GSmodule Design Guidelines 7/18/2012

GS1011M Power Connection Guidelines

- Power Related Pins on GSmodule
  - VBAT – power for RTC. 1.6V to 3.6V
    - Must remain powered to retain prior state information
  - VIN_3V3 – Primary Module Power
    - input power for on-module 1.8V regulator.
    - Limits Depend on Module Type
      - » GS1011MI: 2.7V min 3.6V max
      - » GS1011ME: 3.0V min 3.6V max
      - » GS1500M: 3.14V min 3.46V max
  - EN_1V8 – enable for on-module 1.8V regulator
  - VOUT_1V8 – output of on-module 1.8V regulator (VDD_CORE)
    - Useful as reference voltage for sensors
  - VDDIO – Voltage level for logic signals
    - » GS1011Mxx: 1.62V min 3.6V max
    - » GS1500M: 3.0V min 3.6V max
  - DC_DC_CONTROL – output signal from RTC to control power turn-on and turn-off to remainder of GS1011

Power Rule #1

- VIN_3V3, VDDIO, and VDD_CORE

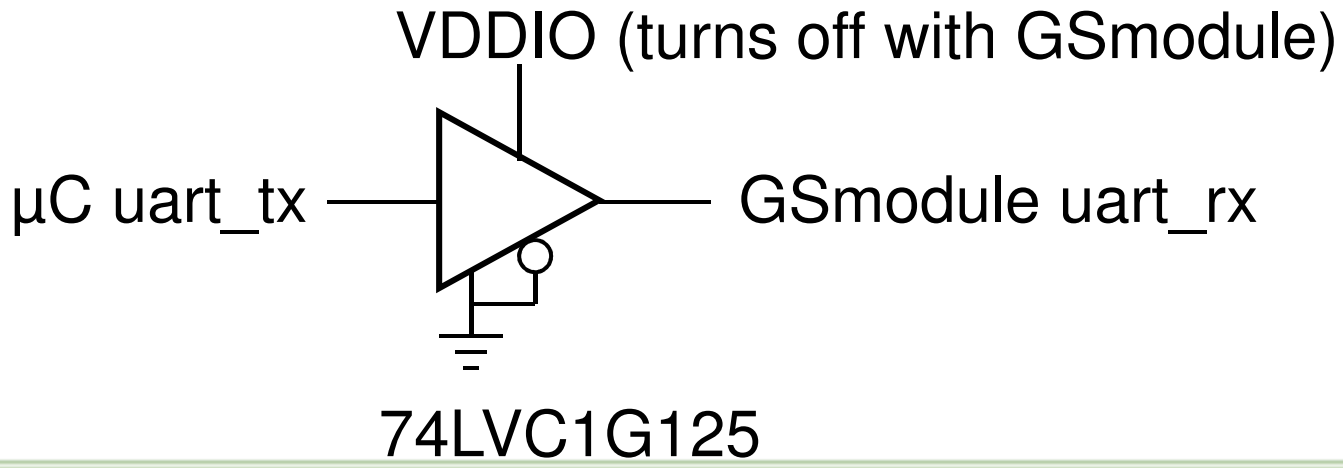
  MUST Power Up and Down **TOGETHER**
  - Exception:
    - On GS1011MI modules ONLY
      - VIN_3V3 may stay on, as long as VBAT is on.
  - VDD_CORE is controlled by EN_1V8
- GSmodule **may not operate correctly** if this rule is violated

Power Control Options

- ALL Supplies “Always ON”
  - VIN_3V3 and VDDIO always stay on
  - EN_1V8 Connected to VIN_3V3
  - DC_DC_CONTROL → No Connect
- “Standby Enabled” Wiring
  - ALL supplies controlled by DC_DC_CONTROL
  - DC_DC_CONTROL → EN_1V8
  - DC_DC_CONTROL → enables VIN_3V3 and VDDIO regulators
- Host Power Switched
  - Host turns power on and off to ALL power pins
  - This MUST include VBAT
    - RTC registers could be corrupted if this is not done.
  - 32KHz startup latency is 3 Seconds max
- Host Commanded
  - Wire like “standby enabled” case above
  - Use Alarm wakeup, AT+PSSTBY to go to sleep

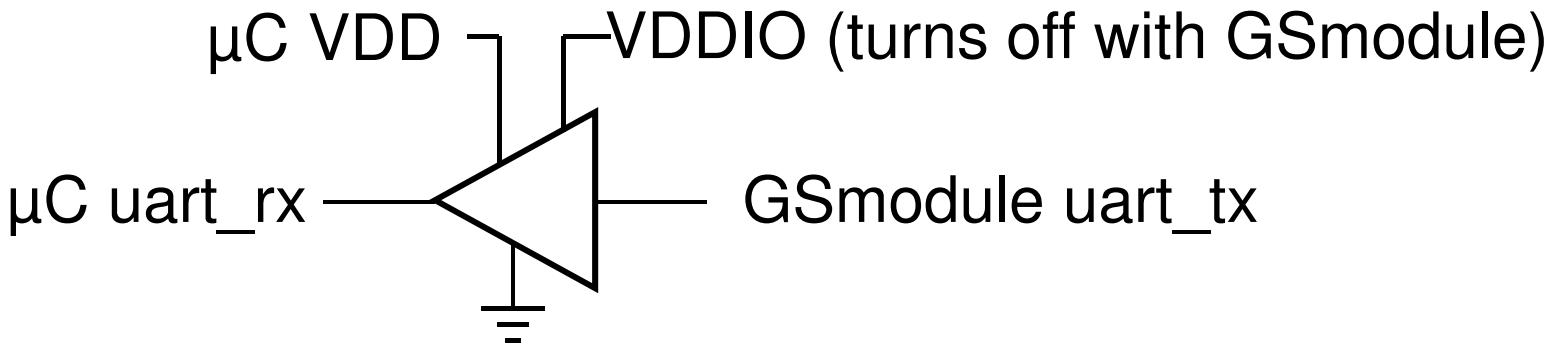
Power Rule #2

- DO NOT drive logic “1” into GSmodule pins when GSmodule is powered OFF
  - Not an issue in Always ON products
- Isolate with over voltage tolerant buffer
  - Can also use this for higher to lower level shift



