White LED Card

For XMC1000 Family

inLight_WhiteLED_V4

White LED Card

Board User's Manual

Revision 1.0, 2013-03-08

Microcontroller

Edition 2013-03-08

Published by
Infineon Technologies AG
81726 Munich, Germany

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (**www.infineon.com**).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Revision History	
Page or Item	**Subjects (major changes since previous revision)**
Revision 1.0, 2013-03-08	

Table of Contents

List of Figures

List of Tables

Introduction

This document describes the features and hardware details of the White LED Card (inLight_WhiteLED_v4) designed to work with Infineon‟s XMC1200 CPU Card. This board is part of Infineon's XMC1000 LED Lighting Application Kit.

1 Overview

The White LED Card is an application expansion card of XMC1000 LED Lighting Application Kit. The White LED Card along with a XMC1200 CPU Card demonstrates the LED lighting capabilities of XMC1200. The main use case for this application card is mainly to demonstrate the smooth brightness control of XMC1200 device including the toolchain. The focus is safe operation under evaluation conditions. The board is not cost optimized and cannot be seen as reference design.

1.1 Key Features

The White LED Card is equipped with the following features

- Connection to XMC1200 CPU Card via 2x30 pins (0.8mm pitch) SAMTEC HSEC8 connector
- Brightness control of four LED strings
- DALI interface with isolation
- Temperature sensing
- Ambient light sensing
- 433MHz RF receiver
- +5V Power supply via SAMTEC 2x30pins connector
- +24V external connection to supply power to the four LED drivers (BCR450)

1.2 Block Diagram

Figure 1 shows the block diagram of the White LED Card. There are following blocks:

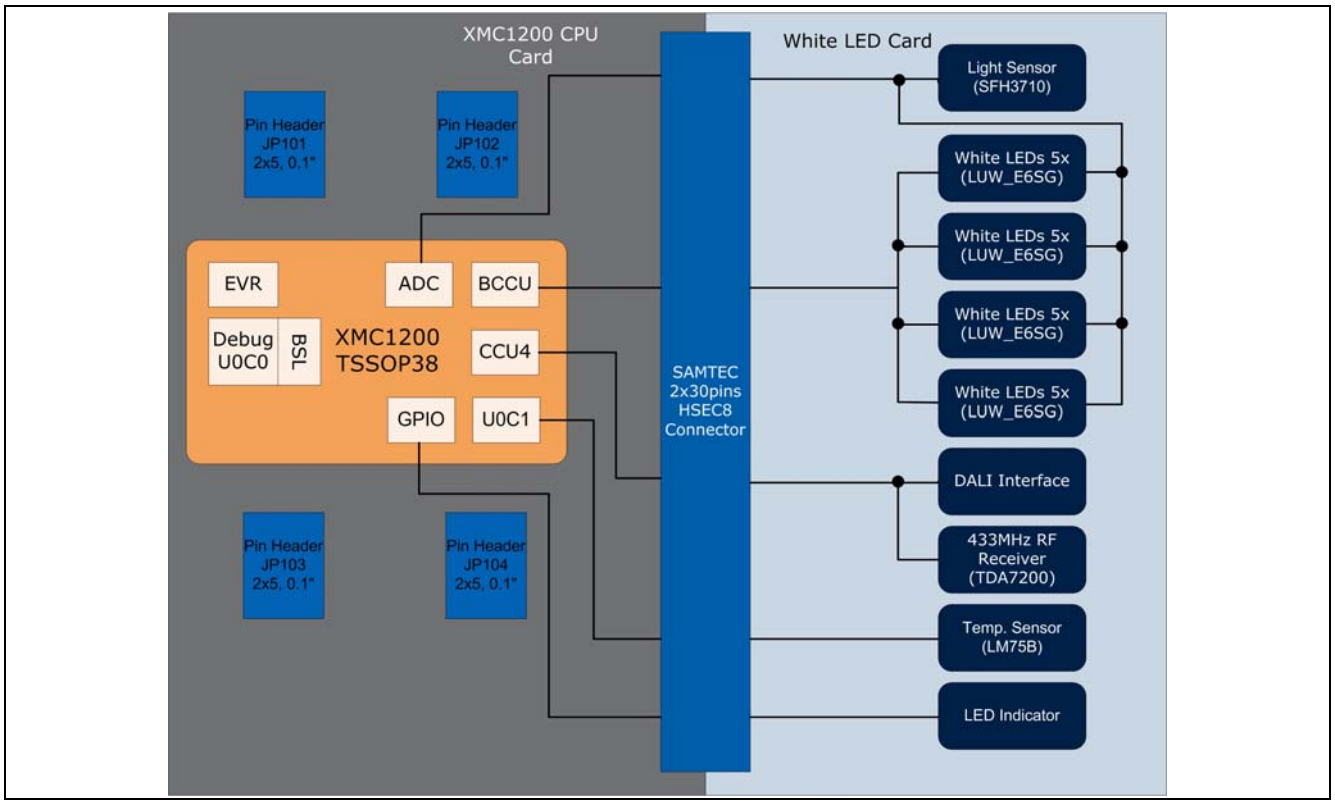

Figure 1 Block Diagram of White LED Card in connection with XMC1200 CPU Card

2 Hardware Description

The following sections give a detailed description of the hardware and how it can be used.

