Square 0.134" 4-Character 5x5 Dot Matrix Serial Input Dot Addressable Intelligent Display® Devices

Lead (Pb) Free Product - RoHS Compliant







SCDQ554xQ SCDQ554xP

Yellow SCDQ5541P/Q/R

Super-red SCDQ5542P/Q/R

Green SCDQ5543P/Q/R

High Efficiency Green SCDQ5544P/Q/R

DESCRIPTION

The SCDQ5541X (Yellow), SCDQ5542X (Super-red), SCDQ5543X (Green), and SCDQ5544X (High Efficiency Green) are four digit, dot addressable 5 x 5 dot matrix, serial input, alphanumeric Intelligent Display devices in a square format. The four digits are packaged in a rugged, high quality, optically transparent, plastic package several mounting options. The SIP Pin for standard display mounting and 90° Bend SIP for side mounting. Additionally, a connector/header configuration is also available for display side mounting.

The on-board CMOS has a 100 bit RAM, one bit associated with one LED, each to generate User Defined Characters. In Power Down Mode, quiescent current is <50 μ A.

The SCDQ554XX is designed for work with the serial port of most common microprocessors. Data is transferred into the display through the Serial Data Input (DATA), clocked by the Serial Data Clock (SDCLK), and enabled by the Load Input (LOAD).

FEATURES

- Four 3.40 mm (0.134") 5 x 5 Dot Matrix Characters in Red, Yellow, Super-red, Green, or High Efficiency Green
- Optimum Display Surface Efficiency (display area to package ratio)
- Square Character Format to Display Data in a Vertical or Horizontal Format
- High Speed Data Input Rate: 5.0 MHz
- ROMless Serial Input, Dot Addressable Display— Ideal for User Defined Characters
- Built-in Decoders, Multiplexers and LED Drivers
- · Readable from 1.8 meters (6 Feet)
- Wide Viewing Angle, ± 55° in X-Axis and Y-Axis
- Attributes:

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- 100 Bit RAM for User Defined Characters
- Eight Dimming Levels
- Power Down Model (<250 μW)
- Software Clear Function
- Lamp Test
- 3.3 V Capability

Ordering Information

Туре	Color of Emission	Character Height mm (inch)	Ordering Code
SCDQ5541P	yellow		Q68100A1472P
SCDQ5542P	super-red	2.2 (0.124)	Q68100A1078P
SCDQ5543P	green	3.2 (0.134)	Q68100A1473P
SCDQ5544P	high efficiency green		Q68100A1474P
SCDQ5541Q	yellow		Q68100A1472Q
SCDQ5542Q	super-red	2.2 (0.124)	Q68100A1078Q
SCDQ5543Q	green	3.2 (0.134)	Q68100A1473Q
SCDQ5544Q	high efficiency green		Q68100A1474Q
SCDQ5541R	yellow		Q68100A1472R
SCDQ5542R	super-red	2.2 (0.124)	Q68100A1078R
SCDQ5543R	green	3.2 (0.134)	Q68100A1473R
SCDQ5544R	high efficiency green		Q68100A1474R



Maximum Ratings

Operation in excess of any of these conditions may result in permanent damage to this device ($T_A = 25^{\circ}$ C)

Parameter	Symbol	Value	Unit
Operating temperature range	$T_{\sf op}$	- 40 + 85	°C
Storage temperature range	T_{stg}	- 40 + 100	°C
Supply Voltage $V_{\rm CC}$ to GND (non-operating)	V_{CC}	-0.5 to + 7.0	V
Input Voltage, any Pin to GND		-0.5 to V _{CC} to 5.5	V
Solder Temperature, Connector only 1.59 mm (0.063") below seating plane, t < 5.0 s	$T_{\mathbb{S}}$	260	°C
Relative Humidity (non-condensing)		85	%
ESD (100 pF, 1.5 kΩ)	V_Z	2.0	kV
Input Current		± 100	mA
Power Dissipation at 85°C		0.65	W

Optical Characteristics at 25°C

 $(V_{CC}=5.0 \text{ V at } 100\% \text{ brightness level, viewing angle: X axis } \pm 55^{\circ}, \text{ Y axis } \pm 65^{\circ})$

