ASTRONICS
DME CORPORATION

ATS3000A

ATS3000A

Electrical-Communication Fault
Isolation Diagnostic Tester

Astronics DME Corporation is proud to introduce the ATS3000A, representing the 3rd generation in the evolution of the ATACTS product line. The ATS3000A is designed using Astronics DME's proven Synthetic Instrumentation (SI) architecture, which combines the functions of multiple traditional instruments into a single, software-defined platform. DME's Next Generation Synthetic Instrumentation Architecture (NGSIA) provides the user with a complete and compact RF, Analog, and Digital test platform. It can be used as a standalone or fully automated system with easy to use graphical user interfaces. The ATS3000A is capable of testing legacy, current and future software-defined radios as well as power amplifiers, couplers and other electronic equipment.

- Software defined, Synthetic Architecture
- 21+ Meters and Instruments
- Field Upgradeable
- Real-time, Programmable IF Bandwidth from 100Hz to 8 MHz
- IQ Synthesis and Analysis via IQ$_{EZ}$™
- Standalone, Automated test Capabilities
- Removable UUT interface module for future ATE communications

GENERIC OVERVIEW

System Overview

With a frequency range of 3 GHz, users are able to test new electronic and advanced radio systems by providing harmonic analysis within the UHF and VHF radio spectrum. In addition to the extended frequency range, the ATS3000A is equipped with real-time, all digital IF and baseband I/Q signal processing to meet the demands of modern digital and analog communication systems. Extensive use of Digital Signal Processing (DSP) allows the ATS3000A to be configured as required through its software-defined architecture in order to support both current (legacy) and future (emerging) requirements.

System Description

The ATS3000A contains multiple meters and instruments that allow users to test, record, and diagnose faulty electronic-communication systems. The Standalone Instrument Software provides access to all instrument panels in a versatile, feature rich environment. A Virtual Instrument (VI) desktop allows up to eight instrument panels to be displayed at a time. Instrument panels can be repositioned for better grouping of related instruments. Graphical indicators and markers highlight critical data on graphs and meters. System status is always visible with, time, date, CPU usage, available memory, system heartbeat, temperature, and RF Status indicators. Modular design allows easy addition and removal of VIs. A representative sample of the instruments and meters that are available within the ATS3000A are: an RF Generator and Receiver equipped with CW, AM, FM, PM, multiple Digital Modulation schemes, as well as a true arbitrary waveform generator, an RSSI, Power, and RF Frequency Error Meter, Constellation Diagram, Error Vector Magnitude (EVM) Meter, Spectrum Analyzer, Digital MultiMeter (DMM), and Digital Storage Oscilloscope (DSO).

Software Capabilities
TestEZ®

The ATS3000A is designed to allow full use of DME's TestEZ® suite of TPS development tools. TestEZ® provides all the software needed for complete, efficient, user-friendly, test application development & diagnostic maintenance. This software tool-set features an easy to use automated test operating system (Test Executive) and software-coding TPS development tool (Code Assist). Additional support tools are provided for probing (Probe Assist), and archive management (Archive Manager). Test EZ® drivers also operate in a manual mode allowing the user GUI access to all ATS3000A Virtual Instrumentation assets. The Code Assist program presents a GUI interface that enables the user with limited coding experience to code with the TestEZ® Code Assist software tool. The ATS3000A TestEZ® application gives the maintainer the ability to convert a work order into an automated test program set so that it can make a diagnosis and initiate repair action on a faulty LRU.

IQ$_{EZ}$™

The ATS3000A also contains DME's latest software, IQ$_{EZ}$™, which allows the end user to synthesize and analyze complex arbitrary waveforms. The RF output signal may be completely defined by the user via its I/Q components, thus virtually any signal type can be created. Additionally, RF input signals are decomposed into I/Q components and imported to IQ$_{EZ}$ allowing virtually any signal type to be analyzed.

System Software Interface Panel
System Architecture/ System Menu

The ATS3000A upon system startup provides the user an easy to use Graphical User Interface Menu Architecture for easy navigation throughout its core software capabilities. It provides the user with system status, time/date, touch screen/mouse menu options, and system shutdown capabilities.

