

Diode Measurements v110

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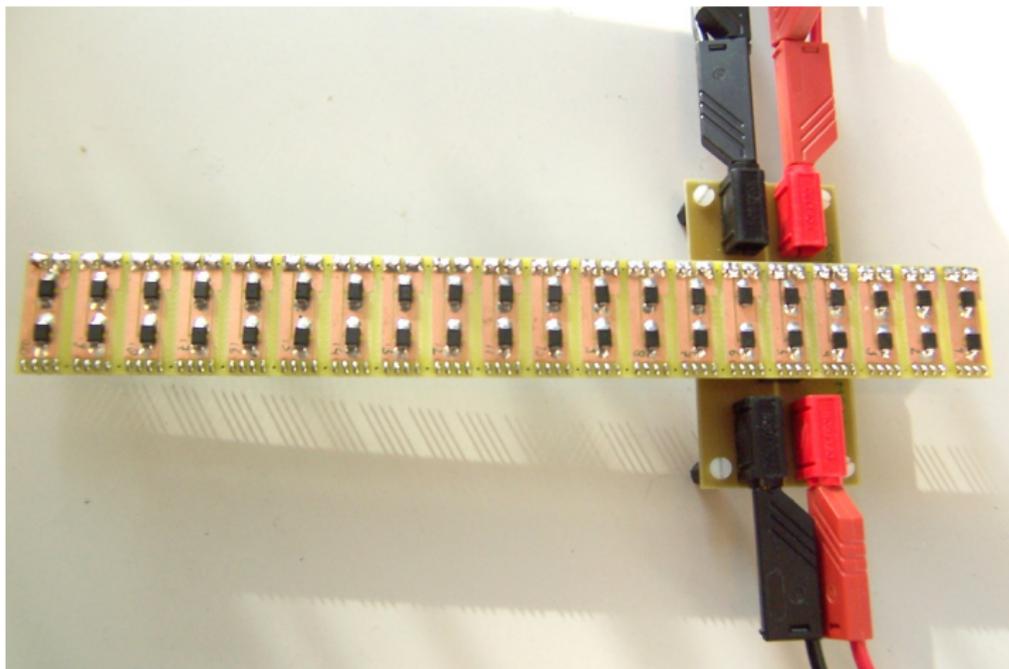
Goal of this presentation

Overall goal: study the effect of the PD input diodes on current unbalance.

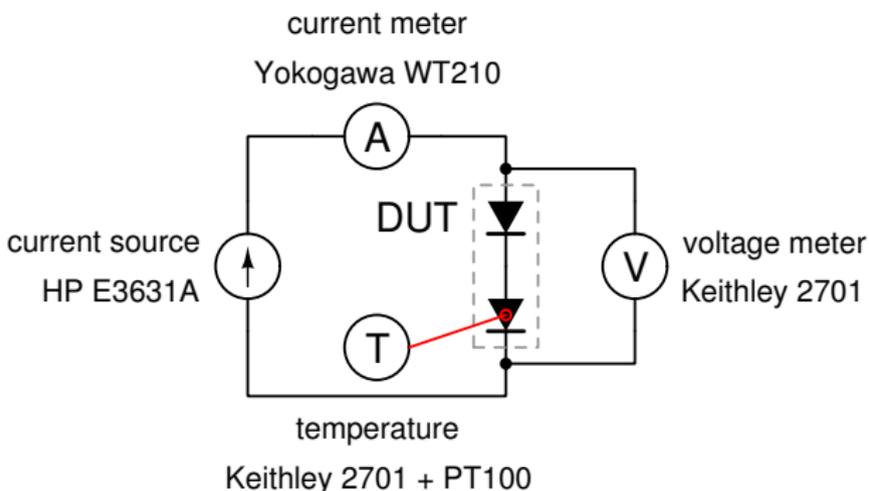
In this presentation we explore the diode voltage over multiple samples of the same diode, over different batches of the same diodes, over different diodes at 3 different currents.

Next steps will include a larger part of the system to explore how the diodes affect current unbalance. This should also lead to insights on good PD design for unbalance and what reasonable requirements in 802.3bt are for the PD.

