PDs Guide

(ver 1.4)

Quick reference for Partial Discharge analysis

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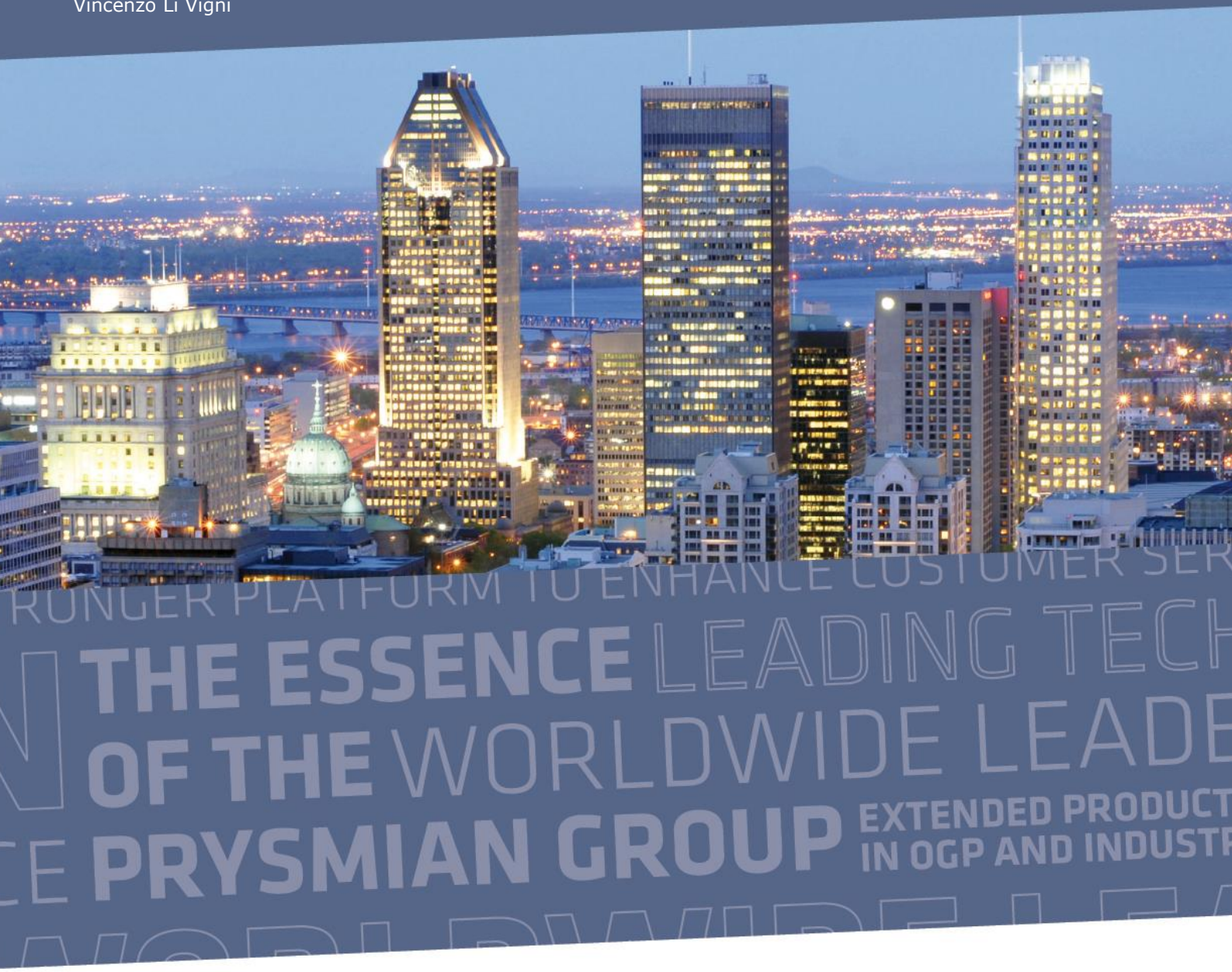
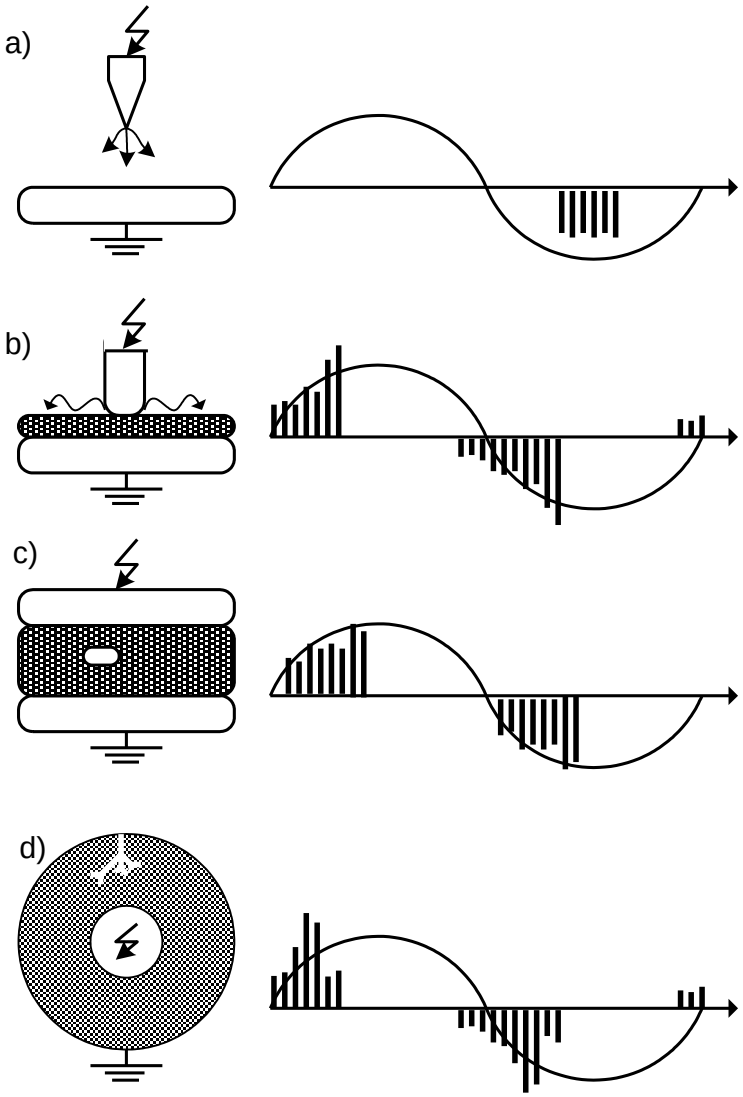


