

FR-4 Double-Sided PCB Material

Recommended Drill Series: 100, 150, 560, 580

Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
0.10mm	0.0040	20	80	200	-0.011	500	0.25	84
0.13mm	0.0050	23	80	300	-0.011	600	0.29	105
0.15mm	0.0059	27	80	300	-0.011	800	0.34	124
#96	0.0063	30	80	400	-0.011	800	0.38	132
#95	0.0067	33	80	400	-0.012	800	0.41	140
#94	0.0071	37	80	500	-0.012	1000	0.46	149
#93	0.0075	40	80	500	-0.012	1000	0.50	157
#92	0.0079	43	80	500	-0.012	1200	0.54	165
#91	0.0083	47	80	600	-0.012	1200	0.59	174
#90	0.0087	50	80	600	-0.012	1200	0.63	182
#89	0.0091	53	80	700	-0.012	1500	0.66	190
#88	0.0095	57	80	700	-0.012	1500	0.71	199
0.25mm	0.0098	60	80	800	-0.012	1500	0.75	205
#87	0.0100	61	80	800	-0.012	1500	0.76	209
#86	0.0105	65	80	800	-0.012	1500	0.81	220
#85	0.0110	68	80	900	-0.013	1700	0.85	230
#84	0.0115	71	80	900	-0.013	1700	0.89	241
0.30mm	0.0118	73	80	1000	-0.013	1700	0.91	247
#83	0.0120	75	80	1000	-0.013	1800	0.94	251
#82	0.0125	78	80	1000	-0.013	1800	0.98	262
#81	0.0130	81	80	1000	-0.013	1800	1.01	272
#80	0.0135	87	80	1000	-0.013	2000	1.09	283
0.35mm	0.0138	87	80	1000	-0.013	2000	1.09	289
#79	0.0145	90	80	1000	-0.013	2000	1.13	304
1/64	0.0156	93	80	1000	-0.014	2000	1.16	327
0.40mm	0.0158	95	80	1000	-0.014	2000	1.19	331
#78	0.0160	97	80	1000	-0.014	2000	1.21	335
0.45mm	0.0177	100	80	1000	-0.014	2000	1.25	371
#77	0.0180	102	80	1000	-0.014	2000	1.28	377
0.50mm	0.0197	109	80	1000	-0.015	2000	1.36	412
#76	0.0200	113	80	1000	-0.015	2000	1.41	419
#75	0.0210	121	80	1000	-0.015	2000	1.51	440
0.55mm	0.0217	128	80	1000	-0.015	2000	1.60	454
#74	0.0225	137	80	1000	-0.015	2000	1.71	471
0.60mm	0.0236	148	80	1000	-0.016	2000	1.85	494
#73	0.0240	154	80	1000	-0.016	2000	1.93	502
#72	0.0250	165	80	1000	-0.016	2000	2.06	523
0.65mm	0.0256	173	80	1000	-0.016	2000	2.16	536
#71	0.0260	182	80	1000	-0.016	2000	2.28	544
0.70mm	0.0276	193	80	1000	-0.016	2000	2.41	578
#70	0.0280	197	80	1000	-0.017	2000	2.46	586
#69	0.0292	205	79	1000	-0.017	2000	2.59	600
0.75mm	0.0295	206	78	1000	-0.017	2000	2.64	600
#68	0.0310	210	74	1000	-0.017	2000	2.84	600
1/32	0.0312	212	73	1000	-0.017	2000	2.90	600
0.80mm	0.0315	215	73	1000	-0.017	2000	2.95	600
#67	0.0320	216	72	1000	-0.017	2000	3.00	600
#66	0.0330	210	70	1000	-0.018	2000	3.00	600
0.85mm	0.0335	204	68	1000	-0.018	2000	3.00	600
#65	0.0350	198	66	1000	-0.018	2000	3.00	600
0.90mm	0.0354	195	65	1000	-0.018	2000	3.00	600
#64	0.0360	192	64	1000	-0.018	2000	3.00	600
#63	0.0370	186	62	1000	-0.019	2000	3.00	600
0.95mm	0.0374	183	61	1000	-0.019	2000	3.00	600
#62	0.0380	180	60	1000	-0.019	2000	3.00	600
#61	0.0390	177	59	1000	-0.019	2000	3.00	600
1.00mm	0.0394	174	58	1000	-0.019	2000	3.00	600
#60	0.0400	171	57	1000	-0.019	2000	3.00	600
#59	0.0410	168	56	1000	-0.020	2000	3.00	600
1.05mm	0.0413	168	56	1000	-0.020	2000	3.00	600
#58	0.0420	165	55	1000	-0.020	2000	3.00	600
#57	0.0430	159	53	1000	-0.020	2000	3.00	600
1.10mm	0.0433	159	53	1000	-0.020	2000	3.00	600
1.15mm	0.0453	153	51	1000	-0.021	2000	3.00	600

