LGD1
nokia 5110 lcd V2

Vraw — R1 4k7 1/4W THP — LCD_Reset	1	RST
LCD_ChipEnable — R3 100R 1/4W THP	2	CE
LCD_DataCommand — R4 100R 1/4W THP	3	DC
LCD_DataIn — R5 100R 1/4W THP	4	DIN
LCD_Clock — R6 100R 1/4W THP	5	CLK
Vraw	6	VCC
R7 4k7 1/4W THP — LCD_BackLight	7	BL
	8	GND

FootprintIndName
ManufacturerCode

BackLight on if BL tied Low
assume reset is active low

GND

MOD1-RFID
RFID module

3v3 — R2 1/4W THP 4k7	RFID_CS	1	SDA / SS	3v3 / 8 → 3v3
	RFID_SCK	2	SCK	
	RFID_MISO	4	MISO	
	RFID_MOSI	3	MOSI	
	Reset_b	7	RST	
		5	IRQ	GND 6

FootprintIndName
ManufacturerCode
GND

I2C pullups not fitted on Arduino
Address 0x57

U1A
Arduino Pro Mini

LED_A0	26	PC0 / A0 / D14	PD0/ D0 / RXI	11 UART_MOD_2_ARD
LCD_BackLight	25	PC1 / A1 /D15	PD1 / D1 / TXO	12 UART_ARD_2_MOD
V_Meas	24	PC2 / A2 /D16	PD2 / D2	8 Buzzer
Config	23	PC3 / A3 /D17	PD3 / D3	7 LED_D3
SDA	33	A4 / SDA	PD4 / D4	6 LCD_Clock
SCL	34	A5 / SCL	PD5 / D5	5 LCD_DataIn
	31	A6	PD6 / D6	4 LCD_DataCommand
	32	A7	PD7 / D7	3 LCD_Reset
			PB0 / D8	2 LCD_ChipEnable
			PB1 / D9	1 Reset_b
			PCB2 / D10 / SS	30 RFID_CS
			PB3/ D11 / MOSI	29 RFID_MOSI
			PB4 / D12 / MISO	28 RFID_MISO
			PB5 / D13 / SCK	27 — R19 100R 1/4W THP — RFID_SCK

FootprintIndName
ManufacturerCode

Dip switch connects to D17
Can be used to set a mode by flipping switch and
reading pin

S2
2way DIP Switch 2.54mm pitch

Vraw — R20 Config 4k7 1/4W THP
GND GND

MOD2-RTC
Real Time Clock DS3231

3v3 3v3 — R8 4k7 1/4W THP / R9 4k7 1/4W THP	SCL	3	SCL	VCC 5 Vraw
	SDA	4	SDA	
		1	32k	
		2	SQW	GND 6

FootprintIndName
ManufacturerCode
GND

MOD3-BT
Bluetooth module

UART_ARD_2_MOD	5	RXD	VCC	2 Vraw
UART_MOD_2_ARD	4	TXD		
Vraw — R18 4k7 1/4W THP — BT_enable	1	EN		
	6	STATE	GND	3

FootprintIndName
ManufacturerCode
GND

U1B
VASTechPartNumber

Vraw	19	RAW	RESET	21
3v3	22	VCC	RESET	10
	13	GND		
	14	GND		
	15	VCC		
	16	RXI		
	17	TXO	GND	9
	18	DTR	GND	20

FTDI UART
FootprintIndName
ManufacturerCode
GND

Vraw is battery teh unregulated voltage 4.2 - 3.2V
The Arduino Modules regulated this to 3.3v uning a
MIC5205 LDO capable of 150mA

LEDs in top Corners

Vraw — R10 100R 1/4W THP — LED1 Red 5mm LED_D3
Vraw — R11 100R 1/4W THP — LED2 Red 5mm

LEDs in bottom Corners

Vraw — R12 100R 1/4W THP — LED3 Red 5mm LED_A0
Vraw — R13 100R 1/4W THP — LED4 Red 5mm

Prefered LED is L-53SRD - Super Bright
Starting Resistro value for LED - 100R

R=100 (3.3 - 2.5) / 100 = 8mA
R=150 (3.3 - 2.5) / 150 = 5.3mA
R=220 (3.3 - 2.5) / 220 = 3.6mA
R=300 (3.3 - 2.5) / 300 = 2.6mA

