IEEE 802.3af DTE Power via MDI

Optimizing disconnect detection ac probing signal

AD HOC A.I. 2.4

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Test objectives

- To set the optimum range of the “AC disconnect” probing signal
- To set the frequency tolerance, according to sensitivity test results
- To test that the “AC disconnect” detection circuit can reliably detect an IEEE compliant PD.

Test setup – PSE side

PARAMETERS:

Cpse = 0.22uF

Cprobe = 10uF

Rpse = 400k

Rprobe = 7.5K

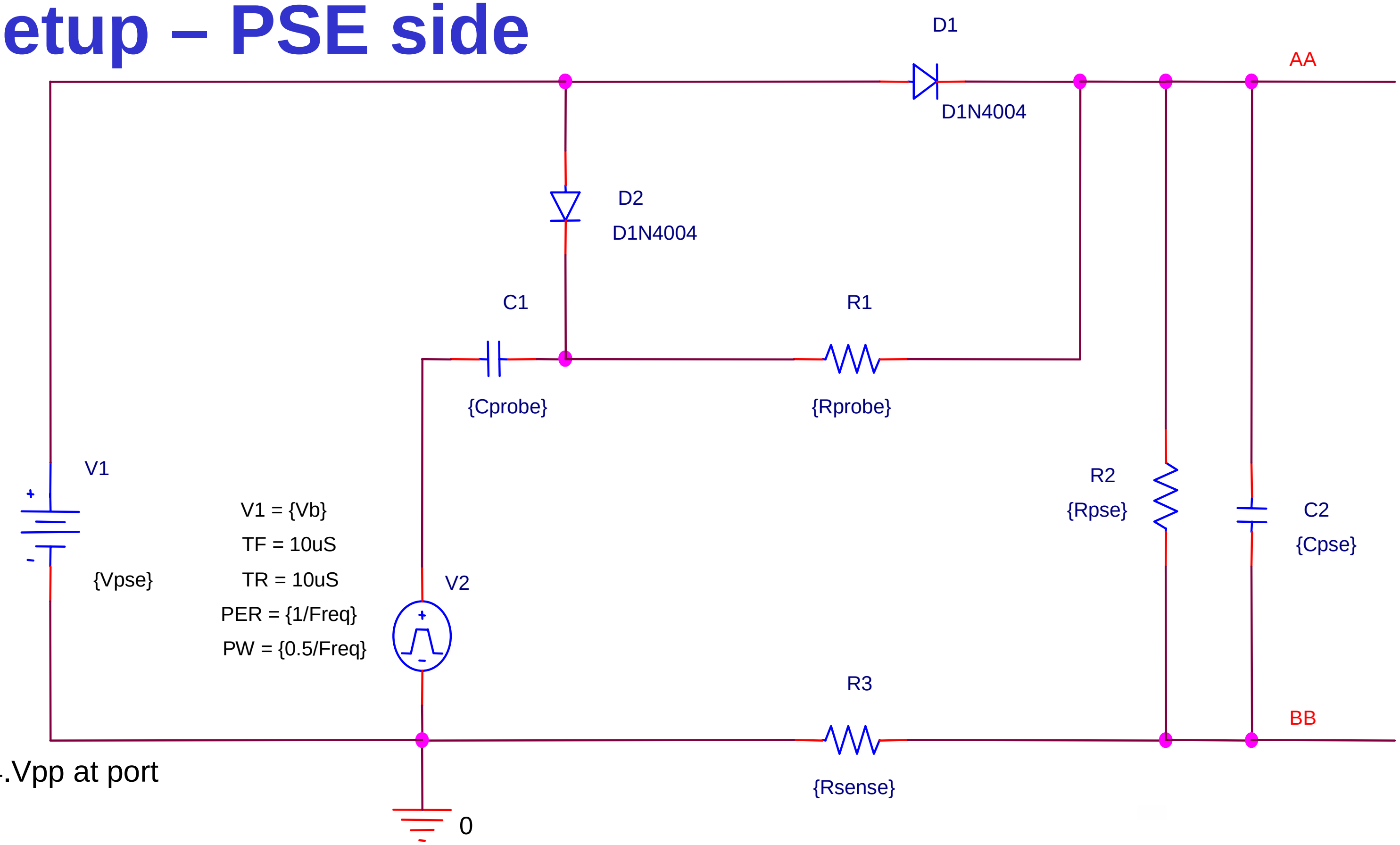
Rsense = 2

Freq = 125

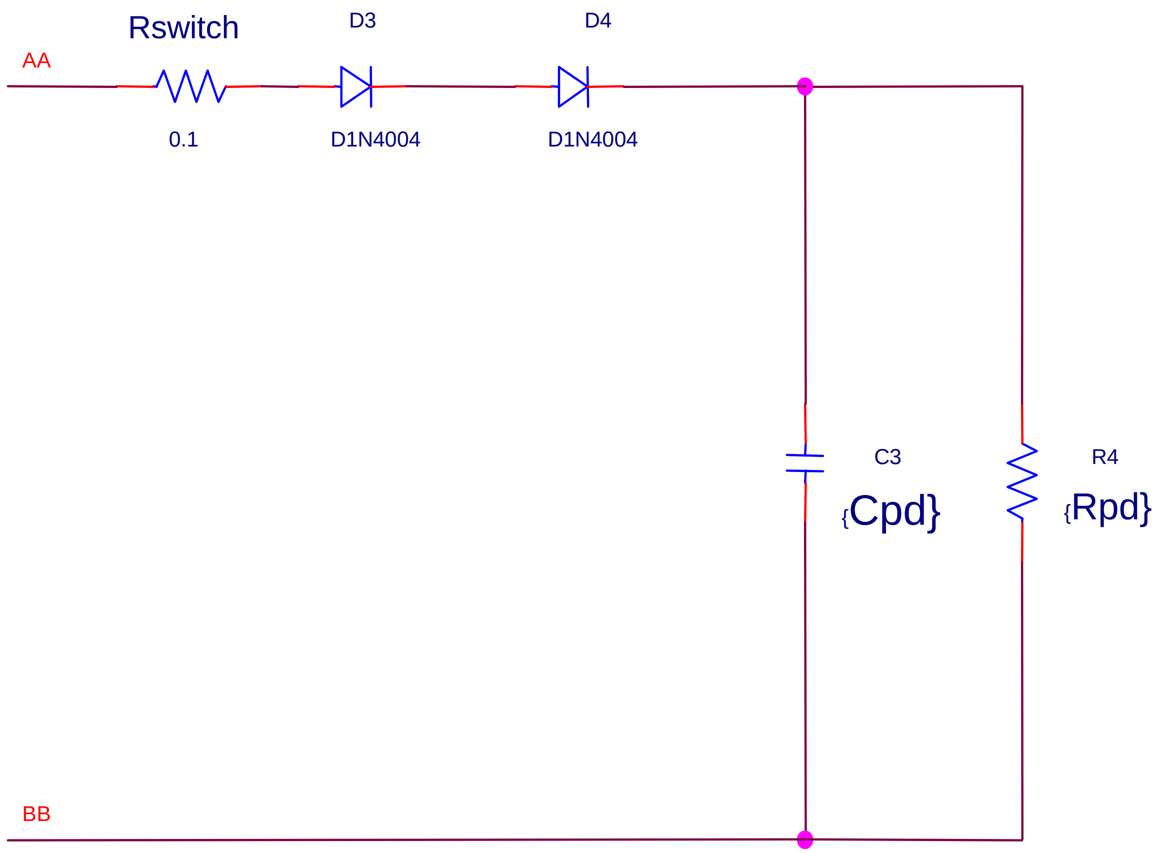
Vpse = 49

D1,D2 =1N4004

Vb = set to have 4.4.Vpp at port



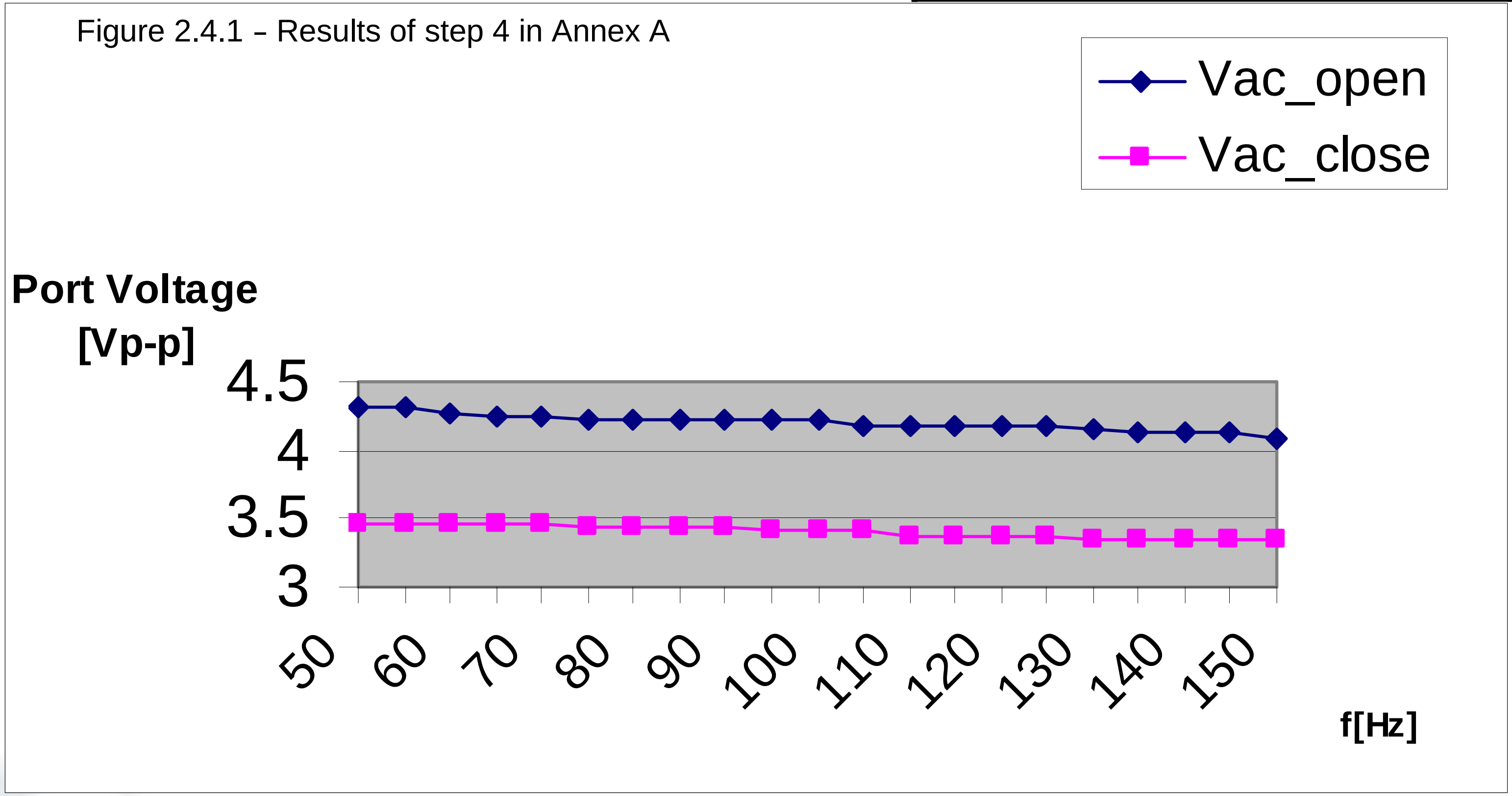
Test setup – PD side



Vac_close vs. frequency.

