

SMM Series

SMM SERIES
Engineering Bulletin Mar 07



- Snap Mount
- Downsize
- High Voltage
- Long Life
- RoHS Compliant
- +85°C Maximum Temperature



The SMM series is a high voltage, long life snap-in capacitor series that offers downsized versions of the SMH series. Compared to our SMH series, the SMM capacitors have a longer rated lifetime of 3,000 hours with the full rated ripple current applied and are also one case size smaller than equivalently rated SMH capacitors. These characteristics allow downsizing for many power supplies and will provide better reliability due to increased life. The SMM capacitors are available in 2 or 4-pin snap-in styles and 4-pin straight terminals. The SMM series capacitors are RoHS compliant offering Pb-free construction.

The standard SMM series capacitors are *not* solvent proof. Refer to guidelines and precautions on the website for usage and installation conditions recommended for United Chemi-Con products.

Summary of Specifications

- PC board 2 or 4-pin snap-in; optional 4-pin straight terminals.
- Capacitance range: 47 to 3,300µF.
- Voltage range: 160 to 450VDC.
- Category temperature range: -25°C to +85°C.
- Leakage current: $3\sqrt{CV}$ (µA) maximum after 5 minutes at +20°C.
- Standard capacitance tolerance: ±20%
- Nominal case size (D × L): 20 × 25mm to 35 × 50mm.
- Rated lifetime: 3,000 hours at +85°C with the rated ripple current applied.

SMM
SNAP MOUNT 85°C

SMM Specifications - Snap Mount

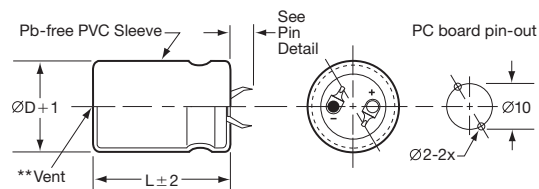
Item	Characteristics																																												
Category Temperature Range	−25 to +85°C																																												
Rated Voltage Range	160 to 450VDC																																												
Capacitance Range	47 to 3,300μF																																												
Capacitance Tolerance	±20% (M) at +20°C, 120Hz																																												
Leakage Current	I ≤ 3√CV (μA) after 5 minutes at +20°C. Where I = Max. leakage current (μA), C = Nominal capacitance (μF) and V = Rated voltage (V)																																												
Dissipation Factor (Tan δ)	At +20°C, 120Hz <table><tr><td>Rated Voltage (V)</td><td>160-400</td><td colspan="5">420-450</td></tr><tr><td>Tan δ (DF) Max.</td><td>0.15</td><td colspan="5">0.20</td></tr></table>							Rated Voltage (V)	160-400	420-450					Tan δ (DF) Max.	0.15	0.20																												
Rated Voltage (V)	160-400	420-450																																											
Tan δ (DF) Max.	0.15	0.20																																											
Low Temperature Characteristics	At 120Hz, impedance (Z) ratio between the −25°C value and +20°C value shall not exceed the values given below. <table><tr><td>Rated Voltage (V)</td><td>160-400</td><td colspan="5">420-450</td></tr><tr><td>Z (−25°C) / Z (+20°C)</td><td>4</td><td colspan="5">8</td></tr></table>							Rated Voltage (V)	160-400	420-450					Z (−25°C) / Z (+20°C)	4	8																												
Rated Voltage (V)	160-400	420-450																																											
Z (−25°C) / Z (+20°C)	4	8																																											
Rated Ripple Current Multipliers	Ambient Temperature (°C) <table><tr><td>+45°C</td><td>+60°C</td><td>+70°C</td><td colspan="4">+85°C</td></tr><tr><td>1.73</td><td>1.50</td><td>1.32</td><td colspan="4">1.00</td></tr></table> Frequency (Hz) <table><tr><td>DC Rated Voltage</td><td>50Hz</td><td>120Hz</td><td>300Hz</td><td>1kHz</td><td>10kHz</td><td colspan="2">50kHz</td></tr><tr><td>160-250V</td><td>0.81</td><td>1.00</td><td>1.17</td><td>1.32</td><td>1.45</td><td colspan="2">1.50</td></tr><tr><td>315-450V</td><td>0.77</td><td>1.00</td><td>1.16</td><td>1.30</td><td>1.41</td><td colspan="2">1.43</td></tr></table>							+45°C	+60°C	+70°C	+85°C				1.73	1.50	1.32	1.00				DC Rated Voltage	50Hz	120Hz	300Hz	1kHz	10kHz	50kHz		160-250V	0.81	1.00	1.17	1.32	1.45	1.50		315-450V	0.77	1.00	1.16	1.30	1.41	1.43	
+45°C	+60°C	+70°C	+85°C																																										
1.73	1.50	1.32	1.00																																										
DC Rated Voltage	50Hz	120Hz	300Hz	1kHz	10kHz	50kHz																																							
160-250V	0.81	1.00	1.17	1.32	1.45	1.50																																							
315-450V	0.77	1.00	1.16	1.30	1.41	1.43																																							
Endurance (Load Life)	The following specifications shall be satisfied when the capacitors are restored to +20°C after subjecting them to DC voltage for 3,000 hours at +85°C with the rated ripple current applied. The sum of the DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitors. Capacitance change: ≤ ±20% of initial measured value Tan δ (DF) : ≤ 200% of initial specified value Leakage current : ≤ initial specified value																																												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to +20°C after exposing them for 1,000 hours at +85°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change: ≤ ±15% of initial measured value Tan δ (DF) : ≤ 150% of initial specified value Leakage current : ≤ initial specified value																																												

Diagram of Dimensions - Snap Mount

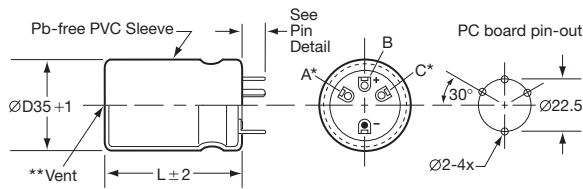
Snap Mount

Unit: mm

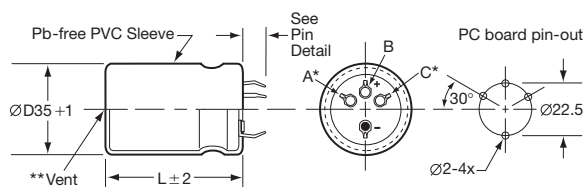
Types VSN $\varnothing 20 \sim \varnothing 35$; VNN $\varnothing 22 \sim \varnothing 35$



