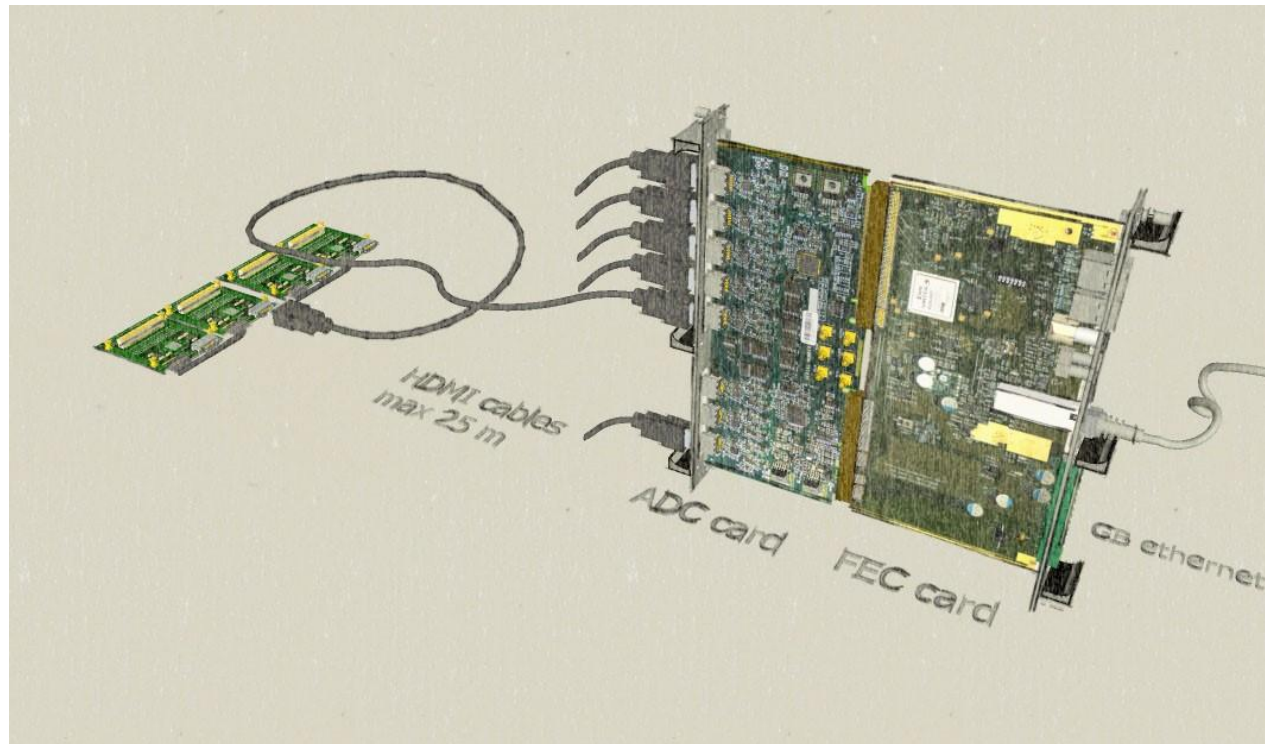


# Connecting VMM frontends to the *SRS* backend

RD51 Miniweek, CERN Feb. 10, 2020

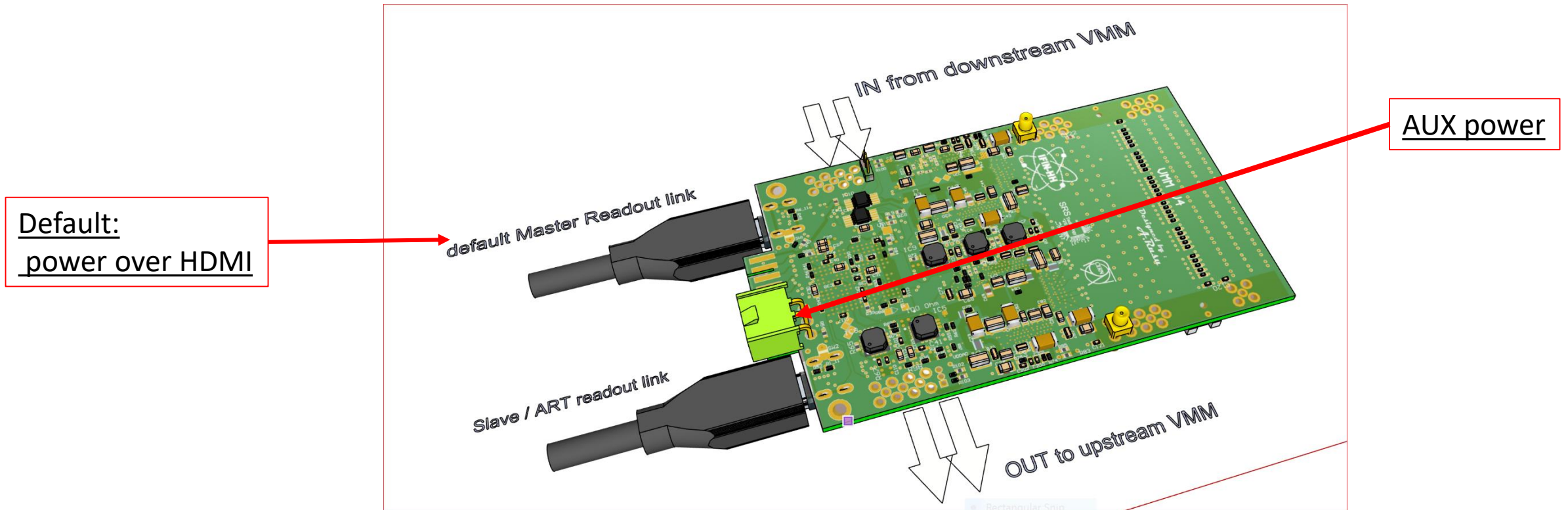
Hans Muller

So far:  
APV frontend... less 1 Watt/hybrid over HDMI



analogue APV circuitry is “tolerant” against power variations over cable, low voltage drop