Plug & Play diodes

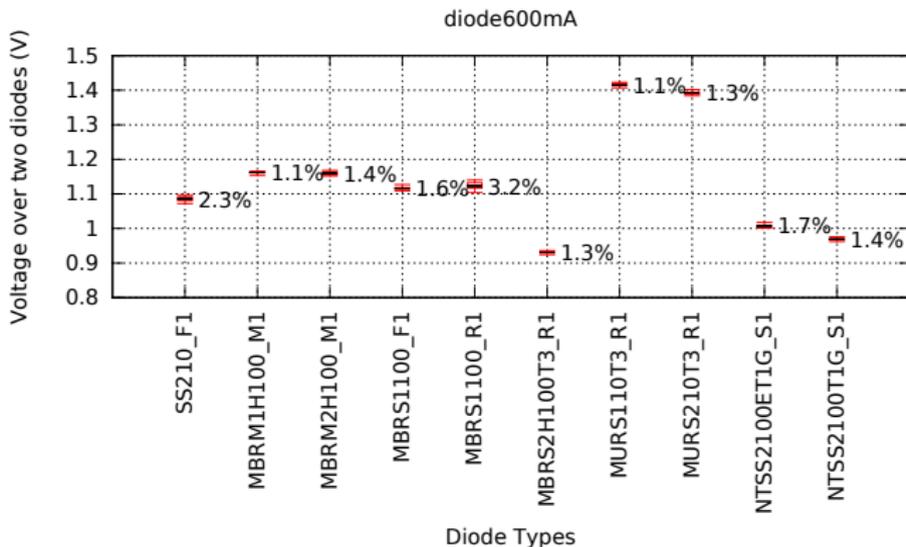


Measurement setup



The diodes are current driven and allowed time to reach thermal equilibrium (checked with PT100 probe). Precision measurement is made of actual diode current and voltage over the diodes in series (V_D).

Overview at 600mA



The maximum (2*diode) to (2*diode) unbalance in diode voltage varies between 1.1% and 3.2% at current level of 600mA.

Measurements summary

Measurements of 400 * 2 diodes in series, 9 different types.

Between 350mA and 600mA or 1000mA all tested diodes show an increase in diode voltage (V_D).

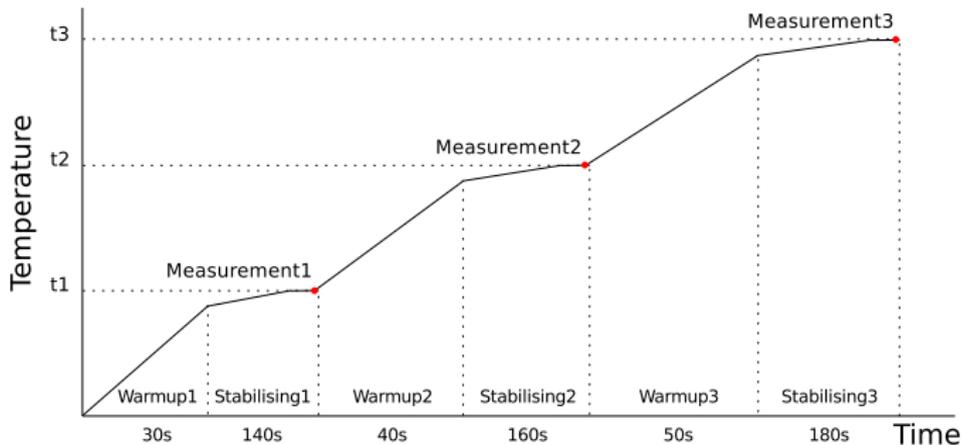
Between 600mA and 1000mA some parts show an increase, but others show a decrease in diode voltage (stability!).

At higher currents, diode to diode maximum difference in diode voltage decreases.

We expect that temperature differences will be the dominant effect in diode unbalance, much more prominent than sample to sample variation.



Annex 1 - diode heating time



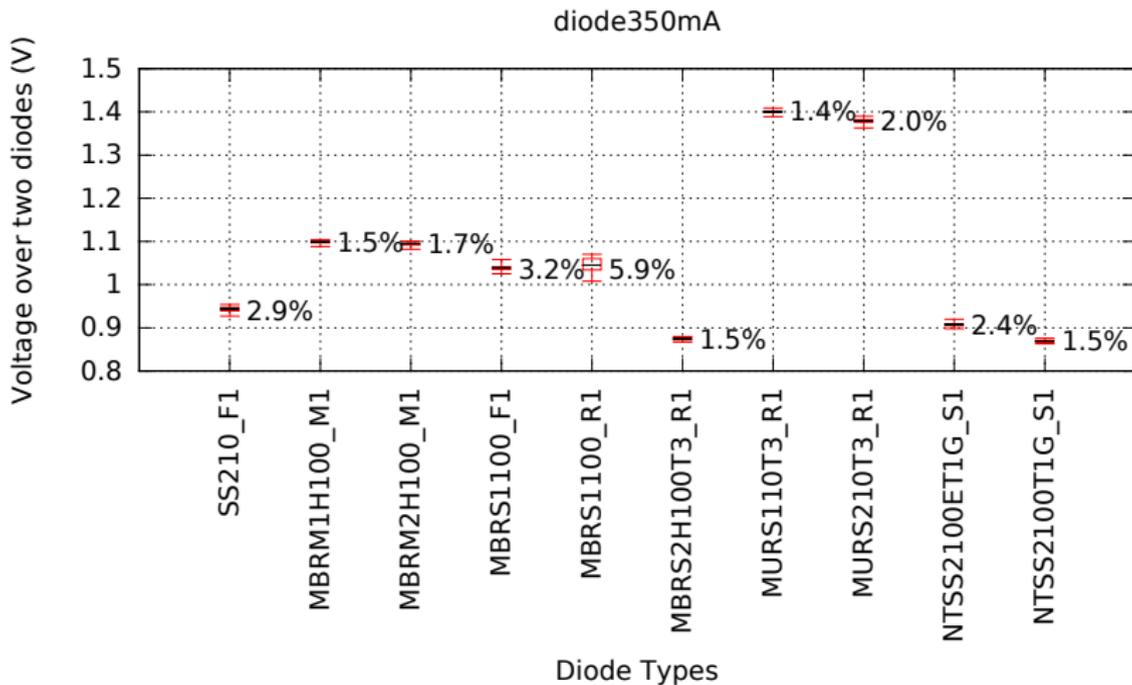
Diode heating was experimentally determined and timings with significant margin used to allow measurements at a thermal stable point. Layout of the diode boards was such to award each diode with same amount of copper area.

