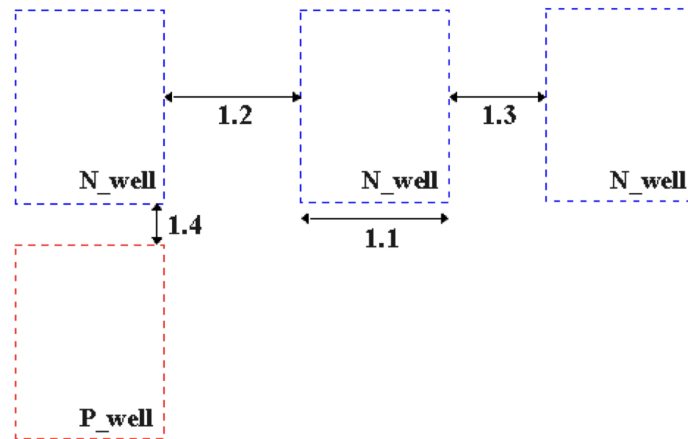


Design Rules

<i>Layers' Name used in LSW</i>	<i>The corresponding names in design rule* file.</i>	<i>Description</i>
Nwell	N WELL	The layer to define the n-doped well area, e.g. used for building PMOS transistors
Oxide	ACTIVE	This layer defines the area for devices e.g. transistor (it is sometimes called active area/thin oxide layer)
Poly	POLY	Polysilicon layer.
Pimp	P PLUS SELECT	For P ⁺ implantation / diffusion.
Nimp	N PLUS SELECT	For N ⁺ implantation / diffusion.
Cont	CONTACT	Contact layer, for contacting 1 st layer metal to polysilicon or 1 st layer metal to substrate.
Metal1	METAL1	1 st layer metal. e.g. for power and ground wiring.
Via1	VIA	For contacting the 1 st layer metal (metal 1) to 2 nd layer metal (Metal2)
Metal2	METAL2	2 nd layer metal
Via2	VIA2	For contacting the 2 nd layer metal (metal 2) to 3 rd layer metal (Metal3)
Metal3	METAL3	3 rd layer metal.
Via3	VIA3	For contacting the 3 rd layer metal (metal 3) to 4 th layer metal (Metal4)
text	N.A.	To put text for labeling purpose.
Notes:		
(drw)	For layout drawing.	
(pin)	For I/O pin definition.	

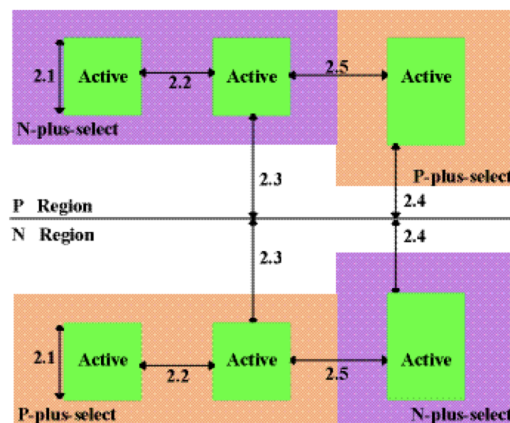
1. The design rules (design rule files in the link stated in P.5) and the lambda rule used; the value of the lambda, $\lambda=0.09 \mu\text{m}$ for our technology.
2. The resolution for mask making, the finest dimension it can achieve is $0.045 \mu\text{m}$, i.e., $\lambda/2$.

Rule	Description	Lambda		
		SCMOS	SUBM	DEEP
1.1	Minimum width	10	12	12
1.2	Minimum spacing between wells at different potential	9	18	18
1.3	Minimum spacing between wells at same potential	6	6	6
1.4	Minimum spacing between wells of different type (if both are drawn)	0	0	0



