

## ***Description***

This device is an extension cable between USB device and host (computer) with embedded into connector “intelligent” integrated circuits on both sides of the cable.

The USB cable with the chip inside is not a passive extension cable. It is an active device. The USB signals going in and out of this extension cable in both directions are buffered to assure signal quality. Unlike passive USB cables the IC prevents signal degradation. The embedded “intelligent” integrated circuit cleans, amplifies USB signal and watches USB 1.1 protocol. Its Control State Machine enables and disables USB and Cable transmitters inside the chip depending on USB signals.

## ***Features***

- ◆ Compliant with USB 1.1 specification;
- ◆ Provides support for any full-speed (12 Mb/s) or low-speed (1.5 Mb/s) USB device;
- ◆ Allows a USB device to have its cable length extended up to **30 meters**;
- ◆ Embedded USB 1.1 Transceivers prevents signal loss;
- ◆ Low cost in comparison with extension of cable using Hubs;
- ◆ Power (vcc) and ground (gnd) Wire Size: 20 AWG;
- ◆ USB Signal lines (DP and DM) Wire Size: 28 AWG, Stranded-Twisted Pair, 90 Ohm Characteristic Impedance;
- ◆ Downstream connector: Female, Type “A”, USB Approved Connector;
- ◆ Upstream connector: Male, Type “A”, USB Approved Connector;

## Compatibility

The UIC4102CP complies with USB 1.1 specifications governing the design of full-speed and low-speed USB devices. However, Unique ICs does not guarantee that all full speed USB devices are compatible with the UIC4102CP.

Some low power low-speed USB devices can work with cable up 100 meters.

## Applications

- ◆ WEB-camera
- ◆ Surveillance camera
- ◆ Printer
- ◆ Scanner
- ◆ Mice
- ◆ Keyboard
- ◆ Etc.

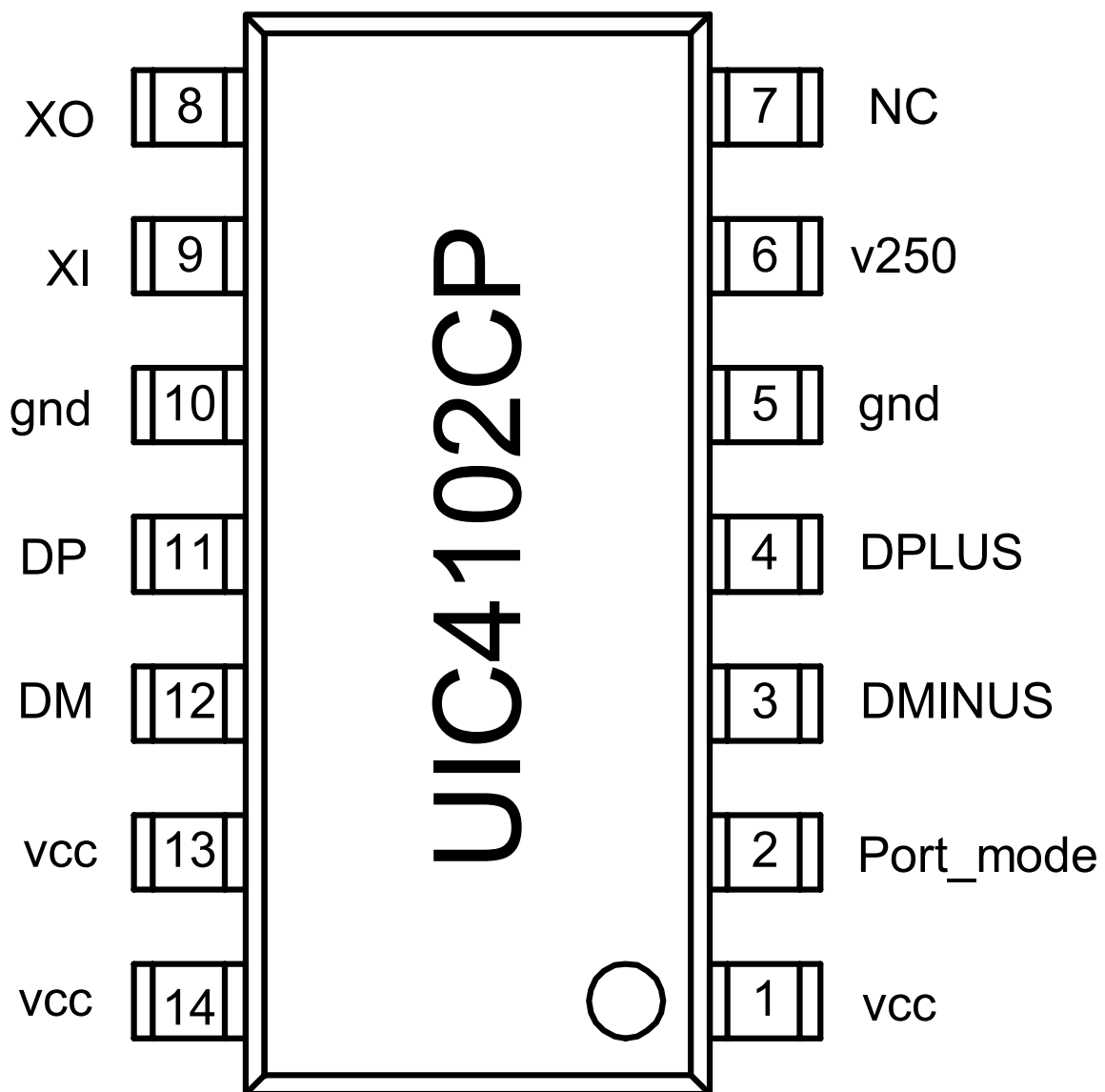
**Table 1. Recommended Operating Conditions**

