THOMAS MORE

Overview of power consumption measurements

Done by Thomas More for the WiSleep project

2023 - 2024

Powerconsumption measurements

1. Table overview of power consumption

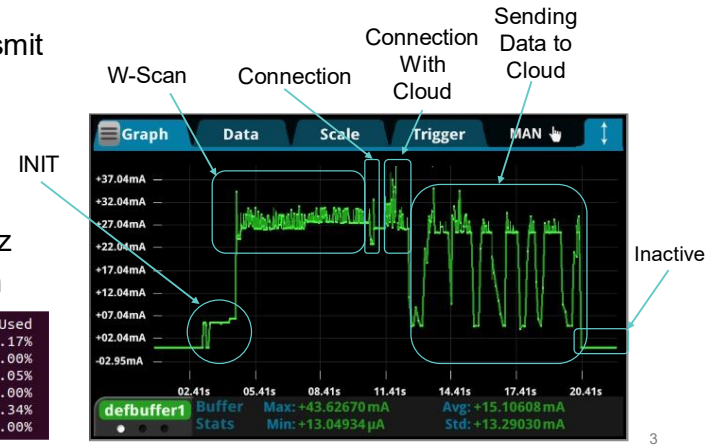
Technology	Deep sleep consumption	Transmit consumption
HaLoW MM6108 only frontend	20µA	25mA
HaLoW NRC7292	554µA	100mA
HaLoW NRC7394	57µA	43mA
BLE specialized button	2µA	8mA
Wifi 2.4GHz specialized button	7µA	80mA
Zigbee specialized button	2µA	4mA
NB-IoT	9µA	200mA
ESP32 wifi	205µA	63mA
ESP32 ESP NOW	205µA	83mA

2. Raw Data

MQTT MorseMicro

- Example current consumption (Mμ frontend only)
  - 5mA Init & Active
  - 25mA Scan, Connect, Transmit
  - 45mA Max peak
  - 20uA Inactive
- STM32 (example appl. proc.)
  - L: 40uA sleep, 4mA@8MHz
  - H: 5uA sleep, 500uA@8MHz
- Memory footprint: 780kB Flash

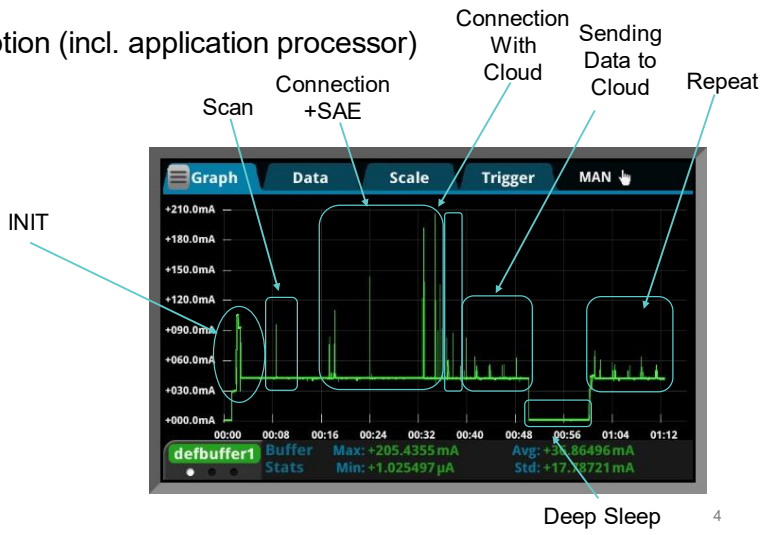
Memory region	Used Size	Region Size	%age Used
RAM:	157624 B	192 KB	80.17%
CCMRAM:	0 GB	64 KB	0.00%
LOADER:	8 B	16 KB	0.05%
CONFIG:	0 GB	32 KB	0.00%
FLASH:	797556 B	1488 KB	52.34%
FILESYSTEM:	0 GB	512 KB	0.00%



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MQTT NewRacom

- Example current consumption (incl. application processor)
  - 20mA Boot
  - 90mA Init
  - 40mA Active
  - 140mA Connection
  - 100mA MQTT
- 813kB Flash
- GPIO config important



