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TK8022

DATA SHEET

Rev 0.91

AMENDMENT HISTORY

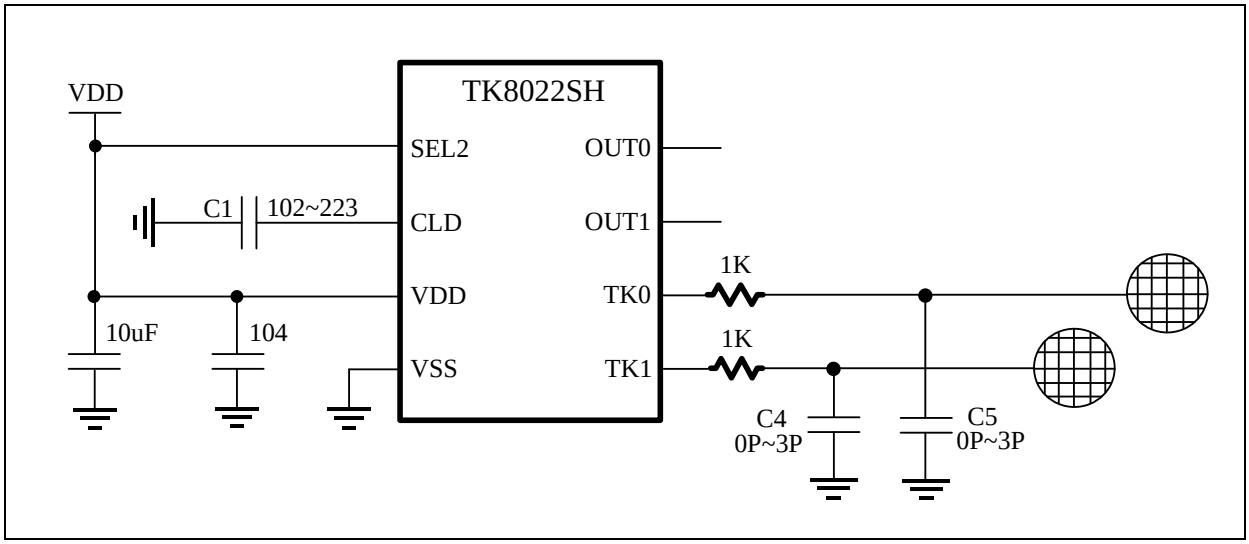
Version	Date	Description
V0.90	Jul, 2017	New release.
V0.91	Nov, 2017	Modify detail information

CONTENTS

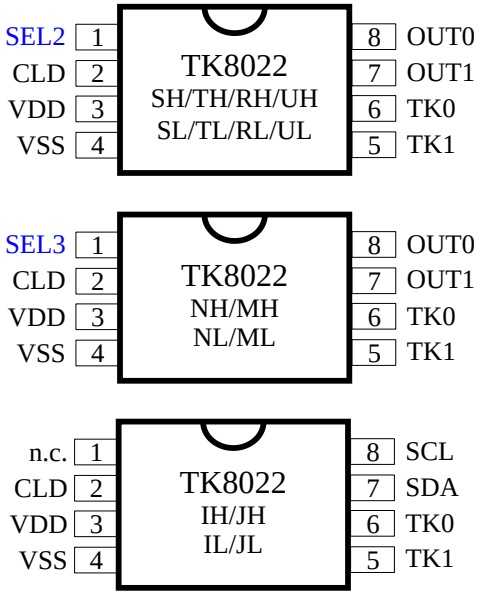
FEATURES

1. Two Key Touch Detector
2. Operation Voltage: 2.1V~5.5V (Type-1, LVR=1.9V) or 1.4V~5.5V (Type-2, LVR=1.2V)
3. Operation Current: 1.8uA @V_{DD}=3V (typical)
4. Enter Low Power mode after no activity for 16 second
5. Sensitivity adjusted by CLD capacitor (1nF~22nF)
6. Active High, Active Low or Open Drain output selectable by SEL2 pin
7. Direct mode or Toggle mode output selectable by SEL3 pin
8. I2C mode selectable by IC part number
9. 16 second or 64 second key press timeout, selectable by IC part number
10. SOP8 package

