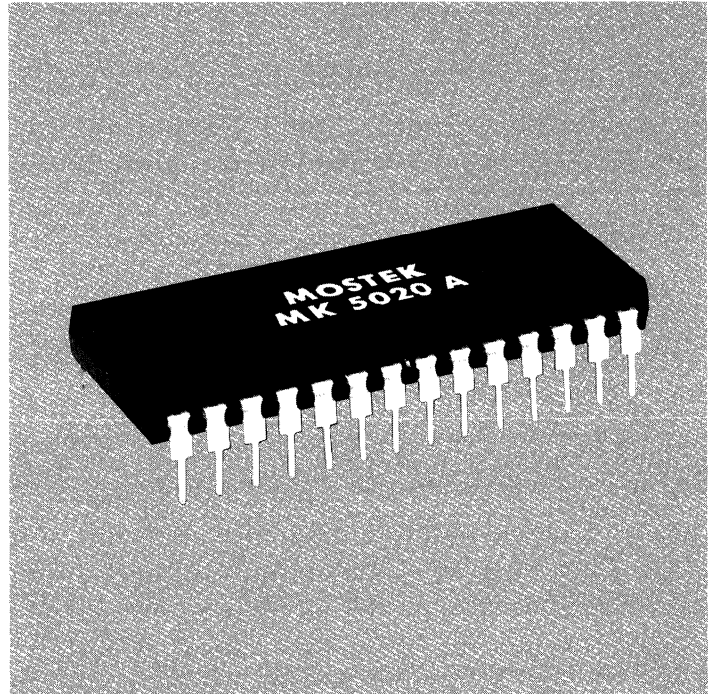


MOS Calculator Series

MOSTEK

FEATURES:

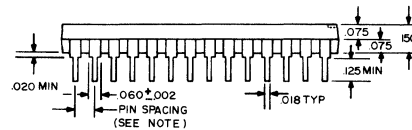
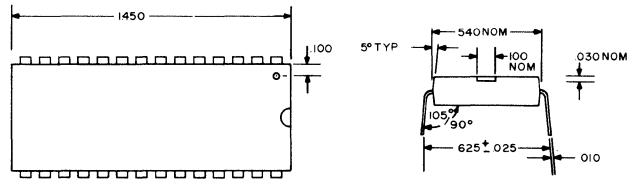
- Direct Segment Drive for LED's
- Low Power Consumption
- Single Power Supply Voltage
- Internal Encoding of Keyboard Inputs
- Internal Debouncing of Keyboard Inputs
- Single 28-pin, Dual-in-line Package
- ROM controlled



STANDARD PRODUCTS:

- MK 5020 A 8-digit, six-function (+, -, X, ÷, %, √) with constant
- MK 5021 C 10-digit, six-function (+, -, X, ÷, %, √) with constant
- MK 5022 A 8-digit, five-function (+, -, X, ÷, %) with constant fully independent memory, and store/recall memory.
- MK 50203 8-digit, five-function (+, -, X, ÷, %) with constant, fully independent memory, reciprocal, and constant register exchange

PACKAGE 28-pin dual-in-line plastic



NOTES:
 1. THE TRUE-POSITION PIN SPACING IS 0.1000 BETWEEN CENTERLINES EACH PIN CENTERLINE IS LOCATED WITHIN ±0.100 OF ITS TRUE LONGITUDINAL POSITION RELATIVE TO PINS 1 AND 28.

Consumer

ABSOLUTE MAXIMUM RATINGS OVER OPERATING FREE-AIR TEMPERATURE RANGE

(All voltages relative to V_{SS})

Supply Voltage Range V_{GG}	+0.3V to -20V
Input Voltage Range.....	+0.3V to -20V
Output Voltage Breakdown SA-SG.....	+0.3V to -7V
DI-DII.....	+0.3V to -17V
Operating Free-Air Temperature Range.....	0°C to +55°C
Storage Temperature Range.....	-40 °C to +100°C

RECOMMENDED OPERATING CONDITIONS ($0^{\circ}\text{C} \leq T_A \leq 55^{\circ}\text{C}$)

