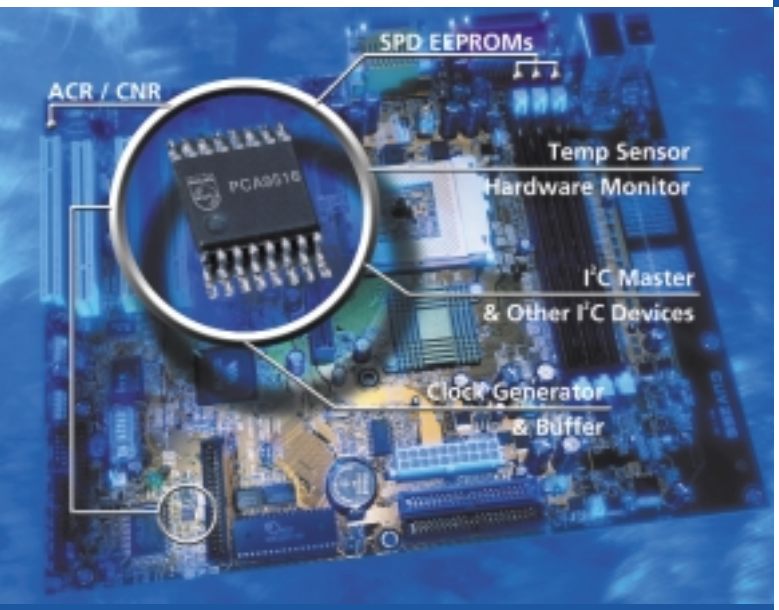
Philips Configuration System Management ICs

PCA9515 PCA9516

I²C Bus Repeater — 5-Channel I²C Hub



These bi-directional I²C drivers enable designers to isolate the I²C bus or SMBus capacitance into smaller sections, accommodating more devices or a longer bus length. Only 400 pF load is allowed on the bus and these devices break the I²C bus or SMBus into multiple 400 pF segments.

Description

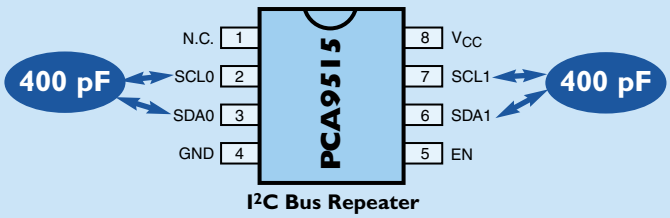
The PCA9515 and PCA9516 allow extension of the I²C bus or SMBus on systems requiring capacitance loads larger than the 400 pF max specified by the I²C protocol. Using these parts, designers can extend the use of the I²C bus in systems with more devices and/or longer bus lengths. The PCA9515 I²C Bus Repeater supports two I²C branches of 400 pF and the PCA9516 5-channel I²C Hub enables separation of the I²C bus into five 400 pF segments for a total I²C bus or SMBus capacitance of 2000 pF.

Additionally, each individual repeater channel has an enable/disable feature which is used to electrically isolate that segment of the I²C bus. Examples where this could be useful include (i) isolating a 100 kHz segment from the rest of a 400 kHz system to allow mixed operation at 100/400 kHz, (ii) supporting the PCI management bus with up to or more than 8 PCI slots, (iii) isolating the SMBus to hot plug PCI slots and (iv) allowing the main SMBus to drive multiple system boards.

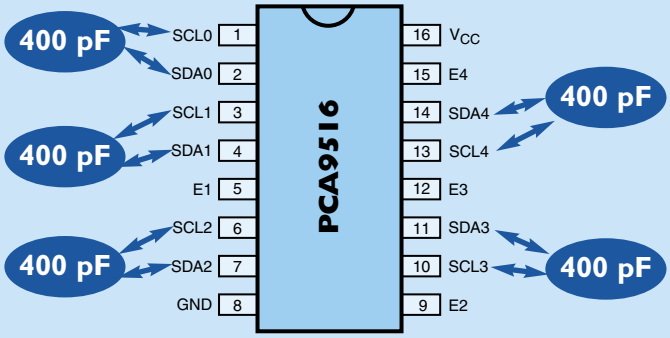
Another use of these devices is in systems using I²C bus or SMBus segments at different voltages of 5.0 V and 3.3 V, thus extending the life of older 5.0 V circuit blocks while using newer 3.3 V devices for improved system performances. The PCA9515/16 are designed to work with clock frequencies up to 400 kHz and are suitable for utilization in a multi-master I²C bus or SMBus environment.

Application Note AN255 "Use of the PCA9515 and PCA9516 in a generic multi-mater I²C environment" covers the use of these devices and explains pull-up resistor sizing in detail. Only one hub or repeater is allowed per I²C or SMBus system. The PCA9518 should be considered for systems larger than 5 segments.

Pin Configurations



I²C Bus Repeater



5-Channel I²C Hub

Order Information

Package	Container	PCA9515	PCA9516
SO	Tube	PCA9515D	PCA9516D
	T & R	PCA9515D-T	PCA9516D-T
TSSOP	Tube	Not Offered	PCA9516PW
	T & R	PCA9515DP-T	PCA9516PW-T

PCA9515/16 Features

- Accommodate more I²C devices or a longer bus length, up to 400 pF per segment
- Bi-directional I²C drivers isolate the I²C bus capacitance of each segment.
- Powered-off high impedance I²C pins support hot insertion
- Open drain outputs and fail safe operation on loss of power
- I²C-bus and SMBus compatible
- Lock-up free operation
- Multi-master capable repeaters support bus arbitration and clock stretching with only one repeater delay between segments
- Individual channel enables allow segments to be individually isolated
- ESD protection exceeds 2000 V HBM per JESD22-A114, 200 V MM per JESD22-A115, and 1000 V CDM per JESD22-C101
- Latch-up testing is done to JEDEC Standard JESD78 which exceeds 100 mA.
- PCA9515 offered in 8-pin SO (D) and TSSOP (DP)
- PCA9516 offered in 16-pin SO narrow (D) and TSSOP (PW)

PCA9515/16 Operating Characteristics

- Operating voltage range is 3.0 V to 3.6 V
- 5.0 V tolerant I²C pins — pull-up resistors to either 3.3 V or 5.0 V voltage levels are allowed on the individual segments
- Operating temperature range is -40 °C to 85 °C
- Accommodate 100 kHz and 400 kHz devices and multiple masters

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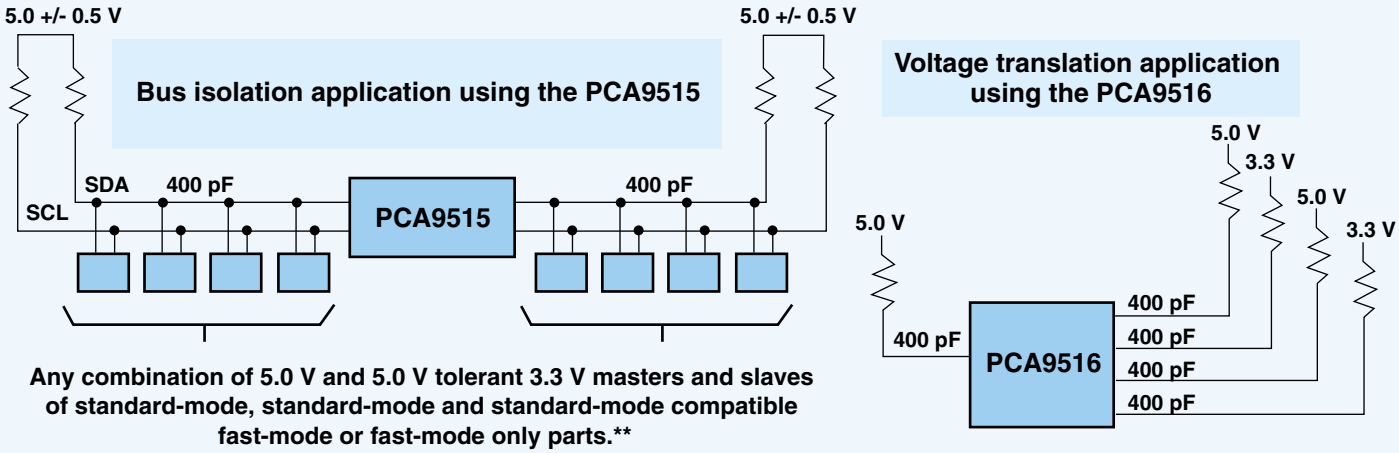
I²C Bus Repeater 5-Channel I²C Hub PCA9515/16

Repeater, Hub and Bus Extender Selection Summary

FEATURES	PCA9515	PCA9516	P82B96	P82B715
Data sheet supply voltage range V_{CC}	3.0 - 3.6 V	3.0 - 3.6 V	2.0 - 15.0 V	4.5 - 12.0 V
Nominal logic levels supported (range)	V_{CC} to 5.5 V	V_{CC} to 5.5 V	V_{CC} to 15.0 V	Equal/less than V_{CC}
Allows I²C bus logic level shifting (range)	3.0 - 5.5 V	3.0 - 5.5 V	2.0 - 15.0 V	no level shifts
Allows interconnecting I²C buses, each 400 pF	yes, 2	yes, 5	yes, 2	no
On-chip bus sink current capability	I²C	I²C	10x I²C	10x I²C
Drives lower impedance " I²C like" buses	no	no	yes	yes
Max. (multimaster) bus capacitance supported	800 pF	2000 pF	unlimited	3000 pF approx
Allows inter-working of I²C and SMBus	yes	yes	yes	no
Designed operating I²C clock speed	400 kHz	400 kHz	100 kHz	100 kHz
Typ. propagation delay (excluding contention)	100 nsec	120 nsec	300 nsec	400 nsec
(Multimaster) system configuration	repeater	hub/star	multi-drop bus	multi-drop bus
Splits I²C to Tx/Rx allowing opto-isolation	no	no	yes	no
Releases all I/Os if V_{CC} supply fails	yes	yes	yes	no
I/Os can be pulled above chip's V_{CC} level	yes, to 5.5 V	yes, to 5.5 V	yes, to 15.0 V	no
Logic "buffer enable" input(s)	yes	yes, 4	no	no
Supply current (typical)	2 mA	7 mA	1 mA	16 mA
Packages	TSSOP/SO8	TSSOP/SO16	DIL/SO8	DIL/SO8

Typical Applications



**All parts must be fast-mode to run at 400 kHz

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