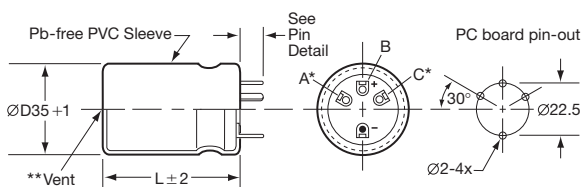
Type VRD $\varnothing 35$



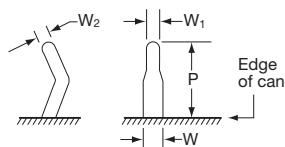
Type VND $\varnothing 35$



Type VQD $\varnothing 35$



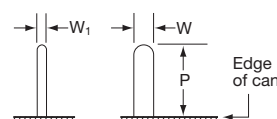
VS & VN Pin Dimensions



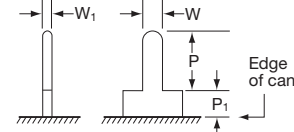
Type	P	W	W ₁	W ₂
VSN $\varnothing 20 \sim \varnothing 30$	4.0 ± 0.5	1.5 ± 0.2	1.0	1.0
VSN $\varnothing 35$	3.5 ± 0.5			
VNN $\varnothing 22 \sim \varnothing 35$	5.8 ± 1.0			
VND $\varnothing 35$	5.8 ± 1.0			

VR & VQ Pin Dimensions

VR Straight Pin



VQ Standoff Pin



Type	P	P ₁	W	W ₁
Straight Pin (VR)	5.50 ± 1.0	—	1.5 ± 0.1	0.7
Standoff Pin (VQ)	3.75 ± 1.0	2.0 max.		

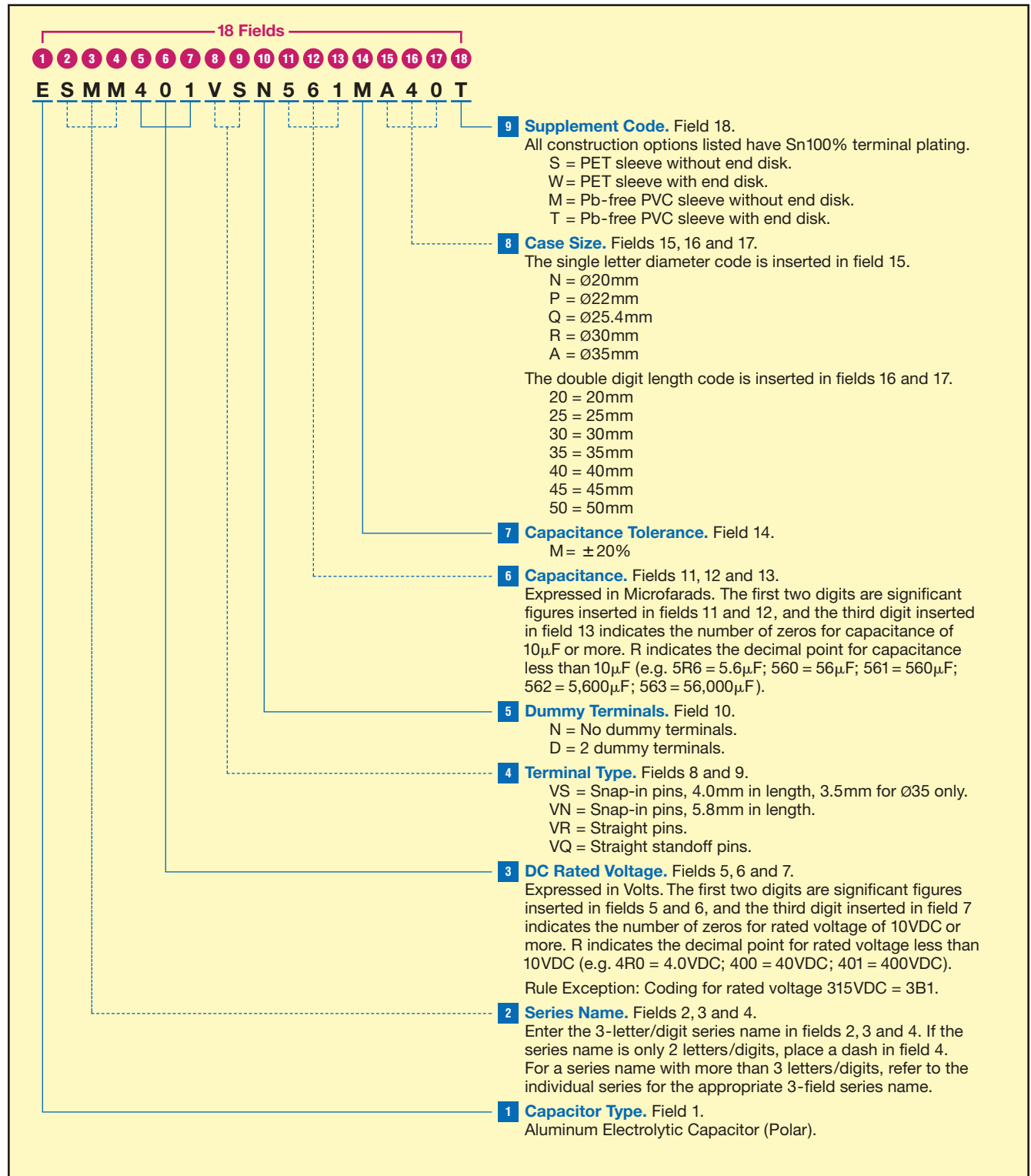
CAUTION:

* Use the blank terminals for mechanical support only. The blank terminals must not be connected to a solder trace on the PC board, but be electrically isolated from the negative or positive terminal.

**Vent may be located either on the bottom or side of the can.

Part Numbering System for SMM Series

When ordering, always specify complete 18-field global part number.



