NuMicro® Family

Arm® Cortex®-M23-based Microcontroller

20 Touch Keys Ricecooker Solution User Manual

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1 OVERVIEW

The 20 touch keys ricecooker solution, designed for rice cooker applications, demonstrates how the Nuvoton NuMicro® M258KG6AE integrates a large size HTN-LCD, 20 ITO-based (Indium tin oxide) touch keys, and a voice prompt solution.

Furthermore, by using NuTool-LCDView, we can easily emulate touch events and LCD display contents on PC via the SWD interface. The developer can develop and validate products without the LCD panel.

Figure 1-1 The 20 Touch Keys Ricecooker Solution

Additionally, the microcontroller used in the 20 touch keys ricecooker solution is Nuvoton NuMicro® M258KG6AE, which is based on the Arm® Cortex®-M23 core. For more information about this 32-bit MCU, please refer to the NuMicro® M254/M256/M258 Low Power LCD Series.

Order number: NK-ITOCOOKER

2 FEATURES

There are 3 features for adopting the 20 touch keys ricecooker solution:

- Saves BOM Cost and Simplifies PCB Layout
  - Three-in-one MCU: core system of NuMicro® M258KG6AE, LCD display controller, and touch key controller
  - LCD controller is equipped with built-in DH1/DH2 capacitance and charge pump features to support V_{LCD}
- Easy to Use
  - Supports NuTool-LCDView to emulate touch events and LCD display
  - Supports voice prompt using Nuvoton ISD ChipCorder® – ISD2361
- High Driving Capability and High Touch Sensitivity
  - LCD controller can driver up to a 10 cm x 10 cm panel
  - ITO-based touch key with high touch sensitivity

3 QUICK START

The 20 touch keys ricecooker solution features a total of 20 touch keys, each with a unique function. For detailed information on the functions of each key, please refer to Figure 3-1.

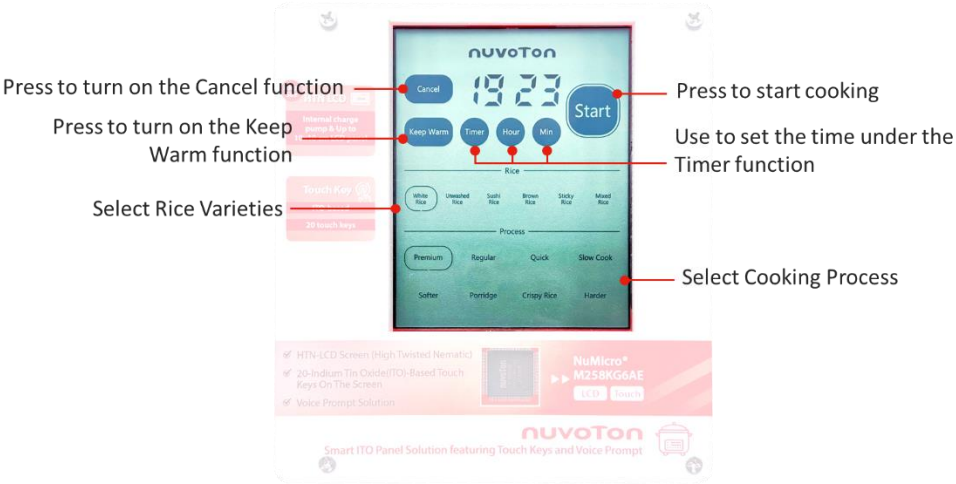

Figure 3-1 Function of Each Touch Key

The usage can be divided into two modes. Each mode offers distinct functionalities and operational procedures, catering to different user needs and preferences.

1. Recipe Mode
   - Select one of rice varieties.
   - Select one of cooking process.
   - Press *Start* to begin cooking. The *Timer* (*Hour and Minute*) will start to Countdown based on the selected cooking process.