	PARAMETER	MIN	TYP	MAX	UNITS	NOTES
V_{GG}	Supply Voltage	-12	-14.5	-17	volts	1
V_{IH}	Input Voltage, Logic 1	$V_{SS} - 1.2$			volts	2, 8
V_{IL}	Input Voltage, Logic 0	V_{GG}		$V_{SS} - 5$	volts	2
ϕ	Clock Period	5.5		11	μsec	3

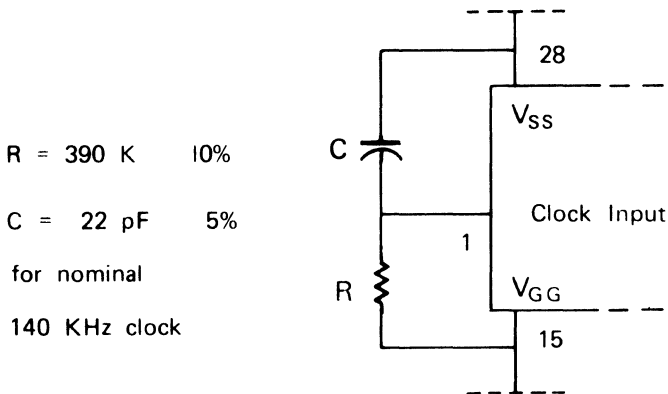
ELECTRICAL CHARACTERISTICS ($12 \leq V \leq 17$; $0^{\circ}\text{C} \leq T_A \leq 55^{\circ}\text{C}$)

	PARAMETER	MIN	TYP	MAX	UNITS	NOTES
I_{GG}	Supply Current		6		mA	
I_I	Input Current @ $V_{IN} = V_{SS}$		150	300	μA	2
$R_{ON(SEG)}$	Segment Output "On" Resistance		300	750	Ω	4, 7
$R_{ON(DIG)}$	Digit Output "On" Resistance		250	600	Ω	4, 8
$I_{OL(SEG)}$	Segment Output Leakage Current		.1	10	μA	5, 9
$I_{OL(DIG)}$	Digit Output Leakage Current		.1	10	μA	6, 9

Notes:

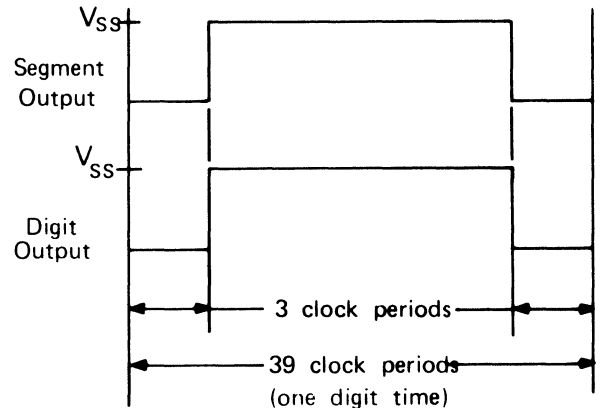
- (1) This parameter is relative to V_{SS} .
- (2) This parameter applies to the KN, KO, KP, and KQ inputs.
- (3) The maximum clock period is related to the worst-case keyboard entry time. 11 μsec corresponds to approximately 44 msec "key down" time. Any increases in the clock period will affect this entry time proportionately.
- (4) Voltage across the output (relative to V_{SS}) is 0 volts to 1.5 volts.
- (5) Voltage across the output (relative to V_{SS}) is 0 volts to 7 volts.
- (6) Voltage across the output (relative to V_{SS}) is 0 volts to 17 volts.
- (7) Segment output current must be limited to less than 7 mA per output.
- (8) Because digit output voltages are used in scanning keyboard inputs, external circuitry (e.g., a display driver) must require less than 2 mA from each digit output in order that the minimum value of V_{IH} can be satisfied in all applications.
- (9) Segment and digit outputs are open drain transistors.

INTERNAL CLOCK OSCILLATOR



The oscillator waveforms appears as a "sawtooth" voltage variation swinging between V_{SS} and $V_{GG} / 2$.

SEGMENT AND DIGIT TIMING AND POLARITY



Note: Segment and digit outputs are turned on to V_{SS} for a displayed segment.

