PowerCube: Ultimate power supply miniaturization using GaN integrated circuits and patented architecture/firmware
Wise-integration’s solution combines GaN power devices and an architecture firmware.

**WiseGan®**
GaN integrated circuit

**WiseWare®**
Patented architecture with firmware

6 patents
WiseGan® & WiseWare®

**PowerCube 100W**

4x4x3cm 3inch³

**WiseGan® integrated half bridge**

WI65100A2 100 mΩ  
WI65170A2 170 mΩ  
WI65070A2 70 mΩ

**WiseWare® + WiseGan®**
AC-DC GaN Demoboards

**45W**
- Active Clamp Flyback
- WiseGan® power stage
- Analog IC control
- 20.1 V fixed output
- Planar transformer

**60W**
- Active Clamp Flyback
- WiseGan® power stage
- Analog IC control
- 5V to 20V output
- Industry standard transformer

**100W**
- WiseWare® architecture
- WiseGan® power stage
- Full Digital control
- USB PD compliant output
- High efficiency planar transformer
AC IN : 0 to 240VAC Power meter RSPM-8213 Power Factor
DC OUT : SIGLENT SDL1020X-E VOUT, IOUT et POUT Laboratory Tektronix Voltage meter DMM4050 WS3024
Oscilloscope CP30  Line AP PP19 output ripple Thermal camera FLIR ETS320
60W ZVS optimization

Operating point 60W 20V/3A @ 122VDCbulk

- High-side is hot
- Low side ok

Operating point 60W 20V/3A @ 311VDCbulk

- Low side is hot
- High side ok

DCbulk = 122V  VOUT=19.8V  POUT=59.3W  TEMP=87°C  RIPPLE_LF=280mV  _HF=1.6V

DCbulk = 312V  VOUT=19.8V  POUT=59.5W  TEMP=94°C  RIPPLE_LF=348mV  _HF=3.4V
WiseGan Zero Voltage Switching test board

- Half bridge configuration
- No extra components needed
  Just add a 5VDC USB power supply and a 340VDC voltage source
- Convenient voltage and current probing using two standard voltage
  probes with oscilloscope
- Onboard PWM and deadtime circuits
- 1A peak @ 1MHz, 340VDC
- No heatsink
Two voltage probes show voltage and current

- Clean voltage waveforms from ZVS operation
- Current waveform measured on shunt resistor
Test result: 100W WISEWARE USB PD

- Reference design validated with GaN devices
- Efficiency 95% reached at 90W
- Test evaluation done on the full power range [0 to 100W]
- ZVS and ZCS is maintained on the full power range

Transformer primary current

Vout_primary (half bridge voltage)

ZVS Switching

Testing WiseWare embedded in a PowerCube
Prototype 100W AC-DC charger
Prototype 3 x smaller than competition products

Power board, active components side

Ultra-miniature 100W USB PD charger 4x4x3cm
WiseWare® system architecture reaches 96% efficiency at 100W (5A, 20V) simulation results
AC voltage from AC source

AC input current controlled by WiseWare

67W output (20V)
Evaluation Results

The evaluation results are shown in Figures 8 to 10.

*Figure 8. $V_{\text{COM}}$ waveform at 1 MHz, with $V_{\text{POS}}=350V$*
Waveform at 100W

Input current waveform of the Power cube observed at full power 100W (5A, 20V)
108W AC input
100W DC output
WiseWare operating
Power factor : 0.97
IEC61000-3-2 standard succeeded
The company

Wise-Integration is a French Tech company which develops GaN Integrated Circuits (IC) and new system architecture with software to make more compact, more efficient and more reliable power supplies.

Incorporated by 4 co-founders from CEA LETI spin-off combining 25 years of experience in semiconductor industry (Engineering, Marketing, R&D and Management).

Locations:
- Grenoble: Business and R&D
- Aix-en-Provence: Head office & Operational center (Product design & industrialization)
- Taïwan: Asian sales office
WiseWare ® proprietary digital control is well suited to customers applications

WiseGaN® 650V GaN IC portfolio extends from 500mΩ down to 35mΩ

Package roadmap aims at high power with reduced temperature rise