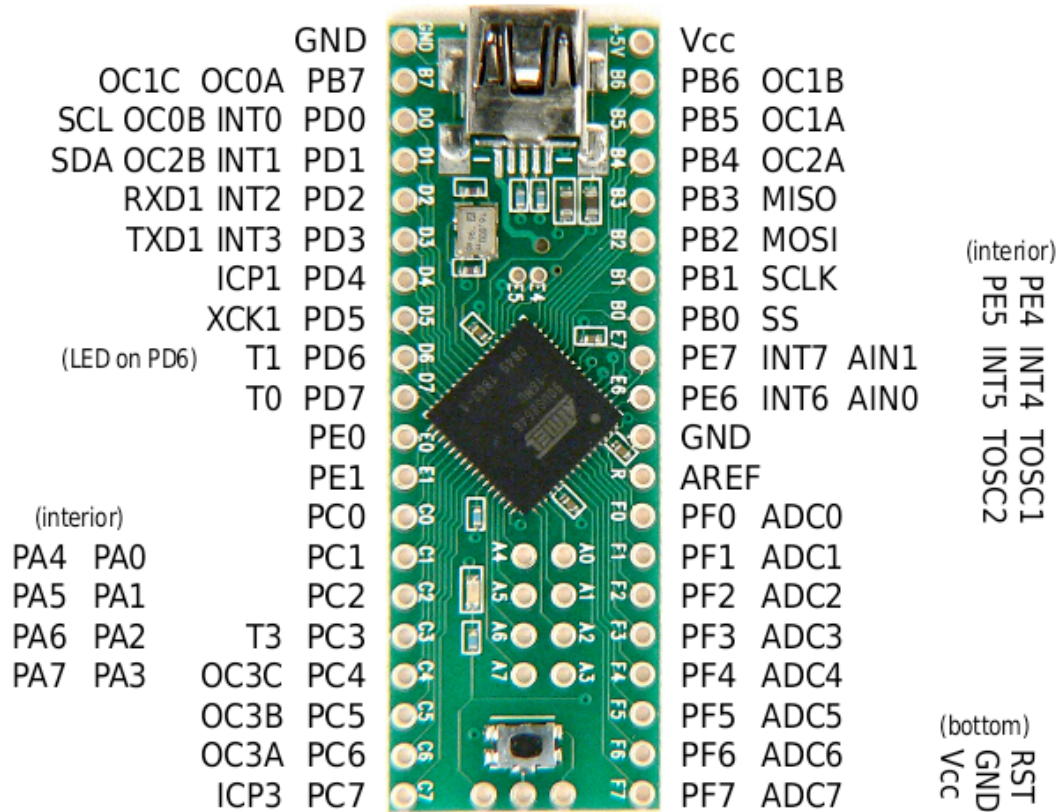


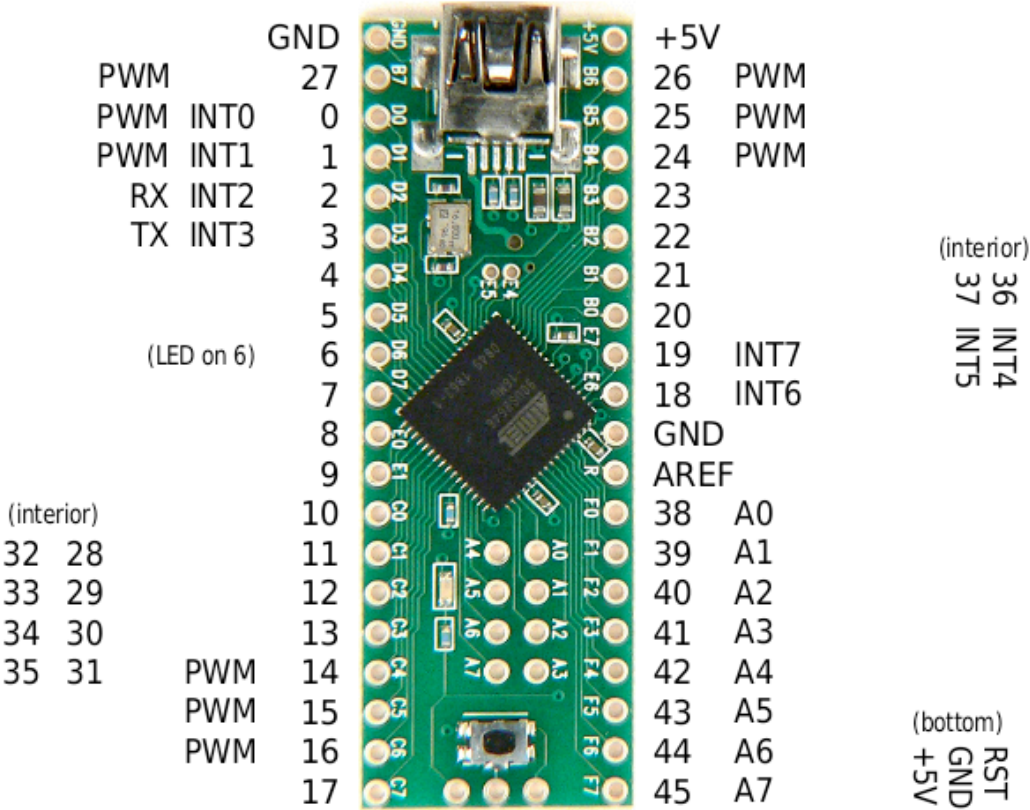
## DDDAC LCD Design Notes

### 1) Teensy 1.0++ Pinouts

#### a) As Port Numbers



b) As Arduino Channels



## 2) Port PinOut Assignments

## a) LCD

Pin	Name	Use
17	C7	LCD D7
16	C6	LCD D6
