

## OVERVIEW

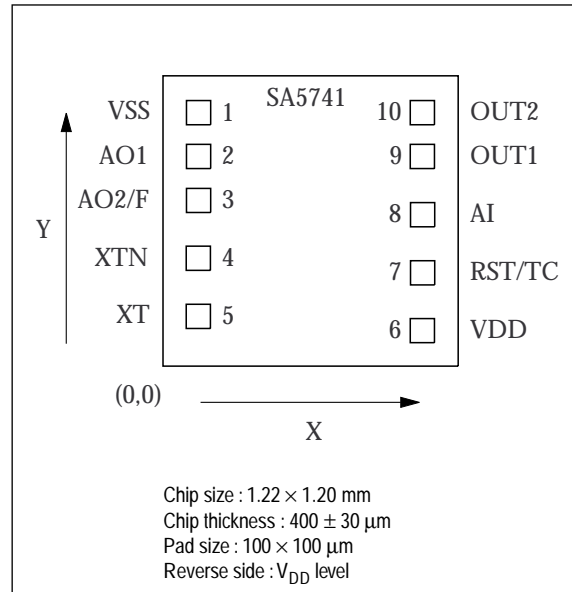
The CF5741 series are analog clock driver ICs using 32.768kHz reference frequency of crystal oscillator. Some versions in accordance with the combinations of each motor drive and alarm output characteristics can provide a wide range of applications for various clock specifications.

## FEATURES

- Operating voltage 1.2 to 2.0V
- Low current 1.2μA (typ) / 1.5V
- Built-in oscillator circuits (32.768 kHz)
- Built-in crystal oscillator capacitors ( $C_G$ ,  $C_D$ )
- Motor output  
Various motor output
- Alarm output  
Various alarm output
- Reset function
- Input debounce function (AI, RST/TC)
- Chip form (CF5741××)

## PINOUT

(Top View)



## SERIES LINEUP

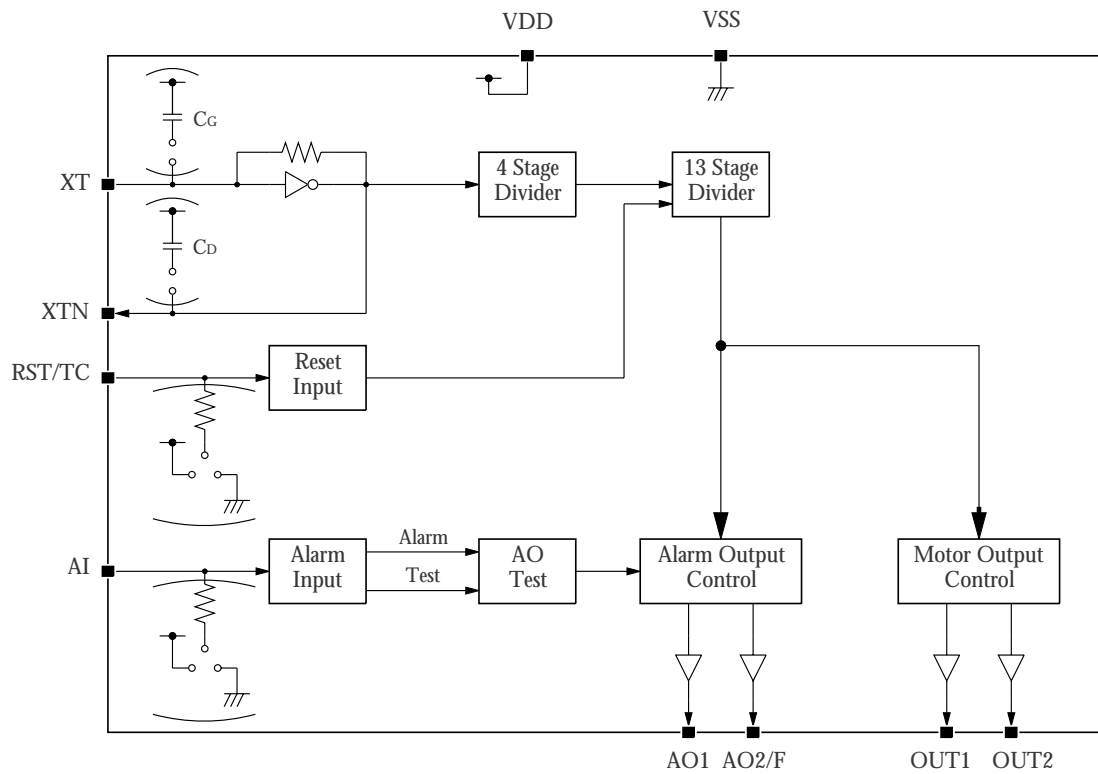
		CF5741AA		CF5741AB		CF5741BA		CF5741BB	
Built-in capacitor	XT terminal $C_G$ (pF)	0		25		0		27	
	XTN terminal $C_D$ (pF)	25		25		25		25	
Reset input	Active level	Low (Pull-up resistor)		Low (Pull-up resistor)		Low (Pull-up resistor)		Low (Pull-up resistor)	
Motor output	Active level	High		High		High		High	
	Hand drive cycle $t_{CY}$ (sec)	1		1		1		1	
	Pulse width $t_{PW}$ (msec)	31.25		31.25		46.875		46.875	
Alarm input	Active level	Low (Pull-up resistor)		Low (Pull-up resistor)		Low (Pull-up resistor)		Low (Pull-up resistor)	
	Test function ( $1/2V_{DD}$ )	Yes		Yes		Yes		Yes	
Alarm output	Terminal	AO1	AO2/F	AO1	AO2/F	AO1	AO2/F <sup>1</sup>	AO1	AO2/F <sup>1</sup>
	Active level	High	High	High	High	High	Low	High	Low
	Fundamental frequency $f_{PW}$ (Hz)	2048	32	2048	32	2048	2048	2048	2048
	Modulation frequency $f_{CY}$ (Hz)	8 + 1	—	8 + 1	—	8 + 1	8 + 1	8 + 1	8 + 1

