

SIYI ZT30 Optical Pod

External SDK Guide

Update Log

Version	Revision Date	Changes	Remarks
V0.1.0	Jun.16, 2026	Document created	

Chapter 1. Protocol Description

1. Protocol Format Description

Field	Index	Byte Size	Description
STX	0	2	0x5566 – Start-of-frame marker (little-endian)
CTRL	2	1	0: need_ack – whether this packet requires acknowledgment. 1: ack_pack – whether this packet is an ACK packet. 2-7: Reserved.
Data_len	3	2	Length of the data field in bytes (little-endian)
SEQ	5	2	Frame sequence number, range 0–65535 (little-endian)
CMD_ID	7	1	Command ID
DATA	8	Data_len	Data payload
CRC16		2	CRC16 checksum over the entire packet (little-endian)

Chapter 2. Protocol Commands

0x00: TCP Heartbeat

CMD_ID:0x00 - TCP Heartbeat			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
			No ack

Note:

Heartbeat Packet: 55 66 01 01 00 00 00 00 59 8B

1. Supported only when connected via TCP.

0x01: Request Firmware Version

CMD_ID:0x01 - Request Firmware Version			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
	uint32_t	camera_firmware_ver	Camera firmware version
	uint32_t	gimbal_firmware_ver	Gimbal firmware version
	uint32_t	zoom_firmware_ver	Zoom Camera Firmware Version

Eg: 0x7A 00 01 0A --> Gimbal firmware version v0.1.10

0x7B 01 00 01 --> Camera firmware version v1.0.1

Note:

1. Since the camera system requires some time to boot up (within 30 seconds), the valid camera firmware version cannot be retrieved until startup is complete. During this period, the returned version will be all zeros (v0.0.0).

0x02: Request Gimbal Hardware ID

CMD_ID:0x02 - Request Gimbal Hardware ID			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
	UInt8_t	hardware_id[12]	Hardware ID string (10-digit ID)

Note: The first two bytes of the hexadecimal product code ID, e.g.,

7A — denote ZT30.

0x04: Auto Focus

CMD_ID: 0x04 — Auto Focus			
Send Data Format			
Index	Data Type	Data Name	Description
1	uint8_t	auto_focus	1: Trigger one-shot auto focus
2	uint16_t	touch_x	X coordinate, range is the width of the video stream resolution
3	uint16_t	touch_y	Y coordinate, range is the height of the video stream resolution
ACK Data Format			
1	uint8_t	sta	1: Setting successful 0: Setting error

Note: Only supported by products with optical zoom. In the zoom dual-stream stitched view, the x coordinate value is half of the video stream resolution.

0x05: Manual Zoom with Auto Focus

CMD_ID: 0x05 — Manual Zoom with Auto Focus			
Send Data Format			
Index	Data Type	Data Name	Description
1	int8_t	zoom	1: Zoom in 0: Stop zooming (sent after release) -1: Zoom out

ACK Data Format			
	uint16_t	zoom_multiple	Current (hybrid) zoom factor (zoom_multiple / 10, i.e., precise to 1 decimal place)

0x06: Manual Focus

CMD_ID: 0x06 — Manual Focus			
Send Data Format			
Index	Data Type	Data Name	Description
1	int8_t	focus	1: Far view 0: Stop focusing (sent after release) -1: Near view
ACK Data Format			
	uint8_t	sta	1: Setting successful 0: Setting error

Note: Only supported by products with optical zoom.

0x07: Gimbal Pan/Tilt Control

CMD_ID:0x07 - Gimbal Pan/Tilt Control			
Send Format			
Index	Data Type	Data Name	Description
1	int8_t	turn_yaw	Range: -100 to 0 to 100. Positive and negative values indicate opposite directions. The farther the slide, the higher the value and the faster the rotation speed. Sending 0 stops the rotation (sent when released). • Sliding right → 0 to 100 • Sliding left → 0 to -100
2	int8_t	turn_pitch	Range: -100 to 0 to 100. Same as above. • Sliding up → 0 to 100 • Sliding down → 0 to -100
ACK Format			
	uint8_t	sta	1 = success 0 = error

0x08: One-Click Return-to-Center

CMD_ID:0x08 - One-Click Return-to-Center			
Send Format			
Index	Data Type	Data Name	Description
1	uint8_t	center_pos	1 = Return to center 2 = Center and point down 3 = Center only 4 = Point down only
ACK Format			
	uint8_t	sta	1 = success 0 = error

0x0A: Request Camera System Information

CMD_ID:0x0A - Request Camera System Information			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
1	uint8_t	reserved	
2	uint8_t	hdr_sta	0: Off 1: On (Not Support)
3	uint8_t	reserved	
4	uint8_t	record_sta	0 = Not recording 1 = Recording 2 = No TF card inserted 3 = Recording – data loss detected, please check the TF card
5	uint8_t	gimbal_motion_mode	0 = Locked mode 1 = Follow mode 2 = FPV mode
6	uint8_t	gimbal_mounting_dir	Gimbal mounting orientation: 0 = Reserved 1 = Normal 2 = Inverted
7	uint8_t	video_hdmi_or_cvbs	HDMI and CVBS Video Output Status 0: HDMI video output ON CVBS video output OFF 1: HDMI video output OFF CVBS video output ON

			2: HDMI video output OFF CVBS video output OFF
8	uint8_t	zoom_linkage	Zoom Linkage Switch 0: Off 1: On

0x0B: Function Feedback Information Return

No request required; sent by the camera

CMD_ID:0x0B - Function Feedback			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
1	uint8_t	info_type	0 = Photo capture successful 1 = Photo capture failed – please check if a TF card is inserted 4 = Recording failed – please check if a TF card is inserted 5 = Recording started 6 = Recording stopped

0x0C: Photo Capture, Recording, etc.

