GT828

A 5-point Touch solution for Tablet

Rev.03——2012.03.28

1 Overview

Based on Projected-Capacitive touch technology, GT828 is a single chip multi-touch solution for MID with 30 driving channels and 20 sensing channels, satisfy the requirement of smaller component.

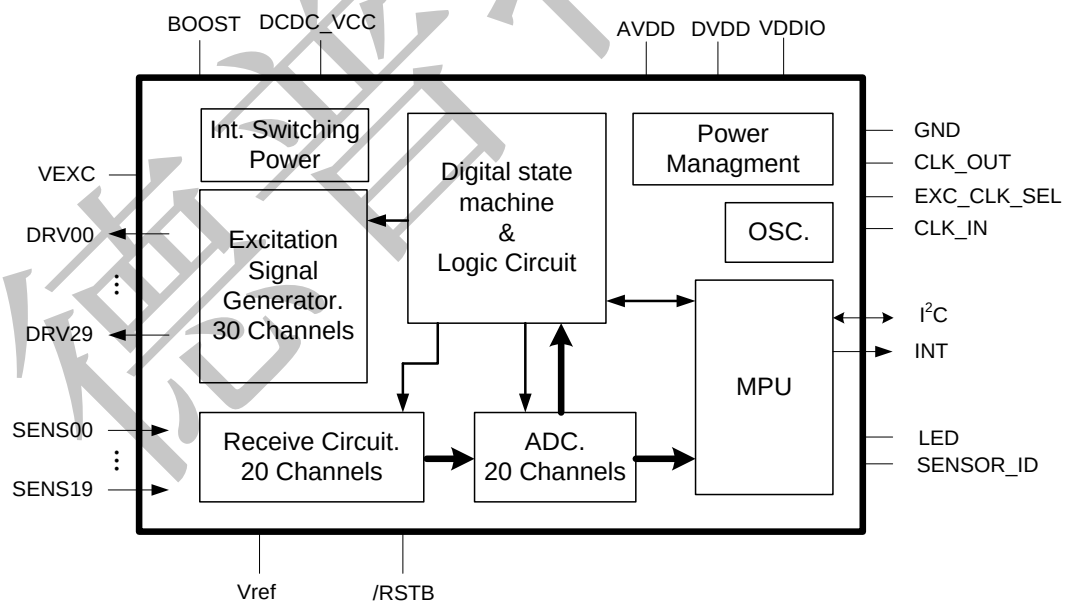
GT828 can support for 5 touches in fast response time and low consumption, which is very suitable for tablet.

2 Features

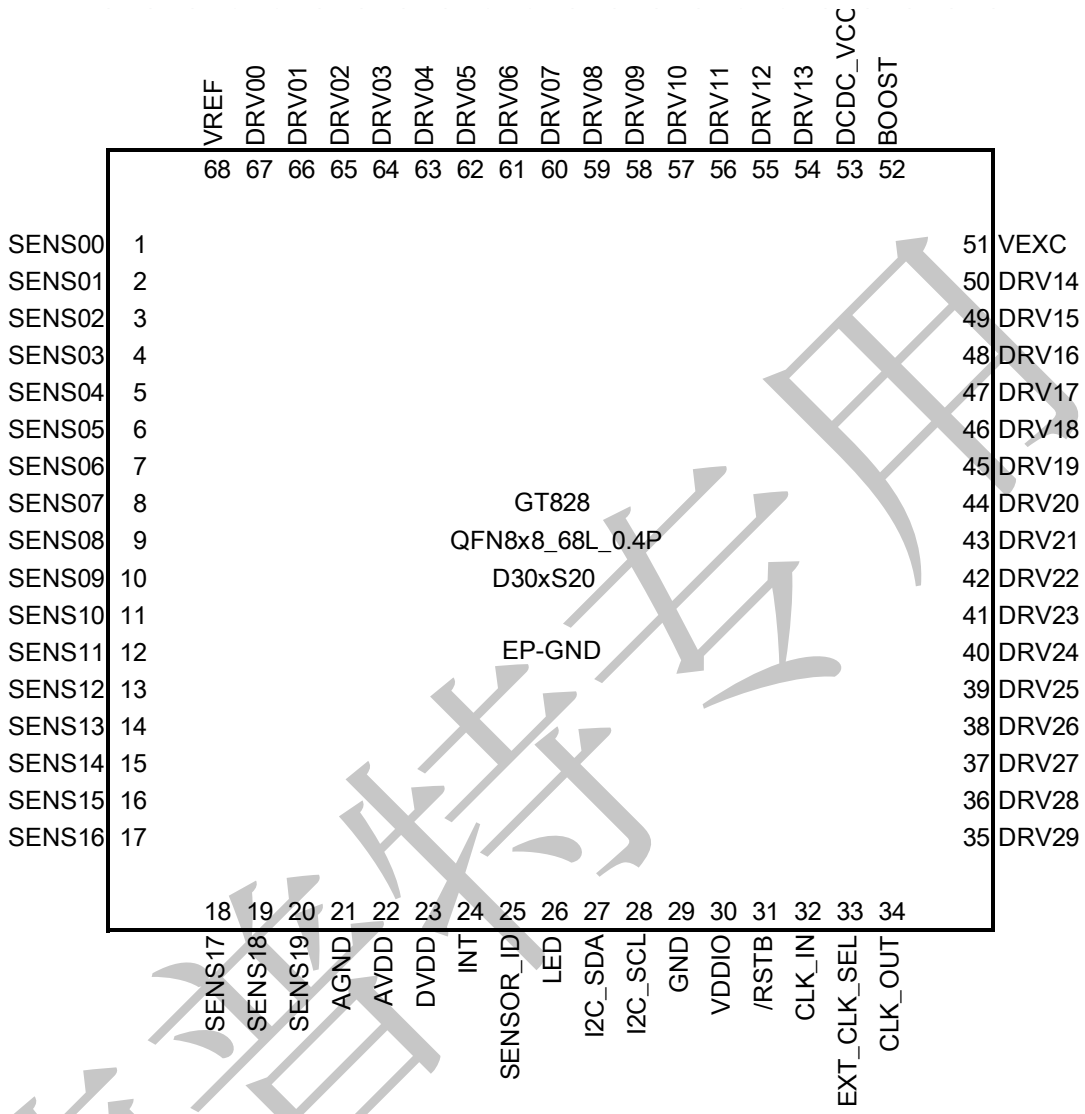
- ✧ Built-in circuit and high performance MPU
  - ➢ Touch scanning frequency: 60Hz
  - ➢ Touch point real time output in coordinates type
  - ➢ Supporting for fixed touch-key function
  - ➢ Unified firmware version for different sizes of touch-panel
  - ➢ Single VDD supply, built-in 1.8V LDO
  - ➢ Flash craft, support on line programming
- ✧ Touch-panel sensor requirement
  - ➢ Supporting size: 8.9”~10.1"
  - ➢ Channel suspending available
  - ➢ Supporting for both ITO glass and ITO Film
  - ➢ Cover lens thickness requirement: glass ≦2mm/ PET ≦1mm
  - ➢ Support FPC key
- ✧ Environmental applicable performance
  - ➢ Initialized automatic calibration
  - ➢ Automatic temperature drift compensation
  - ➢ Operating temperature: -20℃~+85℃, humidity: ≦95%RH
  - ➢ Storage temperature: -60℃~+120℃, humidity: ≦95%RH
- ✧ Communication interface
  - ➢ Standard I^2C communication protocol
  - ➢ Working in Slave mode
  - ➢ Support 1.8V~3.6V interface

