

# ReelFast® SMT Performance Data

The data presented here is for general comparison purposes only. Actual performance is dependent upon application variables. We will be happy to provide samples for you to install. If required, we can also test your installed hardware and provide you with the performance data specific to your application.



**Performance Testing For  
Type SMTSO Spacer/Nut**

With leaded paste.

Data Point	Pushout						Torque-out					
	SMTSO-440 SMTSO-M3		SMTSO-632 SMTSO-M3.5		SMTSO-832 SMTSO-M4		SMTSO-440 SMTSO-M3		SMTSO-632 SMTSO-M3.5		SMTSO-832 SMTSO-M4	
	lbs.	N	lbs.	N	lbs.	N	in-lbs.	N-m	in-lbs.	N-m	in-lbs.	N-m
1	92.0	409	100.0	445	125.0	556	10.50	1.2	22.00	2.5	34.00	3.8
2	87.0	387	81.0	360	108.0	480	9.50	1.1	18.00	2.0	28.00	3.2
3	94.0	418	123.0	547	110.0	489	10.00	1.1	16.00	1.8	29.00	3.3
4	85.0	378	91.0	405	104.0	463	9.00	1.0	19.00	2.1	23.00	2.6
5	74.0	329	89.0	396	92.0	409	9.50	1.1	20.00	2.3	33.00	3.7
6	89.0	396	119.0	529	135.0	600	10.00	1.1	15.00	1.7	30.00	3.4
7	101.0	449	122.0	543	105.0	467	9.00	1.0	17.00	1.9	25.00	2.8
8	97.0	431	108.0	480	95.0	423	10.50	1.2	18.00	2.0	29.00	3.3
9	88.0	391	122.0	543	117.0	520	11.50	1.3	15.00	1.7	28.00	3.2
10	79.0	351	91.0	405	93.0	414	10.50	1.2	20.00	2.3	29.00	3.3
11	81.0	360	115.0	512	122.0	543	10.00	1.1	15.00	1.7	25.00	2.8
12	82.0	365	105.0	467	123.0	547	12.00	1.4	17.00	1.9	29.00	3.3
13	91.0	405	98.0	436	134.0	596	10.00	1.1	18.00	2.0	33.00	3.7
14	66.0	294	105.0	467	112.0	498	10.00	1.1	20.00	2.3	28.00	3.2
15	76.0	338	127.0	565	124.0	552	9.00	1.0	21.00	2.4	32.00	3.6
16	77.0	342	118.0	525	82.0	365	9.50	1.1	23.00	2.6	24.00	2.7
17	63.0	280	112.0	498	93.0	414	10.00	1.1	19.00	2.1	30.00	3.4
18	86.0	383	95.0	423	129.0	574	10.00	1.1	20.00	2.3	25.00	2.8
19	71.0	316	86.0	383	90.0	400	9.50	1.1	19.00	2.1	29.00	3.3
20	75.0	334	79.0	351	144.0	641	10.00	1.1	19.00	2.1	24.00	2.7
21	77.0	342	85.0	378	131.0	583	10.50	1.2	17.00	1.9	26.00	2.9
22	84.0	374	115.0	512	96.0	427	10.50	1.2	22.00	2.5	30.00	3.4
23	76.0	338	109.0	485	105.0	467	10.00	1.1	20.00	2.3	28.00	3.2
24	83.0	369	89.0	396	87.0	387	11.00	1.2	16.00	1.8	26.00	2.9
25	78.0	347	94.0	418	144.0	641	11.00	1.2	17.00	1.9	28.00	3.2
26	77.0	343	111.0	494	125.0	556	13.00	1.5	23.00	2.6	30.00	3.4
27	78.0	347	113.0	503	112.0	498	10.50	1.2	16.00	1.8	35.00	4.0
28	98.0	436	121.0	538	105.0	467	11.00	1.2	17.00	1.9	31.00	3.5
29	89.0	396	119.0	529	92.0	409	9.50	1.1	23.00	2.6	27.00	3.1
30	90.0	400	114.0	507	94.0	418	10.00	1.1	20.00	2.3	30.00	3.4
Min.	63.0	280	79.0	351	82.0	365	9.00	1.0	15.00	1.7	23.00	2.6
Max.	101.0	449	127.0	565	144.0	641	13.00	1.5	23.00	2.6	35.00	4.0
Average	82.8	368	105.2	468	110.9	493	10.23	1.2	18.73	2.1	28.60	3.2

