

Ideal for operating multiple MCS8As with synchronous START and common master clock source

Versions available with internal ovenized 10MHz clock or Cs atomic clock



The MCCD is a 8 output fast pulse driver with 60 ps rise time and a 8 output clock driver (TTL) with internal reference clock or ext input.

## Description

The Model MCCD is a fast pulse distributor intended to be used with multiple MCS8A modules. It is also a very good general-purpose pulse generator when multiple synchronized jitter-free signals are required. It expands one common START signal to several synchronous starting MCS8A units. The introduced additional time jitter is typical less than 0.075 ps rms.

Output rise / fall time is 60 ps. The minimum pulse width is 90 ps. It can operate up to 6 GHz periodic signal frequency.

In addition there is a synchronous clock source at the rear panel. It can supply up to 8 MCS8A units with a common clock for synchronous operation of multiple MCS8A, providing up to 64 synchronized channels. It has a clock input (TTL 3.3V, 10 to 120 MHz) to be distributed to the connected MCS8As. Termination can be 50 Ohm or 3 kOhm. AC or DC coupling is selectable.

If no input signal is connected, the internal 10 MHz clock source is fed to the output connectors. The internal quartz oscillator can be replaced by an oven-stabilized

oscillator (option MCCDOVX) or a highly stable Cs atomic clock (option MCCDATOM). An internal GPS synchronized clock (option MCCDGPS) has the same stability as the Cs atomic clock, a measurement with 10 sec acquisition delay with a Cs clock versus GPS clock over 3 days showed a FWHM of 0.7 ns at 10 sec.

Also there is an optional binary divider (32 bit), which can reduce the external clock in binary steps. Divider factor is set by internal jumpers.

## Performance

### FRONT PANEL:

#### Sync START:

One input (neg. signals)  
8 synchronous outputs with time skew less than 20 ps.  
Propagation delay: ~1.4 ns  
Pulse jitter: 0.075 ps rms (typ.)

### REAR PANEL:

#### Sync master clock:

One input (pos. signal, TTL)  
8 synchronous TTL (3.3 V) outputs.



## Specifications

### FRONT PANEL:

**TRG Input: 1x** SMA connector,  
 $Z_{in} = 50 \text{ Ohm}$ ,  $0 \rightarrow 0.25 \text{ V}$  nom.  
 $0 \text{ V} \dots 1.5 \text{ V}$  maximum input voltage range,  
 Threshold:  $-0.125 \text{ V}$  fixed  
 Don't apply pos. voltage!  
**TRG outputs: 8 x** SMA connector, outputs  
 FAST NIM (CML) pulses  
 (neg.:  $0 \text{ V} \rightarrow -0.4 \text{ V}$ ) into  $50 \text{ Ohm}$ ,  
 $Z_{out} = 50 \text{ Ohm}$ , backterminated.

### REAR PANEL:

**Reference clock in:** BNC connector, TTL  
 compatible,  $10 \text{ MHz}$ ,  
 input frequency:  $< 120 \text{ MHz}$ ,  
 optional  $50 \text{ Ohm}$  terminated (int. Jumper)  
 optional AC- coupled (int. Jumper)  
**Master clock out: (8x)**  
 BNC connector,  
 TTL compatible,  $0 \dots 3.3 \text{ V}$ , rise time:  $1 \text{ ns}$   
**Power connector:**  $5.5 \times 2.1 \text{ mm}$  DC connector  
 (center positive)

### REFERENCE CLOCK:

$10 \text{ MHz}$  crystal oscillator ( $10 \text{ ppm}$ )  
**MCCDOVX** option  
 $10 \text{ MHz}$  ovenized crystal oscillator, frequency  
 stability:  $0.03 \text{ ppm}$  @  $0^\circ \text{C}$  to  $+50^\circ \text{C}$   
**MCCDATOM** option  $10 \text{ MHz}$  Cs atomic clock

Short-term stability (Allan Deviation) of  $3.0 \times 10^{-10}$   
 at  $\tau = 1 \text{ sec}$ , typical long term aging of  $< 9 \times 10^{-10}$   
 $^{10}/\text{month}$ , and maximum frequency change of  
 $\pm 5 \times 10^{-10}$  over an operating temperature range of  
 $-10^\circ \text{C}$  to  $70^\circ \text{C}$ .