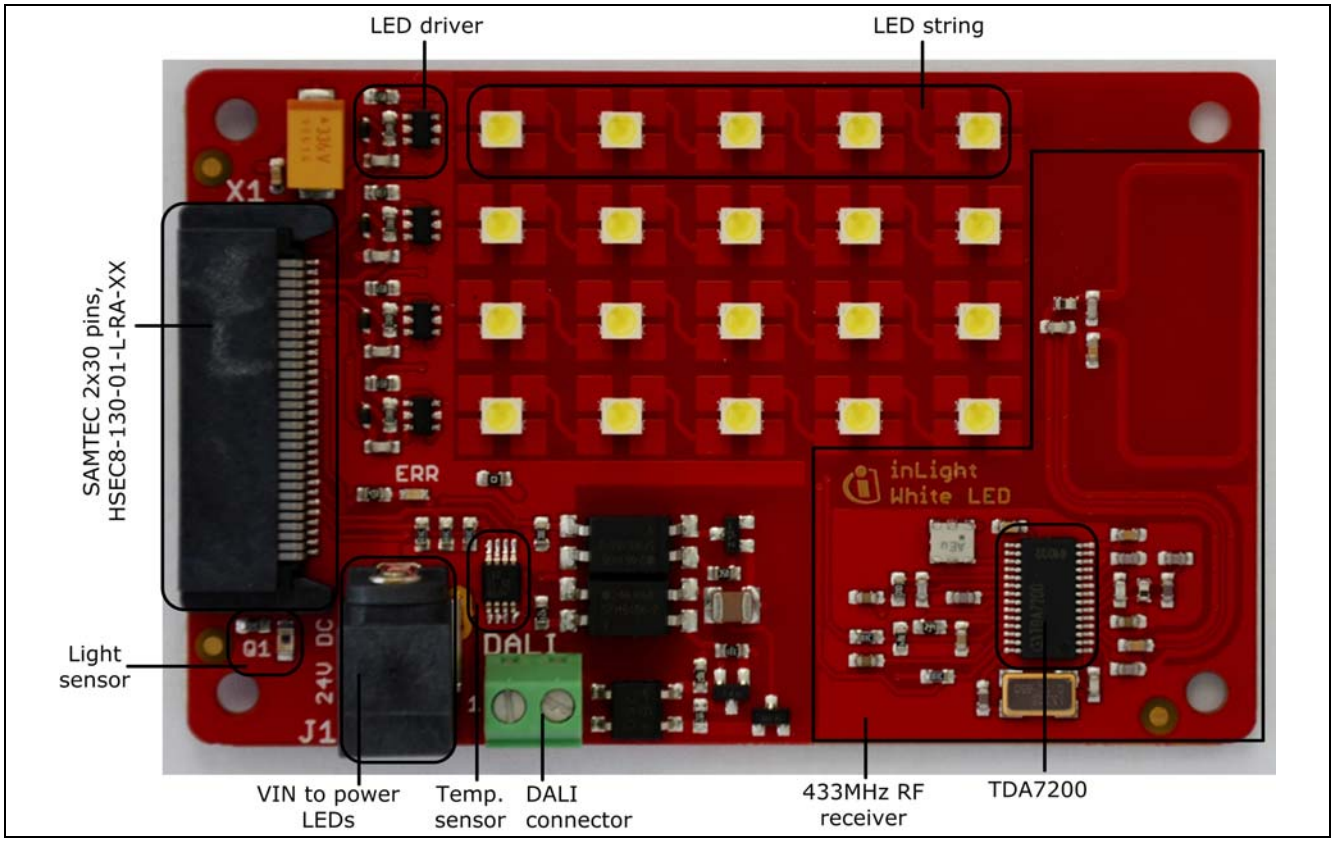

Figure 2 White LED Card

2.1 White LEDs

The White LED Card supports brightness control of four LED strings, each string consists of five White LEDs (LUW_E6SG) on board.The forward voltage V_F is 3.3 V @ I_F=30mA.
The card implements brightness control through BCCU module of XMC1200. The BCCU module used four channels to drive four LED drivers (BCR450) which control the current flow through the White LED string. The +24V power supply to the LED drivers is provided from an external connector J1.

