

# DB01

## NTSC/PAL Video Decoder

### User Manual

Revision 0.1  
30<sup>th</sup> September 2023

## Revisions

Date	Revisions	Version
30-09-2023	First draft	0.1

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## 1. Introduction

DB01 is a broadcast quality video decoder accepting NTSC-M and PAL video inputs.

DB01 accepts analogue CVBS inputs which it filters and clamps before converting to digital composite video using a 12-bit analogue to digital converter (ADC) running at 27MHz. Video decoding is performed using a modified version of SingMai's PT6 video decoder IP core. A seven-tap comb filter adapts between 3D frame, 3D field, 3 line comb and a notch filter on a pixel by pixel basis based on a quality measurement of each comb mode. This provides the highest quality decoding with lowest artifacts.

The DB01 accepts video sources such as cameras, DVD players, time based corrected VCRs and off-air broadcast, **but it will not accept unstable video sources such as analogue laserdisc or non-TBC video tapes.**

The output from the video decoder is converted to a serial digital interface (SDI) output.

DB01 requires 12VDC which is provided via the supplied AC-DC converter.

## 2. Quick start guide

Connect the DB01 to the supplied AC/DC adaptor. Fit the appropriate blades to the adaptor for your country. Blades are supplied for North America, Europe, UK, China and Australia. The adaptor accepts AC between 90 and 264VAC – the full specification is provided in Appendix A.

The connections to the DB01 are shown in Figure 1.

Connect the 12VDC jack from the adaptor to the +12VDC 'Power in' socket on the DB01. The 'Power On' LED should light up blue.

Connect your video input to the video input (BNC). The DB01 accepts either NTSC-M or PAL video (auto selected depending on the measured line standard).



**Figure 1 DB01 Connections.**

The decoded video is encoded to serial digital interface (SDI) format (SMPTE-259M). Connect the video output to a video recorder, monitor or other SDI compatible device.

The DB01 uses a crystal-based voltage-controlled oscillator (VCO) to line-lock to the video input and this has a limited lock range. The DB01 will lock to almost all, cameras, DVDs, set-top boxes, off-air broadcasts and TBC VCRs, but it will not lock to non-TBC VCRs or analogue laserdiscs.

### 3. DB01 Technical Details

A simplified block diagram of the DB01 is shown in Figure 2.

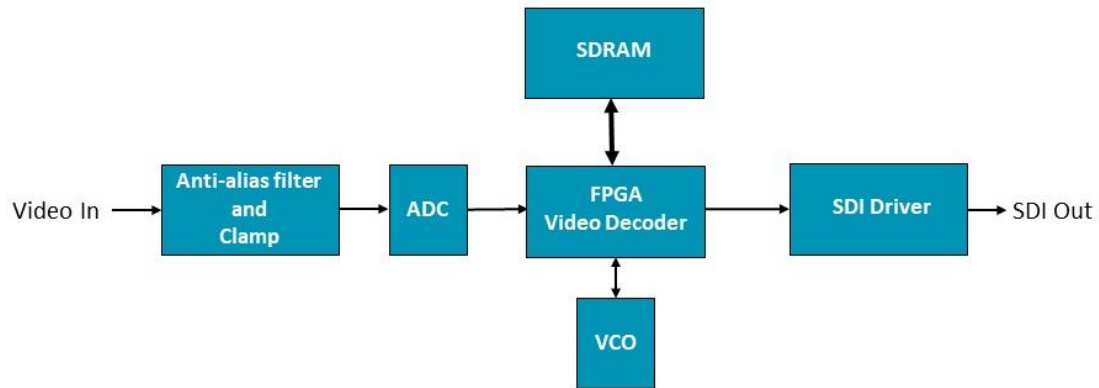


Figure 2 DB01 Block diagram.

The +12VDC from the AC/DC power adaptor is filtered and protected from over-range or reverse polarity inputs. The 12VDC input is then regulated to provide clean power supplies for the module.

The video input is pseudo-differentially received which reduces hum pickup over long cable runs. The video input is terminated by 75Ω and is protected from out-of-range inputs or glitches. The video is then filtered to remove out-of-band noise and sync-tip clamped before being converted to digital video using a 12-bit analogue-to-digital converter running at 27MHz.

The video decoding uses a variant of the SingMai PT6 video decoder IP core. The video input is demodulated to a 'simple' notch filtered Y,U,V signal. This signal is then comb filtered. Two 3D combs and one 2D comb are used – a 3-tap frame comb, a 3-tap field comb and a 3-tap line comb. A narrow notch filter is also provided. The chosen comb mode is selected on a pixel-by-pixel basis, depending on a quality measurement of each mode. The 3D comb filter memory is provided by an SDRAM. The selected comb output is then added back to the demodulated output to provide a full bandwidth signal with very low artifacts. The video is then formatted to a BT656 compatible output before being sent to a SDI transmitter.