2. Reservation Mode
   - Press *Timer* to set the reservation.
   - Press *Hour* and *Min* to set the duration.
   - Press *Start* to begin cooking. The *Timer* (*Hour and Minute*) will start to Countdown based on the reserved duration.

4 HARDWARE AND SCHEMATICS

4.1 Front View

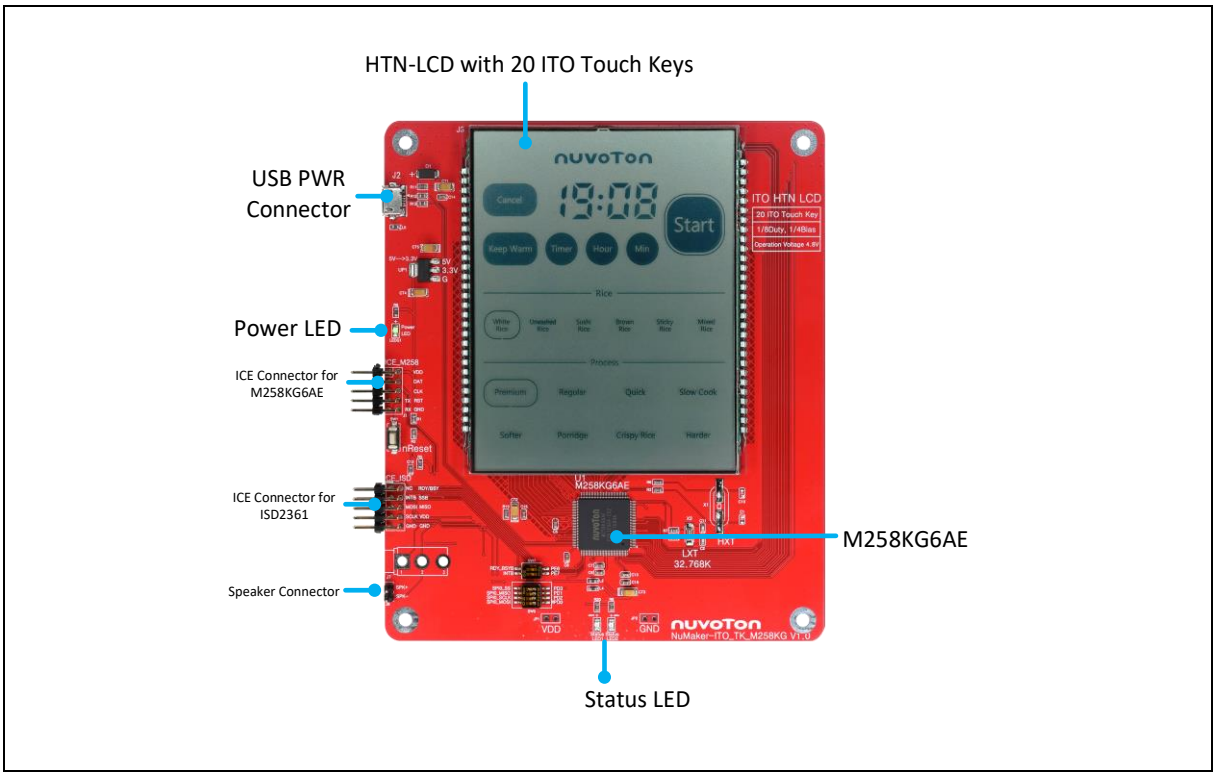

Figure 4-1 Front View of The 20 Touch Keys Ricecooker Solution

Figure 4-1 shows the main components from the front side of the 20 touch keys ricecooker solution. The following lists components from the front view:

- Target chip: M258KG6AE(U1)
- HTN-LCD (J3)
- Power LED (LEDG1)
- Status LED (LEDR1, LEDR2)
- USB PWR connector (J2)
- Reset button (SW1)
- ICE connector for M258KG6AE (J1)
- ICE connector for ISD2361 (J8)
- Speaker connector (J7)

4.2 Rear View

Figure 4-2 shows the main components from the rear side of the 20 touch keys ricecooker solution.

