

## INFORMAL REVISION HISTORY

- \* 071102
  - STARTED WITH TK0149 DEVELOPMENT BOARD
  - REMOVED SWITCHES, BZR, VIBE, OSRAM DISPLAY ETC
  -
- \* 071107 - Steve
  - ADD Bridge Rectifier into charge circuit.
  - Change L4 to MURATA low profile (0.9mm height) chip coil, MURATA P/N: LQH2MCN100K02
  - Identify the part no. and package of P2&P3
  - Identify E1, E2, E3, E4, E5 position.
  - Identify the position and direction of OLED connector
  - Add FPC connectors
  - Clarify the pads of OLED bracket (See PCB)
- \* 071119 - Chet
  - ADD INPUT POWER BRIDGE
  - ADD POWER MUX
  - ADD MANUAL RESET CIRCUIT
  - ADDED ESD PROTECTION ON BUTTON INPUTS
- \* 071127 - Steve
  - ADD Test points for Production (TP1 to TP15)
  - ADD Reserve Pi-matching-network component, Add RF Testpoint TP16
- \* 071127 - Chet
  - Move RF testpoint outboard of matching network to allow better coverage
- \* 080220 - Chet
  - Move vibe control from bit 0 to bit 7 on I/O expander (bit 0 is open drain output only)
  - Ground the "ring" on the RF testpoint
  - Fix choked off VMUXED split plane that was keeping power from getting to vibe on -01
- \* 080311 -03 Version
  - 03 Changes are PCB-only to make the board .8mm thick instead of 1.0mm thick.
  - In addition to fab drawing notes, there are also trace width changes in the CC2431 RF transceiver per John Holt inputs
- \* 080312 -03 Version - Steve Changes
  - Change Y1 part number and footprint to Epson FC-145
  - Change D5 part number and footprint to SOT-23 version
  - Change L4 footprint (was too large)
- \* 080512 - 04 Version Changes (all per 5/5/08 Steve Chen e-mail)
  - Delete TP16 (Antenna port testpoint)
  - Added TP17 on VBAT
  - Change Y1 footprint from FC-145 to FC-135
  - Remove E1 (big RESET\_F testpoint)
  - Change FPC1, FPC2 pads from 3.0mm to 3.5mm long
  - Move P2 down 1mm on layout
  - Move P3 down 3mm on layout
- \* 080519 - Additional -04 Changes (Steve made)
  - Add test point on battery return (not gnd)
  - Swap pin 1 and pin 2 on P2 and P3 (batt, vibe connectors)
  - Modify TFDU4300 silkscreen marking

## TODO:

- \* EVALUATE ALL PULLUPS / PULLDOWNS FOR CONTRIBUTION TO SLEEP CURRENT
- per 5/5 steve e-mail
- remove TP16
- remove E1 (tp)
- Move P2 batt conn 1mm down
- Move P3 (vibe) down 3mm
- make FPC1, FPC2 pads 3.5mm long (were 3.0mm)
- Change Y1 package to FC-135
- MAKE APPROPRIATE BOM MODS

- 1 - COVER
- 2 - CC2431, IRDA, FLASH
- 3 - PWR SUPPLIES, SWITCH I/O
- 4 - CHARGER & GAS GAUGE
- 5 - OLED CONNECTOR, BUZZ, VIBE DRIVE

# TK0171-74-04 ESP WATCH SCHEMATIC

(080519A)

CC2431, Serial Flash, IRDA I/F  
Sht02\_CC2431.Sch



Logic/OLED Power Supplies  
Sht03\_Power.Sch



Battery Charger and Gas Gauge  
Sht04\_Battery\_Interface.Sch

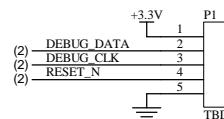


OLED Interface Connectors  
Sht05\_OLED\_Interface.Sch

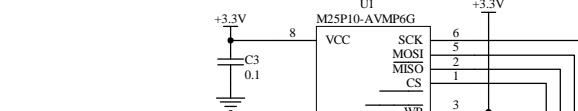


Title		
SCHEMATIC, ESP GEN 3 WATCH		
Size	Number	Revision
B	TK0171-74-04	-
Date:	24-Nov-2008	Sheet 1 of 5
File:	D:\Workshop\ESP\3rd Research\Design\TK0171-74-04_Schematic.dwg	TK0171-22-04_ESP_Watch.dwg