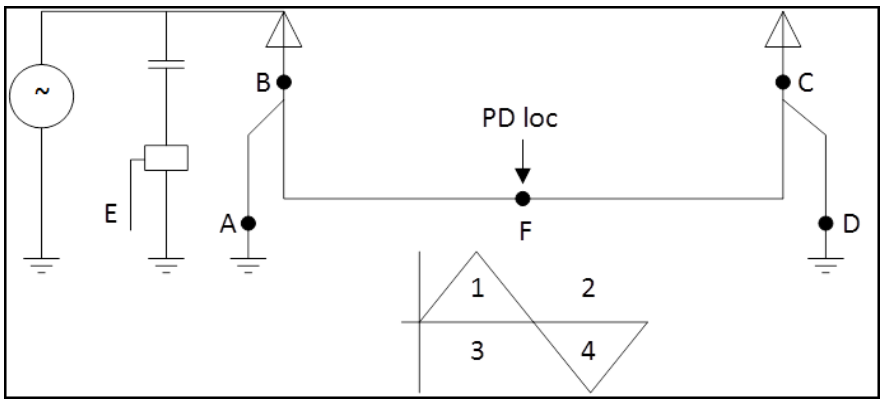
Prysmian Group

PRYSMIAN

Draka



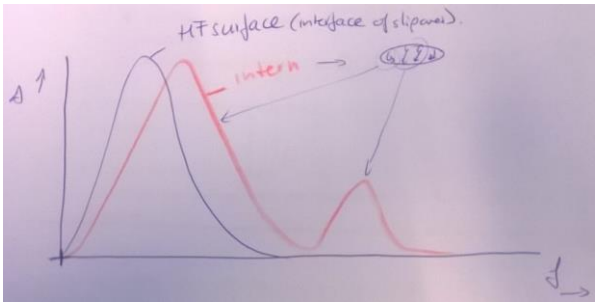
a) Corona
b) Surface
c) Internal
d) Tree

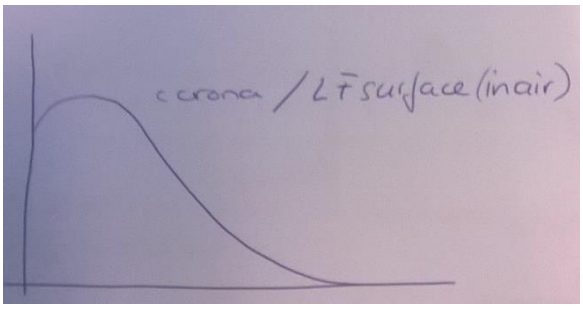


A or B : Pattern in 1 and 4
C or D : Pattern in 2 and 3
E : Pattern in 1, 2, 3 and 4. (sometimes only 1 and 4)
F : Pattern in 1, 2, 3 and 4.

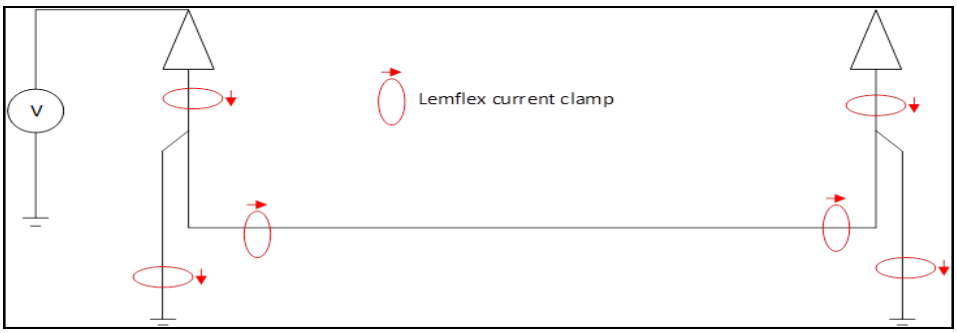
Frequency content:
< 5 MHz : Corona
< 10MHz : Internal surface (e.g. stress-cone)
< 50MHz : Internal discharges

Normal PD is max ~ 0,05usec pulsewidth.
If > 0,05usec : Outside termination (dust etc..)
If 0,25 – 0,5 usec : in oil or rotating machines (PD in oil is "slower" then GIS/XLPE)





