

Series TS-NH



Features

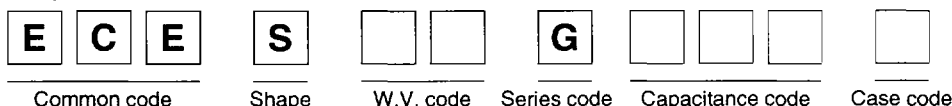
- Long life: 105 °C 2000 hours; high ripple current handling ability
- Wide CV value range (47 ~ 47000 μF/10 ~ 400 V)
- Various case sizes and top vent constructions

Specifications

Item	Performance Characteristics						
Rated Working Voltage Range	10 to 250 V DC	400 V DC					
Operating Temperature Range	-40 to +105 °C	-25 to +105 °C					
Nominal Capacitance Range	68 to 47000 μF	33 to 220 μF					
Capacitance Tolerance	±20 % (120 Hz, +20 °C)						
Leakage Current	$I \leq 0.01CV$ [μA] $CV \leq 100000$ for 16 ~ 100 V $I \leq 3\sqrt{CV}$ [μA] $CV > 100000$ for 16 ~ 100 V & all items of 160 ~ 400 V						
	Leakage current shall be measured after 5 minutes application of rated working voltage at +20 °C. (C = nominal capacitance in μF, V = rated working voltage in V)						
tan δ (120 Hz, +20 °C)	Working voltage [V]	10 16 25 35 50 63					
	tan δ (max.)	0.45 0.35 0.30 0.23 0.18 0.16					
	Rated working voltage [V]	80 100 160 200 250 400					
	tan δ (max.)	0.12 0.11 0.15 0.15 0.15 0.15					
Ripple Current	Refer to standard products table (120 Hz, +105 °C) Correction factor for frequency:						
	Frequency [Hz]	50	60	120	500	1k	10 k – 50 k
	10 ~ 100V	0.93	0.95	1.00	1.05	1.08	1.15
	160 ~ 400V	0.75	0.80	1.00	1.20	1.25	1.40
Endurance	Test conditions Duration : 2000 hours Ambient temperature : +105 °C Applied voltage : DC voltage with maximum permissible ripple current specified at +105 °C (≤ rated working voltage)						
	Post test requirements at +20 °C Leakage current : ≤ Initial specified value Capacitance change : ±20 % of initial measured value tan δ : ≤ 150 % of initial specified value						
Shelf Life	Test conditions Duration : 1000 hours Ambient temperature : +105 °C Applied voltage : (None)			Post test requirements at +20 °C Same limits for "Endurance".			
	Pre-treatment for measurements: Measurements shall be conducted after application of DC working voltage for 30 minutes.						

Large Can
Series TS-NH

Explanation of Part Numbers



ECES	Standard terminal type
ECEC	Short terminal type

φD \ L	25 mm	30 mm	40 mm	50 mm
22 mm	D	E	G	H
25 mm	J	K	M	N
30 mm	Q	R	T	U
35 mm	-	X	Y	Z

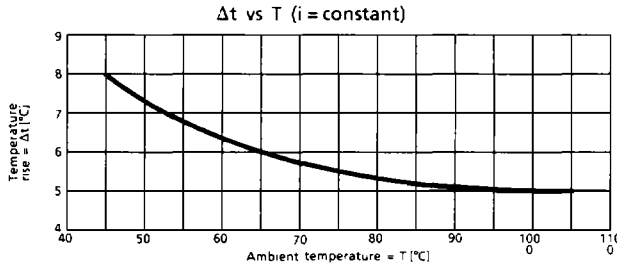
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Expected Life for Ripple Current & Ambient Temperature Stress

■ Calculation Formula

The life of aluminum electrolytic capacitors is highly affected by applied ripple current and ambient temperature. In general the relation between life time, ripple current and ambient temperature is known as:

$$L = L_0 \times 2^{\frac{T_0 - [T + \Delta t (I/I_P)^2]}{10}}$$

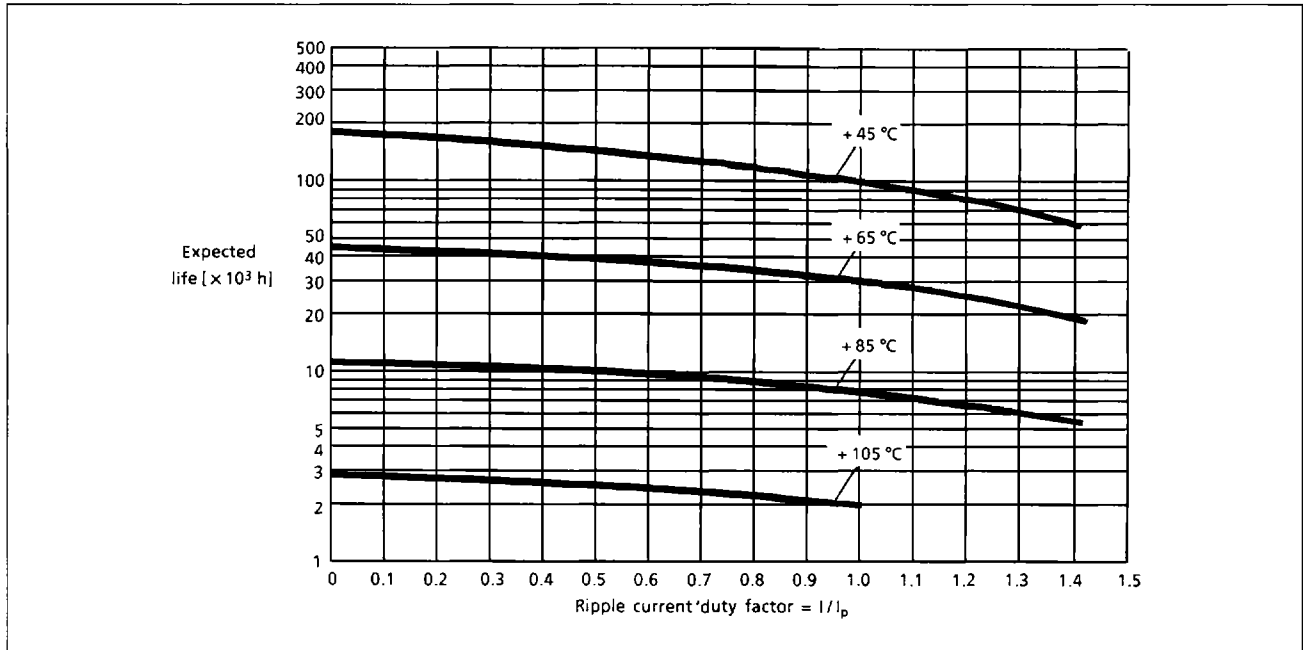


Where:

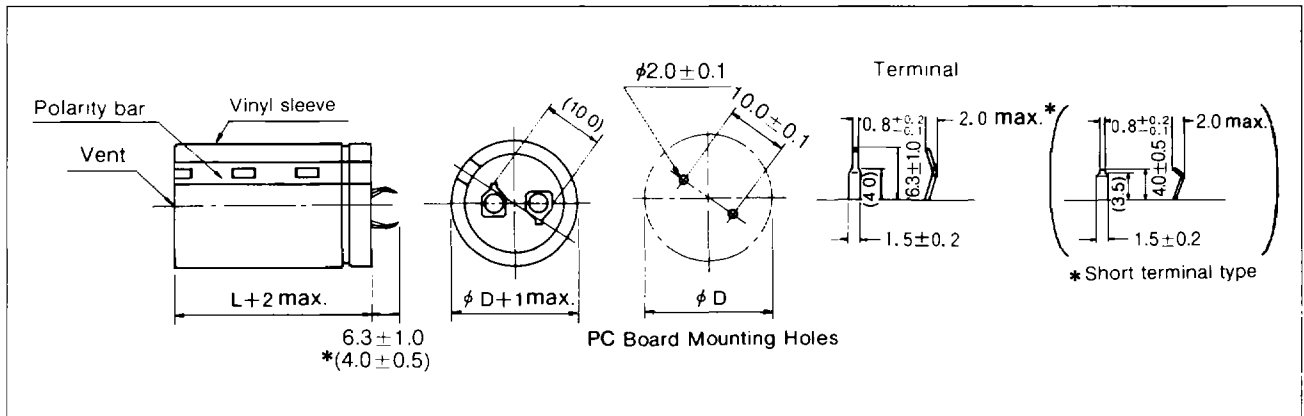
- I : Ripple current to be applied to the capacitor at T °C (120 Hz) [A rms]
- I_P : Specified maximum permissible ripple current at 120 Hz, +105 °C [A rms]
- L : Expected life at T °C [h]
- L₀ : Specified life (series TS-NH: 2000 hours) [h]
- T : Ambient temperature [°C]
- T₀ : Hot spot temperature in the capacitor element = [maximum operating temperature] + [Δt at maximum ambient temperature] = [maximum temperature (series TS-NH: +110 °C)] [°C]
- Δt : Temperature rise at constant current flow of maximum permissible ripple current value specified at +105 °C (see the graph 'Δt vs T') [°C]