Diagram interpretation

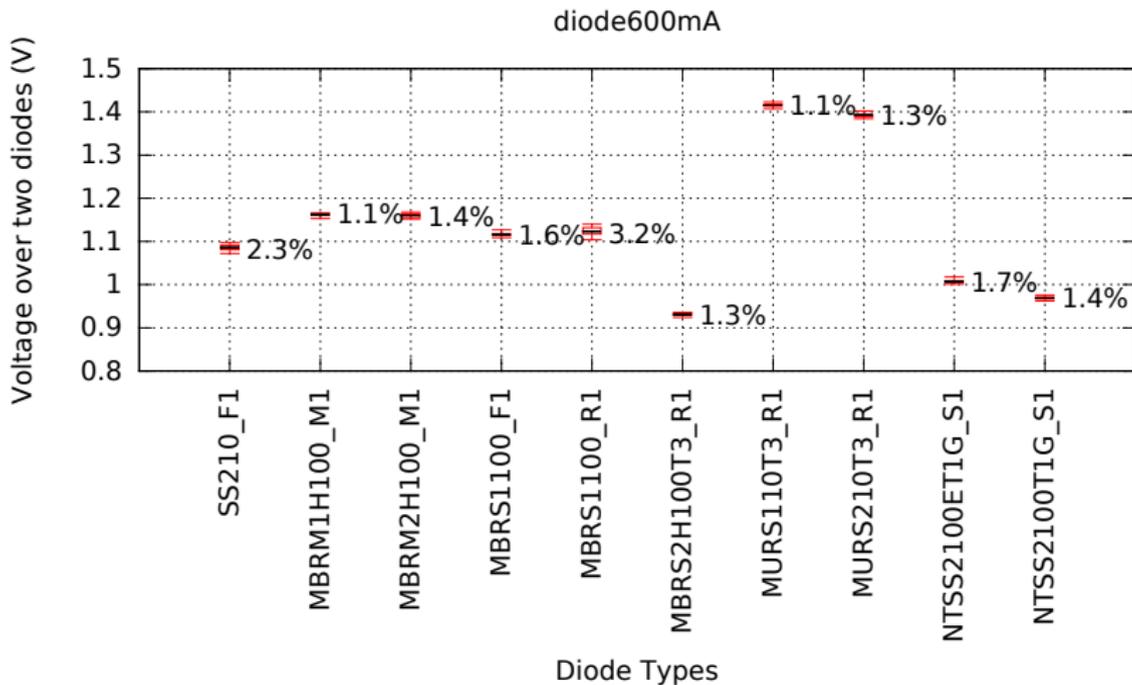
Diodes are measured at currents 350mA, 600mA and 1A. 50 samples of each diode are used. The last two letters in the diode name indicate the purchase source and internal batch number.

Box plots are used to show the results. The black line is the median, the red box represents 50% of the samples. The percentage number indicates the relative voltage difference of two diodes in series at the minimum and maximum of the samples measured.

