FUJITSU MEDIA DEVICES
DATA SHEET

DS01-41105-1E

TANTALUM CAPACITORS

TANTALUM CAPACITORS

TCML Series

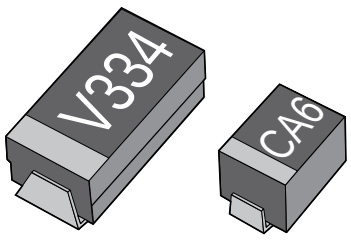
■ DESCRIPTION

Miniaturization of electronic devices (communication devices, audio devices, and AV devices, etc.) has more and more accelerated in recent years. The ultraminiature-size model (2012) meets the customers' needs for high-density packaging, taking full advantage of our technologies for miniaturization and capacity-increase in tantalum capacitor production.

■ FEATURES

- Compact packaging in the volume reduced to one third (P case : 2012) of conventional size (A case : 3216) .
- A maximum height of 1.2 mm allows designing a flat device.
- Capacitance ranges from 0.22 μF to 10 μF, and rated voltage ranges from 4 V to 16 V.

■ PACKAGES



■ PRODUCT LINEUP

Model name	Rated voltage (V)	Rated capacitance (μF)	tanδ (%)	Leakage current (μA)	Case size
TA-4R0TCML1R0M-PR	4	1	8	0.50	P
TA-4R0TCML1R5M-PR	4	1.5	8	0.50	P
TA-4R0TCML2R2M-PR	4	2.2	8	0.50	P
TA-4R0TCML3R3M-PR	4	3.3	8	0.50	P
TA-4R0TCML4R7M-PR	4	4.7	8	0.50	P
TA-4R0TCML6R8M-PR	4	6.8	8	0.50	P
TA-4R0TCML100M-PR	4	10	8	0.50	P
TA-6R3TCMLR68M-PR	6.3	0.68	8	0.50	P
TA-6R3TCML1R0M-PR	6.3	1	8	0.50	P
TA-6R3TCML1R5M-PR	6.3	1.5	8	0.50	P
TA-6R3TCML2R2M-PR	6.3	2.2	8	0.50	P
TA-6R3TCML3R3M-PR	6.3	3.3	8	0.50	P
TA-6R3TCML4R7M-PR	6.3	4.7	8	0.50	P
TA-6R3TCML100M-PR	6.3	10	8	0.63	P
TA-010TCMLR47M-PR	10	0.47	8	0.50	P
TA-010TCMLR68M-PR	10	0.68	8	0.50	P
TA-010TCML1R0M-PR	10	1	8	0.50	P
TA-010TCML1R5M-PR	10	1.5	8	0.50	P
TA-010TCML2R2M-PR	10	2.2	8	0.50	P
TA-016TCMLR22M-PR	16	0.22	8	0.50	P
TA-016TCMLR33M-PR	16	0.33	8	0.50	P
TA-016TCMLR47M-PR	16	0.47	8	0.50	P
TA-016TCMLR68M-PR	16	0.68	8	0.50	P
TA-016TCML1R0M-PR	16	1	8	0.50	P