[Conditions: (I/I_P)² ≤ 2 times]

■ Expected Life (calculated on the basis of specified life under high temperature loading)



Dimensions in mm (not to scale)



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Case Size

<10 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
4700	1.80	22 × 25			
6800	2.10	22 × 30	25 × 25		
10000	2.50	22 × 40	25 × 30	30 × 25	
15000	3.10	22 × 50	25 × 40	30 × 30	
22000	3.40		25 × 50	30 × 40	35 × 30
33000	3.90			30 × 50	35 × 40
47000	4.90				35 × 50

<16 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
3300	1.60	22 × 25			
4700	2.00	22 × 30	25 × 25		
6800	2.40	22 × 40	25 × 30	30 × 25	
10000	2.90	22 × 50	25 × 40	30 × 30	
15000	3.50		25 × 50	30 × 40	35 × 30
22000	4.20			30 × 50	35 × 40
33000	4.80				35 × 50

<25 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
2200	1.50	22 × 25			
3300	1.70	22 × 30	25 × 25		
4700	2.20	22 × 40	25 × 30	30 × 25	
6800	2.60	22 × 50	25 × 40	30 × 30	
10000	3.10		25 × 50	30 × 40	35 × 30
15000	3.50			30 × 50	35 × 40
22000	4.00				35 × 50

<35 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
1500	1.40	22 × 25			
2200	1.60	22 × 30	25 × 25		
3300	1.80	22 × 40	25 × 30	30 × 25	
4700	2.30	22 × 50	25 × 40	30 × 30	
6800	2.90		25 × 50	30 × 40	35 × 30
10000	3.50			30 × 50	35 × 40
15000	3.90				35 × 50

<50 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
1000	1.30	22 × 25			
1500	1.50	22 × 30	25 × 25		
2200	1.90	22 × 40	25 × 30	30 × 25	
3300	2.30	22 × 50	25 × 40	30 × 30	
4700	2.80		25 × 50	30 × 40	35 × 30
6800	3.20			30 × 50	35 × 40
10000	3.70				35 × 50

<63 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
680	0.90	22 × 25			
1000	1.30	22 × 30	25 × 25		
1500	1.60	22 × 40	25 × 30	30 × 25	
2200	2.00	22 × 50	25 × 40	30 × 30	
3300	2.50		25 × 50	30 × 40	35 × 30
4700	2.90			30 × 50	35 × 40
6800	3.30				35 × 50

<80 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
470	0.80	22 × 25			
680	1.20	22 × 30	25 × 25		
1000	1.50	22 × 40	25 × 30	30 × 25	
1500	1.80	22 × 50	25 × 40	30 × 30	
2200	2.30		25 × 50	30 × 40	35 × 30
3300	2.80			30 × 50	35 × 40
4700	3.00				35 × 50

<100 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
330	0.70	22 × 25			
470	1.20	22 × 30	25 × 25		
680	1.40	22 × 40	25 × 30	30 × 25	
1000	1.70	22 × 50	25 × 40	30 × 30	
1500	2.10		25 × 50	30 × 40	35 × 30
2200	2.60			30 × 50	35 × 40
3300	2.90				35 × 50

<160 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
150	0.70	22 × 25			
220	1.00	22 × 30	25 × 25		
330	1.20	22 × 40	25 × 30	30 × 25	
470	1.40	22 × 50	25 × 40	30 × 30	
680	1.70		25 × 50	30 × 40	35 × 30
820	2.00			30 × 50	35 × 40
1200	2.30				35 × 50

<200 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
100	0.72	22 × 25			
150	0.80	22 × 30	25 × 25		
220	1.00	22 × 40	25 × 30	30 × 25	
330	1.20	22 × 50	25 × 40	30 × 30	
470	1.40		25 × 50	30 × 40	35 × 30
680	1.70			30 × 50	35 × 40
1000	2.10				35 × 50