No immediate response; the operation status is returned via 0x0B

CMD_ID:0x0C - Photo Capture			
Send Format			
Index	Data Type	Data Name	Description
	uint8_t	func_type	0 = Photo capture 1= HDR Toggle (Not currently supported) 2 = Record 3 = Motion mode: Locked 4 = Motion mode: Follow 5 = Motion mode: FPV 6 = Set HDMI Video Output, takes effect after restart (Not currently supported) 7 = Set CVBS Video Output, takes effect after restart (Not currently supported) 8 = HDMI/CVBS Video Output All OFF, takes effect after restart (Not currently supported) 9 = One-key point down 10 Linked Zoom (each send toggles the switch)
ACK Format			
			No ACK – status is reported via 0x0B

0x0D: Request Gimbal Attitude Data

CMD_ID:0x0D - Request Gimbal Attitude Data			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
	int16_t	yaw	Yaw angle
	int16_t	pitch	Pitch angle
	int16_t	roll	Roll angle
	int16_t	yaw_velocity	Gyro yaw angular velocity
	int16_t	pitch_velocity	Gyro pitch angular velocity
	int16_t	roll_velocity	Gyro roll angular velocity

Note 1: The above data divided by 10 gives the actual angle, with a precision of 1 decimal place.

Tip: It is recommended to use the 0x25 command to set the attitude data transmission frequency, so that data is actively and continuously sent at the set frequency.

0x0E: Set Gimbal Attitude Angle

CMD_ID:0x0E - Set Gimbal Attitude Angle			
Send Format			
Index	Data Type	Data Name	Description
	int16_t	yaw	Target yaw angle
	int16_t	pitch	Target pitch angle
ACK Format			
	int16_t	yaw	Current yaw angle
	int16_t	pitch	Current pitch angle
	int16_t	roll	Current roll angle

ZT30 Angle Control Range: Yaw: unlimited; Pitch: -90.0° to 25.0° when mounted upright.

Note 1: The control angle precision is 1 decimal place; e.g., to specify yaw 60.5 degrees, set the yaw field to 605.

Note 2: The returned current actual angle divided by 10 gives the actual angle, with a precision of 1 decimal place.

0x0F: Absolute Zoom with Auto Focus

CMD_ID:0x0F - Absolute Zoom with Auto Focus

Send Format			
Index	Data Type	Data Name	Description
1	uint8_t	Absolute_movement_int	Integer part of the target zoom multiplier (0x1 to 0x1E)
2	uint8_t	Absolute_movement_float	Decimal part of the target zoom multiplier (0x0 to 0x9)
ACK Format			
	uint8_t	Absolute_movement_ask	1 = success

0x10: Request Video Stitching Mode

CMD_ID: 0x10 — Request Video Stitching Mode			
Send Data Format			
No.	Data Type	Data Name	Description
ACK Data Format			
1	uint8_t	vdisp_mode	<p>Video Stitching Modes</p> <p>0: Stitching mode(Main Stream: Zoom & Thermal imaging Sub Stream: Wide-angle)</p> <p>1: Stitching mode (Main stream: Wide-angle & Thermal imaging; Sub stream: Zoom)</p> <p>2: Stitching mode (Main stream: Zoom & Wide-angle; Sub stream: Thermal imaging)</p> <p>3: Non-stitching mode (Main stream: Zoom; Sub stream: Thermal imaging)</p> <p>4: Non-stitching mode (Main stream: Zoom; Sub stream: Wide-</p>

			angle) 5: Non-stitching mode (Main stream: Wide-angle; Sub stream: Thermal imaging) 6: Non-stitching mode (Main stream: Wide-angle; Sub stream: Zoom) 7: Non-stitching mode (Main stream: Thermal imaging; Sub stream: Zoom) 8: Non-stitching mode (Main stream: Thermal imaging; Sub stream: Wide-angle)
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0x11: Set Video Stitching Mode

CMD_ID: 0x11 — Set Video Stitching Mode			
Send Data Format			
No.	Data Type	Data Name	Description
1	uint8_t	vdisp_mode	Video Stitching Modes 0: Stitching mode(Main Stream: Zoom & Thermal imaging Sub Stream: Wide-angle) 1: Stitching mode (Main stream: Wide-angle & Thermal imaging; Sub stream: Zoom) 2: Stitching mode (Main stream: Zoom & Wide-angle; Sub stream: Thermal imaging) 3: Non-stitching mode (Main stream: Zoom; Sub stream: Thermal

