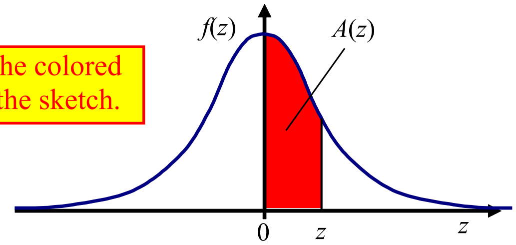
Area $A(z)$ under the normal PDF, $f(z)$

$$A(z)=\frac{1}{2}\operatorname{erf}\left(\frac{z}{\sqrt{2}}\right) \text{ where } z=\frac{x-\mu}{\sigma}\approx\frac{x-\bar{x}}{S}$$

Example, at z = 1.06, $A(z)$ = 0.35543.

$A(z)$ is the colored area in the sketch.



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.00000	0.00399	0.00798	0.01197	0.01595	0.01994	0.02392	0.02790	0.03188	0.03586
0.1	0.03983	0.04380	0.04776	0.05172	0.05567	0.05962	0.06356	0.06749	0.07142	0.07535
0.2	0.07926	0.08317	0.08706	0.09095	0.09483	0.09871	0.10257	0.10642	0.11026	0.11409
0.3	0.11791	0.12172	0.12552	0.12930	0.13307	0.13683	0.14058	0.14431	0.14803	0.15173
0.4	0.15542	0.15910	0.16276	0.16640	0.17003	0.17364	0.17724	0.18082	0.18439	0.18793
0.5	0.19146	0.19497	0.19847	0.20194	0.20540	0.20884	0.21226	0.21566	0.21904	0.22240
0.6	0.22575	0.22907	0.23237	0.23565	0.23891	0.24215	0.24537	0.24857	0.25175	0.25490
0.7	0.25804	0.26115	0.26424	0.26730	0.27035	0.27337	0.27637	0.27935	0.28230	0.28524
0.8	0.28814	0.29103	0.29389	0.29673	0.29955	0.30234	0.30511	0.30785	0.31057	0.31327
0.9	0.31594	0.31859	0.32121	0.32381	0.32639	0.32894	0.33147	0.33398	0.33646	0.33891
1.0	0.34134	0.34375	0.34614	0.34849	0.35083	0.35314	0.35543	0.35769	0.35993	0.36214
1.1	0.36433	0.36650	0.36864	0.37076	0.37286	0.37493	0.37698	0.37900	0.38100	0.38298
1.2	0.38493	0.38686	0.38877	0.39065	0.39251	0.39435	0.39617	0.39796	0.39973	0.40147
1.3	0.40320	0.40490	0.40658	0.40824	0.40988	0.41149	0.41309	0.41466	0.41621	0.41774
1.4	0.41924	0.42073	0.42220	0.42364	0.42507	0.42647	0.42785	0.42922	0.43056	0.43189
1.5	0.43319	0.43448	0.43574	0.43699	0.43822	0.43943	0.44062	0.44179	0.44295	0.44408
1.6	0.44520	0.44630	0.44738	0.44845	0.44950	0.45053	0.45154	0.45254	0.45352	0.45449
1.7	0.45543	0.45637	0.45728	0.45818	0.45907	0.45994	0.46080	0.46164	0.46246	0.46327
1.8	0.46407	0.46485	0.46562	0.46638	0.46712	0.46784	0.46856	0.46926	0.46995	0.47062
1.9	0.47128	0.47193	0.47257	0.47320	0.47381	0.47441	0.47500	0.47558	0.47615	0.47670
2.0	0.47725	0.47778	0.47831	0.47882	0.47932	0.47982	0.48030	0.48077	0.48124	0.48169
2.1	0.48214	0.48257	0.48300	0.48341	0.48382	0.48422	0.48461	0.48500	0.48537	0.48574
2.2	0.48610	0.48645	0.48679	0.48713	0.48745	0.48778	0.48809	0.48840	0.48870	0.48899
2.3	0.48928	0.48956	0.48983	0.49010	0.49036	0.49061	0.49086	0.49111	0.49134	0.49158
2.4	0.49180	0.49202	0.49224	0.49245	0.49266	0.49286	0.49305	0.49324	0.49343	0.49361
2.5	0.49379	0.49396	0.49413	0.49430	0.49446	0.49461	0.49477	0.49492	0.49506	0.49520
2.6	0.49534	0.49547	0.49560	0.49573	0.49585	0.49598	0.49609	0.49621	0.49632	0.49643
2.7	0.49653	0.49664	0.49674	0.49683	0.49693	0.49702	0.49711	0.49720	0.49728	0.49736
2.8	0.49744	0.49752	0.49760	0.49767	0.49774	0.49781	0.49788	0.49795	0.49801	0.49807
2.9	0.49813	0.49819	0.49825	0.49831	0.49836	0.49841	0.49846	0.49851	0.49856	0.49861
3.0	0.49865	0.49869	0.49874	0.49878	0.49882	0.49886	0.49889	0.49893	0.49896	0.49900
3.1	0.49903	0.49906	0.49910	0.49913	0.49916	0.49918	0.49921	0.49924	0.49926	0.49929
3.2	0.49931	0.49934	0.49936	0.49938	0.49940	0.49942	0.49944	0.49946	0.49948	0.49950
3.3	0.49952	0.49953	0.49955	0.49957	0.49958	0.49960	0.49961	0.49962	0.49964	0.49965
3.4	0.49966	0.49968	0.49969	0.49970	0.49971	0.49972	0.49973	0.49974	0.49975	0.49976
3.5	0.49977	0.49978	0.49978	0.49979	0.49980	0.49981	0.49981	0.49982	0.49983	0.49983
3.6	0.49984	0.49985	0.49985	0.49986	0.49986	0.49987	0.49987	0.49988	0.49988	0.49989
3.7	0.49989	0.49990	0.49990	0.49990	0.49991	0.49991	0.49992	0.49992	0.49992	0.49992
3.8	0.49993	0.49993	0.49993	0.49994	0.49994	0.49994	0.49994	0.49995	0.49995	0.49995
3.9	0.49995	0.49995	0.49996	0.49996	0.49996	0.49996	0.49996	0.49996	0.49997	0.49997
4.0	0.49997	0.49997	0.49997	0.49997	0.49997	0.49997	0.49998	0.49998	0.49998	0.49998

