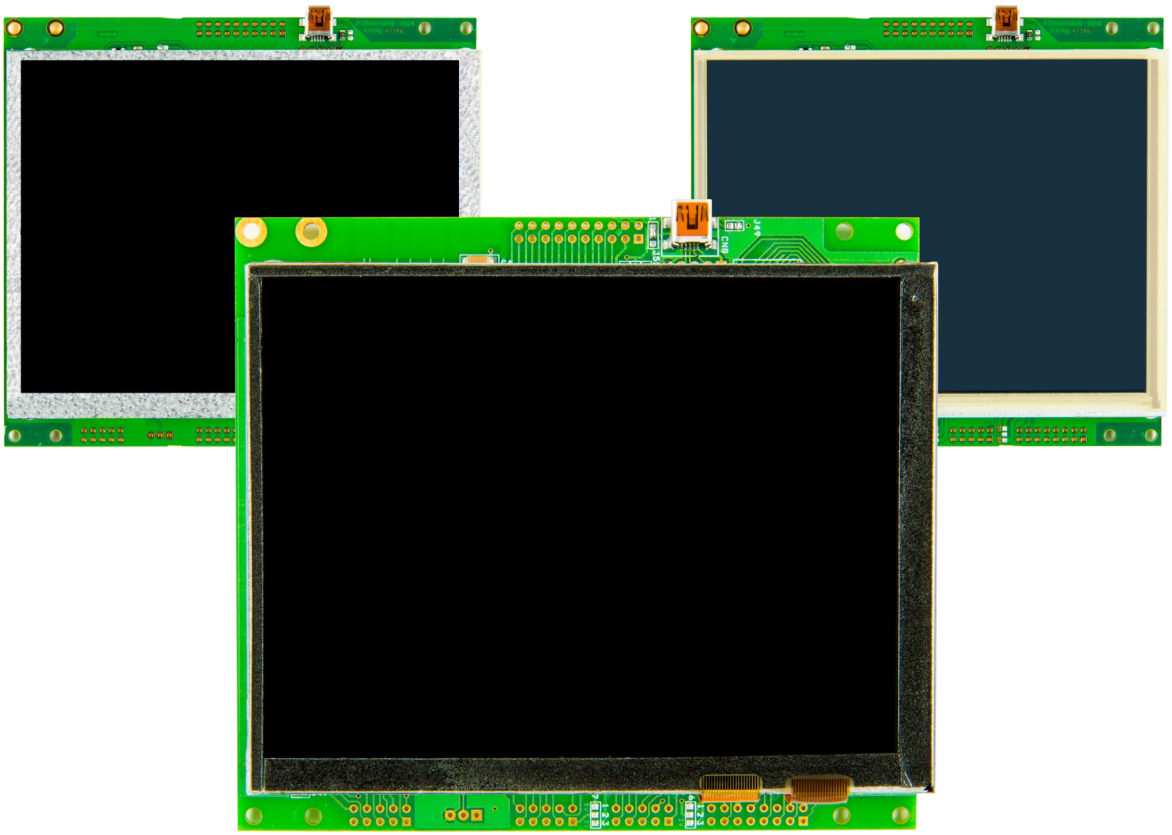

TU640X480C-K61XA1XX

5.7 INCH INTELLIGENT TFT MODULE SERIES

Itron UK's original Itron Smart Series Embedded TFT module incorporates an embedded microprocessor with various interfaces. It uses our own objective-based software language iDevOS.

- Metallised Projective Capacitive Touch/Resistive Touch options
- Intelligent embedded controller
- User friendly iDevOS
- Extensive interface options

Metallised Touch, Resistive Touch and No Touch references MU, RU and NU respectively.

Features

CONTENTS

APPLICABLE PRODUCTS

Part Number	Touch	RS232	RS485	RS422	AS1, I2C, SPI	CN8	Operating System
TU640X480C-K611A1MU	MPCT	YES	YES	YES*	3V3 logic *2	YES	iDevOS
TU640x480C-K612A1MU	MPCT	YES	NO	NO	3V3 logic *2	YES	iDevOS
This product can be customised to your requirements. Contact our sales team for information. (MOQs apply.)							
Software Version	TU-SW2001-V00.49.61						
Hardware Version	PCB800480B issue 4						

Part Number	Touch	RS232	RS485	RS422	AS1, I2C, SPI	CN8	Operating System
TU640x480C-K611A1RU v2	Resistive	YES	YES	YES*	3V3 logic *2	YES	iDevOS
TU640x480C-K612A1RU	Resistive	YES	NO	NO	3V3 logic *2	YES	iDevOS
This product can be customised to your requirements. Contact our sales team for information. (MOQs apply.)							
Software Version	TU-SW2001-V00.49.61						
Hardware Version	PCB800480B issue 5						

Part Number	Touch	RS232	RS485	RS422	AS1, I2C, SPI	CN8	Operating System
TU640x480C-K611A1NU	Projective	YES	YES	YES*	3V3 logic *2	YES	iDevOS
TU640x480C-K612A1NU	Projective	YES	NO	NO	3V3 logic *2	YES	iDevOS
This product can be customised to your requirements. Contact our sales team for information. (MOQs apply.)							
Software Version	TU-SW2001-V00.49.61						
Hardware Version	PCB800480B issue 4						

*Please note that the RS422 interface is an option, an extra transceiver IC have been fitted on the carrier board and extra links are required for its full functionality.

*1 Please note all future references to RS485 and RS422 are available only on the K611 product variants.

*2 5V logic levels are available with a S suffix - eg US

Standard Customisation Options	
Suffix B	RTC Battery backup- e.g. UB
Suffix C	FlexCan transceiver fitted
Suffix E	Product has EMI filter glass fitted between touch and TFT panels- e.g. UE
Suffix F	Product has EMI foil fitted on the rear and sides of the module- e.g. UF
Please contact the sales team before ordering.	

REVISION NOTES

Issue	Date	Remarks
1.0	September 2017	First Release
1.1	January 2018	Definition between variants improved on Applicable Products Page.

PRODUCT OVERVIEW

This module includes an 640x480 pixel TFT panel mounted on a printed circuit board with low profile construction.

Each pixel has red, green and blue striped elements with 18 bit colour control and 8 bit alpha blending.
The CPU with ARM9 core, 64MB SDRAM and 128MB NAND flash memory provide control of data processing, font generation, display scanning and peripheral control. 8KB of EEPROM provide non-volatile memory for system and user parameter storage. The SD card connector allows loading of the original operating system and other ports can also provide updates depending on the operating system used.

An internal independent watchdog chip is reset by the main CPU on a typical 600ms cycle. In the event of a malfunction, the watchdog resets the internal and external 3V3 supply forcing a cold boot for the CPU, memory and any external peripherals connected to the module. The /RESET input on CN3 connects directly to the watchdog circuit and turns off the 3V3 supply when held low.