-Without DC bias
-Frequency range: 50Hz to 150Hz
-Vac_open=4.22Vpp @ 125Hz

Parameter	Rpd	Cpd
Vac_close1	19Kohm	0.1uF
Vac_close3	19Kohm	0.1uF



Vac_close vs. frequency.

-Without DC bias
-Frequency range: 115Hz to 133Hz +/-15%
-Vac_open=4.22Vpp

Parameter	Rpd	Cpd
Vac_close1	5.7Kohm	5uF
Vac_close2	105.7ohm	570uF
Vac_close3	5.7Kohm	5uF
Vac_close4	105.7ohm	570uF

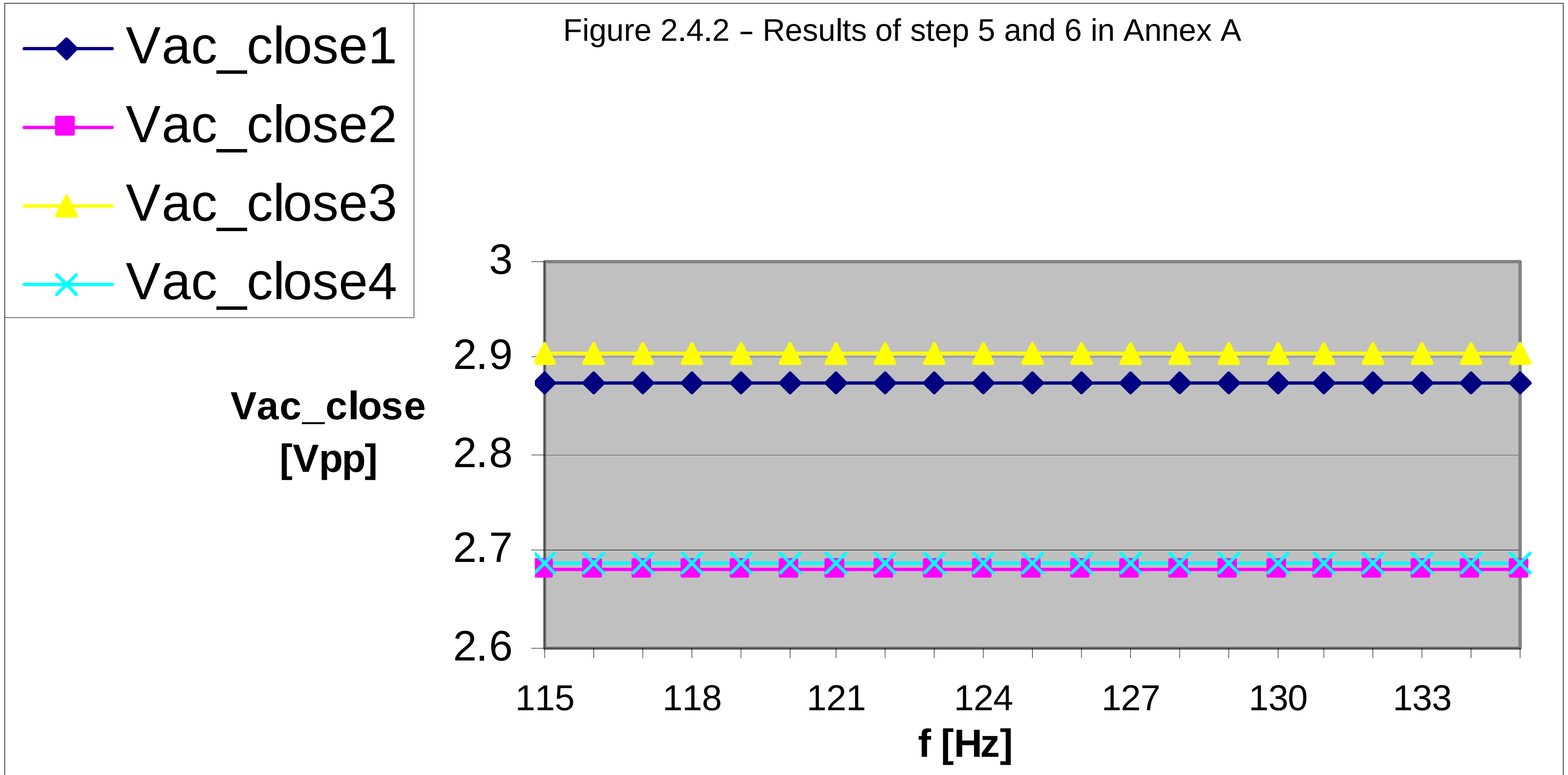


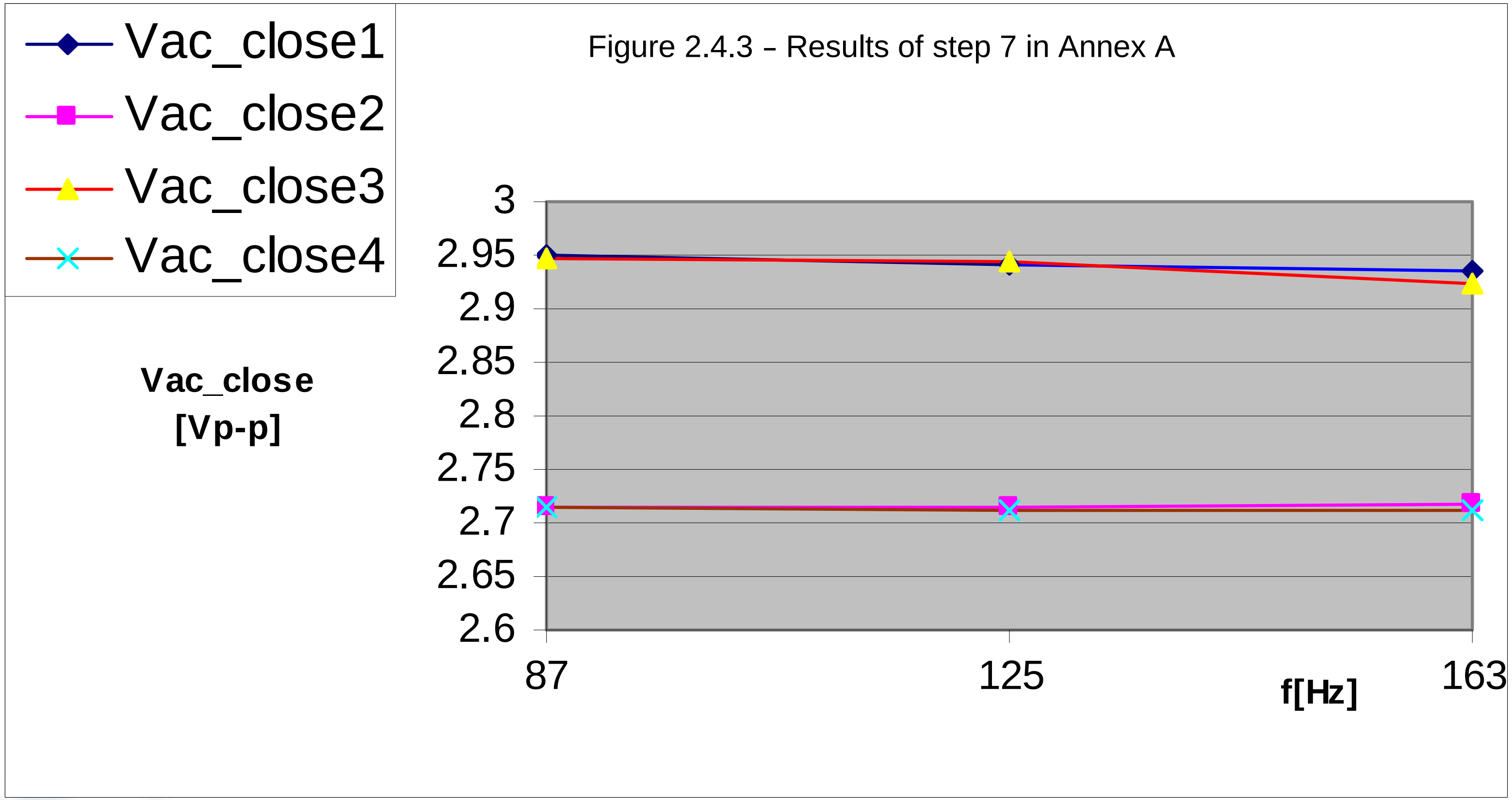
Figure 2.4.2 – Results of step 5 and 6 in Annex A