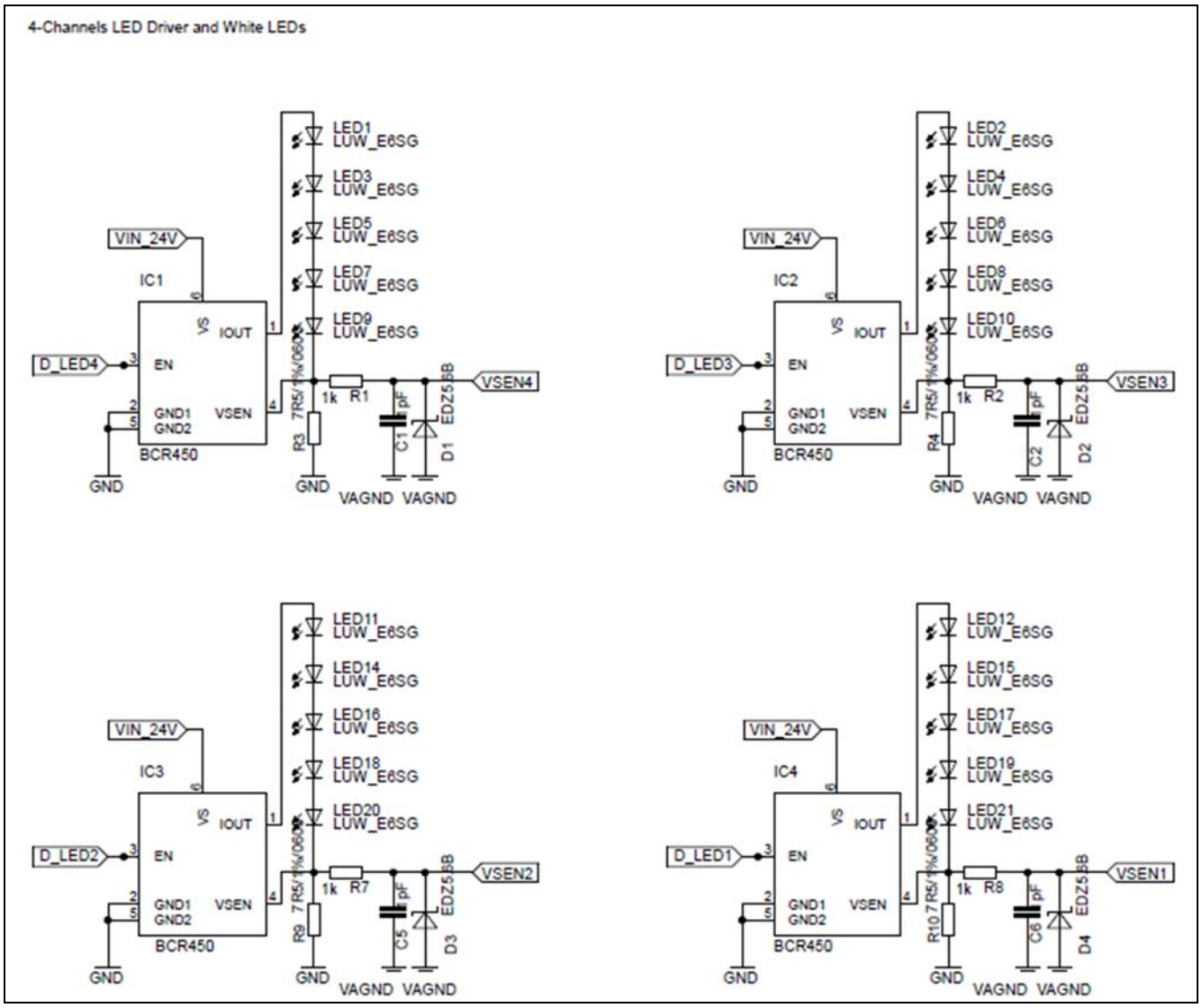

Figure 3 4 channels from BCCU module to control the brightness of 4 White LED strings

Table 1 shows the connection of the BCCU signals to the samtec 2x30pins connector.

Table 1 BCCU signal connection to the SAMTEC 2x30pins Connector

Pin No.	Signal Name	Description
27	D_LED1	BCCU output signal
29	D_LED2	BCCU output signal
31	D_LED3	BCCU output signal
33	D_LED4	BCCU output signal

2.2 Digital Addressable Lighting Interface (DALI)

The White LED Card supports DALI interface on board with two optocoupler (SFH6186-2) which provide level shifting and voltage isolation between the DALI network and the microcontroller's power supply. The DALI connector X3 consists of a DATA+ and DATA- signal pair.

Note: Please remove R105 on XMC1200 CPU Card to receive DALI data.