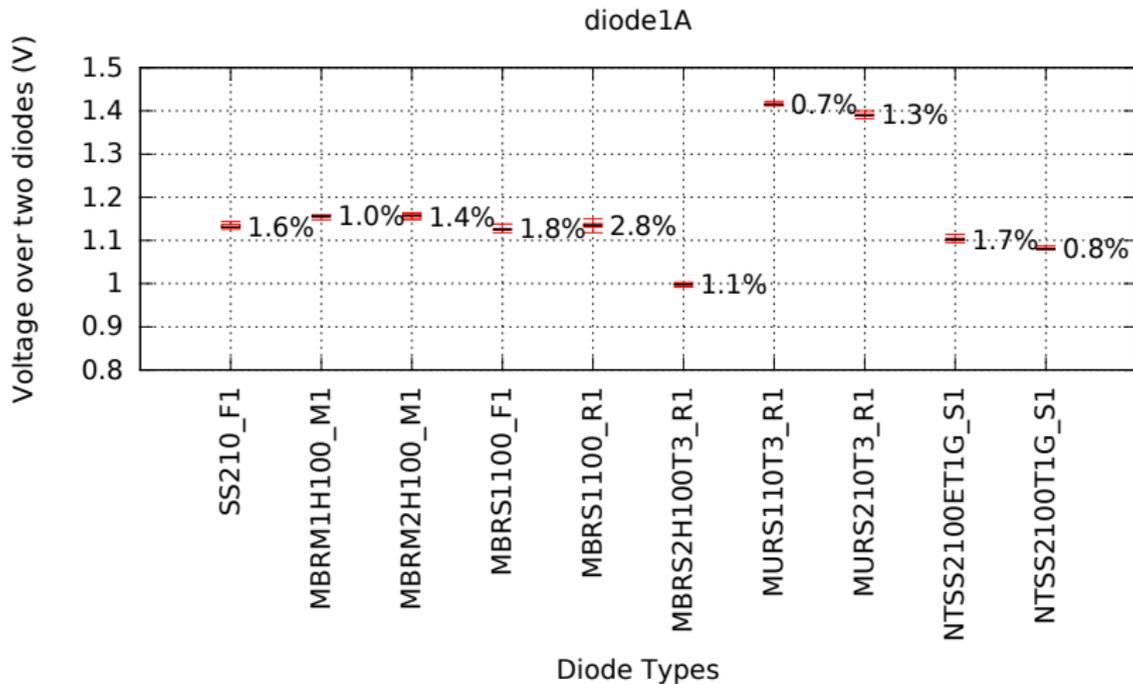
Results diode350mA



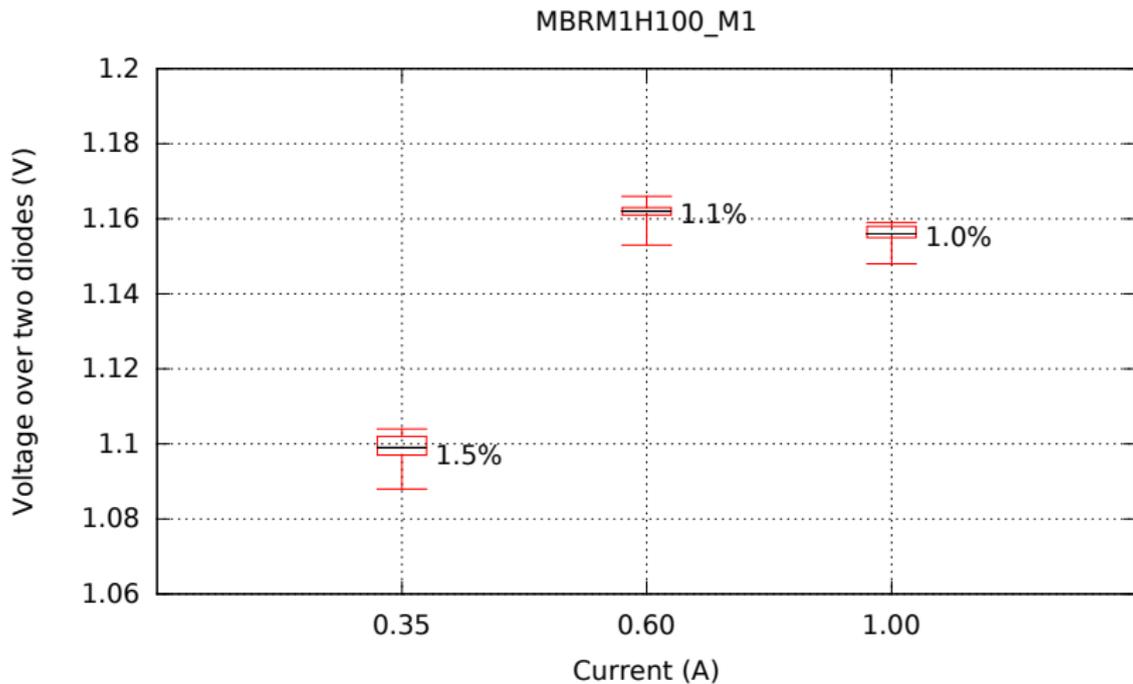
Results diode600mA



