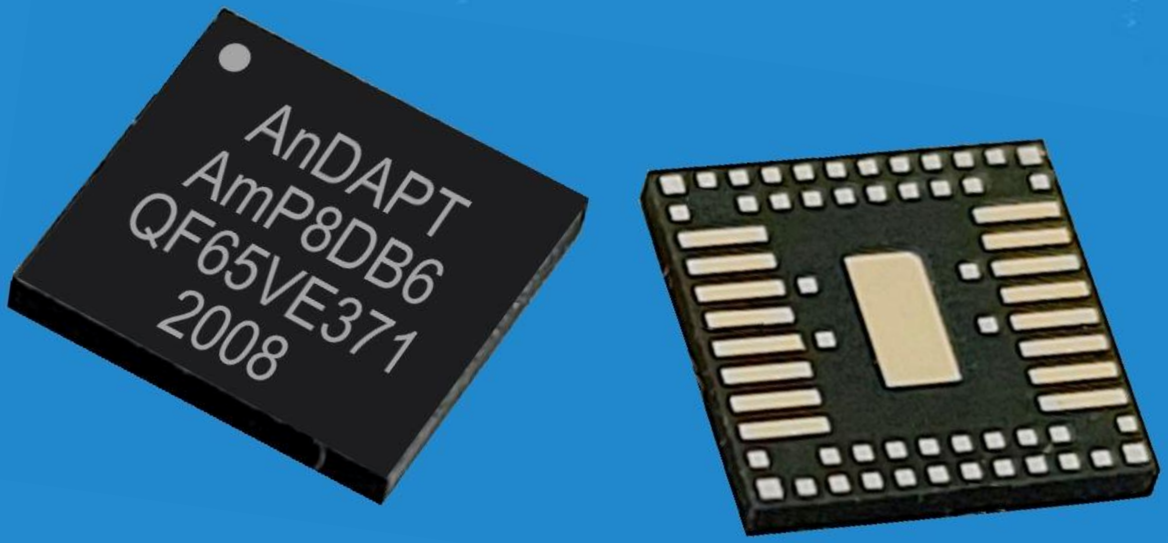


Xilinx Versal AI Core (Mid/High Voltage, Full Power Management) Power Solution

Power Mapping

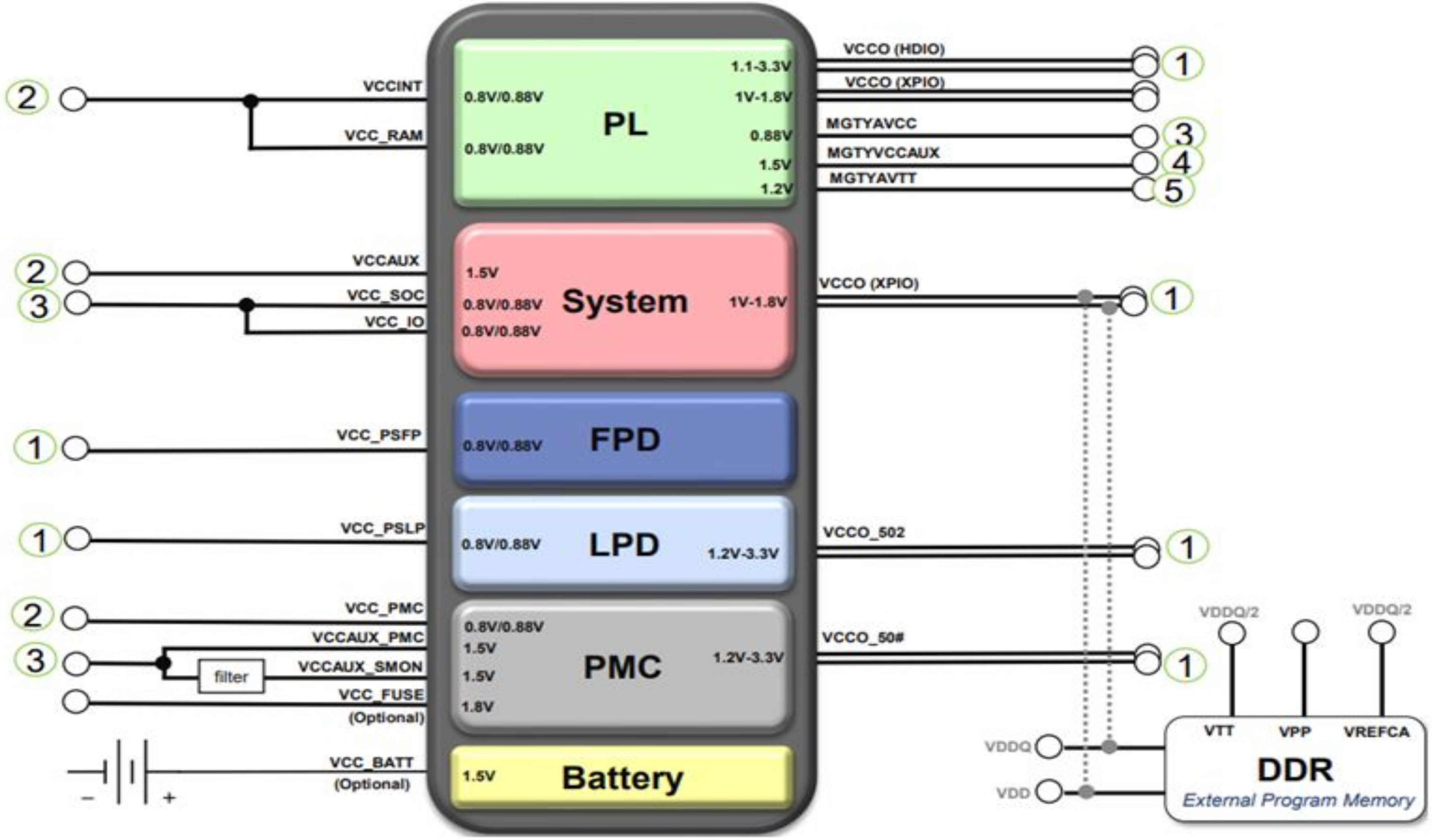
AnDAPT Marketing Team

AnDAPT

Versal AI Core Power Mapping Highlights

- Power tree mappings completed per data received from Xilinx Power Management team
- Both Typical and Upper use-cases are served by the same design
- Data gathered and bench tested by applications team at AnDAPT
  - Data meets or exceeds Xilinx power and timing specifications
- Total 14 power rails covered by 3x AmP ICs including memory and termination rails
- VCCINT (core rail) draws current from 132 A to 165 A and thus will be served using an external IC enabled/disabled by AmP IC
- Total solution area (excluding external core rail) is 1498.33 mm^2
- Presentation contains thermal views of all ICs

Xilinx Versal AI Core Power Tree



Versal AI Core Power Rails: Mid/High Voltage, Full Power Management (Typical & Upper)

Sequence		Voltage (V)	Versal AI Core Typical (A)	Versal AI Core Upper (A)
Rail 1	VCC_PMC	0.8/0.88V	0.24	0.30
Rail 2	VCCINT	0.7/0.8/0.88V	132.01	165.01
Rail 3	VCC_PSLP	0.8/0.88V	0.51	0.64
Rail 4	VCC_PSFP	0.8/0.88V	1.72	2.15
Rail 5	VCC_SOC	0.8/0.88V	3.77	4.72
Rail 6	VCCAUX	1.5V	2.99	3.74
Rail 7	VCCAUX_PMC/VCCAUX_SMON	1.5V	0.12	0.16
Rail 8	MGTAVCC	0.88V	2.47	3.08
Rail 9	MGTAVAUX	1.5V	0.23	0.29
Rail 10	MGTAVTT	1.2V	3.85	4.81
Rail 11	VCC0_PMIO[0…]/VCC[0…](HDIO)	1.2-3.3V, 1.1- 3.3V, 1-1.8V	0	0.00
Current Total (A)			**138.52**	**173.15**

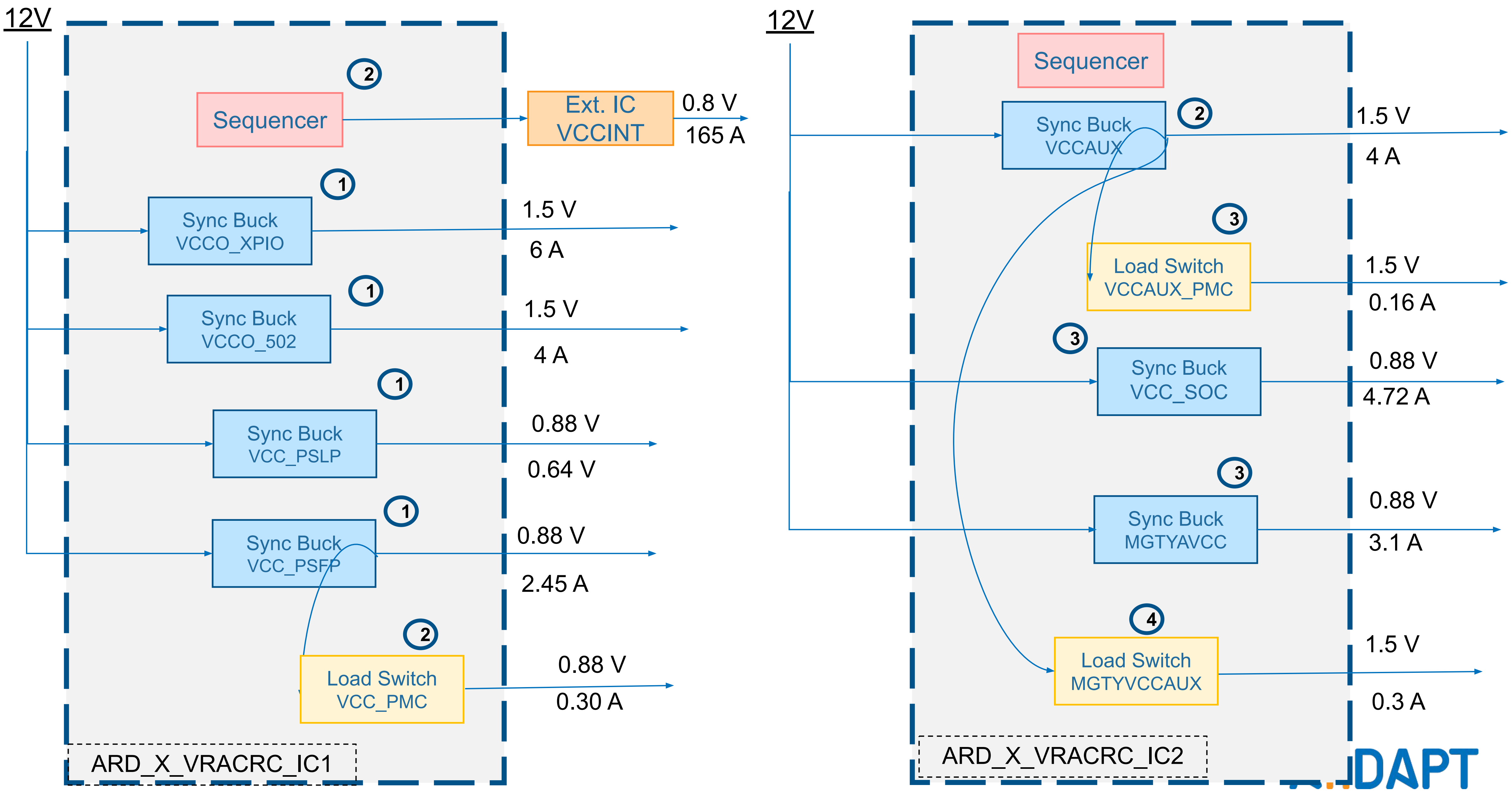
Power Tree Mapping: Versal AI Core

#	Rail	Seq	Power Component	Type	Upstream Rail	Vinput (V)	Vout (V)	Iout (A)	AnDAPT PMIC
1	VCCO_XPIO (VCCO_XPIO, VCCO_HDIO)	1	Sync Buck	C200	PVIN	12	1.5	6	ARD_X_VRACRC_IC1
2	VCCO_502 (VCCO_502, VCCO_50X)	1	Sync Buck	C200	PVIN	12	1.5	4	
3	VCC_PSLP	1	Async Buck	C150	PVIN	0.8/0.88	0.8/0.88	0.64	
4	VCC_PSFP	1	Sync Buck	C200	PVIN	12	0.8/0.88	2.15+0.3	
5	VCCINT (VCC_RAM)	2	Ext IC	-	PVIN	12	0.8/0.88	165	
6	VCC_PMC	2	Load Switch	C750	VCC_PSFP	0.8/0.88	0.8/0.88	0.30	
7	VCCAUX	2	Sync Buck	C200	PVIN	12	1.5	4+0.16+0.3	ARD_X_VRACRC_IC2
8	VCC_SOC (VCC_IO)	3	Sync Buck	C200	PVIN	12	0.8/0.88	4.72	
9	VCCAUX_PMC (VCCAUX_SMON)	3	Load Switch	C750	VCCAUX	1.5	1.5	0.16	
10	MGTYAVCC	3	Sync Buck	C200	PVIN	12	0.88	3.1	
11	MGTYVCCAUX	4	Load Switch	C750	VCCAUX	1.5	1.5	0.3	
12	MGTYAVTT	5	Sync Buck	C200	PVIN	12	1.2	4.9	ARD_X_VRACRC_IC3
13	VDDQ	6	Sync Buck	C220	PVIN	12	1.2	3 + 2	
14	VTT	7	VTT Terminator	C210	VDDQ	1.2	0.6	2	

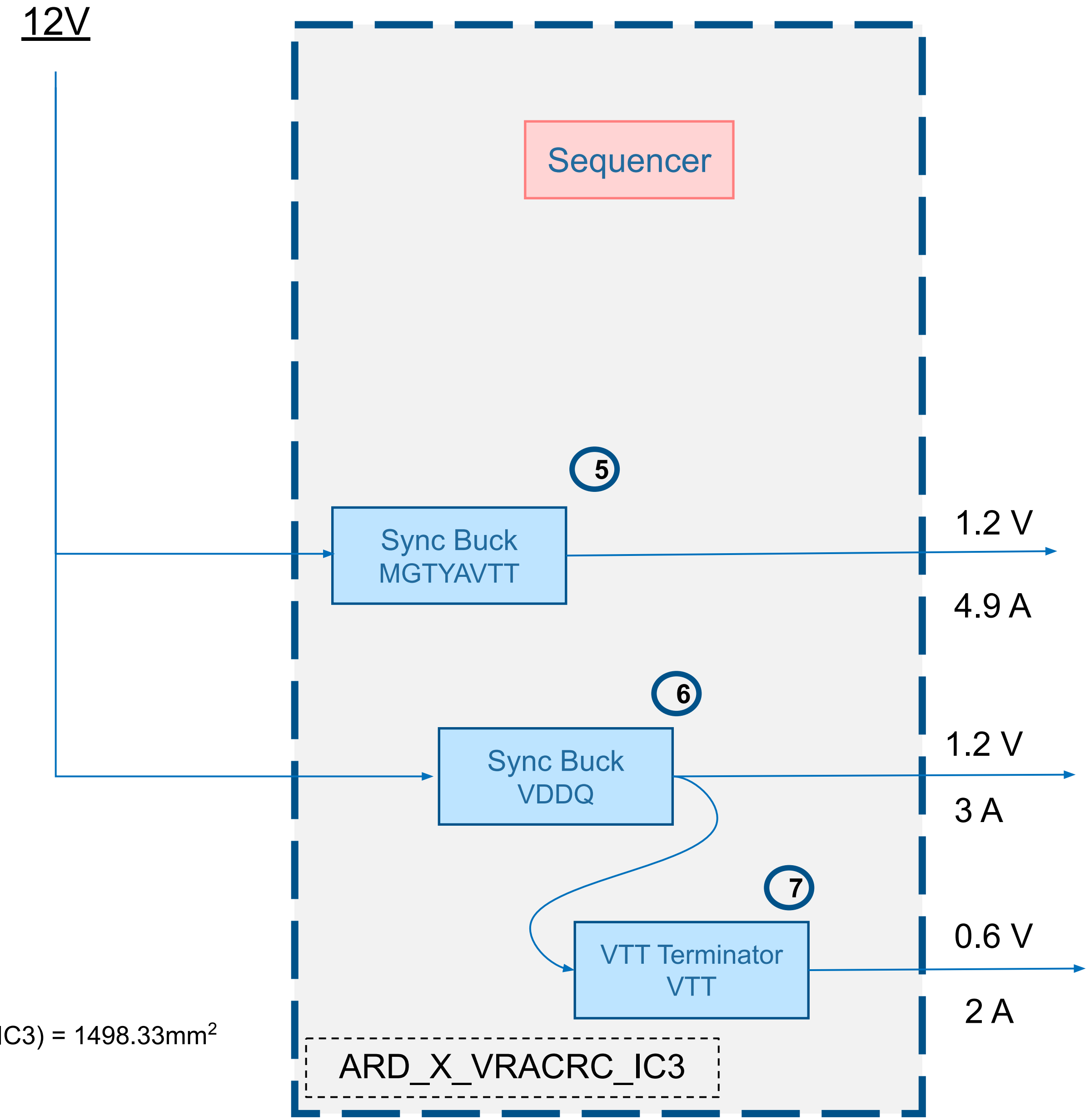
Total estimated solution area = 1498.33 mm^2

