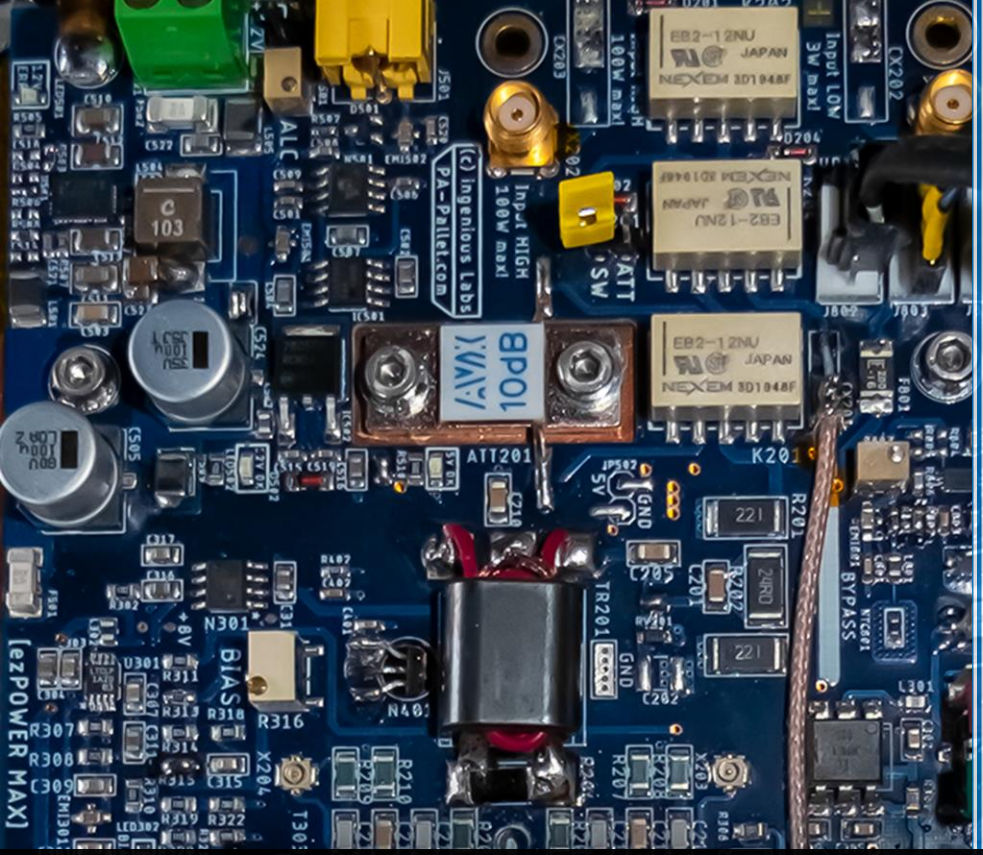
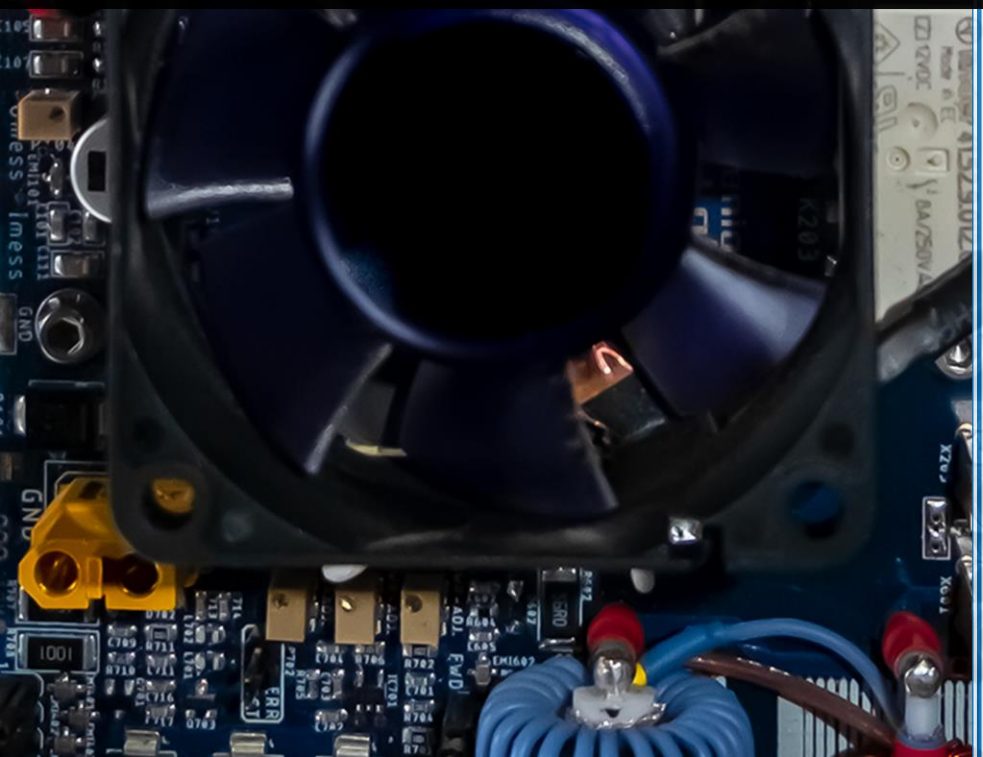


