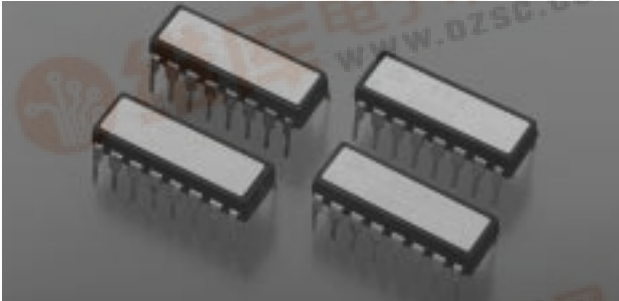


Crystal Oscillators - Programmable - Seiko Epson

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 table on the next page
Oscillation source frequency	fo	600kHz 1MHz 769kHz 60kHz 100kHz 96kHz 153.6kHz 32.768kHz 60kHz 100kHz 32.768kHz	
Power source	Max. supply voltage	V _{DD} -GND	-0/3V ~ +7.0V
voltage	Operating voltage	V _{DD}	5.0V ± 0.5V
Temperature range	Storage temp.	T _{STG}	-55°C ~ +125°C
	Operating temp.	T _{OPR}	-10°C ~ +70°C
Soldering condition (lead part)	T _{SOL}		Under 260°C within 10 sec.
Frequency tolerance	Δf/f	±100ppm	±50ppm ±5ppm (1*)
Frequency/temp. characteristics			+10/-120ppm ±5ppm
Frequency Voltage characteristics		±20ppm ±10ppm ±20ppm	±10ppm ±5ppm
Aging	fa		±5ppm/year max. ±3ppm/year max
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±0.5V, T_a=-10 ~ 70°C CL≤15pF

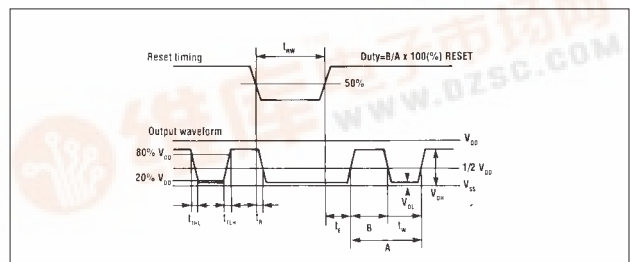
Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
L input voltage	V _{IL}	0		0.8	V	
H input voltage	V _{IH}	V _{DD} -1.0		V _{DD}		
L input current (Reset)	I _{RL}	-30		-5	μA	Reset=V _{SS}
H input current (Reset)	I _{RH}			0.5	μA	Reset=V _{DD}
L input current (input terminal except for Reset)	I _{IL}	-0.5			μA	
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} =40μA
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 _{TLH}		30	60	nS	
Output fall time	t _{THL}		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 _v -1/2 to (*1) t _v (*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) tw=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

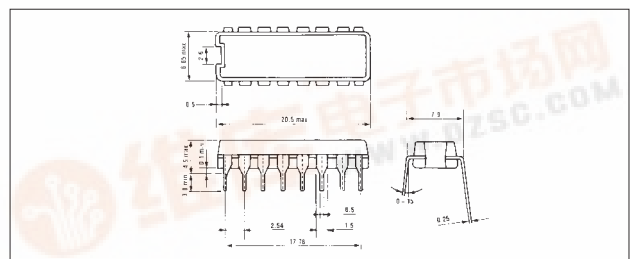
Divider IC (without quartz crystal)

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

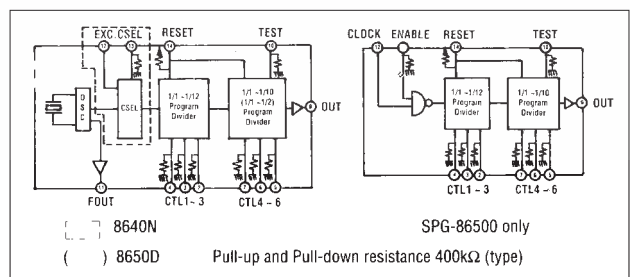
Reset Timing



Dimensions (mm)

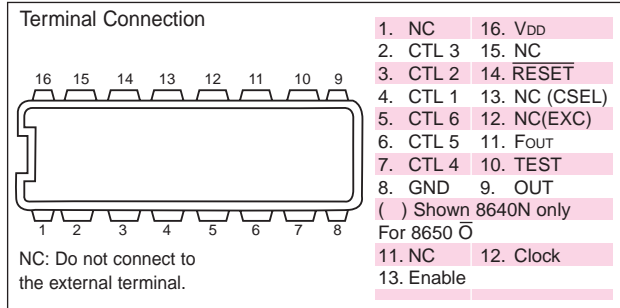


Block Diagram



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 VDD, 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 ⁰)
0	0	1	1/10	0	0	1	1/10 (1 ¹)
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

Set terminal		CTL4	CTL5	CTL6	Output frequency (kHz)	Baud rate output example (fo/16)(bits/sec)
0	0	0	0	0	600K	60K
0	0	1	0	0	60K	6K
0	1	0	0	0	300K	30K
0	1	1	0	0	200K	20K
1	0	0	0	0	150K	15K
1	0	1	0	0	120K	12K
1	1	0	0	0	100K	10K
1	1	1	0	0	50K	5K

8640BN

Set terminal		CTL4	CTL5	CTL6	Output frequency (kHz)	Baud rate output example (fo/16)(bits/sec)
0	0	0	0	0	1M	100K
0	0	1	0	0	100K	10K
0	1	0	0	0	500K	50K
0	1	1	0	0	333.3K	33.3K
1	0	0	0	0	250K	25K
1	0	1	0	0	200K	20K
1	1	0	0	0	166.6K	16.6K
1	1	1	0	0	83.3K	8.3K

8650A 8651A

Set terminal		CTL4	CTL5	CTL6	Output frequency (kHz)	Baud rate output example (fo/16)(bits/sec)
0	0	0	0	0	60K	6K
0	0	1	0	0	6K	600
0	1	0	0	0	30K	3K
0	1	1	0	0	20K	2K
1	0	0	0	0	15K	1.5K
1	0	1	0	0	12K	1.2K
1	1	0	0	0	10K	1K
1	1	1	0	0	5K	500

8650B 8651B

Set terminal		CTL4	CTL5	CTL6	Output frequency (kHz)	Baud rate output example (fo/16)(bits/sec)
0	0	0	0	0	100K	10K
0	0	1	0	0	10K	1K
0	1	0	0	0	50K	5K
0	1	1	0	0	33.3K	3.3K
1	0	0	0	0	25K	2.5K
1	0	1	0	0	20K	2K
1	1	0	0	0	16.6K	1.6K
1	1	1	0	0	8.3K	833.3

8650E 8651E

Set terminal		CTL4	CTL5	CTL6	Output frequency (kHz)	Baud rate output example (fo/16)(bits/sec)
0	0	0	0	0	32768	3276.8
0	0	1	0	0	3276.8	327.68
0	1	0	0	0	16384	1638.4
0	1	1	0	0	10922.6	1092.26
1	0	0	0	0	8192	819.2
1	0	1	0	0	6553.6	655.36
1	1	0	0	0	5461.3	546.13
1	1	1	0	0	2730.6	273.06

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	0	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