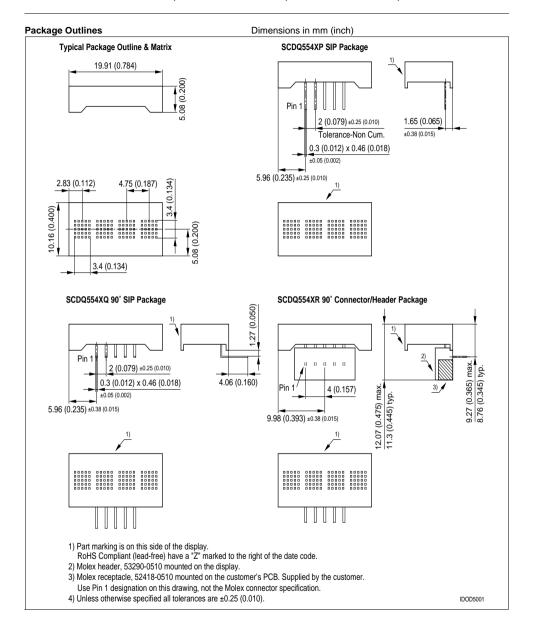
Description	Symbol			Unit			
			Yellow SCDQ5541	Super-red SCDQ5542	Green SCDQ5543	High Efficiency Green SCDQ5544	
Luminous Intensity Character Average (#displayed all digits)	(min.) (typ.)	I _{Vpeak}	1.8 5.4	1.8 5.4	1.8 5.4	2.1 6.4	mcd mcd
Peak Wavelength	(typ.)	λ_{peak}	583	630	565	568	nm
Dominant Wavelength	(typ.)	λ_{dom}	585	620	570	574	nm

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Notes:

- 1. Dot to dot intensity matching at 100% brightness is 1.8:1.
- 2. Displays are binned for hue at 2.0 nm intervals.
- 3. Displays within a given intensity category have an intensity matching of 1.5:1 (max.).





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Electrical characteristics (over operating temperature, unless otherwise specified, $T_A = 25$ °C)

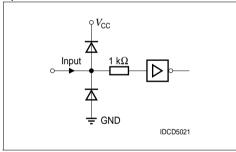
Parameter	Min.	Тур.	Max.	Units	Conditions
V _{CC}	4.5	_	5.5	V	_
I _{CC} (Power Down Mode)	_	_	5.0	μA	$V_{\rm CC}$ =5.0 V, all inputs=0 V or $V_{\rm CC}$
I _{CC} (16 dots on per digit) ¹⁾	_	100	145	mA	$V_{\rm CC}$ =5.0 V, "#" displayed in all 4 digits at 100% brightness at 25xC
V _{IH}	3.5	_	_	V	V _{CC} =4.5 V to 5.5 V
V_{IL}	_	_	1.5	V	V _{CC} =4.5 V to 5.5 V
I _{IH}	_	_	10	μA	V _{CC} =V _{IN=} 5.0 V (all inputs)
I _{IL}	_	_	-10	μΑ	$V_{\rm CC}$ =5.0 V, $V_{\rm IN}$ =0 V (all inputs)
Internal Mux Frequency	375	768	1086	Hz	_
θ_{ja}	_	65	_	°C/W	_

Notes:

Input Circuit

The input resistor/diode network shown below is used for ESD protection and to eliminate substrate latch-up caused by input voltage over/under shoot.

Inputs



Pinout and Pin Definitions

Pin	Function	Definitions
1	LOAD	Low input enables data clocking into 8-bit serial shift register. When LOAD goes high, the contents of 8- bit serial Shift Register will be decoded.
2	SDATA	Serial data input
3	SDCLK	Loads data into the 8-bit serial data register on a low to high transition
4	V _{CC}	Power supply
5	GND	Power supply ground

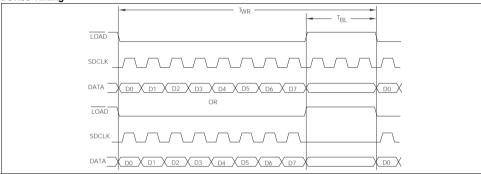


¹⁾ I_{CC} is an average value, the Peak current is $^{5}/_{3}$ x I_{CC}.

Contact manufacturer for 3.3 volt operation.







Write Cycle Timing

(over operating temperature range, $V_{CC} = V_{LL} = 4.5 \text{ V}$ to 5.5 V)

Symbol	Description	Min.	Max.	Units
T _{LDS}	Load Setup Time	50	_	ns
T _{DS}	Data Setup Time	50	_	ns
T _{SDCLK}	Clock Period	200	_	ns
T _{SDCW} (HI or LOW)	Clock Width	70	_	ns
T _{LDH}	Load Hold Time	0	_	ns
T _{DH}	Data Hold Time	25	_	ns
T _{WR}	Total Write Time	2.25	_	μs
T _{BL}	Time Between Writes	600	_	ns
T _{RST}	Reset Active Time	600	_	ns

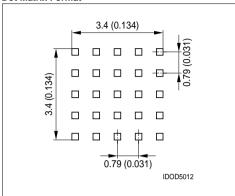
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Notes:

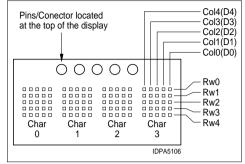
- T_{WR}=Setup Time + 8 Clock Times + Hold Times + Time Between Writes.
- 2. Data is shifted into the display's 8 bit shift register on the positive going edge of the SDCLK.
- 3. Shift register data is evaluated when Load goes high.