<250 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
68	0.45	22 × 25			
100	0.72	22 × 30	25 × 25		
150	0.80	22 × 40	25 × 30	30 × 25	
220	1.05	22 × 50	25 × 40	30 × 30	
330	1.25		25 × 50	30 × 40	35 × 30
470	1.45			30 × 50	35 × 40
680	1.80				35 × 50

<400 V>

Cap. [μF]	Ripple current	Case size φD × L [mm]			
33	0.33	22 × 25			
47	0.47	22 × 30	25 × 25		
68	0.56	22 × 40	25 × 30	30 × 25	
100	0.69	22 × 50	25 × 40	30 × 30	
150	0.82		25 × 50	30 × 40	35 × 30
220	1.00			30 × 50	35 × 40
330	1.20				35 × 50

*Ripple current: [A] rms at 120 Hz, +105°C.

*When capacitors of φ35 × 50 ℓ are mounted to P.C.B., reinforce them with supplementary support or adhesives.
(Avoid using adhesives including halogenated composition.)

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Standard Products

W.V. [V.DC]	Cap. [μ F]	Part No.	Case size ϕ D \times L [mm]	Leakage current (+20 °C/5 min) [mA] max.	tan δ (120 Hz, +20 °C) max.	Ripple current [A] rms max. (120 Hz/+105 °C, 2000 h)
10	4700	ECES1AG472D	22 \times 25	0.47	0.45	1.80
	6800	ECES1AG682E	22 \times 30	0.68	0.45	2.10
		ECES1AG682J	25 \times 25			
	10000	ECES1AG103G	22 \times 40	1.00	0.45	2.50
		ECES1AG103K	25 \times 30			
		ECES1AG103Q	30 \times 25			
	15000	ECES1AG153H	22 \times 50	1.16	0.45	3.10
ECES1AG153M		25 \times 40				
ECES1AG153R		30 \times 30				
22000	ECES1AG223N	25 \times 50	1.40	0.45	3.40	
	ECES1AG223T	30 \times 40				
	ECES1AG223X	35 \times 30				
33000	ECES1AG333U	30 \times 50	1.72	0.45	3.90	
	ECES1AG333Y	35 \times 40				
47000	ECES1AG473Z	35 \times 50	2.05	0.45	4.90	
16	3300	ECES1CG332D	22 \times 25	0.52	0.35	1.60
	4700	ECES1CG472E	22 \times 30	0.75	0.35	2.00
		ECES1CG472J	25 \times 25			
	6800	ECES1CG682G	22 \times 40	0.98	0.35	2.40
		ECES1CG682K	25 \times 30			
		ECES1CG682Q	30 \times 25			
	10000	ECES1CG103H	22 \times 50	1.20	0.35	2.90
ECES1CG103M		25 \times 40				
ECES1CG103R		30 \times 30				
15000	ECES1CG153N	25 \times 50	1.46	0.35	3.50	
	ECES1CG153T	30 \times 40				
	ECES1CG153X	35 \times 30				
22000	ECES1CG223U	30 \times 50	1.77	0.35	4.20	
	ECES1CG223Y	35 \times 40				
33000	ECES1CG333Z	35 \times 50	2.17	0.35	4.80	
25	2200	ECES1EG222D	22 \times 25	0.55	0.30	1.50
	3300	ECES1EG332E	22 \times 30	0.82	0.30	1.70
		ECES1EG332J	25 \times 25			
	4700	ECES1EG472G	22 \times 40	1.02	0.30	2.20
		ECES1EG472K	25 \times 30			
		ECES1EG472Q	30 \times 25			
	6800	ECES1EG682H	22 \times 50	1.23	0.30	2.60
ECES1EG682M		25 \times 40				
ECES1EG682R		30 \times 30				
10000	ECES1EG103N	25 \times 50	1.50	0.30	3.10	
	ECES1EG103T	30 \times 40				
	ECES1EG103X	35 \times 30				
15000	ECES1EG153U	30 \times 50	1.83	0.30	3.50	
	ECES1EG153Y	35 \times 40				
22000	ECES1EG223Z	35 \times 50	2.22	0.30	4.00	
35	1500	ECES1VG152D	22 \times 25	0.52	0.23	1.40
	2200	ECES1VG222E	22 \times 30	0.77	0.23	1.60
		ECES1VG222J	25 \times 25			
	3300	ECES1VG332G	22 \times 40	1.01	0.23	1.80
ECES1VG332K		25 \times 30				
ECES1VG332Q		30 \times 25				
4700	ECES1VG472H	22 \times 50	1.21	0.23	2.30	
	ECES1VG472M	25 \times 40				
	ECES1VG472R	30 \times 30				

