

Type 381LR 105 °C Highest Ripple, Snap-In Aluminum

Ultra-High Ripple Capabilities



Compared to standard 105 °C snap-ins like the Type 381L/LX Type 381LR can handle an extra 25% ripple current or more. This remarkable capability stems from advances in electrolyte that give extremely low ESR values. In high ripple current applications like motor drives you can save by using fewer capacitors.

Highlights

- The right choice for motor drive bus capacitors
- The right choice for UPS bus capacitors
- Compare to Type 381L
- Up to 2 times the ripple current

Specifications

| Temperature Range | -40 °C to + 105 °C ≤ 315 Vdc -25 °C to + 105 °C ≥ 350 Vdc | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|--|--------|---------|--------|-------------|--------|------|------|------|------|------|-------|-------|--------|---------|-------|-------------|------|------|------|------|------|------|
| Rated Voltage Range | 200 Vdc to 450 Vdc | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 56 µF to 2,200 µF | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ± 20% | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current | ≤ 3 \sqrt{CV} µA, 4 mA max, 5 minutes | | | | | | | | | | | | | | | | | | | | | | |
| Ripple Current Multipliers | <p>Ambient Temperature</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>60 °C</th> <th>70 °C</th> <th>85 °C</th> <th>105 °C</th> </tr> </thead> <tbody> <tr> <td>2.35</td> <td>2.20</td> <td>2.00</td> <td>1.70</td> <td>1.00</td> </tr> </tbody> </table> <p>Frequency</p> <table border="1"> <thead> <tr> <th>50 Hz</th> <th>60 Hz</th> <th>120 Hz</th> <th>500 kHz</th> <th>1 kHz</th> <th>10 kHz & Up</th> </tr> </thead> <tbody> <tr> <td>0.75</td> <td>0.80</td> <td>1.00</td> <td>1.20</td> <td>1.25</td> <td>1.40</td> </tr> </tbody> </table> | 45 °C | 60 °C | 70 °C | 85 °C | 105 °C | 2.35 | 2.20 | 2.00 | 1.70 | 1.00 | 50 Hz | 60 Hz | 120 Hz | 500 kHz | 1 kHz | 10 kHz & Up | 0.75 | 0.80 | 1.00 | 1.20 | 1.25 | 1.40 |
| 45 °C | 60 °C | 70 °C | 85 °C | 105 °C | | | | | | | | | | | | | | | | | | | |
| 2.35 | 2.20 | 2.00 | 1.70 | 1.00 | | | | | | | | | | | | | | | | | | | |
| 50 Hz | 60 Hz | 120 Hz | 500 kHz | 1 kHz | 10 kHz & Up | | | | | | | | | | | | | | | | | | |
| 0.75 | 0.80 | 1.00 | 1.20 | 1.25 | 1.40 | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics | Impedance ratio: $Z_{-20^{\circ}\text{C}}/Z_{+25^{\circ}\text{C}}$ ≤ 3 (200–450Vdc) | | | | | | | | | | | | | | | | | | | | | | |
| Endurance Life Test | 3000 h at full load at 105 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life Test | 1000 h at 105 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit | | | | | | | | | | | | | | | | | | | | | | |
| Vibration | 10 to 55 Hz, 0.06" and 10 g max, 2 h each plane | | | | | | | | | | | | | | | | | | | | | | |
| RoHS Compliant | | | | | | | | | | | | | | | | | | | | | | | |

Type 381LR 105 °C Highest Ripple, Snap-In Aluminum

Ultra-High Ripple Capabilities

Part Numbering System



Outline Drawing



Dimensions shown are in mm

Note that for 200 volts and under the insulating end disc is optional - If one is needed add a (+D) to the end of the part numbering system.