The following lists components and connectors from the rear view:

- ChipCorder®: ISD2361 (U2)
- Language switch (SW10)

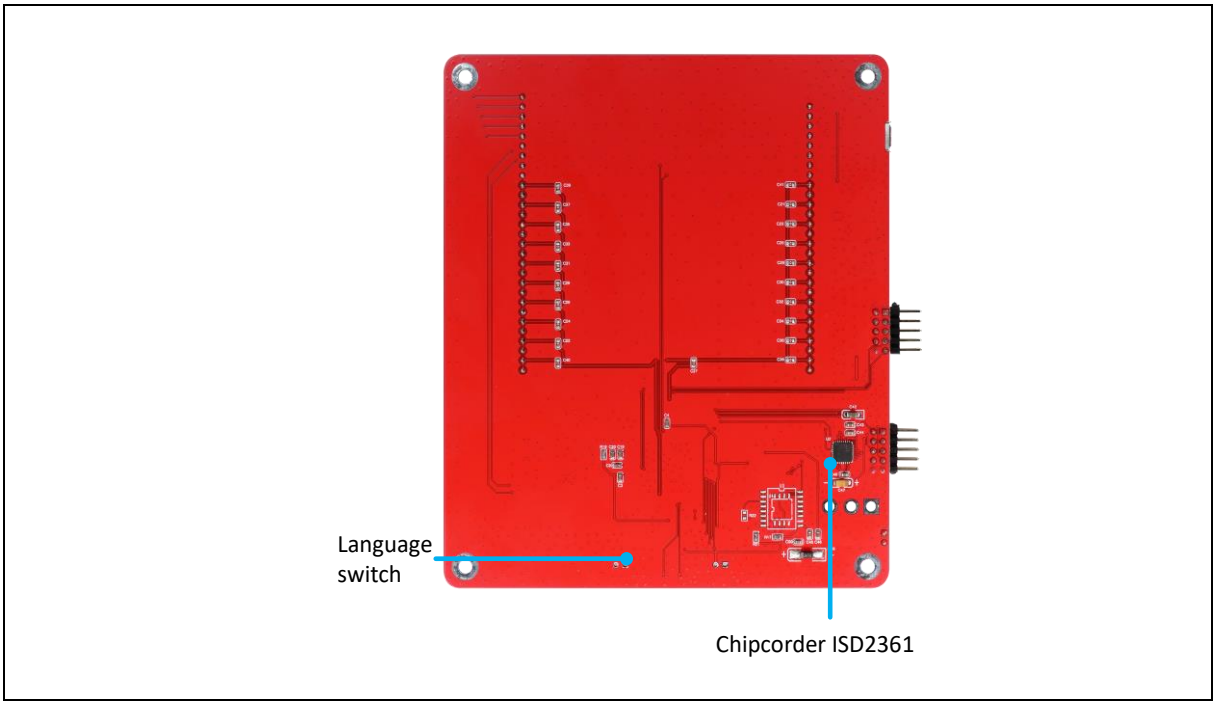

Figure 4-2 Rear View of The 20 Touch Keys Ricecooker Solution

4.3 Status LED

Table 4-1 presents the description of status LED.

Connector	Net Name in Schematic	Description
LED2	LEDR1	The default function is the LED will turn ON when there is an actual touch toggle.
LED1	LEDR2	The default function is that when a scheduled cooking is successful, the LED will turn ON and remain ON until the cooking is completed.

Table 4-1 Status LED

4.4 Switch Control

Table 4-2 presents the condition of switch control.

Connector	Net Name in Schematic	Description
SW10	PE3	This switch is set for language switching functionality. When PE3 is switched to ON, the audio will be in Japanese mode. When switched to OFF, it will be in English mode.

Table 4-2 Switch Control

4.5 The 20 Touch Keys Ricecooker Solution Schematics

4.5.1 M258KG6AE

Figure 4-3 shows the M258KG6AE circuit.

