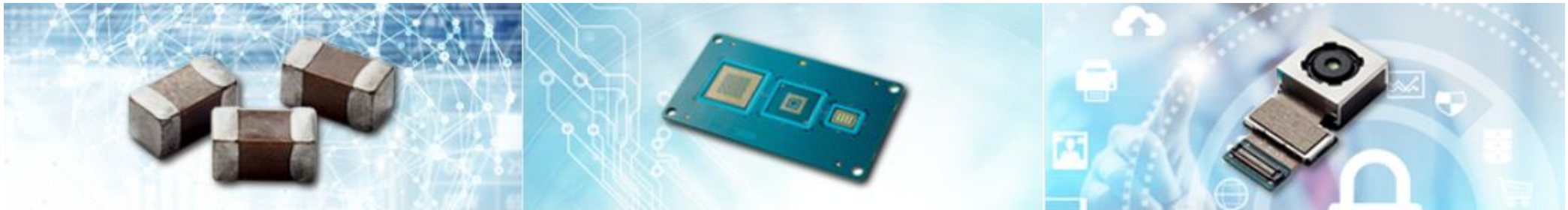


# Automotive MLCC Roadmap

2023.Q1



# Automotive MLCC 2.5V ~ 100V



**SAMSUNG**  
ELECTRO-MECHANICS

| Size  | Voltage | <10p | <100p | 100p | 220p | 470p | 1n | 2.2n | 4.7n | 10n | 22n      | 47n | 100n     | 220n | 470n | 1μ  | 2.2μ | 4.7μ | 10μ  | 22μ  | 47μ  | 100μ | 220μ  | Voltage |
|-------|---------|------|-------|------|------|------|----|------|------|-----|----------|-----|----------|------|------|-----|------|------|------|------|------|------|-------|---------|
| 1210" | 100V    |      |       |      |      |      |    |      |      |     |          |     | COG 2023 |      |      |     |      | X7S  | 2023 |      |      |      |       | 100V    |
|       | 50V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      | X7S  | 2024 |      |      |       | 50V     |
|       | 25V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      | X7S  |      |      |       | 25V     |
|       | 16V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      | 2023 |      |       | 16V     |
|       | 10V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      | X7R  |      |       | 10V     |
|       | 6.3V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      | X7T  |       | 6.3V    |
|       | 4V      |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      | X7T  | Q3.23 | 4V      |
|       | 2.5V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      | X7T  |       | 2.5V    |
| 1206" | 100V    |      |       |      |      |      |    |      |      |     | COG 2023 |     |          |      |      |     | X7S  | 2023 |      |      |      |      |       | 100V    |
|       | 50V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 50V     |
|       | 25V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 25V     |
|       | 16V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      | X7S  |      |       | 16V     |
|       | 10V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 10V     |
|       | 6.3V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      | X7T  |       | 6.3V    |
|       | 4V      |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      | X7T  | Q3.23 | 4V      |
| 0805" | 100V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      | X7S |      |      |      |      |      |      |       | 100V    |
|       | 50V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      | X7S  |      |      |      |      |       | 50V     |
|       | 25V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 25V     |
|       | 16V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 16V     |
|       | 10V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 10V     |
|       | 6.3V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 6.3V    |
|       | 4V      |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 4V      |
| 0603" | 100V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 100V    |
|       | 50V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 50V     |
|       | 25V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 25V     |
|       | 16V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 16V     |
|       | 10V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 10V     |
|       | 6.3V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 6.3V    |
|       | 4V      |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 4V      |
| 0402" | 100V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 100V    |
|       | 50V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 50V     |
|       | 25V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 25V     |
|       | 16V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 16V     |
|       | 10V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 10V     |
|       | 6.3V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 6.3V    |
|       | 4V      |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 4V      |
| 0201" | 50V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 50V     |
|       | 25V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 25V     |
|       | 16V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 16V     |
|       | 10V     |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 10V     |
|       | 6.3V    |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 6.3V    |
|       | 4V      |      |       |      |      |      |    |      |      |     |          |     |          |      |      |     |      |      |      |      |      |      |       | 4V      |

