



Boson[®]+ CZ 14-75 User Manual

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REVISION HISTORY

Version	Date	Comments
A	09/13/2023	Initial Release

RELATED DOCUMENTS

Document No.	Description/Link	QR Code
102-2013-100-01, Ver 221	Boson Camera Adjustments Application Note	
102-2013-40, Release 350, 3.0.26605	Boson and Boson+ Thermal Imaging Core Product Data Sheet	
102-2013-42	Boson SDK Documentation Rev 206	

RESOURCES

Description/Link	QR Code
Boson+ CZ Support Center Find the latest articles, manuals, app notes, and more!	
Teledyne FLIR Technical Support Center Your home for documents, software, and STEP files. We're reinventing the ownership experience. Experience what Teledyne has to offer.	
Teledyne FLIR Product Registration Activate your warranty and stay current with all the latest firmware releases.	

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1. INTRODUCTION AND FEATURES

The [Boson®+ CZ 14-75](#) combines Teledyne FLIR's Boson+ longwave infrared (LWIR) OEM camera module and 5x continuous zoom (CZ) lens, offering a high-performance imaging solution. Boson+ features an industry-leading thermal sensitivity of ≤ 20 mK and an upgraded automatic gain control (AGC) filter, dramatically enhancing scene contrast and sharpness. The high-performance lens and control electronics maintain focus through zoom, providing real-time thermal gradient compensation, flexibility for user-defined command syntax, and expansion for additional features.

- Integrated with Boson+ camera module with 640x512 resolution and 12 μm pixel pitch
- 14-75 mm, F/1.2 LWIR continuous zoom lens optimized for 8.5-12.5 μm
- Light-weight design
- Motorized FOV and focus
- Advanced lens controller features automatic range-tracking and temperature compensation

This manual provides nominal parameters, specifications, and basic operation information. More detailed specifications and test results are in the related documents table.