**CONDITIONS**

<b>Oven</b>	Quad ZCR convection oven with 4 zones	<b>Vias</b>	None
<b>High Temp</b>	496°F / 258°C	<b>Spokes</b>	2 Spoke Pattern
<b>Board Finish</b>	62% Sn, 38% Pb	<b>Paste</b>	Amtech NC559v2 63/37
<b>Board</b>	.062" thick, Single Layer FR-4	<b>Stencil</b>	.0067" / 0.17mm thick
<b>Screen Printer</b>	Ragin Manual Printer		

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**Performance Testing For  
Type SMTSO Spacer/Nut**

With lead-free paste.

Data Point	Pushout								Torque-out					
	SMTSO-440		SMTSO-632		SMTSO-832		SMTPR-6-1ET		SMTSO-440		SMTSO-632		SMTSO-832	
	SMTSO-M3	SMTSO-M3.5	SMTSO-M3.5	SMTSO-M4	SMTSO-M4	SMTSO-M4	SMTSO-M4	SMTSO-M3	SMTSO-M3.5	SMTSO-M3.5	SMTSO-M4	SMTSO-M4	SMTSO-M4	
	lbs.	N	lbs.	N	lbs.	N	lbs.	N	in-lbs.	N-m	in-lbs.	N-m	in-lbs.	N-m
1	62.0	276	82.5	367	135.7	604	127.0	565	8.00	0.9	10.62	1.2	26.55	3.0
2	87.0	387	104.9	467	127.9	569	183.0	814	8.75	1.0	14.16	1.6	28.32	3.2
3	58.0	258	55.3	246	128.3	571	220.0	979	8.50	1.0	15.04	1.7	26.55	3.0
4	40.0	178	56.2	250	158.4	705	146.0	649	9.50	1.1	13.27	1.5	24.78	2.8
5	63.0	280	89.9	400	136.6	608	176.0	783	9.00	1.0	15.93	1.8	28.32	3.2
6	55.0	245	100.0	445	173.3	771	143.0	636	9.00	1.0	14.16	1.6	26.55	3.0
7	77.0	342	109.2	486	180.4	803	153.0	681	9.50	1.1	14.16	1.6	26.55	3.0
8	52.0	231	114.4	509	166.3	740	200.0	890	8.50	1.0	15.04	1.7	24.78	2.8
9	69.0	307	104.0	463	176.9	787	180.0	801	10.00	1.1	14.16	1.6	24.78	2.8
10	63.0	280	101.6	452	168.1	748	161.0	716	9.25	1.0	15.04	1.7	26.55	3.0
11	45.0	200	56.9	253	134.8	600	173.0	770	4.25	0.5	14.16	1.6	24.78	2.8
12	72.0	320	110.6	492	183.6	817	157.0	698	8.50	1.0	15.04	1.7	24.78	2.8
13	55.0	245	104.7	466	153.0	681	148.0	658	11.00	1.2	14.16	1.6	26.55	3.0
14	72.0	320	99.3	442	132.4	589	180.0	801	8.25	0.9	12.39	1.4	28.32	3.2
15	56.0	249	93.9	418	125.4	558	174.0	774	10.50	1.2	14.16	1.6	26.55	3.0
16	44.0	196	89.2	397	112.8	502	110.0	489	10.00	1.1	9.73	1.1	24.78	2.8
17	37.0	165	92.4	411	156.6	697	99.0	440	11.25	1.3	12.39	1.4	26.55	3.0
18	48.0	214	49.9	222	166.3	740	94.0	418	8.50	1.0	14.16	1.6	24.78	2.8
19	47.0	209	102.5	456	136.0	605	106.0	471	9.25	1.0	15.93	1.8	30.09	3.4
20	49.0	218	102.5	456	151.7	675	153.0	681	9.25	1.0	15.04	1.7	28.32	3.2
21	76.0	338	96.0	427	127.9	569	97.0	431	8.50	1.0	15.04	1.7	30.09	3.4
22	48.0	214	114.8	511	116.4	518	289.0	1285	6.75	0.8	9.73	1.1	28.32	3.2
23	60.0	267	100.0	445	139.1	619	237.0	1054	7.50	0.8	15.04	1.7	28.32	3.2
24	65.0	289	89.4	398	160.4	714	142.0	632	6.50	0.7	15.04	1.7	30.09	3.4
25	53.0	236	86.5	385	147.6	657	159.0	707	8.00	0.9	12.39	1.4	30.09	3.4
26	43.0	191	80.7	359	165.2	735	175.0	778	8.00	0.9	15.04	1.7	26.55	3.0
27	58.0	258	103.6	461	173.3	771	136.0	605	7.25	0.8	13.27	1.5	28.32	3.2
28	45.0	200	108.5	483	189.7	844	194.0	863	9.50	1.1	14.16	1.6	26.55	3.0
29	58.0	258	105.4	469	158.9	707	165.0	734	6.50	0.7	11.50	1.3	23.01	2.6
30	39.0	173	99.6	443	150.6	670	165.0	734	7.50	0.8	15.04	1.7	28.32	3.2
Min.	37.0	165	49.9	222	112.8	502	94.0	418	4.25	0.5	9.73	1.1	23.01	2.6
Max.	87.0	387	114.8	511	189.7	844	289.0	1285	11.25	1.3	15.93	1.8	30.09	3.4
Average	56.5	251	93.5	416	151.1	672	161.4	718	8.56	1.0	13.83	1.6	26.96	3.0

