eFinger™ – Button

eKTF5705

Capacitive Touch Button Controller IC

Data Sheet

DOC. VERSION 2.2

(Applicable to eSenseIDE V1.3.0 & later)

ELAN MICROELECTRONICS CORP.

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Contents

Data Sheet Revision History

Doc. Version	Revision Description	Date
0.8	Initial preliminary release version	2012/03/29
1.0	Initial Release of official version	2012/06/15
1.1	1.Add the ordering information and Shipping Box Label 2. add the package SOP24 3. add the Basic button	2012/8/25
1.2	Modify the circuit Add the IDLD mode0 Modify the power consumption of Low power	2012/11/25
2.0	1. increase the key pin for eKTF5705 2. increase the key pin register. 3. modify the text	2013/11/01
2.1	1. Added information on selecting Slider I & Slider II from eUIDEII “Advance Option” checkbox for new project 2. Added detailed Slider II registers description & information 3. Modified the TPREQB hold time of I2C address 0x06 register in chap 6.7.6	2014/04/30
2.2	1. Added the DC/AC Electrical Characteristic/Absolute Maximum Ratings 2. Moved the temperature to chap 8~10 3. Modified Power-On Reset and Initialization	2014/9/9

1 Introduction

This Data Sheet provides the detailed information on Water Proof, maximum 48-key, and Slider solutions for touch button (aka TouchKey(TK)) application based on eKT5705 QFN24/SOP24 microcontroller device. The applications support different touch buttons which can be applied to both One-Line and Two-Line types touch sensors.

The basic key number supports up to 32 touch buttons which is applicable to Two-Line type touch sensors while the One-Line type touch sensors are supported by maximum of 16 touch buttons.

The Water Proof application supports up to 16 touch buttons and these buttons are protected against accidental activation from water or moisture contamination.

For Slider application, 2-key, 4-key, & 8-key per slider and 8-key in dual slider are supported. User can select one type for his application. The slider function is provided with 4~32 levels of sliding resolution. In addition to slider, the system also supports up to 14 touch buttons.

If the application needs more than 32 touch buttons, user should choose the 48-key library appropriately. Maximum of 48-TouchKey is supported which can be applied to Two-Line type touch sensors.

For function applications, the system provides I^2C Slave and Master interface communications with host. User can apply the system protocol to obtain legitimate touch button data from I^2C interface as well as attain complete control of the related peripheral components.

The application supports capacitive touch button with plastic or glass substrate. It can auto-calibrate the parameters for a wide range of capacitance on the touch button sensor.

NOTE

For ordering and shipping information of eKTF5705 Capacitive Touch Button Controller, please refer to Appendix section at the back of this Data Sheet.

2 Features

CPU Configuration

- 8kx15 bits on-chip ROM
- 1072 bytes SRAM
- 8-level stacks for subroutine nesting
- 2 programmable Level Voltage Reset LVR 3.0, 2.7v
- Four CPU operating modes: Normal, Sleep, Green, and IDLE

Operating Frequency:

- IRC mode:
  Main Oscillator: 4M/8M/12M/16MHz
  Sub Oscillator: 16k/64k

Touch Operating Voltage Range:

- 2.8~3.6V

Peripheral Configuration:

- 8-bit real time clock/counter (TCC) with selective signal sources (Fm/Fs)
- 2-channel Digital-to-Analog Converter for 256 steps
- Two 16-bit timers (TMR1/TMR2) with PWM function (shared TMR2 to user)
- I^2C function
- SPI function:
  High EFT immunity (4KV)

Touch Button Sensor:

- Power-on time: Stable operating time < 500ms
- Reliable cover thickness:

Type	Min. ~ Max.	Unit
Plastic	1~10	mm
Glass	1~10	mm

Note: *Under 15x15mm pad size is recommended*

- Supports protocol operation mode

Protocol Mode:

- Interface features: Standard I^2C @100K bps, Fast @400K bps
- Up to 32 capacitive sensor buttons (QFN24)
- Operating/Sleep current: (@ 3.3V 8MHz)

Mode	Description	Power Consumpt'n	Note
Normal	High scan rate without Sleep	3.5mA	@3.3V
Low Power	Idle & Normal modes (alternating)	< 300μA*	Dependent on user's setting
Sleep	Deep Sleep	< 4μA	Only IC

* *These parameters are based on IDLE time (see Section 6.7.25).*

Number of Buttons:

- Up to 48 capacitive sensor buttons

Water Proof:

- Provided on 16 touch buttons(keys)

Slider:

- Provide one slider with 2/4/8 buttons or two sliders with 8 buttons (4 buttons per slider)
- Provides maximum 32 levels of sliding resolution.

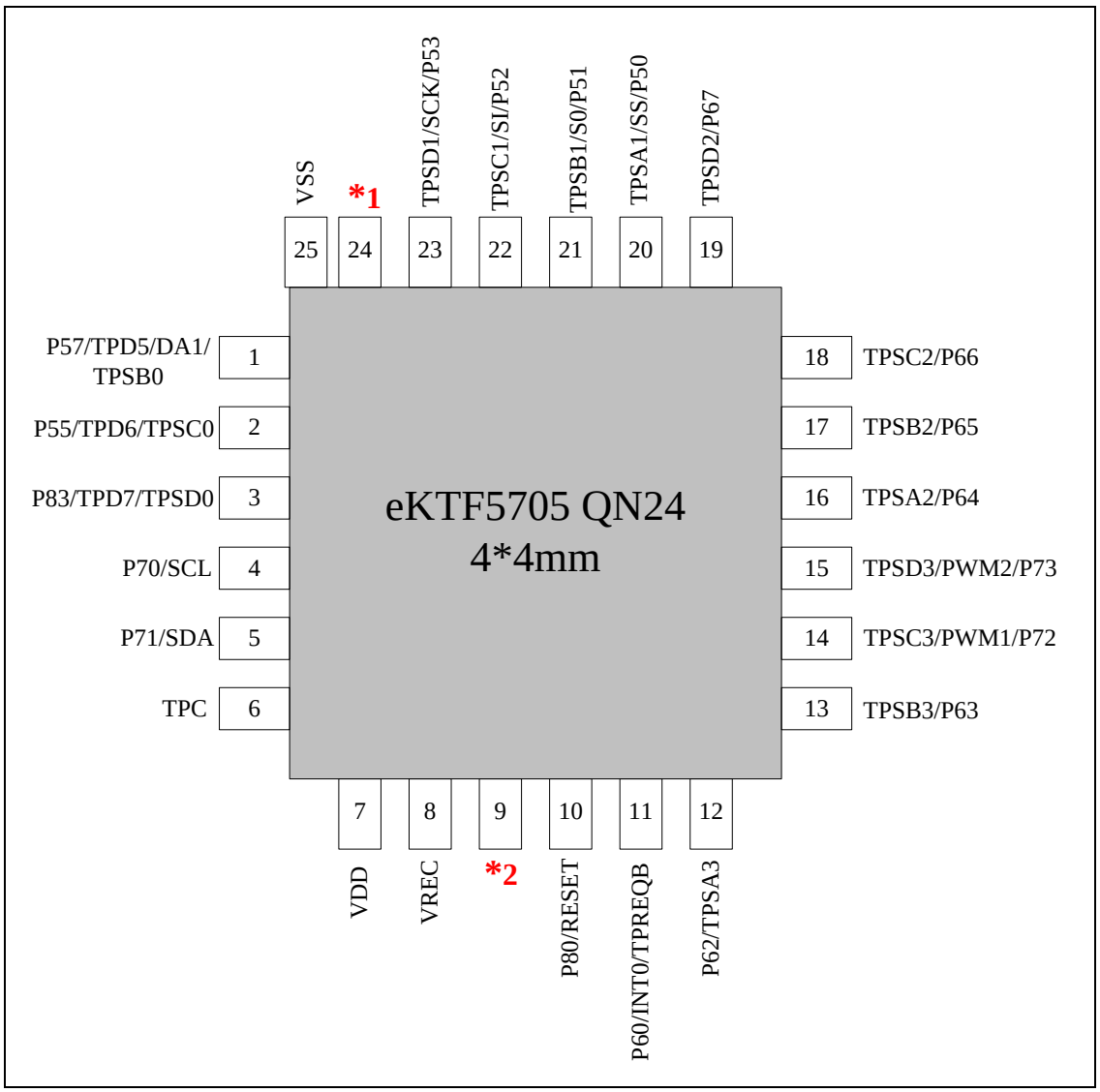
Package Type:

- 24 QFN 4x4x0.8mm: eKTF5705QN24
- 24 SOP 300mil: eKTF5705SO24

NOTE
These are Green Products which do not contain hazardous substances.

3 Pin Assignment

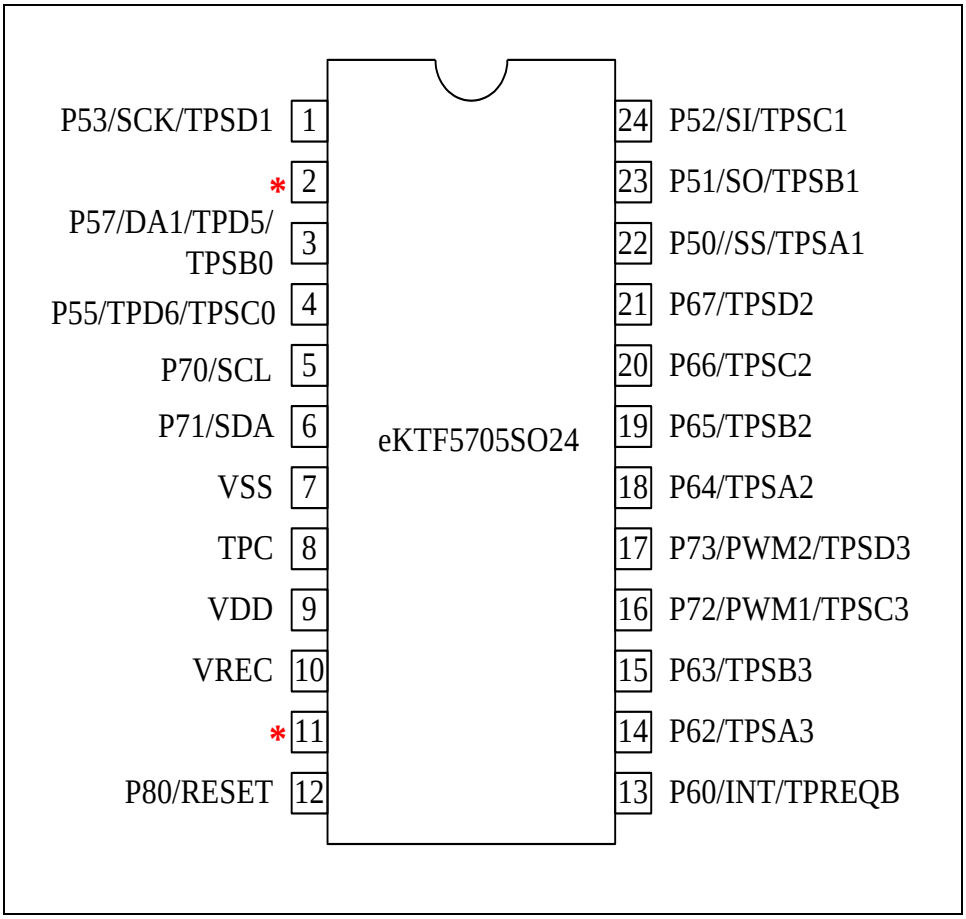
3.1 eKTF5705 QN24 Pin Assignment



***1/*2**: *Refer to pin description in Section 4.1*

Figure 3-1 eKTF5705 QFN24 Pin Assignment

3.2 eKTF5705 SOP24 Pin Assignment



***1/*2**: *Refer to pin description in Section 4.2*

Figure 3-2 eKTF5705 SOP24 Pin Assignment

4 Pin Description

4.1 eKTF5705 QN24 Pin

Symbol	DIR	Pin No.	Function Description
VDD	I	7	Power supply input
TPC	I	6	TouchKey (Touch button) external capacitor (1µf)
VREC	I	8	Voltage Reference external capacitor (2.2µf)
VSS	I	**BACKSIDE**	Ground input. The package substrate must be connected to Ground.
Communication and OUT[n]			
P5x P6x P7x P8x	I/O	1, 2, 3 10, 12 ~ 24	Supports a maximun of 48 touch buttons. 18 of these buttons can be configured with their own output pin function. When one of the touch buttons is triggered, each one of the P5x~P8x becomes active high or active low according to the predefined buttton status. For different composite functons of each P5x~P8x, refer to the eKTF5705 Microcontroller IC Specifications.
SDA, SCL	I/O	5, 4	I^2C communication bus. "Pull high" resistors are required for this bus.
TPREQB	O	11	■ **Power-On Mode:** *W*hen eKTF5705 completes power-on initialitzation, TPREQB will shift to low and then returns to high after a few moments. ■ **Normal Mode:** TPREQB performs as Interrupt Signal pin. If TPREQB = **0**, eKTF5705 is transmitting data. If TPREQB = **1**, eKTF5705 has no data to transmit and is ready to receive command/data from host.
Touch Sensor Pins			
TPD[n]	O	1 ~ 3, 24	2 Line TouchKey driver pin
TPSA[n]	I/O	12, 16, 20,24	Sensor pin of TouchKey Group A
TPSB[n]	I/O	13, 17, 21,1	Sensor pin of TouchKey Group B
TPSC[n]	I/O	14, 18, 22,2	Sensor pin of TouchKey Group C
TPSD[n]	I/O	15, 19, 23,3	Sensor pin of TouchKey Group D
(*1) AS/TPD4	O	24	If the TouchKey number is **less than 12**, the pin acts as the AS (active shielding), or as Driver pin for 2-Line.
(*1) P56/DA0	I/O	24	GPIO/DA0 pin
(*2) P54/OSCO	I/O	9	General Purpose Input/Output / OSC clock output
(*2) AS	O	9	If the TouchKey number is **more than 12**, the pin funtions as the AS (active shielding).

***1/*2:** *Referential to Pins 9 & 24 as indicated in the Pin Assignment diagram in Section 3.1*

4.2 eKTF5705 SOP24 Pin

Symbol		DIR	Pin No.	Function Description
VDD		I	9	Power supply input
TPC		I	8	TouchKey (Touch button) external capacitor (1µf)
VREC		I	10	Voltage Reference external capacitor (2.2µf)
VSS		I	7	Ground input
Communication and OUT[n]				
P5x P6x P7x P8x		O	1~4 14 ~ 24	Supports a maximun of 36 touch buttons. 15 of these buttons can be configured with their own output pin function. When one of the touch buttons is triggered, each one of the P5x~P8x becomes active high or active low according to the predefined buttton status. For different composite functons of each P5x~P8x, refer to the eKTF5705 Mocrocontroller Specifications.
SDA, SCL		I/O	5, 6	I^2C communication bus. "Pull high" resistors are required for this bus.
TPREQB		O	13	■ **Power-On Mode:** *W*hen eKTF5705 completes power-on initialitzation, TPREQB will shift to low and then returns to high after a few moments. ■ **Normal Mode:** TPREQB performs as Interrupt Signal pin. If TPREQB = **0**, eKTF5705 is transmitting data. If TPREQB = **1**, eKTF5705 has no data to transmit and is ready to receive command/data from host.
Touch Sensor Pins				
TPD[n]		O	2 ~ 4	TouchKey driver pulse
TPSA[n]		I/O	14, 18, 22, 2	Sensor pin of TouchKey Group A
TPSB[n]		I/O	15, 19, 23, 3	Sensor pin of TouchKey Group B
TPSC[n]		I/O	16, 20, 24, 4	Sensor pin of TouchKey Group C
TPSD[n]		I/O	17, 21, 1	Sensor pin of TouchKey Group D
(*1)	AS/TPD4	O	2	If the TouchKey number is **less than 12**, the pin funtions as the AS (active shielding), or as Driver pin for 2-Line.
(*1)	P56/DA0	I/O	2	GPIO/DA0 pin
(*2)	P54/OSCO	I/O	11	General Purpose Input/Output / OSC clock output
(*2)	AS	O	11	If the TouchKey number is **more than 12**, the pin funtions as the AS (active shielding).

***1/*2**: *Referential to Pins 2 & 11 as indicated in the Pin Assignment diagram in Section 3.2*

5 General Terms Description

5.1 Power Pin

The VDD pin should be connected to the power source through the C1 and C2 capacitors, then to ground. Take note that the ground pin is located at the back side of the package. Hence, no physical GND pin exists on the front side.