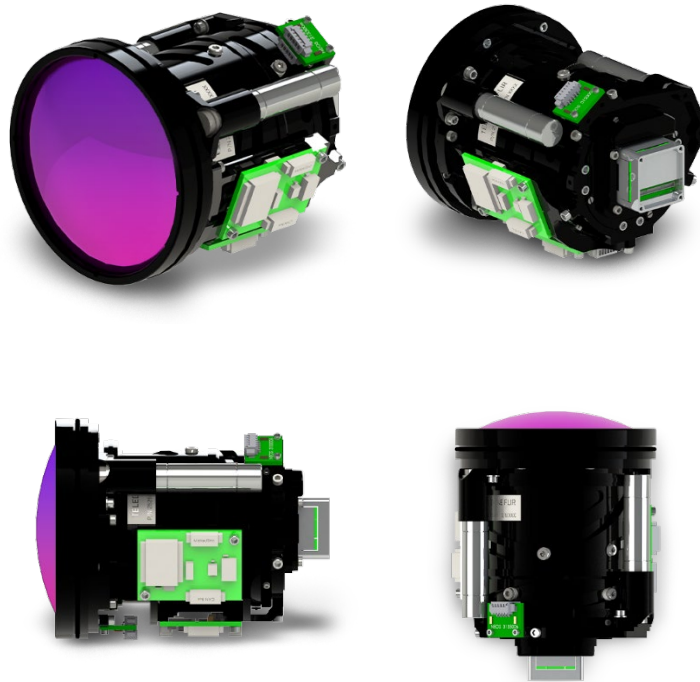


Figure 1. Boson+ CZ14-75

2. KEY SPECIFICATIONS

THERMAL IMAGER	
Array Format	640 × 512
Pixel Pitch	12 µm
Thermal Spectral Range	Longwave infrared; 8 µm – 14 µm
Thermal Sensitivity	≤20 mK
Full Frame Rate, Slow Frame Rate	60 Hz baseline; 30 Hz runtime selectable
Non-uniformity Correction (NUC)	Factory calibrated; updated FFCs with FLIR Silent Shutterless NUC (SSN™)
Solar Protection	Yes, lens only
Digital Zoom	1x to 8x zoom
Symbol Overlay	Re-writable each frame; alpha blending for translucent overlay
RADIOMETRY	
Temperature Measurement	Yes
Scene Dynamic Range	Up to 140 °C (high gain)
Temperature Accuracy	±5 °C accuracy or less, depending upon operating conditions
IMAGING & OPTICAL	
f number	1.2
Image Orientation	Adjustable (vertical flip and/or horizontal flip)
Focal Length	NFOV = 75mm +4% / -0% WFOV = 14mm +0% / -4%
Lens Window Transmittance	HEAR L1: ≥/ = 84% for band 8-12 µm DLC L1: ≥/ = 78% for band 8-12 µm
NFOV/WFOV Co-boresight location	<0.15 mm
Boresight Drift Through Zoom	<0.10 mm
Boresight Repeatability	</ = 0.025 mm
Parfocality	At 20 °C the lens shall stay in focus through zoom within 1/4-wave at 10.6 µm
Minimum Focus Distance	NFOV > 18 m WFOV > 3 m
Distortion	WFOV <6%; NFOV < 1%
Relative Illumination	RI falloff < 10%; Flux change through zoom <4%
FOV Change Time	<1.5 sec
Focus Change Time	<0.5 sec
PHYSICAL ATTRIBUTES	
Size	101 (l) x 77 (w) x 77 (h) mm (3.97 x 3.03 x 3.03 in)
Weight	390 g (13.75 oz)

INTERFACING	
Power Supply	Nominal voltage 12V +/- 1V
Serial Communication	The following serial communications shall be set: RS232, 38400 baud, 1 stop bit, 8 data bits, no parity
Peripheral Channels	I2C, SPI, SDIO
Video Channels	CMOS, MIPI or USB3
Control Channels	UART, USB or I2C
ENVIRONMENTAL	
Operational Temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Non Operating Temperature Range	-40 °C to 80 °C (-40 °F to 176 °F)
Focus Over Temperature	Maintain focus from -35 °C to 70 °C (-31 °F to 158 °F)
IP Rating [at front of lens]	IP67
Protection and Anti-Reflection Coatings	Lens elements shall be coated with anti-reflection coatings subject to adhesion, moderate abrasion, and humidity per durability requirements of MIL-PRF-13830
DLC Option	With DLC front coating, lens to withstand humidity, severe abrasion, and salt fog exposure
ESS Thermal	Lens assembly to be subjected to -35 °C to +70 °C temperature extremes with a maximum of 5 °C/min ramp rate and a minimum dwell of 60 min at each temperature extreme
ESS Vibration	Random vibration, from 10 Hz to 500 Hz with the following vibration profile along the optical axis for a minimum of 10 minutes: at 10 Hz, 0.01 G2/Hz at 50 Hz, 0.01 G2/Hz at 80 Hz, 0.04 G2/Hz at 350 Hz, 0.04 G2/Hz at 500 Hz, 0.01 G2/Hz
Shock	9G with 11msec half-sine pulse, minimum 3 pulses for each of 3 axes
Design and Construction	Lens assembly to meet MIL-STD-1472 and MIL-HDBK-1686
Operational Altitude	12 km (max altitude of a commercial airliner or airborne platform)

Specifications are subject to change. For the up-to-date specifications, go to www.flir.com/bosonpluscz.

3. INSTALLATION AND HANDLING

The camera is intended to be installed into an enclosure and may exhibit stray light effects if operated outside of an enclosure.



The camera should not be opened.
The system is very susceptible to FOD-caused image artifacts.



The camera system is an electrostatic-sensitive device.
ESD control should be implemented during the handling.

4. HARDWARE CONFIGURATION

The Boson+ CZ 14-75 includes the 14-75 mm continuous zoom (CZ) lens integrated with the Boson+ camera module. The CZ lens and infrared (IR) camera module are assembled at the Teledyne FLIR factory to provide an infinity-focused IR image to the camera. Users must select an accessory board and connect the power/communication cable for the camera system. It is configured with a Camera Link® accessory board and power/communication cables in Figure 2 and Figure 4. Datasheet (Doc.# 102-2013-40) for the camera from Teledyne FLIR provides the list of accessories. The lens controller and the camera need separate power and communication cables. The input power of the lens controller is 12 VDC, and the input power for the camera module is 3.3 VDC.

