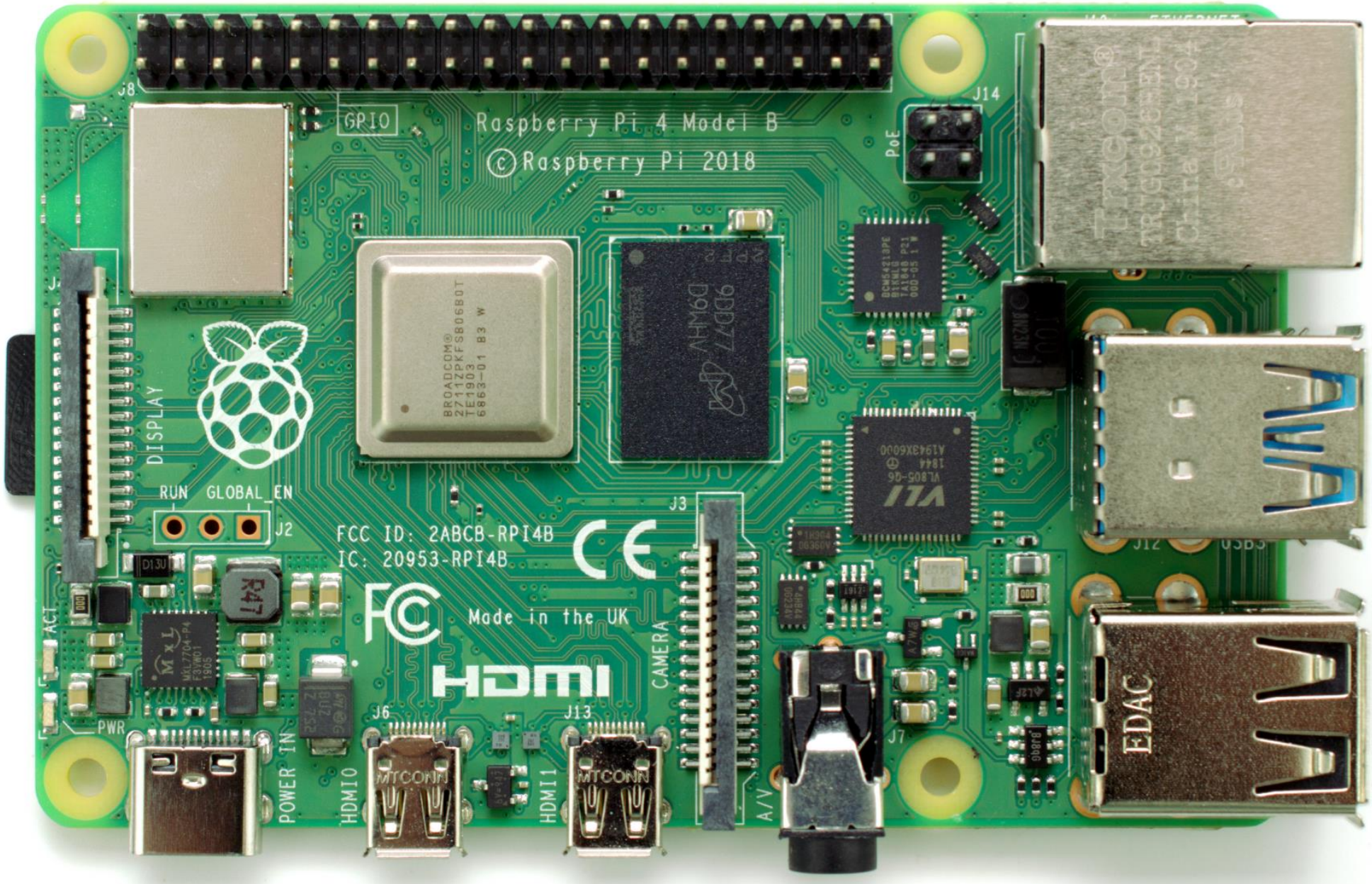
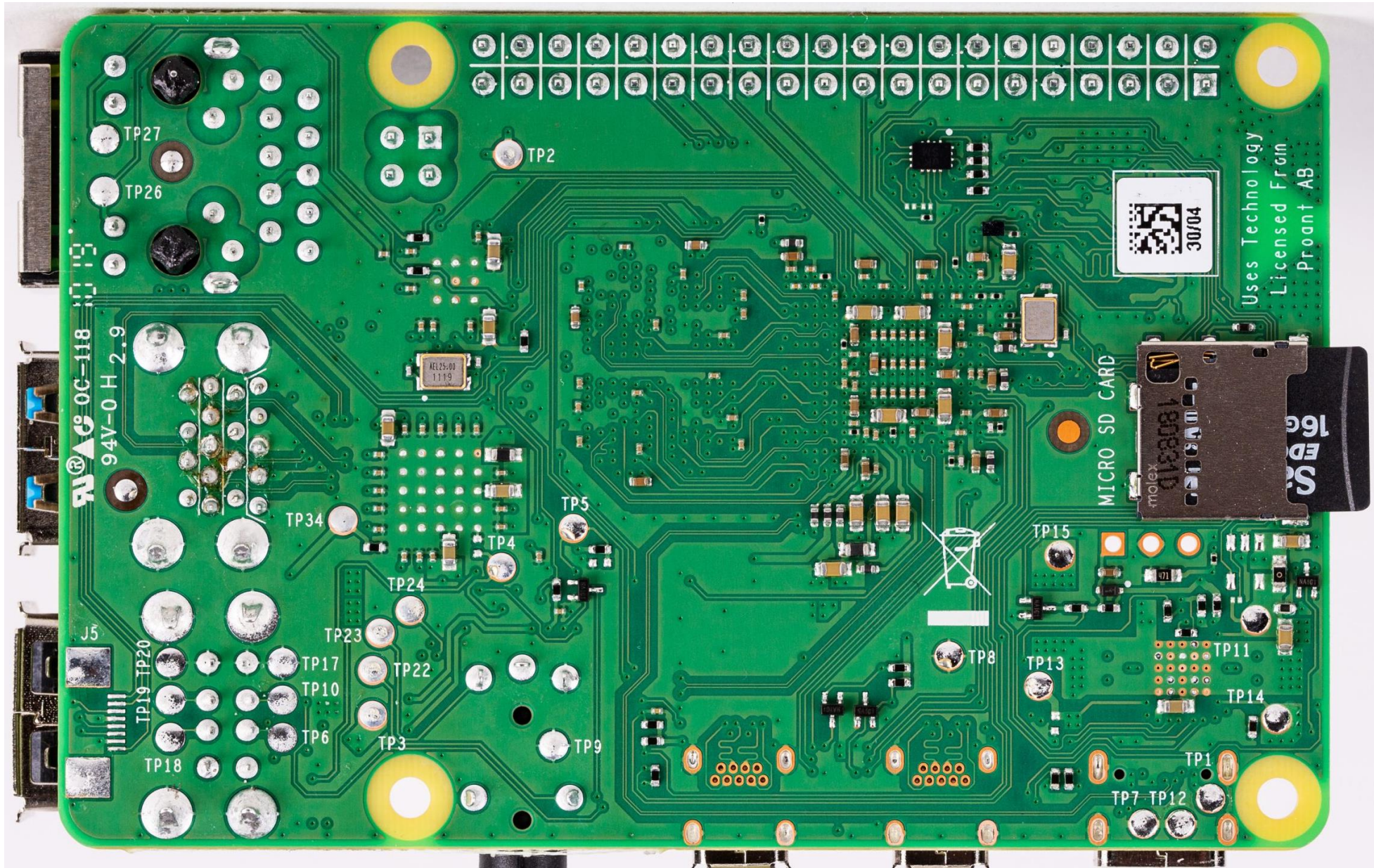
