

Data Sheet

# VIAVI ATC-5000NG

NextGen ATC/DME Test Set and ADS-B Target Generator

### Transmitter

| Frequency                             |   |
|---------------------------------------|---|
| Range                                 | 952 MHz to 1223 MHz                           |
| Resolution                            | 100 kHz                                       |
| Accuracy                              | 2.5 ppm                                       |
| Phase Noise                           | <-80 dBc/Hz @ 100 kHz                         |
| Power                                 |   |
| Range (Transponder)                   | +5 to -110 dBm                                |
| Resolution                            | 0.1 dB  |
| Accuracy<br>@ 1030 MHz                | ±1 dB (+5 to -100 dBm)                        |
|                                       | ±3 dB (< -100 dBm)                            |
| Range (UAT, top<br>antenna port only) | +5 to -100 dBm                                |
| Resolution                            | 0.1 dB  |
| Accuracy                              | ±1 dB @ 978 MHz                               |
| Range (Multi-Receiver)                | -20 to -90 dBm (Low Power Mode)               |
|                                       | -5 to -65 dBm (High Power Mode)               |
|                                       | -40 to -110 dBm (Very Low Power Mode)         |
| Resolution                            | 1 dB  |
| Accuracy                              | ±1 dB (+5 to -100 dBm)                        |
|                                       | ±3 dB (< -100 dBm) @978, 1030 and<br>1090 MHz |



| Range (DO-260B)                           | -20 to -90 dBm (Low Power Mode)       |
|---|---------------------------------------|
|   | -5 to -65 dBm (High Power Mode)       |
|   | -40 to -110 dBm (Very Low Power Mode) |
| Resolution                                | 1 dB                                  |
| Accuracy                                  | ±1 dB (+5 to -100 dBm)                |
|   | ±3 dB (< -100 dBm) @ 1090 MHz         |
| Range (DME, Top Port<br>Only)             | +5 to -110 dBm                        |
| Resolution                                | 0.1 dB                                |
| Accuracy                                  | ±1 dB (-100 to +5 dBm)                |
|   | ±3 dB (< -100 dBm)                    |
|   | 952 to 1223 MHz                       |
| Spectral Purity                           |                                       |
| Harmonics                                 | <-50 dBc                              |
| Spurious                                  | <-55 dBc, 350 to 1800 MHz             |
| Residual FM                               | 250 Hz Peak                           |
| Phase Noise                               | <-80 dBc/Hz @ 100 kHz                 |
| DME Pulse Spectrum<br>at ± 800 kHz Offset | <-52 dBc                              |
| Channels                                  |                                       |
| No. of Channels                           | 2 (DME Option)                        |
|   | 4 (XPDR/UAT)                          |
|   | 6 (ADS-B Option)                      |
| Diversity                                 |                                       |
| Power                                     | ±20 dB                                |
| Resolution                                | 0.1 dB                                |
| Accuracy                                  | ±1 dB                                 |
| Timing                                    | ±1μs                                  |
| Resolution                                | 25 ns                                 |
| Accuracy                                  | ±10 ns                                |
|   |                                       |