ATS3000A System Startup Menu

Help

The help option allows the user to open and access the ATS3000A operator's manual for complete instructions on the basic functionality and maneuverability of the ATS3000A hardware and software platform.

TestEZ®

The TestEZ® menu option provides the end user access to the complete automated software suite within the ATS3000A. Under basic user the Test Executive and Archive Manager Menu options are selectable, while under administrator privileges the Code Assist and Probe Assist options are enabled for Test Program Set diagnostic coding capabilities.

Standalone Virtual Instrumentation

The ATS3000A Standalone Virtual Instrumentation Menu Option provides independent operation of each meter for use as synthetic test instruments. The meters provide a bar graph display and digital data readout. On the graphical meters, users can visualize the signal under test and measure its results either graphically or via a digital readout.
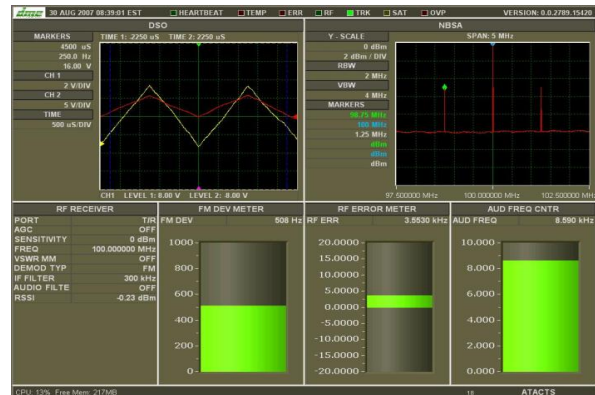

Standalone Virtual Instrumentation GUI

System Information

The system information menu allows the end user to access calibration, system status, software and hardware version information, total estimated test time, and software update capabilities. The system calibration and software update features are administrative privileges to update system level software and to provide certified metrology labs the ability to calibrate the ATS3000A without the unit being calibrated in the manufacturer's facility.

The Code Assist button starts the test program editor; the Probe Assist button starts the picture probe editor. An Archive Manager tool is accessed through the Archives button. Drop down menus provide additional options.
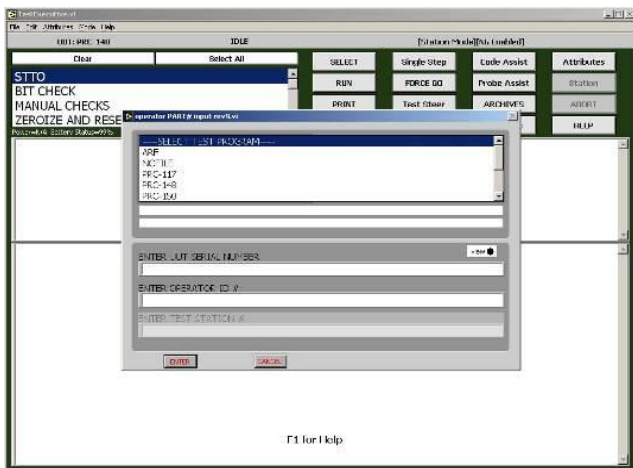
Test Executive Test Program Set Launch Panel

Test Executive Preference Editor

Supported within the Test Executive application is the ability to change and update configuration settings within the Test Executive Preference Editor. The Preference Editor allows the user to configure TestEZ® in a multitude of ways allowing it to meet specific functionalities of different users.
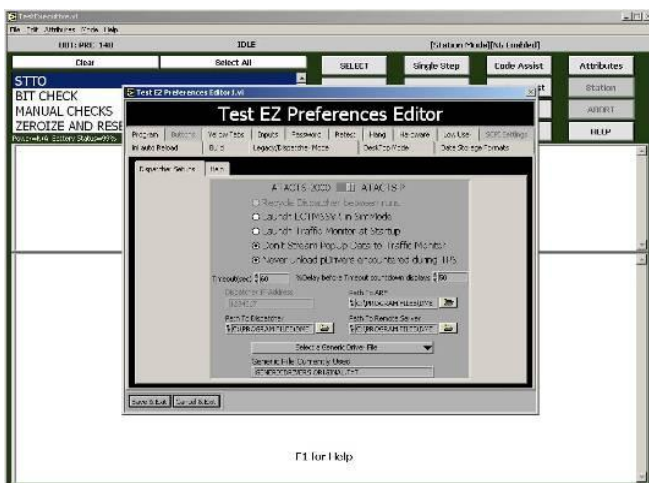
Test Executive Preference Editor