DNP IN PRODUCTION BUT NEED TO PUT A SMALL BUT SOFTWARE DEVELOPMENT FRIENDLY HEADER FOOTPRINT ON THE BOARD. POSSIBLY A SMT FOOTPRINT THAT COULD ALSO BE BED OF NAILS FRIENDLY FOR PRODUCTION PROGRAMMING.



### CC2431 PGM & DEBUG CONNECTIONS



### 128KB SPI FLASH

(3) - PUSHBUTTON1\_N  
 (5) - BEEPER\_CTRL  
 (5) - PUSHBUTTON2\_N  
 (3) - PUSHBUTTON3\_N  
 (3) - PUSHBUTTON4\_N

(5) - DISPLAY\_CMD  
 (5) - DISPLAY\_CS\_N

(5) - SPI\_MOSI

(5) - SPI\_CLK

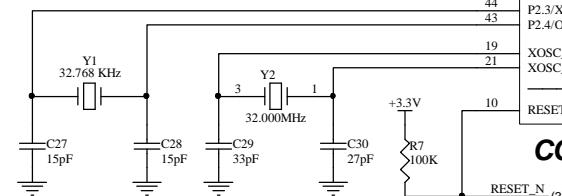
(3,4) - I2C\_SCL

(3,4) - I2C\_SDA

IRDA\_SHUTDN (WAS VIBE\_CTRL ON DEV BRD)

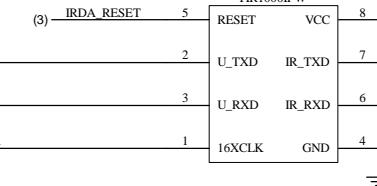
DEBUG\_DATA

DEBUG\_CLK

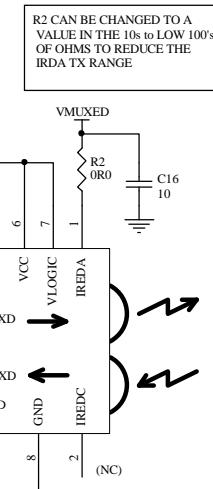
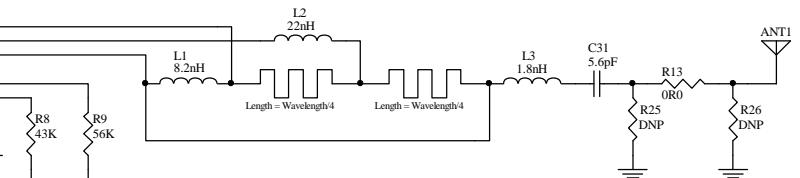
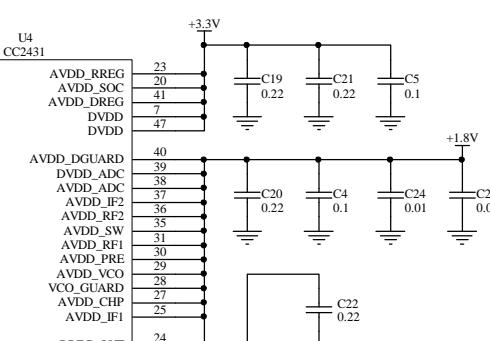


