SMSC
SUCCESS BY DESIGN

TMC2072

Peripheral Mode CircLink^TM Controller

PRODUCT FEATURES

- Low Power CMOS, 3.3 Volt Power Supply with 5 Volt Tolerant I/O
- Supports 8/16-Bit Data Bus
  — Both 86xx and 68hxx Platforms
- 1K On-chip Dual Port Buffer Memory
  — Sequential I/O Mapped Access
- Enhanced Token Passing Protocol from ARCNET
  — Maximum 31 Nodes per Network
  — Token Retry Mechanism
  — Maximum 256 Bytes per Packet
  — Consecutive Node ID Assignment
- Memory Mirror
  — Shared Memory within Network
- Network Standard Time
  — Network Time Synchronization
  — Automatic Time Stamping
- Coded Mark Inversion
  — Intelligent 1-Bit Error Correction
  — Magnetic Saturation Prevention

- Single Operation Mode
  — Supports Only Peripheral (Host) Mode Operates with MCU
- Supports 8 Bit Programmable General Purpose I/O
- Dual Communication Modes (with Peripheral Mode)
  — Free Format Mode
  — Remote Buffer Mode
- 3 Port Hub Integrated
  — 1 Internal and 2 External
- Flexible Topologies
  — Bus, Star, and Tree
- Low-Cost Media can be Used
  — RS485 Differential Driver
- Fiber Optics and Twisted Pair Cable Supported
- 100-Pin, TQFP Lead-Free RoHS Compliant Package
- Temperature Range from 0 to 70 Degrees C

ORDER NUMBER:

TMC2072-MT FOR 100 PIN, TQFP LEAD-FREE ROHS COMPLIANT PACKAGE

General Description

About CircLink

The CircLink networking controller was developed for small control-oriented local network data communication based on ARCNET's token-passing protocol that guarantees message integrity and calculatable maximum delivery times.

In a CircLink network, when a node receives the token it becomes the temporary master of the network for a fixed, short period of time. No node can dominate the network since token control must be relinquished when transmission is complete. Once a transmission is completed the token is passed on to the next node (logical neighbor), allowing it to be come the master.

Because of this token passing scheme, maximum waiting time for network access can be calculated and the time performance of the network is predictable or deterministic. Industrial network applications require predictable performance to ensure that controlled events occur when required.

However, reconfiguration of a regular ARCNET network becomes necessary when the token is missed due to electronic and magnetic noise. In these cases, the maximum wait time for sending datagrams cannot be guaranteed and the real-time characteristic is impaired. CircLink makes several modification to the original ARCNET protocol (such as maximum and consecutive node ID assignment) to avoid token missing as much as possible and reduce the network reconfiguration time.

CircLink implements other enhancements to the ARCNET protocol including a smaller-sized network , shorter packet size, and remote buffer mode operation that enable more efficient and reliable small, control-oriented LANs. In addition, CircLink introduces several unique features for reducing overall system cost while increasing system reliability.

CircLink can operate under a special mode called "Standalone" or "I/O" mode. In this mode, CircLink does not need an administrating CPU for each node. Only one CPU is needed to manage a CircLink network composed of several nodes, reducing cost and complexity.

In a CircLink network, the data sent by the source node is received by all other nodes in the network and stored according to node source ID. For the target node the received data is executed per ARCNET flow control and the data is stored in its buffer RAM. The receiving node processes the data while the remaining nodes on the network discard the data when the receiving node has completed. This memory-mirroring function assures higher reliability and significantly reduces network traffic.

Network Standard Time (NST) is also a unique CircLink feature. NST is realized by synchronizing the individual local time on each network node to the clock master in the designated node from which the packet is sent. CircLink also uses CMI code for transmitting signals, rather than the dipulse or bipolar signals that are the standard ARCNET signals. Since CMI encoding eliminates the DC element, a simple combination of a standard RS485 IC and a pulse transformer can be used to implement a transformer-coupled network.

PRODUCT PREVIEW

About the TMC2072

The TMC2072 network controller is CircLink technology's flagship product. The TMC2072's flexibility and rich feature set enable a high-reliability and high-performance, real-time and control-oriented network without the cumbersome middle layer protocol stacks and complex packet prioritization schemes typically required.

TMC2072 operates at network data transfer rates up to 5 Mbps. Its embedded 1 kByte RAM can be configured into a maximum of 32 pages to implement a 31-node network where each node in the network has the same local memory.

TMC2072 supports "Peripheral Mode" operation, which includes two selectable communication modes: "Free Format Mode" and "Remote Buffer Mode". Free Format mode, retained from ARCNET, is "packet oriented" communication. Remote Buffer mode communication is a CircLink-specific feature, and is a token oriented communication, which includes automatic data transmission when the token arrives.

The TMC2072 has a flexible 8-bit or 16-bit databus to interface various CPU types including X86, 68XX, and SHx with multiplexed or non-multiplexed address/data. When operating in Peripheral mode, the TMC2072 has 8-bit programmable I/O available. When operating in Standalone mode, the TMC2072's I/O configuration is16-bit. The TMC2072 also integrates a 3-port hub (two ports for external connection) to accommodate various network topologies (Bus, Star, etc.) and combinations.

