



Products: *WOOSHCOM*® Model 3010 – R&S DVM, DVRM, DVMD, DVQ, DVQM, DVRG, SFL, SFQ

Converting DHEI (DigiCable Headend Expansion Interface) to ASI Using *WOOSHCOM*® Adapter 3010

Application Note

The DigiCable Headend Expansion Interface (DHEI) is currently in wide spread legacy use throughout the digital TV cable world. Although currently deployed units now all come with DVB-ASI interfaces, lots of legacy equipment is still in place, where the only base band connection opportunity is a DHEI interface.

This application note discusses the use of the *WOOSHCOM*® DHEI output interface adapter (model 3010), which converts the transport stream from DHEI format into DVB-ASI. Further processing and analysis of the transport stream signal then becomes available with any of the Rohde & Schwarz Test & Measurement instruments. It also describes how to extract an unencrypted transport streams out of a Motorola IRT.



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1 Overview about WOOSHCOM® DHEI to ASI Interface Adapter 3010

The miniature interface adapter (WOOSHCOM® model 3010) enables DHEI interfaces to be immediately converted to ASI at the rear of DHEI equipment without using any rack space. Complete cable head end sites can thus be converted into one standard (DVB-ASI) that is easy to work with.

It converts signals from equipment using Motorola's DHEI interface to DVB-ASI worldwide standard for interfacing Baseband MPEG-2 signals. Being a miniature box – the size of a cigarette box – it takes up absolutely no rack space and weighs only 4 oz (113 gr.). It is designed to be free hanging on the cables in the rear of a rack of equipment and is powered from a small wall mounted AC power module.

The adapter operates on both 64 QAM and 256 QAM DHEI clock frequencies. It will accept all DHEI block sizes including the split multiplex outputs of Motorola's IRT operating in Mode 3. Any physical type of DHEI connector may be interfaced to by means of various adaptor cables. The ASI output fully complies with EN 50083-9, and can drive at least 330 feet (100 meter) of Belden 9167 coaxial cable. Incoming DHEI packets are converted to outgoing ASI packets of the same length.

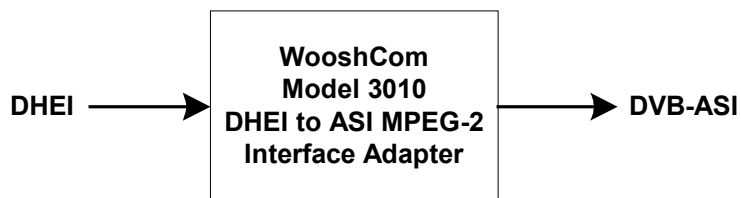


Fig 1. Block diagram of WOOSHCOM® Interface Adapter Model 3010

WOOSHCOM®'s adapter has two power connections on it, to permit power to be daisy chained from one adapter to the next. This enables a chain of adapters to be powered from a single AC power outlet – or from a DC power source. Full power redundancy may be achieved by using two power sources, one at each end of the chain. Power modules at a variety of power levels are available.

All connections to the adapter, including the power, use rugged locking connectors to prevent cables from being inadvertently disconnected.

2 Features and Benefits of the *WOOSHCOM[®] Interface Adapter 3010*

- Transform DHEI interfaces to DVB-ASI
- Standardize all site interfaces to DVB-ASI
- Eliminate DHEI distance limitations of 12 feet (3.65 meter)
- Extend interface distances to 330+ feet (100+ meters)
- Eliminate expensive and awkward DHEI cables
- Use no rack space
- Physical Layer MPEG-2 translation
- Secure locking connectors
- Rugged aluminium extruded case
- Power from tiny AC wall supply or DC source
- Power multiple adapters from single AC wall supply
- Fully redundant power with two AC wall supplies

3 Selection of Cables and Accessories for the Interface Adapter 3010

Signal Cabling

To interface the ASI output of the adapter good engineering practice should be followed in using cables and connectors with an impedance of 75 Ω .

The selection of the required input cable depends on the type of DHEI output that is to be interfaced. The *WOOSHCOM[®]* interface adapter model 3010 has a simplex interface with a 15 pin high-density D-type connector. It provides communication in one direction only. Some units have DHEI duplex interfaces using 26 pin high-density D-type connectors. These can be thought of as two independent simplex interfaces on one plug, one serving as an input and the other as an output.

WOOSHCOM[®] offers several different types of DHEI adapter cables for simplex and duplex interfaces and in different lengths (1 and 3.3 ft.). A complete listing is found in section 7 of this document. If the duplex connector is labeled "EXPANSION OUT", the output is the A port requiring an "A" type cable. In case of an "EXPANSION IN" interface, the output is on the B port of the duplex interface thus requiring a "B" type interface cable.