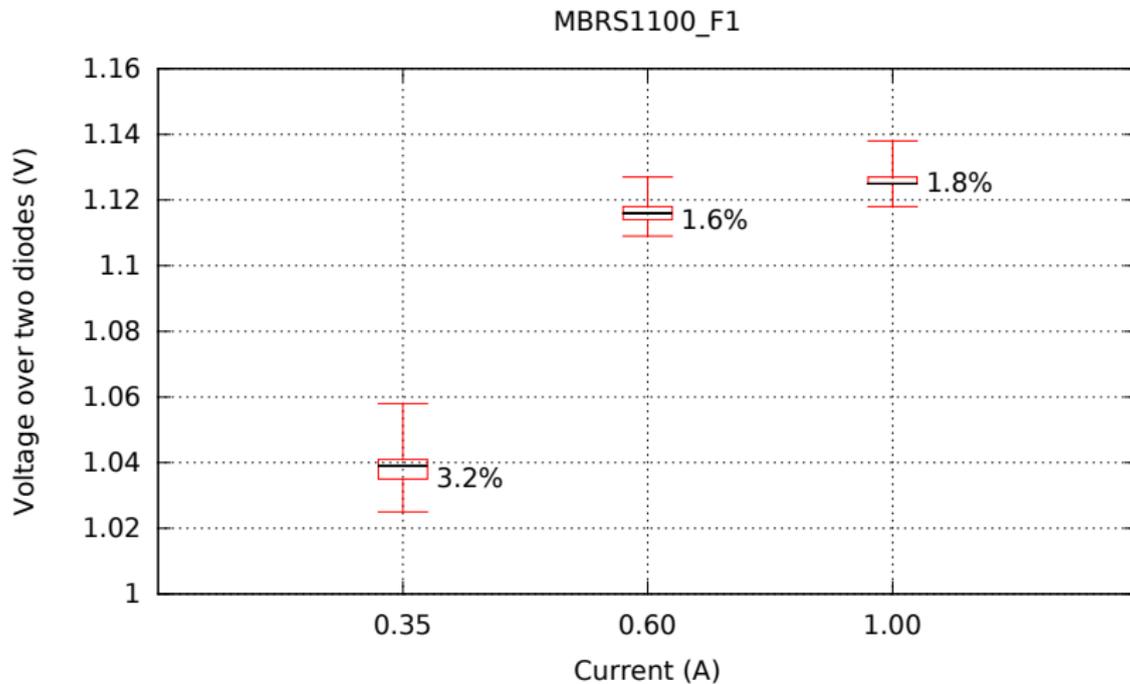
Results diode1A



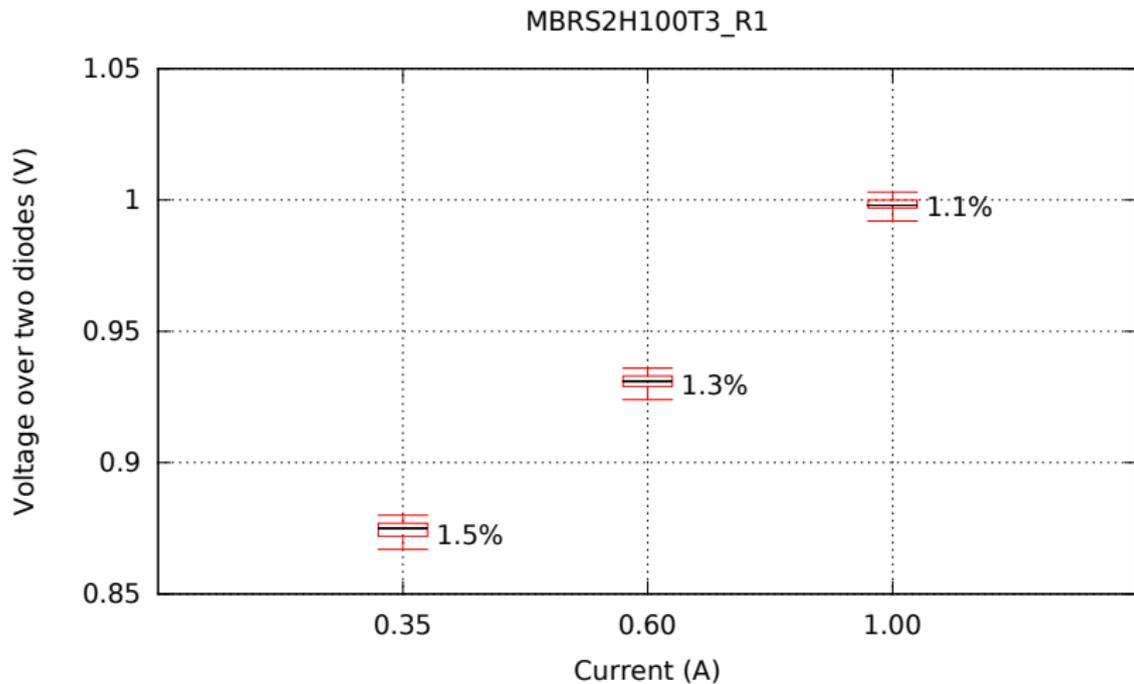
Results MBRM1H100M1



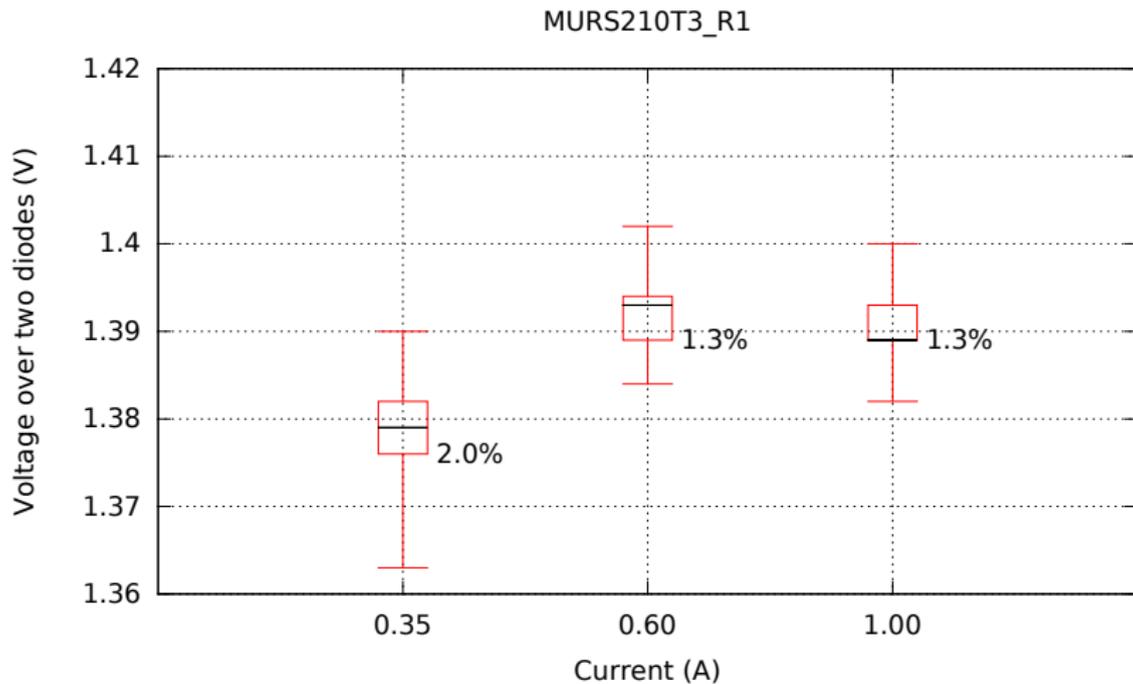
