Department of Electronic & Telecommunication Engineering
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EN4431 - ANALOG IC DESIGN

THREE CURRENT-MIRROR OTA SIMULATION TO ACHIEVE DESIRED SPECIFICATIONS

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ABSTRACT

This report presents the design and simulation of a Three Current-Mirror Operational Transconductance Amplifier (OTA) using 45 nm CMOS technology. The objective of the project is to maximize the Gain Bandwidth Product (GBW) while meeting the required performance specifications, including open-loop gain, unity-gain bandwidth, phase margin, and slew rate. The design approach involves systematic transistor sizing using the gm/ID methodology to optimize performance. Simulations are performed to validate the design, demonstrating improvements in key performance metrics such as DC gain, unity gain frequency, and power efficiency. The results are compared against the required specifications to evaluate the effectiveness of the proposed design.

CONTENTS

LIST OF FIGURES

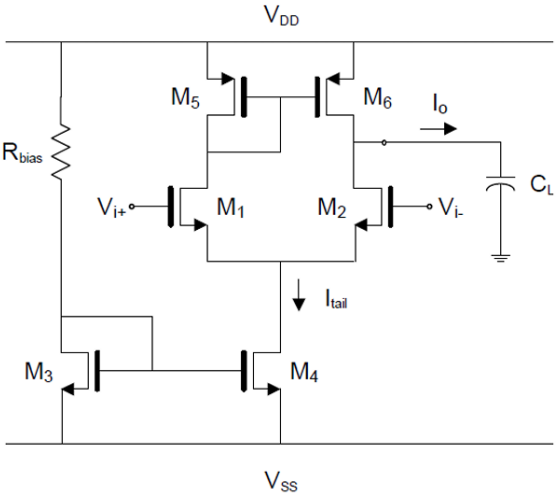
1 INTRODUCTION

Operational Transconductance Amplifiers (OTAs) play a crucial role in analog circuit design, particularly in applications such as filters, analog-to-digital converters, and signal processing circuits. Among various OTA architectures, the Three Current-Mirror OTA offers a balance between gain, bandwidth, and power consumption, making it suitable for low-voltage, high-performance applications.

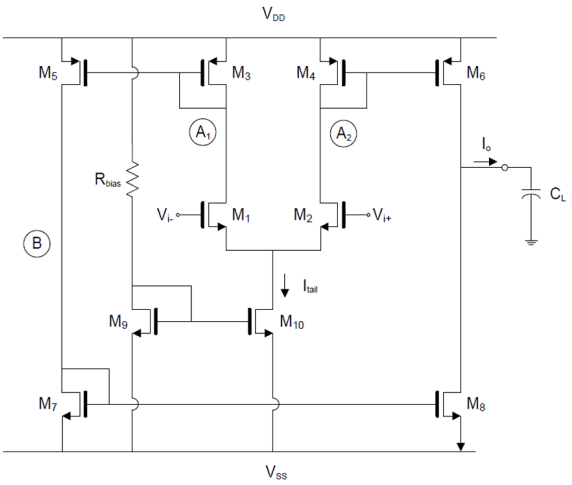
A basic differential amplifier, as shown in Figure 1a, consists of a differential pair biased by a simple current mirror and an active PMOS load. While this configuration provides fundamental amplification capabilities, its performance is limited in terms of gain and bandwidth. To enhance performance, a modified architecture known as the Three Current-Mirror OTA is implemented, as depicted in Figure 1b. This configuration incorporates self-biased loads and additional current mirrors to improve gain and bandwidth efficiency.

The primary objective of this project is to design and simulate a Three Current-Mirror OTA while maximizing the Gain Bandwidth Product (GBW). The design adheres to specific performance constraints, including a minimum open-loop gain of 40 dB, unity gain frequency above 20 MHz, and a phase margin greater than 45°. Additionally, power consumption is limited to 1000 μW to ensure energy efficiency.

The remainder of this report details the design methodology, including transistor sizing calculations and simulation results. Performance metrics such as DC gain, unity gain bandwidth, and phase margin are analyzed, followed by a comparison with theoretical expectations. The final section provides a discussion on design trade-offs and potential improvements for future implementations.



(a) Simple Differential Amplifier used as a single-stage basic OTA (5-transistor OTA).



(b) Two-stage single-ended symmetric OTA (Three Current-Mirror OTA).

Figure 1 — Comparison of different OTA architectures.

2 DESIGN METHODOLOGY AND DETAILS OF THE CALCULATION AND DEVICE SIZES OF SINGLE-STAGE BASIC OTA

2.1 Project Performance Specifications

Required Project Performance Specifications

Parameter	Project Specification
Technology [Min. length of transistors (L_{min})]	45 nm CMOS
Supply voltage V_{DD}	1 V
GND	0 V
Output load capacitance C_L	20 pF
Nominal input common-mode voltage $V_{DD}/2$	0.5 V
Reference current I_{REF}	2 μA (change accordingly)
Overall DC power consumption P_{total}	$\leq$ 1000 μW
Open-loop low-frequency (DC) gain A_{DC}	$\geq$ 100 (40 dB) (maximize)
Unity gain frequency f_U	$\geq$ 20 MHz (maximize)
Phase Margin PM	$>$ 45°
Slew rate (both open-loop and closed-loop) SR	$>$ 10 V/μs

I decided to use L = 100 nm for single-stage basic OTA and two-stage single-ended symmetric OTA.

2.2 Single Stage OTA

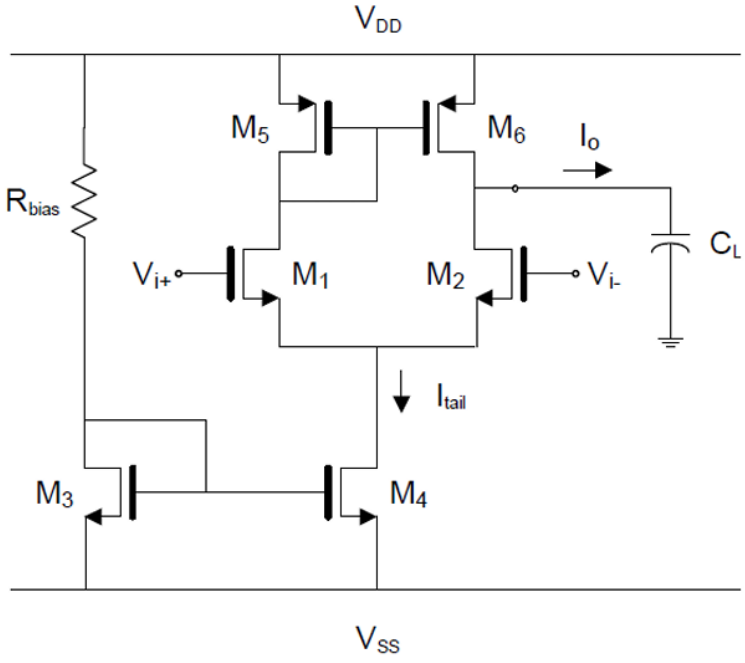


Figure 2 — Schematic of the single-stage OTA circuit.

The given circuit represents a single-stage operational transconductance amplifier (OTA), which is a differential amplifier designed to convert a differential input voltage (V_{i+}, V_{i-}) into an output current (I_o). The differential pair (M1, M2) serves as the core amplification stage, providing gain and signal processing. It is biased by an NMOS current mirror (M3, M4), which ensures a stable tail current (I_{bias}) for proper differential operation. The PMOS current mirror (M5, M6) acts as an active load, providing high output impedance and thereby increasing the amplifier's gain. The tail current (I_{bias}) controls the overall transconductance of the OTA, influencing its gain-bandwidth product. The output current (I_o) is typically converted to a voltage when connected to a capacitive load (C_L).

2.3 Design Methodology and Details of the Calculation and Device Sizes

2.3.1 Assumptions

- $ICMR^- = 0.5$V (the minimum common-mode voltage required to keep the NMOS and the tail current in saturation).
- $ICMR^+ = 0.9$V (the maximum common-mode voltage before the PMOS or output voltage reaches its limit).

2.3.2 Transistor Parameters from Cadence Simulation

The following parameters are obtained from Cadence simulation for NMOS and PMOS design with channel length $L = 1\mu$m (to minimize the channel length modulation) and width $W = 10\mu$m for both NMOS and PMOS transistors. The supply voltage is $V_{DD} = 1$V, and the bias current is $I_o = 10\mu$A.
Referefnce : - How to find process parameter of any technology node

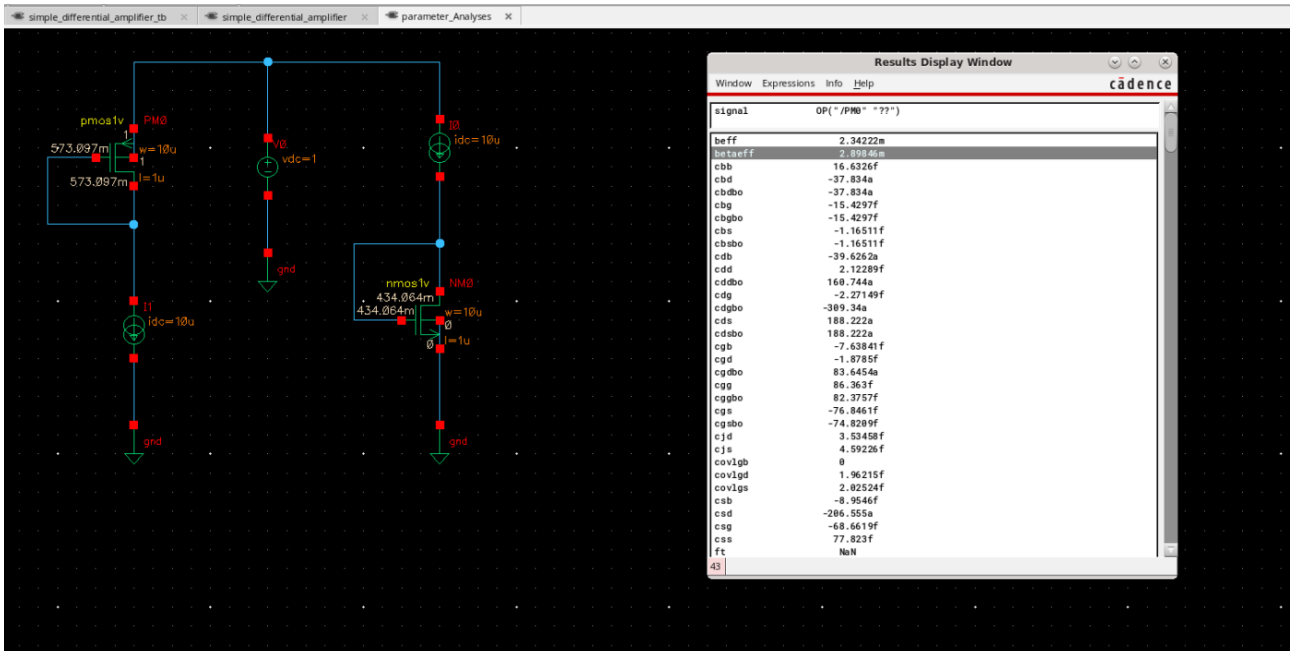


Figure 3 — Transistor Parameters from Cadence Simulation

NMOS Parameters

- Effective Beta ($\beta_{\text{eff, NMOS}}$): 2.89846 mA/V^2 (rounded to 3 mA/V^2)
- Threshold Voltage ($V_{\text{th, NMOS}}$): 397.975 mV (rounded to 0.4 V)

PMOS Parameters

- Effective Beta ($\beta_{\text{eff, PMOS}}$): 2.89846 mA/V^2 (rounded to 3 mA/V^2)

- Threshold Voltage ($V_{\text{th, PMOS}}$): -334.497 mV (rounded to -0.3 V)

2.3.3 Calculation of μC_{ox} for NMOS and PMOS

The effective beta (β_{eff}) is related to the process transconductance parameter μC_{ox} by the following equation:

$$\beta_{\text{eff}} = \mu C_{ox} \frac{W}{L} \tag{1}$$

where $W = 10\ \mu$m, $L = 1\ \mu$m, and $\frac{W}{L} = 10$.
Using the approximated effective beta values from the Cadence simulation:

NMOS $\mu_n C_{ox}$ Calculation

$$\beta_{\text{eff, NMOS}} \approx 3\ \text{mA/V}^2$$
$$\mu_n C_{ox} = \frac{\beta_{\text{eff, NMOS}}}{\frac{W}{L}}$$
$$\mu_n C_{ox} = \frac{3\ \text{mA/V}^2}{10}$$
$$\mu_n C_{ox} = 0.3\ \text{mA/V}^2$$

PMOS $\mu_p C_{ox}$ Calculation

$$\beta_{\text{eff, PMOS}} \approx 3\ \text{mA/V}^2$$
$$\mu_p C_{ox} = \frac{\beta_{\text{eff, PMOS}}}{\frac{W}{L}}$$
$$\mu_p C_{ox} = \frac{3\ \text{mA/V}^2}{10}$$
$$\mu_p C_{ox} = 0.3\ \text{mA/V}^2$$

2.3.4 Device size calculations

- All MOSFETs should be in the saturation region.
- $I_o \rightarrow$ Slew rate – Derivation of I_o:

The relationship between charge and current is given by:

$$\frac{dq}{dt} = I = C\frac{dv}{dt} \tag{2}$$

where the Slew Rate (SR) is defined as:

$$SR = \frac{dv}{dt} \tag{3}$$

Rearranging for I_o:

$$SR = \frac{I_o}{C_L} \tag{4}$$

(Slew rate as a function of output current and load capacitance)
Solving for I_o with $SR = 10\ \text{V}/\mu\text{s}$ and $C_L = 2$ pF:

$$\begin{aligned} I_o &= SR \cdot C_L \\ &= 10\ \text{V}/\mu\text{s} \times 2\ \text{pF} \\ &= 20\mu\text{A} \end{aligned}$$

Let the drain voltage of transistor M1 be denoted as V_1 and the source voltage of transistor M1 as V_2.
In the saturation region of M1, we have:

$$V_{DS} \geq V_{GS} - V_{th}$$

- $M_5, M_6 \rightarrow I_{\text{CMR}^+} = 0.9V$

$$
\begin{aligned}
V_1 &\geq V_{in} - V_{th} \\
V_1 &\geq 0.9V - 0.4V = 0.5V \\
\Rightarrow V_1 &= 0.5V \\
V_{DS} &= V_{DD} - V_1 \\
V_{DS} &= 1V - 0.5V \\
V_{DS} &= 0.5V
\end{aligned}
$$

Based on the symmetry of the circuit, we can say the tail current is double of I_D:

$$I_D = 10\ \mu A$$

2.3.5 Calculation of W/L Ratio for M_5 and M_6

The drain current I_D in the saturation region is given by:

$$I_D = \frac{1}{2}\mu_n C_{ox}\frac{W}{L}(V_{GS} - V_{th})^2 \tag{5}$$

where:

- $\mu_n C_{ox} = 0.3$ mA/V^2
- $I_D = I_o = 10\mu A = 0.01$ mA
- $V_{DS} = V_{GS} = 0.5V$ (since Gate and Drain are shorted)
- $V_{th} \approx 0.4V$
- $L = 1\mu m$

Derivation of W/L

Rearrange the equation to solve for $\frac{W}{L}$:

$$\frac{W}{L} = \frac{2I_D}{\mu_n C_{ox}(V_{GS} - V_{th})^2} \tag{6}$$

Substitute the known values:

$$
\begin{aligned}
I_D &= 0.01 \text{ mA} \\
\mu_n C_{ox} &= 0.3 \text{ mA/V}^2 \\
V_{GS} - V_{th} &= 0.5V - 0.3V = 0.2V \\
(V_{GS} - V_{th})^2 &= (0.2V)^2 = 0.04V^2 \\
\mu_n C_{ox} \times (V_{GS} - V_{th})^2 &= 0.3 \text{ mA/V}^2 \times 0.04 \text{ V}^2 = 0.012 \text{ mA}
\end{aligned}
$$

Now calculate:

$$\frac{W}{L} = \frac{2 \times 0.01 \text{ mA}}{0.012 \text{ mA}} \approx 1.667 \Rightarrow \frac{W}{L} \approx 2 \tag{7}$$

As, I mentioned earlier L = 100 nm then the W = 200 nm.

2.3.6 Open-Loop Gain Derivation for OTA

The open-loop gain A_0 of the OTA is defined as the ratio of the output voltage to the input voltage:

$$A_0 = \frac{V_{\text{out}}}{V_{\text{in}}} \tag{8}$$

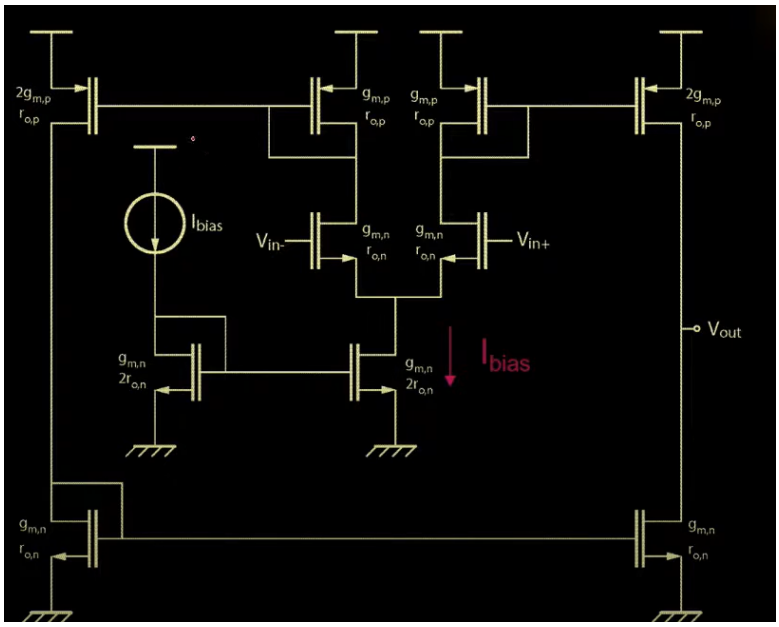


Figure 4 — Current mirror OTA

This expression can be written as:

$$\frac{V_{\text{out}}}{V_{\text{in}}} = (r_{op} \parallel r_{on}) \cdot g_{m,n} \Delta V_{\text{in}} \cdot \frac{1}{\Delta V_{\text{in}}} \tag{9}$$

After canceling out ΔV_{in}, the gain becomes:

$$A_0 = (r_{op} \parallel r_{on}) \cdot g_{m,n} \tag{10}$$

where:

- r_{op}: Output resistance of the transister M6 ,
- r_{on}: Output resistance of the transister M2,

Source: Current Mirror OTA

2.3.7 Derivation of Gain-Bandwidth Product (GB)

The Gain-Bandwidth Product (GB) is the product of the DC gain A_0 and the unity-gain bandwidth f_{GB}:

$$GB = A_0 \cdot f_{GB} \tag{11}$$

The unity-gain bandwidth f_{GB} for the OTA as follows:

$$f_{GB} = \frac{1}{(r_{op} \parallel r_{on}) \cdot 2\pi C_L} \tag{12}$$

where:

- $g_{m1,2}$: Transconductance of the input transistors M1 and M2,
- C_L: Load capacitance at the output.

Substituting the expression for A_0:

$$A_0 = (r_{op} \parallel r_{on}) \cdot g_{m1,2} \tag{13}$$

The Gain-Bandwidth product is then:

$$GB = [(r_{op} \parallel r_{on}) \cdot g_{m1,2}] \cdot \frac{1}{(r_{op} \parallel r_{on}) \cdot 2\pi C_L} \tag{14}$$

Simplifying this expression, we get the final form for the GB:

$$GB = \frac{g_{m1,2}}{2\pi C_L} \tag{15}$$

Given that $GB = 20$ MHz and $C_L = 2$ pF, we can solve for $g_{m1,2}$:

$$g_{m1,2} = GB \cdot 2\pi C_L \tag{16}$$

Substituting the values ($GB = 20 \times 10^6$ Hz, $C_L = 2 \times 10^{-12}$ F):

$$g_{m1,2} \approx 40 \times 2 \times \pi \times 10^{-6} \approx 251.3 \times 10^{-6} \text{ S} \tag{17}$$

$$g_{m1,2} \approx 251.33\mu\text{S} \tag{18}$$

2.3.8 Calculation of W/L Ratios for M1 and M2

The drain current I_D for a MOSFET operating in saturation is given by:

$$I_D = \frac{1}{2}\mu C_{ox}\frac{W}{L}(V_{GS} - V_t)^2 \tag{19}$$

The transconductance g_m is the rate of change of I_D with respect to V_{GS}:

$$g_m = \frac{\partial I_D}{\partial V_{GS}} = \mu C_{ox}\frac{W}{L}(V_{GS} - V_t) \tag{20}$$

By squaring both sides and relating it to I_D:

$$g_m^2 = 2\mu C_{ox}\frac{W}{L}I_D \tag{21}$$

Solving for $\frac{W}{L}$:

$$\frac{W}{L} = \frac{g_m^2}{2\mu C_{ox} I_D} \tag{22}$$

Given the following values:

- $\mu C_{ox} = 0.3$ mA/V^2 (for NMOS),
- $I_D = I_o = 10\mu A = 0.01$ mA,
- $g_{m1,2} \approx 251.3\mu S = 0.2513$ mS (from GB calculation),

Substitute into the W/L ratio equation:

$$\frac{W}{L} = \frac{(0.2513 \times 10^{-3})^2}{2 \cdot (0.3 \times 10^{-3}) \cdot (0.01 \times 10^{-3})} \tag{23}$$

Step-by-step calculation:

$$g_m^2 = (0.2513 \times 10^{-3})^2 = 6.3147 \times 10^{-8} \text{ S}^2 \tag{24}$$

$$2\mu C_{ox} I_D = 2 \cdot (0.3 \times 10^{-3}) \cdot (0.01 \times 10^{-3}) = 6 \times 10^{-9} \text{ A/V}^2 \tag{25}$$

Therefore,

$$\frac{W}{L} = \frac{6.3147 \times 10^{-8}}{6 \times 10^{-9}} \approx 10.5245 \tag{26}$$

To ensure that $ICMR^- \geq 0.5V$, a width-to-length ratio of 20 is selected. With $L = 100nm$, the corresponding width is $W = 2\mu m$.

2.3.9 Calculation of V_{GS} for M1

The drain current I_D for a MOSFET in saturation is expressed as:

$$I_D = \frac{1}{2}\mu C_{ox}\frac{W}{L}(V_{GS} - V_{TH})^2 \tag{27}$$

Given the following values:

- $I_D = I_o = 10\mu A = 0.01 \times 10^{-3}$ A,
- $\mu C_{ox} = 0.3$ mA/V^2 $= 0.3 \times 10^{-3}$ A/V^2,
- $\frac{W}{L} = 20$,
- $V_{TH} \approx 0.4$ V (threshold voltage).

