

Highlighting IPMB Hardware Changes in PICMG[®] 3.0 Revision 3.0

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(a former design centre & semiconductor foundry of
Philips Electronics, 1947 – 1997)

Why is IPMB not exactly I²C-bus?

- It can be the same – but it is not implemented that way for PICMG3.0 AdvancedTCA
- PICMG3.0 modifies the I²C-bus specification^[1]:
 - AdvancedTCA allows up to 24 IPM Controllers to be connected for a total bus capacitance of 690pF
 - IPMB (& I²C-bus) uses a passive (resistor) pull-up
 - Therefore RC rise-time applies to rising edges
 - PICMG3.0 specifies rise time of 900ns
 - Which can easily be achieved with a passive pull-up in I²C-bus
 - HOWEVER, PICMG3.0 limits the pull-up resistor to 2k7 due to restrictions imposed by legacy components^[2]

Why is IPMB not exactly I²C-bus?

- The limit imposed by the pull-up resistor restriction means that to achieve the 900ns rise-time, a small additional (active) pull-up is required at one point
 - Note: Only ~0.63mA additional current is required for a fully loaded system^[3]

“Active Circuitry” change to R3.0

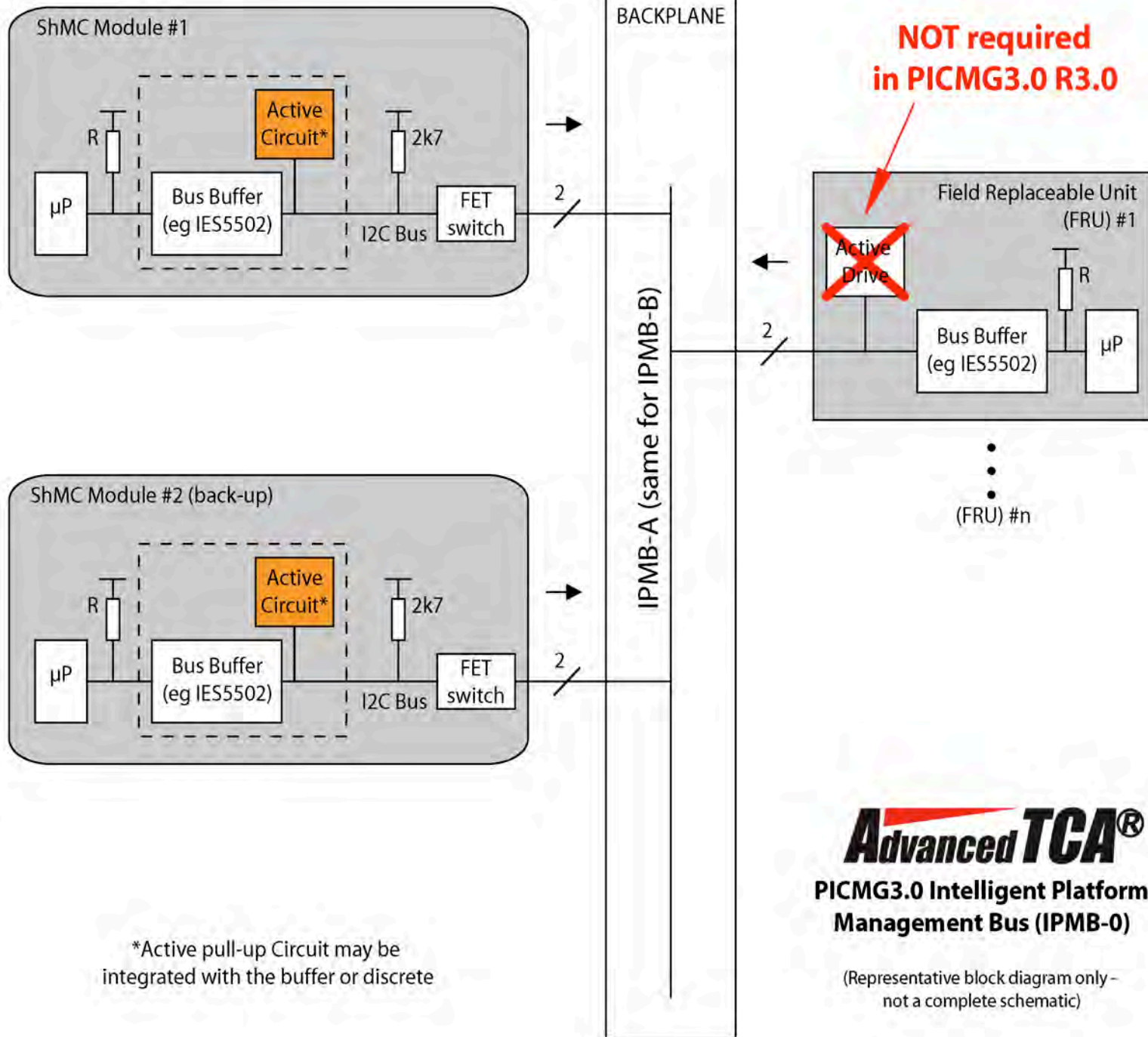
- Before PICMG3.0 R3.0^[4] active circuitry was mandatory at every one of the 24 IPM Controllers
 - Typically *each* of these controllers supply *several milli-amperes* of current
 - Only 0.63mA is required at one single point in a fully loaded system
- PICMG3.0 R3.0 now requires ***only*** the Shelf Management Controller (ShMC) to have this active pull-up