The video decoder is a line-locked decoder. A crystal based 27MHz oscillator is frequency adjusted by the video decoder until horizontal (line) lock is achieved.

## 4. Specification

Power:	+9-14V (+12VDC nominal) @ ~340mA (all outputs driven).
Dimensions:	120mm x 78mm x 27mm.
Video input:	NTSC-M or PAL. 75 $\Omega$ input impedance (coaxial). 1V pk-pk nominal input. Maximum input before clipping 1.4V pk-pk.
Video output:	SDI (SMPTE-259M). 800mV pk-pk into 75 $\Omega$ . >14dB return loss.
Luma bandwidth:	5.5MHz $\pm$ 0.2dB.
Chroma bandwidth:	1.07MHz $\pm$ 0.2dB.
Differential gain/phase:	<1%, <1 $^\circ$ .
K-factor:	<1%.
Luma/chroma delay:	<10ns.
Latency:	<34ms (NTSC). <41ms (PAL).
Operating temperature:	-10 – +40 degC.

## Appendix A: AC-DC adaptor

The specification for the supplied AC-DC adaptor is shown in Figures 3 and 4.

CUI Inc | SERIES: SM136 | DESCRIPTION: AC-DC POWER SUPPLY date 06/23/2022 | page 2 of 5

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**INPUT**

parameter	conditions/description	min	typ	max	units
voltage		90		264	Vac
frequency		47		63	Hz
current				1	A
inrush current	at 230 Vac, full load, 25°C, cold start			70	A
leakage current				0.25	mA
no load power consumption	at 115/230 Vac			0.075	W

**OUTPUT**

parameter	conditions/description	min	typ	max	units
regulation			±5		%
hold-up time	at full load	10			ms

**PROTECTIONS**

parameter	conditions/description	min	typ	max	units
over voltage protection	output shut down			180	%
over current protection	output shut down, auto recovery			170	%
short circuit protection	output shut down, auto recovery				

**SAFETY & COMPLIANCE**

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output at 10 mA for 1 minute		3,000		Vac
isolation resistance	input to output at 500 Vdc	10			MΩ
safety approvals	UL/cUL (60950-1, 62368-1), RCM, CCC, PSE, UKCA				
EMI/EMC	FCC Part 15B Class B, CE				
MTBF	as per Telcordia SR-332, 25°C	300,000			hours
RoHS	yes				

**ENVIRONMENTAL**

parameter	conditions/description	min	typ	max	units
operating temperature		0		40	°C
storage temperature		-20		80	°C
operating humidity	non-condensing	20		80	%
storage humidity	non-condensing	10		90	%

Figure 3 Power supply specification: electrical.

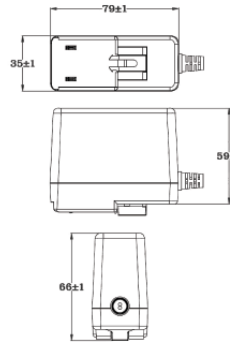


**MECHANICAL**

parameter	conditions/description	min	typ	max	units
dimensions	79 x 35 x 66				mm
inlet plug	interchangeable blades (North America, Europe, UK, Australia, China)				
ac blade clip type	pinch clip				
weight	without blades		160		g

**MECHANICAL DRAWING**

units: mm  
tolerance: ±1.0 mm



INTERCHANGEABLE BLADES					
BLADE DESIGNATOR	N	E	B	A	C
REGION	North America	Europe	UK	Australia	China
BLADE ACCESSORY	SMI-US-2	SMI-EU-2	SMI-UK-2	SMI-AU-2	SMI-CN-2
BLADE	US (N)	Europe (E)	UK (B)	Australia (A)	China (C)

**DC CORD**

units: mm

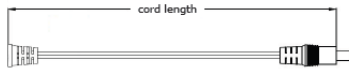


Table 1

MODEL NO.	CABLE	CORD LENGTH
SMI36-5	UL2468, 16 AWG	1,000 mm ±30
SMI36-9	UL2468, 18 AWG	1,500 mm ±30
SMI36-12	UL2468, 16 AWG	1,500 mm ±30
SMI36-15	UL2468, 18 AWG	1,500 mm ±30
SMI36-24	UL2468, 20 AWG	1,500 mm ±30
SMI36-48	UL2468, 22 AWG	1,500 mm ±30

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Figure 4 Power supply specification: mechanical.