Rearrange the equation to solve for $(V_{GS} - V_{TH})$:

$$(V_{GS} - V_{TH})^2 = \frac{2I_D}{\mu C_{ox}\frac{W}{L}} \tag{28}$$

Substitute the values into the equation:

$$(V_{GS} - V_{TH})^2 = \frac{2 \times (0.01 \times 10^{-3})}{(0.3 \times 10^{-3}) \times 20} \tag{29}$$

Thus:

$$(V_{GS} - V_{TH})^2 = \frac{0.02 \times 10^{-3}}{6 \times 10^{-3}} \approx 0.0033 \text{ V}^2 \tag{30}$$

Solving for $V_{GS} - V_{TH}$:

$$V_{GS} - V_{TH} = \sqrt{0.0033} \approx 0.0577 \text{ V} \tag{31}$$

Therefore, the gate-source voltage V_{GS} is:

$$V_{GS} = V_{TH} + (V_{GS} - V_{TH}) \approx 0.4 \text{ V} + 0.0577 \text{ V} \approx 0.4577 \text{ V} \tag{32}$$

Rounding to two decimal places:

$$V_{GS} \approx 0.46 \text{ V} \tag{33}$$

2.3.10 Calculation of W/L for M3 and M4

Given the constraint $V_{IN} > V_{GS} + V_{DSAT}$, where:

- $V_{IN} = V_{ICMR^-} = 0.5$ V,
- $V_{DSAT} < 0.04$ V (use maximum $V_{DSAT} = 0.04$ V for calculation),

Given:

- $I_D = 20\mu A = 0.02 \times 10^{-3}$ A,
- $\mu C_{ox} = 0.3$ mA/V^2 $= 0.3 \times 10^{-3}$ A/V^2,
- $V_{DSAT} < 0.04$ V (use maximum $V_{DSAT} = 0.04$ V for minimum W/L).

Rearrange for $\frac{W}{L}$:

$$\frac{W}{L} = \frac{2I_D}{\mu C_{ox}(V_{DSAT})^2} \tag{34}$$

Substitute the values:

$$\frac{W}{L} = \frac{2 \times (0.02 \times 10^{-3})}{(0.3 \times 10^{-3}) \times (0.04)^2} \tag{35}$$

Thus:

$$\frac{W}{L} = \frac{0.04 \times 10^{-3}}{0.00048 \times 10^{-3}} \approx 83.33 \tag{36}$$

Rounding to the nearest integer:

$$\frac{W}{L} \approx 84 \tag{37}$$

Choosing L= 100 nm, W=8.4µm.

2.4 Summary of Calculated Values

Summary of Calculated Values

Parameter	**Symbol**	**Approximated W/L**	**Chosen W/L**	**Unit**
Chosen Channel Length	L	-	100	nm
W/L Ratio for M_1, M_2	$W/L_{M_1,M_2}$	10.52	20	-
W/L Ratio for M_3, M_4	$W/L_{M_3,M_4}$	83.33	84	-
W/L Ratio for M_5, M_6	$W/L_{M_5,M_6}$	1.67	2	-
Output Current	I_o	-	20	μA
Transconductance	$g_{m1,2}$	-	251.33	μS
Gate-Source Voltage for M_1	V_{GS}	-	0.46	V
NMOS μC_{ox}	$\mu_n C_{ox}$	0.289846	0.3	mA/V^2
PMOS μC_{ox}	$\mu_p C_{ox}$	0.289846	0.3	mA/V^2
NMOS Threshold Voltage	$V_{th,NMOS}$	0.397975	0.4	V
PMOS Threshold Voltage	$V_{th,PMOS}$	-0.334497	-0.3	V

Summary of Calculated Values of Transistors

Transistor	**Length**	**Width**	**Unit**
M_1	0.1	2	μm
M_2	0.1	2	μm
M_3	0.1	8.4	μm
M_4	0.1	8.4	μm
M_5	0.1	0.2	μm
M_6	0.1	0.2	μm

3 SIMULATION RESULTS FOR SINGLE-STAGE BASIC OTA

3.1 Open Loop single-stage basic OTA (Without Feedback)

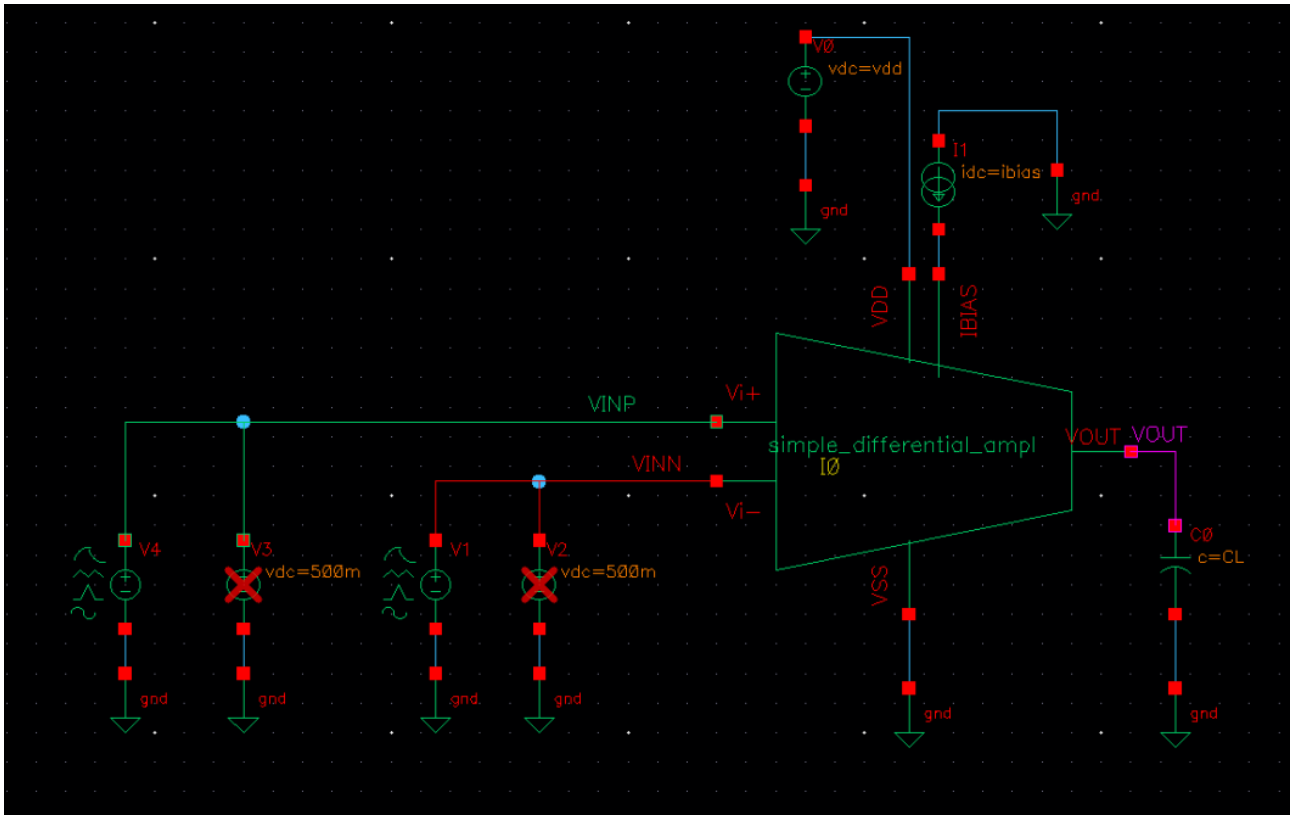


Figure 5 — Open Loop single-stage basic OTA

3.1.1 Transient Analysis Setup

Transient Analysis Parameters of single-stage basic OTA

Terminal	Property	Symbol	Value
Vin+	Delay Time	*vinp_delay*	1 µs
Vin+	Zero Value	*vinp_zero*	1 V
Vin+	One Value	*vinp_one*	0 V
Vin+	Period of Waveform	*vinp_period*	200 µs
Vin+	Rise Time	*vinp_rise*	100 ps
Vin+	Fall Time	*vinp_fall*	100 ps
Vin-	Delay Time	*vinn_delay*	1 µs
Vin-	Zero Value	*vinn_zero*	0 V
Vin-	One Value	*vinn_one*	1 V
Vin-	Period of Waveform	*vinn_period*	200 µs
Vin-	Rise Time	*vinn_rise*	100 ps
Vin-	Fall Time	*vinn_fall*	100 ps

3.1.2 Slew Rate Analysis

The slew rate is calculated using the following expression in Cadence:

$$\text{slewRate}\left(v(\text{"}/VOUT\text{"}, ?\text{result} = \text{"}tran\text{"}), 0, \text{nil}, 1, \text{nil}, 10, 90, \text{nil}, \text{"}time\text{"}\right) \tag{38}$$

The obtained slew rate is:

$$\text{Slew Rate} = 6.5595\,\text{V}/\mu\text{s} \tag{39}$$

Manual Calculation

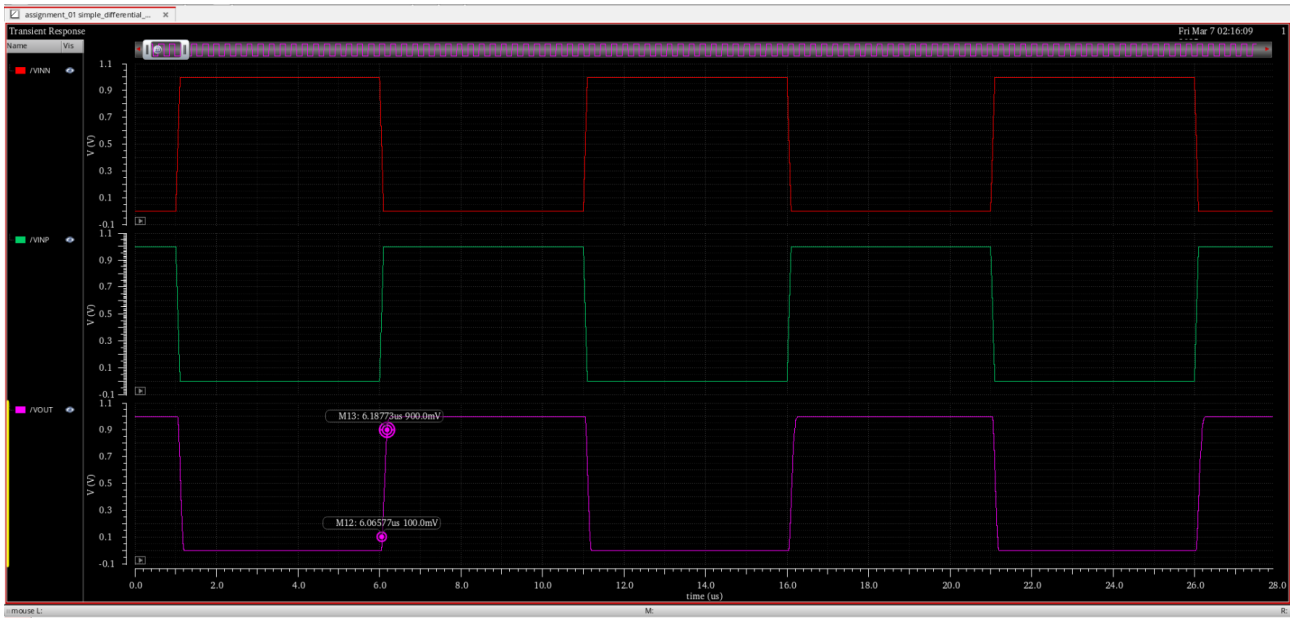


Figure 6 — Slew Rate Analysis of Open Loop single-stage basic OTA

The slew rate (SR) is determined based on the rising edge, indicating the highest rate at which the output voltage (V_{OUT}) changes:

$$SR = \frac{\Delta V_{OUT}}{\Delta t} \tag{40}$$

Analyzing the transient response, V_{OUT} shifts from 100 mV to 900 mV within the time interval from 6.06577 μs to 6.18773 μs:

$$SR = \frac{900 \times 10^{-3} - 100 \times 10^{-3}}{6.18773 \times 10^{-6} - 6.06577 \times 10^{-6}} \tag{41}$$

$$SR = \frac{800 \times 10^{-3}}{0.12196 \times 10^{-6}} \tag{42}$$

$$SR \approx 6.5595\ \text{V}/\mu s \tag{43}$$

3.1.3 AC Analysis Setup

For the AC analysis, a 500 mV DC bias voltage was applied along with a 1 V AC signal, consisting of two components with phase shifts of 0° and 180°.

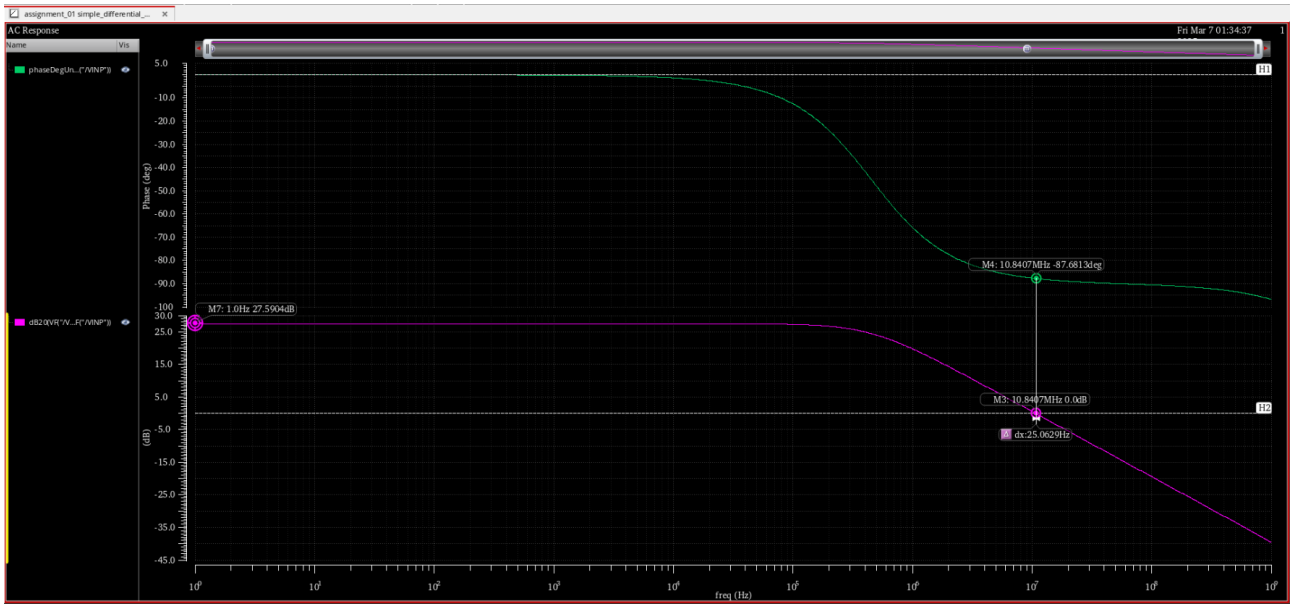


Figure 7 — AC Response of Open Loop single-stage basic OTA

3.1.4 AC Analysis Results

The AC analysis results are obtained from the frequency response plot:

- **DC Gain**: Around 27.5904 dB at 1 nHz, which falls short of the required specification of $\geq$ 40 dB.
- **Unity Gain Bandwidth (UGBW)**: Approximately 10.8407 MHz, which is below the specified requirement of $\geq$ 20 MHz.
- **Phase Margin (PM)**: At 10.8407 MHz, the phase is $-87.6813°$, leading to:

$$PM = 180° - 87.6813° \approx 92.3187° \tag{44}$$

This surpasses the required specification of $> 45°$.

Comparison of Open Loop Results with Design Specifications of single-stage basic OTA

Parameter	Design Specification	Obtained Value	Unit
Open-loop DC Gain	$\geq$100 (40 dB)	27.5904	dB
Unity Gain Frequency	$\geq$20 MHz	10.8407	MHz
Phase Margin	$>45°$	92.3187	°
Slew Rate	>10 V/μs	6.5595	V/μs

3.2 Closed Loop single-stage basic OTA (With Unity Gain Feedback)

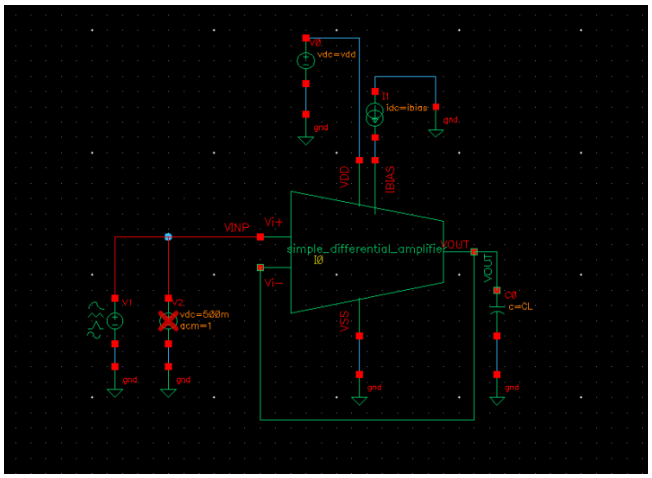


Figure 8 — closed Loop Single-Stage Basic OTA

3.2.1 Transient Analysis Setup

Transient Analysis Parameters of single-stage basic OTA

Terminal	Property	Symbol	Value
Vin+	Delay Time	*vinp_delay*	1 µs
Vin+	Zero Value	*vinp_zero*	1 V
Vin+	One Value	*vinp_one*	0 V
Vin+	Period of Waveform	*vinp_period*	200 µs
Vin+	Rise Time	*vinp_rise*	100 ps
Vin+	Fall Time	*vinp_fall*	100 ps

3.2.2 Slew Rate Analysis

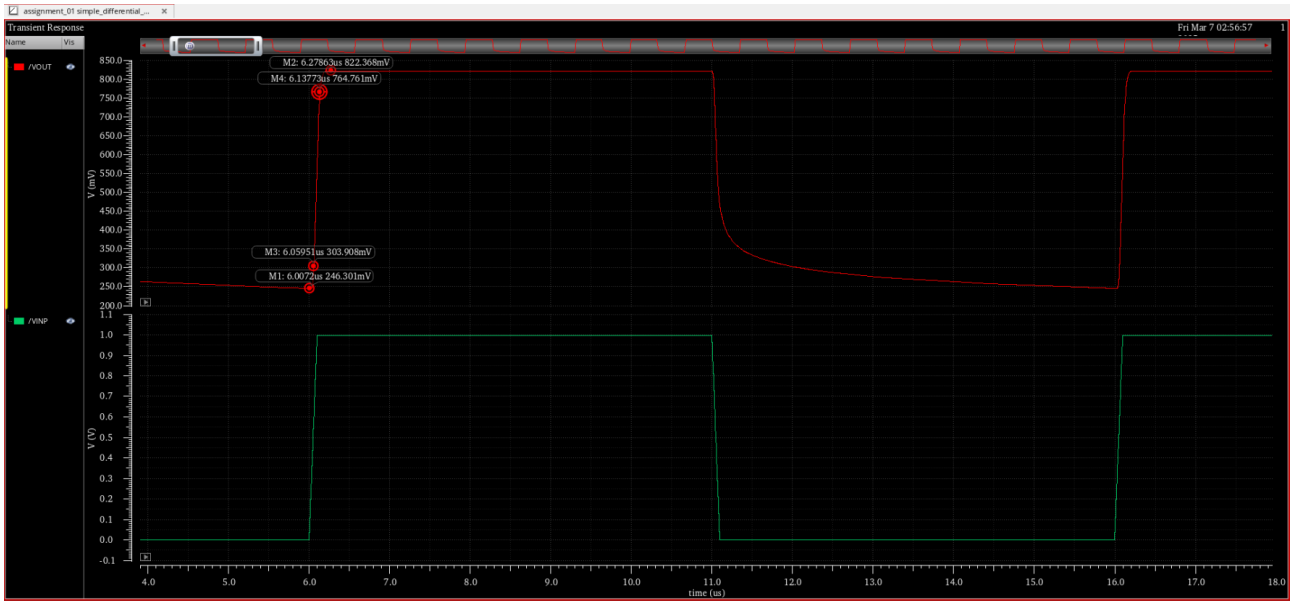


Figure 9 — Slew rate analysis of closed Loop single-stage basic OTA

The transient response is driven by a pulse input with the following parameters:

$$SR = \frac{\Delta V_{OUT}}{\Delta t} \tag{45}$$

From the transient response, V_{OUT} transitions from 303.908 mV to 764.761 mV over 6.05951 μs to 6.13773 μs:

$$SR = \frac{764.761 \times 10^{-3} - 303.908 \times 10^{-3}}{6.13773 \times 10^{-6} - 6.05951 \times 10^{-6}} \tag{46}$$

$$SR = \frac{460.853 \times 10^{-3}}{0.07822 \times 10^{-6}} \tag{47}$$

$$SR \approx 5.891 \text{ V}/\mu s \tag{48}$$

3.2.3 AC Analysis Setup

For the AC analysis, a 500 mV DC voltage with a 1 V AC signal was applied to the V_{INP} terminal.

