M7020R

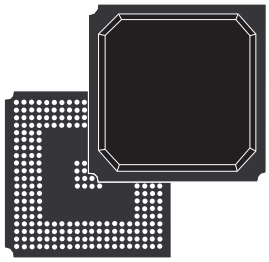
32K x 68-bit Entry NETWORK SEARCH ENGINE

DATA BRIEFING

FEATURES SUMMARY

- 32K DATA ENTRIES IN 68-BIT MODE
- TABLE MAY BE PARTITIONED INTO UP TO FOUR (4) QUADRANTS
  (Data entry width in each octant is configurable as 34, 68, 136, or 272 bits.)
- UP TO 83 MILLION SUSTAINED SEARCHES PER SECOND IN 68-BIT and 136-BIT CONFIGURATIONS
- UP TO 41.5 MILLION SEARCHES PER SECOND IN 34-BIT and 272-BIT CONFIGURATIONS
- SEARCHES ANY SUB-FIELD IN A SINGLE CYCLE
- OFFERS BIT-BY-BIT and GLOBAL MASKING
- SYNCHRONOUS, PIPELINED OPERATION
- UP TO 31 SEARCH ENGINES CASCADABLE WITHOUT PERFORMANCE DEGRADATION
- WHEN CASCADED, THE DATABASE ENTRIES CAN SCALE FROM 248K TO 1984K DEPENDING ON THE WIDTH OF THE ENTRY
- GLUELESS INTERFACE TO INDUSTRY-STANDARD SRAMS
- SIMPLE HARDWARE INSTRUCTION INTERFACE
- IEEE 1149.1 TEST ACCESS PORT
- OPERATING SUPPLY VOLTAGES INCLUDE:
  V_{DD} (Operating Supply Voltage) = 1.8V
  V_{DDQ} (Operating Supply Voltage for I/O) = 2.5 or 3.3V
- 272 PBGA, 27mm x 27mm

Figure 1. 272-ball PBGA Package



272-ball PBGA
27mm x 27mm

DESCRIPTION

Overview

ST Microelectronics, Inc.'s M7020R Search Engine incorporates patent-pending Associative Processing Technology™ (APT) and is designed to be a high-performance, pipelined, synchronous, 32K-entry network database search engine. The M7020R database entry size can be 68 bits, 136 bits, or 272 bits. In the 68-bit entry mode, the size of the database is 32K entries. In the 136-bit mode, the size of the database is 16K entries, and in the 272-bit mode, the size of the database is 8K entries. The M7020R is configurable to support multiple databases with different entry sizes. The 34-bit entry table can be implemented using the Global Mask Registers (GMRs) building-database size of 64K entries with a single device.

Performance

The Search Engine can sustain 83 million transactions per second when the database is programmed or configured as 68 or 136 bits. When the database is programmed to have an entry size of 34 or 272 bits, the Search Engine will perform at 41.5 million transactions per second. STM's M7020R can be used to accelerate network protocols such as Longest-prefix Match (CIDR), ARP, MPLS, and other Layer 2, 3, and 4 protocols.

Applications

This high-speed, high-capacity Search Engine can be deployed in a variety of networking and communications applications. The performance and features of the M7020R make it attractive in applications such as Enterprise LAN switches and routers and broadband switching and/or routing equipment supporting multiple data rates at OC–48 and beyond. The Search Engine is designed to be scalable in order to support network database sizes to 1984K entries specifically for environments that require large network policy databases. Figure 4, page 5 shows the block diagram for the M7020R device.

Table 1. Product Range

Part Number	Operating Supply Voltage	Operating I/O Voltage	Speed	Temperature Range
M7020R-083ZA1	1.8V	2.5 or 3.3V	83MHz	Commercial
M7020R-066ZA1	1.8V	2.5 or 3.3V	66MHz	Commercial
M7020R-050ZA1	1.8V	2.5 or 3.3V	50MHz	Commercial

Figure 2. Switch/Router Implementation Using the M7020R

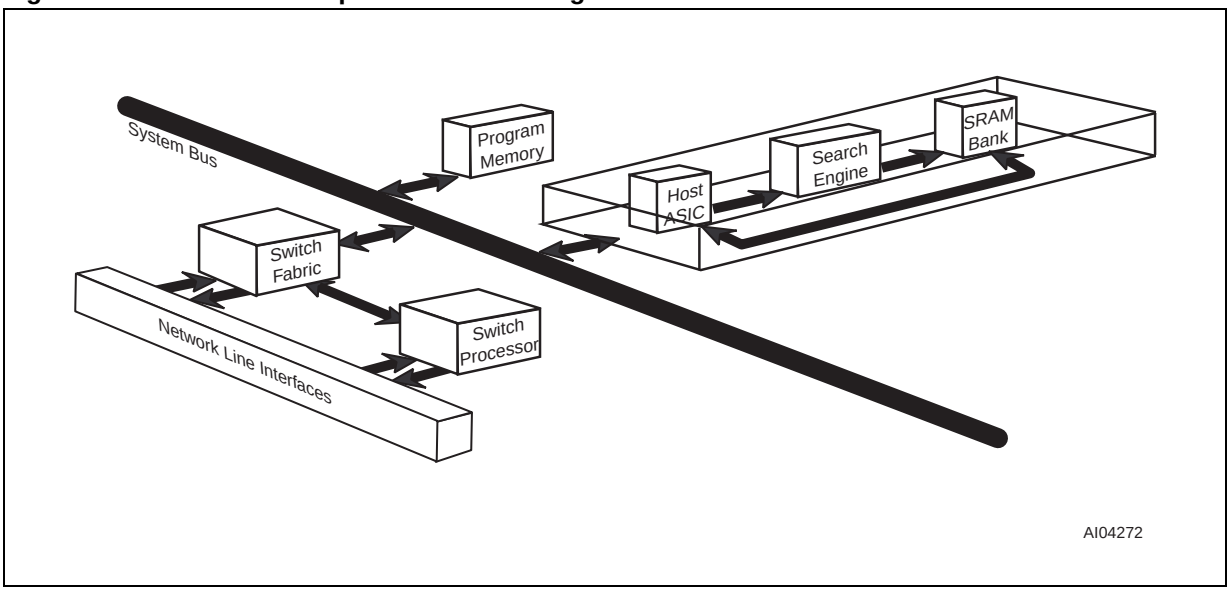


Table 2. Signal Names

Symbol	Type(1)	Description
Clocks and Reset		
CLK2X	I	Master Clock
PHS_L	I	Phase
TEST	I	Test Input
RST_L	I	Reset
Command and DQ Bus		
CMD[8:0]	I	Command Bus
CMDV	I	Command Valid
DQ[67:0]	I/O	Address/Data Bus
ACK(4)	T	READ Acknowledge
EOT(4)	T	End of Transfer
SSF	T	SEARCH Successful Flag
SSV	T	SEARCH Successful Flag Valid
SRAM Interface		
SADR[21:0]	T	SRAM Address
CE_L	T	SRAM Chip Enable
WE_L	T	SRAM Write Enable
OE_L	T	SRAM Output Enable
ALE_L	T	Address Latch Enable

Cascade Interface		
LHI[6:0]	I	Local Hit In
LHO[1:0]	O	Local Hit Out
BHI[2:0]	I	Block Hit In
BHO[2:0]	O	Block Hit Out
FULI[6:0]	I	Full In
FULO[1:0]	O	Full Out
FULL	O	Full Flag
Device Identification		
ID[4:0]	I	Device Identification
Supplies		
V_{DD}	n/a	Chip Core Supply (1.8V)
V_{DDQ}	n/a	Chip I/O Supply (2.5 or 3.3V)
Test Access Port		
TDI	I	Test Access Port's Test Data In
TCK	I	Test Access Port's Test Clock
TDO	T	Test Access Port's Test Data Out
TMS	I	Test Access Port's Test Mode Select
TRST_L	I	Test Access Port's Reset

Note: 1. Signal types are: I = Input only; I/O = Input or Output; O = Output; and T = Tristate
2. "CLK" is an internal clock signal. Any reference to "CLK Cycles" means one cycle of CLK.
3. ACK and EOT Signals require a weak, external pull-down resistor of 47 KΩ or 100 KΩ.

Figure 3. Connections

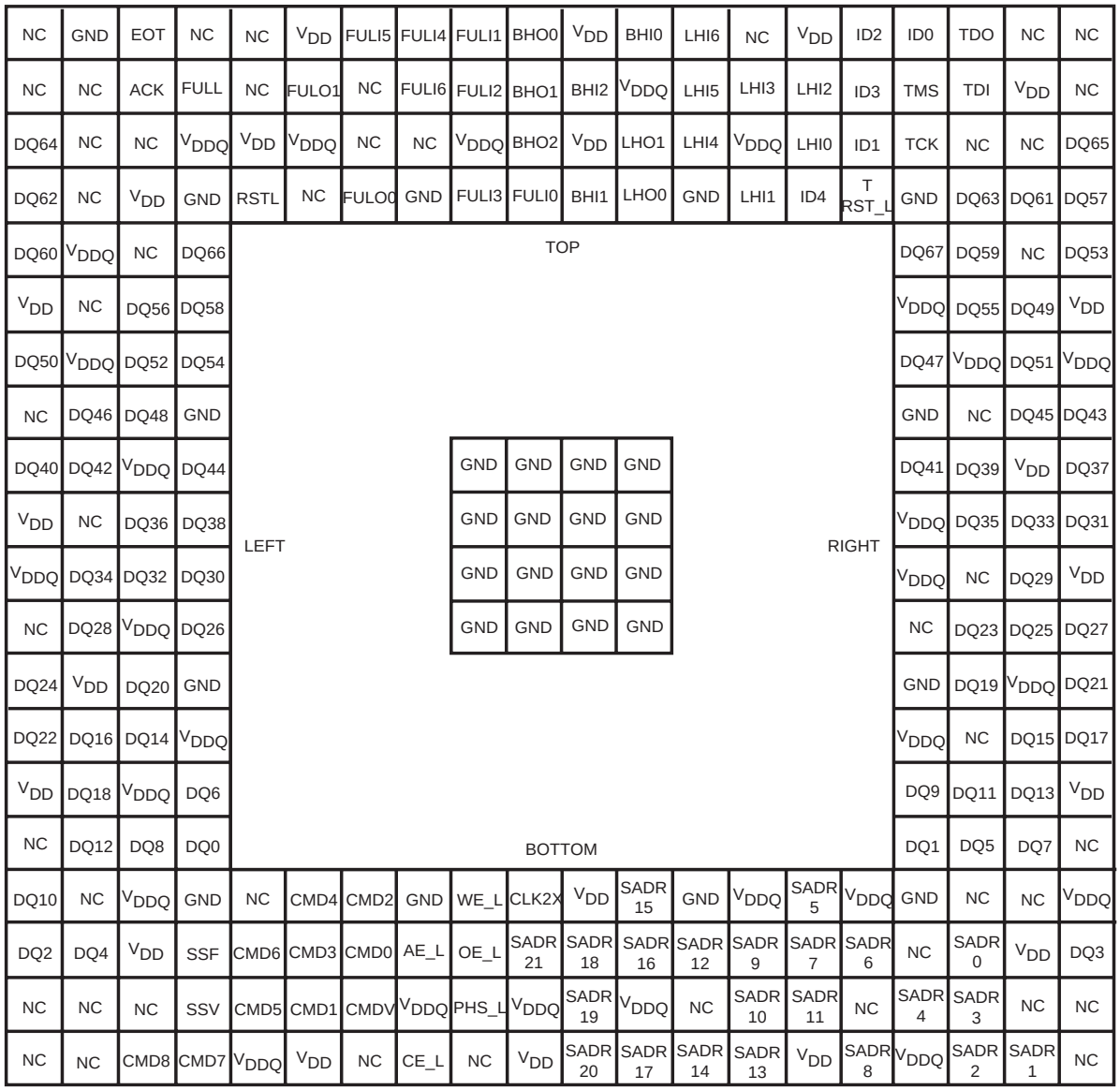
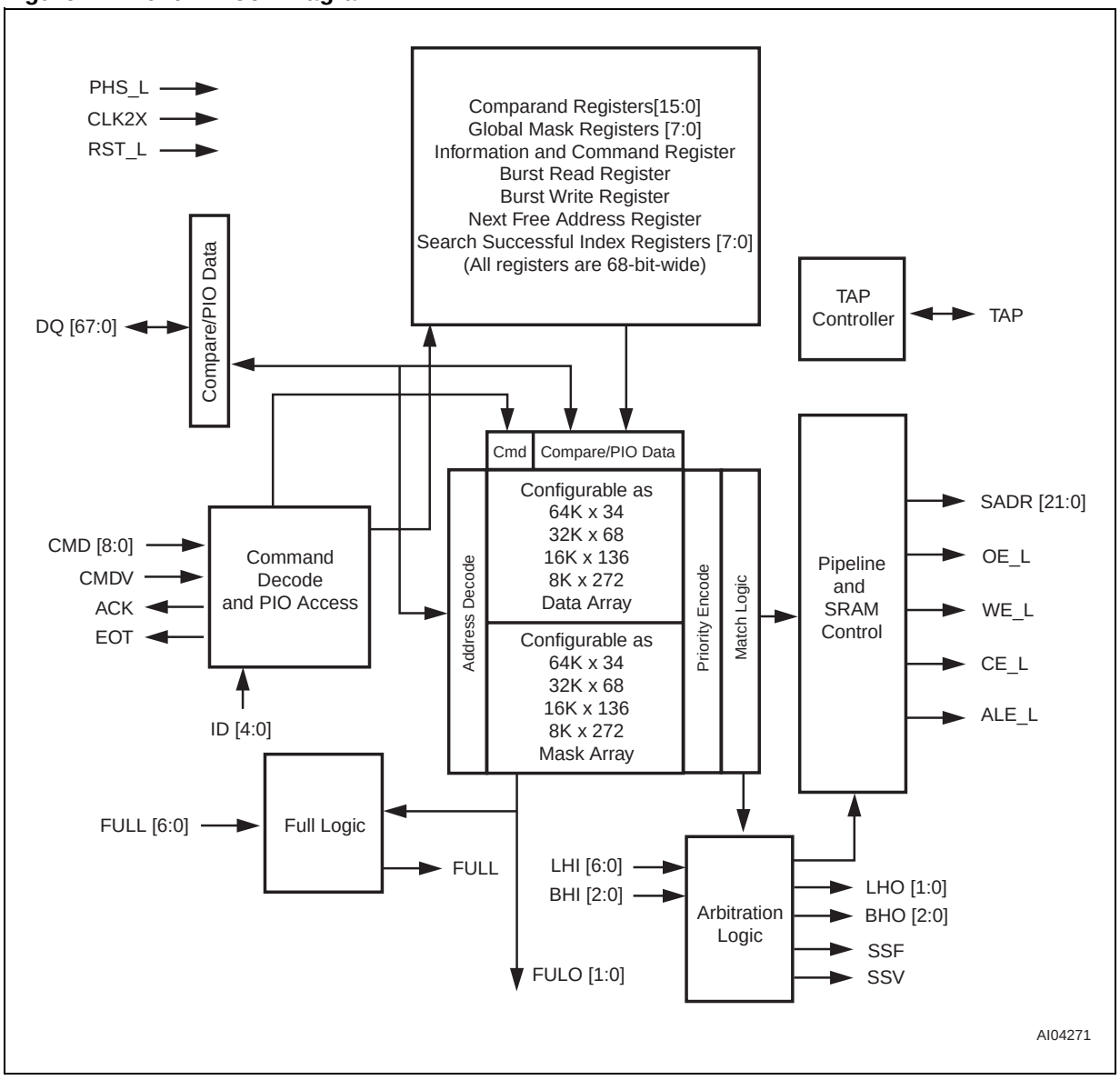


Figure 4. M7020R Block Diagram



PART NUMBERING

Table 3. Ordering Information Scheme

Example: M70 20 R –083 ZA 1 T

Device Type

M70 Search Engine

Density

20 = 2Mb (32K x 68-bit Table Entries)

Operating Supply Voltage

R = V_{DD} = 1.8V

Speed

–083 = 83 Million Searches per Second

–066 = 66 Million Searches per Second

–050 = 50 Million Searches per Second

Package

PBGA = 272-ball count, 27mm x 27mm(1), 1.27mm ball pitch

Temperature Range

1 = 0 to 70°C

Shipping Option

Tape & Reel Packing = T

Note: 1. Where “Z” is the symbol for BGA packages and “A” denotes 1.27mm ball pitch

For a list of available options (e.g., Speed, Package) or for further information on any aspect of this device, please contact the ST Sales Office nearest to you.