**CONDITIONS**

<b>Oven</b>	Quad ZCR convection oven with 4 zones	<b>Vias</b>	None
<b>High Temp</b>	518°F / 270°C	<b>Spokes</b>	2 Spoke Pattern
<b>Board Finish</b>	62% Sn, 38% Pb	<b>Paste</b>	Amtech NC559LF Sn96.5/3.0Ag/0.5Cu (SAC305)
<b>Board</b>	.062" thick, Single Layer FR-4	<b>Stencil</b>	.0067" / 0.17mm thick
<b>Screen Printer</b>	Ragin Manual Printer		

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# ReelFast® SMTRA Performance Data

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**Performance Testing For  
Type SMTRA R'ANGLE® Fastener**

With leaded paste.

Data Point	SMTRA256-8-6		SMTRA440-9-6		SMTRA632-10-8		SMTRA832-12-9		SMTRAM2-6-5		SMTRAM25-6-5		SMTRAM3-7-5		SMTRAM4-9-7	
	Pushout (lbs.)	Side Load (lbs.)	Pushout (lbs.)	Side Load (lbs.)	Pushout (lbs.)	Side Load (lbs.)	Pushout (lbs.)	Side Load (lbs.)	Pushout (N)	Side Load (N)	Pushout (N)	Side Load (N)	Pushout (N)	Side Load (N)	Pushout (N)	Side Load (N)
1	24	8	70	13	114	13	123	21	256	49	387	51	398	48	516	92
2	50	8	66	10	93	8	124	22	257	60	418	52	497	47	463	99
3	52	5	111	12	90	22	136	21	437	56	533	45	497	44	548	102
4	65	4	124	13	121	22	149	21	234	53	402	58	358	51	420	95
5	30	6	103	11	136	24	142	19	227	62	354	48	453	56	559	103
6	58	5	116	12	123	6	117	21	218	42	134	34	497	57	488	105
7	22	7	123	12	162	16	122	22	216	67	461	36	481	59	653	94
8	50	7	86	12	148	13	136	24	324	51	481	52	267	48	499	104
9	47	9	115	11	141	14	84	21	241	67	432	30	359	52	514	103
10	70	11	81	10	147	16	136	23	303	51	435	50	346	40	385	105
11	66	9	97	10	128	13	153	19	267	47	320	51	488	47	400	101
12	49	7	104	12	122	20	155	18	236	55	389	55	542	58	412	103
13	52	8	109	11	123	13	145	19	429	52	182	50	507	50	445	103
14	50	10	120	11	114	8	135	18	370	62	522	52	500	40	427	86
15	53	8	96	10	104	9	114	20	215	47	360	60	359	52	425	100
16	78	10	113	8	124	16	144	16	244	64	258	64	388	41	480	105
17	75	11	99	13	124	21	112	20	218	60	434	55	536	46	625	91
18	63	8	112	11	124	24	152	12	267	66	467	46	365	46	639	104
19	79	7	124	12	122	19	140	24	244	61	392	49	400	48	540	88
20	48	6	86	11	135	20	86	21	248	64	388	51	333	46	544	95
21	44	12	75	13	24	11	147	20	269	59	344	51	431	51	638	99
22	28	10	124	11	27	11	128	22	343	49	487	58	377	52	601	108
23	53	10	100	12	137	10	125	21	415	55	393	49	507	55	612	94
24	24	9	101	8	147	8	147	20	417	56	456	50	544	50	605	97
25	90	7	129	14	120	17	151	18	470	49	398	56	466	53	649	108
26	72	10	99	13	39	15	130	20	290	52	262	59	496	48	643	113
27	64	9	87	8	126	10	111	19	474	52	436	31	406	53	649	94
28	41	10	124	13	61	8	110	20	213	63	490	55	329	49	679	99
29	92	10	106	13	143	4	154	24	390	58	216	36	341	54	687	99
30	43	8	110	10	119	10	139	18	356	63	317	46	580	38	694	100
Min.	22	4	66	8	24	4	84	12	213	42	134	30	267	38	385	86
Max.	92	12	129	14	162	24	155	24	474	67	533	64	580	59	694	113
Average	54.4	8.3	103.7	11.3	114.6	14.0	131.6	20.1	302.9	56.4	384.9	49.4	434.9	49.3	548.0	99.6