### CC2431 RF SOC

## CC2431, IRDA & FLASH



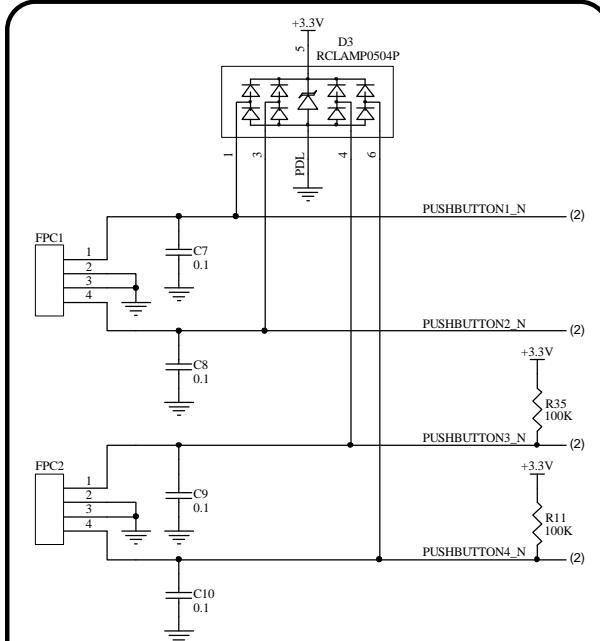
### IRDA ENDEC



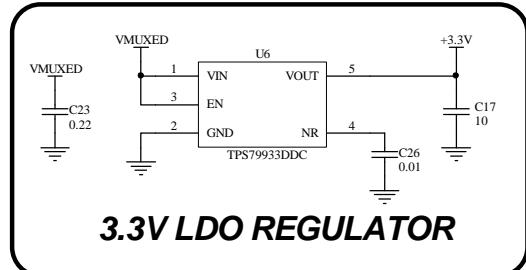
### IRDA XCVR

Title		
	SCHEMATIC, ESP GEN 3 WATCH	
Size	Number	Revision
B	TK0171-74-04	-
Date:	24-Nov-2008	Sheet 2 of 5
File:	D:\Workshop\ESP\3rd Research\Design\Nutia Watch\TK0171-22-04_ESP_Watch.Ddb	

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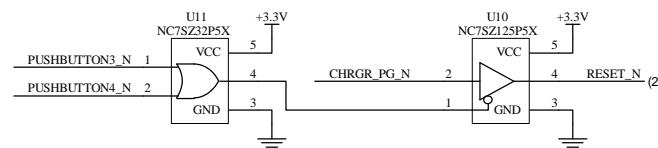


**BUTTON FPC CONNECTIONS**  
(SOLDER PADS - NOT PHYSICAL CONNECTORS)

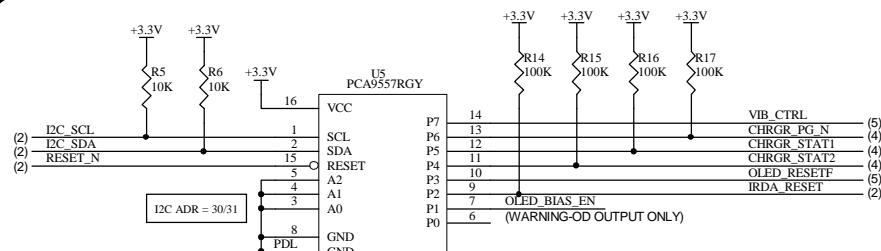


**3.3V LDO REGULATOR**

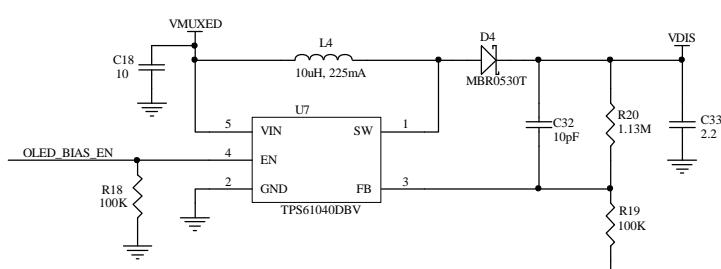
RESET\_N LOW WHEN BOTH BUTTONS PRESSED &amp; ON CHARGER, ELSE HI-Z