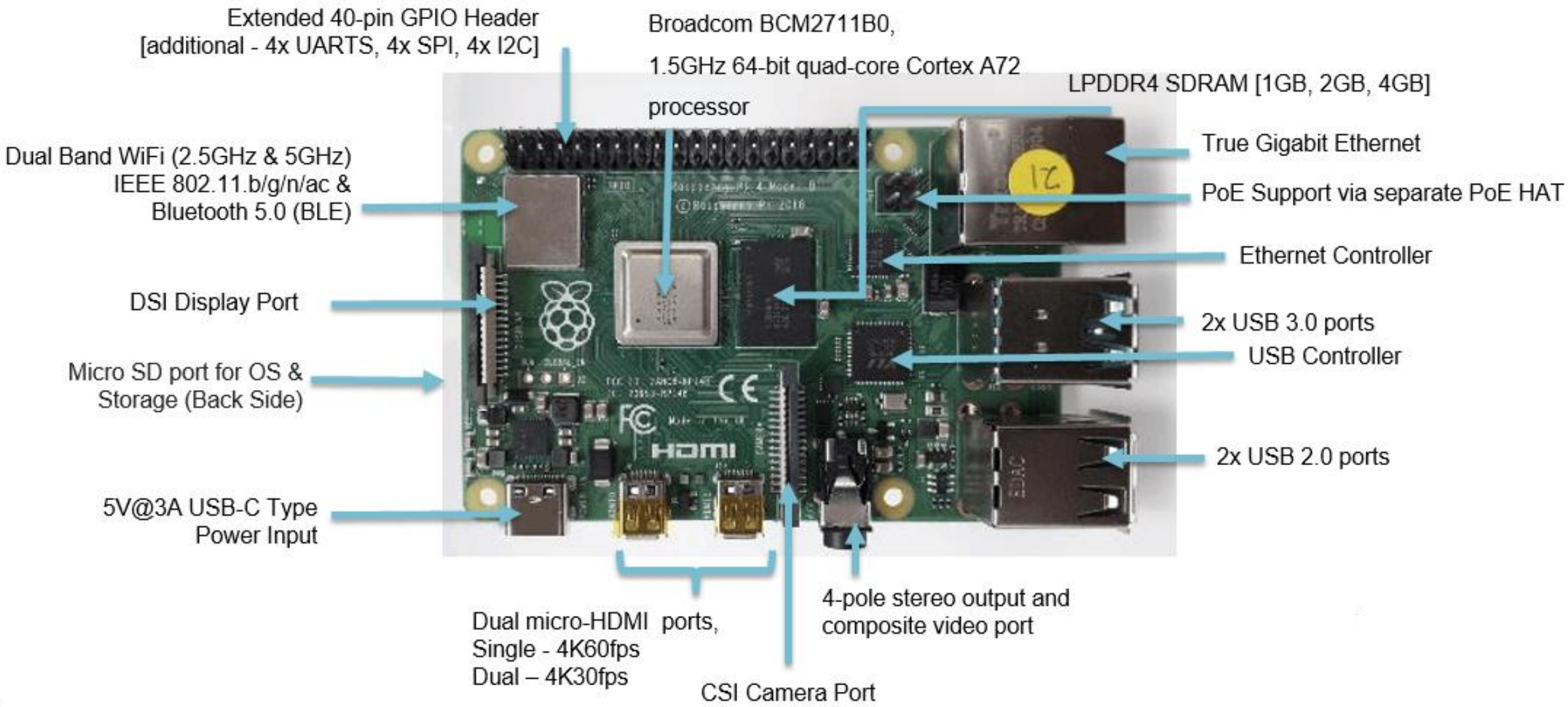
RPi Power Analysis


