ITE 聯陽半導體
ITE Tech. Inc.

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IT7258

Touch Screen Controller

Preliminary Specification V0.2.6

(For A Version)

ITE TECH. INC.

Additional copies of this manual or other ITE literature may be obtained from:

Revision History

Section	Revision	Page No.
-	• Table of Pin Description of General Purpose Input/Output updated • For operation conditions in DC Characteristics section, range of VCC_IO updated to 1.8V-3.3V updated	-

CONTENTS

FIGURES

TABLES

1. Features

- **Programmable Capacitance-to-Digital Converter (CDC)**
  - 18 capacitance sensor inputs
  - 4.8 ms update rate for all sensor inputs
  - No external RC components required
  - Automatic conversion sequencer

- **On-chip Automatic Calibration Logic**
  - Automatic calibration & compensation for environmental change
  - Automatic adaptive threshold and sensitivity levels

- **On-Chip RAM to Store Calibration Data**
  - Hardware initialization of SRAM
  - Host able to access SRAM freely at any time

- **Powerful Hardware Computer Architecture**
  - 16-bit RISC CPU operating at 24Mhz clock
  - 16-bit MAC and 32-bit divider hardware accelerators
  - Internal calibrated oscillator
  - Internal power-on reset circuit and watch-dog counter

- **Flexible Multi-Finger Detection**
  - Supports ghost fingers cancelling
  - Supports maximum 2-finger location and 3-finger gesture detection

- **Flexible On-Chip Memory**
  - 3Kx16 bits of SRAM for data storage
  - 24Kx16 bits of ROM for fundamental program
  - 16Kx16 bits of embedded-flash for extra program update

- **One Dedicated Interrupt Output**

- **I2C Compatible Interface**
  - Compliant to I2C specification v2.1
  - Supports slave device only
  - Supports standard and fast mode
  - 7-bit device addressing mode

- **One Dedicated System Reset**

- **Operation Power**
  - One 2.6 V-3.6 V power source
  - Provides one internal power regulator for core power generation

- **1.8-3.3V IOVCC Support**
  - Provides I2C/GPIO IO power setting

- **Low Power Consumption**
  - Active mode: 6.0 mA
  - Idle mode: 100 uA
  - Sleep mode: 2 uA

- **Temperature Range**
  - -40 ℃ ~ 85 ℃

- **Package**
  - 32-pin XQFN

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2. General Description

The IT7258 is one 18-channel capacitance sensor detection controller companioned with one ITO film screen module to implement multi-touch functionality. It integrates one single electrode 27/35-channel capacitance-to-digital converter (CDC), 16-bit high performance RISC CPU, flexible memory support, and many powerful hardware functions. The internal CDC has one automatic calibrate and compensates engine to remove environmental change effect. It also includes one self-learning circuit that can modify the threshold and sensitivity levels automatically to eliminate the impact of different finger sizes to optimize the finger touch detection. The chip includes one 16-bit RISC CPU to calculate the location of the finger touch and handle all data translation. It also includes one 16-bit MAC and one 32-bit divider hardware accelerators to speed up the location calculation. The IT7258 supports one interrupt output that can be used to indicate the finger location has been changed or some user defined actions. The chip supports many flexible internal memory sizes and types, storing the user program and special data to extend special functions so as to meet users' specific requirements. This chip can reduce the system cost by one supported internal power-on reset generator and one calibrated oscillator, generates 1 MHz, 6 MHz, and 24 MHz clocks.

The IT7258 supports I^2C interface only. The serial interface is to communicate with the host. In addition, I^2C interface also supports two address selection pins to specify the device ID address. Through these interfaces, the host can program the internal control registers to configure and control the chip to meet the users' specific requirements. Besides, they can help communicate the finger locations and some user specified commands.

The IT7258 is available in 32-pad XQFN package. ADC operates at 2.6 V-3.6 V, and IO power operates at 1.8V-3.6V.