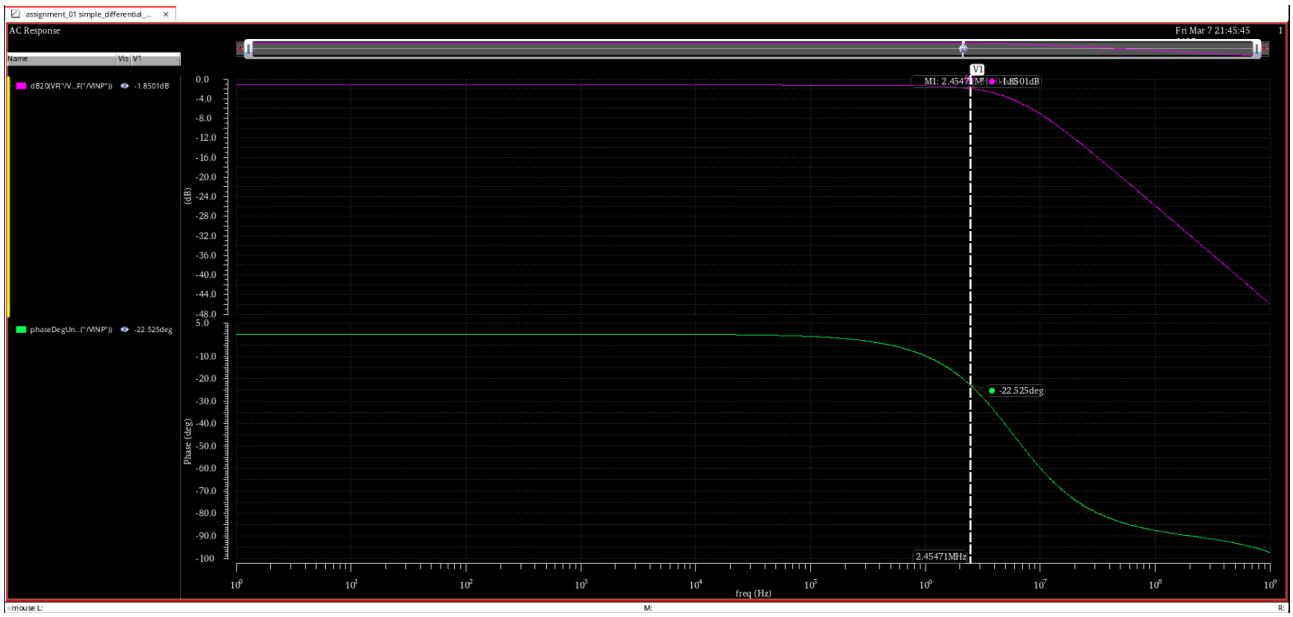


Figure 10 — AC response for closed Loop single-stage basic OTA

4 TUNED SIMULATION RESULTS FOR SINGLE-STAGE BASIC OTA

4.1 Open Loop single-stage basic OTA (Without Feedback)

4.1.1 Slew Rate Analysis

The slew rate is calculated using the following expression in Cadence:

$$\text{slewRate}\left(v(\text{"}/VOUT\text{"}, ?\text{result} = \text{"}tran\text{"}), 0, \text{nil}, 1, \text{nil}, 10, 90, \text{nil}, \text{"}time\text{"}\right) \tag{49}$$

The obtained slew rate is:

$$\text{Slew Rate} = 15.4149\,\text{V}/\mu\text{s} \tag{50}$$

Manual Calculation

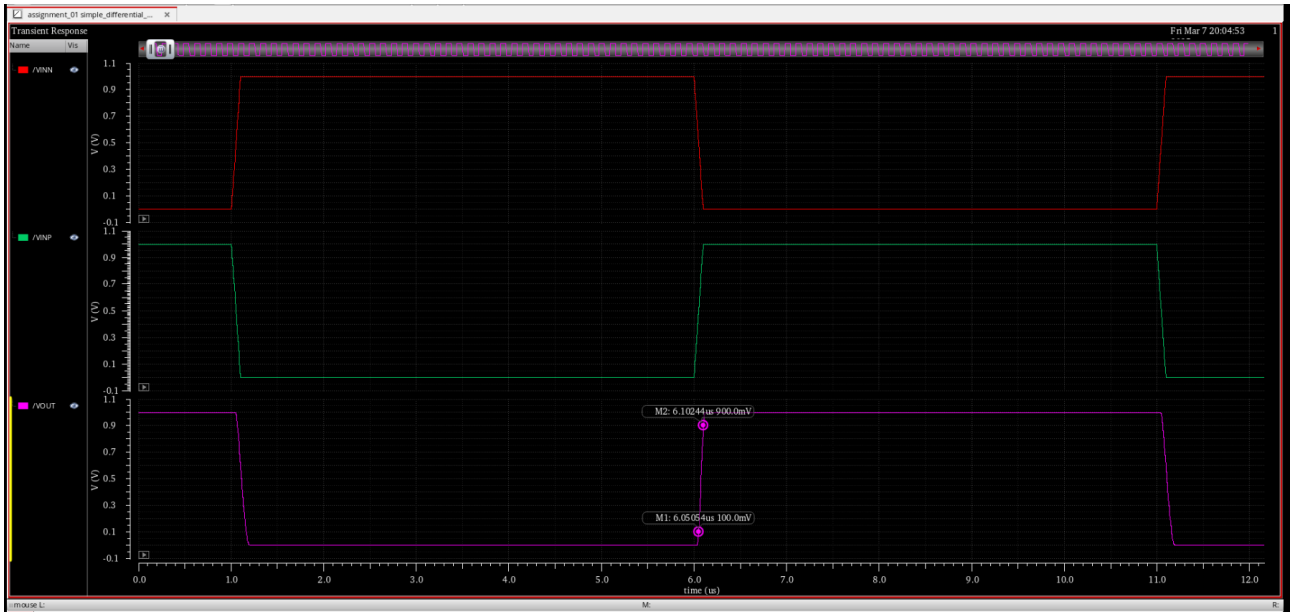


Figure 11 — Slew Rate Analysis of Open Loop single-stage basic OTA - Tuned

The slew rate (SR) is calculated based on the rising edge, representing the maximum rate of change of the output voltage (V_{OUT}):

$$SR = \frac{\Delta V_{OUT}}{\Delta t} \tag{51}$$

From the transient response, V_{OUT} transitions from 100 mV to 900 mV over 6.05054 μs to 6.10244 μs:

$$SR = \frac{900 \times 10^{-3} - 100 \times 10^{-3}}{6.10244 \times 10^{-6} - 6.05054 \times 10^{-6}} \tag{52}$$

$$SR = \frac{800 \times 10^{-3}}{0.0519 \times 10^{-6}} \tag{53}$$

$$SR \approx 15.4142\ \text{V}/\mu s \tag{54}$$

4.1.2 AC Analysis Setup

For the AC analysis, a 500 mV DC bias voltage was applied along with a 1 V AC signal, consisting of two components with phase shifts of 0° and 180°.

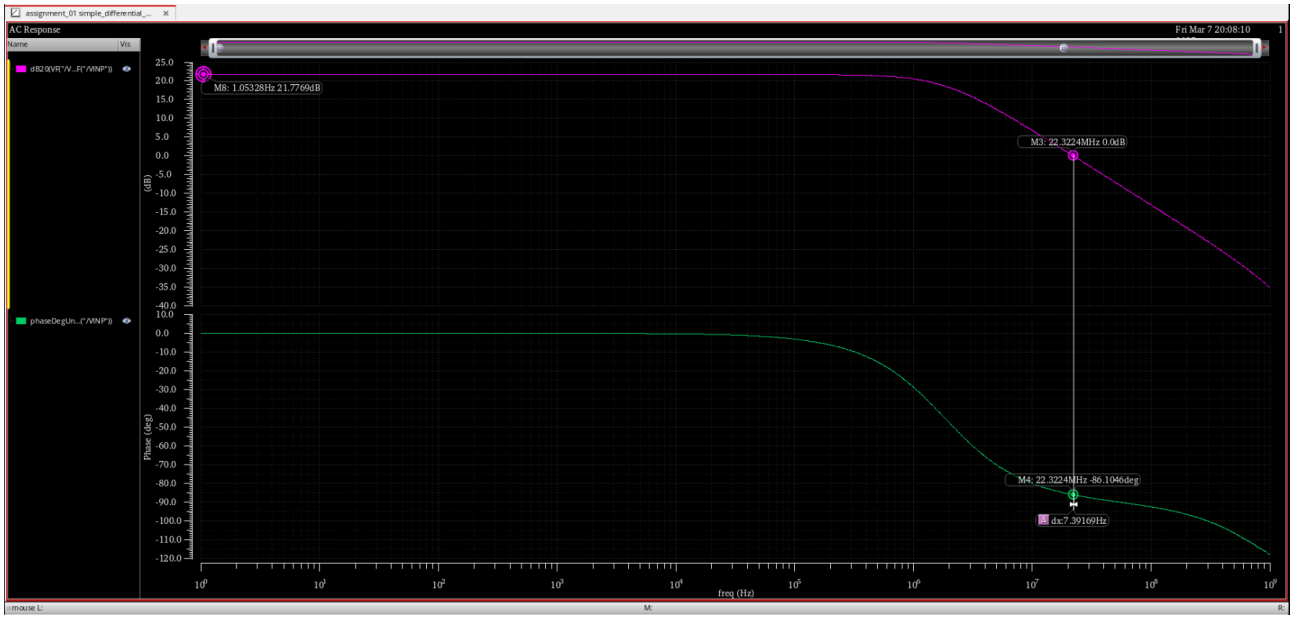


Figure 12 — AC Response of Open Loop single-stage basic OTA - Tuned

4.1.3 AC Analysis Results

The AC analysis results are obtained from the frequency response plot:

- **DC Gain**: Approximately 21.7769 dB at 1 nHz, which does not meet the required specification of $\geq$ 40 dB.
- **Unity Gain Bandwidth (UGBW)**: Around 22.3224 MHz, which satisfies the requirement of $\geq$ 20 MHz.
- **Phase Margin (PM)**: At 22.3224 MHz, the phase is $-86.1046°$, resulting in:

$$PM = 180° - 86.1046° \approx 93.8954° \tag{55}$$

  This surpasses the required specification of $> 45°$.

Comparison of Open Loop Results with Design Specifications

Parameter	Design Specification	Obtained Value	Unit
Open-loop DC Gain	$\geq$100 (40 dB)	21.7769	dB
Unity Gain Frequency	$\geq$20 MHz	22.3224	MHz
Phase Margin	$>45°$	93.8954	°
Slew Rate	>10 V/μs	15.4149	V/μs

4.2 Closed Loop single-stage basic OTA (With Unity Gain Feedback)

4.2.1 Slew Rate Analysis

A pulse input with the following parameters drives the transient response:

$$SR = \frac{\Delta V_{OUT}}{\Delta t} \tag{56}$$

From the transient response, V_{OUT} transitions from 278.016 mV to 874.825 mV over 16.047 μs to 16.0973μs:

$$SR = \frac{874.825 \times 10^{-3} - 278.016 \times 10^{-3}}{16.0973 \times 10^{-6} - 16.047 \times 10^{-6}} \tag{57}$$

$$SR = \frac{596.809 \times 10^{-3}}{0.0503 \times 10^{-6}} \tag{58}$$

$$SR \approx 11.865 \text{ V}/\mu s \tag{59}$$

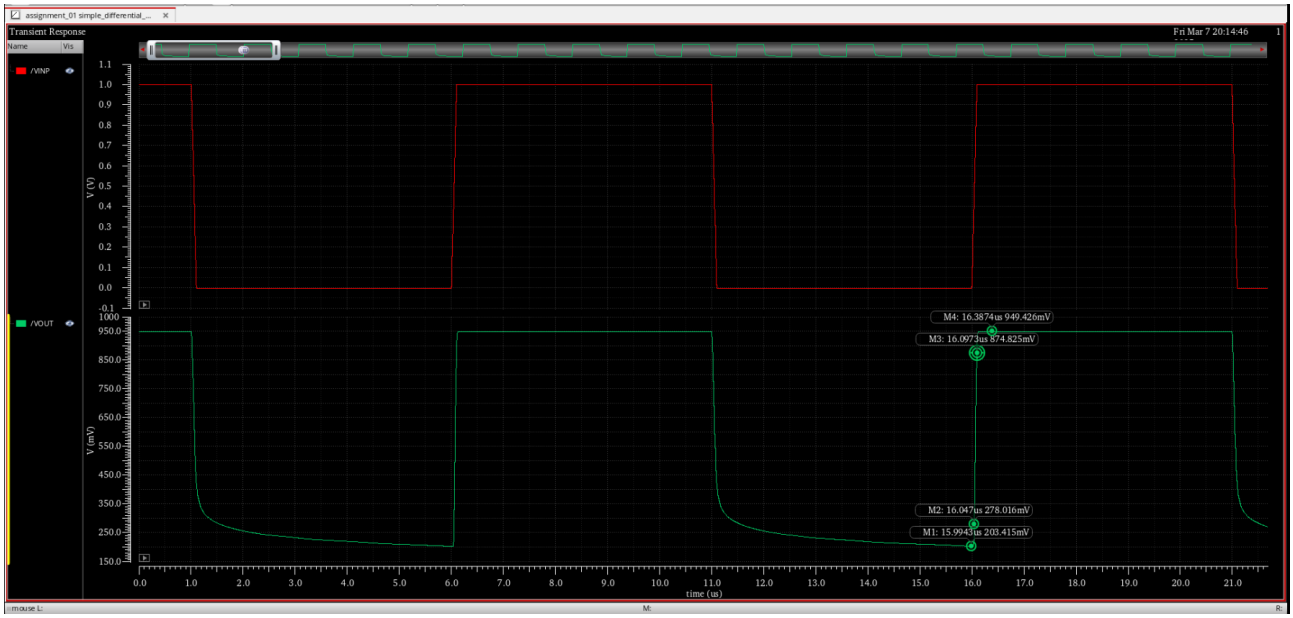


Figure 13 — Closed Loop single-stage basic OTA - Tuned

4.2.2 AC Analysis Setup

For the AC analysis, a 500 mV DC voltage with a 1 V AC signal was applied to the V_{INP} terminal.

Figure 14 — AC Response of closed Loop single-stage basic OTA - Tuned

5 DESIGN METHODOLOGY AND DETAILS OF THE CALCULATION AND DEVICE SIZES OF TWO-STAGE SINGLE-ENDED SYMMETRIC OTA

5.1 Two-Stage single-ended symmetric OTA

An improved version of the differential amplifier integrates self-biased loads, forming a two-stage single-ended symmetric operational transconductance amplifier (OTA), also referred to as a three current-mirror OTA. The input stage consists of a differential pair, while the sub-circuits comprising transistors M_1, M_3 and M_2, M_4 act as self-biased inverters. Additionally, the transistor pairs M_3, M_5, M_4, M_6, M_7, M_8, and M_9, M_{10} function as simple current mirrors. To maintain symmetry in the OTA design, the transistors are matched such that $M_1 = M_2$, $M_3 = M_4$, $M_5 = M_6$, and $M_7 = M_8$.
This symmetrical configuration reduces the number of independent design parameters to four transistor dimensions and the tail current, thereby simplifying the design while preserving balanced operation.

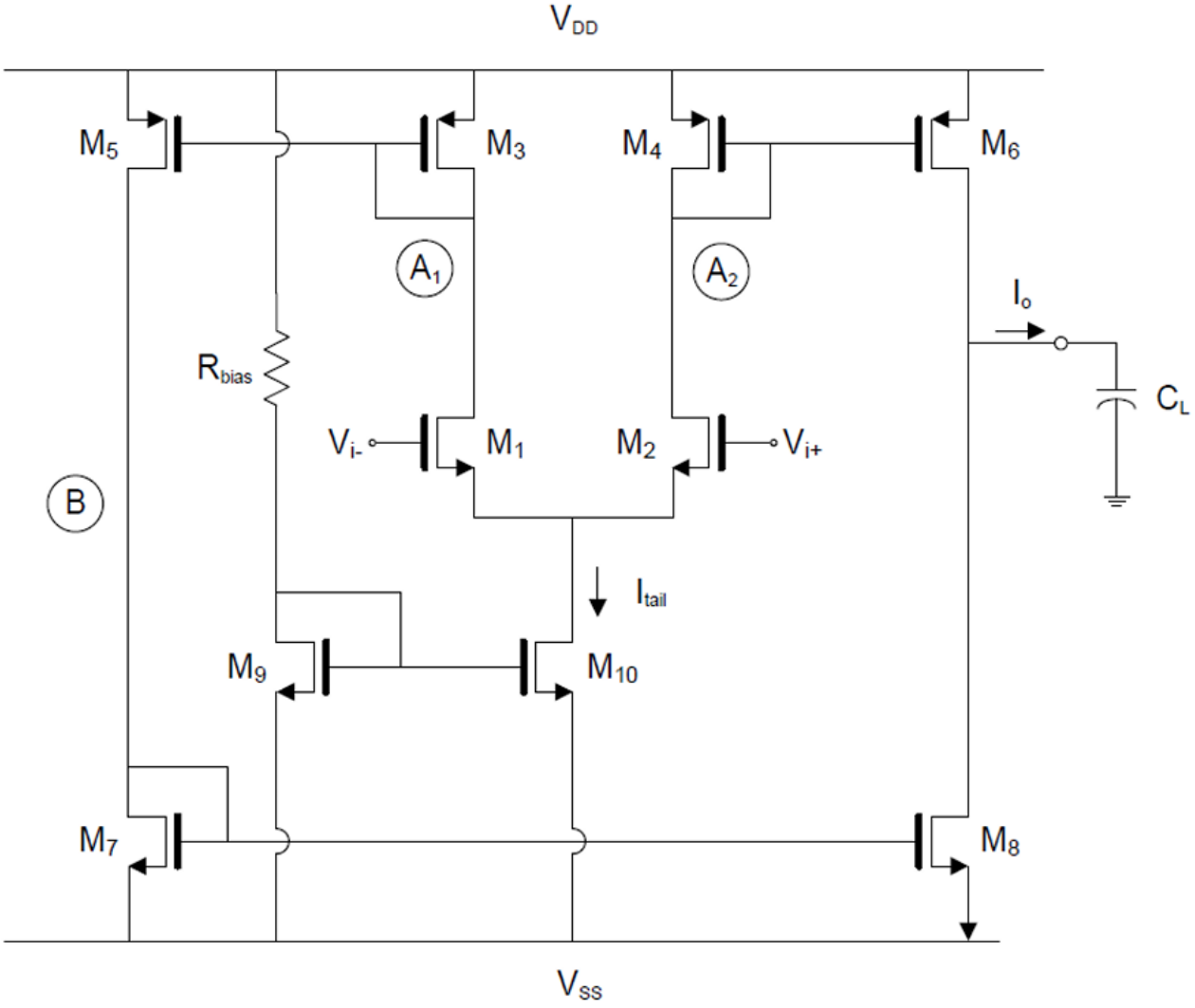


Figure 15 — Schematic Two-Stage single-ended symmetric OTA

5.2 Calculations for device size

The output current I_{out} in the two-stage OTA is directly proportional to the bias current I_{bias}. The input differential pair modulates the tail current (set by I_{bias}) based on the differential input voltage ΔV_{in}, generating a small-signal current proportional to the transconductance

g_m. This current is then mirrored and amplified through the current mirror load and gain stage, leading to

$$I_{\text{out}} = I_{\text{bias}}$$

Increasing I_{bias} enhances the transconductance, gain, and overall output current of the amplifier.

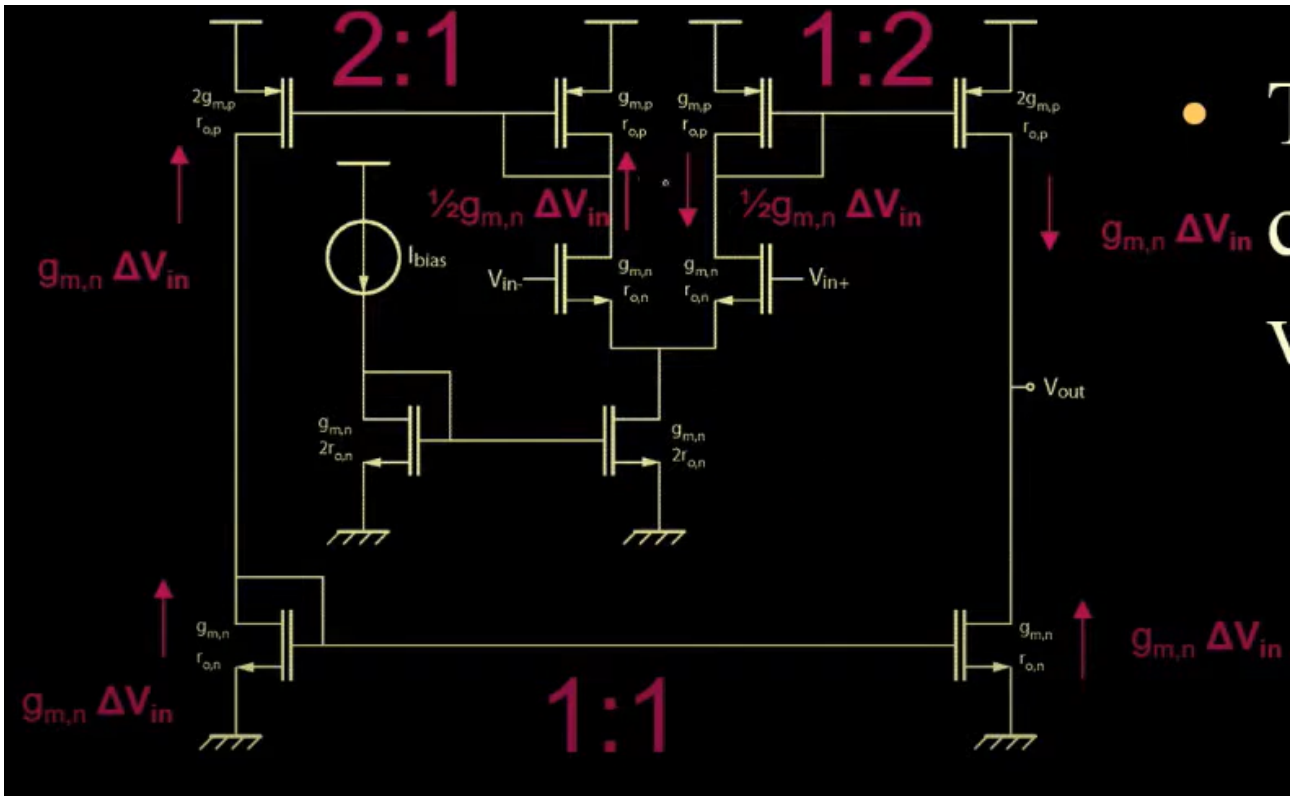


Figure 16 — Current mirror diagram of Two-stage single-ended symmetric OTA (Three current-mirror OTA)

5.3 Mapping Single-Stage to Two-Stage OTA Design

After finalizing the calculations for the single-stage OTA, the next step is to determine the appropriate W/L ratios for the two-stage single-ended symmetric OTA. The transition can be facilitated by mapping the transistor dimensions from the single-stage design to the two-stage configuration based on previously computed values.

In particular, the W/L ratio of 20 obtained for M_1 and M_2 in the single-stage OTA is directly applicable to M_1 and M_2 in the two-stage design, preserving the symmetry of the input differential pair. Similarly, the W/L ratio of 2, originally derived for M_5 and M_6 (corresponding to M_3 and M_4 in the single-stage OTA), is assigned to M_3 and M_4 in the two-stage configuration. Additionally, for M_9 and M_{10}, which correspond to M_3 and M_4 in the single-stage design, a W/L ratio of 84 is maintained.

Furthermore, by analyzing the current distribution across each branch, the W/L ratios for the remaining transistors can be determined. For example, the W/L ratio of M_5 and M_6 is set to twice that of M_3 and M_4, resulting in:

$$2 \times 2 = 4.$$

Similarly, the W/L ratio of 84 is retained for M_7 and M_8 in the two-stage design, ensuring consistency in the current mirror configuration.

