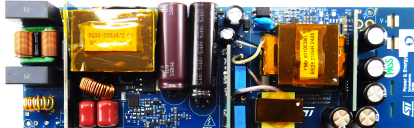


## 19 V-200 W adaptor reference design based on STCMB1, SGT120R65AL, SRK2001A and MASTERGAN1



The picture shown is for illustration purpose only. Actual product may vary depending on buyer's selection and availability.

### Features

- Input voltage range: universal AC from 90 to 264 VAC with 47 Hz to 63 Hz frequency
- Output voltage: 19 VDC at 10.5 A continuous operation
- Maximum output power: 200 W
- Efficiency standards: meet CoC Tier 2 and DoE Level 6 efficiency requirements
- Full load Efficiency: > 94 % at 115 VAC and > 95 % at 230 VAC
- Efficiency at 250 mW > 50 %, compliant with EuP lot 6 Tier 2 limit for household and office equipment
- No load mains consumption: 118 mW at 230 VAC, below European CoC ver. 5 Tier 2 limit for external power supplies

### Description

The **STEVAL-GAN200CB** reference design is based on **STDES-200GANADP**. It is a 19 V-200 W converter tailored for the typical specification of an AC-DC adapter for all-in-one systems, gaming applications, SMPS for LED TV, and lighting applications. It ensures a wide input main range, a very-low power consumption at light loads, and a good average efficiency.

The architecture is based on a two-stage approach: a front-end transition mode PFC preregulator and a downstream LLC resonant half-bridge converter. The PFC and LLC controllers are integrated in the **STCMB1** combo IC.

The **SRK2001A** control implements the synchronous rectification.

The PFC section uses a proprietary and constant-on-time control methodology that does not require a sinusoidal input reference, reducing the system cost and external component count.

The LLC section is based on a proprietary time-shift control method. This improves dynamic behavior and input ripple rejection, resulting in a cleaner output voltage.

A higher efficiency is ensured thanks to the reduction of switching and conduction losses and to the elimination of reverse recovery loss thanks to the **STPOWERGAN** and **MasterGaN** application.

Users no longer need to take care of GaN driving complexity to enjoy the benefits of GaN technology, thanks to the highly integrated **MASTERGAN1** IC, enhancing the robustness of the application and layout simplifications.

Product summary	
19 V-200 W adaptor reference design based on STCMB1, SGT120R65AL, SRK2001A and MASTERGAN1	STEVAL-GAN200CB
Transition mode (TM) PFC with X-cap discharge and LLC resonant combo controller	STCMB1
High power density 600V half-bridge driver with two enhancement mode GaN HEMTs	MasterGaN1
N-channel 600 V, 91 mOhm typ., 25 A MDmesh M6 Power MOSFET in a PowerFLAT 8x8 HV package	STL36N60M6
N-channel 60 V, 0.0024 Ohm typ., 140 A STripFET F7 Power MOSFET in a PowerFLAT 5x6 package	STL140N6F7
Adaptive synchronous rectification controller for LLC resonant converter	SRK2001A
650 V, 75 mOhm typ., 15 A, e-mode PowerGaN transistor	SGT120R65AL
Applications	Smart chargers and adapters