Standard Voltage Ratings - Snap Mount

Rated Voltage (WVDC)	Capacitance (μF)	Global Part Number†	Nominal Case Size* D × L (mm)	Case Size Code	Maximum ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (A rms) at +85°C, 120Hz
160 Volts 200 Volts Surge	270	ESMM161VSN271MN25T	20 × 25	N25	0.921	1.28
	330	ESMM161VSN331MN25T	20 × 25	N25	0.753	1.55
	390	ESMM161VSN391MN30T	20 × 30	N30	0.638	1.63
	470	ESMM161VSN471MN30T	20 × 30	N30	0.529	1.9
	560	ESMM161VSN561MN35T	20 × 35	N35	0.444	2.14
	680	ESMM161VSN681MN40T	20 × 40	N40	0.366	2.35
	820	ESMM161VSN821MN45T	20 × 45	N45	0.303	2.64
	270	ESMM161VSN271MP20T	22 × 20	P20	0.921	1.3
	390	ESMM161VSN391MP25T	22 × 25	P25	0.638	1.63
	470	ESMM161VSN471MP30T	22 × 30	P30	0.529	1.86
	560	ESMM161VSN561MP30T	22 × 30	P30	0.444	2.15
	680	ESMM161VSN681MP35T	22 × 35	P35	0.366	2.35
	820	ESMM161VSN821MP40T	22 × 40	P40	0.303	2.68
	1,000	ESMM161VSN102MP45T	22 × 45	P45	0.249	3.02
	1,200	ESMM161VSN122MP50T	22 × 50	P50	0.207	3.47
	390	ESMM161VSN391MQ20T	25.4 × 20	Q20	0.638	1.62
	470	ESMM161VSN471MQ25T	25.4 × 25	Q25	0.529	1.86
	560	ESMM161VSN561MQ25T	25.4 × 25	Q25	0.444	2.15
	680	ESMM161VSN681MQ30T	25.4 × 30	Q30	0.366	2.33
	820	ESMM161VSN821MQ30T	25.4 × 30	Q30	0.303	2.65
	1,000	ESMM161VSN102MQ35T	25.4 × 35	Q35	0.249	3.0
	1,200	ESMM161VSN122MQ40T	25.4 × 40	Q40	0.207	3.43
	1,500	ESMM161VSN152MQ50T	25.4 × 50	Q50	0.166	3.96
	560	ESMM161VSN561MR20T	30 × 20	R20	0.444	2.05
	680	ESMM161VSN681MR25T	30 × 25	R25	0.366	2.33
	820	ESMM161VSN821MR25T	30 × 25	R25	0.303	2.64
	1,000	ESMM161VSN102MR30T	30 × 30	R30	0.249	2.96
	1,200	ESMM161VSN122MR30T	30 × 30	R30	0.207	3.41
	1,500	ESMM161VSN152MR35T	30 × 35	R35	0.166	3.96
	1,800	ESMM161VSN182MR40T	30 × 40	R40	0.138	4.31
	2,200	ESMM161VSN222MR50T	30 × 50	R50	0.113	4.96
	680	ESMM161VSN681MA20T	35 × 20	A20	0.366	2.26
	820	ESMM161VSN821MA20T	35 × 20	A20	0.303	2.49
	1,000	ESMM161VSN102MA25T	35 × 25	A25	0.249	3.13
	1,200	ESMM161VSN122MA25T	35 × 25	A25	0.207	3.4
	1,500	ESMM161VSN152MA30T	35 × 30	A30	0.166	3.94
	1,800	ESMM161VSN182MA35T	35 × 35	A35	0.138	4.28
	2,200	ESMM161VSN222MA40T	35 × 40	A40	0.113	4.96
	2,700	ESMM161VSN272MA45T	35 × 45	A45	0.092	5.57
	3,300	ESMM161VSN332MA50T	35 × 50	A50	0.075	6.21
180 Volts 225 Volts Surge	270	ESMM181VSN271MN25T	20 × 25	N25	0.921	1.29
	330	ESMM181VSN331MN30T	20 × 30	N30	0.753	1.77
	390	ESMM181VSN391MN30T	20 × 30	N30	0.638	1.84
	470	ESMM181VSN471MN35T	20 × 35	N35	0.529	1.91
	560	ESMM181VSN561MN40T	20 × 40	N40	0.444	2.15
	680	ESMM181VSN681MN45T	20 × 45	N45	0.366	2.41
	820	ESMM181VSN821MN50T	20 × 50	N50	0.303	2.72
	220	ESMM181VSN221MP20T	22 × 20	P20	1.13	1.18
	330	ESMM181VSN331MP25T	22 × 25	P25	0.753	1.77
	390	ESMM181VSN391MP25T	22 × 25	P25	0.638	1.84
	470	ESMM181VSN471MP30T	22 × 30	P30	0.529	1.91
	560	ESMM181VSN561MP35T	22 × 35	P35	0.444	2.25
	680	ESMM181VSN681MP35T	22 × 35	P35	0.366	2.48
	820	ESMM181VSN821MP40T	22 × 40	P40	0.303	2.86
	1,000	ESMM181VSN102MP50T	22 × 50	P50	0.249	3.1
	330	ESMM181VSN331MQ20T	25.4 × 20	Q20	0.753	1.49
	470	ESMM181VSN471MQ25T	25.4 × 25	Q25	0.529	2.08

† For terminal and construction options, refer to the part numbering system for descriptions and codes.

* Refer to diagram of dimensions for detailed case size specifications.

