PCT1339 Multi-Touch Capacitive Touch Controller

General Description

PCT1339 is a low-power, 5-touch Cap-Touch controller to provide a touchpad system with high report rate, high accuracy, and low latency. The IC uses a mutual-capacitance measurement technology to sense capacitance changes and to detect multiple touch points simultaneously.

Basing on mutual capacitance sensing technology, PCT1339 is designed to meet the increasingly demanding needs for multi-touch performance application. All the touch detection, gesture interpretation and motion tracking are handled by PCT1339. An Interrupt flag from the touch controller signals the host to read the touch reports. I2C is used for serial communication between the PCT1339 and the host. A large set of registers facilitates features and performance optimization. Additional user enhancements or adjustments complement the system performance objectives.

Key Features

- Low power consumption
- High CPI
- Wide input power range
- Flexible touch are size and shape
- Interface: I2C/SPI
- Embedded Flash
- Good Water Immunity
- Smart Auto-Calibration
- Palm Rejection
- Thick Cover support up to 1.8mm PC material
- Gesture support
- Open-short factory test support

Applications

- Trackpad
- Touch mouse
- Touch keyboard
- Remote Controller

Key Sensor Parameters

Parameter	Value
Channel Number	20x19~24x15
Touch area	1”~6”
Sensing Type	Mutual
Object Detection	5 Touches
Supply Voltage	1.8V +-10% or 2.3~3.6V
Power Consumption	6 mA @ 90fps 0.13 mA @ Sleep 13uA @ Shutdown mode
Sensitivity	4mm Stylus
Report Rate	Max 146Hz
Latency	< 15ms
CPI	300~2000
Flash	32KB
Operating Temperature (T_j)	-20 to +70 °C

Ordering Information

Part Number	Package Type
PCT1339QN	7mmx7mm QFN56

Lead (Pb) Free RoHS 6 fully compliant

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http://www.pixart.com/contact.asp

Table of Contents

List of Figures

List of Tables

1.0 Introduction

1.1 Overview

PCT1339 touch controller consists of an analog front-end with dedicate 20 drive lines and 15 sense lines together with 4 flexible lines to connect to touch panel. The 4 flexible lines can be set to drive or sense function that means the cell resolution can be 20x19~24x15 according to user's preferred ID geometry. All drive and sense lines can be reordered to provide panel routing flexibility, and each drive/sense line can be independently switched on/off to match the touch screen active areas.

The controller applies a series of excitation signals to the drive electrodes. The signals are coupled to the sense lines via mutual capacitance. Touching anywhere on the panel with a finger alters the capacitance at that specific location. PCT1339 multi-touch controller can simultaneously resolve and track up to five touches. The high report rate allows the host to track rapid touches and movements with less than 15ms latency. The embedded processor filters the data, identifies the touch coordinates and gesture and then report to the host at > 120 Hz rate. However, PCT1339 FW does noise avoidance automatically to get good SNR, so the report rate may be reduced automatically when the environment is noisy.

1.2 Block Diagram

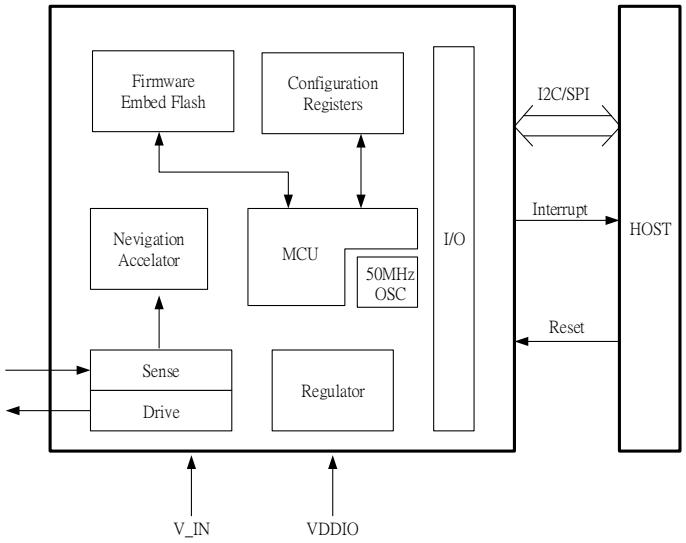


Figure 1. PCT1339 Functional Block Diagram

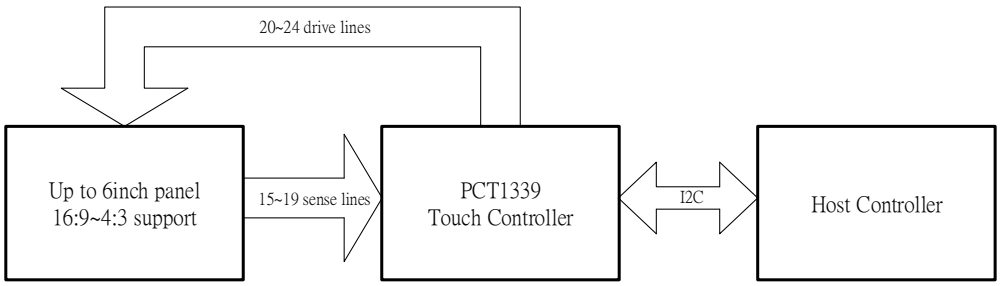


Figure 2. System Block Diagram

1.3 Pin Configuration

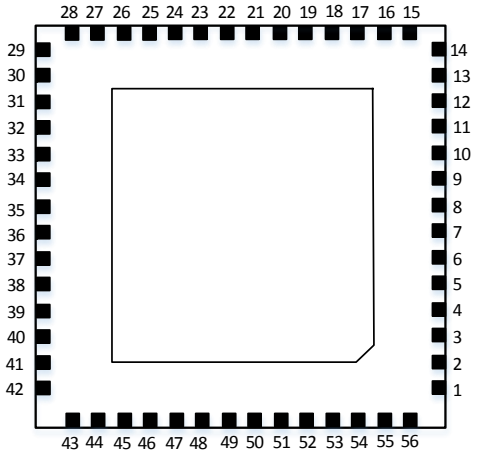


Figure 3. QFN56 7x7 Pin Placement

Table 1. Pin Definition

Pin	Name	Description
1	VDDD	Digital power, connect 1uF to ground
2	VDDIO	Power for interface to Host, connect 0.1uF to ground
3	IO_SEL/RXD	Mux pin: UART_RX: For PXI debug only IO_SEL: External pull high or low to decide SPI or I2C interface (H: SPI; L: I2C)
4	TXD	UART_TX, for PXI debug only
5	IO_CLK	SPI or I2C clock
6	MISO_SDA	SPI MISO or I2C_SDA pin
7	NCS_A1	SPI CS pin or I2C slave address ID
8	MOSI_A0	SPI MOSI pin or I2C slave ID pin
9	INT	Interrupt to Host to indicate data ready
10	NRST	Host to reset PCT1339, active low.
11	VDDCP	Charge-pump input, connect 1uF to ground.
12	CIN	Charge-pump pin, connect 0.22uF between CIN and CIP.
13	CIP	Charge-pump pin, connect 0.22uF between CIN and CIP.
14	VDDAIO	Drive line power, connect 1uF to ground
15	DRV0	Drive line pin
16	DRV1	Drive line pin
17	DRV2	Drive line pin
18	DRV3	Drive line pin
19	DRV4	Drive line pin
20	DRV5	Drive line pin
21	DRV6	Drive line pin
22	DRV7	Drive line pin

