

NOTICE: This document contains references to Agilent Technologies. Agilent's former Test and Measurement business has become Keysight Technologies. For more information, go to **www.keysight.com**.





Agilent Technologies

Layout Library

Advanced Design System
2014.01

Copyright Notice

© Agilent Technologies, Inc. 1983-2014

5301 Stevens Creek Blvd., Santa Clara, CA 95052 USA

No part of this documentation may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

Acknowledgments

Mentor Graphics is a trademark of Mentor Graphics Corporation in the U.S. and other countries. Mentor products and processes are registered trademarks of Mentor Graphics Corporation. * Calibre is a trademark of Mentor Graphics Corporation in the US and other countries. "Microsoft®, Windows®, MS Windows®, Windows NT®, Windows 2000® and Windows Internet Explorer® are U.S. registered trademarks of Microsoft Corporation. Pentium® is a U.S. registered trademark of Intel Corporation. PostScript® and Acrobat® are trademarks of Adobe Systems Incorporated. UNIX® is a registered trademark of the Open Group. Oracle and Java and registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners. SystemC® is a registered trademark of Open SystemC Initiative, Inc. in the United States and other countries and is used with permission. MATLAB® is a U.S. registered trademark of The Math Works, Inc.. HiSIM2 source code, and all copyrights, trade secrets or other intellectual property rights in and to the source code in its entirety, is owned by Hiroshima University and STARC. FLEXIm and FLEXnet are registered trademarks of Flexera Software LLC Terms of Use for Flexera Software information can be found at <http://www.flexerasoftware.com/company/about/terms.htm>. Layout Boolean Engine by Klaas Holwerda, v1.7 <http://www.xs4all.nl/~kholwerd/bool.html>. FreeType Project, Copyright (c) 1996-1999 by David Turner, Robert Wilhelm, and Werner Lemberg. QuestAgent search engine (c) 2000-2002, JObjects. Motif is a trademark of the Open Software Foundation. Netscape is a trademark of Netscape Communications Corporation. Netscape Portable Runtime (NSPR), Copyright (c) 1998-2003 The Mozilla Organization. A copy of the Mozilla Public License is at <http://www.mozilla.org/MPL/>. FFTW, The Fastest Fourier Transform in the West, Copyright (c) 1997-1999 Massachusetts Institute of Technology. All rights reserved. Gradient, HeatWave and FireBolt are trademarks of Gradient Design Automation Inc.

The following third-party libraries are used by the NlogN Momentum solver:

"This program includes Metis 4.0, Copyright © 1998, Regents of the University of Minnesota", <http://www.cs.umn.edu/~metis>, METIS was written by George Karypis (karypis@cs.umn.edu).

Intel® Math Kernel Library, <http://www.intel.com/software/products/mkl>

HSPICE is a registered trademark of Synopsys, Inc. in the United States and/or other countries.

DWG and DXF are registered trademarks of Autodesk, Inc. in the United States and/or other countries.

MATLAB is a registered trademark of The MathWorks, Inc. in the United States and/or other countries.

SuperLU_MT version 2.0 - Copyright © 2003, The Regents of the University of California, through Lawrence Berkeley National Laboratory (subject to receipt of any required approvals from U.S. Dept. of Energy). All rights reserved. SuperLU Disclaimer: THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES;

LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

7-zip - 7-Zip Copyright: Copyright (C) 1999-2009 Igor Pavlov. Licenses for files are: 7z.dll: GNU LGPL + unRAR restriction, All other files: GNU LGPL. 7-zip License: This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA. unRAR copyright: The decompression engine for RAR archives was developed using source code of unRAR program. All copyrights to original unRAR code are owned by Alexander Roshal. unRAR License: The unRAR sources cannot be used to re-create the RAR compression algorithm, which is proprietary. Distribution of modified unRAR sources in separate form or as a part of other software is permitted, provided that it is clearly stated in the documentation and source comments that the code may not be used to develop a RAR (WinRAR) compatible archiver. 7-zip Availability: <http://www.7-zip.org/>

AMD Version 2.2 - AMD Notice: The AMD code was modified. Used by permission. AMD copyright: AMD Version 2.2, Copyright © 2007 by Timothy A. Davis, Patrick R. Amestoy, and Iain S. Duff. All Rights Reserved. AMD License: Your use or distribution of AMD or any modified version of AMD implies that you agree to this License. This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA Permission is hereby granted to use or copy this program under the terms of the GNU LGPL, provided that the Copyright, this License, and the Availability of the original version is retained on all copies. User documentation of any code that uses this code or any modified version of this code must cite the Copyright, this License, the Availability note, and "Used by permission." Permission to modify the code and to distribute modified code is granted, provided the Copyright, this License, and the Availability note are retained, and a notice that the code was modified is included. AMD Availability: <http://www.cise.ufl.edu/research/sparse/amd>

UMFPACK 5.0.2 - UMFPACK Notice: The UMFPACK code was modified. Used by permission. UMFPACK Copyright: UMFPACK Copyright © 1995-2006 by Timothy A. Davis. All Rights Reserved. UMFPACK License: Your use or distribution of UMFPACK or any modified version of UMFPACK implies that you agree to this License. This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License

along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA Permission is hereby granted to use or copy this program under the terms of the GNU LGPL, provided that the Copyright, this License, and the Availability of the original version is retained on all copies. User documentation of any code that uses this code or any modified version of this code must cite the Copyright, this License, the Availability note, and "Used by permission." Permission to modify the code and to distribute modified code is granted, provided the Copyright, this License, and the Availability note are retained, and a notice that the code was modified is included. UMFPACK Availability: <http://www.cise.ufl.edu/research/sparse/umfpack> UMFPACK (including versions 2.2.1 and earlier, in FORTRAN) is available at <http://www.cise.ufl.edu/research/sparse>. MA38 is available in the Harwell Subroutine Library. This version of UMFPACK includes a modified form of COLAMD Version 2.0, originally released on Jan. 31, 2000, also available at <http://www.cise.ufl.edu/research/sparse>. COLAMD V2.0 is also incorporated as a built-in function in MATLAB version 6.1, by The MathWorks, Inc. <http://www.mathworks.com>. COLAMD V1.0 appears as a column-preordering in SuperLU (SuperLU is available at <http://www.netlib.org>). UMFPACK v4.0 is a built-in routine in MATLAB 6.5. UMFPACK v4.3 is a built-in routine in MATLAB 7.1.

Qt Version 4.7.4 - Qt Notice: The Qt code was modified. Used by permission. Qt copyright: Qt Version 4.7.4, Copyright (c) 2010 by Nokia Corporation. All Rights Reserved. Qt License: Your use or distribution of Qt or any modified version of Qt implies that you agree to this License. This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful,

but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA Permission is hereby granted to use or copy this program under the terms of the GNU LGPL, provided that the Copyright, this License, and the Availability of the original version is retained on all copies. User documentation of any code that uses this code or any modified version of this code must cite the Copyright, this License, the Availability note, and "Used by permission." Permission to modify the code and to distribute modified code is granted, provided the Copyright, this License, and the Availability note are retained, and a notice that the code was modified is included. Qt Availability: <http://www.qtsoftware.com/downloads> Patches Applied to Qt can be found in the installation at: \$HPEESOF_DIR/prod/licenses/thirdparty/qt/patches. You may also contact Brian Buchanan at Agilent Inc. at brian_buchanan@agilent.com for more information.

The HiSIM_HV source code, and all copyrights, trade secrets or other intellectual property rights in and to the source code, is owned by Hiroshima University and/or STARC.

Errata The ADS product may contain references to "HP" or "HPEESOF" such as in file names and directory names. The business entity formerly known as "HP EEsof" is now part of Agilent Technologies and is known as "Agilent EEsof". To avoid broken functionality and to maintain backward compatibility for our customers, we did not change all the names and labels that contain "HP" or "HPEESOF" references.

Warranty The material contained in this document is provided "as is", and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this documentation and any information contained herein, including but not limited to the implied warranties of merchantability and

fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license. Portions of this product include the SystemC software licensed under Open Source terms, which are available for download at <http://systemc.org/>. This software is redistributed by Agilent. The Contributors of the SystemC software provide this software "as is" and offer no warranty of any kind, express or implied, including without limitation warranties or conditions or title and non-infringement, and implied warranties or conditions merchantability and fitness for a particular purpose. Contributors shall not be liable for any damages of any kind including without limitation direct, indirect, special, incidental and consequential damages, such as lost profits. Any provisions that differ from this disclaimer are offered by Agilent only.

Restricted Rights Legend U.S. Government Restricted Rights. Software and technical data rights granted to the federal government include only those rights customarily provided to end user customers. Agilent provides this customary commercial license in Software and technical data pursuant to FAR 12.211 (Technical Data) and 12.212 (Computer Software) and, for the Department of Defense, DFARS 252.227-7015 (Technical Data - Commercial Items) and DFARS 227.7202-3 (Rights in Commercial Computer Software or Computer Software Documentation).

Table of Contents

Table of Contents	5
Chapter 1 – Fixed Artwork	17
1.1 Available Fixed Artwork Cells	17
1.2 1D2J1A	23
1.2.1 1D2J1A	24
1.3 2D3H1A.....	24
1.3.1 2D3H1A.....	24
1.4 2D3J1C	25
1.4.1 2D3J1C	25
1.5 2D7C1A.....	25
1.5.1 2D7C1A.....	25
1.6 145MILXP.....	26
1.6.1 145MILXP	26
1.7 145ML4PK.....	26
1.7.1 145ML4PK	26
1.8 AFLANGE.....	27
1.8.1 AFLANGE	27
1.9 AK	27
1.9.1 AK	28
1.10 ALMK	28
1.10.1 ALMK.....	28
1.11 ALMK2	28
1.11.1 ALMK2.....	29
1.12 AP	29
1.12.1 AP.....	29
1.13 AQ.....	30
1.13.1 AQ	30
1.14 ATCCAP.....	30
1.14.1 ATCCAP	30
1.15 ATF36	31

1.15.1	ATF36.....	31
1.16	ATF70	31
1.16.1	ATF70.....	32
1.17	ATF76	32
1.17.1	ATF76.....	32
1.18	ATF84	33
1.18.1	ATF84.....	33
1.19	ATF86	33
1.19.1	ATF86.....	33
1.20	AVNK35	34
1.20.1	AVNK35.....	34
1.21	AVNK70	34
1.21.1	AVNK70.....	35
1.22	AVNK85	35
1.22.1	AVNK85.....	35
1.23	AVNK86	36
1.23.1	AVNK86.....	36
1.24	AXIAL L.....	36
1.24.1	AXIAL_L	36
1.25	AXIAL M.....	37
1.25.1	AXIAL_M.....	37
1.26	AXRES.....	37
1.26.1	AXRES	37
1.27	AXRES2.....	38
1.27.1	AXRES2	38
1.28	AXRES3.....	38
1.28.1	AXRES3	38
1.29	BFLANGE.....	39
1.29.1	BFLANGE	39
1.30	C145D01	39
1.30.1	C145D01.....	39
1.31	C211D07	40

1.31.1	C211D07.....	40
1.32	C211D07V2.....	41
1.32.1	C211D07V2	41
1.33	C221CD02.....	41
1.33.1	C221CD02	41
1.34	C244D04	42
1.34.1	C244D04.....	42
1.35	C249D05	42
1.35.1	C249D05.....	43
1.36	C305D01	43
1.36.1	C305D01.....	43
1.37	C317D02	44
1.37.1	C317D02.....	44
1.38	C319BD01.....	44
1.38.1	C319BD01	44
1.39	C319D06	45
1.39.1	C319D06.....	45
1.40	C369D03	45
1.40.1	C369D03.....	45
1.41	C744AD01.....	46
1.41.1	C744AD01	46
1.42	C751D03.....	47
1.42.1	C751D03.....	47
1.43	C2003.....	47
1.43.1	C2003	47
1.44	C2904.....	48
1.44.1	C2904	48
1.45	C5102.....	48
1.45.1	C5102	48
1.46	C7904.....	49
1.46.1	C7904	49
1.47	C18202.....	49
1.47.1	C18202	50

1.48	C30301.....	50
1.48.1	C30301.....	50
1.49	CD.....	51
1.49.1	CD.....	51
1.50	CERECX.....	51
1.50.1	CERECX.....	51
1.51	CERECXF.....	52
1.51.1	CERECXF.....	52
1.52	CHPCAP.....	52
1.52.1	CHPCAP.....	53
1.53	CHPRES.....	53
1.53.1	CHPRES.....	53
1.54	C-LL.....	53
1.54.1	C-LL.....	53
1.55	C-LR.....	54
1.55.1	C-LR.....	54
1.56	COIL1.....	54
1.56.1	COIL1.....	55
1.57	C-UL.....	55
1.57.1	C-UL.....	55
1.58	C-UR.....	55
1.58.1	C-UR.....	55
1.59	DISK L.....	56
1.59.1	DISK_L.....	56
1.60	DISK M.....	56
1.60.1	DISK_M.....	56
1.61	DISK S.....	57
1.61.1	DISK_S.....	57
1.62	GD4.....	57
1.62.1	GD4.....	57
1.63	GD7.....	58
1.63.1	GD7.....	58

1.64	GD9.....	58
1.64.1	GD9.....	59
1.65	GD11.....	59
1.65.1	GD11.....	59
1.66	GD16.....	60
1.66.1	GD16.....	60
1.67	GF1.....	60
1.67.1	GF1.....	60
1.68	GF4.....	61
1.68.1	GF4.....	61
1.69	GF7.....	61
1.69.1	GF7.....	62
1.70	GF11.....	62
1.70.1	GF11.....	62
1.71	GF21.....	63
1.71.1	GF21.....	63
1.72	HP70GT.....	63
1.72.1	HP70GT.....	63
1.73	HP85PLAS.....	64
1.73.1	HP85PLAS.....	64
1.74	HPAC100.....	64
1.74.1	HPAC100.....	65
1.75	HPAC100X.....	65
1.75.1	HPAC100X.....	65
1.76	HPAC200.....	66
1.76.1	HPAC200.....	66
1.77	HPAC200V2.....	66
1.77.1	HPAC200V2.....	66
1.78	LG.....	67
1.78.1	LG.....	67
1.79	LLD.....	67
1.79.1	LLD.....	68
1.80	M205.....	68

1.80.1	M205.....	68
1.81	M253.....	69
1.81.1	M253.....	69
1.82	MACROT.....	69
1.82.1	MACROT.....	69
1.83	MACROX.....	70
1.83.1	MACROX.....	70
1.84	ME.....	70
1.84.1	ME.....	70
1.85	MICROX.....	71
1.85.1	MICROX.....	71
1.86	MOP.....	71
1.86.1	MOP.....	72
1.87	MW4.....	72
1.87.1	MW4.....	72
1.88	MWT70.....	73
1.88.1	MWT70.....	73
1.89	MWT71.....	73
1.89.1	MWT71.....	73
1.90	MWT73.....	74
1.90.1	MWT73.....	74
1.91	NEC01.....	74
1.91.1	NEC01.....	75
1.92	NEC03.....	75
1.92.1	NEC03.....	75
1.93	NEC07.....	76
1.93.1	NEC07.....	76
1.94	NEC08.....	76
1.94.1	NEC08.....	76
1.95	NEC12.....	77
1.95.1	NEC12.....	77
1.96	NEC13.....	77

1.96.1	NEC13	78
1.97	NEC14	78
1.97.1	NEC14	78
1.98	NEC15	79
1.98.1	NEC15	79
1.99	NEC18	79
1.99.1	NEC18	79
1.100	NEC19	80
1.100.1	NEC19	80
1.101	NEC20	80
1.101.1	NEC20	81
1.102	NEC30	81
1.102.1	NEC30	81
1.103	NEC32	82
1.103.1	NEC32	82
1.104	NEC33	82
1.104.1	NEC33	82
1.105	NEC34	83
1.105.1	NEC34	83
1.106	NEC35	83
1.106.1	NEC35	83
1.107	NEC37	84
1.107.1	NEC37	84
1.108	NEC38	84
1.108.1	NEC38	85
1.109	NEC39	85
1.109.1	NEC39	85
1.110	NEC53E	86
1.110.1	NEC53E	86
1.111	NEC75	86
1.111.1	NEC75	86
1.112	NEC83	87
1.112.1	NEC83	87

1.113	NEC84	87
1.113.1	NEC84	88
1.114	NEC84A.....	88
1.114.1	NEC84A.....	88
1.115	NEC87	89
1.115.1	NEC87	89
1.116	NEC89.....	89
1.116.1	NEC89	89
1.117	NEC89A.....	90
1.117.1	NEC89A.....	90
1.118	OKI 1	90
1.118.1	OKI_1	91
1.119	PFLANGE	91
1.119.1	PFLANGE	91
1.120	RADIAL L.....	92
1.120.1	RADIAL_L.....	92
1.121	RADIAL M.....	92
1.121.1	RADIAL_M.....	92
1.122	RADIAL S	93
1.122.1	RADIAL_S	93
1.123	RESA.....	93
1.123.1	RESA.....	93
1.124	SFLANGE	94
1.124.1	SFLANGE	94
1.125	SMA FEM	94
1.125.1	SMA_FEM	94
1.126	SMSMICROX.....	95
1.126.1	SMSMICROX.....	95
1.127	SOD80.....	95
1.127.1	SOD80.....	96
1.128	SOD123.....	96
1.128.1	SOD123.....	96

1.129	SOD323.....	97
1.129.1	SOD323.....	97
1.130	SOT23.....	97
1.130.1	SOT23.....	97
1.131	SOT23V2.....	98
1.131.1	SOT23V2.....	98
1.132	SOT23V3.....	98
1.132.1	SOT23V3.....	99
1.133	SOT23V4.....	99
1.133.1	SOT23V4.....	99
1.134	SOT23V5.....	100
1.134.1	SOT23V5.....	100
1.135	SOT23V6.....	100
1.135.1	SOT23V6.....	100
1.136	SOT23V7.....	101
1.136.1	SOT23V7.....	101
1.137	SOT23V8.....	101
1.137.1	SOT23V8.....	102
1.138	SOT37.....	102
1.138.1	SOT37.....	102
1.139	SOT89.....	103
1.139.1	SOT89.....	103
1.140	SOT89V2.....	103
1.140.1	SOT89V2.....	103
1.141	SOT103.....	104
1.141.1	SOT103.....	104
1.142	SOT143.....	104
1.142.1	SOT143.....	105
1.143	SOT143R.....	105
1.143.1	SOT143R.....	105
1.144	SOT143RV2.....	106
1.144.1	SOT143RV2.....	106
1.145	SOT143V2.....	106

1.145.1	SOT143V2	106
1.146	SOT143V3	107
1.146.1	SOT143V3	107
1.147	SOT143V4	107
1.147.1	SOT143V4	108
1.148	SOT143V5	108
1.148.1	SOT143V5	108
1.149	SOT143V6	109
1.149.1	SOT143V6	109
1.150	SOT143V7	109
1.150.1	SOT143V7	109
1.151	SOT223	110
1.151.1	SOT223	110
1.152	SOT223V2	111
1.152.1	SOT223V2	111
1.153	SOT323	111
1.153.1	SOT323	111
1.154	SRP	112
1.154.1	SRP	112
1.155	TO39	112
1.155.1	TO39	113
1.156	TO72	113
1.156.1	TO72	113
1.157	TO72V2	114
1.157.1	TO72V2	114
1.158	TO92	114
1.158.1	TO92	114
1.159	TO117	115
1.159.1	TO117	115
1.160	TO206AA	115
1.160.1	TO206AA	116
1.161	TO206AF	116