This module is designed to be RoHS compliant with sub class A EMI emission and 2kV human body contact model for metallised projective capacitive / resistive touch

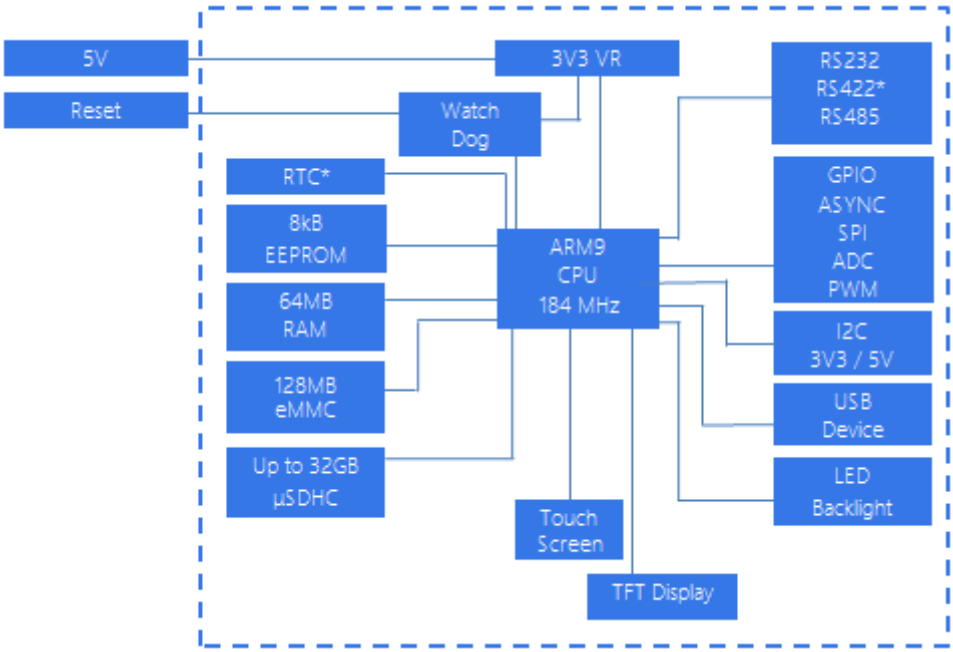

Figure 1 - Circuit Block Diagram.
** Optional.*

TECHNICAL DATA

CPU			
Type	184MHz ARM9 CPU		
Features	L1 cache, 4 KB for instruction, 4 KB for data, RTC (Optional)		
Memory			
Standard	64 MB		
eMMC NAND	128 MB		
microSD card	up to 32 GB		
Interfaces			
USB (Type mini B connector)	USB 2.0 OTG host/device USB 2.0 High-Speed host – 480 Mbps Type mini B connector		
Asynchronous	RS232, RS485 half-Duplex, RS422 Full-Duplex (option) 2 x Asynchronous serial interface (3V3)		
Synchronous	2 x I2C 3V3 or 5V logic levels 2 x SPI 3V3 logic levels		
Audio	AC97 standard (requires MCBK-AC97P1)		
GPIO	Up to 32 user digital GPIO		
ADC	6 ADCs		
PWM	4 PWM Outputs		
Display			
Area	115.2 x 86.4 – 5.7 inch diagonal		
Type	Transmissive		
Resolution	640 x 480 pixels		
Prime Viewing Angle	12 o'clock (colour inversion at 6 o'clock)		
Backlight	500 cd/m^2		
RGB Colours	262,144 (18 bit)		
Power Supply			
Supply	4.5 – 5.5 VDC		
Current	MU: 500-521* mA	RU: 472-485* mA	NU: 478-490*mA
Environment			
Operating Temperature	-20°C to +70°C		
Storage Temperature	-30°C to +70°C		
Storage Humidity	30 to 80% RH @ 25°C Non condensing		
ESD	Designed to comply with 2kV human body contact model (BS EN 6100-4-2)		
EMC	Designed to comply with sub class A EMI emission (BS EN 6100-4-6)		
Software			
Operating System	iDevOS		

*Note, the use of peripherals can lead to a higher drawing of power, user responsible.

ELECTRICAL CHARACTERISTICS

Section	Parameter	Symbol	Min	Typ	Max	Unit	Condition
MU: 5V Input Power Supply	Supply Voltage	Vcc1	4.5	5.0	5.5	VDC	GND = 0V
	Supply Current	Icc1	500	513	521*	mA	Vcc1=5V - All pixels ON Backlight 100%
		Icc3	50	60	70	mA	Vcc1=5V – Reset LOW
RU: 5V Input Power Supply	Supply Voltage	Vcc1	4.5	5.0	5.5	VDC	GND = 0V
	Supply Current	Icc1	478	486	490*	mA	Vcc1=5V - All pixels ON Backlight 100%
		Icc3	50	60	70	mA	Vcc1=5V – Reset LOW
NU: 5V Input Power Supply	Supply Voltage	Vcc1	4.5	5.0	5.5	VDC	GND = 0V
	Supply Current	Icc1	477	485	490*	mA	Vcc1=5V - All pixels ON Backlight 100%
		Icc3	50	60	70	mA	Vcc1=5V – Reset LOW
3V3 Output Power Supply	Supply Voltage	Vcc2	3.2	3.3	3.4	VDC	GND = 0V
	Supply Current	Icc2	-	-	200	mA	Vcc1=5V
Data Interfaces and GPIO Ports	Logic Input Low	VIL	0	-	0.5	VDC	Vcc2=3V3 K0-K30, SDHC, ADC Maximum sink current 10mA per port Total sink current 70mA
	Logic Input High	VIH	2.0	-	Vcc2	VDC	
	Logic Output Low	VOL	0	-	0.7	VDC	
	Logic Output High	VOH	3.0	-	3.4	VDC	
RS232 interface (RX)	Logic Input Low	VIL	-15.0	-	0.6	VDC	Vcc2=3V3
	Logic Input High	VIH	2.0	-	+15.0	VDC	Vcc2=3V3
RS232 interface (TX)	Logic Output Low	VOL	-	-3.0	-2.0	VDC	Vcc2=3V3
	Logic Output High	VOH	4.0	7.0	-	VDC	Vcc2=3V3
/RESET	Logic Input Low	VIL	0		1.2	VDC	Vcc1=5V
	Logic Input High	VIH	2.2		3.4	VDC	Vcc1=5V

If data signals are applied before the power supply stabilizes, the module CPU may not start correctly until a watchdog timeout.
*Note, the use of peripherals can lead to a higher drawing of power, user responsible. Test conducted with a 5V DC power supply.

OPTICAL CHARACTERISTICS

Visual Parameter	Value
Display Area (X x Y mm)	115.2 x 86.4 – 5.7inch diagonal
Display Format (X x Y)	640 x 480 pixels
Dot Size/Pitch (X x Y mm)	0.18 x 0.18
RGB Colours	262,144 (18 bit)
Display Type	Transmissive
Prime Viewing Angle	12 o'clock (colour inversion at 6 o'clock)

Visual Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Contrast Ratio		CR	250	250	-	-	At optimized viewing angle
Colour Chromaticity	White	Wx	0.30	0.35	0.40	-	Θ=0° Φ=0°
		Wy	0.33	0.38	0.43	-	Θ=0° Φ=0°
Viewing Angle	Hor.	Θ	60	70	-	Deg.	CR≥10
	Ver.	Φ	60	70	-	Deg.	CR≥10
Brightness		-	-	500	-	cd/m^2	Center of Display
LED Backlight Lifetime		-	50,000	-	-	Hours	50% of brightness @ 25°C

*applied to the screen's characteristics, excluding Touch panel.