Critical Values for the Student's *t* Distribution

Values of $t_{\alpha/2}$ (critical values) for the student's *t* distribution				
	90% confidence	95% confidence	98% confidence	99% confidence
$\alpha = \rightarrow$	0.10	0.05	0.02	0.01
df = ↓				
1	6.3137	12.7062	31.8210	63.6559
2	2.9200	4.3027	6.9645	9.9250
3	2.3534	3.1824	4.5407	5.8408
4	2.1318	2.7765	3.7469	4.6041
5	2.0150	2.5706	3.3649	4.0321
6	1.9432	2.4469	3.1427	3.7074
7	1.8946	2.3646	2.9979	3.4995
8	1.8595	2.3060	2.8965	3.3554
9	1.8331	2.2622	2.8214	3.2498
10	1.8125	2.2281	2.7638	3.1693
11	1.7959	2.2010	2.7181	3.1058
12	1.7823	2.1788	2.6810	3.0545
13	1.7709	2.1604	2.6503	3.0123
14	1.7613	2.1448	2.6245	2.9768
15	1.7531	2.1315	2.6025	2.9467
16	1.7459	2.1199	2.5835	2.9208
17	1.7396	2.1098	2.5669	2.8982
18	1.7341	2.1009	2.5524	2.8784
19	1.7291	2.0930	2.5395	2.8609
20	1.7247	2.0860	2.5280	2.8453
21	1.7207	2.0796	2.5176	2.8314
22	1.7171	2.0739	2.5083	2.8188
23	1.7139	2.0687	2.4999	2.8073
24	1.7109	2.0639	2.4922	2.7970
25	1.7081	2.0595	2.4851	2.7874
26	1.7056	2.0555	2.4786	2.7787
27	1.7033	2.0518	2.4727	2.7707
28	1.7011	2.0484	2.4671	2.7633
29	1.6991	2.0452	2.4620	2.7564
30	1.6973	2.0423	2.4573	2.7500
35	1.6896	2.0301	2.4377	2.7238
40	1.6839	2.0211	2.4233	2.7045
50	1.6759	2.0086	2.4033	2.6778
100	1.6602	1.9840	2.3642	2.6259
500	1.6479	1.9647	2.3338	2.5857
1000	1.6464	1.9623	2.3301	2.5807
1.00E+10	1.6448	1.9600	2.3264	2.5758

Critical Values for the χ^2 PDF

Critical values of $\chi^2_{1-\alpha/2}$ and $\chi^2_{\alpha/2}$ for the χ^2 distribution (both tails)								
Two tails →	90% confidence		95% confidence		98% confidence		99% confidence	
α →	0.10		0.05		0.02		0.01	
Single tail →	$1-\alpha/2$	$\alpha/2$	$1-\alpha/2$	$\alpha/2$	$1-\alpha/2$	$\alpha/2$	$1-\alpha/2$	$\alpha/2$
Probability →	0.95	0.05	0.975	0.025	0.99	0.01	0.995	0.005
df = ↓	$\chi^2_{1-\alpha/2}$	$\chi^2_{\alpha/2}$	$\chi^2_{1-\alpha/2}$	$\chi^2_{\alpha/2}$	$\chi^2_{1-\alpha/2}$	$\chi^2_{\alpha/2}$	$\chi^2_{1-\alpha/2}$	$\chi^2_{\alpha/2}$
1	0.0039	3.8415	0.0010	5.0239	0.0002	6.6349	0.0000	7.8794
2	0.1026	5.9915	0.0506	7.3778	0.0201	9.2104	0.0100	10.5965
3	0.3518	7.8147	0.2158	9.3484	0.1148	11.3449	0.0717	12.8381
4	0.7107	9.4877	0.4844	11.1433	0.2971	13.2767	0.2070	14.8602
5	1.1455	11.0705	0.8312	12.8325	0.5543	15.0863	0.4118	16.7496
6	1.6354	12.5916	1.2373	14.4494	0.8721	16.8119	0.6757	18.5475
7	2.1673	14.0671	1.6899	16.0128	1.2390	18.4753	0.9893	20.2777
8	2.7326	15.5073	2.1797	17.5345	1.6465	20.0902	1.3444	21.9549
9	3.3251	16.9190	2.7004	19.0228	2.0879	21.6660	1.7349	23.5893
10	3.9403	18.3070	3.2470	20.4832	2.5582	23.2093	2.1558	25.1881
11	4.5748	19.6752	3.8157	21.9200	3.0535	24.7250	2.6032	26.7569
12	5.2260	21.0261	4.4038	23.3367	3.5706	26.2170	3.0738	28.2997
13	5.8919	22.3620	5.0087	24.7356	4.1069	27.6882	3.5650	29.8193
14	6.5706	23.6848	5.6287	26.1189	4.6604	29.1412	4.0747	31.3194
15	7.2609	24.9958	6.2621	27.4884	5.2294	30.5780	4.6009	32.8015
16	7.9616	26.2962	6.9077	28.8453	5.8122	31.9999	5.1422	34.2671
17	8.6718	27.5871	7.5642	30.1910	6.4077	33.4087	5.6973	35.7184
18	9.3904	28.8693	8.2307	31.5264	7.0149	34.8052	6.2648	37.1564
19	10.1170	30.1435	8.9065	32.8523	7.6327	36.1908	6.8439	38.5821
20	10.8508	31.4104	9.5908	34.1696	8.2604	37.5663	7.4338	39.9969
21	11.5913	32.6706	10.2829	35.4789	8.8972	38.9322	8.0336	41.4009
22	12.3380	33.9245	10.9823	36.7807	9.5425	40.2894	8.6427	42.7957
23	13.0905	35.1725	11.6885	38.0756	10.1957	41.6383	9.2604	44.1814
24	13.8484	36.4150	12.4011	39.3641	10.8563	42.9798	9.8862	45.5584
25	14.6114	37.6525	13.1197	40.6465	11.5240	44.3140	10.5196	46.9280
26	15.3792	38.8851	13.8439	41.9231	12.1982	45.6416	11.1602	48.2898
27	16.1514	40.1133	14.5734	43.1945	12.8785	46.9628	11.8077	49.6450
28	16.9279	41.3372	15.3079	44.4608	13.5647	48.2782	12.4613	50.9936
29	17.7084	42.5569	16.0471	45.7223	14.2564	49.5878	13.1211	52.3355
30	18.4927	43.7730	16.7908	46.9792	14.9535	50.8922	13.7867	53.6719
35	22.4650	49.8018	20.5694	53.2033	18.5089	57.3420	17.1917	60.2746
40	26.5093	55.7585	24.4331	59.3417	22.1642	63.6908	20.7066	66.7660
50	34.7642	67.5048	32.3574	71.4202	29.7067	76.1538	27.9908	79.4898
100	77.9294	124.3421	74.2219	129.5613	70.0650	135.8069	67.3275	140.1697
500	449.1467	553.1269	439.9360	563.8514	429.3874	576.4931	422.3034	585.2060
1000	927.5944	1074.6794	914.2572	1089.5307	898.9124	1106.9690	888.5631	1118.9475
∞	∞	∞	∞	∞	∞	∞	∞	∞