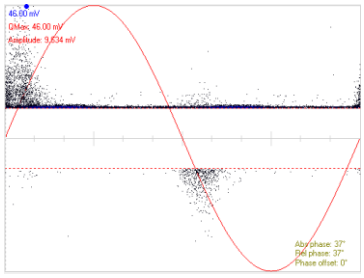
Triggering:
During SAT : I = Icharge => with lemflex shift pattern 90' to the left
Using internal triggering you must shift pattern 30" to the left
Online : I ~ U => don't shift pattern or max 15' to the right for cosphi~0,9



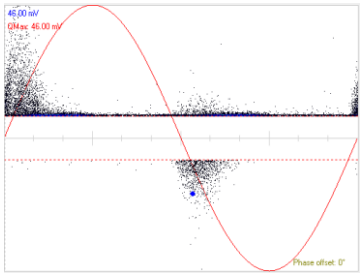
(Notes by Theo Hermans)

3-phase cable, sync on light, 20kV, 1.5 m from cable end (switchgear) in basement: same source (no phase shift)

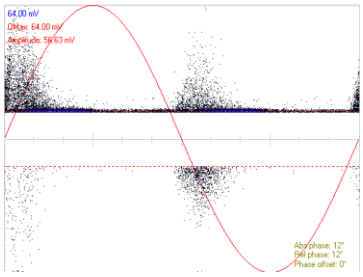
L1



L2



L3



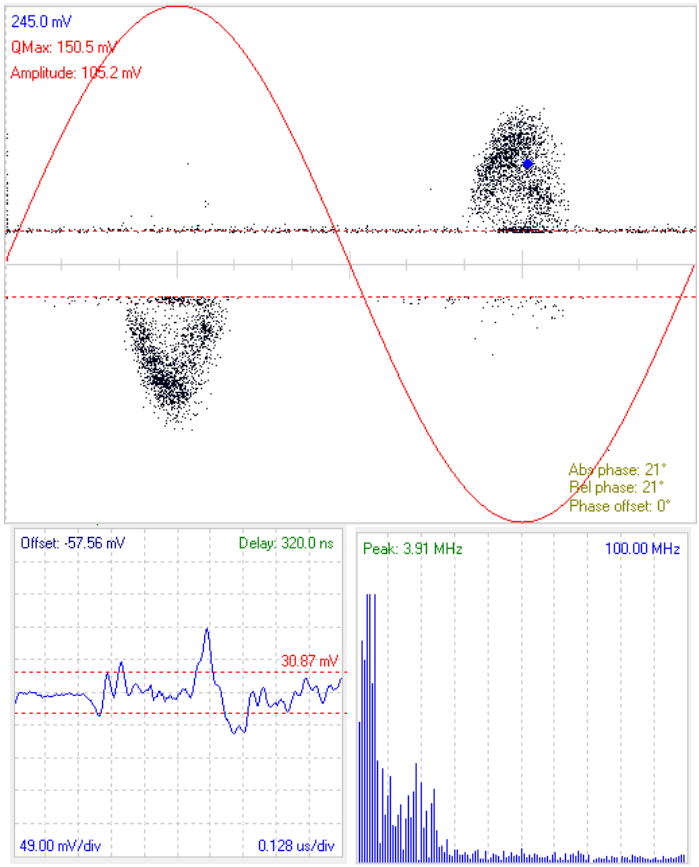


Figure 1 - Corona HV.

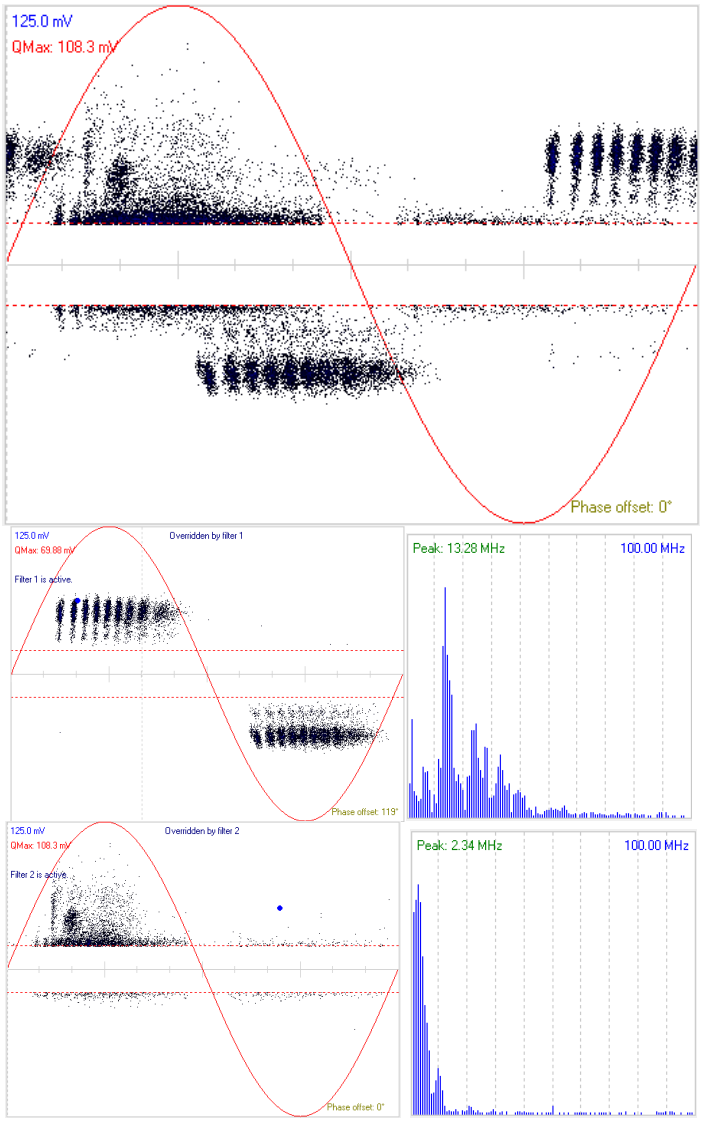


Figure 2 - Corona on terminations (120° phase shift) and surface on HV.
The corona looks like a floating mass; this particular shape is due to rain, snow or dirty.

