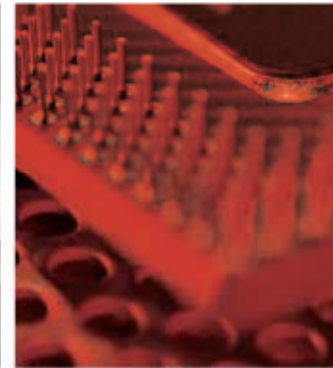




FSA



FSA SUPPLY CHAIN PERFORMANCE SUBCOMMITTEE MEETING

November 6, 2007



AGENDA

- User Satisfaction Survey Results
- Survey Participation Trend Report
- Verify Current Formulas
- Verify Current Filters
- Discuss Participant Comments
- Discuss Changes to 2008 Survey/Report
- Future Timelines/Dates for Next Survey

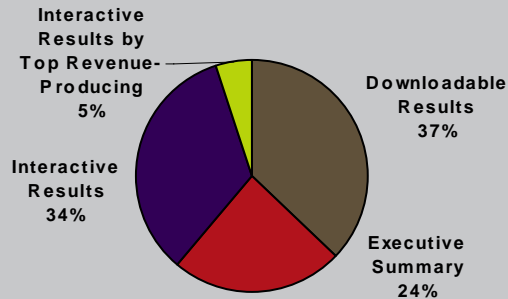




USER SATISFACTION SURVEY RESULTS

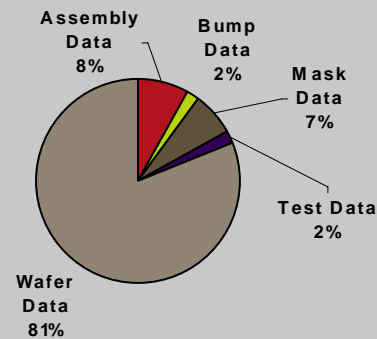
1. 98 Valid Responses

What section of the quarterly report do you find most valuable?



2. 92 Valid Responses

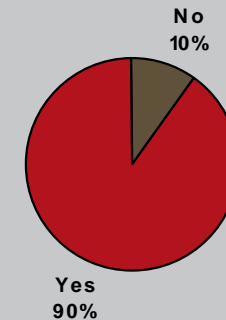
Rank the following in order of value (Highest Value)



Lowest Value = Bump Data (65% of Responses)

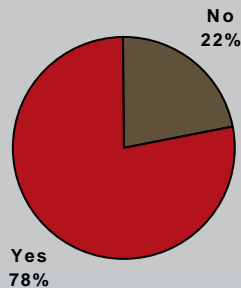
3. 87 Valid Responses

Are the interactive results easy to navigate?



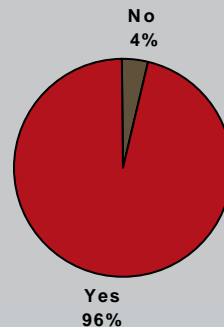
4. 85 Responses

Do you feel the survey results are a good representation of the industry as a whole?



5. 85 Responses

Do the executive summaries give a good overview of the survey results?



6. If no, what additional information would you like to see incorporated?

- More complete wafer & mask cost data.
- Better break down by process options: high voltage, embedded flash, etc
- Pricing on wafers seems strange in some cases
- Proactively gather data from additional small, medium and large customers and identify the data as such
- Flipchip and wirebond packaging information need to be reported separately. Mixing them together makes it very hard to determine correct pricing for either of them.

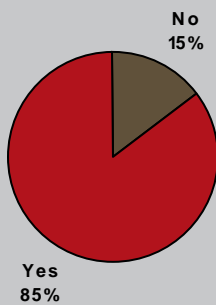




USER SATISFACTION SURVEY RESULTS

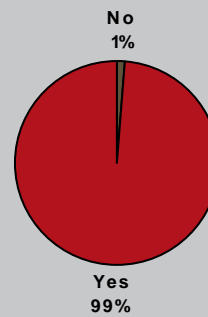
7. 87 Responses

Do you ever view/use the downloadable results?