PVIN = 12V

Power Tree Mapping

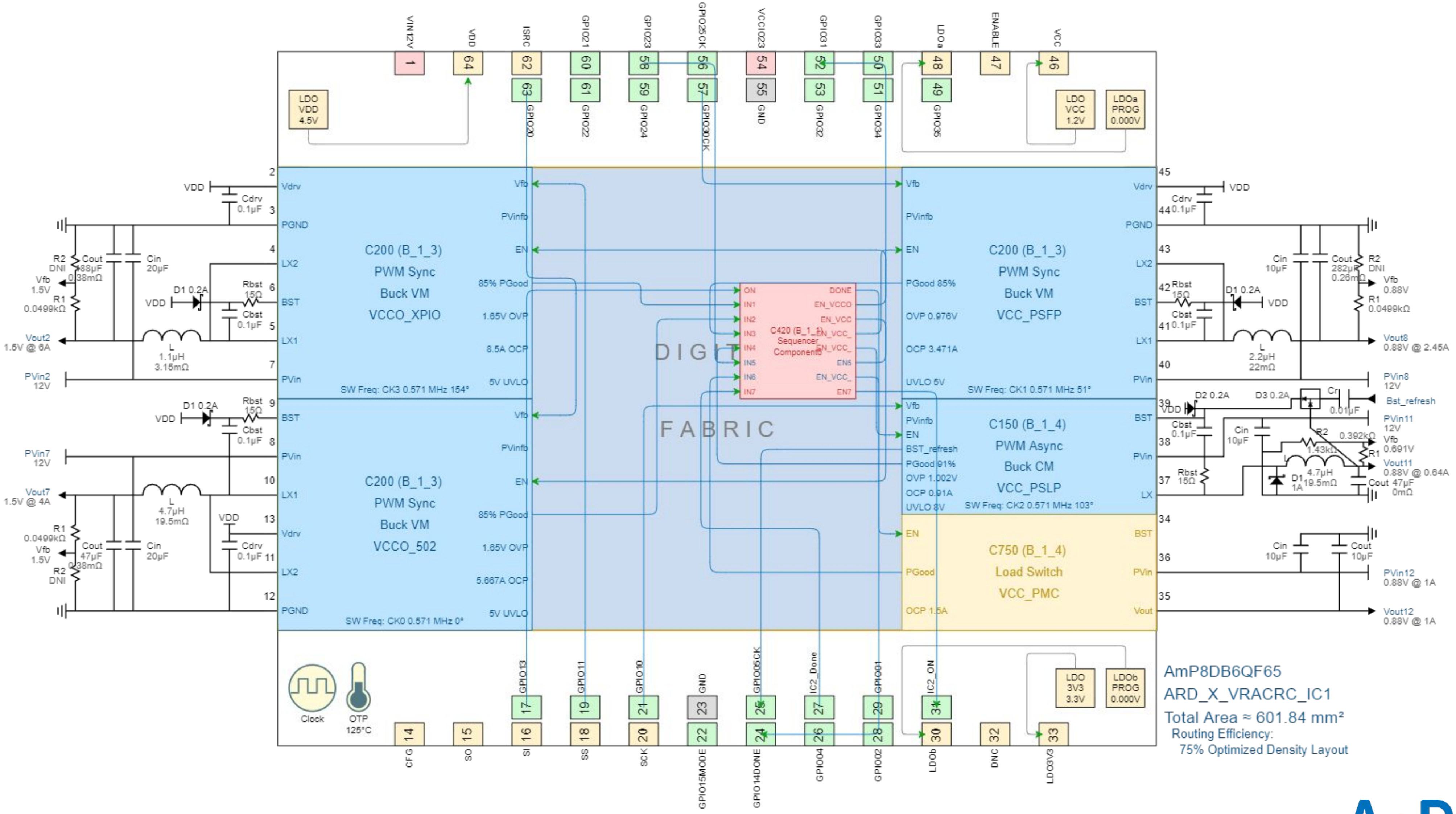


Power Tree Mapping



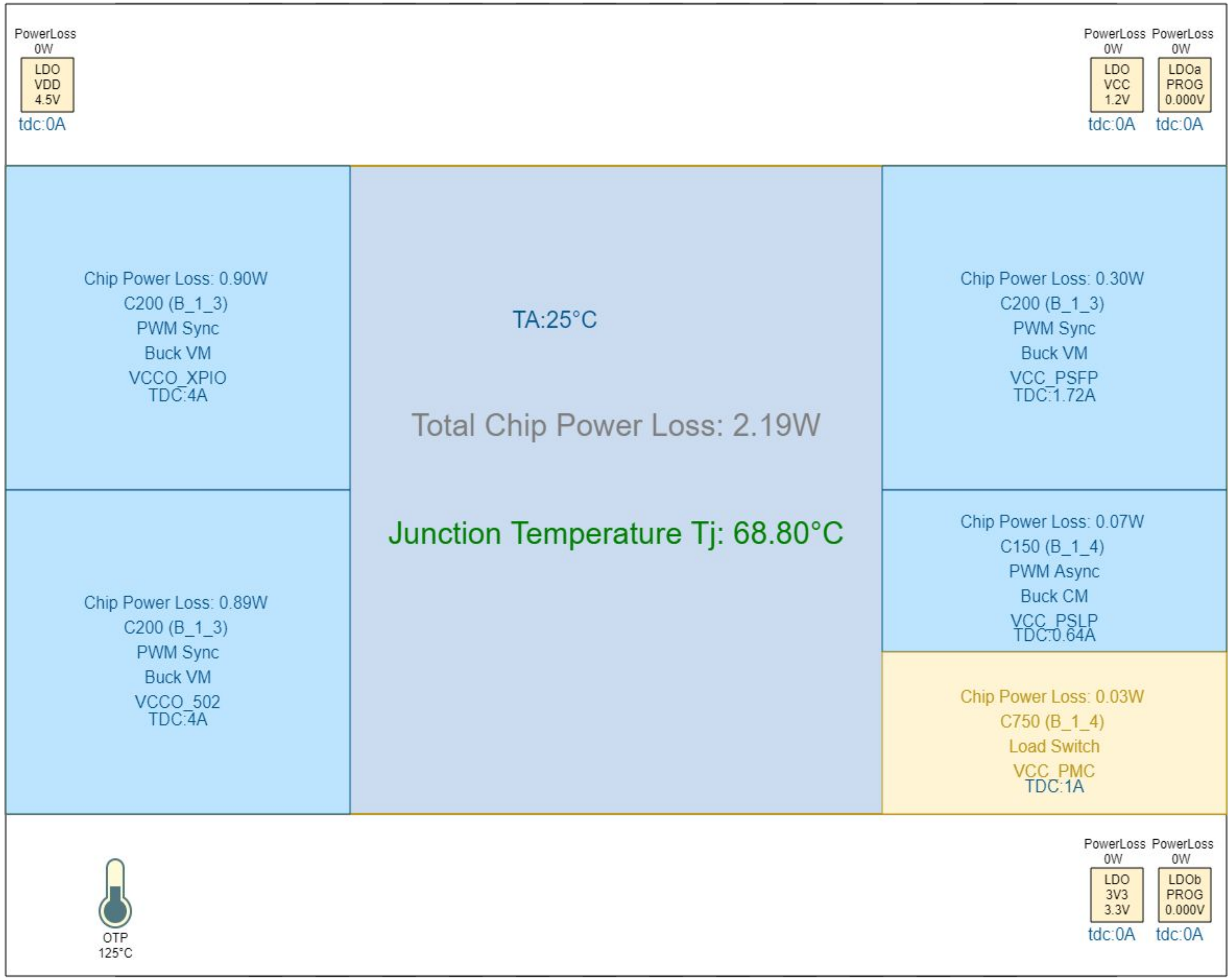
Estimated total area (IC1+IC2+IC3) = 1498.33mm^2

Mapping (WebAmP View) Design –IC1



AmP8DB6QF65
ARD_X_VRACRC_IC1
Total Area ≈ 601.84 mm²
Routing Efficiency:
75% Optimized Density Layout

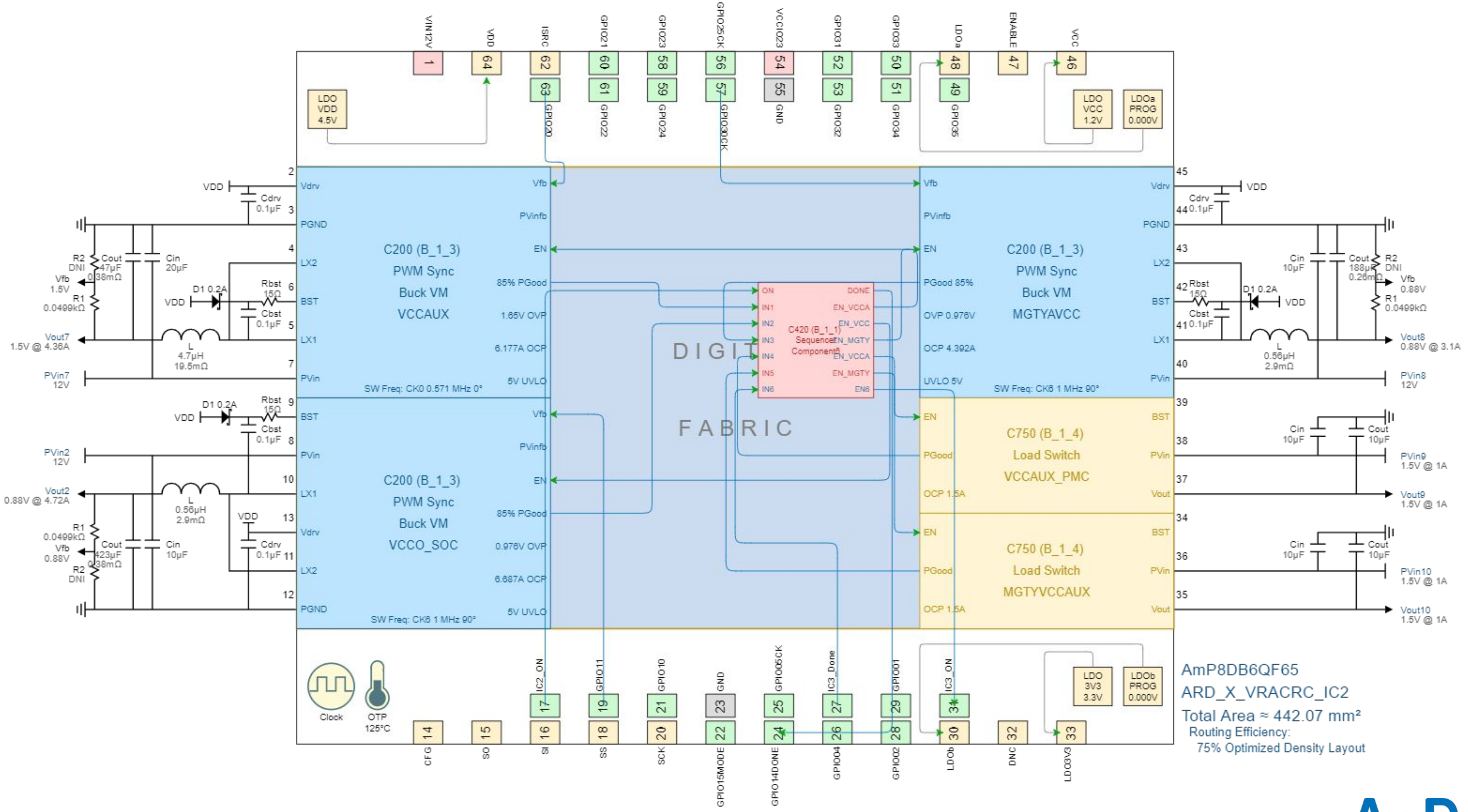
Mapping (Thermal View) –IC1



AmP8DB6QF65
ARD_X_VRACRC_IC1
Total Area ≈ 601.84 mm²
Routing Efficiency:
75% Optimized Density Layout

