

USBF TV (USB-A)

USB connection system for harsh environment



With USB Field, you can insert a standard USB 2.0 cordset into a metallic plug which will protect it from shocks, dust and fluids.
No hazardous on-field cabling and grounding!
 This metallic plug is connected into a receptacle, using a Tri Start Thread coupling mechanism (MIL-DTL-38999 series III type) with anti-decoupling device for high vibrations.

- Applications**
- Embedded computers
 - Data acquisition and transmission in harsh environment
 - Railways
 - Battelfield communication systems
 - Navy systems

Data transmission
 USB specification 2.0
 Data rate: up to 480 Mbps for high speed USB

- Main characteristics**
- Sealed against fluids and dusts (IP68)
 - Shock, vibration and traction resistant
 - No cabling operation in field and no tools required
 - Improved EMI protection
 - Tri Start Thread coupling mechanism (MIL-DTL-38999 series III type) with anti-decoupling device - Shell size 15
 - 2 mechanical coding / polarization possibilities by the user (receptacle insert rotation)
 - USBF TV plug retention in the receptacle: 100 N in the axis
 - Mating cycles: 500 minimum

- Environmental protection**
- Sealing (when mated): IP68 (temporary immersion)
 - Salt spray: 48 h with nickel plating
 > 500 h with olive drab cadmium
 1000 h with marine bronze shell
 - Fire retardant / low smoke: UL94 V0 and NF F 16 101 & 16 102
 - Vibrations: 10 – 500 Hz, 10 g, 3 axes: no discontinuity > 1micro s
 - Shocks: IK06: weight of 250 g drop from 40 cm [15.75 in] onto connectors (mated pair)
 - Humidity: 21 days, 43°C, 98% humidity
 - Temperature range: - 40°C / +85°C

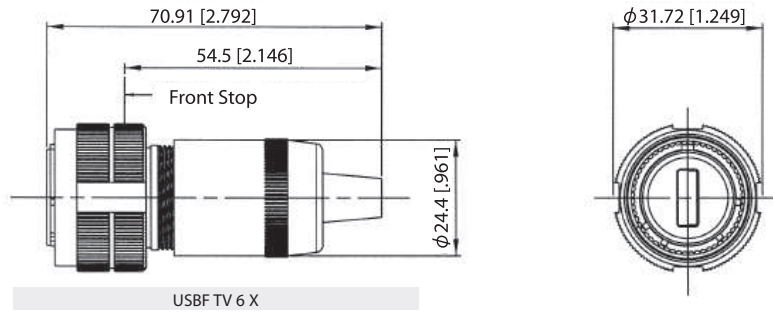
Part number code

| | | | | |
|---|---------|---|---|---|
| Series | USBF TV | 2 | 1 | G |
| USB Field TV | | | | |
| Shell type | | | | |
| 6: plug | | | | |
| 2: square flange receptacle | | | | |
| 2PE: square flange receptacle with metal backshell (type 1) & with metal backshell + plastic gland (type 2) | | | | |
| 2PEM: square flange receptacle with backshell + metal gland (only for back termination type 2 = Solder) | | | | |
| 7: jam nut receptacle | | | | |
| 7PE: jam nut receptacle with metal backshell (type 1) & with metal backshell + plastic gland (type 2) | | | | |
| 7PEM: jam nut receptacle with backshell + metal gland (only for back termination type 2 = Solder) | | | | |
| Back terminations (receptacles only) | | | | |
| 1: female USB-A | | | | |
| 2: solder (4 tinned holes) | | | | |
| Shells material & finish | | | | |
| N: aluminium shell - nickel plating - ROHS compliant | | | | |
| G: aluminium shell - olive drab cadmium plating | | | | |
| BZ: marine bronze shell - ROHS compliant | | | | |

- Examples:
- Olive drab cadmium plug: USBF TV 6G
 - Olive drab cadmium square flange receptacle, USB-A back terminat^o: USBF TV 21G
 - Olive drab cadmium jam nut receptacle, USB-A receptacle back terminat^o: USBF TV 71G
 - Nickel jam nut receptacle, solder back termination: USBF TV 72N

