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Agilent Technologies
395 Page Mill Road
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145MILXP

145 MIL X-PACK
4 ports
package and hole 145 mil diameter
3 leads 30 × 155.5 mil, 1 lead 30 × 391.5 mil
pads 60 mil square
BJT

145ML4PK

145 MIL FOUR-PACK
4 ports
package and hole 145 mil diameter
4 leads 30 × 168.7 mil
pads 60 mil square
BJT
Fixed Artwork

**1D2J1A**

1-2J1A
2 ports
package 59 × 110.2 mil
2 leads 23.6 × 255.9 mil
2 pads 43.6 mil square
Diode

![Diode diagram](image)

**2D3H1A**

2-3H1A
3 ports
flange 98.4 × 338.6 mil
package 98.4 mil square and circle 90 mil diameter
holes 63 mil diameter 240.2 mil center-to-center
2 leads 23.6 × 78.8 mil
2 pads 23.6 mil square
FET

![FET diagram](image)
**2D3J1C**

2-3J1C
4 ports
SMT
package $114.4 \times 59$ mil
2 short leads $15.8 \times 21.8$ mil, 1 long lead $15.8 \times 33.6$ mil
collector lead $23.6 \times 53.6$ mil
pads are lead size plus 10 mil
BJT

---

**2D7C1A**

2-7C1A
3 ports
flange $236.2 \times 728.4$ mil
package $236.2 \times 267.8$ mil and $220.4 \times 267.8$ mil
holes $98.4$ mil diameter spaced $551.2$ mil center-to-center
2 leads $27.6 \times 157.5$ mil
2 pads $27.6$ mil square
FET
AFLANGE

(no name given by vendor)
3 ports
flange 820 × 250 mil
holes 120 mil diameter spaced 570 mil center-to-center
leads 50 × 150 mil
pads 50 mil square
FET

AK

AK
5 ports
open flange 976 × 256 mil
holes 130 mil diameter spaced 726 mil center-to-center
leads 60 × 205 mil
pads 60 mil square
FET
**ALMK**
Alignment marker
conductor diameter 30 mil
no ports

**ALMK2**
Alignment marker
conductor diameter 20 mil
no ports
Fixed Artwork

**AP**

AP
3 ports
flange 750 × 250 mil
holes 125 mil diameter 560 mil center-to-center
leads 60 × 200 mil
pads 60 mil square
FET

![AP Diagram]

**AQ**

AQ
5 ports
flange 750 × 250 mil
holes 130 mil diameter 560 mil center-to-center
leads 60 × 197.5 mil
pads 60 mil square
FET

![AQ Diagram]
**ATF36**

Avantek 36  
4 ports  
SMT  
package 100 mil octagon and 83 mil diameter circle  
leads $20 \times 40$ mil  
pads 20 mil square  
FET

![ATF36 Diagram]

**ATF70**

Avantek 70  
4 port  
SMT  
package 70 mil square and circle  
2 leads $40 \times 212.5$ mil, 2 leads $20 \times 212.5$ mil  
2 pads 40 mil square, 2 pads 20 mil square  
FET

![ATF70 Diagram]
**Fixed Artwork**

**ATF76**
Avantek 76
4 ports
SMT
package 70 mil octagon and circle
2 leads 40 × 69 mil, 2 leads 20 × 69 mil
2 pads 40 mil square, 2 pads 20 mil square
FET

![ATF76 Diagram](image)

**ATF84**
Avantek 84
4 ports
package 85 mil diameter
hole 85 mil diameter
leads 20 × 65 mil
pads 20 × 20 mil
FET

![ATF84 Diagram](image)
**ATF86**
Avantek 86
4 ports
SMT
package 85 mil diameter
leads $20 \times 57.5$ mil
pads $40 \times 66.3$ mil
FET

**ATCCAP**
Chip capacitor outline
2 ports
75 mil port-to-port
leads $110 \times 25$ mil
packages $110 \times 75$
Fixed Artwork

**AVNK35**
Avantek 35  
4 ports  
SMT  
package 100 mil square  
leads 20 × 175 mil  
pads 40 mil square  
BJT

**AVNK70**
Avantek 70  
4 ports  
SMT  
package 70 mil square and circle  
leads 40 × 212.5 mil and leads 20 × 212.5 mil  
pads 40 mil square and pads 20 mil square  
BJT
AVNK85
Avantek 85
4 ports
package and hole 85 mil diameter
leads 20 × 207.5 mil
pads 40 mil square
BJT

AVNK86
Avantek 86
4 ports
SMT
package 85 mil diameter
leads 20 × 57.5 mil
pads 40 × 66.3 mil
BJT
**Fixed Artwork**

**AXIAL_L**
Axial leaded components (large)
2 ports
leads $30 \times 325$
packages $300 \times 770$

**AXIAL_M**
Axial leaded components (medium)
2 ports
leads $30 \times 270$
packages $140 \times 390$
AXRES
Axial leaded components (small)
2 ports
leads $29 \times 100$ mil
resistor $95 \times 249$

AXRES2
Axial leaded components
2 ports
leads $17.5 \times 60$ mil
resistor $57 \times 150$
Fixed Artwork

**AXRES3**

Axial leaded components  
2 ports, 500 mil port-to-port  
leads 29.2 × 205 mil  
resistor

![AXRES3 Diagram](image)

**BFLANGE**

no name given by vendor  
3 ports  
flange 820 × 250 mil  
holes 120 mil diameter 570 mil center-to-center  
leads 50 × 170 mil  
pads 50 mil square  
FET

![BFLANGE Diagram](image)
**C-LL**
Alignment corner marks
no ports
conductor 5 mil wide

![Diagram of C-LL configuration]

**C-LR**
Alignment corner marks
no ports
conductor 5 mil wide

![Diagram of C-LR configuration]
Fixed Artwork

**C-UL**
Alignment corner marks
no ports
conductor 5 mil wide

**C-UR**
Alignment corner marks
no ports
conductor 5 mil wide
**C145D01**

Motorola Case 145-01  
4 ports  
stud mount  
package 375 mil diameter  
hole 325 mil diameter  
4 leads $225 \times 317.5$ mil  
3 pads 225 mil square. 1 pad $225 \times 205$ mil  
BJT

![Diagram of C145D01](image)

**C18202**

Motorola Case 182-02  
2 ports  
package 170 mil diameter cut $\times$ 130 mil chord  
holes 22 mil diameter and $22 \times 20$ mil  
pads 40 mil square  
Diode

![Diagram of C18202](image)
Fixed Artwork

**C2003**

Motorola Case 20-03
3 ports
case 219.5 mil diameter
holes 21 mil diameter 50 mil from case center
pads 40 mil square
BJT

![Diagram of C2003 Case](image)

**C211D07**

Motorola Case 211-07
4 ports
flange 975 × 250 mil
package 380 mil diameter
holes 120 mil diameter 725 mil center-to-center
leads 220 × 210 mil at 45°
pads 220 × 210 mil
FET

![Diagram of C211D07 Case](image)
**C211D07V2**

Motorola Case 211-07  
4 ports  
flange $975 \times 250$ mil  
package $380$ mil diameter  
holes $120$ mil diameter $725$ mil center-to-center  
leads $220 \times 210$ mil at $45^\circ$  
pads $220 \times 210$ mil  
BJT

**C221CD02**

Motorola Case 221C-02  
3 ports  
drawn as if flange  
package $398 \times 698$ mil  
hole $145$ mil diameter  
3 leads $132 \times 33$ mil and $58$ mil  
3 pads $58 \times 132$ mil  
BJT
**Fixed Artwork**

**C244D04**

Motorola Case 244-04  
4 ports  
stud mount  
package 282 mil diameter  
hole 250 mil diameter  
leads 220 × 294 mil  
pads 220 × 220 mil  
FET

![Diagram of C244D04](image)

**C249D05**

Motorola Case 249-05  
4 ports  
package and hole 282 mil diameter  
4 leads 220 × 294 mil  
4 pads 220 mil square  
BJT

![Diagram of C249D05](image)
**C2904**

Motorola Case 29-04  
3 ports  
package 170 mil diameter cut × 135 mil chord  
holes 22 mil diameter and 22 × 20 mil  
pads 40 mil square  
Diode

![Diagram of C2904](image)

**C30301**

Motorola Case 303-01  
4 ports  
SMT  
100 mil square package  
2 leads 40 × 197.5 mil, 2 leads 20 × 197.5 mil  
pads 40 mil square  
BJT

![Diagram of C30301](image)
**C305D01**

Motorola Case 305-01  
4 ports  
stud mount  
package and hole 210 mil diameter  
2 leads 60 × 330 mil, 2 leads 30 × 330 mil  
2 pads 60 mil square, 2 pads 30 mil square  
BJT

---

**C317D02**

Motorola Case 317-02  
4 ports  
190 mil diameter package and hole  
1 lead 100 × 270.5 mil, 3 leads 36 × 207.5 mil  
1 pad 100 mil square, 3 pads 72 mil square  
BJT
**C319BD01**