Insulated Case Dimensions

| Case Code | DIAMETER D | | LENGTH L | | Typical Weight (grams) | Case Code | DIAMETER D | | LENGTH L | | Typical Weight (grams) |
|-----------|------------|--------|----------|--------|------------------------|-----------|------------|--------|----------|--------|------------------------|
| | mm | inches | mm | inches | | | mm | inches | mm | inches | |
| H01 | 22 | 0.87 | 25 | 0.98 | 16 | K01 | 30 | 1.18 | 25 | 0.98 | 30 |
| H02 | 22 | 0.87 | 30 | 1.18 | 19 | K02 | 30 | 1.18 | 30 | 1.18 | 35 |
| H03 | 22 | 0.87 | 35 | 1.38 | 22 | K03 | 30 | 1.18 | 35 | 1.38 | 40 |
| H04 | 22 | 0.87 | 40 | 1.57 | 24 | K04 | 30 | 1.18 | 40 | 1.57 | 44 |
| H45 | 22 | 0.87 | 45 | 1.77 | 28 | K45 | 30 | 1.18 | 45 | 1.77 | 49 |
| H05 | 22 | 0.87 | 50 | 1.97 | 31 | K05 | 30 | 1.18 | 50 | 1.97 | 53 |
| J01 | 25 | 0.98 | 25 | 0.98 | 20 | A01 | 35 | 1.38 | 25 | 0.98 | 42 |
| J02 | 25 | 0.98 | 30 | 1.18 | 24 | A02 | 35 | 1.38 | 30 | 1.18 | 48 |
| J03 | 25 | 0.98 | 35 | 1.38 | 27 | A03 | 35 | 1.38 | 35 | 1.38 | 54 |
| J04 | 25 | 0.98 | 40 | 1.57 | 31 | A04 | 35 | 1.38 | 40 | 1.57 | 60 |
| J45 | 25 | 0.98 | 45 | 1.77 | 35 | A45 | 35 | 1.38 | 45 | 1.77 | 67 |
| J05 | 25 | 0.98 | 50 | 1.97 | 38 | A05 | 35 | 1.38 | 50 | 1.97 | 74 |
| | | | | | | A55 | 35 | 1.38 | 55 | 2.17 | 80 |