**CONDITIONS**

<b>Oven</b>	Quad ZCR convection oven with 4 zones	<b>Vias</b>	None
<b>High Temp</b>	496°F / 258°C	<b>Spokes</b>	2 Spoke Pattern
<b>Board Finish</b>	62% Sn, 38% Pb	<b>Paste</b>	Amtech NC559v2 63/37
<b>Board</b>	.062" thick, Single Layer FR-4	<b>Stencil</b>	.0067" / 0.17 mm thick
<b>Screen Printer</b>	Ragin Manual Printer	<b>Pad Height</b>	.0015" / 0.0381 mm

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**Performance Testing For  
Type SMTRA R'ANGLE® Fastener**

With lead-free paste.

Data Point	SMTRA256-8-6		SMTRA440-9-6		SMTRA632-10-8		SMTRA832-12-9		SMTRAM2-6-5		SMTRAM25-6-5		SMTRAM3-7-5		SMTRAM4-9-7	
	Pushout (lbs.)	Side Load (lbs.)	Pushout (lbs.)	Side Load (lbs.)	Pushout (lbs.)	Side Load (lbs.)	Pushout (lbs.)	Side Load (lbs.)	Pushout (N)	Side Load (N)	Pushout (N)	Side Load (N)	Pushout (N)	Side Load (N)	Pushout (N)	Side Load (N)
1	63	4	94	13	131	9	131	22	327	51	219	42	375	26	297	59
2	79	11	64	10	128	10	163	23	265	64	384	52	299	46	293	63
3	38	9	100	13	81	9	132	24	440	53	413	49	462	19	301	73
4	81	4	50	11	137	14	122	22	539	53	357	36	77	29	356	65
5	71	3	103	9	82	13	157	23	462	52	125	18	131	67	375	73
6	24	9	129	11	149	6	153	18	385	53	108	42	375	51	330	63
7	58	9	109	12	128	4	153	19	469	48	219	30	161	48	369	74
8	54	11	90	4	143	9	153	21	359	54	171	32	224	36	385	75
9	90	7	126	11	84	12	156	21	343	64	236	43	267	57	471	58
10	78	2	87	11	136	8	146	14	498	55	222	39	190	46	238	68
11	102	4	75	12	82	12	73	20	316	49	356	32	292	57	336	61
12	70	6	130	11	112	6	151	24	376	61	363	50	293	47	361	57
13	21	5	34	9	82	9	133	25	418	62	274	38	486	57	443	78
14	19	9	121	12	91	12	137	24	441	57	52	43	198	40	452	87
15	15	2	111	12	121	16	154	22	394	53	275	28	244	43	379	76
16	28	9	109	11	98	11	164	23	339	62	413	30	408	32	385	69
17	46	3	100	10	126	8	178	26	511	53	38	35	516	48	315	89
18	47	5	60	11	114	4	162	25	528	48	107	22	136	42	466	77
19	102	2	46	13	36	7	171	21	361	50	169	40	201	28	387	92
20	23	7	79	11	94	6	130	23	366	68	134	31	324	18	491	38
21	16	9	86	12	136	6	150	23	474	61	53	30	153	38	372	60
22	97	8	138	9	88	7	104	22	376	65	122	37	80	25	348	89
23	38	8	112	13	121	10	127	20	358	67	95	37	246	46	341	107
24	24	11	110	11	141	8	98	20	416	60	503	39	128	42	289	75
25	66	12	82	11	125	4	129	22	559	60	341	27	162	50	505	80
26	22	9	32	13	75	5	145	16	502	62	51	30	140	27	362	82
27	61	9	92	10	96	8	91	19	437	48	155	50	215	49	359	91
28	70	10	87	6	107	7	113	20	359	52	63	49	268	34	325	84
29	24	9	72	10	123	6	123	17	511	57	99	40	350	53	311	70
30	24	7	57	13	131	6	118	18	417	63	378	36	327	39	437	65
Min.	15	2	32	4	36	4	73	14	265	48	38	18	77	18	238	38
Max.	102	12	138	13	149	16	178	26	559	68	503	52	516	67	505	107
Average	51.7	7.1	89.5	10.8	110.3	8.4	137.2	21.2	418.2	56.8	216.5	36.9	257.6	41.3	369.3	73.3

