Introduction

KEMET has developed a new type of tantalum capacitor that replaces the solid manganese dioxide electrode with a solid conductive polymer. This product is named the KO-CAP for KEMET Organic Capacitor. The basic families are the T520 and T530 series. A separate detail of performance characteristics is presented here as there are some differences between the polymer tantalums and the standard MnO2 types. Like all KEMET tantalum chips, these series are 100% screened for all electrical parameters: Capacitance @ 120 Hz, Dissipation Factor (DF) @ 120 Hz, ESR @ 100 kHZ and DC Leakage. It is also 100% surge current tested at full rated voltage through a low impedance circuit. The advantages of the polymer include very low ESR and elimination of the potentially catastrophic failure mode that may occur with standard tantalum capacitors in a high surge current application. Although the natural KO-CAP series failure mechanism is a short circuit, it does not exhibit an explosive failure mode.

ELECTRICAL

1. Operating Temperature Range • -55°C to +105°C

Above 85° C, the voltage rating is reduced linearly from 1.0 x rated voltage to 0.8 x rated voltage at 105°C.

2. Non-Operating Temperature Range

• -55°C to +105°C

3. Capacitance and Tolerance

• 33µF to 1500µF

• ±20% Tolerance

Capacitance is measured at 120 Hz, up to 1.0 volt rms maximum and up to 2.5V DC maximum. DC bias causes only a small reduction in capacitance, up to about 2% when full rated voltage is applied. DC bias is not commonly used for room temperature measurements but is more commonly used when measuring at temperature extremes.

Capacitance does decrease with increasing frequency, but not nearly as much or as quickly as standard tantalums. Figure 1 compares the frequency induced cap rolloff between the KO-CAP and traditional MnO2 types. Capacitance also increases with increasing temperature. See section 12 for temperature coefficients.



FIGURE 1

4. Voltage Ratings

2V-16V DC Rated Voltage

This is the maximum peak DC operating voltage from -55°C to +85°C for continuous duty. Above 85°C, this voltage is derated linearly to 0.8 times the rated voltage for operation at 105°C.

Surge Voltage Ratings

Surge voltage is the maximum voltage to which the part can be subjected under transient conditions including the sum of peak AC ripple, DC bias and any transients. Surge voltage capability is demonstrated by application of 1000 cycles of the relevant voltage, at 25°C, 85°C or 105°C. The parts are charged through a 33 ohm resistor for 30 seconds and then discharged through a 33 ohm resistor for 30 seconds for each cycle.

Voltage Ratings • Table 1

Rated	Surge	Derated	Derated
Voltage	Voltage	Voltage	Surge
		-	Voltage
-55°C	to +85°C	+1()5°C
2V	2.6V	1.6V	2.1V
2.5V	3.3V	2.0V	2.8V
3V	3.9V	2.4V	3.1V
4V	5.2V	3.3V	4.3V
6.3V	8V	5V	6.5V
8V	10.4V	6.4V	8.7V
10V	13V	8V	10.4V
16V	20.8V	12.8V	16.6V

5. Reverse Voltage Rating & Polarity

Polymer tantalum capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. The positive terminal is identified by a laser-marked stripe and may also include a beveled edge. These capacitors will withstand a small degree of transient voltage reversal for short periods as shown in the following table. Please note that these parts may not be operated continuously in reverse, even within these limits.

Table 2					
Temperature Permissible Transient Reverse Voltag					
25°C	15% of Rated Voltage				
55°C	10% of Rated Voltage				
85°C	5% of Rated Voltage				
105°C	3% of Rated Voltage				

6. DC Leakage Current

Because of the high conductivity of the polymer, the KO-CAP family has higher leakage currents than traditional MnO2 type Tantalum caps. The DC Leakage limits at 25°C are calculated as 0.1 x C x V, where C is cap in μ F and V is rated voltage in Volts. Limits for all part numbers are listed in the ratings tables.

DC Leakage current is the current that flows through the capacitor dielectric after a five minute charging period at rated voltage. Leakage is measured at 25°C with full rated voltage applied to the capacitor through a 1000 ohm resistor in series with the capacitor.



DC Leakage current does increase with temperature. The limits for 85°C @ Rated Voltage and 105°C @ 0.8 x Rated Voltage are both 10 times the 25°C limit.

7. Surge Current Capability

Certain applications may induce heavy surge currents when circuit impedance is very low (<0.1 ohm per volt). Driving inductance may also cause voltage ringing. Surge currents may appear as transients during turn-on of equipment.

The KO-CAP has a very high tolerance for surge current. And although the failure mechanism is a short circuit, they do not explode as may occur with standard tantalums in such applications.

The KO-CAP series receives 100% screening for surge current in our production process. Capacitors are surged 4 times at full rated voltage applied through a total circuit resistance of <0.5 ohms. Failures are removed during subsequent electrical testing.

8. Dissipation Factor (DF)

Refer to part number tables for maximum DF limits.

Dissipation factor is measured at 120 Hz, up to 1.0 volt rms maximum, and up to 2.5 volts DC maximum at +25°C. The application of DC bias causes a small reduction in DF, about 0.2% when full rated voltage is applied. DF increases with increasing frequency.

Dissipation factor is the ratio of the equivalent series resistance (ESR) to the capacitive reactance, (X_c) and is usually expressed as a percentage. It is directly proportional to both capacitance and frequency. Dissipation factor loses its importance at higher frequencies, (above about 1 kHz), where impedance (Z) and equivalent series resistance (ESR) are the normal parameters of concern. DF = R = 2 π f CR DF = Dissipation Factor

	2 111 010	Di Dissipution i dotoi
X _c		R= Equivalent Series
		Resistance (Ohms)

- X_c= Capacitive Reactance (Ohms)
- f= Frequency (Hertz)
- C= Series Capacitance (Farads)

DF is also referred to as tan δ or "loss tangent." The "Quality Factor," "Q," is the reciprocal of DF.

9. Equivalent Series Resistance (ESR) and Impedance (Z)

The Equivalent Series Resistance (ESR) of the KO-CAP is much lower than standard Tantalum caps because the polymer cathode has much higher conductivity. ESR is not a pure resistance, and it decreases with increasing frequency.

Total impedance of the capacitor is the vector sum of capacitive reactance (X_c) and ESR, below resonance; above resonance total impedance is the vector sum of inductive reactance (X_L) and ESR.







FIGURE 2b Total Impedance of the Capacitor Above Resonance

To understand the many elements of a capacitor, see Figure 3.



FIGURE 3 The Real Capacitor

A capacitor is a complex impedance consisting of many series and parallel elements, each adding to the complexity of the measurement system.

L — Represents lead wire and construction inductance. In most instances (especially in solid tantalum and monolithic ceramic capacitors) it is insignificant at the basic measurement frequencies of 120 and 1000 Hz.

 $\rm R_{s}$ — Represents the actual ohmic series resistance in series with the capacitance. Lead wires and capacitor electrodes are contributing sources.

 R_{L} — Capacitor Leakage Resistance. Typically it can reach 50,000 megohms in a tantalum capacitor. It can exceed 10¹² ohms in monolithic ceramics and in film capacitors.

 R_d — The dielectric loss contributed by dielectric absorption and molecular polarization. It becomes very significant in high frequency measurements and applications. Its value varies with frequency.

 C_d — The inherent dielectric absorption of the solid tantalum capacitor which typically equates to 1-2% of the applied voltage.