Type 381LR 105 °C Highest Ripple, Snap-In Aluminum

Ultra-High Ripple Capabilities

Ratings

| Cap. (µF) | Catalog Part Number | ESR Max @ 25° C | | Ripple Amps @ 105 °C | | Nominal Size D x L (mm) |
|--------------------------------|------------------------|--------------------|---------------|-------------------------|---------------|----------------------------------|
| | | 120 Hz (Ω) | 20 kHz (Ω) | 120 Hz (A) | 20 kHz (A) | |
| 200 Vdc (250 Vdc Surge) | | | | | | |
| 270 | 381LR271M200H012 | 0.553 | 0.249 | 1.42 | 2.03 | 22 X 25 |
| 330 | 381LR331M200H022 | 0.452 | 0.203 | 1.56 | 2.23 | 22 X 30 |
| 390 | 381LR391M200H022 | 0.383 | 0.172 | 1.71 | 2.44 | 22 X 30 |
| 390 | 381LR391M200J012 | 0.383 | 0.172 | 1.71 | 2.44 | 25 X 25 |
| 470 | 381LR471M200H032 | 0.317 | 0.143 | 1.85 | 2.64 | 22 X 35 |
| 470 | 381LR471M200J022 | 0.317 | 0.143 | 1.85 | 2.64 | 25 X 30 |
| 560 | 381LR561M200H042 | 0.266 | 0.120 | 2.14 | 3.05 | 22 X 40 |
| 560 | 381LR561M200J022 | 0.266 | 0.120 | 2.14 | 3.05 | 25 X 30 |
| 560 | 381LR561M200K012 | 0.266 | 0.120 | 2.14 | 3.05 | 30 X 25 |
| 680 | 381LR681M200H452 | 0.219 | 0.099 | 2.42 | 3.45 | 22 X 45 |
| 680 | 381LR681M200J032 | 0.219 | 0.099 | 2.42 | 3.45 | 25 X 35 |
| 680 | 381LR681M200K022 | 0.219 | 0.099 | 2.42 | 3.45 | 30 X 30 |
| 820 | 381LR821M200H052 | 0.182 | 0.082 | 2.63 | 3.76 | 22 X 50 |
| 820 | 381LR821M200J042 | 0.182 | 0.082 | 2.63 | 3.76 | 25 X 40 |
| 820 | 381LR821M200K022 | 0.182 | 0.082 | 2.63 | 3.76 | 30 X 30 |
| 820 | 381LR821M200A012 | 0.182 | 0.082 | 2.63 | 3.76 | 35 X 25 |
| 1000 | 381LR102M200J452 | 0.149 | 0.067 | 2.84 | 4.06 | 25 X 45 |
| 1000 | 381LR102M200K032 | 0.149 | 0.067 | 2.84 | 4.06 | 30 X 35 |
| 1000 | 381LR102M200A022 | 0.149 | 0.067 | 2.84 | 4.06 | 35 X 30 |
| 1200 | 381LR122M200K042 | 0.124 | 0.062 | 3.13 | 4.47 | 30 X 40 |
| 1200 | 381LR122M200A032 | 0.124 | 0.062 | 3.13 | 4.47 | 35 X 35 |
| 1500 | 381LR152M200K052 | 0.099 | 0.050 | 3.56 | 5.06 | 30 X 50 |
| 1500 | 381LR152M200A042 | 0.099 | 0.050 | 3.56 | 5.06 | 35 X 40 |
| 1800 | 381LR182M200A452 | 0.083 | 0.041 | 3.84 | 5.48 | 35 X 45 |
| 2200 | 381LR222M200A052 | 0.066 | 0.040 | 4.12 | 5.89 | 35 X 50 |
| 250 Vdc (300 Vdc Surge) | | | | | | |
| 220 | 381LR221M250H022 | 0.678 | 0.305 | 1.28 | 1.83 | 22 X 30 |
| 270 | 381LR271M250H022 | 0.553 | 0.249 | 1.42 | 2.03 | 22 X 30 |
| 270 | 381LR271M250J012 | 0.553 | 0.249 | 1.42 | 2.03 | 25 X 25 |
| 330 | 381LR331M250H032 | 0.452 | 0.203 | 1.64 | 2.34 | 22 X 35 |
| 330 | 381LR331M250J022 | 0.452 | 0.203 | 1.64 | 2.34 | 25 X 30 |
| 390 | 381LR391M250H042 | 0.383 | 0.172 | 1.72 | 2.45 | 22 X 40 |
| 390 | 381LR391M250J022 | 0.383 | 0.172 | 1.72 | 2.45 | 25 X 30 |
| 390 | 381LR391M250K012 | 0.383 | 0.172 | 1.72 | 2.45 | 30 X 25 |
| 470 | 381LR471M250H452 | 0.317 | 0.143 | 1.85 | 2.64 | 22 X 45 |
| 470 | 381LR471M250J032 | 0.317 | 0.143 | 1.85 | 2.64 | 25 X 35 |
| 470 | 381LR471M250K022 | 0.317 | 0.143 | 1.85 | 2.64 | 30 X 30 |
| 560 | 381LR561M250J042 | 0.266 | 0.120 | 2.14 | 3.05 | 25 X 40 |
| 560 | 381LR561M250K022 | 0.266 | 0.120 | 2.14 | 3.05 | 30 X 30 |
| 560 | 381LR561M250A012 | 0.266 | 0.120 | 2.14 | 3.05 | 35 X 25 |
| 680 | 381LR681M250J452 | 0.219 | 0.099 | 2.42 | 3.45 | 25 X 45 |

