

MUN5311DW1T1G Series

Preferred Devices

Dual Bias Resistor Transistors

NPN and PNP Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

The Bias Resistor Transistor (BRT) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. These digital transistors are designed to replace a single device and its external resistor bias network. The BRT eliminates these individual components by integrating them into a single device. In the MUN5311DW1T1G series, two complementary BRT devices are housed in the SOT-363 package which is ideal for low power surface mount applications where board space is at a premium.

Features

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- Available in 8 mm, 7 inch/3000 Unit Tape and Reel
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted, common for Q_1 and Q_2 , - minus sign for Q_1 (PNP) omitted)

| Rating | Symbol | Value | Unit |
|---------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CBO} | 50 | Vdc |
| Collector-Emitter Voltage | V_{CEO} | 50 | Vdc |
| Collector Current | I_C | 100 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic (One Junction Heated) | Symbol | Max | Unit |
|---|-----------------|--|----------------------------|
| Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 187 (Note 1) 256 (Note 2) 1.5 (Note 1) 2.0 (Note 2) | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance – Junction-to-Ambient | $R_{\theta JA}$ | 670 (Note 1) 490 (Note 2) | $^\circ\text{C/W}$ |
| Characteristic (Both Junctions Heated) | Symbol | Max | Unit |
| Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 250 (Note 1) 385 (Note 2) 2.0 (Note 1) 3.0 (Note 2) | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance – Junction-to-Ambient | $R_{\theta JA}$ | 493 (Note 1) 325 (Note 2) | $^\circ\text{C/W}$ |
| Thermal Resistance – Junction-to-Lead | $R_{\theta JL}$ | 188 (Note 1) 208 (Note 2) | $^\circ\text{C/W}$ |
| Junction and Storage Temperature | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

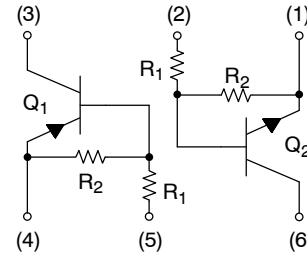
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 @ Minimum Pad
2. FR-4 @ 1.0 x 1.0 inch Pad



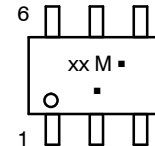
ON Semiconductor®

<http://onsemi.com>



SOT-363
CASE 419B
STYLE 1

MARKING DIAGRAM



- xx = Device Code
- M = Date Code*
- = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or position may vary depending upon manufacturing location.

ORDERING AND DEVICE MARKING INFORMATION

See detailed ordering, shipping, and specific marking information in the table on page 2 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

MUN5311DW1T1G Series

ORDERING, SHIPPING, DEVICE MARKING AND RESISTOR VALUES

| Device | Package | Marking | R1 (K) | R2 (K) | Shipping [†] |
|---------------|----------------------|---------|--------|--------|-----------------------|
| MUN5311DW1T1G | SOT-363 (Pb-Free) | 11 | 10 | 10 | 3000 / Tape & Reel |
| MUN5312DW1T1G | SOT-363 (Pb-Free) | 12 | 22 | 22 | |
| MUN5313DW1T1G | SOT-363 (Pb-Free) | 13 | 47 | 47 | |
| MUN5314DW1T1G | SOT-363 (Pb-Free) | 14 | 10 | 47 | |
| MUN5315DW1T1G | SOT-363 (Pb-Free) | 15 | 10 | ∞ | |
| MUN5316DW1T1G | SOT-363 (Pb-Free) | 16 | 4.7 | ∞ | |
| MUN5330DW1T1G | SOT-363 (Pb-Free) | 30 | 1.0 | 1.0 | |
| MUN5331DW1T1G | SOT-363 (Pb-Free) | 31 | 2.2 | 2.2 | |
| MUN5332DW1T1G | SOT-363 (Pb-Free) | 32 | 4.7 | 4.7 | |
| MUN5333DW1T1G | SOT-363 (Pb-Free) | 33 | 4.7 | 47 | |
| MUN5334DW1T1G | SOT-363 (Pb-Free) | 34 | 22 | 47 | |
| MUN5335DW1T1G | SOT-363 (Pb-Free) | 35 | 2.2 | 47 | |

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MUN5311DW1T1G Series

ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$ unless otherwise noted, common for Q_1 and Q_2 , - minus sign for Q_1 (PNP) omitted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|---------------|-----|-----|------|------|
| OFF CHARACTERISTICS | | | | | |
| Collector-Base Cutoff Current ($V_{CB} = 50\text{ V}$, $I_E = 0$) | I_{CBO} | - | - | 100 | nAdc |
| Collector-Emitter Cutoff Current ($V_{CE} = 50\text{ V}$, $I_B = 0$) | I_{CEO} | - | - | 500 | nAdc |
| Emitter-Base Cutoff Current ($V_{EB} = 6.0\text{ V}$, $I_C = 0$) | MUN5311DW1T1G | - | - | 0.5 | mAdc |
| | MUN5312DW1T1G | - | - | 0.2 | |
| | MUN5313DW1T1G | - | - | 0.1 | |
| | MUN5314DW1T1G | - | - | 0.2 | |
| | MUN5315DW1T1G | - | - | 0.9 | |
| | MUN5316DW1T1G | - | - | 1.9 | |
| | MUN5330DW1T1G | - | - | 4.3 | |
| | MUN5331DW1T1G | - | - | 2.3 | |
| | MUN5332DW1T1G | - | - | 1.5 | |
| | MUN5333DW1T1G | - | - | 0.18 | |
| | MUN5334DW1T1G | - | - | 0.13 | |
| MUN5335DW1T1G | - | - | 0.2 | | |
| Collector-Base Breakdown Voltage ($I_C = 10\ \mu\text{A}$, $I_E = 0$) | $V_{(BR)CBO}$ | 50 | - | - | Vdc |
| Collector-Emitter Breakdown Voltage (Note 3) ($I_C = 2.0\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | 50 | - | - | Vdc |

3. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%

MUN5311DW1T1G Series

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted, common for Q₁ and Q₂, - minus sign for Q₁ (PNP) omitted) (Continued)

| Characteristic | | Symbol | Min | Typ | Max | Unit | | | |
|--|---|----------------------|-----------------|-----------------|------|------|------|-----|-----|
| ON CHARACTERISTICS (Note 4) | | | | | | | | | |
| DC Current Gain (V _{CE} = 10 V, I _C = 5.0 mA) | MUN5311DW1T1G | h _{FE} | 35 | 60 | - | | | | |
| | MUN5312DW1T1G | | 60 | 100 | - | | | | |
| | MUN5313DW1T1G | | 80 | 140 | - | | | | |
| | MUN5314DW1T1G | | 80 | 140 | - | | | | |
| | MUN5315DW1T1G | | 160 | 350 | - | | | | |
| | MUN5316DW1T1G | | 160 | 350 | - | | | | |
| | MUN5330DW1T1G | | 3.0 | 5.0 | - | | | | |
| | MUN5331DW1T1G | | 8.0 | 15 | - | | | | |
| | MUN5332DW1T1G | | 15 | 30 | - | | | | |
| | MUN5333DW1T1G | | 80 | 200 | - | | | | |
| | MUN5334DW1T1G | | 80 | 150 | - | | | | |
| | MUN5335DW1T1G | | 80 | 140 | - | | | | |
| Collector-Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.3 mA) | MUN5311DW1T1G | V _{CE(sat)} | - | - | 0.25 | Vdc | | | |
| | MUN5312DW1T1G | | - | - | 0.25 | | | | |
| | MUN5313DW1T1G | | - | - | 0.25 | | | | |
| | MUN5314DW1T1G | | - | - | 0.25 | | | | |
| | MUN5335DW1T1G | | - | - | 0.25 | | | | |
| | (I _C = 10 mA, I _B = 5 mA) | | MUN5330DW1T1G | - | - | | 0.25 | | |
| | MUN5331DW1T1G | | - | - | 0.25 | | | | |
| | (I _C = 10 mA, I _B = 1 mA) | | MUN5315DW1T1G | - | - | | 0.25 | | |
| | MUN5316DW1T1G | | - | - | 0.25 | | | | |
| | MUN5332DW1T1G | | - | - | 0.25 | | | | |
| | MUN5333DW1T1G | | - | - | 0.25 | | | | |
| | MUN5334DW1T1G | | - | - | 0.25 | | | | |
| | MUN5335DW1T1G | | - | - | 0.25 | | | | |
| | Output Voltage (on) (V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 kΩ) | | MUN5311DW1T1G | V _{OL} | - | | - | 0.2 | Vdc |
| MUN5312DW1T1G | | - | - | | 0.2 | | | | |
| MUN5314DW1T1G | | - | - | | 0.2 | | | | |
| MUN5315DW1T1G | | - | - | | 0.2 | | | | |
| MUN5316DW1T1G | | - | - | | 0.2 | | | | |
| MUN5330DW1T1G | | - | - | | 0.2 | | | | |
| MUN5331DW1T1G | | - | - | | 0.2 | | | | |
| MUN5332DW1T1G | | - | - | | 0.2 | | | | |
| MUN5333DW1T1G | | - | - | | 0.2 | | | | |
| MUN5334DW1T1G | | - | - | | 0.2 | | | | |
| MUN5335DW1T1G | | - | - | | 0.2 | | | | |
| (V _{CC} = 5.0 V, V _B = 3.5 V, R _L = 1.0 kΩ) | | MUN5313DW1T1G | - | | - | 0.2 | | | |
| Output Voltage (off) (V _{CC} = 5.0 V, V _B = 0.5 V, R _L = 1.0 kΩ) | | MUN5311DW1T1G | V _{OH} | | 4.9 | - | - | Vdc | |
| | | MUN5312DW1T1G | | | 4.9 | - | - | | |
| | MUN5313DW1T1G | 4.9 | | - | - | | | | |
| | MUN5314DW1T1G | 4.9 | | - | - | | | | |
| | MUN5333DW1T1G | 4.9 | | - | - | | | | |
| | MUN5334DW1T1G | 4.9 | | - | - | | | | |
| | MUN5335DW1T1G | 4.9 | | - | - | | | | |
| | (V _{CC} = 5.0 V, V _B = 0.050 V, R _L = 1.0 kΩ) | MUN5330DW1T1G | | 4.9 | - | - | | | |
| | (V _{CC} = 5.0 V, V _B = 0.25 V, R _L = 1.0 kΩ) | MUN5315DW1T1G | | 4.9 | - | - | | | |
| | MUN5316DW1T1G | 4.9 | | - | - | | | | |
| | MUN5331DW1T1G | 4.9 | | - | - | | | | |
| | MUN5332DW1T1G | 4.9 | | - | - | | | | |

MUN5311DW1T1G Series

ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$ unless otherwise noted, common for Q_1 and Q_2 , - minus sign for Q_1 (PNP) omitted) (Continued)

| Characteristic | Symbol | Min | Typ | Max | Unit | |
|------------------------------------|---|-------|-------|-------|-------|------------|
| ON CHARACTERISTICS (Note 4) | | | | | | |
| Input Resistor | MUN5311DW1T1G | R1 | 7.0 | 10 | 13 | k Ω |
| | MUN5312DW1T1G | | 15.4 | 22 | 28.6 | |
| | MUN5313DW1T1G | | 32.9 | 47 | 61.1 | |
| | MUN5314DW1T1G | | 7.0 | 10 | 13 | |
| | MUN5315DW1T1G | | 7.0 | 10 | 13 | |
| | MUN5316DW1T1G | | 3.3 | 4.7 | 6.1 | |
| | MUN5330DW1T1G | | 0.7 | 1.0 | 1.3 | |
| | MUN5331DW1T1G | | 1.5 | 2.2 | 2.9 | |
| | MUN5332DW1T1G | | 3.3 | 4.7 | 6.1 | |
| | MUN5333DW1T1G | | 3.3 | 4.7 | 6.1 | |
| | MUN5334DW1T1G | | 15.4 | 22 | 28.6 | |
| | MUN5335DW1T1G | | 1.54 | 2.2 | 2.86 | |
| Resistor Ratio | MUN5311DW1T1G/MUN5312DW1T1G/MUN5313DW1T1G | R1/R2 | 0.8 | 1.0 | 1.2 | |
| | MUN5314DW1T1G | | 0.17 | 0.21 | 0.25 | |
| | MUN5315DW1T1G/MUN5316DW1T1G | | - | - | - | |
| | MUN5330DW1T1G/MUN5331DW1T1G/MUN5332DW1T1G | | 0.8 | 1.0 | 1.2 | |
| | MUN5333DW1T1G | | 0.055 | 0.1 | 0.185 | |
| | MUN5334DW1T1G | | 0.38 | 0.47 | 0.56 | |
| | MUN5335DW1T1G | | 0.038 | 0.047 | 0.056 | |

4. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%

ALL MUN5311DW1T1G SERIES DEVICES

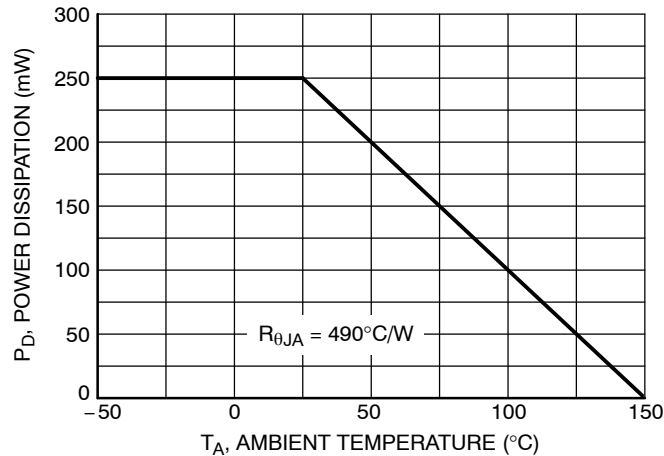


Figure 1. Derating Curve

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5311DW1T1G NPN TRANSISTOR

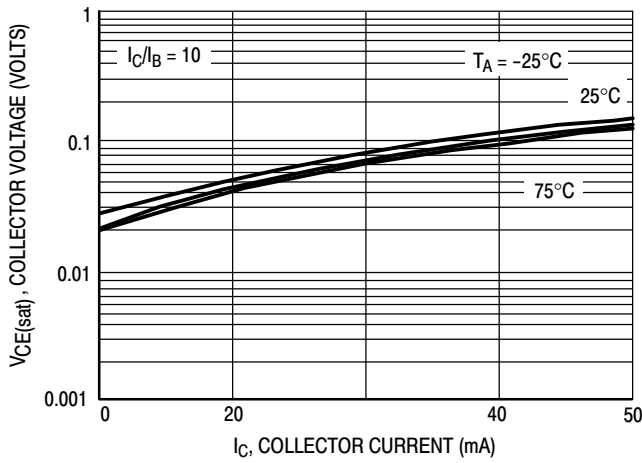


Figure 2. $V_{CE(sat)}$ versus I_C

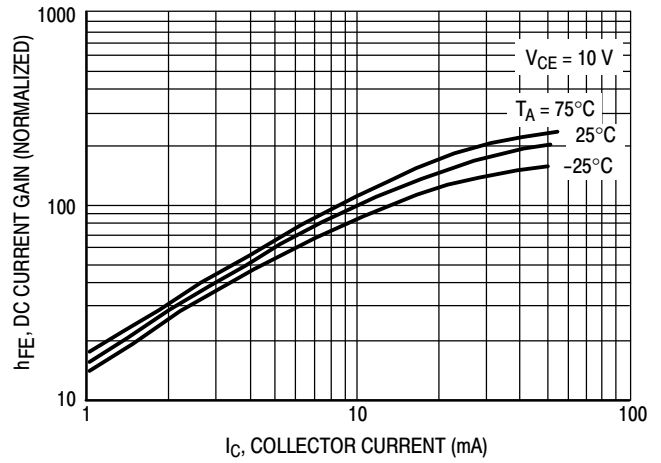


Figure 3. DC Current Gain

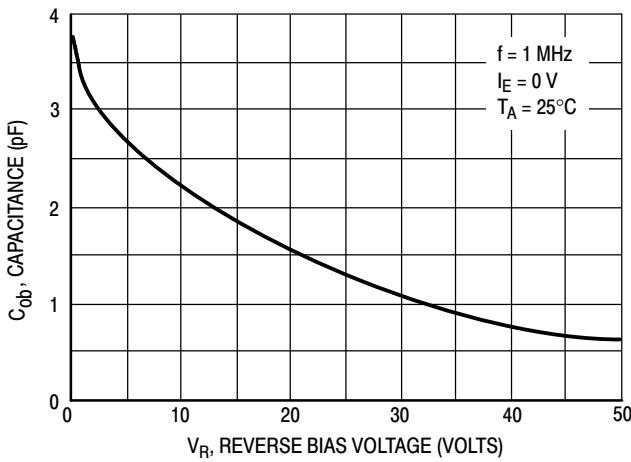


Figure 4. Output Capacitance

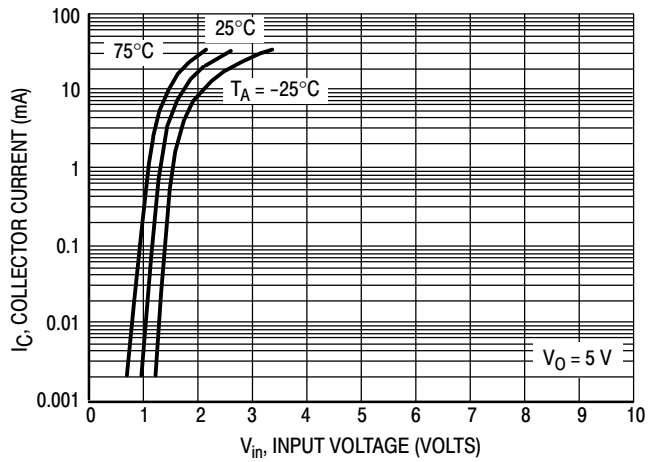


Figure 5. Output Current versus Input Voltage

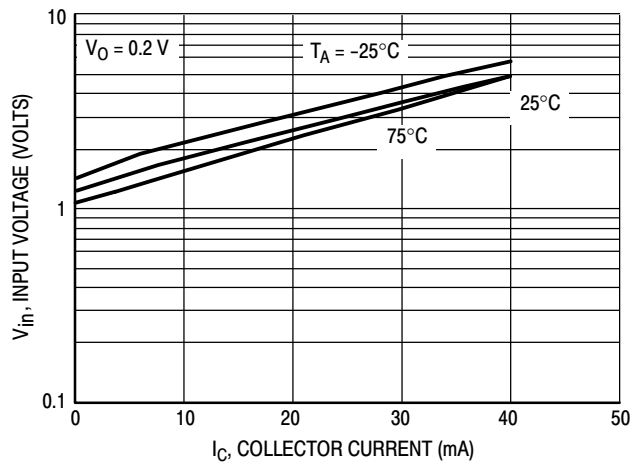


Figure 6. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5311DW1T1G PNP TRANSISTOR

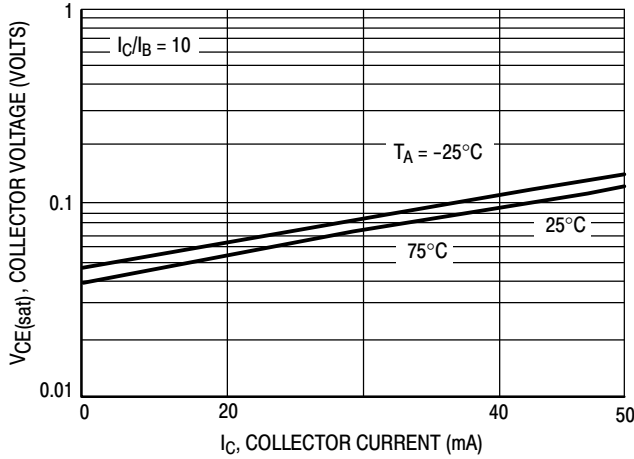


Figure 7. $V_{CE(sat)}$ versus I_C

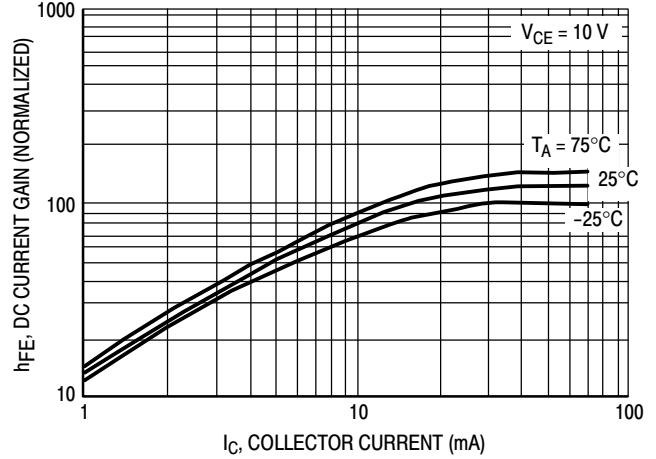


Figure 8. DC Current Gain

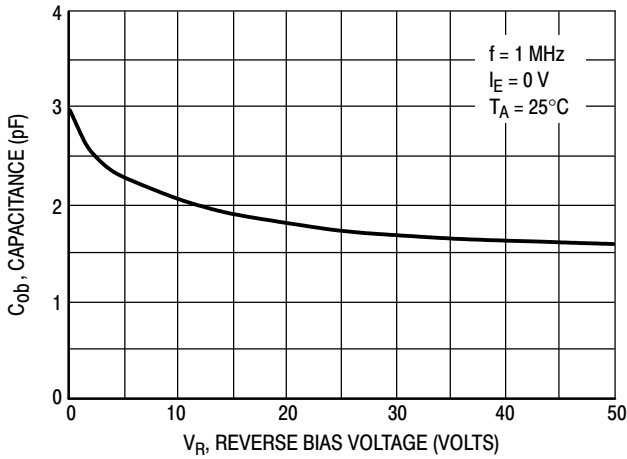


Figure 9. Output Capacitance

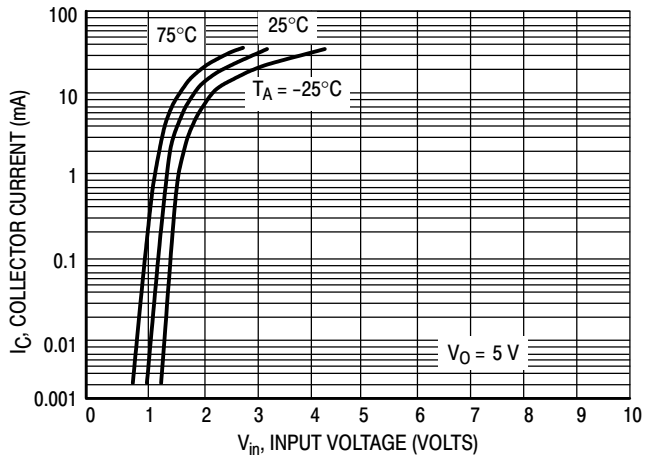


Figure 10. Output Current versus Input Voltage

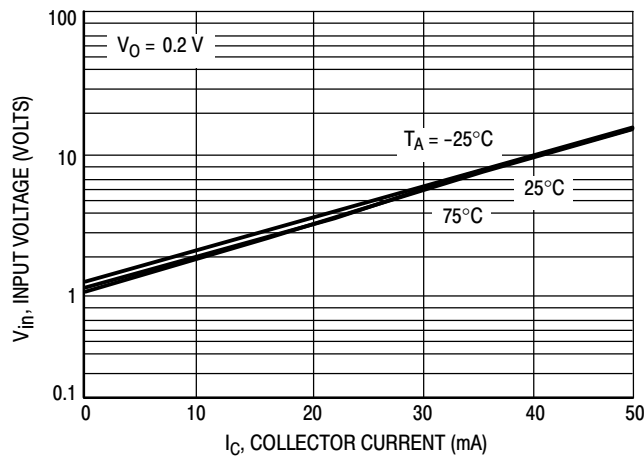


Figure 11. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5312DW1T1G NPN TRANSISTOR

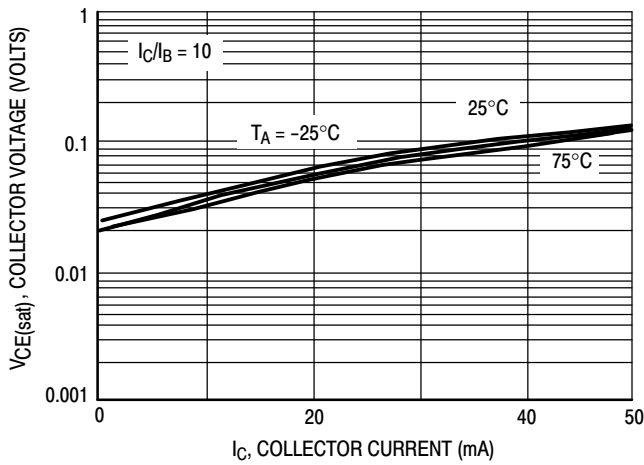


Figure 12. $V_{CE(sat)}$ versus I_C

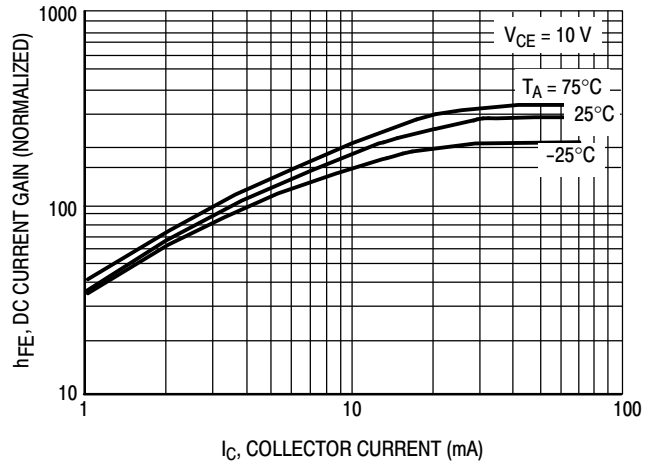


Figure 13. DC Current Gain

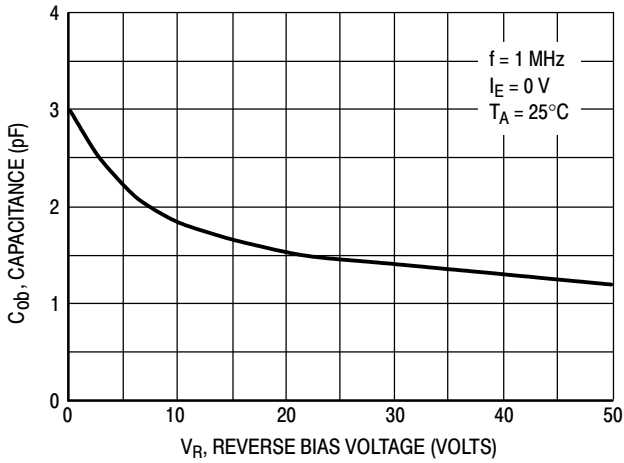


Figure 14. Output Capacitance

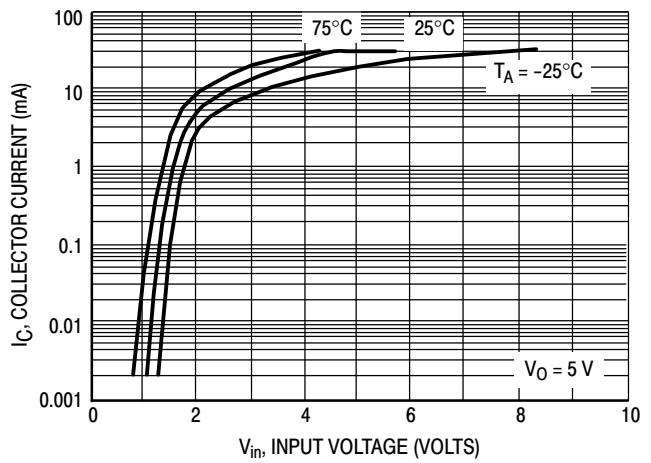


Figure 15. Output Current versus Input Voltage

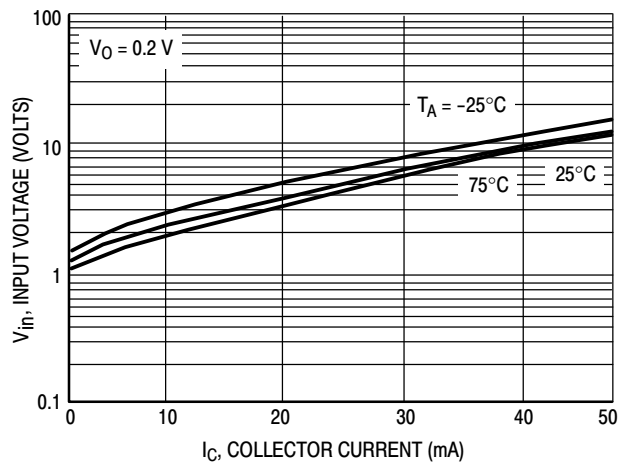


Figure 16. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5312DW1T1G PNP TRANSISTOR

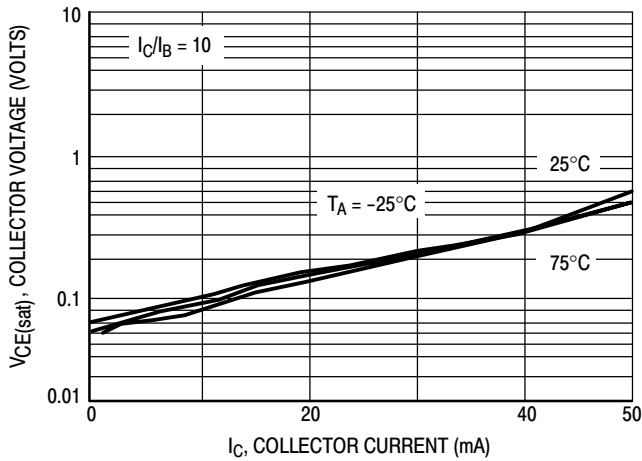


Figure 17. $V_{CE(sat)}$ versus I_C

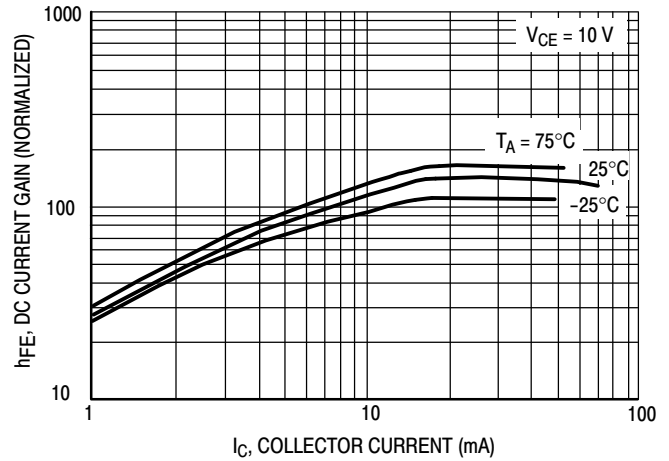


Figure 18. DC Current Gain

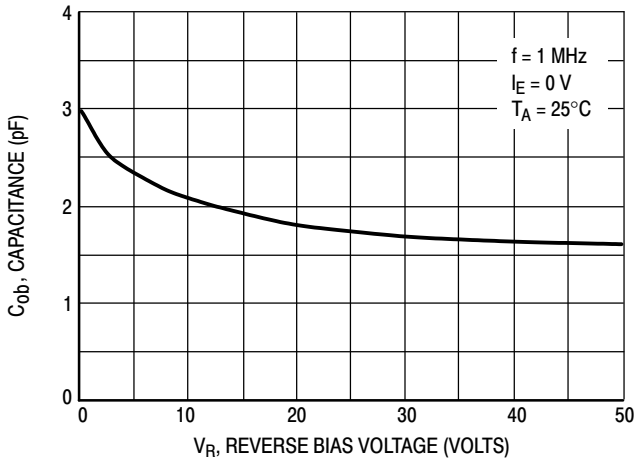


Figure 19. Output Capacitance

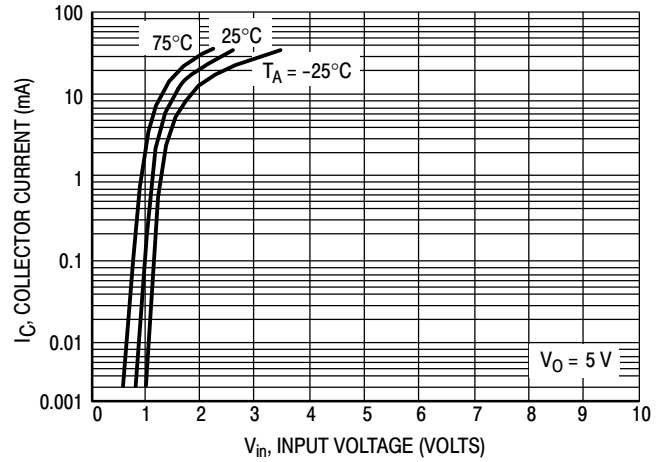


Figure 20. Output Current versus Input Voltage

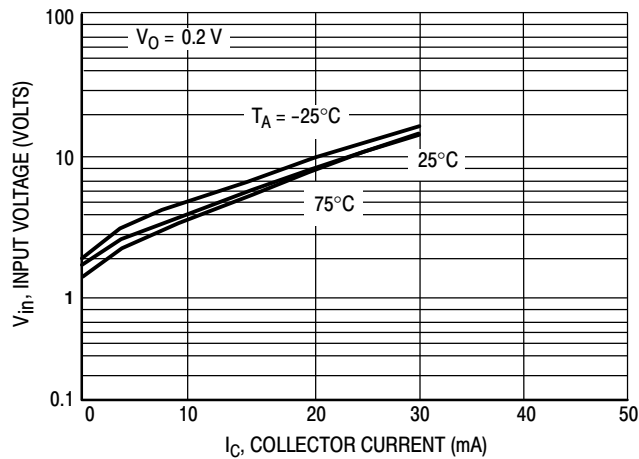


Figure 21. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5313DW1T1G NPN TRANSISTOR

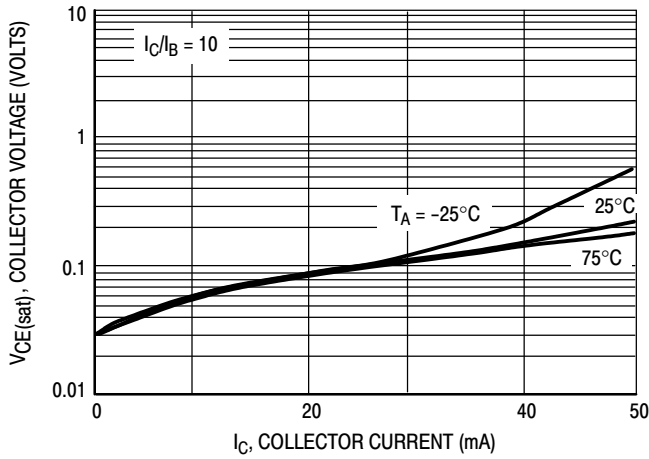


Figure 22. $V_{CE(sat)}$ versus I_C

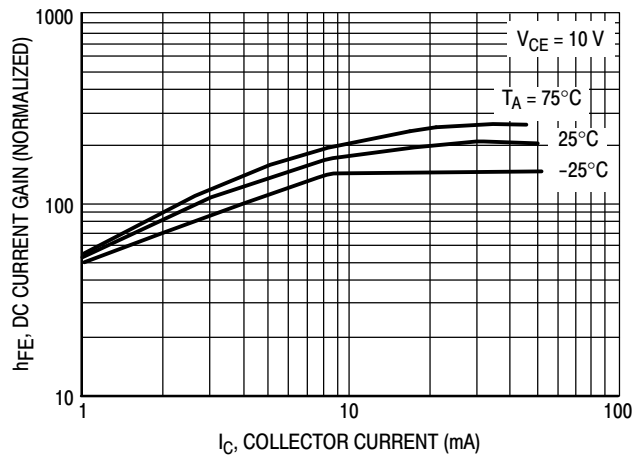


Figure 23. DC Current Gain

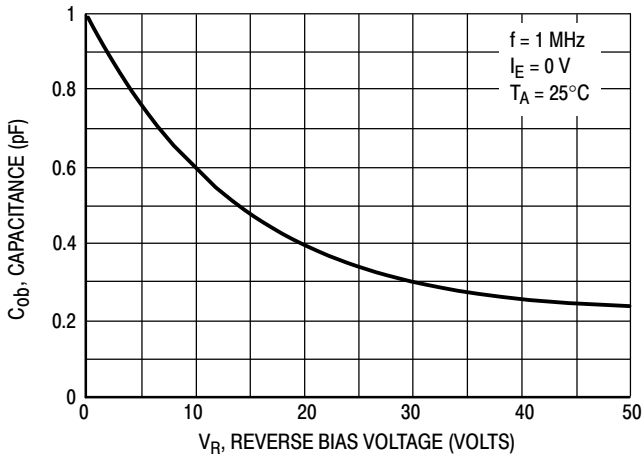


Figure 24. Output Capacitance

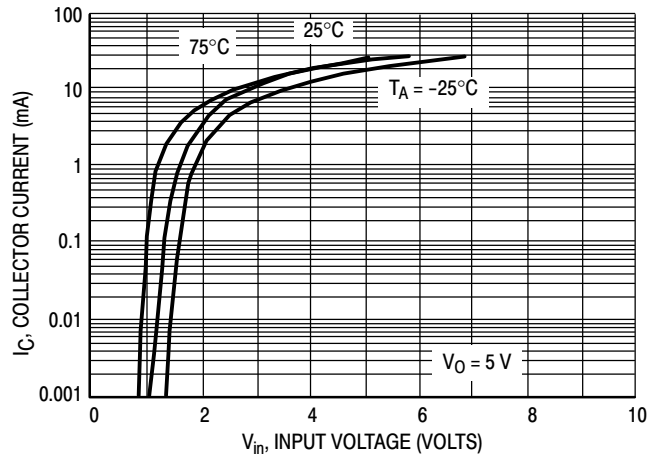


Figure 25. Output Current versus Input Voltage

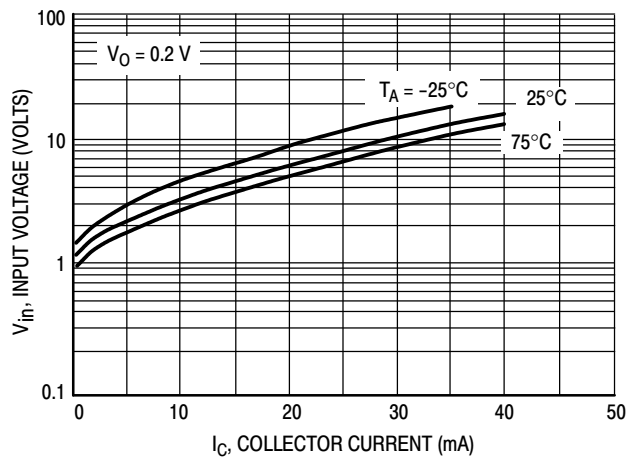


Figure 26. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5313DW1T1G PNP TRANSISTOR

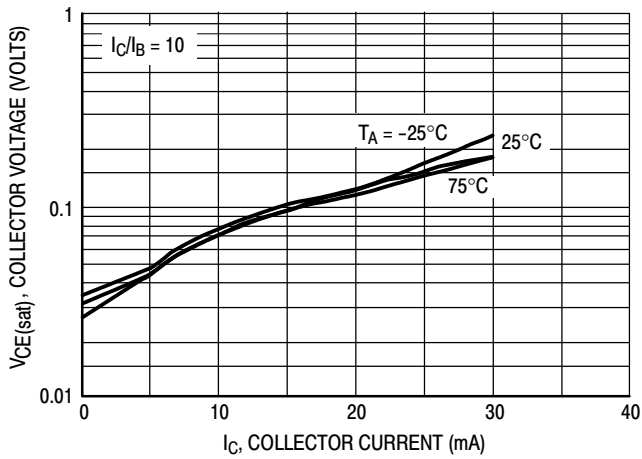


Figure 27. $V_{CE(sat)}$ versus I_C

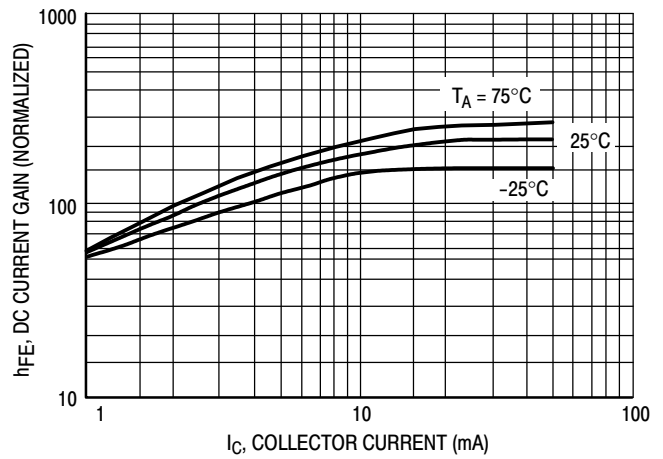


Figure 28. DC Current Gain

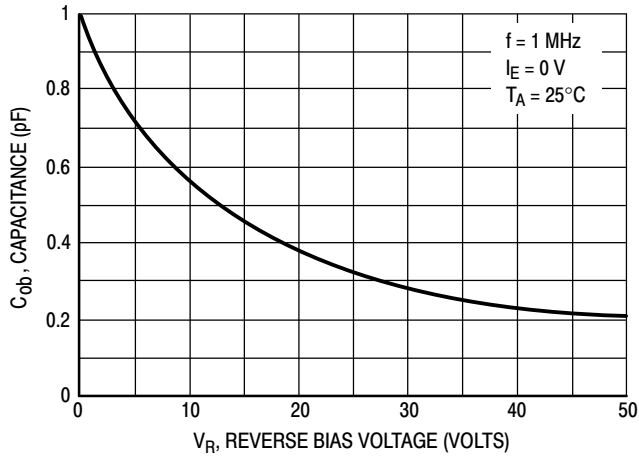


Figure 29. Output Capacitance

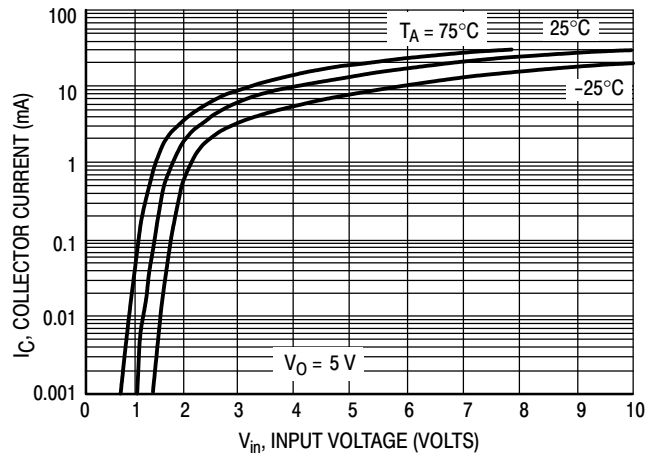


Figure 30. Output Current versus Input Voltage

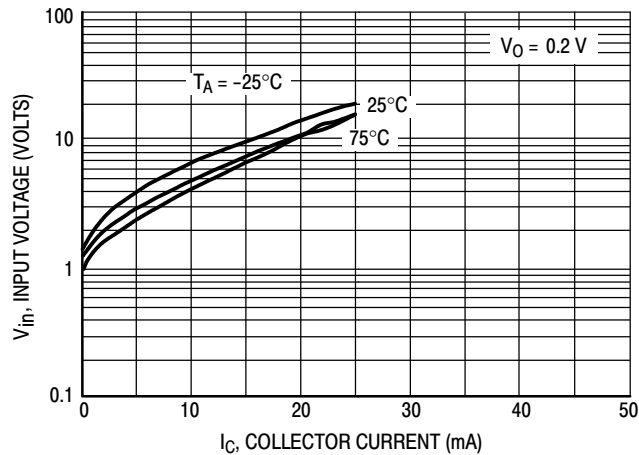


Figure 31. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5314DW1T1G NPN TRANSISTOR

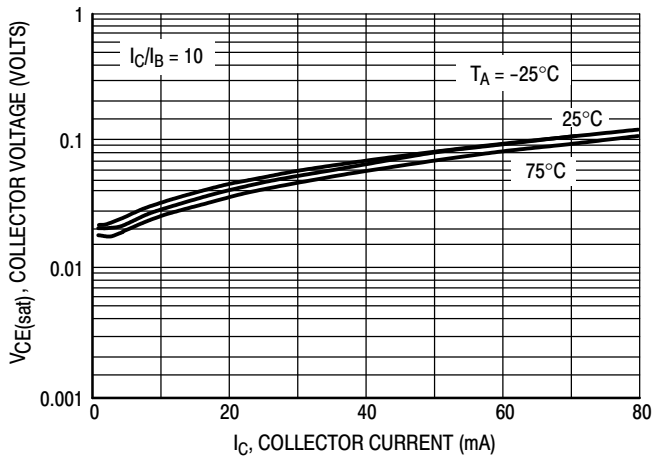


Figure 32. $V_{CE(sat)}$ versus I_C

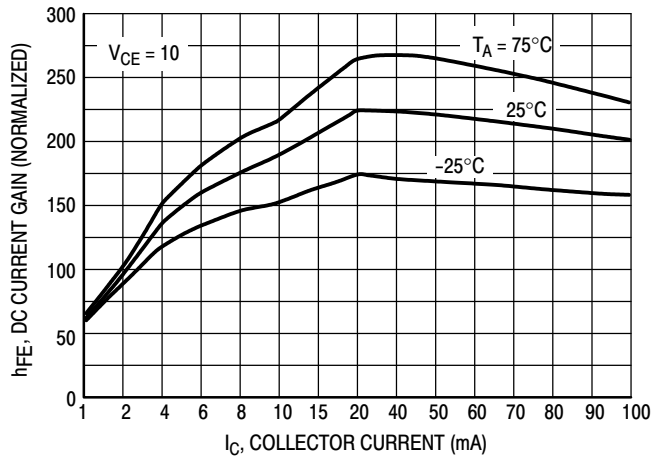


Figure 33. DC Current Gain

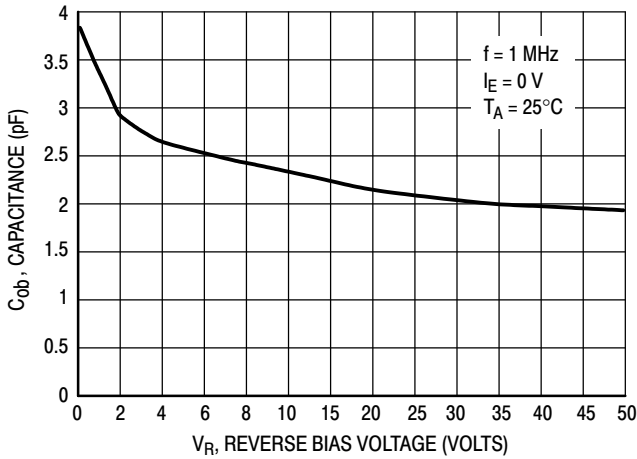


Figure 34. Output Capacitance

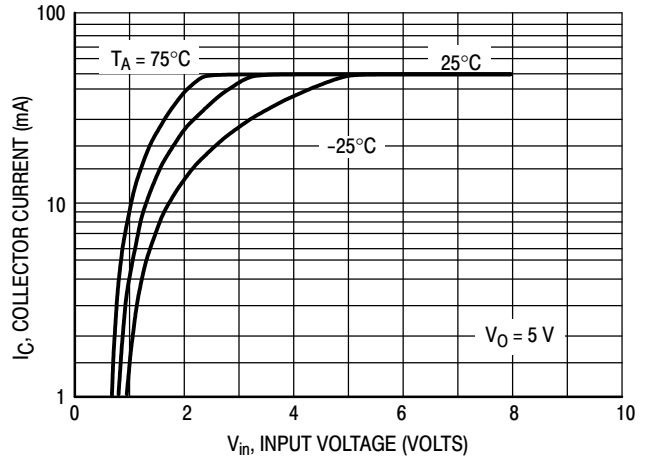


Figure 35. Output Current versus Input Voltage

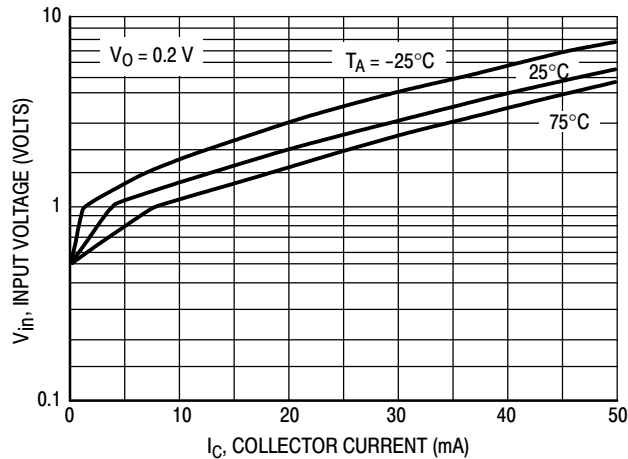


Figure 36. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5314DW1T1G PNP TRANSISTOR

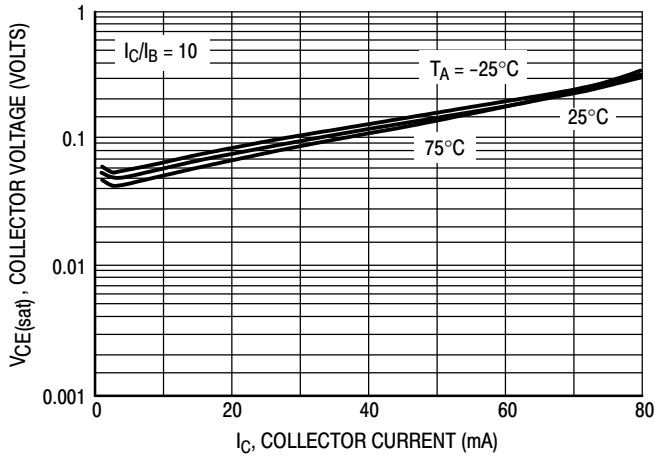


Figure 37. $V_{CE(sat)}$ versus I_C

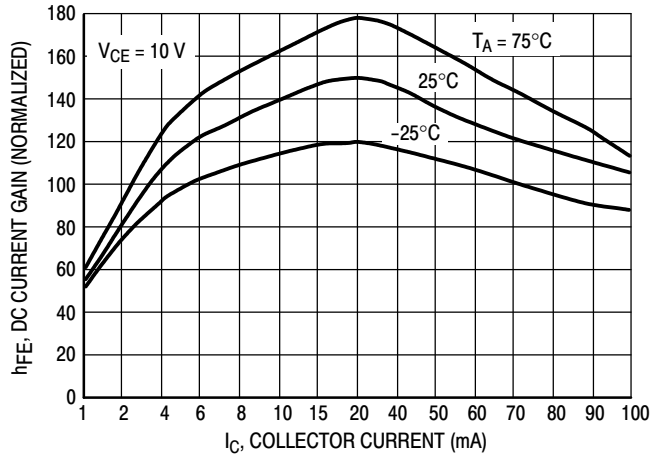


Figure 38. DC Current Gain

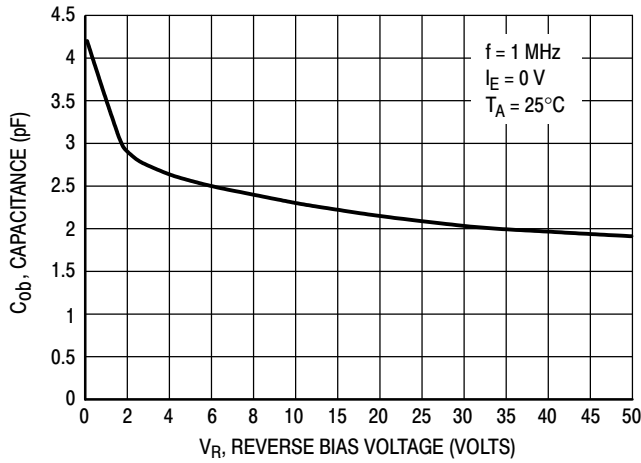


Figure 39. Output Capacitance

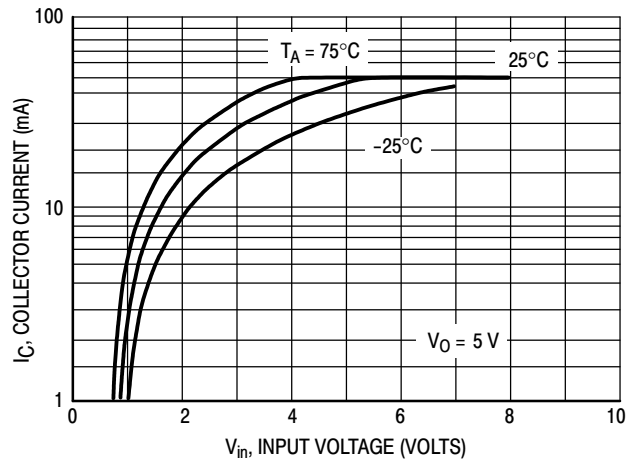


Figure 40. Output Current versus Input Voltage

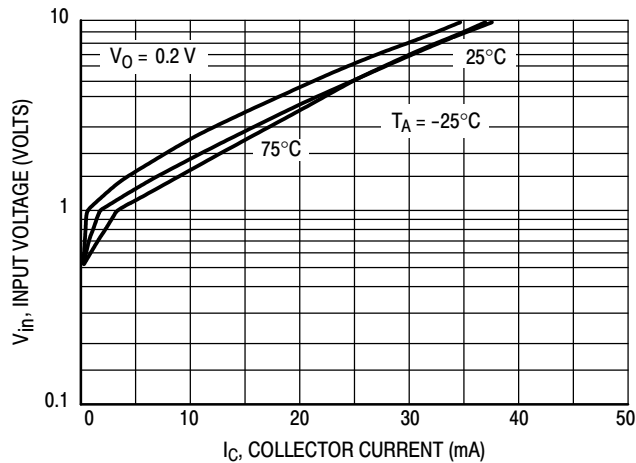


Figure 41. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5315DW1T1G NPN TRANSISTOR

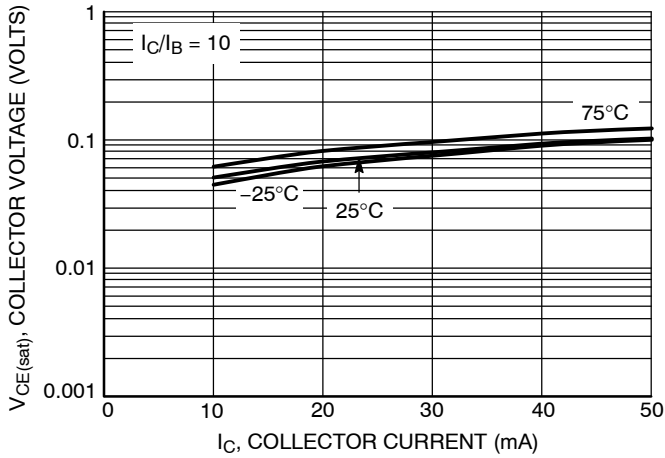


Figure 42. $V_{CE(sat)}$ versus I_C

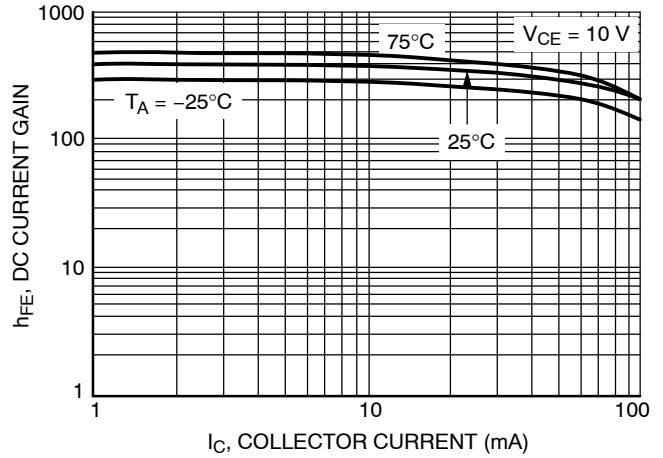


Figure 43. DC Current Gain

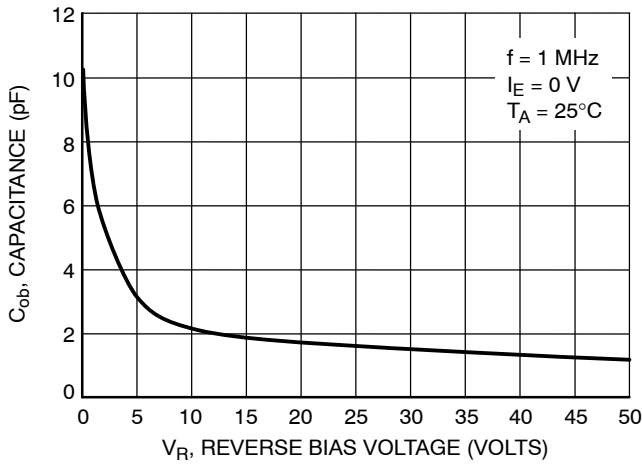


Figure 44. Output Capacitance

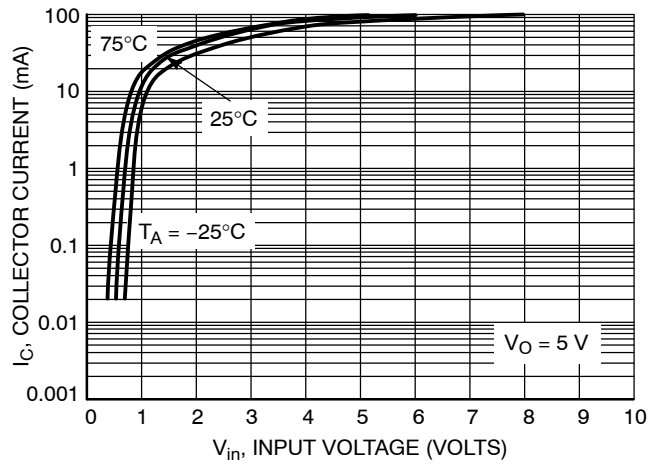


Figure 45. Output Current versus Input Voltage

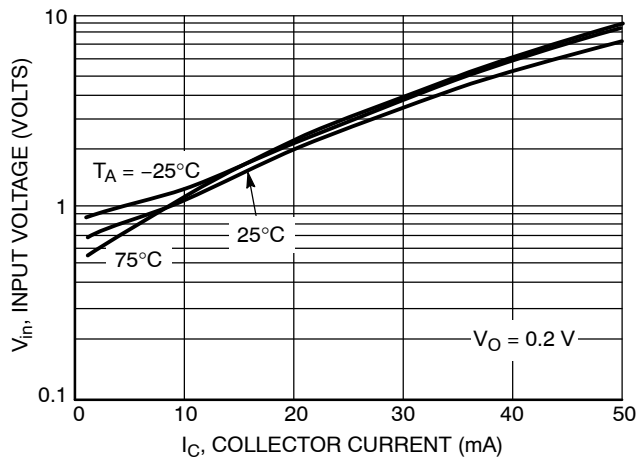


Figure 46. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5315DW1T1G PNP TRANSISTOR