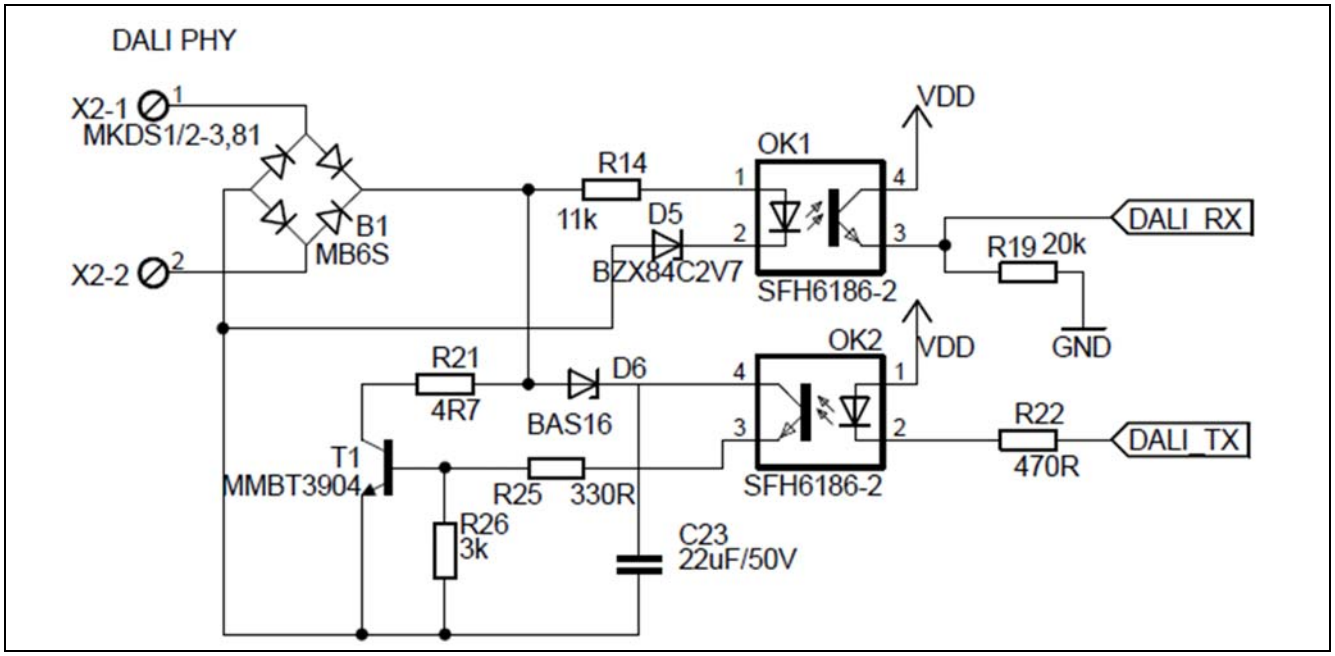

Figure 4 DALI PHY circuit

Table 2 DALI signal connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
21	DALI_RX	Receive DALI data
23	DALI_TX	Transmit DALI data

2.3 Temperature Sensor

The White LED Card supports Temperature Sensing on board with a temperature-to-digital converter (LM75B). XMC1000 device on a XMC1200 CPU Card communicate with the temperature sensor via the I^2C bus. This temperature sensor can achieve a temperature accuracy of +/-2°C from -25 °C to +100°C.

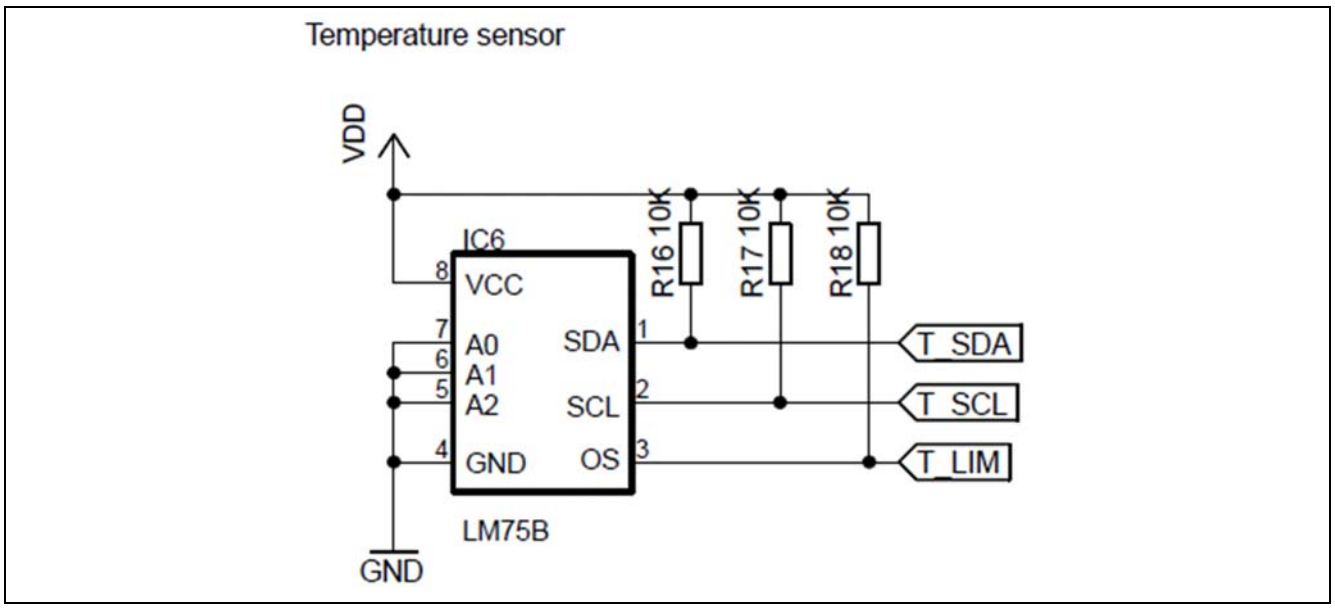

Figure 5 Temperature Sensing Circuit

Table 3 shows the connection of the I²C signals to the SAMTEC 2X30pins connector.