Code Assist™

Code Assist™ is a TPS coding tool that allows rapid software development utilizing a point-and-click style interface. Programming is accomplished through the five tabs: Test Name, Test Limits Callouts Steering, Sub-modules, DTI Info Power/Stimulus and Supplemental Data. A Macro Entry mode, located on the file menu, allows building of driver subroutines. Drop down menus provide additional options.
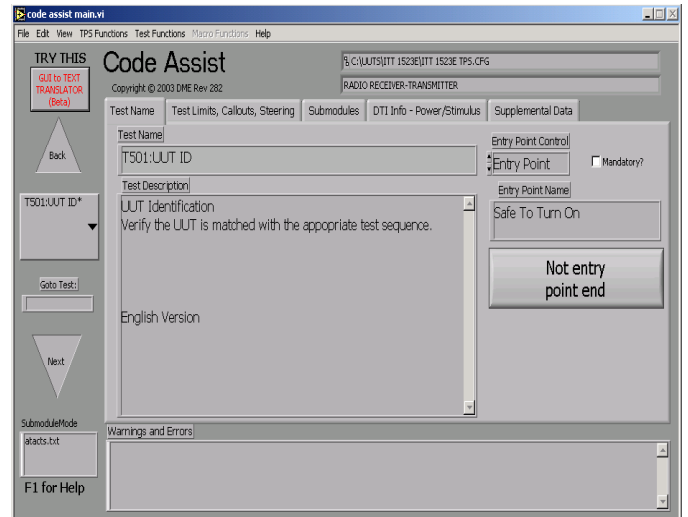

Code Assist User Interface

Archive Manager

The Archive Manager sorts and manages test results files generated by the Test Executive. View, print and delete options are provided on the front panel. The operator can sort test results by UUT, UUT serial number, test station number and date. The sorted groups can then be searched by keywords. For example, a search could be performed that would extract all the results for test number 1020, unit S/N 5 as performed on station #3 from September 13, 2000 to March 1, 2001. Returned results can be condensed and examined. All test results can alternately be viewed using Microsoft Word or WordPad.

Through the Archive Manager, a chronological, printable, test integration journal can be created using the journal menu button. The Archive Manager can be launched from the launcher screen or from the Test Executive's File menu.
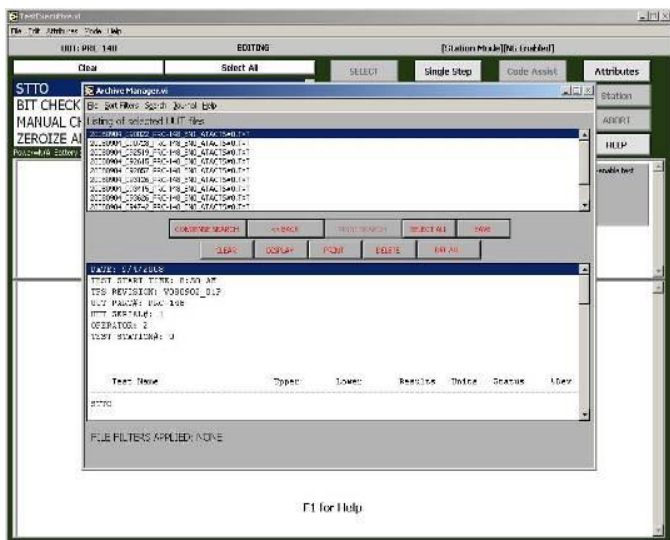
Archive Manager Display

