Over Temperature Detection IC
Thermoflagger™ Application Circuit
(TCTH021BE version)

Reference Guide

RD225B-RGUIDE-01

TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION

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1. Introduction

In recent years, the management and control of the heat generated by electronic components in equipment has become a major issue, and onboard over temperature monitoring and temperature protection solutions have become increasingly important.

We have launched an Over Temperature Detection IC Thermoflagger™ (TCTH Series) as a new solution for over temperature monitoring in electronic equipment. We have also developed an Over Temperature Detection IC Thermoflagger™ application circuit example using this product as a reference design (hereinafter referred to as "this Design"), which is capable of detecting over temperature with a simple configuration; that is done by only combining it with a PTC thermistor. This design has a simple configuration which detects the rise of temperature above alert temperature. This Reference Guide describes this specification and operation procedure.

This design uses an Over Temperature Detection IC Thermoflagger™ TCTH021BE. In addition, small-package MOSFETs SSM3K35MFV and SSM3J35AMFV are used to drive LED.

2. Specifications and Appearance

2.1 Specifications

Table 2.1 lists the main specifications of this circuit.

Table 2.1 Circuit Specifications

Circuit Name	Thermoflagger™	Onboard Sensor	Power Supply	Operation
BE1	TCTH021BE (Open-drain type)	PTC thermistor	USB Type-C®	Red LED turns ON if the temperature of either PTC thermistor exceeds its alert temperature.

2.2 Circuit Block Diagram

Fig. 2.1 shows the block diagram of this circuit.

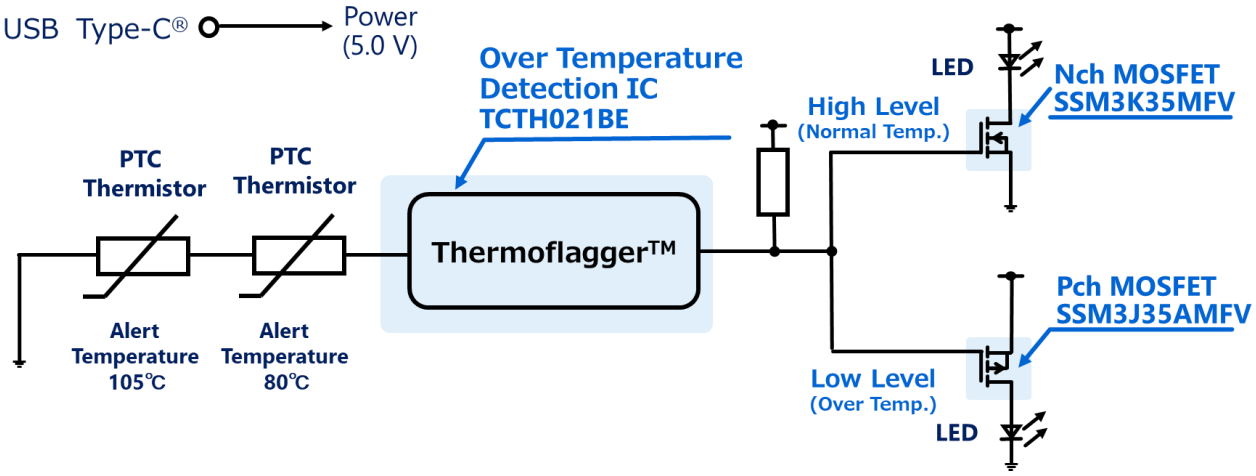


Fig. 2.1 Block Diagram

2.3 External View and Component Layout

Fig. 2.2 shows the external view of this design and Fig. 2.3 shows the layout of the main components.