Motorola Case 319B-01
5 ports
flange 975 × 233 mil
holes 130 mil diameter 725 mil center-to-center
leads 60 × 130 mil
pads 60 mil square
FET

**C319D06**

Motorola Case 319-06
3 ports
flange 975 × 233 mil
holes 130 mil diameter 725 mil center-to-center
4 leads 60 × 100 mil, 2 leads 120 × 100 mil (one notch)
4 pads 80 × 100 mil, 1 pad 40 × 120 mil
BJT
C369D03
Motorola Case 369-03
3 ports
drawn as for flange mount
package 240 × 258 mil
3 leads 30 × 365 mil
2 pads 63 × 118 mil, 1 pad 265 mil square
BJT

C5102
Motorola Case 51-02
2 ports
package 96 × 265 mil
2 leads 20 × 40 mil (bent)
2 holes 22 mil square
2 pads 44 mil square
Diode
**C744AD01**

Motorola Case 744A-01
8 ports
flange 385 × 900 mil
package 424 × 400 mil
holes 126 mil diameter 650 mil center-to-center
4 leads 182 × 70 mil, 4 leads 182 × 120 mil
4 pads 70 mil square, 4 pads 120 mil square
BJT

**C751D03**

Motorola Case 751-03
8 ports
SMT
single device inside
package 192 × 154 mil
8 leads 16.5 × 41.5 mil
8 pads 36.5 mil square
BJT
Fixed Artwork

**C7904**
Motorola Case 79-04
3 ports
package 352.5 mil diameter
holes 21 mil diameter
100 mil from package center
pads 40 mil square
BJT

**CD**
4 ports
package 250 mil square
2 leads 100 × 200 mil, 1 lead 90 × 200 mil, 1 lead 50 × 200 mil
2 pads 100 mil square, 1 pad 90 mil square, 1 pad 50 mil square
FET
**CERECX**

CEREC-X
4 ports
SMT
package 100.4 mil octagon and 86.6 mil diameter circle
leads 19.7 × 32.5 mil
pads 39.5 mil square
BJT

**CERECXF**

CEREC-XF
4 ports
SMT
package 70 mil octagon
leads 20 × 47.5 mil
pads 20 mil square
FET
CHPCAP
Surface mount components
conductor $40 \times 30$ mil
packages $60 \times 120$ mil
2 ports

CHPRES
2 ports
packages $60 \times 120$ mil
leads $40 \times 30$ mil

COIL1
General inductor outline
hand wound coil inductor
2 ports
dia.35 mil
**DISK_L**
Ceramic disk capacitors (large)
2 ports 200 mil port-to-port
packages 140 × 432 mil
leads 24 mil diameter

**DISK_M**
Ceramic disk capacitors (medium)
2 ports 200 mil port-to-port
packages 140 × 300 mil
leads 24 mil diameter
**DISK_S**

Ceramic disk capacitors (small)
2 ports 90 mil port-to-port
packages 140 × 200 mil
leads 24 mil diameter

**GD11**

GD11
4 ports
SMT
package 98.4 mil square and circle
2 leads 39.4 × 196.9 mil, 2 leads 19.7 × 196.9 mil
2 pads 39.4 mil square, 2 pads 19.7 mil square
FET
GD16
GD16
4 ports
SMT
package 75 mil octagon
2 leads 40 × 40 mil, 2 leads 20 × 40 mil
2 pads 40 mil square, 2 pads 20 mil square
FET

GD4
GD4
4 ports
SMT
package 75 mil octagon
2 leads 40 × 157.5 mil, 2 leads 20 × 157.5 mil
2 pads 40 mil square, 2 pads 20 mil square
FET
Fixed Artwork

**GD7**

GD7
4 ports
SMT
package 70 mil square (package is octagonal underneath)
2 leads 40 × 30 mil, 2 leads 20 × 30 mil
2 pads 40 mil square, 2 pads 20 mil square
FET

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**GD9**

GD9
4 ports
SMT
package 70 mil square
2 leads 40 × 157.5 mil, 2 leads 20 × 157.5 mil
2 pads 40 mil square, 2 pads 20 mil square
FET

---

1-36
GF1
GF1
3 ports
flange 327 × 98 mil 10 mil rad corners
package 98 mil square
2 holes 63 mil diameter 213 mil center-to-center
2 leads 24 × 79 mil
2 pads 24 mil square
FET

GF11
GF11
3 ports
open flange 433 × 256 mil
holes 70 mil diameter 362 mil center-to-center
2 leads 20 × 79 mil
2 pads 20 mil square
FET
Fixed Artwork

**GF21**
GF21
3 ports
open flange 689 × 250 mil 30 mil corners
holes 98.4 mil diameter 563 mil center-to-center
2 leads 39.4 × 157.5 mil
2 pads 39.4 × 39.4 mil
FET

![Index cut](image1)

**GF4**
GF4
3 ports
flange 417 × 138 mil 12 mil corners
package 150 × 98 mil minus indentations
holes 63 mil diameter 264 mil center-to-center
2 leads 24 × 79 mil
2 pads 24 mil square
FET

![Index cut](image2)
**GF7**

GF7  
3 ports  
flange 551 × 173 mil  
package 197 × 173 mil minus indentations  
holes 87 mil diameter 354 mil center-to-center  
2 leads 24 × 79 mil  
2 pads 24 mil square  
FET

![GF7 Diagram]

**HP70GT**

HPAC-70GT  
4 ports  
SMT  
package 70 mil diameter  
2 leads 30 × 165 mil, 2 leads 20 × 165 mil  
pads 40 mil square  
BJT

![HP70GT Diagram]
Fixed Artwork

**HP85PLAS**

HP85 Plastic
4 ports
package and hole 85 mil diameter
leads 20 × 100.5 mil
pads 40 mil square
BJT

```
index cut port 4
```

**HPAC100**

HPAC100
4 ports
SMT
package 100 mil square and diameter
2 leads 40 × 130 mil, 2 leads 20 × 130 mil
pads 40 mil square
BJT

```
port 4
index cut
```
**HPAC100X**

HPAC100X
4 ports
SMT
package 100 mil octagon and 83 mil diameter circle
4 leads 20 × 150 mil
pads 40 mil square
BJT

**HPAC200**

HPAC200
4 ports
package and hole 200 mil diameter
leads enter package at 128 mil diameter
2 leads 60 × 200 mil, 2 leads 30 × 200 mil
pads 60 mil square
BJT
Fixed Artwork

**HPAC200V2**

HPAC200
4 ports
package and hole 200 mil diameter
leads enter package at 128 mil diameter
2 leads $60 \times 200$ mil, 2 leads $30 \times 200$ mil
pads 60 mil square
BJT

**LG**

LG
4 ports
SMT
package 70 mil octagon
2 leads $40 \times 59$ mil, 2 leads $20 \times 59$ mil
2 pads 40 mil square, 2 pads 20 mil square
FET
**LLD**
2 ports
SMT
package 114.2 × 53.2 mil
2 leads 11.8 × 53.2 mil
2 pads 31.8 × 73.2 mil
Diode

**M205**
2 ports
SMT
package 60 × 106.3 mil
2 leads 21.7 × 21.5 mil
2 pads 41.7 × 41.5 mil
Diode
Fixed Artwork

**M253**

M253
4 ports
SMT
package 70 mil octagon
2 leads 40 × 59 mil, 2 leads 20 × 59 mil
2 pads 40 mil square, 2 pads 20 mil square
FET

![M253 Diagram](attachment:image.png)

**MACROT**

MACRO-T
3 ports
package and hole 190 mil diameter
2 pins 36 × 207.5 mil, 1 pin 36 × 337.5 mil
pads 72 mil square
BJT

![MACROT Diagram](attachment:image.png)
MACROX

MACRO-X
4 ports
package and hole 190 mil diameter
3 pins $36 \times 207.5$ mil, 1 pin $36 \times 337.5$ mil
pads 72 mil square
BJT

---

ME

ME
3 ports
flange $630 \times 197$ mil
package 197 mil square
holes 87 mil diameter $472$ mil center-to-center
2 leads $39 \times 79$ mil
2 pads 39 mil square
FET
Fixed Artwork

**MICROX**

MICRO-X
4 ports
SMT
package 100 mil octagon and 83 mil diameter circle
leads 20 × 177.5 mil
pads 40 mil square
BJT

![Diagram of MICROX](image)

**MOP**

Mini Octal Package
8 ports
SMT
package 185.4 × 59 mil
8 leads 25 × 15.8 mil
8 pads 45 × 35.8 mil
Diode

![Diagram of MOP](image)
MW4
MW4
4 ports
SMT
package 51.2 × 114.2 mil
2 leads 31.5 × 25.6 mil, 2 leads 15.8 × 25.6 mil
2 pads 51.5 × 45.6 mil, 2 pads 35.8 × 45.6 mil
FET

