VisIC Technologies

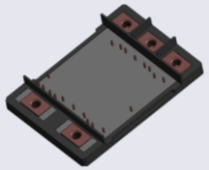
Jan 2026

Business update

HYUNDAI MOTOR GROUP

Committed

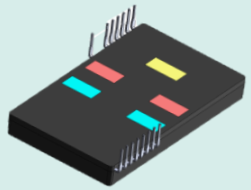
- Committed to integrate GaN into Hybrid and Battery EV platforms
- Own VisIC module for HEV and GaN supply for BEV module, with design support
- SoP 2029



2 Global OEM

Active development projects

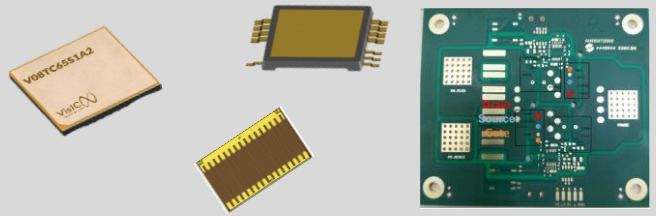
- GaN scalable modules integration into BEV platforms, from 80 kW to 350 kW
- VisIC to supply GaN dice and design support



3 OEM + 1 T1

Technology evaluation

- Active technology evaluation and choice of suitable platforms



Building our China automotive (presence, connection , production)

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2

Device for EV power train

Target features:

- ❑ Reliable by automotive standards
- ❑ Process uniformity to produce high current dice (>100A) at high yield
- ❑ Low switching losses per given RDSON
- ❑ High threshold voltage (> 5V)
- ❑ Easily paralleled, 4-6 devices

Not all GaN is created equal

E-mode

Trade off between V_T and I_D

I_D, A/mm	V_T, V
0.59	+0.65
0.37	+1.25
0.19	+1.81

D-mode

No trade off between V_T and I_D

I_D, A/mm	V_T, V	V_T, V D3GaN
0.6	-5.94	+9.06
0.77	-7.12	+7.88
1.1	-9.3	+6.7

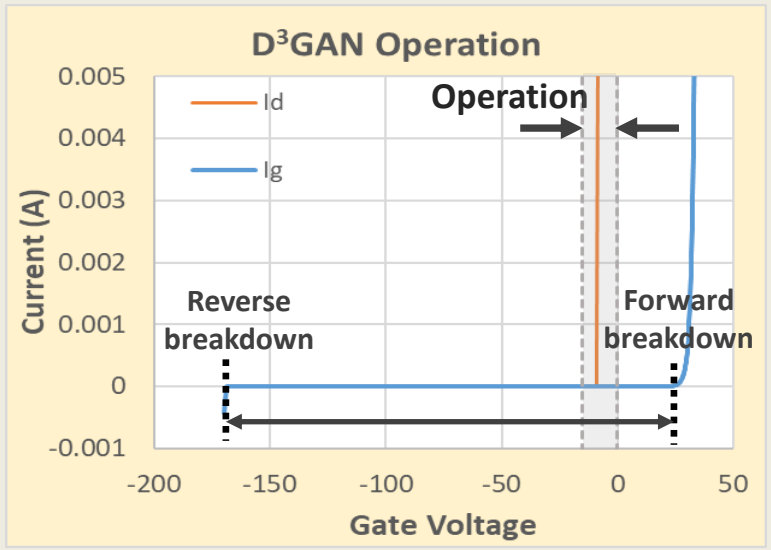
D-mode GaN HEMT

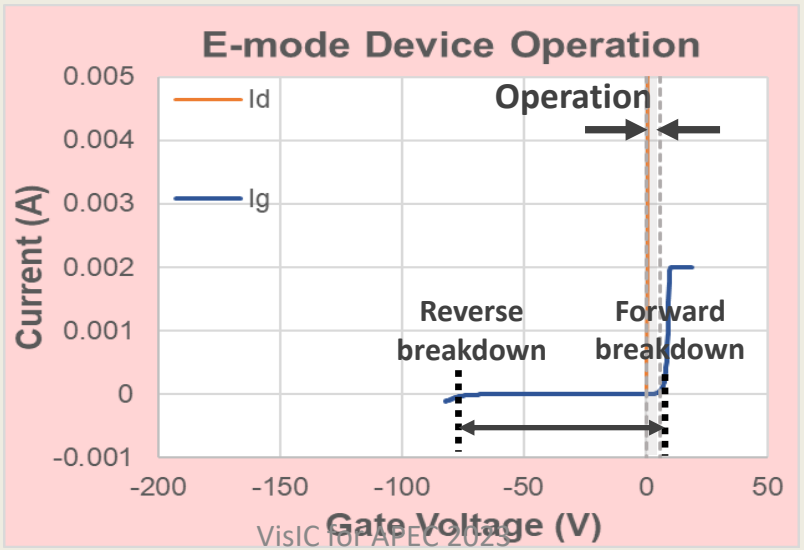
has inherently much higher current that E-mode GaN HEMT