“Active Circuitry” change to R3.0

- Please be aware:
 - The requirement for a small active pull-up at the ShMC **only** applies to PICMG3.0 AdvancedTCA systems
 - Other (non-PICMG3.0) IPMB systems do not require **ANY** active pull-up. They can use the standard unmodified I²C-bus specification as it was intended.
e.g.:
 - Systems where total bus capacitance is standard 400pF or less
 - Systems not imposing the 2k7 pull-up limit
 - “ATCA like” closed-loop or proprietary systems
 - Perhaps MicroTCA and PicoTCA

“Active Circuitry” change to R3.0

- This change primarily involves the 2-wire bus-buffer IC's used on modules designed to connect to the IPMB
- Parts are now available to meet this requirement



*Active pull-up Circuit may be integrated with the buffer or discrete

Advanced TCA[®]
 PICMG3.0 Intelligent Platform Management Bus (IPMB-0)

(Representative block diagram only - not a complete schematic)

“Backplane Voltage” change to R3.0

- The second important change to the IPMB is the requirement:
 - REQ 3.572: “An IPM Controller, **shall** drive the I²C signals on the Backplane to 400mV or lower while sinking 1.2mA for a logic low”^[4]

- Before Revision 3.0 the requirement was 500mV at the backplane.

“Backplane Voltage” change to R3.0

- Be sure to confirm that any devices driving the Backplane can achieve the required 400mV V_{ol} at 1.2mA
 - Consider offsets of 50 ~ 250mV through your buffers, and the *guaranteed* V_{ol} of the micro driving it.
- Be sure to confirm that any devices being driven from the Backplane can be reliably driven by a V_{il} of 400mV