1.161.1	TO206AF	116
1.162	TO226AA	117
1.162.1	TO226AA	117
1.163	TPLAST	117
1.163.1	TPLAST	117
1.164	TUNCAP	118
1.164.1	TUNCAP	118
1.165	UMD	118
1.165.1	UMD	119
1.166	UPRIGHT	119
1.166.1	UPRIGHT	119
1.167	URP	119
1.167.1	URP	120
1.168	WIRE0	120
1.168.1	WIRE0	120
1.169	WIRE1	120
1.169.1	WIRE1	121
Chapter 2 – Font Definitions		122
2.1	din17	122
2.2	iso3098	122
2.3	roman	123
2.4	smooth	123
2.5	italic	124
2.6	standard	124
2.7	gothic	125
2.8	math	125
2.9	sans	126
2.10	sansbold	126
2.11	filled	127
2.12	filledbold	127
2.13	straight	128
2.14	straightfilled	128

Chapter 3 – SMT Package Layout Artwork Library	129
3.1 Using SMT Package Artwork as Artwork Replacement.....	129
3.1.1 SMT Artwork Replacement Examples	130
3.2 Ceramic Flat Pack (CFP) Packages	130
3.2.1 Ceramic Flat Pack (CFP) Packages	130
3.2.2 Ceramic Flat Pack (CFP) Layout Artwork	132
3.3 Chip and MELF Components.....	132
3.3.1 Chip and MELF Component Packages.....	132
3.3.2 Chip Component Layout Artwork	134
3.4 SOT, DPAK, D2PAK Packages	134
3.4.1 SOT, DPAK, D2PAK Packages (dimensions in mm)	134
3.4.2 SOT-23 Layout Artwork.....	137
3.5 Plastic Flat Pack (PFP) Packages	137
3.5.1 Plastic Flat Pack (PFP) Packages	137
3.5.2 Plastic Flat Pack (PFP) Layout Artwork	138
3.6 Quad Flat Pack (QFP) Packages.....	138
3.6.1 Quad Flat Pack (QFP) Packages.....	139
3.6.2 Quad Flat Pack (QFP) Layout Artwork.....	142
3.7 Plastic Leaded Chip Carrier (PLCC)	142
3.7.1 Plastic Leaded Chip Carrier (PLCC) Packages.....	142
3.7.2 Plastic Leaded Chip Carrier (PLCC) Layout Artwork.....	144
3.8 Small Outline IC (SOIC).....	144
3.8.1 Small Outline IC (SOIC) Packages	144
3.8.2 Small Outline IC (SOIC) Package Layout Artwork	145
3.9 Writing Customized SMT PAL Artwork	145
3.9.1 Structure of a SMT PAL artwork	146
3.9.2 Examples of SMT PAL Artwork Using the Generic Function.....	148

Chapter 1 – Fixed Artwork

The fixed artwork cells provided with ADS 2011 are available in the ads_designs library. For information about how to setup your component to use one of these fixed artwork designs, see [Setting up a Component](#).

1.1 Available Fixed Artwork Cells

- [1D2J1A](#)
- [2D3H1A](#)
- [2D3J1C](#)
- [2D7C1A](#)
- [145MILXP](#)
- [145ML4PK](#)
- [AFLANGE](#)
- [AK](#)
- [ALMK](#)
- [ALMK2](#)
- [AP](#)
- [AQ](#)
- [ATCCAP](#)
- [ATF36](#)
- [ATF70](#)
- [ATF76](#)
- [ATF84](#)
- [ATF86](#)
- [AVNK35](#)

- [AVNK70](#)
- [AVNK85](#)
- [AVNK86](#)
- [AXIAL L](#)
- [AXIAL M](#)
- [AXRES](#)
- [AXRES2](#)
- [AXRES3](#)
- [BFLANGE](#)
- [C145D01](#)
- [C211D07](#)
- [C211D07V2](#)
- [C221CD02](#)
- [C244D04](#)
- [C249D05](#)
- [C305D01](#)
- [C317D02](#)
- [C319BD01](#)
- [C319D06](#)
- [C369D03](#)
- [C744AD01](#)
- [C751D03](#)
- [C2003](#)
- [C2904](#)
- [C5102](#)



- [C7904](#)
- [C18202](#)
- [C30301](#)
- [CD](#)
- [CERECX](#)
- [CERECXF](#)
- [CHPCAP](#)
- [CHPRES](#)
- [C-LL](#)
- [C-LR](#)
- [COIL1](#)
- [C-UL](#)
- [C-UR](#)
- [DISK L](#)
- [DISK M](#)
- [DISK S](#)
- [GD4](#)
- [GD7](#)
- [GD9](#)
- [GD11](#)
- [GD16](#)
- [GF1](#)
- [GF4](#)
- [GF7](#)
- [GF11](#)
- [GF21](#)

- [HP70GT](#)
- [HP85PLAS](#)
- [HPAC100](#)
- [HPAC100X](#)
- [HPAC200](#)
- [HPAC200V2](#)
- [LG](#)
- [LLD](#)
- [M205](#)
- [M253](#)
- [MACROT](#)
- [MACROX](#)
- [ME](#)
- [MICROX](#)
- [MOP](#)
- [MW4](#)
- [MWT70](#)
- [MWT71](#)
- [MWT73](#)
- [NEC01](#)
- [NEC03](#)
- [NEC07](#)
- [NEC08](#)
- [NEC12](#)
- [NEC13](#)



- [NEC14](#)
- [NEC15](#)
- [NEC18](#)
- [NEC19](#)
- [NEC20](#)
- [NEC30](#)
- [NEC32](#)
- [NEC33](#)
- [NEC34](#)
- [NEC35](#)
- [NEC37](#)
- [NEC38](#)
- [NEC39](#)
- [NEC53E](#)
- [NEC75](#)
- [NEC83](#)
- [NEC84](#)
- [NEC84A](#)
- [NEC87](#)
- [NEC89](#)
- [NEC89A](#)
- [OKI 1](#)
- [PFLANGE](#)
- [RADIAL L](#)
- [RADIAL M](#)
- [RADIAL S](#)

- [RESA](#)
- [SFLANGE](#)
- [SMA FEM](#)
- [SMSMICROX](#)
- [SOD80](#)
- [SOD123](#)
- [SOD323](#)
- [SOT23](#)
- [SOT23V2](#)
- [SOT23V3](#)
- [SOT23V4](#)
- [SOT23V5](#)
- [SOT23V6](#)
- [SOT23V7](#)
- [SOT23V8](#)
- [SOT37](#)
- [SOT89](#)
- [SOT89V2](#)
- [SOT103](#)
- [SOT143](#)
- [SOT143R](#)
- [SOT143RV2](#)
- [SOT143V2](#)
- [SOT143V3](#)
- [SOT143V4](#)

- [SOT143V5](#)
- [SOT143V6](#)
- [SOT143V7](#)
- [SOT223](#)
- [SOT223V2](#)
- [SOT323](#)
- [SRP](#)
- [TO39](#)
- [TO72](#)
- [TO72V2](#)
- [TO92](#)
- [TO117](#)
- [TO206AA](#)
- [TO206AF](#)
- [TO226AA](#)
- [TPLAST](#)
- [TUNCAP](#)
- [UMD](#)
- [UPRIGHT](#)
- [URP](#)
- [WIRE0](#)
- [WIRE1](#)

1.2 1D2J1A

1.2.1 1D2J1A

1-2J1A

2 ports

package 59 × 110.2 mil

2 leads 23.6 × 255.9 mil

2 pads 43.6 mil square

Diode



NOTE: text size for a and c has been enlarged

1.3 2D3H1A

1.3.1 2D3H1A

2-3H1A

3 ports

flange 98.4 × 338.6 mil

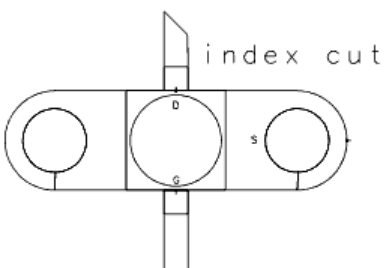
package 98.4 mil square and circle 90 mil diameter

holes 63 mil diameter 240.2 mil center-to-center

2 leads 23.6 × 78.8 mil

2 pads 23.6 mil square

FET



1.4 2D3J1C

1.4.1 2D3J1C

2-3J1C

4 ports

SMT

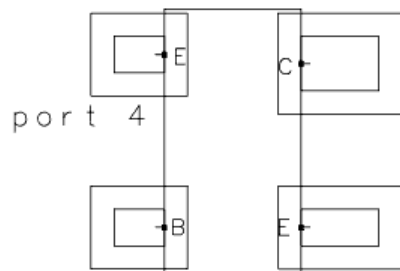
package 114.4 × 59 mil

2 short leads 15.8 × 21.8 mil, 1 long lead 15.8 × 33.6 mil

collector lead 23.6 × 53.6 mil

pads are lead size plus 10 mil

BJT



1.5 2D7C1A

1.5.1 2D7C1A

2-7C1A

3 ports

flange 236.2 × 728.4 mil

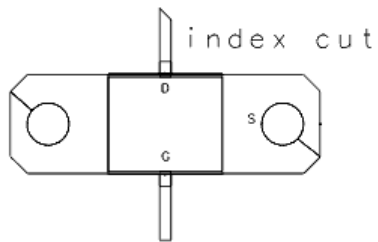
package 236.2 × 267.8 mil and 220.4 × 267.8 mil

holes 98.4 mil diameter spaced 551.2 mil center-to-center

2 leads 27.6 × 157.5 mil

2 pads 27.6 mil square

FET



1.6 145MILXP

1.6.1 145MILXP

145 MIL X-PACK

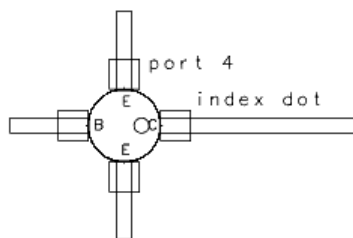
4 ports

package and hole 145 mil diameter

3 leads 30 × 155.5 mil, 1 lead 30 × 391.5 mil

pads 60 mil square

BJT



1.7 145ML4PK

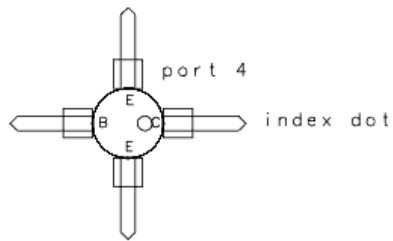
1.7.1 145ML4PK

145 MIL FOUR-PACK

4 ports

package and hole 145 mil diameter

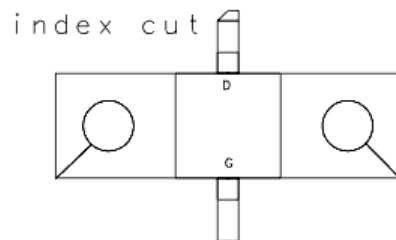
4 leads 30×168.7 mil
pads 60 mil square
BJT



1.8 AFLANGE

1.8.1 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



1.9 AK

1.9.1 AK

AK

5 ports

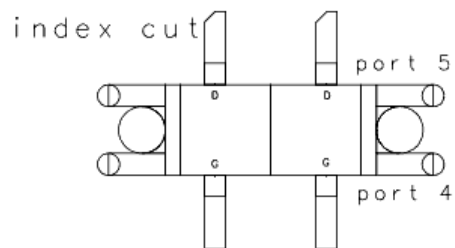
open flange 976 × 256 mil

holes 130 mil diameter spaced 726 mil center-to-center

leads 60 × 205 mil

pads 60 mil square

FET



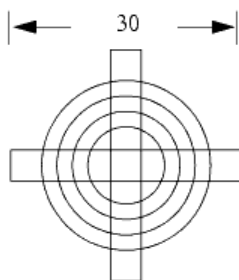
1.10 ALMK

1.10.1 ALMK

Alignment marker

conductor diameter 30 mil

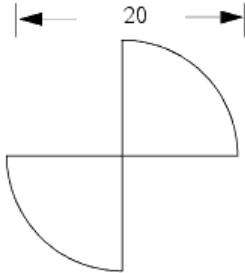
no ports



1.11 ALMK2

1.11.1 ALMK2

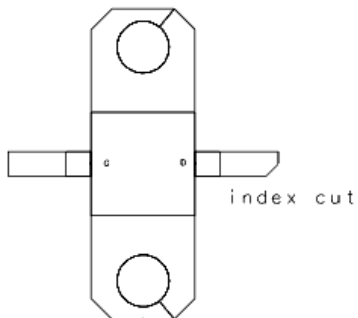
Alignment marker
conductor diameter 20 mil
no ports



1.12 AP

1.12.1 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



1.13 AQ

1.13.1 AQ

AQ

5 ports

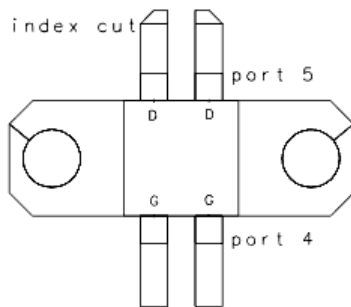
flange 750 × 250 mil

holes 130 mil diameter 560 mil center-to-center

leads 60 × 197.5 mil

pads 60 mil square

FET



1.14 ATCCAP

1.14.1 ATCCAP

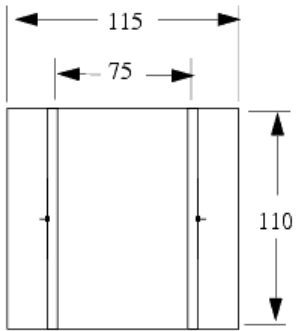
Chip capacitor outline

2 ports

75 mil port-to-port

leads 110 × 25 mil

packages 110 × 75



1.15 ATF36

1.15.1 ATF36

Avantek 36

4 ports

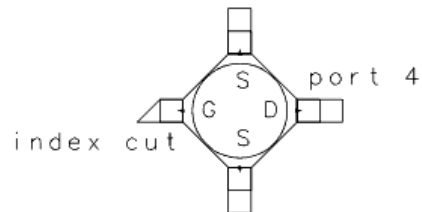
SMT

package 100 mil octagon and 83 mil diameter circle

leads 20 × 40 mil

pads 20 mil square

FET



1.16 ATF70

1.16.1 ATF70

Avantek 70

4 port

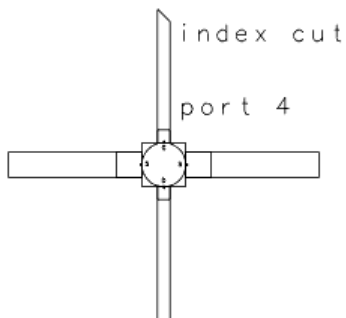
SMT

package 70 mil square and circle

2 leads 40 × 212.5 mil, 2 leads 20 × 212.5 mil

2 pads 40 mil square, 2 pads 20 mil square

FET



1.17 ATF76

1.17.1 ATF76

Avantek 76

4 ports

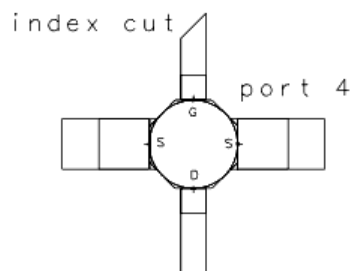
SMT

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

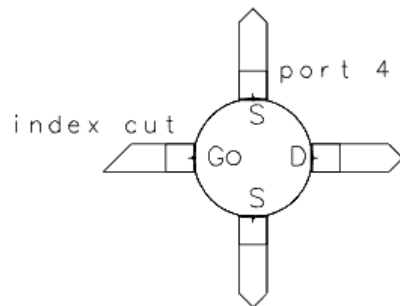
FET



1.18 ATF84

1.18.1 ATF84

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

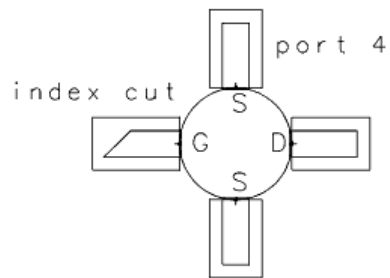


1.19 ATF86

1.19.1 ATF86

Avantek 86
4 ports
SMT
package 85 mil diameter
leads 20 × 57.5 mil
pads 40 × 66.3 mil

FET



1.20 AVNK35

1.20.1 AVNK35

Avantek 35

4 ports

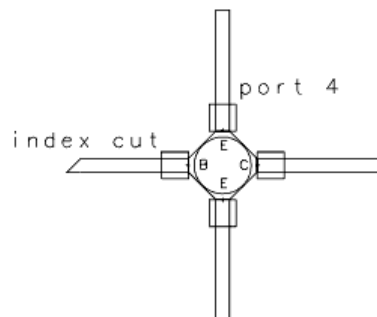
SMT

package 100 mil square

leads 20 x 175 mil

pads 40 mil square

BJT



1.21 AVNK70

1.21.1 AVNK70

Avantek 70

4 ports

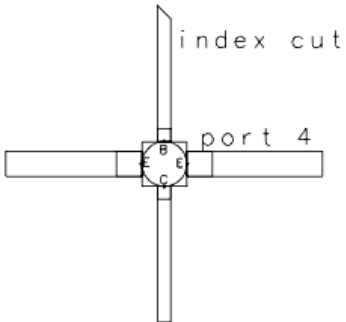
SMT

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



1.22 AVNK85

1.22.1 AVNK85

Avantek 85

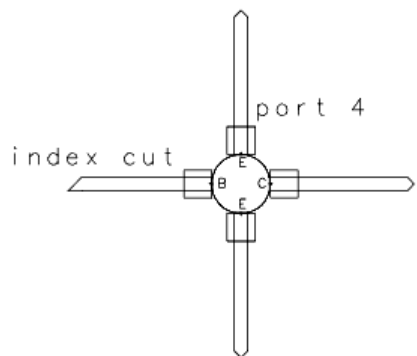
4 ports

package and hole 85 mil diameter

leads 20 × 207.5 mil

pads 40 mil square

BJT



1.23 AVNK86

1.23.1 AVNK86

Avantek 86

4 ports

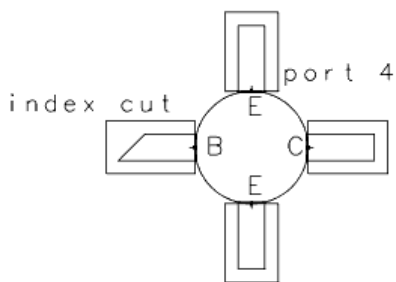
SMT

package 85 mil diameter

leads 20 × 57.5 mil

pads 40 × 66.3 mil

BJT



1.24 AXIAL L

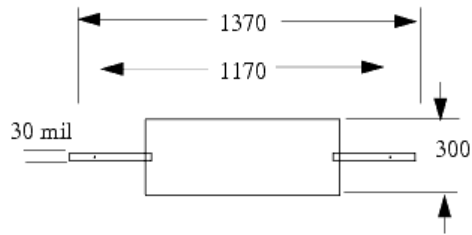
1.24.1 AXIAL_L

Axial leaded components (large)

