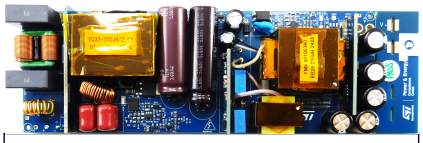
STEVAL-GAN200CB

Data brief

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.

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

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.

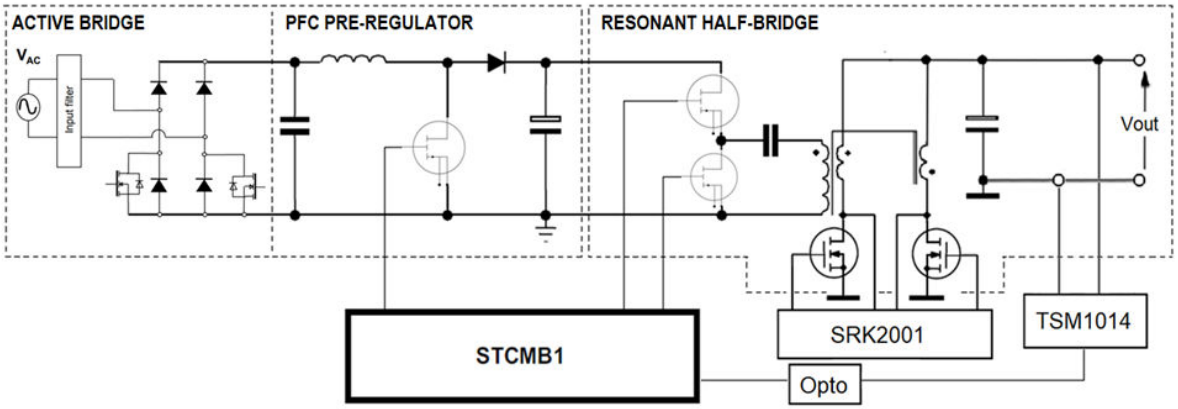
1 Electrical specifications

Table 1. STEVAL-GAN200CB electrical specifications

Symbol	Parameter	Test conditions	Min.	Nom.	Max.	Unit
Input parameters						
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
Output parameters						
V_{out}	Output voltage	VIN = 90 V_{RMS} ~ 264 V_{RMS} I_{OUT} = 0 A ~ 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
η_{ave}	Four-point average efficiency: 25%, 50%, 75%, and 100% load	At 115 V_{AC} and measured at the end on the kit		92		%
η_{ave}	Four-point average efficiency: 25%, 50%, 75%, and 100% load	At 230 V_{AC} and measured at the end on the kit		93		%
Ambient and EMI parameters						
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

