexLock™ is a modular connector system based on 2.54mm pitch, 10 up to 36 positions and 3.20mm pitch, 10 up to 26 positions with 2A/pin current capability and Connector Positioning Assurance.
- Meets the needs of demanding applications in Automotive markets and compliant to USCAR-2 and LV 214 S3.



FlexLock™ Flex-to-Board Solution Overview

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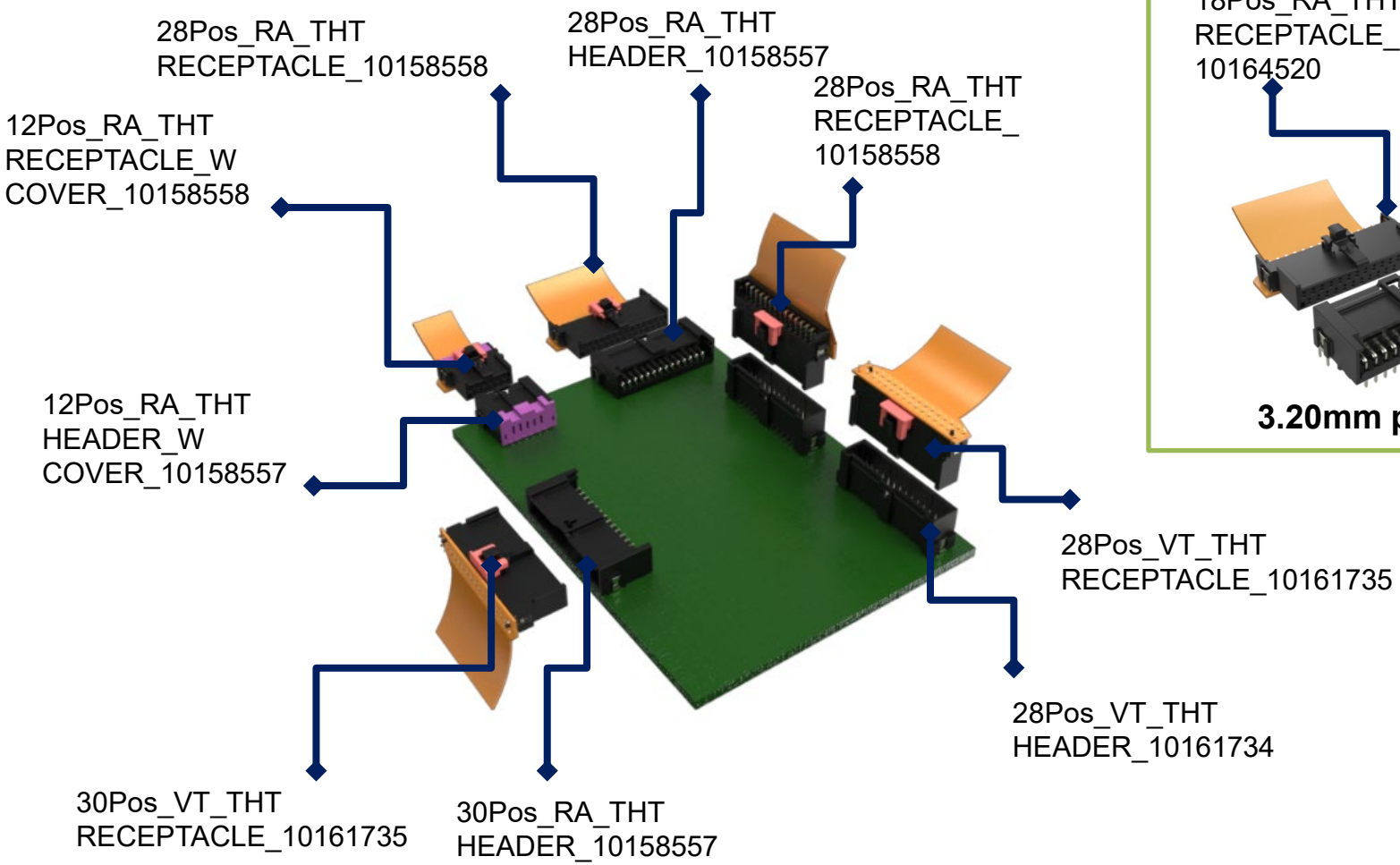
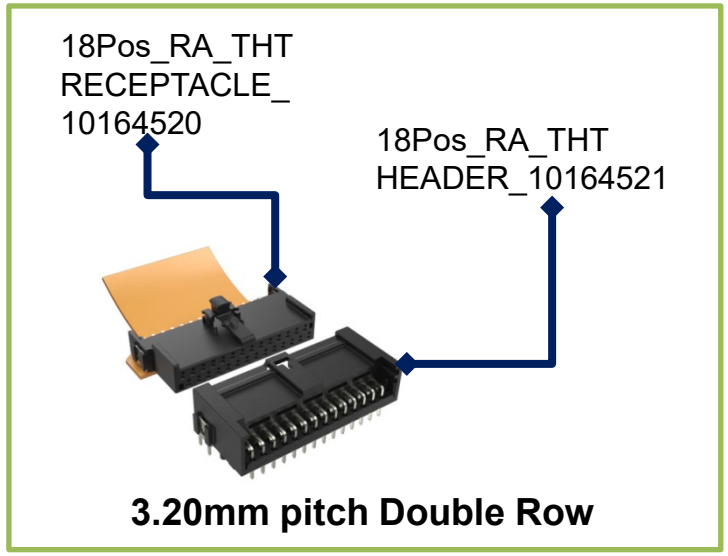
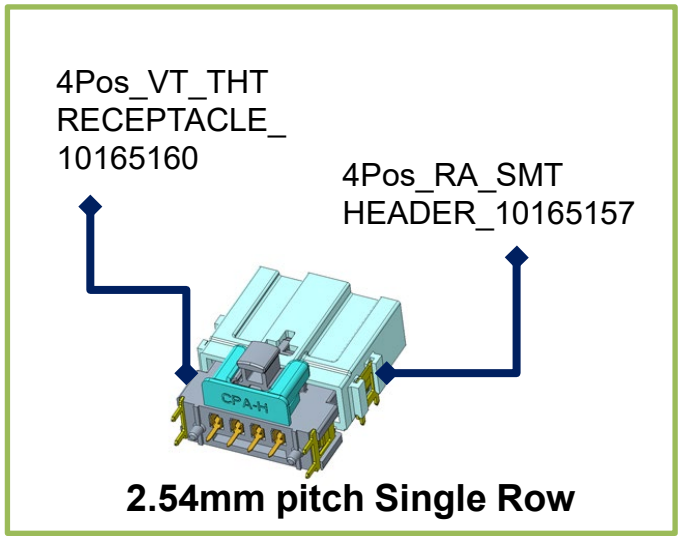