Connecting to a Motorola IRT

Both Integrated Receiver Transmitter units, the IRT-1000 and IRT-2000, have an "EXPANSION IN" as well as an "EXPANSION OUT" interface. The two ports offer different points within the signal flow where to extract data. The "EXPANSION OUT" port offers a transport stream with unencrypted in-the-clear video and audio using *WOOSHCOM[®]*'s Model CAS001 or CAS002 duplex DHEI cable adapters.

A re-encrypted copy of the transport stream as it leaves the unit QAM modulated, can be obtained at the "EXPANSION IN" interface using *WOOSHCOM[®]*'s Model CBS001 or CBS002 duplex DHEI cable adapters. Please see also section 4 of this document for a more detailed description of this application.

Connecting to a Motorola MPS

The MPS uses simplex DHEI ports, and therefore WOOSHCOM®'s Model CSS001 or CSS002 simplex DHEI cable adapters would be used.

Connecting to a Scientific Atlanta MDR (D9228)

The MDR has two "EXPANSION IN" ports on its rear panel. To receive data from one of these ports, the "B" side would have to be interfaced using WOOSHCOM®'s Model CBS001 or CBS002 duplex DHEI cable adapters.

Power Cabling

The WOOSHCOM® Interface Adapter Model 3010 is powered by an unregulated DC between 9 and 24 V. Two optional wall mount AC adapters are offered with different wattage capabilities. The one with the lesser output power (2.4 Watt) can supply only one DHEI Interface Adapter.

Due to the higher output power of 15 Watts the other AC wall mount adapter can supply up to 8 DHEI interface adapters. Power extender cables of various lengths (2 and 3.3 ft) are available for daisy chaining several adapters through a second power port (Fig. 2).

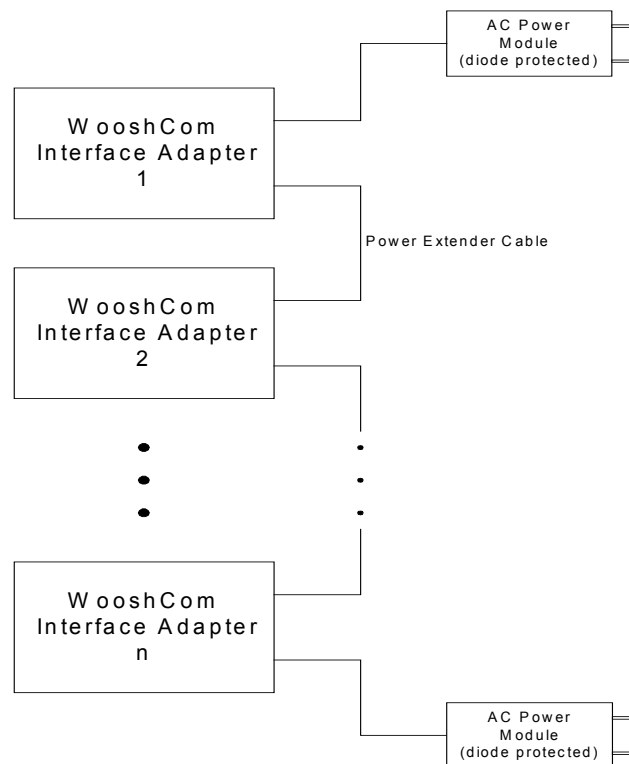


Fig 2. Powering Multiple Devices by Daisy Chaining Power

Another advantage of this power supply is the diode protection of its output. With connecting one of these power supplies to either end of a daisy chain of DHEI interface adapter models 3010 a fully redundant power supply of the whole configuration is enabled, as one supply can take over the complete supply requirement in case of a failure.

When using WOOSHCOM® AC Power Modules, the power ports may be hot-plugged without causing damage to the Interface Adapters and without causing power induced data errors to active upstream devices.

4 Interfacing to a Motorola IRT-1000 & -2000

The Integrated (satellite) Receiver (& cable) Transmitter units IRT-1000 and IRT-2000 from Motorola provide two different DHEI ports with signal access at different locations inside the signal flow (Fig. 3).

The transport stream present at output port “A” of the “EXPANSION OUT” interface features the video and audio services in-the-clear after all satellite encryption has been taken out. This output signal is excellent for video and audio quality measurements with Digital Video Quality Analyzers R&S DVQ and DVQM, as services are un-encrypted at this measurement point.

