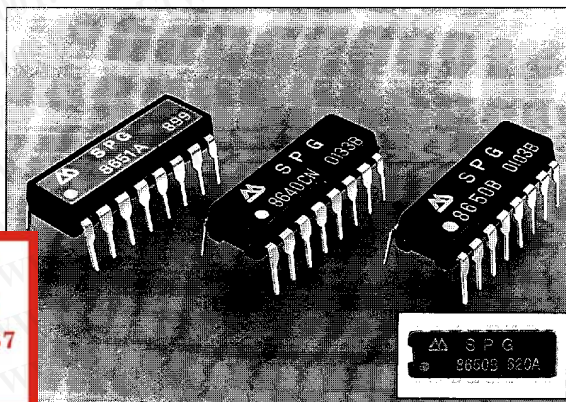


# PROGRAMMABLE TYPE CRYSTAL OSCILLATOR

## SPG series

- Capable of selecting 57 varieties of frequency output
- Use of C-MOS IC enables low current consumption
- Easy-to-mount DIP16PIN type

勝特力材料 886-3-5753170  
 勝特力电子(上海) 86-21-34970699  
 勝特力电子(深圳) 86-755-83298787  
[Http://www.100y.com.tw](http://www.100y.com.tw)



Actual size

### Specifications (characteristics)

Item	Symbol	Specifications											Remarks
Model name		8640AN	8640BN	8640CN	8650A	8650B	8650C	8650D	8650E	8651A	8651B	8651E	
Oscillation source frequency	f <sub>o</sub>	600KHz	1MHz	768KHz	60KHz	100KHz	96KHz	153.6KHz	32.768KHz	60KHz	100KHz	32.768KHz	For output frequency, refer to the table in the next page
Power source voltage	V <sub>DD-GND</sub>	-0.3V to +7.0V											
Operating voltage	V <sub>DD</sub>	5.0V ± 0.5V											
Storage temperature	T <sub>STG</sub>	-55°C to +125°C											
Operating temperature	T <sub>OPR</sub>	-10°C to +70°C											
Soldering condition (lead part)	T <sub>SOL</sub>	Under 260°C within 10 sec.											Package should be less than 150°C
Frequency tolerance	Δf/f	±100ppm			±50ppm				±5ppm *				V <sub>DD</sub> =5V, Ta=25°C
Frequency temperature characteristics		+10/-120ppm											V <sub>DD</sub> =5V, Ta=10 to 70°C
Frequency voltage characteristics		±20ppm	±10ppm	±20ppm	±10ppm				±5ppm				V <sub>DD</sub> =4.5 to 5.5V
Aging	f <sub>a</sub>	±5ppm/year MAX.											V <sub>DD</sub> =5V, Ta=25°C
Current consumption	I <sub>OP</sub>	1.0mA MAX.	2.0mA MAX.	1.5mA MAX.	0.5mA MAX.								No load condition

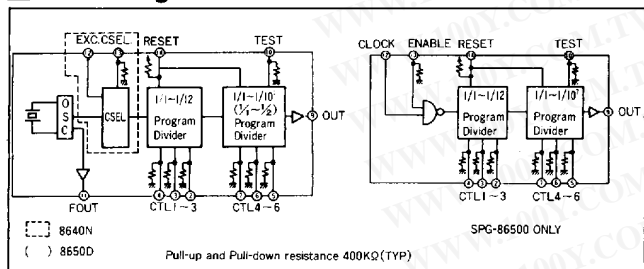
\* Frequency tolerance of 8651 system shows the value guaranteed at the time of shipment.