# Transmitter (continued)

| Modulation                                   |                          |  |
|--|--------------------------|--|
| Pulse On/Off Ratio                           | >80 dB                   |  |
| Pulse Position (high sp                      | eed rise/fall time mode) |  |
| Mode A Interrogation<br>P1-P3 Default        | 8.0 µs                   |  |
| Accuracy                                     | ±10 ns                   |  |
| Mode C Interrogation<br>P1-P3 Default        | 21.0 µs                  |  |
| Accuracy                                     | ±10 ns                   |  |
| ATCRBS Interrogation<br>P1-P2 Default        | 2.0 µs                   |  |
| Accuracy                                     | ±15 ns                   |  |
| ATCRBS Interrogation<br>P3-P4 Default        | 2.0 µs                   |  |
| Accuracy                                     | ±15 ns                   |  |
| ATCRBS Interrogation<br>Variation            | ±1.95 μs                 |  |
| Resolution                                   | 25 ns                    |  |
| Accuracy (P1-P3)                             | ±10 ns                   |  |
| Accuracy (P1-P2 and P3-P4)                   | ±15 ns                   |  |
| Mode S Interrogation<br>P1-P2 Default        | 2.0 µs                   |  |
| Accuracy                                     | ±10 ns                   |  |
| Mode S Interrogation<br>P1-P2 Variation      | ±1.95 μs                 |  |
| Resolution                                   | 25 ns                    |  |
| Accuracy                                     | ±10 ns                   |  |
| Mode S Interrogation<br>P6 to SPR Default    | 1.25 µs                  |  |
| Accuracy                                     | ±15 ns                   |  |
| Mode S Interrogation<br>P6 Variation         | ±1.95 μs                 |  |
| Resolution                                   | 25 ns                    |  |
| Accuracy                                     | ±15 ns                   |  |
| Mode S Interrogation<br>P2 to SPR Default    | 2.75 µs                  |  |
| Accuracy                                     | ±15 ns                   |  |
| Mode S Interrogation<br>SPR Variation        | ±1.0 µs                  |  |
| Resolution                                   | 25 ns                    |  |
| Accuracy                                     | ±15 ns                   |  |
| Mode S Interrogation<br>P5 prior SPR Default | 400 ns                   |  |
| Accuracy                                     | ±15 ns                   |  |
| Mode S Interrogation<br>P5 Variation         | ±1.95 µs                 |  |
| Resolution                                   | 25 ns                    |  |
| Accuracy                                     | ±15 ns                   |  |

| Interference<br>Interrogation Signal #1<br>(Relative to P1 Pulse)  | -17.5 to 400 µs  |
|--|--|
| Resolution   | 25 ns  |
| Accuracy   | ±20 ns   |
| Interference<br>Interrogation Signal #2<br>(Relative to signal #1) | 0 to 400 µs  |
| Resolution   | 25 ns  |
| Accuracy   | ±10 ns   |
| Double/Interlace<br>Interrogation                                  | 0 to 400 µs  |
| Resolution   | 25 ns  |
| Accuracy   | ±10 ns   |
| DME P1 to P2 Default   | 12 or 30 µs  |
| Accuracy   | ±50 ns   |
| DME P1 to P2 Variation   | DME X +7.9 µs to -2.5 µs                               |
|  | DME Y +7.9 µs to -7.9 µs                               |
| Resolution   | 25 ns  |
| Accuracy   | ±50 ns   |
| Pulse Width (high spee   | d rise/fall time mode)                                 |
| ATCRBS Interrogation<br>P1/P2/P3 Default                           | 0.8 µs   |
| Accuracy   | ±10 ns   |
| ATCRBS Interrogation<br>P4 Short                                   | 0.8 µs   |
| Accuracy   | ±10 ns   |
| ATCRBS Interrogation<br>P4 Long                                    | 1.6 µs   |
| Accuracy   | ±10 ns   |
| ATCRBS Interrogation<br>P1/P2/P3/P4 Variation                      | 0 to 1.95 µs for P1, P2 and P3, 0 to<br>2.75 µs for P4 |
| Resolution   | 25 ns  |
| Accuracy   | ±10 ns (PW ≥ 0.2 µs)                                   |
| Mode S Interrogation<br>P1/P2 Default                              | 0.8 µs   |
| Accuracy   | ±10 ns   |
| Mode S Interrogation<br>P1/P2 Variation                            | 0 to 1.95 µs   |
| Resolution   | 25 ns  |
| Accuracy   | ±10 ns (PW ≥ 0.2 µs)                                   |
| Mode S Interrogation<br>P6 Short Default                           | 16.25 µs   |
| Accuracy   | ±10 ns   |
| Mode S Interrogation<br>P6 Long Default                            | 30.25 µs   |
| Accuracy   | ±10 ns   |
| Mode S Interrogation Pe  | variation  |
| P6 Overall   | -0.5 to +1.45 µs (offset range)                        |
| Resolution   | 25 ns  |
| Accuracy   | ±10 ns   |