Parameter	Name	Limits			Condition
		min	typ	max	
Supply Power Voltage, V	vcc	3,0	3,3	3,6	
DC Input voltage range, V	VI	0	-	3,6	
DC Output voltage range, V	VO	0	-	vcc	
Operating ambient temperature range in free air, °C	Tamb	-40	-	+85	
ESD Protection, all pins, V				2000	

Table 2. UIC4102CP Characteristics

Parameter	Name	Limits			Condition
		min	typ	max	
<b>Cable Signal Characteristics</b>					
Max Supply Current Drawn, mA	I <sub>supply</sub>	-	20	26	Temp = 27° C
Max Cable Voltage Drop, V		-	-	0.09	Temp = 27° C
Cable data signaling high, mV	V <sub>CSH</sub>	460	-	550	
Cable data signaling low, mV	V <sub>CSL</sub>	-10	-	10	
Cable Idle Level, mV	V <sub>CIL</sub>	-10	-	10	
Cable chip signal delay, ns	T <sub>CD</sub>	-	13.5	-	
Cable Length, m	CL			30	
<b>DP, DM Input Levels</b>					
Input High Threshold, V	V <sub>Ih</sub>	2,0	-	-	
Input Low Threshold, V	V <sub>Il</sub>	-	-	0,8	
Differential input sensitivity, V	V <sub>DI</sub>	0.2	-	-	[(DP) – (DM)]
Differential common mode range, V	V <sub>CM</sub>	0.8	-	2.5	Includes V <sub>DI</sub> range
Single ended receiver threshold, V	V <sub>SE</sub>	0.8	-	2.0	
<b>DP, DM Output Levels</b>					
Output High Voltage, V	V <sub>oh</sub>	2,4	-	-	I <sub>oh</sub> < 6mA
Output Low Voltage, V	V <sub>ol</sub>	-	-	0,4	I <sub>ol</sub> < 6mA
<b>Leakage Current</b>					
Hi-Z State data line leakage current, uA	I <sub>LO</sub>	-	-	±10	0V < V <sub>IN</sub> < 3.3V
<b>Capacitance</b>					
USB 1.1 Transceiver capacitance, pF	C <sub>IN</sub>	-	-	20	Pin to <b>gnd</b>
<b>Output Resistance</b>					
Driver output resistance, Ω	Z <sub>DRV</sub>	28	-	44	Steady state drive

