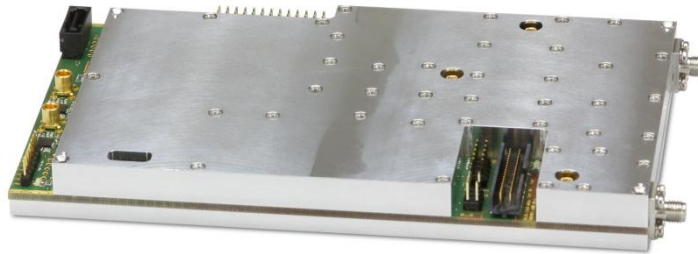


## DVB Satellite Modulator OEM Module SDMO



**DVB S2X**<sup>®</sup>

**DVB CID**<sup>®</sup>



The DVB Satellite Modulator OEM Module SDMO is a cost effective, high performance OEM solution designed to be easily integrated into any kind of platform.

The board is in compliance with DVB-S2X standard offering an advanced feature set including Carrier ID and symbol rates up to 80 Msps.

Benefiting from WORK Microwave's years of experience in digital design the modulator board has been developed to provide a highly compact solution to fit into third-party vendors' products such as video encoders and fly-away systems.

Additionally the board will also serve for rack-mount and module-based versions of WORK Microwave's A-Series product line.

The board's design integrates all required subsystems without compromising modulation performance. Furthermore, low power consumption combined with intelligent housing enable the module to be operated in challenging thermal environments.

Available as standard size or customized dimensions the SDMO is easily integrated into any third-party products.

### Key features

- DVB-S2X - ETSI EN 302 307-2
- DVB-S2 - ETSI EN 302 307-1
- DVB-DSNG - ETSI EN 301 210
- DVB-S - ETSI EN 300 421
- DVB-S2X modulations:  
QPSK / 8PSK / 16APSK / 32APSK / 64APSK  
normal, short and linear
- DVB-S2 modulations:  
QPSK / 8PSK / 16APSK / 32APSK  
normal, short
- DVB-S and DVB-DSNG:  
QPSK / 8PSK / 16QAM modulation
- DVB Carrier ID - ETSI TS 103 129
- Optional BISS-E encryption, supports multi program transport stream
- Physical layer framing with scrambling codes 0 to 262141 according to DVB-S2 standard
- Roll-Off: 35 %, 25 %, 20 %, 15 %, 10 %, 5 %
- Adjustable digital slope equalizer
- Dual ASI interfaces with automatic cable equalizer and auto-switchover
- DVB-S2 Multistream support with capacity management with two input streams supported
- Null packet insertion and deletion with PCR correction
- Symbol rates from 8 kbps to 80 Msps
- Data rate max 213 Mbps per ASI Interface
- Extended operating temperature range option  
-30 °C to 60 °C (-22 °F to 140 °F)

