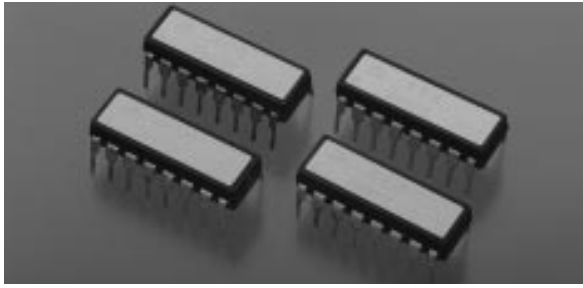


Crystal Oscillators - Programmable - Seiko Epson

SPG Series



Features

- Capable of selecting 57 varieties of frequency output
- Use of CMOS IC enables low current consumption
- Easy-to-mount DIP 16 pin type
- Most types held ex-stock

Specifications

Item	Symbol	Specifications											Remarks	
Model name		8640AN	8640BN	8640CN	8650A	8650B	8650C	8650D	8650E	8651A	8651B	8651E	For output frequency, refer to the	
Oscillation source frequency	f_o	600kHz	1MHz	769kHz	60kHz	100kHz	96kHz	153.6kHz	32.768kHz	60kHz	100kHz	32.768kHz	table on the next page	
Power source	Max. supply voltage	V_{DD-GND}											-0/3V ~ +7.0V	
voltage	Operating voltage	V_{DD}											5.0V \pm 0.5V	
Temperature	Storage temp.												-55°C ~ +125°C	
range	Operating temp.												-10°C ~ +70°C	
Soldering condition (lead part)	T_{SOL}	Under 260°C within 10 sec.											Package should be less than 150°C	
Frequency tolerance	$\Delta f/f$	± 100 ppm			± 50 ppm			± 5 ppm (1*)			$V_{DD}=5V, T_a=25^\circ C$			
Frequency/temp. characteristics													+10/-120ppm	$V_{DD}=5V, T_a=10 \sim 70^\circ C$
Frequency Voltage characteristics		± 20 ppm	± 10 ppm	± 20 ppm	± 10 ppm			± 5 ppm			$V_{DD}=4.5 \sim 5.5V$			
Aging	f_a	± 5 ppm/year max.			± 3 ppm/year max			± 3 ppm/year max			$V_{DD}=5V, T_a=25^\circ C$			
Current consumption	I_{OP}	1.0mA	2.0mA	1.5mA				0.5mA			Max. No load condition			

(*1) Frequency tolerance of 8651 system shows the value guaranteed at the time of shipment

Electrical Characteristics $V_{DD}=5V \pm 0.5V, T_a=10 \sim 70^\circ C, C_L \leq 15pF$

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
L input voltage	V_{IL}	0		0.8	V	
H input voltage	V_{IH}	$V_{DD}-1.0$		V_{DD}	V	
L input current (Reset)	I_{RL}	-30		-5	μA	Reset= V_{SS}
H input current (Reset)	I_{RH}			0.5	μA	Reset= V_{DD}
L input current (input terminal except for Reset)	I_{IL}	-0.5			μA	
H input current (input terminal except for Reset)	I_{IH}	5		30	μA	
L output voltage	V_{OL}			0.4	V	$I_{OL}=1.6mA$
H output voltage	V_{OH}	$V_{DD}-1.0$			V	$I_{OH}=40\mu A$
L output current	I_{OL}	1.6			mA	$V_{OL}=0.4V$
H output current	I_{OH}			-40	μA	$V_{OH}=V_{DD}-1.0V$
Output rise time	t_{rLH}		30	60	nS	
Output fall time	t_{rHL}		25	50	nS	
Duty		40		60	%	Except in the case of 1/3 and 1/5
Min. reset pulse width	t_{RW}	1.0			μS	
Reset delay time	t_R			1.0	μS	
Reset release synchronous error	t_E	$t_w-1/2$ to (*1) t_w (*2)				
External signal input frequency	F_{IN}			1M	Hz	8640N only
External signal input plus width	t_{IN}	0.5			μS	8640N only
Oscillation startup time	t_{OSC}		0.2	1	sec.	(*3)

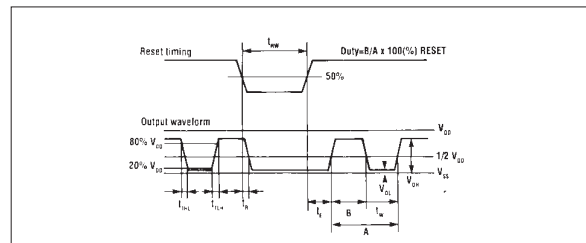
(*1) to-oscillation source cycle. (*2) $t_w-1/2$ cycle of preset frequency
 (*3) for more than 1mS until $V_{DD}=0.4.5V$. Time at 4.5V is to be zero

Divider IC (without quartz crystal)

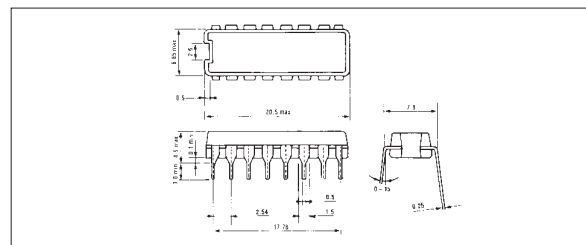
Item	Symbol	Specifications	Remarks
Model name		8650 ?	
Input clock frequency		1MHz MAX	
Current consumption	I_{OP}	about 2mA	No load condition