Note: This information is based on 80K RPM Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable

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Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
#56	0.0465	147	49	1000	-0.021	2000	3.00	600
3/64	0.0469	147	49	1000	-0.021	2000	3.00	600
1.20mm	0.0472	147	49	1000	-0.021	2000	3.00	600
1.25mm	0.0492	141	47	1000	-0.021	2000	3.00	600
1.30mm	0.0512	135	45	1000	-0.022	2000	3.00	600
#55	0.0520	132	44	1000	-0.022	2000	3.00	600
1.35mm	0.0531	129	43	1000	-0.022	2000	3.00	600
#54	0.0550	126	42	1000	-0.023	2000	3.00	600
1.40mm	0.0551	126	42	1000	-0.023	2000	3.00	600
1.45mm	0.0571	120	40	1000	-0.023	2000	3.00	600
1.50mm	0.0591	117	39	1000	-0.024	2000	3.00	600
#53	0.0595	117	39	1000	-0.024	2000	3.00	600
1.55mm	0.0610	114	38	1000	-0.024	2000	3.00	600
1/16	0.0625	111	37	1000	-0.025	2000	3.00	600
1.60mm	0.0630	108	36	1000	-0.025	2000	3.00	600
#52	0.0635	108	36	1000	-0.025	2000	3.00	600
1.65mm	0.0650	105	35	1000	-0.025	2000	3.00	600
1.70mm	0.0669	102	34	1000	-0.026	2000	3.00	600
#51	0.0670	102	34	1000	-0.026	2000	3.00	600
1.75mm	0.0689	99	33	1000	-0.026	2000	3.00	600
#50	0.0700	99	33	1000	-0.026	2000	3.00	600
1.80mm	0.0709	96	32	1000	-0.027	1800	3.00	600
1.85mm	0.0728	93	31	1000	-0.027	1800	3.00	600
#49	0.0730	93	31	1000	-0.027	1800	3.00	600
1.90mm	0.0748	93	31	1000	-0.027	1800	3.00	600
#48	0.0760	90	30	1000	-0.028	1800	3.00	600
1.95mm	0.0768	90	30	1000	-0.028	1800	3.00	600
5/64	0.0781	87	29	1000	-0.028	1800	3.00	600
#47	0.0785	87	29	1000	-0.028	1800	3.00	600
2.00mm	0.0787	87	29	1000	-0.028	1800	3.00	600
2.05mm	0.0807	84	28	1000	-0.029	1800	3.00	600
#46	0.0810	84	28	1000	-0.029	1800	3.00	600
#45	0.0820	84	28	1000	-0.029	1800	3.00	600
2.10mm	0.0827	84	28	1000	-0.029	1800	3.00	600
2.15mm	0.0846	81	27	1000	-0.030	1800	3.00	600
#44	0.0860	81	27	1000	-0.030	1800	3.00	600
2.20mm	0.0866	78	26	1000	-0.030	1800	3.00	600
2.25mm	0.0886	78	26	1000	-0.031	1800	3.00	600
#43	0.0890	78	26	1000	-0.031	1800	3.00	600
2.30mm	0.0906	75	25	1000	-0.031	1800	3.00	600
2.35mm	0.0925	75	25	1000	-0.032	1800	3.00	600
#42	0.0935	75	25	1000	-0.032	1800	3.00	600
3/32	0.0938	72	24	1000	-0.032	1800	3.00	600
2.40mm	0.0945	72	24	1000	-0.032	1800	3.00	600
#41	0.0960	72	24	1000	-0.032	1800	3.00	600
2.45mm	0.0965	72	24	1000	-0.033	1800	3.00	600
#40	0.0980	69	23	1000	-0.033	1800	3.00	600
2.50mm	0.0984	69	23	1000	-0.033	1800	3.00	600
#39	0.0995	69	23	1000	-0.033	1500	3.00	600
2.55mm	0.1004	69	23	1000	-0.033	1500	3.00	600
#38	0.1015	69	23	1000	-0.034	1500	3.00	600
2.60mm	0.1024	66	22	1000	-0.034	1500	3.00	600
#37	0.1040	66	22	1000	-0.034	1500	3.00	600
2.65mm	0.1043	66	22	1000	-0.034	1500	3.00	600
2.70mm	0.1063	66	22	1000	-0.035	1500	3.00	600
#36	0.1065	66	22	1000	-0.035	1500	3.00	600
2.75mm	0.1083	63	21	1000	-0.035	1500	3.00	600
7/64	0.1094	63	21	1000	-0.036	1500	3.00	600
#35	0.1100	63	21	1000	-0.036	1500	3.00	600
2.80mm	0.1102	63	21	1000	-0.036	1500	3.00	600
#34	0.1110	63	21	1000	-0.036	1500	3.00	600
2.85mm	0.1122	60	20	1000	-0.036	1500	3.00	600
#33	0.1130	60	20	1000	-0.036	1500	3.00	600
2.90mm	0.1142	60	20	1000	-0.037	1500	3.00	600
#32	0.1160	60	20	1000	-0.037	1500	3.00	607
2.95mm	0.1161	60	20	1000	-0.037	1500	3.00	608
3.00mm	0.1181	60	20	1000	-0.038	1500	3.00	618
#31	0.1200	60	20	1000	-0.038	1200	3.00	628
3.05mm	0.1201	60	20	1000	-0.038	1200	3.00	629
3.10mm	0.1220	60	20	1000	-0.038	1200	3.00	638
3.15mm	0.1240	60	20	1000	-0.039	1200	3.00	649
1/8	0.1250	60	20	1000	-0.039	1200	3.00	654

