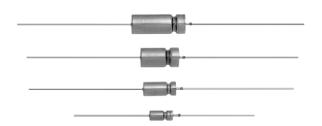


Wet Tantalum Capacitors, Space Level, Established Reliability, DLA Drawing 20001



LINKS TO ADDITIONAL RESOURCES



FEATURES

- Screened for space level applications
- Tantalum case, hermetically sealed, axial leaded
- Screened M39006/33 capacitors
 - Established failure rate
 - "H" or high shock and vibration rated
 - Enhanced 100 % or group A testing
 - Enhanced production lot testing group B prior to shipment
- Stability
- Thermal shock
- 1000 h life at +85 °C
- Reverse voltage rating at +85 °C is 3 V_{DC} and at +125 °C is 2 V_{DC}

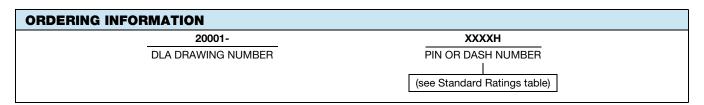
CROSS REFERENCE		
DLA DRAWING	MIL SPECIFICATION	STYLE
DLA 20001	M39006/33	CLR93

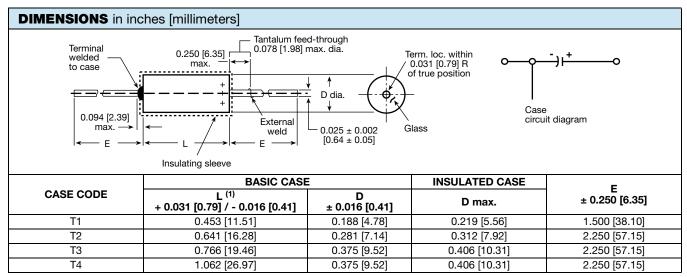
Established Reliability "Space Level" Wet Tantalum Capacitors

In accordance with the DLA 20001 drawing, all parts are up-screened from "M" failure rate, "H" characteristic, MIL-PRF-39006/33 capacitors.

Parts are marked with the DLA 20001 drawing number and PIN (dash number).

For information on the exact performance of these capacitors, please refer to the latest issue of the DLA 20001 drawing and M39006/33 specification.