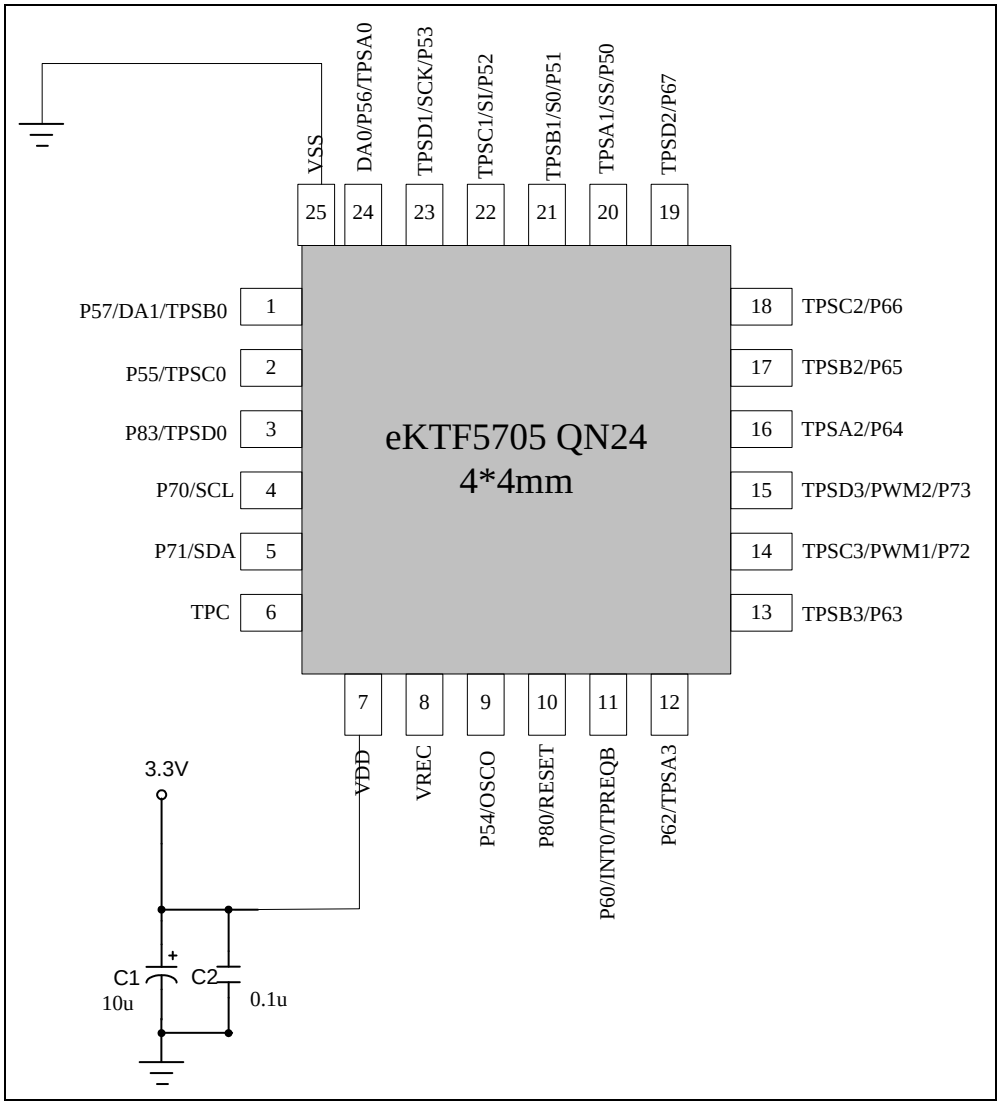


Figure 5-1 Power Pins Connection

5.2 Touch Sensor Pin and Control Pin

5.2.1 Touch Sensor Pin for Water Proof

The eKTF5705 supports One-Line type touch sensors which provide up to16 sensor pins for user's Water Proof application. The following Figures 5-2 & 5-3 depict a simple case of 4/16 touch buttons with Active Shield (AS: Pin24 for 1~12 buttons, Pin9 for 13~16 buttons) function that protects the system against environmental noise. User can activate the function with Register 0x12 (see Section 6.7.10).

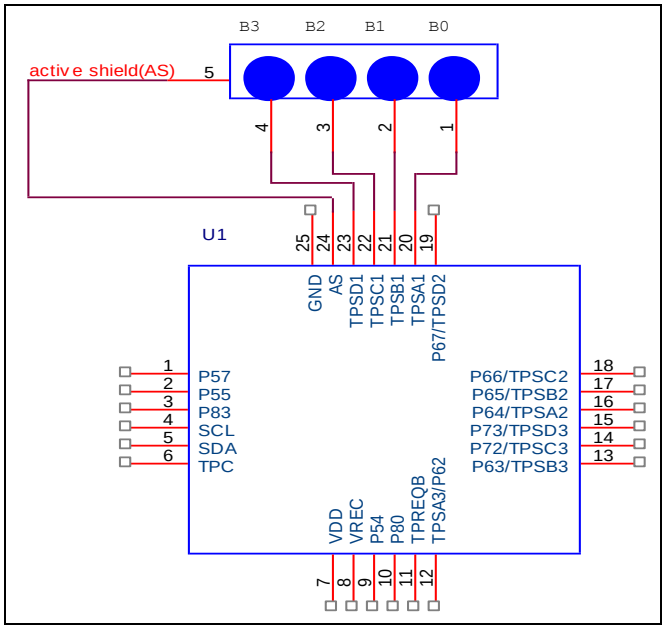


Figure 5-2 One-Line Type Sensor Group Connections for 4 Touch Buttons

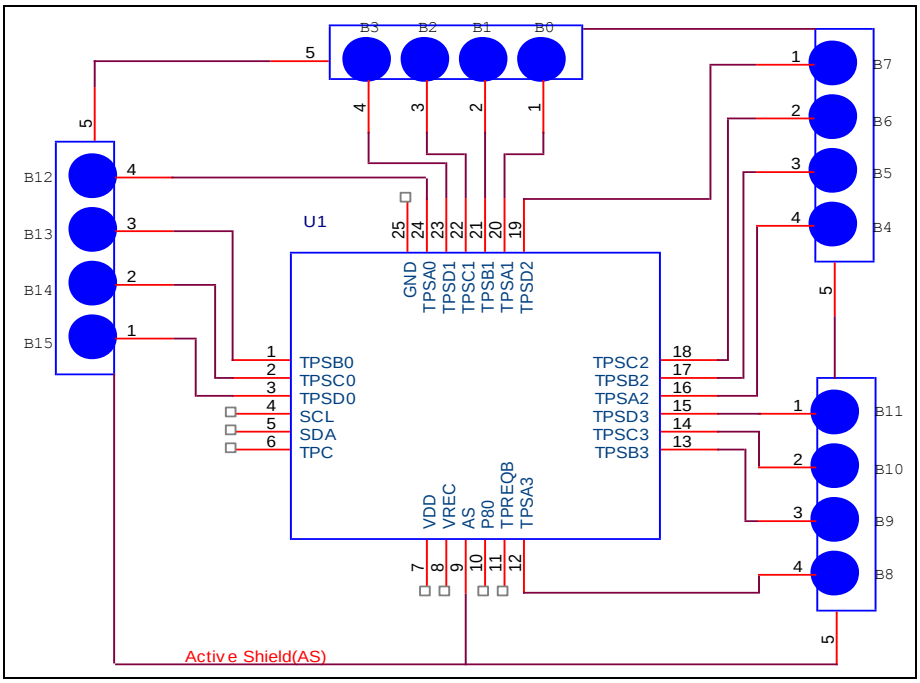


Figure 5-3 One-Line Type Sensor Group Connections for 16 Touch Buttons

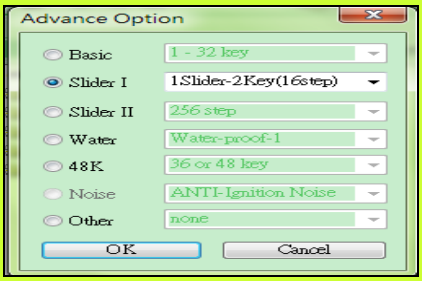
5.2.2 Touch Sensor Pin for Slider

The eKTF5705 also supports One-Line type touch sensors which provide up to16 sensor pins for user's Slider application The Figure 5-4 below depicts a simple case of a 4-key slider and 4 touch buttons. The new project "advance option" of eUIDII must select "Slider I"(Low count step(resolution) or "Slider II"(High count step(resolution).

Slider Type / Sensor Pin	One Slider 2Key (Pin)	One Slider 4Key (Pin)	One/Two Slider 8Key (Pin)
TPSA1	Slider pin1	Slider pin1	Slider pin1
TPSB1	Slider pin2	Slider pin2	Slider pin2
TPSC1 / P52	Button pin or I/O	Slider pin3	Slider pin3
TPSD1 / P53	Button pin or I/O	Slider pin4	Slider pin4
TPSA2 / 64	Button pin or I/O	Button pin or I/O	Slider pin5
TPSB2 / P65	Button pin or I/O	Button pin or I/O	Slider pin6
TPSC2 / P66	Button pin or I/O	Button pin or I/O	Slider pin7
TPSD2 / P67	Button pin or I/O	Button pin or I/O	Slider pin8
TPSA3 / P62	Button pin or I/O	Button pin or I/O	Button pin or I/O
TPSB3 / P63	Button pin or I/O	Button pin or I/O	Button pin or I/O
TPSC3 / P72	Button pin or I/O	Button pin or I/O	Button pin or I/O
TPSD3 / P73	Button pin or I/O	Button pin or I/O	Button pin or I/O
TPSA0 / P56	Button pin or I/O	Button pin or I/O	Button pin or I/O
TPSB0 / P57	Button pin or I/O	Button pin or I/O	Button pin or I/O
TPSC0 / P55	Button pin or I/O	Button pin or I/O	Button pin or I/O
TPSD0 / P83	Button pin or I/O	Button pin or I/O	Button pin or I/O

NOTE

1. *If the new project "Advance Option" checkbox of eUIDII has the Slider I selected as shown in the figure below, all the sliders (2key, 4key, & 8key) function sensor pin are fixed.*



2. *If to apply the low count step(resolution)(<=32), it recommended user to select the "Slider I" of Advance Option.*
3. *If to apply the High count step(resolution), it recommended user to select the "Slider II" of Advance Option.*
4. *The length of slider can affect the step count. Please contact with the elan AE to discuss the production structure.*

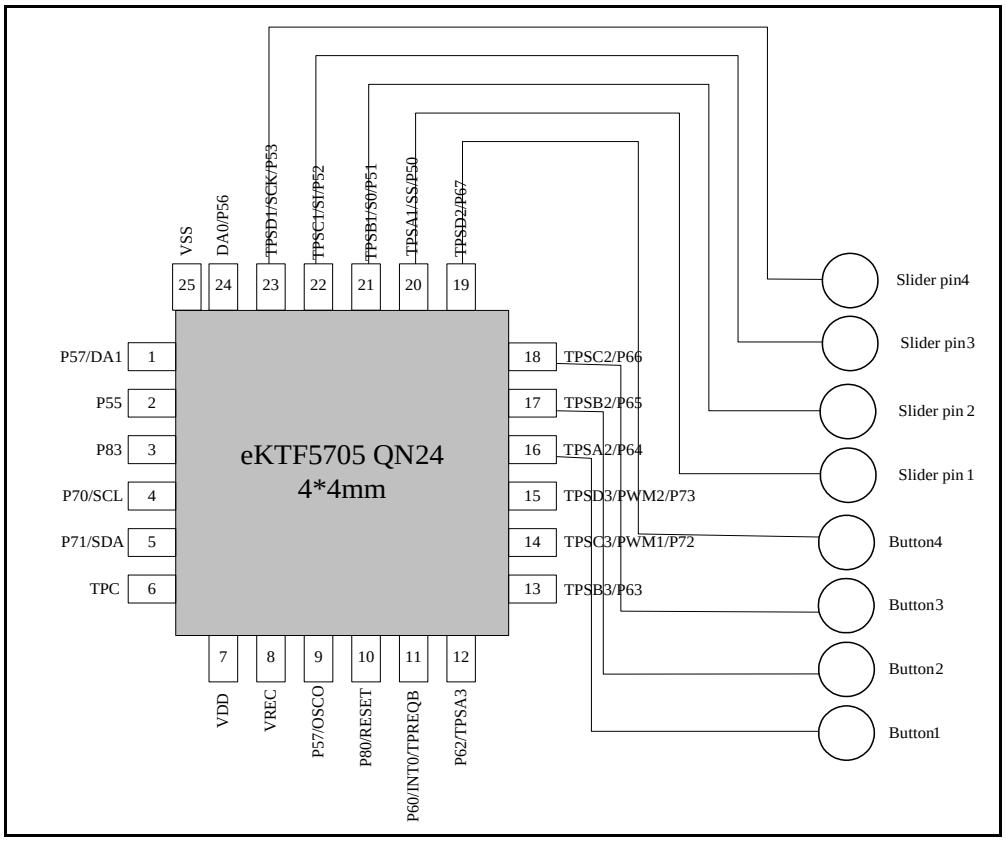


Figure 5-4 Circuit on One 4-Key Slider and 4 Touch Buttons

5.2.3 Touch Sensor Pin for 48key

The eKTF5705 48-key library provides up to 48 touch buttons for user's touch sensing application. 4 driving pins (TPD[n]) and 12 sensor pins (TPSx[n]) are used when the maximum 48 touch buttons application is employed. Touch sensor pins Groups A to D (see Section 4) can be activated together and only requires 12 scans to achieve the maximum 48 touch buttons application. The scanning sequence for driver pins is always from TPD4 to TPD7, and that of sensor group, is from TPSA1 to TPSD1, then TPSA2 to TPSD2, and finally from TPSA3 to TPSD3.

For 48 key application, the TPD4 and TPSA1~TPSD1 are scanned first to compose Buttons 0~ 3, then TPD5 and TPSA1~ TPSD1 are scanned next to composed Buttons 4~7, and so on until the last button group (Buttons 44~47) are composed by TPD7 and TPSA3~TPSD3.

The other choice is up to 36 key touch buttons. Pin 3 will be P83 pin and the scanning sequence is the same as with 48 keys but with TPD7 excluded.

5.2.4 One-Line Type Touch Sensor Pin

The eKTF5705 also supports One-Line type touch sensor which provides 16 touch button pins for user's application. The eUIDEII new project "Advance Option" checkbox must have the Basic option selected as indicated in Figure 5-5a below. A simple case of 4 touch buttons with Active Shield (AS) function that protects the system against environmental noise is depicted in Figure 5-5b below. User can activate the function with Register 0x13 (see Section 6.7.11). The Active Shield (AS) acts as GND pin also, but both pins (AS and GND pins) cannot be connected together. The scanning sequence for One-Line type sensor group always stars from TPSA1 to TPSD1, then TPSA2 to TPSD2, TPSA3 to TPSD3, and finally from TPSA0 to TPSD0. For Two-Line type sensor group, the scanning sequence is from TPSA1 to TPSD1, then TPSA2 to TPSD2, and finally from TPSA3 to TPSD3.

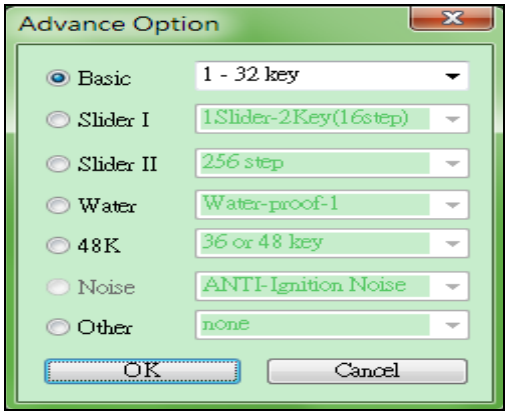


Figure 5-5a The 1~32 Key Number Option (Including One/Two Line Type)

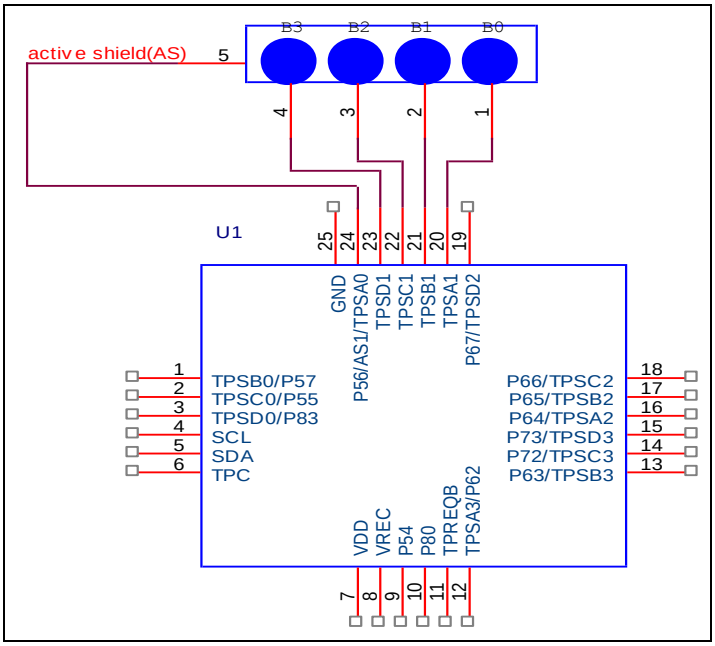


Figure 5-5b One-Line Type Sensor Group Connections for 4 Touch Buttons

6 I²C Protocol

The eKTF5705 supports the standard I²C protocol (SCL, SDA) and a request signal (TPREQB). Figure 6-1 below illustrates the system block diagram of I²C Slave interface.