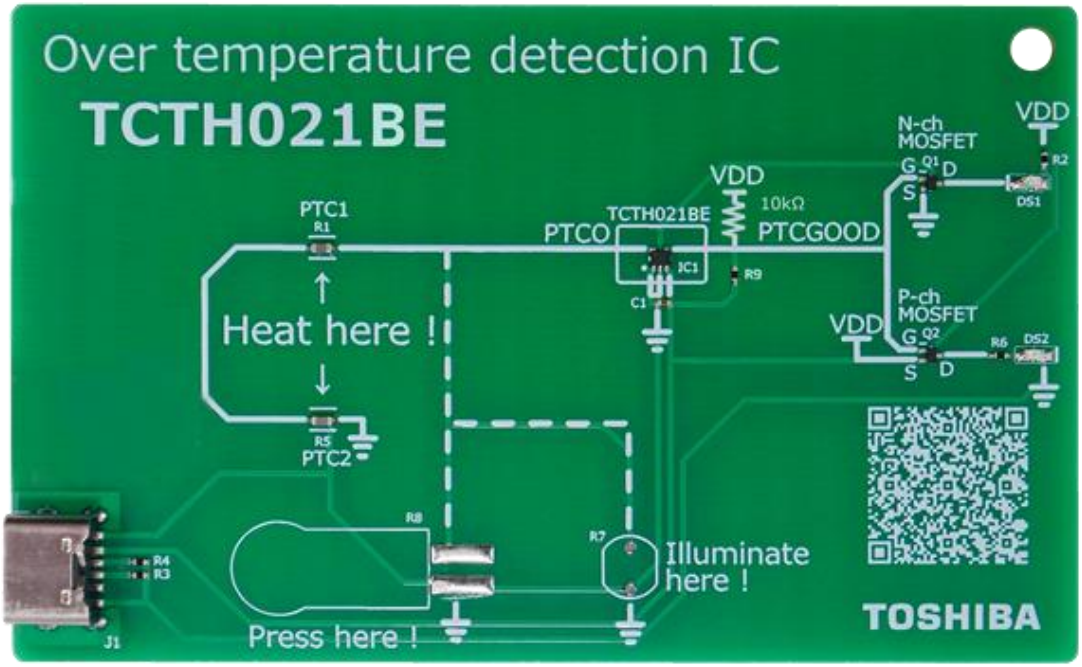


Fig. 2.2 PCB Front View

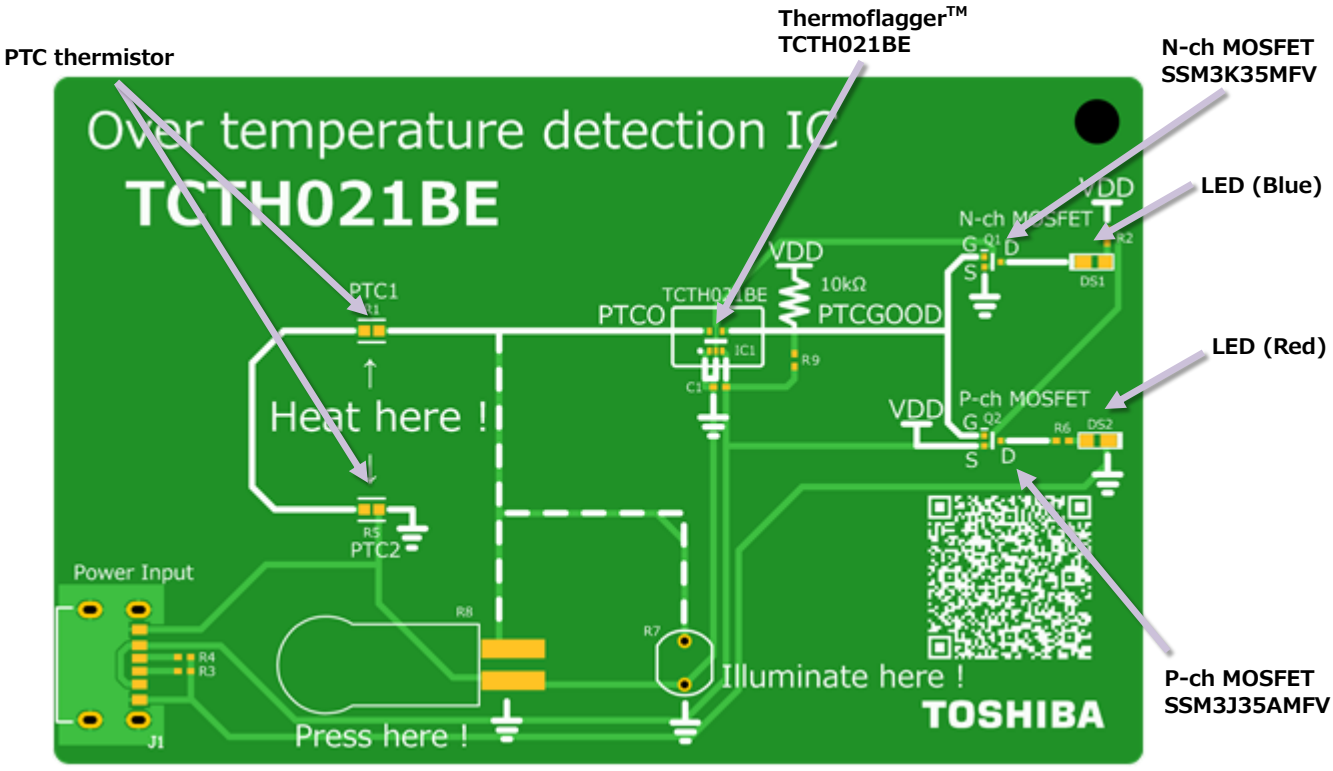


Fig. 2.3 PCB Component Layout (Front View)

3. Schematic, Bill of Material, and PCB Pattern

3.1 Schematic

Refer to the following file:

RD225B-SCHEMATIC1-xx.pdf

(xx is the revision number.)

3.2. Bill of Material

Refer to the following file:

RD225B-BOM-xx.pdf

(xx is the revision number.)

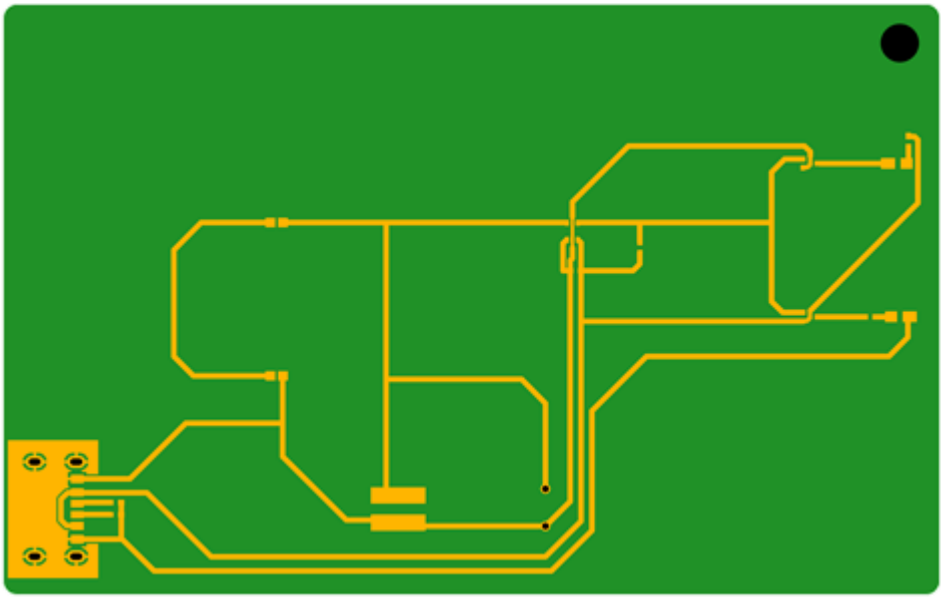
3.3. PCB Pattern

Fig. 3.1 shows the pattern of the PCB.