**Power requirements:**  $12 \text{ V DC} / 0.5 \text{ A}$

**Operating Temperature Range:**  $0^\circ \text{C}$  to  $+50^\circ \text{C}$

**Physical:** aluminum case,  
 $275 \text{ mm} \times 260 \text{ mm} \times 48 \text{ mm}$ ,  $1.8 \text{ kg}$

**Shipping case:**  $500 \text{ mm} \times 400 \text{ mm} \times 200 \text{ mm}$ ,  
 $7 \text{ kg}$

### Accessories:

- External power supply: IN:  $90 - 264 \text{ V AC}$   
 Out:  $12 \text{ V DC}$  (enclosed)
- Handbook

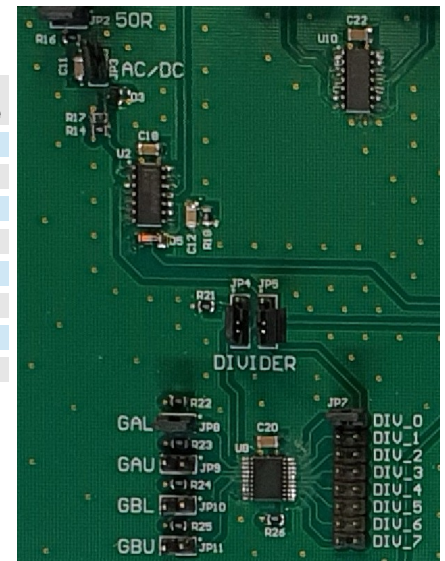
### Hardware options:

- **MCCDOVX** option: Oven controlled oscillator
- **MCCDATOM** option:  $10 \text{ MHz}$  Cs atomic clock
- **MCCDDIV** option: internal 32bit binary divider
- **MSET1** Set of cables:  $8 \times \text{RG316 SMA-SMA}$ ,  $30 \text{ cm}$
- **MSET2** Set of cables:  $8 \times \text{RG316 BNC-BNC}$ ,  $50 \text{ cm}$
- **MSET3** Set of cables:  $8 \times \text{RG316 BNC-BNC}$ ,  $100 \text{ cm}$
- **MSET4** Set of cables:  $1 \times \text{SMA } 1 \text{ m}$ ,  $8 \times \text{SMA } 20 \text{ cm}$ ,  
 $8 \times \text{BNC } 50 \text{ cm}$ , BNC-SMA adapter (RG316)

### Examples of divider settings

Jumper 7 setting	Jumper 8 GAL active	Jumper 9 GAU active	Jumper 10 GBL active	Jumper 11 GBU active
DIV_0	5,000,000.0	19,531.250	76.294	0.298
DIV_1	2,500,000.0	9,765.625	38.127	0.149
DIV_2	1,250,000.0	4,882.813	19.073	0.075
DIV_3	625,000.0	2,441.406	9.573	0.037
DIV_4	312,500.0	1,220.703	4.768	0.019
DIV_5	156,250.0	610.352	2.625	0.009
DIV_6	78,125.0	305.176	1.192	0.005
DIV_7	39,062.5	152.588	0.596	0.002

**Divider Frequency in Hz for an input frequency of 10 MHz**



### Order Information

Model	Description	Order
<b>MCCD</b>	8-fold pulse driver + master clock source with 8 synchronous outputs	MCCD
<b>MCCDOVX</b>	Option: oven controlled ref. oscillator (higher stability)	MCCDOVX
<b>MCCDATOM</b>	Option: Cs atomic clock (highest stability)	MCCDATOM
<b>MCCDGPS</b>	Option: GPS synchronized reference clock	MCCDGPS
<b>MCCDDIV</b>	Option: internal divider	MCCDDIV
<b>MSET1</b>	Set of cables: $8 \times \text{RG316 SMA-SMA}$ , $30 \text{ cm}$	MSET1
<b>MSET2</b>	Set of cables: $8 \times \text{RG316 BNC-BNC}$ , $50 \text{ cm}$	MSET2
<b>MSET3</b>	Set of cables: $8 \times \text{RG316 BNC-BNC}$ , $100 \text{ cm}$	MSET3
<b>MSET4</b>	Set of cables: $1 \times \text{SMA } 1 \text{ m}$ , $8 \times \text{SMA } 20 \text{ cm}$ , $8 \times \text{BNC } 50 \text{ cm}$ , BNC-SMA adapter	MSET4