# Now: VMM frontend: 3W power / hybrid

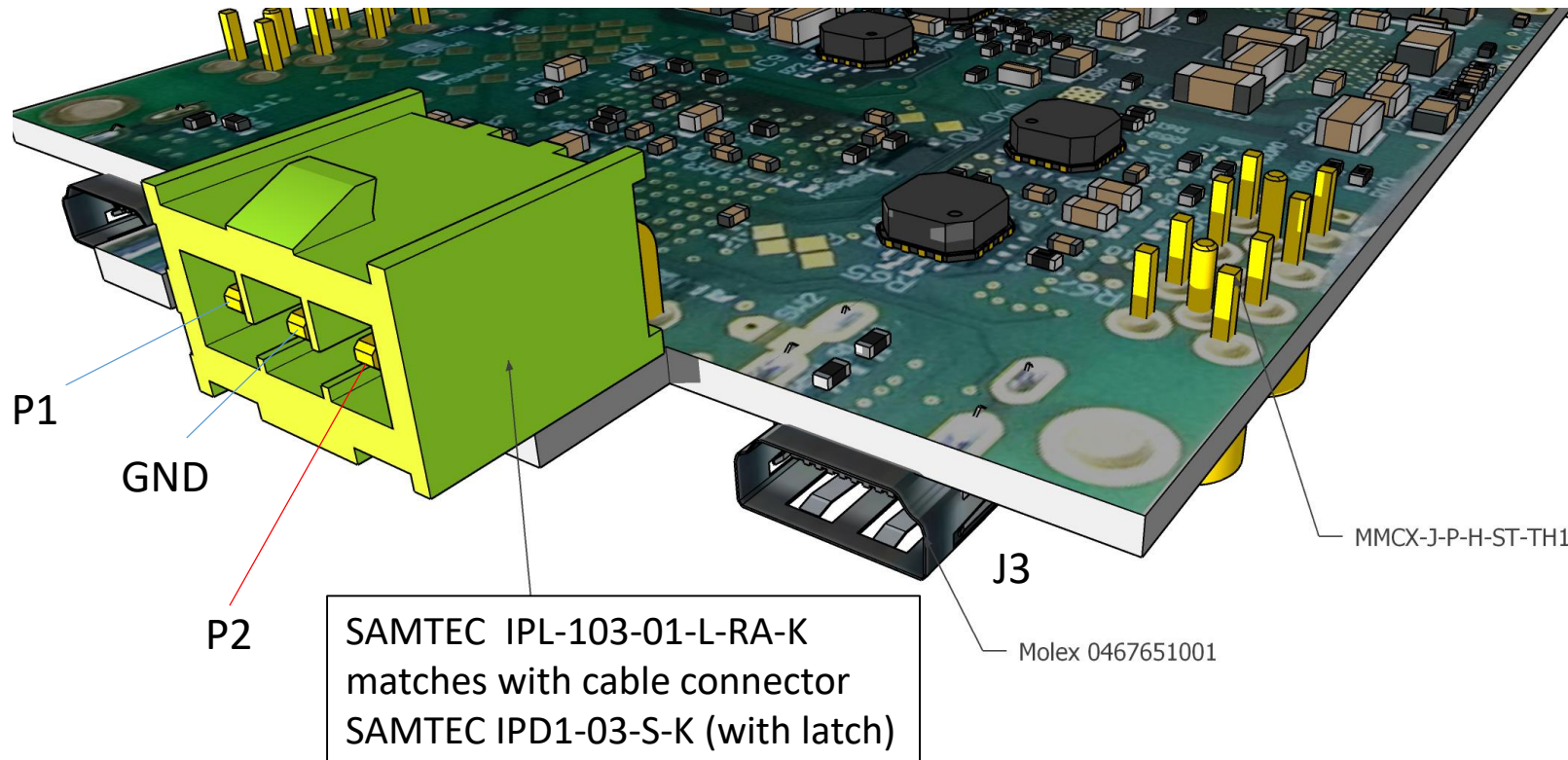


1.5 Ampere variable over HDMI: Digital LVDS link to VMM must stay in absolute synchronization with clock, ( link status 4 required). AUX power connector for common GND return and safe power

# Auxiliary power connector

( SATA Power on DVMcard or Powerbox should be disabled! )

TOP side



## Auxiliary VMM power connector

Recommended AUX Voltages

**P2** = min. 1.75V -> 4 LDO's  
2x VMM (1.2V) ~ **1.5A**

GND = low impedance cable

**P1** = min 3 V -> LDO  
FPGA/Flash/ADC (2.5V) ~ **0.15A**

# HDMI 1.4 cables A-D (micro)\*

DVMcard to VMMhybrid , or Powerbox to VMM hybrid, 2m or 5m



Pin Assignment			
HDMI Male		HDMI Male	HDMI Male
1	White	1	10
2	Drain	2	11
3	Red	3	12
4	White	4	13
5	Drain	5	14
6	Brown	6	17
7	White	7	19
8	Drain	8	15
9	Blue	9	16
			18
			Shell

pin Numbers for A side connector  
( different on D side !)