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Dot Matrix Format

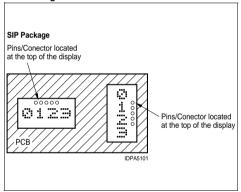


Character Address, Row, & Column Data Map

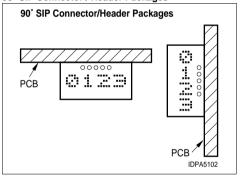


- Viewed from the LED side of the display with the display in a horizontal position.
- The row address and column data are typical for all character positions. The LED is on when the data bit = 1 and off when the data bit = 0.

Suggested Display Mounting SIP PAckage



Suggested Display Mounting 90° SIP Connector / Header Packages



Operation of the SCDQ554XX

The SCDQ554XX display consists of a CMOS IC containing control logic and drivers for four 5 x 5 characters. These components are assembled in a compact plastic package.

Individual LED dot addressablity allows the user great freedom in creating special characters or mini-icons. The User Definable Character Set examples illustrate 200 different character and symbol possibilities. Each example has the hexadecimal code required to display characters in a horizontal or vertical format. See Figures above, Suggested Display Mounting, for the display positioning. Generally, the contacts should be on the right side of the display for the vertical format and on the top of the display for the horizontal format.

The serial data interface provides a highly efficient interconnection between the display and the mother board. The SCDQ554XX requires only three input lines as compared to 15 for an equivalent four character parallel input part.

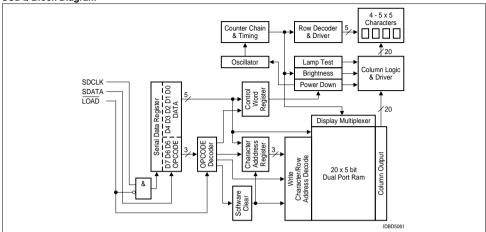
The on-board CMOS IC is the electronic heart of the display. The IC accepts decoded serial data, which is stored in the internal RAM. Asynchronously the RAM is read by the character multiplexer at a strobe rate that results in a flicker free display. shows the three functional areas of the IC. These include: the input serial data register and control logic, a 100 bits two port RAM, and an internal multiplexer/display driver.

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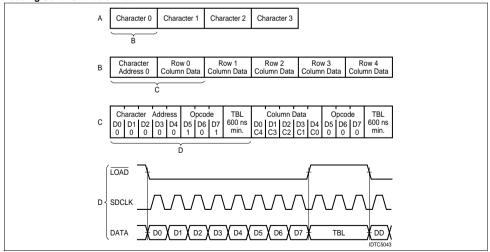
SCDQ Block Diagram



The following explains how to format the serial data to be loaded into the display. The user supplies a string of bit mapped decoded characters. The contents of this string is shown in Figure "Loading Serial Character Data A" (page 8). Figure "Loading Serial Character Data B" (page 8) shows that each character consists of six 8 bit words. The first word encodes the display character location and the succeeding five bytes are row data. The row data represents the status (On, Off) of individual column LEDs. Figure "Loading Serial Character Data C" (page 8) shows that each 8 bit word is formatted to include a three bit Operational Code (OPCODE) defined by bits D7–D5 and five bits (D4–D0) representing Column Data, Character Address, or Control Word Data.

Figure "Loading Serial Character Data D" (page 8) shows the sequence for loading the bytes of data. Bringing the LOAD line low enables the serial register to accept data. The shift action occurs on the low to high transition of the serial data clock (SDCLK). The least significant bit (D0) is loaded first. After eight clock pulses the LOAD line is brought high. With this transition the OPCODE is decoded. The decoded OPCODE directs D4–D0 to be latched in the Character Address register, stored in the RAM as Column data, or latched in the Control Word register. The control IC requires a minimum 600 ns delay between successive byte loads.

Loading Serial Character Data





The Character Address bits, D4–D0 stored in the Character Address Register and the Column Data Instruction's Row Address bits, D7–D5, direct the Column Data bits, D4–D0 to specific RAM location. See the Instruction Set Table for address and data format. Figure "Writing Character "D' Example" (page 9) shows the Row Address for the example character "D" See Figure "Character Address, Row, & Column Data Map" (page 7) for the dot positioning (Display contacts are at the top of the display).

Column data is written and read asynchronously from the 200 bit RAM. Once loaded the internal oscillator and character multiplexer reads the data from the RAM. These characters are row strobed with column data as shown in Figure "Row Strobe Example" (page 10). The character strobe rate is determined by the internal ICS=\$30 counter.