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Standard Products

W.V. [V.DC]	Cap. [μF]	Part No.	Case size φD × L [mm]	Leakage current (+20 °C/5 min) [mA] max.	tan δ (120 Hz, +20 °C) max.	Ripple current [A] rms max. (120 Hz/+105 °C, 2000 h)
35	6800	ECES1VG682N	25 × 50	1.46	0.23	2.90
		ECES1VG682T	30 × 40			
		ECES1VG682X	35 × 30			
35	10000	ECES1VG103U	30 × 50	1.77	0.23	3.50
		ECES1VG103Y	35 × 40			
		ECES1VG153Z	35 × 50			
50	1000	ECES1HG102D	22 × 25	0.50	0.18	1.30
	1500	ECES1HG152E	22 × 30	0.75	0.18	1.50
		ECES1HG152J	25 × 25			
	2200	ECES1HG222G	22 × 40	0.99	0.18	1.90
		ECES1HG222K	25 × 30			
		ECES1HG222Q	30 × 25			
	3300	ECES1HG332H	22 × 50	1.21	0.18	2.30
ECES1HG332M		25 × 40				
ECES1HG332R		30 × 30				
4700	ECES1HG472N	25 × 50	1.45	0.18	2.80	
	ECES1HG472T	30 × 40				
	ECES1HG472X	35 × 30				
6800	ECES1HG682U	30 × 50	1.74	0.18	3.20	
	ECES1HG682Y	35 × 40				
10000	ECES1HG103Z	35 × 50	2.12	0.18	3.70	
63	680	ECES1JG681D	22 × 25	0.42	0.16	0.90
	1000	ECES1JG102E	22 × 30	0.63	0.16	1.30
		ECES1JG102J	25 × 25			
	1500	ECES1JG152G	22 × 40	0.94	0.16	1.60
		ECES1JG152K	25 × 30			
		ECES1JG152Q	30 × 25			
	2200	ECES1JG222H	22 × 50	1.11	0.16	2.00
ECES1JG222M		25 × 40				
ECES1JG222R		30 × 30				
3300	ECES1JG332N	25 × 50	1.36	0.16	2.50	
	ECES1JG332T	30 × 40				
	ECES1JG332X	35 × 30				
4700	ECES1JG472U	30 × 50	1.63	0.16	2.90	
	ECES1JG472Y	35 × 40				
6800	ECES1JG682Z	35 × 50	1.96	0.16	3.30	
80	470	ECES1KG471D	22 × 25	0.37	0.12	0.80
	680	ECES1KG681E	22 × 30	0.54	0.12	1.20
		ECES1KG681J	25 × 25			
	1000	ECES1KG102G	22 × 40	0.80	0.12	1.50
		ECES1KG102K	25 × 30			
		ECES1KG102Q	30 × 25			
	1500	ECES1KG152H	22 × 50	1.03	0.12	1.80
ECES1KG152M		25 × 40				
ECES1KG152R		30 × 30				
2200	ECES1KG222N	25 × 50	1.25	0.12	2.30	
	ECES1KG222T	30 × 40				
	ECES1KG222X	35 × 30				
3300	ECES1KG332U	30 × 50	1.54	0.12	2.80	
	ECES1KG332Y	35 × 40				
4700	ECES1KG472Z	35 × 50	1.83	0.12	3.00	
100	330	ECES2AG331D	22 × 25	0.33	0.11	0.70
	470	ECES2AG471E	22 × 30	0.47	0.11	1.20
ECES2AG471J		25 × 25				