GPIO
Raspberry Pi 4 Model B
©Raspberry Pi 2018
J8
J14
PoE
DISPLAY
RUN
GLOBAL_EN
J2
J3
FCC ID: 2ABCB-RPI4B
IC: 20953-RPI4B
Made in the UK
HDMI
CAMERA
A/V
ACT
PWR
POWER IN
HDMI0
HDMI1
J6
J13
J7
J12
EDAC


TP27
TP26
TP2
TP34
TP5
TP4
TP24
TP23
TP17
TP22
TP10
TP6
TP3
TP9
TP18
TP19
TP20
J5
TP8
TP15
TP13
TP11
TP14
TP1
TP7
TP12
MICRO SD CARD
Uses Technology
Licensed From
Proant AB
30/04
94V-0 H 2.9


Extended 40-pin GPIO Header
[additional - 4x UARTS, 4x SPI, 4x I2C]
Broadcom BCM2711B0,
1.5GHz 64-bit quad-core Cortex A72
processor
LPDDR4 SDRAM [1GB, 2GB, 4GB]
Dual Band WiFi (2.5GHz & 5GHz)
IEEE 802.11.b/g/n/ac &
Bluetooth 5.0 (BLE)
True Gigabit Ethernet
PoE Support via separate PoE HAT
Ethernet Controller
DSI Display Port
2x USB 3.0 ports
USB Controller
Micro SD port for OS &
Storage (Back Side)
2x USB 2.0 ports
5V@3A USB-C Type
Power Input
Dual micro-HDMI ports,
Single - 4K60fps
Dual – 4K30fps
4-pole stereo output and
composite video port
CSI Camera Port

Thermal Analysis

- https://www.hackster.io/news/raspberry-pi-4-firmware-updates-tested-a-deep-dive-into-thermal-performance-and-optimization-2f22c78e7089
- What code to run to load the processor?

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Raspberry Pi 4 Firmware Updates Tested: A Deep Dive Into Thermal Performance and Optimization

The Raspberry Pi 4 was a hot property at launch — literally — but have a series of firmware updates made a measurable difference?

Gareth Halfacree Follow

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The Raspberry Pi 4 Model B. (📷: Gareth Halfacree)

15

The Raspberry Pi 4 launched earlier this year to critical acclaim, thanks to upgrades including but not limited to a more powerful processor, the first new graphics processor in Raspberry Pi history, true gigabit Ethernet connectivity, and PCI Express-connected USB 3.0 ports. It also drew some criticism for its

