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Industrial Summit
GOES ON TOUR 2023
Powering Your Sustainable Innovation

Digital Power Approach with STM32G4 in 3kW 5G Telecom Rectifier

Industrial Power & Energy Competence Center
Asia Pacific

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Power & Energy
Competence
Center

Agenda

1 Background

2 Introduction for 3kW Digital Solution

3 EVM Board Performance

4 ST Products introduction

5 Summary

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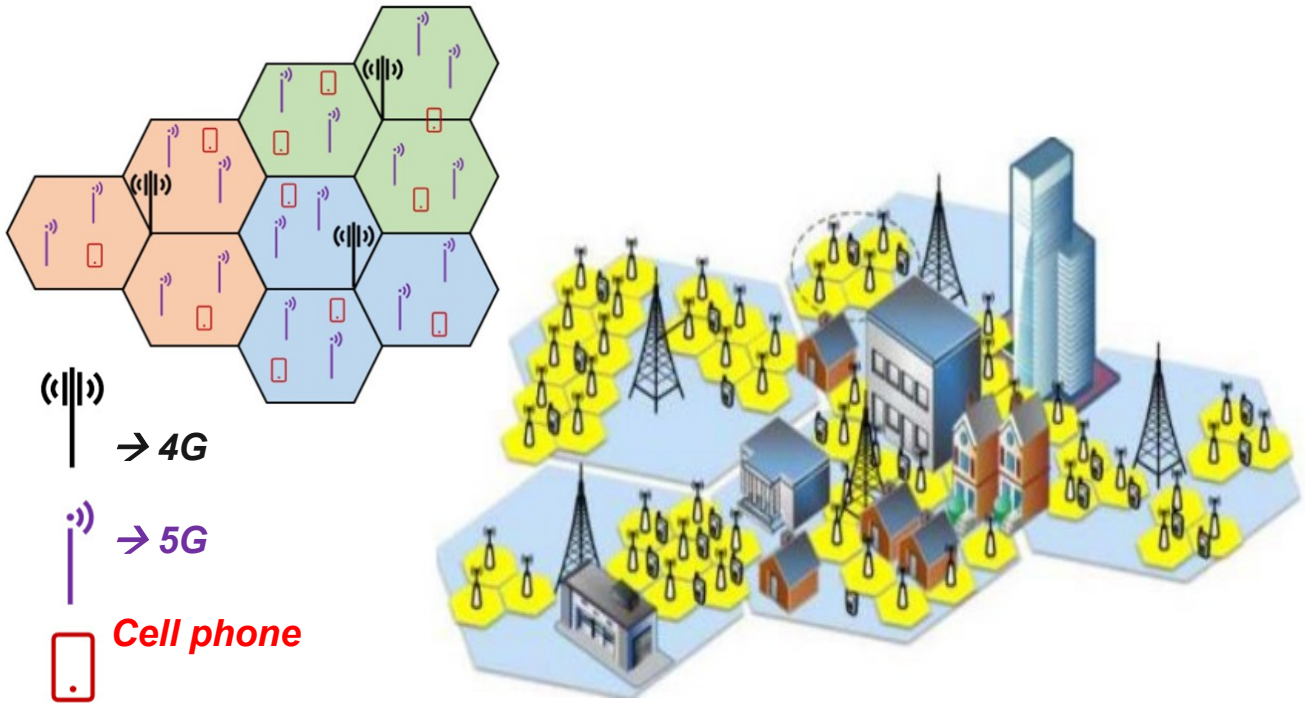
Background

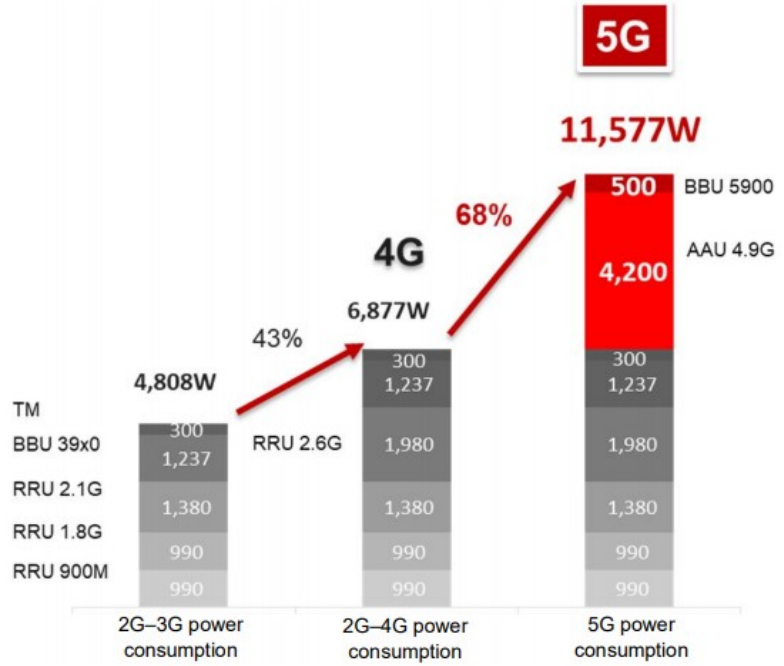
5G Telecom power requirements

Higher system integration is the Key for 5G power
Provides higher power density and higher efficiency!

- **Smaller coverage due to higher frequency radio:** in order to achieve high network speed and low latency



- **Higher power consumption in 5G usage:** in order to fulfill high traffic density and connection density



Source: Huawei

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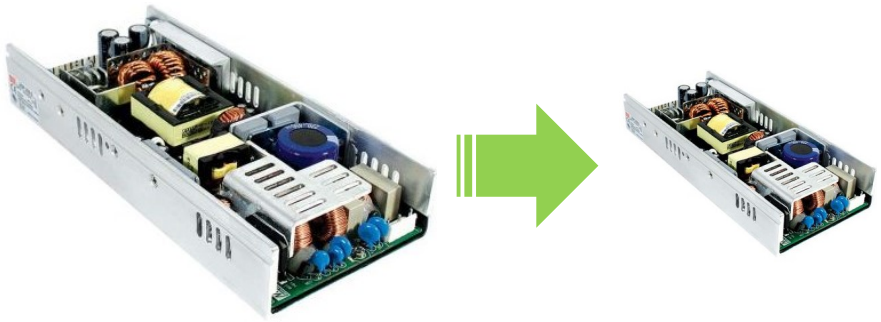
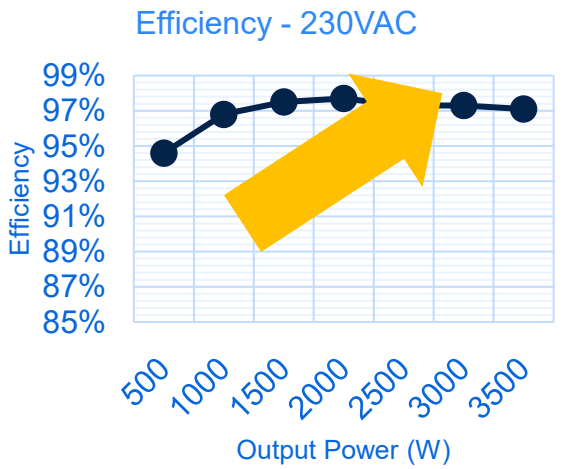
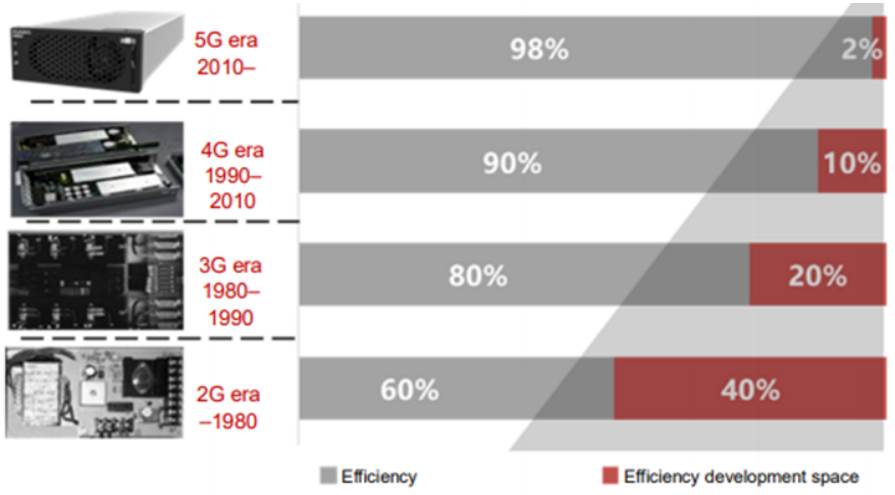
Digital solution for 5G power applications

To achieve high system integration, we need..

- High flexibility and good adaptability for advanced topologies to achieve high efficiency
- Provide benefit on downsizing and BOM reduction
- Support communication for real-time monitoring (safety)
- Less component variation (high reliability)







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Introduction for 3kW Digital Solution

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Telecom Rectifier/Datacenter/Server

Prototype: Q2/21
Final Release: Q4/21

3kW CCM TTP PFC + FB LLC + SR -Telecom Rectifier

PE.SP_0001.20

Physical Sample

ST 3kW Telecom Rectifier

Commercial 2.9kW Telecom Rectifier

Application key features:

- Fully Digital AC-DC Power Supply
- Input AC Voltage: 90 VAC up to 264 VAC
- Input AC Frequency: 47Hz to 63Hz
- DC output voltage: 53.5 VDC
- Peak Efficiency > 96.5% @ 230VAC
- Power Factor > 0.99 @ 100% load
- iTHD < 5% @ 100% load
- Hold up time: 10ms
- Outline Dimension: 100mm*310mm*41mm
- Power Density up to 40W/inch^3
- Peak inrush current < 30A

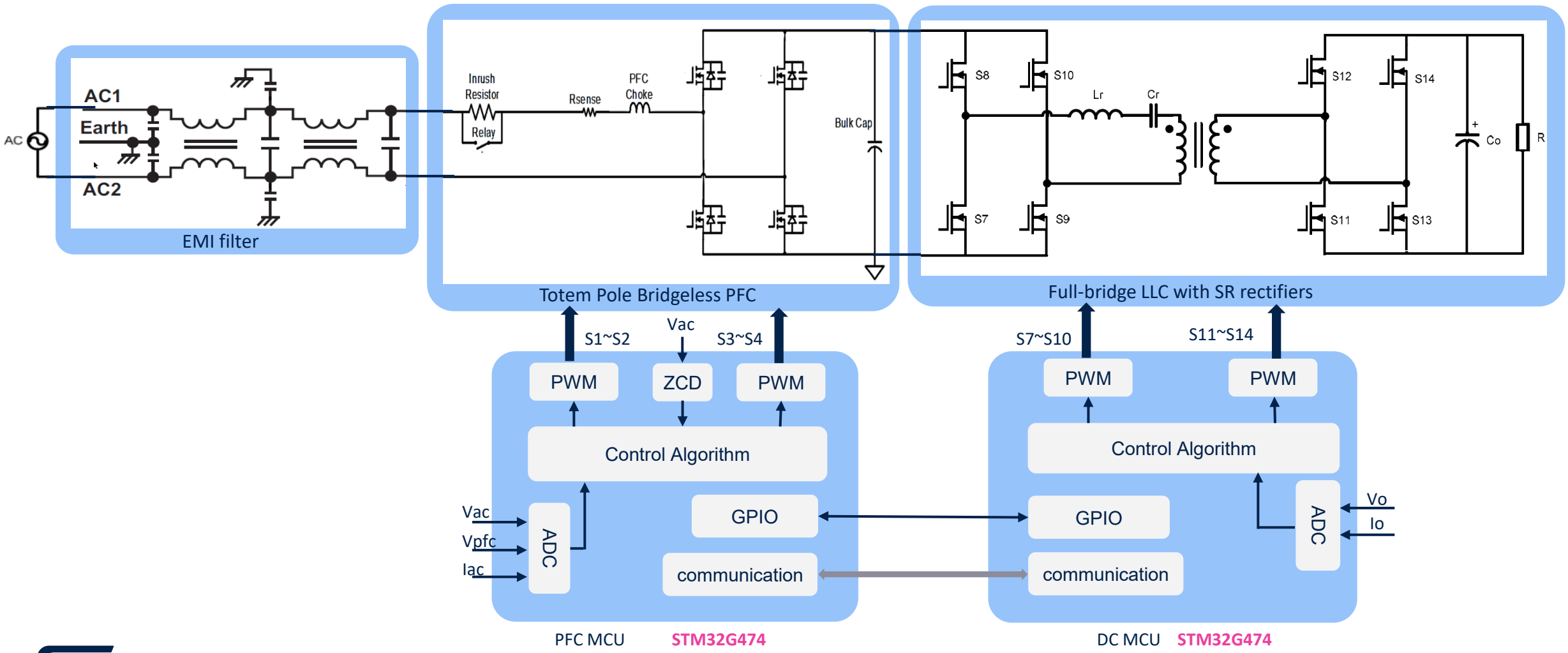
Key Products

PFC: SCTW35N65G2V (SiC MOSFET), STY139N65M5 (SJ MOSFET), STGAP2D (Galvanic insulated gate driver), STM32G4 (32-bit MCU)
LLC: STW70N65DM6 (SJ MOSFET), STGAP2HS (Galvanic insulated gate driver), STL130N8F7 (SR MOSFET), STDRIVE200H (SR Driver IC), STM32G4 (32-bit MCU)
Aux. Power: VIPer26HD/VIPer38LD (Converter for aux. PS)

Key Benefits

- Peak Efficiency > 96.5%
- Power Density up to 40W/inch^3

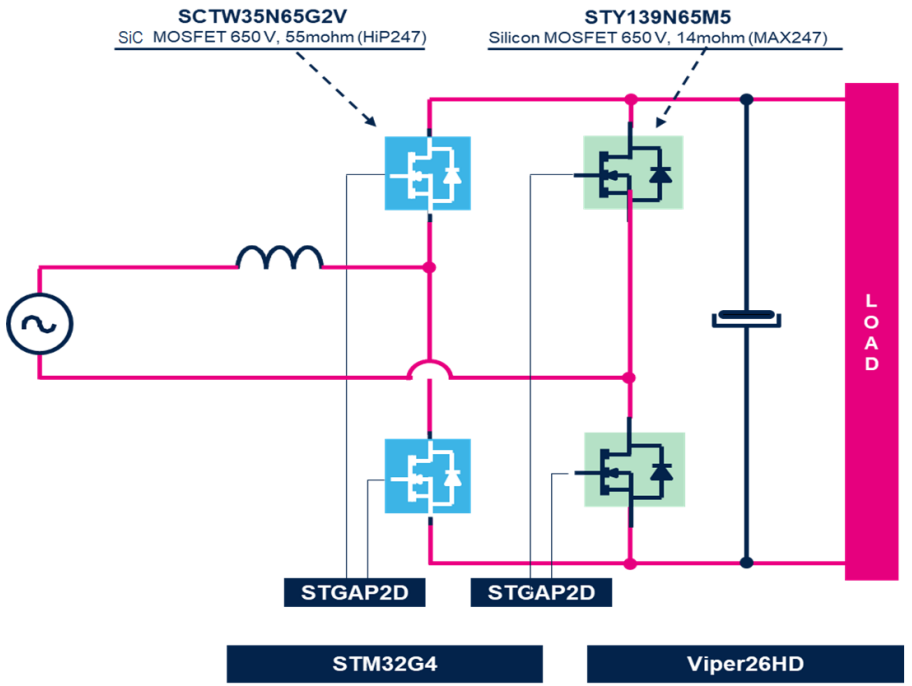
Simplified block diagram



CCM Totem Pole PFC solution Based on SiC MOSFET

Key Specs

- Input AC voltage: 90VAC up to 264VAC
- Input Inrush Current: < 30A
- Switching Frequency : 70kHz
- Operation Mode: CCM
- Peak Efficiency: 98.5% @ 230VAC
- Power Factor > 0.99 @ 100% load
- iTHD < 5% @ 100% load
- Digital (STM32G4) Power Control



Key Products:

- SCTW35N65G2V (SiC MOSFET)
- STY139N65M5 (SJ MOSFET)
- STGAP2D (Galvanic insulated gate driver)
- STM32G4 (32-bit MCU)