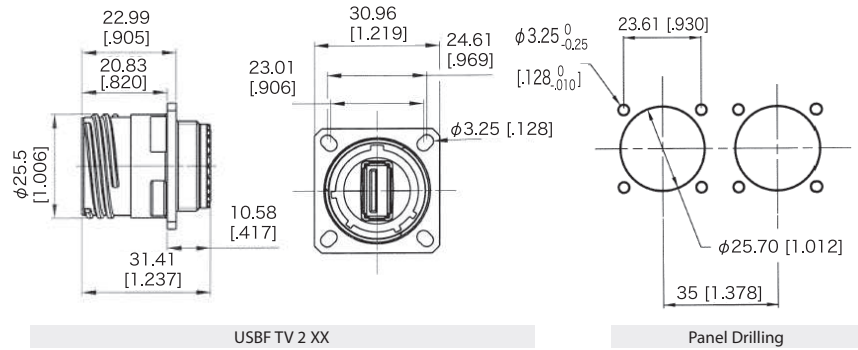
Plug

- Shell type 6

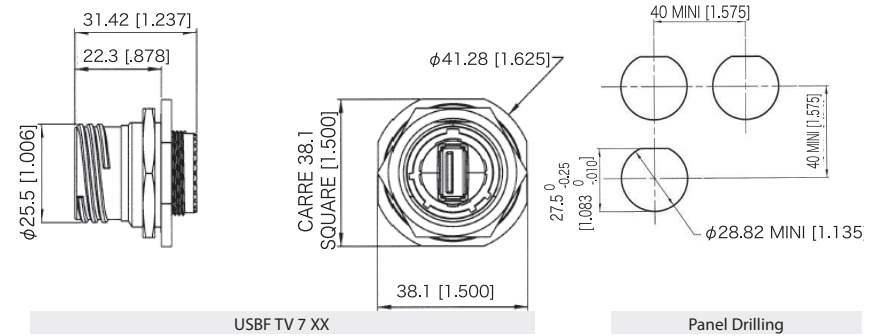


Receptacles

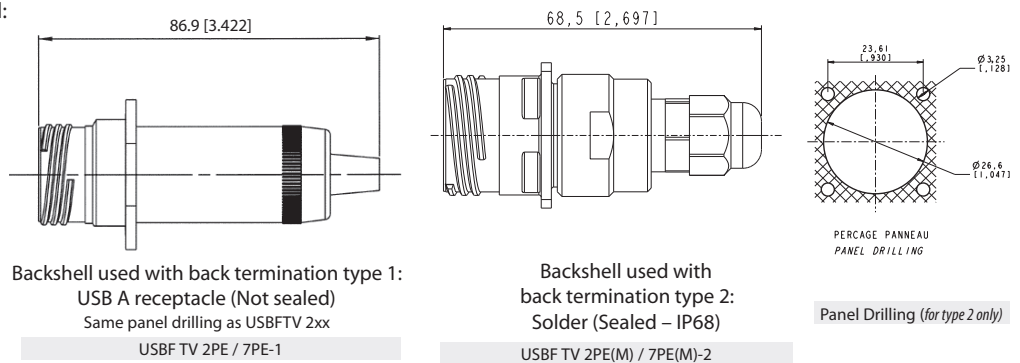
- Square flange receptacle
- 4 mounting holes: shell type 2



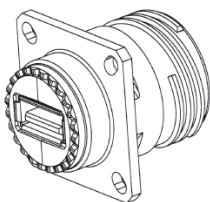
- Jam nut receptacle
- Hexagonal nut mounting: shell type 7



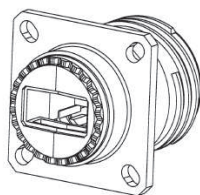
- Receptacles with backshell:
- Shell type 2PE and 7PE



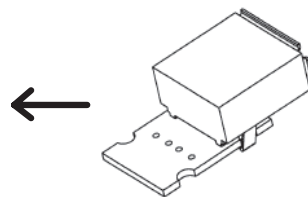
Back terminations



Type 1: female USB-A



Type 2: solder 4 Tinned holes to solder your cable



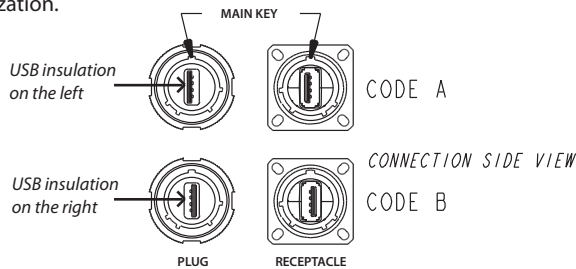
View of the PCB of the Type 2 version with 4 tinned holes for solder termination

Assembly instructions

Can be used with most the USB cordset brands : No tools required!

Plug assembly

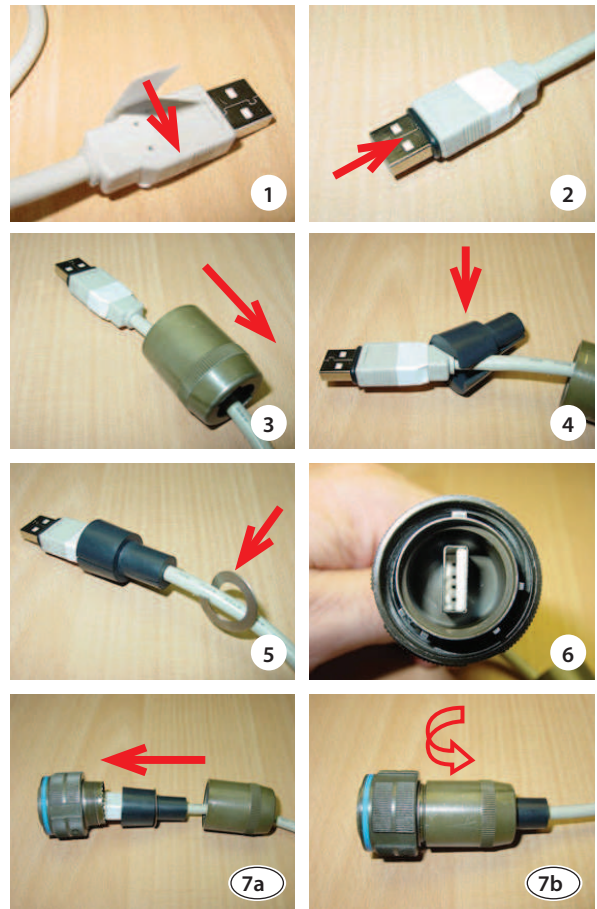
1. Only if you need a full sealing (IP68): Install the white sticker around the plug, covering the 4 little holes of the overmolding
2. Insert the black O Ring around the front face of the USB A plug. This O Ring will ensure connection sealing
3. Insert the USB cordset into the metallic backshell
4. Insert the retention spacer laterally to the cable (this spacer is soft, in order to adapt to different shapes of overmolding) and slide the overmolding of the USB-A plug into this retention spacer
5. Insert the friction ring laterally to the cable
6. Choose the right coding (2 positions) and insert the USB-A plug into the protective plug. Note at this step, the main key is used for polarization.



