

### Surface Mount Type

Series: **TG** Type : **V**

■ **Features**

Endurance: 125°C 1000 to 2000 h  
 Miniaturization (40% less than TA Series)  
 Low ESR (Low temp)  
 Vibration-proof product is available upon request. ( $\phi 8 \leq$ )  
 RoHS directive compliant (Parts No: EEV\* $\phi 12.5 \leq$ , EEE\*)



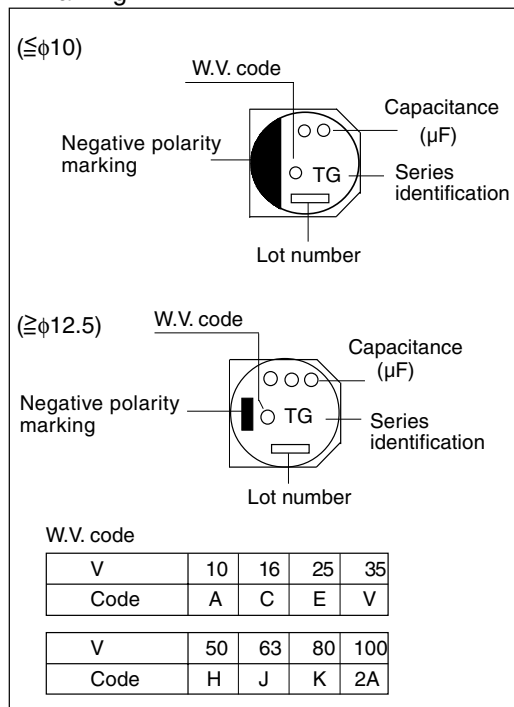
■ **Applications**

For use near car engines.  
 Good for electronically controlled units (ECU, ABS etc).

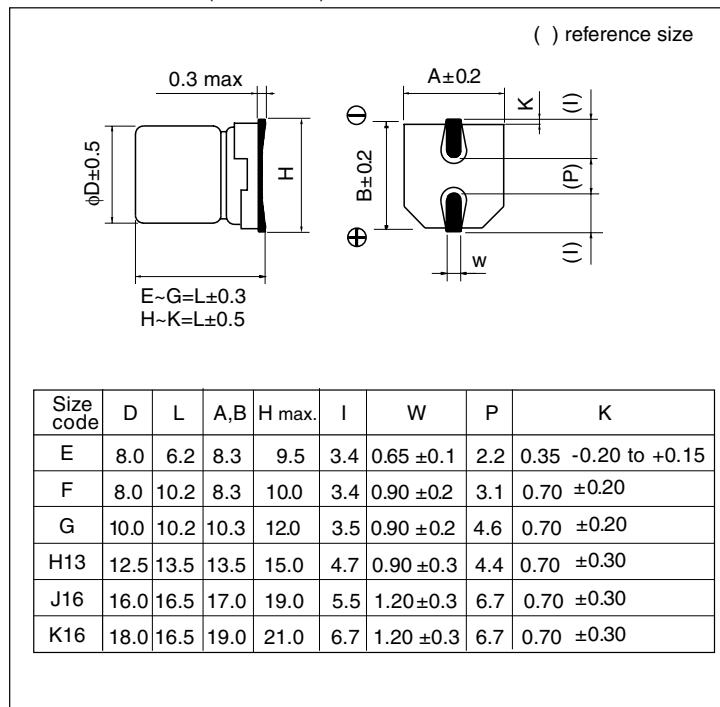
■ **Specifications**

Category temp. range	-40 to +125°C									
Rated W.V. Range	10 to 100 V .DC									
Nominal Cap. Range	10 to 4700 $\mu$ F									
Capacitance Tolerance	$\pm 20$ % (120Hz/+20°C)									
DC Leakage Current	$I \leq 0.01$ CV or 3( $\mu$ A) after 2 minutes (Whichever is greater)									
tan $\delta$	Please see the attached standard products list									
Characteristics at Low Temperature	W.V. (V)	10	16	25	35	50	63	80	100	(Impedance ratio at 120Hz)
	-25 / +20 °C	3	2	2	2	2	2	2	2	
	-40 / +20 °C	6	4	4	3	3	3	3	3	
Endurance	After applying rated working voltage for 1000 hours ( $\phi 8 \times 6.2$ ), 2000 hours ( $8 \times 10.2 \leq$ ) at +125 $\pm 2$ °C and then being stabilized at +20°C, capacitors shall meet the following limits.									
	Capacitance change	$\pm 30$ % of initial measured value (code U: $\pm 35$ %)								
	tan $\delta$	$\leq 300$ % of initial specified value (code U: 350%)								
Shelf Life	After storage for 1000 hours at +125 $\pm 2$ °C with no voltage applied and then being stabilized at +20°C, capacitors shall meet the limits specified in Endurance. (With voltage treatment)									
	After reflow soldering (Refer to page 86 for recommended temperature profile) and then being stabilized at +20°C, capacitor shall meet the following limits.									
Resistance to Soldering Heat	After reflow soldering (Refer to page 86 for recommended temperature profile) and then being stabilized at +20°C, capacitor shall meet the following limits.									
	Capacitance change	$\pm 10$ % of initial measured value								
	tan $\delta$	$\leq$ initial specified value								
DC leakage current	$\leq$ initial specified value									

