Hybrid Thermal

EDA TechnoFair2000

2000年1月27~28日

アンソフト・ジャパン株式会社

Hybrid Thermal

は下記の機能を含みます:

- 会話型モデル・ジェネレーション (DXF、Gerberからのインポートも可)
- IC/Package/MCM用熱解析プリ・ポストプロセッサ
- 熱、熱応力解析
- チップ、サブストレート熱コンタ図
- BGAとQFPパッケージ用にカスタマイズされたモデラー

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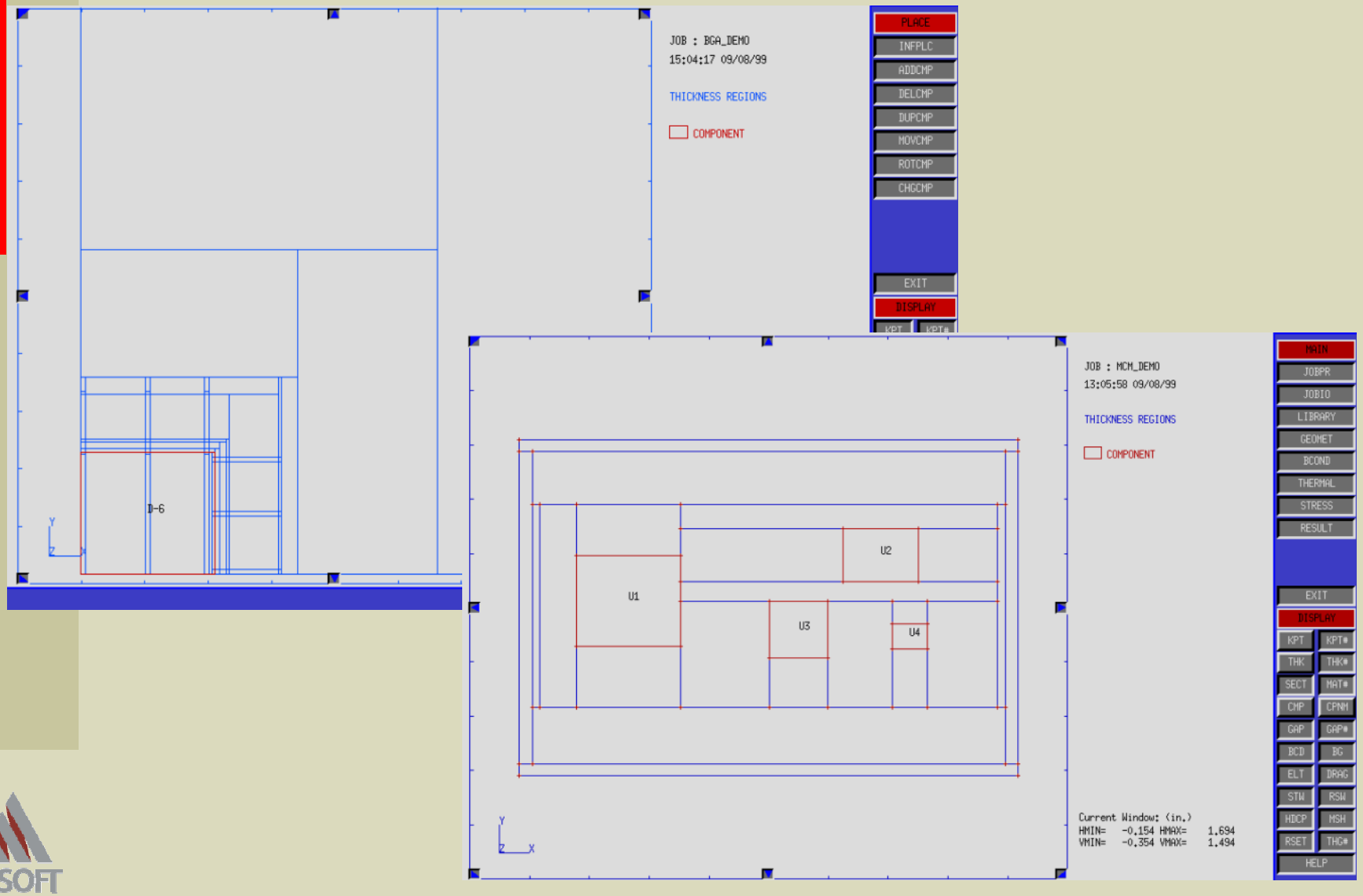
パッケージ・レイアウト: Single or multi-chip



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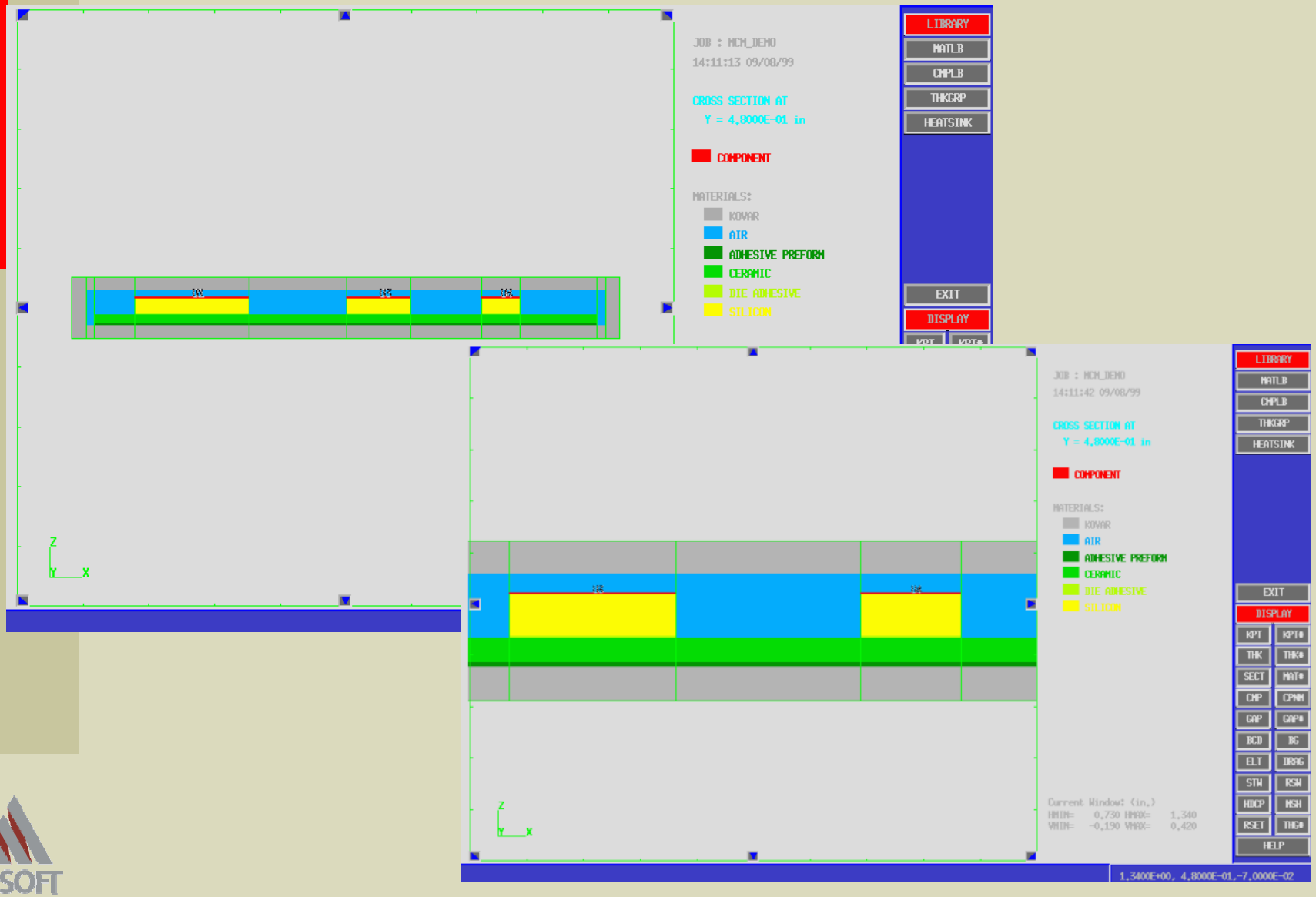
サブストレイト層構造 とMCM レイアウト



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BGA/QFP 用モデラー設定画面

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JOB : BGA_DEMO  10:11:00 09/09/99

    PACKAGE TYPE                        = PBGA/DIE-UP
  11. GRAPHICAL MODEL SETUP

 3. PCB LAYER
    31. MATERIAL                                = LAMCCL-H832
    32. SIZE IN X                               =    27.00      mm
    **. SIZE IN Y                               =    27.00      mm
    34. THICKNESS                               =   0.2890      mm
    341. SIZE OF VIA PERIMETER GAP              =    5.300      mm
    35. # VIAS IN FLAG AREA (X DIRECTION)       =      4
    36. # VIAS UNDER VIA GAP (X DIRECTION)      =     19
    37. DIAMETER (OD) OF VIAS IN FLAG AREA      =   0.3000      mm
    38. DIAMETER (OD) OF VIAS IN PERIMETER      =   0.3000      mm
    39. MATERIAL INSIDE FLAG VIAS               = AIR
    40. MATERIAL INSIDE PERIMETER VIAS          = AIR
   411. DIAMETER (ID) OF VIAS IN FLAG AREA      =   0.2500      mm
   412. DIAMETER (ID) OF VIAS IN PERIMETER      =   0.2500      mm
   413. VIA WALL MATERIAL                       = COPPER
   414. VIA/PLANE TOP GAP DISTANCE              =   0.1000      mm
   415. VIA/PLANE BOTTOM DISTANCE               =   0.1000      mm
   416. GENERATE COMPOSITE VIA MATERIAL

 4. MOUNTING PAD
    41. MATERIAL                                = COPPER
    42. SIZE IN X                               =    10.50      mm
    **. SIZE IN Y                               =    10.50      mm
    44. SIZE IN Z                               =   0.1000      mm

 5. DIE
    51. DIE NAME                                = DELCO PST-6
    52. DIE MATERIAL                            = SILICON
    53. DIE BOND MATERIAL                       = ABLEBOND8360
    54. DIE BOND THICKNESS                      =  1.2700E-02 mm
    55. OPERATIONAL POWER                       =    3.000      W
    57. LONG SIDE                               = X

 6. WIRE BOND
    61. MATERIAL                                = GOLD
    62. AVERAGE LENGTH                          =    3.000      mm
    63. DIAMETER                                =  3.3000E-02 mm
    64. NO. OF WIRES ON RIGHT SIDE              =   17
    65. NO. OF WIRES ON TOP SIDE                =   17

 7. SOLDER BALLS
    71. SOLDER BALL MATERIAL                    = SOLDER_EUT
    72. NUMBER OF SOLDER BALLS:
        721. IN X DIRECTION                     =   4
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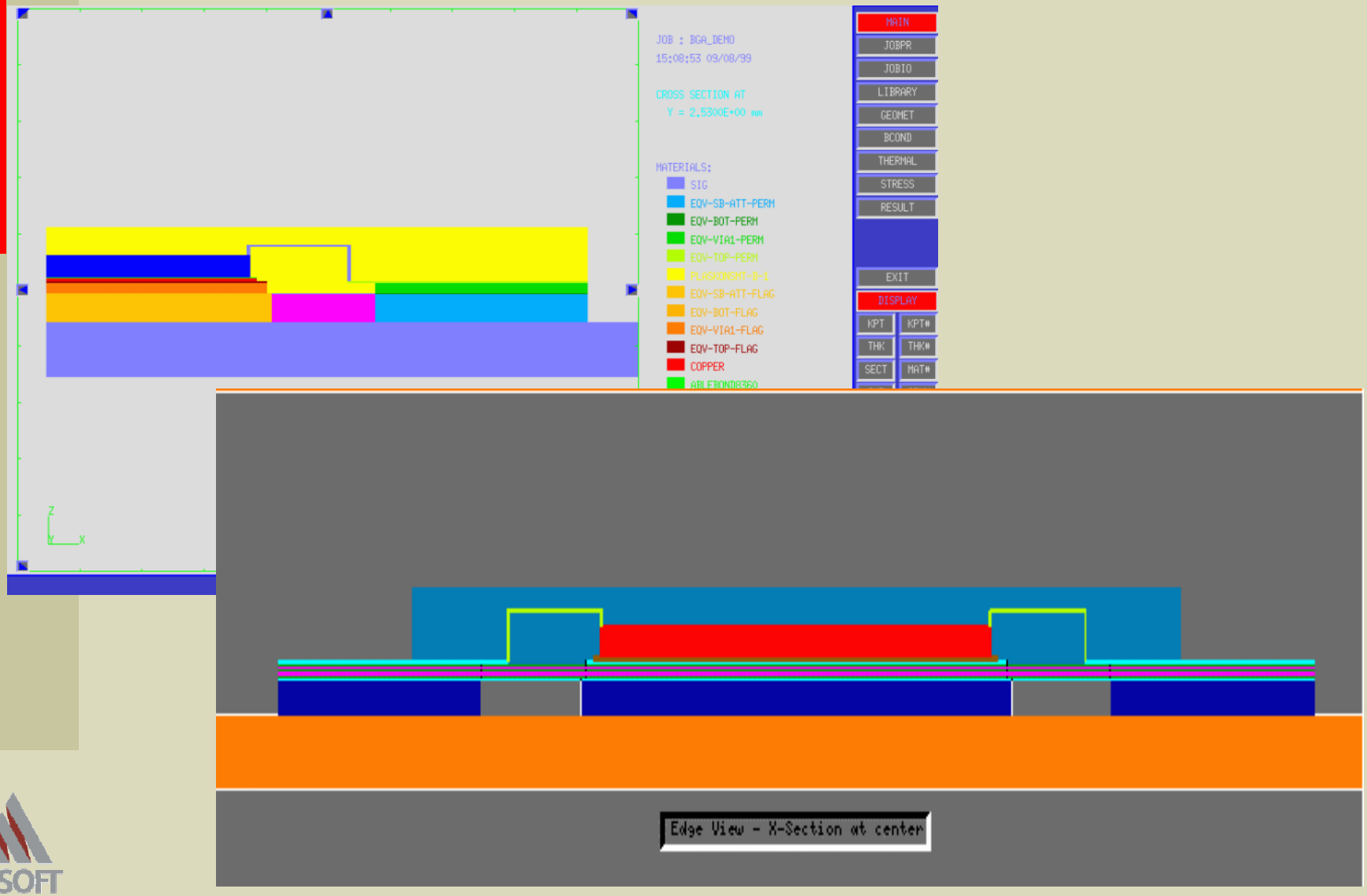
サブストレイト層構造 とBGA レイアウト



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サブストレイト層構造と部品配置情報

JOB : MCM_DEMO 10:18:44 09/09/99

********* THICKNESS GROUP 1 *********

LAYER #	MATERIAL # AND NAME	THICKNESS (in)	EMISSIVITY
1.	1 KOVAR	1.90000E-01	0.000000E+00

********* THICKNESS GROUP 2 *********

LAYER #	MATERIAL # AND NAME	THICKNESS (in)	EMISSIVITY
1.	1 KOVAR	4.00000E-02	0.000000E+00
2.	6 AIR	1.10000E-01	0.000000E+00
3.	1 KOVAR	4.00000E-02	0.000000E+00

********* THICKNESS GROUP 3 *********

LAYER #	MATERIAL # AND NAME	THICKNESS (in)	EMISSIVITY
1.	1 KOVAR	4.00000E-02	0.000000E+00
2.	3 ADHESIVE PREFORM	5.00000E-03	0.000000E+00
3.	2 CERAMIC	3.00000E-02	0.000000E+00
4.	6 AIR	7.50000E-02	0.000000E+00
5.	1 KOVAR	4.00000E-02	0.000000E+00

********* THICKNESS GROUP 4 *********

LAYER #	MATERIAL # AND NAME	THICKNESS (in)	EMISSIVITY
1.	1 KOVAR	4.00000E-02	0.000000E+00
2.	3 ADHESIVE PREFORM	5.00000E-03	0.000000E+00
3.	2 CERAMIC	3.00000E-02	0.000000E+00
4.	5 DIE ADHESIVE	2.00000E-03	0.000000E+00
5.	4 SILICON	5.00000E-02	0.000000E+00
6.	6 AIR	2.30000E-02	0.000000E+00
7.	1 KOVAR	4.00000E-02	0.000000E+00

JOB : MCM_DEMO 10:20:29 09/09/99

********* COMPONENT PLACEMENT *********

1. NAME = U1
2. COMPONENT LIBRARY NAME = MAC
3. LOCATION
   31. X = 3.370E-01 in
   32. Y = 5.930E-01 in
   33. Z = 1.270E-01 in
4. LONG SIDE = X
5. OPERATIONAL POWER = 1.964E+00 W
6. LOCAL REFERENCE POWER LEVEL = DEFAULT
7. LOCAL POWER FACTOR = DEFAULT
8. COMPONENT MOUNTING SURFACE = BOTTOM

********* COMPONENT PLACEMENT *********

1. NAME = U3
2. COMPONENT LIBRARY NAME = TRW
3. LOCATION
   31. X = 8.620E-01 in
   32. Y = 4.950E-01 in
   33. Z = 1.270E-01 in
4. LONG SIDE = Y
5. OPERATIONAL POWER = 1.021E+00 W
6. LOCAL REFERENCE POWER LEVEL = DEFAULT
7. LOCAL POWER FACTOR = DEFAULT
8. COMPONENT MOUNTING SURFACE = BOTTOM

********* COMPONENT PLACEMENT *********

1. NAME = U2
2. COMPONENT LIBRARY NAME = LTS
3. LOCATION
   31. X = 1.116E+00 in
   32. Y = 7.490E-01 in
   33. Z = 1.270E-01 in
4. LONG SIDE = X
5. OPERATIONAL POWER = 1.447E+00 W
6. LOCAL REFERENCE POWER LEVEL = DEFAULT
7. LOCAL POWER FACTOR = DEFAULT
8. COMPONENT MOUNTING SURFACE = BOTTOM

********* COMPONENT PLACEMENT *********

1. NAME = U4
2. COMPONENT LIBRARY NAME = LM137
3. LOCATION

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境界条件: 对流, 放射, 熱伝導

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JOB : HGN_DMOI  10:24:13 09/09/99

<< TOP SURFACE >>
1. CONVECTION B.C.                      = DEFINED
  11. CONVECTION HEAT TRANSFER COEF.    =  2.50000E+01 W/m^2.K
  12. LOCAL AMBIENT TEMPERATURE         =  3.30000E+01 C
2. RADIATION B.C.                       = UNDEFINED
3. KNOWN TEMPERATURE B.C.               = UNDEFINED
4. APPLIED HEAT FLUX B.C.               = UNDEFINED
5. BOUNDARY LIMIT                       =  1.90000E-01 in

<< BOTTOM SURFACE >>
1. CONVECTION B.C.                      = UNDEFINED
2. RADIATION B.C.                       = UNDEFINED
3. KNOWN TEMPERATURE B.C.               = UNDEFINED
4. APPLIED HEAT FLUX B.C.               = UNDEFINED
5. BOUNDARY LIMIT                       =  0.00000E+00 in

<< TOP SIDE >>
1. CONVECTION B.C.                      = UNDEFINED
2. RADIATION B.C.                       = UNDEFINED
3. KNOWN TEMPERATURE B.C.               = DEFINED
  31. KNOWN TEMPERATURE                 =  4.50000E+01 C
4. APPLIED HEAT FLUX B.C.               = UNDEFINED
5. BOUNDARY LIMIT                       =  1.14000E+00 in