PRODUCT PREVIEW
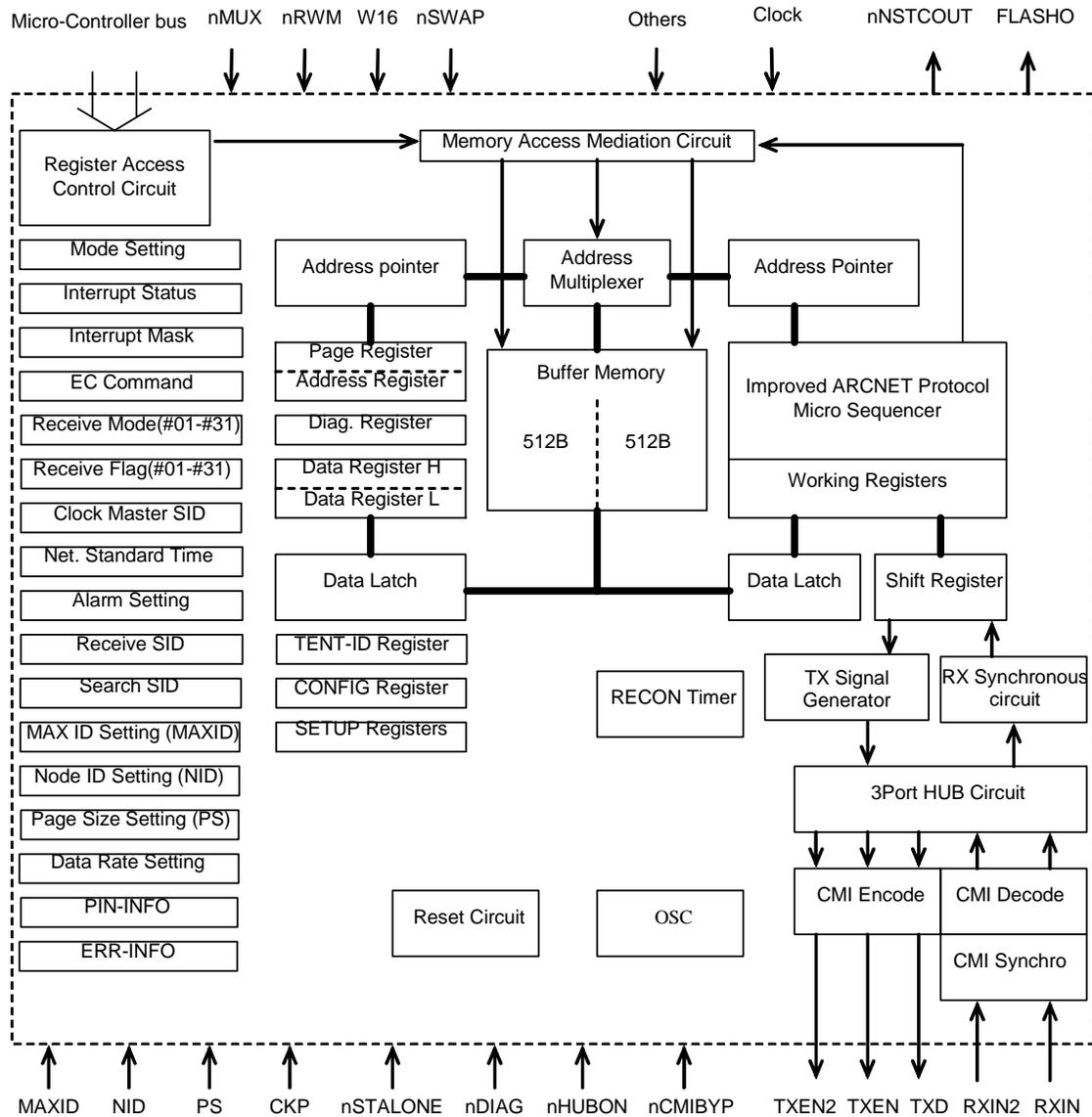
Block Diagram

Figure 1 TMC2072 Internal Block Daigram

PRODUCT PREVIEW
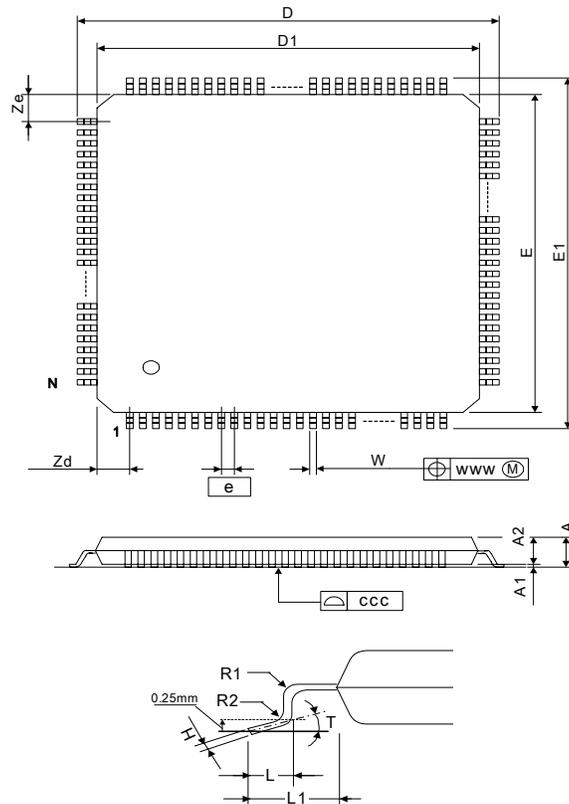
Package Outline

Figure 2 TMC2072 Package Outline

Table 1 TMC2072 Package Parameters

SYMBOL	ITEMS	MIN	TYP	MAX
A	Overall Package Height	-	-	1.6
A1	Standoff	0.05	-	0.15
A2	Body Thickness	1.35	-	1.45
D	X Span	15.8	-	16.2
D1	X body Size	13.9	-	14.1
E	Y Span	15.8	-	16.2
E1	Y body Size	13.9	-	14.1
H	Lead Frame Thickness	0.09	-	0.2
L	Lead Foot Length	0.45	0.6	0.75
L1	Lead Length	-	1.0	-
e	Lead Pitch	0.5 Basic		
T	Lead Foot Angle	0°	-	7°
W	Lead Width	0.17	0.22	0.27
www	Lead position Tolerance	-0.04	-	0.04
R1	Lead Shoulder Radius	0.08	-	-
R2	Lead Foot Radius	0.08	-	0.2
ccc	Coplanarity	-	-	0.08
N	Pin count	100		

Notes:
1. Controlling Unit: millimeter.
2. Package body dimensions D1 and E1 do not include the mold protrusion.
   Maximum mold protrusion is 0.25 mm.

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