1. AO is complete reverse phase of AO. (even output is inactive.)

## ORDERING INFORMATION

Device	Package
CF5741××	Chip form

## BLOCK DIAGRAM



## PIN DESCRIPTION

Number	Name	Description	Dimensions ( $\mu\text{m}$ )	
			X	Y
1	VSS	Ground	147	1048
2	AO1	Alarm signal output1	147	867
3	AO2 / F	Alarm signal output2/Frequency output	147	685
4	XTN	Crystal oscillator connection	146	446
5	XT	Crystal oscillator connection	146	206
6	VDD	Power supply pin	1072	147
7	RST / TC	Reset/Test clock input	1073	386
8	AI	Alarm input	1073	626
9	OUT1	Motor drive output 1	1072	867
10	OUT2	Motor drive output 2	1072	1048

## SPECIFICATIONS

### Absolute Maximum Ratings

Parameter	Symbol	Condition	Rating	Unit
Supply voltage	$V_{DD} - V_{SS}$		– 0.3 to 5.0	V
Input voltage	$V_{IN}$		$V_{SS} \leq V_{IN} \leq V_{DD}$	V
Operating temperature	$T_{OPR}$		– 30 to 80	°C
Storage temperature	$T_{STG}$		– 65 to 150	°C

### Electrical Characteristics

$T_a = 25^\circ\text{C}$ ,  $V_{DD} = 1.5\text{V}$ ,  $V_{SS} = 0\text{V}$ ,  $X'_{tal}$  ( $f_o = 32.768\text{kHz}$ ,  $C_1 \leq 35\text{k}\Omega$ ), unless otherwise noted.

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Supply voltage	$V_{DD}$		1.2	1.5	2.0	V
Current consumption	$I_{DD}$	OUT1, OUT2 = Open		1.2	4.0	$\mu\text{A}$
Oscillator start-up time	$t_{STA}$	$V_{DD} = 1.2\text{V}$			5.0	sec
		$V_{DD} = 1.5\text{V}$			2.0	sec
Motor output current	$I_{MOT}$	$V_{DD} = 1.2\text{V}$ , $R_L = 200\Omega^1$	4.0			mA
Input resistance <sup>2</sup> (AI, RST/TC)	$R_{IN}$		200		1200	$\text{k}\Omega$
Oscillator stability	$\Delta f/f$	$V_{DD} = 1.2\text{V}$ to $2.0\text{V}$		0.5	1.0	ppm / 0.1V
Alarm output current (AO1, AO2/F)	$I_{OL1}$	$V_{OL} = 0.75\text{V}$	900			$\mu\text{A}$
	$I_{OL2}$	$V_{OL} = 0.75\text{V}$	10			$\mu\text{A}$
	$I_{OH1}$	$V_{OH} = 0.75\text{V}$	900			$\mu\text{A}$
	$I_{OH2}$	$V_{OH} = 0.75\text{V}$	10			$\mu\text{A}$
Frequency output voltage	$V_F$	$V_{DD} = 1.2\text{V}$ , $C_L = 50\text{pF}$	0.4			V
Internal capacitance <sup>3</sup>	$C_G$					pF
	$C_D$					pF

1.  $R_L$  is resistor of motor coil, that connect OUT1 between OUT2.