The host can read or write eKTF5705 via I²C protocol. eKTF5705 is always a Slave device. Under I²C Slave interface, the SCL and SDA signals should be pulled high with resistors at the host end. In general, the termination Resistors R1 and R2 resistance is from 1kΩ to 10kΩ and an appropriate resistance should be selected to accommodate the specified rising time on SCL and SDA. The host processor has to provide a serial clock signal (SCL) to eKTF5705. If eKTF5705 has a message for the host, TPREQB will send a falling edge signal to indicate transmit request.

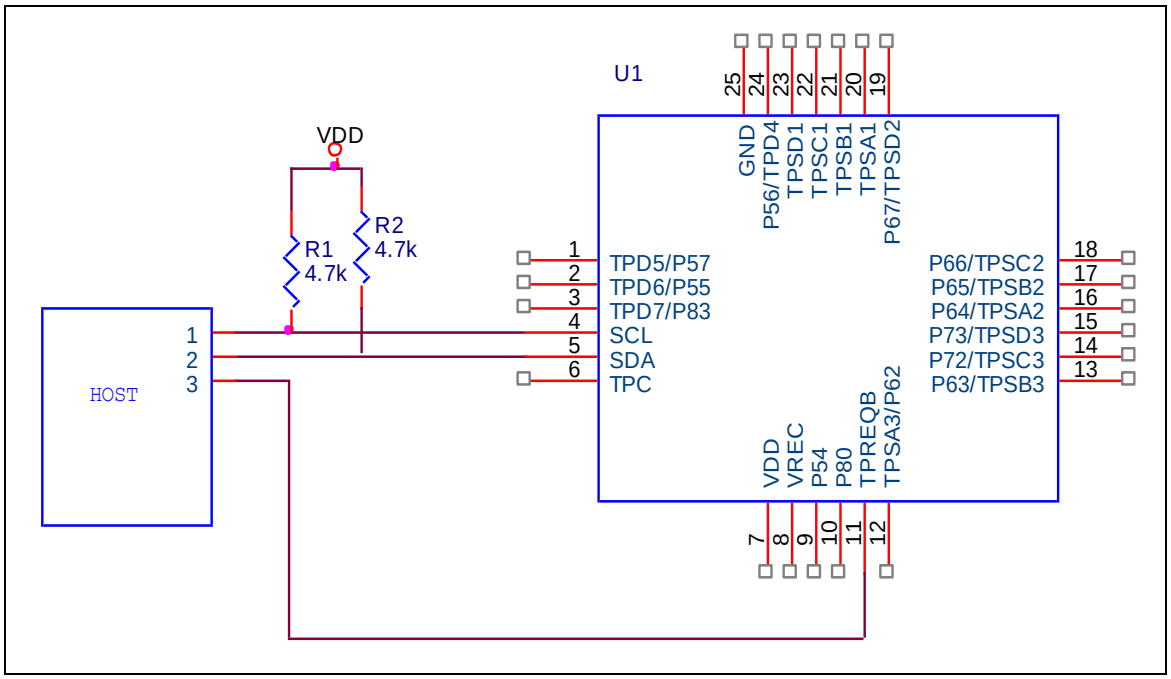


Figure 6-1 Connecting eKTF5705 to Host through I²C Interface

6.1 I²C Operation

All communications start from a START condition and are followed by Slave address packet. The address packet is 9 bits long, consisting of 7 Slave address bits, one READ/WRITE control bit, and an acknowledge bit. When the TouchKey controller detects that it is being addressed, it will acknowledge by pulling SDA to low in the 9th SCL (ACK) cycle. All data packets are 9 bits long, consisting of one data byte and an acknowledge bit. An Acknowledge (ACK) is initiated by the Receiver by pulling the SDA line to low during the 9th SCL cycle. If the Receiver keeps the SDA line at high, a NACK is signal is sent. Each write or read cycle must end with a STOP condition.

Figures 6-2a and 6-2b below illustrate the bit level waveform of I²C Master Write/Read data to/from I²C Slave device with 7-bit addressing mode. When R/$\overline{W}$ bit is set to "**0**", and the Slave address is verified, the I²C Master is able to write data to I²C Slave. On the other hand, when R/$\overline{W}$ bit is set to "**1**" and the Slave address is verified, the I²C Master is able to read data from I²C Slave. If the Slave address verification is in error, I²C Slave will not work.

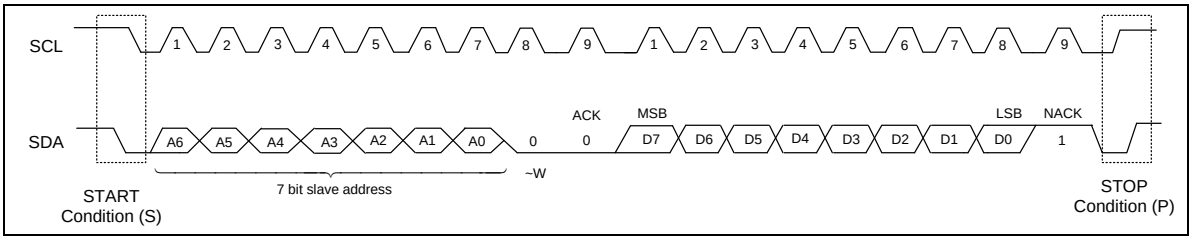


Figure 6-2a I²C Master Writing Data to I²C Slave (R/$\overline{W}$=0) Bit Level Waveform

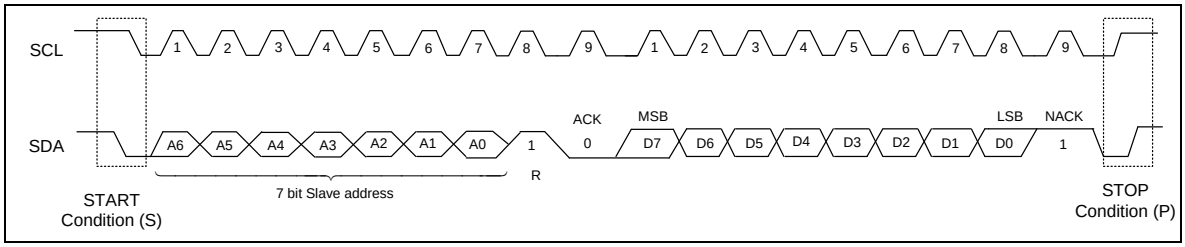


Figure 6-2b I²C Master Reading Data from I²C Slave (R/$\overline{W}$=1) Bit Level Waveform

The I²C bit level waveform shown in the above figures are supported by eKTF5705. The eKTF5705 TouchKey controller is defined as a Slave device of I²C while the host is defined as a Master. The TouchKey controller device address is defined as 7-bit address format.

NOTE

- *The eKT5705 default Slave address is as follows:*

Advanced Application	*Slave Address*	*Remarks*
Basic key button	*011 0000*	-
Water Proof	*011 0100*	-
Slider	*011 0010*	-
48key	*010 0100*	-

- If to have many masters in I²C system, the masters must support arbitration function.

6.2 Writing to eKTF5705

The eKTF5705 supports I²C write protocol. The first byte of a write access is the command code. The next one or the "n" bytes, respectively; are the data to be written. The eKTF5705 acknowledges each byte, and the entire transaction is completed with a STOP condition.

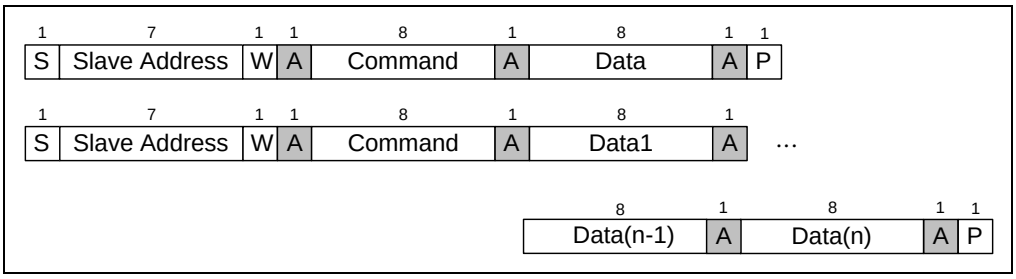


Figure 6-3 Single and Continuative Write Modes

6.3 Reading from eKTF5705

Reading data is slightly more complicated than writing data. First the host must write an instruction to the eKTF5705. Then, it followed the instruction with a repeated START condition to indicate the host is ready to read from the Slave address. The eKTF5705 then, returns one or "n" bytes of data to host. Note that a NACK signifies the end of the read transfer.

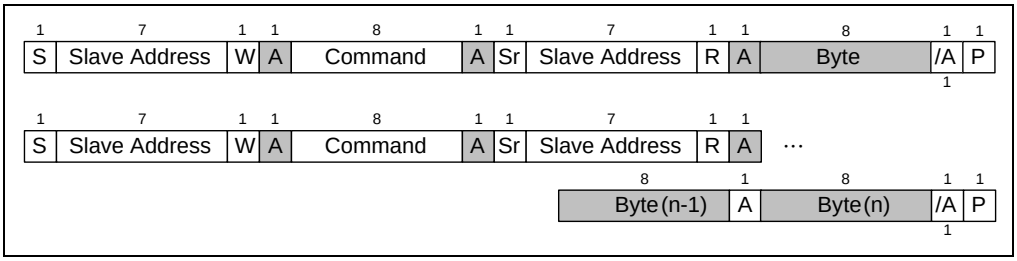


Figure 6-4 Single and Continuative Read Modes

6.4 Writing & Reading Timing Conditions

The figure below shows the timing condition and characteristics of the I^2C interface. The eKTF5705 adopts a bit rate of up to 400k bit/sec.

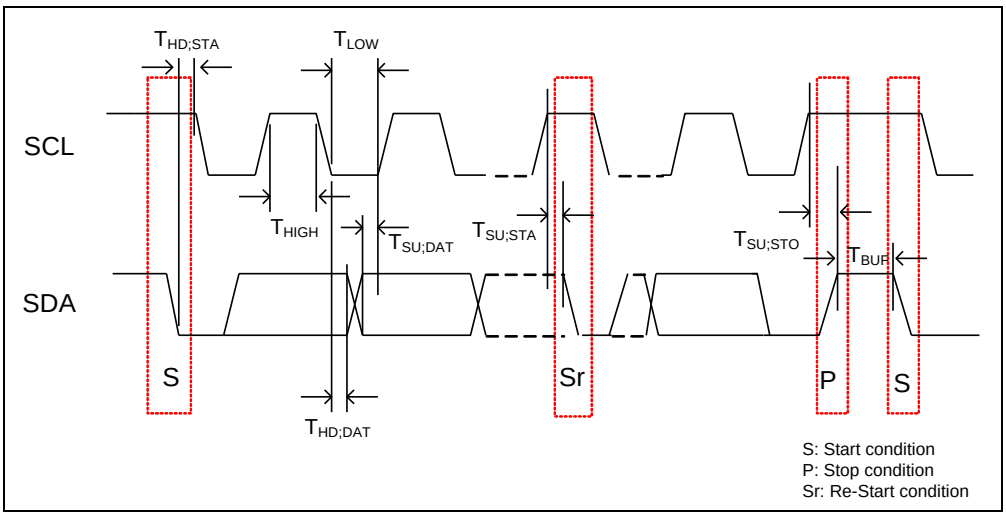


Figure 6-5 I^2C Interface Timing Diagram

6.4.1 SDA and SCL Pins I²C Interface Characteristics

Symbol	Description	Standard Mode		Unit
		Min.	Max.	
f_{SCL}	SCL clock frequency	-	100	kHz
$T_{HD;STA}$	Hold time (repeated) START condition. After this period, the first clock pulse is generated.	5	-	µs
T_{LOW}	LOW period of the SCL clock	5	-	µs
T_{HIGH}	HIGH period of the SCL clock	5	-	µs
$T_{SU;STA}$	Set-up time for a repeated START condition	5	-	µs
$T_{HD;DAT}$	Data hold time	5	-	µs
$T_{SU;DAT}$	Data set-up time	3.6	-	µs
$T_{SU;STO}$	Set-up time for STOP condition	6	-	µs
T_{BUF}	Bus free time between a STOP and START condition	5.2	-	µs

Symbol	Description	Standard Mode		Unit
		Min.	Max.	
f_{SCL}	SCL clock frequency	-	400	kHz
$T_{HD;STA}$	Hold time (repeated) START condition. After this period, the first clock pulse is generated.	1	-	µs
T_{LOW}	LOW period of the SCL clock	1.5	-	µs
T_{HIGH}	HIGH period of the SCL clock	1	-	µs
$T_{SU;STA}$	Set-up time for a repeated START condition	1	-	µs
$T_{HD;DAT}$	Data hold time	-	-	µs
$T_{SU;DAT}$	Data set-up time	200	-	ns
$T_{SU;STO}$	Set-up time for STOP condition	1	-	µs
T_{BUF}	Bus free time between a STOP and START condition	1.5	-	µs

6.5 TPREQB Pin

The TPREQB pin is used to automatically alert the host of any changes with the button status, thus minimizing the need of unnecessary I²C communications. After power-on of the TouchKey controller, the host needs not communicate with the device unless the TPREQB pin goes active. The TPREQB will only become inactive again when the host performs a read byte/word. The eKTF5705 provides two types of

TPREQB operation modes, i.e., Low Active mode or Waiting mode. User can decide which one to use to satisfy the hold-system request.

6.5.1 TPREQB Low-Active Mode

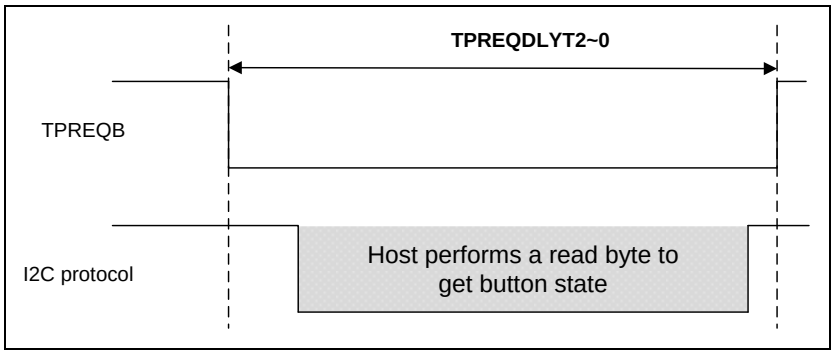


Figure 6-6 TPREQB Signal Recovered under TPREQDLYT2~0

The TPREQB state is Normal High or Normal Low under different settings. For example, if the TouchKey controller detects any change with the button status (TPREQDLYEN=1), it will pull the TPREQB signal to Low first, and starts the TPREQB timer. TPREQB will then return to High until the TPREQB timer time-out occurs. If TPREQB time duration is set too long, the TPREQB will remain at Low state even after the I^2C communication is already completed. Hence, a suitable TPREQB pin timing value should be configured with Bit0 ~ Bit2 of Address 0x06 (see Section 6.7.6). This setting is very important under TPREQB low-active mode.

6.5.2 TPREQB Waiting Mode

The TPREQB state is Normal High or Normal Low under different settings. For example, if the TouchKey controller detects any change with the button status (TPREQDLYEN=0), it will pull the TPREQB signal to Low first. After the host performs a read byte/word from TouchKey controller, the TouchKey controller will pull-high the TPREQB signal again. If the host is not performing read procedure, the TPREQB will always stay at low state.

