



65210ES INERTIAL MEASUREMENT SYSTEM

SPECIFICATIONS

- 6-DOF Inertial Measurement System (IMS)
- Onboard Signal Processor with IRIG Encoder
- Optional FM Transmitter
- AES Encryption Options

This Measurement Specialties product is subject to the licensing jurisdiction of the U.S. Department of State in accordance with the International Traffic in Arms Regulations (ITAR) (22 C.F.R. 120 - 130). http://www.pmddtc.state.gov/regulations_laws/itar_official.html

FEATURES AND BENEFITS

User Programmable Settings

The output range and low-pass filter of each 65210ES accelerometer axes and rate gyro axes can be set via a built-in RS-485 interface, as can the IRIG-106 encoded PCM output configuration (channel output, sub-commutation, word size, NRZ-L / RNRZ-L / Bi-Phase-L / RBi-Phase-L encoding). The carrier frequency for optional built-in multi-channel S band transmitters can also be set. Programmability reduces costs as the 65210ES can be stocked and configured to meet different application requirements as needed.

Compensated Serial and Telemetry Outputs

Calibrated, ranged, and filtered test data can be streamed out at up to 3Mbit/sec via RS-485 or IRIG-106 encoded PCM.

Built-in Calibration

Calibration data for each internal sensor is maintained in the instrument.

The TE Connectivity 65210ES can be supplied as a user-configurable 6-DoF (six degree of freedom) Inertial Measurement System containing three internal accelerometers, three internal rate gyros, two temperature sensors, battery voltage and current monitor, signal processor, IRIG encoder, optional FM transmitter, and high-capacity Li-Ion battery in a small, easy-to-install package.

All channels are measured simultaneously with each sampled at 16 bits, filtered, ranged, and calibration compensated at up to 42,500 samples/sec/channel by the built-in digital signal processor. The output range, filter frequency and calibration of each channel, as well as the PCM configuration, can be set by the user.

A frame counter and CRC cyclic redundancy check can be included in each telemetry frame to allow dropped frames and data corruption to be detected.

An optional aerodynamic adaptor covers top exposed screws and provides tie down holes for captivating connector mates.

High Accuracy and Linearity over Wide Temperature Range

Accelerometer and gyro accuracy is improved by minimizing variations due to temperature and aging effects. Each sensor has been tested over the -40 to +85°C temperature range.

Communication Integrity

A CRC16 cyclic redundancy check is available to validate communications. Telemetry also supports a frame counter to ease detection of missing frames.

Self-Test

Self-test and fixed level outputs simplify installation and system check out by verification of channel integrity and ground station setup.

Sealed, Small Cylindrical Package

Package has a 2.75 inch diameter, 5.95 inch overall length, and a 3"-12 UN Class 2A thread for mounting. The package can be Nitrogen pressurized via built-in valve.

Built-In High Capacity, Fast-Charging Battery

Complete recharge in less than two hours provides up to 20 hours of operation with transmitter off. Built-in monitoring is provided for battery current and voltage.

Suitable for Harsh Environments

The 65210ES is robust and can be used in harsh environments. The unit will survive 100g shock while powered.

Encryption Options

The Encryption Option allows the 65210ES to encrypt the IRIG-106 encoded PCM data stream measurement values prior to transmission. The encryption method is AES and can be configured to use either 128-bit or 256-bit encryption. Telemetry frames must be configured with either 16 or 32 bytes of channel data that can be encrypted, corresponding to the two encryption key sizes. Encryption is not applied to the SYNC, FCTR, SN, PAD or CRC bytes in the frame. Encryption requires minimum ICU V2.36 to be supported.

PERFORMANCE SPECIFICATIONS

All values are typical at +24°C, battery powered, unless otherwise stated. TE Connectivity reserves the right to update and change these specifications without notice.