Pin	Name	Description
23	DRV8	Drive line pin
24	DRV9	Drive line pin
25	DRV10_SEN0	Mux pin: Can be set to Drive or sense function
26	DRV11_SEN1	Mux pin: Can be set to Drive or sense function
27	SEN2	Sense line pin
28	SEN3	Sense line pin
29	SEN4	Sense line pin
30	SEN5	Sense line pin
31	SEN6	Sense line pin
32	SEN7	Sense line pin
33	SEN8	Sense line pin
34	SEN9	Sense line pin
35	SEN10	Sense line pin
36	SEN11	Sense line pin
37	SEN12	Sense line pin
38	SEN13	Sense line pin
39	SEN14	Sense line pin
40	SEN15	Sense line pin
41	SEN16	Sense line pin
42	VDDA	Analog power, connect 1uF to ground.
43	DRV12_SEN17	Mux pin: Can be set to Drive or sense function
44	DRV13_SEN18	Mux pin: Can be set to Drive or sense function
45	DRV14	Drive line pin
46	DRV15	Drive line pin
47	DRV16	Drive line pin
48	DRV17	Drive line pin
49	DRV18	Drive line pin
50	DRV19	Drive line pin
51	DRV20	Drive line pin
52	DRV21	Drive line pin
53	DRV22	Drive line pin
54	DRV23	Drive line pin
55	VDDAIO	Drive line power, connect 1uF to ground
56	VIN	Main power input, connect 1uF to ground

1.4 IO Diagram

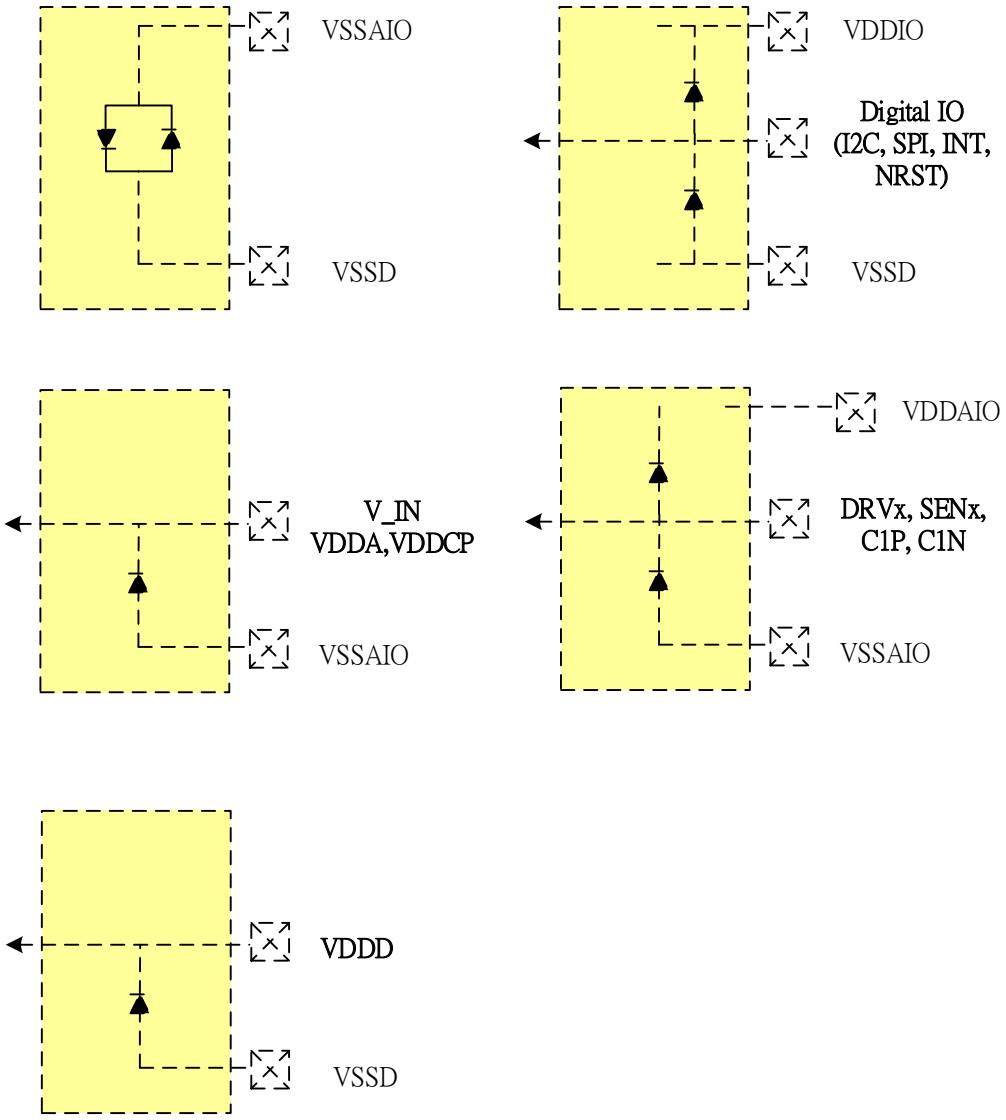
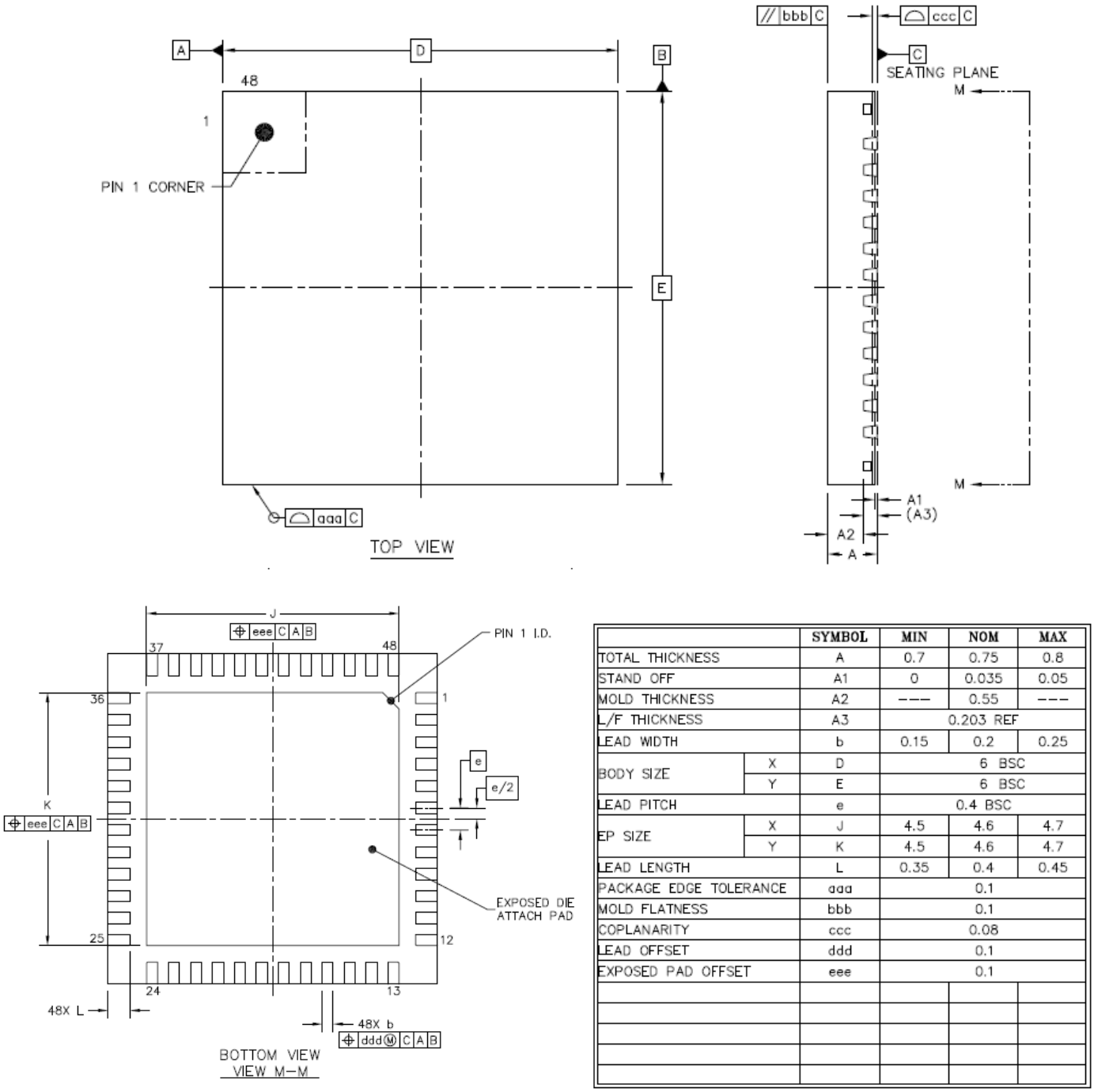