MECHANICAL DRAWING METALLISED PROJECTIVE CAPACITIVE TOUCH

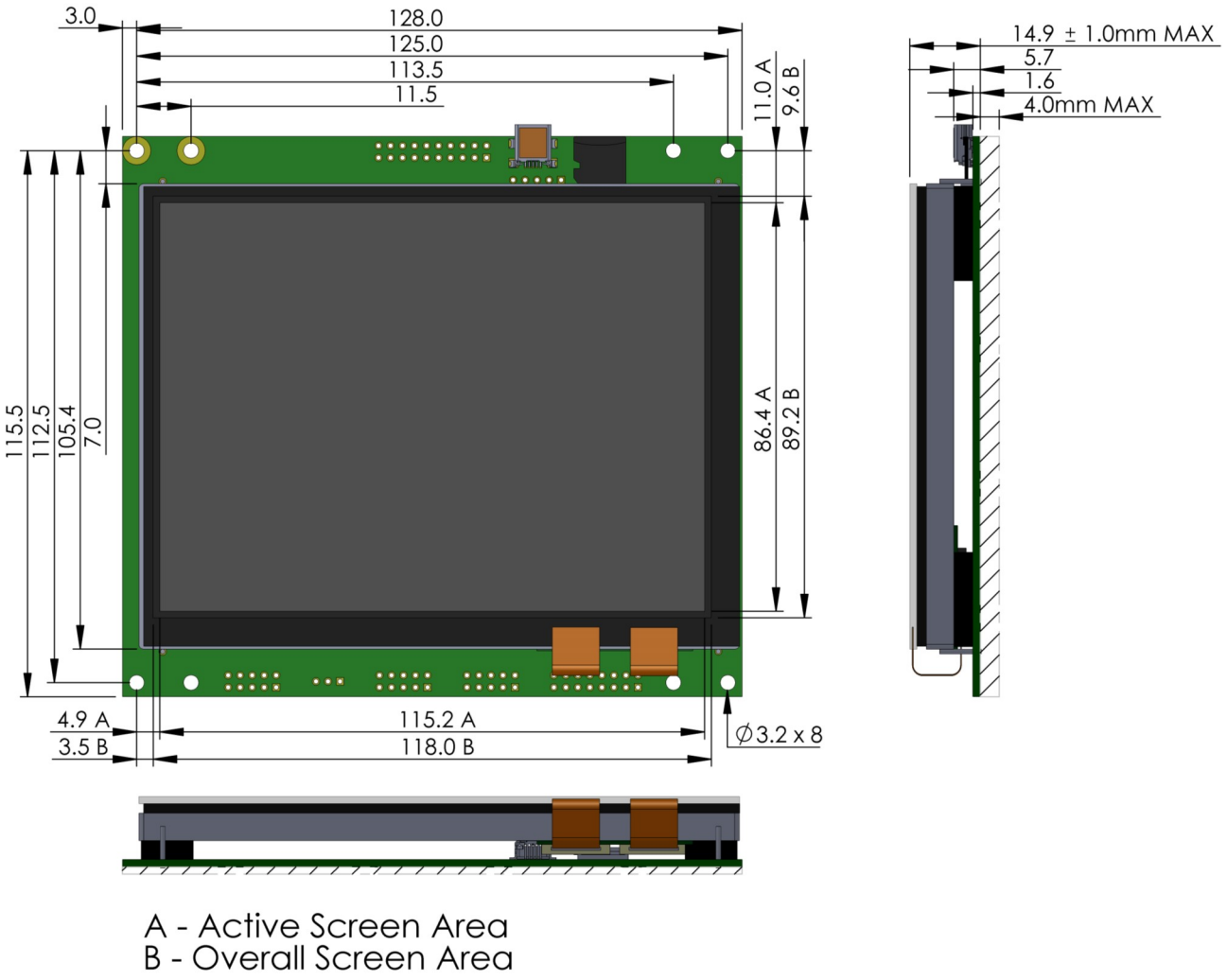

Figure 2 – TU640x480C-K61XA1MU Mechanical drawing. Reference dimensions only.

All the dimensions above are in mm, with a tolerance of ± 0.1mm unless stated otherwise. When an EMI filter glass is fitted, the overall thickness of the module increases by 1.0mm. The mounting pins connect the TFT panel frame to the PCB for placement accuracy, shielding and fixing.

For 3D CAD drawings, please refer to the website at www.itrontft.com.

MECHANICAL DRAWING RESISTIVE TOUCH

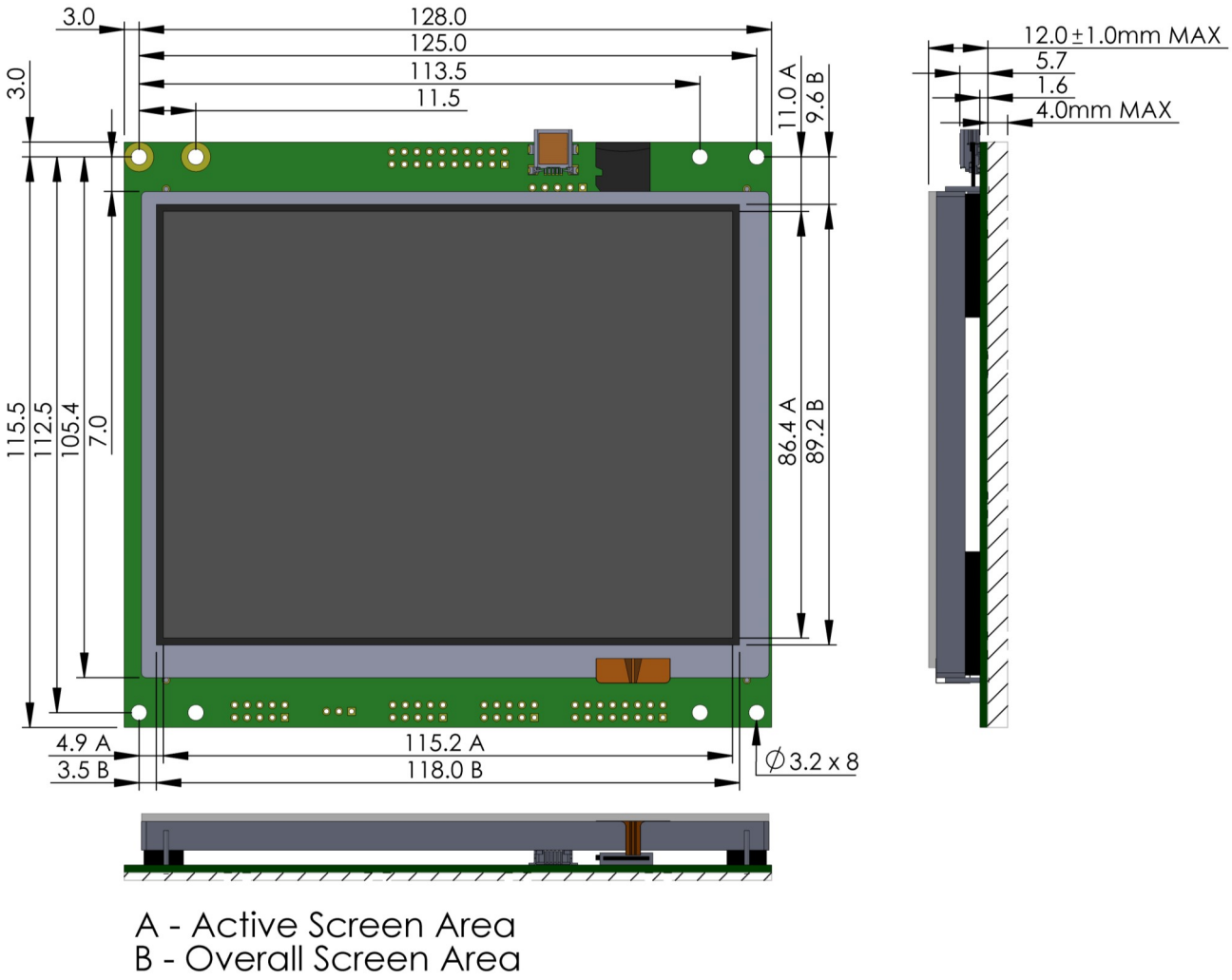

Figure 3 – TU640x480C-K61XA1RU Mechanical drawing. Reference dimensions only.

