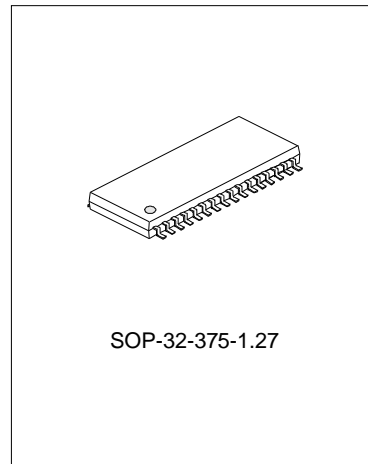


LED DRIVER IC OF(12~11) x(6~7)SEGMENTS DISPLAY

DESCRIPTION

SC16461 is an LED controller driven on a 1/7 to 1/8 duty factor. Eleven segment output lines, six grid output lines, 1 segment/grid output lines, one display memory, control circuit, key scan circuit are all incorporated into a single chip to build a highly reliable peripheral device for a single chip microcomputer. Serial data is fed to SC16461 via a four-line serial interface. Housed in a 32-pin SOP package, SC16461 pin assignments and application circuit are optimized for easy PCB layout and cost saving advantages.



FEATURES

- * CMOS technology
- * Low power consumption
- * Multiple display modes (12 segment, 6 grid to 11 segment, 7 grid)
- * Key scanning (10 x 3 matrix)
- * 8-step dimming circuitry
- * Serial interface for clock, data input, data output, strobe pins

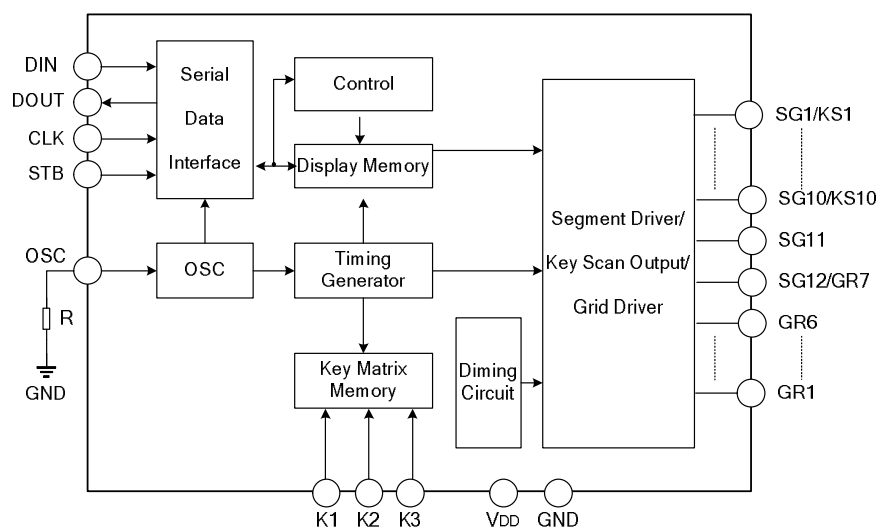
ORDERING INFORMATION

Device	Package
SC16461	SOP-32-375-1.27

APPLICATIONS

- * Micro-computer peripheral device
- * VCR set
- * Combi set

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (unless otherwise stated, $T_{amb}=25^{\circ}C$, $V_{SS}=0V$)

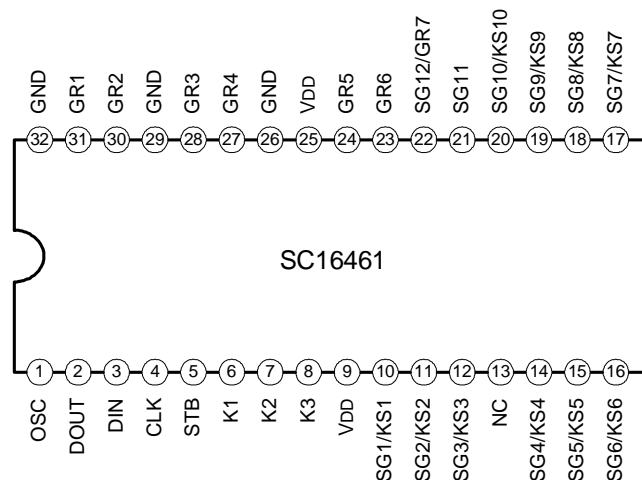
Characteristic	Symbol	Value	Unit
Supply Voltage	VDD	-0.5 to +7	V
Logic Input Voltage	VI	-0.5 to VDD+0.5	V
Driver Output Current	IOLGR	+250	mA
	IOHSG	-50	mA