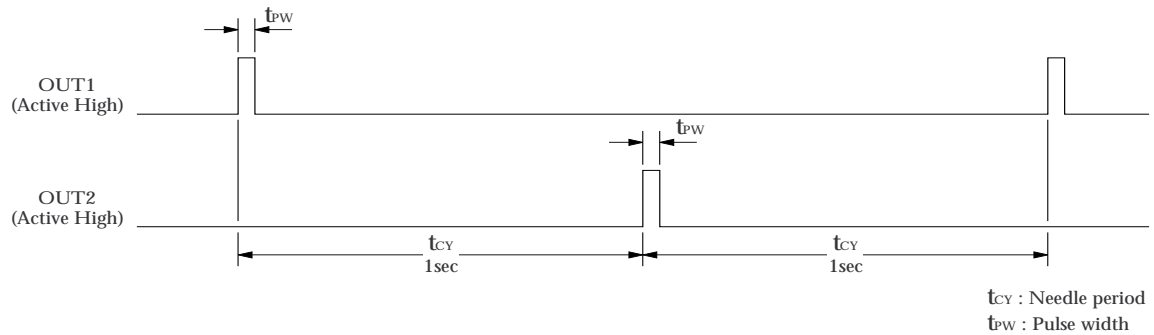
2.  $R_{IN} = V_{DD}/I_S$ .  $I_S$  is current that flow into VSS from AI, RST/TC, when AI, RST/TC short VSS. (AI, RST/TC build-in pull-up resistor.)

3.  $C_G$  is internal capacitor between VDD and XT.  $C_D$  is internal capacitor between VDD and XTN.

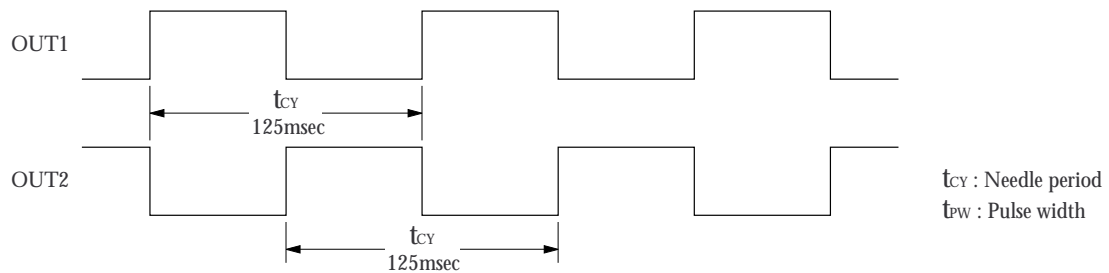
## FUNCTIONAL DESCRIPTION

### Motor Output

#### Stepping motor drive type



#### Sweeping motor drive type



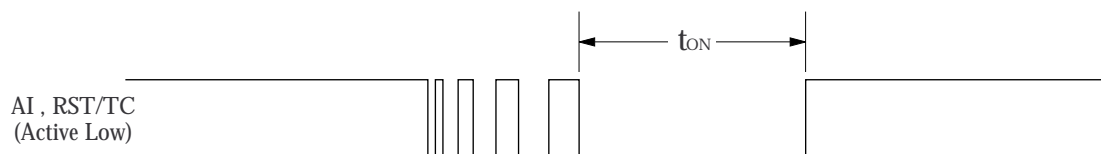
### Input Debounce Function (AI ,RST/TC)

Setting bouncing delay time prevents the circuit from the erroneous operation by AI and RST/TC input bouncing.

$t_{ON} < 62.5$  msec : Alarm and reset input is ignored.

$62.5 \leq t_{ON} \leq 125$  msec : Alarm and reset input is ignored or accepted.

$t_{ON} > 125$  msec : Alarm and reset input is accepted.