2.54mm pitch Double Row

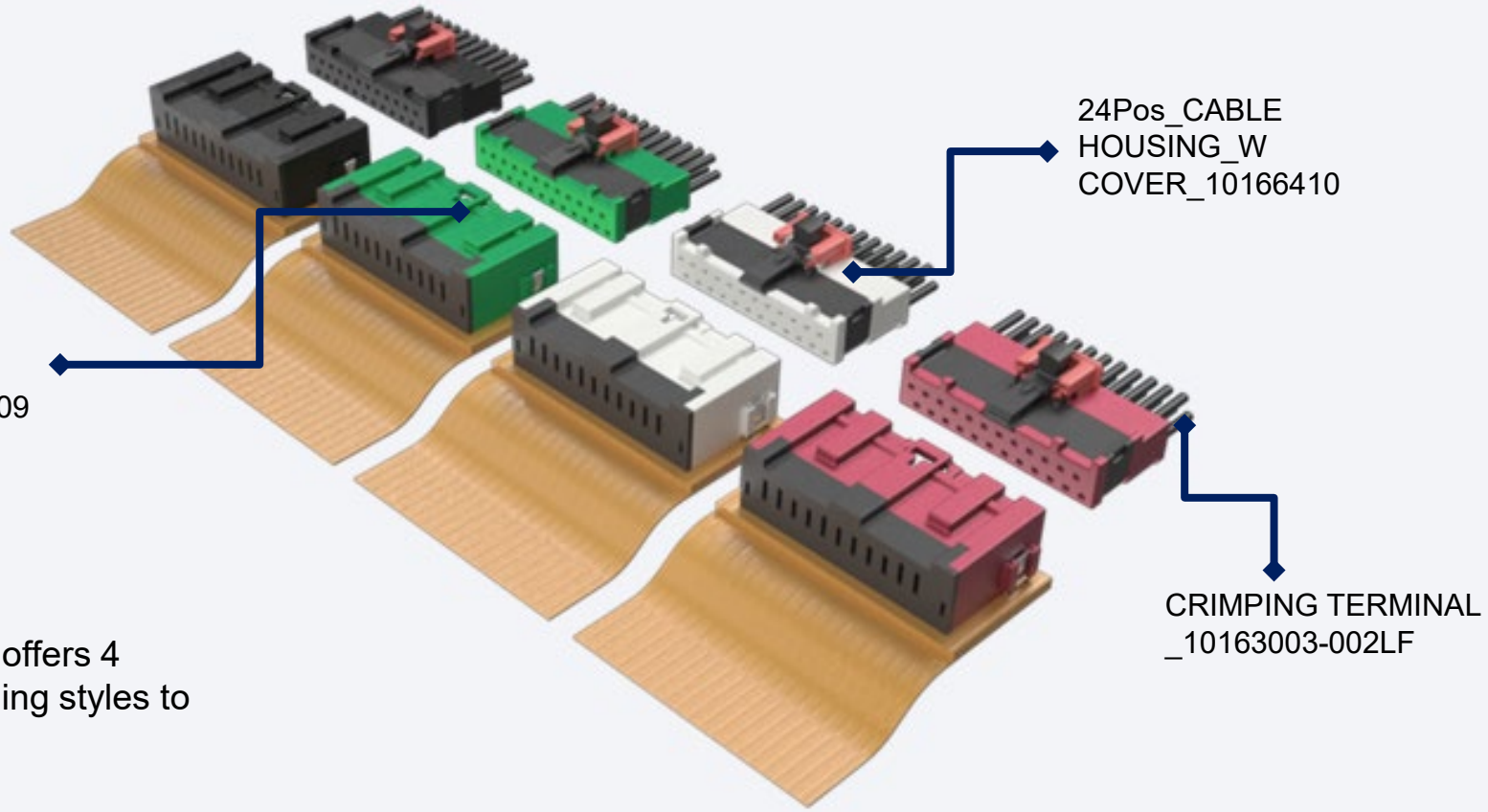


3.20mm pitch Double Row



2.54mm pitch Single Row

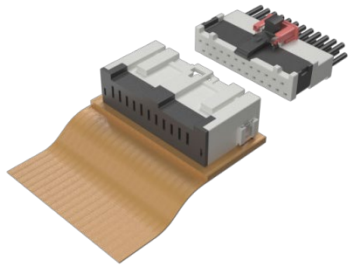
FlexLock™ Flex-to-Wire - Solution Overview



FlexLock™ Flex-to-Wire offers 4 different color-coded coding styles to prevent mismatching

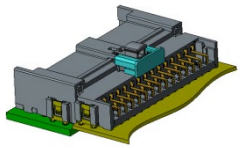
FlexLock™ Glossary

- **Header** *Housing with pins (Male connector)*
- **Receptacle** *Housing with pins (Female connector)*
- **Cable kit** *Cable housing, Crimping terminal (Female connector)*
- **CPA** *Connector Position assurance*
- **STG** *Staggered (contacts placed on staggered row)*
- **Horizontal** *Connection axis parallel to the board*
- **Vertical** *Connection axis perpendicular to the board*



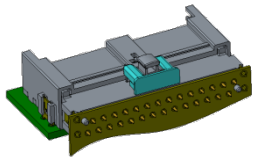
Header RA
+
Cable Housing
(2.54mm pitch D/R)

Flex-to-Wire

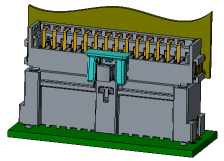


Header RA
+
Receptacle RA
(2.54mm pitch D/R)

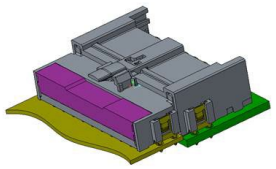
Header VT
+
Receptacle VT
(2.54mm pitch D/R)



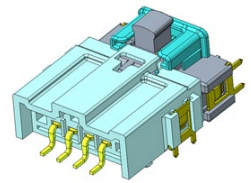
Header RA
+
Receptacle VT
(2.54mm pitch D/R)



Header VT
+
Receptacle RA
(2.54mm pitch D/R)



Header RA
+
Receptacle RA
(3.2mm pitch D/R)



Header RA
+
Receptacle VT
(2.54mm pitch S/R)

Flex-to-Board

FlexLock™ Product Family Matrix (1/2)

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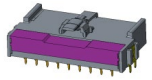
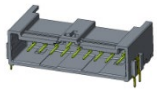
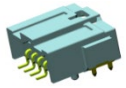
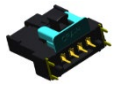
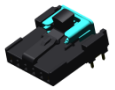
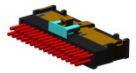
Image	FlexLock Type	Flex to Board			Max Current (A)	Plating options	Base number	Available Pins
		Pin position	D/R or S/R	STG				
	**2.54mm pitch** Header, Right Angle TH	10-36p	D/R	✓	2A	Tin, Gold	10158557	12/28(std, A)/30/36p(A~D)
	**2.54mm pitch** Header, Vertical TH	10-36p	D/R	✓	2A	Tin, Gold	10161734	28/30/36p(A/B)
	**2.54mm pitch** Receptacle, Vertical, TH	10-36p	D/R	✓	2A	Tin, Gold	10161735-VXXXXXXLF	28/30/36p(A/B)
	**2.54mm pitch** Receptacle, Right Angle, TH	10-36p	D/R	✓	2A	Tin, Gold	10158558-RXXXXXXLF	12/28(std, A)/30p
	**3.20mm pitch** Receptacle, Right Angle, TH	10-26p	D/R	✓	2A	Tin, Gold	10164520	18p
	**3.20mm pitch** Header, Right Angle, TH	10-26p	D/R	✓	2A	Tin, Gold	10164521	18p
	**2.54mm pitch** Header, Right Angle SMT	4-15p	S/R	✓	2A	Tin, Gold	10165157	4p
	**2.54mm pitch Receptacle,** Vertical TH	4-15p	S/R	✓	2A	Tin, Gold	10165160-VXXX010LF	4p
	**2.54mm pitch Receptacle**, Right Angle TH	4-15p	S/R	✓	2A	Tin, Gold	10165159-RXXX010LF	4p

New

Remarks:
1) Others position change over lead time will be 6 weeks for FOT samples.
2) R/A header SMT type only offer less than 20p and SMT type to be reviewed with PM case by case

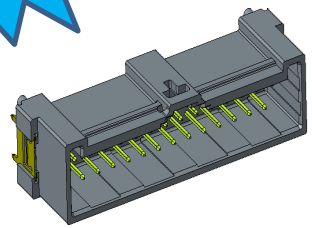
FlexLock™ Product Family Matrix (2/2)

Image	Pitch	Board header Type	Flex to Wire			Max. Current (A)	Wire size	Plating options	Auto Std.	Base number	Available Pins
			Pin position	Double Row	STG		AWG				
	2.54mm	Right Angle TH (mount on Flex)	10-36p	✓	✓	2A		Tin	USCAR T2V2	10166409	20/24/28/32/36p
	2.54mm	Cable housing kits	10-36p	✓	✓	2A	22/24/26AWG	Tin	USCAR T2V2	10166410	20/24/28/32/36p
		Crimping Contact					22/24/26AWG	Tin	USCAR T2V2	10163003	-002LF (AWG 22/24)

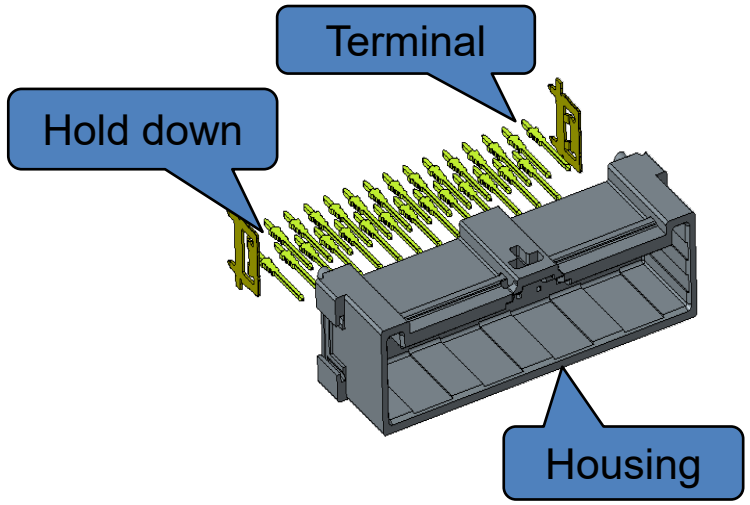
Remarks:
1. Others position change over lead time will be 6 weeks for FOT samples.