MWT70
MWT70
4 ports
SMT
package 70 mil square and circle
2 leads 40 × 200 mil, 2 leads 20 × 200 mil
2 pads 40 mil square, 2 pads 20 mil square
FET
MWT71

MWT71
3 ports
flange 335 × 98 mil
package 98 mil square
holes 63 mil diameter 240 mil center-to-center
2 leads 24 × 201 mil
2 pads 24 mil square
FET

MWT73

MWT73
4 ports
SMT
package 70 mil octagon and circle
2 leads 40 × 157 mil, 2 leads 20 × 157 mil
2 pads 40 mil square, 2 pads 20 mil square
FET
**NEC01**

NEC01
3 ports
package 275.6 mil diameter circle cut to 244 mil width
1 lead 59 × 78.8 mil, 1 lead 59 mil square
1 pad 59 mil square, 1 pad 59 × 78.8 mil
emitter on bottom
BJT

**NEC03**

NEC03
4 ports
SMT
package 137.8 mil diameter
2 leads 78.7 × 196.9 mil, 2 leads 39.4 × 196.9 mil
pads 78.7 mil square
BJT
Fixed Artwork

**NEC07**
NEC07
4 ports
SMT
package 98.4 mil square and circle
2 leads 39.4 $\times$ 196.9 mil, 2 leads 19.7 $\times$ 196.9 mil
pads 39.4 mil square
BJT

**NEC08**
NEC08
4 ports
SMT
package 78.7 mil square
leads 23.6 $\times$ 196.9 mil
pads 47.2 mil square
BJT
**NEC12**

NEC12
3 ports
package 229.9 mil diameter
holes 17.8 mil diameter
50 mil from package center
pads 40 mil square
BJT

**NEC13**

NEC13
3 ports
package 370.1 mil diameter
holes 17.8 mil diameter
100 mil from package center
pads 40 mil square
BJT
**NEC14**

NEC14
3 ports
package 370.1 mil diameter
holes 17.8 mil diameter
100 mil from package center
pads 40 mil square
BJT

**NEC15**

NEC15
3 ports
package 370.1 mil diameter
holes 17.8 mil diameter
100 mil from package center
pads 40 mil square
BJT
NEC18
NEC18
4 ports
SMT
package $49.2 \times 78.7$ mil
3 leads $11.8 \times 15.8$ mil, 1 lead $15.8$ mil square
3 pads $31.8$ mil square

NEC19
NEC19
3 ports
SMT
package $31.5 \times 63$ mil
2 leads $7.9 \times 15.8$ mil, 1 lead $11.8 \times 15.8$ mil
BJT
Fixed Artwork

**NEC20**

NEC20  
4 ports  
stud mount  
package and hole 295.3 mil diameter  
4 leads 78.8 × 196.9 mil  
4 pads 78.8 mil square  
BJT

![Diagram of NEC20](image)

**NEC30**

NEC30  
3 ports  
SMT  
package 49.3 × 78.8 mil  
leads 11.8 × 16.7 mil  
pads 31.9 × 36.8 mil  
BJT

![Diagram of NEC30](image)
NEC32

NEC32
3 ports
package 204.7 mil diameter circle cut × 149.9 mil chord
total y-axis height 165.4 mil
holes 19.7 mil diameter 69.7 mil down from chord spaced 50 mil center-to-center
pads 40 mil square
BJT

NEC33

NEC33
3 ports
SMT
package 115 × 51 mil
leads 16.5 × 21.5 mil
pads 41.5 × 39.4 mil
BJT
Fixed Artwork

**NEC34**

NEC34  
3 ports  
SMT  
package 177.2 × 97.7 mil  
2 leads 16.5 × 33.1 mil and 27.6 × 64.4 mil  
2 pads 39.4 × 59.1 mil  
BJT

---

**NEC35**

NEC35  
4 ports  
SMT  
package 100.4 mil octagon and 82.7 mil diameter circle  
leads 19.7 × 149.6 mil  
pads 39.4 mil square  
BJT

---
**NEC37**

NEC37
4 ports
package and hole 149.6 mil diameter
3 leads $23.6 \times 157.5$ mil, 1 lead $23.6 \times 393.7$ mil
pads 47.2 mil square
BJT

**NEC38**

NEC38
4 ports
SMT
package 70 mil octagon
leads $20 \times 43.5$ mil
pads 20 mil square
FET
**NEC39**

NEC39
4 ports
SMT
package $59.1 \times 114.2$ mil
3 leads $15.7 \times 25.6$ mil, 1 lead $23.6 \times 25.6$ mil
pads are leads 10 mil xy
BJT

**NEC53E**

NEC53E
3 ports
flange $800 \times 250$ mil
holes $130$ mil diameter $563$ mil center-to-center
1 lead $30 \times 210$ mil, 1 lead $115 \times 210$ mil
1 pad $30$ mil square, 1 pad $115$ mil square
BJT
**NEC75**

NEC75
3 ports
flange 385.8 × 90.6 mil
holes 70.8 mil diameter 275.6 mil center-to-center
2 leads 19.6 × 118.1 mil
2 pads 19.6 mil square
FET

**NEC83**

NEC83
4 ports
SMT
package 70 mil square
2 leads 40 × 157.5 mil, 2 leads 20 × 157.5 mil
2 pads 40 mil square, 2 pads 20 mil square
FET
Fixed Artwork

**NEC84**

NEC84  
4 ports  
SMT  
package 70 mil octagon  
leads 20 \(\times\) 157.5 mil  
pads 20 mil square  
FET

**NEC84A**

NEC84A  
4 ports  
SMT  
package 70 mil octagon  
leads 20 \(\times\) 157.5 mil  
pads 20 mil square  
FET
NEC87
NEC87
3 ports
package $114.2 \times 137.8$ mil octagon
2 leads $23.6 \times 196.9$ mil
2 pads $23.6$ mil square
collector on bottom
BJT

NEC89
NEC89
4 ports
SMT
package 80 mil octagon
2 leads $80 \times 157.5$ mil, 2 leads $20 \times 157.5$ mil
2 pads 20 mil square, 2 pads 80 mil square
FET
**NEC89A**

NEC89A
4 ports
SMT
package 80 mil octagon
2 leads 80 × 157.5 mil, 2 leads 20 × 157.5 mil
2 pads 20 mil square, 2 pads 80 mil square
FET

**OKI_1**

(no name given by vendor)
3 ports
package and hole 130 × 185 mil
2 leads 19.7 × 78.8 mil
2 pads 19.7 mil square
2 support bars 5 × 20 mil
FET
PFLANGE
(no name given by vendor)
5 ports
flange 820 × 250 mil
holes 120 mil diameter 570 mil center-to-center
leads 60 × 200 mil
pads 60 mil square
FET

RADIAL_L
Radial leaded components
2 ports 400 mil port-to-port
packages 140 × 480 mil
leads 28 mil diameter
**RADIAL_M**

Radial leaded components  
2 ports 200 mil port-to-port  
packages 90 × 290 mil  
leads 28 mil diameter

![RADIAL_M Diagram](image)

**RADIAL_S**

Radial leaded components  
2 ports 200 mil port-to-port  
packages 90 × 190 mil  
leads 28 mil diameter

![RADIAL_S Diagram](image)
**RESA**

Chip resistor
2 ports 30 mil port-to-port
packages 20 × 30 mil
resi 20 × 50 mil

---

**SFLANGE**

(no name given by vendor)
4 ports
flange 975 × 250 mil
package 380 mil diameter
holes 120 mil diameter 725 mil center-to-center
leads 220 × 210 mil at 45°
pads 220 × 210 mil
FET
**SMA_FEM**

SMA connector outline female
no ports
conductor
cond2
leads

**SMSMICROX**

Siemens MICRO-X
4 ports
SMT
package 70 mil octagon
2 leads 20 × 47.5 mil, 2 leads 40 × 47.5 mil
2 pads 20 mil square, 2 pads 40 mil square
FET
WARNING: NOT identical to MICROX
**SOD123**

SOD123
2 ports
SMT
package 61 × 106.3 mil
2 leads 19.7 × 23.6 mil
2 pads 39.7 × 43.6 mil
Diode

```
  o
```

**SOD323**

SOD323
2 ports
SMT
package 49.2 × 98.6 mil
2 leads 11.8 × 15.8 mil
2 pads 31.8 × 35.8 mil
Diode

```
  o
```
**SOD80**

SOD80  
2 ports  
SMT  
package $63 \times 137.8$ mil  
2 leads $11.8 \times 63$ mil  
2 pads $31.8 \times 83$ mil  
Diode

**SOT103**

SOT103  
4 ports  
package and hole $189$ mil diameter  
3 leads $45.3 \times 200.8$ mil  
1 lead $45.3 \times 318.9$ mil  
pads $90.6$ mil square  
BJT
SOT143
SOT143
4 ports
SMT
package 51 × 115 mil
3 leads 16 × 20 mil, 1 lead 32 × 20 mil
3 pads 40 × 39.4 mil, 1 pad 55.2 × 40 mil
BJT