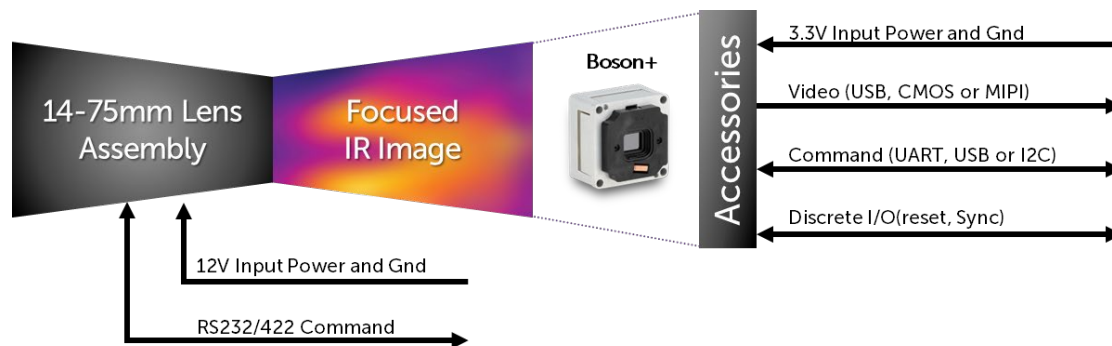


Figure 2. Simplified block diagram of the hardware

5. QUICK START GUIDE

5.1 Communication Port Selection

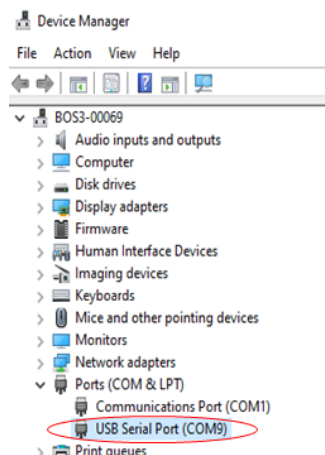


Figure 3. USB to RS232 converter and new COM port assigned from Windows OS

A USB-to-RS232 or USB-to-RS422 converter can be used to implement serial communication. Most computers have USB ports as configurable serial communication ports. After the converter driver is installed and recognized by the Windows OS, the specific communication port can be found in the “Device Manager” of the Windows OS. Figure 3 includes a representative USB-to-RS232 converter and a screenshot of the designated communication port assigned by Windows OS, the “COM9.” The designated COM port number can then be entered in the settings window for Terminal emulators.

5.2 Cable Connections

Figure 4 includes the Boson+ CZ 14-75 with the Camera Link® accessory board installed. The power/comm cable for the lens controller should be connected to the 6-pin Molex PicoBlade connector (Molex 53261-0671). The micro-USB 3.0 cable should be connected to the Camera Link accessory board to provide power to the camera and stream the video signal.

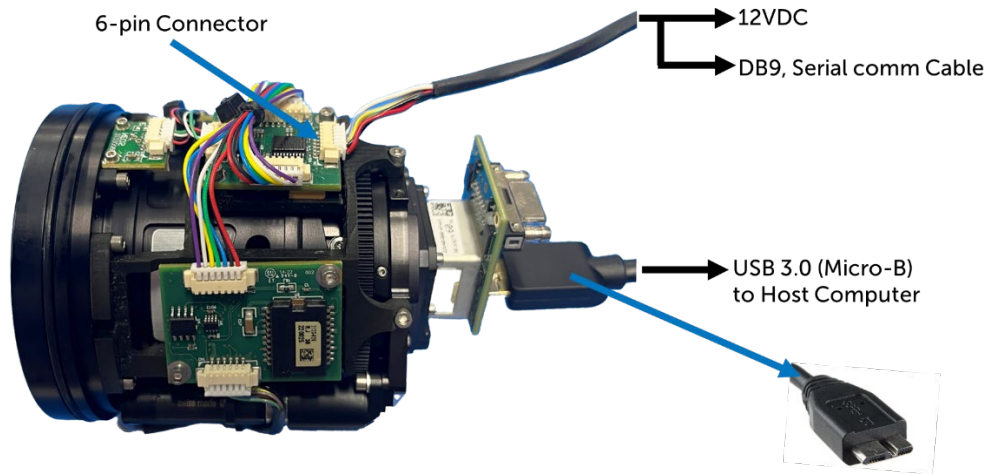


Figure 4. Cable connection for Boson+ CZ 14-75 with Camera Link Accessory Board

5.3 Operating the Lens Using Terminal

The commands and specifications in this section provide the basic information needed to interface the motorized optical system with the host computer using the serial terminal emulator, e.g., HyperTerminal or Putty. Details of all provided commands and additional commands can be found in Lens Controller User Manual M-006 and M-007, provided upon request.