Table 3 I²C signals connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
10	T_LIM	Overtemperature shutdown
50	T_SCL	I²C serial clock
52	T_SDA	I²C serial bidirectional data

2.4 433MHz RF Receiver

The White LED Card supports 433MHz remote control system via a 433MHz RF Receiver (TDA7200) that is connected to the XMC1200 CPU Card through the SAMTEC 2x30pins connector.

Note: Please remove R104 on XMC1200/XMC1300 CPU Card to receive RF data.

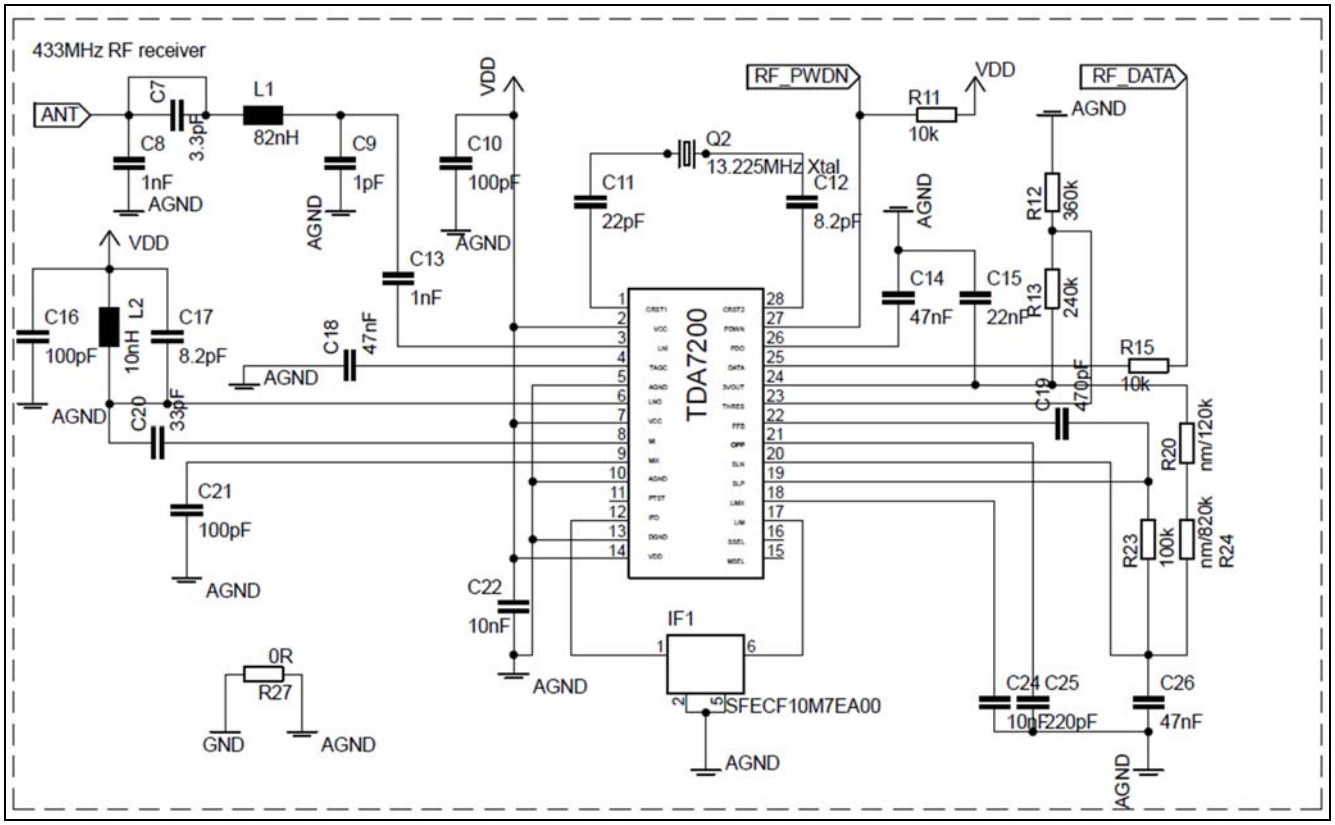

Figure 6 433MHz RF receiver circuit

Table 4 433MHz RF receiver signal connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
17	RF_DATA	RF Data In
43	RF_PWDN	Tied 'High' to enable RF Receiver

2.5 Light Sensor

The White LED Card supports ambient light sensing on board with NPN Phototransistor (SFH3710). The voltage output AMB_LT will be measured by the ADC module.