5.3.1 Summary of W/L Ratios for Two-Stage single-ended symmetric OTA

Summary of W/L Ratios for a two-stage single-ended symmetric OTA

Transistor Pair	W/L Ratio
M_1, M_2 (Differential Pair)	20
M_3, M_4 (Self-Biased Inverters)	2
M_5, M_6 (Current Mirror)	4
M_7, M_8 (Current Mirror)	84
M_9, M_{10} (Current Mirror)	84

5.4 Summary of Calculated size parameter values

Summary of Calculated Values of Transistors of a two-stage single-ended symmetric OTA

Transistor	Length	Width	Unit
M_1	0.1	2	μm
M_2	0.1	2	μm
M_3	0.1	0.2	μm
M_4	0.1	0.2	μm
M_5	0.1	0.4	μm
M_6	0.1	0.4	μm
$M7$	0.1	8.4	μm
M_8	0.1	8.4	μm
M_9	0.1	8.4	μm
M_10	0.1	8.4	μm

6 SIMULATION RESULTS OF A TWO-STAGE SINGLE-ENDED SYMMETRIC OTA

6.1 Open Loop Case of a two-stage single-ended symmetric OTA (Without Feedback)

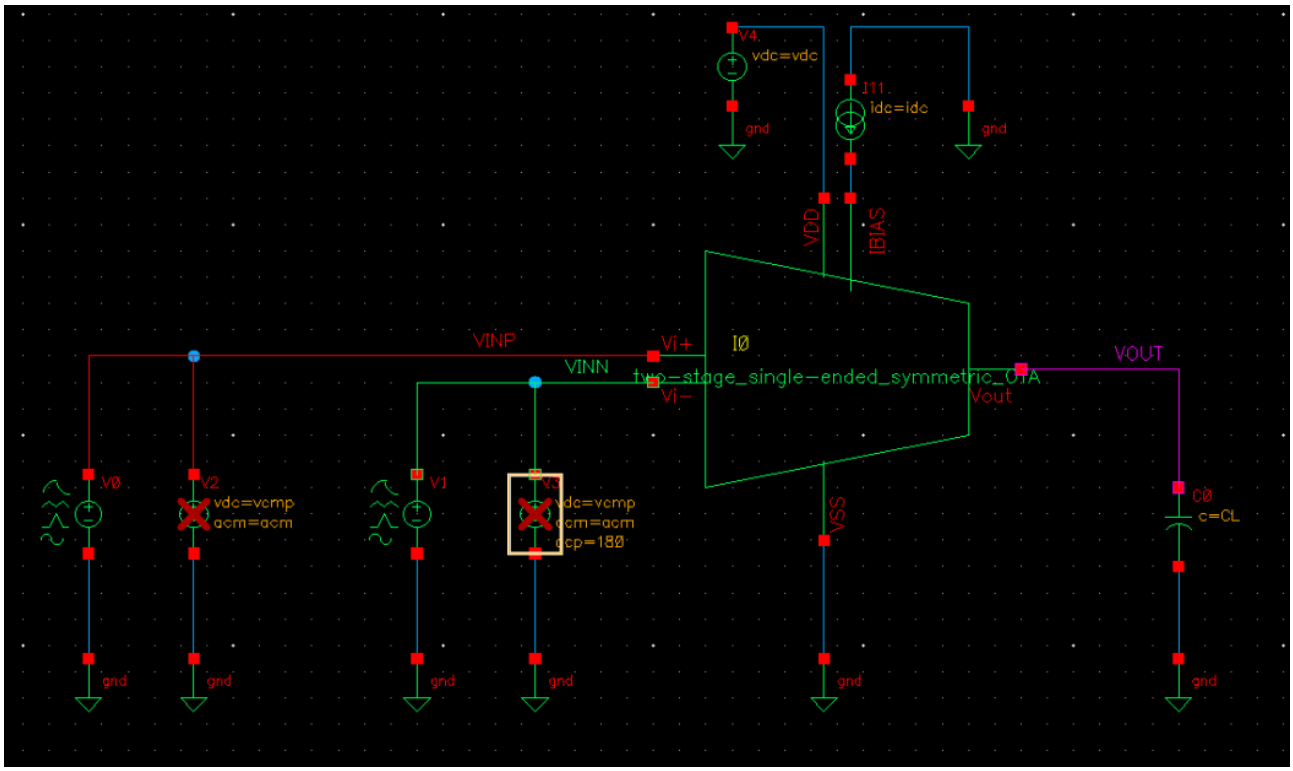


Figure 17 — A two-stage single-ended symmetric OTA - open loop case

6.1.1 Transient Analysis Setup

Transient Analysis Parameters of a two-stage single-ended symmetric OTA - open loop case

Terminal	Property	Symbol	Value
Vin+	Delay Time	*vinp_delay*	1 µs
Vin+	Zero Value	*vinp_zero*	1 V
Vin+	One Value	*vinp_one*	0 V
Vin+	Period of Waveform	*vinp_period*	20 µs
Vin+	Rise Time	*vinp_rise*	100 ns
Vin+	Fall Time	*vinp_fall*	100 ns
Vin-	Delay Time	*vinn_delay*	1 µs
Vin-	Zero Value	*vinn_zero*	0 V
Vin-	One Value	*vinn_one*	1 V
Vin-	Period of Waveform	*vinn_period*	20 µs
Vin-	Rise Time	*vinn_rise*	100 ns
Vin-	Fall Time	*vinn_fall*	100 ns

6.1.2 Slew Rate Analysis

The slew rate is calculated using the following expression in Cadence:

$$\text{slewRate}\left(v(\text{"}/VOUT\text{"}, ?\text{result} = \text{"}tran\text{"}), 0, \text{nil}, 1, \text{nil}, 10, 90, \text{nil}, \text{"}time\text{"}\right) \tag{60}$$

The obtained slew rate is:

$$\text{Slew Rate} = 11.5636\,\text{V}/\mu\text{s} \tag{61}$$

Manual Calculation

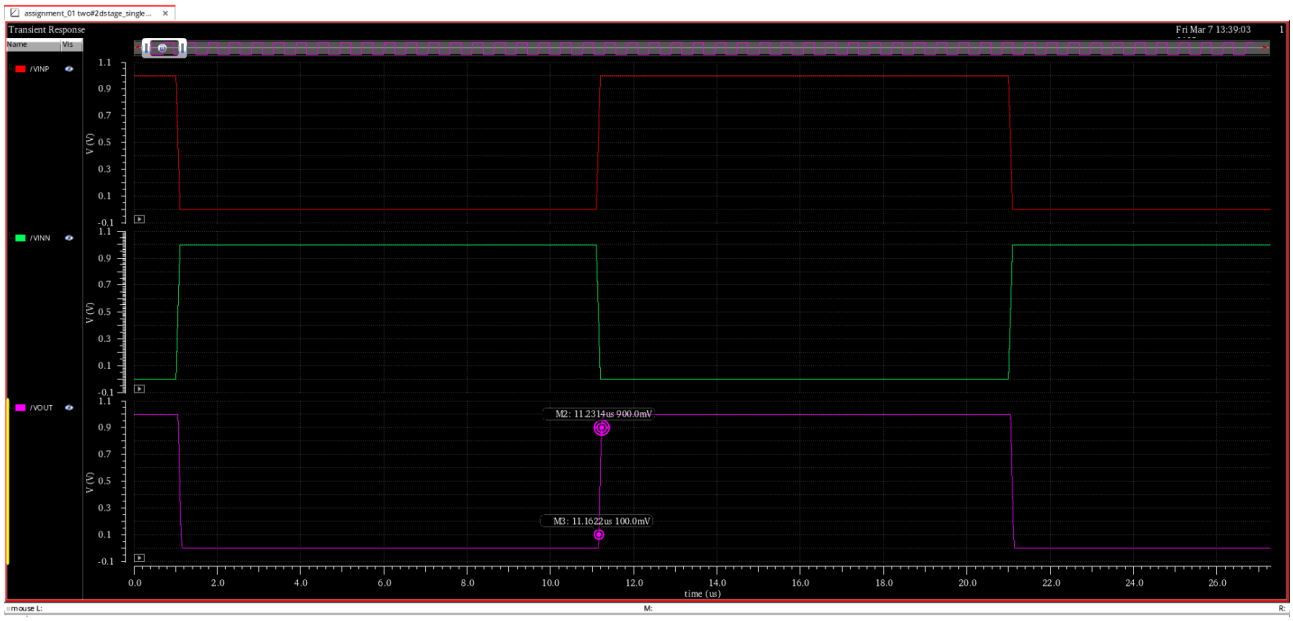


Figure 18 — Slew Rate Analysis of Open Loop of a two-stage single-ended symmetric OTA

The slew rate (SR) is calculated based on the rising edge, representing the maximum rate of change of the output voltage (V_{OUT}):

$$SR = \frac{\Delta V_{OUT}}{\Delta t} \tag{62}$$

From the transient response, V_{OUT} transitions from 100 mV to 900 mV over 11.1622 μs to 11.2314 μs:

$$SR = \frac{900 \times 10^{-3} - 100 \times 10^{-3}}{11.2314 \times 10^{-6} - 11.1622 \times 10^{-6}} \tag{63}$$

$$SR = \frac{800 \times 10^{-3}}{0.0692 \times 10^{-6}} \tag{64}$$

$$SR \approx 11.5606\ \text{V}/\mu s \tag{65}$$

6.1.3 AC Analysis Setup

For the AC analysis, a 500 mV DC bias voltage was applied along with a 1 V AC signal, consisting of two components with phase shifts of 0° and 180°.

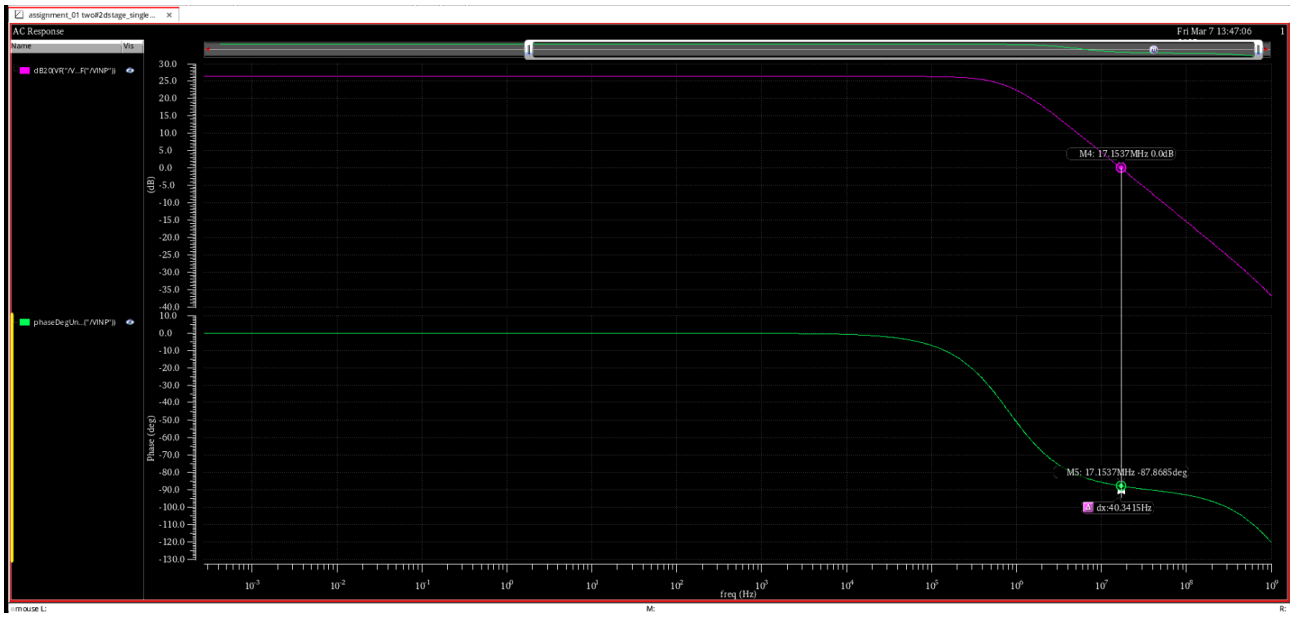


Figure 19 — AC Response of Open Loop of a two-stage single-ended symmetric OTA

6.1.4 AC Analysis Results

The AC analysis results are obtained from the frequency response plot:

- **DC Gain**: Around 26.4813 dB at 1 nHz, which does not meet the required specification of $\geq$ 40 dB.
- **Unity Gain Bandwidth (UGBW)**: Approximately 17.1537 MHz, falling short of the specified requirement of $\geq$ 20 MHz.
- **Phase Margin (PM)**: At 17.1537 MHz, the phase is $-87.8685°$, resulting in:

$$PM = 180° - 87.8685° \approx 92.1315° \tag{66}$$

This exceeds the required specification of $> 45°$.

Comparison of Open Loop Results with Design Specifications of a two-stage single-ended symmetric OTA

Parameter	Design Specification	Obtained Value	Unit
Open-loop DC Gain	$\geq$100 (40 dB)	26.4813	dB
Unity Gain Frequency	$\geq$20 MHz	17.1537	MHz
Phase Margin	$>45°$	92.1315	°
Slew Rate	>10 V/μs	11.5606	V/μs

6.2 Closed Loop of a two-stage single-ended symmetric OTA (With Unity Gain Feedback)

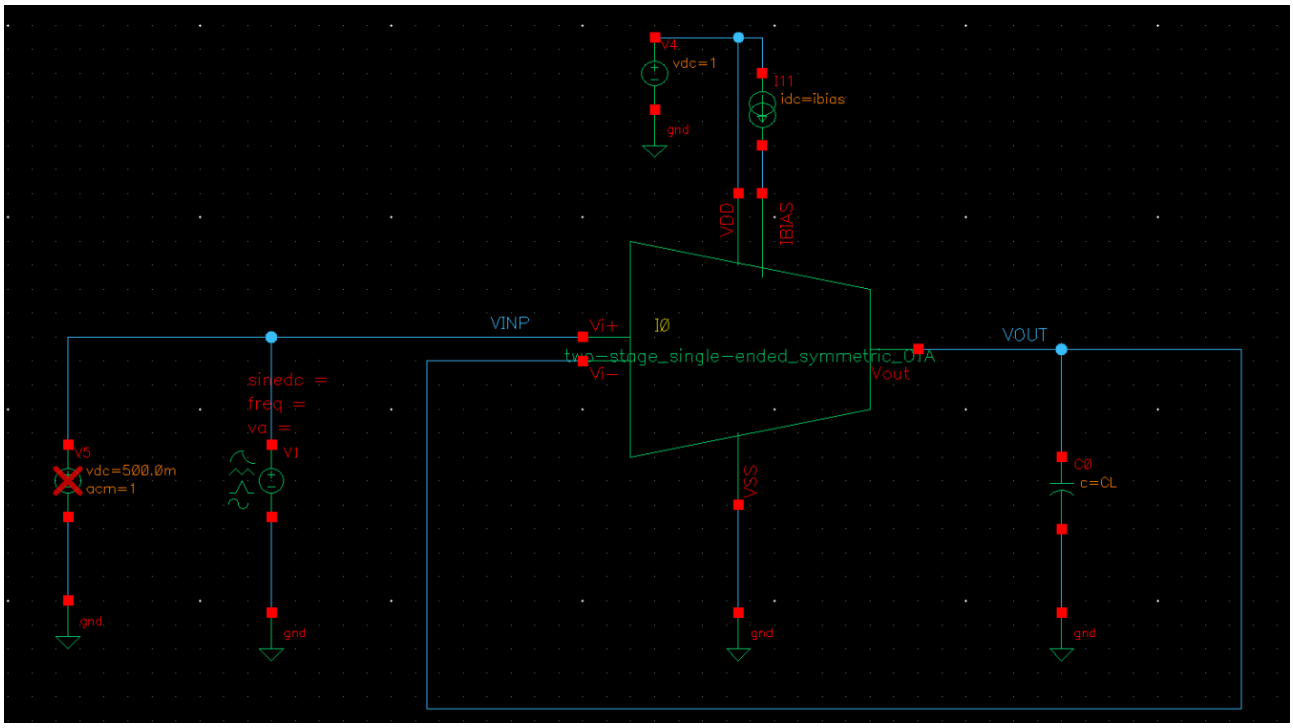


Figure 20 — Closed Loop of a Two-Stage Single-Ended Symmetric OTA

6.2.1 Transient Analysis Setup

Transient Analysis Parameters of a two-stage single-ended symmetric OTA - Closed loop

Terminal	Property	Symbol	Value
Vin+	Delay Time	*vinp_delay*	1 µs
Vin+	Zero Value	*vinp_zero*	1 V
Vin+	One Value	*vinp_one*	0 V
Vin+	Period of Waveform	*vinp_period*	20 µs
Vin+	Rise Time	*vinp_rise*	100 ns
Vin+	Fall Time	*vinp_fall*	100 ns

6.2.2 Slew Rate Analysis

The transient response is driven by a pulse input with the following parameters:

$$SR = \frac{\Delta V_{OUT}}{\Delta t} \tag{67}$$

From the transient response, V_{OUT} transitions from 249.006 mV to 793.059 mV over 11.1559 μs to 11.2089 μs:

$$SR = \frac{793.059 \times 10^{-3} - 249.006 \times 10^{-3}}{11.2089 \times 10^{-6} - 11.1559 \times 10^{-6}} \tag{68}$$

$$SR = \frac{544.053 \times 10^{-3}}{0.053 \times 10^{-6}} \tag{69}$$

$$SR \approx 10.2651 \text{ V}/\mu s \tag{70}$$

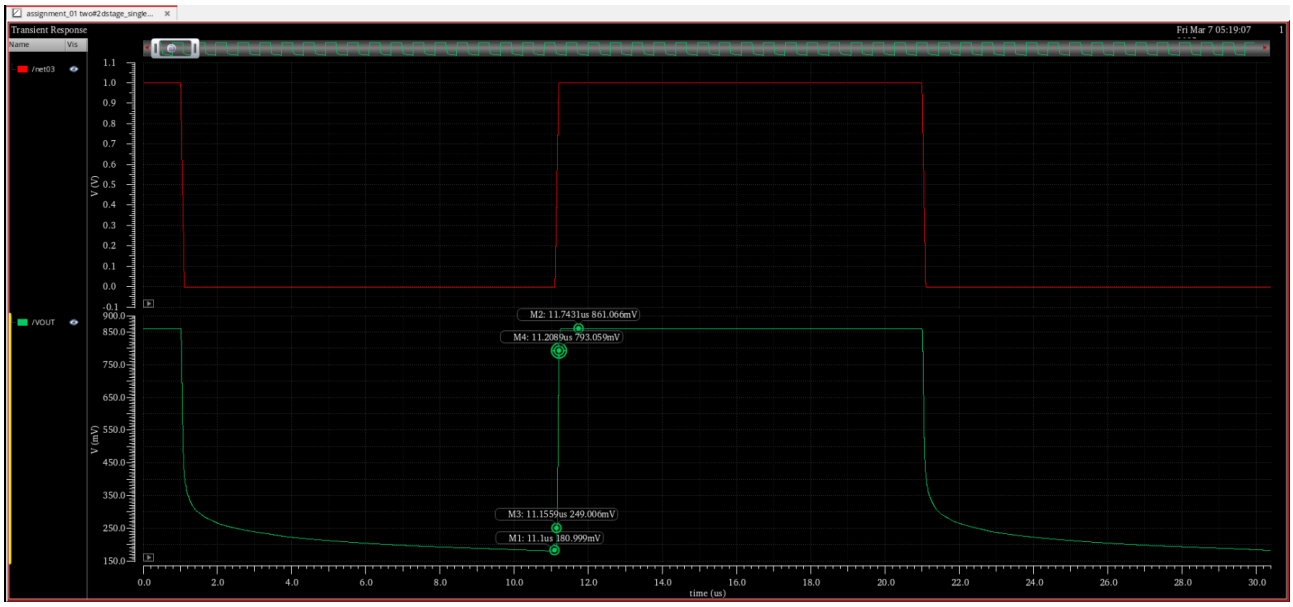


Figure 21 — Slew Rate Analysis of closed Loop of a two-stage single-ended symmetric OTA

6.2.3 AC Analysis Setup

For the AC analysis, a 500 mV DC voltage with a 1 V AC signal was applied to the V_{INP} terminal.

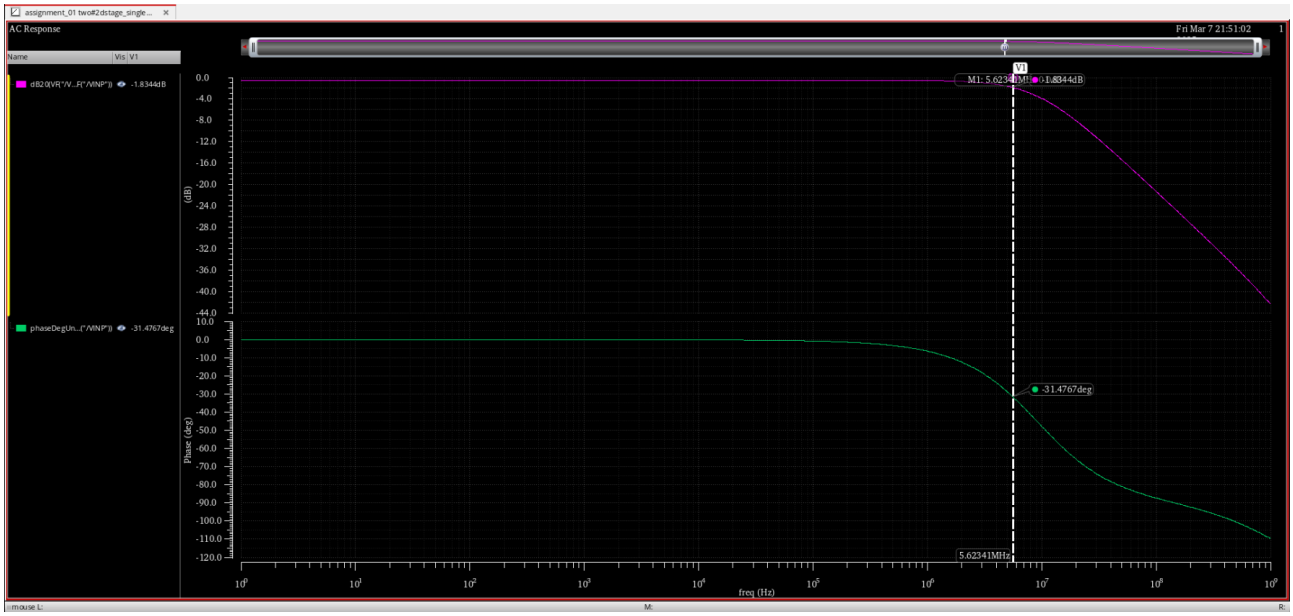


Figure 22 — AC Response of closed Loop of a two-stage single-ended symmetric OTA

7 TUNED SIMULATION RESULTS OF A TWO-STAGE SINGLE-ENDED SYMMETRIC OTA

7.1 Open Loop Case of a two-stage single-ended symmetric OTA (Without Feedback)

7.1.1 Slew Rate Analysis

The slew rate is calculated using the following expression in Cadence:

$$\text{slewRate}\left(v(\text{"}/VOUT\text{"}, ?\text{result} = \text{"}tran\text{"}), 0, \text{nil}, 1, \text{nil}, 10, 90, \text{nil}, \text{"}time\text{"}\right) \tag{71}$$

The obtained slew rate is:

$$\text{Slew Rate} = 20.1081\,\text{V}/\mu\text{s} \tag{72}$$

Manual Calculation

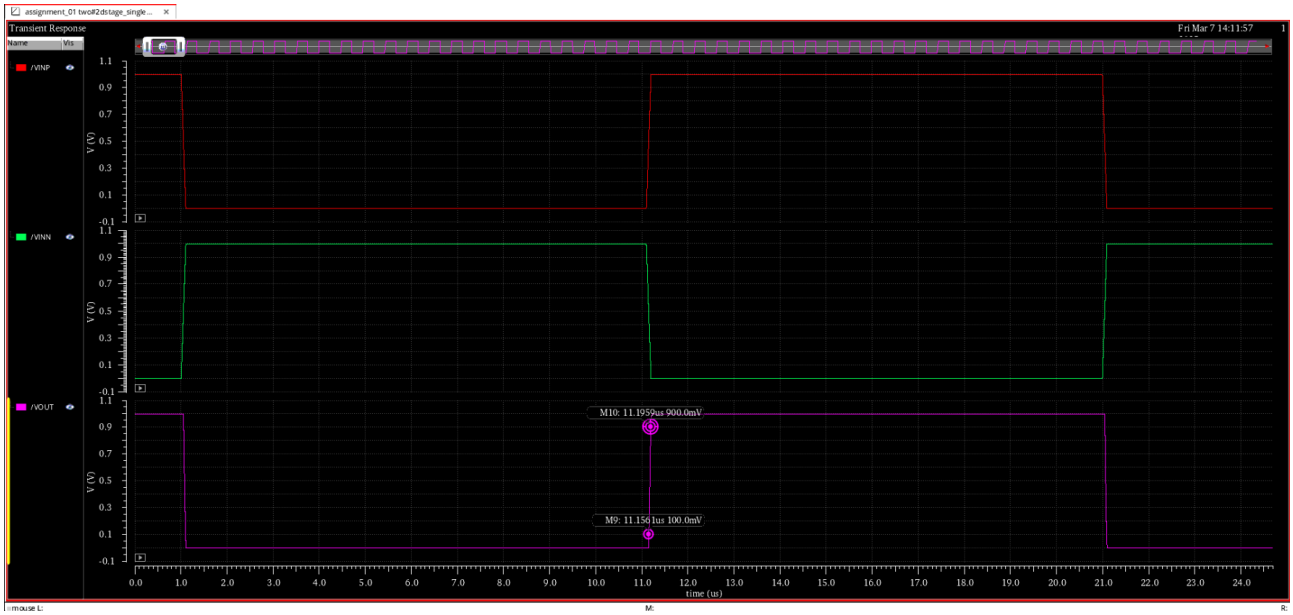


Figure 23 — Slew Rate Analysis Open Loop of a two-stage single-ended symmetric OTA - Tuned

The slew rate (SR) is calculated based on the rising edge, representing the maximum rate of change of the output voltage (V_{OUT}):

$$SR = \frac{\Delta V_{OUT}}{\Delta t} \tag{73}$$

From the transient response, V_{OUT} transitions from 100 mV to 900 mV over 11.1561 μs to 11.1959 μs:

$$SR = \frac{900 \times 10^{-3} - 100 \times 10^{-3}}{11.1959 \times 10^{-6} - 11.1561 \times 10^{-6}} \tag{74}$$

$$SR = \frac{800 \times 10^{-3}}{0.0398 \times 10^{-6}} \tag{75}$$

$$SR \approx 20.1005\ \text{V}/\mu s \tag{76}$$

7.1.2 AC Analysis Setup

For the AC analysis, a 500 mV DC bias voltage was applied along with a 1 V AC signal, consisting of two components with phase shifts of 0° and 180°.