Critical Values of the Linear Correlation Coefficient

Values of r_t (critical values) for linear correlation coefficient								
$c = \rightarrow$	80%	90%	92.5%	95%	97%	98%	99%	99.5%
$\alpha = \rightarrow$	0.2	0.1	0.075	0.05	0.03	0.02	0.01	0.005
$n = \downarrow$								
3	0.95106	0.98769	0.99307	0.99692	0.99889	0.99951	0.99988	0.99997
4	0.80000	0.90000	0.92500	0.95000	0.97000	0.98000	0.99000	0.99500
5	0.68705	0.80538	0.83994	0.87834	0.91377	0.93433	0.95874	0.97404
6	0.60840	0.72930	0.76718	0.81140	0.85503	0.88219	0.91720	0.94170
7	0.55086	0.66944	0.70809	0.75449	0.80206	0.83287	0.87453	0.90556
8	0.50673	0.62149	0.65985	0.70673	0.75599	0.78872	0.83434	0.86974
9	0.47159	0.58221	0.61982	0.66638	0.71613	0.74978	0.79768	0.83591
10	0.44280	0.54936	0.58606	0.63190	0.68148	0.71546	0.76459	0.80461
11	0.41866	0.52140	0.55713	0.60207	0.65114	0.68510	0.73479	0.77589
12	0.39806	0.49726	0.53202	0.57598	0.62434	0.65807	0.70789	0.74961
13	0.38022	0.47616	0.50998	0.55294	0.60049	0.63386	0.68353	0.72553
14	0.36456	0.45750	0.49043	0.53241	0.57911	0.61205	0.66138	0.70344
15	0.35069	0.44086	0.47295	0.51398	0.55980	0.59227	0.64114	0.68311
16	0.33828	0.42590	0.45719	0.49731	0.54227	0.57425	0.62259	0.66434
17	0.32710	0.41236	0.44290	0.48215	0.52627	0.55774	0.60551	0.64696
18	0.31696	0.40003	0.42986	0.46828	0.51158	0.54255	0.58971	0.63083
19	0.30770	0.38873	0.41791	0.45553	0.49804	0.52852	0.57507	0.61580
20	0.29921	0.37834	0.40689	0.44376	0.48551	0.51550	0.56144	0.60176
22	0.28414	0.35983	0.38723	0.42271	0.46303	0.49209	0.53680	0.57627
24	0.27114	0.34378	0.37016	0.40439	0.44338	0.47158	0.51510	0.55370
26	0.25977	0.32970	0.35516	0.38824	0.42603	0.45341	0.49581	0.53355
28	0.24972	0.31722	0.34184	0.37389	0.41055	0.43718	0.47851	0.51542
30	0.24075	0.30606	0.32991	0.36101	0.39664	0.42257	0.46289	0.49900
32	0.23268	0.29599	0.31915	0.34937	0.38405	0.40933	0.44870	0.48404
34	0.22537	0.28686	0.30938	0.33879	0.37259	0.39725	0.43573	0.47034
36	0.21871	0.27852	0.30045	0.32911	0.36209	0.38618	0.42381	0.45773
38	0.21261	0.27086	0.29225	0.32022	0.35243	0.37598	0.41282	0.44608
40	0.20699	0.26381	0.28469	0.31201	0.34350	0.36655	0.40264	0.43527
45	0.19469	0.24833	0.26808	0.29396	0.32384	0.34575	0.38014	0.41133
50	0.18434	0.23529	0.25407	0.27871	0.30720	0.32813	0.36103	0.39093
55	0.17549	0.22411	0.24205	0.26561	0.29289	0.31295	0.34453	0.37329
60	0.16780	0.21438	0.23159	0.25420	0.28041	0.29970	0.33010	0.35783
65	0.16104	0.20582	0.22238	0.24415	0.26940	0.28799	0.31735	0.34414
70	0.15504	0.19821	0.21419	0.23520	0.25959	0.27756	0.30596	0.33191
80	0.14480	0.18522	0.20019	0.21990	0.24280	0.25970	0.28643	0.31091
90	0.13636	0.17449	0.18863	0.20725	0.22890	0.24490	0.27022	0.29345
100	0.12924	0.16543	0.17886	0.19655	0.21714	0.23236	0.25648	0.27863
150	0.10523	0.13482	0.14582	0.16033	0.17726	0.18980	0.20973	0.22807
200	0.09100	0.11664	0.12619	0.13879	0.15350	0.16441	0.18176	0.19776
300	0.07420	0.09515	0.10295	0.11327	0.12532	0.13426	0.14851	0.16167
400	0.06421	0.08236	0.08912	0.09807	0.10852	0.11629	0.12866	0.14010
500	0.05741	0.07364	0.07970	0.08770	0.09706	0.10402	0.11510	0.12535
1000	0.04056	0.05204	0.05633	0.06200	0.06863	0.07356	0.08142	0.08870

Modified Thompson Tau – Used for Determination of Outliers

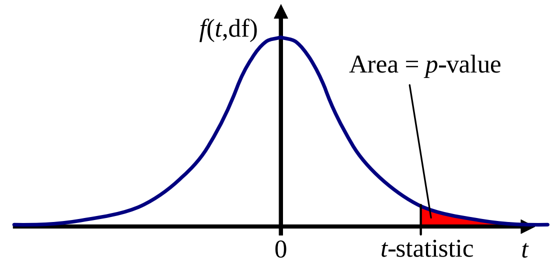
In this table, τ is obtained from the expression $\tau = \dfrac{t \cdot (n-1)}{\sqrt{n}\sqrt{n-2+t^2}}$, where

- n is the number of data points
- t is the student's t value, based on $\alpha = 0.05$ and df = n-2 (note that here df = n-2 instead of n-1). In Excel, we calculate t as TINV(α, df), i.e., here t = TINV(α, n-2)

