HV Intermediate Bus Converter as essential link to power Server boards directly from 800 V DC

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Bodo's
Wide Bandgap
Event 2025

Making WBG Designs Happen

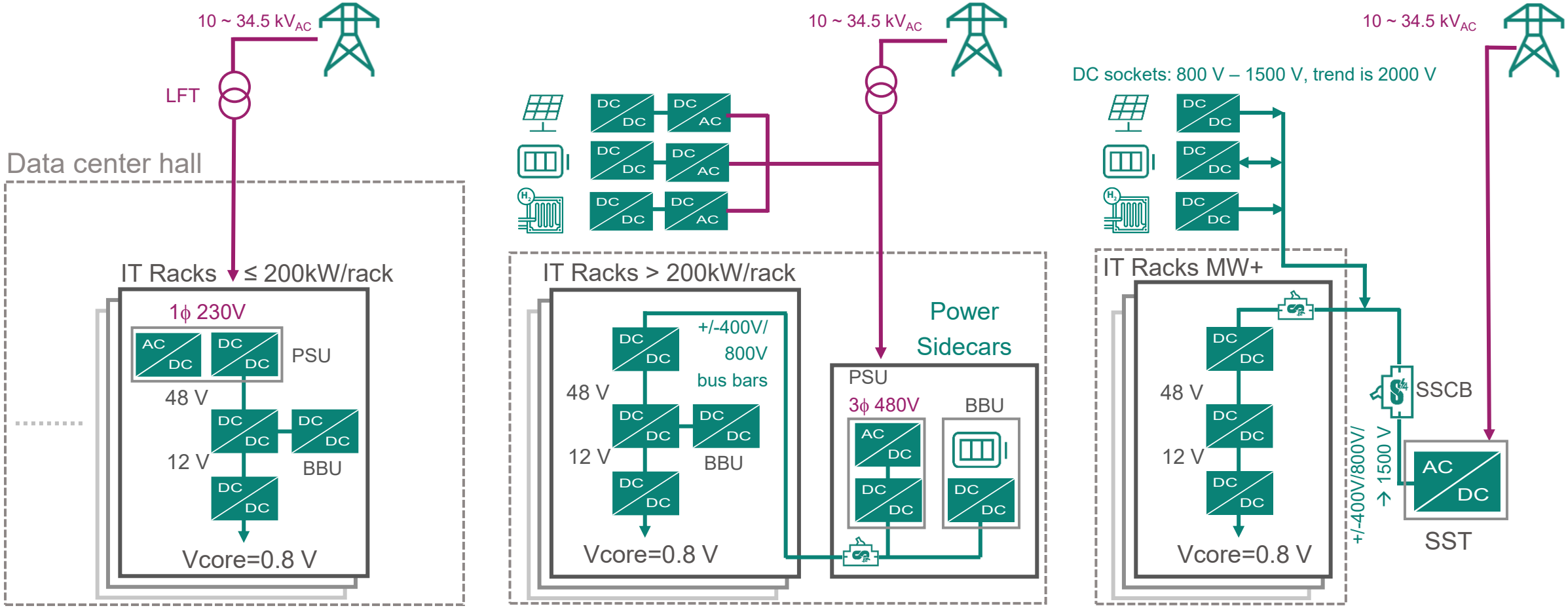
GaN

Infineon converts any source voltage into Vcore

AI datacenter today
Single-phase AC power shelf

Immediate power increase
HV DC to IT rack

Future-proof scalable solution
DC microgrid with Solid-State Transformer



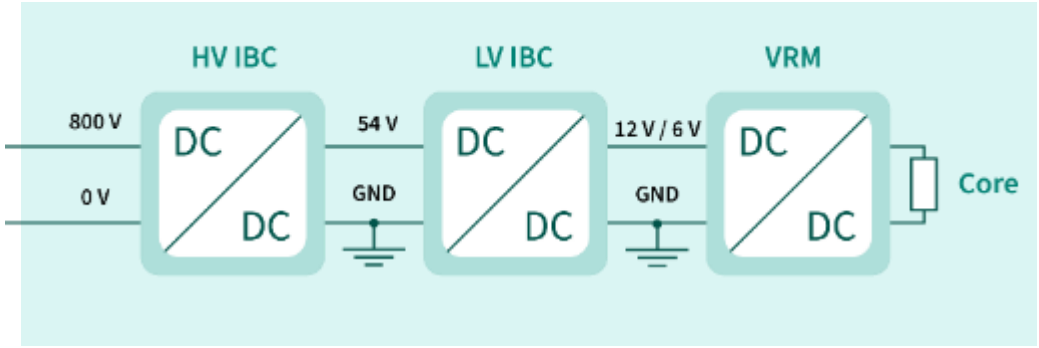
*these are exemplary schematics of key power conversion stages for power delivery to IT racks