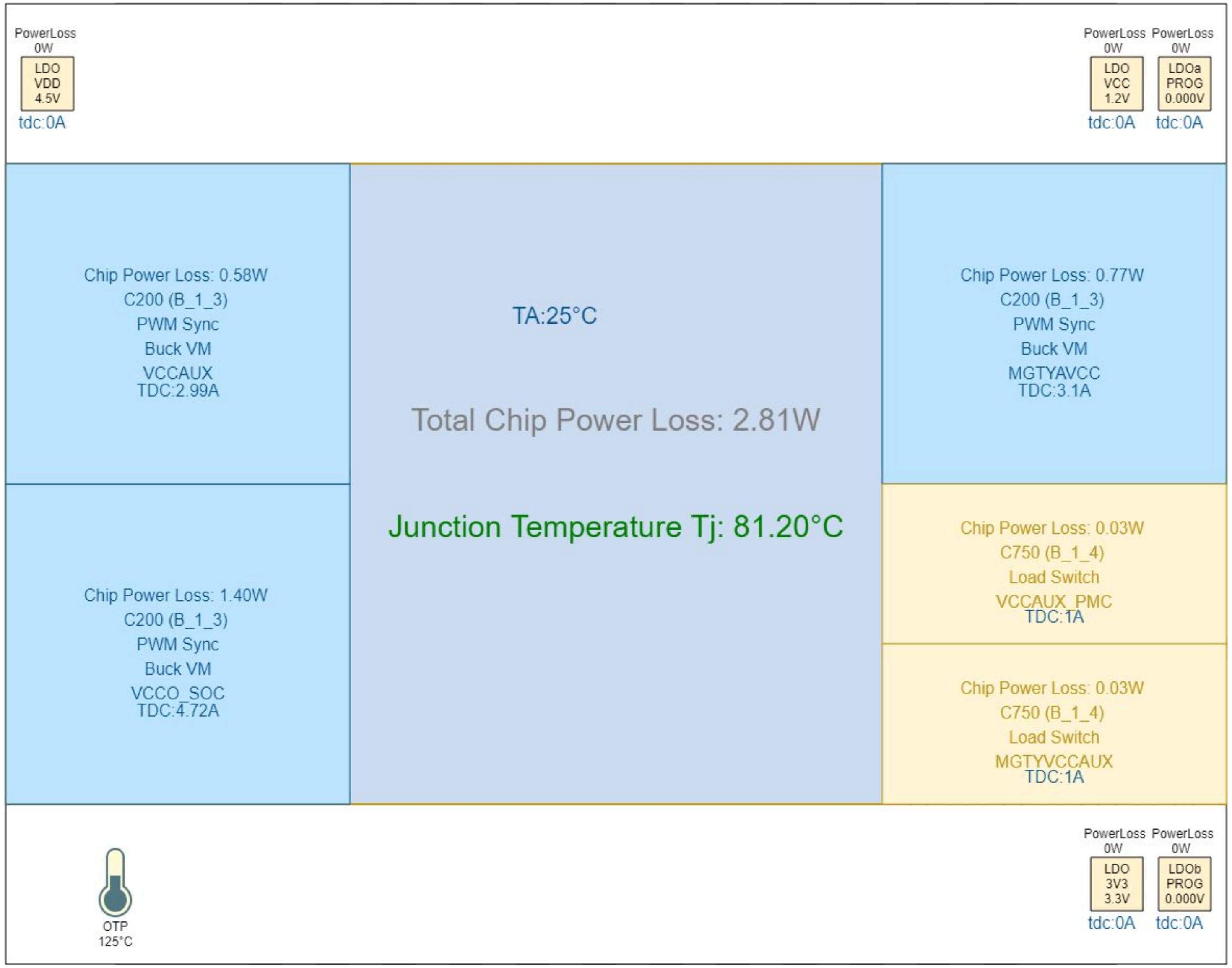
AnDAPT

Mapping (WebAmP View) Design –IC2



AnDAPT

Mapping (Thermal View) –IC2



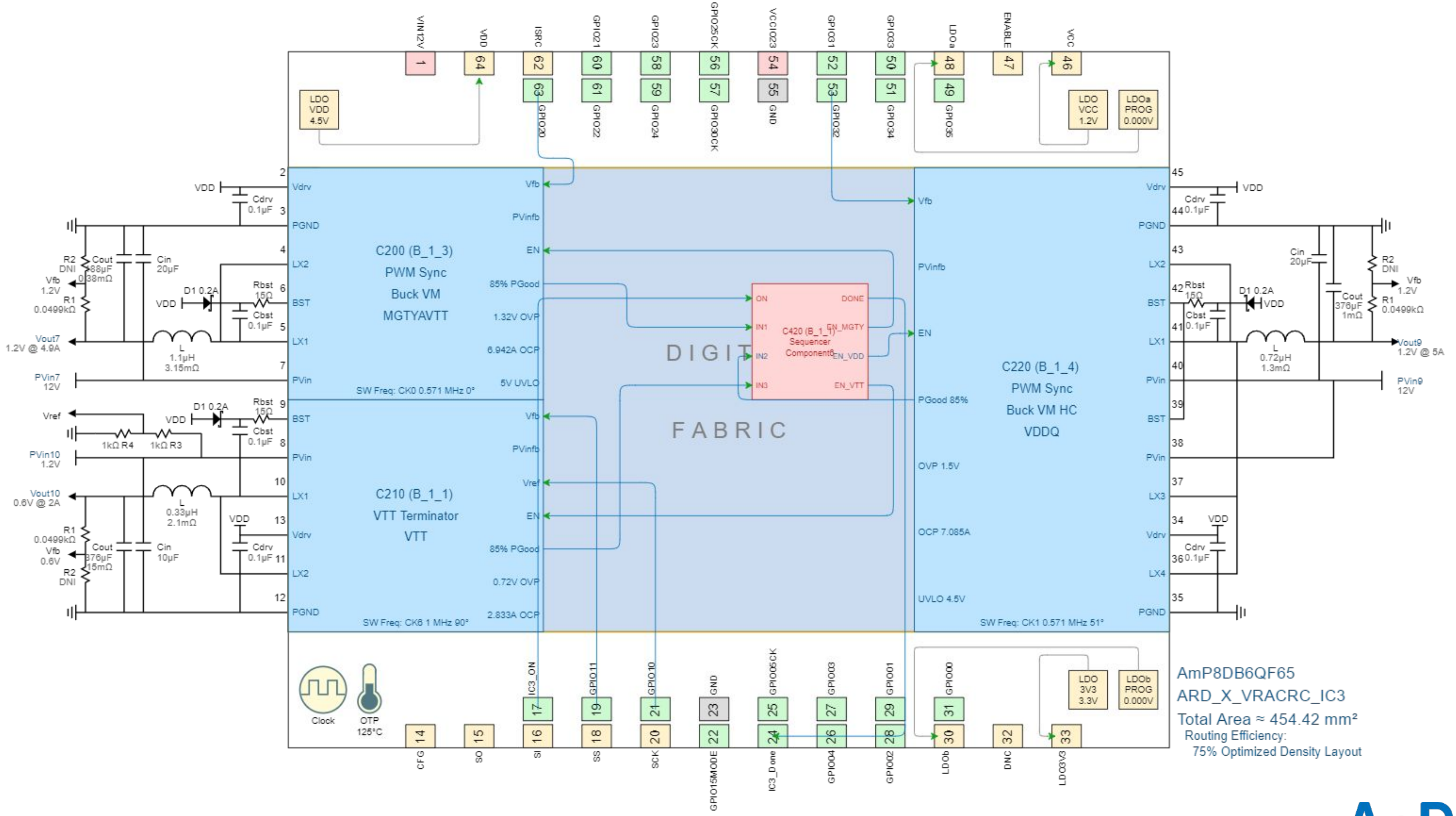
AmP8DB6QF65

ARD_X_VRACRC_IC2

Total Area ≈ 442.07 mm²

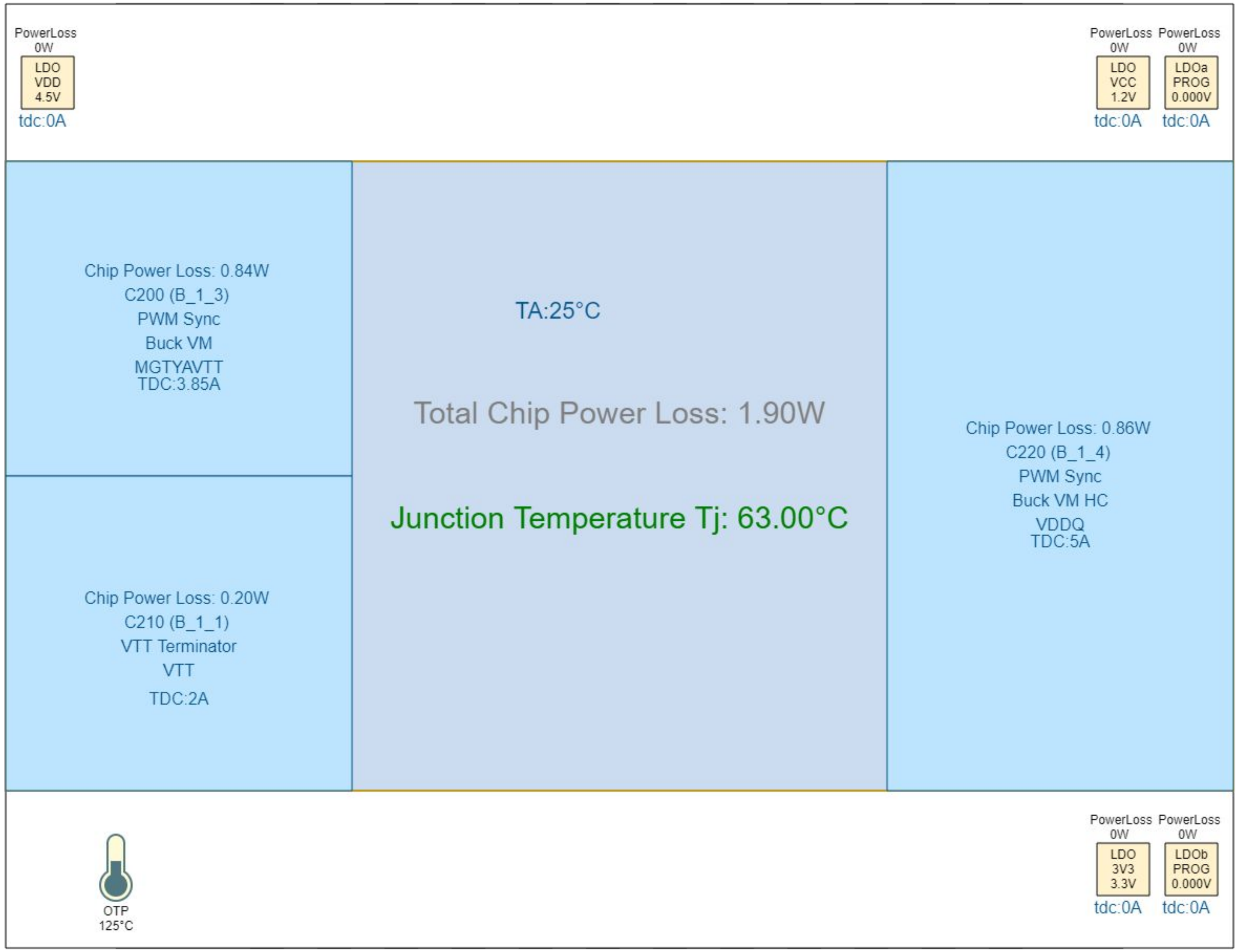
Routing Efficiency:
75% Optimized Density Layout

Mapping (WebAmP View) Design –IC3



AmP8DB6QF65
ARD_X_VRACRC_IC3
Total Area ≈ 454.42 mm²
Routing Efficiency:
75% Optimized Density Layout

Mapping (Thermal View) –IC3



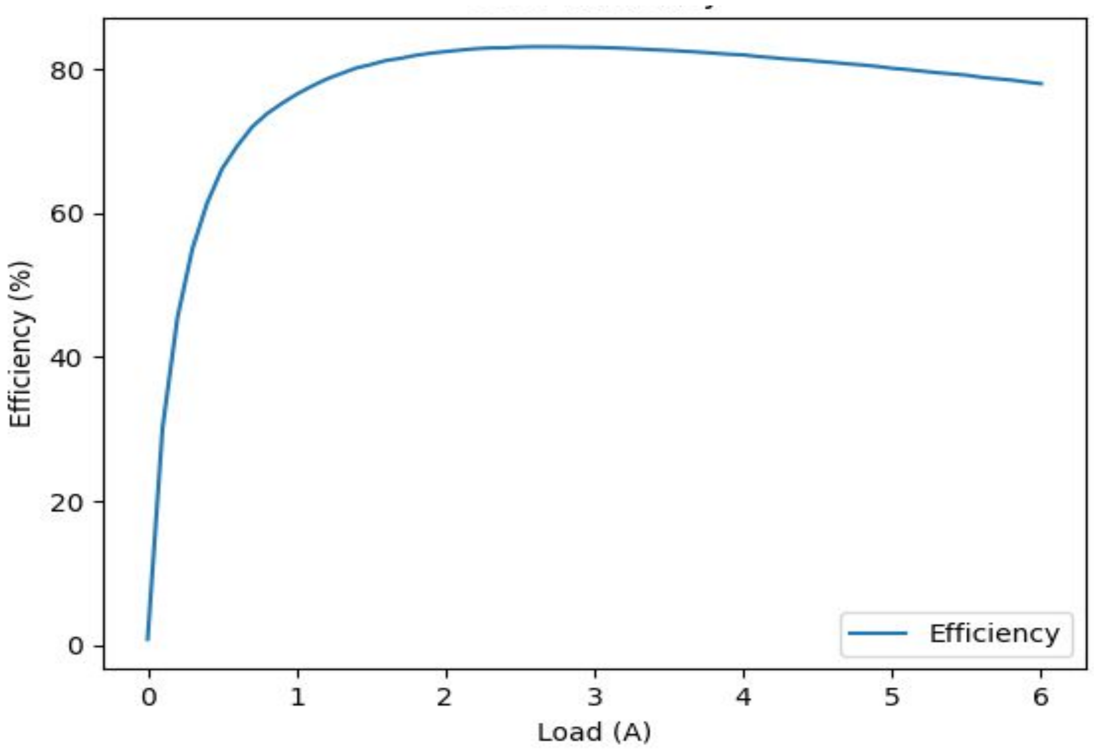
AmP8DB6QF65
ARD_X_VRACRC_IC3
Total Area ≈ 454.42 mm²
Routing Efficiency:
75% Optimized Density Layout

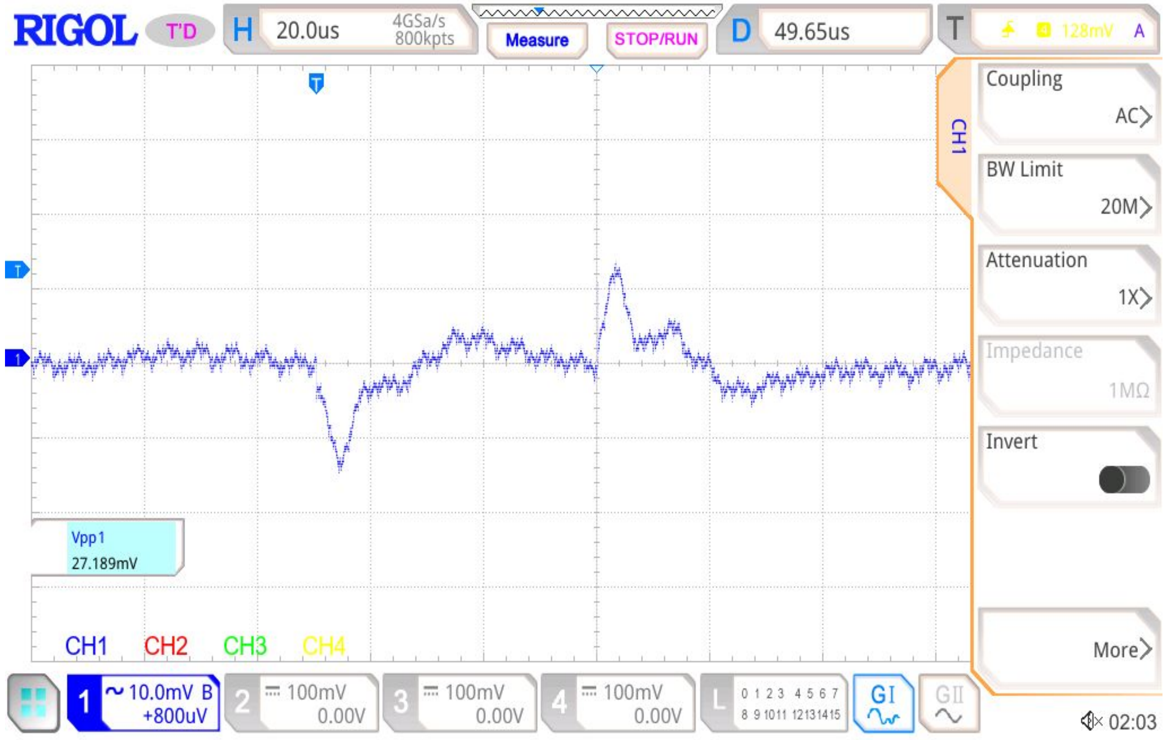
AnDAPT

VCCO_XPIO
1.5 V / 6 A

- C200 (Synchronous Buck)
- Fsw = 0.571 MHz
- L = 1.1 µH, P/N Wurth 744314110
- C = 4x47 uF

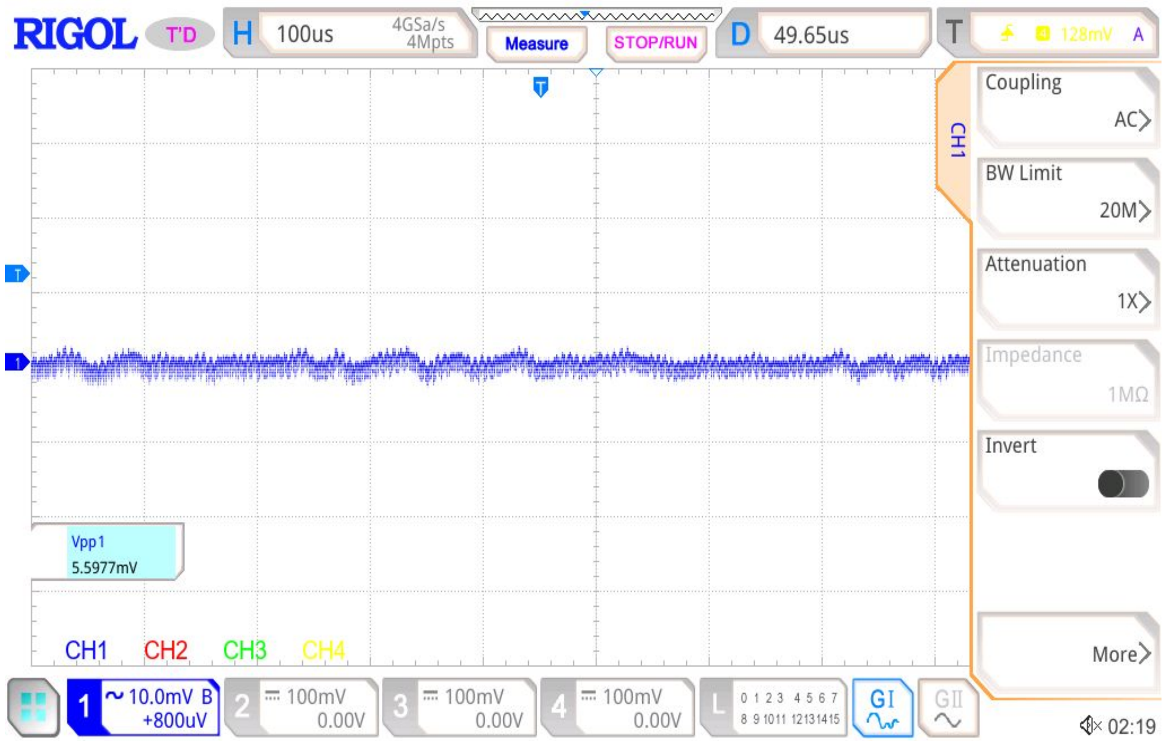
Efficiency & Transient

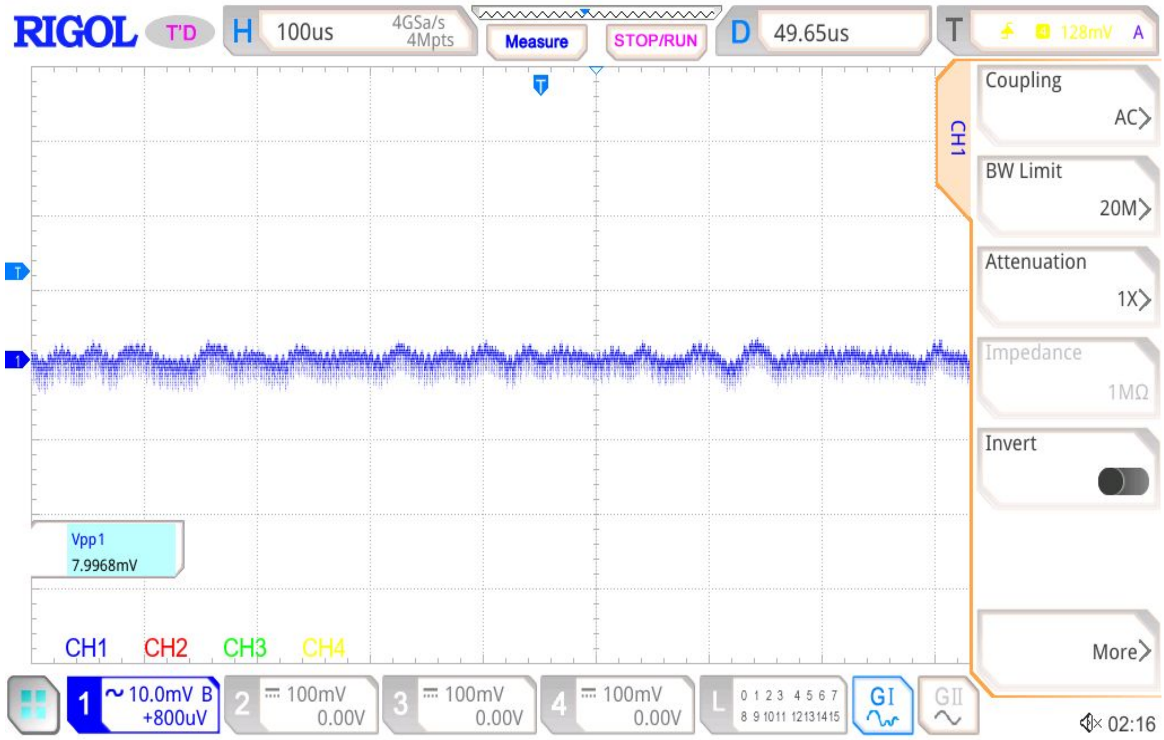




Vout = 1.5V
Transient 4.5 – 6 A@10 A/μs
V_{PP} = 27.18 mV
Fsw = 0.571 MHz
L = 1.1 μH, C= 4x47 uF

Ripple





No Load
V_{PP} = 5.59 mV

Vout = 1.5 V

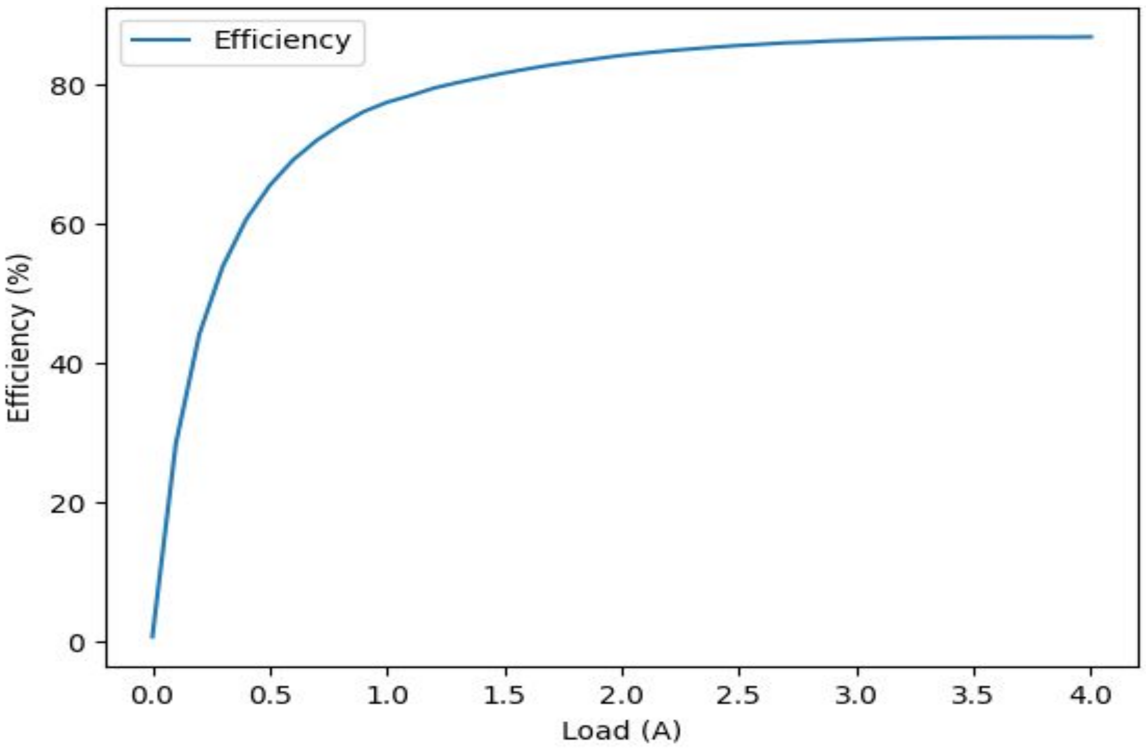
6 A Load
V_{PP} = 7.99 mV

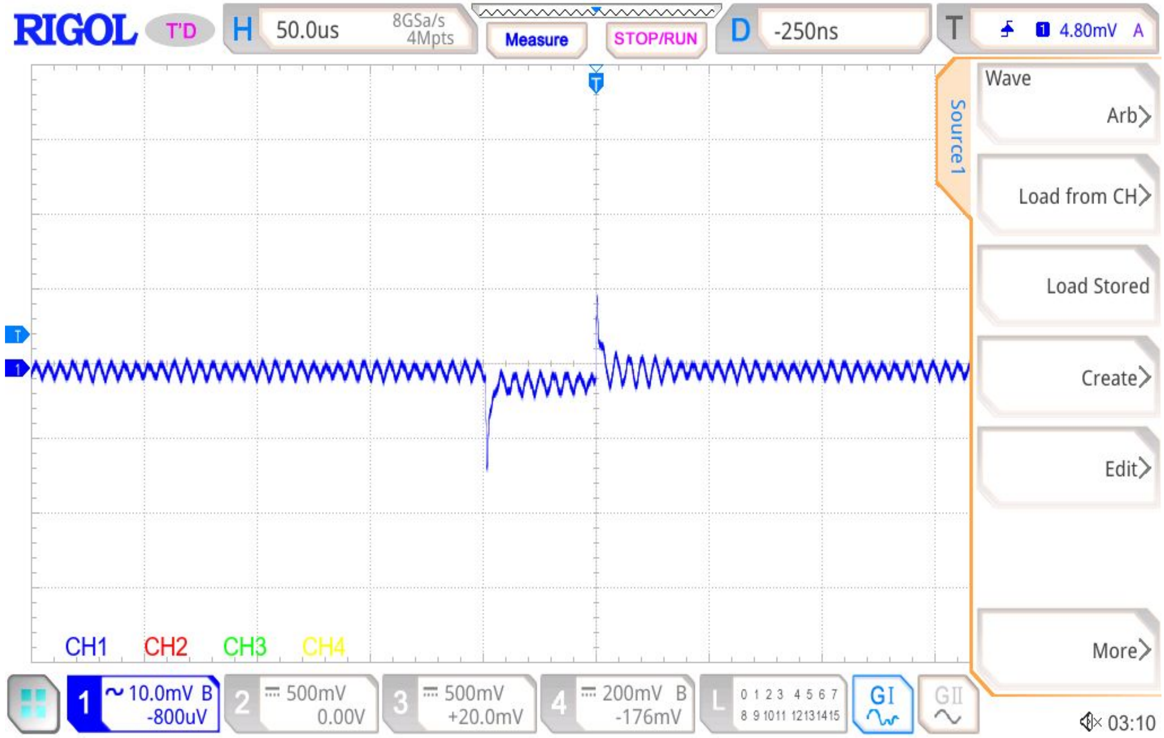
AnDAPT

VCCO_502
1.5 V / 4 A

- C200 (Synchronous Buck)
- Fsw = 0.571 MHz
- L = 4.7 µH, P/N Wurth 744311470
- C = 1x47 uF