# DVB Satellite Modulator OEM Module SDMO

Modulator Type:		SDMO	
IF-Output Frequency:	50 ... 180 MHz (option V)	950 ... 2150 MHz	
Frequency Resolution	1 Hz		
Phase Noise:			
10 Hz	-70		-65
100 Hz	-80		-75
1 kHz	-88		-88
10 kHz	-90		-90
100 kHz	-100		-100
1 MHz	-115		-115
max. values in dBc/Hz			
IF-Output Characteristics:	Impedance:	50 Ω	
	Return Loss:	>20 dB typ > 18 dB min	
	Output Power:	-25 dBm ... 5 dBm, 0.1 dB steps (V-Band output)	
		-30 dBm ... 0 dBm, 0.1 dB steps (L-band output)	
	Accuracy:	± 0.5 dB	
	Stability:	± 0.5 dB	
	Output Power muted:	<-85 dBm	
	Connector:	SMA female	
	10 MHz reference over L-band output:	1.5 ±1.5 dBm, switchable	
Spurious Outputs:	Signal related:	<-70 dBc (unmodulated carrier, 50 ... 90 MHz or 100 ... 180 MHz for V-Band output)	
		<-70 dBc (unmodulated carrier, 950 ... 1900 MHz L-band output)	
		<-55 dBc (unmodulated carrier, 1900 ... 2150 MHz L-band output)	
		<-45 dBc (unmodulated carrier harmonics, out of band)	
Frequency/Clock Stability:	Standard:	±2 x 10 <sup>-7</sup> (0°C ... 50°C, after warm up), aging: ±2 x 10 <sup>-8</sup> per day, ±1 x 10 <sup>-8</sup> per year	
	Option EXT:	±2 x 10 <sup>-8</sup> (-30°C ... 60°C, after warm up), aging: ±1 x 10 <sup>-9</sup> per day, ±1 x 10 <sup>-7</sup> per year	
Symbol Rate:	Max Range:	8 ksps ... 80 Msps	
	Step size:	1 sps	
Data Rate:	3 kbps ... 213 Mbps (ASI interface) * *) max 170 Mbps, when BISS-1/E active		
Modulation / Encoding DVB-S2X:	ModCods: (normal FEC frame)	QSPK 13/45, 9/20, 11/20 8PSK 23/36, 25/36, 13/18 16APSK 26/45, 3/5, 28/45, 23/36, 25/36, 13/18, 7/9, 77/90 32APSK 32/45, 11/15, 7/9 64APSK 11/15, 7/9, 4/5, 5/6 (option)	
	ModCods: (short FEC frame)	QPSK 11/45, 4/15, 14/45, 7/15, 8/15, 32/45 8PSK 7/15, 8/15, 26/45, 32/45 16APSK 7/15, 8/15, 26/45, 3/5, 32/45 32APSK 2/3, 32/45	
	ModCods linear: (normal FEC frame)	8PSK 5/9-L, 26/45-L 16APSK 1/2-L, 8/15-L, 5/9-L, 3/5-L, 2/3-L 32APSK 2/3-L, 25/36-L 64APSK 32/45-L (option)	
		(contact factory for 128APSK, 256 APSK modulation types)	
Modulation / Encoding DVB-S2:	FEC Frame Lengths:	FEC-Frames n <sub>ldpc</sub> = 64800 (normal FEC Frame) or n <sub>ldpc</sub> = 16200 (short FEC frame)	
	ModCods:	QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 (only n <sub>ldpc</sub> =64800) 8PSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 (only n <sub>ldpc</sub> =64800) 16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 (only n <sub>ldpc</sub> =64800) 32APSK 3/4, 4/5, 5/6, 8/9, 9/10 (only n <sub>ldpc</sub> =64800)	
	Pilots Insertion:	on / off	
	Physical Layer Scrambling:	N=0 ... 262141	
Modulation / Encoding DVB-S / DVB-DSNG:	Outer Reed Solomon Coding:	188/204, T=8	
	Convolutional Interleaving:	Depth I =12	
	Inner Coding	BPSK or QPSK 1/2, 2/3, 3/4, 5/6, 6/7, 7/8 (Convolutional K=7) 8PSK 2/3, 5/6, 8/9 (Pragmatic Trellis) 16QAM 3/4, 7/8 (Pragmatic Trellis)	
Carrier ID:	DVB-CID according to ETSI TS 103 129		
Signal Spectrum Mask:	α = 0.35, 0.25, 0.20, 0.15, 0.10, 0.05		
Transport Stream Inputs:	Dual DVB-ASI-electrical (2 x Connector MCX female, Impedance 75 Ω, cable EQ) auto switching selectable between input 1 and 2 in case of ASI signal interruption, ASI data missing support of 2 TS multiple input streams (except with option BI)		
Multiple Transport Streams:	Individual modulation and FEC (MODCOD) configuration per TS input Capacity calculator/limitation per TS input can be activated Input stream synchronization and Null-Packet deletion according to ETSI EN 302307-1, Annex D.2, D.3.		
Transport Stream Security (Option BI):	BISS-E Scrambler, compliant to EBU Tech 3292 rev. 2 Supports single or multi program transport streams in BISS Mode 0, 1 and E BISS Mode 0: no scrambling, MPEG transport stream is transferred untouched BISS Mode 1: MPEG transport stream is scrambled using 12-hexadecimal-character Clear Session Word BISS Mode E: MPEG transport stream is scrambled using a session word which is derived from a 16-hexadecimal-character Encrypted Session Word and 14-hexadecimal-character Injected Identifier Max. input rate for Clear Session Word and Encrypted Session Word: - 10 times per 5 minutes - 1 time per 10 seconds  <b>Important note:</b> Option BI operates exclusively with single stream operation. Devices with option BI do not contain the otherwise included support for 2 input streams!		

Specifications continued next page

# DVB Satellite Modulator OEM Module SDMO

<b>Transport Stream Frames Size:</b>	188 or 204 bytes
<b>Packet Stuffing:</b>	TS Null packet or TS All Zero packet insertion (DVB-S, DVB-DSNG, DVB-S2) or Dummy PLFRAME insertion (DVB-S2 only), when the data rate to transmit is higher than the data rate at the data input. Null packet deletion can be enabled to remove incoming null packets. PCR (program clock reference) correction (with Null packet insertion/deletion) for max 250 PID streams with PCRs included. Not supported in case of DVB-S2 multiple input stream operation.
<b>Still Picture Playback:</b>	As standard a color bar pattern is transmitted with main profile at main level (MPML) MPEG-2 encoding, 4:3 aspect ratio, 25 Hz frame rate, interlaced (suitable for PAL or SECAM). As option an alternative, customized still picture can be loaded (different content, different aspect ratio, different frame rate).
<b>Compliant with Standards:</b>	ETSI EN 300421, ETSI EN 301210, ETSI EN 302307-1 and -2, ETSI TS 103129 EN 50083-9 (ASI electrical, SPI Interface)
<b>Monitoring:</b>	Faults, stored faults with time stamps
<b>Monitoring and Control Interface:</b>	Protocol: Multipoint Connection: RS232 over 2.54mm pin header
<b>Temperature Range:</b>	0°C ... 50 °C operating -30°C ... 60 °C operating with 10 minutes warm up at -30°C (option EXT) -30°C ... 80 °C storage
<b>Relative Humidity:</b>	<95% non condensing
<b>Mains Power Input:</b>	12 ... 24 V DC nominal, 11 ... 26 V DC max
<b>Mains Power Consumption:</b>	Standard: 14 W typ. Option EXT: 17 W typ.
<b>Mains Power Input Connector:</b>	2.54mm pin header
<b>Dimension and Weight:</b>	185 x 17 x 100 mm <sup>3</sup> (WxHxD) standard module 185 x 25 x 100 mm <sup>3</sup> (WxHxD) with cables and/or option EXT approx. 0.45 kg

Specifications are subject to change

## Order information:

SDMO-[options]

## Possible options are:

<b>V</b>	additional VHF-band output
<b>EXT</b>	extended temperature range and clock stability
<b>BI</b>	BISS scrambling

## Cannot be combined with:

-  
-  
-

## Requires:

-  
-  
-

## Examples:

<b>SDMO-V</b>	Modulator with 50 Ω L-band output and 50 Ω VHF-band output
<b>SDMO-EXT</b>	Modulator with extended temperature range, including higher clock stability



Trade Mark of the DVB Digital Video Broadcasting Project