As frequency increases, X_c continues to decrease according to its equation above. There is unavoidable inductance as well as resistance in all capacitors, and at some point in frequency, the reactance ceases to be capacitive and becomes inductive. This frequency is called the self-resonant point. In solid tantalum capacitors, the resonance is damped by the ESR, and a smooth, rather than abrupt, transition from capacitive to inductive reactance follows.

Figure 4 compares the frequency response of a KO-CAP to a standard Tantalum chip. See also frequency curves shown in the T520 section, p.39. Maximum limits for 100 kHz ESR are listed in the part number tables for each series.

The T530 Capacitance, Impedance and ESR vs. Frequency Comparisions are located on page 43. Maximum limits for 100 kHz are listed in the part number table on page 42.



T495D 150 uF (MnO₂) vs. T520D 150 uF (Polymer)



FIGURE 4

10. AC Power Dissipation

Power dissipation is a function of capacitor size and materials. Maximum power ratings have been established for all case sizes to prevent overheating. In actual use, the capacitor's ability to dissipate the heat generated at any given power level may be affected by a variety of circuit factors. These include board density, pad size, heat sinks and air circulation.

Table	23
Tantalum Chip Power	Dissipation Ratings

Case	e Code	Maximum Power Dissipation
KEMET	EIA	mWatts @ +25°C w/+20°C Rise
T520/T	3528-12	70
T520/B	3528-21	85
T520/V	7343-20	125
T520/D	7343-31	150
T520/Y	7343-40	156
T520/X	7343-43	165
T530/D	7343-31	255
T530/X	7343-43	270
T530/E	7260-38	285

11. AC Operation

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and power dissipation capability.

Permissible AC ripple voltage which may be applied is limited by three criteria:

- a. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
- b. The negative peak AC voltage, in combination with bias voltage, if any, must not exceed the permissible reverse voltage ratings presented in Section 5.
- c. The power dissipated in the ESR of the capacitor must not exceed the appropriate value specified in Section 10.

KEMET Electronics Corporation, P.O. Box 5928, Greenville, S.C. 29606, (864) 963-6300



Actual power dissipated may be calculated from the following:

 $P = I^2 R$ Substituting I = \underline{E} , P = $\underline{E}^2 R$ 7 Z²

where:

- I = rms ripple current (amperes)
- E = rms ripple voltage (volts)
- P = power (watts)
- Z = impedance at specified frequency (ohms)
- R = equivalent series resistance at specified frequency (ohms)

Using P max from Table 3, maximum allowable rms ripple current or voltage may be determined as follows:

 $I(max) = \sqrt{P max/R}$ $E(max) = Z \sqrt{P max/R}$ These values should be derated at elevated temperatures as follows:

Temperature	Derating Factor
85°C	.9
105°C	.4

ENVIRONMENTAL

12. Temperature Stability

Mounted capacitors withstand extreme temperature testing at a succession of continuous steps at +25°C, -55°C, +25°C, +85°C, +105°C, +25°C in that order. Capacitors are allowed to stabilize at each temperature before measurement. Cap, DF, and DCL are measured at each temperature except DC Leakage is not measured at -55°C.

Table 4 Acceptable limits are as follows:

Step	Temp.	∆Cap	DCL	DF			
1	+25°C	Specified	Catalog	Catalog			
		Tolerance	Limit	Limit			
2	-55°C	±20% of	N/A	Catalog			
		initial value		Limit			
3	+25°C	±10% of	Catalog	Catalog			
		initial value	Limit	Limit			
4	+85°C	±20% of	10x Catalog	1.2x Catalog			
		initial value	Limit	Limit			
5	+105°C	±30% of	10x Catalog	1.5x Catalog			
		initial value	Limit	Limit			
6	+25°C	±10% of	Catalog	Catalog			
		initial value	Limit	Limit			

13. Standard Life Test

85°C, Rated Voltage, 2000 Hours

- Post Test Performance:
- a. Capacitance: within -20%/+10% of initial value
- b. DF: within initial limit
- c. DC Leakage: within initial limit
- d. ESR: within initial limit

- 14. High Temperature Life Test
 - 105°C, 0.8 x Rated Voltage, 2000 hours
 - Post Test Performance:
 - a. Capacitance: within -20%/+10% of initial value
 - b. DF: within initial limit
 - c. DC Leakage: within 1.25 x initial limit
 - d. ESR: within 2 x initial limit

15. Storage Life Test

• 105°C, 0VDC, 2000 Hours

Post Test Perfomance:

- a. Capacitance: within -20%/+10% of initial value
- b. DF: within initial limit
- c. DC Leakage: within 1.25 x initial limit
- d. ESR: within 2 x initial limit

16. Thermal Shock

• Mil-Std-202, Method 107, Condition B

Minimum temperature is -55°C Maximum temperature is +105°C 500 Cycles

Post Test Performance:

- a. Capacitance: within +10%/-20% of initial value
- b. DF: within initial limit
- c. DC Leakage: within initial limit
- d. ESR: within 2 x initial limit

17. Moisture Resistance Testing • J-Std-020

Steps 7a and 7b excluded, 0V, 21 cycles Post Test Performance:

- a. Capacitance: within ±30% of initial value
- b. DF: within initial limit
- c. DC Leakage: within initial limit
- d. ESR: within initial limit

18. Load Humidity

• 85°C, 85% RH, Rated Voltage, 500 Hours Post Test Performance:

- a. Capacitance: within +35%/-5% of initial value
- b. DF: within initial limit
- c. DC Leakage: within 5 x initial limit
- d. ESR: within 2 x initial limit

19. ESD

 Polymer tantalum capacitors are not sensitive to Electro-Static Discharge (ESD).

20. Failure Mechanism and Reliability

The normal failure mechanism is dielectric breakdown. Dielectric failure can result in high DC Leakage current and may proceed to the level of a short circuit. With sufficient time to charge, healing may occur by one of two potential mechanisms. The polymer adjacent to the dielectric fault site may overheat and vaporize, disconnecting the fault site from the circuit. The polymer may also

oxidize into a more resistive material that plugs the defect site in the dielectric and reduces the flow of current.

Capacitor failure may be induced by exceeding the rated conditions of forward DC voltage, reverse DC voltage, surge current, power dissipation or temperature. Excessive environmental stress, such as prolonged or high temperature reflow processes may also trigger dielectric failure.

Failure rates may be improved in application by derating the voltage applied to the capacitor. KEMET recommends that KO-CAPs be derated to 80% or less of the rated voltage in application.

KO-CAPs exhibit a benign failure mode in that they do not fail catastophically even under typical fault conditions. If a shorted capacitor is allowed to pass unlimited current, it may overheat and the case may discolor. But this is distinctly different from the explosive "ignition" that may occur with standard MnO2 cathode tantalums. Replacement of the MnO2 by the polymer removes the oxygen that fuels ignition during a failure event.

MECHANICAL

21. Resistance to Solvents

• Mil-Std-202, Method 215

Post Test Performance:

- a. Capacitance within ±10% of initial value
- b. DC Leakage within initial limit
- c. Dissipation Factor within initial limit
- d. ESR within initial limit
- e. Physical no degradation of case, terminals or marking
- 22. Fungus
 - Mil-Std-810, Method 508
- 23. Flammability
 - UL94 VO Classification
 - Encapsulant materials meet this classifaction
- 24. Resistance to Soldering Heat
 - Maximum Reflow
 - +240 ±5°C, 10 seconds
 - Typical Reflow
 - +230 ±5°C, 30 seconds
 - Post Test Performance:
 - a. Capacitance within $\pm 10\%$ of initial value
 - b. DC Leakage within initial limit
 - c. Dissipation Factor within initial limit
 - d. ESR within initial limit

25. Solderability

- Mil-Std-202, Method 208
- ANSI/J-STD-002, Test B

Applies to Solder Coated terminations only.

