SPEEDCHIPS FAMILY XRS7000 Series

Single-chip Gigabit HSR/PRP Switches

XRS7000 series switches are integrated circuits (ICs) with which you can add HSR/PRP functionality to your device. They are the first HSR ICs in the world. XRS7000 is part of Arrow Electronics' SpeedChip family.

There are two different chips available: XRS7003 and XRS7004. They both have support for the standardized HSR and PRP redundancy protocols (IEC 62439-3 Clause 5 & 4). They also include IEEE1588v2 Precision Time Protocol (PTP) transparent clock functionality.

XRS7003 can be employed in HSR and PRP end nodes and XRS7004 in both end nodes and HSR and PRP RedBoxes. A QuadBox can be built using two XRS7004 devices.

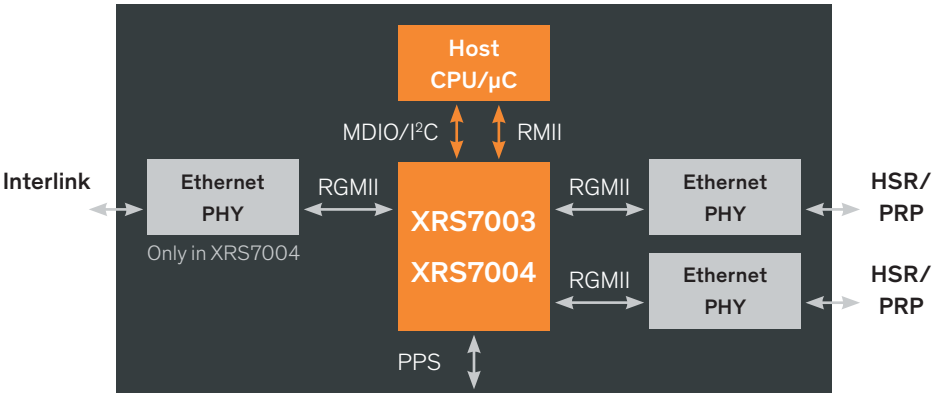
High-availability Seamless Redundancy and Parallel Redundancy Protocol

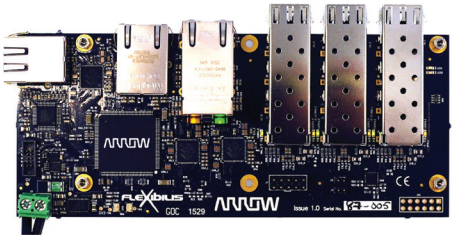
HSR and PRP protocols are used in applications that require short reaction time and high availability. Typical applications include smart grid electrical substation automation and other critical networking applications such as industrial automation, motion control, vehicle and military communication. HSR and PRP provide a network that has no single point of failure and zero recovery time in case of a failure: Single network faults will not result in any frame loss. The network is fully operational even during maintenance as any network device can be disconnected and replaced without breaking the network connectivity.

Reference board for evaluation purposes is available for order.

Reference Board part number:
ARWSCBRD-XRS7004E **ARWSCBRD-XRS7004F**
Device part numbers:
ARWSC-XRS7003E **ARWSC-XRS7003F** **ARWSC-XRS7004E** **ARWSC-XRS7004F**

XRS7000 series chips and the reference boards are distributed by Arrow





Feature	Benefit
HSR (High-availability Seamless Redundancy) - Max HSR network size is 512 hops - HSR proxy node table size is 512 in XRS7004 which is for RedBox applications	Cost-efficient and standardized redundancy method with zero recovery time. A ring can have up to 512 HSR nodes
PRP (Parallel Redundancy Protocol)	Compatible also with PRP devices
RSTP support	Network loop detection and removal
Gigabit Ethernet Switch	Can be used also as a traditional Ethernet switch without HSR/PRP
Two (XRS7003) or three (XRS7004) 10/100/1000 Mbit/s RGMII ports	Gigabit speed means more transfer capacity and less latency
PTP (Precision time Protocol)	No need for separate time synchronization network, for example IRIG-B. Instead the time information can be shared through the HSR/PRP network.
I^2C and MDIO interfaces for register access	Industry standard methods for configuring device functionality
Cut-through and store-and-forward operation	Preferred forwarding method can be chosen: Cut-through mode minimizes latency while store-and-forward offers greater reliability
Quality of Services (QoS) with priority tagging, packet filtering and four priority queues per port	Important packets can be prioritized which minimizes latency of higher priority traffic
Port-based VLAN and VLAN tagging - Max number of VLANs is 4096	The network can be segmented which can simplify network design and management
PPS (Pulse per Second) input and output	Time information can be exchanged with other devices and systems within or outside the IEEE 1588 domain
Support for MAC address based authenticating methods	Provides security by authenticating connected devices
RMON statistics counters	SNMP support for network monitoring purposes
There are two industrial range packages available: - E144 (22 mm x 22 mm, 0.5 mm pitch) - F256 (17 mm x 17 mm, 1.0 mm pitch)	Small footprint and suitable for industrial and harsh environments

Comparison Table / Device Features

Feature	XRS7003	XRS7004
10/100/1000 Mbit/s RGMII ports	2	3
10/100 Mbit/s RMII ports	1	1
High-Availability Seamless Redundancy (HSR)	Yes	Yes
Parallel Redundancy Protocol (PRP)	Yes	Yes
Precision Time Protocol (PTP)	Yes	Yes
Queues per port	4	4
Maximum number of VLANs	4096	4096
Recommended HSR network size	Up to 512 hops	Up to 512 hops
HSR proxy node table size	64 nodes	512 nodes
Package*	144-Pin Plastic Enhanced Quad Flat Pack (EQFP) or 256-Pin Fine Line Ball Grid Array (FBGA)	
Temperature range	-40° C to +100° C	-40° C to +100° C

* The XRS7003 and XRS7004 are pin compatible with the exception of XRS7004 having one RGMII port more than XRS7003.

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Online
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