Ad

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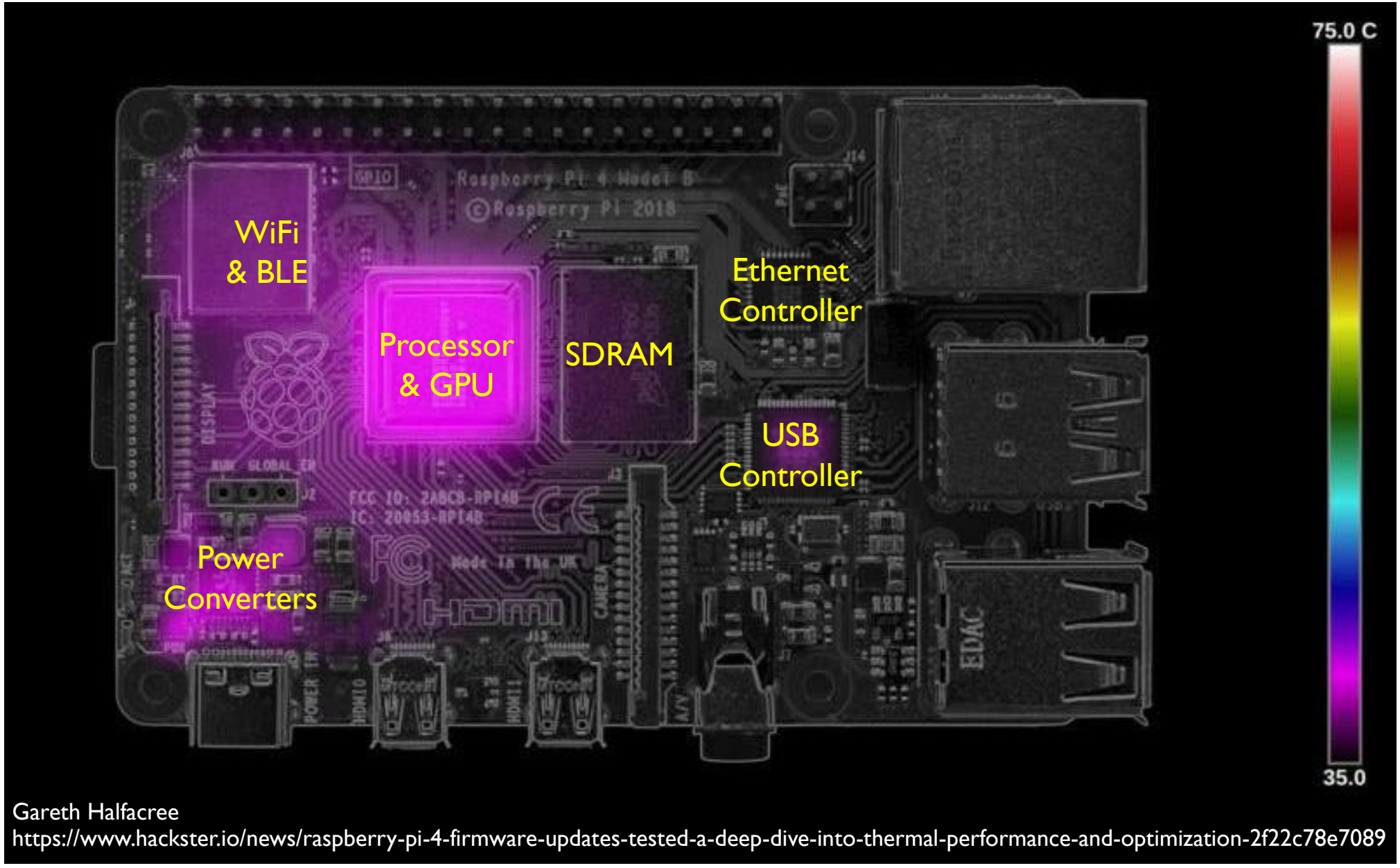
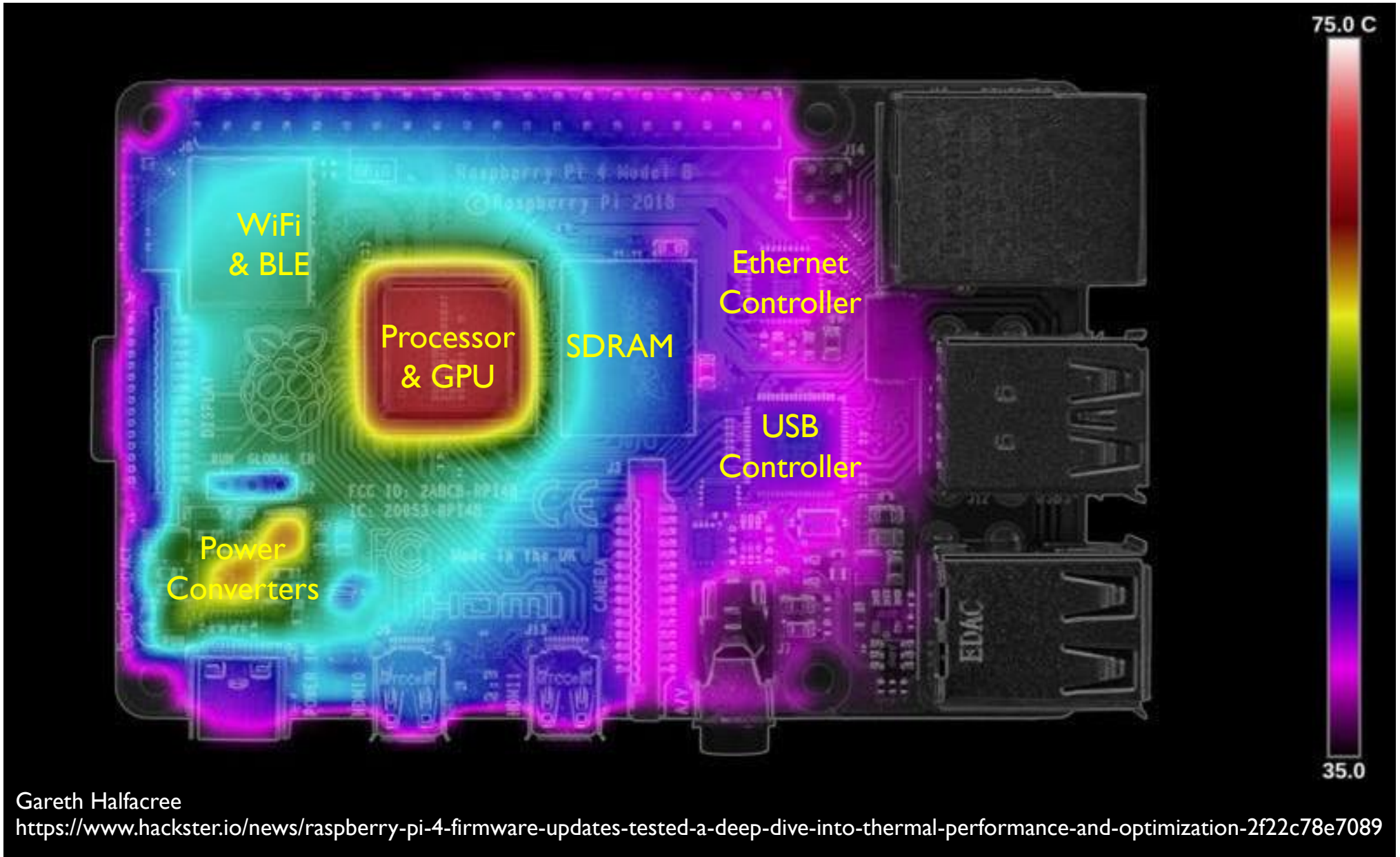
Idle