■ PRINCIPAL CHARACTERISTICS

Parameter		Test method (JIS-C-5101-1, 3)	Value		Unit
			Min.	Max.	
Category temperature range		—	–55	+125	°C
Maximum temperature at rated voltage		—	—	+85	°C
Rated voltage range		120 Hz	4	16	V
Capacitance range			0.22	10	µF
Rated capacitance allowable error			–20	+20	%
Tangent of loss angle (tanδ)			—	8	%
Leakage current		Apply a rated voltage through 1000 Ω protection resistor connected in series, and measure leakage current in 5 min.	—	Either 0.01 CV or 0.5 µA, whichever is greater.	µA
Heat resistance against soldering	Appearance	After preheating in 150 °C Celsius for 2 min, expose to the heat under the following conditions : • Immerse in soldering bath at 260 °C ± 5 °C, for 10 s ± 1 s, or • Perform reflow soldering at 260 °C ± 5 °C, for 10 s ± 1 s.	No fault such as a crack is found on external package.		—
	Capacitance		Lower than initial value by 10.	Higher than initial value by 10.	%
	tanδ		—	150, less than rated initial value.	%
	Leakage current		—	Rated initial value	—
Quick change of temperature	Capacitance	Place under 5 cycles of temperature change between –55 °C and +125 °C.	Lower than initial value by 10.	Higher than initial value by 10.	%
	tanδ		—	150 of rated initial value.	%
	Leakage current		—	Rated initial value	—
High temperature and humidity (steady-state)	Capacitance	Place under a circumstance of 60 degrees Celsius, 90% to 95% RH for 500 h with no load. Measurement must be taken after placing under room temperature and humidity for 1 h to 2 h.	Lower than initial value by 20.	Higher than initial value by 20.	%
	tanδ		—	150 of rated initial value.	%
	Leakage current		—	Rated initial value	—

(Continued)

(Continued)

Parameter		Test method (JIS-C-5101-1, 3)	Value		Unit
			Min.	Max.	
Durability	Capacitance	Apply rated voltage at 85 °C, and apply specified derating voltage at 125 °C for 2000 h. Power supply impedance shall be 3 Ω or lower.	Lower than initial value by 20.	Higher than initial value by 20.	%
	tanδ		—	150 of rated initial value.	%
	Leakage current		—	125 of rated initial value.	%
Failure rate after soldering		After heat resistance test against soldering, perform durability test under 85 °C.	—	1% / 1000 h (60%CL)	—

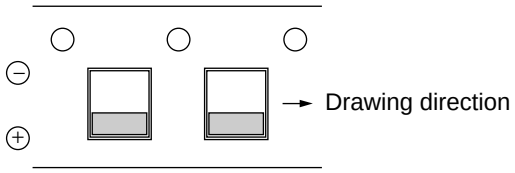
■ SERIES LIST

WV / C (μF)	4 V (0 G)	6.3 V (0 J)	10 V (1 A)	16 V (1 C)
0.22				P
0.33				P
0.47			P	P
0.68		P	P	P
1.0	P	P	P	P
1.5	P	P	P	
2.2	P	P	P	
3.3	P	P		
4.7	P	P		
6.8	P			
10.0	P	P		
15.0				

■ PART NUMBER DESIGNATION

Indication example) P case, 10 V/0.68 μF

TA	–	010	TCML	R68	M	–	P	R
Product type		Rated voltage	Series name	Capacitance	Allowable error		Size	Taping specifications
		(Example) 6.3 V → 6R3, 10 V → 010		(Example) 1.0 μF → 1R0, 0.33 μF → R33	M → ±20%		P	R : Taping



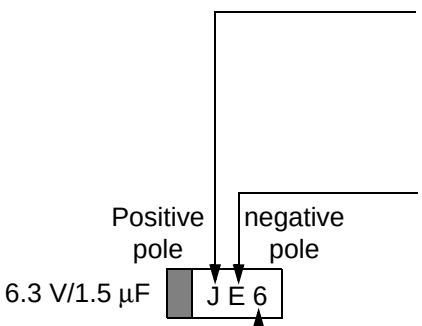
Specify “R” if a positive pole is on the right side against drawing direction. (A positive pole is on the other side of sending holes.)

■ MARKING AND POLARITY INDICATION

(Polarity of (+) is indicated by a stripe.)

Rated voltage and capacitance (picofarad : pF) are indicated by symbols.

