3.0 kW Dual LLC Evaluation Board

EVAL_3kW_2LLC_C7
TO-220
TO-247

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General

Description:

The **"EVAL_3kW_2LLC_C7"** - evaluation board shows how to design a dual phase LLC system solution of a telecom/industrial SMPS with the target to meet **highest efficiency** requirements. On this purpose there has been applied latest CoolMOS™ technology IPP60R040C7 600 V Power MOSFET on the primary side and OptiMOS™ low voltage Power MOSFET in SuperSO8 BSC093N15NS5 in the synchronous rectification secondary stage, in combination with QR CoolSET™ ICE2QR2280Z, 1EDI60N12AF EiceDRIVER™ high voltage, high speed driver ICs for MOSFETs, low side gate driver 2EDN7524R and digital LLC controller XMC4400

Summary of features:

- Output voltage: 44 V_{DC} – 58 V_{DC}
- Output current max: 55 A
- Peak efficiency @ 50% load > 98.5%
- Efficiency @ 10% load > 97%

The following variants are available:

- EVAL_3kW_2LLC_C7 version with CoolMOS™ C7 **TO-220**, IPP60R040C7, EVAL_3kW_2LLC_C7_220
- EVAL_3kW_2LLC_C7 version with CoolMOS™ C7 **TO-247**, IPW60R040C7, EVAL_3kW_2LLC_C7_247

Example of system understanding: Infineon demo solution for highest efficiency HV DC-DC stage

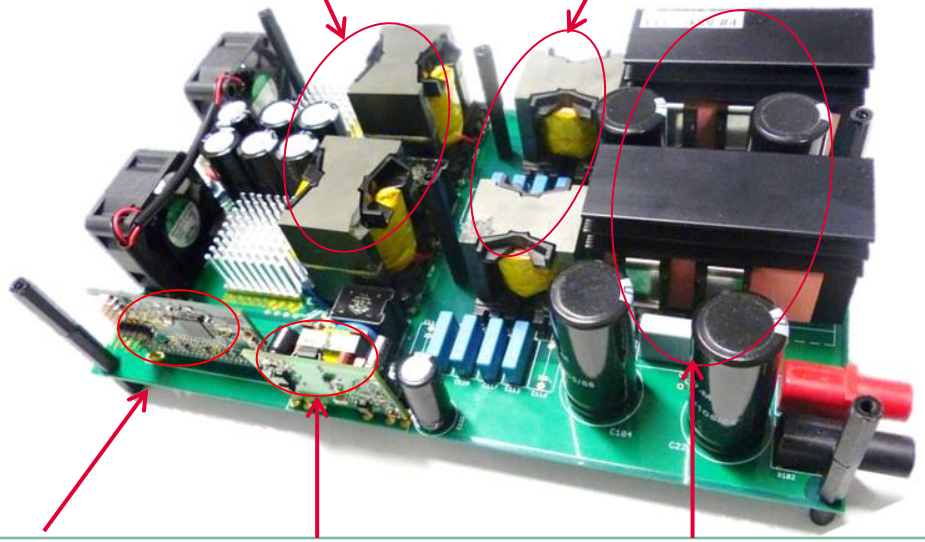
Half-bridge LLC with synchronous rectification in center tap configuration	
V_{in}	350 V_{DC} - 400 V_{DC}
V_{in_nom}	380 V_{DC}
V_{out}	44 V_{DC} - 58 V_{DC}
I_{out}	55 A
P_o	3 kW
C_r	66 nF
L_r	12 uH
L_m	62 uH

Primary HV MOSFETs
CoolMOS™ IPP60R040C7
Reduced gate charge (Q_g)
- Reduced E_{off}
- High body diode ruggedness

SR MOSFETs
OptiMOS™ BSC093N15NS5
New generation
- Best FOM $R_{DS(on)}$ x Q_g
- Best FOM $R_{DS(on)}$ x Q_{oss}

Transformer
SP-PQ 40/40 core

Resonant inductor
SP-PQ 35/35 core



LLC controller
digital XMC4400

Bias QR Flyback controller
ICE2QR2280Z

HV MOSFETs
IPP60R040C7 TO-220
IPP60R040C7 TO-247

Digital control board

Infineon`s solution to control the 3 kW dual phase LLC evaluation board

Digital

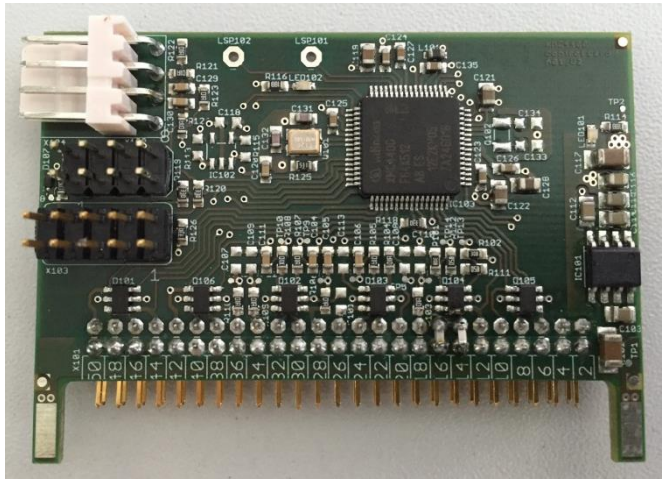
XMC4400-F64K512 AB

Summary of features:

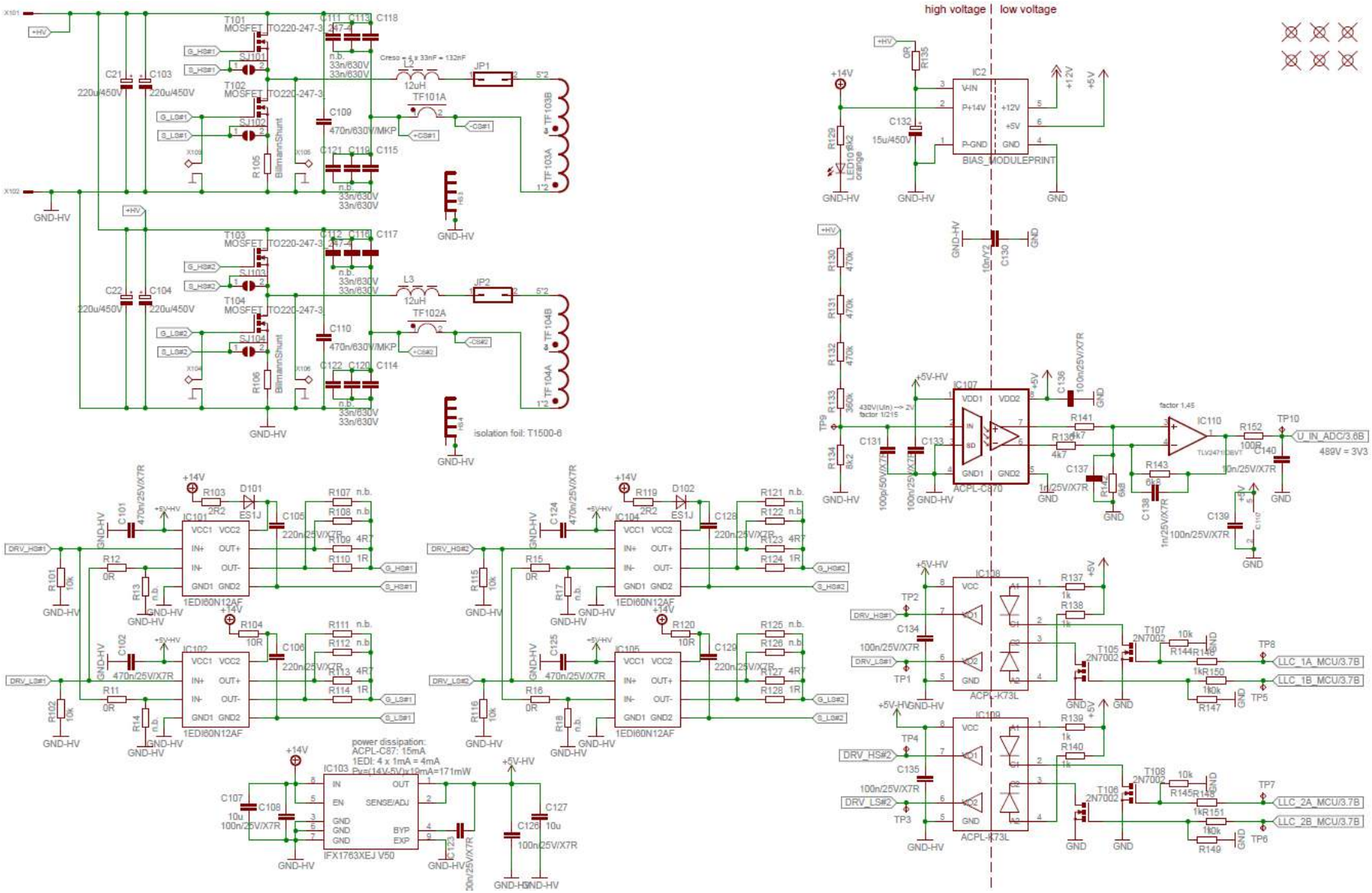
- ARM® Cortex®-M4, 120 MHz, incl. single cycle DSP MAC and floating point unit (FPU)
- 8-channel DMA + dedicated DMAs for USB and Ethernet
- USB 2.0 full-speed on-the-go
- CPU Frequency: 120 MHz
- eFlash: 512 kB including hardware ECC
- 80 kB SRAM
- Package: PG-LQFP-64

Target applications:

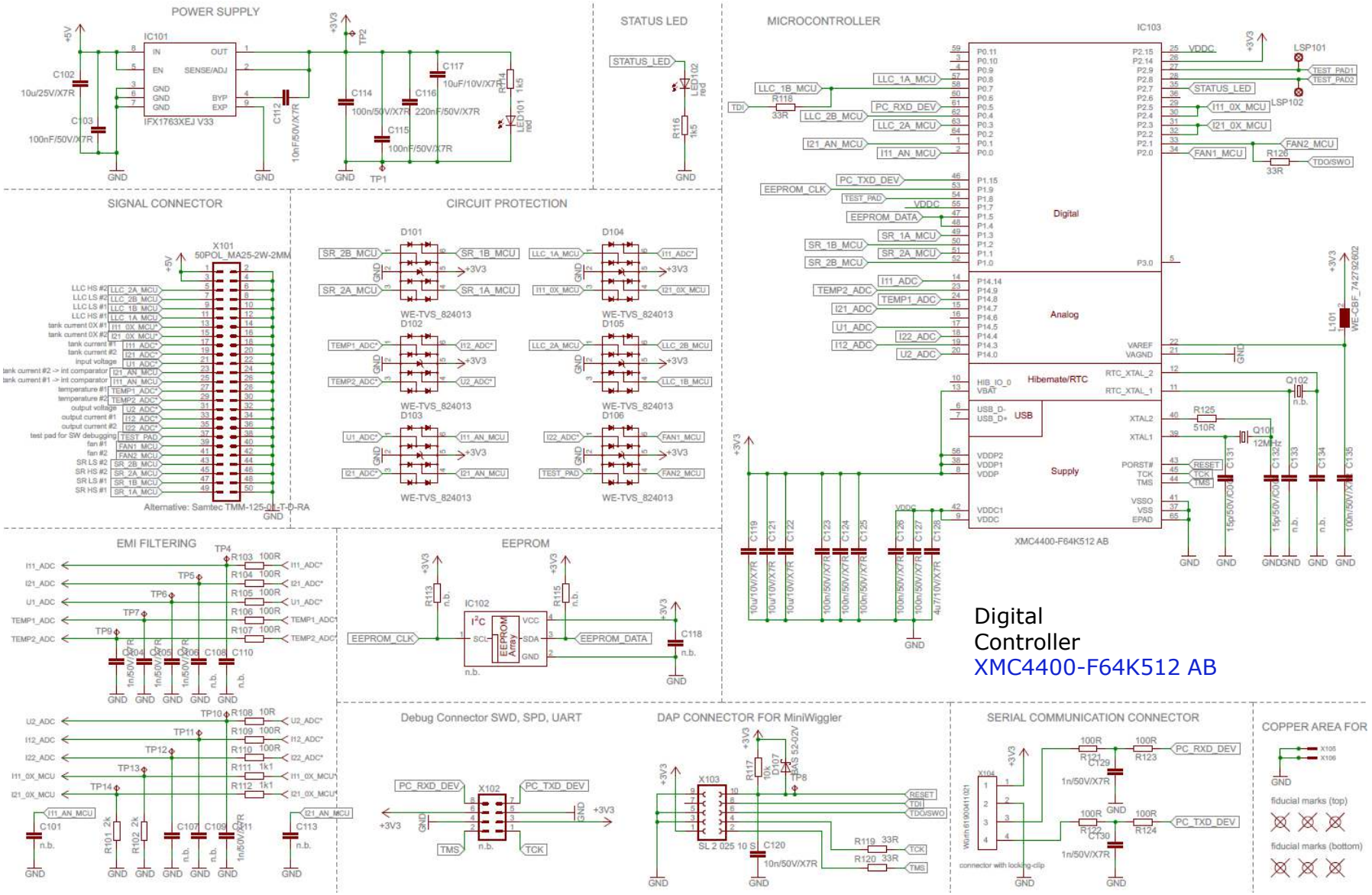
- Motor control
- Position detection
- IO devices
- HMI
- Solar inverters
- SMPS
- Sense & control systems
- PLC
- UPS
- Light networks