■ **Marking**



■ **Dimensions in mm (not to scale)**



■ Case size VS Capacitance, ESR and Ripple current

ESR;(Ω/100kHz,+20°C),Ripple current ;(mA r.m.s./100kHz+125°C)

Capacitance (μF)	W.V. (V)	10			16			25					
		size	ESR		Ripple current	size	ESR		Ripple current	size	ESR		Ripple current
			20°C	-40°C			20°C	-40°C			20°C	-40°C	
47									E	1.0	20	100	
100	E	1.0	20	100	F	0.5	10	197	(E)	(1.0)	(20)	(100)	
									F	0.5	10	197	
220	(E)	(1.0)	(20)	(100)	(F)	(0.5)	(10)	(197)	(F)	(0.5)	(10)	(197)	
	F	0.5	10	197	G	0.3	6.0	270	G	0.3	6.0	270	
330	(F)	(0.5)	(10)	(197)	(G)	(0.3)	(6.0)	(270)	(G)	(0.3)	(6.0)	(270)	
	G	0.3	6.0	270	H13	0.12	1.8	800	H13	0.12	1.8	800	
470	(G)	(0.3)	(6.0)	(270)	H13	0.12	1.8	800	H13	0.12	1.8	800	
680					H13	0.12	1.8	800	(H13)	(0.12)	(1.8)	(800)	
									J16	0.08	1.2	1100	
1000	H13	0.12	1.8	800	(H13)	(0.12)	(1.8)	(800)	(J16)	(0.08)	(1.2)	(1100)	
					J16	0.08	1.2	1100	K16	0.075	1.1	1300	
1500	(H13)	(0.12)	(1.8)	(800)									
2200	J16	0.08	1.2	1100	(J16)	(0.08)	(1.2)	(1100)	K16	0.075	1.1	1300	
					K16	0.075	1.1	1300					
3300	(J16)	(0.08)	(1.2)	(1100)	K16	0.075	1.1	1300					
	K16	0.075	1.1	1300									
4700	K16	0.075	1.1	1300									

Capacitance (μF)	W.V. (V)	35			50			63					
		size	ESR		Ripple current	size	ESR		Ripple current	size	ESR		Ripple current
			20°C	-40°C			20°C	-40°C			20°C	-40°C	
10					E	1.6	32	80	E	2.2	55	55	
22					E	1.6	32	80	F	1	25	100	
33	E	1.0	20	100	(E)	(1.6)	(32)	(80)	(F)	(1)	(25)	(100)	
					F	0.75	15	133	G	0.8	20	150	
47	(E)	(1.0)	(20)	(100)	(F)	(0.75)	(15)	(133)	(F)	(1)	(25)	(100)	
	F	0.5	10	197	G	0.5	10	221	G	0.8	20	150	
100	(F)	(0.5)	(10)	(197)					(G)	(0.8)	(20)	(150)	
	G	0.3	6.0	270	(G)	(0.5)	(10)	(221)	H13	0.26	5.2	350	
220	(G)	(0.3)	(6.0)	(270)	H13	0.23	3.4	600	H13	0.26	5.2	350	
330	H13	0.12	1.8	800	H13	0.23	3.4	600	J16	0.18	3.6	500	
470	(H13)	(0.12)	(1.8)	(800)	J16	0.15	2.2	900	J16	0.18	3.6	500	
	J16	0.08	1.2	1100									
680	(J16)	(0.08)	(1.2)	(1100)	(J16)	(0.15)	(2.2)	(900)					
	K16	0.075	1.1	1300	K16	0.14	2.1	950					
1000	K16	0.075	1.1	1300	K16	0.14	2.1	950					

Capacitance (μF)	W.V. (V)	80			100				
		size	ESR		Ripple current	size	ESR		Ripple current
			20°C	-40°C			20°C	-40°C	
10	F	1.3	32	70	F	1.3	32	70	
22	(F)	(1.3)	(32)	(70)	(F)	(1.3)	(32)	(70)	
	G	1.0	25	90	G	1.0	25	90	
33	(F)	(1.3)	(32)	(70)	G	1.0	25	90	
	G	1.0	25	90					
47	(G)	(1.0)	(25)	(90)	H13	0.42	8.4	250	
	H13	0.42	8.4	250					
100	(H13)	(0.42)	(8.4)	(250)	J16	0.3	6.0	350	
	J16	0.3	6.0	350					
220	(J16)	(0.3)	(6.0)	(350)	K16	0.28	5.6	400	
	K16	0.28	5.6	400					
330	(J16)	(0.3)	(6.0)	(350)	K16	0.28	5.6	400	
	K16	0.28	5.6	400					
470	K16	0.28	5.6	400					

( ) Shows miniaturized size  
Suffix : U

### ■ Standard Products

W.V. (V)	Cap (±20%) (μF)	Case Size			Specification			Part No. (RoHS: not compliant)		Part No. (RoHS: compliant)		Min. Packaging Q'ty  Taping (pcs)
		Dia. (mm)	Length (mm)	Size code	Ripple current (100kHz) (+125°C) (mA)	ESR (100kHz) (+20°C) (Ω)	tan δ (120Hz) (+20°C)		Reflow		Reflow	
10	100	8	6.2	E	100	1.0	0.30	EEVTG1A101P	(2)	EEETG1A101P	(5)	1000
	220	(8)	(6.2)	(E)	(100)	(1.0)	0.30	EEVTG1A221UP	(2)	EEETG1A221UP	(5)	1000
		8	10.2	F	197	0.5	0.30	EEVTG1A221P	(2)	EEETG1A221P	(5)	500
	330	(8)	(10.2)	(F)	(197)	(0.5)	0.30	EEVTG1A331UP	(2)	EEETG1A331UP	(5)	500
		10	10.2	G	270	0.3	0.30	EEVTG1A331P	(2)	EEETG1A331P	(5)	500
	470	(10)	(10.2)	(G)	(270)	(0.3)	0.30	EEVTG1A471UP	(2)	EEETG1A471UP	(5)	500
	1000	12.5	13.5	H13	800	0.12	0.30			EEVTG1A102Q	(2)	200
	1500	(12.5)	(13.5)	(H13)	(800)	(0.12)	0.30			EEVTG1A152UQ	(2)	200
	2200	16	16.5	J16	1100	0.08	0.32			EEVTG1A222M	(2)	125
	3300	(16)	(16.5)	(J16)	(1100)	(0.08)	0.34			EEVTG1A332UM	(2)	125
18		16.5	K16	1300	0.075	0.34			EEVTG1A332M	(2)	125	
4700	18	16.5	K16	1300	0.075	0.36			EEVTG1A472M	(2)	125	
16	100	8	10.2	F	197	0.5	0.23	EEVTG1C101P	(2)	EEETG1C101P	(5)	500
	220	(8)	(10.2)	(F)	(197)	(0.5)	0.23	EEVTG1C221UP	(2)	EEETG1C221UP	(5)	500
		10	10.2	G	270	0.3	0.23	EEVTG1C221P	(2)	EEETG1C221P	(5)	500
	330	(10)	(10.2)	(G)	(270)	(0.3)	0.23	EEVTG1C331UP	(2)	EEETG1C331UP	(5)	500
		12.5	13.5	H13	800	0.12	0.23			EEVTG1C331Q	(2)	200
	470	12.5	13.5	H13	800	0.12	0.23			EEVTG1C471Q	(2)	200
	680	12.5	13.5	H13	800	0.12	0.23			EEVTG1C681Q	(2)	200
	1000	(12.5)	(13.5)	(H13)	(800)	(0.12)	0.23			EEVTG1C102UQ	(2)	200
		16	16.5	J16	1100	0.08	0.23			EEVTG1C102M	(2)	125
	2200	(16)	(16.5)	(J16)	(1100)	(0.08)	0.25			EEVTG1C222UM	(2)	125
18		16.5	K16	1300	0.075	0.25			EEVTG1C222M	(2)	125	
3300	18	16.5	K16	1300	0.075	0.27			EEVTG1C332M	(2)	125	
25	47	8	6.2	E	100	1.0	0.18	EEVTG1E470P	(2)	EEETG1E470P	(5)	1000
	100	(8)	(6.2)	(E)	(100)	(1.0)	0.18	EEVTG1E101UP	(2)	EEETG1E101UP	(5)	1000
		8	10.2	F	197	0.5	0.18	EEVTG1E101P	(2)	EEETG1E101P	(5)	500
	220	(8)	(10.2)	(F)	(197)	(0.5)	0.18	EEVTG1E221UP	(2)	EEETG1E221UP	(5)	500
		10	10.2	G	270	0.3	0.18	EEVTG1E221P	(2)	EEETG1E221P	(5)	500
	330	(10)	(10.2)	(G)	(270)	(0.3)	0.18	EEVTG1E331UP	(2)	EEETG1E331UP	(5)	500
		12.5	13.5	H13	800	0.12	0.18			EEVTG1E331Q	(2)	200
	470	12.5	13.5	H13	800	0.12	0.18			EEVTG1E471Q	(2)	200
	680	(12.5)	(13.5)	(H13)	(800)	(0.12)	0.18			EEVTG1E681UQ	(2)	200
		16	16.5	J16	1100	0.08	0.18			EEVTG1E681M	(2)	125
1000	(16)	(16.5)	(J16)	(1100)	(0.08)	0.18			EEVTG1E102UM	(2)	125	
	18	16.5	K16	1300	0.075	0.18			EEVTG1E102M	(2)	125	
2200	18	16.5	K16	1300	0.075	0.20			EEVTG1E222M	(2)	125	
35	33	8	6.2	E	100	1.0	0.16	EEVTG1V330P	(2)	EEETG1V330P	(5)	1000
	47	(8)	(6.2)	(E)	(100)	(1.0)	0.16	EEVTG1V470UP	(2)	EEETG1V470UP	(5)	1000
		8	10.2	F	197	0.5	0.16	EEVTG1V470P	(2)	EEETG1V470P	(5)	500
	100	(8)	(10.2)	(F)	(197)	(0.5)	0.16	EEVTG1V101UP	(2)	EEETG1V101UP	(5)	500
		10	10.2	G	270	0.3	0.16	EEVTG1V101P	(2)	EEETG1V101P	(5)	500
	220	(10)	(10.2)	(G)	(270)	(0.3)	0.16	EEVTG1V221UP	(2)	EEETG1V221UP	(5)	500
330	12.5	13.5	H13	800	0.12	0.16			EEVTG1V331Q	(2)	1000	

An explanation of the taping dimensions can be found on page 84.