Probe Assist has three different end-user display styles that are selected using the Code Assist driver. An Info window in the lower right corner allows scratch pad notes for each scene. Pictures are imported into Probe Assist via the Picture List Manager.
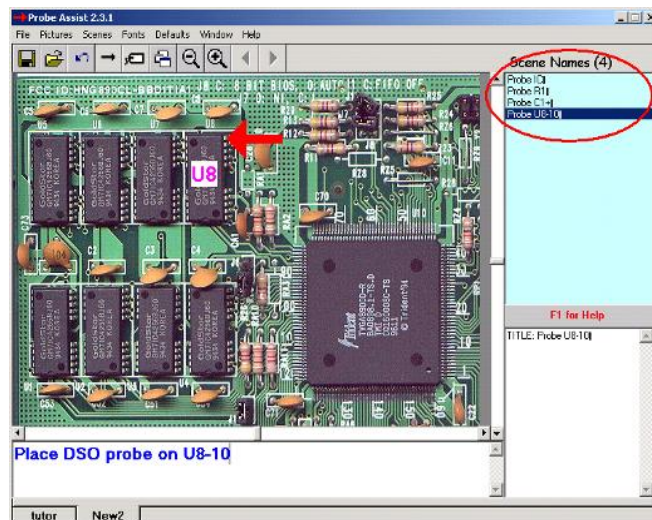
Probe Assist Display Panel

Probe Assist™

Probe Assist™ is a software tool that coordinates arrows, tags and messages with pictures of a UUT. It allows the test engineer to create picture scenes conveying setup, teardown or circuit probing information and then display the results from the test program via the Code Assist driver for Probe Assist. Probe Assist has a built in tutorial found under the Probe Assist File menu. Hot Buttons provide for quick user access to often used functions. Additional options are provided on drop down menus. Arrows and Tags are easily added to pictures through right clicking. A scene names box displays all potentially viewable picture setups. The operator instructions appear directly below the picture.

Standalone Virtual Instrumentation

The ATACTS family utilizes GUI-based stand alone Synthetic Instrument Mode for manual instrument manipulation and utilization.


The ATACTS family always operates in the Duplex mode where both the Generator and Receiver are active.

The Independent RF Receive and RF Generate mode screens offer more screen space to display monitoring, measurement and metering functions. The Duplex, Generate and Receive modes offer a control panel for the Generator, the Receiver or both, along with an empty screen area (octants) where synthetic instrumentations are enabled.

Each screen is made up of 8 octants. Empty octants are capable of being filled with any synthetic instrumentation functions that are available/applicable for the displayed screen mode. Both the Generate and Receive modes offer up to 6 free octants and the Duplex mode offers 4. All synthetic instrumentation features require at least 1 octant each. The ¼ screen Oscilloscope, ¼ screen RF Spectrum Analyzer and ¼ screen Dynamic Signal Analyzer require 2 octants each.

Synthetic instrumentation functions are expandable into larger windows that allow access to all features of that functional instrument. The Oscilloscope, RF Spectrum Analyzer occupy the full screen when expanded.
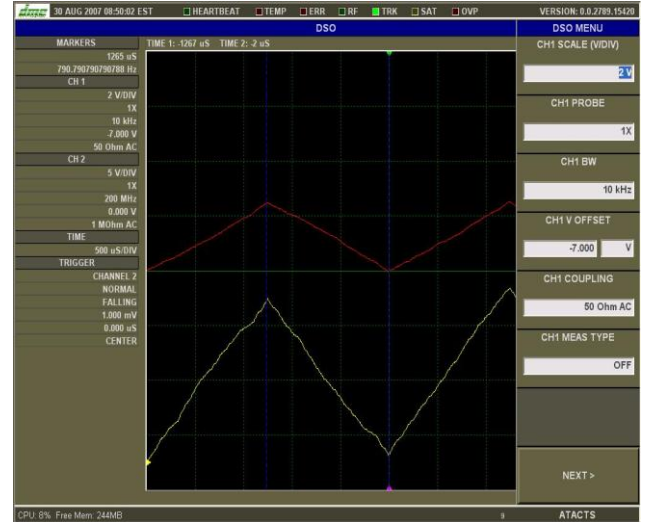
Expandable Virtual Instrument Menu/Display