Figure 24 — Slew Rate Analysis Open Loop of a two-stage single-ended symmetric OTA - Tuned

7.1.3 AC Analysis Results

The AC analysis results are derived from the frequency response plot:

- **DC Gain**: Around 28.4211 dB at 1 nHz, which falls short of the required specification of $\geq$ 40 dB.
- **Unity Gain Bandwidth (UGBW)**: Approximately 49.1822 MHz, which exceeds the specification of $\geq$ 20 MHz.
- **Phase Margin (PM)**: At 49.1822 MHz, the phase is $-90.1535°$, resulting in:

$$PM = 180° - 90.1535° \approx 89.8465° \tag{77}$$

This surpasses the required specification of $> 45°$.

Comparison of Open Loop Results with Design Specifications of a two-stage single-ended symmetric OTA - - Tuned

Parameter	Design Specification	Obtained Value	Unit
Open-loop DC Gain	$\geq$100 (40 dB)	28.4211	dB
Unity Gain Frequency	$\geq$20 MHz	49.1822	MHz
Phase Margin	$>45°$	89.8465	°
Slew Rate	>10 V/μs	20.1081	V/μs

7.2 Closed Loop of a two-stage single-ended symmetric OTA (With Unity Gain Feedback) - Tuned

7.2.1 Slew Rate Analysis

The transient response is driven by a pulse input with the following parameters:

$$SR = \frac{\Delta V_{OUT}}{\Delta t} \tag{78}$$

From the transient response, V_{OUT} transitions from 200 mV to 737.705 mV over 11.1459 μs to 11.1832 μs:

$$SR = \frac{737.705 \times 10^{-3} - 200 \times 10^{-3}}{11.1459 \times 10^{-6} - 11.1832 \times 10^{-6}} \tag{79}$$

$$SR = \frac{537.705 \times 10^{-3}}{0.0373 \times 10^{-6}} \tag{80}$$

$$SR \approx 14.4157 \text{ V}/\mu s \tag{81}$$

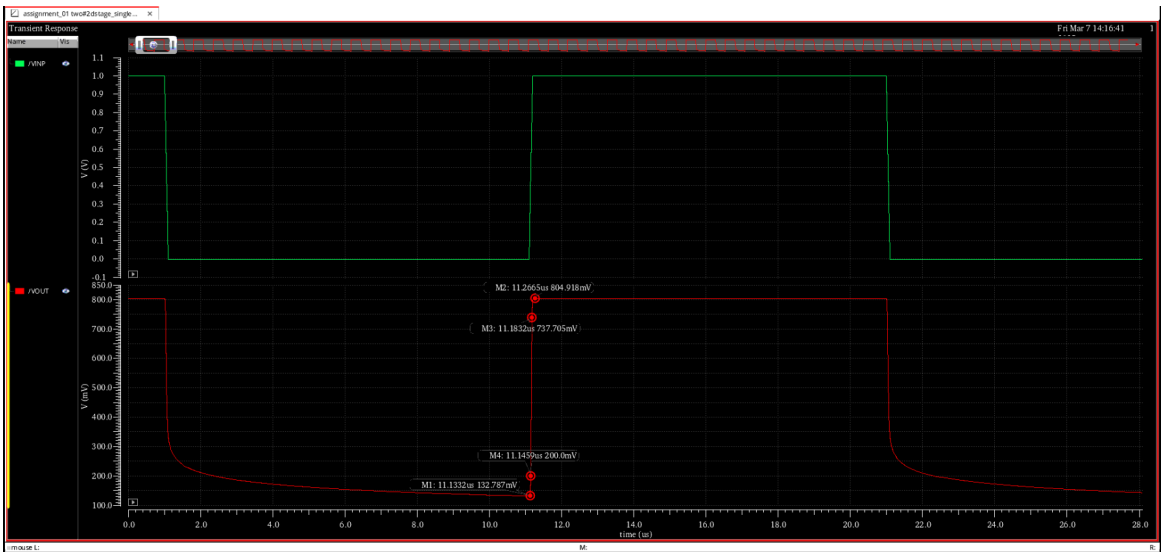


Figure 25 — Slew Rate Analysis for closed Loop of a two-stage single-ended symmetric OTA - Tuned

7.2.2 AC Analysis Setup

For the AC analysis, a 500 mV DC voltage with a 1 V AC signal was applied to the V_{INP} terminal.

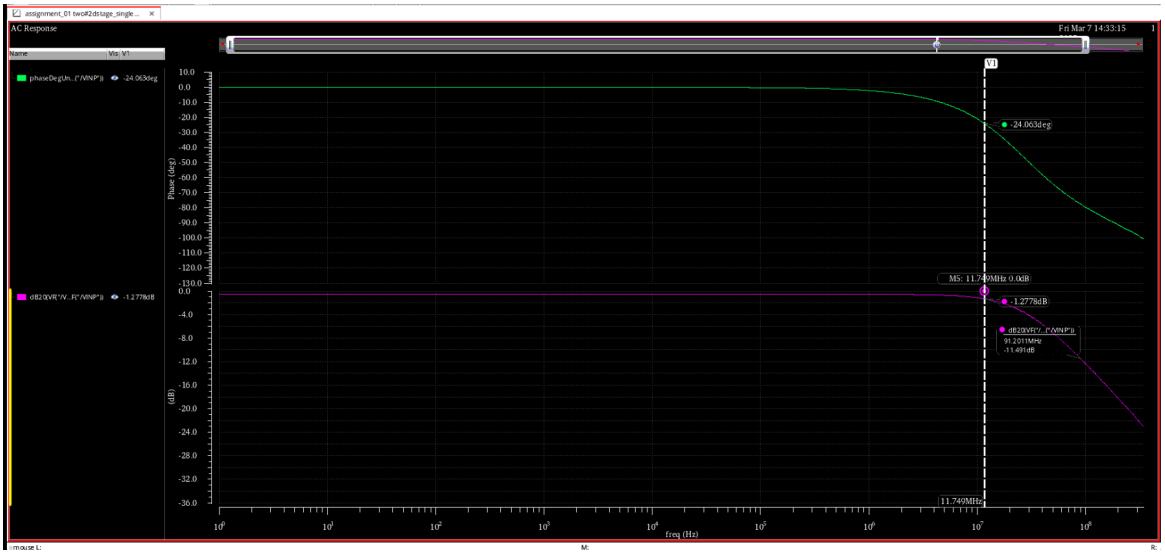


Figure 26 — AC Analysis for closed Loop of a two-stage single-ended symmetric OTA - Tuned

8 COMPARISON BETWEEN DESIGN/SIMULATION RESULTS

8.1 Comparison between design/simulation results of a single-stage basic OTA

Comparison of results with Calculated, and Tuned Values of width for Open and Closed Loop (Single-stage basic OTA)

Parameter	Design Specification	Obtained Values	
		Calculated	Tuned
Open Loop			
Open-loop DC Gain (dB)	≥100 (40 dB)	27.5904	21.7769
Unity Gain Frequency (MHz)	≥20	10.8407	22.3224
Phase Margin (°)	>45	92.3187	93.8954
Slew Rate (V/μs)	>10	6.5595	15.4149
Closed Loop			
Slew Rate (V/μs)	>10	5.891	11.865

8.2 Comparison between design/simulation results of a two-stage single-ended symmetric OTA

Comparison of results with Calculated, and Tuned Values of width for Open and Closed Loop (Two-Stage Single-Ended Symmetric OTA)

Parameter	Design Specification	Obtained Values	
		Calculated	Tuned
Open Loop			
Open-loop DC Gain (dB)	≥100 (40 dB)	26.4813	28.4211
Unity Gain Frequency (MHz)	≥20	17.1537	49.1822
Phase Margin (°)	>45	92.1315	89.8465
Slew Rate (V/μs)	>10	11.5606	20.1081
Closed Loop			
Slew Rate (V/μs)	>10	10.2651	14.4157

Initially, I simulated with the calculated width values for $L = 100$ nm. For the single-stage basic OTA, I was unable to meet all the design specifications, although I did manage to meet the phase margin with the calculated values. I then adjusted the transistor widths, particularly increasing the widths of M6 and M4, which allowed me to achieve values that met the design specifications. For the two-stage single-ended symmetric OTA, I was able to meet some of the design specifications, such as the slew rate and phase margin with the calculated values. After tuning the transistor widths, I successfully achieved values that satisfied all the design specifications except open-loop DC gain. However, in both circuits, I was unable to meet the required open-loop DC gain (dB).