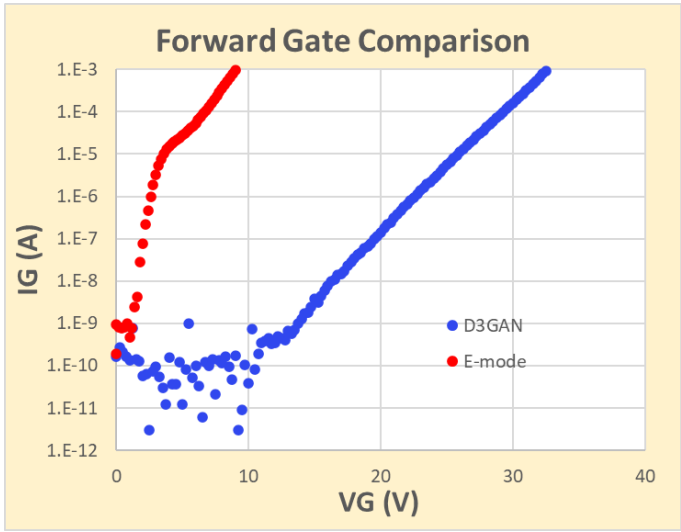
D-mode and E-mode

1. D-mode is proven reliable technology widely employed in high power RADARs front end
2. D-mode has fundamentally lower specific R_{DSON} for same class, due to absence of V_T and R_{DRSON} trade off
3. D-mode has fundamentally better reliability and robustness due to absence of doping-introduced defects

Gate current versus Vgs[V] depicting operational region and gate breakdown



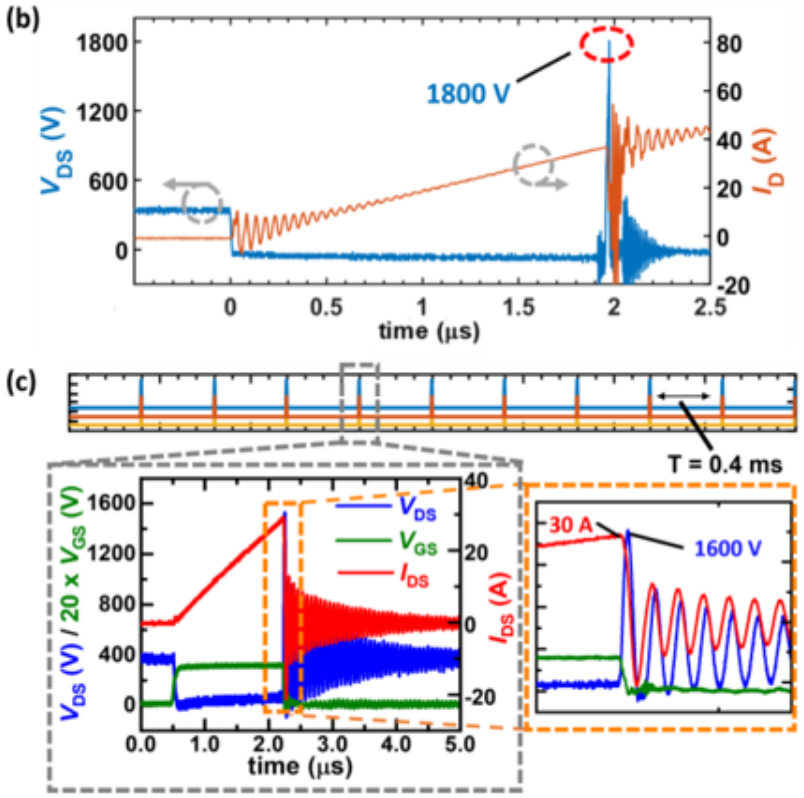




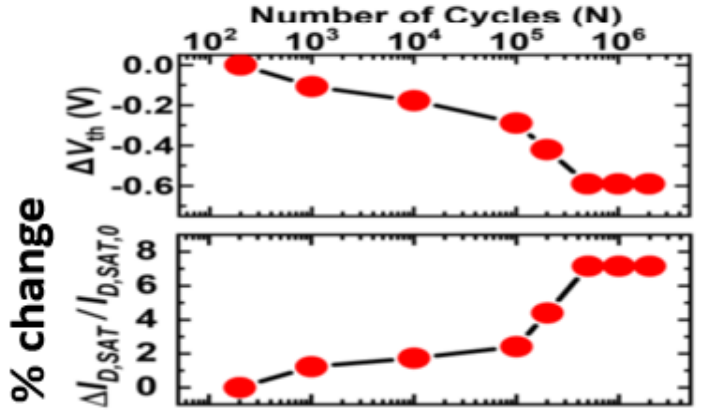
Inductive load switching:

tests developed in CPES, Virginia Tech, to characterize readiness of GaN for EV inverter