<< BOTTOM SIDE >>
1. CONVECTION B.C.                      = UNDEFINED
2. RADIATION B.C.                       = UNDEFINED
3. KNOWN TEMPERATURE B.C.               = DEFINED
  31. KNOWN TEMPERATURE                 =  4.50000E+01 C
4. APPLIED HEAT FLUX B.C.               = UNDEFINED
5. BOUNDARY LIMIT                       =  0.00000E+00 in

<< LEFT-HAND SIDE >>
1. CONVECTION B.C.                      = DEFINED
  11. CONVECTION HEAT TRANSFER COEF.    =  5.00000E+00 W/m^2.K
  12. LOCAL AMBIENT TEMPERATURE         =  3.30000E+01 C
2. RADIATION B.C.                       = UNDEFINED
3. KNOWN TEMPERATURE B.C.               = UNDEFINED
4. APPLIED HEAT FLUX B.C.               = UNDEFINED
5. BOUNDARY LIMIT                       =  0.00000E+00 in

<< RIGHT-HAND SIDE >>
1. CONVECTION B.C.                      = DEFINED
  11. CONVECTION HEAT TRANSFER COEF.    =  5.00000E+00 W/m^2.K
  12. LOCAL AMBIENT TEMPERATURE         =  3.30000E+01 C
2. RADIATION B.C.                       = UNDEFINED
3. KNOWN TEMPERATURE B.C.               = UNDEFINED
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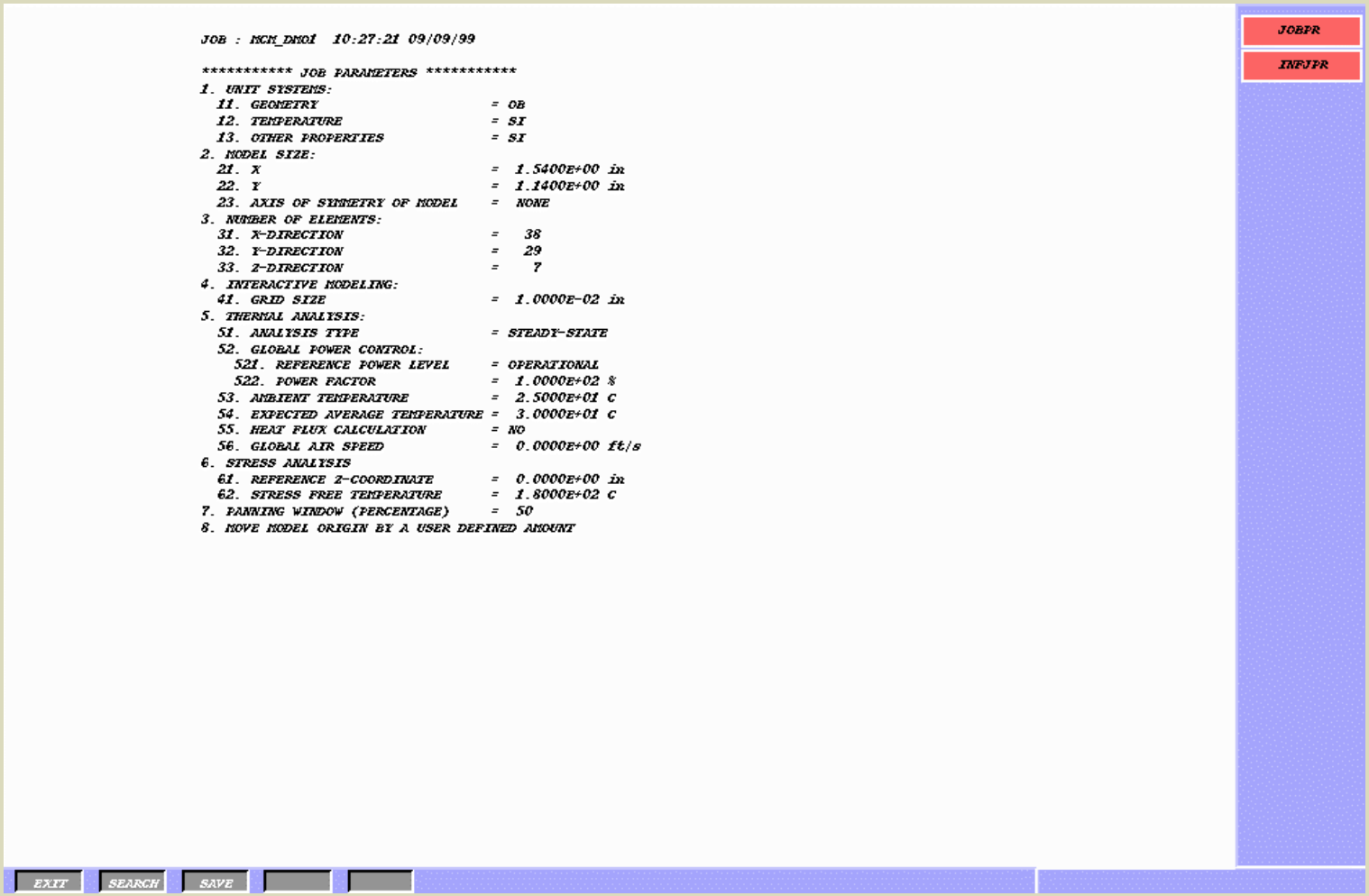
Model の設定と解析パラメータ