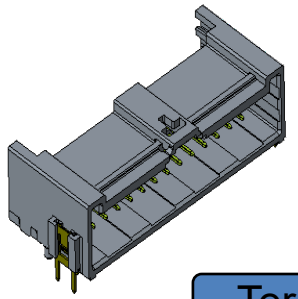
FlexLock™ Header (Flex-to-Board)

New

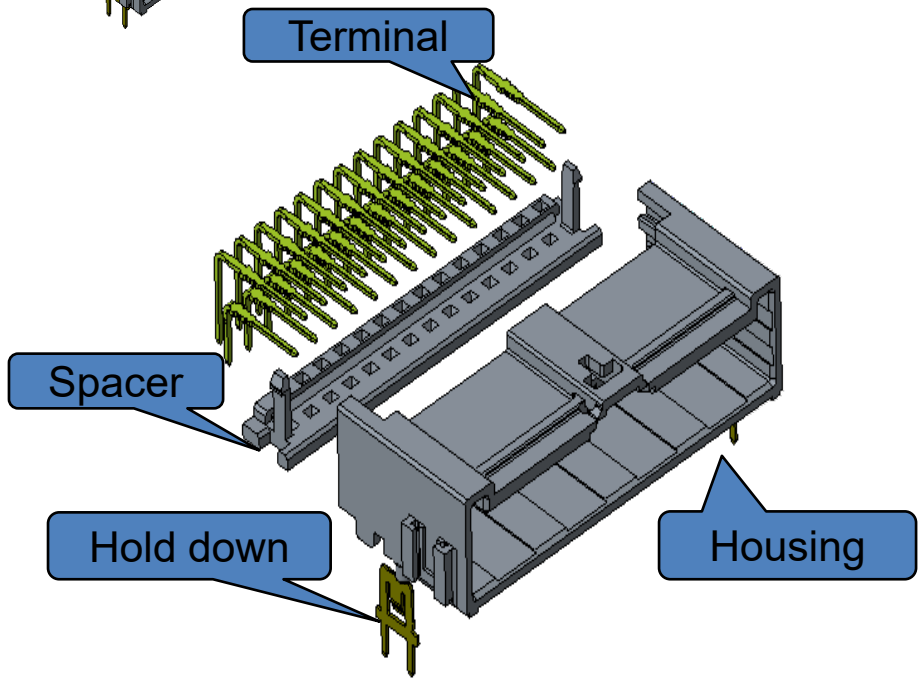


Header VT type





Header RA type



FlexLock™ Receptacle (Flex-to-Board)

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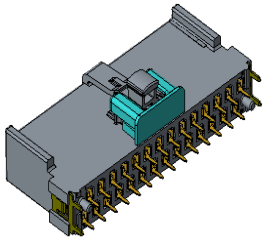
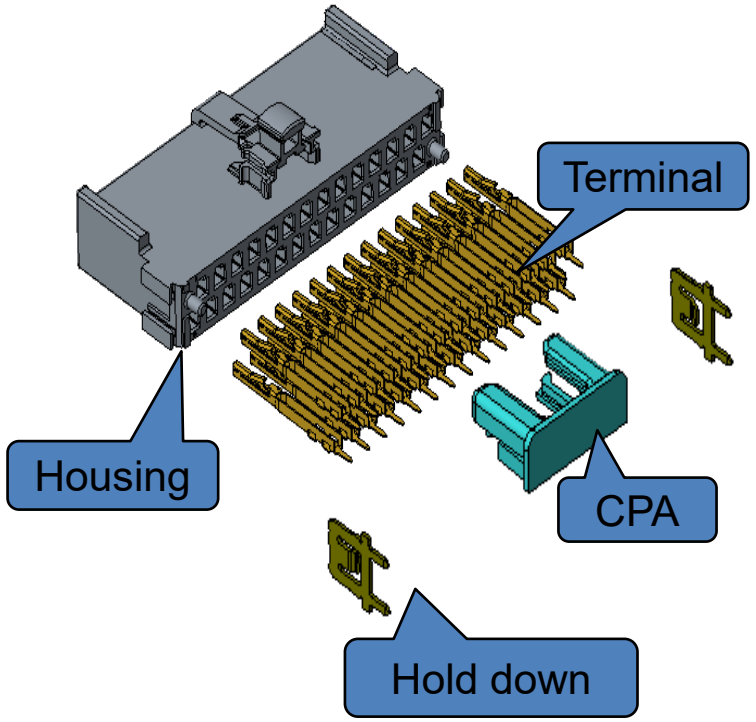
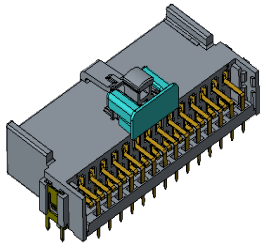
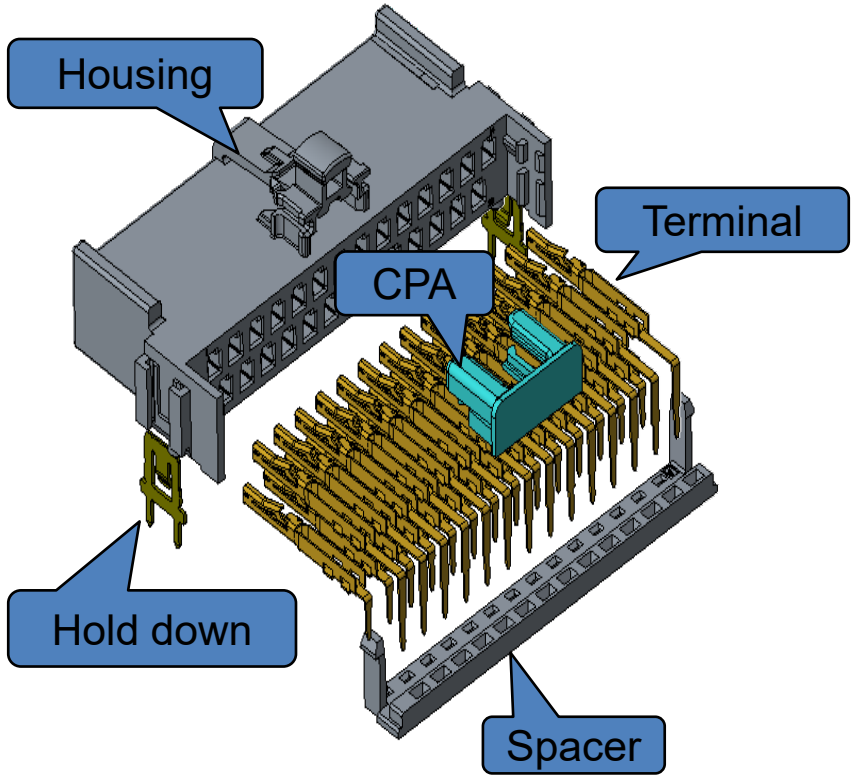