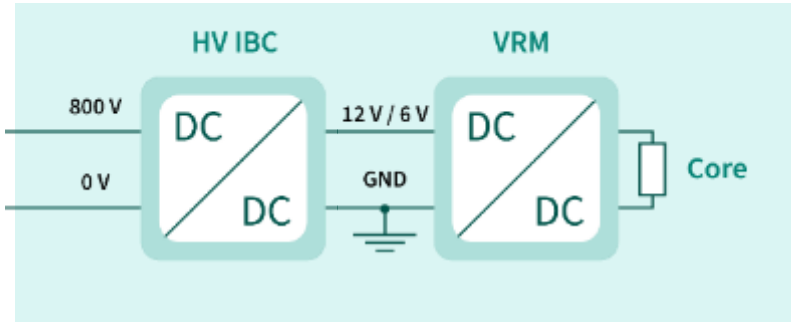
LFT = Line Frequency Transformer
SSCB = Solid State Circuit Breaker

PSU = Power Supply Unit
BBU = Battery Backup Unit
SST= Solid-State Transformer

AC cable
DC cable

Rack architecture of the future with HVDC

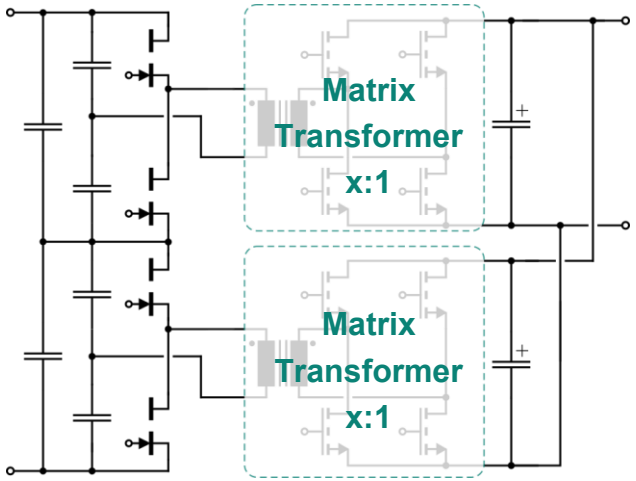


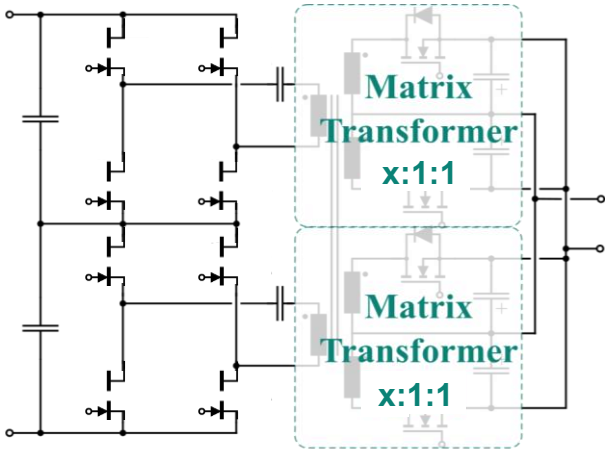


„Clean“ IT rack

only compute loads

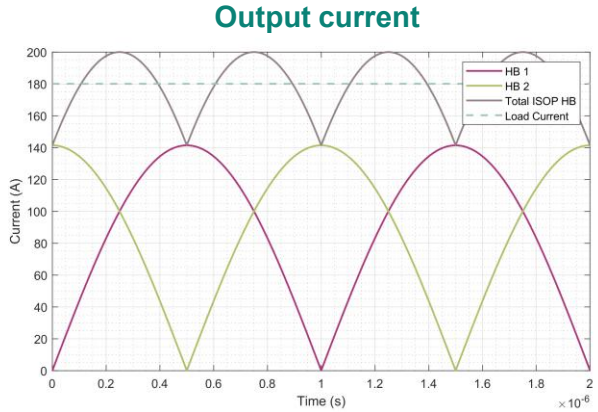
ISOP LLC for High Voltage DC Bus Architecture





Input-Series LLC-DCX

- good trade off between component count and RDSon
- low output current ripple due to interleaving