Results MBR51100F1



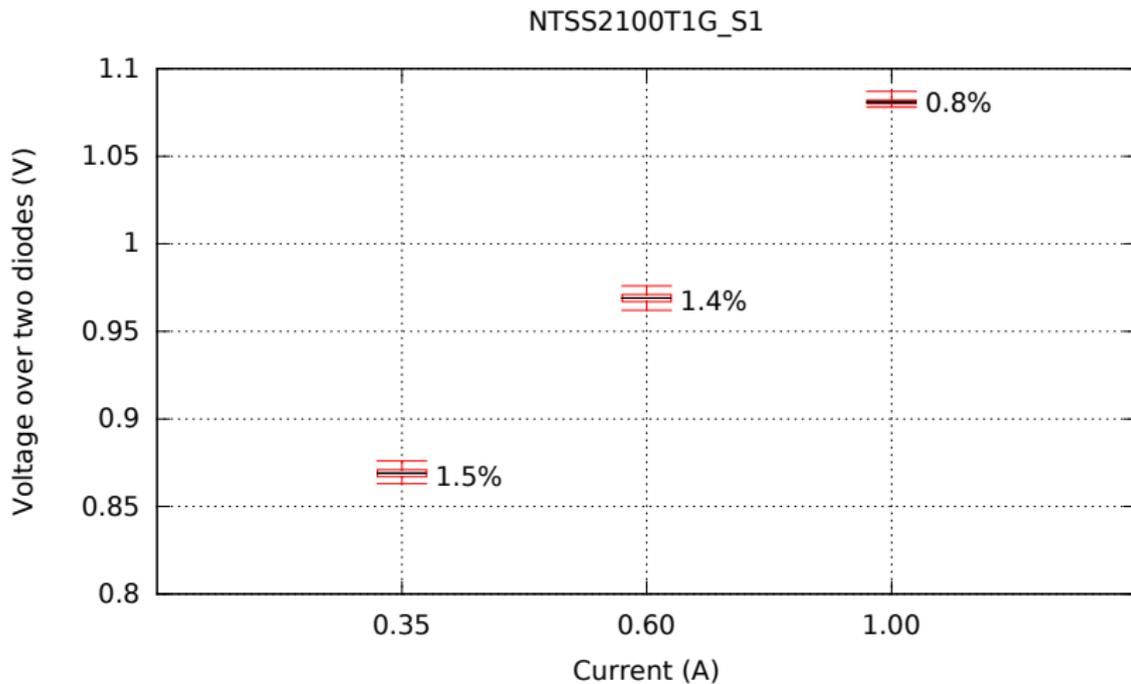
Results MBR2H100T3R1



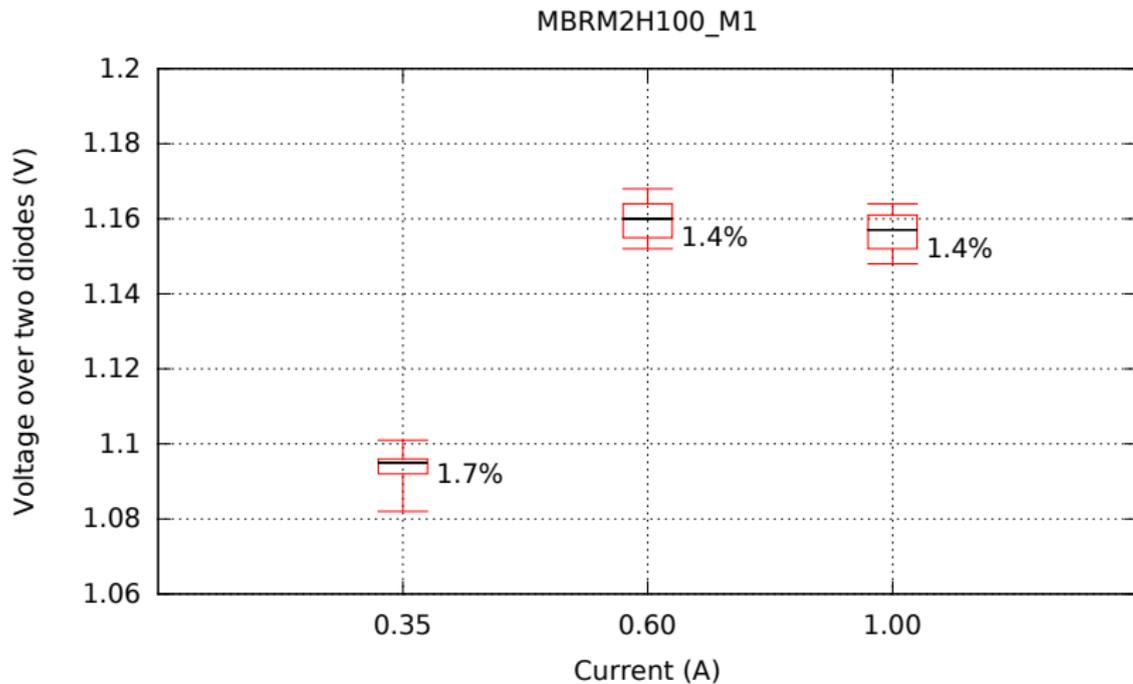
