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APT601 - 1402

(74)

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(54)

가

가
가

1

2

, ,

, 1

2

2d

1a 1d

2a 2d

3

가

(via hole)

가 , (step coverage) 가 ,

scene) 가 , (step difference) (dual dama 가 .

Ta, TaN, TiN, WN, WSiN, TiSiN .

P Ta IMP(ionized metal plasma) . , IM (step coverage) 가

, TaN IMP , Ta (nitridation) 가 TaN (stoichiometry) 가

, Ta TaN 가 (precursor) (CVD) 가 , CVD

500 , CVD TiN .

W - Si - N, Ti - Si - N 3

가

1a 1d

1a (10) (11) (chemical vapor depos
 ition, CVD) (10) ()
 , 1 (11) 1 (12)

3) (12) (11) (inter - metal dielectric,1
 (13) TEOS(tetra ethyl ortho silicate) SOG(spin on glass)
 SiO₂

(13) 1 (12)
 2 가 ,

1 (12) 1 , 1

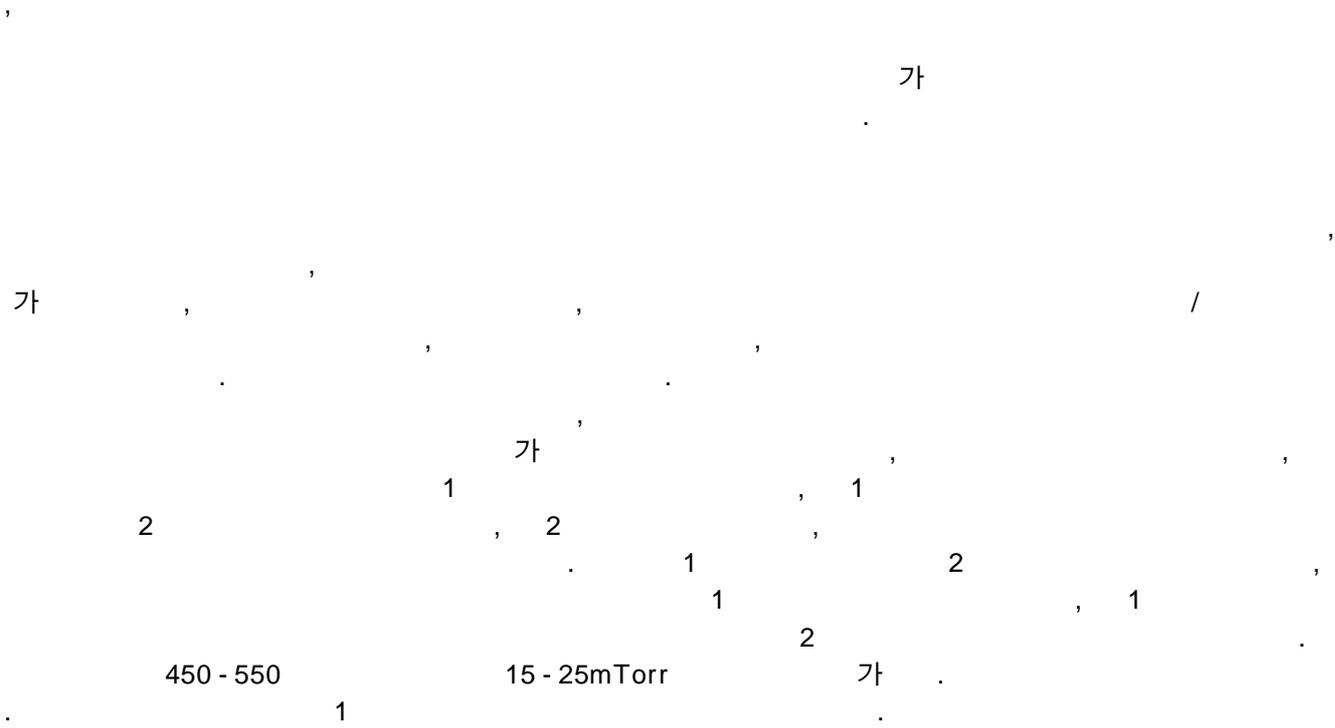
(13) 1 (13) , 1
 가

1b (13) 1 (12) (14)
 PVD(physical vapor deposition) (14) Ti TiN
 , IMP TaN , TaN 가 TiN

1c (14) 2 (15) CVD
 , (14) (Cu bulk layer) Al, Cu (Cu seed layer,
) PVD (15) (electroplating)

1d , (13)
 1 (12) 2 (150) ,

가



(dual damascene)

(nitridation)

TaN

가

IMP(ionized metal plasma)

Ta

TaN

가

가

가

가

IMD(inter metal dielectric RC

(time delay)

가

2a 2d
 2a (20) (21) (chemical va
 por deposition, CVD)

(22), (21) (20) / (21) 1 (22) 1
 가

3) (22) (21) (inter - metal dielectric,2
 (23) TEOS(tetra ethyl ortho silicate) SOG(spin on glass)
 SiO₂
 (23) 1 (22)
 (H) (H) 2 (T)
 (H) 1 (22) 가 (T)

