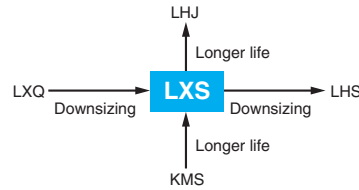


# LXS Series

- For solar power generation
- Endurance with ripple current : 5,000 hours at 105°C
- Rated voltage range : 160 to 600V
- Downsized from LXQ series
- Non solvent resistant type
- RoHS2 Compliant

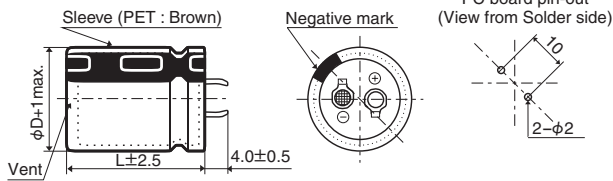


## ◆ SPECIFICATIONS

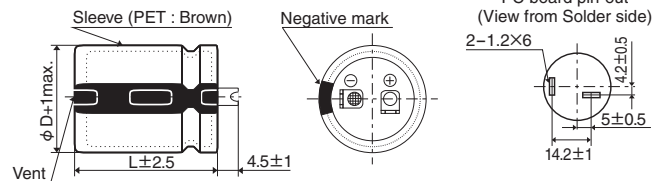
Items	Characteristics		
<b>Category Temperature Range</b>	-25 to +105°C		
<b>Rated Voltage Range</b>	160 to 600V <sub>dc</sub>		
<b>Capacitance Tolerance</b>	±20% (M) (at 20°C, 120Hz)		
<b>Leakage Current</b>	I ≤ 3/CV Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 20°C after 5 minutes)		
<b>Dissipation Factor (tan δ)</b>	Rated voltage (V <sub>dc</sub> )	160 to 400V	420 to 600V
	tan δ (Max.)	0.15	0.20
<b>Low Temperature Characteristics (Max. Impedance Ratio)</b>	Rated voltage (V <sub>dc</sub> )	160 to 400V	420 to 600V
	Z(-25°C)/Z(+20°C)	4	8
<b>Endurance</b>	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 5,000 hours at 105°C.		
	Capacitance change	≤ ±20% of the initial value	
	D.F. (tan δ)	≤ 200% of the initial specified value (500V <sub>dc</sub> : ≤ 250%, 550, 600V <sub>dc</sub> : ≤ 300%)	
	Leakage current	≤ The initial specified value	
<b>Shelf Life</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 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	≤ ±15% of the initial value	
	D.F. (tan δ)	≤ 150% of the initial specified value	
	Leakage current	≤ The initial specified value	

## ◆ DIMENSIONS [mm]

● Terminal Code : VS (φ22 to φ35) : Standard

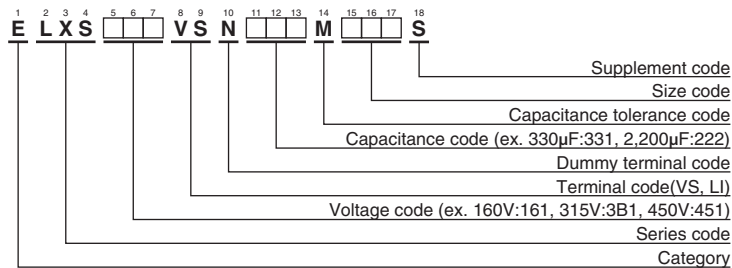


● Terminal Code : LI (φ30, φ35)



The standard design has no plastic disc.

## ◆ PART NUMBERING SYSTEM



Please refer to "Product code guide (snap-in type)"

