

# Modus 3 - DVB-T DVB-H DAB/T-DMB I/Q Streaming Multi Standard Network Emulator

The CellMetric Modus 3 network emulator is designed to provide cost effective, simple to use digital modulation and RF channel simulation for broadcasters, silicon and software developers, sales demonstration and production test systems.

Live TS feeds can be modulated to the DVB-T and DVB-H standard EN 300 477 using the Synchronous Parallel Interfaces (SPI) or the optional ASI interface.

## Features & Benefits

- ❑ Software Defined Radio (SDR) architecture allows multi standard operation and simple upgrade
- ❑ Compact, light and portable for field trials and demonstrations
- ❑ Highly intuitive user Interface – easy to use
- ❑ Cost effective for multiple unit deployment
- ❑ Application Specific I/Q™ channel coder options for DVB-T & DVB-H
- ❑ Looks like a USB peripheral to control PC
- ❑ Play out from Compact Flash or Hard Disk Drive
- ❑ Supports DAB via I/Q streaming interface
- ❑ I/Q & RF Outputs UHF & L Band to 2.2GHz
- ❑ Includes customisable channel plans for most common scenarios
- ❑ SFN Operation option
- ❑ I/Q streaming allows known stress test patterns to be replayed
- ❑ Internal PRBS generator for BER measurement
- ❑ TU6 fading model and AWGN option for RF channel simulation
- ❑ Options for:
  - ❑ SFN Operation
  - ❑ AWGN module
  - ❑ TU6 Fading module
  - ❑ ASI Interfaces
  - ❑ Hard Disk



Easy to use



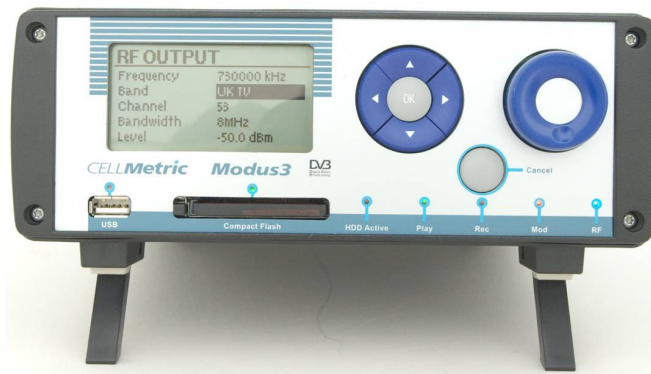
Portable



Light weight



Cost effective



Modus 3 is a RF I/Q vector signal generator which can be customized by the addition of modulation channel coders and a channel fading simulator.

Modus 3 supports generation of signals at RF in the UHF TV and L Bands, with the option to generate signals from optional plug in channel coders (DVB-H/ DVB-T) or from pre stored I/Q data patterns. I/Q data can be down loaded from a control PC and stored in non volatile removable compact FLASH memory cards. An optional hard disk can also be fitted for stream storage.

I/Q data can be generated using a software model of a modulator, or from captured field trials data, and can include fading by modifying the I/Q data using for example Matlab.

Modus 3 generates its output signal in the RF domain with a low phase noise master oscillator from which I/Q modulated pairs are up converted to either the UHF TV band or L band. Channel bandwidths of 1.7 (DAB), 5, 6, 7, 8MHz are supported in DVB-T and DVB-H modes.

Output level can be controlled in the range 0dBm to -110 dBm using the inbuilt attenuator option in steps of 0.5 dB.

## AWGN & TU6 Channel Fading Option

Modus 3 supports an optional AWGN & Typical Urban 6 (TU6) fading module, allowing simulation of the real world RF fading environment during product development and validation.

CellMetric designs and manufactures innovative digital broadcast equipment.

Its products focus on reliability, ruggedness, modularity, intelligence and flexibility using leading edge digital technology.

CellMetric is based close to the centre of the historic university city of Cambridge, UK.

www.cellmetric.co.uk

# Modus 3 Digital Modulator

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## IQ Streaming and fade simulation

Modus 3 provides the option to play out pre recorded I/Q modulation pairs stored in Flash memory cards. I/Q data can be downloaded to the Modus 3 via its USB port. Once stored on memory cards, or optional hard disk, the I/Q data can be reused or shared with other modulators.

## Hierarchical Modulation support

Hierarchical modulation is supported with  $\alpha$  of 1, 2 or 4 in QAM mode. High priority and low priority streams are input via ASI transport stream inputs, or can be played from the Compact Flash card.