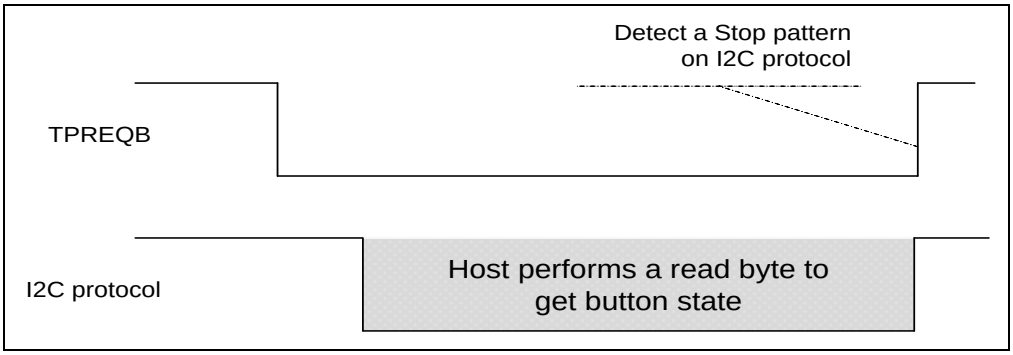


Figure 6-7 TPREQB Signal under TPREQDLYEN=0

6.6 Map Registers Commands Summary

The Host controls the Slave TouchKey IC via the following commands:

Command (I^2C Address)	Access Direction	Description
Basic button / Water Proof / Slider / 48key commands		
0x00	R	Product ID **(PDID)**
0x01	R	BOP Version **(BOPVN)**
0x02	R	Serial Number **(SERNB)**
0x03	R	Firmware Version **(FMVN)**
0x05	R/W	General configure **(GERCON)**
0x06	R/W	TPREQB configure **(TPQCON)**
0x09	R	TPERR bit **(TPERR)**
0x11	R	I^2C Slave address L **(I2CSL)**
0x12	R/W	Touch configure mode **(TPMSMODE)**
0x13	R/W	Touch driver enable bit **(TPIODRV)**
0x14	R/W	Touch sense enable bit **(TPIOSENS)**
0x15	R/W	Touch Sensitivity1 setting **(TPSIGAIN1)***
0x16	R/W	Touch Sensitivity2 setting **(TPSIGAIN2)***
0x17	R/W	Touch Speed setting **(TPSSPEED1)***
0x18	R/W	Touch Speed setting **(TPSSPEED2)***
0x19	R/W	Touch button quantity **(TPKEYQUTY)**
0x24	R/W	Button operation mode **(KEYOPER)**
0x25	R/W	System operation mode **(SYSOPER)**
0x26	R/W	Button de-bounce **(KEYDEBMS)**
Basic button / Water Proof Advance Commands		
0x20	R	Button Status0 **(KEY_MAP0)***
0x21	R	Button Status1 **(KEY_MAP1)***
0x30~0x3F	R/W	Trigger level adjustment **(FTN_X)***
0x90	R/W	Water proof Level setting (**Wip_ControlReg**)
Slider Advance Commands (including eUIDEII Slider I/II)		
0x20	R	Button Status0 **(KEY_MAP0)***
0x21	R	Button Status1 **(KEY_MAP1)***
0x30~0x3F	R/W	Trigger level adjustment **(FTN_X)***

**User must adjust these commands to obtain the appropriate button number to touch.*

(Continuation)

Command (I^2C Address)	Access Direction	Description
eUIDEII Slide I		
0X91	R	Slider step (Resolution)
0X92	R/W	S1-slider trigger level
0X93	R/W	S1-slider release level
0X94	R/W	S1-slider de-bounce
0X95	R	Slider error flag
0X96	R	S1-slider position(output)
0x97	R/W	S1-slider Noise Level
0x98	R/W	S1 Noise Bounce
0X99	R/W	S2-slider trigger level (Only supports 8key@2slider)**
0X9A	R/W	S2-slider release level (Only supports 8key@2slider)**
0X9B	R/W	S2-slider debounc (Only supports 8key@2slider)**
0X9C	R	S2-slider position(output) (Only supports 8key@2slider)**
0x9D	R/W	S2-slider Noise Level
0x9E	R/W	S2 Noise Bounce
eUIDEII Slider II		
0X91	R/W	Slider status(configuration)
0X92	R/W	Slider trigger level (High byte)
0X93	R/W	Slider trigger level (Low byte)
0X95	R	Slider position(output)
0X96	R/W	Slider pin quantity
0x97	R/W	Slider step (resolution)
48key Advance Commands		
0x1E	R	Button Status0 **(KEY_MAP0*)**
0x1F	R	Button Status1 **(KEY_MAP1*)**
0x20	R	Button Status2 **(KEY_MAP2*)**
0x21	R	Button Status3 **(KEY_MAP3*)**
0x22	R	Button Status4 **(KEY_MAP4*)**
0x23	R	Button Status5 **(KEY_MAP5*)**
0x30~0x5F	R/W	Trigger level adjustment **(FTN_X*)**

**User must adjust these commands to obtain the appropriate button number to touch.*

***Any of the sliders can each provide 4-key(pin) only.*

6.7 Registers Description

6.7.1 Address 0x00: Product ID

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Product ID							
R-0	R-1	R-0	R-1	R-0	R-1	R-1	R-1

Bit 7~0 (Product ID_0): Product ID is 0x57

6.7.2 Address 0x01: BOP Version

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
BOP Version							
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

Bit 7~0 (BOP Version): All 8-bit registers are definable. User can check the BOP version number anytime. Note that eSense IDE will automatically load the BOP version into the register.

6.7.3 Address 0x02: Serial Number

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Serial Number							
R-0	R-0	R-0	R-0	R-0	R-1	R-0	R-1

Bit 7~0 (Serial Number): Serial Number is 0x05

6.7.4 Address 0x03: Firmware Version

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Firmware Code Version							
R	R	R	R	R	R	R	R

Bit 7~0 (Firmware Code Version): All 8-bit registers are definable. User can check the firmware version number anytime.

6.7.5 Address 0x05: General Configuration

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
SReset	ReCal	-	ReBuild	-	-	-	-
R/W-0	R/W-0	R-0	R/W-0	R-0	R-0	R-0	R-0

Bit 7 (SReset): Software reset. When this bit is set to "**1**", Reset function is executed immediately and clears the bit to "**0**" after reset is completed.

0: Reset completed

1: Execute reset

Bits 5, 3 ~ 0: Not used bits. Set to "**0**" all the time.

Bit 6 (ReCal): This bit is used to recalibrate the sensor basic capacitance to adjust and compensate capacitance shift due to change of environment. If ReCal bit is set from "**0**" to "**1**", it will recalibrate immediately and then return to "**0**" to complete the process.

0: ReCal completed

1: Execute ReCal

Bit 4 (ReBuild): TouchKey pin assignment and function mode configuration. This bit also includes the Recalibration to adjust sensor basic capacitance change due to environment change as stated above (Bit 6).

When ReBuild bit is set, the TouchKey pin and functions will run according to defined modes. After the host changes the TouchKey configuration contents of Address 0x00~0x1F (by setting ReBuild bit from "**0**" to "**1**"), the TouchKey pin assigned structure will rearrange immediately. Then the ReBuild bit will return to "**0**" when the change is completed.

0: ReBuild completed

1: Execute ReBuild

NOTE
Registers 0x00~0x1F (see Sections 6.7.1 ~ 6.7.19) must rebuild after change.

6.7.6 Address 0x06: TPREQB Pin Configuration

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
TPREQIO	-	-	-	TPREQDLYEN	TPREQDLYT2	TPREQDLYT1	TPREQDLYT0
RW-0	R-0	R-0	R-0	R/W-0	R/W-0	R/W-0	R/W-0

Bit 7 (TPREQBIO): Switch pin function between TPREQB and P60. If pin is not used as TPREQB, the pin can function as GPIO.

0: TPREQB Function

1: P60

Bits 6~4: Not used bits. Set to "**0**" all the time.

Bit 3 (TPREQDLYEN): TPREQB pin delay function control bit

0: Disable

1: Enable

Bit 2 ~ 0 (TPREQDLYT2 ~ 0): TPREQB pin status on hold timer

Delay time = $2^{\wedge(N-1)}$*Tbase (where Tbase is 10 msec, N is TPREQDLYT [2:0].)

TPREQDLYT2	TPREQDLYT1	TPREQDLYT0	Tsec	Note
0	**0**	**0**	Tbase/2	Tbase = 10 msec
0	**0**	**1**	Tbase*1	-
0	**1**	**0**	Tbase*2	-
0	**1**	**1**	Tbase*4	-
1	**0**	**0**	Tbase*8	-
1	**0**	**1**	Tbase*16	-
1	**1**	**0**	Tbase*32	-
1	**1**	**1**	Tbase*64	-

6.7.7 Address 0x09: TPERR Bit, Parameter Error Register

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-	-	-	-	-	TPTR	TPOV	-
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

If the bits are "**1**", the relevant registers needs to be modified.

Bits 7~3, 0: Not used bits. Set to "**0**" all the time.

Bit 2 (TPTR): Touch transfer error. Need to increase **Registers 0x17 & 0x18** Touch transfer time (see Sections 6.7.15 & 6.7.16).

Bit 1 (TPOV): Touch gain overflow. Need to increase fraction factor of **Registers 0x15 & 0x16** Touch Sensitivity (**SST1, SST2_MT, & SST2_FC**). For example; from 1/4 to 1/8 (see Sections 6.7.13 & 6.7.14).

6.7.8 Address 0x11: I^2C Slave Address L

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
IA7	IA6	IA5	IA4	IA3	IA2	IA1	IA0
R	R	R	R	R	R	R	R

Bits 7(IA7): Reserved bit. Set to "0" all the time.

Bit 6 ~ 0 (IA6~0): eKTF5705 Device Slave address.

6.7.9 Address 0x12: Touch Configuration Mode

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
MXM		-	-	-	-	-	SGPIO
48key							
0	0	R-0	R-0	R-0	R-0	R-0	R/W-1
Water Proof/Slider							
0	1	R-0	R-0	R-0	R-0	R-0	R/W-1
Basic button							
R/W-0	R/W-0	R-0	R-0	R-0	R-0	R-0	R/W-1

The register must match with proper button sensor type on PCB.

Bit 7 ~ 6 (MXM): Set eKTF5705 button type (for **Basic button** only)

MXM	Description	Note
00	Two-Line mode	Select the Touch type from "Tool/adjust TP value" of eUIDEII
01	One-Line mode	
10	Reserve	-
11	*	-

* *See table under the next Section 6.7.11*

Bit 5 ~ 1: Not used bits. Set to "**0**" all the time.

Bit 0 (SGPIO): Set the default low status GPIO or skip the default IO setting.

The default GPIO can prevent environmental noise and provide ESD protection. And if the GPIO is not used, the circuit must be connected to GND.

0: Set the default GPIO value from LIB

1: Skip LIB default GPIO setting (user has to set his own default setting)

6.7.10 Address 0x13: Touch Driver Pin Enable Bit
(for Slider/Basic button/48key)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Slider/Basic button							
DR7EN	DR6EN	DR5EN	DR4EN	-	-	DREN	-
WR-0	WR-0	WR-0	WR-0	R-0	R-0	R-0	R-0
48key							
DR7EN	-	-	-	-	-	-	-
WR-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

Bit 7 ~ 4,1 (DR7EN ~ DR4EN,DREN): Touch driver pin enable bits. If disabled, the pin functions as GPIO.

MXM	Bit	QN24 Pin Description		SOP24 Pin Description	
Slider/Basic button					
11	DR4EN=x	Pin24 = P56/DA0		Pin2 = P56/DA0	
	DR5EN=x	Pin1 = P57/DA1		Pin3 = P57/DA1	
	DR6EN=x	Pin2 = P55		Pin4 = P55	
	DR7EN=x	Pin3 = P83		-	
-	-	x=1	x=0	x=1	x=0
00	DREN=x	Not used	Not used	Not used	Not used
	DR4EN=x	Pin24 = TPD4	Pin24 = P56/DA0	Pin2 = TPD4	Pin2 = P56/DA0
	DR5EN=x	Pin1 = TPD5	Pin1 = P57/DA1	Pin3 = TPD5	Pin3 = P57/DA1
	DR6EN=x	Pin2 = TPD6	Pin2 = P55	Pin4 = TPD6	Pin4 = P55
	DR7EN=x	Pin3 = TPD7	Pin3 = P83	-	-
01	DREN=x	Pin9 = AS	Pin9 = P54/OSCO	Pin9 = AS	Pin9 = P54/OSCO
	DR4EN=x	Pin24 = AS1	Pin24 = P56/DA0	Pin2 = AS1	Pin2 = P56/DA0
	DR5EN=x	Pin1 = AS2	Pin1 = P57/DA1	Pin3 = AS2	Pin3 = P57/DA1
	DR6EN=x	Pin2 = AS3	Pin2 = P55	Pin4 = AS3	Pin4 = P55
	DR7EN=x	Not used	Pin3 = P83	-	-
48key				-	
M<=36	DR7EN=0	Pin3 = P83		-	
M<=48	DR7EN=1	Pin3 = TPD7		-	

NOTE

1. *The MXM is the Address 0x12 Touch mode*
2. *If the TouchKey number is **less than 12** in 1 Line mode, the DR4EN can be operated. Otherwise the DREN will be only operated.*
3. *If the TouchKey number set in 2 Line mode, the DR5/6EN setup will be dependent on the combination of key circuit.*

Bits 3/2/0: Not used bits. Set to "**0**" all the time.

6.7.11 Address 0x14: Touch Sense Pin Enable Bit

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
SEN3EN	SEN2EN	SEN1EN	SEN0EN	-	-	-	-
R/W-0	R/W-0	R/W-0	R/W-0	R-0	R-0	R-0	R-0
48key							
1	**1**	**1**	R-0	R-0	R-0	R-0	R-0

Bit 7 (SEN3EN): TPSA3 ~TPSD3 enable control bits. If disabled, these pins function as GPIO.

0: Disable

1: Enable TPSA3 ~TPSD3 (Btn8~Btn11 for One-Line)

SEN3EN	QN24 Description	SOP24 Description
0	Pin12 = P62	Pin14 = P62
	Pin13 = P63	Pin15 = P63
	Pin14 = P72	Pin16 = P72
	Pin15 = P73	Pin17 = P73
1	Pin12 = TPSA3	Pin14 = TPSA3
	Pin13 = TPSB3	Pin15 = TPSB3
	Pin14 = TPSC3	Pin16 = TPSC3
	Pin15 = TPSD3	Pin17 = TPSD3

Bit 6 (SEN2EN): TPSA2 ~TPSD2 enable control bits. If disabled, these pins function as GPIO.

0: Disable

1: Enable TPSA2 ~TPSD2 (Btn4~Btn7 for One-Line)

SEN2EN	QN24 Description	SOP24 Description
0	Pin16 = P64	Pin18 = P64
	Pin17 = P65	Pin19 = P65
	Pn18 = P66	Pn20 = P66
	Pin19 = P67	Pin21 = P67
1	Pin16 = TPSA2	Pin18 = TPSA2
	Pin17 = TPSB2	Pin19 = TPSB2
	Pin18 = TPSC2	Pin20 = TPSC2
	Pin19 = TPSD2	Pin21 = TPSD2

Bit 5 (SEN1EN): TPSA1~TPSD1 enable control bits. If disabled, these pins function as GPIO.

0: Disable

1: Enable TPSA1 ~TPSD1 (Btn0~Btn3 for One-Line)

SEN1EN	QN24 Description	SOP24 Description
0	Pin20 = P50	Pin22 = P50
	Pin21 = P51	Pin23 = P51
	Pn22 = P52	Pn24 = P52
	Pin23 = P53	Pin1 = P53
1	Pin20 = TPSA1	Pin22 = TPSA1
	Pin21 = TPSB1	Pin23 = TPSB1
	Pin22 = TPSC1	Pin24 = TPSC1
	Pin23 = TPSD1	Pin1 = TPSD1

Bit 4 (SEN0EN): TPSA0~TPSD0 enable control bits. If disabled, these pins function as GPIO.

0: Disable

1: Enable TPSA0 ~TPSD0 (Btn12~Btn15 for One-Line)

SEN1EN	QN24 Description	SOP24 Description
0	Pin24 = P56	Pin2 = P56
	Pin1 = P57	Pin3 = P57
	Pn2 = P55	Pin4 = P55
	Pin3 = P83	-
1	Pin24 = TPSA0	Pin2 = TPSA0
	Pin1 = TPSB0	Pin3 = TPSB0
	Pin2 = TPSC0	Pin4 = TPSC0
	Pin3 = TPSD0	-

Bit 3~0: Not used bits. Set to "**0**" all the time.

6.7.12 Address 0x15: Touch SENSITIVITY1 Setting

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
SST1							
R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0

Bit 7 ~ 0 (SST1): Touch sensitivity level selection; "**0**" is lowest, and **255** is highest. For instance thick cover needs higher sensitivity level, while thin cover requires lower level. This setting will also impact Touch execution time, i.e., higher **SST1** needs longer Touch execution time, hence the button response is slower.

6.7.13 Address 0x16: Touch SENSITIVITY2 Setting

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-	-	SST2_MT		-	SST2_FC		
R-0	R-0	R/W-0	R/W-0	R-0	R/W-0	R/W-0	R/W-0

Bit 7 ~ 6: Not used bits. Set to "**0**" all the time.

Bit 5 ~ 4 (SST2_MT): SST2_MT is the magnification of SST1 which is used for rough sensitivity adjustment. It has three levels of magnification as shown below**:**

SST2_MT	Magnification Level
00	1
01	2
10	4
11	

Bit 3: Not used bits. Set to "**0**" all the time.

