ELBA Product Interface Control Document

Version : V 2.0.1

Date: May ,16 2006

Revision History

Revision #	Date	Author	Description
V1.0.0	May 19, 2006	BK Ong	Initial Draft
V1.0.1	Jun 22, 2006	BK Ong	Update Morphing Touch Interrupt signal, keypad matrix signal names
V1.0.2	Jun 26, 2006	BK Ong	1. Update the FM_int connection to SCM_A11. 2. FM reset connect to SCM_A11 US2_SPEED instead of RESETB from Atlas. 3. Rename the signal names to be close the schematic names.
V1.0.3	Jul 7, 2006	BK Ong	1 Add Side Switch 2 Add power/hold switch 3 Update Ambient sensor circuit 4 Delete Camera LED Indicator
V1.0.4	Jul 17, 2006	BK Ong	1. Update Lin Vib shut down pin 2. Update FM Radio documentations 3. Updated HB USB section 4. Added BT section
V1.0.5	Jul 24, 2006	BK Ong	1. Updated display interface diagram 2. 2. Update Elba slide sw pins assignment due to error.
V1.0.6	Aug 02, 2006	BK Ong	1. Update battery capacity 2. Updated local Haptics 3. Modify the Linear Vib to remove the global Haptics function 4. Add Camera Privacy Indicator 5. Imager Interface
V1.0.7	Aug 17, 2006	BK Ong	1. Document clarification per requested by SW Integration team 2. Modify Antenna switch control requirement table for Quad-band GSM
V1.0.8	Sept 5, 2006	BK Ong	1. Update Audio interface section 2. Indicate the LED indicator's location 3. Rename keypad R4C5 from VA to Side Select
V1.0.9	Nov 22 2006	BK Ong	1. Reference to PR1 HW will be

			updated from this ICD version onwards 2. Update playtime module interfaces changes and keypad hystersis GPIO 3. Changed Linear Vibrator shutdown GPIO 4. Update information on Audio Interface section 5. Update FM module change from Si4701B to Si4703
V1.1.0	Dec, 26 2006	BK Ong	1. Reference to PR1.3HW (Backend version, Mainboard named PR1.3, Daughter bd, PFlex and DFlex named PR1.2) will be updated from this ICD version onwards 2. Changed Camera Privacy LED from B+ to VBOOST supply 3. Added interface connection for PR1.3 HW to indicate change of GPIO GP_SP_A26 to U3_CTS_B 4. Removal of Side touch sensor
V2.0.0	May, 15 2007	BK Ong	1. Reference to R1.4.1, R1.5 and R2.1 HW (Backend version), Main Board, Daughter board, PFlex and DFlex are named PR2.0. 2. Added PCB and Flex version table and Morphing Module version table 3. Modify keypad hsytersis implementation with two diodes to the SCMA11 SPI1_SS1 pin. 4. Linear Vibrator gain setting change
V2.0.1	May, 16 2007	BK Ong	1. Reference to R2.2 HW (Backend version) 2. Morphing Module Interface change 3. Removal of Ambient Light feature

Abstract:

This document describes Elba closed phone specific hardware interfaces that are different from SCM-A11 “platform”

How this document is arranged: Table – A: summarizes all hardware features of Elba. The third column in the table, says whether the hardware feature is supported by 3GSM Architecture Team’s “SCM-A11 Platform” solution. If yes, then this document will not provide any interface details. You will have to refer the SCM-A11 platform compass site. If no, then this document will provide full details of the interface

References

1. All references related to platform http://compass.mot.com/go/scma11platform -
2. Platform ICD folder http://compass.mot.com/go/157961165 -
3. All Elba EE related folder http://compass.mot.com/go/elbaee -
4. Schematics for Rigid PCB folder http://compass.mot.com/go/elbapcb - Main board named PR1.3, Daughter bd named PR1.2
5. Schematics for Flex PCB folder http://compass.mot.com/go/elbafpc - for PFlex and DFlex both named PR1.2
6. Component specifications folder http://compass.mot.com/go/elbaicspec
7. Elba Wingboard related document folder http://compass.mot.com/go/elbawingboard

Definitions & Abbreviations:

1. SCM-A11 Platform – 3GSM Architecture team’s closed up phone
2. EL – ElectroLuminiscent
3. SCM-A11 – Single Core Modem(SC140e) with ARM11 Processor
4. EDR – Enhanced Data Rate
5. SIM – Subscriber Identification Module
6. PWM – Pulse Width Modulator
7. MCP – Multi-Chip Packaging
8. WB – Wing Board
9. DB – Daughter Board

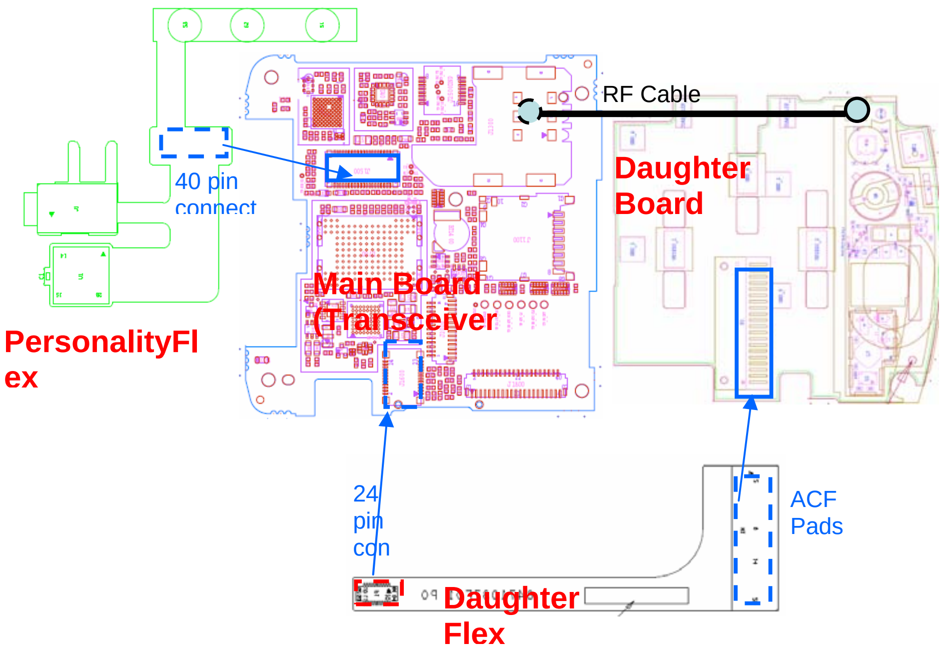
Elba Hardware PR1.3 Summary Table (Table – A)

Feature	Description	Is it platform?	Remarks
Processor	SCM-A11	Yes	All wb
Power Management	Atlas 3.5	Yes	All wb
RF	TransAAM+Raptor	Yes	All wb
Display	2" QVGA Landscape, 262K color Transmissive	No	Interface similar to I-module.
Display backlight	5 LEDs like platform	Yes	Refere to display interface document for detail
Memory	64MB SDRAM SDR (x16) 1.8V + 128MB NAND SLC LB (x16) 1.8V in MCP package	Yes	P3B with Large Page support
Embedded Memory	2GB NAND using SDHC2	Yes	P3B
MicroSD	SDHC1	Yes	P3B
Imager	2Mpixel, Micron SOC2020 from Liteon.	Yes	P3B
Keypad	2 pole keypad	No	P3B
Keypad backlight	EL	No	P3B
Power/Hold sw	Power switch and Hold switch	No	P3B
USB Connectivity	HS USB, FX2LP	No	P3B
Bluetooth	TI BRF6300 EDR Class 2	No	P3B
SIM	No MM SIM Support	Yes	
Microphone	Mono, top firing	No	Roadmap mic
Earpiece	Mono	No	Roadmap earpiece
Ringer	Polyphonic Speaker	Yes	
Battery	BK5, 970mAH	No	Roadmap battery
Local Haptics	Custom solution	Yes	P3B
Ambient Light Sensor	Avago part number APDS-9003-021 4888938N02	No	Same interface as P3A ambient light (Toshiba TPS 852)
Antenna Switch	Custom solution	Yes	P2A onwards
FM Radio	Si4703	Yes	P3A onward support with Si4701B
Headset Jack	3.5mm with MIC function	Yes	P3A

Elba Electrical Schematics interconnections

This section provides overall schematic interconnection. Look for the folder names in brackets for the respective schematic blocks described in the drawing below.

P1.3 Electrical Interconnections



PCB and Flex Versions

BE Build name	Main BD	Daughter bd	Pflex	Dflex	RS Flex	LS Flex
	PCB and Flex Versions					
P0	P0	P0	P0	P0	P0	Non, use metal plate
R1.1.1 PR1.2.1	P1	P1	P1	P1	P1	P1
PR1.3.1	PR1.3	PR1.2	PR1.2	PR1.2	removed	removed
R1.4.1 R1.5 R2.1	PR2.0	PR2.0	PR2.0	PR2.0	removed	removed
R2.2	PR2.3	PR2.2	PR2.2	PR2.2	removed	removed

Schematic resides in two main folders, http://compass.mot.com/go/elbapcb for Rigid PCB and http://compass.mot.com/go/elbafpc for Flex schematics.

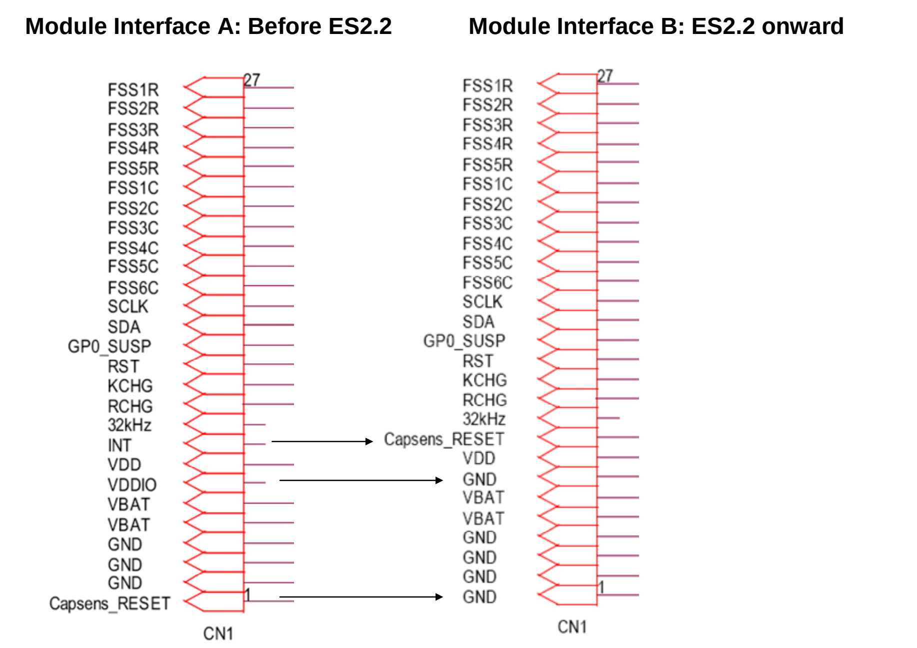
Schematic folder : **Transceiver** for Main transceiver circuitry
Schematic folder : **Daughter** for Daughter board circuitry
Schematic folder : **DFlex** for Daughter Flex circuitry
Schematic folder : **PFlex** for Personality Flex circuitry

Side touch sense flex is **removed** in PR1.3 HW.