LC resonant circuit using transistors's Coss helps to measure dynamic breakdown of the transistor and evaluate it's robustness in similar to inverter operation stress condition

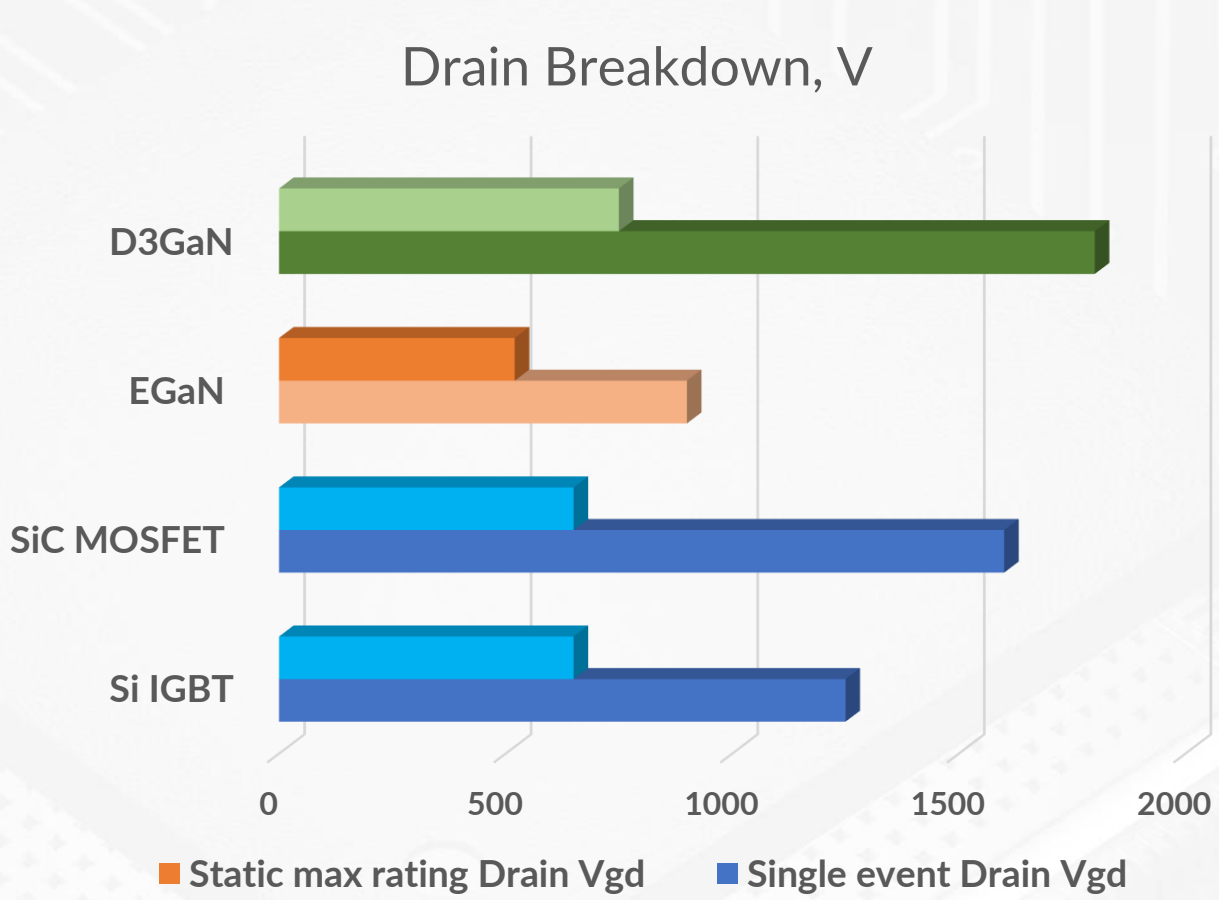


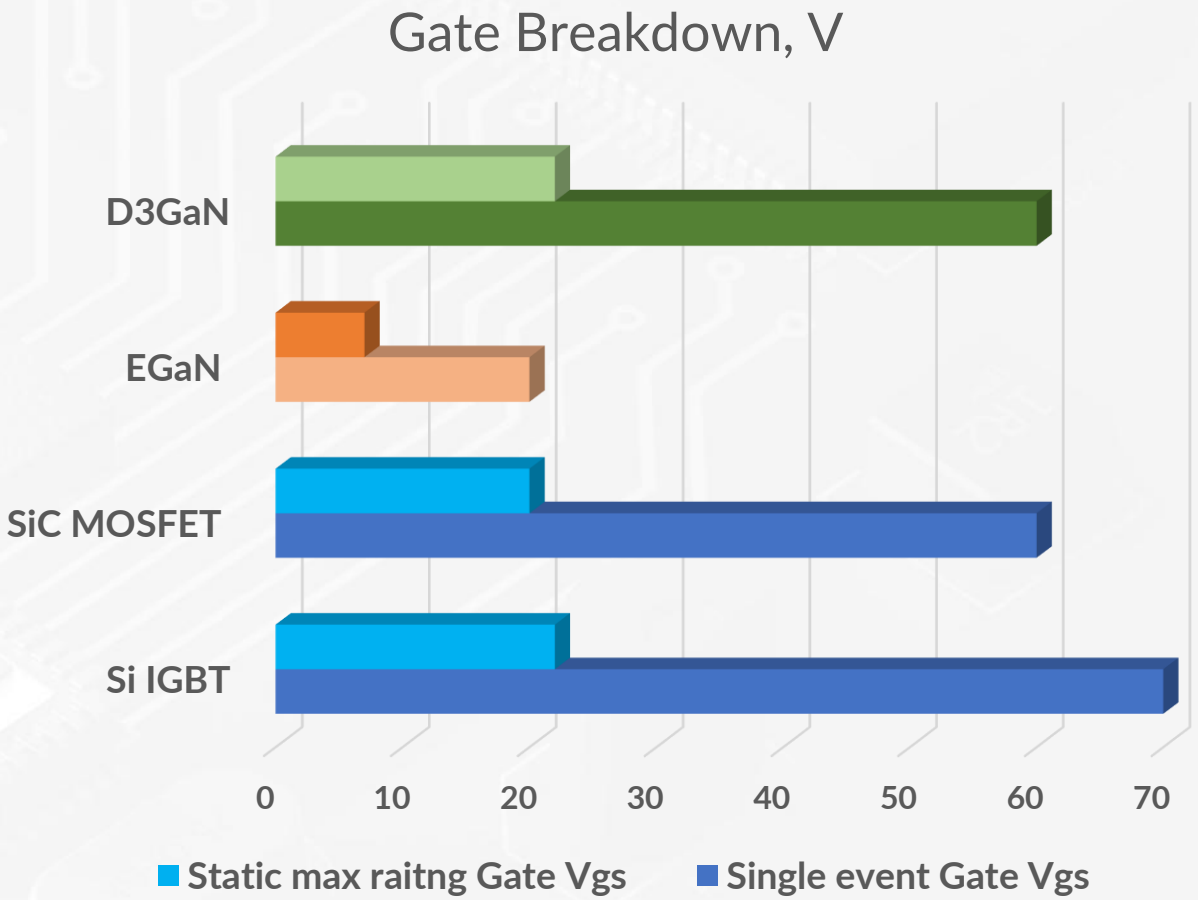
- Repetitive pulses at **90% of dyn BV voltage (unparalleled capability: competitor technology were at ~50% for d-mode and ~25% for e-mode).**
- Negligible parametric shift were observed.