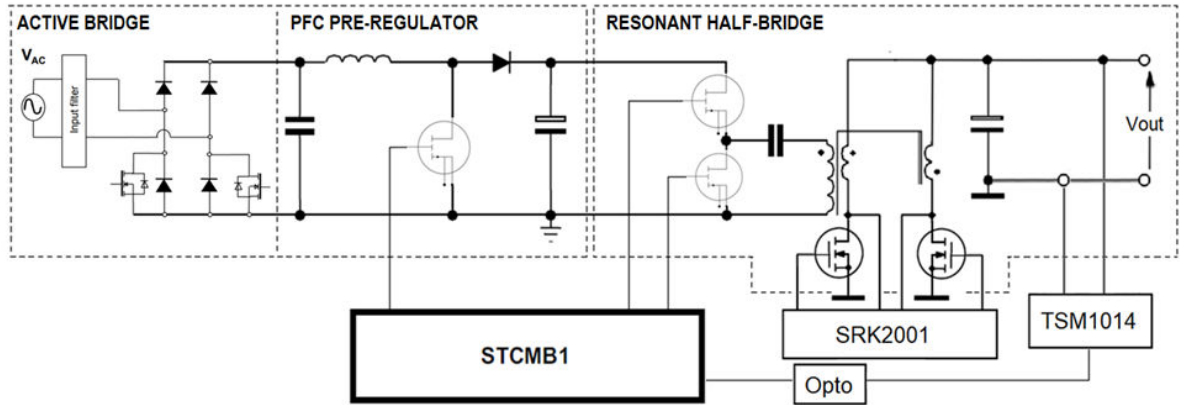
# 1 Electrical specifications

**Table 1. STEVAL-GAN200CB electrical specifications**

Symbol	Parameter	Test conditions	Min.	Nom.	Max.	Unit
<b>Input parameters</b>						
$V_{IN}$	Input line voltage		90	115 / 230	264	Vrms
$f_{LINE}$	Input line frequency		47	50 / 60	63	Hz
$P_{STBY}$	No load input power	$V_{IN} = 115 V_{RMS}$ and $230 V_{RMS}$			150	mW
<b>Output parameters</b>						
$V_{out}$	Output voltage	$V_{IN} = 90 V_{RMS} \sim 264 V_{RMS}$ $I_{OUT} = 0 A \sim 3 A$		19		V
$V_{ripple}$	Output voltage ripple	Peak-to-peak value with 20 MHz bandwidth			250	mV
$I_{out}$	Output current		0		10.5	A
$P_{out}$	Continuous output power		0		200	W
$\eta_{ave}$	Four-point average efficiency: 25%, 50%, 75%, and 100% load	At 115 $V_{AC}$ and measured at the end on the kit		92		%
$\eta_{ave}$	Four-point average efficiency: 25%, 50%, 75%, and 100% load	At 230 $V_{AC}$ and measured at the end on the kit		93		%
<b>Ambient and EMI parameters</b>						
$T_{AMB}$	Ambient temperature	Free convection sea level	0	25	40	°C