Power and Buzzer

Power Budget
Rought power draw 250mA

0.15 A   - Arduino pro mini
0.0002 A - Display "
0.0002 A - RTC
0.03 A   - BT
0.03 A   - RFID

Vraw — R14 1/4W THP 100R — LED5 Red 5mm
GND

MOD4
1S 3.7V Lithium Battery Capacity Indicator Module 4.2V
Vraw + —
GND

BAT1
Battery Holder
VCC GND
GND

S1
Slide Switch 3mm pitch

	NC	
Vbatt	VCC	
Vraw	NO	

Indicate On / OFF in Overlay

P1 Buzzer Connector
Vraw
1
2
3

Buzzer — R16 100R 1/4W THP — Q1 2n3904
GND

Vraw — R15 4k7 1/4W THP — V_Meas
R17 4k7 1/4W THP
GND

V_meas = VCC/2

Vadc = (Vmeas x 1024) / Vref
{Vref must be set to Avcc (3.3V) }
{if Vref = 1.1V , use 4k7 and 15k
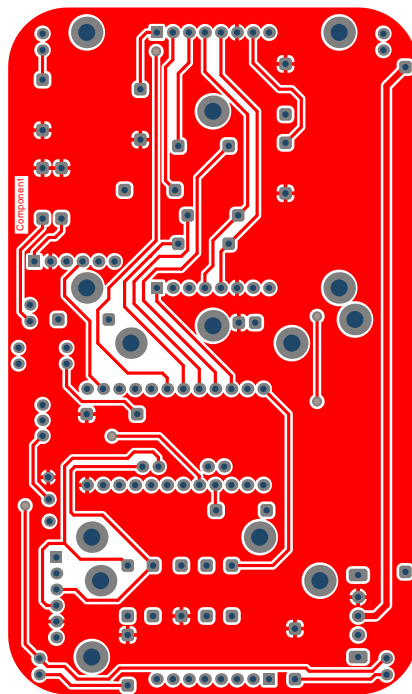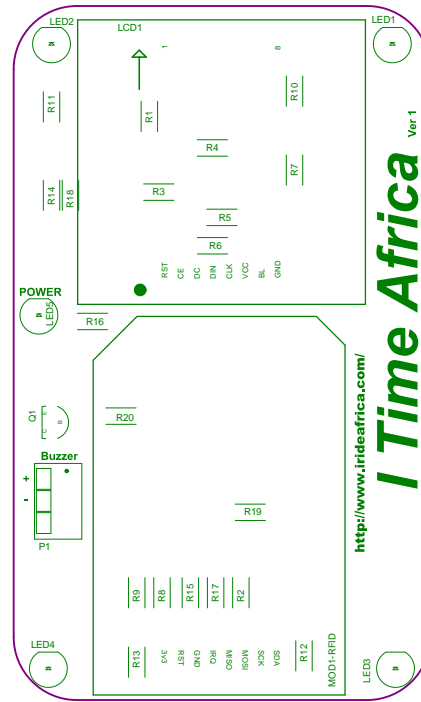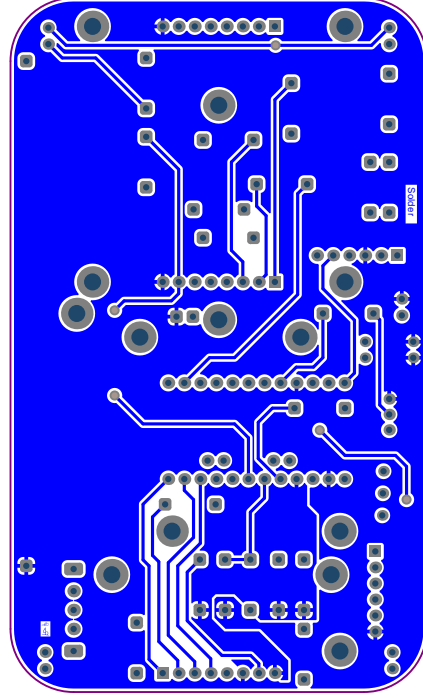divider}

	1	2	3	4	

Links to Component ordered

LCD   https://www.aliexpress.com/item/84-48-LCD-Module-White-backlight-adapter-pcb-for-Nokia-5110/1859113549.html?spm=a2g0s.9042311.0.0.fpwn1h