			<p>imaging)</p> <p>4: Non-stitching mode (Main stream: Zoom; Sub stream: Wide-angle)</p> <p>5: Non-stitching mode (Main stream: Wide-angle; Sub stream: Thermal imaging)</p> <p>6: Non-stitching mode (Main stream: Wide-angle; Sub stream: Zoom)</p> <p>7: Non-stitching mode (Main stream: Thermal imaging; Sub stream: Zoom)</p> <p>8: Non-stitching mode (Main stream: Thermal imaging; Sub stream: Wide-angle)</p>
ACK Data Format			
1	uint8_t	vdisp_mode	<p>Video Stitching Modes</p> <p>0: Stitching mode(Main Stream: Zoom & Thermal imaging Sub Stream: Wide-angle)</p> <p>1: Stitching mode (Main stream: Wide-angle & Thermal imaging; Sub stream: Zoom)</p> <p>2: Stitching mode (Main stream: Zoom & Wide-angle; Sub stream: Thermal imaging)</p> <p>3: Non-stitching mode (Main stream: Zoom; Sub stream: Thermal imaging)</p> <p>4: Non-stitching mode (Main</p>

			<p>stream: Zoom; Sub stream: Wide-angle)</p> <p>5: Non-stitching mode (Main stream: Wide-angle; Sub stream: Thermal imaging)</p> <p>6: Non-stitching mode (Main stream: Wide-angle; Sub stream: Zoom)</p> <p>7: Non-stitching mode (Main stream: Thermal imaging; Sub stream: Zoom)</p> <p>8: Non-stitching mode (Main stream: Thermal imaging; Sub stream: Wide-angle)</p>
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0x12: Get Temperature of Selected Point

CMD_ID:0x12-----Get Temperature of Selected Point			
Send Data Format			
No	Data Type	Data Name	Description
1	uint16_t	x	X coordinate of the selected point
2	uint16_t	y	Y coordinate of the selected point
3	uint8_t	get_temp_flag	0: Disable measurement; 1: Measure once; 2: Continuous measurement (5 Hz)
ACK Data Format			
1	uint16_t	temp	Temperature of the selected point, divided by 100 to retain two decimal places
1	uint16_t	x	X coordinate of the selected point
2	uint16_t	y	Y coordinate of the selected point

Note: The measurement response frequency is about 1 Hz.

0x13: Regional Temperature Measurement

CMD_ID:0x13----- Regional Temperature Measurement			
Send Data Format			
No.	Data Type	Data Name	Description
1	uint16_t	startx	X coordinate of the box start point
2	uint16_t	starty	Y coordinate of the box start point
3	uint16_t	endx	X coordinate of the box end point
4	uint16_t	endy	Y coordinate of the box end point
5	uint8_t	get_temp_flag	0: Disable measurement; 1: Measure once; 2: Continuous measurement
ACK Data Format			
1	uint16_t	startx	X coordinate of the box start point
2	uint16_t	starty	Y coordinate of the box start point
3	uint16_t	endx	X coordinate of the box end point
4	uint16_t	endy	Y coordinate of the box end point
5	uint16_t	temp_max	Maximum temperature within the box, divided by 100 to retain two decimal places
6	uint16_t	temp_min	Minimum temperature within the box, divided by 100 to retain two decimal places
7	uint16_t	temp_max_x	X coordinate of the maximum temperature within the box
8	uint16_t	temp_max_y	Y coordinate of the maximum temperature within the box
9	uint16_t	temp_min_x	X coordinate of the minimum temperature within the box
10	uint16_t	temp_min_y	Y coordinate of the minimum

			temperature within the box
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The thermal imaging camera has electronic zoom capability. The temperature measurement box will scale up or down with the electronic zoom factor. When using electronic zoom, it is recommended to refer to the box returned by the camera for the temperature measurement range.

0x14: Global Temperature Measurement

CMD_ID:0x14-----Global Temperature Measurement			
Send Data Format			
No.	Data Type	Data Name	Description
1	uint8_t	get_temp_flag	0: Disable measurement; 1: Measure once; 2: Continuous measurement
ACK Data Format			
1	uint16_t	temp_max	Maximum temperature within the entire frame, divided by 100 to retain two decimal places
2	uint16_t	temp_min	Minimum temperature within the entire frame, divided by 100 to retain two decimal places
3	uint16_t	temp_max_x	X coordinate of the maximum temperature within the entire frame
4	uint16_t	temp_max_y	Y coordinate of the maximum temperature within the entire frame
5	uint16_t	temp_min_x	X coordinate of the minimum temperature within the entire frame
6	uint16_t	temp_min_y	Y coordinate of the minimum temperature within the entire frame

0x15: Request Laser Ranging Distance

CMD_ID: 0x15 — Request Laser Ranging Distance

Send Data Format			
No.	Data Type	Data Name	Description
ACK Data Format			
1	Uint16_t	laser_distance	Laser ranging distance value, low byte first, high byte last, minimum value 50, data unit: dm

0x16: Request Supported Zoom Range

CMD_ID:0x16 - Request Supported Zoom Range			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
	uint8_t	zoom_max_int	Integer part of the maximum zoom multiplier
	UInt8_t	Zoom_max_float	Decimal part of the maximum zoom multiplier

0x17: Request Laser Ranging Target Latitude and Longitude Information

CMD_ID: 0x17 — Laser Ranging Target Latitude and Longitude Information			
Send Data Format			
Index	Data Type	Data Name	Description
ACK Format			
	int32_t	Lon_degE7	Longitude [degE7] (WGS84, EGM96 ellipsoid)
	int32_t	Lat_degE7	Latitude [degE7] (WGS84, EGM96 ellipsoid)