(Indication example)



First digit : Voltage indication

Rated voltage	4 V (0 G)	6.3 V (0 J)	10 V (1 A)	16 V (1 C)	20 V (1 D)	25 V (1 E)	35 V (1 V)
Symbol	G	J	A	C	D	E	V

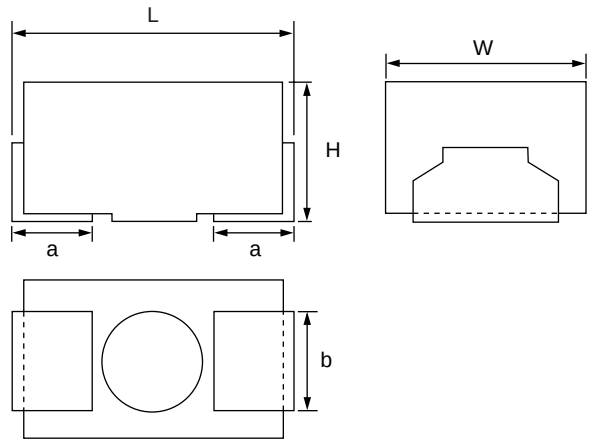
Second digit : 2 significant digits of nominal capacitance are indicated in one uppercase alphabetical character.

Symbol	A	E	J	N	S	W
Number	1.0	1.5	2.2	3.3	4.7	6.8

Third digit : Multiplier for a nominal capacitance value is indicated in one value.

Symbol	4	5	6
Multiplier	10^4	10^5	10^6

■ PACKAGE DIMENSION



Unit : mm

	L	W	H	a	b
P	2.0 ± 0.2	1.25 ± 0.2	1.2 (Max.)	0.6 ± 0.2	0.9 ± 0.2

■ OTHER REQUIREMENTS

(1) Surge voltage and reduction voltage

(Rated voltage and reduction voltage by temperature)

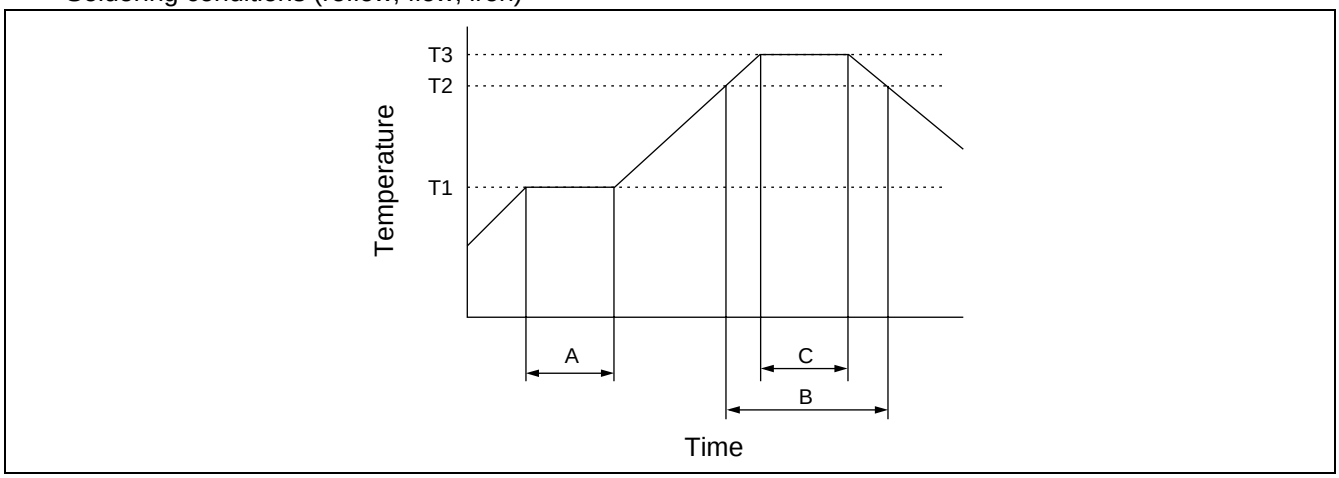
85 ℃	**Rated voltage**	4 V	6.3 V	10 V	16 V
	Surge voltage	5 V	8 V	13 V	20 V
125 ℃	**Reduction voltage**	2.5 V	4 V	6.3 V	10 V
	Surge voltage	3.2 V	5 V	8 V	13 V

(2) Storage conditions

20 °C ± 15 °C, 65% ± 20% RH, no longer than 2 years.