Figure 4. IO Block Diagram

2.0 Mechanical Specifications

2.1 Package Information

QFN-48 6mmx6mm



		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.7	0.75	0.8
STAND OFF		A1	0	0.035	0.05
MOLD THICKNESS		A2	---	0.55	---
L/F THICKNESS		A3		0.203 REF	
LEAD WIDTH		b	0.15	0.2	0.25
BODY SIZE	X	D		6 BSC	
	Y	E		6 BSC	
LEAD PITCH		e		0.4 BSC	
EP SIZE	X	J	4.5	4.6	4.7
	Y	K	4.5	4.6	4.7
LEAD LENGTH		L	0.35	0.4	0.45
PACKAGE EDGE TOLERANCE		aaa		0.1	
MOLD FLATNESS		bbb		0.1	
COPLANARITY		ccc		0.08	
LEAD OFFSET		ddd		0.1	
EXPOSED PAD OFFSET		eee		0.1	

Figure 5. Package Mechanical Information

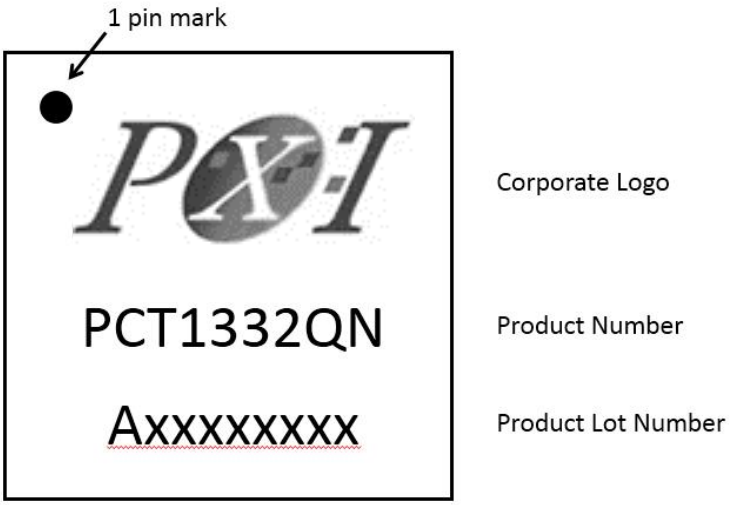


Figure 6. Package Marking Information

2.2 Soldering Information

2.2.1 PCB Footprint Recommendation

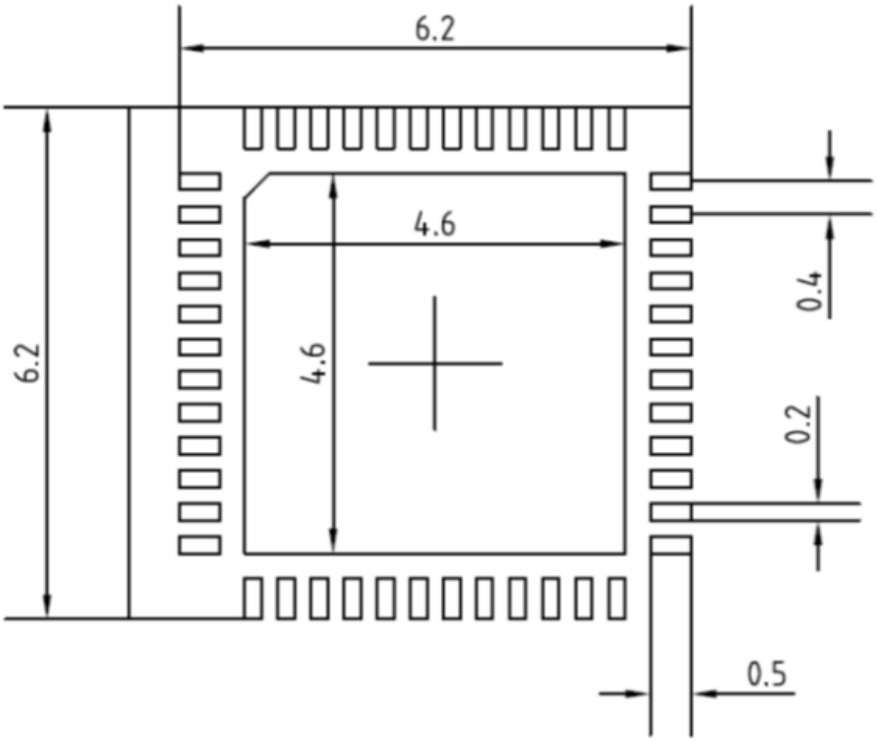


Figure 7. Recommend PCB Layout

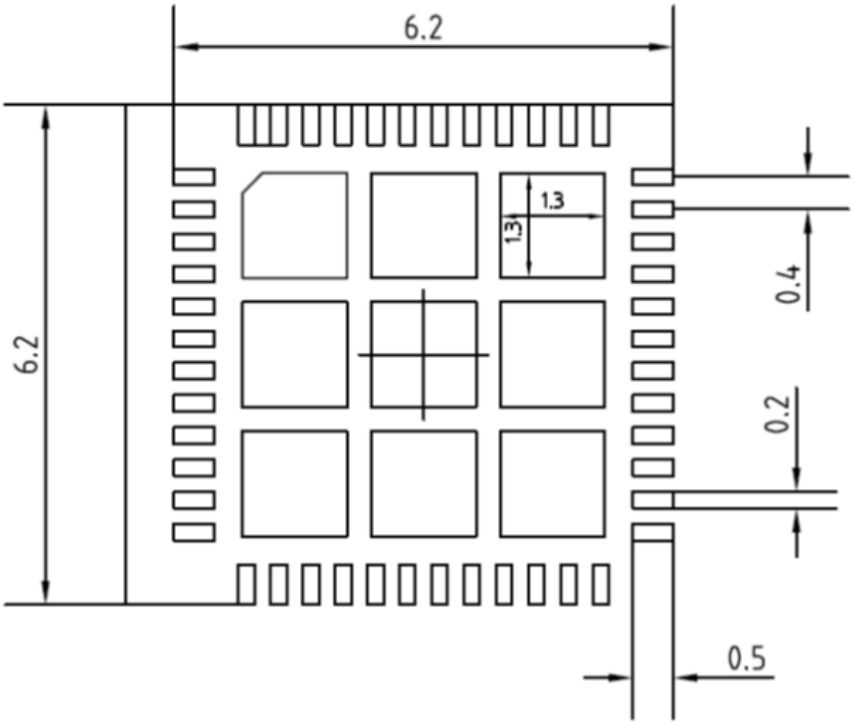
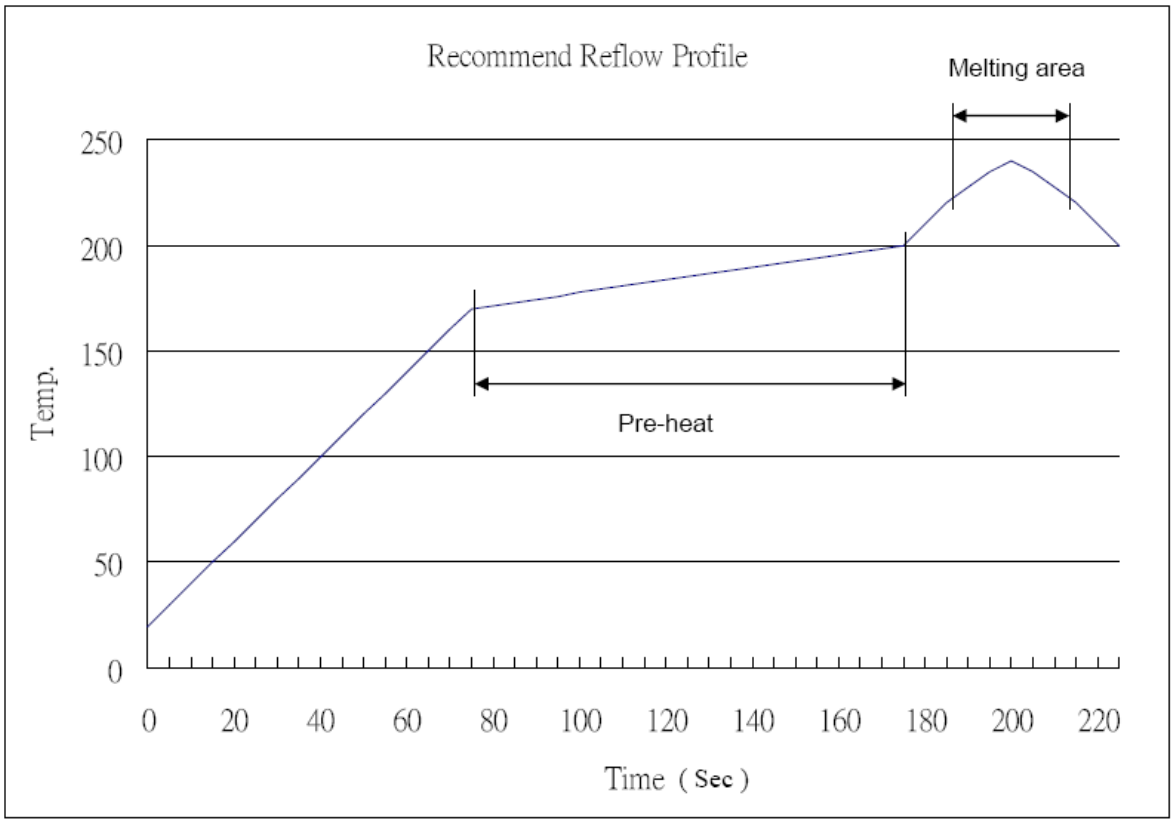