SOT143R
SOT143R
4 ports
SMT
package 51 × 115 mil
3 leads 16 × 20 mil, 1 lead 32 × 20 mil
3 pads 40 × 39.4 mil, 1 pad 55.2 × 40 mil
BJT
SOT143RV2
SOT143
4 ports
SMT
package $51 \times 115$ mil
3 leads $16 \times 20$ mil, 1 lead $32 \times 20$ mil
3 pads $40 \times 39.4$ mil, 1 pad $55.2 \times 40$ mil
BJT

SOT143V2
SOT143
4 ports
SMT
package $51 \times 115$ mil
3 leads $16 \times 20$ mil, 1 lead $32 \times 20$ mil
3 pads $40 \times 39.4$ mil, 1 pad $55.2 \times 40$ mil
BJT
**SOT143V3**

SOT143
4 ports
SMT
package $51 \times 115$ mil
3 leads $16 \times 20$ mil, 1 lead $32 \times 20$ mil
3 pads $40 \times 39.4$ mil, 1 pad $55.2 \times 40$ mil
Diode

![Diagram of SOT143V3](image)

**SOT143V4**

SOT143
4 ports
SMT
package $51 \times 115$ mil
3 leads $16 \times 20$ mil, 1 lead $32 \times 20$ mil
3 pads $40 \times 39.4$ mil, 1 pad $55.2 \times 40$ mil
Diode

![Diagram of SOT143V4](image)
**SOT143V5**

SOT143
4 ports
SMT
package 51 × 115 mil
3 leads 16 × 20 mil, 1 lead 32 × 20 mil
3 pads 40 × 39.4 mil, 1 pad 55.2 × 40 mil
Diode
SOT143V6

SOT143
4 ports
SMT
package 51 × 115 mil
3 leads 16 × 20 mil, 1 lead 32 × 20 mil
3 pads 40 × 39.4 mil, 1 pad 55.2 × 40 mil
Diode
**SOT143V7**

SOT143  
4 ports  
SMT  
package $51 \times 115$ mil  
3 leads $16 \times 20$ mil, 1 lead $32 \times 20$ mil  
3 pads $40 \times 39.4$ mil, 1 pad $55.2 \times 40$ mil  
Diode
**SOT223**

SOT223  
4 ports  
SMT  
package 255.9 × 137.8 mil  
3 leads 27.6 × 68.9 mil, 1 lead 118.1 × 68.9 mil  
3 pads 98.5 × 59.2 mil, 1 pad 78.9 × 149.6 mil  
BJT

---

**SOT223V2**

SOT223  
3 ports  
SMT  
package 255.9 × 137.8 mil  
3 leads 27.6 × 68.9 mil, 1 lead 118.1 × 68.9 mil  
3 pads 98.5 × 59.2 mil, 1 pad 78.9 × 149.6 mil  
Diode
Fixed Artwork

**SOT23**

SOT23  
3 ports  
SMT  
package $115 \times 51$ mil  
leads $16.5 \times 21.5$ mil  
pads $41.5 \times 39.4$ mil  
BJT

![Diagram of SOT23](Diagram)

**SOT23V2**

SOT23  
2 ports  
SMT  
package $115 \times 51$ mil  
leads $16.5 \times 21.5$ mil  
pads $41.5 \times 39.4$ mil  
Diode

![Diagram of SOT23V2](Diagram)
SOT23V3
SOT23
2 ports
SMT
package 115 × 51 mil
leads 16.5 × 21.5 mil
pads 41.5 × 39.4 mil
Diode

SOT23V4
SOT23
2 ports
SMT
package 115 × 51 mil
leads 16.5 × 21.5 mil
pads 41.5 × 39.4 mil
Diode
Fixed Artwork

**SOT23V5**
SOT23  
3 ports  
SMT  
package $115 \times 51$ mil  
leads $16.5 \times 21.5$ mil  
pads $41.5 \times 39.4$ mil  
Diode

![Diode SOT23V5 diagram](image1)

**SOT23V6**
SOT23  
3 ports  
SMT  
package $115 \times 51$ mil  
leads $16.5 \times 21.5$ mil  
pads $41.5 \times 39.4$ mil  
Diode

![Diode SOT23V6 diagram](image2)
**SOT23V7**

SOT23  
3 ports  
SMT  
package 115 × 51 mil  
leads 16.5 × 21.5 mil  
pads 41.5 × 39.4 mil  
Diode

**SOT23V8**

SOT23  
3 ports  
SMT  
package 115 × 51 mil  
leads 16.5 × 21.5 mil  
pads 41.5 × 39.4 mil  
Diode
**SOT323**

SOT323  
3 ports  
SMT  
package 78.6 × 49.4 mil  
leads 11.8 × 16.8 mil  
pads 31.8 × 36.8 mil  
BJT

**SOT37**

SOT37  
3 ports  
package and hole 189 mil diameter  
2 leads 41.3 × 200.8 mil  
1 lead 41.3 × 318.9 mil  
pads 82.6 mil square  
BJT
**SOT89**

SOT89
3 ports
SMT
package 177.2 × 97.7 mil
2 leads 16.5 × 33.1 mil
collector lead 18.6 × 33.1 mil and 27.6 × 64.64 mil
2 pads 59.1 × 39.4 mil
BJT

![SOT89 Diagram]

---

**SOT89V2**

SOT89
3 ports
SMT
package 177.2 × 97.7 mil
2 leads 16.5 × 33.1 mil
collector lead 18.6 × 33.1 mil and 27.6 × 64.64 mil
2 pads 59.1 × 39.4 mil
BJT

![SOT89V2 Diagram]
Fixed Artwork

**SRP**

SRP  
2 ports  
SMT  
package 63 × 104.3 mil  
2 leads 22.6 × 23.6 mil  
2 pads 42.6 × 43.6 mil  
Diode

![SRP Diagram](image1)

**TO117**

TO117  
4 ports  
stud mount package and hole 295.3 diameter  
2 leads 157.5 × 393.7 mil, 2 leads 59.1 × 393.7 mil  
2 pads 59.1 mil square, 2 pads 157.5 mil square  
BJT

![TO117 Diagram](image2)
TO206AA

TO206AA
3 ports
package 219.5 mil diameter
holes 21 mil diameter 50 mil from package center
pads 40 mil square
BJT

TO206AF

TO206AF
3 ports
package 219.5 mil diameter
holes 21 mil diameter 50 mil from package center
pads 40 mil square
BJT
Fixed Artwork

**TO226AA**

TO226AA
3 ports
package 170 mil diameter cut $\times 135$ mil chord
holes 22 mil diameter and 22 $\times$ 20 mil
pads 40 mil square
BJT

**TO39**

TO39
3 ports
package 352.5 mil diameter
holes 21 mil diameter 100 mil from package center
pads 40 mil square
BJT
**TO72**

TO72
3 ports
package 225.4 mil diameter
holes 21 mil diameter 50 mil from center
pads 40 mil square
BJT

**TO72V2**

TO72V2
3 ports
package 225.4 mil diameter
holes 21 mil diameter 50 mil from center
pads 40 mil square
BJT
Fixed Artwork

**TO92**

TO92
3 ports
package 170 mil diameter cut × 135 mil chord
holes 22 mil diameter and 22 × 20 mil
pads 40 mil square
BJT

![TO92 Diagram](image)

**TPLAST**

TPLAST
3 ports
package and hole 181.1 mil diameter
2 leads 35.4 × 196.85 mil, 1 lead 35.4 × 315 mil
pads 70.8 mil square
BJT

![TPLAST Diagram](image)
**TUNCAP**

Tunable chip capacitor
2 ports 75 mil port-to-port
leads 110 × 25 mil
packages 12 × 62
dielectric 110 × 115

---

**UMD**

UMD
2 ports
package 63 × 102.4 mil
2 leads 15.8 × 31.6 mil (bent)
2 pads 40 mil square
2 holes 20 mil square
Diode
Fixed Artwork

**UPRIGHT**

Upright mounted variable resistor
no ports
packages 170 × 250 mil
Text

![UPRIGHT diagram](image)

**URP**

URP
2 ports
SMT
package 52 × 70 mil
2 leads 10 × 15 mil
2 pads 30 × 35 mil
Diode

![URP diagram](image)
**WIRE0**

Wire loop outline  
2 ports 133.5 mil port-to-port  
conductor 15 mil wide × 47 mil  
dielectric

**WIRE1**

one turn coil outline  
2 ports 330 mil port-to-port  
dielectric 35 mil wide
Chapter 2: SMT Package Layout Artwork Library

The SMT Package Layout Artwork Library (SMT PAL) defines the SMT package artwork for some of the most commonly-used packages. The SMT PAL consists of 131 artwork packages of 7 different types:

- Ceramic Flat Pack (CFP)
- Chip and MELF components
- SOT, DPAK and D2PAK
- Plastic Flat Pack (PFP)
- Quad Flat Pack (QFP)
- Plastic Leaded Chip Carrier (PLCC)
- Small Outline IC (SOIC)

This chapter describes the library, including the package type and name, the AEL interface function name (AEL macro name), and the dimensions of the package. A diagram is shown for each package type.