- Wake-up time
  - From Green mode: <48ms
  - From Sleep mode: <200ms
  - Initialization: <200ms
- Power supply:
  - Single power: 2.6V~3.6V
- Power ripple:
  - Vpp≦50mV
- Packaging: 68pins, 8mm*8mm QFN
- Development supporting tools
  - Touch-panel module's performance analysis tool
  - Supporting the configuration information for different touch-panel module
  - Q/C tools for mass production
  - Developing guide & reference code supporting
  - Program on line and software upgrade

3 Chip diagram



4 Pin Definition



Pin No.	Name	Function Description	Note
1~20	SENS00~SENS19	Sensing Channels	
21	AGND	Analog Ground	
22	AVDD	Analog power	
23	DVDD	Digital power	Output, connect with 2.2uF filter capacitor
24	INT	Interruption signal	Edge trigger register is configurable
25	Sensor_ID	Module Vender detecting	External suspending, or connect with VDDIO, or connect with GND
26	LED	LED control	High efficient

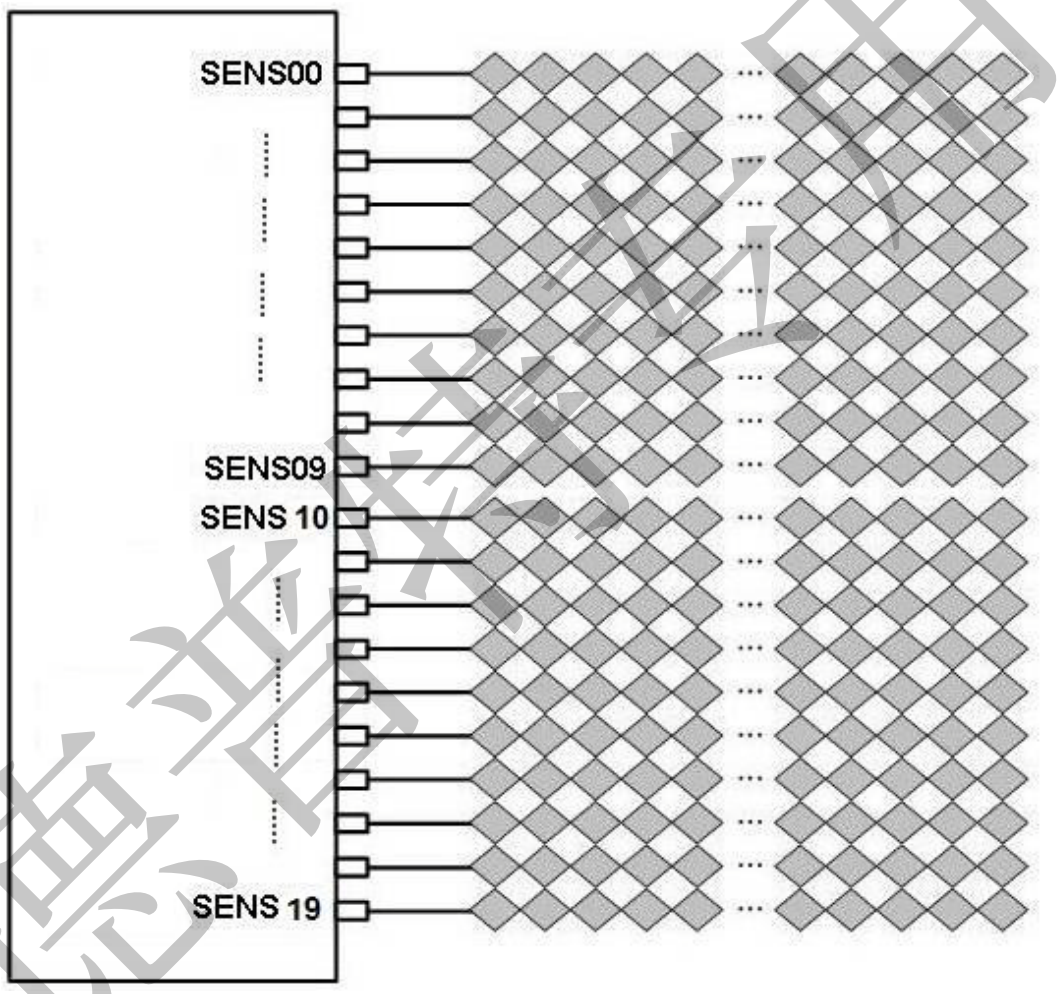
27	I2C_SDA	I^2C data	External pull-up
28	I2C_SCL	I^2C clock	External pull-up
29	GND	Digital Ground	
30	VDDIO	VDD of GPIO	Connect with DVDD：1.8V Connect with AVDD：AVDD
31	/RSTB	System reset pin	Internal pull-up，pull-down to reset
32	CLK_IN	External clock input pin	Suspending
33	EXT_CLK_SEL	External clock enable	Suspending
34	CLK_OUT	Internal clock output pin	Suspending
35~50	DRV29~DRV14	Driving signal output	
51	VEXC	High voltage driving power input pin	
52	BOOST	Power supply switch	Connect with electrical inductance and diode
53	DCDC_VCC	Built-in switch power input pin	
54~67	DRV13~DRV00	Driving channel	
68	VREF	Reference voltage	Connect 0.1uF capacitor with AGND Connect 220K resistance with AVDD

5 Sensor Development

5.1 Arrangement of Sensing Channels