Fully qualified according  
AEC-Q200 & VW80808

3 & 5mm guaranteed  
bending capability available

R&D

Recommended

Smaller / Higher V  
available

NRND

**X7R | X7S | X7T**

- 10% tolerance is standard
  - 6.3V | 16V | 50V | 100V in focus
  - E3 is recommended
- 1 | 2.2 | 4.7

**COG**

- 5% tolerance is standard
  - 50V & 100V are most used
  - E6 is recommended
- 1 | 1.5 | 2.2 | 3.3 | 4.7 | 6.8

# Automotive MLCC High Voltage



**SAMSUNG**  
ELECTRO-MECHANICS

- X7R & C0G
- -55°C ~ 125°C

Under Development

Recommended

| Size  | Voltage | TCC | 10p | 100p     | 220p | 470p | 1n   | 2.2n | 4.7n | 10n | 15n  | 22n  | 33n  | 47n | 100n | 220n | 330n | 470n | 1000n |  |
|-------|---------|-----|-----|----------|------|------|------|------|------|-----|------|------|------|-----|------|------|------|------|-------|--|
| 1812" | 2kV     | X7R |     |          |      |      |      | 2023 |      |     |      |      |      |     |      |      |      |      |       |  |
|       | 1kV     |     |     |          |      |      |      |      |      |     |      |      | 2023 |     |      |      |      |      |       |  |
|       | 630V    |     |     |          |      |      |      |      |      |     |      |      |      |     | 2023 |      |      |      |       |  |
|       | 250V    |     |     |          |      |      |      |      |      |     |      |      |      |     |      |      |      |      | 2023  |  |
| 1210" | 1000V   | C0G |     |          |      |      | C0G  |      |      |     |      | 2023 |      |     |      |      |      |      |       |  |
|       |         | X7R |     |          |      |      |      |      |      |     |      | X7R  |      |     |      |      |      |      |       |  |
|       | 630V    | C0G |     |          |      |      |      |      |      | C0G |      |      |      |     |      |      |      |      |       |  |
|       |         | X7R |     |          |      |      |      |      |      |     |      |      | X7R  |     | 2023 |      |      |      |       |  |
|       | 250V    | X7R |     |          |      |      |      |      |      |     |      | X7R  |      |     |      |      |      |      |       |  |
| 1206" | 1000V   | C0G | C0G |          |      |      |      |      |      |     |      |      |      |     |      |      |      |      |       |  |
|       |         | X7R |     |          |      |      | X7R  |      |      |     |      |      |      |     |      |      |      |      |       |  |
|       | 630V    | C0G | C0G |          |      |      |      |      |      |     |      |      |      |     |      |      |      |      |       |  |
|       |         | X7R |     |          |      |      | X7R  |      |      |     |      |      | 2023 |     |      |      |      |      |       |  |
|       | 250V    | C0G | C0G |          |      |      |      |      |      |     |      |      |      |     |      |      |      |      |       |  |
|       |         | X7R |     |          |      |      |      |      |      |     |      | X7R  |      |     |      |      | 2023 |      |       |  |
| 0805" | 630V    | C0G | C0G |          |      |      | 2023 |      |      |     |      |      |      |     |      |      |      |      |       |  |
|       |         |     | C0G |          |      |      |      |      |      |     |      |      |      |     |      |      |      |      |       |  |
|       | 250V    |     | X7R |          |      |      |      | X7R  |      |     |      |      |      |     |      |      |      |      |       |  |
| 0603" | 250V    | X7R |     | C0G 2023 |      |      |      |      |      |     | 2024 |      |      |     |      |      |      |      |       |  |
| Size  | Voltage | TCC | 10p | 100p     | 220p | 470p | 1n   | 2.2n | 4.7n | 10n | 15n  | 22n  | 33n  | 47n | 100n | 220n | 330n | 470n | 1000n |  |