

# Q-Cleave-D

## Reticle Design Description

### General Description:

The Q-Cleave-D reticle is a general purpose Line-Space reticle featuring a wide range of feature sizes in both dense and isolated structures. The reticle features both clear-field and dark-field structure sets. Also included on the reticle are clear-field and dark-field electrically-testable linewidth structures.

This reticle is especially useful in applications that require “cleaving” the wafer for cross-sections.

This reticle is exposed using the ATDF DUV Micrascan III scanner. Typical minimum feature size on the wafer is 0.18um for non-metal films, and 0.25um for metal films.

This is a single level reticle with no overlay capability.

The open area of this reticle is 36.8%.

The reticle was built targeting 0.18um vertical lines.

The field size on the wafer is 20.00mm(X) by 20.00mm(Y).

The Overall Die layout is pictured in **Figure 1**. Note that each module location has a single letter designation. The structures are lettered A through S, starting at the upper left corner of the field.

### Dark Field vs. Clear Field:

The term “Dark Field” describes structures in which the features have the photo-resist on the wafer cleared. In other words, if the structure is a isolated line, for the “dark field” module, the line would be a line having no resist, and the field area around the line would have un-exposed resist. **Figure 2** shows a Clear field and a Dark field structure.

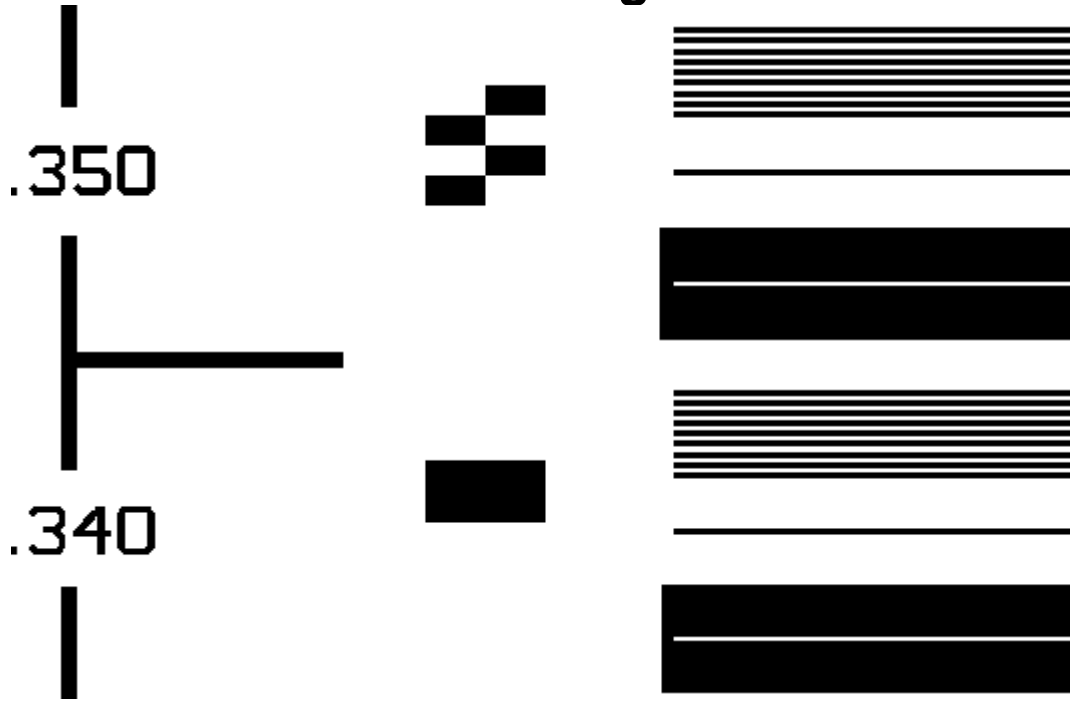
The term “Clear Field” is opposite of “Dark Field”. In other words, if the structure is a isolated line, for the “clear field” module, the line would be a line having un-exposed resist, and the field area around the line would have no resist.