◆ STANDARD RATINGS

WV (V <sub>dc</sub> )	Cap (μF)	Case size φD×L(mm)	tan δ	Rated ripple current (Arms/105°C, 120Hz)	Part No.	WV (V <sub>dc</sub> )	Cap (μF)	Case size φD×L(mm)	tan δ	Rated ripple current (Arms/105°C, 120Hz)	Part No.	
160	470	22 × 25	0.15	1.47	ELXS161VSN471MP25S	200	1,500	35 × 35	0.15	3.36	ELXS201VSN152MA35S	
	680	22 × 30	0.15	1.86	ELXS161VSN681MP30S		1,800	30 × 50	0.15	3.72	ELXS201VSN182MR50S	
	680	25.4 × 25	0.15	1.84	ELXS161VSN681MQ25S		1,800	35 × 40	0.15	3.81	ELXS201VSN182MA40S	
	820	22 × 35	0.15	2.09	ELXS161VSN821MP35S		2,200	35 × 45	0.15	4.32	ELXS201VSN222MA45S	
	820	25.4 × 30	0.15	2.08	ELXS161VSN821MQ30S		2,700	35 × 50	0.15	4.88	ELXS201VSN272MA50S	
	1,000	22 × 40	0.15	2.35	ELXS161VSN102MP40S		250	270	22 × 25	0.15	1.11	ELXS251VSN271MP25S
	1,000	22 × 45	0.15	2.40	ELXS161VSN102MP45S			330	22 × 30	0.15	1.29	ELXS251VSN331MP30S
	1,000	25.4 × 35	0.15	2.40	ELXS161VSN102MQ35S			390	22 × 35	0.15	1.44	ELXS251VSN391MP35S
	1,000	30 × 25	0.15	2.50	ELXS161VSN102MR25S			390	25.4 × 25	0.15	1.40	ELXS251VSN391MQ25S
	1,200	22 × 50	0.15	2.69	ELXS161VSN122MP50S			470	22 × 40	0.15	1.61	ELXS251VSN471MP40S
	1,200	25.4 × 40	0.15	2.68	ELXS161VSN122MQ40S	470		25.4 × 30	0.15	1.57	ELXS251VSN471MQ30S	
	1,200	30 × 30	0.15	2.77	ELXS161VSN122MR30S	560		22 × 45	0.15	1.79	ELXS251VSN561MP45S	
	1,200	35 × 25	0.15	2.91	ELXS161VSN122MA25S	560		25.4 × 35	0.15	1.79	ELXS251VSN561MQ35S	
	1,500	25.4 × 45	0.15	3.05	ELXS161VSN152MQ45S	560		30 × 25	0.15	1.87	ELXS251VSN561MR25S	
	1,500	30 × 35	0.15	3.17	ELXS161VSN152MR35S	680		22 × 50	0.15	2.02	ELXS251VSN681MP50S	
	1,800	25.4 × 50	0.15	3.40	ELXS161VSN182MQ50S	680	25.4 × 40	0.15	2.02	ELXS251VSN681MQ40S		
	1,800	30 × 40	0.15	3.57	ELXS161VSN182MR40S	680	30 × 30	0.15	2.08	ELXS251VSN681MR30S		
	1,800	35 × 30	0.15	3.62	ELXS161VSN182MA30S	680	35 × 25	0.15	2.19	ELXS251VSN681MA25S		
	2,200	30 × 45	0.15	4.05	ELXS161VSN222MR45S	820	25.4 × 45	0.15	2.26	ELXS251VSN821MQ45S		
	2,200	30 × 50	0.15	4.11	ELXS161VSN222MR50S	820	25.4 × 50	0.15	2.29	ELXS251VSN821MQ50S		
2,200	35 × 35	0.15	4.07	ELXS161VSN222MA35S	820	30 × 35	0.15	2.34	ELXS251VSN821MR35S			
2,700	35 × 40	0.15	4.67	ELXS161VSN272MA40S	820	35 × 30	0.15	2.45	ELXS251VSN821MA30S			
2,700	35 × 45	0.15	4.78	ELXS161VSN272MA45S	1,000	30 × 40	0.15	2.66	ELXS251VSN102MR40S			
3,300	35 × 50	0.15	5.40	ELXS161VSN332MA50S	1,200	30 × 45	0.15	2.99	ELXS251VSN122MR45S			
180	390	22 × 25	0.15	1.34	ELXS181VSN391MP25S	1,200	30 × 50	0.15	3.04	ELXS251VSN122MR50S		
	560	22 × 30	0.15	1.68	ELXS181VSN561MP30S	1,200	35 × 35	0.15	3.00	ELXS251VSN122MA35S		
	560	25.4 × 25	0.15	1.67	ELXS181VSN561MQ25S	1,200	35 × 40	0.15	3.11	ELXS251VSN122MA40S		
	680	22 × 35	0.15	1.90	ELXS181VSN681MP35S	1,500	35 × 45	0.15	3.56	ELXS251VSN152MA45S		
	820	22 × 40	0.15	2.13	ELXS181VSN821MP40S	1,800	35 × 50	0.15	3.98	ELXS251VSN182MA50S		
	820	25.4 × 30	0.15	2.08	ELXS181VSN821MQ30S	315	180	22 × 25	0.15	0.95	ELXS3B1VSN181MP25S	
	820	25.4 × 35	0.15	2.17	ELXS181VSN821MQ35S		220	22 × 30	0.15	1.10	ELXS3B1VSN221MP30S	
	820	30 × 25	0.15	2.26	ELXS181VSN821MR25S		220	25.4 × 25	0.15	1.10	ELXS3B1VSN221MQ25S	