SENS0~SENS19 are 20 capacitive detection input channel, which are directly connected with ITO sensors.

Please arrange the channels in sequence as below: The sequence to connect sensing ITO channel with chip is from SENS0 to SENS19.

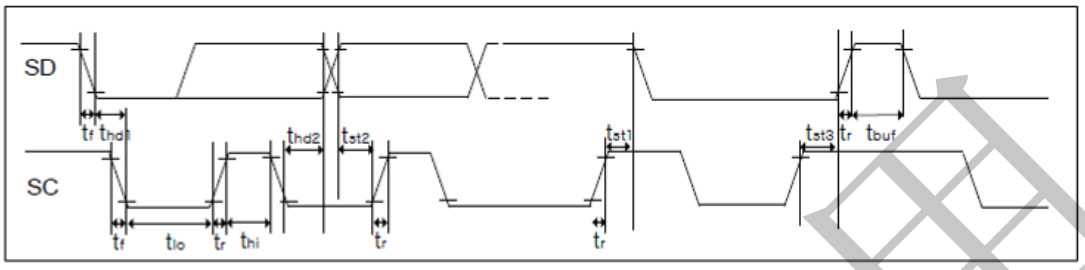


5.2 Arrangement of Driving Channels

DRV0~DRV29 are the 30 driving channels, which are directly connected with 30 ITO sensors. Driving channels can be arranged freely w/o any sequence, it also supports channel suspending. After the layout of driving channels, relevant registers of GT828 shall be configured to ensure logic position relations consistent with physical position relations of driving channels.

5.3 I2C Communication

GT828 provides standard I^2C communication interface, SCL and SDA to communicate with CPU. GT828 is treated as slave unit, and all the communication is started by CPU, which has the communication speed up to 600K bps.
The timing circuit of I^2C hardware circuit is as follows :



Parameter	Symbol	MIN	Max	Unit
SC frequency	f_{sck}	-	600	KHZ
SC low period	t_{lo}	0.8	-	us
SC high period	t_{hi}	0.5	-	us
SC setup time for START condition	t_{st1}	0.4	-	us
SC setup time for STOP condition	t_{st3}	0.4	-	us
SC hold time for START condition	t_{hd1}	0.4	-	us
SD setup time	t_{st2}	0.5	-	us
SD hold time	t_{hd2}	0.2	-	us

The address of GT828's slave unit : 0xBA/0xBB. When Master CPU looking for the address of GT828, it also sends the control bits of reading and writting. The control bits of reading and writting is attached after the address of slave unit, '0' stands for Write Operation, '1' stands for Read Operation, thus the unit address can be formed. That is to say : 0xBA – to process Write Operation to GT828; 0xBB – to process Read Operation to GT828.