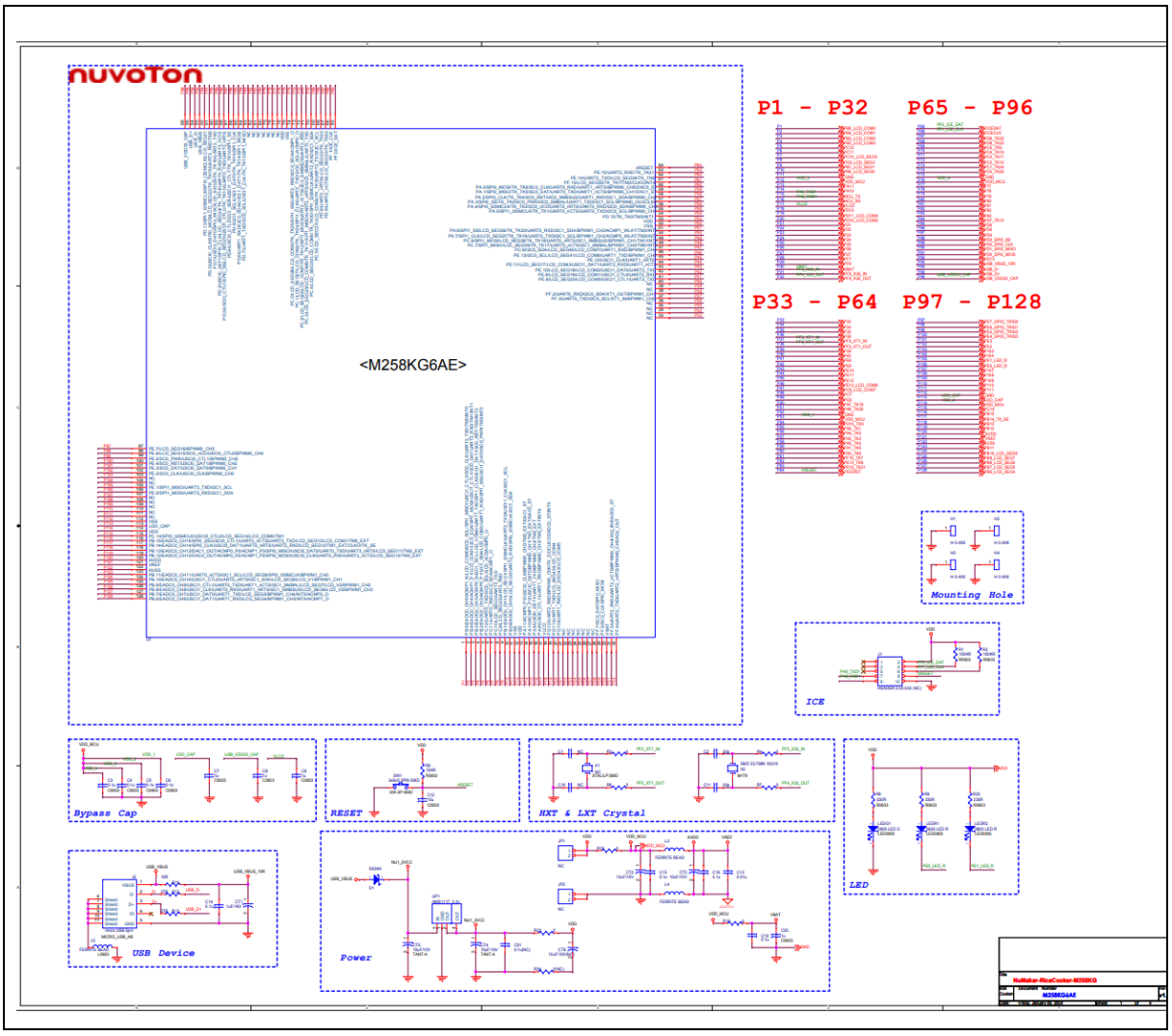

Figure 4-3 M258KG6AE Circuit

4.5.2 LCD

Figure 4-4 shows the LCD circuit.

