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Revision Information

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<td>X1</td>
<td>9 July 2016</td>
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<td>X2</td>
<td>12 July 2016</td>
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<td>Update MCU decoupling, add boot section</td>
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<td>X3</td>
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<td>Update MCU decoupling, update notes, rename nets</td>
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<td>X4</td>
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<td>Update J13 setting, update power to RV1, update notes</td>
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<td>Update FRDM+ connection compatible to DEVKIT-MOTORGF</td>
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<td>X6</td>
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<td>Add I/O pins</td>
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<td>Change U15 to NNXP210URZ, change R57 to 10kK</td>
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<td>X8</td>
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<td>Remove I/O, add JD9</td>
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<td>X10</td>
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<td>Change R56 from 10k to 20k, and connected to F3V3 SDA</td>
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<td>Change U15 to ME2003-0.8TMR, remove R57, change R56 to 10k, add C87</td>
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<td>25 Sept 2016</td>
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<td>Release</td>
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Notes:
- All components and board processes are to be ROHS compliant
- All capacitors are 10% tolerance unless otherwise stated
- All resistors are 5% tolerance unless otherwise stated
- All zero ohm links are 0603
- All connectors and headers are denoted Px and are 2.54mm pitch unless otherwise stated
- All jumpers are denoted Jx. Jumpers are 2mm pitch
- Jumper default positions are shown in the schematics. For 3 way jumpers, default is always posn 1-2
- 2 Pin jumpers generally have the "source" on pin 1
- All switches are denoted SWx
- All test points (SMT wire loop style) are denoted TPx
- Test point Vias (just through hole pads) are denoted TPVx
- 3 Different test points used in design:
  - TPVx - Through Hole Pad small
  - TPHx - Through Hole Pad Large (for standard 0.1" header). Also used on IO Matrix (IOxM)
  - TPX - Surface Mount Wire Loop

User notes are given throughout the schematics.
Specific PCB LAYOUT notes are detailed in ITALICS

Caution:
These schematics are provided for reference purposes only. As such, NXP does not make any warranty, implied or otherwise, as to the suitability of circuit design or component selection (type or value) used in these schematics for hardware design using the NXP Calypso family of Microprocessors. Customers using any part of these schematics as a basis for hardware design, do so at their own risk and Freescale does not assume any liability for such a hardware design.
Board Power

**5V Switching Regulator**
- Input Voltage 12V, Output 5V at 1800mA
- Layout note: follow IC datasheet recommendations for PCB layout and thermal dissipation

**3.3V Switching Regulator**
- Input Voltage 5V, Output 3.3V at 1600mA
- Layout note: follow IC datasheet recommendations for PCB layout and thermal dissipation

**Board supply selection**
- Select between USB and external 12V
  - 1-2 -> external 12V
  - 2-3 -> USB/CUART connector

**3.3V & 5V Power Decoupling**
- Decoupling distributed uniformly
- Layout note: follow IC datasheet recommendations for PCB layout and thermal dissipation

**Test and reference points**
- GND Test Points, Top Side
- Layout note: follow IC datasheet recommendations for PCB layout and thermal dissipation

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**Board Power**

- DEVKIT-MCSHIELD/DEVKIT-MOTORGD
- CON_2x8
- JTAG & RESET
- TJA1081B & FLEXRAY Parts
- LEDs & BUTTONs & Potentiometer
- MCU (LDO inside) MK20DX128VF5
- & OpenSDA Parts & Power Isolation

**Power Devices**

- 5V Switching Regulator
- MCU (LDO inside) MK20DX128VF5
- & OpenSDA Parts & Power Isolation

**Connectors**

- 3.3V Switching Regulator
- Input Voltage 5V, Output 3.3V at 1600mA
- Layout note: follow IC datasheet recommendations for PCB layout and thermal dissipation

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**NXP Devices**

- 5V Switching Regulator
- MCU (LDO inside) MK20DX128VF5
- & OpenSDA Parts & Power Isolation

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**Interface Circuits**

- JTAG & RESET
- TJA1081B & FLEXRAY Parts
- LEDs & BUTTONs & Potentiometer
- MCU (LDO inside) MK20DX128VF5
- & OpenSDA Parts & Power Isolation

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**Devkit-MPC5744P**

- 3.3V Switching Regulator
- Input Voltage 5V, Output 3.3V at 1600mA
- Layout note: follow IC datasheet recommendations for PCB layout and thermal dissipation

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**DEVKIT-MPC5744P**

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Default Configuration:
- MCU supply voltages (VDD_HV_IO, VDD_HV_PMU, VDD_HV_OSC, VDD_HV_ADV, VDD_HV_FLA) are set to 3.3V
- MCU core voltage (VDD_LV_CORE, VDD_LV_PLL) are set to 1.25V
- MCU analog reference voltage (VDD_HV_AREx) are set 3.3V default. Could be 5V, or from external J2 pin15 (3.15V-5.5V).

VDD_HV_AREx0 and VDD_HV_AREx1 cannot be operated at different voltages and need to be supplied by the same voltage source.

