

## OVERVIEW

The CF5732 series are analog clock driver ICs using 32kHz 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.

The CF5732 series incorporates 4 types of pace adjustment capacitors, which enables to adjust the pace with bonding options.

## FEATURES

- Built-in oscillator circuits(32.678 kHz)
- On-chip feed back resistors (Rf, Rd)
- Crystal oscillator capacitors (C<sub>D</sub>, C<sub>G</sub>)
- Additional 4 capacitors for pace adjustment.
- Debounce circuit (AI terminal)
- Single 1.5 V supply
- Available as a die

## SERIES LINEUP

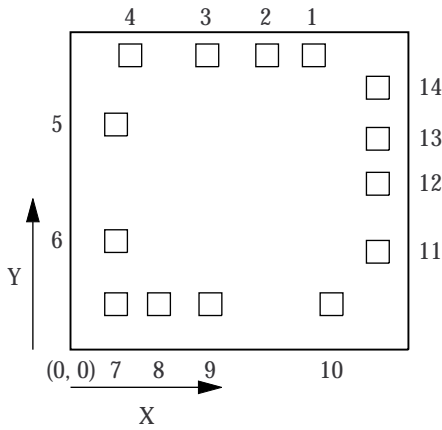
		CF5732EA	CF5732FA	CF5732GA	CF5732HA	CF5732JA	CF5732KA						
Built-in Capacitor	XT terminal C <sub>G</sub> (pF)	11.5	11.5	10	11.5	11.5	11.5						
	XT terminal C <sub>D</sub> (pF)	29	29	25	29	29	29						
	C1(pF)	6	6	3	6	6	6						
	C2(pF)	7	7	4	7	7	7						
	C4(pF)	8	8	5	8	8	8						
	C4(pF)	9	9	6	9	9	9						
Motor Output	Active Level	-	H	L	H	H	H						
Output	Hand Drive Cycle(sec)	0.125	1	1	1	1	1						
	Pulse Width(msec)	DUTY50%	31.25	31.25	15.6	23.4375	46.875						
Alarm Input	Active Level	L	L	L	L	L	L						
	Test Function	Yes(1/2V <sub>DD</sub> )	Yes(1/2V <sub>DD</sub> )	Yes(1/2V <sub>DD</sub> )	Yes(1/2V <sub>DD</sub> )	Yes(1/2V <sub>DD</sub> )	Yes(1/2V <sub>DD</sub> )						
Alarm Output	Terminal	AO	$\overline{AO}$	AO	$\overline{AO}$	AO	$\overline{AO}$	AO	$\overline{AO}$	AO	$\overline{AO}$	AO	$\overline{AO}$
	Active Level	H	L(*1)	H	L(*2)	H	L(*1)	H	L(*2)	H	L(*2)	H	L(*2)
	Fundamental Frequency(Hz)	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
	Modulation Frequency(Hz)	8+1	8+1	8+1	8+1	8+1	8+1	16+1	16+1	8+1	8+1	8+1	8+1
	I <sub>OH</sub> MIN(mA)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
	I <sub>OL</sub> MIN(mA)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

(\*1)  $\overline{AO}$  is the reverse phase of AO, when output is active. (the same phase, when output is inactive)

(\*2)  $\overline{AO}$  is complete reverse phase of AO. (even output is inactive.)

# CF5732 Series

## PINOUT



Chip size: 1.49×1.40mm  
 Chip thickness: 300±30μm  
 Pad size: 100×100μm  
 Reverse side of chip is V<sub>DD</sub>.

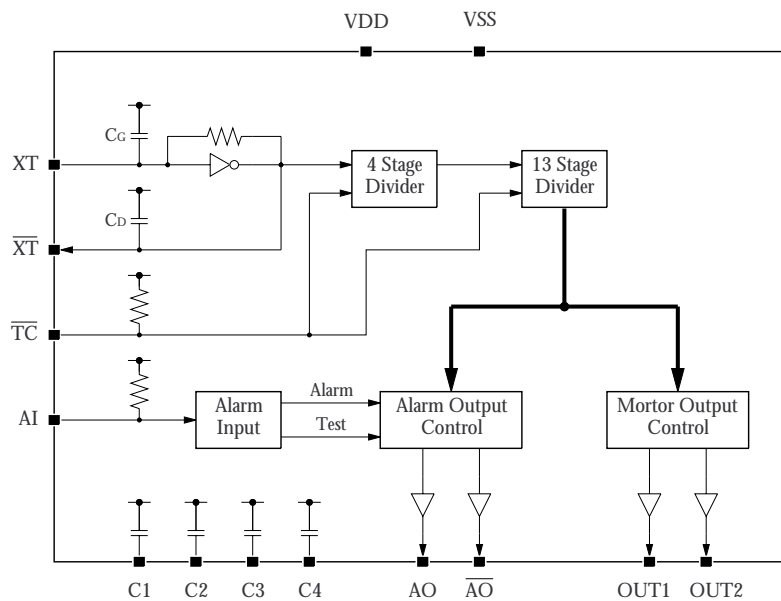
## PIN DESCRIPTION

Name	Description
VDD	Power supply pin
VSS	Ground
$\overline{TC}$	Test pin
AI	Alarm Input
AO	Alarm signal Output
$\overline{AO}$	Alarm signal Inverting Output
OUT2	Motor drive output 2
OUT1	Motor drive output 1
$\overline{XT}$	Crystal oscillator connection
XT	Crystal oscillator connection
C1	Supplementary internal capacitor connection 1
C2	Supplementary internal capacitor connection 2
C3	Supplementary internal capacitor connection 3
C4	Supplementary internal capacitor connection 4