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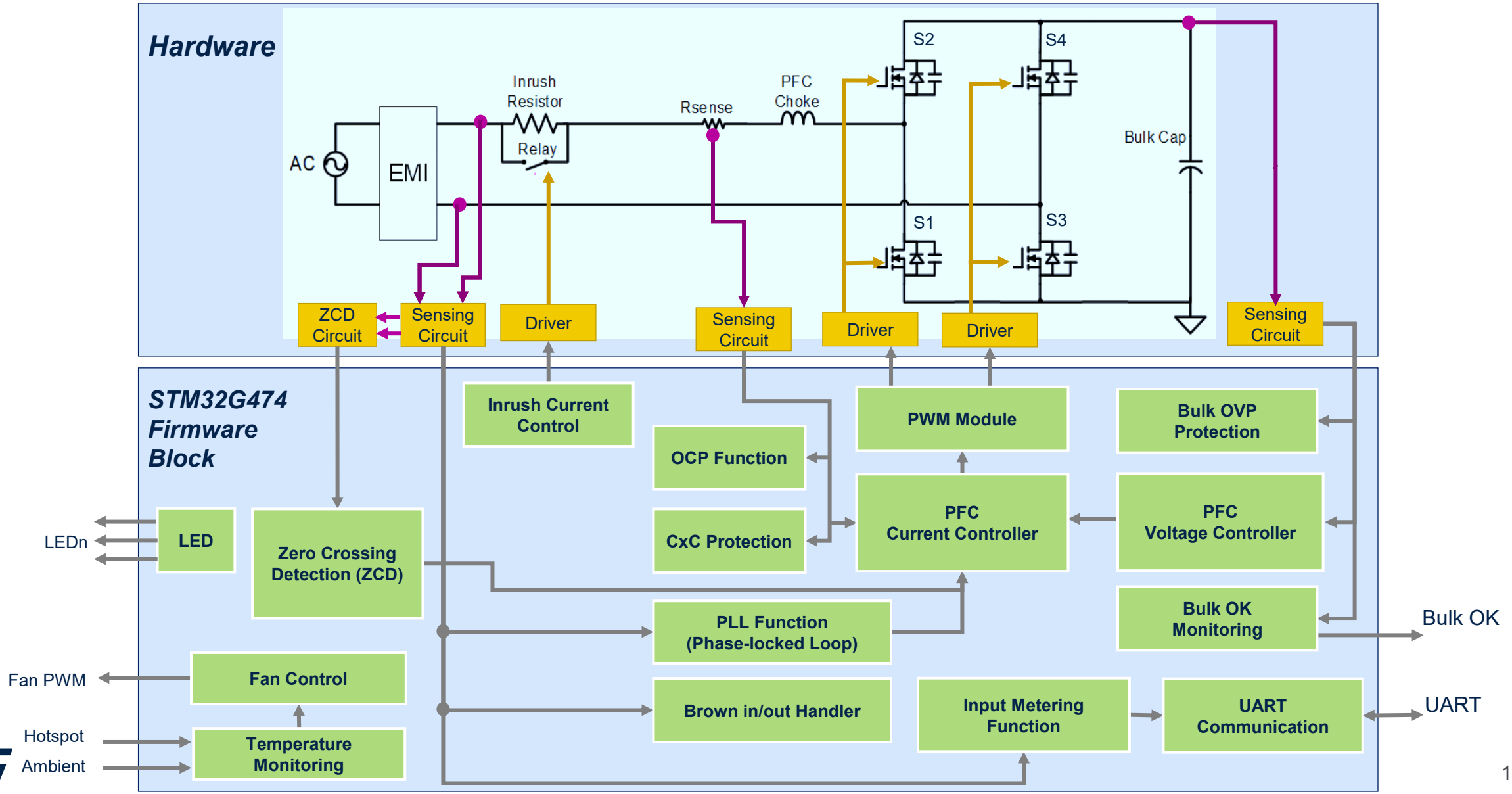
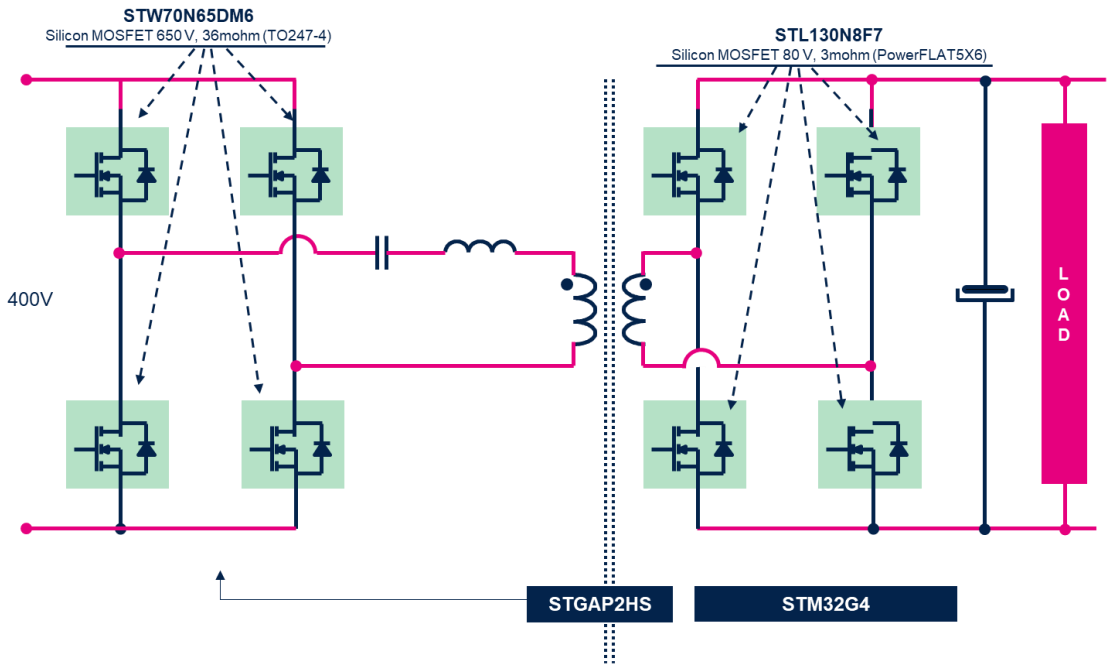
Totem-Pole PFC block diagram



3kW Full-Bridge LLC solution

Key Specs

- Input DC voltage: 350V - 425V
- Output Voltage: 53.5V
- Switching Frequency : 80kHz – 150kHz
- Resonant Frequency: 115kHz
- Peak Efficiency: 98.2%
- Output Voltage Dynamic Response: < 5%
- Digital (STM32G4) Power Control



Key Products:

- STW70N65DM6 (HV MOSFET)
- STL130N8F7 (SR MOSFET)
- STGAP2HS (Galvanic insulated gate driver)
- STM32G4 (32-bit MCU)
- VIPer38LD (converter for aux. PS)

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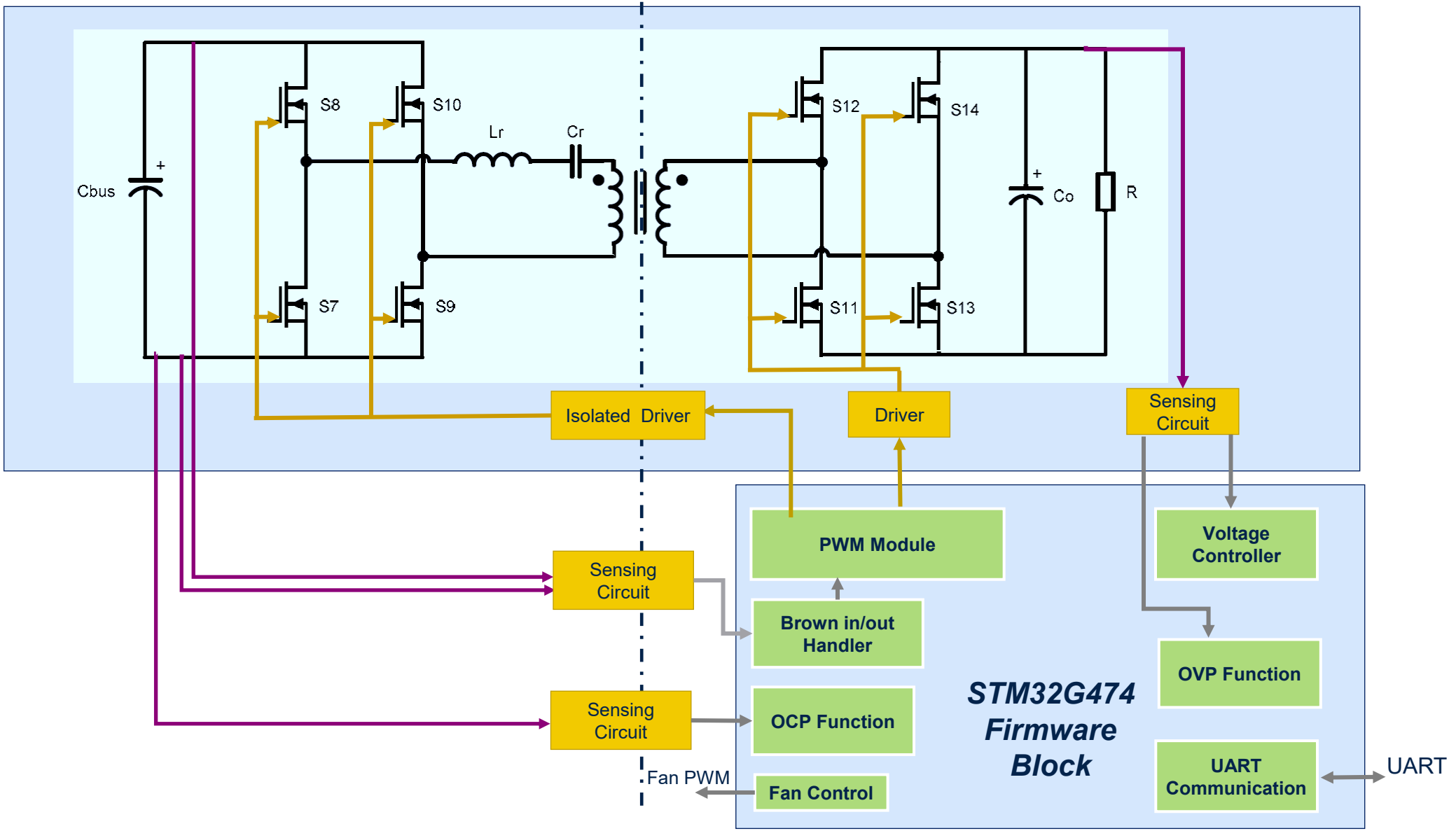
FB LLC block diagram

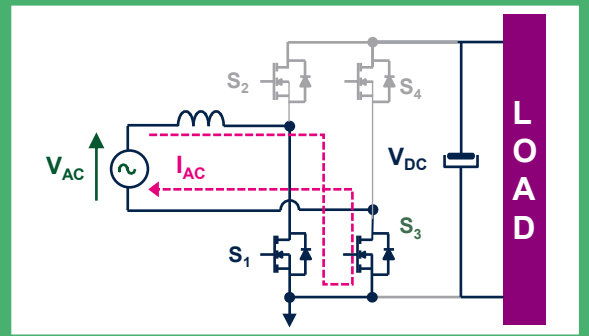


Operation mode for Totem-Pole PFC

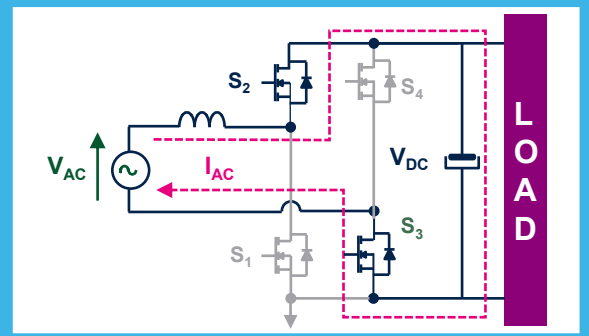
$V_{AC} > 0$

S1 controls PFC choke charging
S3 can be switched on to reduce voltage drop of the body diode

S1 on, inductor current rising



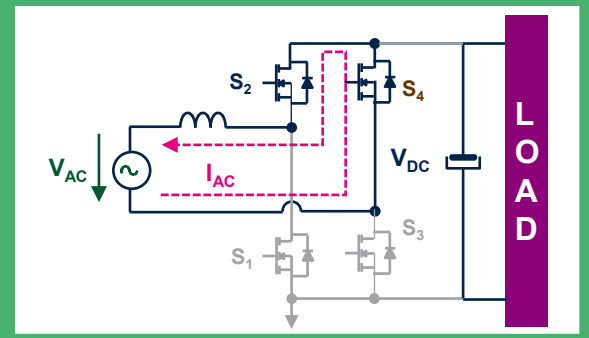
S1 off, inductor current falling



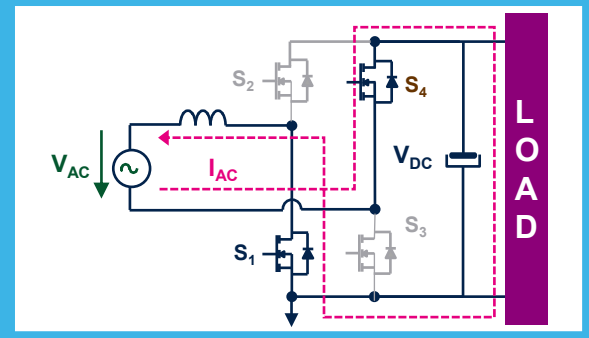
$V_{AC} < 0$

S2 controls PFC choke charging
S4 can be switched on to reduce voltage drop of the body diode

S2 on, inductor current rising



S2 off, inductor current falling



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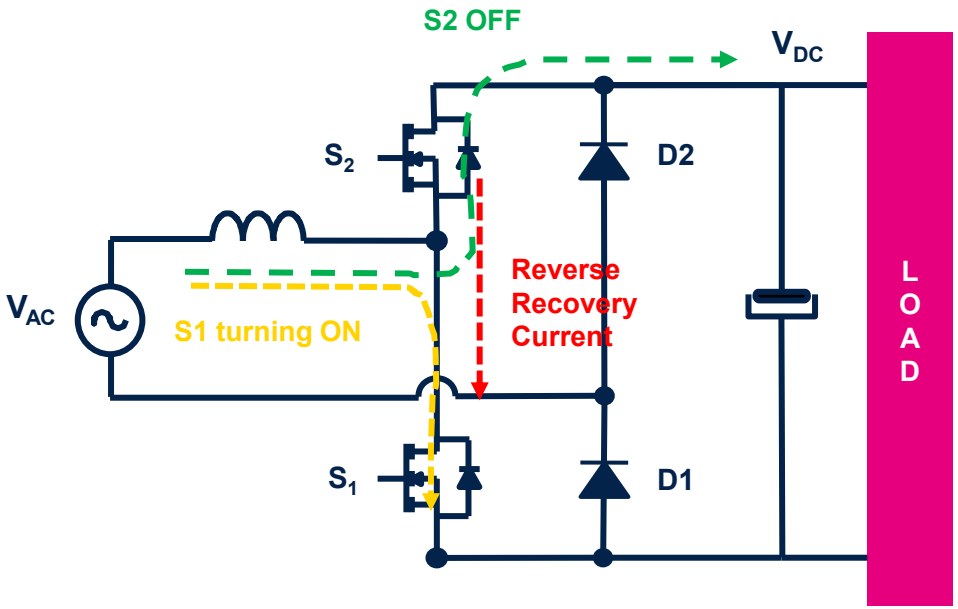
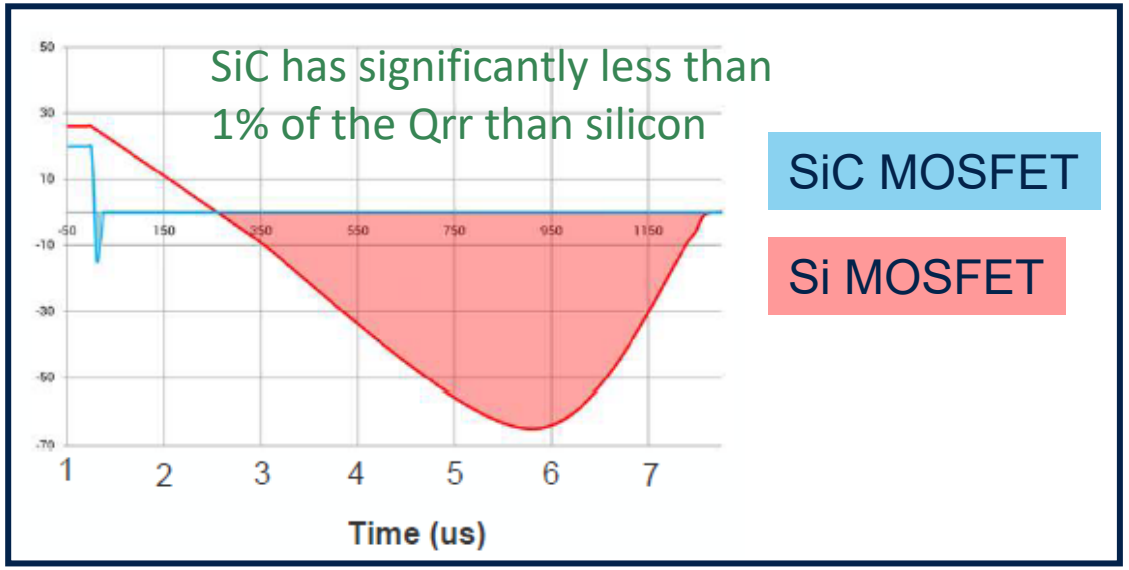
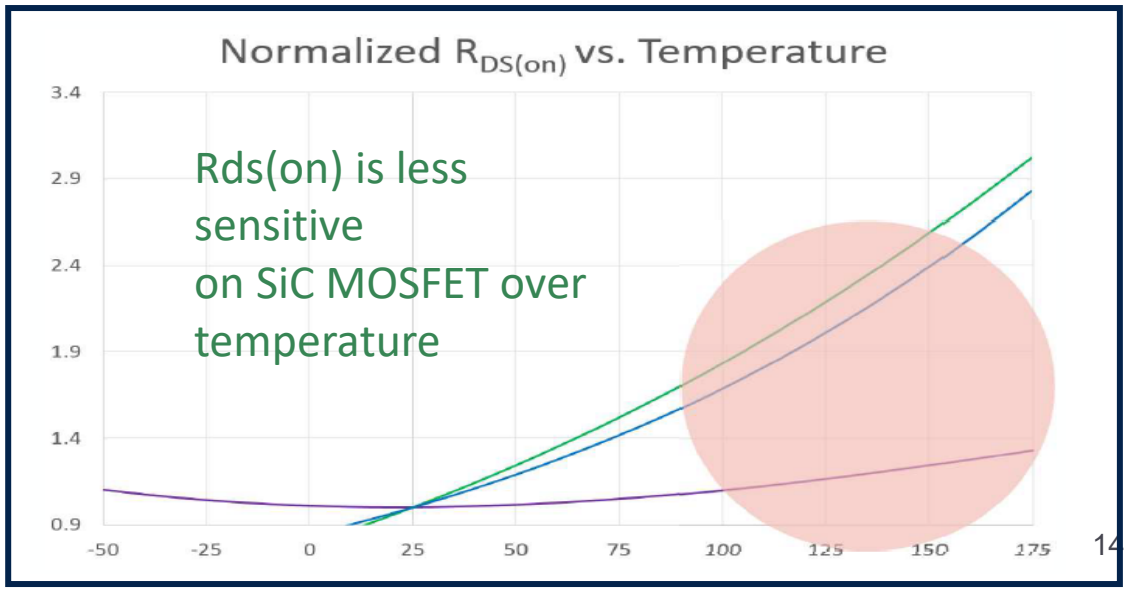
SiC MOSFET and driver IC

