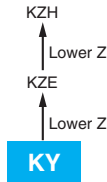


KY Series

- Newly innovative electrolyte is employed to minimize ESR
- Endurance with ripple current : 6,000 to 10,000 hours at 105°C
- Non solvent resistant type
- RoHS2 Compliant

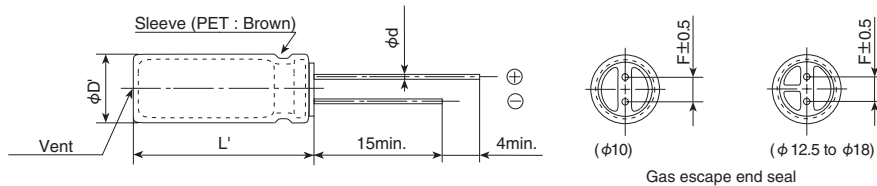


SPECIFICATIONS

Items	Characteristics										
Category	-40 to +105°C										
Temperature Range	-40 to +105°C										
Rated Voltage Range	6.3 to 100V _{dc}										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)										
Dissipation Factor (tan δ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	
	tan δ (Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.09	0.08	
	When nominal capacitance exceeds 1,000μF, add 0.02 to the value above for each 1,000μF increase. (at 20°C, 120Hz)										
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	2	2	2	
	Z(-40°C)/Z(+20°C)	8	6	4	3	3	3	3	3	3	
(at 120Hz)											
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied (the peak voltage shall not exceed the rated voltage) for the specified period of time at 105°C.										
	Time	6.3 to 10V _{dc}	φ 10 : 6,000hours			φ 12.5 to 18 : 8,000hours					
		16 to 100V _{dc}	φ 10 : 7,000hours			φ 12.5 to 18 : 10,000hours					
	Capacitance change	≤ ±25% of the initial value									
	D.F. (tan δ)	≤ 200% of the initial specified value									
Leakage current	≤ The initial specified value										
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.										
	Capacitance change	≤ ±25% of the initial value									
	D.F. (tan δ)	≤ 200% of the initial specified value									
	Leakage current	≤ The initial specified value									

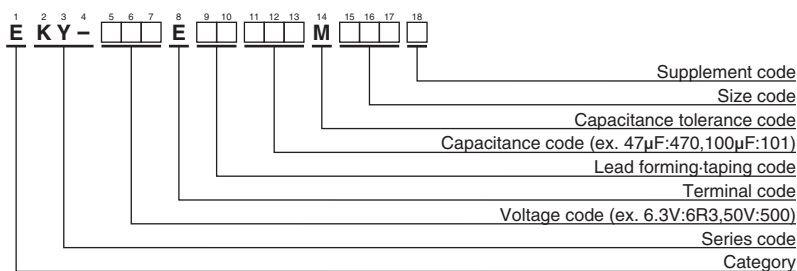
DIMENSIONS [mm]

● Terminal Code : E



φD	10	12.5	16	18
φd	0.6	0.6	0.8	0.8
F	5.0	5.0	7.5	7.5
φD'	φD+0.5max.			
L'	L+1.5max.			

PART NUMBERING SYSTEM



Please refer to "Product code guide (radial lead type)"