Efficiency & Transient

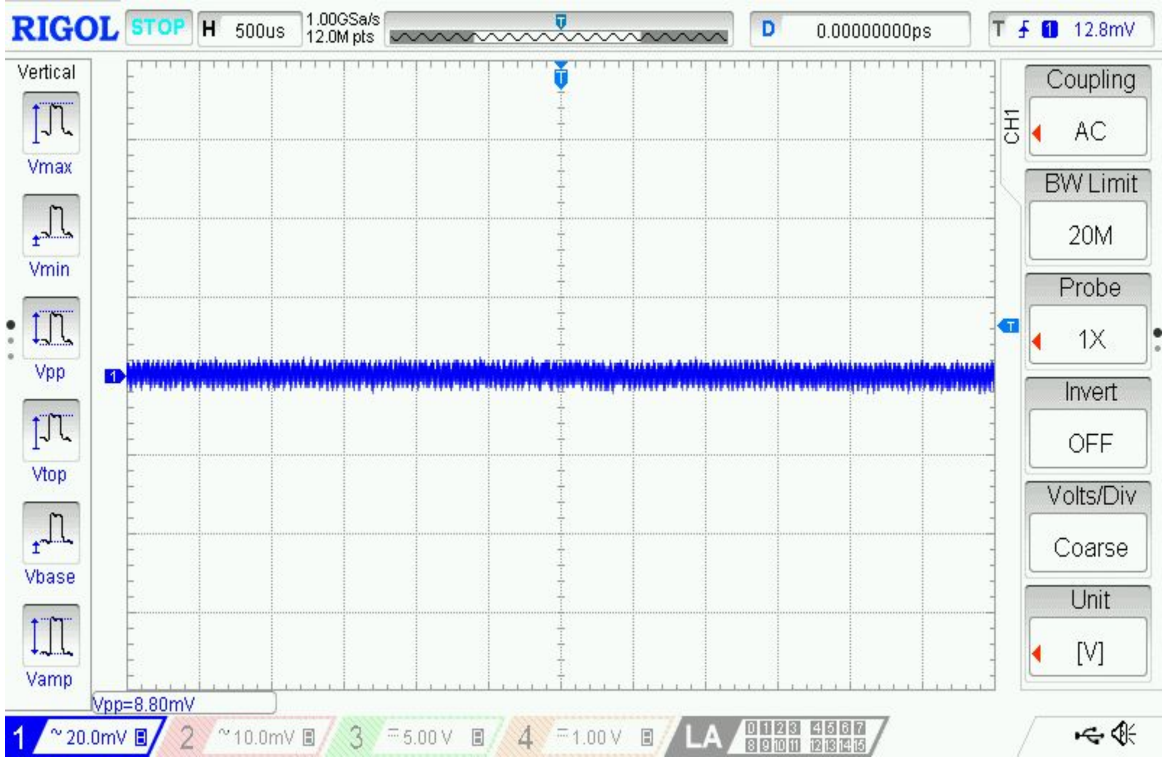


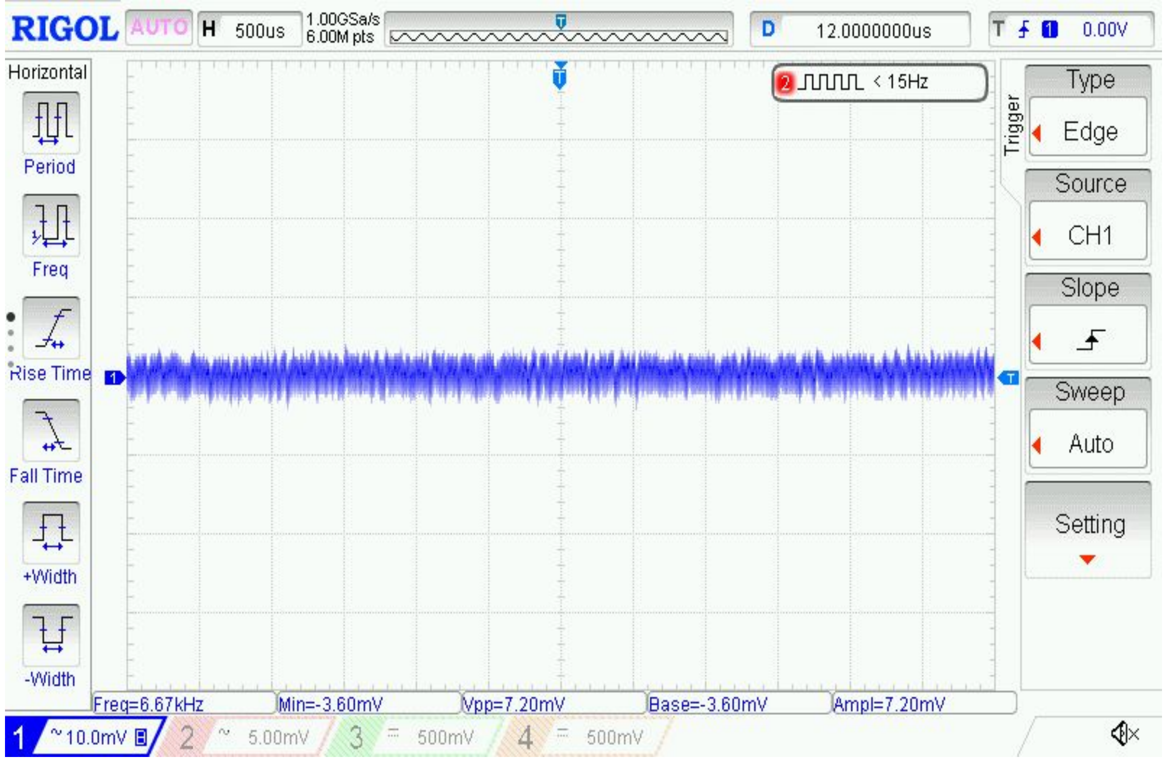


Vout = 1.5V
Transient 2.68A – 4A @ 10 A/μs
V_{PP} = 25 mV
Fsw = 0.571 MHz
L = 4.7 μH, C = 1x47 uF

AnDAPT

Ripple





No Load
V_{PP} = 8.80 mV

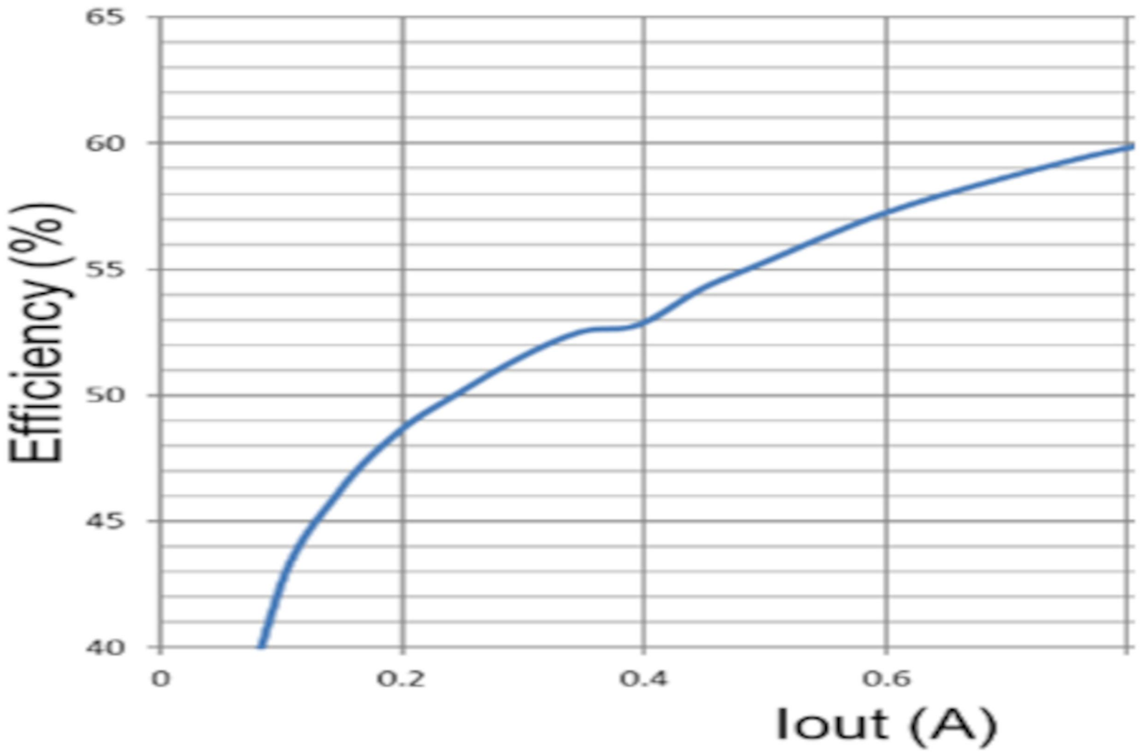
Vout = 1.5 V

4 A Load
V_{PP} = 7.20 mV

VCC_PSLP
0.88 V / 0.64 A

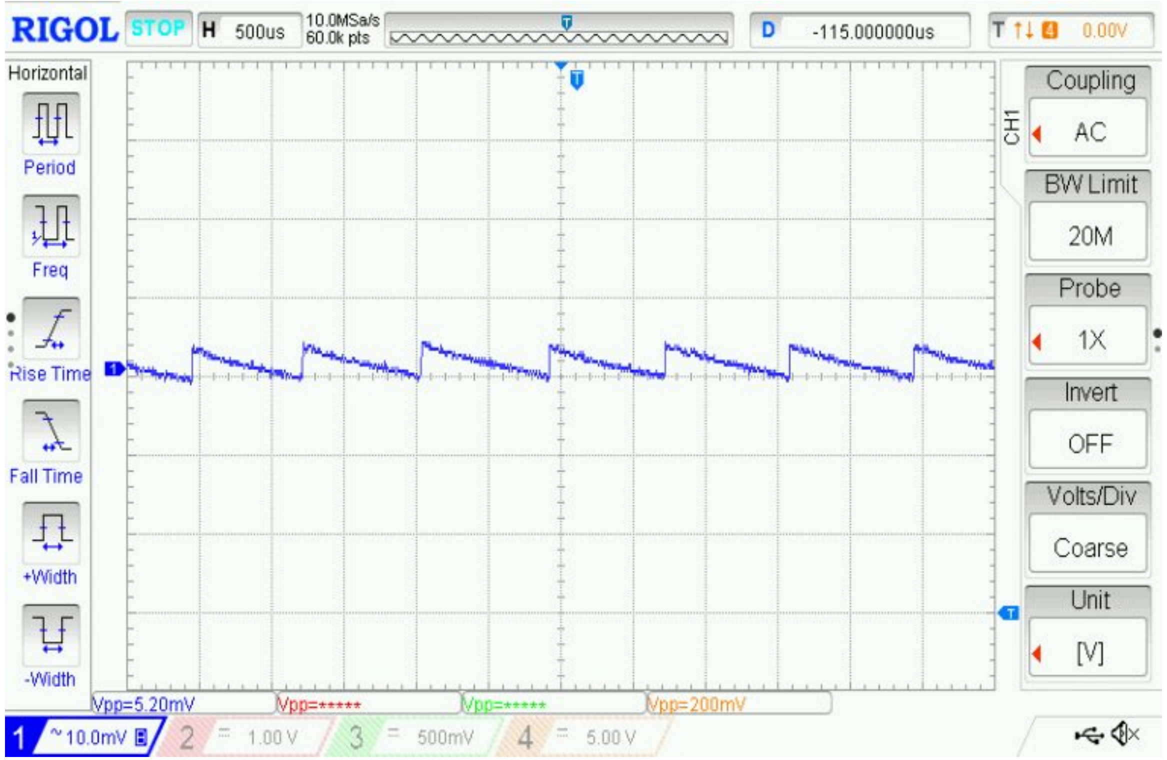
- C150 (Asynchronous Buck)
- Fsw = 0.571 MHz
- L = 4.7 µH, P/N Wurth 744311470
- C = 1x47 uF

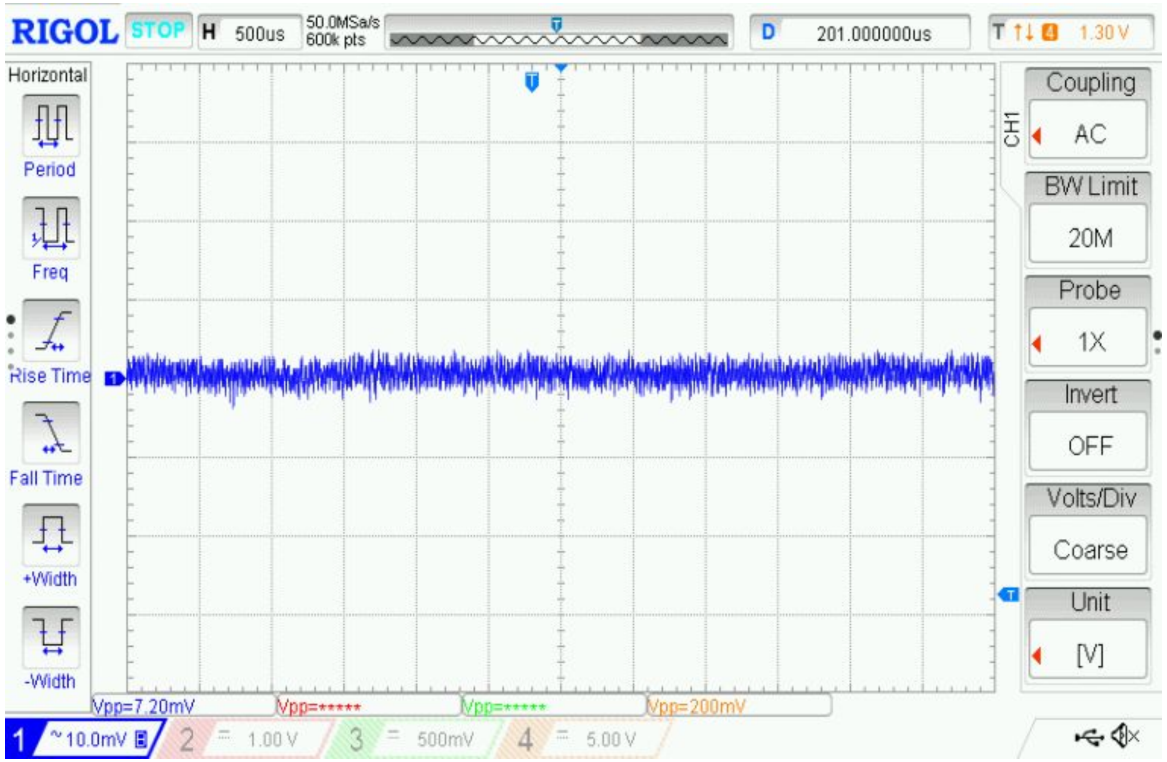
Efficiency & Transient



Vout = 0.88 V
Transient 0.48 A – 0.64A @ 100 A/µs
V_{PP} = 12.4 mV
Fsw = 0.571 MHz
L = 4.7 µH, C = 1x47 uF