■ RECOMMENDED MOUNTING CONDITIONS

- Soldering conditions (reflow, flow, iron)



1. Reflow

- Reflow (peak) temperature
  T1 : 150 °C to 160 °C
  T2 : 210 °C
  T3 : 230 °C (240 °C at maximum)
- Reflow time
  A : 30 s to 120 s
  B : 30 s to 40 s
  C : 15 s to 25 s
- Number of times of reflow soldering processes
  Twice or less.
- Flux
  Use of rosin-type flux with low chlorine (0.2 wt% chlorine or less) is recommended.

2. Flow

- Flow temperature and time : 250 °C, 5 s
  (preheating at 150 °C to 160 °C, for 15 s to 120 s is recommended)
- Number of flow soldering processes : 1
- Flux : Use of rosin-type flux with low chlorine (0.2 wt% chlorine or less) is recommended.

3. Iron soldering

- Soldering temperature, time : 350 °C, 3 s to 6 s
  (with iron power of 30 W. Preheating : Preheating similar to flow soldering is recommended.)
- Number of iron soldering processes : 3 or less.
- Flux : Use of rosin-type flux with low chlorine (0.2 wt% chlorine or less) is recommended.

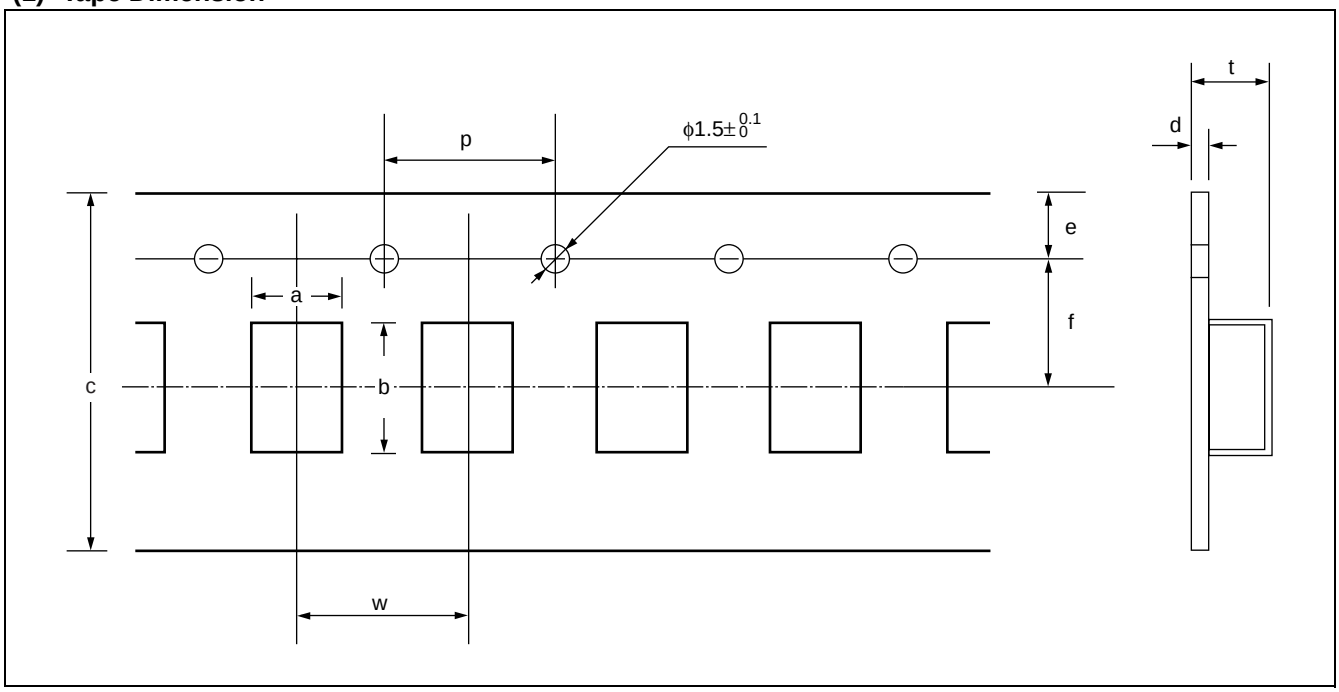
Quick heating of a capacitor after long-term storage, which took up moisture, causes high-pressure inside the product by vaporization of moist and may result in cracks on external resin. Pre-baking at 60 °C to 120 °C for 12 h to 72 h removes the moist and prevents such cracks.