15	C5	LCD D6
14	C4	LCD D5
9	E1	LCD E
8	E0	LCD R/W GND'ed
7	D7	LCD RS
1	D1	LCD Backlight Control

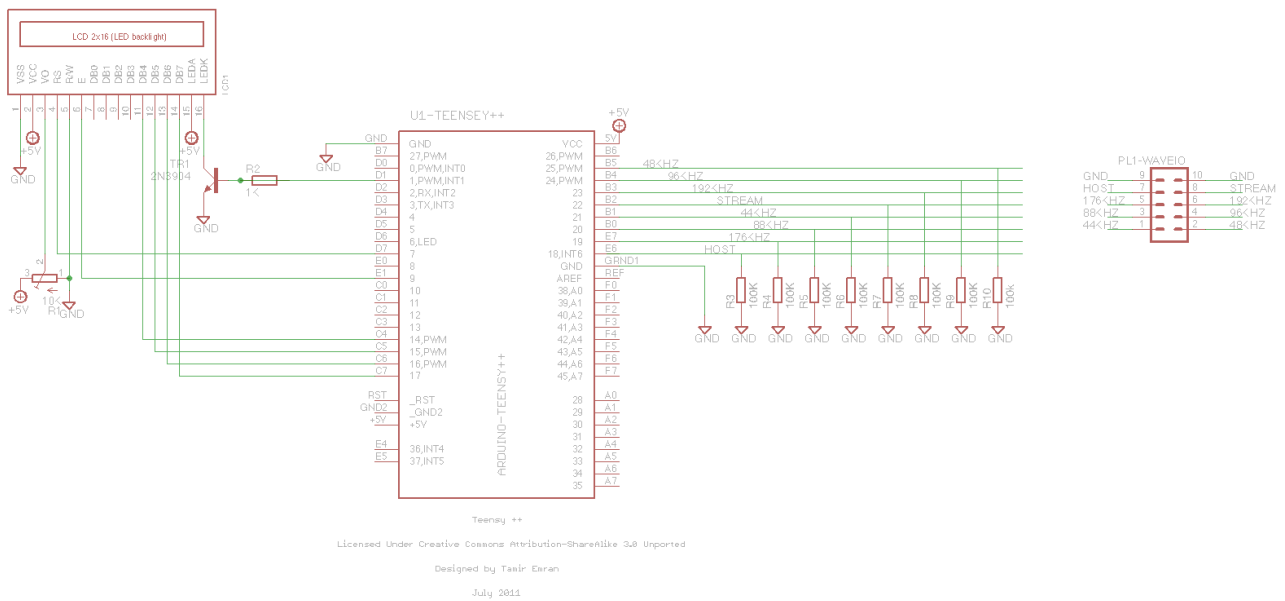
## b) WaveIO

Pin	Name	Use
18	E6	Host Active
19	E7	176.4KHz
20	B0	88KHz
21	B2	44.1KHz
22	B3	Audio Streaming
23	B3	192KHz
24	B4	96KHz
25	B3	48KHz