ELECTRICAL CHARACTERISTICS (unless otherwise stated, $V_{DD}=5V$, $V_{SS}=0V$, $T_{amb}=25^{\circ}C$)

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	VDD		4.5	5	5.5	V
Dynamic Current (note)	IDDdyn		--	--	5	mA
High-Level Output Current	IOHSG1	$V_O=V_{DD}-1V$ SG1~SG12	-10	-14	--	mA
	IOHSG2	$V_O=V_{DD}-2V$ SG1~ SG12	-20	-25	--	mA
Low-Level Output Current	IOLGR	$V_O=0.3V$, GR1~GR7	100	140	--	mA
Segment High-Level Output Current Tolerance	ITOLSG	$V_O=V_{DD}-1V$ SG1~SG12	--	--	± 5	%
High-Level Input Voltage	VIH	--	0.7VDD	--	5	V
Low-Level Input Voltage	VIL	--	0	--	0.3VDD	V
Oscillation Frequency	fOSC	R=51k Ω	350	500	650	kHz

Note: test condition: set display control commands=80H (display turn OFF state)

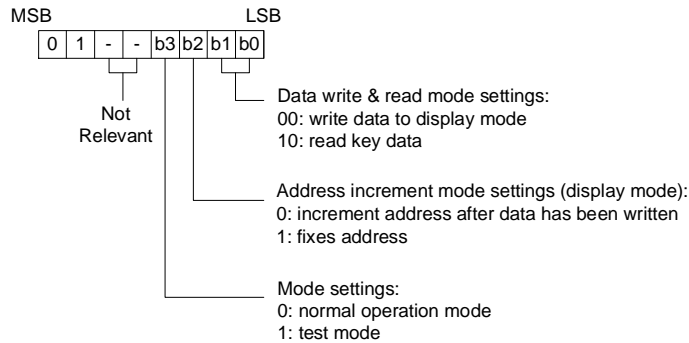
PIN CONFIGURATIONS



Command 2: data setting commands

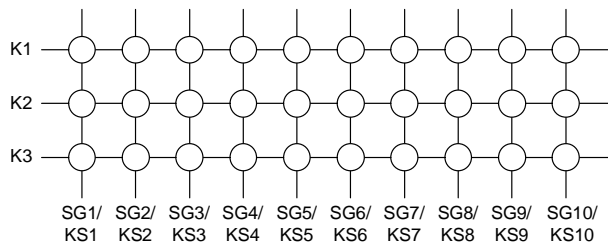
The data setting commands executes the data write or data read modes for 16461. The data setting command, the bits 5 and 6 (b4, b5) are ignored, bit 7 (b6) is given the value of “1” while bit 8 (b7) is given the value of “0”. Please refer to the diagram below.

When power is turned ON, bit 4 to bit 1 (b3 to b0) are given the value of “0”.

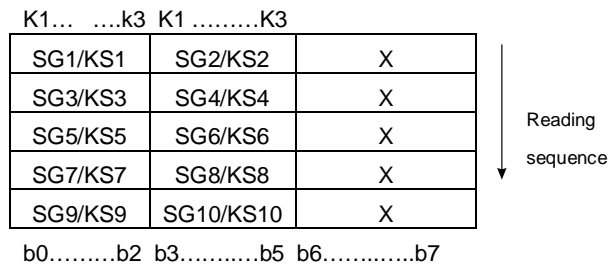


SC16461 key matrix & key input data storage ram

SC16461 key matrix consists of 10 x 3 array as shown below:



Each data entered by each key is stored as follows and read by a read command, starting from the last significant bit. When the most significant bit of the data (b0) has been read, the least significant of the next data (b7) is read.

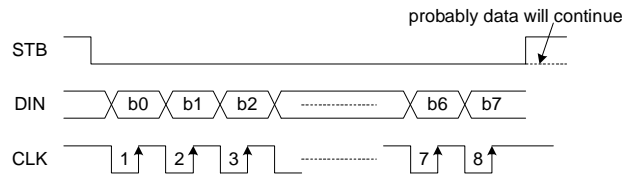


Note: b6 and b7 do not care.