Power Rule #3

- VDDIO MUST MATCH external device
  - If not, use level shifter to make levels same
  - Can level shift up or down
- VDDIO is the logic level used for communicating to external devices



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GS1011M Signal Guidelines

- Bring out GPIO27 to test point
  - such that it can be pulled up to VDDIO
- At power up GSmodule looks at the state of GPIO27
  - To determine whether Flash needs to be reloaded
  - This is the most fail-safe way to re-program the flash
  - Use this method for code development
  - This works, even if the code that is now in flash is bad
- ADC pins -- maximum voltage is 1.8V
- MOST digital pins are referenced to VDDIO
- Pins Referenced to VBAT:
  - ALARM1, ALARM2
  - DC_DC_CONTROL
  - RTC_OUT1, RTC_OUT2
- Reference voltage determines logic “1” level
  - And when it turns on/off
- If using SSPI Interface to Host
  - Provide 10K ohms pull-up on SSPI_CS pin to VDDIO

EXT_RESETn Pin

- MAY be left unconnected
- If driven, MUST be OPEN DRAIN
  - Also driven by GS1011 chip @ power up
  - Driven by voltage monitor chip
- If driven, add 10K pull-up to VDDIO
- Do Not assert reset during boot times
  - Problem if it releases, then re-asserts
  - May not finish first boot operations
  - Detect boot done by:
    - "Serial 2 WiFi APP" message using UART
    - Finish read out "Serial 2 WiFi APP" message with SPI

Special Functions of GPIO Pins

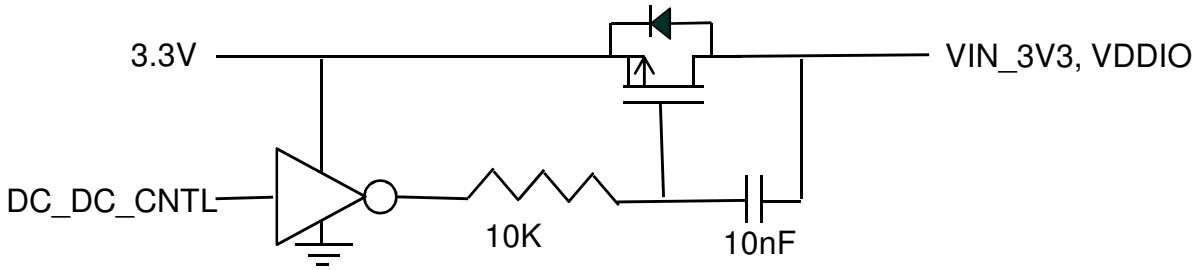
- GPIO10 - “WPS” switch
- GPIO12 – used internally on GS1011ME to tell SW its an ME module
- GPIO19 – Asynchronous Notifications
- GPIO21 – Factory Code Restore
- GPIO26 – SPI interface select
- GPIO28 – SPI Interrupt back to host

Specific Module Type Notes

- GS1500M
  - MSPI Port used ONLY for flash memory
  - Other devices are not allowed
  - Flash memory accessed thru WLAN CPU
- GS1011MIC
  - VDDIO4 **MUST** be wired to VOUT_1V8
  - ALL GPIO pins except UARTs are 1.8v Signal Levels
  - EXT_RESETn pin is 1.8V signal level
- GS1011MxxS
  - Recommend Power control **NOT** be “always on”
  - There is no EN_1V8 pin, so software can **always** turn off 1.8V power. Other power should go off too.
  - No damage to chip if 1.8V goes off when other power is on
    - May result in incorrect operation until power cycle

Voltage Regulator Guidelines

- GS1011MI
  - 400mA recommended
- GS1011MEx and GS1500M
  - 500mA recommended
- “Soft Start” Regulators Recommended
  - If using a PFET we suggest the following soft start circuit:



- Note that these are guidelines only
  - Customers are free to select their own margins from typical currents

Flash Memory Parts

- 1MByte Parts are listed here
  - Other parts from the same vendors are thought to be OK
- Reference Part is Micron M25P80
  - This gives the minimum instruction set which must be supported
- Use MSPI_CS1 as chip select
- 10K Pull-up Resistor from chip select to VDDIO
- Use 0.1uF bypass cap on flash

Acceptable Flash Memory Parts

- Parts Gainspan has Verified
  - Micron M25P80
  - Gigadevice GD25Q80
  - EON EN25F80A
  - Macronix MX25L8006E
- Have Not Tried, But Think are OK
  - Winbond W25Q80BV
  - Spansion S25FL008K
  - Spansion S25FL208K

NOT Acceptable Flash Memory Parts

- NOT Acceptable:
  - SST SST25VF080B
    - Same as PCT PCT25VF080B
    - Uses Address Increment Mode for programming
    - Would need new drivers
  - Atmel AT25DF081A and AT25DB081D
    - Use RapidS protocol
    - SPI mode 0 data comes out one clock late