5.3.1 Communications and Power

All commands to the Teledyne FLIR lens (controller) and replies from the lens are ASCII strings. Strings sent to the lens must be terminated by a <CR>. Reply strings from the lens typically end with a command-prompt character (>). The proper COM port number should be entered in the terminal emulator setting in addition to the following setup. The COM port number can be found in the "Ports (COM & LPT)" section of the Device Manager in Windows OS. See section 6.1 for details.

- Protocol: RS232
- Baud Rate: 38400
- Data Bits: 8
- Parity: None

5.3.2 FOV Motion

Axis number 1 is the FOV axis. The alias for this axis is the letter v. Commands include:

- Move to WFOV: /MPAv 0, p
- Move to NFOV: /MPAv 100, p
- Move to intermediate FOV: /MPAv xx,p where xx is the percentage of travel (0-100)
- Move to a specific Focal Length: /MPAv xx, F where xx is the target EFL in mm (14-75)

5.3.3 Focus Motion

Axis number 2 is the focus axis. The alias for this axis is the letter f. Commands include:

- Move to infinity focus: /MPAf 100, u
- Move a small amount toward a near object: /MPRf -25
- Move a small amount toward a far object: /MPRf 25
- Move a large amount toward a near object: /MPRf -200
- Move a large amount toward a far object: /MPRf 200
- Get the current focus axis position in encoder counts: /GMSf[2] 1

5.3.4 Miscellaneous Commands

Additional helpful commands include:

- Get the lens temperature: /GTV
- Reset the Teledyne FLIR controller: /RST0 NEOS
- Initiate Home sequence for an axis: /HOMx where x is the axis number specified above
- Turn On temperature compensation: /MDF[4] 2
- Turn Off temperature compensation: /MDF[4] 0
- Turn On range compensation: /MDF[5] 2
- Turn Off range compensation: /MDF[5] 0

5.4 Operating the Boson+

Teledyne FLIR provides a separate Boson GUI (Windows-based) v4.0 application to operate the Boson+ and stream/capture video images. The [Boson GUI v4.0](#) quick-start guide provides a step-by-step procedure to see thermal images. The Boson GUI and various application notes can be found at www.flir.com/boson.

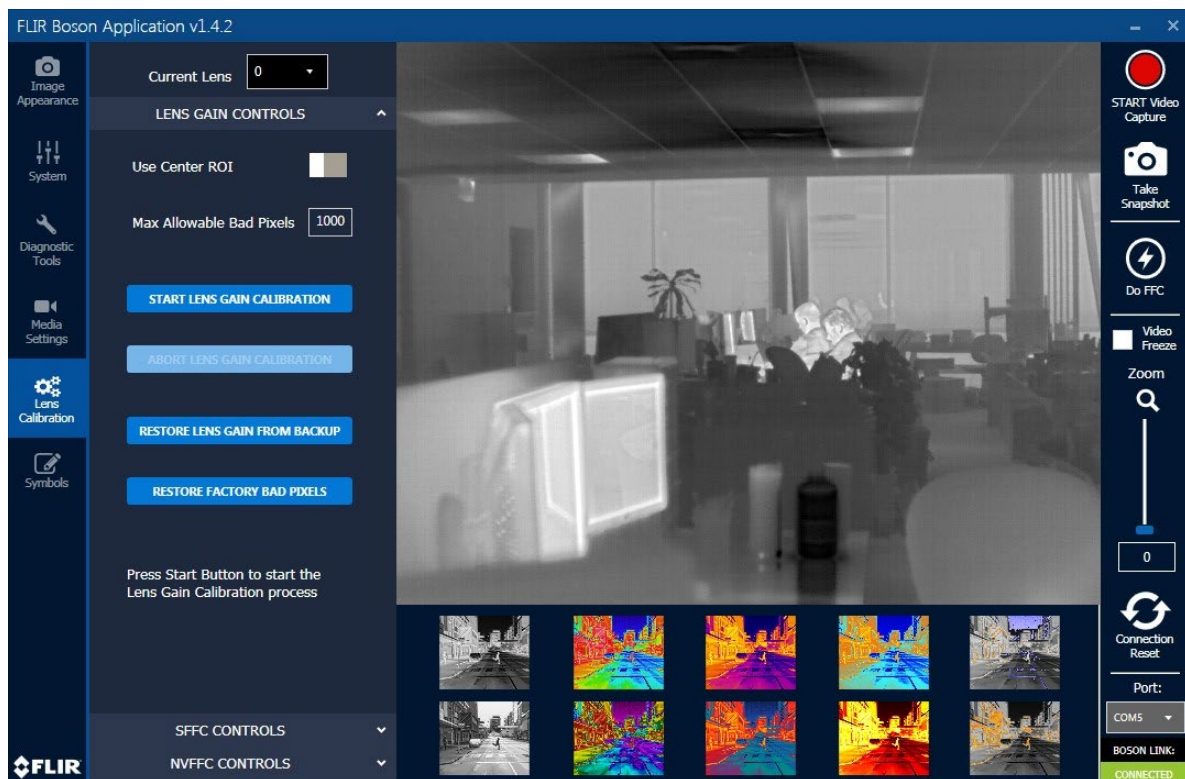


Figure 5. Screenshots of the Boson GUI

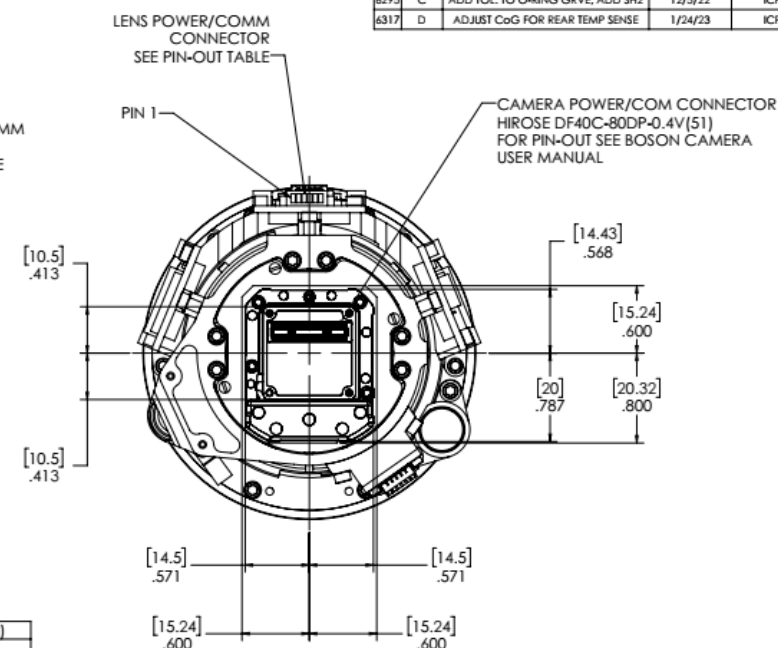
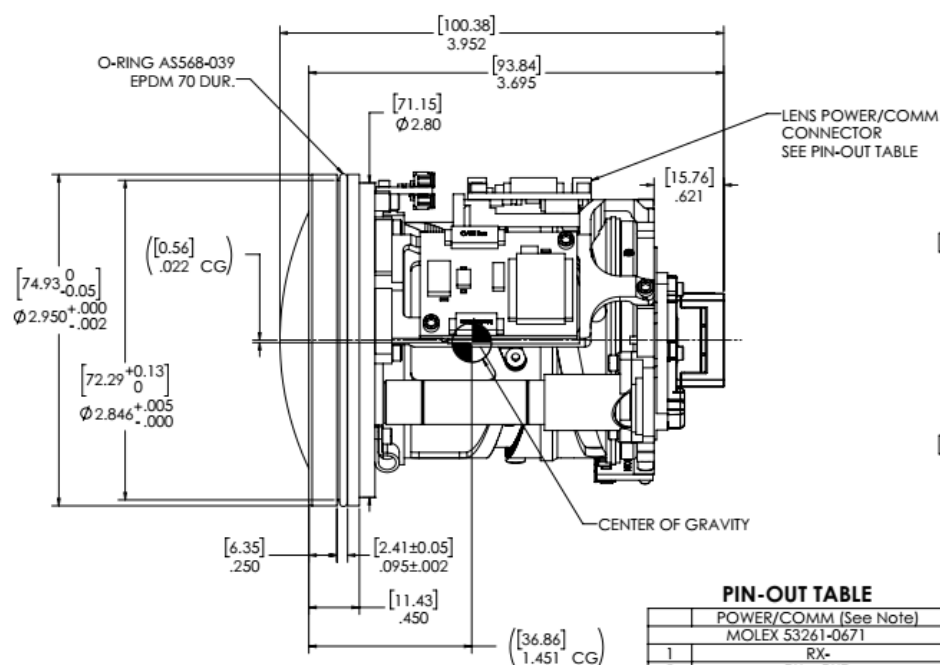
6 INTERFACE CONTROL