Note

(1) Length of basic case sleeving shall be as specified in MIL-PRF-39006



ASE								8/43/			
	CAP.	PIN FOR	MAX. DC	L (µA) AT	MAX. ESR AT	MAX. DF ⁽¹⁾ AT	MAX. IMP. AT	011	CAPACITANGE (%		MAX. RIPPLE
ODE	TOL. (± %)	DLA 20001	+25 °C	+25 °C +25 °C		+25 °C 120 Hz	-55 °C 120 Hz (Ω)		+85 °C	+125 °C	CURRENT ⁽²⁾ AT +85 °C 40 kHz (mA _{RMS})
			50 V	_{DC} AT +85	°C; 30 V _D	_C AT +125	°C				
T1	20	0021H	1	5	1.5	9.2	35	-25	8	15	1050
T1	10	0022H	1	5	1.5	9.2	35	-25	8	15	1050
T2	20	0023H	2	10	0.9	17.9	17.5	-50	8	15	1800
T2	10	0024H	2	10	0.9	17.9	17.5	-50	8	15	1800
T3	20	0027H	3	25	0.75	31.9	10	-50	8	15	2100
T3	10	0028H	3	25	0.75	31.9	10	-50	8	15	2100
T4	20	0029H	5	40	0.7	43.1	10	-58	10	20	2750
T4	10	0030H	5	40	0.7	43.1	10	-58	10	20	2750
			60 V	_{DC} AT +85	°C; 40 V _D	C AT +125	°C				
T1	20	0031H	1	5	2	8.5	44	-25	8	12	1050
T1	10	0032H	1	5	2	8.5	44	-25	8	12	1050
T2	20	0033H	2	10	1.1	14.9	20	-40	8	15	1650
T2	10	0034H	2	10	1.1	14.9	20	-40	8	15	1650
T3	20	0037H	3	25	0.9	31.8	15	-60	8	15	2100
T3	10	0038H	3	25	0.9	31.8	15	-60	8	15	2100
T4	20	0039H	5	40	0.8	40.5	10	-58	8	15	2750
T4	10	0040H	5	40	8.0	40.5	10	-58	8	15	2750
			75 V	DC AT +85	°C; 50 V _D	_C AT +125	°C				
T1	20	0041H	1	5	2.5	7.5	66	-25	5	9	1050
T1	10	0042H	1	5	2.5	7.5	66	-25	5	9	1050
T2	20	0043H	2	10	1.3	12.9	24	-35	6	10	1650
T2	10	0044H	2	10	1.3	12.9	24	-35	6	10	1650
T3	20	0047H	3	30	1.0	29.9	12	-45	6	10	2100
T3	10	0048H	3	30	1.0	29.9	12	-45	6	10	2100
T4	20	0049H	5	50	0.9	38.3	12	-55	8	12	2750
T4	10	0050H	5	50	0.9	38.3	12	-55	8	12	2750
			100 V	_{DC} AT +85	°C; 65 V _C	OC AT +125	°C				
T1	20	0051H	1	5	3.5	4.8	125	-18	3	10	1050
T1	10	0052H	1	5	3.5	4.8	125	-18	3	10	1050
T2	20	0053H	2	10	2.1	12.9	37	-30	4	12	1650
T2	10	0054H	2	10	2.1	12.9	37	-30	4	12	1650
T3	20	0057H	3	25	1.6	21.7	22	-35	6	12	2100
T3	10	0058H	3	25	1.6	21.7	22	-35	6	12	2100
T4	20	0059H	5	50	1.2	23.9	15	-40	6	12	2750
T4	10	0060H	5	50	1.2	23.9	15	-40	6		2750
	T1 T2 T3 T4 T1 T1 T1 T2 T3 T4 T1 T1 T2 T3 T4 T1 T1 T2 T3 T3 T4 T1 T1 T2 T3 T3 T4 T1 T1 T1 T2 T3 T3 T4 T4 T1 T1 T1 T1 T1 T2 T3 T3 T4 T4 T1 T1 T1 T1 T1 T1 T1	T1 10 T2 20 T3 10 T4 20 T1 10 T1 20 T1 10 T2 20 T2 10 T3 20 T3 10 T4 20 T4 10 T1 20 T1 10 T2 20 T2 10 T3 20 T4 10 T1 20 T1 10 T2 20 T2 10 T3 20 T3 10 T4 20 T1 10 T2 20 T2 10 T3 20 T3 10 