All the dimensions above are in mm, with a tolerance of ± 0.1mm unless stated otherwise. When an EMI filter glass is fitted, the overall thickness of the module increases by 1.0mm. The mounting pins connect the TFT panel frame to the PCB for placement accuracy, shielding and fixing.

For 3D CAD drawings, please refer to the website at www.itrontft.com.

MECHANICAL DRAWING NO TOUCH

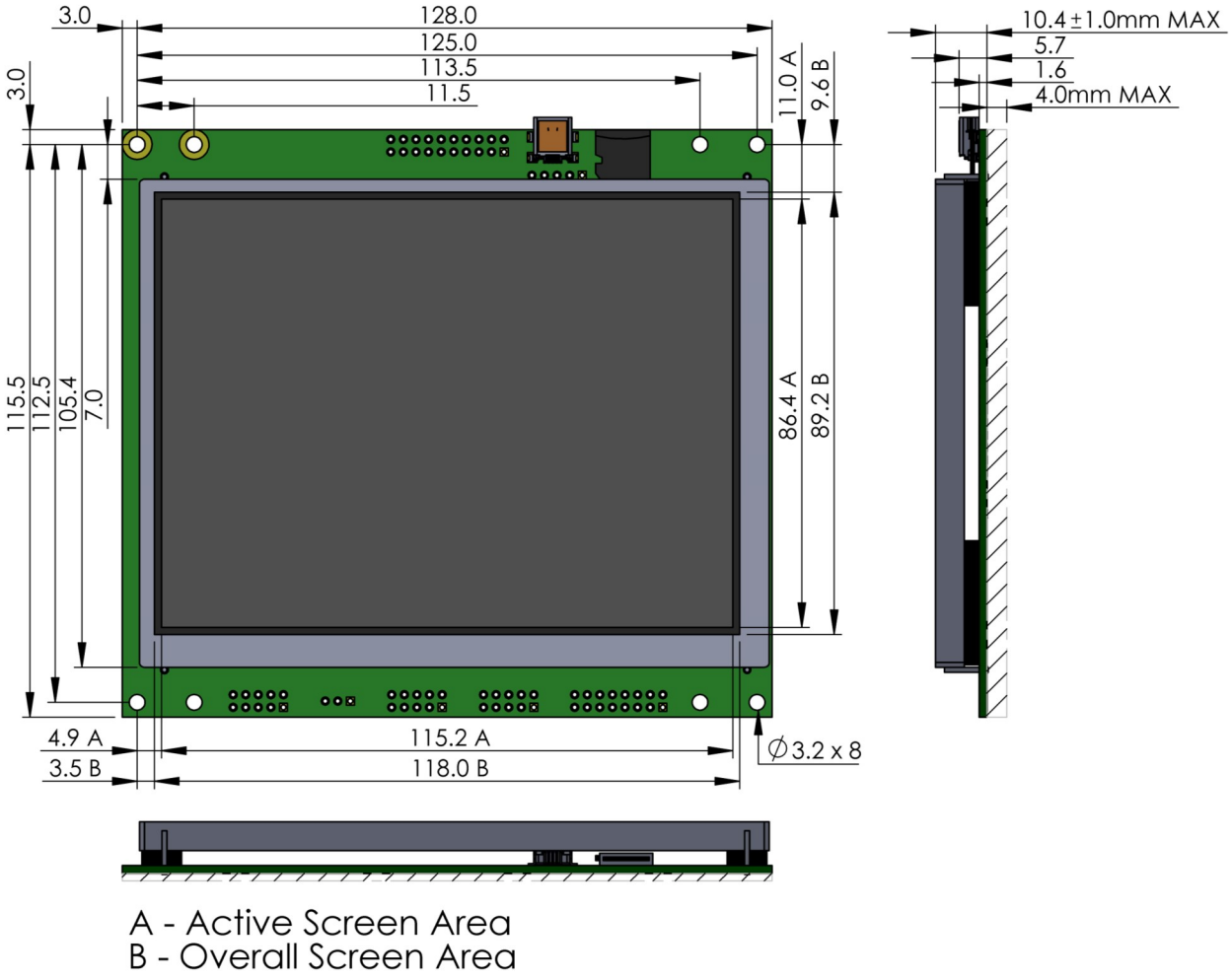

Figure 4 – TU640x480C-K61XA1NU Mechanical drawing. Reference dimensions only.

All the dimensions above are in mm, with a tolerance of ± 0.1mm unless stated otherwise. When an EMI filter glass is fitted, the overall thickness of the module increases by 1.0mm. The mounting pins connect the TFT panel frame to the PCB for placement accuracy, shielding and fixing.

For 3D CAD drawings, please refer to the website at www.itrontft.com.

CONNECTOR LOCATION AND FUNCTION

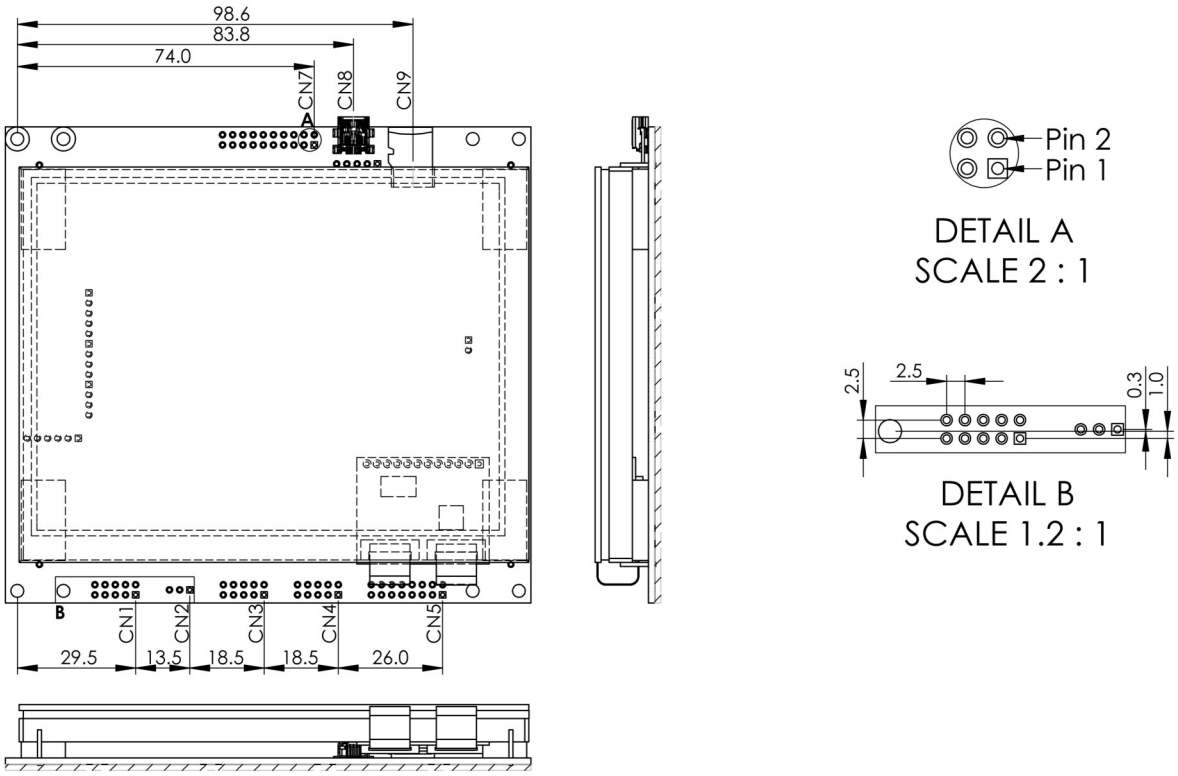

Figure 5 - TU640x480C-K61XA1XX Connector Location drawing. Reference dimensions only.
Note: RU and NU connector locations are the same as the image above.