| Cap. (µF) | Catalog Part Number | ESR Max @ 25° C | | Ripple Amps @ 105 °C | | Nominal Size D x L (mm) |
|--------------------------------|------------------------|--------------------|---------------|-------------------------|---------------|----------------------------------|
| | | 120 Hz (Ω) | 20 kHz (Ω) | 120 Hz (A) | 20 kHz (A) | |
| 250 Vdc (300 Vdc Surge) | | | | | | |
| 680 | 381LR681M250K032 | 0.219 | 0.099 | 2.42 | 3.45 | 30 X 35 |
| 680 | 381LR681M250A022 | 0.219 | 0.099 | 2.42 | 3.45 | 35 X 30 |
| 820 | 381LR821M250K042 | 0.182 | 0.082 | 2.63 | 3.76 | 30 X 40 |
| 820 | 381LR821M250A032 | 0.182 | 0.082 | 2.63 | 3.76 | 35 X 35 |
| 1000 | 381LR102M250K052 | 0.149 | 0.067 | 2.84 | 4.06 | 30 X 50 |
| 1000 | 381LR102M250A042 | 0.149 | 0.067 | 2.84 | 4.06 | 35 X 40 |
| 1200 | 381LR122M250A452 | 0.124 | 0.062 | 3.13 | 4.47 | 35 X 45 |
| 1500 | 381LR152M250A052 | 0.099 | 0.050 | 3.56 | 5.06 | 35 X 50 |
| 400 Vdc (450 Vdc Surge) | | | | | | |
| 82 | 381LR820M400H012 | 1.617 | 0.728 | 0.8 | 1.14 | 22 X 25 |
| 100 | 381LR101M400H022 | 1.326 | 0.597 | 0.91 | 1.3 | 22 X 30 |
| 100 | 381LR101M400J012 | 1.960 | 0.960 | 0.91 | 1.3 | 25 X 25 |
| 120 | 381LR121M400H032 | 1.105 | 0.497 | 1.02 | 1.46 | 22 X 35 |
| 120 | 381LR121M400J022 | 1.105 | 0.497 | 1.02 | 1.46 | 25 X 30 |
| 150 | 381LR151M400H042 | 1.105 | 0.387 | 1.07 | 1.53 | 22 X 40 |
| 150 | 381LR151M400J022 | 1.105 | 0.387 | 1.07 | 1.53 | 25 X 30 |
| 150 | 381LR151M400K012 | 1.105 | 0.387 | 1.07 | 1.53 | 30 X 25 |
| 180 | 381LR181M400H452 | 0.737 | 0.322 | 1.12 | 1.6 | 22 X 45 |
| 180 | 381LR181M400J032 | 0.737 | 0.322 | 1.12 | 1.6 | 25 X 35 |
| 180 | 381LR181M400K022 | 0.737 | 0.322 | 1.12 | 1.6 | 30 X 30 |
| 220 | 381LR221M400H052 | 0.603 | 0.271 | 1.42 | 2.03 | 22 X 50 |
| 220 | 381LR221M400J042 | 0.603 | 0.271 | 1.42 | 2.03 | 25 X 40 |
| 220 | 381LR221M400K022 | 0.603 | 0.271 | 1.42 | 2.03 | 30 X 30 |
| 220 | 381LR221M400A012 | 0.603 | 0.271 | 1.42 | 2.03 | 35 X 25 |
| 270 | 381LR271M400J452 | 0.491 | 0.221 | 1.56 | 2.23 | 25 X 45 |
| 270 | 381LR271M400K032 | 0.491 | 0.221 | 1.56 | 2.23 | 30 X 35 |
| 270 | 381LR271M400A022 | 0.491 | 0.221 | 1.56 | 2.23 | 35 X 30 |
| 330 | 381LR331M400K042 | 0.402 | 0.181 | 1.71 | 2.44 | 30 X 40 |
| 330 | 381LR331M400A022 | 0.402 | 0.181 | 1.71 | 2.44 | 35 X 30 |
| 390 | 381LR391M400K452 | 0.34 | 0.153 | 1.85 | 2.64 | 30 X 45 |
| 390 | 381LR391M400A032 | 0.34 | 0.153 | 1.85 | 2.64 | 35 X 35 |
| 470 | 381LR471M400A042 | 0.282 | 0.127 | 2.01 | 2.87 | 35 X 40 |
| 560 | 381LR561M400A452 | 0.237 | 0.107 | 2.35 | 3.36 | 35 X 45 |
| 420 Vdc (470 Vdc Surge) | | | | | | |
| 68 | 381LR680M420H012 | 1.95 | 0.878 | 0.76 | 1.08 | 22 X 25 |
| 82 | 381LR820M420H022 | 1.617 | 0.728 | 0.8 | 1.14 | 22 X 30 |
| 82 | 381LR820M420J012 | 1.617 | 0.728 | 0.8 | 1.14 | 25 X 25 |
| 100 | 381LR101M420H022 | 1.326 | 0.597 | 0.91 | 1.3 | 22 X 30 |
| 100 | 381LR101M420J012 | 1.326 | 0.597 | 0.91 | 1.3 | 25 X 25 |
| 120 | 381LR121M420H032 | 1.105 | 0.497 | 1.02 | 1.46 | 22 X 35 |
| 120 | 381LR121M420J022 | 1.105 | 0.497 | 1.02 | 1.46 | 25 X 30 |