Bit 2 ~ 0 (SST2_FC): Touch sensitivity fraction table select bits with a total of 0~7 levels available selections as shown in the table below. The higher the SST2_FC value, the lower is the sensibility will be, while the stability becomes higher. In contrary, the lower the SST2_FC value, the higher is the sensibility will be, while the stability becomes lower. The recommended value is **5** (1/28).

$$SENSITIVITY = (SST1 * SST2\_MT + 20) * SST2\_FC$$

SST2_FC	Description	Note
0	1/2	Highest sensitivity, Lowest stability
1	1/4	
2	1/8	
3	1/16	
4	1/24	
5	1/28	
6	1/32	
7	1/36	Lowest sensitivity, Highest stability

NOTE
If used with 2-Line configuration, the SST2_FC value of 0~3 is recommended.

6.7.14 Address 0x17: Touch SPEED1 Setting

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
SPP_SE				SPP11	SPP10	SPP9	SPP8
WR-0	WR-0	WR-0	WR-0	WR-0	WR-0	WR-0	WR-0

Bit 7 ~ 4 (SPP_SE): Touch transfer setup time setting. Each transfer needs an initial setup time, and larger trace (route) requires longer setup time. A total of 16 levels can be set, "**0**" is the shortest and "**15**" is the longest. The longer the setup time, the better the Touch data can be.

$$SPEED\_Setup = (10\mu s + SPP\_SE * 0.5\mu s)$$

Bit 3 ~ 0 (SP11~8): Touch high speed transfer time; 11~8bit

6.7.15 Address 0x18: Touch SPEED2 Setting

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
SPP7	SPP6	SPP5	SPP4	SPP3	SPP2	SPP1	SPP0
WR-0	WR-0	WR-0	WR-0	WR-0	WR-0	WR-0	WR-0

Bit 7 ~ 0 (SP7~0): Touch transfer time setting; a total of 12 bits (SP11~0) range can be set. 0xFFF is longest and 0x000 is shortest. This parameter relates to layout size of the physical PCB trace. Therefore, the larger the PCB trace is, the longer transfer time it needs.

$SPEED\_Tran\ sfer = (200\mu s + SPP * 0.5\mu s)$

6.7.16 Address 0x19: Touch Button Quantity

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Water Proof/Slider/Basic button (1-Line)							
-	-	-	-	TPQUTY(Bit 3~0)			
R-0	R-0	R-0	R-0	R/W-0	R/W-0	R/W-0	R/W-0
48Key/Basic button(2-Line)							
-	-	TPQUTY(Bit5~0)					
R-0	R-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0

NOTE

1.To update the pin status of Address 0x13/0x14, it must update the button quantity.

2. Button number = TPQUTY+1.

Water Proof/Slider/Basic button (1-Line)

Bit 7 ~ 4: Not used bits. Set to "**0**" all the time.

Bit 3 ~ 0 (TPQUTY): Select button quantity. One-line mode maximum is 12 buttons(TPQUTY=0x0B). Two-line mode maximum is 48 buttons(TPQUTY=0x1F).

48Key/Basic button (2-Line)

Bit 7 ~ 6: Not used bits. Set to "**0**" all the time.

Bit 5 ~ 0 (TPQUTY): Select button quantity. One-line mode maximum is 12 buttons(TPQUTY=0x0B). Two-line mode maximum is 48 buttons(TPQUTY=0x1F).

6.7.17 Address 0x1E: Button Status 0 *(for 48Key only)*

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Btn7	Btn6	Btn5	Btn4	Btn3	Btn2	Btn1	Btn0
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

Bit 7 ~ 0 (Btn7 ~ Btn0): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 7~0. By reading this register, user can check the button status.

0: Button is untouched

1: Button is touched

6.7.18 Address 0x1F: Button Status 1 *(for 48Key only)*

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Btn15	Btn14	Btn13	Btn12	Btn11	Btn10	Btn9	Btn8
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

Bit 7 ~ 0 (Btn15 ~ Btn8): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 15~8. By reading this register, user is able to check the button status.

0: Button is untouched

1: Button is touched

6.7.19 Address 0x20: Button Status 0 for Water Proof/Slider/Basic, Button Status 2 for 48Key

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Water Proof/Slider/Basic button							
Btn7	Btn6	Btn5	Btn4	Btn3	Btn2	Btn1	Btn0
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0
48Key							
Btn23	Btn22	Btn21	Btn20	Btn19	Btn18	Btn17	Btn16
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

Status 0 of Water Proof/Slider/Basic button

Bit 7 ~ 0 (Btn7 ~ Btn0): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 7~0. By reading this register, user is able to check the button status.

0: Button is untouched

1: Button is touched

Status 2 of 48Key

Bit 7 ~ 0 (Btn23 ~ Btn16): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 23~16. By reading this register, user is able to check the button status.

0: Button is untouched

1: Button is touched

6.7.20 Address 0x21: Button Status 1 for Basic/Water Proof/Slider, Button Status 3 for 48Key

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Basic button (overall total 0~31)/Water Proof/Slider							
Btn15	Btn14	Btn13	Btn12	Btn11	Btn10	Btn9	Btn8
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0
48Key							
Btn31	Btn30	Btn29	Btn28	Btn27	Btn26	Btn25	Btn24
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

Status 1 of Basic button (overall total 0~31)/Water Proof/Slider

Bit 7 ~ 0 (Btn15 ~ Btn8): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 15~8 (or overall total of 31 bits with the Basic button bits under Address 0x20, 0x22 & 0x23 as shown in Sections 6.7.20, 6.7.22, & 6.7.23 respectively are added). By reading this register, user is able to check the button status.

0: Button is untouched

1: Button is touched

> **NOTE**
> *The button quantity provided under One-Line pattern /circuit is only 16 buttons.*

Status 3 of 48Key

Bit 7 ~ 0 (Btn31 ~ Btn24): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 31~24. By reading this register, user is able to check the button status.

0: Button is untouched

1: Button is touched

6.7.21 Address 0x22: Button Status 4 (for Basic button/48key only)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Basic(overall total 0~31)							
Btn23	Btn22	Btn21	Btn20	Btn19	Btn18	Btn17	Btn16
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0
48Key							
Btn39	Btn38	Btn37	Btn36	Btn35	Btn34	Btn33	Btn32
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

Status 4 of Basic button

Bit 7 ~ 0 (Btn23 ~ Btn16): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 23~16 (or overall total of 31 bits with the Basic button bits under Address 0x20, 0x21 & 0x23 as shown in Sections 6.7.20, 6.7.21, & 6.7.23 respectively are added). By reading this register, user is able to check the button status.

0: Button is untouched

1: Button is touched

Status 4 of 48Key

Bit 7 ~ 0 (Btn39 ~ Btn32): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 39~32. By reading this register, user is able to check the button status.

0: Button is untouched

1: Button is touched

6.7.22 Address 0x23: Button Status 5 (for Basic button/48Key only)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Basic(overall total 0~31)							
Btn31	Btn30	Btn29	Btn28	Btn27	Btn26	Btn25	Btn24
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0
48Key							
Btn47	Btn46	Btn45	Btn44	Btn43	Btn42	Btn41	Btn40
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

Status 5 of Basic button

Bit 7 ~ 0 (Btn31 ~ Btn24): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 31~24 (or overall total of 31 bits with the Basic button bits under Address 0x20, 0x21 & 0x22 as shown in Sections 6.7.20, 6.7.21, & 6.7.22 respectively are added). By reading this register, user is able to check the button status.

0: Button is untouched

1: Button is touched

Status 5 of 48Key

Bit 7 ~ 0 (Btn47 ~ Btn40): This register determines whether button status is touched or untouched. A total of 8 bits represent each individual status of Buttons 47~40. By reading this register, user is able to check the button status.

0: Button is untouched

1: Button is touched

6.7.23 Address 0x24: Button Operation Mode

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
BtM1	BtM0	SBO	-	-	-	-	-
Water Proof							
1	0	-	-	-	-	-	-
48Key/Slider/Basic button							
R/W-0	R/W-0	R/W-0	R-0	R-0	R-0	R-0	R-0

Bit 7 ~ 6 (BtM1 ~ 0): Button operation mode selection

BtM1	BtM0	Description	Remarks
0	**0**	Multi-button mode	With serveral buttons enabled, buttons that exceed the set senditivity trigger level (0x30~0x4F); will have their status bit set to "**1**".
0	**1**	First button mode	With several buttons enabled, the first button to surpass the set sensitivity trigger level (0x30~0x4F); will have its status bit set to "**1**".
1	**0**	Strong button mode	With several buttons enabled and a number of buttons surpassed the set sensitivity trigger level (0x30~0x4F); the button with the highest sensitivity will have its status bit set to "**1**" **(only Water Proof supports this item).**
1	**1**	X	Not used

Bit 5(SBO): This bit selects the Strong button mode options (Strong1/Strong2).

0: Strong1 - If KeyA is already pressed; KeyB is also considered pressed. If the total keys (except KeyB) are **released**, KeyB needs to be pressed hardier.

1: Strong2 - If KeyA is already pressed, KeyB is also considered pressed. If KeyB sensitivity is **higher than** KeyA, KeyB needs to be pressed hardier.

> **NOTE**
> *The KeyA/KeyB sensitivity must be higher than the trigger level. The KeyA/B represents different key numbers.*

Bit 4 ~ 0: Not used bits. Set to "**0**" all the time.

6.7.24 Address 0x25: Power Mode Configure

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-	-	-	-	-	TP_IDLE	TP_PWR_M2	TP_PWR_M1
R-0	R-0	R-0	R-0	R-0	R/W-0	R/W-0	R/W-0

Bit 7 ~ 3: Not used bits. Set to "**0**" all the time.

Bit 2 ~ 0 (TP_IDLE, TP_PWR_M2~M1): Operation mode selection

TP_IDLE	TP_PWR_M2	TP_PWR_M1	Description	Remarks
0	**0**	**0**	Touch runs at Normal mode.	-
0	**0**	**1**	Sleep once. After wake-up, Touch will run at Normal mode **(SLEEP MODE1)**.	Under this mode, Touch wake-ups by I²C protocol
0	**1**	**0**	Touch will scan all button status. If no button is triggered, Touch will go to Sleep mode again and wait for next wake-up signal **(SLEEP MODE2)**.	
0	**1**	**1**	Touch will run at Idle mode for about 500ms, and wake-ups to Normal mode to scan all buttons. If no button is triggered, Touch will return to Idle mode and wait for the next 500ms time out **(IDLE MODE0)**.	Under this mode, Touch wake-ups by Internal timer time out.
1	**0**	**0**	Touch will run at Idle mode for about 250ms, and wake-ups to Normal mode to scan all buttons. If no button is triggered, Touch will return to Idle mode and wait for the next 250ms time out **(IDLE MODE1)**.	
1	**0**	**1**	Touch will run at Idle mode for about 125ms, and wake-ups to Normal mode to scan all buttons. If no button is triggered, Touch will return to Idle mode and wait for the next 125ms time out **(IDLE MODE2)**.	
1	**1**	**0**	Touch will run at Idle mode for about 62.5ms, and wake-ups to Normal mode to scan all buttons. If no button is triggered, Touch will return to Idle mode and wait for the next 62.5ms time out **(IDLE MODE3)**.	Under this mode, Touch wake-ups by Internal timer time out.
1	**1**	**1**	Touch will run at Idle mode about 32ms, and wake-ups to Normal mode to scan all buttons. If no button is triggered, Touch will return to Idle mode and wait for the next 32ms time out **(IDLE MODE4)**.	

6.7.25 Address 0x26: Button De-Bounce Control

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-				Bounce Set			
R-0	R-0	R-0	R-0	R/W-0	R/W-0	R/W-0	R/W-0

Bit 7 ~ 4: Not used bits. Set to "**0**" all the time.

Bit 3 ~ 0 (Bounce Set): These bits are the bounce time control for buttons. The bounce time mechanism reduces noise interference on button status. The TouchKey controller provides touch and release de-bounce time control to resist noise effect. The following figure shows an example of detection with bounce Time = 2**;** meaning 2 consecutive samples are necessary to

trigger the key detection or 2 consecutive samples are necessary to end detection.

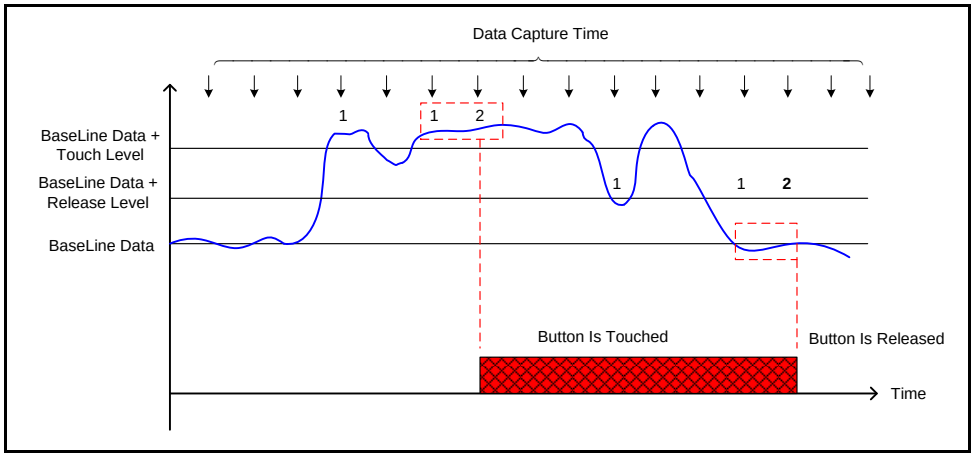


Figure 6-8 An Example of Bounce Time Operation

6.7.26 Trigger Level Adjustment

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Water Proof/Slider (Address 0x30~0x3B)							
FTN_0~FTN_15							
R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
Basic Button (Address 0x30~0x4F)							
FTN_0~FTN_31							
R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
48key (Address 0x30~0x5F)							
FTN_0~FTN_47							
R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0

These registers are use to trigger level and obtain button status. If the sensitivity is higher than the level, the relative bit of the button status will be "**1**".

Bit 7 ~ 0 (FTN_X): Adjustment of 8-bit address value is provided for 32keys & 48keys. 6keys is provided for different applications. The highest setting value is 0xFF, and the lowest is 0x00. The full range value can be adjusted in three stages, i.e., 0x00~0x80 as first stage, 0x81~0xC0 as second stage, and the rest is the third stage. Using the following formula can obtain the correct value to use.

1ST 0x00 ~ 0x80 = $FTN\_X * 2$
2ST 0x81 ~ 0xC0 = $(FTN\_X - 128) * 4 + 256$
3ST 0xC1 ~ 0xFF = $(FTN\_X - 192) * 8 + 512$

6.7.27 Address 0x90: Water Proof Option

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
WLevel	-	-	WEn	-	-	-	-
R/W-0	-	-	R/W-1	-	-	-	-

Bit 7 (WLevel): Water proof level select. User can select High or Low level.
0: Low Level
1: High Level

Bit 4 (WEn): Water proof enable. Default to enable.

Bit 6, 5, 3 ~ 0: Not used bits. Set to "**0**" all the time.

6.7.28 Address 0x91: Slider Step (Resolution)/Slider Status

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Slider Step (Resolution) for eUIDEII Slider I							
-	-	Slider Step (Resolution)					
-	-	R/W-0					
Slider Status for eUIDEII Slider II							
Bounce Set				ReleaseOut	Finger	Mode	En/Dis
R/W-0	R/W-1	R/W-0	R/W-1	R/W-0	R-0	R/W-1	R/W-1

Slider I:

Bit 7 ~ 6: Not used bits. Set to "**0**" all the time.

Bit 5 ~ 0 (Slider step): These 6 bits are used to set the slider step (resolution). Slider maximum resolution is 32, but for 2key slider; the maximum resolution is 16.

Slider II:

Bit 7 ~ 4 (Slider de-bounce): These bits are the bounce time control for slider position output. The bounce time mechanism reduces noise interference at slider position.

Bit 3 (Finger release output mode): Finger release mode selection

0: Clear mode. The Position Register (0x95) is cleared to zero when finger is released.

1: Keep mode. The Position Register (0x95) will keep the last position where finger is released. To verify whether finger is pressed or released, refer to the Bit 2 (Finger status) below.

Bit 2 (Finger status): Find out whether finger is on sensor or not.

0: Finger is not touching on sensor (released status)

1: Finger is on sensor (touch status)

Bit 1 (Mode): Mode selection

0: Slider mode

1: Wheel mode

Bit 0 (Enable/Disable): Slider function enable/disable.

0: Disable

1: Enable

6.7.29 Address 0x92:Slider Trigger Level

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S1-Slider Trigger Level							
R/W-0							
eUIDEII Slider II							
Slider Trigger Level (High Byte)							
R/W-0							

These registers are use to slider trigger level and obtain slider step(resolution).

Slider I:

Bit 7 ~ 0 (Slider trigger level): These 8 bits are used to set the slider sensor trigger level. When slider offset exceeds the slider trigger level, then the slider function will start to execute.