9 APPENDIX: CMOS-LEVEL CIRCUIT & NETLISTS

9.1 CMOS-Level Circuits

9.1.1 CMOS-Level Circuit of a Single-Stage Basic OTA

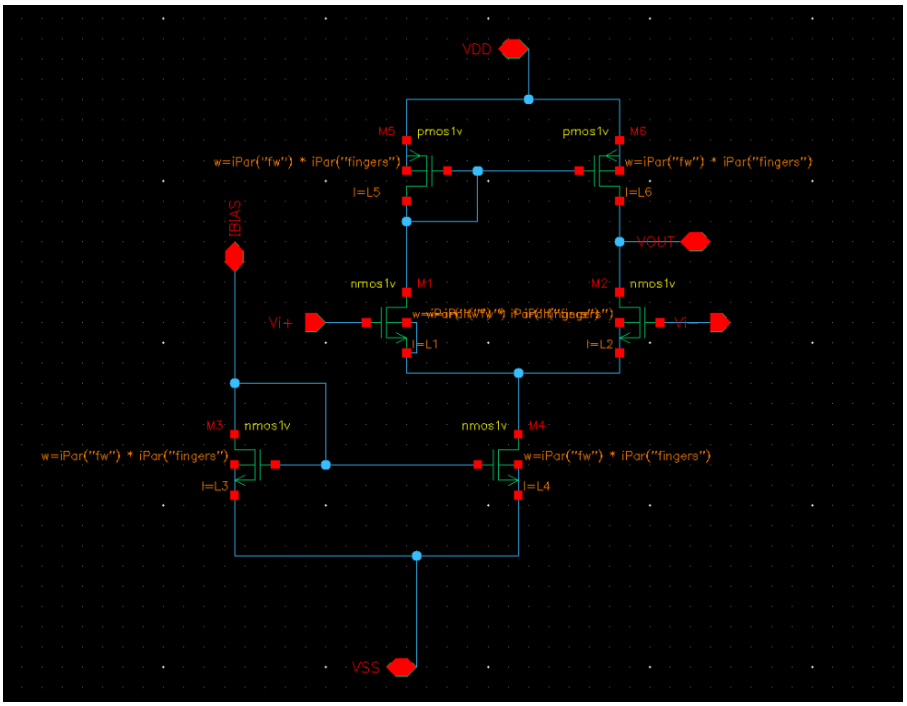


Figure 27 — CMOS-Level Circuit of a Single-Stage Basic OTA

9.1.2 CMOS-Level Circuit of a two-stage single-ended symmetric OTA

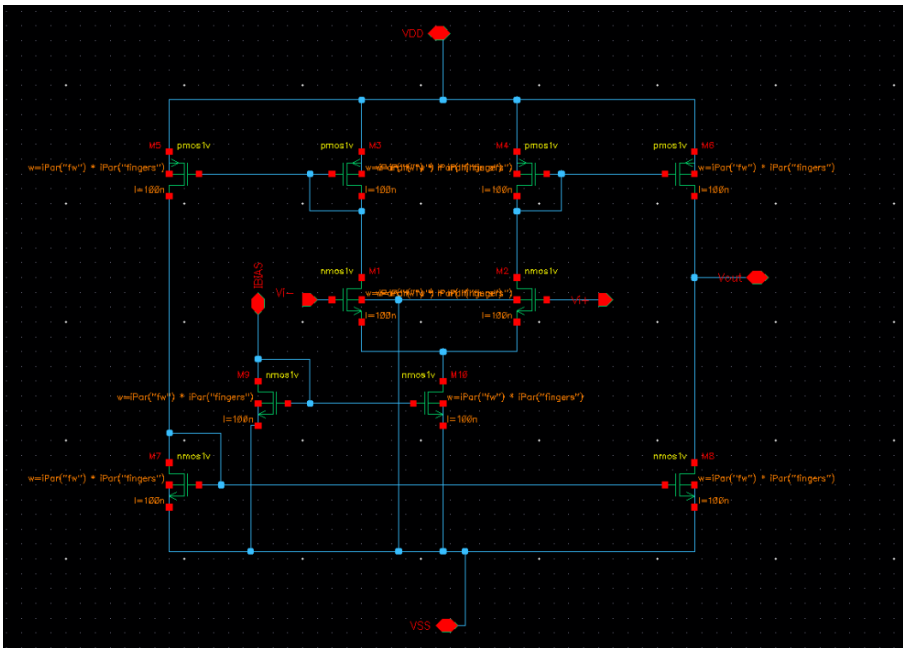


Figure 28 — CMOS-Level Circuit of a two-stage single-ended symmetric OTA

9.2 Netlists

9.2.1 Netlist of single-stage basic OTA

```
// Generated for: spectre
// Generated on: Mar  7 19:35:23 2025
// Design library name: assignment_01
// Design cell name: simple_differential_amplifier
// Design view name: schematic
simulator lang=spectre
global 0
parameters width6 L6 width5 L5 width3 L3 width4 L4 width2 L2 width1
    L1
include "/home/aed/cadence/dicd_source/cadence_pdk/gpdk045_v_6_0/
   gpdk045/../models/spectre/gpdk045.scs" section=mc

// Library name: assignment_01
// Cell name: simple_differential_amplifier
// View name: schematic
M6 (VOUT net20 VDD VDD) g45p1svt w=((width6) * (1)) l=L6 nf=1 as=((
   width6) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n : (((60n
   ) - 0) + 60n)) * 120n) + ((width6) * 50n)) + (floor(((1) - 1) /
   2.0) * (((((60n) - 0) + 60n) * 120n) + ((width6) * 100n))) +
   ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) + 60n
   ) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((width6) * 50n)) : 0))
    / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n
   )) * (width6)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) - 0)
   + 50n) ? 60n : (((60n) - 0) + 50n)) * (width6))) + ((((1) / 2) -
    floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n :
   (((60n) - 0) + 80n)) * (width6)) : 0)) / 1 \
         ad=((width6) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
            0) + 60n) * 120n) + ((width6) * 100n))) + ((((1) / 2) -
             floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((width6) * 50n))
            : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
             50n) ? 60n : (((60n) - 0) + 50n)) * (width6))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width6)) :
            0)) / 1 \
         ps=((width6) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
             ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
            1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
            ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
            n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
            0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))) + (2 * (width6))) + (floor(((1) -
             1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
            (((60n) - 0) + 50n))) + (2 * (width6)))) + ((((1) / 2)
            - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (width6))) :
             0)) / 1 \
```

```
pd=((width6) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
   ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
   != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
   ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
   * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
    + 50n))) + (2 * (width6)))) + ((((1) / 2) - floor((1)
   / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
    (((60n) - 0) + 80n))) + (2 * (width6))) : 0)) / 1 \
nrd=((width6) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
    0) + 60n) * 120n) + ((width6) * 100n))) + ((((1) / 2)
   - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
    50n : (((60n) - 0) + 60n)) * 120n) + ((width6) * 50n))
    : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
   + 50n) ? 60n : (((60n) - 0) + 50n)) * (width6))) +
   ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
    0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width6)) :
   0)) / 1 / ((width6) * (1) * (width6) * (1)) \
nrs=((width6) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
   50n : (((60n) - 0) + 60n)) * 120n) + ((width6) * 50n))
   + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
   n) + ((width6) * 100n))) + ((((1) / 2) - floor((1) / 2)
    == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
    0) + 60n)) * 120n) + ((width6) * 50n)) : 0)) / 1 :
   (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (width6)) + (floor(((1) - 1) / 2.0) * ((60n >
   (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
   width6))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
   (width6)) : 0)) / 1 / ((width6) * (1) * (width6) * (1))
    \
sa=((width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
   : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
    80n) ? 100n : (((60n) - 0) + 80n)) \
sb=((width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
   : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
    80n) ? 100n : (((60n) - 0) + 80n)) \
sd=((width6) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
    (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
   ) \
sca=(( (width6) * ( (((1u) * (1u) / (((width6) < 119.5n) ?
    (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
   ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
   ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((width6) <
   119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
   0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
    : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
   (((width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
    : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
   + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
   u)/ ((((width6) < 119.5n) ? (50n > (((60n) - 0) + 60n)
   ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
   - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
```

```
      ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
       ((60n)+(width6)))) + ((1u) * (1u) / (60n)) - ((1u) *
      (1u)/ ((60n)+(width6)))))) / ((width6) * (45n)) \
    scb=(((width6) * (((((width6) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n)/10 + (1u)/100)*exp(-10 * (((width6) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n) / (1u)) - (((((width6) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
      width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
      (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
      80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
      + ((((width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
      50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
      0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
      /100)*exp(-10 * (((width6) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n) / (1u)) - (((((width6) < 119.5n) ? (50n > (((60n) -
      0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
      > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
      )+(45n))/10 + (1u)/100)*exp(-10 * ((((width6) < 119.5n)
       ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
      n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
      (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
      (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
      )+(width6))/10 + (1u)/100)*exp(-10 * ((60n)+(width6)) /
       (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
      - (((60n)+(width6))/10 + (1u)/100)*exp(-10 * ((60n)+(
      width6)) / (1u))))) / ((width6) * (45n)) \
    scc=(((width6) * (((((width6) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n)/20 + (1u)/400)*exp(-20 * (((width6) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n) / (1u)) - (((((width6) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
      width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
      (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
      80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
      + ((((width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
      50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
      0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
      /400)*exp(-20 * (((width6) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
```

```
             > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
            n) / (1u)) - (((((width6) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
            )+(45n))/20 + (1u)/400)*exp(-20 * ((((width6) < 119.5n)
             ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
            n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
            (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
            )+(width6))/20 + (1u)/400)*exp(-20 * ((60n)+(width6)) /
             (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
            - (((60n)+(width6))/20 + (1u)/400)*exp(-20 * ((60n)+(
            width6)) / (1u))))) / ((width6) * (45n)) \
         m=(1)
M5 (net20 net20 VDD VDD) g45p1svt w=((width5) * (1)) l=L5 nf=1 as
   =((width5) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((width5) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((width5) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((width5) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (width5)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (width5))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (width5)) : 0)) / 1 \
         ad=((width5) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
            0) + 60n) * 120n) + ((width5) * 100n))) + ((((1) / 2) -
             floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((width5) * 50n))
            : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
             50n) ? 60n : (((60n) - 0) + 50n)) * (width5))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width5)) :
            0)) / 1 \
         ps=((width5) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
             ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
            1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
            ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
            n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
            0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))) + (2 * (width5))) + (floor(((1) -
             1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
            (((60n) - 0) + 50n))) + (2 * (width5)))) + ((((1) / 2)
            - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (width5))) :
             0)) / 1 \
         pd=((width5) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
            ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
            != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
            ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
            * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
             + 50n))) + (2 * (width5)))) + ((((1) / 2) - floor((1)
```

```
+ 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
    (((60n) - 0) + 80n))) + (2 * (width5))) : 0)) / 1 \
nrd=((width5) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
    0) + 60n) * 120n) + ((width5) * 100n))) + ((((1) / 2)
   - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
    50n : (((60n) - 0) + 60n)) * 120n) + ((width5) * 50n))
    : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
   + 50n) ? 60n : (((60n) - 0) + 50n)) * (width5))) +
   ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
    0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width5)) :
   0)) / 1 / ((width5) * (1) * (width5) * (1)) \
nrs=((width5) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
   50n : (((60n) - 0) + 60n)) * 120n) + ((width5) * 50n))
   + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
   n) + ((width5) * 100n))) + ((((1) / 2) - floor((1) / 2)
    == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
    0) + 60n)) * 120n) + ((width5) * 50n)) : 0)) / 1 :
   (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (width5)) + (floor(((1) - 1) / 2.0) * ((60n >
   (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
   width5))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
   (width5)) : 0)) / 1 / ((width5) * (1) * (width5) * (1))
    \
sa=((width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
   : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
    80n) ? 100n : (((60n) - 0) + 80n)) \
sb=((width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
   : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
    80n) ? 100n : (((60n) - 0) + 80n)) \
sd=((width5) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
    (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
   ) \
sca=(( (width5) * ( (((1u) * (1u) / (((width5) < 119.5n) ?
    (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
   ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
   ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((width5) <
   119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
   0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
    : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
   (((width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
    : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
   + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
   u)/ ((((width5) < 119.5n) ? (50n > (((60n) - 0) + 60n)
   ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
   - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
   ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
    ((60n)+(width5)))) + ((1u) * (1u) / (60n)) - ((1u) *
   (1u)/ ((60n)+(width5)))))) / ((width5) * (45n)) \
scb=(((width5) * (((((width5) < 119.5n) ? (50n > (((60n) -
    0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
```

```
n)/10 + (1u)/100)*exp(-10 * (((width5) < 119.5n) ? (50n
 > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
0) + 80n))+60n) / (1u)) - (((((width5) < 119.5n) ? (50n
 > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
(((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
+ ((((width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
/100)*exp(-10 * (((width5) < 119.5n) ? (50n > (((60n) -
 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
 > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
n) / (1u)) - (((((width5) < 119.5n) ? (50n > (((60n) -
0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
> (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
)+(45n))/10 + (1u)/100)*exp(-10 * ((((width5) < 119.5n)
 ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
(((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
(((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
)+(width5))/10 + (1u)/100)*exp(-10 * ((60n)+(width5)) /
 (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
- (((60n)+(width5))/10 + (1u)/100)*exp(-10 * ((60n)+(
width5)) / (1u))))) / ((width5) * (45n)) \
scc=(((width5) * (((((width5) < 119.5n) ? (50n > (((60n) -
 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
 > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
n)/20 + (1u)/400)*exp(-20 * (((width5) < 119.5n) ? (50n
 > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
0) + 80n))+60n) / (1u)) - (((((width5) < 119.5n) ? (50n
 > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
(((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
+ ((((width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
/400)*exp(-20 * (((width5) < 119.5n) ? (50n > (((60n) -
 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
 > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
n) / (1u)) - (((((width5) < 119.5n) ? (50n > (((60n) -
0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
> (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
)+(45n))/20 + (1u)/400)*exp(-20 * ((((width5) < 119.5n)
 ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
```

```
           n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
           )+(width5))/20 + (1u)/400)*exp(-20 * ((60n)+(width5)) /
            (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
           - (((60n)+(width5))/20 + (1u)/400)*exp(-20 * ((60n)+(
           width5)) / (1u))))) / ((width5) * (45n)) \
        m=(1)
M3 (IBIAS IBIAS VSS VSS) g45n1svt w=((width3) * (1)) l=L3 nf=1 as
   =((width3) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((width3) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((width3) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((width3) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (width3)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (width3))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (width3)) : 0)) / 1 \
        ad=((width3) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
           0) + 60n) * 120n) + ((width3) * 100n))) + ((((1) / 2) -
            floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) * 120n) + ((width3) * 50n))
           : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
            50n) ? 60n : (((60n) - 0) + 50n)) * (width3))) +
           ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
            0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width3)) :
           0)) / 1 \
        ps=((width3) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
            ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
           1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
           ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
           n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
           0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))) + (2 * (width3))) + (floor(((1) -
            1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
           (((60n) - 0) + 50n))) + (2 * (width3)))) + ((((1) / 2)
           - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
           80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (width3))) :
            0)) / 1 \
        pd=((width3) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
           ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
           != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
           ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
           * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
            + 50n))) + (2 * (width3)))) + ((((1) / 2) - floor((1)
           / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))) + (2 * (width3))) : 0)) / 1 \
        nrd=((width3) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
            0) + 60n) * 120n) + ((width3) * 100n))) + ((((1) / 2)
           - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((width3) * 50n))
```

```
        : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
      + 50n) ? 60n : (((60n) - 0) + 50n)) * (width3))) +
      ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
        0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width3)) :
      0)) / 1 / ((width3) * (1) * (width3) * (1)) \
    nrs=((width3) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
      50n : (((60n) - 0) + 60n)) * 120n) + ((width3) * 50n))
      + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
      n) + ((width3) * 100n))) + ((((1) / 2) - floor((1) / 2)
        == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
        0) + 60n)) * 120n) + ((width3) * 50n)) : 0)) / 1 :
      (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
      80n)) * (width3)) + (floor(((1) - 1) / 2.0) * ((60n >
      (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
      width3))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
        > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
      (width3)) : 0)) / 1 / ((width3) * (1) * (width3) * (1))
        \
    sa=((width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
        80n) ? 100n : (((60n) - 0) + 80n)) \
    sb=((width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
        80n) ? 100n : (((60n) - 0) + 80n)) \
    sd=((width3) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
        (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
      ) \
    sca=(( (width3) * ( (((1u) * (1u) / (((width3) < 119.5n) ?
        (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
      ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
      ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((width3) <
      119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
      0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
        : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
      (((width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
      + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
      u)/ ((((width3) < 119.5n) ? (50n > (((60n) - 0) + 60n)
      ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
      - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
      ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
        ((60n)+(width3)))) + ((1u) * (1u) / (60n)) - ((1u) *
      (1u)/ ((60n)+(width3)))))) / ((width3) * (45n)) \
    scb=(((width3) * (((((width3) < 119.5n) ? (50n > (((60n) -
        0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
        > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n)/10 + (1u)/100)*exp(-10 * (((width3) < 119.5n) ? (50n
        > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n) / (1u)) - (((((width3) < 119.5n) ? (50n
        > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
```

```
          0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
          width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
          (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
          80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
          + ((((width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
          50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
          0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
          /100)*exp(-10 * (((width3) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
          n) / (1u)) - (((((width3) < 119.5n) ? (50n > (((60n) -
          0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
          > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
          )+(45n))/10 + (1u)/100)*exp(-10 * ((((width3) < 119.5n)
           ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
          n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
          (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
          (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
          )+(width3))/10 + (1u)/100)*exp(-10 * ((60n)+(width3)) /
           (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
          - (((60n)+(width3))/10 + (1u)/100)*exp(-10 * ((60n)+(
          width3)) / (1u))))) / ((width3) * (45n)) \
       scc=(((width3) * (((((width3) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
          n)/20 + (1u)/400)*exp(-20 * (((width3) < 119.5n) ? (50n
           > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
          e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
          0) + 80n))+60n) / (1u)) - (((((width3) < 119.5n) ? (50n
           > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
          e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
          0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
          width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
          (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
          80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
          + ((((width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
          50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
          0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
          /400)*exp(-20 * (((width3) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
          n) / (1u)) - (((((width3) < 119.5n) ? (50n > (((60n) -
          0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
          > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
          )+(45n))/20 + (1u)/400)*exp(-20 * ((((width3) < 119.5n)
           ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
          n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
          (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
          (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
          )+(width3))/20 + (1u)/400)*exp(-20 * ((60n)+(width3)) /
           (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
```

```
            - (((60n)+(width3))/20 + (1u)/400)*exp(-20 * ((60n)+(
               width3)) / (1u))))) / ((width3) * (45n)) \
         m=(1)
M4 (net22 IBIAS VSS VSS) g45n1svt w=((width4) * (1)) l=L4 nf=1 as
   =((width4) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((width4) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((width4) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((width4) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (width4)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (width4))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (width4)) : 0)) / 1 \
         ad=((width4) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
            0) + 60n) * 120n) + ((width4) * 100n))) + ((((1) / 2) -
             floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((width4) * 50n))
            : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
             50n) ? 60n : (((60n) - 0) + 50n)) * (width4))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width4)) :
            0)) / 1 \
         ps=((width4) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
             ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
            1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
            ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
            n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
            0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))) + (2 * (width4))) + (floor(((1) -
             1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
            (((60n) - 0) + 50n))) + (2 * (width4)))) + ((((1) / 2)
            - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (width4))) :
             0)) / 1 \
         pd=((width4) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
            ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
            != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
            ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
            * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
             + 50n))) + (2 * (width4)))) + ((((1) / 2) - floor((1)
            / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
             (((60n) - 0) + 80n))) + (2 * (width4))) : 0)) / 1 \
         nrd=((width4) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
             0) + 60n) * 120n) + ((width4) * 100n))) + ((((1) / 2)
            - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
             50n : (((60n) - 0) + 60n)) * 120n) + ((width4) * 50n))
             : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
            + 50n) ? 60n : (((60n) - 0) + 50n)) * (width4))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width4)) :
            0)) / 1 / ((width4) * (1) * (width4) * (1)) \
```

```
nrs=((width4) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
   50n : (((60n) - 0) + 60n)) * 120n) + ((width4) * 50n))
   + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
   n) + ((width4) * 100n))) + ((((1) / 2) - floor((1) / 2)
    == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
    0) + 60n)) * 120n) + ((width4) * 50n)) : 0)) / 1 :
   (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (width4)) + (floor(((1) - 1) / 2.0) * ((60n >
   (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
   width4))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
   (width4)) : 0)) / 1 / ((width4) * (1) * (width4) * (1))
    \
sa=((width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
   : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
    80n) ? 100n : (((60n) - 0) + 80n)) \
sb=((width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
   : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
    80n) ? 100n : (((60n) - 0) + 80n)) \
sd=((width4) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
    (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
   ) \
sca=(( (width4) * ( (((1u) * (1u) / (((width4) < 119.5n) ?
    (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
   ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
   ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((width4) <
   119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
   0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
    : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
   (((width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
    : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
   + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
   u)/ ((((width4) < 119.5n) ? (50n > (((60n) - 0) + 60n)
   ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
   - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
   ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
    ((60n)+(width4)))) + ((1u) * (1u) / (60n)) - ((1u) *
   (1u)/ ((60n)+(width4)))))) / ((width4) * (45n)) \
scb=(((width4) * (((((width4) < 119.5n) ? (50n > (((60n) -
    0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
   n)/10 + (1u)/100)*exp(-10 * (((width4) < 119.5n) ? (50n
    > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
   e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
   0) + 80n))+60n) / (1u)) - (((((width4) < 119.5n) ? (50n
    > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
   e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
   0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
   width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
   80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
   + ((((width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
```

```
           50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
           0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
           /100)*exp(-10 * (((width4) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n) / (1u)) - (((((width4) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
           )+(45n))/10 + (1u)/100)*exp(-10 * ((((width4) < 119.5n)
            ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
           n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
           )+(width4))/10 + (1u)/100)*exp(-10 * ((60n)+(width4)) /
            (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
           - (((60n)+(width4))/10 + (1u)/100)*exp(-10 * ((60n)+(
           width4)) / (1u))))) / ((width4) * (45n)) \
         scc=(((width4) * (((((width4) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n)/20 + (1u)/400)*exp(-20 * (((width4) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n) / (1u)) - (((((width4) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
           width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
           (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
           80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
           + ((((width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
           0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
           /400)*exp(-20 * (((width4) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n) / (1u)) - (((((width4) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
           )+(45n))/20 + (1u)/400)*exp(-20 * ((((width4) < 119.5n)
            ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
           n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
           )+(width4))/20 + (1u)/400)*exp(-20 * ((60n)+(width4)) /
            (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
           - (((60n)+(width4))/20 + (1u)/400)*exp(-20 * ((60n)+(
           width4)) / (1u))))) / ((width4) * (45n)) \
         m=(1)
M2 (VOUT Vi\- net22 net22) g45n1svt w=((width2) * (1)) l=L2 nf=1 as
   =((width2) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((width2) * 50n)) + (floor(((1) -
```

```
 1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((width2) * 100n)))
 + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((width2) * 50n)) :
0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
80n)) * (width2)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (width2))) + ((((1) /
2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
: (((60n) - 0) + 80n)) * (width2)) : 0)) / 1 \
      ad=((width2) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
         0) + 60n) * 120n) + ((width2) * 100n))) + ((((1) / 2) -
          floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
         50n : (((60n) - 0) + 60n)) * 120n) + ((width2) * 50n))
         : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
          50n) ? 60n : (((60n) - 0) + 50n)) * (width2))) +
         ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
          0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width2)) :
         0)) / 1 \
      ps=((width2) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
          ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
         1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
         ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
         n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
         0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
         (((60n) - 0) + 80n))) + (2 * (width2))) + (floor(((1) -
          1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
         (((60n) - 0) + 50n))) + (2 * (width2)))) + ((((1) / 2)
         - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (width2))) :
          0)) / 1 \
      pd=((width2) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
         ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
         != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
         ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
         * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
          + 50n))) + (2 * (width2)))) + ((((1) / 2) - floor((1)
         / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
          (((60n) - 0) + 80n))) + (2 * (width2))) : 0)) / 1 \
      nrd=((width2) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
          0) + 60n) * 120n) + ((width2) * 100n))) + ((((1) / 2)
         - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
          50n : (((60n) - 0) + 60n)) * 120n) + ((width2) * 50n))
          : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
         + 50n) ? 60n : (((60n) - 0) + 50n)) * (width2))) +
         ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
          0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width2)) :
         0)) / 1 / ((width2) * (1) * (width2) * (1)) \
      nrs=((width2) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
         50n : (((60n) - 0) + 60n)) * 120n) + ((width2) * 50n))
         + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
         n) + ((width2) * 100n))) + ((((1) / 2) - floor((1) / 2)
          == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
          0) + 60n)) * 120n) + ((width2) * 50n)) : 0)) / 1 :
```

```
      (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
      80n)) * (width2)) + (floor(((1) - 1) / 2.0) * ((60n >
      (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
      width2))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
      (width2)) : 0)) / 1 / ((width2) * (1) * (width2) * (1))
       \
    sa=((width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n)) \
    sb=((width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n)) \
    sd=((width2) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
       (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
      ) \
    sca=(( (width2) * ( (((1u) * (1u) / (((width2) < 119.5n) ?
       (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
      ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
      ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((width2) <
      119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
      0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
       : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
      (((width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
       : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
      + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
      u)/ ((((width2) < 119.5n) ? (50n > (((60n) - 0) + 60n)
      ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
      - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
      ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
       ((60n)+(width2)))) + ((1u) * (1u) / (60n)) - ((1u) *
      (1u)/ ((60n)+(width2)))))) / ((width2) * (45n)) \
    scb=(((width2) * (((((width2) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n)/10 + (1u)/100)*exp(-10 * (((width2) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n) / (1u)) - (((((width2) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
      width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
      (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
      80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
      + ((((width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
      50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
      0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
      /100)*exp(-10 * (((width2) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n) / (1u)) - (((((width2) < 119.5n) ? (50n > (((60n) -
```

```
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
            )+(45n))/10 + (1u)/100)*exp(-10 * ((((width2) < 119.5n)
             ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
            n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
            (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
            )+(width2))/10 + (1u)/100)*exp(-10 * ((60n)+(width2)) /
             (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
            - (((60n)+(width2))/10 + (1u)/100)*exp(-10 * ((60n)+(
            width2)) / (1u))))) / ((width2) * (45n)) \
          scc=(((width2) * (((((width2) < 119.5n) ? (50n > (((60n) -
              0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
             > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
            n)/20 + (1u)/400)*exp(-20 * (((width2) < 119.5n) ? (50n
             > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
            e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
            0) + 80n))+60n) / (1u)) - (((((width2) < 119.5n) ? (50n
             > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
            e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
            0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
            width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
            (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
            + ((((width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
            0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
            /400)*exp(-20 * (((width2) < 119.5n) ? (50n > (((60n) -
              0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
             > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
            n) / (1u)) - (((((width2) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
            )+(45n))/20 + (1u)/400)*exp(-20 * ((((width2) < 119.5n)
             ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
            n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
            (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
            )+(width2))/20 + (1u)/400)*exp(-20 * ((60n)+(width2)) /
             (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
            - (((60n)+(width2))/20 + (1u)/400)*exp(-20 * ((60n)+(
            width2)) / (1u))))) / ((width2) * (45n)) \
          m=(1)
M1 (net20 Vi\+ net22 net22) g45n1svt w=((width1) * (1)) l=L1 nf=1
   as=((width1) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((width1) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((width1) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((width1) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (width1)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (width1))) + ((((1) /
```

```
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (width1)) : 0)) / 1 \
         ad=((width1) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
            0) + 60n) * 120n) + ((width1) * 100n))) + ((((1) / 2) -
             floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((width1) * 50n))
            : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
             50n) ? 60n : (((60n) - 0) + 50n)) * (width1))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width1)) :
            0)) / 1 \
         ps=((width1) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
             ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
            1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
            ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
            n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
            0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))) + (2 * (width1))) + (floor(((1) -
             1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
            (((60n) - 0) + 50n))) + (2 * (width1)))) + ((((1) / 2)
            - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (width1))) :
             0)) / 1 \
         pd=((width1) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
            ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
            != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
            ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
            * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
             + 50n))) + (2 * (width1)))) + ((((1) / 2) - floor((1)
            / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
             (((60n) - 0) + 80n))) + (2 * (width1))) : 0)) / 1 \
         nrd=((width1) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
             0) + 60n) * 120n) + ((width1) * 100n))) + ((((1) / 2)
            - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
             50n : (((60n) - 0) + 60n)) * 120n) + ((width1) * 50n))
             : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
            + 50n) ? 60n : (((60n) - 0) + 50n)) * (width1))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (width1)) :
            0)) / 1 / ((width1) * (1) * (width1) * (1)) \
         nrs=((width1) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((width1) * 50n))
            + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
            n) + ((width1) * 100n))) + ((((1) / 2) - floor((1) / 2)
             == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
             0) + 60n)) * 120n) + ((width1) * 50n)) : 0)) / 1 :
            (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
            80n)) * (width1)) + (floor(((1) - 1) / 2.0) * ((60n >
            (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
            width1))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
             > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
```

```
      (width1)) : 0)) / 1 / ((width1) * (1) * (width1) * (1))
       \
    sa=((width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n)) \
    sb=((width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n)) \
    sd=((width1) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
       (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
      ) \
    sca=(( (width1) * ( (((1u) * (1u) / (((width1) < 119.5n) ?
       (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
      ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
      ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((width1) <
      119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
      0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
       : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
      (((width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
       : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
      + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
      u)/ ((((width1) < 119.5n) ? (50n > (((60n) - 0) + 60n)
      ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
      - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
      ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
       ((60n)+(width1)))) + ((1u) * (1u) / (60n)) - ((1u) *
      (1u)/ ((60n)+(width1)))))) / ((width1) * (45n)) \
    scb=(((width1) * (((((width1) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n)/10 + (1u)/100)*exp(-10 * (((width1) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n) / (1u)) - (((((width1) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
      width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
      (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
      80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
      + ((((width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
      50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
      0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
      /100)*exp(-10 * (((width1) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n) / (1u)) - (((((width1) < 119.5n) ? (50n > (((60n) -
      0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
      > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
      )+(45n))/10 + (1u)/100)*exp(-10 * ((((width1) < 119.5n)
       ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
      n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
```

```
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
           )+(width1))/10 + (1u)/100)*exp(-10 * ((60n)+(width1)) /
            (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
           - (((60n)+(width1))/10 + (1u)/100)*exp(-10 * ((60n)+(
           width1)) / (1u))))) / ((width1) * (45n)) \
         scc=(((width1) * (((((width1) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n)/20 + (1u)/400)*exp(-20 * (((width1) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n) / (1u)) - (((((width1) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
           width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
           (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
           80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
           + ((((width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
           0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
           /400)*exp(-20 * (((width1) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n) / (1u)) - (((((width1) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
           )+(45n))/20 + (1u)/400)*exp(-20 * ((((width1) < 119.5n)
            ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
           n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
           )+(width1))/20 + (1u)/400)*exp(-20 * ((60n)+(width1)) /
            (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
           - (((60n)+(width1))/20 + (1u)/400)*exp(-20 * ((60n)+(
           width1)) / (1u))))) / ((width1) * (45n)) \
         m=(1)
simulatorOptions options reltol=1e-3 vabstol=1e-6 iabstol=1e-12
   temp=27 \
    tnom=27 scalem=1.0 scale=1.0 gmin=1e-12 rforce=1 maxnotes=5
       maxwarns=5 \
    digits=5 cols=80 pivrel=1e-3 sensfile="../psf/sens.output" \
    checklimitdest=psf
modelParameter info what=models where=rawfile
element info what=inst where=rawfile
outputParameter info what=output where=rawfile
designParamVals info what=parameters where=rawfile
primitives info what=primitives where=rawfile
subckts info what=subckts where=rawfile
saveOptions options save=allpub
```