Figure 8. Recommend Stencil Layout

2.2.2 Soldering Profile



Recommend Pb-free solder paste vender & type : 1. Almit LFM-48W TM-HP
2. Senju M705-GRN360-K

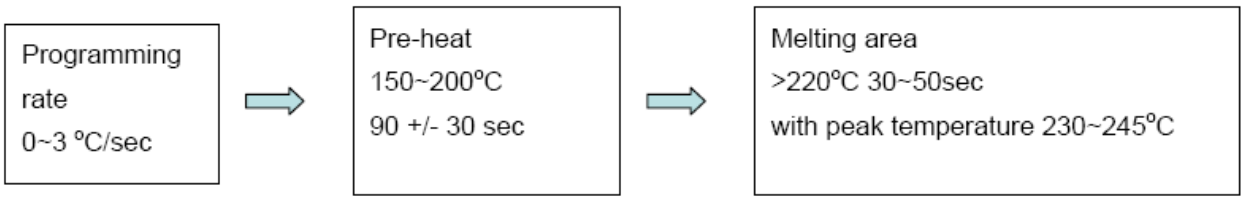


Figure 9. Recommend Soldering Profile

3.0 Electrical Specifications

3.1 Absolute Maximum Rating

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	Ts	-60	125	°C	
Operation Temperature	Ta	-40	85	°C	
Supply voltage with internal regulator	V_IN	-0.5	3.6	V	
	VDDIO	-0.5	3.6	V	
Supply voltage with external regulator	V_IN	-0.5	2	V	
	VDDIO	-0.5	3.6	V	
	VDDA	-0.5	2	V	
	VDDAIO	-0.5	5.5	V	
	VDDD	-0.5	2	V	
Relative Humidity	RH	0	85	%	
ESD			5	kV	
Analog pin voltage		-0.3	VDDAIO+0.3	V	
Digital pin voltage		-0.3	VDDIO+0.3	V	
Lead solder Temperature			260	°C	

3.2 Recommend Operation Condition

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Operation Temperature	Ta	-20		85	°C	
Power Supply – With internal Regulator						
Supply voltage	V_IN	2.6	3	3.6	V	
	VDDIO	1.62	3.3/1.8	3.6	V	
Regulator output	VDDD	1.72	1.8	2	V	
	VDDA	1.72	1.8	2	V	
	VDDCP	2.1	2.2	2.3	V	@VIN>2.4V
Power Supply – Without internal Regulator						
Supply voltage	V_IN	1.72	1.8	2.0	V	
	VDDD	1.72	1.8	2.0	V	
	VDDA	1.72	1.8	2.0	V	
	VDDCP	1.72	1.8	2.0	V	
	VDDIO	1.62	3.3/1.8	3.6	V	
Supply Noise – With internal Regulator						
VPP @ VIN				200	mVpp	
Supply Noise – Without internal Regulator						
VPP @ Supply Voltage				20	mVpp	

3.3 Power Consumption

With internal Regulator turn on; charge pump turn off

Mode	State	Report Rate (Hz)	Current Consumption (mA)	
			20x19 (39Ch)	10x10 (20Ch)
Active(*1)	1-touch	100/80	6.5/5.5	4.5/4.0
	No touch	100/80	3/2.5	2.4/2.15
Rest1 Mode (*1)	Idle	40	1.5	1.1
	Rest1	10	0.45	0.34
	Rest2	2	0.16	0.14
Shutdown		0	13µA	13µA

Note*1: 20uA can be saved if internal regulator is disable (provide 1.8V externally)

3.4 Interface Level Specification

Parameter	Symbol	Min	Typ	Max	Unit
Input high voltage	VIH	VDDIO*0.7			V
Input low voltage	VIL			VDDIO*0.3	V
Output high Voltage	VOH	VDDIO*0.8			V
Output low voltage	VOL			VDDIO*0.2	V

3.5 AC Timing Specification

3.5.1 Power on Sequence Timing Requirement with Internal Regulator

Parameter	Symbol	Min	Typ	Max	Unit
VDDIO to V_IN Delay	T1 (*1)			10	µs
V_IN stable to Reset release	T2	1			ms
Reset release to register access	T3	5			ms
charge-pump enable to VDDAIO stable	T4	2			ms
Minimum reset duration	T5	10			µs
Register access delay after resume	T3	5			ms

Notes *1: We suggest VDDIO to be applied after V_IN. If VDDIO need to be applied before V_IN, the time gap should be less than 10us. That means, T1 could be “negative”.