26. Vibration

• Mil-Std-202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20G Peak

Post Test Performance:

- a. Capacitance within ±10% of initial value
- b. DC Leakage within initial limit
- c. Dissipation Factor within initial limit
- d. ESR within initial limit

27. Shock

• Mil-Std-202, Method 213, Condition I, 100 G Peak

Post Test Performance:

- a. Capacitance within ±10% of initial value
- b. DC Leakage within initial limit
- c. Dissipation Factor within initial limit
- d. ESR within initial limit

28. Terminal Strength

- Pull Force
 - One Pound (454 grams), 30 Seconds



- Tensile Force
 - Four Pounds (1.8 kilograms), 60 Seconds



Shear Force Table 5 Maximum Shear Loads

Case Code		Maximum Sh	near Loads
KEMET EIA		Kilograms	Pounds
В	3528-21	3.6	8.0
V	7343-20	5.0	11.0
D	7343-31	5.0	11.0
Х	7343-43	5.0	11.0

Post Test Performance:

- a. Capacitance within ±5% of initial value
- b. DC Leakage within initial limit
- c. Dissipation Factor within initial limit
- d. ESR within initial limit



COMPONENT PERFORMANCE CHARACTERISTICS APPLICATIONS bigb integrity solder fillets. Broken

29. Handling

Automatic handling of encapsulated components is enhanced by the molded case which provides compatibility with all types of high speed pick and place equipment. Manual handling of these devices presents no unique problems. Care should be taken with your fingers, however, to avoid touching the solder-coated terminations as body oils, acids and salts will degrade the solderability of these terminations. Finger cots should be used whenever manually handling all solderable surfaces.

30. Termination Coating

The standard finish coating is 90/10 Sn/Pb solder (Tin/Lead-solder coated). 100% tin coating is available upon request.

31. Recommended Mounting Pad Geometries

Proper mounting pad geometries are essential for successful solder connections. These dimensions are highly process sensitive and should be designed to maximize the intergrity of the solder joint, and to minimize component rework due to unacceptable solder joints.

Figure 5 illustrates pad geometry. The table provides recommended pad dimensions for reflow soldering techniques. These dimensions are intended to be a starting point for circuit board designers, to be fine tuned, if necessary, based upon the peculiarities of the soldering process and/or circuit board design.

Contact KEMET for Engineering Bulletin Number F-2100 entitled "Surface Mount Mounting Pad Dimensions and Considerations" for further details on this subject.



Figure 5

 Table 6 - Land Pattern Dimensions for Reflow Solder

KEMET/EIA Size Code B/3528-21	Pad Dimensions							
KEMET/EIA Size Code				Y	С			
	Ζ	G	Х	(ref)	(ref)			
B/3528-21	5.00	1.10	2.50	1.95	3.05			
D/7343-31, V/7343-20, X/7343-43	8.90	3.80	2.70	2.55	6.35			

32. Soldering

The T520 KO-CAP family has been designed for reflow solder processes. They are not recommended for wave solder. Solder-coated terminations have excellent wetting characteristics for

high integrity solder fillets. Preheating of these components is recommended to avoid extreme thermal stress. The maximum recommended preheat rate is 2°C per second.

Hand-soldering should be avoided. If necessary, it should be performed with care due to the difficulty in process control. 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. The iron should be removed. "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 is not harmful to the product. Marking permanency is not affected by this change.

33. Washing

Standard washing techniques and solvents are compatible with all KEMET surface mount tantalum capacitors. Solvents such as Freon TMC and TMS, Trichlorethane, methylene chloride, prelete, and isopropyl alcohol are not harmful to these components. Please note that we are not endorsing the use of banned or restricted solvents. We are simply stating that they would not be harmful to the components.

If ultrasonic agitation is utilized in the cleaning process, care should be taken to minimize energy levels and exposure times to avoid damage to the terminations.

KEMET tantalum chips are also compatible with newer aqueous and semi-aqueous processes.

34. Encapsulations

Under normal circumstances, potting or encapsulation of KEMET tantalum chips is not required.

35. Storage Environment

Tantalum chip capacitors should be stored in normal working environments. While the chips themselves are quite robust in other environments, solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will be degraded by high temperature - reels may soften or warp, and tape peel force may increase. KEMET recommends that maximum storage temperature not exceed 40 degrees C, and the maximum storage humidity not exceed 60% relative humidity. In addition, temperature fluctuations should be minimized to avoid condensation on the parts, and atmospheres should be free of chlorine and sulfur bearing compounds. For optimized solderability, chip stock should be used promptly, preferably within 1.5 years of receipt.

POLYMER TANTALUM CHIP CAPACITORS KEMET

Voltage 2V to 25V

• EIA Standard Case Sizes

100% Surge Current Tested

FEATURES Capacitance 15 to 1000µF (±20%)

- Polymer Cathode Technology
- Low ESR
- High Frequency Cap Retention
- No-Ignition Failure Mode
- Use Up to 80% of Rated Voltage (20% Derating)

OUTLINE DRAWING



DIMENSIONS - MILLIMETERS

Ca	se Size											
KEMET	EIA	L	W	Н	K ±0.20	F ±0.1	S ±0.3	X(Ref)	T(Ref)	A(Min)	G(ref)	E(ref)
Т	3528-12	3.5 ± 0.2	2.8 ± 0.2	1.2 max	0.3	2.2	0.8	0.05	0.13	1.1	1.8	2.2
В	3528-21	3.5 ± 0.2	2.8 ± 0.2	1.9 ± 0.2	0.9	2.2	0.8	0.10 ± 0.10	0.13	1.1	1.8	2.2
V	7343-20	7.3 ± 0.3	4.3 ± 0.3	1.9 max	0.9	2.4	1.3	0.05	0.13	3.8	3.5	3.5
D	7343-31	7.3 ± 0.3	4.3 ± 0.3	2.8 ± 0.3	1.5	2.4	1.3	0.10 ± 0.10	0.13	3.8	3.5	3.5
Y	7343-40	7.3 ± 0.3	4.3 ± 0.3	4.0 max	1.9	2.4	1.3	0.10 ± 0.10	0.13	3.8	3.5	3.5
Х	7343-43	7.3 ± 0.3	4.3 ± 0.3	4.0 ± 0.3	2.3	2.4	1.3	0.10 ± 0.10	0.13	3.8	3.5	3.5

T520 ORDERING INFORMATION

520 V 157 M 006 A S E015

Tantalum

Series T520 - Low ESR Polymer

Case Size

B, V, D, X

Capacitance Picofarad Code

First two digits represent significant figures. Third digit specifies number of zeros to follow.