Receptacle VT type

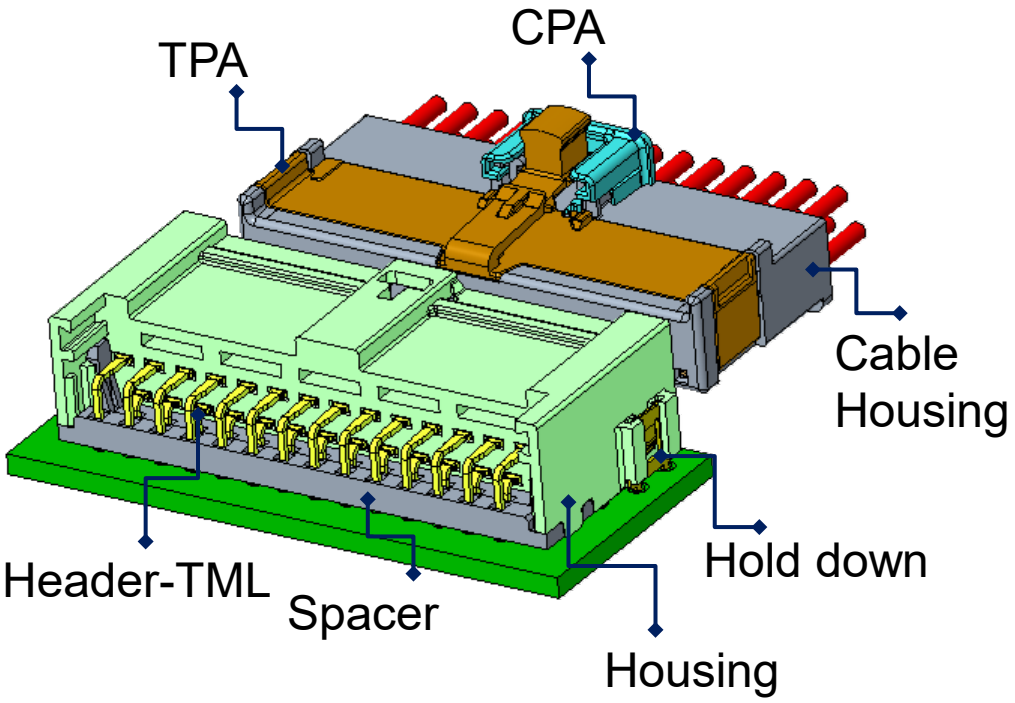


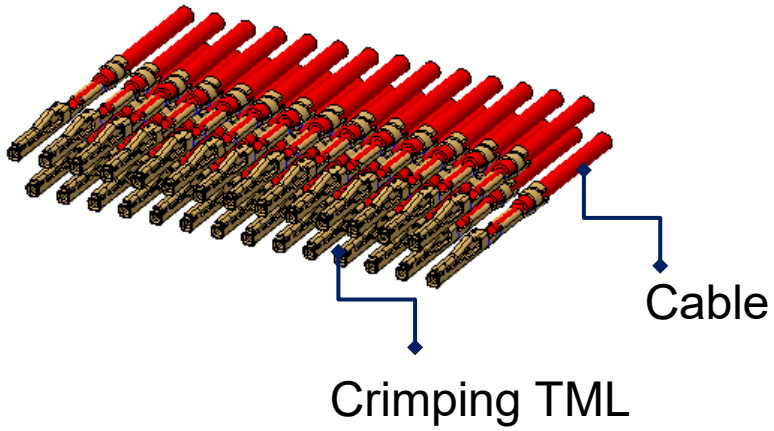


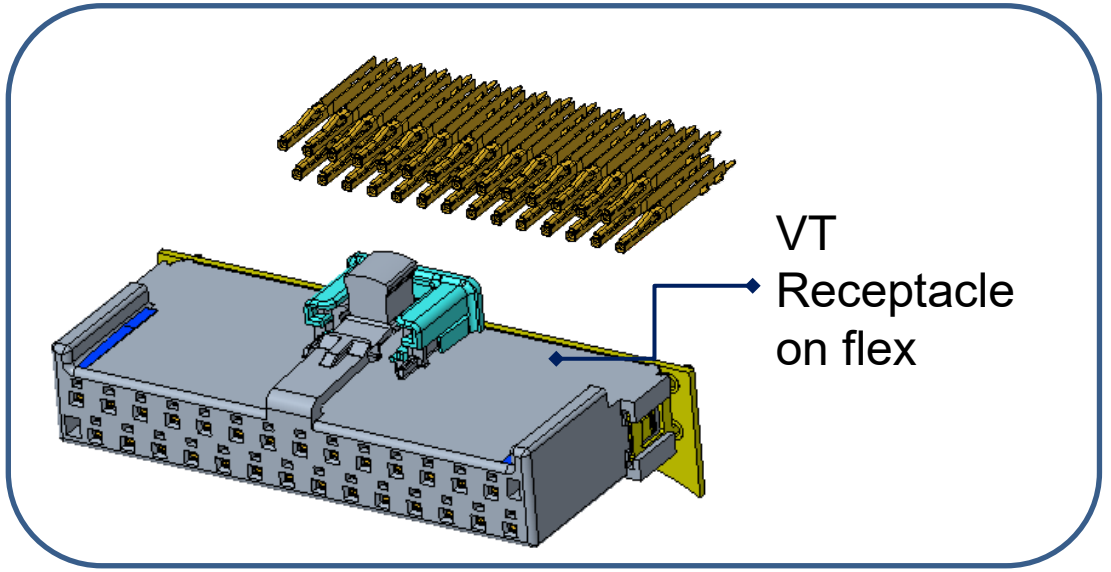
Receptacle RA type



FlexLock™ Overview (Flex-to-Wire)

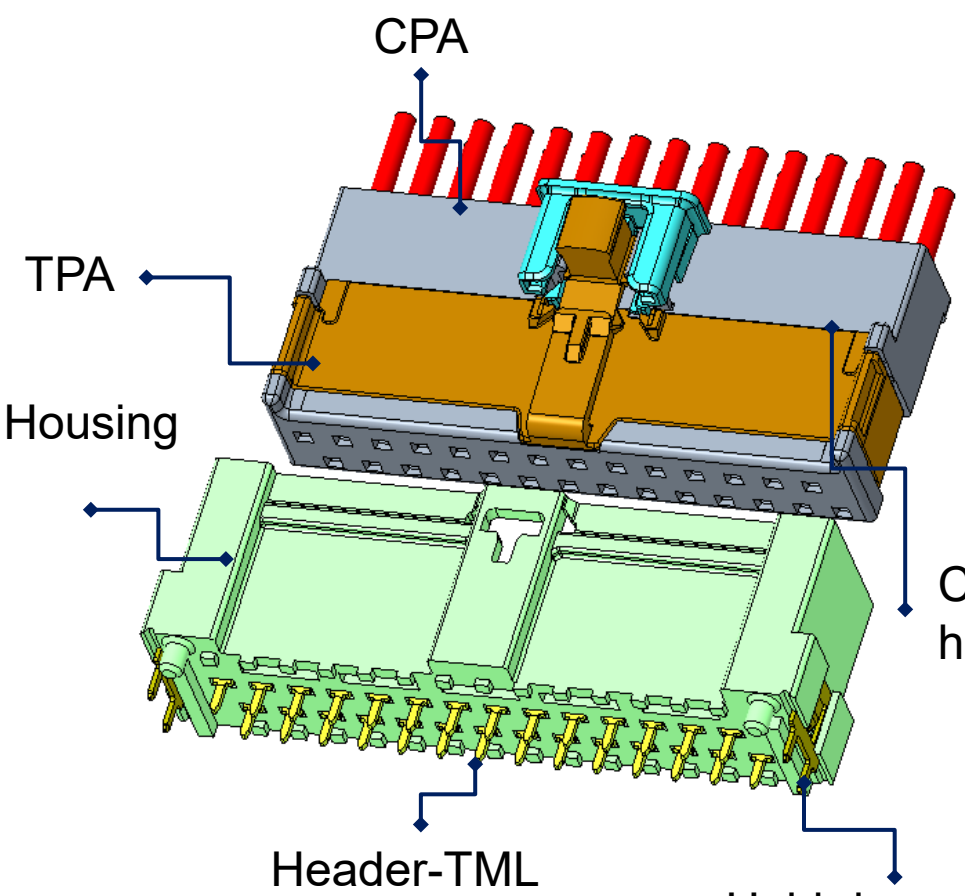


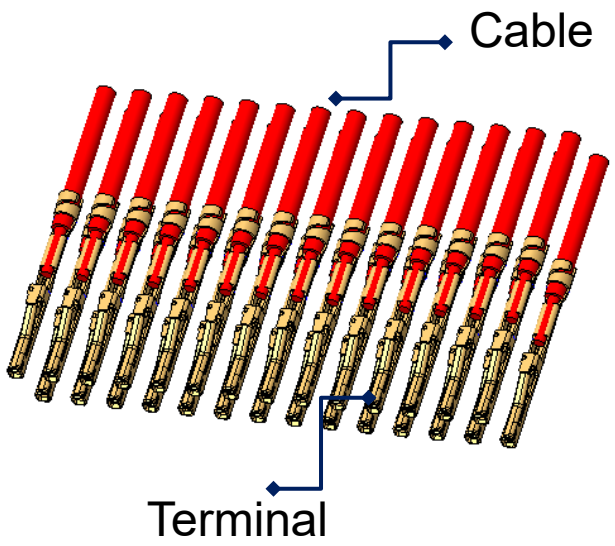


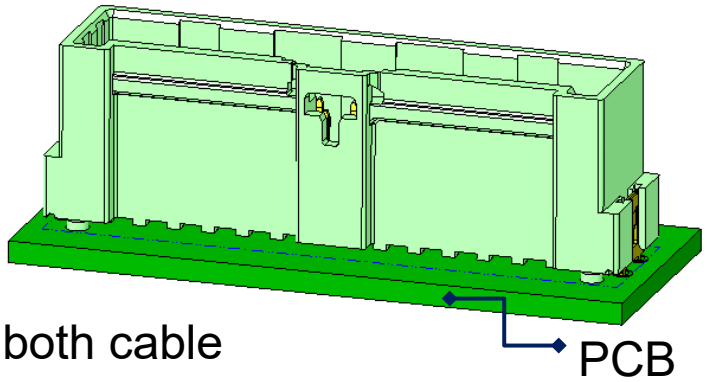


The FlexLock™ right-angle header mates with both cable housing and receptacle on flex.