### Electric characteristics V<sub>DD</sub>=5V±0.5V, Ta=-10~70°C CL≤15pF

Item	Symbol	MIN	TYP	MAX	Unit	Remarks
L. input voltage	V <sub>IL</sub>	0		0.8	V	
H. input voltage	V <sub>IH</sub>	V <sub>DD</sub> -1.0		V <sub>DD</sub>	V	
L. input current (Reset)	I <sub>RL</sub>	-30		-5	μA	Reset=GND
H. input current (Reset)	I <sub>RH</sub>			0.5	μA	Reset=V <sub>DD</sub>
L. input current (input terminal except for Reset)	I <sub>IL</sub>	-0.5			μA	
H. input current (input terminal except for Reset)	I <sub>IH</sub>	5		30	μA	
L. output voltage	V <sub>OL</sub>			0.4	V	I <sub>OL</sub> =1.6mA
H. output voltage	V <sub>OH</sub>	V <sub>DD</sub> -1.0			V	I <sub>OH</sub> =-40μA
L. output current	I <sub>OL</sub>	1.6			mA	V <sub>OL</sub> =0.4V
H. output current	I <sub>OH</sub>			-40	μA	V <sub>OH</sub> =V <sub>DD</sub> -1.0V
Output rise time	t <sub>TLH</sub>		30	60	nsec	
Output fall time	t <sub>THL</sub>		25	50	nsec	
Duty		40		60	%	Except in the case of 1/3 and 1/5
Min. reset pulse width	t <sub>RW</sub>	1.0			μsec	
Reset delay time	t <sub>R</sub>			1.0	μsec	
Reset release synchronous error	t <sub>E</sub>	1/2 to *1		t <sub>w</sub> *2	μsec	
External signal input frequency	F <sub>IN</sub>			1M	Hz	8640N only
External signal input pulse width	t <sub>IN</sub>	0.5			μsec	8640N only
Oscillation startup time	t <sub>OSC</sub>		0.2	1	sec	*3

\*1 to = oscillation source cycle. \*2 t<sub>w</sub>=1/2 cycle of preset frequency.  
 \*3 For more than 1ms, until V<sub>DD</sub>=0→4.5V. Time at 4.5V is to be zero.

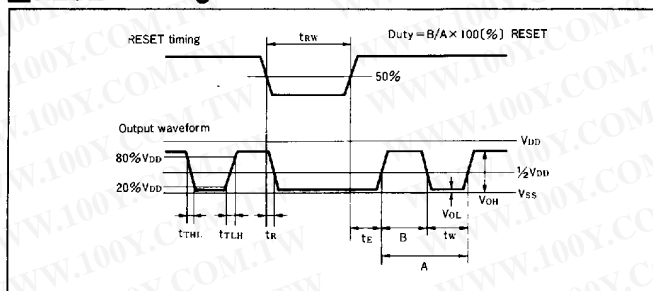
### Block diagram



### Divider IC (without quartz crystal)

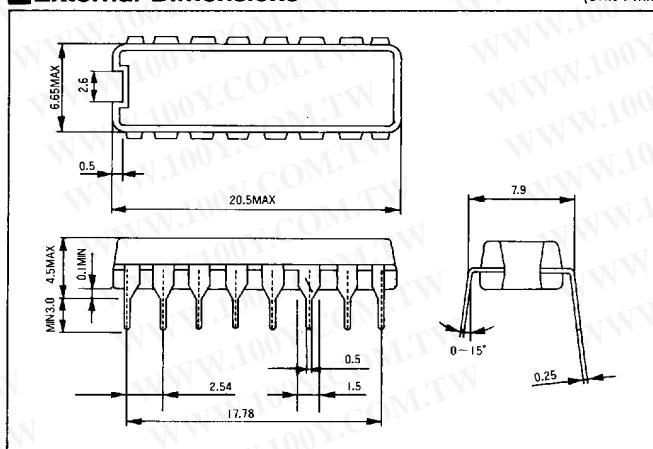
Item	Symbol	Specifications	Remarks
Model name		8650 O	
Input clock frequency		1 MHz MAX.	
Current consumption	I <sub>OP</sub>	about 2 mA	No load condition

### RESET timing

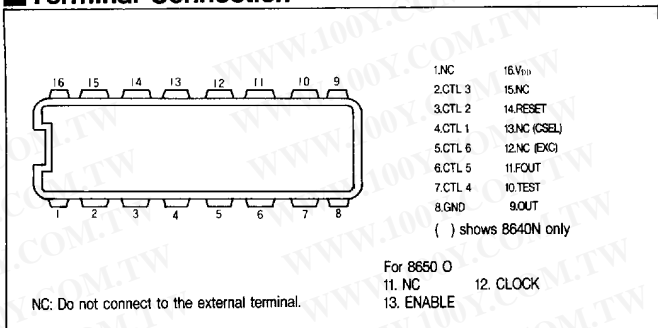


### External Dimensions

(Unit : mm)



**Terminal Connection**



**Explanation of terminal**

- (a) CTL 1-6 : Programs dividing ratio. (pull-down resistor incorporated)
  - (b) OUT : Output frequency preset by CTL 1 to 6. (Refer to the setting procedure of output frequency)
  - (c) FOUT : Constantly outputs the oscillation source frequency of built-in quartz crystal.
  - (d) RESET : Stops output at RESET = "L". (pull-up resistor incorporated)
  - (e) 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)
  - (f) EXC (8640N only) : Serves as input terminal when using an external clock by changing to the built-in oscillator.
  - (g) CSEL (8640N only) : When this terminal is made H, the external clock is selected. (pull-down resistor incorporated)
- (Note) Treatment of empty terminals. When RESET terminal is not used, this should be connected to V<sub>DD</sub>, when TEST terminal, CSEL terminal, and CTL 1 to 6 terminals is not used, to GND.