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3. Block Diagram

Figure 3-1. Block Diagram
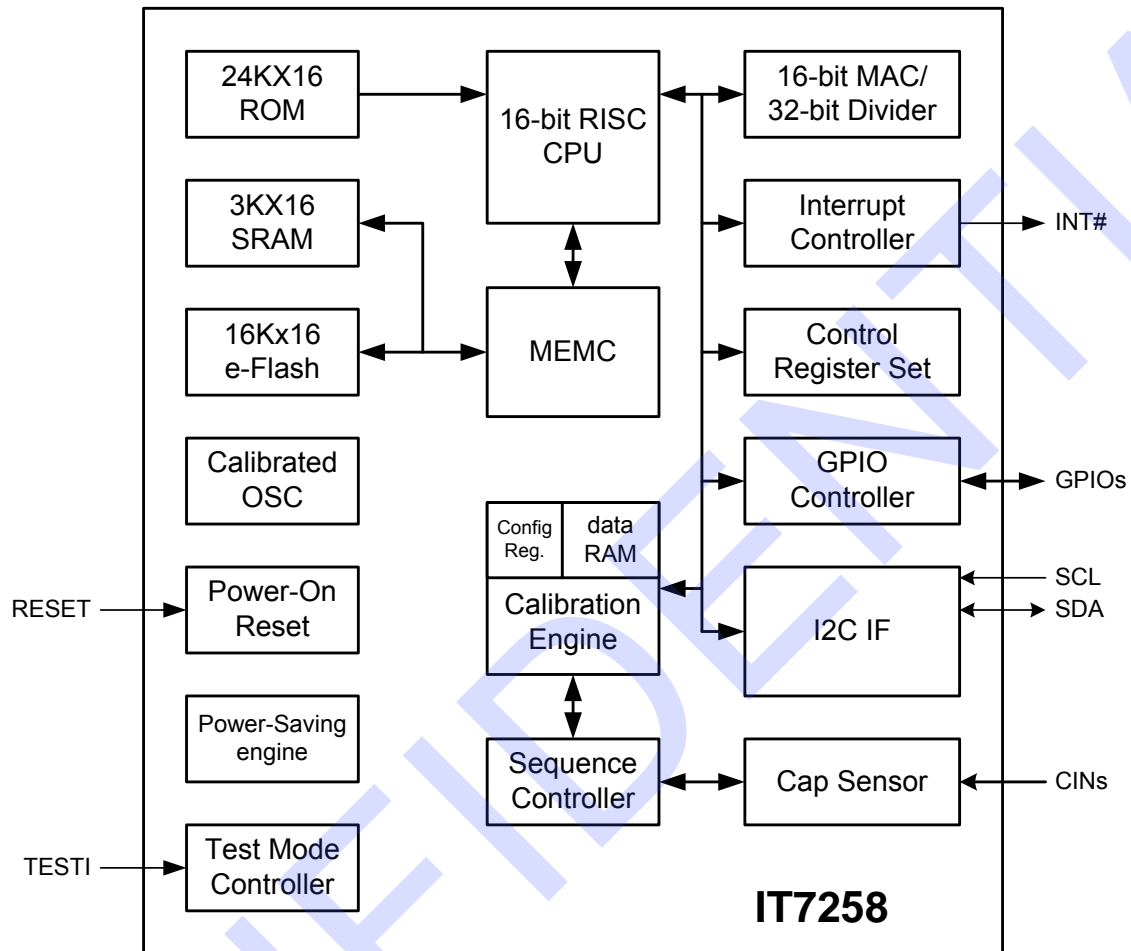
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4. Pin Configuration

CIN08 — 1
CIN09 — 2
CIN10 — 3
CIN11 — 4
CIN12 — 5
CIN13 — 6
CIN14 — 7
CIN15 — 8

IT7258 AXQN

Top pins (32–25): CIN07, CIN06, CIN05, CIN04, CIN03, CIN02, CIN01, CIN00

Right pins (24–17): RESET, GPIO1, GPIO0, VCC_IO, VSS_IO, VSS_IO, SDA, SCL

Bottom pins (9–16): CIN16, CIN17, SHIELD, VMID, VCCA, GNDA, VCC18, VCC3V
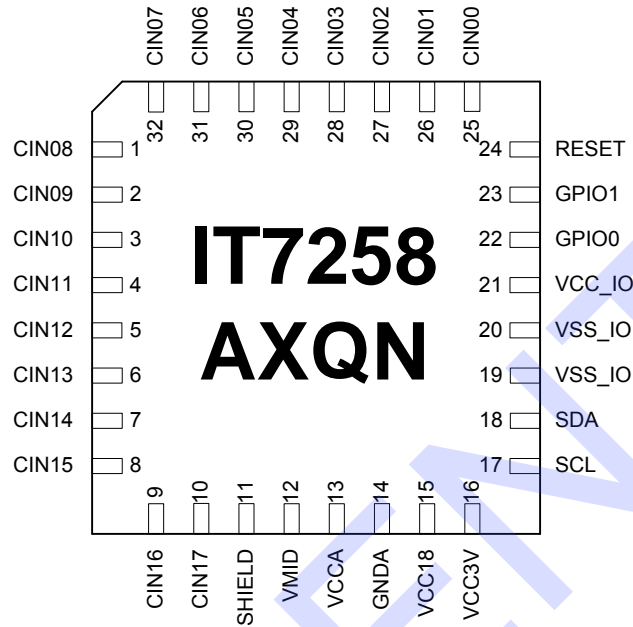
Table 4-1. IT7258AXQN Pins Listed in Numeric Order (32-pin XQFN)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	CIN08	9	CIN16	17	SCL	25	CIN00
2	CIN09	10	CIN17	18	SDA	26	CIN01
3	CIN10	11	SHIELD	19	VSS_IO	27	CIN02
4	CIN11	12	VMID	20	VSS_IO	28	CIN03
5	CIN12	13	VCCA	21	VCC_IO	29	CIN04
6	CIN13	14	GNDA	22	GPIO0	30	CIN05
7	CIN14	15	VCC18	23	GPIO1	31	CIN06
8	CIN15	16	VCC3V	24	RESET	32	CIN07

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5. Pin Description

Table 5-1. Pin Description of Capacitance Sensor Related Pins

Pin(s) No.	Signal	Attribute	Description
Capacitance Sensor Related Pins (Analog I/F)			
25-32, 1-10	**CIN00-17**	**AI**	*Capacitance Sensor Input Channels* These inputs are used to sense the capacitance values. They can be implemented to functions relating to buttons, scroll bars, and wheels by the use along with capacitance sensors.
12	**VMID**	**AO**	*½ VCCA Reference, connected to external 1uF bypass CAP*
11	**SHIELD**	**AO**	*CDC Active Shield Output* This pin must be connected to the external plane.

Table 5-2. Pin Description of General Purpose Input/Output

Pin(s) No.	Signal	Attribute	Description
General Purpose Input/Output (GPIO) (1.8V-3.3V CMOS I/F, 5V tolerant)			
22	**GPIO0**	**IOK16**	*General Purpose Input/Output 0/Interrupt Output* ■ The first function of this pin is to detect the input signal or output some programming signals by the user program. ■ The second function of this pin is Interrupt Output.
23	**GPIO1**	**IOK16**	*General Purpose Input/Output 1/Firmware Debug Mode Input* ■ The first function of this pin is to detect the input signal or output some programming signals by the user program. ■ The second function of this pin is Firmware Debug Mode Input. The input state will be latched to the internal register when the chip is powered up. Force this signal high to make chip upgrade new flash firmware code if the code has any error.
24	**RESET**	**IOK16**	*System Reset* This pin is system reset and active Low.