PARAMETERS

ACCELEROMETER	A010	A040	A050	A100	NOTES
Range	±10g	±40g	±50g	±100g	User configurable
Thermal Zero Bias Drift	±0.25g	±1.0g	±1.1g	±2.0g	-40 to +85°C
Thermal Sensitivity Drift	±5.0%	±5.0%	±5.0%	±5.0%	-40 to +85°C
Non-Linearity	±0.1%	±0.1%	±0.1%	±0.1%	BFSL
Accelerometer Bandwidth	0-1000Hz	0-440Hz	0-2000Hz	0-2500Hz	-3dB point
Programmable Filter Setting (-3dB)	1-10kHz	1-10kHz	1-10kHz	1-10kHz	User programmable
Noise Density	0.13mg/√Hz	0.03mg/√Hz	0.03mg/√Hz	0.03mg/√Hz	Bandpass
Alignment	±1°	±1°	±1°	±1°	Typ. orthogonality <0.5°
Transverse Sensitivity	±1.0%	±1.0%	±1.0%	±1.0%	Excluding misalignment

ANGULAR RATE GYROS	G1K0	G1K2	GS00	
Range	1000°/sec	1200°/sec	20,000°/sec	User configurable
Thermal Zero Rate Drift	±3.0°/sec	±3.0°/sec	±3.0°/sec	-20 to +70°C
Thermal Sensitivity Drift	±2.5%	±2.5%	±2.5%	-20 to +70°C
Non-Linearity	±0.1%	±0.1%	±0.1%	BFSL
Upper Cutoff Frequency	100Hz	100Hz	100Hz	-3dB point
Noise Density	0.20°/sec/√Hz	0.20°/sec/√Hz	0.40°/sec/√Hz	1-100Hz
Cross-Axis Sensitivity	±1.0%	±1.0%	±1.0%	Excluding misalignment

TEMPERATURE SENSOR (internal)

Accuracy	±2.0°C
Resolution	±0.25°C

BATTERY (Vs)

Battery Life with 0.5W Transmitter	4hrs @ 25°C	
Battery Life with Transmitter Off	15hrs @ 25°C	
Charge time @ 20°C	2hrs, uncharged to full capacity	Must charge 0-45°C

IRIG-106 ENCODER

PCM Output Rate	1.5Mbit/sec	Based on NRZ
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OPTIONAL FM TRANSMITTER (S Band)

Transmit Power	0.5 to 2.0W options, see ordering info
Carrier Frequency	2.2 to 2.4GHz options, see ordering info