T4 20 T1 10 T2 20 T3 20 T3 10 T4 20 T4 20 T4 20 T7 20 T7 10 T7 20	T1 10 0022H T2 20 0023H T2 10 0024H T3 20 0027H T3 10 0028H T4 20 0029H T4 10 0030H T1 10 0032H T2 10 0034H T3 20 0037H T3 10 0038H T4 20 0039H T4 10 0039H T4 10 0040H T1 20 0041H T1 10 0042H T2 10 0041H T1 10 0042H T2 10 0044H T3 20 0047H T3 10 0048H T4 20 0049H T4 10 0050H T5 10 0050H T6 10 0054H T7 10 0054H	T1 20 0021H 1 T1 10 0022H 1 T2 20 0023H 2 T2 10 0024H 2 T3 20 0027H 3 T3 10 0028H 3 T4 20 0029H 5 T4 10 0030H 5 T6	T1 20 0021H 1 5 T1 10 0022H 1 5 T2 20 0023H 2 10 T2 10 0024H 2 10 T3 20 0027H 3 25 T3 10 0028H 3 25 T4 20 0029H 5 40 T4 10 0030H 5 40 T6 20 0031H 1 5 T1 10 0032H 1 5 T1 10 0032H 1 5 T1 20 0031H 1 5 T1 10 0034H 2 10 T2 10 0034H 2 10 T3 20 0037H 3 25 T3 10 0038H 3 25 T4 20 0039H 5 40 T4 10 0040H 5 40 T6 V _{DC} AT +85 T1 20 0041H 1 5 T1 10 0042H 1 5 T2 20 0043H 2 10 T3 20 0047H 3 30 T4 20 0049H 5 50 T4 20 0049H 5 50 T4 10 0050H 5 50 T0 0051H 1 5 T1 20 0051H 1 5 T1 20 0051H 1 5 T1 20 0059H 5 50 T0 0058H 3 25 T3 10 0058H 3 25 T3 20 0057H 3 25 T3 10 0058H 3 25 T3 20 0059H 5 50	T1	T1 20 0021H 1 5 1.5 9.2 T1 10 0022H 1 5 1.5 9.2 T2 20 0023H 2 10 0.9 17.9 T2 10 0024H 2 10 0.9 17.9 T3 20 0027H 3 25 0.75 31.9 T3 10 0028H 3 25 0.75 31.9 T4 20 0029H 5 40 0.7 43.1 T4 10 0030H 5 40 0.7 43.1 T6 20 0031H 1 5 2 8.5 T1 10 0032H 1 5 2 8.5 T1 10 0032H 1 5 2 8.5 T1 10 0032H 1 5 2 8.5 T1 10 0034H 2 10 1.1 14.9 T2 10 0034H 2 10 1.1 14.9 T3 20 0037H 3 25 0.9 31.8 T3 10 0038H 3 25 0.9 31.8 T4 20 0039H 5 40 0.8 40.5 T4 10 0040H 5 40 0.8 40.5 T5 V _{DC} AT +85 °C; 50 V _{DC} AT +125 T1 20 0041H 1 5 2.5 7.5 T1 10 0042H 1 5 2.5 7.5 T1 20 0041H 1 5 2.5 7.5 T1 20 0041H 2 10 1.3 12.9 T2 10 0044H 2 10 1.3 12.9 T3 20 0047H 3 30 1.0 29.9 T3 10 0048H 3 30 1.0 29.9 T4 20 0049H 5 50 0.9 38.3 T4 20 0049H 5 50 0.9 38.3 T4 20 0059H 5 50 0.9 38.3 T1 20 0057H 3 55 0.9 38.3 T1 20 0059H 5 50 0.9 38.3 T1 20 0059H 5 50 0.9 38.3 T1 20 0059H 5 50 0.9 38.3	TI 10 0022H 1 5 1.5 9.2 35 TI 20 0023H 2 10 0.9 17.9 17.5 TI 20 0024H 2 10 0.9 17.9 17.5 TI 30 20 0027H 3 25 0.75 31.9 10 TI 31 10 0028H 3 25 0.75 31.9 10 TI 4 20 0029H 5 40 0.7 43.1 10 TI 4 10 0030H 5 40 0.7 43.1 10 TI 5 2 8.5 44 TI 10 0032H 1 5 2 8.5 44 TI 10 0032H 1 5 2 8.5 44 TI 10 0032H 1 5 2 8.5 44 TI 10 0033H 2 10 1.1 