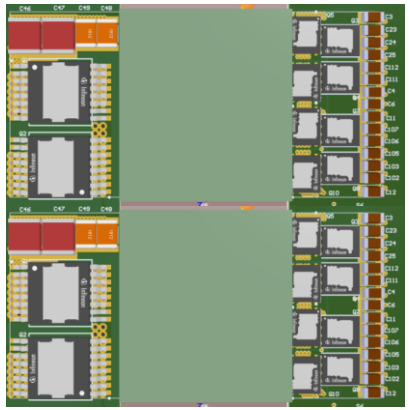
- lower dv/dt due to stacking
- allow using 650 V MLCC capacitors and lower v-sec of the transformer enables low profile
- open IP

Possible paths from 800 V DC to core – HVIBC

800 V to 50 V/12 V/6 V

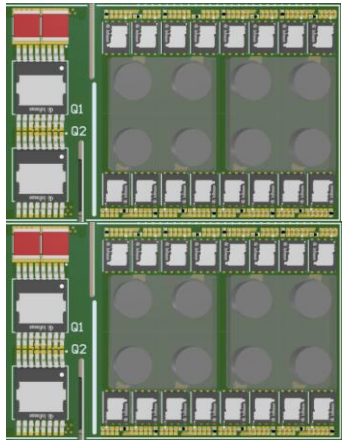
6 kW 800 V→50 V

- ISOP **Half-bridge** LLC topology
- Full-Bridge Rectifier
- 2x 3 kW 400 V→50 V for **6 kW**
- Stackable up to 12 kW
- 60 mm x 60 mm x **11 mm**
- Fsw = **800 kHz**



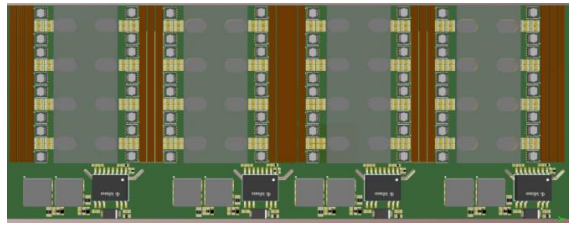
6 kW 800 V→12 V

- ISOP **Half-bridge** LLC topology
- Center-tapped rectifier
- 2x 3 kW 400 V→12 V for **6 kW**
- Stackable up to 12 kW
- 62 mm x 80 mm x **8 mm**
- Fsw = **800 kHz**



10 kW 800 V→6 V

- ISOP **Full-bridge** LLC topology
- Center-tapped rectifier
- 2x 5 kW 400 V→6 V for **10 kW**
- Stackable up to 20 kW
- 170 mm x 60 mm x **6.5 mm**
- Fsw = **700 kHz**



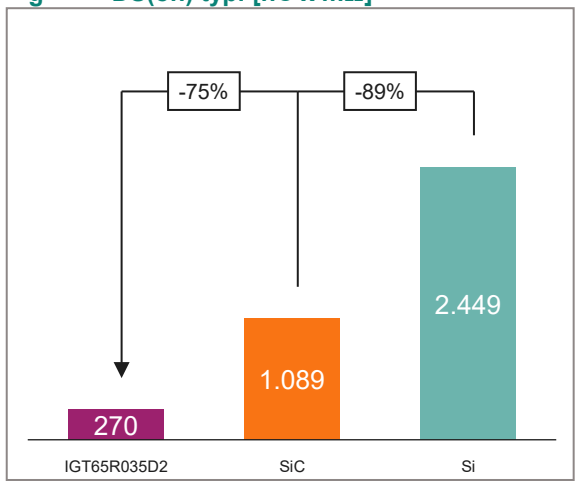
Under Development

CoolGaN™ Transistor 650 V G5 with best-in-class FOMs

Highest efficiency at increased switching frequencies between technologies

	Voltage	$R_{DS(on)}*E_{oss}$	$R_{DS(on)}*Q_g$	$R_{DS(on)}*Q_{oss}$
Silicon	600	100%	100%	100%
SiC	650	88%	44%	13%
GaN	**650**	**91%**	**11%**	**11%**

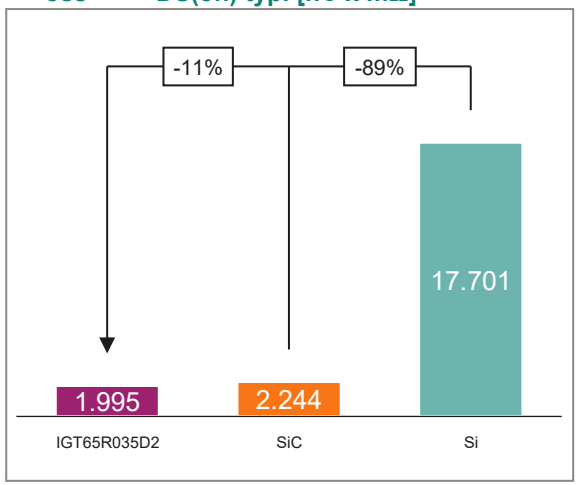
Q_g x $R_{DS(on)}$ typ. [nC x mΩ]