■ RECOMMENDED CLEANSING CONDITIONS

- Avoid ultrasonic cleansing in principle. Bubble cleansing is recommended. If ultrasonic cleansing is unavoidable, cleansing in under one minute is recommended to avoid cavitation.
- Use non-chlorine type or alcoholic organic solvent that is easily dryable and residue-free (e.g. isopropyl alcohol, toluene, benzene, etc.) for cleansing.
- Soaking a capacitor in solvent may erase a stamp. Soaking must be within 20 min. No limitation is applicable if stamp is not taken in account. For similar reason, vapor-phase cleansing must be done within 10 min.
- Use of the following solvents, that cause swelling or dissolving on external resin, are not allowed : ester-family methoxy-butyl acetate, amide-family N, N-dimethylformamide (DMF) , polyhydric alcohol dielectric diethylene glycol, and monobutyl ether.

■ PACKING

(1) Tape Dimension



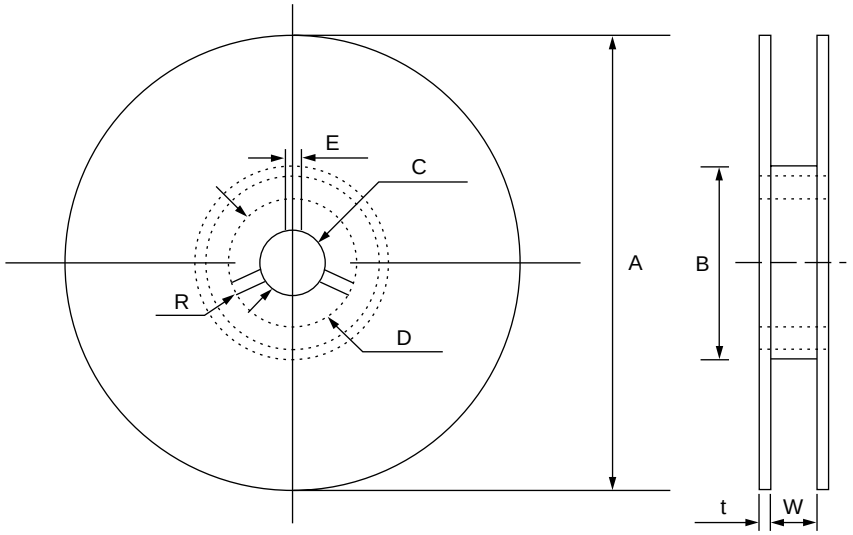
Unit : mm

Case size	a	b	c	e	f	t	p	w	d
P	1.4 ± 0.1	2.2 ± 0.1	8 ± 0.3	1.75 ± 0.1	3.5 ± 0.1	1.55 ± 0.1	4 ± 0.1	4 ± 0.1	0.2

(“a” and “b” are inside diameters.)