Ardunio   https://www.aliexpress.com/item/2PCS-New-Pro-Mini-Atmega328-3-3V-8M-Replace-ATmega128-For-Arduino-Compatible-Nano/2037934450.html?spm=a2g0s.9042311.0.0.wP2Mco

RTC   https://www.aliexpress.com/item/DS3231-AT24C32-IIC-High-Precision-RTC-Module-Clock-Timer-Memory-Module/2037934408.html?spm=a2g0s.9042311.0.0.wP2Mco

Bluetooth   https://www.aliexpress.com/item/Wireless-Serial-6-Pin-Bluetooth-RF-Transceiver-Module-HC-05-RS232-Master-Slave/2038549888.html?spm=a2g0s.9042311.0.0.wP2Mco

RFID   https://www.aliexpress.com/item/13-56MHz-RFID-MF-RC522-RC-522-Reader-Writer-Module-I2C-Interface-2-Pins-Sensor-Card/32785550279.html?spm=a2g0s.9042311.0.0.wP2McoLEDs in bottom Corners

Slide Switch   http://www.communica.co.za/Catalog/Details/P2077750286
http://www.communica.co.za/catalog/Details/P2624616678

Generic Component

LEDs   5mm rount through hole
http://www.communica.co.za/Catalog/Details/P2732841061
http://www.communica.co.za/Catalog/Details/P4141732095
http://www.communica.co.za/Catalog/Details/P3165777451

Transistor   2n3904 npn Bipolar 200mA 60V
http://www.communica.co.za/Catalog/Details/P0173638625

Screw Terminal   3 pin / 2 pin 3.5mm pitch
https://www.netram.co.za/2955-screw-terminal-35mm-2-pin-5-pk.html

Resistors   Axial Carbon Film resisor 1/4W

I Ride Africa

Title	I Time Africa		
Size	Number		Revision
A4			V1
Date:	17/12/15	Sheet 2of	2
File:	C:\Users\...\Notes.SchDoc	Drawn By:	P Henning

Component Side

LED2

LCD1

LED1

R11

R10

R1

R4

R7

R14
R18

R3

R5

R6

RST CE DC DIN CLK VCC BL GND

POWER
LED5

R16

I Time Africa Ver 1

http://www.irideafrica.com/

Q1

R20

Buzzer

+ −

P1

R19

R9 R8 R15 R17 R2

R13

3V3 RST GND MISO MOSI SCK SDA

R12

MOD1-RFID

LED4

LED3

Top Overlay

Bottom Layer

VCC (3.3V)

MOD3-BT

Date:

BAT1

MOD4

EN
VCC
GND
TXD
RXD
STATE

S2

D9
D8
D7
D6
D5
D3
D2
GND
RST
RXI
TXO

Config

− +

U1

A6
A7
A8
A9

A5
A4

SCK
MISO
MOSI
SS
A0
A1
A2
A3
RST
VCC
GND
RAW

SN:

GND

32k
SQW
SCL
SDA
VCC
GND

ON

S1

OFF

MOD2-RTC

Bottom Overlay

PCB MANUFACTURING INFORMATION

CONSTRUCTION

FAB SPECIFICATION	IPC-6012 CLASS	■ 2	□ 3 □ MIL-SPEC P-55110
LEAD-FREE RoHS	■ YES	□ NOT REQD	
MATERIAL	■ FR4	□ FR408HR	□ OTHER_____
SPECIAL CORES	■ YES	□ NO	□ OTHER_____
FINAL PCB THICKNESS	1.6mm		
THICKNESS TOLERANCE	10%		
LAYER COUNT	□ 2		

LAYER STACK-UP	■ MECHANICAL LAYER		□ FILENAME_____
ALLOW PCB ROTATION	■ NO	□ YES - 90 / 270 DEGREES	
IMPEDANCE CONTROL	■ NO	□ YES	□ PER STACKUP
SUPPLY TEST COUPONS	■ NO	□ YES	
BOARD EDGE	NO EXPOSED COPPER		

BOW & TWIST	0.75% SMT (IPC-TM-650 Method 2.4.22)		
PROFILING	NC-ROUTE	□ V-SCORE	□ BOTH AS INDICATED
PROFILE TOLERANCE	+/- 0.15mm	□ +/- 0.2mm	□ +/-0.25mm