2 ports

leads 30 × 325

packages 300 × 770



1.25 AXIAL M

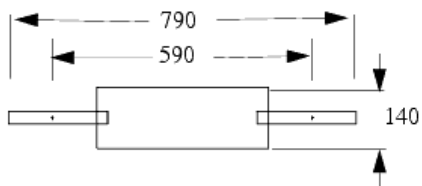
1.25.1 AXIAL_M

Axial leaded components (medium)

2 ports

leads 30 × 270

packages 140 × 390



1.26 AXRES

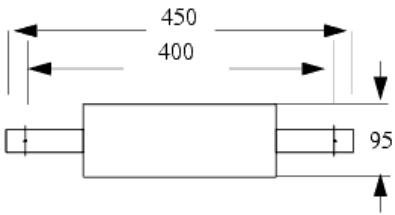
1.26.1 AXRES

Axial leaded components (small)

2 ports

leads 29 × 100 mil

resistor 95 × 249



1.27 AXRES2

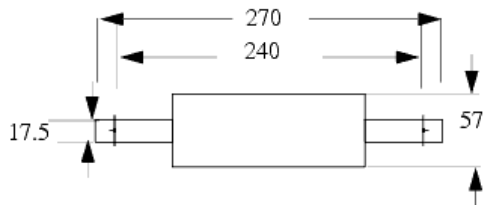
1.27.1 AXRES2

Axial leaded components

2 ports

leads 17.5 × 60 mil

resistor 57 × 150



1.28 AXRES3

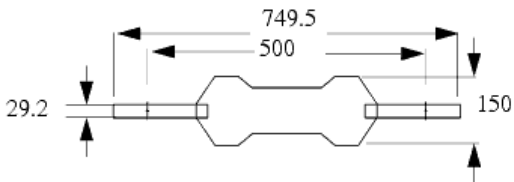
1.28.1 AXRES3

Axial leaded components

2 ports, 500 mil port-to-port

leads 29.2 × 205 mil

resistor



1.29 BFLANGE

1.29.1 BFLANGE

no name given by vendor

3 ports

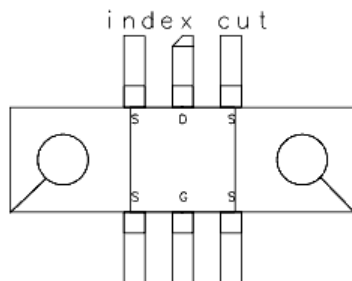
flange 820 × 250 mil

holes 120 mil diameter 570 mil center-to-center

leads 50 × 170 mil

pads 50 mil square

FET



1.30 C145D01

1.30.1 C145D01

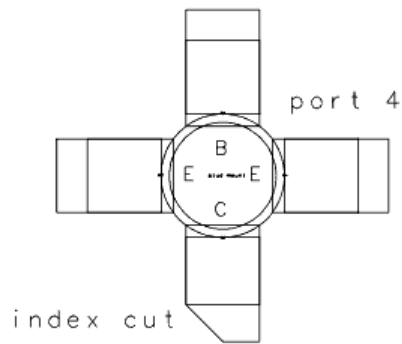
Motorola Case 145-01

4 ports

stud mount

package 375 mil diameter

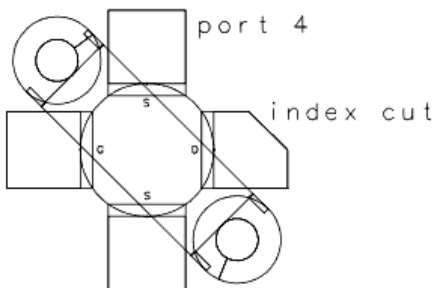
hole 325 mil diameter
 4 leads 225 × 317.5 mil
 3 pads 225 mil square. 1 pad 225 × 205 mil
 BJT



1.31 C211D07

1.31.1 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



1.32 C211D07V2

1.32.1 C211D07V2

Motorola Case 211-07

4 ports

flange 975 × 250 mil

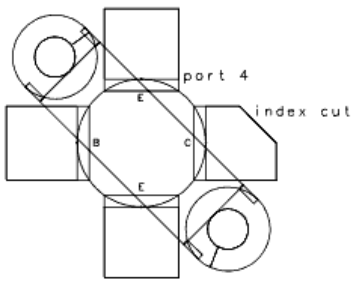
package 380 mil diameter

holes 120 mil diameter 725 mil center-to-center

leads 220 × 210 mil at 45°

pads 220 × 210 mil

BJT



1.33 C221CD02

1.33.1 C221CD02

Motorola Case 221C-02

3 ports

drawn as if flange

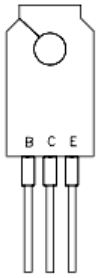
package 398 × 698 mil

hole 145 mil diameter

3 leads 132 × 33 mil and 58 mil

3 pads 58 × 132 mil

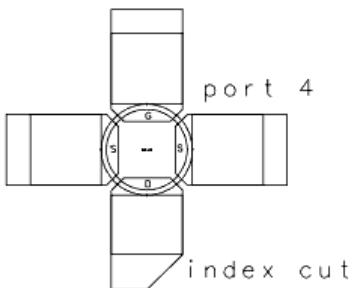
BJT



1.34 C244D04

1.34.1 C244D04

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



1.35 C249D05

1.35.1 C249D05

Motorola Case 249-05

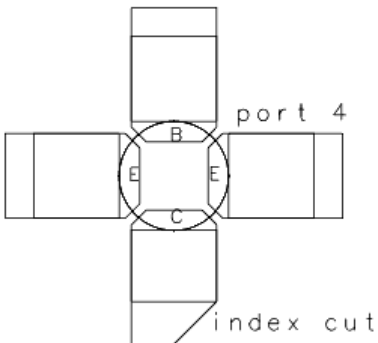
4 ports

package and hole 282 mil diameter

4 leads 220 × 294 mil

4 pads 220 mil square

BJT



1.36 C305D01

1.36.1 C305D01

Motorola Case 305-01

4 ports

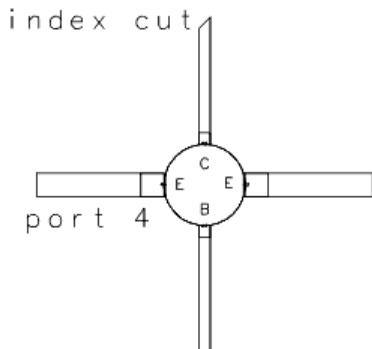
stud mount

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



1.37 C317D02

1.37.1 C317D02

Motorola Case 317-02

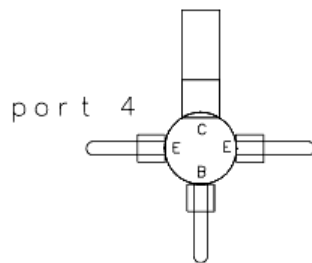
4 ports

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



1.38 C319BD01

1.38.1 C319BD01

Motorola Case 319B-01

5 ports

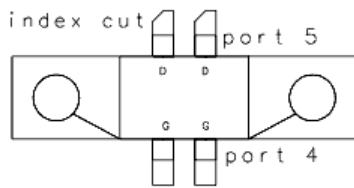
flange 975 × 233 mil

holes 130 mil diameter 725 mil center-to-center

leads 60 × 130 mil

pads 60 mil square

FET



1.39 C319D06

1.39.1 C319D06

Motorola Case 319-06

3 ports

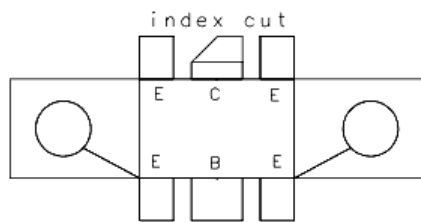
flange 975 × 233 mil

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



1.40 C369D03

1.40.1 C369D03

Motorola Case 369-03

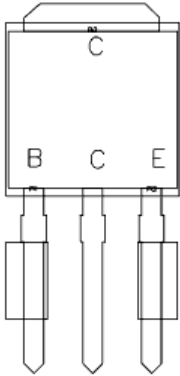
3 ports

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



1.41 C744AD01

1.41.1 C744AD01

Motorola Case 744A-01

8 ports

flange 385 × 900 mil

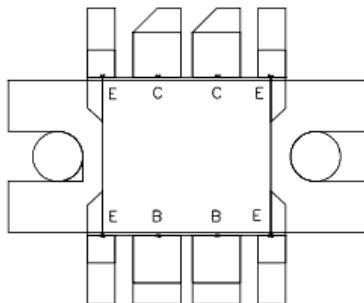
package 424 × 400 mil

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

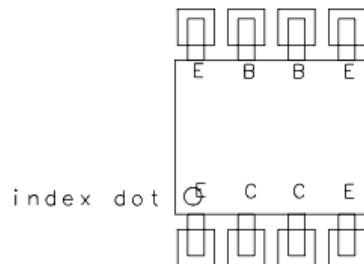
BJT



1.42 C751D03

1.42.1 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

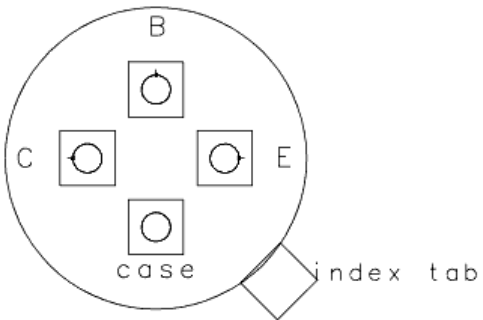


1.43 C2003

1.43.1 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



1.44 C2904

1.44.1 C2904

Motorola Case 29-04

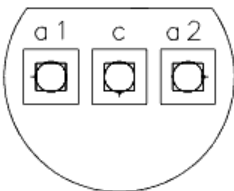
3 ports

package 170 mil diameter cut x 135 mil chord

holes 22 mil diameter and 22 x 20 mil

pads 40 mil square

Diode



1.45 C5102

1.45.1 C5102

Motorola Case 51-02

2 ports

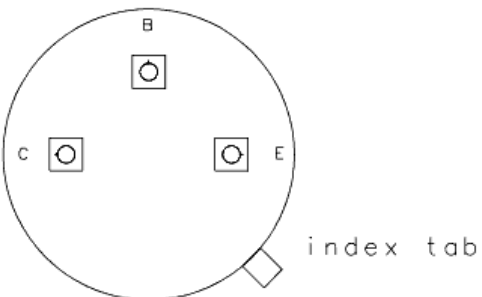
package 96 × 265 mil
2 leads 20 × 40 mil (bent)
2 holes 22 mil square
2 pads 44 mil square
Diode



1.46 C7904

1.46.1 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



1.47 C18202

1.47.1 C18202

Motorola Case 182-02

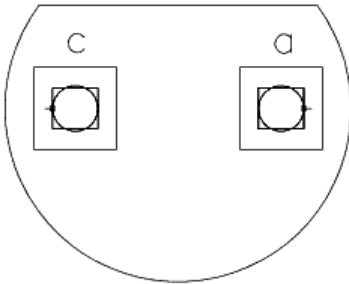
2 ports

package 170 mil diameter cut × 130 mil chord

holes 22 mil diameter and 22 × 20 mil

pads 40 mil square

Diode



1.48 C30301

1.48.1 C30301

Motorola Case 303-01

4 ports

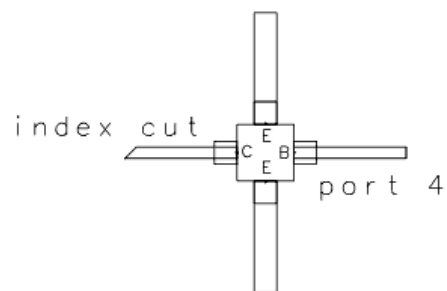
SMT

100 mil square package

2 leads 40 × 197.5 mil, 2 leads 20 × 197.5 mil

pads 40 mil square

BJT



1.49 CD

1.49.1 CD

CD

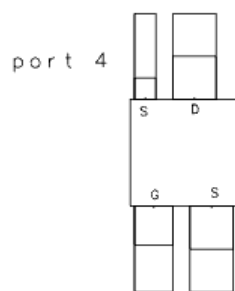
4 ports

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



1.50 CERECX

1.50.1 CERECX

CEREC-X

4 ports

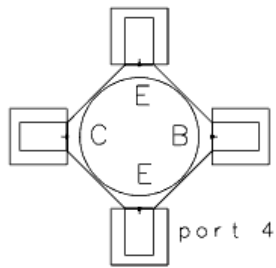
SMT

package 100.4 mil octagon and 86.6 mil diameter circle

leads 19.7 × 32.5 mil

pads 39.5 mil square

BJT



1.51 CERECXF

1.51.1 CERECXF

CEREC-XF

4 ports

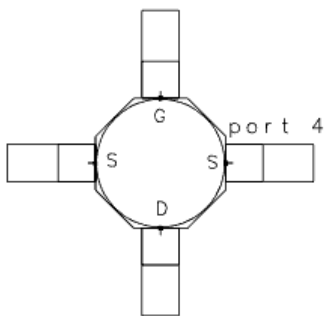
SMT

package 70 mil octagon

leads 20 x 47.5 mil

pads 20 mil square

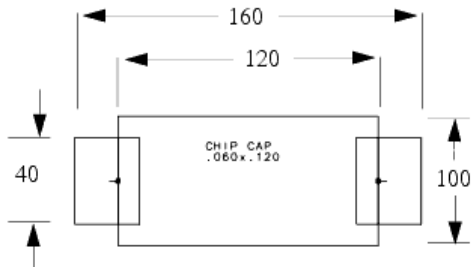
FET



1.52 CHPCAP

1.52.1 CHPCAP

Surface mount components
conductor 40 × 30 mil
packages 60 × 120 mil
2 ports



1.53 CHPRES

1.53.1 CHPRES

2 ports
packages 60 × 120 mil
leads 40 × 30 mil

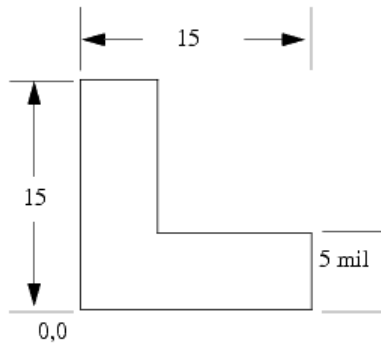


1.54 C-LL

1.54.1 C-LL

Alignment corner marks
no ports

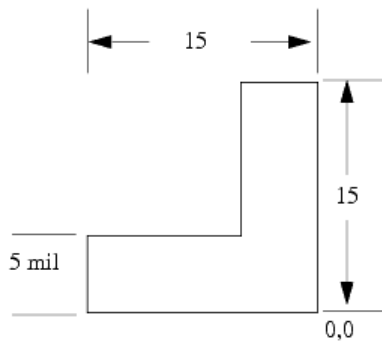
conductor 5 mil wide



1.55 C-LR

1.55.1 C-LR

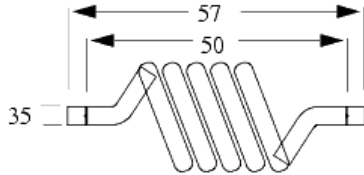
Alignment corner marks
no ports
conductor 5 mil wide



1.56 COIL1

1.56.1 COIL1

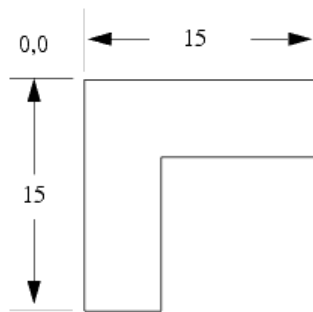
General inductor outline
hand wound coil inductor
2 ports
dia.35 mil



1.57 C-UL

1.57.1 C-UL

Alignment corner marks
no ports
conductor 5 mil wide

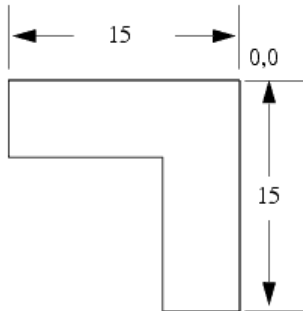


1.58 C-UR

1.58.1 C-UR

Alignment corner marks
no ports

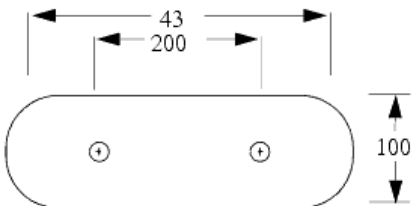
conductor 5 mil wide



1.59 DISK L

1.59.1 DISK_L

Ceramic disk capacitors (large)
2 ports 200 mil port-to-port
packages 140 × 432 mil
leads 24 mil diameter

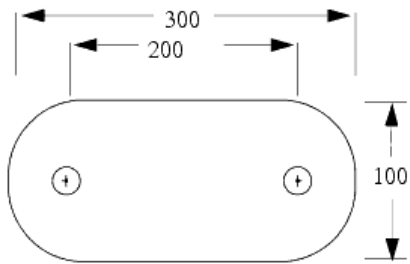


1.60 DISK M

1.60.1 DISK_M

Ceramic disk capacitors (medium)
2 ports 200 mil port-to-port
packages 140 × 300 mil

leads 24 mil diameter



1.61 DISK S

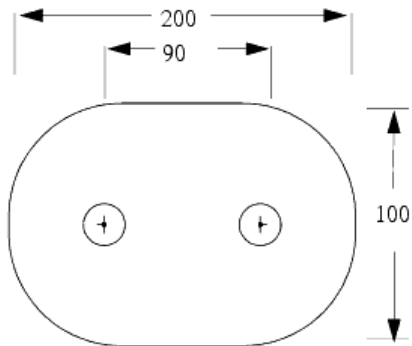
1.61.1 DISK_S

Ceramic disk capacitors (small)

2 ports 90 mil port-to-port

packages 140 × 200 mil

leads 24 mil diameter



1.62 GD4

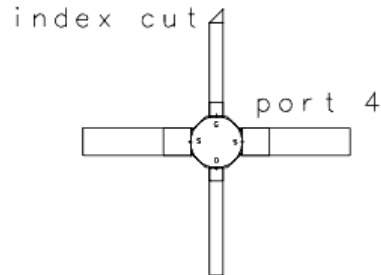
1.62.1 GD4

GD4

4 ports

SMT

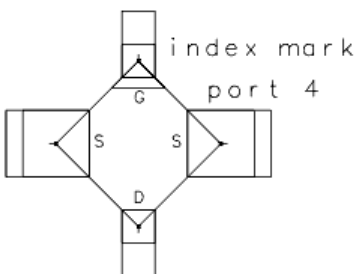
package 75 mil octagon
 2 leads 40 × 157.5 mil, 2 leads 20 × 157.5 mil
 2 pads 40 mil square, 2 pads 20 mil square
 FET



