

NAND Flash shortage update by Simms International plc December 2016

The supply shortage of NAND flash in the third quarter of 2016 will exacerbate in the fourth quarter due to higher demand in the smartphone and solid-state drive (SSD) industries, according to the latest report from DRAMeXchange. The short supply, coupled with strong demand, also will contribute to rising prices of NAND flash wafers and memory cards until the end of 2016. DRAMeXchange also expects prices to rise for eMMC, eMCP and SSD products.

In addition, demand from SSD manufacturers continues to increase as SSDs approach price parity with HDDs. DRAMeXchange expects the SSD adoption rate for notebook computers worldwide will exceed 30 percent for the first time, reaching nearly 33 percent, in 2016. Demand also is growing significantly for enterprise-grade SSDs in the second half of 2016. Demand has been mainly driven by server manufacturers and data centres in the U.S. and China. The NAND Flash shortage is predicated to last well into Q1 2017.

Production capabilities are limited for NAND Flash and as a result lead times are getting longer. With shortage of supply comes obsolescence issues. With limited production capabilities inevitably NAND manufacturers are forced to concentrate on supply for the most popular and profitable technologies. Over the longer term this can have such a devastating effect on critical applications as new replacements need to be sought when less popular technologies are no longer supported.

The message from Simms to overcome potential obsolescence issues is;

- 1) Investigate and understand your short and medium term demand for NAND based products (0-12 months)
- 2) Highlight cost sensitive requirements and remove the volatility aspect by forward ordering.
- 3) Take stock provisions or work with a supplier who can manage this on your behalf.
- 4) Ensure that JIT and Call off facilities are in place with your supplier

Details on the NAND market below help to explain why we are facing these challenges.

The NAND Flash market is experiencing its biggest technology transition — to 3D NAND in an effort to continue cost reductions, increase performance and satisfy demand. NAND Semi Conductors have moved resources so that FABs are now focusing on 3D NAND technology.

Today's NAND is mainly 2D so production levels have been significantly reduced as 3D NAND development takes priority. This has led to periods of under supply and created shortages which are unprecedented. The release of house hold mobile phone technologies for the tier 1 manufacturers such as Apple & Samsung has also added to over demand. As a Tier 1 customer these manufacturers are allocated vast amounts of 2D NAND wafer which restricts availability for all other partners.



Industrial NAND manufacturers' allocation is affected by this to for the following reasons below.

All NAND Flash is created in wafer form (above and below) and is eventually sliced to produce individual NAND chips. However not all NAND is created equally and characteristics vary from each part of the wafer.

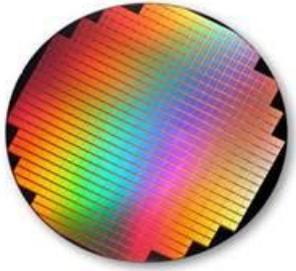
Raw NAND is cut from wafers to provide a large number of die. Due to the wafer production process, each NAND die is different to all others, each with slightly different properties. On a wafer there are known positions for die of differing specifications and tolerances, most being within the specifications.

Die in locations with specifications in the middle of the tolerance range (commonly called the sweet spots) can be used in industrial, as they will have the best endurance, wide temperature suitability and power efficiency, whilst those outside may be better suited to consumer, where tolerances and endurance are not so critical.

After all sorting has been done, die with specifications outside of those published by the suppliers are sold for use in non-critical and low cost applications.

The test process is either performed by the wafer manufacturer or by other companies which can do their own sorting by testing prior to packaging, although in this case, the wafer vendor will normally provide a map of the expected best die..

In summary as all types of NAND comes from the same wafers initially. A shortage of NAND wafer impacts all markets.



Simms International plc
Northdown Business Park
Ashford Road, Lenham
Kent ME17 2DL

Tel: +44 (0) 1622 852800
Email: enquiries@simms.co.uk
Web: www.simms.co.uk

 **simms**
memory and storage specialists

[PAGE TWO]

Simms International plc
Northdown Business Park
Ashford Road, Lenham
Kent ME17 2DL

Tel: +44 (0) 1622 852800
Email: enquiries@simms.co.uk
Web: www.simms.co.uk