650V Gen2 SiC MOSFET



- Low body diode reverse recovery.
- Low switching loss due to outstanding figure of merit
- Low power loss at high temperature due to less temperature dependence of on resistance





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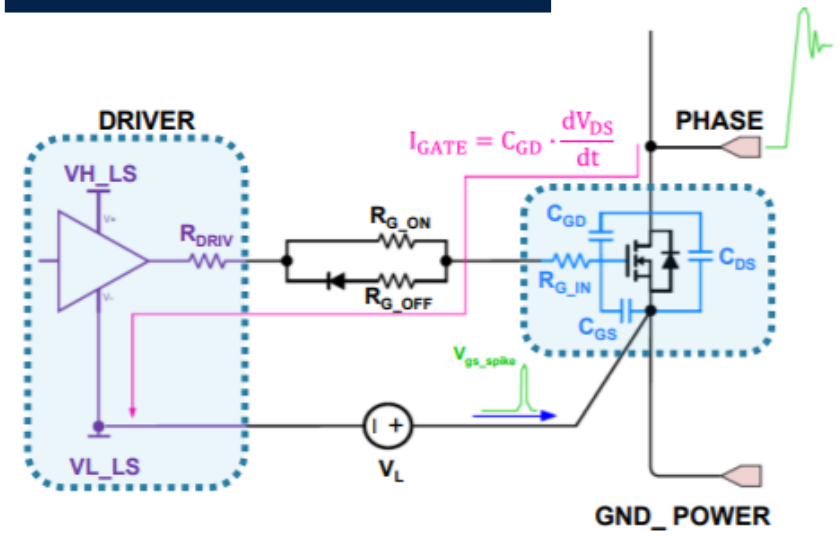
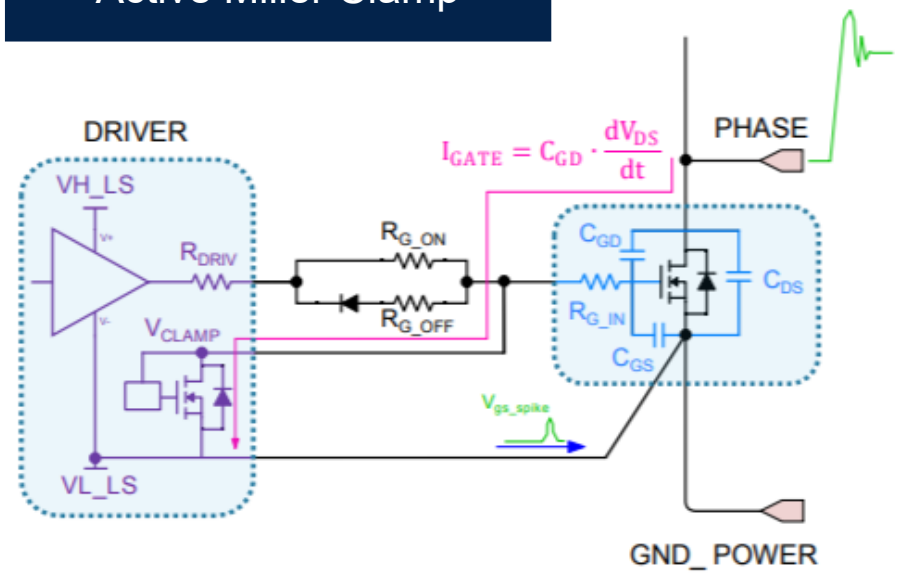
Mitigation techniques for induced G-S glitches

- SiC MOSFET can generate high slew rate dv/dt transients
- High slew rate dv/dt may generates Miller turn-on spike at gate terminal
- Negative turn-off bias also helps to prevent fault trigger due to Vgs glitch
- Active miller clamp feature minimizes Vgs glitch

Negative gate driving



Active Miller Clamp



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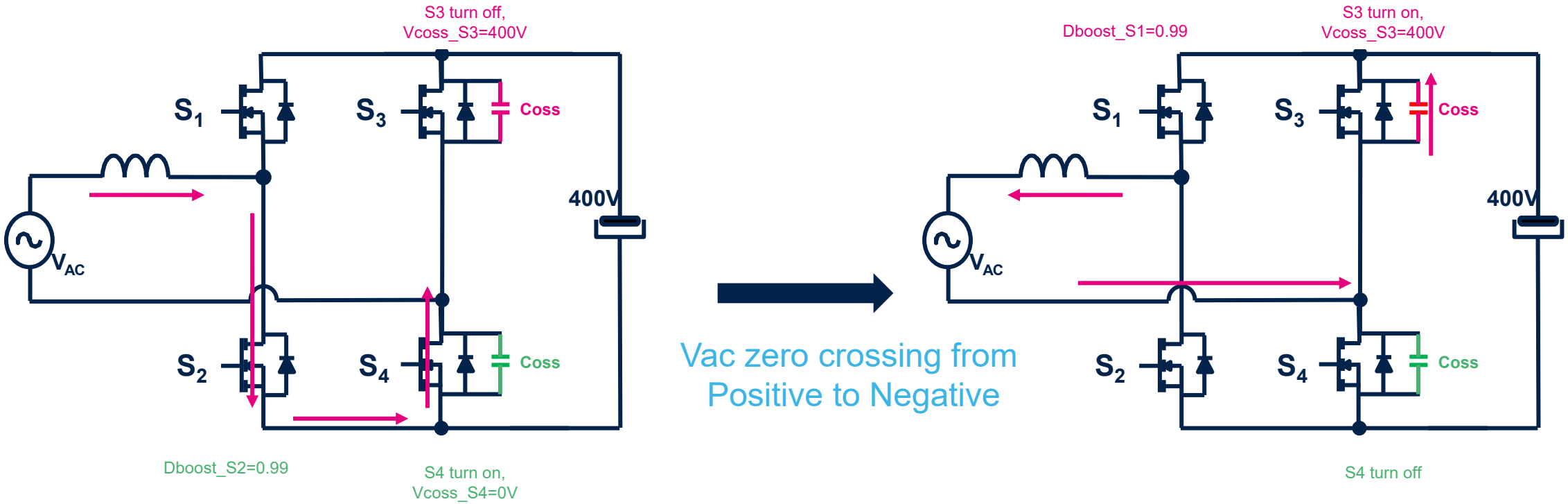
Design challenge
Current spike at AC zero crossing



- At a zero-crossing when the AC input is going from positive to negative.
  - Before zero-crossing, Vcoss_S3=400V, Dboost=0.99 to S2, (1-Dboost)=0.01 to S1
  - After zero-crossing, Vcoss_S4=400V, Dboost=0.99 to S1, (1-Dboost)=0.01 to S2
- Right at zero-crossing, if Dboost changes abruptly, the Vcoss_S3 will cause a current spike.

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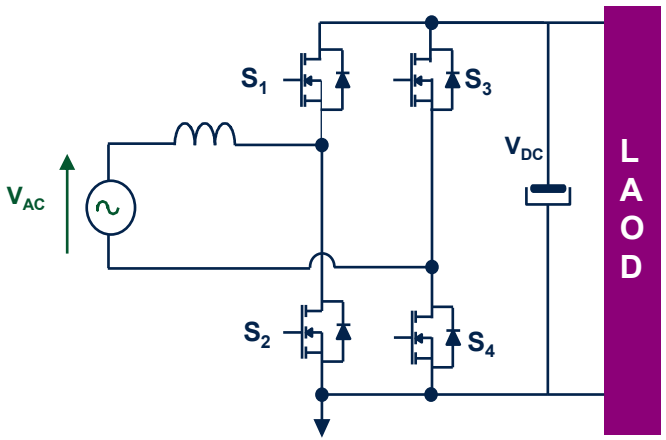
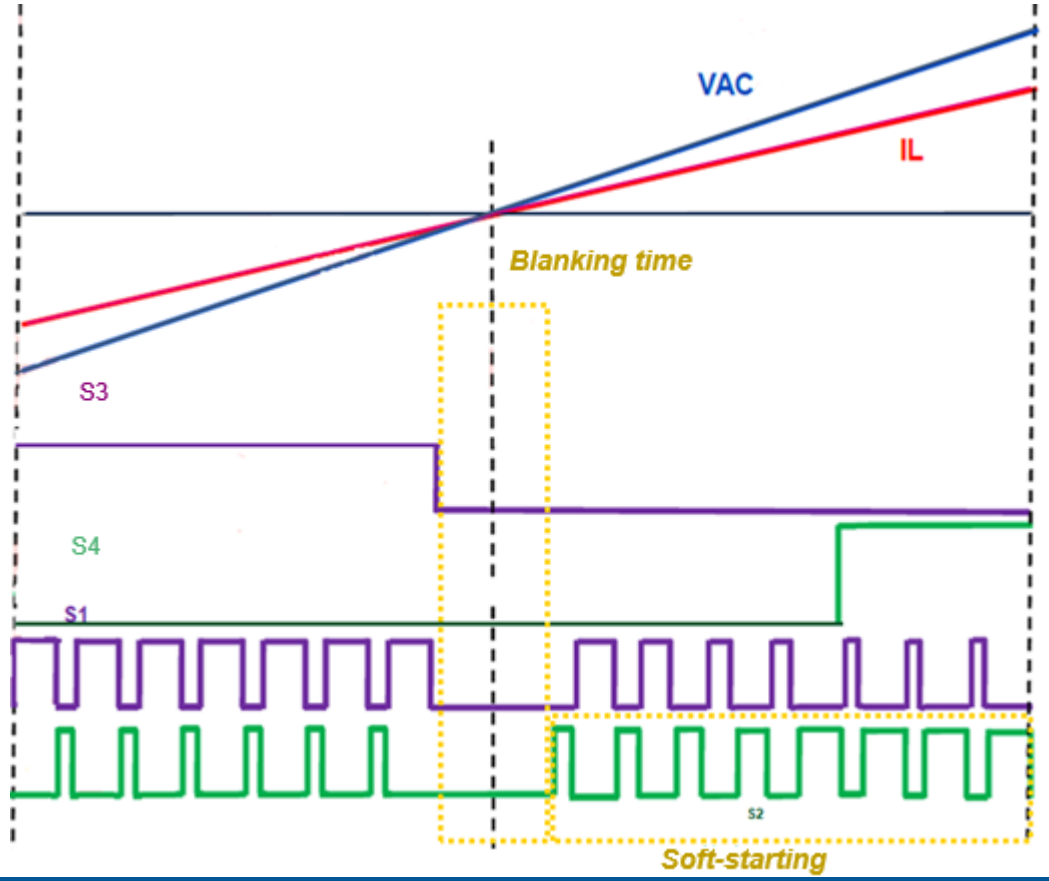
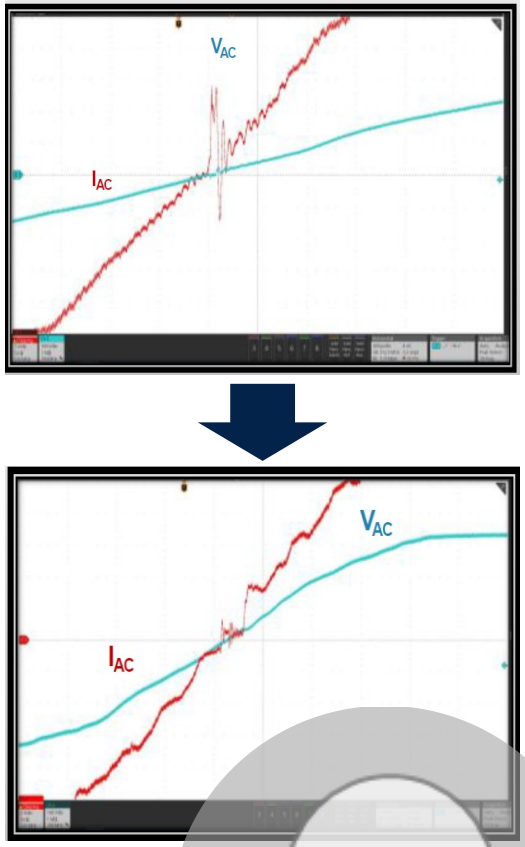
Solution for Eliminating Current Spike

- Blanking + Soft-start duty scheme







All MOSFETs are turned OFF to ensure a safe permutation of the power switches control and to avoid to short-circuit of the output DC capacitor.

S1 or S2 active switches are controlled with a soft duty cycle

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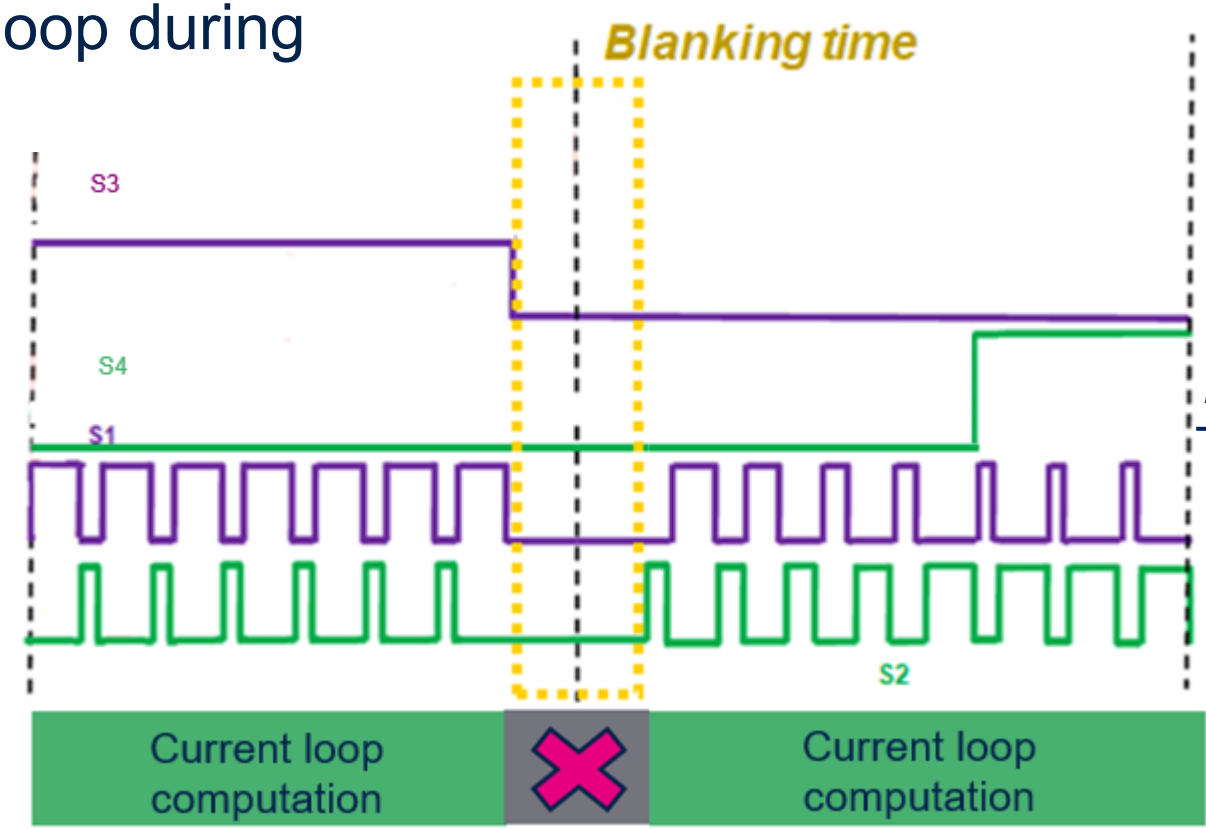
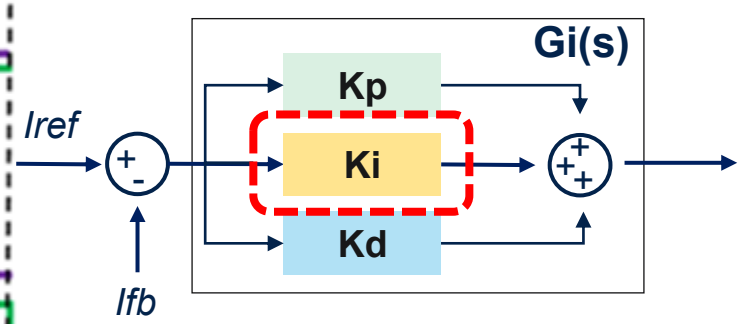
Solution for eliminating current spike

- Freeze current loop during blanking time





The control loop should freeze during the blanking time, in order to avoid the integrator of the current loop to generate a large PWM pulse, which will cause a large current spike

Resonant tank design

Magnetizing inductance Lm selection

Considerations:

- Select resonant frequency around 110kHz based power density target
- Main consideration is to achieve the optimal efficiency
- Primary MOSFET Eoff is related to Lm
- Primary MOSFET conducting loss is related to Lm
- Transformer copper loss is related to Lm
- Resonant inductor copper loss is related to Lm
- Power MOSFET ZVS is related to Lm