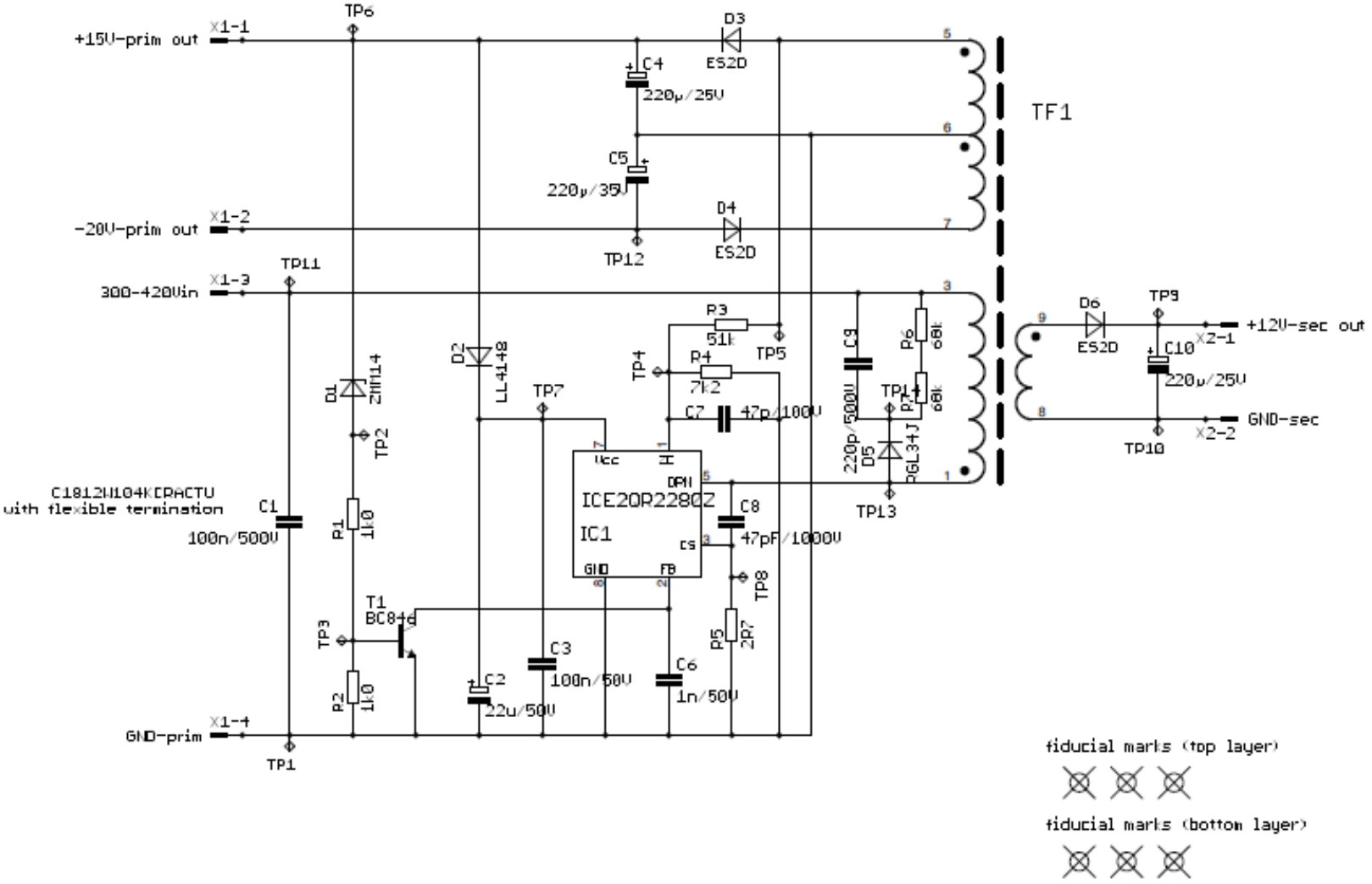
Main power board schematic



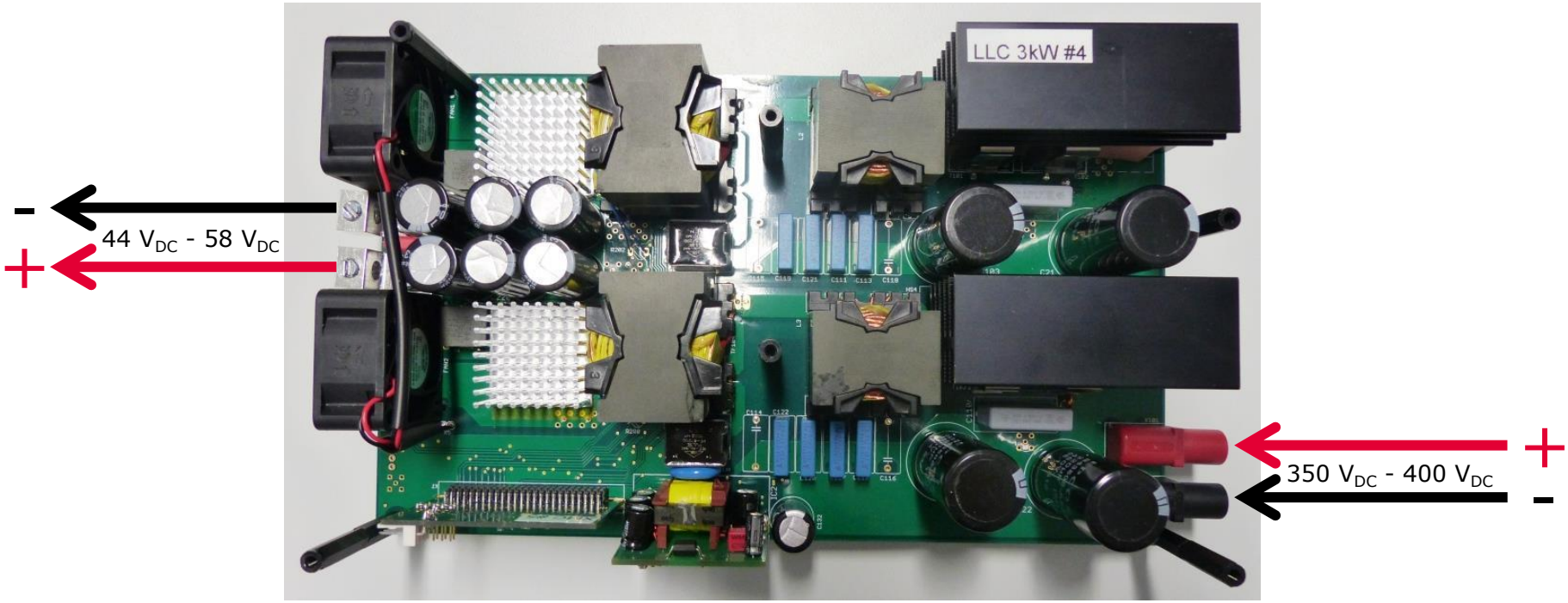
Digital control board schematic



Bias board schematic