<u>Morphing Module Versions</u>

Phone HW Version	Main Transceiver Version	Pelikon reset line	Freescale Debug pin	Module	Pelikon fw	Quantum fw	FSS or FSR	Side Sensors	Top Sensor	Omega Sensor	Interface pin
R1.1	PR1	GPO2	GP_AP_A26	ES0..3	v6.1	4.15	FSS	yes	full	GEN 5-c	a
R1.2	PR1	GPO2	GP_AP_A26	ES1.0	v6.1	4.15	FSS	yes	full	GEN 5-c	a
R1.3	PR1.3	GPO2	U3_CTS_B	ES1.1	v6.1	4.15	FSR	no	full	GEN 5-d	a
R1.4.1	PR2.0	GPO2	U3_CTS_B	ES1.1	v6.1	4.15	FSR	no	full	GEN 5-d	a
R1.5	PR2.0	GPO2	U3_CTS_B	ES2.1	v6.4	4.15	FSR	no	full	GEN 5-d	a
R2.1	PR2.0	GPO2	U3_CTS_B	ES2.1.1	v6.4	4.19	FSR	no	full	GEN 5-d	a
R2.2	PR2.3	GPO2	U3_CTS_B	ES2.3	v6.5	5.21	FSR, P24	no	full	GEN 5-d	b

Morphing Module Inteface changes details from R2.2 onwards

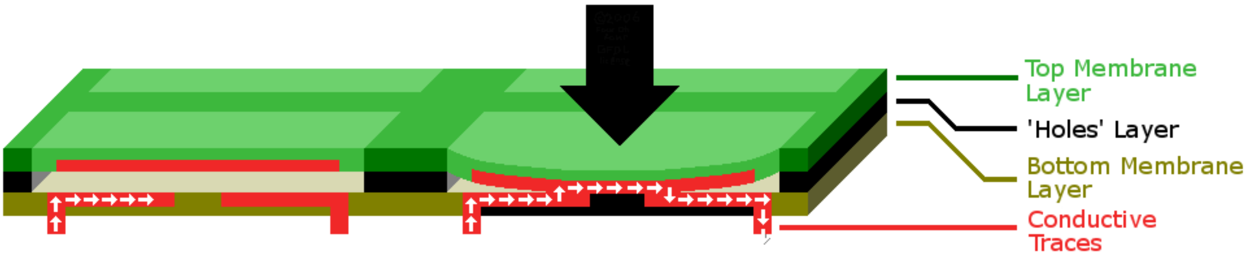


Module interface changes to minimize capsense noise

Keypad Interface

FSR Membrance Switch

Elba uses the 2-pole keypress detection scheme like all synergy phone models. But the material used for the keypad “dome” is different. It is called a “FSR Membrane Switch” This material is similar to the ones that are used in most household appliances like Microwave ovens and washing machines.
The drawing below shows the structure of a “FSR Membrane Switch”



Elba Keypad mapping

	C0	C1	C2	C3	C4	C5
R0	6	Nav Right	1	Nav Center	Music Jump/Skip Back	*Capture/Playback Toggle*
R1	8	Nav Down	3	Soft Left	Clear/Skip Forward	*Still/Video Toggle*
R2	7	9	5	Star	#	0
R3	2/Play Pause	Nav Up	*End*	Send	Repeat/Zoom In	*Shuffle/Zoom Out*
R4	4	Nav Left	Side Up	Soft Right	Side Down	Side Select

(yellow)	**Key Already Pressed**
(green)	**Allowed Third Key Press**
(red)	**Forbidden Third Key Press (ghosting)**
(blue)	**Elba morph keys sharing with existing keys**
(peach)	**Elba specific/additional morph keys**

Meets and exceeds multiple-key press requirements and requests for gaming:

- Required two key press combination = Any2of(6, 8, 2, 4, #, 0, 9, 5)
- Required two key press combination = Any2of(Nav Right, Nav Down, Nav Up, Nav Left, #, 0, 9, 5)
- Requested three key press combination = Any2of(Nav Right, Nav Down, Nav Up, Nav Left) + Any1of(#, 0, 9, 5)
- Requested three key press combination = Any2of(6, 8, 2, 4) + Any1of(#, 0, 9, 5)
- In addition to these requests, this matrix would support action keys of * and 7, as well as the required #, 0, 9, and 5.

Below table shows the equivalent connection to SCM-A11.

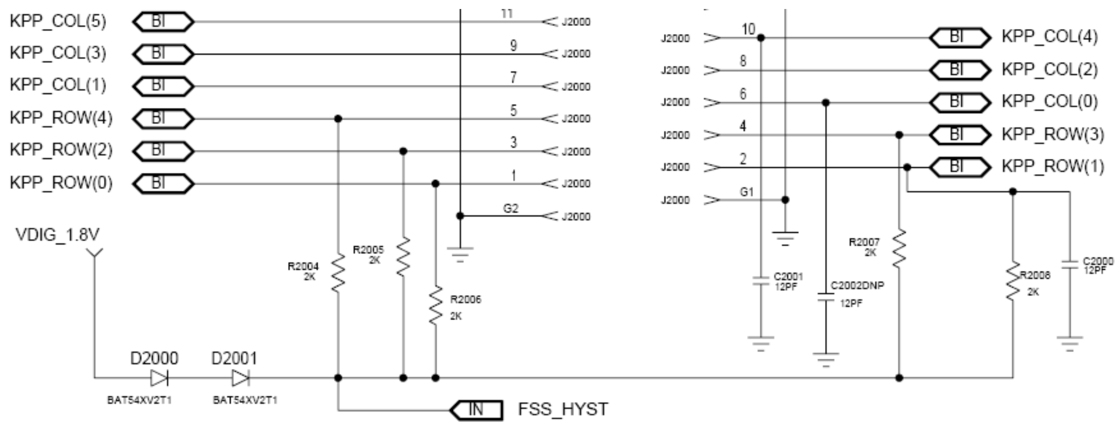
Symbol Above	C0	C1	C2	C3	C4	C5
SCM-A11	KPCOL0	KPCOL1	KPCOL2	KPCOL3	KPCOL4	KPCOL5

Symbol Above	R0	R1	R2	R3	R4	
SCM_A11	KPROW0	KPROW1	KPROW2	KPROW3	KPROW4	

Keypad debounces timing: TBD (Tentatively keep to current default setting)

<u>Keypad Hystersis</u>

Modify keypad hsytersis implementation with two diodes, D2000 and D2001 to the SCMA11 SPI1_SS1 pin (netname is FSS_HYST) from R1.4.1 onwards as illustrated in the schematic below.

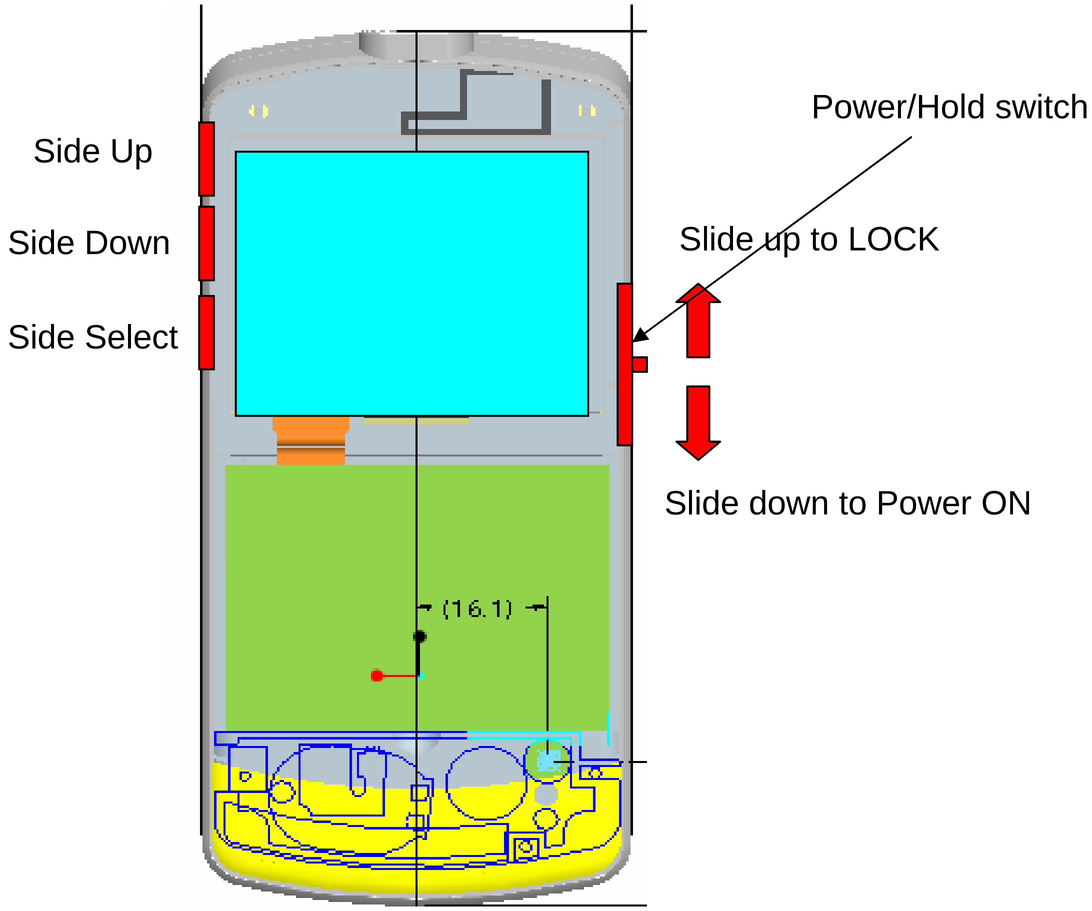


Morph Keys Specific to Elba	
Morph Mode	**Keys**
Music	Play/Pause Skip Forward Skip Back Shuffle Repeat
Camera Capture / Playback	Zoom In Zoom Out Capture/Playback Toggle Still/Video Toggle

Elba Side Keys

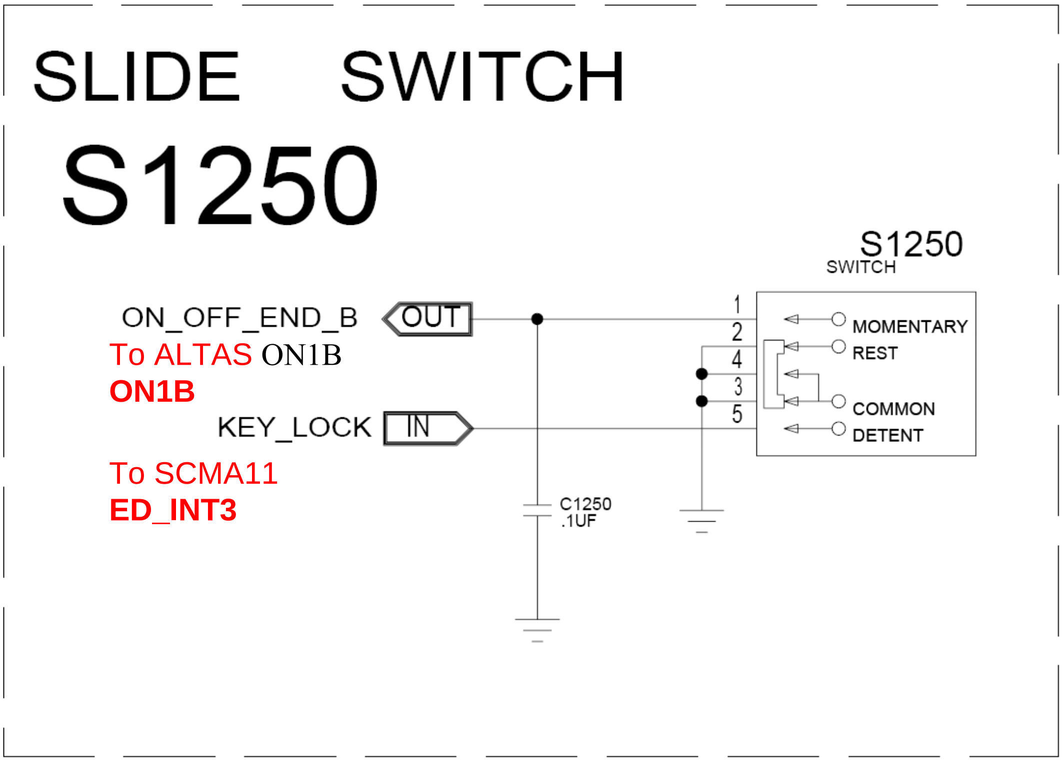
Elba has 3 side keys which are activated by the normal keypad dome. They are :

1. Side Up
2. Side Down
3. Side Select



Side Switches and Power/Hold Switch

Elba Power/Hold switch



Powering up of the phone is carried out by sliding the switch momentary such that ON1B is grounded and become open-circuit when the switch is released (switch will spring back to original position).
Power up sequence should be initiated after ON1B is grounded for 1 second at the same time meeting the protocert requirement in ED00232 (http://www.reliability.css.mot.com/procs_lab-doi.aspx) for Turn ON time.