8. 74 Responses

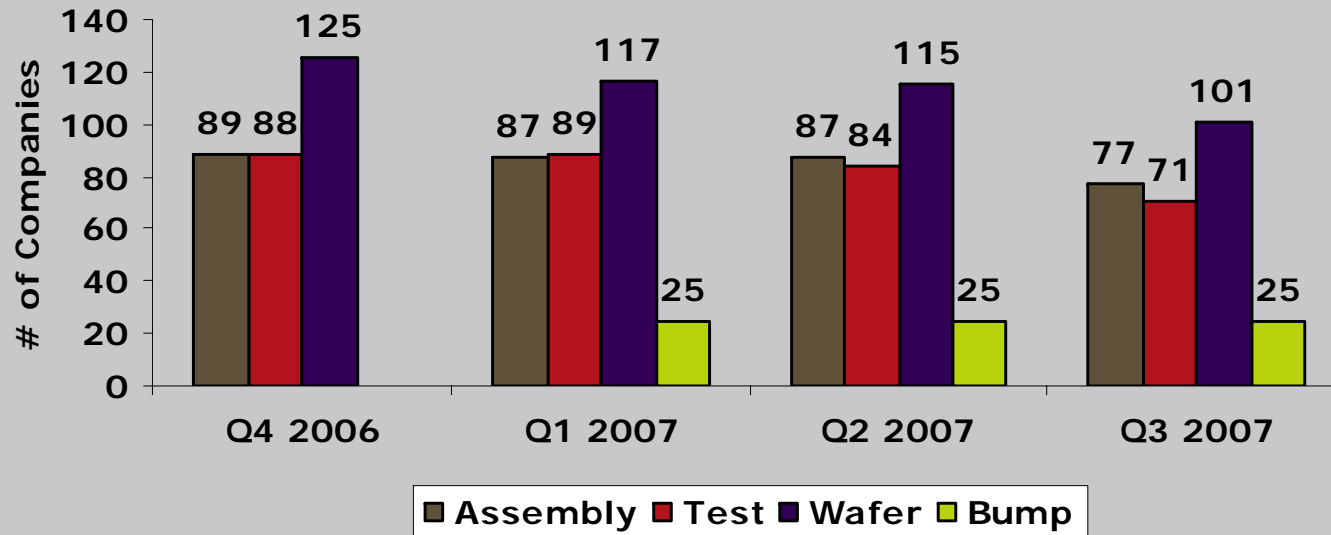
If yes, do you find this feature valuable?





SURVEY PARTICIPATION TREND REPORT

Survey Participation (Raw Data)





CURRENT FORMULAS

Wafer

Average Price Per Wafer:

$$\frac{\text{SUM}(\text{PricePerWafer} * \text{WafersPurchased})}{\text{SUM}(\text{WafersPurchased})}$$

Median Value: The middle value of a set of ordered data

Avg Price Per Layer:

$$\frac{\text{SUM}(\text{PricePerLayer} * \text{WafersPurchased})}{\text{SUM}(\text{WafersPurchased})}$$

$$* \text{PricePerLayer} = \text{PricePerWafer} / \text{MaskLayers}$$

$$* \text{PricePerWafer} = \text{PricePaidPerWafer}$$

$$* \text{WafersPurchased} = \# \text{ Wafers Purchased Last Quarter}$$

Mask

Average Mask Set Cost: $\text{SUM}(\text{MaskCost}) / \#$ of Entries

$$\text{EX: } (10+12+15+15+16)/5 = \mathbf{13.60}$$

Avg Cost Per Mask: $\text{SUM}(\text{MaskCost}) / \text{SUM}(\#$ of Masks)