# Q-Cleave-D 1828 Field Layout



Figure 1

**Figure 2**



TOP – Clear Field

Note: Black area is resist.

Bottom – Dark Field

Note: Black area is resist.

## List of Structures:

The reticle has a common module set of structures repeated in a series of 18 locations, 9 of these locations above the center, and 9 below the center.

At the center of the field, there is a similar module, with longer horizontal line structures. A plot of the field is shown in **Figure 3**.

The structures featured on this reticle are listed below, with more detailed descriptions in the next section. These structure names are as shown in Figure 1.

1. **Vert Clear Lines** - lines are ~2310um in length
2. **Horz Dark Lines** - lines are ~2530um in length
3. **Horz Clear Lines** - lines are ~2530um in length
4. **Center Horz Dark Lines** - lines are ~ 4900um in length
5. **Center Horz Clear Lines** - lines are ~ 4900um in length
6. **H-Dark E-test** - linewidth test structures ranging in sizes from 150nm to 250nm
7. **H-Clear E-test** - linewidth test structures ranging in sizes from 150nm to 250nm
8. **V-Dark E-test** - linewidth test structures ranging in sizes from 150nm to 250nm
9. **V-Clear E-test** - linewidth test structures ranging in sizes from 150nm to 250nm

## Line Structure Descriptions:

### Design information common to all Line Structures:

The line structures have two sets of lines.

One set consists of an isolated line, a set of 1:1 dense lines, and a reverse tone isolated line. The .350 and .340 sizes of this set are as shown in **Figure 2**. Note that the .120um, .110um, and .100um dense lines are 1:3 pitch, instead of 1:1. The size range for this set is shown in **Table 1**.

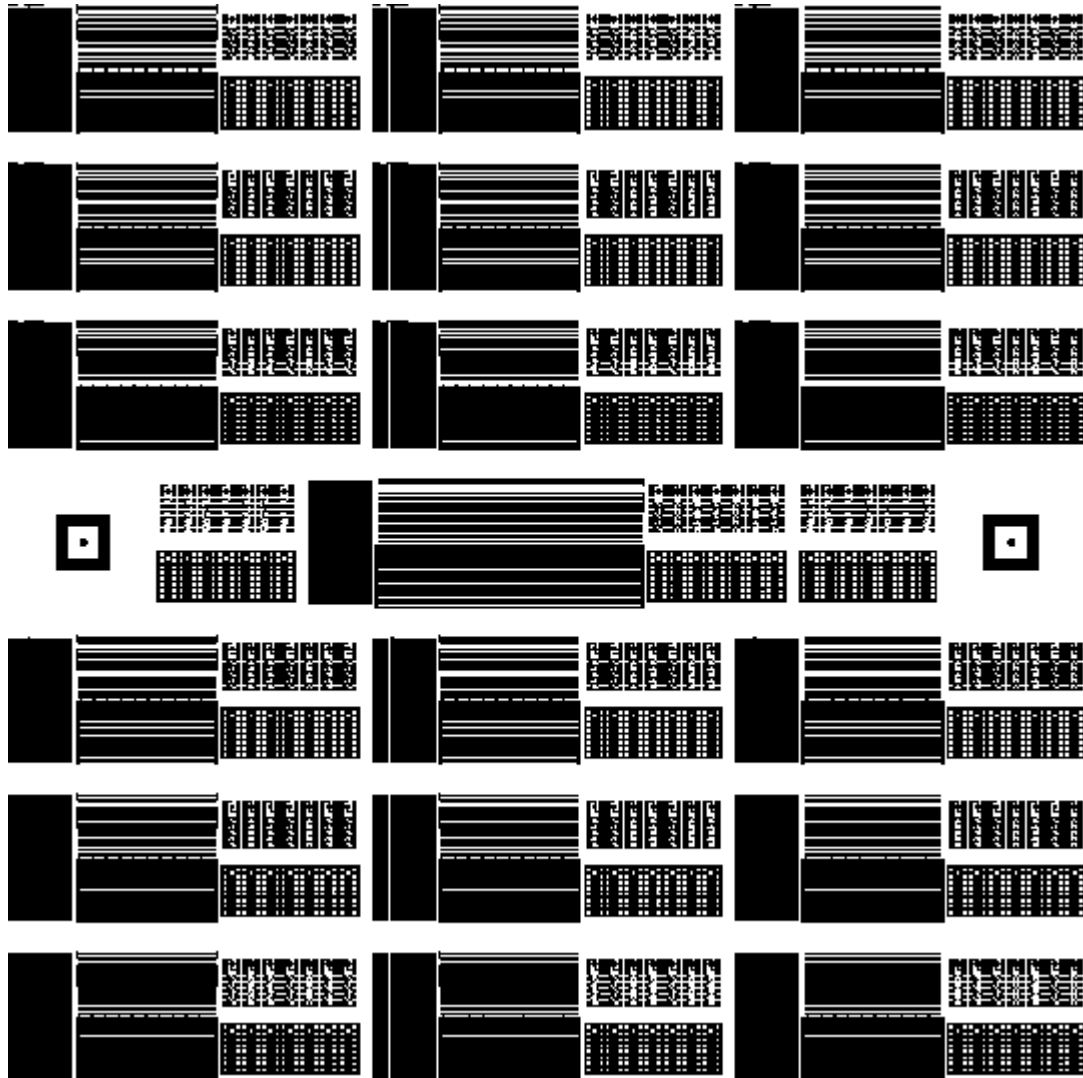
The other set of lines provide multiple pitches for given line sizes. This set includes 1:1, 1:1.5, 1:2, 1:3, 1:5, and 1:10 pitches. The feature sizes for this set are .180um, .200um, .220um, and .250um.