APPLICATION CIRCUIT



PIN ASSIGNMENT



PIN DESCRIPTION

Name	In/Out	Pin Description
OUT0, OUT1	O	Touch Key corresponding output
SCL, SDA	I/O	I2C Bus communication pin
TK0, TK1	I	Touch Key input
CLD	I/O	Key sensitivity adjust capacitor (1nF~22nF)
SEL2	I	connect to VDD: OUT0 and OUT1 are CMOS active low output connect to VSS: OUT0 and OUT1 are CMOS active high output floating: OUT0 and OUT1 are open drain output
SEL3	I	connect to VDD: OUT0 and OUT1 are Direct mode output connect to VSS: OUT0 and OUT1 are Toggle mode output
VDD, VSS	P	Power input pin and ground

***Note*:** According to the part number, SEL2 and SEL3 could be package bonding option.

DEVICE LIST

Type-1 IC Part number	OUT0, OUT1 output mode	OUT0, OUT1 output level	Max. time for key press timeout
TK8022SH	Direct mode	Active Low / Active High / Open Drain	16S, @VDD=3V
TK8022TH	Toggle mode		
TK8022NH	Direct mode / Toggle mode	Active Low	
TK8022IH	I2C mode	–	
TK8022RH	Direct mode	Active Low / Active High / Open Drain	64S, @VDD=3V
TK8022UH	Toggle mode		
TK8022MH	Direct mode / Toggle mode	Active Low	
TK8022JH	I2C mode	–	

Type-1 Device Feature:

- @25℃ : Operation Voltage = 2.1V~5.5V, LVR=1.9V
- @VDD=3V: Normal mode current=2.5uA, Low Power mode current=1.3uA

Type-2 IC Part number	OUT0, OUT1 output mode	OUT0, OUT1 output level	Max. time for key press timeout
TK8022SL	Direct mode	Active Low / Active High / Open Drain	9S, @VDD=3V 16S, @VDD=1.5V
TK8022TL	Toggle mode		
TK8022NL	Direct mode / Toggle mode	Active Low	
TK8022IL	I2C mode	–	
TK8022RL	Direct mode	Active Low / Active High / Open Drain	36S, @VDD=3V 64S, @VDD=1.5V
TK8022UL	Toggle mode		
TK8022ML	Direct mode / Toggle mode	Active Low	
TK8022JL	I2C mode	–	

Type-2 Device Feature:

- @25℃ : Operation Voltage = 1.4V~5.5V, LVR=1.2V
  @0℃ : Operation Voltage = 1.5V~5.5V, LVR=1.35V
- @VDD=3V: Normal mode current=6.8uA, Low Power mode current=4.5uA
  @VDD=1.5V: Normal mode current=1.7uA, Low Power mode current=0.9uA

FUNCTIONAL DESCRIPTION

1. Output Pin Mode Selection

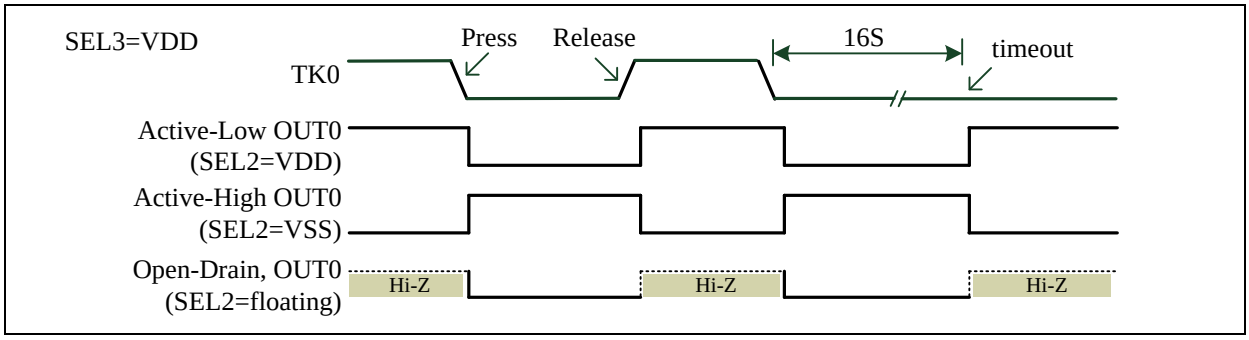
For the TK8022SH group devices, SEL2 is a user-controllable pin to select the OUT0/OUT1's output level, and the SEL3 is wired to VDD/VSS by package bonding to fix at the Direct/Toggle mode.