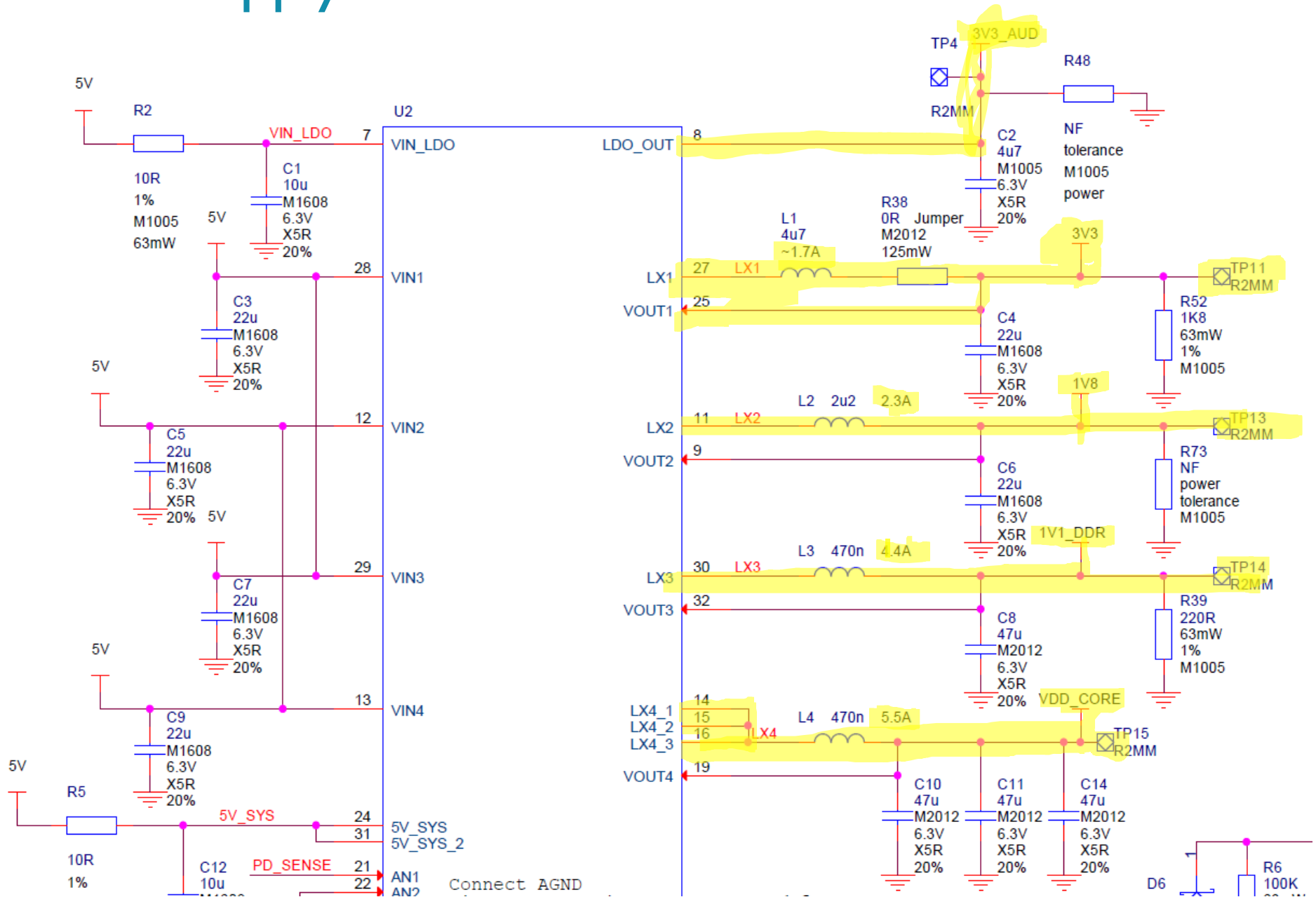
Gareth Halfacree
https://www.hackster.io/news/raspberry-pi-4-firmware-updates-tested-a-deep-dive-into-thermal-performance-and-optimization-2f22c78e7089