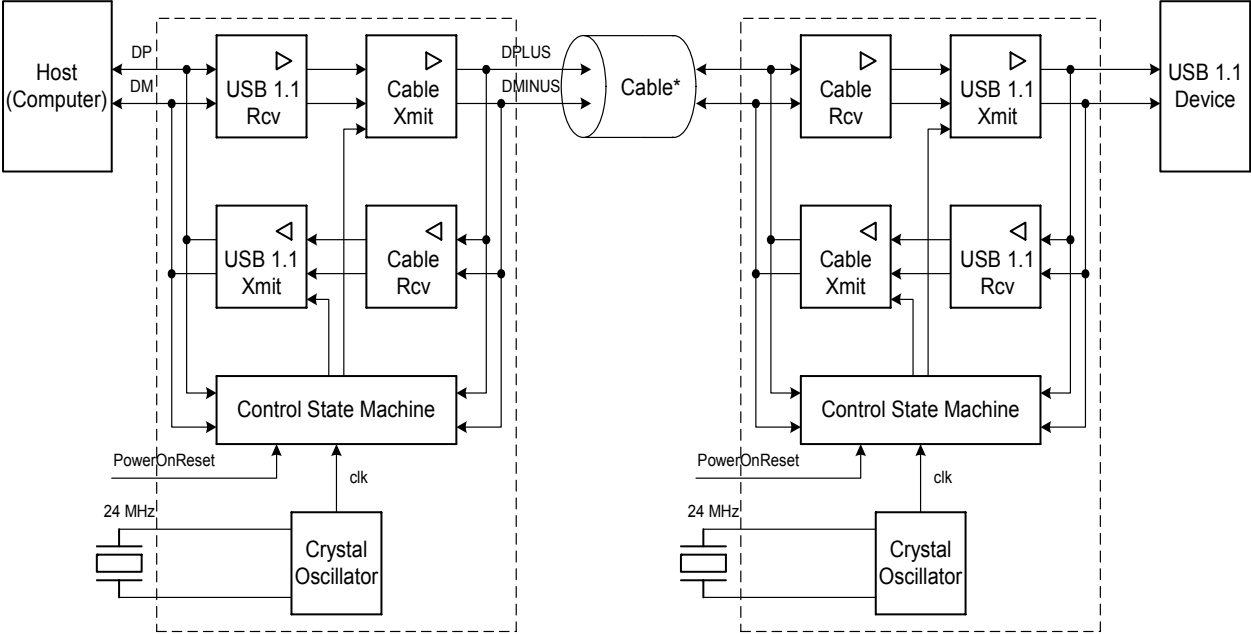
### Pin Configuration



**Table 3. USB 1.1 Active Extension Cable embedded “intelligent” IC Pin Description**

Pin Number	Name	Direction	Description
1	vcc	Power	Chip power, 3.3V
2	Port_Mode	Input	Externally assigns the embedded IC function. 0: downstream port (on device cable side); 3.3V: upstream port (on host cable side)
3	DMINUS	Input/Output	Data minus pin on cable side, corresponding to DM pin on USB side
4	DPLUS	Input/Output	Data plus pin on cable side, corresponding to DP pin on USB side
5	gnd	Power	Chip ground
6	v250	Analog	DPLUS, DMINUS low threshold
7	NC	-	Must be not connected
8	XO	Output	<b>Oscillator Output.</b> Connect to external 24 MHz crystal resonator
9	XI	Input	<b>Oscillator Input.</b> Connect to external 24 MHz crystal resonator
10	gnd	Power	Chip ground
11	DP	Input/Output	USB Data Pin Data +
12	DM	Input/Output	USB Data Pin Data -
13	vcc	Power	Chip power, 3.3V
14	vcc	Power	Chip power, 3.3V

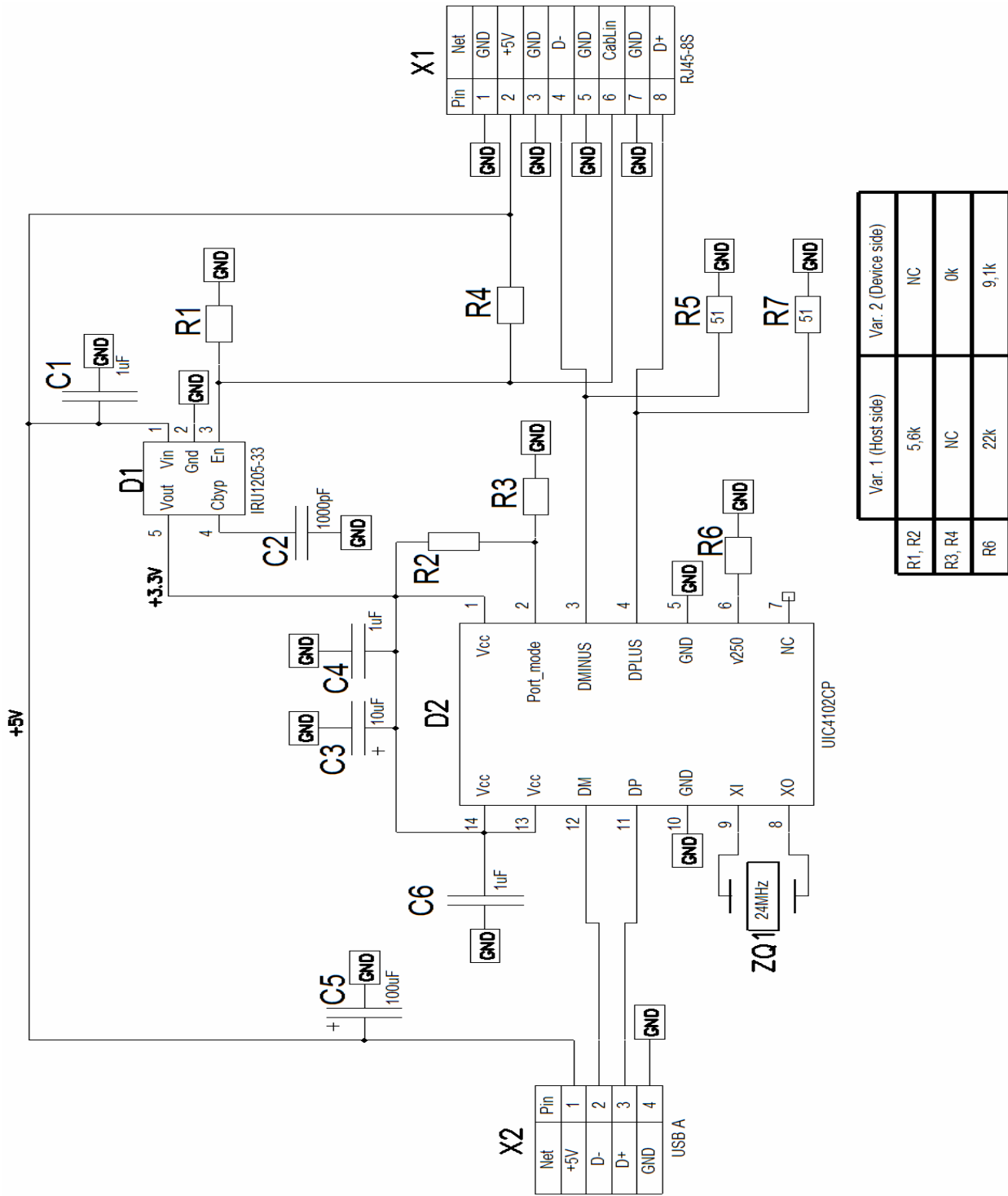
### Cable embedded IC Functional Block Diagram



\* CAT5E/CAT6 (shielded cables) or USB2.0 cable

### Typical external component connections

For CAT5E/CAT6 interconnection cable



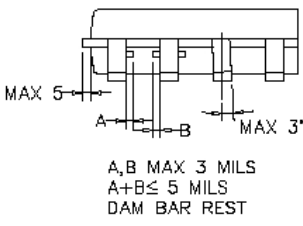
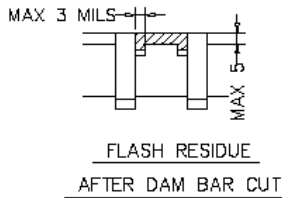
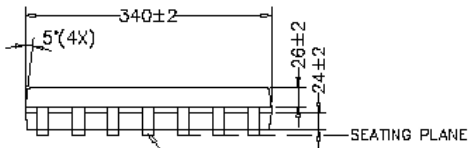
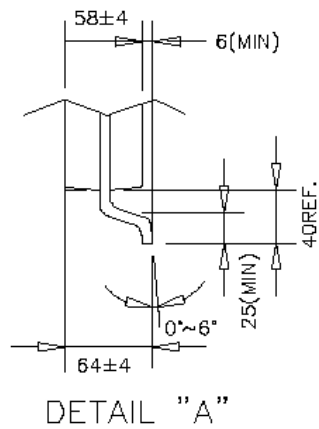
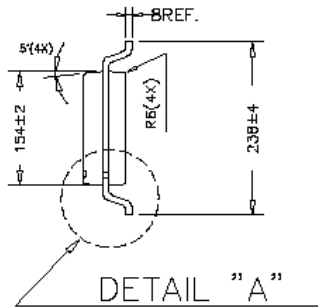
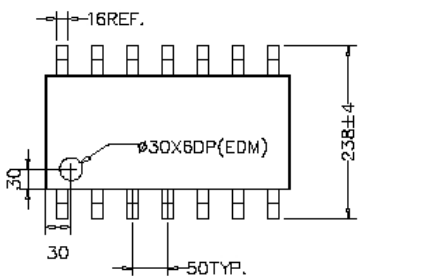
	Var. 1 (Host side)	Var. 2 (Device side)
R1, R2	5,6k	NC
R3, R4	NC	0k
R6	22k	9,1k

**Cable outer shield termination method**



**Package Outline**

**14-Pin SOP package**



A, B MAX 3 MILS  
 A+B ≤ 5 MILS  
 DAM BAR REST

- NOTE:
1. PACKAGE SURFACE: MATTE FINISH
  2. ALL DIMENSIONS ARE IN MIL
  3. WARPAGE FACTOR (2 MILS/INCH)
  4. MATTE FINISH  $R_a$  1.6-2.3 $\mu$ m.