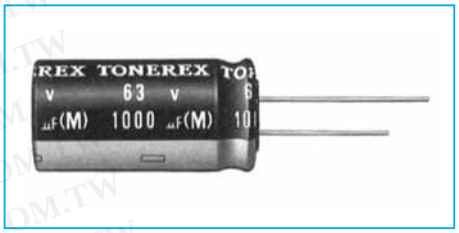
Miniature Standard Capacitors for Audio

GREEN CAP | For audio



TONEREX

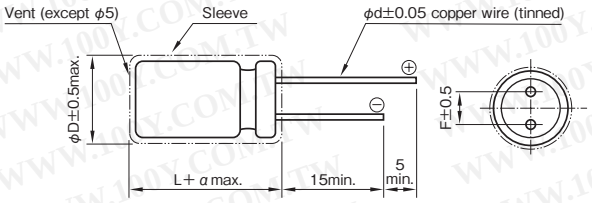
- Adopting the newly developed formation method and composite electrolytic paper for audio application has reduced distortion, achieving high-quality sound.
- All lead wires are oxygen-free copper wires to reduce distortion.

Specifications

Item	Performance
Category temperature range (℃)	−40 to +85
Tolerance at rated capacitance (%)	±20 (20℃,120Hz)
Leakage current (μA)	Less than 0.01CV or 4 whichever is larger (after 5 minutes) C : Rated capacitance (μF) ; V: Rated voltage (V) (20℃)
Tangent of loss angle (tanδ)	Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 100 tanδ (max.): 0.24 / 0.20 / 0.16 / 0.14 / 0.12 / 0.10 / 0.09 / 0.08 0.02 is added to every 1000μF increase over 1000μF (20℃,120Hz)
Endurance (85℃) (Applied ripple current)	Test time: 1000 hours Leakage current: The initial specified value or less Percentage of capacitance change: Within ±20% of initial value Tangent of the loss angle: 150% or less of the initial specified value
Shelf life (85℃)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)

Outline Drawing

Unit : mm



φD	5	6.3	8	10	12.5	16	18
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φd	0.6	0.6	0.6	0.6	0.8	0.8	0.8
α	1.5			1.5 for L16 max. 2.0 for L20 min.			

Coefficient of Frequency for Rated Ripple Current

Rated voltage (V)	Frequency (Hz) / CV (μF×WV)	50・60	120	1k	10k	100k
6.3 to 16	All CV value	0.80	1	1.1	1.2	1.2
25 to 35	≦1000	0.80	1	1.5	1.7	1.7
	1000<	0.80	1	1.2	1.3	1.3
50 to 100	≦1000	0.80	1	1.6	1.9	1.9
	1000<	0.80	1	1.2	1.3	1.3

Part numbering system (example : 25V100μF)

ROB	—	25	V	101		M		G3		#
Series code		Rated voltage symbol		Rated capacitance symbol		Capacitance tolerance symbol		Casing symbol		Additional symbol

Case symbol

Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol
5×11	E3	10×12.5	H3	12.5×20	I5	16×31.5	J7
6.3×11	F3	10×16	H4	12.5×25	I6	16×35.5	J8
8×11.5	G3	10×20	H5	16×25	J6	18×35.5	K8
						18×40	K9