Standalone Virtual Instrumentation GUI

ATS3000A
Software Defined Reconfigurable Technology Meeting Today's Needs, Ready for Tomorrow's Challenges

PRODUCT SPECIFICATIONS

RF SIGNAL GENERATOR

FREQUENCY
Range
: *1.0 MHz to 3.0 GHz (Usable from 250 kHz)*
Resolution
: *1 Hz*
Accuracy
: *See Reference Oscillator*

OUTPUT LEVEL
Range
: *T/R Port: -130.0 to 0.0 dBm (-10 dBm max for Non constant envelope modulation) (usable to -137 dBm)*
Duplex: -110.0 to +7.0 dBm (0 dBm max for Non-constant envelope modulation) (usable to +10 dBm)
Resolution
: *0.01 dB*
Accuracy (typical ± 0.5 dB)
: *T/R ports: ±1.0 dB, 0 dBm ≥ pwr ≥-100 dBm (Typical better than ±0.5 dB)*
±2.5 dB, < -100 dBm
Duplex port: ±1.0 dB, 7 dBm ≥ pwr ≥-90 dBm (Typical better than ±0.5 dB)
±2.5 dB, < -90 dBm

SPECTRAL PURITY
Residual FM
: *<15 Hz (300 Hz to 3 kHz bandwidth)*
Residual AM
: *<0.1% RMS (300 Hz to 3 kHz bandwidth)*
Harmonics
: *<-35 dBc @ < 0 dBm T/R Port (typical ≤ -45 dBc)*
<-35 dBc @ < 7dBm Duplex Port (typical ≤ -45 dBc)
Non-Harmonics
: *<-50 dBc @ < 0 dBm T/R Port (typical ≤ -60 dBc)*
<-50 dBc @ < 7 dBm Duplex Port (typical ≤ -60 dBc) (excluding crossovers)
Phase Noise
: *<-88 dBc/Hz 20 kHz offset, ≤ 1.0 GHz*
<-85 dBc/Hz 20 kHz offset, > 1.0 GHz

MODULATION
INTERNAL FM
Deviation
: *±100 Hz to ±100 kHz*
Accuracy
: *3% plus residual (From ±1 kHz to ±100 kHz deviation) (Sine) (Typical < 1%)*
Resolution
: *1 Hz*
Deviation Rate
: *10 Hz to 40 kHz*
Waveform
: *Sine, Square*
THD
: *<0.5% (1 kHz rate, ≥10 kHz deviation, 300 Hz to 3 kHz BW)*

INTERNAL AM
Modulation Range
: *0 to 100%*
Accuracy
: *3% plus residual (Modulation from 10% to 90%)*
Resolution
: *0.1%*
Rate
: *10 Hz to 40 kHz*

Waveform
: *Sine, Square*
THD
: *<1% (1 kHz rate, 10 to 90% AM, 300 Hz to 3 kHz BW))*

INTERNAL PM
Modulation Range
: *0.1 to 10.0 radians*
Accuracy
: *3% plus residual (≥1 radian PM)*
Resolution
: *0.1 radians*
Rate
: *10 Hz to 40 kHz*
Waveform
: *Sine, Square*
THD
: *<0.5% (1kHz rate, ≥1 radian PM, 300 Hz to 3 kHz BW)*

INTERNAL DIGITAL I/Q (Option)
Standard Modulation Package
: *ASK, FSK, BPSK, QPSK, DQPSK, π/4-DQPSK, 8PSK*

INTERNAL ARBITRARY I/Q (Option)
Modulation
: *IQ$_{EZ}$™user defined waveforms*

RF RECEIVE METERS
RF RECEIVER

FREQUENCY
Range
: *1.0 MHz to 3.0 GHz (Usable from 250 kHz)*

SENSITIVITY
<-100 dBm (>10 dB SINAD, FM, 25 kHz IF BW,1 kHz rate, 6 kHz FM deviation, 300 Hz to 3.0 kHz post detection filter)