Suffix Communication :

Only when GT828 recieved suffix signal (under the situation of no external I^2C communication), can it update the buffer zone of coordinate output in real-time. Therefore, when I^2C communication is finished, suffix communication should be send. If multiple I^2C communication was occured continously, then the suffix communication can only be sent after the last I^2C communication (the process of reading cordinate is an exception, if there is one frame of cordinates hasn't been read, the suffix communication cannot been sent during I^2C communication process, to avoid GT828 rewritting coordinate output buffer zone when host machine is reading). The format of suffix communication is as follows :
To look for the address 0x8000 of register by using write operation process, then send the stop signal.

a) Data transmission

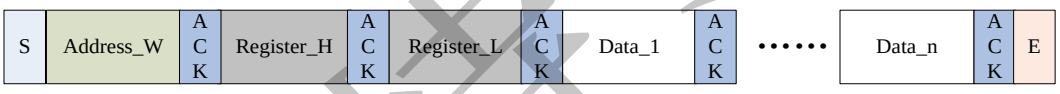
The communication is always started by host CPU, the effective initial signal is: when SCL keeps as “1”, SDA has a transition from “1” to “0”. The address information and data stream are both transmitted after initial signal.

The entire slave unit that is connected with I^2C bus, should detect the 8 digits address information on the bus which is sent after initial signal, and make the right responding. When receiving the matching address information, GT828 will chage SDA to output port in the ninth clock cycle, and set ‘0’ as responding signal. If it cannot recieve matching address information, i.e. not 0XBA or 0XBB, GT828 will keep free state.

The data on SDA port sends 9 digits data based on 9 clock cycle series: 8 digits effective data + 1 digit responding signal ACK or non responding signal NACK by receiving party. Data transmission is effective when SCL is “1”.

When communication is finished, the stop signal will be sent by host CPU. Stop signal is when SCL is “1”, the status of SDA has a transition from “0” to “1”.

b) Writing operation to GT828



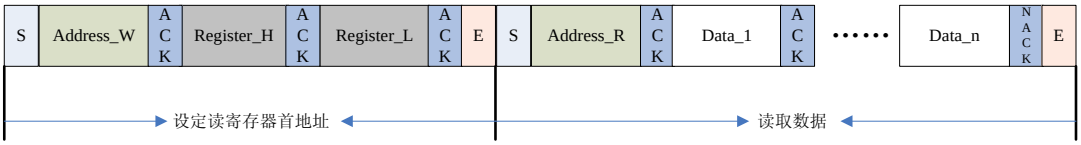
Sequence Chart of Write operation

The above is the seuence chart of write operation from host CPU to GT828. The host CPU produces an initial signal first, then send address information and reading and writing information ‘0’ stands for write operation : 0XBA.

When receiving responding, the host CPU will send 16 digits address of register, then to send the 8 digits data that will be write in register.

The address of GT828 register will plus 1 automatically after writing operation, so when host CPU needs to conduct writing operation to register with continuous address, it can write continuously during one writing operation. When finishing writing operation, the host CPU will send stop signal to finish current writing operation.

c) Reading Operation to GT828



The flow diagram of reading operation

The above is the flow diagram of reading operation from host CPU to GT828.

The host CPU produces an initial signal first, then send address information and reading and writing information ‘0’ stands for write operation : 0XAA.

When receiving responding, the host CPU will send 16 digits address information of register, and set the register information that needs to be read. When receiving the responding, the host CPU will resend the initial signal , send reading operation: 0XAB. When receiving responding, the host CPU starting to read data.

GT828 also support continuous reading operation, which is default as reading data continuously. When the host CPU receiving each Byte data, it needs to send a responding signal which stands for receiving successful. When receiving the last needed Byte, the main CPU will send “non answering signal NACK” , then to send the stop signal to finish communication.

5.4 Information of GT828 Register

Addr	Dir	Name	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0xF40	R	Touch Flags	Buffer Status		L_touch	P4	P3	P2	P1	P0
0xF41	R	TouchKey	Reserved				Key4	Key3	Key2	Key1
0xF42	R	Point0	Point0 X H							
0xF43	R		Point0 X L							
0xF44	R		Point0 Y H							
0xF45	R		Point0 Y L							
0xF46	R		Point0 Size							
0xF47	R	Point1	Point1 X H							
0xF48	R		Point1 X L							
0xF49	R		Point1 Y H							
0xF4A	R		Point1 Y L							
0xF4B	R		Point1 Size							
0xF4C	R	Point2	Point2 X H							
0xF4D	R		Point2 X L							
0xF4E	R		Point2 Y H							
0xF4F	R		Point2 Y L							
0xF50	R		Point2 Size							
0xF51	R	Point3	Point3 X H							
0xF52	R		Point3 X L							
0xF53	R		Point3 Y H							
0xF54	R		Point3 Y L							
0xF55	R		Point3 Size							
0xF56	R	Point4	Point4 X H							
0xF57	R		Point4 X L							
0xF58	R		Point4 Y H							