14.9 20 TI 20 0031H 2 10 1.1 14.9 20 TI 20 0031H 3 25 0.9 31.8 15 TI 30 0038H 3 25 0.9 31.8 15 TI 40 0039H 5 40 0.8 40.5 10 TI 5 V _{DC} AT +85 °C; 50 V _{DC} AT +125 °C TI 1 20 0041H 1 5 2.5 7.5 66 TI 10 0042H 1 5 2.5 7.5 66 TI 20 0041H 1 5 2.5 7.5 66 TI 20 0041H 1 5 2.5 7.5 66 TI 20 0041H 2 10 1.3 12.9 24 TI 10 0042H 1 5 2.5 7.5 66 TI 20 0044H 2 10 1.3 12.9 24 TI 10 0044H 2 10 1.3 12.9 24 TI 10 0044H 2 10 1.3 12.9 24 TI 10 0044H 3 30 1.0 29.9 12 TI 10 0048H 3 30 1.0 29.9 12 TI 10 0050H 5 50 0.9 38.3 12 TI 20 0051H 1 5 3.5 4.8 125 TI 20 0051H 1 5 3.5 4.8 125 TI 20 0053H 2 10 2.1 12.9 37 TI 20 0054H 3 25 1.6 21.7 22 TI 3 10 0058H 3 25 1.6 21.7 22 TI 3 10 0058H 3 25 1.6 21.7 22 TI 3 10 0058H 3 25 1.6 21.7 22 TI 3 10 0058H 3 25 1.6 21.7 22 TI 3 10 0058H 3 25 1.6 21.7 22	T1 20 0021H 1 5 1.5 9.2 35 -25 T1 10 0022H 1 5 1.5 9.2 35 -25 T1 10 0022H 1 5 1.5 9.2 35 -25 T2 20 0023H 2 10 0.9 17.9 17.5 -50 T2 10 0024H 2 10 0.9 17.9 17.5 -50 T3 20 0027H 3 25 0.75 31.9 10 -50 T3 10 0028H 3 25 0.75 31.9 10 -50 T4 20 0029H 5 40 0.7 43.1 10 -58 T4 10 0030H 5 40 0.7 43.1 10 -58 T4 10 0030H 5 40 0.7 43.1 10 -58 T4 10 0031H 1 5 2 8.5 44 -25 T1 10 0032H 1 5 2 8.5 44 -25 T1 10 0032H 1 5 2 8.5 44 -25 T2 20 0033H 2 10 1.1 14.9 20 -40 T2 10 0034H 2 10 1.1 14.9 20 -40 T3 20 0037H 3 25 0.9 31.8 15 -60 T4 20 0039H 5 40 0.8 40.5 10 -58 T4 10 0040H 5 40 0.8 40.5 10 -58 T5 V _{DC} AT +85 °C; 50 V _{DC} AT +125 °C T1 20 0041H 1 5 2.5 7.5 66 -25 T4 10 0042H 1 5 2.5 7.5 66 -25 T4 20 0043H 2 10 1.3 12.9 24 -35 T4 20 004H 1 5 2.5 7.5 66 -25 T5 10 004H 1 5 0.9 38.3 12 -55 T5 V _{DC} AT +85 °C; 65 V _{DC} AT +125 °C T1 20 004H 3 30 1.0 29.9 12 -45 T3 10 004H 3 30 1.0 29.9 12 -45 T4 20 004H 5 50 0.9 38.3 12 -55 T4 20 004H 5 50 0.9 38.3 12 -55 T4 20 004H 5 50 0.9 38.3 12 -55 T4 20 004H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55 T4 20 005H 5 50 0.9 38.3 12 -55	T1 20 0021H 1 5 1.5 9.2 35 -25 8 T1 10 0022H 1 5 1.5 9.2 35 -25 8 T1 10 0022H 1 5 1.5 9.2 35 -25 8 T1 2 20 0023H 2 10 0.9 17.9 17.5 -50 8 T1 2 10 0024H 2 10 0.9 17.9 17.5 -50 8 T1 3 20 0027H 3 25 0.75 31.9 10 -50 8 T3 10 0028H 3 25 0.75 31.9 10 -50 8 T4 20 0029H 5 40 0.7 43.1 10 -58 10 T4 10 0030H 5 40 0.7 43.1 10 -58 10 T4 10 0030H 1 5 2 8.5 44 -25 8 T1 10 0032H 1 5 2 8.5 44 -25 8 