**MANUAL RESET CIRCUIT**



**I2C I/O EXPANDER**



**OLED BIAS BOOST CONVERTER**

## 3.3V LDO, OLED BIAS SUPPLY AND SWITCH CONNECTORS

Title		
SCHEMATIC, ESP GEN 3 WATCH		
Size	Number	Revision
B	TK0171-74-04	-
Date:	24-Nov-2008	Sheet 3 of 5
File:	D:\Workshop\ESP\3rd Research\Design\Nuttu Watch\TK0171-22-04_ESP_Watch.Ddb	

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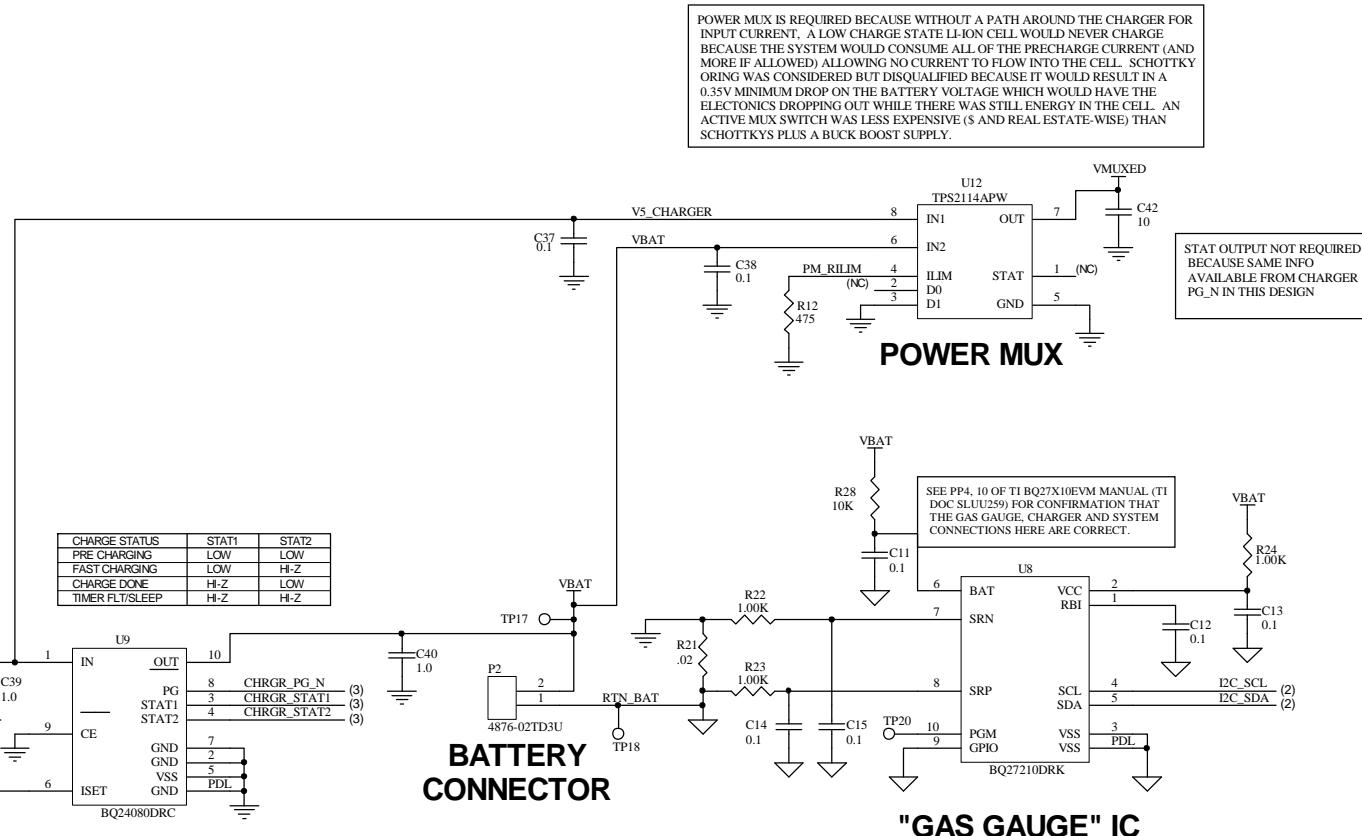
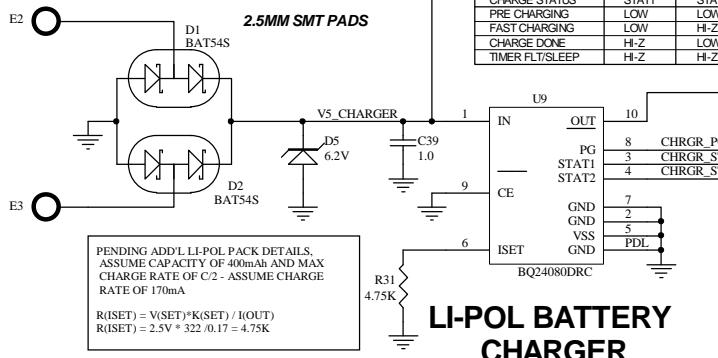
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## BATTERY CHARGER, GAS GAUGE & POWER MUXING