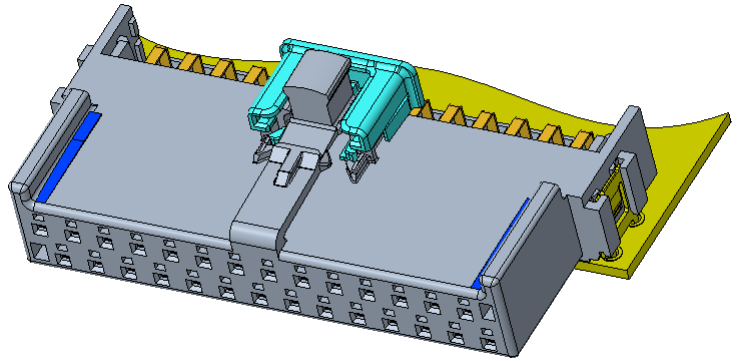
FlexLock™ Overview (Flex-to-Wire)







FlexLock™ vertical header mates with both cable housing and receptacle on flex.



RA Receptacle on flex

FlexLock™ Product Specifications

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SPECIFICATIONS

Pitch	:	2.54mm & 3.20mm
PCB termination	:	THT for header, THT for receptacle
Configuration	:	Double Row and Single Row, Vertical and Right Angle

MECHANICAL PERFORMANCE

- Durability: 20 cycles (Tin plating), 30 cycles (Au plating)
- Mating / Un-mating Force: 75N Max
- Terminal Insertion Force: <5N Max/pin
- Terminal Retention Force: 15N Mini.

TECHNICAL DOCUMENTS

- Product Specification:
  GS-12-1679 (FlexLock 2.54mm & 3.2mm D/R, flex-to-board)
  GS-12-1745 (FlexLock 2.54mm S/R)
  GS-12-1535 (FlexLock 2.54mm, flex-to-wire)
- Package Specification: GS-14-2781
- Application Specification:
  GS-20-0707 (flex-to-board)
  GS-20-0788 (flex-to-wire)

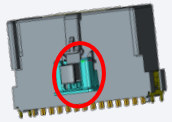
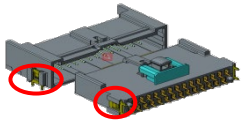
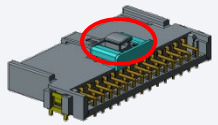
ELECTRICAL PERFORMANCE

- Low Level Contact Resistance:< 25mΩ
- Insulation Resistance: > 100MΩ
- Voltage Rating: 48V DC
- Current Rating: 2A
- Dielectric Withstand Voltage: 500VAC
- Temperature Rise: +55°C max for 7.32A

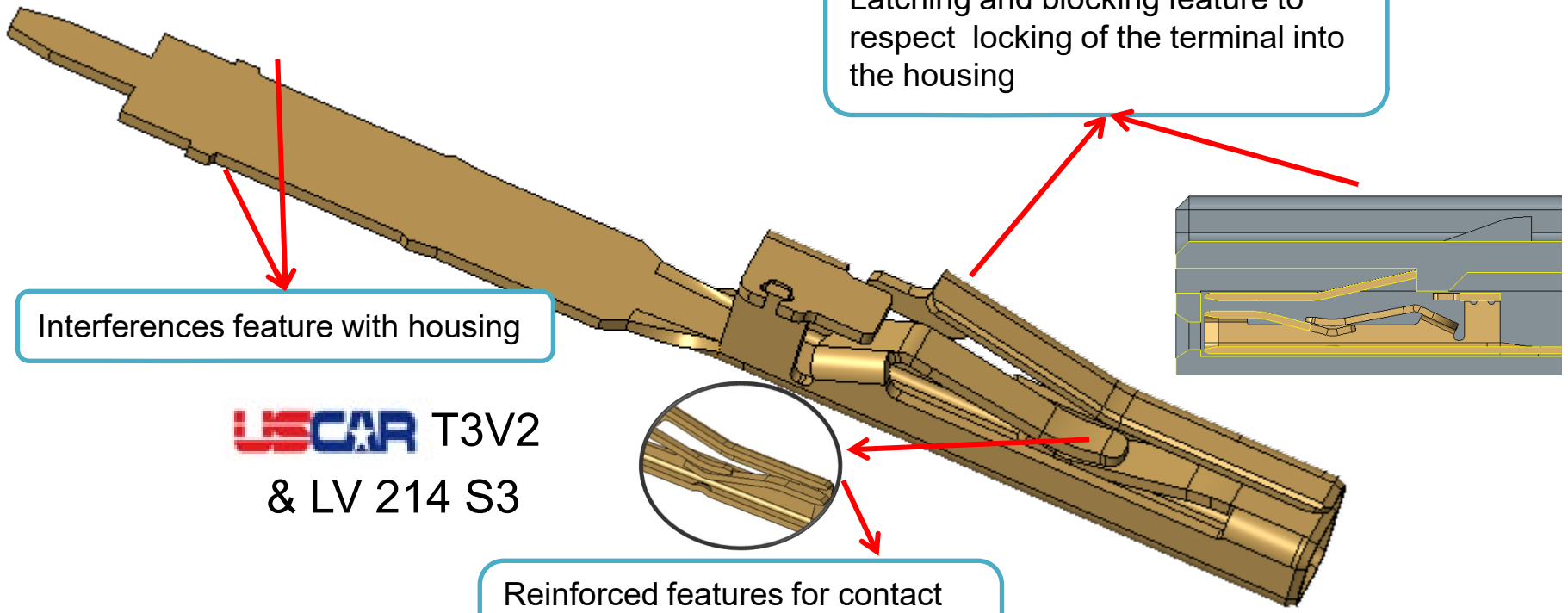
MATERIALS

- Board Header Connector contact: Copper alloy
- Housing: High temp. UL94V-0
- Terminal for Crimping: Phosphor bronze Alloy (Tin plating or 8u" GXT/Au or 30u" Au)
- Operating Temperature: -40°C to +105°C

