Application note
MHAD08_01
Issue 1, 5th May 2016

AksIM™ PWM readhead with PWM communication interface and longer cable

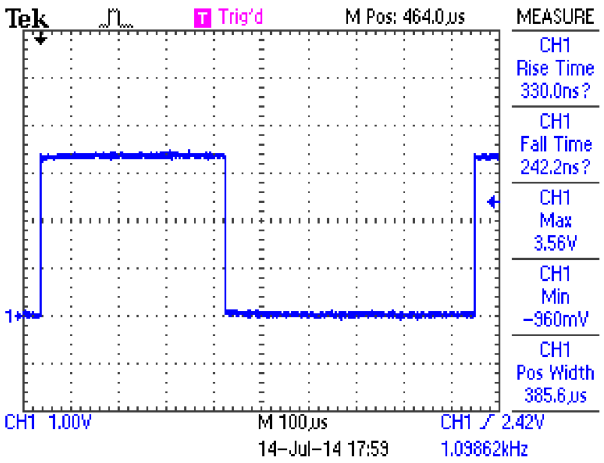
Setup

AksIM MHA7PWE16BT40F00 readhead with MRA7 ring.

Flying end of a 4 meters long cable is connected to a 5.0 V supply and PWM output to oscilloscope with 10:1 probe. Power supply voltage measured on the readhead is 4.7 V which is well inside tolerated range.

Measurements:

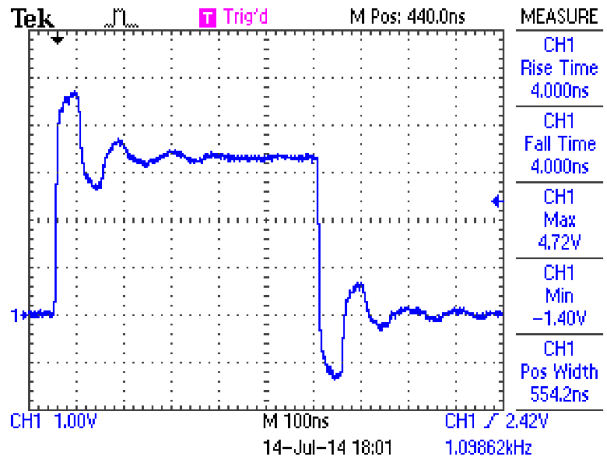
PWM communication interface with variant E (1099 Hz) of the “PWE” option:



Measured frequency is 1098.6 Hz.

Voltage is 0 V to 3.3 V. Measured values slightly differ due to overshoot spikes.

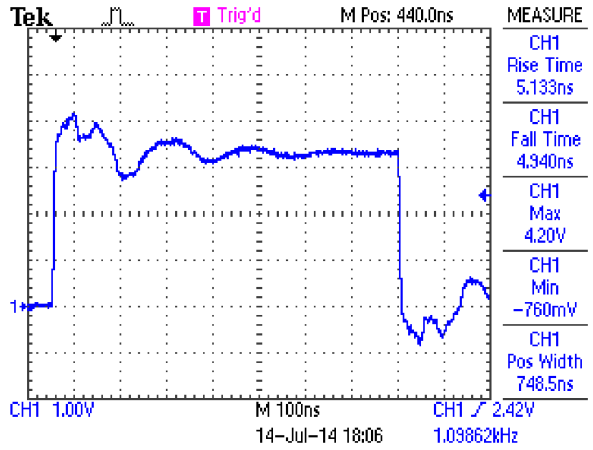
Short pulse shape with inner and outer shields unconnected and PWM line not terminated:



Overshoot for 1.4 V and undershoot for -1.4 V.

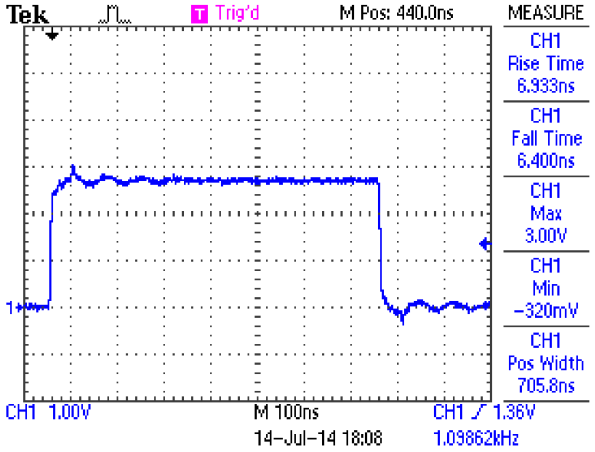
Ringing clearly visible.

Inner shield connected to GND and PWM line not terminated:



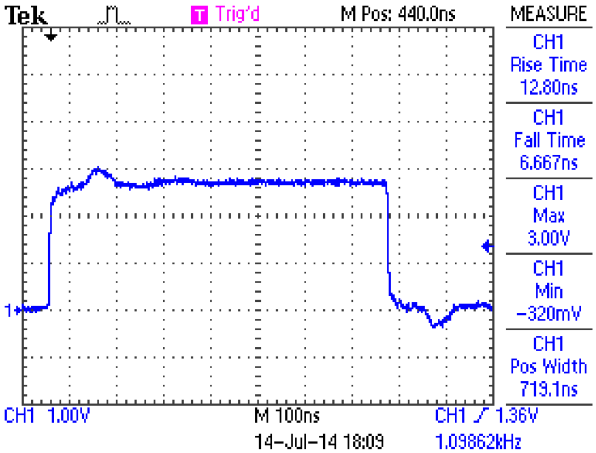
Overshoot for 0.9 V and undershoot for -0.8 V.

Inner shield not connected and PWM line terminated with 120 Ω resistor to GND:



Termination reduces ringing and overshoots to nearly zero but signal drop is noticable. Voltage is 2.8 V.

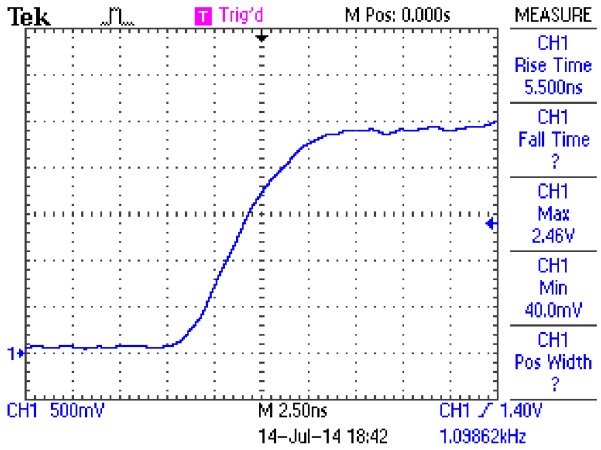
Inner shield connected to GND and PWM line terminated with 120 Ω resistor to GND:



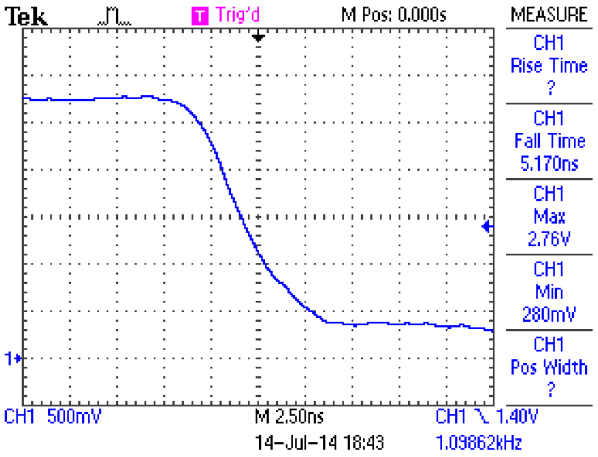
Signal bouncing is visible but does not affect the performance.

This connection scheme is preferred as it reduces overshoots and improves noise immunity.

Rise time measurement:



Fall time measurement:



Rise and fall time is 5.5 ns in worst case.

Conclusion:

Preferred connection scheme is:
Inner shield connected to GND and PWM line terminated with 120 Ω resistor to GND.
Outer shield connected to earthing point as per data sheet MHA.
Minimum power supply at the beginning of the cable is 4.4 V.

Receiver must be able to read the digital signal that has levels of 0 V for logical zero and 2.8 V for logical one.

One PWM step length is 13.9 ns long (one count of resolution of 16-bit encoder).
If accurate position readout is required, then rise and fall times should be taken into account.

Head office

RLS merilna tehnika d.o.o.
Poslovna cona Žeje pri Komendi
Pod vrbami 2
SI-1218 Komenda
Slovenia

T +386 1 5272100
F +386 1 5272129
E mail@rls.si
www.rls.si

Document issues

Issue	Date	Page	Corrections made
1	5. 5. 2016	-	New document