Connection instruction



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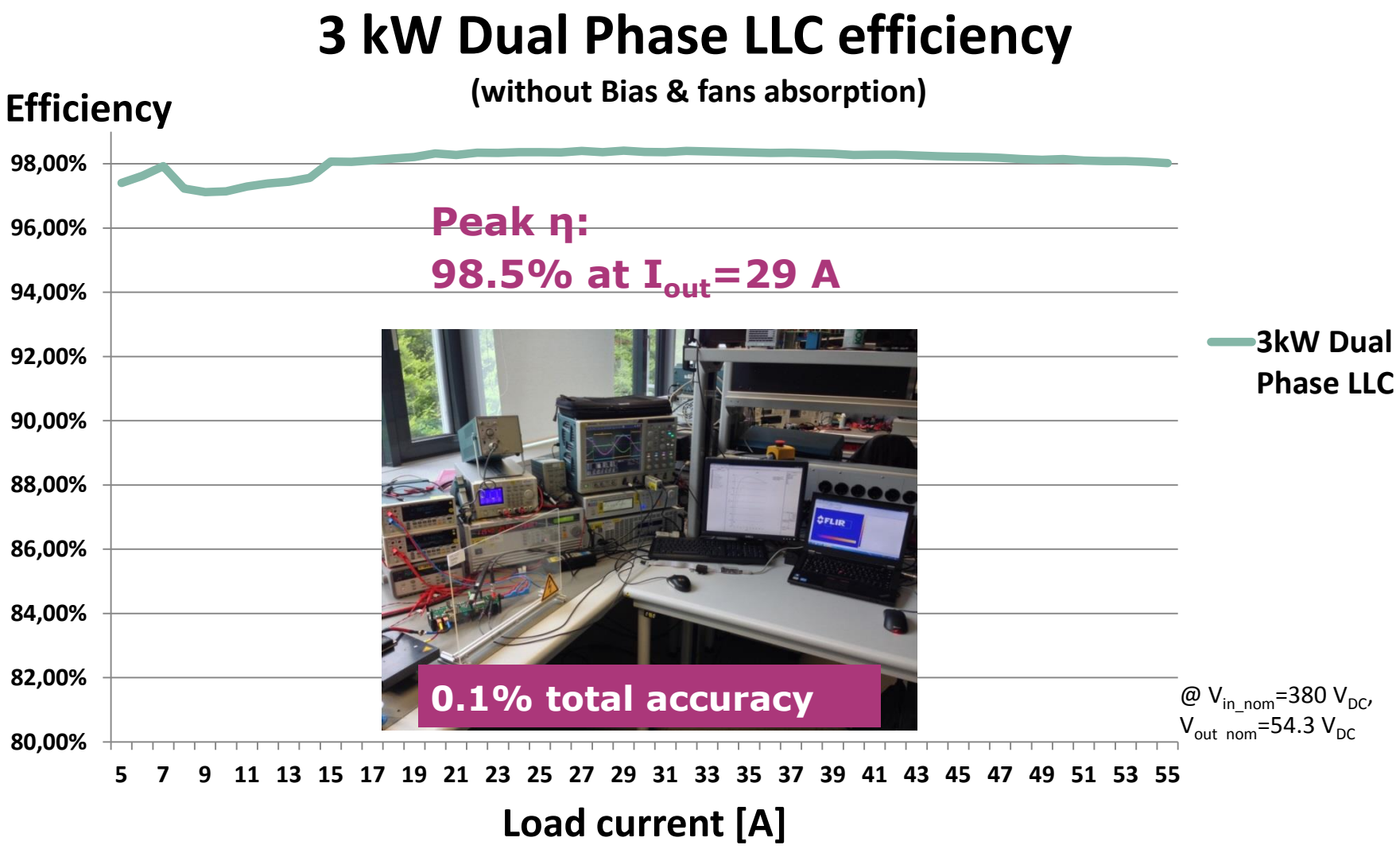
Efficiency plot measured with IPP60R040C7/ IPW60R040C7



