Temperature Measurement

Colibri T30

Issued by:	Toradex	**Document Type:**	Measurement Report

Purpose:	Learn more about the temperatures on the Colibri T30/Iris combo under full load

Version:	0.1

Revision History		
Date	**Version**	**Remarks**
14-08-2013	0.1	Preliminary draft

1 Temperature Distribution with Iris Carrier board

1.1 Test Setup

-Colibri T30 V1.1b 1GB RAM 2GB Flash (Test Version)

-Iris V1.1 A

-T30_LinuxImageV2.0Beta2

-4 CPU cores 100% load (No Idle Program)

-Playing movie from a USB.

-Dual Screen setup 2x1080p connected via splitter cable on the DVI-I connector (mirror mode)

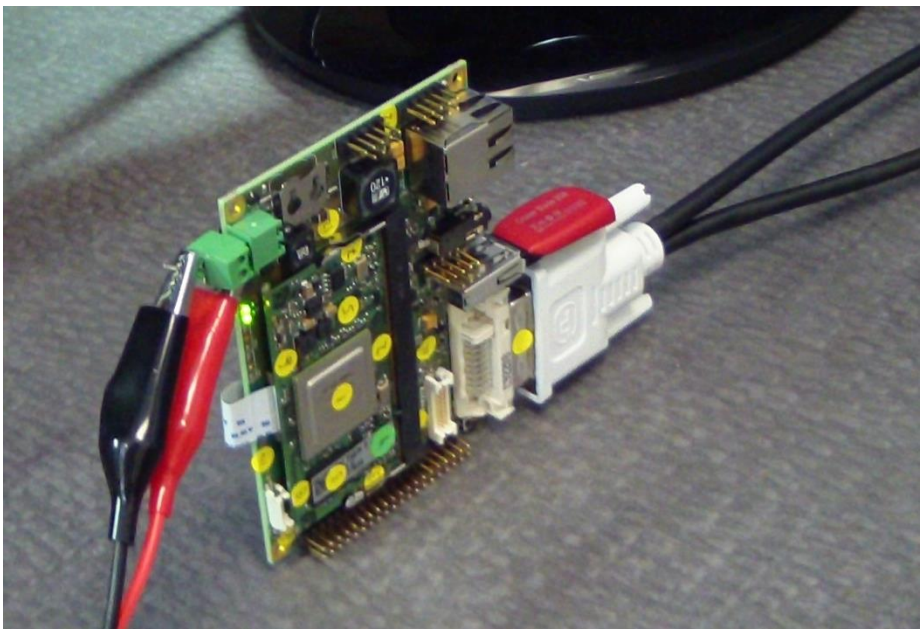
-Iris Board vertical

-No forced air circulation

-System was running for about 1 hour with constant power consumption

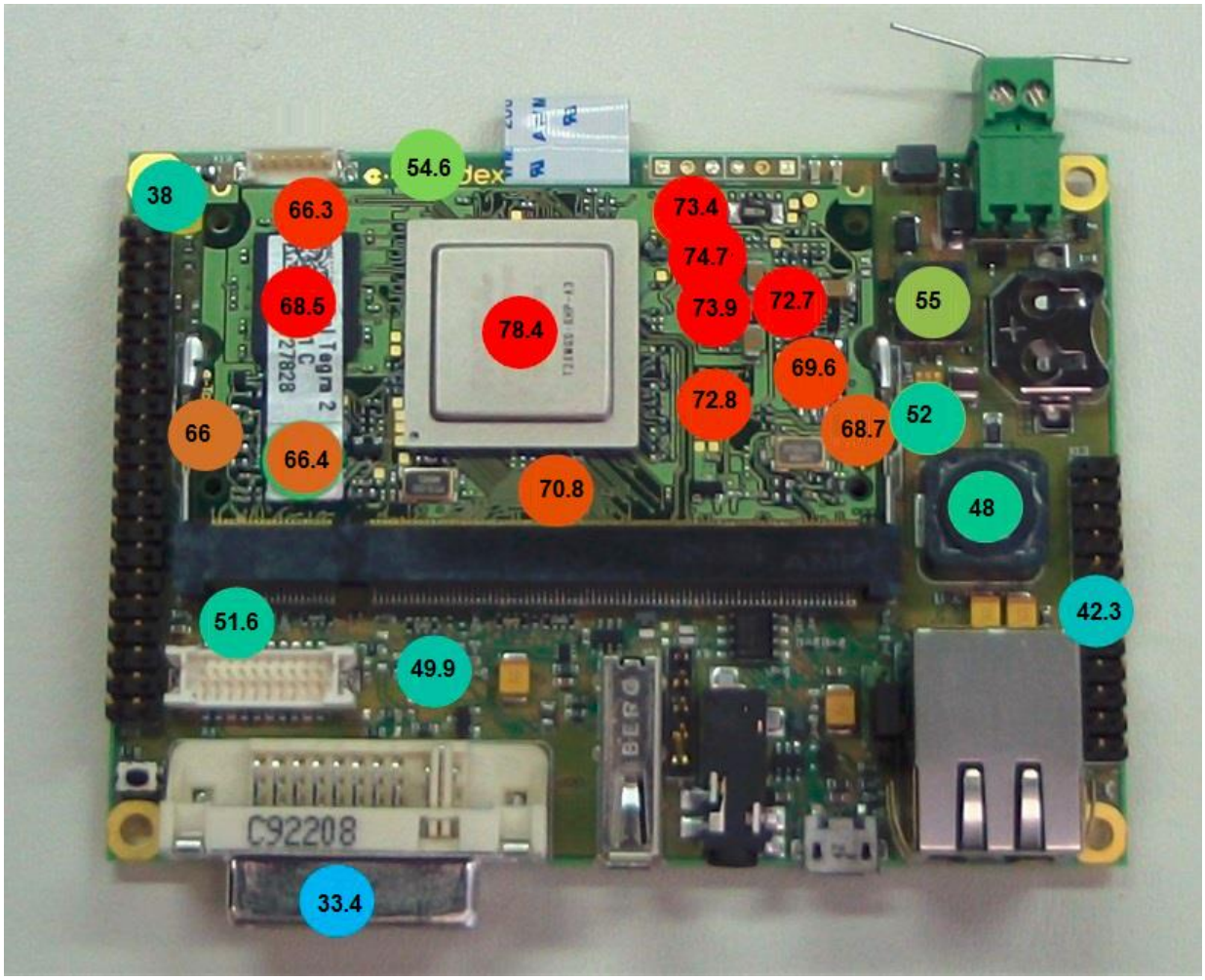
-Measurement Device ThermoWorks Close Focus IR (Target Diameter 0.1”)

