

# Summary of Changes from BSIM-BULK107.2.0 Beta 2 to BSIM-BULK107.2.0 Beta 3:

BSIM Group, IIT Kanpur, UC Berkeley

Yawar Hayat Zarkob ([yawarz21@iitk.ac.in](mailto:yawarz21@iitk.ac.in)), Ayushi Sharma, Dinesh Rajasekharan,  
Chetan Kumar Dabhi, Ahtisham Pampori

## A. Summary of enhancements:

1. **2024enh5 (ADI):** Add more QA tests to cover all parameters and MODs

## B. Summary of bug-fixes:

2. **2024bug16 (ADI):** Missing reference data in the QA package for some QA tests
3. **2024bug17 (Infineon):** Ensure CMD1 and CMS1 parameters have impact only when IIMOD=1.

## C. Description of enhancements:

1. **2024enh5 (ADI): Add more QA tests to cover all parameters and MODs**
  - Used check\_parameter\_coverage.py file to add missing tests in the new QA package.
  - The number of tests has increased from 133 to 242.

## D. Description of bug-fixes:

### 2. 2024bug16 (ADI): Missing reference data in the QA package for some QA tests

- Test 091\_AC\_Vd\_b\_HVMOD1\_WL for the PMOS transistor produced only 23 lines of reference data. Expected 67 lines of reference data.
- Similarly tests 094\_AC\_Vd\_b\_HVCAP1\_WL and 097\_AC\_Vd\_b\_HVCAPS1\_WL for the PMOS transistor produced only 34 and 23 lines of reference data respectively. Expected 67 lines of reference data.
- QA test results were generated with the latest version of the reference simulator to solve the problem.
- In the latest QA package, reference data for all the tests are present.

### 3. 2024bug17 (Infineon): Ensure CMD1 and CMS1 parameters have impact only when IIMOD=1.

- CMD1 and CMS1 parameters are introduced to model conductivity modulation effect which happens only when there is impact ionization in the drift region.
- Therefore, the parameters CMD1 and CMS1 should impact drift region saturation current only when IIMOD=1.
- Modified the code as shown below

BSIM-BULK 107.2.0 beta2

```
idrft_sat_d = T11 * NDRIFTD * T9 * (1 + devsign * CMD1 * pow(Vb_cm, CMD2));
```

### BSIM-BULK 107.2.0 beta3

```
if (IIMOD != 0) begin
    idrift_sat_d = T11 * NDRIFTD * T9 * (1 + devsign * CMD1 * pow(Vb_cm, CMD2));
end else begin
    idrift_sat_d = T11 * NDRIFTD * T9;
end
```

### BSIM-BULK 107.2.0 beta2

```
idrift_sat_s = T11 * NDRIFTS * (1 + devsign * CMS1 * pow(Vb_cm, CMS2));
```

### BSIM-BULK 107.2.0 beta3

```
if (IIMOD != 0) begin
    idrift_sat_s = T11 * NDRIFTS * (1 + devsign * CMS1 * pow(Vb_cm, CMS2));
end else begin
    idrift_sat_s = T11 * NDRIFTS;
end
```