7. Screw the backshell on the plug body. A wrench can be necessary to fully tighten it, and the connection to the receptacle can help

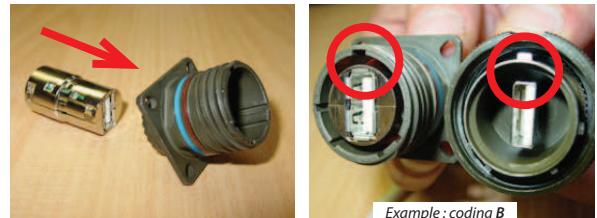
IMPORTANT NOTE

The connection sealing is not done by the black retention spacer (which is slotted), but by the front face ORing (fig.2)



Receptacle assembly

Insert the USB module from the rear. Reference is main key. Beware to have a coding compatible with the coding you used for the plug: on front view, the white shapes in the USBs must be on the same side.



To remove the USB module, insert the removal tool **USBF ODE** from the Front, and push back the module.

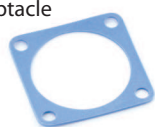


Accessories

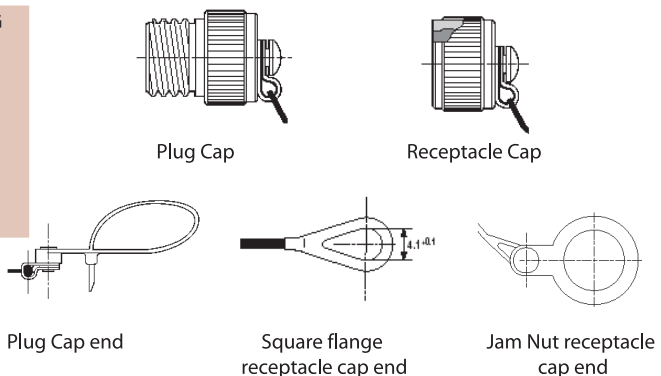
■ Metallic caps

| | USBF TVC | 2 | G |
|--|----------|---|---|
| Connector type | | | |
| 6: plug | | | |
| 2: square flange receptacle | | | |
| 7: jam nut receptacle | | | |
| Shells material & finish | | | |
| N: aluminium shell - nickel - ROHS compliant | | | |
| G: aluminium shell - olive drab cadmium | | | |
| BZ: marine bronze shell - ROHS compliant | | | |

- Panel gasket for square flange receptacle
Thickness: 0,8 mm [.031]
P/n: **JE15**



- Receptacle insert removal tool: p/n **USBF ODE**



USBF TV

Transversally sealed receptacles



In some applications, a transversal sealing for the receptacle is a « must ». This will prevent fluids and dust from going through the receptacle when plug or cap are not mated to the receptacle. The sealed solution (version "S") has a compound at the rear of the receptacle below. In addition, the Sealed USBF TV has been successfully tested in very high vibration corresponding to airplane applications.

Applications

- Embedded computers
- Data acquisition and transmission in harsh environment
- Railways
- Battelfield communication systems
- Navy systems

Data transmission

USB specification 2.0
Data rate: up to 480 Mb/s for high speed USB

Main characteristics

- Sealed against fluids and dusts (IP68)
- Shock, vibration and traction resistant
- No cabling operation in field and no tools required
- Improved EMI protection
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- 2 mechanical coding/polarization possibilities by the user (receptacle insert rotation)
- USBF TV plug retention in the receptacle: 100 N in the axis
- Mating cycles: 500 minimum

Environmental protection

- Sealing (when mated): IP68 (temporary immersion)
- Salt spray: 48 h with nickel plating
> 500 h with olive drab cadmium
1000 h with marine bronze shell
- Fire retardant / Low smoke: UL94 V0 and NF F 16 101 & 16 102
- Vibrations: 10 – 500 Hz, 10 g, 3 axes: no discontinuity > 1 micro s
- Shocks: IK06 ► weight of 250 g drop from 40 cm [15.75 in] onto connectors (mated pair)
- Humidity: 21 days, 43°C, 98% humidity
- Temperature range: - 40°C / +85°C

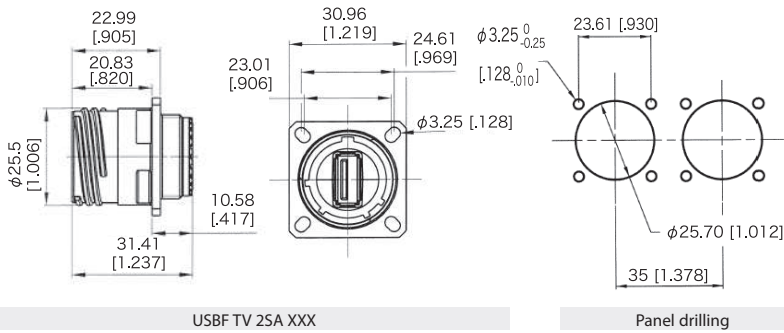
Part number code

| | | | | | | | |
|--|---------|------|---|---|---|----|---|
| Series | USBF TV | 2PES | A | 2 | N | 03 | A |
| USB Field TV | | | | | | | |
| Shell Type | | | | | | | |
| 2S : square flange receptacle | | | | | | | |
| 2PES: square flange receptacle + backshell + plastic gland | | | | | | | |
| 2PEMS: square flange receptacle + backshell + metal gland | | | | | | | |
| 7S: jam nut receptacle | | | | | | | |
| 7PES: jam nut receptacle + backshell + plastic gland | | | | | | | |
| 7PEMS: jam nut receptacle + backshell + metal gland | | | | | | | |
| Coding | | | | | | | |
| "A" (Standard) or "B" | | | | | | | |
| Back terminations | | | | | | | |
| 2: rugged USB cable (see corresponding datasheet page 109) | | | | | | | |
| Shells plating | | | | | | | |
| N: nickel | | | | | | | |
| G: olive drab cadmium | | | | | | | |
| USB cable length | | | | | | | |
| 03: 30 cm [11.81 inches] | | | | | | | |
| 05: 50 cm [19.68 inches] | | | | | | | |
| 10: 1 meter [39.37 inches] | | | | | | | |
| USB cable end | | | | | | | |
| A: standard USB-A plug | | | | | | | |
| OPEN: open cable (no connector) | | | | | | | |