Standard Voltage Ratings - Snap Mount

Rated Voltage (WVDC)	Capacitance (μF)	Global Part Number†	Nominal Case Size* D × L (mm)	Case Size Code	Maximum ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (A rms) at +85°C, 120Hz
180 Volts 225 Volts Surge	560	ESMM181VSN561MQ25T	25.4 × 25	Q25	0.444	2.25
	680	ESMM181VSN681MQ30T	25.4 × 30	Q30	0.366	2.5
	820	ESMM181VSN821MQ35T	25.4 × 35	Q35	0.303	2.75
	1,000	ESMM181VSN102MQ40T	25.4 × 40	Q40	0.249	3.06
	1,200	ESMM181VSN122MQ45T	25.4 × 45	Q45	0.207	3.63
	470	ESMM181VSN471MR20T	30 × 20	R20	0.529	1.88
	680	ESMM181VSN681MR25T	30 × 25	R25	0.366	2.46
	820	ESMM181VSN821MR25T	30 × 25	R25	0.303	2.69
	1,000	ESMM181VSN102MR30T	30 × 30	R30	0.249	3.1
	1,200	ESMM181VSN122MR35T	30 × 35	R35	0.207	3.55
	1,500	ESMM181VSN152MR40T	30 × 40	R40	0.166	4.1
	1,800	ESMM181VSN182MR45T	30 × 45	R45	0.138	4.55
	680	ESMM181VSN681MA20T	35 × 20	A20	0.366	2.26
	1,000	ESMM181VSN102MA25T	35 × 25	A25	0.249	2.98
	1,200	ESMM181VSN122MA30T	35 × 30	A30	0.207	3.49
	1,500	ESMM181VSN152MA35T	35 × 35	A35	0.166	4.02
	1,800	ESMM181VSN182MA35T	35 × 35	A35	0.138	4.54
	2,200	ESMM181VSN222MA40T	35 × 40	A40	0.113	4.83
	2,700	ESMM181VSN272MA50T	35 × 50	A50	0.092	5.3
200 Volts 250 Volts Surge	220	ESMM201VSN221MN25T	20 × 25	N25	1.13	1.19
	270	ESMM201VSN271MN25T	20 × 25	N25	0.921	1.39
	330	ESMM201VSN331MN30T	20 × 30	N30	0.753	1.56
	390	ESMM201VSN391MN35T	20 × 35	N35	0.638	1.74
	470	ESMM201VSN471MN35T	20 × 35	N35	0.529	2.03
	560	ESMM201VSN561MN40T	20 × 40	N40	0.444	2.18
	680	ESMM201VSN681MN50T	20 × 50	N50	0.366	2.48
	220	ESMM201VSN221MP20T	22 × 20	P20	1.13	1.18
	270	ESMM201VSN221MP25T	22 × 25	P25	0.921	1.37
	330	ESMM201VSN331MP25T	22 × 25	P25	0.753	1.51
	390	ESMM201VSN391MP30T	22 × 30	P30	0.638	1.73
	470	ESMM201VSN471MP30T	22 × 30	P30	0.529	1.97
	560	ESMM201VSN561MP35T	22 × 35	P35	0.444	2.18
	680	ESMM201VSN681MP40T	22 × 40	P40	0.366	2.48
	820	ESMM201VSN821MP45T	22 × 45	P45	0.303	2.81
	1,000	ESMM201VSN102MP50T	22 × 50	P50	0.249	3.28
	270	ESMM201VSN271MQ20T	25.4 × 20	Q20	0.921	1.35
	330	ESMM201VSN331MQ20T	25.4 × 20	Q20	0.753	1.49
	390	ESMM201VSN391MQ25T	25.4 × 25	Q25	0.638	1.71
	470	ESMM201VSN471MQ25T	25.4 × 25	Q25	0.529	1.95
	560	ESMM201VSN561MQ30T	25.4 × 30	Q30	0.444	2.15
	680	ESMM201VSN681MQ30T	25.4 × 30	Q30	0.366	2.48
	820	ESMM201VSN821MQ35T	25.4 × 35	Q35	0.303	2.79
	1,000	ESMM201VSN102MQ40T	25.4 × 40	Q40	0.249	3.28
	1,200	ESMM201VSN122MQ45T	25.4 × 45	Q45	0.207	3.61
	390	ESMM201VSN391MR20T	30 × 20	R20	0.638	1.71
	470	ESMM201VSN471MR20T	30 × 20	R20	0.529	1.88
	560	ESMM201VSN561MR25T	30 × 25	R25	0.444	2.15
	680	ESMM201VSN681MR25T	30 × 25	R25	0.366	2.48
	820	ESMM201VSN821MR30T	30 × 30	R30	0.303	2.8
	1,000	ESMM201VSN102MR35T	30 × 35	R35	0.249	3.15
	1,200	ESMM201VSN122MR35T	30 × 35	R35	0.207	3.61
	1,500	ESMM201VSN152MR45T	30 × 45	R45	0.166	4.13
	1,800	ESMM201VSN182MR50T	30 × 50	R50	0.138	4.6
	470	ESMM201VSN471MA20T	35 × 20	A20	0.529	1.88
	560	ESMM201VSN561MA20T	35 × 20	A20	0.444	2.05
	680	ESMM201VSN681MA20T	35 × 20	A20	0.366	2.36
	820	ESMM201VSN821MA25T	35 × 25	A25	0.303	2.83
	1,000	ESMM201VSN102MA30T	35 × 30	A30	0.249	3.26

†For terminal and construction options, refer to the part numbering system for descriptions and codes.

*Refer to diagram of dimensions for detailed case size specifications.

Standard Voltage Ratings - Snap Mount

Rated Voltage (WVDC)	Capacitance (μF)	Global Part Number†	Nominal Case Size* D × L (mm)	Case Size Code	Maximum ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (A rms) at +85°C, 120Hz
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200 Volts 250 Volts Surge	1,200	ESMM201VSN122MA30T	35 × 30	A30	0.207	3.57
	1,500	ESMM201VSN152MA35T	35 × 35	A35	0.166	4.06
	1,800	ESMM201VSN182MA40T	35 × 40	A40	0.138	4.59
	2,200	ESMM201VSN222MA45T	35 × 45	A45	0.113	5.25

220 Volts 270 Volts Surge	220	ESMM221VSN221MN25T	20 × 25	N25	1.13	1.25
	270	ESMM221VSN271MN30T	20 × 30	N30	0.921	1.46
	330	ESMM221VSN331MN35T	20 × 35	N35	0.753	1.64
	390	ESMM221VSN391MN40T	20 × 40	N40	0.638	1.84
	470	ESMM221VSN471MN45T	20 × 45	N45	0.529	2.12
	560	ESMM221VSN561MN50T	20 × 50	N50	0.444	2.33
	180	ESMM221VSN181MP20T	22 × 20	P20	1.381	1.06
	270	ESMM221VSN271MP25T	22 × 25	P25	0.921	1.47
	330	ESMM221VSN331MP30T	22 × 30	P30	0.753	1.7
	390	ESMM221VSN391MP35T	22 × 35	P35	0.638	1.89
	470	ESMM221VSN471MP35T	22 × 35	P35	0.529	2.0
	560	ESMM221VSN561MP40T	22 × 40	P40	0.444	2.33
	680	ESMM221VSN681MP45T	22 × 45	P45	0.366	2.63
	270	ESMM221VSN271MQ20T	25.4 × 20	Q20	0.921	1.35
	330	ESMM221VSN331MQ25T	25.4 × 25	Q25	0.753	1.69
	390	ESMM221VSN391MQ25T	25.4 × 25	Q25	0.638	1.84
	470	ESMM221VSN471MQ30T	25.4 × 30	Q30	0.529	2.08
	560	ESMM221VSN561MQ35T	25.4 × 35	Q35	0.444	2.38
	680	ESMM221VSN681MQ40T	25.4 × 40	Q40	0.366	2.68
	820	ESMM221VSN821MQ45T	25.4 × 45	Q45	0.303	3.01
	1,000	ESMM221VSN102MQ50T	25.4 × 50	Q50	0.249	3.4
	330	ESMM221VSN331MR20T	30 × 20	R20	0.753	1.58
	390	ESMM221VSN391MR20T	30 × 20	R20	0.638	1.71
	470	ESMM221VSN471MR25T	30 × 25	R25	0.529	2.12
	560	ESMM221VSN561MR25T	30 × 25	R25	0.444	2.31
	680	ESMM221VSN681MR30T	30 × 30	R30	0.366	2.62
	820	ESMM221VSN821MR35T	30 × 35	R35	0.303	2.99
	1,000	ESMM221VSN102MR40T	30 × 40	R40	0.249	3.42
	1,200	ESMM221VSN122MR45T	30 × 45	R45	0.207	3.88
	1,500	ESMM221VSN152MR50T	30 × 50	R50	0.166	4.44
	390	ESMM221VSN391MA20T	35 × 20	A20	0.638	1.79
	470	ESMM221VSN471MA20T	35 × 20	A20	0.529	1.88
	560	ESMM221VSN561MA20T	35 × 20	A20	0.444	2.14
	680	ESMM221VSN681MA25T	35 × 25	A25	0.366	2.58
	820	ESMM221VSN821MA30T	35 × 30	A30	0.303	2.79
	1,000	ESMM221VSN102MA30T	35 × 30	A30	0.249	3.29
	1,200	ESMM221VSN122MA35T	35 × 35	A35	0.207	3.68
	1,500	ESMM221VSN152MA40T	35 × 40	A40	0.166	4.10
	1,800	ESMM221VSN182MA45T	35 × 45	A45	0.138	4.52