> **NOTE**
> *All slider offsets can not exceed 0xFF. Otherwise, slider error bit (0x95) will be set to "**1**". See Section 6.7.33.*

Slider II:

Bit 7 ~ 0 (Slider trigger level): The high byte of slider sensor trigger level under eUIDE Slider II.

6.7.30 Address 0x93: S1-Slider Release Level / Slider Trigger Level (Low Byte)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S1-Slider Release Level							
R/W-0							
eUIDEII Slider II							
Slider Trigger Level (Low Byte)							
R/W-0	R/W-1	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0

Slider I:

Bit 7 ~ 0 (Slider release level): These 8 bits are used to set the slider sensor release level. When all slider offsets are below slider release level, the slider function will not work.

Slider II:

Bit 7 ~ 0 (Slider trigger level): The low byte of slider sensor trigger level under eUIDE Slider II.

6.7.31 Address 0x94: S1-Slider de-Bounce

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S1-de-Bounce Set				-			
R/W-0	R/W-0	R/W-0	R/W-0	R -0	R -0	R -0	R -0

Bit 7 ~ 4 (Slider de-bounce): These bits are the bounce time control for slider sensor position output. The bounce time mechanism reduces noise interference on slider position.

Bit 3 ~ 0: Not used bits. Set to "**0**" all the time.

6.7.32 Address 0x95: Slider Error Bit / Slider Position(Output)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
-	-	-	-	-	-	**S2**-error	**S1**-error
-	-	-	-	-	-	R-0	R-0
eUIDEII Slider II							
Slider Position(output)							
R-0							

Slider I:

Bit 7 ~ 2: Not used bits. Set to "**0**" all the time.

Bit 1 ~ 0 (S2/1-error flag): When this bit set to "**1**." It means the slider sensor offset is over 0xFF(255). User must fine-tune Touch Sensitivity1 and Touch Sensitivity2 to set this bit to "**0**".

Slider II:

Bit 7 ~ 0 (Slider position(ouput)): When slider function execution is finished, the resulting slider sensor position will output from this register which user can read to obtain finger position.

6.7.33 Address 0x96: S1-Slider Position(Output) / Slider Pin Quantity

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
-	-	**S1**-Slider Position(Output)					
-	-	R-0					
eUIDEII Slider II							
-	-	-	-	Slider Pin Quantity			
-	-	-	-	R/W-1	R/W-0	R/W-0	R/W-0

Slider I:

Bit 7 ~ 6: Not used bits. Set to "**0**" all the time.

Bit 5 ~ 0 (Slider position(output)): When slider function execution is finished, the resulting slider sensor position will output from this register which user can read to obtain finger position.

Slider II:

Bit 7 ~ 4: Not used bits. Set to "**0**" all the time.

Bit 3 ~ 0 (Slider pin quantity): The Pin Quantity range is recommended from 4 to 8. If setup value is out of range, some unpredicted error will occur.

6.7.34 Address 0x97: S1-Slider Noise Level/Slider Step (Resolution)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S1-Slider Noise Level							
R/W-0							
eUIDEII Slider II							
Slider Step (Resolution)							
R/W-0							

Slider I:

Bit 7 ~ 0 (S1-Slider noise level): These 8 bits are used to set the S1 slider sensor Noise Level to prevent unstable environment. The slider noise offset can not exceed the Noise Level.

Slider II:

Bit 7 ~ 0 (Slider step): These 8 bits are used to set the slider sensor step (resolution). Slider max resolution is 255.

6.7.35 Address 0x98: S1-Slider Noise Bounce

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S1-Slider Noise Bounce							
R/W-0							

Bit 7 ~ 0 (S1-Slider noise bounce): These 8 bits are used to set the S1 slider sensor Noise Bounce. The bounce prevents external environmental noise and avoids slider swing. If a large noise bounce value is set, it will reduce the slider sensor smoothness level.

6.7.36 Address 0x99: S2-Slider Trigger Level *(for Slider 2 Sensor only)*

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S2-Slider Trigger Level							
R/W-0							

Bit 7 ~ 0 (Slider trigger level): These 8 bits are used to set the slider sensor trigger level. When slider offset exceeds slider trigger level, then the slider function will start to execute.

> **NOTE**
> *All slider offsets can not exceed 0xFF. Otherwise, slider error bit (0x95) will be set to "**1**". See Section 6.7.33.*

6.7.37 Address 0x9A: S2-Slider Release Level *(for Slider 2 Sensor only)*

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S2-Slider Release Level							
R/W-0							

Bit 7 ~ 0 (Slider release level): These 8 bits are used to set the slider sensor release level. When all slider offsets are below slider release level, then the slider function will not work.

6.7.38 Address 0x9B: S2-Slider de-Bounce *(for Slider 2 Sensor only)*

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S2-de-Bounce				-			
R/W-0	R/W-0	R/W-0	R/W-0	R -0	R -0	R -0	R -0

Bit 7 ~ 4 (Slider de-bounce): These bits are the bounce time control for slider sensor position output. The bounce time mechanism reduces noise interference at slider position.

Bit 3 ~ 0: Not used bits. Set to "**0**" all the time.

6.7.39 Address 0x9C: S2-Slider Position(Output) *(for Slider 2 Sensor only)*

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
-	-	**S2**-Slider position(output)					
-	-	R-0					

Bit 7 ~ 6: Not used bits. Set to "**0**" all the time.

Bit 5 ~ 0 (Slider position(output)): When slider function execution is finished, the slider sensor position result will output from this register for user to read and obtain finger position.

6.7.40 Address 0x9D: S2-Slider Noise Level (for Slider 2 Sensor only)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S2-Slider Noise Level							
R/W-0							

Bit 7 ~ 0 (S2-Slider Noise Level): These 8 bits are used to set the 2nd slider sensor Noise Level to prevent unstable environment. The slider noise offset can not exceed the Noise Level.

6.7.41 Address 0x9E: S2-Slider Noise Bounce (for Slider 2 Sensor only)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
eUIDEII Slider I							
S2-Slider Noise Bounce							
R/W-0							

Bit 7 ~ 0 (S2-Slider Noise Bounce): These 8 bits are used to set the Noise Bounce. The bounce prevents external environmental noise to avoid slider swing. If a large noise bounce value is set, it will reduce slider sensor smoothness level.

NOTE

- *The eUIDEII **Slider I** only supports the second or S2 Slider sensor. The number of pins (keys) of either S1 or S2 Slider sensors is "**4**".*
- *The Slider of eUIDEII **Slider II** can define Slider pin quantity (see Register 0x96, Section 6.7.34) and Slider step (see Register 0x97, Section 6.7.35). User needs to adjust the defined values that are consistent with the actual hardware structure.*

6.8 Power-On Reset and Initialization

The rising edge time of the VDD power on must be more than 50μs. after the touch button IC is powered on, the eKTF5705 controller will perform initialization. This includes MCU and some parameter initialization.

After the touch button IC is powered on, the eKTF5705 controller will perform initialization. This includes MCU and some parameter initialization. After the initial processing is completed, the TPREQB pin will output low and then returns to high to report the initial Touch state to host. This will tell the host that the touch button IC is ready to start working. The figure at right shows the initialization process after power-up. The Touch button IC power-on maximum initialization time is 2000ms.

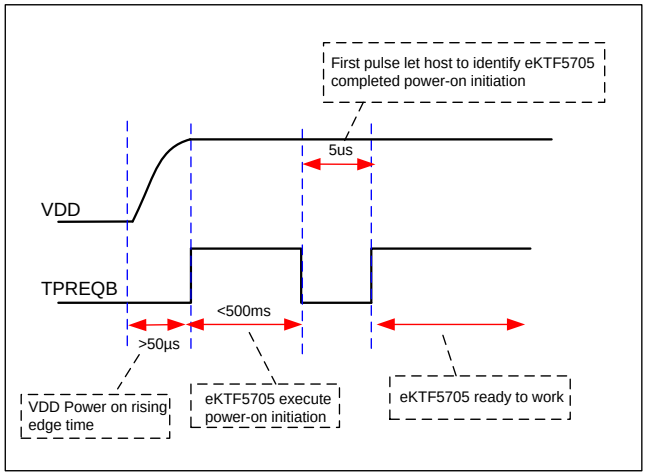


Figure 6-9 Power-on Reset and initialization Timing

After eKTF5705 has completed the power-on initialization, user can start reading or writing eKTF5705 via I^2C protocol.

