9V DC to 5V Regulated Supply

U1 LM7805_CGE
Input | ground | output

J1 Barrel_Jack_Switch
F1 1.5A
TP1 TestPoint_CGE
TP2 TestPoint_CGE
+5V
C1 1uF 50V
C2 .1uF 50V
EARTH
EARTH

Edited by CGE
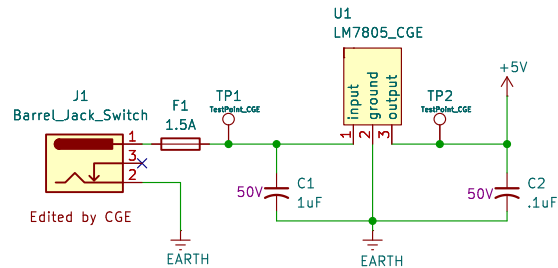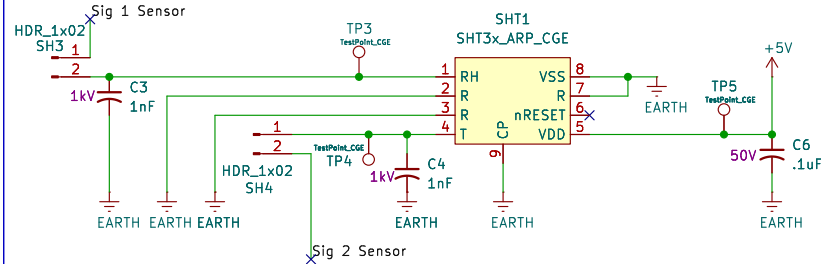
9 V DC input from barrel jack (J1) is protected by a 1.5 A fuse (F1)
The LM7805 regulator (U1) converts 9 V to a stable 5 V output
C1 (33 µF) and C2 (1 µF) for input/output filtering
EARTH net is the common ground reference

SHT31-ARP-B Humidity and Temperature Sensor

Sig 1 Sensor
HDR_1x02 SH3
TP3 TestPoint_CGE
SHT1 SHT3x_ARP_CGE
RH | VSS
R | R
R | nRESET
T | VDD
CP
C3 1nF 1kV
HDR_1x02 SH4
TP4 TestPoint_CGE
C4 1nF 1kV
+5V
TP5 TestPoint_CGE
C6 .1uF 50V
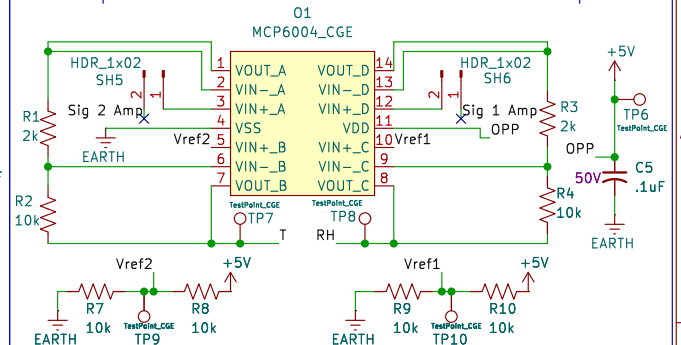EARTH EARTH EARTH EARTH EARTH EARTH
Sig 2 Sensor