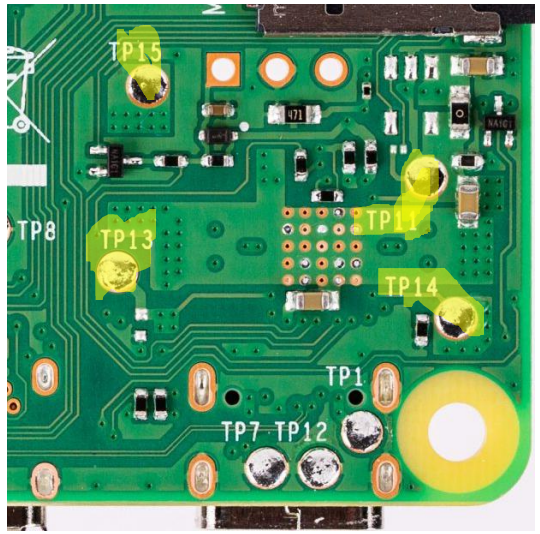
Loaded



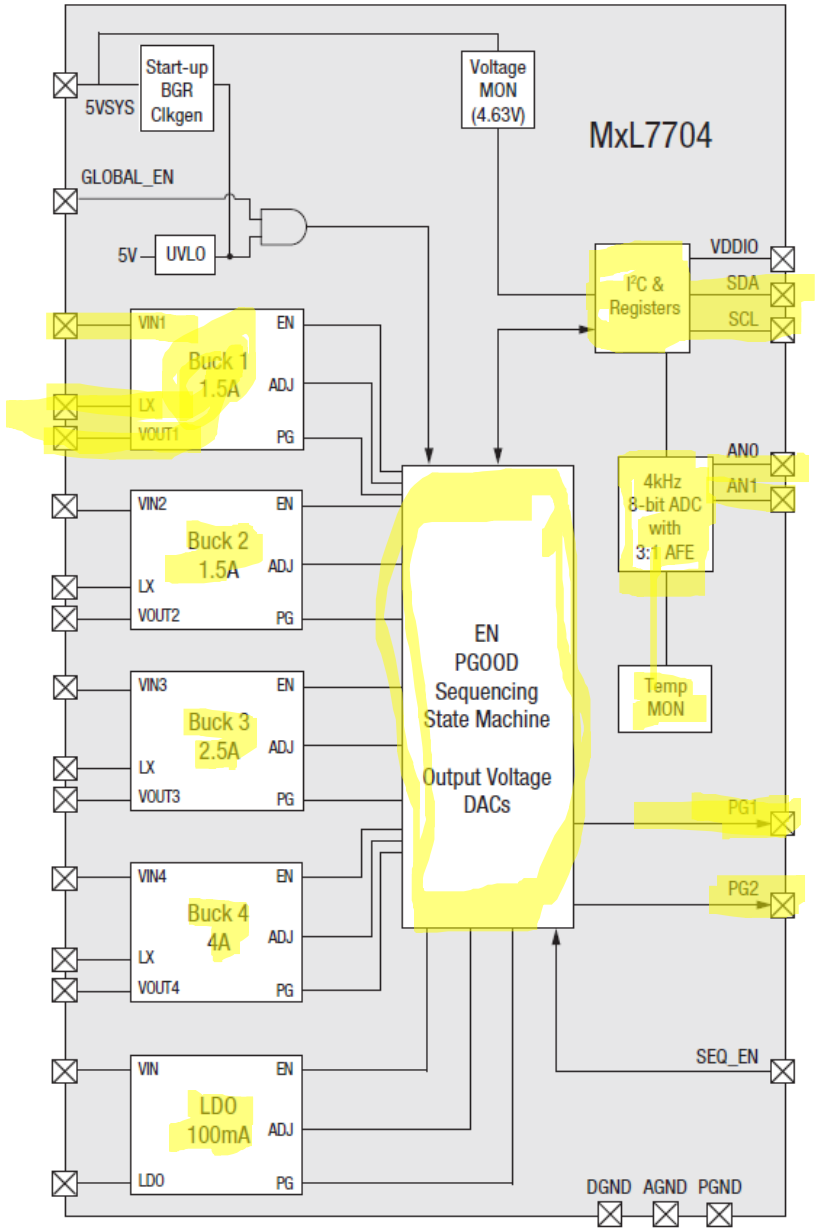
Gareth Halfacree
https://www.hackster.io/news/raspberry-pi-4-firmware-updates-tested-a-deep-dive-into-thermal-performance-and-optimization-2f22c78e7089

Power Supply





MxL7704 Power Management IC (PMIC)