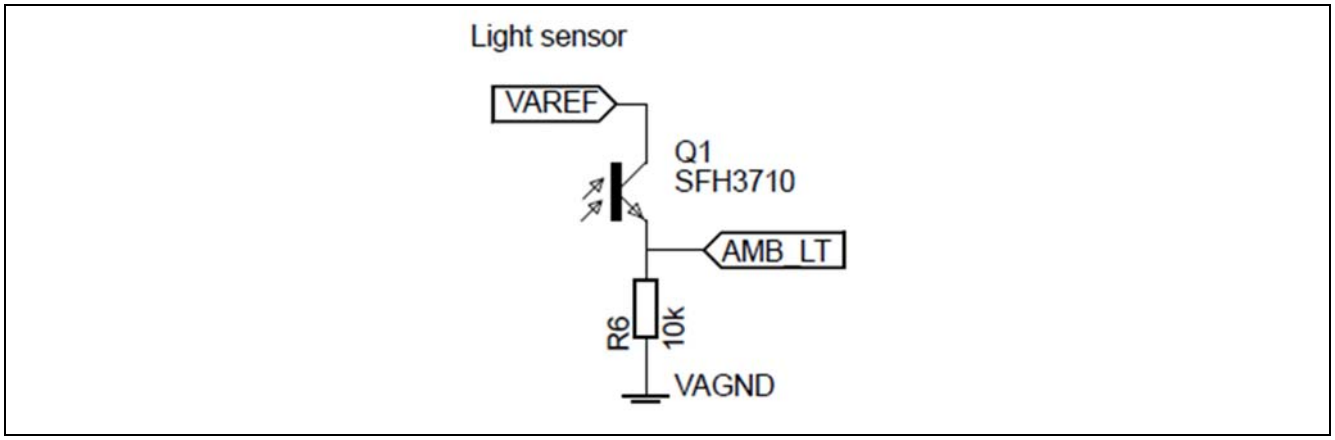

Figure 7 Ambient Light Sensing Circuit

Table 5 shows the connection of the Light sensing signals to the SAMTEC 2X30pins connector.

Table 5 Light sensing signals connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
2	AMB_LT	Light sensor analog voltage output

2.6 Power

Power input (5V) to the White LED Card is supported through the SAMTEC 2x30pins connector. VAREF and VAGND supply power to 433MHz RF Receiver and Light sensing transistor. VDD and GND provide power to DALI and the rest of circuitry.

External power connector J1 supply +24V DC to the four LED Driver ICs.

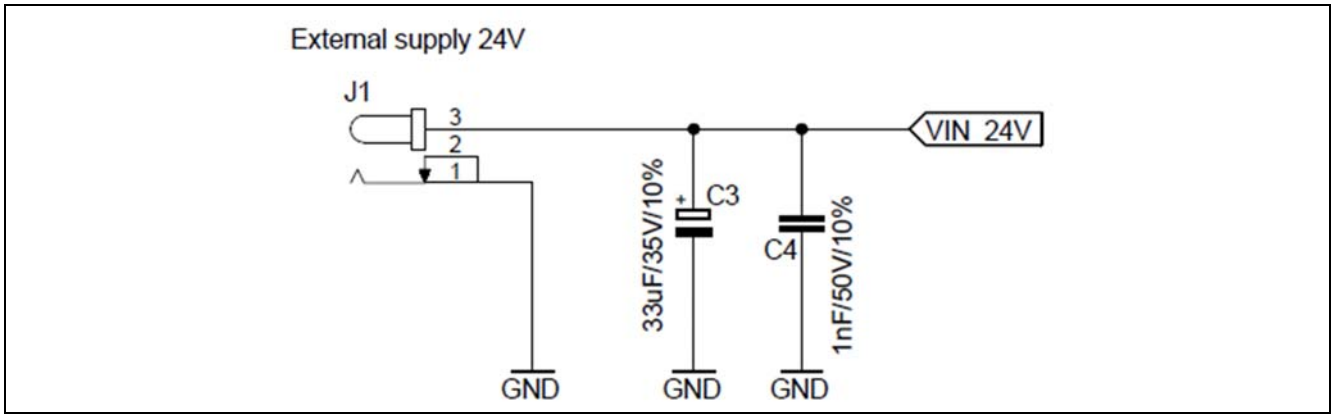

Figure 8 VIN_24V External Power Supply

Table 6 Power and ground signals connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
13	VAGND	Analog ground
14	GND	Digital ground
15	VAREF	Analog VDD +5V
16	VDD	Digital VDDP +5V

2.7 Error Indicating LED

The White LED Card supports a red LED indication on board with signal from GPIO Port pin of the XMC1200 device on the XMC1200 CPU Card for user application usage.

