MASK DEFINITION

To fabricate your mask(s) correctly and swiftly, please provide us the following information when you submit your design:

General information

Customer's name:
Affiliation:
Tel:

Mask name (if any):
Mask size [1]:
Mask substrate material [2]:

Data format [3]: (default GDSII)
Data scale: (default 1:1)
File name:
Top cell name:

For each mask, please specify

GDS layer number:
Mask polarity/tone (DF or BF) [4]:
Mask orientation/parity (CU or CD, WR or RR) [5]:
Smallest feature size (or critical dimension, CD) and polarity/tone [6]:
Feature tolerance:

Customer's special request (if any):

Remarks:

1) MASK SIZE
7", 6", 5", 4" or 2.5"? We recommend keeping all structures at least about 1 cm from the edge of the mask!

Some designs have not been centered on the mask on purpose; we like to know if we may center your design. We are reluctant to change the design of our clients if not clearly ordered.

2) MASK SUBSTRATE MATERIALS
Soda lime, quartz or other? It depends on the smallest feature size of your design. For the smallest feature size larger than 1.5 micron, soda lime substrate is a cost-effective choice. For the smallest feature size smaller than

1.5 micron, we recommend choosing quartz substrate to obtain the best photo lithography accuracy. For other materials, please specify.

3) DATA FORMAT
If your design file is not in GDSII format, please convert it into GDSII before your submission.

4) MASK POLARITY/TONE (DF or BF)
Do you want the filled polygons in the design to appear in chromium on the mask, which is called Bright Field (BF)?

Or, do you want the filled polygons in the design to appear transparent on the mask that is called Dark Field (DF)?

If you define for example waveguides as filled polygon lines and you use positive resist to protect the layer on your wafer from etching you should subsequently order BF.

5) MASK ORIENTATION/PARITY (CU or CD, WR or RR)

How do you want your design to appear on the wafer?

If you normally look at the mask on the chromium/image side (NOT through the glass) this is named Chrome Up (CU);

If you normally look at the mask THROUGH the glass on the chromium, this is called Chrome Down (CD)

This in itself serves no purpose. However if you also state if the design should be mirrored: Wrong Reading (WR) or NOT mirrored: Right Reading (RR) this is usefull information.

Example 1: For example if you want your design to appear on the mask as in your design-file while looking through the glass on the chrome, you should specify: CD RR

Example 2: Some people use backside exposure but like to match it to previous frontside exposure: they specify CU WR

6) SMALLEST FEATURE SIZE/POLARITY
Also called characteristic dimension (CD), the smallest feature size is one of the most important parameters for mask fabrication. Not only is different process chosen for it, but also cost (totally different!) is based on it. It could be the smallest pattern or gap sizes.

Similar to mask polarity, the smallest feature polarity could be TRANSPARENT (without chromium covering) or OPAQUE (with chromium covering).

7) CUSTOMER’S SPECIAL INSTRUCTION

You can write in any special instructions and requirements on mask fabrication which are not addressed in the mask order form.

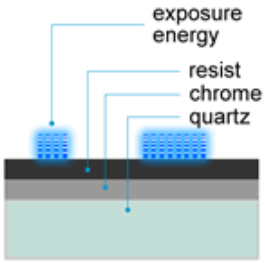
An example

Mask Definition Form

Customer's name:	**Jeremy**		
Affiliation:	**NUS**		
Tel:	**87654321**		
Mask name (if any):	**Combdrive**		
Mask size [1]:	**5"**		
Mask substrate material [2]:	**Quartz**		
Data format [3]:	**GDSII**		
Data scale:	**1:1**		
File name:	**Combdrive_final.gds**		
Top cell name:	**Cell0**		
GDS layer number:	**47**	**3**	**…**
Mask polarity/tone (BF or DF) [4]:	**DF**	**BF**	**…**
Mask orientation/parity (CU or CD, WR or RR) [5]:	**CU WR**	**CD WR**	**…**
Smallest feature size/polarity [6]:	**1 µm / Transparent**	**2 µm / Opaque**	**…**
Feature tolerance:	**0.15 µm**	**0.2 µm**	**…**
Customer's special request:			

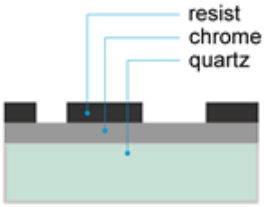
Appendix

HOW A PHOTOMASK IS MADE



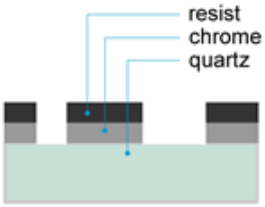
1 GENERATE PATTERN

Convert circuit design data to image in resist through e-beam/laser exposure.



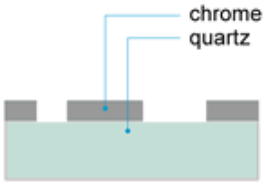
2 DEVELOP RESIST

Develop temporary pattern in resist to serve as a match for etching.



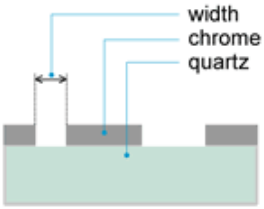
3 ETCH CHROME

Define permanent pattern in chrome.



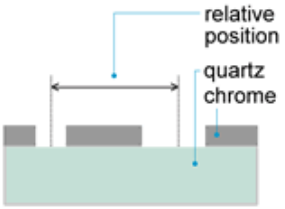
4 REMOVE RESIST

Remove temporary masking layer.



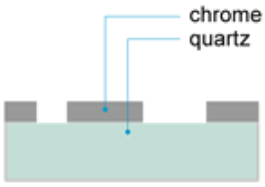
5 MEASURE CRITICAL DIMENSIONS

Ensure features are the proper size.



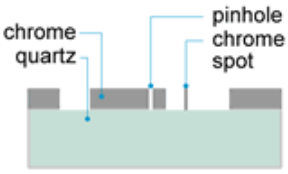
6 MEASURE FEATURE PLACEMENT

Ensure features are in the proper position.



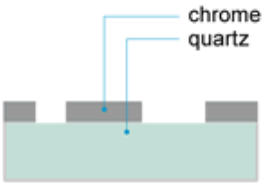
7 INITIAL CLEAN

Clean for defect inspection.



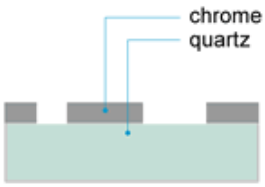
8 INSPECT FOR DEFECTS

Ensure no unetched chrome or pinholes are present.



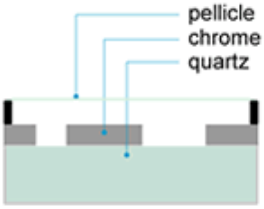
9 REPAIR

Repair any defects found.



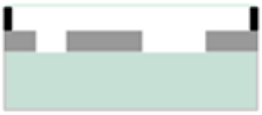
10 PRE-PELLICLE CLEAN

Remove any particulates before pellicle application.



11 APPLY PELLICLE

Provide a particle barrier to ensure the integrity of the pattern from particles.



12 AUDIT

Provide final check to ensure mask produced meets customer's expectations.