0x18: Request Current Zoom Multiplier

CMD_ID:0x18 - Request Current Zoom Multiplier			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
	uint8_t	zoom_int	Integer part of the current zoom multiplier
	UInt8_t	Zoom_float	Decimal part of the current zoom multiplier

0x19: Request Current Gimbal Mode

CMD_ID:0x19 - Request Current Gimbal Mode			
Send Format			
Index	Data Type	Data Name	Description

ACK Format			
	uint8_t	gimbal_mode	0 = Locked mode 1 = Follow mode 2 = FPV mode

0x1A: Request Current Thermal Imaging Pseudo-color

CMD_ID:0x1A-----Request Current Thermal Imaging Pseudo-color			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
	uint8_t	pseudo color	【Total of 11 color swatches.】 0: White_Hot 1: Reserved 2: Sepia 3: Ironbow 4: Rainbow 5: Night 6: Aurora 7: Red_Hot 8: Jungle 9: Medical 10: Black_Hot 11: Glory_Hot

0x1B: Set Current Thermal Imaging Pseudo-color

CMD_ID:0x1B-----Set Current Thermal Imaging Pseudo-color			
Send Format			
Index	Data Type	Data Name	Description

	uint8_t	pseudo color	【Total of 11 color swatches.】 0: White_Hot 1: Reserved 2: Sepia 3: Ironbow 4: Rainbow 5: Night 6: Aurora 7: Red_Hot 8: Jungle 9: Medical 10: Black_Hot 11: Glory_Hot
ACK Data Format			
	uint8_t	pseudo color	【Total of 11 color swatches.】 0: White_Hot 1: Reserved 2: Sepia 3: Ironbow 4: Rainbow 5: Night 6: Aurora 7: Red_Hot 8: Jungle 9: Medical 10: Black_Hot 11: Glory_Hot

0x20: Request Camera Encoding Parameters

CMD_ID:0x20 - Request Camera Encoding Parameters

Send Format			
Index	Data Type	Data Name	Description
	uint8_t	req_stream_type	0 = Record stream 1 = Main stream 2 = Sub stream
ACK			
1	uint8_t	stream_type	0 = Record stream 1 = Main stream 2 = Sub stream
2	uint8_t	VideoEncType	Encoding type: 1 = H.264 2 = H.265
3	uint16_t	Resolution_L	Resolution – width
4	uint16_t	Resolution_H	Resolution – height
5	uint16_t	VideoBitrate	Fixed bitrate (unit: Kbps)
6	uint8_t	VideoFrameRate	Frame rate (fps)

0x21: Set Camera Encoding Parameters

CMD_ID:0x21 - Set Camera Encoding Parameters			
Send Format			
Index	Data Type	Data Name	Description
1	uint8_t	stream_type	0 = Set record stream 1 = Set main stream 2 = Set Sub stream
2	uint8_t	VideoEncType	Encoding type: 1 = H.264 2 = H.265 (The encoding format of the recording stream is not currently modifiable.)
3	uint16_t	Resolution_L	Resolution – width (e.g., 1920, 1280)
4	uint16_t	Resolution_H	Resolution – height (e.g., 1080, 720)
5	uint16_t	VideoBitrate	Video bitrate (unit: Kbps)
6	uint8_t	reserve	Reserved
ACK			
1	uint8_t	stream_type	0 = Set record stream 1 = Set main stream 2 = Set Sub stream
2	uint8_t	sta	1 = Success 0 = Failure

Note: If the main stream is a zoom video, the recording resolution supports 4K (3840×2160) and 2K (2560×1440). If it is a fixed-focus stream, it supports 2K (2560×1440). Thermal imaging is fixed at 640×512.

0x22: Send Vehicle Attitude Data to Gimbal

CMD_ID:0x22 - Send Vehicle Attitude Data to Gimbal			
Send Data Format			
Index	Data Type	Data Name	Description
1	uin32_t	time_boot_ms	[ms]Timestamp (time since system boot)
1	float	Roll	[rad] Roll angle $(-\pi..+\pi)$
2	float	Pitch	[rad] Pitch angle $(-\pi/2..+\pi/2)$
3	float	Yaw	[rad] Yaw angle $(-\pi..+\pi)$
4	float	Rollspeed	[rad/s] Roll angular speed
5	float	Pitchspeed	[rad/s] Pitch angular speed
6	float	Yawspeed	[rad/s] Yaw angular speed
ACK			

0x24: Request Flight Controller to Send Data Stream to Gimbal

CMD_ID:0x24-----Request Flight Controller to Send Data Stream to Gimbal			
Send Data Format			
Index	Data Type	Data Name	Description
1	uint8_t	data_type	1: Attitude data 2: RC channel data
2	uint8_t	data_freq	Output frequency 0 : Disable transmission 1: 2Hz 2: 4Hz 3: 5Hz 4: 10Hz 5: 20Hz 6: 50Hz 7: 100Hz
ACK			
1	uint8_t	data_type	1: Attitude data 2: RC channel data

0x25: Request Gimbal to Send Data Stream

CMD_ID:0x25-----Request Gimbal to Send Data Stream			
Send Data Format			
Index	Data Type	Data Name	Description
1	uint8_t	data_type	
2	uint8_t	data_freq	Output frequency: 0: Disable transmission 1: 2Hz 2: 4Hz 3: 5Hz 4: 10Hz 5: 20Hz 6: 50Hz 7: 100Hz The laser data output frequency ignores this setting; the actual output frequency takes precedence.
ACK			
1	uint8_t	data_type	1: Attitude data 2: Laser ranging data

Note 1: To subscribe to laser ranging data, laser ranging must first be enabled using command 0x32.