MCU Power Decoupling

Layout notes: VDD_HV_PMU (3.3V) Decoupling. Place 0.01uF caps close to VDD_HV_PMU pin. Place the 4.7uF caps close to the jumper.

Layout notes: VDD_HV_IO (3.3V) Decoupling. Place one of the 0.047uF and 0.01uF caps close to each VDD_HV_IO pin. Place the 10uF caps close to the jumper.

Layout notes: VDD_HV_FLA (3.3V) Decoupling. Place the 0.01uF caps close to VDD_HV_FLA pin. Place the 0.1uF caps close to the jumper.

Layout notes: VDD_HV_OSC (3.3V) Decoupling. Place the 0.01uF caps close to VDD_HV_OSC pin. Place the 0.1uF caps close to the jumper.

Layout notes: VDD_HV_ADV (3.3V) Decoupling. Place the 0.047uF and 0.01uF caps close to VDD_HV_ADV pin. Place the 1uF caps close to the jumper.

Layout notes: VDD_HV_ARE0 (3.3V) Decoupling. Place the 0.047uF and 0.01uF caps close to VDD_HV_ARE0 pin. Place the 1uF caps close to the jumper.

Layout notes: VDD_HV_ARE1 (3.3V) Decoupling. Place the 0.047uF and 0.01uF caps close to VDD_HV_ARE1 pin. Place the 1uF caps close to the jumper.

Layout notes: VDD_LV_PLL (1.25V) Decoupling. Place the 0.047uF caps close to VDD_LV_PLL pin.
TARGET RESET LED

Reset Switch

Tri-State Buffered RESET signal to reset the MCU

Reset Input / Output

Connect an external LVI to pad when supplying external 1.25V so that PORST is asserted until external 1.25V supply is at threshold and stable

Bi Directional reset line to/from MCU

Reset from Debugger

RST-SWITCHx
SYSTEM-RSTx
RST-INx
DBUG-RSTx
GND

3V3_SR

JTAG-RSTx [6]
MCU-RSTx [5,6,8,9]
MCU_PORSTx [5]

Bi-Directional reset line to/from MCU

JTAG Standard 14-pin Connector

Layout Note: Clearly mark pin numbers 1, 2, 13 and 14

Optional Config

BOOT CONFIGURATION

Layout Note: Mark MC_RGM_ABS0, MC_RGM_ABS2, MC_RGM_FAB close to U26 pins
**Flexray, CAN, LIN**

### FlexRAY_A Physical Interface

**Note on VBAT:**
- Operational range is 4.45V to 60V
- Undervoltage detection is max 4.715V

On EVB this is supplied from 5V, in theory this should be to battery with 60us delay between applying VBat and I/O voltages. If necessary, 12V can be externally supplied by removing the resistor and connecting pad to 12V

**Bus voltage +/- 12V (VBAT = 12v)** Components spec'd for 12V operation

**Crimped lead - 279-9522**
**Receptacle housing - 279-9156**

- **3V3_SR**
- **5V0_SR**
- **FRBATA**
- **C38 0.1UF**
- **C39 0.1UF**
- **C36 10uF**
- **C37 10uF**
- **(FR_DBG1)**
- **(FR_DBG0)**
- **(FR_DBG2)**
- **R30 10K**
- **R31 10K**
- **R32 10K**
- **R33 47**
- **C40 10PF**
- **C41 4700pF**
- **R34 10K**

**LIN0 Physical Interface**

**Master Mode Pullup Enable**

- **MC33662LEF** LIN transceiver is newer version of 33661 offering:
  - Full LIN compliance (33661 no longer compliant)
  - Improved ESD protection on LIN pin up to 15KV
  - Improved ESD on Wake and VSUP Pins
  - Other EMC and performance improvements

See [www.nxp.com](http://www.nxp.com) for more details

- **EN = 3.3V** enables Transceiver and sets I/O for 3.3V
- **MAX = GND** ensures no spurious wakeups

**CAN0 Physical Interface**

- **VDD = 5.0V** input supply for CAN transceiver (4.5 to 5.5V)
- **V/I = 3.3V** for MCU TX and RX pins
- **STB = High for Standby mode, pulled low for normal mode.**

**Layout notes:**
- CAN termination resistor footprint
- Place on underside of PCB
**NOTE:**

Arduino UNO compatible headers: J1, J2, J3, J4

FRDM+ MC SHIELD/DEVKIT-MOTORGD compatible headers: J1, J2, J3, J4, J5

DEVKIT-COMM compatible headers: J1, J2, J3, J4, J5, J6

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**Layout notes (at least):**

- EXT_LV_PWR: 20mil
- EXT_HV_PWR: 40mil x2
- EXT_AR_PWR: 20mil
- 5V0_SR: 20mil
- 3V3_SR: 20mil x3

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Populate R81 for external ADC high reference voltage

Check external power before put on the shunt

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FRDM+ I/O interface default 3.3V

Not all pins are compatible 5V

Net with prefix "LT" for 5V option