Values of the Modified Thompson τ

n	τ		n	τ
3	1.1511		33	1.9160
4	1.4250		34	1.9174
5	1.5712		35	1.9186
6	1.6563		36	1.9198
7	1.7110		37	1.9209
8	1.7491		38	1.9220
9	1.7770		39	1.9230
10	1.7984		40	1.9240
11	1.8153		42	1.9257
12	1.8290		44	1.9273
13	1.8403		46	1.9288
14	1.8498		48	1.9301
15	1.8579		50	1.9314
16	1.8649		52	1.9325
17	1.8710		54	1.9335
18	1.8764		56	1.9345
19	1.8811		58	1.9354
20	1.8853		60	1.9362
21	1.8891		65	1.9381
22	1.8926		70	1.9397
23	1.8957		75	1.9411
24	1.8985		80	1.9423
25	1.9011		90	1.9443
26	1.9035		100	1.9459
27	1.9057		150	1.9506
28	1.9078		200	1.9530
29	1.9096		500	1.9572
30	1.9114		1000	1.9586
31	1.9130		5000	1.9597
32	1.9146		($\to \infty$)	1.9600

p-Values for the *t* Distribution – ***one tail***, df = 9

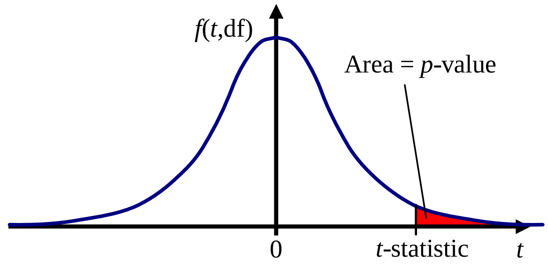


For *two tails*, multiply the value by 2, since the *t* PDF is symmetric.
The *p*-value is the colored area under the *t* PDF in the sketch.

Example: 1-tailed *p* at *t* = 1.06: *p*-value = TDIST(*t*,df,1) = 0.15838.
2-tailed *p* at *t* = 1.06: *p*-value = TDIST(*t*,df,2) = 0.31676.

t	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.50000	0.49612	0.49224	0.48836	0.48448	0.48061	0.47673	0.47286	0.46899	0.46513
0.1	0.46127	0.45741	0.45356	0.44971	0.44587	0.44204	0.43821	0.43439	0.43057	0.42676
0.2	0.42296	0.41917	0.41539	0.41162	0.40785	0.40410	0.40036	0.39662	0.39290	0.38919
0.3	0.38550	0.38181	0.37814	0.37448	0.37083	0.36719	0.36358	0.35997	0.35638	0.35280
0.4	0.34924	0.34570	0.34217	0.33865	0.33516	0.33168	0.32821	0.32477	0.32134	0.31793
0.5	0.31454	0.31116	0.30781	0.30447	0.30115	0.29785	0.29457	0.29131	0.28807	0.28485
0.6	0.28165	0.27847	0.27532	0.27218	0.26906	0.26597	0.26289	0.25984	0.25681	0.25380
0.7	0.25081	0.24784	0.24490	0.24198	0.23908	0.23620	0.23335	0.23052	0.22771	0.22492
0.8	0.22216	0.21942	0.21670	0.21400	0.21133	0.20868	0.20606	0.20345	0.20087	0.19832
0.9	0.19578	0.19327	0.19079	0.18832	0.18588	0.18346	0.18107	0.17870	0.17635	0.17402
1.0	0.17172	0.16944	0.16718	0.16495	0.16274	0.16055	0.15838	0.15624	0.15412	0.15202
1.1	0.14994	0.14789	0.14586	0.14385	0.14186	0.13989	0.13795	0.13603	0.13412	0.13224
1.2	0.13039	0.12855	0.12673	0.12494	0.12317	0.12141	0.11968	0.11797	0.11628	0.11460
1.3	0.11295	0.11132	0.10971	0.10812	0.10655	0.10499	0.10346	0.10194	0.10045	0.09897
1.4	0.09751	0.09607	0.09465	0.09325	0.09187	0.09050	0.08915	0.08782	0.08650	0.08521
1.5	0.08393	0.08266	0.08142	0.08019	0.07897	0.07778	0.07660	0.07543	0.07428	0.07315
1.6	0.07203	0.07093	0.06984	0.06877	0.06771	0.06667	0.06564	0.06463	0.06363	0.06264
1.7	0.06167	0.06072	0.05977	0.05884	0.05793	0.05702	0.05613	0.05525	0.05439	0.05354
1.8	0.05270	0.05187	0.05105	0.05025	0.04946	0.04868	0.04791	0.04715	0.04640	0.04567
1.9	0.04494	0.04423	0.04353	0.04284	0.04215	0.04148	0.04082	0.04017	0.03953	0.03890
2.0	0.03828	0.03766	0.03706	0.03647	0.03588	0.03531	0.03474	0.03418	0.03363	0.03309
2.1	0.03256	0.03203	0.03152	0.03101	0.03051	0.03002	0.02953	0.02906	0.02859	0.02813
2.2	0.02767	0.02722	0.02678	0.02635	0.02592	0.02550	0.02509	0.02468	0.02428	0.02389
2.3	0.02350	0.02312	0.02274	0.02237	0.02201	0.02165	0.02130	0.02095	0.02061	0.02028
2.4	0.01995	0.01962	0.01931	0.01899	0.01868	0.01838	0.01808	0.01779	0.01750	0.01721
2.5	0.01693	0.01666	0.01638	0.01612	0.01586	0.01560	0.01534	0.01509	0.01485	0.01461
2.6	0.01437	0.01414	0.01391	0.01368	0.01346	0.01324	0.01302	0.01281	0.01260	0.01240
2.7	0.01220	0.01200	0.01180	0.01161	0.01142	0.01124	0.01106	0.01088	0.01070	0.01053
2.8	0.01036	0.01019	0.01002	0.00986	0.00970	0.00954	0.00939	0.00924	0.00909	0.00894
2.9	0.00880	0.00866	0.00852	0.00838	0.00824	0.00811	0.00798	0.00785	0.00772	0.00760
3.0	0.00748	0.00736	0.00724	0.00712	0.00701	0.00690	0.00679	0.00668	0.00657	0.00646
3.1	0.00636	0.00626	0.00616	0.00606	0.00596	0.00587	0.00578	0.00568	0.00559	0.00550
3.2	0.00542	0.00533	0.00524	0.00516	0.00508	0.00500	0.00492	0.00484	0.00476	0.00469
3.3	0.00461	0.00454	0.00447	0.00440	0.00433	0.00426	0.00419	0.00413	0.00406	0.00400
3.4	0.00394	0.00387	0.00381	0.00375	0.00370	0.00364	0.00358	0.00352	0.00347	0.00342
3.5	0.00336	0.00331	0.00326	0.00321	0.00316	0.00311	0.00306	0.00301	0.00297	0.00292
3.6	0.00287	0.00283	0.00279	0.00274	0.00270	0.00266	0.00262	0.00258	0.00254	0.00250
3.7	0.00246	0.00242	0.00239	0.00235	0.00231	0.00228	0.00224	0.00221	0.00217	0.00214
3.8	0.00211	0.00208	0.00204	0.00201	0.00198	0.00195	0.00192	0.00189	0.00187	0.00184
3.9	0.00181	0.00178	0.00176	0.00173	0.00170	0.00168	0.00165	0.00163	0.00160	0.00158
4.0	0.00156	0.00153	0.00151	0.00149	0.00146	0.00144	0.00142	0.00140	0.00138	0.00136
4.1	0.00134	0.00132	0.00130	0.00128	0.00126	0.00124	0.00122	0.00121	0.00119	0.00117
4.2	0.00115	0.00114	0.00112	0.00110	0.00109	0.00107	0.00106	0.00104	0.00102	0.00101
4.3	0.00100	0.00098	0.00097	0.00095	0.00094	0.00093	0.00091	0.00090	0.00089	0.00087
4.4	0.00086	0.00085	0.00084	0.00082	0.00081	0.00080	0.00079	0.00078	0.00077	0.00076
4.5	0.00074	0.00073	0.00072	0.00071	0.00070	0.00069	0.00068	0.00067	0.00066	0.00065