Note 2: The laser ranging data frequency cannot be set at this time; any non-zero value enables transmission.

0x26: Request Gimbal Magnetic Encoder Angle Data

CMD_ID:0x26-----Request Gimbal Magnetic Encoder Angle Data			
Send Data Format			
Index	Data Type	Data Name	Description
ACK Data Format			
	int16_t	yaw_angle	Yaw angle
	int16_t	pitch_angle	Pitch angle
	int16_t	roll_angle	Roll angle

Note: The above data divided by 10 gives the actual angle, with a precision of 1 decimal place.

Recommendation: Use command 0x25 to set the attitude data transmission frequency, so that data is actively and continuously sent at the set frequency.

0x2A: Request Gimbal Motor Voltage Data

CMD_ID:0x2A-----Request Gimbal Motor Voltage Data			
Send Data Format			
Index	Data Type	Data Name	Description
ACK Data Format			
	int16_t	yaw_voltage	Yaw motor voltage
	int16_t	pitch_voltage	Pitch motor voltage
	int16_t	roll_voltage	Roll motor voltage

Note: The above data divided by 1000 gives the actual voltage, with a precision of 3 decimal places.

Recommendation: Use command 0x25 to set the motor voltage data transmission frequency, so that data is actively and continuously sent at the set frequency.

0x30: Set UTC Time

CMD_ID:0x30 - Set UTC Time			
Send Format			
Index	Data Type	Data Name	Description
1	uint64_t	Timestamp	UNIX epoch time(us)
ACK Format			
1	uint8_t	ack	1 = Success 0 = Invalid time format

0x31: Request Laser Ranging Status

CMD_ID:0x 31 -----Request Laser Ranging Status			
Send Data Format			
Index	Data Type	Data Name	Description
ACK Data Format			
1	Uint8_t	laser_state	1: Laser ranging ON 0: Laser ranging OFF

0x32: Turn On/Off Laser Ranging

CMD_ID:0x 32 ----- Turn On/Off Laser Ranging			
Send Data Format			
Index	Data Type	Data Name	Description
1	Uint8_t	laser_state	1: Laser ranging ON 0: Laser ranging OFF
ACK Data Format			
1	Uint8_t	Sta	1: Setting successful 0: Setting failed

0x37: Request Thermal Imaging Gain Mode

CMD_ID:0x 37 ----- Request Thermal Imaging Gain Mode			
Send Data Format			
No	Data Type	Data Name	Description
ACK Data Format			
1	uint8_t	Ir_gain	0: Low gain 1: High gain

0x38: Set Thermal Imaging Gain Mode

CMD_ID:0x 38 ----- Set Thermal Imaging Gain Mode			
Send Data Format			
No	Data Type	Data Name	Description
1	uint8_t	Ir_gain	0: Low gain 1: High gain
ACK Data Format			
1	uint8_t	Ir_gain	0: Low gain 1: High gain

0x3E: Send Raw GPS Data to Gimbal

CMD_ID:0x 3E-----Send Raw GPS Data to Gimbal			
Send Data Format			
No	Data Type	Data Name	Description
1	uint32_t	time_boot_ms	[ms]time since boot
2	int32_t	lat	[degE7]Latitude
3	int32_t	lon	[degE7]Longitude
4	int32_t	alt	[cm]Altitude (MSL)
5	int32_t	alt_ellipsoid	[cm]Altitude (above WGS84, EGM96 ellipsoid). Positive for up.

6	int32_t	vn	[m E3/s] X Speed
7	int32_t	ve	[m E3/s] Y Speed
8	int32_t	vd	[m E3/s] Z Speed
ACK Data Format			
		no	

0x48: Format SD Card

CMD_ID:0x48 - Format SD Card			
Send Format			
Index	Data Type	Data Name	Description
ACK Format			
1	uint8_t	format_sta	0 = Format failed 1 = Format successful

0x4D: Get AI Mode Status

CMD_ID:0x4D - Get AI Mode Status			
Send Format			
Index	Data Type	Data Name	Description
ACK Data Format			
1	uint8_t	sta	0 = AI mode off 1 = AI mode on

0x4F: Manually Update Thermal Imaging Shutter

CMD_ID:0x4F-----Manually Update Thermal Imaging Shutter			
Send Format			
Index	Data Type	Data Name	Description
ACK Data Format			
1	Uint8_t	ack	1: Update successful

0x70: Get Gimbal Weak Control Status

CMD_ID:CMD_ID:0X70: Manually Update Thermal Imaging Shutter			
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Send Format			
Index	Data Type	Data Name	Description
ACK Data Format			
1	UInt8_t	ack	0: Off 1: On

0x71: Set Gimbal Weak Control Status

CMD_ID:CMD_ID:0X70: Manually Update Thermal Imaging Shutter			
Send Format			
Index	Data Type	Data Name	Description
1	UInt8_t	weak_mode_state	0: Off 1: On
ACK Data Format			
1	UInt8_t	ack	0: Setting successful 1: Setting failed

0x80: Gimbal Camera Soft Reboot

CMD_ID:0x 80 -----Gimbal Camera Soft Reboot			
Send Format			
Index	Data Type	Data Name	Description
1	uint8_t	Camera_reboot	0: No action 1: Camera reboot (camera reboot not currently supported)
2	uint8_t	Gimbal_reset	0: No action 1: Gimbal reboot
ACK Data Format			
1	uint8_t	Camera_reboot_sta	0: No action 1: Camera reboot
2	uint8_t	Gimbal_reset_sta	0: No action 1: Gimbal reboot

0x81: Get Gimbal Camera IP Address

CMD_ID:0x 81 -----Get Gimbal Camera IP Address			
Send Format			
Index	Data Type	Data Name	Description
ACK Data Format			
1	uint32_t	IP	IP address
2	uint32_t	Mask	Subnet mask
3	uint32_t	Gateway	Gateway

0x82: Set Gimbal Camera IP Address

CMD_ID:0x 82 -----Set Gimbal Camera IP Address			
Send Data Format			
Index	Data Type	Data Name	Description
1	uint32_t	IP	IP address
2	uint32_t	Mask	Subnet mask
3	uint32_t	Gateway	Gateway
ACK Data Format			
1	uint8_t	Ack	1: Setting successful

Chapter 3. Communication Interface

1. TTL Serial Port

Baud rate: 115200

Data bits: 8, Stop bits: 1, Parity: None

2. UDP

IP: 192.168.144.25

Port: 37260

3. TCP

IP: 192.168.144.25

Port: 37260

Heartbeat packet: 55 66 01 01 00 00 00 00 00 59 8B

Chapter 4. Communication Data Examples

Color legend: Header | CTRL | Data Length | SEQ | ID | Data/Date | CRC

TCP Heartbeat

55 66 01 01 00 00 00 00 00 59 8B

Request Firmware Version

55 66 01 00 00 00 00 01 64 C4

Request Gimbal Hardware ID

55 66 01 00 00 00 00 02 07 F4

Auto Focus

55 66 01 05 00 00 00 04 01 C0 03 1C 02 15 8E(For the screen coordinate (960, 540))

Manual Zoom with Auto Focus

55 66 01 01 00 00 00 05 01 8D 64(Zoom in)

55 66 01 01 00 00 00 05 00 AC 74(Stop Zooming)

55 66 01 01 00 00 00 05 FF 5C 6A(Zoom out)

Manual Focus

55 66 01 01 00 00 00 06 01 DE 31(Far view)

55 66 01 01 00 00 00 06 00 FF 21(Stop)

55 66 01 01 00 00 00 06 FF 0F 3F(Near view)

Gimbal Pan / Tilt Control

55 66 01 02 00 00 00 07 14 00 46 EB(yaw 20% speed, pitch stopped)

55 66 01 02 00 00 00 07 00 00 F1 24(yaw and pitch both stopped)

One-Click Function

55 66 01 01 00 00 00 08 01 D1 12(Return-to-Center)

55 66 01 01 00 00 00 08 02 B2 22(Center and point down)

55 66 01 01 00 00 00 08 03 93 32(Center only)

55 66 01 01 00 00 00 08 04 74 42(Point down only)

Request Camera System Information

55 66 01 00 00 00 00 0A 0F 75

Photo Capture, Recording, etc.

55 66 01 01 00 00 00 0C 00 34 CE(Photo capture)

55 66 01 01 00 00 00 0C 02 76 EE(Record)

55 66 01 01 00 00 00 0C 03 57 FE(Locked mode)

55 66 01 01 00 00 00 0C 04 B0 8E(Follow mode)

55 66 01 01 00 00 00 0C 05 91 9E(FPV mode)

55 66 01 01 00 00 00 0C 0A 7E 6F(Toggle Linked Zoom Status)

Request Gimbal Attitude Data

55 66 01 00 00 00 00 0D E8 05

Set Gimbal Attitude Angle

55 66 01 04 00 00 00 0E 00 00 7C FC 4F A4(yaw 0°,pitch -90°)

55 66 01 04 00 00 00 0E 2C 01 C8 00 59 17(yaw 30°,pitch 20°)

Absolute Zoom

55 66 01 02 00 00 00 0F 01 00 61 BE(1.0x)

55 66 01 02 00 00 00 0F 07 05 62 44(7.5x)

Request Video Stitching Mode

55 66 01 00 00 00 00 10 74 C6

Set Video Stitching Mode

55 66 01 02 00 00 00 11 00 02 70 F5(Main stream: Wide-angle, Sub stream: Thermal imaging)

55 66 01 02 00 00 00 11 02 00 50 B3(Main stream: Thermal imaging, Sub stream: Wide-angle)

55 66 01 02 00 00 00 11 03 02 23 A0(Main stream: Wide-angle & Thermal imaging, Sub stream: Thermal imaging)

Get Selected Point Temperature from Thermal Imaging

55 66 01 05 00 00 00 12 C0 03 1C 02 01 AC D7(Measure once at point (960, 540)
Thermal Imaging Regional Temperature Measurement

55 66 01 09 00 00 00 13 C8 00 C8 00 90 01 90 01 01 7C 03 (Measure once within the rectangle from top-left [200, 200] to bottom-right [400, 400])

Get Laser Ranging Status

55 66 01 00 00 00 00 31 37 F2

Turn On/Off Laser Ranging

55 66 01 01 00 00 00 32 01 8F F8(Turn on laser ranging)

55 66 01 01 00 00 00 32 00 AE E8(Turn off laser ranging)