SERIAL COMMUNICATION FORMAT

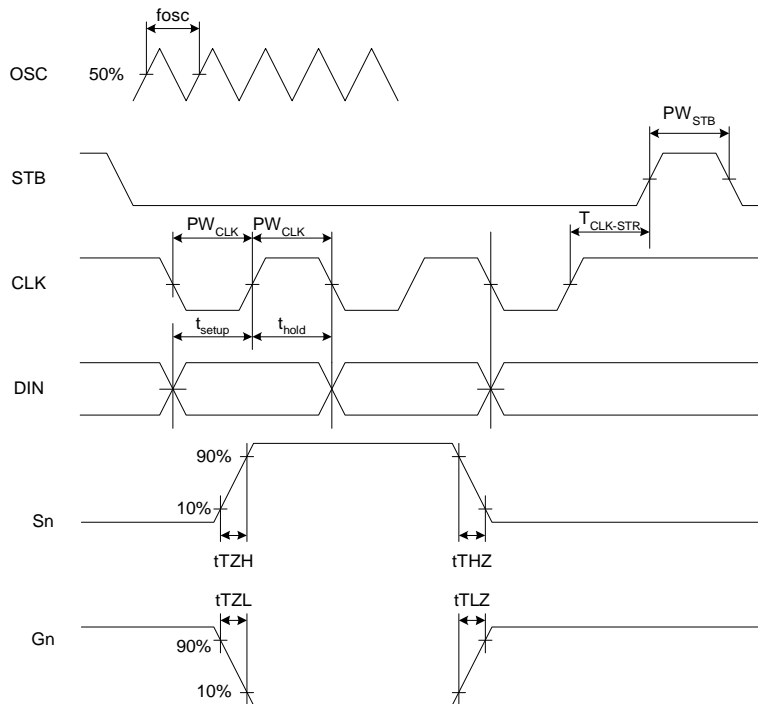
The following diagram shows the SC16461 serial communication format.

RECEPTION (Data/Command Write)



SWITCHING CHARACTERISTIC WAVEFORM

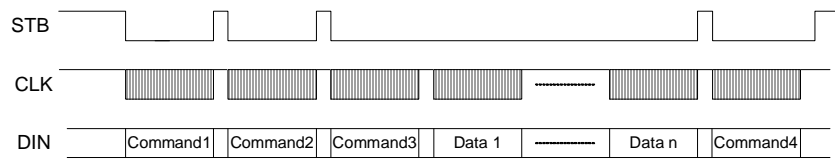
SC16461 switching characteristics waveform is given below.



Where: PW_{CLK} (clock pulse width) $\geq 400ns$ PW_{STB} (strobe pulse width) $\geq 1\mu s$
 t_{setup} (data setup time) $\geq 100ns$ t_{hold} (Data hold time) $\geq 100ns$
 $t_{CLK-STB}$ (clock strobe time) $\geq 1\mu s$ t_{THZ} (fall time) $\leq 10\mu s$
 t_{TZH} (rise time) $\leq 1\mu s$ F_{OSC} = oscillation frequency
 t_{TLZ} $< 1\mu s$ t_{TLZ} $< 10\mu s$

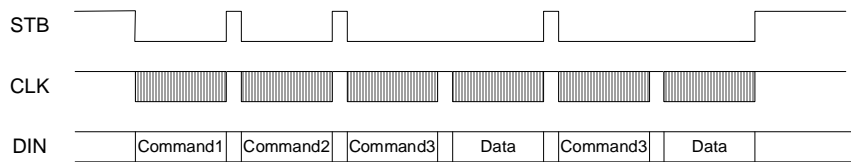
APPLICATIONS

Display memory is update by incrementing addresses. Please refer to the following diagram.