Standard Ratings

Rated voltage (V) / Item / Rated capacitance (μF)	6.3 Case φD×L (mm)	6.3 Rated ripple current mArms	10 Case φD×L (mm)	10 Rated ripple current mArms	16 Case φD×L (mm)	16 Rated ripple current mArms	25 Case φD×L (mm)	25 Rated ripple current mArms	35 Case φD×L (mm)	35 Rated ripple current mArms	50 Case φD×L (mm)	50 Rated ripple current mArms	63 Case φD×L (mm)	63 Rated ripple current mArms	100 Case φD×L (mm)	100 Rated ripple current mArms
0.47	—	—	—	—	—	—	—	—	—	—	5×11	5	—	—	5×11	10
1	—	—	—	—	—	—	—	—	—	—	5×11	10	—	—	5×11	15
2.2	—	—	—	—	—	—	—	—	—	—	5×11	20	—	—	5×11	25
3.3	—	—	—	—	—	—	—	—	—	—	5×11	25	—	—	5×11	30
4.7	—	—	—	—	—	—	5×11	25	—	—	5×11	35	5×11	35	6.3×11	40
10	—	—	—	—	5×11	35	5×11	40	5×11	45	5×11	50	6.3×11	60	8×11.5	70
22	—	—	5×11	50	5×11	60	5×11	60	6.3×11	75	6.3×11	80	8×11.5	100	10×12.5	120
33	5×11	55	5×11	65	5×11	70	6.3×11	80	6.3×11	90	8×11.5	110	8×11.5	115	10×16	160
47	5×11	65	5×11	75	6.3×11	95	6.3×11	100	8×11.5	120	8×11.5	130	10×12.5	165	10×20	210
100	6.3×11	110	6.3×11	120	8×11.5	150	8×11.5	165	10×12.5	210	10×16	250	10×20	285	12.5×20	340
220	8×11.5	185	8×11.5	200	10×12.5	265	10×16	310	10×20	365	12.5×20	440	12.5×20	470	16×25	620
330	10×12.5	265	10×12.5	200	10×16	350	10×20	410	12.5×20	500	12.5×20	540	12.5×25	620	16×31.5	820
470	10×12.5	315	10×16	380	10×20	460	12.5×20	550	12.5×25	640	16×25	800	16×25	840	18×35.5	1000
1000	10×20	550	12.5×20	670	12.5×25	810	16×25	1000	16×25	1050	16×31.5	1200	18×35.5	1500	—	—
2200	12.5×25	980	16×25	1200	16×25	1350	16×35.5	1650	18×35.5	1900	—	—	—	—	—	—
3300	16×25	1300	16×31.5	1600	16×35.5	1800	18×40	2100	—	—	—	—	—	—	—	—
4700	16×31.5	1700	16×35.5	1900	18×35.5	2400	—	—	—	—	—	—	—	—	—	—
6800	16×35.5	2100	18×40	2600	—	—	—	—	—	—	—	—	—	—	—	—
10000	18×40	2800	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85℃, 120Hz

NOTE
Design, Specifications are subject to change without notice.
Ask factory for technical specifications before purchase and/or use.

ELNA®

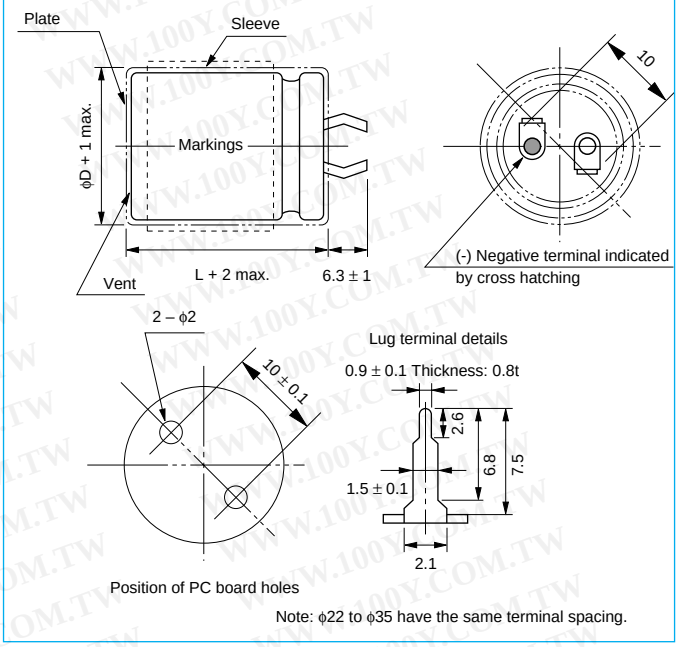
LPO (Common Name: TONEREX) Aluminum Electrolytic Capacitors For Audio

Series LPO TONEREX For Power Supply Filter

- Adopting the newly developed formation method and composite electrolytic paper for audio application has reduced distortion, achieving high-quality sound.
- Best suited as power supply filters for sound quality priority audio equipment.
- Printed circuit board terminal snap-in type.
- Gold-printing on a black sleeve. (labeled “TONEREX”)

Photo

Outline Drawing



Note: ϕ22 to ϕ35 have the same terminal spacing.