Instruction Set

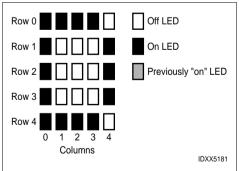
OPERATION	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	HEX	DESCRIPTION
CONTROL WORD	1	1	1	1	L T	B r	B r	B r	F0+X	Select Control Word plus operand See Control Word Format
Power Down Mode	1	1	1	1	1	1	1	1	FF	Power Down Mode–0% Brightness
SFT CLEAR	1	1	0	0	0	0	0	0	C0	Software Clear
ADDRESS	1	0	1	0	0	0	0	0	A0	Select Digit Address 0
REGISTER	1	0	1	0	0	0	0	1	A1	Select Digit Address 1
CHR ADRS	1	0	1	0	0	0	1	0	A2	Select Digit Address 2
0–3	1	0	1	0	0	0	1	1	А3	Select Digit Address 3
COLUMN DATA	0	0	0	D 4	D 3	D 2	D 1	D 0	00+X	Row 0 D4–D0=Column Data
	0	0	1	D 4	D 3	D 2	D 1	D 0	20+X	Row 1 D4–D0=Column Data
	0	1	0	D 4	D 3	D 2	D 1	D 0	40+X	Row 2 D4–D0=Column Data
	0	1	1	D 4	D 3	D 2	D 1	D 0	60+X	Row 3 D4–D0=Column Data
	1	0	0	D 4	D 3	D 2	D 1	D 0	80+X	Row 4 D4–D0=Column Data

Row data is written to the character address contained in the Character Address Register.

Writing Character "D" Example

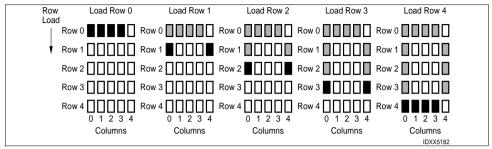
	Op D7	code D6	D5	Colu D4 C0	mn D D3 C1	ata D2 C2	D1 C3	D0 C4	Hex
Row 0	0	0	0	1	1	1	1	0	1E
Row 1	0	0	1	1	0	0	0	1	31
Row 2	0	1	0	1	0	0	0	1	51
Row 3	0	1	1	1	0	0	0	1	71
Row 4	1	0	0	1	1	1	1	0	9E

Row and Column Locations for a Character "D"





Row Strobe Example



The user can activate four Control functions. These include: LED Brightness Level, Lamp Test, IC Power Down, or Display Clear. OPCODEs and five bit words are used to initiate these functions. The OPCODEs and Control Words for the Character Address and Loading Column Data are shown in Instruction Set Table.

The user can select seven specific LED brightness levels. These brightness levels (in percentages of full brightness of the display) include: 100% (F0HEX), 53% (F1HEX), 40% (F2HEX), 27% (F3HEX), 20% (F4HEX), 13% (F5HEX), and 6.6% (F6HEX). The brightness levels are controlled by changing the duty factor of the row strobe pulse.

Display Brightness

	cod D6	e D5	Con D4	trol W D3	ord D2	D1	Hex	Operation Level	
1	1	1	1	0	0	0	0	F0	100%
1	1	1	1	0	0	0	1	F1	53%
1	1	1	1	0	0	1	0	F2	40%
1	1	1	1	0	0	1	1	F3	27%
1	1	1	1	0	1	0	0	F4	20%
1	1	1	1	0	1	0	1	F5	13%
1	1	1	1	0	1	1	0	F6	6.6%

The SCDQ554X offers a unique Display Power Down feature which reduces $I_{\rm CC}$ to less than 50 μ A. When FFHEX is loaded the display is set to 0% brightness and the internal multiplex clock is stopped. When in the Power Down mode data may still be written into the RAM. The display is reactivated by loading a new rightness Level Control Word into the display.

Power Down

	cod D6	e D5		trol W D3	ord D2	Hex	Operation Level		
1	1	1	1	1	1	1	1	FF	0% brightness

The Lamp Test is enabled by loading F8HEX into the serial shift register. This Control Word sets all of the LEDs to a 53% brightness level. Operation of the Lamp Test has no affect on the RAM and is cleared by loading a Brightness Control Word.

Lamp Test

	Op code D7 D6 D5			trol W D3	ord D2	Hex	Operation Level		
1	1	1	1	0	В	В	В		Lamp Test (OFF)
1	1	1	1	1	0	0	0	F8	Lamp Test (ON)

The Software Clear (C0HEX) clears the Address Register and the RAM. The display is blanked and the Character Address Register will be set to Character 0. The internal counter and the Control Word Register are unaffected. The Software Clear will remain active until the next data input cycle is initiated.

Software Clear

				trol W		Hex	Operation		
D7	D6	D5	D4	D3	D2	D1	D0		Level
1	1	0	0	0	0	0	0	C0	CLEAR

Electrical & Mechanical Considerations

Interconnect Considerations

Optimum product performance can be had when the following electrical and mechanical recommendations are adopted. The SCDQ554XX's IC is constructed in a high speed CMOS process, consequently high speed noise on the SERIAL DATA, SERIAL DATA CLOCK, and LOAD lines may cause incorrect data to be written into the serial shift register. Adhere to transmission line termination procedures when using fast line drivers and long cables (>10 cm).

