**Date:** 11.04.2019

**Attendees:** Mesut Uğur, Furkan Karakaya

**Location:** Electrical Machines Laboratory

**Target:** V1.3 Gate Driver Board (#1)

**Test type:** Double Pulse Test

**Aims before the test:**

**1.** To test the new version Gate Driver Board (GDB) for the first time

**2.** To verify the design of new GDB with Double Pulse Test (DPT) applied to each phase

**3.** To observe the potential improvements on Vds and Vgs overshoots and oscillations with the new layout design

**Conditions:** All-phases, 22 Ohm Ron, 2 Ohm Roff. 0-300V VDC. Load: Stage-2

**Steps:**

**1.** Electrical and functional tests are applied to the board step by step. All VCC voltages and gate driver circuits are verified and the board is prepared for the DPT tests.

**2.** DPT is applied by observing Vds (turn-off) and Vgs (false-turn-on region) separately. The load is connected to bottom switch and Vds and Vgs are observed from the bottom switch for all tests.

**3.** On each phase, Vds is observed from 0V to 100V first.

**4.** On each phase, Vgs is observed from 0V to 200V.

**5.** On each phase, Vds is observed from 100V to 200V. Vds overshoots are quite similar to each other, and very low compared to the old GDB version (until 200V).

**6.** On phase-a, Vgs is observed from 200V to 300V. False-turn-on performance is promising.

**7.** On phase-c, Vgs is observed from 200V to 300V. False-turn-on performance is also promising. However, a weird peak emerges for 260VDC and higher, 100 ns after the first false-turn-on moment (where top switch is turned-off). Its emergence, number of peaks and amplitude (max 2.2V) changes from trial to trial, showing a probabilistic behaviour.

**8.** Phase-A and Phase-C are indirectly tested for isolation, and no problem occured.

**What to do next:**

**1.** The remaining DPTs will be applied.

**a.** Phase-B Vgs 200V-300V, Phase-B Vds 200V-300V,Phase-A Vds 200V-300V, Phase-C Vds 200V-300V

**2.** The new peak on the Vgs will be analyzed thoroughly. PWM signal, top switch gate (by changing the load connection) and/or N3V voltage will be observed on those moments to get an idea.

**3.** Successive DPT tests may be applied.

**4.** If no problem occurs, 3-phase inverter test with light load will be applied from 0V to 300V by increasing the voltage slowly.

**Results:**

**1. Vds Overshoot**

 

**200V**



**2. Vgs False-Turn-On**



**200V 300V**

 

**3. Gariplikler**



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