This chapter also describes how you can use the SMT PAL to define the SMT package artwork in a custom `create_item` and how you can use the AEL macro name defining the package artwork as an artwork replacement for sub-circuits or sub-systems.
Using SMT Package Artwork as Artwork Replacement

The procedure for using the SMT package artwork as an artwork replacement is similar to using the standard artwork replacements. In the Design Parameters dialog box, change the artwork type to AEL macro and define the two parameters, SMTPAD and OFFSET. Set the SMTPAD parameter type to string.

Figure 2-1 shows an example for using the SMT package layout artwork library AEL function as an artwork replacement, through the Parametric Subnetwork (PSN). Underlying the network 3PortSubNet is the element S3P, that can be viewed by pushing into the component. In the Design Parameters dialog for the subnetwork, 3PortSubNet, the Artwork Type is set to AEL macro and Name is set to smtart_SOT23. Two parameters, SMTPAD and OFFSET, are defined in the Design Parameters dialog. Set the SMTPAD parameter value to String, with “Pad1” as its default value. Set the OFFSET parameter type to real, with 0 as its default value.

Figure 2-1. SMT Artwork Replacement Examples
Ceramic Flat Pack (CFP) Packages

Table 2-1 lists 17 CFP packages and the associated layout artwork AEL macro name and dimensions for each package. Figure 2-2 shows the layout artwork for a typical CFP with the marked dimensions given in the table.

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package</th>
<th>Lead</th>
<th>Lead-lead Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Width (mm)</td>
<td>Length (mm)</td>
<td>Width (mm)</td>
</tr>
<tr>
<td>CFP24</td>
<td>smtart_CFP24</td>
<td>15.36</td>
<td>9.65</td>
<td>0.43</td>
</tr>
<tr>
<td>CFP28</td>
<td>smtart_CFP28</td>
<td>18.78</td>
<td>9.14</td>
<td>0.43</td>
</tr>
<tr>
<td>CFP42</td>
<td>smtart_CFP42</td>
<td>27.16</td>
<td>16.24</td>
<td>0.43</td>
</tr>
<tr>
<td>CFP10-03</td>
<td>smtart_CFP10_03</td>
<td>7.36</td>
<td>3.81</td>
<td>0.305</td>
</tr>
<tr>
<td>CFP14-03</td>
<td>smtart_CFP14_03</td>
<td>9.9</td>
<td>3.81</td>
<td>0.305</td>
</tr>
<tr>
<td>CFP10-04</td>
<td>smtart_CFP10_04</td>
<td>7.36</td>
<td>6.35</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP14-04</td>
<td>smtart_CFP14_04</td>
<td>9.9</td>
<td>6.35</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP16-04</td>
<td>smtart_CFP16_04</td>
<td>11.17</td>
<td>6.35</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP16-21</td>
<td>smtart_CFP16_21</td>
<td>11.17</td>
<td>13.96</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP20-22</td>
<td>smtart_CFP20_22</td>
<td>13.71</td>
<td>16.5</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP24-19</td>
<td>smtart_CFP24_19</td>
<td>16.25</td>
<td>8.88</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP24-21</td>
<td>smtart_CFP24_21</td>
<td>16.25</td>
<td>13.96</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP28-19</td>
<td>smtart_CFP28_19</td>
<td>18.79</td>
<td>8.88</td>
<td>0.508</td>
</tr>
<tr>
<td>CFP36-20</td>
<td>smtart_CFP36_20</td>
<td>23.87</td>
<td>11.42</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP36-21</td>
<td>smtart_CFP36_21</td>
<td>23.87</td>
<td>13.96</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP36-23</td>
<td>smtart_CFP36_23</td>
<td>23.87</td>
<td>21.57</td>
<td>0.431</td>
</tr>
<tr>
<td>CFP40-20</td>
<td>smtart_CFP40_20</td>
<td>26.41</td>
<td>11.42</td>
<td>0.431</td>
</tr>
</tbody>
</table>
Table 2-2 lists 15 chip component packages and 4 MELF components, and the associated layout artwork AEL macro name and dimensions for each package. Figure 2-3 shows the layout artwork for a typical chip component, 0402, with the marked dimensions given in the table.

Table 2-2. Chip and MELF Component Packages

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package Width (mm)</th>
<th>Package Length (mm)</th>
<th>End-cap Termination Length (mm)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0402</td>
<td>smtart_0402</td>
<td>0.508</td>
<td>1.00</td>
<td>0.127</td>
<td>Resistor</td>
</tr>
<tr>
<td>0603-Res</td>
<td>smtart_0603R</td>
<td>0.787</td>
<td>1.55</td>
<td>0.305</td>
<td>Resistor</td>
</tr>
<tr>
<td>0603-Cap</td>
<td>smtart_0603C</td>
<td>0.787</td>
<td>1.55</td>
<td>0.203</td>
<td>Capacitor</td>
</tr>
<tr>
<td>0805</td>
<td>smtart_0805</td>
<td>1.22</td>
<td>2.01</td>
<td>0.457</td>
<td>Resistor or capacitor</td>
</tr>
<tr>
<td>1005</td>
<td>smtart_1005</td>
<td>1.27</td>
<td>2.54</td>
<td>0.254</td>
<td>Capacitor</td>
</tr>
</tbody>
</table>
Table 2-2. Chip and MELF Component Packages (continued)

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package</th>
<th>End-cap Termination Length (mm)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Width</td>
<td>Length (mm)</td>
<td></td>
</tr>
<tr>
<td>1206</td>
<td>smtart_1206</td>
<td>1.57</td>
<td>3.20</td>
<td>0.558</td>
</tr>
<tr>
<td>1210</td>
<td>smtart_1210</td>
<td>2.49</td>
<td>3.20</td>
<td>0.558</td>
</tr>
<tr>
<td>1805</td>
<td>smtart_1805</td>
<td>1.27</td>
<td>4.57</td>
<td>0.305</td>
</tr>
<tr>
<td>1808</td>
<td>smtart_1808</td>
<td>2.03</td>
<td>4.57</td>
<td>0.305</td>
</tr>
<tr>
<td>1812</td>
<td>smtart_1812</td>
<td>3.17</td>
<td>4.57</td>
<td>0.305</td>
</tr>
<tr>
<td>1825</td>
<td>smtart_1825</td>
<td>6.35</td>
<td>4.57</td>
<td>0.305</td>
</tr>
<tr>
<td>2010</td>
<td>smtart_2010</td>
<td>2.54</td>
<td>5.1</td>
<td>0.40</td>
</tr>
<tr>
<td>2220</td>
<td>smtart_2220</td>
<td>5.08</td>
<td>5.58</td>
<td>1.27</td>
</tr>
<tr>
<td>2225</td>
<td>smtart_2225</td>
<td>6.35</td>
<td>5.58</td>
<td>1.27</td>
</tr>
<tr>
<td>2512</td>
<td>smtart_2512</td>
<td>3.2</td>
<td>6.3</td>
<td>0.40</td>
</tr>
<tr>
<td>2309</td>
<td>smtart_2309</td>
<td>2.3</td>
<td>5.9</td>
<td>1.0</td>
</tr>
<tr>
<td>1406</td>
<td>smtart_1406</td>
<td>1.55</td>
<td>3.5</td>
<td>0.80</td>
</tr>
<tr>
<td>SOD-80</td>
<td>smtart_SOD80</td>
<td>1.60</td>
<td>3.5</td>
<td>0.431</td>
</tr>
<tr>
<td>SOD-87</td>
<td>smtart_SOD87</td>
<td>1.6</td>
<td>3.5</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Note: The pads have been omitted in the figure.

Figure 2-3. Chip Component Layout Artwork
SMT Package Layout Artwork Library

**SOT, DPAK, D2PAK Packages**

Table 2-3 lists 20 SOT, DPAK, and D2PAK packages and the associated layout artwork AEL macro name and dimensions for each package.

Most packages require two parameters, SMTPAD and OFFSET. Packages that require two SMTPAD parameters are indicated by an asterisk (*). If lead 1 (e.g., SOT143) is of a different dimension than the other leads, the first SMTPAD identifies lead 1. If a lead other than lead 1 (e.g., DPAK1) is of a different dimension, then the second SMTPAD identifies the lead of a different dimension.

Figure 2-4 shows the layout artwork for a typical SOT-23 package with the marked dimensions given in the table.