## Technical Specification

### Operating Conditions:

Power Supply voltage 100 to 260V 47-400 Hz AC  
Operating Temperature range 0 to +40°C

### Outputs:

Frequency Range 100MHz to 2.2 GHz in 1KHz Steps  
Output channels UHF 470 to 862 MHz  
Output Offset 62.5kHz minimum (with +/- 166.66 kHz offset capability)  
Output frequency accuracy better than  $\pm 3$ ppm over temperature range  
Output Band III & L Band 174 to 240 MHz 1452 to 1492MHz and 1675 MHz  
Signal output level 0dBm nominal to -110dBm  
Output Impedance 50  $\Omega$   
Resolution 0.5 dB  
Repeatability  $\pm 1$ dB  
Output RLR Better than 10dB  
Spectral flatness Better than  $\pm 0.5$ dB across any 8MHz channel  
Gain Taper Better than  $\pm 2$ dB across the UHF band  
Intermodulation products Better than -45dBc in channel, -60dBc out of channel

### Modulation:

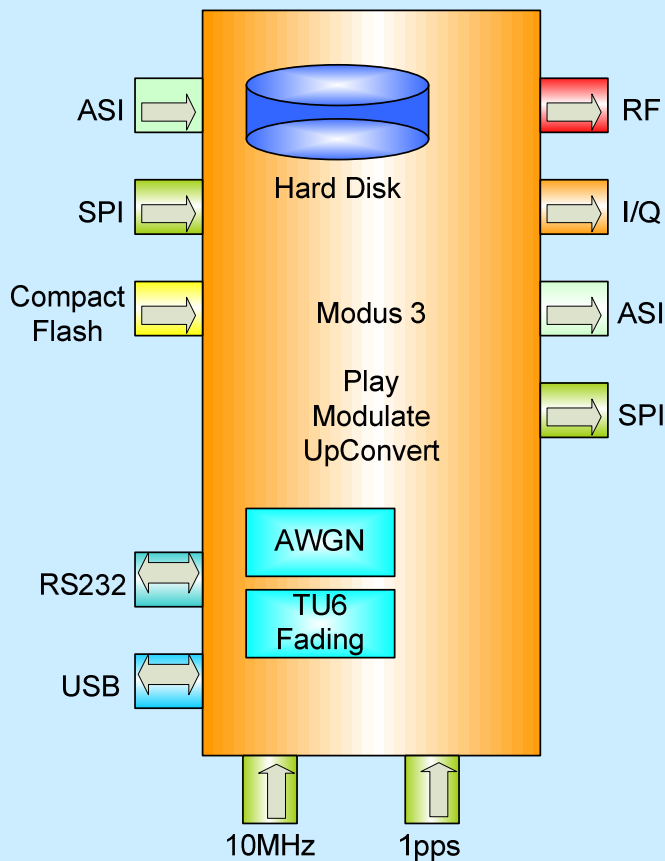
DVB-T/H EN 300 744  
DAB EN 300 401 (I/Q Streaming Mode)  
FFT Mode 2k 4k 8k  
Modulation QPSK, 16 QAM, 64 QAM  
Guard Interval 1/4, 1/8, 1/16, 1/32  
FEC 1/2, 2/3, 3/4, 5/6, 7/8  
Bandwidth 1.7, 5, 6, 7, 8 MHz  
Hierarchical Code support Hierarchy 1, 2, 4 16 QAM 64 QAM  
Spectral Polarity Normal or inverted

### Interfaces:

External Frequency Ref. 10MHz SMA Connector  
Timing Ref. 1PPS SMA Connector  
RF Out SMA Connector 50 $\Omega$   
I/Q Out Differential  $\pm I / \pm Q$  Output  
Serial USB (Slave) RS232  
Transport Stream In Dual DVB ASI BNC connectors supporting Hierarchical modulation (Optional)  
Transport Stream In Synchronous Parallel Interface (SPI) 25way D connector  
Removable Memory Compact Flash Memory Card

### Installation:

Desk top case 210 W x 74mm H x 220mm D  
Weight 2.5Kg



### Ordering Information

I/Q Modulator	Modus 3
Options	DVB-T Channel Modulator DVB-H Channel Modulator TU6 Fading Model SFN operation 110dB Attenuator Dual ASI 100GByte Hard Disk
	MODT MODH TU6 SFN01 AT110 ASI02 DIS100

CELLMetric

Intelligent infrastructure