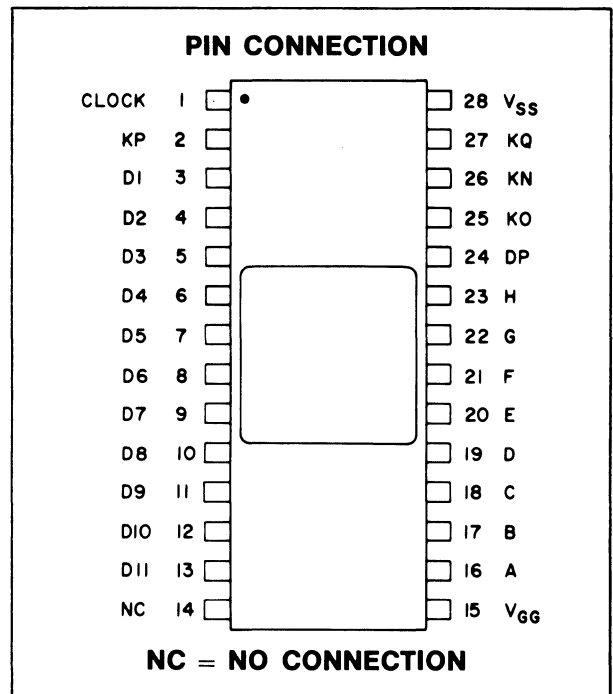
Consumers

MK 5020AN

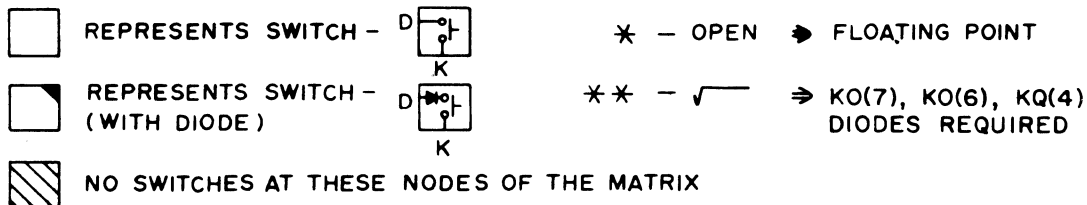
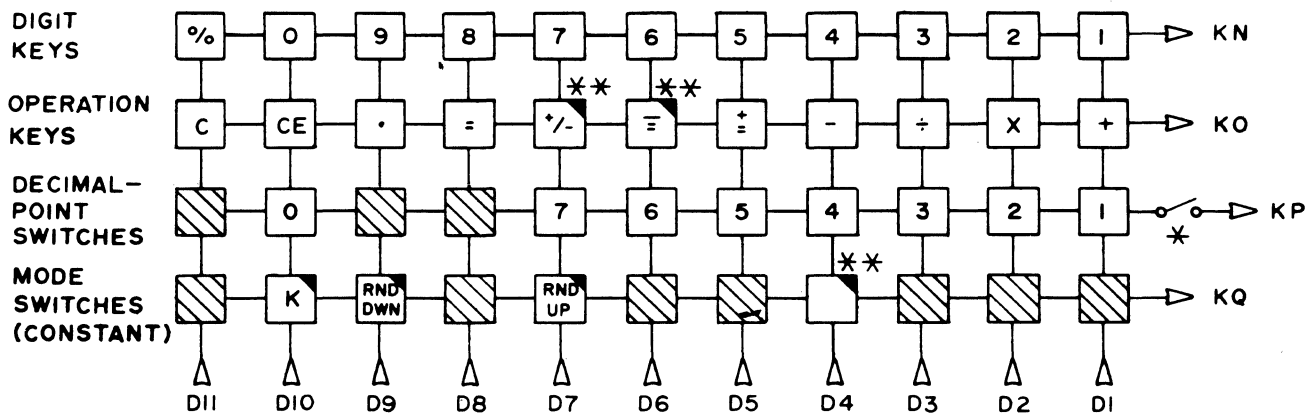
DESCRIPTION

The MK 5020 A is a six-function (+, -, X, ÷, %, √) 8-digit calculator, featuring selectable constant, floating or fixed decimal point (selectable to eight positions), selectable roundoff, algebraic or business entry, credit balance, chain calculations, leading zero suppression, and internal debouncing and encoding of keyboard inputs.

Low power dissipation, broad supply voltage range, a single power supply, and an internal clock oscillator makes the MK 5020 A ideal for battery-operated, hand-held calculators with lower system costs.