(H) (T)
 1 (22) 1

2 (23) 1 (23)
 1 가 (23)

2b (23) 1 (22) 1
 (24) 1 (24) IMP(ionized metal plasma)

2c 1 (24) (nitridation) 1
 0) 2 (241) 2 (241) 1 (24)
 2 (241) 2 (241)

(N) 가 15 - 25 mTorr 가 450 - 550

(23) 가 가 가 IMD(inter metal dielectric)

2d, 2 (241) 2 (241) (Cu bulk layer) (25)
 Cu, 2 (241)
 (Cu seed layer,) PVD
 (electroplating)

1 (22) 2 (250) (23)
 (chemical mechanical polishing)

3 가 (20) (2
 3, (21)

1) 1 (22)

1 (22) (21) 1 (22) (inter metal dielectric, 23)

(23) 가 1 (22) 2
 가 (240) 1 (22), 1 (240) Ta 1

, 1 (240) 2 (241) TaN
 Ta/TaN

2 (241) (25) 가
 (25) 2 (25) (25)

가 가

가

IMD(inter metal dielectric RC (time delay)

(57)

1.

가

2.

3.

4.

1

5.

가

1

2

2

6.

7.

6

1

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1

1

2

8.

7 , 450 - 550 15 - 25mTorr 가

9.

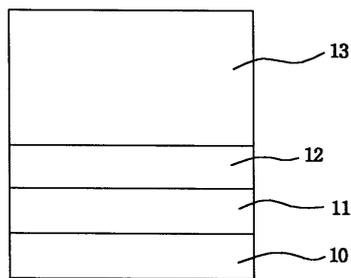
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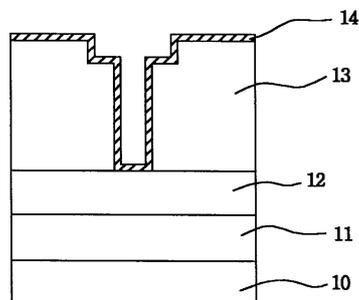
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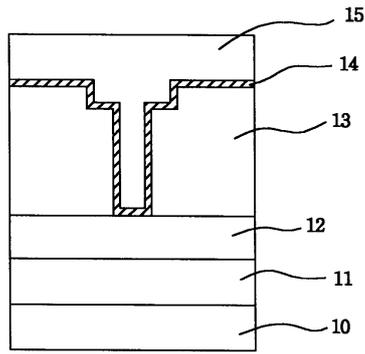
1a



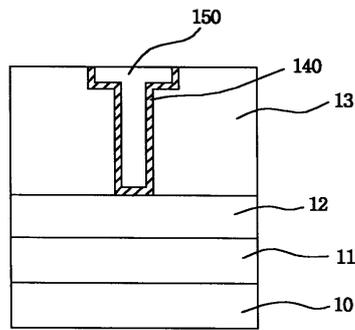
1b



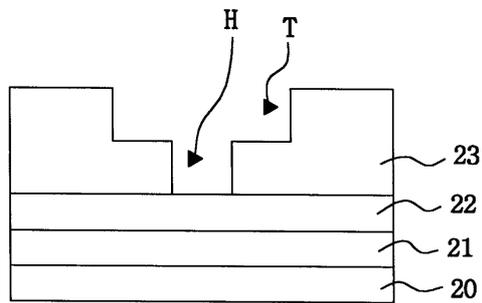
1c



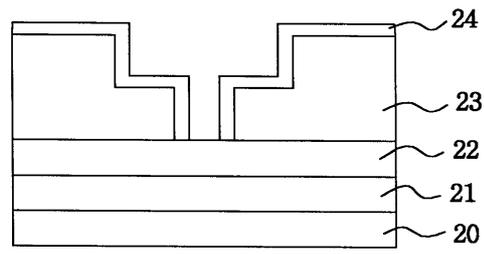
1d



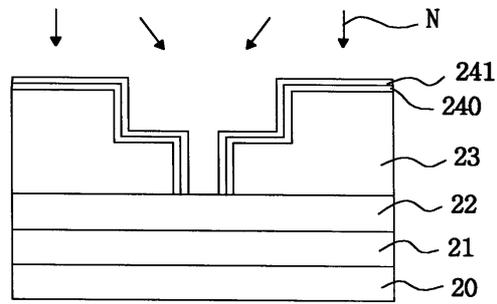
2a



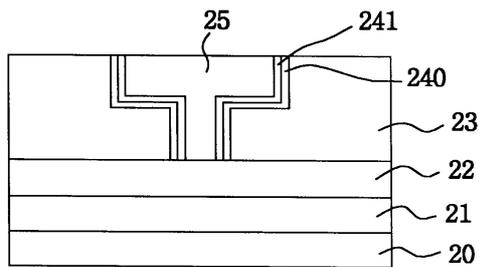
2b



2c



2d



3