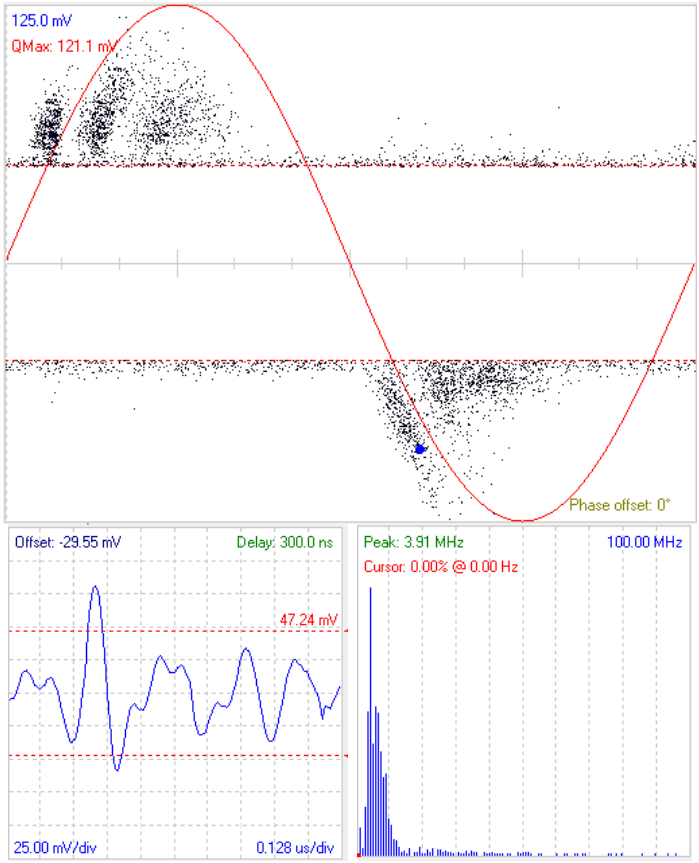


Figure 3 - Surface in air HV connection.
Low frequency content; the shape of the pattern resembles the one of the 50Hz sine.
In this case the PDs are probably due to humidity or dust on the outdoor termination.

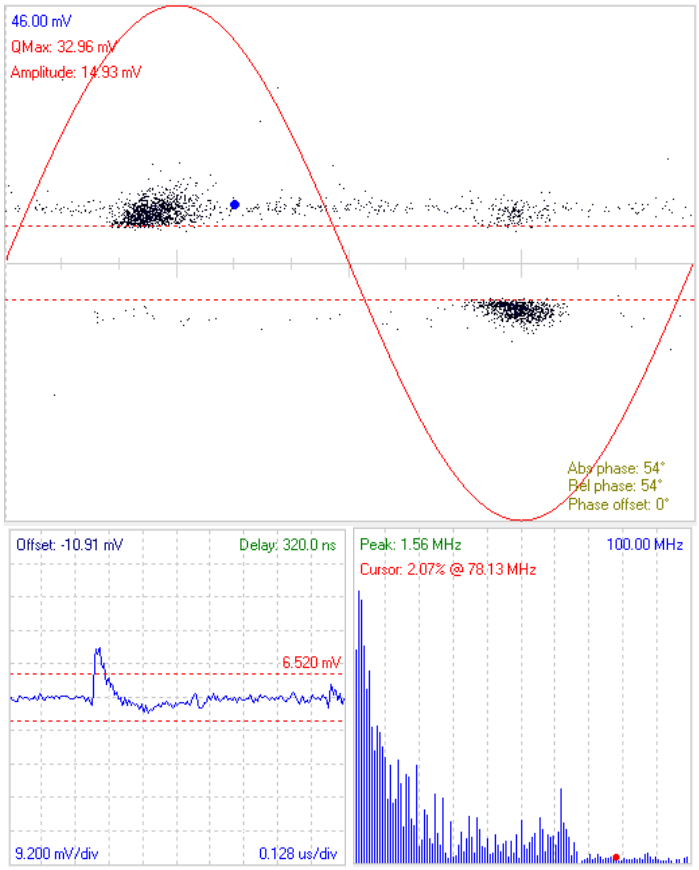


Figure 4 - Surface on MV termination with a small mistake in phase that could be shifted 90° on the left.