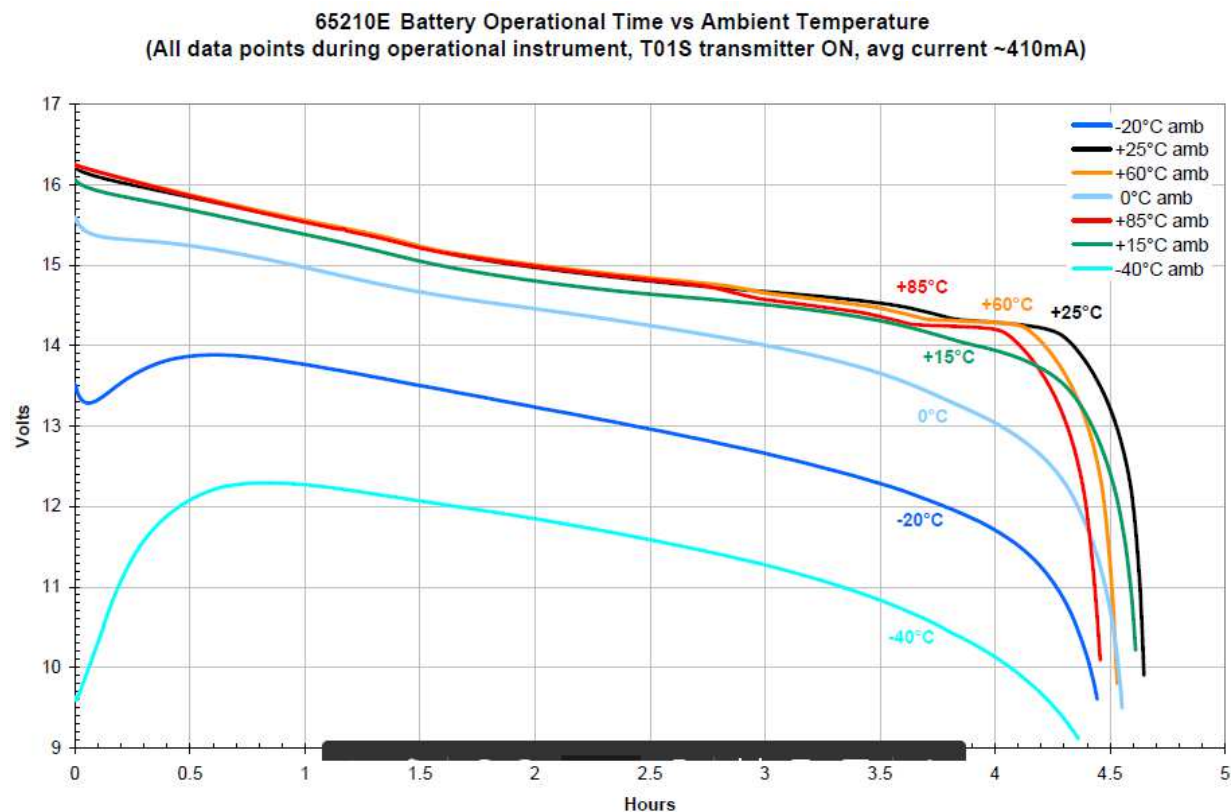
ENVIRONMENTAL

Operating Temperature (°C)	-20 to +70°C
Storage Temperature (°C)	-40 to +85°C
Shock	±100g

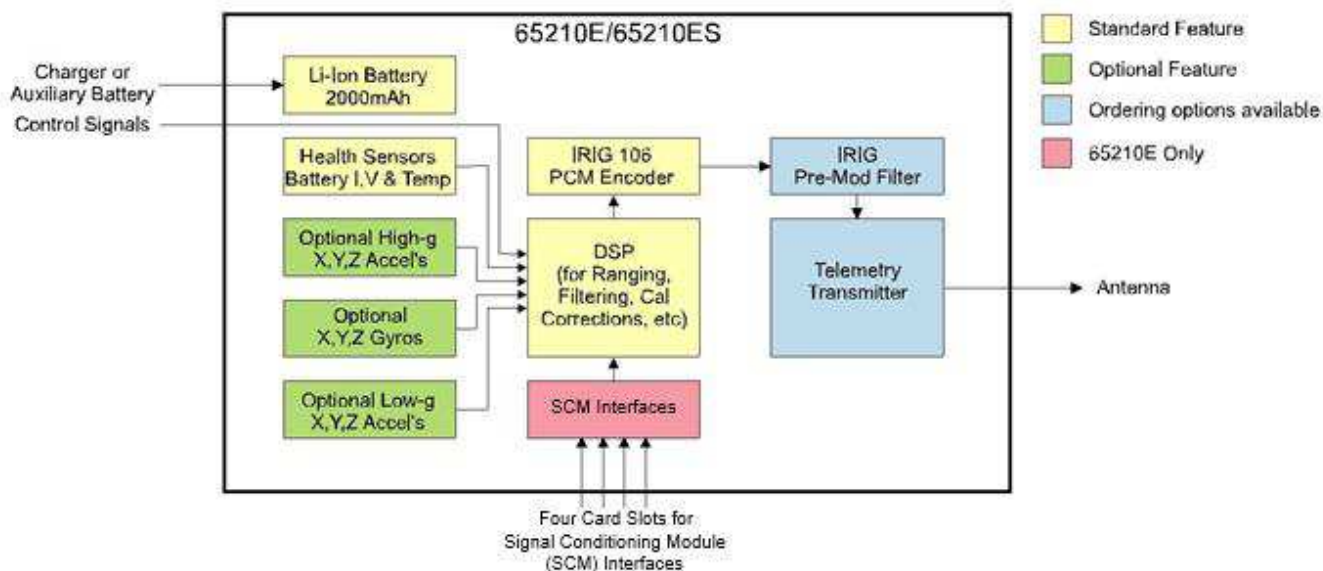
PHYSICAL

Housing Material	Aluminum, Electroless Nickel Plated
Weight	823 grams, without mounting adaptor