(2) Reel Dimension

Material : Polystyrene



Unit : mm

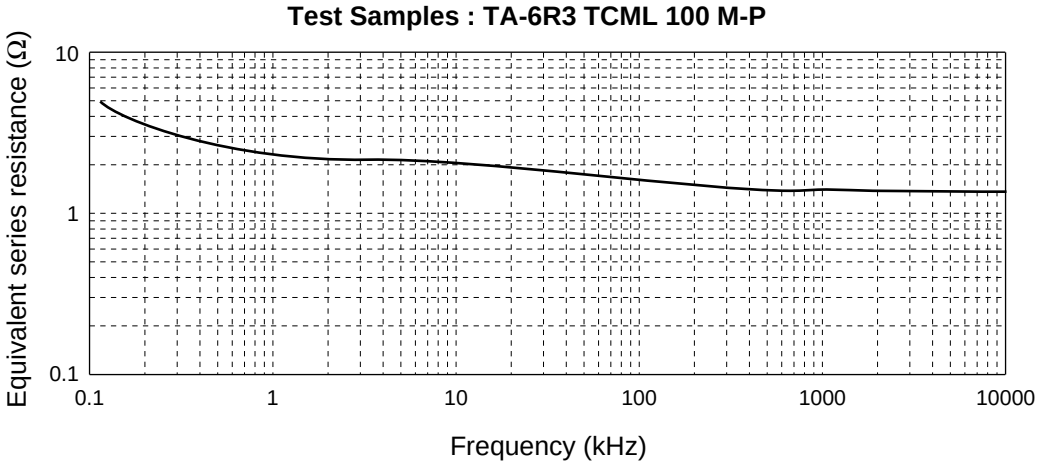
Case size	A	B	C	D	E	W	t	R
P	$180 \pm {}^{0}_{3.0}$	$60 \pm {}^{1.0}_{0}$	13 ± 0.2	21 ± 0.8	2 ± 0.5	9 ± 0.3	2 ± 0.5	1

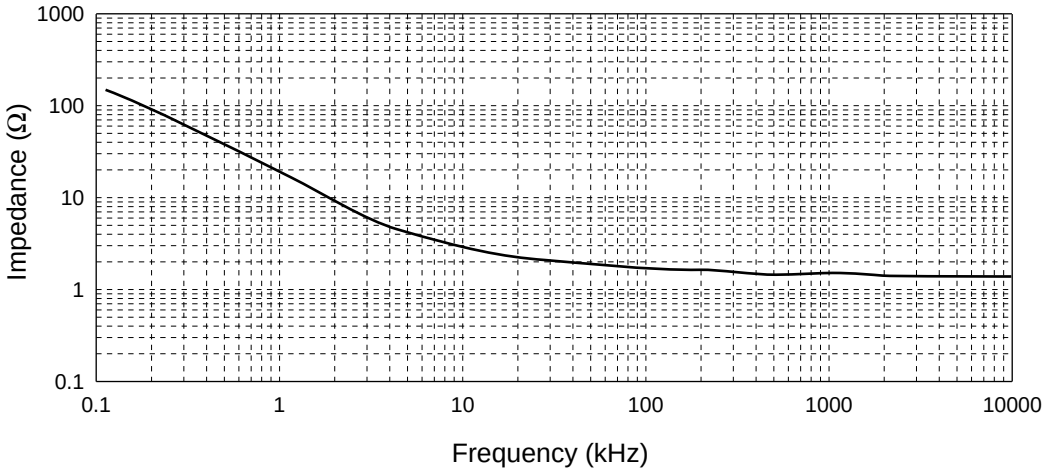
(3) Carrier Tape Packaging Unit

Case size	Quantity (capacitors/reel)
P	3000

■ APPENDIX (Typ. value)

