

# Integrated Telemetry Instrumentation Kit Model MD50C-5



Supplying high performance flight instrumentation, RF/microwave assemblies, power amplifiers, IFF and data acquisition Systems for severe environments.

The MD50C-5 Radar Transponder is a miniature precision augmentation device used to enhance the capability of C-band radars. Utilized primarily for range safety functions, the MD50C-5 is suitable for use in both manned and unmanned vehicles. This transponder is applicable to precision tracking of aircraft, sounding rockets, missiles, and drone targets, both sea and airborne. Through the use of a state-of-the-art RF-to-video detection receiver, typical IF down conversion components such as the local oscillator, mixer, and IF amplifier are eliminated. The reduced parts count leads to increased overall unit reliability.

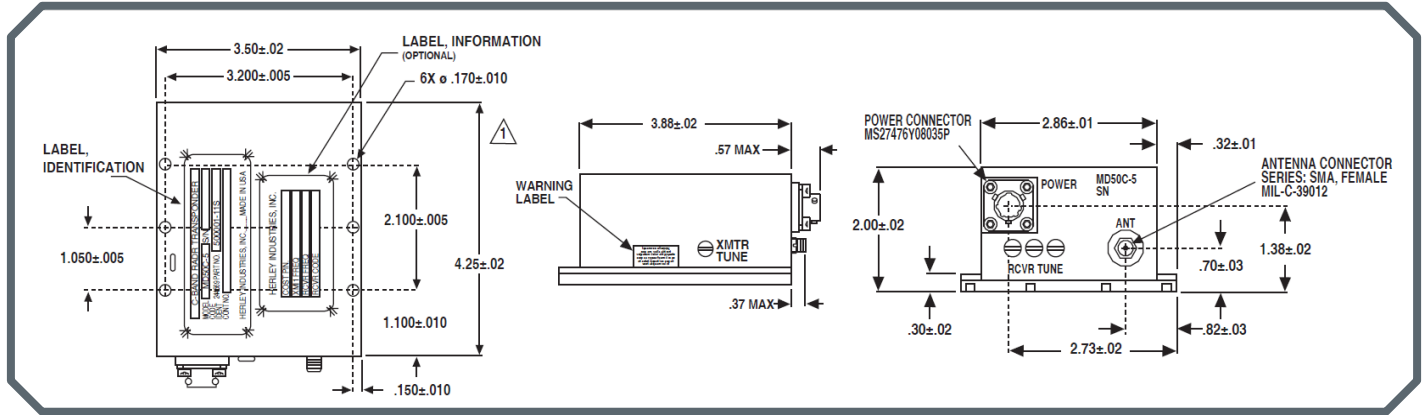
The design of the MD50C-5 utilizes the latest in modern devices and circuitry. It is all solid-state, except for the triode transmitter, to provide a reliable product with extremely long operating life.

Due to U.S. Export Control Reform Ultra's Radar Transponders have transitioned from ITAR to Department of Commerce Export Administration Regulations (EAR) making them ITAR-free.

DOD / OSR Clearance 12-S-0220



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PRODUCT BRIEF

RELEASE DATE 12/31/2020

# Integrated Telemetry Instrumentation Kit

## Model MD50C-5

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### FEATURES:

- 50 Watt peak power output
- Long life triode cavity oscillator transmitter
- Sensitive direct RF-to-video detection receiver
- Small, less than 25 cubic inches (405 cubic cms)
- Lightweight, less than 20 ounces (567 grams)
- Tunable over 5.4 to 5.9 GHz
- Adjustable internal delay
- Reverse polarity power lead protection
- Single and double pulse interrogation settings
- Adjustable code spacing
- Built-in duplexer for single antenna operation and protection from high antenna reflections

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### ENVIRONMENTAL:

- Frequency Range: 5.4 to 5.9 GHz
- Frequency Separation: 50 MHz min.
- Impedance, Input/Output: 50 ohms nominal
- Reverse Polarity Protection: Built-in series diode protection against damage from DC input power reversal
- Voltage Transient Protection: Internal power supply stabilizes transients to the normal operating voltages
- Short and Open Circuit Protection: Built-in to provide antenna mismatch protection
- Input Voltage: 22 to 32 VDC, Floating from ground
- Input Current: 0.40 Amps maximum to 2600 pps
- Recovery Time: 50 µsecs. maximum
- Blanking: Built-in circuitry prevents reply during recovery time

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### PHYSICAL:

- Size: 4.25 x 3.5 x 2.0 inches (10.8 x 8.9 x 5.1 cms)
- Volume: 25 cubic inches (405 cu. cms)
- Weight: 20 ounces (567 gms)
- Duplexer: Built-in circulator/isolator, (ferrite 4-port)
- Test Points: Internal test points are provided for alignment
- Antenna Connector: SMA Female
- Power Connector: MS27476Y- 08D35P (mates with MS27484E08B35S)
- Pin Connections: #1, +28v; #2, 28v return

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### RECEIVER:

- Design: Direct RF-to-video detection
- Sensitivity: -65 dBm minimum
- Frequency Tuning: Three preselector controls externally accessible upon removal of seal screws

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## Model MD50C-5

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- Tuning Range: 5.4 to 5.9 GHz
- Sensitivity Bandwidth: Greater than -65 dBm over  $\pm 3$  MHz around assigned frequency
- Dynamic Range: +10 to -65 dBm
- Bandwidth (3dB):  $11 \pm 5$  MHz
- Image Rejection: Non-existent image frequency (no local oscillator)
- Pulse Decoder: Single or double, internally selectable
- Pulse Width: 0.25 to 5.0  $\mu$ secs. single; 0.25 to 1.0  $\mu$ secs double
- Pulse Rise Time: 0.1  $\mu$ sec. maximum single or double
- Double Pulse Coding: Spacing adjustable between 3.0 and 15.0  $\mu$ secs
- Second Pulse Spacing: Accepts  $\pm 0.15$   $\mu$ secs. Rejects  $\pm 0.3$   $\mu$ secs
- Random Triggering: 10 pps maximum

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### TRANSMITTER:

- Power Output: 50 Watts peak minimum
- Output device: Triode cavity oscillator (Limited operating life of 200 hours minimum, which includes all periods of DC power applied to the transponder)
- Frequency Tuning: Single control externally accessible upon removal of seal screw
- Tuning Range: 5.4 to 5.9 GHz
- Frequency Stability:  $\pm 5.0$  MHz
- Pulse Width:  $0.5 \pm 0.1$   $\mu$ sec
- Pulse Width Jitter: 0.01  $\mu$ sec. maximum
- Pulse Rise/Fall Time: 0.1/0.2  $\mu$ sec. max. (10 to 90%)
- Spectrum: The reply pulse RF spectrum bandwidth (in MHz) will not exceed 3.0/pulse width (in  $\mu$ secs.) measured at the 1/4 power level points
- PRF: 100 pps to 2600 pps typical
- Reply Delay: Adjustable from 2.0 to 6.0  $\mu$ sec, (2.5  $\mu$ sec typical)
- Delay Variation: 0.03  $\mu$ sec. maximum deviation from -30 dBm value for input signals levels between 0 and -60 dBm
- Delay Jitter: 0.02  $\mu$ sec. maximum 0 to -55 dBm, 0.05  $\mu$ sec maximum -55 to -65 dBm
- Interrogation Replies: 99% minimum for input signal levels between +10 and -65 dBm
- Duty Cycle: Up to 0.002 (0.2%)
- Over interrogation Protection: 3200 pps typical

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### ENVIRONMENTAL:

- The transponder meets the requirements of MIL-STD-810

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- Vibration Sine: 5 to 10 Hz, 0.20 inch double amplitude; 10 to 18 Hz 1g; 18 to 81 Hz 0.06 inch double amplitude; 81 to 2000 Hz, 20g
- Vibration Random: 16.9g rms, 0.008g<sup>2</sup>rms/Hz at 20 Hz, 0.20g<sup>2</sup>rms/Hz from 100 Hz to 1000 Hz, 0.05g<sup>2</sup>rms/Hz at 2000 Hz
- Temperature, Operating: -40°F (-40°C) to +160°F (+71°C) standard, (-54°C to +85°C available)
- Temperature, Storage: -80°F (-62°C) to +185°F (+85°C)
- Shock: 100g (6 milliseconds) in any axis, sawtooth, 120g (4 milliseconds) in any axis, sawtooth
- Altitude: 760 mm of mercury (sea level) to 0.04 mm of mercury (230,000 feet altitude)
- Humidity: Any, up to 100% including condensation due to temperature changes
- Acceleration: 50g applied along any axis for 1 minute
- RFI/EMI: MIL-STD-461, tested per MIL-STD-462
- Pressurization: 22 psi bubble leak test

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### PRODUCT NUMBERS:

- P/N 500001-11S - Standard unit
- P/N 500001-12 - Standard unit with telemetry in/out, SMA connectors on front panel
- P/N 500001-16 - Standard unit with external single pulse/double pulse switch

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\* Product in development, targeted specification