CN1: RS232, RS485, RS422

The RS232 interface has a maximum baud rate of 250K bits per second subject to inter-connection. The interface buffer IC provides a limited negative and positive supply (-3V, +7V) suitable for short distance, low load applications. The baud rate, data orientation, stop bits, handshaking, buffer size and associated interrupts can be configured by the firmware. CTS and RTS can be selected depending on the required handshaking method. RS485 can be used at the same time as RS232 RXD/ TXD/CTS/RTS. The Tx/Rx lines are high impedance when not used. Care must be taken not to exceed the maximum loading of 8 devices per line. Please consult us if a higher loading is required. Line termination should be external.

Please note that the RS422 interface is an option, an extra transceiver IC has to be fitted on the carrier board and extra links are required for its full functionality.

Please refer to CN4 and CN7 for PWM and GPIO ports definitions respectively.

Pin	Signal	Function
1	NC, Tx+*, TxRx+	RS485 TxRx+ or RS422 Tx+ – transmit positive (* only for RS422 option) or No connection
2	DTR, Rx-	DTR or RS422 Rx- – receive negative (* only for RS422 option)
3	TXD	RS232 transmit output
4	CTS	RS232 flow control input
5	RXD	RS232 receive input
6	RTS	RS232 flow control output
7	DSR, Rx+	DSR or RS422 Rx+ – receive positive (* only for RS422 option)
8	TxRx- , Tx-* ,NC	RS485 TxRx- or RS422 Tx- – transmit negative (* only for RS422 option) or No connection
9	GND	0V
10	Vcc1.0	5V output when J47 is soldered

CN2: POWER, BUZZER

This connector is ideal to be used as a power source due to the protection provided by the fuse.

Pin 2 on CN2 is dedicated to the IDevOS command (BUZZ) allowing 3V3 piezoelectric buzzers to be directly controlled by software.

Pin	Signal	Function
1	Vcc1.0	5V input
2	Buzz	Open drain buzzer output
3	GND	0V

CN3: AS1, I2C, SPI, IO Ports

The TU Series has two asynchronous interfaces: AS1 and AS2. The asynchronous logic level (3V3) interfaces have a maximum baud rate of 250k bits per second subject to inter-connection. Optional buffers can be fitted for connection to systems where open collector drive mode is required at 3V3 or 5V logic levels. The baud rate, data orientation, stop bits, handshaking, buffer size and associated interrupts can be configured by the firmware. AS1 output MB - Module Busy and input HB - Host Busy support hardware handshaking between master and slave.

The I2C is a standard two-wire serial interface used to connect the chip with peripherals or host controllers.
This interface provides a standard speed (up to 100 kbps), and a fast speed (up to 400 kbps) I2C connection to multiple devic-es with the chip acting in either I2C master or I2C slave mode. Optional buffers can be fitted for connection to systems where open collector drive is required at 3V3 or 5V.

The SPI interface requires jumper J11 pads 1-2, 3-4, 5-6 and 7-8 are linked. Optional open collector buffers can be fitted for operation in systems that require 3V3 or 5V interface. The maximum speed is 1MB per second subject to inter-connection. The order of data bits and the rising or falling edge of clock can be defined in software.

Please refer to CN7 for GPIO ports definition.

Pin	Signal	Function
1	Vcc1.1, Vcc2	5V input or 3V3 out depending on jumper J27 (Vcc1: 1-2; 3V3: 2-3)
2	SCL, SCK, K24	I2C SCL clock, SCK SPI clock, K24 user GPIO
3	AS1_RX, SS, K25	AS1 serial receive input, Slave Select SPI, K25 user GPIO
4	SDA, MOSI, K26	I2C1 SDA data, MOSI SPI data, K26 user GPIO
5	GND	0V
6	/IRQ1, MISO, K27	/IRQ1 interrupt request, MISO SPI data, K27 user GPIO
7	AS1_TX , /IRQ, K28	AS1 serial transmit output, /IRQ SPI, K28 user GPIO
8	/RESET	Master reset - active LOW
9	MB, K29	Module busy output(AS1), K29 user GPIO
10	HB, K30	Host busy input(AS1), K30 user GPIO

CN4: ADC, PWM, AUDIO, IO Ports

The ADC reference voltage is connected to the 3V3 supply. The ADCs have a 10 bit resolution producing conversion values between 0 for 0V and 1023 for 3V3 with a tolerance of 5. Since the value at 0V may not be 0, it is important to take this into consideration when designing your analogue interface circuit if a zero value is important. The maximum sample rate is 200kHz and is available for processing according to the firmware configuration. Calibration values can be retained in the host or stored in the on board EEPROM.

There are 3 PWM outputs available that can be used by the user. The PWM4 output is only available for the user if the back-light brightness is then fixed at 100% using the relevant jumper link. The polarity (on/off), cycle time in microseconds (160Hz-1MHz), duty in percentage (0-100) and pre-scale value of (1, 2, 4, 8, 16, 64, 256, 1024), the default is 1.

The AC97 high speed interface can connects to a compatible codec to provide high quality stereo audio input and output. As the clock speed is typically 40MHz and it may be necessary to use a ferrite sleeve on the connecting ribbon cable when using the ports as an audio bus. Please refer to the web for further details on the AC97 protocol and timing.

Please refer to CN7 for GPIO ports definition.

Pin	Signal	Function
1	ADC1, K16	ADC 1 input, K16 user GPIO
2	ADC6, K17	ADC 6 input, K17 user GPIO
3	GND	0V
4	Vcc1.1, Vcc2	5V input or 3V3 out depending on jumper J26 (Vcc1: 1-2; 3V3: 2-3)
5	PWM1, K18	PWM 1 output or K18 user GPIO
6	PWM2, K19	PWM 2 output or K19 user GPIO
7	ATX, K20	AC97 transmit, K20 user GPIO
8	ARX, K21	AC97 receive, K21 user GPIO
9	ACK, K22	AC97 clock, K22 user GPIO
10	AFS, K23	AC97 frame select, K23 user GPIO

CN5: USB, SDHC Expansion

The USB interface operates as a USB Device for connection to a host such as a PC. An internal filter provides ESD protection and noise suppression. When using the pre-fitted connector CN8, it is not recommended to link J1 and J5 which connect CN5 or CN15 otherwise line imbalance could occur. Depending on the firmware, a software driver will require installation on the host. Please refer to the web for USB 2.0 specification details. Disconnect J48 to stop the USB host supply powering the module and link J49 to connect the CN8 USB screen to the module 0V.

The module supports micro SD card storage devices up to 32 GB.

Pin	Signal	Function
1	DA2	SD card data 2
2	DA3	SD card data 3
3	CDA	SD card command
4	Vcc2	3V3 output only
5	CK	SD card clock
6	GND	0V
7	DA0	SD card data 0
8	DA1	SD card data 1
9	GND	0V
10	CD	SD card detect
11	GND	0V
12	Vcc1	5V input / output
13	USB-	USB D-
14	USB+	USB D+
15	K31	K31 user GPIO
16	GND	0V

CN6: DEBUG

This connector provides a 3V3 level asynchronous interface to the user without "handshaking" capabilities.

This interface can be used simultaneously with AS1 and AS2.

Pin	Signal	Function
1	Vcc2	3V3 output only
2	GND	0V
3	DRXD	Debug receive input
4	DTXD	Debug transmit output

CN7: IO Ports, AS2, PWM

Many GPIO ports have dual or triple functions as a general purpose logic level inputs/outputs or a fixed function interface. During reset and power on the GPIO ports can have a floating state, hence it is imperative to provide an inverting circuit to ensure a low condition where required.