Results MURS210T3R1



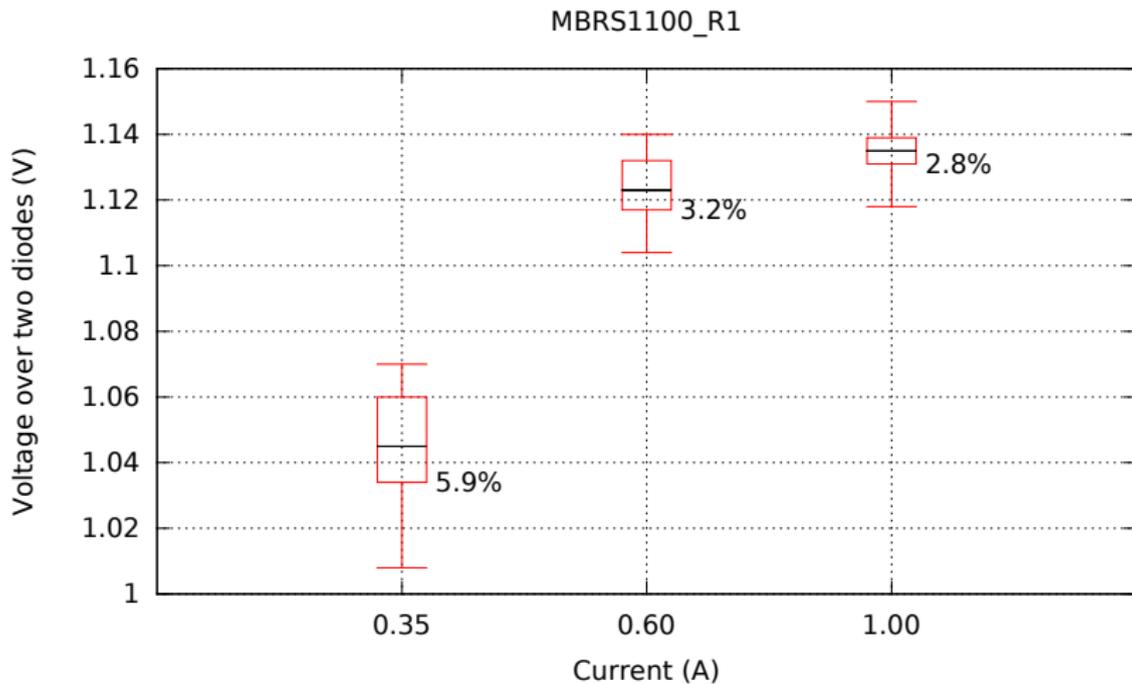
Results NTSS2100T1GS1



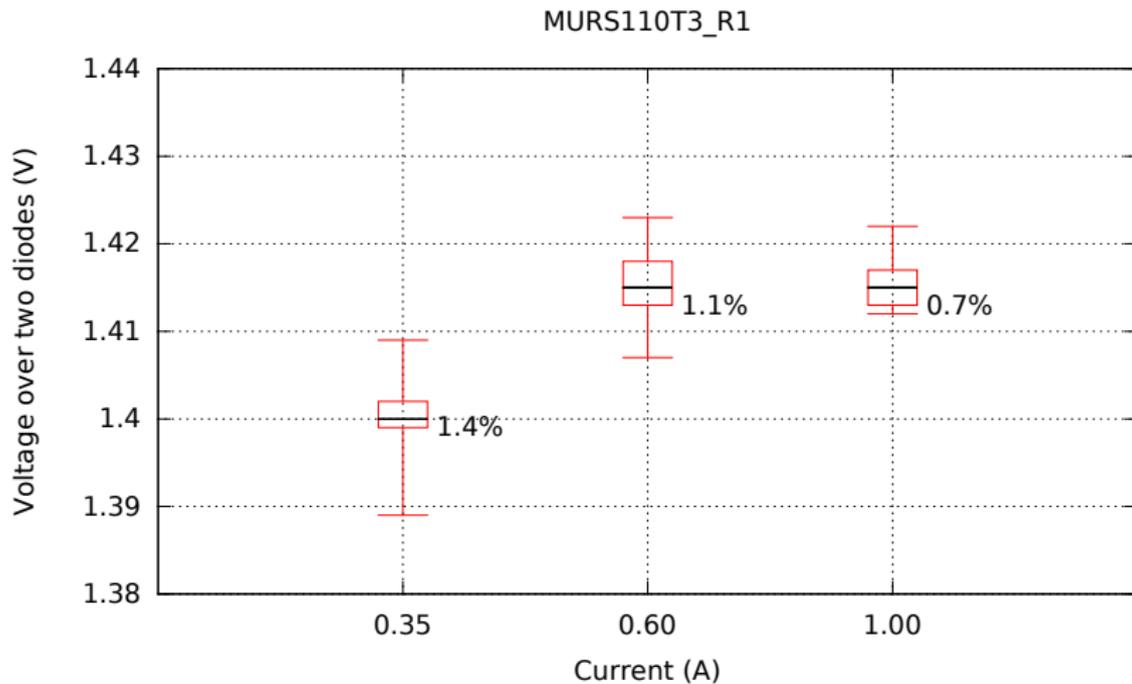
Results MBRM2H100M1



