### Standard Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TS-7670-128-2048F-I SBC with a NXP/Freescale i.MX28 454MHz ARM9 CPU, 128 MB of DDR2 RAM, and 2GB of eMMC, I-Temp (-40C to 85C)</td>
</tr>
<tr>
<td>2</td>
<td>TS-7670-256-2048F-2CAN-I SBC with a NXP/Freescale i.MX28 454MHz ARM9 CPU, 256 MB of DDR2 RAM, 2GB of eMMC, and 2nd CAN, I-Temp (-40C to 85C)</td>
</tr>
<tr>
<td>3</td>
<td>TS-7670-256-2048F-I-DEV SBC with a NXP/Freescale i.MX28 454MHz ARM9 CPU, 256 MB DDR2 RAM, 2GB eMMC, 2nd CAN port &amp; GPS radio, I-Temp (-40C to 85C)</td>
</tr>
</tbody>
</table>

### Optional Components/Features Summary

#### 256 MB RAM Option
- Included only on -256-xxx Standard Options
- CHANGE: U19 to 256 MB Ind. Temp

#### 2nd CAN Port
- Included only on -2CAN & -DEV Standard Options
- ADD: U26 and TVS6

#### GPS Option
- Included only on -DEV Standard Option
- ADD: U14, CN2, PF2, L4

* Res. Straps on Page 11

#### Serial Port Usage
- UART0 = RS-232
- UART1 = RS-232
- UART2 = Modbus
- UART3 = DC
- UART4 = GPS Radio
- Debug = Console/USB
- DC = Daughter Card
- 4 DIO also go to DC

MX286 UART0 supports RTS/CTS
- hardware flow control

Web Schematic: Some proprietary information has been withheld.
Rev.E Changes:

Strip out M0 parts and NAND Flash

Change the way "SD_BOOT" Jumper works
   JP1 directly controls CPU Strap pins
   SiLab no longer needs to drive CPU Boot straps
   SiLab can still read two Jumpers

Change RA LED pads to be bigger
RJ45 plastic align holes too small on PCB
Change eMMC to 153 ball size
Update 5V Reg.
Add RS-485 new TVS
Change to new CN99 for CM Quick Test support
Allow SPI Boot over CN99
Allow MX28 to program SiLab
Change to Vert. Battery Holder
Add a unique way to ID Rev.E (reading CPU ball T7)
Add Res straps - total = 4

Rev.E Board can be identified by reading CPU ball T7
with weak PU Res enabled
CN99

Factory Programing/Test

Push Switch
Title: Rev: Designer Sheet of TS-7670 MX286 CPU

May 8, 2017

Technologic Systems

Rev: E

Title: TS-7670 MX286 CPU

Sheet 5 of 15
MX286

64M x 16
128 MB

OR

128M x 16
256 MB

DDR2 SDRAM (128 or 256 MByte)

Technologic Systems  Date  May 8, 2017
Title:  TS-7670 DDR2 RAM
Rev:  E  Designer  Sheet 7 of 15
8-28 VDC

Power Input

USB and MX286
Switched Power

Ethernet and SD
Switched Power

5V Power Supply (2000 mA)

C91 must be very near U17

Power Input 8-28 VDC

Technologic Systems Date May 8, 2017
Title: TS-7670 5V and Switched Power
Rev: E Designer Sheet 8 of 15
Title: Rev: Designer Sheet of TS-7670 AUX Power Reg, Boot Strap 9E May 8, 2017

Boot Source

<table>
<thead>
<tr>
<th>LCD_D0</th>
<th>LCD_D1</th>
<th>LCD_D2</th>
<th>LCD_D3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 1 0</td>
<td>1 0 0 1</td>
<td>1 0 1 0</td>
<td>0 0 0 0</td>
</tr>
</tbody>
</table>

Bias Res.

3.3V  ETM off
TEST off

Select Boot

Aux. 3.3V Reg

RAM 1.8V Reg

Boot Jumpers

Factory Programing Interface
Auto MDIX is supported and Polarity Correction supported
Flash Memory

Micro SD Card Sockets

Factory Programing Interface

Resistor Strapping Table

<table>
<thead>
<tr>
<th>R66</th>
<th>R57</th>
<th>R56</th>
<th>R55</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

0 = POP, 1 = DNP

TS-7670-128-2048F-I
TS-7670-256-2048F-2CAN-I
TS-7670-256-2048F-I-DEV

Res. Straps

Strap Option LSB

Strap Option MSB

C122 0.1 uF
7 DATA_0
8 DATA_1
1 DATA_2
2 DATA_3
5 CLK
3 COMMAND
4 VDD
6 GND
10 FRM2
9 FRM1
11 FRM3
12 FRM4

C88 4.7 uF
1 8 RN10-A 10K
2 7 RN4-B 10K
3 6 RN4-C 10K
4 5 RN4-D 10K

EMMC_MICRON_4GB_BG153_ITEMP

A3 DATA_0
A4 DATA_1
A5 DATA_2
B2 DATA_3
M6 CLK
M5 COMMAND

E6 VCC
P6 GND
P4 GND
N5 GND
N2 GND
K8 GND
H10 GND
E7 GND
C4 GND

F5 VCC
J10 VCC
K9 VCC
C6 VDD I
M4 VCC Q
P3 VCC Q
N4 VCC Q
P5 VCC Q

B3 DATA_4
B4 DATA_5
B5 DATA_6
B6 DATA_7
K5 RESET #
C2 VDD I
G5 GND
M4 VCC Q
A6 TOSH_GND
J5 TOSH_GND

EMMC_CLK
EMMC_CMD
EMMC_D3
EMMC_D2
EMMC_D1
EMMC_D0

SW_SD_3.3V

SILAB_C2_CLK
SILAB_3.3V
SILAB_C2_RESET
SILAB_CLK

SW_SD_3.3V

STRAP_3
SILAB_3.3V

STRAP_2
SILAB_3.3V

STRAP_1
SILAB_3.3V

STRAP_4

GPS Radio and Auto RS-485

Telit SL869
GPS Radio

RF Conn.
RA SMA

Max Baud Rate supported is 1042 Kbaud
Clock for this baud rate is 1.33 MHz

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

Modbus Auto 485 TX Enable

Clock = 1.25 to 1.30 times the Baud Rate

Auto RS-485 Enable
RS-232 Ports and Daughter Card Headers

RS-232 Transceiver

3.3V <-- 5V
Level shifter

RS-232 Ports and Daughter Card Headers

Port 1
RS-232

RTS/CTS Hardware
Flow control supported

Port 2
RS-232

Technologic Systems
Date May 8, 2017
Title: TS-7670 RS-232 Ports
Rev: E  Designer  Sheet 14 of 15