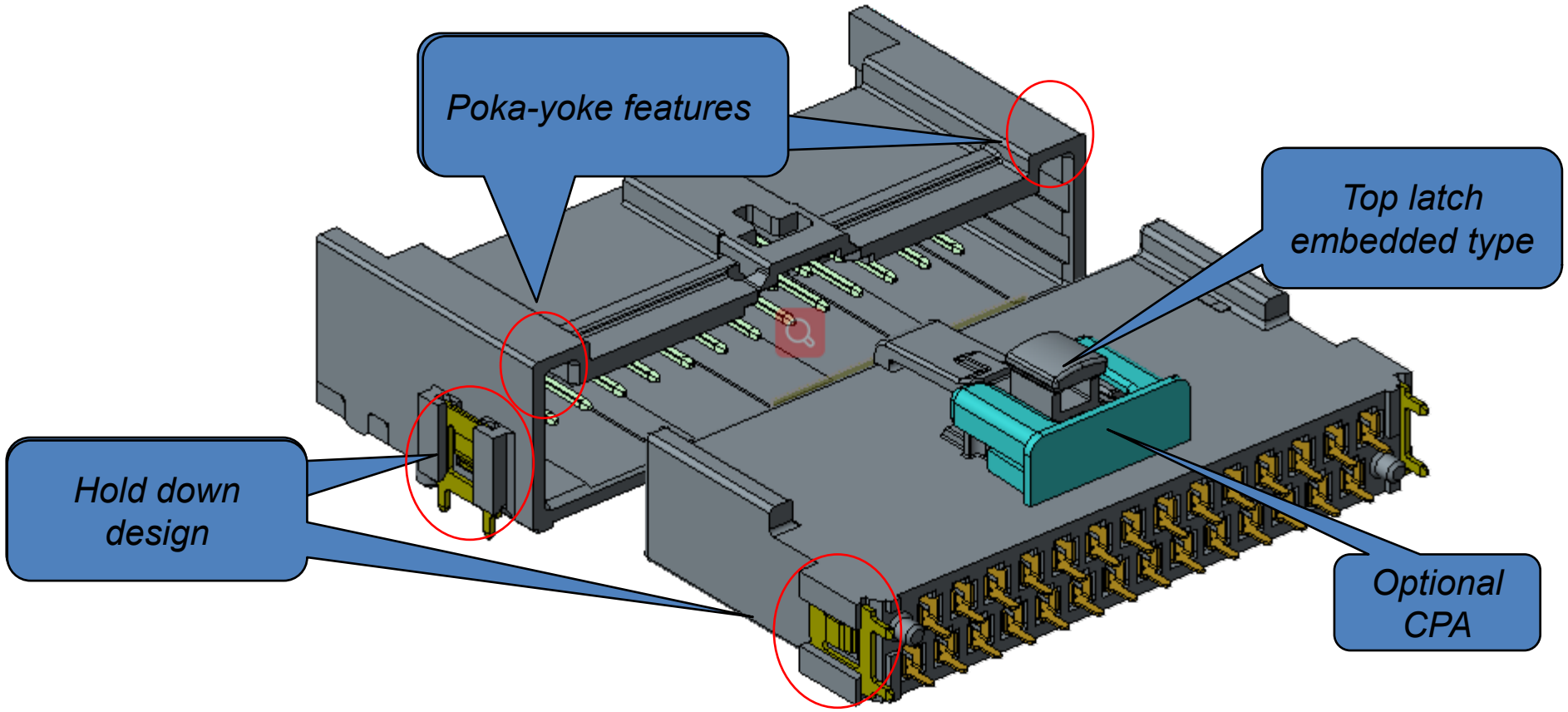
FlexLock™ Features and Benefits

Product picture	Features	Benefits	Customer Value
	Poka-yoke	Easily assembly with right direction	Avoid error assembly of header and receptacle
	Housing with positive locking	Ensures secure mating retention and prevents unintentional cable release	Provides an audible click when securely mated and secures performance over time
	Dual beam box contact (x2)	Prevents contact damage during mating and offers two points of contact	Maximize contact normal force and reliability over time
	Latched and blocked contacts	Latching and blocking features to respect locking of terminal into the housing	Very reliable terminal locking prevents unintentional cable release
	Hold down features	Secure the SMT & THT headers onto the PCB	Improves board retention
	Connector positioning assurance (CPA)	Ensures that connectors are properly mated and remain together once mated	Robust solution ensures reliable, vibration resistant connection over time
	Four different coding with four different colors	Visual and mechanical mismatching prevention system	Prevent mismatching during assembly

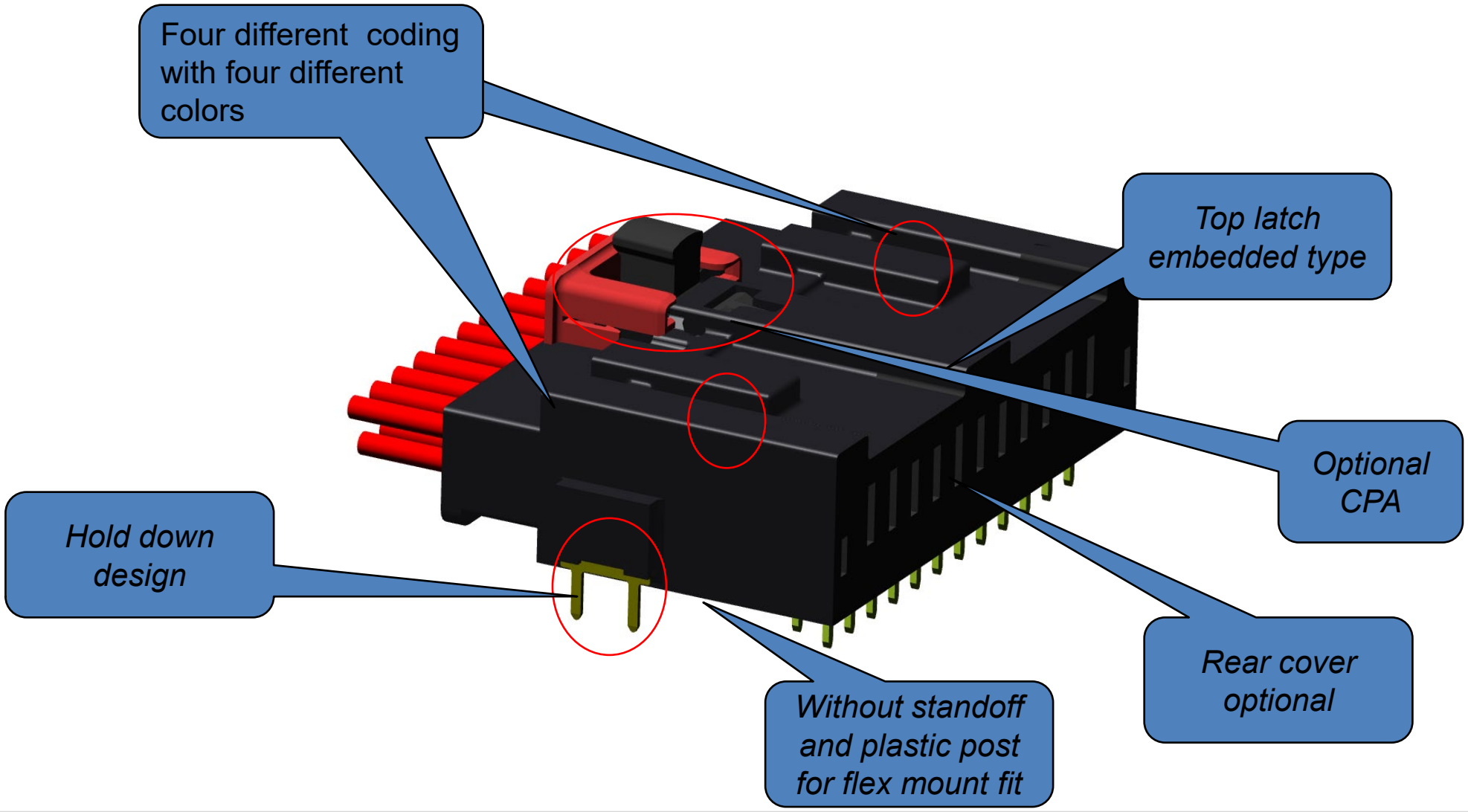
FlexLock™ Terminal Features



FlexLock™ Features (Flex-to-Board)



FlexLock™ Features (Flex-to-Wire)



FlexLock™ Header part numbers 2.54mm pitch Double Row

Right Angle Header

10158557- XXXXXXLF

R: STANDARD
_: FOR CUSTOMER CODE

PIN NUMBER
32- 32 PIN
30- 30 PIN
28- 28 PIN
20- 20 PIN
10- 10 PIN

CONTACT AREA PLATING
1. 8u" GXT OR GOLD
2. 40u" TIN
3. 40u" TIN WITH LUBRICATION
4. 30u" GXT OR GOLD

LEAD FREE

CODING OPTION (SEE NOTES 7)
1:NO CODING FEATURE (BLACK)
2:GREEN(RAL6002)
3:WHITE(RAL9001)
4:BORDEAUX (RAL4004)
A:WITH CODING FEATURE CODING A BLACK
B:CODING B GREEN(RAL6002)
C:CODING C WHITE(RAL9001)
D:CODING D BORDEAUX (RAL4004)