Unit: mm

Specifications

No.	Item	Performance
1	Temperature range (°C)	–40 to +85
2	Leakage current	Less than 0.03 CV (μA) or 5 mA whichever is smaller (after five minutes), C: Capacitance (μF), V: Voltage (V)
3	Capacitance tolerance (%)	±20 (20°C, 120 Hz)
4	Tangent of loss angle (tan δ)	tan δ (max.): Rated voltage (V) / Capacitance(μF): 16 to 25 — CV>200000: 0.40, CV≤200000: 0.30; 35 to 42 — 0.35, 0.20; 50 to 100 — 0.30, 0.20 (20°C,120 Hz)
5	Stability at low temperature	Rated voltage (V): 16 to 35, 50 to 100; Impedance ratio (max.) Z–25°C/Z+20°C: 4, 3; Z–40°C/Z+20°C: 15, 10 (120 Hz)
6	Endurance (85°C) (Applied ripple current)	Test time: 1000 hrs; Leakage current: Initial specified value or less; Change in capacitance: Within ±20% of initial value; tan δ: 150% or less of initial specified value
7	Max. storage temp. (85°C)	Test time: 500 hrs; Leakage current: Initial specified value or less; Change in capacitance: Within ± 20% of initial value; tan δ: 150% or less of initial specified value. Voltage application treatment.
8	Applicable Standards	JIS C 5101-1, 5101-4 1998 (IEC 60384-1 1992, 60384-4 1985)

Coefficients of Frequency for Ripple Current

Rated Voltage (V) \ Frequency (Hz)	50	120	10 k	1 k	20 k
16 to 56	0.95	1	1.10	1.15	1.15
63 to 100	0.95	1	1.16	1.30	1.33

Coefficients of Temperature for Ripple Current

Temperature (°C)	+40 or less	+55	+70	+85
Coefficients	2.1	1.8	1.5	1

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LPO (Common Name: TONEREX) Aluminum Electrolytic Capacitors For Audio

Case size by working voltage & capacitance (in mm)

(mm)

WV(V) / Cap.(μF)	16	25	35	50	63	80	100
680					22 x 25	22 x 30 / 25 x 25	22 x 35 / 25 x 30 30 x 25
1000				22 x 25	22 x 30 / 25 x 25	22 x 35 / 25 x 30 30 x 25	22 x 50 / 25 x 40 30 x 30 / 35 x 25
1500			22 x 25	22 x 30 / 25 x 25	22 x 35 / 25 x 30 30 x 25	22 x 50 / 25 x 40 30 x 30 / 35 x 25	25 x 50 / 30 x 40 35 x 30
2200		22 x 25	22 x 30 / 25 x 25	22 x 40 / 25 x 30 30 x 25	22 x 45 / 25 x 40 30 x 30 / 35 x 25	25 x 50 / 30 x 40 35 x 30	30 x 50 / 35 x 40
3300	22 x 20	22 x 30 / 25 x 25	22 x 35 / 25 x 30 30 x 25	22 x 50 / 25 x 40 30 x 30 / 35 x 25	25 x 50 / 30 x 40 35 x 30	30 x 50 / 35 x 40	
4700	22 x 25	22 x 35 / 25 x 35 30 x 25	22 x 45 / 25 x 40 30 x 30 / 35 x 25	25 x 50 / 30 x 40 35 x 30	30 x 50 / 35 x 40	35 x 50	
6800	22 x 35 / 25 x 30 30 x 25	22 x 45 / 25 x 40 30 x 30 / 35 x 25	25 x 50 / 30 x 40 35 x 30	30 x 50 / 35 x 40	35 x 50		
10000	22 x 45 / 25 x 35 30 x 30 / 35 x 25	25 x 50 / 30 x 40 35 x 30	30 x 50 / 35 x 40				