GaN

GaN for highest power **density**

Q_{oss} x $R_{DS(on)}$ typ. [nC x mΩ]

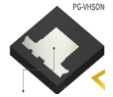


- Enables **reduced driving losses,** especially at light-load conditions
- Allows to reach **higher efficiency at increased frequency**

- Enables **better soft-switching performance** (e.g., LLC), and **reduction of passives, thus increased power density**

CoolGaN™ with outstanding FOM supports easy soft-switching operation & enables lowest driving losses

High-voltage CoolGaN™ Transistor in-house portfolio
Broad portfolio enables optimized product selection

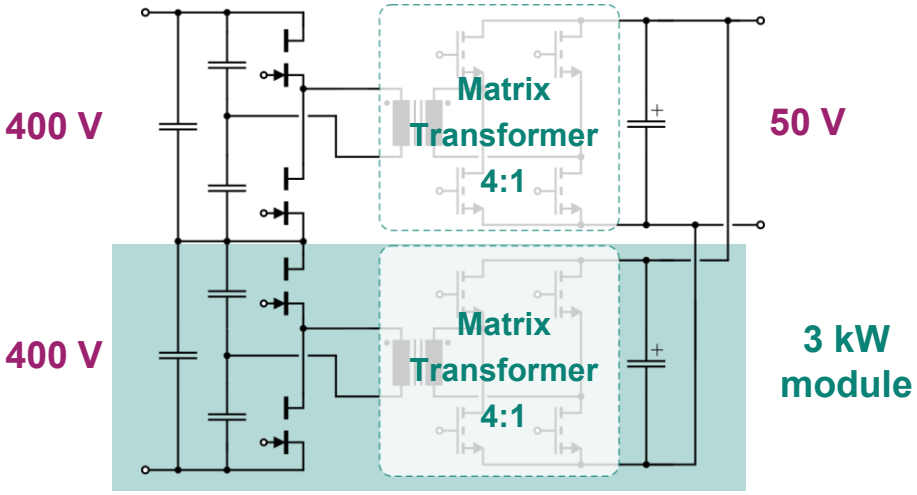
CoolGaN™ Transistor G5									
$R_{DS(on, typ)}$ [mΩ]	650 V							700 V	
	ThinPAK 5x6	DFN 8x8	DSO TSC	ThinPAK 8x8	TOLL	TOLT	DSC 8x8	DPAK	ThinPAK 5x6
									
500								IGD70R500D2S	
270	IGLR65R270D2							IGD70R270D2S	IGLR70R270D2S
200	IGLR65R200D2							IGD70R200D2S	IGLR70R200D2S
140	IGLR65R140D2	IGLD65R140D2		IGL65R140D2	IGT65R140D2			IGD70R140D2S	IGLR70R140D2S
100/110		IGLD65R110D2		IGL65R110D2		IGLT65R110D2	IGLC65R100D2		
65/80		IGLD65R080D2		IGL65R080D2			IGLC65R065D2		
55		IGLD65R055D2	IGOT65R055D2	IGL65R055D2	IGT65R055D2	IGLT65R055D2			
45			IGOT65R045D2		IGT65R045D2	IGLT65R045D2			
30/35			IGOT65R035D2		IGT65R035D2	IGLT65R035D2	IGLC65R030D2		
20/25			IGOT65R025D2		IGT65R025D2	IGLT65R025D2	IGLC65R020D2		
17					IGT65R017D2*	IGLT65R017D2*			

Suitable solutions for HV IBC

Released | Coming soon

*under feasibility, timeline is subject to change

Unregulated Full GaN 800 V-to-50 V Converter



Components per 3 kW 400 V-to-50 V module:

Primary side: 2x 650 V GIT GaN HEMTs (IGLT65R025D2)

Secondary side: 8x 100 V SG GaN HEMTs (IGD015S10S1)

Power Capabilities:

Total power: 6 kW TDP

Peak power: 10.8 kW (x1.8 TDP) for 400 µs and 9.0 kW (x1.5 TDP) for 50 ms

Demonstrator of 3 kW 400 V-to-50 V module

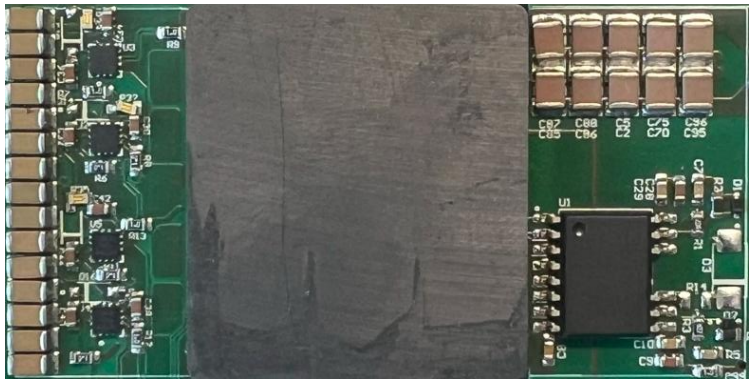
Top

Height: 11 mm

Efficiency: 98% at full load

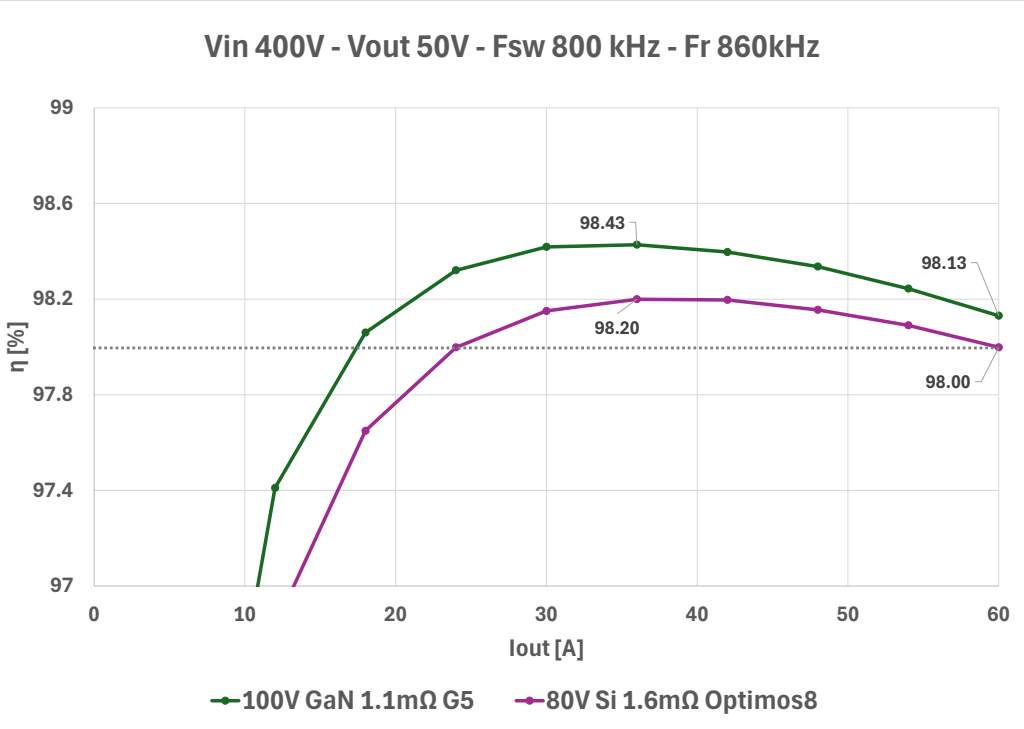
Power Density: 2482 W/inch^3

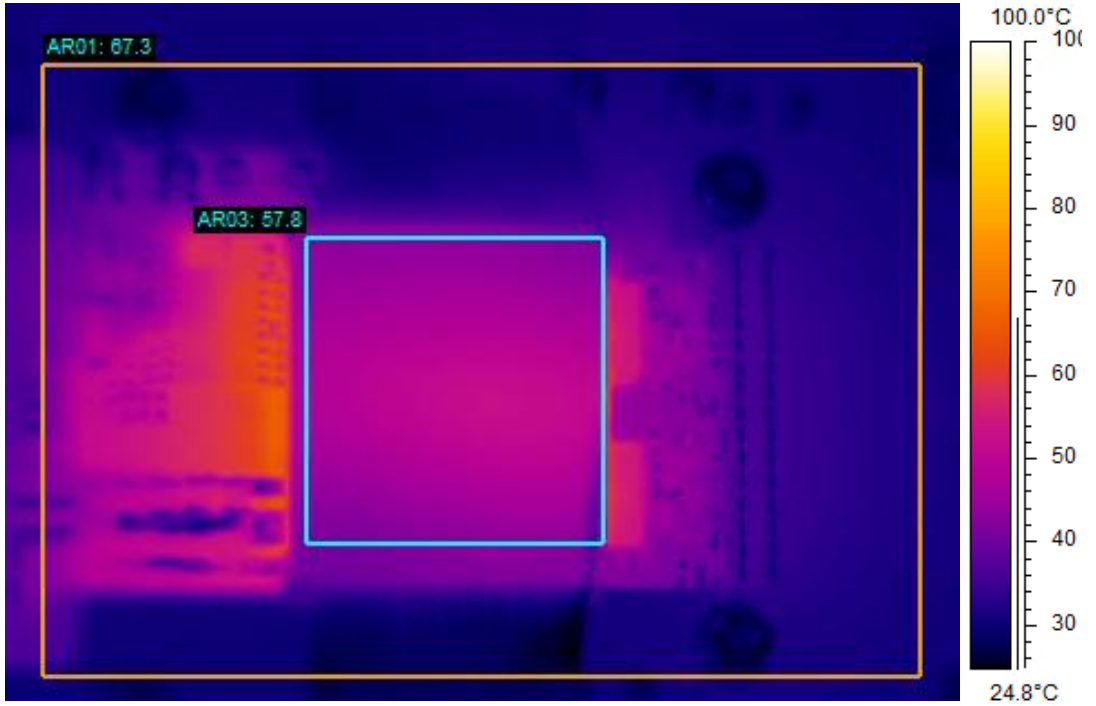