## 2 Block diagram

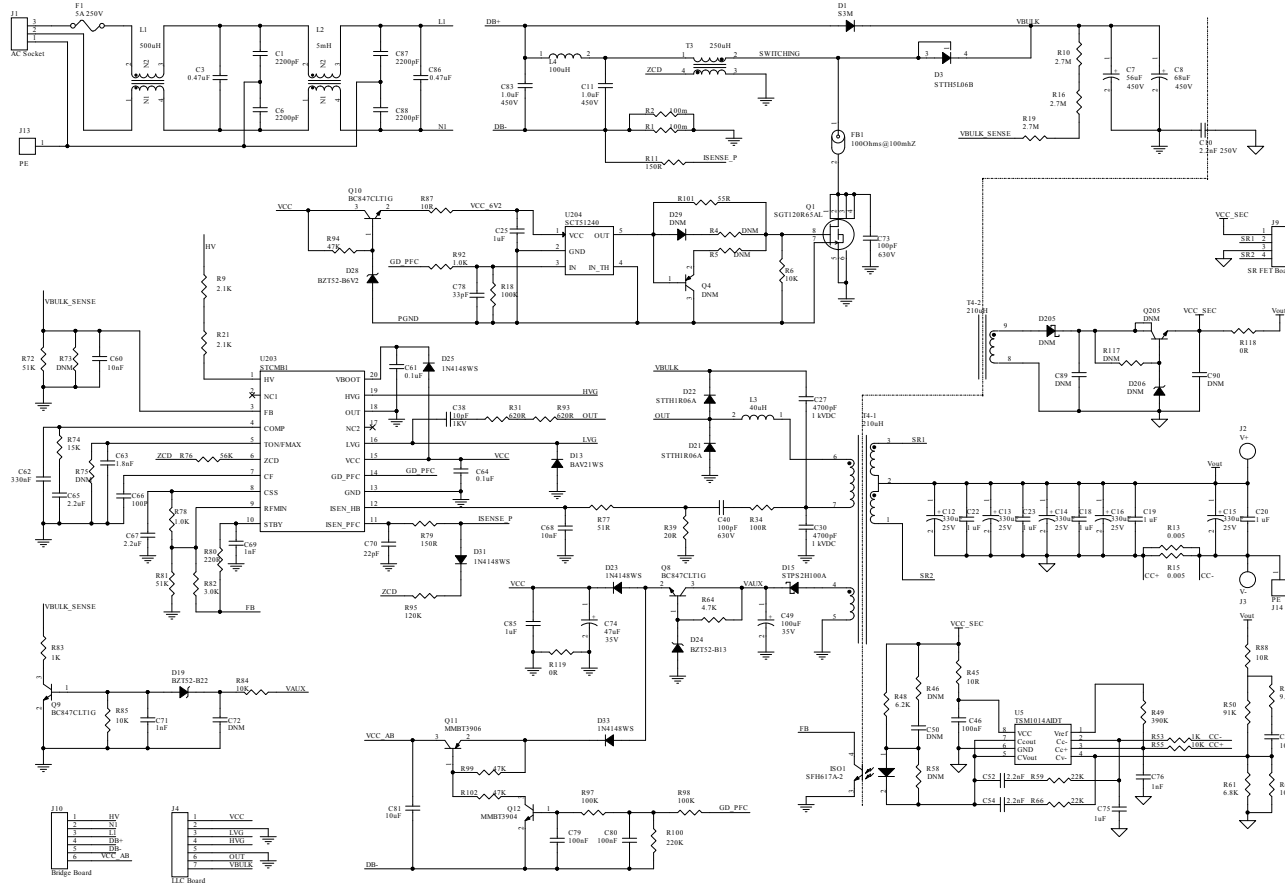
Figure 1. STEVAL-GAN200CB architecture block diagram



### 3 Schematic diagrams

Notice: These schematics are for illustration purpose only. Actual product may vary depending on the buyer's selection and availability.