ELNA®

LPO (Common Name: TONEREX) Aluminum Electrolytic Capacitors For Audio

Standard Ratings

ELNA PART NO. / WV (V)	CAP. (μF)	SIZE (φx L) (mm)	tan δ	Ripple Current (Arms)
16 V				
LPO-16V332MPDS1	3300	22 x 20	0.30	1.2
LPO-16V472MPDS1	4700	22 x 25	0.30	1.5
LPO-16V682MPDS1	6800	22 x 35	0.30	2.0
LPO-16V682MPDS2	6800	25 x 30	0.30	2.5
LPO-16V682MPDS3	6800	30 x 30	0.30	2.6
LPO-16V103MPDS1	10000	22 x 45	0.30	2.7
LPO-16V103MPDS2	10000	25 x 35	0.30	3.2
LPO-16V103MPDS3	10000	30 x 30	0.30	3.3
LPO-16V103MPDS4	10000	35 x 25	0.30	3.4
25 V				
LPO-25V222MPDS1	2200	22 x 25	0.30	1.0
LPO-25V332MPDS1	3300	22 x 30	0.30	1.3
LPO-25V332MPDS2	3300	25 x 25	0.30	1.7
LPO-25V472MPDS1	4700	22 x 35	0.30	1.7
LPO-25V472MPDS2	4700	25 x 30	0.30	2.1
LPO-25V472MPDS3	4700	30 x 25	0.30	2.2
LPO-25V682MPDS1	6800	22 x 45	0.30	2.2
LPO-25V682MPDS2	6800	25 x 40	0.30	2.7
LPO-25V682MPDS3	6800	30 x 30	0.30	2.7
LPO-25V682MPDS4	6800	35 x 25	0.30	2.8
LPO-25V103MPDS2	10000	25 x 50	0.40	3.0
LPO-25V103MPDS3	10000	30 x 40	0.40	3.1
LPO-25V103MPDS4	10000	35 x 30	0.40	3.1
35 V				
LPO-35V152MPDS1	1500	22 x 25	0.20	1.0
LPO-35V222MPDS1	2200	22 x 30	0.20	1.3
LPO-35V222MPDS2	2200	25 x 25	0.20	1.7
LPO-35V332MPDS1	3300	22 x 35	0.20	1.7
LPO-35V332MPDS2	3300	25 x 30	0.20	2.2
LPO-35V332MPDS3	3300	30 x 25	0.20	2.3
LPO-35V472MPDS1	4700	22 x 45	0.20	2.3
LPO-35V472MPDS2	4700	25 x 40	0.20	2.8
LPO-35V472MPDS3	4700	30 x 30	0.20	2.8
LPO-35V472MPDS4	4700	35 x 25	0.20	2.9
LPO-35V682MPDS2	6800	25 x 50	0.35	2.6
LPO-35V682MPDS3	6800	30 x 40	0.35	2.7
LPO-35V682MPDS4	6800	35 x 30	0.35	2.7
LPO-35V103MPDS3	10000	30 x 50	0.35	3.4
LPO-35V103MPDS4	10000	35 x 40	0.35	3.5
50 V				
LPO-50V102MPDS1	1000	22 x 25	0.20	0.8
LPO-50V152MPDS1	1500	22 x 30	0.20	1.1
LPO-50V152MPDS2	1500	25 x 25	0.20	1.4
LPO-50V222MPDS1	2200	22 x 40	0.20	1.5
LPO-50V222MPDS2	2200	25 x 30	0.20	1.8
LPO-50V222MPDS3	2200	30 x 25	0.20	1.9
LPO-50V332MPDS1	3300	22 x 50	0.20	2.0
LPO-50V332MPDS2	3300	25 x 40	0.20	2.3
LPO-50V332MPDS3	3300	30 x 30	0.20	2.4
LPO-50V332MPDS4	3300	35 x 25	0.20	2.4
LPO-50V472MPDS2	4700	25 x 50	0.30	2.4
LPO-50V472MPDS3	4700	30 x 40	0.30	2.4
LPO-50V472MPDS4	4700	35 x 30	0.30	2.5
LPO-50V682MPDS3	6800	30 x 50	0.30	3.1
LPO-50V682MPDS4	6800	35 x 40	0.30	3.1
63 V				
LPO-63V681MPDS1	680	22 x 25	0.20	0.7
LPO-63V102MPDS1	1000	22 x 30	0.20	0.9
LPO-63V102MPDS2	1000	25 x 25	0.20	1.2
LPO-63V152MPDS1	1500	22 x 35	0.20	1.2
LPO-63V152MPDS2	1500	25 x 30	0.20	1.5
LPO-63V152MPDS3	1500	30 x 25	0.20	1.6
LPO-63V222MPDS1	2200	22 x 45	0.20	1.6
LPO-63V222MPDS2	2200	25 x 40	0.20	1.9
LPO-63V222MPDS3	2200	30 x 30	0.20	1.9
LPO-63V222MPDS4	2200	35 x 25	0.20	2.0
LPO-63V332MPDS2	3300	25 x 50	0.30	2.0
LPO-63V332MPDS3	3300	30 x 40	0.30	2.1
LPO-63V332MPDS4	3300	35 x 30	0.30	2.1
LPO-63V472MPDS3	4700	30 x 50	0.30	2.6
LPO-63V472MPDS4	4700	35 x 40	0.30	2.6
LPO-63V682MPDS4	6800	35 x 50	0.30	3.3

Note: Allowable Ripple Current 120 Hz at 85°C

This catalog printed in U.S.A. on 1/2001.
Specification and dimensions in this catalog are subject to change without notice.
If necessary, drawings can be provided.