Good digital grounds (pin 1) and power supply decoupling (pin 2) will insure that $l_{\rm CC}$ (<350 mA peak) switching currents do not generate localized ground bounce. Therefore it is recommended that each display package use a 0.1 μF and 20 μF capacitor between $V_{\rm CC}$ and ground.



ESD Protection

The input protection structure of the SCDQ554XX provides significant protection against ESD damage. It is capable of withstanding discharges greater than 2.0 kV. Take all the standard precautions, normal for CMOS components. These include properly grounding personnel, tools, tables, and transport carriers that come in contact with unshielded parts. If these conditions are not, or cannot be met, keep the leads of the device shorted together or the parts in anti-static packaging.

Soldering Considerations

The SCDQ554XX can be hand soldered with SN63 solder using a grounded iron set to 260°C.

Wave soldering is also possible following these conditions: Preheat that does not exceed 93°C on the solder side of the PC board or a package surface temperature of 85°C. Water soluble organic acid flux (except carboxylic acid) or resin-based RMA flux without alcohol can be used.

Wave temperature of $245^{\circ}\text{C} \pm 5^{\circ}\text{C}$ with a dwell between 1.5 s to 3.0 s. Exposure to the wave should not exceed temperatures above 260°C for five seconds at 1.59 mm (0.063") below the seating plane. The packages should not be immersed in the wave.

The SCDQ554XR connects to an external connector receptacle which may be soldered before inserting the SCDQ554XR Display. In this way, only the connector is subject to the user's soldering process. The Molex 52418-0510 receptacle called out in the product drawing can be used in solder reflow processes. See Molex for specifications.

Post Solder Cleaning Procedures

The least offensive cleaning solution is hot D.I. water (60°C) for less than 15 minutes. Addition of mild saponifiers is acceptable. Do not use commercial dishwasher detergents.

For faster cleaning, solvents may be used. Exercise care in choosing solvents as some may chemically attack the nylon package. For further information refer to Appnotes 18 and 19 at www.osram-os.com or in the current Short Form Catalogue. See Appnote 19, Table 2, "Displays—Group 2".

Optical Considerations

The 3.12 mm (0.123") high character of the SCDQ554XX gives readability up to five feet. Proper filter selection enhances readability over this distance.

Using filters emphasizes the contrast ratio between a lit LED and the character background. This will increase the discrimination of different characters. The only limitation is cost. Take into consideration the ambient lighting environment for the best cost/benefit ratio for filters.

Incandescent (with almost no green) or fluorescent (with almost no ered) lights do not have the flat spectral response of sunlight. Plastic band-pass filters are an inexpensive and effective way to strengthen contrast ratios. The SCDQ5542X is a super-red display and should be matched with long wavelength pass filter in the 570 nm to 590 nm range. The SCDQ5541X/3X/4X should be matched with a yellow-green band-pass filter that peaks at 565 nm. For displays of multiple colors, neutral density grey filters offer the best compromise.

Additional contrast enhancement is gained by shading the displays. Plastic band-pass filters with built-in louvers offer the next step up in contrast improvement. Plastic filters can be improved further with anti-reflective coatings to reduce glare. The trade-off is fuzzy characters. Mounting the filters close to the display reduces

this effect. Take care not to overheat the plastic filter by allowing for proper air flow.

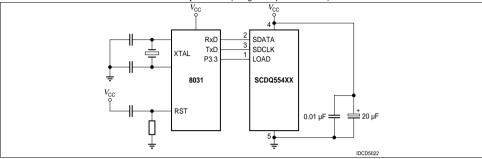
Optimal filter enhancements are gained by using circular polarized, anti-reflective, band-pass filters. The circular polarizing further enhances contrast by reducing the light that travels through the filter and reflects back off the display to less than 1%.

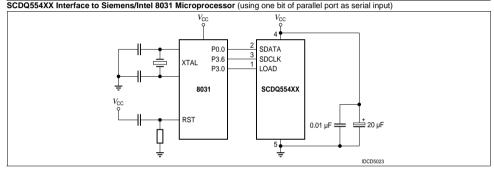
Several filter manufacturers supply quality filter materials. Some of them are: Panelgraphic Corporation, W. Caldwell, NJ; SGL Homeite, Wilmington, DE; 3M Company, Visual Products Division, St. Paul, MN; Polaroid Corporation, Polarizer Division, Cambridge, MA; Marks Polarized Corporation, Deer Park, NY, Hoya Optics, Inc., Fremont, CA.

One last note on mounting filters: recessing displays and bezel assemblies is an inexpensive way to provide a shading effect in overhead lighting situations. Several Bezel manufacturers are: R.M.F. Products, Batavia, IL; Nobex Components, Griffith Plastic Corp., Burlingame, CA; Photo Chemical Products of California, Santa Monica, CA; I.E.E.-Atlas, Van Nuys, CA.



