

TS20S

Capacitance And Rated Voltage Range
(Letter Denotes Case Size)

Rated Voltage(V)	20	25	35	50	63
Capacitance(μF)	Case Size & ESR				
0.68		B(300)	B(350)	B(350,400)	
1	B(300)	B(300)	B(350)	B(300,350)	B(300), C(200,300), D(120)
1.5	B(300)	B(300), C(150)	B(200,350), C(200)	B(300,350), C(200,300)	C(200,300), D(120)
2.2	A(250), B(150,300)	B(250,300), C(100,150)	B(200,(350), C(200)	B(350), C(200,300)	C(200), D(120)
3.3	A(250), B(150,00), C(150)	B(250,300), C(100,150)	B(200,350), C(200)	C(200), D(100)	C(200), D(120)
4.7	B(150,300), C(100,150)	B(150,250,300), C(100,150)	B(200,350), C(200)	C(200), D(100)	C(200), D(75,120,300), E(120)
6.8	B(150,300), C(100,150)	B(90,150,300), C(100,150)	C(200), D(90)	C(200), H(70,90), D(70,100,120)	D(120), E(100,150)
10	B(100,150,300), C(100,150)	B(100,150,300), C(100,150), D(90)	B(200), C(200), H(70,120), D(90), E(90)	D(90,120), E(70,100)	D(120), E(50,(100,150)
15	B(90), C(80,150), D(70,80)	B(100,150), C(150), H(90), D(90), E(80)	C(200), H(100,125), D(70,100), E(90)	V(100), E(70,100)	V(120), E(35,120,150)
22	C(100,150), H(45,70), H(90), D(60,80), E(50,80)	B(150), C(100,150), H(60,90), D(60,80,100), E(80)	D(70,100), E(90)	V(100), W(100), E(75,100)	W(120)
33	C(150), H(70), D(60,80), E(50,80)	H(60,100), D(60,80,100), E(80)	D(65), D(100), V(90), E(55,70,90)	V(100), W(100), E(75)	
47	C(150), H(55,70,90), D(55,80), E(50,80)	D(60,80,100), E(50,80)	V(90), W(90), E(30,55,90)	W(100)	
68	D(55,80), E(45,80)	D(80), V(80), E(50,80)	W(90)		
100	D(55), V(80), E(45,80)	V(80), W(80), E(60,80)			
150	V(80), W(80), E(80)	V(80), W(80)			
220	V(80), W(80), E(80)				

TS20S

Rated Voltage (V)	Rated CAP (μF)	Case Code	Category Temp (°C)	Category Voltage (V)	Max DCL(μA) @25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	100kHz RMS Current (mA)		
								45°C	85°C	105°C
16	330	E	105	12.8	528	10	25	2236	1565	559
		E	105	12.8	528	10	50	1581	1107	395
		E	105	12.8	528	10	80	1250	875	313
		V	105	12.8	528	10	40	1936	1356	484
		V	105	12.8	528	10	80	1369	959	342
		W	105	12.8	528	10	80	1581	1107	395
20	1	B	105	16	2	10	300	500	350	125
	1.5	B	105	16	3	10	300	500	350	125
	2.2	A	105	16	4.4	10	250	510	357	127
		B	105	16	4.4	10	150	707	495	177
	3.3	B	105	16	4.4	10	300	500	350	125
		A	105	16	6.6	10	250	510	357	127
		B	105	16	6.6	10	150	707	495	177
	4.7	B	105	16	6.6	10	300	500	350	125
		A	105	16	6.6	10	150	775	542	194
		B	105	16	9.4	10	150	707	495	177
	6.8	B	105	16	9.4	10	300	500	350	125
		C	105	16	9.4	10	100	949	664	237
		C	105	16	9.4	10	150	775	542	194
	10	B	105	16	13.6	10	150	707	495	177
		B	105	16	13.6	10	300	500	350	125
		C	105	16	13.6	10	100	949	664	237
		C	105	16	13.6	10	150	775	542	194
	15	B	105	16	20	8	100	866	606	217
		B	105	16	20	10	150	707	495	177
		B	105	16	20	10	300	500	350	125
		C	105	16	20	10	100	949	664	237
		C	105	16	20	10	150	775	542	194
	22	B	105	16	30	10	90	913	639	228
		C	105	16	30	10	80	1061	742	265
		C	105	16	30	10	150	775	542	194
		D	105	16	30	10	70	1225	857	306
		D	105	16	30	10	80	1146	802	286
	33	C	105	16	44	10	100	949	664	237
		C	105	16	44	10	150	775	542	194
		D	105	16	44	10	60	1323	926	331
		D	105	16	44	10	80	1146	802	286
		E	105	16	44	10	50	1581	1107	395
		E	105	16	44	10	80	1250	875	313
		H	105	16	44	10	45	1667	1167	417
	33	H	105	16	44	6	70	1336	935	334
		H	105	16	44	10	90	1179	825	295
C		105	16	66	10	150	775	542	194	
D		105	16	66	10	60	1323	926	331	
D		105	16	66	10	80	1146	802	286	