For AS2 and PWM definitions please refer to CN3 and CN4 respectively.

Pin	Signal	Function
1	Vcc1.1	5V input
2	GND	0V
3	Vcc2	3V3 output only
4	GND	0V
5	AS2_TX, K0	Asynchronous transmit output AS2, K0 user GPIO
6	AS2_RX, K1	Asynchronous receive input AS2, K1 user GPIO
7	K2	K2 User GPIO
8	K3	K3 User GPIO
9	K4	K4 User GPIO
10	K5	K5 User GPIO
11	K6	K6 User GPIO
12	K7, PWM4	K7 User GPIO, PWM4 with link J52 and J6 pins 1 & 2 causes backlight level to be fixed at 100%
13	K8	K8 User GPIO
14	K9, PWM3	K9 User GPIO, PWM3
15	K10	K10 User GPIO
16	K11	K11 User GPIO
17	K12	K12 User GPIO
18	K13	K13 User GPIO
19	K14	K14 User GPIO
20	K15	K15 User GPIO

CN8: USB

See CN5 USB definition.

Pin	Signal	Function
CN8	MINI USB	MINI TYPE B USB Socket for USB0 host/device depending on jumper J55 (device:1-2; host:2-3)

CN12: RS485, RS422

For RS485/RS422 definitions please refer to CN1.

Pin	Signal	Function
1	TXDO	RS485 3V3 level transmit output can be used when RS485/422 ICs not fitted
2	GND	0V
3	RXDI	RS485 3V3 level receive input can be used when RS485/422 ICs not fitted
4	Vcc1.1	5V input

J6: USB

The USB module provides high-performance USB On-The-Go (OTG) and host functionality (up to 480 Mbps), compliant with the USB 2.0 specification and the OTG supplement. The module has DMA capabilities for handling data transfer between internal buffers and system memory. When the OTG controller works in device mode, it can only work in FS or HS mode. The jumper J55 can be used to allow the USB0 host supply power to the module.

Pin	Signal	Function
1	Vcc1.1	5V input
2	USB-	USB D-
3	USB+	USB D+
4	K31	K31 User GPIO
5	GND	0V

JUMPER SETTINGS

Name	Description	Function
BT1	Battery Connector	Apply solder bump to centre pad before fitting holder. CR2032 battery positive up
BATT1	RTC supply	Apply right angle connector top side soldered for RTC backup during power off
BL	LED backlight	When the backlight is software disabled, 30VDC at 20mA can be externally supplied
J8	RS422, RS485	Solder 1 and 2 for Full Duplex RS422, solder 2 and 3 for Half Duplex RS485
J11	SPI link	Solder all four links in the array to connect the SPI interface to CN3
J14 WP	Write protect EEP	Solder to prevent data update of EEPROM non-volatile memory where fitted
J15	CTS+RS4/DSR	Solder 1 and 2 for CTS and RS485 if fitted, solder 2 and 3 for DSR when RS485 not fitted
J16	RTS+RS4/DTR	Solder 1 and 2 for RTS and RS485 if fitted, solder 2 and 3 for DTR when RS485 not fitted
J17	Watchdog Timeout	Open = 600ms (default). Link 1 and 2 = 1200ms. Link 2 and 3 = 150ms
J18 WP	Write protect NAND	Solder to prevent data update of NAND memory
J19	Mounting Hole	Link to connect mounting hole plating to 0V
J26	CN4-4: VIO, Vcc2	VIO, 3V3out selector for CN4-4: 1-2 for VIO, 2-3 for 3V3out
J27	CN3-1: VIO, Vcc2	VIO, 3V3out selector for CN3-1: 1-2 for VIO, 2-3 for 3V3out
J47	CN1 Pin10 Vcc1	Solder this jumper to connect the 5V supply, Vcc1 to Pin 10 on CN1
J48	CN8 USB Supply	Linked by default. Disconnect to prevent USB supply powering module
J49	CN8 USB Frame	Linked by default. Disconnect to prevent USB cable screen connection to 0V
J20, J37	TFT Frame GND	Soldered by default to connect the metal frame of the TFT to 0V
J50, J51	TFT Frame GND	Soldered by default to connect the metal frame of the TFT to 0V
J52, J6	PWM4	To use PWM4 on K7 link J52 and J6 pins 1 and 2. Backlight level is fixed at 100%

METALLISED PROJECTIVE CAPACITIVE TOUCH PANEL

The projective capacitive touch panel uses two pieces of glass, 'X' electrodes on one, 'Y' electrodes on another. These are 'sandwiched' together with insulation between. The touch panel controller scans the X electrodes and measures capacitance effects on the Y electrodes. An EMI filter window can be mounted between the TFT and the touch to prevent TFT scan interference.

The module works with up to 8mm glass or 4mm plastic on top with no optical bonding required. Please note that the distances mentioned include air gap.

The firmware can adjust touch parameters, such as, de-bounce sensitivity and auto-calibrates the touch screen at power on.

Proximity of the touch panel or flexi-cable to metal parts may cause interference; ensure that the front glass cover is larger than the touch panel.

RESISTIVE TOUCH PANEL

The resistive touch panel uses a glass substrate with ITO coating and micro spacers to separate an overlay also coated with ITO.

Conductive bars on each layer allow an X and Y voltage to be applied across each layer in turn while the other layer is connected to ADC inputs to measure the potential difference where a touch occurs. The firmware can adjust sample rate, de-bounce and acceptance area. Use a neoprene or silicon gasket between the enclosure front panel and the touch panel to prevent false touches.

The touch panel ADC inputs can be externally connected via CN19 as ADC2-ADC5 or via FPC connector CN26

TU640x480C-K61XA1MU PRODUCT IMAGE

Front View

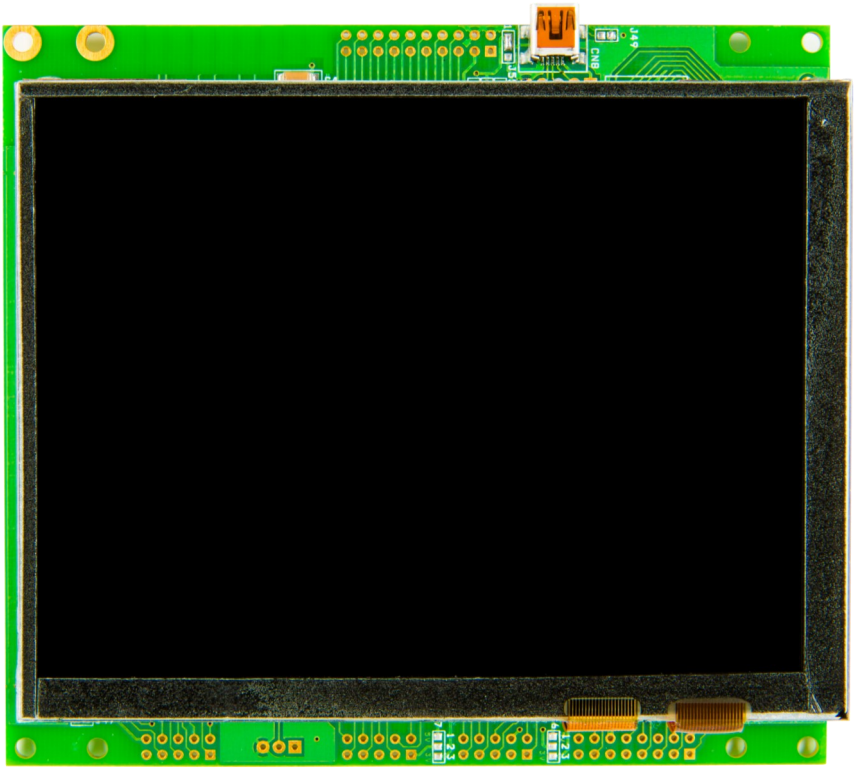

Figure 6 - TU640x480C– K61XA1MU Front View

Rear View

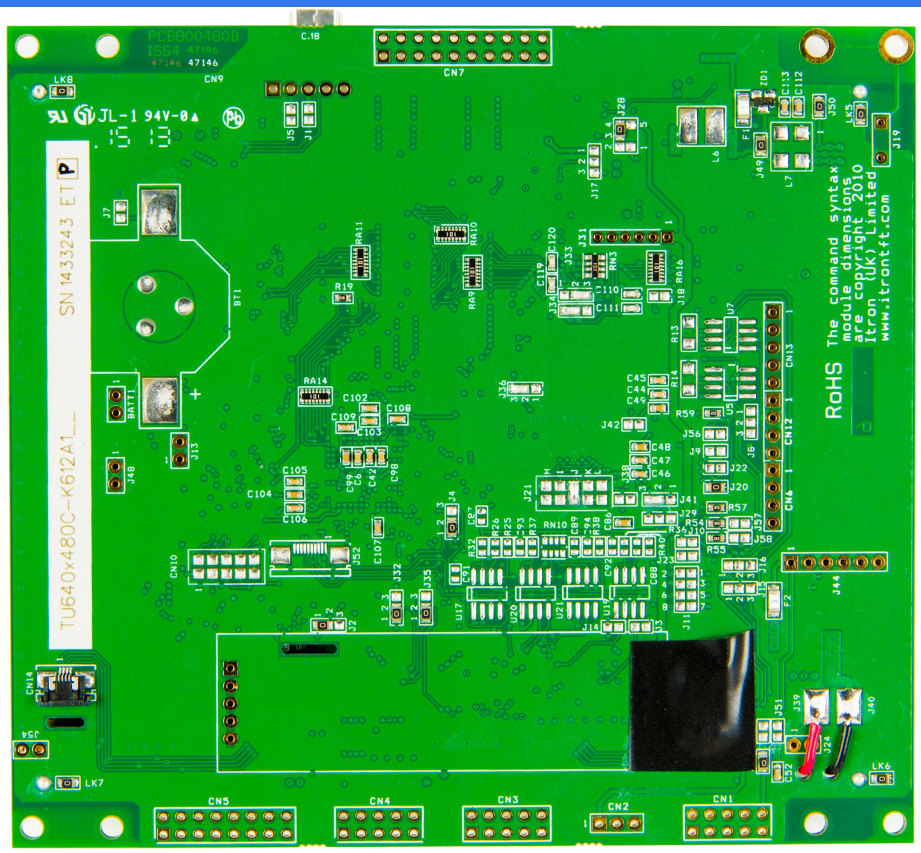

Figure 7 - TU640x480C– K61XA1MU Rear View

TU640x480C-K61XA1RU PRODUCT IMAGE

Front View

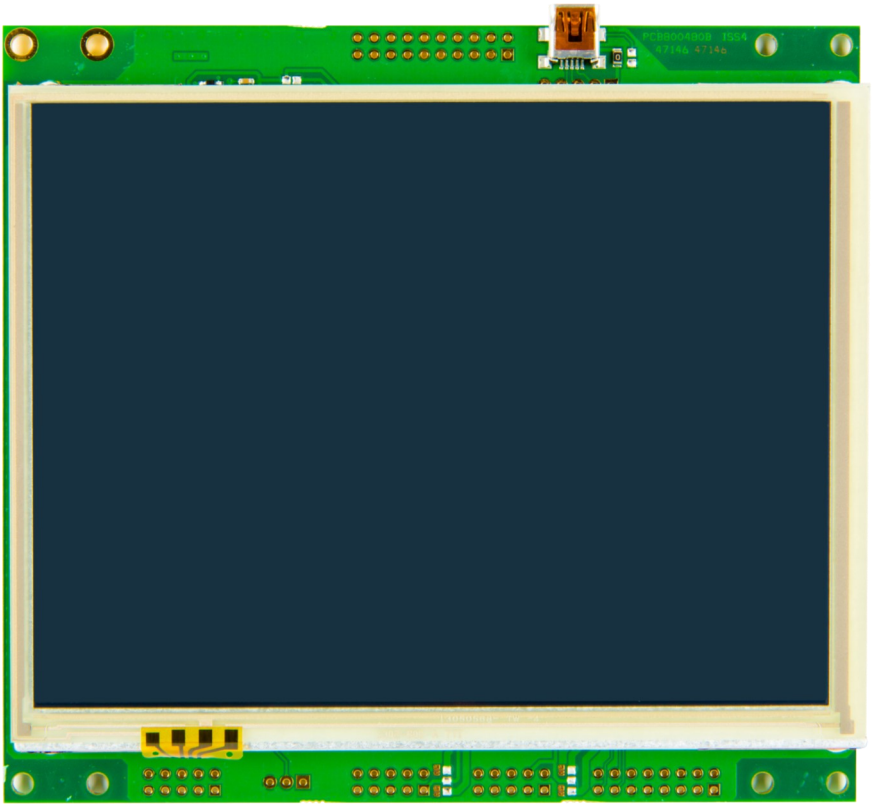

Figure 8 - TU640x480C– K61XA1RU Front View

Rear View

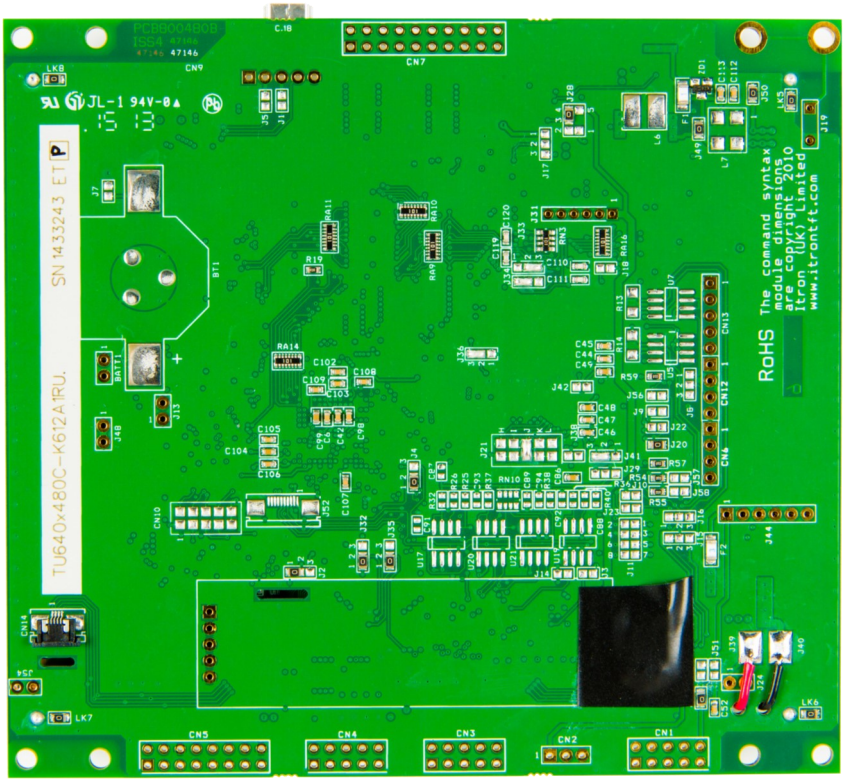

Figure 9 - TU640x480C– K61XA1RU Rear View

TU640x480C-K61XA1NU PRODUCT IMAGE

Front View

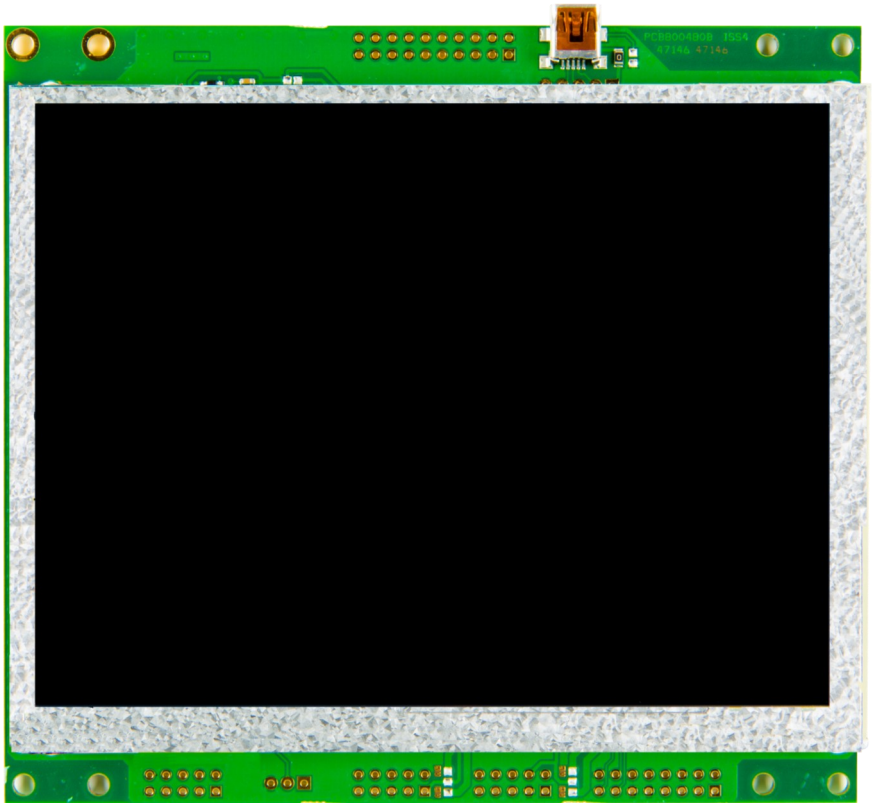

Figure 10- TU640x480C– K61XA1NU Front View

Rear View

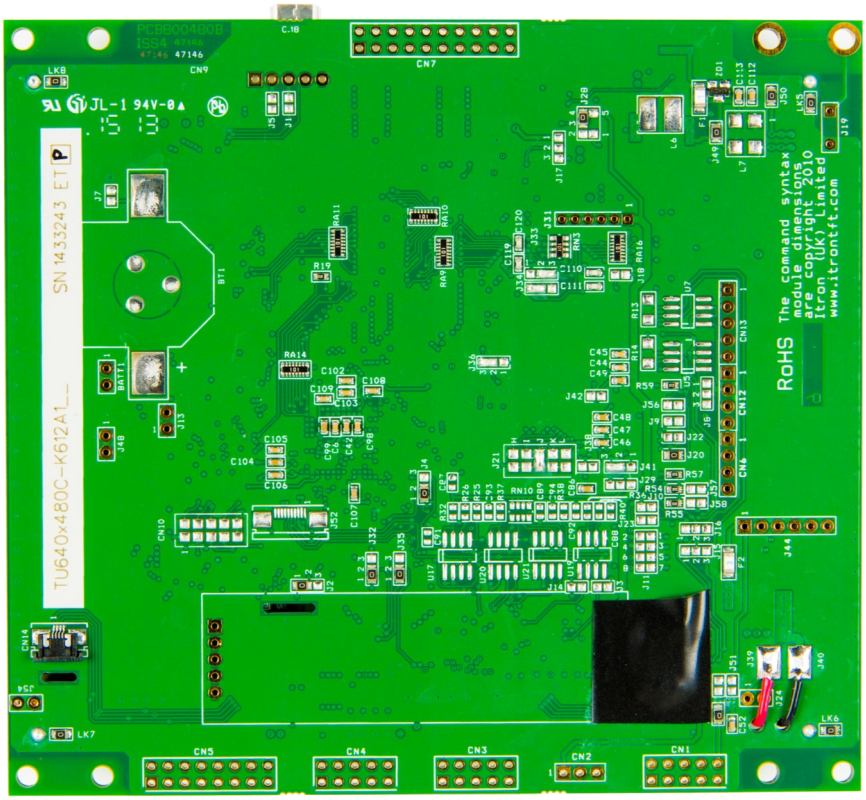

Figure 11 - TU640x480C– K61XA1NU Rear View

CONNECTOR ASSIGNMENT

Pin	Signal	Pin	Signal
CN1: RS232, RS485, RS422 *1, IO Ports			
1	NC, Tx+*1, TxRx+	2	DTR, Rx-*1
3	TXD	4	CTS
5	RXD	6	RTS
7	DSR/Rx+*1	8	TxRX-, Tx-*1, NC
9	GND	10	Vcc1.1*2
CN2: POWER, BUZZER			
1	Vcc1.0	2	Buzz
3	GND		
CN3: AS1, I2C1, IO Ports			
1	Vcc1.1, Vcc2	2	SCL,SCK,K24
3	AS1_RX, /SS, K25	4	SDA,MOSI,K26
5	GND	6	/IRQ1,MISO,K27
7	AS1_TX, /IRQ,K28	8	/RESET