Table 5-3. Pin Description of I^{2}C Interface

Pin(s) No.	Signal	Attribute	Description
I^{2}C Interface (1.8V-3.3V CMOS I/F)			
17	SCL	IOK2	*I2C Clock*
18	SDA	IOK2	*I2C Data*

Table 5-4. Pin Description of Power/Ground Signals

Pin(s) No.	Signal	Attribute	Description
Power Ground Signals			
13	VCCA	I	*Analog VCC (3.3V) for Capacitor Sensor*
14	GNDA	I	*Analog Ground for Capacitor Sensor*
16	VCC33	I	*Digital 3.3V and Embeded Flash Analog Power*
21	VCC_IO	I	*IO PAD VCC (range 1.8V-3.3V)*
19,20	VSS_IO	I	*Digital Ground for Digital Component*
15	VCC18	O	*Internal LDO 1.8V Output*

Notes: I/O cell types are described below:

I: Input PAD.
AI: Analog Input PAD.
IK: Schmitt Trigger Input PAD.
AO: Analog Output PAD.
O2:   2 mA Output PAD.
O8:   8 mA Output PAD.
IOK2:   2 mA Bidirectional PAD with Schmitt Trigger Input PAD.
IOK16: 16 mA Bidirectional PAD with Schmitt Trigger Input PAD.

6.   Serial Interface

6.1   Overview

The IT7258 is available with an I^{2}C –compatible interface. The serial interface of both supports four transfer types, single write, burst write, single read, and burst read.

6.2   I^{2}C –compatible Interface

The IT7258 supports the industry standard 2-wire I^{2}C serial interface protocol and is compatible with System Management Bus (SMBus) protocol.

6.2.1   Device Address

The IT7258 only supports one device address. The device address is listed below.

Table 6-1. IT7258 I^{2}C Device Address

I^{2}C Address
1000 110

6.2.2   Data Transfer

Data is transferred over the I^{2}C bus in 8-bit address and 8-bit data. The IT7258 supports the following four types of transfer. The related protocol and timing diagrams are shown below.

Single Write

S	7-BIT DEVICE ADDRESS	W	ACK	REGISTER ADDRESS[7:0]	ACK	WRITE DATA [7:0]	ACK	P

Burst Write

						Address = n		Address = n+1	
S	7-BIT DEVICE ADDRESS	W	ACK	REGISTER ADDRESS[7:0]	ACK	WRITE DATA [7:0]	ACK	WRITE DATA [7:0]	ACK

Address = n+2		Address = n+3				
WRITE DATA [7:0]	ACK	WRITE DATA [7:0]	ACK	•••	ACK	P

Single Read

S	7-BIT DEVICE ADDRESS	W	ACK	REGISTER ADDRESS[7:0]	ACK	SR	7-BIT DEVICE ADDRESS	R	ACK

READ DATA [7:0]	$\overline{ACK}$	P

Burst Read

S	7-BIT DEVICE ADDRESS	W	ACK	REGISTER ADDRESS[7:0]	ACK	SR	7-BIT DEVICE ADDRESS	R	ACK

Address = n		Address = n+1		Address = n+2		Address = n+3			
READ DATA [7:0]	ACK	READ DATA [7:0]	ACK	READ DATA [7:0]	ACK	READ DATA [7:0]	ACK	···	$\overline{ACK}$ P

S	START BIT	ACK	ACKNOWLEDGE BIT		OUTPUT FROM HOST
P	STOP BIT	$\overline{ACK}$	NO ACKNOWLEDGE BIT		OUTPUT FROM IT7250
SR	REPEATED START BIT				

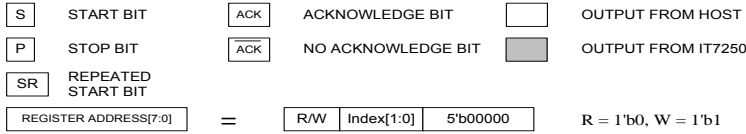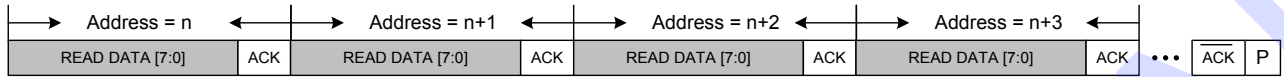| REGISTER ADDRESS[7:0]	=	R/W	Index[1:0]	5'b00000	R = 1'b0, W = 1'b1

Figure 6-1. Example of I²C Timing for Single Data Write Operation
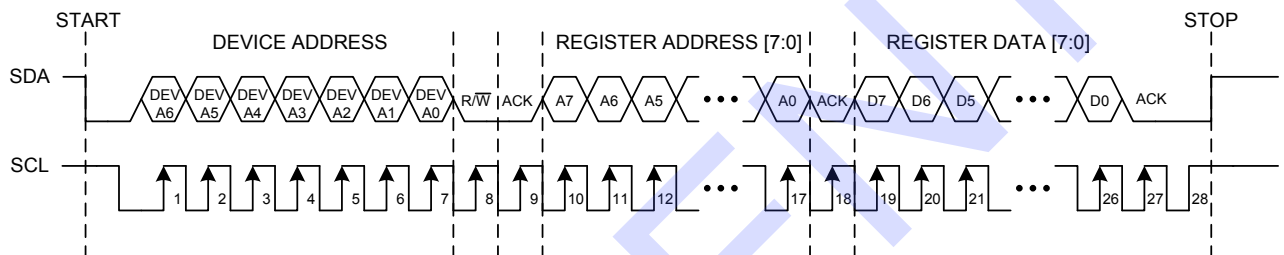