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package</th>
<th>Lead 1</th>
<th>Other Leads</th>
<th>Lead-lead Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOT-23</td>
<td>smtart_SOT23</td>
<td>2.92</td>
<td>1.30</td>
<td>0.45</td>
<td>0.51</td>
</tr>
<tr>
<td>SOT-23, Metric</td>
<td>smtart_SOT23M1</td>
<td>2.92</td>
<td>1.50</td>
<td>0.45</td>
<td>0.50</td>
</tr>
<tr>
<td>SOT-23, Metric</td>
<td>smtart_SOT23M2</td>
<td>2.92</td>
<td>1.50</td>
<td>0.45</td>
<td>0.65</td>
</tr>
<tr>
<td>SOT-23, Metric</td>
<td>smtart_SOT23M3</td>
<td>1.60</td>
<td>0.80</td>
<td>0.30</td>
<td>0.40</td>
</tr>
<tr>
<td>SOT-23, Metric</td>
<td>smtart_SOT23M4</td>
<td>2.00</td>
<td>1.25</td>
<td>0.30</td>
<td>0.43</td>
</tr>
<tr>
<td>SOT-23, Metric</td>
<td>smtart_SOT23M5</td>
<td>2.90</td>
<td>1.30</td>
<td>0.40</td>
<td>0.55</td>
</tr>
<tr>
<td>SOT-25</td>
<td>smtart_SOT25A</td>
<td>2.92</td>
<td>1.50</td>
<td>0.30</td>
<td>0.65</td>
</tr>
<tr>
<td>SOT-25</td>
<td>smtart_SOT25B</td>
<td>2.00</td>
<td>0.90</td>
<td>0.20</td>
<td>0.60</td>
</tr>
<tr>
<td>SOT-25</td>
<td>smtart_SOT25C</td>
<td>2.00</td>
<td>1.25</td>
<td>0.20</td>
<td>0.43</td>
</tr>
<tr>
<td>SOT-25</td>
<td>smtart_SOT2 5D</td>
<td>2.90</td>
<td>1.60</td>
<td>0.30</td>
<td>0.60</td>
</tr>
<tr>
<td>SOT-36</td>
<td>smtart_SOT36</td>
<td>2.90</td>
<td>1.60</td>
<td>0.30</td>
<td>0.60</td>
</tr>
<tr>
<td>SOT-143*</td>
<td>smtart_SOT143A</td>
<td>2.90</td>
<td>1.30</td>
<td>0.88</td>
<td>0.75</td>
</tr>
<tr>
<td>SOT-143*</td>
<td>smtart_SOT143B</td>
<td>2.90</td>
<td>1.30</td>
<td>0.88</td>
<td>0.60</td>
</tr>
</tbody>
</table>

Note: An asterisk (*) denotes that the artwork requires 2 SMTPAD components.
Table 2-3. SOT, DPAK, D2PAK Packages (continued)

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package</th>
<th>Lead 1</th>
<th>Other Leads</th>
<th>Lead-lead Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Width (mm)</td>
<td>Length (mm)</td>
<td>Width (mm)</td>
<td>Length (mm)</td>
</tr>
<tr>
<td>SOT-223*</td>
<td>smtart_SOT223</td>
<td>6.50</td>
<td>3.50</td>
<td>3.00</td>
<td>1.75</td>
</tr>
<tr>
<td>DPAK*</td>
<td>smtart_DPAK1</td>
<td>5.50</td>
<td>5.50</td>
<td>5.20</td>
<td>2.79</td>
</tr>
<tr>
<td>DPAK*</td>
<td>smtart_DPAK2</td>
<td>5.50</td>
<td>5.50</td>
<td>5.20</td>
<td>12.0</td>
</tr>
<tr>
<td>DPAK*</td>
<td>smtart_DPAK3</td>
<td>6.09</td>
<td>6.09</td>
<td>5.20</td>
<td>2.74</td>
</tr>
<tr>
<td>DPAK*</td>
<td>smtart_DPAK4</td>
<td>5.87</td>
<td>6.10</td>
<td>4.83</td>
<td>2.74</td>
</tr>
<tr>
<td>DPAK*</td>
<td>smtart_DPAK5</td>
<td>8.15</td>
<td>5.82</td>
<td>5.38</td>
<td>4.45</td>
</tr>
<tr>
<td>D2PAK*</td>
<td>smtart_D2PAK</td>
<td>10.41</td>
<td>9.96</td>
<td>0.71</td>
<td>4.83</td>
</tr>
</tbody>
</table>

Note: An asterisk (*) denotes that the artwork requires 2 SMTPAD components.

Figure 2-4. SOT-23 Layout Artwork

Note: The pads have been omitted in the figure.
Plastic Flat Pack (PFP) Packages

Table 2-4 lists 3 Plastic Flat Pack (PFP) packages and the associated layout artwork AEL macro name and dimensions for each package. Figure 2-5 shows the layout artwork for a PFP with the marked dimensions given in the table.

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package Width (mm)</th>
<th>Package Length (mm)</th>
<th>Lead Width (mm)</th>
<th>Lead Length (mm)</th>
<th>Lead-lead Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFP-16</td>
<td>smtart_PFP16</td>
<td>10.18</td>
<td>6.85</td>
<td>0.43</td>
<td>8.88</td>
<td>1.27</td>
</tr>
<tr>
<td>PFP-18</td>
<td>smtart_PFP18</td>
<td>11.04</td>
<td>7.79</td>
<td>0.43</td>
<td>7.87</td>
<td>1.27</td>
</tr>
<tr>
<td>PFP-20</td>
<td>smtart_PFP20</td>
<td>15.49</td>
<td>9.27</td>
<td>0.43</td>
<td>7.72</td>
<td>1.27</td>
</tr>
</tbody>
</table>

Note: The pads have been omitted in the figure.

Figure 2-5. Plastic Flat Pack (PFP) Layout Artwork

Quad Flat Pack (QFP) Packages

Table 2-5 lists 48 Quad Flat Pack (QFP) and the associated layout artwork AEL macro name and dimensions for each package. Figure 2-6 shows the layout artwork for a typical QFP package with the marked dimensions given in the table.
## Table 2-5. Quad Flat Pack (QFP) Packages

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package</th>
<th>Lead</th>
<th>Lead-lead</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Width (mm)</td>
<td>Length (mm)</td>
<td>Width (mm)</td>
<td>Length (mm)</td>
</tr>
<tr>
<td>QFP32A</td>
<td>smtart_QFP32A</td>
<td>7.0</td>
<td>7.0</td>
<td>0.3</td>
<td>1.0</td>
</tr>
<tr>
<td>QFP32B</td>
<td>smtart_QFP32B</td>
<td>5.0</td>
<td>5.0</td>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>QFP40A</td>
<td>smtart_QFP40A</td>
<td>6.0</td>
<td>6.0</td>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>QFP40B</td>
<td>smtart_QFP40B</td>
<td>5.0</td>
<td>5.0</td>
<td>0.15</td>
<td>1.0</td>
</tr>
<tr>
<td>QFP40C</td>
<td>smtart_QFP40C</td>
<td>7.0</td>
<td>5.0</td>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>QFP44A</td>
<td>smtart_QFP44A</td>
<td>10.5</td>
<td>11.5</td>
<td>0.3</td>
<td>1.5</td>
</tr>
<tr>
<td>QFP44B</td>
<td>smtart_QFP44B</td>
<td>10.1</td>
<td>10.1</td>
<td>0.3</td>
<td>1.1</td>
</tr>
<tr>
<td>QFP44C</td>
<td>smtart_QFP44C</td>
<td>10.6</td>
<td>10.6</td>
<td>0.3</td>
<td>1.9</td>
</tr>
<tr>
<td>QFP44D</td>
<td>smtart_QFP44D</td>
<td>10.0</td>
<td>10.0</td>
<td>0.3</td>
<td>1.61</td>
</tr>
<tr>
<td>QFP44E</td>
<td>smtart_QFP44E</td>
<td>10.0</td>
<td>10.0</td>
<td>0.41</td>
<td>1.99</td>
</tr>
<tr>
<td>QFP44F</td>
<td>smtart_QFP44F</td>
<td>14.0</td>
<td>14.0</td>
<td>0.35</td>
<td>1.61</td>
</tr>
<tr>
<td>QFP48A</td>
<td>smtart_QFP48A</td>
<td>12.7</td>
<td>12.7</td>
<td>0.3</td>
<td>2.3</td>
</tr>
<tr>
<td>QFP48B</td>
<td>smtart_QFP48B</td>
<td>12.0</td>
<td>12.0</td>
<td>0.3</td>
<td>1.65</td>
</tr>
<tr>
<td>QFP48C</td>
<td>smtart_QFP48C</td>
<td>7.0</td>
<td>7.0</td>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>QFP48D</td>
<td>smtart_QFP48D</td>
<td>6.0</td>
<td>6.0</td>
<td>0.15</td>
<td>1.0</td>
</tr>
<tr>
<td>QFP52A</td>
<td>smtart_QFP52A</td>
<td>16.7</td>
<td>16.7</td>
<td>0.3</td>
<td>2.3</td>
</tr>
<tr>
<td>QFP52B</td>
<td>smtart_QFP52B</td>
<td>10.0</td>
<td>10.0</td>
<td>0.3</td>
<td>1.61</td>
</tr>
<tr>
<td>QFP52C</td>
<td>smtart_QFP52C</td>
<td>10.0</td>
<td>10.0</td>
<td>0.3</td>
<td>2.05</td>
</tr>
<tr>
<td>QFP52D</td>
<td>smtart_QFP52D</td>
<td>7.0</td>
<td>5.0</td>
<td>0.15</td>
<td>1.0</td>
</tr>
<tr>
<td>QFP54</td>
<td>smtart_QFP5</td>
<td>11.2</td>
<td>11.2</td>
<td>0.3</td>
<td>1.6</td>
</tr>
<tr>
<td>QFP56</td>
<td>smtart_QFP56</td>
<td>11.5</td>
<td>12.5</td>
<td>0.3</td>
<td>1.5</td>
</tr>
<tr>
<td>QFP60A</td>
<td>smtart_QFP60A</td>
<td>14.0</td>
<td>14.0</td>
<td>0.4</td>
<td>2.1</td>
</tr>
<tr>
<td>QFP60B</td>
<td>smtart_QFP60B</td>
<td>10.0</td>
<td>7.0</td>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>QFP64A</td>
<td>smtart_QFP64A</td>
<td>15</td>
<td>15</td>
<td>0.35</td>
<td>1.3</td>
</tr>
<tr>
<td>QFP64B</td>
<td>smtart_QFP64B</td>
<td>19.4</td>
<td>15</td>
<td>0.4</td>
<td>1.3</td>
</tr>
<tr>
<td>QFP64C</td>
<td>smtart_QFP64C</td>
<td>15.3</td>
<td>15.3</td>
<td>0.35</td>
<td>1.5</td>
</tr>
<tr>
<td>QFP64D</td>
<td>smtart_QFP64D</td>
<td>21.3</td>
<td>15.3</td>
<td>0.41</td>
<td>1.7</td>
</tr>
</tbody>
</table>
### Table 2-5. Quad Flat Pack (QFP) Packages (continued)