◆ STANDARD RATINGS

VV (V _{dc})	Cap (μF)	Case size φD×L(mm)	Impedance (Ω max./100kHz)		Rated ripple current (mA rms/105°C, 100kHz)	Part No.	VV (V _{dc})	Cap (μF)	Case size φD×L(mm)	Impedance (Ω max./100kHz)		Rated ripple current (mA rms/105°C, 100kHz)	Part No.
			20°C	-10°C						20°C	-10°C		
6.3	820	10×12.5	0.080	0.32	865	EKY-6R3E□□821MJCS	16	8,200	18×35.5	0.014	0.038	4,220	EKY-160E□□822MMP1S
	1,200	10×16	0.060	0.24	1,210	EKY-6R3E□□122MJ16S		10,000	18×40	0.012	0.032	4,280	EKY-160E□□103MM40S
	1,500	10×20	0.046	0.18	1,400	EKY-6R3E□□152MJ20S		330	10×12.5	0.080	0.32	865	EKY-250E□□331MJCS
	1,800	12.5×15	0.049	0.16	1,450	EKY-6R3E□□182MK15S		470	10×16	0.060	0.24	1,210	EKY-250E□□471MJ16S
	2,200	10×25	0.042	0.17	1,650	EKY-6R3E□□222MJ25S		680	10×20	0.046	0.18	1,400	EKY-250E□□681MJ20S
	2,700	10×30	0.031	0.12	1,910	EKY-6R3E□□272MJ30S		680	12.5×15	0.049	0.16	1,450	EKY-250E□□681MK15S
	2,700	16×15	0.042	0.12	1,940	EKY-6R3E□□272ML15S		820	10×25	0.042	0.17	1,650	EKY-250E□□821MJ25S
	3,300	12.5×20	0.035	0.12	1,900	EKY-6R3E□□332MK20S		1,000	10×30	0.031	0.12	1,910	EKY-250E□□102MJ30S
	3,900	12.5×25	0.027	0.089	2,230	EKY-6R3E□□392MK25S		1,000	12.5×20	0.035	0.12	1,900	EKY-250E□□102MK20S
	3,900	18×15	0.043	0.11	2,210	EKY-6R3E□□392MM15S		1,000	16×15	0.042	0.12	1,940	EKY-250E□□102ML15S
	4,700	12.5×30	0.024	0.078	2,650	EKY-6R3E□□472MK30S		1,200	18×15	0.043	0.11	2,210	EKY-250E□□122MM15S
	5,600	12.5×35	0.020	0.065	2,880	EKY-6R3E□□562MK35S		1,500	12.5×25	0.027	0.089	2,230	EKY-250E□□152MK25S
	5,600	16×20	0.027	0.078	2,530	EKY-6R3E□□562ML20S		1,800	12.5×30	0.024	0.078	2,650	EKY-250E□□182MK30S
	6,800	12.5×40	0.017	0.056	3,350	EKY-6R3E□□682MK40S		1,800	16×20	0.027	0.078	2,530	EKY-250E□□182ML20S
	6,800	16×25	0.021	0.060	2,930	EKY-6R3E□□682ML25S		2,200	12.5×35	0.020	0.065	2,880	EKY-250E□□222MK35S
	6,800	18×20	0.026	0.067	2,860	EKY-6R3E□□682MM20S		2,200	18×20	0.026	0.067	2,860	EKY-250E□□222MM20S
	8,200	16×31.5	0.017	0.050	3,450	EKY-6R3E□□822MLN3S		2,700	12.5×40	0.017	0.056	3,350	EKY-250E□□272MK40S
	10,000	16×35.5	0.015	0.044	3,610	EKY-6R3E□□103MLP1S		2,700	16×25	0.021	0.060	2,930	EKY-250E□□272ML25S
10,000	18×25	0.019	0.049	3,140	EKY-6R3E□□103MM25S	3,300	16×31.5	0.017	0.050	3,450	EKY-250E□□332MLN3S		
12,000	16×40	0.013	0.038	4,080	EKY-6R3E□□123ML40S	3,300	18×25	0.019	0.049	3,140	EKY-250E□□332MM25S		