Figure 6-2. Example of I²C Timing for Single Data Read Operation
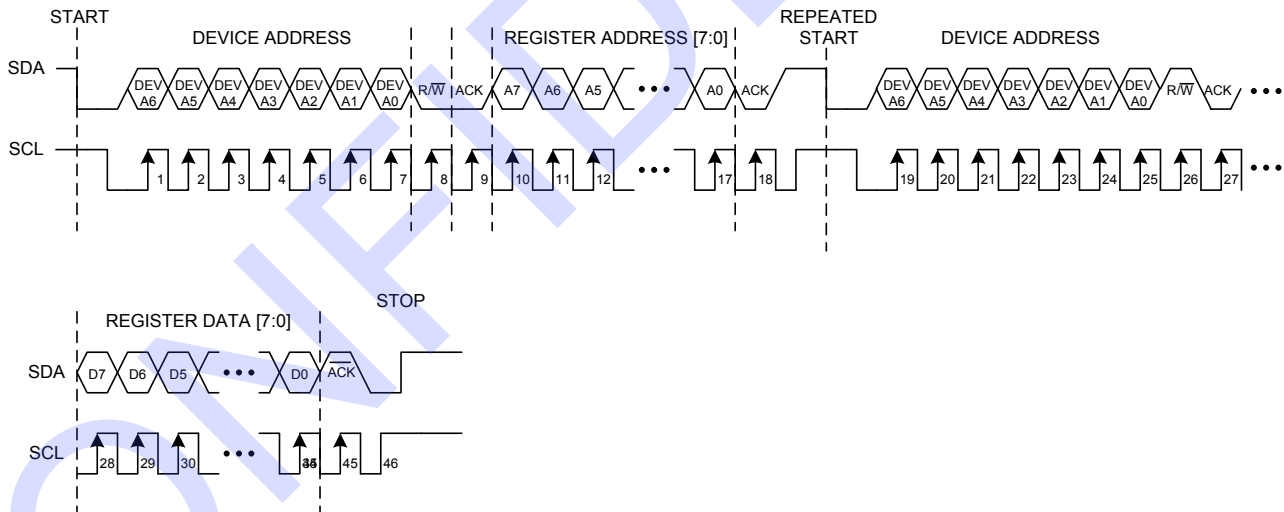
7. Power-Up Sequence

For the power-up sequence, please follow the steps below to power up the IT7258:

1. Set GPIO1 low to avoid the IT7258 going into the firmware debug mode.
2. Turn on the power supply for the IT7258.
3. After VCC3V supplied to the IT7258 is at stable 10ms, GPIO1 can be floating, pull-up, or pull-down.

Figure 7-1. Definition of Timing for Power-Up Sequence

VCC3V

GPIO1
Don't care signal pull-up/pull-down

10 ms

GPIO1 input mode for firmware upgrade setting

GPIO1 output mode for interrupt
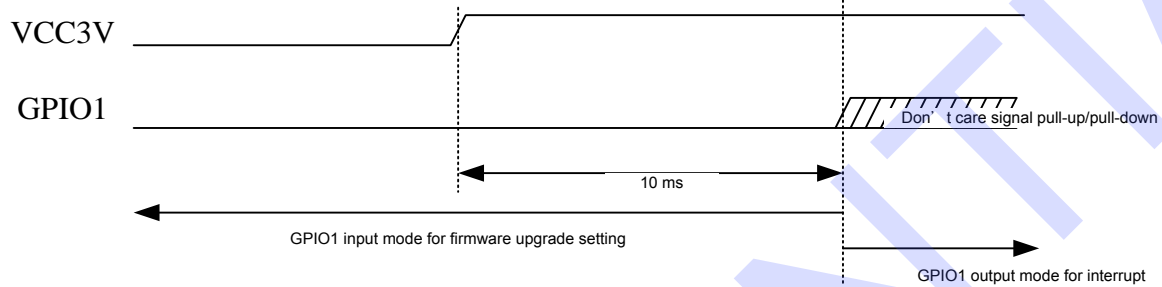
Figure 7-2. Definition of Timing for Power-Up System State

VCC_IO

Tstartup2,typ

2.3V

VCC3V

Internal POR

Internal system reset

Tstartup1,typ

Internal mcu work
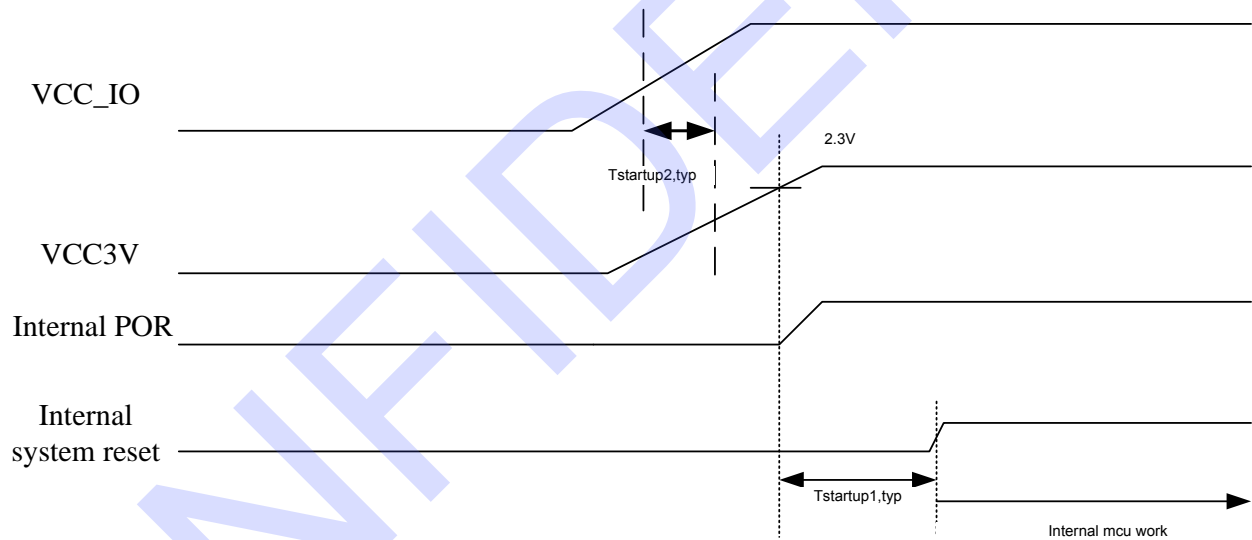
Figure 7-3. Definition of Timing for Power-off System State