SCDQ554XX Interface to Siemens/Intel 8031 Microprocessor (using serial port in mode 0)





Microprocessor Interface

The microprocessor interface is through the serial port, SPI port or one out of eight data bits on the eight bit parallel port and also control lines SDCLK and LOAD.

Power Up Sequence

Upon power up display will come on at random. Thus the display should be reset at power-up. The reset will set the Address Register to Digit 0, User RAM is set to 0 (display blank) the Control Word is set to 0 (100% brightness with Lamp Test off) and the internal counters are reset.

V_{CC}
V_{CC}

V_{CC}

4

P0.0

SData
SDCLK
Load
SCDQ554XX

V_{CC}

RST

V_{CC}

4

4

4

4

4

4

4

4

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SCDQ554XX Interface with Motorola 68HC05C4 Microprocessor (using SPI port)



IDCD5024

Loading Data into the Display

Use following procedure to load data into the display:

- 1. Power up the display.
- 2. Step A: software clear the display.
- Step B: Load the Control Word with the desired brightness level.
- 4. Load the Digit Address into the display.
- 5. Load display row and column data for the selected digit.
- 6. Repeat steps 4 and 5 for all digits.

Data Contents for the Display in a Horizontal Format "↑AB↓"

Step	D7	D6	D5	D4	D3	D2	D1	D0	Function
A	1	1	0	0	0	0	0	0	CLEAR
B (optional)	1	1	1	1	0	В	В	В	BRIGHTNESS SELECT
1	1	0	1	0	0	0	0	0	DIGIT DO SELECT
2	0	0	0	0	0	1	0	0	ROW 0 D0 (1)
3	0	0	1	0	1	1	1	0	ROW 1 D0 (1)
4	0	1	0	1	0	1	0	1	ROW 2 D0 (1)
5	0	1	1	0	0	1	0	0	ROW 3 D0 (↑)
6	1	0	0	0	0	1	0	0	ROW 4 D0 (1)
7	1	0	1	0	0	0	0	1	DIGIT D1 SELECT
8	0	0	0	0	0	1	0	0	ROW 0 D1 (A)
9	0	0	1	0	1	0	1	0	ROW 1 D1 (A)
10	0	1	0	1	1	1	1	1	ROW 2 D1 (A)
11	0	1	1	1	0	0	0	1	ROW 3 D1 (A)
12	1	0	0	1	0	0	0	1	ROW 4 D1 (A)
13	1	0	1	0	0	0	1	0	DIGIT D2 SELECT
14	0	0	0	1	1	1	1	0	ROW 0 D2 (B)
15	0	0	1	0	1	0	0	1	ROW 1 D2 (B)
16	0	1	0	0	1	1	1	0	ROW 2 D2 (B)
17	0	1	1	0	1	0	0	1	ROW 3 D2 (B)
18	1	0	0	1	1	1	1	0	ROW 4 D2 (B)
19	1	0	1	0	0	0	1	1	DIGIT D3 SELECT
20	0	0	0	0	0	1	0	0	ROW 0 D3 (↓)
21	0	0	1	0	0	1	0	0	ROW 1 D3 (↓)
22	0	1	0	1	0	1	0	1	ROW 2 D3 (↓)
23	0	1	1	0	1	1	1	0	ROW 3 D3 (↓)
24	1	0	0	0	0	1	0	0	ROW 4 D3 (↓)

User Definable Character Set Examples*

Upper and lower case alphabets

	HEX		HEX		HEX CODE		HEX CODE		HEX CODE		HEX CODE		HEX CODE		HEX		HEX	
CODE		98289		24888		#£222		요두문문의		# K R R E		82225		87.28t		R 22 4 22 H		85788
	04 2A 5F 71 91	::::	1E 29 4E 69 9E	::::	0F 30 50 70 8F	:	1E 29 49 69 9E		1F 30 5E 70 9F	:	1F 30 5E 70 90	:	0F 30 53 71 8F		11 31 5F 71 91		0E 24 44 64 8E	::
¥ ₩ O		82 61 41 21		13464		#242P		₽84% 		₽842 +		#r528		34 34 38 38		#####		# 12 8 18 18 18
	01 21 41 71 8E	•:	13 34 58 74 93	::::	10 30 50 70 9F	:	11 3B 55 71 91	:··:	11 39 55 73 91	· · · ·	0E 31 51 71 8E	::::	1E 31 5E 70 90		0C 32 56 72 8D	:::.	1E 31 5E 74 92	::::
¥¥00		85885		85785		82425		88±85		₽842F		2848=		128488		25882		
	0F 30 4E 61 9E	•	1F 24 44 64 84	:	11 31 51 71 8E	: :	11 31 51 6A 84	::	11 31 55 7B 91		11 2A 44 6A 91		11 2A 44 64 84	·:-:	1F 22 44 68 9F	:::		
¥900 ₩		32488		#8848		88888		名名名名市		28488		888888		88488		#8448		88278
	00 2E 52 72 8D	:::.	10 30 5E 71 9E		00 2F 50 70 8F	::::	01 21 4F 71 8F	•:::	00 2E 5F 70 8E	::::	04 2A 48 7C 88		00 2F 50 73 8F	::	10 30 56 79 91	:··· :	04 20 4C 64 8E	::.
¥800		82 61 26 26		#8488		82728		28487		928887		88488		84 44 04		8444		#8488
	00 26 42 72 8C	:	10 30 56 78 96	:. ::	0C 24 44 64 8E	::.	00 2A 55 71 91	: ::	00 36 59 71 91	:··:	00 2E 51 71 8E	::::	00 3E 51 7E 90	 ·	00 2F 51 6F 81	•;	00 33 54 78 90	···
¥800		80 45 24 08		828488		#2±#2		88488		#8#42P		88488		89 65 42 24 08		88488		
	00 23 44 62 8C	.:	08 3C 48 6A 84	::.	00 32 52 72 8D		00 31 51 6A 84	::	00 31 55 7B 91		00 32 4C 6C 92	:::	00 31 4A 64 98	····	00 3E 44 68 9E	:::		