SPACER OPTION
0: WITHOUT SPACER
1: WITH SPACER

REAR COVER OPTION
1: WITHOUT REAR COVER
2: WITH REAR COVER

Vertical Header

Part number scheme
10161734- XXXXXXLF

V:STANDARD
_:FOR CUSTOMER CODE

PIN NUMBER
36- 36 PIN
~~~
30- 30 PIN
28- 28 PIN
~~~
10- 10 PIN

CONTACT AREA PLATING
1. 8u" GXT OR GOLD
2. 40u"TIN
3. 40u" TIN WITH LUBRICATION

REGISTRATION PICK UP PARTS
0: WITHOUT
1: WITH MYLAR
2: WITH CAP

LEAD FREE

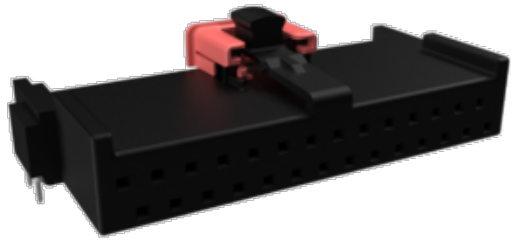
CODING TYPE(SEE NOTES 7)
1: NO CODING FEATURE BLACK
2: GREEN(RAL6002)
3: WHITE(RAL9001)
4: Bordeaux(RAL4004)
A: DIM F 6.73 BLACK
B: DIM F 6.23 GREEN(RAL6002)
C: DIM F 5.73 WHITE(RAL9001)
D: DIM F 7.23 Bordeaux(RAL4004)

TAIL- TYPE OPTIONAL
0: CONTACT TAIL SMT
1: CONTACT TAIL THT L=1.85
2: CONTACT TAIL THT L=2.55

New

FlexLock™ Receptacle part numbers 2.54mm pitch Double Row

Right Angle Receptacle



10158558- XXXXXXLF

R:STANDARD
B:SPECIAL FOR USER
(CPA SEPERATED WRAP)
_:FOR CUSTOMER CODE

PIN NUMBER
36- 36 PIN
--
30- 30 PIN
28- 28 PIN
...
10- 10 PIN

CONTACT AREA PLATING
1. 8u" GXT OR GOLD
2. 40u"TIN
3. 30u" GXT OR GOLD

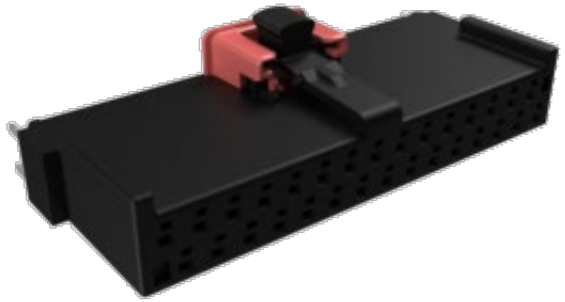
LEAD FREE

CODING TYPE(HOUSING COLOR)
1: DIM F 0 (NO CODING) BLACK
2: GREEN(RAL6002)
3: WHITE(RAL9001)
4: BORDEAUX(RAL4004)
A: DIM F 6.65 BLACK
B: DIM F 6.15 GREEN(RAL6002)
C: DIM F 5.65 WHITE(RAL9001)
D: DIM F 7.15 BORDEAUX(RAL4004)

CPA OPTIONAL
0: WITHOUT CPA
1: WITH CPA

COVER OPTIONAL
1:WITH OUT COVER
2:WITH COVER

Vertical Receptacle



10161735- XXXXXLF

V:STANDARD
_:FOR CUSTOMER CODE

PIN NUMBER
36- 36 PIN

32- 32 PIN
30- 30 PIN
28- 28 PIN

10- 10 PIN

CONTACT AREA PLATING
1. 8u" GXT OR GOLD
2. 40u"TIN
3. 30u" GXT OR GOLD

LEAD FREE

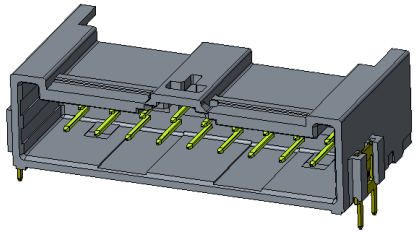
CODING OPTIONAL(SEE NOTES 7)
1:NO CODING FEATURE (BLACK)
2:GREEN(RAL6002)
3:WHITE(RAL9001)
4:BORDEAUX (RAL4004)
A:WITH CODING FEATURE CODING A BLACK
B:CODING B GREEN (RAL6002)
C:CODING C WHITE (RAL9001)
D:CODING D BORDEAUX (RAL4004)

CPA OPTIONAL
0: WITHOUT
1: WITH

REGISTRATION MYLAR
0: WITHOUT
1: WITH

FlexLock™ Header & Receptacle part numbers 3.20mm pitch D/R

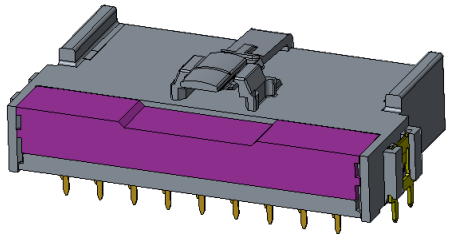
Right Angle Header



10164521-XXXXXXXLF

- CONNECTOR STYLE
  R: RIGNT ANGLE.
- PIN NUMBER
  18- 18 PIN
  14- 14 PIN
- PACKING TYPE
  0:TRAY
  1:CARRIER TAPE
- LEAD FREE
- COVER:
  0:WITH OUT
  1:WITH
- TAIL STYLE OPTION
  0: ALL TH, HD TAIL LENGTH: 2.60
- CONTACT AREA PLATING
  0:40U" TIN

Right Angle Receptacle

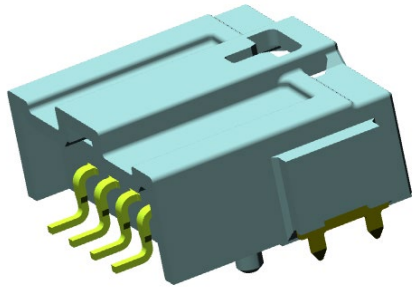


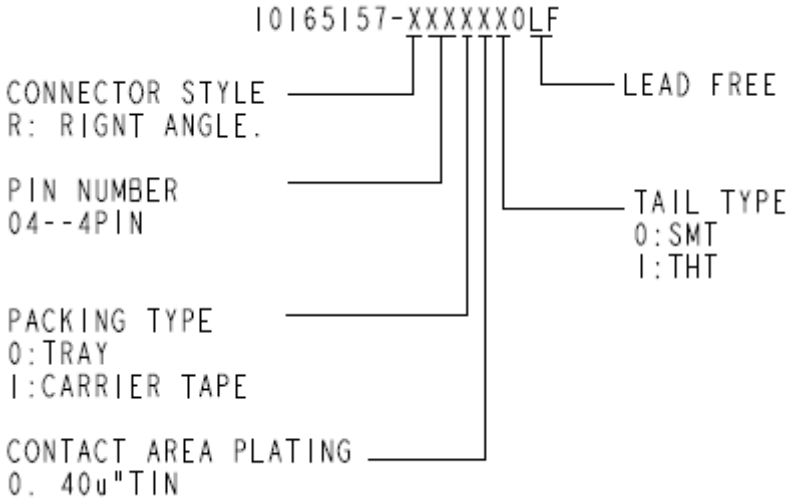
10164520-XXXXXXXLF

- CONNECTOR STYLE
  R: RIGNT ANGLE.
- PIN NUMBER
  18- 18 PIN
  ...
- PACKING TYPE
  0:TRAY
  1:CARRIER TAPE
- LEAD FREE
- COVER OPTIONAL
  0: WITHOUT
  1: WITH
- HOLD DOWN OPTION AND DIM "L"
  0: THT, L=2.15 NO HOLD DOWN
  1: THT, L=2.15 WITH HOLD DOWN
- PLATING
  0: TIN 40U"

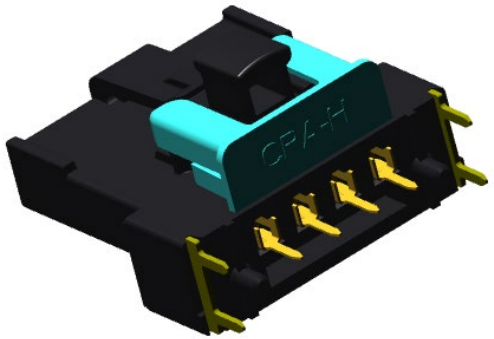
FlexLock™ Header part numbers 2.54mm pitch Single Row