9	MB,K29	10	HB,K30
CN4: ADC, PWM, AUDIO, IO Ports			
1	ADC1,K16	2	ADC2,K17
3	GND	4	Vcc1.1, Vcc2*4
5	PWM1,K18	6	PWM2,K19
7	ATX,K20	8	ARX,K21
9	ACK,K22	10	AFS,K23
CN5: USB, SDHC Expansion, IO Ports			
1	DA2	2	DA3
3	CDA	4	Vcc2
5	CK	6	GND
7	DA0	8	DA1
9	GND	10	CD
11	GND	12	Vcc1.1
13	USB1-	14	USB1+
15	K31	16	GND
CN6: DEBUG			
1	Vcc2	2	GND
3	DRXD	4	DTXD
CN7: IO Ports			
1	Vcc1.1	2	GND
3	Vcc2	4	GND
5	AS2_TX, K0	6	AS2_RX, K1
7	K2	8	K3
9	K4	10	K5
11	K6	12	K7, PWM4*5
13	K8	14	K9, PWM3
15	K10	16	K11
17	K12	18	K13
19	K14	20	K15
CN8: USB0			
Mini USB (USB0)*6			
CN12: RS4			
1	TXDO	2	RXDI
3	GND	4	Vcc1.1
J6: USB			
1	Vcc1.1	2	USB-
3	USB+	4	K31
5	GND		

*1 - option;
*2 - when J47 soldered;
*3 - selectable via jumper J27 (5V: 1-2; 3V3: 2-3)
*4 - selectable via jumper J26 (VIO: 1-2; 3V3: 2-3
*5 - Selectable via jumper J52 and J6 pins (1 - 2 setting
Backlight level to be fixed at 100%);
*6 - selectable via jumper J55 (device: 1-2; host: 2-3)
Vcc1.0 - fused 5Vin; Vcc1.1-unfused 5Vin;
VIO-Vcc1.1, Vcc1.2, selectable via J6 (Vcc1.0: 1-2; Vcc1.2: 2-3)