## 3) Bill Of Materials

Item	Part No.	Value	No. Off	Supplier	Item Code	Note
Teensy 1.0++	U1		1	pjrc.com	Teensy ++	Now Teensy2.0 ++
LCD	LCD1		1	Maplin.co.uk	N27AZ	16 x 2 backlit
Cermet Trimmer Potentiometer	R1	10K	1	Maplin.co.uk	UH27E	Multiturn
Small Signal Transistor	TR1	2N5551	1	Maplin.co.uk	UL36P	Could use 2N3904
Pull Downs	R3-10	100K	8			
LCD Backlight Resistor	R2	1K	1			
ICD header	PL1	2 x 5	1	Maplin.co.uk	JB85G	

#### 4) Schematic



## 5) Arduino Sketch Code

```
// DDCAc Code 1.0 , AudioH, March 2013

/*
  LCD circuit:
  LCD RS pin to digital pin 10
  LCD Enable pin to digital pin 8
  LCD D4 pin to digital pin 3
  LCD D5 pin to digital pin 2
  LCD D6 pin to digital pin 1
  LCD D7 pin to digital pin 0
  LCD R/W pin to ground

  WaveIO Pins
  Streaming  = B2
  Host Active = E6
  192 KHz    = B3
  176.4 KHz  = E7
  96 KHz     = B4
  88.2 KHz   = B0
  48 KHz     = B5
  44.1 KHz   = B1
*/

//Set Variables
//int led = 6; // onboard LED D6

// include the library code:
#include <LiquidCrystal.h>

// initialize the library with the numbers of the interface pins
// lcd(RS,Enable,D4,D5,D6,D7)
LiquidCrystal lcd(7, 9, 14, 15, 16, 17);
String lck = "Lock";
String nlck = "NLCK";
String strm = "Streaming";
String nstrm = "No Music!";
String cpyrht = "AudioH 2013 v1.0";
String blank = "          ";

// WaveIO Signals
int strmstatus= 22;
int lckstatus = 18;
int smple192 = 23;
int smple176 = 19;
int smple96 = 24;
int smple88 = 20;
int smple48 = 25;
int smple44 = 21;
```

```

int led_brht = 1; //D1
int i = 0; // genaral loop counter
elapsedMillis timer_dim = 0;
int dimmed = false;
int streaming = false;
int prv_streaming = false;
int dim_delay = 15000;

void setup() {
  // initialise LED and WaveIO inputs
  pinMode(led, OUTPUT);
  pinMode(lckstatus,INPUT);
  pinMode(strmstatus,INPUT);
  pinMode(smple44,INPUT);
  pinMode(smple48,INPUT);
  pinMode(smple88,INPUT);
  pinMode(smple96,INPUT);
  pinMode(smple176,INPUT);
  pinMode(smple192,INPUT);

  // turn on backlight
  analogWrite(led_brht,255);

  // set up the LCD's number of columns and rows:
  lcd.begin(16, 2);
  // Print a message to the LCD.
  lcd.print(cpyrht);
  lcd.setCursor(14,1);
  lcd.print("DDDAC by Doede Douma");
  while (!digitalRead(strmstatus)) {
    lcd.scrollDisplayLeft();
    delay(280);
  }
  lcd.clear();
  timer_dim = 0;
}

void loop() {
  // check lock status
  lcd.setCursor(0,0);
  if (digitalRead(lckstatus))
    lcd.print (lck);
  else
    lcd.print(nlck);

  // check streaming status
  lcd.setCursor(7,0);
  if (streaming = digitalRead(strmstatus))
    lcd.print (strm);

```

```

else
    lcd.print(nstrm);

lcd.setCursor(0,1);
//lcd.print(blank);

// check sample rate
if(digitalRead(smple44))
    lcd.print("44.1 KHz    ");

if(digitalRead(smple48))
    lcd.print("48 KHz      ");

if(digitalRead(smple88))
    lcd.print("88.2 KHz    ");

if(digitalRead(smple96))
    lcd.print("96 KHz      ");

if(digitalRead(smple176))
    lcd.print("176.4 KHz   ");

if(digitalRead(smple192))
    lcd.print("192 KHz     ");


if ((timer_dim > dim_delay) && (!dimmed)) {
    for (i=250; i >= 10; i-=10) {
        analogWrite(led_brght,i);
        delay(15);
    }
    dimmed = true;
    prv_streaming = streaming;
}

if (streaming != prv_streaming && dimmed) {
    dimmed = false;
    timer_dim = 0;
    analogWrite(led_brght,255);
}

}

```