250 Volts 300 Volts Surge	180	ESMM251VSN181MN25T	20 × 25	N25	1.381	1.20
	220	ESMM251VSN221MN25T	20 × 25	N25	1.13	1.26
	270	ESMM251VSN271MN30T	20 × 30	N30	0.921	1.42
	330	ESMM251VSN331MN35T	20 × 35	N35	0.753	1.68
	390	ESMM251VSN391MN40T	20 × 40	N40	0.638	1.92
	470	ESMM251VSN471MN50T	20 × 50	N50	0.529	2.06
	150	ESMM251VSN151MP20T	22 × 20	P20	1.658	0.97
	180	ESMM251VSN181MP20T	22 × 20	P20	1.381	1.06
	220	ESMM251VSN221MP25T	22 × 25	P25	1.13	1.24
	270	ESMM251VSN271MP25T	22 × 25	P25	0.921	1.5
	330	ESMM251VSN331MP30T	22 × 30	P30	0.753	1.66
	390	ESMM251VSN391MP35T	22 × 35	P35	0.638	1.88
	470	ESMM251VSN471MP35T	22 × 35	P35	0.529	2.15

† For terminal and construction options, refer to the part numbering system for descriptions and codes.

* Refer to diagram of dimensions for detailed case size specifications.

Standard Voltage Ratings - Snap Mount

Rated Voltage (WVDC)	Capacitance (μF)	Global Part Number†	Nominal Case Size* D × L (mm)	Case Size Code	Maximum ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (A rms) at +85°C, 120Hz
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250 Volts 300 Volts Surge	560	ESMM251VSN561MP40T	22 × 40	P40	0.444	2.48
	680	ESMM251VSN681MP50T	22 × 50	P50	0.366	2.61
	220	ESMM251VSN221MQ20T	25.4 × 20	Q20	1.13	1.22
	330	ESMM251VSN331MQ25T	25.4 × 25	Q25	0.753	1.61
	390	ESMM251VSN391MQ30T	25.4 × 30	Q30	0.638	1.88
	470	ESMM251VSN471MQ35T	25.4 × 35	Q35	0.529	2.15
	560	ESMM251VSN561MQ35T	25.4 × 35	Q35	0.444	2.35
	680	ESMM251VSN681MQ40T	25.4 × 40	Q40	0.366	2.67
	820	ESMM251VSN821MQ45T	25.4 × 45	Q45	0.303	3.01
	330	ESMM251VSN331MR20T	30 × 20	R20	0.753	1.58
	390	ESMM251VSN391MR25T	30 × 25	R25	0.638	1.86
	470	ESMM251VSN471MR25T	30 × 25	R25	0.529	2.05
	560	ESMM251VSN561MR25T	30 × 25	R25	0.444	2.35
	680	ESMM251VSN681MR30T	30 × 30	R30	0.366	2.71
	820	ESMM251VSN821MR35T	30 × 35	R35	0.303	2.98
	1,000	ESMM251VSN102MR40T	30 × 40	R40	0.249	3.56
	1,200	ESMM251VSN122MR45T	30 × 45	R45	0.207	3.99
	390	ESMM251VSN391MA20T	35 × 20	A20	0.638	1.71
	470	ESMM251VSN471MA20T	35 × 20	A20	0.529	1.88
	680	ESMM251VSN681MA25T	35 × 25	A25	0.366	2.58
	820	ESMM251VSN821MA30T	35 × 30	A30	0.303	2.96
	1,000	ESMM251VSN102MA35T	35 × 35	A35	0.249	3.48
	1,200	ESMM251VSN122MA35T	35 × 35	A35	0.207	3.84
	1,500	ESMM251VSN152MA40T	35 × 40	A40	0.166	4.33
	1,800	ESMM251VSN182MA50T	35 × 50	A50	0.138	4.54

315 Volts 365 Volts Surge	120	ESMM3B1VSN121MN25T	20 × 25	N25	2.763	0.89
	150	ESMM3B1VSN151MN30T	20 × 30	N30	2.21	1.05
	180	ESMM3B1VSN181MN35T	20 × 35	N35	1.381	1.18
	220	ESMM3B1VSN221MN35T	20 × 35	N35	1.13	1.3
	270	ESMM3B1VSN271MN45T	20 × 45	N45	0.921	1.52
	330	ESMM3B1VSN331MN50T	20 × 50	N50	0.753	1.73
	100	ESMM3B1VSN101MP20T	22 × 20	P20	3.315	0.79
	150	ESMM3B1VSN151MP25T	22 × 25	P25	2.21	1.06
	180	ESMM3B1VSN181MP30T	22 × 30	P30	1.381	1.29
	220	ESMM3B1VSN221MP30T	22 × 30	P30	1.13	1.41
	270	ESMM3B1VSN271MP35T	22 × 35	P35	0.921	1.68
	330	ESMM3B1VSN331MP40T	22 × 40	P40	0.753	1.91
	390	ESMM3B1VSN391MP45T	22 × 45	P45	0.638	2.07
	120	ESMM3B1VSN121MQ20T	25.4 × 20	Q20	2.763	0.9
	150	ESMM3B1VSN151MQ20T	25.4 × 20	Q20	2.21	1.0
	180	ESMM3B1VSN181MQ25T	25.4 × 25	Q25	1.381	1.38
	220	ESMM3B1VSN221MQ25T	25.4 × 25	Q25	1.13	1.47
	270	ESMM3B1VSN271MQ30T	25.4 × 30	Q30	0.921	1.7
	330	ESMM3B1VSN331MQ35T	25.4 × 35	Q35	0.753	1.94
	390	ESMM3B1VSN391MQ40T	25.4 × 40	Q40	0.638	2.11
	470	ESMM3B1VSN471MQ45T	25.4 × 45	Q45	0.529	2.31
	560	ESMM3B1VSN561MQ50T	25.4 × 50	Q50	0.444	2.46
	180	ESMM3B1VSN181MR20T	30 × 20	R20	1.381	1.16
	220	ESMM3B1VSN221MR20T	30 × 20	R20	1.13	1.28
	270	ESMM3B1VSN271MR25T	30 × 25	R25	0.921	1.55
	330	ESMM3B1VSN331MR25T	30 × 25	R25	0.753	1.98
	390	ESMM3B1VSN391MR30T	30 × 30	R30	0.638	2.15
	470	ESMM3B1VSN471MR35T	30 × 35	R35	0.529	2.38
	560	ESMM3B1VSN561MR35T	30 × 35	R35	0.444	2.63
	680	ESMM3B1VSN681MR45T	30 × 45	R45	0.366	2.82
	820	ESMM3B1VSN821MR50T	30 × 50	R50	0.303	3.28
	270	ESMM3B1VSN271MA20T	35 × 20	A20	0.921	1.43
	390	ESMM3B1VSN391MA25T	35 × 25	A25	0.638	1.95