1. Please do not use multimeter through the measuring procedures.
2. Capacitance and DF measured at :100Hz U_~ =2.2° 1.0V U₋~1.0° 0.5V, Frequency=100Hz. Test only applied in series equivalent circuit.
3. Voltage derating is applied at +105 The DCL parameter should be read after 5 minutes when it connected to the circuit
4. Special size and demand could consult with us.

TS20S

Rated Voltage (V)	Rated CAP (μF)	Case Code	Category Temp (°C)	Category Voltage (V)	Max DCL(μA) @25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	100kHz RMS Current (mA)		
								45°C	85°C	105°C
20	47	C	105	16	94	10	150	775	542	194
		D	105	16	94	10	55	1382	967	345
		D	105	16	94	10	80	1146	802	286
		E	105	16	94	10	50	1581	1107	395
		E	105	16	94	10	80	1250	875	313
		H	105	16	94	10	55	1508	1055	377
		H	105	16	94	6	70	1336	935	334
	H	105	16	94	10	90	1179	825	295	
	68	D	105	16	136	6	55	1382	967	345
		D	105	16	136	10	80	1146	802	286
		E	105	16	136	6	45	1667	1167	417
		E	105	16	136	10	80	1250	875	313
	100	D	105	16	200	10	55	1382	967	345
		E	105	16	200	6	45	1667	1167	417
		E	105	16	200	10	80	1250	875	313
		V	105	16	200	10	80	1369	959	342
	150	E	105	16	300	10	80	1250	875	313
		V	105	16	300	10	80	1369	959	342
		W	105	16	300	10	80	1581	1107	395
	220	E	105	16	440	10	80	1250	875	313
		V	105	16	440	10	80	1369	959	342
W		105	16	440	10	80	1581	1107	395	
25	0.68	B	105	20	1.7	10	300	500	350	125
	1	B	105	20	2.5	10	300	500	350	125
	1.5	B	105	20	3.8	10	300	500	350	125
		C	105	20	3.8	10	150	775	542	194
	2.2	B	105	20	5.5	10	250	548	383	137
		B	105	20	5.5	10	300	500	350	125
		C	105	20	5.5	10	100	949	664	237
	3.3	C	105	20	5.5	10	150	775	542	194
		B	105	20	8.3	10	250	548	383	137
		B	105	20	8.3	10	300	500	350	125
		C	105	20	8.3	10	100	949	664	237
	4.7	C	105	20	8.3	10	150	775	542	194
		B	105	20	11.8	6	150	707	495	177
		B	105	20	11.8	10	250	548	383	137
		B	105	20	11.8	10	300	500	350	125
		C	105	20	11.8	10	100	949	664	237
	6.8	C	105	20	11.8	10	150	775	542	194
		B	105	20	17	6	90	913	639	228
		B	105	20	17	6	150	707	495	177
		B	105	20	17	10	300	500	350	125
		C	105	20	17	10	100	949	664	237
10	C	105	20	17	10	150	775	542	194	
	B	105	20	25	8	100	866	606	217	
	B	105	20	25	6	150	707	495	177	
	B	105	20	25	10	300	500	350	125	
	C	105	20	25	10	100	949	664	237	
	C	105	20	25	10	150	775	542	194	
D	105	20	25	10	90	1080	756	270		