Reflow profiles can be found on page 86.

Endurance: 125°C 1000h - 2000h

### ■ Standard Products

W.V. (V)	Cap (±20%) (μF)	Case Size			Specification			Part No. (RoHS: not compliant)		Part No. (RoHS: compliant)		Min. Packaging Q'ty  Taping (pcs)
		Dia. (mm)	Length (mm)	Size code	Ripple current (100kHz) (+125°C) (mA)	ESR (100kHz) (+20°C) (Ω)	tan δ (120Hz) (+20°C)		Reflow		Reflow	
35	470	12.5	13.5	(H13)	(800)	(0.12)	0.16			EEVTG1V471UQ	(2)	200
		16	16.5	J16	1100	0.08	0.16			EEVTG1V471M	(2)	125
	680	(16)	(16.5)	(J16)	(1100)	(0.08)	0.16			EEVTG1V681UM	(2)	125
		18	16.5	K16	1300	0.075	0.16			EEVTG1V681M	(2)	125
	1000	18	16.5	K16	1300	0.075	0.16			EEVTG1V102M	(2)	125
50	10	8	6.2	E	80	1.6	0.14	EEVTG1H100P	(2)	EEETG1H100P	(5)	1000
	22	8	6.2	E	80	1.6	0.14	EEVTG1H220P	(2)	EEETG1H220P	(5)	1000
	33	(8)	(6.2)	(E)	(80)	(1.6)	0.14	EEVTG1H330UP	(2)	EEETG1H330UP	(5)	1000
		8	10.2	F	133	0.75	0.14	EEVTG1H330P	(2)	EEETG1H330P	(5)	500
	47	(8)	(10.2)	(F)	(133)	(0.75)	0.14	EEVTG1H470UP	(2)	EEETG1H470UP	(5)	500
		10	10.2	G	221	0.5	0.14	EEVTG1H470P	(2)	EEETG1H470P	(5)	500
	100	(10)	(10.2)	(G)	(221)	(0.5)	0.14	EEVTG1H101UP	(2)	EEETG1H101UP	(5)	500
	220	12.5	13.5	H13	600	0.23	0.14			EEVTG1H221Q	(2)	200
	330	12.5	13.5	H13	600	0.23	0.14			EEVTG1H331Q	(2)	200
	470	16	16.5	J16	900	0.15	0.14			EEVTG1H471M	(2)	125
	680	(16)	(16.5)	(J16)	(900)	(0.15)	0.14			EEVTG1H681UM	(2)	125
		18	16.5	K16	950	0.14	0.14			EEVTG1H681M	(2)	125
	1000	18	16.5	K16	950	0.14	0.14			EEVTG1H102M	(2)	125
63	10	8	6.2	E	55	2.2	0.12	EEVTG1J100P	(2)	EEETG1J100P	(5)	1000
	22	8	10.2	F	100	1	0.12	EEVTG1J220P	(2)	EEETG1J220P	(5)	500
	33	(8)	(10.2)	(F)	(100)	(1)	0.12	EEVTG1J330UP	(2)	EEETG1J330UP	(5)	500
		10	10.2	G	150	0.8	0.12	EEVTG1J330P	(2)	EEETG1J330P	(5)	500
	47	(8)	(10.2)	(F)	(100)	(1)	0.12	EEVTG1J470UP	(2)	EEETG1J470UP	(5)	500
		10	10.2	G	150	0.8	0.12	EEVTG1J470P	(2)	EEETG1J470P	(5)	500
	100	(10)	(10.2)	(G)	(150)	(0.8)	0.12	EEVTG1J101UP	(2)	EEETG1J101UP	(5)	500
		12.5	13.5	H13	350	0.26	0.12			EEVTG1J101Q	(2)	200
	220	12.5	13.5	H13	350	0.26	0.12			EEVTG1J221Q	(2)	200
	330	16	16.5	J16	500	0.18	0.12			EEVTG1J331M	(2)	125
	470	16	16.5	J16	500	0.18	0.12			EEVTG1J471M	(2)	125
80	10	8	10.2	F	70	1.3	0.12	EEVTG1K100P	(2)	EEETG1K100P	(5)	500
	22	(8)	(10.2)	(F)	(70)	(1.3)	0.12	EEVTG1K220UP	(2)	EEETG1K220UP	(5)	500
		10	10.2	G	90	1.0	0.12	EEVTG1K220P	(2)	EEETG1K220P	(5)	500
	33	(8)	(10.2)	(F)	(70)	(1.3)	0.12	EEVTG1K330UP	(2)	EEETG1K330UP	(5)	500
		10	10.2	G	90	1.0	0.12	EEVTG1K330P	(2)	EEETG1K330P	(5)	500
	47	(10)	(10.2)	(G)	(90)	(1.0)	0.12	EEVTG1K470UP	(2)	EEETG1K470UP	(5)	500
		12.5	13.5	H13	250	0.42	0.12			EEVTG1K470Q	(2)	200
	100	(12.5)	(13.5)	(H13)	(250)	(0.42)	0.12			EEVTG1K101UQ	(2)	200
		16	16.5	J16	350	0.3	0.12			EEVTG1K101M	(2)	125
	220	(16)	(16.5)	(J16)	(350)	(0.3)	0.12			EEVTG1K221UM	(2)	125
		18	16.5	K16	400	0.28	0.12			EEVTG1K221M	(2)	125
	330	(16)	(16.5)	(J16)	(350)	(0.3)	0.12			EEVTG1K331UM	(2)	125
		18	16.5	K16	400	0.28	0.12			EEVTG1K331M	(2)	125
	470	18	16.5	K16	400	0.28	0.12			EEVTG1K471M	(2)	125

An explanation of the taping dimensions can be found on page 84.

Reflow profiles can be found on page 86.

Endurance: 125°C 1000h - 2000h

### ■ Standard Products

W.V. (V)	Cap (±20%) (μF)	Case Size			Specification			Part No. (RoHS: not compliant)		Part No. (RoHS: compliant)		Min. Packaging Q'ty
		Dia. (mm)	Length (mm)	Size code	Ripple current (100kHz) (+125°C) (mA)	ESR (100kHz) (+20°C) (Ω)	tan δ (120Hz) (+20°C)		Reflow	Reflow	Taping (pcs)	
100	10	8	10.2	F	70	1.3	0.1	EEVTG2A100P	(2)	EEETG2A100P	(5)	500
	22	(8)	(10.2)	(F)	(70)	(1.3)	0.1	EEVTG2A220UP	(2)	EEETG2A220UP	(5)	500
				G	90	1.0	0.1	EEVTG2A220P	(2)	EEETG2A220P	(5)	500
	33	10	10.2	G	90	1.0	0.1	EEVTG2A330P	(2)	EEETG2A330P	(5)	500
	47	12.5	13.5	H13	250	0.42	0.1			EEVTG2A470Q	(2)	200
	100	16	16.5	J16	350	0.3	0.1			EEVTG2A101M	(2)	125
	220	18	16.5	K16	400	0.28	0.1			EEVTG2A221M	(2)	125
	330	18	16.5	K16	400	0.28	0.1			EEVTG2A331M	(2)	125

An explanation of the taping dimensions can be found on page 84.

Reflow profiles can be found on page 86.

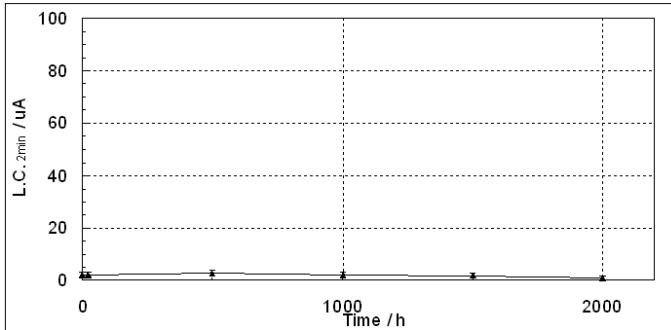
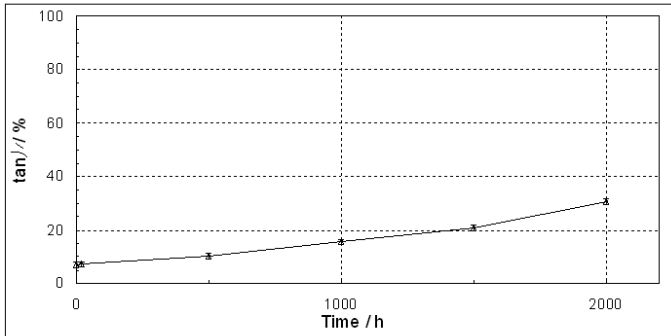
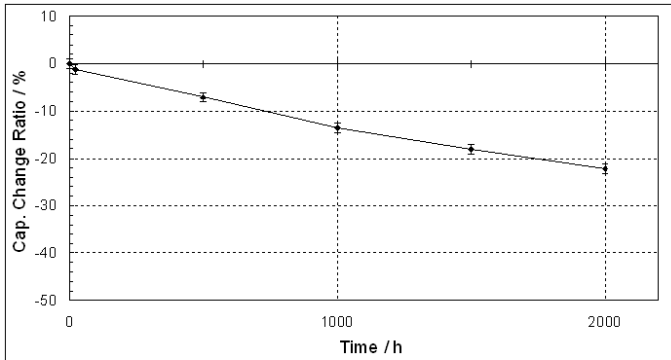
Endurance: 125°C 1000h - 2000h

### ■ Frequency Correction Factor of Rated Ripple Current

	Frequency (Hz)			
	120	1k	10k	100k~
coefficient	0.65	0.85	0.95	1.00

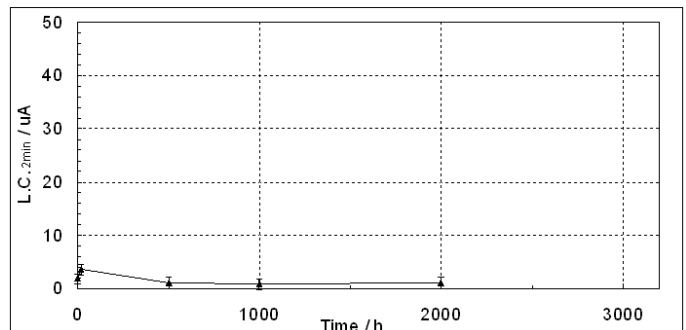
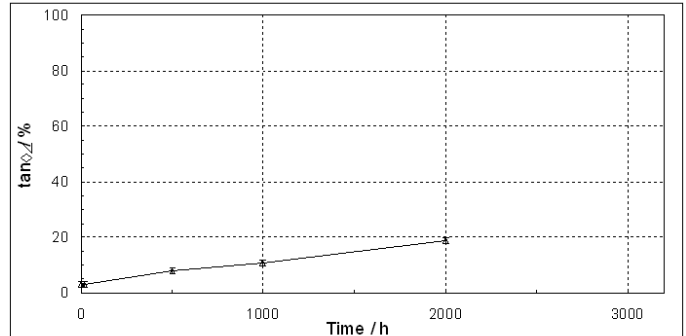
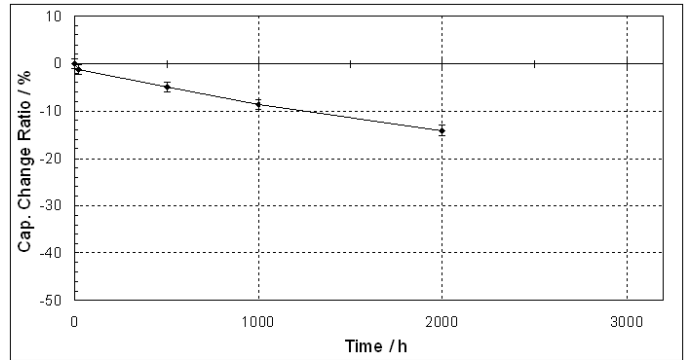
### ■ Endurance

**EEETG1E221UP (25V220uF, Dia.8x10)**



At 125C  
Applied W.V.  
n=10 each

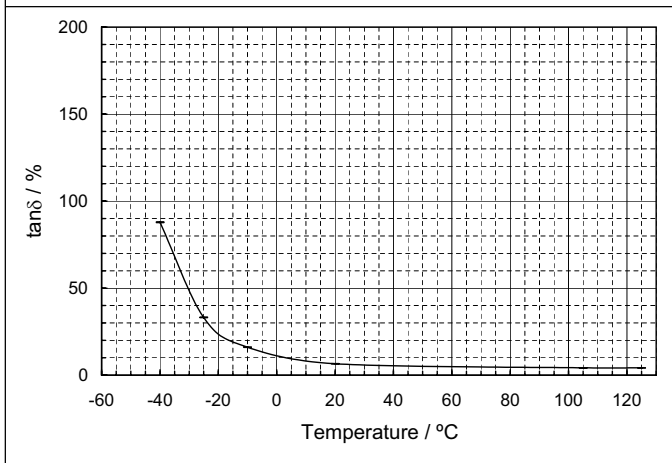
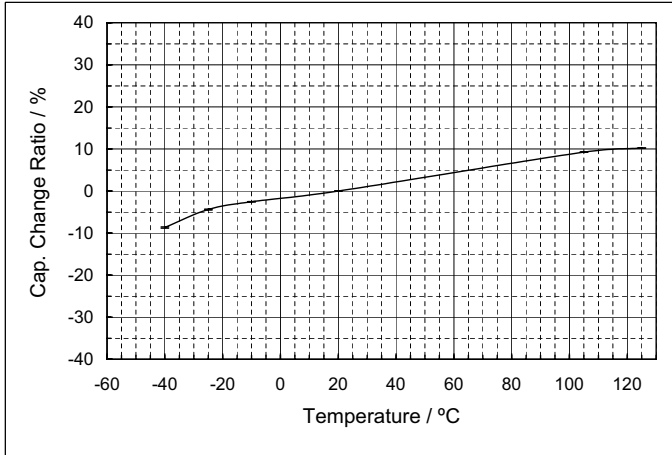
**EEVTG1V101P (35V100uF, Dia.10x10.2)**