	1,000	22 × 45	0.15	2.40	ELXS181VSN102MP45S		270	22 × 35	0.15	1.24	ELXS3B1VSN271MP35S	
	1,000	22 × 50	0.15	2.45	ELXS181VSN102MP50S		270	25.4 × 30	0.15	1.25	ELXS3B1VSN271MQ30S	
	1,000	25.4 × 40	0.15	2.45	ELXS181VSN102MQ40S		330	22 × 40	0.15	1.40	ELXS3B1VSN331MP40S	
	1,000	30 × 30	0.15	2.52	ELXS181VSN102MR30S		330	30 × 25	0.15	1.43	ELXS3B1VSN331MR25S	
	1,000	35 × 25	0.15	2.66	ELXS181VSN102MA25S		390	22 × 45	0.15	1.56	ELXS3B1VSN391MP45S	
	1,200	25.4 × 45	0.15	2.73	ELXS181VSN122MQ45S		390	22 × 50	0.15	1.59	ELXS3B1VSN391MP50S	
	1,200	30 × 35	0.15	2.83	ELXS181VSN122MR35S		390	25.4 × 35	0.15	1.57	ELXS3B1VSN391MQ35S	
	1,500	25.4 × 50	0.15	3.10	ELXS181VSN152MQ50S	470	25.4 × 40	0.15	1.76	ELXS3B1VSN471MQ40S		
	1,500	30 × 40	0.15	3.26	ELXS181VSN152MR40S	470	25.4 × 45	0.15	1.79	ELXS3B1VSN471MQ45S		
	1,500	35 × 30	0.15	3.31	ELXS181VSN152MA30S	470	30 × 30	0.15	1.73	ELXS3B1VSN471MR30S		
	1,800	30 × 45	0.15	3.66	ELXS181VSN182MR45S	470	35 × 25	0.15	1.82	ELXS3B1VSN471MA25S		
	1,800	35 × 35	0.15	3.68	ELXS181VSN182MA35S	560	25.4 × 50	0.15	1.99	ELXS3B1VSN561MQ50S		
2,200	30 × 50	0.15	4.11	ELXS181VSN222MR50S	560	30 × 35	0.15	1.93	ELXS3B1VSN561MR35S			
2,200	35 × 40	0.15	4.22	ELXS181VSN222MA40S	560	35 × 30	0.15	2.02	ELXS3B1VSN561MA30S			
2,200	35 × 45	0.15	4.32	ELXS181VSN222MA45S	680	30 × 40	0.15	2.19	ELXS3B1VSN681MR40S			
2,700	35 × 50	0.15	4.88	ELXS181VSN272MA50S	680	30 × 45	0.15	2.25	ELXS3B1VSN681MR45S			
200	390	22 × 25	0.15	1.34	ELXS201VSN391MP25S	680	35 × 35	0.15	2.26	ELXS3B1VSN681MA35S		
	470	22 × 30	0.15	1.54	ELXS201VSN471MP30S	820	30 × 50	0.15	2.51	ELXS3B1VSN821MR50S		
	560	22 × 35	0.15	1.72	ELXS201VSN561MP35S	820	35 × 40	0.15	2.57	ELXS3B1VSN821MA40S		
	560	25.4 × 25	0.15	1.67	ELXS201VSN561MQ25S	1,000	35 × 45	0.15	2.91	ELXS3B1VSN102MA45S		
	680	22 × 40	0.15	1.94	ELXS201VSN681MP40S	1,200	35 × 50	0.15	3.25	ELXS3B1VSN122MA50S		
	680	25.4 × 30	0.15	1.89	ELXS201VSN681MQ30S	400	120	22 × 25	0.15	0.77	ELXS401VSN121MP25S	
	680	30 × 25	0.15	2.06	ELXS201VSN681MR25S		150	22 × 30	0.15	0.90	ELXS401VSN151MP30S	
	820	22 × 45	0.15	2.17	ELXS201VSN821MP45S		180	22 × 35	0.15	1.02	ELXS401VSN181MP35S	
	820	25.4 × 35	0.15	2.17	ELXS201VSN821MQ35S		180	25.4 × 25	0.15	0.99	ELXS401VSN181MQ25S	
	1,000	22 × 50	0.15	2.45	ELXS201VSN102MP50S		220	22 × 40	0.15	1.15	ELXS401VSN221MP40S	
	1,000	25.4 × 40	0.15	2.45	ELXS201VSN102MQ40S		220	25.4 × 30	0.15	1.13	ELXS401VSN221MQ30S	
	1,000	30 × 30	0.15	2.52	ELXS201VSN102MR30S		220	30 × 25	0.15	1.17	ELXS401VSN221MQ25S	
	1,000	35 × 25	0.15	2.66	ELXS201VSN102MA25S		270	22 × 45	0.15	1.29	ELXS401VSN271MP45S	
	1,200	25.4 × 45	0.15	2.73	ELXS201VSN122MQ45S		270	22 × 50	0.15	1.32	ELXS401VSN271MP50S	
	1,200	25.4 × 50	0.15	2.78	ELXS201VSN122MQ50S		270	25.4 × 35	0.15	1.30	ELXS401VSN271MQ35S	
	1,200	30 × 35	0.15	2.83	ELXS201VSN122MR35S	330	25.4 × 40	0.15	1.47	ELXS401VSN331MQ40S		
	1,200	35 × 30	0.15	2.96	ELXS201VSN122MA30S	330	30 × 30	0.15	1.45	ELXS401VSN331MR30S		
	1,500	30 × 40	0.15	3.26	ELXS201VSN152MR40S	330	35 × 25	0.15	1.52	ELXS401VSN331MA25S		
	1,500	30 × 45	0.15	3.34	ELXS201VSN152MR45S	390	25.4 × 45	0.15	1.63	ELXS401VSN391MQ45S		