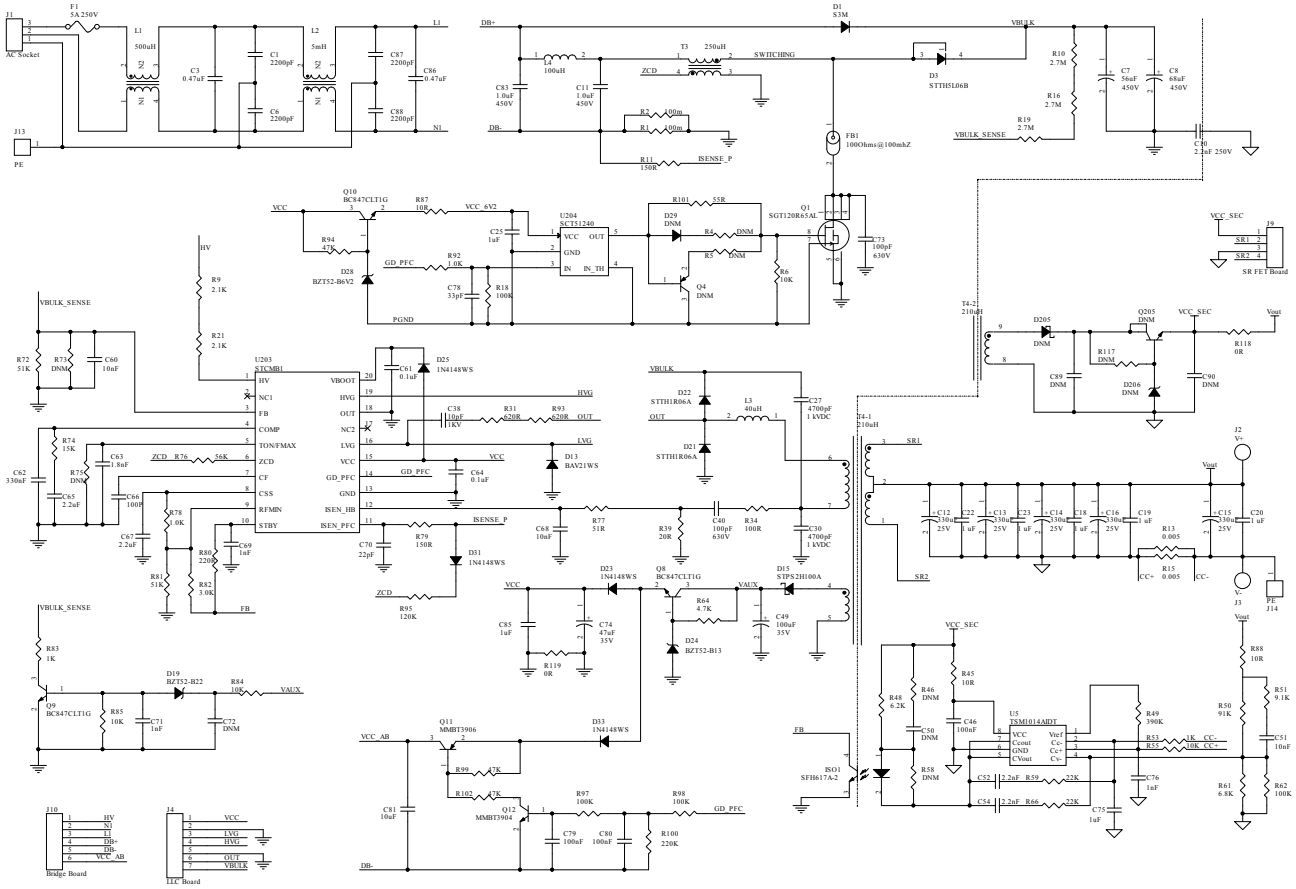


Figure 3. STEVAL-GAN200CBB schematic diagram

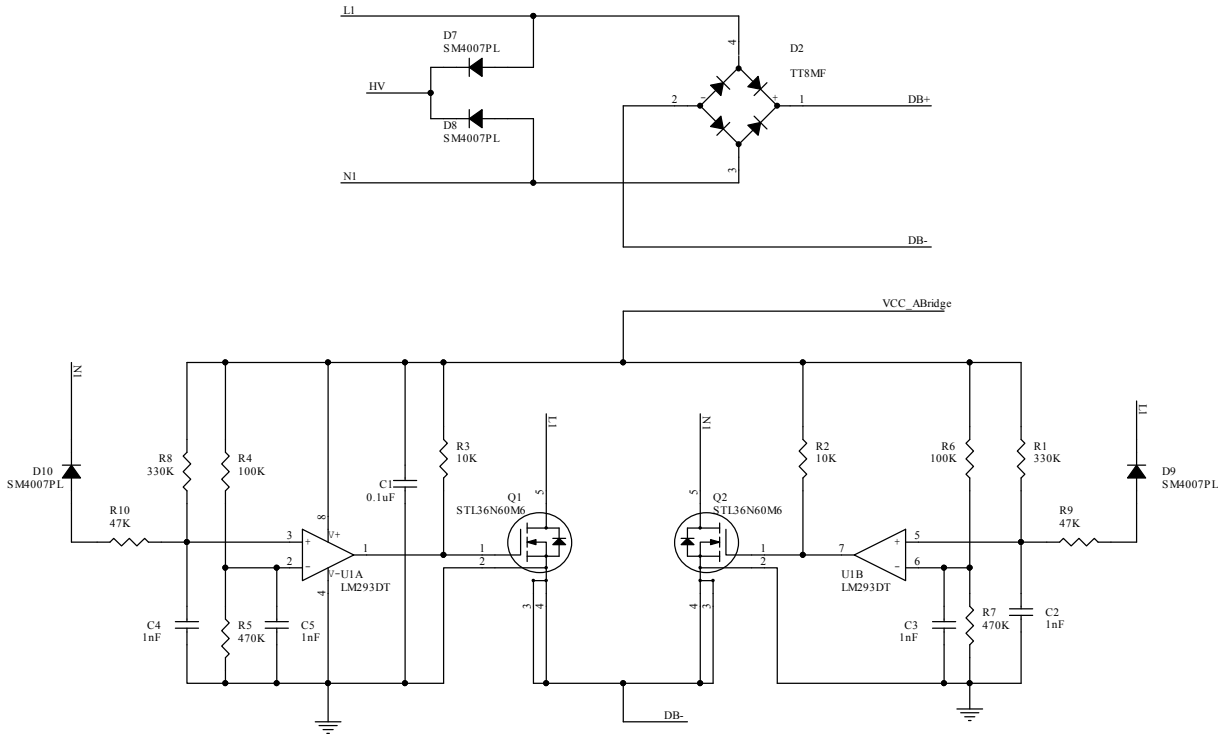