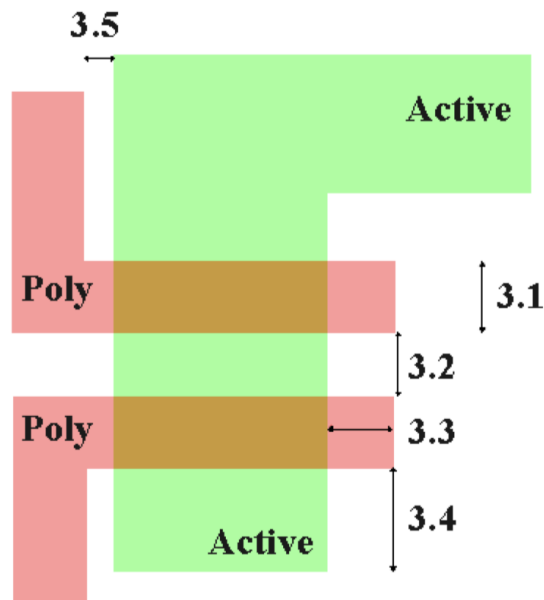
SCMOS Layout Rules - Active

Rule	Description	Lambda		
		SCMOS	SUBM	DEEP
2.1	Minimum width	3 *	3 *	3
2.2	Minimum spacing	3	3	3
2.3	Source/drain active to well edge	5	6	6
2.4	Substrate/well contact active to well edge	3	3	3
2.5	Minimum spacing between non-abutting active of different implant. Abutting active ("split-active") is illustrated under Select Layout Rules.	4	4	4



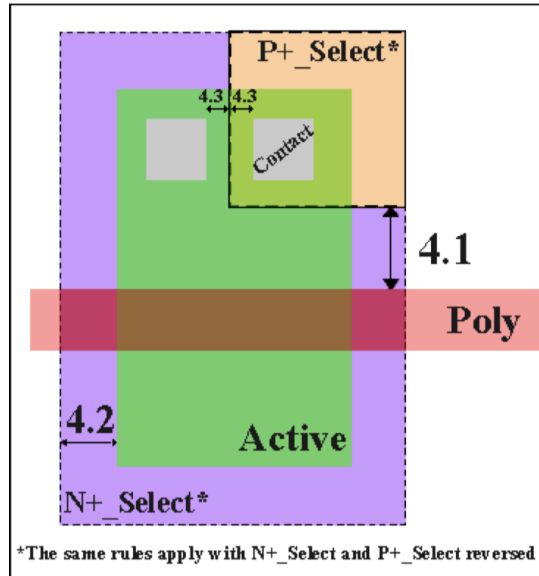
SCMOS Layout Rules - Poly

Rule	Description	Lambda		
		SCMOS	SUBM	DEEP
3.1	Minimum width	2	2	2
3.2	Minimum spacing over field	2	3	3
3.2.a	Minimum spacing over active	2	3	4
3.3	Minimum gate extension of active	2	2	2.5
3.4	Minimum active extension of poly	3	3	4
3.5	Minimum field poly to active	1	1	1



SCMOS Layout Rules - Select

Rule	Description	Lambda		
		SCMOS	SUBM	DEEP
4.1	Minimum select spacing to channel of transistor to ensure adequate source/drain width	3	3	3
4.2	Minimum select overlap of active	2	2	2
4.3	Minimum select overlap of contact	1	1	1.5
4.4	Minimum select width and spacing (Note: P-select and N-select may be coincident, but must <i>not</i> overlap) (not illustrated)	2	2	4



SCMOS Layout Rules - Contact to Poly

On 0.50 micron process (and all finer feature size processes), it is required that all features on the insulator layers (CONTACT, VIA, VIA2) must be of the single standard size; there are no exceptions for pads (or logos, or anything else); large openings must be replaced by an array of standard sized openings. Contacts must be drawn orthogonal to the grid of the layout. Non-Manhattan contacts are not allowed.

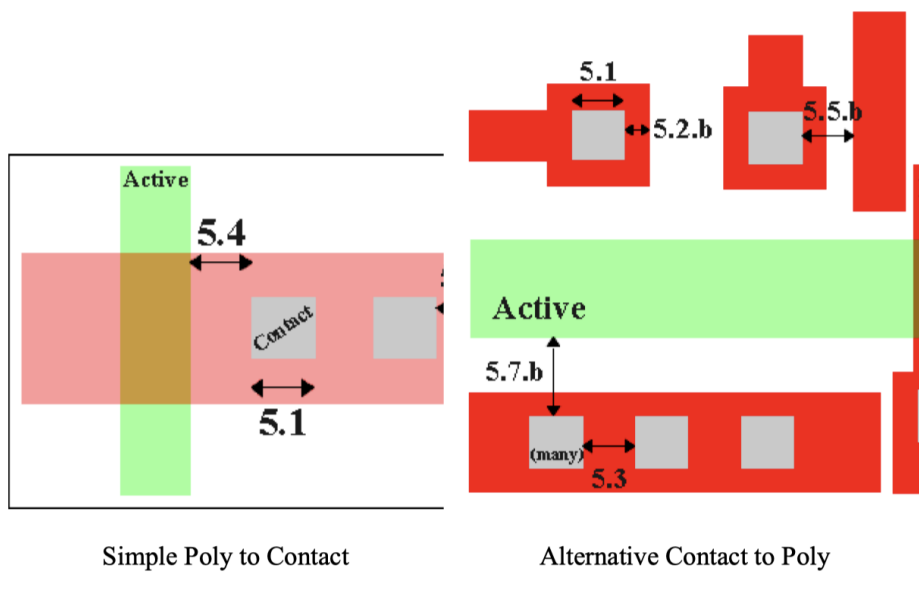
If your design cannot tolerate 1.5 lambda contact overlap in 5.2, use the alternative rules which reduce the overlap but increase the spacing to surrounding features. Rules 5.1, 5.3, and 5.4, still apply and are unchanged.