TYPICAL BATTERY TIME FOR 65210ES



BLOCK DIAGRAM



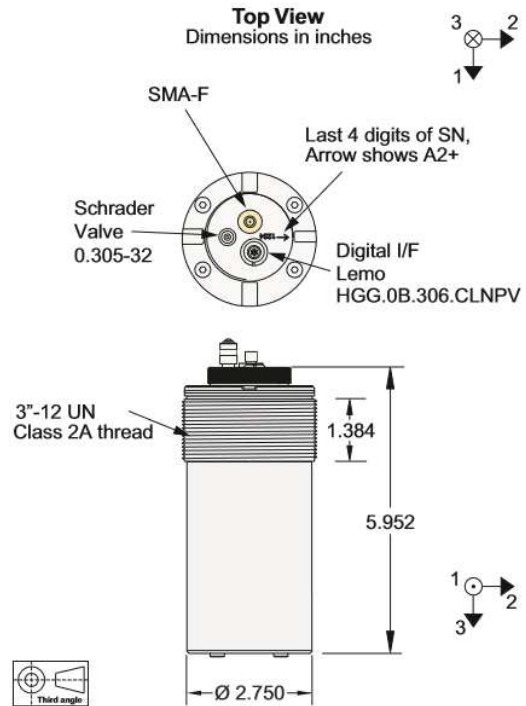
DIMENSIONS

STANDARD CONNECTOR

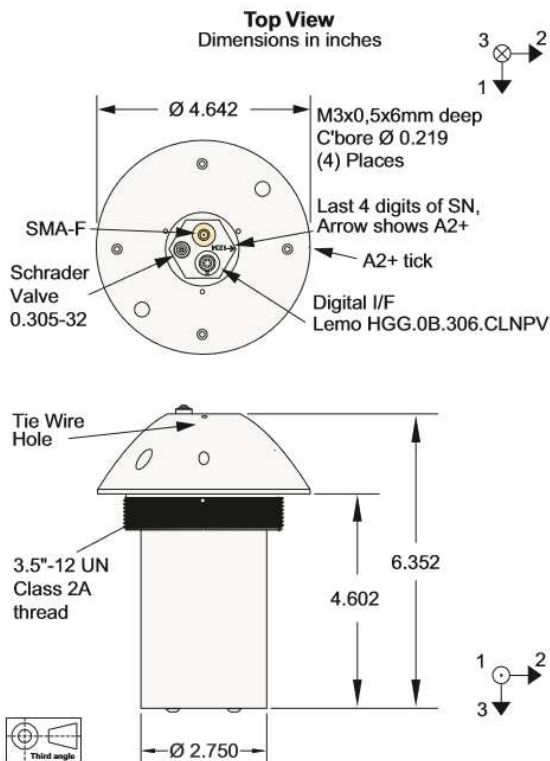


Pin	Signal
1	Aux
2	RS485-
3	RS485+
4	Power Enable L
5	Ground
6	+V Power
SMA-F	RF Out

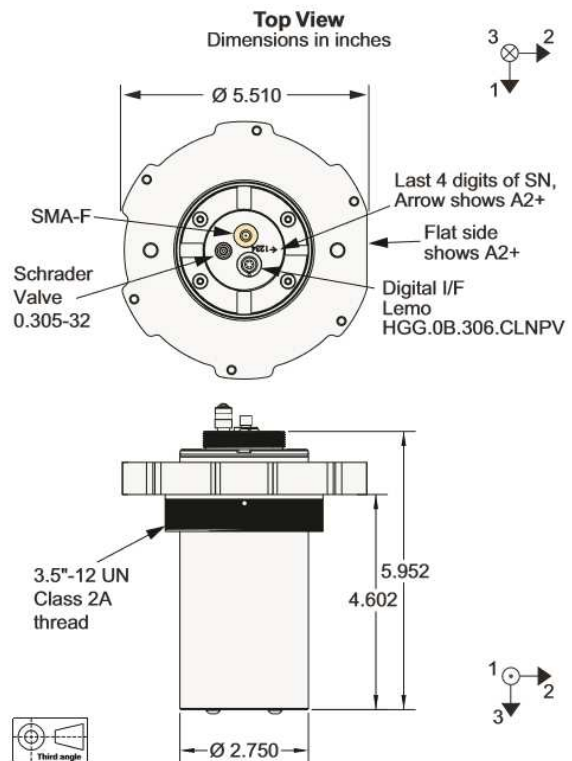
M0: NO MOUNTING



M1: PARABOLIC MOUNTING



M2: RADOME RING (DSU-33)