VCC3V

VCC_IO

Toff,typ
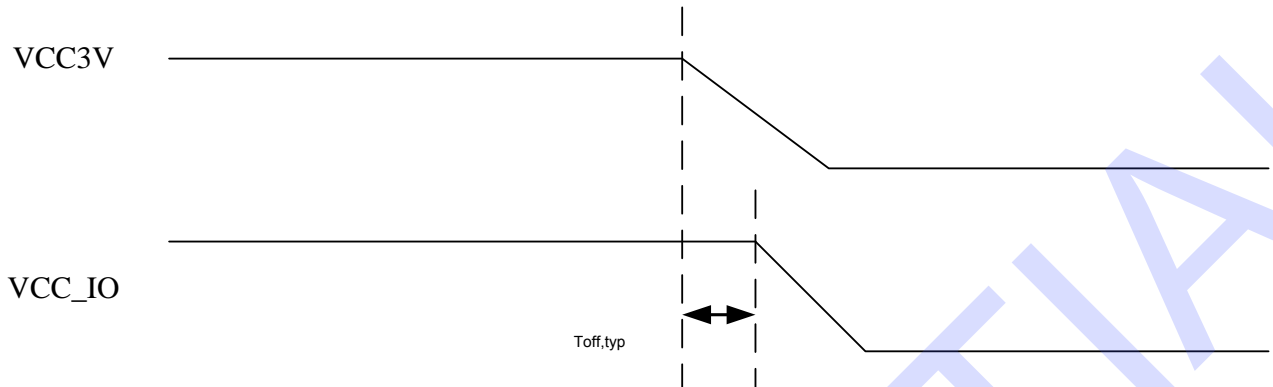
Figure 7-4. Definition of Timing for External System Reset

System
Reset
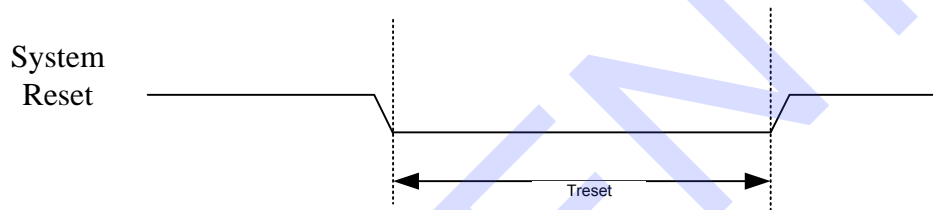
Treset

Figure 7-5. Power-Up Timing

Symbol	Parameter	Min.	Typ.	Max.	Unit
Tstartup1	Chip Power-Up Timing	-	5	10	ms
Tstartup2	Chip Power-up Timing between VCC_IO & VCC3V	0	-	-	ms
Toff	Chip Power-off Timing between VCC_IO & VCC3V	0	-	-	ms
Treset	Chip System Reset Timing	8	-	10	Ms

8. DC Characteristics

Absolute Maximum Ratings

Power Supply (V_{CC}) ....-0.3V to 3.6V

Input Voltage ....-0.3V to VCC + 0.3V

Output Voltage ....-0.3V to VCC + 0.3V

Storage Temperature ....-40°C to 125°C

Comments

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to this device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied, and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

DC Electrical Characteristics
(Operation Conditions: VCCA=VCC33=2.6 V-3.6 V, VCC_IO=1.8V-3.3V, Ta= -40°C~85°C)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{IL}	Input Low Voltage	CMOS	-	-	0.3* V_{CC_IO}	V
V_{IH}	Input High Voltage	CMOS	0.7* V_{CC_IO}	-	-	V
Vt-	Schmitt trigger negative going threshold voltage	CMOS	-	0.3* V_{CC_IO}	-	V
Vt+	Schmitt trigger positive going threshold voltage	CMOS	-	0.7* V_{CC_IO}	-	V
V_{OL}	Output Low Voltage	I_{OL}=2mA	-	-	0.4	V
$V_{OH,}$ VCC_IO=1.8	Output High Voltage	I_{OH}=2mA	-	1	-	V
$V_{OH,}$ VCC_IO=3.3	Output High Voltage	I_{OH}=2mA	-	2.7	-	V
R_I	Input Pull-up resistance	V_{IL}=0V or V_{IH}=Vcc	-	75	-	KΩ
I_{CC}	Operating current	VCCA=3.3V, Active mode	-	6.0	6.5	mA
$I_{CC,IDLE1*}$	Operating current (analog CDC clock: 250 KHz, power save timeout: 1600ms)	VCCA=3.3V, Idle mode	-	100	200	uA
$I_{CC,IDLE2*}$	Operating current (analog CDC clock: 500 KHz, power save timeout: 25ms)	VCCA=3.3V, Idle mode	-	300	400	uA
$I_{CC,SLEEP}$	Operating current	VCCA=3.3V, Sleep mode	-	2	10	uA
I_{IL}	Input Leakage current	No pull-up	-1	-	1	uA
I_{OZ}	Tri-state leakage current		-1	-	1	mA
C_{IN}	Input capacity		-	10	-	pF
C_{OUT}	Output capacity		-	10	-	pF
C_{BID}	Bi-directional buffer capacity		-	10	-	pF

