National Semiconductor

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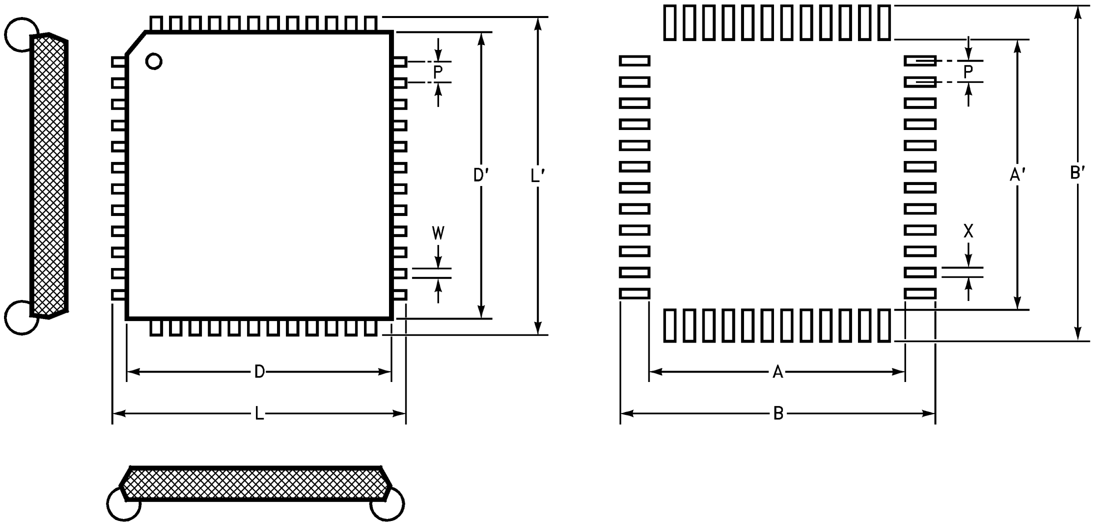
Land Pattern Recommendations

The following land pattern recommendations are provided as guidelines for board layout and assembly purposes.

These recommendations cover the following National Semiconductor packages: PLCC, PQFP, SOP, SSOP and TSOP.

For SOT-23 (5-Lead) and TO-263 (3- or 5-Lead) packages, refer to land patterns shown in the Physical Dimensions for MA05A and TS3B or TS5B packages, respectively.

Plastic Leaded Chip Carriers (PLCC)



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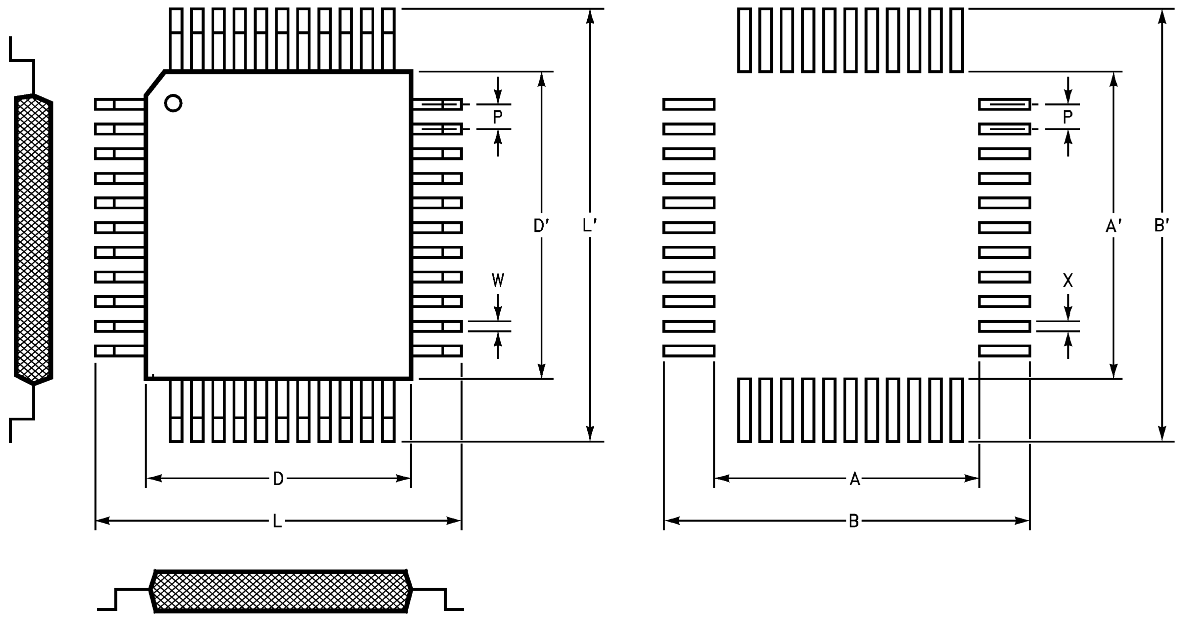
D Body Size (mm)	D' Body Size (mm)	Lead Count No.	L Lead Tip to Tip (mm)	L' Lead Tip to Tip (mm)	W Lead Width (mm)	P Lead/Pad Pitch (mm)	A Inner Pad to Pad Edge (mm)	A' Inner Pad to Pad Edge (mm)	B Outer Pad to Pad Edge (mm)	B' Outer Pad to Pad Edge (mm)	X Land Width (mm)
8.89	8.89	20	10.03	10.03	0.53	1.27	6.73	6.73	10.80	10.80	0.63
11.43	11.43	28	12.57	12.57	0.53	1.27	9.27	9.27	13.34	13.34	0.63
11.43	14.05	32	12.57	15.11	0.53	1.27	9.27	12.00	13.34	16.00	0.63
16.51	16.51	44	17.65	17.65	0.53	1.27	14.35	14.35	18.42	18.42	0.63
19.05	19.05	52	20.19	20.19	0.53	1.27	16.89	16.89	20.96	20.96	0.63
24.13	24.13	68	25.27	25.27	0.53	1.27	21.97	21.97	26.04	26.04	0.63
29.21	29.21	84	30.35	30.35	0.53	1.27	27.05	27.05	31.12	31.12	0.63