†For terminal and construction options, refer to the part numbering system for descriptions and codes.

*Refer to diagram of dimensions for detailed case size specifications.

Standard Voltage Ratings - Snap Mount

Rated Voltage (WVDC)	Capacitance (μF)	Global Part Number†	Nominal Case Size* D × L (mm)	Case Size Code	Maximum ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (A rms) at +85°C, 120Hz
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315 Volts 365 Volts Surge	470	ESMM3B1VSN471MA30T	35 × 30	A30	0.529	2.46
	560	ESMM3B1VSN561MA30T	35 × 30	A30	0.444	2.69
	680	ESMM3B1VSN681MA35T	35 × 35	A35	0.366	3.05
	820	ESMM3B1VSN821MA40T	35 × 40	A40	0.303	3.45
	1,000	ESMM3B1VSN102MA45T	35 × 45	A45	0.249	3.59

350 Volts 400 Volts Surge	100	ESMM351VSN101MN25T	20 × 25	N25	3.315	0.81
	120	ESMM351VSN121MN30T	20 × 30	N30	2.763	0.96
	150	ESMM351VSN151MN30T	20 × 30	N30	2.21	1.1
	180	ESMM351VSN181MN35T	20 × 35	N35	1.381	1.24
	220	ESMM351VSN221MN45T	20 × 45	N45	1.13	1.37
	270	ESMM351VSN271MN50T	20 × 50	N50	0.921	1.56
	82	ESMM351VSN820MP20T	22 × 20	P20	4.043	0.72
	120	ESMM351VSN121MP25T	22 × 25	P25	2.763	1.04
	150	ESMM351VSN151MP30T	22 × 30	P30	2.21	1.2
	180	ESMM351VSN181MP30T	22 × 30	P30	1.381	1.34
	220	ESMM351VSN221MP35T	22 × 35	P35	1.13	1.47
	270	ESMM351VSN271MP40T	22 × 40	P40	0.921	1.7
	330	ESMM351VSN331MP45T	22 × 45	P45	0.753	1.87
	120	ESMM351VSN121MQ20T	25.4 × 20	Q20	2.763	0.9
	150	ESMM351VSN151MQ25T	25.4 × 25	Q25	2.21	1.22
	180	ESMM351VSN181MQ25T	25.4 × 25	Q25	1.381	1.37
	220	ESMM351VSN221MQ30T	25.4 × 30	Q30	1.13	1.53
	270	ESMM351VSN271MQ35T	25.4 × 35	Q35	0.921	1.73
	330	ESMM351VSN331MQ35T	25.4 × 35	Q35	0.753	1.97
	390	ESMM351VSN391MQ40T	25.4 × 40	Q40	0.638	2.14
	470	ESMM351VSN471MQ50T	25.4 × 50	Q50	0.529	2.55
	150	ESMM351VSN151MR20T	30 × 20	R20	2.21	1.06
	180	ESMM351VSN181MR20T	30 × 20	R20	1.381	1.16
	220	ESMM351VSN221MR25T	30 × 25	R25	1.13	1.54
	270	ESMM351VSN271MR25T	30 × 25	R25	0.921	1.8
	330	ESMM351VSN331MR30T	30 × 30	R30	0.753	2.03
	390	ESMM351VSN391MR35T	30 × 35	R35	0.638	2.23
	470	ESMM351VSN471MR35T	30 × 35	R35	0.529	2.53
	560	ESMM351VSN561MR40T	30 × 40	R40	0.444	2.73
	680	ESMM351VSN681MR50T	30 × 50	R50	0.366	3.15
	220	ESMM351VSN221MA20T	35 × 20	A20	1.13	1.29
	270	ESMM351VSN271MA20T	35 × 20	A20	0.921	1.49
	330	ESMM351VSN331MA25T	35 × 25	A25	0.753	1.8
	390	ESMM351VSN391MA30T	35 × 30	A30	0.638	2.3
	470	ESMM351VSN471MA30T	35 × 30	A30	0.529	2.55
	560	ESMM351VSN561MA35T	35 × 35	A35	0.444	2.75
	680	ESMM351VSN681MA40T	35 × 40	A40	0.366	3.15
	820	ESMM351VSN821MA45T	35 × 45	A45	0.303	3.47
	1,000	ESMM351VSN102MA50T	35 × 50	A50	0.249	3.6

400 Volts 450 Volts Surge	68	ESMM401VSN680MN25T	20 × 25	N25	4.875	0.75
	82	ESMM401VSN820MN30T	20 × 30	N30	4.043	0.82
	100	ESMM401VSN101MN30T	20 × 30	N30	3.315	0.95
	120	ESMM401VSN121MN35T	20 × 35	N35	2.763	1.07
	150	ESMM401VSN151MN40T	20 × 40	N40	2.21	1.22
	180	ESMM401VSN181MN45T	20 × 45	N45	1.842	1.28
	220	ESMM401VSN221MN50T	20 × 50	N50	1.507	1.41
	68	ESMM401VSN680MP20T	22 × 20	P20	4.878	0.65
	82	ESMM401VSN820MP25T	22 × 25	P25	4.043	0.84
	100	ESMM401VSN101MP25T	22 × 25	P25	3.315	0.99
	120	ESMM401VSN121MP30T	22 × 30	P30	2.763	1.09
	150	ESMM401VSN151MP35T	22 × 35	P35	2.21	1.24
	180	ESMM401VSN181MP40T	22 × 40	P40	1.842	1.41

† For terminal and construction options, refer to the part numbering system for descriptions and codes.