Powering down of the phone is achieved by the same sliding and release action. Power down sequence should be initiated after ON1B is grounded for more than 3 seconds at the same time meeting the protocert requirement in ED00232 for Turn OFF time.

It is recommended that this timing is software configurable depending on field trial and user experience during phone Turn ON and Turn OFF.

Key lock function is achieved by sliding the switch to the detent location, connecting the ED_INT3 to ground of the switch.

Key unlock function is achieved by sliding the switch back to its original location, causing the ED_INT3 to become open-circuited at the slide switch.

Elba Memory Specifications

NFC Memory interface

- 128MByte NAND, 16 bit I/O, Large page, 1.8V core and I/O supply
- 64MByte SDRAM, 16 bit data bus, SDR, 1.8V core and I/O supply
- NAND and SDRAM in a MCP Package, 149 bga, Toshiba footprint
-

External Memory Interface Memory Map

Address	Use	Access
ESCTL/MDDRC Memory Space		
0x9000_0000 - 0x9FFF_FFFF	CSD1 SDRAM/MDDR Memory Region (256MB)	Read/Write
NFC Memory Space		
0xB800_0000 – 0xB800_0FFF	NFC Memory Region 1 (4k, NandFlash)	Read/Write

- NAND interface utilizes the NFC of SCMA11. The start address begins at 0xB800_0000.
- SDRAM is selected via CSD_1 and thus is memory is mapped to 0x9000_0000 of the SCMA11 memory interface memory map.
- SDRAM interface uses the ESDCTL of the SCMA-11.

SDHC1 Memory interface

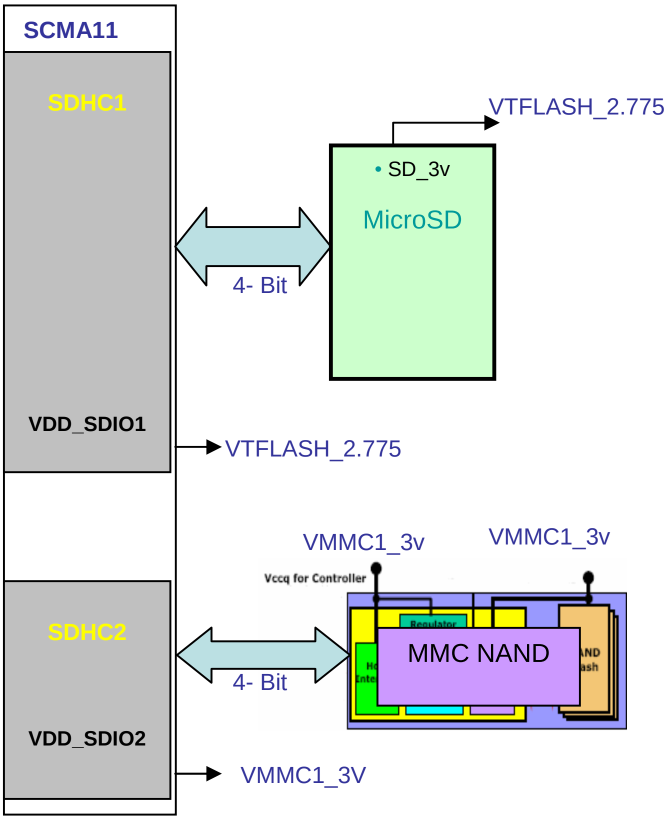
1. External MicroSD (also know as TransFlash)
   The Maximum capacity that it can support is 4 GBytes.

http://compass.mot.com/go/178060946

SDHC2 Memory interface

2. 2GBytes Embedded MMC Nand, MultiMedia Card system Spec Ver 3.2. Compatible. 169 Balls.

Memory Interface Block Diagram



Elba HS USB

- Elba USB-HS block is shown below.
- It supports both USB-FS (default) and USB-HS modes.
- Accessories detection process will be same as before.
- The application design is referenced from Ascension / Lido (http://compass.mot.com/go/ascension). As such the final hardware is subjected to changes.
- Application note can be found in http://compass.mot.com/go/187080302

Explanation of Circuit:

- FX2LP
  - The FX2LP is an USB-HS controller and is accessed by the phone's processor as a memory mapped device for hi-speed connectivity.

- USB Switch

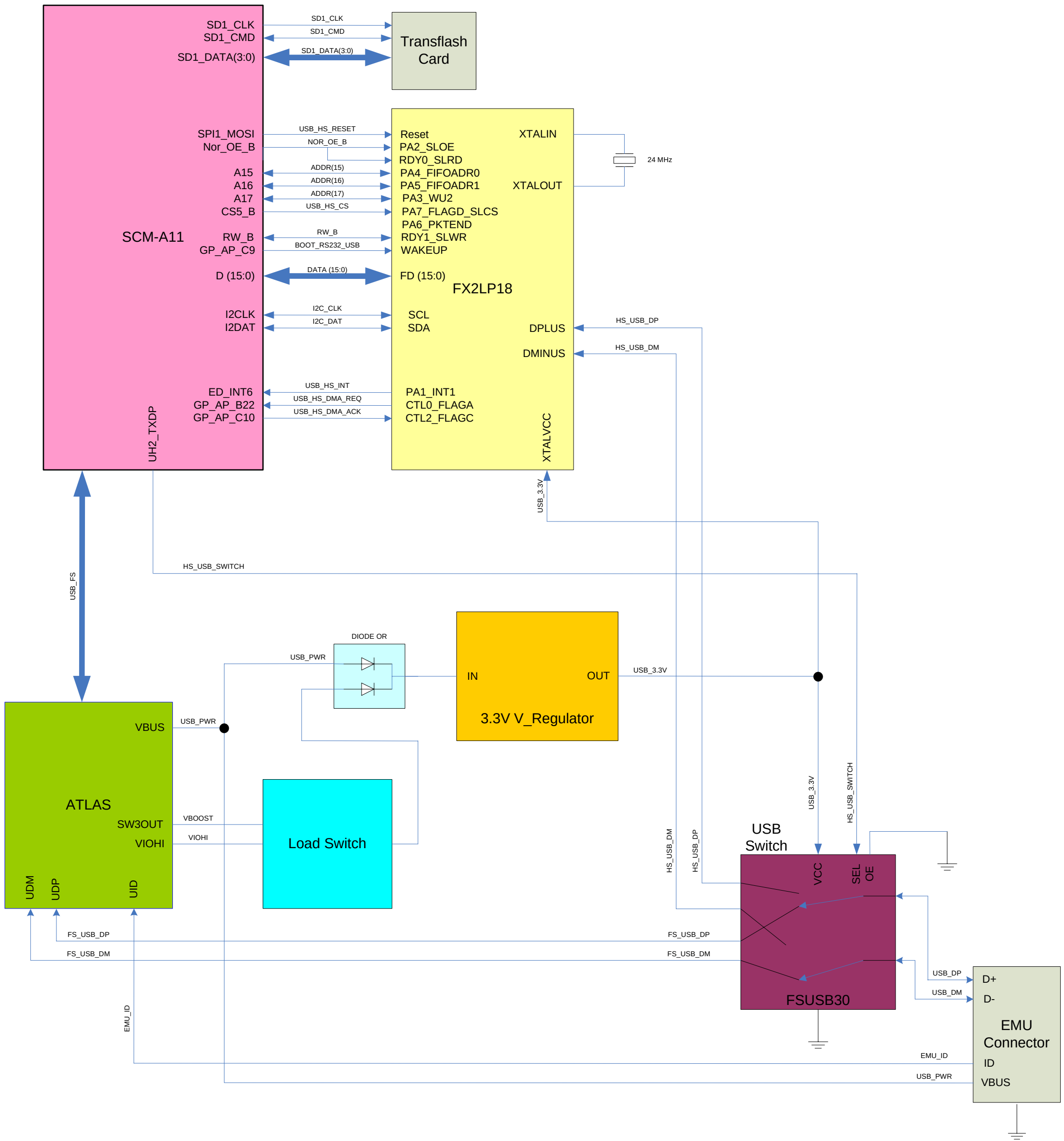
- The switch is to switch between FX2LP and Atlas transceiver for hi-speed and full speed communications respectively and is controlled by SCM-All UH2-TXDP pin. In default mode, the pin is in low state and USB communication will be in full speed mode. High speed communication mode will kick in when the pin is in high state.
- It isolates Atlas during high speed communication so that capacitance of the Atlas pins does not compromise data integrity.
- It isolates FX2LP during accessory detection to prevent the non-powered chip from loading D+ / D- when phone is off.

- Load Switch
  - It will disconnect Vboost from the regulator when phone is off so as to reduce current drain in off mode.

- 24 MHz Crystal
  - FX2LP will only support the 24 MHz clock frequency. Our current architecture is unable to generate this frequency thus this crystal is needed in the circuitry to provide the required frequency.