Note: The operation current of the idle mode will be varied with the setting of the operation condition (analog CDC clock and power save timeout). The "$I_{CC,IDLE1}$ " is the operation current under the best condition of the idle mode, where the setting will bring about less power consumption but longer response time. On the other hand, the "$I_{CC,IDLE2}$ " is the operation current under the worst condition of the idle mode, where the setting will bring about more power consumption but shorter response time.

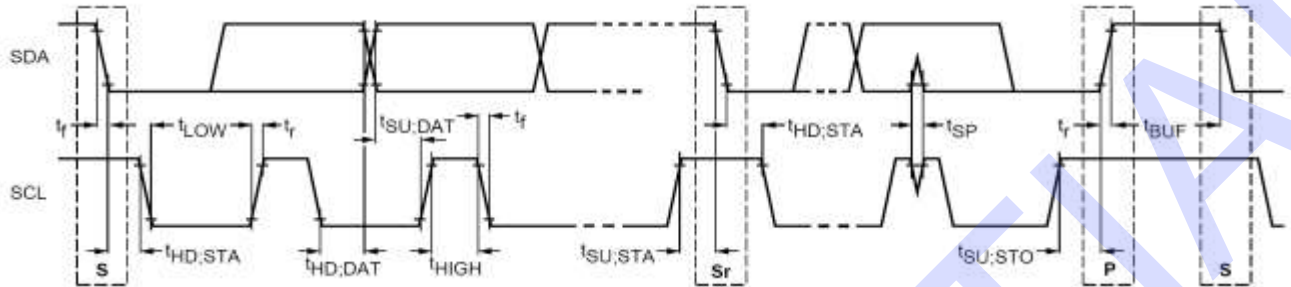## 9. AC Characteristics

Figure 9-1. Definition of Timing for I^{2}C Interface

Table 9-1. I^{2}C AC Characteristics

| Symbol	Parameter	Min.	Max.	Unit
f_{SCL}	SCL clock frequency	1	400	kHz
$t_{HD;STA}$	Hold time (repeated) START condition After this period, the first clock pulse is generated.	0.6	-	us
t_{LOW}	LOW period of the SCL clock	1.3	-	us
t_{HIGH}	HIGH period of the SCL clock	0.6	-	us
$t_{SU;STA}$	Set-up time for a repeated START condition	0.6	-	us
$t_{HD;DAT}$	Data hold time	0	0.9	us
$t_{SU;DAT}$	Data setup time	100	-	ns
t_r	Rise time of both SDA and SCL signals	$20+0.1C_b$	300	ns
t_f	Fall time of both SDA and SCL signals	$20+0.1C_b$	300	ns
$t_{SU;STO}$	Set-up time for STOP condition	0.6	-	us
t_{BUF}	Bus free time between a STOP and START condition	1.3	-	us
C_b	Capacitive load for each bus line	-	400	pF
V_{nL}	Noise margin at the LOW level for each connected device (including hysteresis)	$0.1V_{CC\_IO}$	-	V
V_{nH}	Noise margin at the HIGH level for each connected device (including hysteresis)	$0.2V_{CC\_IO}$	-	V
$t_{timeout}$	Cumulative SCL low timeout limit	3	5	ms

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10. Package Information

Saw Type XQFN 32L Outline Dimensions   **unit: inches/mm**
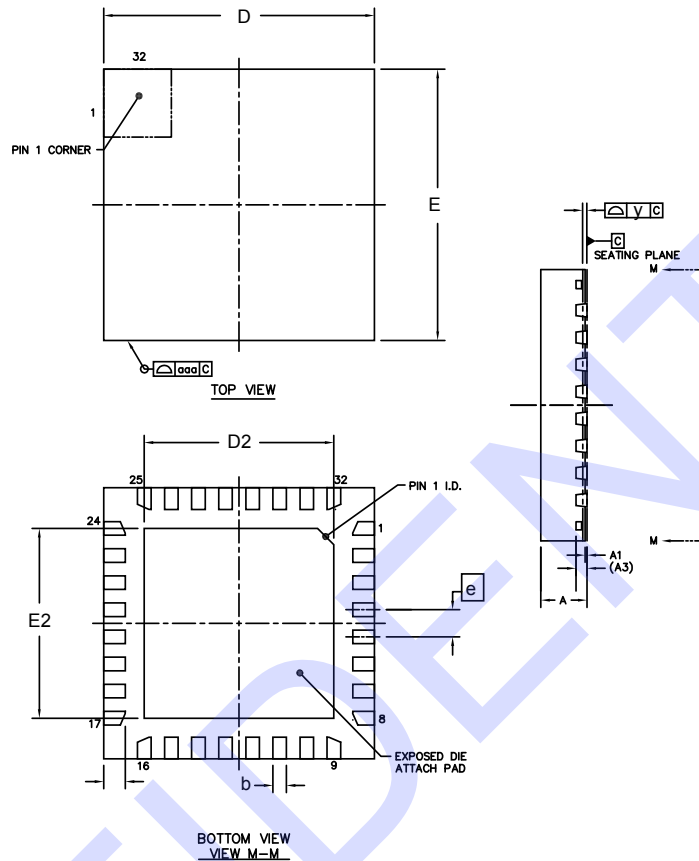
Symbol	Dimensions in inches			Dimensions in mm		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	0.018	0.020	0.022	0.45	0.50	0.55
A1	0	0.001	0.002	0.00	0.035	0.05
A3	0.008 REF			0.203 REF		
b	0.006	0.008	0.01	0.15	0.20	0.25
D	0.157 BSC			4.00 BSC		
D2	0.102	0.106	0.110	2.6	2.7	2.8
E	0.157 BSC			4.00BSC		
E2	0.102	0.106	0.110	2.6	2.7	2.8
e	0.016 BSC			0.40 BSC		
L	0.010	0.012	0.014	0.25	0.30	0.35
y	---	---	0.003	--	--	0.08