Plastic Quad Flat Packages (PQFP)



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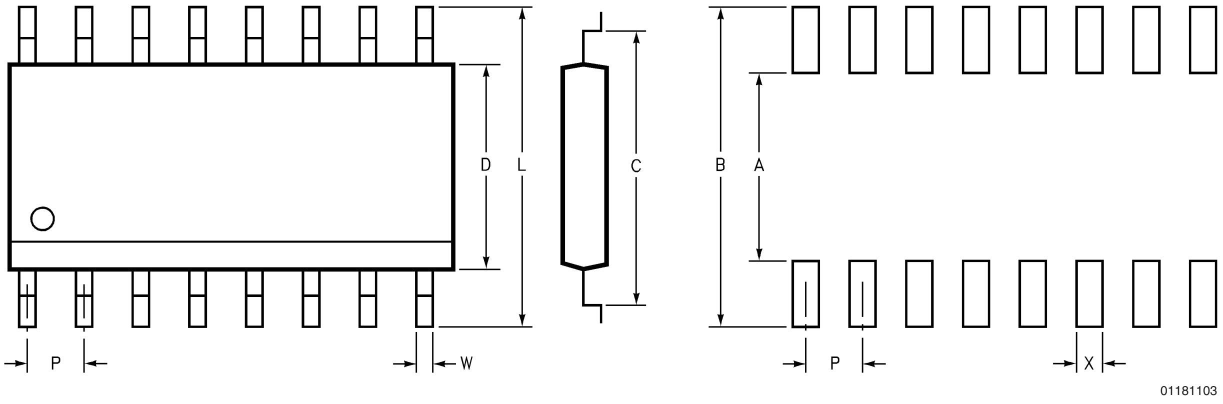
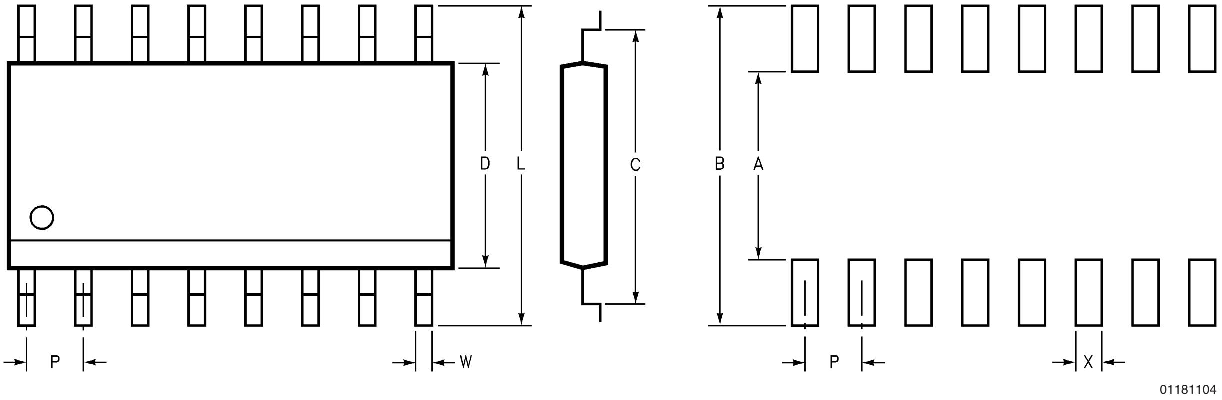
D Body Size (mm)	D' Body Size (mm)	Lead Count No.	L Lead Tip to Tip (mm)	L' Lead Tip to Tip (mm)	W Lead Width (mm)	P Lead/Pad Pitch (mm)	A Inner Pad to Pad Edge (mm)	A' Inner Pad to Pad Edge (mm)	B Outer Pad to Pad Edge (mm)	B' Outer Pad to Pad Edge (mm)	X Land Width (mm)
7	7	40	9.29	9.29	0.26	0.50	7.50	7.50	9.78	9.78	0.30
7	7	48	9.40	9.40	0.27	0.50	6.88	6.90	10.42	10.40	0.32
10	10	44	13.35	13.35	0.45	0.80	10.53	10.53	14.47	14.47	0.55
10	10	52	14.15	14.15	0.38	0.65	9.08	9.08	15.17	15.17	0.43
12	12	64	14.00	14.00	0.38	0.65	11.48	11.48	15.02	15.02	0.43
14	14	80	18.15	18.15	0.38	0.65	13.08	13.08	19.17	19.17	0.43
14	20	80	17.80	23.80	0.35	0.80	13.50	19.50	18.50	24.50	0.40
14	14	100	17.45	17.45	0.30	0.50	13.08	13.08	18.47	18.47	0.35
14	20	100	17.80	23.80	0.30	0.65	13.50	19.50	18.50	24.50	0.35
20	20	100	24.30	18.30	0.40	0.65	21.28	15.28	25.32	19.32	0.45
24	24	132	24.21	24.21	0.30	0.64	21.67	21.67	25.23	25.23	0.40
28	28	120	32.15	32.15	0.45	0.80	27.88	27.88	33.17	33.17	0.55
28	28	128	31.45	31.45	0.45	0.80	28.03	28.03	32.47	32.47	0.55
28	28	144	32.15	32.15	0.38	0.65	28.03	28.03	33.17	33.17	0.43
28	28	160	32.40	32.40	0.38	0.65	29.48	29.48	33.42	33.42	0.43
28	28	208	30.60	30.60	0.30	0.50	28.08	28.08	31.62	31.62	0.35