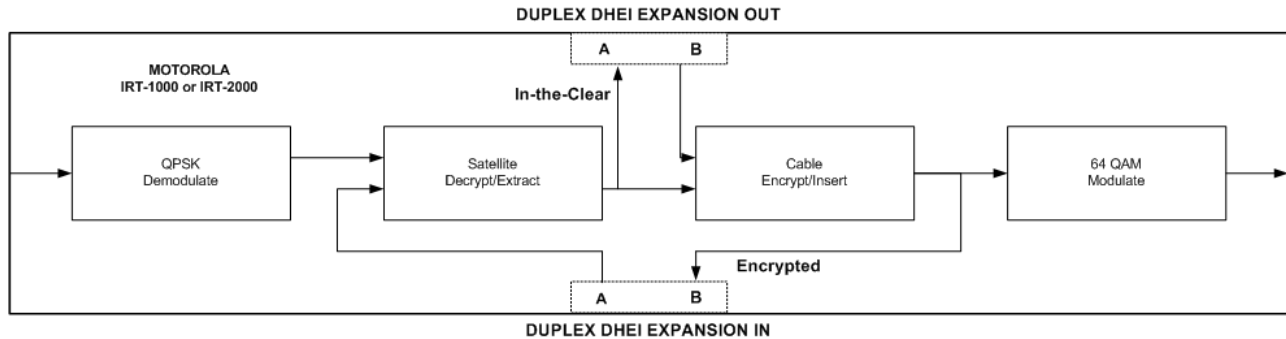


Fig 3. Motorola IRT-1000 /IRT-2000 Internal Block Diagram

Port “B” on the “EXPANSION IN” connector provides the transport stream with the service already re-encrypted for cable delivery. These signals are ideal for monitoring of the stream that actually goes out on the cable. Transport stream monitoring can be done using MPEG2 Realtime Monitor R&S DVRM or MPEG2 Monitoring System R&S DVM. Unless encryption is turned off for in-the-clear channels, video and audio data won’t be available for decoding or further quality analysis from this port.

5 Specification of the WOOSHCOM® Interface Adapter Model 3010

- DHEI Interface:
Conforms to Motorola DigiCable Headend Expansion Interface Specification Doc. No. 410-399-001 R.3; May 4th, 1998
Simplex DHEI – 15 pin High Density Female
Clock Rate: 29.2657 MHz or 38.8107 MHz
Block Size: unrestricted
Information Rate: unrestricted
Packet Size: 188 or 204 Bytes
- DVB-ASI Interface:
Conforms to EN 50083-9
75 Ω BNC
Packet Size: Same as input
- Transport Stream:
MPEG-2 per ISO/IEC 13818-1
Induced PCR Jitter: Theoretical Limit ±18 ns
- Power Requirements:
Unregulated DC: 9 V to 24 V
Power Consumption: 1.8 Watts
Recommended plug: Switchcraft 760 K

- Conforms to FCC Part 15, Class B
Conforms to Canadian ICES-003, Class B
- Physical:
Body Dimensions: 3.4" x 2.3" x 1" (87.2 x 56.6 x 26.2 mm)
Weight: 4 oz (113 gr)

6 Acronym Glossary

ATSC	Advanced Television Systems Committee
ASI	Asynchronous Serial Interface
DHEI	DigiCable Headend Expansion Interface
DVB	Digital Video Broadcasting
FCC	Federal Communications Commissions
FEC	Forward Error Correction
MPEG	Motion Picture Experts Group
TS	Transport Stream

7 Literature

Model 3010 DHEI to ASI MPEG-2 Interface Adapter User's Guide WooshCom®

8 Ordering information

Rohde & Schwarz products and options

DVM50	MPEG2 Monitoring System	2085.1900.02
DVM100	MPEG2 Monitoring System	2085.1600.02
DVM400	Digital Video Measurement System	2085.1800.02
DVRM	MPEG2 Real Time Monitor	2068.8580.02
DVMD	MPEG2 Measurement Decoder	2068.8597.02
DVQ	Digital Video Quality Analyzer	2079.7151.02
DVQM	Multichannel Digital Video Quality Analyzer	2088.0004.02
DVRG	Digital Video Recorder Generator	2083.1302.02
SFL-S/-C/-V/-J	TV Test Transmitter	2072.7679.10/15/30/40
SFQ	TV Test Transmitter	2072.5501.02

WOOSHCOM® products and options

3010	Simplex DHEI to DVB-ASI MPEG-2 Interface Adapter	
CAS001	Cable Assembly, Duplex DHEI "A" to Simplex DHEI, length 1.0 ft (0.3 m)	
CAS002	Cable Assembly, Duplex DHEI "A" to Simplex DHEI, length 3.3 ft (1.0 m)	
CBS001	Cable Assembly, Duplex DHEI "B" to Simplex DHEI, length 1.0 ft (0.3 m)	
CBS002	Cable Assembly, Duplex DHEI "B" to Simplex DHEI, length 3.3 ft (1.0 m)	
CSS001	Cable Assembly, Simplex DHEI to Simplex DHEI, length 1.0 ft (0.3 m)	
CSS002	Cable Assembly, Simplex DHEI to Simplex DHEI, length 3.3 ft (1.0 m)	
PWUA009	AC Power Module, Wall mount, 2.4 Watt, No Diode Protection	
PWUA190	AC Power Module, Wall mount, 15 Watt, Diode Protection	
CPE002	Cable Assembly, DC Power Extender with Locking Connectors, 2.0 ft (0.6 m)	
CPE003	Cable Assembly, DC Power Extender with Locking Connectors, 3.3 ft (1.0 m)	



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