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Standard Products

W.V. [V.DC]	Cap. [μ F]	Part No.	Case size ϕ D \times L [mm]	Leakage current (+20 °C/5 min) [mA] max.	tan δ (120 Hz, +20 °C) max.	Ripple current [A] rms max. (120 Hz/+105 °C, 2000 h)
100	680	ECES2AG681G	22 \times 40	0.68	0.11	1.40
		ECES2AG681K	25 \times 30			
		ECES2AG681Q	30 \times 25			
	1000	ECES2AG102H	22 \times 50	1.00	0.11	1.70
		ECES2AG102M	25 \times 40			
ECES2AG102R	30 \times 30					
1500	ECES2AG152N	25 \times 50	1.16	0.11	2.10	
	ECES2AG152T	30 \times 40				
ECES2AG152X	35 \times 30					
2200	ECES2AG222U	30 \times 50	1.40	0.11	2.60	
	ECES2AG222Y	35 \times 40				
3300	ECES2AG332Z	35 \times 50	1.72	0.11	2.90	
160	150	ECES2CG151D	22 \times 25	0.46	0.15	0.70
	220	ECES2CG221E	22 \times 30	0.56	0.15	1.00
		ECES2CG221J	25 \times 25			
	330	ECES2CG331G	22 \times 40	0.68	0.15	1.20
		ECES2CG331K	25 \times 30			
		ECES2CG331Q	30 \times 25			
	470	ECES2CG471H	22 \times 50	0.82	0.15	1.40
ECES2CG471M		25 \times 40				
ECES2CG471R	30 \times 30					
680	ECES2CG681N	25 \times 50	0.98	0.15	1.70	
	ECES2CG681T	30 \times 40				
ECES2CG681X	35 \times 30					
820	ECES2CG821U	30 \times 50	1.08	0.15	2.00	
	ECES2CG821Y	35 \times 40				
1200	ECES2CG122Z	35 \times 50	1.31	0.15	2.30	
200	100	ECES2DG101D	22 \times 25	0.42	0.15	0.72
	150	ECES2DG151E	22 \times 30	0.51	0.15	0.80
		ECES2DG151J	25 \times 25			
	220	ECES2DG221G	22 \times 40	0.62	0.15	1.00
		ECES2DG221K	25 \times 30			
		ECES2DG221Q	30 \times 25			
	330	ECES2DG331H	22 \times 50	0.77	0.15	1.20
ECES2DG331M		25 \times 40				
ECES2DG331R	30 \times 30					
470	ECES2DG471N	25 \times 50	0.91	0.15	1.40	
	ECES2DG471T	30 \times 40				
ECES2DG471X	35 \times 30					
680	ECES2DG681U	30 \times 50	1.10	0.15	1.70	
	ECES2DG681Y	35 \times 40				
1000	ECES2DG102Z	35 \times 50	1.34	0.15	2.10	
250	68	ECES2EG680D	22 \times 25	0.39	0.15	0.45
	100	ECES2EG101E	22 \times 30	0.47	0.15	0.72
		ECES2EG101J	25 \times 25			
	150	ECES2EG151G	22 \times 40	0.58	0.15	0.80
		ECES2EG151K	25 \times 30			
ECES2EG151Q		30 \times 25				
220	ECES2EG221H	22 \times 50	0.70	0.15	1.05	
	ECES2EG221M	25 \times 40				
	ECES2EG221R	30 \times 30				
330	ECES2EG331N	25 \times 50	0.86	0.15	1.25	
	ECES2EG331T	30 \times 40				
	ECES2EG331X	35 \times 30				

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W.V. [V.DC]	Cap. [μ F]	Part No.	Case size ϕ D \times L [mm]	Leakage current (+20 °C/5 min) [mA] max.	tan δ (120 Hz, +20 °C) max.	Ripple current [A] rms max. (120 Hz/+105 °C, 2000 h)
250	470	ECES2EG471U	30 \times 50	1.02	0.15	1.45
		ECES2EG471Y	35 \times 40			
	680	ECES2EG681Z	35 \times 50	1.23	0.15	1.80
400	33	ECES2GG330D	22 \times 25	0.34	0.15	0.33
	47	ECES2GG470E	22 \times 30	0.41	0.15	0.47
		ECES2GG470J	25 \times 25			
	68	ECES2GG680G	22 \times 40	0.49	0.15	0.56
		ECES2GG680K ECES2GG680Q	25 \times 30 30 \times 25			
	100	ECES2GG101H ECES2GG101M ECES2GG101R	22 \times 50	0.60	0.15	0.69
			25 \times 40 30 \times 30			
150	ECES2GG151N ECES2GG151T ECES2GG151X	25 \times 50	0.73	0.15	0.82	
		30 \times 40 35 \times 30				
220	ECES2GG221U ECES2GG221Y	30 \times 50	0.88	0.15	1.00	
		35 \times 40				
330	ECES2GG331Z	35 \times 50	1.08	0.15	1.20	

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