Simple
Contact to Poly

Rule	Description	Lambda		
		SCMOS	SUBM	DEEP
5.1	Exact contact size	2x2	2x2	2x2
5.2	Minimum poly overlap	1.5	1.5	1.5
5.3	Minimum contact spacing	2	3	4
5.4	Minimum spacing to gate of transistor	2	2	2

Alternative
Contact to Poly

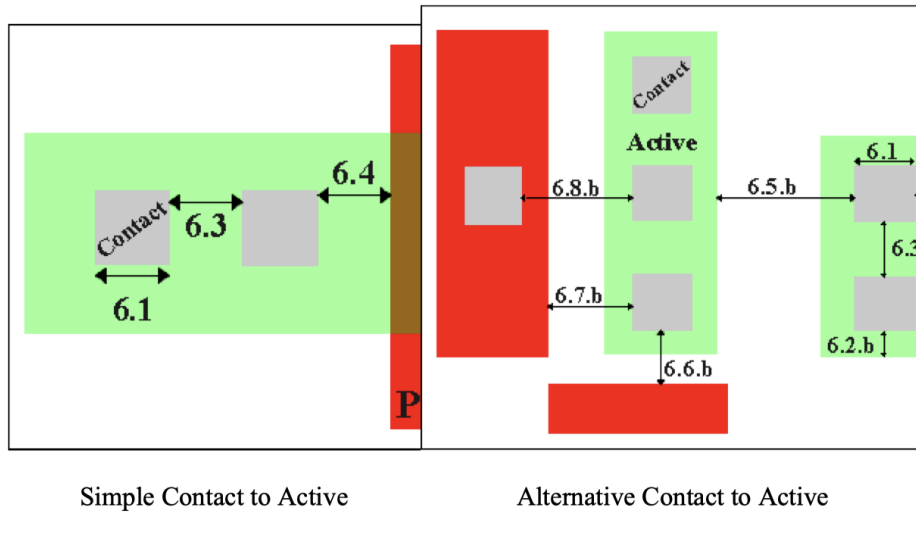
Rule	Description	Lambda		
		SCMOS	SUBM	DEEP
5.2.b	Minimum poly overlap	1	1	1
5.5.b	Minimum spacing to other poly	4	5	5
5.6.b	Minimum spacing to active (one contact)	2	2	2
5.7.b	Minimum spacing to active (many contacts)	3	3	3



SCMOS Layout Rules - Contact to Active

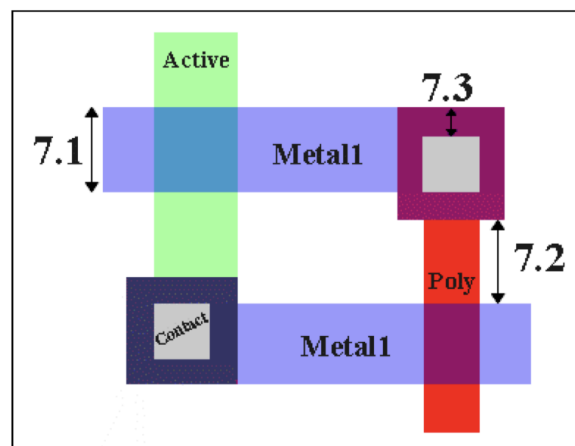
If your design cannot handle the 1.5 lambda contact overlap in 6.2, use the alternative rules which reduce the overlap but increase the spacing to surrounding features. Rules 6.1, 6.3, and 6.4, still apply and are unchanged. Contacts must be drawn orthogonal to the grid of the layout. Non-Manhattan contacts are not allowed.