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NEW SDK NewRacom

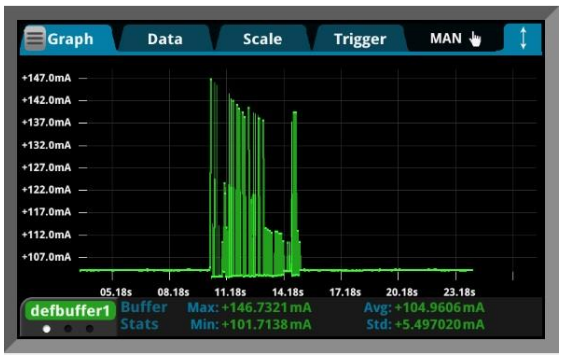
- Sleep mode previous SDK: ~800uA
- Sleep mode latest SDK: ~554uA
- 30% decrease
- Still too high



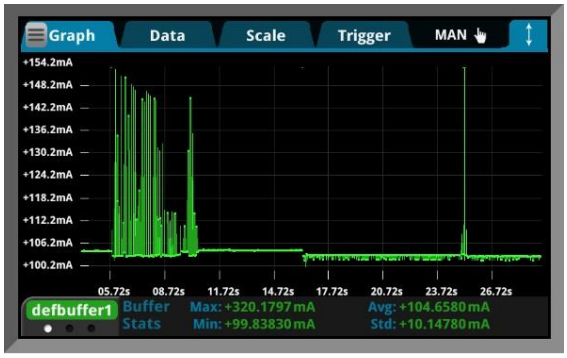
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NEW SDK Newracom

- W-Scan



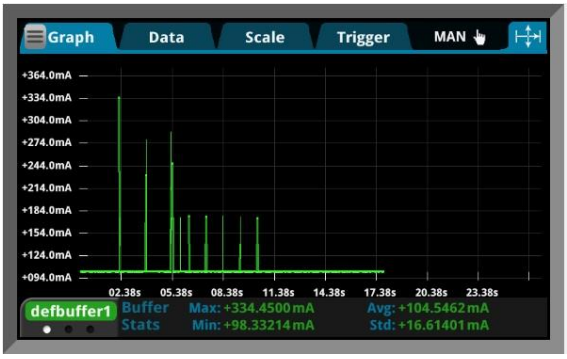
- Connect



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NEW SDK Newracom

- DHCP



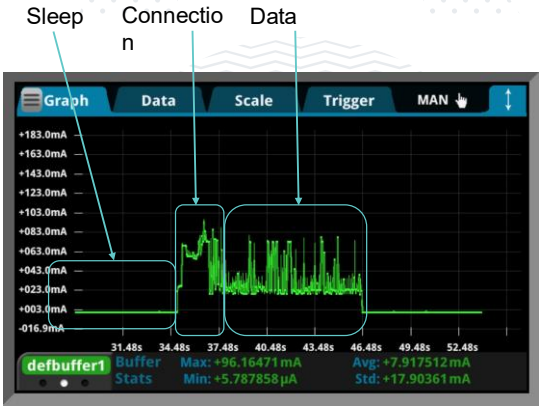
- PING



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Power consumption WIFI

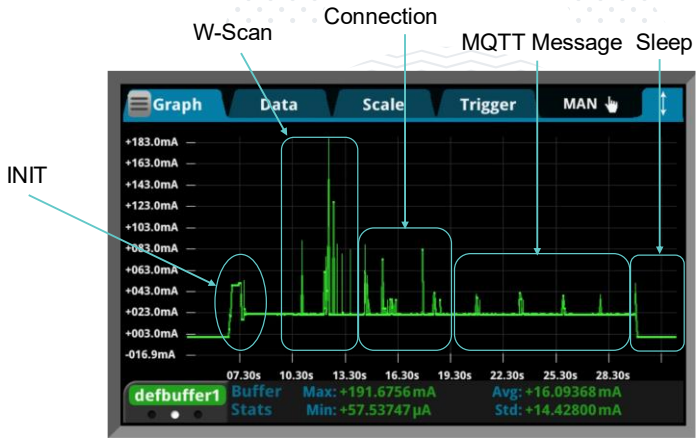
- Wifi Push Button
  - 1 push
  - Deep sleep