Notes:
1. Controlling dimension：Millimeter
2. Reference document：JEDEC MO-248
3. Take SMT into consideration, please use the minimum number of D2's and E2's dimensions.

DI-Saw-XQFN32(4*4)v2

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11. Ordering Information

All components provided are RoHS-compliant (100% Green Available).

Part No.	Channel Number	Package
IT7258AXQN	18	32-pin 4*4 0.5mm XQFN

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12. Top Marking Information

IT7258AXQN (XQFN32)

PART NO. ——————— 7258AXQN

DATE CODE ——————— DDDDX ——————— TRACKING CODE

LOT ID ——————— XXXXX

PIN 1 IDENTIFIER ——————— ●
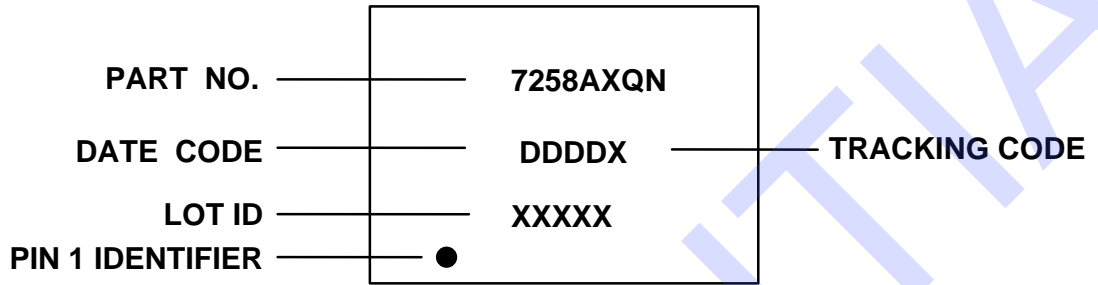
0. PARTIES

ITE Tech. Inc. ("Seller") is a company headquartered in Taiwan, Republic of China, and incorporated under laws of Republic of China, Buyer is a company or an entity, purchasing product from ITE Tech. Inc.

1. ACCEPTANCE OF TERMS

BUYER ACCEPTS THESE TERMS (i) BY WRITTEN ACCEPTANCE (BY PURCHASE ORDER OR OTHERWISE), OR (ii) BY FAILURE TO RETURN GOODS DESCRIBED ON THE FACE OF THE PACKING LIST WITHIN FIVE DAYS OF THEIR DELIVERY.

2. DELIVERY

(a)   Otherwise specified in the order agreed by Seller, delivery will be made Free Carrier (Incoterms), Seller's warehouse, Science-Based Industrial Park, Hsinchu, Taiwan.
(b)   Title to the goods and the entire risk will pass to Buyer upon delivery to carrier.
(c)   Shipments are subject to availability. Seller shall make every reasonable effort to meet the date(s) quoted or acknowledged; and if Seller makes such effort, Seller will not be liable for any delays.

3. TERMS OF PAYMENT

(a)   Terms are as stated on Seller's quotation, or if none are stated, net thirty (30) days. Accounts past due will incur a monthly charge at the rate of one percent (1%) per month (or, if less, the maximum allowed by applicable law) to cover servicing costs.
(b)   Seller reserves the right to change credit terms at any time in its sole discretion.

4. LIMITED WARRANTY

(a)   Seller warrants that the goods sold will be free from defects in material and workmanship and comply with Seller's applicable published specifications for a period of ninety (90) days from the date of Seller's delivery. Within the warranty period and by obtaining a return number from Seller, Buyer may request replacement or repair for defective goods.
(b)   Goods or parts which have been subject to abuse (including without limitation repeated or extended exposure to conditions at or near the limits of applicable absolute ratings) misuse, accident, alteration, neglect, or unauthorized repair or improper application are not covered by any warranty. No warranty is made with respect to custom products or goods produced to Buyer's specifications (unless specifically stated in a writing signed by Seller).
(c)   No warranty is made with respect to goods used in devices intended for use in applications where failure to perform when properly used can reasonably be expected to result in significant injury (including, without limitation, navigation, aviation or nuclear equipment, or for surgical implant or to support or sustain life) and Buyer agrees to indemnify, defend, and hold harmless Seller from all claims, damages and liabilities arising out of any such uses.
(d)   This Paragraph 4 is the only warranty by Seller with respect to goods and may not be modified or amended except in writing signed by an authorized officer of Seller.
(e)   Buyer acknowledges and agrees that it is not relying on any applications, diagrams or circuits contained in any literature, and by its conditions Buyer will test all parts and applications under extended field and laboratory conditions. Notwithstanding any cross-reference or any statements of compatibility, functionality, interchangeability, and the like, the goods may differ from similar goods from other vendors in performance, function or operation, and in areas not contained in the written specifications, or as to ranges and conditions outside such specifications; and Buyer agrees that there are no warranties and that Seller is not responsible for such things.
(f)   EXCEPT AS PROVIDED ABOVE, SELLER MAKES NO WARRANTIES OR CONDITIONS, EXPRESS, IMPLIED, OR STATUTORY; AND SELLER EXPRESSLY EXCLUDES AND DISCLAIMS ANY WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE OR APPLICATION.