Simple Contact to Active					Alternative Contact to Active				
Rule	Description	Lambda			Rule	Description	Lambda		
		SCMOS	SUBM	DEEP			SCMOS	SUBM	DEEP
6.1	Exact contact size	2x2	2x2	2x2	6.2.b	Minimum active overlap	1	1	1
6.2	Minimum active overlap	1.5	1.5	1.5	6.5.b	Minimum spacing to diffusion active	5	5	5
6.3	Minimum contact spacing	2	3	4	6.6.b	Minimum spacing to field poly (one contact)	2	2	2
6.4	Minimum spacing to gate of transistor	2	2	2	6.7.b	Minimum spacing to field poly (many contacts)	3	3	3
					6.8.b	Minimum spacing to poly contact	4	4	4



SCMOS Layout Rules - Metal1

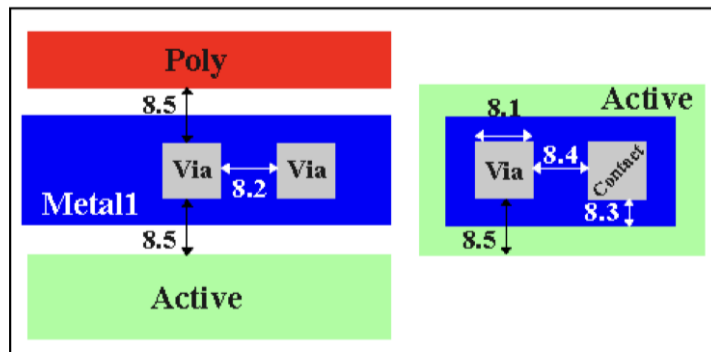
Rule	Description	Lambda		
		SCMOS	SUBM	DEEP
7.1	Minimum width	3	3	3
7.2	Minimum spacing	2	3	3
7.3	Minimum overlap of any contact	1	1	1
7.4	Minimum spacing when either metal line is wider than 10 lambda	4	6	6



SCMOS Layout Rules - Via

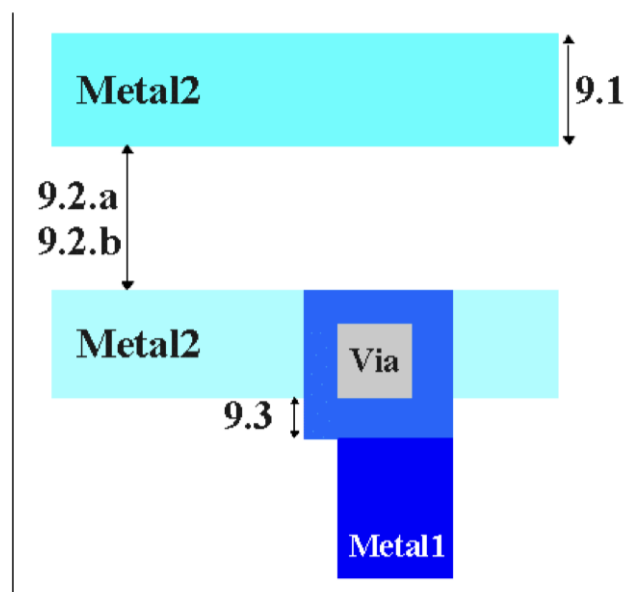
Vias must be drawn orthogonal to the grid of the layout. Non-Manhattan vias are not allowed.

Rule	Description	Lambda					
		2 Metal Process			3+ Metal Process		
		SCMOS	SUBM	DEEP	SCMOS	SUBM	DEEP
8.1	Exact size	2 x 2	n/a	n/a	2 x 2	2 x 2	3 x 3
8.2	Minimum via1 spacing	3	n/a	n/a	3	3	3
8.3	Minimum overlap by metal1	1	n/a	n/a	1	1	1
8.4	Minimum spacing to contact for technology codes mapped to processes that do not allow stacked vias (SCNA, SCNE, SCN3M, SCN3MLC)	2	n/a	n/a	2	2	n/a
8.5	Minimum spacing to poly or active edge for technology codes mapped to processes that do not allow stacked vias (NOTE: list is not same as for 8.4)	2	n/a	n/a	2	2	n/a