Ripple





No Load
V_{PP} = 5.20 mV

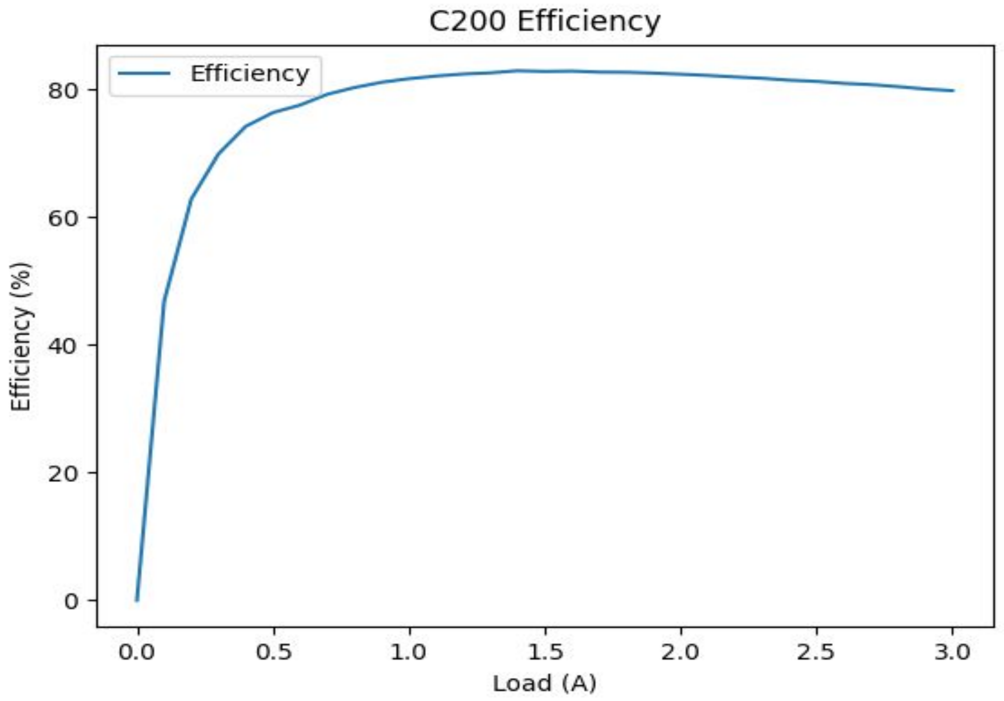
Vout = 0.88 V

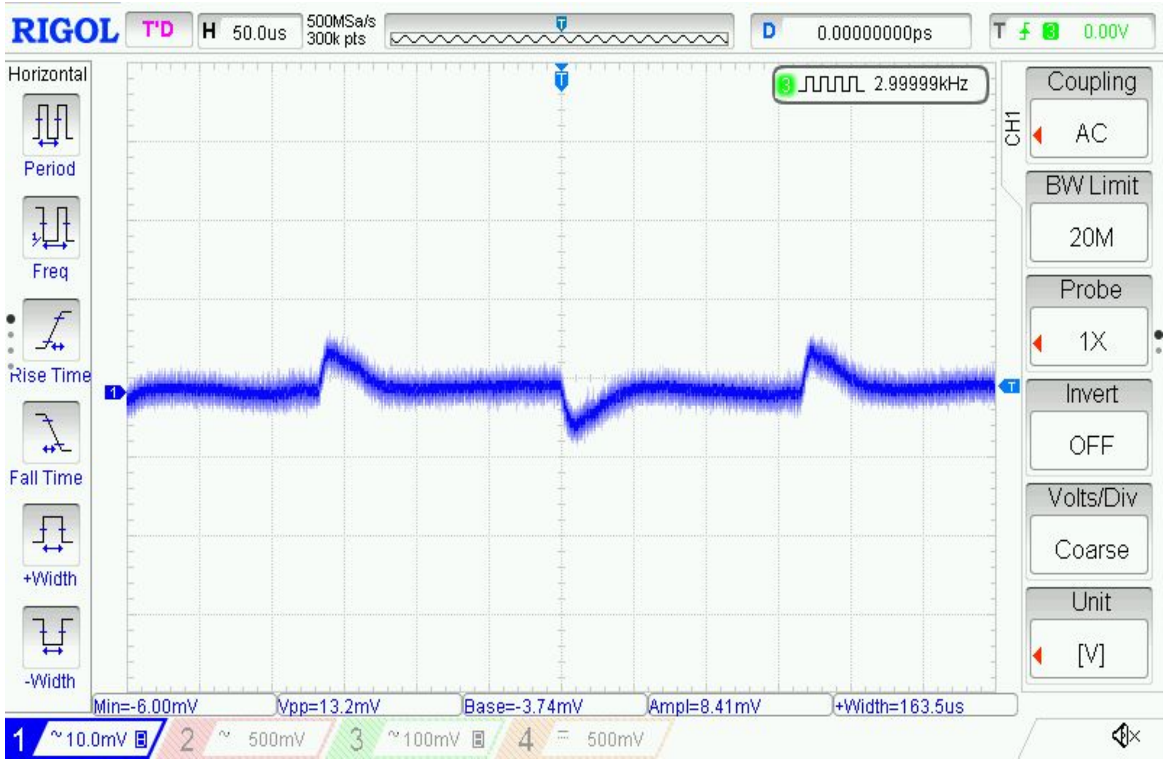
0.64 A Load
V_{PP} = 7.20 mV

VCC_PSFP
0.88 V / 2.45 A

- C200 (Synchronous Buck)
- Fsw = 0.571 MHz
- L = 2.2 µH, P/N Wurth 74438357022
- C = 6x47 uF

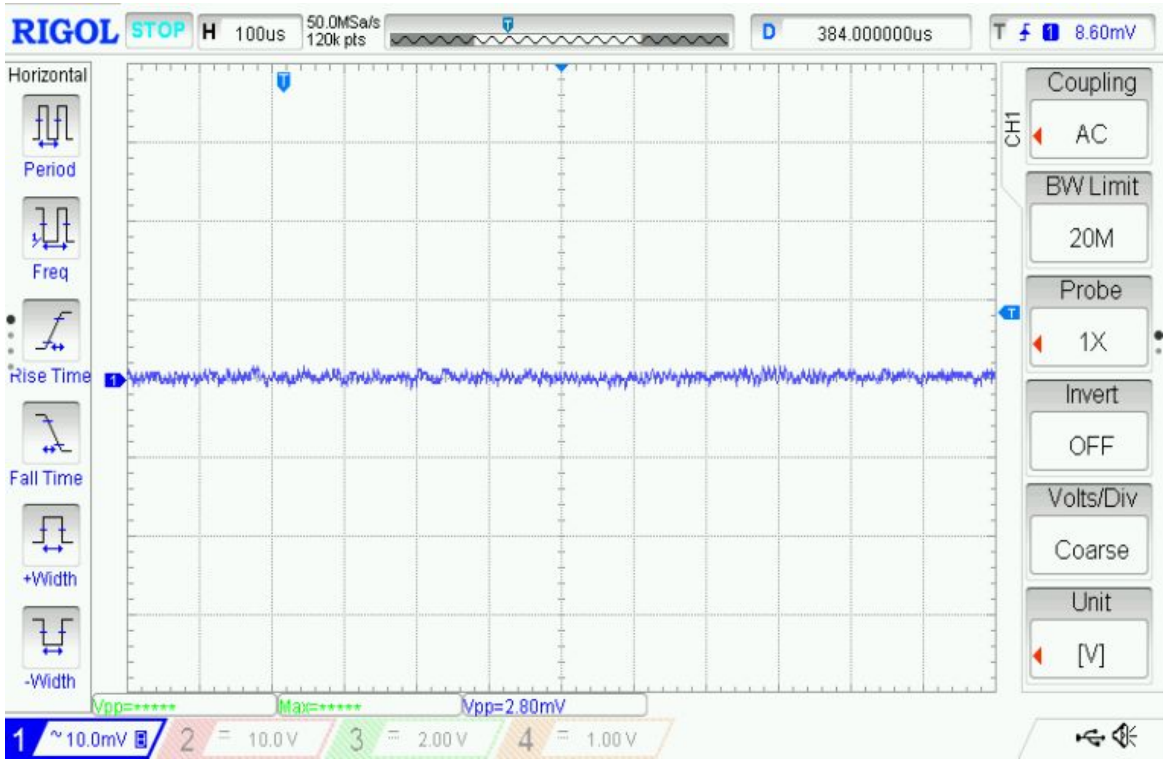
Efficiency & Transient

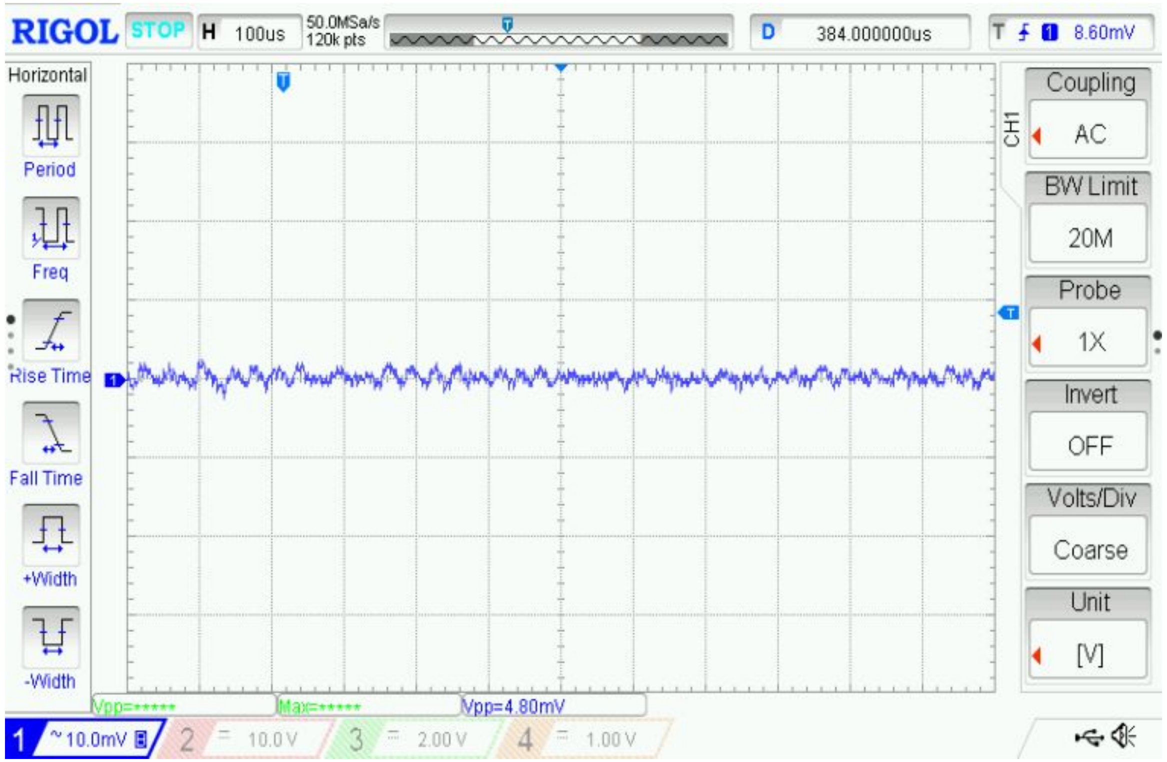




Vout = 0.88 V
Transient 1.83A – 2.45A @ 10 A/μs
V_{PP} = 13.2 mV
Fsw = 0.571 MHz
L = 2.2 μH, C = 6x47 uF

Ripple





No Load
V_{PP} = 2.80 mV

Vout = 0.88 V

2.45 A Load
V_{PP} = 4.80 mV

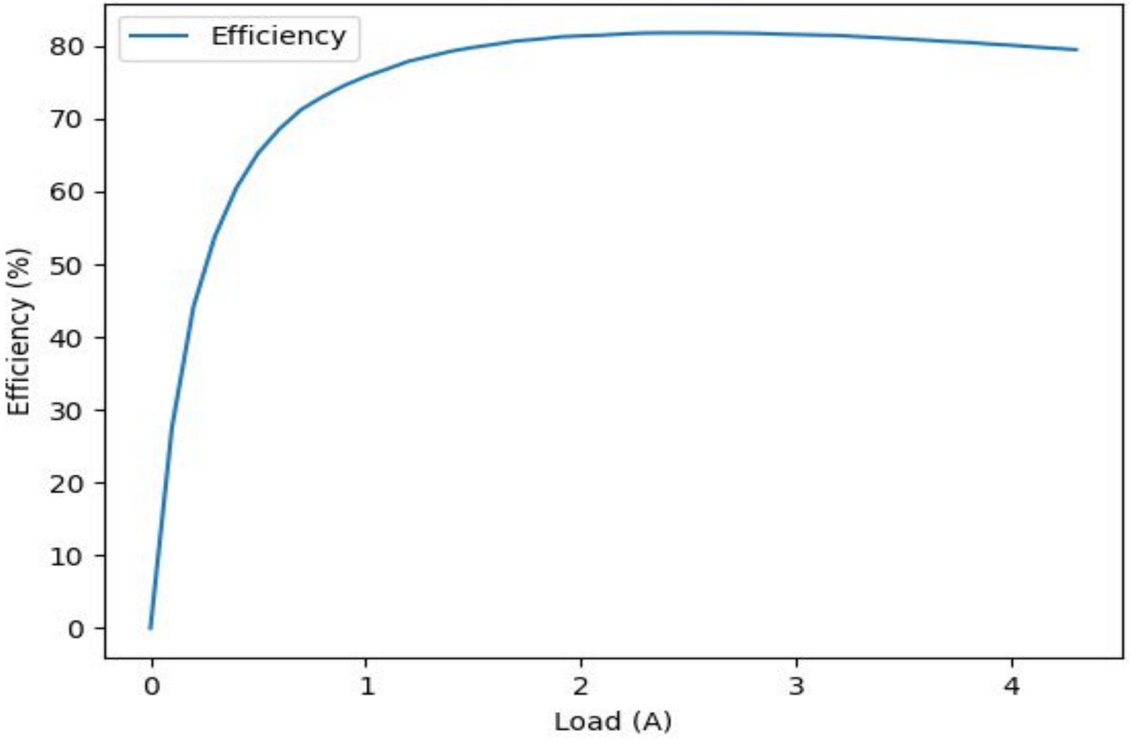
VCC_PMC
0.88 V / 0.30 A

- C750 (Load Switch)

VCCAUX
1.5 V / 4.46 A

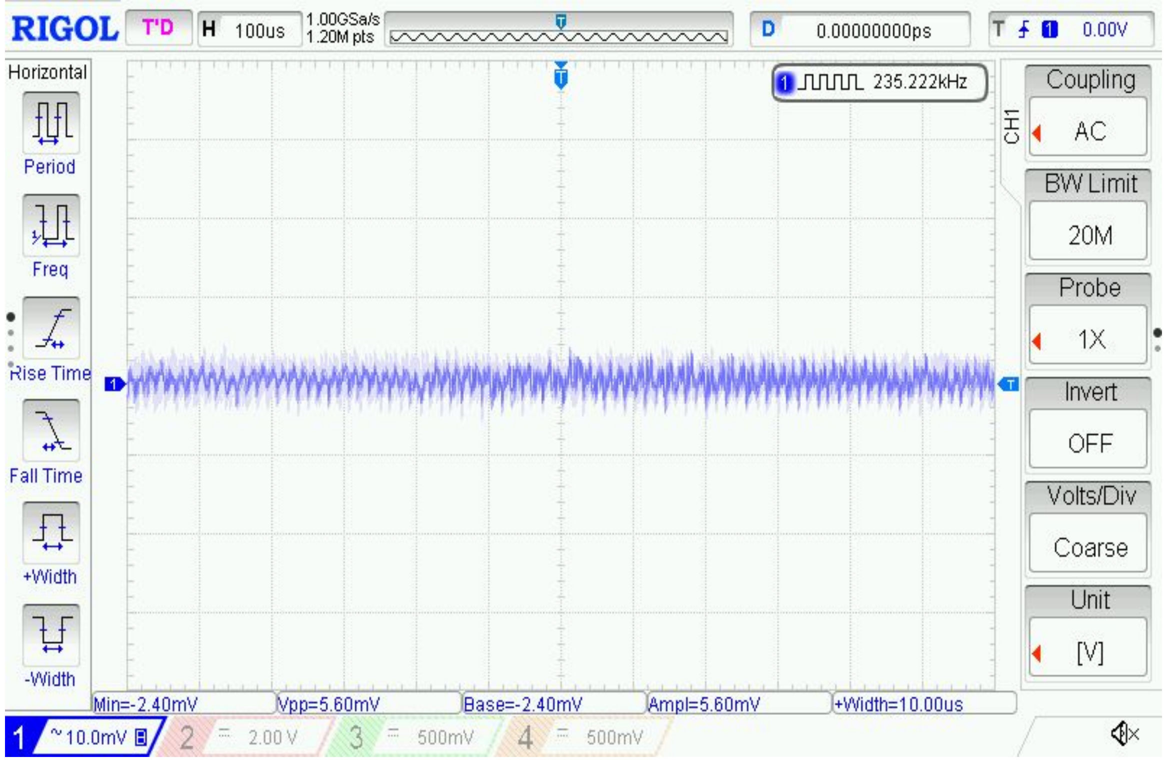
- C200 (Synchronous Buck)
- Fsw = 0.571 MHz
- L = 4.7 µH, P/N Wurth 744311470
- C = 1x47 uF

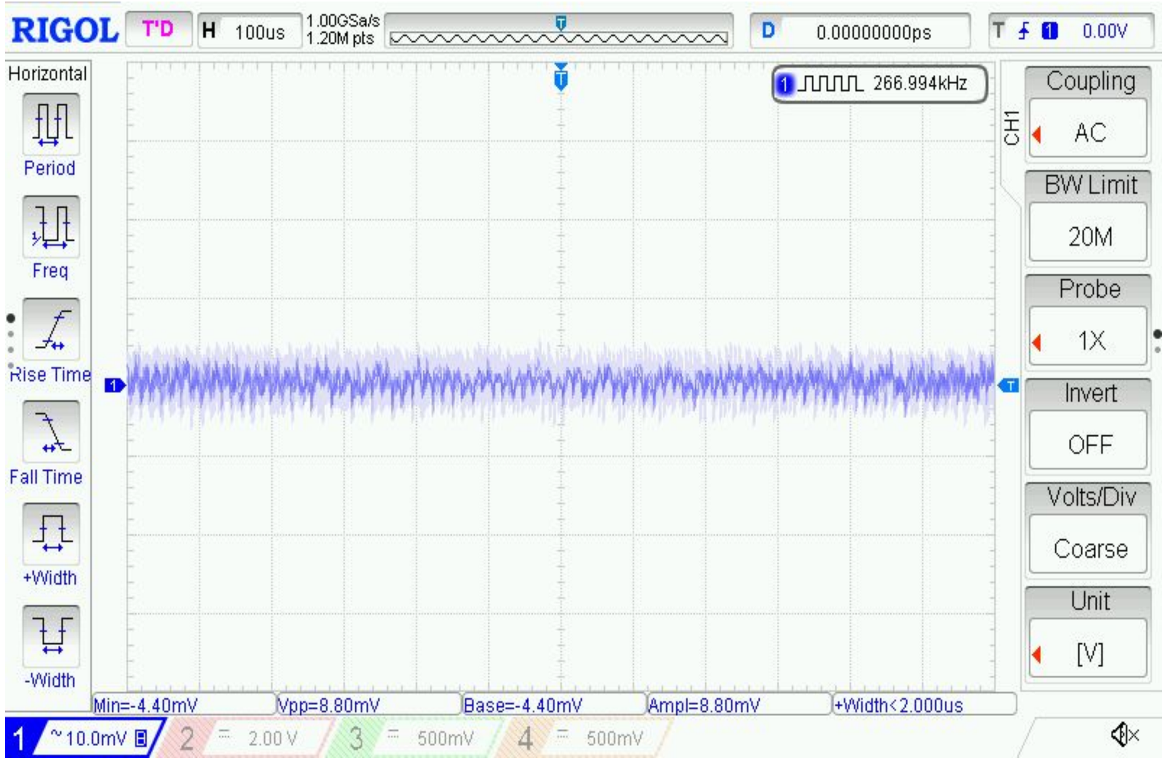
Efficiency & Transient



Vout = 1.5V
Transient 3.34A – 4.46A @ 10 A/μs
V_{PP} = 51.2 mV
Fsw = 0.571 MHz
L = 4.7 μH, C = 1x47 uF