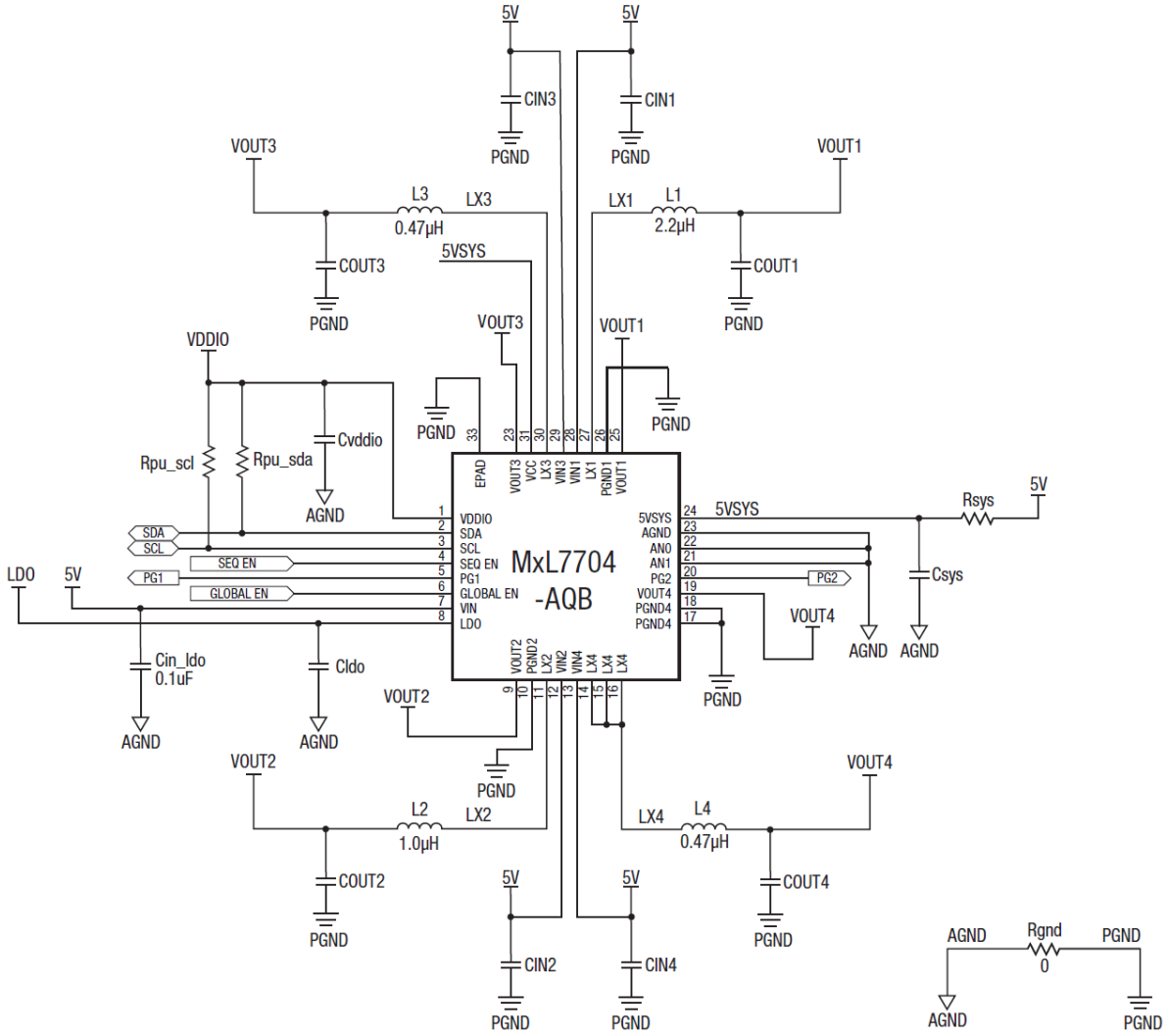
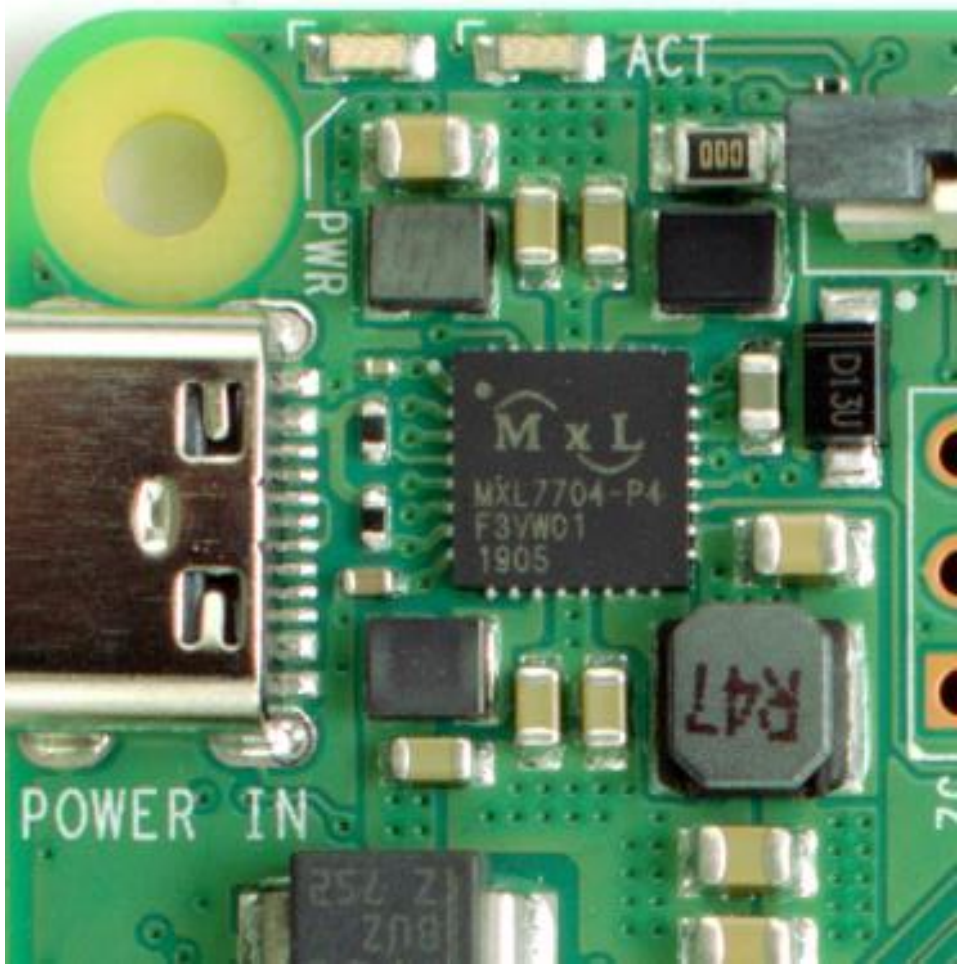
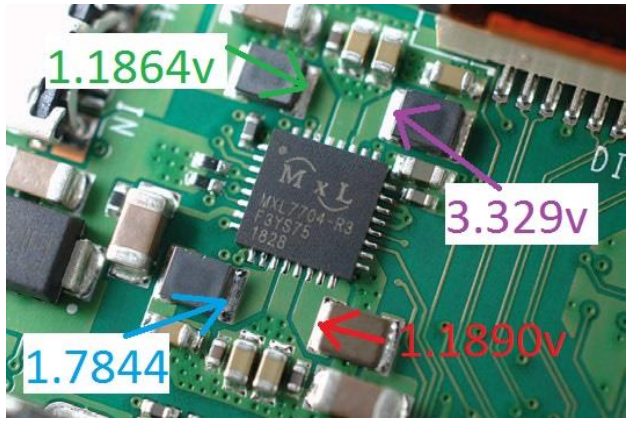