* Refer to diagram of dimensions for detailed case size specifications.

Standard Voltage Ratings - Snap Mount

Rated Voltage (WVDC)	Capacitance (μF)	Global Part Number†	Nominal Case Size* D × L (mm)	Case Size Code	Maximum ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (A rms) at +85°C, 120Hz
400 Volts 450 Volts Surge	220	ESMM401VSN221MP45T	22 × 45	P45	1.507	1.58
	270	ESMM401VSN271MP50T	22 × 50	P50	1.228	1.65
	82	ESMM401VSN820MQ20T	25.4 × 20	Q20	4.043	0.74
	100	ESMM401VSN101MQ20T	25.4 × 20	Q20	3.315	0.82
	120	ESMM401VSN121MQ25T	25.4 × 25	Q25	2.763	1.13
	150	ESMM401VSN151MQ30T	25.4 × 30	Q30	2.21	1.27
	180	ESMM401VSN181MQ30T	25.4 × 30	Q30	1.842	1.44
	220	ESMM401VSN221MQ35T	25.4 × 35	Q35	1.507	1.64
	270	ESMM401VSN271MQ40T	25.4 × 40	Q40	1.228	1.79
	330	ESMM401VSN331MQ45T	25.4 × 45	Q45	1.005	2.0
	390	ESMM401VSN391MQ50T	25.4 × 50	Q50	0.85	2.12
	120	ESMM401VSN121MR20T	30 × 20	R20	2.763	0.95
	150	ESMM401VSN151MR25T	30 × 25	R25	2.21	1.2
	180	ESMM401VSN181MR25T	30 × 25	R25	1.842	1.52
	220	ESMM401VSN221MR30T	30 × 30	R30	1.507	1.66
	270	ESMM401VSN271MR30T	30 × 30	R30	1.228	1.82
	330	ESMM401VSN331MR35T	30 × 35	R35	1.005	2.05
	390	ESMM401VSN391MR40T	30 × 40	R40	0.85	2.26
	470	ESMM401VSN471MR45T	30 × 45	R45	0.705	2.51
	560	ESMM401VSN561MR50T	30 × 50	R50	0.592	2.85
	180	ESMM401VSN181MA20T	35 × 20	A20	1.842	1.16
	220	ESMM401VSN221MA25T	35 × 25	A25	1.507	1.47
	270	ESMM401VSN271MA25T	35 × 25	A25	1.228	1.63
	330	ESMM401VSN331MA30T	35 × 30	A30	1.005	2.05
	390	ESMM401VSN391MA35T	35 × 35	A35	0.85	2.28
	470	ESMM401VSN471MA35T	35 × 35	A35	0.705	2.54
	560	ESMM401VSN561MA40T	35 × 40	A40	0.592	2.85
	680	ESMM401VSN681MA50T	35 × 50	A50	0.488	3.1
420 Volts 470 Volts Surge	56	ESMM421VSN560MN25T	20 × 25	N25	5.92	0.58
	68	ESMM421VSN680MN25T	20 × 25	N25	4.875	0.7
	82	ESMM421VSN820MN30T	20 × 30	N30	4.043	0.8
	100	ESMM421VSN101MN35T	20 × 35	N35	3.315	0.9
	120	ESMM421VSN121MN35T	20 × 35	N35	2.763	1.04
	150	ESMM421VSN151MN40T	20 × 40	N40	2.21	1.17
	180	ESMM421VSN181MN50T	20 × 50	N50	1.842	1.27
	47	ESMM421VSN470MP20T	22 × 20	P20	7.053	0.54
	56	ESMM421VSN560MP20T	22 × 20	P20	5.92	0.59
	82	ESMM421VSN820MP25T	22 × 25	P25	4.043	0.85
	100	ESMM421VSN101MP30T	22 × 30	P30	3.315	0.97
	120	ESMM421VSN121MP30T	22 × 30	P30	2.763	1.07
	150	ESMM421VSN151MP35T	22 × 35	P35	2.21	1.21
	180	ESMM421VSN181MP40T	22 × 40	P40	1.842	1.33
	220	ESMM421VSN221MP45T	22 × 45	P45	1.507	1.55
	68	ESMM421VSN680MQ20T	25.4 × 20	Q20	4.875	0.68
	82	ESMM421VSN820MQ20T	25.4 × 20	Q20	4.043	0.74
	100	ESMM421VSN101MQ25T	25.4 × 25	Q25	3.315	0.98
	120	ESMM421VSN121MQ25T	25.4 × 25	Q25	2.763	1.08
	150	ESMM421VSN151MQ30T	25.4 × 30	Q30	2.21	1.26
	180	ESMM421VSN181MQ35T	25.4 × 35	Q35	1.842	1.42
	220	ESMM421VSN221MQ35T	25.4 × 35	Q35	1.507	1.58
	270	ESMM421VSN271MQ40T	25.4 × 40	Q40	1.228	1.74
	330	ESMM421VSN331MQ50T	25.4 × 50	Q50	1.005	2.2
	100	ESMM421VSN101MR20T	30 × 20	R20	3.315	0.87
	120	ESMM421VSN121MR20T	30 × 20	R20	2.763	0.95
	150	ESMM421VSN151MR25T	30 × 25	R25	2.21	1.3
	180	ESMM421VSN181MR25T	30 × 25	R25	1.842	1.48
	220	ESMM421VSN221MR30T	30 × 30	R30	1.507	1.65
	270	ESMM421VSN271MR35T	30 × 35	R35	1.228	1.9

†For terminal and construction options, refer to the part numbering system for descriptions and codes.

*Refer to diagram of dimensions for detailed case size specifications.