“Backplane Voltage” change to R3.0

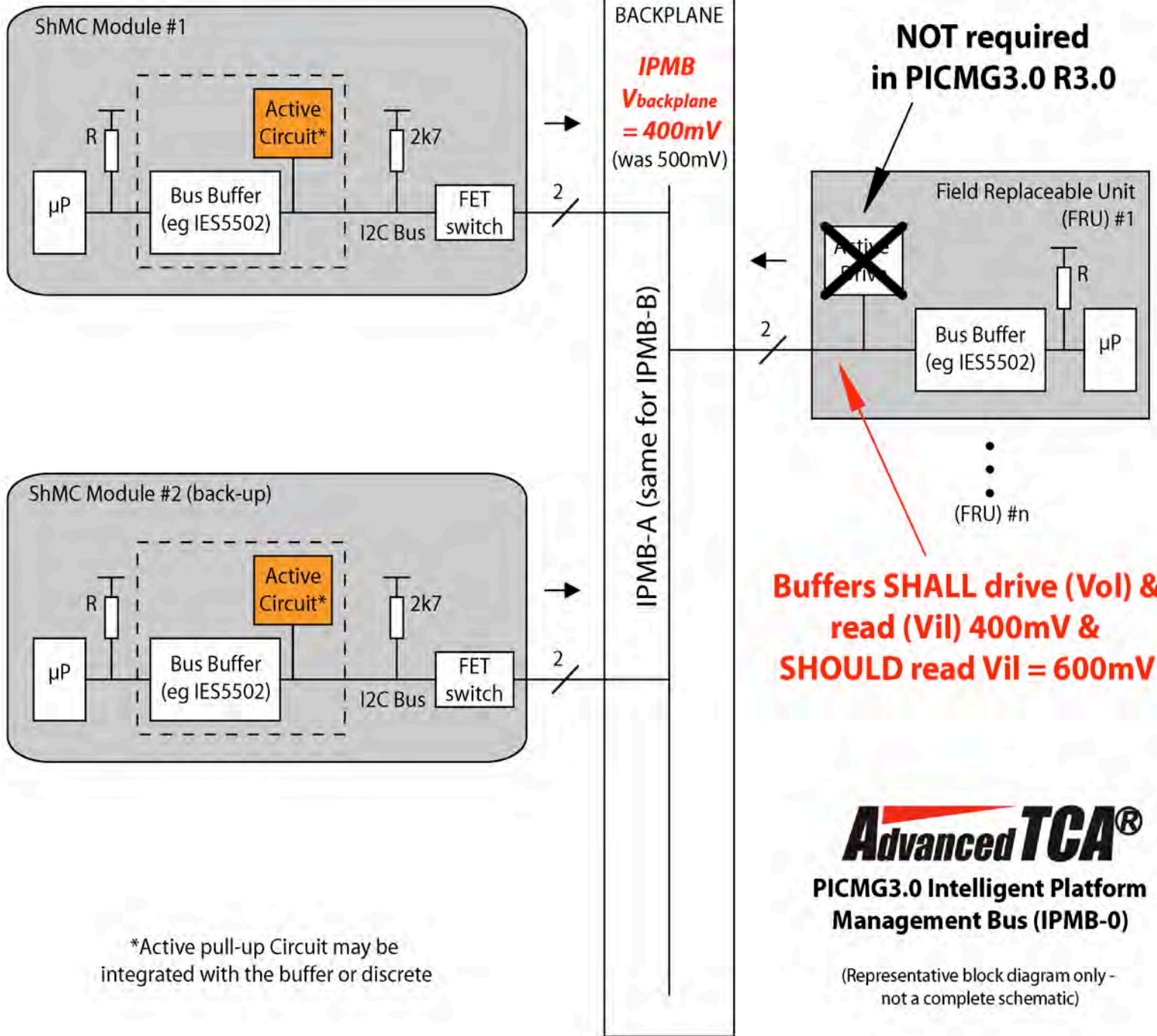
- Of course good design practice demands you ensure sufficient noise margins by selecting IC's with a worst case V_{il} higher than 400mV

- This is recommended in PICMG3.0 R3.0:
 - REQ3.574: “An IPM Controller that is not an Active or Backup ShMCs **should** detect an input voltage of 600mV and lower as a logic low when receiving I²C signals from the Backplane.”^[4]

 - Similarly, REQ3.575: “... Active or Backup ShMCs **may** detect an input voltage of 600mV ...”^[4]

“Backplane Voltage” change to R3.0

- Again, this change primarily involves the 2-wire bus-buffer IC's used on modules designed to connect to the IPMB
- Some recommendations are for worst case, or backwards compatibility. Higher noise margins are achievable and should be sought
- Again, parts are now available to meet this requirement



*Active pull-up Circuit may be integrated with the buffer or discrete



www.HendonSemiconductors.com

www.bus-buffer.com

- [1] UM10204: "I²C-bus Specification and User Manual", Rev 03, 19 June 2007, NXP B.V.
- [2] Appendix C, "PICMG3.0 Revision2.0 AdvancedTCA Base Specification", March 18, 2005
- [3] Appendix C, "PICMG3.0 Revision3.0 AdvancedTCA Base Specification", March 24, 2008
- [4] "PICMG3.0 Revision3.0 AdvancedTCA Base Specification", March 24, 2008

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