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package Width (mm)</th>
<th>Package Length (mm)</th>
<th>Lead Width (mm)</th>
<th>Lead Length (mm)</th>
<th>Lead-lead Spacing (mm)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QFP64E</td>
<td>smtart_QFP64E</td>
<td>22.8</td>
<td>22.8</td>
<td>0.457</td>
<td>10.15</td>
<td>1.27</td>
<td>16 leads/side</td>
</tr>
<tr>
<td>QFP64F</td>
<td>smtart_QFP64F</td>
<td>14.0</td>
<td>14.0</td>
<td>0.381</td>
<td>1.61</td>
<td>0.8</td>
<td>13 × 19 leads</td>
</tr>
<tr>
<td>QFP64G</td>
<td>smtart_QFP64G</td>
<td>14.0</td>
<td>14.0</td>
<td>0.356</td>
<td>1.18</td>
<td>0.8</td>
<td>16 leads/side</td>
</tr>
<tr>
<td>QFP64H</td>
<td>smtart_QFP64H</td>
<td>20.0</td>
<td>14.0</td>
<td>0.432</td>
<td>1.61</td>
<td>1.0</td>
<td>13 × 19 leads</td>
</tr>
<tr>
<td>QFP64I</td>
<td>smtart_QFP64I</td>
<td>7.0</td>
<td>7.0</td>
<td>0.15</td>
<td>1.0</td>
<td>0.4</td>
<td>16 leads/side</td>
</tr>
<tr>
<td>QFP70</td>
<td>smtart_QFP70</td>
<td>23.6</td>
<td>10.4</td>
<td>0.3</td>
<td>2.5</td>
<td>0.8</td>
<td>11 × 24 leads</td>
</tr>
<tr>
<td>QFP72</td>
<td>smtart_QFP72</td>
<td>10.0</td>
<td>10.0</td>
<td>0.2</td>
<td>1.0</td>
<td>0.5</td>
<td>18 leads/side</td>
</tr>
<tr>
<td>QFP74</td>
<td>smtart_QFP74</td>
<td>20.6</td>
<td>20.6</td>
<td>0.4</td>
<td>1.3</td>
<td>1.0</td>
<td>18 × 19 leads</td>
</tr>
<tr>
<td>QFP76</td>
<td>smtart_QFP76</td>
<td>10.0</td>
<td>7.0</td>
<td>0.15</td>
<td>1.0</td>
<td>0.4</td>
<td>15 × 23 leads</td>
</tr>
<tr>
<td>QFP80A</td>
<td>smtart_QFP80A</td>
<td>14.0</td>
<td>14.0</td>
<td>0.3</td>
<td>1.6</td>
<td>0.65</td>
<td>20 leads/side</td>
</tr>
<tr>
<td>QFP80B</td>
<td>smtart_QFP80B</td>
<td>20.0</td>
<td>14.0</td>
<td>0.35</td>
<td>1.8</td>
<td>0.8</td>
<td>16 × 24 leads</td>
</tr>
<tr>
<td>QFP80C</td>
<td>smtart_QFP80C</td>
<td>20.0</td>
<td>14.0</td>
<td>0.35</td>
<td>2.35</td>
<td>0.8</td>
<td>16 × 24 leads</td>
</tr>
<tr>
<td>QFP80D</td>
<td>smtart_QFP80D</td>
<td>14.0</td>
<td>14.0</td>
<td>0.3</td>
<td>1.18</td>
<td>0.65</td>
<td>20 × 20 leads/side</td>
</tr>
<tr>
<td>QFP80E</td>
<td>smtart_QFP80E</td>
<td>20.0</td>
<td>14.0</td>
<td>0.36</td>
<td>2.1</td>
<td>0.8</td>
<td>16 × 24 leads</td>
</tr>
<tr>
<td>QFP80F</td>
<td>smtart_QFP80F</td>
<td>20.0</td>
<td>14.0</td>
<td>0.36</td>
<td>1.6</td>
<td>0.8</td>
<td>16 × 24 leads</td>
</tr>
<tr>
<td>QFP80G</td>
<td>smtart_QFP80G</td>
<td>12.0</td>
<td>12.0</td>
<td>0.203</td>
<td>1.0</td>
<td>0.5</td>
<td>20 × 20 leads/side</td>
</tr>
<tr>
<td>QFP80A</td>
<td>smtart_QFP80A</td>
<td>20.0</td>
<td>14.0</td>
<td>0.3</td>
<td>2.5</td>
<td>0.65</td>
<td>18 × 26 leads</td>
</tr>
<tr>
<td>QFP80B</td>
<td>smtart_QFP80B</td>
<td>12.0</td>
<td>12.0</td>
<td>0.2</td>
<td>1.0</td>
<td>0.5</td>
<td>22 leads/side</td>
</tr>
<tr>
<td>QFP80C</td>
<td>smtart_QFP80C</td>
<td>10.0</td>
<td>10.0</td>
<td>0.15</td>
<td>1.0</td>
<td>0.4</td>
<td>22 leads/side</td>
</tr>
<tr>
<td>QFP80D</td>
<td>smtart_QFP80D</td>
<td>14.0</td>
<td>10.0</td>
<td>0.2</td>
<td>1.0</td>
<td>0.5</td>
<td>18 × 26 leads</td>
</tr>
<tr>
<td>QFP94</td>
<td>smtart_QFP94</td>
<td>20.6</td>
<td>20.6</td>
<td>0.35</td>
<td>1.3</td>
<td>0.8</td>
<td>23 × 24 × 23 × 24 leads</td>
</tr>
</tbody>
</table>
Table 2-6 lists 11 Plastic Leaded Chip Carrier (PLCC) packages and the associated layout artwork AEL macro name and dimensions for each package. Figure 2-7 shows the layout artwork for a typical PLCC package with the marked dimensions given in the table.

Table 2-6. Plastic Leaded Chip Carrier (PLCC) Packages

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package Width (mm)</th>
<th>Package Length (mm)</th>
<th>Lead Width (mm)</th>
<th>Lead-lead Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLCC18AA</td>
<td>smtart_PLCC18A A</td>
<td>10.85</td>
<td>7.32</td>
<td>0.431</td>
<td>1.27</td>
</tr>
<tr>
<td>PLCC18AB</td>
<td>smtart_PLCC18 AB</td>
<td>12.52</td>
<td>7.42</td>
<td>0.431</td>
<td>1.27</td>
</tr>
<tr>
<td>PLCC20SQ</td>
<td>smtart_PLCC20 SQ</td>
<td>8.13</td>
<td>8.13</td>
<td>0.431</td>
<td>1.27</td>
</tr>
<tr>
<td>PLCC22RT</td>
<td>smtart_PLCC22 RT</td>
<td>11.62</td>
<td>6.54</td>
<td>0.431</td>
<td>1.27</td>
</tr>
<tr>
<td>PLCC28RT</td>
<td>smtart_PLCC28 RT</td>
<td>12.94</td>
<td>7.87</td>
<td>0.431</td>
<td>1.27</td>
</tr>
<tr>
<td>PLCC28SQ</td>
<td>smtart_PLCC28 SQ</td>
<td>10.67</td>
<td>10.67</td>
<td>0.431</td>
<td>1.27</td>
</tr>
<tr>
<td>PLCC32RT</td>
<td>smtart_PLCC32 RT</td>
<td>12.95</td>
<td>10.67</td>
<td>0.431</td>
<td>1.27</td>
</tr>
<tr>
<td>PLCC44SQ</td>
<td>smtart_PLCC44 SQ</td>
<td>15.48</td>
<td>15.48</td>
<td>0.431</td>
<td>1.27</td>
</tr>
</tbody>
</table>
Table 2-6. Plastic Leaded Chip Carrier (PLCC) Packages (continued)