LPO (Common Name: TONEREX) Aluminum Electrolytic Capacitors For Audio

Standard Ratings

ELNA PART NO. / WV (V)	CAP. (μF)	SIZE (φx L) (mm)	tan δ	Ripple Current (Arms)
80 V				
LPO-80V681MPDS1	680	22 x 30	0.20	0.7
LPO-80V681MPDS2	680	25 x 25	0.20	1.0
LPO-80V102MPDS1	1000	22 x 35	0.20	1.0
LPO-80V102MPDS2	1000	25 x 30	0.20	1.2
LPO-80V102MPDS3	1000	35 x 25	0.20	1.3
LPO-80V152MPDS1	1500	22 x 50	0.20	1.3
LPO-80V152MPDS2	1500	25 x 40	0.20	1.6
LPO-80V152MPDS3	1500	30 x 30	0.20	1.6
LPO-80V152MPDS4	1500	35 x 25	0.20	1.7
LPO-80V222MPDS2	2200	25 x 50	0.20	2.0
LPO-80V222MPDS3	2200	30 x 40	0.20	2.1
LPO-80V222MPDS4	2200	35 x 30	0.20	2.1
LPO-80V332MPDS3	3300	30 x 50	0.30	2.2
LPO-80V332MPDS4	3300	35 x 40	0.30	2.2
LPO-80V472MPDS4	4700	35 x 50	0.30	2.7
100 V				
LPO-100V681MPDS1	680	22 x 35	0.20	0.8
LPO-100V681MPDS2	680	25 x 30	0.20	1.1
LPO-100V681MPDS3	680	30 x 25	0.20	1.1
LPO-100V102MPDS1	1000	22 x 50	0.20	1.2
LPO-100V102MPDS2	1000	25 x 40	0.20	1.4
LPO-100V102MPDS3	1000	30 x 30	0.20	1.4
LPO-100V102MPDS4	1000	35 x 25	0.20	1.5
LPO-100V152MPDS2	1500	25 x 50	0.20	1.8
LPO-100V152MPDS3	1500	30 x 40	0.20	1.8
LPO-100V152MPDS4	1500	35 x 30	0.20	1.8
LPO-100V222MPDS3	2200	30 x 50	0.30	1.8
LPO-100V222MPDS4	2200	35 x 40	0.30	1.8

Note: Allowable Ripple Current 120 Hz at 85°C

Power Supply Smoothing Use,Standard Capacitors (Common name : TONEREX) Series LAO

- **Adopting the newly developed formation method and composite electrolytic paper for audio application has reduced distortion, achieving high-quality sound.**
- **Best suited as power supply filters for sound quality priority audio equipment.**
- **Printed circuit board terminal snap-in type.**
- **Gold-printing on a black sleeve. (labeled "TONEREX")**

For audio: LAO ⇦ LA5

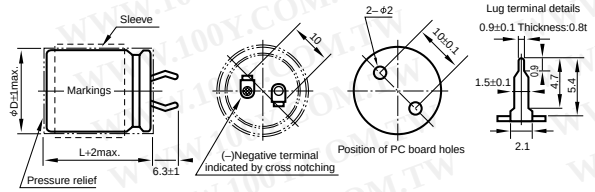
Specifi

Item	Performance
Category temperature range (˚C)	−40 to +85
Tolerance at rated capacitance (%)	±20 (20˚C,120Hz)
Leakage current (μA)	Less than 0.03CV or 5mA whichever is smaller(after 5 minutes) C: Rated capacitance(μF), V: Rated voltage(V) (20˚C)
Tangent of loss angle (tanδ)	Rated voltage (V): 16 / 25 / 35 / 50 to 100; tanδ (max.): 0.40 / 0.40 / 0.35 / 0.30 (20˚C,120Hz)
Characteristics at high and low temperature	Rated voltage (V): 16 to 35 / 50 to 100; Impedance ratio (max.) Z−25˚C / Z+20˚C: 4 / 3; Z−40˚C / Z+20˚C: 15 / 10 (120Hz)
Endurance (85˚C) (Applied ripple current)	Test time: 1000 hours; Leakage current: The initial specified value or less; Percentage of capacitance change: Within ±20% of initial value; Tangent of the loss angle: 150% or less of the initial specified value
Shelf life (85˚C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)