Type 381LR 105 °C Highest Ripple, Snap-In Aluminum

Ultra-High Ripple Capabilities

| Cap. (μ F) | Catalog Part Number | ESR Max @ 25° C | | Ripple Amps @ 105 °C | | Nominal Size D x L (mm) |
|--------------------------------|------------------------|------------------------|------------------------|-------------------------|---------------|----------------------------------|
| | | 120 Hz (Ω) | 20 kHz (Ω) | 120 Hz (A) | 20 kHz (A) | |
| 420 Vdc (470 Vdc Surge) | | | | | | |
| 150 | 381LR151M420K012 | 0.884 | 0.398 | 1.07 | 1.53 | 30 X 25 |
| 180 | 381LR181M420H452 | 0.737 | 0.332 | 1.12 | 1.6 | 22 X 45 |
| 180 | 381LR181M420J042 | 0.737 | 0.332 | 1.12 | 1.6 | 25 X 40 |
| 180 | 381LR181M420K022 | 0.737 | 0.332 | 1.12 | 1.6 | 30 X 30 |
| 180 | 381LR181M420A012 | 0.737 | 0.332 | 1.12 | 1.6 | 35 X 25 |
| 220 | 381LR221M420J452 | 0.603 | 0.271 | 1.42 | 2.03 | 25 X 45 |
| 220 | 381LR221M420K032 | 0.603 | 0.271 | 1.42 | 2.03 | 30 X 35 |
| 220 | 381LR221M420A022 | 0.603 | 0.271 | 1.42 | 2.03 | 35 X 30 |
| 270 | 381LR271M420J052 | 0.491 | 0.221 | 1.68 | 2.4 | 25 X 50 |
| 270 | 381LR271M420K042 | 0.491 | 0.221 | 1.68 | 2.4 | 30 X 40 |
| 270 | 381LR271M420A022 | 0.491 | 0.221 | 1.68 | 2.4 | 35 X 30 |
| 330 | 381LR331M420K452 | 0.402 | 0.181 | 1.78 | 2.54 | 30 X 45 |
| 330 | 381LR331M420A032 | 0.402 | 0.181 | 1.78 | 2.54 | 35 X 35 |
| 390 | 381LR391M420K052 | 0.34 | 0.153 | 1.91 | 2.73 | 30 X 50 |
| 390 | 381LR391M420A042 | 0.34 | 0.153 | 1.91 | 2.73 | 35 X 40 |
| 470 | 381LR471M420A452 | 0.282 | 0.127 | 2.23 | 3.18 | 35 X 45 |
| 450 Vdc (500 Vdc Surge) | | | | | | |
| 56 | 381LR560M450H012 | 2.368 | 1.066 | 0.67 | 0.95 | 22 X 25 |
| 68 | 381LR680M450H022 | 1.95 | 0.878 | 0.76 | 1.08 | 22 X 30 |
| 68 | 381LR680M450J012 | 1.95 | 0.878 | 0.76 | 1.08 | 25 X 25 |
| 82 | 381LR820M450H022 | 1.617 | 0.728 | 0.8 | 1.14 | 22 X 30 |
| 82 | 381LR820M450J012 | 1.617 | 0.728 | 0.8 | 1.14 | 25 X 25 |