7 Application Circuits

7.1 Water Proof Application

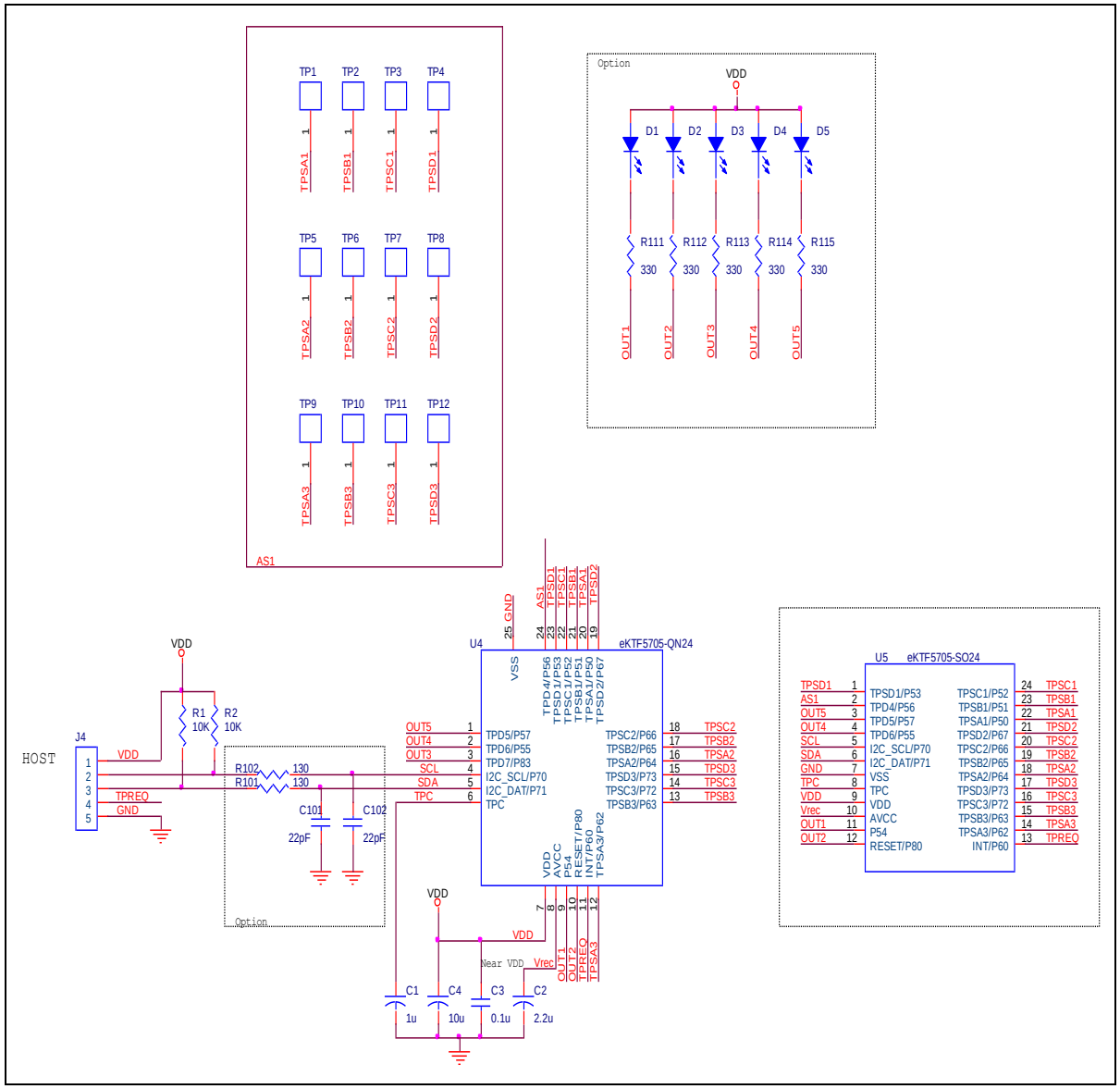


Figure 7-1 eKTF5705 Water Proof Application Circuit

7.2 Slider Application

7.2.1 1Slider with 2Key Application

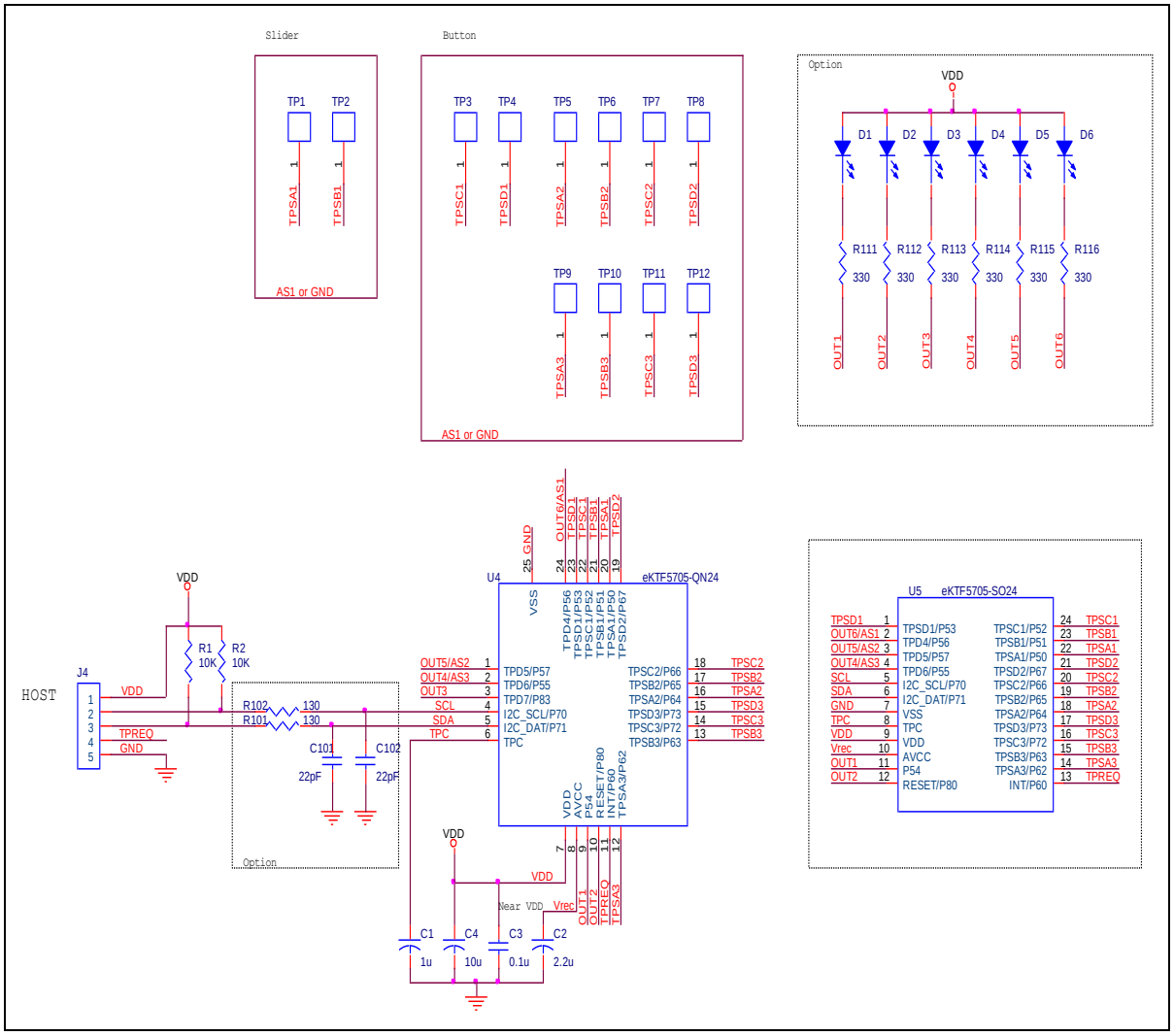


Figure 7-2 eKTF5705 1Slider Using 2Key Application Circuit

7.2.2 1Slider with 4Key Application

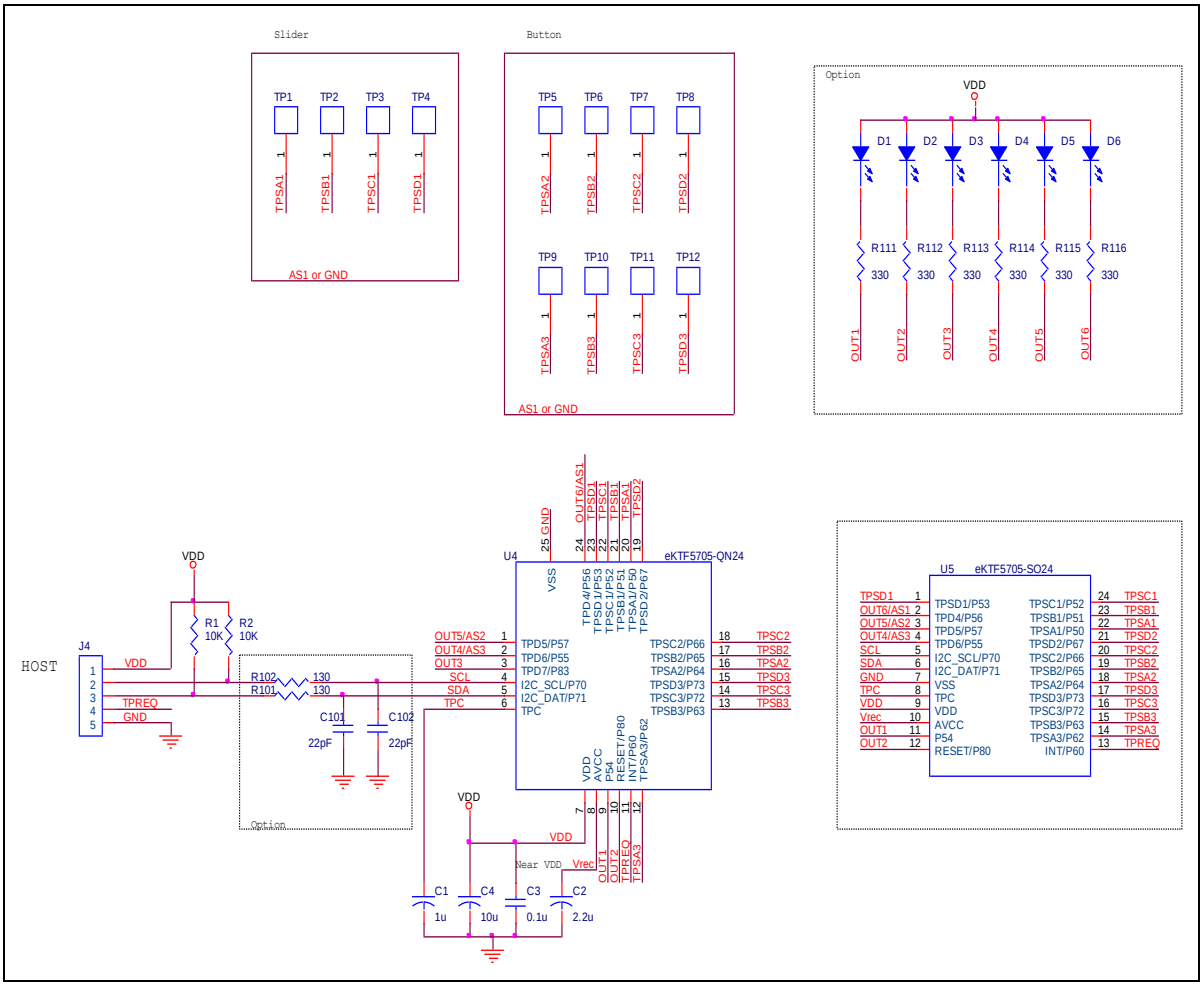


Figure 7-3 eKTF5705 1Slider Using 4Key Application Circuit.