4

Title		
Size	Number	Revision
B	TK0171-74-04	-
Date:	24-Nov-2008	Sheet 4 of 5
File:	D:\Workshop\ESP\3rd Research\Design\Nuttu Watch\TK0171-22-04_ESP_Watch.Ddb	

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# OLED DISPLAY, BEEPER & VIBRATOR I/O

**OLED CONNECTOR NOTE**

THERE IS AN FPC ADAPTER BETWEEN THIS BOARD AND THE R7 DISPLAY. SINCE THE DISPLAY HAS 25 PINS BUT THIS CONNECTOR ONLY HAS 24 PINS, THE 'NC' PIN 1 ON THE DISPLAY DOES NOT CONNECT TO THIS BOARD. THIS CAUSES THE BOARD VS DISPLAY PIN NUMBERS TO BE SKewed BY ONE.

BOARD PIN 1 = DISPLAY PIN 2  
BOARD PIN 24 = DISPLAY PIN 25

CC2431 PORT PIN 1.1 HAS AN ADVERTISED 20mA SOURCE/SINK CAPABILITY WHICH SHOULD BE CAPABLE OF DRIVING THE PIEZO DIRECTLY. THE 25nA BUFFER IS INCLUDED HERE TO MITIGATE RISK RELATED TO HAVING THE PROCESSOR DIRECTLY SOURCE AC INTO THE CAPACITIVE LOAD OF THE PIEZO. ONCE THE SYSTEM IS STABLE AND WELL CHARACTERIZED IT MAY BE POSSIBLE TO REMOVE THIS BUFFER AND DRIVE DIRECTLY FROM THE PORT PIN.

NOTE:  
 VIBRATOR SPEC IS 2.0V TO 4.0V OPERATING SO RESISTOR  
 WILL NEED TO DROP ~0.3V MINIMUM TO KEEP WITHIN  
 SPEC. VIBE COULD BE RUN OFF 3.3V BUT IT IS CURRENTLY  
 BELIEVED TO BE BETTER TO USE THE POWER AS  
 VIBRATION IS ASSEMBLED AS HEAT SINKS DO. PERHAPS  
 MORE IMPORTANTLY, HAVING VIBE ON LDO WOULD  
 REQUIRE A LOOK AT LDO LOAD TRANSIENT RESPONSE.  
 THE VIBE AMPLITUDE WILL VARY SOMEWHAT AS A  
 FUNCTION OF BATTERY STATE BUT WILL BE EQUAL TO OR  
 GREATER THAN IF IT WAS RUNNING OFF REGULATED 3.3V.

Title		
SCHEMATIC, ESP GEN 3 WATCH		
Size B	Number TK0171-74-04	Revision -
Date: 24-Nov-2008	Sheet 5 of 5	
File: D:\Workshop\ESP\3rd Research\Design\Nikon Watch\TK0171-22-04 ESP Watch.bdb		