

GRAPHENE HALL EFFECT SENSOR ON 6H-SiC

Four-terminal 1.4-mm × 1.4-mm van der Pauw structure

Passivation: 100-nm-thick layer of amorphous atomic-layer-deposited Al₂O₃

Active layer: equal-arm cross-shape 100-μm × 300-μm active area made of transfer-free p-type hydrogen-intercalated quasi-free-standing epitaxial Chemical Vapor Deposition graphene

Substrate: semi-insulating vanadium-compensated on-axis 500-μm-thick 6H-SiC(0001)

Mounting: in-house-made 6.6-mm × 6.6-mm sapphire holder equipped with four Ti/Au corner contacts

| Parameter at 300 K | Min | Max | Units |
|--------------------------|--------|--------|---------------------|
| Hole concentration | 4.5E12 | 5.1E12 | cm ⁻² |
| Hole mobility | 1000 | 2000 | cm ² /Vs |
| Sheet resistance | 200 | 600 | Ω/sq |
| Offset voltage | — | 50 | mV (I = 1 mA) |
| Feed current | — | 10 | mA |
| Current-mode sensitivity | 120 | 140 | V/AT |
| Operating temperatures | 80 | 573 | K |

| | 300 K - 573 K | 573 K - 700 K | 700 K - 770 K |
|-------------------------|---------------|---------------|---------------|
| Thermal stability [%/K] | -0.02 | — | — |

GRAPHENE HALL EFFECT SENSOR ON 4H-SiC

Four-terminal 1.4-mm × 1.4-mm van der Pauw structure

Passivation: 100-nm-thick layer of amorphous atomic-layer-deposited Al₂O₃

Active layer: equal-arm cross-shape 100-μm × 300-μm active area made of transfer-free p-type hydrogen-intercalated quasi-free-standing epitaxial Chemical Vapor Deposition graphene

Substrate: semi-insulating high-purity on-axis 500-μm-thick 4H-SiC(0001)

Mounting: in-house-made 6.6-mm × 6.6-mm sapphire holder equipped with four Ti/Au corner contacts

| Parameter at 300 K | Min | Max | Units |
|--------------------------|--------|--------|---------------------|
| Hole concentration | 7.0E12 | 8.0E12 | cm ⁻² |
| Hole mobility | 1000 | 2000 | cm ² /Vs |
| Sheet resistance | 400 | 900 | Ω/sq |
| Offset voltage | — | 50 | mV (I = 1 mA) |
| Feed current | — | 10 | mA |
| Current-mode sensitivity | 70 | 90 | V/AT |
| Operating temperatures | 80 | 770 | K |

| | 300 K - 573 K | 573 K - 700 K | 700 K - 770 K |
|-------------------------|---------------|---------------|---------------|
| Thermal stability [%/K] | -0.01 | -0.04 | -0.18 |

GRAPHENE HALL EFFECT SENSOR ON DEFECT-ENGINEERED 4H-SiC

Four-terminal 1.4-mm × 1.4-mm van der Pauw structure

Passivation: 100-nm-thick layer of amorphous atomic-layer-deposited Al₂O₃

Active layer: equal-arm cross-shape 100-μm × 300-μm active area made of transfer-free p-type hydrogen-intercalated quasi-free-standing epitaxial Chemical Vapor Deposition graphene

Substrate: pre-epitaxially-modified semi-insulating high-purity on-axis 500-μm-thick 4H-SiC(0001)

Mounting: in-house-made 6.6-mm × 6.6-mm sapphire holder equipped with four Ti/Au corner contacts

| Parameter at 300 K | Min | Max | Units |
|--------------------------|--------|--------|---------------------|
| Hole concentration | 7.0E12 | 8.0E12 | cm ⁻² |
| Hole mobility | 1000 | 2000 | cm ² /Vs |
| Sheet resistance | 200 | 600 | Ω/sq |
| Offset voltage | — | 50 | mV (I = 1 mA) |
| Feed current | — | 10 | mA |
| Current-mode sensitivity | 70 | 90 | V/AT |
| Operating temperatures | 80 | 770 | K |

| | 300 K - 573 K | 573 K - 700 K | 700 K - 770 K |
|-------------------------|---------------|---------------|---------------|
| Thermal stability [%/K] | -0.01 | -0.02 | -0.12 |

CURRENT-MODE SENSITIVITY