COMPONENT MARKING



212 = 12th week of 2002

T520 SERIES CONSTRUCTION

ESR

Lead Material

Failure Rate

Voltage

M = ± 20%

A - Not Applicable

S - Standard Solder Coated

Capacitance Tolerance



Case beamKent Part NumberDe Landsong By 2000 MEther Applie App		520	RATINGS &	PARIN	UMBE	R REF	ERE	:NC	
2. Vol Rating # 18°C (1.4 Vol Rating at 18°C) 1.8 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 0.7 2.00 V TS20817700ERASED01 25 8 400 1.5 1.3 2.0 0.2 2.20.0 V TS2081770ERASED3 25 8 400 1.5 1.3 2.0 0.2 2.20.0 V TS2022770ERASED35 55 10 45 1.7 1.5 0.7 2.20.0 V TS202770ERASED35 83 10 10 12 2.2 2.0 1.5 1.3 3.30.0 V TS2047770ERASED35 118 10 15 2.2 2.0 1.3 470.0 V TS2047770ERASED35 100 2.5 2.3 1.3 1.6 1.5 1.3 1.6 1.5 1.3 1.6 1.5 1.3 1.6 1.5 1.3 1.6 1.5 1.3 1.6 1.5 1.3 1.6	-		KEMET Part Number		25°C 120 Hz	25°C 100 kHz	mA	rms @ 2	5°C,
The D V TESDAPTRIDGASEGNO 94 10 10 18 18 10 7.7 10000 B TOSCIERTIALERASEENO 25 8 900 1.51 1.3 1.50 1.5 220.0 V TOSCIERTIALERASEENO 25 8 900 1.51 1.3 1.50 1.50 220.0 V TOSCIEZTIALERASEENO 55 10 25 2.2 2.0 0.9 330.0 V TESCIEZTIALERASEENO 85 10 15 2.2 2.4 1.5 470.0 V TOSCIEZTIALERASEENO 118 10 115 1.3 2.2 2.4 1.3 10000 V TOSCIETTIALERASEENO 10 15 1.3 0.6 1.5 1.3 0.6 10000 V TOSCIETTIALERASEENO 10 15 1.3 0.6 1.3 1.0 0.5 1.3 1.0 0.6 1.3 1.0 0.6 1.3 <			2 Volt Rating	1 @ +85°C (1.6 Vo	It Rating at 10	(5°C)	25°C	85°C	105°C
TODO B TE20B117MERASESION 25 8 40 1.5 1.3 0.6 2200 V TE20B117MERASESION 25 8 70 1.1 1.0 0.4 2200 V TE20B117MERASESION 65 10 15 2.9 2.6 1.2 2200 V TE20B117MERASESION 65 10 2.9 2.6 1.2 230.0 V TE20D137MERASESION 63 10 2.5 2.8 2.2 2.0 1.9 2470.0 V TE20D137MERASESION 63 10 12 2.2 2.5 1.3 0.6 2470.0 V TE20D137MERASESION 100 10 10 10 10 10 10 10 10 10 10 10 10 10 10 0.6 10 10 0.6 10 15 1.2 2.5 1.2 10 10 10 10 10 10	470.0	V	T520V477M002ASE040	94	10	40	1.8	1.6	0.7
1000 B TS200217WCRASSEDT 25 8 700 1.1 1.0 0.4 2200 V TS20V27WCRASSEDT 65 10 25 22 2.0 0.0 330.0 V TS20V27WCRASSEDT 63 10 25 2.9 2.4 1.2 330.0 V TS20V37WCRASSEDT 63 10 2.9 2.4 1.2 330.0 V TS20V37WCRASEDT 63 10 2.5 2.5 1.3 470.0 V TS20V37WCRASEDT 118 10 15 3.2 2.8 1.3 100.0 V TS20V37WCRASEDT 10 12 2.5 2.3 1.0 100.0 V TS20V37WCRASEDT 10 1.5 1.3 0.6 100.0 V TS20V37WCRASEDT 0.0 1.5 1.3 0.6 100.0 V TS20V37WCRASEDT 0.0 1.5 1.3 0.6 100.0 R <td>100.0</td> <td>В</td> <td></td> <td></td> <td></td> <td></td> <td>15</td> <td>13</td> <td>0.6</td>	100.0	В					15	13	0.6
220.0 V T520/22/M2RASA5205 55 10 25 2.2 2.0 0.0 330.0 V T520/22/M2RASE016 99 10 9 3.7 1.4 1.5 330.0 V T520/23/M2RASE016 99 10 9 3.7 1.4 1.5 470.0 V T520/23/M2RASE015 118 10 15 2.2 2.0 1.3 680.0 D T520/05/M2RASE5015 170 10 15 2.2 2.1 1.3 100.0 B T520/05/M2RASE5015 170 10 4.5 1.7 1.5 1.0 0.6 100.0 B T520/05/M2RASE502 725 1.0 0 4.5 1.3 0.6 100.0 B T520/05/M2RASE502 726 1.0 1.5 1.3 0.6 100.0 B T520/05/M2RASE502 726 1.0 1.5 2.2 2.6 1.2 100.0 B <t< td=""><td>100.0</td><td>В</td><td>T520B107M2R5ASE070</td><td>25</td><td>8</td><td>70</td><td>1.1</td><td>1.0</td><td>0.4</td></t<>	100.0	В	T520B107M2R5ASE070	25	8	70	1.1	1.0	0.4
2200 V TS20/327M2RASES09 99 10 95 3.7 3.4 1.5 97 330.0 V TS20/337M2RASES09 83 10 15 2.2 2.6 1.2 330.0 V TS20/337M2RASES05 118 10 15 2.2 2.6 1.2 470.0 V TS20/37M2RASES05 119 10 15 2.2 2.6 1.3 680.0 D TS200ERM2RASES05 170 10 40 1.5 1.5 1.6 1000.0 TS200ERM2RASES04 170 10 40 1.5									
330.0 V T520/337M2RASAE015 83 10 15 2.9 2.6 1.9 470.0 V T520/337M2RASAE012 118 10 12 3.2 2.9 1.3 680.0 D T520/37M2RASAE013 170 10 16 3.3 2.8 1.3 1000.0 V T520/37M2RASAE023 280 1.0 2.8 2.3 1.0 1000.0 V T520/07M2RASAE023 280 1.0 2.8 2.3 1.3 0.6 1000.0 B T5200/07M03A5E040 30 8 40 1.5 1.3 0.6 1500.0 B T5200/07M03A5E040 46 8 40 1.5 1.3 0.6 1530.0 V T5200/07M03A5E05 2.9 1.0 1.5 2.2 2.6 1.2 330.0 V T5200/07M03A5E05 2.9 1.0 1.5 1.3 0.6 1000.0 X T5200/07M03A5E05	220.0	V	T520V227M2R5ASE045	55	10				
330.0 V TS20/37M/2RASAED2 83 10 25 2.2 2.0 9.0 470.0 V TS20/47M/2RASAED12 118 10 112 2.4 2.8 1.3 680.0 D TS2006FM/2RASAED12 118 10 115 2.4 2.8 1.3 680.0 D TS2006FM/2RASAED12 100 125 2.3 2.3 1.0 100.0 B TS2006FM/2RASAED20 30 8 70 1.1 1.0 0.4 1100.0 B TS2006FM/2RASAED0 30 8 70 1.1 1.0 0.4 1100.0 B TS2006FM/2RASAED20 30 8 70 1.1 1.0 0.4 11200 PS2006FM/2RASAED1 2.4 8 1.3 3.6 1.3 3.6 1.3 3.6 1.3 3.6 1.3 3.6 1.3 3.6 1.3 3.6 1.3 3.6 1.3 3.6 1.3 3.6		-							
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680.0 D TS2D0687M2RSAEE015 170 100 15 3.2 2.8 1.3 680.0 V TS2D0687M2RSAEE03 170 100 426 2.8 2.3 1.0 1000.0 V TS2D0787M2RSAEE03 170 100 426 2.8 2.3 1.0 1000.0 F TS2D0787M2RSAEE03 30 8 70 1.6 1.0 0.4 1000.0 B TS2D08177M003A5E00 45 8 70 1.6 1.5 2.8 1.3 0.6 150.0 B TS2D08177M003A5E012 99 100 12 3.2 2.8 1.3 330.0 V TS2D0237M003A5E012 99 10 12 3.2 1.0 9.2 330.0 V TS2D0157M003A5E010 9.0 10 3.0 2.3 2.1 1.5 330.0 V TS2D0157M003A5E010 9.0 1.6 1.0 0.0 1.7 0.0 1.6 <td></td> <td></td> <td></td> <td>-</td> <td>-</td> <td></td> <td>-</td> <td>-</td> <td>-</td>				-	-		-	-	-
B80.0 Y TES2VYBR/MARSATEO25 17.0 10 25 2.5 2.3 1.0 VIEXPUERSATEO25 250 10 25 2.5 1.5 0.6 100.0 B T520167/M003A5E017 99 10 1.5 2.2 2.6 1.2 330.0 V T5202087/M003A5E015 204 10 1.5 3.0 1.3 680.0 D T5202087/M003A5E010 204 10 1.5 3.0 1.3 1000.0 X T520168/M003A5E101 2.0 7 8 70 1.1 1.0 0.4 1000.0 X T520168/M003A5E101 2.7 8 70 1.1 1.0 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>									