6.1 Mechanical ICD (without accessory board)

NOTES:

1. MASS: 390g (APPROX FROM MODEL).

REVISIONS				
ECN	REV.	DESCRIPTION	DATE	APPROVE
	A	ENGINEERING RELEASE	10/31/22	ICP
6292	B	ADD CENTER OF GRAVITY	11/30/22	ICP
6295	C	ADD TOL TO O-RING GRVE, ADD SH2	12/5/22	ICP
A317	D	ADJUST CoG FOR REAR TEMP SENSE	1/24/23	ICP



PART NUMBER TABLE

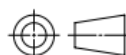
PART No	COATING, LENS 1	CAMERA NUMBER FLIR BOSON+
2526-350-1L-1	HEAR	22640X000-6IAAX
2526-350-1L-DLC-1	DLC	22640X000-6IAAX
2526-350-1L-2	HEAR	22640X000-6PAAX
2526-350-1L-DLC-2	DLC	22640X000-6PAAX
2526-350-1L-3	HEAR	22640X000-9IAAX
2526-350-1L-DLC-3	DLC	22640X000-9IAAX

PIN-OUT TABLE

POWER/COMM (See Note)	
MOLEX 53261-0671	
1	RX-
2	RX+, RXD
3	TX-, TXD
4	TX+
5	VIN
6	GND

Note:
TX & RX are for RS422. TXD & RXD are for RS232
T and R refer to Controller functions, i.e.
RX= controller receive, TX=controller transmit

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INTERPRET DRAWING IAW
DOD-STD-100, ASME Y14.5-2009
AND MIL-STD-12.

THIRD ANGLE PROJECTION

		QUICK CRITICALS SPECIFIED DIMENSIONS ARE IN INCHES	DRAWING NO. I. P.R.E.S.	DATE 9/23/87
		NEXT FOLLOWING TOLERANCES: DICHONAL FRACTIONS ANGLES	CHECKED BY I. P.R.E.S.	9/23/87
		.006 .010 .006 .010 .006 .010	SIGNATURE SIGNED FOR	
		MATERIAL	FINISH	
		NEXT ASSY USED ON		
		APPLICATION		

INTERFACE CONTROL DRAWING



LWIR ZOOM LENS AND CAMERA

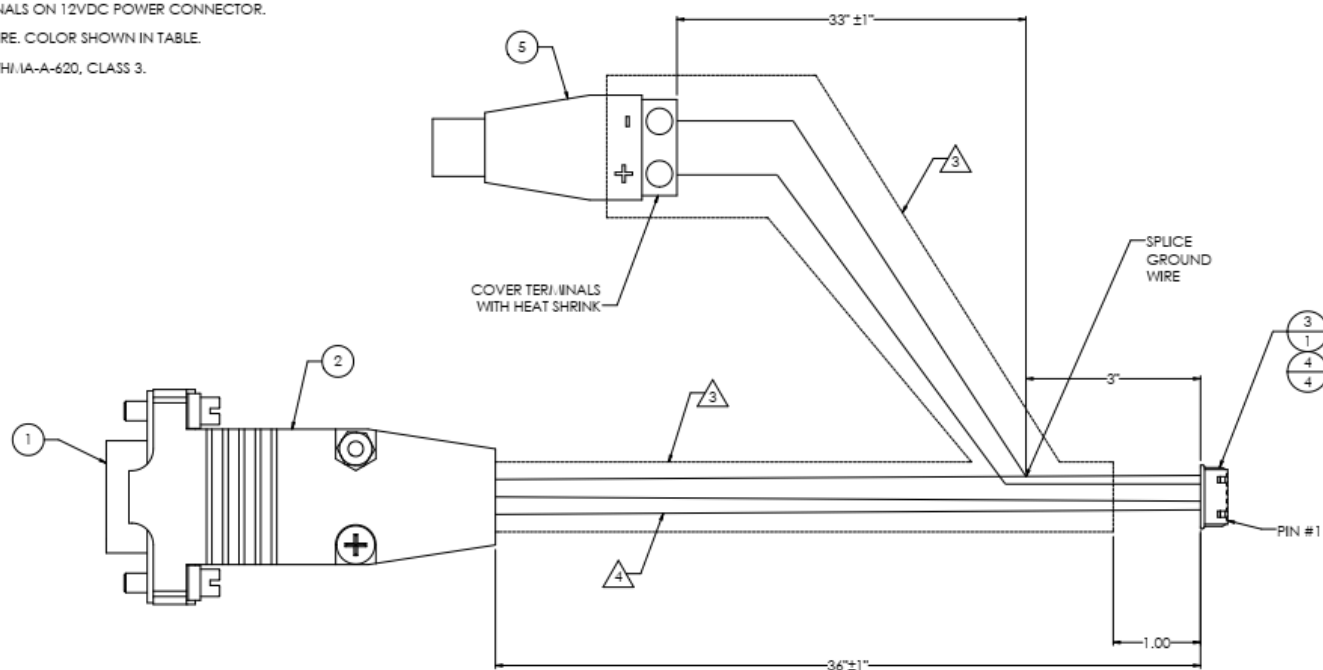
SIZE D	CAGE NO. 56V27	2526350-1L-X	REV D
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6.2 Cable Assembly