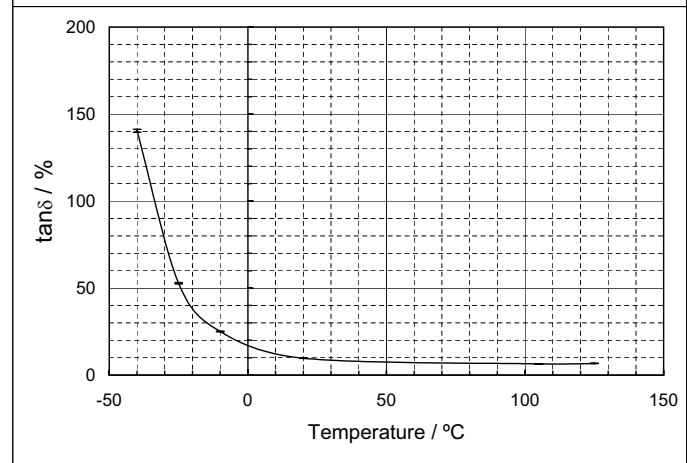
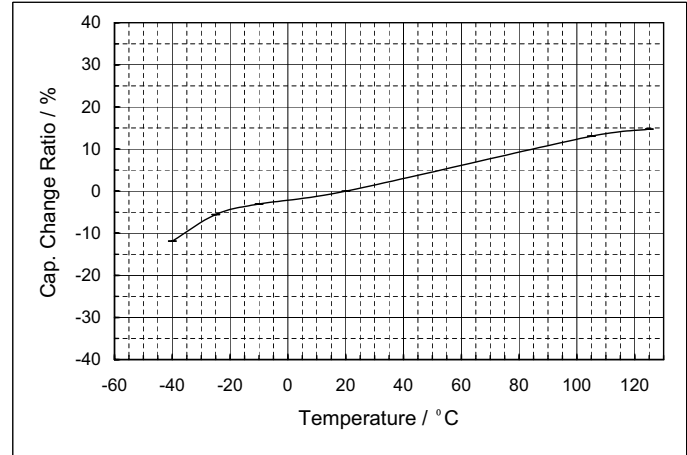
At 125C  
Applied W.V.  
n=10 each