# Transmitter (continued)

| Mode S Interrogation<br>P5 Default                       | 0.8 µs  |
|--|---|
| Accuracy   | ±10 ns  |
| Mode S Interrogation<br>P5 Variation                     | 0.2 to 1.95 µs                                |
| Resolution   | 25 ns   |
| Accuracy   | ±10 ns  |
| Interference Pulse<br>Width                              | 0.2 to 32.0 µs                                |
| Resolution   | 25 ns   |
| Accuracy   | ±25 ns  |
| DME P1/P2 Default  | 3.5 µs  |
| Accuracy   | ±250 ns                                       |
| DME P1/P2 Variation                                      | 3.5 to 9.0 µs                                 |
| Resolution   | 25 ns   |
| Accuracy   | ±250 ns                                       |
| Pulse Rise/Fall Time                                     |   |
| Transponder  | <50 / <50 ns                                  |
| Accuracy   | <50 ns  |
| DME  | 2.0 / 2.5 µs                                  |
| Accuracy   | ±25 μs  |
| Pulse Amplitude  |   |
| ATCRBS Interrogation<br>Variation (all pulses)           | +9 to -19 dB                                  |
| Resolution   | 0.1 dB  |
| Accuracy   | ±0.5 dB                                       |
| Mode S Interrogation<br>Variation P2, P6 and<br>P5 (SLS) | +9 to -19 dB                                  |
| Resolution   | 0.1 dB  |
| Accuracy   | ±0.5 dB                                       |
| Interference   | +9 to -19 dB                                  |
| Resolution   | 0.1 dB  |
| Accuracy   | ±0.5 dB                                       |
| DME Echo   | +6 to -15 dB                                  |
| Resolution   | 0.1 dB  |
| Accuracy   | ±0.5 dB                                       |
| Interrogation Table/Bu                                   | rst Mode                                      |
| Unique Messages  | 1 to 1000                                     |
| Interrogations/Burst                                     | 1 to 10K                                      |
| Burst Spacing  | 0 to 20 s (0 s for single burst transmissions |
| Resolution   | 0.1 s   |
| Accuracy   | ±100 ms                                       |
| Bursts/Trigger   | 1, continuous or until stop command received  |

| Block Transmissions                           |  |
|---|--|
| Unique Messages                               | 1 to 2000 messages   |
| No. of Blocks                                 | 1 to 50,000 or infinite  |
| Interrogation Spacing                         | User defines spacing between interrogations:                                     |
| within Block                                  | Min: 10 µs   |
|   | Max: block period -120 µs  |
| Resolution                                    | 1.0 µs   |
| Period  | 10 ms to 90 seconds  |
| Resolution                                    | 1 ms   |
| Accuracy                                      | ±1 ms  |
| PRF   |  |
| Single Interrogation                          | 1 to 10,000 Hz   |
| Resolution                                    | 1 Hz   |
| Accuracy                                      | 0.1% of setting  |
| Interrogation Table<br>(Continuous and Burst) | 1 to 10,000 Hz   |
| Resolution                                    | 1 Hz   |
| Accuracy                                      | 0.1 % of setting   |
| Double Interrogation                          |  |
| Each message                                  | 1 to 10 kHz  |
| PRF   | in sync or non-sync  |
| Resolution                                    | 1 Hz   |
| Accuracy                                      | 0.1% of setting  |
| Interlace                                     | 1 to 10 kHz  |
| Resolution                                    | 1 Hz   |
| Accuracy                                      | 0.1% of setting  |
| Interlace Ratio                               |  |
| Ratio   | 1:1 to 1:1000  |
| Suppressor Pulse                              |  |
| XPDR  | Position: 3.4 µs prior to P1 of interrogation<br>Width: duration of transmission |
| Accuracy                                      | ±0.3 µs  |
| DME   | Position: 3.4 µs prior to P1 of reply,<br>Width: 36 µs                           |
| Accuracy                                      | ±0.3 μs, ±2.0 μs for Width   |
| Amplitude                                     | >25 V (fixed)  |
| DME Simulation                                |  |
| Equalizing Pulse Pair                         | 100 µs after ident pulse pair  |
| Accuracy                                      | ±0.1 µs  |
| Ident Frequency                               | 1350 Hz  |
| Accuracy                                      | ±0.02%   |
| Dot Default                                   | 120 ms   |
| Accuracy                                      | ±1 ms  |
| Dot Variation                                 | 50 to 250 ms   |
| Resolution                                    | 10 ms  |
| Accuracy                                      | ±1 ms  |
| Dash Default                                  | 360 ms   |
| Accuracy                                      | ±1 ms  |
| Dash Variation                                | 150 to 750 ms  |
|   |  |
| Resolution                                    | 10 ms  |