T1 10 0032H 1 5 2 8.5 44 -25 8 T1 10 0034H 2 10 1.1 14.9 20 -40 8 T2 20 0031H 1 5 2 8.5 44 -25 8 T2 20 0033H 2 10 1.1 14.9 20 -40 8 T2 10 0034H 2 10 1.1 14.9 20 -40 8 T3 20 0037H 3 25 0.9 31.8 15 -60 8 T4 20 0039H 5 40 0.8 40.5 10 -58 8 T4 20 0039H 5 40 0.8 40.5 10 -58 8 T4 20 0039H 5 40 0.8 40.5 10 -58 8 T4 10 0040H 5 40 0.8 40.5 10 -58 8 T5 10 0040H 1 5 2.5 7.5 66 -25 5 T1 10 0044H 1 5 2.5 7.5 66 -25 5 T1 10 0044H 2 10 1.3 12.9 24 -35 6 T1 10 0044H 2 10 1.3 12.9 24 -35 6 T1 10 0049H 5 50 0.9 38.3 12 -55 8 T1 10 0049H 5 50 0.9 38.3 12 -55 8 T1 10 0049H 5 50 0.9 38.3 12 -55 8 T1 10 0050H 5 50 0.9 38.3 12 -55 8 T1 10 0050H 5 50 0.9 38.3 12 -55 8 T1 10 0050H 5 50 0.9 38.3 12 -55 8 T1 10 0050H 5 50 0.9 38.3 12 -55 8 T1 10 0050H 5 50 0.9 38.3 12 -55 8	T1 20 0021H 1 5 1.5 9.2 35 -25 8 15 T1 10 0022H 1 5 1.5 9.2 35 -25 8 15 T1 10 0022H 1 5 1.5 9.2 35 -25 8 15 T1 2 20 0023H 2 10 0.9 17.9 17.5 -50 8 15 T1 2 10 0024H 2 10 0.9 17.9 17.5 -50 8 15 T1 3 20 0027H 3 25 0.75 31.9 10 -50 8 15 T1 3 10 0028H 3 25 0.75 31.9 10 -50 8 15 T1 4 20 0029H 5 40 0.7 43.1 10 -58 10 20 T1 4 10 0030H 5 40 0.7 43.1 10 -58 10 20 T1 1 20 0031H 1 5 2 8.5 44 -25 8 12 T1 1 0 0032H 1 5 2 8.5 44 -25 8 12 T1 1 0 0032H 1 5 2 8.5 44 -25 8 12 T1 1 0 0033H 2 10 1.1 14.9 20 -40 8 15 T1 2 0 0031H 3 25 0.9 31.8 15 -60 8 15 T1 3 20 0037H 3 25 0.9 31.8 15 -60 8 15 T1 4 20 0039H 5 40 0.8 40.5 10 -58 8 15 T1 4 20 0039H 5 40 0.8 40.5 10 -58 8 15 T1 4 20 0039H 5 40 0.8 40.5 10 -58 8 15 T1 5 V _{DC} AT +85 °C; 50 V _{DC} AT +125 °C T1 1 0 0040H 5 40 0.8 40.5 10 -58 8 15 T1 1 0 0040H 5 40 2.8 40.5 10 -58 8 15 T1 1 0 0040H 5 40 2.8 40.5 10 -58 8 15 T1 1 0 0040H 5 40 2.8 40.5 10 -58 8 15 T1 1 0 0040H 5 40 2.8 40.5 10 -58 8 15 T1 1 0 0040H 5 40 2.9 31.8 15 -60 8 15 T1 1 0 0040H 5 40 2.8 40.5 10 -58 8 15 T1 2 0 0041H 1 5 2.5 7.5 66 -25 5 9 T1 1 20 0041H 1 5 2.5 7.5 66 -25 5 9 T1 1 20 0041H 1 5 2.5 7.5 66 -25 5 9 T1 2 20 0043H 2 10 1.3 12.9 24 -35 6 10 T1 2 0 0040H 5 50 0.9 38.3 12 -55 8 12 T1 2 0 0049H 5 50 0.9 38.3 12 -55 8 12 T1 2 0 0049H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0040H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 1 5 3.5 4.8 125 -18 3 10 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12 T1 1 0 0050H 5 50 0.9 38.3 12 -55 8 12