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Power consumption NRC7394

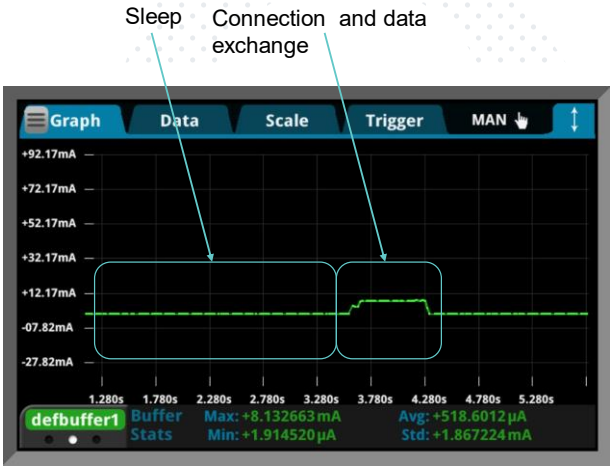
- MQTT Client
  - Connection
  - Send 5 MQTT messages



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Power consumption BLE

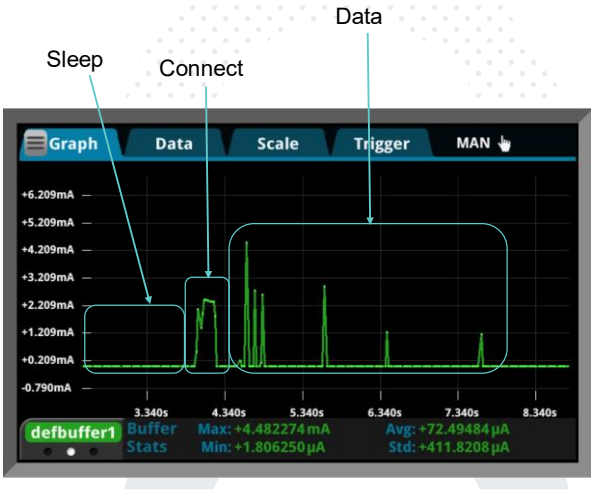
- BLE Push Button
  - 1 push
  - Deep sleep



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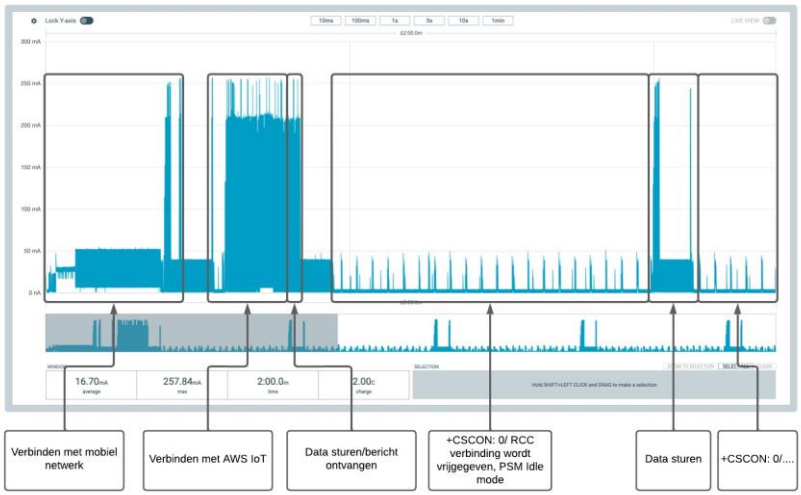
Power consumption ZigBee

- ZigBee Push Button
  - 1 push
  - Deep sleep



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MQTT NB-IoT



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ESP

- Average current consumption in deep sleep: 205 µA
- Max current consumption while sending data: 63,4mA
- Max current consumption while sending long distance: 110mA
- Real world distance: about 10m indoors (multiple walls)
- Time to send 117 bytes of data: + - 850ms

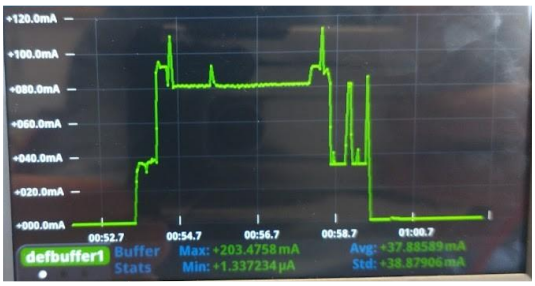


Deep sleep	Wifi setup and peering	Sending data
+- 205µA	+- 35 mA	+- 63 mA
5 sec	0,6 sec	0,25 sec

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Comparison ESPNOW – ESP WiFi

- Current consumption in deep sleep is similar
- Current consumption in power on is about 20mA higher
- Large difference in time to setup Wifi +-6 sec



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