# Transmitter (continued)

| Space Default       | 150 ms                            |
|---------------------|-----------------------------------|
| Accuracy            | ±1 ms                             |
| Space Variation     | 50 to 250 ms                      |
| Resolution          | 10 ms                             |
| Accuracy            | ±1 ms                             |
| Code Rate Default   | 30 s                              |
| Accuracy            | ±100 ms                           |
| Code Rate Variation | 10 to 65 s                        |
| Resolution          | 0.1 s                             |
| Accuracy            | ±100 ms                           |
| Echo Range          | 30 nmi                            |
| Accuracy            | ±0.02 nmi                         |
| Range               | -1 to 400 nmi                     |
| Resolution          | 0.01 nmi                          |
| Accuracy            | ±0.02 nmi                         |
| Velocity            | 0 to 10000 knots                  |
| Resolution          | 1 knot                            |
| Accuracy            | ±0.001% of setting                |
| Acceleration        | 0 to 400 ft/s2                    |
| Resolution          | 1 ft/s2                           |
| Accuracy            | ±0.05% of setting                 |
| Squitter            | 0 to 8000 Hz                      |
| Resolution          | 1 Hz                              |
| Accuracy            | 10 Hz or 2%, whichever is greater |
| Reply Efficiency    | 0 to 100 %                        |
| Resolution          | 1%                                |
| Accuracy            | ±0.5%                             |
| RNAV                |                                   |
| X Channel Spacing   | 50 µs @ 0 nmi                     |
| Accuracy            | ±0.5 µs                           |
| Y Channel Spacing   | 56 µs @ 0 nmi                     |
| Accuracy            | ±0.5 µs                           |
| Width (X and Y)     | 7 µs                              |
| Accuracy            | ±1.0 µs                           |

#### Receiver

Resolution

Accuracy

| VSWR                    |  |
|-------------------------|--|
| <1.4 (952 to 1223 MHz)  |  |
| Max Input Power         |  |
| +60 dBm                 |  |
| Operating Range         |  |
| XPDR, +17 to +60 dBm    | (1090 ±3 MHz)                                    |
| UAT (bottom antenna p   | ort only), +30 to +57 dBm (978 ±3 MHz)           |
| DME, +17 to +60 dBm (   | 1020 to 1155 ±3 MHz)                             |
| Receiver Decoding       |  |
| Messages                | ATCRBS Interrogation and Replies                 |
|                         | Mode S Interrogations and Replies                |
|                         | UAT Ground and Airborne<br>Messages [UAT Option] |
|                         | DME Interrogations                               |
| Channels                |  |
| No. of Channels         | 2, Top/Bottom                                    |
| Measurement             |  |
| Power                   | +17 to +60 dBm                                   |
| XPDR                    | 1090 ±3 MHz                                      |
| DME                     | 1025 to 1150 MHz                                 |
| Resolution              | 0.1 dB   |
| Accuracy                | ±0.5 dB  |
| Frequency (XPDR)        | 1090 MHz <u>+</u> 3 MHz                          |
| Resolution              | 1 kHz  |
| Accuracy                | ±50 kHz  |
| Frequency (DME)         | RX Channels (1025 to 1150 MHz ±1 MHz)            |
| Resolution              | 1 kHz  |
| Accuracy                | ±20 kHz  |
| Pulse Spacing           |  |
| Resolution              | 1 ns   |
| Accuracy                | ±10 ns (XPDR)                                    |
|                         | ±50 ns (DME)                                     |
| Pulse Width             |  |
| Resolution              | 1 ns   |
| Accuracy                | ±15 ns (XPDR)                                    |
|                         | ±50 ns (DME)                                     |
| Pulse Rise/Fall Time    |  |
| Resolution              | 1 ns   |
| Accuracy                | ± 15 ns (XPDR)<br>+100 ns (DMF)                  |
| Reply Delay (XPDR: ATCR | 35 & Mode S)                                     |
| Resolution              | 25 ns  |
| Accuracy                | +50 ns   |
| Renly litter            |  |
| Resolution              | 1 ns   |
|                         | +20 pc   |
| Dercept Banky           |  |
| гетсепт керту           | U to 100% (sample size equal to PRF or           |