## Twisted pair lines:

4 x shielded, 3Gbps twisted pairs

Data-1M (1,3) uplink, Data-2M (4,6) uplink

Controls (7,9) downlink, CLK (10,12) downlink

1 x shielded twisted pair (14,19) (Ethernet HDMI 1.4) = **power P2**

1 x pair ( I2C) (15 SCL downlink -16 SDA bidir)

## Single lines:

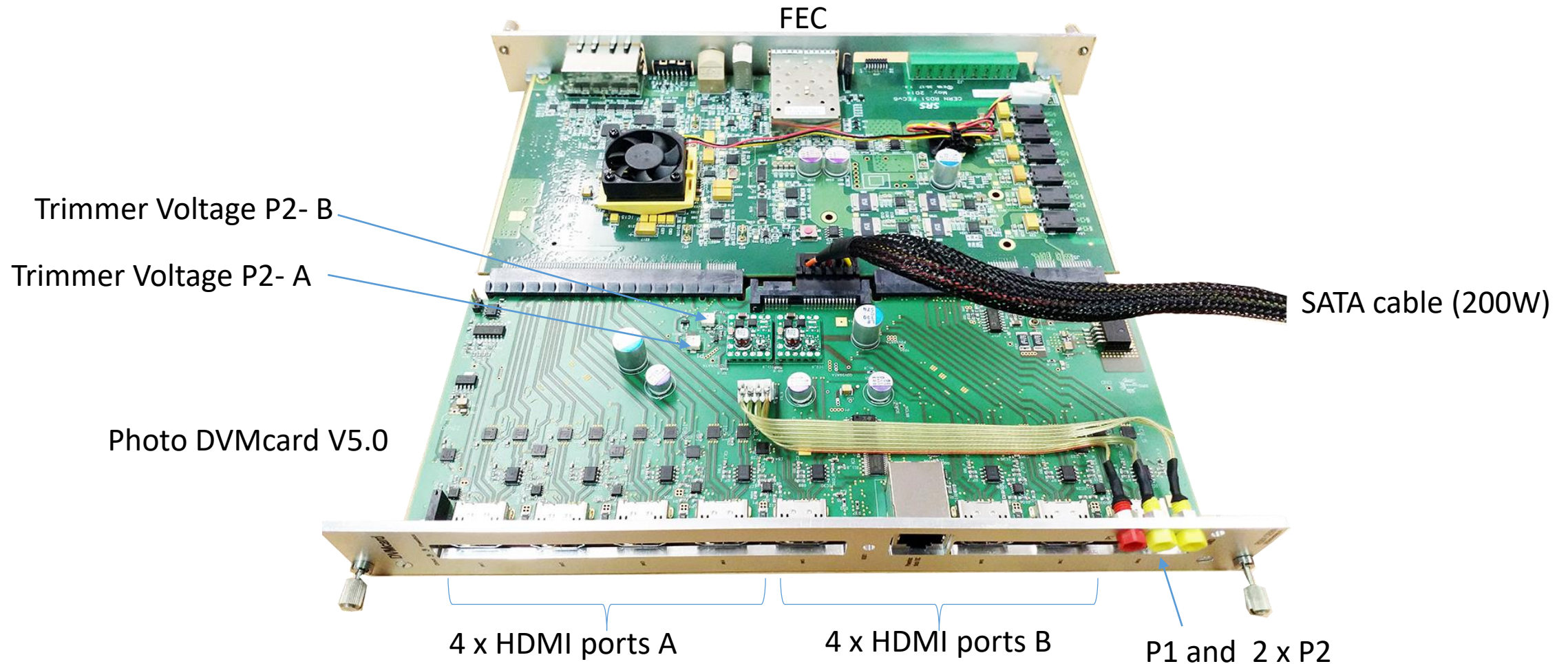
1 x M/S (13 sense bidir )

1 x power (18 = **power P1**)

**6 x GND** 2,5,8,11,17,shell

\* 2m Molex, CERN SCEM 07.89.00.215.1  
5m SEA, CERN SCEM 07.89.00.220.2

# SRS backend: FEC / DVMcard with P1,P2 power via SATA



# Power Option 1: VMM power via HDMI cable

2x DCDC converters 10 A each

+12V SATA input 200W

SATA

Trimmer P2a

Trimmer P2b

This option requires trimming of P2a and P2b voltages  
2m HDMI cable: > 3.6V  
5m HDMI cable: > 4.6V

