

# DIGITAL MONOLITHIC INTEGRATED CIRCUITS (MOS)

## MOS IC, LSI

Type No.	Function	Maximum Ratings (Ta=25°C)	Electrical Characteristics (Ta=25°C)							
			Item	Symbol	Condition	min.	typ.	max.	Unit	
MN6094 MN6095 △ MN6096	CMOS Quartz Clock Circuit with 64Hz Synchronous Motor Driver	V <sub>DD</sub> = -0.3 ~ +4V V <sub>I</sub> = -0.3 ~ +4V P <sub>D</sub> = 300mW T <sub>opr</sub> = -30 ~ +70°C T <sub>stg</sub> = -40 ~ +100°C	Supply Voltage	V <sub>DD</sub>		1.2	1.5	1.9	V	
			Supply Current	I <sub>DD</sub>	Without load		25	35	μA	
			Output Saturation Resistance (O1, O2)	R <sub>sat1</sub>	I <sub>O</sub> = 3mA			200	Ω	
			Output Saturation Resistance (AI)	R <sub>sat2</sub>	I <sub>O</sub> = 0.1mA		1	4	kΩ	
			Frequency Variation vs Supply Voltage	Δf/fo	V <sub>DD</sub> = 1.2 ~ 1.7V			± 1	ppm	
			Osc. Feedback Resistance	R <sub>f</sub>		0.5	3		MΩ	
		Operating Condition		Osc. Rise Time	t <sub>os</sub>	V <sub>DD</sub> = 1.2V			1	s
		V <sub>DD</sub> = 1.5V V <sub>SS</sub> = 0 f <sub>osc</sub> = 4.19MHz	Alarm Signal Output Waveforms							
		MN6220	CMOS Quartz Clock Circuit with Time Signal Generator Usable Either with 0.5Hz Stepper or 16Hz Synchronous Motor	V <sub>DD</sub> = -0.3 ~ +4V V <sub>I</sub> = -0.3 ~ V <sub>DD</sub> + 0.3V T <sub>opr</sub> = -30 ~ +70°C T <sub>stg</sub> = -55 ~ +100°C  Operating Condition V <sub>DD</sub> = 1.5V V <sub>SS</sub> = 0 f <sub>osc</sub> = 4.19MHz	Supply Current	I <sub>DD</sub>	Without load		50	70
Power Consumption	P <sub>tot</sub>				Without load		75	105	μW	
Output Saturation Resistance (O1, O2)	R <sub>sat(P+N)</sub>				V <sub>DD</sub> = 1.2V, I <sub>O</sub> = 3mA		75	100	Ω	
"H" Level Input Voltage (R)	V <sub>IH</sub>				CNT, RST, CLR, HRS, SKP	1.1			V	
"L" Level Input Voltage (R)	V <sub>IL</sub>				STP, ADJ, CST Pin			0.4	V	
Input Current	I <sub>in</sub>				V <sub>I</sub> = 0, RST, CLR, HRS, SKP, STP, ADJ, CST Pin	-7.5	-15	-30	μA	
Output Resistance (1)	R <sub>O1</sub>				Between OTS, OTR Pin and OTC Pin			2	kΩ	
Output Resistance (2)	R <sub>O2</sub>				Between OTC Pin and V <sub>SS</sub> Pin			0.5	kΩ	
Frequency Variation vs Supply Voltage	Δf/fo				V <sub>DD</sub> = 1.2 ~ 1.7V			± 1	ppm	
Osc. Feedback Resistance	R <sub>f</sub>					0.5	3		MΩ	
Osc. Rise Time	t <sub>os</sub>	V <sub>DD</sub> = 1.2V			1	s				
<b>CMOS Watches</b>										
△ MN6200	CMOS Digital Quartz Watch Circuit for LCD Driver	V <sub>SS</sub> = -5 ~ +0.3V T <sub>opr</sub> = -10 ~ +70°C T <sub>stg</sub> = -55 ~ +100°C  Operating Condition V <sub>SS</sub> = -1.5V V <sub>LCD</sub> = -3.0V f <sub>osc</sub> = 32.768kHz	Supply Voltage	V <sub>SS</sub>	V <sub>SS</sub> = 0V	-1.25	-1.55	-1.80	V	
			Supply Current	I <sub>SS</sub>	V <sub>SS</sub> = -1.55V Without load			-2.5	μA	
			Output Saturation Voltage	V <sub>sat</sub>	t <sub>osc</sub> = 10s			-1.4	V	
			Frequency Variation vs Supply Voltage	Δf/fo	V <sub>SS</sub> = -1.45 ~ -1.55V			± 2	ppm	
			Oscillation Rise Time	R <sub>f</sub>	V <sub>SS</sub> = -1.55V		20		MΩ	
MN6201	CMOS Digital Quartz Watch Circuit for LCD Driver	V <sub>SS1</sub> = +0.2 ~ -3V V <sub>SS2</sub> = +0.2 ~ -6V T <sub>opr</sub> = -20 ~ +70°C T <sub>stg</sub> = -55 ~ +100°C  Operating Condition V <sub>DD</sub> = 0 V <sub>SS1</sub> = -1.55V V <sub>SS2</sub> = -3V f <sub>osc</sub> = 32.768kHz	Supply Voltage (1)	V <sub>SS1</sub>		-1.25	-1.55	-1.8	V	
			Supply Voltage (2)	V <sub>SS2</sub>	C <sub>1</sub> Open	-2	-3	-3.6	V	
			Supply Current	I <sub>SS</sub>	Without load			-3.6	μA	
			Osc. Start Voltage	V <sub>STA</sub>	t <sub>osc</sub> = 10s			-1.4	V	
			Frequency Variation vs Supply Voltage	Δf/fo	V <sub>SS1</sub> = -1.45 ~ -1.55V			± 2	ppm	
			Osc. Feedback Resistance	R <sub>f</sub>			20		MΩ	