p-Values for the *t* Distribution – ***one tail***, **df = 19**

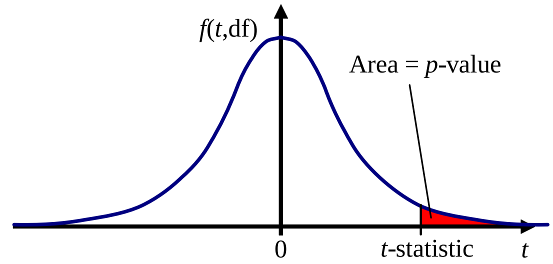


For *two tails*, multiply the value by 2, since the *t* PDF is symmetric.
The *p*-value is the colored area under the *t* PDF in the sketch.

Example: 1-tailed *p* at *t* = 1.06: *p*-value = TDIST(*t*,df,1) = 0.15122.
2-tailed *p* at *t* = 1.06: *p*-value = TDIST(*t*,df,2) = 0.30243.

t	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.50000	0.49606	0.49213	0.48819	0.48426	0.48032	0.47639	0.47246	0.46854	0.46461
0.1	0.46070	0.45678	0.45287	0.44897	0.44507	0.44117	0.43728	0.43340	0.42953	0.42566
0.2	0.42180	0.41795	0.41411	0.41027	0.40645	0.40264	0.39883	0.39504	0.39125	0.38748
0.3	0.38372	0.37997	0.37623	0.37251	0.36879	0.36509	0.36141	0.35774	0.35408	0.35044
0.4	0.34681	0.34320	0.33960	0.33602	0.33245	0.32890	0.32537	0.32185	0.31835	0.31487
0.5	0.31141	0.30796	0.30453	0.30113	0.29774	0.29436	0.29101	0.28768	0.28436	0.28107
0.6	0.27780	0.27454	0.27131	0.26810	0.26491	0.26174	0.25859	0.25546	0.25235	0.24927
0.7	0.24621	0.24316	0.24014	0.23715	0.23417	0.23122	0.22829	0.22538	0.22250	0.21964
0.8	0.21680	0.21398	0.21119	0.20842	0.20568	0.20295	0.20026	0.19758	0.19493	0.19230
0.9	0.18969	0.18711	0.18455	0.18202	0.17951	0.17702	0.17456	0.17212	0.16970	0.16731
1.0	0.16494	0.16259	0.16027	0.15797	0.15570	0.15345	0.15122	0.14901	0.14683	0.14467
1.1	0.14254	0.14043	0.13834	0.13627	0.13423	0.13221	0.13021	0.12823	0.12628	0.12435
1.2	0.12244	0.12056	0.11870	0.11686	0.11504	0.11324	0.11146	0.10971	0.10798	0.10627
1.3	0.10458	0.10291	0.10126	0.09963	0.09803	0.09644	0.09487	0.09333	0.09181	0.09030
1.4	0.08882	0.08735	0.08590	0.08448	0.08307	0.08168	0.08031	0.07896	0.07763	0.07632
1.5	0.07502	0.07375	0.07249	0.07125	0.07002	0.06882	0.06763	0.06646	0.06531	0.06417
1.6	0.06305	0.06194	0.06086	0.05978	0.05873	0.05769	0.05666	0.05566	0.05466	0.05368
1.7	0.05272	0.05177	0.05084	0.04992	0.04902	0.04813	0.04725	0.04639	0.04554	0.04470
1.8	0.04388	0.04307	0.04228	0.04149	0.04072	0.03996	0.03922	0.03849	0.03777	0.03706
1.9	0.03636	0.03567	0.03500	0.03434	0.03368	0.03304	0.03241	0.03180	0.03119	0.03059
2.0	0.03000	0.02942	0.02886	0.02830	0.02775	0.02721	0.02668	0.02616	0.02565	0.02515
2.1	0.02466	0.02417	0.02370	0.02323	0.02277	0.02232	0.02188	0.02145	0.02102	0.02060
2.2	0.02019	0.01979	0.01939	0.01900	0.01862	0.01825	0.01788	0.01752	0.01716	0.01682
2.3	0.01648	0.01614	0.01581	0.01549	0.01518	0.01487	0.01456	0.01426	0.01397	0.01368
2.4	0.01340	0.01313	0.01286	0.01259	0.01233	0.01207	0.01182	0.01158	0.01134	0.01110
2.5	0.01087	0.01064	0.01042	0.01020	0.00999	0.00978	0.00957	0.00937	0.00918	0.00898
2.6	0.00879	0.00861	0.00842	0.00825	0.00807	0.00790	0.00773	0.00757	0.00741	0.00725
2.7	0.00709	0.00694	0.00679	0.00665	0.00651	0.00637	0.00623	0.00610	0.00597	0.00584
2.8	0.00571	0.00559	0.00547	0.00535	0.00523	0.00512	0.00501	0.00490	0.00480	0.00469
2.9	0.00459	0.00449	0.00439	0.00430	0.00420	0.00411	0.00402	0.00393	0.00385	0.00376
3.0	0.00368	0.00360	0.00352	0.00344	0.00337	0.00329	0.00322	0.00315	0.00308	0.00301
3.1	0.00295	0.00288	0.00282	0.00276	0.00270	0.00264	0.00258	0.00252	0.00247	0.00241
3.2	0.00236	0.00230	0.00225	0.00220	0.00215	0.00211	0.00206	0.00201	0.00197	0.00193
3.3	0.00188	0.00184	0.00180	0.00176	0.00172	0.00168	0.00164	0.00161	0.00157	0.00154
3.4	0.00150	0.00147	0.00144	0.00140	0.00137	0.00134	0.00131	0.00128	0.00125	0.00123
3.5	0.00120	0.00117	0.00114	0.00112	0.00109	0.00107	0.00105	0.00102	0.00100	0.00098
3.6	0.00095	0.00093	0.00091	0.00089	0.00087	0.00085	0.00083	0.00081	0.00080	0.00078
3.7	0.00076	0.00074	0.00073	0.00071	0.00069	0.00068	0.00066	0.00065	0.00063	0.00062
3.8	0.00060	0.00059	0.00058	0.00056	0.00055	0.00054	0.00053	0.00052	0.00050	0.00049
3.9	0.00048	0.00047	0.00046	0.00045	0.00044	0.00043	0.00042	0.00041	0.00040	0.00039
4.0	0.00038	0.00037	0.00037	0.00036	0.00035	0.00034	0.00033	0.00033	0.00032	0.00031
4.1	0.00030	0.00030	0.00029	0.00028	0.00028	0.00027	0.00027	0.00026	0.00025	0.00025
4.2	0.00024	0.00024	0.00023	0.00023	0.00022	0.00022	0.00021	0.00021	0.00020	0.00020
4.3	0.00019	0.00019	0.00018	0.00018	0.00018	0.00017	0.00017	0.00016	0.00016	0.00016
4.4	0.00015	0.00015	0.00015	0.00014	0.00014	0.00014	0.00013	0.00013	0.00013	0.00013
4.5	0.00012	0.00012	0.00012	0.00011	0.00011	0.00011	0.00011	0.00010	0.00010	0.00010