**◆STANDARD RATINGS**

WV (V <sub>dc</sub> )	Cap (μF)	Case size φD×L(mm)	tan δ	Rated ripple current (Arms/105°C, 120Hz)	Part No.	WV (V <sub>dc</sub> )	Cap (μF)	Case size φD×L(mm)	tan δ	Rated ripple current (Arms/105°C, 120Hz)	Part No.
400	390	25.4 × 50	0.15	1.66	ELXS401VSN391MQ50S	450	220	30 × 30	0.20	1.18	ELXS451VSN221MR30S
	390	30 × 35	0.15	1.61	ELXS401VSN391MR35S		220	35 × 25	0.20	1.24	ELXS451VSN221MA25S
	390	35 × 30	0.15	1.68	ELXS401VSN391MA30S		270	25.4 × 45	0.20	1.36	ELXS451VSN271MQ45S
	470	30 × 40	0.15	1.82	ELXS401VSN471MR40S		270	25.4 × 50	0.20	1.38	ELXS451VSN271MQ50S
	470	35 × 35	0.15	1.88	ELXS401VSN471MA35S		270	30 × 35	0.20	1.34	ELXS451VSN271MR35S
	560	30 × 45	0.15	2.04	ELXS401VSN561MR45S		270	35 × 30	0.20	1.40	ELXS451VSN271MA30S
	560	30 × 50	0.15	2.07	ELXS401VSN561MP50S		330	30 × 40	0.20	1.52	ELXS451VSN331MR40S
	560	35 × 40	0.15	2.13	ELXS401VSN561MA40S		390	30 × 45	0.20	1.70	ELXS451VSN391MR45S
	680	35 × 45	0.15	2.40	ELXS401VSN681MA45S		390	30 × 50	0.20	1.73	ELXS451VSN391MR50S
	820	35 × 50	0.15	2.69	ELXS401VSN821MA50S		390	35 × 35	0.20	1.71	ELXS451VSN391MA35S
420	100	22 × 25	0.20	0.70	ELXS421VSN101MP25S	470	35 × 40	0.20	1.95	ELXS451VSN471MR40S	
	120	22 × 30	0.20	0.81	ELXS421VSN121MP30S	470	35 × 45	0.20	1.99	ELXS451VSN471MA45S	
	120	25.4 × 25	0.20	0.81	ELXS421VSN121MQ25S	560	35 × 50	0.20	2.22	ELXS451VSN561MA50S	
	150	22 × 35	0.20	0.93	ELXS421VSN151MP35S	100	30 × 25	0.20	0.82	ELXS501VSN101MR25S	
	180	22 × 40	0.20	1.04	ELXS421VSN181MP40S	120	30 × 30	0.20	0.91	ELXS501VSN121MR30S	
	180	25.4 × 30	0.20	1.02	ELXS421VSN181MQ30S	120	35 × 25	0.20	0.88	ELXS501VSN121MA25S	
	180	30 × 25	0.20	1.06	ELXS421VSN181MR25S	150	30 × 35	0.20	1.04	ELXS501VSN151MR35S	
	220	22 × 45	0.20	1.17	ELXS421VSN221MP45S	180	30 × 40	0.20	1.17	ELXS501VSN181MR40S	
	220	22 × 50	0.20	1.20	ELXS421VSN221MP50S	180	35 × 30	0.20	1.10	ELXS501VSN181MA30S	
	220	25.4 × 35	0.20	1.18	ELXS421VSN221MQ35S	220	30 × 45	0.20	1.33	ELXS501VSN221MR45S	
	270	25.4 × 40	0.20	1.33	ELXS421VSN271MQ40S	220	35 × 35	0.20	1.23	ELXS501VSN221MA35S	
	270	25.4 × 45	0.20	1.36	ELXS421VSN271MQ45S	270	30 × 50	0.20	1.50	ELXS501VSN271MR50S	
	270	30 × 30	0.20	1.31	ELXS421VSN271MR30S	270	35 × 40	0.20	1.42	ELXS501VSN271MA40S	