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Numerals and punctuation

	HEX CODE		HEX CODE		HEX		HEX CODE		HEX CODE		HEX CODE		HEX		HEX		HEX	
HEX		8E 73 55 39 0E		88 55 21 00		91 73 35 99		91 75 55 35 0A		434 F 4		9D 75 55 35 35		88 35 35 00 00 00		85,485		8A 75 35 36 0A
	0E 33 55 79 8E		04 2C 44 64 8E	•	1E 21 46 68 9F	••••	1E 21 4E 61 9E	·····	06 2A 5F 62 82		1F 30 5E 61 9E		06 28 5E 71 8E	····.	1F 22 44 68 88	:	0E 31 4E 71 8E	
HEX		85383		84 77 94 94 94		81 75 5F 35 12		85 6F 55 31 09		8 X 4 8 5		84 75 22 05		82528		88458		82428
	0E 31 4F 62 8C	•	0A 3F 4A 7F 8A		0F 34 4E 65 9E		06 29 5C 68 9F		19 3A 44 6B 93		08 34 4D 72 8D		0C 2C 44 68 80	::	02 24 44 64 82		08 24 44 64 88	
HEX		85488		22242		88488		22442		82488		28483		88888		88.488		8882
	0C 2C 48 64 80	::	04 24 5F 64 84		00 2C 4C 64 88	::	00 20 5F 60 80	••••	00 20 40 6C 8C	::	01 22 44 68 90		04 24 44 60 84	:	0A 2A 40 60 80	::	07 24 44 64 87	
HEX		88422		25 F 7 2 9		85 35 35 35 35 35 35 35 35 35 35 35 35 35		81 61 21		88888		80 20 20 00		82428		88488		82448
	10 28 44 62 81	•••	1C 24 44 64 9C		0E 35 57 70 8E		00 20 40 60 9F	••••	0C 2C 40 6C 8C	::	0C 20 4C 64 88	::	02 24 48 64 82	·:	00 3F 40 7F 80	••••	08 24 42 64 88	:-
HEX		87278		84828		82 1 80 0 2 4 8 1 1 80		808 808 808		88425		95 6E 5F 15		28882		82848		
	0E 31 42 64 88	••••	06 24 48 64 86	::	0C 24 42 64 8C	:	04 24 40 64 84	:	11 2A 44 6E 84	•	15 2E 5F 6E 95		04 2A 51 60 80	•••	08 35 42 60 80	••••		

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^{*}CAUTION: No more than 128 LEDs "on" at one time at 100% brightness.

User Definable Character Set Examples* (continued)

Scientific notations, ect.