SCMOS Layout Rules - Metal2

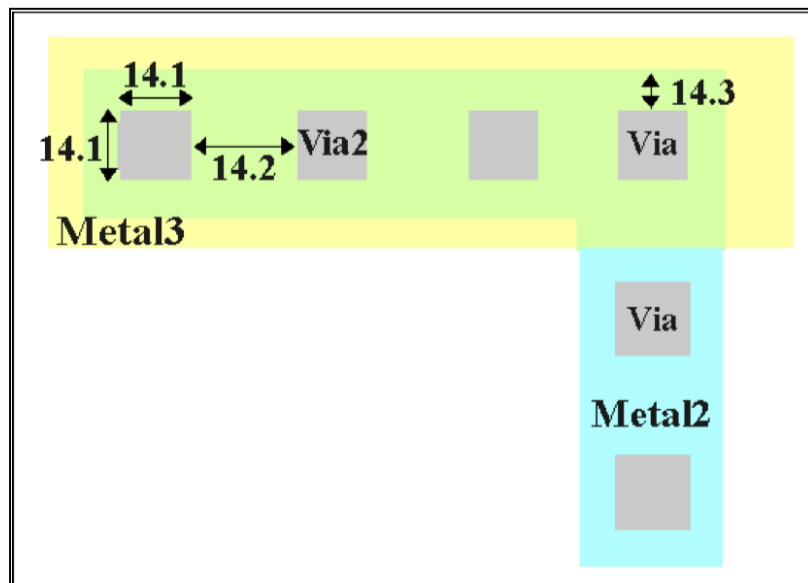
Rule	Description	Lambda					
		2 Metal Process			3+ Metal Process		
		SCMOS	SUBM	DEEP	SCMOS	SUBM	DEEP
9.1	Minimum width	3	n/a	n/a	3	3	3
9.2	Minimum spacing	3	n/a	n/a	3	3	4
9.3	Minimum overlap of via1	1	n/a	n/a	1	1	1
9.4	Minimum spacing when either metal line is wider than 10 lambda	6	n/a	n/a	6	6	8



SCMOS Layout Rules - Via2

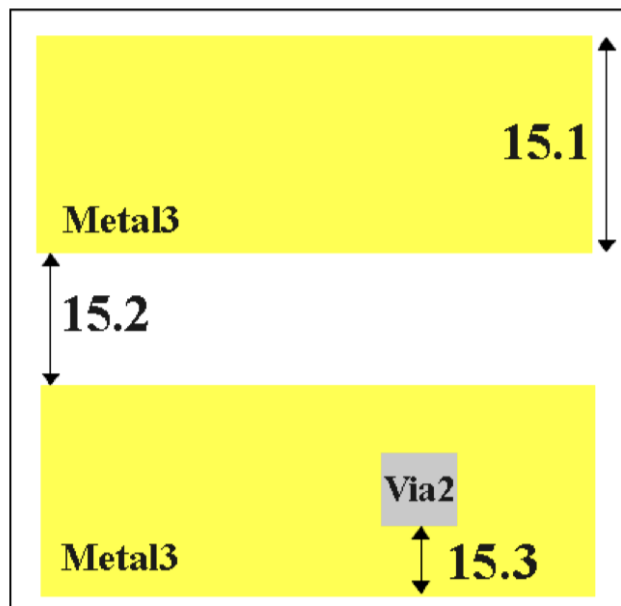
Vias must be drawn orthogonal to the grid of the layout. Non-Manhattan vias are not allowed.

Rule	Description	Lambda					
		3 Metal Process			4+ Metal Process		
		SCMOS	SUBM	DEEP	SCMOS	SUBM	DEEP
14.1	Exact size	2x2	2x2	n/a	2x2	2x2	3x3
14.2	Minimum spacing	3	3	n/a	3	3	3
14.3	Minimum overlap by metal2	1	1	n/a	1	1	1
14.4	Via2 may be placed over via1						
14.5	Via2 may be placed over contact						



SCMOS Layout Rules - Metal3

Rule	Description	Lambda					
		3 Metal Process			4+ Metal Process		
		SCMOS	SUBM	DEEP	SCMOS	SUBM	DEEP
15.1	Minimum width	6	5	n/a	3	3	3
15.2	Minimum spacing to metal3	4	3	n/a	3	3	4
15.3	Minimum overlap of via2	2	2	n/a	1	1	1
15.4	Minimum spacing when either metal line is wider than 10 lambda	8	6	n/a	6	6	8



SCMOS Layout Rules - Via3

Vias must be drawn orthogonal to the grid of the layout. Non-Manhattan vias are not allowed.

Rule	Description	Lambda					
		4 metal Process			5+ Metal Process		
		SCMOS	SUBM	DEEP	SCMOS	SUBM	DEEP
21.1	Exact size	2x2	2x2	n/a	n/a	2x2	3x3
21.2	Minimum spacing	3	3 *	n/a	n/a	3	3
21.3	Minimum overlap by Metal3	1	1	n/a	n/a	1	1

* Exception: Use lambda=4 for rule 21.2 only when using SCN4M_SUBM for Agilent/HP GMOS10QA 0.35 micron process