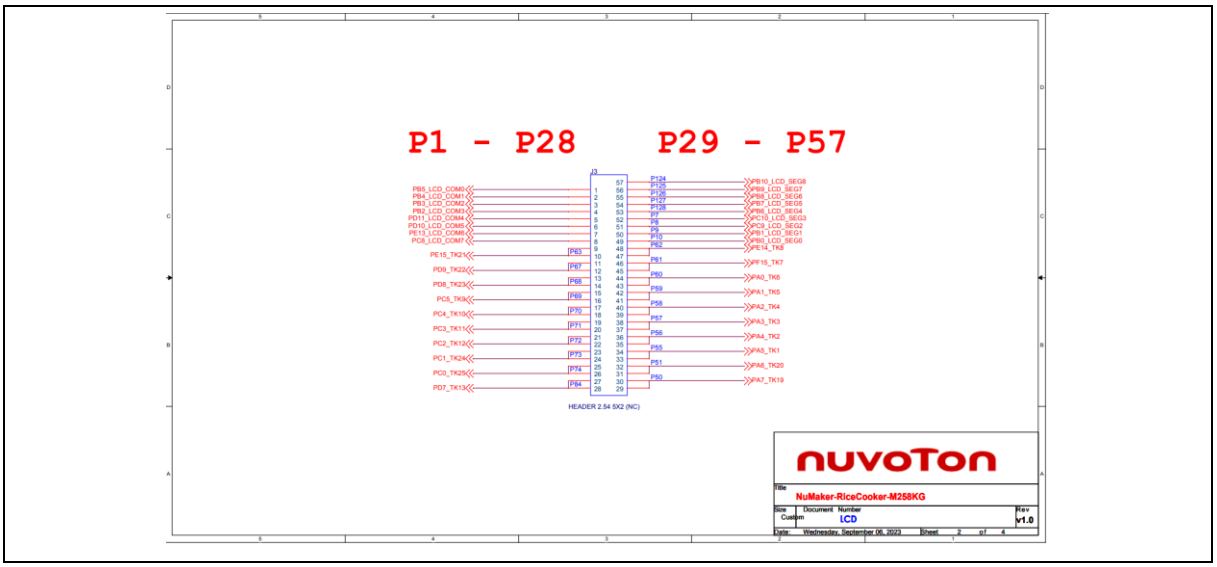

Figure 4-4 LCD Circuit

4.5.3 Touch Key

Figure 4-5 shows the touch key circuit.