12,000	18×31.5	0.015	0.040	4,170	EKY-6R3E□□123MMN3S	3,900	16×35.5	0.015	0.044	3,610	EKY-250E□□392MLP1S		
15,000	18×35.5	0.014	0.038	4,220	EKY-6R3E□□153MMP1S	3,900	18×31.5	0.015	0.040	4,170	EKY-250E□□392MMN3S		
18,000	18×40	0.012	0.032	4,280	EKY-6R3E□□183MM40S	4,700	16×40	0.013	0.038	4,080	EKY-250E□□472ML40S		
10	680	10×12.5	0.080	0.32	865	EKY-100E□□681MJCS	4,700	18×35.5	0.014	0.038	4,220	EKY-250E□□472MMP1S	
	1,000	10×16	0.060	0.24	1,210	EKY-100E□□102MJ16S	5,600	18×40	0.012	0.032	4,280	EKY-250E□□562MM40S	
	1,200	10×20	0.046	0.18	1,400	EKY-100E□□122MJ20S	220	10×12.5	0.080	0.32	865	EKY-350E□□221MJCS	
	1,500	10×25	0.042	0.17	1,650	EKY-100E□□152MJ25S	330	10×16	0.060	0.24	1,210	EKY-350E□□331MJ16S	
	1,500	12.5×15	0.049	0.16	1,450	EKY-100E□□152MK15S	470	10×20	0.046	0.18	1,400	EKY-350E□□471MJ20S	
	2,200	10×30	0.031	0.12	1,910	EKY-100E□□222MJ30S	470	12.5×15	0.049	0.16	1,450	EKY-350E□□471MK15S	
	2,200	12.5×20	0.035	0.12	1,900	EKY-100E□□222MK20S	560	10×25	0.042	0.17	1,650	EKY-350E□□561MJ25S	
	2,200	16×15	0.042	0.12	1,940	EKY-100E□□222ML15S	680	10×30	0.031	0.12	1,910	EKY-350E□□681MJ30S	
	2,700	18×15	0.043	0.11	2,210	EKY-100E□□272MM15S	680	12.5×20	0.035	0.12	1,900	EKY-350E□□681MK20S	
	3,300	12.5×25	0.027	0.089	2,230	EKY-100E□□332MK25S	680	16×15	0.042	0.12	1,940	EKY-350E□□681ML15S	
	3,900	12.5×30	0.024	0.078	2,650	EKY-100E□□392MK30S	1,000	12.5×25	0.027	0.089	2,230	EKY-350E□□102MK25S	
	3,900	16×20	0.027	0.078	2,530	EKY-100E□□392ML20S	1,000	18×15	0.043	0.11	2,210	EKY-350E□□102MM15S	
	4,700	12.5×35	0.020	0.065	2,880	EKY-100E□□472MK35S	1,200	12.5×30	0.024	0.078	2,650	EKY-350E□□122MK30S	
	5,600	12.5×40	0.017	0.056	3,350	EKY-100E□□562MK40S	1,200	16×20	0.027	0.078	2,530	EKY-350E□□122ML20S	
	5,600	16×25	0.021	0.060	2,930	EKY-100E□□562ML25S	1,500	12.5×35	0.020	0.065	2,880	EKY-350E□□152MK35S	
	5,600	18×20	0.026	0.067	2,860	EKY-100E□□562MM20S	1,800	12.5×40	0.017	0.056	3,350	EKY-350E□□182MK40S	
	6,800	16×31.5	0.017	0.050	3,450	EKY-100E□□682MLN3S	1,800	16×25	0.021	0.060	2,930	EKY-350E□□182ML25S	
	6,800	18×25	0.019	0.049	3,140	EKY-100E□□682MM25S	1,800	18×20	0.026	0.067	2,860	EKY-350E□□182MM20S	
8,200	16×35.5	0.015	0.044	3,610	EKY-100E□□822MLP1S	2,200	16×31.5	0.017	0.050	3,450	EKY-350E□□222MLN3S		
8,200	18×31.5	0.015	0.040	4,170	EKY-100E□□822MMN3S	2,200	18×25	0.019	0.049	3,140	EKY-350E□□222MM25S		
10,000	16×40	0.013	0.038	4,080	EKY-100E□□103ML40S	2,700	16×35.5	0.015	0.044	3,610	EKY-350E□□272MLP1S		