0xF59	R		Point4 Y L
0xF5A	R		Point4 Size
0xF5B	R	Coor checksum	Check sum of coordinate information
0xF5C ~0xF7C	-	NC	Reserved
0xF7D	R	PID	Product ID(hex)
0xF7E	R	VID_H	Product version High byte(hex)
0xF7F	R	VID_L	Product version low byte(hex)
0xF80	R/W	DriverCH0	The Matching IC driving wire of Screen Drive NO.1
0xF81	R/W	DriverCH1	The Matching IC driving wire of Screen Drive NO.2
0xF82	R/W	DriverCH2	The Matching IC driving wire of Screen Drive NO.3
0xF83	R/W	DriverCH3	The Matching IC driving wire of Screen Drive NO.4
0xF84	R/W	DriverCH4	The Matching IC driving wire of Screen Drive NO.5
0xF85	R/W	DriverCH5	The Matching IC driving wire of Screen Drive NO.6
0xF86	R/W	DriverCH6	The Matching IC driving wire of Screen Drive NO.7
0xF87	R/W	DriverCH7	The Matching IC driving wire of Screen Drive NO.8
0xF88	R/W	DriverCH8	The Matching IC driving wire of Screen Drive NO.9
0xF89	R/W	DriverCH9	The Matching IC driving wire of Screen Drive NO.10
0xF8A	R/W	DriverCH10	The Matching IC driving wire of Screen Drive NO.11
0xF8B	R/W	DriverCH11	The Matching IC driving wire of Screen Drive NO.12
0xF8C	R/W	DriverCH12	The Matching IC driving wire of Screen Drive NO.13
0xF8D	R/W	DriverCH13	The Matching IC driving wire of Screen Drive NO.14
0xF8E	R/W	DriverCH14	The Matching IC driving wire of Screen Drive NO.15
0xF8F	R/W	DriverCH15	The Matching IC driving wire of Screen Drive NO.16
0xF90	R/W	DriverCH16	The Matching IC driving wire of Screen Drive NO.17
0xF91	R/W	DriverCH17	The Matching IC driving wire of Screen Drive NO.18
0xF92	R/W	DriverCH18	The Matching IC driving wire of Screen Drive NO.19
0xF93	R/W	DriverCH19	The Matching IC driving wire of Screen Drive NO.20
0xF94 ~0xF9D	-	NC	Reserved
0xF9E	R/W	SensorCH0	Pin connected to the first sensing channel on Touch panel
0xF9F	R/W	SensorCH1	Pin connected to the second sensing channel on Touch panel
0xFA0	R/W	SensorCH2	Pin connected to the Third sensing channel on Touch panel
0xFA1	R/W	SensorCH3	Pin connected to the Forth sensing channel on Touch panel
0xFA2	R/W	SensorCH4	Pin connected to the Fifth sensing channel on Touch panel
0xFA3	R/W	SensorCH5	Pin connected to the Sixth sensing channel on Touch panel
0xFA4	R/W	SensorCH6	Pin connected to the Seventh sensing channel on Touch panel
0xFA5	R/W	SensorCH7	Pin connected to the eighth sensing channel on Touch panel
0xFA6	R/W	SensorCH8	Pin connected to the Ninth sensing channel on Touch panel
0xFA7	R/W	SensorCH9	Pin connected to the Tenth sensing channel on Touch panel
0xFA8	R/W	SensorCH10	Pin connected to the Eleventh sensing channel on Touch panel
0xFA9	R/W	SensorCH11	Pin connected to the Twelfth sensing channel on Touch panel
0xFAA	R/W	SensorCH12	Pin connected to the Thirteenth sensing channel on Touch panel

0xFAB	R/W	SensorCH13	Pin connected to the Fourteenth sensing channel on Touch panel						
0XFAC ~0XFB1	-	NC	Reserved						
0xFB2	R/W	ADCCFG	Chip scanning control parameter						
0xFB3	R/W	SCAN	Chip scanning control parameter						
0xFB4	R/W	F1SET	The frequency of driving pulse No.1						
0xFB5	R/W	F2SET	The frequency of driving pulse No.2						
0xFB6	R/W	F3SET	The frequency of driving pulse No.3						
0xFB7	R/W	F1PNUM	Quantity of driving pulse No. 1						
0xFB8	R/W	F2PNUM	Quantity of driving pulse No. 2						
0xFB9	R/W	F3PNUM	Quantity of driving pulse No. 3						
0xFBA	R/W	F1DELAY	Phase delay of Driving pulse No.1						
0xFBB	R/W	F2DELAY	Phase delay of Driving pulse No.2						
0xFBC	R/W	F3DELAY	Phase delay of Driving pulse No.3						
0xFBD	R/W	DC-DC	High Pressure setting						
0xFBE	R/W	Sc_Touch	Threshold of touch keys						
0xFBF	R/W	Sc_Leave	Threshold of touch keys leave						
0xFC0	R/W	Md_switch	Reserved	DD2	Reserved	Shape_EN	INT Pulse mode	SITO Noise reduction switch	Reserved	Reserved
0xFC1	R/W	LPower_C	Reserved	Time to enter low power consumption without touch keys: 0-63s is valid. Unit: seconds					
0xFC2	R/W	Refresh	0-100 is valid； the cycle is10ms if it's 0, the cycle is 20ms if it's 100						
0xFC3	R/W	Touch_N	Reserved	Reserved	Touch points output，1-5 is valid				
0xFC4	R/W	Output_Th	Output limit，only output if coordinate change is bigger than this value						
0xFC5	R/W	X_Ou_Max_H	Max of X coordinates						
0xFC6	R/W	X_Ou_Max_L							
0xFC7	R/W	Y_Ou_Max_H	Max of Y coordinates						
0xFC8	R/W	Y_Ou_Max_L							
0xFC9	R/W	X_Co_Sm	Smooth threshold in X: 0~255, 0 refers to off						
0xFCA	R/W	Y_Co_Sm	Smooth threshold in Y: 0~255, 0 refers to off						
0xFCB	R/W	X_Sp_Lim	Slide speed limitation in X: 0~255, 0 refers to off						
0xFCC	R/W	Y_Sp_Lim	Slide speed limitation in Y: 0~255, 0 refers to off						
0xFCD	R/W	Noise_R	Reserved	Reduce white noise:0-15 is valid					
0xFCE	R/W	NC	Reserved						
0xFCF	R/W	Filter	Reserved	coordinate filter: 0~15, Step=4					
0xFD0	R/W	Large_Tc	Large touch reference: 0~255 dots						