- Parametric results saturated after 1 million cycles.



Q. Song et al., "GaN MIS-HEMTs in Repetitive Overvoltage Switching: Parametric Shift and Recovery," 2022 IEEE International Reliability Physics Symposium (IRPS), Dallas, TX, USA, 2022, pp. 10B.4-1-10B.4-7, doi: 10.1109/IRPS48227.2022.9764548.

Semi technologies robustness for inverter





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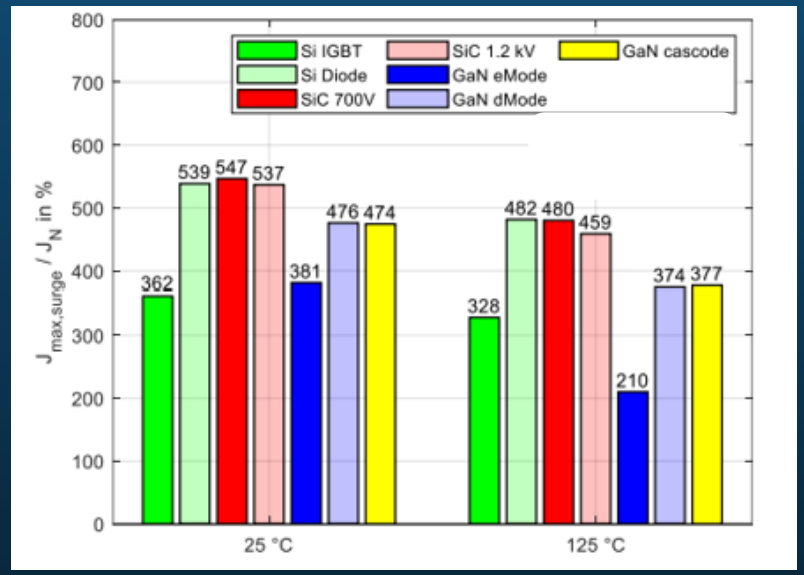
D3GaN is extremely robust