$$\text{EX: } (10+12+15+15+16)/(2+3+5+5+4) = \mathbf{3.58}$$

Purchase Details		Wafer Specifications	
Important: - Only include purchases from 7/1/2007 to 9/29/2007			
Vendor:	<input type="text" value="Please Select"/>	Process:	<input type="text" value="Select"/>
Price Paid per Wafer:	US\$ <input type="text" value="0.00"/>	Does this process include embedded Flash?:	<input type="text" value="Select"/>
<input type="checkbox"/> PO Queue Time: (Order to start lead time)	<input type="text" value="Please Select"/>	Process Geometry:	<input type="text" value="Select"/>
<input type="checkbox"/> Current Fab Cycle Time: (Days per Layer Processed: 0.5 - 5.0)	<input type="text" value="0.0"/>	Wafer Size:	<input type="text" value="Select"/>
<input type="checkbox"/> Volume of Wafer Purchases per Month:	<input type="text" value="Please Select"/>	# Metal Layers:	<input type="text" value="Select"/>
<input type="checkbox"/> Engineering Lot Charge for Initial Prototype Lot:	US\$ <input type="text"/>	# Poly Layers:	<input type="text" value="Select"/>
<input type="checkbox"/> Total Production Mask Set Cost:	US\$ <input type="text"/>	Epitaxial:	<input type="text" value="Select"/>
# of Masks Included in Set:	<input type="text"/>	# of Mask Layers:	<input type="text" value="Select"/>
<input type="checkbox"/> Mask Service Type:	<input type="text" value="Please Select"/>	Engineering or Production:	<input type="text" value="Select"/>
<input type="checkbox"/> # Wafers Purchased Last Quarter:	<input type="text" value="0"/>	<input type="checkbox"/> Performance to 1st Committed Schedule:	<input type="text" value="Please Select"/>
		Average yield of wafers received (percent):	<input type="text" value="Select"/>





CURRENT FORMULAS

Test

Avg. Hourly Rate:

$$\text{SUM}(\text{HourlyRate} * \text{UnitsTested}) / \text{SUM}(\text{Units Tested})$$

Median Value: The middle value of a set of ordered data

Assembly

Avg Price/Lead:

$$\text{SUM}(\text{CostPerLead} * \text{UnitsAssembled}) / \text{SUM}(\text{UnitsAssembled})$$

Median Value: The middle value of a set of ordered data

Wafer Bump

Average Bump Service Price Per Wafer:

$$\text{SUM}(\text{BumpServicePricePerWafer} * (\text{Wafers Bumped})) / \text{SUM}(\text{Wafers Bumped})$$

Median Value: The middle value of a set of ordered data

Test Specifications

Test Flow: *

? Test Type: *

? Signal Pin Count: *

? Clock Rate (MHz): *

? Hourly Rate: *

of Units tested: *

K units tested/week: *

Purchase Details

Important:
 - Only include purchases from 7/1/2007 to 9/29/2007

Vendor: *

Package Family: *

Wafer Size: *

Die Size: *

? Avg Cost per Lead/Ball: *

of Units Assembled: *

Units per week (ku): *

Purchase Details

Important:
 - Only include purchases from 7/1/2007 to 9/29/2007

Vendor: *

Bump Purpose: *

Wafer Size: *

Bump Process: *

Bump Material: *

Bumped Fab Redistribution Layers: *

Wafers Per Week: *

Wafers Purchased/Bumped: *

Bump Service Price Per Wafer: *





CURRENT FILTERS

Wafer

	Wafer Size	Process	Geometry	Minimum	Maximum		
1.	*	*	>1.0	120.00	2000.00	View/Edit	Delete
2.	*	*	0.065	1200.00	9000.00	View/Edit	Delete
3.	*	*	0.09	1200.00	6000.00	View/Edit	Delete
4.	*	*	0.6	120.00	2000.00	View/Edit	Delete
5.	*	*	0.8	120.00	2000.00	View/Edit	Delete
6.	200mm	CMOS	0.13	900.00	4200.00	View/Edit	Delete
7.	200mm	CMOS	0.15	900.00	2600.00	View/Edit	Delete
8.	200mm	CMOS	0.18	750.00	2200.00	View/Edit	Delete
9.	200mm	CMOS	0.25	550.00	2200.00	View/Edit	Delete
10.	200mm	CMOS	0.35	500.00	1800.00	View/Edit	Delete
11.	200mm	CMOS	0.5	500.00	1600.00	View/Edit	Delete