1.63 GD7

1.63.1 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



1.64 GD9

1.64.1 GD9

GD9

4 ports

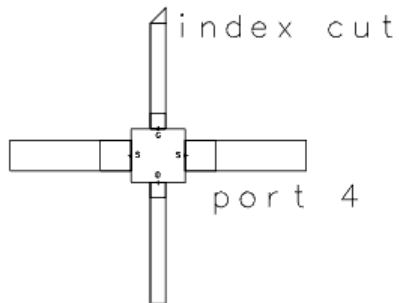
SMT

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



1.65 GD11

1.65.1 GD11

GD11

4 ports

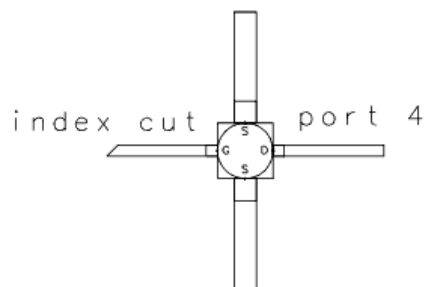
SMT

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



1.66 GD16

1.66.1 GD16

GD16

4 ports

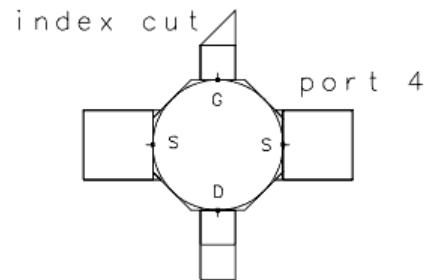
SMT

package 75 mil octagon

2 leads 40 x 40 mil, 2 leads 20 x 40 mil

2 pads 40 mil square, 2 pads 20 mil square

FET



1.67 GF1

1.67.1 GF1

GF1

3 ports

flange 327 x 98 mil 10 mil rad corners

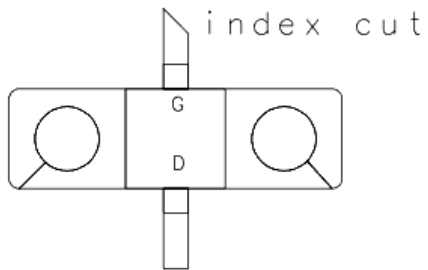
package 98 mil square

2 holes 63 mil diameter 213 mil center-to-center

2 leads 24 x 79 mil

2 pads 24 mil square

FET



1.68 GF4

1.68.1 GF4

GF4

3 ports

flange 417 × 138 mil 12 mil corners

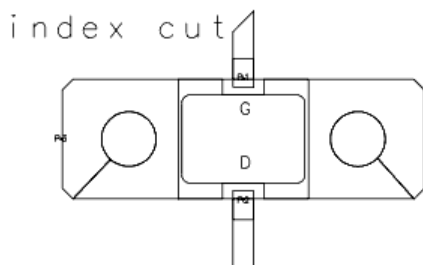
package 150 × 98 mil minus indentations

holes 63 mil diameter 264 mil center-to-center

2 leads 24 × 79 mil

2 pads 24 mil square

FET



1.69 GF7

1.69.1 GF7

GF7

3 ports

flange 551 × 173 mil

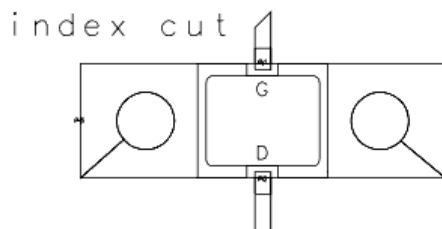
package 197 × 173 mil minus indentations

holes 87 mil diameter 354 mil center-to-center

2 leads 24 × 79 mil

2 pads 24 mil square

FET



1.70 GF11

1.70.1 GF11

GF11

3 ports

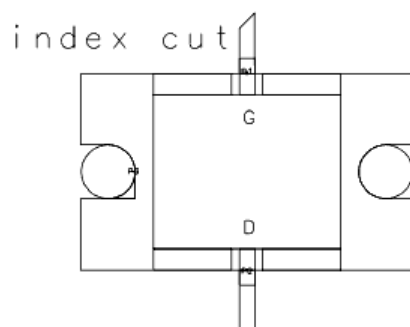
open flange 433 × 256 mil

holes 70 mil diameter 362 mil center-to-center

2 leads 20 × 79 mil

2 pads 20 mil square

FET



1.71 GF21

1.71.1 GF21

GF21

3 ports

open flange 689 x 250 mil 30 mil corners

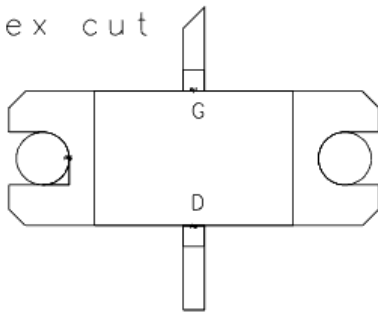
holes 98.4 mil diameter 563 mil center-to-center

2 leads 39.4 x 157.5 mil

2 pads 39.4 x 39.4 mil

FET

index cut



1.72 HP70GT

1.72.1 HP70GT

HPAC-70GT

4 ports

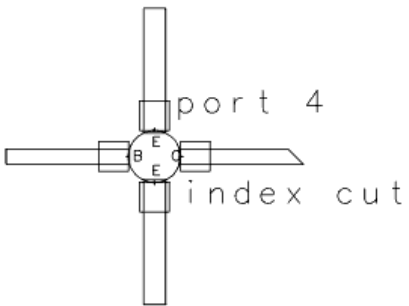
SMT

package 70 mil diameter

2 leads 30 x 165 mil, 2 leads 20 x 165 mil

pads 40 mil square

BJT



1.73 HP85PLAS

1.73.1 HP85PLAS

HP85 Plastic

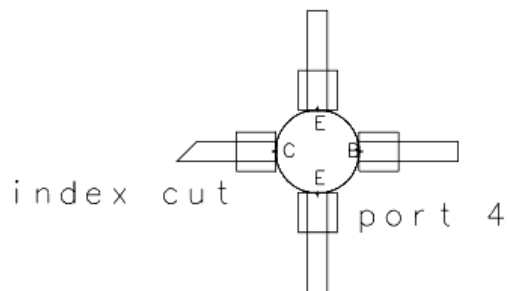
4 ports

package and hole 85 mil diameter

leads 20 × 100.5 mil

pads 40 mil square

BJT



1.74 HPAC100

1.74.1 HPAC100

HPAC100

4 ports

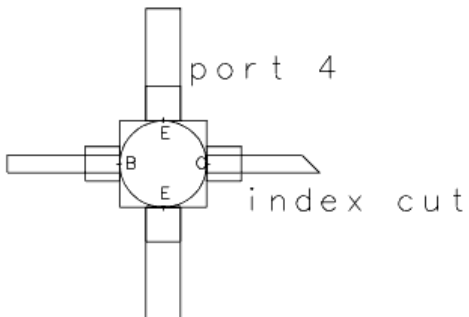
SMT

package 100 mil square and diameter

2 leads 40 × 130 mil, 2 leads 20 × 130 mil

pads 40 mil square

BJT



1.75 HPAC100X

1.75.1 HPAC100X

HPAC100X

4 ports

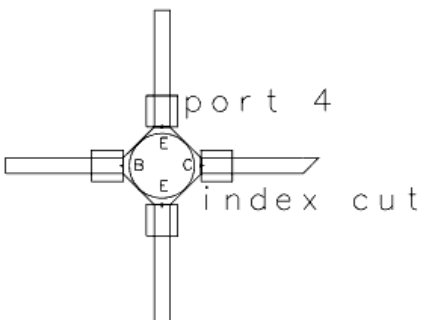
SMT

package 100 mil octagon and 83 mil diameter circle

4 leads 20 × 150 mil

pads 40 mil square

BJT



1.76 HPAC200

1.76.1 HPAC200

HPAC200

4 ports

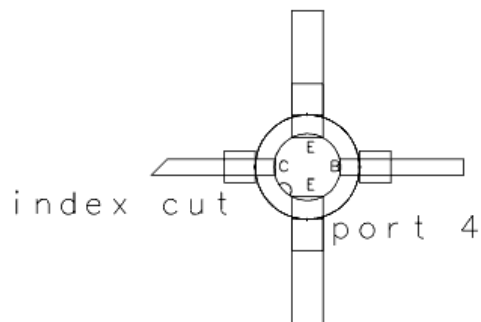
package and hole 200 mil diameter

leads enter package at 128 mil diameter

2 leads 60 × 200 mil, 2 leads 30 × 200 mil

pads 60 mil square

BJT



1.77 HPAC200V2

1.77.1 HPAC200V2

HPAC200

4 ports

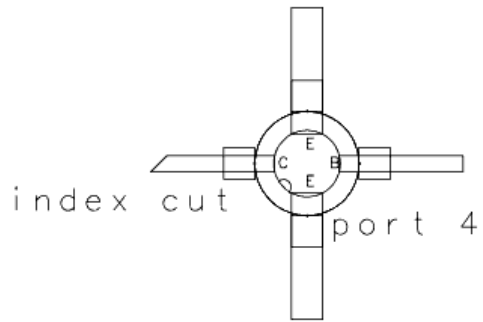
package and hole 200 mil diameter

leads enter package at 128 mil diameter

2 leads 60 × 200 mil, 2 leads 30 × 200 mil

pads 60 mil square

BJT



1.78 LG

1.78.1 LG

LG

4 ports

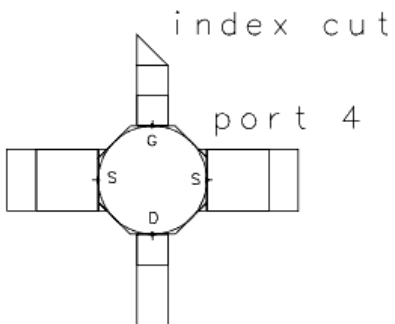
SMT

package 70 mil octagon

2 leads 40 x 59 mil, 2 leads 20 x 59 mil

2 pads 40 mil square, 2 pads 20 mil square

FET



1.79 LLD

1.79.1 LLD

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



1.80 M205

1.80.1 M205

M205

2 ports

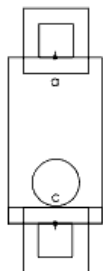
SMT

package 60 × 106.3 mil

2 leads 21.7 × 21.5 mil

2 pads 41.7 × 41.5 mil

Diode



1.81 M253

1.81.1 M253

M253

4 ports

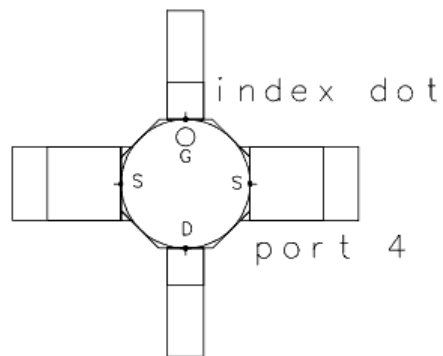
SMT

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



1.82 MACROT

1.82.1 MACROT

MACRO-T

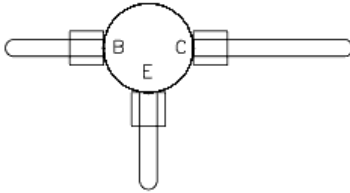
3 ports

package and hole 190 mil diameter

2 pins 36 × 207.5 mil, 1 pin 36 × 337.5 mil

pads 72 mil square

BJT



1.83 MACROX

1.83.1 MACROX

MACRO-X

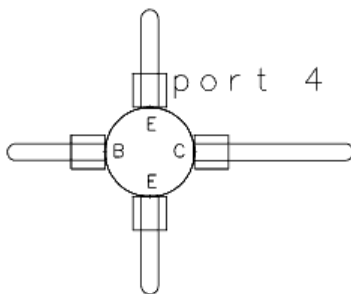
4 ports

package and hole 190 mil diameter

3 pins 36 × 207.5 mil, 1 pin 36 × 337.5 mil

pads 72 mil square

BJT



1.84 ME

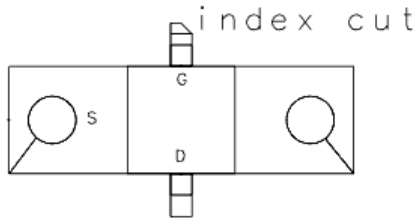
1.84.1 ME

ME

3 ports

flange 630 × 197 mil

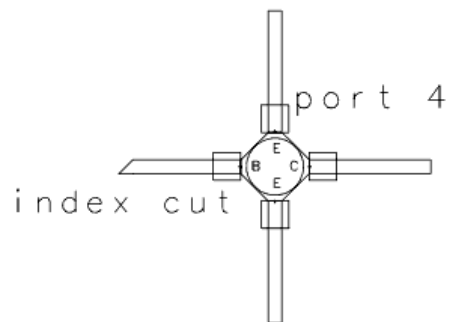
package 197 mil square
holes 87 mil diameter 472 mil center-to-center
2 leads 39 x 79 mil
2 pads 39 mil square
FET



1.85 MICROX

1.85.1 MICROX

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



1.86 MOP

1.86.1 MOP

Mini Octal Package

8 ports

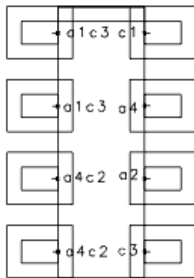
SMT

package 185.4 × 59 mil

8 leads 25 × 15.8 mil

8 pads 45 × 35.8 mil

Diode



1.87 MW4

1.87.1 MW4

MW4

4 ports

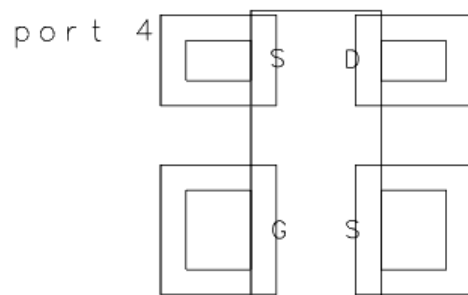
SMT

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



1.88 MWT70

1.88.1 MWT70

MWT70

4 ports

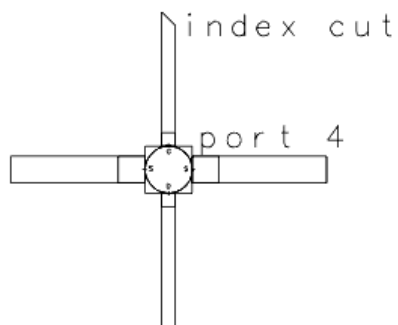
SMT

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



1.89 MWT71

1.89.1 MWT71

MWT71

3 ports

flange 335 × 98 mil

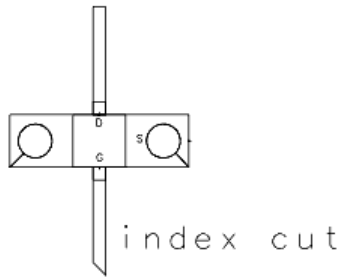
package 98 mil square

holes 63 mil diameter 240 mil center-to-center

2 leads 24 × 201 mil

2 pads 24 mil square

FET



1.90 MWT73

1.90.1 MWT73

MWT73

4 ports

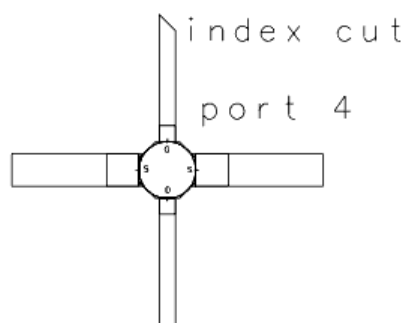
SMT

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



1.91 NEC01

1.91.1 NEC01

NEC01

3 ports

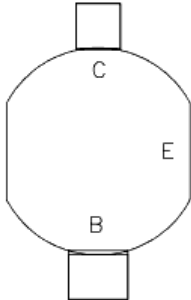
package 275.6 mil diameter circle cut to 244 mil width