**Table 1 – Feature Sizes for Iso/Dense/Reverse Line Set.**

	Feature Size (nm)
1	100
2	110
3	120
4	130
5	140
6	150
7	160
8	170
9	180
10	190
11	200
12	220
13	240
14	250
15	260
16	280
17	300
18	320
19	340
20	350
21	360
22	380
23	400
24	450
25	500
26	600
27	800
28	1000
29	1200
30	1500
31	2000

**Note:** The largest features are at the top of the structure.

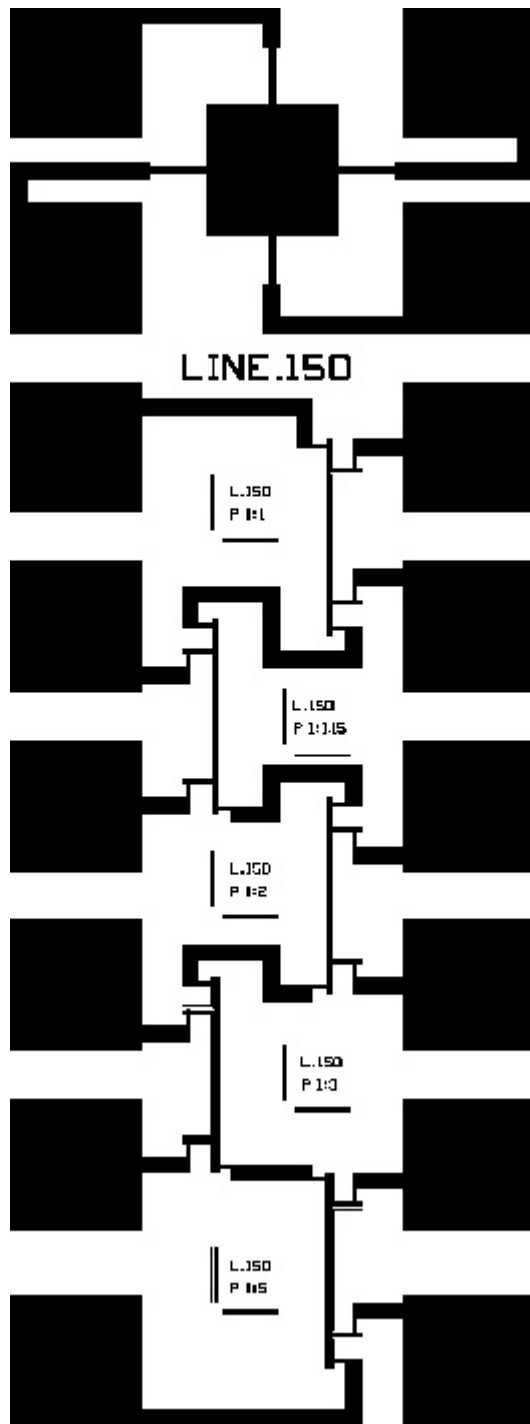
Figure 3



Q-Cleave-D Full Field

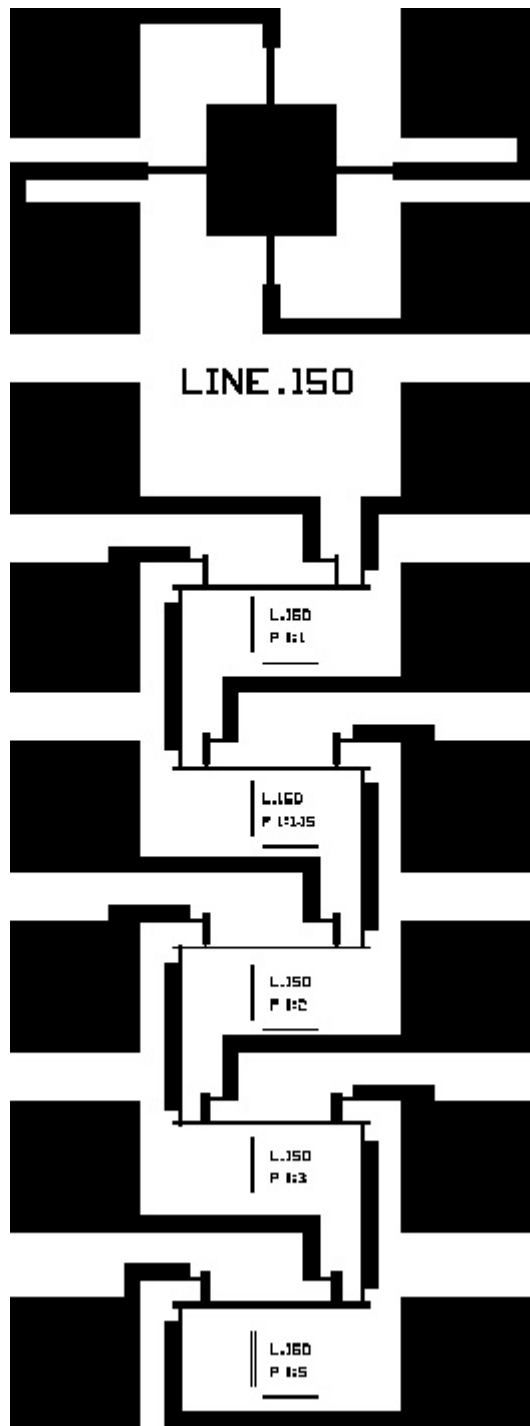
**H-Dark E-test**  
**H-Clear E-test**  
**V-Dark E-test**  
**V-Clear E-test**

**The electrically testable linewidth modules.**



**Figure 4**

.150um Vertical Electrically testable Linewidth Module



**Figure 5**

.150um Horizontal Electrically testable Linewidth Module