JEDEC Small Outline and Shrink Small Outline Packages (SOP and SSOP)



D Body Size (in)	Lead Count No.	C Shoulder to Shoulder (in)	L Lead Tip to Tip (in)	W Lead Width (in)	P Lead/Pad Pitch (in)	A Inner Pad to Pad Edge (in)	B Outer Pad to Pad Edge (in)	X Pad Width (in)
SOP								
0.150	8	0.170	0.244	0.020	0.050	0.094	0.294	0.028
0.150	14	0.170	0.244	0.020	0.050	0.094	0.294	0.028
0.150	16	0.170	0.244	0.020	0.050	0.094	0.294	0.028
0.300	14	0.3300	0.4100	0.0190	0.0500	0.2800	0.4600	0.0270
0.300	16	0.3300	0.4100	0.0190	0.0500	0.2800	0.4600	0.0270
0.300	20	0.3300	0.4100	0.0190	0.0500	0.2800	0.4600	0.0270
0.300	24	0.3300	0.4100	0.0190	0.0500	0.2800	0.4600	0.0270
0.300	28	0.3300	0.4100	0.0190	0.0500	0.2800	0.4600	0.0270
SSOP								
0.150	20	0.185	0.241	0.010	0.025	0.145	0.281	0.014
0.150	24	0.185	0.241	0.010	0.025	0.145	0.281	0.014
0.300	48	0.340	0.420	0.012	0.025	0.300	0.460	0.016
0.300	56	0.340	0.420	0.012	0.025	0.300	0.460	0.016

EIAJ Small Outline, Shrink Small Outline, and Thin Small Outline Packages (SOP, SSOP and TSOP)



D Body Size (mm)	Lead Count No.	C Shoulder to Shoulder (mm)	L Lead Tip to Tip (mm)	W Lead Width (mm)	P Lead/Pad Pitch (mm)	A Inner Pad to Pad Edge (mm)	B Outer Pad to Pad Edge (mm)	X Pad Width (mm)
SOP TYPE II								
5.300	14	6.280	8.000	0.400	1.270	5.010	9.270	0.600
5.300	16	6.280	8.000	0.400	1.270	5.010	9.270	0.600
5.300	20	6.280	8.000	0.400	1.270	5.010	9.270	0.600
SSOP TYPE II								
5.300	20	6.600	8.100	0.400	0.650	5.584	9.116	0.451
5.300	24	6.600	8.100	0.400	0.650	5.584	9.116	0.451
SSOP TYPE III								
7.500	40	8.900	10.500	0.350	0.650	7.884	11.516	0.452
TSOP TYPE I								
18.500	32	19.000	20.200	0.250	0.500	17.984	21.216	0.301

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