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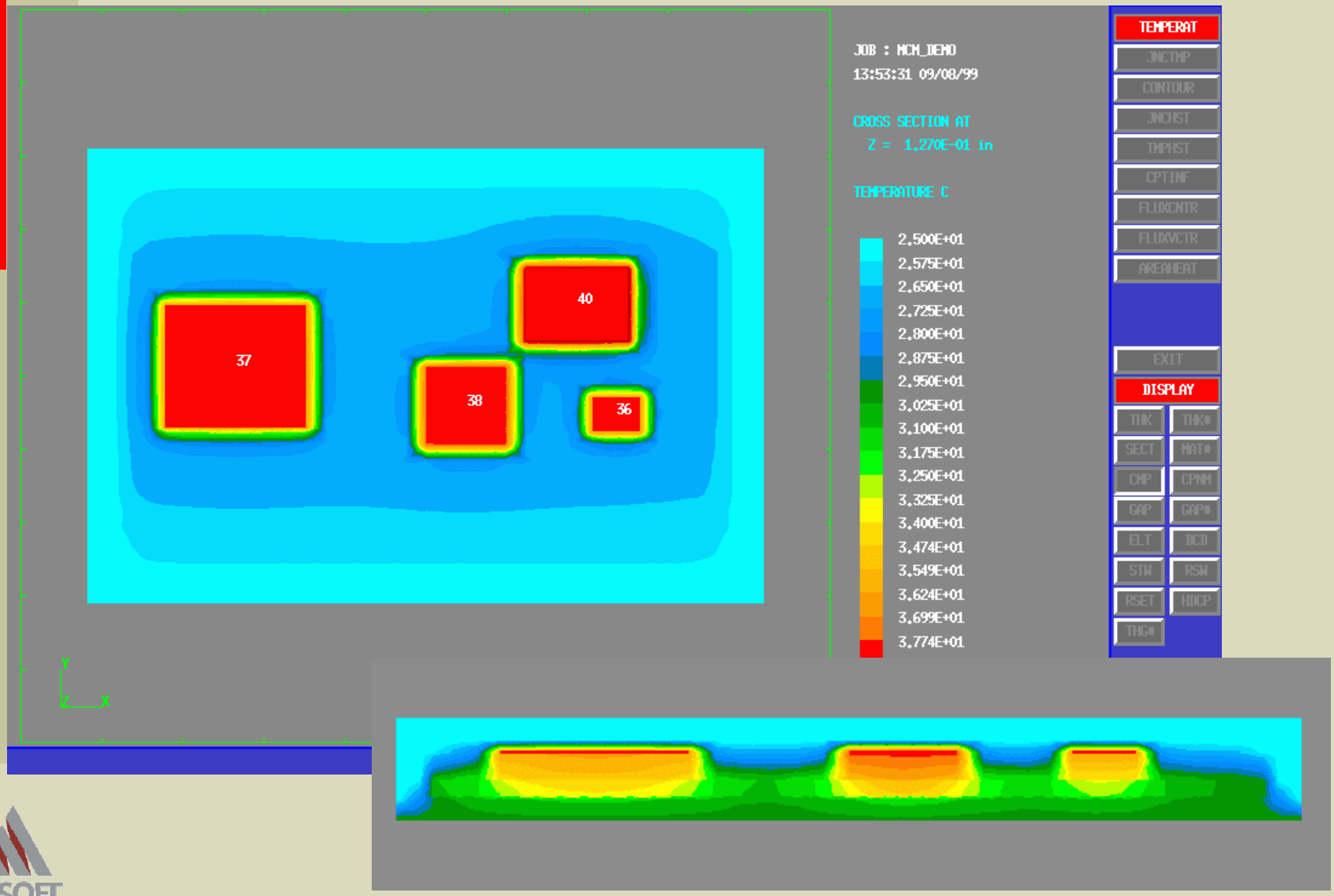
サブストレイトとチップの熱コンタ図