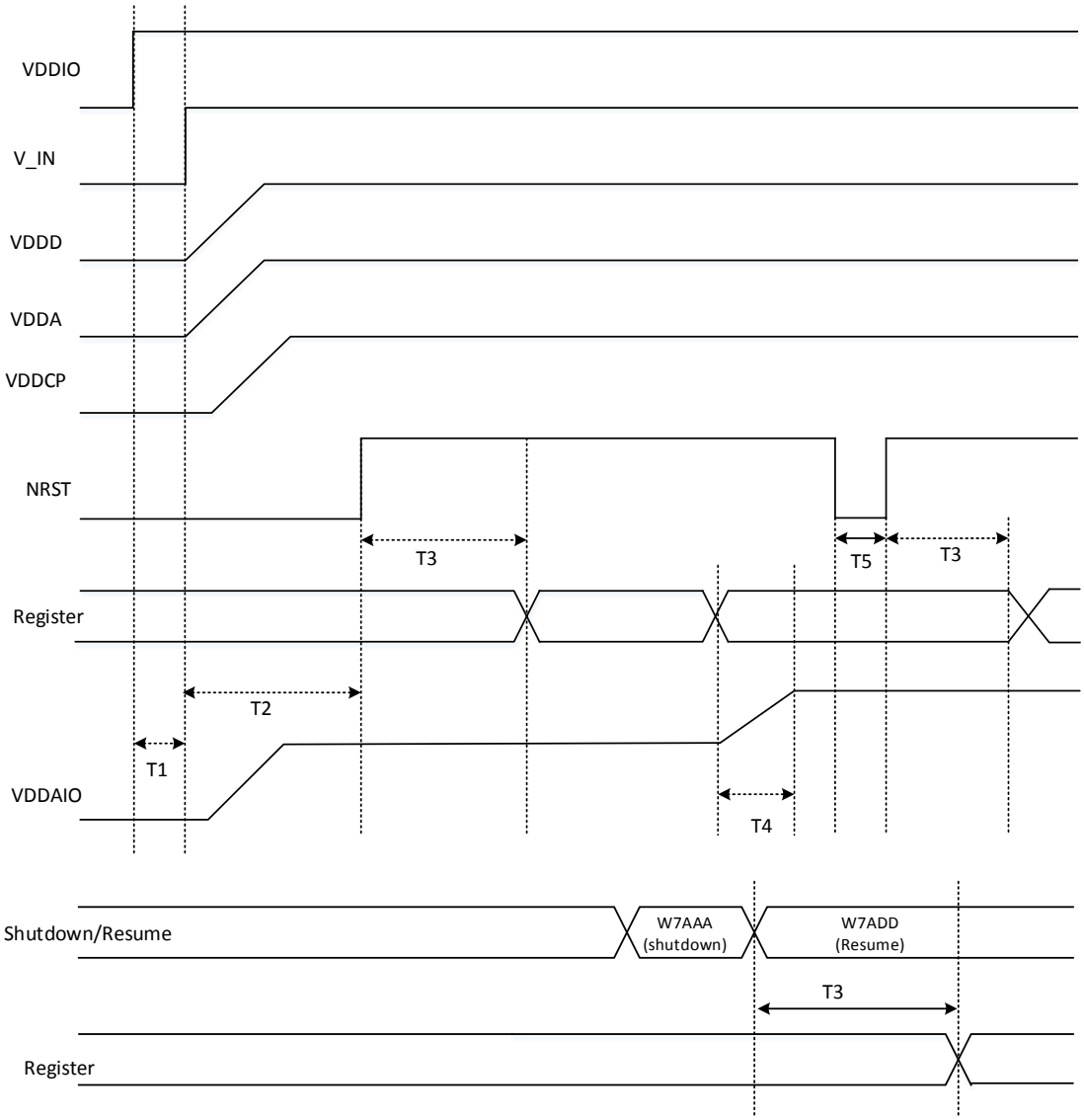


Figure 10. Power-up Sequence with Internal Regulator

3.5.2 Power-on Sequence Timing Requirement without internal Regulator and Without Charge Pump

Parameter	Symbol	Min	Typ	Max	Unit
VDDIO to V_IN Delay	T1 (*1)			10	µs
V_IN stable to Reset release	T2	1			ms
Reset release to register access	T3	5			ms
Register access delay after resume	T3	5			ms

Notes *1: We suggest VDDIO to be applied after V_IN. If VDDIO need to be applied before V_IN, the time gap should be less than 10us. That means, T1 could be "negative".

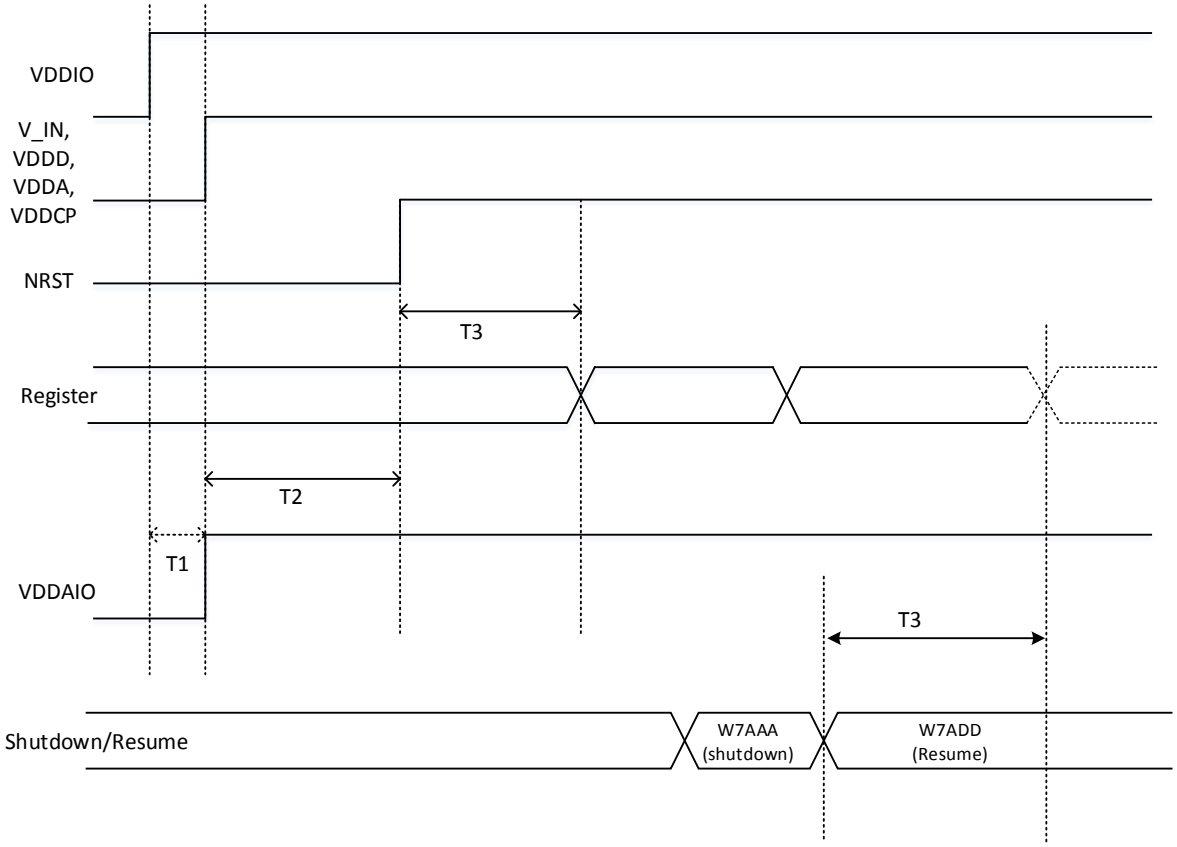


Figure 11. Power-up Sequence without Internal Regulator

4.0 Reference Schematic

PCT1339 supports two types of wire connections.

4.1 To use PCT1339's internal regulator and charge pump.

This is the preferred one. Host provides minimum 2.3V power to VIN pin then internal regulator regulate the voltage to all domains. As shown in Figure 12, V_IN and VDDIO are the powers need to be supplied.

