

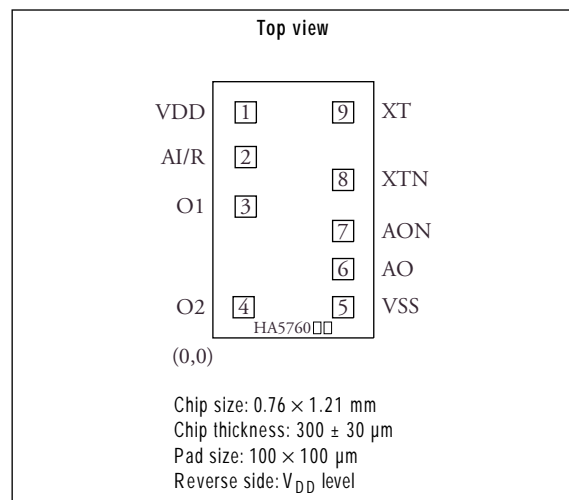
## OVERVIEW

The CF5760 series devices are analog clock ICs that derive their timing from a 32.768 kHz oscillator element. They feature a reset function (optional seconds control function) which can be used to maintain accurate time. Various alarm functions and motor outputs are available to match a wide range of clock specifications.

## FEATURES

- 1.2 to 2.0V operating supply voltage
- 1.2 $\mu$ A (typ) / 1.5V current consumption
- 32.768 kHz oscillator circuit
- Oscillator capacitance  $C_G$  and  $C_D$  built-in
- Alarm output function
- Reset function (optional seconds control function)
- Input chattering elimination function (AI/R)
- Chip form (CF5760 $\times\times$ )

## PAD LAYOUT



## SERIES CONFIGURATION

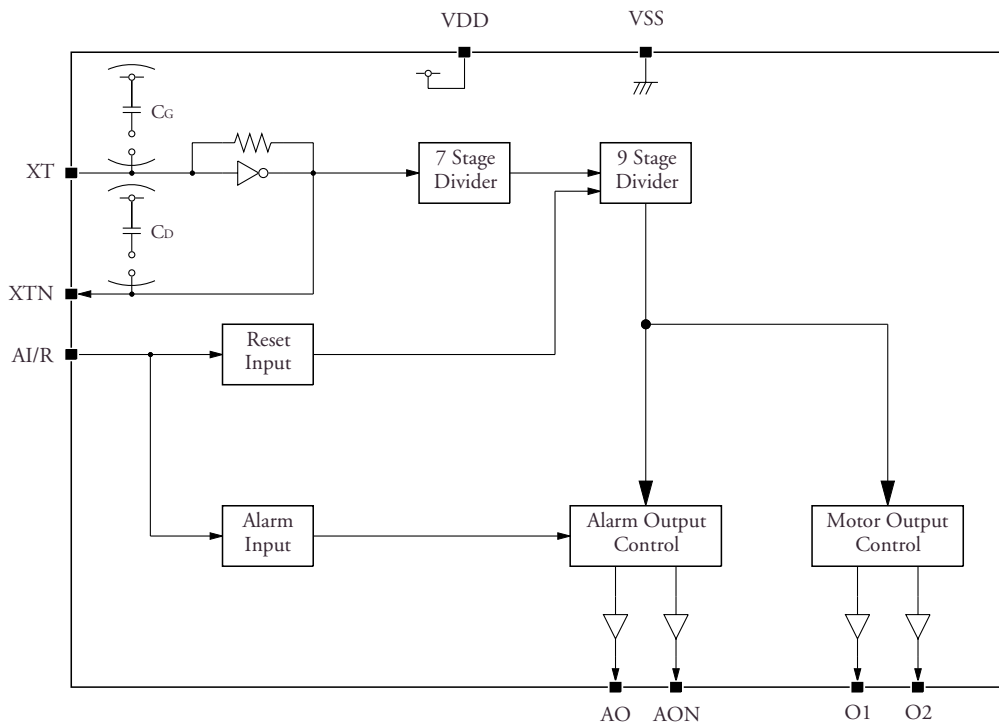
		CF5760AA	CF5760BA	CF5760CC	CF5760DA	CF5760EA	CF5760FC	CF5760HA	CF5760JA
Built-in capacitance <sup>1</sup>	$C_G$ (pF)	3	3	3	3	3	3	3	3
	$C_D$ (pF)	25	25	33	25	25	33	25	25
Alarm input/reset input level		HIGH/LOW	HIGH/LOW	LOW/HIGH	LOW/HIGH	-/LOW	LOW/HIGH	LOW/HIGH	LOW/HIGH
Motor output	Active level	LOW	LOW	HIGH	LOW	-	-	HIGH	-
	Needle period $t_{CY}$ (s)	1	1	1	1	1	0.0625	1	0.0625
	Pulsewidth $t_{PW}$ (ms)	23.4	23.4	31.25	27.3	1000	62.5	46.875	62.5
Alarm output	Pins	AO	AON	AO	AON	AO	AON	AO	AON
	Active level	HIGH	LOW	HIGH	F (32kHz)	HIGH	LOW	HIGH	F (32kHz)
	Frequency $f_{PW}$ (kHz)	4	4	DC	-	2	2	DC	-
	Modulation $t_{CY}$ (Hz)	8	8	-	-	8 + 1	8 + 1	-	-
	$I_{OH}$ min ( $\mu$ A)	900	900	900	10	900	900	900	10
	$I_{OL}$ min ( $\mu$ A)	900	900	10	10	900	900	10	10