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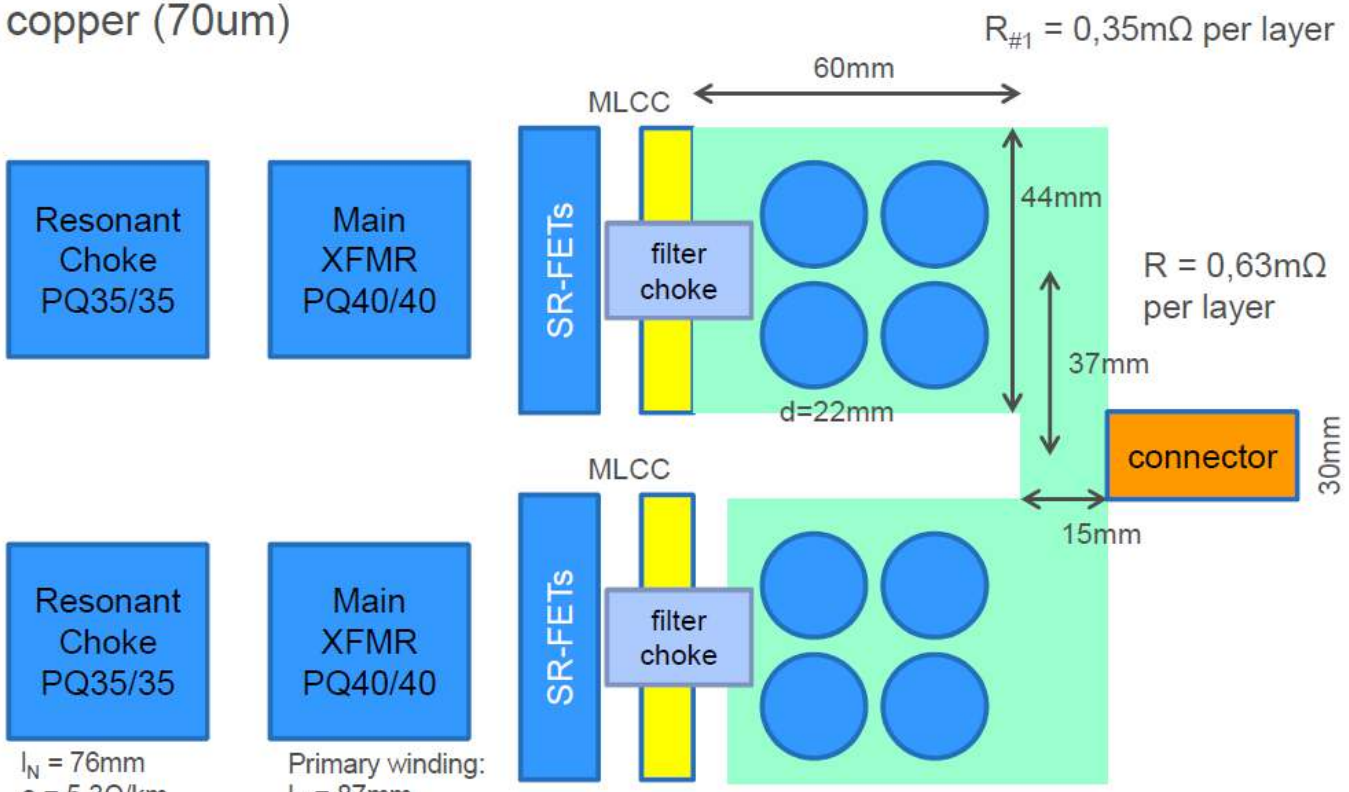
Design concept

Basic components positioning in the PCB

4 layer PCB, 2oz copper (70um)



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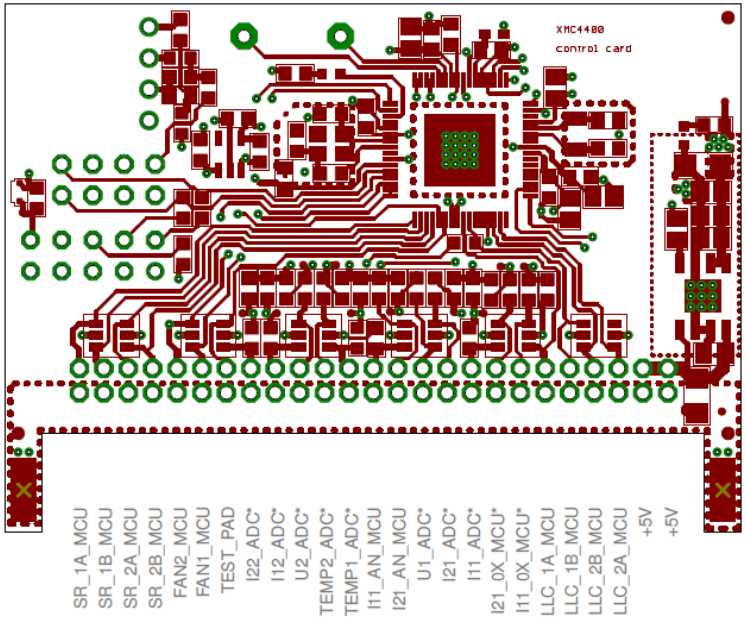
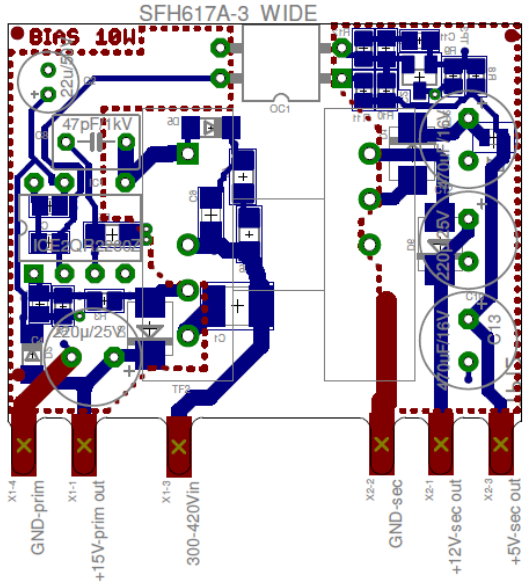
Two daughter boards