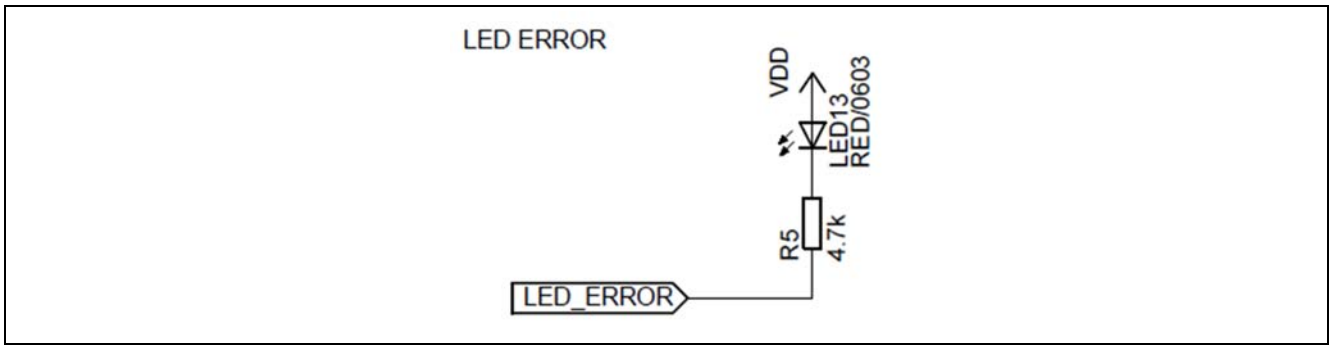

Figure 9 Error Indicating LED

Table 7 shows the connection of the Light sensing signals to the SAMTEC 2X30pins connector.

Table 7 LEDTS signal connection to the SAMTEC 2x30pins connector

Pin No.	Signal	Description
46	LED_ERROR	LED signalling

2.8 2x30pins SAMTEC connector

The SAMTEC connector of the White LED Card interfaces its signals to a XMC1200 CPU Card.

Figure 10 2x30pins SAMTEC connector

3 Production Data

3.1 Schematics

This chapter contains the schematics for the White LED Card:

- SAMTEC Connector, Power, 4 channels LED driver, DALI interface, 433MHz RF Receiver.

