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Addressing migrations of SCN devices to more advanced technologies

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Document information

Info	Content
Keywords	SCN vs. SCC, SCN UART, SCN replacement
Abstract	This application note is applicable to the following Philips Semiconductors Industrial UARTs: SCN2681, SCN68681, and SCN2681T. It addresses the migrations of SCN devices to more advanced technologies and provides guidelines for the replacement of the SCN devices with the SCC and later devices.

PHILIPS

Revision history

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1	20040629	Application note (9397 750 13523)

Contact information

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1. Introduction

Upward software and pin compatibility has been a primary goal in the over twenty year history Philips Semiconductors in the design of asynchronous digital communication devices. The fullest expression of this goal is seen in the family of 2-channel Industrial UART communication circuits. These circuits started as 5-volt N channel semiconductor (SCN) integrated circuits. They have now progressed through the various semiconductor-processing technologies that now include multi voltage and multi temperature circuits generally named SCCxxx, SCxxx and SC28Lxxx manufactured in fully static CMOS technology.

This application note provides guidelines for the replacement of the former SCN parts with the SCC and later parts. Specifically listed is the replacement of the SCN2681 with the SCC2681, the SCN2681T with the SCC2681T, and the SCN68681 with the SCC68681.

2. Description

The major difference between the SCC and SCN devices is the SCC devices are CMOS while the SCN devices are NMOS. The SCC2681 is a CMOS version of the SCN2681 Dual UART. The SCC2681 is functionally and pin-to-pin compatible with the SCN2681. Thus, the SCC devices can be substituted into existing SCN designs. In addition, the SCC devices draw significantly less power than the SCN devices.

If increased performance is key in your design considerations, solutions such as the SC26C92, SC28L92 as well as the forthcoming 256-byte FIFO 28L202 are recommended (see Table 1).

Table 1: Replacement chart with added features

Pin compatibility exists for all parts listed below except the SC28L202.

Feature	N channel part	Nominal replacement, in order of increasing capability			
	SCN2681	SCC2681	SC26C92	SC28L92	SC28L202
Power supply			5 V	3.3 V and 5 V	3.3 V and 5 V
FIFOs			8-byte	16-byte	256-byte
Bus interface			Intel	Intel and Motorola	Intel and Motorola
Speed (max @16x)			1 Mbit/s	1 Mbit/s	3.125 Mbit/s
Intelligence Interrupt Arbitration					Yes
Real Time Data Error Detection					Yes
	SCN2681T	SCC2681T	SC26C92 (as above)	SC28L92 (as above)	SC28L202 (as above)
	SCN68681	SCC28681		SC28L92 (as above)	SC28L202 (as above)

The following paragraph is directed to the several system conditions and user assumptions regarding internal chip logic that may present some concern in making this change. Please refer to Table 2 for particular information relevant to the migration of the SCN devices to their equivalent SCC devices.

Table 2: Replacing SCN devices with SCC devices

Point of difference	Problem	Correction
Polarity of crystal	No problem if crystal is used.	No action.
Pin X1 and X2 reversed	No problem is X1 is driven and X2 is open.	No action.
	Problem if X1 is driven and X2 is grounded.	Remove ground at X2.
Internal Oscillator	The SCN needs very small capacitor loading while the SCC uses the crystal manufacturer loading.	The SCC start-up should be verified.
Counter Timer	The SCN powers up in the running condition while the SCC powers up with the Counter/Timer (C/T) stopped.	Require a 'start counter' command before the counter is used.
	The C/T special time-out active.	Hardware reset must be used.
Bit 7 of the SCN command register is not used	Some software written for the SCN may have used this bit as a flag.	For access to the lower 8 commands of the command register, bit 7 must be set to '0'.
Maximum and minimum pin voltages	CMOS technology places limit on pin voltages above V_{CC}.	Restrict pin voltage to (V_{CC} + 0.5) volts.
Power-down mode	May become active.	Use hardware reset to clear.

If you choose the increased capability of the SC26C92 or the SC28L92 as a replacement to the SCN devices, please note the following:

- All comments in Table 2 apply to these devices with added deeper FIFO size and faster speed.
- The pin configuration is the same.
- It would be desirable to take advantage of the additional features of the newer devices.
- The 28L92 provides pin select for Intel and Motorola buses interface. The Motorola interface will require the grounding of the I/M pin (refer to the 28L92 data sheet for details).
  - When the I/M pin is LOW (grounded), the bus interface pin configuration changes to that of the SCN68681.
  - When the I/M pin is HIGH or not connected, it assumes the pin configuration of the SCN2681.

2.1 Considerations for the SC28L202

The forthcoming SC28L202 is a 2-channel UART with 256-byte FIFOs and faster data transfer rate. In addition, it has advanced features such as intelligence interrupt arbitration and real time data error detection. It will run the software of all previous 2-channel parts.

3. Conclusion

Today, CMOS technology is widely used semiconductor technology for integrated circuits such as UART. The main advantage of the SCC over SCN devices is the much smaller power dissipation. Unlike the SCN circuits, the SCC circuits have almost no static power dissipation. Power is dissipated only when the circuit switches. Thus, the SCC devices result in much better performance. If you have further questions, please direct them to the factory contact: **datacom.tech-support@philips.com**.

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5. Contents

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