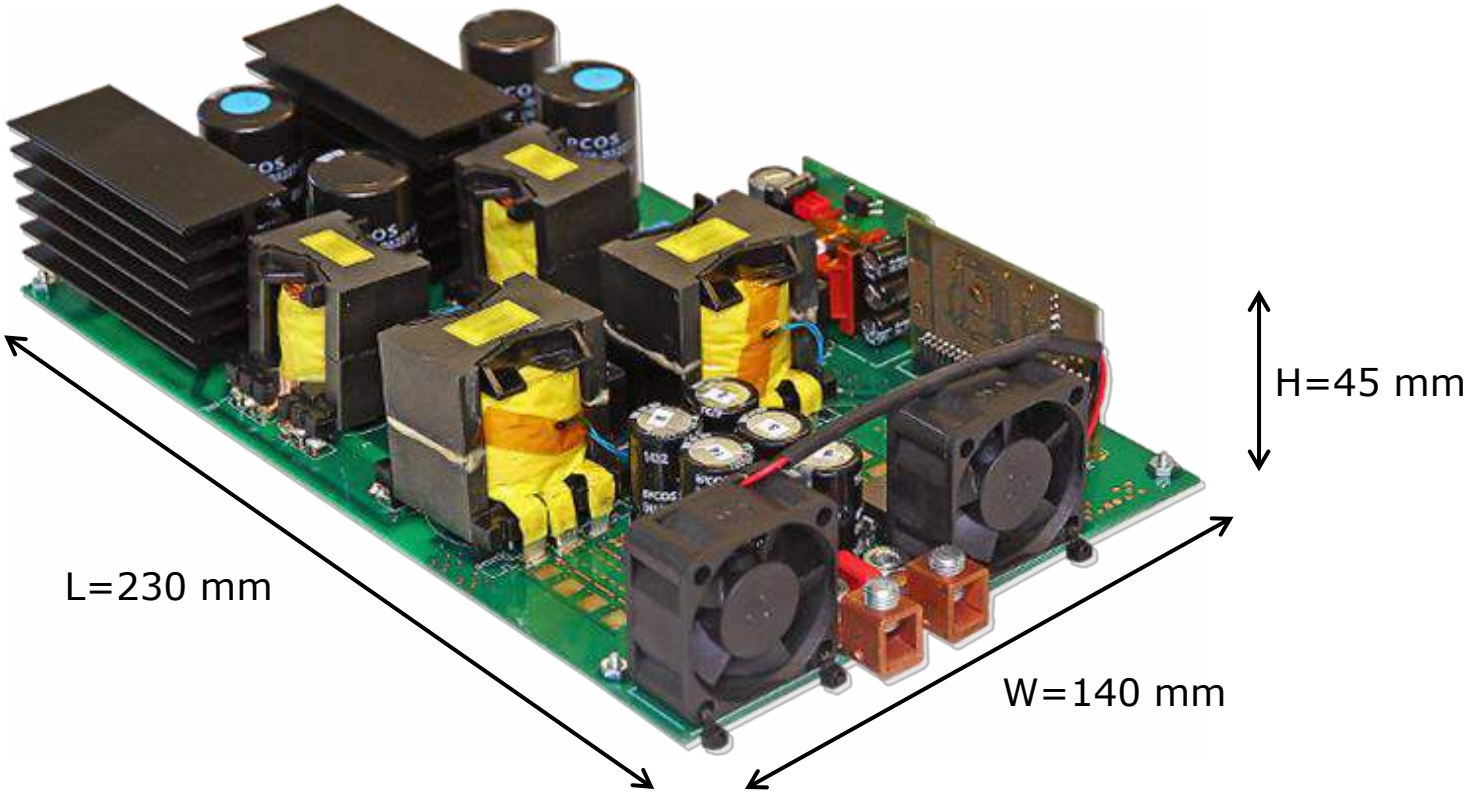


Microcontroller board

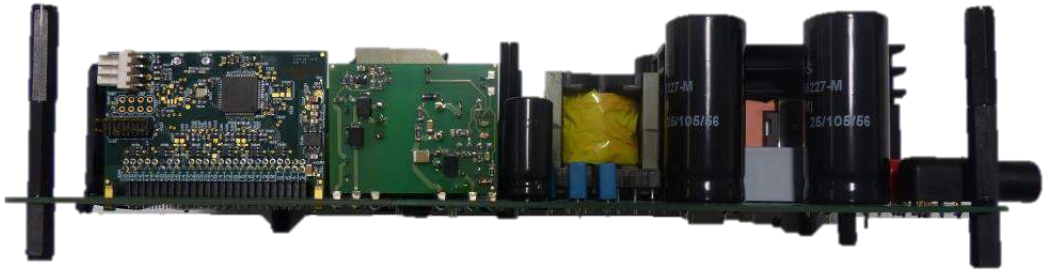


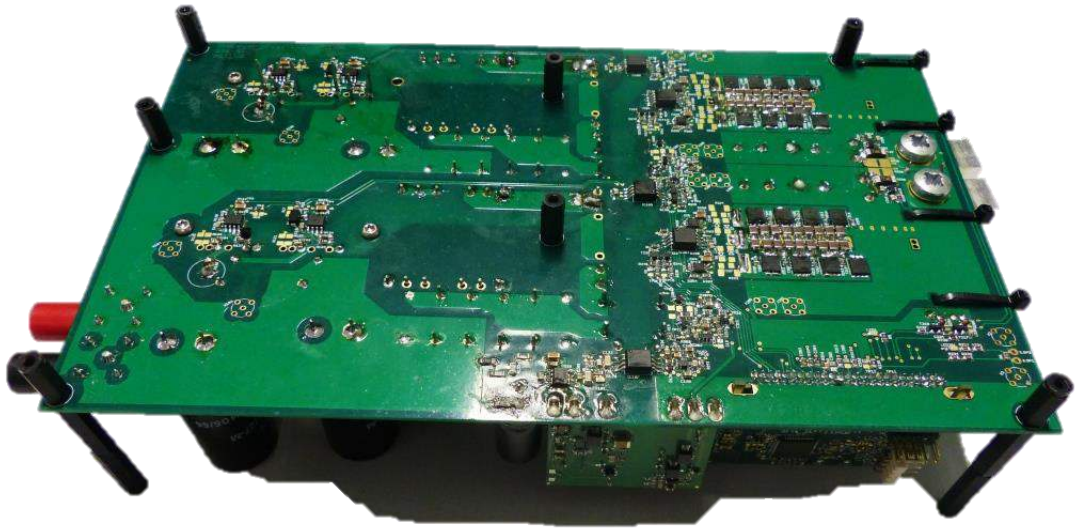
Auxiliary converter board

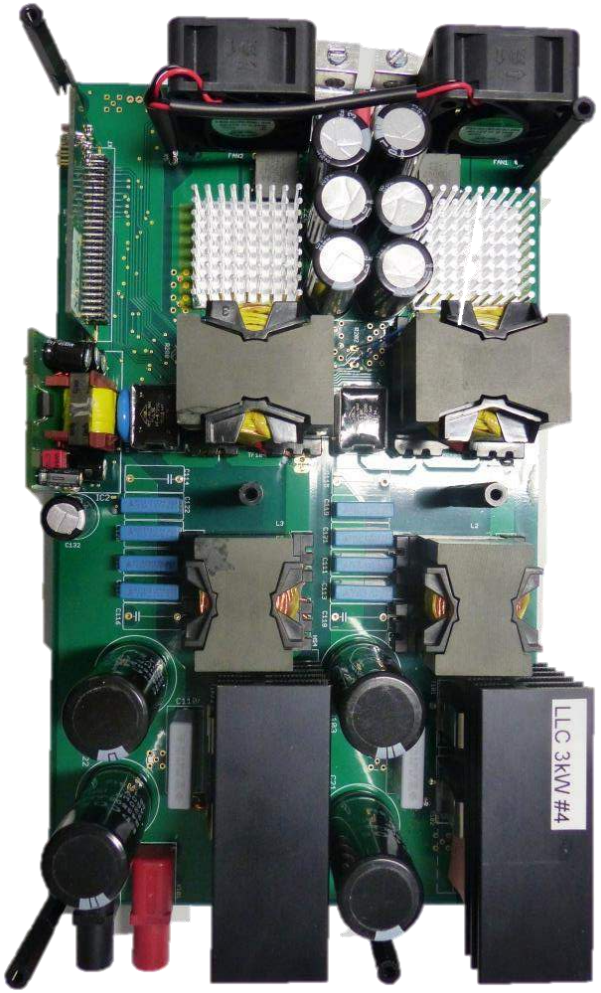
Final shape and overall dimensions



Evaluation board EVAL_3kW_2LLC_C7



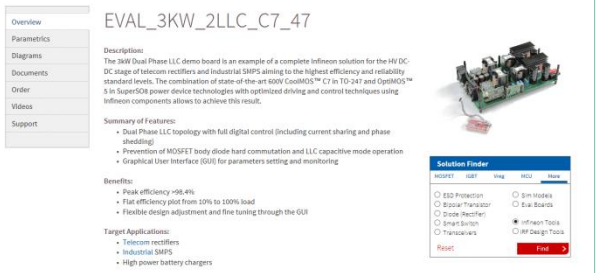




Support slides
3 KW Dual LLC evaluation board

Evaluation board page

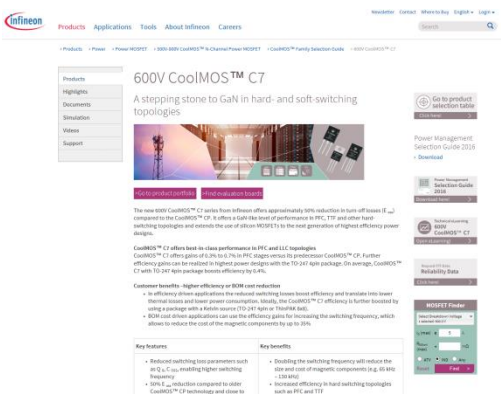
- Technical Description
- Datasheets
- Parameters
- Related material
- Videos



- EVAL_3kW_2LLC_C7

Product family pages

- Product Brief
- Application Notes
- Selection Guides
- Datasheets and Portfolio
- Videos
- Simulation Models



- IPP60R040C7
- BSC093N15NS5
- XMC4400-F64K512 AB
- 2EDN7524R
- ICE2QR2280Z
- 1EDI60N12AF
- IFX1763XEJ V50
- IFX1763XEJ V33

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