	HEX		HEX		HEX		HEX		HEX		HEX		HEX		HEX		HEX	
X S		84468		88828		43524		28234		882288		#F22#		#5888		25 K B X S		88848
	06 2E 5E 6E 86	•	04 24 48 71 8E	.:∙	1F 20 59 75 93	::	1F 20 56 79 91	····:	0E 20 4A 64 8A	::	0D 32 52 72 8D		0C 32 56 71 96	:::	0E 24 4E 71 8E		00 24 4A 71 9F	···:
Œ. GOO		98 98 98 97		82288		22489		24425		28485		88458		85888		89870		8E 51 3E 10
	10 3C 52 72 81	:: :.	0E 31 5F 71 8E		10 28 44 6A 91	···	09 29 49 6E 90		01 2E 54 64 84	·:::	04 2E 55 6E 84	•:::•	0E 31 51 6A 9B		01 2E 5A 6A 8A	.:::	0F 32 52 72 8C	
HEX CODE		97 37 31		92 44 00 00		92 7A 54 20 00		84 44 02		84 64 52 36 0A		84 52 34 14		90 74 50 20 00		82 77 30 10		28882
	1F 28 44 68 9F	:::	18 24 48 7C 80	:::	1C 28 44 78 80	::	12 36 5A 67 80	:.	06 21 5A 67 80	•:::	07 22 59 66 80	:	1C 34 5C 60 80	:::	0F 28 48 78 88	.:"	04 2E 5F 6E 80	•
HEX		82 67 27 02		88488		88 37 30 88		8E 5F 5F 04		84 6E 2E 0E		84448		8E 6E 2E 0E		28782		22422
	00 24 4E 7F 8E		00 2E 5F 6E 84	•	0E 3F 4E 64 80	•	04 3E 5F 7E 84	::::	04 2F 5F 6F 84	•	0E 2E 4E 6E 8E	:::	00 3F 5F 7F 80	*****	04 2E 55 64 84	· ••••	04 24 55 6E 84	••
HEX CODE		84 64 55 2E 04		84 55 24 04		9F 71 31		83 24 00		88 75 48 35 08		95 28 15		9F 75 5F 35 1F		###88		#F878
	04 22 5F 62 84		04 28 5F 68 84	•:	1F 31 51 71 9F		08 2C 4A 78 98	: ···	0A 35 4A 75 8A	\vdots	15 2A 55 6A 95	:::	1F 35 5F 75 9F		00 3F 5F 7C 80		0E 3F 5B 7F 8E	
SOE H		83 67 20 00		82458		88825		22888		87 67 2F 0F		###88		98 57 57 50 51				
	00 27 4F 78 9C	::::	00 3C 5F 63 87	***	00 20 40 60 83	••	00 20 40 67 9F	::	00 23 5F 7F 9F		0C 3C 5C 7C 9C	:::	15 2E 44 64 84	••••				

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Foreign characters

	HEX		HEX CODE		HEX CODE		HEX		HEX CODE		HEX CODE		HEX CODE		HEX CODE		HEX	
MEX WDE		24885		812828		8242		88888		88488		82528		81:848		85738		884%8
	1F 21 5F 62 84	:	1F 21 46 64 88	:::	01 22 46 6A 82	•:	04 3F 51 61 86	•	00 3F 44 64 9F		02 3F 46 6A 92	:::	08 3F 49 6A 88	•	1F 21 45 67 8C	••••	02 3F 51 62 8C	::::
¥80		814881		ន្ធមនុទ		28 E E E E		824878		22.22.24		86488		88425		25.88.2H		88845
	08 3F 49 69 92		04 3F 44 7F 84		0F 29 51 62 8C	···	08 2F 52 62 82	•••••	0F 21 41 61 9F		0A 3F 4A 62 8C	••••	19 21 59 62 9C	 :	0F 29 55 63 8C	•	01 3E 42 7F 86	
₩ 9000		82825		85822		82 24 28		88488		27.22.0		25288		88 28 01		28888		28888
	15 35 55 62 8C	••	0E 20 5F 64 98		08 28 4C 6A 90	:.	04 3F 44 64 98	.:.	0E 20 40 60 9F	••••	1F 21 4A 64 9A	:	04 3E 44 6E 95	:::.	04 24 44 68 90	·:	04 22 51 71 91	: :
X₩ CODE		88258		85225		35578		92228		888758		26 35 35 15		24979		8538#		28 8 8 3 3 2
	10 3F 50 70 8F	• • • • • • • • • • • • • • • • • • • •	1F 21 41 62 8C	•••	0E 20 4E 60 8F	•••	04 28 51 7F 81	····:	01 21 4A 64 8A	::	1F 28 5F 68 87	••••	1E 22 42 62 9F		1F 21 5F 61 9F		0E 20 5F 61 8E	••••
₩ 9000		82488		88 27 20 27 20		88 57 88		85 F 28 5		85822		P 52 58 E		#r#85		88888		8K822
	12 32 52 64 88	i.:	04 34 54 75 96	::	1E 25 4F 74 8F	::::	0F 34 5F 74 97	::::	0F 30 4F 64 98	::::	0F 33 55 79 9E		0F 34 57 74 8F		00 2A 5F 74 8B	::::	08 24 4E 72 8F	
₩ 900 900		24489		884128		82 85 28 28 28 28		82428		81.818		86 24 34 34 34 34 34		88228				
	0A 2E 51 7F 91	: <u>:</u>	02 24 4C 64 8E	::	04 2A 4E 71 8E	··	0A 34 52 7A 96		08 24 51 71 8E	::::	02 24 51 71 8E	::::	04 2A 51 71 8E	::::				

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2006-05-12

^{*}CAUTION: No more than 128 LEDs "on" at one time at 100% brightness.

Revision History: 2006-05-12 Previous Version: 2006-01-23

Page	Subjects (major changes since last revision)	Date of change
all	Lead free device	2006-01-23

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