Ripple





No Load
V_{PP} = 5.60 mV

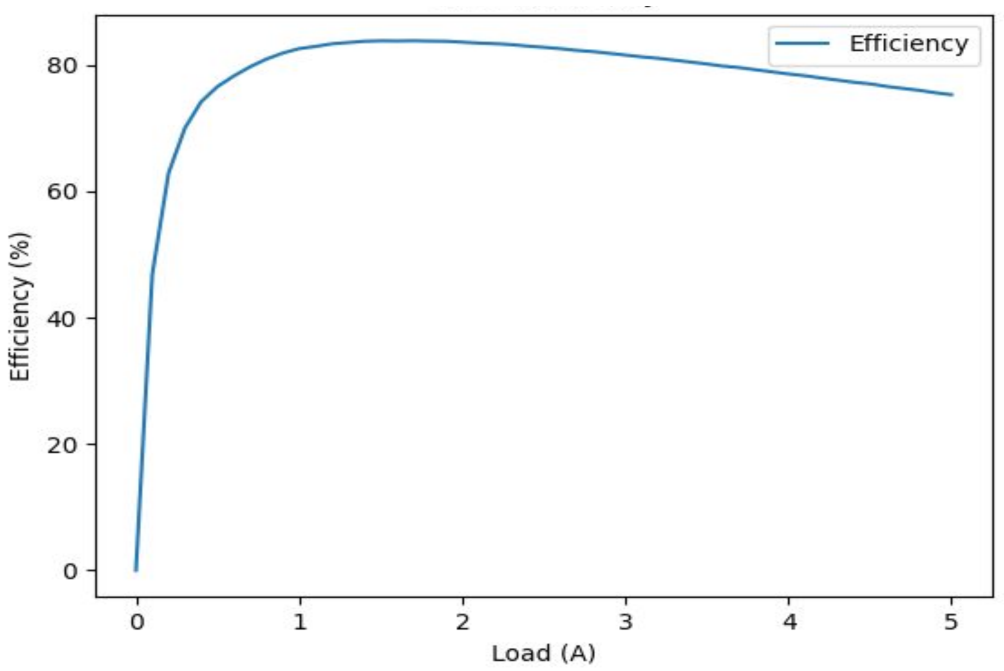
Vout = 1.5 V

4.46 A Load
V_{PP} = 8.80 mV

VCC_SOC
0.88 V / 4.72 A

- C200 (Synchronous Buck)
- Fsw = 1 MHz
- L = 0.56 µH, P/N Wurth 744393440056
- C = 9x47 uF

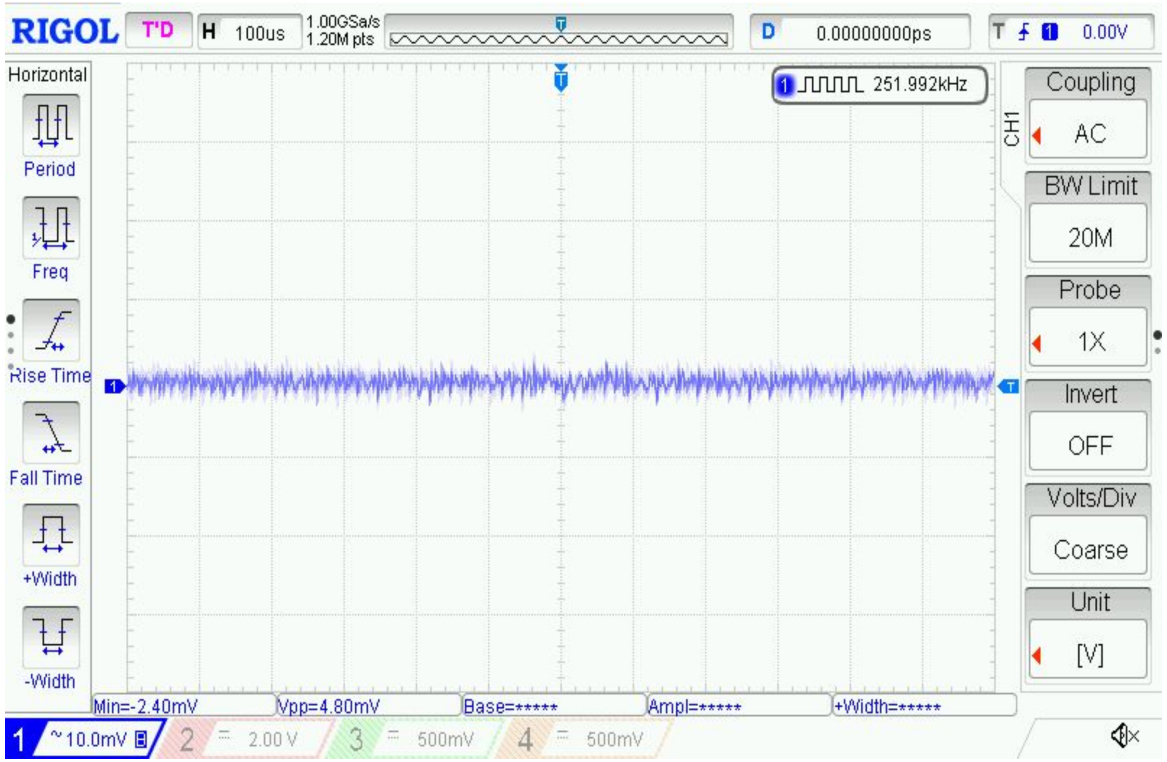
Efficiency & Transient

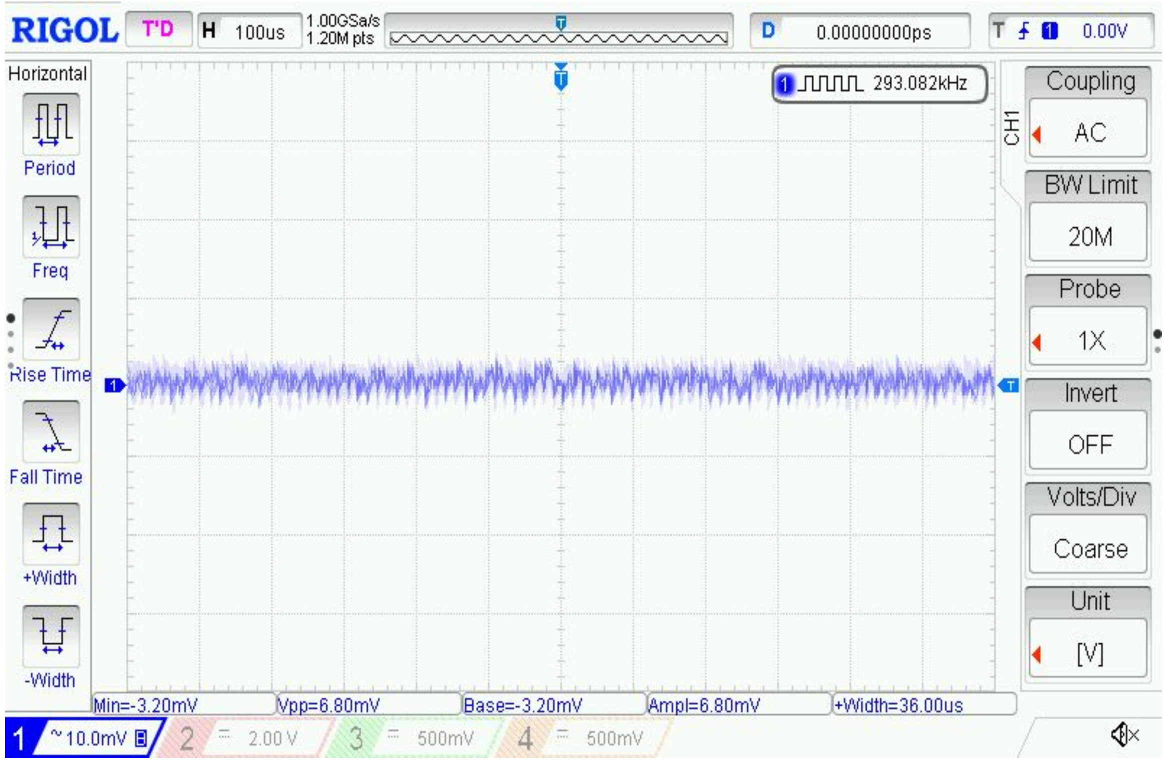


Vout = 0.88V
Transient 0.47A – 4.72A @ 10 A/µs
V_{PP} = 14.8 mV
Fsw = 1 MHz
L = 0.56 µH, C = 9x47 uF

AnDAPT

Ripple





No Load
V_{PP} = 4.80 mV

Vout = 0.88 V

4.72 A Load
V_{PP} = 6.80 mV

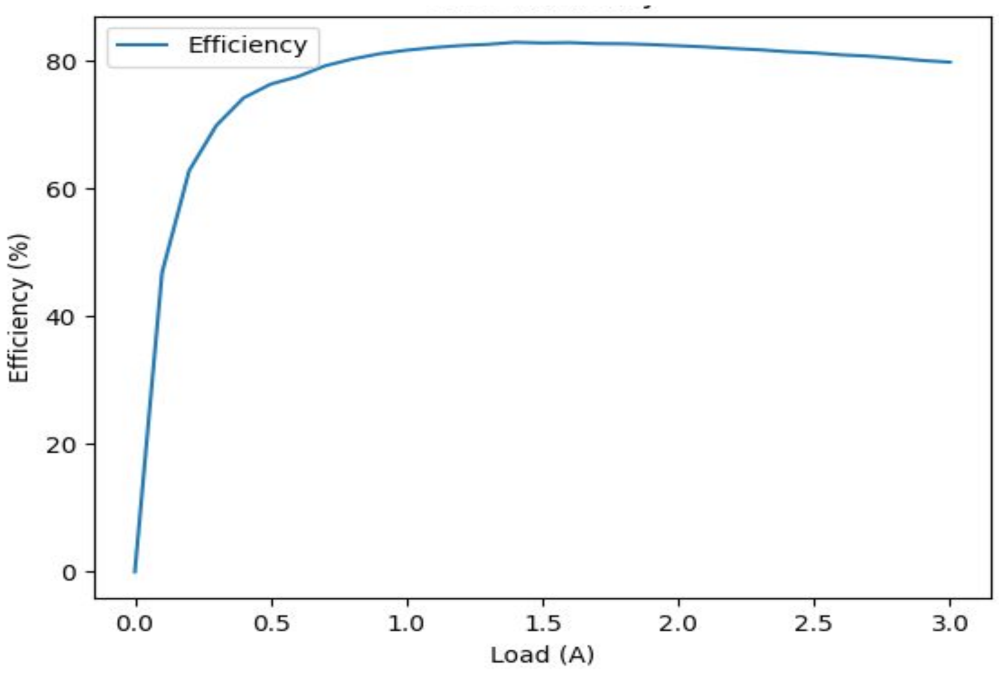
VCCAUX_PMC
1.5 V / 0.16 A

- C750 (Load Switch)

MGTYAVCC 0.88 V / 3.1 A

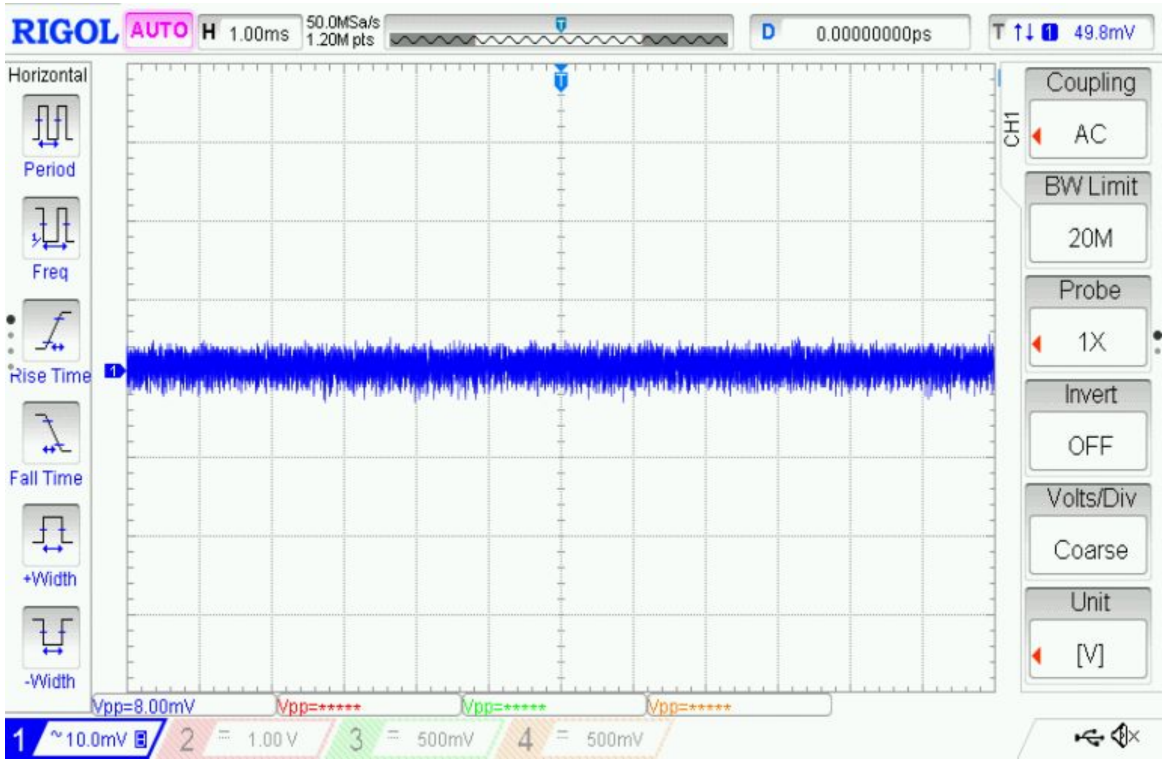
- C200 (Synchronous Buck)
- Fsw = 1 MHz
- L = 0.56 µH, P/N Wurth 744393440056
- C = 4x47 uF

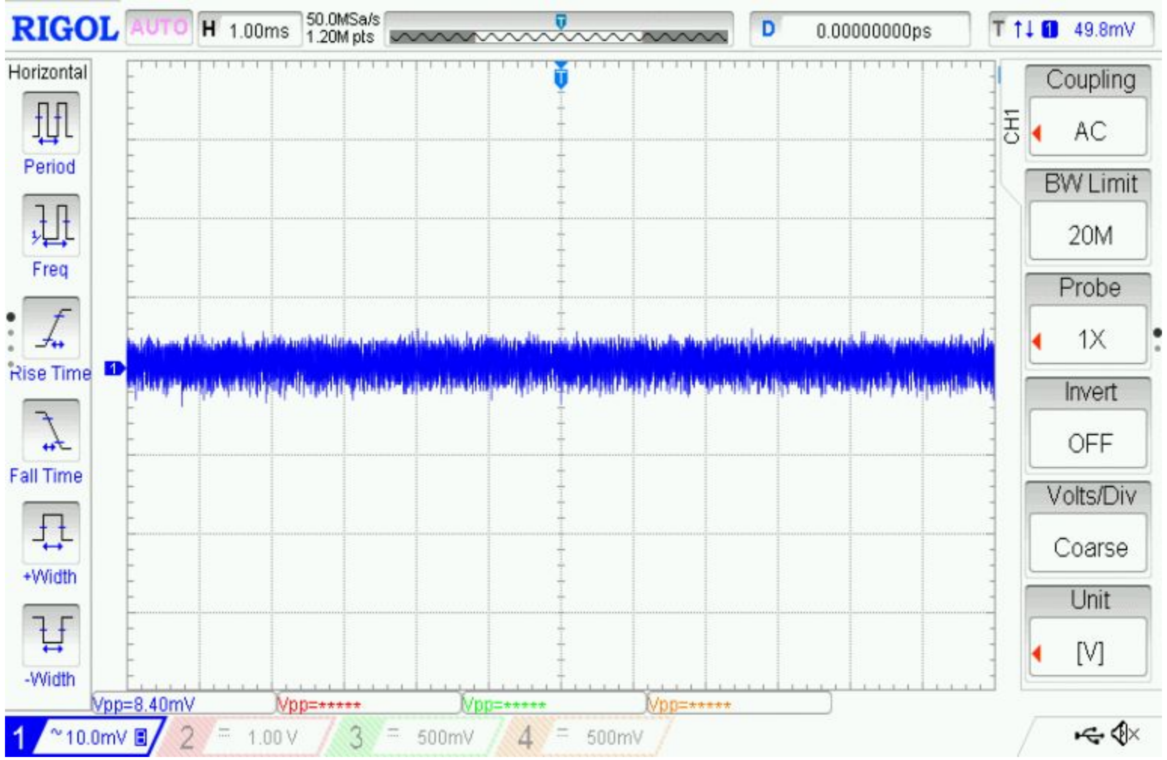
Efficiency & Transient



Vout = 0.88V
Transient 2.32A – 3.1A @ 10 A/µs
V_{PP} = 14.4 mV
Fsw = 1 MHz
L = 0.56 µH, C = 4x47 uF