For the TK8022NH group devices, SEL3 is a user-controllable pin to select the Direct/Toggle mode, and the SEL2 is wired to VDD by package bonding to fix at the Active Low output.

For the TK8022IH group devices, I2C mode is set by mask option.

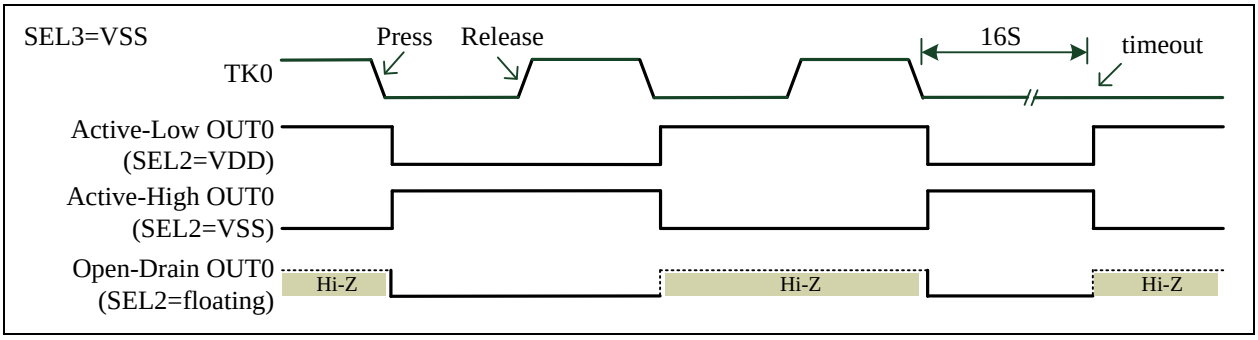
1.1 Direct output mode

This mode needs to connect SEL3 to VDD. Take TK0-OUT0 as an example, the Direct mode waveform is as shown below.



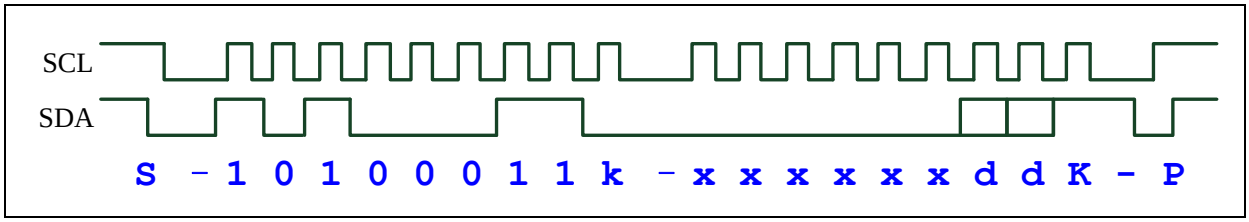
1.2 Toggle output mode

This mode needs to connect SEL3 to VSS. Take TK0-OUT0 as an example, the Toggle mode waveform is as shown below.



1.3 I2C mode

The slave I2C mode is selectable by mask option. The chip support 1 byte I2C read command.



S–10100011k–xxxxxxddK–P
S = Master send I2C START
P = Master send I2C STOP
k = Slave (TK8022) reply ACK (=0)
K = Master reply ACK (=1)
10100011 = Master send slave address
xxxxxxdd = Slave reply Data, **dd** represent the TK1 and TK0's press status

2. Touch Sensitivity Adjustment

The Touch Key Sensitivity can be adjusted by CLD pin's capacitor C1 (1nF~22nF). Larger CLD capacitance makes more sensitivity. The TK pin's capacitor C4/C5 (0pF~3pF) is used to balance the TK0 and TK1's sensitivity. Smaller TK capacitance makes more sensitivity.

3. Key Press Timeout Reset

If any key is pressed more than 16 or 64 seconds (select by part number), the chip reset itself.

4. Normal mode and Low Power mode

The chip starts at Normal mode after reset. If no event occurred for 16 second, it switches to Low Power mode. It switches to Normal mode after detecting TK pin's capacitance variation event.

ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Parameter	Rating	Unit
Supply voltage	V_{SS} –0.3 ~ V_{SS} +5.5	V
Input voltage	V_{SS} –0.3 ~ V_{DD} +0.3	
Operating temperature	–20 ~ +70	℃
Storage temperature	–65 ~ +150	

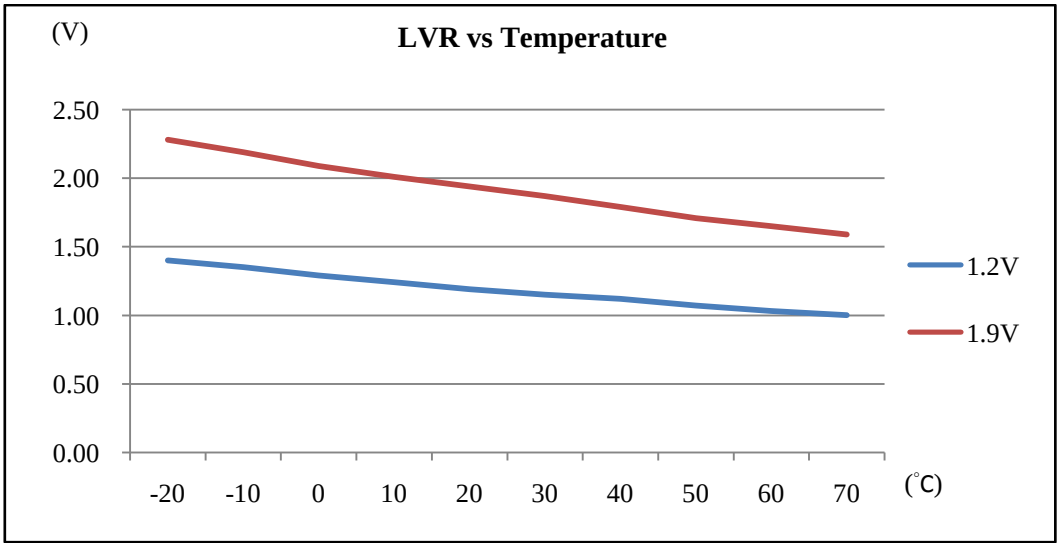
DC Characteristics (TA=25°C)

Parameter	Sym	Conditions		Min	Typ	Max	Unit
Input High Voltage	V_{IH}	all Input	–	0.8V_{DD}			V
Input Low Voltage	V_{IL}			–	–	0.2V_{DD}	
I/O Port Source Current	I_{OH}	all Output	V_{DD}=3.0V V_{OH}=2.7V	–	5	–	mA
			V_{DD}=5.0V V_{OH}=4.5V	–	10	–	
I/O Port Sink Current	I_{OL}	all Output	V_{DD}=3.0V V_{OL}=0.3V	–	11	–	
			V_{DD}=5.0V V_{OL}=0.5V	–	20	–	
Power Supply Current Normal mode	I_{DD}	LVR=1.9V	V_{DD}=5.0V	–	7.8	–	uA
		LVR=1.9V	V_{DD}=3.0V	–	2.5	–	
		LVR=1.2V		–	6.8	–	
		LVR=1.2V	V_{DD}=1.5V	–	1.7	–	
Power Supply Current Low Power mode	I_{DD}	LVR=1.9V	V_{DD}=5.0V	–	5.0	–	uA
		LVR=1.9V	V_{DD}=3.0V	–	1.3	–	
		LVR=1.2V		–	4.5	–	
		LVR=1.2V	V_{DD}=1.5V	–	0.9	–	
Timeout Lead Time	T_{LT}	LVR=1.9V	V_{DD}=3~5V	–	16/64	–	S
		LVR=1.2V	V_{DD}=3.0V	–	9/36	–	
			V_{DD}=1.5V	–	16/64	–	
LVR Voltage	V_{LVR}	select 1.9V		1.7	1.9	2.1	V
		select 1.2V		1.0	1.2	1.4	

I2C Characteristics (TA=25℃)

