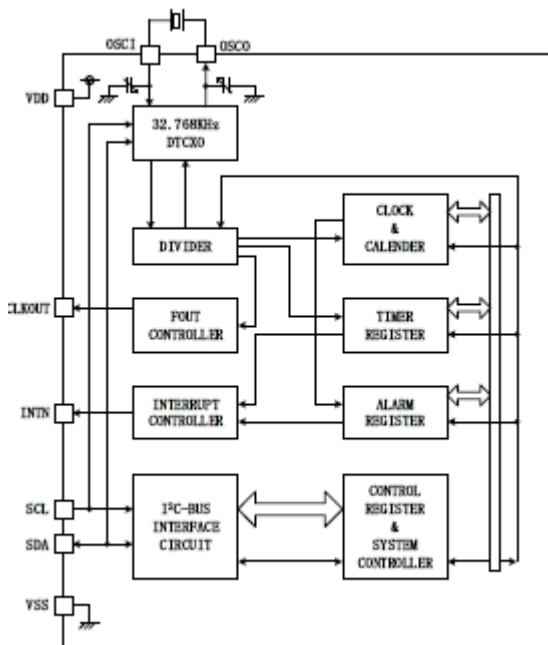High-stability real-time clock chip with the I²C bus communication interface and the temperature compensation functions

- With the built-in 32.768KHz crystal oscillator temperature compensation circuit provides high-accuracy clock output within the scope of -40℃~85℃

- With the built-in crystal oscillator load capacitor, it supports the crystal oscillator frequency adjustment function

- It supports the high-speed I2C bus protocol (400KHz)

- Multiple interruption functions: including timing alarm interruption (settable parameters: week, day, hour, minute), fixed period interruption and time updating interruption

- Programming realization of 32.768KHz/1024Hz/1Hz clock output

- It supports complete calendar functions during 2000-2099, and supports automatic adjustment of leap year

- I2C working voltage scope: 2.0V~5.5V; clock circuit working voltage scope: 1.6V~5.5V

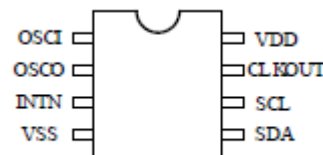- Low current power consumption: 2.3μA@3V(Typ)

■ Structure diagram

■ General specifications

□■Highly frequency stability:
  ■25℃:±20ppm；(monthly deviation less than 55s)
□□-40~85℃:±50ppm；(monthly deviation less than 136s)
□■Built-in 12.5pF crystal load capacitor, in no need of calibration for output frequency
□■Can slightly adjust the frequency through the configuration register: (0.75ppm/Step)
□■Programmable to realize different frequency output functions:
  □■CLKOUT pin can drive 30pF capacitor load
  □■Optional output frequency: 32.768kHz, 1024Hz, 1Hz
■Abundant interruption functions:
  □■Fixed period interruption: set any period interruption between 1/4096s and 4095
  □■Timing alarm interruption: Can generate alarm interruption events in set week, day, hour or minute.
  □■Time updating interruption: Generate interruption alarm events with second updating or minute updating according to the set value.
□■Automatic leap year adjustment function

■ Definitions of pins

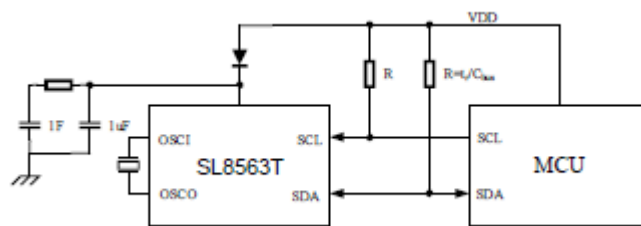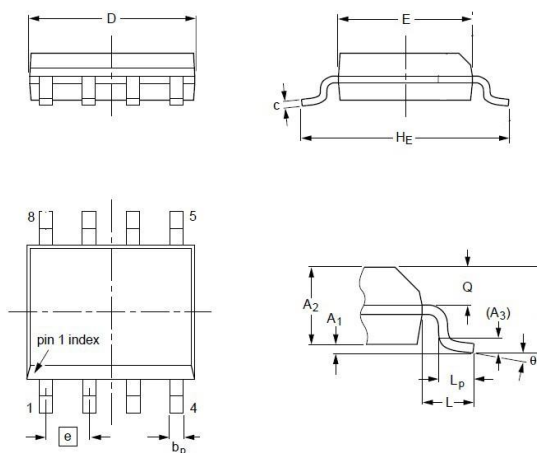| Pin No.	Pin Name	Function
1	OSCI	Crystal oscillator input
2	OSCO	Crystal oscillator output
3	INTN	Interruption output port, N_Ch leakage structure
4	VSS	Ground circuit
5	SDA	I²C bus communication data transmission end
6	SCL	I²C bus communication serial clock input end
7	CLKOUT	Clock output end and CMOS output
8	VDD	Power supply

■ Electrical characteristics   ***Please refer to the User Guide for detailed data**

Item	Symbol	Condition		Min.	Typ.	Max.	Unit
Current power consumption	I_{DD1}	Disable CLKOUT	$V_{DD}=3V$		2.3	2.6	μA
	I_{DD2}		$V_{DD}=5V$		2.4	2.7	
	I_{DD3}	CLKOUT=32.768KHz	$V_{DD}=3V$		2.9	3.3	
	I_{DD4}		$V_{DD}=5V$		3.6	4.0	
Low level input voltage	V_{IL}	SCL, SDA Pins		0		$0.3V_{DD}$	V
High level input voltage	V_{IH}			$0.7V_{DD}$		V_{DD}	
Low level output voltage	V_{OL}	FOUT, INTN, SDA pins	$I_{OH}=-1mA$	0		0.3	V
High level output voltage	V_{OH}	FOUT pin	$I_{OL}=1mA$	$V_{DD}-0.3$		V_{DD}	
SCL clock period	f_{SCL}	$V_{DD}=2.0V\sim5.5V$				400	KHz
CLKOUT duty ratio	δ_{CLKOUT}	$V_{DD}=1.6V\sim5.5V$			50		%
CLKOUT voltage coefficient	$\Delta f/f$	$V_{DD}=2.0V\sim5.5V$				1.0	ppm/V
Crystal ESR	R_S					70	KΩ
Crystal shunt load capacitor	C_L				12.5		pF

■ Application cases

■ Package Specification

	A	A_1	A_2	A_3	b_p	c	θ	UNIT
MAX	1.8	0.3	1.45		0.49	0.3	8°	
TYP				0.3				mm
MIN		0.1	1.25		0.36	0.2	0°	

	D	E	e	H_E	L	L_p	Q	UNIT
MAX	5.0	4.0		6.2		1.0	0.7	
TYP	4.9	3.9	1.27	6.0	1.05			mm
MIN	4.8	3.8		5.8		0.4	0.6	