### Temperature Characteristics

EEVTG1A101P (10V, 100 $\mu$ F, Dia. 8 x 6.2) n = 3

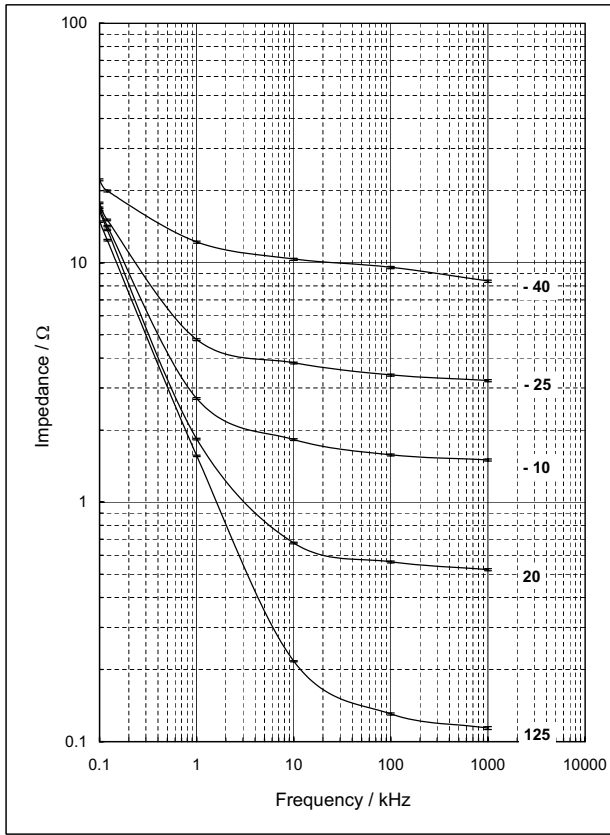


EEVTG1A471P (10V, 470 $\mu$ F, Dia. 10 x 10.2) n = 3

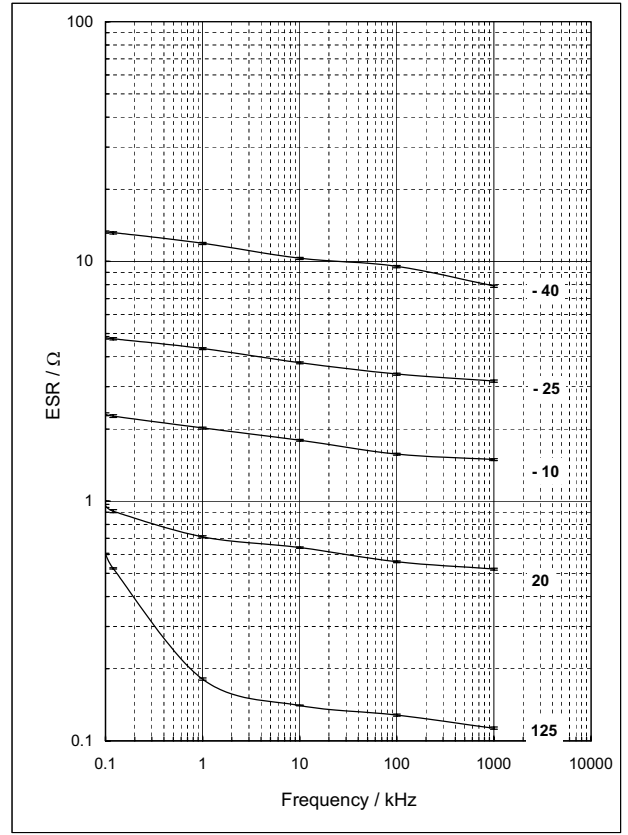


### Temperature Characteristics

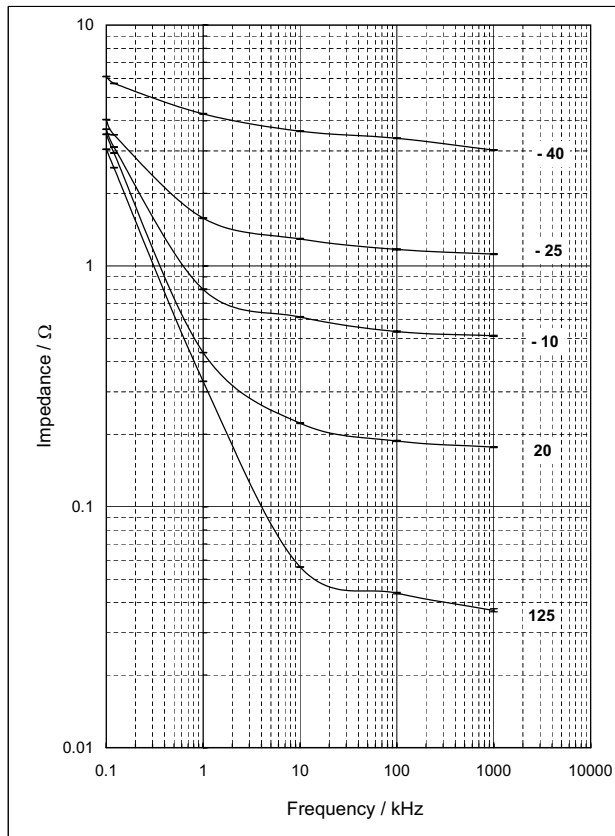
EEVTGK1A101P (10V, 100 $\mu$ F, Dia. 8 x 6.2) n=3



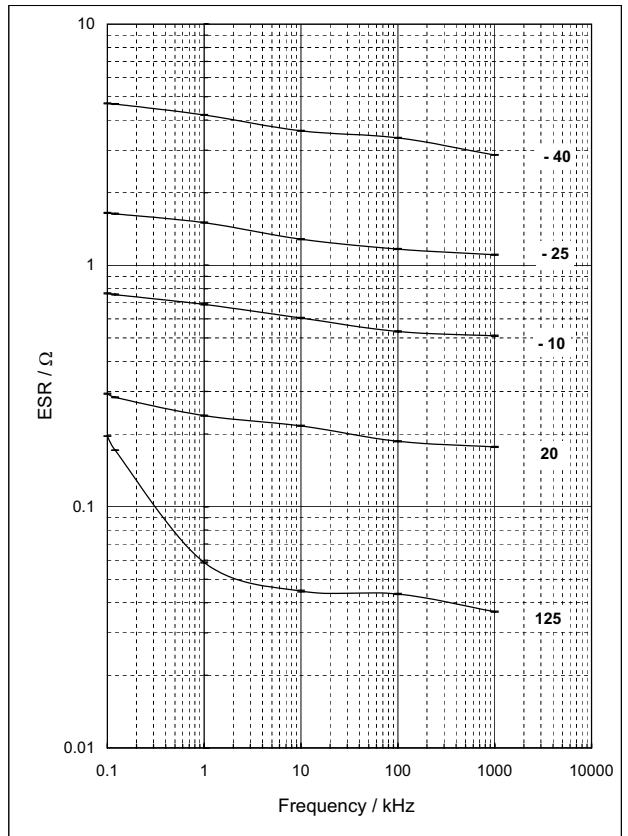
EEVTGK1A101P (10V, 100 $\mu$ F, Dia. 8 x 6.2) n=3



EEVTG1A101P (10V, 100 $\mu$ F, Dia. 8 x 6.2) n=3



EEVTGK1A101P (10V, 100 $\mu$ F, Dia. 8 x 6.2) n=3





Pre-fix	Suffix	Case Diameter	RoHS Compliant	Terminal Finish	Reflow Condition		Reflow Chart
					Peak Temperature	Time above 200	
ECE-V	R	3mm to 5mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	6mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	8mm to 10mm	No	Sn-Pb	230 for 5 seconds	20 seconds	(2) Fig.2
EEV-	R	4mm to 5mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	6mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	8mm to 10mm	No	Sn-Pb	230 for 5 seconds	20 seconds	(2) Fig.2
	Q	12.5mm	Yes	Sn	230 for 5 seconds	20 seconds	(2) Fig.2 (Except for EB series) (3) Fig.3 (EB series only)
	M	16mm to 18mm	Yes	Sn	230 for 5 seconds	20 seconds	(2) Fig.2 (Except for EB series) (3) Fig.3 (EB series only)
EEE-	R	3mm to 5mm	Yes	Sn-Bi	250 for 5 seconds	60 seconds	(4) Fig.4
	P	6mm	Yes	Sn-Bi	250 for 5 seconds	60 seconds	(4) Fig.4
	P	8mm to 10mm	Yes	Sn-Bi	235 for 5 seconds	60 seconds	(5) Fig.5