| Cap. (μ F) | Catalog Part Number | ESR Max @ 25° C | | Ripple Amps @ 105 °C | | Nominal Size D x L (mm) |
|--------------------------------|------------------------|------------------------|------------------------|-------------------------|---------------|----------------------------------|
| | | 120 Hz (Ω) | 20 kHz (Ω) | 120 Hz (A) | 20 kHz (A) | |
| 450 Vdc (500 Vdc Surge) | | | | | | |
| 100 | 381LR101M450H032 | 1.326 | 0.597 | 0.91 | 1.3 | 22 X 35 |
| 100 | 381LR101M450J022 | 1.326 | 0.597 | 0.91 | 1.3 | 25 X 30 |
| 120 | 381LR121M450H042 | 1.105 | 0.497 | 1.02 | 1.46 | 22 X 40 |
| 120 | 381LR121M450J032 | 1.105 | 0.497 | 1.02 | 1.46 | 25 X 35 |
| 120 | 381LR121M450K012 | 1.105 | 0.497 | 1.02 | 1.46 | 30 X 25 |
| 150 | 381LR151M450H452 | 0.884 | 0.396 | 1.07 | 1.53 | 22 X 45 |
| 150 | 381LR151M450J042 | 0.884 | 0.396 | 1.07 | 1.53 | 25 X 40 |
| 150 | 381LR151M450K022 | 0.884 | 0.396 | 1.07 | 1.53 | 30 X 30 |
| 150 | 381LR151M450A012 | 0.884 | 0.396 | 1.07 | 1.53 | 35 X 25 |
| 180 | 381LR181M450H052 | 0.737 | 0.332 | 1.12 | 1.6 | 22 X 50 |
| 180 | 381LR181M450J042 | 0.737 | 0.332 | 1.12 | 1.6 | 25 X 40 |
| 180 | 381LR181M450K022 | 0.737 | 0.332 | 1.12 | 1.6 | 30 X 30 |
| 180 | 381LR181M450A012 | 0.737 | 0.332 | 1.12 | 1.6 | 35 X 25 |
| 220 | 381LR221M450J452 | 0.603 | 0.271 | 1.42 | 2.03 | 25 X 45 |
| 220 | 381LR221M450K032 | 0.603 | 0.271 | 1.42 | 2.03 | 30 X 35 |
| 220 | 381LR221M450A022 | 0.603 | 0.271 | 1.42 | 2.03 | 35 X 30 |
| 270 | 381LR271M450K042 | 0.491 | 0.221 | 1.72 | 2.45 | 30 X 40 |
| 270 | 381LR271M450A032 | 0.491 | 0.221 | 1.72 | 2.45 | 35 X 35 |
| 330 | 381LR331M450K052 | 0.402 | 0.181 | 1.85 | 2.64 | 30 X 50 |
| 330 | 381LR331M450A042 | 0.402 | 0.181 | 1.85 | 2.64 | 35 X 40 |
| 390 | 381LR391M450A042 | 0.34 | 0.153 | 1.97 | 2.82 | 35 X 40 |
| 470 | 381LR471M450A052 | 0.282 | 0.127 | 2.47 | 3.53 | 35 X 50 |

Typical Performance Curves

Life Test 105 °C, Full Load, 220 μ F, 400 Vdc
Capacitance, DF, Leakage Current



Hours @ Rated Max Temp, Voltage, Ripple

Life Test 105 °C, Full Load, 330 μ F, 400 Vdc
Capacitance, DF, Leakage Current



Hours @ Rated Max Temp, Voltage, Ripple



Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9