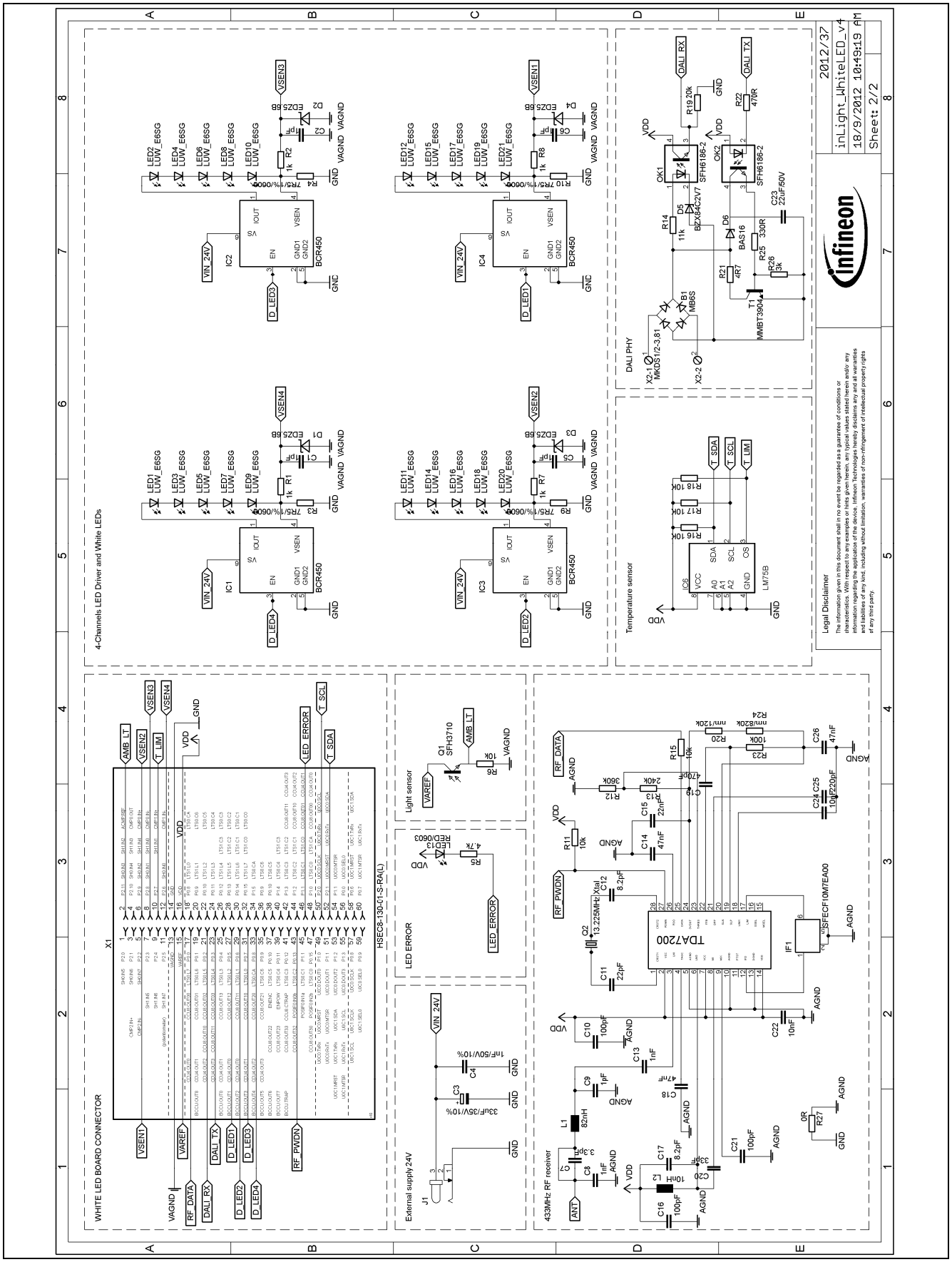

Figure 11 Schematic of White LED Card

3.2 Layout and Geometry

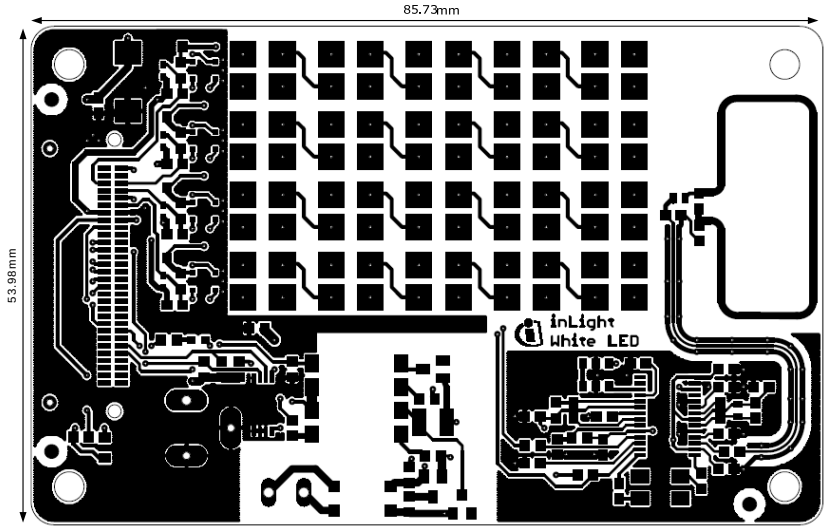

Figure 12 White LED Card layout and geometry

3.3 Bill of Materials

Table 8 White LED Card BOM

Sl. No.	Qty	Value	Device	Reference Designator
1	5	1pF/10V/10%/0603	Capacitor	C1,C2,C5,C6,C9
2	1	3.3pF/10V/10%/0603	Capacitor	C7
3	2	8.2pF/10V/10%/0603	Capacitor	C12,C17
4	1	22pF/10V/10%/0603	Capacitor	C11
5	3	100pF/10V/10%/0603	Capacitor	C10,C16,C21
6	1	220pF/10V/10%/0603	Capacitor	C25
7	1	470pF/10V/10%/0603	Capacitor	C19
8	3	1nF/50V/10%	Capacitor	C4,C8,C13
9	2	10nF/10V/10%/0603	Capacitor	C22,C24
10	1	22nF/10V/10%/0603	Capacitor	C15
11	1	33pF/10V/10%/0603	Capacitor	C20
12	3	47nF/10V/10%/0603	Capacitor	C14,C18,C26
13	1	22uF/50V/10V/10%/1210	Capacitor	C23
14	1	33uF/35V/10%/SMC_D	Capacitor	C3
15	4	EDZ5.6B	Zener Diode	D1,D2,D3,D4
16	1	BZX84C2V7	Zener Diode	D5
17	1	BAS16	Diode	D6
18	4	BCR450	LED driver	IC1,IC2,IC3,IC4
19	1	TDA7200	RF Receiver, Infineon	IC5

Sl. No.	Qty	Value	Device	Reference Designator
20	1	LM75B	I2C, temp. sensor	IC6
21	1	SFECF10M7EA00	IF filter	IF1
22	1	SPC4077	DC Power Jack	J1
23	1	10nH/0603	Inductor	L2
24	1	82nH/0603	Inductor	L1
25	20	LUW_E6SG	White LED	LED1-12, LED14-21
26	1	RED/CHIPLED/0603	Red LED	LED13
27	2	SFH6186-2	Optocoupler	OK1,OK2
28	1	13.225MHz Xtal	Crystal	Q2
29	1	0R/0603	Resistor	R27
30	2	4R7/0603	Resistor	R21
31	4	7R5/1%/0603	Resistor	R3,R4,R9,R10
32	1	330R/0603	Resistor	R25
33	1	470R/0603	Resistor	R22
34	4	1k/0603	Resistor	R1,R2,R7,R8
35	1	3k/0603	Resistor	R26
36	1	4.7k/0603	Resistor	R5
37	6	10k/0603	Resistor	R6,R11,R15,R16,R17,R18
38	1	11k/0603	Resistor	R14
39	1	20k/0603	Resistor	R19
40	1	100k/0603	Resistor	R23
41	1	240k/0603	Resistor	R13
42	1	360k/0603	Resistor	R12
43	1	nm/120k	Resistor	R20
44	1	nm/820k	Resistor	R24
45	1	MMBT3904	Transistor	T1
46	1	HSEC8-130-01-L-RA	SAMTEC connector	X1
47	1	MKDS1/2-3,81	DALI connector	X2

w w w . i n f i n e o n . c o m

Published by Infineon Technologies AG