**CONDITIONS**

<b>Oven</b>	Quad ZCR convection oven with 4 zones	<b>Vias</b>	None
<b>High Temp</b>	518°F / 270°C	<b>Spokes</b>	2 Spoke Pattern
<b>Board Finish</b>	62% Sn, 38% Pb	<b>Paste</b>	Amtech NC559LF Sn96.5/3.0Ag/0.5Cu (SAC305)
<b>Board</b>	.062" thick, Single Layer FR-4	<b>Stencil</b>	.0067" / 0.17 mm thick
<b>Screen Printer</b>	Ragin Manual Printer	<b>Pad Height</b>	.0015" / 0.0381 mm

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# microPEM™ Type SMTSO Performance Data

The data presented here is for general comparison purposes only. Actual performance is dependent upon application variables. We will be happy to provide samples for you to install. If required, we can also test your installed hardware and provide you with the performance data specific to your application.



## microPEM™ FASTENERS

Performance Testing For  
microPEM™ Type SMTSO Fasteners

With lead-free paste.

Data Point	Pushout		Torque-out	
	SMTSO-080, SMTSO-M1, SMTSO-M1.2, SMTSO-M1.4, SMTSO-M1.4		SMTSO-080, SMTSO-M1, SMTSO-M1.2, SMTSO-M1.4, SMTSO-M1.4	
	lbs.	N	in-oz	N-cm
1	84.1	374	80	56
2	81.8	364	80	56
3	88.1	392	80	56
4	92.6	412	70	49
5	83.4	371	60	42
6	86.8	386	80	56
7	84.8	377	80	56
8	86.6	385	80	56
9	96.0	427	70	49
10	83.6	372	90	64
11	85.4	380	80	56
12	81.2	361	80	56
13	72.8	324	80	56
14	84.5	376	80	56
15	87.2	388	70	49
16	85.9	382	80	56
17	88.8	395	90	64
18	82.5	367	80	56
19	82.7	368	80	56
20	83.4	371	90	64
21	89.5	398	70	49
22	80.7	359	80	56
23	83.9	373	80	56
24	86.6	385	80	56
25	83.6	372	70	49
26	90.6	403	90	64
27	85.0	378	80	56
28	82.3	366	90	64
29	85.7	381	80	56
30	84.1	374	80	56
Min.	72.8	324	60	42
Max.	96.0	427	90	64
Average	85.1	378.7	79	56

### CONDITIONS

<b>Oven</b>	Quad ZCR convection oven with 4 zones	<b>Vias</b>	None
<b>High Temp</b>	518°F / 270°C	<b>Spokes</b>	2 Spoke Pattern
<b>Board Finish</b>	62% Sn, 38% Pb	<b>Paste</b>	Amtech NC559LF
<b>Board</b>	.062" thick, Single Layer FR-4	<b>Stencil</b>	Sn96.5/3.0Ag/0.5Cu (SAC305)
<b>Screen Printer</b>	Ragin Manual Printer		.0067" / 0.17mm thick

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