10,000	18×35.5	0.014	0.038	4,220	EKY-100E□□103MMP1S	2,700	18×31.5	0.015	0.040	4,170	EKY-350E□□272MMN3S		
12,000	18×40	0.012	0.032	4,280	EKY-100E□□123MM40S	3,300	16×40	0.013	0.038	4,080	EKY-350E□□332ML40S		
16	470	10×12.5	0.080	0.32	865	EKY-160E□□471MJCS	3,300	18×35.5	0.014	0.038	4,220	EKY-350E□□332MMP1S	
	680	10×16	0.060	0.24	1,210	EKY-160E□□681MJ16S	3,900	18×40	0.012	0.032	4,280	EKY-350E□□392MM40S	
	1,000	10×20	0.046	0.18	1,400	EKY-160E□□102MJ20S	150	10×12.5	0.12	0.48	760	EKY-500E□□151MJCS	
	1,000	12.5×15	0.049	0.16	1,450	EKY-160E□□102MK15S	220	10×16	0.084	0.34	1,050	EKY-500E□□221MJ16S	
	1,200	10×25	0.042	0.17	1,650	EKY-160E□□122MJ25S	270	10×20	0.060	0.24	1,220	EKY-500E□□271MJ20S	
	1,500	10×30	0.031	0.12	1,910	EKY-160E□□152MJ30S	270	12.5×15	0.061	0.20	1,260	EKY-500E□□271MK15S	
	1,500	12.5×20	0.035	0.12	1,900	EKY-160E□□152MK20S	330	10×25	0.055	0.22	1,440	EKY-500E□□331MJ25S	
	1,500	16×15	0.042	0.12	1,940	EKY-160E□□152ML15S	470	10×30	0.043	0.17	1,690	EKY-500E□□471MJ30S	
	2,200	12.5×25	0.027	0.089	2,230	EKY-160E□□222MK25S	470	12.5×20	0.045	0.15	1,660	EKY-500E□□471MK20S	
	2,200	18×15	0.043	0.11	2,210	EKY-160E□□222MM15S	470	16×15	0.055	0.17	1,690	EKY-500E□□471ML15S	
	2,700	12.5×30	0.024	0.078	2,650	EKY-160E□□272MK30S	560	12.5×25	0.034	0.11	1,950	EKY-500E□□561MK25S	
	2,700	16×20	0.027	0.078	2,530	EKY-160E□□272ML20S	560	18×15	0.054	0.15	1,930	EKY-500E□□561MM15S	
	3,300	12.5×35	0.020	0.065	2,880	EKY-160E□□332MK35S	680	12.5×30	0.030	0.10	2,310	EKY-500E□□681MK30S	
	3,900	12.5×40	0.017	0.056	3,350	EKY-160E□□392MK40S	820	12.5×35	0.025	0.083	2,510	EKY-500E□□821MK35S	
	3,900	16×25	0.021	0.060	2,930	EKY-160E□□392ML25S	820	16×20	0.034	0.10	2,210	EKY-500E□□821ML20S	
	3,900	18×20	0.026	0.067	2,860	EKY-160E□□392MM20S	1,000	12.5×40	0.021	0.069	2,920	EKY-500E□□102MK40S	
	4,700	16×31.5	0.017	0.050	3,450	EKY-160E□□472MLN3S	1,000	16×25	0.025	0.075	2,555	EKY-500E□□102ML25S	
	4,700	18×25	0.019	0.049	3,140	EKY-160E□□472MM25S	1,000	18×20	0.036	0.097	2,490	EKY-500E□□102MM20S	
5,600	16×35.5	0.015	0.044	3,610	EKY-160E□□562MLP1S	1,200	16×31.5	0.022	0.066	3,010	EKY-500E□□122MLN3S		
5,600	18×31.5	0.015	0.040	4,170	EKY-160E□□562MMN3S	1,200	18×25	0.026	0.070	2,740	EKY-500E□□122MM25S		
6,800	16×40	0.013	0.038	4,080	EKY-160E□□682ML40S	1,500	16×35.5	0.019	0.057	3,150	EKY-500E□□152MLP1S		