△ Preliminary

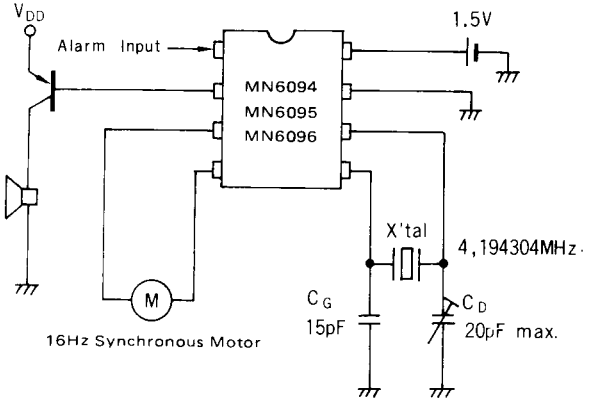
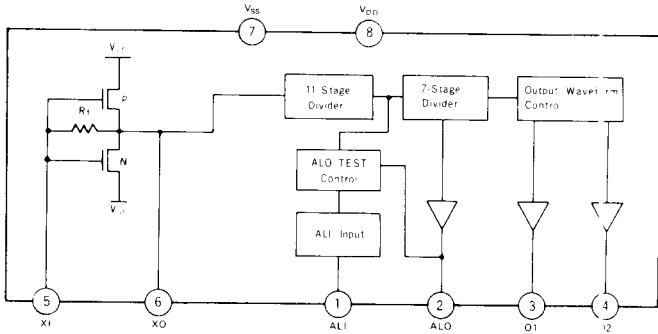
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MOS IC, LSI

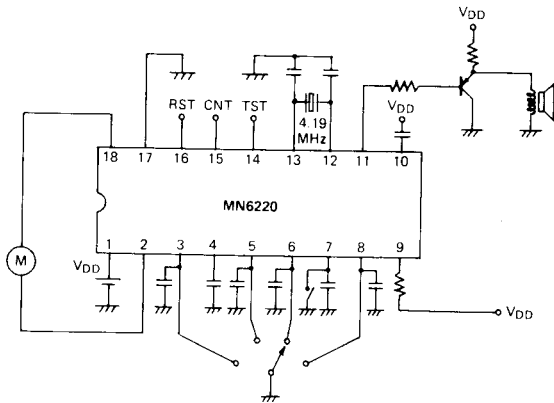
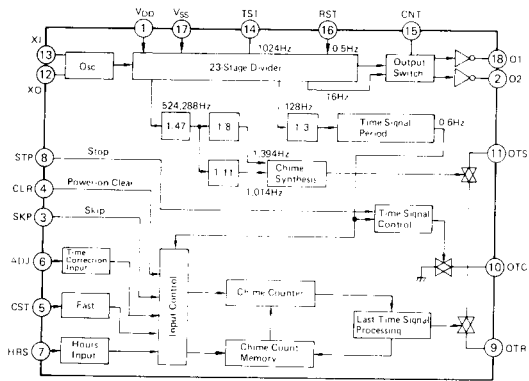
Block Diagram

Application Circuit

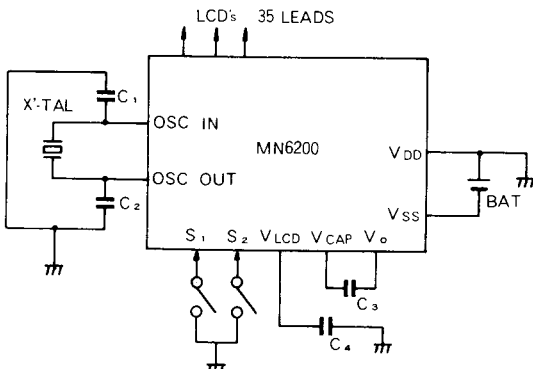
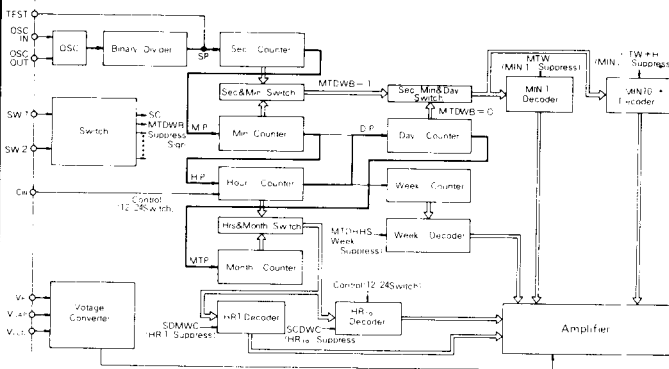
**MN6094, MN6095, MN6096**  
(Package L-9, 8-Lead Plastic DIL)



**MN6220** (Package L-15, 18-Lead Plastic DIL)



**MN6200** (Chip)



**MN6201** (Chip)

Test Circuit