(Unit: μm)

No	Name	X	Y	No	Name	X	Y
1	VDD	1023	1248	8	OUT1	340	151
2	VSS	817	1248	9	$\overline{XT}$	567	151
3	$\overline{TC}$	553	1248	10	XT	1101	151
4	AI	214	1248	11	C1	1305	382
5	AO	151	943	12	C2	1305	682
6	$\overline{AO}$	151	429	13	C3	1305	880
7	OUT2	151	151	14	C4	1305	1105

## BLOCK DIAGRAM



## CF5732 Series

### ABSOLUTE MAXIMUM RATINGS

(V<sub>SS</sub>= 0V)

Parameter	Symbol	Condition	Rating	Unit
Supply Voltage	V <sub>DD</sub> - V <sub>SS</sub>		-0.3 to +5.0	V
Input Voltage	V <sub>IN</sub>		V <sub>SS</sub> ≤ V <sub>IN</sub> ≤ V <sub>DD</sub>	V
Operating Temperature	T <sub>OPR</sub>		-30 to +70	°C
Storage Temperature	T <sub>STG</sub>		-40 to +125	°C

### ELECTRICAL CHARACTERISTICS

(T<sub>a</sub>= 25°C, V<sub>DD</sub>= 1.5V, V<sub>SS</sub>= 0V, f<sub>0</sub>= 32.768kHz unless otherwise noted)

Parameter	Symbol	Condition	Rating			Unit
			MIN	TYP	MAX	
Supply Voltage	V <sub>DD</sub>		1.1	1.5	2.0	V
Supply Current	I <sub>DD</sub>	No Load(*1)		1.0	3.0	μA
Motor Output Current	I <sub>MOT</sub>	V <sub>DD</sub> = 1.2V, R <sub>L</sub> = 200Ω	4.0			mA
Alarm Output Current	I <sub>OH</sub>	AO, $\overline{AO}$ pin, V <sub>OH</sub> = 0.75V	-1.0			mA
	I <sub>OL</sub>	AO, $\overline{AO}$ pin, V <sub>OL</sub> = 0.75V	1.0			mA
Alarm Input Voltage	V <sub>IH</sub>	AI pin	V <sub>DD</sub> -0.2		V <sub>DD</sub>	V
	V <sub>IL</sub>	AI pin	V <sub>SS</sub>		V <sub>SS</sub> +0.2	V
Alarm Input Center Voltage	V <sub>IM</sub>	AI pin		1/2V <sub>DD</sub>		V
Input Resistance	R <sub>IN</sub>	AI pin	5	15	50	kΩ
Oscillator Stability	Δf/f	V <sub>DD</sub> = 1.1V to 2.0V		0.5	1	PPM/0.1V
Internal Capacitance	C <sub>G</sub>	(*2)	GA		10	pF
			others		11.5	pF
	C <sub>D</sub>	(*3)	GA		25	pF
			others		29	pF

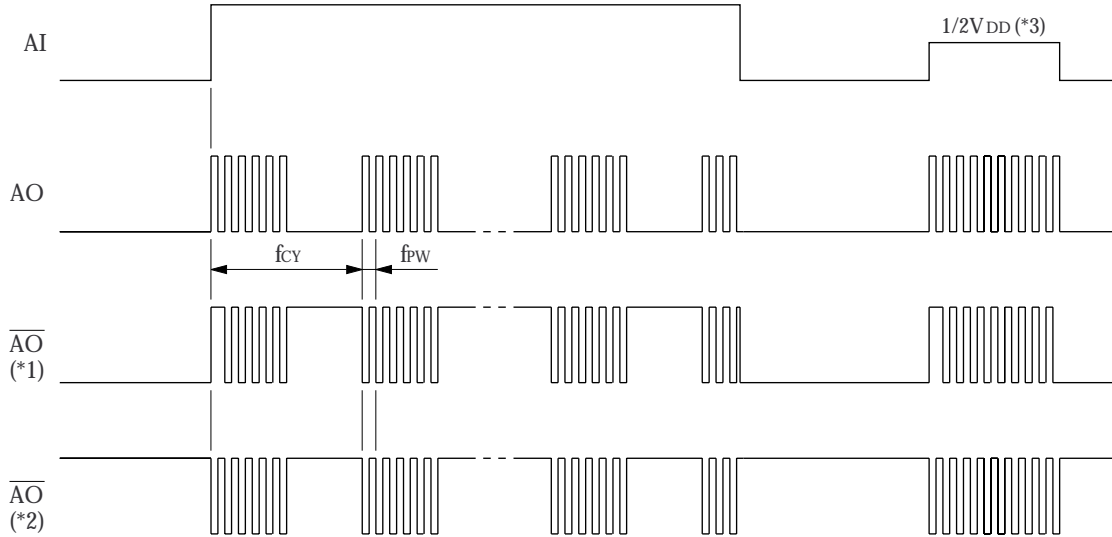
(\*1) All terminals except for the supply and the crystal oscillators are open.

