Logic Webinar Series

Understanding advanced logic translators and level shifters

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Logic for Electronic Design Engineers

Session 1

Do these devices (LSF, NXS/NXB) have second sources including package?

Yes. All the part types have second sources including packages.

Is the 4-pin X2SON4 package available from other suppliers?

No. Nexperia is the only supplier at this moment. Other packages in the X2SON family have already acquired second sources, this is the newest in the family however.

Do the SD/SIM card device packages meet the height requirement for these cards?

Yes. This has been aligned with Qualcomm and Samsung. Usually this device is located on the motherboard and not in the SIM/SC card itself so height is typically not an issue.

Where are these specific devices manufactured? China or Europe?

All these devices have COO (Country Of Origin) in China as that is where they have final assembly.
Actual locations are China ASEN (Standard Logic packages) and ATSN (Micropak's and Picogates).
Front end (silicon fabrication) is in Europe (ICN8 Nijmegen).

What is the function of the one-shot on the NXS/NXB family?

The one-shot accelerate the rising edge faster than would be normally possible with the open drain/pullup resistor combination. More details are in the recording of the Session 2.

Are the NCA9306 I²C translators compatible with the NXP and TI devices?

Yes. NCA9306 are LSF translators, and the difference lies in the fact that they have Max values specified in the DS, wherein LSF has only the typical values.

Regarding multiple edge accelerators on the same signal line: is there a limit? Do you really only need just one, correct?

NXS has a one-shot edge accelerator for incoming rising edges to accelerate them until high level is reached, then the accelerator turns off and the pull-up maintains the high level. Falling edges are not accelerated and pulled down by the sender via the pass transistor.

NXB has one-shot accelerators for both rising and falling edges and a push-pull buffer (+ 4kOhm in front of it) to maintain the respective high/low level when it is reached. NXB has no pass transistor.

Is there any voltage translator qualified for functional safety application?

A specific qualification for functional safety according to particular specifications beyond the standard qualification (example for standard: Q-100 for automotive) is not supported for our translator products.

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Session 2

Are there any startup requirements for the NXS/NXB devices (Port A before or after Port B on startup)?

No. Either power rail can be powered on first.

Are there any restrictions on the NXB family for which side should support the higher voltage?

The higher voltage rail should always be connected to V_{CCB}.

Can NXS devices be used for I²C applications?

Yes. The NXS devices can meet the I²C requirements.

Are versions of the NXS available without the one-shot?

No. All versions of the NXS have at least one one-shot (per channel), NXB devices have two one-shots per channel. Only the NFS devices have no one-shot.

Regarding the LSF family:

1. Is this family only suitable for open drain lines?
2. Is it really possible to meet frequencies of 40 to 100 MHz with open drain signals?

1. The disadvantage with two push-pull participants are the following:

   - In receive mode, the receiver needs a pull-up to generate the high level for it as the pass transistor is disconnecting for high level drive, so we need additional pull-ups.

   - Consider two push-pull participants, one participant is driving a low level and the other one is trying to drive a high level, in this case the pass transistor would be opened by the low level driver and the high level driver on the other side would drive with it's high side transistor (lower ohmic compared to pull-up) and cause a much higher current than the pull-ups would and this would lift the VIL at the sender side, furthermore sending a low level would fail in this case as the receiver is trying the send a high level. In open-drain case the low level would pull down the voltage at the receiver side as well even if the receiver shuts down the transistor, as the pull-up resistors are much higher than internal high side RDSon values.

   - If both participants are aligned the translation could work but then the advantage of auto sense might not be needed that much.

2. The qualification of the LSF was done for capacitive loads of 30pF and 50pF and optimized PCBs.

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Contact us

Presenter | Tom Wolf
tom.wolf@nexperia.com
Mobile +1 919-986-0143
630 Davis Drive, Suite 200
NC 27560 Morrisville, USA

Presenter | Christian Backhaus
christian.backhaus@nexperia.com
Mobile +49 403 07 08 17 07
Stresemannallee 101
22529 Hamburg, Germany

Presenter | Vikram Singh Parihar
vikram.singh@nexperia.com
Mobile +31 6 221 376 55
Jonkerbosplein 52
6534 AB Nijmegen, The Netherlands

Presenter | Wim Lumeij
wim.lumeij@nexperia.com
Mobile +31 6 232 625 69
Jonkerbosplein 52
6534 AB Nijmegen, The Netherlands

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