Comments:

Cortex M0 can be powered from USB or by 8-28VDC Power
If D8 installed, then MX286 can be powered by USB power
Cortex M0 is powered up first, then it controls MX286 start up
Cortex M0 does these functions:
- Controls MX286 power up sequence
- Controls MX286 Boot Strapping
- USB Device to Console conversion
- Controls Blue LED
- Can read Push Switch
- Measures Analog Vin value
- Reads SD_BOOT Jumper
- Contains customer specific "ID Code"?
- Other NV Parameter storage?

MX286 UART0 supports RTS/CTS hardware flow control

Rev. A Problem -- FB20 and FB28 have bad Silkscreen

Notes:

1) How do we do WatchDog?
   If MX286 uses internal WD, then we must keep BATT_LOAD# asserted all the time - about 3 mA

2) Where is MAC address stored?
   Is it better to have it in M0?

3) For Modbus 1024K baud operation - must use DMA
   Serial Port RX DMA on MX286 says "must be multiples of 4 bytes"
   TX DMA does not say restricted to 4 byte multiples

Serial Port Usage

<table>
<thead>
<tr>
<th>Port</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>UART0</td>
<td>RS-232</td>
</tr>
<tr>
<td>UART1</td>
<td>RS-232</td>
</tr>
<tr>
<td>UART2</td>
<td>Modbus/DC</td>
</tr>
<tr>
<td>UART3</td>
<td>DC</td>
</tr>
<tr>
<td>UART4</td>
<td>GPS Radio</td>
</tr>
</tbody>
</table>

Debug = Console/DC
DC = Daughter Card
10 DIO also go to DC

Rev. A has no A/D from CPU

Standard TS-7670

DNP: RN14, RN24, RN25, R65, HD2

2nd CAN port is an option
GPS Radio is an option
FB7 not Pop, U7 is populated
use MX286 CPU

128MB and 256MB RAM sizes

BOM Warning:

Never Pop, FB28
Two x2 -> Single x2

Drop-Tank.com

Requires special BOM
Use MX283 CPU?
No RTC, No CAN, No Modbus, One SD card, 256 MB RAM
Install: RN14, RN24, RN25, R65
Remove: RN21, RN22, RN23

Quebec Gov't

HD2 only pop for them
No Modbus
128MB RAM, one CAN, GPS pop
MX286 CPU (extended temp)
Needs Ext. Temp 1GB SD card

GPS option adds:
U14, PF2, L4, HD3

2nd CAN adds:
U26 and TVS6
MX286 ARM® CPU

UARTs, ADC

Audio
SD Card
SPI Boot

NAND, PWM
JTAG, I2C

LCD

All JTAG have 47K internal pullup except RTCK

Page 1311 - Winbond SPI x2 and x4 supported
Page 1313 of Data sheet

Page 1311 - Winbond SPI x2 and x4 supported

12 MHz default boot clock

U3 D3 and U3 D4 are extra
2 data lines for SPI s4 read

Page 1311 - Winbond SPI x2 and x4 supported

EVK schematic references a 12MHz Winbond chip

LCD_05 and 06 bias low
LCD_RS biased high
LCD_RS low = use OTP

Ref Design uses
CS0 and RDY0

NAND Interface

See: EVK schematic, Page 15

LCD_00 thru LCD_04
Control Boot Source

PWM outputs can be 24 MHz
divided by 16-bit integer
 Allows clock 12MHz and lower
Battery pin supplies current to charge battery.

DCDC_BAT pin is power input for DCDC converters - connect direct to battery.

PSWITCH can be driven to 3.3V if a series 10K resistor is used.

VDD4P2 is an output -- only feeds two 1.2K resistors.

Reg VDD1P5 goes to nothing.

FR7 not populated? See U7.

USB has FET in parallel with D6 "to improve efficiency".