1.2 Test Results

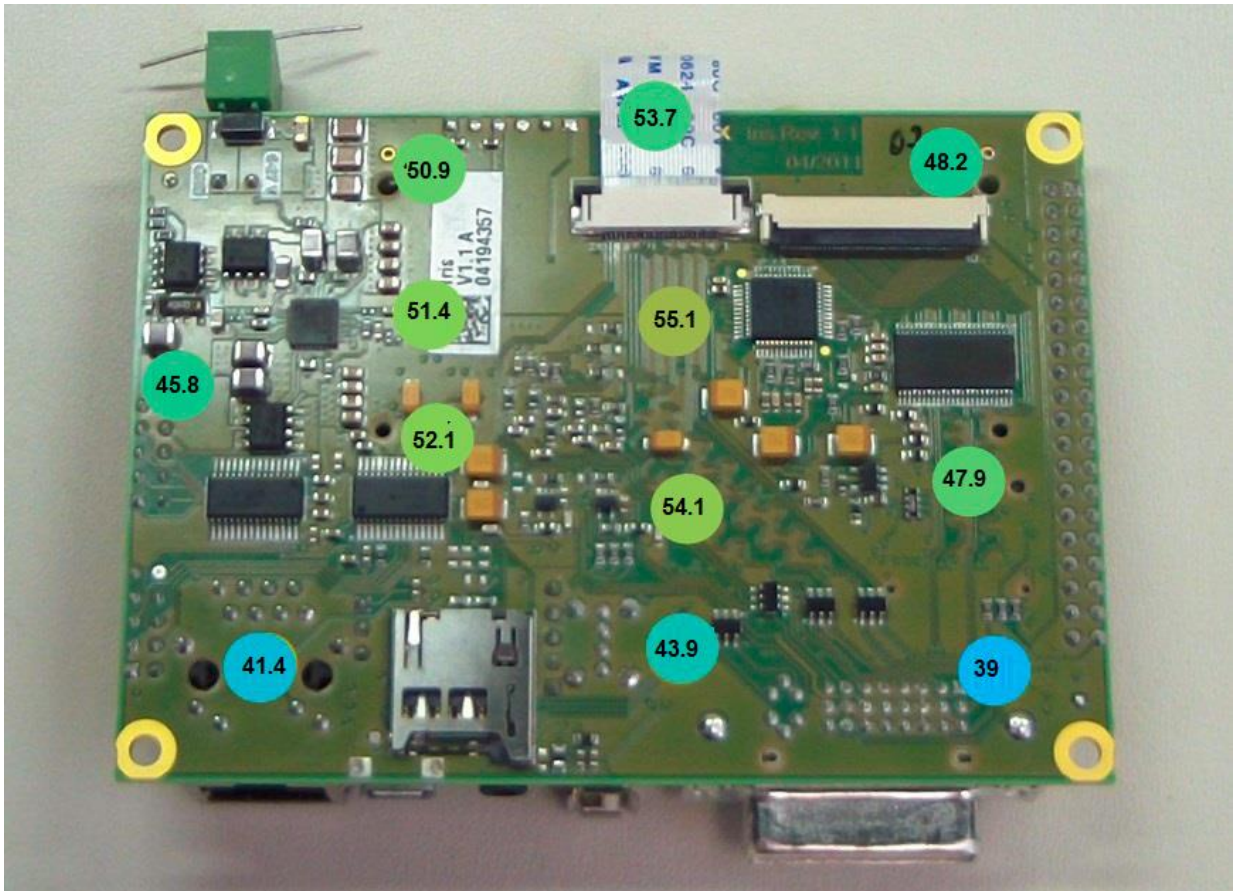


- Ambient temperature: 28 Celsius
- CPU temperature 86 Celsius
- Power consumption of whole system: 410mA @ 12V
- All temperatures in Grad Celsius

1.2.1 Front



1.2.2 Back



2 Heat Sink Test

2.1 Test Setup

-Colibri T30 V1.1b 1GB RAM 2GB Flash

-Iris V1.1 A

-T30_LinuxImageV2.0Beta2

-Dynamically Voltage/Frequency switching deactivated, all frequencies to max (CPU 1GHz)

-4 CPU cores 100% load (No Idle Program)

-Playing 1080p movie from a USB Stick. (Via Hub)

-Dual Screen setup 2x1080p connected via splitter cable on the DVI-I connector (mirror mode)

-Iris Board flat on table

-No forced air circulation

-System was running for at least 1 hour with constant power consumption (with case more than 3h)

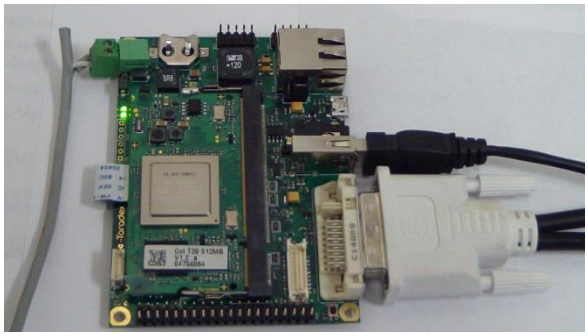
-Measurement Device ThermoWorks Close Focus IR (Target Diameter 0.1")