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								45°C	85°C	105°C
25	15	B	105	20	37.5	6	100	866	606	217
		B	105	20	37.5	6	150	707	495	177
		C	105	20	37.5	10	150	775	542	194
		D	105	20	37.5	10	90	1080	756	270
		E	105	20	37.5	10	80	1250	875	313
		H	105	20	37.5	10	90	1179	825	295
	22	B	105	20	55	6	150	707	495	177
		C	105	20	55	6	100	949	664	237
		C	105	20	55	10	150	775	542	194
		D	105	20	55	6	60	1323	926	331
		D	105	20	55	10	80	1146	802	286
		D	105	20	55	6	100	1025	717	256
		E	105	20	55	10	80	1250	875	313
		H	105	20	55	10	60	1443	1010	361
	33	D	105	20	82.5	10	60	1323	926	331
		D	105	20	82.5	10	80	1146	802	286
		D	105	20	82.5	6	100	1025	717	256
		E	105	20	82.5	10	80	1250	875	313
		H	105	20	82.5	10	60	1443	1010	361
		H	105	20	82.5	6	100	1118	783	280
	47	D	105	20	117.5	6	60	1323	926	331
		D	105	20	117.5	10	80	1146	802	286
		D	105	20	117.5	6	100	1025	717	256
		E	105	20	117.5	6	50	1581	1107	395
		E	105	20	117.5	10	80	1250	875	313
	68	D	105	20	170	10	80	1146	802	286
		E	105	20	170	6	50	1581	1107	395
		E	105	20	170	10	80	1250	875	313
		V	105	20	170	10	80	1369	959	342
	100	E	105	20	250	10	60	1443	1010	361
		E	105	20	250	10	80	1250	875	313
		V	105	20	250	10	80	1369	959	342
		W	105	20	250	10	80	1581	1107	395
	150	V	105	20	375	10	80	1369	959	342
		W	105	20	375	10	80	1581	1107	395
	35	0.68	B	105	28	2.4	10	350	463	324
1		B	105	28	3.5	10	350	463	324	116
1.5		B	105	28	5.3	6	200	612	429	153
		B	105	28	5.3	10	350	463	324	116
2.2		C	105	28	5.3	10	200	671	470	168
		B	105	28	7.7	6	200	612	429	153
		B	105	28	7.7	10	350	463	324	116
3.3		C	105	28	7.7	10	200	671	470	168
		B	105	28	11.6	6	200	612	429	153
		B	105	28	11.6	10	350	463	324	116
4.7		C	105	28	11.6	10	200	671	470	168
		B	105	28	16.5	6	200	612	429	153
		B	105	28	16.5	10	350	463	324	116
		C	105	28	16.5	10	200	671	470	168