Figure 4. STEVAL-GAN200CBL schematic diagram

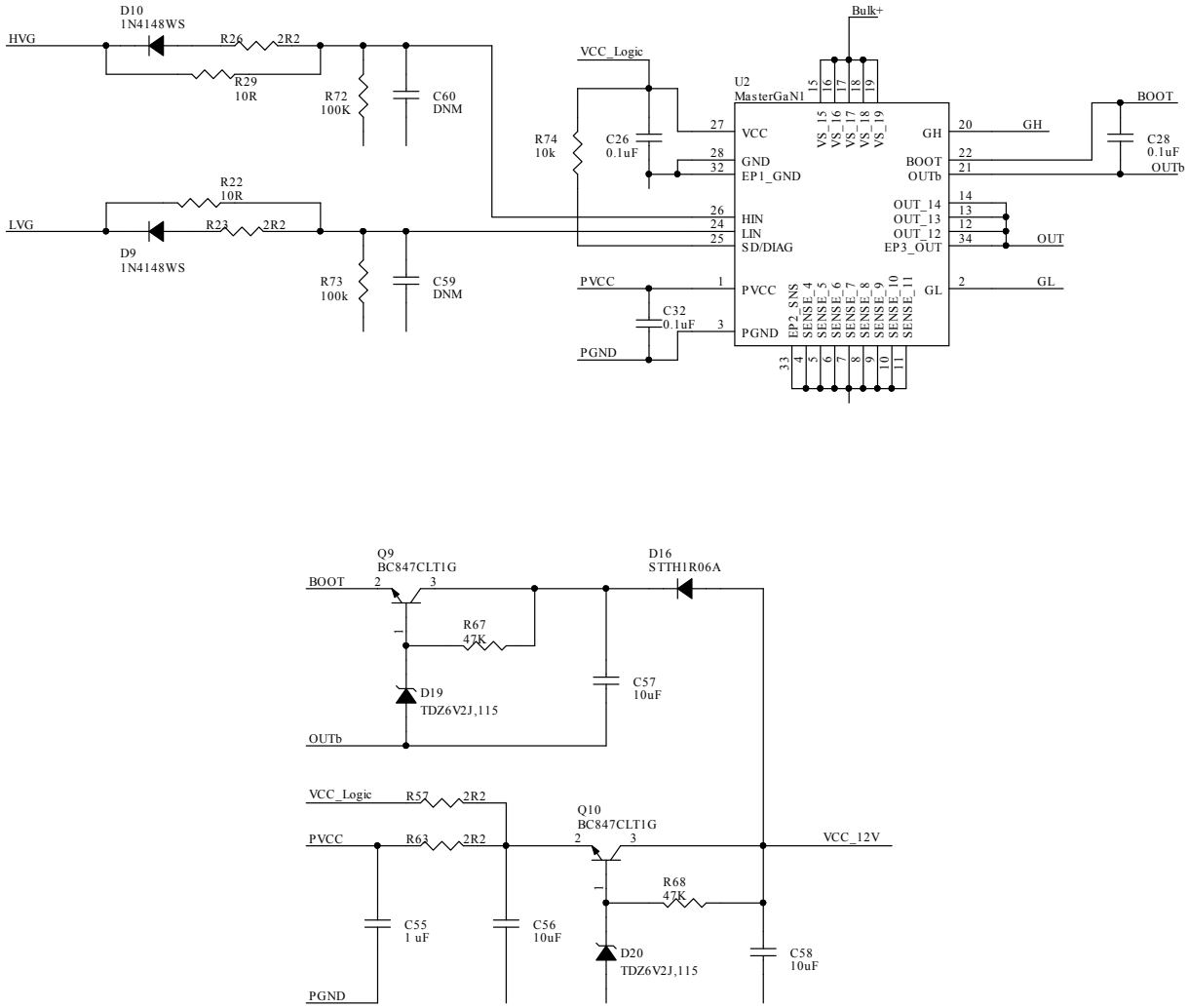
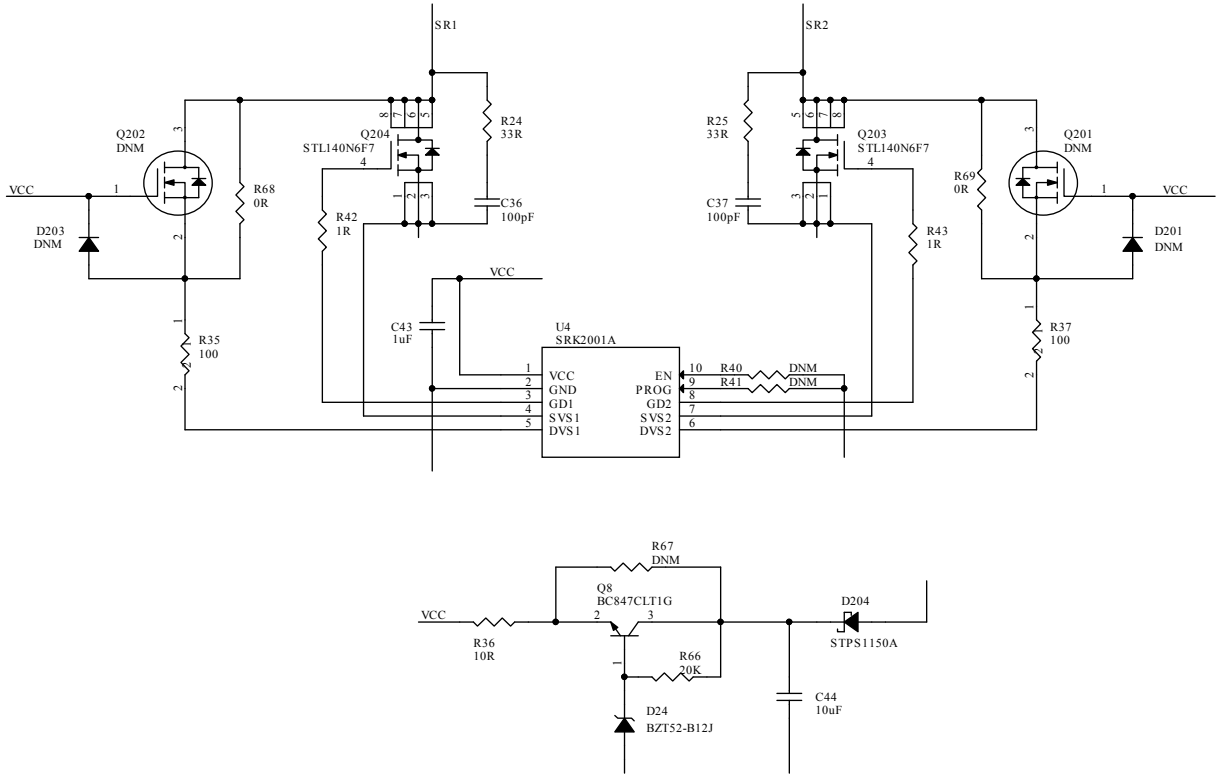


Figure 5. STEVAL-GAN200CBS schematic diagram



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.