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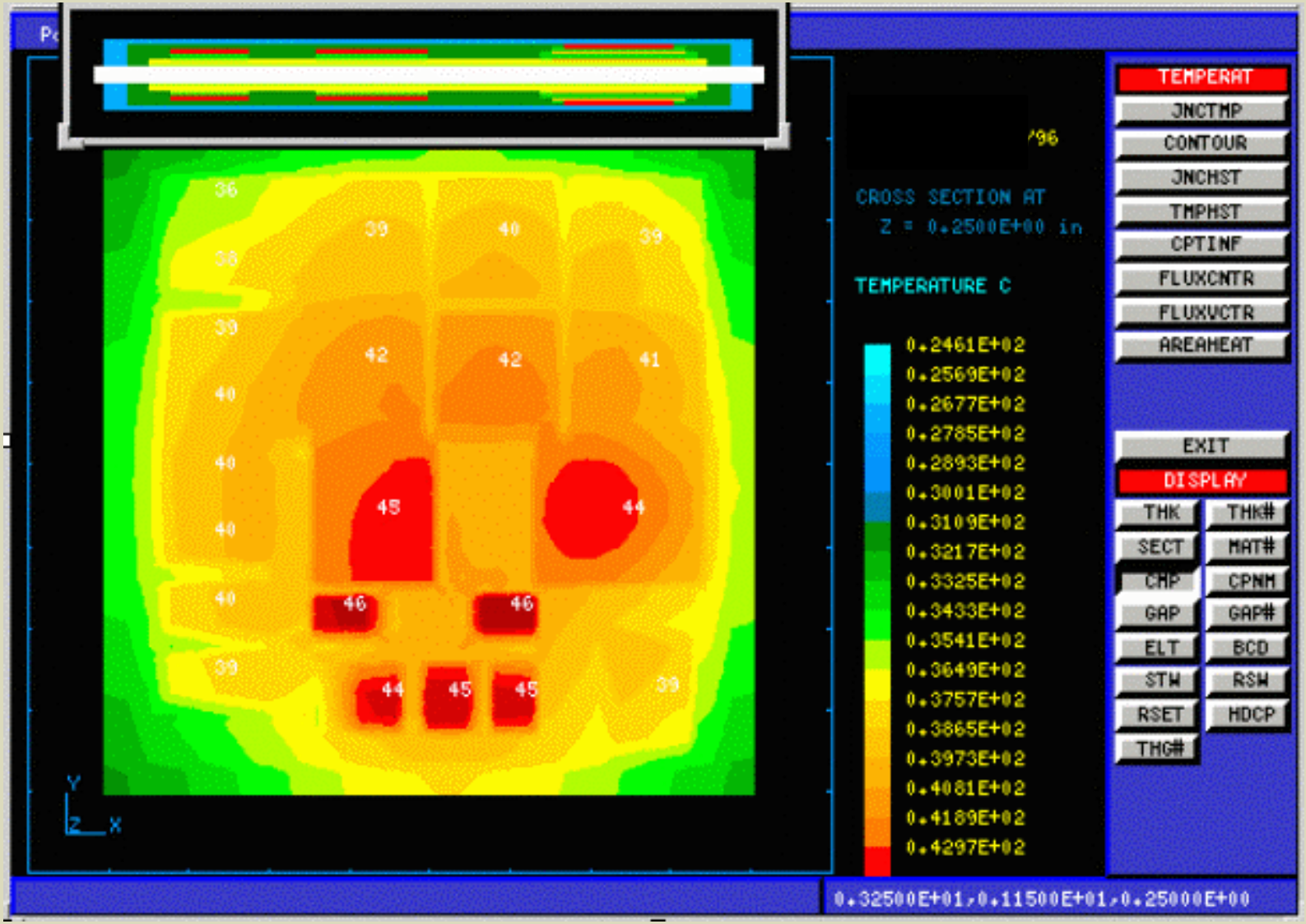
サブストレイトとチップの熱コンタ図