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150.0 B T52028157M003ASE070 45 8 70 1.1 1.0 0.4 330.0 V T520V337M003ASE015 99 10 15 2.9 2.6 1.2 330.0 V T520V337M003ASE015 204 10 15 3.2 2.8 1.3 680.0 D T520D687M003ASE015 300 10 15 3.3 3.0 1.3 1000.0 X T520X168M003ASE016 204 10 40 1.8 1.7 0.8 1000.0 X T520X168M003ASE016 200 15 3.3 3.0 1.3 000.0 X T520T156M004ASE010 6 8 40 1.5 1.3 0.6 15.0 B T520E167M004ASE070 60 8 70 1.1 1.0 0.4 15.0 B T520E167M004ASE070 60 8 70 1.1 1.0 0.4 15.0 T T520E157M004ASE070 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
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33.00 V T520V337M003ASE015 99 10 15 2.9 2.6 1.2 680.0 D T520D687M003ASE015 204 10 15 3.2 2.8 1.3 680.0 D T520D687M003ASE015 300 10 15 3.3 3.0 1.3 1000.0 X T520X16M003ASE03 300 10 30 2.3 2.1 0.9 T50.0 T T520X16M003ASE040 27 8 400 1.5 1.3 0.6 68.0 B T520E66M004ASE040 27 8 40 1.5 1.3 0.6 150.0 T T202B167M004ASE040 40 8 40 1.5 1.8 0.6 1.5 1.3 0.4 0.6 1.5 2.9 2.0 1.9 2.2 2.0 0.9 2.2 2.0 0.9 2.2 2.0 0.9 2.2 2.0 0.9 2.2 2.0 0.9 2.2									
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680.0 D T522X0697M003ASE014 204 10 40 1.9 1.7 0.8 1000.0 X T52X1040003ASE030 300 10 30 2.3 2.1 0.9 150.0 X T52X040003ASE030 300 10 30 2.3 2.1 0.9 150.0 T T52X0150004ASE040 6 8 100 0.8 0.7 0.3 68.0 B T52X0150004ASE070 27 8 70 1.1 1.0 0.4 100.0 B T52X01570004ASE070 40 8 70 1.1 1.0 0.4 150.0 B T52X01570004ASE070 60 8 70 1.1 1.0 0.4 150.0 V T52X14570004ASE025 88 10 2.5 2.2 2.0 0.9 220.0 V T52X17004ASE045 88 10 4.5 1.7 1.6 0.7 230.0 V T52X177						-			
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4 Volt Rating @ +87C (3.3 Volt Rating at +105°C)									
68.0 B T5208664M004ASE00 27 8 400 1.5 1.3 0.6 68.0 B T5208107M004ASE00 27 8 70 1.1 1.0 0.4 100.0 B T5208107M004ASE00 40 8 40 1.5 1.3 0.6 150.0 B T5208157M00A4SE070 60 8 40 1.5 2.9 2.6 1.2 150.0 V T520V157M00A4SE055 60 10 15 2.9 2.6 1.2 150.0 V T520V27M00A4SE055 60 10 2.5 2.2 2.0 0.9 220.0 V T520V27M00A4SE055 88 10 45 1.7 1.5 0.7 330.0 V T520V37M00A4SE056 132 10 25 2.2 2.0 0.9 330.0 D T520D37M00AASE065 132 10 45 1.8 1.6 0.7 330.0 D			4 Volt Rating			05°C)			
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1900 B TS20B157M004ASE070 600 8 700 1.1 1.0 0.4 1.2 1900 V TS20V157M004ASE025 60 10 25 2.2 2.0 0.9 220.0 V TS20V227M004ASE025 88 10 25 2.2 2.0 0.9 220.0 V TS20V227M004ASE025 88 10 45 1.7 1.5 0.7 220.0 V TS20V227M004ASE025 132 10 45 1.8 1.6 0.7 230.0 V TS20V337M004ASE045 132 10 45 1.8 1.6 0.7 330.0 D TS20D337M004ASE040 132 10 45 1.8 1.6 0.7 330.0 D TS20D37M004ASE040 188 10 15 3.2 2.8 1.3 330.0 D TS20D477M004ASE015 188 10 1.5 3.2 1.4 470.0 D <				-	-	-			-
150.0 V T520V167M004ASE025 60 10 25 2.2 2.0 0.9 220.0 V T520V227M004ASE025 88 10 15 2.4 2.6 1.2 220.0 V T520V227M004ASE025 88 10 45 1.7 1.5 0.7 220.0 D T520V337M04ASE025 132 10 25 2.2 2.0 0.9 330.0 V T520V337M04ASE040 132 10 40 1.8 1.6 0.7 330.0 D T520D337M04ASE040 132 10 40 1.9 1.7 0.8 330.0 D T520D337M04ASE040 132 10 45 1.8 1.6 0.7 470.0 D T520D477M04ASE012 188 10 15 3.2 2.8 1.3 470.0 D T520D477M04ASE025 188 10 2.9 2.2 2.0 1.9 470.0 D	150.0	В	T520B157M004ASE070	60	8	70	1.1	1.0	0.4
220.0 V T520V227M04ASE015 88 10 15 2.9 2.6 1.2 220.0 V T520V227M04ASE025 88 10 45 1.7 1.5 0.7 220.0 V T520V27M04ASE025 132 10 25 2.2 2.0 0.9 330.0 V T520V337M04ASE025 132 10 45 1.8 1.6 0.7 330.0 D T5200337M04ASE045 132 10 45 1.8 1.6 0.7 330.0 D T5200337M04ASE045 132 10 45 1.8 1.6 0.7 470.0 D T5200477M04ASE015 188 10 15 3.2 2.8 1.3 470.0 D T5200477M04ASE015 188 10 16 3.3 3.2 2.8 1.3 680.0 X T520X687M04ASE015 272 10 25 2.4 2.2 0.0 9 680.0<					-	-	-	-	
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2200 D T5200377M004ASE045 88 10 65 1.5 1.4 0.6 330.0 V T520V337M004ASE045 132 10 25 2.2 2.0 0.9 330.0 D T520V337M004ASE046 132 10 40 1.8 1.6 0.7 330.0 D T520D337M004ASE046 132 10 40 1.9 1.7 0.8 330.0 D T520D37M004ASE012 188 10 12 3.5 3.2 1.4 470.0 D T520D477M004ASE012 188 10 15 2.2 2.8 1.3 470.0 D T520D477M004ASE040 188 10 40 1.9 1.7 0.8 680.0 X T520X687M004ASE045 272 10 25 2.5 2.3 1.0 680.0 X T520X687M004ASE035 272 10 35 2.2 2.0 0.9 5 T <td< td=""><td></td><td></td><td></td><td></td><td>-</td><td>-</td><td></td><td>-</td><td></td></td<>					-	-		-	
330.0 V T520V337M004ASE040 132 10 40 1.8 1.6 0.7 330.0 D T520D337M004ASE045 132 10 45 1.8 1.6 0.7 330.0 D T520D337M004ASE045 132 10 45 1.8 1.6 0.7 470.0 D T520D37M004ASE012 188 10 15 3.2 2.8 1.3 470.0 D T520D47TM004ASE015 188 10 15 3.2 2.8 1.2 470.0 D T520D47TM004ASE015 188 10 2.5 2.5 2.3 1.0 680.0 Y T520X687M004ASE035 272 10 2.5 2.5 2.3 1.0 680.0 X T520X687M004ASE035 272 10 2.5 2.5 2.3 1.0 680.0 X T520X687M004ASE035 272 10 2.5 1.3 0.6 15.0 T T520X687M00	220.0	D	T520D227M004ASE065	88	10	65	1.5	1.4	0.6
330.0 D T520D337M004ASE040 132 10 15 3.2 2.8 1.3 330.0 D T520D337M004ASE045 132 10 40 1.9 1.7 0.8 330.0 D T520D377M004ASE012 188 10 12 3.5 3.2 1.4 470.0 D T520D477M004ASE015 188 10 12 3.2 2.8 1.3 470.0 D T520D477M004ASE025 188 10 40 1.9 1.7 0.8 470.0 D T520P477M004ASE025 272 10 15 3.3 3.0 1.3 680.0 X T520X687M004ASE015 272 10 15 3.3 3.0 1.3 680.0 X T520156M006ASE010 2.1 8 100 0.8 0.7 0.3 33.0 B T520833M006ASE040 2.1 8 70 1.1 1.0 0.4 47.0 B <									