**Explanation of terminal (86500)**

- (a) CLOCK Clock input (max. 1MHz)
- (b) ENABLE Be sure to connect to V<sub>DD</sub>

**Setting of divider output**

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

\*0=L 1=H ( ) 8650D

**Setting of output frequency**

**8640AN** Unit : Hz

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	1	1	1	1	1
0	0	1	1	0	0	0	1	1	1
0	0	0	0	600K	60K	6K	600	60	6
0	0	1	1	60K	6K	600	60	6	0.6
0	1	0	0	300K	30K	3K	300	30	3
0	1	1	1	200K	20K	2K	200	20	2
1	0	0	0	150K	15K	1.5K	150	15	1.5
1	0	1	1	120K	12K	1.2K	120	12	1.2
1	1	0	0	100K	10K	1K	100	10	1
1	1	1	1	50K	5K	500	50	5	0.5

**8640BN**

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	1	1	1	1	1
0	0	1	1	0	0	0	1	1	1
0	0	0	0	1M	100K	10K	1K	100	10
0	1	0	0	100K	10K	1K	100	10	1/10
0	1	1	1	500K	50K	5K	500	50	5
0	1	1	1	333.3K	33.3K	3.3K	333.3	33.3	3.3
1	0	0	0	250K	25K	2.5K	250	25	2.5
1	0	1	1	200K	20K	2K	200	20	2
1	1	0	0	166.6K	16.6K	1.6K	166.6	16.6	1.6
1	1	1	1	83.3K	8.3K	833.3	83.3	8.3	0.83

**8650A 8651A**

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	1	1	1	1	1
0	0	1	1	0	0	0	1	1	1
0	1	0	0	30K	3K	300	30	3	0.3
0	1	1	1	20K	2K	200	20	2	0.2
1	0	0	0	15K	1.5K	150	15	1.5	0.15
1	0	1	1	12K	1.2K	120	12	1.2	0.12
1	1	0	0	10K	1K	100	10	1	0.1
1	1	1	1	5K	500	50	5	0.5	0.05

**8650B 8651B**

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	1	1	1	1	1
0	0	1	1	10K	1K	100	10	1	1/10
0	1	0	0	50K	5K	500	50	5	1/2
0	1	1	1	33.3K	3.3K	333.3	33.3	3.33	1/3
1	0	0	0	25K	2.5K	250	25	2.5	1/4
1	0	1	1	20K	2K	200	20	2	1/5
1	1	0	0	16.6K	1.6K	166.6	16.6	1.6	1/6
1	1	1	1	8.3K	833.3	83.3	8.3	0.83	1/12

**8650E 8651E**

Set terminal	CTL4	CTL5	CTL6	CTL7	CTL8	CTL9	CTL10	CTL11	CTL12
0	0	0	0	0	1	1	1	1	1
0	0	1	1	3276.8	327.68	32.768	3.276	0.3276	0.03276
0	1	0	0	3276.8	327.68	32.768	3.276	0.327	0.0327
0	1	1	1	1638.4	163.84	16.384	1.638	0.1638	0.01638
1	0	0	0	10922.6	1092.26	109.226	10.922	1.092	0.1092
1	0	1	1	819.2	81.92	8.192	0.819	0.0819	0.00819
1	1	0	0	655.36	65.536	6.5536	0.655	0.0655	0.00655
1	1	1	1	546.13	54.613	5.4613	0.546	0.0546	0.00546
1	1	1	1	2730.6	273.06	27.306	2.730	0.273	0.0273

Note: Lower digits are omitted.

**Baud rate generator**

**8640CN**

CTL1	CTL2	CTL3	CTL4	CTL5	CTL6	Output frequency	Baud rate output example (fo/16)
0	0	0	0	0	0	768 KHz	4800bits/sec
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	Baud rate output example (fo/16)
0	0	0	0	0	0	96.0KHz	6000bits/sec
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	Baud rate output example (fo/16)
0	0	0	0	0	0	153.6KHz	9600bits/sec
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	9.6	600
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

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