1. Built-in capacitance includes the parasitic capacitance.

## ORDERING INFORMATION

Device	Package
CF5760 $\times\times$	Chip form

## BLOCK DIAGRAM



## PAD DESCRIPTION/DIMENSIONS

No.	Name	Description	Dimensions ( $\mu\text{m}$ )	
			X	Y
1	VDD	Supply	155	1065
2	AI/R	Alarm input and reset input	155	854
3	O1	Motor output 1	155	620
4	O2	Motor output 2	145	145
5	VSS	Ground	615	145
6	AO	Alarm output 1	615	325
7	AON	Alarm output 2	615	505
8	XTN	Oscillator output	615	746
9	XT	Oscillator input	615	1065

## SPECIFICATIONS

### Absolute Maximum Ratings

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

### Electrical Characteristics

$T_a = 25^\circ\text{C}$ ,  $V_{DD} = 1.5\text{V}$ ,  $V_{SS} = 0\text{V}$ ,  $C_G = 23\text{pF}$ ,  $C_D = 25\text{pF}$ ,  $X'tal$  ( $f_0 = 32.768\text{kHz}$ ,  $C_1 = 50\text{k}\Omega$  max) unless otherwise noted

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Operating voltage	$V_{DD}$		1.2	-	2.0	V
Current consumption	$I_{DD}$	O1 = O2 = open	-	1.2	4.0	$\mu\text{A}$
Oscillator start-up time	$t_{STA}$	$V_{DD} = 1.2\text{V}$	-	-	5.0	s
Motor output current	$I_{MOT}$	$V_{DD} = 1.2\text{V}$ , $R_L = 200\Omega^1$	4.0	-	-	mA
AI/R HIGH-level input current	$I_{IH}$	$V_{DD} = 1.5\text{V}$	2	4	8	$\mu\text{A}$
AI/R LOW-level input current	$I_{IL}$	$V_{DD} = 1.5\text{V}$	2	4	8	$\mu\text{A}$
Oscillator frequency stability	$\Delta f/f$	$V_{DD} = 1.2$ to $2.0\text{V}$	-	0.5	1.0	ppm/0.1V
Alarm LOW-level output current <sup>2</sup> (AO, AON)	$I_{OL1}$	$V_{DD} = 1.5\text{V}$ , $V_{OL} = 0.75\text{V}$	900	2000	-	$\mu\text{A}$
	$I_{OL2}$	$V_{DD} = 1.5\text{V}$ , $V_{OL} = 0.75\text{V}$	10	30	-	$\mu\text{A}$
Alarm HIGH-level output current <sup>2</sup> (AO, AON)	$I_{OH1}$	$V_{DD} = 1.5\text{V}$ , $V_{OH} = 0.75\text{V}$	900	2000	-	$\mu\text{A}$
	$I_{OH2}$	$V_{DD} = 1.5\text{V}$ , $V_{OH} = 0.75\text{V}$	10	30	-	$\mu\text{A}$
F output voltage <sup>3</sup>	$V_F$	$V_{DD} = 1.2\text{V}$ , $C_L = 50\text{pF}$	0.4	-	-	V
Internal capacitance <sup>4</sup>	$C_G$		Refer to the SERIES LINEUP			pF
	$C_D$					pF

1.  $R_L$  is the load resistance connected between O1 and O2.

2. CF5760AA/ CC/ FC/ HA: If the outputs (AO or AON) are short circuit, the output current is  $I_{AO} \geq 900 \mu\text{A}$ .

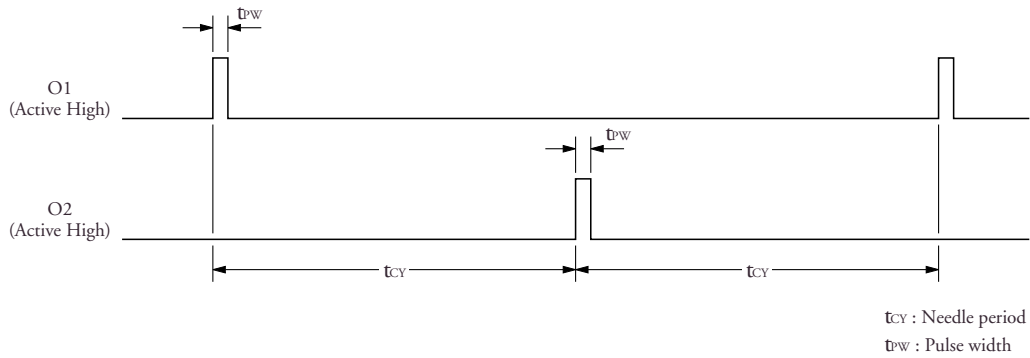
3. The F output voltage rating,  $V_F$ , when a load capacitance,  $C_L$ , is connected between pin F and  $V_{SS}$ , is the difference voltage between the center voltage,  $0.5V_{DD}$ , and the peak voltage.

4.  $C_G$  is the capacitance between  $V_{DD}$  and XT.  $C_D$  is the capacitance between  $V_{DD}$  and XTN.

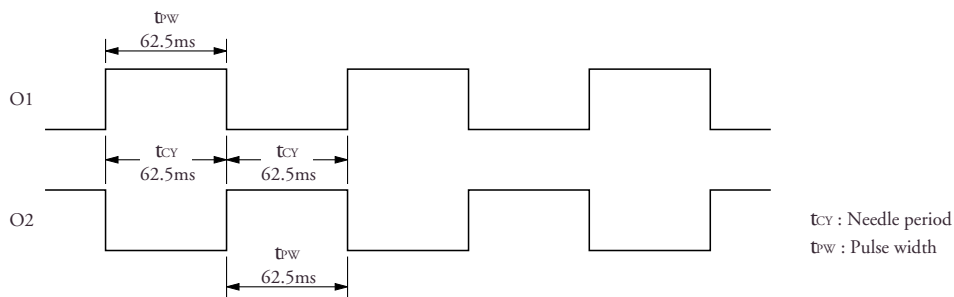
## FUNCTIONAL DESCRIPTION

### Motor Output

#### Motor output waveform (step motor driver)

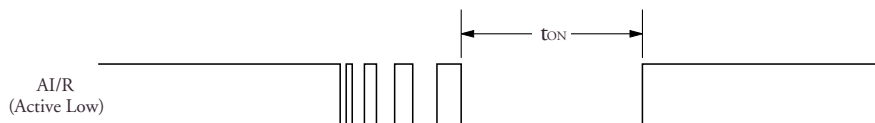


#### Motor output waveform (sweep motor driver)



### Input Chattering Elimination Function (AI/R)

A bounce delay is provided on the AI/R input to eliminate erroneous operation caused by input bounce (chattering).



$t_{ON} < 62.5ms$ : input is ignored.  
 $62.5 \leq t_{ON} \leq 125ms$ : indeterminate  
 $t_{ON} > 125ms$ : input is accepted.