9.2.2 Netlist of a two-stage single-ended symmetric OTA

```
// Generated for: spectre
// Generated on: Mar  7 19:31:59 2025
// Design library name: assignment_01
// Design cell name: two-stage_single-ended_symmetric_OTA
// Design view name: schematic
simulator lang=spectre
global 0
parameters Width6 Width5 Width4 Width3 Width7 Width8 Width9 Width10
    Width2 \
    Width1
include "/home/aed/cadence/dicd_source/cadence_pdk/gpdk045_v_6_0/
   gpdk045/../models/spectre/gpdk045.scs" section=mc

// Library name: assignment_01
// Cell name: two-stage_single-ended_symmetric_OTA
// View name: schematic
M6 (Vout net24 VDD VDD) g45p1svt w=((Width6) * (1)) l=100n nf=1 as
   =((Width6) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((Width6) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width6) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width6) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (Width6)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width6))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (Width6)) : 0)) / 1 \
        ad=((Width6) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
           0) + 60n) * 120n) + ((Width6) * 100n))) + ((((1) / 2) -
            floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) * 120n) + ((Width6) * 50n))
           : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
            50n) ? 60n : (((60n) - 0) + 50n)) * (Width6))) +
           ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
            0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width6)) :
           0)) / 1 \
        ps=((Width6) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
            ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
           1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
           ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
           n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
           0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))) + (2 * (Width6))) + (floor(((1) -
            1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
           (((60n) - 0) + 50n))) + (2 * (Width6)))) + ((((1) / 2)
           - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
           80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width6))) :
            0)) / 1 \
        pd=((Width6) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
           ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
```

```
        != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
        ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
        * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
         + 50n))) + (2 * (Width6)))) + ((((1) / 2) - floor((1)
        / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
         (((60n) - 0) + 80n))) + (2 * (Width6))) : 0)) / 1 \
      nrd=((Width6) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
         0) + 60n) * 120n) + ((Width6) * 100n))) + ((((1) / 2)
        - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
         50n : (((60n) - 0) + 60n)) * 120n) + ((Width6) * 50n))
         : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
        + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width6))) +
        ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
         0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width6)) :
        0)) / 1 / ((Width6) * (1) * (Width6) * (1)) \
      nrs=((Width6) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
        50n : (((60n) - 0) + 60n)) * 120n) + ((Width6) * 50n))
        + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
        n) + ((Width6) * 100n))) + ((((1) / 2) - floor((1) / 2)
         == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
         0) + 60n)) * 120n) + ((Width6) * 50n)) : 0)) / 1 :
        (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
        80n)) * (Width6)) + (floor(((1) - 1) / 2.0) * ((60n >
        (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
        Width6))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
         > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
        (Width6)) : 0)) / 1 / ((Width6) * (1) * (Width6) * (1))
         \
      sa=((Width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n)) \
      sb=((Width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n)) \
      sd=((Width6) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
         (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
        ) \
      sca=(( (Width6) * ( (((1u) * (1u) / (((Width6) < 119.5n) ?
         (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
        ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
        ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width6) <
        119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
        0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
         : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
        (((Width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
         : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
        + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
        u)/ ((((Width6) < 119.5n) ? (50n > (((60n) - 0) + 60n)
        ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
        - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
        ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
```

```
          ((60n)+(Width6)))) + ((1u) * (1u) / (60n)) - ((1u) *
         (1u)/ ((60n)+(Width6)))))) / ((Width6) * (45n)) \
      scb=(((Width6) * (((((Width6) < 119.5n) ? (50n > (((60n) -
          0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
          > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
         n)/10 + (1u)/100)*exp(-10 * (((Width6) < 119.5n) ? (50n
          > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
         e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
         0) + 80n))+60n) / (1u)) - (((((Width6) < 119.5n) ? (50n
          > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
         e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
         0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
         Width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
         (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
         + ((((Width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
         50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
         0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
         /100)*exp(-10 * (((Width6) < 119.5n) ? (50n > (((60n) -
          0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
          > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
         n) / (1u)) - (((((Width6) < 119.5n) ? (50n > (((60n) -
         0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
         > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
         )+(45n))/10 + (1u)/100)*exp(-10 * ((((Width6) < 119.5n)
          ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
         n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
         (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
         (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
         )+(Width6))/10 + (1u)/100)*exp(-10 * ((60n)+(Width6)) /
          (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
         - (((60n)+(Width6))/10 + (1u)/100)*exp(-10 * ((60n)+(
         Width6)) / (1u))))) / ((Width6) * (45n)) \
      scc=(((Width6) * (((((Width6) < 119.5n) ? (50n > (((60n) -
          0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
          > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
         n)/20 + (1u)/400)*exp(-20 * (((Width6) < 119.5n) ? (50n
          > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
         e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
         0) + 80n))+60n) / (1u)) - (((((Width6) < 119.5n) ? (50n
          > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
         e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
         0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
         Width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
         (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
         + ((((Width6) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
         50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
         0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
         /400)*exp(-20 * (((Width6) < 119.5n) ? (50n > (((60n) -
          0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
          > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
```

```
            n) / (1u)) - (((((Width6) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
            )+(45n))/20 + (1u)/400)*exp(-20 * ((((Width6) < 119.5n)
             ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
            n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
            (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
            )+(Width6))/20 + (1u)/400)*exp(-20 * ((60n)+(Width6)) /
             (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
            - (((60n)+(Width6))/20 + (1u)/400)*exp(-20 * ((60n)+(
            Width6)) / (1u))))) / ((Width6) * (45n)) \
          m=(1)
M5 (net8 net15 VDD VDD) g45p1svt w=((Width5) * (1)) l=100n nf=1 as
   =((Width5) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((Width5) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width5) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width5) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (Width5)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width5))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (Width5)) : 0)) / 1 \
          ad=((Width5) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
             0) + 60n) * 120n) + ((Width5) * 100n))) + ((((1) / 2) -
              floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
             50n : (((60n) - 0) + 60n)) * 120n) + ((Width5) * 50n))
             : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
              50n) ? 60n : (((60n) - 0) + 50n)) * (Width5))) +
             ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
              0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width5)) :
             0)) / 1 \
          ps=((Width5) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
              ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
             1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
             ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
             n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
             0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
             (((60n) - 0) + 80n))) + (2 * (Width5))) + (floor(((1) -
              1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
             (((60n) - 0) + 50n))) + (2 * (Width5)))) + ((((1) / 2)
             - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
             80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width5))) :
              0)) / 1 \
          pd=((Width5) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
             ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
             != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
             ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
             * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
              + 50n))) + (2 * (Width5)))) + ((((1) / 2) - floor((1)
```

```
        / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
         (((60n) - 0) + 80n))) + (2 * (Width5))) : 0)) / 1 \
      nrd=((Width5) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
         0) + 60n) * 120n) + ((Width5) * 100n))) + ((((1) / 2)
        - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
         50n : (((60n) - 0) + 60n)) * 120n) + ((Width5) * 50n))
         : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
        + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width5))) +
        ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
         0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width5)) :
        0)) / 1 / ((Width5) * (1) * (Width5) * (1)) \
      nrs=((Width5) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
        50n : (((60n) - 0) + 60n)) * 120n) + ((Width5) * 50n))
        + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
        n) + ((Width5) * 100n))) + ((((1) / 2) - floor((1) / 2)
         == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
         0) + 60n)) * 120n) + ((Width5) * 50n)) : 0)) / 1 :
        (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
        80n)) * (Width5)) + (floor(((1) - 1) / 2.0) * ((60n >
        (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
        Width5))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
         > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
        (Width5)) : 0)) / 1 / ((Width5) * (1) * (Width5) * (1))
         \
      sa=((Width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n)) \
      sb=((Width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n)) \
      sd=((Width5) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
         (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
        ) \
      sca=(( (Width5) * ( (((1u) * (1u) / (((Width5) < 119.5n) ?
         (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
        ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
        ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width5) <
        119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
        0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
         : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
        (((Width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
         : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
        + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
        u)/ ((((Width5) < 119.5n) ? (50n > (((60n) - 0) + 60n)
        ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
        - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
        ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
         ((60n)+(Width5)))) + ((1u) * (1u) / (60n)) - ((1u) *
        (1u)/ ((60n)+(Width5)))))) / ((Width5) * (45n)) \
      scb=(((Width5) * (((((Width5) < 119.5n) ? (50n > (((60n) -
         0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
         > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
```

```
n)/10 + (1u)/100)*exp(-10 * (((Width5) < 119.5n) ? (50n
 > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
0) + 80n))+60n) / (1u)) - (((((Width5) < 119.5n) ? (50n
 > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
Width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
(((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
+ ((((Width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
/100)*exp(-10 * (((Width5) < 119.5n) ? (50n > (((60n) -
 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
 > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
n) / (1u)) - (((((Width5) < 119.5n) ? (50n > (((60n) -
0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
> (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
)+(45n))/10 + (1u)/100)*exp(-10 * ((((Width5) < 119.5n)
 ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
(((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
(((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
)+(Width5))/10 + (1u)/100)*exp(-10 * ((60n)+(Width5)) /
 (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
- (((60n)+(Width5))/10 + (1u)/100)*exp(-10 * ((60n)+(
Width5)) / (1u))))) / ((Width5) * (45n)) \
scc=(((Width5) * (((((Width5) < 119.5n) ? (50n > (((60n) -
 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
 > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
n)/20 + (1u)/400)*exp(-20 * (((Width5) < 119.5n) ? (50n
 > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
0) + 80n))+60n) / (1u)) - (((((Width5) < 119.5n) ? (50n
 > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
Width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
(((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
+ ((((Width5) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
/400)*exp(-20 * (((Width5) < 119.5n) ? (50n > (((60n) -
 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
 > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
n) / (1u)) - (((((Width5) < 119.5n) ? (50n > (((60n) -
0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
> (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
)+(45n))/20 + (1u)/400)*exp(-20 * ((((Width5) < 119.5n)
 ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
```

```
           n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
           )+(Width5))/20 + (1u)/400)*exp(-20 * ((60n)+(Width5)) /
            (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
           - (((60n)+(Width5))/20 + (1u)/400)*exp(-20 * ((60n)+(
           Width5)) / (1u))))) / ((Width5) * (45n)) \
        m=(1)
M4 (net24 net24 VDD VDD) g45p1svt w=((Width4) * (1)) l=100n nf=1 as
   =((Width4) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((Width4) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width4) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width4) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (Width4)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width4))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (Width4)) : 0)) / 1 \
        ad=((Width4) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
           0) + 60n) * 120n) + ((Width4) * 100n))) + ((((1) / 2) -
            floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) * 120n) + ((Width4) * 50n))
           : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
            50n) ? 60n : (((60n) - 0) + 50n)) * (Width4))) +
           ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
            0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width4)) :
           0)) / 1 \
        ps=((Width4) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
            ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
           1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
           ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
           n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
           0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))) + (2 * (Width4))) + (floor(((1) -
            1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
           (((60n) - 0) + 50n))) + (2 * (Width4)))) + ((((1) / 2)
           - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
           80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width4))) :
            0)) / 1 \
        pd=((Width4) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
           ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
           != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
           ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
           * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
            + 50n))) + (2 * (Width4)))) + ((((1) / 2) - floor((1)
           / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))) + (2 * (Width4))) : 0)) / 1 \
        nrd=((Width4) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
            0) + 60n) * 120n) + ((Width4) * 100n))) + ((((1) / 2)
           - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((Width4) * 50n))
```

```
        : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
       + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width4))) +
       ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
        0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width4)) :
       0)) / 1 / ((Width4) * (1) * (Width4) * (1)) \
    nrs=((Width4) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
       50n : (((60n) - 0) + 60n)) * 120n) + ((Width4) * 50n))
       + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
       n) + ((Width4) * 100n))) + ((((1) / 2) - floor((1) / 2)
        == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
        0) + 60n)) * 120n) + ((Width4) * 50n)) : 0)) / 1 :
       (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
       80n)) * (Width4)) + (floor(((1) - 1) / 2.0) * ((60n >
       (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
       Width4))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
        > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
       (Width4)) : 0)) / 1 / ((Width4) * (1) * (Width4) * (1))
        \
    sa=((Width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
       : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
        80n) ? 100n : (((60n) - 0) + 80n)) \
    sb=((Width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
       : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
        80n) ? 100n : (((60n) - 0) + 80n)) \
    sd=((Width4) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
        (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
       ) \
    sca=(( (Width4) * ( (((1u) * (1u) / (((Width4) < 119.5n) ?
        (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
       ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
       ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width4) <
       119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
       0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
        : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
       (((Width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
       + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
       u)/ ((((Width4) < 119.5n) ? (50n > (((60n) - 0) + 60n)
       ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
       - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
       ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
        ((60n)+(Width4)))) + ((1u) * (1u) / (60n)) - ((1u) *
       (1u)/ ((60n)+(Width4)))))) / ((Width4) * (45n)) \
    scb=(((Width4) * (((((Width4) < 119.5n) ? (50n > (((60n) -
        0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
        > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
       n)/10 + (1u)/100)*exp(-10 * (((Width4) < 119.5n) ? (50n
        > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
       e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
       0) + 80n))+60n) / (1u)) - (((((Width4) < 119.5n) ? (50n
        > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
       e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
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```
          0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
          Width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
          (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
          80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
          + ((((Width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
          50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
          0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
          /100)*exp(-10 * (((Width4) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
          n) / (1u)) - (((((Width4) < 119.5n) ? (50n > (((60n) -
          0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
          > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
          )+(45n))/10 + (1u)/100)*exp(-10 * ((((Width4) < 119.5n)
           ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
          n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
          (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
          (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
          )+(Width4))/10 + (1u)/100)*exp(-10 * ((60n)+(Width4)) /
           (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
          - (((60n)+(Width4))/10 + (1u)/100)*exp(-10 * ((60n)+(
          Width4)) / (1u))))) / ((Width4) * (45n)) \
       scc=(((Width4) * (((((Width4) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
          n)/20 + (1u)/400)*exp(-20 * (((Width4) < 119.5n) ? (50n
           > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
          e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
          0) + 80n))+60n) / (1u)) - (((((Width4) < 119.5n) ? (50n
           > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
          e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
          0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
          Width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
          (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
          80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
          + ((((Width4) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
          50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
          0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
          /400)*exp(-20 * (((Width4) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
          n) / (1u)) - (((((Width4) < 119.5n) ? (50n > (((60n) -
          0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
          > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
          )+(45n))/20 + (1u)/400)*exp(-20 * ((((Width4) < 119.5n)
           ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
          n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
          (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
          (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
          )+(Width4))/20 + (1u)/400)*exp(-20 * ((60n)+(Width4)) /
           (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
```

```
            - (((60n)+(Width4))/20 + (1u)/400)*exp(-20 * ((60n)+(
               Width4)) / (1u))))) / ((Width4) * (45n)) \
         m=(1)
M3 (net15 net15 VDD VDD) g45p1svt w=((Width3) * (1)) l=100n nf=1 as
   =((Width3) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((Width3) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width3) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width3) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (Width3)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width3))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (Width3)) : 0)) / 1 \
         ad=((Width3) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
            0) + 60n) * 120n) + ((Width3) * 100n))) + ((((1) / 2) -
             floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((Width3) * 50n))
            : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
             50n) ? 60n : (((60n) - 0) + 50n)) * (Width3))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width3)) :
            0)) / 1 \
         ps=((Width3) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
             ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
            1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
            ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
            n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
            0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))) + (2 * (Width3))) + (floor(((1) -
             1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
            (((60n) - 0) + 50n))) + (2 * (Width3)))) + ((((1) / 2)
            - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width3))) :
             0)) / 1 \
         pd=((Width3) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
            ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
            != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
            ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
            * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
             + 50n))) + (2 * (Width3)))) + ((((1) / 2) - floor((1)
            / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
             (((60n) - 0) + 80n))) + (2 * (Width3))) : 0)) / 1 \
         nrd=((Width3) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
             0) + 60n) * 120n) + ((Width3) * 100n))) + ((((1) / 2)
            - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
             50n : (((60n) - 0) + 60n)) * 120n) + ((Width3) * 50n))
             : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
            + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width3))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width3)) :
            0)) / 1 / ((Width3) * (1) * (Width3) * (1)) \
```

```
nrs=((Width3) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
   50n : (((60n) - 0) + 60n)) * 120n) + ((Width3) * 50n))
   + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
   n) + ((Width3) * 100n))) + ((((1) / 2) - floor((1) / 2)
    == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
    0) + 60n)) * 120n) + ((Width3) * 50n)) : 0)) / 1 :
   (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (Width3)) + (floor(((1) - 1) / 2.0) * ((60n >
   (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
   Width3))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
   (Width3)) : 0)) / 1 / ((Width3) * (1) * (Width3) * (1))
    \
sa=((Width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
   : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
    80n) ? 100n : (((60n) - 0) + 80n)) \
sb=((Width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
   : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
    80n) ? 100n : (((60n) - 0) + 80n)) \
sd=((Width3) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
    (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
   ) \
sca=(( (Width3) * ( (((1u) * (1u) / (((Width3) < 119.5n) ?
    (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
   ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
   ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width3) <
   119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
   0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
    : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
   (((Width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
    : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
   + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
   u)/ ((((Width3) < 119.5n) ? (50n > (((60n) - 0) + 60n)
   ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
   - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
   ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
    ((60n)+(Width3)))) + ((1u) * (1u) / (60n)) - ((1u) *
   (1u)/ ((60n)+(Width3)))))) / ((Width3) * (45n)) \
scb=(((Width3) * (((((Width3) < 119.5n) ? (50n > (((60n) -
    0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
   n)/10 + (1u)/100)*exp(-10 * (((Width3) < 119.5n) ? (50n
    > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
   e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
   0) + 80n))+60n) / (1u)) - (((((Width3) < 119.5n) ? (50n
    > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
   e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
   0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
   Width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
   80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
   + ((((Width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
```

```
           50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
           0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
           /100)*exp(-10 * (((Width3) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n) / (1u)) - (((((Width3) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
           )+(45n))/10 + (1u)/100)*exp(-10 * ((((Width3) < 119.5n)
            ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
           n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
           )+(Width3))/10 + (1u)/100)*exp(-10 * ((60n)+(Width3)) /
            (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
           - (((60n)+(Width3))/10 + (1u)/100)*exp(-10 * ((60n)+(
           Width3)) / (1u))))) / ((Width3) * (45n)) \
         scc=(((Width3) * (((((Width3) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n)/20 + (1u)/400)*exp(-20 * (((Width3) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n) / (1u)) - (((((Width3) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
           Width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
           (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
           80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
           + ((((Width3) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
           0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
           /400)*exp(-20 * (((Width3) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n) / (1u)) - (((((Width3) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
           )+(45n))/20 + (1u)/400)*exp(-20 * ((((Width3) < 119.5n)
            ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
           n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
           )+(Width3))/20 + (1u)/400)*exp(-20 * ((60n)+(Width3)) /
            (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
           - (((60n)+(Width3))/20 + (1u)/400)*exp(-20 * ((60n)+(
           Width3)) / (1u))))) / ((Width3) * (45n)) \
         m=(1)
M7 (net8 net8 VSS VSS) g45n1svt w=((Width7) * (1)) l=100n nf=1 as
   =((Width7) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((Width7) * 50n)) + (floor(((1) -
```

```
 1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width7) * 100n)))
 + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width7) * 50n)) :
0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
80n)) * (Width7)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width7))) + ((((1) /
2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
: (((60n) - 0) + 80n)) * (Width7)) : 0)) / 1 \
      ad=((Width7) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
         0) + 60n) * 120n) + ((Width7) * 100n))) + ((((1) / 2) -
          floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
         50n : (((60n) - 0) + 60n)) * 120n) + ((Width7) * 50n))
         : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
          50n) ? 60n : (((60n) - 0) + 50n)) * (Width7))) +
         ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
          0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width7)) :
         0)) / 1 \
      ps=((Width7) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
          ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
         1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
         ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
         n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
         0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
         (((60n) - 0) + 80n))) + (2 * (Width7))) + (floor(((1) -
          1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
         (((60n) - 0) + 50n))) + (2 * (Width7)))) + ((((1) / 2)
         - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width7))) :
          0)) / 1 \
      pd=((Width7) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
         ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
         != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
         ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
         * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
          + 50n))) + (2 * (Width7)))) + ((((1) / 2) - floor((1)
         / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
          (((60n) - 0) + 80n))) + (2 * (Width7))) : 0)) / 1 \
      nrd=((Width7) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
          0) + 60n) * 120n) + ((Width7) * 100n))) + ((((1) / 2)
         - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
          50n : (((60n) - 0) + 60n)) * 120n) + ((Width7) * 50n))
          : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
         + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width7))) +
         ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
          0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width7)) :
         0)) / 1 / ((Width7) * (1) * (Width7) * (1)) \
      nrs=((Width7) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
         50n : (((60n) - 0) + 60n)) * 120n) + ((Width7) * 50n))
         + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
         n) + ((Width7) * 100n))) + ((((1) / 2) - floor((1) / 2)
          == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
          0) + 60n)) * 120n) + ((Width7) * 50n)) : 0)) / 1 :
```

```
      (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
      80n)) * (Width7)) + (floor(((1) - 1) / 2.0) * ((60n >
      (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
      Width7))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
      (Width7)) : 0)) / 1 / ((Width7) * (1) * (Width7) * (1))
       \
    sa=((Width7) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n)) \
    sb=((Width7) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n)) \
    sd=((Width7) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
       (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
      ) \
    sca=(( (Width7) * ( (((1u) * (1u) / (((Width7) < 119.5n) ?
       (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
      ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
      ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width7) <
      119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
      0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
       : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
      (((Width7) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
       : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
      + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
      u)/ ((((Width7) < 119.5n) ? (50n > (((60n) - 0) + 60n)
      ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
      - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
      ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
       ((60n)+(Width7)))) + ((1u) * (1u) / (60n)) - ((1u) *
      (1u)/ ((60n)+(Width7)))))) / ((Width7) * (45n)) \
    scb=(((Width7) * (((((Width7) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n)/10 + (1u)/100)*exp(-10 * (((Width7) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n) / (1u)) - (((((Width7) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
      Width7) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
      (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
      80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
      + ((((Width7) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
      50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
      0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
      /100)*exp(-10 * (((Width7) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n) / (1u)) - (((((Width7) < 119.5n) ? (50n > (((60n) -
```

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            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
            )+(45n))/10 + (1u)/100)*exp(-10 * ((((Width7) < 119.5n)
             ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
            n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
            (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
            )+(Width7))/10 + (1u)/100)*exp(-10 * ((60n)+(Width7)) /
             (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
            - (((60n)+(Width7))/10 + (1u)/100)*exp(-10 * ((60n)+(
            Width7)) / (1u))))) / ((Width7) * (45n)) \
          scc=(((Width7) * (((((Width7) < 119.5n) ? (50n > (((60n) -
              0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
             > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
            n)/20 + (1u)/400)*exp(-20 * (((Width7) < 119.5n) ? (50n
             > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
            e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
            0) + 80n))+60n) / (1u)) - (((((Width7) < 119.5n) ? (50n
             > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
            e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
            0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
            Width7) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
            (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
            + ((((Width7) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
            0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
            /400)*exp(-20 * (((Width7) < 119.5n) ? (50n > (((60n) -
             0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
             > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
            n) / (1u)) - (((((Width7) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
            )+(45n))/20 + (1u)/400)*exp(-20 * ((((Width7) < 119.5n)
             ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
            n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
            (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
            )+(Width7))/20 + (1u)/400)*exp(-20 * ((60n)+(Width7)) /
             (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
            - (((60n)+(Width7))/20 + (1u)/400)*exp(-20 * ((60n)+(
            Width7)) / (1u))))) / ((Width7) * (45n)) \
          m=(1)
M8 (Vout net8 VSS VSS) g45n1svt w=((Width8) * (1)) l=100n nf=1 as
   =((Width8) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((Width8) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width8) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width8) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (Width8)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width8))) + ((((1) /
```

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   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (Width8)) : 0)) / 1 \
         ad=((Width8) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
            0) + 60n) * 120n) + ((Width8) * 100n))) + ((((1) / 2) -
             floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((Width8) * 50n))
            : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
             50n) ? 60n : (((60n) - 0) + 50n)) * (Width8))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width8)) :
            0)) / 1 \
         ps=((Width8) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
             ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
            1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
            ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
            n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
            0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))) + (2 * (Width8))) + (floor(((1) -
             1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
            (((60n) - 0) + 50n))) + (2 * (Width8)))) + ((((1) / 2)
            - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width8))) :
             0)) / 1 \
         pd=((Width8) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
            ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
            != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
            ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
            * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
             + 50n))) + (2 * (Width8)))) + ((((1) / 2) - floor((1)
            / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
             (((60n) - 0) + 80n))) + (2 * (Width8))) : 0)) / 1 \
         nrd=((Width8) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
             0) + 60n) * 120n) + ((Width8) * 100n))) + ((((1) / 2)
            - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
             50n : (((60n) - 0) + 60n)) * 120n) + ((Width8) * 50n))
             : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
            + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width8))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width8)) :
            0)) / 1 / ((Width8) * (1) * (Width8) * (1)) \
         nrs=((Width8) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) * 120n) + ((Width8) * 50n))
            + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
            n) + ((Width8) * 100n))) + ((((1) / 2) - floor((1) / 2)
             == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
             0) + 60n)) * 120n) + ((Width8) * 50n)) : 0)) / 1 :
            (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
            80n)) * (Width8)) + (floor(((1) - 1) / 2.0) * ((60n >
            (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
            Width8))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
             > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
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      (Width8)) : 0)) / 1 / ((Width8) * (1) * (Width8) * (1))
       \
    sa=((Width8) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n)) \
    sb=((Width8) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
      : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n)) \
    sd=((Width8) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
       (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
      ) \
    sca=(( (Width8) * ( (((1u) * (1u) / (((Width8) < 119.5n) ?
       (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
      ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
      ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width8) <
      119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
      0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
       : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
      (((Width8) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
       : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
      + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
      u)/ ((((Width8) < 119.5n) ? (50n > (((60n) - 0) + 60n)
      ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
      - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
      ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
       ((60n)+(Width8)))) + ((1u) * (1u) / (60n)) - ((1u) *
      (1u)/ ((60n)+(Width8)))))) / ((Width8) * (45n)) \
    scb=(((Width8) * (((((Width8) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n)/10 + (1u)/100)*exp(-10 * (((Width8) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n) / (1u)) - (((((Width8) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
      Width8) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
      (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
      80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
      + ((((Width8) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
      50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
      0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
      /100)*exp(-10 * (((Width8) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n) / (1u)) - (((((Width8) < 119.5n) ? (50n > (((60n) -
      0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
      > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
      )+(45n))/10 + (1u)/100)*exp(-10 * ((((Width8) < 119.5n)
       ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
      n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
```

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           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
           )+(Width8))/10 + (1u)/100)*exp(-10 * ((60n)+(Width8)) /
            (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
           - (((60n)+(Width8))/10 + (1u)/100)*exp(-10 * ((60n)+(
           Width8)) / (1u))))) / ((Width8) * (45n)) \
         scc=(((Width8) * (((((Width8) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n)/20 + (1u)/400)*exp(-20 * (((Width8) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n) / (1u)) - (((((Width8) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
           Width8) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
           (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
           80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
           + ((((Width8) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
           0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
           /400)*exp(-20 * (((Width8) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n) / (1u)) - (((((Width8) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
           )+(45n))/20 + (1u)/400)*exp(-20 * ((((Width8) < 119.5n)
            ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
           n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
           )+(Width8))/20 + (1u)/400)*exp(-20 * ((60n)+(Width8)) /
            (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
           - (((60n)+(Width8))/20 + (1u)/400)*exp(-20 * ((60n)+(
           Width8)) / (1u))))) / ((Width8) * (45n)) \
         m=(1)
M9 (IBIAS IBIAS VSS VSS) g45n1svt w=((Width9) * (1)) l=100n nf=1 as
   =((Width9) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((Width9) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width9) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width9) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (Width9)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width9))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (Width9)) : 0)) / 1 \
         ad=((Width9) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
            0) + 60n) * 120n) + ((Width9) * 100n))) + ((((1) / 2) -
             floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
```

```
          50n : (((60n) - 0) + 60n)) * 120n) + ((Width9) * 50n))
          : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
           50n) ? 60n : (((60n) - 0) + 50n)) * (Width9))) +
          ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
           0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width9)) :
          0)) / 1 \
        ps=((Width9) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
           ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
          1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
          ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
          n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
          0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
          (((60n) - 0) + 80n))) + (2 * (Width9))) + (floor(((1) -
           1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
          (((60n) - 0) + 50n))) + (2 * (Width9)))) + ((((1) / 2)
          - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
          80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width9))) :
           0)) / 1 \
        pd=((Width9) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
          ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
          != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
          ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
          * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
           + 50n))) + (2 * (Width9)))) + ((((1) / 2) - floor((1)
          / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))) + (2 * (Width9))) : 0)) / 1 \
        nrd=((Width9) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
           0) + 60n) * 120n) + ((Width9) * 100n))) + ((((1) / 2)
          - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) * 120n) + ((Width9) * 50n))
           : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
          + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width9))) +
          ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
           0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width9)) :
          0)) / 1 / ((Width9) * (1) * (Width9) * (1)) \
        nrs=((Width9) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
          50n : (((60n) - 0) + 60n)) * 120n) + ((Width9) * 50n))
          + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
          n) + ((Width9) * 100n))) + ((((1) / 2) - floor((1) / 2)
           == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
           0) + 60n)) * 120n) + ((Width9) * 50n)) : 0)) / 1 :
          (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
          80n)) * (Width9)) + (floor(((1) - 1) / 2.0) * ((60n >
          (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
          Width9))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
          (Width9)) : 0)) / 1 / ((Width9) * (1) * (Width9) * (1))
           \
        sa=((Width9) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
          : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
           80n) ? 100n : (((60n) - 0) + 80n)) \
```