Ripple





No Load
V_{PP} = 8.0 mV

Vout = 0.88 V

3.1 A Load
V_{PP} = 8.40 mV

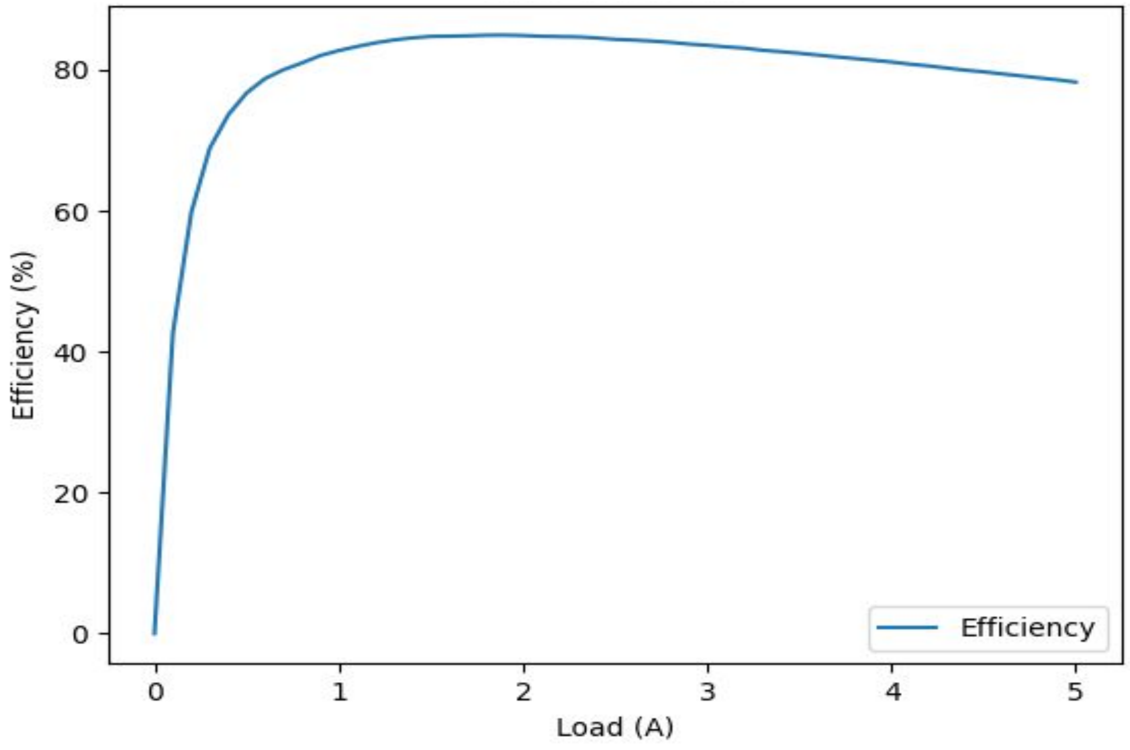
MGTYVCCAUX
1.5 V / 0.3 A

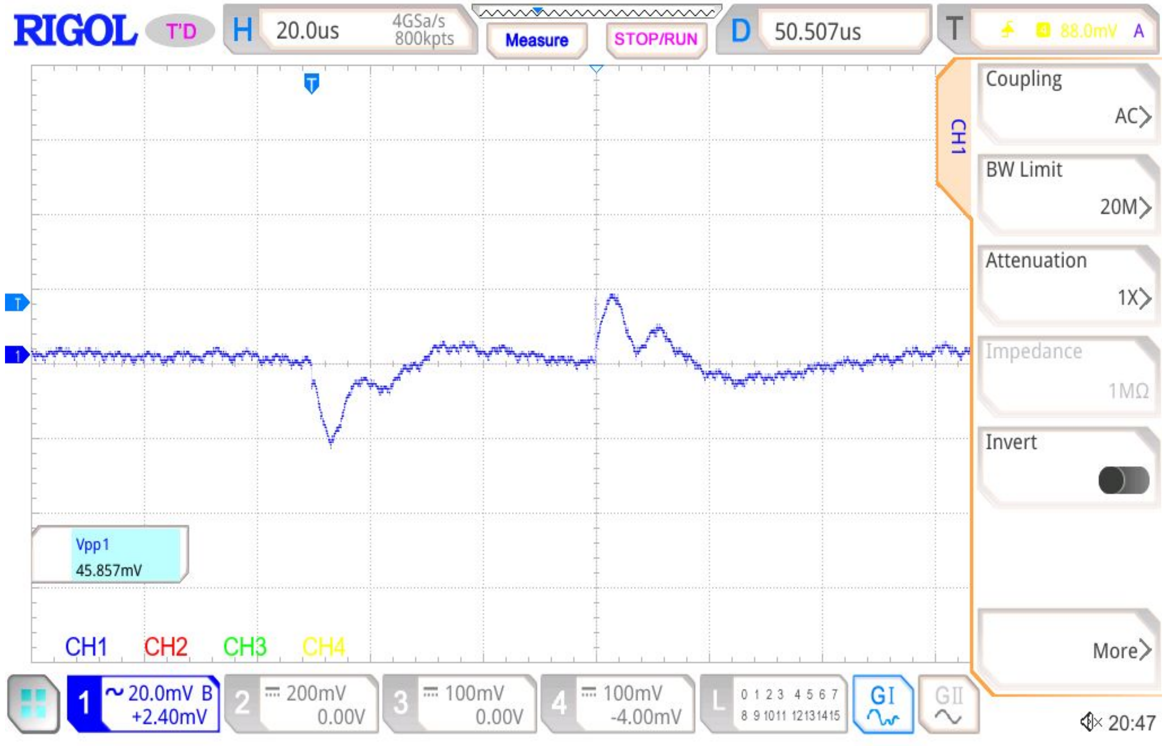
- C750 (Load Switch)

MGTYAVTT
1.2 V / 4.9 A

- C200 (Synchronous Buck)
- Fsw = 0.571 MHz
- L = 1.1 µH, P/N Wurth 744314110
- C = 4x47 uF

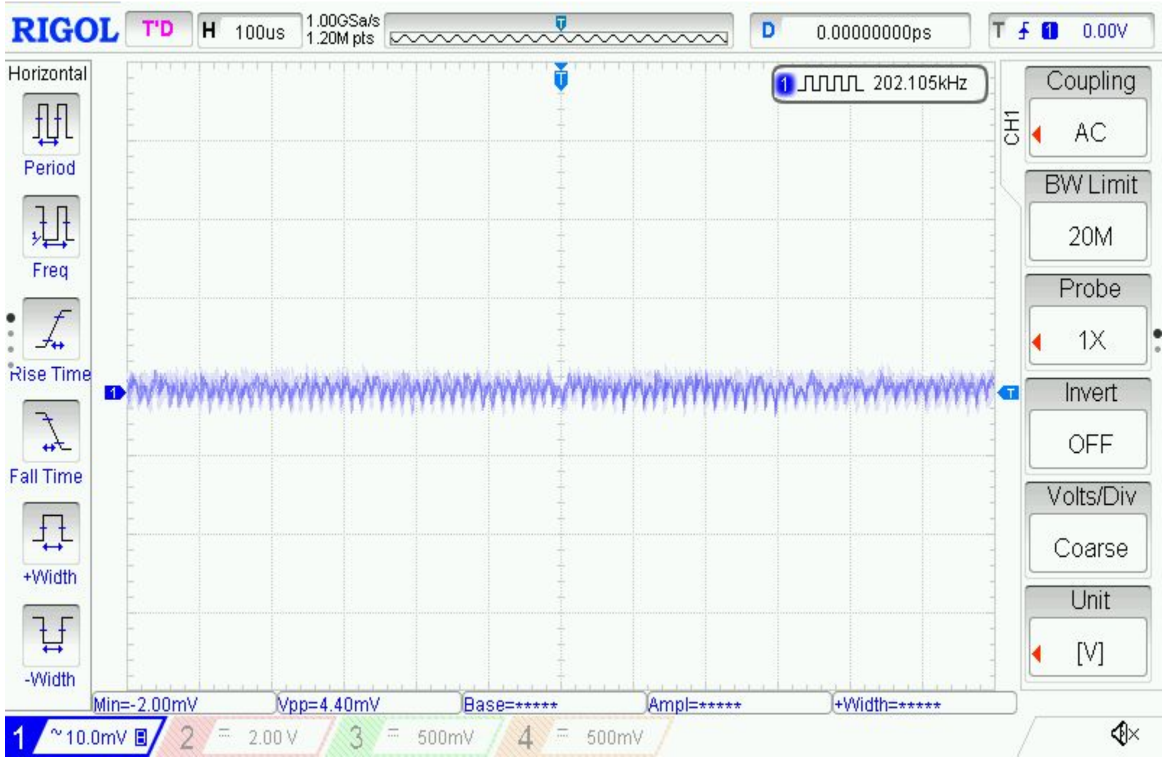
Efficiency & Transient

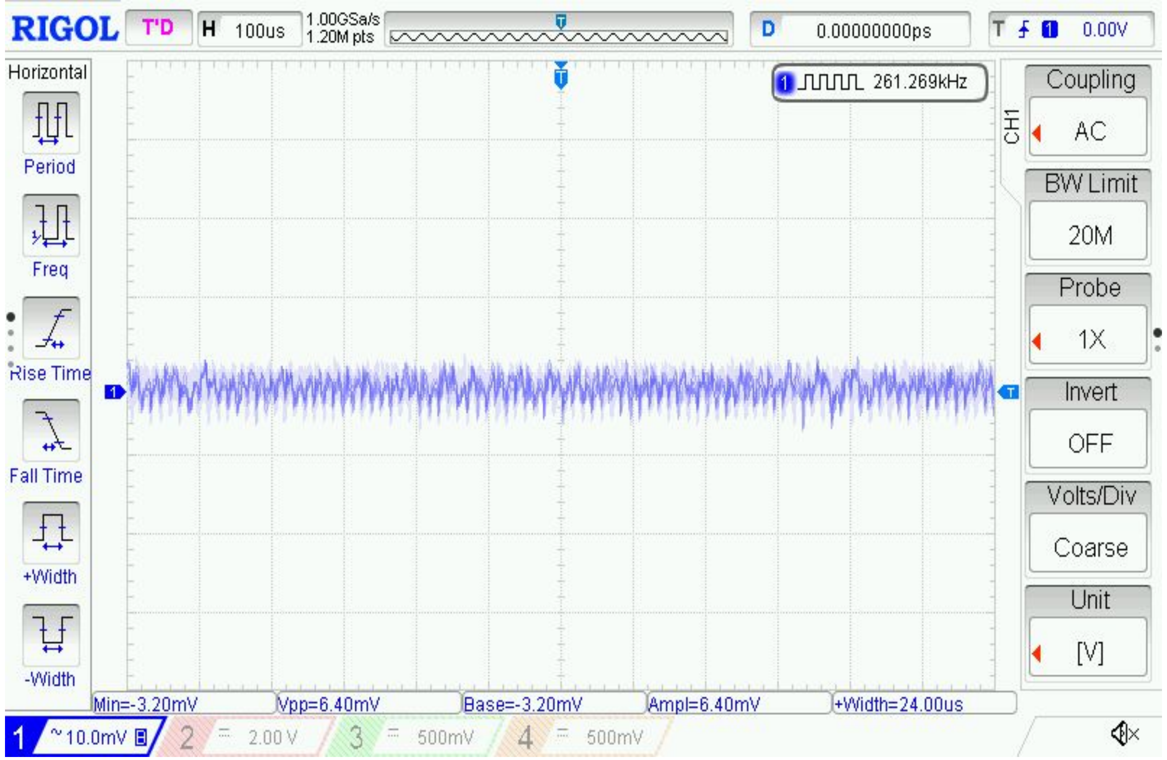




Vout = 1.2V
Transient 3.675 – 4.9A @ 10 A/µs
V_{PP} = 45.85 mV
Fsw = 0.571 MHz
L = 1.1 µH, C = 4x47 uF

Ripple





No Load
V_{PP} = 4.40 mV

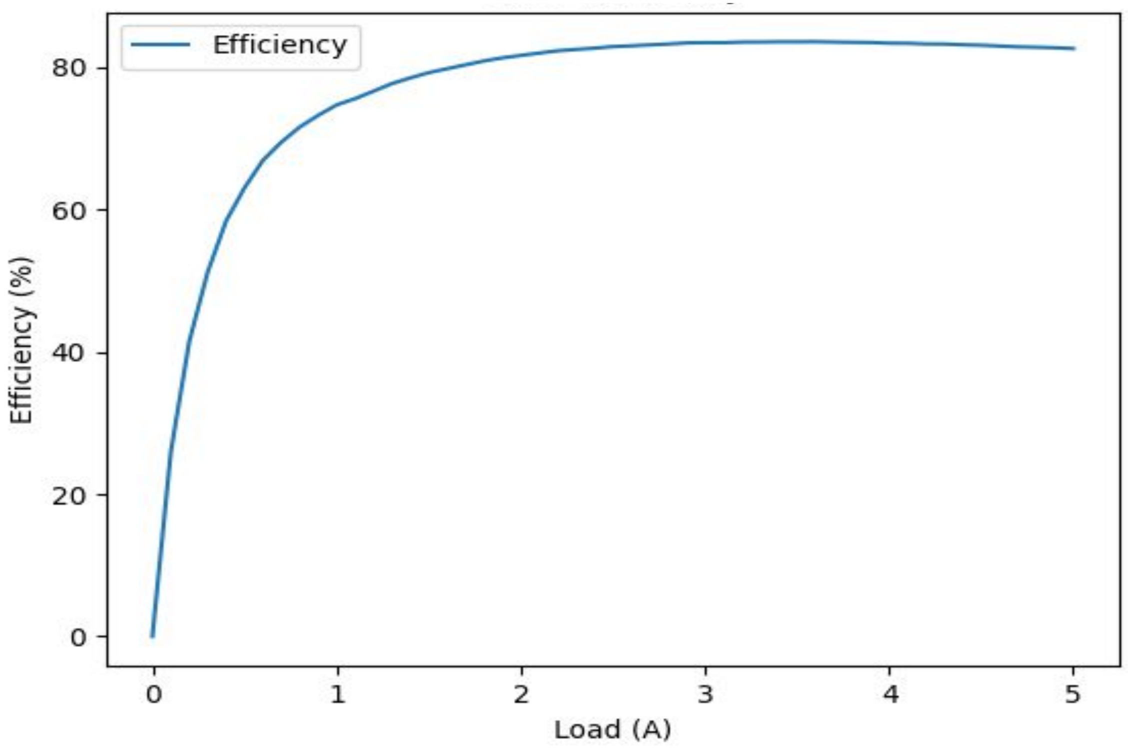
Vout = 1.2 V

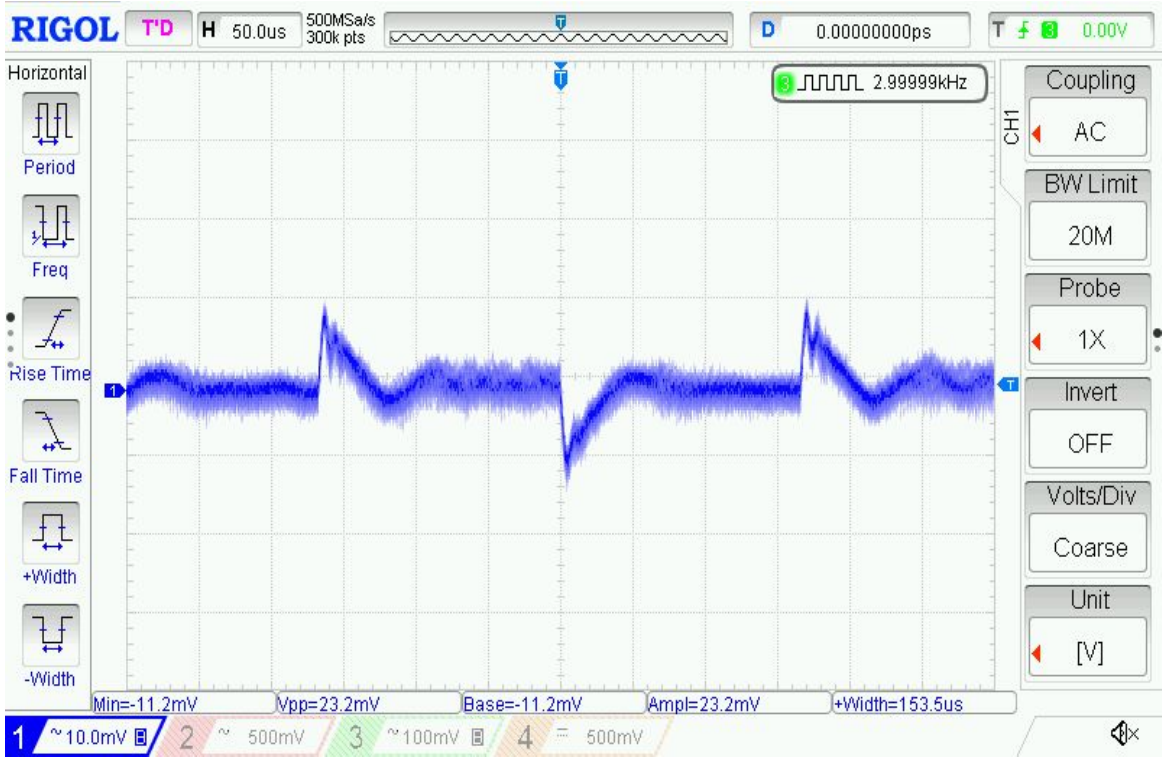
4.9 A Load
V_{PP} = 6.40 mV

VDDQ
1.2 V / 5 A

- C220 (Synchronous Buck)
- Fsw = 0.571 MHz
- L = 0.72 µH, P/N Wurth 74402500072
- C = 8x47 uF