Standard Voltage Ratings - Snap Mount

Rated Voltage (WVDC)	Capacitance (μF)	Global Part Number†	Nominal Case Size* D × L (mm)	Case Size Code	Maximum ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (A rms) at +85°C, 120Hz
420 Volts 470 Volts Surge	330	ESMM421VSN331MR35T	30 × 35	R35	1.005	1.98
	390	ESMM421VSN391MR40T	30 × 40	R40	0.85	2.22
	470	ESMM421VSN471MR45T	30 × 45	R45	0.705	2.5
	150	ESMM421VSN151MA20T	35 × 20	A20	2.21	1.11
	180	ESMM421VSN181MA20T	35 × 20	A20	1.842	1.16
	220	ESMM421VSN221MA25T	35 × 25	A25	1.507	1.47
	270	ESMM421VSN271MA30T	35 × 30	A30	1.228	1.94
	330	ESMM421VSN331MA35T	35 × 35	A35	1.005	2.17
	390	ESMM421VSN391MA35T	35 × 35	A35	0.85	2.27
	470	ESMM421VSN471MA40T	35 × 40	A40	0.705	2.61
	560	ESMM421VSN561MA45T	35 × 45	A45	0.592	2.95
	680	ESMM421VSN681MA50T	35 × 50	A50	0.488	3.15
450 Volts 500 Volts Surge	56	ESMM451VSN560MN25T	20 × 25	N25	5.92	0.61
	68	ESMM451VSN680MN30T	20 × 30	N30	4.875	0.71
	82	ESMM451VSN820MN35T	20 × 35	N35	4.043	0.8
	100	ESMM451VSN101MN35T	20 × 35	N35	3.315	0.88
	120	ESMM451VSN121MN40T	20 × 40	N40	2.763	0.99
	150	ESMM451VSN151MN45T	20 × 45	N45	2.21	1.13
	47	ESMM451VSN470MP20T	22 × 20	P20	7.053	0.54
	56	ESMM451VSN560MP20T	22 × 20	P20	5.92	0.59
	68	ESMM451VSN680MP25T	22 × 25	P25	4.875	0.71
	82	ESMM451VSN820MP25T	22 × 25	P25	4.043	0.86
	100	ESMM451VSN101MP30T	22 × 30	P30	3.315	0.95
	120	ESMM451VSN121MP35T	22 × 35	P35	2.763	1.07
	150	ESMM451VSN151MP40T	22 × 40	P40	2.21	1.18
	180	ESMM451VSN181MP45T	22 × 45	P45	1.842	1.32
	220	ESMM451VSN221MP50T	22 × 50	P50	1.507	1.48
	68	ESMM451VSN680MQ20T	25.4 × 20	Q20	4.875	0.68
	82	ESMM451VSN820MQ20T	25.4 × 20	Q20	4.043	0.74
	100	ESMM451VSN101MQ25T	25.4 × 25	Q25	3.315	0.97
	120	ESMM451VSN121MQ30T	25.4 × 30	Q30	2.763	1.09
	150	ESMM451VSN151MQ30T	25.4 × 30	Q30	2.21	1.25
	180	ESMM451VSN181MQ35T	25.4 × 35	Q35	1.842	1.4
	220	ESMM451VSN221MQ40T	25.4 × 40	Q40	1.507	1.59
	270	ESMM451VSN271MQ45T	25.4 × 45	Q45	1.228	1.73
	330	ESMM451VSN331MQ50T	25.4 × 50	Q50	1.005	2.12
	82	ESMM451VSN820MR20T	30 × 20	R20	4.043	0.79
	100	ESMM451VSN101MR20T	30 × 20	R20	3.315	0.87
	120	ESMM451VSN121MR25T	30 × 25	R25	2.763	1.12
	150	ESMM451VSN151MR25T	30 × 25	R25	2.21	1.29
	180	ESMM451VSN181MR30T	30 × 30	R30	1.842	1.45
	220	ESMM451VSN221MR30T	30 × 30	R30	1.507	1.64
	270	ESMM451VSN271MR35T	30 × 35	R35	1.228	1.89
	330	ESMM451VSN331MR40T	30 × 40	R40	1.005	2.12
	390	ESMM451VSN391MR45T	30 × 45	R45	0.85	2.35
	470	ESMM451VSN471MR50T	30 × 50	R50	0.705	2.65
	120	ESMM451VSN121MA20T	35 × 20	A20	2.763	0.99
	150	ESMM451VSN151MA20T	35 × 20	A20	2.21	1.06
	180	ESMM451VSN181MA25T	35 × 25	A25	1.842	1.33
	220	ESMM451VSN221MA25T	35 × 25	A25	1.507	1.66
	270	ESMM451VSN271MA30T	35 × 30	A30	1.228	1.9
	330	ESMM451VSN331MA35T	35 × 35	A35	1.005	2.15
	390	ESMM451VSN391MA40T	35 × 40	A40	0.85	2.38
	470	ESMM451VSN471MA45T	35 × 45	A45	0.705	2.68
	560	ESMM451VSN561MA50T	35 × 50	A50	0.592	2.88

†For terminal and construction options, refer to the part numbering system for descriptions and codes.

*Refer to diagram of dimensions for detailed case size specifications.

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United Chemi-Con (UCC):

<u>ESMM161VND472MA63T</u>	<u>ESMM250VNN103MP35T</u>	<u>ESMM351VND182MB80T</u>	<u>ESMM350VNN183MA35T</u>
<u>ESMM350VNN103MA25T</u>	<u>ESMM421VNN221MA25T</u>	<u>ESMM630VNN332MA20W</u>	<u>ESMM421VNN681MA50T</u>
<u>ESMM201VNN152MR45T</u>	<u>ESMM451VNN821MA80T</u>	<u>ESMM251VND222MA63T</u>	<u>ESMM350VNN273MA45T</u>
<u>ESMM800VNN332MQ40T</u>	<u>ESMM401VNN101MQ25T</u>	<u>ESMM250VNN223MQ50T</u>	<u>ESMM421VNN151MQ30T</u>
<u>ESMM500VNN223MA50T</u>	<u>ESMM501VND391MA50T</u>	<u>ESMM451VND122MB80T</u>	<u>ESMM401VND102MA63T</u>
<u>ESMM501VNN391MA50T</u>	<u>ESMM350VNN562MQ25T</u>	<u>ESMM421VNN121MQ25W</u>	<u>ESMM800VNN123MA63T</u>
<u>ESMM500VNN103MQ50T</u>	<u>ESMM401VND152MB80T</u>	<u>ESMM101VNN682MA50W</u>	<u>ESMM250VNN473MA50T</u>
<u>ESMM451VND821MB63T</u>	<u>ESMM500VNN273MB50T</u>	<u>ESMM351VND102MA50T</u>	<u>ESMM401VNN680MQ20T</u>
<u>ESMM201VND222MB40T</u>	<u>ESMM401VNN221MP40T</u>	<u>ESMM251VND152MA40T</u>	<u>ESMM250VNN333MR50T</u>
<u>ESMM451VNN331MQ50T</u>	<u>ESMM251VND471MA20W</u>	<u>ESMM500VNN183MA45T</u>	<u>ESMM500VNN822MR35T</u>
<u>ESMM500VNN103MR40T</u>	<u>ESMM401VNN561MA40T</u>	<u>ESMM630VND123MA50T</u>	<u>ESMM421VNN471MA40T</u>
<u>ESMM401VNN331MR35W</u>	<u>ESMM451VND561MA50T</u>	<u>ESMM451VNN561MA50T</u>	<u>ESMM500VND223MA50T</u>
<u>ESMM451VND821MA63T</u>	<u>ESMM500VNN153MA45T</u>		