ezPOWER MAX

Solid State of the ART



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Electronic Design

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Electrical Specifications

- **1500W average Power – except 6m (1300W average Power) @62V_{DS}**
  Capable of running all Modulation-Modes like SSB, CW, AM, FM, FT8, RTTY, etc.
- Frequency Range: all Amateur Bands 160m to 6m (1.8 MHz – 54 MHz)
- Ampleon ART2K0FE LDMOS Power Transistor (2000W, 65V_{DS})
- Broadband Tube-and-Sleeve-Transformer with quiet forced Air-Cooling
- Input ATT
  - Switchable -6 dB or -16 dB
  - 3W in SDR Mode (-6 dB onboard Att.), approx. 30-50W in TRX Mode (-16 dB onboard Att.)
- Input VSWR: better than 1 : 1,5
- CW Keydown Output Power per Band @62V_{DS} - 3W CW Keydown Input-Power
  → *see Power-Diagram on Page 3*
  → see *Temperature-Tests on Page 4*
- Linearity (IMD3): all Bands better than -30 dBc @1kW
  Average of all Bands @1kW:
  - Two-Tone: -37 dBc (-43 dBc PEP)
    (without Predistortion)
  - Two-Tone: -61 dBc (-67 dBc PEP)
    (with Predistortion)
- Efficiency and Current @ full Power
  - Average of all Bands: $\eta \approx 82\ \%$ $I_{DS} \approx 31$ Amps (35 Amps max.)
- No Time-Limit for transmitting in SSB and CW Modes on all Bands (with Water-Cooling only)