□□ : Enter the appropriate lead forming or taping code.



KY Series

◆STANDARD RATINGS

WV (V _{dc})	Cap (μF)	Case size φD×L(mm)	Impedance (Ω max./100kHz)		Rated ripple current (mA _{rms} /105°C, 100kHz)	Part No.	WV (V _{dc})	Cap (μF)	Case size φD×L(mm)	Impedance (Ω max./100kHz)		Rated ripple current (mA _{rms} /105°C, 100kHz)	Part No.
			20°C	-10°C						20°C	-10°C		
50	1,800	16×40	0.016	0.048	3,710	EKY-500E□□182ML40S	80	390	12.5×30	0.042	0.13	1,500	EKY-800E□□391MK30S
	1,800	18×31.5	0.021	0.057	3,635	EKY-500E□□182MMN3S		470	12.5×35	0.036	0.11	1,650	EKY-800E□□471MK35S
	2,200	18×35.5	0.017	0.046	3,680	EKY-500E□□222MMP1S		470	16×25	0.038	0.12	1,700	EKY-800E□□471ML25S
	2,700	18×40	0.014	0.038	3,800	EKY-500E□□272MM40S		470	18×20	0.045	0.14	1,500	EKY-800E□□471MM20S
	82	10×12.5	0.11	0.44	690	EKY-630E□□820MJC5S		560	12.5×40	0.032	0.095	1,800	EKY-800E□□561MK40S
120	10×16	0.076	0.31	950	EKY-630E□□121MJ16S	680		16×31.5	0.032	0.095	1,850	EKY-800E□□681MLN3S	
180	10×20	0.056	0.23	1,150	EKY-630E□□181MJ20S	680		18×25	0.036	0.11	1,750	EKY-800E□□681MM25S	
180	12.5×16	0.072	0.29	1,150	EKY-630E□□181MK16S	820		16×35.5	0.029	0.086	2,000	EKY-800E□□821MLP1S	
220	10×25	0.046	0.19	1,350	EKY-630E□□221MJ25S	820		18×31.5	0.030	0.090	1,900	EKY-800E□□821MMN3S	
270	12.5×20	0.041	0.13	1,500	EKY-630E□□271MK20S	1,000		16×40	0.027	0.081	2,200	EKY-800E□□102ML40S	
390	12.5×25	0.031	0.093	1,900	EKY-630E□□391MK25S	1,000		18×35.5	0.027	0.081	2,200	EKY-800E□□102MMP1S	
470	12.5×30	0.028	0.084	2,300	EKY-630E□□471MK30S	1,200		18×40	0.026	0.077	2,700	EKY-800E□□122MM40S	
470	16×20	0.032	0.096	2,000	EKY-630E□□471ML20S	100		47	10×12.5	0.17	0.66	480	EKY-101E□□470MJC5S
560	12.5×35	0.024	0.072	2,500	EKY-630E□□561MK35S			68	10×16	0.11	0.47	600	EKY-101E□□680MJ16S
680	12.5×40	0.021	0.063	2,800	EKY-630E□□681MK40S			82	10×20	0.084	0.34	800	EKY-101E□□820MJ20S
680	16×25	0.025	0.075	2,600	EKY-630E□□681ML25S		100	12.5×16	0.11	0.34	750	EKY-101E□□101MK16S	
680	18×20	0.030	0.090	2,500	EKY-630E□□681MM20S		120	10×25	0.069	0.28	900	EKY-101E□□121MJ25S	
820	16×31.5	0.021	0.063	2,850	EKY-630E□□821MLN3S		150	12.5×20	0.062	0.18	1,100	EKY-101E□□151MK20S	
820	18×25	0.024	0.072	2,800	EKY-630E□□821MM25S		220	12.5×25	0.047	0.14	1,250	EKY-101E□□221MK25S	
1,000	16×35.5	0.019	0.057	2,900	EKY-630E□□102MLP1S		220	16×20	0.048	0.15	1,350	EKY-101E□□221ML20S	
1,200	16×40	0.018	0.054	3,400	EKY-630E□□122ML40S		270	12.5×30	0.042	0.13	1,500	EKY-101E□□271MK30S	
1,200	18×31.5	0.020	0.060	3,300	EKY-630E□□122MMN3S		330	12.5×35	0.036	0.11	1,650	EKY-101E□□331MK35S	
1,500	18×35.5	0.018	0.054	3,400	EKY-630E□□152MMP1S		330	16×25	0.038	0.12	1,700	EKY-101E□□331ML25S	
1,800	18×40	0.017	0.051	3,500	EKY-630E□□182MM40S		330	18×20	0.045	0.14	1,500	EKY-101E□□331MM20S	
80	68	10×12.5	0.17	0.66	480		EKY-800E□□680MJC5S	390	12.5×40	0.032	0.095	1,800	EKY-101E□□391MK40S
	100	10×16	0.11	0.47	600		EKY-800E□□101MJ16S	470	16×31.5	0.032	0.095	1,850	EKY-101E□□471MLN3S
	120	10×20	0.084	0.34	800		EKY-800E□□121MJ20S	470	18×25	0.036	0.11	1,750	EKY-101E□□471MM25S
	150	10×25	0.069	0.28	900	EKY-800E□□151MJ25S	560	16×35.5	0.029	0.086	2,000	EKY-101E□□561MLP1S	
	150	12.5×16	0.11	0.34	750	EKY-800E□□151MK16S	560	18×31.5	0.030	0.090	1,900	EKY-101E□□561MMN3S	
	220	12.5×20	0.062	0.18	1,100	EKY-800E□□221MK20S	680	16×40	0.027	0.081	2,200	EKY-101E□□681ML40S	
	330	12.5×25	0.047	0.14	1,250	EKY-800E□□331MK25S	680	18×35.5	0.027	0.081	2,200	EKY-101E□□681MMP1S	
	330	16×20	0.048	0.15	1,350	EKY-800E□□331ML20S	820	18×40	0.026	0.077	2,700	EKY-101E□□821MM40S	

□□ : Enter the appropriate lead forming or taping code.