Bottom



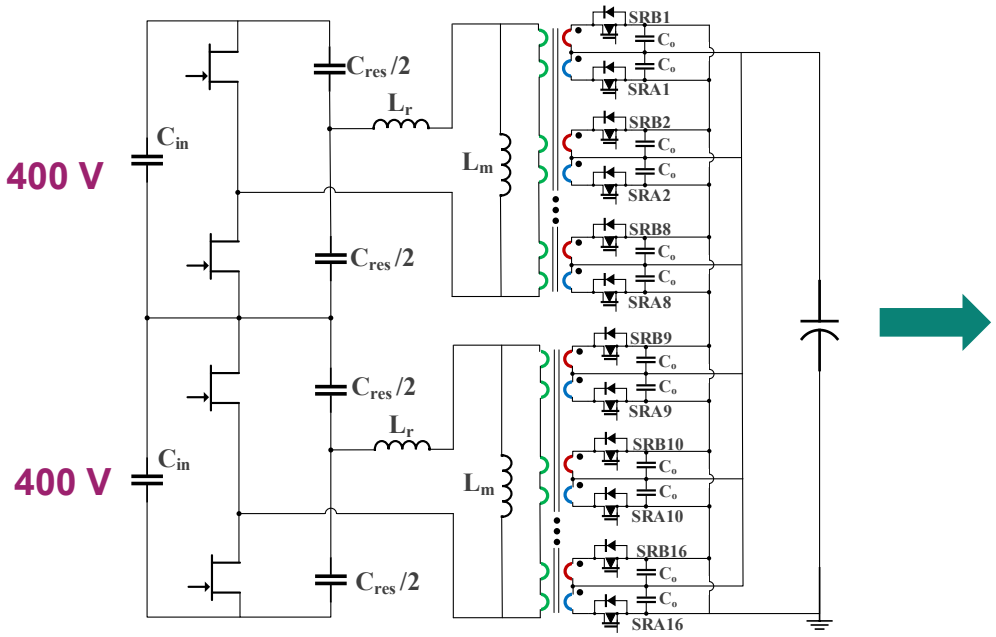
All switches must be on top side → TSC or DSC packages required

Unregulated Full GaN 800 V-to-50 V Converter





Unregulated 800 V-to-12 V Converter



Components per 6 kW 800 V-to-12 V module:

Primary side: 4x 650 V CoolGaN™ GIT HEMT (IGLT65R025D2)