0xFD1	R/W	Shake_Cu	TouchShakeCount			FingerNumberShakeCount	
0xFD2	R/W	Pos_Ref_T	Positive refreshing time, 0~255, 0 refers to off				
0xFD3	R/W	Nag_Ref_T	Negative refreshing time, 0~255, 0 refers to off				
0xFD4	R/W	NC	Reserved				
0xFD5	R/W	NC					
0xFD6	R/W	Edge_exp	Reserved				0: weak stretch 1: strong stretch
0xFD7	R/W	Tc_K_F	Key_com	Key_Con	Reserved	Touch key available area (single side)	
0xFD8	R/W	Key 1	Key 1 position: 0~255				
0xFD9	R/W	Key 2	Key 2 position: 0~255				
0xFDA	R/W	Key 3	Key 3 position: 0~255				
0xFDB	R/W	Key 4	Key 4 position: 0~255				
0xFDC	R/W	K_Touch	Touch threshold on touch keys				
0xFDD	R/W	K_Leave	Release threshold on touch keys				
0xFDE	R/W	K_SEC_max	When independent touch judge, the upper limit of second biggest D-value				
0xFDF	R/W	K_DIS_min	Reserved				
0xFE0	R/W	X_border_Lim_Near	The settings of abandoned coordinate area of X axix (near end)				
0xFE1	R/W	X_border_Lim_Far	The settings of abandoned coordinate area of X axix (far end)				
0xFE2	R/W	Y_border_Lim_Near	The settings of abandoned coordinate area of Y axix (near end)				
0xFE3	R/W	Y_border_Lim_Far	The settings of abandoned coordinate area of Y axix (far end)				
0xFE4	R/W	KEY_ADCCFG	FPC Touch Key ADC configure settings				
0xFE5	R/W	KEY_F1SET	FPC Touch Key driver frequency settings				
0xFE6	R/W	KEY_F1NUM	Number of FPC touch key pulse				
0xFE7	R/W	Key_Shake_Cu	Jitter count for valid touch key				
0xFE8	R/W	Key2_Touch	FPC touch key 2 touchLevel				
0xFE9	R/W	Key3_Touch	FPC touch key 3 touchLevel				
0xFEA	R/W	Key4_Touch	FPC touch key 4 touchLevel				
0xFEB ~0xFEE	-	NC	Reserved				
0xFEF	R/W	Con_Frs	The sign of configuration information update, master control write 1 in this position after configuration info.				
0xFF0	R/W	Cfg_Chk_H	Configuration information addition and verify, high byte in advance				
0xFF1	R/W	Cfg_Chk_L					
0xFF2	R/W	System_Sta	Power_sta		Reserved		
0xFF3	R/W	LED_Con	LED_EN	LED_CM	LED_SW	Length of time of LED on after release touch key. Unit: seconds	
0xFF4	R/W	Command	Reserved				

0xFF5	R	Module_Type	Reserved	Module Supplier ID No. 0-2 is valid

5.5 Design specification of ITO sensor

DITO

	GT828
Impedance of driving channel race	≦3KΩ
Impedance of driving channel	≦10KΩ
Impedance of sensing channel race	≦10KΩ
Impedance of sensing channel	≦60KΩ
Capacitor of node	≦4pF
Constant of sensing channel RC	≦6us. Typ.=3.6us

SITO

	GT828
Impedance of driving channel race	≦3KΩ
Impedance of driving channel	≦10KΩ
Impedance of sensing channel race	≦10KΩ
Impedance of sensing channel	≦10KΩ
Capacitor of node	≦4pF
Constant of sensing channel RC	≦6us. Typ.=3.6us

When the channel races are used with metallic material, some races may be oxidized and their impedance will become larger due to process control or other reasons, the impedance will be different; when the wires are used with ITO materials, though the races in all channels will be maintained consistent by virtue of matching length and width in design, there still be some difference. In order to guarantee data consistency and evenness in the whole panel, the wiring impedance shall meet the requirements as above table.

Besides, when driving races parallel to the sensing races, the ground wire shall be inserted between them. The width of the ground wire shall be at least twice as channel races, no less than 0.2mm.

5.6 Touch keys

GT828 can support 4 separated touch keys, there are two ways to design touch keys: Driver used as the key common terminal or sensor used as the key common terminal.

Driver used as the key common terminal: 4 keys are formed with 1 driver and 4 sensors. The driving channels used as keys cannot be reused with driver on screen, but the sensing channel used as key must be reused on screen.

Sensor used as the key common terminal: 4 keys are formed with 1 sensor and 4 drivers. The sensing channels used as keys cannot be reused with sensor on screen,

but the driving channel used as keys must be reused on screen.

6 Function description

6.1 Working mode

6.1.1 Normal mode

In Normal mode, the fastest coordinate refresh cycle is between 10ms-20ms (depend on the settings of configuration information).