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Rated Voltage (V)	Rated CAP (µF)	Case Code	Category Temp (°C)	Category Voltage (V)	Max DCL(µA) @25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	100kHz RMS Current (mA)		
								45°C	85°C	105°C
35	6.8	C	105	28	23.8	10	200	671	470	168
		D	105	28	23.8	10	90	1080	756	270
	10	B	105	28	35	6	200	612	429	153
		C	105	28	35	10	200	671	470	168
		D	105	28	35	10	90	1080	756	270
		E	105	28	35	10	90	1179	825	295
		H	105	28	35	6	70	1336	935	334
		H	105	28	35	10	120	1021	714	255
	15	C	105	28	52.5	6	200	671	470	168
		D	105	28	52.5	6	70	1225	857	306
		D	105	28	52.5	6	100	1025	717	256
		E	105	28	52.5	10	90	1179	825	295
		H	105	28	52.5	10	100	1118	783	280
		H	105	28	52.5	10	125	1000	700	250
	22	D	105	28	77	6	70	1225	857	306
		D	105	28	77	6	100	1025	717	256
		E	105	28	77	10	90	1179	825	295
	33	D	105	28	115.5	10	65	1271	890	318
		D	105	28	115.5	6	100	1025	717	256
		E	105	28	115.5	6	55	1508	1055	377
		E	105	28	115.5	6	70	1336	935	334
		E	105	28	115.5	10	90	1179	825	295
		V	105	28	115.5	10	90	1291	904	323
	47	E	105	28	164.5	10	30	2041	1429	510
		E	105	28	164.5	6	55	1508	1055	377
		E	105	28	164.5	10	90	1179	825	295
		V	105	28	164.5	10	90	1291	904	323
		W	105	28	164.5	10	90	1491	1043	373
68	W	105	28	238	10	90	1491	1043	373	
50	0.68	B	105	40	3.4	10	350	463	324	116
		B	105	40	3.4	6	400	433	303	108
	1	B	105	40	5	6	300	500	350	125
		B	105	40	5	10	350	463	324	116
	1.5	B	105	40	7.5	6	300	500	350	125
		B	105	40	7.5	10	350	463	324	116
		C	105	40	7.5	10	200	671	470	168
	2.2	C	105	40	7.5	6	300	548	383	137
		B	105	40	11	10	350	463	324	116
		C	105	40	11	10	200	671	470	168
	3.3	C	105	40	11	6	300	548	383	137
		C	105	40	16.5	10	200	671	470	168
		D	105	40	16.5	10	100	1025	717	256
	4.7	C	105	40	23.5	10	200	671	470	168
		D	105	40	23.5	10	100	1025	717	256
	6.8	C	105	40	34	10	200	671	470	168
		D	105	40	34	10	70	1225	857	306
		D	105	40	34	10	100	1025	717	256
		D	105	40	34	10	120	935	655	234
		H	105	40	34	10	70	1336	935	334
H		105	40	34	10	90	1179	825	295	

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								45°C	85°C	105°C
50	10	D	105	40	50	10	90	1080	756	270
		D	105	40	50	10	120	935	655	234
		E	105	40	50	6	70	1336	935	334
		E	105	40	50	10	100	1118	783	280
	15	E	105	40	75	6	70	1336	935	334
			105	40	75	10	100	1118	783	280
			105	40	75	10	100	1225	857	306
	22	E	105	40	110	10	75	1291	904	323
			105	40	110	10	100	1118	783	280
		V	105	40	110	10	100	1225	857	306
			105	40	110	10	100	1414	990	354
	33	E	105	40	165	10	75	1291	904	323
			105	40	165	10	100	1225	857	306
			105	40	165	10	100	1414	990	354
47	W	105	40	235	10	100	1414	990	354	
63	1	B	105	50.4	6.3	8	300	500	350	125
		C	105	50.4	6.3	10	200	671	470	168
		C	105	50.4	6.3	6	300	548	383	137
		D	105	50.4	6.3	10	120	935	655	234
	1.5	C	105	50.4	9.5	10	200	671	470	168
			105	50.4	9.5	6	300	548	383	137
		D	105	50.4	9.5	10	120	935	655	234
	2.2	C	105	50.4	13.9	10	200	671	470	168
		D	105	50.4	13.9	10	120	935	655	234
	3.3	C	105	50.4	20.8	10	200	671	470	168
		D	105	50.4	20.8	10	120	935	655	234
	4.7	C	105	50.4	29.6	6	200	671	470	168
			105	50.4	29.6	10	75	1183	828	296
		D	105	50.4	29.6	10	120	935	655	234
			105	50.4	29.6	10	300	592	414	148
			105	50.4	29.6	10	120	1021	714	255
	6.8	D	105	50.4	42.8	10	120	935	655	234
		E	105	50.4	42.8	6	100	1118	783	280
			105	50.4	42.8	6	150	913	639	228
	10	D	105	50.4	63	10	120	935	655	234
			105	50.4	63	10	50	1581	1107	395
		E	105	50.4	63	6	100	1118	783	280
			105	50.4	63	6	150	913	639	228
	15	E	105	50.4	94.5	10	35	1890	1323	472
			105	50.4	94.5	10	120	1021	714	255
		E	105	50.4	94.5	10	150	913	639	228
			105	50.4	94.5	10	120	1118	783	280
	22	W	105	50.4	138.6	10	120	1291	904	323