SELECTIVITY
Programmable Real Time IF BW
: *100 Hz to 8.0 MHz*
Resolution
: *1 Hz*

SIGNAL LEVEL (RANGE)
T/R port: -100 to +44 dBm Continuous
Duplex port: -100 to +40 dBm Continuous
Duty cycle
: *T/R port: Max power given a 6.0 seconds ON, 1.0 minutes OFF duty cycle per the table below. Design for 250kHz to 3GHz*

Tested 1MHz to 1GHz

Ambient (°C)	CW (Watts)	Peak (Watts)
30	25	125
35	21.875	87.5
40	18.75	75
45	15.625	62.5
50	12.5	50
55	9.375	37.5
60	6.25	25
65	3.125	12.5

Duplex port: Max power given a 15.0 seconds ON, 1.0 minutes OFF duty cycle per the table below. Design for 250kHz to 3GHz
Tested 1MHz to 1GHz

Ambient (°C)	Peak (Watts)
30	50
35	35
40	30
45	25
50	20
55	15
60	10
65	5

RF COUNTER/ERROR
Range
±50 Hz to ± 4.0 MHz Capture BW
Resolution
0.1, 1.0, & 10 Hz programmable
Accuracy
See Reference Oscillator

RSSI (IN BAND RF POWER METER)
Input
Noise floor is BW dependent (Lower level measurements obtained with smaller IF filter BW)
Filter BW
See RF Receiver Selectivity
Resolution
0.01 dB
Accuracy
±2 dB (typical ±0.5 dB) (-100 dBm to +20 dBm)

DEMOD COUNTER
See Audio Analyzer

SINAD
See Audio Analyzer

DISTORTION METER
See Audio Analyzer

FM DEVIATION METER
Range
±100 Hz to ±100 KHz
Resolution
1.0 Hz
Accuracy
±5% plus residual (1 kHz rate, 1 kHz to 100 kHz FM deviation) Using appropriate IF BW.
Rate
10 Hz to 40 kHz

AM METER
Range
0 to 100%

Resolution
0.1%
Accuracy
±3 % plus residual (1 kHz rate, 10 to 90% AM) Using appropriate IF BW.)
Rate
10 Hz to 40 kHz

PM METER
Range
0.1 to 10.0 radians
Resolution
0.01 radians
Accuracy
±5 % plus residual (1 kHz rate, ≥ 1 radian PM) Using appropriate IF BW.
Rate
10 Hz to 40 kHz

EVM METER
Range
0 to 100%
Symbol Rate
100 Hz to 1 MHz
Resolution
0.01%
Accuracy
±3 % (typical)

RF POWER METER (BROAD BAND)
FREQUENCY
Range
1.0 MHz to 3.0 GHz (Usable from 250 kHz)

LEVEL
Range
0.02 mW to 125.0 W
Resolution
0.1 mW or 0.01 dB
Accuracy
10%, ±1 digit

AUDIO FUNCTION GENERATOR(S)
CHANNELS
2 Front Panel Channels
4 UUT Interface Module Channels

WAVEFORM
Sine, Square, Triangle, Ramp, Pulse, & DC

FREQUENCY
Range
Sine: 0 Hz to 100 kHz (usable to 250kHz)
Resolution
0.1 Hz
Accuracy
± 0.2 Hz (Sine)

LEVEL (SINE)
Range
0 to 7 Vrms
0 to 3.5 Vrms (50 ohm Mode)
Resolution
0.1 mV

Accuracy
±5% of setting (Level ≥ 0.1 Vrms, Sine) (Typical<1%)
Spectral Purity
<1.0% (20 Hz to 100 kHz, Level ≥ 0.1 Vrms, Sine)
(Typical<0.3%)

AUDIO ANALYZER
Audio signal is automatically detected and measured

CHANNELS
2 Front Panel Channels
Demodulated RF
2 UUT Interface Module Channels

LEVEL
0.1 Vrms to 8 Vrms (excluding Demodulated RF)