Critical event for traction inverters:

- Active short circuit event: when inverter control fails → motor continues to revolve → energy must be dissipated through inverter to prevent battery damage.
- Si and SiC metrics: x3 operational current;

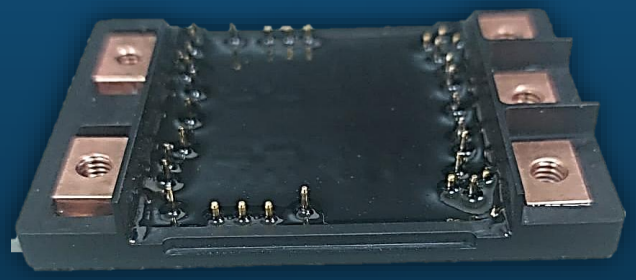


Testing and analysis by Prof. M. Bakran, D. Nehmer @ University of Bayreuth, Faculty for Engineering, Chair of Mechatronics

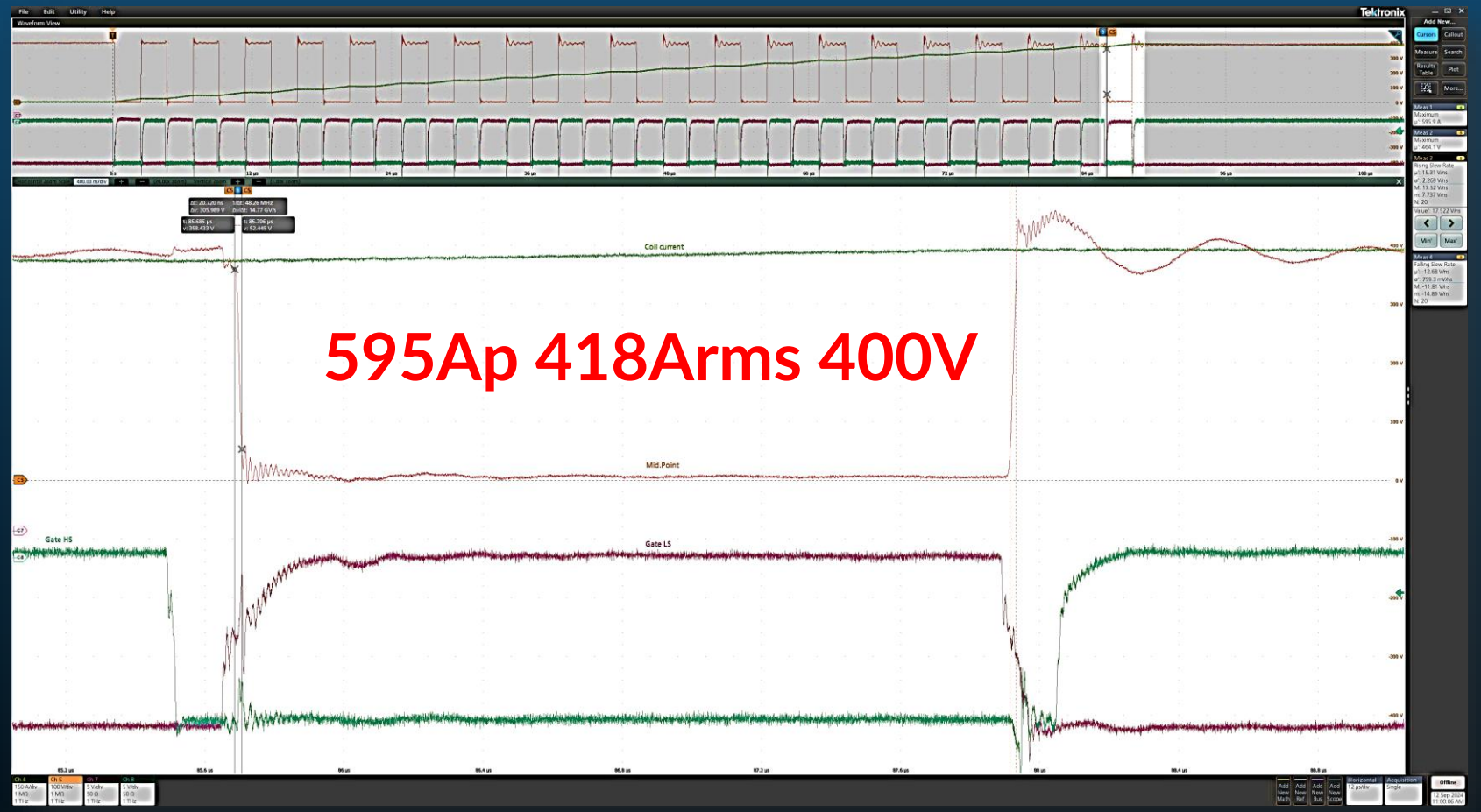
Experimental ratios:

D³GaN	E-GaN	SiC	Si IGBT
3.74	2.10	4.80	3.28

MPM2 D3GaN 2 x Gen2



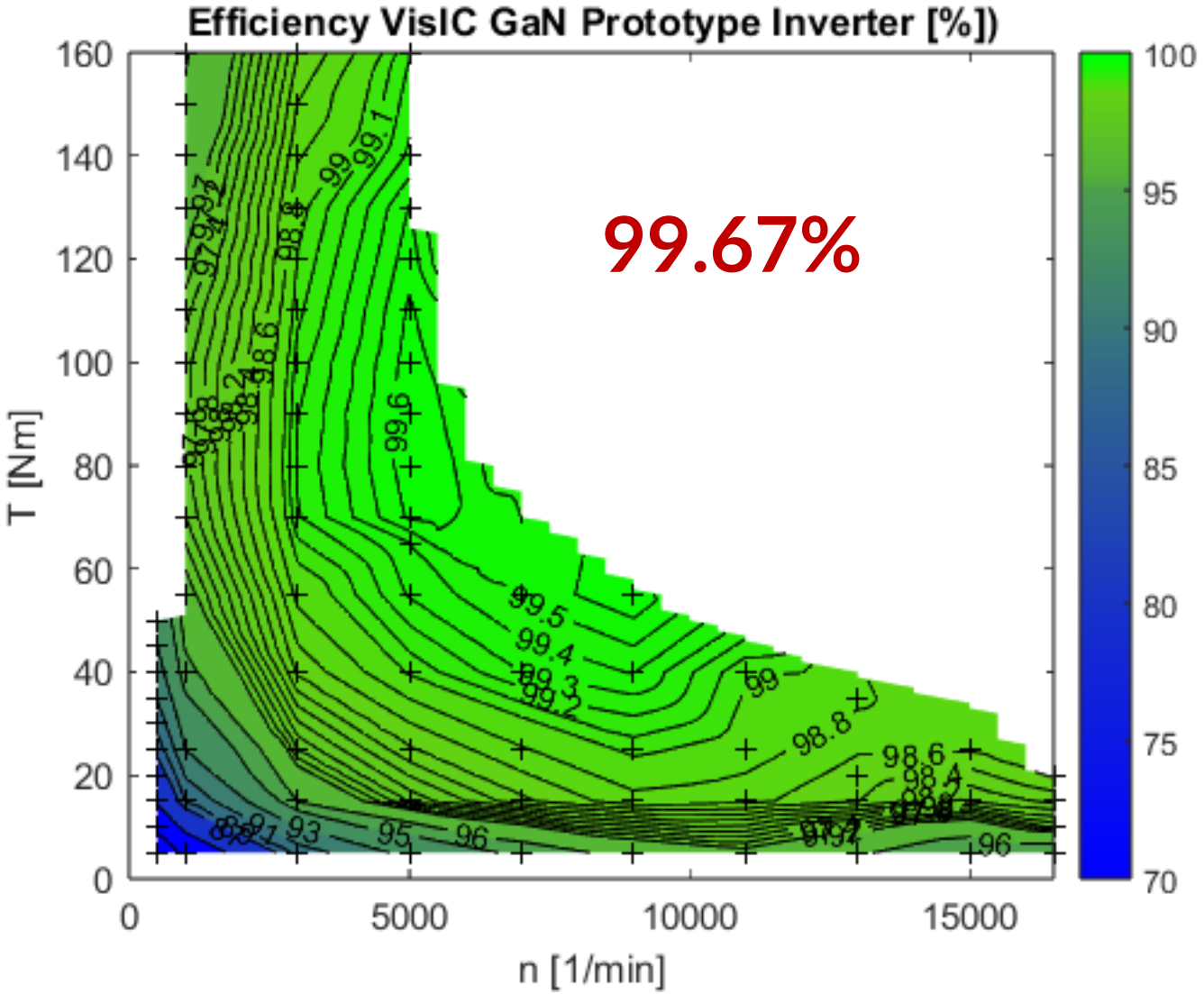
Half Bridge with 2 paralleled 5 mOhm VisIC D^3GaN dice