-CPU Junction measured via internal Thermal Diode

2.2 Test Results

Test	Description	Ambient [°C]	CPU Junction [°C]	Other Temperature [°C]	
1	No Heat Sink Flat	25	84.4		
2	No Heat Sink Vertical	24.8	79		
3	No Heat Sink in Case	25	86	Top of Case Central	43
4	Large Black Heat Sink	25.8	66.8	Side Fin Central	58.6
5	Large Black Heat Sink Vertical	24	61.5	Side Fin Central	55.8
6	Small Black Heat Sink Flat	26	76.8	Top of Heat Sink Central	72.1
7	Small Black Heat Sink Vertical	25.7	72.7	Top of Heat Sink Central	68.7
8	Small Black Heat Sink in Case	25.6	70.3	Top of Case Central	42
9	Small Blue Heat Sink Flat	26	75.6	Top of Heat Sink Central	72.1
10	Small Blue Heat Sink Vertical	25.2	71.7	Top of Heat Sink central	68.3
11	Small Blue Heat Sink in Case	25.1	84.6	Top of Heat Sink Central	40.6

2.2.1 Test 1, No Heat Sink



2.2.2 Test 2, No Heat Sink in Case

Heavy Cast Aluminum Case

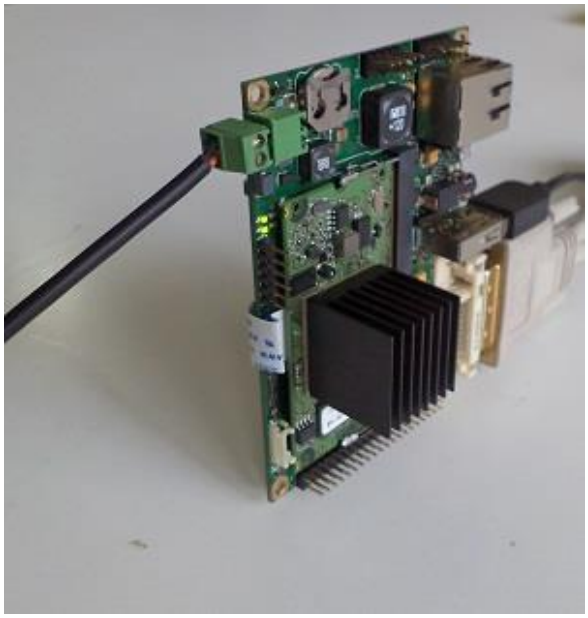
2.2.3 Test 3, Large Black Heat Sink

ATS-54230W-C2-R0

http://www.digikey.com/product-detail/en/ATS-54230W-C2-R0/ATS1250-ND/1284964

The weight of the Heat sink is considerable high, additional mechanical fixation of the Colibri is recommended. For example use the mounting wholes on the Colibri and the Iris.

2.2.4 Test 4, Large Black Heat Sink Vertical



ATS-54250W-C2-R0

http://www.digikey.com/product-detail/en/ATS-54250W-C2-R0/ATS1251-ND/1284965

In this position most probably more heat is transfer via the bottom of the PCB.

The weight of the Heat sink is considerable high, additional mechanical fixation of the Colibri is recommended. For example use the mounting wholes on the Colibri and the Iris.

2.2.5 Test 5, Small Black Heat Sink

BDN10-3CB/A01

http://www.digikey.com/product-detail/en/BDN10-3CB%2FA01/294-1098-ND/272736

2.2.6 Test 6, Small Black Heat Sink in Case

Same heat sink than in test 5, but mounted inside the cast aluminum case form test 2. The top of the heat sink touches the case with some pressure. Be careful if you apply pressure to the module, deformation of the Colibri PCB can stress the solder joints and can lead to defects. Such failure may happen only after months or/and after many temperature cycles.

2.2.7 Test 7, Small Blue Heat Sink

ATS-60000-C2-R0

http://www.digikey.com/product-detail/en/ATS-60000-C2-R0/ATS1376-ND/1285090