200, whichever is greater)

0.1 %

±1%

### **Receiver (continued)**

| Mode S Squitter Rate               |  |
|------------------------------------|--|
| DF11                               | 0.01 s to 4.0 s  |
| Resolution                         | 1 ms   |
| Accuracy                           | ±1 ms ±2.5 ppm   |
| DF17                               |  |
| Airborne Position                  | 0.01 s to 2.0 s  |
| Resolution                         | 1 ms   |
| Accuracy                           | ±1 ms ±2.5 ppm   |
| Surface Position                   | 0.01 s to 15.0 s   |
| Resolution                         | 1 ms   |
| Accuracy                           | ±1 ms ±2.5 ppm   |
| A/C Identification                 | 0.01 s to 25.0 s   |
| Resolution                         | 1 ms   |
| Accuracy                           | ±1 ms ±2.5 ppm   |
| Airborne Velocity                  | 0.01 s to 2.0 s  |
| Resolution                         | 1 ms   |
| Accuracy                           | ±1 ms ±2.5 ppm   |
| Event Driven                       | 0.01 s to 25.0 s   |
| Resolution                         | 1 ms   |
| Accuracy                           | ±1 ms ±2.5 ppm   |
| Interrogation Rate<br>(DME)        | 0 to 10 kHz  |
| Resolution                         | 1 Hz   |
| Accuracy                           | ±1 Hz  |
| Scope Trigger Output (             | Scope 1 and Scope 2)   |
| Width (XPDR, DME)                  | 1.0 µs   |
| Accuracy                           | ±0.5 μs  |
| XPDR Position                      |  |
| Interrogation                      | -1.0 to +600 μs relative to rising edge of<br>P1 (default -1.0 μs) |
| Resolution                         | 25 ns  |
| Accuracy                           | ±0.5 μs Typical  |
| Reply                              | -1.0 µs prior to 1st pulse of reply (F1/P1)                        |
| Resolution                         | 25 ns  |
| Accuracy                           | ±0.5 μs Typical  |
| DME Position                       |  |
| Squitter<br>Echo<br>Ident<br>Reply | 4.5 μs prior to 1st pulse of any selected transmission             |
| Accuracy                           | ±0.5 µs  |

| Interrogation | 2.5 µs following Trise of received interrogation pulse P1 |
|---------------|---|
| Accuracy      | ±0.5 µs Typical   |

#### Environmental

| Temperature                |   |
|----------------------------|---|
| Requires 45 minute warm-u  | up period to meet specified performance |
| Full specified performance | 23°C, ±5°C (73.4°F, ±41°F)              |
| Operating                  | 0 to +40°C (32° to 104°F)               |
| Storage                    | 0 to +71°C (32° to 159.8°F)             |
| Relative Humidity          | 0 to 95% noncondensing                  |
| Degree of Protection       | IPX-0                                   |
| AC Input Power             |   |
| Voltage Range              | 100 to 240 VAC, 50 to 60 Hz             |
| Power Consumption          | 100 W nominal                           |

#### **Physical Characteristics**

| Dimensions | 10.5 in (H) x 19 in (W) x 24 in (D)<br>(26.7 cm x 48.3 cm x 60.9 cm) |
|------------|--|
| Weight     | 41 lbs (18.6 kg) test set only                                       |

## **Functional Characteristics**

| Remote Interface                          |
|---|
| Ethernet                                  |
| GPIB                                      |
| Inputs/Outputs                            |
| Suppression bus (front/back)              |
| 2 scope BNC outputs (front/back)          |
| LAN (front/back)                          |
| 2 USB Type A (front) for HID/flash drives |

## **Test Set Certifications**

| MIL-PRF-28800F (Class 3 Device) |
|---------------------------------|
| CE                              |
| UL/EN 61010-1                   |
| EN 61326-1                      |
|                                 |



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