Parameter	Min	Typ	Max	Unit
SCL clock low time	500	–	–	nS
SCL clock high time	500	–	–	
SDA setup time	100	–	–	
SDA data hold time	100	–	–	
SDA and SCL rise time	–	–	150	
SDA and SCL fall time	–	–	150	
START condition hold time	500	–	–	
STOP condition setup time	500	–	–	
STOP to START condition time	800	–	–	
Capacitive load for each bus line	–	–	200	pF

Characteristics Graphs



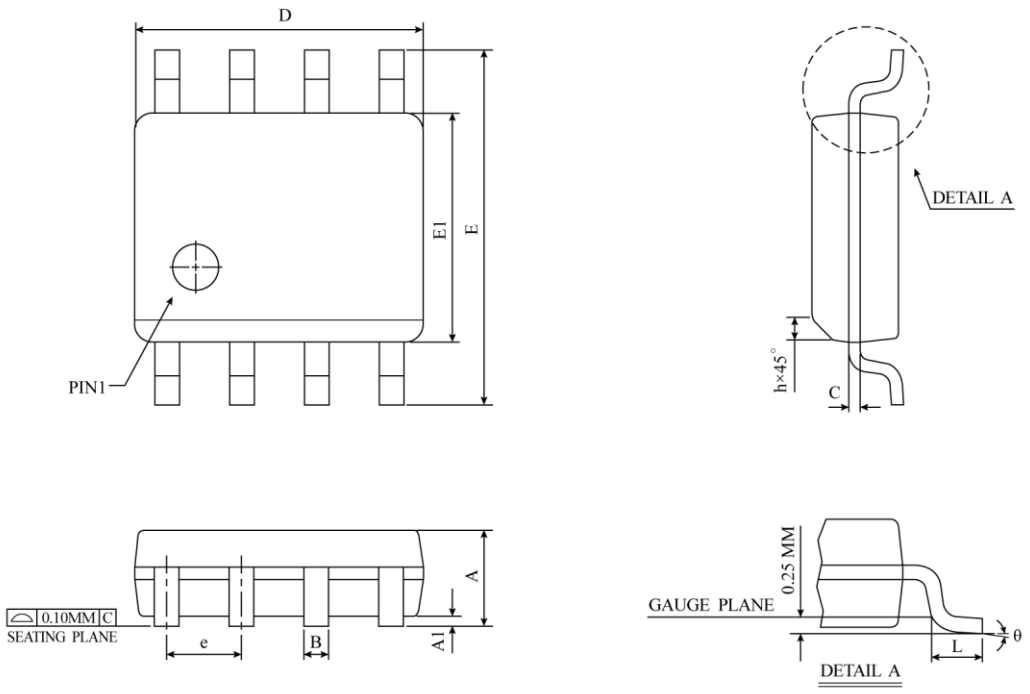
PACKAGE INFORMATION

Ordering Information

Ordering number	Package
TK8022SH-201-14	SOP8 (150mil)
TK8022SL-202-14	
TK8022RH-203-14	
TK8022RL-204-14	
TK8022TH-201-14	
TK8022TL-202-14	
TK8022UH-203-14	
TK8022UL-204-14	
TK8022NH-201-14	
TK8022NL-202-14	
TK8022MH-203-14	
TK8022ML-204-14	
TK8022IH-205-14	
TK8022IL-206-14	
TK8022JH-207-14	
TK8022JL-208-14	

Package Information

● SOP-8 (150mil) Package Dimension



SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	1.55	1.75	0.0532	0.0610	0.0688
A1	0.10	0.18	0.25	0.0040	0.0069	0.0098
B	0.33	0.42	0.51	0.0130	0.0165	0.0200
C	0.19	0.22	0.25	0.0075	0.0087	0.0098
D	4.80	4.90	5.00	0.1890	0.1939	0.1988
E	5.80	6.00	6.20	0.2284	0.2362	0.2440
E1	3.80	3.90	4.00	0.1497	0.1536	0.1574
e	1.27 BSC			0.050 BSC		
h	0.25	0.38	0.50	0.0099	0.0148	0.0196
L	0.40	0.84	1.27	0.0160	0.0330	0.0500
θ	0°	4°	8°	0°	4°	8°
JEDEC	MS-012 (AA)					

⚠ * NOTES : DIMENSION " D " DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL
NOT EXCEED 0.15 MM (0.006 INCH) PER SIDE.