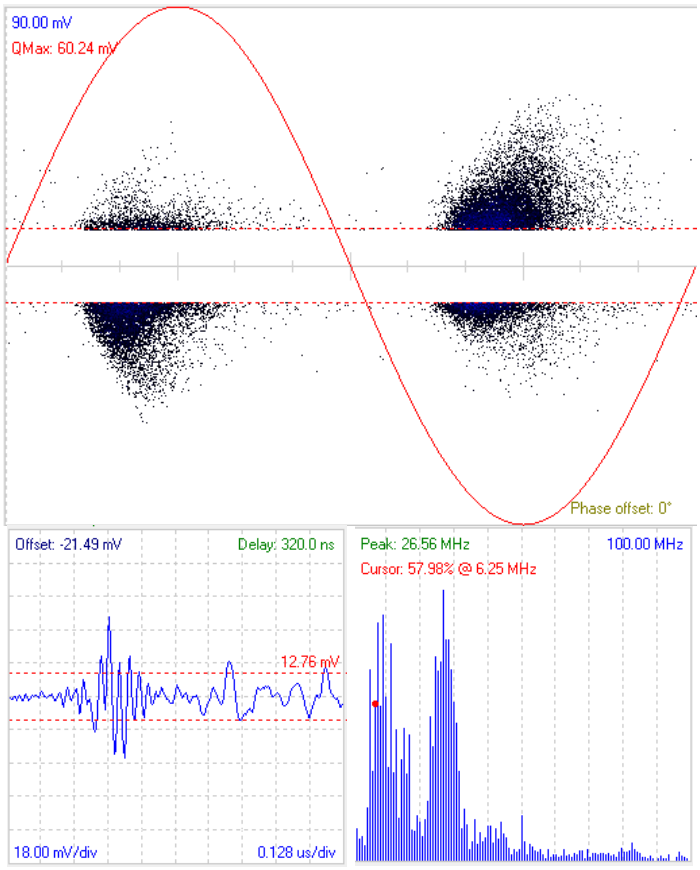


Figure 5 - Surface scratch on external semicon layer MV cable.