Onboard Features

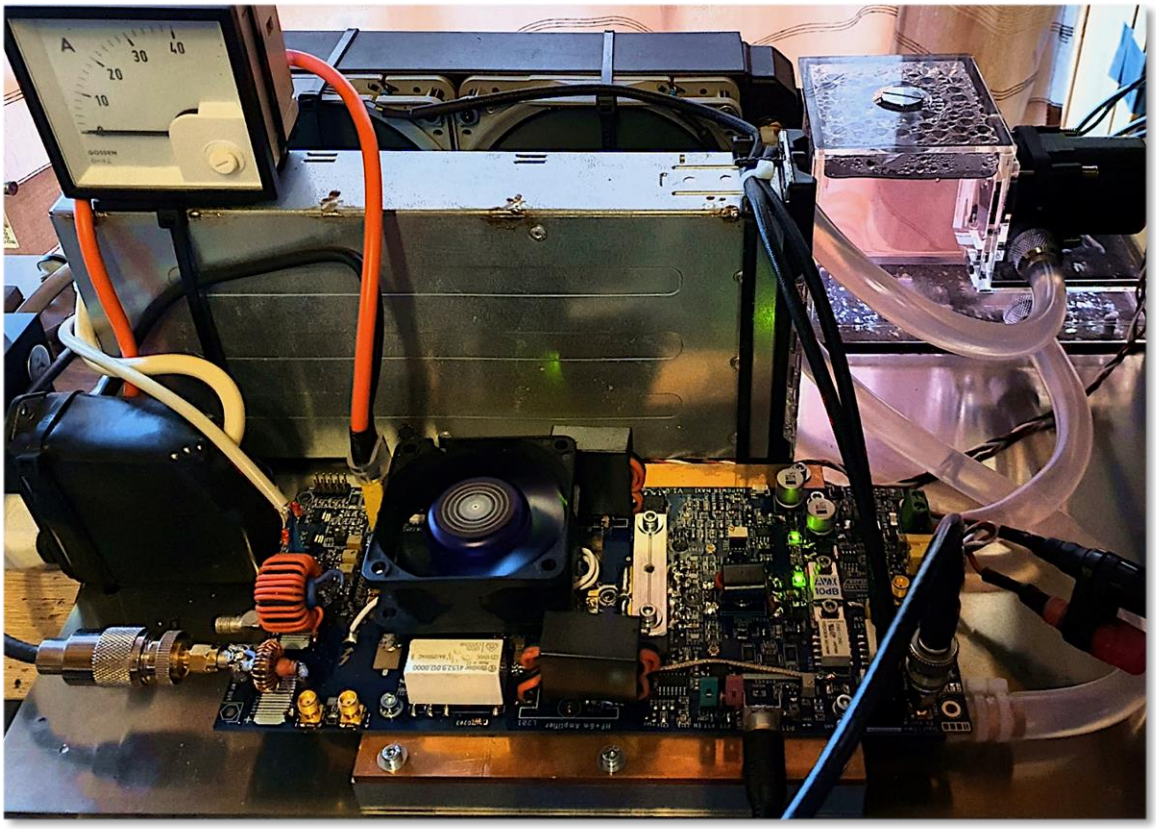
- RX/TX Relays
- Insertion Path in RX/TX-Chain for Low-Pass-Filter Bank
- Adjustable static ALC Voltage to limit the TRX Output-Power and to prevent Power-Peaks
- SWR Bridge with FWD/REF Signal Outputs, logarithmic (0-12V)
- -60 dB Sampler Output (Predistortion/Linearization exclusively for HPSDR-compatible Radios)
- Fully analog ultrafast Hardware-Protection Circuit with instant Powerstage-Deactivation
  - Overcurrent adjustable LED Indicator
  - High SWR adjustable LED Indicator
  - High Output-Power adjustable LED Indicator
  - High Temperature PTT off at Cu-Temp. > 75 °C LED Indicator
- Extension-Header (2x5-Pin 2,54mm)
  - Hardware-Protection Status
  - Powerstage Supply Voltage and Current
  - Output Power (logarithmic 0-12V)
  - SWR (logarithmic 0-12V)
  - Temperature Cu-Plate (LM35 analog, 10 mV/°C Voltage-Output)
- 2x 12 VDC Connectors for Fans, Temperature controlled (4-Pin Molex)
- 1x 12 VDC Connector for Water-Pump, unregulated (4-Pin Molex)
- Onboard Power Supplies
  - 12 VDC (8A max.), for external Use providing up to 4A
  - 5 VDC (1A max.), internal Use only

Mechanical Specifications

- 4-Layer PCB with all 2oz (4x 70 µm) Copper
- Board Dimensions: (L) 230mm, (W) 100mm, (H) 40mm
- Compatible with Air- and Water-Cooling Systems
- LDMOS Transistor clamped to Cu-Plate using Liquid Metal between Surfaces providing best electrical and thermal Conductivity
- Heat Spreader Dimensions: (L) 150mm, (W) 127mm, (H) 6mm
- Aluminum-Plate with 4-Pass Cu-Tubing for Water-Cooling
  - Dimensions: (L) 153mm, (W) 127mm, (H) 15mm
  - Thermal Resistance: 0.02 K/W at 5.7 Liter/min Waterflow

Recommended Equipment for Quick Start:

- Power Supply Options:
  - Switching Power-Supply: 50 VDC min. (reduced Output-Power) – 62 VDC max. (full Performance)
  - Lithium-Ion Power-Pack: 52 VDC with min. 13 Ah (reduced Output-Power)
- Low Pass Filter Bank 160m – 6m
- For Water-Cooling:
  - 240mm x 45mm Radiator with 2x 12 VDC PWM 120mm Fans
  - Water-Pump (12 VDC) with at least 500l/h
  - PVC or Silicone Tubes (10mm inner Diameter)
- For Air-Cooling:
  - Minimum (L) 300mm, (W, H) 120mm Heatsink with 2x 12 VDC PWM 120mm Fans