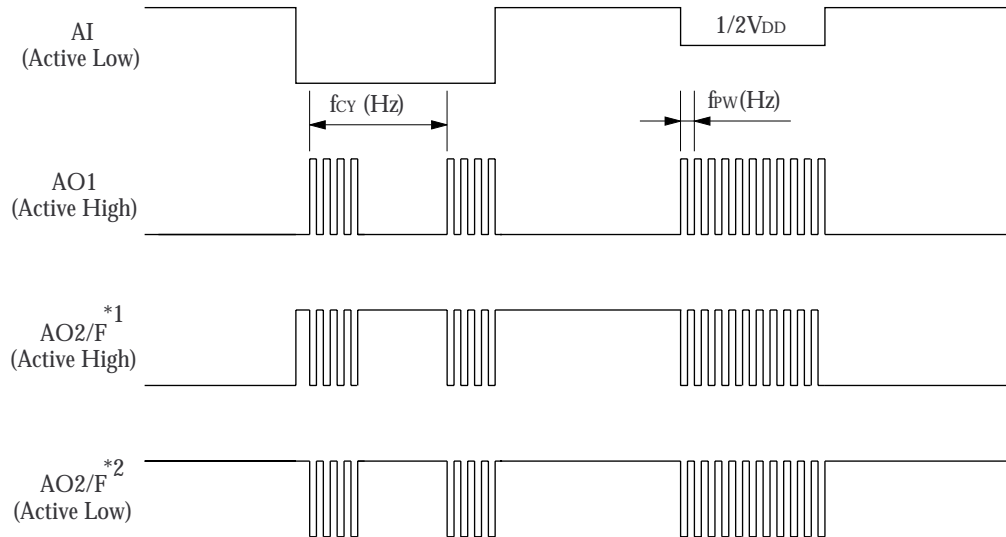




## Test Function

### Fundamental frequency alarm output function

AI goes to  $1/2V_{DD}$  when AO1 and AO2 output alarm fundamental frequency. This frequency can be used to adjust frequency.



\*1 : AO2 / F is the reverse phase of AO1, when output is active.

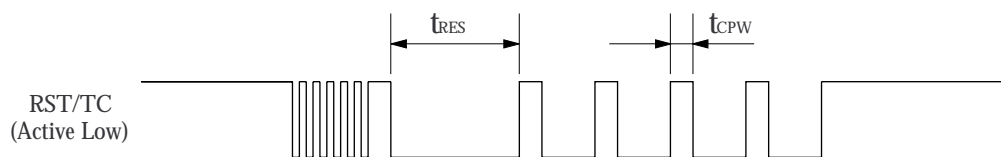
\*2 : AO2 / F is complete reverse phase of AO1.

$f_{PW}$  : Alarm fundamental frequency

$f_{CY}$  : Alarm modulation frequency

### Gain fast function

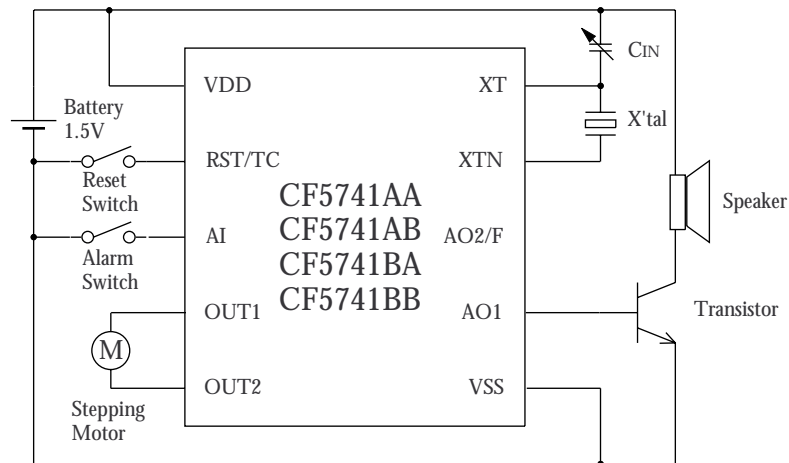
RST/TC is active level more than 125 msec. And RST/TC input outside clock when motor output gain fast.  $t_{CPW}$  is more less than 0.9765625 msec.



$t_{RES} \geq 125\text{msec}$

$t_{CPW} \leq 0.9765625\text{msec}$

## APPLICATION CIRCUITS



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