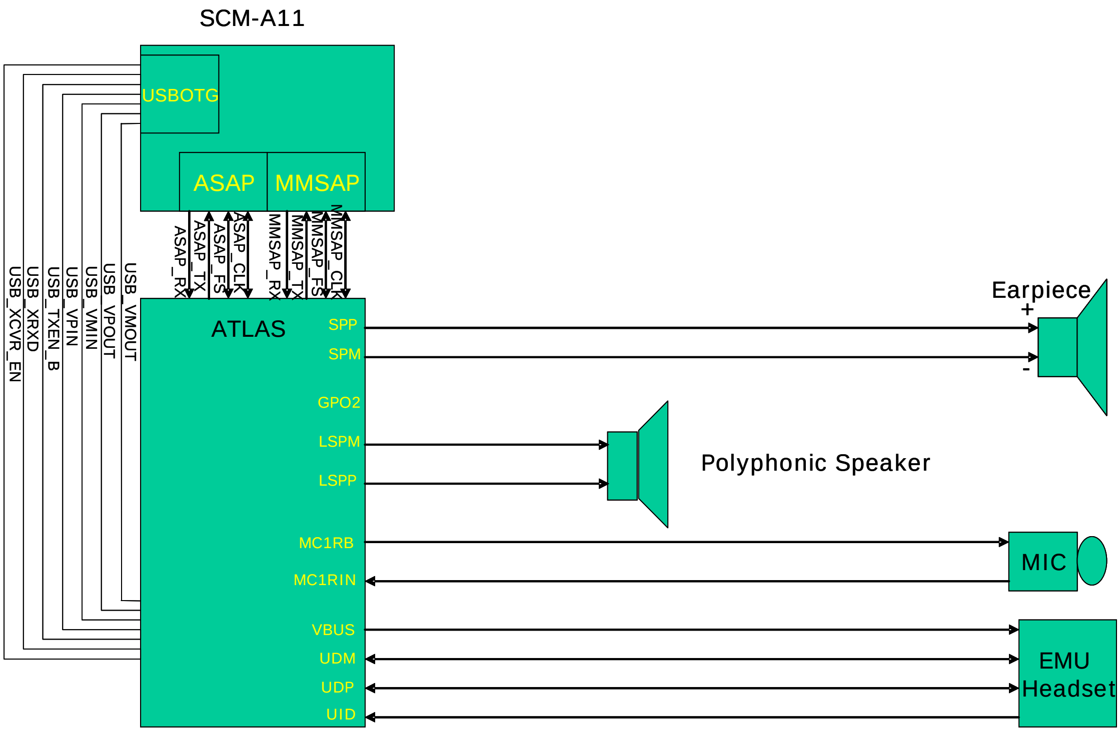
- Discrete 3.3V Regulator
  - This regulator is needed to power the USB switch when the Atlas regulators have not turned on yet. This is needed for charger detection when phone is off.

- VBUS/VBOOST Diode OR
  - VBUS will typically be at 5V for USB, 5V for charger detection, between 5V and 3V with a collapsed charger and between 4.2V and 3V for EMU headset mode. VBOOST will be at 5.5V when the phone is on and at a diode drop below B+ when the phone is off.
  - The USB switch must be powered for charger detection. When the phone is off and the battery safety circuit is open-circuit, the power for the regulator and switch must come from VBUS.
  - During EMU headset mode, the USB switch must be powered at ≥3.3V to prevent audio clipping. Therefore the regulator input must be >3.4V. In this mode, VBUS could be as low as 3V. Therefore VBOOST must be used to power the regulator in this mode.



USB-HS Block Diagram

Elba Audio Interface



Elba Audio block is shown above.

Microphone:
Non Zero Height (NZS) top firing. SCT approved. Motorola Part no. : 5071146E01 (Supplier : Knowles, Supplier P/No.: SPM0204HE5-PB). Specification available at URL http://compass.mot.com/go/203700182

Earpiece speaker:
SCT approved part. The Motorola part number: 5088902Yxx (xx: 01: Pioneer, xx: 02: AAC). Specification available at http://compass.mot.com/go/203700182

Ringer:
Polyphonic Speaker. New part under SCT development roadmap. The Motorola Part no.: 5071508Dxx.
(Supplier: xx = 03: Citizen, xx = 02: AAC)
Specification available at http://compass.mot.com/go/203700182

Headset accessory:
Supports both Mono & Stereo micro USB EMU headset. Part No. for the headset are as follows:

mUSB Stereo Headset – Part number: SYN1458A
Marketing name: S280

mUSB Mono Headset – Part number: SYN1472A
Marketing name: S270

Elba Local Haptics

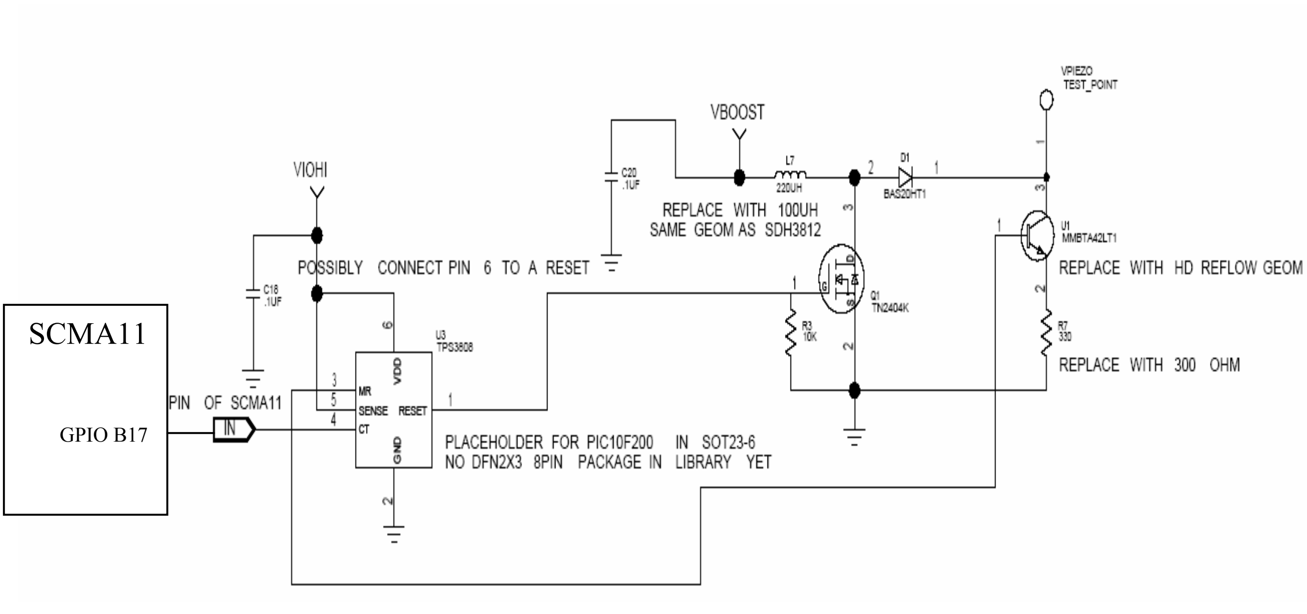
http://compass.mot.com/go/elbahaptics

Haptics is needed for two specific uses cases, namely
a) Multimedia games force feedback
b) keypress tactile feedback

Elba uses a "FSR Membrane Switch" as the keypad. This material does not provide any tactile feedback to the user when a key is pressed, unlike the "metal dome keypad". Hence, a haptics feedback is necessary for keypress.
Elba uses a new type of vibrator called the "piezoelectric transducer".

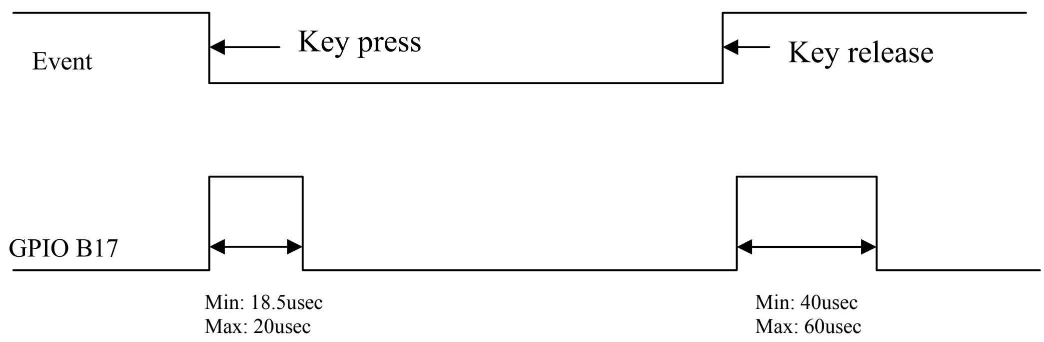
Elba Haptics Implementation

The piezo needs a simple boost regulator circuit and a corresponding discharge circuit driven by a microcontroller for its operation. PIC10F202 is the microcontroller that will be used by Elba. As seen in the schematic below, the microcontroller is connected to GPIO B17 (AP_PWM) pin of SCM-A11.



To generate a "key press haptic" to the user, a single pulse is sent from GPIO B17 to the PIC. The pulse duration should be between 18.5 to 20µs when a valid key is pressed (key down event).

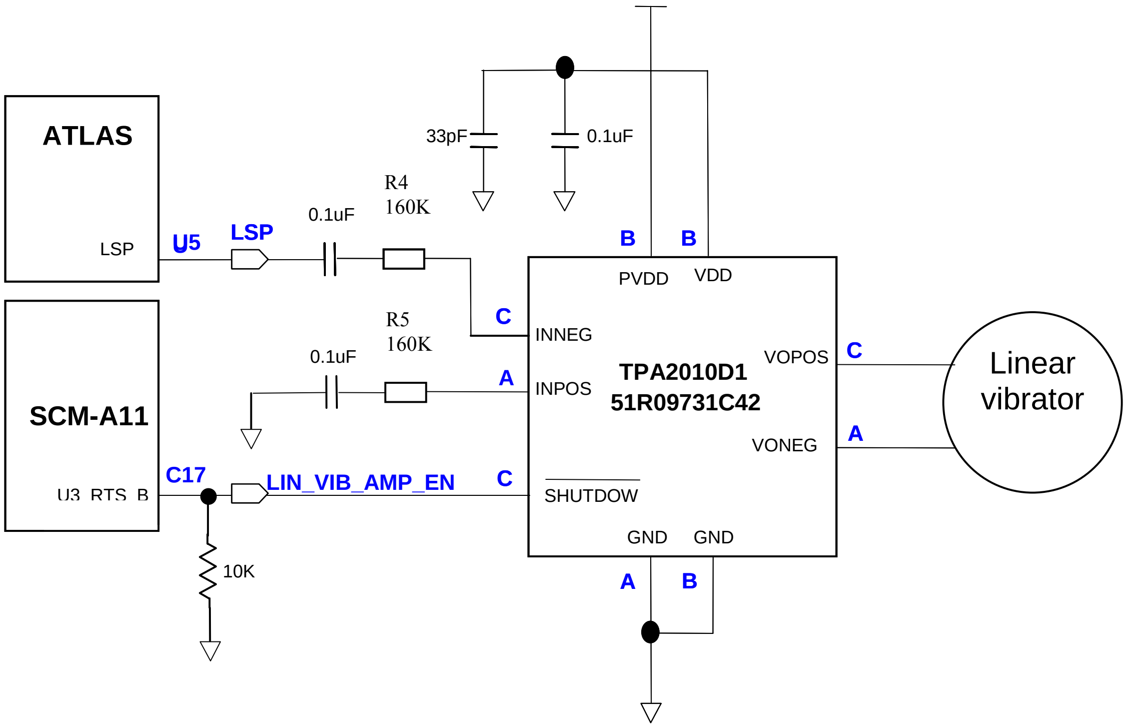
For a key up event(key release), another pulse with a duration of 40 to 60µs is needed.



ELBA Linear Vibrator

The linear vibrator is driven by a 2.5W Class-D audio Power Amplifier (PA) from TI (P/No.: TPA2010) .This PA allows independent gain settings while summing signals from separate sources. It can be configured to operate either in the differential or single ended mode.

In Elba, the PA is designed to operate in the single ended mode and the signal is driving through the negative differential input (INNEG) from LSPL (pin U5) of the Atlas IC (U900). LSPL is the left channel of the loudspeaker.



The amplifier is controlled by the signal from the U3_RTS_B (C17) from SCMA11.