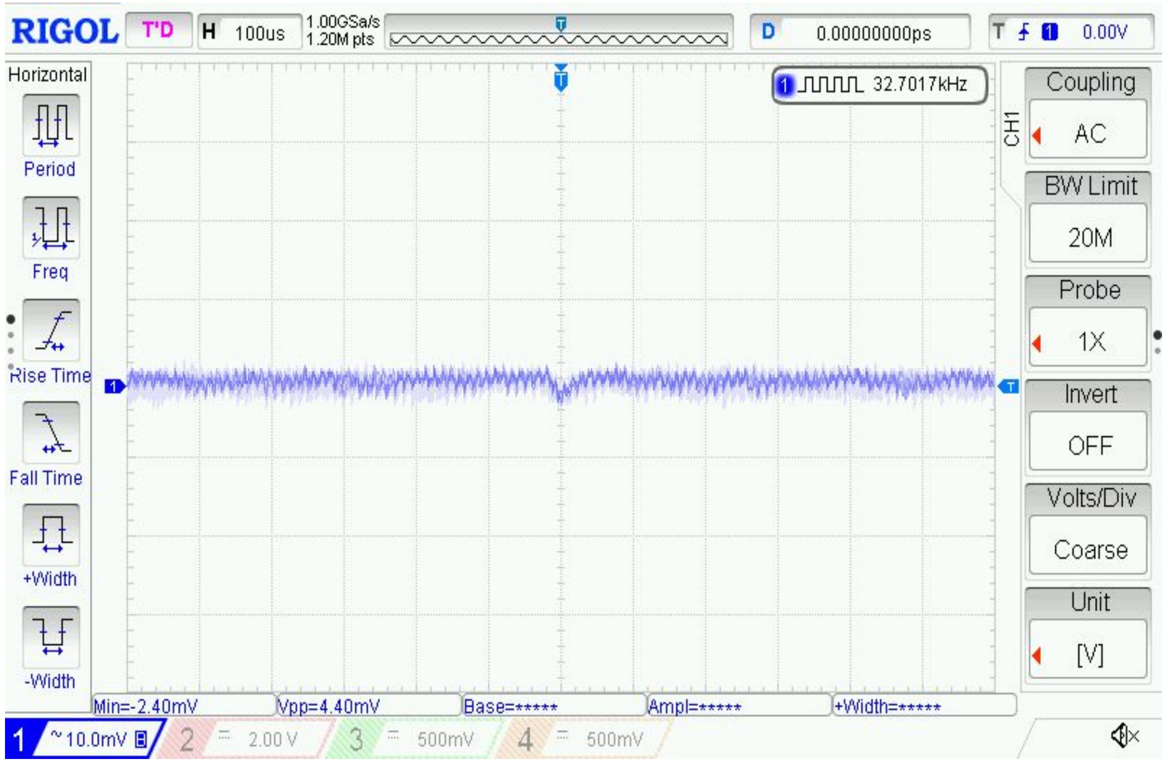
Efficiency & Transient

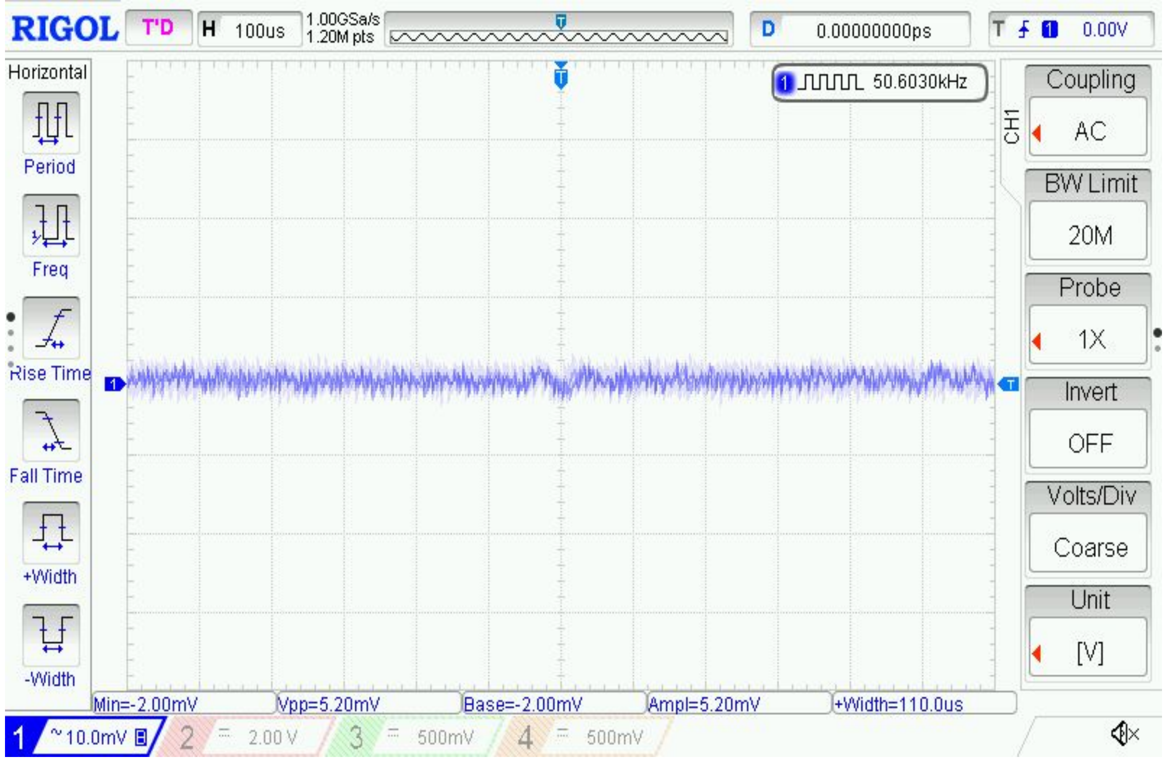




Vout = 1.2V
Transient 0.5 – 5A @ 10 A/μs
V_{PP} = 23.2 mV
Fsw = 0.571 MHz
L = 0.72 μH, C = 8x47 uF

Ripple





No Load
V_{PP} = 4.40 mV

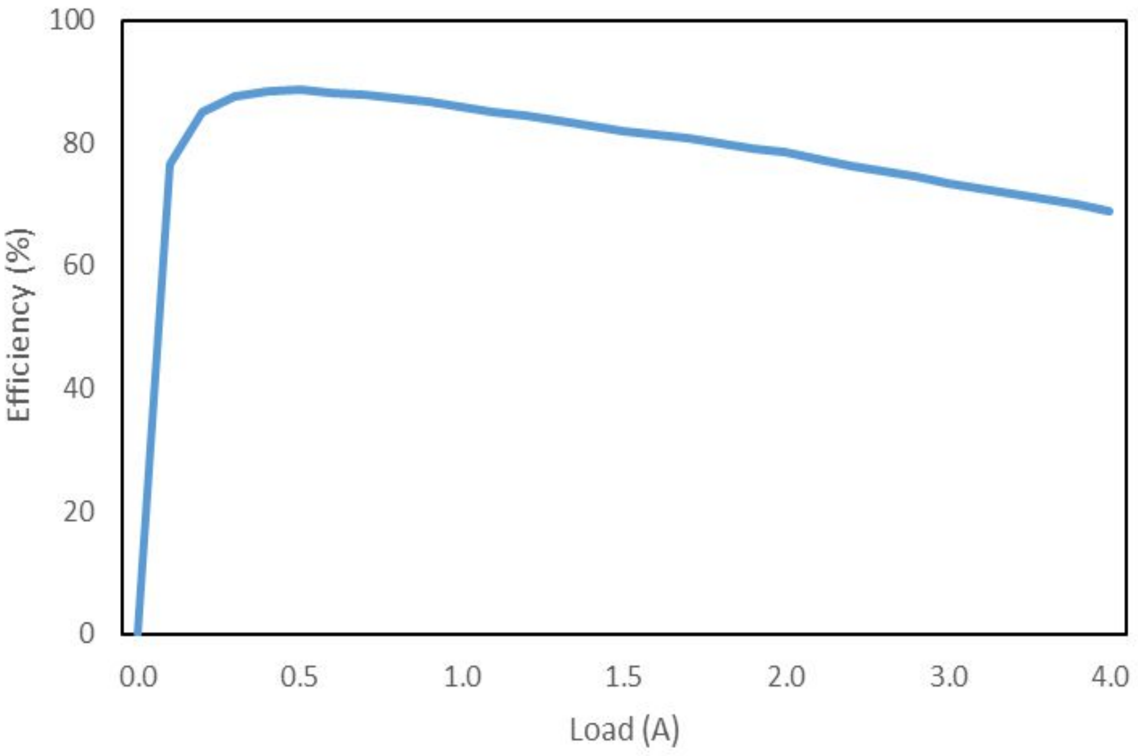
Vout = 1.2 V

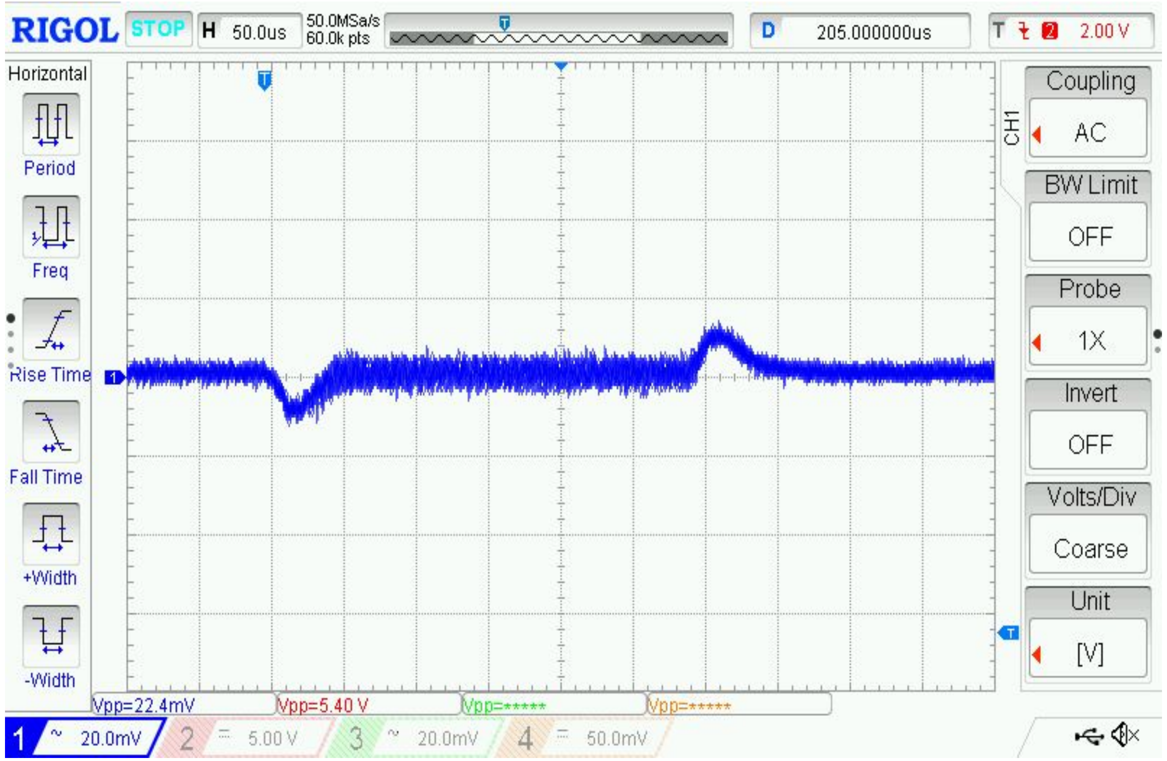
5 A Load
V_{PP} = 5.20 mV

VTT
0.6 V / 2 A

- C210 (VTT Terminator)
- Fsw = 1 MHz
- L = 0.33 µH, P/N Wurth 744393440033
- C = 8x47 uF

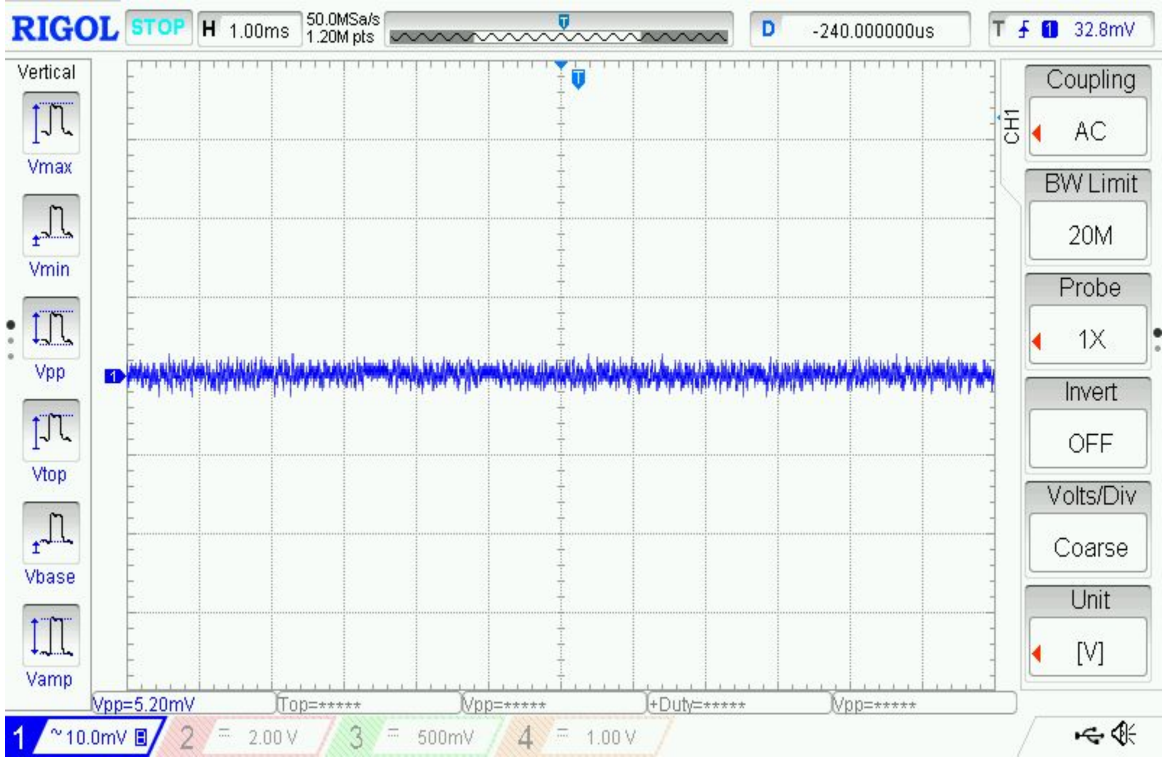
Efficiency & Transient

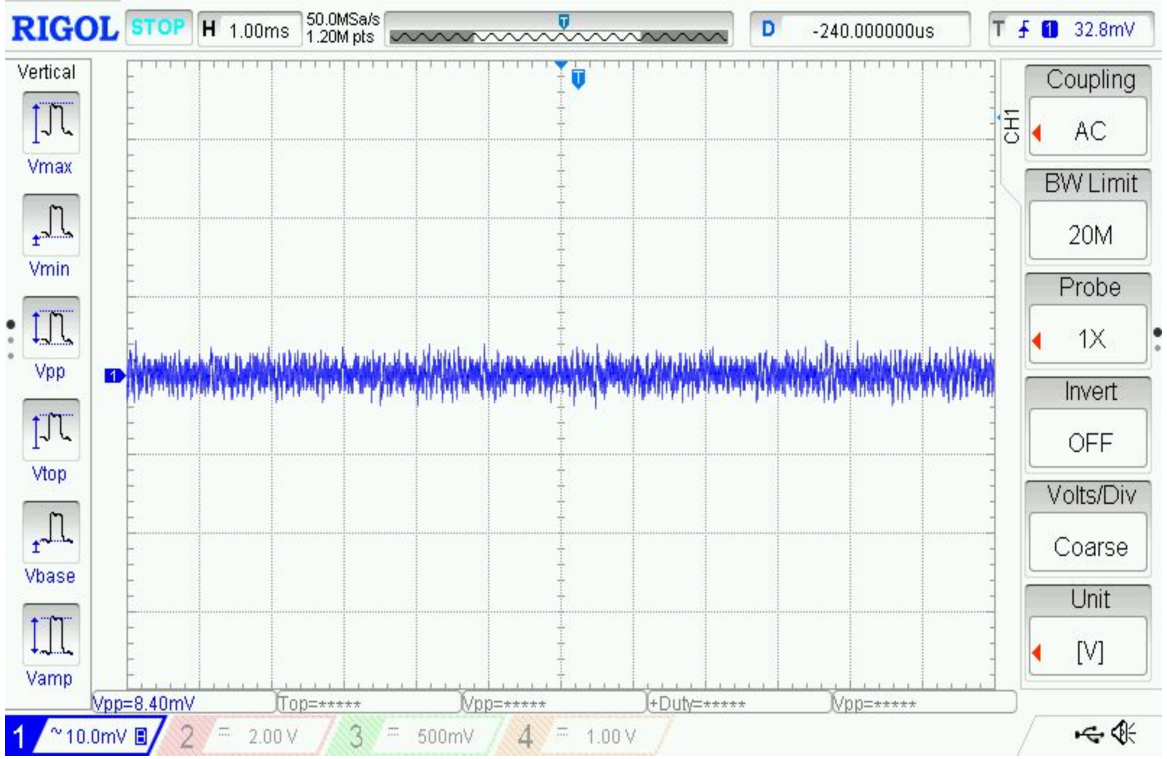




Vout = 0.6V
Transient 3 – 4A @ 10 A/μs
V_{PP} = 22.4 mV
Fsw = 1 MHz
L = 0.33 μH, C = 8x47 uF

Ripple

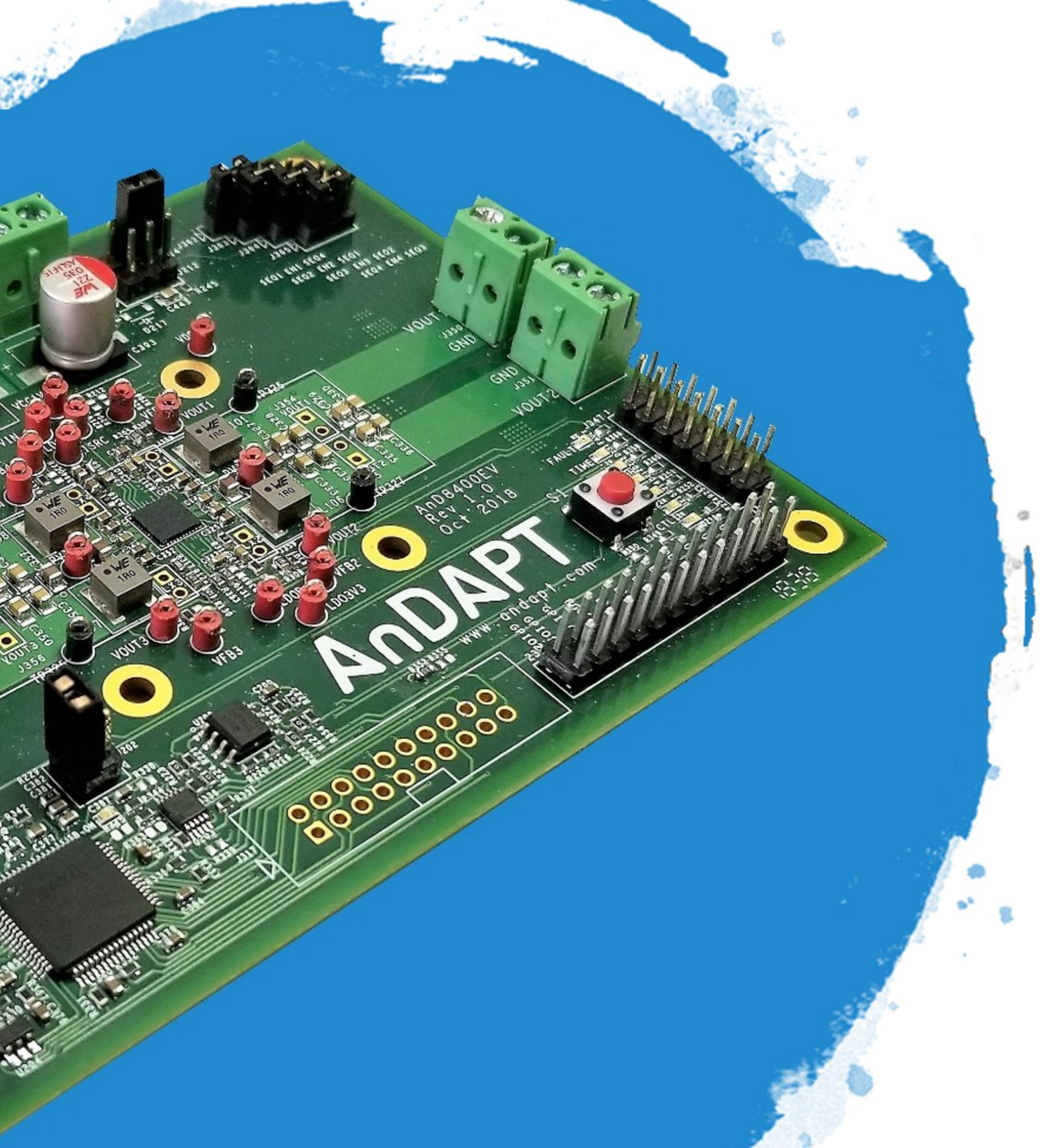




No Load
V_{PP} = 5.20 mV

Vout = 0.6 V

4 A Load
V_{PP} = 8.40 mV



Thank You