Note: This information is based on **80K RPM** Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable

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Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
3.20mm	0.1260	60	20	1000	-0.018	1200	3.00	659
3.25mm	0.1280	60	20	1000	-0.018	1200	3.00	670
#30	0.1285	60	20	1000	-0.019	1200	3.00	672
3.30mm	0.1299	60	20	1000	-0.019	1200	3.00	680
3.35mm	0.1319	60	20	1000	-0.019	1200	3.00	690
3.40mm	0.1339	60	20	1000	-0.019	1200	3.00	701
3.45mm	0.1358	60	20	1000	-0.019	1200	3.00	711
#29	0.1360	60	20	1000	-0.019	1200	3.00	712
3.50mm	0.1378	60	20	1000	-0.019	1200	3.00	721
3.55mm	0.1398	60	20	1000	-0.019	1200	3.00	732
#28	0.1405	60	20	1000	-0.019	1200	3.00	735
9/64	0.1406	60	20	1000	-0.019	1200	3.00	736
3.60mm	0.1417	60	20	1000	-0.019	1200	3.00	742
3.65mm	0.1437	60	20	1000	-0.020	1200	3.00	752
#27	0.1440	60	20	1000	-0.020	1200	3.00	754
3.70mm	0.1457	60	20	1000	-0.020	1200	3.00	762
#26	0.1470	60	20	1000	-0.020	1200	3.00	769
3.75mm	0.1476	60	20	1000	-0.020	1200	3.00	772
#25	0.1495	60	20	1000	-0.020	1200	3.00	782
3.80mm	0.1496	60	20	1000	-0.020	1200	3.00	783
3.85mm	0.1516	60	20	1000	-0.020	1200	3.00	793
#24	0.1520	60	20	1000	-0.020	1200	3.00	795
3.90mm	0.1535	60	20	1000	-0.020	1200	3.00	803
#23	0.1540	60	20	1000	-0.020	1200	3.00	806
3.95	0.1555	60	20	1000	-0.020	1200	3.00	814
5/32	0.1562	60	20	1000	-0.020	1200	3.00	817
#22	0.1570	60	20	1000	-0.020	1200	3.00	822
4.00mm	0.1575	60	20	1000	-0.020	1200	3.00	824
#21	0.1590	55	20	1000	-0.021	1000	2.75	832
4.05mm	0.1594	55	20	1000	-0.021	1000	2.75	834
#20	0.1610	55	20	1000	-0.021	1000	2.75	843
4.10mm	0.1614	55	20	1000	-0.021	1000	2.75	845
4.15mm	0.1634	55	20	1000	-0.021	1000	2.75	855
4.20mm	0.1654	55	20	1000	-0.021	1000	2.75	866
#19	0.1660	55	20	1000	-0.021	1000	2.75	869