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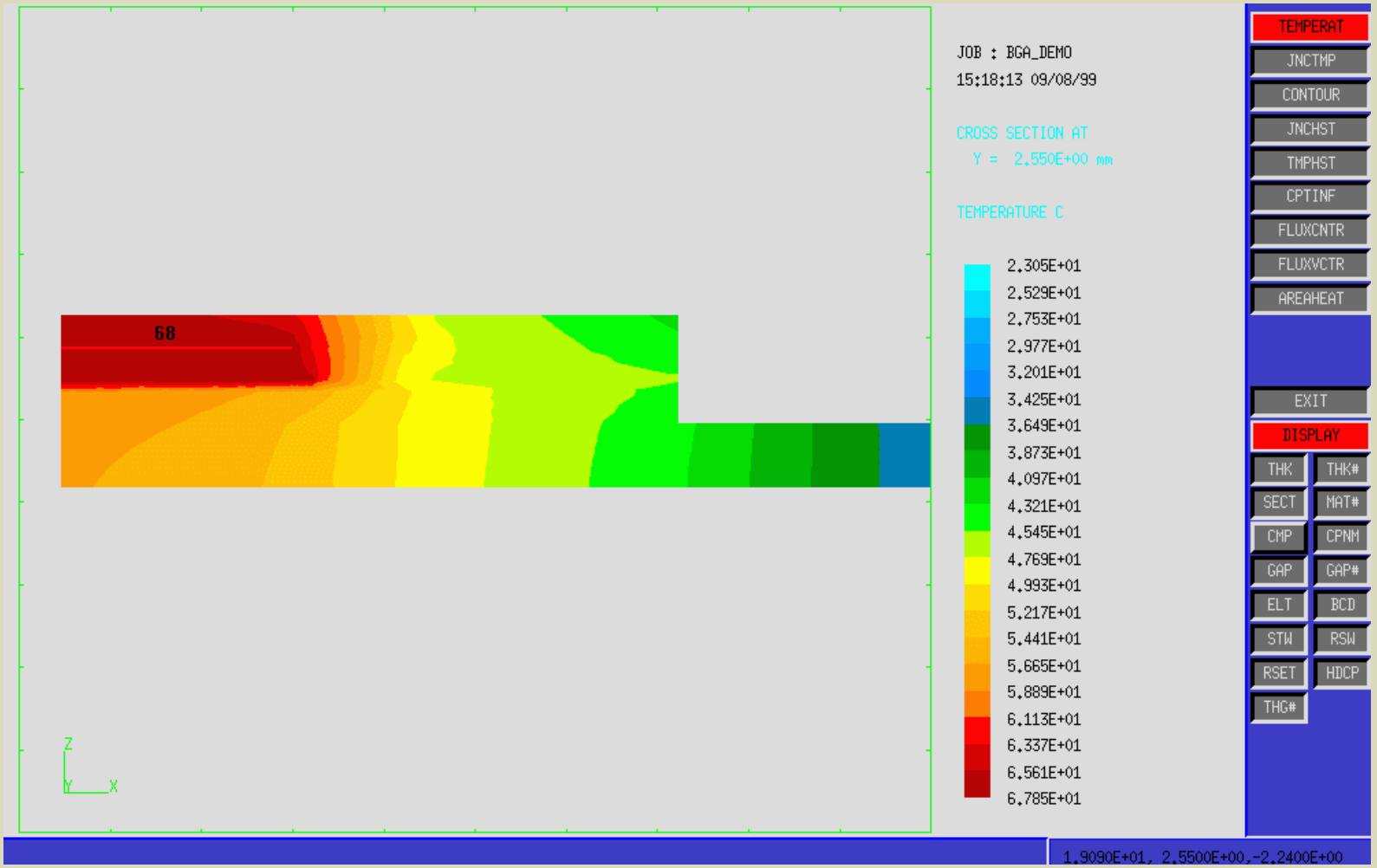
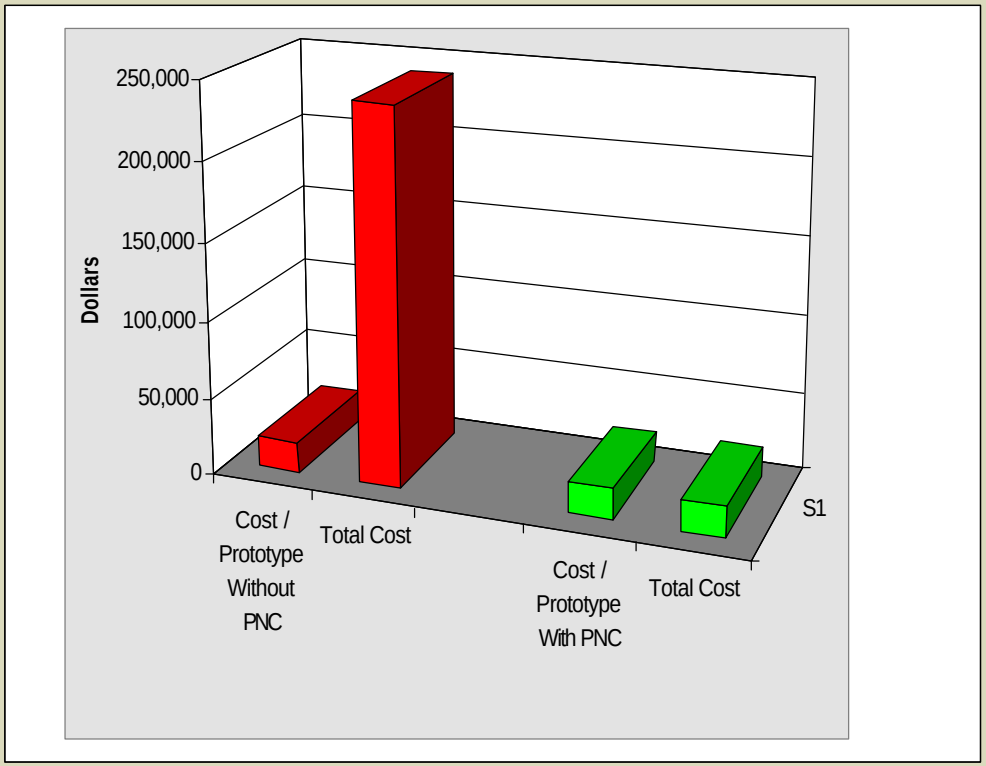
サブストレイトとチップの熱コンタ図



HYBRID THERMAL 成功事例

- 試作回数を12回から1回に削減
- 当初スケジュールより4カ月前に設計が終了、既存のやり方より9カ月も早く設計
- $220、000のコスト削減



Hybrid Thermalの優位性

- 定常 •過渡解析環境におけるサブストレイトとチップ温度を予測
- 3次元による熱解析Viewer
- パッケージやMCMレイアウトのための材料や設計の変更に容易に対応
- 専用のBGA/QFPモデラー による効果的な方法を供給