p-Values for the *t* Distribution – ***one tail***, **df = 29**



For *two tails*, multiply the value by 2, since the *t* PDF is symmetric.
The *p*-value is the colored area under the *t* PDF in the sketch.

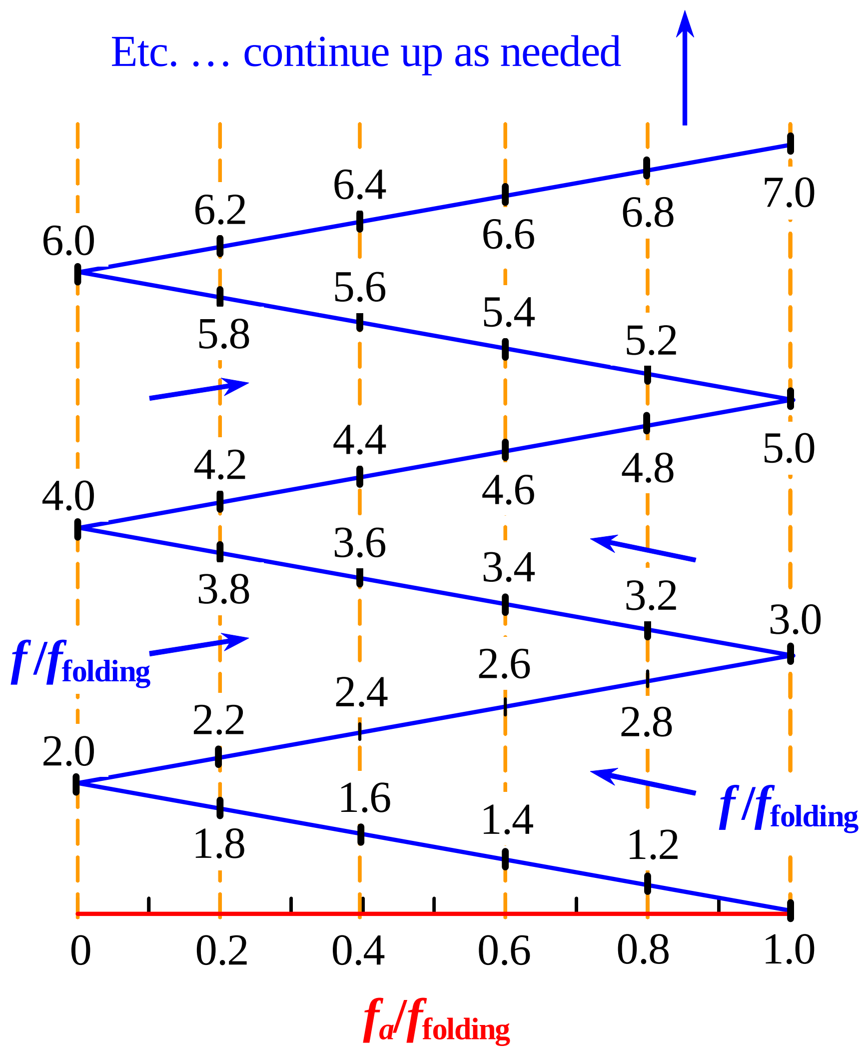
Example: 1-tailed *p* at *t* = 1.06: *p*-value = TDIST(*t*,df,1) = 0.14895.
2-tailed *p* at *t* = 1.06: *p*-value = TDIST(*t*,df,2) = 0.29789.