SHT31-ARP-B Humidity and Temperature Sensor is expected to output 10% of VDD up to 90% of VDD
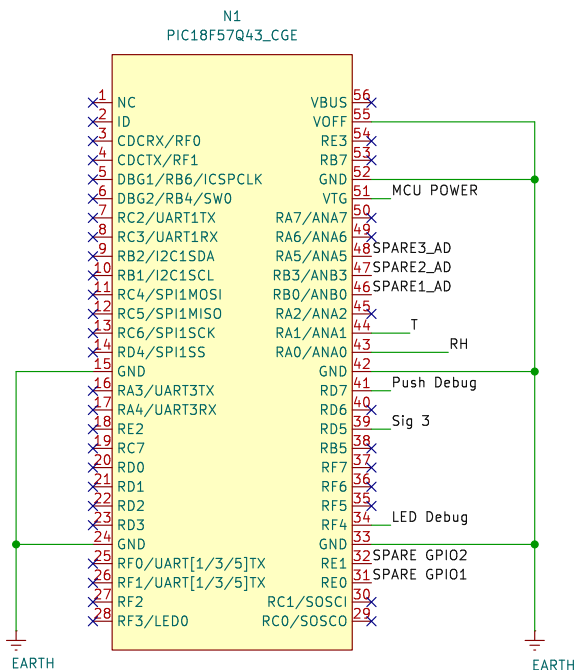for both Sig 1 Sensor [Relative Humidity (RH) pin] and Sig 2 Sensor [Temperature (T) pin]

VDD: 5V

RH pin voltage output range: 0.5 V – 4.5 V for 0 – 100 % RH
T pin voltage output range: ~0.77 V – ~4.34 V for -40 °C – +125 °C

Amplification Circuit for SHT31 Outputs

O1 MCP6004_CGE
HDR_1x02 SH5
VOUT_A | VOUT_D
VIN_-A | VIN_-D
VIN_+A | VIN_+D
VSS | VDD
VIN_+B | VIN_+C
VIN_-B | VIN_-C
VOUT_B | VOUT_C
HDR_1x02 SH6
Sig 2 Amp
Sig 1 Amp
R1 2k
R2 10k
R3 2k
R4 10k
Vref2
Vref1
OPP
OPP
+5V
TP6 TestPoint_CGE
C5 .1uF 50V
EARTH
TP7 TestPoint_CGE T
TP8 TestPoint_CGE RH

Vref2
R7 10k TP9 TestPoint_CGE R8 10k
+5V
Vref1
R9 10k TP10 TestPoint_CGE R10 10k
+5V
EARTH EARTH

MCP6004 configured as 2 non-inverting amplifiers (Gain ≈ 1.2) to condition SHT31-ARP-B
Temperature & Humidity signals around a 2.5 V mid-supply reference for 0–5 V ADC use.
Expected outputs: Temp ≈ 0.44–4.7 V, RH ≈ 0.1–4.9 V from inputs 0.77–4.34 V and 0.5–4.5 V respectively.
Testpoints: TP6 = 5 V, TP7 = Temp Out, TP8 = RH Out, TP9 = Vref2 ≈ 2.5 V, TP10 = Vref1 ≈ 2.5 V

Microchip PIC18F57Q43 Curiosity Nano

N1 PIC18F57Q43_CGE

Pin	Name		Name	Pin
1	NC		VBUS	56
2	ID		VOFF	55
3	CDCRX/RF0		RE3	54
4	CDCTX/RF1		RB7	53
5	DBG1/RB6/ICSPCLK		GND	52
6	DBG2/RB4/SW0		VTG	51
7	RC2/UART1TX		RA7/ANA7	50
8	RC3/UART1RX		RA6/ANA6	49
9	RB2/I2C1SDA		RA5/ANA5	48
10	RB1/I2C1SCL		RA4/ANA4	47
11	RC4/SPI1MOSI		RB0/ANB0	46
12	RC5/SPI1MISO		RA2/ANA2	45
13	RC6/SPI1SCK		RA1/ANA1	44
14	RD4/SPI1SS		RA0/ANA0	43
15	GND		GND	42
16	RA3/UART3TX		RD7	41
17	RA4/UART3RX		RD6	40
18	RE2		RD5	39
19	RC7		RB5	38
20	RD0		RF7	37
21	RD1		RF6	36
22	RD2		RF5	35
23	RD3		RF4	34
24	GND		GND	33
25	RF0/UART[1/3/5]TX		RE1	32
26	RF1/UART[1/3/5]TX		RE0	31
27	RF2		RC1/SOSCI	30
28	RF3/LED0		RC0/SOSCO	29