GND Test Point
Length of this trace is equal to [CLK + Data] lengths
Data = Average length of all data traces.
5V Power Supply (2000 mA)

8-28 VDC
Power Input

USB and MX286
Switched Power

Ethernet and SD
Switched Power

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C90</td>
<td>.1 uF</td>
</tr>
<tr>
<td>L7</td>
<td>10 uH</td>
</tr>
<tr>
<td>C67</td>
<td>10 uF</td>
</tr>
<tr>
<td>C91</td>
<td>.1 uF</td>
</tr>
<tr>
<td>TVS8</td>
<td>28V</td>
</tr>
<tr>
<td>FB12</td>
<td>220 ohm</td>
</tr>
<tr>
<td>C80</td>
<td>4.7 uF 6.3V</td>
</tr>
<tr>
<td>D8</td>
<td>3A</td>
</tr>
<tr>
<td>FB15</td>
<td>220 ohm</td>
</tr>
<tr>
<td>FB16</td>
<td>220 ohm</td>
</tr>
</tbody>
</table>

C98: 10 uF 50V

L7: 10 uH

C67: 10 uF

C91: .1 uF

TVS8: 28V

FB12: 220 ohms

C80: 4.7 uF 6.3V

D8 allows USB to power MX286
This will only work if 3.7V Reg (U7) is powering MX286

.063 hole

USB and MX286
Switched Power

Rise time of both outputs measured at ~1V/μs
10/100 Ethernet

Auto MDIX is supported and Polarity Correction supported

PHY address and mode latch on rising edge of Reset
These can be set via MDIC or via Reset

Mode input latched on rising edge of Reset
This can be set via MDC or via Reset

LED active state is always the opposite as the strap state

MDIO bus can not be used until 100 us after
Reset# is deasserted

MDCLK max is 2.5 MHz

LED high voltage in VDD_2A = 3.3V

The MDIO bus can not be used until 100 us after
Reset# is deasserted

MDCLK max is 2.5 MHz

1.2V Core

The RJ45 pinout includes:
- RJ45
- NC on MX283

The circuit diagram includes various components and connections such as:
- U11: LAN8720AI_QFN24
- C120, C121: .1 uF
- FB9, FB8: 220 ohm
- C116: .1 uF
- C110: .1 uF
- C83, C84, C86: 4.7 uF
- R46, R47: 140 ohm
- RN4-D: 3.3K
- RN9-B, RN9-C, RN9-D: 10K

The schematic also includes connections for:
- J4 ENET0_COL
- J3 ENET0_CRS
- G4ENET0_MDC
- H4ENET0_MDIO
- F3 ENET0_RX_CLK
- E4ENET0_RX_EN
- J2 ENET0_RXD3
- J1 ENET0_RXD2
- H2ENET0_RXD1
- H1ENET0_RXD0
- E3 ENET0_TX_CLK
- F4ENET0_TX_EN
- G2 ENET0_TXD3
- G1 ENET0_TXD2
- F2ENET0_TXD1
- F1ENET0_TXD0
- U3-E: MX286_CPU_IND
Flash Memory

Micro SD Card Socket

NAND Flash

Daughter Card Interface

Supplemental Interface

SD Boot Jumper
GPS Radio and Auto RS-485

Telit SL869
GPS Radio

RF Conn.

RA RMA

Warning: DNP FB28!

Modbus Auto 485 TX Enable

Auto RS-485 Enable

Counter asserts TX_EN for 14.5 clocks after Clear removed
Assuming the clock is 1.28 times the Baud rate, this is 11.3 data bits
Worst case (bit 7 = 0 of last data byte in packet),
TX_EN asserted about 11 bit times past end of packet

Quickest Turn off of TX_EN occurs when last packet byte is FF
Then TX_EN turns off about 2 bit times after end of packet

Max Baud Rate supported is 1042 Kbaud
Clock for this baud rate is 1.33 MHz
RS-232 Ports and Daughter Card Headers

RS-232 Transceiver

3.3V --> 5V
Level shifter

RS-232 Transceiver

RS-232 Ports

Port 1
RS-232

Port 2
RS-232

RJ45 Pinouts

For DropTank install:
RN14, RN24, RN25, R65

For Std. unit install:
RN21, RN22, RN23

Technologic Systems
Date: Jan. 5, 2014
Title: TS-7670 RS-232 Ports
Rev: A
Mod Bus RS-485 and CAN Port

Modbus
Power Switch

RS-485 Driver

Modbus
RJ45

CAN_0 Transceiver

CAN
RJ45

TJA1040 allows low power 15 uA mode