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package Width (mm)</th>
<th>Package Length (mm)</th>
<th>Lead Width (mm)</th>
<th>Lead-lead Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLCC52SQ</td>
<td>smtart_PLCC52 SQ</td>
<td>18.02</td>
<td>18.02</td>
<td>0.431</td>
<td>1.27</td>
</tr>
<tr>
<td>PLCC68SQ</td>
<td>smtart_PLCC68 SQ</td>
<td>23.10</td>
<td>23.10</td>
<td>0.431</td>
<td>1.27</td>
</tr>
<tr>
<td>PLCC84SQ</td>
<td>smtart_PLCC84 SQ</td>
<td>28.17</td>
<td>28.17</td>
<td>0.431</td>
<td>1.27</td>
</tr>
</tbody>
</table>

Note: The pads have been omitted in the figure.

Figure 2-7. Plastic Leaded Chip Carrier (PLCC) Layout Artwork
Small Outline IC (SOIC)

Table 2-7 lists 13 Small Outline IC (SOIC) packages and the associated layout artwork AEL macro name and dimensions for each package. Figure 2-8 shows the layout artwork for a typical SOIC package with the marked dimensions given in the table.

<table>
<thead>
<tr>
<th>Part Name</th>
<th>AEL Macro Name</th>
<th>Package Width (mm)</th>
<th>Package Length (mm)</th>
<th>Lead Width (mm)</th>
<th>Lead Length (mm)</th>
<th>Lead-lead Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO8N</td>
<td>smtart_SO8N</td>
<td>3.90</td>
<td>4.87</td>
<td>0.432</td>
<td>1.05</td>
<td>1.27</td>
</tr>
<tr>
<td>SO14N</td>
<td>smtart_SO14N</td>
<td>3.90</td>
<td>8.63</td>
<td>0.432</td>
<td>1.05</td>
<td>1.27</td>
</tr>
<tr>
<td>SO16N</td>
<td>smtart_SO16N</td>
<td>3.90</td>
<td>9.90</td>
<td>0.432</td>
<td>1.05</td>
<td>1.27</td>
</tr>
<tr>
<td>SO14M</td>
<td>smtart_SO14M</td>
<td>5.59</td>
<td>9.910</td>
<td>0.432</td>
<td>1.01</td>
<td>1.27</td>
</tr>
<tr>
<td>SO16M</td>
<td>smtart_SO16M</td>
<td>5.59</td>
<td>11.20</td>
<td>0.457</td>
<td>1.01</td>
<td>1.27</td>
</tr>
<tr>
<td>SO8L</td>
<td>smtart_SO8L</td>
<td>7.50</td>
<td>5.20</td>
<td>0.432</td>
<td>1.40</td>
<td>1.27</td>
</tr>
<tr>
<td>SO14L</td>
<td>smtart_SO14L</td>
<td>57.50</td>
<td>9.010</td>
<td>0.432</td>
<td>1.40</td>
<td>1.27</td>
</tr>
<tr>
<td>SO16L</td>
<td>smtart_SO16L</td>
<td>7.50</td>
<td>10.30</td>
<td>0.432</td>
<td>1.40</td>
<td>1.27</td>
</tr>
<tr>
<td>SO18L</td>
<td>smtart_SO18L</td>
<td>7.50</td>
<td>11.55</td>
<td>0.432</td>
<td>1.40</td>
<td>1.27</td>
</tr>
<tr>
<td>SO20L</td>
<td>smtart_SO20L</td>
<td>7.50</td>
<td>12.80</td>
<td>0.432</td>
<td>1.40</td>
<td>1.27</td>
</tr>
<tr>
<td>SO24L</td>
<td>smtart_SO24L</td>
<td>7.50</td>
<td>15.37</td>
<td>0.432</td>
<td>1.40</td>
<td>1.27</td>
</tr>
<tr>
<td>SO28L</td>
<td>smtart_SO28L</td>
<td>7.50</td>
<td>17.92</td>
<td>0.432</td>
<td>1.40</td>
<td>1.27</td>
</tr>
<tr>
<td>SO32L</td>
<td>smtart_SO32L</td>
<td>7.50</td>
<td>20.50</td>
<td>0.432</td>
<td>1.70</td>
<td>1.27</td>
</tr>
</tbody>
</table>
Figure 2-8. Small Outline IC (SOIC) Package Layout Artwork

Note: The pads have been omitted in the figure.
Using SMT PAL for Custom Components

This section describes how to use SMT package artwork for a custom component. An example of this process uses the AEL function defining the SMT package artwork in the SMT PAL. This artwork is used in the SMT component libraries: capacitors, resistors, inductors, amplifiers, filters, and mixers. In the SMT amplifier library, the layout artwork (SOT143 package) for HP's Model No. MSA-2111 uses the SMT PAL primitive AEL function in the following sequence:

- The AEL `create_item` function calls the AEL macro function `sa_hp_SOT143`. The AEL macro function `sa_hp_SOT143` is located in the library artwork file `SMT_AmplifierLibrary_artwork.ael`.
- In turn, `sa_hp_SOT143` calls the primitive AEL function `smtart_draw_SMT`. The primitive AEL function `smtart_draw_SMT` is located in the SMT PAL file `smtpal.atf`.
- Then the AEL function `smtart_draw_SMT` passes the parameters that are necessary for customizing the artwork, as shown in Figure 2-9.

```plaintext
defun sa_hp_SOT143 (de_set_global_db_factor(), smtpad, smtpad2, offset)
{
    decl initialD1, initialD2, portS2x, port3Y;
    //initialD1 = 0.5 * (0.00293 - 0.0017125 - 0.5*0.00085 - 0.5*0.000455);
    //initialD2 = 0.5 * (0.00293 - 0.00191 - 0.5*0.000455 - 0.5*0.000455);
    initialD1 = 0.0002825;
    initialD2 = 0.0002825;
    portS2x = 0.0013 + 2 * (0.0005375 - 0.5*0.000455);
    smtart_draw_SMT (list(smtpad,smtpad2),offset,0.0013,0.00293,0,0,
        list(0.0017125,0,0.00191,0), list(initialD1,0,initialD2,0),
        list(2,0,2,0), list(0.000455, 0.0005375, 0.00085, 0.0005375, NULL,
            0.000455, 0.0005375, 0.000455, 0.0005375, NULL, "side1"),
        list(0,0,-90, 0,-0.00191,-90.0, portS2x,-0.0017125,90,
            portS2x,0.0,90),0,"mts", "portOpt6",0,
        list(1,3));
}
```

Figure 2-9. Example of Customizing Artwork Using the AEL Function `smtart_draw_smt`
SMT Package Layout Artwork Library
Chapter 3: Font Definitions

din17

```
abcdefghijkl
mnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890-=|
~!@#$%^&*()_+\
[]()<>;:'".,/?
```

iso3098

```
abcdefghijkl
mnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890-=|
~!@#$%^&*()_+\
[]()<>;:'".,/?
```
Font Definitions

roman

a b c d e f g h i j k l
m n o p q r s t u v w x y z
A B C D E F G H I J K L
M N O P Q R S T U V W X Y Z
□ 1 2 3 4 5 6 7 8 9 0 — = □
□ ! □ □ $ % ’ & * ( ) □ + □
□ □ □ □ ‘ ; : ’ ” , . / ?

smooth

a b c d e f g h i j k l
m n o p q r s t u v w x y z
A B C D E F G H I J K L
M N O P Q R S T U V W X Y Z
` 1 2 3 4 5 6 7 8 9 0 — = |
□ ! @ # $ % ^ & * ( ) _ + \\
[ ] □ □ < > ; : ’ ” , . / ?
Font Definitions

gothic

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
01234567890
! , $ % & * ( ) \ + \ - \ = \ < \ > \ \ / \ ?

math

αβγδεζηθικλμν

ουπρστυφχψωθφ

ΑΒΓΔΕΖΗΘΙΚΛΜΝ

ΟΠΡΣΤΤΥΦΧΨΩνα

.1234567890

≠ ≡ ≈ ≥ ≤ ø x ( ) + \ - \ / \ %\ ^
Font Definitions

**filled**

```
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
`1234567890-='\n~!@#$%^&*()_+\[
{}<>;:'",./?
```

**filledbold**

```
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
`1234567890-='\n~!@#$%^&*()_+\[
{}<>;:'",./?
```
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3-8  straightfilled
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