The output of the amplifier is given by the following formula:

$$\text{Vout} = \text{Vin} \times \text{Gain} \qquad \text{where Gain} = \frac{300K}{\text{Rin}}$$

In Elba, the gain for the input driving signal from Atlas audio output has been tentatively set to 3.

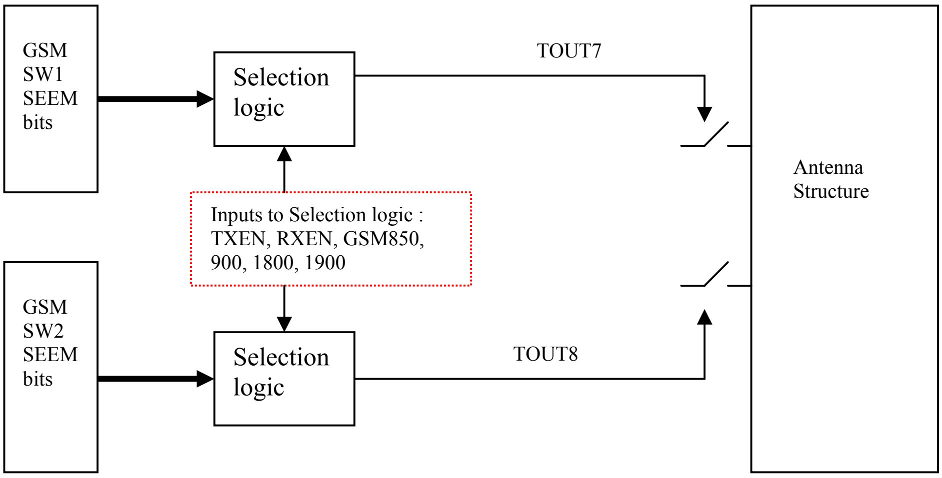
From R1.4.1 onwards, R4 was changed from 62K to 160K and & R5 was change from 100kohm to 160Kohm to synchronize with Lido gain setting

Elba Ambient Light Sensor Interface

This feature is removed from Elba from R2.2 onwards.

Elba Antenna Switch Implementation

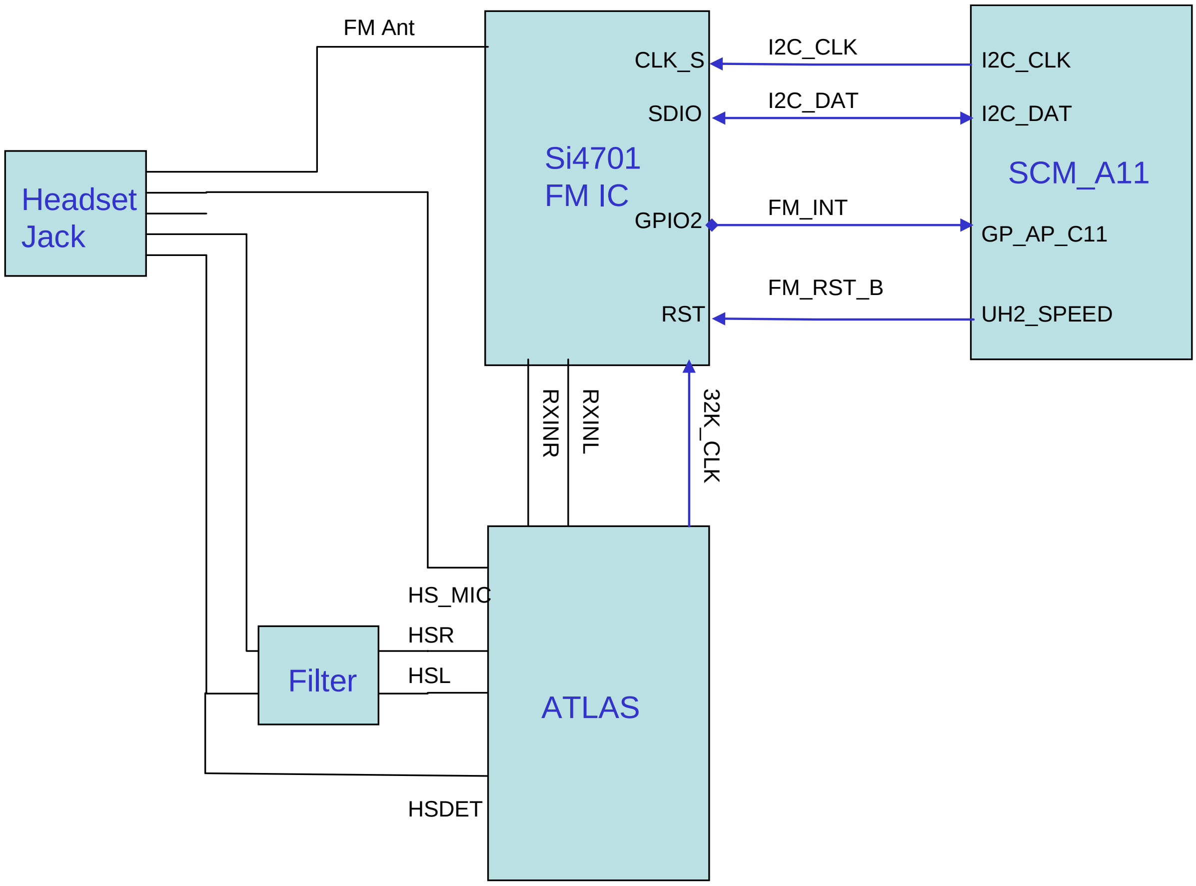
Elba uses an innovative method to tune the antenna between two bands.



Antenna switch control requirements for Quad-band GSM		
	Antenna switch control lines	
Band	Sw1 (TOUT7)	Sw2 (TOUT8)
GSM 850 TX	High	High
EGSM 900 TX	Low	Low
DCS 1800 TX	High	High
PCS 1900 TX	High	Low
GSM 850 RX	High	High
EGSM 900 RX	Low	Low
DCS 1800 RX	High	High
PCS 1900 RX	High	Low

For further details, please refer to the following compass link
http://compass.mot.com/doc/190958508/Reqt_for_antenna_swtiching_sw.doc

Elba FM Radio Implementation



Above schematic indicates interface for Si4701-B, however FM module is changed to Si4703 in PR1 HW onwards, the interface remains the same. The sw for Si4703 can remain the same as for Si4701B.

The FM IC Si4701-B interface with SCM_A11 through I2C bus.

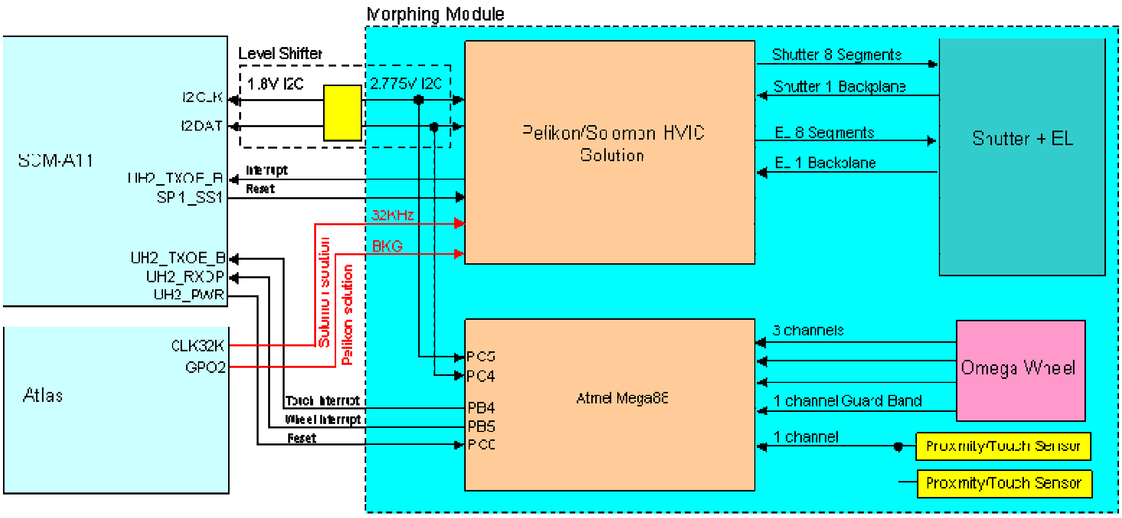
- The FM_INT signal from the GPIO2 of the Si4701-B is the interrupt for RDS Ready (RSDR) and can also function as the SEEK/TUNE COMPLETE (STC) signal to SCM_A11. The two interrupts can be differentiated by polling the bit 15 (RDSR) and bit 14 (STC) of Register 0Ah for “1”. (The detailed register definition can be found in Si4700/01-B spec)
- The Si4701-B is initialized on the rising edge of the signal UH2_SPEED from SCM_A11.

The 32 KHz clock is derived from the Atlas. The stereo output from the FM IC, RXINL and RXINR (Left and Right audio output) are connected to the ATLAS. The final Left and Right audio output (HSL and HSR) from the ATLAS are then connected to the headset jack through filter.

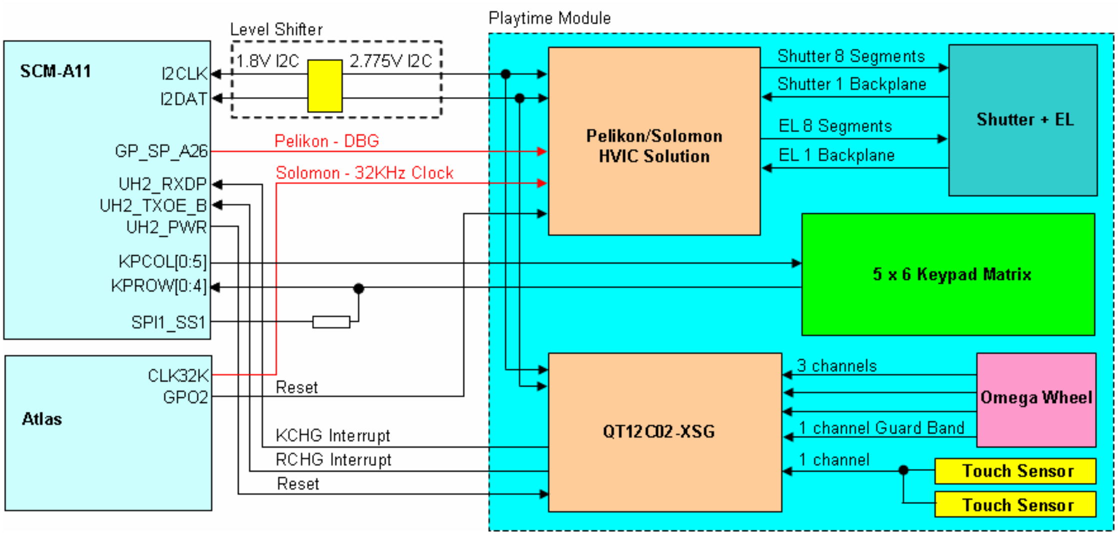
The FM IC RF input (FM Ant) is connected to the FM antenna in the Headset jack.