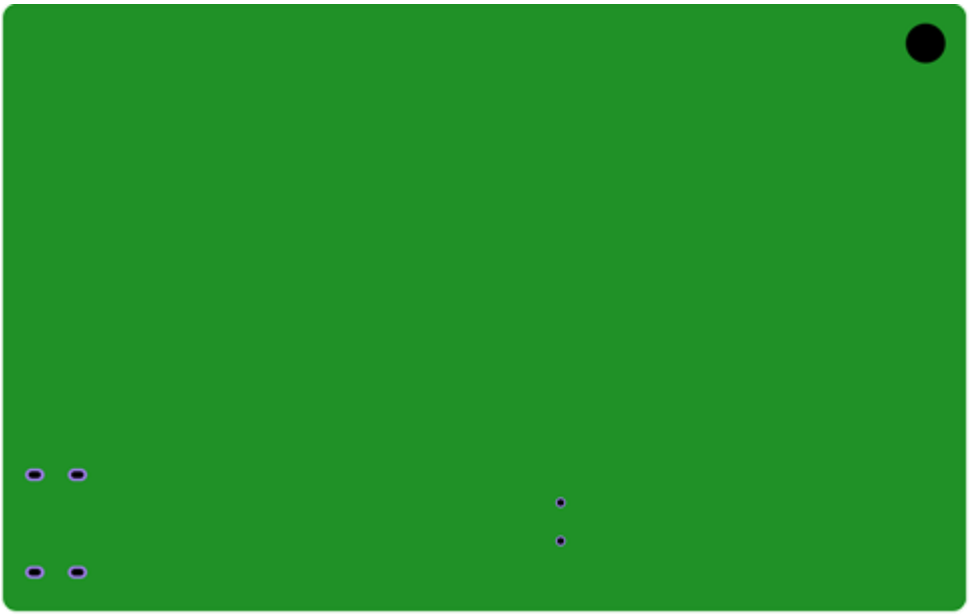
Also refer to the following file:

RD225B-LAYER-xx.pdf

(xx is the revision number.)



<LAYER1 >



<LAYER2>

Fig. 3.1 PCB Pattern (Front View)

4. Operation

4.1 Operation Procedure

The standard procedure for starting this circuit is as follows.

・Connect a USB charger to USB Type-C® connector (J1).
The blue LED turns on at normal temperature.

・ If PTC thermistor 1 (alert temperature: approx. 80 °C) or PTC thermistor 2 (alert temperature: approx. 105 °C) is heated, and if its temperature exceeds its alert temperature, Thermoflagger™ will detect over temperature and turn on the red LED. Thermoflagger™ is able to detect the over temperature of any of the PTC thermistor irrespective of the temperature of other PTC thermistor.

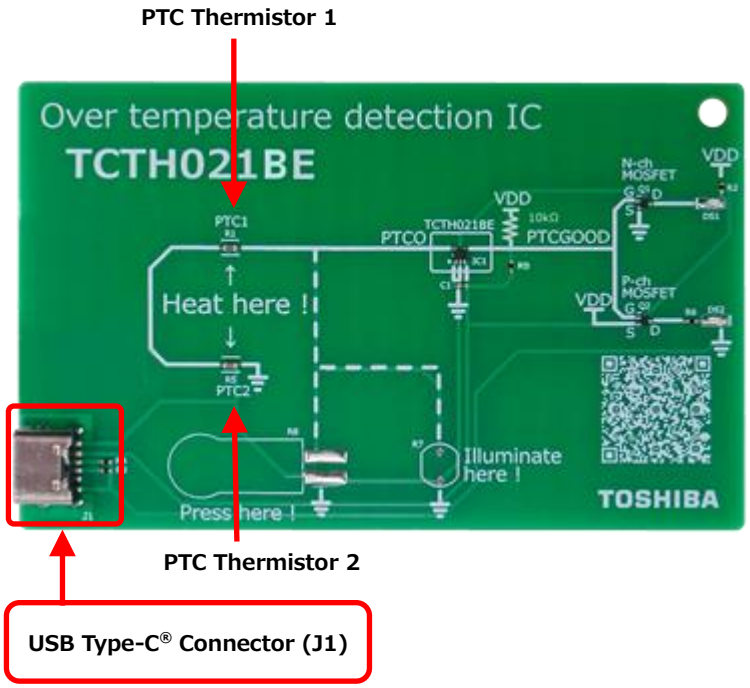


Fig. 4.1 PCB Front View

4.2 External Connector Specifications

The external connector specifications of this circuit are as follows.

Table 4.1 Input Connector Specifications

Input Connector	Input Voltage
J1 (USB Type-C®)	5 V

5. Precautions

・Be careful not to touch any part of the PCB other than the sensor, as it may get destroyed by static electricity.

・Do not apply excessive voltage to USB Type-C® connector.

・When disposing of this PCB, follow the instructions of your local authorities.

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