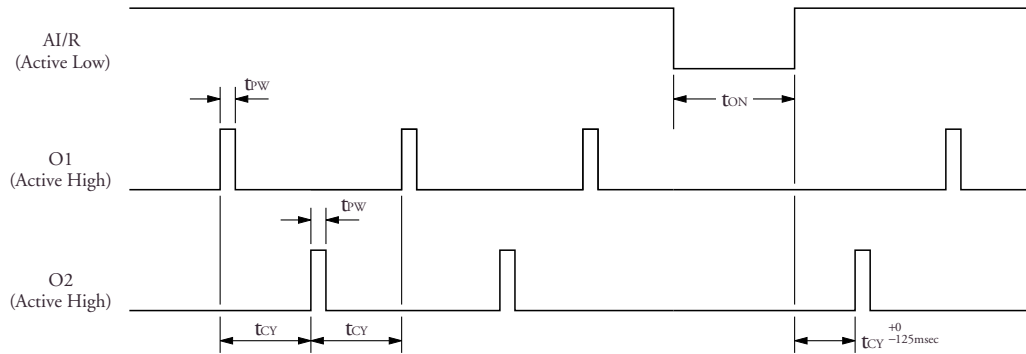
### Input Control Functions

When AI/R is open circuit, a 256Hz signal is output.

When AI/R is HIGH or LOW, it selects the alarm (HIGH)/reset (LOW) function or reset (HIGH)/alarm (LOW) function depending on the version.

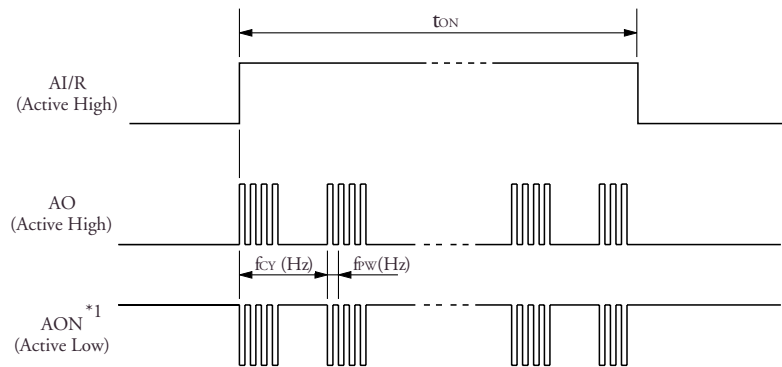
### Reset Function (optional seconds control function)

When AI/R goes active level for a reset, the motor output stops. When the reset is released, the first motor output pulse occurs on the output pin opposite to that which had the last output pulse immediately before the reset.



### Alarm Output

#### Alarm output waveform



\*1: Opposite phase to AO.

$f_{PW}$  = alarm fundamental frequency

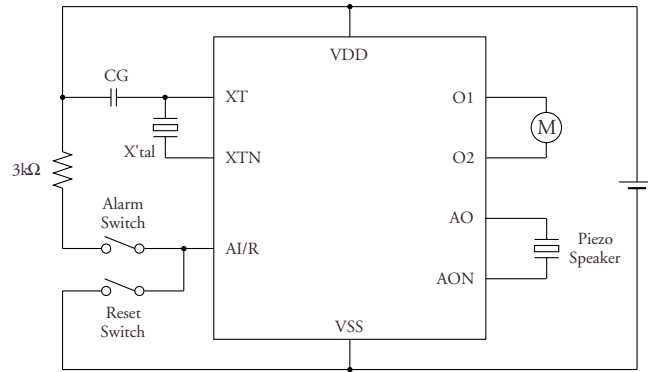
$f_{CY}$  = alarm modulation frequency

### F Output Function

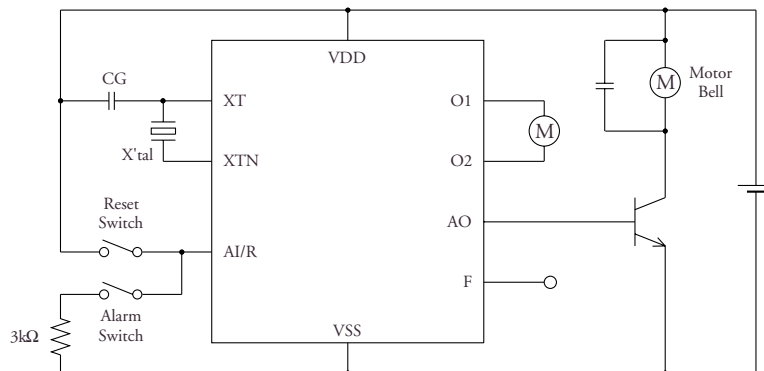
The AON pin may be replaced by the F pin which is used to output a 32kHz signal (unaffected by the reset function).

**TYPICAL APPLICATION CIRCUITS**

**Alarm (HIGH)/Reset (LOW), Piezoelectric alarm**



**Reset (HIGH)/Alarm (LOW), DC Output, F Output**



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