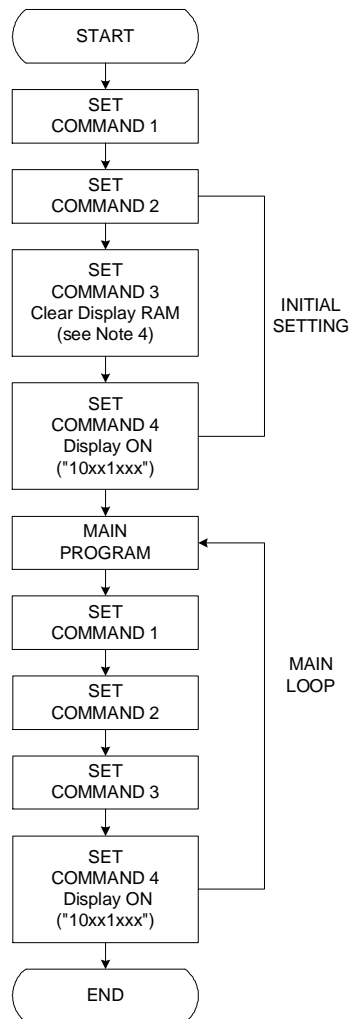
Where: Only when "STB" is low , the "CLK" signal is valid.
 Command 1: Display Mode Setting Command
 Command 2: Data Setting Command
 Command 3: Address Setting Command
 Data 1 to n: Transfer Display Data (10 Bytes max.)
 Command 4: Display Control Command

The following diagram shows the waveforms when updating specific addresses.



Where: Only when "STB" is low , the "CLK" signal is valid.
 Command 1--Display Mode Setting Command
 Command 2--Data Setting Command
 Command 3-- Address Setting Command
 Data-- Display Data