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2. Capacitance and DF measured at :100Hz U_~ =2.2° 1.0V U_~ =1.0° 0.5V, Frequency=100Hz. Test only applied in series equivalent circuit.
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Land Dimension / Courtyard

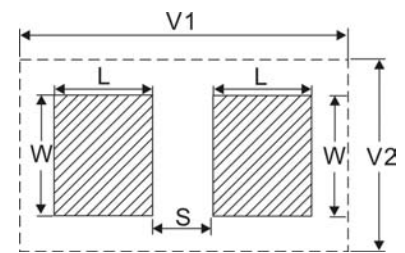
Case Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B : Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
A	1.35	2.20	0.62	6.02	2.8	1.23	1.8	0.82	4.92	2.3	1.13	1.42	0.98	4.06	2.04
B	2.35	2.21	0.92	6.32	4.0	2.23	1.8	1.12	5.22	3.5	2.13	1.42	1.28	4.36	3.24
C	2.35	2.77	2.37	8.92	4.5	2.23	2.37	2.57	7.82	4	2.13	1.99	2.73	6.96	3.74
D	2.55	2.77	3.67	10.22	5.6	2.43	2.37	3.87	9.12	5.1	2.33	1.99	4.03	8.26	4.84
E	2.55	2.77	3.67	10.22	5.6	2.43	2.37	3.87	9.12	5.1	2.33	1.99	4.03	8.26	4.84

Density Level A: For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

Density Level B: For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.

Density Level C: For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC-7351).

- 1 Height of these chips may create problems in wave soldering.
- 2 Land pattern geometry is too small for silkscreen outline.



Surface Mount Footprints

Soldering Process

Suntan tantalum capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. Suntan's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J STD 020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

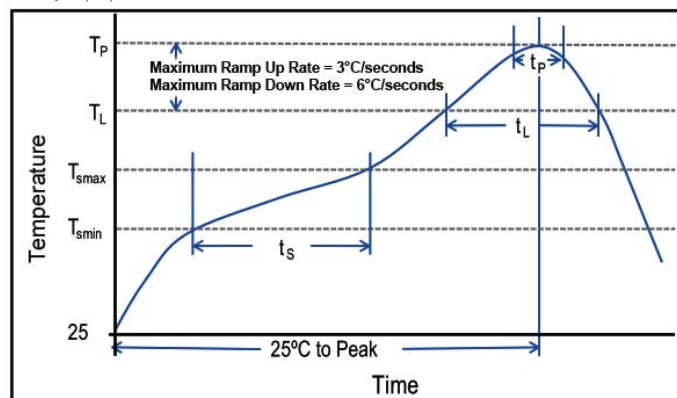
Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

During typical reflow operations, a slight darkening of the gold- colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (ts) from T_{Smin} to T_{Smax}	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* , 235°C**	250°C* , 260°C**
Time within 5°C of Maximum Peak Temperature (tP)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.

*Case Size D, E**Case Size A, B, C



Recommended Reflow Profile

Note: Specifications are subject to change without notice. For more detail and update, please visit our website.