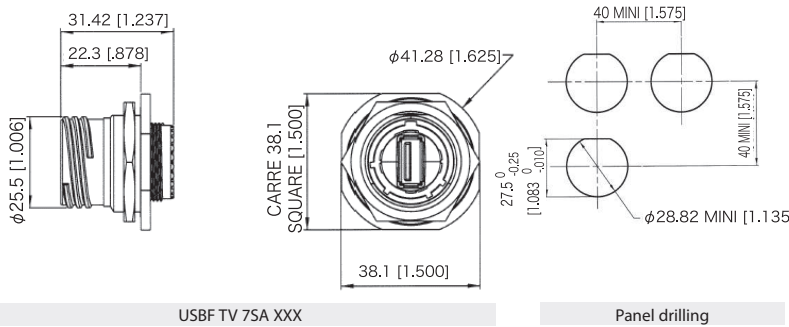
Examples: - Olive drab cadmium square flange receptacle with 30 cm of USB cable and standard USB-A plug: USBF TV 2S G 03 A
- Nickel jam nut receptacle + backshell + plastic gland, with 1 meter of USB cable, and a standard USB-A plug: USBF TV 7PES N10 A

Receptacles

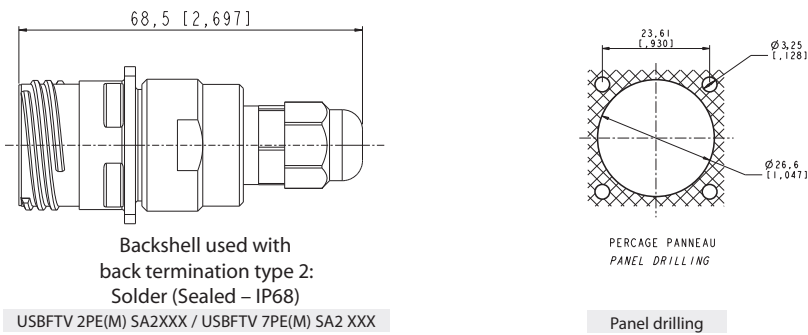
■ Square flange receptacle 4 mounting holes: shell type 2



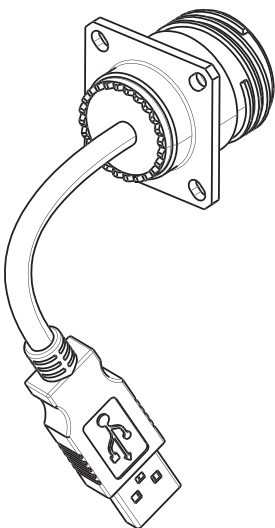
■ Jam nut receptacle hexagonal nut mounting: shell type 7



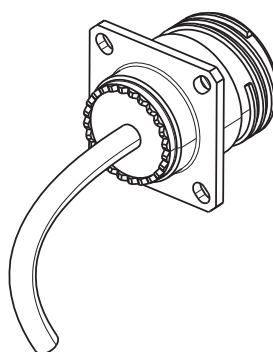
■ Jam nut receptacle hexagonal nut mounting: shell type 7



Cordset end



USB cable end type "A"



USB cable type "OPEN"



USBF TV

Hermetic receptacles



In some applications, a transversal hermiticity for the receptacle is a « must ». This will prevent gas from going through the receptacle when plug or cap are not mated to the receptacle.

The hermetic solution (version "H") has a compound at the rear of the receptacle. Helium leakage is less than 1.10^{-6} cm³ per second [0.1 micron cubit ft per hour] at one bar [15 psi] pressure differential.

Applications

- Embedded computers
- Data acquisition and transmission in harsh environment
- Railways
- Battelfield communication systems
- Navy systems

Data transmission

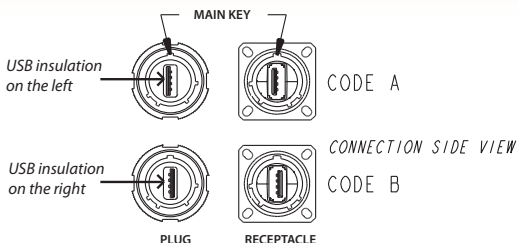
USB specification 2.0
Data rate: up to 480 Mb/s for high speed USB

Main characteristics

- Same as the USBF TV (see page 76)... a complete IP68 sealing of the receptacle is added (even with no plug or no protective cap mated).
- Outside dimensions are the same as the standard USBF TV (USB-A).
- Vibrations : the compounded version of the USBF TV has been tested in vibration following the NAS 1599 aeronautic specification (ambient temperature): 5 - 3000 Hz, 20g, 2.5 mm [.1 inch] double amplitude, 3 axes, 12 hours
Note: this specification exceeds MIL-C-26500 requirements.

IMPORTANT NOTE

Due to the compound, the coding of the connector must be done in the factory: use the codes A or B in the part number. **Example:** USBF TV 2H A 2 N 03 A



Part number code

| | | | | | | | |
|-----------------------|---|----|---|---|---|----|---|
| Series | USBF TV | 2H | A | 2 | N | 03 | A |
| USB Field TV | | | | | | | |
| Shell type | | | | | | | |
| 2H : | hermetic square flange receptacle | | | | | | |
| 2PEH: | hermetic square flange receptacle + backshell + plastic gland | | | | | | |
| 2PEMH: | hermetic square flange receptacle + backshell + metal gland | | | | | | |
| 7H: | hermetic jam nut receptacle | | | | | | |
| 7PEH: | hermetic jam nut receptacle + backshell + plastic gland | | | | | | |
| 7PEMH: | hermetic jam nut receptacle + backshell + metal gland | | | | | | |
| Coding | | | | | | | |
| "A" (standard) or "B" | | | | | | | |
| Back terminations | | | | | | | |
| 2: | rugged USB cable (see corresponding datasheet page 109) | | | | | | |
| Shells plating | | | | | | | |
| N: | nickel | | | | | | |
| G: | olive drab cadmium | | | | | | |
| USB cable length | | | | | | | |
| 03: | 30 cm [11.81 inches] | | | | | | |
| 05: | 50 cm [19.68 inches] | | | | | | |
| 10: | 1 meter [39.37 inches] | | | | | | |
| USB cable end | | | | | | | |
| A: | standard USB-A plug | | | | | | |
| OPEN: | open cable (no connector) | | | | | | |

Examples: - Olive drab cadmium hermetic square flange receptacle with 30 cm of USB cable and standard USB-A plug: USBF TV 2H G 03 A
- Nickel hermetic jam nut receptacle + backshell + plastic gland, with 1 meter of USB cable, and a standard USB-A plug: USBF TV 7PEH N10 A



USBF TV

Receptacles with 360° EMI backshells

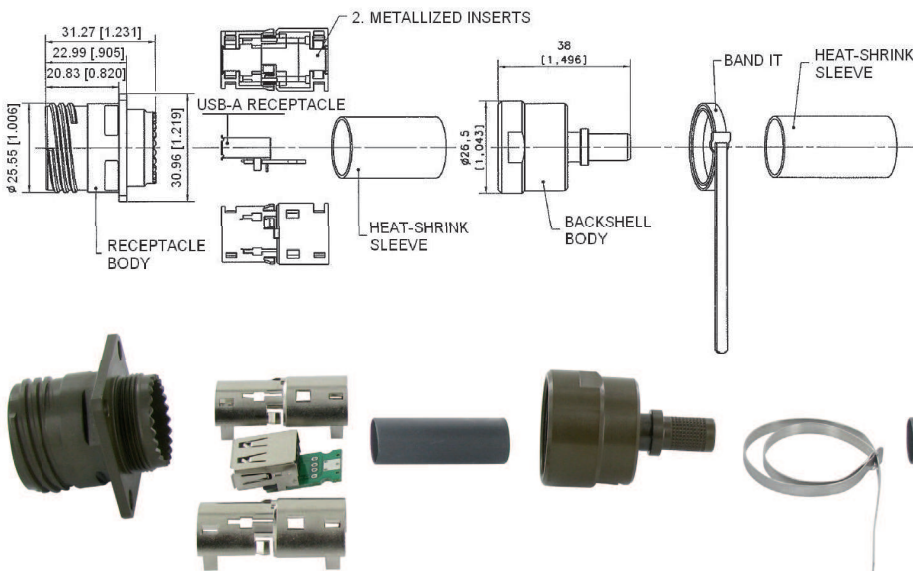


USBFTV receptacles series with EMI backshells provide 360° shielding: same protection than the one proposed per standard MIL-DTL-38999 serie III connectors. We offer these EMI backshells with square flange and jam nut receptacles. The available platings are nickel or olive drab cadmium. With those solutions we suggest using our reinforced USB cable (shielded – zero halogen jacket) ► see page 109

We can provide those receptacles:

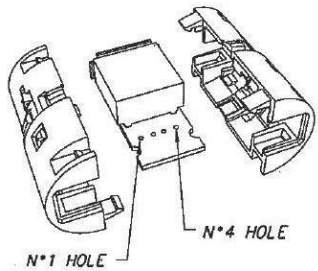
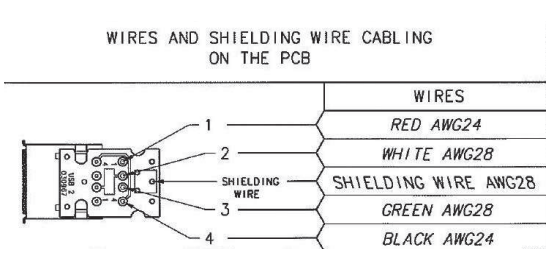
- with cordset already soldered
- without cordset

Example with a square flange receptacle (provided without cable)



| Part number | Plating | Square flange receptacle | Jam nut receptacle |
|--------------------|-------------------------|--------------------------|--------------------|
| | Nickel - ROHS compliant | KIT40263 | KIT40245 |
| Olive drab cadmium | KIT40263G | KIT40245G | |

IMPORTANT NOTE
 With receptacles provided without cable, customer will have to solder his cable on the PCB ; please find below the cabling specification.
 If customer prefers to use his cable, please check with us compatibility with our EMI backshells: www.usbfield.com

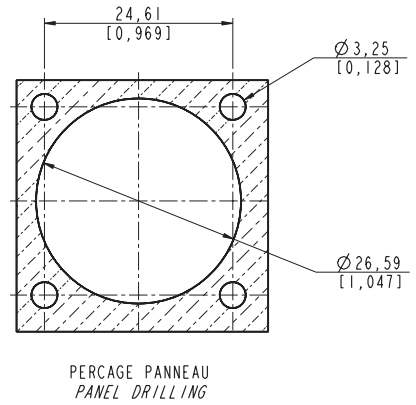
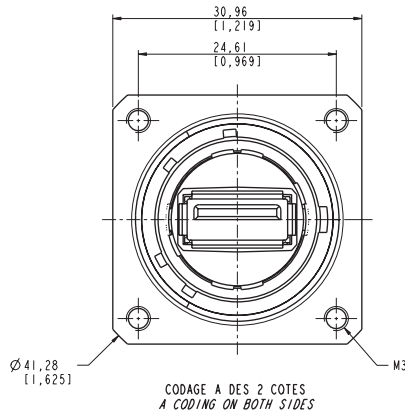
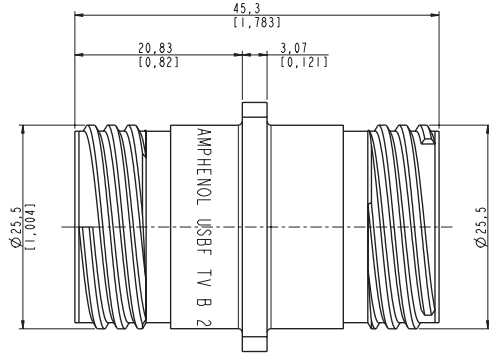




USBF TV

Through bulkhead

Receptacle



| Part number | Plating | P/N |
|-------------|-------------------------|---------------|
| | Nickel - ROHS compliant | USBF TV B 2 N |
| | Olive drab cadmium | USBF TV B 2 G |

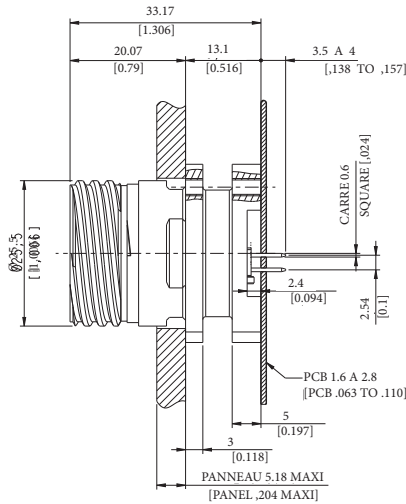
Nota : could be used with plug USBFTV, nickel and olive drab cadmium. See page 97.

USBF TV

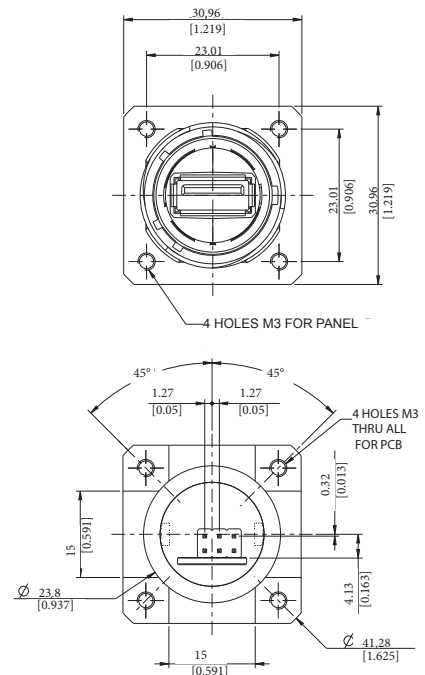
Stand off receptacles

These receptacles can be soldered directly to your PCB. A compound insures a transversal sealing and good performance in high-vibration environments.
The shell of those receptacles are in the "Stand Off" style.
They can be connected with rugged USBF TV series plugs.

Square flange receptacle

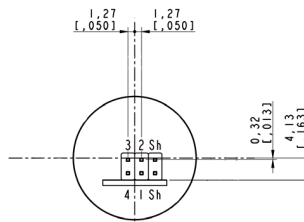
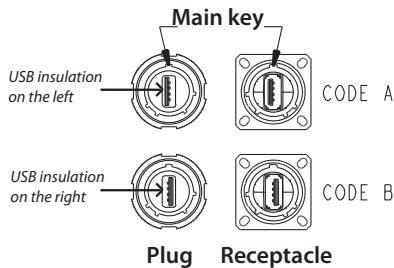


Datas for coding A
Coding B is also available, please consult us.

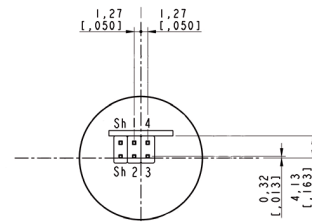


| Part number | Plating | P/N for coding A | P/N for coding B |
|-------------|-------------------------|-------------------|-----------------------|
| | Nickel - ROHS compliant | USBF TV 25 N F459 | USBF TV 2S B 5 N F459 |
| | Olive drab cadmium | USBF TV 25 G F459 | USBF TV 2S B 5 G F459 |

Connection side view



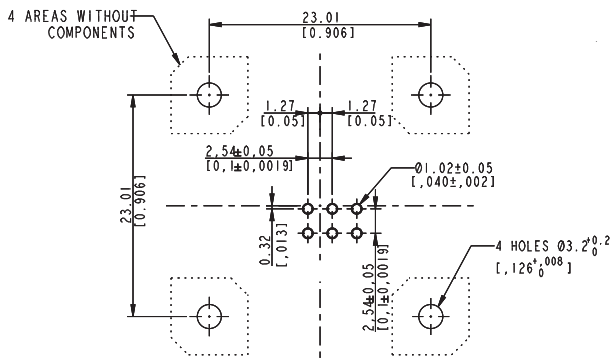
Coding A - Pins position :
1 & 4 = Power - Red & black wires USB2.0 cable
2 & 3 = Signal - White & green wires USB2.0 cable
Sh = Shield



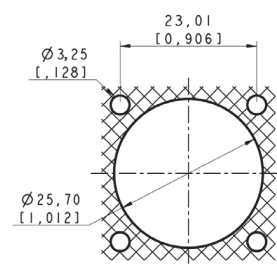
Coding B - Pins position :
1 & 4 = Power - Red & black wires USB2.0 cable
2 & 3 = Signal - White & green wires USB2.0 cable
Sh = Shield

Recommended PCB hole LAYOUT (Coding A) - Solder side view

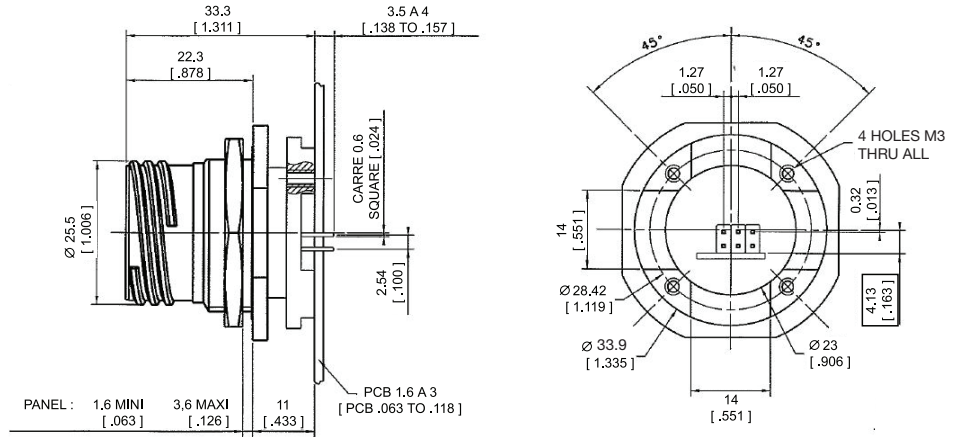
Nota : for coding B, please consult us.



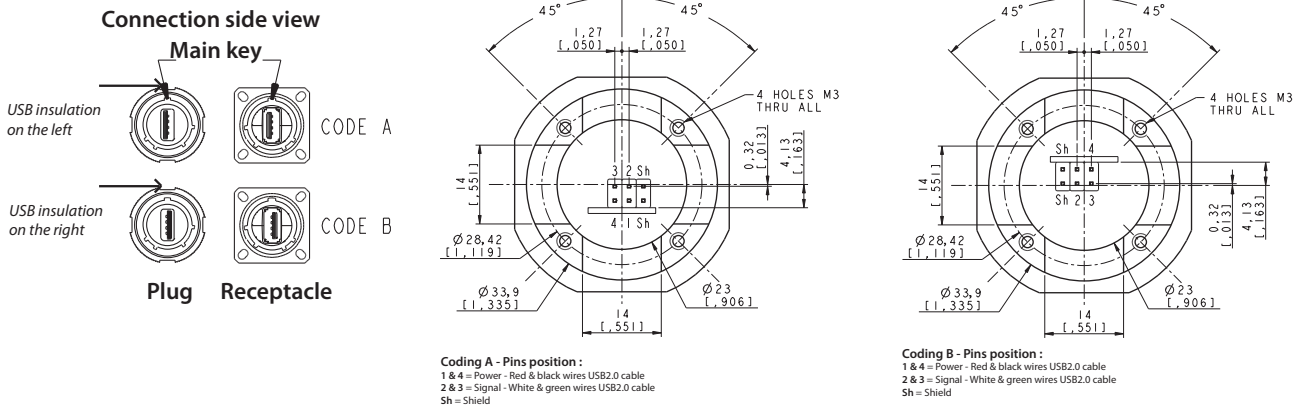
Panel drilling



Jam nut receptacle

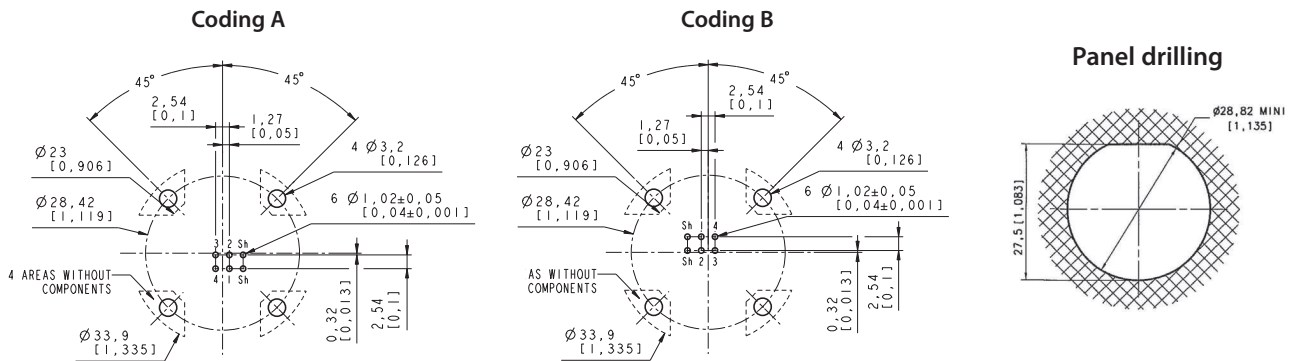


| Part number | Plating available | P/N for coding A | P/N for coding B |
|--------------------|-------------------------|-----------------------|-----------------------|
| | Nickel - ROHS compliant | USBF TV 75 N F459 | USBF TV 75 B 5 N F459 |
| Olive drab cadmium | USBF TV 75 G F459 | USBF TV 75 B 5 G F459 | |



Recommended PCB hole LAYOUT

Solder side view

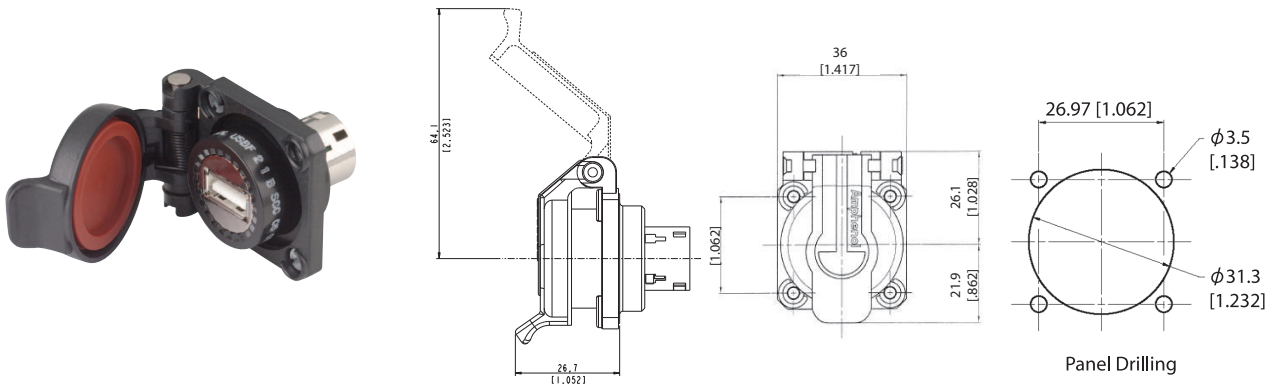


USB 2.0 Receptacle with Self Closing Cap



This Self Closing Cap automatically protects the USB Field square flange receptacles (MIL-C-26482 type), protecting your system from dust and water projections. The same cap can be used to protect RJ45, USB3.0, USBB and IEEE1394 receptacles. A spring automatically closes the upper part of the cap when either the RJ Field plug, RJ45 cordset, USB or IEEE1394 cordset, or USB key are removed from the receptacle.

USBF 21 X SCC



Version: USB-A (front and back termination)

| Part number * | Plating | | Metallized inserts (EMI) | |
|---------------|---------------------------|-------------------|--------------------------|--|
| | Part number * | Plating | Metallized inserts (EMI) | |
| USBF 21B SCC | Black coated | No (blank insert) | | |
| USBF 21N SCC | Nickel plated | Yes | | |
| USBF 21G SCC | Olive drab cadmium plated | Yes | | |

* The part number includes the receptacle + the self closing cap

■ Note: Panel gasket with any of these receptacles: JE18



RJF 21 X SCC, USBBF 21 X SCC, & IEEE1394



RJ45 version
(see page 25)



USB3.0-A version
(see page 94)



USB-B version
(see page 118)



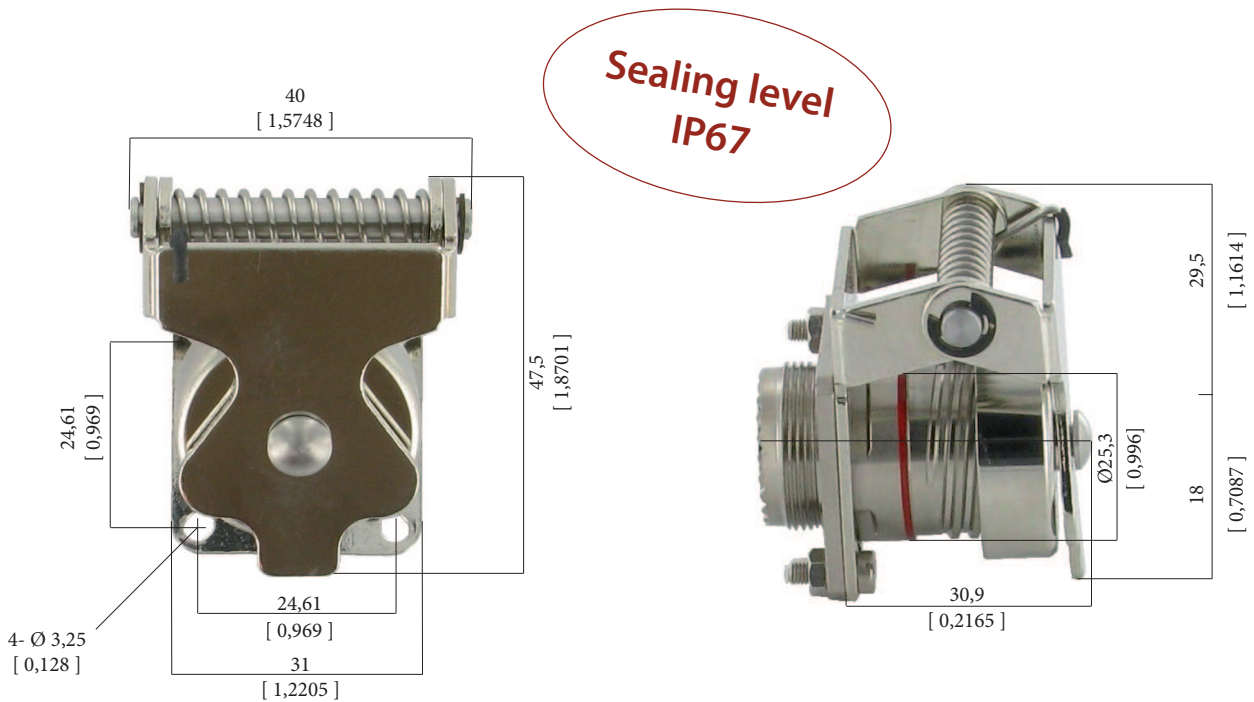
IEEE1394 version
(see page 143)

Metallic Self Closing Cap (SCC)

For USBF TV 2.0 square flange receptacles.

This Self Closing cap automatically protects the USBF TV (2.0 - type A) square flange receptacles (MIL-DTL-38999 type), protecting your system from dust and water projection.

A spring automatically closes the upper part of the cap when the USB plug is removed from the receptacle.



IMPORTANT NOTE

Metal Self Closing cap are sold separately (without receptacle).



| Part number | Plating | P/N |
|-------------|-------------------------|-------------------|
| | Black - ROHS compliant | USBFTVSCCB |
| | Nickel - ROHS compliant | USBFTVSCCN |
| | Olive drab cadmium | USBFTVSCCG |

Remark: also compatible with USB3FTV (type A) & USBBFTV (type B) square flange receptacles:

USB3FTVXX (see page 95)

USBBFTV2XX (see page 119)

■ Panel gasket for square flange receptacle (thickness: 0,8 mm [.031]):

Part number: **JE15**