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



1.92 NEC03

1.92.1 NEC03

NEC03

4 ports

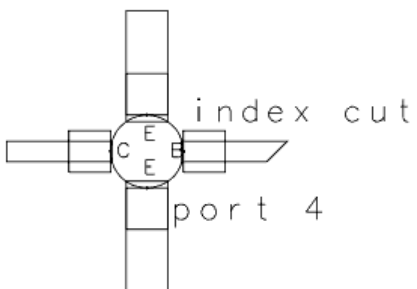
SMT

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



1.93 NEC07

1.93.1 NEC07

NEC07

4 ports

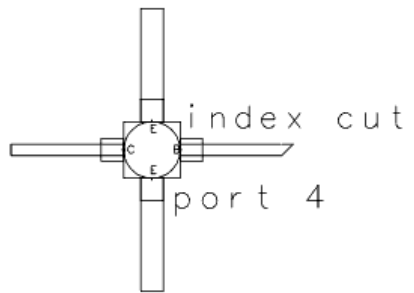
SMT

package 98.4 mil square and circle

2 leads 39.4 × 196.9 mil, 2 leads 19.7 × 196.9 mil

pads 39.4 mil square

BJT



1.94 NEC08

1.94.1 NEC08

NEC08

4 ports

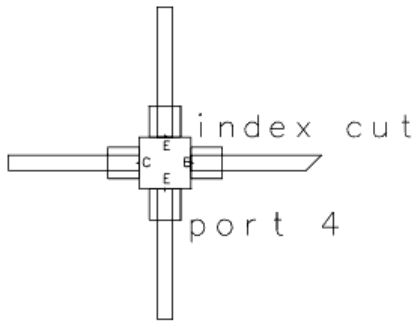
SMT

package 78.7 mil square

leads 23.6 × 196.9 mil

pads 47.2 mil square

BJT



1.95 NEC12

1.95.1 NEC12

NEC12

3 ports

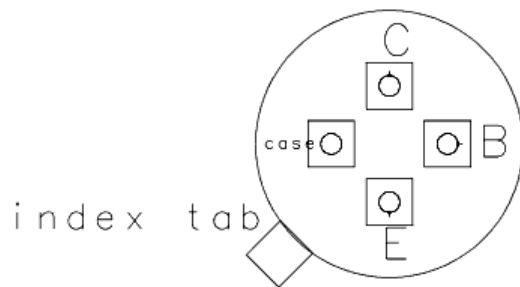
package 229.9 mil diameter

holes 17.8 mil diameter

50 mil from package center

pads 40 mil square

BJT



1.96 NEC13

1.96.1 NEC13

NEC13

3 ports

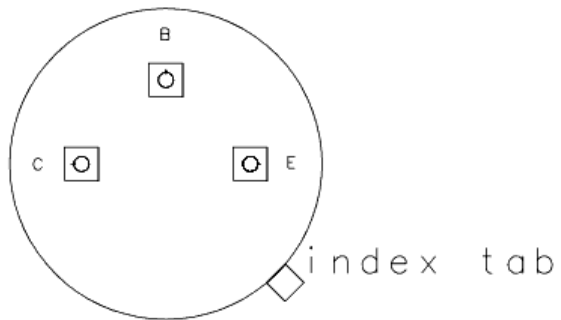
package 370.1 mil diameter

holes 17.8 mil diameter

100 mil from package center

pads 40 mil square

BJT



1.97 NEC14

1.97.1 NEC14

NEC14

3 ports

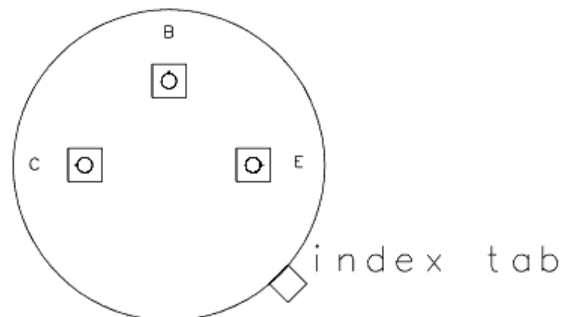
package 370.1 mil diameter

holes 17.8 mil diameter

100 mil from package center

pads 40 mil square

BJT



1.98 NEC15

1.98.1 NEC15

NEC15

3 ports

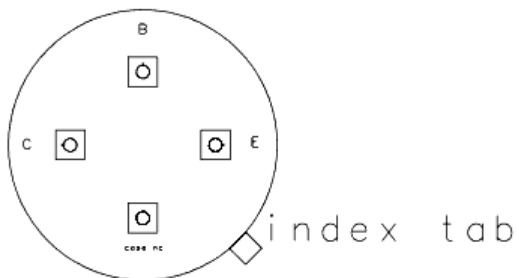
package 370.1 mil diameter

holes 17.8 mil diameter

100 mil from package center

pads 40 mil square

BJT



1.99 NEC18

1.99.1 NEC18

NEC18

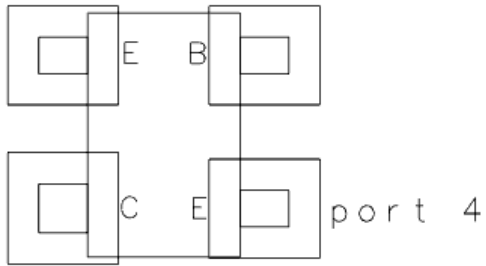
4 ports

SMT

package 49.2 x 78.7 mil

3 leads 11.8 x 15.8 mil, 1 lead 15.8 mil square

3 pads 31.8 mil square



1.100 NEC19

1.100.1 NEC19

NEC19

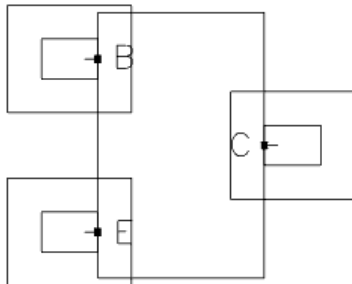
3 ports

SMT

package 31.5 × 63 mil

2 leads 7.9 × 15.8 mil, 1 lead 11.8 × 15.8 mil

BJT



1.101 NEC20

1.101.1 NEC20

NEC20

4 ports

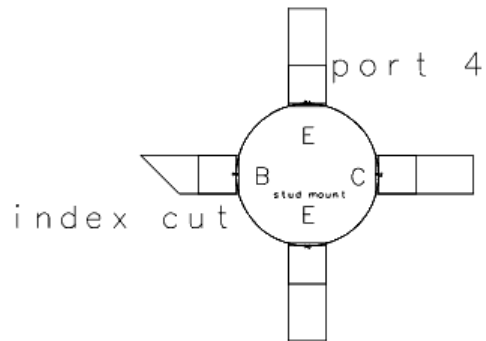
stud mount

package and hole 295.3 mil diameter

4 leads 78.8 × 196.9 mil

4 pads 78.8 mil square

BJT



1.102 NEC30

1.102.1 NEC30

NEC30

3 ports

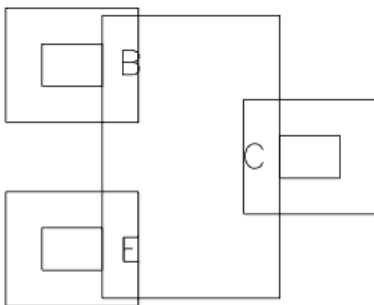
SMT

package 49.3 × 78.8 mil

leads 11.8 × 16.7 mil

pads 31.9 × 36.8 mil

BJT



1.103 NEC32

1.103.1 NEC32

NEC32

3 ports

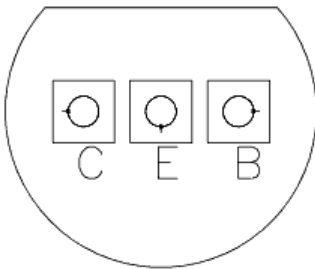
package 204.7 mil diameter circle cut × 149.9 mil chord

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



1.104 NEC33

1.104.1 NEC33

NEC33

3 ports

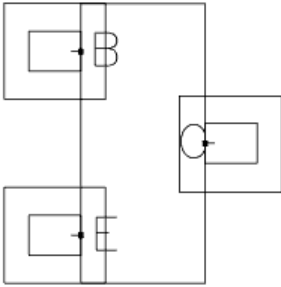
SMT

package 115 × 51 mil

leads 16.5 × 21.5 mil

pads 41.5 × 39.4 mil

BJT



1.105 NEC34

1.105.1 NEC34

NEC34

3 ports

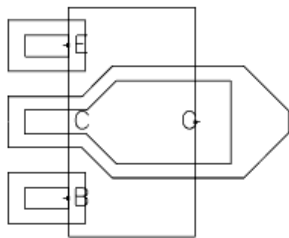
SMT

package 177.2 x 97.7 mil

2 leads 16.5 x 33.1 mil and 27.6 x 64.4 mil

2 pads 39.4 x 59.1 mil

BJT



1.106 NEC35

1.106.1 NEC35

NEC35

4 ports

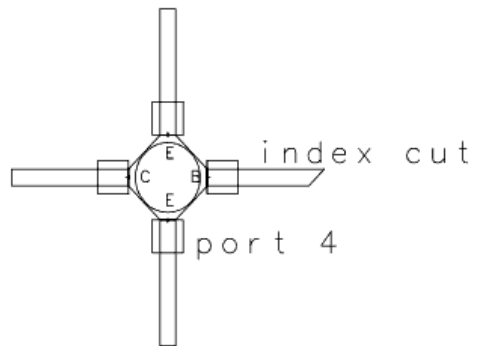
SMT

package 100.4 mil octagon and 82.7 mil diameter circle

leads 19.7 × 149.6 mil

pads 39.4 mil square

BJT



1.107 NEC37

1.107.1 NEC37

NEC37

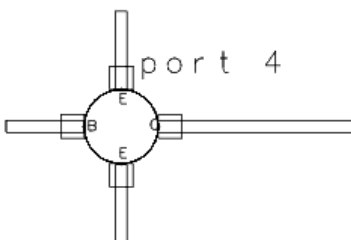
4 ports

package and hole 149.6 mil diameter

3 leads 23.6 × 157.5 mil, 1 lead 23.6 × 393.7 mil

pads 47.2 mil square

BJT



1.108 NEC38

1.108.1 NEC38

NEC38

4 ports

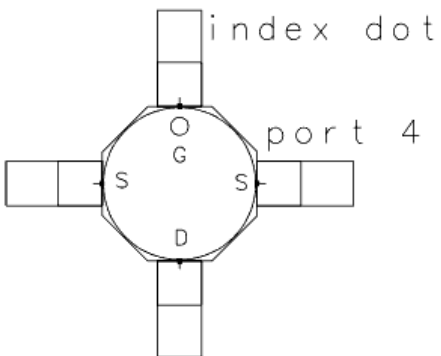
SMT

package 70 mil octagon

leads 20 x 43.5 mil

pads 20 mil square

FET



1.109 NEC39

1.109.1 NEC39

NEC39

4 ports

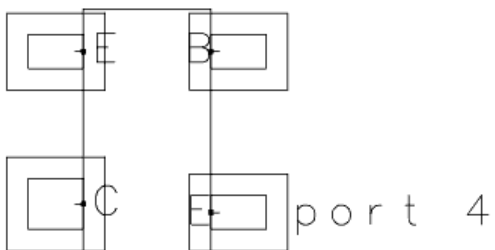
SMT

package 59.1 x 114.2 mil

3 leads 15.7 x 25.6 mil, 1 lead 23.6 x 25.6 mil

pads are leads 10 mil xy

BJT



1.110 NEC53E

1.110.1 NEC53E

NEC53E

3 ports

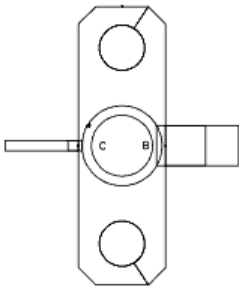
flange 800 × 250 mil

holes 130 mil diameter 563 mil center-to-center

1 lead 30 × 210 mil, 1 lead 115 × 210 mil

1 pad 30 mil square, 1 pad 115 mil square

BJT



1.111 NEC75

1.111.1 NEC75

NEC75

3 ports

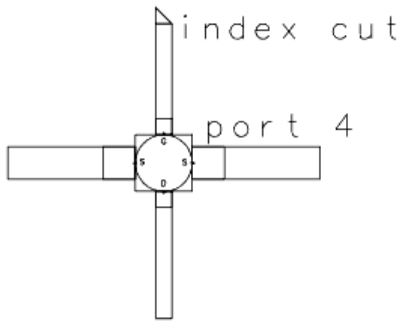
flange 385.8 × 90.6 mil

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



1.112 NEC83

1.112.1 NEC83

NEC83

4 ports

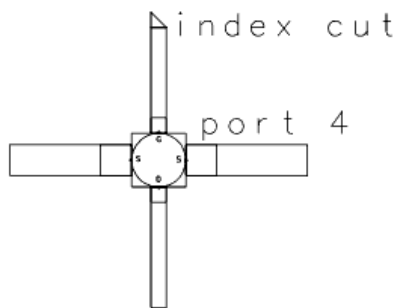
SMT

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



1.113 NEC84

1.113.1 NEC84

NEC84

4 ports

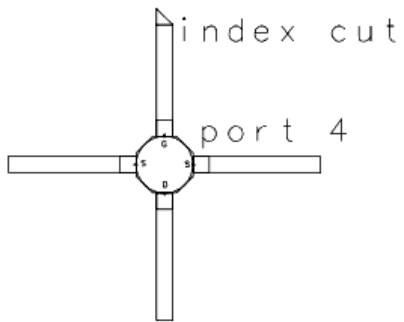
SMT

package 70 mil octagon

leads 20 x 157.5 mil

pads 20 mil square

FET



1.114 NEC84A

1.114.1 NEC84A

NEC84A

4 ports

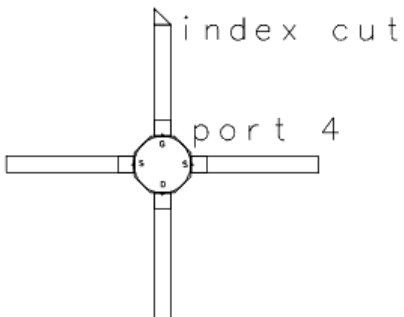
SMT

package 70 mil octagon

leads 20 x 157.5 mil

pads 20 mil square

FET



1.115 NEC87

1.115.1 NEC87

NEC87

3 ports

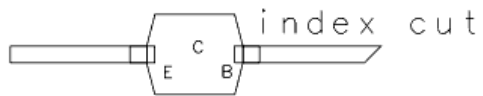
package 114.2 × 137.8 mil octagon

2 leads 23.6 × 196.9 mil

2 pads 23.6 mil square

collector on bottom

BJT



1.116 NEC89

1.116.1 NEC89

NEC89

4 ports

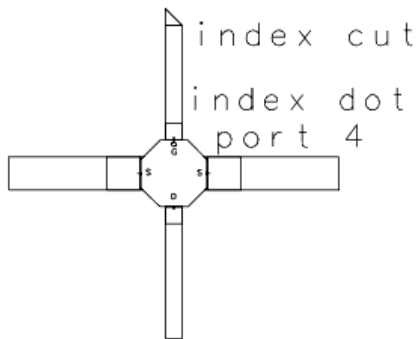
SMT

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



1.117 NEC89A

1.117.1 NEC89A

NEC89A

4 ports

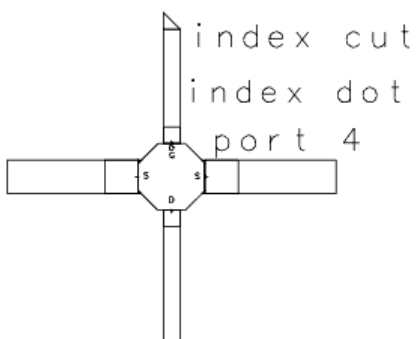
SMT

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



1.118 OKI 1

1.118.1 OKI_1

(no name given by vendor)

3 ports

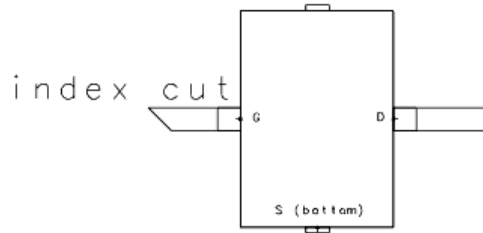
package and hole 130 × 185 mil

2 leads 19.7 × 78.8 mil

2 pads 19.7 mil square

2 support bars 5 × 20 mil

FET



1.119 PFLANGE

1.119.1 PFLANGE

(no name given by vendor)

5 ports

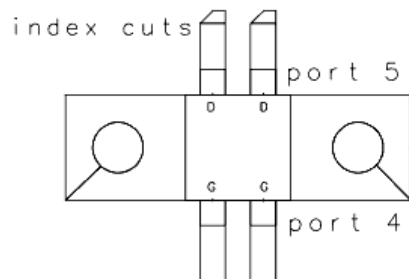
flange 820 × 250 mil

holes 120 mil diameter 570 mil center-to-center

leads 60 × 200 mil

pads 60 mil square

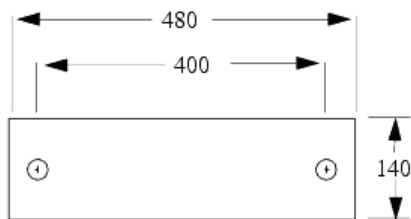
FET



1.120 RADIAL L

1.120.1 RADIAL_L

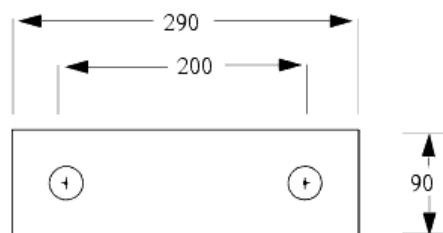
Radial leaded components
2 ports 400 mil port-to-port
packages 140 × 480 mil
leads 28 mil diameter



1.121 RADIAL M

1.121.1 RADIAL_M

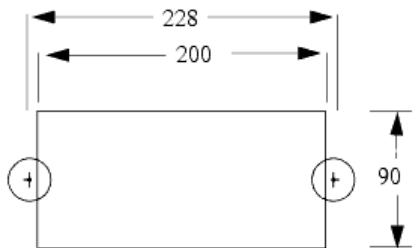
Radial leaded components
2 ports 200 mil port-to-port
packages 90 × 290 mil
leads 28 mil diameter



1.122 RADIAL S

1.122.1 RADIAL_S

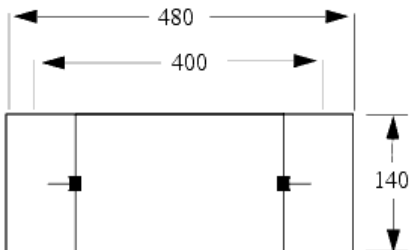
Radial leaded components
2 ports 200 mil port-to-port
packages 90 × 190 mil
leads 28 mil diameter



1.123 RESA

1.123.1 RESA

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



1.124 SFLANGE

1.124.1 SFLANGE

(no name given by vendor)