Figure 24: MxL7704-AQB Typical Application

Power Supply Rails and Voltages





PMIC Control Registers

Device	7-Bit Address
MxL7704	0x2D

Table 9: Register Map

Address	Register	R/W	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0x00	Revision ID	R	Revision ID (7:0)							
0x01	ADC Enable	R/W								ADC EN
0x02	Phase Interleaving	R/W(1)	Buck 4[1:0]		Buck 3[1:0]		Buck 2[1:0]		Buck 1[1:0]	
0x10	Vout LDO	R/W	VLDO[7:0]							
0x11	Vout Buck 1	R/W	VBuck1[7:0]							
0x12	Vout Buck 2	R/W	VBuck2[7:0]							
0x13	Vout Buck 3	R/W	VBuck3[7:0]							
0x14	Vout Buck 4	R/W	VBuck4[7:0]							
0x15	Buck Sequence Group Assignment	R/W	Buck 4[1:0]		Buck 3[1:0]		Buck 2[1:0]		Buck 1[1:0]	
0x16	LDO Sequence Group Assignment and Channel Enables	R/W	LDO[1:0]			EN4	EN3	EN2	EN1	ENL
0x17	SEQ EN Assign and PG1 Routing	R/W	EN Assign			Buck 4	Buck 3	Buck 2	Buck 1	LDO
0x18	PG2 Routing	R/W				Buck 4	Buck 3	Buck 2	Buck 1	LDO
0x19	Fault Actions, Down Sequencing, Frequency	R/W	Chip/ Channel	Soft Off EN	78Ω discharge		FREQ[3:0](1)			
0x1A	PGOOD and UV	R	TWARN 105C	UV Flag	UV Current	PG Buck4	PG Buck3	PG Buck2	PG Buck1	PG LDO
0x1B	Temp	R	Temp[7:0]							
0x1C	ADC0	R	ADC1[7:0]							
0x1D	ADC1	R	ADC2[7:0]							

NOTE:
1. Must not be written dynamically.

Table 10: Default Values

Address	Register	Default Value -AQB	Default Value -XQB
0x00	Revision ID	0xA0	
0x01	ADC Enable	0x01	
0x02	Phase Interleaving	0xE4	
0x10	Vout LDO	0xA5 3.3V	0xA5 3.3V
0x11	Vout Buck 1	0xA5 3.3V	0xA5 3.3V
0x12	Vout Buck 2	0x5A 1.8V	0x5A 1.8V
0x13	Vout Buck 3	0xD8 1.35V	0xD8 1.35V
0x14	Vout Buck 4	0xC0 1.20V	0x88 0.85V
0x15	Buck Sequence Group Assignment	0xF9	0x3B
0x16	LDO Sequence Group Assignment and Channel Enables	0x1F	0xDF
0x17	SEQ EN Assign and PG1 Routing	0x44	0x40
0x18	PG2 Routing	0x1A	0x1E
0x19	Fault Actions, Down Sequencing, Frequency	0xE9	0xE4
0x1A	PGOOD and UV	0x7F	0x7F

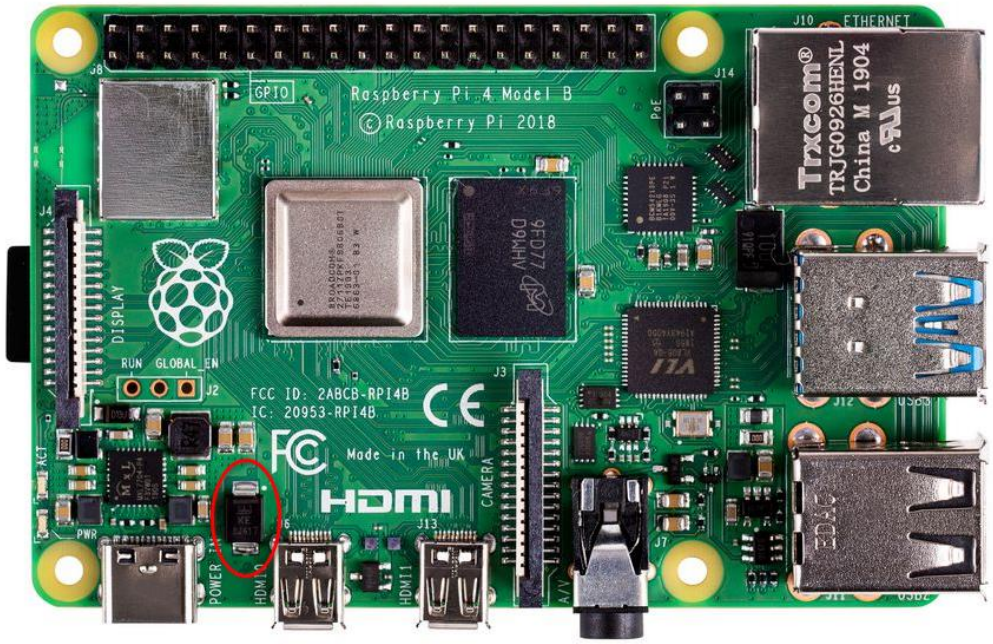
PMIC Replacement and Repair

RaspberryPi 4 MXL7704-R4 PMIC replacement and repair

Thu Jul 01, 2021 12:15 pm

Hi All!

Recently I had little problem with my RPi 4B board. I was working on some project and left my RPi connected to my lab bench power supply for half an hour. When I came back, I saw OCP (over current protection) on my power supply is activated and rPi is taking ca. 2A @ 1V. I turned off everything quickly and measured 5V line on my Pi. It turned out that there is short circuit on 5V rail. Other rails like 3.3V an 1.8V was ok. Propably, voltage that was set on my PS was to high (5.2V). First, I desoldered 5.1V zener diode here:



Nefarious19

Posts: 1

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