Outline Drawing

Unit: mm

Printed circuit board snap-in type(Series LAO)



Coefficient of Frequency for Rated Ripple Current

Frequency(Hz) / Rated voltage(V)	50	120	1k	10k	20k
50 or less	0.95	1	1.10	1.15	1.15
63 to 100	0.95	1	1.16	1.30	1.33

Part numbering system (example: 63V6800μF)

Printed circuit board snap-in type	LAO	—	63V	682	MPD	S4	□
	Series code		Rated voltage symbol	Rated capacitance symbol		Casing symbol	Additional symbol

• The standard ratings are described on the next page.

∗ There are overseas factory product only on this page.

NOTE
Design, Specifications are subject to change without notice.
Ask factory for technical specifications before purchase and/or use.

Standard Ratings

Rated voltage(V) / Item / Casing symbol / ø xL(mm)		16		25		35		50		63		80		100	
		Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current
		µF	Arms	µF	Arms	µF	Arms	µF	Arms	µF	Arms	µF	Arms	µF	Arms
22x20	S1	3300	1.2	—	—	—	—	—	—	—	—	—	—	—	—
22x25	S1	4700	1.5	2200	1.0	1500	0.8	1000	0.8	680	0.7	—	—	—	—
22x30	S1	—	—	3300	1.3	2200	1.3	1500	1.1	1000	0.9	680	0.7	—	—
22x35	S1	6800	2.0	4700	1.7	3300	1.7	—	—	1500	1.2	1000	1.0	680	0.8
22x40	S1	—	—	—	—	—	—	2200	1.5	—	—	—	—	—	—
22x45	S1	10000	2.7	6800	2.2	4700	2.3	—	—	2200	1.6	—	—	—	—
22x50	S1	—	—	—	—	—	—	3300	2.0	—	—	1500	1.3	1000	1.2
25x25	S2	—	—	3300	1.7	2200	1.7	1500	1.4	1000	1.2	680	1.0	—	—
25x30	S2	6800	2.5	4700	2.1	3300	2.2	2200	1.8	1500	1.5	1000	1.2	680	1.1
25x35	S2	10000	3.2	—	—	—	—	—	—	—	—	—	—	—	—
25x40	S2	—	—	6800	2.7	4700	2.8	3300	2.3	2200	1.9	1500	1.6	1000	1.4
25x45	S2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25x50	S2	—	—	10000	3.0	6800	2.6	4700	2.4	3300	2.0	2200	2.0	1500	1.8
30x25	S3	6800	2.6	4700	2.2	3300	2.3	2200	1.9	1500	1.6	1000	1.3	680	1.1
30x30	S3	10000	3.3	6800	2.7	4700	2.8	3300	2.4	2200	1.9	1500	1.6	1000	1.4
30x35	S3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30x40	S3	—	—	10000	3.1	6800	2.7	4700	2.4	3300	2.1	2200	2.1	1500	1.8
30x45	S3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30x50	S3	—	—	—	—	10000	3.4	6800	3.1	4700	2.6	3300	2.2	2200	1.8
35x25	S4	10000	3.4	6800	2.8	4700	2.9	3300	2.4	2200	2.0	1500	1.7	1000	1.5
35x30	S4	—	—	10000	3.1	6800	2.7	4700	2.5	3300	2.1	2200	2.1	1500	1.8
35x35	S4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35x40	S4	—	—	—	—	10000	3.5	6800	3.1	4700	2.6	3300	2.2	2200	1.8
35x45	S4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35x50	S4	—	—	—	—	—	—	—	—	6800	3.3	4700	2.7	—	—

(Note) Rated ripple current : 85˚C, 120Hz.

∗ There are overseas factory product only on this page.

NOTE
Design, Specifications are subject to change without notice.
Ask factory for technical specifications before purchase and/or use.