Under the situation of Normal mode, the chip will automatically enter into Green mode if no touch is detected in a short period of time to reduce power consumption. The length of this period can be set through configurable information, which is between 0~63s with stepping of 1s.

6.1.2 Green mode

In Green mode, the touch scanning cycle is fixed as 48ms. It will automatically enter into Normal mode if any touch is detected.

6.1.3 Sleep mode

For a lower consumption, Master can set GT828 be in Sleep mode through I^2C command. The master input a rising edge in INT pin (can be achieved by making master pull down INT, then transfer its own INT to suspending input status) will make GT828 return back to normal mode.

6.2 Interrupt trigger mode

In order to reduce the burden of CPU, only will GT828 inform CPU to read the coordinate information when there is variation of output information. The main CPU can set trigger mode by relevant register digit “INT”. “1” is rising edge trigger, which means when it is operating, GT828 will output a rising edge trigger to inform CPI; when setting “0”, it means falling edge trigger.

6.3 Sleeping mode

When the display is turned off or in any circumstance that operation of touch panel is

not needed, master can set GT828 be in Sleep mode through I^2C command. GT828 will return to normal mode when rising edge signal is produced by INT.

6.4 Data dropping function

In order to support more ID design, GT828 designed data dropping function especially. By setting relevant register (Please read Programming Guide for more information), when user touches extra sensor area outside Active Area, GT828 will drop those data automatically.

6.5 Automatic calibration

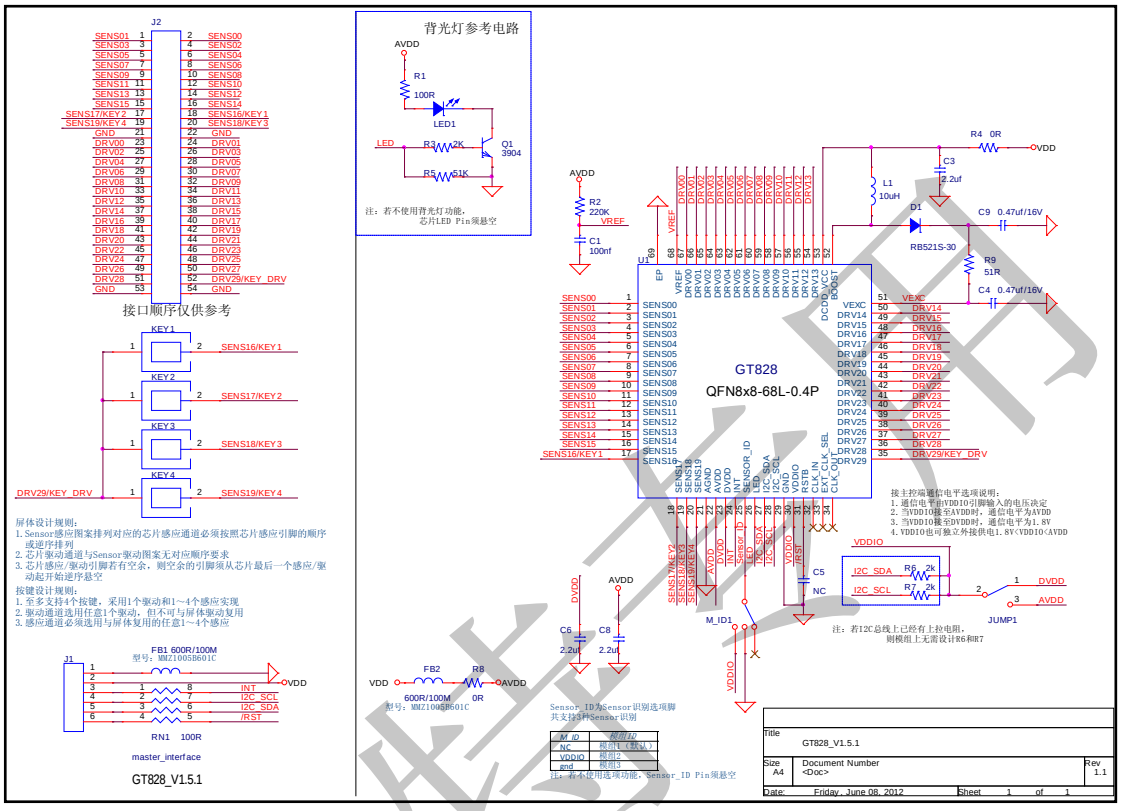
6.5.1 Initialization calibration

Different temperature, humidity and physical space structure will affect the sensor's parameter. According to environmental situation GT828 will update the touch detecting reference automatically in initialized 200ms.

6.5.2 Automatic temperature drift

Slow change of temperature, humidity or dust and other environmental factors will also affect the sensor's parameter. GT828 calculates and analyzes historical data, and compare to the current data variation. Base on this, the detecting reference will be modified automatically.

7 Circuit diagram for reference



GT828 Circuit diagram for reference

Notes：

1. This circuit only shows basic applications, and may be modified according to actual conditions.
2. The capacitor should be used material of X7R.