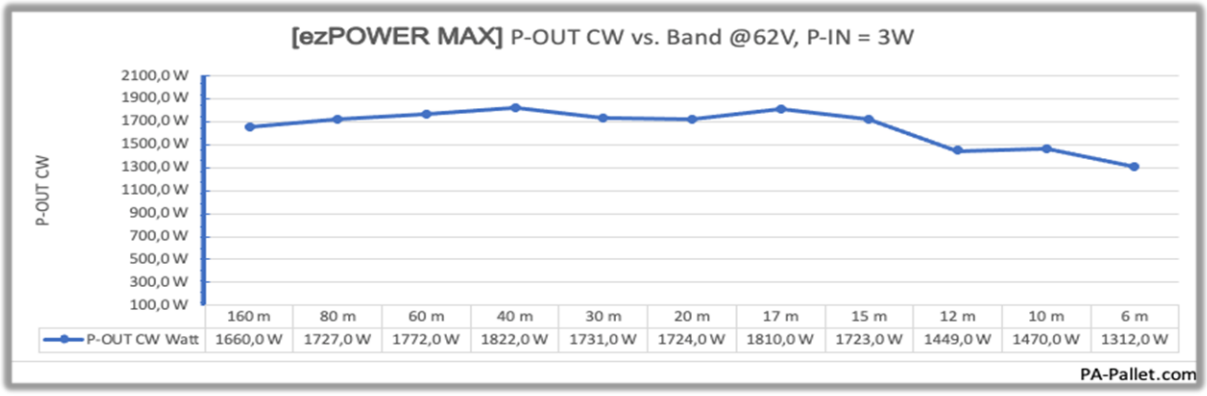
QUICK-SETUP Example

Measurements

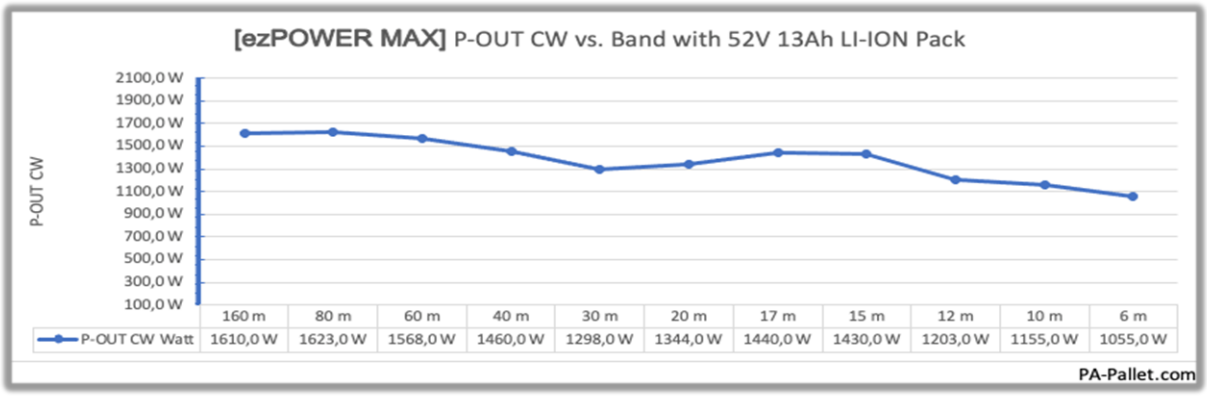
Test-Equipment:

- LP-700 Powermeter
- R&S Dummy-Load
- Hermes SDR
- FA 5W PA

CW Keydown Output Power over all Bands with modified EATON APR48



CW Keydown Output Power over all Bands (P-IN = 3W) with 52V 13Ah LI-ION Pack



Test-Equipment

- LP-700 Powermeter
- R&S 5kW Dummy-Load
- Uni-T UT61C

Temperature Tests with 100% ICAS Duty-Cycle, CW Keydown

Conditions: 5 min. ON, 5 min. OFF, tested with Water-Cooling

240 mm Radiator | 600 l/h Pump | 2x 120mm Fans - Temp. controlled

1500W CW Keydown | **62V** | **32 Amps** | $T_{AMBIENT}$ = 25,5°C

Tested Bands: **80m, 20m, 6m**

Temperatures after 5 Minutes ON

LDMOS-Case **75°C** **Cu-Plate** **58°C**

Temperatures after 5 Minutes OFF

LDMOS-Case **35°C** **Cu-Plate** **36°C**

30 Minutes Temperature Test

Conditions: **30 min. ON**, 5 min. OFF, tested with Water-Cooling

240 mm Radiator | 600 l/h Pump | 2x 120mm Fans - Temp. controlled

1300W CW Keydown | **62V** | **26 Amps** | $T_{AMBIENT}$ = 25,8°C

Tested Band: **40m**

Info: Temperatures are stable after 20 Minutes, similar to CCS **(Continuous Commercial Service)**

Temperatures after 30 Minutes ON

LDMOS-Case **68°C** **Cu-Plate** **56°C**

Temperatures after 5 Minutes OFF

LDMOS-Case **35°C** **Cu-Plate** **36°C**