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470.0 D T52DP477M004ASE012 188 10 12 3.2 2.8 1.3 470.0 D T52D0477M004ASE015 188 10 15 3.2 2.8 1.3 470.0 D T52D0477M004ASE016 188 10 25 2.4 2.2 1.0 470.0 D T52D0477M004ASE025 188 10 40 1.9 1.7 0.8 680.0 Y T520X687M004ASE035 272 10 25 2.5 2.3 1.0 680.0 X T520X687M004ASE035 272 10 35 3.3 3.0 1.3 680.0 X T520T55M006ASE040 21 8 40 1.5 1.3 0.6 33.0 B T520T336M006ASE070 21 8 70 1.1 1.0 0.4 47.0 B T520B436M066ASE070 23 8 70 1.1 1.0 0.4 47.0 B T5									
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470.0 D T520D477M004ASE040 188 10 25 2.4 2.2 1.0 470.0 D T620D477M004ASE040 188 10 40 1.9 1.7 0.8 680.0 X T5200687M004ASE015 272 10 15 3.3 3.0 1.3 680.0 X T520X687M004ASE035 272 10 15 3.3 3.0 1.3 680.0 X T520X687M004ASE015 272 10 35 2.2 2.0 0.9 500 T T5208687M006ASE100 9.5 8 100 0.8 0.7 0.3 33.0 B T520B36M006ASE070 21 8 70 1 0.9 0.4 47.0 B T520B476M006ASE070 28 70 1.1 1.0 0.4 47.0 B T520B476M006ASE070 43 8 70 1.1 1.0 0.4 100.0 B T520B607M006ASE040									
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680.0 X T520X687M004ASE015 272 10 15 3.3 3.0 1.3 680.0 X T520X687M004ASE035 272 10 35 2.2 2.0 0.9 66.3 Volt Rating & +85°C (5 Volt Rating at +105°C) 0.8 0.7 0.3 33.0 B T5208336M006ASE000 2.1 8 40 1.5 1.3 0.6 33.0 B T5208336M006ASE070 21 8 70 1 0.9 0.4 47.0 B T5208476M006ASE070 30 8 40 1.5 1.3 0.6 47.0 B T5208476M006ASE040 43 8 40 1.5 1.3 0.6 68.0 B T5208686M006ASE070 63 8 70 1.1 1.0 0.4 150.0 V T5208167M006ASE070 63 8 70 1.1 1.0 0.4 150.0 V T5208167M006ASE070 63 8	470.0	D	T520D477M004ASE040	188	10	40	1.9	1.7	0.8
680.0 X T520X687M004ASE035 272 10 35 2.2 2.0 0.9 66.3 Volt Rating @ +86°C (5 Volt Rating at +105°C) 15.0 T T520T156M006ASE100 9.5 8 100 0.8 0.7 0.33 33.0 B T520B336M006ASE000 21 8 40 1.5 1.3 0.6 33.0 B T520B336M006ASE070 21 8 70 1.1 0.9 0.4 47.0 B T520B476M006ASE040 30 8 40 1.5 1.3 0.6 48.0 B T520B476M006ASE040 43 8 40 1.5 1.3 0.6 68.0 B T520B407M006ASE070 43 8 70 1.1 1.0 0.4 100.0 B T520B107M006ASE040 63 8 70 1.1 1.0 0.4 100.0 B T520B107M006ASE040 95 10 15 2.9 2.6									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			T520X687M004ASE035	272	10	35			-
33.0 B T520B336M006ASE040 21 8 40 1.5 1.3 0.6 33.0 B T520B336M006ASE070 21 8 70 1.1 1.0 0.4 33.0 T T520B376M006ASE070 21 8 70 1.0.9 0.4 47.0 B T520B476M006ASE070 30 8 40 1.5 1.3 0.6 47.0 B T520B476M006ASE040 43 8 70 1.1 1.0 0.4 68.0 B T520B668M006ASE070 43 8 70 1.1 1.0 0.4 100.0 B T520B107M006ASE070 63 8 70 1.1 1.0 0.4 150.0 V T520V157M006ASE025 95 10 15 2.9 2.6 1.2 150.0 V T520V157M006ASE045 95 10 45 1.7 1.5 0.7 150.0 D T5200157M006ASE045 <	15.0	т		ng @ +85°C (5 Vo	It Rating at +		0.8	0.7	0.3
33.0 T T5201336M006ASE040 21 8 70 1 0.9 0.4 47.0 B T520B476M006ASE040 30 8 40 1.5 1.3 0.6 47.0 B T520B476M006ASE040 43 8 40 1.5 1.3 0.6 68.0 B T520B686M006ASE070 43 8 40 1.5 1.3 0.6 68.0 B T520B107M006ASE070 63 8 40 1.5 1.3 0.6 100.0 B T520B107M006ASE070 63 8 70 1.1 1.0 0.4 150.0 V T520V157M006ASE025 95 10 25 2.2 2.0 0.9 150.0 V T520V157M006ASE045 95 10 45 1.7 1.5 0.7 150.0 D T520D157M006ASE025 95 10 15 2.9 2.6 1.2 150.0 D T520D27M006ASE	33.0	В	T520B336M006ASE040			40	1.5	1.3	0.6
47.0 B T520B476M006ASE040 30 8 40 1.5 1.3 0.6 47.0 B T520B476M006ASE070 30 8 70 1.1 1.0 0.4 68.0 B T520B686M006ASE040 43 8 40 1.5 1.3 0.6 68.0 B T520B686M006ASE040 63 8 70 1.1 1.0 0.4 100.0 B T520B107M006ASE070 63 8 70 1.1 1.0 0.4 150.0 V T520V157M006ASE015 95 10 15 2.9 2.6 1.2 150.0 V T520V157M006ASE045 95 10 40 1.8 1.6 0.7 150.0 V T520V157M006ASE045 95 10 45 1.7 1.5 0.7 150.0 D T520D157M006ASE045 95 10 25 1.4 2.2 1.0 150.0 D T520D157M0									
68.0 B T520B686M006ASE040 43 8 40 1.5 1.3 0.6 68.0 B T520B686M006ASE070 43 8 70 1.1 1.0 0.4 100.0 B T520B107M006ASE040 63 8 40 1.5 1.3 0.6 100.0 B T520B107M006ASE070 63 8 70 1.1 1.0 0.4 150.0 V T520V157M006ASE025 95 10 25 2.2 2.0 0.9 150.0 V T520V157M006ASE045 95 10 40 1.8 1.6 0.7 150.0 V T520V157M006ASE045 95 10 45 1.7 1.5 0.7 150.0 D T520D157M006ASE025 95 10 25 2.4 2.2 1.0 150.0 D T520D157M006ASE025 139 10 25 2.2 2.0 0.9 220.0 V T520V2	47.0	В	T520B476M006ASE040	30	8	40	1.5	1.3	0.6
68.0 B T5208686M006ASE070 43 8 70 1.1 1.0 0.4 100.0 B T5208107M006ASE040 63 8 40 1.5 1.3 0.6 100.0 B T5208107M006ASE070 63 8 70 1.1 1.0 0.4 150.0 V T520V157M006ASE025 95 10 15 2.9 2.6 1.2 150.0 V T520V157M006ASE025 95 10 40 1.8 1.6 0.7 150.0 V T520V157M006ASE045 95 10 45 1.7 1.5 0.7 150.0 D T520D157M006ASE025 95 10 45 1.7 1.5 0.7 150.0 D T520D157M006ASE025 95 10 55 1.7 1.5 0.7 120.0 V T520V227M006ASE025 139 10 40 1.8 1.6 0.7 220.0 V T520									
100.0 B T520B107M006ASE040 63 8 40 1.5 1.3 0.6 100.0 B T520B107M006ASE070 63 8 70 1.1 1.0 0.4 150.0 V T520V157M006ASE015 95 10 15 2.9 2.6 1.2 150.0 V T520V157M006ASE040 95 10 40 1.8 1.6 0.7 150.0 V T520V157M006ASE045 95 10 45 1.7 1.5 0.7 150.0 D T520V157M006ASE045 95 10 45 1.7 1.5 0.7 150.0 D T520D157M006ASE025 95 10 55 1.7 1.5 0.7 150.0 D T520D157M006ASE025 95 10 55 1.7 1.5 0.7 220.0 V T520V27M006ASE040 139 10 40 1.8 1.6 0.7 220.0 D T52									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	100.0	В	T520B107M006ASE040	63	8	40	1.5	1.3	0.6