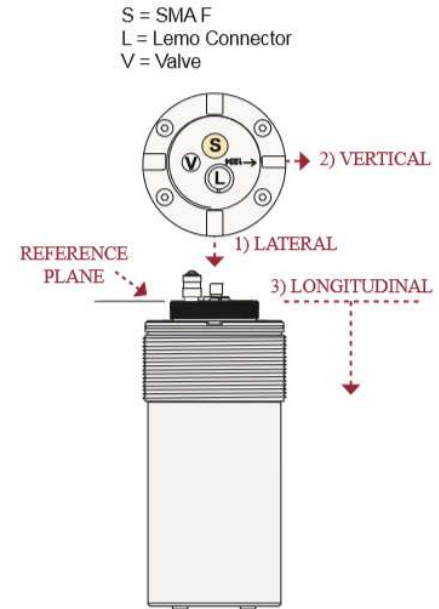
SENSOR CENTER OF GRAVITY LOCATIONS FOR 65210ES

ACCELEROMETER AND GYRO CENTER OF GRAVITY POSITIONS WITHOUT ADAPTER

Accelerometer	Axes (inches)		
Option A040	1-Lateral	2-Vertical	3-Longitudinal
A1 Lateral	-0.112	+0.518	+1.434
A2 Vertical	+0.315	+0.518	+1.008
A3 Longitudinal	-0.112	+0.944	+1.008
Accelerometer Position ± 0.025 inches			

Accelerometer	Axes (inches)		
Option A010, A050, A100	1-Lateral	2-Vertical	3-Longitudinal
A1 Lateral	+0.301	+0.518	+1.008
A2 Vertical	-0.112	+0.930	+1.008
A3 Longitudinal	-0.112	+0.518	+1.420
Accelerometer Position ± 0.050 inches			

Rate Gyro	Axes (inches)		
Option G1K0, G1K2	1-Lateral	2-Vertical	3-Longitudinal
A1 Lateral	+0.370	-0.518	+1.008
A2 Vertical	-0.112	-0.999	+1.008
A3 Longitudinal	-0.112	-0.518	+1.489
Gyro Position ± 0.050 inches			

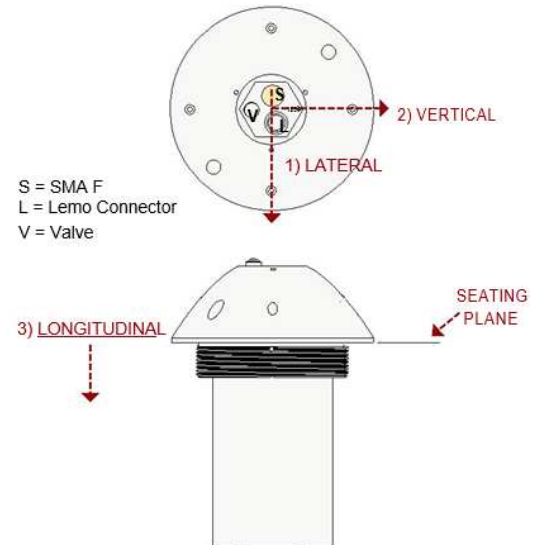


ACCELEROMETER AND GYRO CENTER OF GRAVITY POSITIONS WITH ADAPTER (Parabolic or Radome Rina DSU33)

Accelerometer	Axes (inches)		
Option A040	1-Lateral	2-Vertical	3-Longitudinal
A1 Lateral	-0.112	+0.518	+0.084
A2 Vertical	+0.315	+0.518	-0.342
A3 Longitudinal	-0.112	+0.944	-0.342
Accelerometer Position ± 0.025 inches			

Accelerometer	Axes (inches)		
Option A010, A050, A100	1-Lateral	2-Vertical	3-Longitudinal
A1 Lateral	+0.301	+0.518	-0.342
A2 Vertical	-0.112	+0.930	-0.342
A3 Longitudinal	-0.112	+0.518	+0.070
Accelerometer Position ± 0.050 inches			

Rate Gyro	Axes (inches)		
Option G1K0, G1K2	1-Lateral	2-Vertical	3-Longitudinal
A1 Lateral	+0.370	-0.518	-0.342
A2 Vertical	-0.112	-0.999	-0.342
A3 Longitudinal	-0.112	-0.518	+0.139
Gyro Position ± 0.050 inches			



Axis 3 (longitudinal) position adjustments (per installation):
Will be increased by up to 0.083" when the main instrument assembly is screwed into 12 TPI adapter, as up to one turn back-off may be required (average increase will be 0.042").