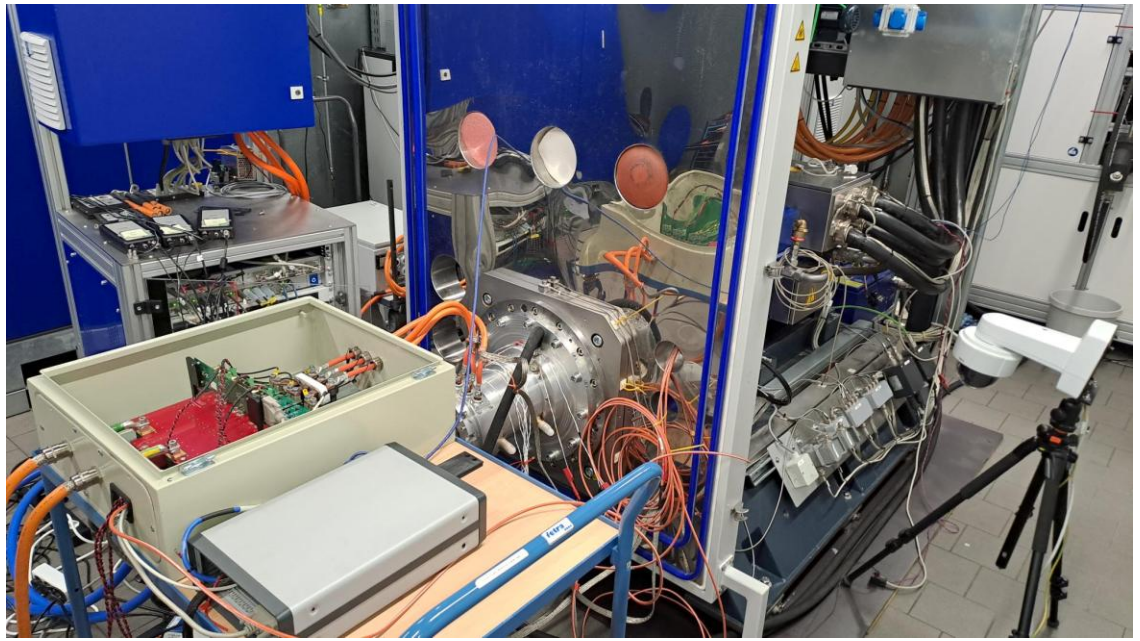


Rising Slew Rate = max 17.52 V/ns; Falling Slew Rate = max -14.89 V/ns; $V_{MIDPOINT}$ = max 464V; Freq =74MHz