MCU POWER
SPARE3_AD
SPARE2_AD
SPARE1_AD
T
RH
Push Debug
Sig 3
LED Debug
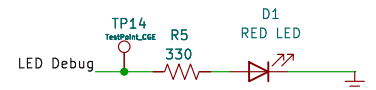SPARE GPIO2
SPARE GPIO1
EARTH EARTH

PIC18F57Q43 MCU – Receives analog inputs (T, RH), debug input (Push Debug), and drives LED Debug and Sig 3 alert output.
Powered via VTG with local decoupling

MCU Debug Pushbutton Input

+5V
SW1 SW_DPST_CGE
TP13 TestPoint_CGE
R6 10k
Push Debug
C8 0.47uF 25V
EARTH
EARTH
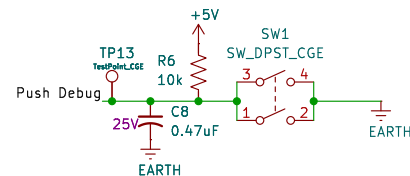
Push Debug Input (to RD7)
Includes pull-up resistor R6 (10 kΩ) to hold RD7 HIGH
Pressing the switch connects the input to GND (logic LOW)
Hardware-debounced using C8 (0.47 µF)
Intended for triggering or testing MCU debug functions

8-pin header (Team Connector)
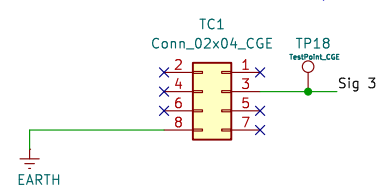
TC1 Conn_02x04_CGE
TP18 TestPoint_CGE
Sig 3
EARTH

Sig 3 is digital output from the PIC18F57Q43 to 8-pin team connector
Pin 3 in the team connector connects to the subsystem that will trigger an alarm
when Humidtiy threshold is met

Status Indicator

TP14 TestPoint_CGE
D1 RED LED
R5 330
LED Debug
EARTH

Status Indicator LED
Connected to MCU pin (RF3)
Indicates system activity or status

MCU Power Supply

+5V
MCU POWER
C7 .1uF 50V
TP16 TestPoint_CGE
EARTH
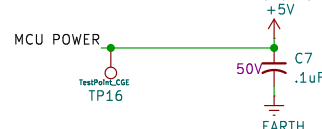
MCU receives its operating power through this pin
0.1 µF bypass capacitor at VTG (VDD)
EARTH net is tied to MCU ground (GND)

Extra Pin Headers

SPARE3_AD — 3
SPARE2_AD — 2 SH2
SPARE1_AD — 1 SPARE_3

SPARE GPIO2 — 2 SH1
SPARE GPIO1 — 1 SPARE_2

Spare 1X03 Header intended for either
analog signals from SHT31 sensor or
general purpose input/output for LED/PUSH debug
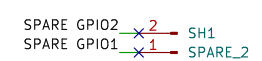
Spare 1X02 Header intended for either
general purpose input/output for LED/PUSH debug
or additional outputs to other subsystems

General Notes for Subsystem Schematic Design: Humidity & Temperature Sensor

* Note: All resistors are ¼ W unless otherwise specified
* Extra Pin Headers available in subsystem;
  look under "Extra Pin Headers" section for more details
* 1X02 pin headers on Sig 1 and Sig 2 in the SHT31-ARP-B
  Sensor circuit will mini-jumpers to connect over to Op-Amp;
  these headers can also bypass Op-Amp circuit and connnect directly
  to the PIC if any problem with signal amplification.
  No connection flags were placed to avoid errors
  these pins signals are intended to be connected via jumpers

Cristopher Gutierrez Team 208

Sheet: /
File: CGE_Subsystem.kicad_sch
Title: Subsystem Schematic Design: Humidity & Temperature Sensor
Size: A4
Date: 2025-11-12
Rev: 3.0
KiCad E.D.A. 9.0.4
Id: 1/1