CONDUCTIVE MATERIAL

QTY SIGNAL LAYERS	■ 2		
QTY COPPER PLANES	□ 0		
MIN TRACE WIDTH	■ 0.2mm		
MIN CLEARANCE	■ 0.2mm		
Cu TRACE TOLERANCE	+/- 5%mm	□ +/- 10%	□ +/- 15%
Cu THICKNESS INTERNAL	17um	■ 35um	□ PER STACKUP
FINAL Cu THICKNESS EXT	17um	■ 35um	□ PER STACKUP
PLATING FINISH	■ ENIG	□ FLASH GOLD	□ OTHER____
EXTERNAL PLATING	■ CLASS 2 - 20um	□ CLASS 3 - 25um	
SELECTIVE Au PLATING	■ NO	□ AS INDICATED	□ ON EDGE FINGERS

INTERCONNECTS

DRILL PROCESS	■ THT	□ BLIND & BURIED VIAS	□ MICRO VIAS
FILLED VIAS	■ NO	□ YES	□ SELECTIVE
IPC-4761 VIA TYPE	■ I(a) TENTED	□ VI - FILLED & COVERED	□ VII - FILLED & CAPPED
FILLING METHOD	■ CONDUCTIVE	□ NON-CONDUCTIVE	
HOLE PLATING	■ CLASS 2 - 20um	□ CLASS 3 - 25um	
MIN DRILL SIZE	0.25mm		
MIN FINISHED HOLE	1mm		
MIN HOLE TO COPPER	■ 0.2mm		
FINAL HOLE SIZE	AS PER DRILL TABLE		□ CUSTOM INSTRUCTION
HOLE SIZE TOLERANCE	+/- 0.075mm	□ +/- 0,1mm	□ +/- 0,215mm
HOLE POSITION TOL (GDT)	0.075mm	■ 0.085mm	
MIN ASPECT RATIO	6.4: 1		

COSMETICS

SOLDERMASK SIDES	□ TOP	□ BOT	■ BOTH SIDES
SOLDERMASK TYPE	PHOTO IMAGEABLE (SMOBC)		
SOLDERMASK COLOUR	■ GREEN	□ BLUE	□ RED □ BLACK □ WHITE
SOLDERMASK WEBBING	GANG RELIEF NOT ALLOWED, UNLESS BELOW CAPABILITY		
SILKSCREEN COLOUR	■ WHITE	□ YELLOW	□ OTHER_____
SILKSCREEN PRINT	NO LEGEND TO BE APPLIED OVER SOLDER PADS		
SILKSCREEN QTY	□ TOP	□ BOT	■ BOTH SIDES
SILKSCREEN OVER PADS	■ NOT PERMITTED, PLEASE REMOVE IF PRESENT		

MANUFACTURING DEVIATIONS

PAD REMOVAL	■ NO	□ ALLOWED ON UNUSED PADS ON INNER LAYERS	
TEARDROPPING	■ NO	■ YES	
THIEVING	■ NO	□ WHERE INDICATED	□ ALLOWED ON PANEL STRIPS

ADDITIONAL REQUIREMENTS

ELECTRICAL TEST	□ NONE		■ FLYING PROBE
MANUFACTURER LOGO	■ ALLOWED	□ NO	
BATCH No ON S/SCREEN	■ YES	□ NO	
CERTIFICATE REQ'D	■ E-TEST	□ UL94	□ IPC-6011/12 □ MIL-SPEC P-55110
SILKSCREEN SERIAL #	□ YES	■ NO	

FINGER EDGE CONNECTOR

PLATING THICKNESS	□ 1um	□ 2um	□ 5um
PLATING TYPE	■ HARD GOLD		□ ENIG
CHAMPHER ANGLES	□ 20°	□ 30°	□ 45°
CHAMPHER HEIGHT	□ ???		
DETAIL	□ NO		□ YES, SEE MECHANICAL LAYER