4.25mm	0.1673	55	20	1000	-0.021	1000	2.75	876
4.30mm	0.1693	55	20	1000	-0.021	1000	2.75	886
#18	0.1695	55	20	1000	-0.021	1000	2.75	887
4.35mm	0.1713	55	20	1000	-0.021	1000	2.75	896
11/64	0.1719	55	20	1000	-0.021	1000	2.75	900
#17	0.1730	55	20	1000	-0.021	1000	2.75	905
4.40mm	0.1732	55	20	1000	-0.021	1000	2.75	906
4.45mm	0.1752	55	20	1000	-0.022	1000	2.75	917
#16	0.1770	55	20	1000	-0.022	1000	2.75	926
4.50mm	0.1772	55	20	1000	-0.022	1000	2.75	927
4.55mm	0.1792	50	20	1000	-0.022	1000	2.50	938
#15	0.1800	50	20	1000	-0.022	1000	2.50	942
4.60mm	0.1811	50	20	1000	-0.022	1000	2.50	948
#14	0.1820	50	20	1000	-0.022	1000	2.50	952
4.65mm	0.1831	50	20	1000	-0.022	1000	2.50	958
#13	0.1850	50	20	1000	-0.022	1000	2.50	968
4.70mm	0.1850	50	20	1000	-0.022	1000	2.50	968
4.75mm	0.1870	50	20	1000	-0.022	1000	2.50	979
3/16	0.1875	45	20	1000	-0.022	1000	2.25	981
4.80mm	0.1890	45	20	1000	-0.023	800	2.25	989
#12	0.1890	45	20	1000	-0.023	800	2.25	989
4.85mm	0.1909	45	20	1000	-0.023	800	2.25	999
#11	0.1910	45	20	1000	-0.023	800	2.25	1000
4.90mm	0.1929	45	20	1000	-0.023	800	2.25	1010
#10	0.1935	45	20	1000	-0.023	800	2.25	1013
4.95mm	0.1949	45	20	1000	-0.023	800	2.25	1020
#9	0.1960	45	20	1000	-0.023	800	2.25	1026
5.00mm	0.1968	45	20	1000	-0.023	800	2.25	1030
5.05mm	0.1988	45	20	1000	-0.023	800	2.25	1040
#8	0.1990	45	20	1000	-0.023	800	2.25	1041
5.10mm	0.2008	40	20	1000	-0.023	600	2.00	1051
#7	0.2010	40	20	1000	-0.023	600	2.00	1052
5.15mm	0.2028	40	20	1000	-0.023	600	2.00	1061
13/64	0.2031	40	20	1000	-0.023	600	2.00	1063
#6	0.2040	40	20	1000	-0.024	600	2.00	1068
5.20mm	0.2047	40	20	1000	-0.024	600	2.00	1071
#5	0.2055	40	20	1000	-0.024	600	2.00	1075

Note: This information is based on **80K RPM** Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable

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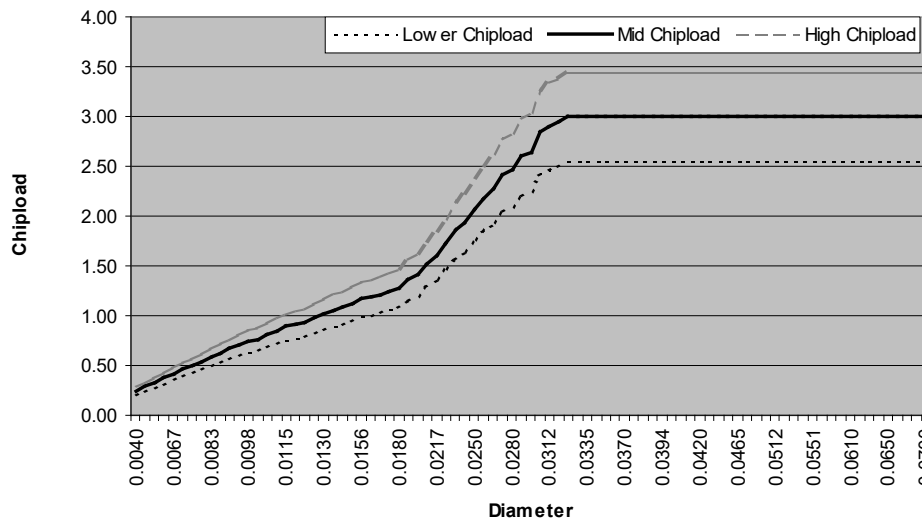
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Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
5.25mm	0.2067	40	20	1000	-0.024	600	2.00	1082
5.30mm	0.2087	40	20	1000	-0.024	600	2.00	1092
#4	0.2090	40	20	1000	-0.024	600	2.00	1094
5.35mm	0.2106	40	20	1000	-0.024	600	2.00	1102
5.40mm	0.2126	40	20	1000	-0.024	600	2.00	1113
#3	0.2130	40	20	1000	-0.024	600	2.00	1115
5.45mm	0.2146	40	20	1000	-0.024	600	2.00	1123
5.50mm	0.2165	40	20	1000	-0.024	600	2.00	1133
5.55mm	0.2185	40	20	1000	-0.024	600	2.00	1143
7/32	0.2188	40	20	1000	-0.024	600	2.00	1145
5.60mm	0.2205	40	20	1000	-0.025	600	2.00	1154
#2	0.2210	35	20	1000	-0.025	600	1.75	1157
5.65mm	0.2224	35	20	1000	-0.025	500	1.75	1164
5.70mm	0.2244	35	20	1000	-0.025	500	1.75	1174
5.75mm	0.2264	35	20	1000	-0.025	500	1.75	1185
#1	0.2280	35	20	1000	-0.025	500	1.75	1193
5.80mm	0.2283	35	20	1000	-0.025	500	1.75	1195
5.85mm	0.2302	35	20	1000	-0.025	500	1.75	1205
5.90mm	0.2323	35	20	1000	-0.025	500	1.75	1216
A	0.2340	35	20	1000	-0.025	500	1.75	1225
5.95mm	0.2343	35	20	1000	-0.026	500	1.75	1226
15/64	0.2344	35	20	1000	-0.026	500	1.75	1227
6.00mm	0.2362	35	20	1000	-0.026	500	1.75	1236
B	0.2380	35	20	1000	-0.026	500	1.75	1246
6.05mm	0.2382	35	20	1000	-0.026	500	1.75	1247
6.10mm	0.2402	30	20	1000	-0.026	500	1.50	1257
C	0.2420	30	20	1000	-0.026	500	1.50	1266
6.15mm	0.2421	30	20	1000	-0.026	500	1.50	1267
6.20mm	0.2441	30	20	1000	-0.026	500	1.50	1277
D	0.2460	30	20	1000	-0.026	500	1.50	1287
6.25mm	0.2461	30	20	1000	-0.026	500	1.50	1288
6.30mm	0.2480	30	20	1000	-0.026	500	1.50	1298
6.35mm	0.2500	30	20	1000	-0.027	500	1.50	1308
6.40mm	0.2520	30	20	1000	-0.027	500	1.50	1319
6.50mm	0.2559	30	20	1000	-0.027	500	1.50	1339
F	0.2570	30	20	1000	-0.027	500	1.50	1345
6.60mm	0.2598	30	20	1000	-0.027	500	1.50	1360

In some cases, there may be an opportunity to increase the chipload based on the application's robustness. Variables such as machine technology and condition, stack support materials, and Kyocera design selection may allow the increased throughput with higher chiploads. Multiply the recommended chipload by 1.15 to reach the higher chipload.

If the application is not as robust due to heavy glass, high copper content, tight annular ring requirements, or similar, multiply the recommended chipload by 0.85.

Chiploads for FR-4 Double-Sided



Note: This information is based on 80K RPM Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable