

Test Results of HICUM Level 2V2.21

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The corresponding ASCII data may be found in the HICUM website. Any modification of the code and corresponding results will be updated with newer version names.

ASCII file nomenclature:

General format: Netlist_name_x_y.elpa

where,

y=1: T=300K

y=2: T=200K

y=3: T=400K

y=4: T=600K

y=5: Electrothermal/Self-heating effect

y=6: NQS effect (Not available)

y=7: Collector current spreading effect

y=8: Substrate transistor effect without substrate network

y=9: Effects with substrate transistors and substrate network

and

x=1: Intrinsic transistor

x=2: Internal Transistor:

Thermal data for x=2:

y=3: T=200K, y=4: T=400K, y=5: T=600K, y=6: T=300K.

x=3: Complete transistor

Section 1: Results of Intrinsic Transistor

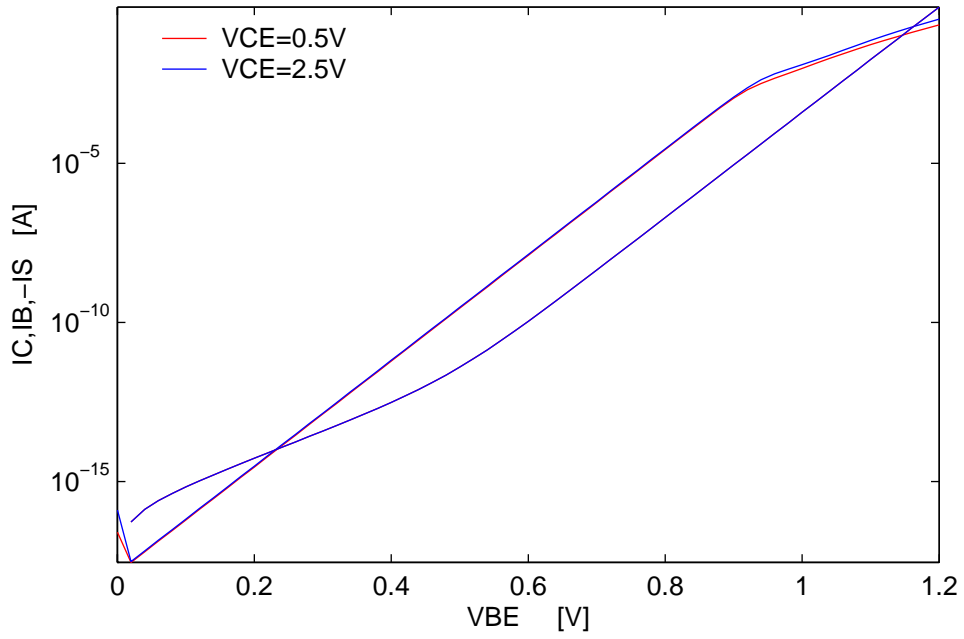


FIGURE 1. Forward Gummel plots at $V_{CE}=0.5, 2.5$ Volt and $T=300K$.

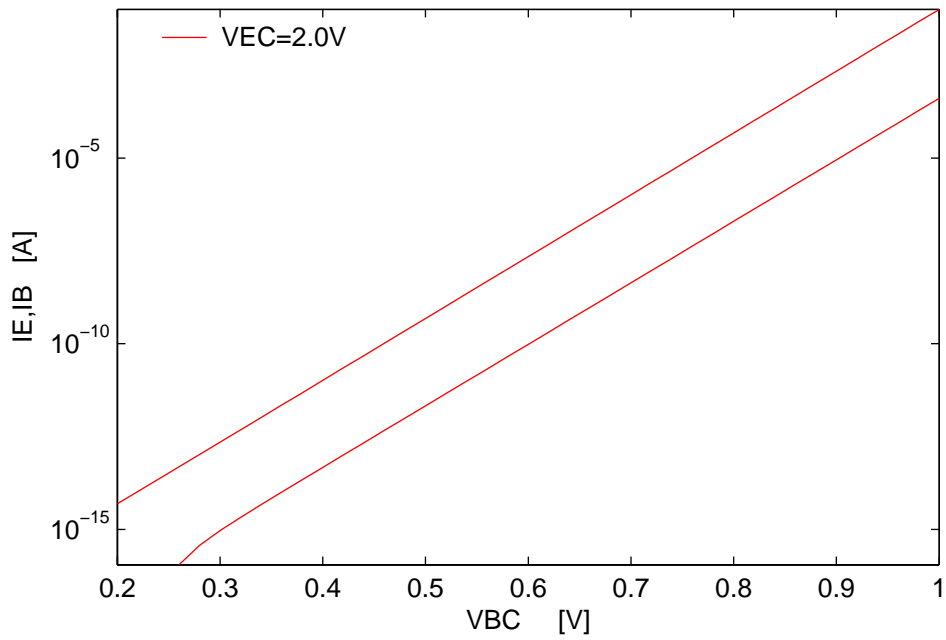


FIGURE 2. Reverse Gummel plots at $V_{EC}=2.0V$ at $T=300K$.

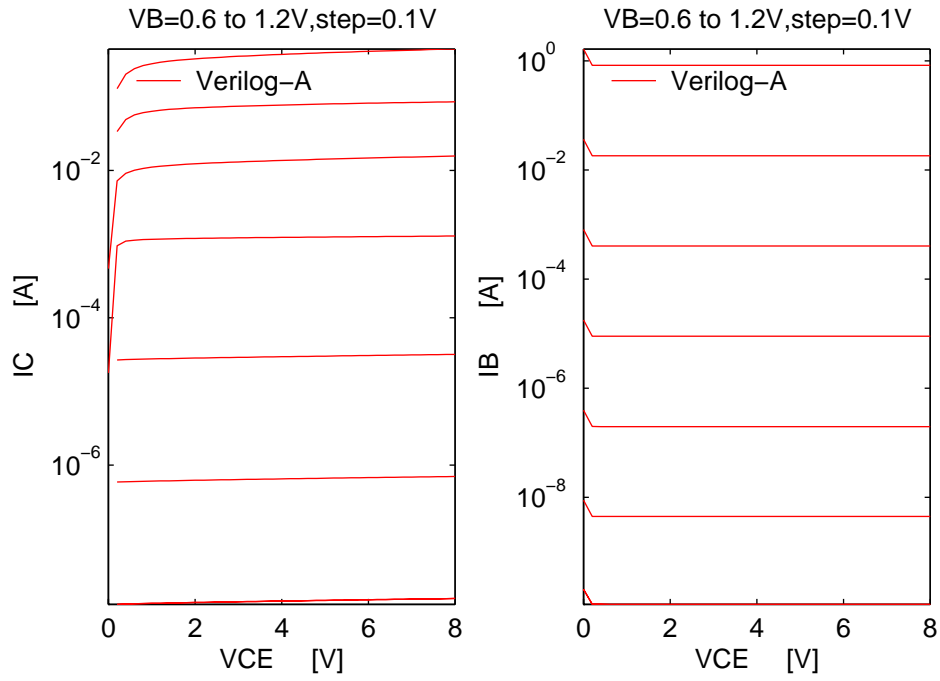


FIGURE 3. Forced-VB output characteristics and I_B - V_{CE} plots at $T=300K$.

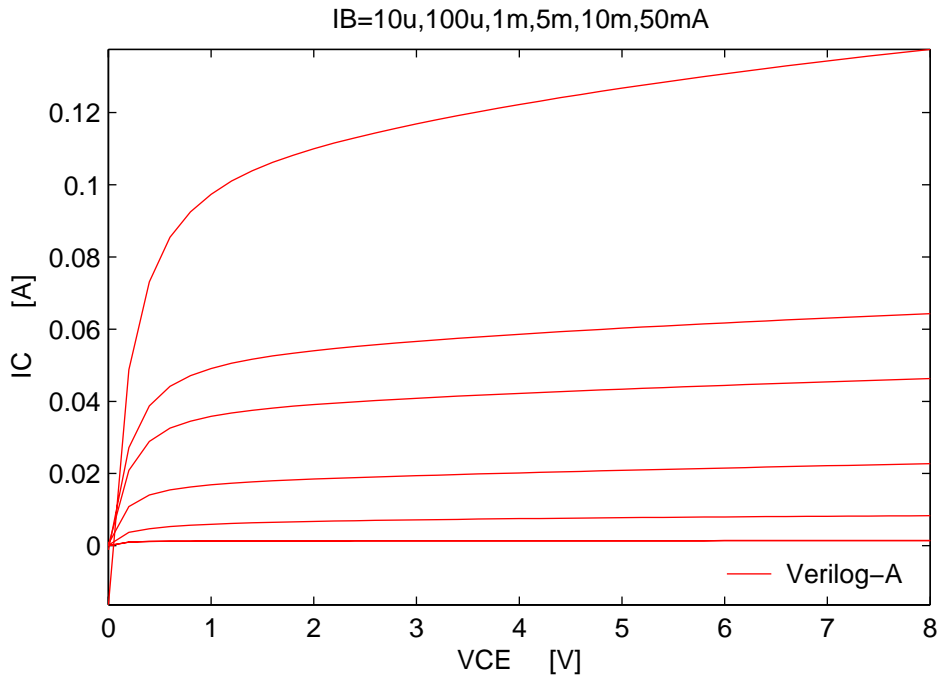


FIGURE 4. Forced-IB output characteristics at $T=300K$.

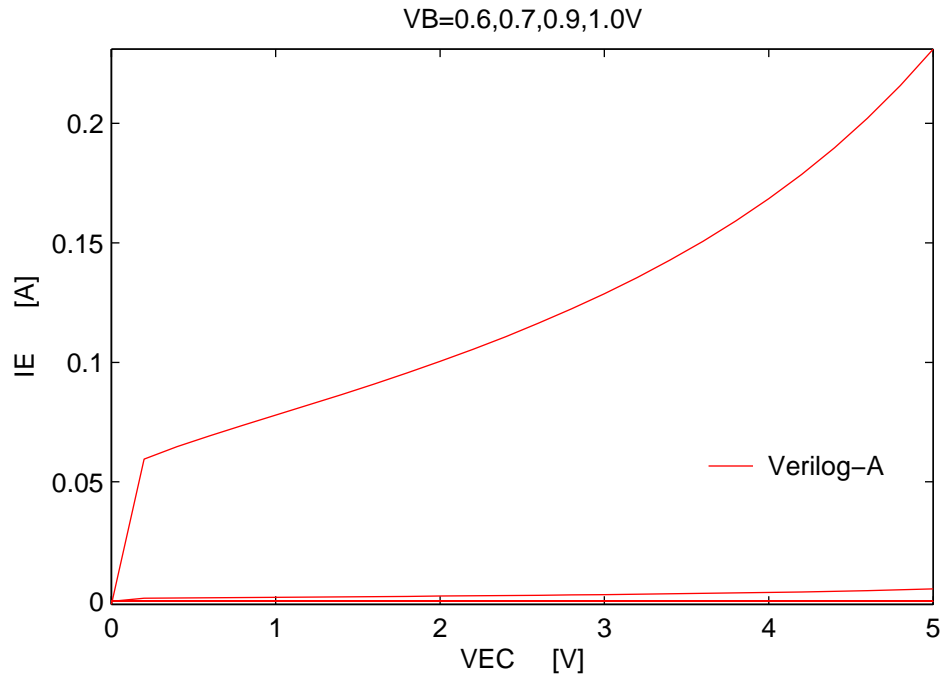


FIGURE 5. Reverse output characteristics at T=300K.

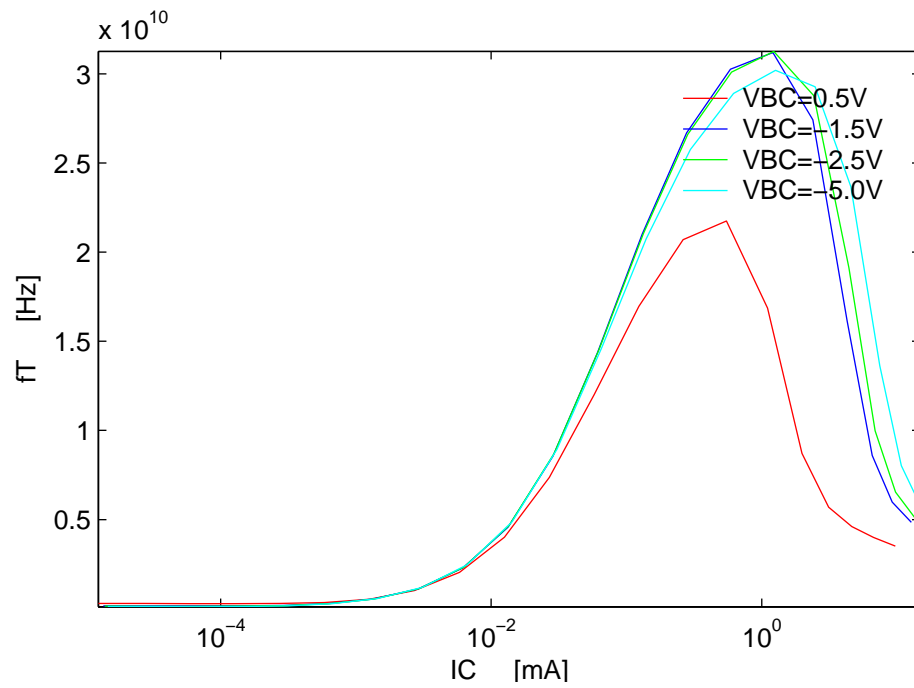


FIGURE 6. f_T (Hz) vs I_C (mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V, f_T extracted at f=2.8GHz.

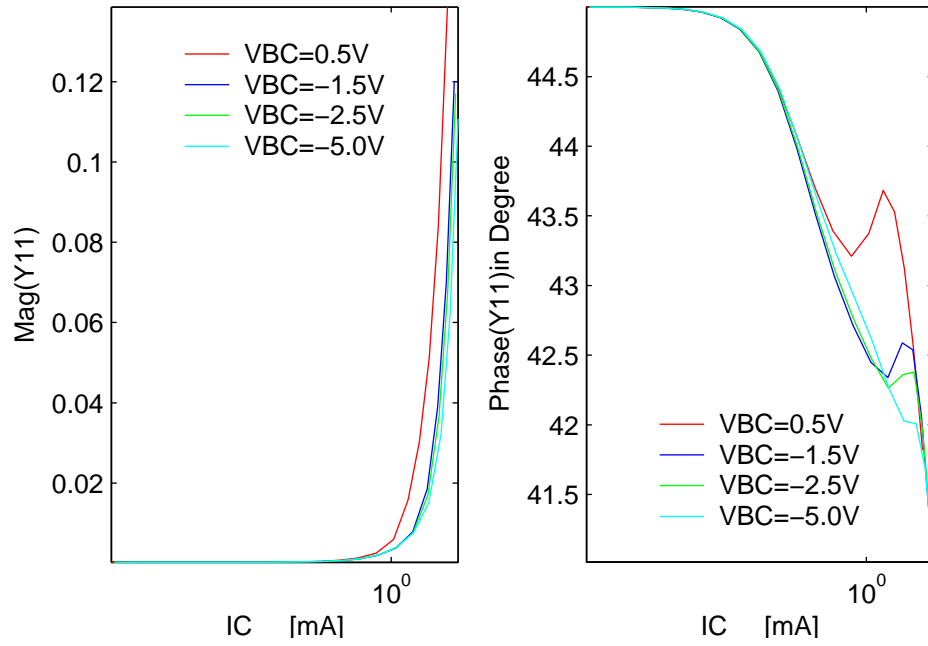


FIGURE 7. Y11 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

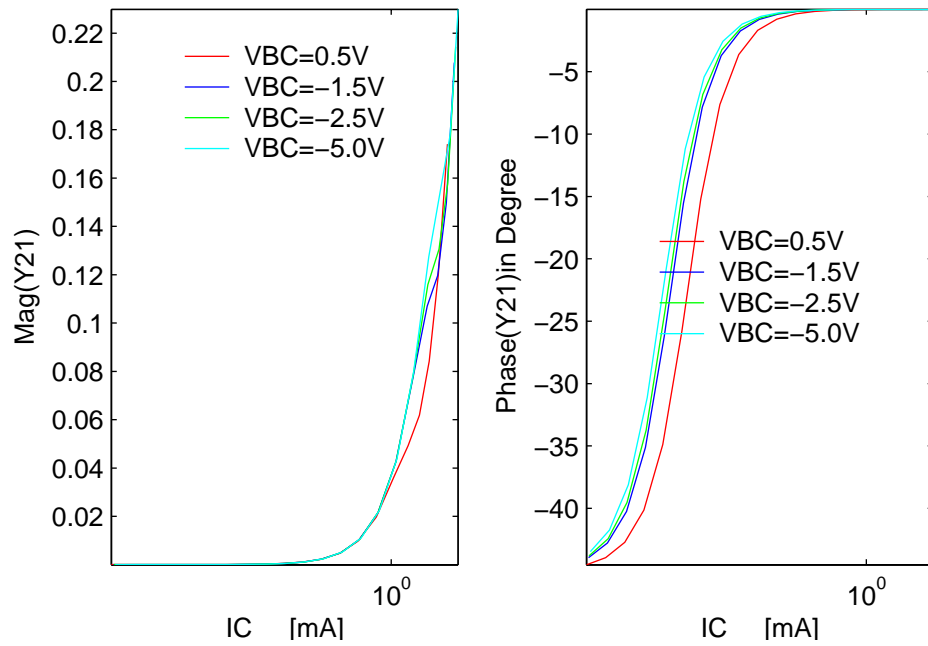


FIGURE 8. Y21 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

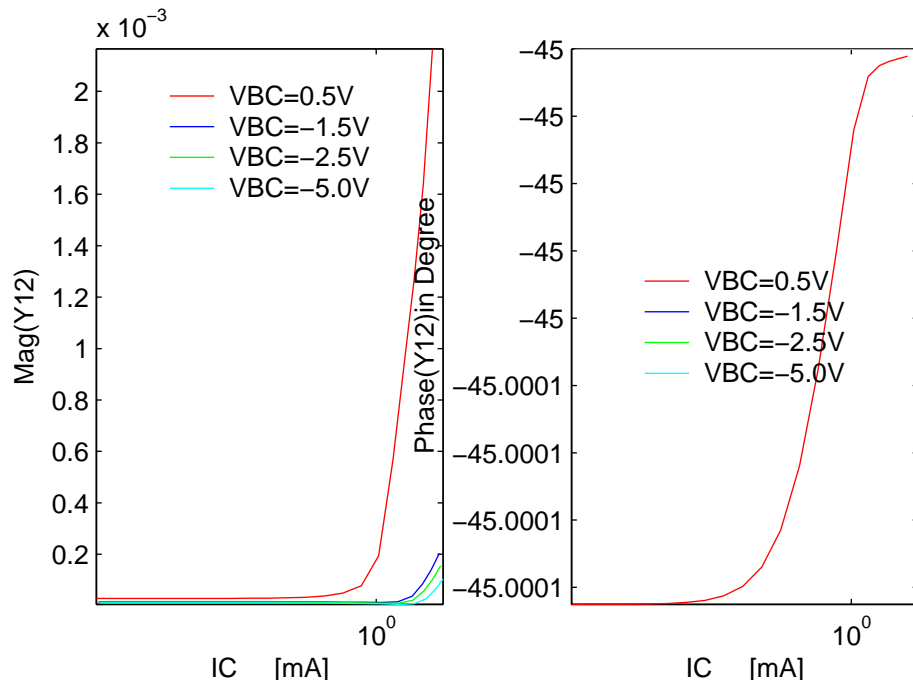


FIGURE 9. Y12 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

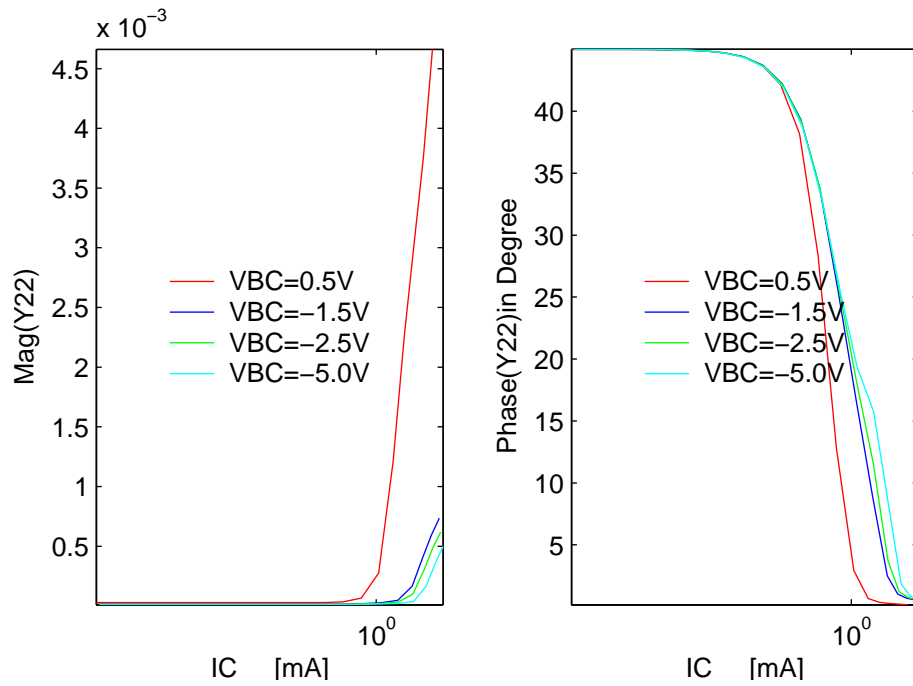


FIGURE 10. Y22 (extracted at f=2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

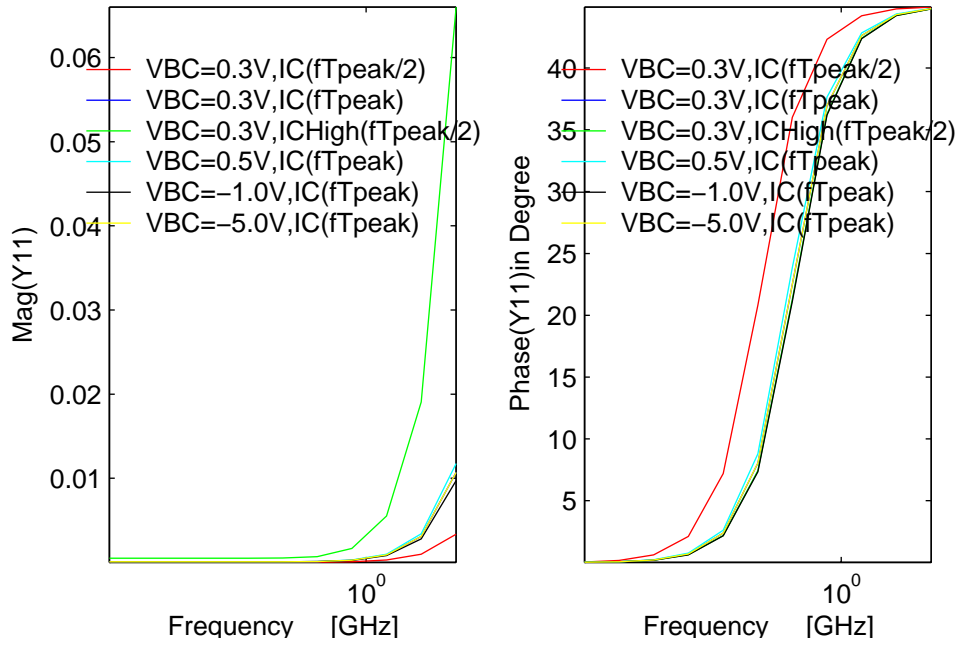


FIGURE 11. Y11 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

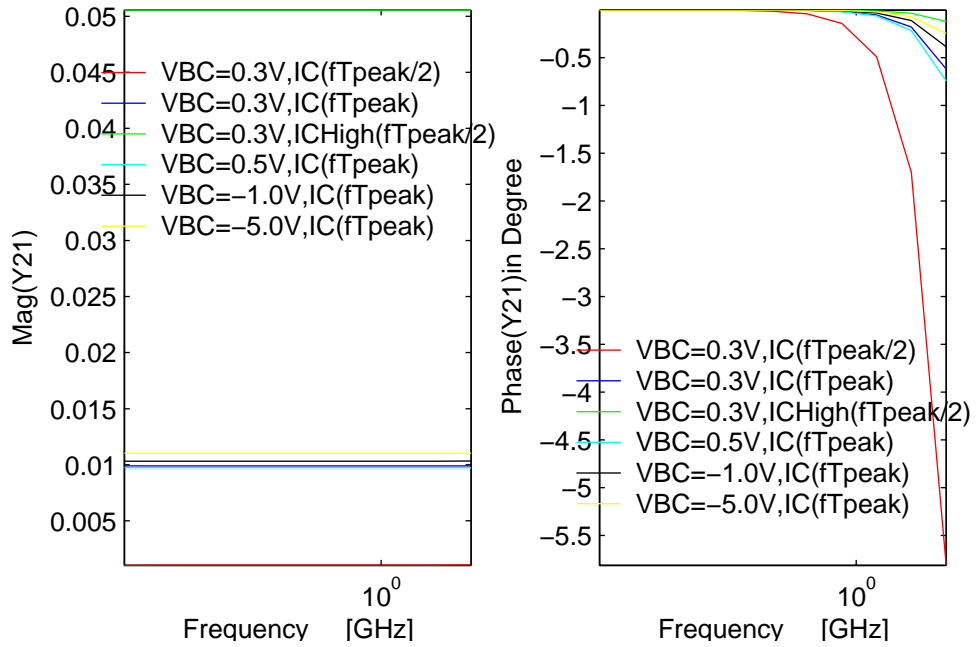


FIGURE 12. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

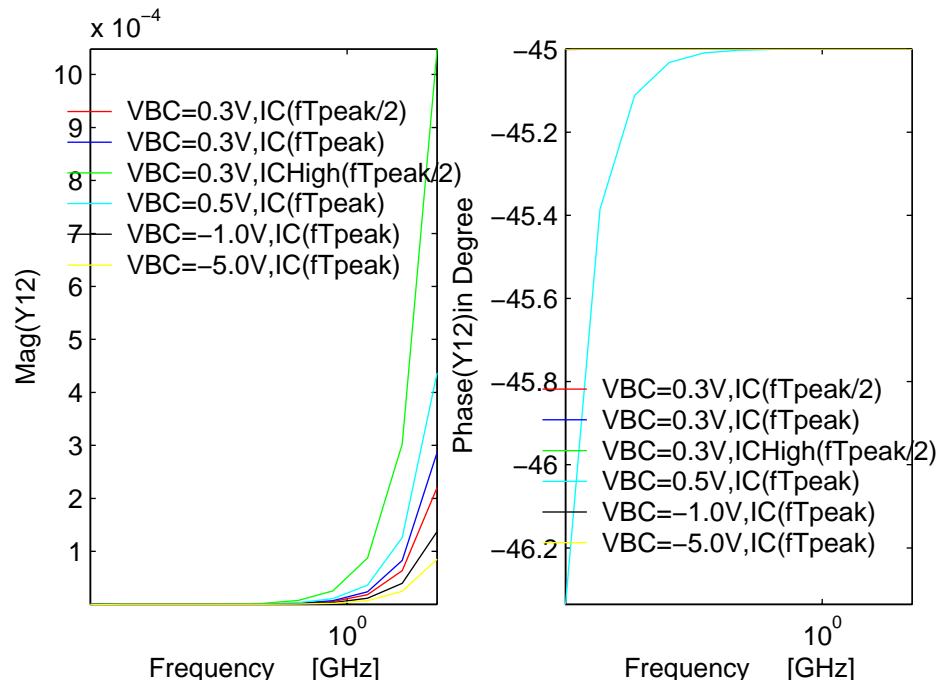


FIGURE 13. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

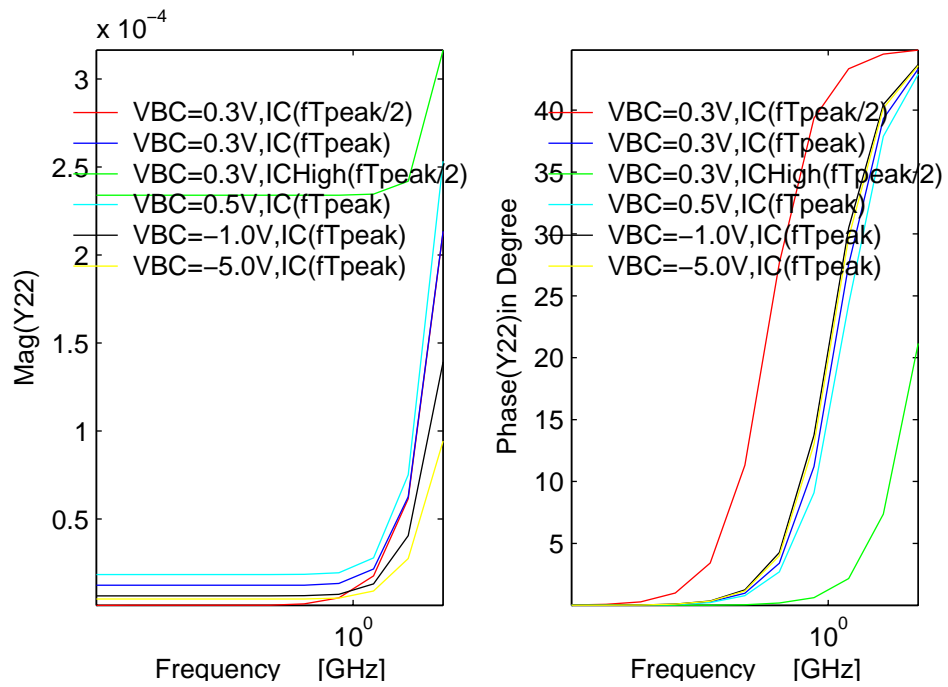


FIGURE 14. Y22 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

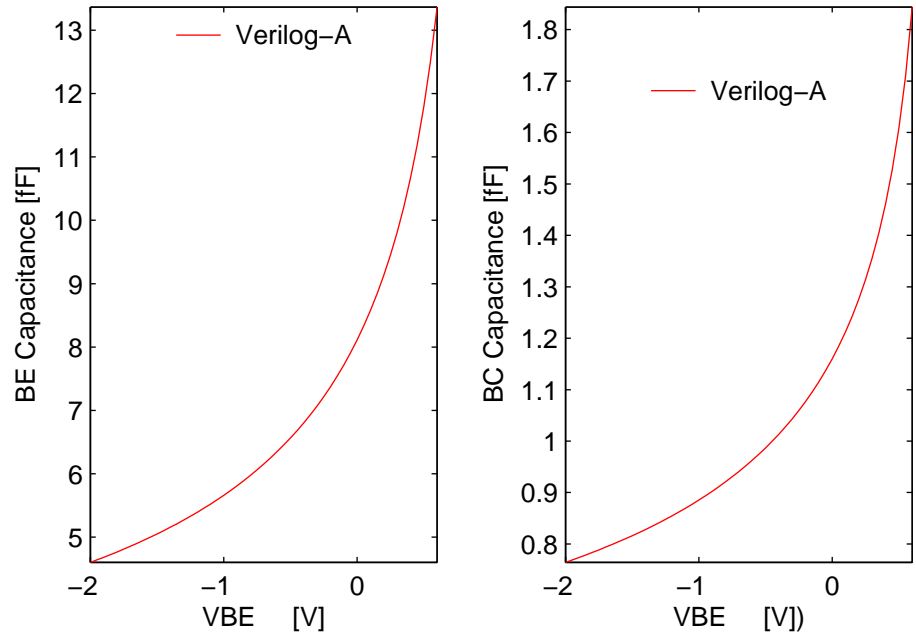


FIGURE 15. Depletion capacitances, C_{be} and C_{bc} (fF) vs BE voltages (Volt) plots at $T=300K$.

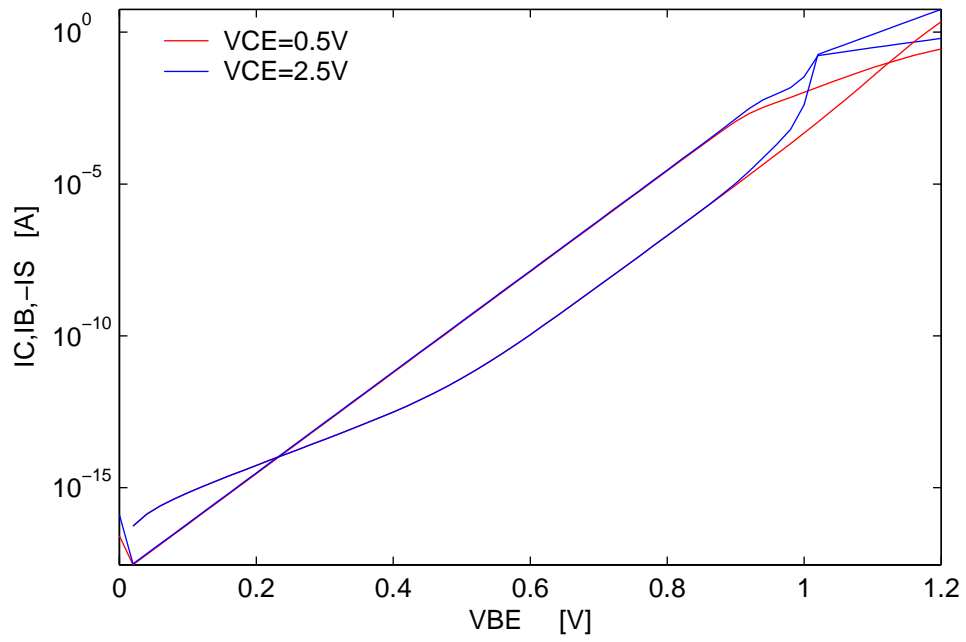


FIGURE 16. Forward Gummel plots at $V_{CE}=0.5, 2.5$ Volt and $T=300K$ with self-heating effect.

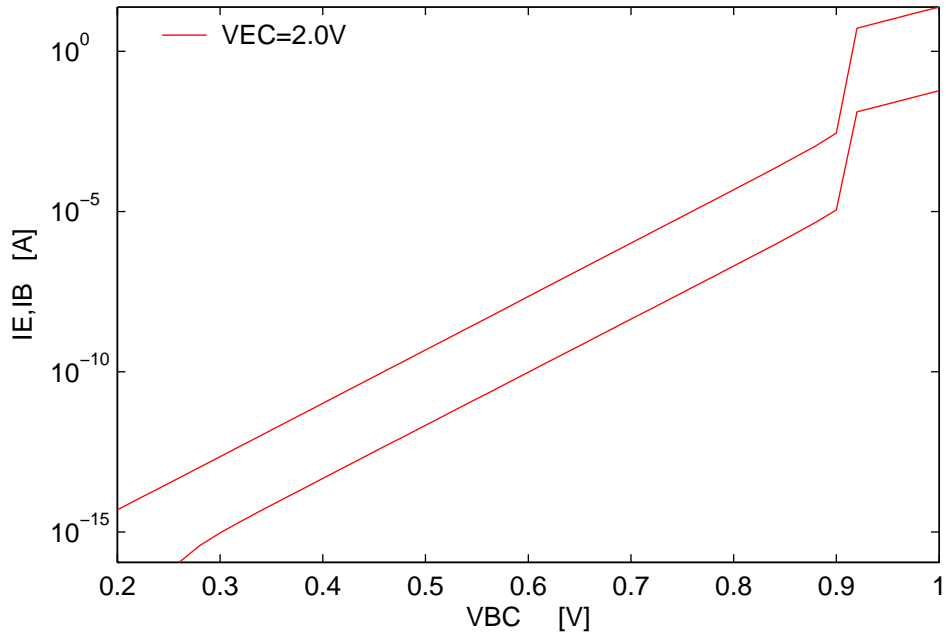


FIGURE 17. Reverse Gummel plots at $V_{EC}=2.0V$ at $T=300K$ with self-heating effect.

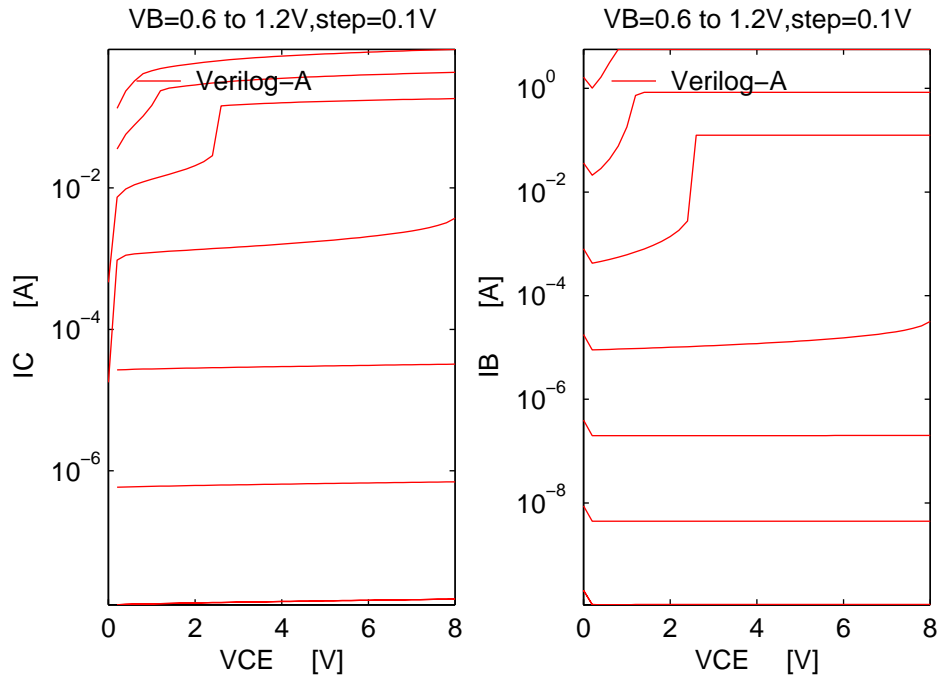


FIGURE 18. Forced-VB output characteristics and I_B - V_{CE} plots at $T=300K$ with self-heating effect.

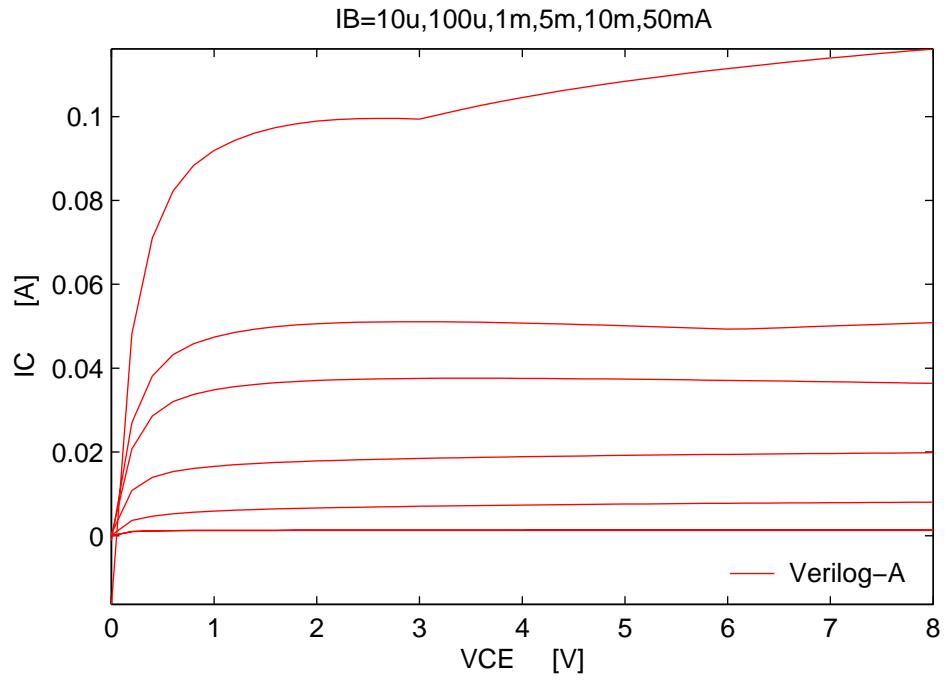


FIGURE 19. Forced-IB output characteristics at T=300K with self-heating effect.

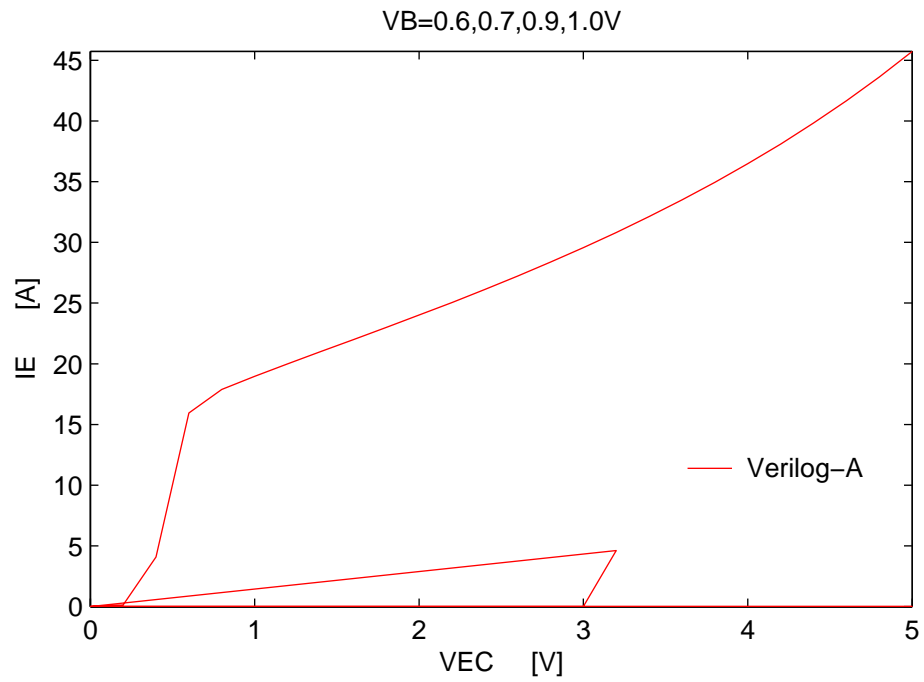


FIGURE 20. Reverse output characteristics at T=300K with self-heating effect .

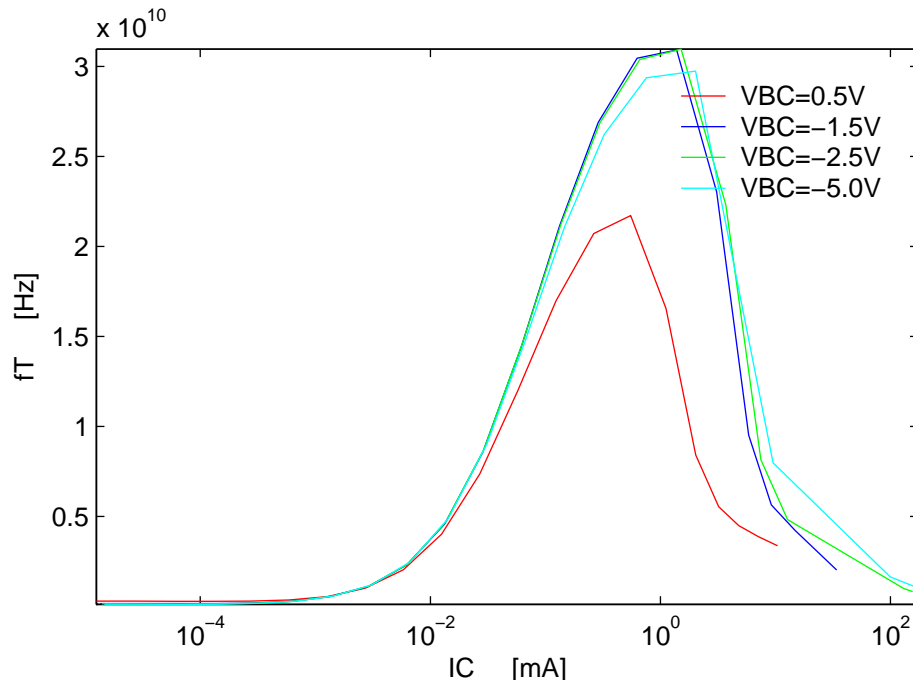


FIGURE 21. f_T (Hz) vs I_C (mA) plots at $T=300K$ for $V_{bc}=0.5, -1.5, -2.5,$ and $-5V$, f_T extracted at $f=2.8GHz$ with self-heating effect.

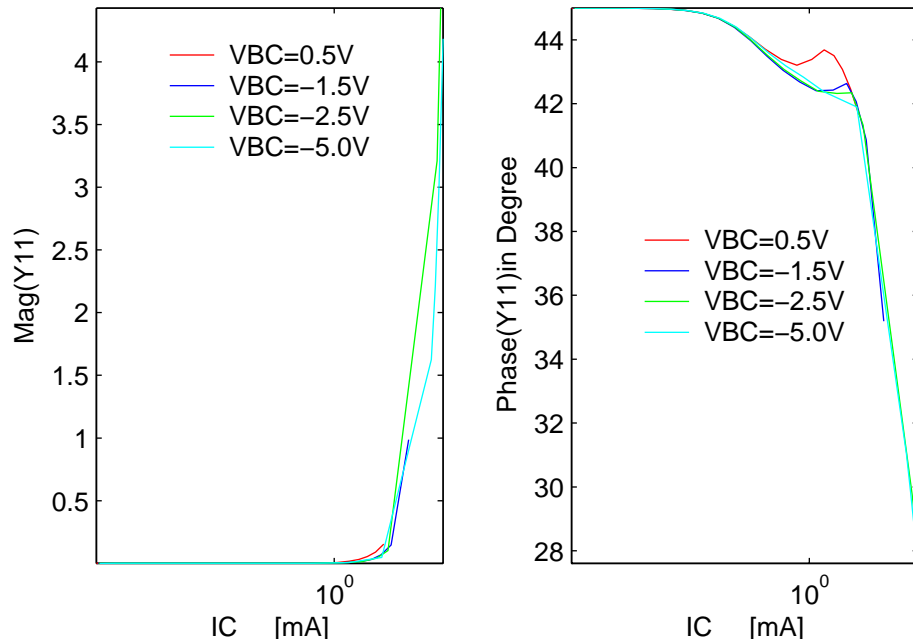


FIGURE 22. Y_{11} (extracted at $2.8GHz$) vs I_C (mA) plots at $T=300K$ for $V_{bc}=0.5, -1.5, -2.5,$ and $-5V$ with self-heating effect.

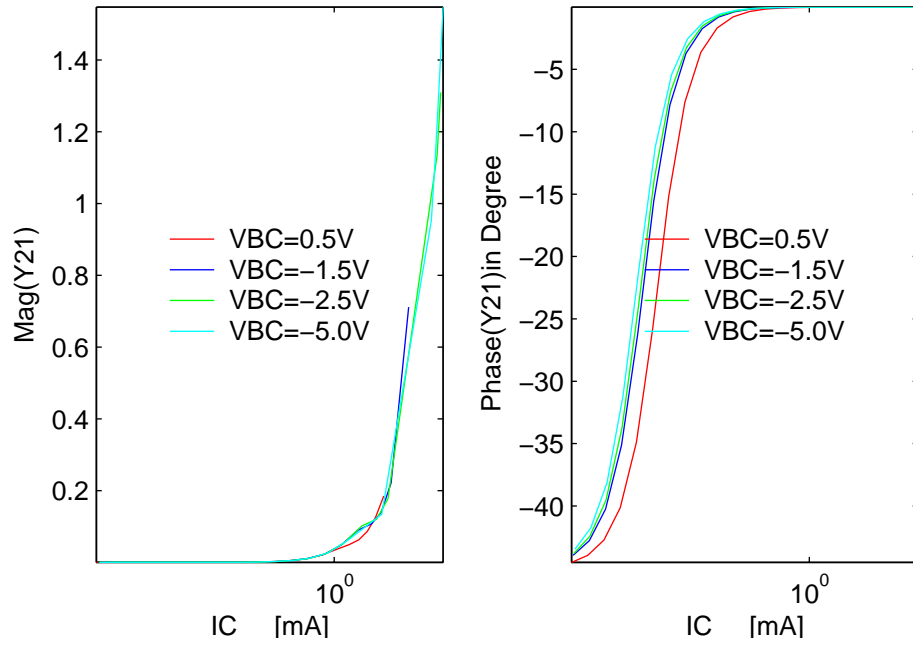


FIGURE 23. Y21 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with self-heating effect.

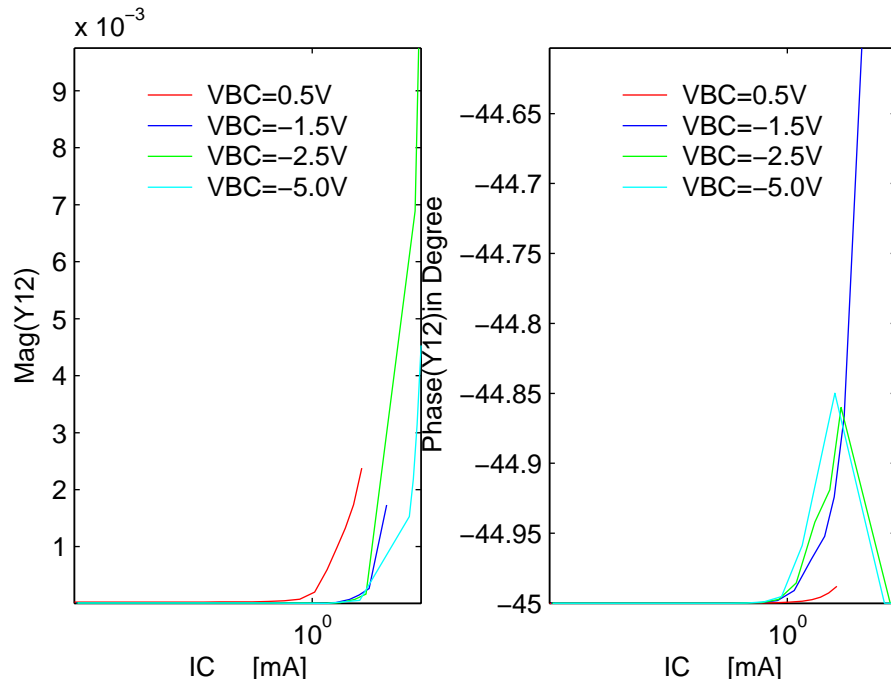


FIGURE 24. Y12 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with self-heating effect.

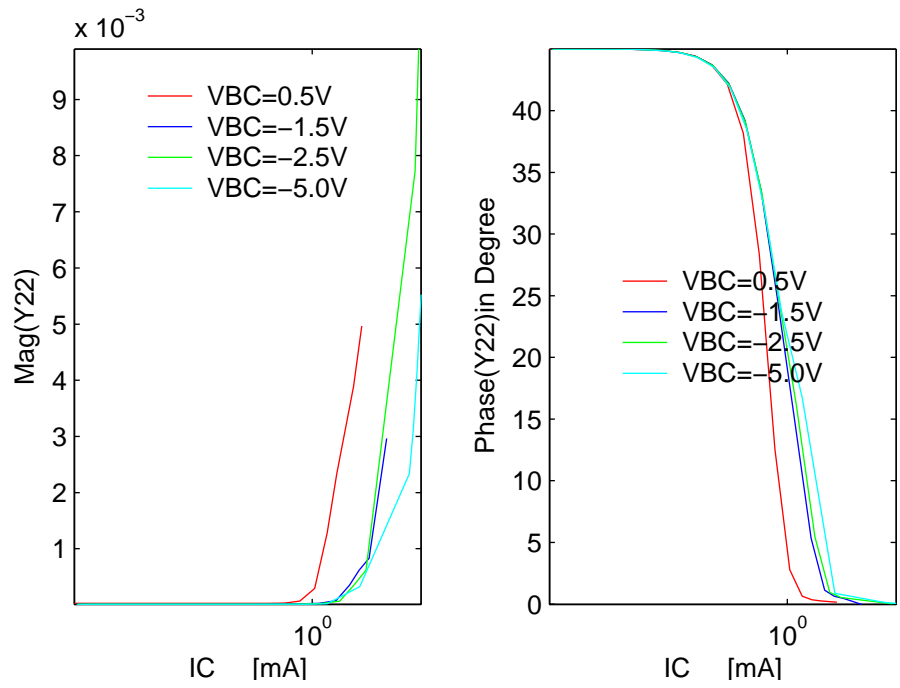


FIGURE 25. Y22 (extracted at f=2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with self-heating effect.

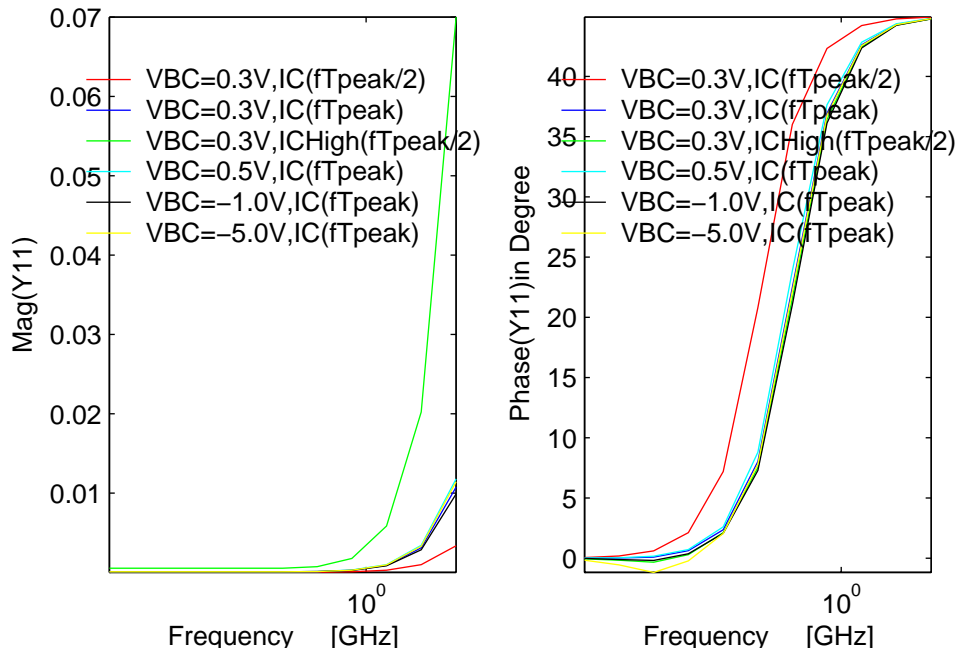


FIGURE 26. Y11 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(ftpeak),IC(ftpeak/2)and ICHigh(ftpeak/2) with self-heating effect.

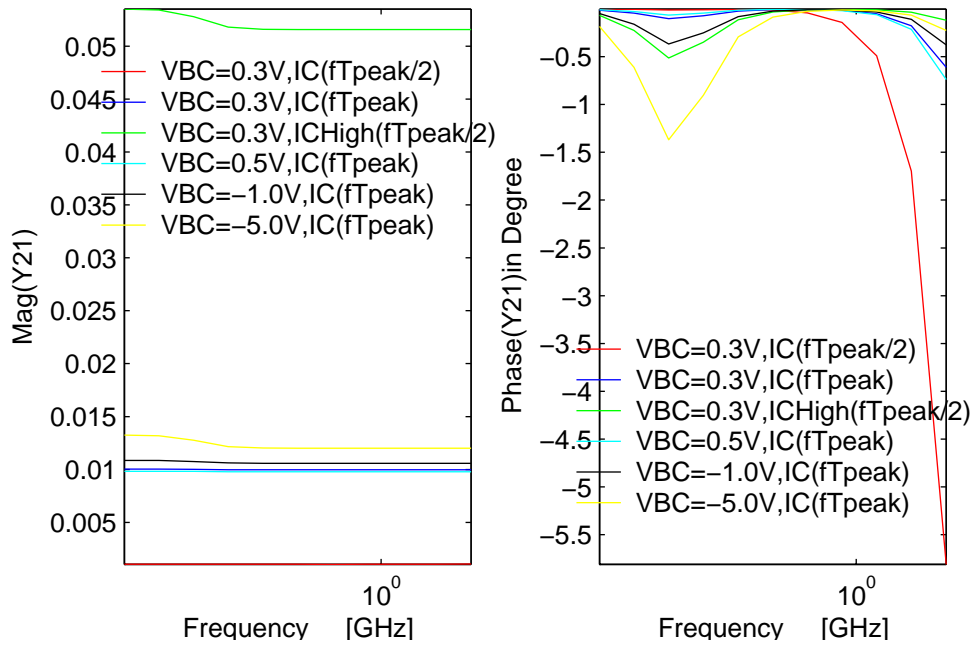


FIGURE 27. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with self-heating effect.

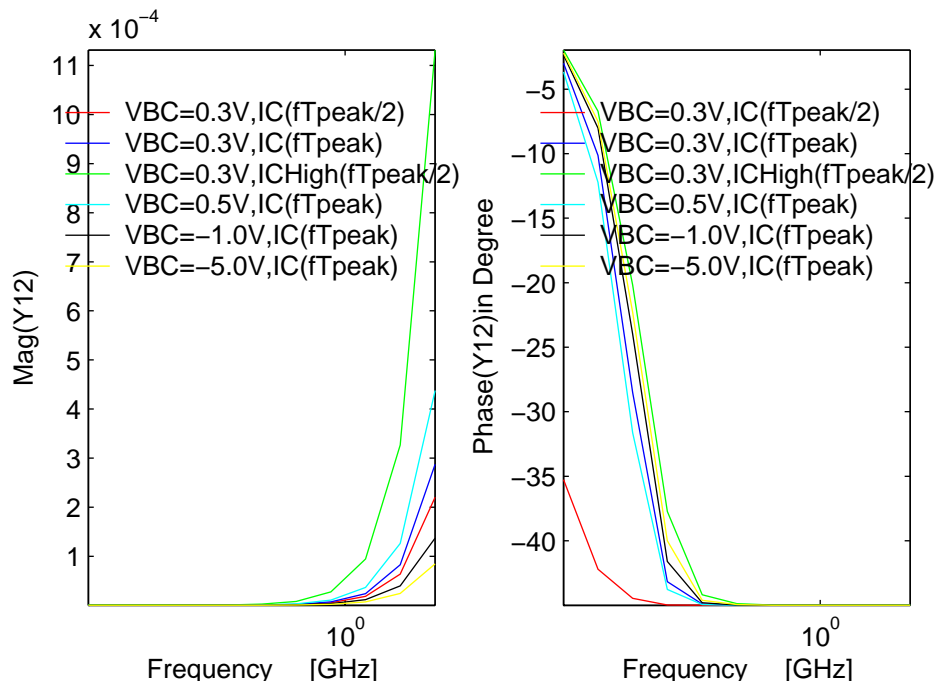


FIGURE 28. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with self-heating effect.

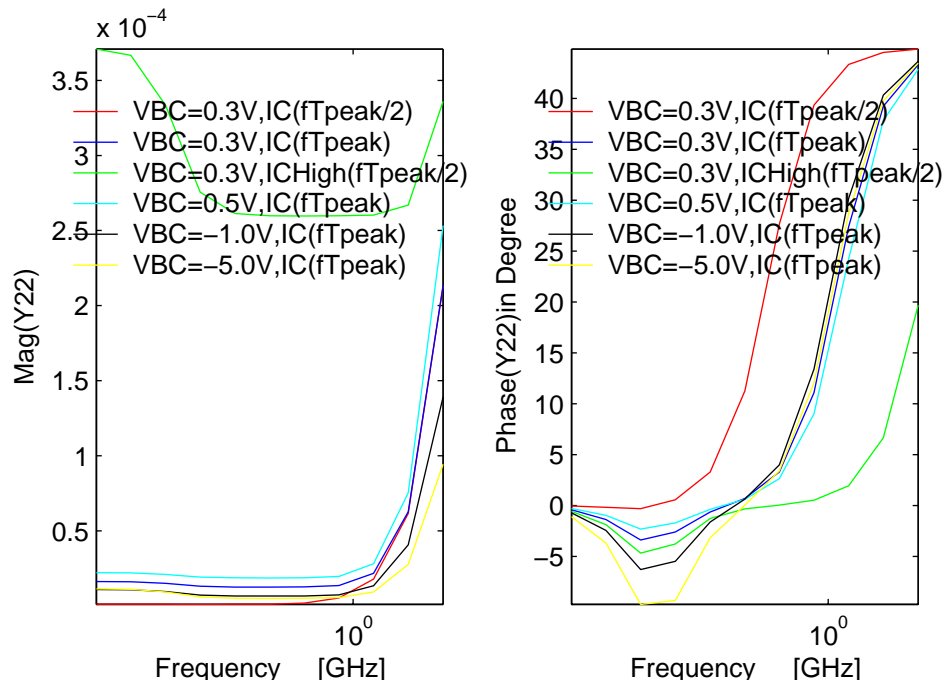


FIGURE 29. Y22 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with self-heating effect.

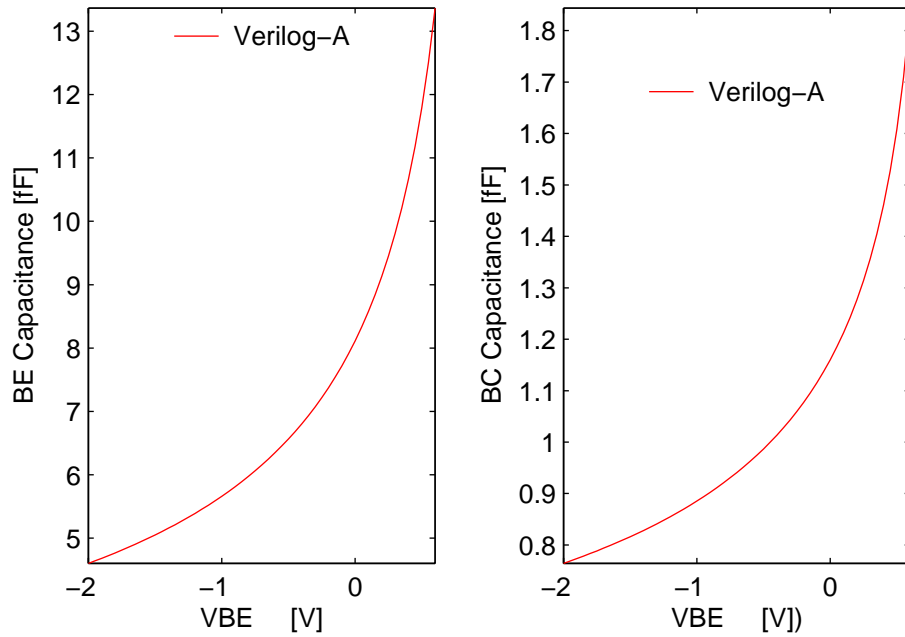


FIGURE 30. Depletion capacitances, Cbe and Cbc (fF) vs BE voltages (Volt) plots at T=300K with self-heating effect.

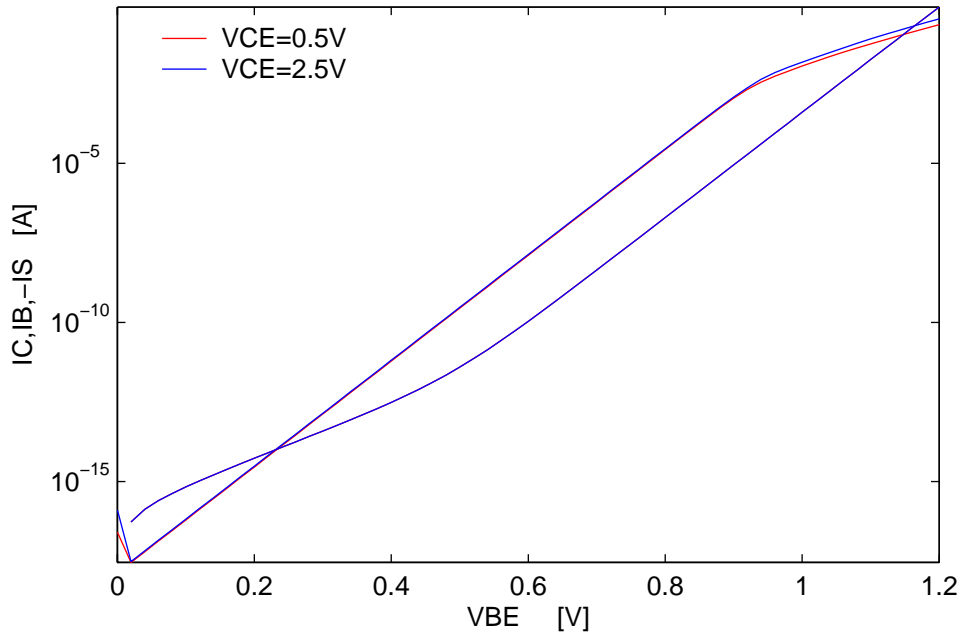


FIGURE 31. Forward Gummel plots at VCE=0.5,2.5 Volt and T=300K with collector current spreading effect.

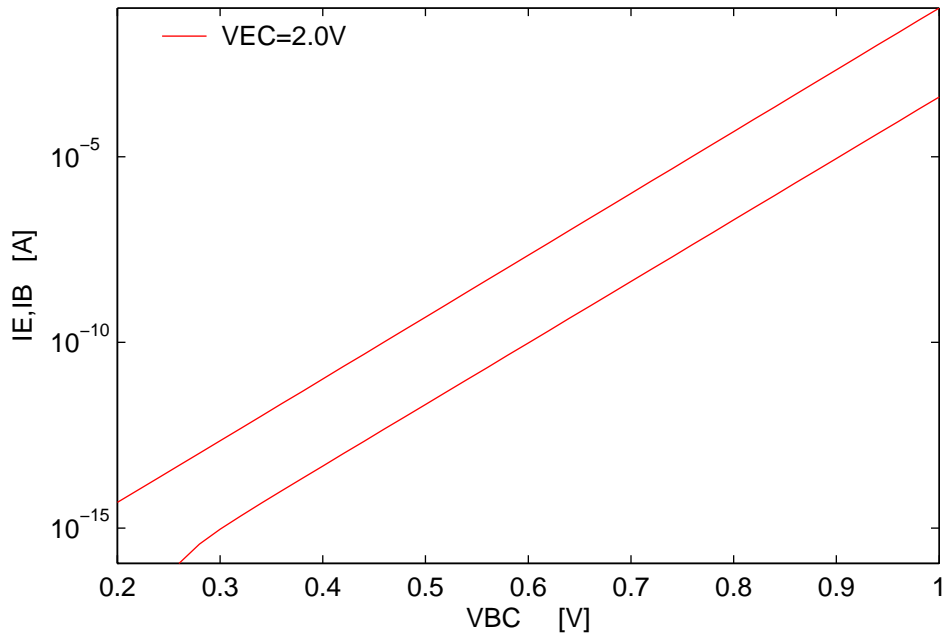


FIGURE 32. Reverse Gummel plots at VEC=2.0V at T=300K with collector current spreading effect.

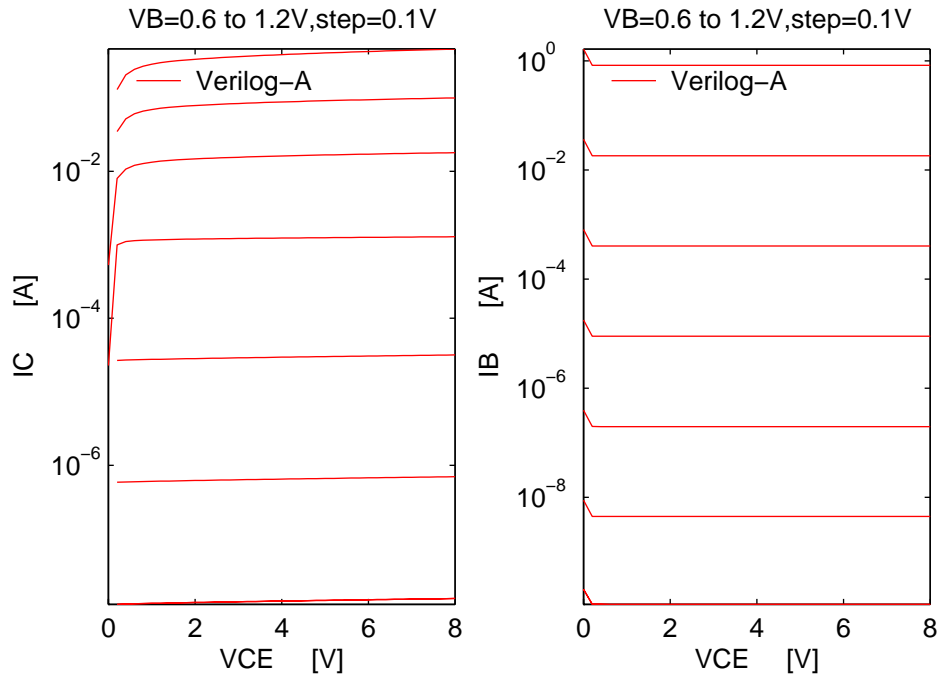


FIGURE 33. Forced-VB output characteristics and I_B - V_{CE} plots at $T=300K$ with collector current spreading effect.

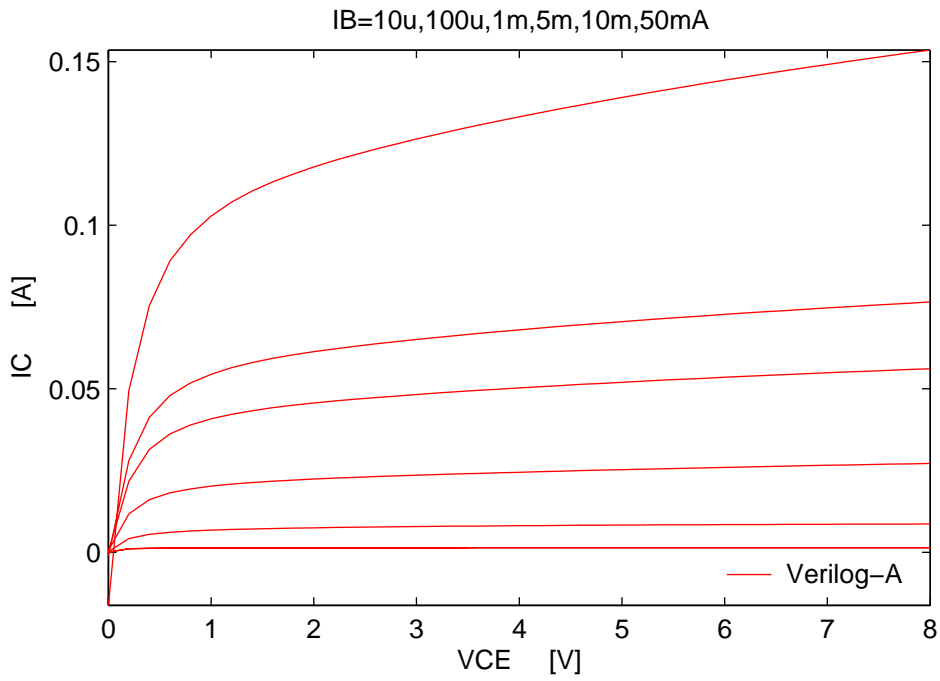


FIGURE 34. Forced-IB output characteristics at $T=300K$ with collector current spreading effect.

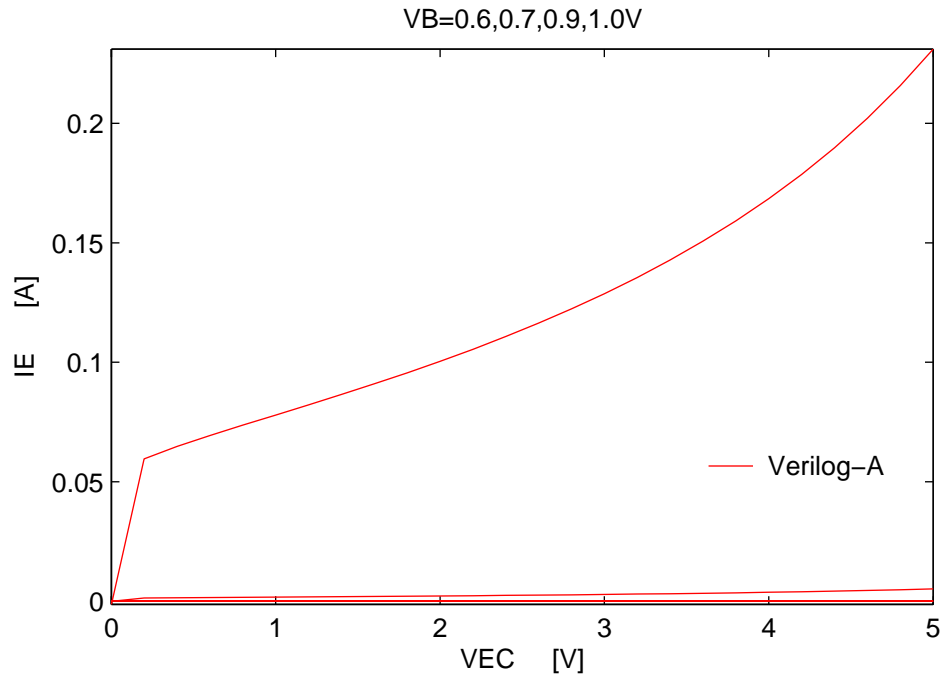


FIGURE 35. Reverse output characteristics at T=300K with collector current spreading effect.

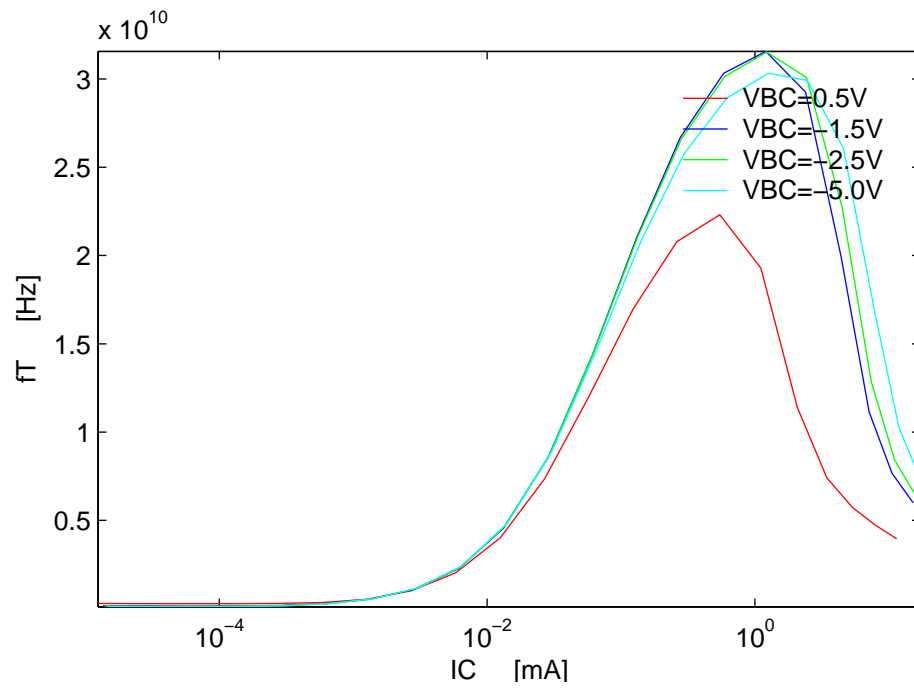


FIGURE 36. f_T (Hz) vs I_C (mA) plots at T=300K for $V_{bc}=0.5, -1.5, -2.5,$ and $-5V$, f_T extracted at $f=2.8GHz$ with collector current spreading effect.

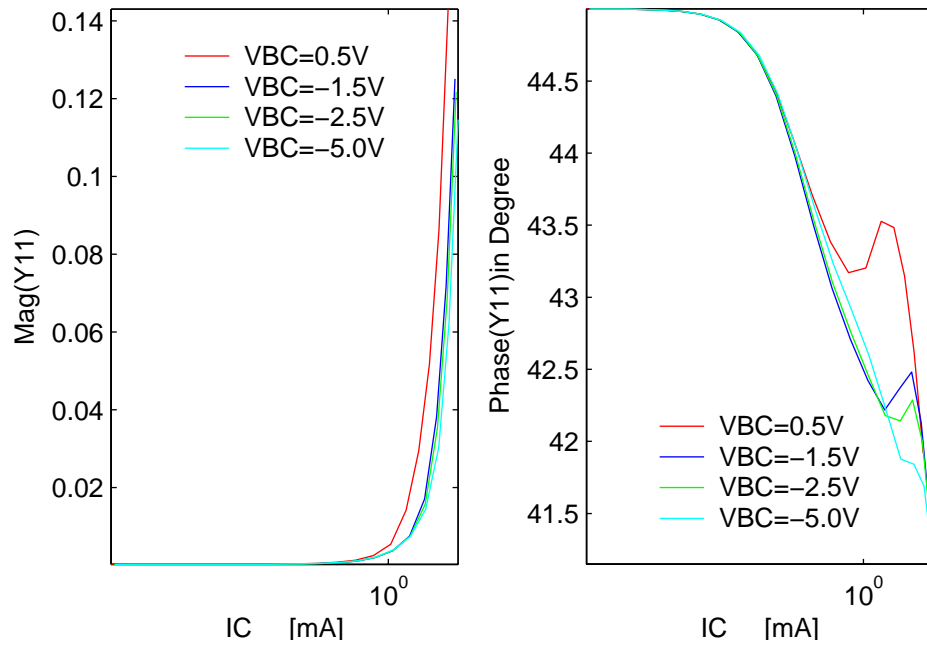


FIGURE 37. Y11 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with collector current spreading effect.

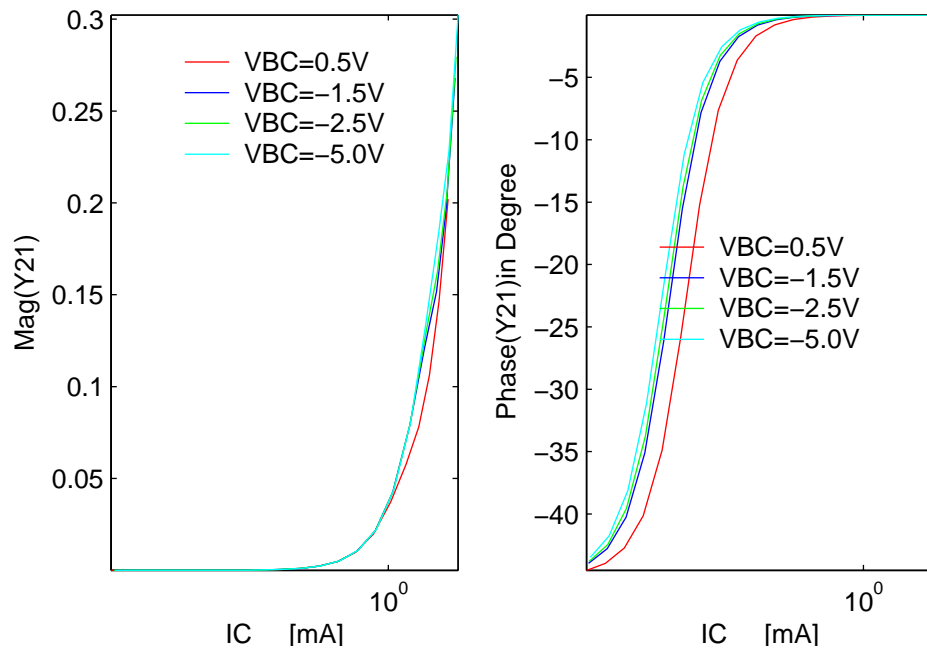


FIGURE 38. Y21 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with collector current spreading effect.

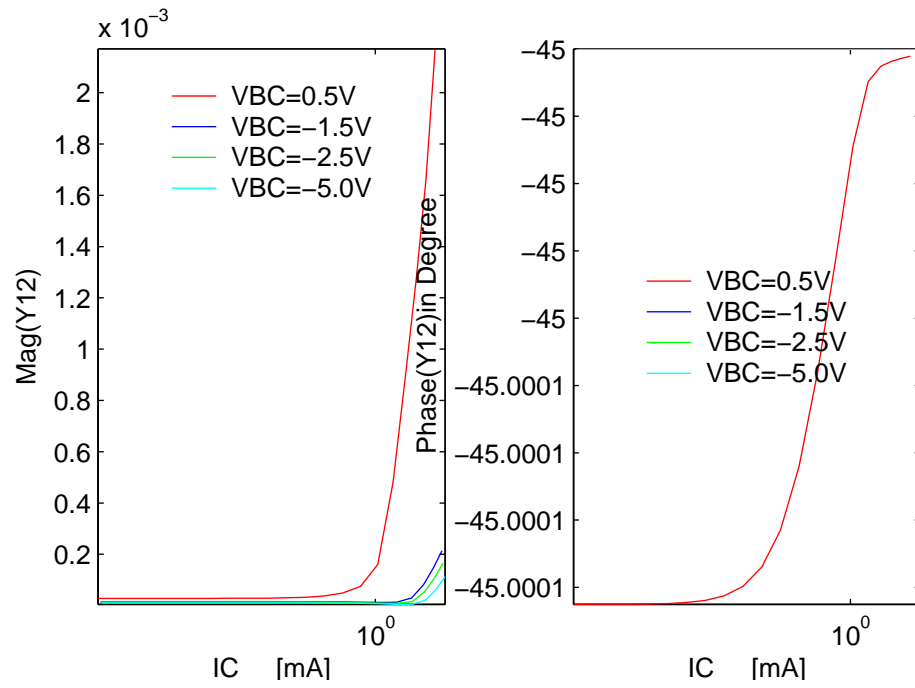


FIGURE 39. Y12 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with collector current spreading effect.

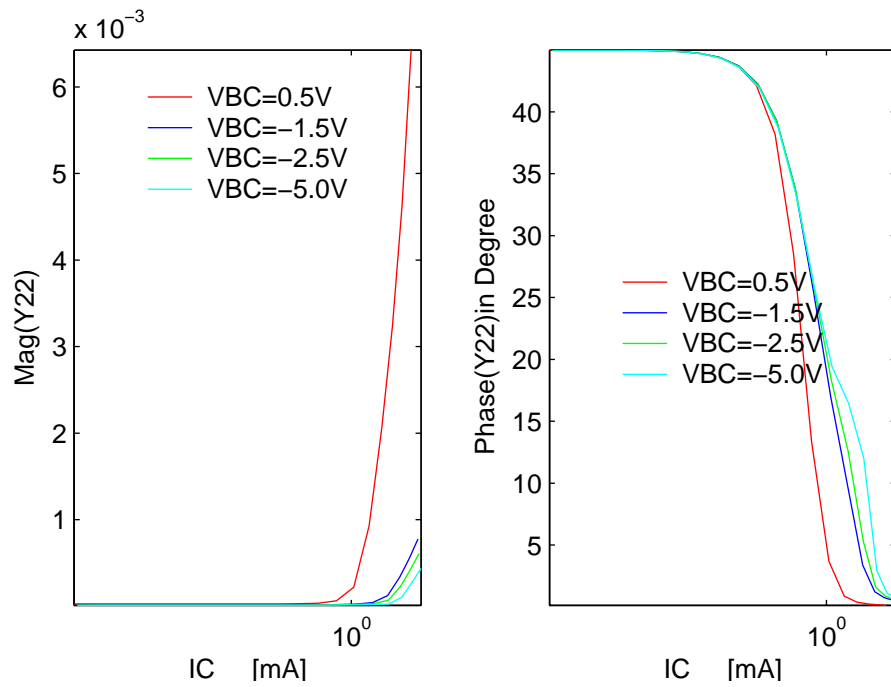


FIGURE 40. Y22 (extracted at f=2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with collector current spreading effect.

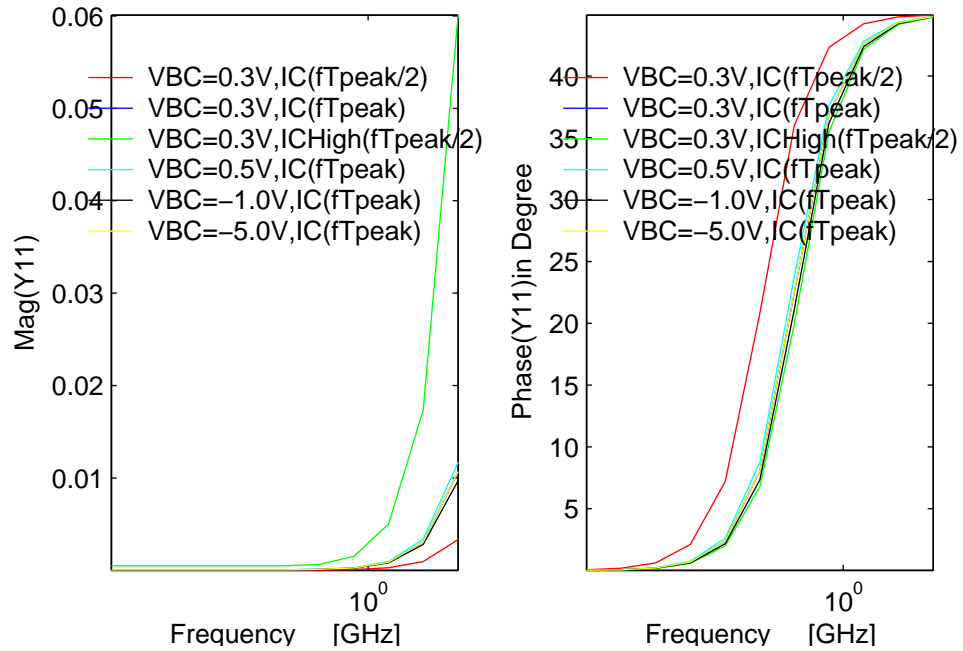


FIGURE 41. Y11 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with collector current spreading effect.

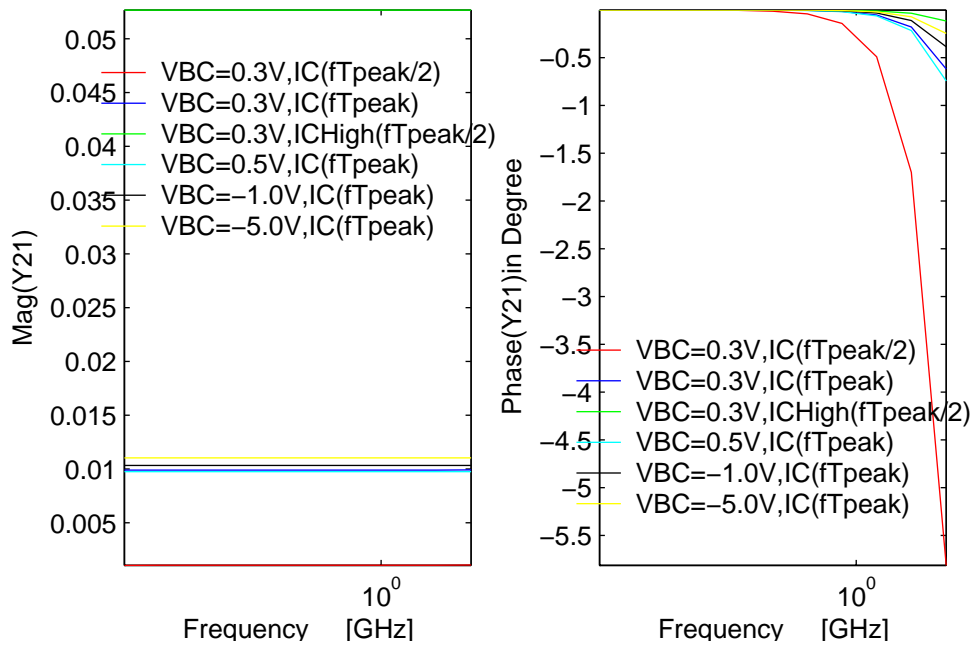


FIGURE 42. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with collector current spreading effect.

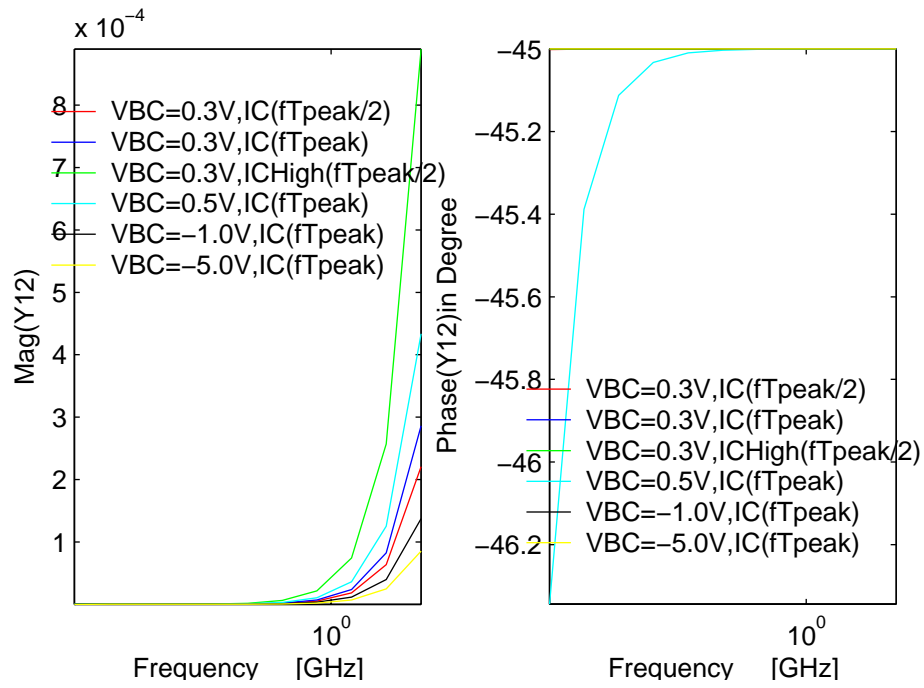


FIGURE 43. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with collector current spreading effect.

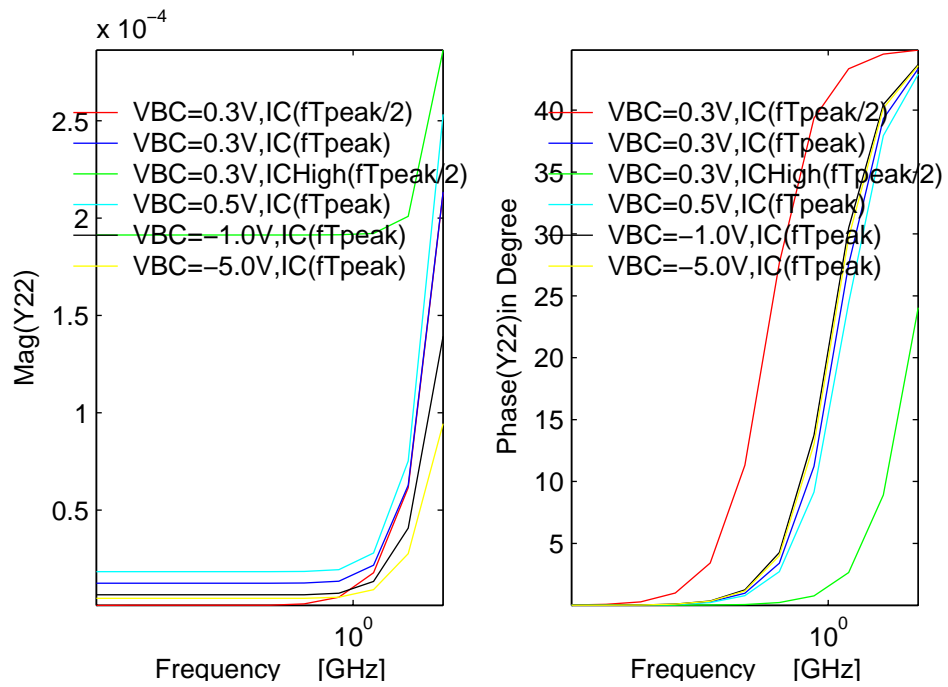


FIGURE 44. Y22 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with collector current spreading effect.

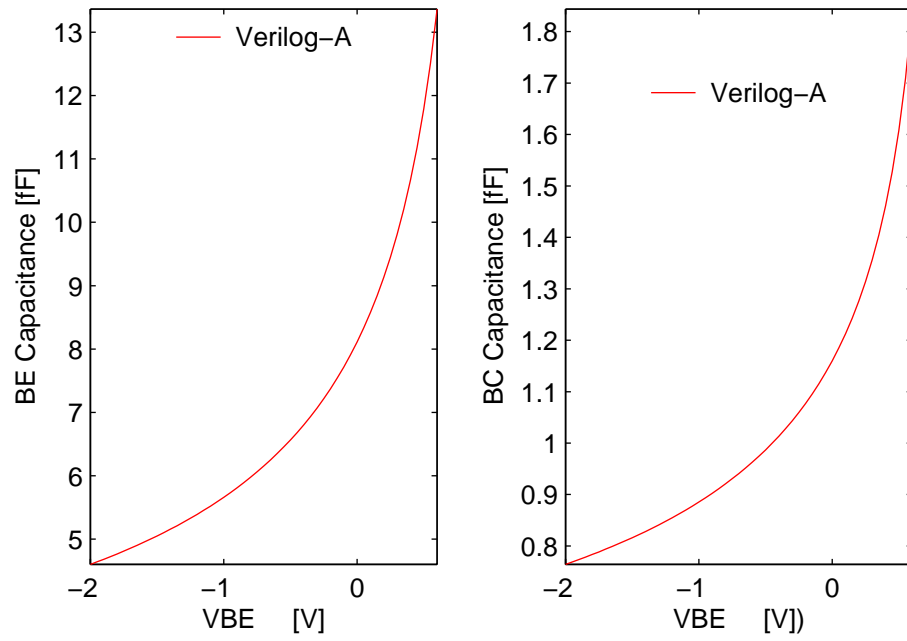


FIGURE 45. Depletion capacitances, C_{be} and C_{bc} (fF) vs BE voltages (Volt) plots at $T=300K$ with collector current spreading effect.

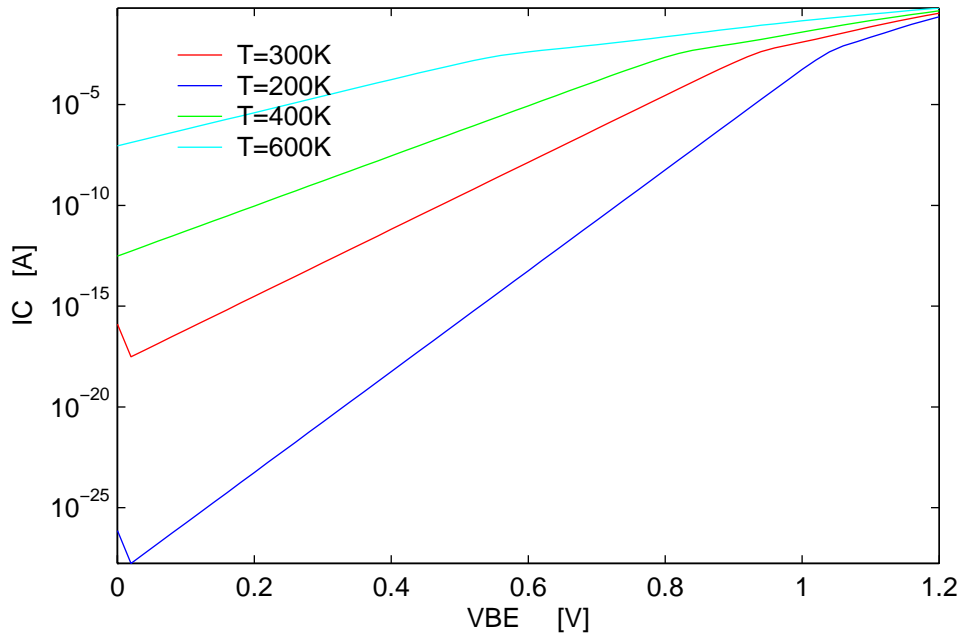


FIGURE 46. I_C vs. V_{BE} at $V_{CE}=2.5V$ and $T=200K, 300K, 400K, 600K$.

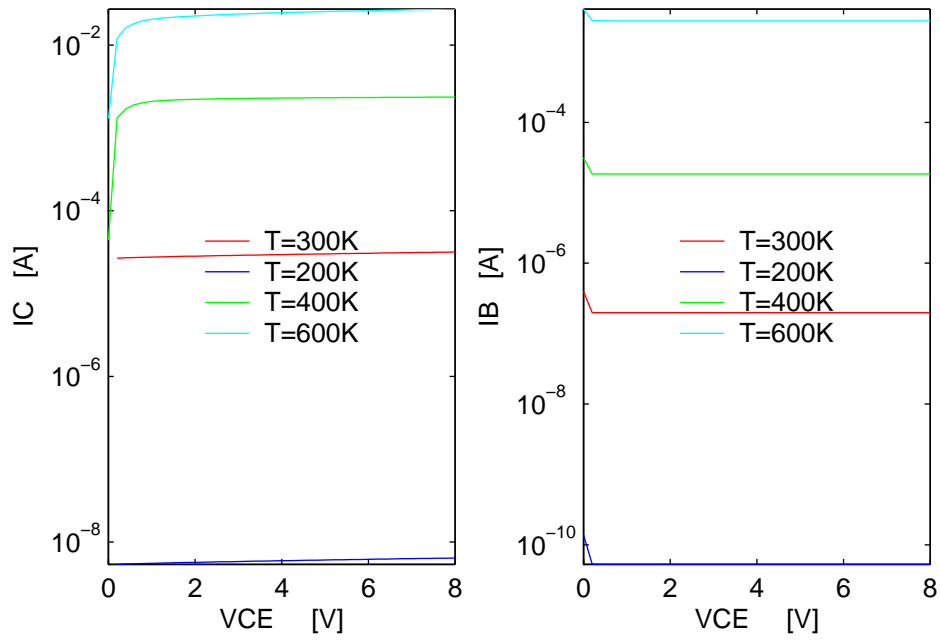


FIGURE 47. I_C and I_B vs. V_{CE} at $V_B=0.8\text{V}$ and $T=200\text{K}, 300\text{K}, 400\text{K}, 600\text{K}$.

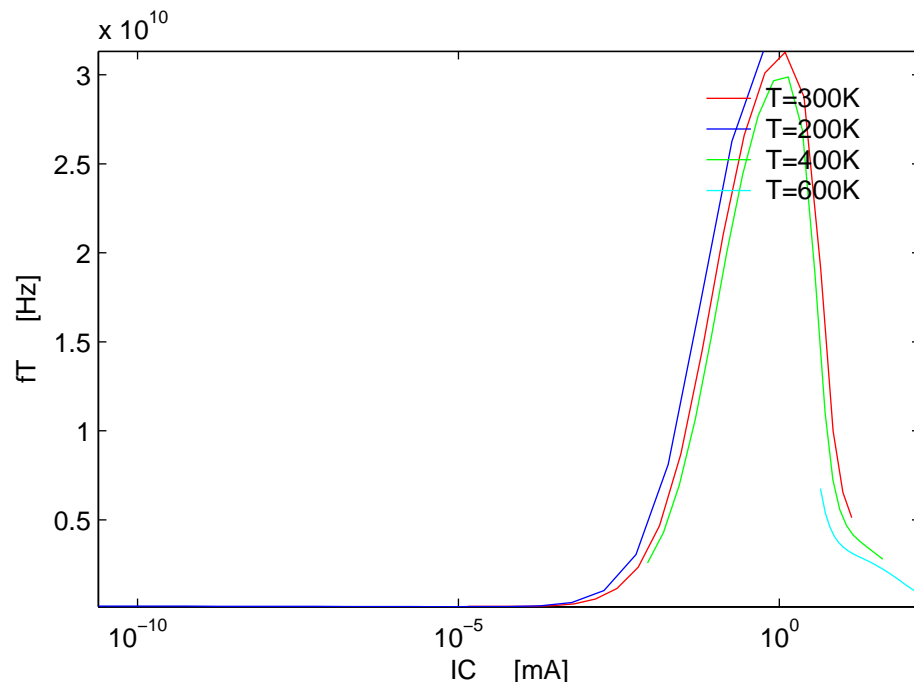


FIGURE 48. $f_T(\text{Hz})$ vs. $I_C(\text{mA})$ at $V_{BC}=-2.5\text{V}$ and $T=200\text{K}, 300\text{K}, 400\text{K}, 600\text{K}$.

Section 2: Results of Internal Transistor

With Tunneling current source tagged to the peripheral base node (Figs. 49-63) and to the internal base node (Figs. 64-78).

Also Figs. 79 corresponds to the tunnelling source connected to the peripheral base node.

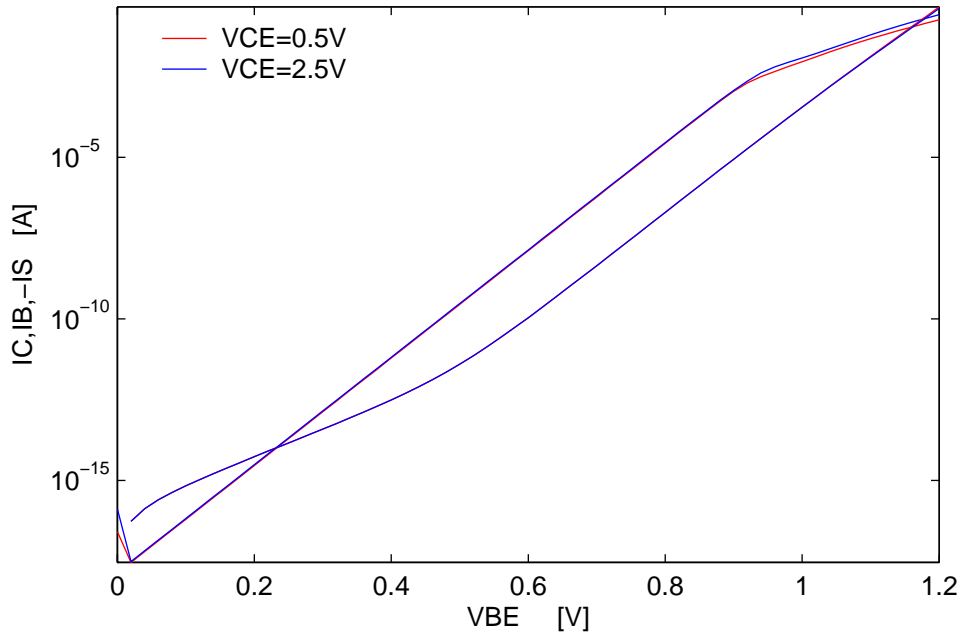


FIGURE 49. Forward Gummel plots at $V_{CE}=0.5, 2.5$ Volt and $T=300K$.

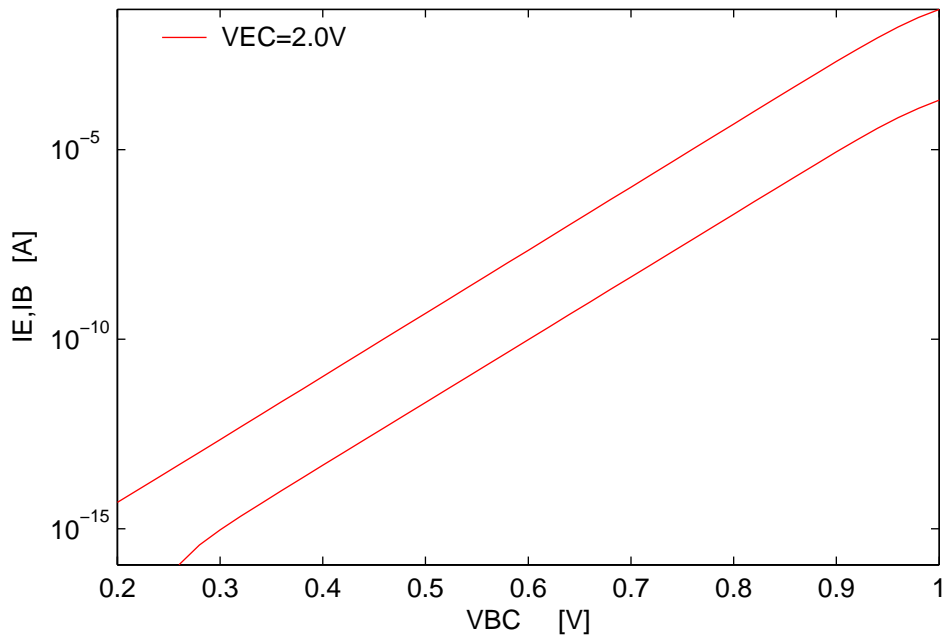


FIGURE 50. Reverse Gummel plots at $V_{EC}=2.0V$ at $T=300K$.

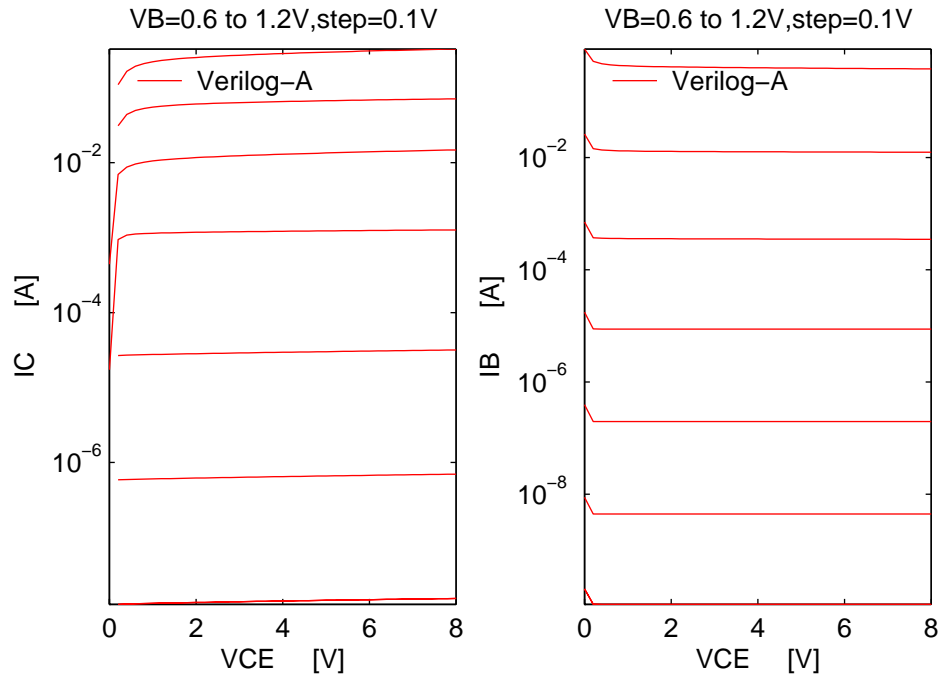


FIGURE 51. Forced-VB output characteristics and I_B - V_{CE} plots at $T=300K$.

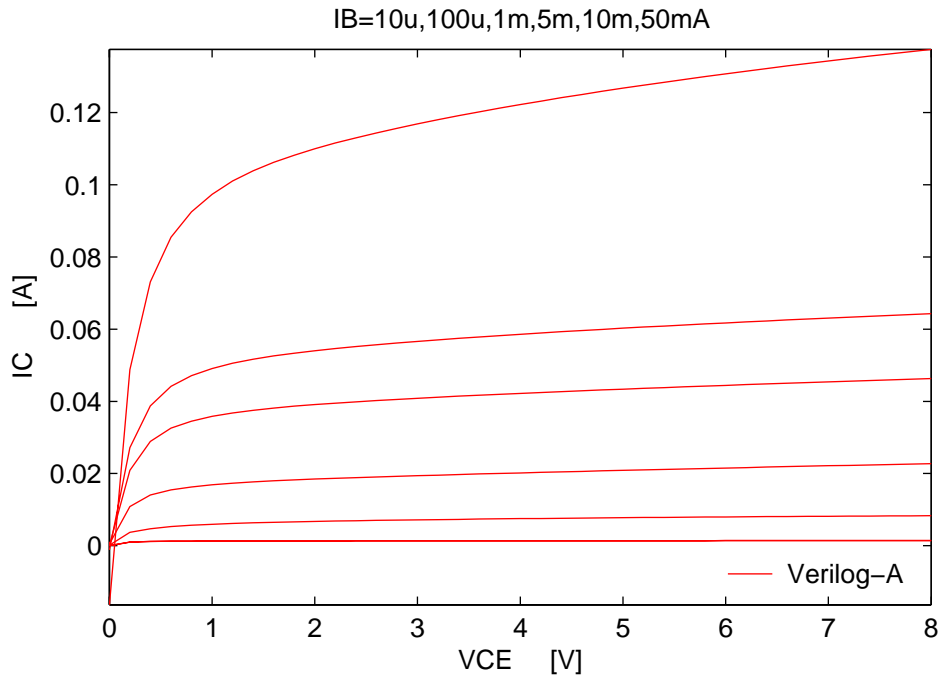


FIGURE 52. Forced-IB output characteristics at $T=300K$.

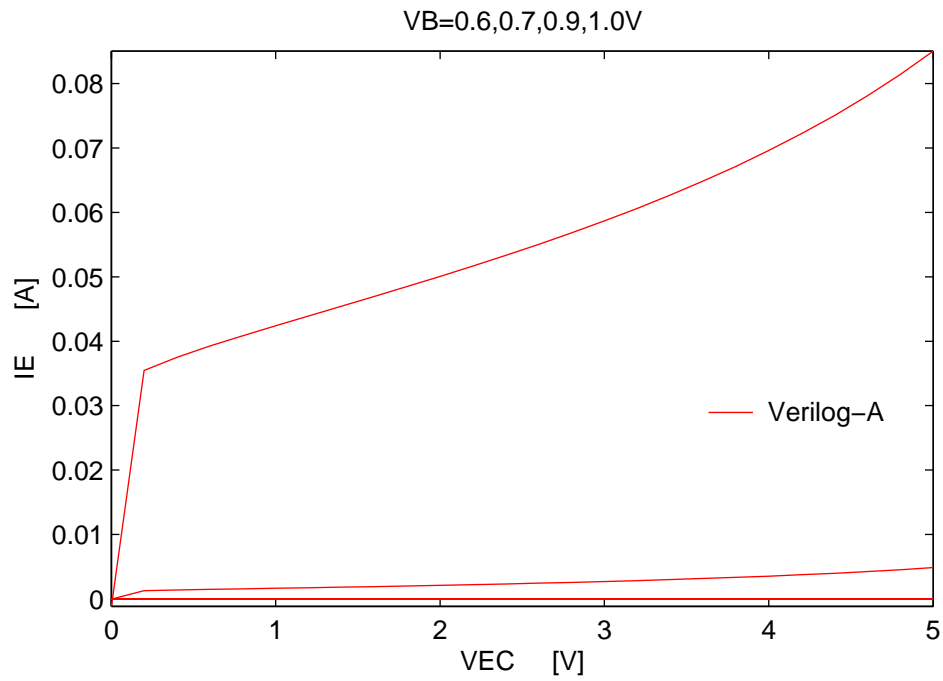


FIGURE 53. Reverse output characteristics at $T=300\text{K}$.

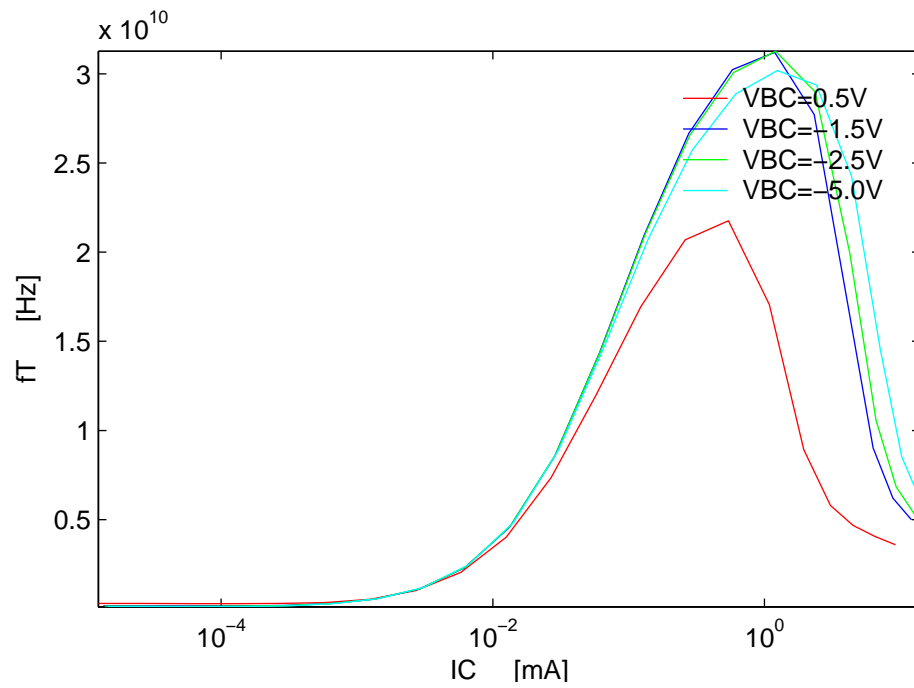


FIGURE 54. $f_T(\text{Hz})$ vs $I_C(\text{mA})$ plots at $T=300\text{K}$ for $V_{bc}=0.5, -1.5, -2.5,$ and -5V , f_T extracted at $f=2.8\text{GHz}$.

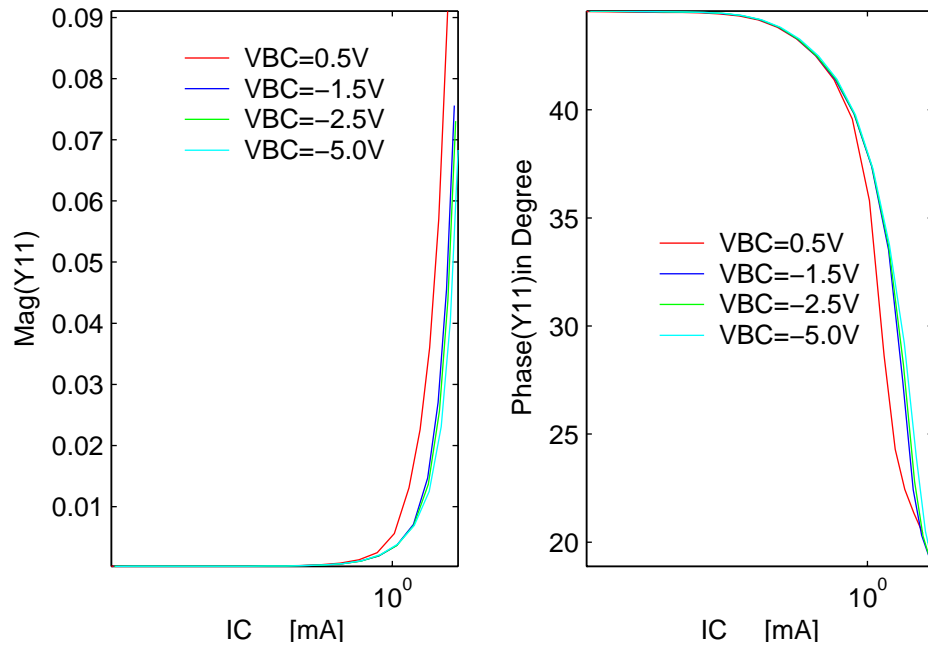


FIGURE 55. Y11 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

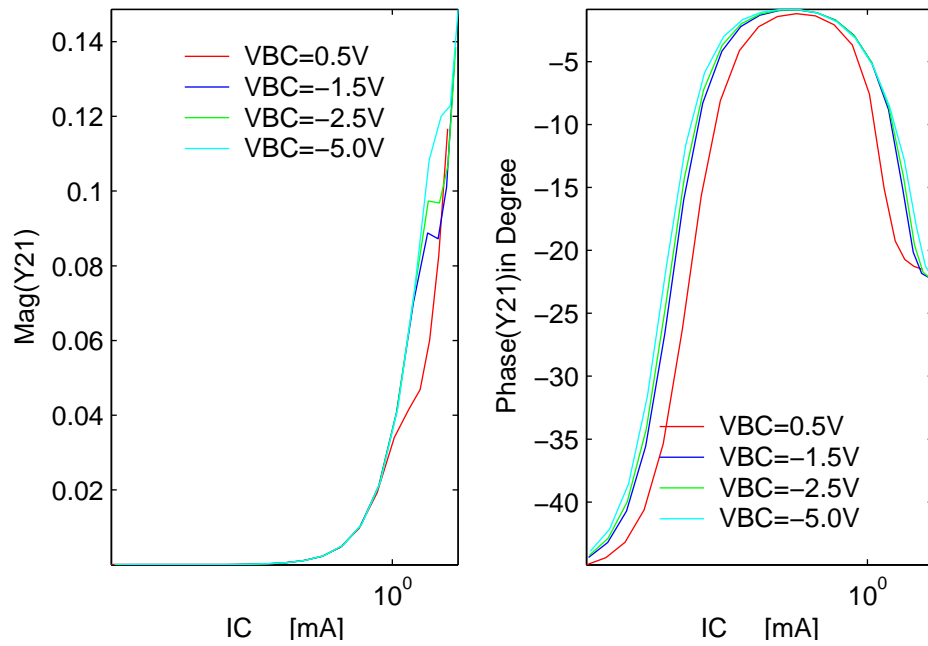


FIGURE 56. Y21 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

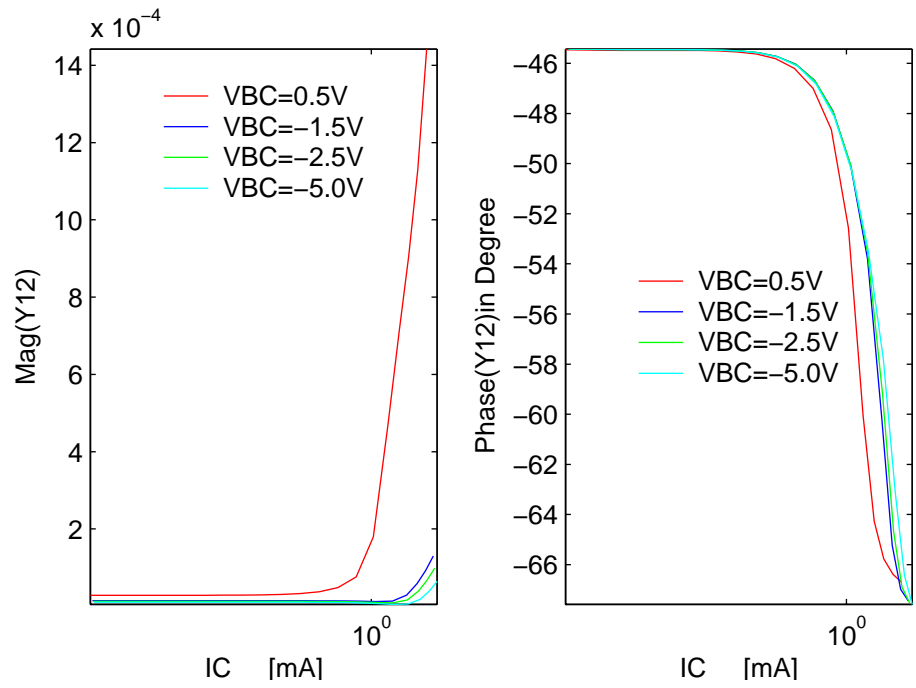


FIGURE 57. Y12 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

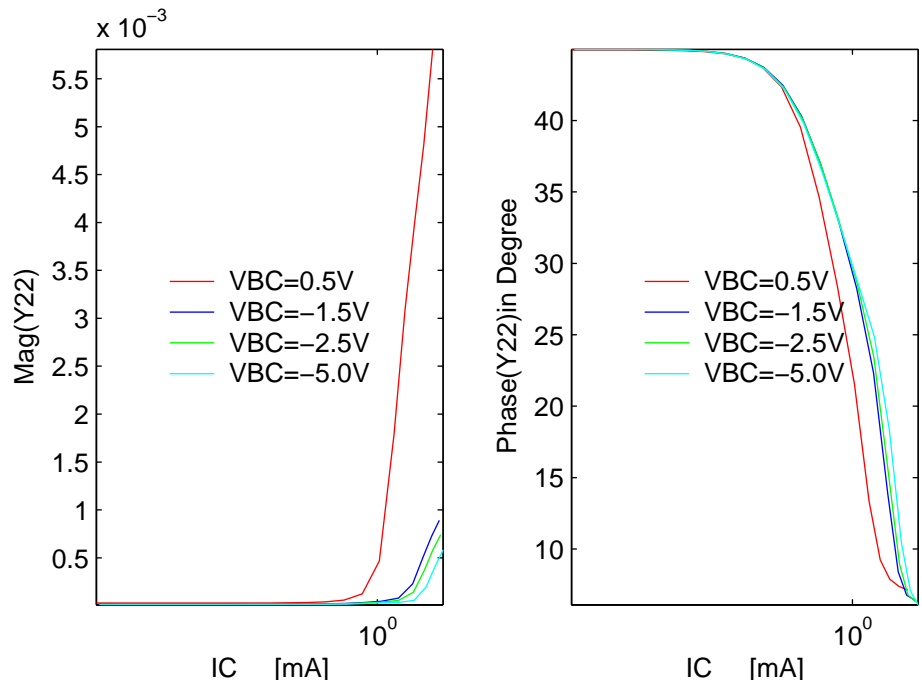


FIGURE 58. Y22 (extracted at f=2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

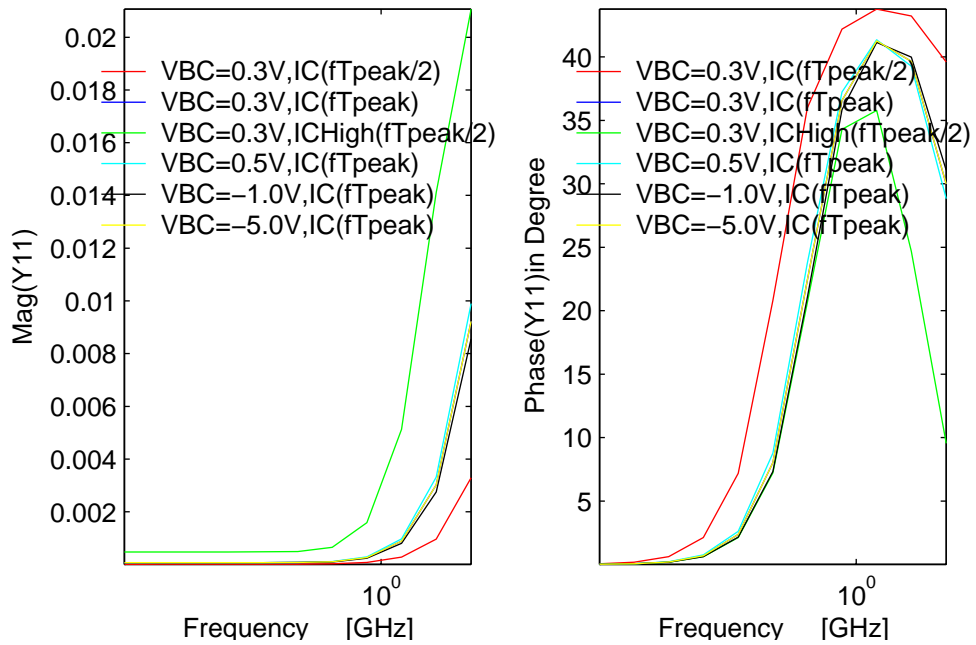


FIGURE 59. Y11 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

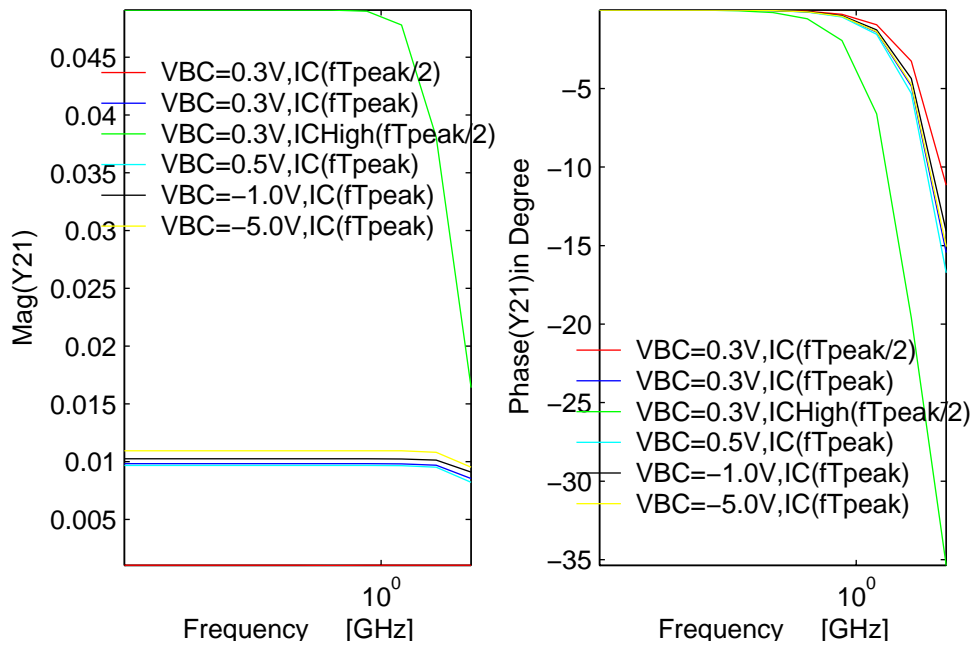


FIGURE 60. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

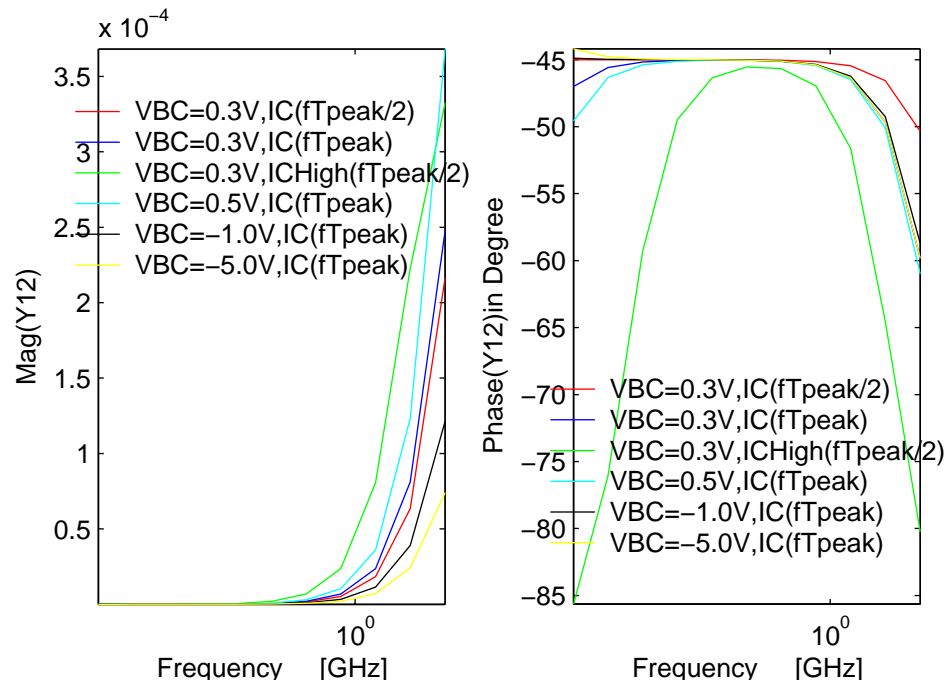


FIGURE 61. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

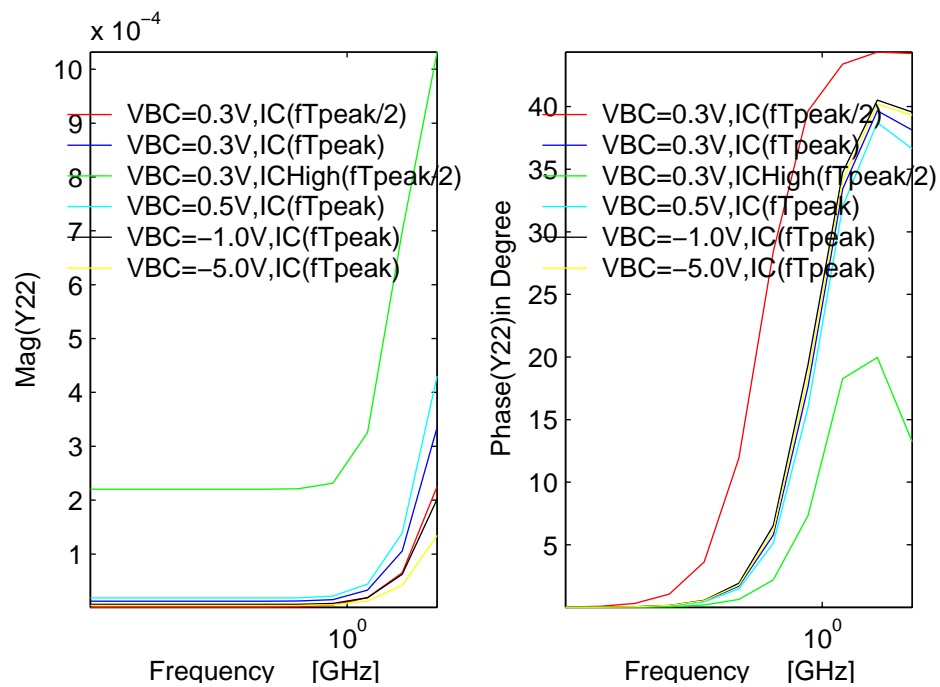


FIGURE 62. Y22 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

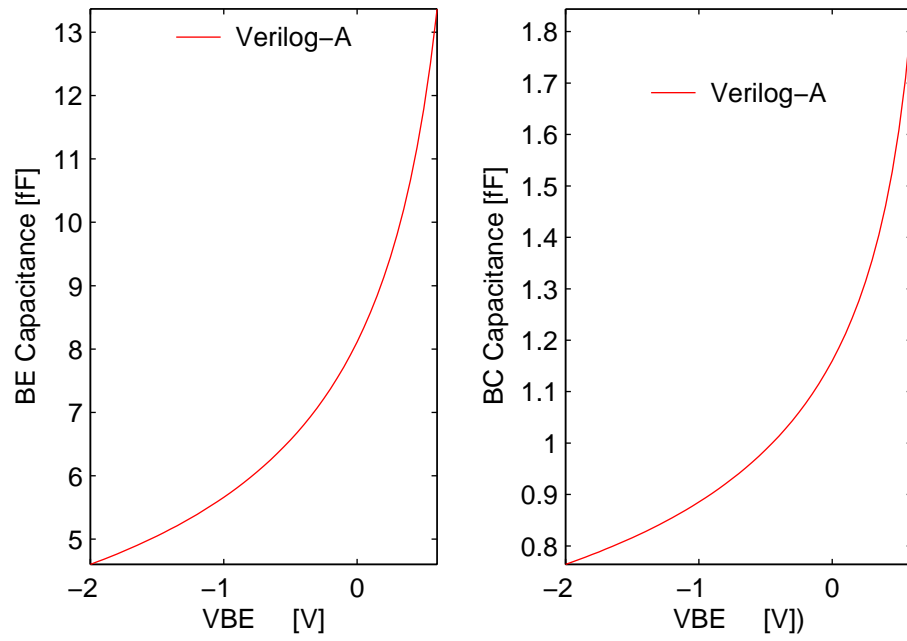


FIGURE 63. Depletion capacitances, C_{be} and C_{bc} (fF) vs BE voltages (Volt) plots at $T=300K$.

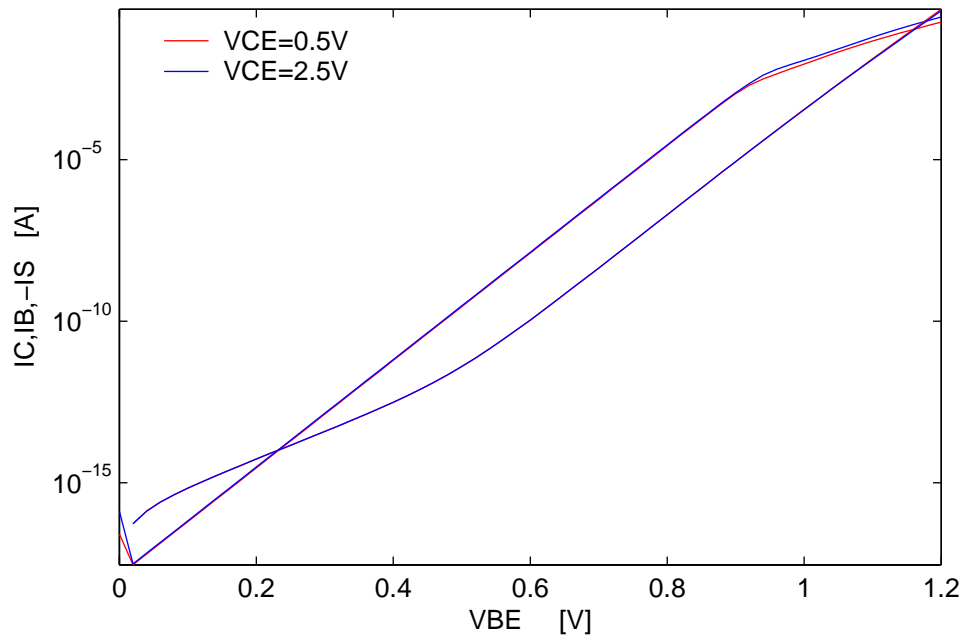


FIGURE 64. Forward Gummel plots at $V_{CE}=0.5, 2.5$ Volt and $T=300K$.

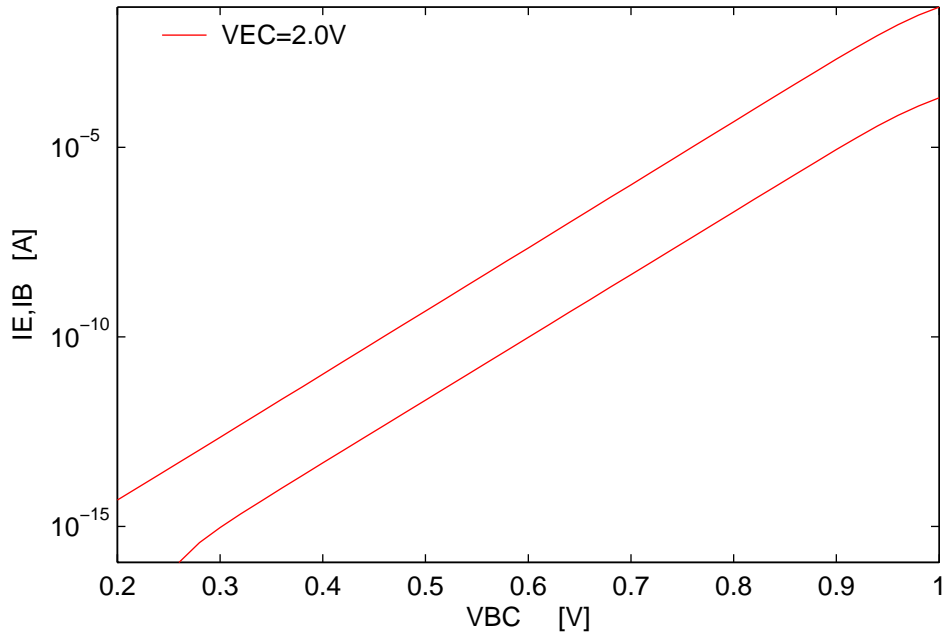


FIGURE 65. Reverse Gummel plots at $VEC=2.0V$ at $T=300K$.

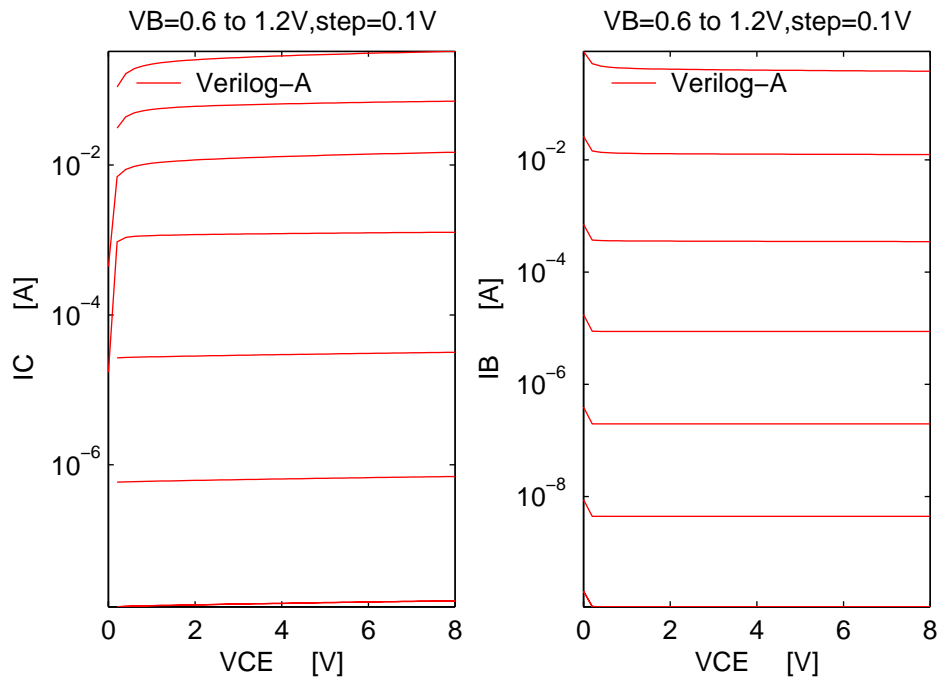


FIGURE 66. Forced- V_B output characteristics and I_B - V_{CE} plots at $T=300K$.

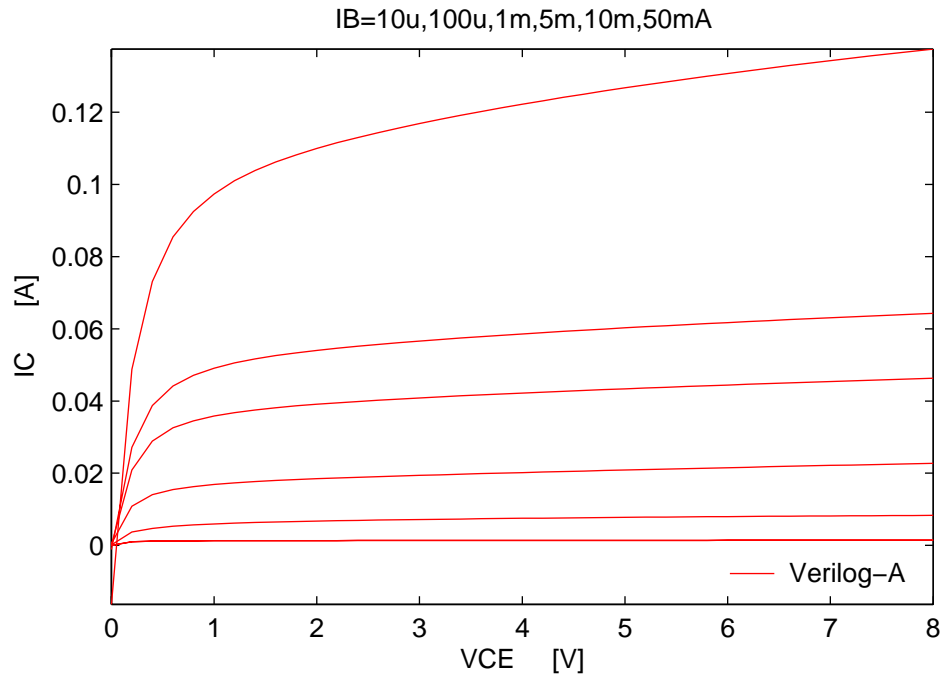


FIGURE 67. Forced-IB output characteristics at T=300K.

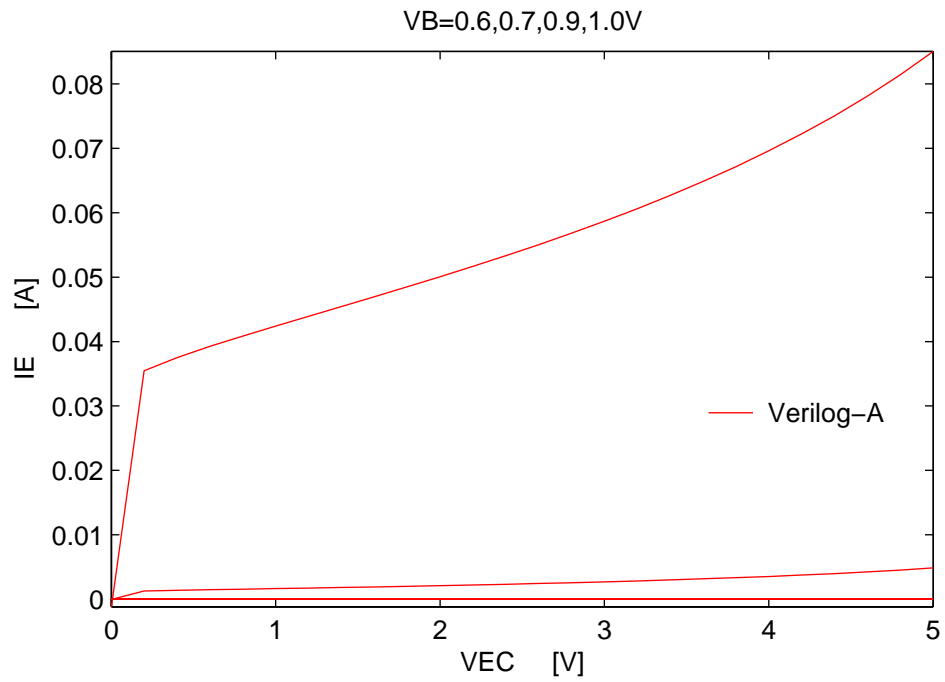


FIGURE 68. Reverse output characteristics at T=300K.

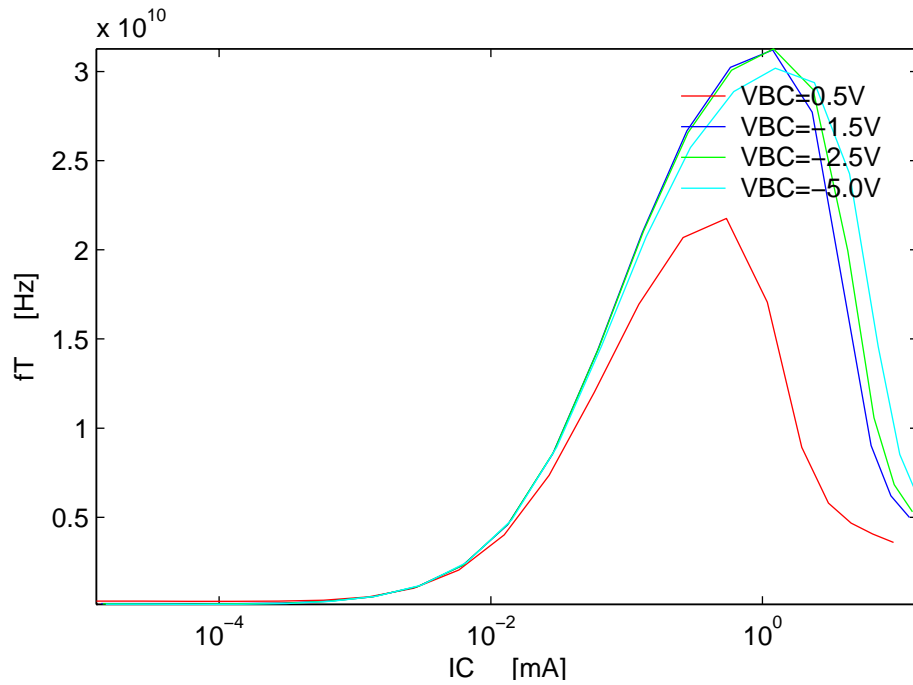


FIGURE 69. f_T (Hz) vs I_C (mA) plots at $T=300K$ for $V_{bc}=0.5, -1.5, -2.5,$ and $-5V$, f_T extracted at $f=2.8GHz$.

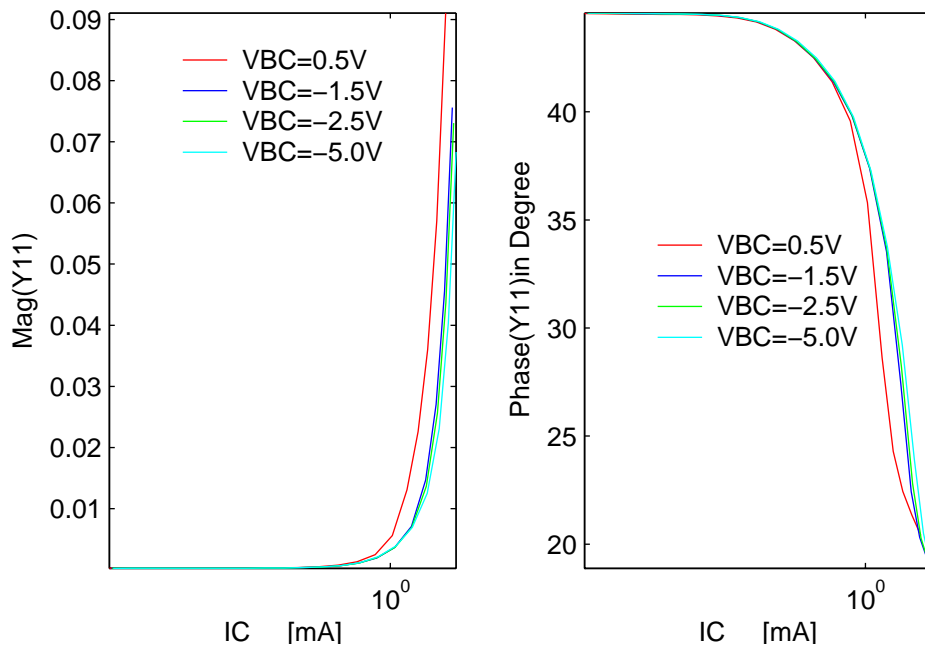


FIGURE 70. Y_{11} (extracted at $2.8GHz$) vs I_C (mA) plots at $T=300K$ for $V_{bc}=0.5, -1.5, -2.5,$ and $-5V$.

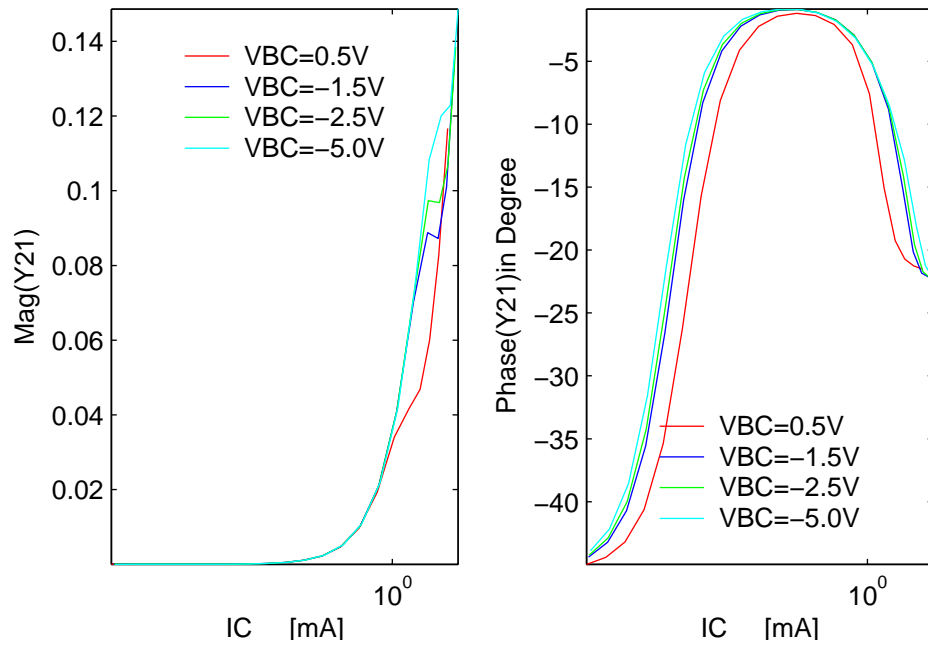


FIGURE 71. Y_{21} (extracted at 2.8GHz) vs I_C (mA) plots at $T=300\text{K}$ for $V_{bc}=0.5, -1.5, -2.5,$ and -5V .

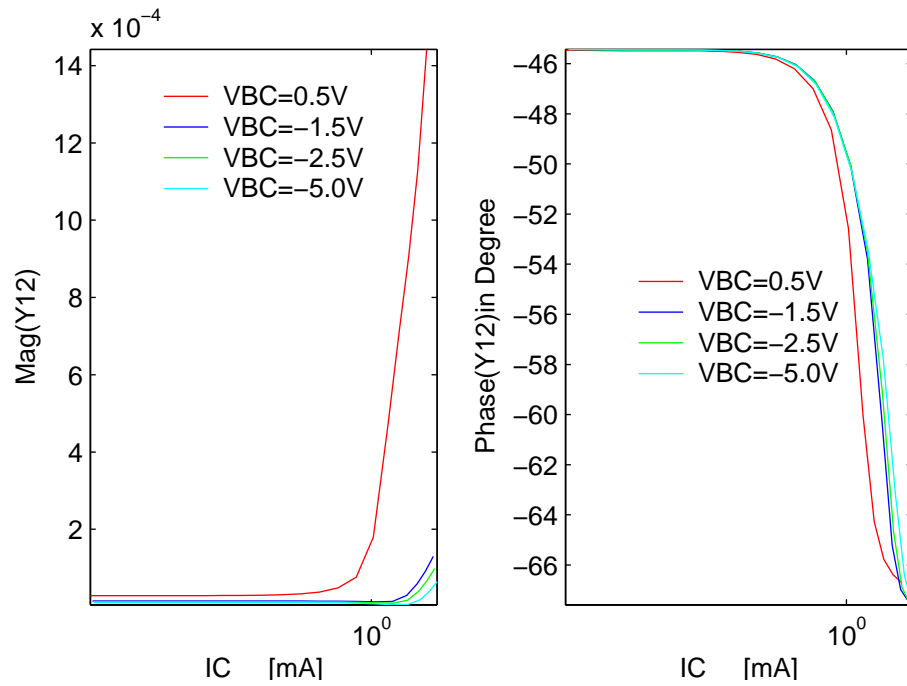


FIGURE 72. Y_{12} (extracted at 2.8GHz) vs I_C (mA) plots at $T=300\text{K}$ for $V_{bc}=0.5, -1.5, -2.5,$ and -5V .

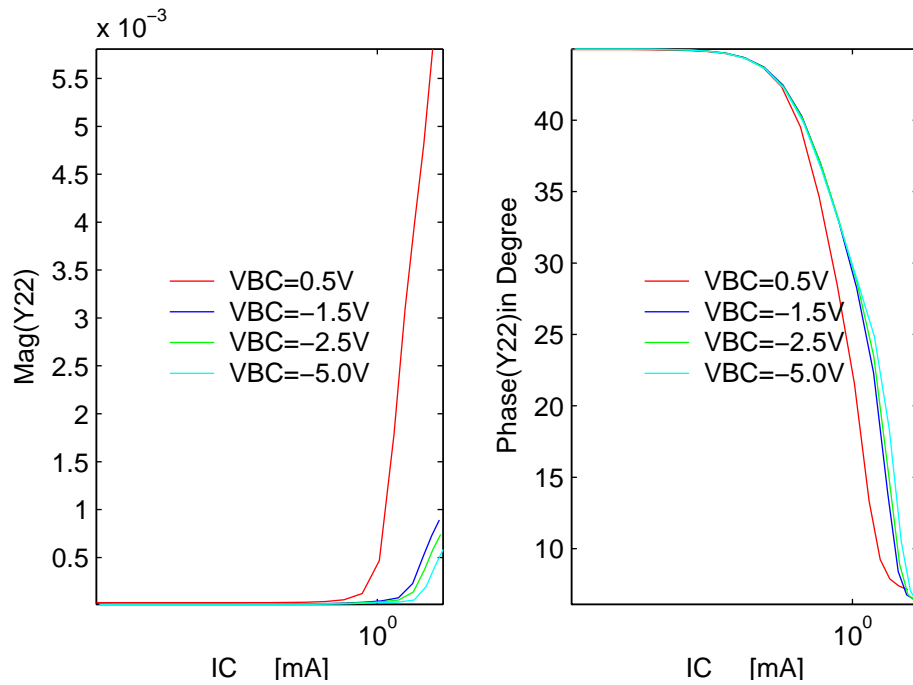


FIGURE 73. Y22 (extracted at $f=2.8\text{GHz}$) vs $IC(\text{mA})$ plots at $T=300\text{K}$ for $Vbc=0.5,-1.5,-2.5,$ and -5V .

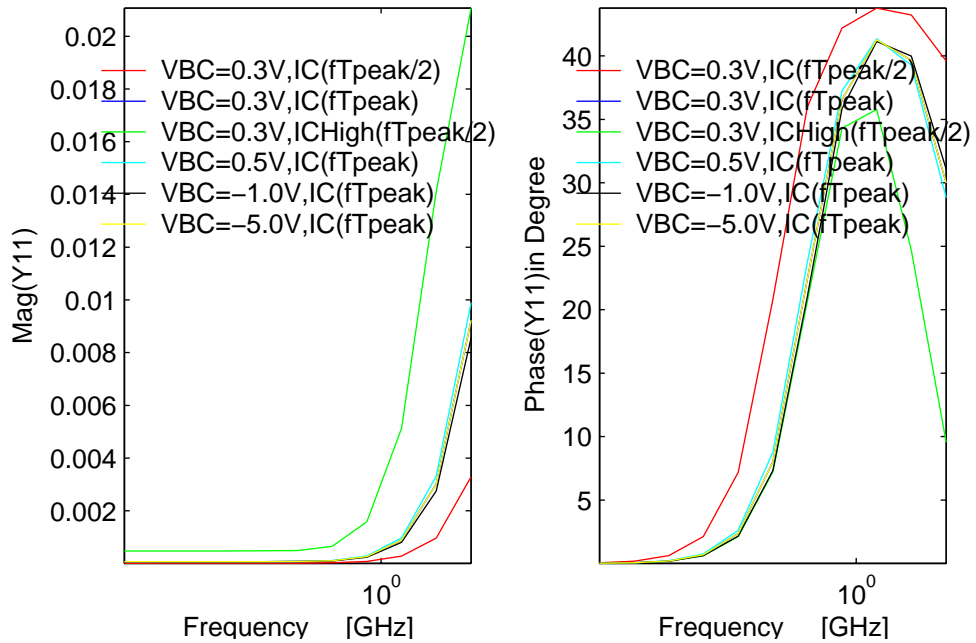


FIGURE 74. Y11 vs Frequency(GHz) plots at $T=300\text{K}$, $Vbc=0.3, 0.5, -1.0$ and -5.0V for $IC(fTpeak), IC(fTpeak/2)$ and $ICHigh(fTpeak/2)$.

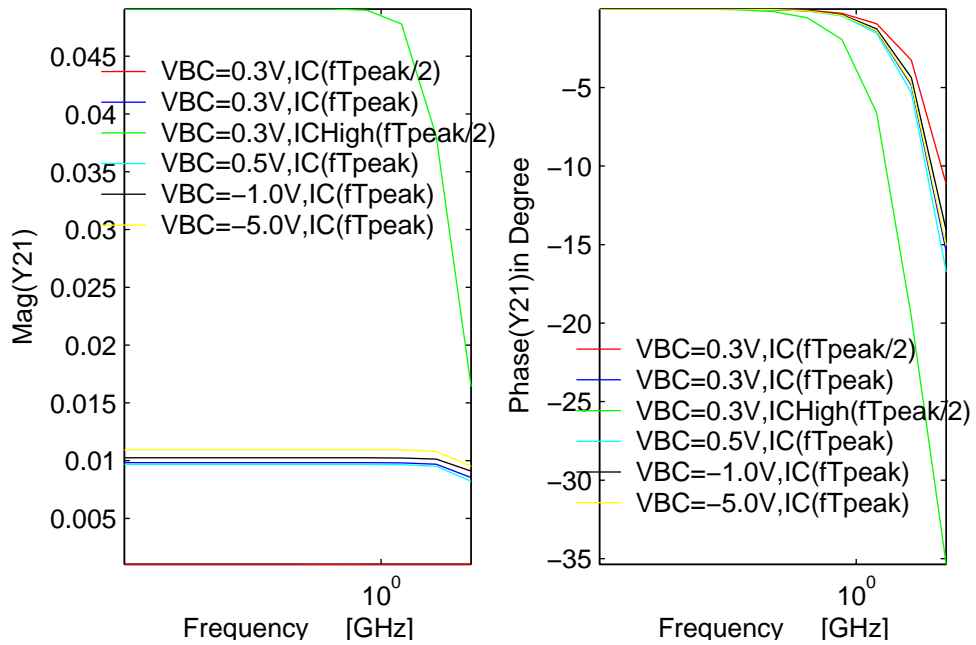


FIGURE 75. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and IChigh(fTpeak/2).

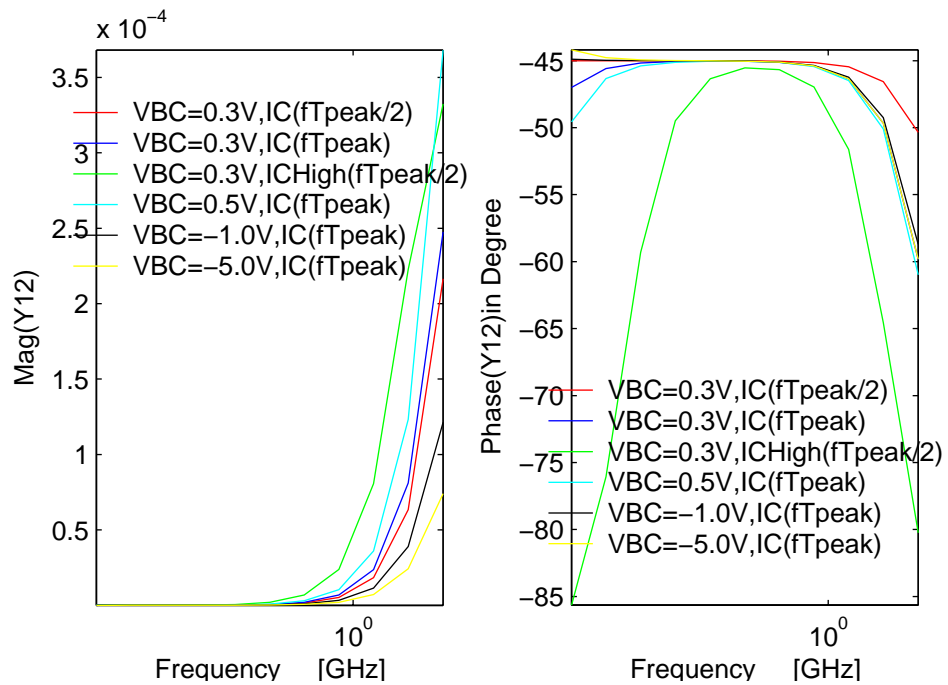


FIGURE 76. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(fTpeak/2)and IChigh(fTpeak/2).

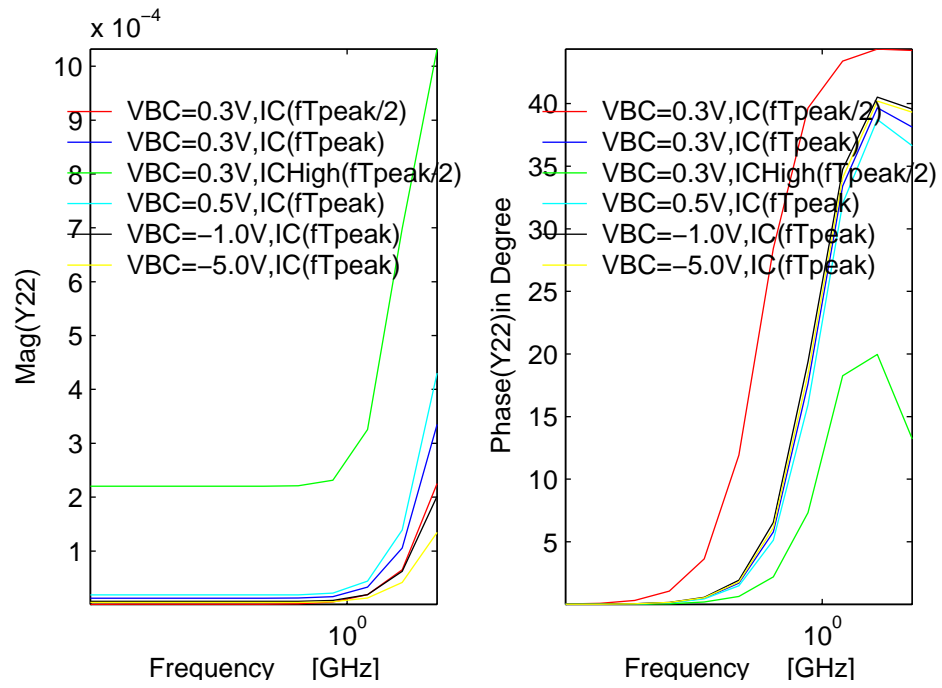


FIGURE 77. Y22 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2).

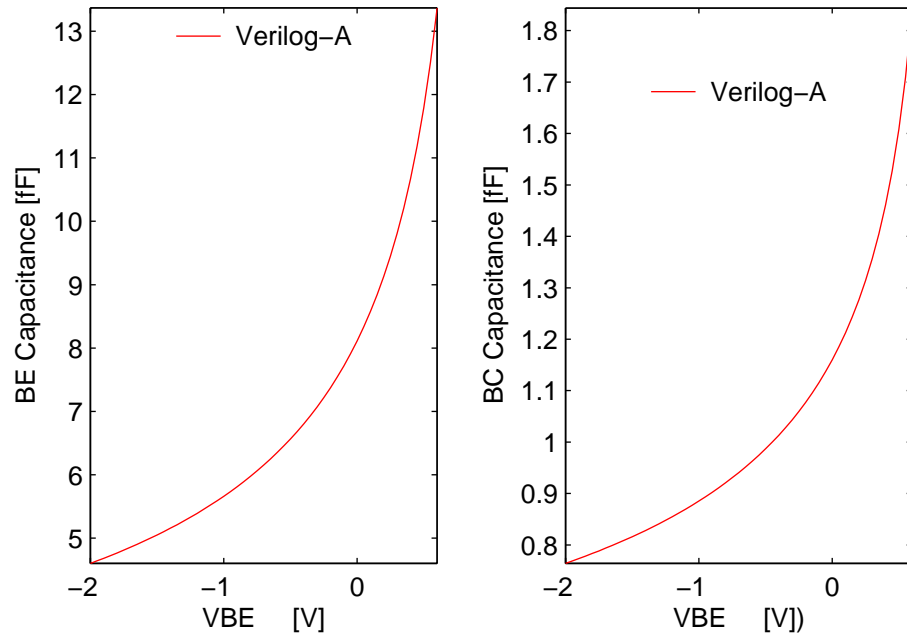


FIGURE 78. Depletion capacitances, Cbe and Cbc (fF) vs BE voltages (Volt) plots at T=300K.

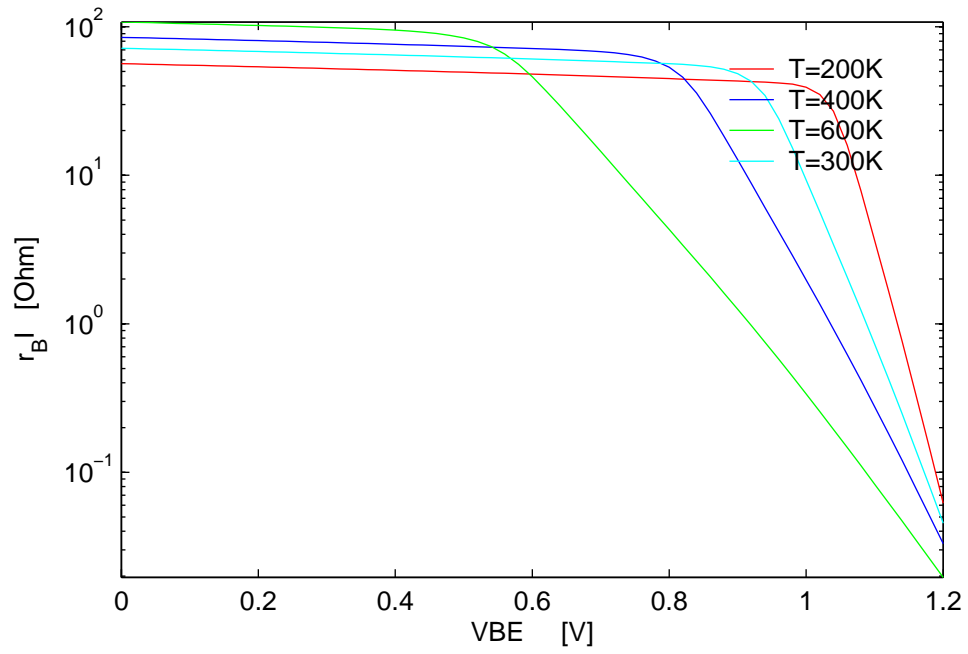


FIGURE 79. R_{Bi} vs. V_{BE} for $T=200K$, $300K$, $400K$ and $600K$.

Section 2: Results of Complete Transistor

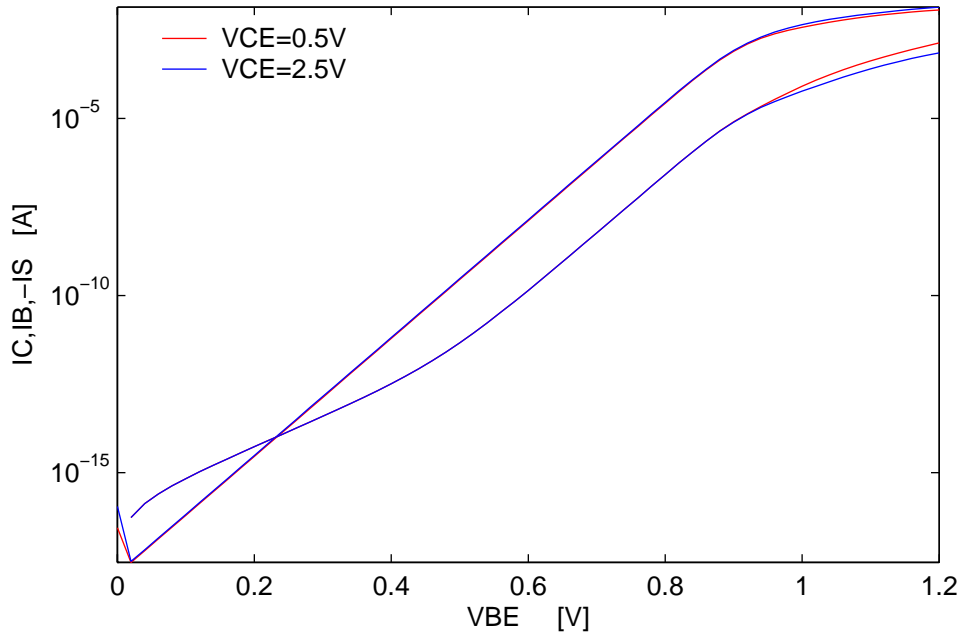


FIGURE 80. Forward Gummel plots at $V_{CE}=0.5, 2.5$ Volt and $T=300K$.

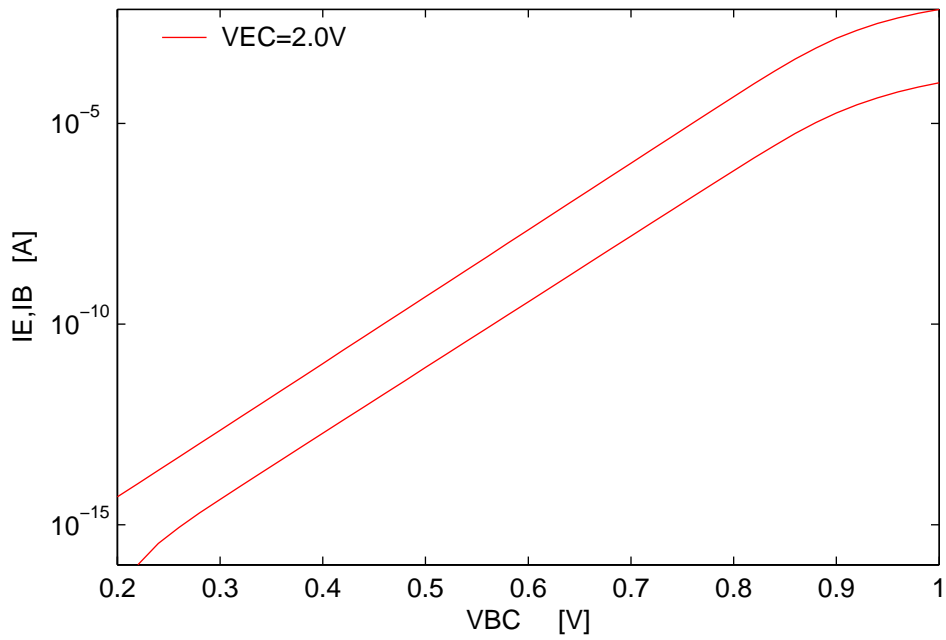


FIGURE 81. Reverse Gummel plots at $V_{EC}=2.0V$ at $T=300K$.

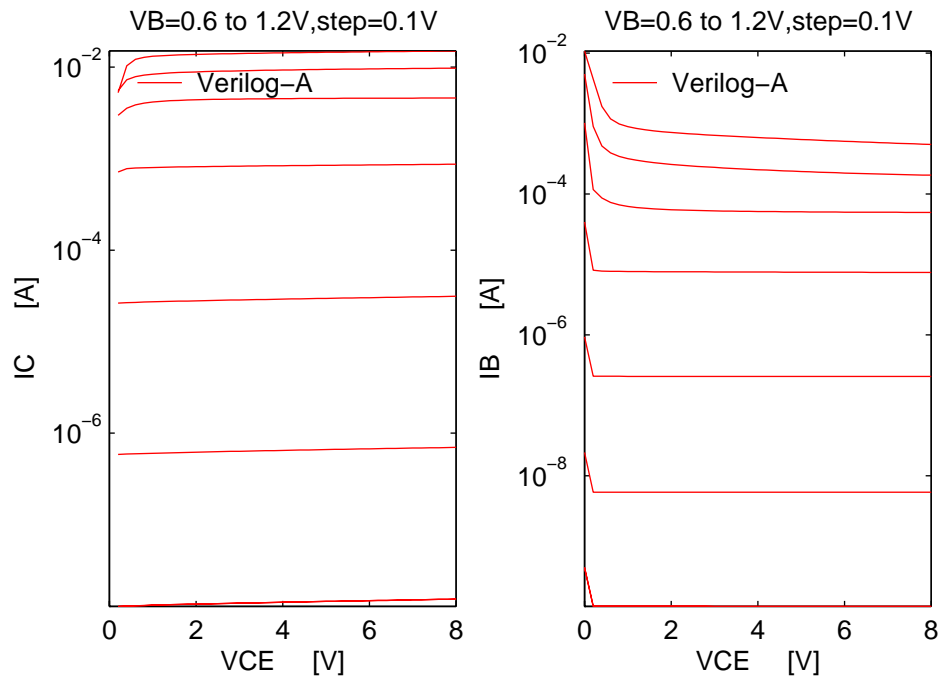


FIGURE 82. Forced-VB output characteristics and I_B - V_{CE} plots at $T=300K$.

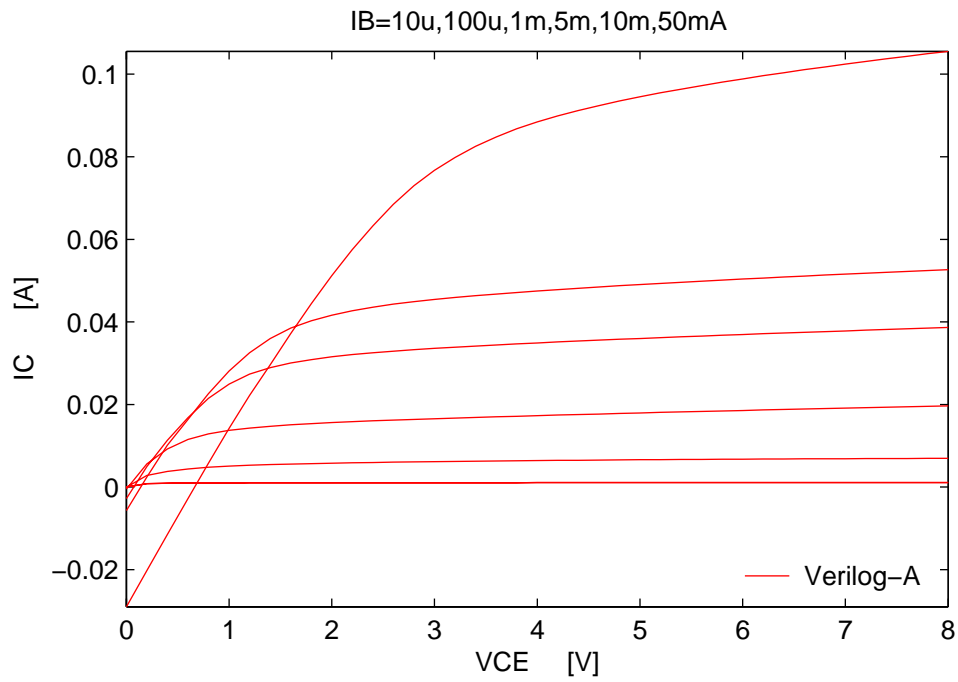


FIGURE 83. Forced-IB output characteristics at $T=300K$.

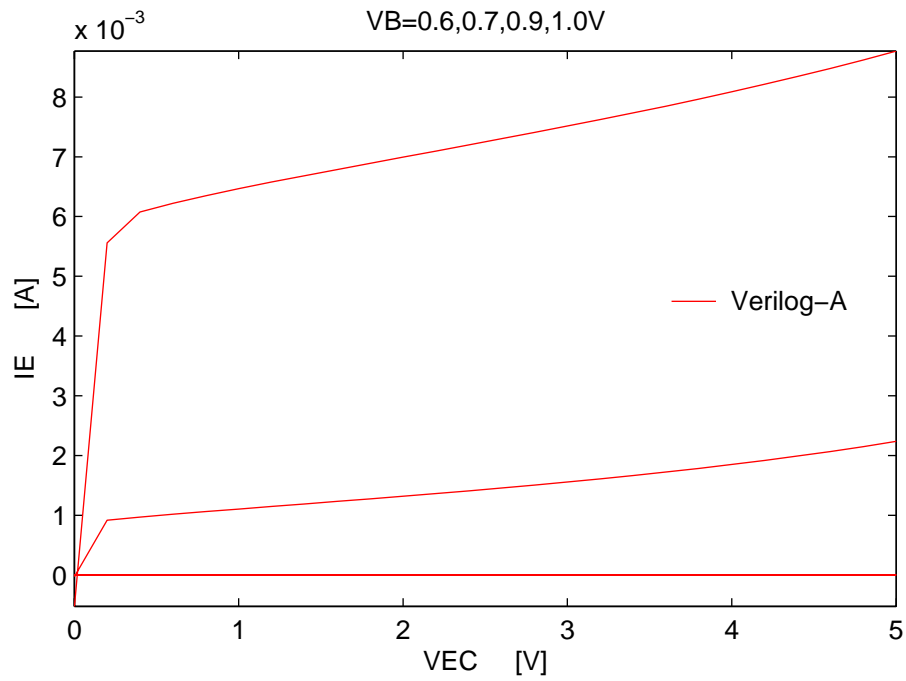


FIGURE 84. Reverse output characteristics at T=300K.

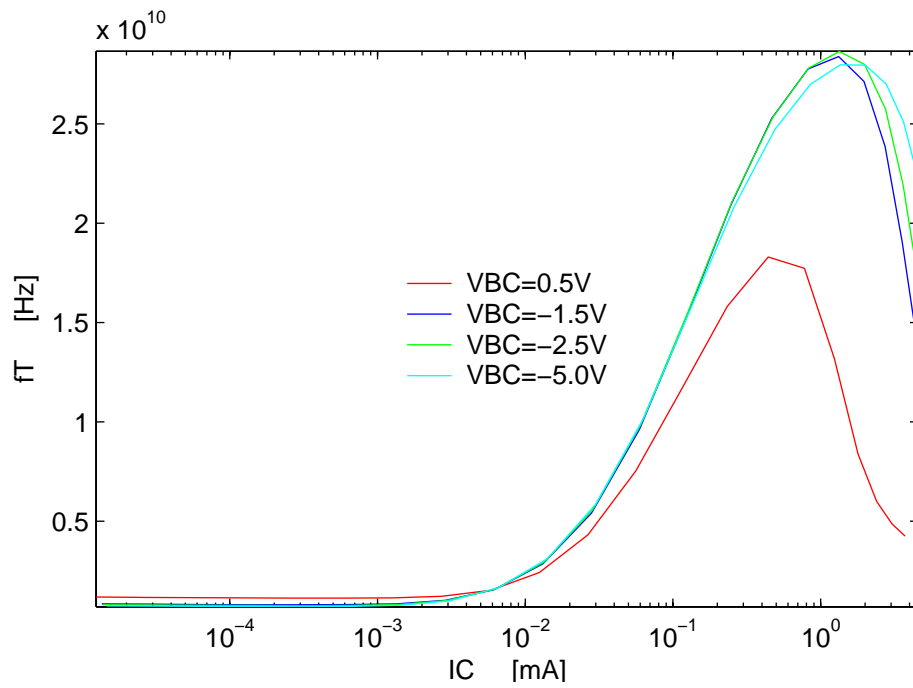


FIGURE 85. f_t (Hz) vs I_C (mA) plots at T=300K for V_{bc} =0.5,-1.5,-2.5, and -5V, f_t extracted at f =2.8GHz.

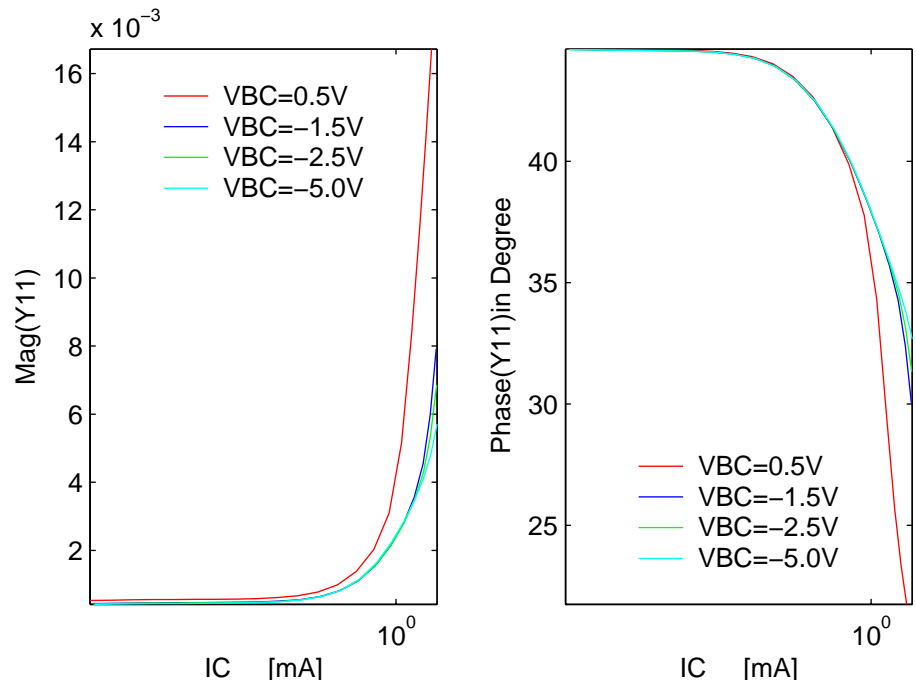


FIGURE 86. Y11 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

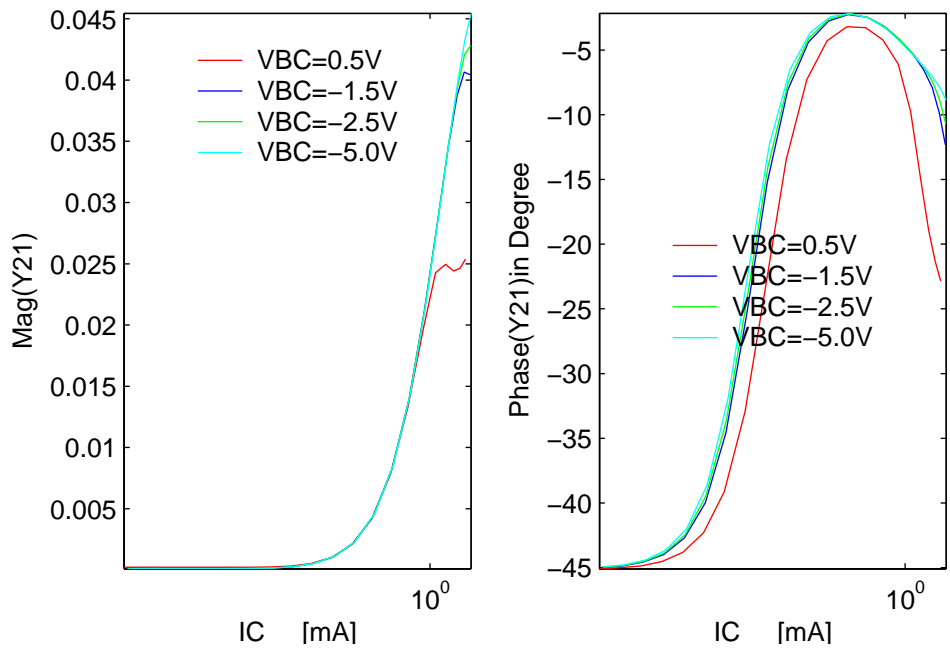


FIGURE 87. Y21 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

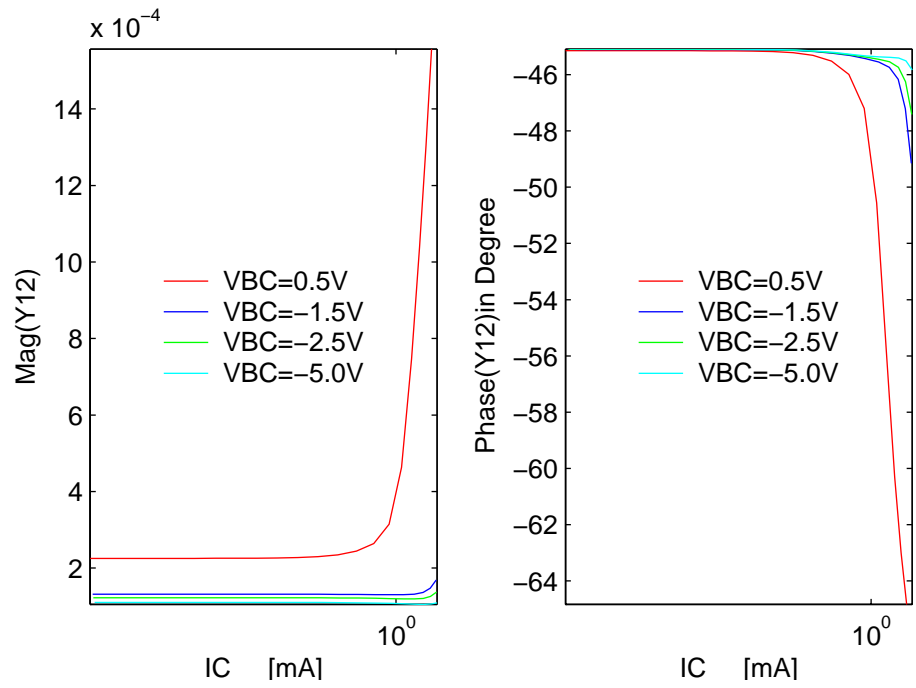


FIGURE 88. Y12 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

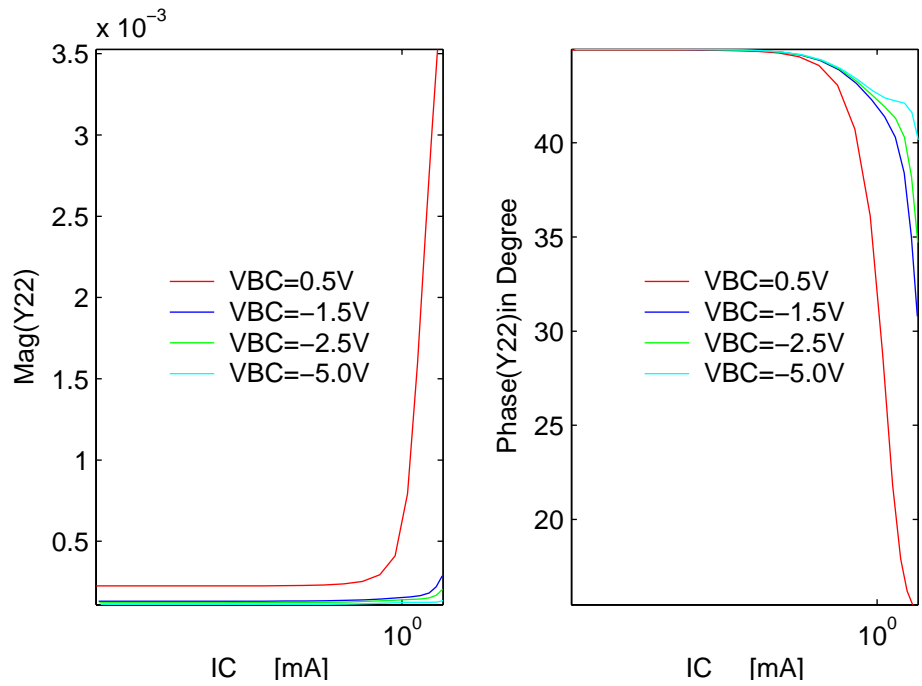


FIGURE 89. Y22 (extracted at f=2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V.

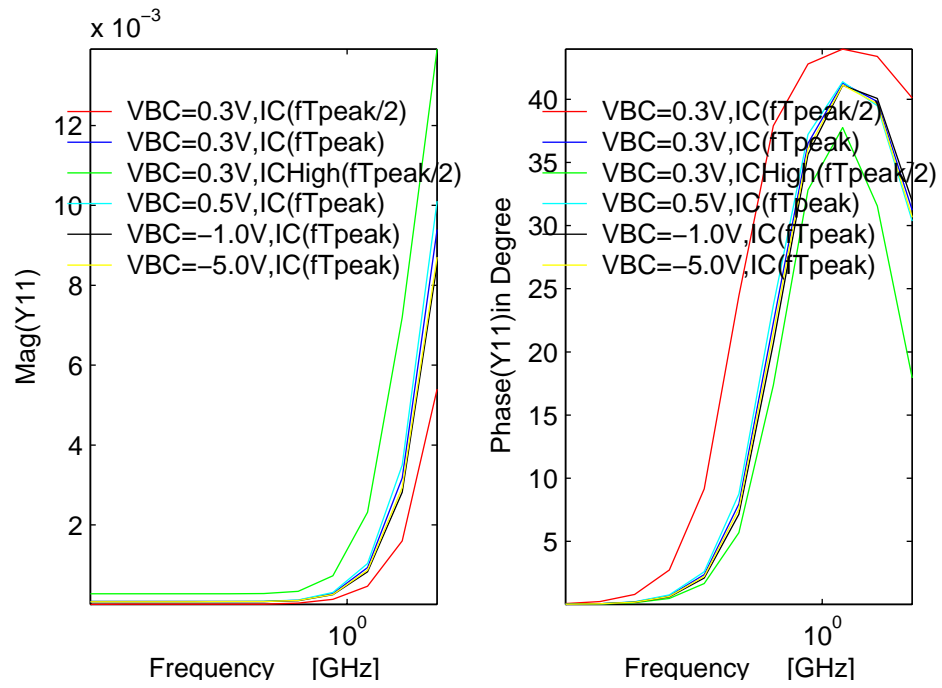


FIGURE 90. Y11 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

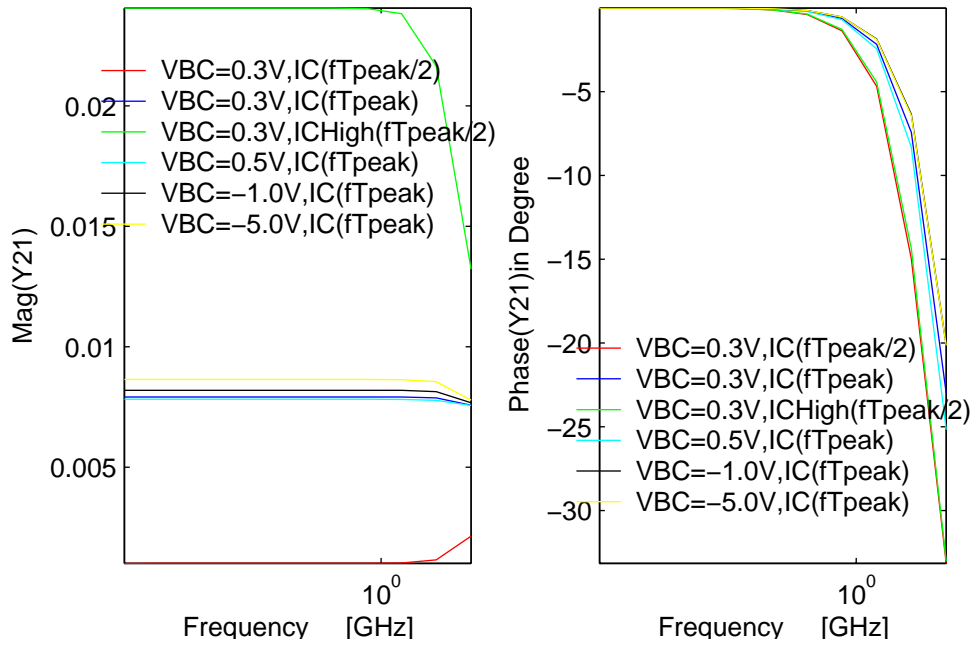


FIGURE 91. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

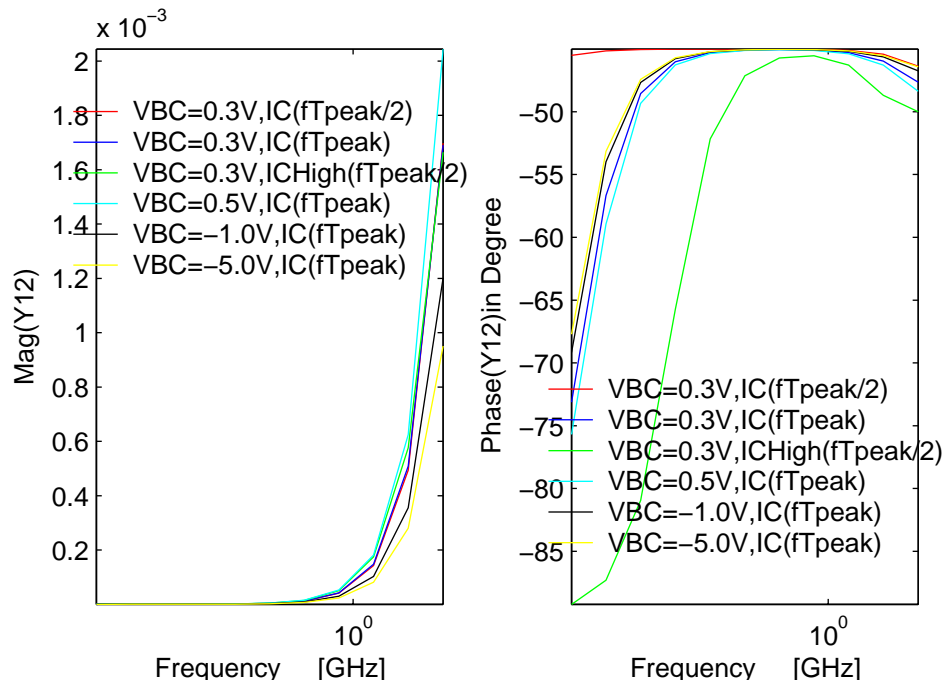


FIGURE 92. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

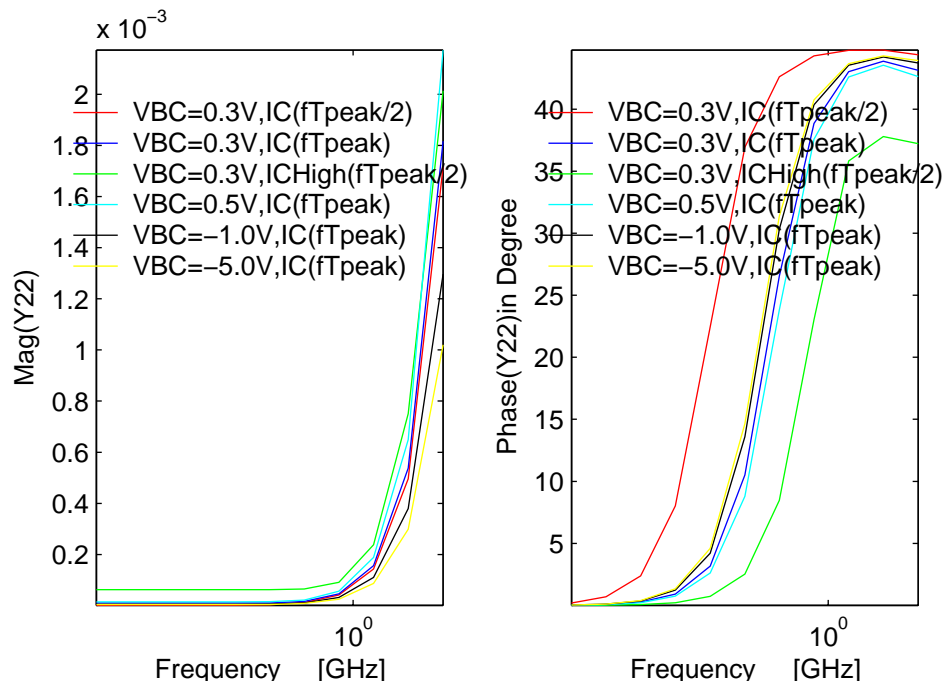


FIGURE 93. Y22 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2).

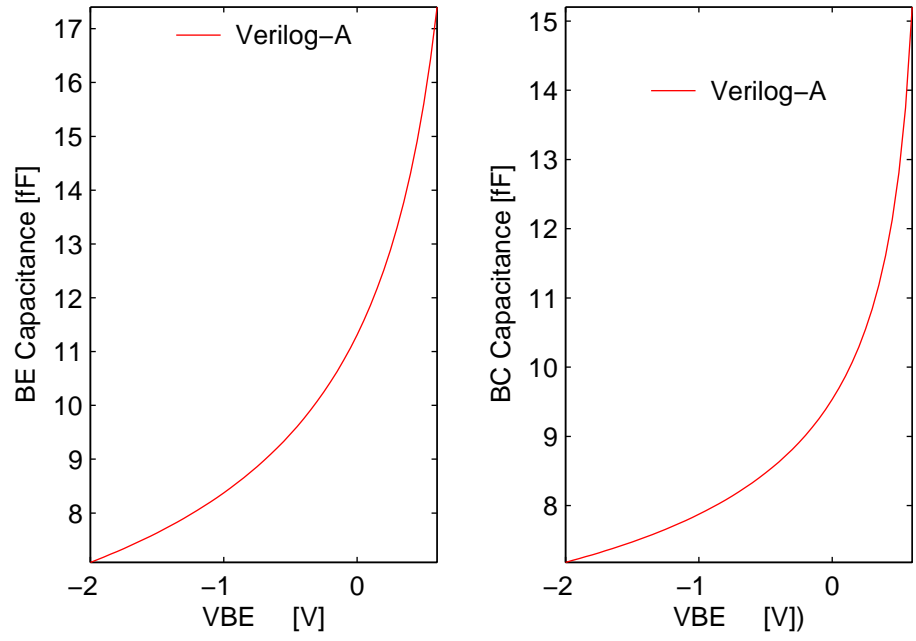


FIGURE 94. Depletion capacitances, C_{be} and C_{bc} (fF) vs BE voltages (Volt) plots at $T=300K$.

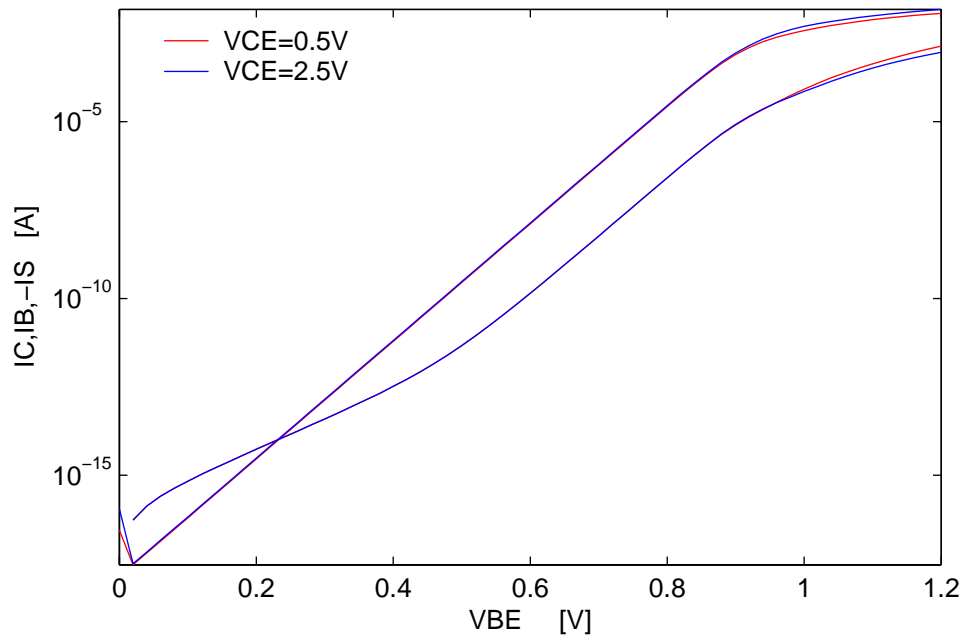


FIGURE 95. Forward Gummel plots at $V_{CE}=0.5, 2.5$ Volt and $T=300K$ with self-heating effect.

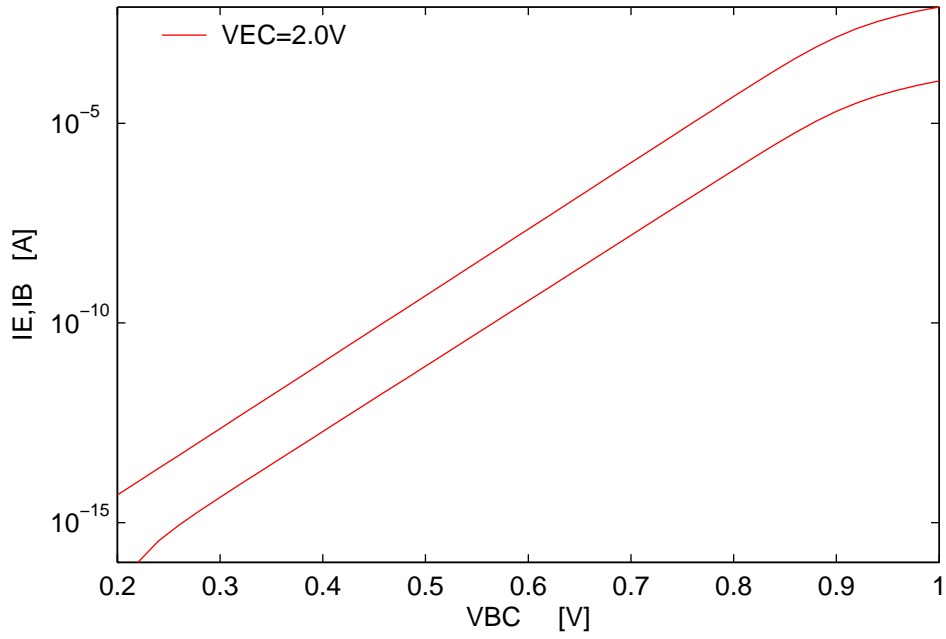


FIGURE 96. Reverse Gummel plots at $V_{EC} = 2.0V$ at $T = 300K$ with self-heating effect.

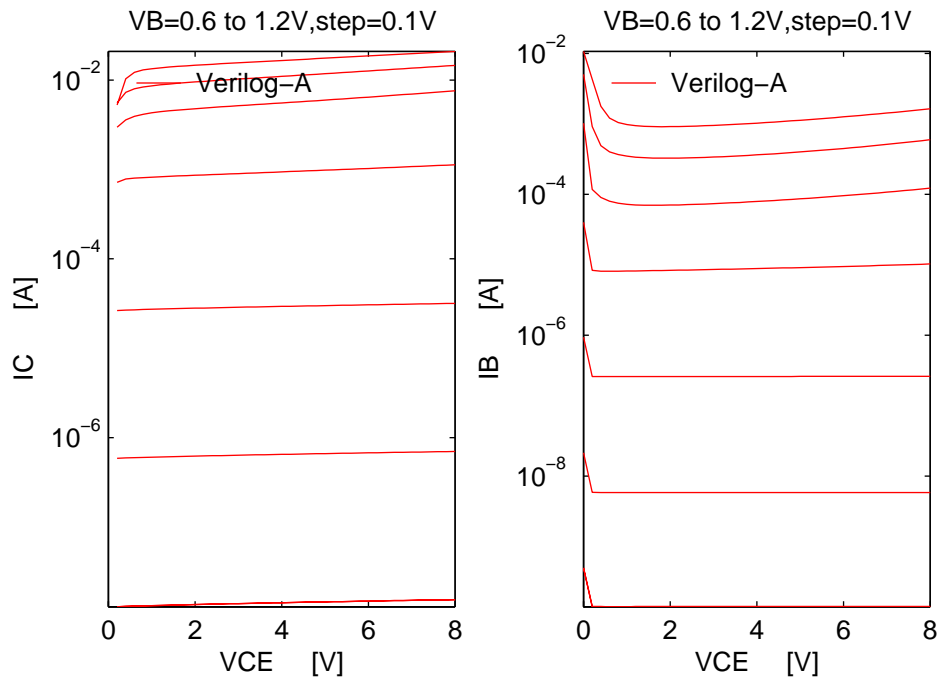


FIGURE 97. Forced-VB output characteristics and I_B - V_{CE} plots at $T = 300K$ with self-heating effect.

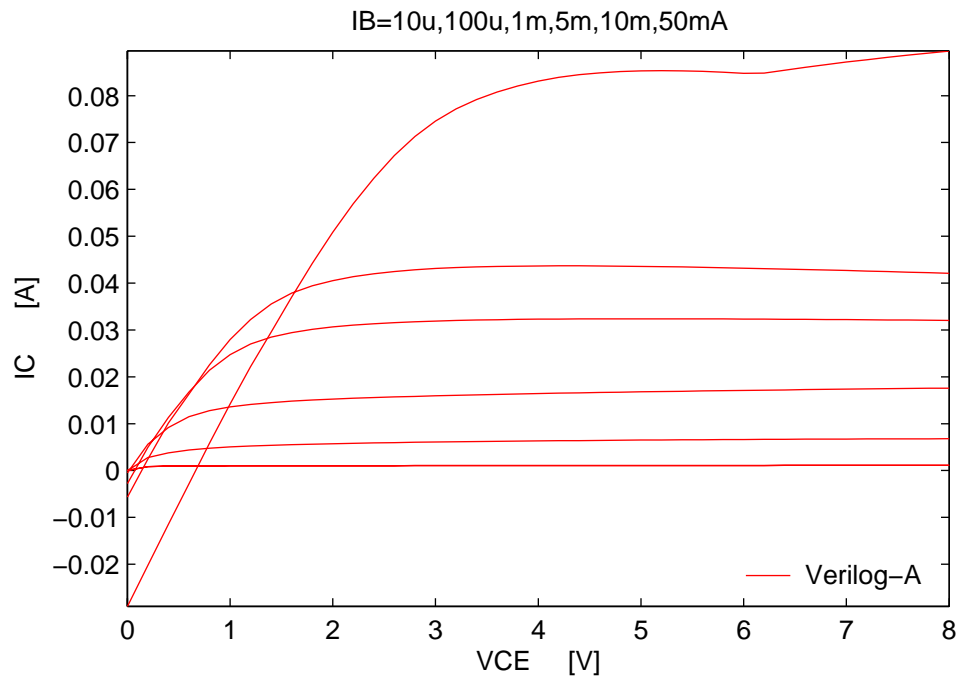


FIGURE 98. Forced-IB output characteristics at T=300K with self-heating effect.

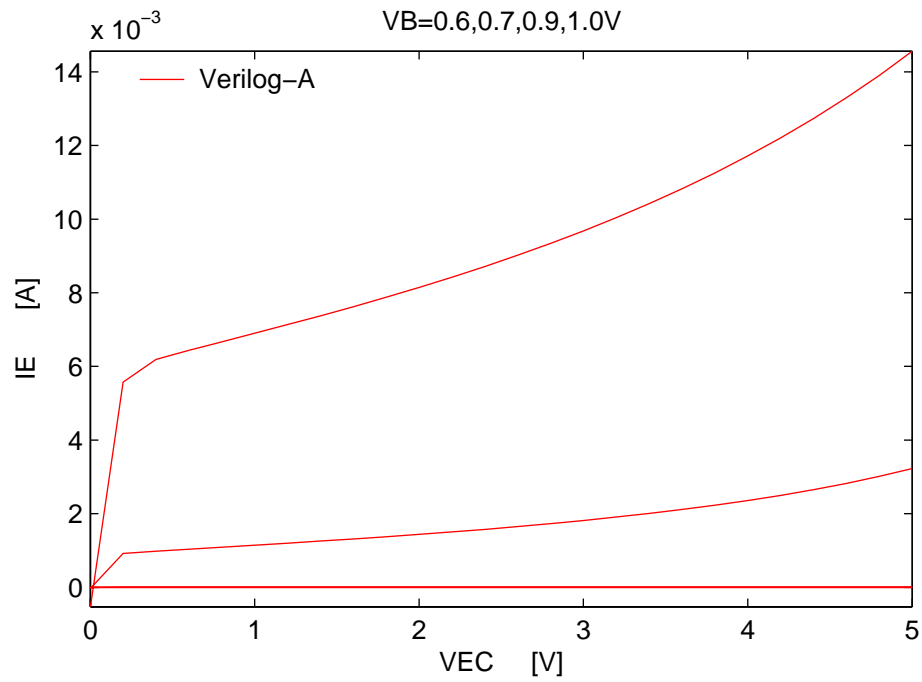


FIGURE 99. Reverse output characteristics at T=300K with self-heating effect.

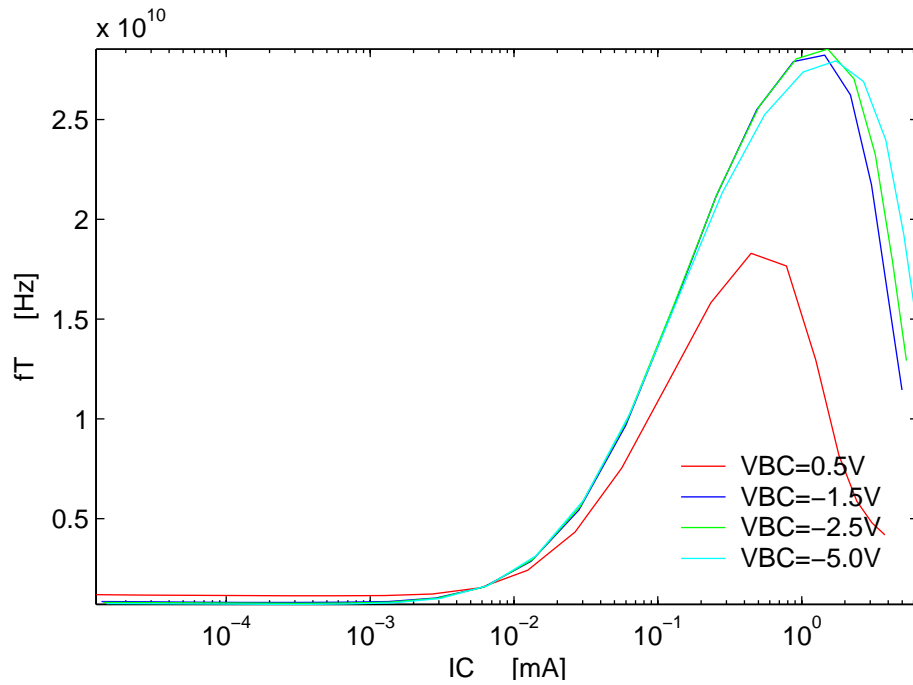


FIGURE 100. f_T (Hz) vs I_C (mA) plots at $T=300K$ for $V_{bc}=0.5, -1.5, -2.5,$ and $-5V$, f_T extracted at $f=2.8GHz$ with self-heating effect.

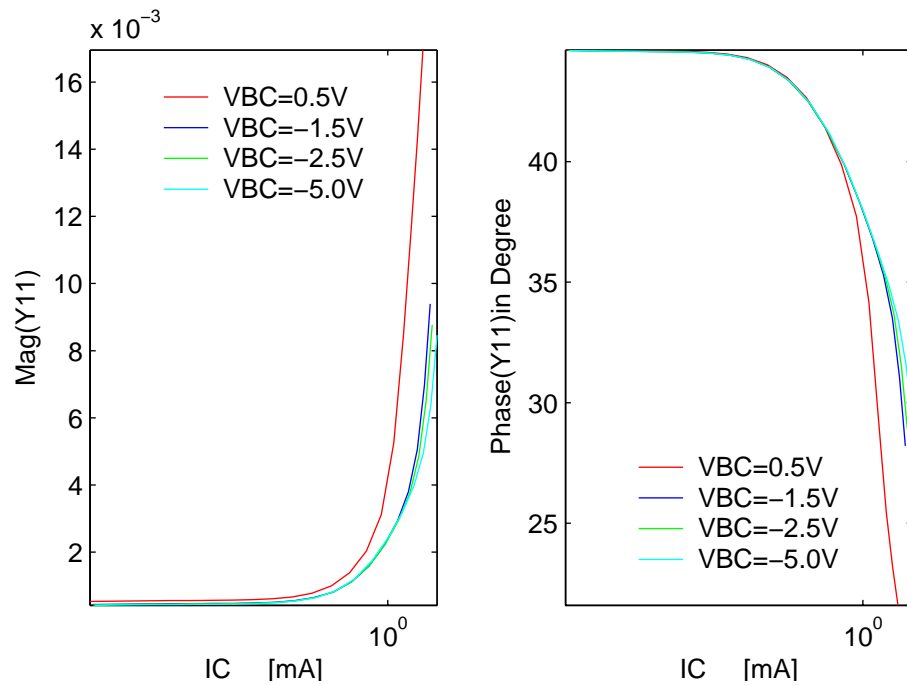


FIGURE 101. Y_{11} (extracted at $2.8GHz$) vs I_C (mA) plots at $T=300K$ for $V_{bc}=0.5, -1.5, -2.5,$ and $-5V$ with self-heating effect.

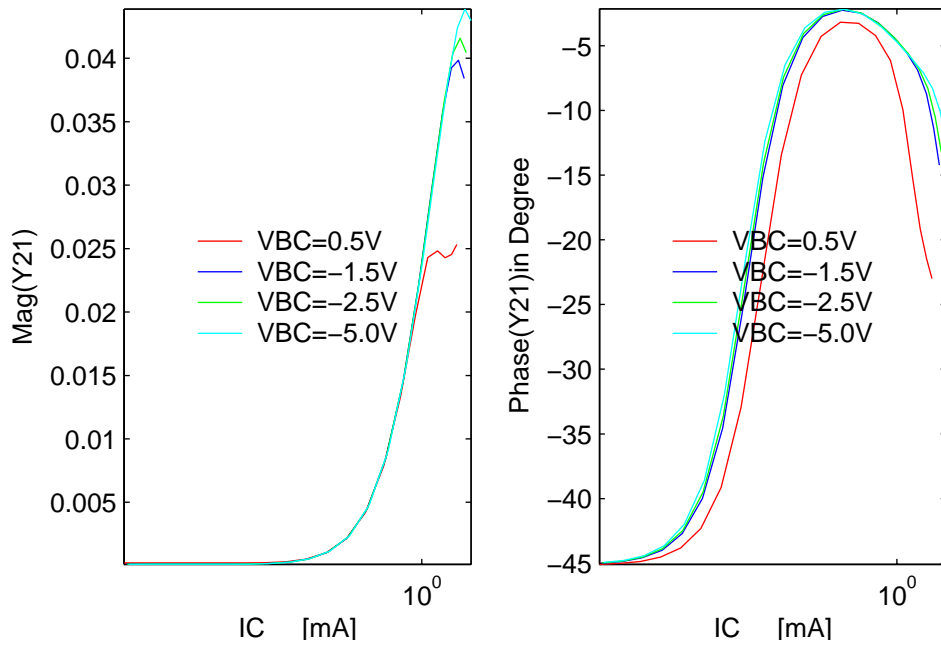


FIGURE 102. Y21 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with self-heating effect.

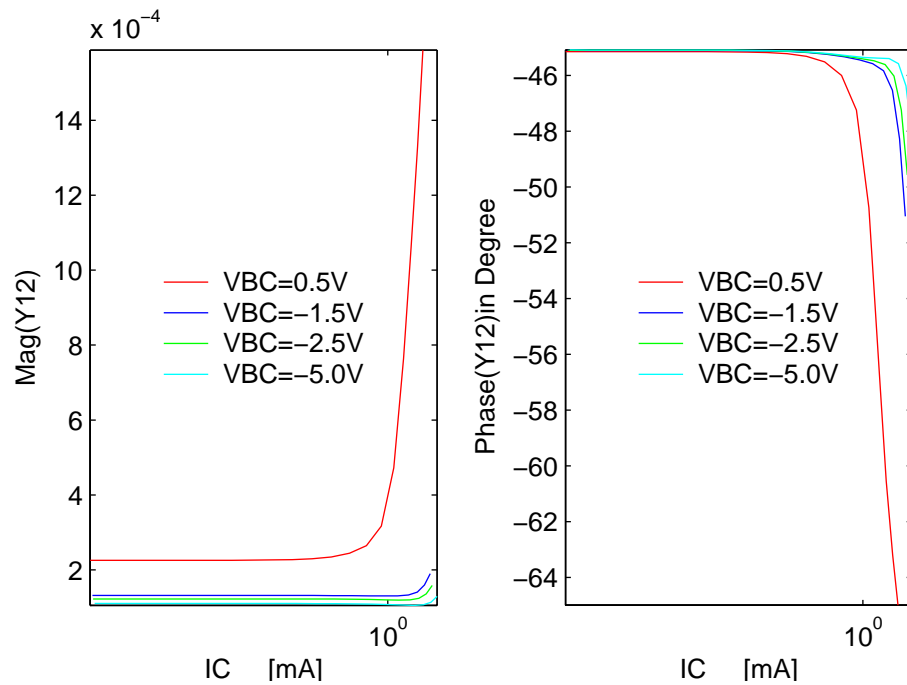


FIGURE 103. Y12 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with self-heating effect.

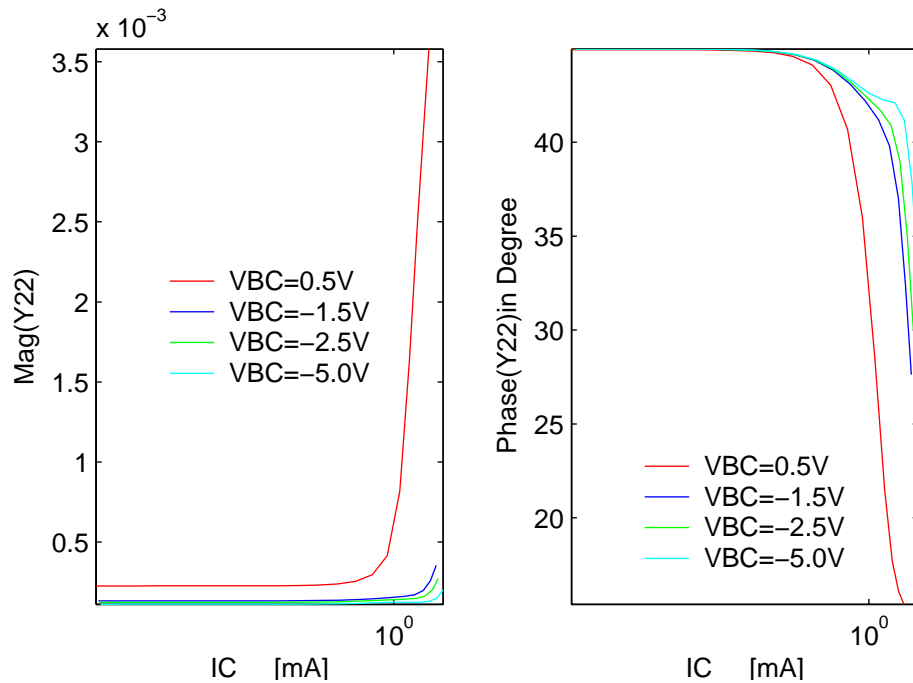


FIGURE 104. Y22 (extracted at $f=2.8\text{GHz}$) vs IC(mA) plots at $T=300\text{K}$ for $V_{bc}=0.5,-1.5,-2.5,$ and -5V with self-heating effect.

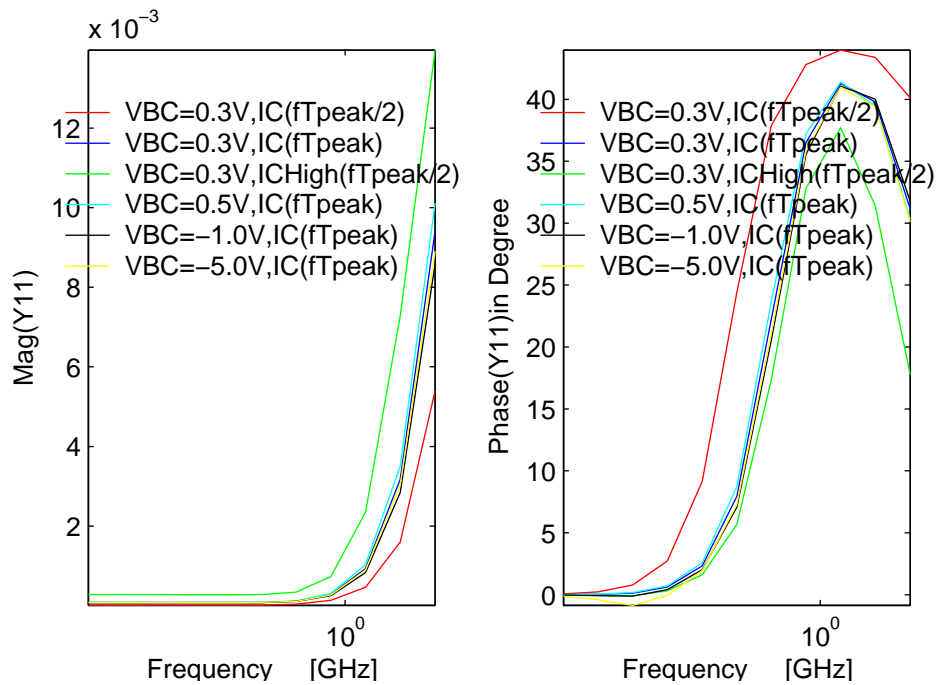


FIGURE 105. Y11 vs Frequency(GHz) plots at $T=300\text{K}$, $V_{bc}=0.3, 0.5, -1.0$ and -5.0V for $IC(fT_{peak}), IC(fT_{peak}/2)$ and $IC_{high}(fT_{peak}/2)$ with self-heating effect.

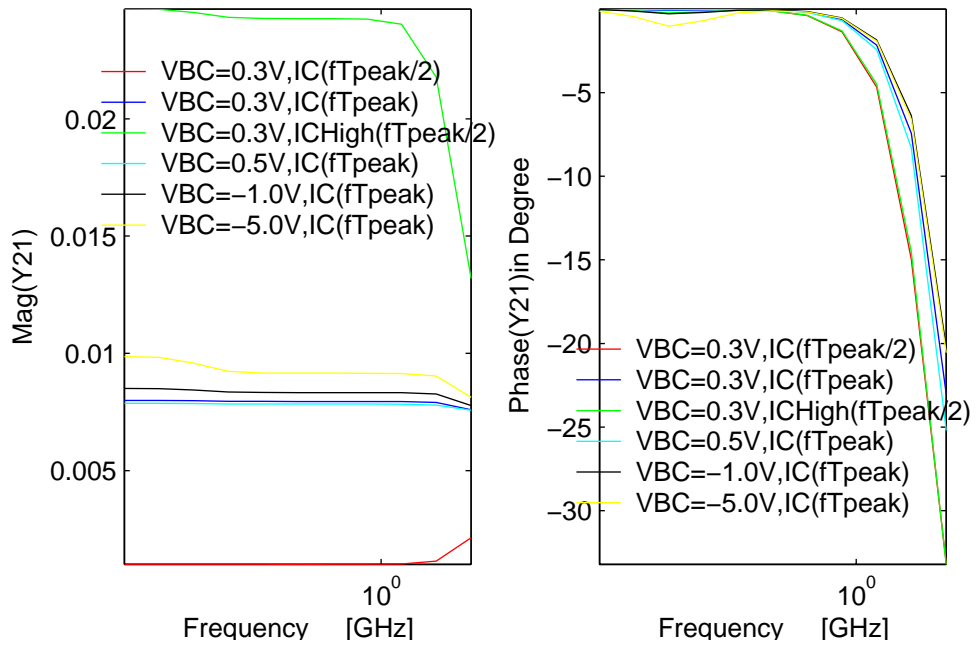


FIGURE 106. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with self-heating effect.

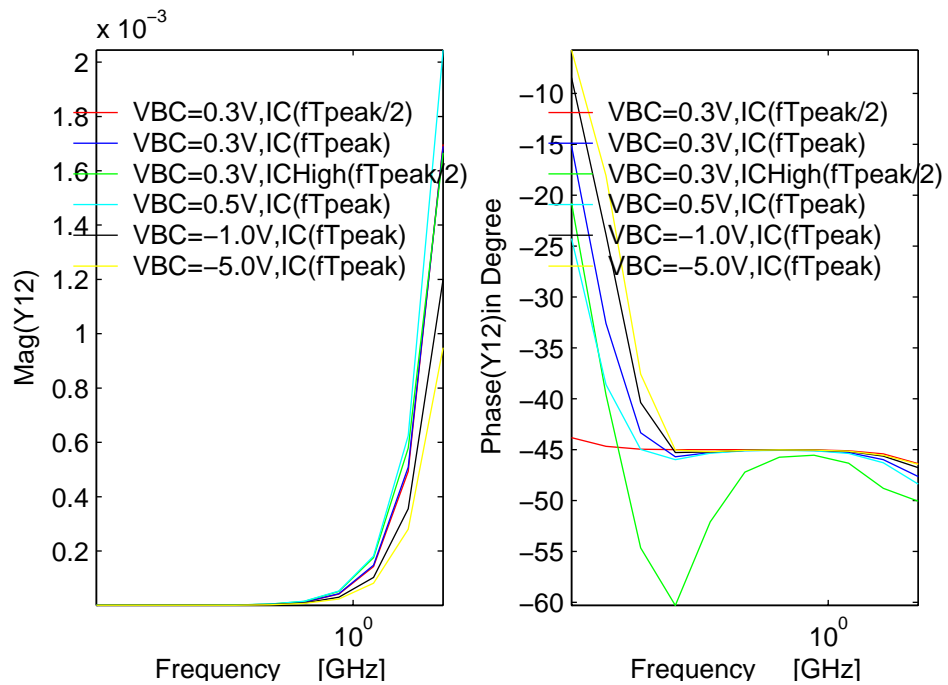


FIGURE 107. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with self-heating effect.

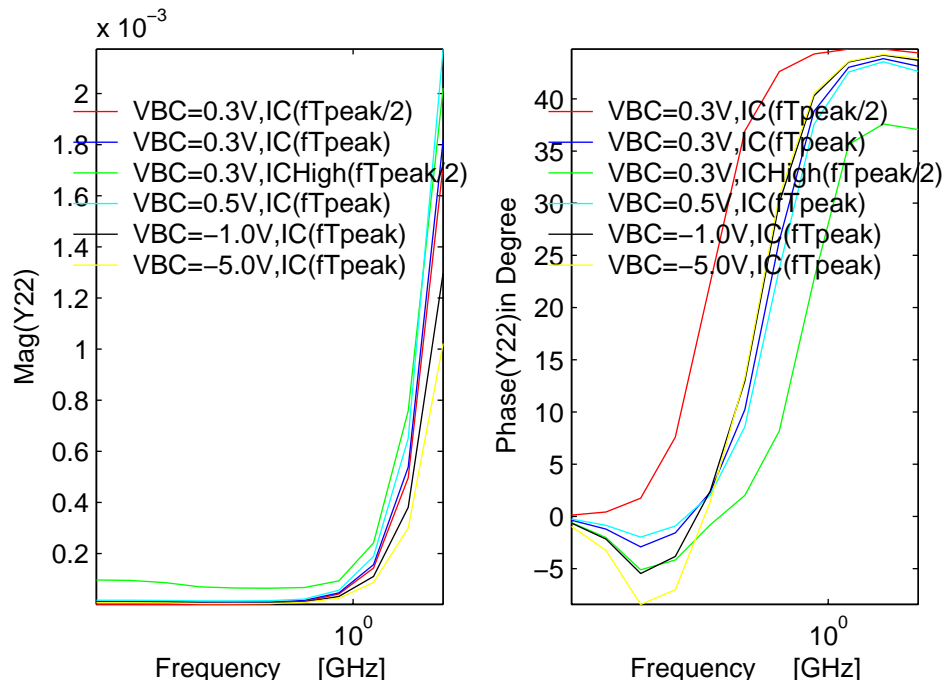


FIGURE 108. Y_{22} vs Frequency(GHz) plots at $T=300K$, $V_{bc}=0.3, 0.5, -1.0$ and $-5.0V$ for $I_C(f_{Tpeak}), I_C(f_{Tpeak}/2)$ and $I_{CHigh}(f_{Tpeak}/2)$ with self-heating effect.

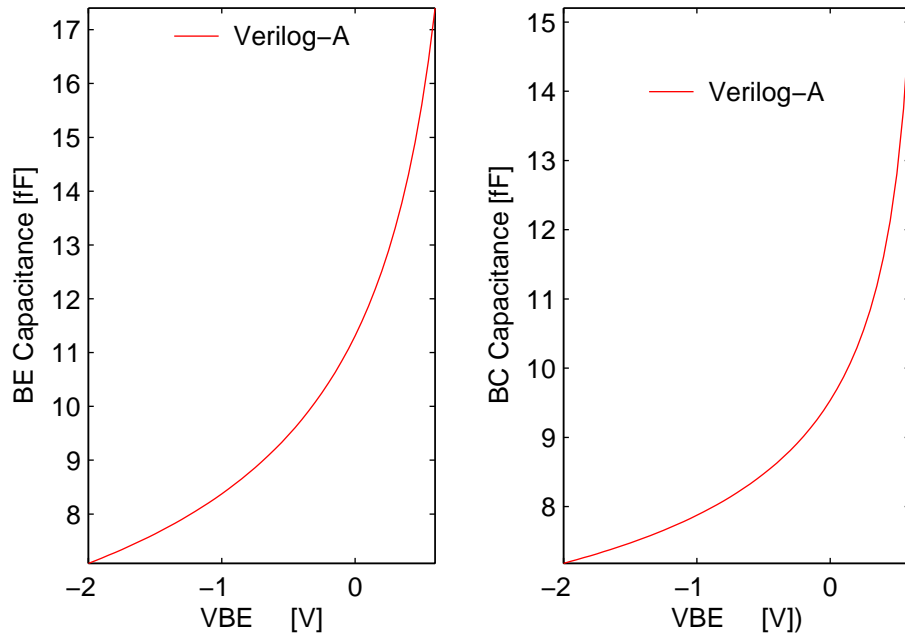


FIGURE 109. Depletion capacitances, C_{be} and C_{bc} (fF) vs BE voltages (Volt) plots at $T=300K$ with self-heating effect.

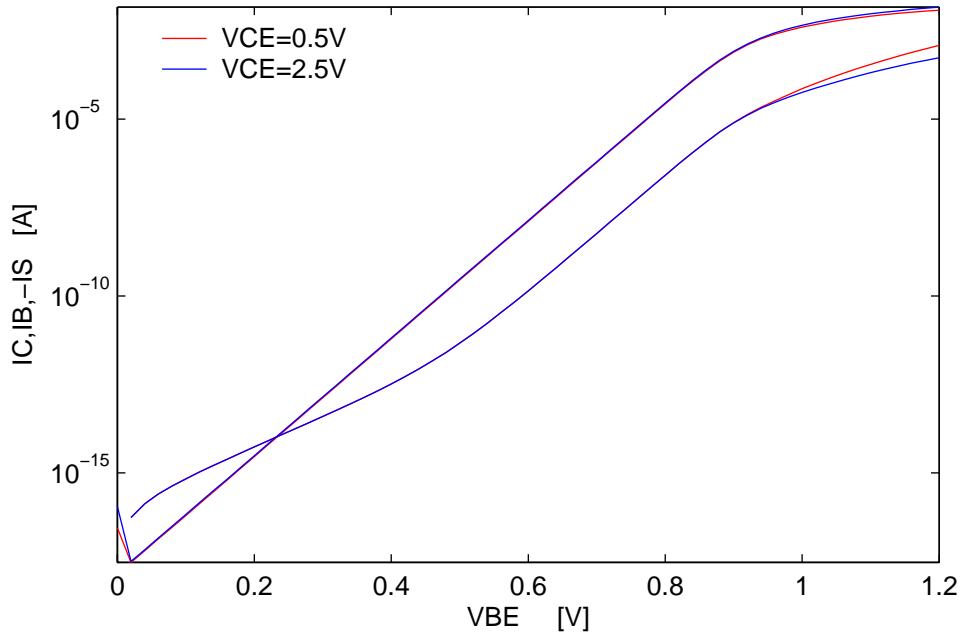


FIGURE 110. Forward Gummel plots at $V_{CE}=0.5,2.5$ Volt and $T=300K$ with collector current spreading effect.

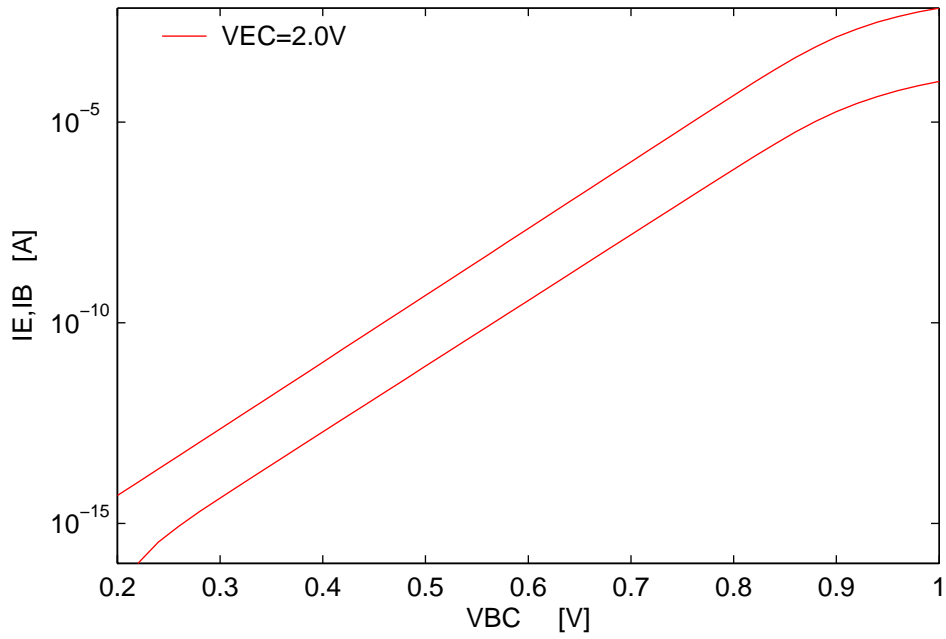


FIGURE 111. Reverse Gummel plots at $V_{EC}=2.0V$ at $T=300K$ with collector current spreading effect.

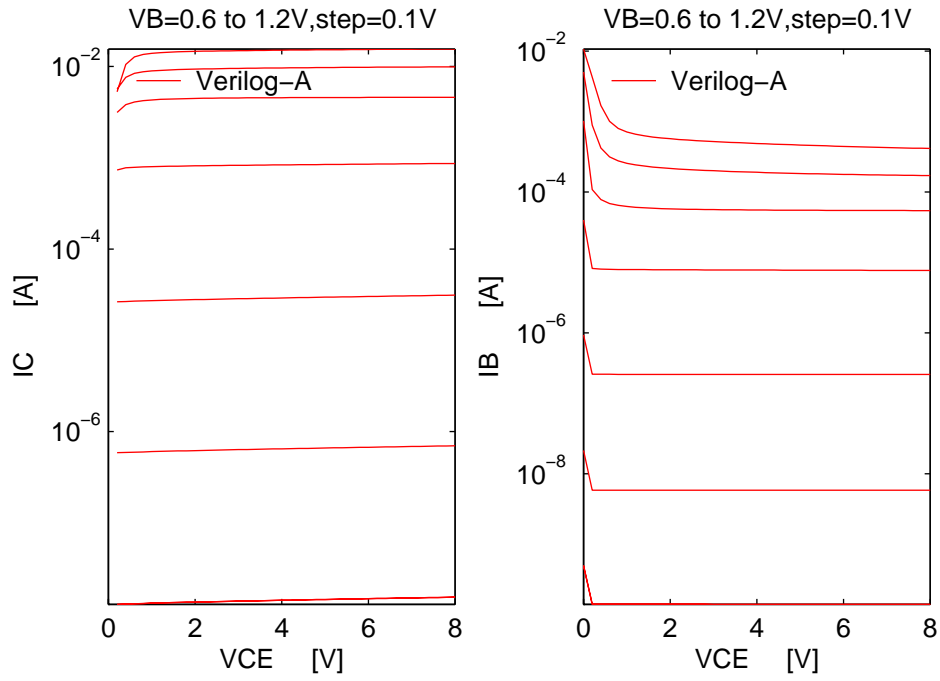


FIGURE 112. Forced-VB output characteristics and I_B - V_{CE} plots at $T=300K$ with collector current spreading effect.

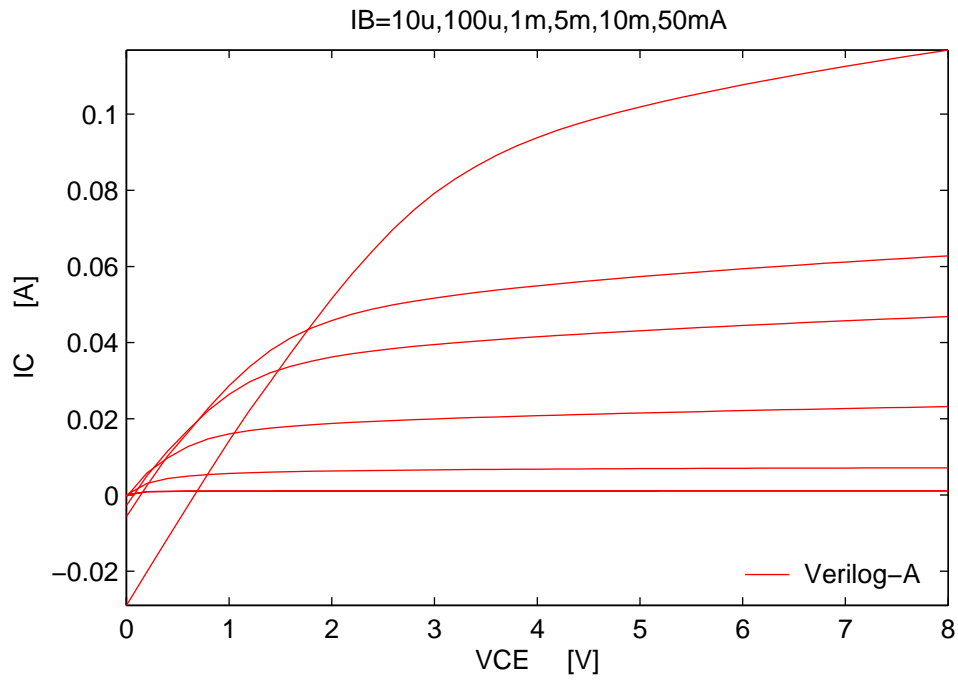


FIGURE 113. Forced-IB output characteristics at $T=300K$ with collector current spreading effect.

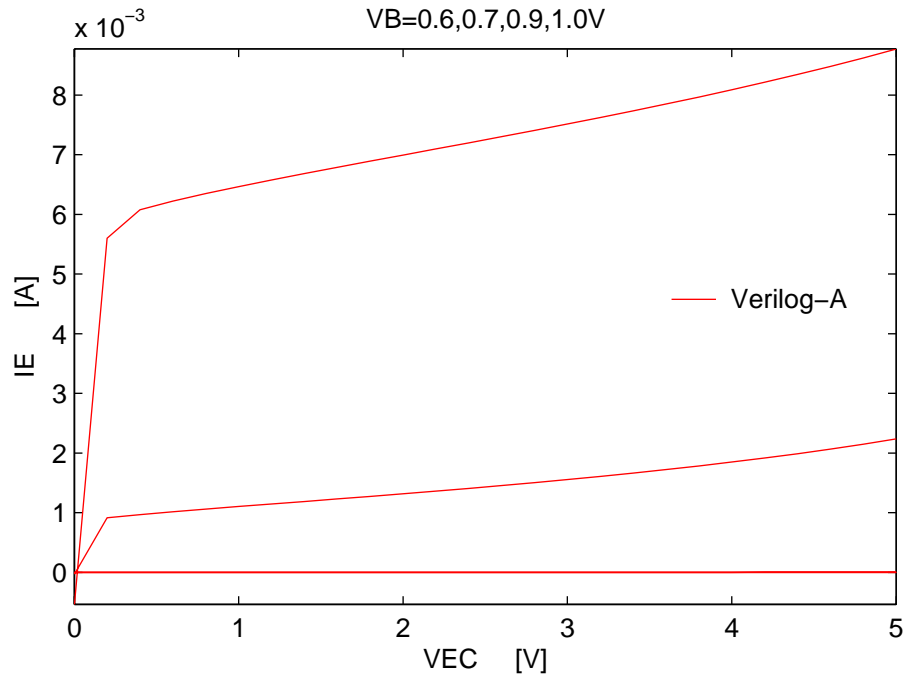


FIGURE 114. Reverse output characteristics at T=300K with collector current spreading effect.

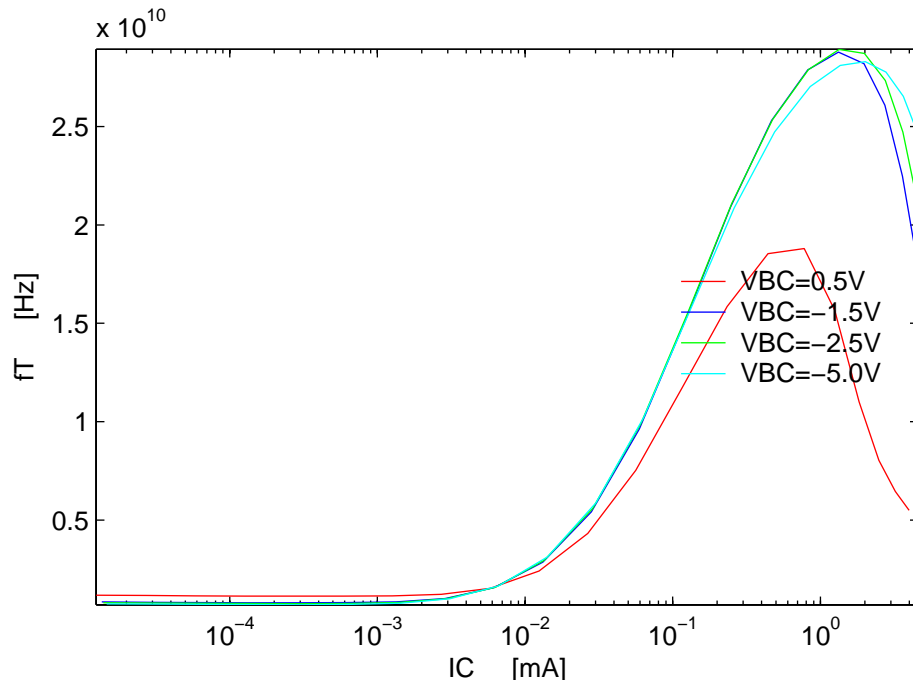


FIGURE 115. f_T (Hz) vs I_C (mA) plots at T=300K for $V_{bc}=0.5, -1.5, -2.5, \text{ and } -5$ V, f_T extracted at $f=2.8$ GHz with collector current spreading effect.

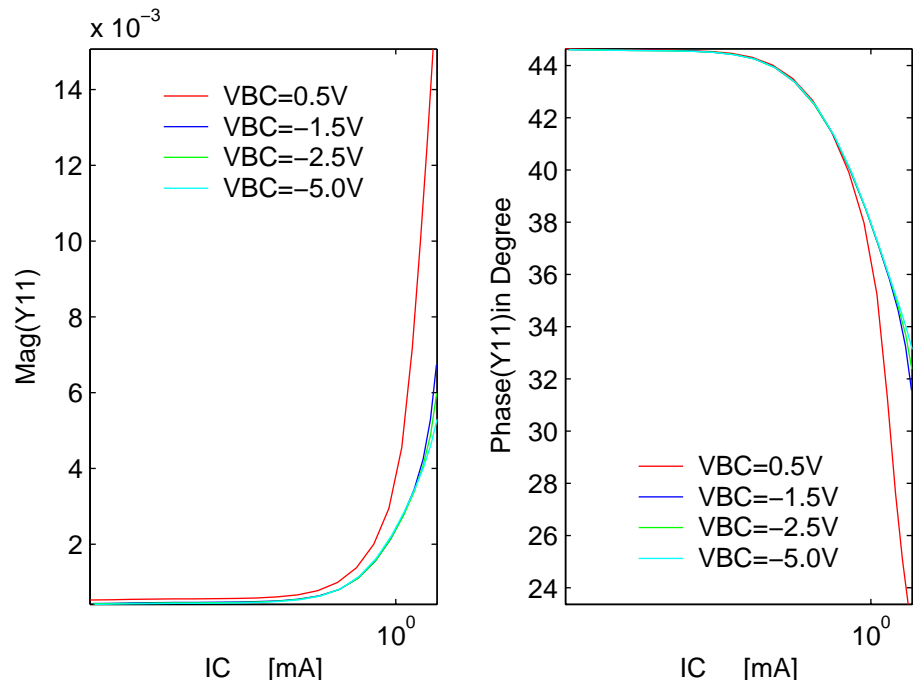


FIGURE 116. Y11 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with collector current spreading effect.

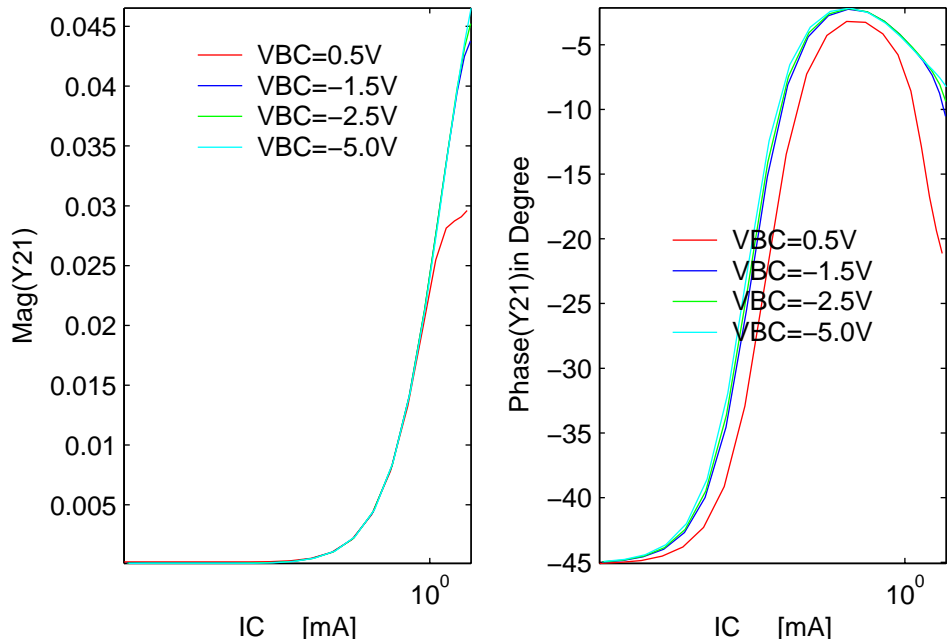


FIGURE 117. Y21 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with collector current spreading effect.

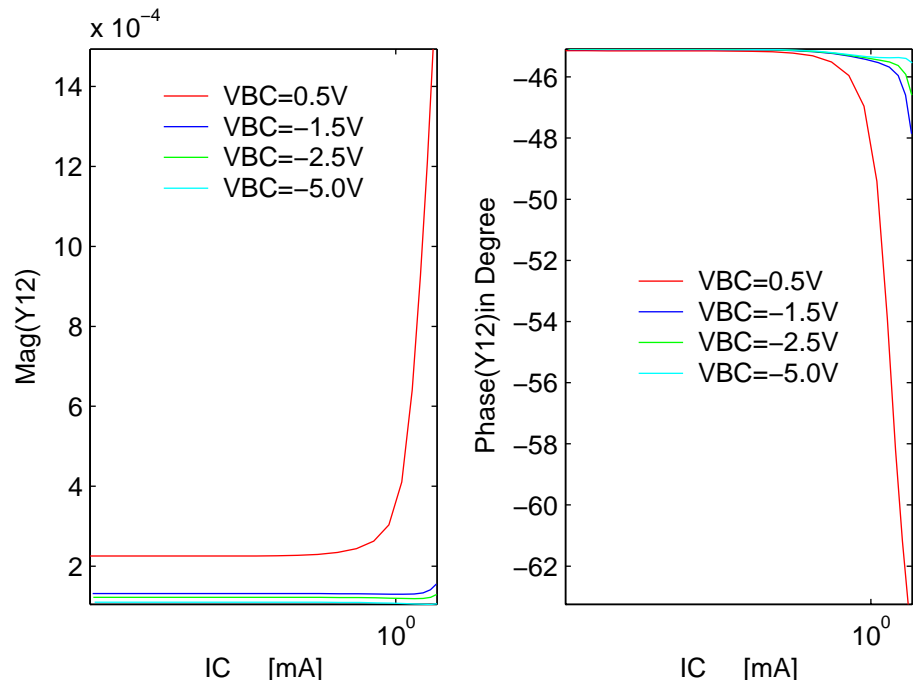


FIGURE 118. Y12 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with collector current spreading effect.

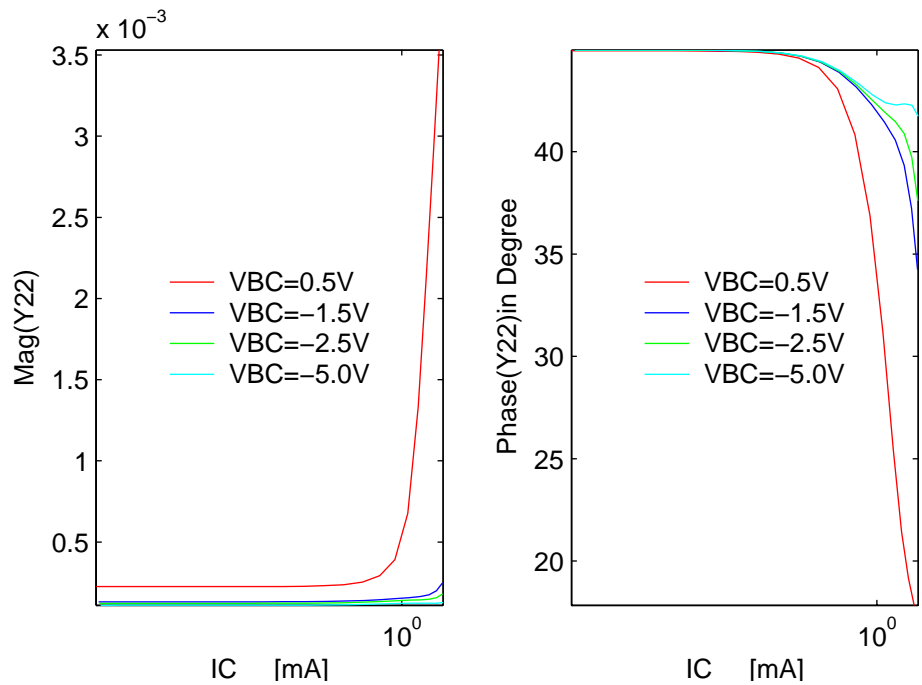


FIGURE 119. Y22 (extracted at f=2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with collector current spreading effect.

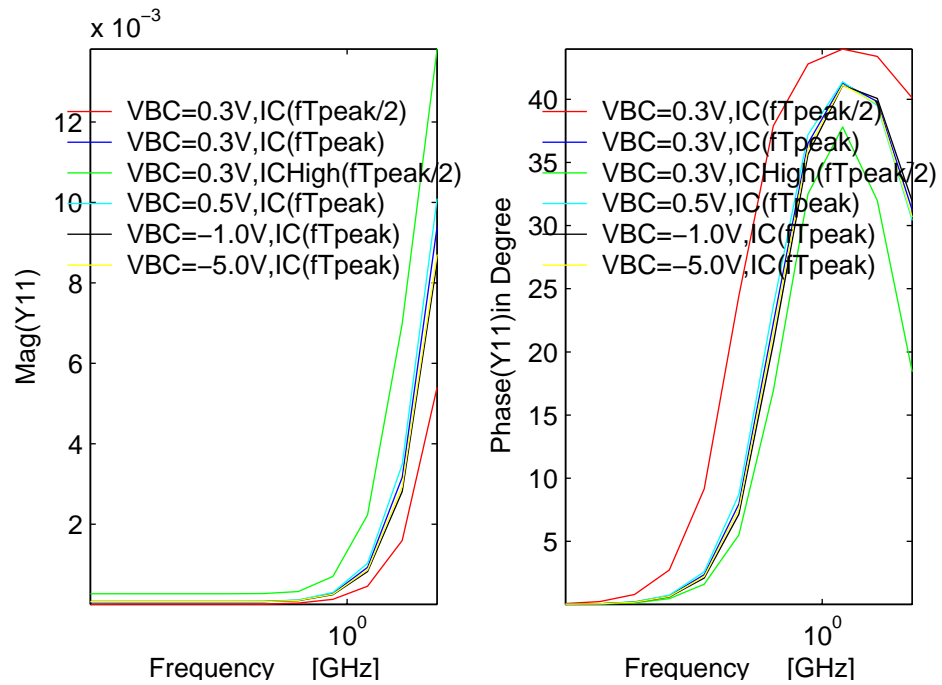


FIGURE 120. Y11 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with collector current spreading effect.

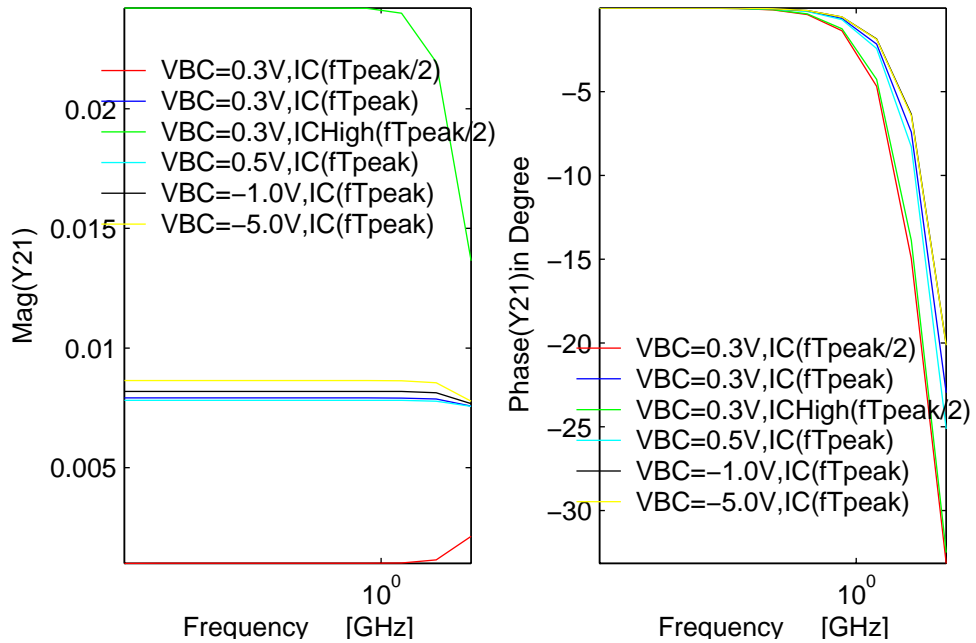


FIGURE 121. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with collector current spreading effect.

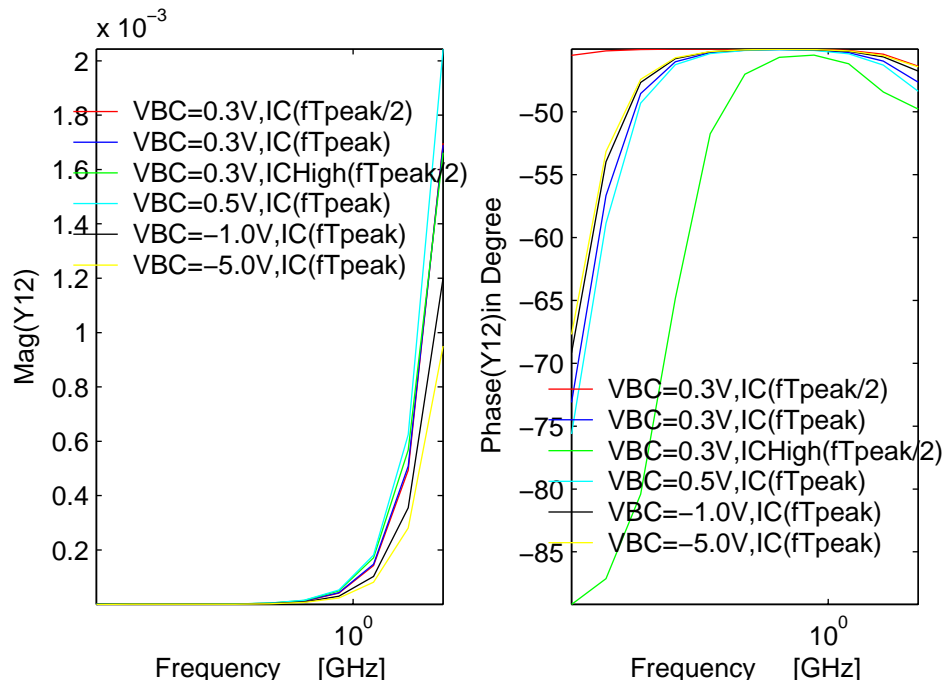


FIGURE 122. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with collector current spreading effect.

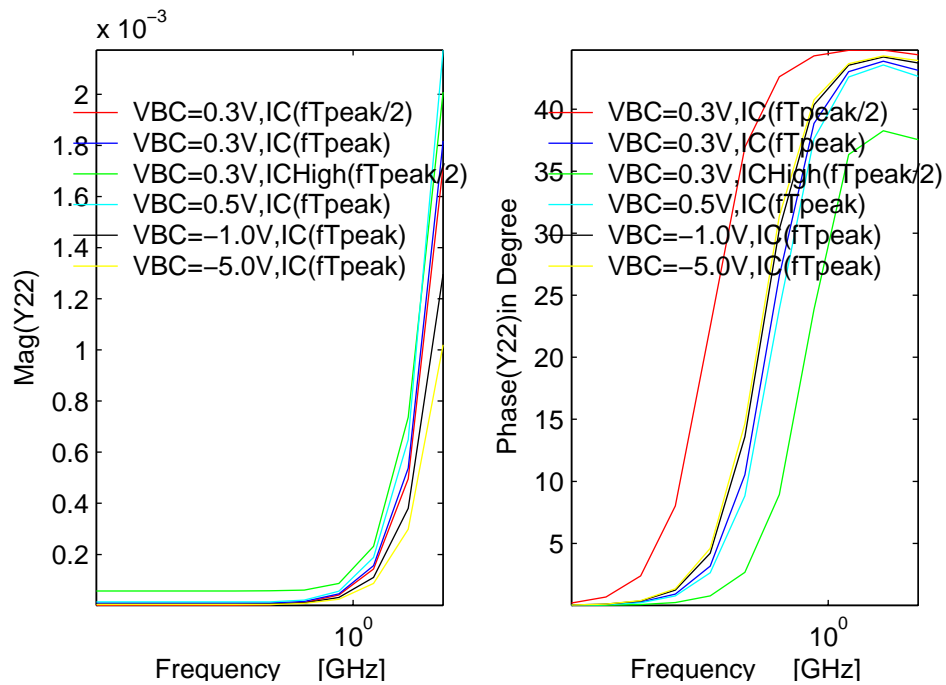


FIGURE 123. Y22 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with collector current spreading effect.

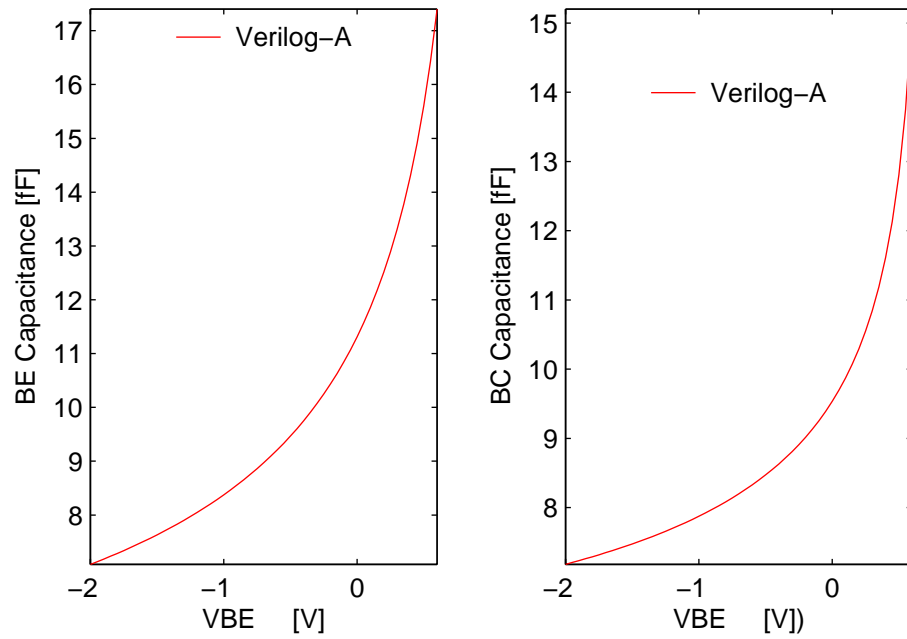


FIGURE 124. Depletion capacitances, C_{be} and C_{bc} (fF) vs BE voltages (Volt) plots at $T=300K$ with collector current spreading effect.

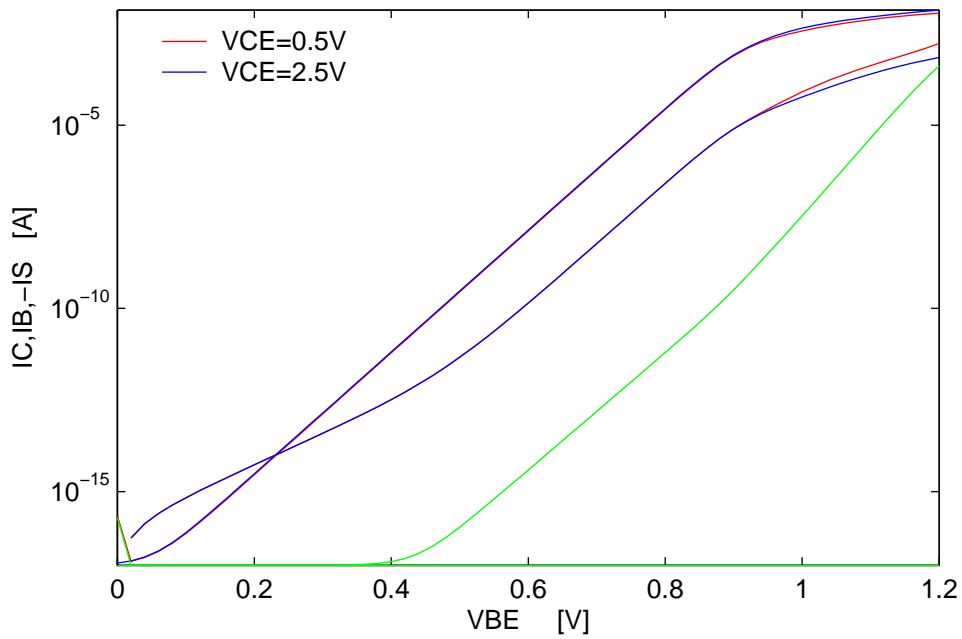


FIGURE 125. Forward Gummel plots at $V_{CE}=0.5, 2.5$ Volt and $T=300K$ with substrate transistor but without substrate network.

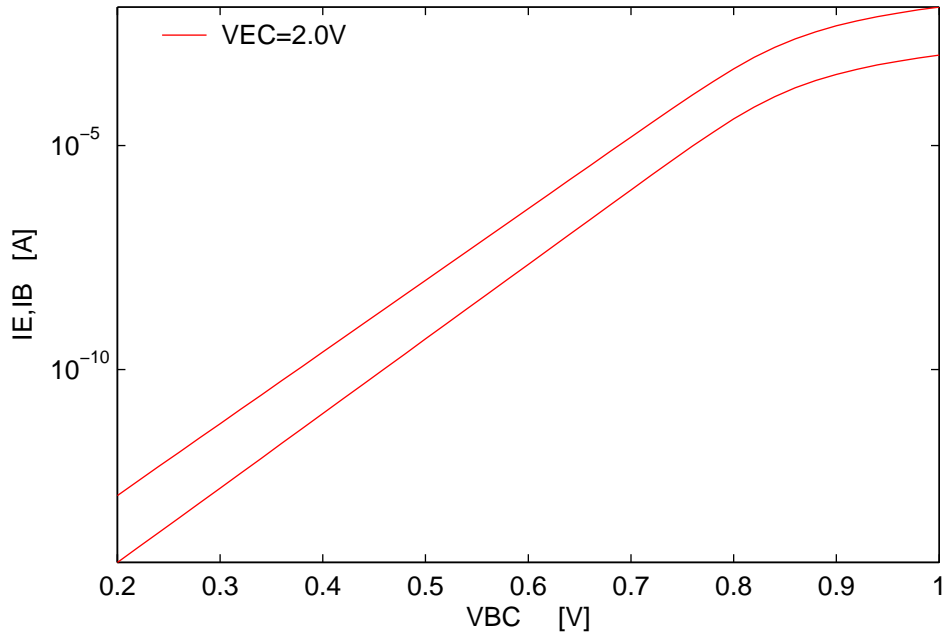


FIGURE 126. Reverse Gummel plots at $V_{EC}=2.0V$ at $T=300K$ with substrate transistor but without substrate network.

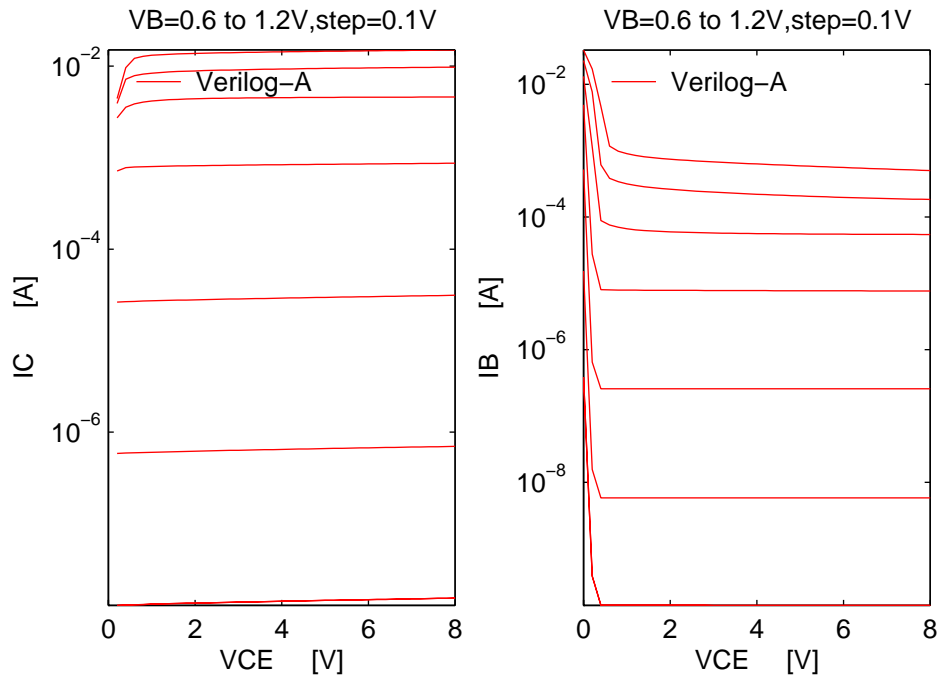


FIGURE 127. Forced-VB output characteristics and I_B - V_{CE} plots at $T=300K$ with substrate transistor but without substrate network.

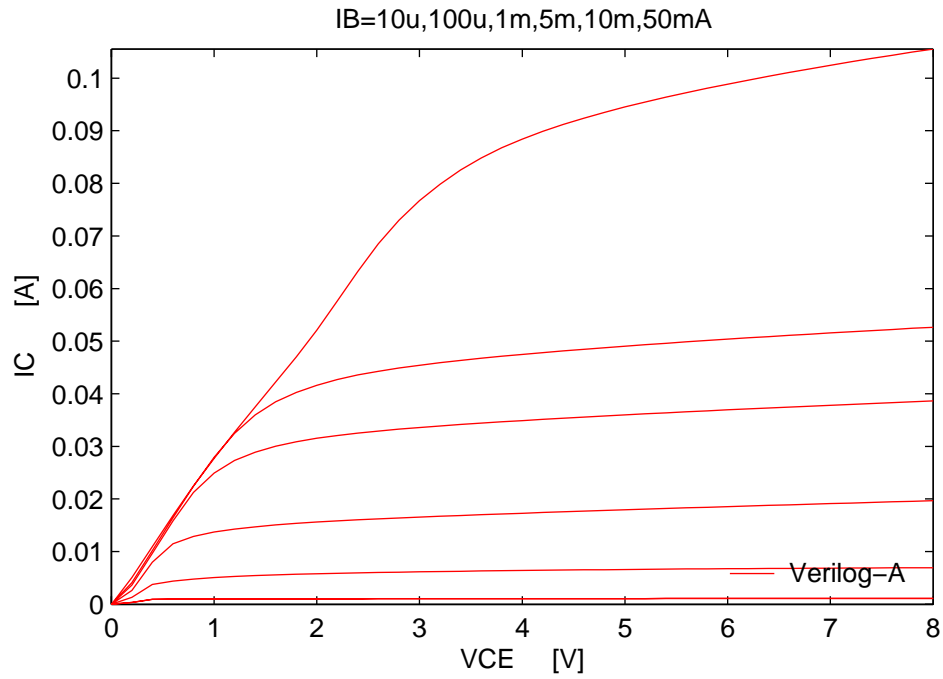


FIGURE 128. Forced-IB output characteristics at $T=300K$ with substrate transistor but without substrate network.

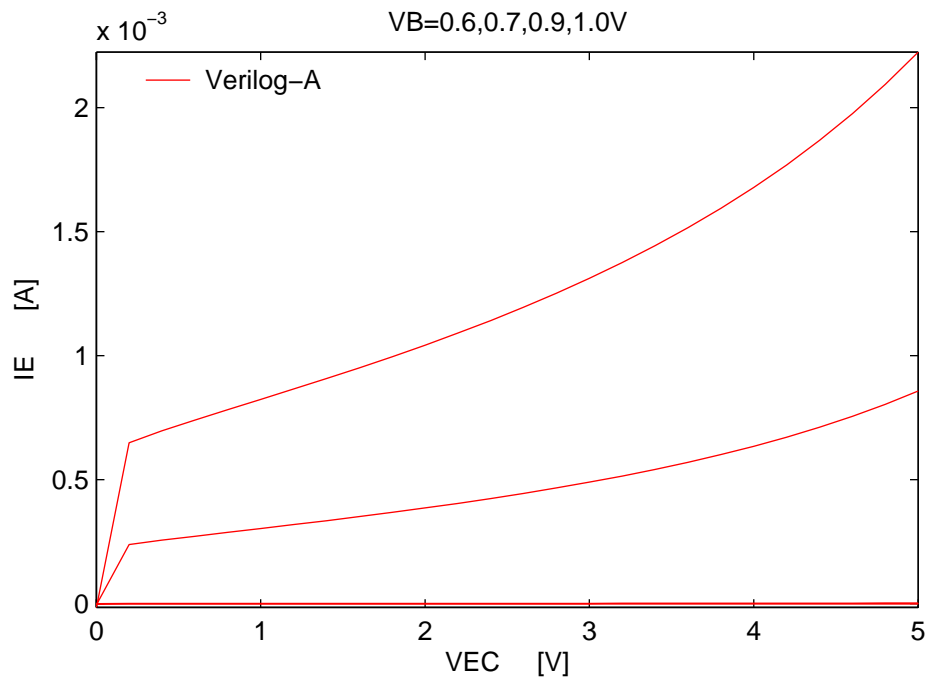


FIGURE 129. Reverse output characteristics at $T=300K$ with substrate transistor but without substrate network.

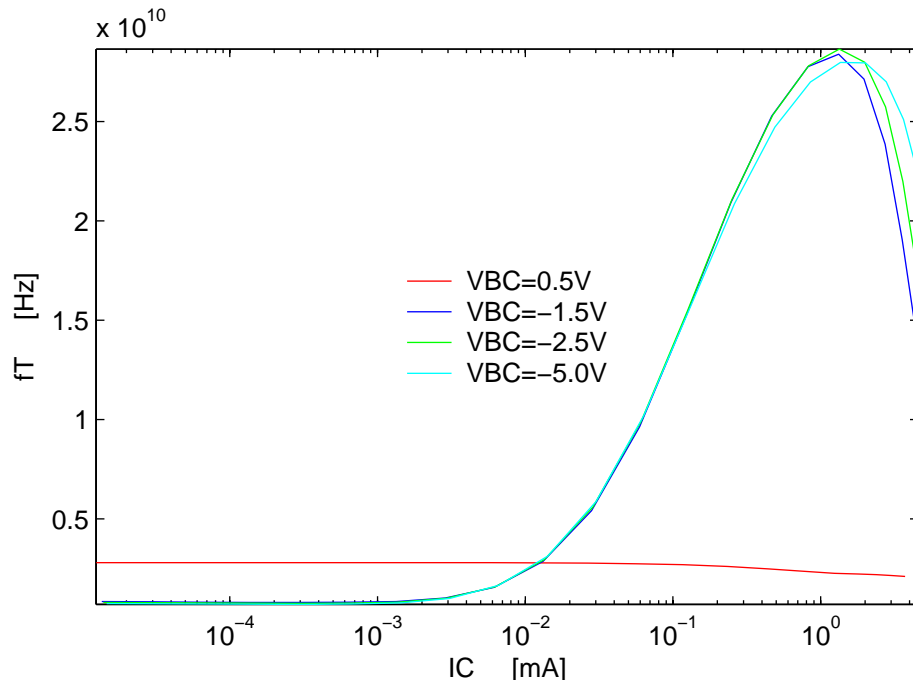


FIGURE 130. f_T (Hz) vs I_C (mA) plots at $T=300K$ for $V_{bc}=0.5, -1.5, -2.5,$ and $-5V$, f_T extracted at $f=2.8GHz$ with substrate transistor but without substrate network.

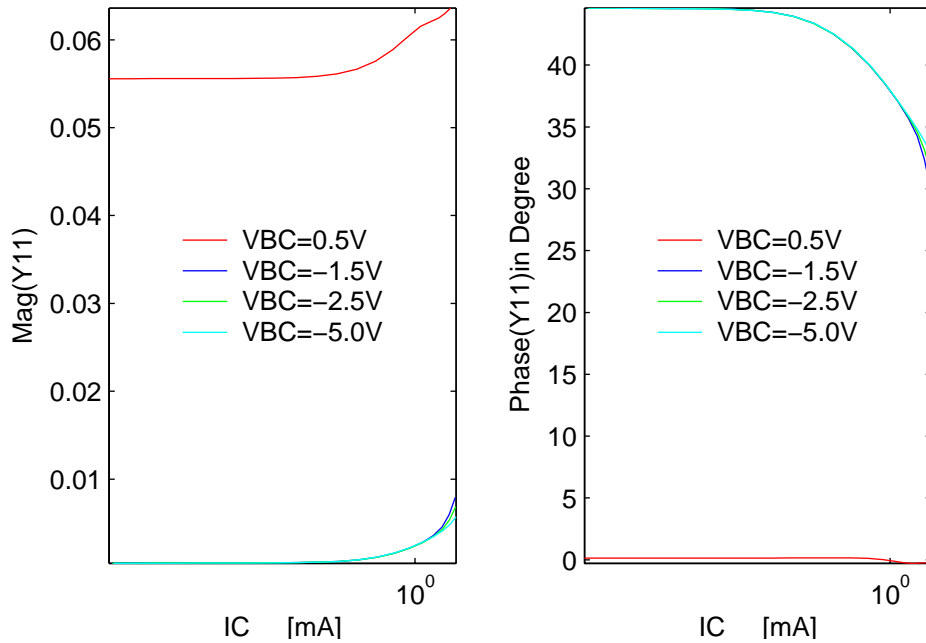


FIGURE 131. Y_{11} (extracted at $2.8GHz$) vs I_C (mA) plots at $T=300K$ for $V_{bc}=0.5, -1.5, -2.5,$ and $-5V$ with substrate transistor but without substrate network.

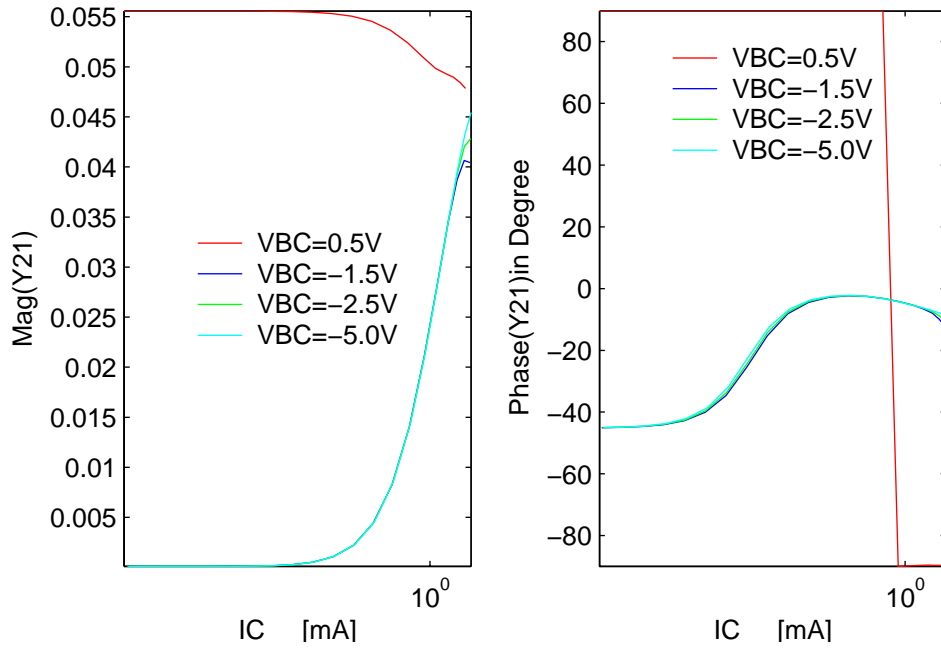


FIGURE 132. Y_{21} (extracted at 2.8GHz) vs I_C (mA) plots at $T=300\text{K}$ for $V_{bc}=0.5, -1.5, -2.5,$ and -5V with substrate transistor but without substrate network.

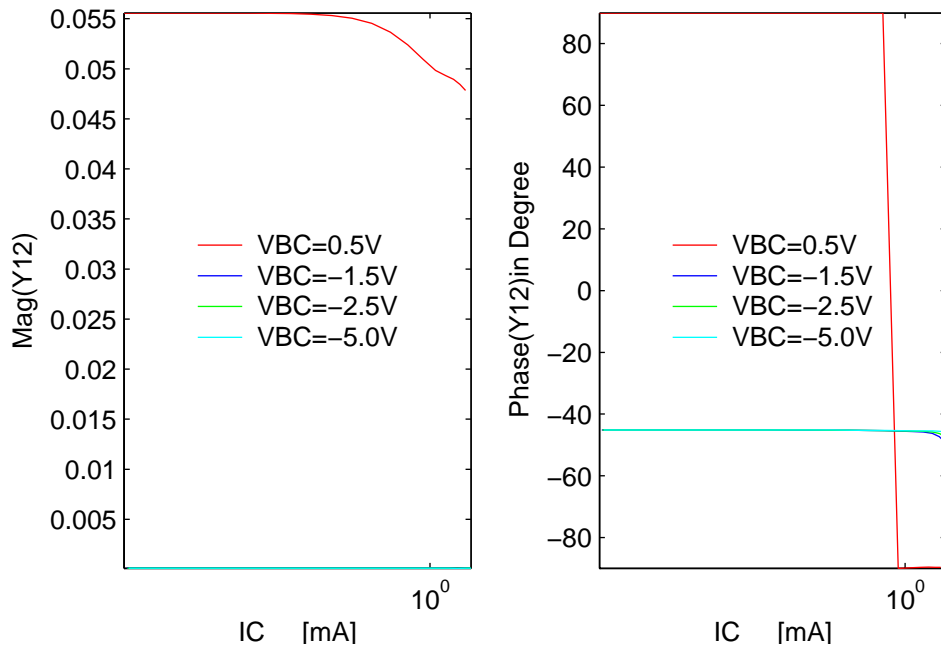


FIGURE 133. Y_{12} (extracted at 2.8GHz) vs I_C (mA) plots at $T=300\text{K}$ for $V_{bc}=0.5, -1.5, -2.5,$ and -5V with substrate transistor but without substrate network.

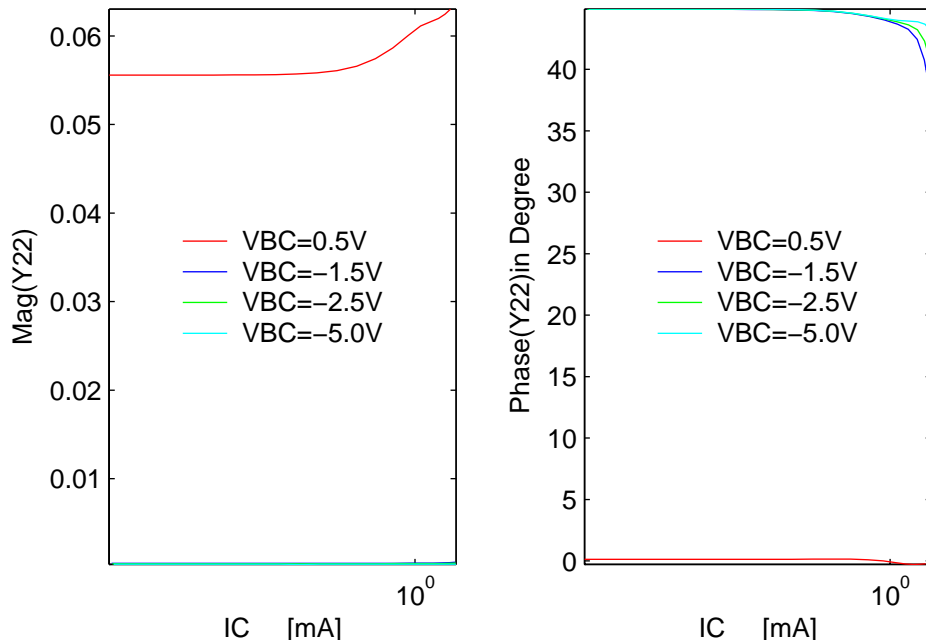


FIGURE 134. Y_{22} (extracted at $f=2.8\text{GHz}$) vs $I_C(\text{mA})$ plots at $T=300\text{K}$ for $V_{bc}=0.5,-1.5,-2.5,$ and -5V with substrate transistor but without substrate network.

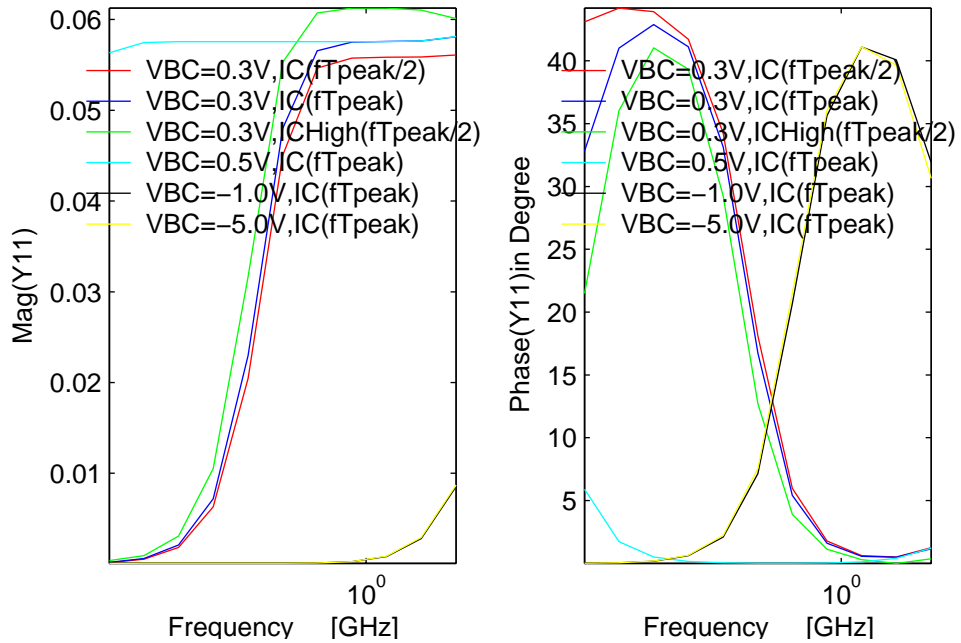


FIGURE 135. Y_{11} vs Frequency(GHz) plots at $T=300\text{K}$, $V_{bc}=0.3, 0.5, -1.0$ and -5.0V for $I_C(fT_{peak}), I_C(fT_{peak}/2)$ and $I_{Chigh}(fT_{peak}/2)$ with substrate transistor but without substrate network.

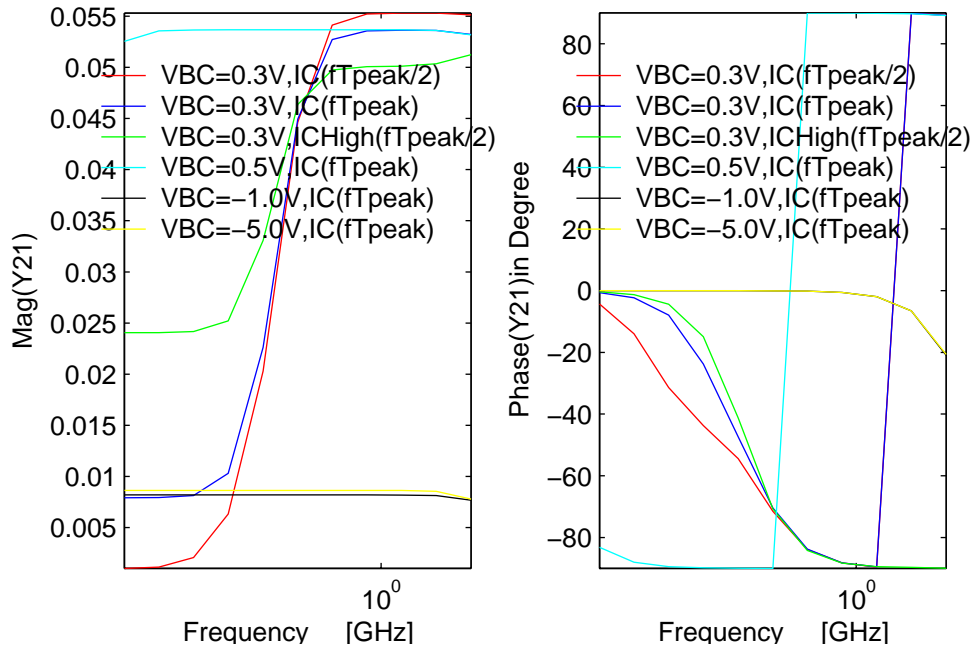


FIGURE 136. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2) with substrate transistor but without substrate network.

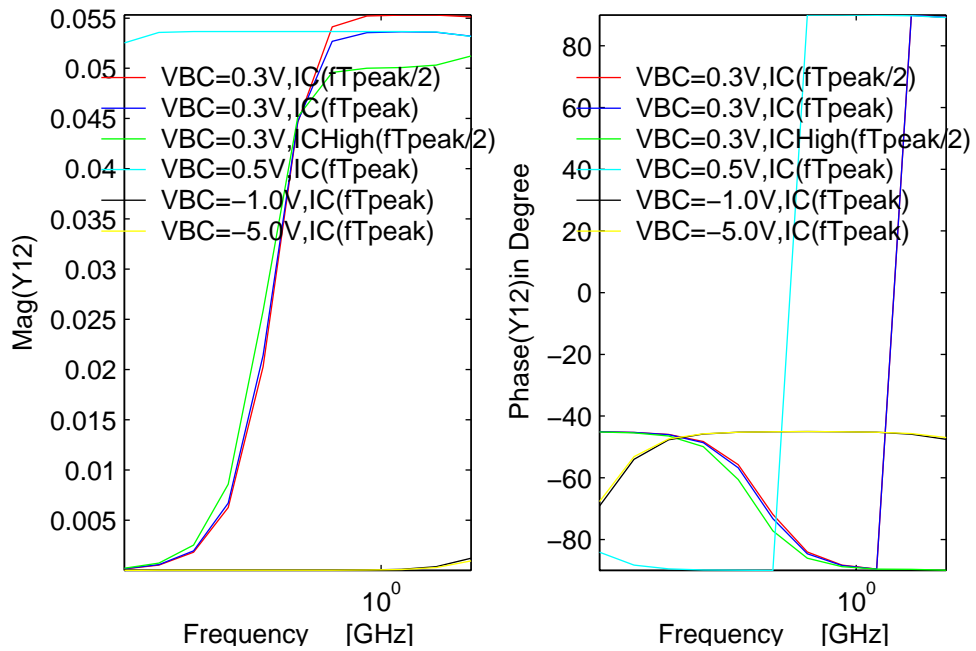


FIGURE 137. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(ftpeak/2)and ICHigh(fTpeak/2) with substrate transistor but without substrate network.

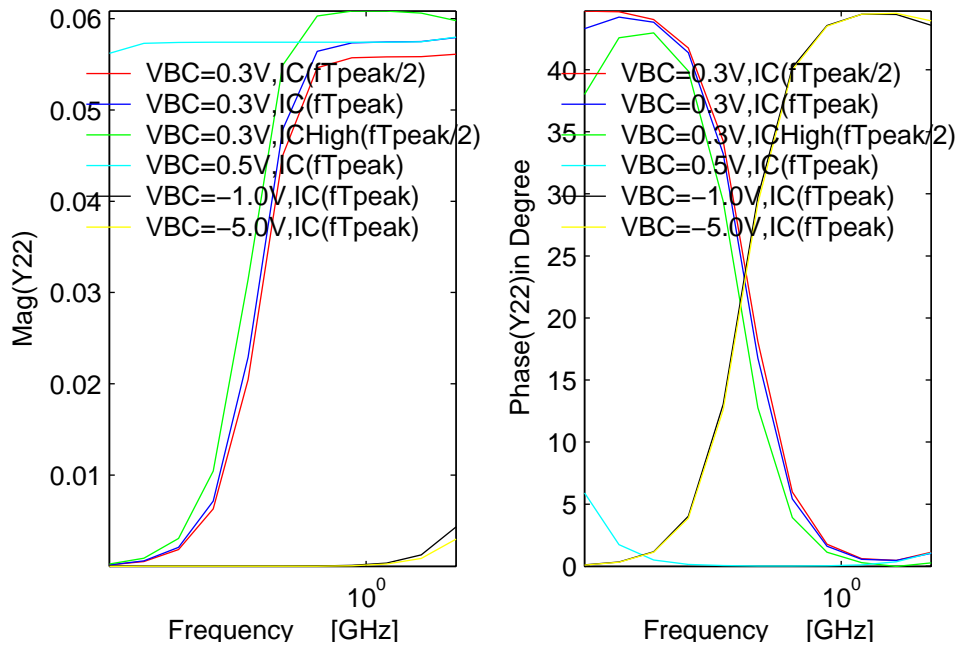


FIGURE 138. Y22 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with substrate transistor but without substrate network.

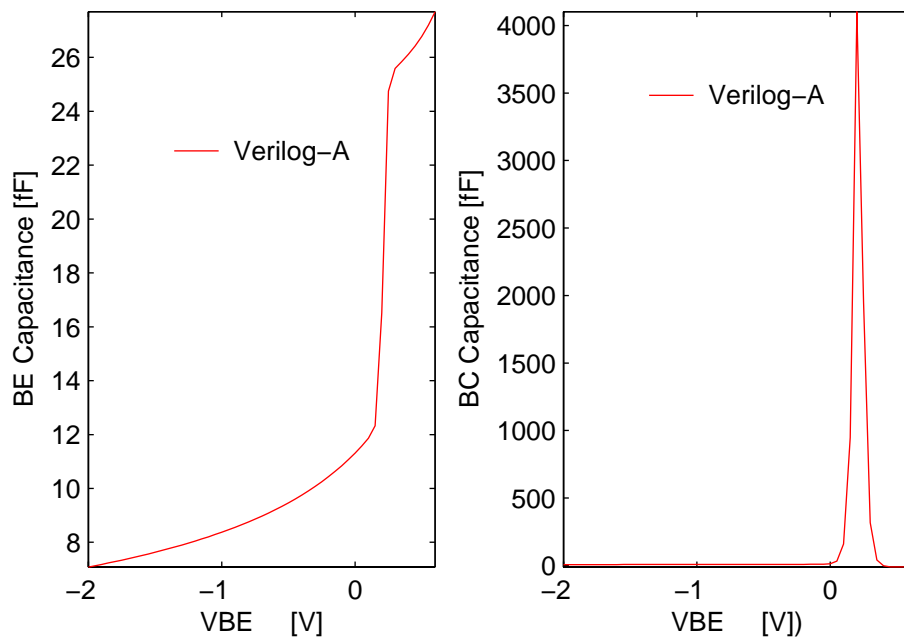


FIGURE 139. Depletion capacitances, Cbe and Cbc (fF) vs BE voltages (Volt) plots at T=300K with substrate transistor but without substrate network calculated from Y-parameters.

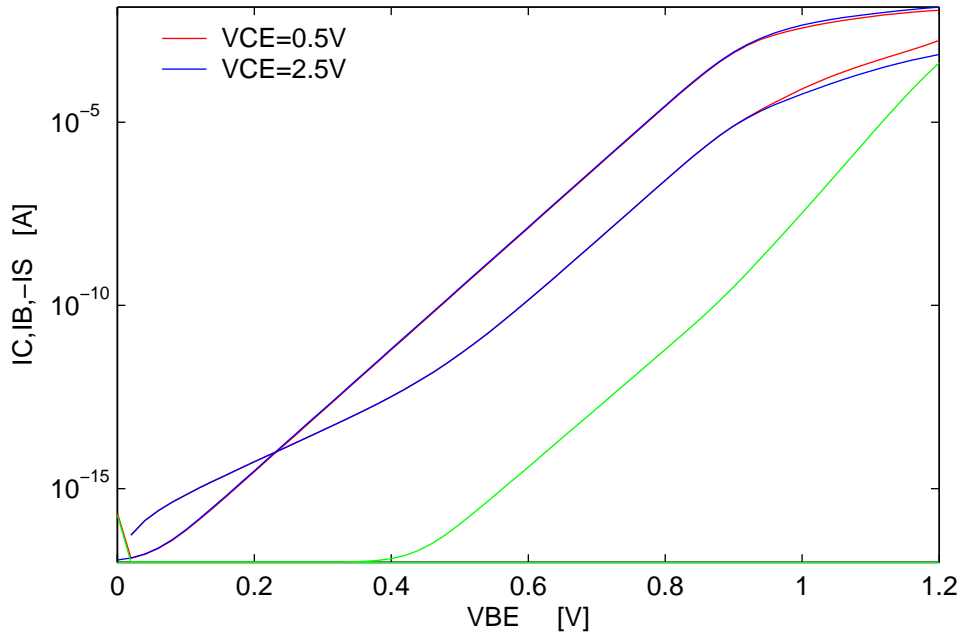


FIGURE 140. Forward Gummel plots at VCE=0.5,2.5 Volt and T=300K with substrate transistor as well as substrate network.

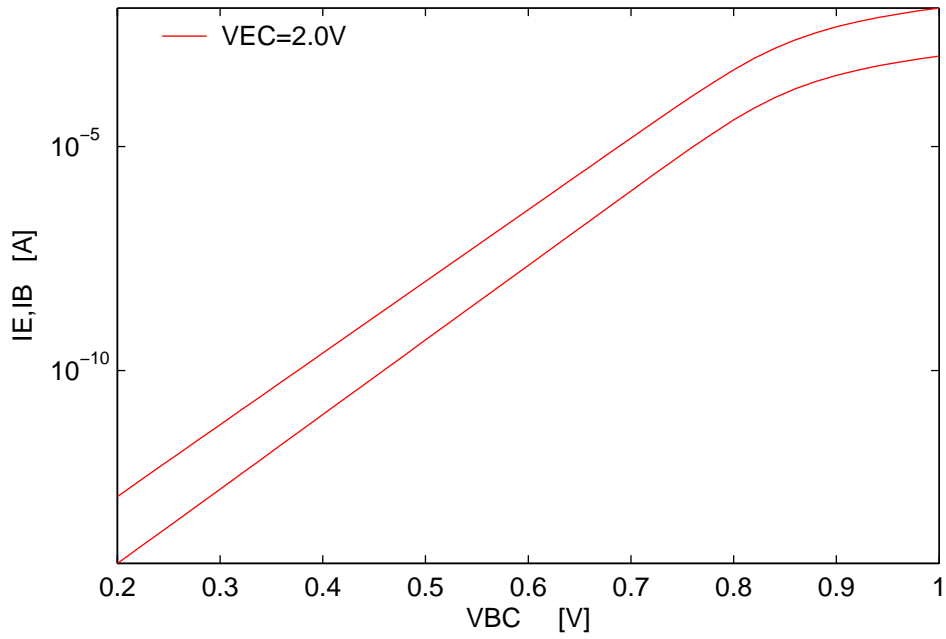


FIGURE 141. Reverse Gummel plots at VEC=2.0V at T=300K with substrate transistor as well as substrate network.

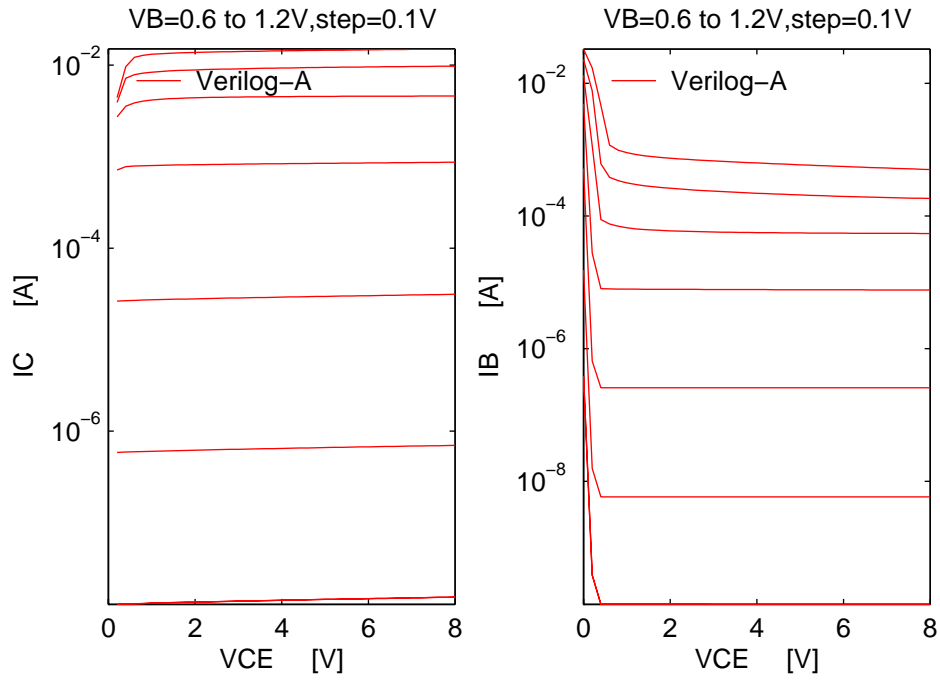


FIGURE 142. Forced-VB output characteristics and Ib-VCE plots at T=300K with substrate transistor as well as substrate network.

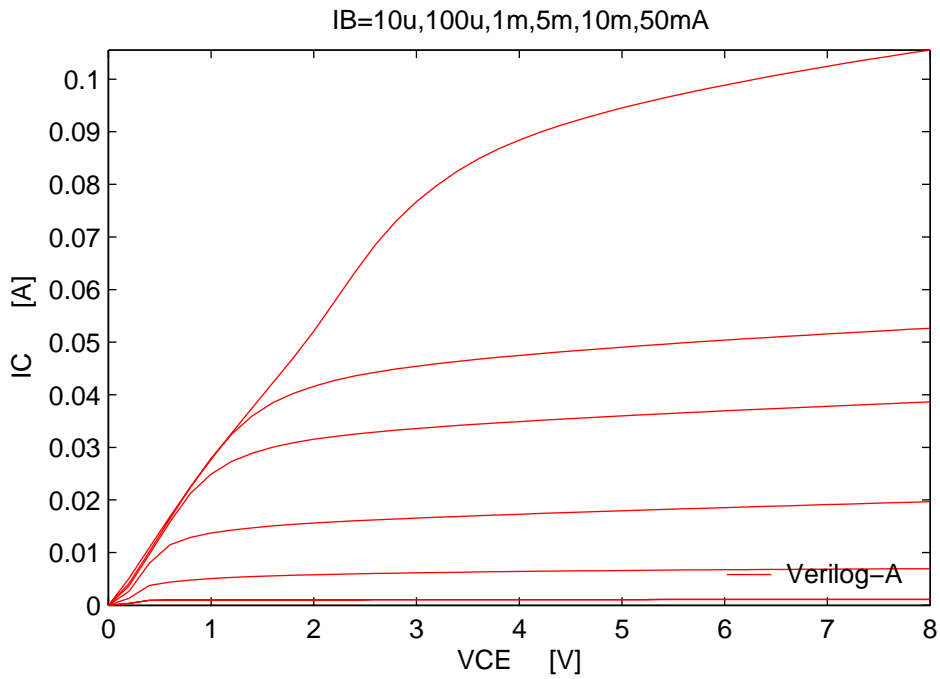


FIGURE 143. Forced-IB output characteristics at T=300K with substrate transistor as well as substrate network.

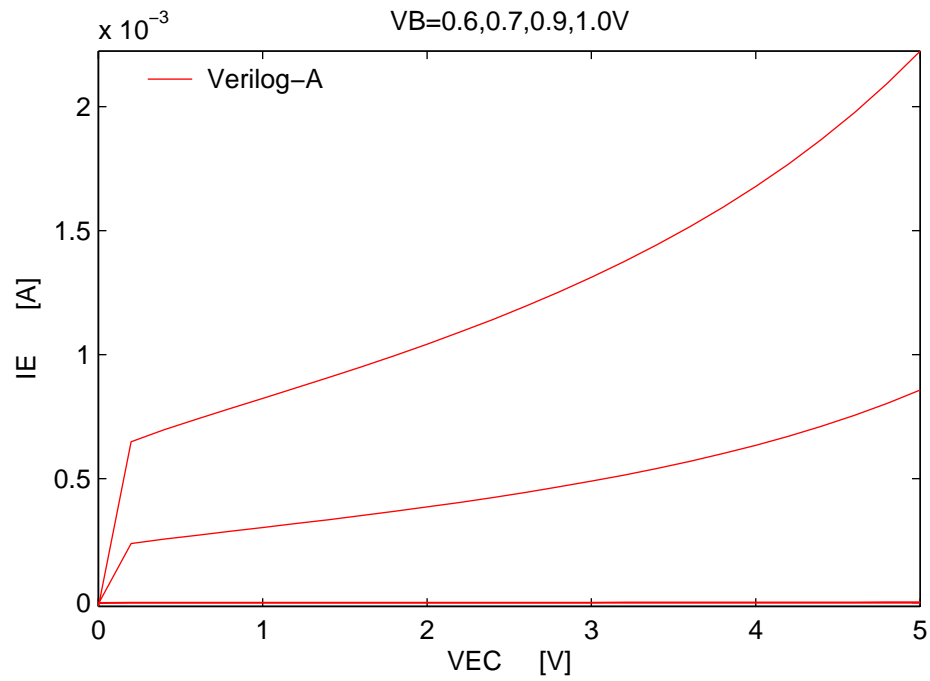


FIGURE 144. Reverse output characteristics at $T=300\text{K}$ with substrate transistor as well as substrate network.

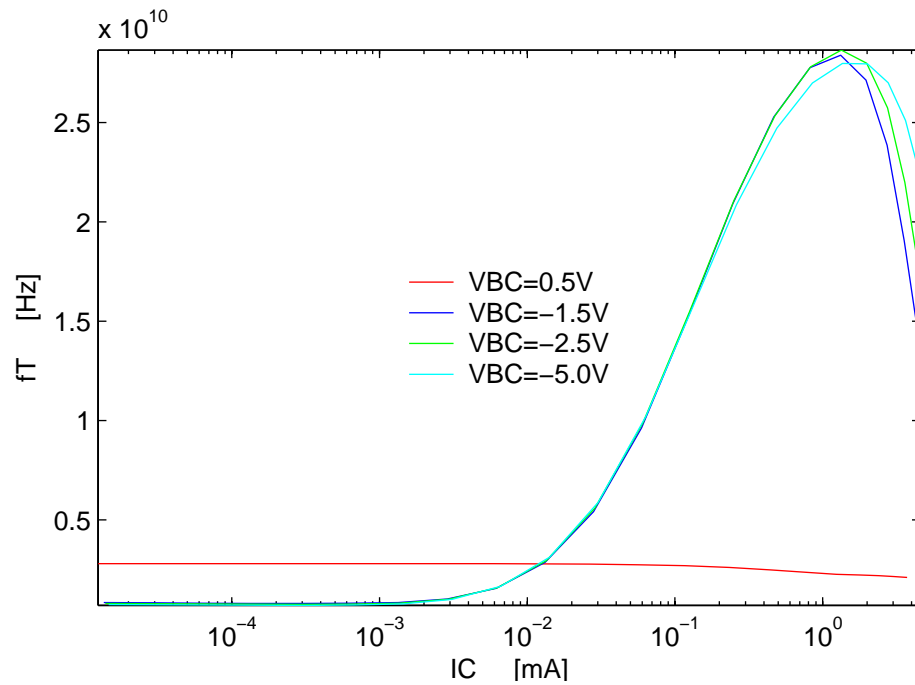


FIGURE 145. $f_T(\text{Hz})$ vs $I_C(\text{mA})$ plots at $T=300\text{K}$ for $V_{bc}=0.5, -1.5, -2.5,$ and -5V , f_T extracted at $f=2.8\text{GHz}$ with substrate transistor as well as substrate network.

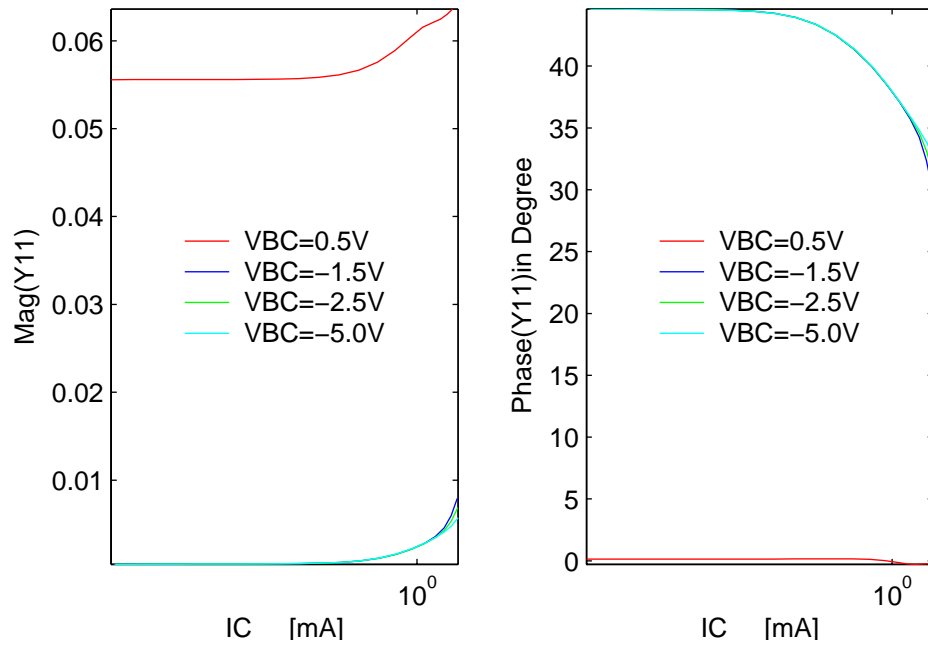


FIGURE 146. Y11 (extracted at 2.8GHz) vs I_C (mA) plots at $T=300\text{K}$ for $V_{bc}=0.5, -1.5, -2.5,$ and -5V with substrate transistor as well as substrate network.

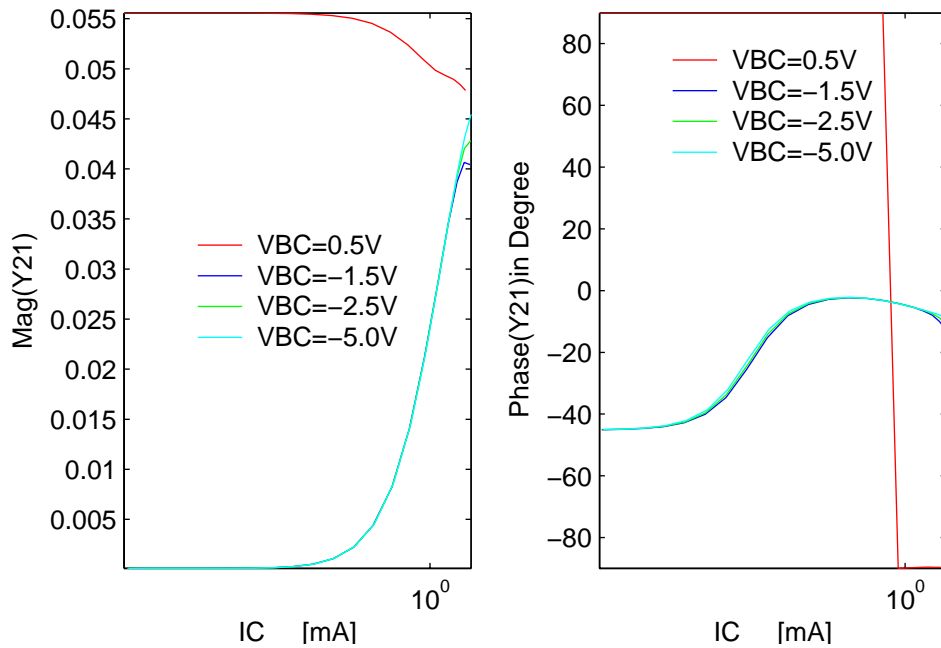


FIGURE 147. Y21 (extracted at 2.8GHz) vs I_C (mA) plots at $T=300\text{K}$ for $V_{bc}=0.5, -1.5, -2.5,$ and -5V with substrate transistor as well as substrate network.

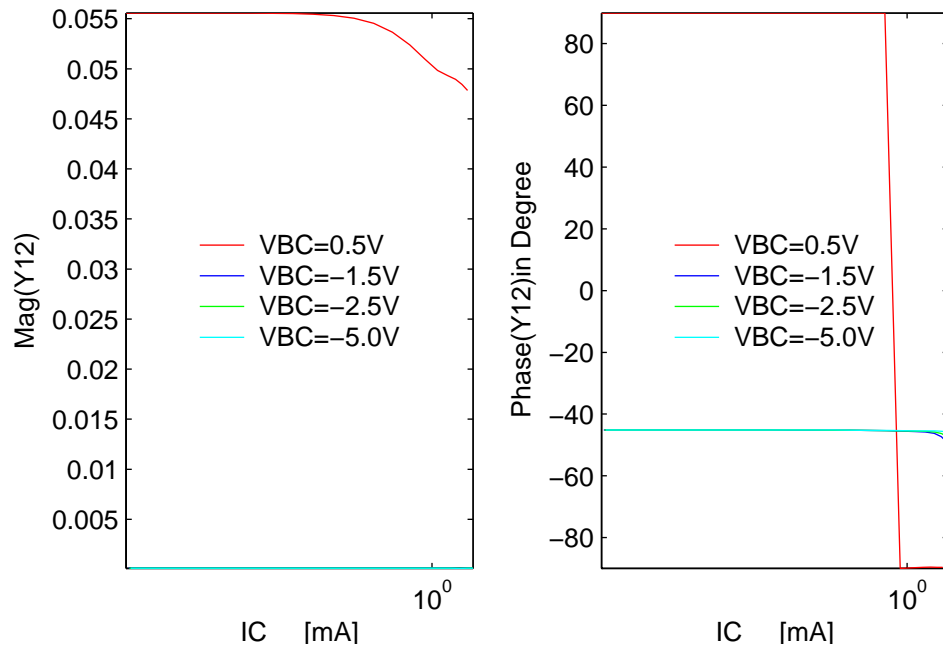


FIGURE 148. Y12 (extracted at 2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with substrate transistor as well as substrate network.

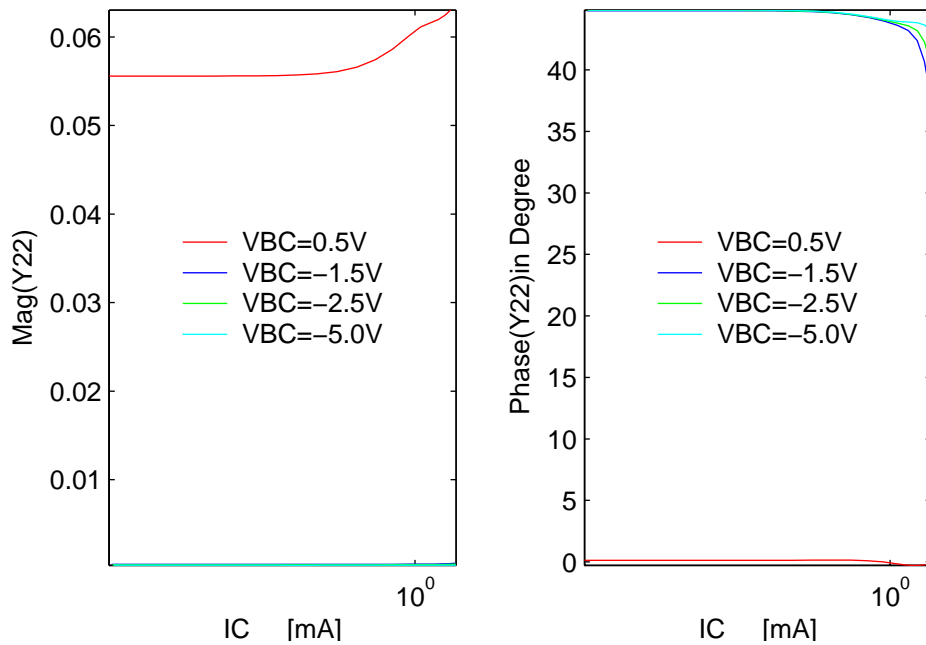


FIGURE 149. Y22 (extracted at f=2.8GHz) vs IC(mA) plots at T=300K for Vbc=0.5,-1.5,-2.5, and -5V with substrate transistor as well as substrate network.

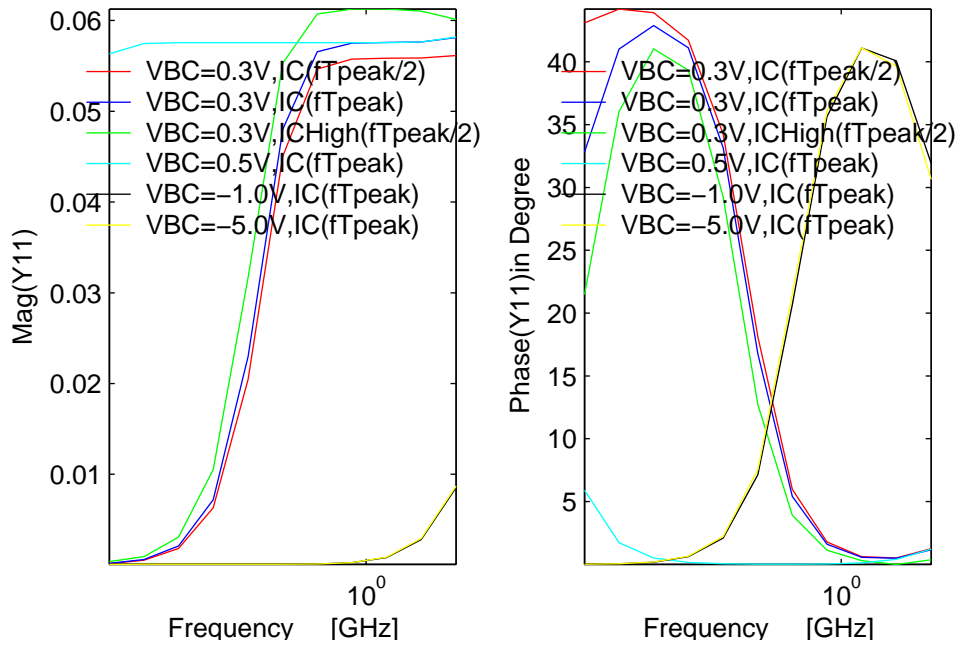


FIGURE 150. Y11 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with substrate transistor as well as substrate network.

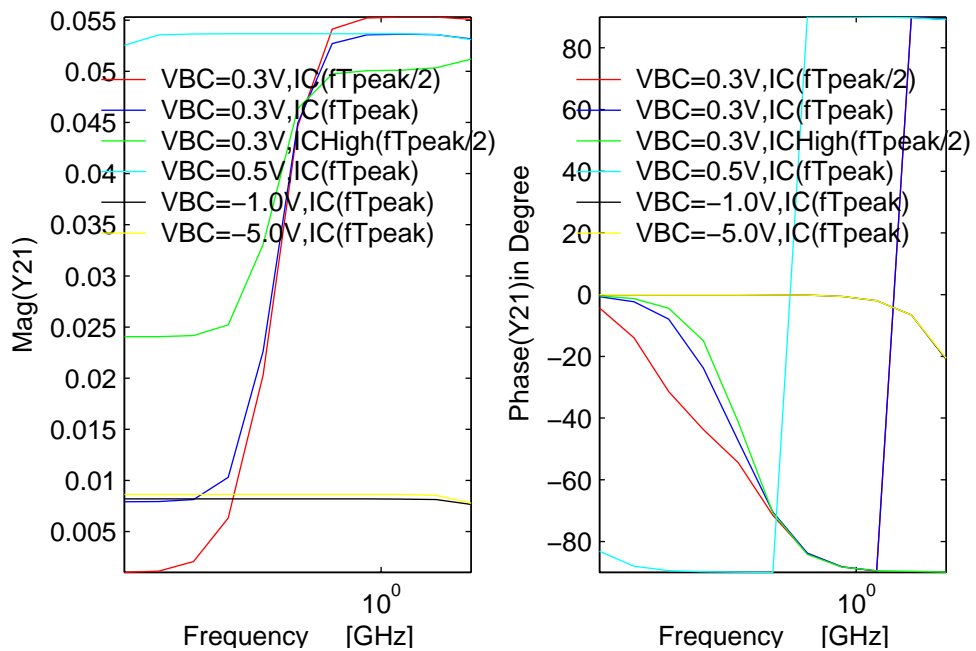


FIGURE 151. Y21 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with substrate transistor as well as substrate network.

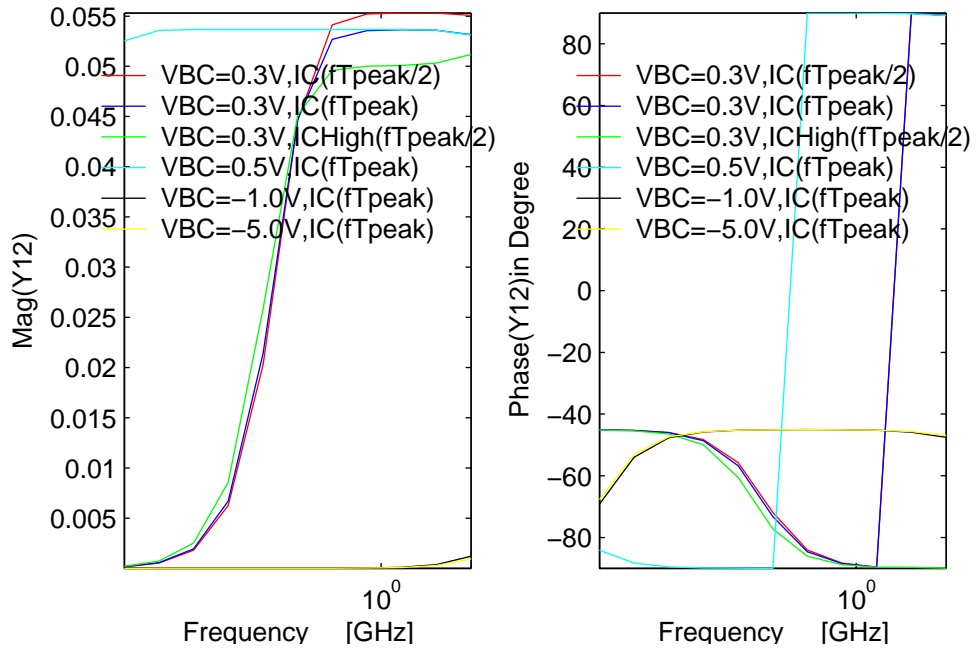


FIGURE 152. Y12 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0, -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with substrate transistor as well as substrate network.

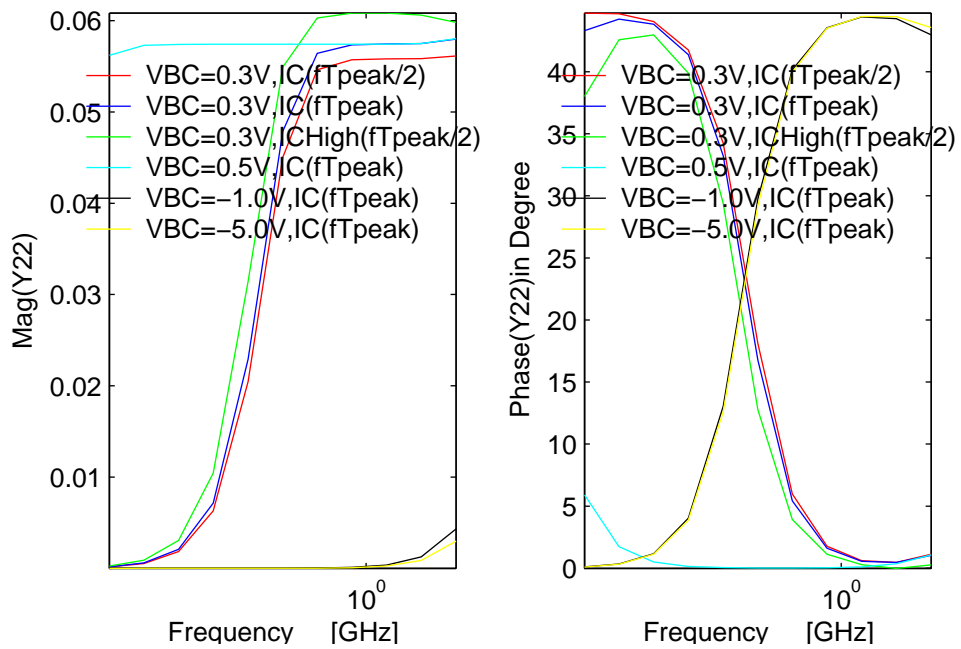


FIGURE 153. Y22 vs Frequency(GHz) plots at T=300K, Vbc=0.3, 0.5, -1.0 and -5.0V for IC(fTpeak),IC(fTpeak/2)and ICHigh(fTpeak/2) with substrate transistor as well as substrate network.

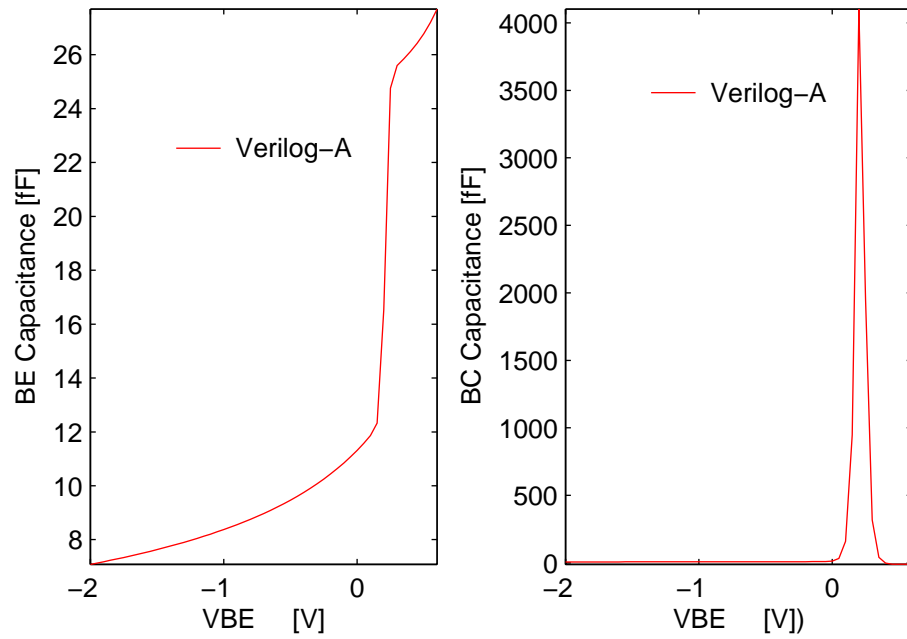


FIGURE 154. Depletion capacitances, C_{be} and C_{bc} (fF) vs BE voltages (Volt) plots at $T=300K$ with substrate transistor as well as substrate network (calculated from Y -parameter).

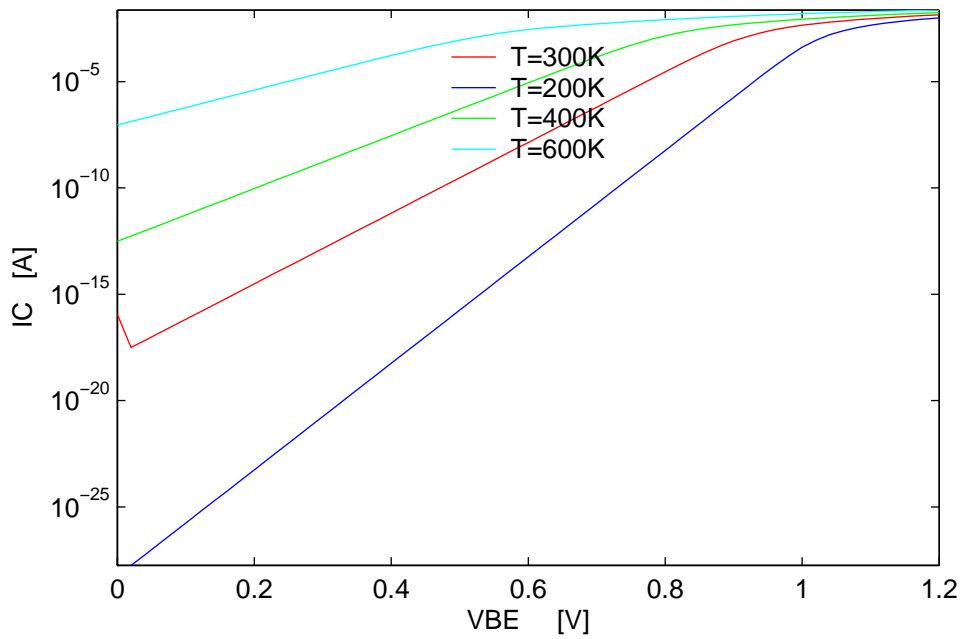


FIGURE 155. I_C vs. V_{BE} at $V_{CE}=2.5V$ and $T=200K, 300K, 400K, 600K$.

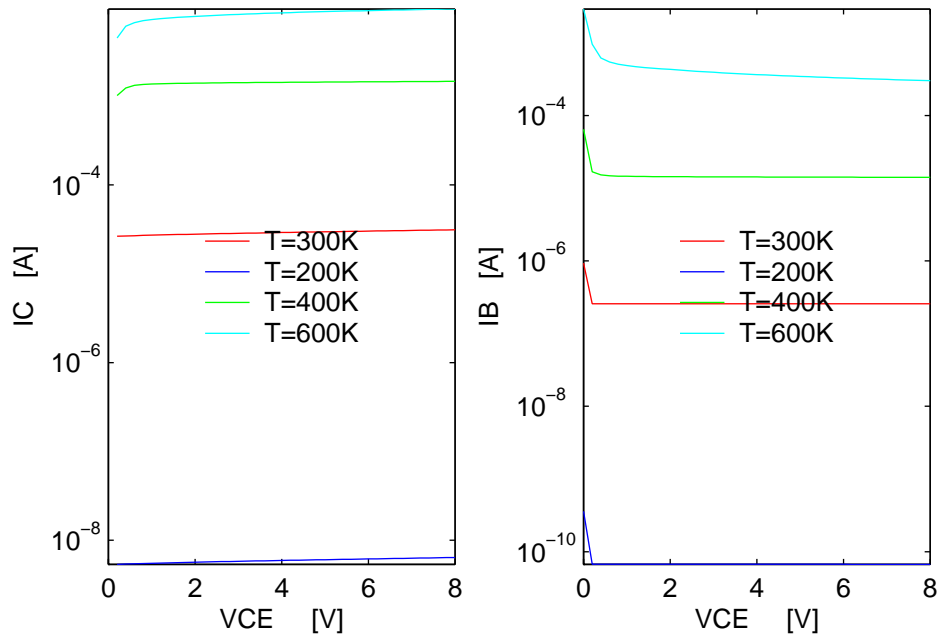


FIGURE 156. I_C and I_B vs. V_{CE} at $V_B=0.8V$ and $T=200K, 300K, 400K, 600K$.

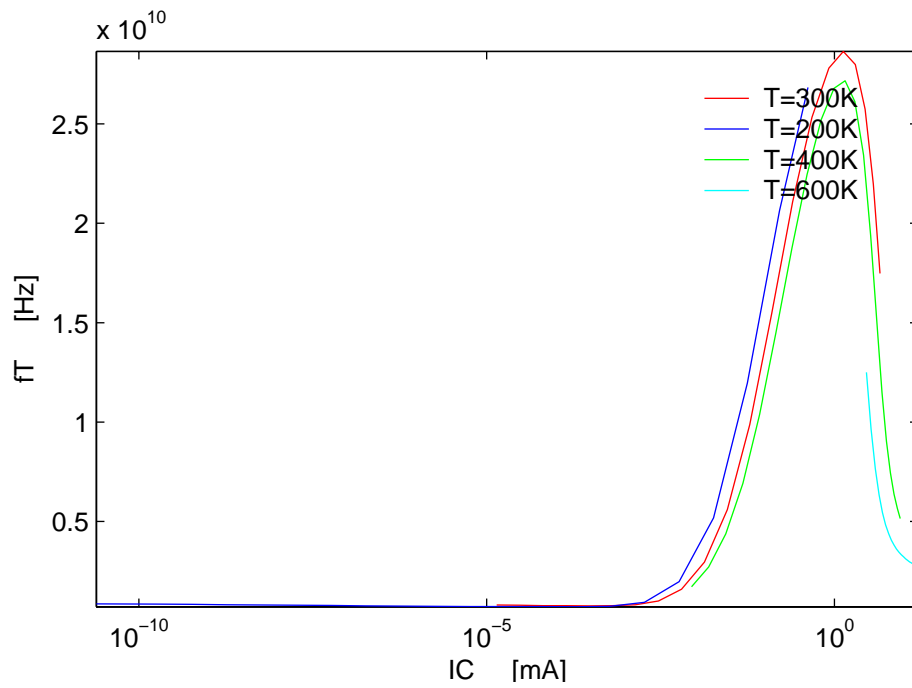


FIGURE 157. f_T (Hz) vs. I_C (mA) at $V_{BC}=-2.5V$ and $T=200K, 300K, 400K, 600K$.