IMPEDANCE
Differential: 150, 300, 600, and 100K ohms

SELECTABLE FILTERS
3 kHz LP
15 kHz LP
20 kHz LP
300 Hz HP
300 Hz – 3 kHz
300 Hz – 15 kHz
300 Hz – 20 kHz

AF COUNTER
Range
100 Hz to 40 kHz
Resolution
0.1 Hz
Accuracy
±0.2 Hz
Waveshape
Sine or Square

SINAD METER
Range
0 to 60 dB
Resolution
0.01 dB
Accuracy
±1 dB (1 kHz, >3 dB & ≤ 40 dB, 300 Hz to 3 kHz BPF)
Signal Frequency
100 Hz to 10 kHz
Filters
CCITT, C-Message, & selectable filters

DISTORTION METER
Range
0.0% to 100.0%
Resolution
0.01%
Accuracy
<±0.5% (1 kHz, >1 dB & ≤ 40 dB, 300 Hz to 3 kHz BPF)
Filters
CCITT, C-Message, & selectable filters

RF SPECTRUM ANALYZER

FREQUENCY
Range
1.0 MHz to 3.0 GHz (Usable from 250 kHz)
Resolution
1 Hz
Frequency Accuracy
See Reference Oscillator
Span
programmable from 100 Hz to 3 GHz
Span Accuracy
±1% of span width
Marker Accuracy
±1% of span width

LEVEL
Ref Level Range
See RF Receiver
Vertical Scales
1, 2, 5, & 10 dB/division
Reference Level Resolution
0.1 dB
Ref Level Units
dBm, dBµV, dBmV
Dynamic Range
>60 dB (ref level 6 dBm, two tones 0 dBm)
Accuracy
±2 dB
Harmonic Spurious
-30 dBc
Non-Harmonic Spurious
-50 dBR, <2700MHz @ 0 dBm

RESOLUTION BANDWIDTH
RBW Selection
programmable 1 Hz to 1 MHz
Window Shape
Kaiser-Bessel

FUNCTION/FEATURE
Display Modes
Live, average, max hold, hold
Averages
1 to 100

MARKERS
Number of Markers
2
Marker Functions
Marker to peak
Marker to next right/left

OSCILLOSCOPE

DISPLAY
Channels
2
Trace Types
Live, captured
Measurements
Freq, Vrms, Vmin, Vmax, Vpp, Vavg,
pulse width (neg & pos), & Phase difference

VERTICAL

3 dB Bandwidth
50 MHz
Frequency Range
DC to 20 MHz (122.88 MS/sec)
Input Range
±40 Vp Max
Scales
5 mV to 10 V/div in a 1, 2, 5 sequence
Accuracy
5mV/DIV: ±3% + 0.15 range/DIV
10mV/DIV, 20mV/DIV, 50mV/DIV, 100mV/DIV,
200mV/DIV: ±2% + 0.04 range/DIV
0.5V/DIV, 1.0V/DIV: ±2% + 0.02 range/DIV
2.0V/DIV, 5.0V/DIV, 10V/DIV: ±2% + 0.01 range/DIV
Resolution
<1% of full scale
Coupling
DC, AC, GND

HORIZONTAL

Sweep Factors
0.1 µSec to 1 Sec/division in a 1, 2, 5 sequence
Accuracy
See Reference Oscillator
Resolution
<1% of full scale
Input Impedance
1 MΩ (20 pF), 50 Ω selectable

TRIGGER

Trigger Source
Channel 1, Channel 2, EXT
Trigger Edge
Rising or falling
Trigger Mode
Auto or normal
Capture
Continuous or single shot
External Trigger Level
±5 V
Front Panel

FREQUENCY STANDARD (Reference Oscillator)

INTERNAL FREQUENCY STANDARD (OCXO)

Frequency
10 MHz
Accuracy (0 to 50 degrees C)
±0.3 ppm

DIGITAL MULTIMETER

AC / DC VOLTMETER

Range
1mV to 600V
Resolution
5-½ digits
Accuracy
DC
600V range: ±1% reading ±0.0002 of full scale
100V range: ±1% reading ±0.0002 of full scale
10V range: ±1% reading ±0.0002 of full scale
1V range: ±1% reading ±0.0002 of full scale