Elba Playtime Module

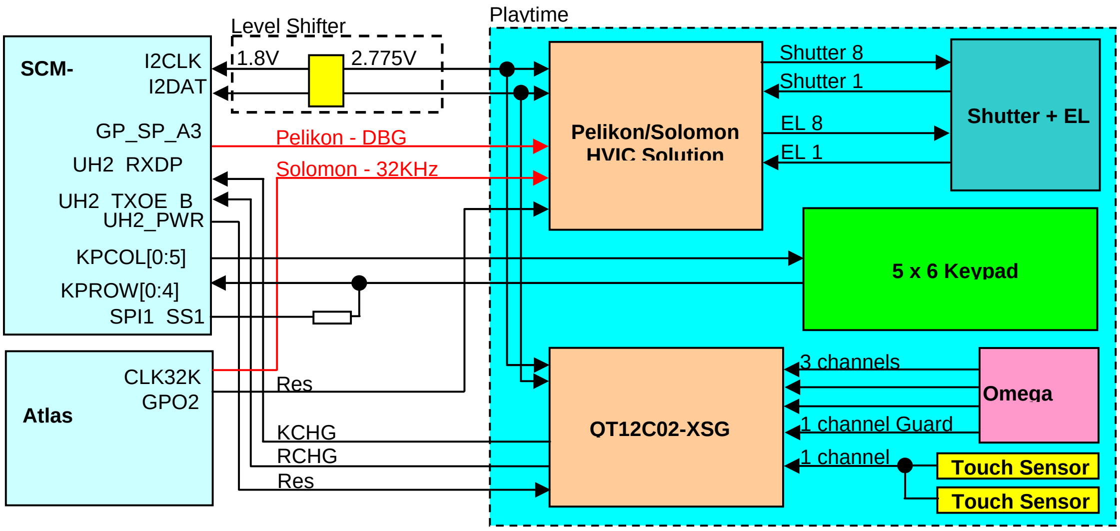
P0 HW Connection:



R1 HW Connection:



R1.3 HW Connection:



UH2_TXOE_B - The signal on Elba is being called TNLC_RCHG. This is the interrupt from the capacitive sensing peripheral that signals the host processor that a user initiated event has occurred on the omega scrolling device. This connection is different from P0.

UH2_RXDP - The signal on Elba is being called TNLC_KCHG_INT. This is the interrupt from the capacitive sensing peripheral that signals the host processor that a user-initiated state change has occurred on touch sensor. This connection is different from P0.

UH2_PWR - The signal is being called CAP_RESET on Elba, and is used for resetting the capacitive sensing peripheral.

GP_SP_A3 – SCMA pin name is **U3_CTS_B**. The signal will be called UI_IC_DBG on Elba. This signal is used for reprogramming the morphing front panel assembly "on the fly" so the phone teams won't have to rework phones or build new ones every time Motorola or the customer wants to change the look and feel of the morphing in some way. This pin is required only for Pelikon solution and not for Solomon solution. This connection is different from R1.

SPI1_SS1 - The signal is being called FSS_HYST on Elba, which is used to provide the net effect of mechanical force hysteresis in the Force Sensing Switch membrane keypad used in some morphing phones. This connection is different from P0.

GPO2 - The signal on Elba is being called TNLC_RESET. This is the reset line to the morphing peripheral. This connection is different from P0.

32kHz clock is required only for Solomon solution and not required for Pelikon solution.

Details located at following compass:

http://compass.mot.com/go/198188971

As this link may not be accessible to everyone, please refer to below person for further information:

SW issues: Richards Dan-ADR096 (Technology Integration SW)
Pelikon HW issues: Wagner Dan-WLDW24 (Technology Integration EE)
Solomon HW issues: Yu Pinky-W19030 (DDC EE)
Elba HW issues: Chew Darren-E12299 (Elba EE)

Elba Power Management

Pls refer to http://compass.mot.com/go/elbapowerdist for the latest power distribution and Atlas' register settings.

Elba Charging SOL and Charging LED indicator

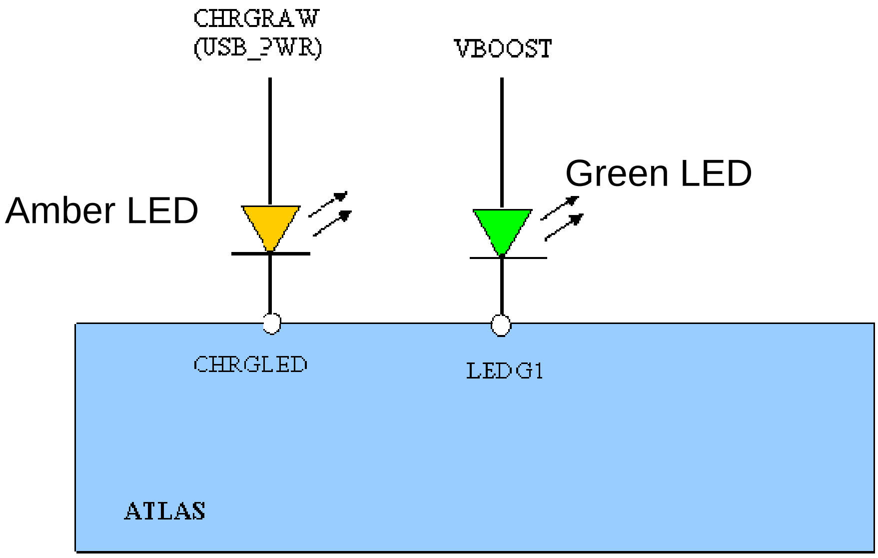
Charging sign-of-life (SOL) for dead battery is supported by the amber LED connecting to CHRGLED of ALTAS. Atlas has a standalone trickle charge mode to ensure that a completely discharged battery can be charged without software control. This mode is required especially when charging from a USB host. In this charging mode, the amber LED will be lit up by Atlas automatically. The LED will remain ON even after battery is charged up and phone is powered up. Software has to clear the CHRGLEDEN bit or program the charger in order to turn off the amber LED.

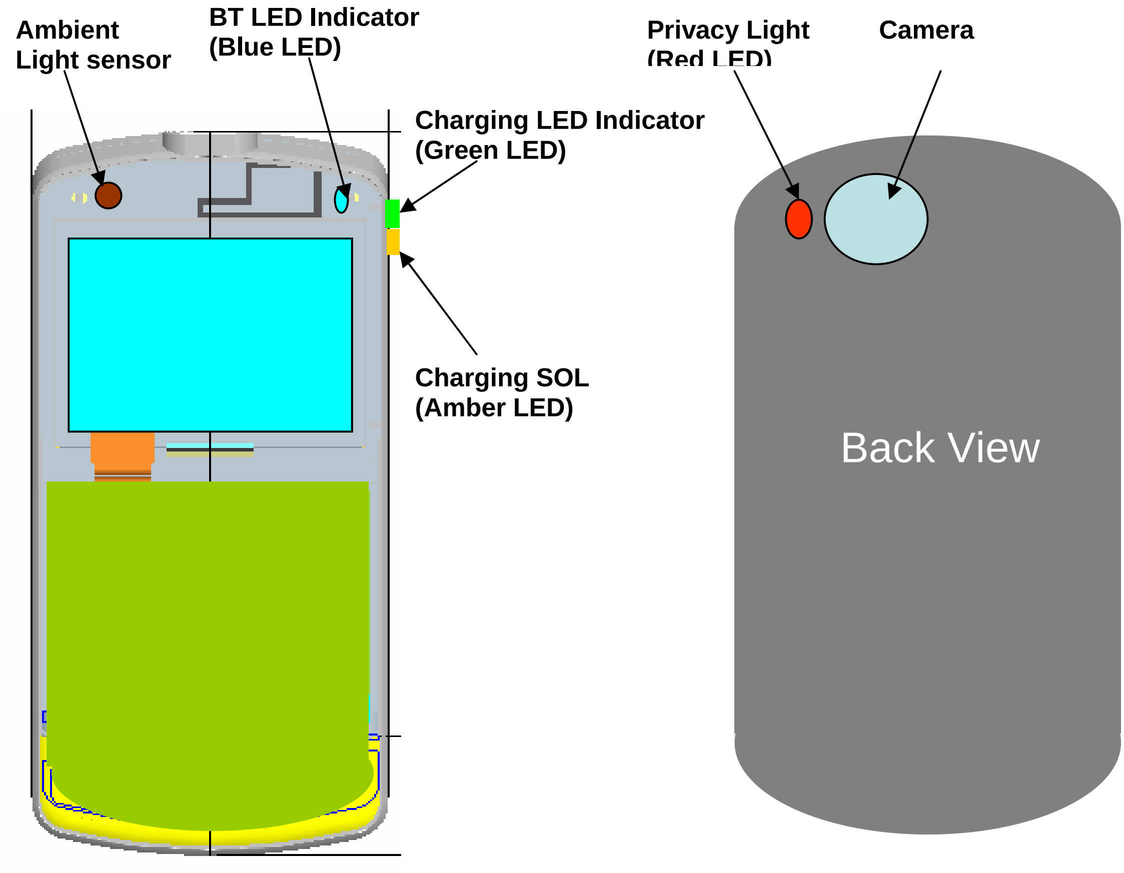
The Green LED is a charging indicator and it is connected to Atlas tri-color LED driver. The Geen LED should be lit up with breathing effect after the Amber LED is turned off by software. Vboost from Atlas' switcher3 has to be turned ON in this case. The breathing pattern of Green LED should be similar to all other Scalpel family products.

One of the condition is that at any one time only either one LED will be lit up to show the charging status.

Current setting for the Green LED (LED G1) is to be 6mA. To be configurable to a optimized value at a later stage.

For details on lighting support, please refer to MRS 16697.


CHRGRAW
(USB_PWR)
VBOOST
Green LED
Amber LED
CHRGLED
LEDG1
ATLAS

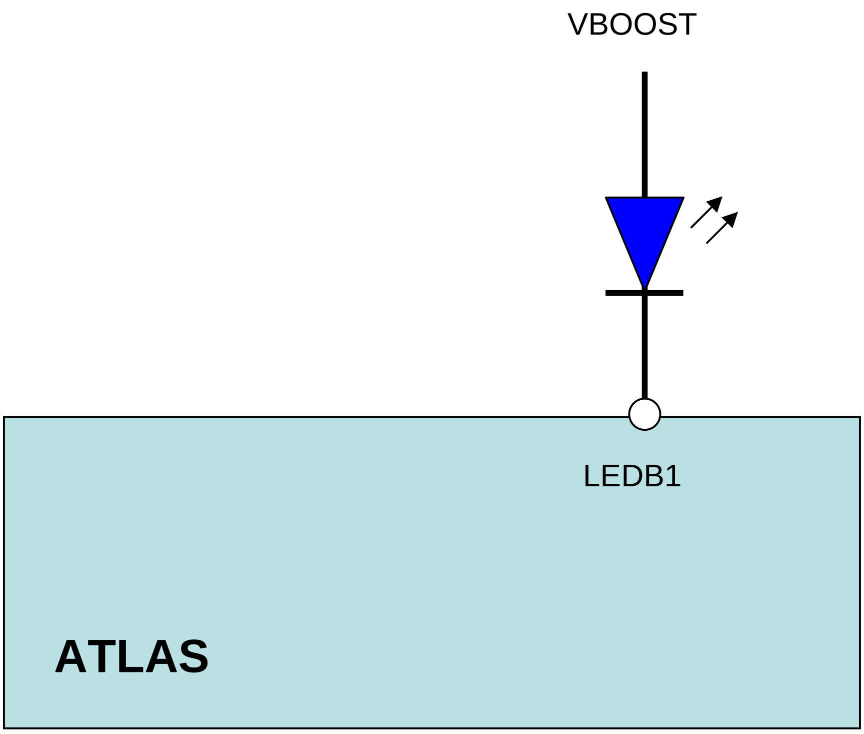


LED indicator and Ambient Sensor location

Elba BT Indicator

Current setting for the LED is to be 6mA. To be configurable to a optimized value at a later stage. For details on lighting support, please refer to MRS 16697**.**

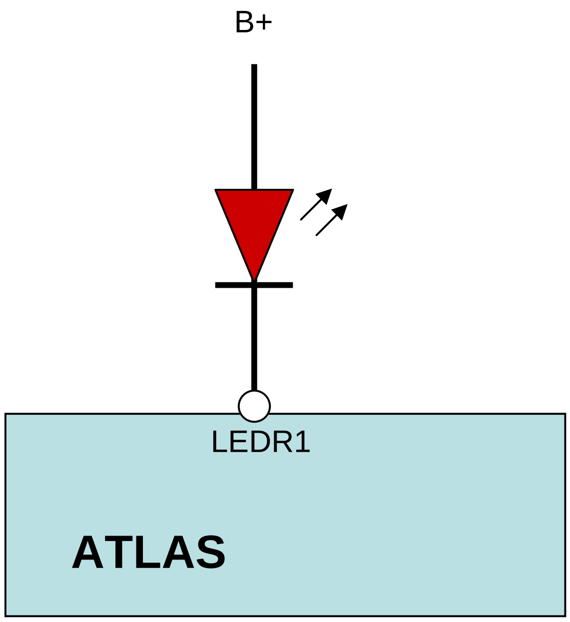
BT Indicator



Elba Camera Privacy Indicator

The camera privacy light is to be turned ON whenever camera sensor is activated. Current setting for the LED is to be 6mA. To be configurable to a optimized value at a later stage. For details on lighting support, please refer to MRS 16697. Supply pin for LED is changed from VBOOST to B+ supply in PR1.3.

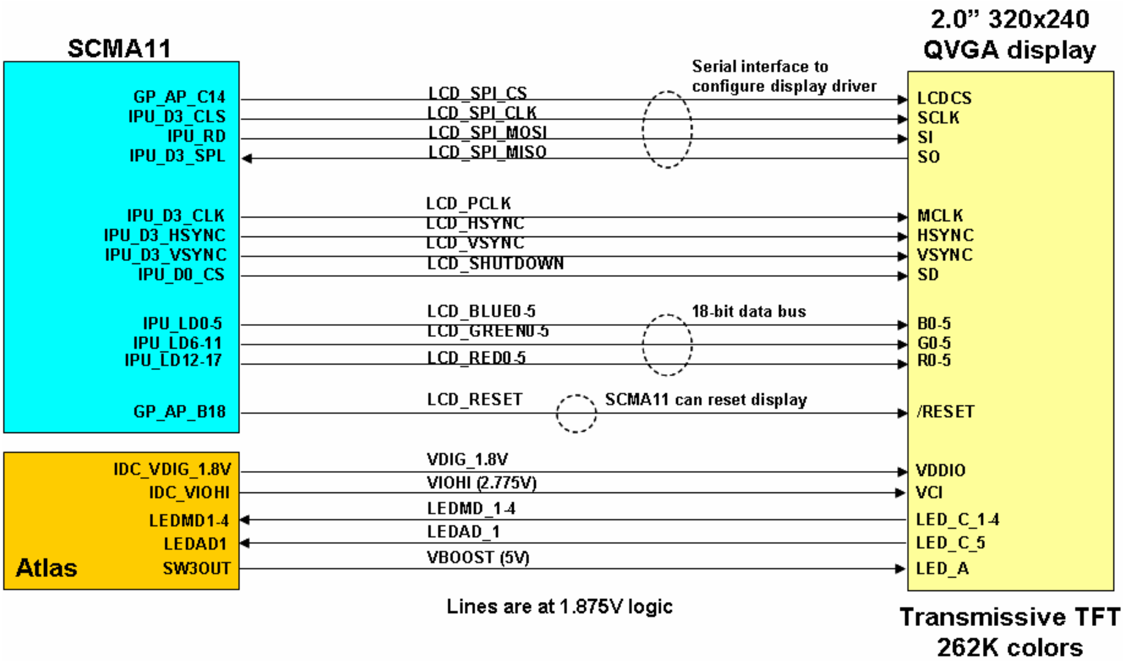
Camera Privacy



Elba Landscape Display Interface

Pin #	Pin Name	Pin Description	IN/OUT	Pin Name in daughter wingboard schematic	Pin connected to SCMA11 (15x15mm) / Atlas
1	B0	Blue 0	IN	LCD_BLUE0	IPU_LD0
2	B1	Blue 1	IN	LCD_BLUE1	IPU_LD1
3	B2	Blue 2	IN	LCD_BLUE2	IPU_LD2
4	B3	Blue 3	IN	LCD_BLUE3	IPU_LD3
5	B4	Blue 4	IN	LCD_BLUE4	IPU_LD4
6	B5	Blue 5	IN	LCD_BLUE5	IPU_LD5
7	G0	Green 0	IN	LCD_GREEN0	IPU_LD6
8	G1	Green 1	IN	LCD_GREEN1	IPU_LD7
9	G2	Green 2	IN	LCD_GREEN2	IPU_LD8
10	G3	Green 3	IN	LCD_GREEN3	IPU_LD9
11	G4	Green 4	IN	LCD_GREEN4	IPU_LD10
12	G5	Green 5	IN	LCD_GREEN5	IPU_LD11
13	R0	Red 0	IN	LCD_RED0	IPU_LD12
14	R1	Red 1	IN	LCD_RED1	IPU_LD13
15	R2	Red 2	IN	LCD_RED2	IPU_LD14
16	R3	Red 3	IN	LCD_RED3	IPU_LD15
17	R4	Red 4	IN	LCD_RED4	IPU_LD16
18	R5	Red 5	IN	LCD_RED5	IPU_LD17
19	GND	Ground	GND	GND_BB	GND_BB
20	MCLK	Dot Clock	IN	LCD_PCLK	IPU_D3_CLK
21	GND	Ground	GND	GND_BB	GND_BB
22	Hsync	Horizontal Synchronization	IN	LCD_HSYNC	IPU_D3_HSYNC
23	GND	Ground	GND	GND_BB	GND_BB
24	Vsync	Vertical Sync	IN	LCD_VSYNC	IPU_D3_VSYNC
25	SO	Serial Data Output	OUT	LCD_SPI_MISO	IPU_D3_SPL
26	SI	Serial Data Input	IN	LCD_SPI_MOSI	IPU_RD
27	SD	Shut Down	IN	LCD_SHUTDOWN	IPU_D0_CS
28	SCLK	Serial Clock (rising edge)	IN	LCD_SPI_CLK	IPU_D3_CLS
29	LCDCS	LCD Chip Select	IN	LCD_SPI_CS	GP_AP_C14
30	/RESET	Reset Signal (active low)	IN	LCD_RESET	GP_AP_B18
31	GND	Ground	GND	GND_BB	GND_BB
32	VDDIO	Logic Voltage	IN	VDIG_1.8V	IDC_VDIG_1.8V (Altas)

		(1.875 V)			
33	VCI	Analog Voltage 2.775 V	IN	VIOHI	IDC_VIOHI (Altas)
34	GND	Ground	GND	GND_BB	GND_BB
35	LED_C_1	LED Cathode	OUT	LEDMD_1	LEDMD1 (Altas)
36	LED_C_2	LED Cathode	OUT	LEDMD_2	LEDMD2 (Altas)
37	LED_C_3	LED Cathode	OUT	LEDMD_3	LEDMD3 (Altas)
38	LED_C_4	LED Cathode	OUT	LEDMD_4	LEDMD4 (Altas)
39	LED_C_5	LED Cathode	OUT	LEDAD_1	LEDAD1 (Altas)
40	LED_A	LED Anode	IN	VBOOST	SW3IN, SW3OUT, SW3FB (Altas)
41	GND	Ground	GND	GND_BB	GND_BB



This interface is almost similar to Saipan Display interface, except for backlight control, which requires additional LEDAD1 for the 5th LED.

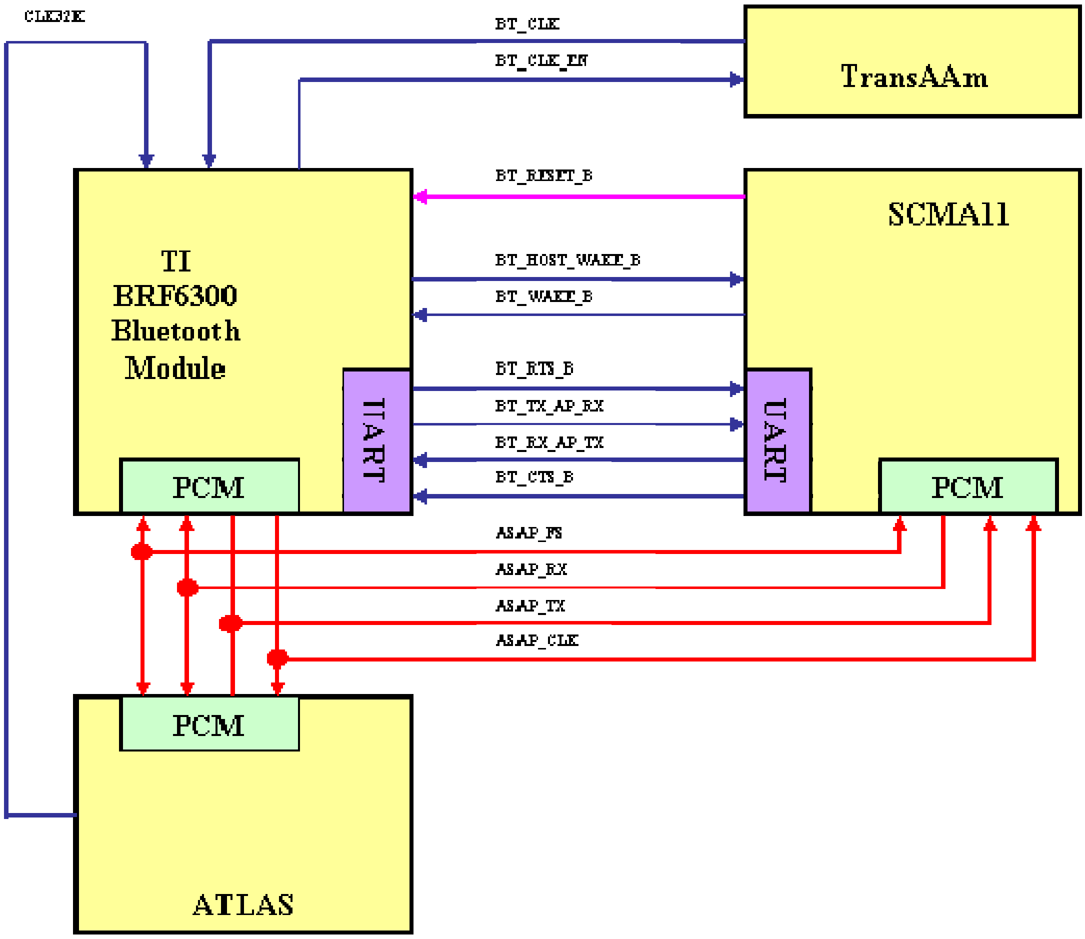
Refer to Elba landscape display specification for timing (6.3.3.4) differences from Saipan I-Module. These timing changes are required for landscape display. Take note on Figure 6.3.3.4.1 (Horizontal Write Timing), Figure 6.3.3.4.2 (Vertical Write Timing) and Figure 6.3.3.4.3 (Pixel Clock Timing).

SW team is required to advise on SCM-A11 IPU buffer memory location.

Landscape Display Motorola P/N: 72RXXXXXXX

Specification is located at: http://compass.mot.com/go/203076060

Elba Bluetooth



Elba uses the TI BRF6300 module 4888735Y04 for Class 2 Bluetooth application. The BRF6300 is a Bluetooth Ver2.0 specification compliance chip and supports Enhance Data Rate (EDR). EDR support 2 and 3 Mbps RF data rate.

The HCI transport layer uses the UART for interface between BRF6300 and SCMA11. The audio codec uses the PCM interface.

BRF6300 system clock is provided by TransAAM. The BRF6300 will request for the 26MHz clock signal through the BT_CLK_EN pin. A 32KHz clock is also required during Deep Sleep Mode (DSM). The 26MHz clock will be switched OFF during DSM.

The BT_RESET_B signal pin from SCMA11 will be used to activate a system reset on the BRF6300.

Actually PCM signal is connected from BT to SCMA11. However, the BT PCM line is sharing with the phone audio PCM line to SCMA11. therefore it is reflected in the schematic as sharing. Only one device will be using the PCM line to SCMA11 at one time. Either you use BT headset or the phone speakers (earpiece or midi).

The 32KHz clock can either be ON or OFF during normal operation. The current configuration in ATLAS for 32KHz is always ON. Moreover, 32KHz is shared between FM and BT.

**BT Deep sleep mode characteristics*

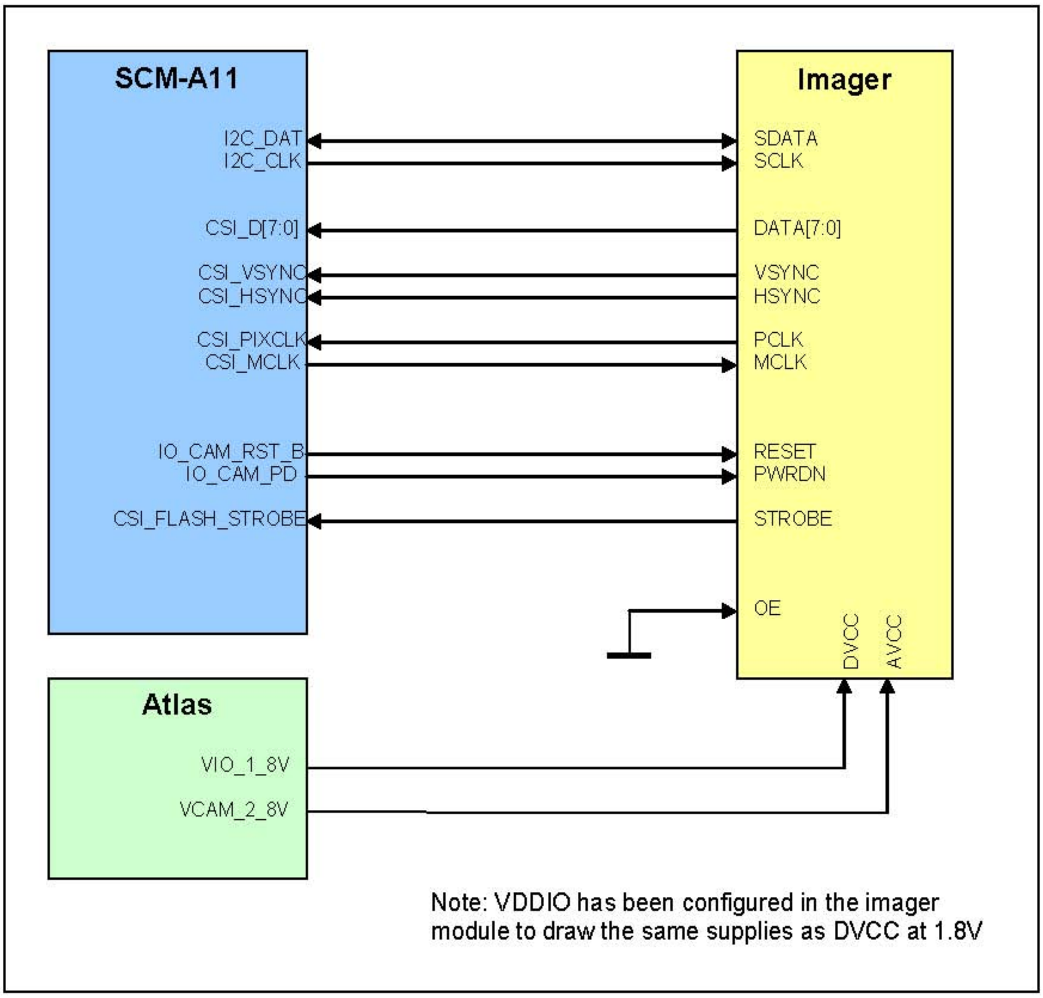
1) Not in Connection but communicating with host (SCMA11)
2) BT device in Sniff, Park or Hold mode
3) Only slow clock (32KHz) is active, fast clock switch off

When exiting from deep sleep mode, SCMA11 will wake BT up using the BT_WAKE_B. Upon waking up, the BT needing a clk signal to operate will sent a logic high on BT_CLK_EN to TransAAM which will provide the 26MHz to BT via BT_CLK line.

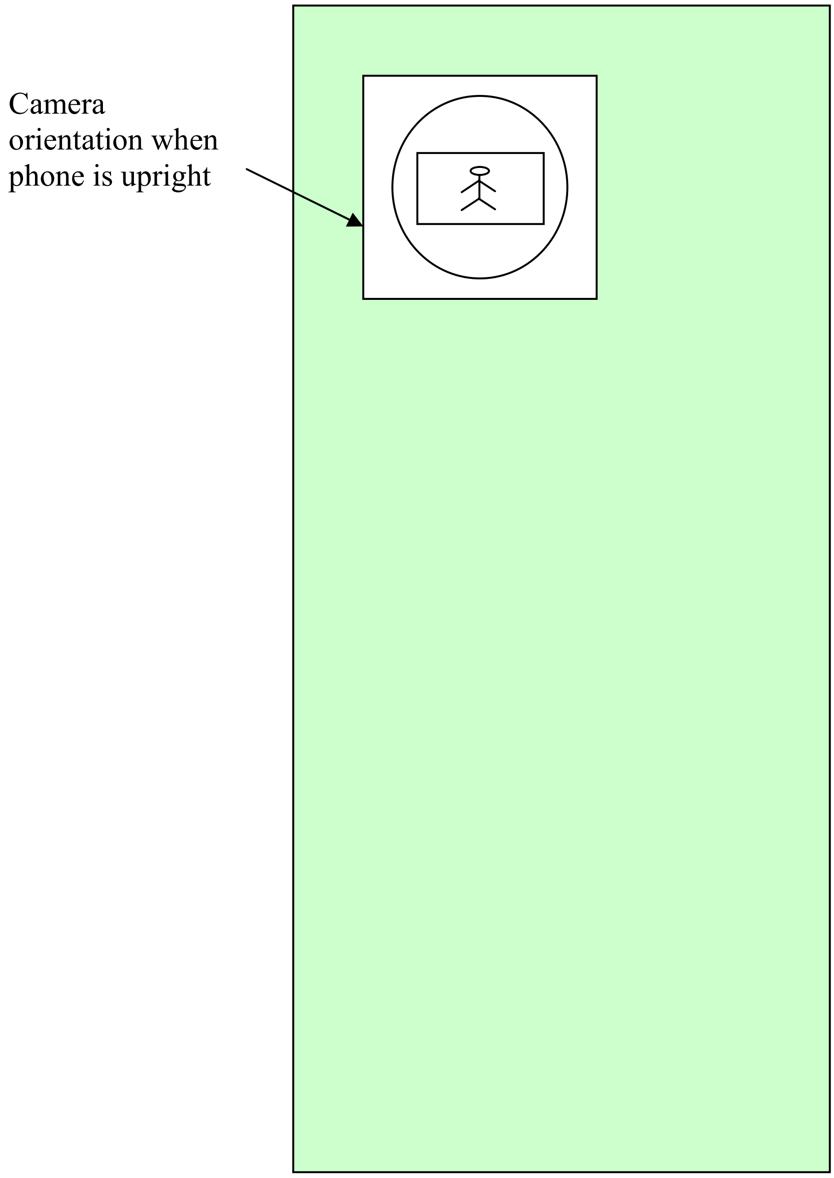
Elba Imager Interface

ELBA uses SOC2020 MICRON 2.0Mpixel Sensor. Please refer to this link for Elba imager driver specification. Below is the interface for the Imager to SCMA11 and Atlas

http://compass.mot.com/go/203068369



The Camera sensor orientation is Landscape.



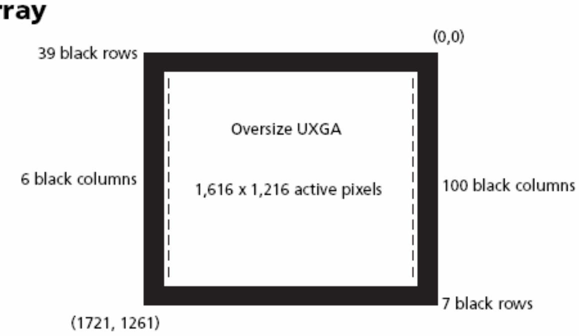
Pixel Array

Pixel Array Structure

The sensor core pixel array is configured as 1,722 columns by 1,262 rows (shown in Figure 4). The first 100 columns and the first 39 rows of pixels are optically black and are used for the automatic black level adjustment; the last 6 columns are also optically black.

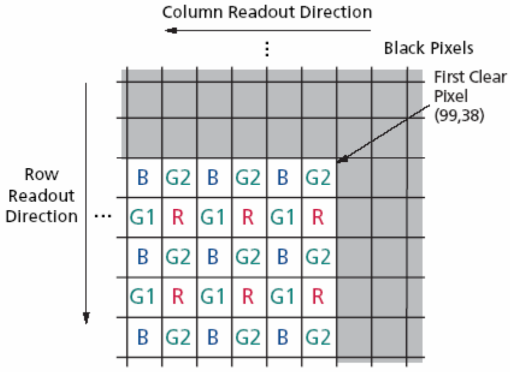
The optically active pixels are used as follows: In default mode a UXGA image (1,616 columns by 1,216 rows) is generated, starting at row 40, column 101. An 8-pixel boundary of active pixels is enabled around the image to avoid boundary effects during color interpolation and correction.

Figure 4: Pixel Array



The sensor core uses a Bayer color pattern, as shown in Figure 5. The even-numbered rows contain green and red color pixels; odd-numbered rows contain blue and green color pixels. Even-numbered columns contain green and blue color pixels; odd-numbered columns contain red and green color pixels.

Figure 5: Pixel Color Pattern Detail (Top Right Corner)



Default Readout Order

By convention, the sensor core pixel array is shown with pixel (0,0) in the top right-hand corner (see Figure 4 on page 12). This reflects the actual layout of the array on the die. When the sensor is imaging in a system, the active surface of the sensor faces the scene as shown in Figure 6.

When the image is read out of the sensor, it is read one row at a time, with the rows and columns sequenced. By convention, data from the sensor is shown with the first pixel read out-pixel (99,38) in the case of the sensor core-in the top lefthand corner.

Figure 6: Imaging a Scene