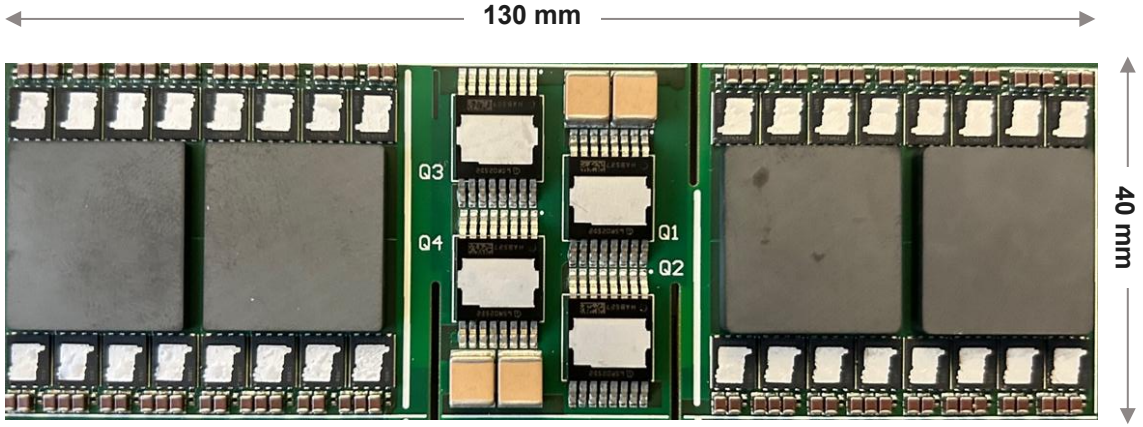
Secondary side: 32x 40 V Si OptiMos7™ (IGD015S10S1)

Power Capabilities:

Total power: 6 kW TDP

Peak power: 10.8 kW (x1.8 TDP) for 400 µs and 9.0 kW (x1.5 TDP) for 50 ms

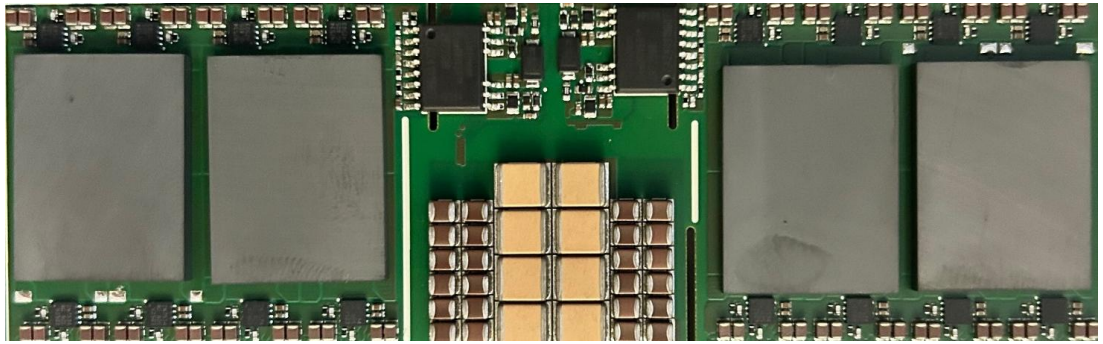
Demonstrator of 6 kW 800 V-to-50 V module



Top

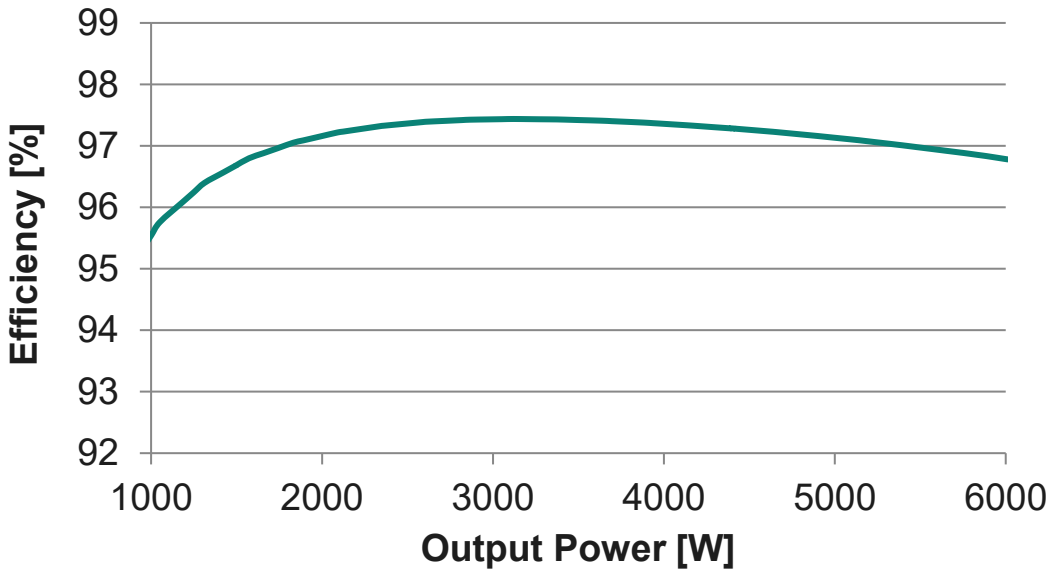
Efficiency: 97% at full load
Power Density: 2364 W/inch^3

