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TECH TALK

A journal of bus architecture tips & techniques

Are VMEbus & VME64X Really Compatible? (Part 1 of 4)

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VMEbus, a bus that has been around since Pac-Man, remains a dominant embedded architecture. The creation of VME64X breathed in new life, and soon, VITA 41 and 46 will further extend this legacy. What happens when you want to upgrade your legacy VMEbus system? Can you add a higher performing VME64X board or must you scrap the system and start over with VME64X? If you build a VME64X system, can you insert VMEbus cards into it?

Here's the problem: plugging a VME64X board into a VMEbus system isn't straight forward. In a series of four articles, I will tell how you can plug in a VME64X board, plus address the differences between price, performance, and structure of the solution you choose.

VME64X was adopted in 1997 to address some shortcomings of VMEbus, namely performance, I/O, and power. It utilized IEEE 1101.10, a mechanical standard that is also used by CompactPCI. VME64X was designed to be compatible with older VMEbus boards. In other words, VMEbus boards can plug into VME64X systems. However, VME64X boards won't plug into older VMEbus systems without some forethought and design considerations. To blend these two specifications, you need to understand how VME64X enhanced the connector, power provisions, mechanicals specified by IEEE 1101.10, and rear transition area.

Connectors
An obvious addition to VME64X was a move from the three row 96-pin connector to a five row 160-pin connector for J1 / P1 and J2 / P2 (see chart). An optional 95-pin J0 connector also is specified between J1 and J2. VME64X has 141 more user defined pins (46 pins on J2 and 95 pins on J0) plus additional pins for extra power and ground. J0 / P0 is frequently used to route I/O from the board to a rear transition module. In some systems, J0 is bussed. VME64X backplanes may be ordered with or without J0.

Power
VME64X requires +3.3V in addition to the VMEbus voltage inputs of +5V, +12V, and -12V. You'll find the +3.3V power pins on Row d of J2. Thus, a VME64X AC to DC power supply has four voltage outputs. In general, VME64X boards will consume more power than VMEbus boards so VME64X power supplies need to supply more watts for the same number of slots. VME64X provides additional +5V power on pins labeled VPC (Voltage Pre-Charge).

Mechanicals (IEEE 1101.10)
VME64X, as well as CompactPCI, adopted the IEEE 1101.10 standard. It offers several mechanical enhancements over the earlier IEEE 1101.1 specification. The most visible improvement is the handle that includes an injector and ejector. The older VMEbus handle had only an ejector. There has been a lot written about handles; if you're interested in the technical specifications, click here. Other noticeable improvements include EMC shielding, ESD protection, an alignment pin, front panel keying, an improved card guide, and a new mounting rail.

Rear Transition Area (IEEE 1101.11)
Since VME64X specified a large number of user defined pins, it made sense to create a standard for plugging in rear transition boards. IEEE 1101.11 specifies a 6U x 80mm rear card cage, card guides, and rails. VME64X, as well as CompactPCI, adopted this specification. A rear transition module (essentially 6U x 80mm of more real estate per slot) mates to the backside of the backplane and allows a VME64X card to route I/O signals to it. Most processor boards take advantage of this module to mount the keyboard, mouse, video, storage, and other interface connectors.

Now that you know some major differences and similarities of the two architectures, how do you actually combine VMEbus and VME64X hardware? I'll tell you in the next article.

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