5. LIMITATION OF LIABILITY

(a)   Seller will not be liable for any loss, damage or penalty resulting from causes beyond its reasonable control, including but not limited to delay by others, force majeure, acts of God, or labor conditions. In any such event, the date(s) for Seller's performance will be deemed extended for a period equal to any delay resulting.
(b)   THE LIABILITY OF SELLER ARISING OUT OF THE CONTRACT OR ANY GOODS SOLD WILL BE LIMITED TO REFUND OF THE PURCHASE PRICE OR REPLACEMENT OF PURCHASED GOODS (RETURNED TO SELLER FREIGHT PRE-PAID) OR, WITH SELLER'S PRIOR WRITTEN CONSENT, REPAIR OF PURCHASED GOODS.
(c)   Buyer will not return any goods without first obtaining a customer return order number.
(d)   AS A SEPARATE LIMITATION, IN NO EVENT WILL SELLER BE LIABLE FOR COSTS OF SUBSTITUTE GOODS; FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL OR INDIRECT DAMAGES; OR LOSS OF USE, OPPORTUNITY, MARKET POTENTIAL, AND/OR PROFIT ON ANY THEORY (CONTRACT, TORT, FROM THIRD PARTY CLAIMS OR OTHERWISE). THESE LIMITATIONS SHALL APPLY NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY REMEDY.

(e)   No action against Seller, whether for breach, indemnification, contribution or otherwise, shall be commenced more than one year after the cause of action has accrued, or more than one year after either the Buyer, user or other person knew or with reasonable diligence should have known of the matter or of any claim of dissatisfaction or defect involved; and no such claim may be brought unless Seller has first been given commercially reasonable notice, a full written explanation of all pertinent details, and a good faith opportunity to resolve the matter.
(f)   BUYER EXPRESSLY AGREES TO THE LIMITATIONS OF THIS PARAGRAPH 5 AND TO THEIR REASONABLENESS.

6. SUBSTITUTIONS AND MODIFICATIONS

Seller may at any time make substitutions for product ordered which do not materially and adversely affect overall performance with the then current specifications in the typical and intended use. Seller reserves the right to halt deliveries and shipments and alter specifications and prices without notice. Buyer shall verify that the literature and information is current before purchasing.

7. CANCELLATION

The purchase contract may not be canceled by Buyer except with written consent by Seller and Buyer's payment of reasonable cancellation charges (including but not limited to expenses already incurred for labor and material, overhead, commitments made by Seller, and a reasonable profit).

8. INDEMNIFICATION

Seller will, at its own expense, assist Buyer with technical support and information in connection with any claim that any parts as shipped by Seller under the purchase order infringe any valid and enforceable copyright, or trademark, provided however, that Buyer (i) gives immediate written notice to Seller, (ii) permits Seller to participate and to defend if Seller requests to do so, and (iii) gives Seller all needed information, assistance and authority. However, Seller will not be responsible for infringements resulting from anything not entirely manufactured by Seller, or from any combination with products, equipment, or materials not furnished by Seller. Seller will have no liability with respect to intellectual property matters arising out of products made to Buyer's specifications, code, or designs.

Except as expressly stated in this Paragraph 8 or in another writing signed by an authorized officer, Seller makes no representations and/or warranties with respect to intellectual and/or industrial property and/or with respect to claims of infringement. Except as to claims Seller agrees in writing to defend, BUYER WILL INDEMNIFY, DEFEND AND HOLD HARMLESS SELLER FROM ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING ATTORNEYS FEES) AGAINST AND/OR ARISING OUT OF GOODS SOLD AND/OR SHIPPED HEREUNDER.

9. NO CONFIDENTIAL INFORMATION

Seller shall have no obligation to hold any information in confidence except as provided in a separate non-disclosure agreement signed by both parties.

10. ENTIRE AGREEMENT

(a)   These terms and conditions are the entire agreement and the only representations and understandings between Seller and Buyer, and no addition, deletion or modification shall be binding on Seller unless expressly agreed to in written and signed by an officer of Seller.
(b)   Buyer is not relying upon any warranty or representation except for those specifically stated here.

11. APPLICABLE LAW

The contract and all performance and disputes arising out of or relating to goods involved will be governed by the laws of R.O.C. (Taiwan, Republic of China), without reference to the U.N. Convention on Contracts for the International Sale of Goods or to conflict of laws principles. Buyer agrees at its sole expense to comply with all applicable laws in connection with the purchase, use or sale of the goods provided hereunder and to indemnify Seller from any failure by Buyer to so comply. Without limiting the foregoing, Buyer certifies that no technical data or direct products thereof will be made available or re-exported, directly or indirectly, to any country to which such export or access is prohibited or restricted under R.O.C. laws or U.S. laws or regulations, unless prior authorization is obtained from the appropriate officials and agencies of the government as required under R.O.C. or U.S. laws or regulations.

12. JURISDICTION AND VENUE

The courts located in Hsinchu, Taiwan, Republic of China, will have the sole and exclusive jurisdiction and venue over any dispute arising out of or relating to the contract or any sale of goods hereunder. Buyer hereby consents to the jurisdiction of such courts.

13. ATTORNEYS' FEES

Reasonable attorneys' fees and costs will be awarded to the prevailing party in the event of litigation involving and/or relating to the enforcement or interpretation of the contract and/or any goods sold under it.