7.2.3 1Slider with 8Key Application

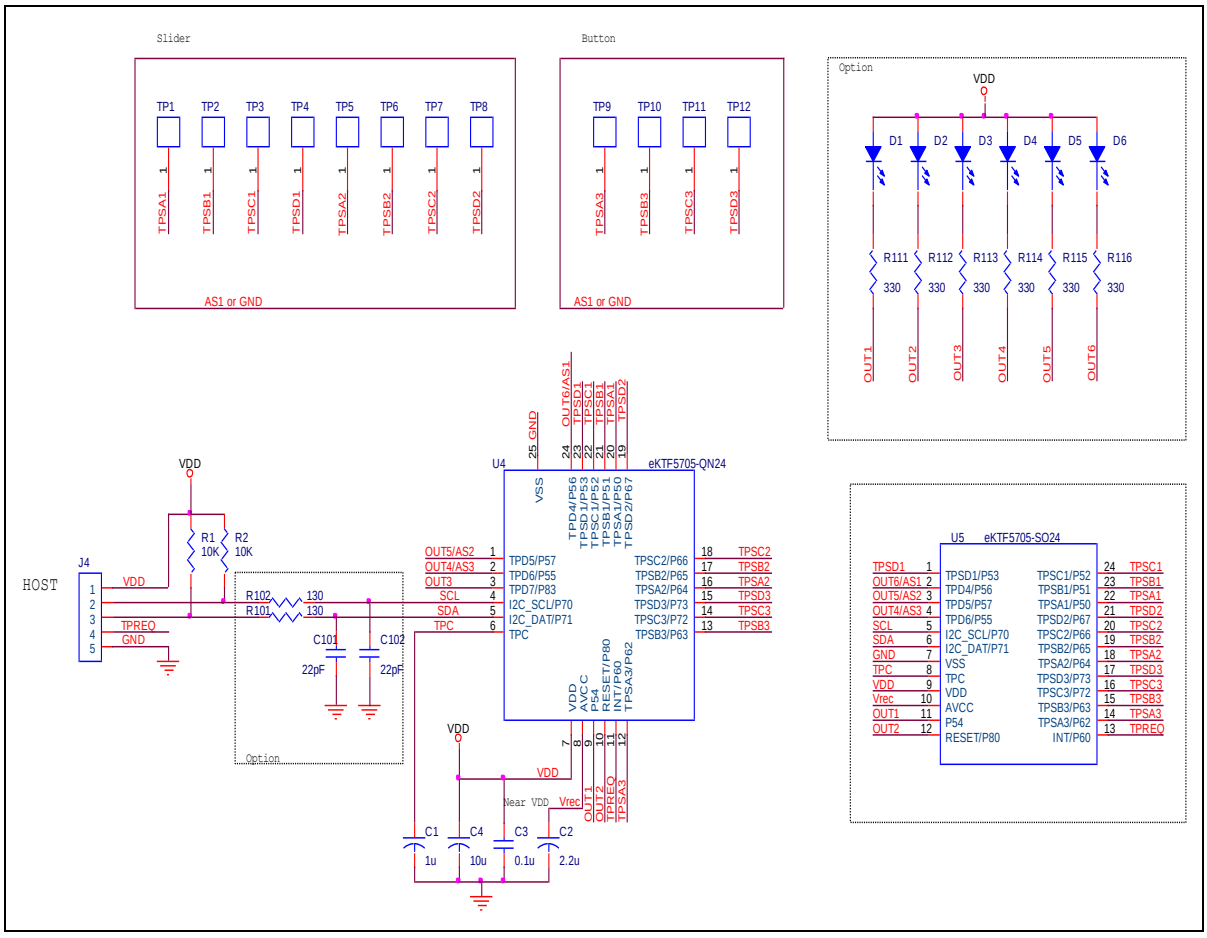


Figure 7-4 eKTF5705 1Slider Using 8Key Application Circuit

7.2.4 2Slider (4Key@1Slider) Application

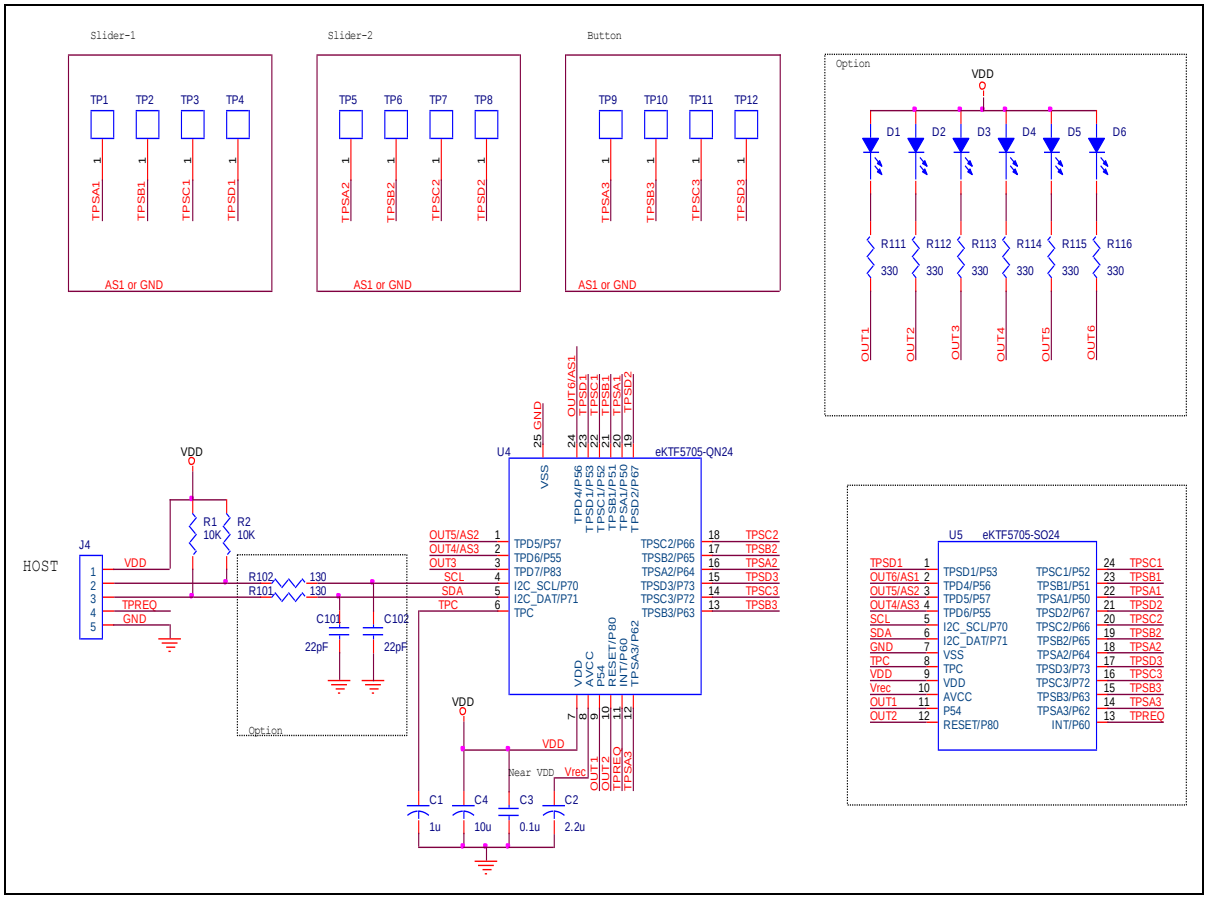


Figure 7-5 eKTF5705 2Slider (4Key@1Slider) Application Circuit

7.3 48 Keys Application

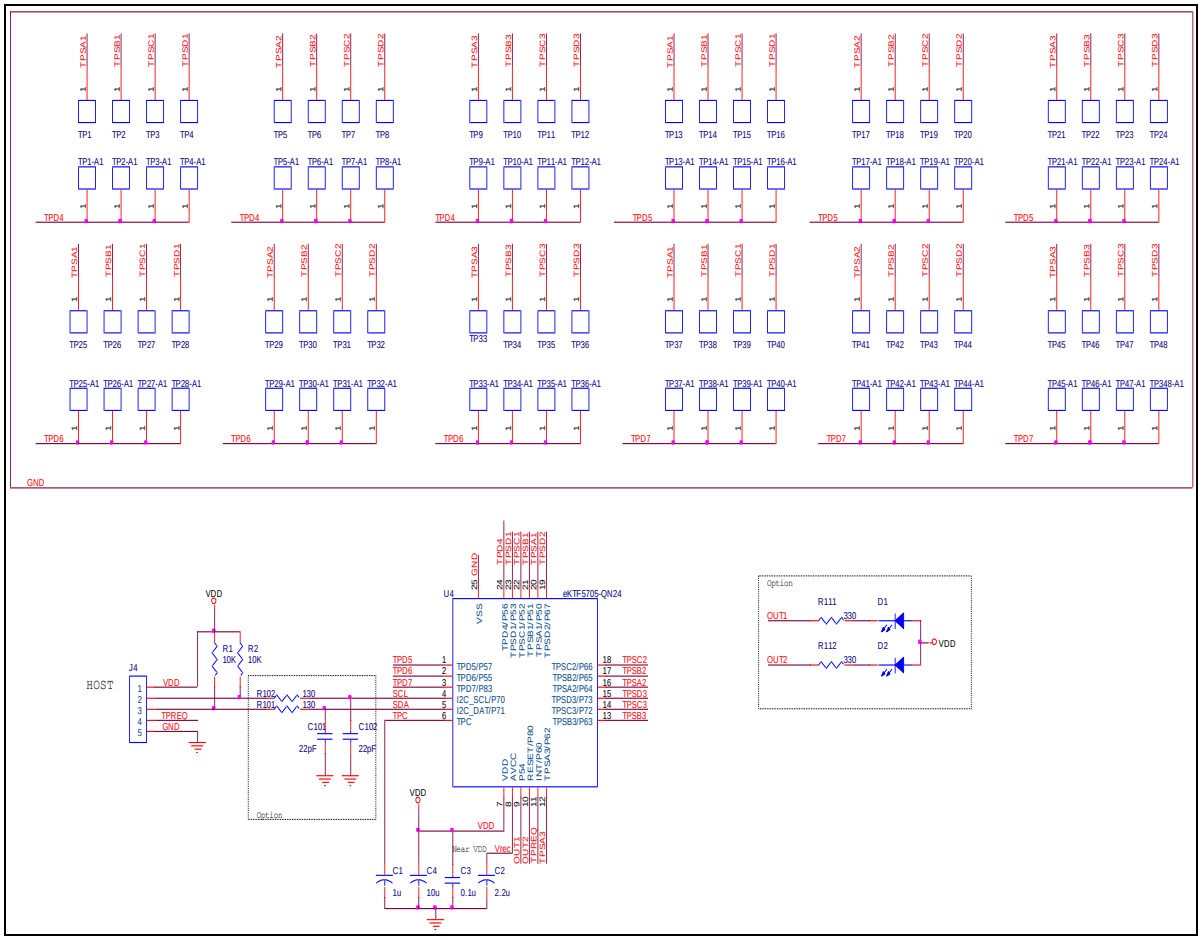


Figure 7-6 eKTF5705 48 Keys Application Circuit

7.4 Basic Button Application

7.4.1 One-Line Application

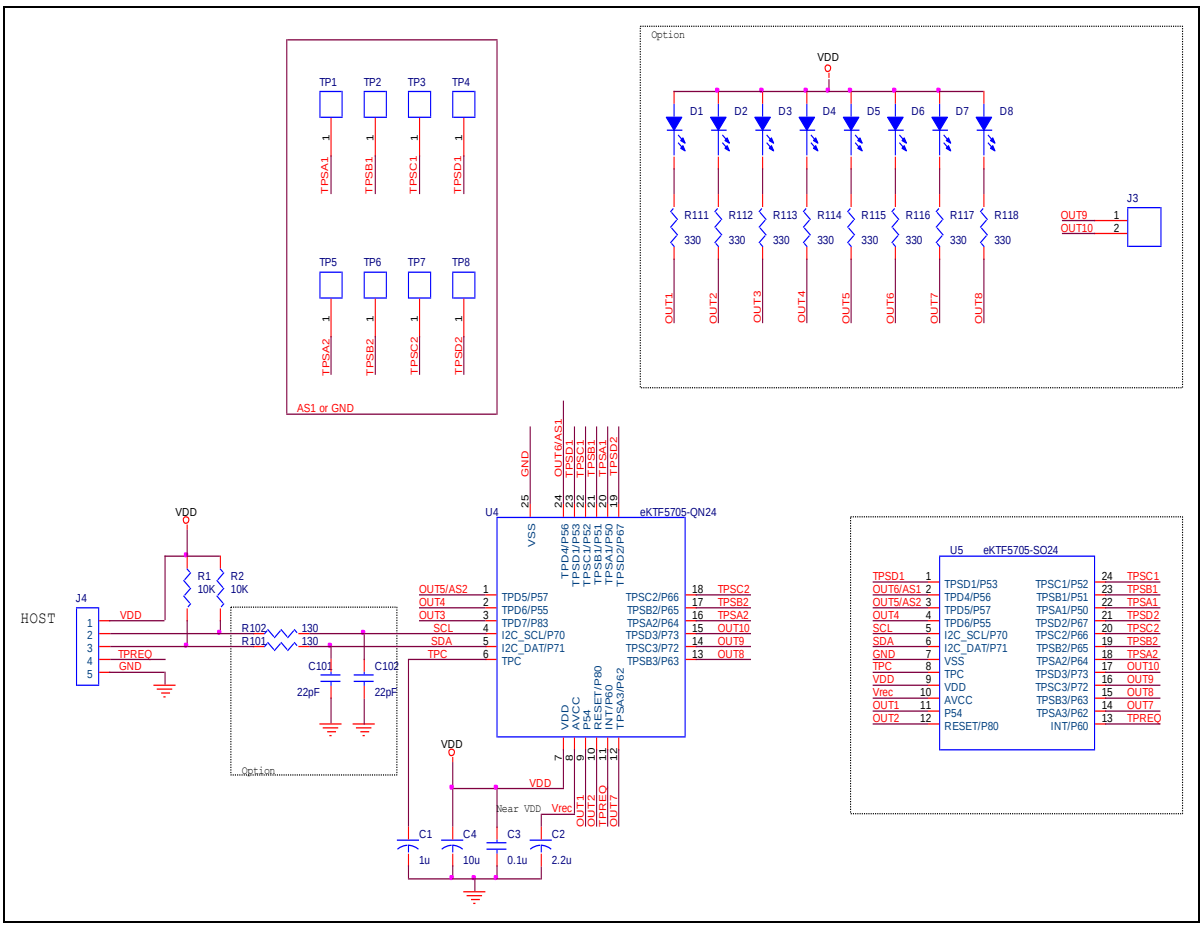


Figure 7-7 eKTF5705 One-Line Application Circuit

7.4.2 Two-Line Application

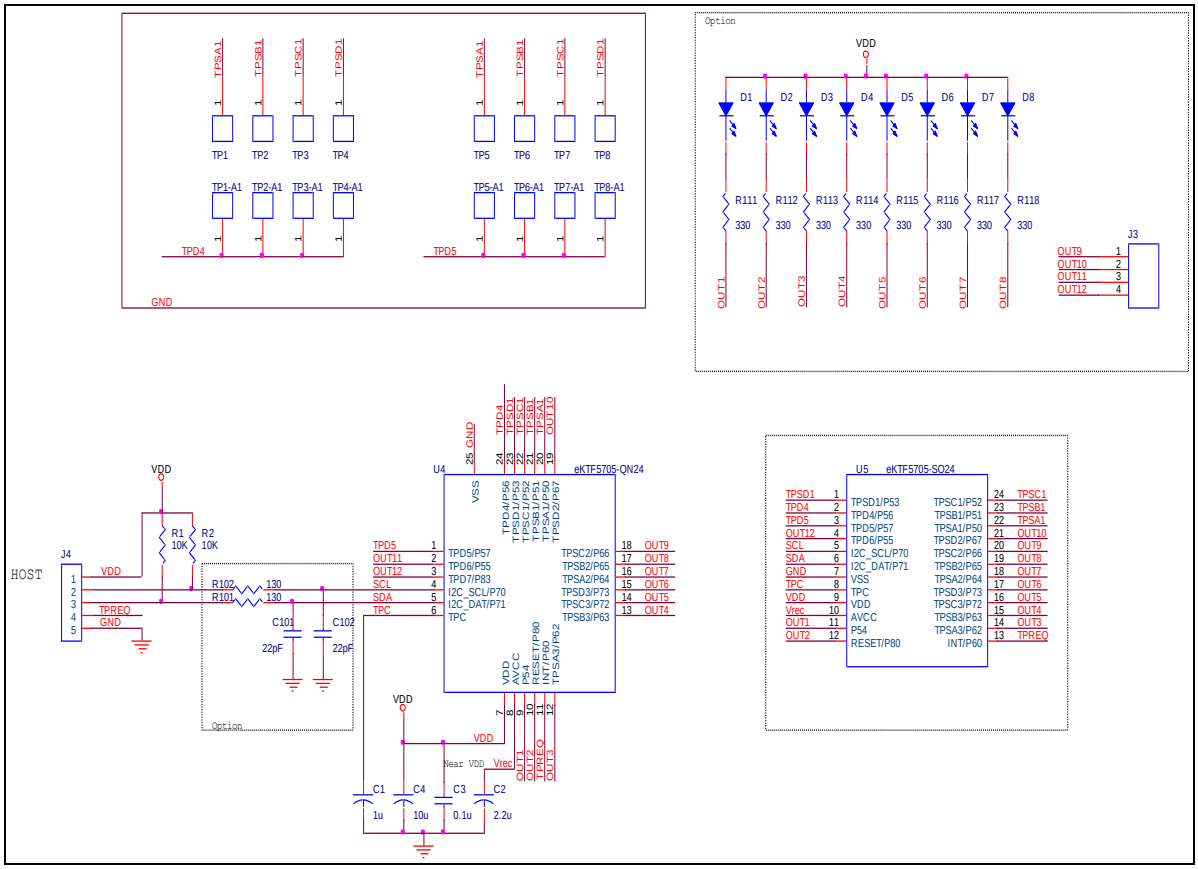


Figure 7-8 eKTF5705 Two-Line Application Circuit

8. Absolute Maximum Ratings

Items	Rating		
Temperature under bias	-40°C	to	85°C
Storage temperature	-65°C	to	150°C
Input voltage	Vss-0.3V	to	Vdd+0.3V
Output voltage	Vss-0.3V	to	Vdd+0.3V
Working Voltage	2.3V	to	3.6V
Working Frequency	DC	to	16MHz

9. DC Electrical Characteristics

■ **(Ta=25 C, VDD=3.6V±5%, VSS=0V)**

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Fxt	IRC: VDD to 3.6 V	8MHz	-	8M	-	Hz
IRCE	Internal RC oscillator error per stage		-	±1	1	%
IIL	Input Leakage Current for input pins	VIN = VDD, VSS	-1	0	1	μA
VIH1	Input High Voltage (Schmitt trigger)	Ports 5, 6, 7, 8	0.7Vdd		Vdd+0.3V	V
VIL1	Input Low Voltage (Schmitt trigger)	Ports 5, 6, 7, 8	-0.3V		0.3Vdd	V
VIHT1	Input High Threshold Voltage (Schmitt trigger)	/RESET,TCC,INT	0.7Vdd		Vdd+0.3V	V
VILT1	Input Low Threshold Voltage (Schmitt trigger)	/RESET,TCC,INT	-0.3V		0.3Vdd	V
IOH1	Output High Level Current (Ports 5, 6, 7, 8,)	VOH = VDD-0.1VDD	-	-4.5	-	mA
IOH2	Output High Level Current (high drive) (Ports 5, 6, 7, 8)	VOH = VDD-0.1VDD	-	-8	-	mA
IOL1	Output Low Level Current (Ports 5, 6, 7, 8,)	VOL = GND+0.1VDD	-	16	-	mA
IOL2	Output Low Level Current (high sink) (Ports 5, 6, 7, 8)	VOL = GND+0.1VDD	-	25	-	mA
IPH	Pull-High Current	Pull-high active, input pin at VSS		-75		μA
IPL	Pull-Low current	Pull-low active, input pin at Vdd	-	40	-	μA

NOTE

- *The above parameters are theoretical values only and have not been tested or verified.*
- *Data under the "Min.", "Typ.", and "Max." columns are based on theoretical results at 25°C. These data are for design reference only and have not been tested or verified.*

10. AC Electrical Characteristics

(eKTF5705 -40≦Ta≦85°C, VDD=3.6V, VSS=0V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dclk	Input CLK duty cycle		45	50	55	%
Tins	Instruction cycle time	RC type	250		DC	ns
Ttcc	TCC input period		(Tins+20)/N*			ns
Tdrh	Device reset hold time		11.3	16.2	21.6	ms
Trst	/RESET pulse width	Ta = 25°C	2000			ns
Twdt	Watchdog timer period	Ta = 25°C	11.3	16.2	21.6	ms
Tset	Input pin setup time			0		ns
Thold	Input pin hold time		15	20	25	ns
Tdelay	Output pin delay time	Cload=20pF	45	50	55	ns

* ***N:*** *Selected prescaler ratio*

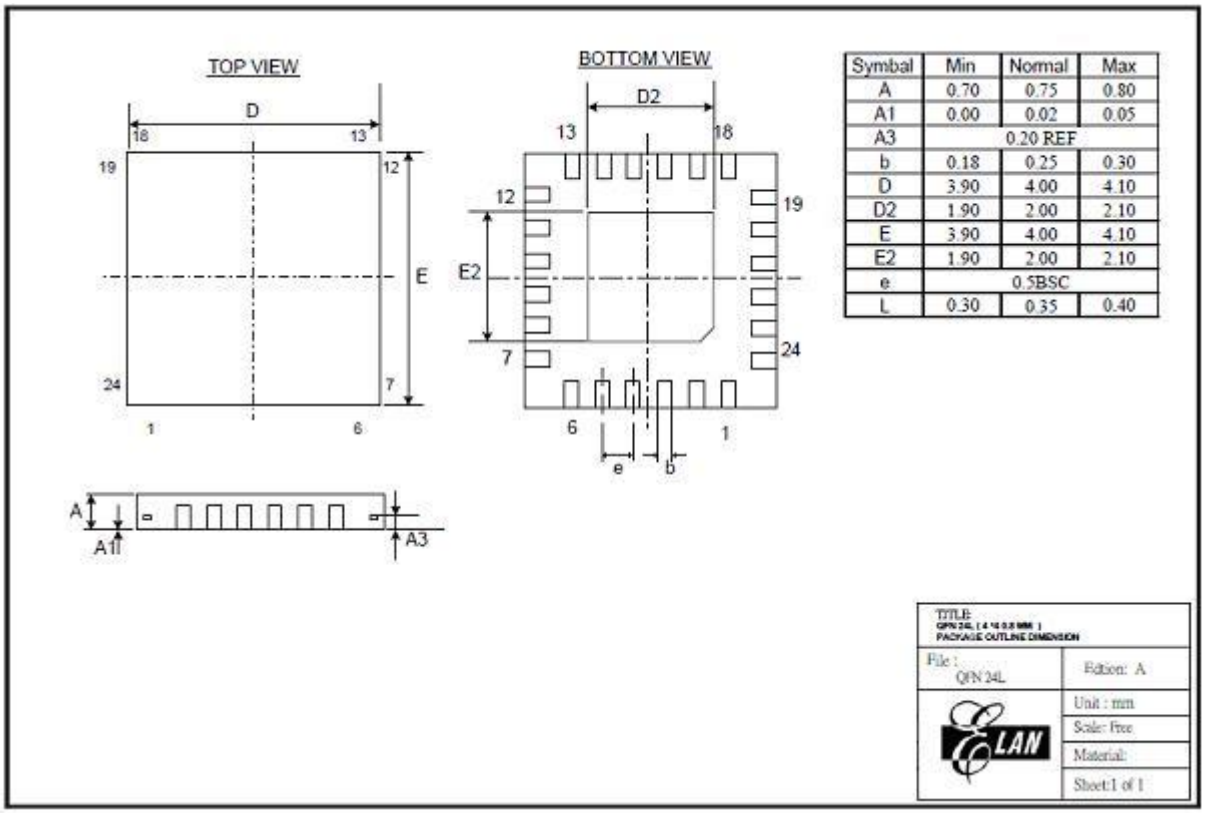
NOTE

- *The above parameters are theoretical values only and have not been tested or verified.*
- *Data under the "Min.", "Typ.", and "Max." columns are based on theoretical results at 25°C. These data are for design reference only and have not been tested or verified.*

APPENDIX

A Package Type

A.1 eKTF5705QN24

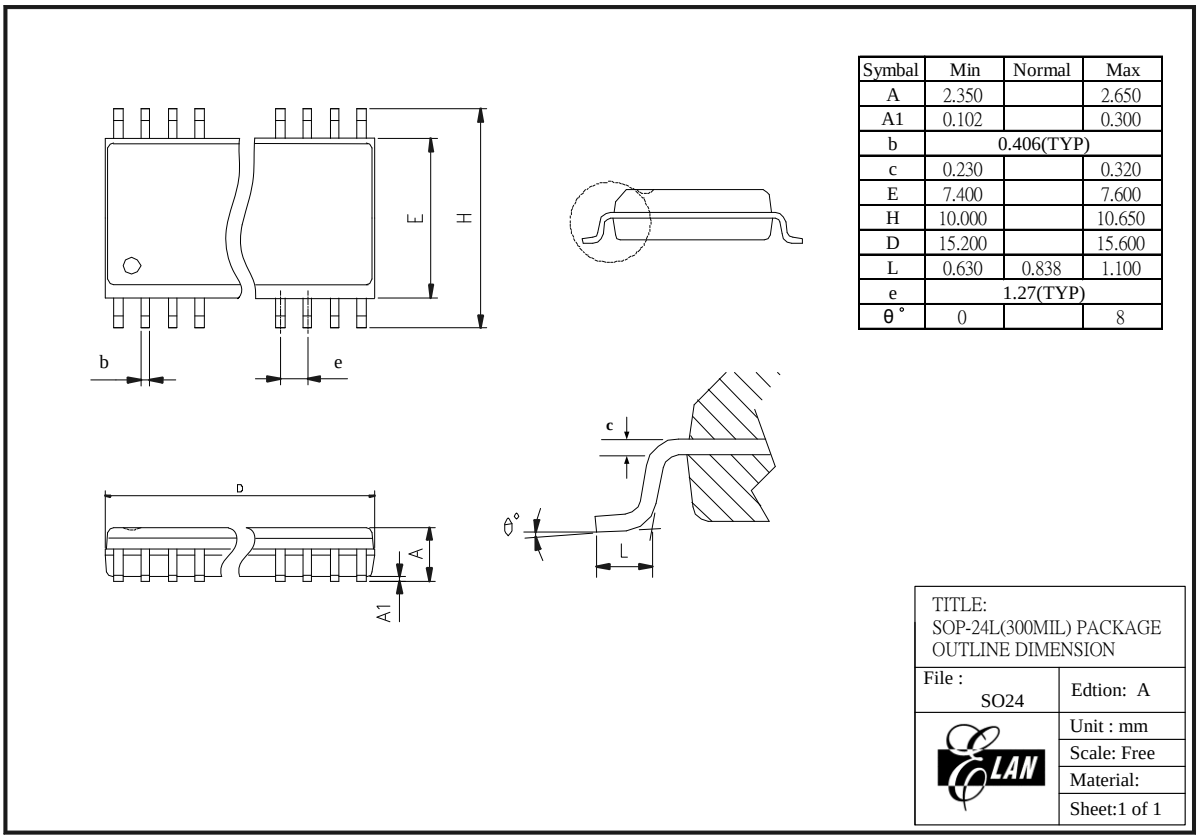


Symbal	Min	Normal	Max
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3		0.20 REF	
b	0.18	0.25	0.30
D	3.90	4.00	4.10
D2	1.90	2.00	2.10
E	3.90	4.00	4.10
E2	1.90	2.00	2.10
e		0.5BSC	
L	0.30	0.35	0.40

TITLE
PACKAGE OUTLINE DIMENSION
File : QFN 24L
Edition: A
Unit : mm
Scale: Free
Material:
Sheet:1 of 1

Figure A-1 eKTF5705 24-Pin QFN Package Type

A.2 eKTF5705SO24



Symbal	Min	Normal	Max
A	2.350		2.650
A1	0.102		0.300
b	0.406(TYP)		
c	0.230		0.320
E	7.400		7.600
H	10.000		10.650
D	15.200		15.600
L	0.630	0.838	1.100
e	1.27(TYP)		
θ°	0		8

TITLE: SOP-24L(300MIL) PACKAGE OUTLINE DIMENSION	
File : SO24	Edtion: A
	Unit : mm
	Scale: Free
	Material:
	Sheet:1 of 1

Figure A-2 eKTF5705 24-pin SOP Package Type

B Ordering Information

IC	Part Number to Order	Package	Marking on IC
eKTF5705 *1	KTF5705QN24x n *2	QFN-24pin (4x4x0.8mm)	eKTF5705 QN24x *2 yywwn *3 xxxxxx *3
	KTF5705SO24x n *2	SOP-24pin (300mil)	ELAN eKTF5705SO24x *2 yywwn *3 xxxxxx *3

*1 *The part number 1'st code "**e**" is omitted from the actual order to ELAN as shown at right column.*

*2 *The code x represents compliance to 1 of the 2 directives on Green product; "**J**" or "**S**". "**J**" complies with the Rohs GP directive, "**S**" complies with the Sony GP directive.*

The code n represents the alphabetical rolling codes used by ELAN for internal identification purposes.

*3 ***yyww:** data code; **xxxxxx:** batch number (ELAN internal coding)*

The code n represents the alphabetical suffix code used by ELAN for internal identification purposes

NOTE

The internal rolling codes used by ELAN are subject to change without further notice.

B.1 Shipping Box Label

*1 *The code 1 represents compliance to 1 of the 2 directives on Green product; "**J**" or "**S**". "**J**" complies with the Rohs GP directive, "**S**" complies with the Sony GP directive.*

*2 *The code 2 represents ELAN internal rolling code. It is subject to change without further notice.*

*3 *The information on these blocks will vary in accordance with the actual goods being ordered and delivered.*

Figure B-1 eKTF5705 QFN/SOP Shipping Labels