150.0 V T520V157M006ASE025 95 10 25 2.2 2.0 0.9 150.0 V T520V157M006ASE040 95 10 40 1.8 1.6 0.7 150.0 V T520V157M006ASE045 95 10 45 1.7 1.5 0.7 150.0 D T520D157M006ASE025 95 10 15 3.2 2.8 1.3 150.0 D T520D157M006ASE025 95 10 25 2.4 2.2 1.0 150.0 D T520D157M006ASE025 95 10 55 1.7 1.5 0.7 220.0 V T520V227M006ASE025 139 10 25 2.2 2.0 0.9 220.0 V T520V227M006ASE040 139 10 40 1.8 1.6 0.7 220.0 D T520D227M006ASE040 139 10 50 1.7 1.6 0.7 330.0 V <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>									
150.0 V T520V157M006ASE045 95 10 45 1.7 1.5 0.7 150.0 D T520D157M006ASE015 95 10 15 3.2 2.8 1.3 150.0 D T520D157M006ASE025 95 10 25 2.4 2.2 1.0 150.0 D T520D157M006ASE055 95 10 55 1.7 1.5 0.7 220.0 V T520V227M006ASE055 139 10 15 2.9 2.6 1.2 220.0 V T520V227M006ASE025 139 10 40 1.8 1.6 0.7 220.0 V T520V227M006ASE040 139 10 40 1.8 1.6 0.7 220.0 D T520D227M006ASE040 139 10 50 1.7 1.6 0.7 330.0 V T520D227M006ASE045 139 10 50 1.7 1.6 0.7 330.0 V	150.0	V	T520V157M006ASE025	95	10	25	2.2	2.0	0.9
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	150.0	D	T520D157M006ASE015	95	10	15	3.2	2.8	1.3
220.0 V T520V227M006ASE015 139 10 15 2.9 2.6 1.2 220.0 V T520V227M006ASE025 139 10 25 2.2 2.0 0.9 220.0 V T520V227M006ASE025 139 10 40 1.8 1.6 0.7 220.0 D T520D227M006ASE040 139 10 40 1.8 1.6 0.7 220.0 D T520D227M006ASE040 139 10 40 1.9 1.7 0.8 220.0 D T520D227M006ASE050 139 10 50 1.7 1.6 0.7 330.0 D T520D237M006ASE040 208 10 25 2.2 2.0 0.9 330.0 V T520V337M006ASE040 208 10 15 3.2 2.8 1.3 330.0 D T520D337M006ASE045 208 10 15 3.2 2.4 1.2 1.0 330.0									
220.0 V T520V227M006ASE040 139 10 40 1.8 1.6 0.7 220.0 D T520D227M006ASE015 139 10 15 3.2 2.8 1.3 220.0 D T520D227M006ASE040 139 10 40 1.9 1.7 0.8 220.0 D T520D227M006ASE050 139 10 50 1.7 1.6 0.7 330.0 V T520V337M006ASE025 208 10 25 2.2 2.0 0.9 330.0 V T520V337M006ASE045 208 10 15 3.2 2.8 1.3 330.0 D T520D337M006ASE045 208 10 15 3.2 2.8 1.3 330.0 D T520D337M006ASE045 208 10 25 2.4 2.2 1.0 330.0 D T520D337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 D	220.0	V	T520V227M006ASE015	139	10	15	2.9	2.6	
220.0 D T520D227M006ASE015 139 10 15 3.2 2.8 1.3 220.0 D T520D227M006ASE040 139 10 40 1.9 1.7 0.8 220.0 D T520D227M006ASE050 139 10 50 1.7 1.6 0.7 330.0 V T520V337M006ASE025 208 10 25 2.2 2.0 0.9 330.0 V T520V337M006ASE040 208 10 40 1.8 1.6 0.7 330.0 D T520D337M006ASE045 208 10 25 2.4 2.2 1.0 330.0 D T520D337M006ASE040 208 10 45 1.8 1.6 0.7 330.0 D T520D337M006ASE040 208 10 45 1.8 1.6 0.7 330.0 D T520D337M006ASE042 208 10 45 1.8 1.6 0.7 330.0 V									
220.0 D T520D227M006ASE050 139 10 50 1.7 1.6 0.7 330.0 V T520V337M006ASE025 208 10 25 2.2 2.0 0.9 330.0 V T520V337M006ASE025 208 10 40 1.8 1.6 0.7 330.0 D T520D337M006ASE015 208 10 15 3.2 2.8 1.3 330.0 D T520D337M006ASE025 208 10 25 2.4 2.2 1.0 330.0 D T520D337M006ASE045 208 10 40 1.9 1.7 0.8 330.0 D T520D337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 D T520D337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 V T520Y337M006ASE045 208 10 25 2.5 2.3 1.0 470.0 Y									
330.0 V T520V337M006ASE025 208 10 25 2.2 2.0 0.9 330.0 V T520V337M006ASE040 208 10 40 1.8 1.6 0.7 330.0 D T520D337M006ASE045 208 10 15 3.2 2.8 1.3 330.0 D T520D337M006ASE045 208 10 25 2.4 2.2 1.0 330.0 D T520D337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 D T520D337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 D T520D337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 V T520V337M006ASE045 208 10 25 2.5 2.3 1.0 330.0 Y T520V37M006ATE025 208 10 25 2.5 2.3 1.0 470.0 X									
330.0 V T520V337M006ASE040 208 10 40 1.8 1.6 0.7 330.0 D T520D337M006ASE015 208 10 15 3.2 2.8 1.3 330.0 D T520D337M006ASE025 208 10 25 2.4 2.2 1.0 330.0 D T520D337M006ASE040 208 10 40 1.9 1.7 0.8 330.0 D T520D337M006ASE045 208 10 40 1.9 1.7 0.8 330.0 D T520D337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 Y T520V337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 Y T520V37M006ASE045 208 10 25 2.5 2.3 1.0 470.0 Y T520V477M006ASE018 296 10 18 3.0 2.7 1.2 470.0 X								-	-
330.0 D T520D337M006ASE025 208 10 25 2.4 2.2 1.0 330.0 D T520D337M006ASE040 208 10 40 1.9 1.7 0.8 330.0 D T520D337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 V T5200337M006ASE045 208 10 25 2.5 2.3 1.0 330.0 Y T520Y337M006ATE025 208 10 25 2.5 2.3 1.0 470.0 Y T520X477M006ASE018 296 10 18 3.0 2.7 1.2 470.0 X T520X477M006ASE035 296 10 35 2.2 2.0 0.9	330.0	V	T520V337M006ASE040	208	10	40	1.8	1.6	0.7
330.0 D T520D337M006ASE040 208 10 40 1.9 1.7 0.8 330.0 D T520D337M006ASE045 208 10 45 1.8 1.6 0.7 330.0 Y T520V337M006ASE045 208 10 25 2.5 2.3 1.0 470.0 Y T520V477M006ATE025 296 10 25 2.5 2.3 1.0 470.0 X T520X477M006ASE035 296 10 18 3.0 2.7 1.2 470.0 X T520X477M006ASE035 296 10 35 2.2 2.0 0.9									
330.0 Y T520Y337M006ATE025 208 10 25 2.5 2.3 1.0 470.0 Y T520Y477M006ATE025 296 10 25 2.5 2.3 1.0 470.0 X T520X477M006ASE018 296 10 18 3.0 2.7 1.2 470.0 X T520X477M006ASE018 296 10 35 2.2 2.0 0.9	330.0	D	T520D337M006ASE040	208	10	40	1.9	1.7	0.8
470.0 Y T520Y477M006ATE025 296 10 25 2.5 2.3 1.0 470.0 X T520X477M006ASE018 296 10 18 3.0 2.7 1.2 470.0 X T520X477M006ASE035 296 10 35 2.2 2.0 0.9									
470.0 X T520X477M006ASE035 296 10 35 2.2 2.0 0.9	470.0	Y	T520Y477M006ATE025	296	10	25	2.5	2.3	1.0