AC
600V range: ±2% reading ±0.0002 of full scale
100V range: ±2% reading ±0.0012 of full scale
10V range: ±2% reading ±0.0012 of full scale
1V range: ±2% reading ±0.012 of full scale
0.1V range: ±0.5% reading ±0.02 of full scale
AC Volts Frequency Range
40 Hz to 20 kHz

AC / DC CURRENT METER

Range
0.01 to 10 A
Resolution
5-½ digits
Accuracy
DC
1A range: ±1% reading ±0.01 of full scale
10A range: ±1% reading ±0.002 of full scale
AC
1A range: ±2% reading ±0.0002 of full scale
10A range: ±2% reading ±0.002 of full scale
AC Volts Frequency Range
40 Hz to 10 kHz

OHMMETER

Range
0.1 Ω to 20 M Ω
Resolution
5-½ digits
Accuracy
20Mohm range: ±0.5% reading ±0.005 of full scale
2Mohm range: ±0.5% reading ±0.002 of full scale
200Kohm range: ±0.5% reading ±0.0005 of full scale
20Kohm range: ±0.5% reading ±0.0005 of full scale
2Kohm range: ±0.5% reading ±0.0005 of full scale
200ohm range: ±0.5% reading ±0.005 of full scale

INPUT/OUTPUT CONNECTORS

T/R

Connector
Type N
Function
Receive or Generate RF
Impedance
50 Ω(nominal)
VSWR:
≤ 1.2:1

DUPLEX

Connector
Type N
Function
Receive or Generate RF
Impedance
50 Ω(nominal)
VSWR:
< 1.4:1, ≤ 1 GHz
<1.5:1, > 1 GHz

DMM

Connector
3 Sheathed Banana Jack (V/ohm, Com, Amp)
Function
Digital Multimeter inputs located on the front panel

DSO/AUDIO INPUT

Connector
3 BNC (Channel 1 & 2, Trigger)
Function
DSO and Audio inputs located on the front panel

AUDIO OUTPUT

Connector
2 BNC (Channel 1 & 2)
Function
Front panel audio outputs

UUT INTERFACE MODULE (UUT-IM)

User Removable/Interchangeable Digital I/O and routing matrix to support new radio interface/bus requirements.

UUT-IM-001
Connector
156 pin ZIF connector
Function
Programmable Digital I/O and UUT input signal routing to the DMM, DSO, and Audio Analyzer
Signals
Serial RS-232/RS-422/RS-485
One dedicated RS-232
Six configurable serial input
TTL
Six configurable TTL
Six configurable open collector signals
Programmable I/O
12 output, 10 input, and 4 bidirectional I/O signals
Range
-10V to +10V
UUT Relay Switching
Provides a 16:1 and a 7:1 relay tree for routing UUT signals to the DMM, DSO, and Audio Analyzer. In addition a 1:4 and a 1:3 relay tree is provided for the Audio Outputs and a 2:1 tree for the Audio Inputs.
Multifunction I/O Pins
User programmable I/O

USER INTERFACE

DISPLAY

Resolution
1024 x 768
Touch Screen (Option)

FRONT PANEL KEYPAD
FRONT PANEL SPINNER KNOB
USB MOUSE
USB KEYBOARD

POWER REQUIREMENTS

AC

Voltage
100 to 120 VAC 50/60 Hz
220 to 240 VAC 50/60 Hz

ACCESSORIES

Standard
Scope Probes (2)
DMM Probes
AC Power Cord
Extra Fuses
Operators Manual
Standard Computer Mouse
Battery Charger

Optional
External Computer Keyboard
Maintenance Manual
ATS3000A Self Test Kit

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Tomorrow's Test Solutions – Today

Astronics DME Corporation's next generation Radio Test Family offers proven solutions for electrical-communication testing. The evolution of the ATACTS product line features software-defined reconfigurable technology that meets today's needs and is ready for tomorrow's challenges…