Get One Laser Ranging Value

55 66 01 00 00 00 00 15 D1 96

Request Zoom Range Supported by the Main Stream Current Lens

55 66 01 00 00 00 00 16 B2 A6

Request Longitude/Latitude of Laser Ranging Target Point

55 66 01 00 00 00 00 17 93 B6

Request Current Zoom Factor of the Main Stream

55 66 01 00 00 00 00 18 7C 47

Request Current Gimbal Mode

55 66 01 00 00 00 00 19 5D 57

Request Current Thermal Imaging Pseudo-color

55 66 01 00 00 00 00 1A 3E 67

Set Current Thermal Imaging Pseudo-color

55 66 01 01 00 00 00 1B 00 D0 54(White Hot)

55 66 01 01 00 00 00 1B 02 92 74(Glow Gold)

Request Camera Encoding Parameters

55 66 01 01 00 00 00 20 01 9E 9D

Set Camera Encoding Parameters

55 66 01 09 00 00 00 21 01 02 00 0F 70 08 00 00 00 95 6E(Main stream H.265 3840x2160)

55 66 01 09 00 00 00 21 01 02 80 07 38 04 00 00 00 59 94(Main stream H.265 1920x1080)

55 66 01 09 00 00 00 21 01 02 00 05 D0 02 00 00 00 58 AA(Main stream H.265 1280x720)

55 66 01 09 00 00 00 21 02 02 00 0F 70 08 00 00 00 D1 43(Sub stream H.265 3840x2160)

55 66 01 09 00 00 00 21 02 02 80 07 38 04 00 00 00 1D B9(Main stream H.265 1920x1080)

55 66 01 09 00 00 00 21 02 02 00 05 D0 02 00 00 00 2D 62(Main stream H.265 1280x720)

Request Gimbal Data Stream Push

55 66 01 02 00 00 00 25 01 04 E2 BF(Request attitude data transmission at 10 Hz)

55 66 01 02 00 00 00 25 01 00 66 FF(Request attitude data transmission stop)

55 66 01 02 00 00 00 25 02 01 14 BA(Laser data stream, frequency cannot be set; any non-zero value triggers push)

Request Gimbal Magnetic Encoder Angle

55 66 01 00 00 00 00 26 E1 90

Request Gimbal Motor Voltage

55 66 01 00 00 00 00 2A 6D 51

Set UTC Time

55 66 01 08 00 00 00 30 38 3F FB EF E9 4D 06 00 D5 67

(1774517009203000 为 2026-3-26 9:23:29)

Request Thermal Imaging Gain Status

55 66 01 00 00 00 00 37 F1 92

Set Thermal Imaging Gain Status

55 66 01 01 00 00 00 38 00 65 07(Low gain)

55 66 01 01 00 00 00 38 01 44 17(High gain)

Request System Time

55 66 01 00 00 00 00 40 81 9C

Format SD Card

55 66 01 00 00 00 00 48 89 1D

Get AI Mode

55 66 01 00 00 00 00 4D 2C 4D

Get AI Tracking Target Data Stream Status

55 66 01 00 00 00 00 4E 4F 7D

Manually Trigger Thermal Imaging Shutter

55 66 01 00 00 00 00 4F 6E 6D

Toggle AI Target Information Stream

55 66 01 01 00 00 00 51 01 F6 A6(Enable)

55 66 01 01 00 00 00 51 00 D7 B6(Disable)

Set AI Mode

55 66 01 01 00 00 00 55 01 32 6A(Enable)

55 66 01 01 00 00 00 55 00 13 7A(Disable)

Select AI Tracking Target

55 66 01 09 00 00 00 56 01 C8 00 C8 00 90 01 90 01 92 20(Select rectangle from top-left [200,200] to bottom-right [400,400])

55 66 01 09 00 00 00 56 00 00 00 00 00 00 00 00 2D 94(Cancel tracking)

55 66 01 09 00 00 00 56 01 C0 03 1C 02 00 00 00 00 39 F9(Select point [960,540])

Get AI Tracking Status

55 66 01 00 00 00 00 57 57 FE

AI Candidate Target Bounding Box Push Switch

55 66 01 01 00 00 00 5F 05 7D C5(Enable)
55 66 01 01 00 00 00 5F 04 5C D5(Disable)

Get EIS (Electronic Image Stabilization) Switch
55 66 01 00 00 00 00 60 E3 B8

Set EIS (Electronic Image Stabilization) Switch

55 66 01 01 00 00 00 61 01 63 A3(Enable)
55 66 01 01 00 00 00 61 00 42 B3(Disable)

Get/Set Electronic Defog Switch

55 66 01 00 00 00 00 62 A1 98(Get status)
55 66 01 01 00 00 00 62 00 11 E6(Auto)
55 66 01 01 00 00 00 62 01 30 F6(Low)
55 66 01 01 00 00 00 62 02 53 C6(High)
55 66 01 01 00 00 00 62 03 72 D6(off)

Get/Set Night Vision Switch

55 66 01 00 00 00 00 63 80 88(Get status)
55 66 01 01 00 00 00 63 00 20 D5(Off)
55 66 01 01 00 00 00 63 01 01 C5(On)

Gimbal Camera Soft Reboot

55 66 01 02 00 00 00 80 00 01 1A 8A(Reboot gimbal, camera does not reboot))