T520 RATINGS & PART NUMBER REFERENCE

POLYMER TANTALUM CHIP CAPACITORS **KEMET**

Capaci- tance µF	Case Size	KEMET Part Number	DC Leakage μA @ 25°C Max	DF% @ 25°C 120 Hz Max	ESR mΩ @ 25°C 100 kHz Max	Α	pple Curi rms @ 29 00 kHz M	5°C,
		8 Volt Rating	@ +85°C (6.4 Vol	t Rating at +10	05°C)			
33.0	В	T520B336M008ASE040	26	8	40	1.5	1.3	0.6
33.0	В	T520B336M008ASE070	27	8	70	1.1	1.0	0.4
150.0	D	T520D157M008ASE025	120	10	25	2.4	2.2	1.0
150.0	D	T520D157M008ASE040	120	10	40	1.9	1.7	0.8
150.0	D	T520D157M008ASE055	120	10	55	1.7	1.5	0.7
		10 Volt Ratir	ng @ +85°C (8 Vol	Rating at +10	05°C)			
33.0	В	T520B336M010ASE040	33	8	40	1.5	1.3	0.6
33.0	В	T520B336M010ASE070	33	8	70	1.1	1.0	0.4
68.0	V	T520V686M010ASE045	68	10	45	1.7	1.5	0.7
68.0	V	T520V686M010ASE060	68	10	60	1.4	1.3	0.6
100.0	V	T520V107M010ASE018	100	10	18	2.6	2.4	1.1
100.0	V	T520V107M010ASE025	100	10	25	2.2	2.0	0.9
100.0	V	T520V107M010ASE045	100	10	45	1.7	1.5	0.7
100.0	V	T520V107M010ASE050	100	10	50	1.6	1.4	0.6
100.0	D	T520D107M010ASE018	100	10	18	3.2	2.8	1.3
100.0	D	T520D107M010ASE055	100	10	55	1.7	1.5	0.7
100.0	D	T520D107M010ASE080	100	10	80	1.4	1.2	0.5
150.0	D	T520D157M010ASE025	150	10	25	2.4	2.2	1.0
150.0	D	T520D157M010ASE040	150	10	40	1.9	1.7	0.8
150.0	D	T520D157M010ASE055	150	10	55	1.7	1.5	0.7
220.0	D	T520D227M010ASE018	220	10	18	2.9	2.6	1.2
220.0	D	T520D227M010ASE025	220	10	25	2.4	2.2	1.0
220.0	D	T520D227M010ASE040	220	10	40	1.9	1.7	0.8
330.0	Х	T520X337M010ASE025	330	10	25	2.6	2.3	1.0
330.0	Х	T520X337M010ASE040	330	10	40	2.0	1.8	0.8
		16 Volt Rating	@ +85°C (12.8 Vo	olt Rating at +	105°C)			
33.0	V	T520V336M016ASE060	53	10	60	1.4	1.3	0.6
47.0	V	T520V476M016ASE070	76	10	70	1.3	1.2	0.5
47.0	D	T520D476M016ASE070	75	10	70	1.5	1.3	0.6
		25 Volt Ratin	g @ +85°C (20 Vo	t Rating at +1	05°C)			
15.0	D	T520D156M025ASE080	38	10	80	1.4	1.2	0.5

T520 RATINGS & PART NUMBER REFERENCE

Newest values indicated in RED

TYPICAL FREQUENCY RESPONSE CURVES

T520V157M006AS @ +25°C with 3VDC Bias Impedance and ESR (Ohms)



T520V157M006AS @ +25°C with 3V DC Bias Measured Capacitance (F) Measured Inductance (H)



T520D337M006AS@ +25°C with3VDC Bias Impedance and ESR (Ohms)



T520D337M006AS@+25°C with 3V DC Bias Measured Capacitance (F) Measured Inductance (H)



Polymer Tantalum Surface Mount