Vac_close vs. frequency.

-Without DC bias
-Frequency range: 87Hz to 163Hz(+/-30%)
- Vac_open=4.22Vpp

Parameter	Rpd	Cpd
Vac_close1	5.7Kohm	5uF
Vac_close2	105.7ohm	570uF
Vac_close3	5.7Kohm	5uF
Vac_close4	105.7ohm	570uF

Figure 2.4.3 – Results of step 7 in Annex A



Measurements for different PD vendors

(Results of steps 8,9 and 10 in Annex A)

Device	**Phone1**	**Phone 2**	**Phone3**
Parameter(Vpp)			
Vac_open	4.188	4.188	4.188
Vac_close after detection - No DC bias	2.85	2.75	2.8
Vac_close – With DC bias	0.0072	0.0056	0.008

Summary and Conclusions

- Vac_close and Vac_open are not sensitive to frequency change with in wide range +/-30% and more (less than 50mVpp)
- Vac_close without DC bias is kept within narrow limits as function of PD load changes (250mVpp max)
- Threshold points should be set by PSE vendor according to his implementation and Vac_open value
- Successful Disconnect Detection has been achieved with 3 different PDs
- Good parameters tracking has been demonstrated for 3 different PDs

Bottom line:

- Sensitivity of ac probing voltage to its frequency is low enough to allow low cost implementation.
  - Tested for 50Hz to 150Hz span.
- Optimum nominal frequency should be selected according to PSE circuit parameters only.
- 500Hz should be absolute max value.

Annex A - Test procedure

1. Set the optimum values of test setup parameters according to other hardware functions attached to the port (detection function etc.). For the test setup in figure 1, the following values has been chosen: R1 =7.5Kohm, C1=10uF.
2. All tests will be performed without DC voltage bias at the port, unless otherwise is specified.
   All measurements made across D1 or across the PSE port.
3. Sweep frequency from 50Hz to 150Hz at step of 5Hz and measure Vac_open.
   (no load is connected to PSE, 4.4V>Vac_open>2.5V)
4. Connect min load of 19kohm and capacitor of 0.1uF = Z=9.9kohm and measure Vac_close.
   Find the frequency, Fc, that generates the highest value of Vdiff=Vac_open-Vac_close
   Mark the frequency as the optimal frequency value.
5. Sweep frequency around Fc at step of 1Hz and measure Vac_close1,Vac_close2, Vac_close3 and Vac_close4 per table 2.4.2 Annex B),
6. Find the frequency range that still meets proposed limits.
7. Repeat steps 5 and 6 for 30% change at frequency.
8. Measure Vac_open across the port for f=Fc.
9. Connect IEEE compliant PD to port and measure Vac_close (no DC applied) and Vac_close_dc
   (When Vdc=48V is applied)
10. Repeat measurements for other IEEE compliant PD’s (according to device table).

Annex B - Table 2.4.2: test loads

Parameter	**R**	**C**
Vac_close1	5.7Kohm	5uF
Vac_close2	105.7ohm	570uF
Vac_close3	5.7Kohm	5uF
Vac_close4	105.7ohm	570uF

Annex C - Table 2.4.3: Device Table

Device	Manufacturer	Model
Phone 1	MFG1	PN1
Phone 2	MFG2	PN2
Phone 3	MFG3	PN2