Notes

[•] Letter "H" in the dash number indicates high vibration and shock requirements (i.e., 53.79 g's random vibration, 80 g's sinusoidal vibration, and 500 g's shock)

⁽¹⁾ DF is calculated from ESR and is for reference only

⁽²⁾ For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table



RIPPLE	RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE, AND APPLIED PEAK VOLTAGE																								
FREQUEN APPLIED I CURRENT	RIPPLE		120) Hz			800) Hz			1 k	κHz			10	kHz		40 kHz		100 kHz					
AMBIENT			TEM	IP °C			TEM	IP °C			TEM	IP °C			TEM	IP °C			TEM	IP °C			TEM	IP °C	
STILL AIR		≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125
	100 %	0.60	0.39	-	-	0.71	0.43	-	-	0.72	0.46	-	-	0.88	0.55	-	-	1.0	0.63	-	-	1.1	0.69	-	-
% OF	90 %	0.60	0.46	-	-	0.71	0.55	-	-	0.72	0.55	-	-	0.88	0.67	-	-	1.0	0.77	-	1	1.1	0.85	-	-
APPLIED	80 %	0.60	0.52	0.35	-	0.71	0.62	0.42	-	0.72	0.62	0.42	-	0.88	0.76	0.52	-	1.0	0.87	0.59	1	1.1	0.96	0.65	-
VOLTAGE	70 %	0.60	0.58	0.44	-	0.71	0.69	0.52	-	0.72	0.70	0.52	-	0.88	0.85	0.64	-	1.0	0.97	0.73	-	1.1	1.07	0.80	-
	66 2/3 %	0.60	0.60	0.46	0.27	0.71	0.71	0.55	0.32	0.72	0.72	0.55	0.32	0.88	0.88	0.68	0.40	1.0	1.0	0.77	0.45	1.1	1.1	0.85	0.50

Notes

- 1. At +125 °C the rated voltage of the capacitors decreases to 66 2/3 % of the +85 °C rated voltage
- 2. The peak of the applied AC ripple voltage plus the applied DC voltage must not exceed the DC voltage rating of the capacitor either forward or reverse
- 3. The ripple current listed represents a rating calculated using a maximum internal temperature rise (ΔT) of +50 °C at 40 kHz at +85 °C ambient with a maximum peak rated voltage of 66 2/3 % of the +85 °C peak voltage rating
- 4. The maximum allowable internal temperature rise (ΔT) decreases linearly to a calculated +10 °C rise at +125 °C ambient
- 5. The internal temperature rise is directly proportional to the equivalent series resistance of the capacitor and equivalent series resistance increases with decreasing frequency

GROUP A INSPECTION AND GROUP B INSPECTION PER DLA 20001

GROUP A INSPECTION							
TEST / INSPECTION	REQUIREMENT PARAGRAPH	SAMPLE PROCEDURE					
SUBGROUP 1	·						
Thermal shock (10 cycles)	3.2						
Constant voltage conditioning (168 h)	3.3	100 %					
DC leakage at +25 °C	3.1.9						
DC leakage at +85 °C	3.1.9						
Capacitance	3.1.7						
ESR	3.1.11						
Seal, condition C	3.4						
Seal, condition A or D	3.5						
SUBGROUP 2							
Mechanical examination (dimensions only)	3.1.1	See Table IV of DLA20001					
SUBGROUP3							
Solderability	3.6	5 samples, 0 failures					
SUBGROUP4							
Visual inspection	3.8g						
Materials	3.9	13 samples, 0 failures					
Marking	3.10						
Workmanship	3.15						

GROUP B INSPECTION								
TEST / INSPECTION	REQUIREMENT PARAGRAPH	SAMPLE PROCEDURE						
SUBGROUP 1								
Stability at low and high temperatures	3.7	13 samples, 0 failures						
SUBGROUP 2								
Thermal shock (30 cycles)	3.2							
Life (1000 h at +85 °C)	3.8							
DC leakage at +25 °C	3.1.9	10 complex O foilures						
DC leakage at +85 °C	3.1.9	10 samples, 0 failures						
Capacitance	3.1.7							
ESR	3.1.11							



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