	270	35 × 25	0.20	1.38	ELXS421VSN271MA25S	330	35 × 45	0.20	1.60	ELXS501VSN331MA45S	
	330	25.4 × 50	0.20	1.52	ELXS421VSN331MQ50S	390	35 × 50	0.20	1.78	ELXS501VSN391MA50S	
	330	30 × 35	0.20	1.48	ELXS421VSN331MR35S	470	35 × 60	0.20	2.03	ELXS501VSN471MA60S	
	330	35 × 30	0.20	1.55	ELXS421VSN331MA30S	120	30 × 30	0.20	0.91	ELXS551VSN121MR30S	
	390	30 × 40	0.20	1.66	ELXS421VSN391MR40S	150	30 × 35	0.20	1.04	ELXS551VSN151MR35S	
	390	30 × 45	0.20	1.70	ELXS421VSN391MR45S	180	30 × 40	0.20	1.17	ELXS551VSN181MR40S	
	390	35 × 35	0.20	1.71	ELXS421VSN391MA35S	180	35 × 30	0.20	1.10	ELXS551VSN181MA30S	
470	30 × 50	0.20	1.90	ELXS421VSN471MR50S	220	30 × 50	0.20	1.35	ELXS551VSN221MR50S		
470	35 × 40	0.20	1.95	ELXS421VSN471MA40S	220	35 × 40	0.20	1.28	ELXS551VSN221MA40S		
560	35 × 45	0.20	2.17	ELXS421VSN561MA45S	270	35 × 45	0.20	1.45	ELXS551VSN271MA45S		
680	35 × 50	0.20	2.45	ELXS421VSN681MA50S	330	35 × 50	0.20	1.64	ELXS551VSN331MA50S		
450	82	22 × 25	0.20	0.64	ELXS451VSN820MP25S	390	35 × 60	0.20	1.85	ELXS551VSN391MA60S	
	120	22 × 30	0.20	0.81	ELXS451VSN121MP30S	120	30 × 40	0.20	0.96	ELXS601VSN121MR40S	
	120	22 × 35	0.20	0.83	ELXS451VSN121MP35S	120	35 × 30	0.20	0.95	ELXS601VSN121MA30S	
	120	25.4 × 25	0.20	0.81	ELXS451VSN121MQ25S	150	30 × 45	0.20	1.10	ELXS601VSN151MR45S	
	150	22 × 40	0.20	0.94	ELXS451VSN151MP40S	150	35 × 35	0.20	1.07	ELXS601VSN151MA35S	
	150	25.4 × 30	0.20	0.93	ELXS451VSN151MQ30S	180	30 × 50	0.20	1.22	ELXS601VSN181MR50S	
	180	22 × 45	0.20	1.06	ELXS451VSN181MP45S	180	35 × 40	0.20	1.22	ELXS601VSN181MA40S	
	180	25.4 × 35	0.20	1.06	ELXS451VSN181MQ35S	220	30 × 60	0.20	1.40	ELXS601VSN221MR60S	
	180	30 × 25	0.20	1.06	ELXS451VSN181MR25S	220	35 × 45	0.20	1.38	ELXS601VSN221MA45S	
	220	22 × 50	0.20	1.20	ELXS451VSN221MP50S	270	35 × 50	0.20	1.56	ELXS601VSN271MA50S	
220	25.4 × 40	0.20	1.20	ELXS451VSN221MQ40S	330	35 × 60	0.20	1.79	ELXS601VSN331MA60S		

**◆RATED RIPPLE CURRENT MULTIPLIERS**

●Frequency Multipliers

Frequency(Hz)	50	120	300	1k	10k	50k
160 to 250V <sub>dc</sub>	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450V <sub>dc</sub>	0.77	1.00	1.16	1.30	1.41	1.43
500 to 600V <sub>dc</sub>	0.70	1.00	1.16	1.30	1.41	1.43

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 ELXS3B1VSN391MQ35S 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