

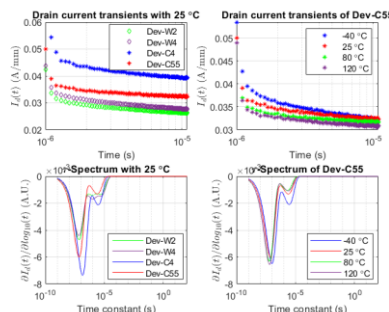
Trapping-effects of AlGaIn/GaN HEMTs

- ✓ Trapping effects due to unintentional defects and intentional doping degrade RF performance.
- ✓ Understanding impact of emission time constant on the linearization performance is critically for DPD with trapping-effects compensation.
- ✓ Impact of emission time constant on both ACPR and EVM was investigated by PA-DPD co-simulation and were validated by experiments.



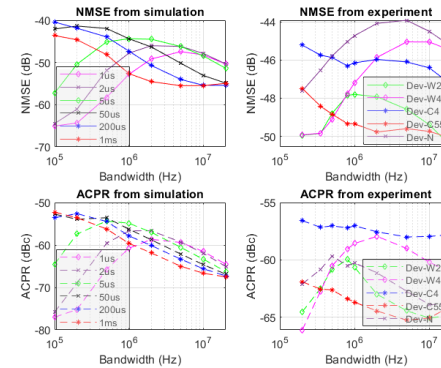
Co-simulation

- DPD with generalized memory quadratic B-spline using Farrow structure is on MATLAB
- A PA model with thermal and trapping modelling implemented in ADS
- ✓ Time constant of trapping-effects
 - 100 ns capture time constant
 - [1us 0.1s] emission time constant



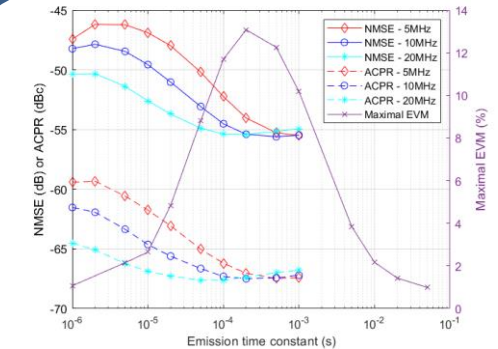
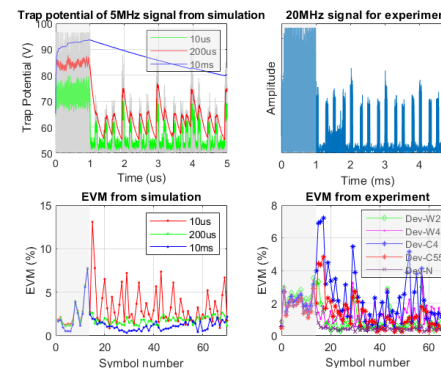
Impact on the ACPR Performance

- When $BW \times \tau_e$ is roughly equal to 5, it normally gets the worst performance..



Impact on the EVM Performance

- [10us 10ms]
- Worst maximal EVM performance when emission time constant is 200 us



- ✓ Emission time constant has negligible impact on the ACPR performance when it is greater than 0.1 ms for signals with bandwidth larger than 5 MHz.
- ✓ Obvious maximal EVM degradation can be observed when emission time constant is from 10 us to 10 ms,



DPD for trapping-effects compensation:

- ✓ Needs to compensate long-term memory introduced by trapping effects of emission time constant from 10 us to 10 ms to achieve better maximal EVM performance.
- ✓ DPD algorithm should also consider temperature dependence of emission time constant.