4 ports

flange 975 × 250 mil

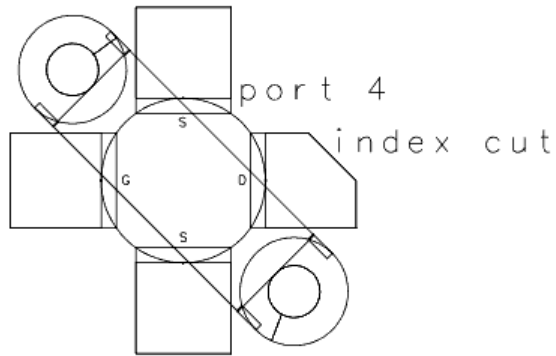
package 380 mil diameter

holes 120 mil diameter 725 mil center-to-center

leads 220 × 210 mil at 45°

pads 220 × 210 mil

FET



1.125 SMA FEM

1.125.1 SMA_FEM

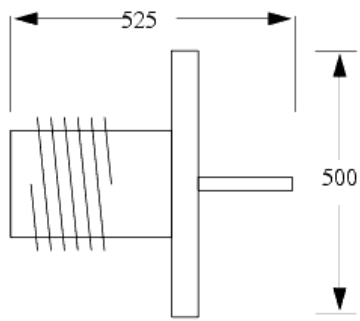
SMA connector outline female

no ports

conductor

cond2

leads



1.126 SMSMICROX

1.126.1 SMSMICROX

Siemens MICRO-X

4 ports

SMT

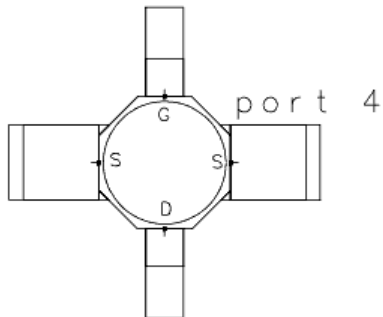
package 70 mil octagon

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



1.127 SOD80

1.127.1 SOD80

SOD80

2 ports

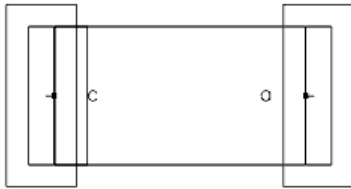
SMT

package 63 × 137.8 mil

2 leads 11.8 × 63 mil

2 pads 31.8 × 83 mil

Diode



1.128 SOD123

1.128.1 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



1.129 SOD323

1.129.1 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



1.130 SOT23

1.130.1 SOT23

SOT23

3 ports

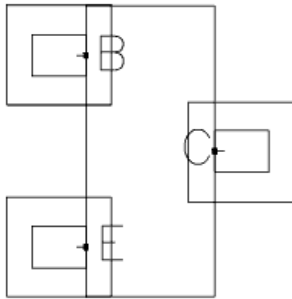
SMT

package 115 × 51 mil

leads 16.5 × 21.5 mil

pads 41.5 × 39.4 mil

BJT



1.131 SOT23V2

1.131.1 SOT23V2

SOT23

2 ports

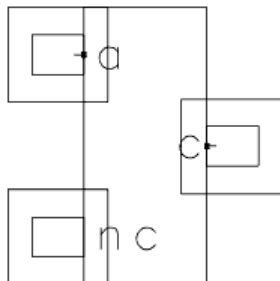
SMT

package 115 × 51 mil

leads 16.5 × 21.5 mil

pads 41.5 × 39.4 mil

Diode



1.132 SOT23V3

1.132.1 SOT23V3

SOT23

2 ports

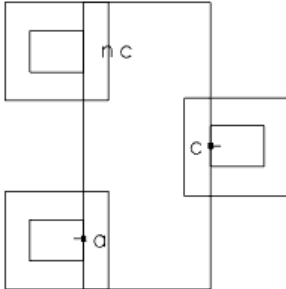
SMT

package 115 × 51 mil

leads 16.5 × 21.5 mil

pads 41.5 × 39.4 mil

Diode



1.133 SOT23V4

1.133.1 SOT23V4

SOT23

2 ports

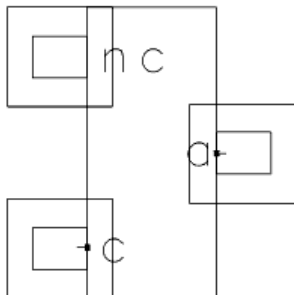
SMT

package 115 × 51 mil

leads 16.5 × 21.5 mil

pads 41.5 × 39.4 mil

Diode



1.134 SOT23V5

1.134.1 SOT23V5

SOT23

3 ports

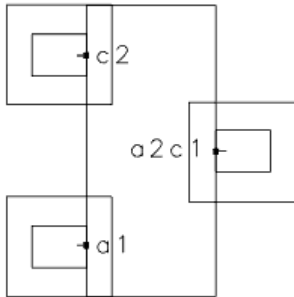
SMT

package 115 × 51 mil

leads 16.5 × 21.5 mil

pads 41.5 × 39.4 mil

Diode



1.135 SOT23V6

1.135.1 SOT23V6

SOT23

3 ports

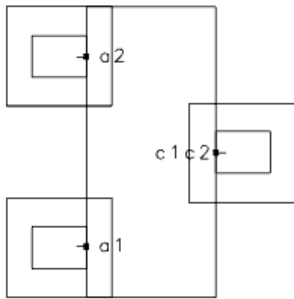
SMT

package 115 × 51 mil

leads 16.5 × 21.5 mil

pads 41.5 × 39.4 mil

Diode



1.136 SOT23V7

1.136.1 SOT23V7

SOT23

3 ports

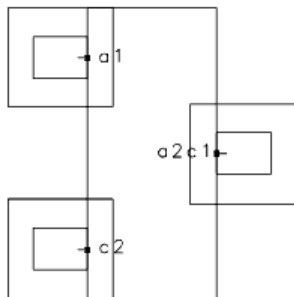
SMT

package 115 × 51 mil

leads 16.5 × 21.5 mil

pads 41.5 × 39.4 mil

Diode



1.137 SOT23V8

1.137.1 SOT23V8

SOT23

3 ports

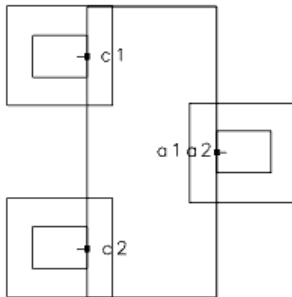
SMT

package 115×51 mil

leads 16.5×21.5 mil

pads 41.5×39.4 mil

Diode



1.138 SOT37

1.138.1 SOT37

SOT37

3 ports

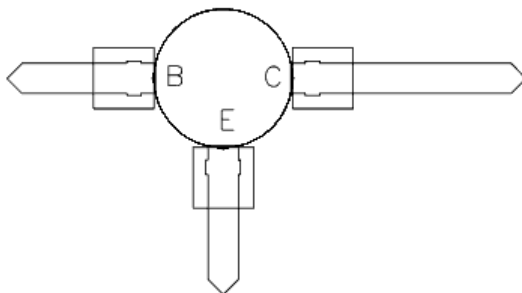
package and hole 189 mil diameter

2 leads 41.3×200.8 mil

1 lead 41.3×318.9 mil

pads 82.6 mil square

BJT



1.139 SOT89

1.139.1 SOT89

SOT89

3 ports

SMT

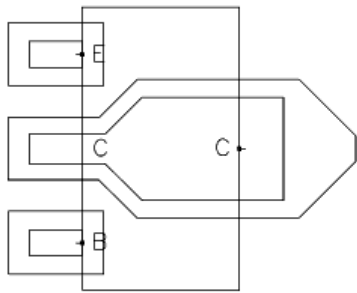
package 177.2 × 97.7 mil

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



1.140 SOT89V2

1.140.1 SOT89V2

SOT89

3 ports

SMT

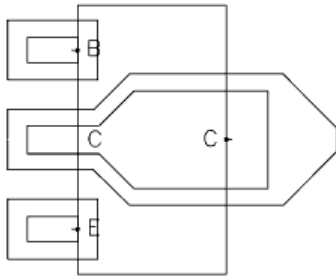
package 177.2 × 97.7 mil

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



1.141 SOT103

1.141.1 SOT103

SOT103

4 ports

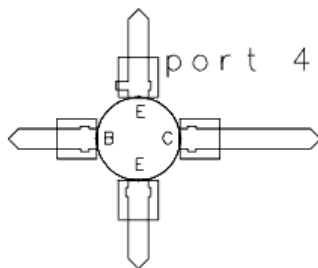
package and hole 189 mil diameter

3 leads 45.3 × 200.8 mil

1 lead 45.3 × 318.9 mil

pads 90.6 mil square

BJT



1.142 SOT143

1.142.1 SOT143

SOT143

4 ports

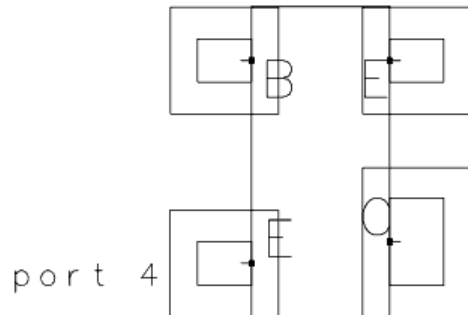
SMT

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



1.143 SOT143R

1.143.1 SOT143R

SOT143R

4 ports

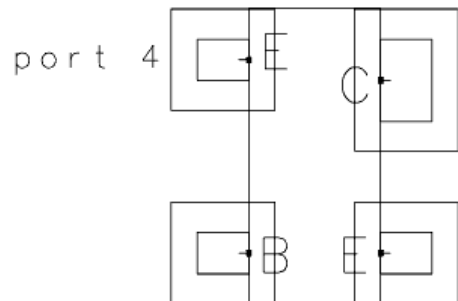
SMT

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



1.144 SOT143RV2

1.144.1 SOT143RV2

SOT143

4 ports

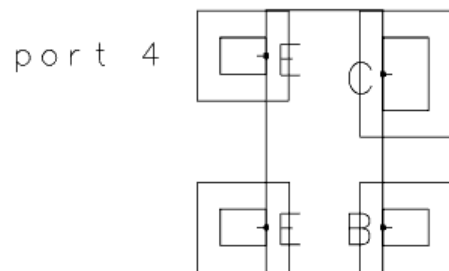
SMT

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



1.145 SOT143V2

1.145.1 SOT143V2

SOT143

4 ports

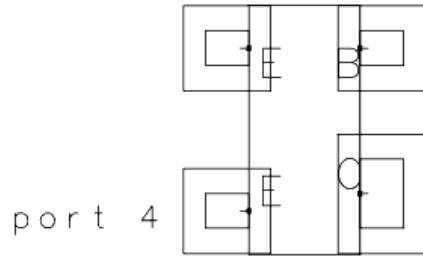
SMT

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



1.146 SOT143V3

1.146.1 SOT143V3

SOT143

4 ports

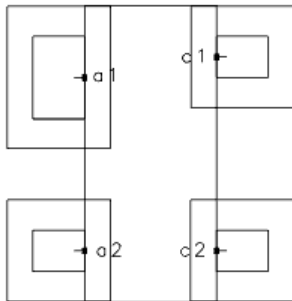
SMT

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



1.147 SOT143V4

1.147.1 SOT143V4

SOT143

4 ports

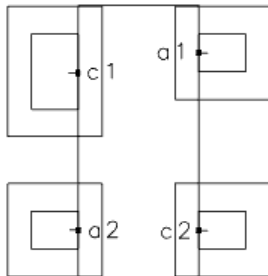
SMT

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



1.148 SOT143V5

1.148.1 SOT143V5

SOT143

4 ports

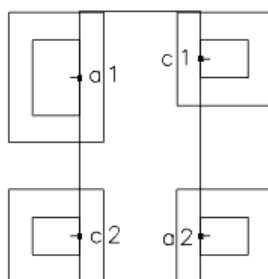
SMT

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



1.149 SOT143V6

1.149.1 SOT143V6

SOT143

4 ports

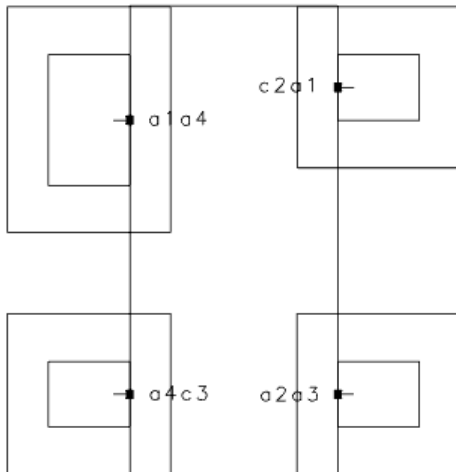
SMT

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



1.150 SOT143V7

1.150.1 SOT143V7

SOT143

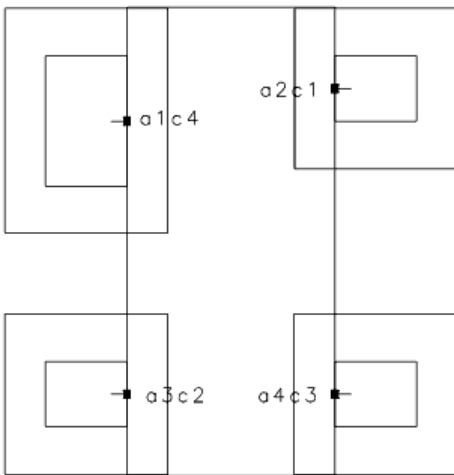
4 ports

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



1.151 SOT223

1.151.1 SOT223

SOT223

4 ports

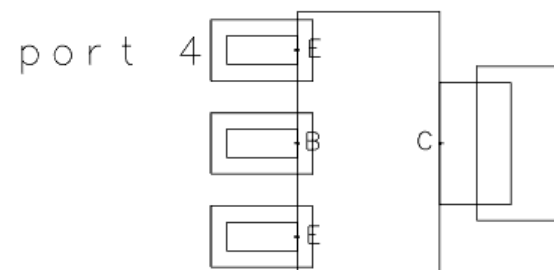
SMT

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



1.152 SOT223V2

1.152.1 SOT223V2

SOT223

3 ports

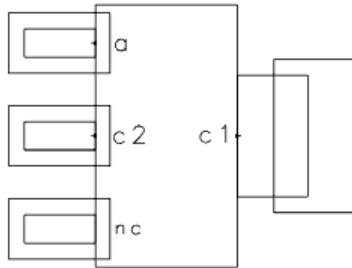
SMT

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



1.153 SOT323

1.153.1 SOT323

SOT323

3 ports

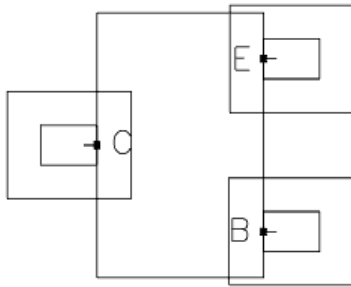
SMT

package 78.6 × 49.4 mil

leads 11.8 × 16.8 mil

pads 31.8 × 36.8 mil

BJT



1.154 SRP

1.154.1 SRP

SRP

2 ports

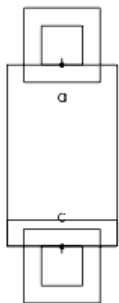
SMT

package 63 × 104.3 mil

2 leads 22.6 × 23.6 mil

2 pads 42.6 × 43.6 mil

Diode



1.155 TO39

1.155.1 TO39

TO39

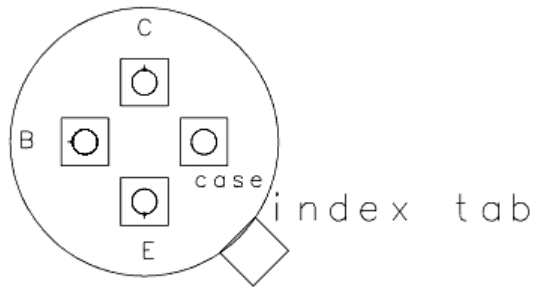
3 ports

package 352.5 mil diameter

holes 21 mil diameter 100 mil from package center

pads 40 mil square

BJT



1.156 TO72

1.156.1 TO72

TO72

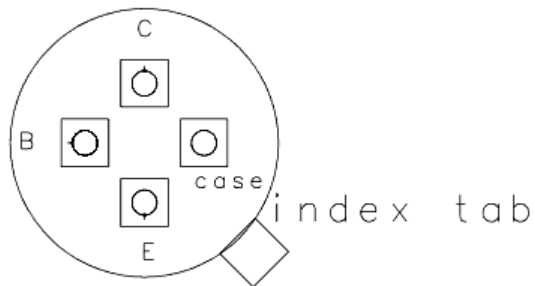
3 ports

package 225.4 mil diameter

holes 21 mil diameter 50 mil from center

pads 40 mil square

BJT



1.157 TO72V2

1.157.1 TO72V2

TO72V2

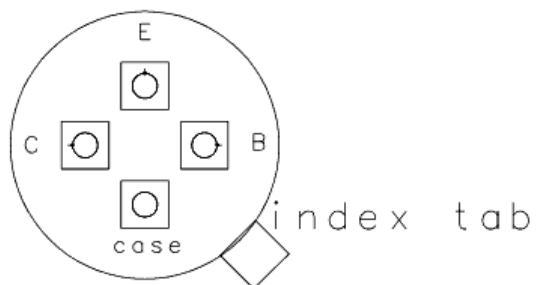
3 ports

package 225.4 mil diameter

holes 21 mil diameter 50 mil from center

pads 40 mil square

BJT



1.158 TO92

1.158.1 TO92

TO92

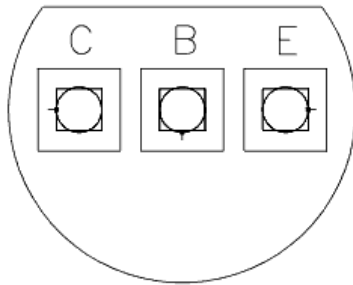
3 ports

package 170 mil diameter cut × 135 mil chord

holes 22 mil diameter and 22 × 20 mil

pads 40 mil square

BJT



1.159 TO117

1.159.1 TO117

TO117

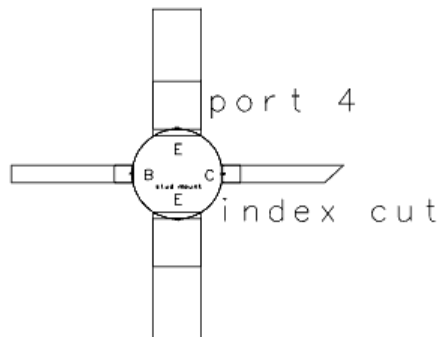
4 ports

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

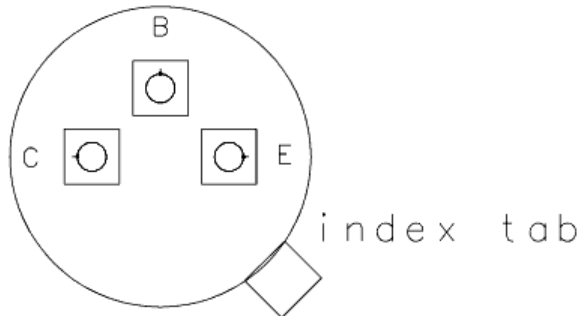
BJT



1.160 TO206AA

1.160.1 TO206AA

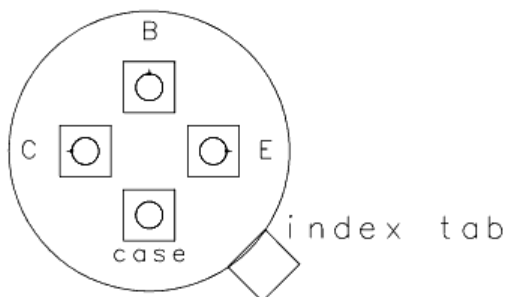
TO206AA
3 ports
package 219.5 mil diameter
holes 21 mil diameter 50 mil from package center
pads 40 mil square
BJT



1.161 TO206AF

1.161.1 TO206AF

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



1.162 TO226AA

1.162.1 TO226AA

TO226AA

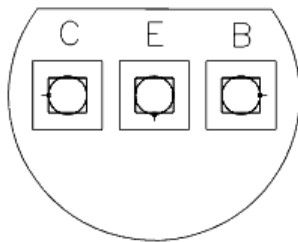
3 ports

package 170 mil diameter cut × 135 mil chord

holes 22 mil diameter and 22 × 20 mil

pads 40 mil square

BJT



1.163 TPLAST

1.163.1 TPLAST

TPLAST

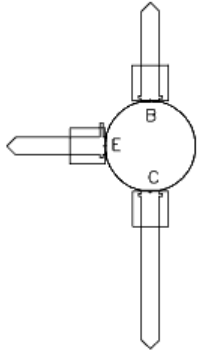
3 ports

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

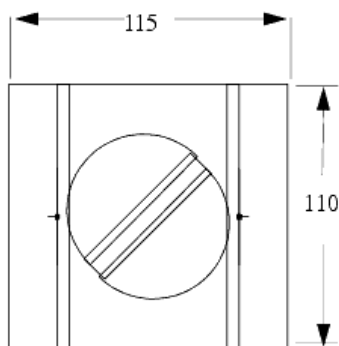
BJT



1.164 TUNCAP

1.164.1 TUNCAP

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



1.165 UMD

1.165.1 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



1.166 UPRIGHT

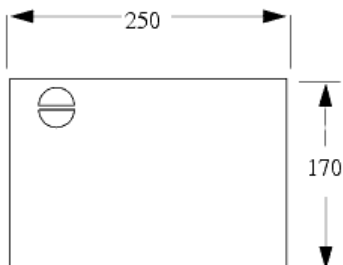
1.166.1 UPRIGHT

Upright mounted variable resistor

no ports

packages 170 × 250 mil

Text



1.167 URP

1.167.1 URP

URP

2 ports

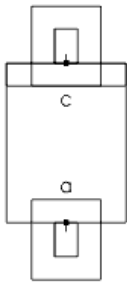
SMT

package 52 × 70 mil

2 leads 10 × 15 mil

2 pads 30 × 35 mil

Diode



1.168 WIRE0

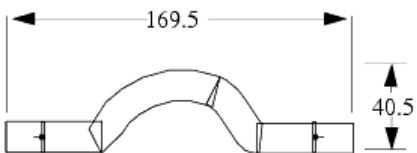
1.168.1 WIRE0

Wire loop outline

2 ports 133.5 mil port-to-port

conductor 15 mil wide × 47 mil

dielectric



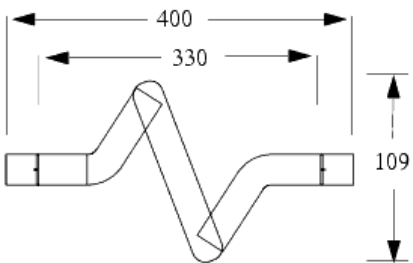
1.169 WIRE1

1.169.1 WIRE1

one turn coil outline

2 ports 330 mil port-to-port

dielectric 35 mil wide



Chapter 2 – Font Definitions

2.1 din17

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

2.2 iso3098

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

2.3 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 - = □
□ ! □ □ $ % ' & * ( ) □ + □
□ □ □ □ □ ' ; : ' " , . / ?
```

2.4 smooth