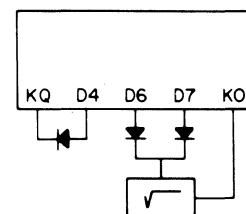
KEY MATRIX



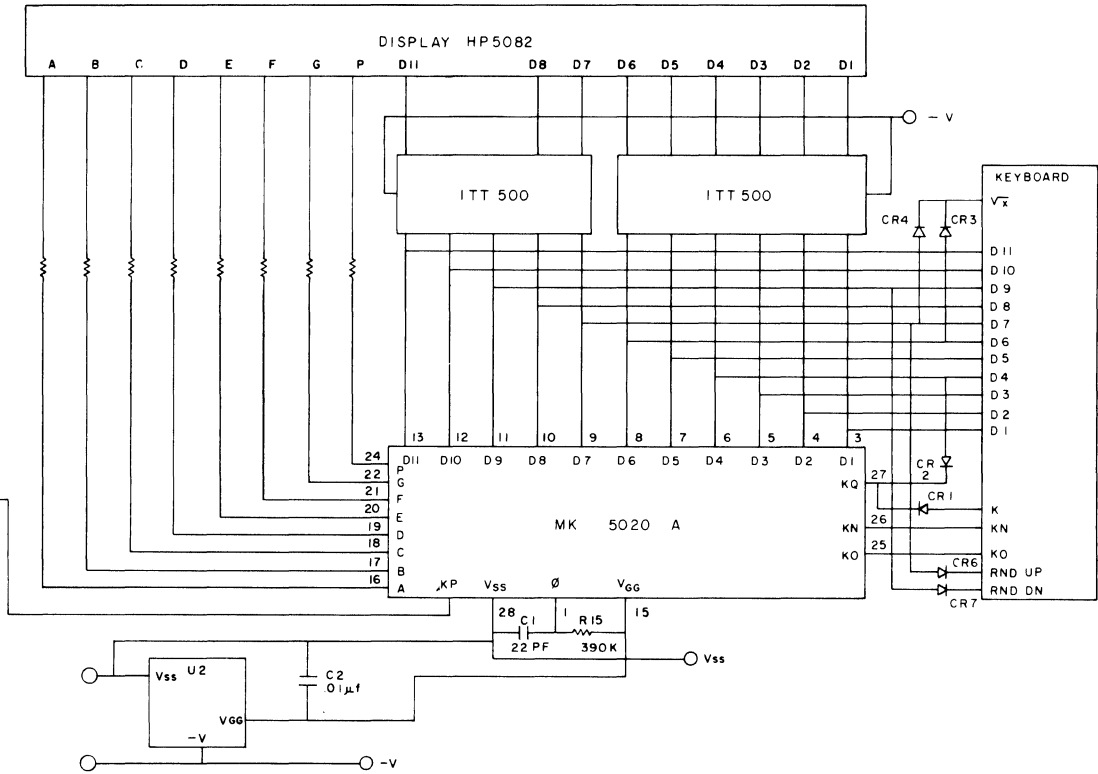
DISPLAY FONT



CONNECTIONS FOR SQUARE ROOT KEY



SCHEMATIC



NOTES:
 UNLESS OTHERWISE SPECIFIED
 1 ALL RESISTORS ARE 1/4W, 5%
 2 ALL DIODES ARE 1N4148

PROBLEM	FIXED POINT OR FLOATING	CONSTANT	KEY ENTRIES	REMARKS	DISPLAY
PERCENT KEY					
Find 15% of 200	Floating	*	C 15 % X 200 =		0. 15. 0.15 0.15 200. 30.
Find 15% of 200	Floating	*	C 200 X 15 %		0. 200. 200. 15. 30.
Find 15% mark up on \$200 and total	Floating	*	C 200 + 15 % =	This gives the mark up This gives the total	0. 200. 200. 15. 30. 230.
Find 22% discount and selling price on \$526	Floating	*	C 526 - 22 % =	This is the discount This is the selling price	0. 526. 526. 22. 115.72 410.28
CONSTANT PERCENT					
Find 15% of: 200, 450, 372	Floating	on	C 15 % X 200 = 450 = 372 =		0. 15. 0.15 0.15 200. 30. 450. 67.5 372. 55.8