ACCESSORIES

65250A Adaptor and 65250AK2 Programming Kit

A bidirectional momentary toggle switch and LED allow a 65250A adaptor to be used to activate the 65210 series IMS without additional hardware. Toggling the switch towards the LED will turn a 65210 IMS system on or off with the LED flashing when the power state change has completed. Toggling the switch away from the LED pulls the Aux line low.

The 65250AK2 programming kit includes a 6ft RS232 to adapter cable and a 3ft adapter to IMS cable providing all wiring required to communicate.



65251E Activation Plug

The 65251E Activation Plug can be used to enable or disable operation of the 65210 series IMS units. Connecting an activation plug to a 65210 IMS which is off causes the power up to be initiated. Connecting to a powered system will cause the system to power down when the plug is removed. A bicolored LED indicates the operational status. The 65251E Activation Plug provides power on/off control without any additional equipment.



65260A S-Band Monopole Antenna

The TE Connectivity 65260A antenna is reliable and rugged, designed to be used with the 65210 series IMS units. Operating over the 2200 to 2300 MHz S-band frequency range, the 65260A maintains a VSWR of less than 1.5:1, providing excellent efficiency.

The 65260A's true SMA-M interface allows direct attachment to 65210 Series Inertial Measurement Systems (IMS) without interference or damage to the SMA female connector. Holes are provided for tie down wires to ensure positive captivation.



65280A Battery Charger and 65284E Battery Replacement.

The 65280A Battery Charger plugs into any 110 VAC outlet and displays recharging status through an LED indicator. Designed to plug into the 65250A adapter. For an International compatible power cord, order the model 65281A Battery Charger.

For a replacement battery, TE Connectivity offers the model 65284E Battery Replacement accessory.



Additional Accessories

35290A	USB to RS232 Adaptor
65250E-T004	6-pin Lemo to DB9 cable, 4 ft.
65286E024	Lemo programming cable, 24 in.
65286E018	Lemo programming cable, 18 in.
65286E018R	Lemo programming cable, 18 in., right angle
65286R018SMA	RF cable extension, 18 in.
65286R004SMA	RF cable extension, 4 in.
65261A	15-pin connector, 10 ft. leads
65262A	25-pin connector, 10 ft. leads
65252A	M-F cable, 9 pin, 6 ft.
65269A	Alignment Pin Kit

ORDERING INFORMATION

65210ES	A040	G1K2	T01S	M2
Accelerometers				
A000 = None				
A010 = $\pm 10g$				
A040 = $\pm 40g$				
A050 = $\pm 50g$				
A100 = $\pm 100g$				
Angular Rate Gyros				
G000 = None				
G1K0 = $\pm 1000^\circ/\text{sec}$				
G1K2 = $\pm 1200^\circ/\text{sec}$				
GS00 = $\pm 20,000^\circ/\text{s}$ (roll axis only, $\pm 1200^\circ/\text{s}$ on other axes)				
Transmitter				
T000 = None				
T00S = 0.5W, 272kb/s, 2.2-2.3GHz, S band				
T01S = 0.5W, 1.5Mb/s, 2.2-2.3GHz, S band				
T03S = 0.5W, 3.0Mb/s, 2.2-2.3GHz, S band				
TA1S = 1.0W, 1.5Mb/s, 2.2-2.3GHz, S band				
TA1B = 1.0W, 1.5Mb/s, 2.2-2.4GHz, S band				
T11S = 1.5W, 1.5Mb/s, 2.2-2.3GHz, S band				
T13S = 1.5W, 3.0Mb/s, 2.2-2.3GHz, S band				
T20S = 2.0W, 272kb/s, 2.2-2.3GHz, S band				
T20U = 2.0W, 272kb/s, 2.3-2.4GHz, S band				
Adapter				
M0 = None				
M1 = Parabolic Mounting				
M2 = Radome Ring (DSU33)				

Example; 65210ES-A040-G1K2-T01S-M2

Model 65210ES, $\pm 40g$ accel range, $\pm 1200^\circ/\text{sec}$ rate range, 0.5W 1.5Mb/s S-band Transmitter, Radome Ring Mounting Adapter

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