```
abcde fgh i jkl
mnopq r s t u v w x y z
ABCDEF GHI JKL
MNOPQR STUVWXYZ
` 1 2 3 4 5 6 7 8 9 0 - = |
□ ! @ # $ % ^ & * ( ) - + \
[ ] □ □ < > ; : ' " , . / ?
```

2.5 *italic*

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 - = □
 □ ! □ □ \$ □ □ & * () □ + □
 [] { } □ □ ; : ' " , . / ?

2.6 **standard**

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 - = |
 ~ ! @ # \$ % ^ & * () + \
 [] { } < > ; : ' " , . / ?

2.7 gothic

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 - = □
 □ ! ' ' \$ % □ & * () □ + □
 □ □ □ □ □ □ ; : ' " , . / ?

2.8 math

α β γ δ ε ζ η θ ι κ λ μ
 ν ξ ο π ρ σ τ υ φ χ ψ ω θ φ
 Α Β Γ Δ Ε Ζ Η Θ Ι Κ Λ Μ
 Ν Ξ Ο Π Ρ Σ Τ Υ Φ Χ Ψ Ω ς α
 . 1 2 3 4 5 6 7 8 9 0 - = √ ∑
 ≠ √ ∙ ∘ ∞ ÷ ≥ ∝ × () + √ ∑
 ζ ≠ ω ≡ < > ε e ' " , . / ≈ ∑

2.9 sans

abcdefghijklmnopkl
mnopqrstuvwxyz
ABCDEFGHIJKLM
MNOPQRSTUVWXYZ
' 1234567890 - = |
~ ! @ # \$ % ^ & * () _ + \
[] { } < > ; : ' " , . / ?

2.10 sansbold

abcdefghijklmnopkl
mnopqrstuvwxyz
ABCDEFGHIJKLM
MNOPQRSTUVWXYZ
' 1234567890 - = |
**~ ! @ # \$ % ^ & * () _ + \
[] { } < > ; : ' " , . / ?**

2.11 filled

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

2.12 filledbold

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

2.13 straight

```

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 - = |
~ ! @ # $ % ^ & * ( ) _ + \
[ ] { } < > ; : ' " . / ?

```

2.14 straightfilled

```

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

```

Chapter 3 – 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 section 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.

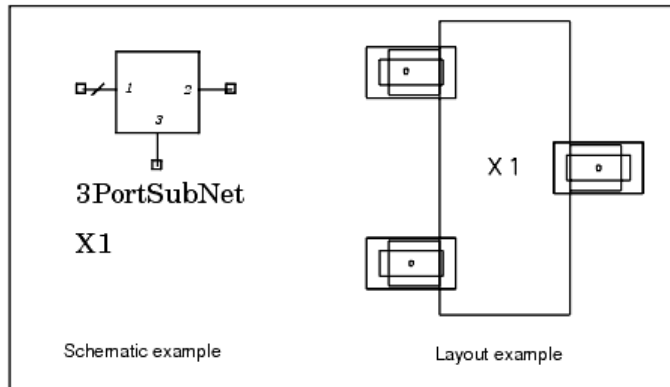
This section also describes how you can use the SMT PAL to define the SMT package artwork in a custom *create_item* and how you can use the AEL macro name defining the package artwork as an artwork replacement for sub-circuits or sub-systems.

3.1 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, SMT_Pad and OFFSET. Set the SMT_Pad parameter type to *string*.

[SMT Artwork Replacement Examples](#) 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, SMT_Pad and OFFSET, are defined in the Design Parameters dialog. Set the SMT_Pad parameter value to *String*, with *"Pad1"* as its default value. Set the OFFSET parameter type to *real*, with *0* as its default value.



3.1.1 SMT Artwork Replacement Examples

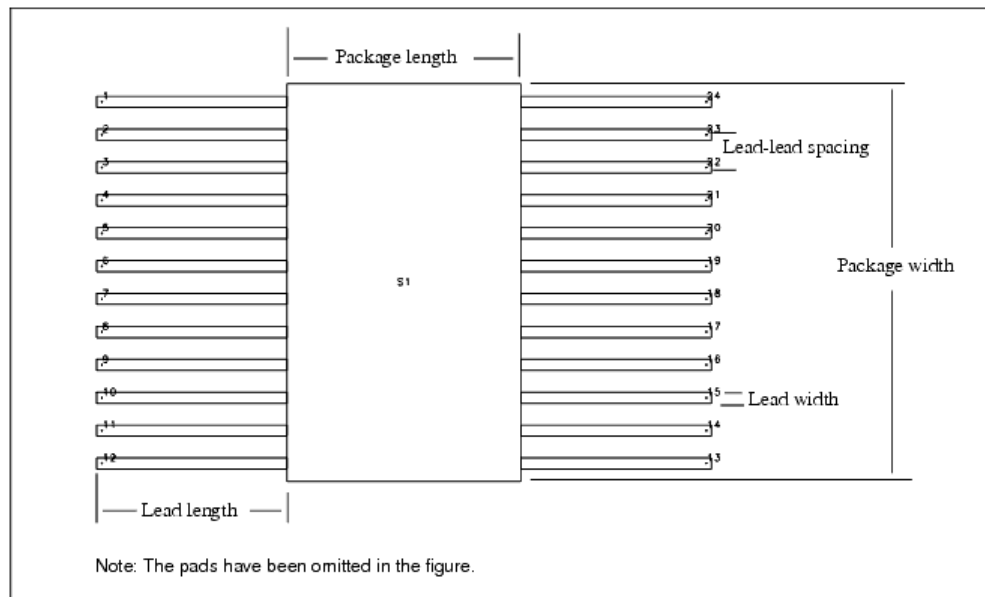
3.2 Ceramic Flat Pack (CFP) Packages

[Ceramic Flat Pack \(CFP\) Packages](#) lists 17 CFP packages and the associated layout artwork AEL macro name and dimensions for each package. [Ceramic Flat Pack \(CFP\) Layout Artwork](#) shows the layout artwork for a typical CFP with the marked dimensions given in the table.

3.2.1 Ceramic Flat Pack (CFP) Packages

Part Name	AEL Macro Name	Package		Lead		Lead-lead Spacing (mm)
		Width (mm)	Length (mm)	Width (mm)	Length (mm)	
CFP24	smtart_CFP24	15.36	9.65	0.43	7.87	1.27

Part Name	AEL Macro Name	Package		Lead		Lead-lead Spacing (mm)
CFP28	smtart_CFP 28	18.78	9.14	0.43	7.87	1.27
CFP42	smtart_CFP 42	27.16	16.24	0.43	7.61	1.27
CFP10-03	smtart_CFP 10_03	7.36	3.81	0.305	2.74	1.27
CFP14-03	smtart_CFP 14_03	9.9	3.81	0.305	2.74	1.27
CFP10-04	smtart_CFP 10_04	7.36	6.35	0.431	2.47	1.27
CFP14-04	smtart_CFP 14_04	9.9	6.35	0.431	2.47	1.27
CFP16-04	smtart_CFP 16_04	11.17	6.35	0.431	2.47	1.27
CFP16-21	smtart_CFP 16_21	11.17	13.96	0.431	3.16	1.27
CFP20-22	smtart_CFP 20_22	13.71	16.5	0.431	2.89	1.27
CFP24-19	smtart_CFP 24_19	16.25	8.88	0.431	3.20	1.27
CFP24-21	smtart_CFP 24_21	16.25	13.96	0.431	3.16	1.27
CFP28-19	smtart_CFP 28_19	18.79	8.88	0.508	3.20	1.27
CFP36-20	smtart_CFP 36_20	23.87	11.42	0.431	2.93	1.27
CFP36-21	smtart_CFP 36_21	23.87	13.96	0.431	3.16	1.27
CFP36-23	smtart_CFP 36_23	23.87	21.57	0.431	2.86	1.27
CFP40-20	smtart_CFP 40_20	26.41	11.42	0.431	2.93	1.27



3.2.2 Ceramic Flat Pack (CFP) Layout Artwork

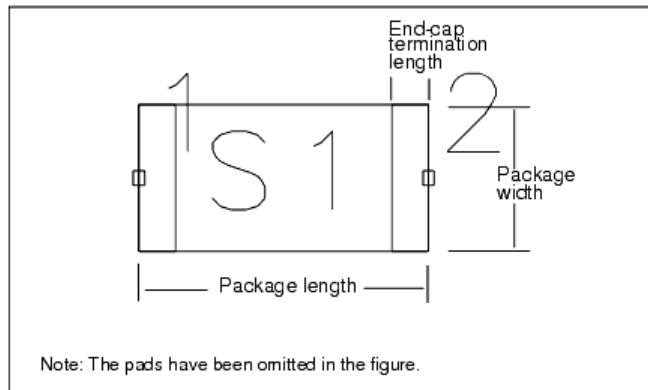
3.3 Chip and MELF Components

[Chip and MELF Component Packages](#) lists 15 chip component packages and 4 MELF components, and the associated layout artwork AEL macro name and dimensions for each package. [Chip Component Layout Artwork](#) shows the layout artwork for a typical chip component, 0402, with the marked dimensions given in the table.

3.3.1 Chip and MELF Component Packages

Part Name	AEL Macro Name	Package	End-cap Termination Length (mm)	Description

Part Name	AEL Macro Name	Package		End-cap Termination Length (mm)	Description
Width (mm)	Length (mm)				
0402	smtart_0402	0.508	1.00	0.127	Resistor
0603-Res	smtart_0603R	0.787	1.55	0.305	Resistor
0603-Cap	smtart_0603C	0.787	1.55	0.203	Capacitor
0805	smtart_0805	1.22	2.01	0.457	Resistor or capacitor
1005	smtart_1005	1.27	2.54	0.254	Capacitor
1206	smtart_1206	1.57	3.20	0.558	Resistor or capacitor
1210	smtart_1210	2.49	3.20	0.558	Resistor or capacitor
1805	smtart_1805	1.27	4.57	0.305	Capacitor
1808	smtart_1808	2.03	4.57	0.305	Capacitor
1812	smtart_1812	3.17	4.57	0.305	Capacitor
1825	smtart_1825	6.35	4.57	0.305	Capacitor
2010	smtart_2010	2.54	5.1	0.40	Capacitor
2220	smtart_2220	5.08	5.58	1.27	Capacitor
2225	smtart_2225	6.35	5.58	1.27	Capacitor
2512	smtart_2512	3.2	6.3	0.40	Capacitor
2309	smtart_2309	2.3	5.9	1.0	MELF
1406	smtart_1406	1.55	3.5	0.80	MELF
SOD-80	smtart_SOD80	1.60	3.5	0.431	MELF
SOD-87	smtart_SOD87	1.6	3.5	0.30	MELF



3.3.2 Chip Component Layout Artwork

3.4 SOT, DPAK, D2PAK Packages

[SOT, DPAK, D2PAK Packages](#) 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, `SMT_Pad` and `OFFSET`. Packages that require two `SMT_Pad` parameters are indicated by an asterisk (*). If lead 1 (e.g., SOT143) is of a different dimension than the other leads, the first `SMT_Pad` identifies lead 1. If a lead other than lead 1 (e.g., DPAK1) is of a different dimension, then the second `SMT_Pad` identifies the lead of a different dimension.

[SOT-23 Layout Artwork](#) shows the layout artwork for a typical SOT-23 package with the marked dimensions given (in mm) in the table.

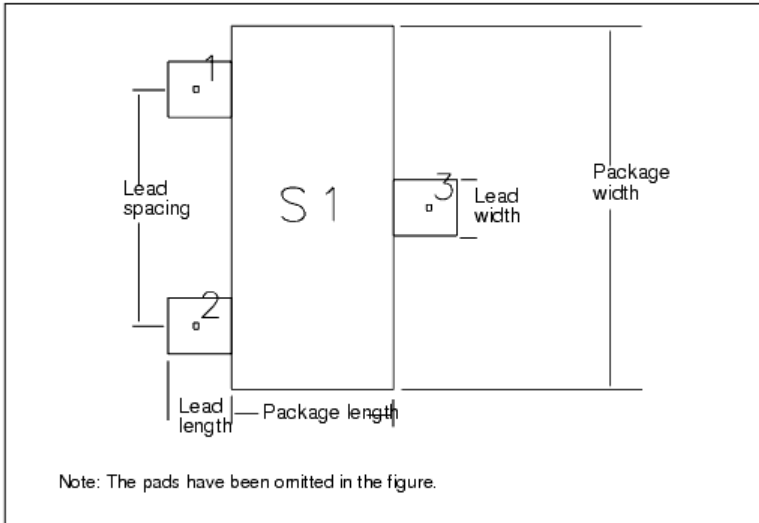
3.4.1 SOT, DPAK, D2PAK Packages (dimensions in mm)

Part Name	AEL Macro Name	Package	Lead 1		Other Leads		Lead-lead Spacing		
			Width (mm)	Length (mm)	Width (mm)	Length (mm)	Side 1 (mm)	Side 2 (mm)	
SOT-23	smtart_SOT23	2.92	1.30	0.45	0.51	0.45	0.51	1.90	N/A
SOT-23, Metric	smtart_SOT23 M1	2.92	1.50	0.45	0.50	0.45	0.50	1.90	N/A
SOT-23, Metric	smtart_SOT23 M2	2.92	1.50	0.45	0.65	0.45	0.65	1.90	N/A
SOT-23, Metric	smtart_SOT23 M3	1.60	0.80	0.30	0.40	0.30	0.40	1.00	N/A
SOT-23, Metric	smtart_SOT23 M4	2.00	1.25	0.30	0.43	0.30	0.43	1.30	N/A
SOT-23, Metric	smtart_SOT23 M5	2.90	1.30	0.40	0.55	0.40	0.55	1.90	N/A
SOT-25	smtart_SOT25A	2.92	1.50	0.30	0.65	0.30	0.54	1.90	0.95
SOT-25	smtart_SOT25B	2.00	0.90	0.20	0.60	0.20	0.60	1.30	0.65
SOT-25	smtart_SOT25C	2.00	1.25	0.20	0.43	0.20	0.43	0.65	0.65
SOT-25	smtart_SOT25D	2.90	1.60	0.30	0.60	0.30	0.60	0.95	0.95
SOT-36	smtart_SOT36	2.90	1.60	0.30	0.60	0.30	0.60	0.95	0.95
SOT-143*	smtart_SOT143 A	2.90	1.30	0.88	0.75	0.48	0.75	1.70	1.90

Part Name	AEL Macro Name	Package		Lead 1		Other Leads		Lead-lead Spacing	
SOT-143*	smtart_SOT143B	2.90	1.30	0.88	0.60	0.48	0.60	1.70	1.90
SOT-223*	smtart_SOT223	6.50	3.50	3.00	1.75	0.74	1.75	2.30	N/A
DPAK*	smtart_DPAK1	5.50	5.50	5.20	2.79	0.51	2.00	4.60	N/A
DPAK*	smtart_DPAK2	5.50	5.50	5.20	12.0	0.51	2.00	2.30	N/A
DPAK*	smtart_DPAK3	6.09	6.09	5.20	2.74	0.79	1.07	4.60	N/A
DPAK*	smtart_DPAK4	5.87	6.10	4.83	2.74	0.79	1.07	4.57	N/A
DPAK*	smtart_DPAK5	8.15	5.82	5.38	4.45	1.14	1.55	4.57	N/A
D2PAK*	smtart_D2PAK	10.41	9.96	0.71	4.83	9.96	1.27	2.54	N/A

Note

An asterisk (*) in above table denotes that the artwork requires 2 SMT_Pad components.



3.4.2 SOT-23 Layout Artwork

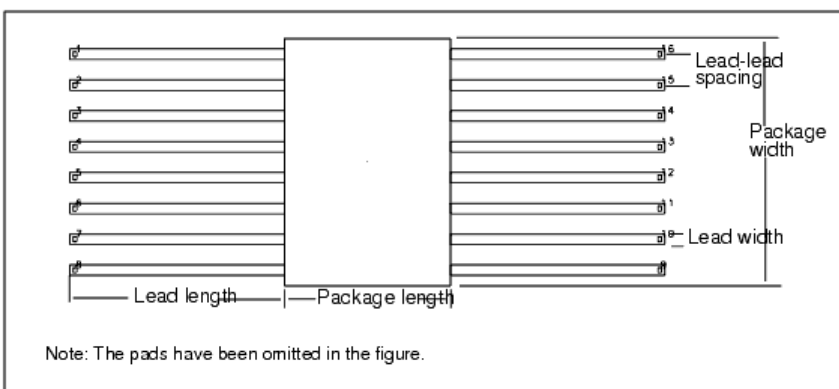
3.5 Plastic Flat Pack (PFP) Packages

[Plastic Flat Pack \(PFP\) Packages](#) lists 3 Plastic Flat Pack (PFP) packages and the associated layout artwork AEL macro name and dimensions for each package. [Plastic Flat Pack \(PFP\) Layout Artwork](#) shows the layout artwork for a PFP with the marked dimensions given in the table.

3.5.1 Plastic Flat Pack (PFP) Packages

Part Name	AEL Macro Name	Package		Lead		Lead-lead Spacing (mm)
		Width (mm)	Length (mm)	Width (mm)	Length (mm)	
PFP-16	smtart_PFP	10.18	6.85	0.43	8.88	1.27

Part Name	AEL Macro Name	Package		Lead		Lead-lead Spacing (mm)
	16					
PFP-18	smtart_PFP18	11.04	7.79	0.43	7.87	1.27
PFP-20	smtart_PFP20	15.49	9.27	0.43	7.72	1.27



3.5.2 Plastic Flat Pack (PFP) Layout Artwork

3.6 Quad Flat Pack (QFP) Packages

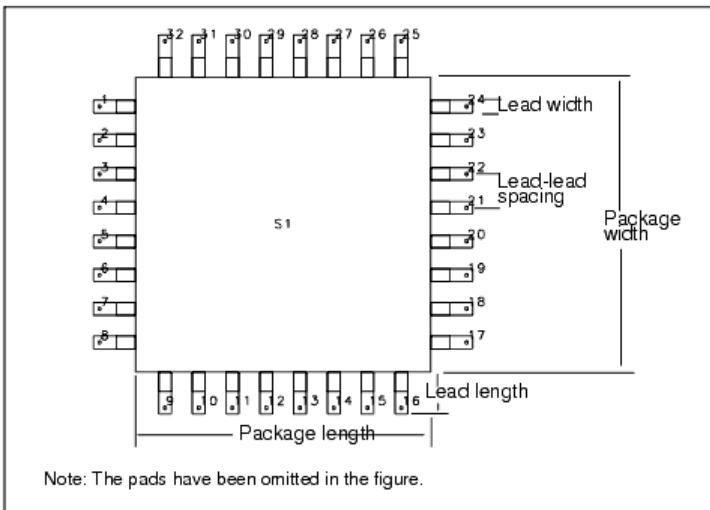
[Quad Flat Pack \(QFP\) Packages](#) lists 48 Quad Flat Pack (QFP) and the associated layout artwork AEL macro name and dimensions for each package. [Quad Flat Pack \(QFP\) Layout Artwork](#) shows the layout artwork for a typical QFP package with the marked dimensions given in the table.

3.6.1 Quad Flat Pack (QFP) Packages

Part Name	AEL Macro Name	Package		Lead		Lead-lead Spacing (mm)	Descriptio n
		Width (mm)	Length (mm)	Width (mm)	Length (mm)		
QFP32A	smtart_QF P32A	7.0	7.0	0.3	1.0	0.8	8 leads/side
QFP32B	smtart_QF P32B	5.0	5.0	0.2	1.0	0.5	8 leads/side
QFP40A	smtart_QF P40A	6.0	6.0	0.2	1.0	0.5	10 leads/side
QFP40B	smtart_QF P40B	5.0	5.0	0.15	1.0	0.4	10 leads/side
QFP40C	smtart_QF P40C	7.0	5.0	0.2	1.0	0.5	12 × 8 leads
QFP44A	smtart_QF P44A	10.5	11.5	0.3	1.5	0.8	11 leads/side
QFP44B	smtart_QF P44B	10.1	10.1	0.3	1.1	0.8	11 leads/side
QFP44C	smtart_QF P44C	10.6	10.6	0.3	1.9	0.8	11 leads/side
QFP44D	smtart_QF P44D	10.0	10.0	0.3	1.61	0.8	11 leads/side
QFP44E	smtart_QF P44E	10.0	10.0	0.41	1.99	0.8	11 leads/side
QFP44F	smtart_QF P44F	14.0	14.0	0.35	1.61	1.0	11 leads/side
QFP48A	smtart_QF P48A	12.7	12.7	0.3	2.3	0.8	12 leads/side
QFP48B	smtart_QF P48B	12.0	12.0	0.3	1.65	0.8	12 leads/side
QFP48C	smtart_QF P48C	7.0	7.0	0.2	1.0	0.5	12 leads/side
QFP48D	smtart_QF P48D	6.0	6.0	0.15	1.0	0.4	12 leads/side
QFP52A	smtart_QF	16.7	16.7	0.3	2.3	1.0	13

Part Name	AEL Macro Name	Package		Lead		Lead-lead Spacing (mm)	Description
	P52A						leads/side
QFP52B	smtart_QF P52B	10.0	10.0	0.3	1.61	0.65	13 leads/side
QFP52C	smtart_QF P52C	10.0	10.0	0.3	2.05	0.65	13 leads/side
QFP52D	smtart_QF P52D	7.0	5.0	0.15	1.0	0.40	16 × 10 leads
QFP54	smtart_QF P5	11.2	11.2	0.3	1.6	0.65	14 × 13 leads
QFP56	smtart_QF P56	11.5	12.5	0.3	1.5	0.65	14 leads/side
QFP60A	smtart_QF P60A	14.0	14.0	0.4	2.1	0.8	15 leads/side
QFP60B	smtart_QF P60B	10.0	7.0	0.2	1.0	0.5	12 × 18 leads
QFP64A	smtart_QF P64A	15	15	0.35	1.3	0.8	16 leads/side
QFP64B	smtart_QF P64B	19.4	15	0.4	1.3	1.0	13 × 19 leads
QFP64C	smtart_QF P64C	15.3	15.3	0.35	1.5	0.8	16 leads/side
QFP64D	smtart_QF P64D	21.3	15.3	0.41	1.7	1.0	13 × 19 leads
QFP64E	smtart_QF P64E	22.8	22.8	0.457	10.15	1.27	16 leads/side
QFP64F	smtart_QF P64F	14.0	14.0	0.381	1.61	0.8	13 × 19 leads
QFP64G	smtart_QF P64G	14.0	14.0	0.356	1.18	0.8	16 leads/side
QFP64H	smtart_QF P64H	20.0	14.0	0.432	1.61	1.0	13 × 19 leads
QFP64I	smtart_QF P64I	7.0	7.0	0.15	1.0	0.4	16 leads/side
QFP70	smtart_QF P70	23.6	10.4	0.3	2.5	0.8	11 × 24 leads

Part Name	AEL Macro Name	Package		Lead		Lead-lead Spacing (mm)	Description
QFP72	smtart_QF P72	10.0	10.0	0.2	1.0	0.5	18 leads/side
QFP74	smtart_QF P74	20.6	20.6	0.4	1.3	1.0	18 x 19 leads
QFP76	smtart_QF P76	10.0	7.0	0.15	1.0	0.4	15 x 23 leads
QFP80A	smtart_QF P80A	14.0	14.0	0.3	1.6	0.65	20 leads/side
QFP80B	smtart_QF P80C	20.0	14.0	0.35	1.8	0.8	16 x 24 leads
QFP80C	smtart_QF P80C	20.0	14.0	0.35	2.35	0.8	16 x 24 leads
QFP80D	smtart_QF P80D	14.0	14.0	0.3	1.18	0.65	20 x 20 leads/side
QFP80E	smtart_QF P80E	20.0	14.0	0.36	2.1	0.8	16 x 24 leads
QFP80F	smtart_QF P80F	20.0	14.0	0.36	1.6	0.8	16 x 24 leads
QFP80G	smtart_QF P80G	12.0	12.0	0.203	1.0	0.5	20 x 20 leads/side
QFP88A	smtart_QF P88A	20.0	14.0	0.3	2.5	0.65	18 x 26 leads
QFP88B	smtart_QF P88B	12.0	12.0	0.2	1.0	0.5	22 leads/side
QFP88C	smtart_QF P88C	10.0	10.0	0.15	1.0	0.4	22 leads/side
QFP88D	smtart_QF P88D	14.0	10.0	0.2	1.0	0.5	18 x 26 leads
QFP94	smtart_QF P94	20.6	20.6	0.35	1.3	0.8	23 x 24 x 23 x 24 leads



3.6.2 Quad Flat Pack (QFP) Layout Artwork

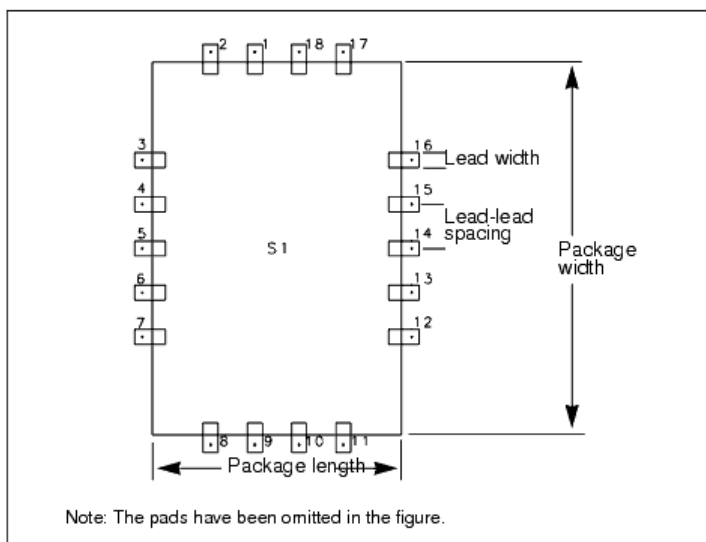
3.7 Plastic Leaded Chip Carrier (PLCC)

[Plastic Leaded Chip Carrier \(PLCC\) Packages](#) lists 11 Plastic Leaded Chip Carrier (PLCC) packages and the associated layout artwork AEL macro name and dimensions for each package. [Plastic Leaded Chip Carrier \(PLCC\) Layout Artwork](#) shows the layout artwork for a typical PLCC package with the marked dimensions given in the table.

3.7.1 Plastic Leaded Chip Carrier (PLCC) Packages

Part Name	AEL Macro Name	Package		Lead	Lead-lead Spacing (mm)
Width (mm)	Length (mm)	Width (mm)			
PLCC18AA	smtart_PLCC 18A A	10.85	7.32	0.431	1.27

Part Name	AEL Macro Name	Package		Lead	Lead-lead Spacing (mm)
PLCC18AB	smtart_PLCC 18 AB	12.52	7.42	0.431	1.27
PLCC20SQ	smtart_PLCC 20 SQ	8.13	8.13	0.431	1.27
PLCC22RT	smtart_PLCC 22 RT	11.62	6.54	0.431	1.27
PLCC28RT	smtart_PLCC 28 RT	12.94	7.87	0.431	1.27
PLCC28SQ	smtart_PLCC 28 SQ	10.67	10.67	0.431	1.27
PLCC32RT	smtart_PLCC 32 RT	12.95	10.67	0.431	1.27
PLCC44SQ	smtart_PLCC 44 SQ	15.48	15.48	0.431	1.27
PLCC52SQ	smtart_PLCC 52 SQ	18.02	18.02	0.431	1.27
PLCC68SQ	smtart_PLCC 68 SQ	23.10	23.10	0.431	1.27
PLCC84SQ	smtart_PLCC 84 SQ	28.17	28.17	0.431	1.27



3.7.2 Plastic Leaded Chip Carrier (PLCC) Layout Artwork

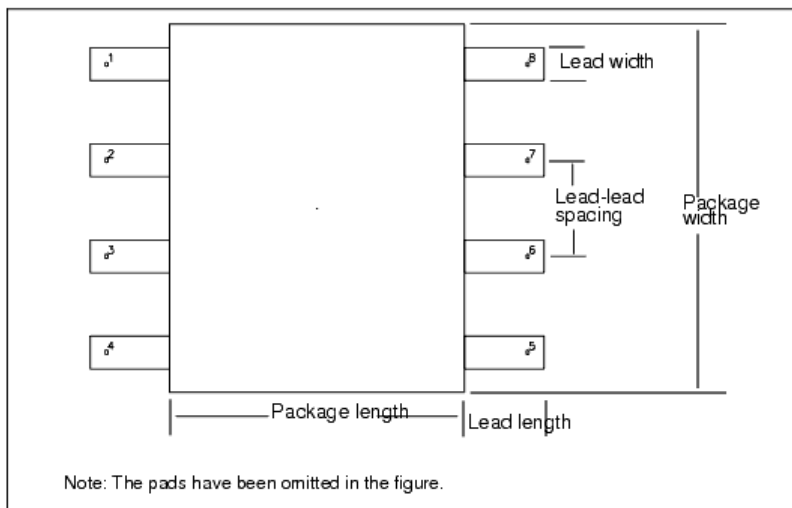
3.8 Small Outline IC (SOIC)

[Small Outline IC \(SOIC\) Packages](#) lists 13 Small Outline IC (SOIC) packages and the associated layout artwork AEL macro name and dimensions for each package. [Small Outline IC \(SOIC\) Package Layout Artwork](#) shows the layout artwork for a typical SOIC package with the marked dimensions given in the table.

3.8.1 Small Outline IC (SOIC) Packages

Part Name	AEL Macro Name	Package		Lead		Lead-lead Spacing (mm)
		Width (mm)	Length (mm)	Width (mm)	Length (mm)	
SO8N	smtart_SO8N	3.90	4.87	0.432	1.05	1.27
SO14N	smtart_SO14N	3.90	8.63	0.432	1.05	1.27
SO16N	smtart_SO16N	3.90	9.90	0.432	1.05	1.27
SO14M	smtart_SO14M	5.59	9.910	0.432	1.01	1.27
SO16M	smtart_SO16M	5.59	11.20	0.457	1.01	1.27
SO8L	smtart_SO8L	7.50	5.20	0.432	1.40	1.27
SO14L	smtart_SO14L	57.50	9.010	0.432	1.40	1.27
SO16L	smtart_SO16L	7.50	10.30	0.432	1.40	1.27

Part Name	AEL Macro Name	Package		Lead		Lead-lead Spacing (mm)
	6L					
SO18L	smart_SO18L	7.50	11.55	0.432	1.40	1.27
SO20L	smart_SO20L	7.50	12.80	0.432	1.40	1.27
SO24L	smart_SO24L	7.50	15.37	0.432	1.40	1.27
SO28L	smart_SO28L	7.50	17.92	0.432	1.40	1.27
SO32L	smart_SO32L	7.50	20.50	0.432	1.70	1.27



3.8.2 Small Outline IC (SOIC) Package Layout Artwork

3.9 Writing Customized SMT PAL Artwork

This section describes how to customize the SMT PAL artwork AEL functions to use in a custom component. Most times, the SMT artwork types in the SMT PAL can be used without any modifications, assuming the dimensions of the artwork match the requirements. However, sometimes the artwork in the PAL may not match the dimensions required. In this case, the existing AEL code in the SMT PAL could be used to write a customized artwork.

3.9.1 Structure of a SMT PAL artwork

All SMT PAL artwork use an AEL function to describe the artwork. For example, the SOT143A package uses the AEL function `smtart_SOT143A(smtpad1, smtpad2, offset)`. The code for this function is shown below:

```
defun smtart_SOT143A (smtpad1,
smtpad2, offset)
{
// Lead 1 and 2 are interchanged in the leadDim_list on Purpose
smtart_draw_SMT(
list(smtpad1, smtpad2), //list of SMT PAD instance name
offset, //pad offset from connecting pin
0.0013, //width of package in Units (1.3 mm)
0.0029, //Length of package in Units (2.9 mm)
0, //not used
0, //not used
list(0.0017,0.0,0.0019,0.0), //Lead-to-lead spacing on sides 1,2,3 and 4
//of the package in Units
list(0.00026,0,0.00026,0), //LeadOffset
list(2,0,2,0), //Number of leads list
list(0.00048,0.00075, 0.00088,0.00075, NULL, 0.00048,0.00075,
0.00048,0.00075, NULL, "side1"),
list(0,0,-90, 0,-0.0017,-90, 0.00232,-0.0017,90, 0.00232,0.0002,90),
//Pins list
0, //Not Used
"mts", //Units
"portOpt6", //Package style option
0, //Lead Extension
NULL
); //smtart_draw_SMT
}
```

The code above calls another function called, `smtart_draw_SMT()`. This is a generic function that is used by all the SMT PAL artworks. An explanation of the arguments used in the generic function `smtart_draw_SMT()` is given below:

Argument Name	Description
SMT_PAD_list	List of SMT PAD instance name. For example, the SOT143A has 2 pads, one for leads 1, and another one for leads 2, 3, and 4.
Offset	Pad offset from connecting pin.
Width	Width of package (vertical dimension) in Units e.g. 0.0013 for SOT143A
Length	Length of package (horizontal dimension) in Units e.g. 0.0029 for SOT143A
Width1	Not used
Length1	Not used
Spacing	List of 4 lead-to-lead spacing (in Units) on sides 1, 2, 3, and 4.
LeadOffset	List of lead edge offset (in Units) from edge of package for all 4 sides.
NumLeads	List of number of leads on each side of the package.
LeadsDim	List of leads dimensions on all sides (width1, length1, width2, length2, etc.)
PinsList	List of pin parameters on all sides.
DelX	Not used
Units	Dimension units - "um", "mm", "mts", "mil", "in"
PackageStyle	Package style option. The choices are: portOpt1 – SOT23,SOT25,SOT36 portOpt2 – SOIC, CFP, PFP portOpt3 – PLCC portOpt4 – components, MELF portOpt5 – QFP portOpt6 – SOT143, SOT223 portOpt7 – D2PAK portOpt8 – portOpt9 – DPAK2
LeadExt	Lead extension
PortTransList	Not used

Side 1 is the left hand side, 2 to the top, 3 to the right and 4 to the bottom. Pin 1 is always on the left hand side of the package and is drawn at the origin (0,0).

3.9.2 Examples of SMT PAL Artwork Using the Generic Function

Some more examples of SMT PAL artwork using the generic function is given below.

SOIC Artwork

```
defun smtart_SO8N (smtpad, offset)
{
  decl initialDist;
  // all dimensions in mts.
  //initialDist = 0.5 * [Body_length - Lead_width - ((No_leads/2) - 1) *
lead-lead spacing]
  initialDist = 0.5 * (0.00487 - 0.000432 - 3 * 0.00127);
  smtart_draw_SMT(smtpad,offset,0.0039,0.00487,0,0,
    list(0.00127,0,0.00127,0), list(initialDist,0,initialDist,0),
    list(4,0,4,0),list(0.000432,0.00105,0,0,0.000432,0.00105,0,0),
    list(-90.0,1,NULL,NULL,90.0,5,NULL,NULL),0,"mts", "portOpt2",
0,NULL);
}
```

PLCC Artwork

```
defun smtart_PLCC18AA (smtpad, offset)
{
  decl initialDistL, initialDistW, packLength, packWidth, leadExt;
  leadExt = 0.000508;
  packLength = 0.01173 - 2 * leadExt;
  packWidth = 0.00817 - 2 * leadExt;
  // all dimensions in mts.
  initialDistL = 0.5 * (packLength - 0.000432 - 4 * 0.00127);
  initialDistW = 0.5 * (packWidth - 0.000432 - 3 * 0.00127);
  smtart_draw_SMT(smtpad,offset,packWidth,packLength,0,0,
    list(0.00127,0.00127,0.00127,0.00127),
```

```
list(initialDistL,initialDistW,initialDistL,initialDistW),

list(5,4,5,4),list(0.000432,0.00088,0.000432,0.00085,0.000432,0.00088,0.0004
32,0.00085),
  list(-90.0,3,7, 180,2,18, 90.0,12,16, 0,8,11, 2),0,"mts", "portOpt3",
leadExt, NULL);
//elPorts_list =
list(ang1,nodeStart,nodeStop,ang2,nodeStart,nodeStop,.....,node1Position)
}
```

Ceramic Flat Packages (CFP) and Plastic Flat Packages (PFP)

```
defun smtart_CFP24 (smtpad, offset)
{
  decl initialD;
  initialD = 0.5*(0.01536-11*0.00127-0.00043);
  //initialD = {packLength - (#Leads-1)*spacing - leadWidth}/2
  smtart_draw_SMT(smtpad,offset,0.00965,0.01536,0,0,
    list(0.00127,0,0.00127,0), list(initialD,0,initialD,0),
    list(12,0,12,0),list(0.00043,0.00787,0,0,0.00043,0.00787,0,0),
    list(-90.0,1, NULL,NULL, 90.0,13, NULL,NULL),0,"mts", "portOpt2", 0,
  NULL);
}
```

Quad Flat Package (QFP)

```
defun smtart_QFP32A (smtpad, offset)
{
  decl initialD;
  initialD = 0.5*(0.007-7*0.0008-0.0003);
  smtart_draw_SMT(smtpad,offset,0.007,0.007,0,0,
    list(0.0008,0.0008,0.0008,0.0008),
  list(initialD,initialD,initialD,initialD),

list(8,8,8,8),list(0.0003,0.001,0.0003,0.001,0.0003,0.001,0.0003,0.001,0.000
46),
  list(-90.0,1, 180,32, 90.0,17, 0,9),0,"mts", "portOpt5", 0, NULL);
}
```