Assembly

	Package Family	Leads	Minimum	Maximum		
1.	BGA (>= 1.0 pitch)	>1024	0.0020	0.0500	View/Edit	Delete
2.	BGA (>= 1.0 pitch)	129-256	0.0020	0.0150	View/Edit	Delete
3.	BGA (>= 1.0 pitch)	257-512	0.0020	0.0300	View/Edit	Delete
4.	BGA (>= 1.0 pitch)	513-768	0.0020	0.0300	View/Edit	Delete
5.	BGA (>= 1.0 pitch)	65-128	0.0020	0.0150	View/Edit	Delete
6.	BGA (>= 1.0 pitch)	769-1024	0.0020	0.0500	View/Edit	Delete
7.	BGA (>= 1.0 pitch)	lt 64	0.0020	0.0150	View/Edit	Delete
8.	BGA (lt 1.0 pitch)	*	0.0020	0.0300	View/Edit	Delete
9.	PLCC	*	0.0020	0.0300	View/Edit	Delete
10.	QFN	*	0.0020	0.0400	View/Edit	Delete
11.	xQFP	*	0.0020	0.0300	View/Edit	Delete

Total Production Mask Set Cost = \$22,000 - \$1,500,000

Test = \$50-\$500



PARTICIPANT COMMENTS



Overall

- We would very much like to participate in this survey; however, by the sheer fact that we are not running material yet, we are precluded from participating, even though we have pricing to share. We would greatly appreciate it if this hole in the survey practice was addressed to allow early phase startups like ours to participate on an equal footing with other larger companies.

Test

- Regarding test, I suggest adding a mandatory field to tester platform (e.g. J750, Integra flex, catalyst, etc.). This field will help to analyze the test price wisely.
- Hourly Rates: In order to compare this to our internal cost, we would like to ask you whether those include just the tester; tester and handler; tester, handler and other equipment needed for test; or pricing of test houses projected on an hourly basis.
- Do not see the difference between "# of Units tested" and "K units tested/week."

of Units tested: Total number of units tested during the 3-month timeline.

K units tested/week: This is more or less an average of the number of units tested per WEEK.

- On the FSA survey I am asked for an hourly rate for assembly and test. We are charged on a unit basis. Since this is a required field, what do I enter?



PARTICIPANT COMMENTS



Assembly

- The back-end pricing that is entered in the survey - should it include grinding, sorting, boxing and trays, and packaging materials, or is it just purely packaging?
- Our die size is 106 mm^2 when the limit is 50 mm^2 pls make sure next time we can place the correct size.
- Although you have lead per pin pricing for some package/pin count, may I know is there any price differentiation on # of layer (ex. 2L, 4L, 2-2-2L or 3-3-3L)? Most of the pricing is based on which # of layer?
- Your categories are in mm^2 , but I wanted to verify the actual size calculation you expect to be used. If a die is 5×5 do you expect it to be 25 mm^2 and/or 100? $5 \times 5 = 25$ and/or $5 \times 5 = 25$ 25 squared = 100? From your allowed ranges of $< 5 \text{ mm}^2$ up to $31\text{-}50 \text{ mm}^2$, the largest die would be 7×7 (square) = 49 mm^2 . Is it possible you mean size of one side of the die? i.e. a 7×7 should be a 7 for the grouping? If your calculation is anything but 1 side of the die, then a majority of our die would be too large to include in the survey, and I just need to ensure I do not include any of them.
- TAB and COF, which is a very cheap package with high pin density on film. FSA has no such choice in the survey.



PARTICIPANT COMMENTS



Wafer

- There was no 100mm option for wafer size available. We put in the nearest option, which was 150mm.
- There was no option of EXACTLY 1.0um geometry available, we had to select between 0.8um and >1.0um. Here again, we selected the nearest option which was >1.0um, but the correct, exact number for the "foundry nbr 2" is EXACTLY 1.0um geometry.
- The survey makes an assumption that all developments are done with 8 inch wafers, where mask plates go from \$1500 upwards hence the \$40k lower limit. If on older technologies such as these running on 6 inch wafers, the masks cost less than \$1000 hence a mask set coming in at well below the \$40k lower limit
- Your survey doesn't account for .16um.





CHANGES TO 2008 SURVEY/REPORT

- Wafer Section - Should any changes be made?
- Assembly Section - Should any changes be made?
- Wafer Bump Section - Should any changes be made?
- Test Section - Should any changes be made?
- Formulas - Self populated boxes
- Graphs
- Comment box





FUTURE TIMELINES/DATES FOR NEXT SURVEY

- Next Meeting
 - 11/26/2007?
 - Discuss the Q4 2007 WP & Back-End Survey Results
- Next Survey
 - Q1 2008 Survey begins 1/2/2008