When operating at fs=fr=116kHz, Lm=225uH:
RMS magnetizing current is 2.17A
MOSFET switching off current is 3.752A
Voltage/current phase difference is Φ=0.309
Total zvs discharging capability is 800nC

Calculation

Check maximum Lm to ensure MOSFET ZVS at light load:

$frt := 150kHz$ — *maximun switching frequency at steady status*

$Coss := 286 \cdot (1 + 30\%)pF = 371.8 \cdot pF$ — *output capacitor of MOSFET (considering 30% tolerrance)*

$Td := 400ns$ — *deat time between MOSFETs conduction*

$Cstray := 100pF$ — *parastic capacitor*

the peak value of excitation current when Lm=Lm_zvs, suppose the switching off current of mosfet is peak excitation current, so the current should meet ZVS condition as below:

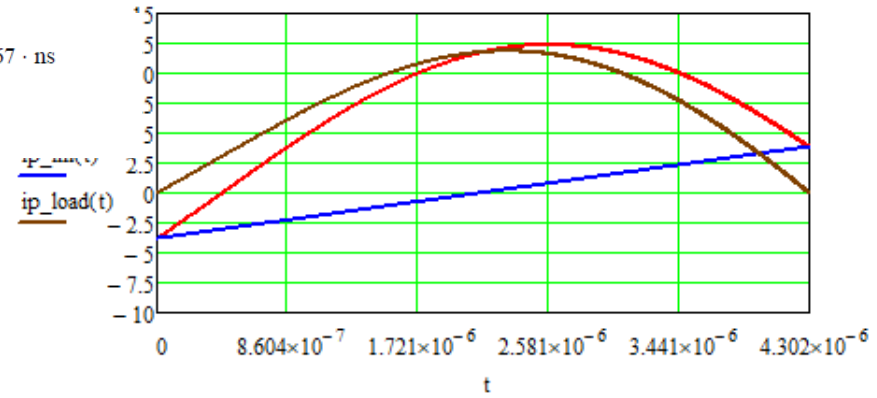
$$I(Lm\_zvs) := \frac{Vpfc\_v \cdot \left(\frac{1}{2frt} - Td\right)}{4Lm\_zvs}$$

$$Lm\_zvs := root[I(Lm\_zvs) \cdot Td - (2Coss + Cstray) \cdot Vpfc\_t, Lm\_zvs, 1\mu H, 500\mu H] = 257.892 \cdot \mu H$$

Select Lm=230uH, then double check Td margin at full load:

$$Td\_max := \frac{\phi}{\pi} \cdot \frac{1}{2fr} = 423.467 \cdot ns$$

Td<Td_max, ok



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Resonant tank design

Resonant tank Cr, Lr selection

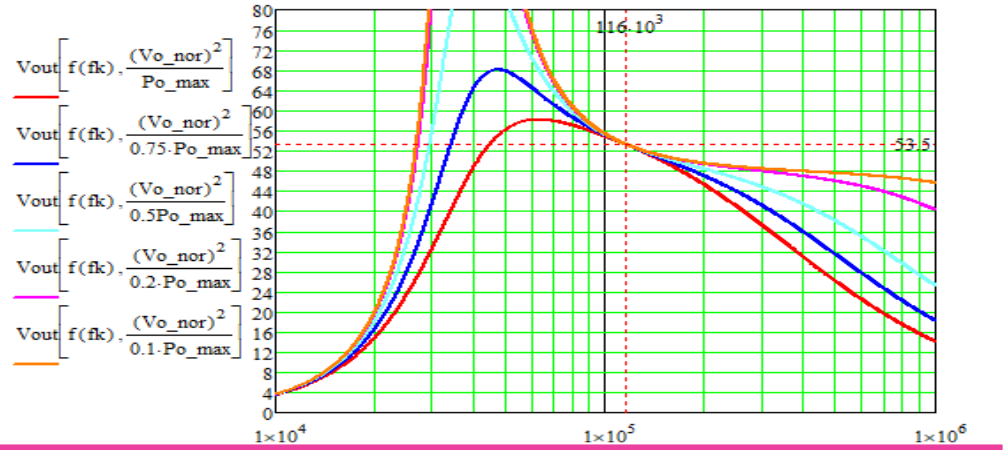
Considerations:

- Influence for efficiency, mainly Lr
- Output voltage range and its corresponding operating frequency range
- Smaller Lr can reduce total resonant inductor power loss
- Smaller Lr will reduce output capability @ low Vin and full load
- Influence for output maintain time during shut down
- Smaller Lr means higher frequency is needed for output regulation @ high Vin and light load

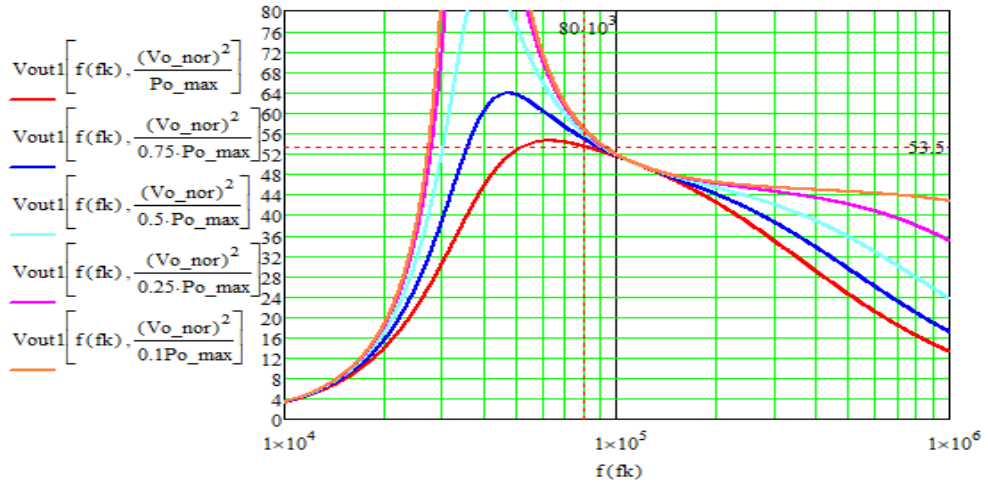
When operating with Lm=225uH, Lr=25uH, Cr=75nF:
K=9,
Q=0.42 @ full load
fs=80kHz @ Vin=375V, Vout=53.5V, full load
fs=165kHz @ Vin=425V, Vout=53.5V, Iout=1A

Calculation

Vout vs. fs @ Vin=400Vdc, each load



Vout vs. fs @ Vin=375Vdc, each load



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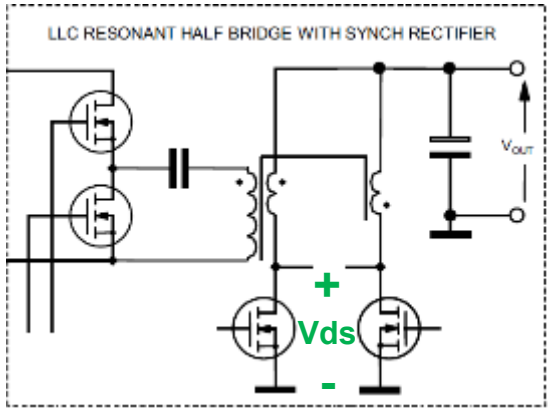
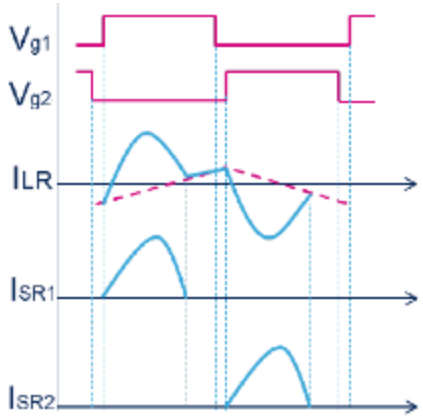
Design challenge: Synchronous rectifier (SR) control

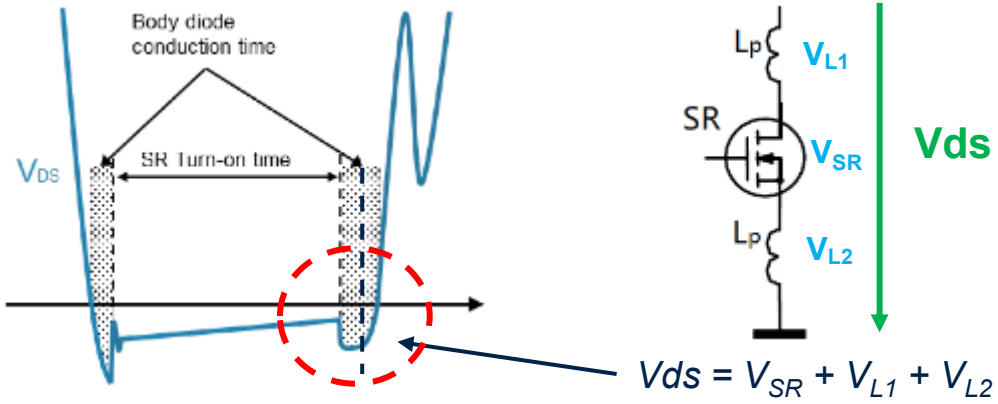


- Negative current caused by late SR MOSFET turn-off



- At heavy load (below resonant frequency), late SR turn off will force MOSFET conduct and cause a negative current from output capacitor
- This negative current could damage the power MOSFETs and resulting unit failure

- Premature SR MOSFET turn-off



- Due to the stray inductance in series with the SR MOSFET, the sensed drain-source signal (Vds) is not really the voltage drop across the SR MOSFET (V_{SR})
- So it will prematurely turn-off SR MOSFET and cause low efficiency

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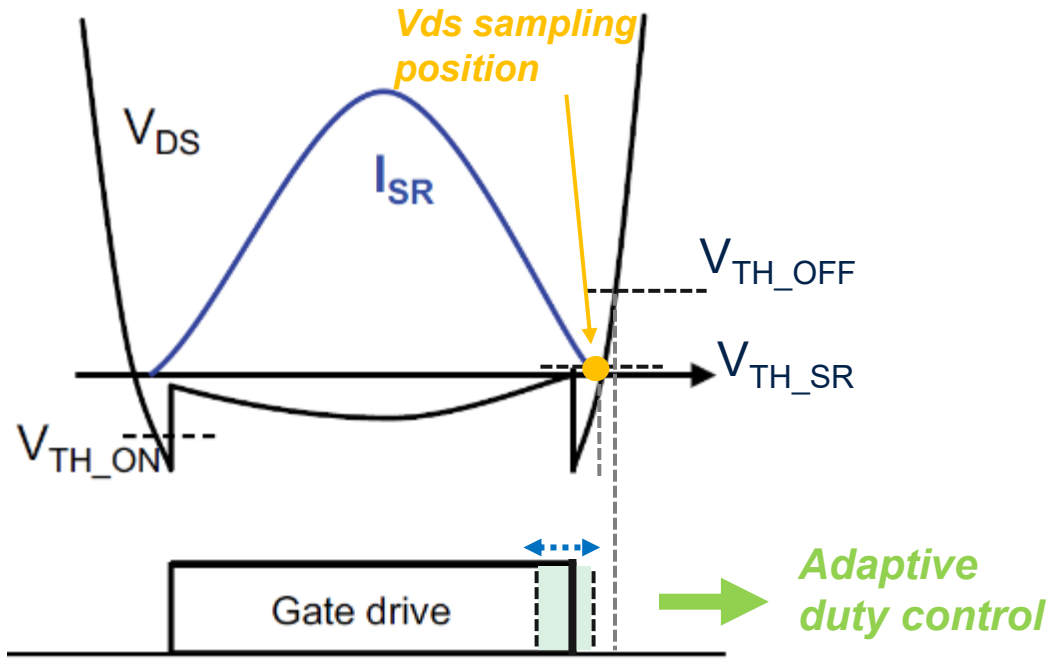
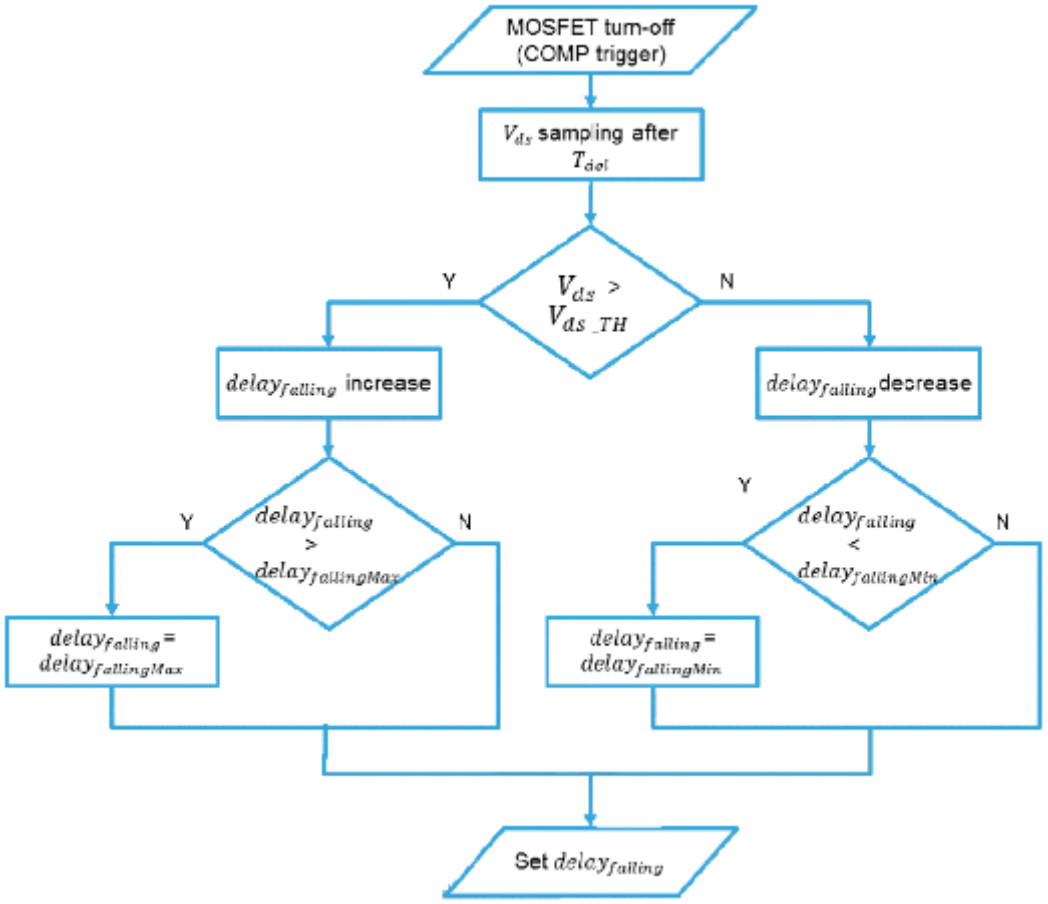
Adaptive SR control solution

- Adaptive SR control algorithm
  - Adaptive duty change for turn-off control bases on the comparison of sampled Vds and V_{TH_SR} threshold





EVM Board Performance

Contents

- Efficiency / iTHD / PF
- Soft start up
- Load Transient Response
- Load on with full power
- Hold-up time

Find more information from *https://www.st.com/en/evaluation-tools/stdes-3kwtlcp.html*

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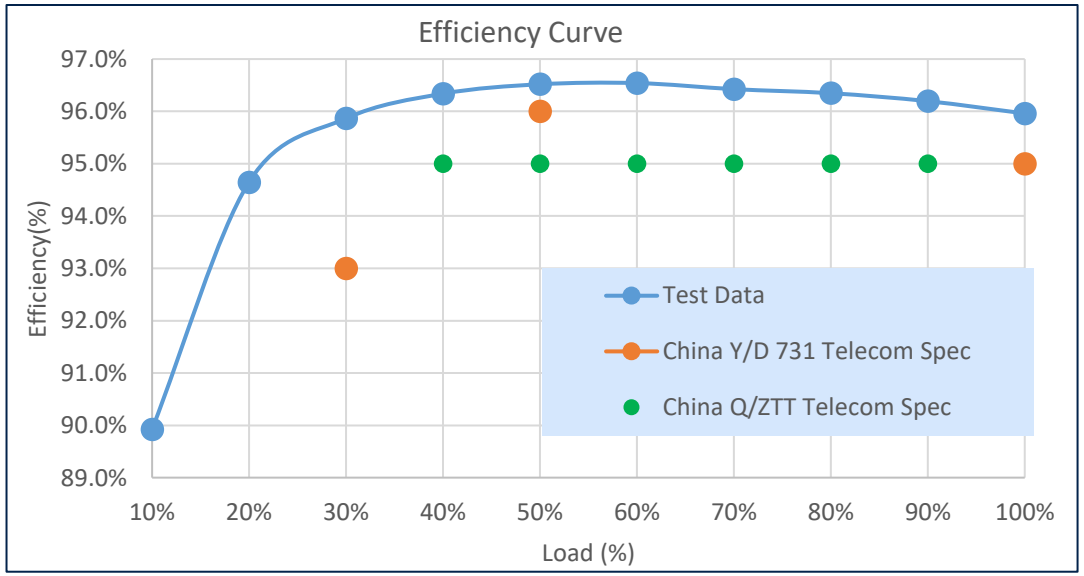
Efficiency curve