Get Gimbal Camera IP

55 66 01 00 00 00 00 81 EC 55

Set Gimbal Camera IP

(IP address 192.168.144.25, subnet mask 255.255.255.0, gateway 192.168.144.1)

55 66 02 0C 00 00 00 82 C0 A8 90 19 FF FF FF 00 C0 A8 90 01 DF A6

Chapter 5. CRC16 Checksum Code

```
const uint16_t crc16_tab[256];

/*****

CRC16 Coding & Decoding  $G(X) = X^{16} + X^{12} + X^5 + 1$ 

*****/

uint16_t CRC16_cal(uint8_t *ptr, uint32_t len, uint16_t crc_init)
{
    uint16_t crc, oldcrc16;
    uint8_t temp;
    crc = crc_init;
    while (len--!=0)
    {
        temp=(crc>>8)&0xff;
        oldcrc16=crc16_tab[*ptr^temp];
        crc=(crc<<8)^oldcrc16;
        ptr++;
    }
    return(crc);
}

uint8_t crc_check_16bites(uint8_t* pbuf, uint32_t len, uint32_t* p_result)
{
    uint16_t crc_result = 0;
    crc_result= CRC16_cal(pbuf,len, 0);
    *p_result = crc_result;

    return 2;
}
```

```
const uint16_t crc16_tab[256]= {0x0,0x1021,0x2042,0x3063,0x4084,0x50a5,0x60c6,0x70e7,  
    0x8108,0x9129,0xa14a,0xb16b,0xc18c,0xd1ad,0xe1ce,0xf1ef,  
    0x1231,0x210,0x3273,0x2252,0x52b5,0x4294,0x72f7,0x62d6,  
    0x9339,0x8318,0xb37b,0xa35a,0xd3bd,0xc39c,0xf3ff,0xe3de,  
    0x2462,0x3443,0x420,0x1401,0x64e6,0x74c7,0x44a4,0x5485,  
    0xa56a,0xb54b,0x8528,0x9509,0xe5ee,0xf5cf,0xc5ac,0xd58d,  
    0x3653,0x2672,0x1611,0x630,0x76d7,0x66f6,0x5695,0x46b4,  
    0xb75b,0xa77a,0x9719,0x8738,0xf7df,0xe7fe,0xd79d,0xc7bc,  
    0x48c4,0x58e5,0x6886,0x78a7,0x840,0x1861,0x2802,0x3823,  
    0xc9cc,0xd9ed,0xe98e,0xf9af,0x8948,0x9969,0xa90a,0xb92b,  
    0x5af5,0x4ad4,0x7ab7,0x6a96,0x1a71,0xa50,0x3a33,0x2a12,  
    0xdbfd,0xcbdc,0xfbbf,0xeb9e,0x9b79,0x8b58,0xbb3b,0xab1a,  
    0x6ca6,0x7c87,0x4ce4,0x5cc5,0x2c22,0x3c03,0xc60,0x1c41,  
    0xedae,0xfd8f,0xcdec,0xddcd,0xad2a,0xbd0b,0x8d68,0x9d49,  
    0x7e97,0x6eb6,0x5ed5,0x4ef4,0x3e13,0x2e32,0x1e51,0xe70,  
    0xff9f,0xefbe,0xdfdd,0xcffc,0xbf1b,0xaf3a,0x9f59,0x8f78,  
    0x9188,0x81a9,0xb1ca,0xa1eb,0xd10c,0xc12d,0xf14e,0xe16f,  
    0x1080,0xa1,0x30c2,0x20e3,0x5004,0x4025,0x7046,0x6067,  
    0x83b9,0x9398,0xa3fb,0xb3da,0xc33d,0xd31c,0xe37f,0xf35e,  
    0x2b1,0x1290,0x22f3,0x32d2,0x4235,0x5214,0x6277,0x7256,  
    0xb5ea,0xa5cb,0x95a8,0x8589,0xf56e,0xe54f,0xd52c,0xc50d,  
    0x34e2,0x24c3,0x14a0,0x481,0x7466,0x6447,0x5424,0x4405,  
    0xa7db,0xb7fa,0x8799,0x97b8,0xe75f,0xf77e,0xc71d,0xd73c,  
    0x26d3,0x36f2,0x691,0x16b0,0x6657,0x7676,0x4615,0x5634,  
    0xd94c,0xc96d,0xf90e,0xe92f,0x99c8,0x89e9,0xb98a,0xa9ab,  
    0x5844,0x4865,0x7806,0x6827,0x18c0,0x8ce1,0x3882,0x28a3,  
    0xcb7d,0xdb5c,0xeb3f,0xfb1e,0x8bf9,0x9bd8,0xabbb,0xbb9a,  
    0x4a75,0x5a54,0x6a37,0x7a16,0xaf1,0x1ad0,0x2ab3,0x3a92,  
    0xfd2e,0xed0f,0xdd6c,0xcd4d,0xbdaa,0xad8b,0x9de8,0x8dc9,  
    0x7c26,0x6c07,0x5c64,0x4c45,0x3ca2,0x2c83,0x1ce0,0xcc1,
```

```
0xef1f,0xff3e,0xcf5d,0xdf7c,0xaf9b,0xbfba,0x8fd9,0x9ff8,  
0x6e17,0x7e36,0x4e55,0x5e74,0x2e93,0x3eb2,0xed1,0x1ef0  
};
```