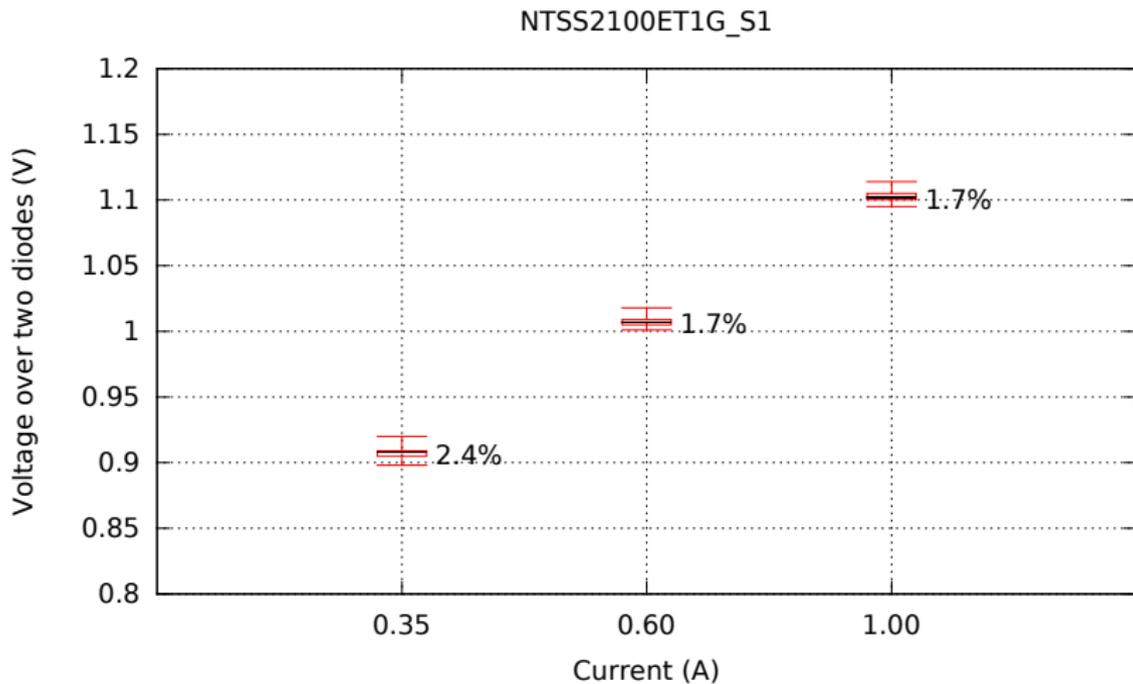
Results MBR51100R1



Results MURS110T3R1



Results NTSS2100ET1GS1



Results SS210F1