The 4mm GND plug must get connected to hybrids via a low impedance power cable



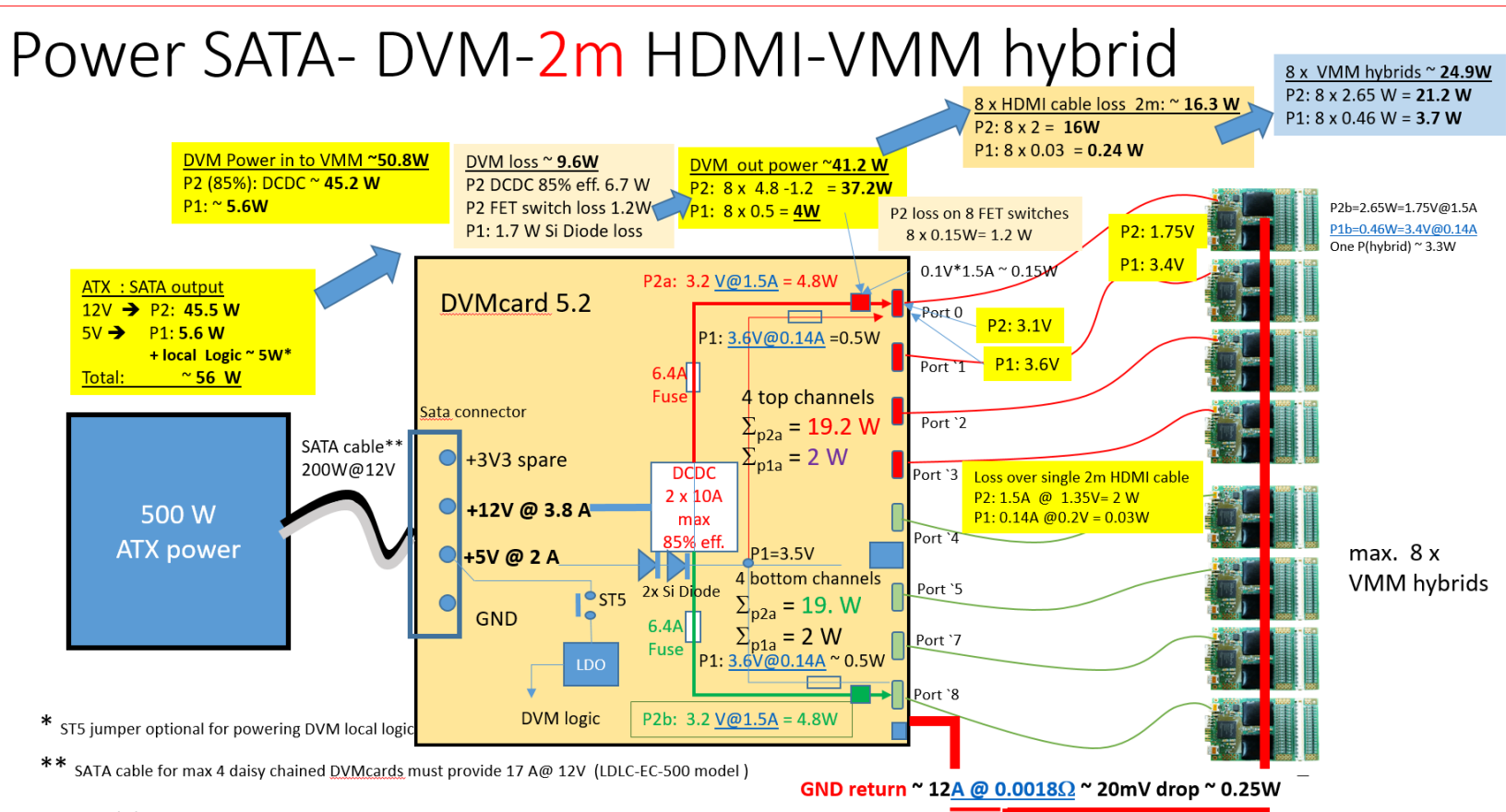
top 4 HDMI ports,  $\Sigma$  max 6.5A

bottom 4 HDMI ports  $\Sigma$  max 6.5A

Common GND return up 13 A:

# 2m HDMI cables

56 Watt Input Power → 9.6 Watt DVM loss  
5W local logic → 16.5 Watt @ 8 cables → 25 Watt ( 8 hybrids VMM )

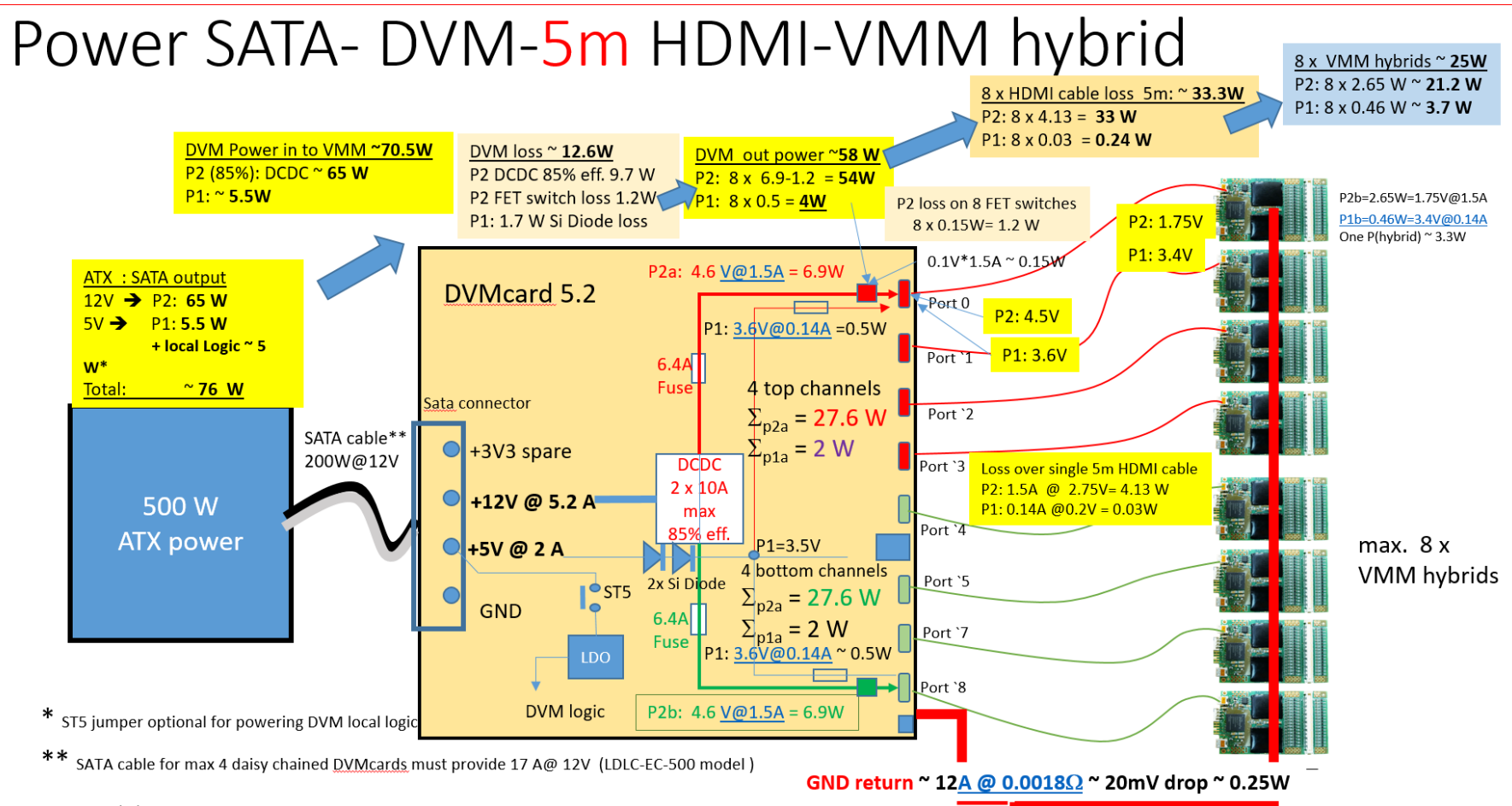


\* ST5 jumper optional for powering DVM local logic  
\*\* SATA cable for max 4 daisy chained DVMcards must provide 17 A@ 12V (LDLC-EC-500 model)