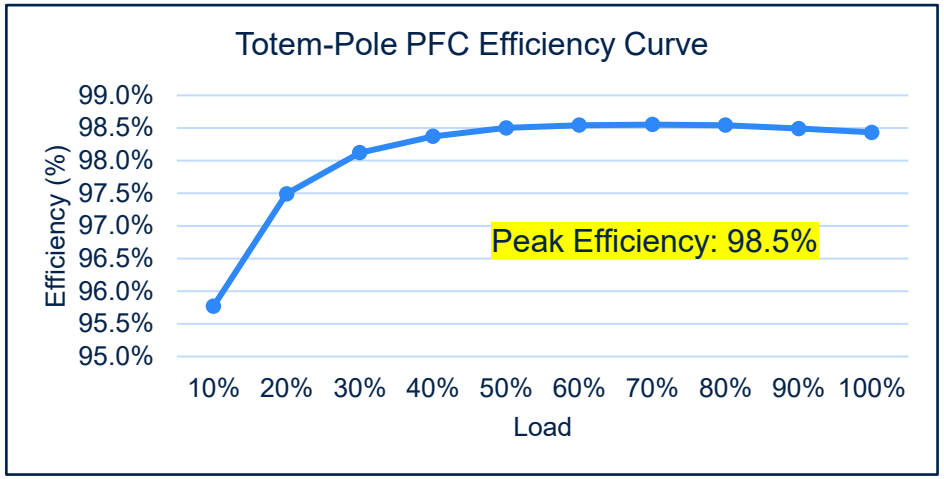
Efficiency

load	Vin	Iin	Pin	Vo	Io	Efficiency
10%	230.65	1.5053	334.4	53.611	5.609	89.92%
20%	230.63	2.7967	634.5	53.576	11.209	94.65%
30%	230.59	4.101	939.4	53.544	16.819	95.87%
40%	230.49	5.423	1245.9	53.515	22.429	96.34%
50%	230.37	6.748	1551.6	53.487	27.999	96.52%
60%	230.32	8.095	1862	53.438	33.639	96.54%
70%	230.21	9.446	2174.2	53.415	39.249	96.43%
80%	230.23	10.806	2485.8	53.39	44.859	96.35%
90%	230.13	12.178	2800	53.369	50.469	96.20%
100%	230.07	13.54	3113	53.345	55.999	95.96%

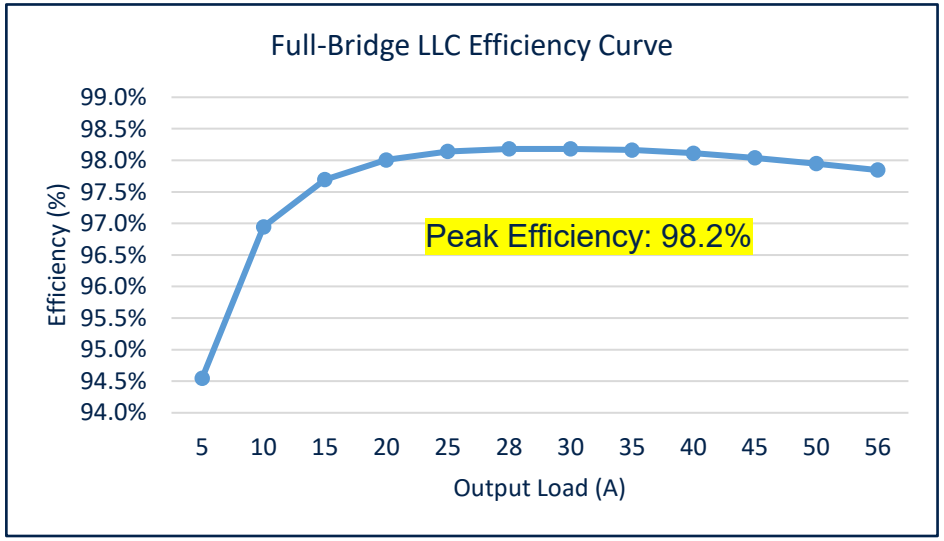


Test Condition: 230Vac/50Hz

Totem-Pole PFC Efficiency

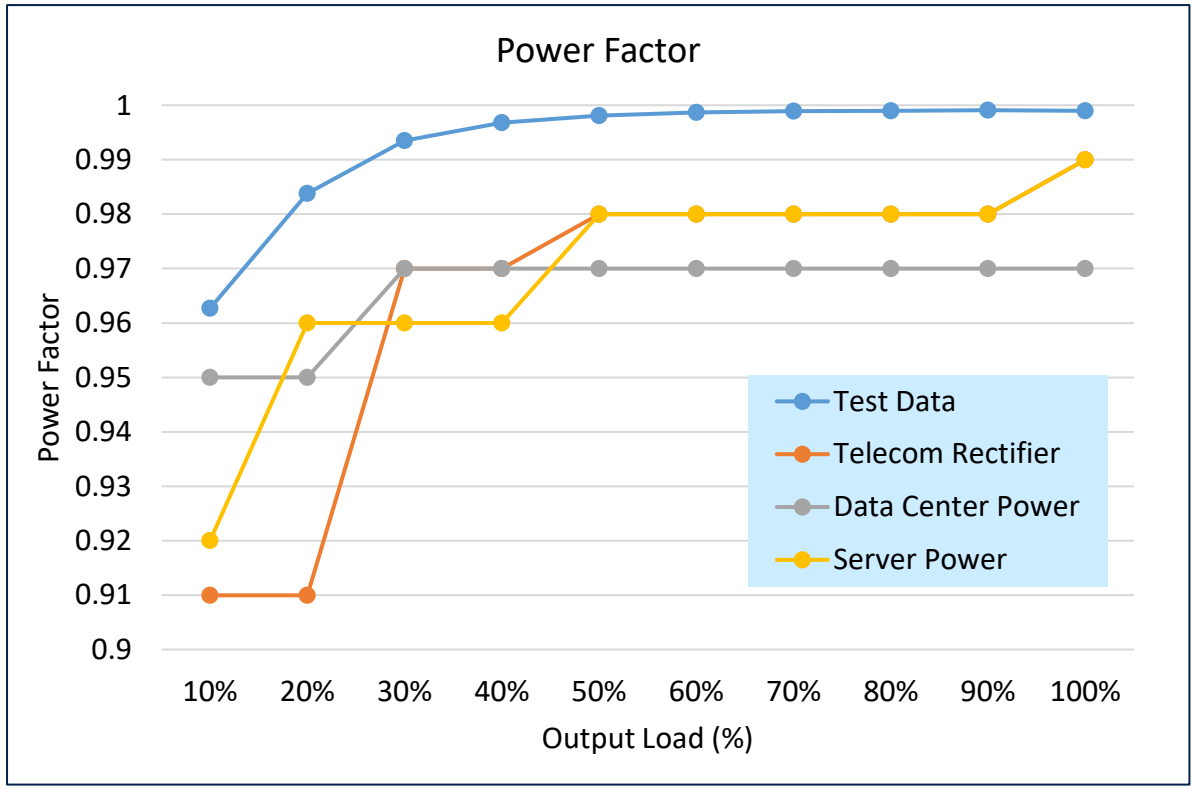


Full-Bridge LLC Efficiency

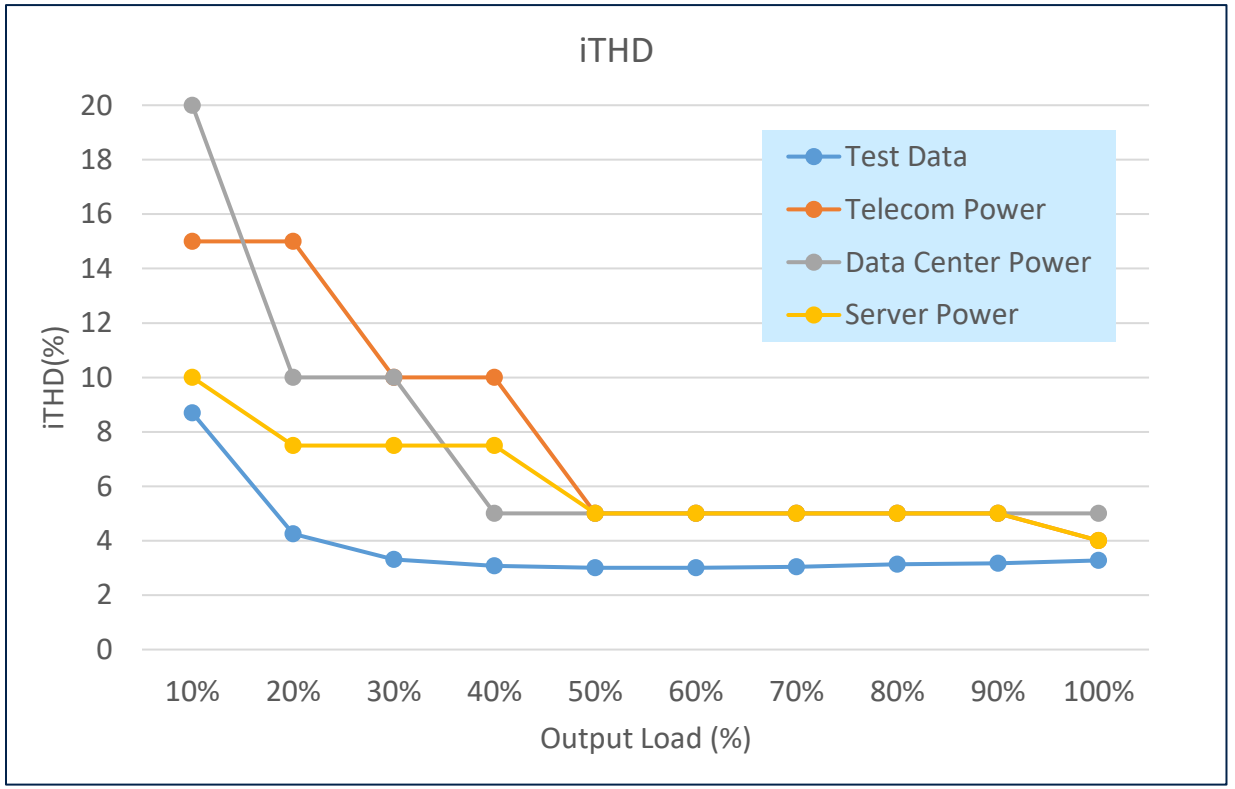


iTHD / Power factor @ 230Vac

PF



iTHD



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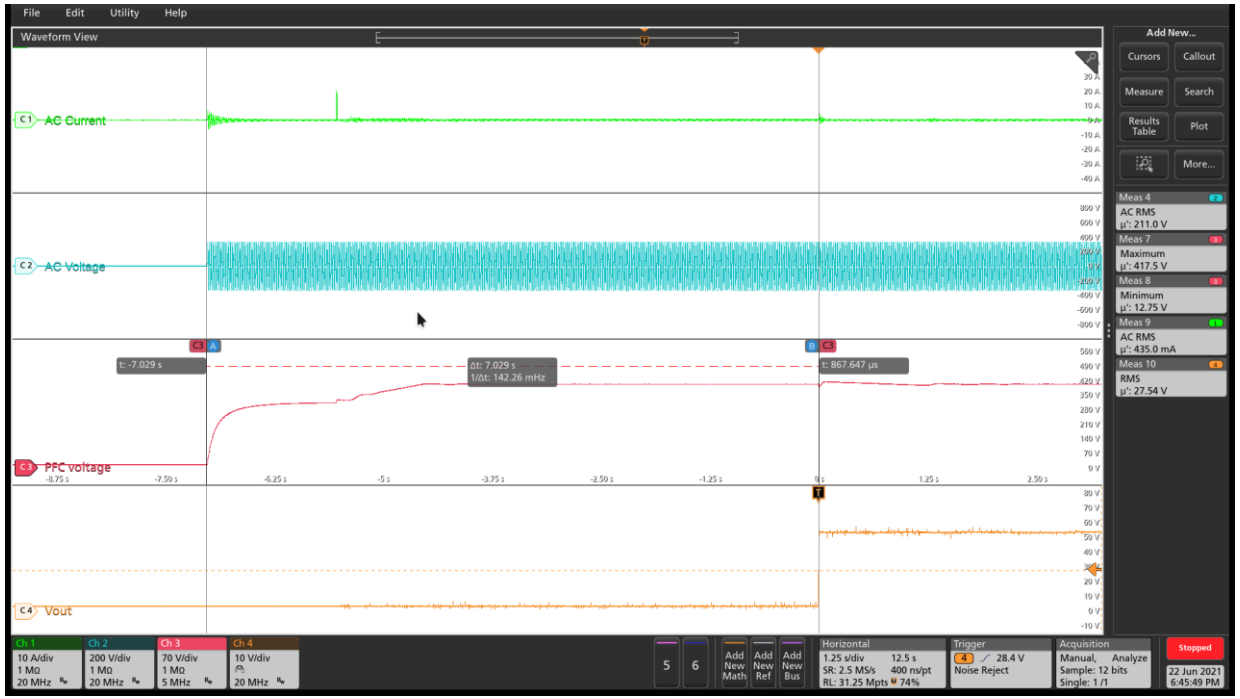
Soft start 230Vac/50Hz

No load

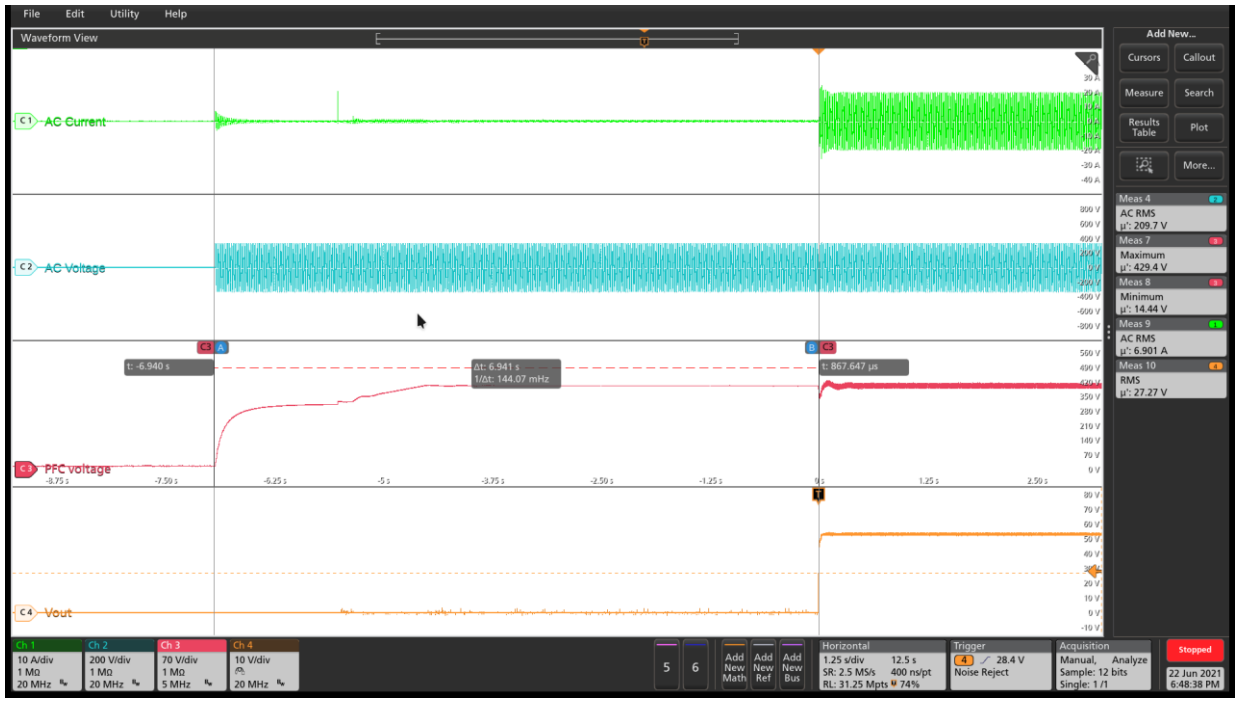
Tss=7.029s



CH1: Input current (10A/div)
CH2: Input Voltage (200V/div)
CH3: Bulk Cap Voltage (70V/div)
CH4: Output Voltage (10V/div)

Full load

Tss=6.941s



CH1: Input current (10A/div)
CH2: Input Voltage (200V/div)
CH3: Bulk Cap Voltage (70V/div)
CH4: Output Voltage (10V/div)

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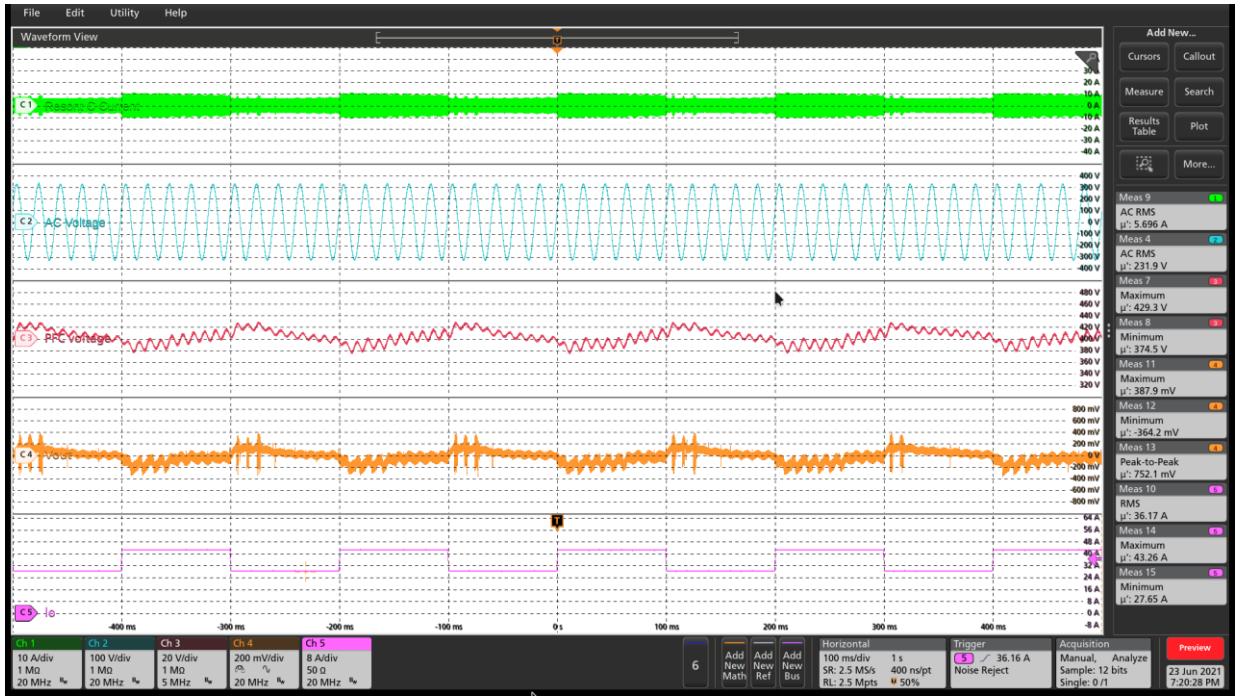
Load Transient response 230Vac/50Hz

25%~50%~25% 0.1A/us 100ms

CH1: Resonant current (10A/div)
CH2: Input Voltage (100V/div)
CH3: Bulk Cap Voltage (20V/div Vos=400V)
CH4: Output Voltage (200mV/div AC coupled)
CH5: Load Current (5A/div)

50%~75%~50% 0.1A/us 100ms



CH1: Resonant current (10A/div)
CH2: Input Voltage (100V/div)
CH3: Bulk Cap Voltage (20V/div Vos=400V)
CH4: Output Voltage (200mV/div AC coupled)
CH5: Load Current (8A/div)

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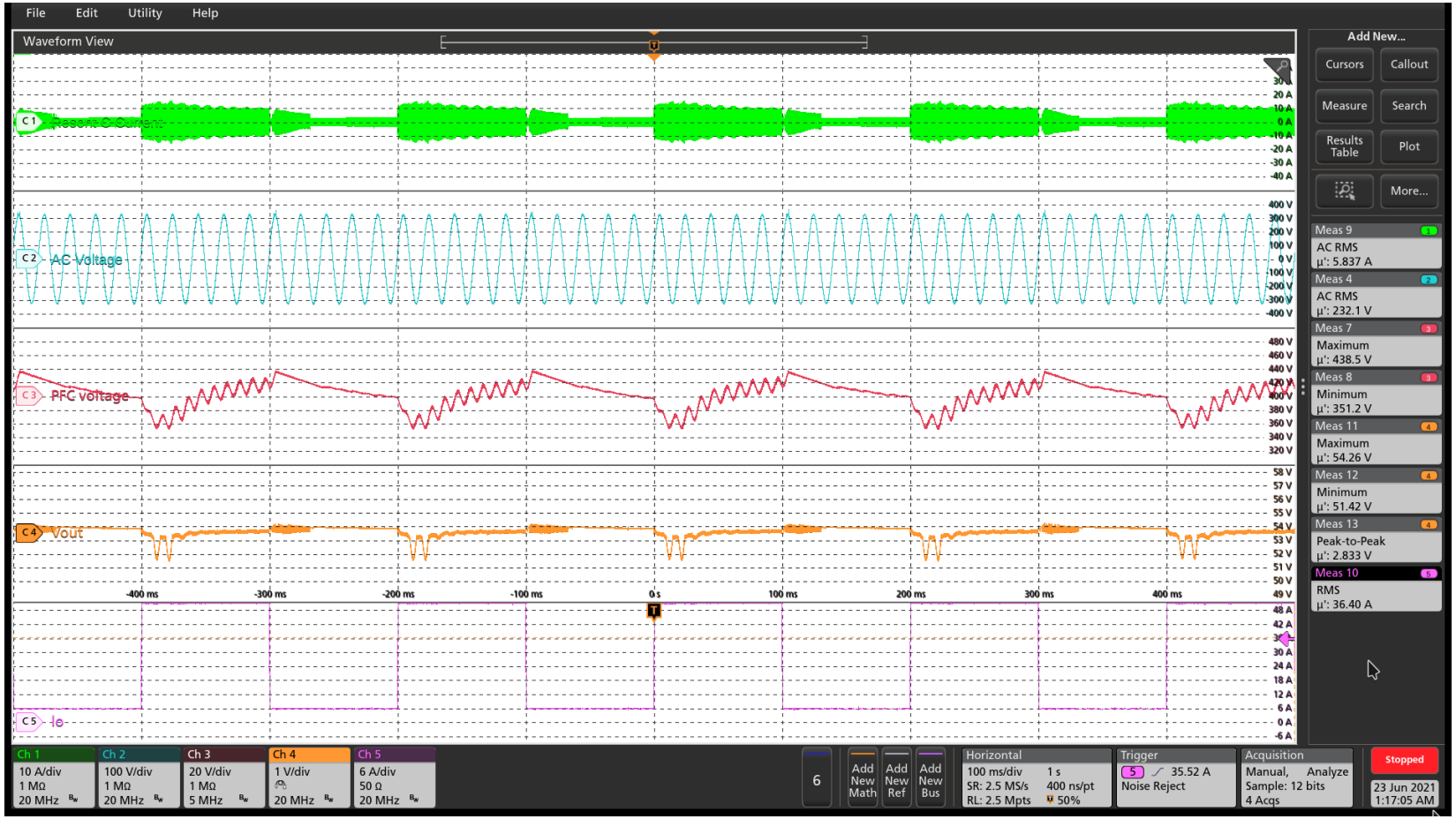
Load Transient Response 230Vac/50Hz

10%~90%~10% 0.1A/us 100ms



CH1: Resonant current (10A/div)
CH2: Input Voltage (100V/div)
CH3: Bulk Cap Voltage (20V/div Vos=400V)
CH4: Output Voltage (1V/div Vos=53.5V)
CH5: Load Current (6A/div)

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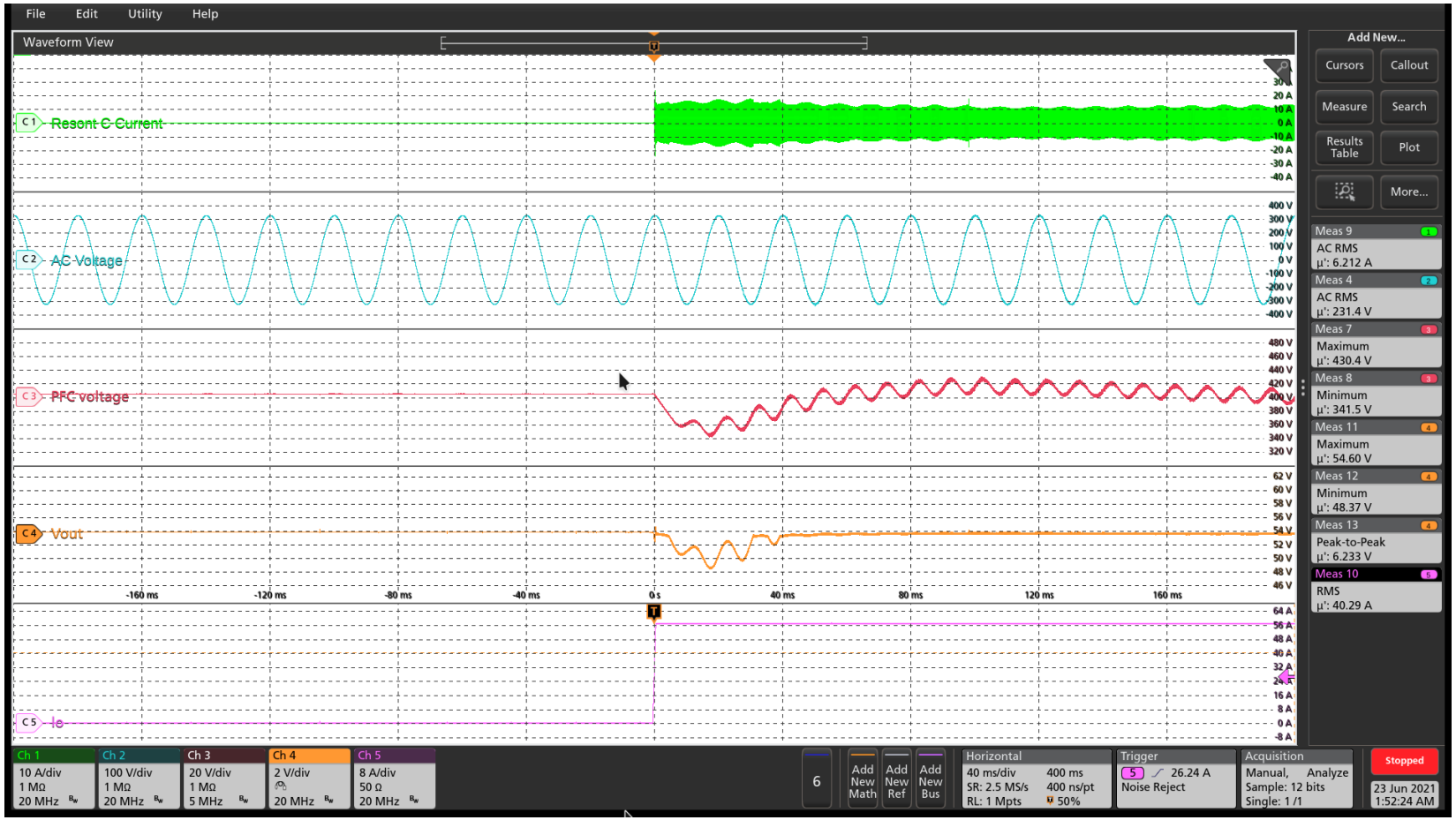
Load on with full power 230Vac/50Hz

Load on with full power



CH1: Resonant current (10A/div)
CH2: Input Voltage (100V/div)
CH3: Bulk Cap Voltage (20V/div Vos=400V)
CH4: Output Voltage (2V/div Vos=53.5V)
CH5: Load Current (8A/div)

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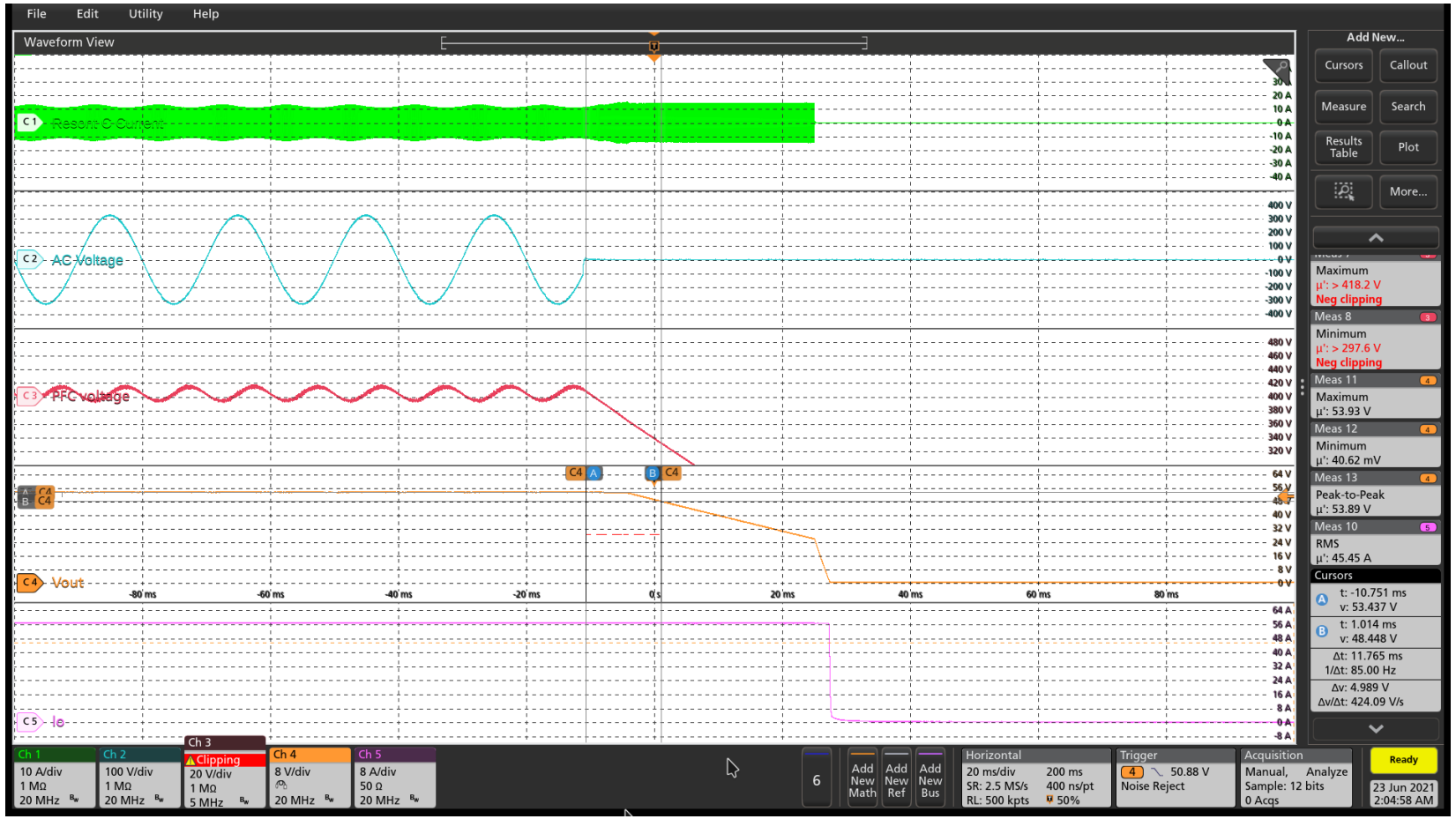
Hold up time 230Vac/50Hz

Holdup time

T_{holdup}=10.751ms From 53.5V drop to 48.5V



CH1: Resonant current (10A/div)
CH2: Input Voltage (100V/div)
CH3: Bulk Cap Voltage (20V/div Vos=400V)
CH4: Output Voltage (8V/div)
CH5: Load Current (8A/div)

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ST Products introduction

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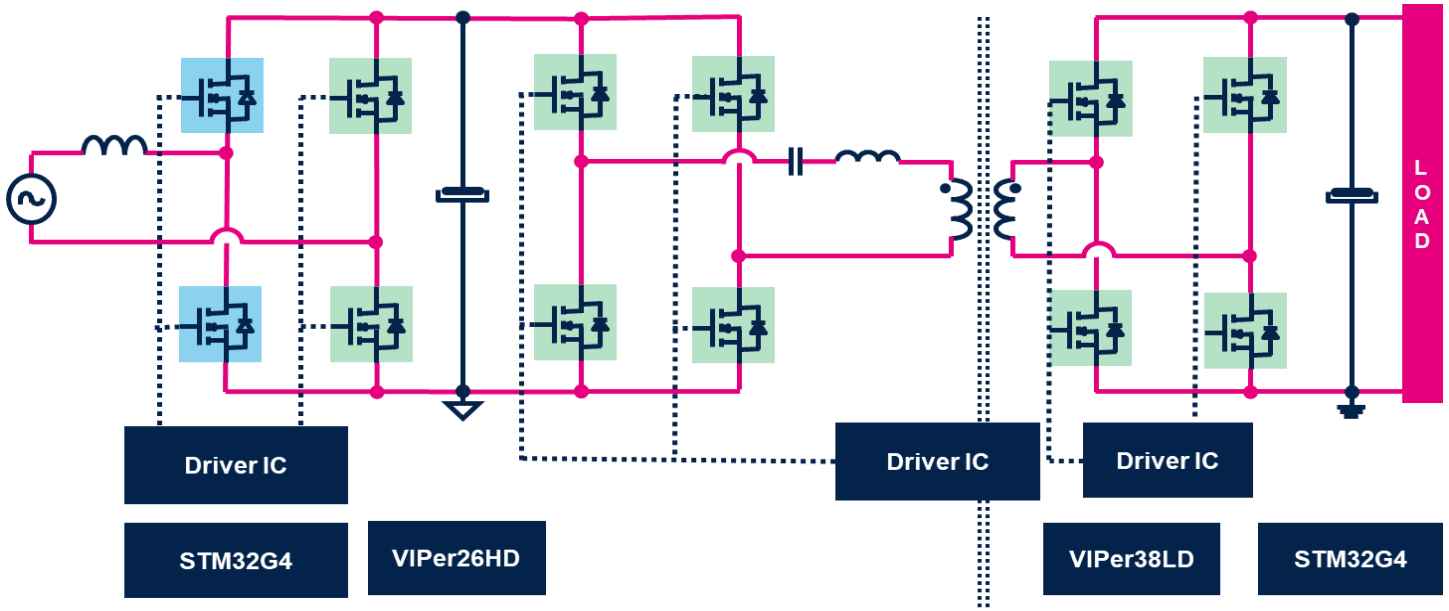
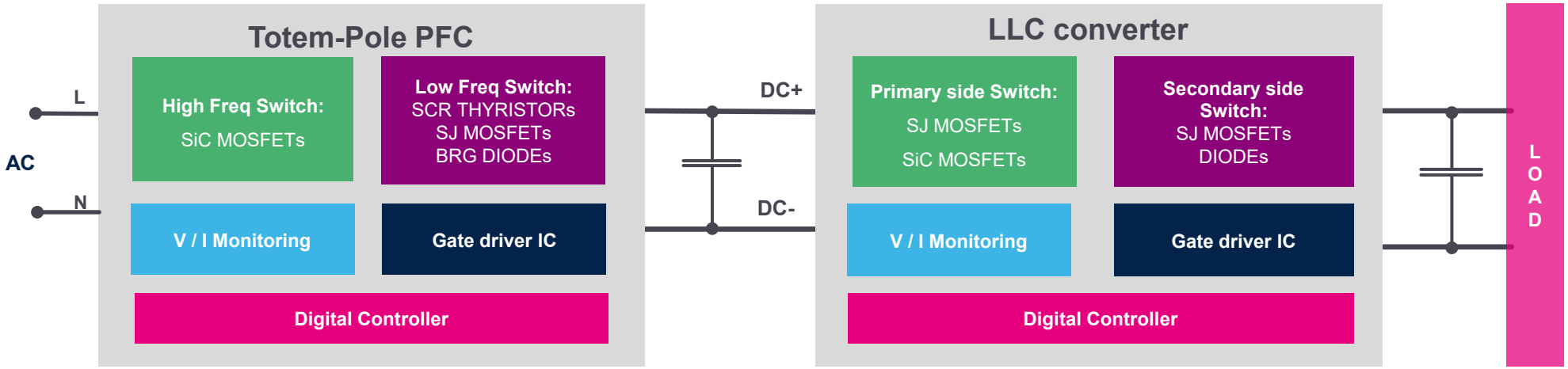
ST products introduction





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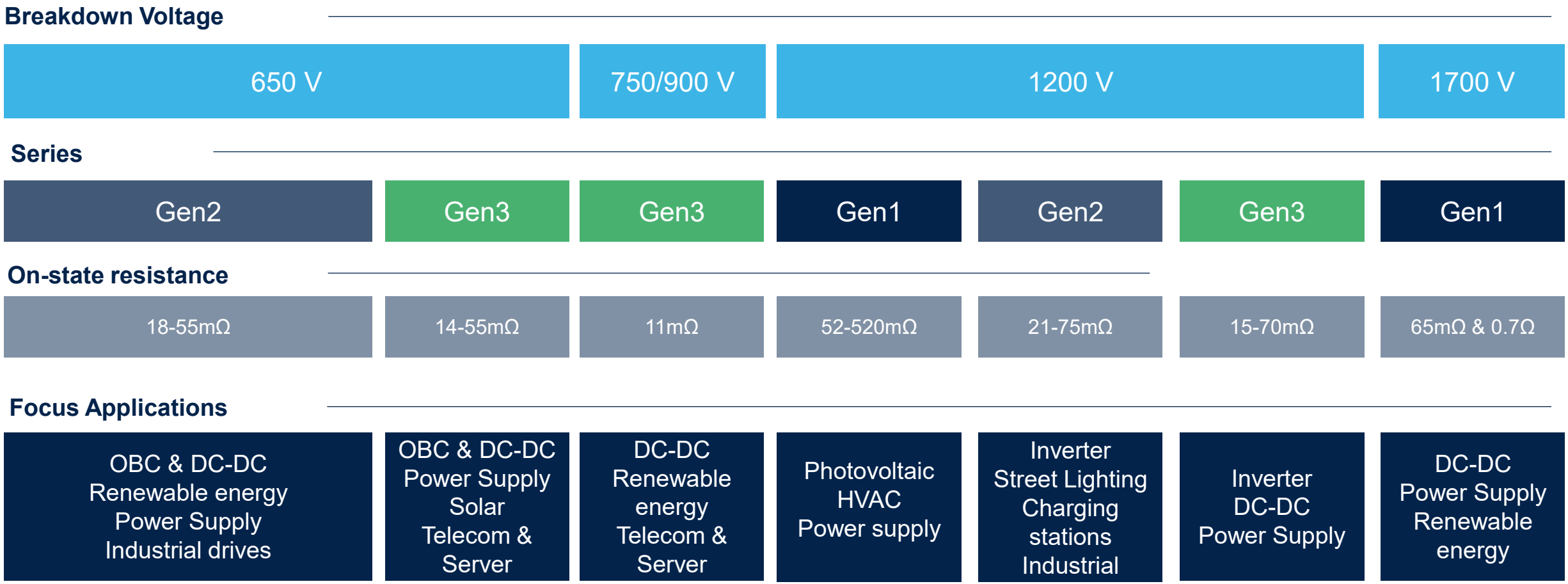
STPOWER SiC MOSFET
Product family ratings and applications



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SiC MOSFETs Gen2

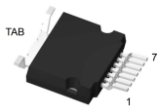
Vgs=18V	V_{DS} [V]	R_{DS}(on) Typ@ 25 °C [mΩ]	Id [A]	Package				
				HiP247	HiP247-LL	HiP247-4LL	H2PAK-7L	Power flat 8*8
Industrial Grade				Tj max= 200°C			Tj max= 175°C	Tj max= 175°C
SCTW90N65G2V	650	18	119	X				
SCTWA90N65G2V					X			
SCTWA90N65G2V-4						X		
SCTH90N65G2V-7							X	
SCTL90N65G2V								X
SCTW35N65G2V	650	55	45	X				
SCTWA35N65G2V					X			
SCTWA35N65G2V-4						X		
SCTH35N65G2V-7							X	
SCTL35N65G2V								X

KEY FEATURES

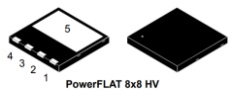
- Very low switching losses
- Low power losses at high temperatures
- Higher operating temperature (up to 200 °C)
- Body diode with no recovery losses
- Easy to drive

KEY BENEFITS

- Smaller form factor and higher power density
- Reduced size/cost of passive components
- Higher system efficiency
- Reduced cooling requirements and heatsink size



HU3PAK



H²PAK-7L


HiP247 LL


HiP247-4L

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SiC MOSFETs Gen3

Automotive Grade AECQ 101 Compliant	V_{DS} [V]	R_{DS}(on) Typ @ 25°C [Ω], *Vgs=18V	Package	Status	Eng. samp
SCT055HU65G3AG	650	0.055	HU3PAK	Available	
SCT055H65G3AG			H2PAK-7L		Available
SCT055W65G3AG			HiP247		Available
SCT055W65G3-4AG			HiP247 4L (LL)		Available
SCT040HU65G3AG	650	0.042	HU3PAK	Available	
SCT040H65G3AG			H2PAK-7	Available	
SCT040H65G3SAG			H2PAK-7 Straight leed	Available	
SCT027HU65G3AG	650	0.027	HU3PAK		Available
SCT027H65G3AG			H2PAK-7L		Available
SCT027W65G3AG			HiP247		Available
SCT027W65G3-4AG			HiP247 4L (LL)		Available
SCT018HU65G3AG	650	0.021	**HU3PAK**		Available
SCT018H65G3AG			H2PAK-7L	Available	
SCT018W65G3AG			HiP247		Available
SCT018W65G3-4AG			HiP247 4L (LL)		Available
SCT014HU65G3AG	650	0.014	HU3PAK		Available

KEY FEATURES

- Very low switching losses
- Low power losses at high temperatures
- Higher operating temperature (up to 200 °C)
- Body diode with no recovery losses
- Easy to drive

KEY BENEFITS

- Smaller form factor and higher power density
- Reduced size/cost of passive components
- Higher system efficiency
- Reduced cooling requirements and heatsink size

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High voltage MOSFET series super-junction MDmesh™

Breakdown Voltage								
600V				650V			700V	800V – 1700V
MDmesh series								
M2	M6	DM2	DM6	M5	DM2	DM6	M6	K5
Focus Topology								
Flyback, PFC/LLC resonant conv.	Flyback, PFC/LLC high efficiency	HB / FB, ZVS, LLC	HB / FB, ZVS, LLC high efficiency	Hi-end-power PFC and hard switching topologies	HB / FB, ZVS, LLC high power level	HB / FB, ZVS, LLC high power level high efficiency	Flyback topology	
Focus Applications								
Charger adapters Led lighting, Medical	Server, 5G, Consumer, Adapters, Solar, Medical	Solar, Server, Telecom SMPS, EV-Car/Charging, Medical					LED driver, LED lighting, auxiliary SMPS, EV-Car, Medical	

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SJ MOSFETs
600V DM6 series

Part Number	Vds (V)	RDS(on)@typ 25	Id(A)	Package									
				TO-247	TO247-4	TO-247 long leads	TO-LL	TO-220	D2PAK	HU3PAK	H2PAK-2	I2PAK	PowerFLAT 8x8 HV
STW75N60DM6	600	0.036	72	X									
STWA75N60DM6						X							
STW72N60DM6AG	600	0.042	56	X									
STW70N60DM6-4			62		X								
STWA70N60DM6						X							
STW70N60DM6				X									
STWA67N60DM6	600	0.054	58			X							
STO67N60DM6		0.059					X						
STWA65N60DM6	600	0.071	46			X							
STW65N60DM6				X									
STO65N60DM6		0.076					X						
STW52N60DM6	600	0.074	45	X									
STP50N60DM6	600	0.08	36					X					
STB47N60DM6AG	600	0.08	36						X				
STH47N60DM6-2AG											X		
STI47N60DM6AG												X	
STHU47N60DM6AG										X			
STL52N60DM6	600	0.084	45										X

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SJ MOSFETs
650V DM6 series

Part Number	Vds (V)	RDS(on)@typ 25	Id(A)	Package						
				TO-247	TO247-4	TO-247 long leads	TO-LL	TO-220	D2PAK	HU3PAK
STW75N65DM6-4	650	0.036	75		X					
STWA75N65DM6						X				
STWA68N65DM6AG	650	0.039	72			X				
STW68N65DM6-4AG					X					
STW70N65DM6	650	0.04	68	X						
STWA70N65DM6						X				
STW70N65DM6-4					X					
STW68N65DM6	650	0.059	55	X						
STWA68N65DM6						X				
STO68N65DM6		0.065					X			
STWA46N65DM6AG	650	0.063	50			X				
STWA38N65DM6AG	650	0.082	42			X				
STP50N65DM6	650	0.091	33					X		
STB50N65DM6									X	
STW50N65DM6				X						
STWA32N65DM6AG	650	0.097	37			X				
STHU32N65DM6AG										X

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Isolated gate drive for SiC MOSFET

1700 V Galvanic isolated Single & Dual channel

SO-8

STGAP2S
STGAP2SC
STGAP2SICSN
STGAP2SICSNC

SO-16

STGAP2D

- Galvanic isolated, up to 1700 V high voltage rail
- Extreme Transient Immunity up to ± 100 V / ns
- Fast Switching Frequency (Tp 80ns only)
- High current capability 4A Isink / Isource

6000 V Galvanic isolated Single & Dual channel

SO-8W

STGAP2HS
STGAP2HSC
STGAP2SiCS
STGAP2SiCSC

SO-36W

STGAP2HD
STGAP2SICD

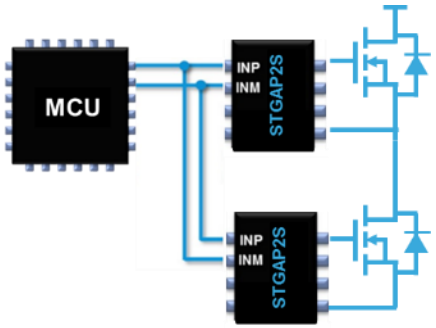
- Galvanic isolated, up to 6000 V high voltage rail
- Extreme Transient Immunity up to ± 100 V / ns
- Fast Switching Frequency (Tp 80ns only)
- High current capability 4A Isink / Isource

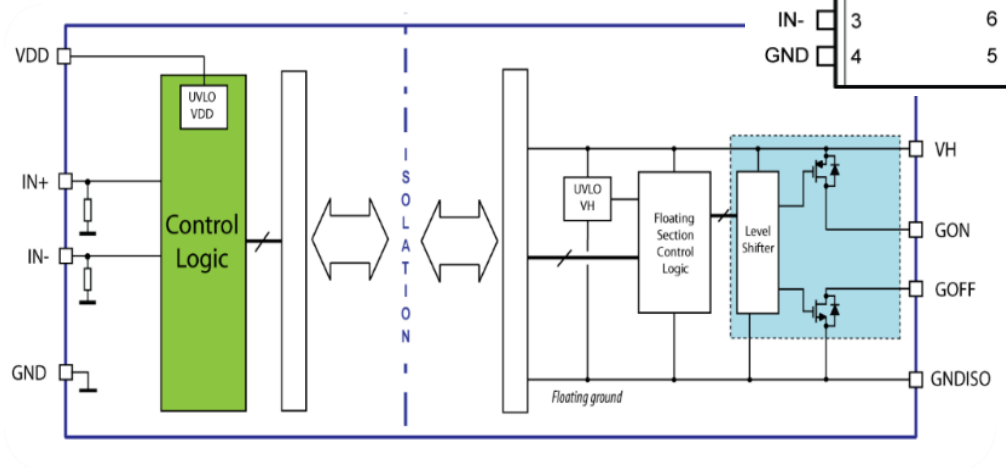
STGAP2S, STGAP2SC
STGAP2SICSN, STGAP2SICSNC

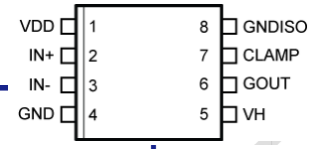
1700 V, 4A isolated gate drivers

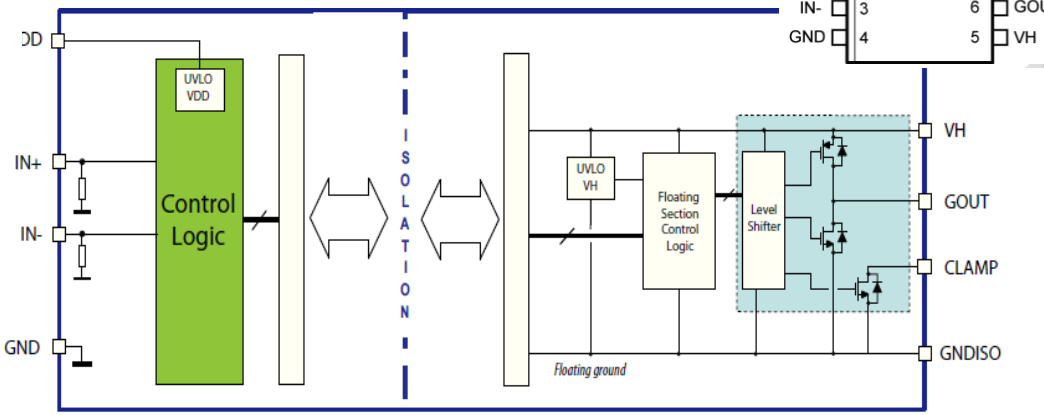
- 3V3/ 5 V logic inputs (logic thresholds 1/3, 2/3 of VDD)
- **Up to 26 V supply voltage**
- **4 A Sink/Source current capability**
- Short propagation delay: 80 ns
- UVLO Function
- Stand-by function
- 100 V/ns CMTI
- High voltage rail up to 1700 V
- Temperature shut-down protection

- Active High & Active Low input pins, for HW interlocking
- **STGAP2S/STGAP2SICSN**:
- Separated Outputs option for easy gate driving tuning
- **STGAP2SC/STGAP2SICSNC**:
- Miller CLAMP pin option to avoid induced turn-on
- Negative gate drive ability
- SO8 Package









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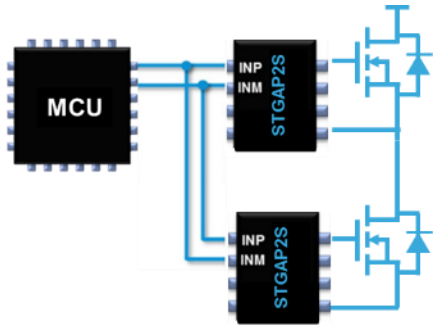
STGAP2HS, STGAP2HSC
STGAP2SiCS, STGAP2SiCSC

6kV, 4A isolated gate drivers

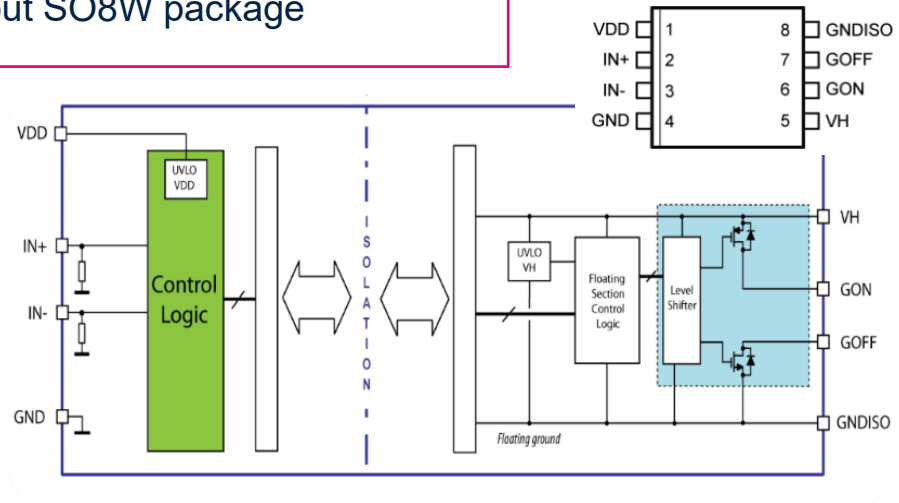
- 3.3V/5V logic inputs (logic thresholds 1/3, 2/3 of VDD)
- **Up to 26 V supply voltage**
- **4 A Sink/Source current capability**
- Short propagation delay: 80 ns
- **UVLO Function (optimized for SiC Version)**
- Stand-by function
- 100 V/ns CMTI
- Galvanic isolated up to 6kV
- Temperature shut-down protection
- Compact and simplified layout SO8W package