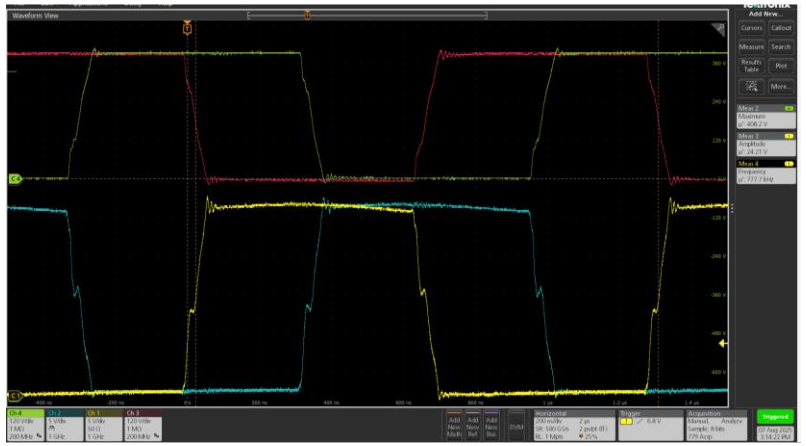
Height: 8 mm



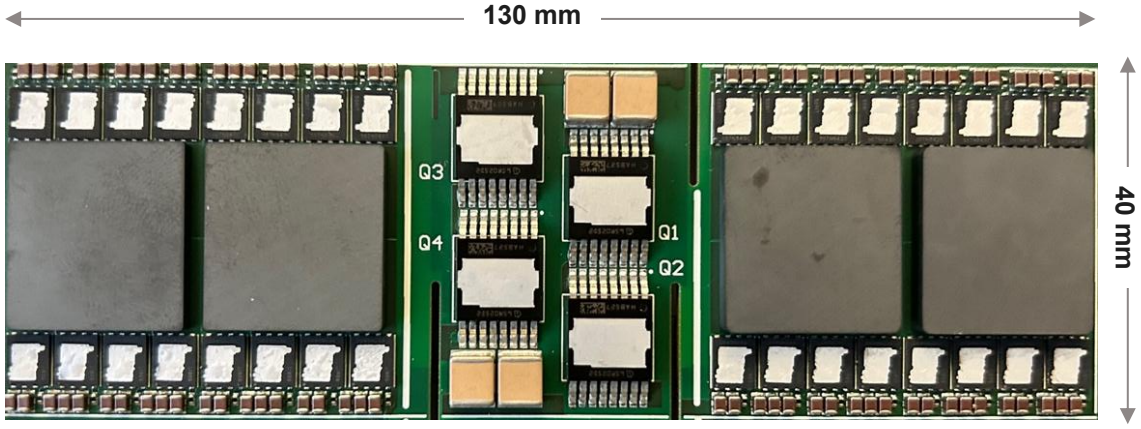
Bottom

Unregulated 800 V-to-12 V Converter





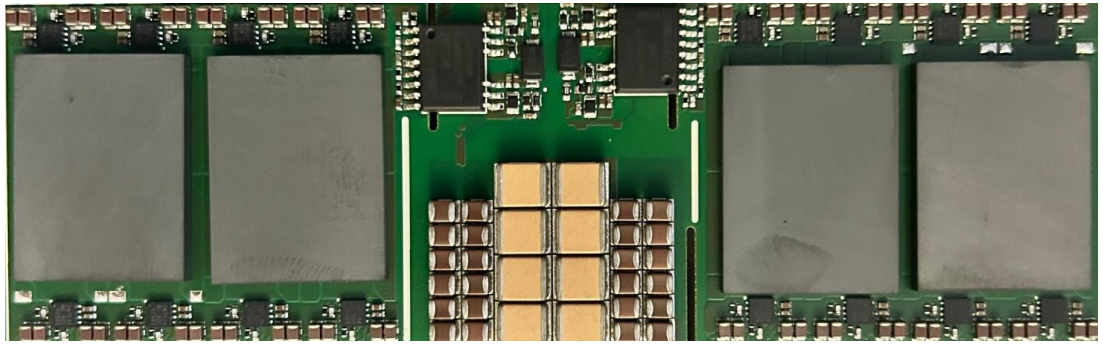
Demonstrator of 6 kW 800 V-to-50 V module



Top

Efficiency: 96.8% at full load
Power Density: 2364 W/inch^3

Height: 8 mm



Bottom


Infineon