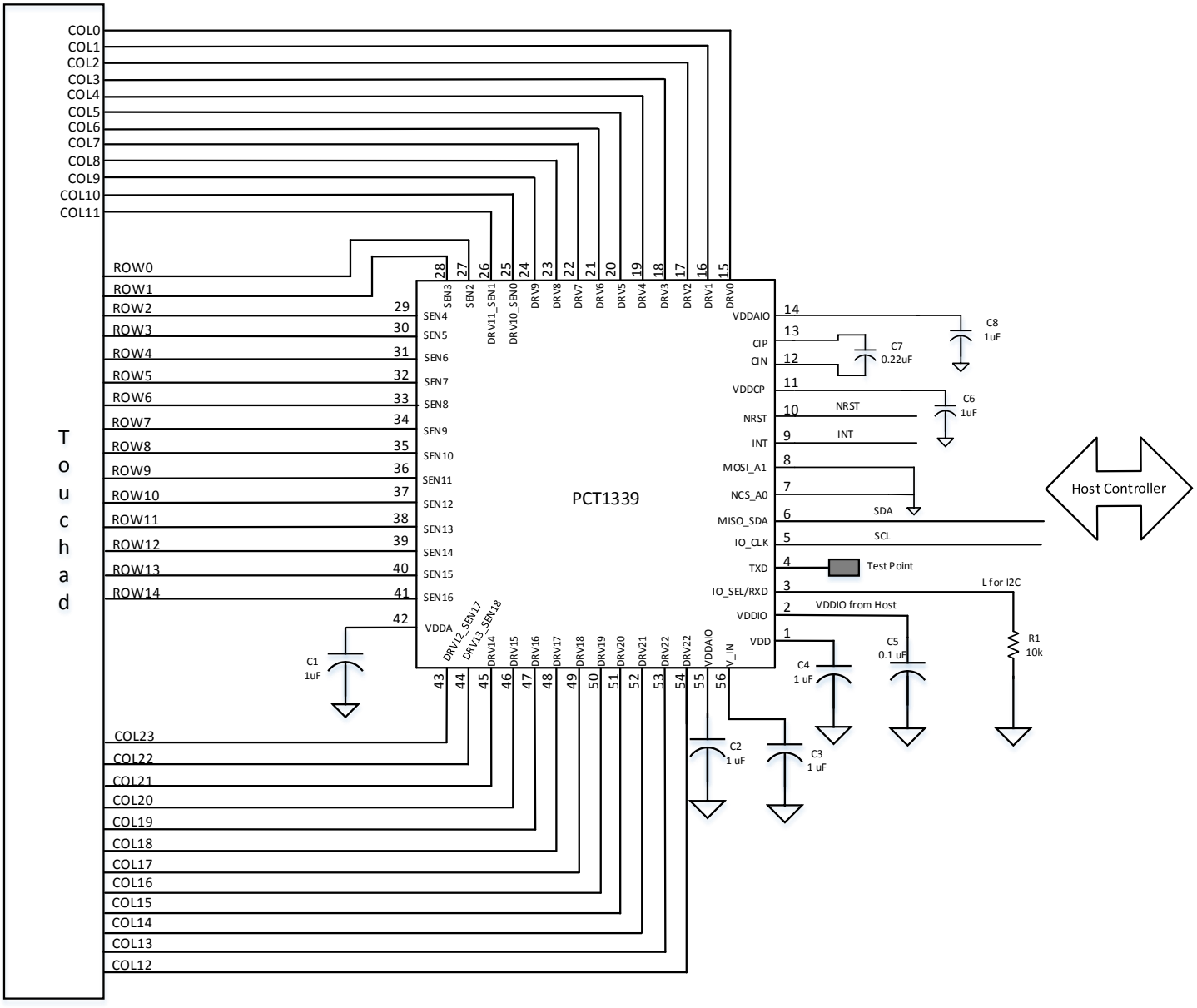


Figure 12. Reference Schematic to Use Internal Regulator with charge pump

4.2 Without using internal Regulator

For this case, user need to provide a power within 1.72V~2.0V to all power domain and the voltage ripple should be less than 20mV. This is the power saving configuration but with weak noise immunity. This configuration is suitable for wireless application.

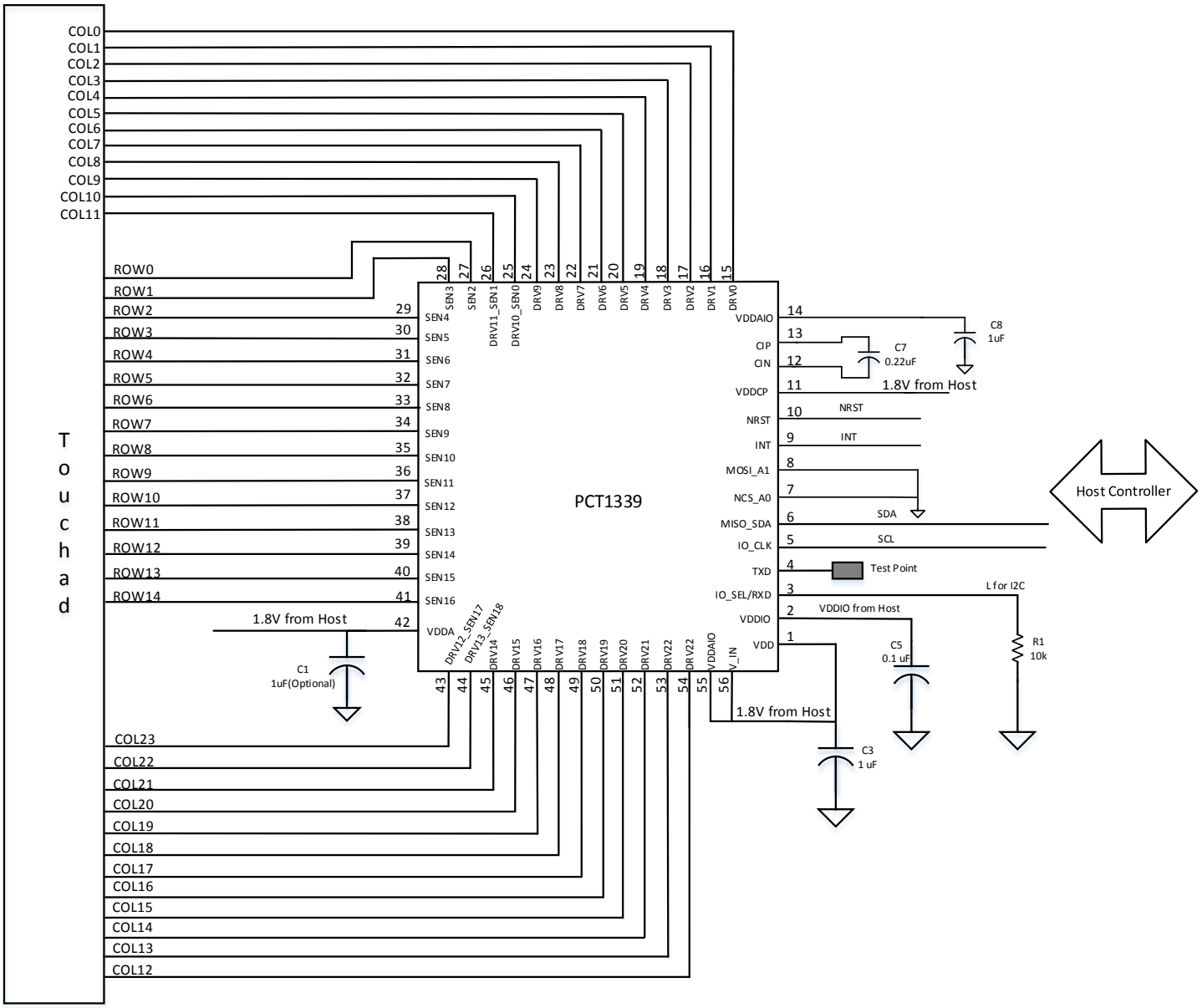


Figure 13. Reference Schematic without Using Internal Regulator

5.0 Register Map

There are three register banks related to host access in PCT1339, and the register banks are switched through register 0x7F:

- Reg0x7F=0: bank0, associate with handshaking register.
- Reg0x7F=5: bank5, to report touch data in little endian format
- Reg0x7F=6: bank6, to access PCT1339 register.

5.1 Register in Bank6

Table 2. Bank6 register table

Add [hex]	Register Name	R/W	Save to Flash?
0x51	R_USER_ADDR	R/W	Yes
0x52	R_USER_DATA	R/W	Yes
0x53	R_STATUS	R/W	No
0x54	BOOT_STAT	R	No
0x7A	Shutdown	R/W	No

5.2 Indirect Register

The registers in Table 7 are accessed through indirect registers reg0x51 and reg0x52. All the register in Table 3. Indirect Register could be programmed to flash except read only registers.

Note: When the register is over one byte, please program low byte first then high byte. After high byte programmed, the new setting is enabled.