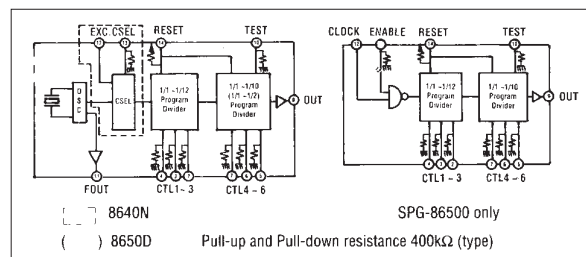
Reset Timing



Dimensions (mm)



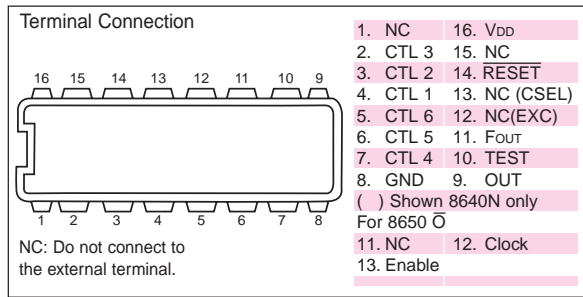
Block Diagram



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Crystal Oscillators - Programmable - Seiko Epson

SPG Series



Explanation of Terminals

Terminal Name	Function
CTL1 to 6	Programs dividing ratio. (pull-down resistor incorporated)
OUT	Output frequency preset by CTL1-6. (Refer to the setting procedure of output frequency)
FOUT	Constantly outputs the oscillation source frequency of built-in quartz crystal.
RESET	Stops output at RESET="L". (Pull up resistor incorporated)
TEST	Used for the input terminal for testing. When CTL4 is H, output will be 1000 times larger than the preset value at TEST="H". (Pull-down resistor incorporated)
EXC	Serves as input terminal when using an external clock by (8640N only) changing to the built-in oscillator. Effective only when CSEL is H.
CSEL	When this terminal is made H, the external clock is selected (8640N only) (Pull down resistor incorporated).

Note: treatment of empty terminals. When RESET terminal is not used, this should be connected to V_{DD}, when TEST terminal, CSEL terminal, and CTL1 to 6 terminals are not used, to GND.

Additional explanation of terminals for 8650D series

Clock	Clock input (max. 1MHz)
ENABLE	Be sure to connect to V _{DD}

Setting of Divider Output

CTL1	CTL2	CTL3	Dividing ratio	CTL4	CTL5	CTL6	Dividing ratio
0	0	0	1/1	0	0	0	1/1 (1 st)
0	0	1	1/10	0	0	1	1/10 (1 st)
0	1	0	1/2	0	1	0	1/10 ² (1/2 ²)
0	1	1	1/3	0	1	1	1/10 ³ (1/2 ³)
1	0	0	1/4	1	0	0	1/10 ⁴ (1/2 ⁴)
1	0	1	1/5	1	0	1	1/10 ⁵ (1/2 ⁵)
1	1	0	1/6	1	1	0	1/10 ⁶ (1/2 ⁶)
1	1	1	1/12	1	1	1	1/10 ⁷ (1/2 ⁷)

*0 = L 1 = H

()8650D

Setting of Output Frequency

8640AN

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0

8640BN

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0

8650A 8651A

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0

8650B 8651B

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0

8650E 8651E

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0

Baud Rate Generator

8640CN

CTL1	CTL2	CTL3	CTL4	CTL5	CTL6	Output frequency (kHz)	Baud rate output example (fo/16)(bits/sec)
0	0	0	0	0	0	768k	48000
1	0	1	0	0	0	153.6	9600
0	0	1	0	0	0	76.8	4800
0	1	0	0	0	1	38.4	2400
1	0	0	0	0	1	19.2	1200

8650C

CTL1	CTL2	CTL3	CTL4	CTL5	CTL6	Output frequency (kHz)	Baud rate output example (fo/16)(bits/sec)
0	0	0	0	0	0	96.0	6000
1	0	1	0	0	0	19.2	1200
0	0	1	0	0	0	9.6	600
0	1	0	0	0	1	4.8	300
0	1	1	0	0	1	3.2	200
1	0	0	0	0	1	2.4	150
1	1	0	0	0	1	1.6	100
1	1	1	0	0	1	0.8	50

8650D

CTL1	CTL2	CTL3	CTL4	CTL5	CTL6	Output frequency (kHz)	Baud rate output example (fo/16)(bits/sec)
0	0	0	0	0	0	153.6	9600
0	0	0	0	0	1	76.8	4800
0	0	0	0	1	0	38.4	2400
0	0	0	0	1	1	19.2	1200
0	0	0	1	0	1	4.8	300
0	1	1	1	0	0	3.2	200
0	0	0	1	1	0	2.4	150
1	1	0	1	0	0	1.6	100
0	0	0	1	1	1	1.2	75
1	1	1	1	0	0	0.8	50

Note: Lower digits are omitted



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