```
sb=((Width9) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
   : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
    80n) ? 100n : (((60n) - 0) + 80n)) \
sd=((Width9) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
    (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
   ) \
sca=(( (Width9) * ( (((1u) * (1u) / (((Width9) < 119.5n) ?
    (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
   ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
   ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width9) <
   119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
   0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
    : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
   (((Width9) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
    : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
   + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
   u)/ ((((Width9) < 119.5n) ? (50n > (((60n) - 0) + 60n)
   ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
   - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
   ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
    ((60n)+(Width9)))) + ((1u) * (1u) / (60n)) - ((1u) *
   (1u)/ ((60n)+(Width9)))))) / ((Width9) * (45n)) \
scb=(((Width9) * (((((Width9) < 119.5n) ? (50n > (((60n) -
    0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
   n)/10 + (1u)/100)*exp(-10 * (((Width9) < 119.5n) ? (50n
    > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
   e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
   0) + 80n))+60n) / (1u)) - (((((Width9) < 119.5n) ? (50n
    > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
   e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
   0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
   Width9) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
   80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
   + ((((Width9) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
   50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
   0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
   /100)*exp(-10 * (((Width9) < 119.5n) ? (50n > (((60n) -
    0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
   n) / (1u)) - (((((Width9) < 119.5n) ? (50n > (((60n) -
   0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
   > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
   )+(45n))/10 + (1u)/100)*exp(-10 * ((((Width9) < 119.5n)
    ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
   n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
   (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
   (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
   )+(Width9))/10 + (1u)/100)*exp(-10 * ((60n)+(Width9)) /
    (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
```

```
            - (((60n)+(Width9))/10 + (1u)/100)*exp(-10 * ((60n)+(
            Width9)) / (1u))))) / ((Width9) * (45n)) \
          scc=(((Width9) * (((((Width9) < 119.5n) ? (50n > (((60n) -
              0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
              > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
            n)/20 + (1u)/400)*exp(-20 * (((Width9) < 119.5n) ? (50n
              > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
            e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
            0) + 80n))+60n) / (1u)) - (((((Width9) < 119.5n) ? (50n
              > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
            e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
            0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
            Width9) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
            (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
            + ((((Width9) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
            0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
            /400)*exp(-20 * (((Width9) < 119.5n) ? (50n > (((60n) -
              0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
              > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
            n) / (1u)) - (((((Width9) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
            )+(45n))/20 + (1u)/400)*exp(-20 * ((((Width9) < 119.5n)
              ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
            n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
            (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
            )+(Width9))/20 + (1u)/400)*exp(-20 * ((60n)+(Width9)) /
              (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
            - (((60n)+(Width9))/20 + (1u)/400)*exp(-20 * ((60n)+(
            Width9)) / (1u))))) / ((Width9) * (45n)) \
          m=(1)
M10 (net026 IBIAS VSS VSS) g45n1svt w=((Width10) * (1)) l=100n nf=1
    as=((Width10) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
    (((60n) - 0) + 60n)) * 120n) + ((Width10) * 50n)) + (floor(((1)
    - 1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width10) * 100n
   ))) + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0)
    + 60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width10) * 50n)
   ) : 0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
   0) + 80n)) * (Width10)) + (floor(((1) - 1) / 2.0) * ((60n >
   (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width10))) +
    ((((1) / 2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80
   n) ? 100n : (((60n) - 0) + 80n)) * (Width10)) : 0)) / 1 \
          ad=((Width10) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
              0) + 60n) * 120n) + ((Width10) * 100n))) + ((((1) / 2)
              - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n)
            ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width10) * 50n
            )) : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) -
            0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width10))) +
            ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
```

```
        0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width10)) :
        0)) / 1 \
    ps=((Width10) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n
       ) ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
        1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
       ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
       n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
       0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
       (((60n) - 0) + 80n))) + (2 * (Width10))) + (floor(((1)
       - 1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
       (((60n) - 0) + 50n))) + (2 * (Width10)))) + ((((1) / 2)
        - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width10)))
       : 0)) / 1 \
    pd=((Width10) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60
       n) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
        != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60
       n) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
        * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) -
       0) + 50n))) + (2 * (Width10)))) + ((((1) / 2) - floor
       ((1) / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ?
       100n : (((60n) - 0) + 80n))) + (2 * (Width10))) : 0)) /
        1 \
    nrd=((Width10) < 119.5n) ? ((floor((1) / 2.0) * (((((60n)
       - 0) + 60n) * 120n) + ((Width10) * 100n))) + ((((1) /
       2) - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n
       ) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width10) *
       50n)) : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n)
       - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width10)))
       + ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n)
        - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width10))
        : 0)) / 1 / ((Width10) * (1) * (Width10) * (1)) \
    nrs=((Width10) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
        50n : (((60n) - 0) + 60n)) * 120n) + ((Width10) * 50n)
       ) + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) *
       120n) + ((Width10) * 100n))) + ((((1) / 2) - floor((1)
       / 2) == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60
       n) - 0) + 60n)) * 120n) + ((Width10) * 50n)) : 0)) / 1
       : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
        80n)) * (Width10)) + (floor(((1) - 1) / 2.0) * ((60n >
        (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
       Width10))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100
       n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
        (Width10)) : 0)) / 1 / ((Width10) * (1) * (Width10) *
       (1)) \
    sa=((Width10) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
       + 80n) ? 100n : (((60n) - 0) + 80n)) \
    sb=((Width10) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
       + 80n) ? 100n : (((60n) - 0) + 80n)) \
```

```
sd=((Width10) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08)
   : (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n
   )) \
sca=(( (Width10) * ( (((1u) * (1u) / (((Width10) < 119.5n)
    ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
   n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
   (((60n) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width10
   ) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n
   ) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ?
   100n : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u
   ) / (((Width10) < 119.5n) ? (50n > (((60n) - 0) + 60n)
   ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
   - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u)
    * (1u)/ ((((Width10) < 119.5n) ? (50n > (((60n) - 0) +
    60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n >
   (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)
   +(45n))))) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u)
    * (1u) / ((60n)+(Width10)))) + ((1u) * (1u) / (60n)) -
    ((1u) * (1u)/ ((60n)+(Width10)))))) / ((Width10) * (45
   n)) \
scb=(((Width10) * (((((Width10) < 119.5n) ? (50n > (((60n)
    - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 :
   (100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n
   ))+60n)/10 + (1u)/100)*exp(-10 * (((Width10) < 119.5n)
   ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n
   )) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60
   n) - 0) + 80n))+60n) / (1u)) - (((((Width10) < 119.5n)
   ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n
   )) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60
   n) - 0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 *
   ((((Width10) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
   50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
   0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) /
   (1u)) + ((((Width10) < 119.5n) ? (50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n >
   (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)
   /10 + (1u)/100)*exp(-10 * (((Width10) < 119.5n) ? (50n
   > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e
   -08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0)
    + 80n))+60n) / (1u)) - (((((Width10) < 119.5n) ? (50n
   > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e
   -08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0)
    + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
   Width10) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
    (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
   80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))
   ) + ((45n) * (((60n)/10 + (1u)/100)*exp(-10 * (60n) /
   (1u)) - (((60n)+(Width10))/10 + (1u)/100)*exp(-10 *
   ((60n)+(Width10)) / (1u)) + ((60n)/10 + (1u)/100)*exp
   (-10 * (60n) / (1u)) - (((60n)+(Width10))/10 + (1u)
   /100)*exp(-10 * ((60n)+(Width10)) / (1u))))) / ((
   Width10) * (45n)) \
```

```
          scc=(((Width10) * (((((Width10) < 119.5n) ? (50n > (((60n)
              - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 :
             (100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n
             ))+60n)/20 + (1u)/400)*exp(-20 * (((Width10) < 119.5n)
             ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n
             )) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60
             n) - 0) + 80n))+60n) / (1u)) - (((((Width10) < 119.5n)
             ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n
             )) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60
             n) - 0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 *
             ((((Width10) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
             50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
             0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) /
             (1u)) + ((((Width10) < 119.5n) ? (50n > (((60n) - 0) +
             60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n >
             (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)
             /20 + (1u)/400)*exp(-20 * (((Width10) < 119.5n) ? (50n
             > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e
             -08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0)
              + 80n))+60n) / (1u)) - (((((Width10) < 119.5n) ? (50n
             > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e
             -08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0)
              + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
             Width10) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
              (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
             80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))
             ) + ((45n) * (((60n)/20 + (1u)/400)*exp(-20 * (60n) /
             (1u)) - (((60n)+(Width10))/20 + (1u)/400)*exp(-20 *
             ((60n)+(Width10)) / (1u)) + ((60n)/20 + (1u)/400)*exp
             (-20 * (60n) / (1u)) - (((60n)+(Width10))/20 + (1u)
             /400)*exp(-20 * ((60n)+(Width10)) / (1u))))) / ((
             Width10) * (45n)) \
          m=(1)
M2 (net24 Vi\+ net026 VSS) g45n1svt w=((Width2) * (1)) l=100n nf=1
   as=((Width2) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((Width2) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width2) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width2) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (Width2)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width2))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (Width2)) : 0)) / 1 \
          ad=((Width2) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
             0) + 60n) * 120n) + ((Width2) * 100n))) + ((((1) / 2) -
              floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
             50n : (((60n) - 0) + 60n)) * 120n) + ((Width2) * 50n))
             : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
              50n) ? 60n : (((60n) - 0) + 50n)) * (Width2))) +
             ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
```

```
        0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width2)) :
       0)) / 1 \
    ps=((Width2) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
        ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
       1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
       ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
       n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
       0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
       (((60n) - 0) + 80n))) + (2 * (Width2))) + (floor(((1) -
        1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
       (((60n) - 0) + 50n))) + (2 * (Width2)))) + ((((1) / 2)
       - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
       80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width2))) :
        0)) / 1 \
    pd=((Width2) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
       ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
       != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
       ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
       * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
        + 50n))) + (2 * (Width2)))) + ((((1) / 2) - floor((1)
       / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
        (((60n) - 0) + 80n))) + (2 * (Width2))) : 0)) / 1 \
    nrd=((Width2) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
        0) + 60n) * 120n) + ((Width2) * 100n))) + ((((1) / 2)
       - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
        50n : (((60n) - 0) + 60n)) * 120n) + ((Width2) * 50n))
        : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
       + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width2))) +
       ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
        0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width2)) :
       0)) / 1 / ((Width2) * (1) * (Width2) * (1)) \
    nrs=((Width2) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
       50n : (((60n) - 0) + 60n)) * 120n) + ((Width2) * 50n))
       + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
       n) + ((Width2) * 100n))) + ((((1) / 2) - floor((1) / 2)
        == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
        0) + 60n)) * 120n) + ((Width2) * 50n)) : 0)) / 1 :
       (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
       80n)) * (Width2)) + (floor(((1) - 1) / 2.0) * ((60n >
       (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
       Width2))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
        > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
       (Width2)) : 0)) / 1 / ((Width2) * (1) * (Width2) * (1))
        \
    sa=((Width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
       : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
        80n) ? 100n : (((60n) - 0) + 80n)) \
    sb=((Width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
       : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
        80n) ? 100n : (((60n) - 0) + 80n)) \
```

```
+sd=((Width2) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
+    (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
+   ) \
+sca=(( (Width2) * ( (((1u) * (1u) / (((Width2) < 119.5n) ?
+    (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
+   ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
+   ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width2) <
+   119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
+   0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
+    : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
+   (((Width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
+    : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
+   + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
+   u)/ ((((Width2) < 119.5n) ? (50n > (((60n) - 0) + 60n)
+   ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
+   - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
+   ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
+    ((60n)+(Width2)))) + ((1u) * (1u) / (60n)) - ((1u) *
+   (1u)/ ((60n)+(Width2)))))) / ((Width2) * (45n)) \
+scb=(((Width2) * (((((Width2) < 119.5n) ? (50n > (((60n) -
+    0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
+    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
+   n)/10 + (1u)/100)*exp(-10 * (((Width2) < 119.5n) ? (50n
+    > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
+   e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
+   0) + 80n))+60n) / (1u)) - (((((Width2) < 119.5n) ? (50n
+    > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
+   e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
+   0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
+   Width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
+   (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
+   80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
+   + ((((Width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
+   50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
+   0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
+   /100)*exp(-10 * (((Width2) < 119.5n) ? (50n > (((60n) -
+    0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
+    > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
+   n) / (1u)) - (((((Width2) < 119.5n) ? (50n > (((60n) -
+   0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
+   > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
+   )+(45n))/10 + (1u)/100)*exp(-10 * ((((Width2) < 119.5n)
+    ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
+   n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
+   (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
+   (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
+   )+(Width2))/10 + (1u)/100)*exp(-10 * ((60n)+(Width2)) /
+    (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
+   - (((60n)+(Width2))/10 + (1u)/100)*exp(-10 * ((60n)+(
+   Width2)) / (1u))))) / ((Width2) * (45n)) \
+scc=(((Width2) * (((((Width2) < 119.5n) ? (50n > (((60n) -
+    0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
```

```
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n)/20 + (1u)/400)*exp(-20 * (((Width2) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n) / (1u)) - (((((Width2) < 119.5n) ? (50n
            > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
           e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
           0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
           Width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
           (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
           80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
           + ((((Width2) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
           0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
           /400)*exp(-20 * (((Width2) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
           n) / (1u)) - (((((Width2) < 119.5n) ? (50n > (((60n) -
           0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
           > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
           )+(45n))/20 + (1u)/400)*exp(-20 * ((((Width2) < 119.5n)
            ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
           n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
           (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
           (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
           )+(Width2))/20 + (1u)/400)*exp(-20 * ((60n)+(Width2)) /
            (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
           - (((60n)+(Width2))/20 + (1u)/400)*exp(-20 * ((60n)+(
           Width2)) / (1u))))) / ((Width2) * (45n)) \
        m=(1)
M1 (net15 Vi\- net026 VSS) g45n1svt w=((Width1) * (1)) l=100n nf=1
   as=((Width1) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ? 50n :
   (((60n) - 0) + 60n)) * 120n) + ((Width1) * 50n)) + (floor(((1) -
    1) / 2.0) * (((((60n) - 0) + 60n) * 120n) + ((Width1) * 100n)))
    + ((((1) / 2) - floor((1) / 2) == 0) ? (((50n > (((60n) - 0) +
   60n) ? 50n : (((60n) - 0) + 60n)) * 120n) + ((Width1) * 50n)) :
   0)) / 1 : (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
   80n)) * (Width1)) + (floor(((1) - 1) / 2.0) * ((60n > (((60n) -
   0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width1))) + ((((1) /
   2) - floor((1) / 2) == 0) ? ((100n > (((60n) - 0) + 80n) ? 100n
   : (((60n) - 0) + 80n)) * (Width1)) : 0)) / 1 \
        ad=((Width1) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
           0) + 60n) * 120n) + ((Width1) * 100n))) + ((((1) / 2) -
            floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
           50n : (((60n) - 0) + 60n)) * 120n) + ((Width1) * 50n))
           : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0) +
            50n) ? 60n : (((60n) - 0) + 50n)) * (Width1))) +
           ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
            0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width1)) :
           0)) / 1 \
        ps=((Width1) < 119.5n) ? (((2 * (50n > (((60n) - 0) + 60n)
            ? 50n : (((60n) - 0) + 60n))) + 340n) + (floor(((1) -
```

```
        1) / 2.0) * ((2 * (((60n) - 0) + 60n)) + 440n)) +
        ((((1) / 2) - floor((1) / 2) == 0) ? ((2 * (50n > (((60
        n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n))) + 340n) :
        0)) / 1 : (((2 * (100n > (((60n) - 0) + 80n) ? 100n :
        (((60n) - 0) + 80n))) + (2 * (Width1))) + (floor(((1) -
         1) / 2.0) * ((2 * (60n > (((60n) - 0) + 50n) ? 60n :
        (((60n) - 0) + 50n))) + (2 * (Width1)))) + ((((1) / 2)
        - floor((1) / 2) == 0) ? ((2 * (100n > (((60n) - 0) +
        80n) ? 100n : (((60n) - 0) + 80n))) + (2 * (Width1))) :
         0)) / 1 \
    pd=((Width1) < 119.5n) ? ((floor((1) / 2.0) * ((2 * (((60n
        ) - 0) + 60n)) + 440n)) + ((((1) / 2) - floor((1) / 2)
        != 0) ? ((2 * (50n > (((60n) - 0) + 60n) ? 50n : (((60n
        ) - 0) + 60n))) + 340n) : 0)) / 1 : ((floor((1) / 2.0)
        * ((2 * (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0)
         + 50n))) + (2 * (Width1)))) + ((((1) / 2) - floor((1)
        / 2) != 0) ? ((2 * (100n > (((60n) - 0) + 80n) ? 100n :
         (((60n) - 0) + 80n))) + (2 * (Width1))) : 0)) / 1 \
    nrd=((Width1) < 119.5n) ? ((floor((1) / 2.0) * (((((60n) -
         0) + 60n) * 120n) + ((Width1) * 100n))) + ((((1) / 2)
        - floor((1) / 2) != 0) ? (((50n > (((60n) - 0) + 60n) ?
         50n : (((60n) - 0) + 60n)) * 120n) + ((Width1) * 50n))
         : 0)) / 1 : ((floor((1) / 2.0) * ((60n > (((60n) - 0)
        + 50n) ? 60n : (((60n) - 0) + 50n)) * (Width1))) +
        ((((1) / 2) - floor((1) / 2) != 0) ? ((100n > (((60n) -
         0) + 80n) ? 100n : (((60n) - 0) + 80n)) * (Width1)) :
        0)) / 1 / ((Width1) * (1) * (Width1) * (1)) \
    nrs=((Width1) < 119.5n) ? ((((50n > (((60n) - 0) + 60n) ?
        50n : (((60n) - 0) + 60n)) * 120n) + ((Width1) * 50n))
        + (floor(((1) - 1) / 2.0) * (((((60n) - 0) + 60n) * 120
        n) + ((Width1) * 100n))) + ((((1) / 2) - floor((1) / 2)
         == 0) ? (((50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
         0) + 60n)) * 120n) + ((Width1) * 50n)) : 0)) / 1 :
        (((100n > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) +
        80n)) * (Width1)) + (floor(((1) - 1) / 2.0) * ((60n >
        (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)) * (
        Width1))) + ((((1) / 2) - floor((1) / 2) == 0) ? ((100n
         > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n)) *
        (Width1)) : 0)) / 1 / ((Width1) * (1) * (Width1) * (1))
         \
    sa=((Width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n)) \
    sb=((Width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
        : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
         80n) ? 100n : (((60n) - 0) + 80n)) \
    sd=((Width1) < 119.5n) ? (((60n) - 0) + 60n) + (2*5e-08) :
         (60n > (((60n) - 0) + 50n) ? 60n : (((60n) - 0) + 50n)
        ) \
    sca=(( (Width1) * ( (((1u) * (1u) / (((Width1) < 119.5n) ?
         (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)
        ) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n
```

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      ) - 0) + 80n))+60n)) - ((1u) * (1u) / ((((Width1) <
      119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) -
      0) + 60n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n
       : (((60n) - 0) + 80n))+60n)+(45n)))) + ((1u) * (1u) /
      (((Width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n
       : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0)
      + 80n) ? 100n : (((60n) - 0) + 80n))+60n)) - ((1u) * (1
      u)/ ((((Width1) < 119.5n) ? (50n > (((60n) - 0) + 60n)
      ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n)
      - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n))))
      ) + ( (45n) * ( (((1u) * (1u) / (60n)) - ((1u) * (1u) /
       ((60n)+(Width1)))) + ((1u) * (1u) / (60n)) - ((1u) *
      (1u)/ ((60n)+(Width1)))))) / ((Width1) * (45n)) \
   scb=(((Width1) * (((((Width1) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n)/10 + (1u)/100)*exp(-10 * (((Width1) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n) / (1u)) - (((((Width1) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n)+(45n))/10 + (1u)/100)*exp(-10 * ((((
      Width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
      (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
      80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
      + ((((Width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
      50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
      0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/10 + (1u)
      /100)*exp(-10 * (((Width1) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n) / (1u)) - (((((Width1) < 119.5n) ? (50n > (((60n) -
      0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
      > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
      )+(45n))/10 + (1u)/100)*exp(-10 * ((((Width1) < 119.5n)
       ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
      n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
      (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
      (((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u)) - (((60n
      )+(Width1))/10 + (1u)/100)*exp(-10 * ((60n)+(Width1)) /
       (1u)) + ((60n)/10 + (1u)/100)*exp(-10 * (60n) / (1u))
      - (((60n)+(Width1))/10 + (1u)/100)*exp(-10 * ((60n)+(
      Width1)) / (1u))))) / ((Width1) * (45n)) \
   scc=(((Width1) * (((((Width1) < 119.5n) ? (50n > (((60n) -
       0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
       > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
      n)/20 + (1u)/400)*exp(-20 * (((Width1) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
      e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
      0) + 80n))+60n) / (1u)) - (((((Width1) < 119.5n) ? (50n
       > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5
```

```
            e-08 : (100n > (((60n) - 0) + 80n) ? 100n : (((60n) -
            0) + 80n))+60n)+(45n))/20 + (1u)/400)*exp(-20 * ((((
            Width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ? 50n :
            (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) - 0) +
            80n) ? 100n : (((60n) - 0) + 80n))+60n)+(45n)) / (1u))
            + ((((Width1) < 119.5n) ? (50n > (((60n) - 0) + 60n) ?
            50n : (((60n) - 0) + 60n)) + 5e-08 : (100n > (((60n) -
            0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n)/20 + (1u)
            /400)*exp(-20 * (((Width1) < 119.5n) ? (50n > (((60n) -
             0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
             > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60
            n) / (1u)) - (((((Width1) < 119.5n) ? (50n > (((60n) -
            0) + 60n) ? 50n : (((60n) - 0) + 60n)) + 5e-08 : (100n
            > (((60n) - 0) + 80n) ? 100n : (((60n) - 0) + 80n))+60n
            )+(45n))/20 + (1u)/400)*exp(-20 * ((((Width1) < 119.5n)
             ? (50n > (((60n) - 0) + 60n) ? 50n : (((60n) - 0) + 60
            n)) + 5e-08 : (100n > (((60n) - 0) + 80n) ? 100n :
            (((60n) - 0) + 80n))+60n)+(45n)) / (1u)))) + ((45n) *
            (((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u)) - (((60n
            )+(Width1))/20 + (1u)/400)*exp(-20 * ((60n)+(Width1)) /
             (1u)) + ((60n)/20 + (1u)/400)*exp(-20 * (60n) / (1u))
            - (((60n)+(Width1))/20 + (1u)/400)*exp(-20 * ((60n)+(
            Width1)) / (1u))))) / ((Width1) * (45n)) \
         m=(1)
simulatorOptions options reltol=1e-3 vabstol=1e-6 iabstol=1e-12
   temp=27 \
    tnom=27 scalem=1.0 scale=1.0 gmin=1e-12 rforce=1 maxnotes=5
       maxwarns=5 \
    digits=5 cols=80 pivrel=1e-3 sensfile="../psf/sens.output" \
    checklimitdest=psf
modelParameter info what=models where=rawfile
element info what=inst where=rawfile
outputParameter info what=output where=rawfile
designParamVals info what=parameters where=rawfile
primitives info what=primitives where=rawfile
subckts info what=subckts where=rawfile
saveOptions options save=allpub
```