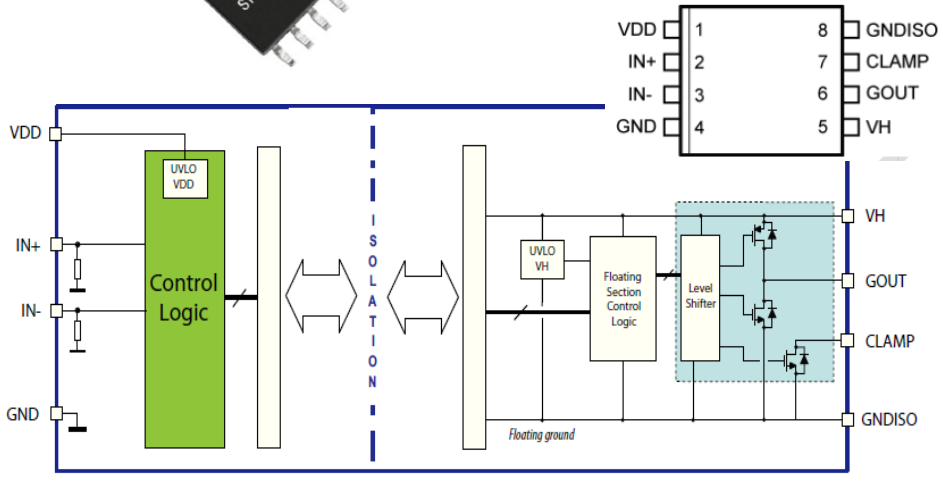
- Active High & Active Low input pins, for HW interlocking
- **STGAP2HS/STGAP2SICS**:
- Separated Outputs option for easy gate driving tuning
- **STGAP2HSC/STGAP2SICSC**:
- Miller CLAMP pin option to avoid induced turn-on
- Negative gate drive ability
- SO8-W Package



KEY APPLICATIONS

- Motor control
- Factory automation
- Industrial drives and Fans
- DC/ DC converters
- Welding





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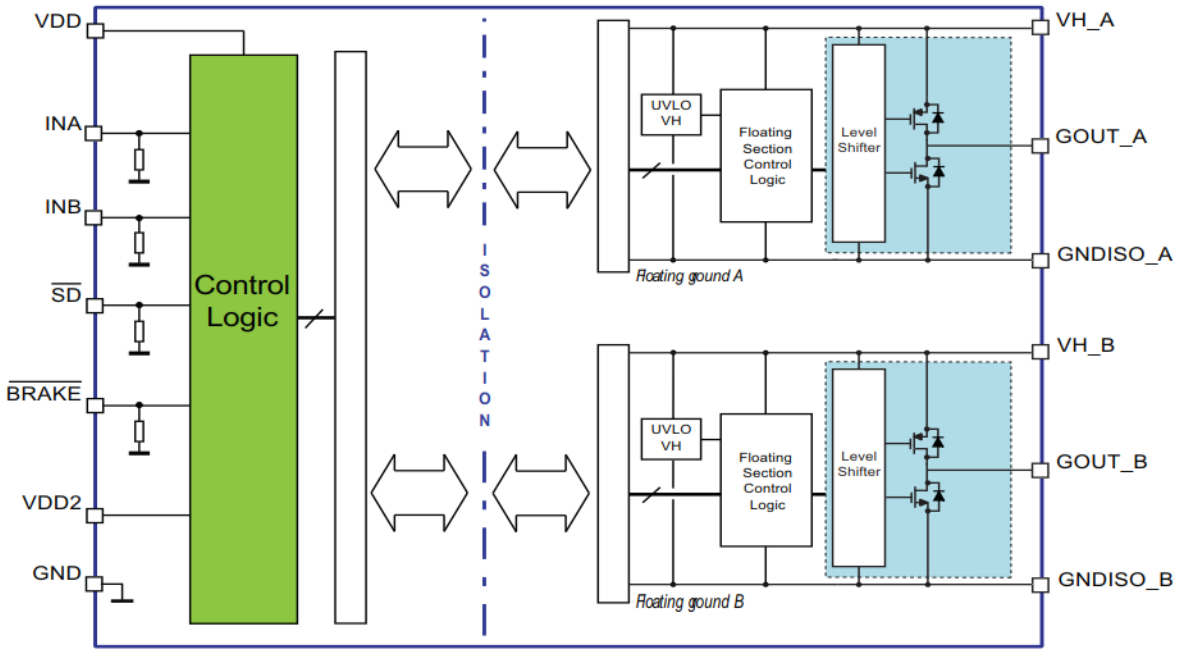
STGAP2D

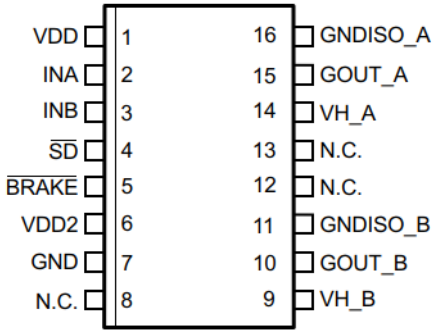
1700 V, 4A isolated gate drivers

- 3.3V/5V logic inputs (logic thresholds 1/3, 2/3 of VDD)
- **Up to 26 V supply voltage**
- **4 A Sink/Source current capability**
- Short propagation delay: 80 ns
- UVLO Function
- Stand-by function
- 100 V/ns CMTI
- High voltage rail up to 1700 V
- Temperature shut-down protection
- Single input pin, in phase with output
- Shut-Down SD pin, with integrated pull-down
- BRAKE pin
- Interlocking
- Negative gate drive ability
- SO16 Package



KEY APPLICATIONS

- Motor control
- Factory automation
- Industrial drives and fans
- DC-DC converters
- Induction heating
- Welding



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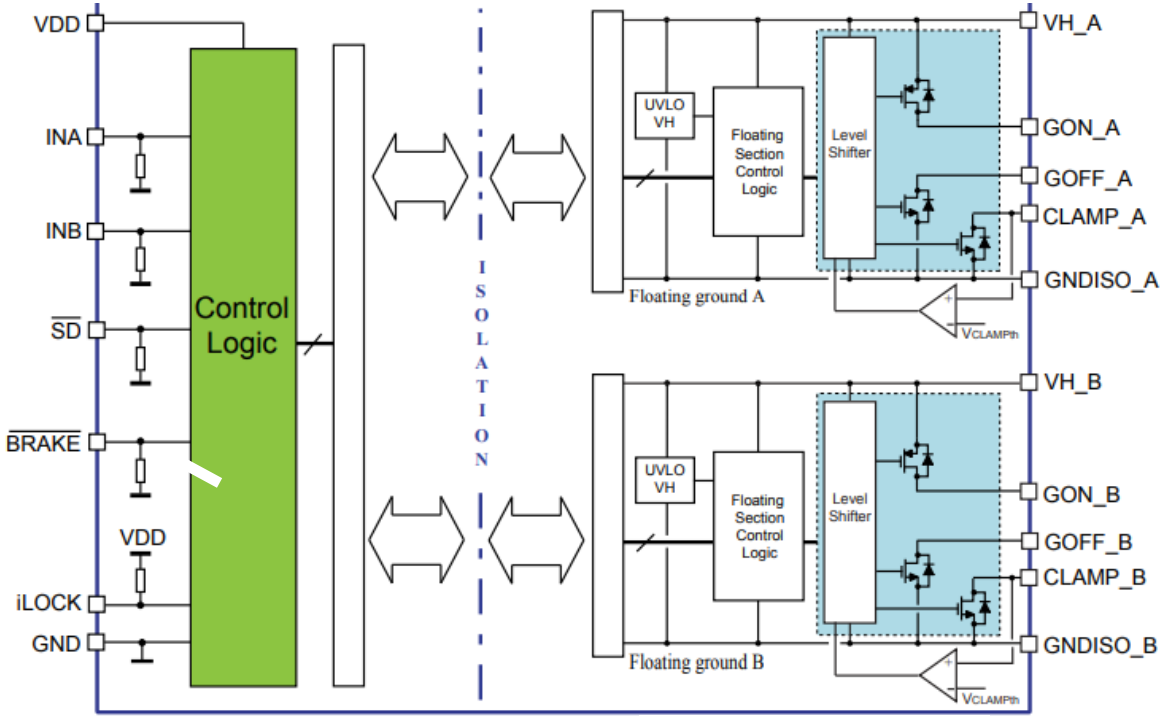
STGAP2HD, STGAP2SICD

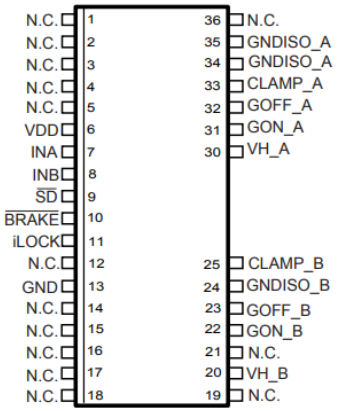
6kV, 4A isolated gate drivers

- High voltage rail up to 1200 V
- Driver current capability: 4 A sink/source
- dV/dt transient immunity ±100 V/ns
- Overall input-output propagation delay: 75 ns
- Separate sink and source option for easy gate driving configuration
- 4 A Miller CLAMP
- UVLO function
- Configurable interlocking function
- Dedicated SD and BRAKE pins
- Gate driving voltage up to 26 V
- 3.3 V, 5 V TTL/CMOS inputs with hysteresis
- Temperature shutdown protection
- Standby function
- 6 kV galvanic isolation
- Wide Body SO-36W



KEY APPLICATIONS

- Battery chargers
- Induction heating
- PFC converters
- DC-DC converters
- Inverter
- Welding
- Power supply units
- UPS



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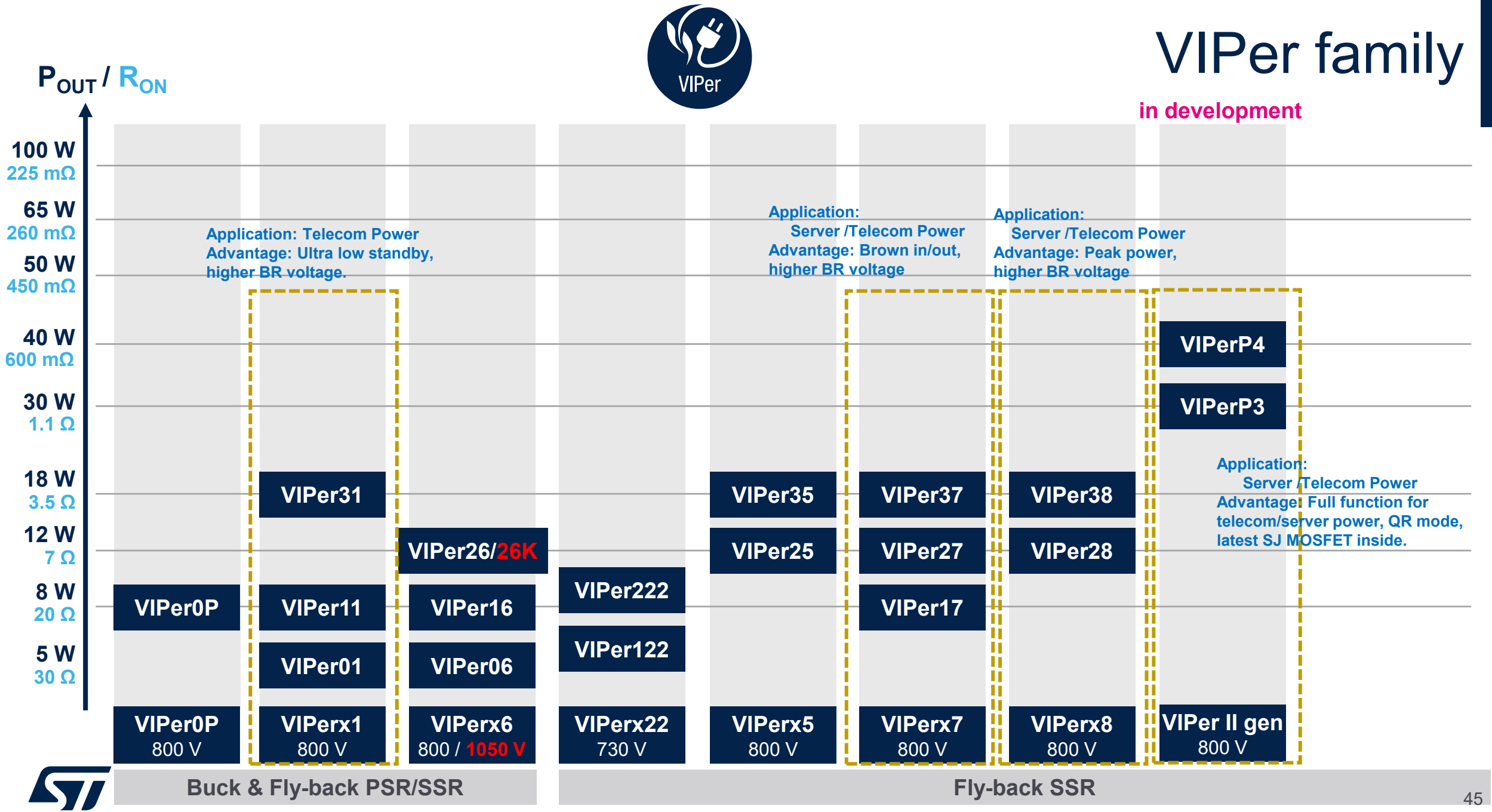
VIPer family



STM32G474 MCU

The STM32G474 based on a 32-bit Arm® Cortex®-M4 core
with FPU and DSP instructions running at 170 MHz is well suited for digital power conversion

Hi-resolution PWM and Rich Analog STM32G474 MCU for Digital Control

- 170MHz 32-bit Arm® Cortex®-M4 core with FPU
- Routine booster of CCM-SRAM up to 32 kb
- Mathematic hardware accelerators (CORDIC / FMAC)
- High resolution timer (184ps) for precise PWM control
- Rich advanced analog
- USB type-C Power Delivery (PD)
- +/- 1% internal clock

MAIN APPLICATIONS

Commercial, architectural and street lighting

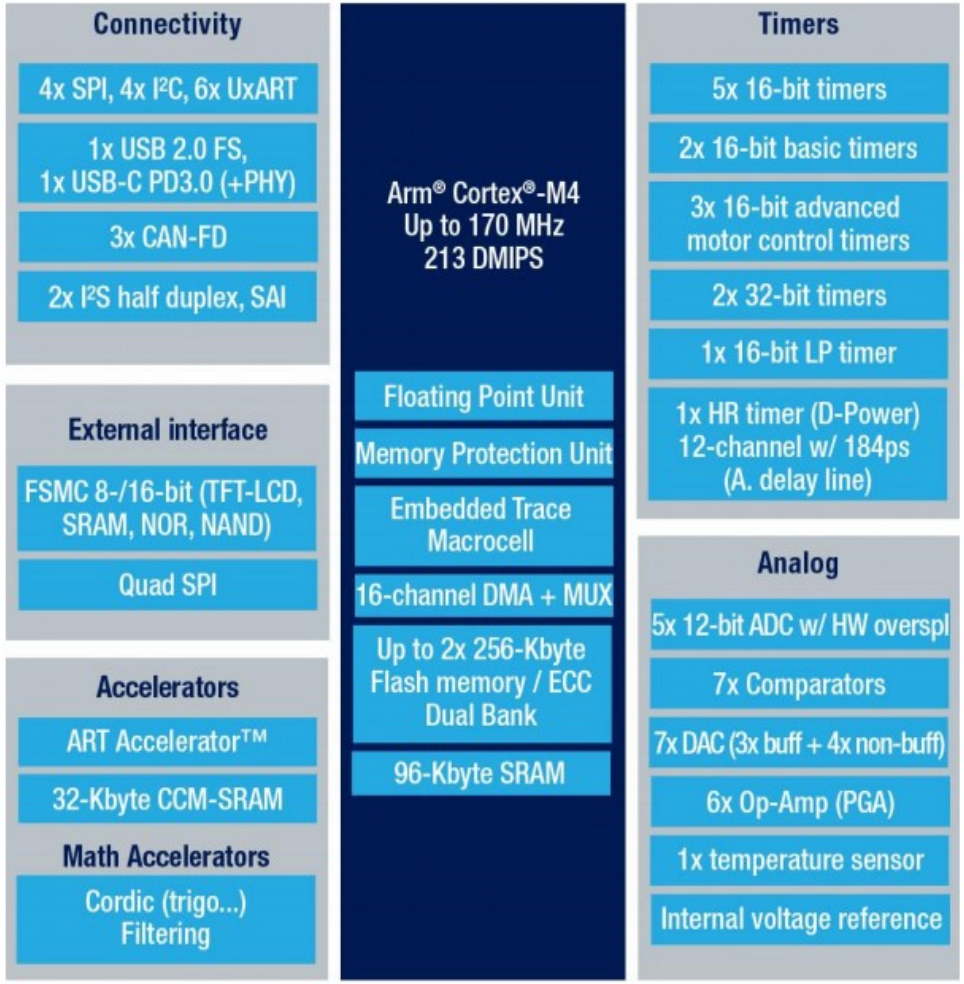
Server/Telecom

Welding

Charging station

UPS & Data center Power supply

Solar inverters



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Summary

Summary

- This digital solution with STM32G4 will help you achieve high efficiency / high power density for 5G telecom power supply
- ST provides the latest technologies (SiC/STGAP/M6/STM32) for high power density and high efficiency solutions on 5G telecom power applications.
- This reference design offers:
  - Digital power solution for totem-pole PFC converter and Full-bridge LLC with synchronous rectifiers
  - Peak efficiency is greater than 96.5%， PFC section is 98.5%, DCDC section is 98.2%
  - iTHD distortion lower than 5% when load is greater than 50%
  - Inrush-current limitation is based on PTC resistor and relay-controlled.
  - Adaptive duty change for turn-off control bases on the comparison of sampled Vds and V_{TH_SR} threshold.

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Power & SPIN Microsite

Our technology starts with You

Find out more at www.st.com

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