8 Electrical characteristics

8.1 Absolute operation rating (Temperature 25℃)

Parameter	Min	Max	Unit
Analog power AVDD (refer to AGND)	0.3	4	V
Digital power DVDD (refer to DGND)	0.3	2	V
VDDIO (refer to DGND)	0.3	4	V
Input voltage on digital I/O	-0.3	DVDD+0.3	V
Operating temperature	-20	+85	℃
Storage temperature	-60	+150	℃
Operating humidity	—	95	%
Welding temperature (10s)		+220	℃
ESD protective voltage（HB Model）		±2	KV

8.2 Operating characteristic (Temperature 25 ℃ , AVDD=2.8V)

Parameter	Min	Typical value	Max	Unit
Operating voltage	2.6	2.8	3.6	V
Power ripple	—	-	50	mV
Operating temperature	-20	+25	+85	℃
Operating humidity	—	-	95	%

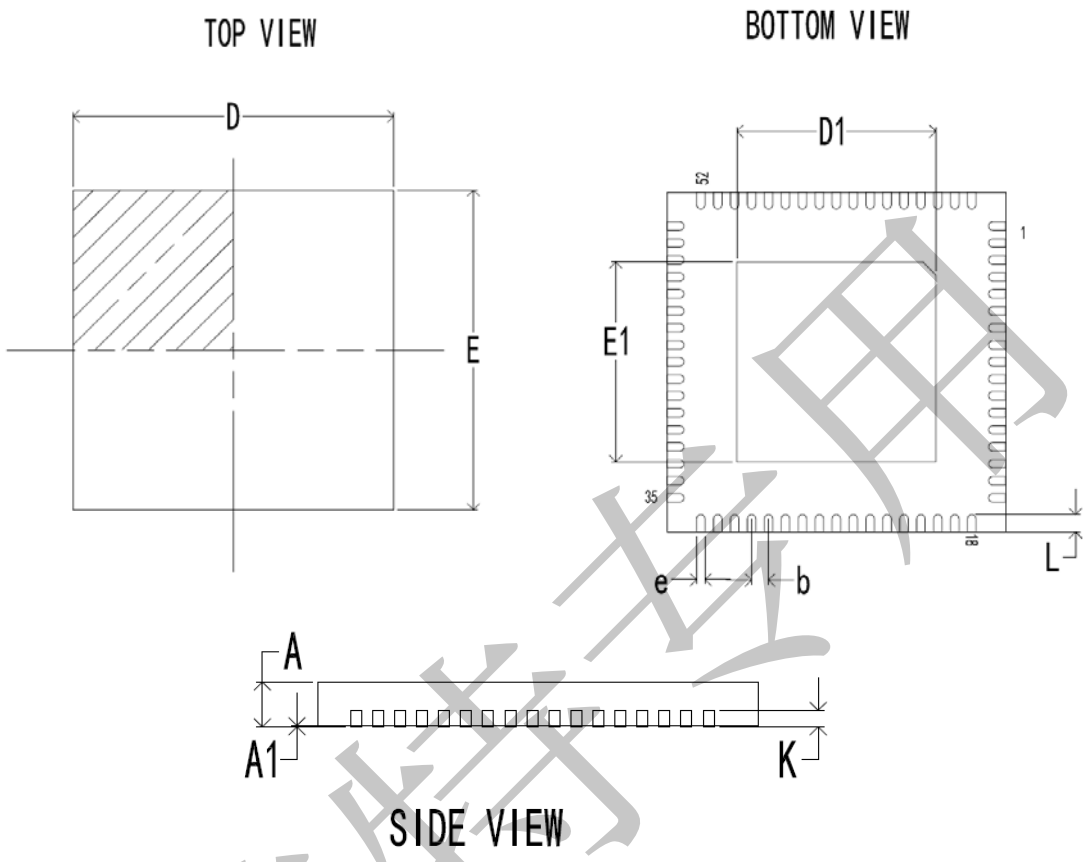
8.3 AC characteristic（Temperature 25℃, AVDD=2.8V）

Parameter	Min	Typical value	Max	Unit
OSC oscillation frequency	-	30	-	MHz
Touch scanning cycle	10	16	20	ms
Sensitivity	—	0.01	—	pF
Time of existing from sleep mode	66.25	130.25	200	ms
Time of existing from green mode	0	24	48	ms
I/O output rise time	—	30	—	ns
I/O output fall time	—	25	—	ns

8.4 DC characteristic（Temperature 25℃, AVDD=2.8V）

Parameter	Min	Typical value	Max	Unit
Operating current (Normal mode)	-	10	-	mA
Operating current (Green mode)	-	6	-	mA
Operating current (Sleep mode)	90	100	120	uA
Input voltage in low level	—	—	0.7	V
Input voltage in high level	1.6	—	2.0	V
output voltage in low level	—	—	0.1	V
output voltage in high level	—	2.8	—	V

9 Packaging



Symbal	Min	Normal	Max
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b		0.40BSC	
D		8.00BSC	
D1	4.55	4.70	4.80
E		8.00BSC	
E1	4.55	4.70	4.80
e	0.15	0.20	0.25
L	0.35	0.45	0.55
K		0.30BSC	

10 Contact information

Shenzhen Goodix Technology Co., Ltd.

Address: Floor 13, Phase B, TengFei Industrial Building, FuTian Free Trade Zone, ShenZhen, 518000

TEL：+86-755-33338828 FAX：+86-755-33338788

www.goodix.com

11 Document history page

Version	Date	Description of Change
Rev.01	2011-10-08	Pre-release
Rev.02	2011-11-06	Update component value of Circuit diagram
Rev.03	2012-03-28	Update Register information and I^2C communication instruction