# 5m HDMI cables

76 Watt Input Power → 12.6 Watt DVM loss  
5W local logic → 33.3 Watt @ 8 cable → 25 Watt ( 8 hybrids VMM )



Effective 5m cable  
resistance (all inclusive)  
P2 over 2 lines:  
1.8 Ω

# Power via HDMI cable: GND return cable required

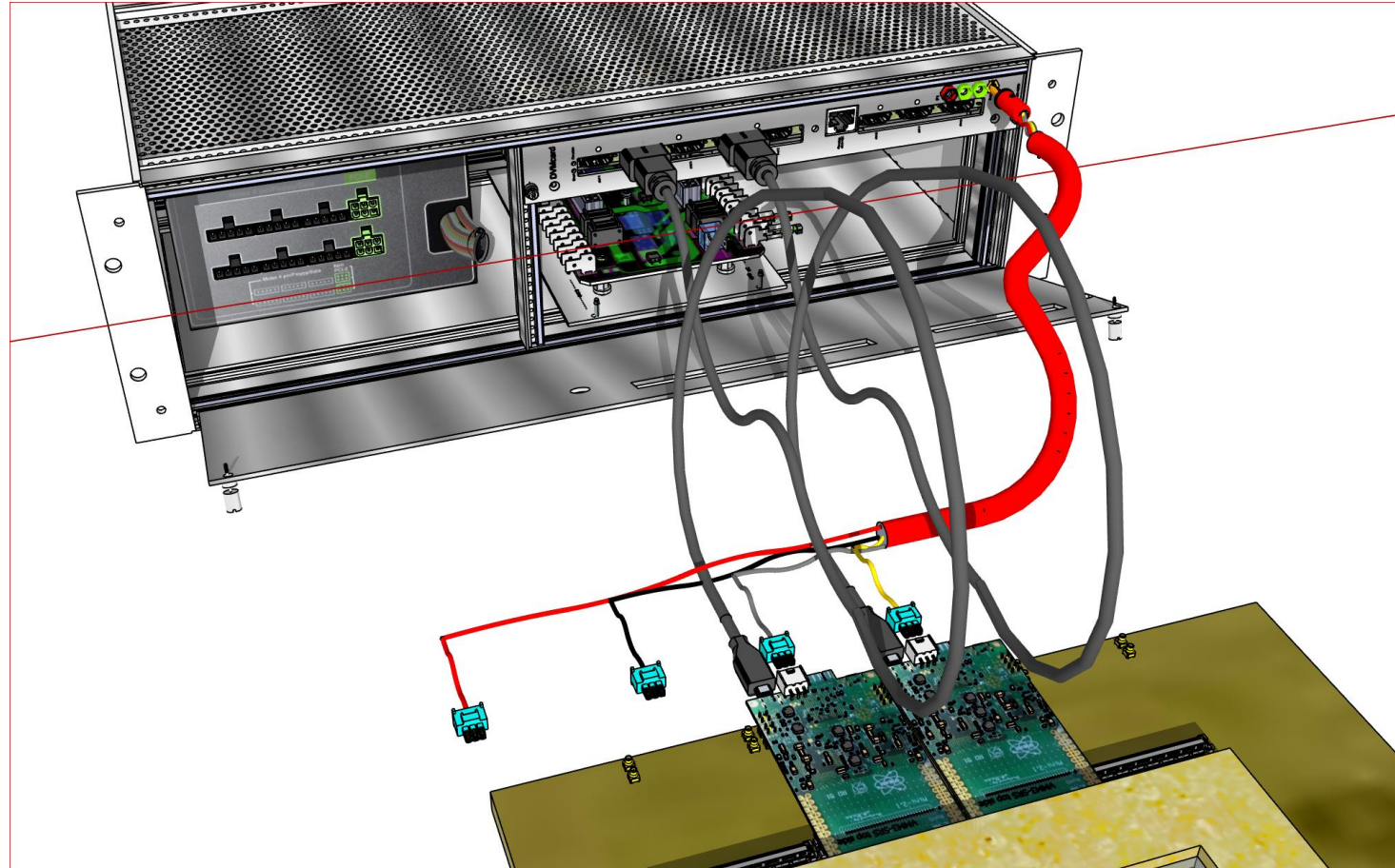
Each wire to one hybrid  
crimped to center pin of  
VMM AUX connector IPD1-03-S-K