RECOMMENDED PROGRAMMING FLOWCHART



Note: 1.Command 1: display mode setting commands

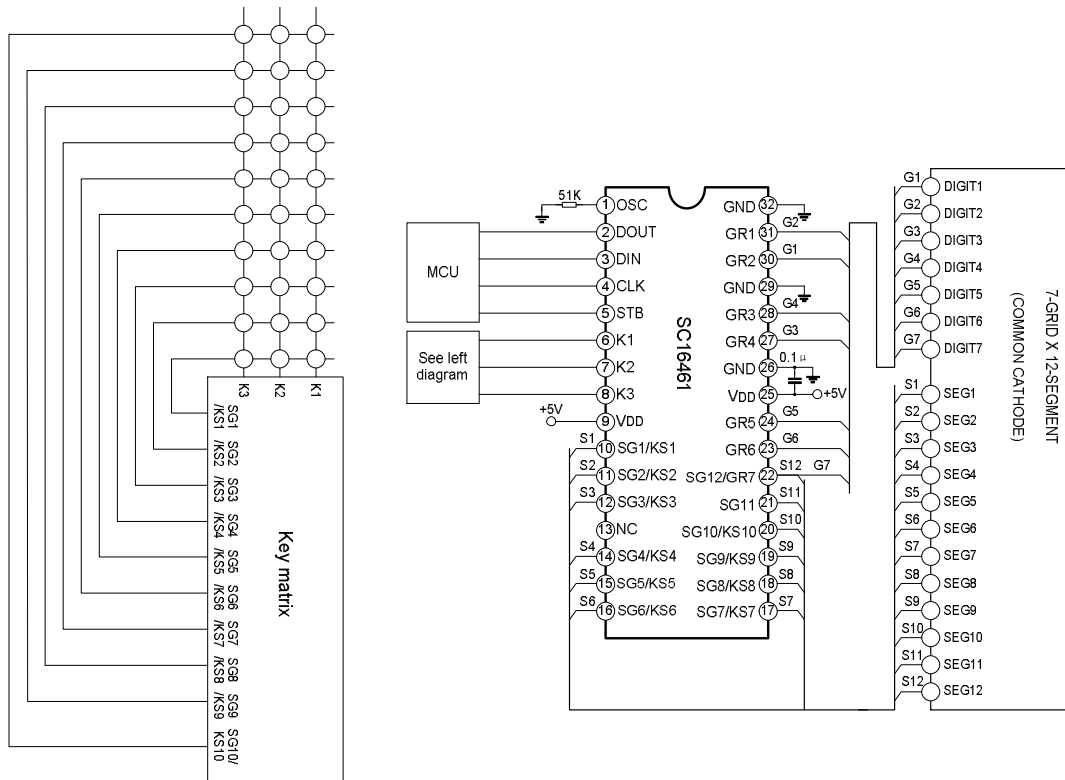
2. Command 2: data setting commands

3. Command 3: address setting commands

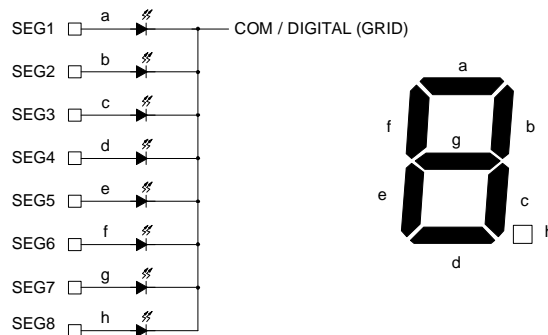
4. Command 4: display control commands

5. When IC power is applied for the first time, the contents of the display RAM are not defined; thus, it is strongly suggested that the contents of the display RAM must be cleared during the initial setting.

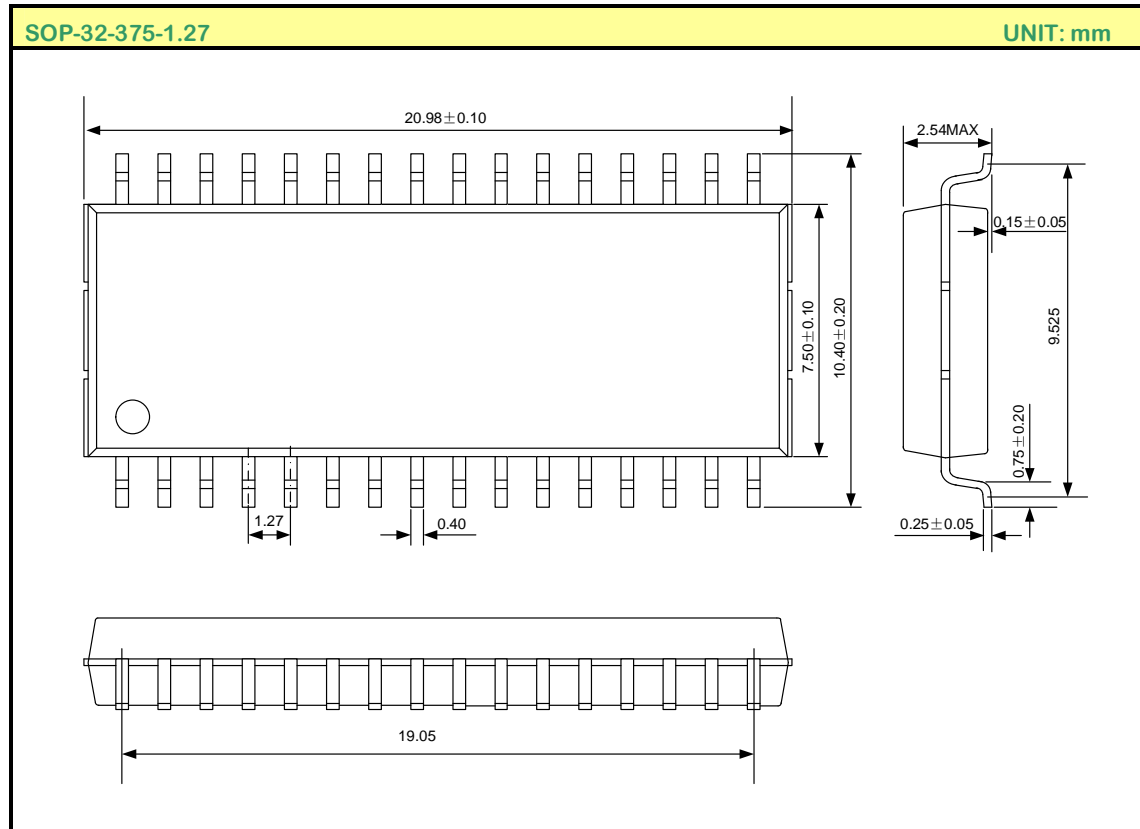
APPLICATION CIRCUIT



Note: the capacitor (0.1µF) connected between the GND and VDD pins must be located as near as possible to the SC16461 chip.



PACKAGE OUTLINE



HANDLING MOS DEVICES:

Electrostatic charges can exist in many things. All of our MOS devices are internally protected against electrostatic discharge but they can be damaged if the following precautions are not taken:

- Persons at a work bench should be earthed via a wrist strap.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed for dispatch in antistatic/conductive containers.