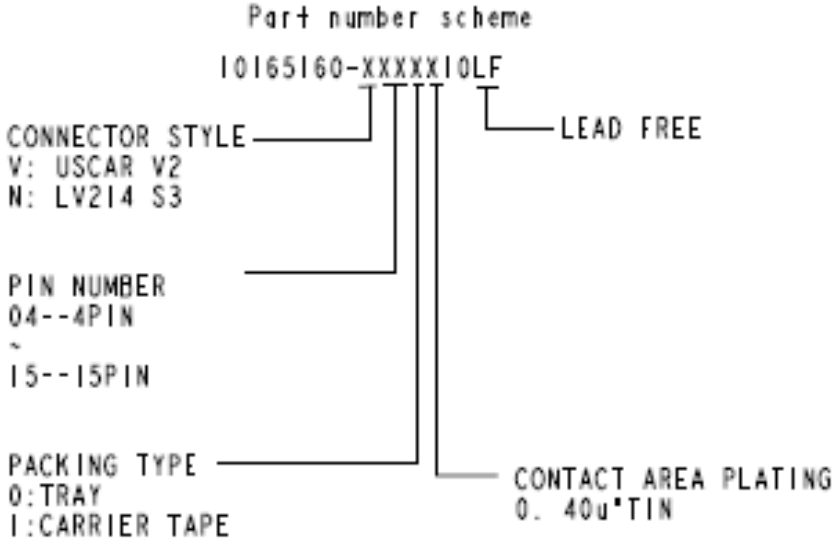
Right Angle Header





Vertical Receptacle

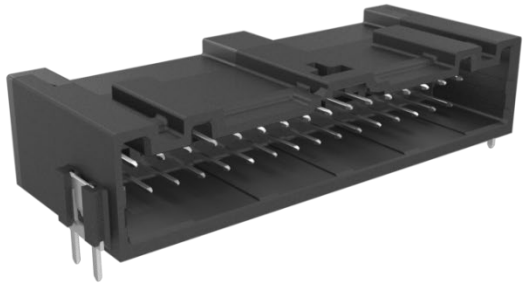




FlexLock™ Header & Cable housing part numbers 2.54mm pitch (flex-to-wire)

Amphenol
COMMUNICATIONS SOLUTIONS

Right Angle Header



10166409-FXXX10XLF

CONNECTOR STYLE
F: RIGHT ANGLE
NO STANDOFF & POST

PIN NUMBER
36- 36 PIN
34- 34 PIN
~~~
22- 22 PIN
20- 20 PIN

CONTACT AREA PLATING
1. 8u" GXT OR GOLD
2. 40u"TIN

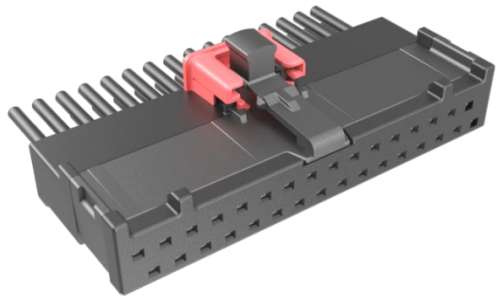
LEAD FREE

CODING TYPE (SEE NOTES 7)
A: DIM F 6.73 BLACK
B: DIM F 6.23 GREEN(RAL6002)
C: DIM F 5.73 WHITE(RAL9001)
D: DIM F 7.23 Bordeaux(RAL4004)

TAIL SPACER OPTION
0: WITHOUT SPACER

REAR COVER OPTION
1: WITH REAR COVER

## Cable housing



10166410-XXXX00XLF

CONNECTOR STYLE
W: WIRE LOCK

PIN NUMBER
36- 36 PIN
----
28- 28 PIN
...

CONTACT AREA PLATING
0. 40u"TIN

LEAD FREE

CODING TYPE(SEE NOTES 7)
0: NO CODING FEATURE (BLACK)
A: DIM B 6.65 BLACK
B: DIM B 6.15 GREEN(RAL6002)
C: DIM B 5.65 WHITE(RAL9001)
D: DIM B 7.15 BORDEAUX(RAL4004)
~~~

FlexLock™ Cable terminal numbers 2.54mm pitch (flex-to-wire)

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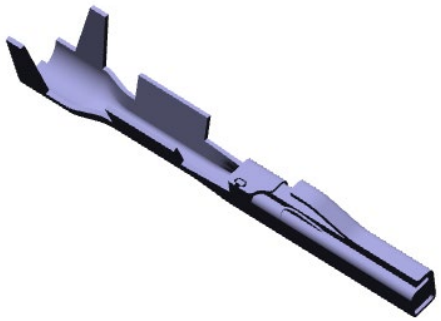
COMMUNICATIONS SOLUTIONS

Cable terminal



5. PART NUMBER: 10163003 – 0 0 X LF

CONTACT PLATING:
0=2.5~5um Hot-Dip Pure Tin

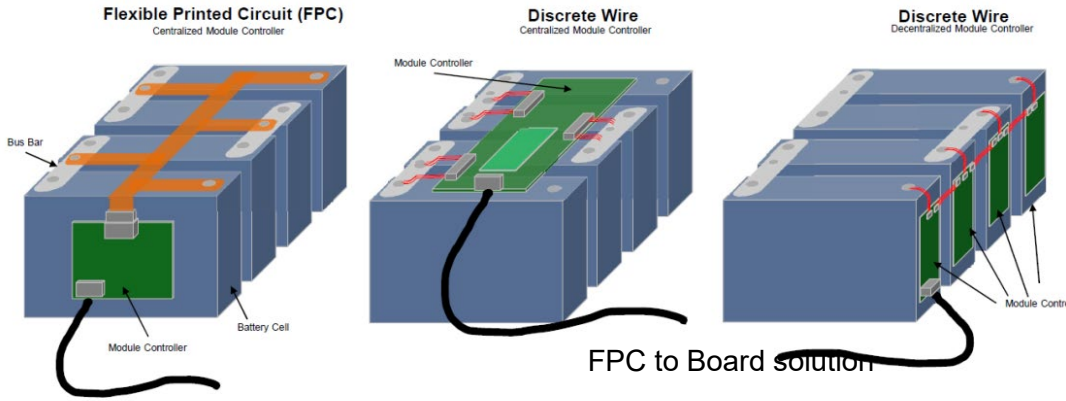
WIRE SIZE RANGE:
1=0.13 to 0.17mm²
2=0.22 to 0.35mm²

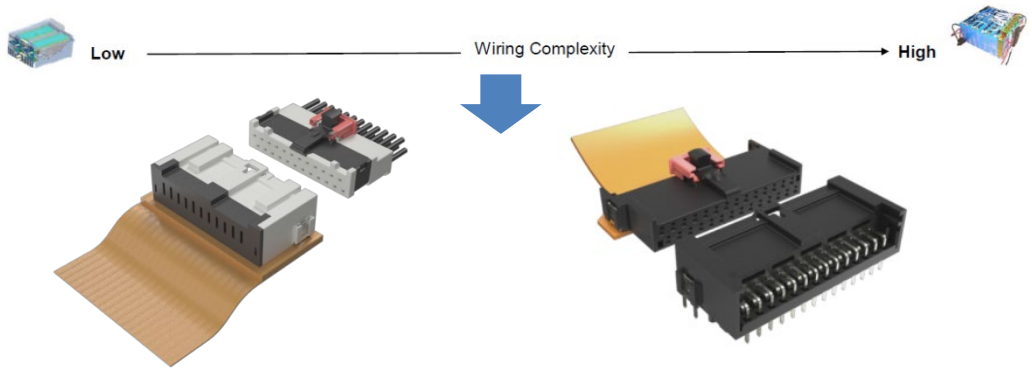
RESERVE NUMBER

Application Focus - BMS

EV Battery Management System

• Different building practices





A Battery Management System (BMS) is the monitoring system that manages the output, charging and discharging and provide notifications on the status of the battery pack. A BMS is not one system, but it is a whole set of subsystems, each individually responsible for performing a specific task.

Battery Management Systems (BMS) can be found wherever there is a need for efficient control and monitoring of a battery system and basically BMS optimize battery efficiency and maximize range.

Since BMS are made up of several electronic systems interconnect technology is important to ensure control of all diagnostic and safety functions.

FlexLock® key benefits for application:
-Allow direct connection between the structure of automotive FPC and the board.
-Eliminates the need for complex, heavy wire assembly
-Allows for easier assembly and is more cost effective compared to discrete wire connections.

FlexLock™ Applications

Energy Storage Systems
Robotics

BMS (Battery Management System)
EV Power Converter Control

Thank You

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