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Capacitance(μF)	Frequency(Hz)			
	120	1k	10k	100k
47 to 180	0.40	0.75	0.90	1.00
220 to 560	0.50	0.85	0.94	1.00
680 to 1,800	0.60	0.87	0.95	1.00
2,200 to 3,900	0.75	0.90	0.95	1.00
4,700 to	0.85	0.95	0.98	1.00

The deterioration of aluminum electrolytic capacitors accelerates their life due to the internal heating produced by ripple current. For details, refer to Section "5-3 Ripple Current Effect on Lifetime" in the catalog, Technical Note.



- Always read "Notes on Use" before using the product in order to enable you to use the product correctly and prevent any faults and accidents from occurring.
- Request the Product Specification on the product of NIPPON CHEMI-CON CORPORATION to refer to it as well as this brochure prior to the order of the products. Some specific notes on use of the ordered product may be described in the specifications.
- The products listed in this catalog are designed and manufactured for general electronics equipment use and are not intended for use in applications that can adversely affect human life; where the malfunction of equipment may cause damage to life or property. In addition, our products are not intended to be used in specific applications that may cause a major social impact. Please consult with us in advance of usage of our products in the following listed applications. ① Aerospace equipment ② Power generation equipment such as thermal power, nuclear power etc. ③ Medical equipment ④ Transport equipment (automobiles, trains, ships, etc.) ⑤ Transportation control equipment ⑥ Disaster prevention / crime prevention equipment ⑦ Highly publicized information processing equipment ⑧ Submarine equipment ⑨ Other applications that are not considered general-purpose applications.
- The circuits described as examples in this catalog and the "delivery specifications" are featured in order to show the operations and usage of our products, however, this fact does not guarantee that the circuits are available to function in your equipment systems. We are not in any case responsible for any failures or damage caused by the use of information contained herein. You should examine our products, of which the characteristics are described in the "delivery specifications" and other documents, and determine whether or not our products suit your requirements according to the specifications of your equipment systems. Therefore, you bear final responsibility regarding the use of our products.
Please make sure that you take appropriate safety measures such as use of redundant design and malfunction prevention measures in order to prevent fatal accidents and/or fires in the event any of our products malfunction.
- We strongly recommend our customers to purchase Nippon Chemi-Con products only through our official sales channels. We assume no responsibility for any defects or damages caused by using products purchased from outside our official sales channel or of counterfeit goods. In addition, we will ask the customer to pay the investigation cost for products purchased outside our official sales channel.
- We reserve the right to discontinue production and delivery of products. We do not guarantee that all the products included in this catalog will be available in the future.
The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products
- We continually strive to improve the quality and reliability of our products, but in any case that our product does not meet our published specifications, please stop using it promptly and contact us immediately. As for compensation for non-conforming goods delivered by Chemi-Con, we will limit it only to goods found in non-compliance of our published specifications. This may be accomplished by a no cost replacement of non-conforming individual products, a credit of the piece price paid per each individual non-conforming product, or in other ways deemed necessary.
In addition, we have an established system with enhanced traceability, therefore we will limit the applicable lot items for any potential compensation.

[Part Numbering System](#)

[Part Numbering System \(Appendix\)](#)

[Standardization](#)

[Available Items by Manufacturing Locations](#)

[Environmental Measures](#)

[Technical Note](#)

[Precautions and Guidelines](#)

[Recommended Soldering Conditions](#)

[Taping, Lead-preforming and Packaging](#)

[Available Terminals for Snap-in and Screw Mount Type](#)

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View **EKY-630ELL471ML20S** on WIN SOURCE](#)
- ⊖ [United Chemi-Con Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management