2 or 5 m according HDMI cable

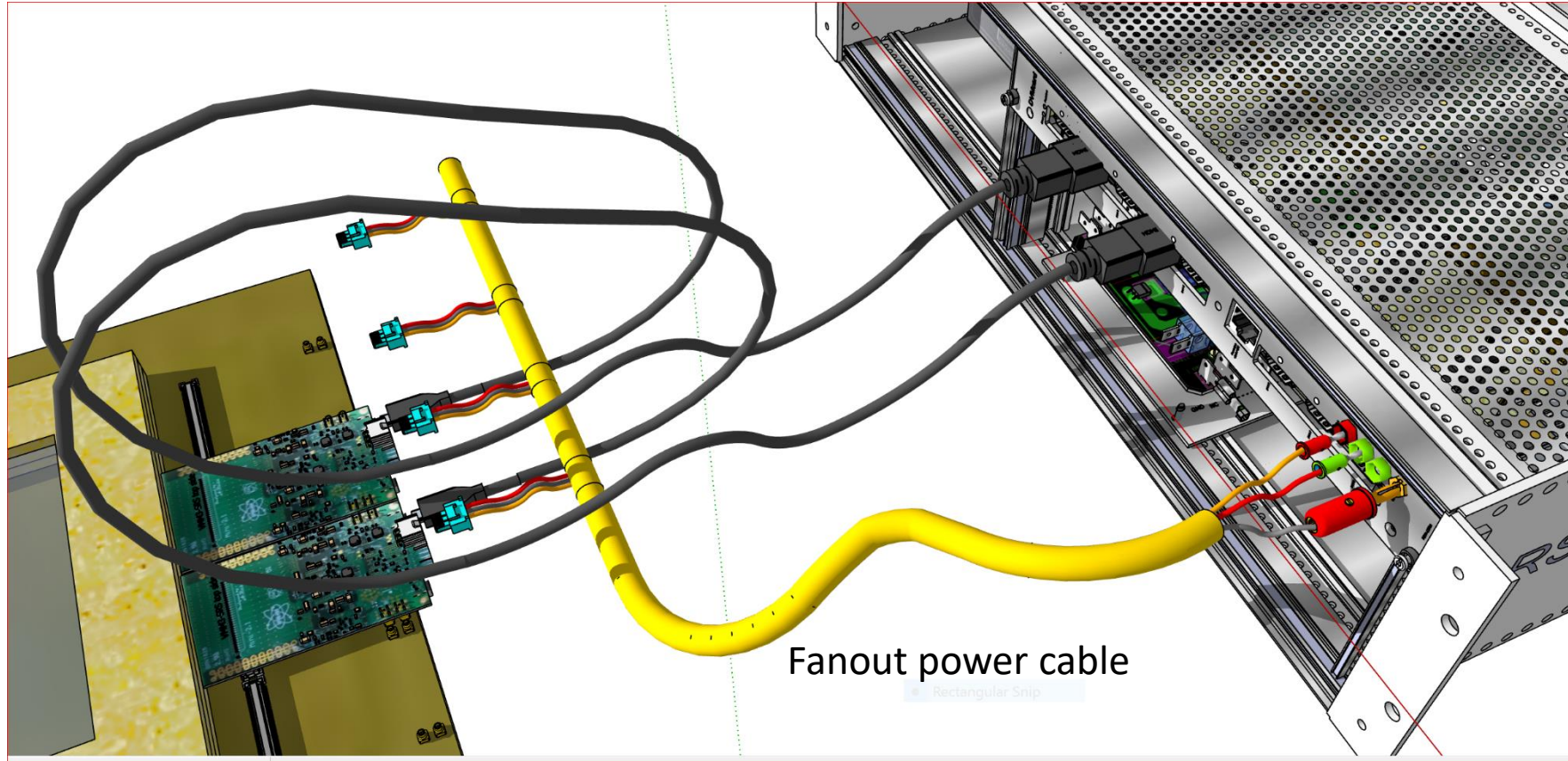
4mm Banana plug  
to DVM GND plug  
all 4 wires

GND cable ( 4 hybrids ): 4 x 0.5 mm standard flexible power cable  
VMM side: each wire , increasing 15 cm lenght to one SAMTEC IPD1-03-S-K  
Center GND pin  
DVM side: Banana 4mm (GND) all 4 wires yellow, black, gray, red

# Power via HDMI: both HDMI and GND Return cable required



# Option2: Power via Fanout-cable from DVMcard



This option avoids major Power loss over HDMI and brings low impedance Power + GND from DVMcard to 4 hybrids.

1-4 VMM hybrids:

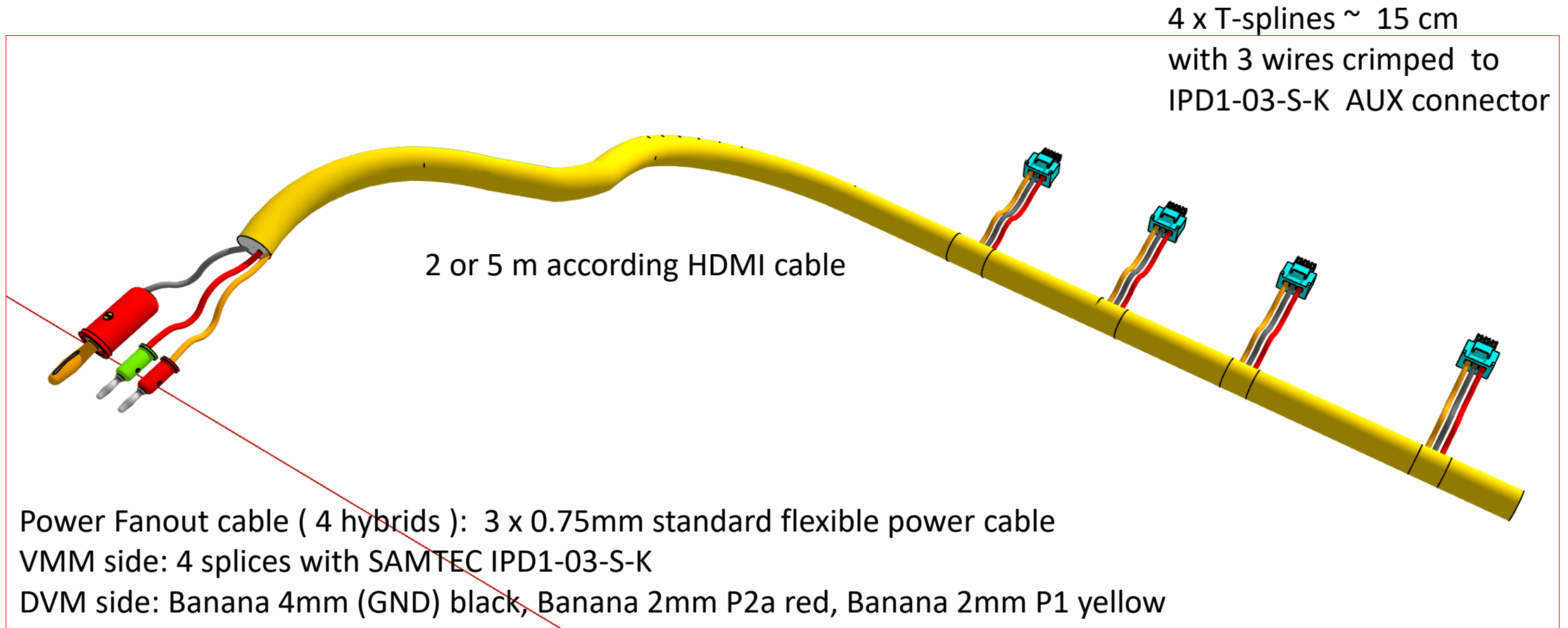
1 Fanout cable P2a or P2B

5-8 VMM hybrids:

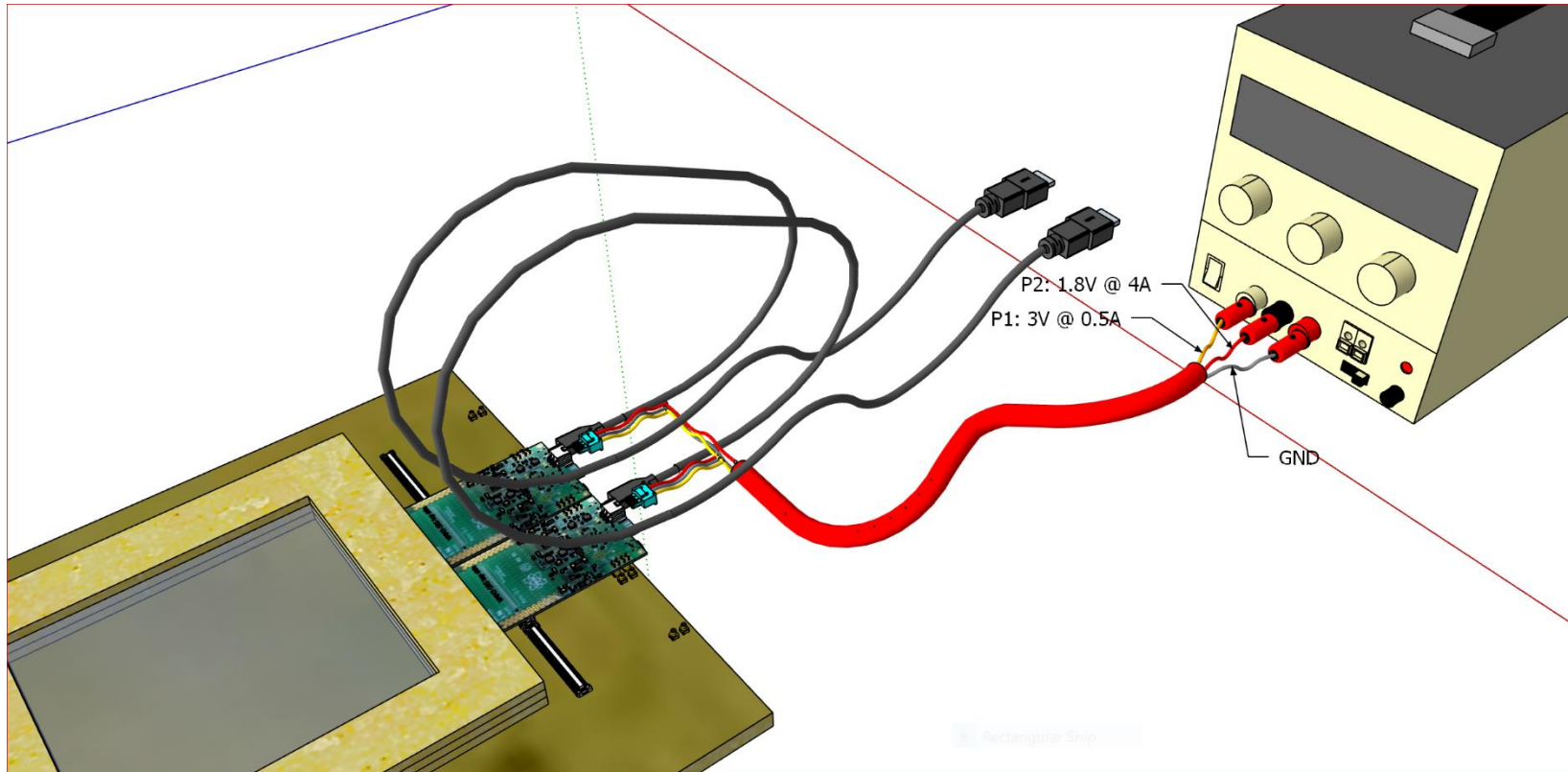
2 Fanout cables  
Sharing GND and P1  
one cable P2a the other P2B,

Power on HDMI cables to be disabled : 2 slide on DVM switches allow to select Fanout Power on P2a and P2b: 1.9 - 2.1V (trimmers): required on VMM : =1.75V