Table 3. Indirect Register

Add (Hex)	Name	BW	R/W	Default Value(*1)	Take effect only after Flash?
0x00	PRODUCT_ID	[7:0]	R	0x8B	-
0x01	HW_REV_ID	[7:0]	R	0x02	-
0x02	FW_MAJOR_REV_ID	[7:0]	R	0X03	-
0x03	FW_MINOR_REV_ID	[7:0]	R	0x06	-
0x07	INT_CTL	[7:0]	R/W	0x00	No
0x0a	ORIENTATION	[7:0]	R/W	0x00	No
0x0b	ROW	[7:0]	R/W	0x10	No
0x0c	COLUMN	[7:0]	R/W	0x17	No
0x0d	REPORT_POINTS	[7:0]	R/W	0x05	No
0x10	MAX_HEIGHT[15:8]	[7:0]	R/W	0x03	No
0x11	MAX_HEIGHT[7:0]	[7:0]	R/W	0x00	No
0x12	MAX_WIDTH[15:8]	[7:0]	R/W	0x05	No
0x13	MAX_WIDTH[7:0]	[7:0]	R/W	0xD0	No

Add (Hex)	Name	BW	R/W	Default Value(*1)	Take effect only after Flash?
0x14	REPORT_CTL	[7:0]	R/W	0x00	No
0x18	MAX_REPORT_RATE	[7:0]	R/W	0x92	No
0x19	MIN_REPORT_RATE	[7:0]	R/W	0x38	No
0x1a	OBS_OP_REPORT_RATE	[7:0]	R	-	-
0x1b	CHARGER_MODE	[7:0]	R/W	0x00	No
0x1c	CHARGE_PUMP	[7:0]	R/W	0x00	No
0x20	IDLE_DS[15:8]	[7:0]	R/W	0x00	No
0x21	IDLE_DS[7:0]	[7:0]	R/W	0x64	No
0x22	IDLE_FRAME_RATE[7:0]	[7:0]	R/W	0x3c	No
0x23	REST1_DS[15:8]	[7:0]	R/W	0x00	No
0x24	REST1_DS[7:0]	[7:0]	R/W	0xc8	No
0x25	REST1_FRAME_RATE	[7:0]	R/W	0x0a	No
0x26	REST2_DS[15:8]	[7:0]	R/W	0x01	No
0x27	REST2_DS[7:0]	[7:0]	R/W	0x90	No
0x28	REST2_FRAME_RATE	[7:0]	R/W	0x04	No
0x2c	LG_OPERATOIN_MODE	[7:0]	R/W	0x40	No
0x2F	CELL_COUNT_FILTER	[7:0]	R/W	0x00	No
0x38	THUMB_SUMI_LB[25:24]	[1:0]	R/W	0x00	No
0x39	THUMB_SUMI_LB[23:16]	[7:0]	R/W	0x00	No
0x3a	THUMB_SUMI_LB[15:8]	[7:0]	R/W	0x46	No
0x3b	THUMB_SUMI_LB[7:0]	[7:0]	R/W	0x50	No
0x3c	MOMENT_TH_BASE[11:8]	[3:0]	R/W	0x0e	No
0x3d	MOMENT_TH_BASE[7:0]	[7:0]	R/W	0x24	No
0x3e	MOMENT_TH_SLOPE[15:8]	[7:0]	R/W	0x01	No
0x3f	MOMENT_TH_SLOPE[7:0]	[7:0]	R/W	0x6f	No
0x40	COL0	[7:0]	R/W	0x00	No
0x41	COL1	[7:0]	R/W	0x01	No
0x42	COL2	[7:0]	R/W	0x02	No
0x43	COL3	[7:0]	R/W	0x03	No
0x44	COL4	[7:0]	R/W	0x04	No
0x45	COL5	[7:0]	R/W	0x05	No
0x46	COL6	[7:0]	R/W	0x06	No
0x47	COL7	[7:0]	R/W	0x07	No
0x48	COL8	[7:0]	R/W	0x08	No

Add (Hex)	Name	BW	R/W	Default Value(*1)	Take effect only after Flash?
0x49	COL9	[7:0]	R/W	0x09	No
0x4a	COL10	[7:0]	R/W	0x0a	No
0x4b	COL11	[7:0]	R/W	0x0b	No
0x4c	COL12	[7:0]	R/W	0x17	No
0x4d	COL13	[7:0]	R/W	0x16	No
0x4e	COL14	[7:0]	R/W	0x15	No
0x4f	COL15	[7:0]	R/W	0x14	No
0x50	COL16	[7:0]	R/W	0x13	No
0x51	COL17	[7:0]	R/W	0x12	No
0x52	COL18	[7:0]	R/W	0x11	No
0x53	COL19	[7:0]	R/W	0x10	No
0x54	COL20	[7:0]	R/W	0x0F	No
0x55	COL21	[7:0]	R/W	0x0E	No
0x56	COL22	[7:0]	R/W	0x0D	No
0x57	COL23	[7:0]	R/W	0x0C	No
0x58	ROW0	[7:0]	R/W	0x02	No
0x59	ROW1	[7:0]	R/W	0x03	No
0x5a	ROW2	[7:0]	R/W	0x04	No
0x5b	ROW3	[7:0]	R/W	0x05	No
0x5c	ROW4	[7:0]	R/W	0x06	No
0x5d	ROW5	[7:0]	R/W	0x07	No
0x5e	ROW6	[7:0]	R/W	0x08	No
0x5f	ROW7	[7:0]	R/W	0x09	No
0x60	ROW8	[7:0]	R/W	0x0a	No
0x61	ROW9	[7:0]	R/W	0x0b	No
0x62	ROW10	[7:0]	R/W	0x0c	No
0x63	ROW11	[7:0]	R/W	0x0d	No
0x64	ROW12	[7:0]	R/W	0x0e	No
0x65	ROW13	[7:0]	R/W	0x0f	No
0x66	ROW14	[7:0]	R/W	0x10	No
0x67	ROW15	[7:0]	R/W	0x11	No
0x68	ROW16	[7:0]	R/W	0x12	No
0x69	ROW17	[7:0]	R/W	0x00	No
0x6a	ROW18	[7:0]	R/W	0x01	No
0x6c	DRV_SEN_SELECT	[7:0]	R/W	0x04	No
0x81	PALM_TOTAL_CELLS_HI	[7:0]	R/W	0x01	No

Add (Hex)	Name	BW	R/W	Default Value(*1)	Take effect only after Flash?
0x82	PALM_TOTAL_CELLS_LO	[7:0]	R/W	0x7c	No
0x83	PALM_RELEASE_CELLS_HI	[7:0]	R/W	0x01	No
0x84	PALM_RELEASE_CELLS_LO	[7:0]	R/W	0x7c	No
0x85	PALM_PROLONG	[7:0]	R/W	0x0f	No
0x86	PWRON_TOUCH_CELLS	[7:0]	R/W	0x02	No
0x87	PWRON_TOUCH_DETECT_TIME	[7:0]	R/W	0x3c	No
0x88	FRAME_LEVEL_NEG_STG[15:8]	[7:0]	R/W	0xf9	No
0x89	FRAME_LEVEL_NEG_STG[7:0]	[7:0]	R/W	0x75	No
0x8a	FRAME_LEVEL_NEG_MED[15:8]	[7:0]	R/W	0xfe	No
0x8b	FRAME_LEVEL_NEG_MED[7:0]	[7:0]	R/W	0xd4	No
0x8c	FRAME_LEVEL_ZERO[15:8]	[7:0]	R/W	0x00	No
0x8d	FRAME_LEVEL_ZERO[7:0]	[7:0]	R/W	0x00	No
0x8e	FRAME_LEVEL_POS_MED[15:8]	[7:0]	R/W	0x01	No
0x8f	FRAME_LEVEL_POS_MED[7:0]	[7:0]	R/W	0x90	No
0x90	FRAME_LEVEL_POS_STG[15:8]	[7:0]	R/W	0x06	No
0x91	FRAME_LEVEL_POS_STG[7:0]	[7:0]	R/W	0x8b	No
0x98	HIGHLAND_LEVEL[15:8]	[7:0]	R/W	0x03	No
0x99	HIGHLAND_LEVEL[7:0]	[7:0]	R/W	0xe8	No
0x9a	HIGHLAND_NUM[15:8]	[7:0]	R/W	0x00	No
0x9b	HIGHLAND_NUM[7:0]	[7:0]	R/W	0x70	No
0xa0	NEG_RESET_CELL[15:8]	[7:0]	R/W	0x00	No
0xa1	NEG_RESET_CELL[7:0]	[7:0]	R/W	0x02	No
0xa2	NEG_RESET_LEVEL[15:8]	[7:0]	R/W	0xfa	No
0xa3	NEG_RESET_LEVEL[7:0]	[7:0]	R/W	0xec	No
0xa4	NEG_RESET_WAIT	[7:0]	R/W	0x1e	No
0xaa	LG_FORCE_FULL_SCAN_NUM	[7:0]	R/W	0x14	No
0xb4	OAHB[24]	[7:0]	R/W	0x00	No
0xb5	OAHB[23:16]	[7:0]	R/W	0x01	No
0xb6	OAHB[15:8]	[7:0]	R/W	0x38	No
0xb7	OAHB[7:0]	[7:0]	R/W	0x80	No
0xc8	SLOW_CAL_THD[15:8]	[7:0]	R/W	0x03	No
0xc9	SLOW_CAL_THD[7:0]	[7:0]	R/W	0xe8	No
0xce	ACCEP_SNR[15:8]	[7:0]	R/W	0x00	No
0xcf	ACCEP_SNR[7:0]	[7:0]	R/W	0x32	No
0xd4	DEAD_ZONE_DEJIG_TH[15:8]	[7:0]	R/W	0x00	No
0xd5	DEAD_ZONE_DEJIG_TH[7:0]	[7:0]	R/W	0xc8	No

