

## General Features

- Modular multi-channel recording/playback system for extended continuous RF and bitstream data
- 8Gbps real-time bandwidth (1GB/s)
- Slot for field hot swappable Solid State Memory Cartridge (SSMC) for acquired data recording/playback:
  - 1TB, 4TB and 8TB SSMCs
  - 8TB SSMC allows up to 2h 20m of continuous data acquisition at 8Gbps (2x channels 250MSPS, 16bits)
- Two slots for Analog I/O Modules (AIOM) for RF-signal AD/DA:
  - A/D AIOM: 2x-channels, 16-bi, 250MSPS A/D with PGA
  - D/A AIOM: 2x-channels, 16-bi, 500MSPS
- Two 10Gbps+ SFP+ ports for acquisition of bitstream data
- Optional DSP functions applied to I/O RF-signal:
  - Multi-channel DDC/DUC
  - Multi-band input RF-signal analyzer with activity detectors
  - Digital filters, level detectors and more...
- Multi-channel extension at a cost of dataword size reduction
- Multi-unit capability to increase number of channels while keeping dataword size
- Ultra-low jitter programmable sampling frequency generator
- External reference clock option
- External DAQ control synchronization
- 1GbE RJ45 port for remote control
- Two eSATA ports for SSMC-to-External HDD data transfer
- COM/RS232C ports for communication with external GPS receivers, event trackers, antenna controllers, etc
- «Stand-alone» capability with power down and time scheduled recording/playback events
- Front panel device status LED indicators
- 1U 19" rugged rack case and low weight (6kg, 12 pounds)

## Software

- Remote control via LAN or Internet
- Smart control for "virtual" multi-unit multi-channel system
- Intuitive GUI
- Real-time monitoring of input RF-signal in time and spectrum domains
- Data transfer between SSMC, PC and eSATA HDDs
- Signal analyzer for SSMC, eSATA and PC data
- «Stand-alone» mode programming
- Data import/export to 3<sup>rd</sup> party DSP applications

## Applications

- Instrumentation and RF test installations
- Automotive and stationary off-air monitoring
- Telecommunication
- Astrophysics and astronomy



## Overview

*TORNADO-RS1/Gen3* is a next generation multi-channel RF data recording/playback system with modular construction and extended capabilities from MicroLAB Systems. The *TORNADO-RS1/Gen3* delivers outstanding flexibility for on-fly system reconfiguration, fast set-up, easy data stocking and high system and data storage reliability.

Two slots for plug-in analog I/O modules (AIOM) and two 10Gbps+ SFP+ slots at device backplane are available to immediately adapt to external RF signals and bitstream data source. Off-the-shelf analog I/O modules allow multi-channel data acquisition up to 250MSPS 16bits performance.

The *TORNADO-RS1/Gen3* supports smart integration of up to four units into one "virtual" multi-channel perfectly synchronized data acquisition system with up to 32Gbps of aggregative throughput performance.

Acquired data is stored in a high-capacity hot-swappable solid-state memory cartridge (SSMC). This delivers quick readiness to acquire next portion of real-time data and provides safe and convenient stocking of acquired data.

A "stand-alone" operation of *TORNADO-RS1/Gen3* keeps unit in power-down mode and temporary activates it to acquire data per user scheduled events list. Each listed event specifies activation date and time, data acquisition mode (recording or playback), acquisition duration and complete system configuration settings. Recording is performed until either the events list is over or SSMC is full. Generated log file keeps detailed tracking of scheduled activity.

One of the greatest features of *TORNADO-RS1/Gen3* is possibility to extend its functionality beyond just the recorder/playback device and to apply optional real-time DSP to acquired data before it is stored in SSMC. For example, in case DDC, demodulator and decoder DDC function are chained for input signal, then this will reduce signal bandwidth and will dramatically increase the recording time allowing multichannel recording.

To meet the demanding applications, *TORNADO-RS1/Gen3* comes in 1U 19" 1U rugged rack case and weights only 6kg (12 pounds)!

The *TORNADO-RS1/Gen3* is an ideal tool for mobile and stationary RF off-air monitoring, RF instrumentation, astrophysics and astronomy.

## Technical Specifications

### TORNADO-RS1 Gen3

#### Real-time data I/O performance and data acquisition:

Number of Analog IOM (AIOM) slots at system backplane	2
Sampling frequency range	5MHz... 250MHz
Maximum real-time I/O bandwidth:	8 Gbps
Number of 16-bit 250MSPS AD/DA channels	2
Number of 8-bit 250MSPS AD/DA channels	4
Number of 16-bit 125MSPS AD/DA channels	8
data word size	2,4,8, 16 bits
Two SFP+ ports for bitstream I/O data	10+ Gbps
External sampling frequency and multi-unit synchronization support	+
External reference clock input	+

#### Real-time data storage:

Number of hot-swappable SSMC slots at system front panel	1
SSMC storage capacity	1TB, 4TB, 8TB
Maximum data recording/playback time (for 8TB SSMC):	
1x-channel 16bits 186.66 MSPS	6h.30m
2x-channel 16bits 186.66 MSPS	3h.15m
1x-channel 16bits 250 MSPS	4h.40m
2x-channel 16bits 250 MSPS	2h.20m
4x-channel 8bits 250 MSPS	2h.20m
1x-channel 16bits 125 MSPS	9h.20m

#### External I/O interfaces:

1G Ethernet port for remote control	+
eSATA ports for data backup/upload to/from external HDD	2 (SATA III)

Battery backup real-time clock and 2100 year calendar  
Stand-alone operation with time scheduled events list

+

Front-panel LED indicators for system status

+

Power

90VAC...240VAC  
(autorange),  
250W max

Physical dimensions

1U 19" rack

Weight

6kg (12 pounds)

#### Notes:

1. AIOM states for removable analog I/O module. Installs via system backplane. Requires system power OFF to be replaced.
2. SSMC states for hot-swappable solid state memory cartridge. Inserts via system front-panel. Does not require system power OFF to be replaced.