t	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.50000	0.49604	0.49209	0.48814	0.48418	0.48023	0.47628	0.47234	0.46839	0.46445
0.1	0.46052	0.45658	0.45266	0.44873	0.44481	0.44090	0.43700	0.43310	0.42920	0.42532
0.2	0.42144	0.41757	0.41371	0.40985	0.40601	0.40217	0.39835	0.39454	0.39073	0.38694
0.3	0.38316	0.37939	0.37563	0.37189	0.36815	0.36443	0.36073	0.35704	0.35336	0.34969
0.4	0.34604	0.34241	0.33879	0.33519	0.33160	0.32803	0.32447	0.32094	0.31741	0.31391
0.5	0.31042	0.30696	0.30351	0.30007	0.29666	0.29327	0.28989	0.28653	0.28320	0.27988
0.6	0.27658	0.27331	0.27005	0.26681	0.26360	0.26040	0.25723	0.25408	0.25095	0.24784
0.7	0.24475	0.24169	0.23864	0.23562	0.23262	0.22965	0.22669	0.22376	0.22086	0.21797
0.8	0.21511	0.21227	0.20945	0.20666	0.20389	0.20114	0.19842	0.19572	0.19305	0.19039
0.9	0.18777	0.18516	0.18258	0.18002	0.17749	0.17498	0.17250	0.17003	0.16760	0.16518
1.0	0.16279	0.16042	0.15808	0.15576	0.15347	0.15119	0.14895	0.14672	0.14452	0.14234
1.1	0.14019	0.13806	0.13595	0.13387	0.13181	0.12977	0.12776	0.12576	0.12379	0.12185
1.2	0.11993	0.11802	0.11615	0.11429	0.11246	0.11065	0.10886	0.10709	0.10535	0.10362
1.3	0.10192	0.10024	0.09858	0.09694	0.09533	0.09373	0.09215	0.09060	0.08907	0.08755
1.4	0.08606	0.08459	0.08313	0.08170	0.08029	0.07889	0.07752	0.07616	0.07483	0.07351
1.5	0.07221	0.07093	0.06967	0.06843	0.06720	0.06599	0.06480	0.06363	0.06248	0.06134
1.6	0.06022	0.05912	0.05803	0.05696	0.05590	0.05487	0.05385	0.05284	0.05185	0.05088
1.7	0.04992	0.04897	0.04804	0.04713	0.04623	0.04535	0.04448	0.04362	0.04278	0.04195
1.8	0.04114	0.04034	0.03955	0.03877	0.03801	0.03726	0.03653	0.03580	0.03509	0.03440
1.9	0.03371	0.03303	0.03237	0.03172	0.03108	0.03045	0.02983	0.02923	0.02863	0.02805
2.0	0.02747	0.02691	0.02635	0.02581	0.02528	0.02475	0.02424	0.02373	0.02324	0.02275
2.1	0.02227	0.02180	0.02134	0.02089	0.02045	0.02001	0.01959	0.01917	0.01876	0.01836
2.2	0.01796	0.01758	0.01720	0.01683	0.01646	0.01610	0.01575	0.01541	0.01507	0.01474
2.3	0.01442	0.01410	0.01379	0.01349	0.01319	0.01290	0.01261	0.01233	0.01205	0.01178
2.4	0.01152	0.01126	0.01101	0.01076	0.01052	0.01028	0.01005	0.00982	0.00960	0.00938
2.5	0.00916	0.00895	0.00875	0.00855	0.00835	0.00816	0.00797	0.00779	0.00761	0.00743
2.6	0.00726	0.00709	0.00692	0.00676	0.00660	0.00645	0.00630	0.00615	0.00600	0.00586
2.7	0.00573	0.00559	0.00546	0.00533	0.00520	0.00508	0.00496	0.00484	0.00472	0.00461
2.8	0.00450	0.00439	0.00429	0.00418	0.00408	0.00398	0.00389	0.00379	0.00370	0.00361
2.9	0.00352	0.00344	0.00335	0.00327	0.00319	0.00311	0.00304	0.00296	0.00289	0.00282
3.0	0.00275	0.00268	0.00262	0.00255	0.00249	0.00243	0.00237	0.00231	0.00225	0.00219
3.1	0.00214	0.00209	0.00203	0.00198	0.00193	0.00188	0.00184	0.00179	0.00175	0.00170
3.2	0.00166	0.00162	0.00158	0.00154	0.00150	0.00146	0.00142	0.00139	0.00135	0.00132
3.3	0.00128	0.00125	0.00122	0.00119	0.00116	0.00113	0.00110	0.00107	0.00104	0.00102
3.4	0.00099	0.00096	0.00094	0.00092	0.00089	0.00087	0.00085	0.00082	0.00080	0.00078
3.5	0.00076	0.00074	0.00072	0.00070	0.00069	0.00067	0.00065	0.00063	0.00062	0.00060
3.6	0.00059	0.00057	0.00056	0.00054	0.00053	0.00051	0.00050	0.00049	0.00047	0.00046
3.7	0.00045	0.00044	0.00043	0.00041	0.00040	0.00039	0.00038	0.00037	0.00036	0.00035
3.8	0.00034	0.00033	0.00033	0.00032	0.00031	0.00030	0.00029	0.00028	0.00028	0.00027
3.9	0.00026	0.00026	0.00025	0.00024	0.00024	0.00023	0.00022	0.00022	0.00021	0.00021
4.0	0.00020	0.00019	0.00019	0.00018	0.00018	0.00017	0.00017	0.00017	0.00016	0.00016
4.1	0.00015	0.00015	0.00014	0.00014	0.00014	0.00013	0.00013	0.00013	0.00012	0.00012
4.2	0.00012	0.00011	0.00011	0.00011	0.00010	0.00010	0.00010	0.00010	0.00009	0.00009
4.3	0.00009	0.00009	0.00008	0.00008	0.00008	0.00008	0.00007	0.00007	0.00007	0.00007
4.4	0.00007	0.00007	0.00006	0.00006	0.00006	0.00006	0.00006	0.00006	0.00005	0.00005
4.5	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	0.00004	0.00004

Folding Diagram for Aliasing Calculations

Instructions for using the folding diagram:

- Calculate the folding frequency, $f_{\text{folding}} = f_s/2$.
- Locate f/f_{folding} on the folding diagram, as plotted below. *Note*: For values of f/f_{folding} greater than 5.0, the folding diagram can easily be extended, following the obvious pattern.
- Read straight down from the value of f/f_{folding} to obtain the value of f_a/f_{folding} on the bottom (horizontal) axis.
- Finally, calculate the aliasing frequency, $f_a = \left(\frac{f_a}{f_{\text{folding}}}\right) f_{\text{folding}}$.



Alternative – an equation instead of the folding diagram:

- General equation to determine the perceived frequency of *any* signal frequency f when sampled at *any* sampling frequency f_s, whether there is aliasing or not: $f_{\text{perceived}} = \left| f - f_s \cdot \text{NINT}\left(\frac{f}{f_s}\right) \right|$, where
    - NINT is the "nearest integer" function.
    - In Excel, use ROUND(x,0) to round real number x to the nearest integer.

Thermocouple Voltage Data – Table 9.2 of Wheeler, A. J. and Ganji, A. R., *Introduction to Engineering Experimentation*, Ed. 2, Pearson Education Inc. (Prentice Hall), Upper Saddle River, NJ, 2004.