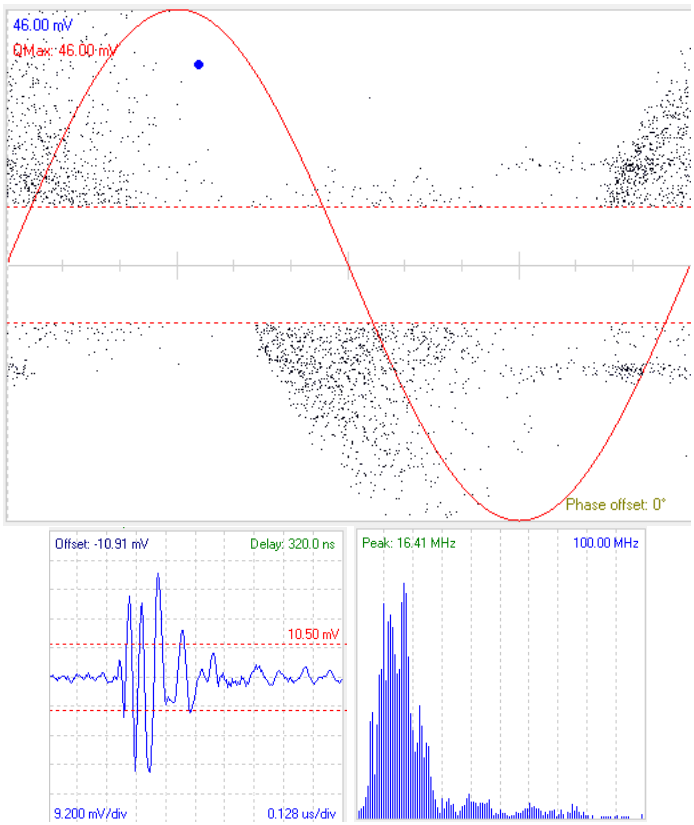


Figure 6 - Surface on a transformer termination

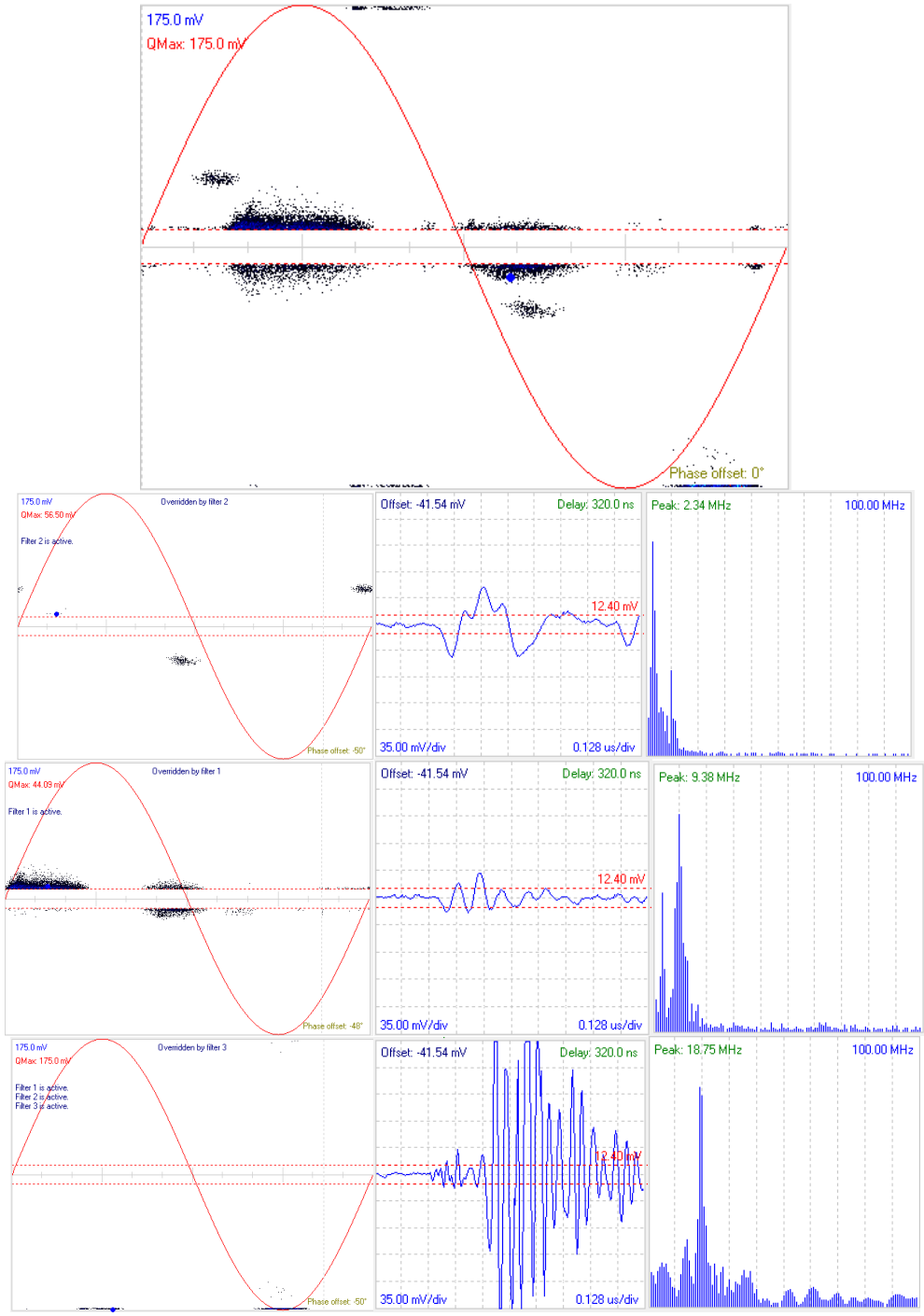


Figure 7 - Two corona + Surface bag (Phase shift -50°)

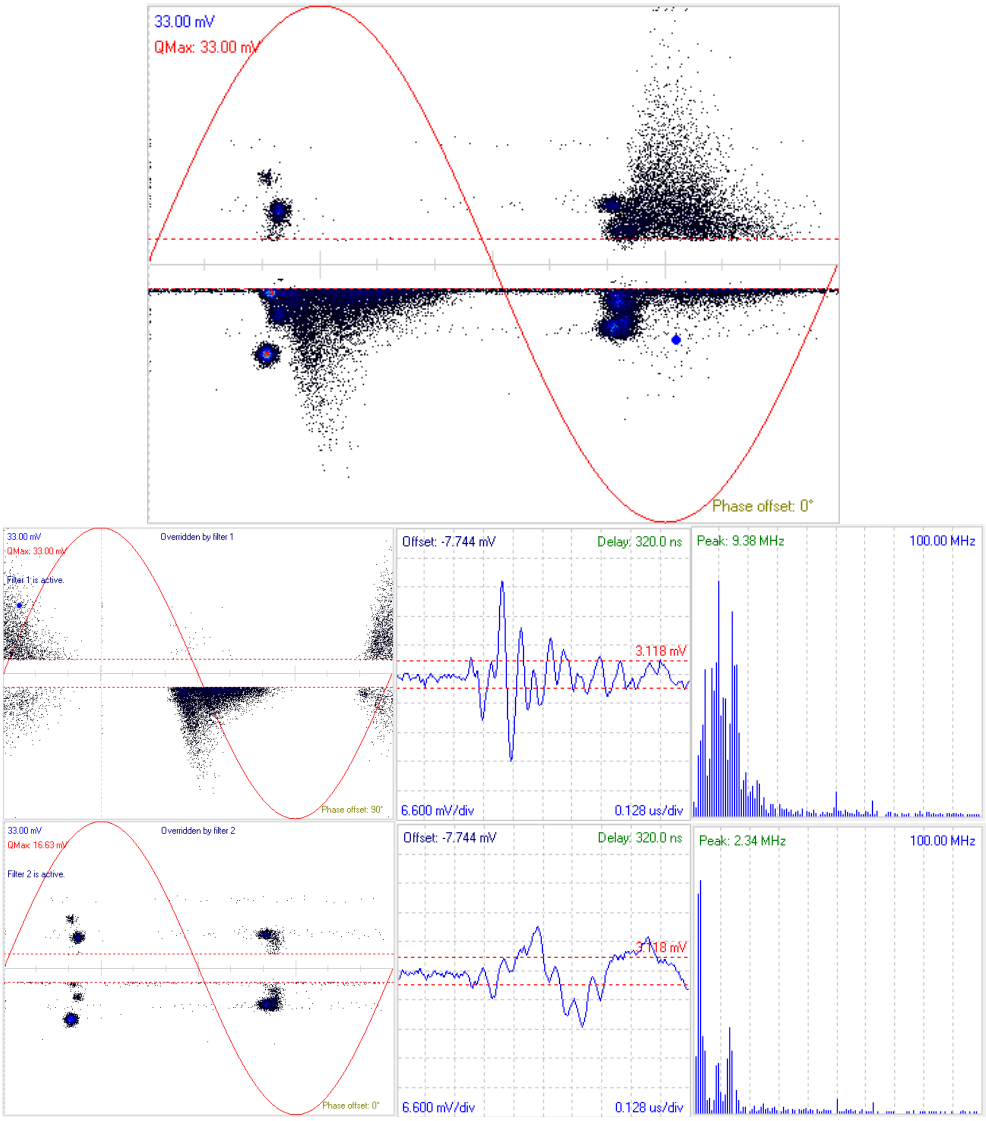


Figure 8 - Surface GIS dry 220kV.
(top) Surface
(bottom) Resonant generator noise.

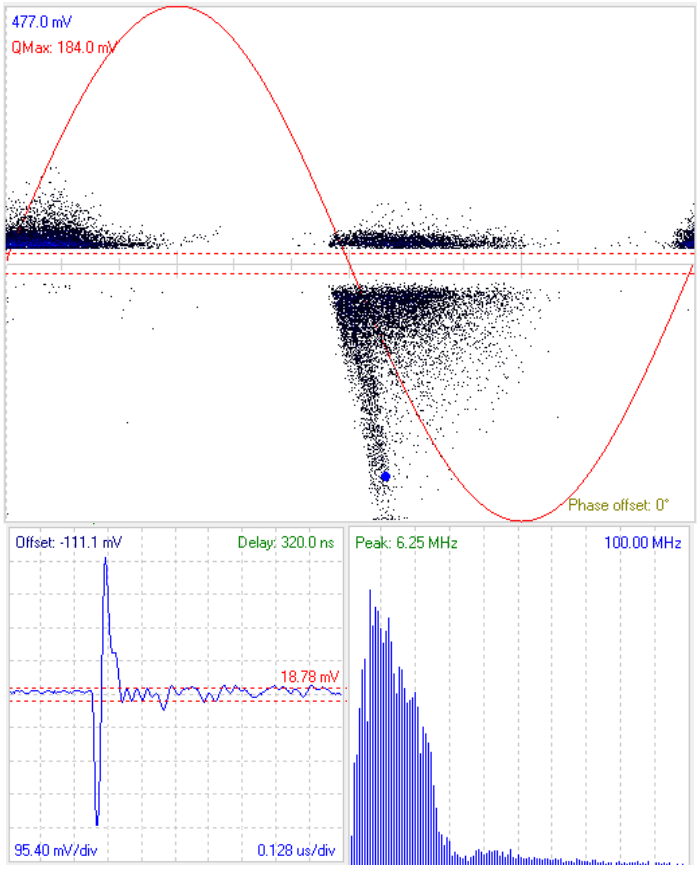


Figure 9 – Internal on Joint 220 kV.

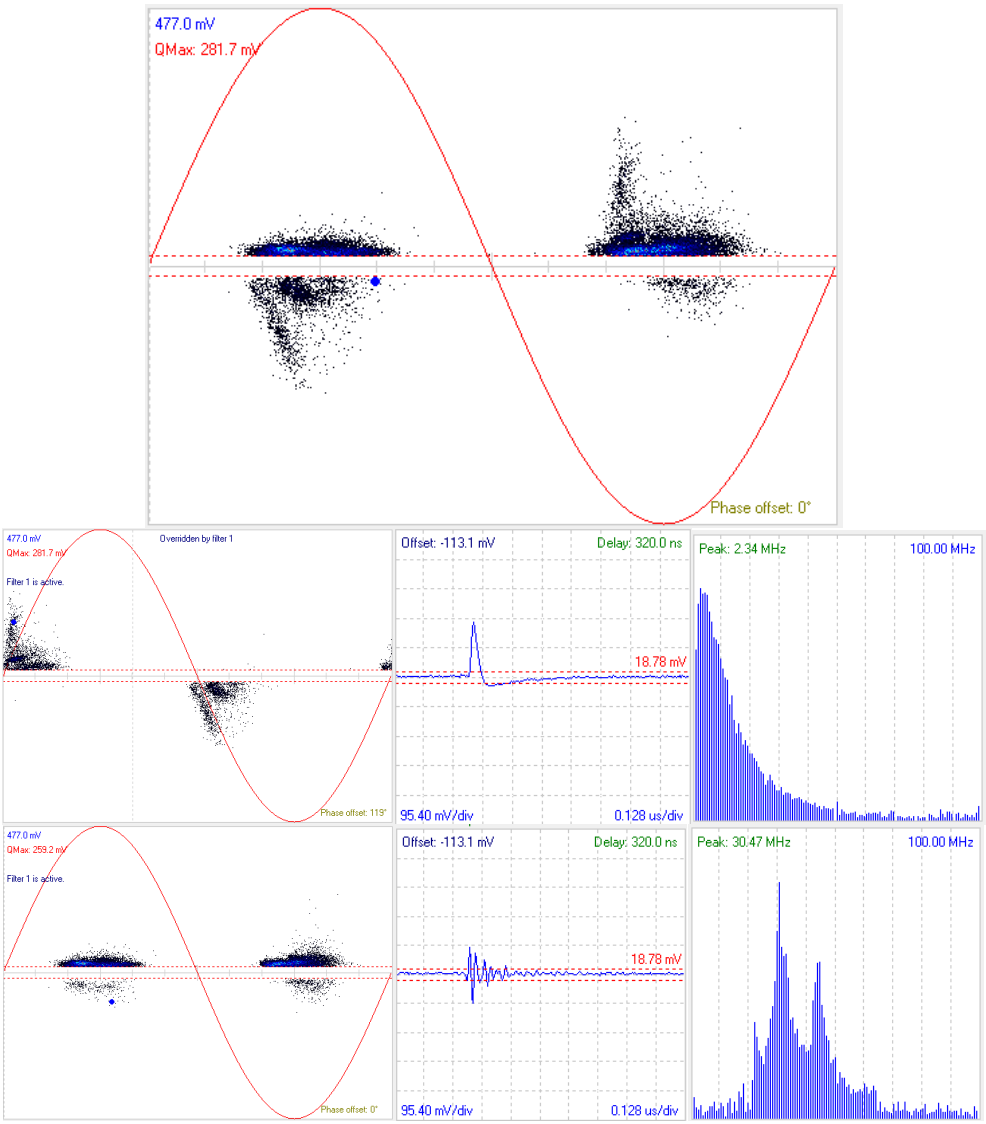


Figure 10 - Joint PD bag + Corona 120°.

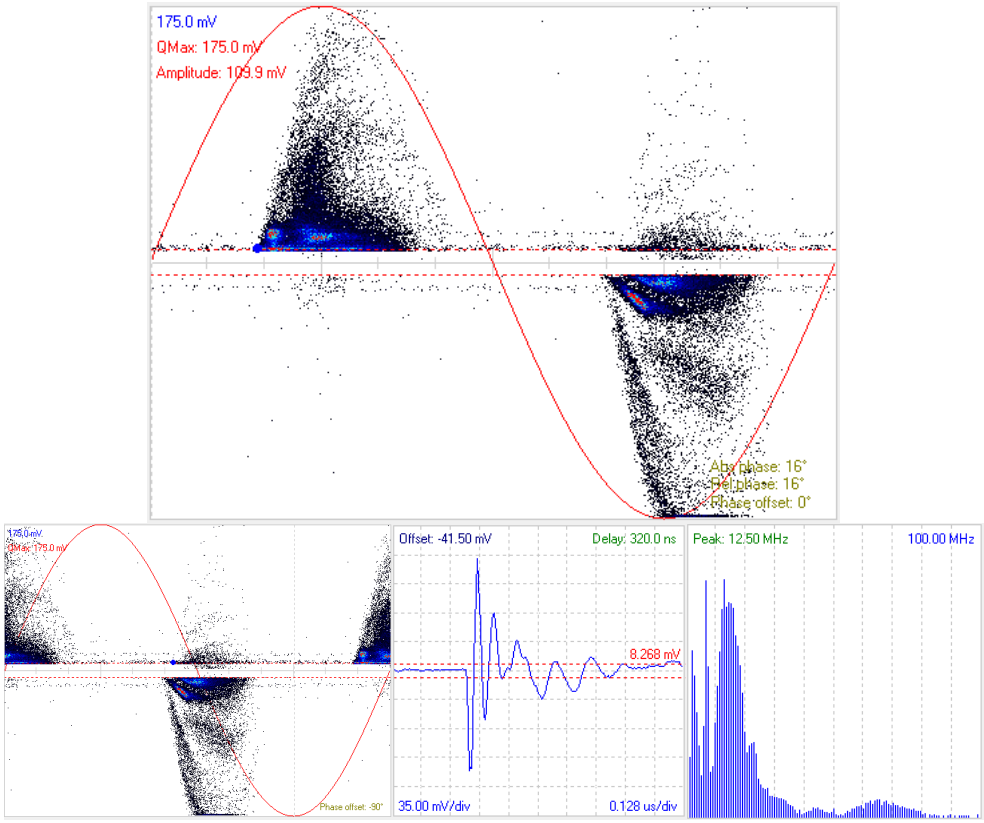


Figure 11 – Internal - Voids 150 kV cable.
-90° phase shift

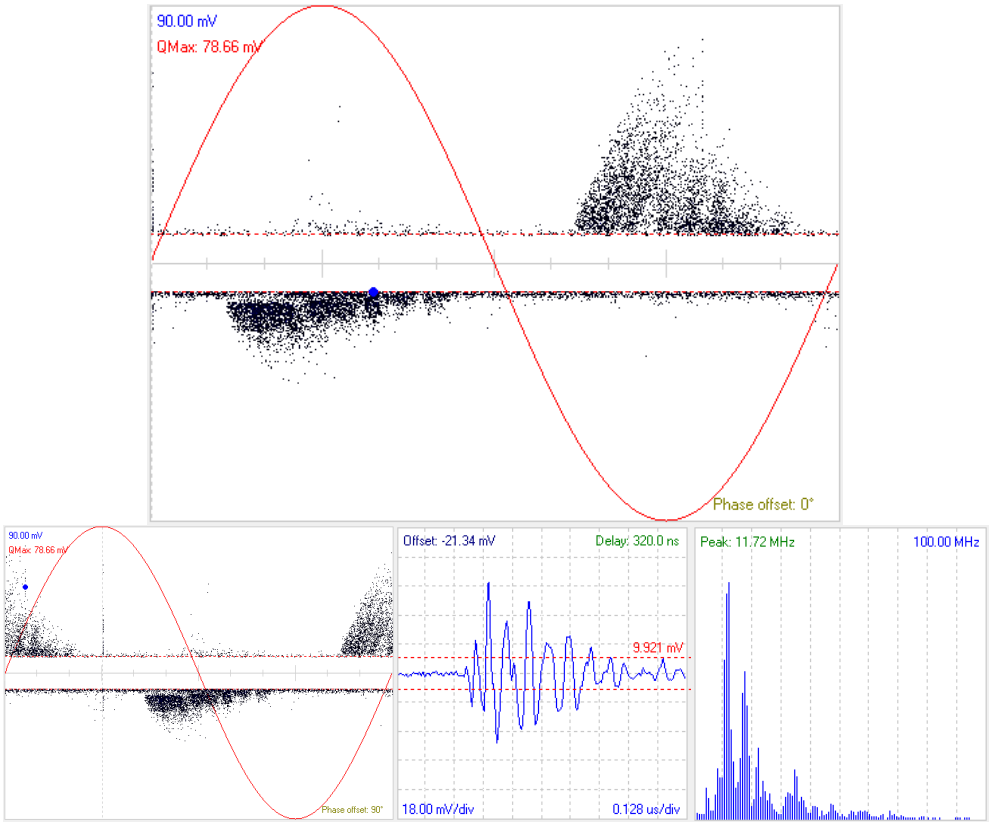


Figure 12 - Internal - Water treeing MV cable.
(90° phase shift)