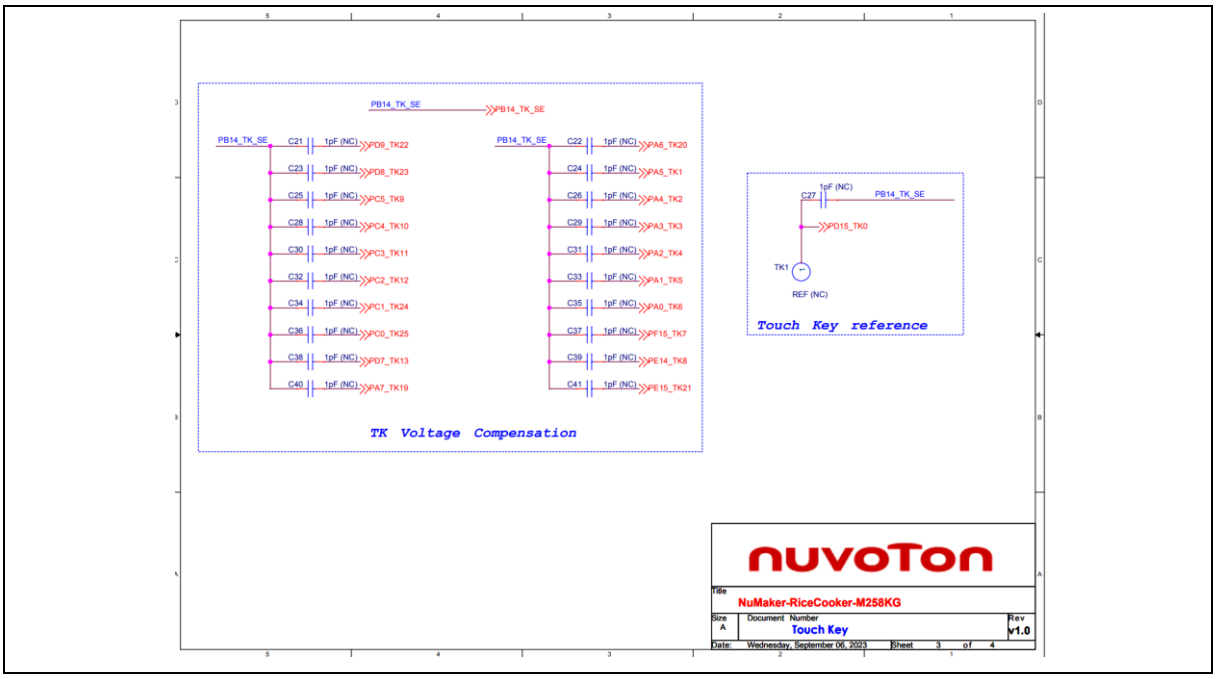

Figure 4-5 Touch Key Circuit

4.5.4 ChipCorder®

Figure 4-6 shows the ISD2361 ChipCorder® circuit.

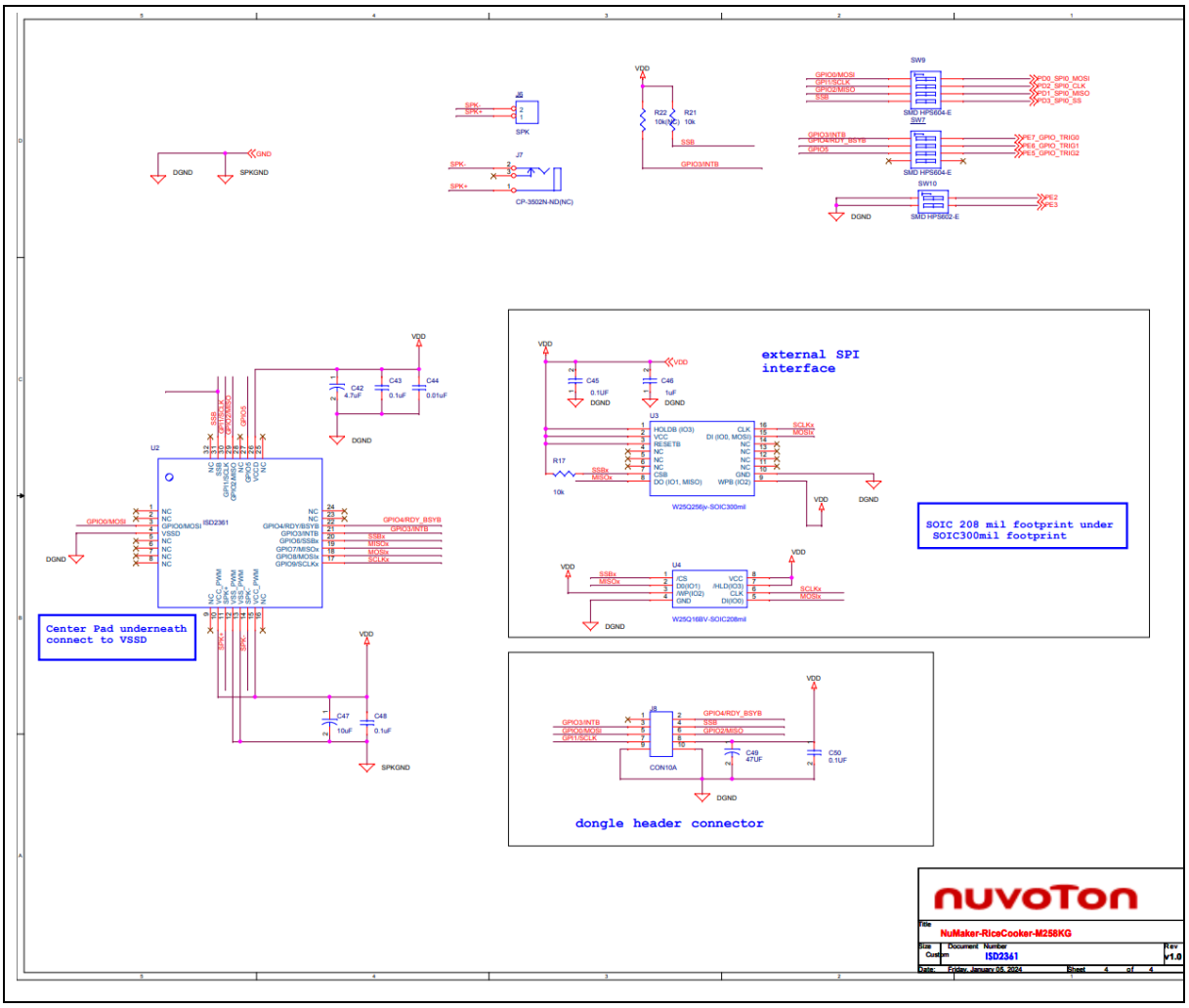

Figure 4-6 ChipCorder® Circuit

4.5.5 PCB Placement

Figure 4-7 and Figure 4-8 show the front and rear placement of the 20 touch keys ricecooker solution.

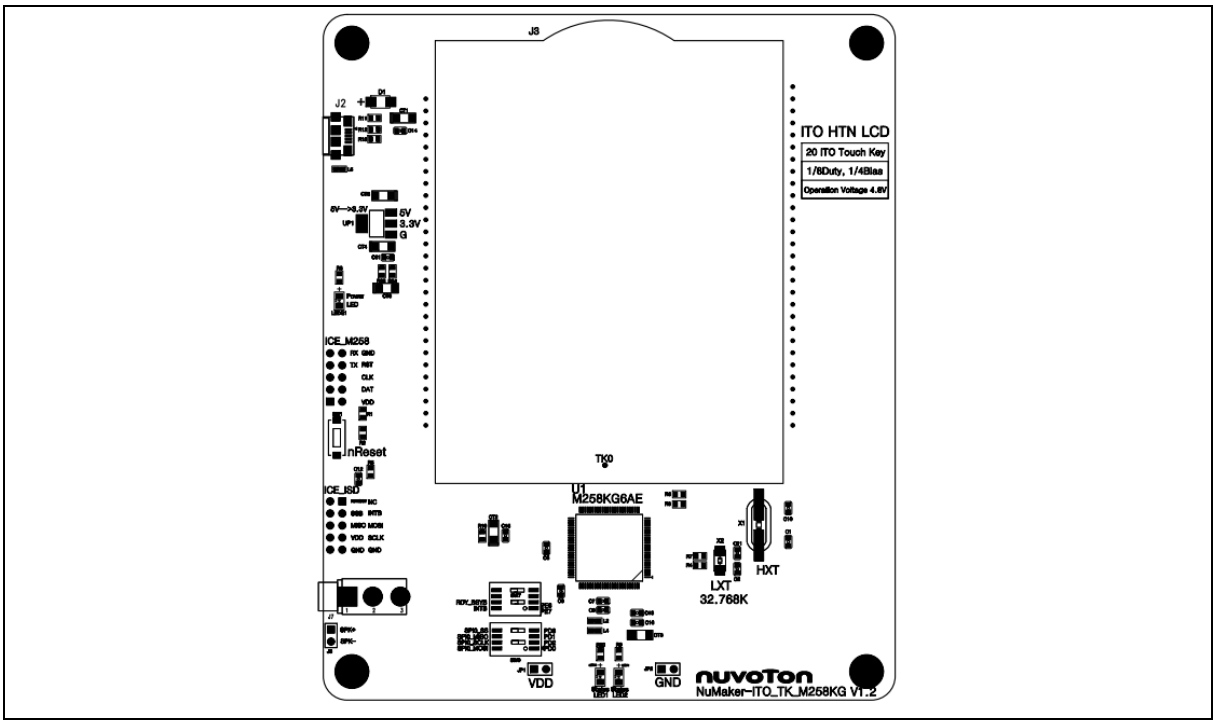

Figure 4-7 Front Placement

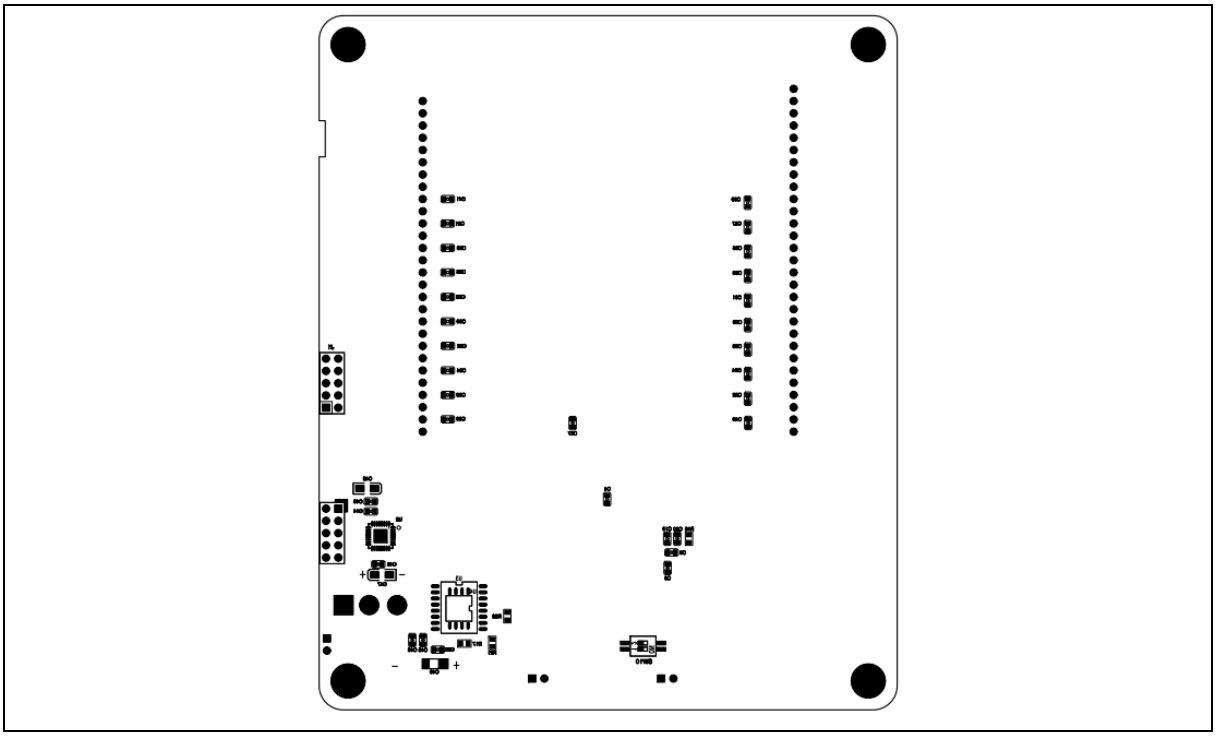

Figure 4-8 Rear Placement

5 REVISION HISTORY

Date	Revision	Description
2024.06.05	1.00	● Initial version.

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