TABLE 9.2 Millivolt Output of Common Thermocouples (Reference Junction at 0°C)

Temperature (°C)	Thermocouple type T	E	J	K	R	S
−250	−6.181	−9.719		−6.404		
−200	−5.603	−8.824	−7.890	−5.891		
−150	−4.648	−7.279	−6.499	−4.912		
−100	−3.378	−5.237	−4.632	−3.553		
−50	−1.819	−2.787	−2.431	−1.889		
0	0.000	0.000	0.000	0.000	0.000	0.000
20	0.789	1.192	1.019	0.798	0.111	0.113
40	1.611	2.419	2.058	1.611	0.232	0.235
60	2.467	3.683	3.115	2.436	0.363	0.365
80	3.357	4.983	4.186	3.266	0.501	0.502
100	4.277	6.317	5.268	4.095	0.647	0.645
120	5.227	7.683	6.359	4.919	0.800	0.795
140	6.204	9.078	7.457	5.733	0.959	0.950
160	7.207	10.501	8.560	6.539	1.124	1.109
180	8.235	11.949	9.667	7.338	1.294	1.273
200	9.286	13.419	10.777	8.137	1.468	1.440
220	10.360	14.909	11.887	8.938	1.647	1.611
240	11.456	16.417	12.998	9.745	1.830	1.785
260	12.572	17.942	14.108	10.560	2.017	1.962
280	13.707	19.481	15.217	11.381	2.207	2.141
300	14.860	21.033	16.325	12.207	2.400	2.323
350	17.816	24.961	19.089	14.292	2.896	2.786
400	20.869	28.943	21.846	16.395	3.407	3.260
450		32.960	24.607	18.513	3.933	3.743
500		36.999	27.388	20.640	4.471	4.234
600		45.085	33.096	24.902	5.582	5.237
700		53.110	39.130	29.218	6.741	6.274
800		61.022		33.277	7.949	7.345
900		68.873		37.325	9.203	8.448
1000		76.358		41.269	10.503	9.585
1100				45.108	11.846	10.754
1200				48.828	13.224	11.947
1300				52.398	14.624	13.155
1400					16.035	14.368
1500					17.445	15.576
1600					18.842	16.771
1700					20.215	17.942

Platinum 100-Ω RTD Table

TABLE F.3
Platinum RTD 100 Ω at 0°C, DIN curve 43760, 9–68

°C	Ohms	°C	Ohms	°C	Ohms	°C	Ohms	°C	Ohms
–200	18.53	–40	84.21	120	146.06	280	204.88	440	260.75
–195	20.65	–35	86.19	125	147.94	285	206.68	445	262.45
–190	22.78	–30	88.17	130	149.82	290	208.46	450	264.14
–185	24.92	–25	90.15	135	151.7	295	210.25	455	265.83
–180	27.05	–20	92.13	140	153.57	300	212.03	460	267.52
–175	29.17	–15	94.1	145	155.45	305	213.81	465	269.21
–170	31.28	–10	96.07	150	157.32	310	215.58	470	270.89
–165	33.38	–5	98.04	155	159.18	315	217.36	475	272.57
–160	35.48	0	100	160	161.04	320	219.13	480	274.25
–155	37.57	5	101.95	165	162.9	325	220.9	485	275.92
–150	39.65	10	103.9	170	164.76	330	222.66	490	277.6
–145	41.73	15	105.85	175	166.62	335	224.42	495	279.27
–140	43.8	20	107.79	180	168.47	340	226.18	500	280.93
–135	45.87	25	109.73	185	170.32	345	227.94	505	282.6
–130	47.93	30	111.67	190	172.16	350	229.69	510	284.26
–125	49.99	35	113.61	195	174	355	231.44	515	285.91
–120	52.04	40	115.54	200	175.84	360	233.19	520	287.57
–115	54.09	45	117.47	205	177.68	365	234.93	525	289.22
–110	56.13	50	119.4	210	179.51	370	236.67	530	290.87
–105	58.17	55	121.32	215	181.34	375	238.41	535	292.51
–100	60.2	60	123.24	220	183.17	380	240.15	540	294.16
–95	62.23	65	125.16	225	185	385	241.88	545	295.8
–90	64.25	70	127.07	230	186.82	390	243.61	550	297.43
–85	66.27	75	128.98	235	188.64	395	245.34	555	299.07
–80	68.28	80	130.89	240	190.46	400	247.06	560	300.7
–75	70.29	85	132.8	245	192.27	405	248.78	565	302.33
–70	72.29	90	134.7	250	194.08	410	250.5	570	303.95
–65	74.29	95	136.6	255	195.89	415	252.21	575	305.58
–60	76.28	100	138.5	260	197.7	420	253.93	580	307.2
–55	78.27	105	140.39	265	199.5	425	255.64	585	308.81
–50	80.25	110	142.28	270	201.3	430	257.34	590	310.43
–45	82.23	115	144.18	275	203.09	435	259.05	595	312.04

(Continued on next page)

TABLE F.3
(Continued)

°C	Ohms	°C	Ohms	°C	Ohms	°C	Ohms	°C	Ohms
600	313.65	655	331.15	710	348.3	765	365.1	820	381.55
605	315.25	660	332.72	715	349.84	770	366.61	825	383.03
610	316.86	665	334.29	720	351.38	775	368.12	830	384.5
615	318.46	670	335.86	725	352.92	780	369.62	835	385.98
620	320.05	675	337.43	730	354.45	785	371.12	840	387.45
625	321.65	680	338.99	735	355.98	790	372.62	845	388.91
630	323.24	685	340.55	740	357.51	795	374.12	850	390.38
635	324.83	690	342.1	745	359.03	800	375.61		
640	326.41	695	343.66	750	360.55	805	377.1		
645	327.99	700	345.21	755	362.07	810	378.59		
650	329.57	705	346.76	760	363.59	815	380.07		

Table taken from R. E. Fraser, *Process Measurement and Control – Introduction to Sensors, Communication, Adjustment, and Control*, Prentice-Hall, Inc., Upper Saddle River, NJ, 2001.

Resistance values for two standard thermistors

T (°C)	T (°F)	R (Ω) for type 2252	R (Ω) for type 5000
-10.0	14.0	12460	27670
-9.0	15.8	11810	26210
-8.0	17.6	11190	24830
-7.0	19.4	10600	23540
-6.0	21.2	10050	22320
-5.0	23.0	9534	21170
-4.0	24.8	9046	20080
-3.0	26.6	8586	19060
-2.0	28.4	8151	18100
-1.0	30.2	7741	17190
0.0	32.0	7355	16330
1.0	33.8	6989	15520
2.0	35.6	6644	14750
3.0	37.4	6319	14030
4.0	39.2	6011	13340
5.0	41.0	5719	12700
6.0	42.8	5444	12090
7.0	44.6	5183	11510
8.0	46.4	4937	10960
9.0	48.2	4703	10440
10.0	50.0	4482	9951
11.0	51.8	4273	9486
12.0	53.6	4074	9046
13.0	55.4	3886	8628
14.0	57.2	3708	8232
15.0	59.0	3539	7857
16.0	60.8	3378	7500
17.0	62.6	3226	7162
18.0	64.4	3081	6841
19.0	66.2	2944	6536
20.0	68.0	2814	6247
21.0	69.8	2690	5972
22.0	71.6	2572	5710
23.0	73.4	2460	5462
24.0	75.2	2354	5225
25.0	77.0	2252	5000
26.0	78.8	2156	4787
27.0	80.6	2064	4583
28.0	82.4	1977	4389
29.0	84.2	1894	4204
30.0	86.0	1815	4029