66.00

110.00
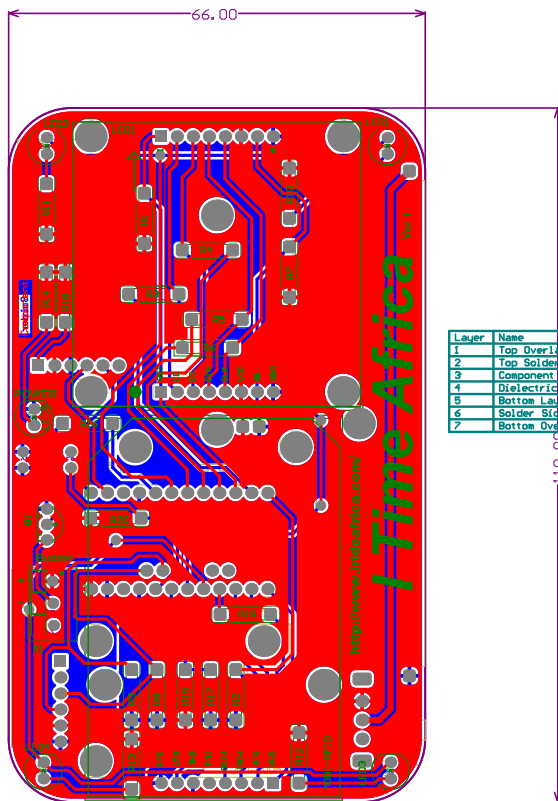
Layer	Name	Material	Thickness	Constant	Board Layer Stack
1	Top Overlay				
2	Top Solder	Solder Resist	0.010mm	3.5	
3	Component Side	Copper	0.036mm		
4	Dielectric 1	FR-4	1.500mm	4.2	
5	Bottom Layer	Copper	0.036mm		
6	Solder Side	Solder Resist	0.010mm	3.5	
7	Bottom Overlay				

PCB ASSEMBLY INSTRUCTIONS

1: RoHS BUILD	□ NO	■ YES
2: WASH PCB	■ NO	□ YES
3: THL COMPONENT LEGS	< 2mm CUT BEFORE ASSEMBLY	
4: BREAK PCB FROM PANEL	■ NO	□ YES
5: X-RAY PCB	■ NO	□ YES
6: OPTICAL INSPECTION	□ NO	■ YES
7: BASIC ELECTRICAL TEST	■ NO	□ YES
8: ASSEMBLY CALIBRATION	■ NO	□ YES
9: PRODUCTION PROGRAMMING	■ NO	□ YES
10: CONFORMAL COATING	■ NO	□ YES
11: STATIC SENSITIVE	□ NO	■ YES

Top/Bottom Side

Assembly Variant [No Variations]

I Ride Africa

I Time Africa

DATESTAMP OF THIS PRINT 2:29:25 PM

17/12/15

ASSEMBLY DRAWING

PRJ_Title

I Ride Africa

PRJ_Number ASSY

PROJECT NUMBER

SHEET 1 OF 2

DRAWN Undero_Timer_pcb v1.PcbDoc

MANUFACTURING DRAWING

I Time Africa

PRJ_Title

V1.0

Item #	mn Name Error:Manufa	#Column Name Error:Manufacturer No	Quantity	#Column Name Error:Note	Designator	Description	Column Name Error:Footpri	#Column Name Error:Comment	LibRef
1			1		BAT1	Battery Holder			Battery Holder
2			1		LCD1	nokia 5110 lcd V2			nokia 5110 lcd V2
3			5		LED1, LED2, LED3, LED4, LED5	Red LED, 5mm THP			Red LED THP
4			1		MOD1-RFID	RFID module			RFID module
5			1		MOD2-RTC	Real Time Clock DS3231			Real Time Clock DS3231
6			1		MOD3-BT	Bluetooth module			Bluetooth module
7			1		MOD4	1S 3.7V Lithium Battery Capacity Indicator Module 4.2V			Battery Indicator
8			1		P1	3 pin Screw Terminal 3.5mm			3 pin Screw Terminal 3.5mm
9	NPN Transistor		1		Q1	NPN Transistor			NPN Transistor
10			8		R1, R2, R7, R8, R9, R17, R18, R20	Resistor			4k7
11			11		R3, R4, R5, R6, R10, R11, R12, R13, R14, R16, R19	Resistor			100R
12			1		R15	Resistor			15K
13			1		S1	Slide Switch 3mm pitch			Slide Switch 3mm pitch
14			1		S2	2way DIP Switch 2.54mm pitch			2way DIP Switch 2.54mm pitch
15	Arduino Pro Mini		1		U1	Arduino Pro Mini			Arduino Pro Mini