NOTES:

1. MARKING: BAG AND TAG PER MIL-STD-130 P/N, REV LTR.
2. FLUOROCARBON/POLYIMIDE INSULATED (E.G. TRADE NAME "KAPTON") WIRE SHALL NOT BE USED.
3. WIRE BUNDLE TO BE SLEEVED WITH HEAT SHRINK TUBING, EXTEND TO 1" FROM I/OLEX RECEPTACLE, EXTEND INTO SHELL TO 0.25" FROM D-SUB CONNECTOR. COVER SCREW TERMINALS ON 12VDC POWER CONNECTOR.
4. 30 AWG STRANDED WIRE, COLOR SHOWN IN TABLE.
5. FABRICATE IAW IPC/WHI-IA-A-620, CLASS 3.

REVISIONS				
ECN	REV	DESCRIPTION	DATE	APPROVED
	A	ENGINEERING RELEASE	07/12/23	JAG

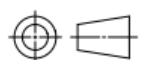


CONNECTOR PIN-OUT TABLE				
REFERENCE	P-ELEC-248 PIN #	WIRE COLOR	P-ELEC-XXX PIN #	P-ELEC-048 PIN #
N/C	1			
*Rx	2	ORANGE		2
*Tx	3	BLUE		3
N/C	4			
V _{IN}	5	RED	INNER (+)	
GND	6	BLACK	OUTER (-)	5

5	P-ELEC-384	CONN, 5.5mm X 2.1mm, 12VDC, FEI/IALE	AI/AZON #B07C61434H	1
4	P-ELEC-250	CRIMP SOCKET, PICOBLADE, 28-32 AWG	I/OLEX 50058-8000	4
3	P-ELEC-248	1.25mm PITCH, WIRE TO WIRE AND WIRE TO HOUSING, FEI/IALE, & CIRCUITS	I/OLEX #51021-0600	1
2	P-ELEC-051	D-SUB BACKSHELL, 09 POS	AI/IP 17E165709	1
1	P-ELEC-048	CONN, D-SUB 09, FEI/IALE, SOLDER	NEWARK #01111858	1
ITEM NO.	PART NUMBER	DESCRIPTION	REMARKS	QTY.

INTERPRET DRAWING IAW
DOD-STD-100, ASME Y14.5-2009
AND MIL-STD-12.

THIRD ANGLE PROJECTION



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES WITH FOLLOWING TOLERANCES:		DATE	06/30/23
DECIMALS	FRACTIONS	ANGLES	
0.1	1/16	1°	
0.001	1/64	15'	
0.0005	1/128	30'	
APPROVED		DATE	07/11/23
NEXT ASSY		USED ON	
APPLICATION			

 FLIR Systems Inc.

CABLE ASSY, PWR & COMM

SCALE	CAGE NO.	REV
D	56V27	A
	2526402	

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End of Manual