Add (Hex)	Name	BW	R/W	Default Value(*1)	Take effect only after Flash?
0xda	MOUSE_ACC_MIN_V	[7:0]	R/W	0x00	No
0xdb	MOUSE_ACC_MAX_V	[7:0]	R/W	0x00	No
0xdc	MOUSE_ACC_GAIN2	[7:0]	R/W	0x00	No
0xdd	EDGE_STRENGTH_EN	[7:0]	R/W	0x00	No
0xde	OBJAOI_LOWBOUND[15:8]	[7:0]	R/W	0x01	No
0xdf	OBJAOI_LOWBOUND[7:0]	[7:0]	R/W	0x90	No
0xe0	CENTER_VALUE_LOWBOUND [15:8]	[7:0]	R/W	0x02	No
0xe1	CENTER_VALUE_LOWBOUND [7:0]	[7:0]	R/W	0xee	No
0xe2	TOUCH_FORCE[15:8]	[7:0]	R/W	0x04	No
0xe3	TOUCH_FORCE[7:0]	[7:0]	R/W	0x08	No
0xe4	RELEASE_FORCE[15:8]	[7:0]	R/W	0x01	No
0xe5	RELEASE_FORCE[7:0]	[7:0]	R/W	0x90	No
0xe6	INTENSITY[15:8]	[7:0]	R/W	0x01	No
0xe7	INTENSITY[7:0]	[7:0]	R/W	0x2c	No
0xe8	OBJ_SIZE[15:8]	[7:0]	R/W	0x00	No
0xe9	OBJ_SIZE[7:0]	[7:0]	R/W	0x01	No
0xea	TOUCH_ID_ASSIGN	[7:0]	R/W	0x01	No
0xeb	REPORT_LATENCY	[7:0]	R/W	0x01	No
0xec	SMOOTH_FILTER1	[7:0]	R/W	0x18	No
0xed	SMOOTH_FILTER2	[7:0]	R/W	0x18	No
0xfd	DUP_DIST_UPBOUND[15:8]	[7:0]	R/W	0x0b	No
0xfe	DUP_DIST_UPBOUND[7:0]	[7:0]	R/W	0xb8	No
0xff	GESTURE_SWITCH	[7:0]	R/W	0x00	No

*1: The default register value is based on the case without any register programmed to flash.

5.2.1 Touch Data Report Register

The motion report register bank is used to report touch coordinate and gesture information. User needs to switch to register bank5, to get motion data by write 0x05 to reg0x7F.

Table 4. Motion Data Report

Address	Name	Bit	R/W	Description
0x01	Obj0_ID[2:0]	[2:0]	R	Tracking ID of object 0
0x01	Obj0_valid[0]	[6]	R	Valid value of object 0
0x02	Obj0_X[7:0]	[7:0]	R	X coordinate of object 0
0x03	Obj0_X[15:8]	[7:0]	R	
0x04	Obj0_Y[7:0]	[7:0]	R	Y coordinate of object 0
0x05	Obj0_Y[15:8]	[7:0]	R	
0x06	Obj0_size[7:0]	[7:0]	R	Size of object 0
0x07	Obj0_size[9:8]	[1:0]	R	
0x08	Obj0_AOI[7:0]	[7:0]	R	Average intensity of object 0
0x09	Obj0_AOI[15:8]	[7:0]	R	
0x11	Obj1_ID[2:0]	[2:0]	R	Tracking ID of object 1
0x11	Obj1_valid[0]	[6]	R	Valid value of object 1
0x12	Obj1_X[7:0]	[7:0]	R	X coordinate of object 1
0x13	Obj1_X[15:8]	[7:0]	R	
0x14	Obj1_Y[7:0]	[7:0]	R	Y coordinate of object 1
0x15	Obj1_Y[15:8]	[7:0]	R	
0x16	Obj1_size[7:0]	[7:0]	R	Size of object 1
0x17	Obj1_size[9:8]	[1:0]	R	
0x18	Obj1_AOI[7:0]	[7:0]	R	Average intensity of object 1
0x19	Obj1_AOI[15:8]	[7:0]	R	
0x21	Obj2_ID[2:0]	[2:0]	R	Tracking ID of object 2
0x21	Obj2_valid[0]	[6]	R	Valid value of object 2
0x22	Obj2_X[7:0]	[7:0]	R	X coordinate of object 2
0x23	Obj2_X[15:8]	[7:0]	R	
0x24	Obj2_Y[7:0]	[7:0]	R	Y coordinate of object 2
0x25	Obj2_Y[15:8]	[7:0]	R	
0x26	Obj2_size[7:0]	[7:0]	R	Size of object 2
0x27	Obj2_size[9:8]	[1:0]	R	
0x28	Obj2_AOI[7:0]	[7:0]	R	Average intensity of object 2
0x29	Obj2_AOI[15:8]	[7:0]	R	
0x31	Obj3_ID[2:0]	[2:0]	R	Tracking ID of object 3

Address	Name	Bit	R/W	Description
0x31	Obj3_valid[0]	[6]	R	Valid value of object 3
0x32	Obj3_X[7:0]	[7:0]	R	X coordinate of object 3
0x33	Obj3_X[15:8]	[7:0]	R	
0x34	Obj3_Y[7:0]	[7:0]	R	Y coordinate of object 3
0x35	Obj3_Y[15:8]	[7:0]	R	
0x36	Obj3_size[7:0]	[7:0]	R	Size of object 3
0x37	Obj3_size[9:8]	[1:0]	R	
0x38	Obj3_AOI[7:0]	[7:0]	R	Average intensity of object 3
0x39	Obj3_AOI[15:8]	[7:0]	R	
0x41	Obj4_ID[2:0]	[2:0]	R	Tracking ID of object 4
0x41	Obj4_valid[0]	[6]	R	Valid value of object 4
0x42	Obj4_X[7:0]	[7:0]	R	X coordinate of object 4
0x43	Obj4_X[15:8]	[7:0]	R	
0x44	Obj4_Y[7:0]	[7:0]	R	Y coordinate of object 4
0x45	Obj4_Y[15:8]	[7:0]	R	
0x46	Obj4_size[7:0]	[7:0]	R	Size of object 4
0x47	Obj4_size[9:8]	[1:0]	R	
0x48	Obj4_AOI[7:0]	[7:0]	R	Average intensity of object 4
0x49	Obj4_AOI[15:8]	[7:0]	R	
0x7C	OBJ_Number	[7:0]	R	Touch point number
0x7D	gesture_type[4:0]	[4:0]	R	Gesture types report (No gesture report in FW_V3.6)
0x5A	gesture_mx[7:0]	[7:0]	R	The meaning of this register is gesture type dependent. gesture_type = 1: ➔Relative distance of x gesture_type = 7,8,9: ➔The amount of mouse ticks other gesture_type = : ➔N/A (No gesture report in FW_V3.6)
0x5B	gesture_mx[15:8]	[7:0]	R	
0x5C	gesture_my[7:0]	[7:0]	R	The meaning of this register is gesture type dependent. gesture_type = 1: ➔Relative distance of Y other gesture_type = : ➔N/A (No gesture report in FW_V3.6)
0x5D	gesture_my[15:8]	[7:0]	R	
0x72	Bank_Info	[7:0]	R	The register to note current register bank. If value of Reg0x72 is 0x55, then it is in Bank5.
0x74	Product_ID	[7:0]	R	This is the register to show product ID (0x8B). The read value is same as the value read in user register 0x00.

Document Revision History

Revision	Date	Description
1.0	Apr 11th, 16	1st creation based on DS v1.41_FW3.6