2. Dyno Tests @ AVL Regensburg

AVL SOFTWARE AND FUNCTIONS

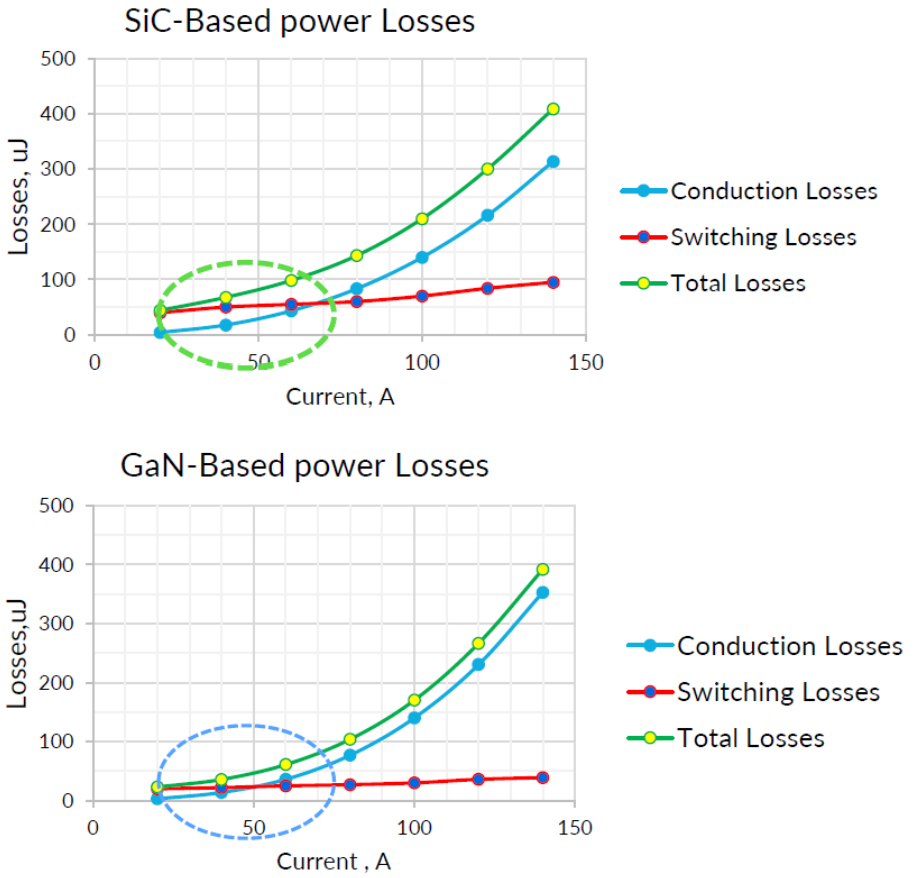




- Max. Efficiency: >99.5% (400V, 10kHz, 9kmin^{-1}, 55Nm)
- DUT Gen. 1 GaN: latest Generation will improve further Performance and Efficiency
- Max current: 330Arms
- Sensitivity of Switching Frequency (5 – 14 kHz) have been measured – analysis ongoing

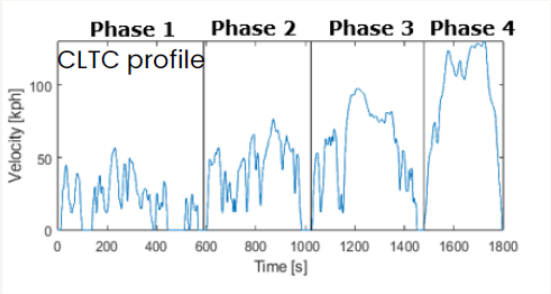
GAN vs SiC for inverter application

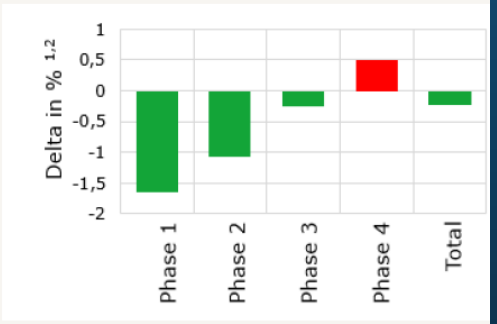
GAN brings higher efficiency than SiC in light load range



Outperforms SiC in total losses by a factor of 2.5

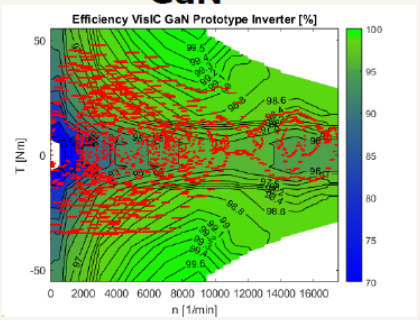
AVL inverter using Visic GaN Gen1 efficiency testing
@ same e-machine and same speed & load



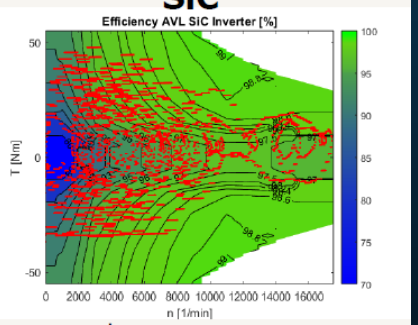


- SiC outperforms GaN
- GaN outperforms SiC

GaN



SiC



- CLTC measurement

NXP GD and VisIC GaN delivers better efficiency than SiC, helping drivers go farther on less power

D3GaN in traction inverter

GAN inverter Development NXP/AVL/VisiC

D-mode GAN can drive high power

3-party collaboration

- VisIC D3GAN Gen-2 Chip Technology
- NXP latest dedicated GD317x GaN driver
- AVL e-drive control software

Dual Traction Inverter Specification:

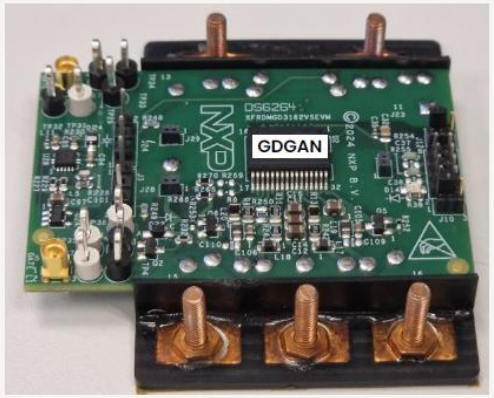
- 400V/>2x600Arms = >1200Arms
- Switching Speed up to 20kHz
- Peak Efficiency 99,5%+

Targeted collaboration outcome:

- Implementation into vehicle Tesla Model S by Q2 2026 for test drive

Offer fast time to market to customer with innovative solution

NXP GDGaN EVB



AVL inverter

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Thank You