(\*2) C<sub>G</sub> is the incorporated capacitance between V<sub>DD</sub> and XT.

(\*3) C<sub>D</sub> is the incorporated capacitance between V<sub>DD</sub> and  $\overline{XT}$ .

FUNCTIONAL DESCRIPTION

Alarm input/output



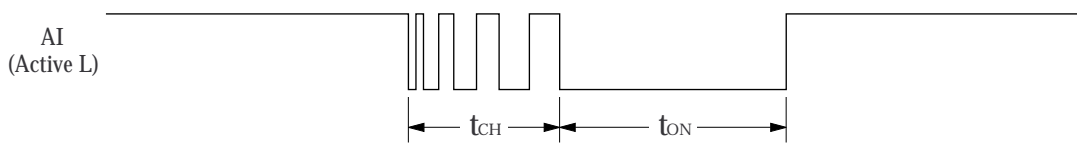
- (\*1)  $\overline{AO}$  is the reverse phase of AO, when output is active. (the same phase, when output is inactive): CF5732EA, GA
- (\*2)  $\overline{AO}$  is complete reverse phase of AO. (even output is inactive.): CF5732FA, HA, JA, KA
- (\*3) When AI is held at  $1/2 V_{DD}$ , the alarm reference, frequency is output at AO and  $\overline{AO}$ .

Input Debouncing Circuit

Setting bouncing delay time prevents the circuit from the erroneous operation by AI input bouncing (chattering.)

$t_{on} \leq 31.25 \text{ msec}$  : The alarm input is ignored

$t_{on} \geq 62.5 \text{ msec}$  : The alarm input is accepted

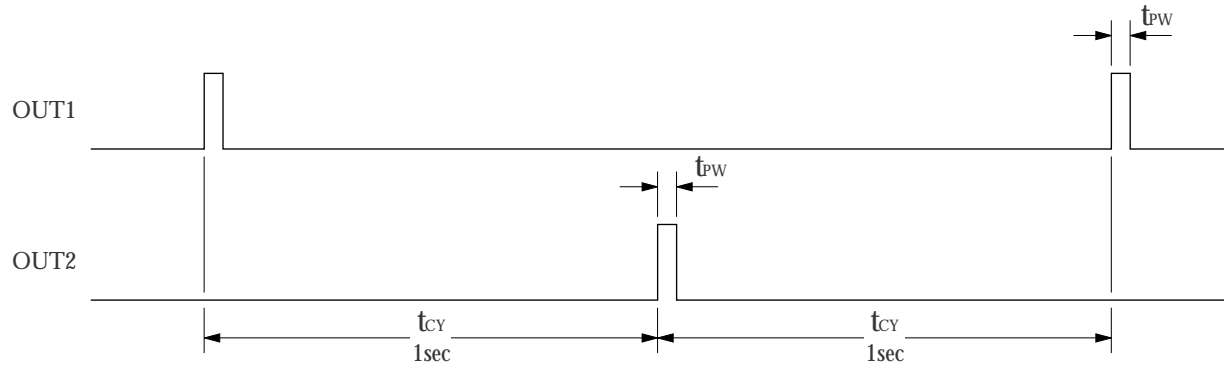


# CF5732 Series

## Motor Drive Outputs

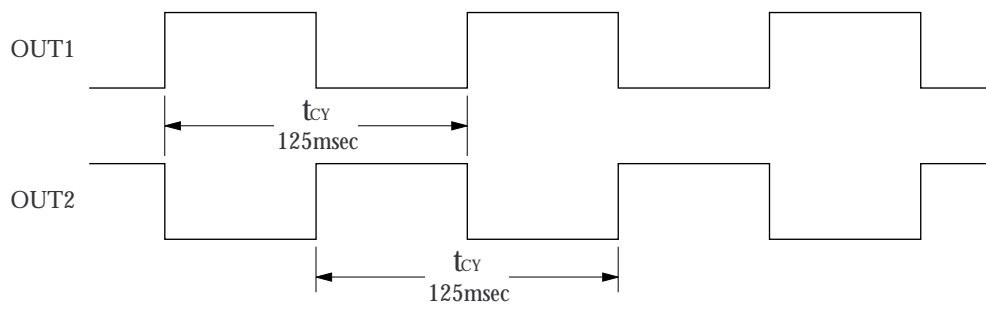
### Step needle movement

CF5732FA, GA, HA, JA, KA



### Continuos needle movement

CF5732EA



## CF5732 Series

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