Figure 2. STEVAL-GAN200CBM schematic diagram



**Figure 3. STEVAL-GAN200CBB schematic diagram**

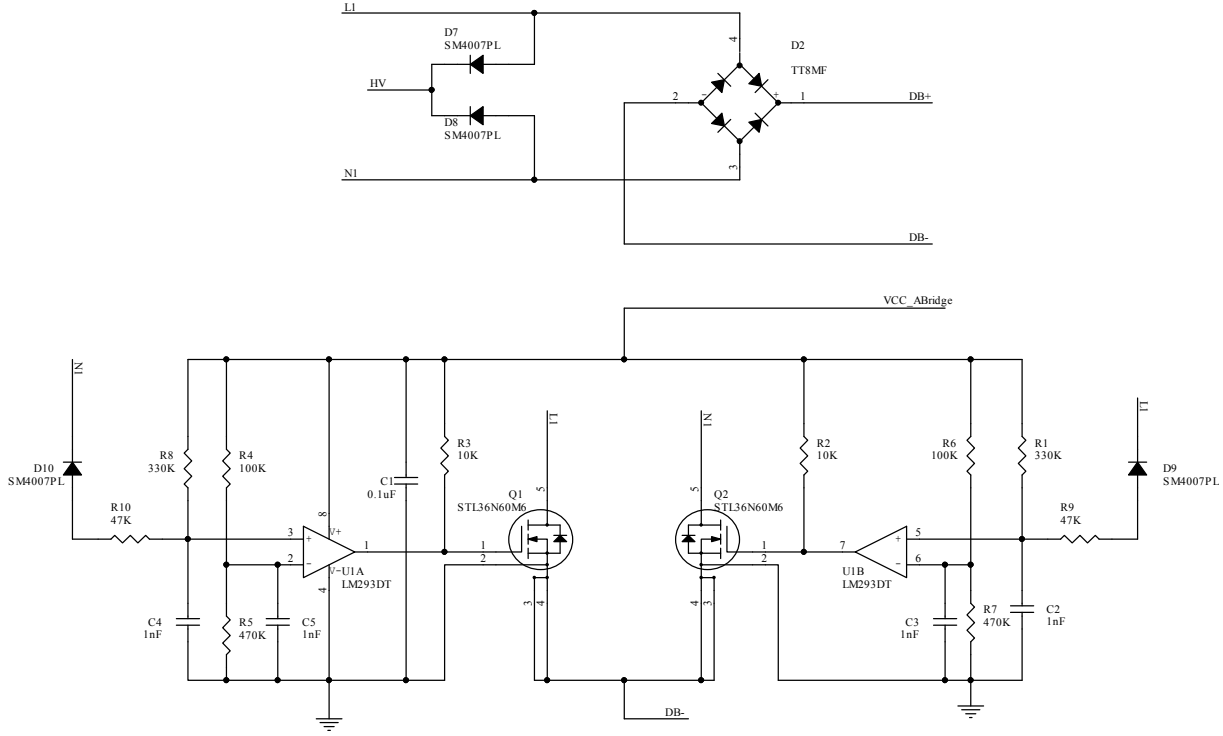


Figure 4. STEVAL-GAN200CBL schematic diagram

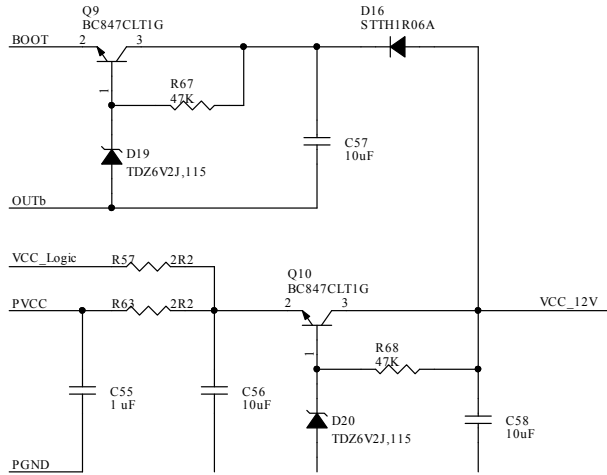
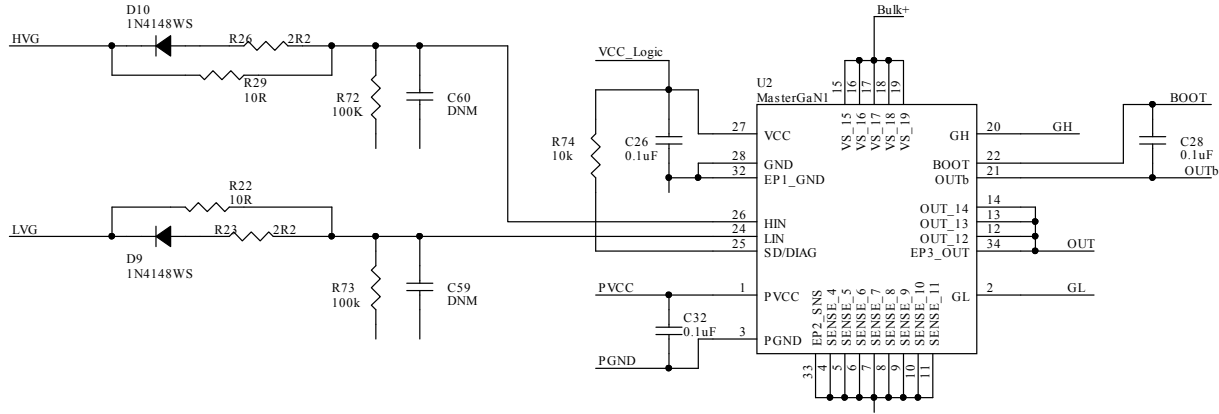
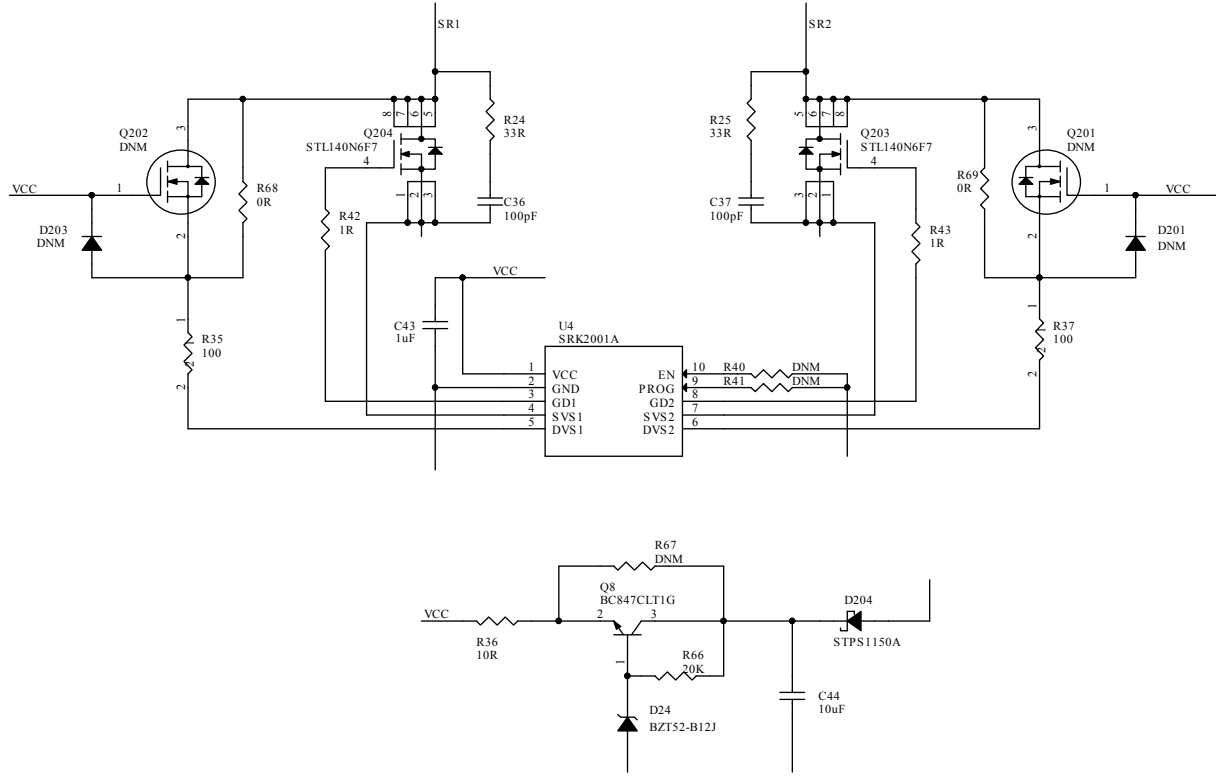


Figure 5. STEVAL-GAN200CBS schematic diagram





## **4 Custom evaluation boards information**

---

*Notice: These evaluation boards are custom designed and built, in small quantities, according to specific requests from customers and are destined for evaluation and testing of ST products in a research and development setting. Please contact ST to provide your specific requests and get your custom built board(s).*



## Revision history

Table 2. Document revision history

Date	Version	Changes
05-Dec-2024	1	Initial release.

**IMPORTANT NOTICE – READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgment.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to [www.st.com/trademarks](http://www.st.com/trademarks). All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2024 STMicroelectronics – All rights reserved