# Power fanout cable (option)



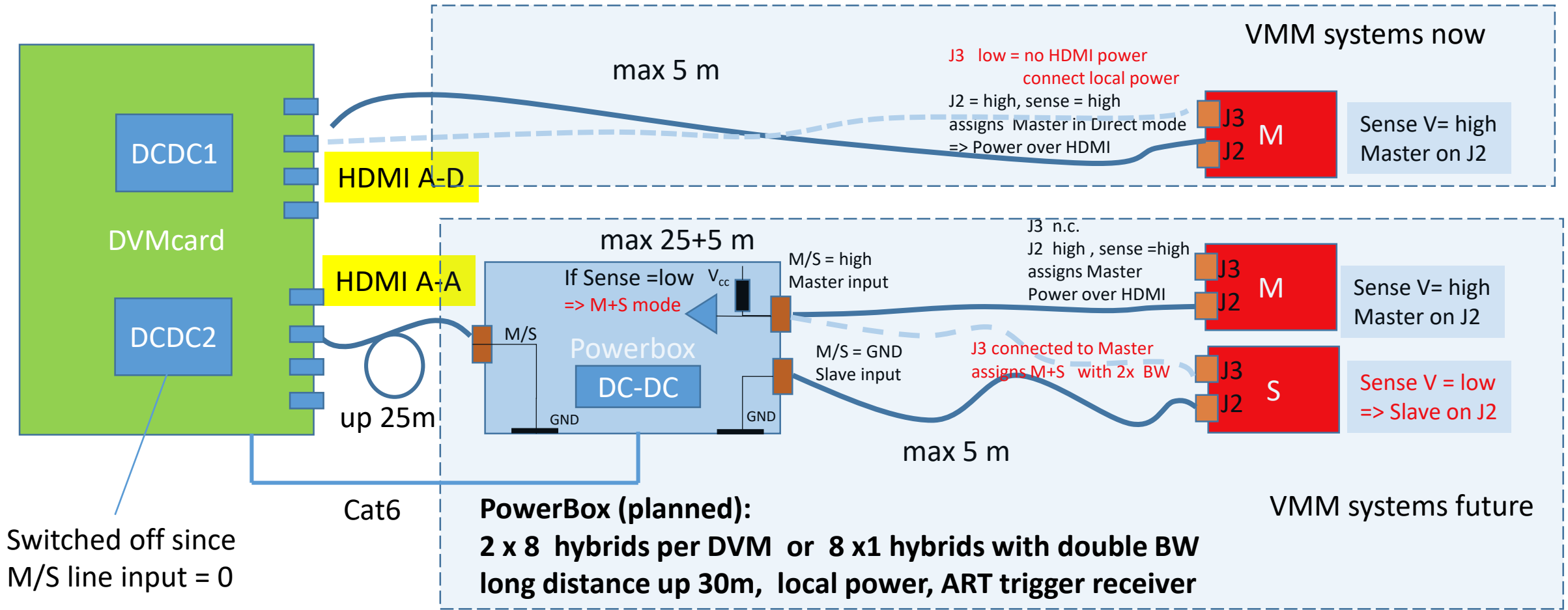
# Power option 3: Extra Power supplies



This option is a backup  
two power Outlets  
(or 2 Power supplies)  
required  
0.75 mm<sup>2</sup> wire dia  
recommended

# Master-Slave coding & connections

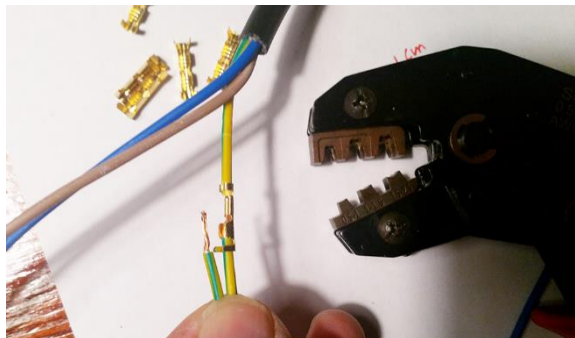
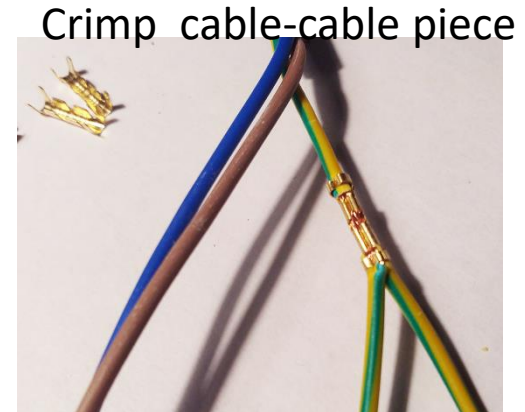
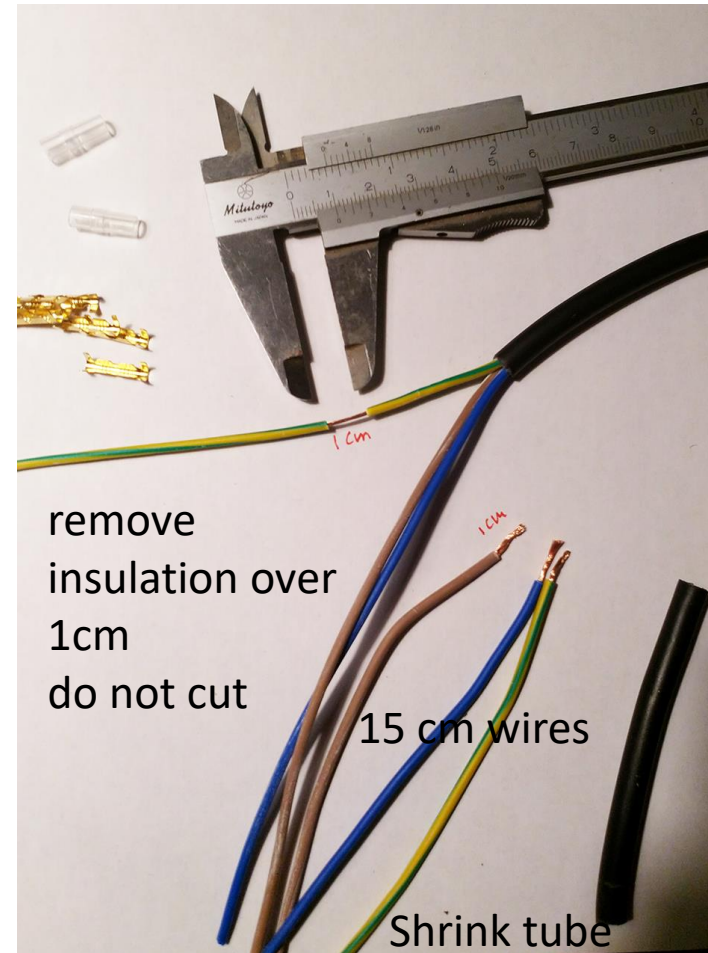
DVM: P2 Power over HDMI: enabled if M/S line = high Z  
 P2 Power over HDMI: disabled if 1 M/S line = low



# Backup slides



# T-Splicing: no solder, no cut



# Tools and crimps