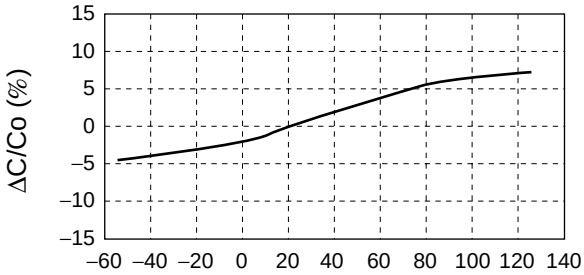
- **Frequency characteristics**

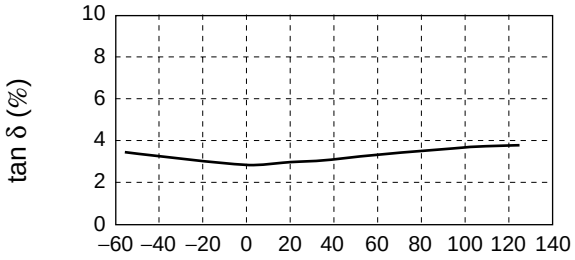


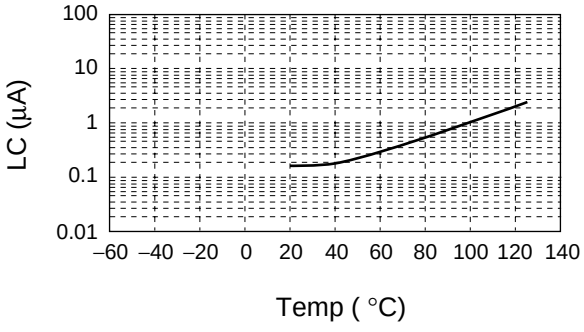


- **High/low temperature stability**

Test Samples : TA-6R3 TCML 100 M-P

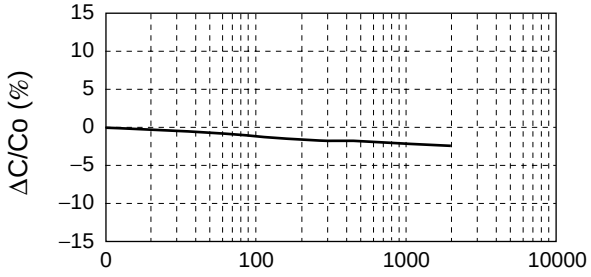


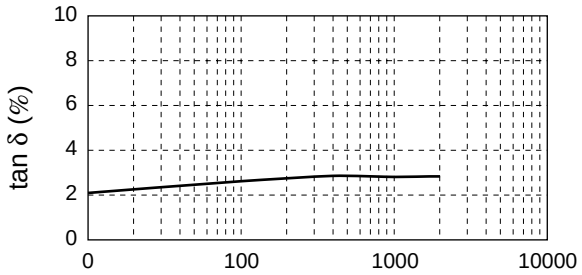


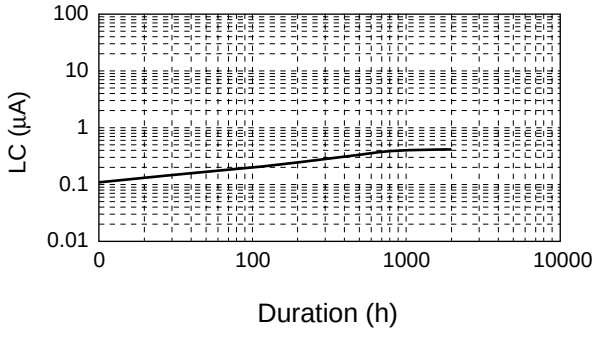


- **Loaded conditions at elevated temperature (85 degrees Celsius)**

Test Samples : TA-6R3 TCML 100 M-P







FUJITSU MEDIA DEVICES LIMITED

The contents of this document are subject to change without notice. Customers are advised to consult with FUJITSU MEDIA DEVICES sales representatives before ordering.

The information and circuit diagrams in this document are presented as examples of device applications, and are not intended to be incorporated in devices for actual use. Also, FUJITSU MEDIA DEVICES is unable to assume responsibility for infringement of any patent rights or other rights of third parties arising from the use of this information or circuit diagrams.

The products described in this document are designed, and manufactured as contemplated for general use, including without limitation, ordinary industrial use, general office use, personal use, and household use, but are not designed, developed and manufactured as contemplated (1) for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could have a serious effect to the public, and could lead directly to death, personal injury, severe physical damage or other loss (i.e., nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system), or (2) for use requiring extremely high reliability (i.e., submersible repeater and artificial satellite).
Please note that Fujitsu will not be liable against you and/or any third party for any claims or damages arising in connection with above-mentioned uses of the products.

Any electronic devices have inherently a certain rate of failure. You must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of over-current levels and other abnormal operating conditions.

If any products described in this document represent goods or technologies subject to certain restrictions on export under the Foreign Exchange and Foreign Trade Control Law of Japan, the prior authorization by Japanese government should be required for export of those products from Japan.

F0106