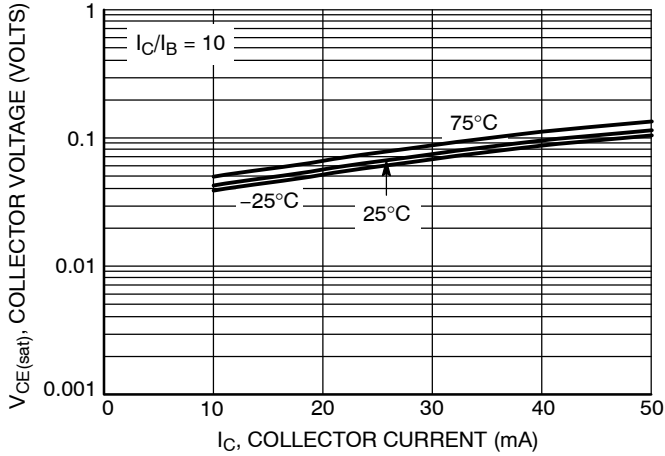


Figure 47. $V_{CE(sat)}$ versus I_C

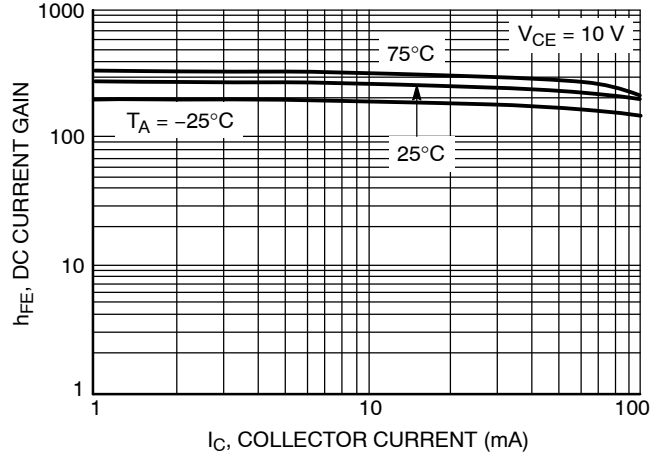


Figure 48. DC Current Gain

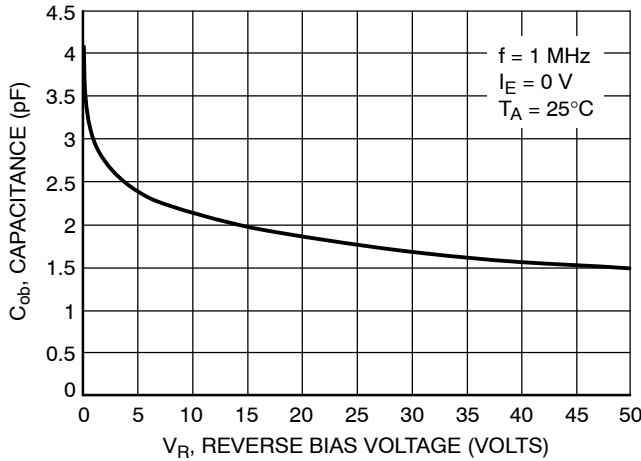


Figure 49. Output Capacitance

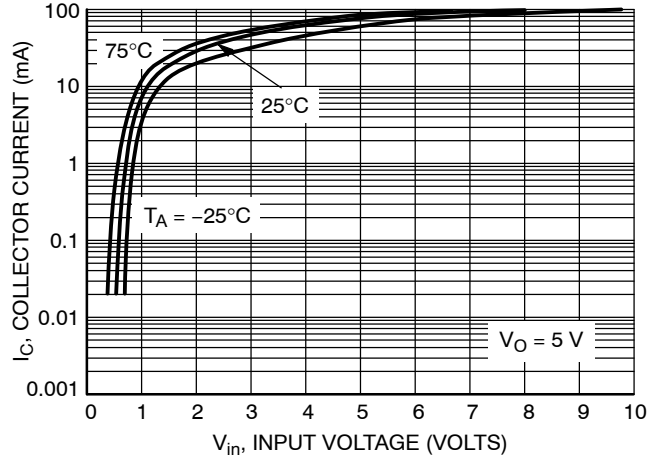


Figure 50. Output Current versus Input Voltage

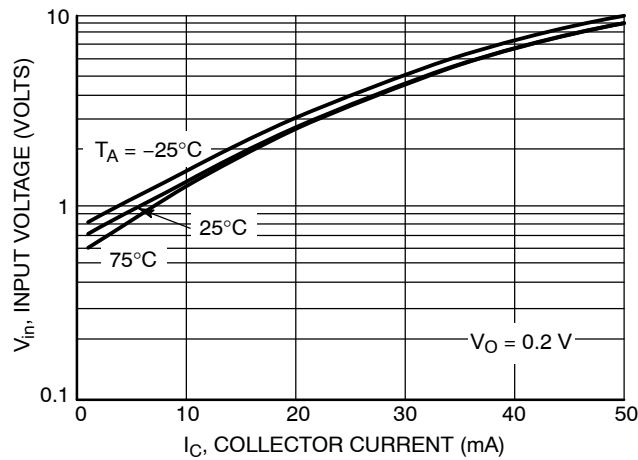


Figure 51. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5316DW1T1G NPN TRANSISTOR

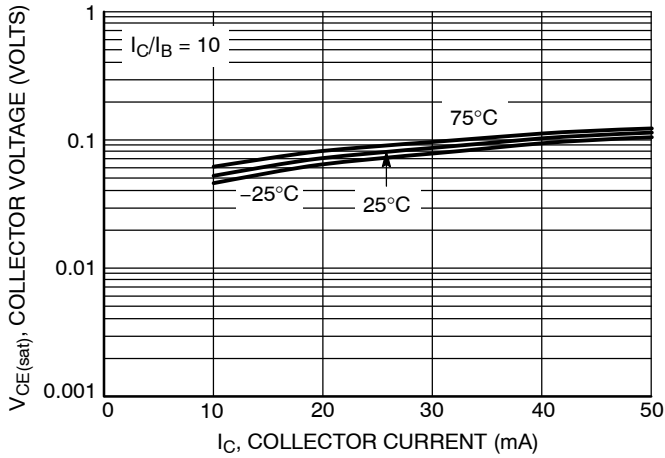


Figure 52. $V_{CE(sat)}$ versus I_C

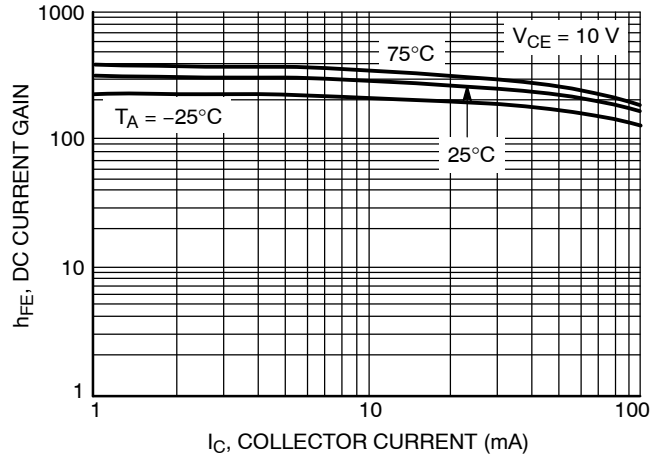


Figure 53. DC Current Gain

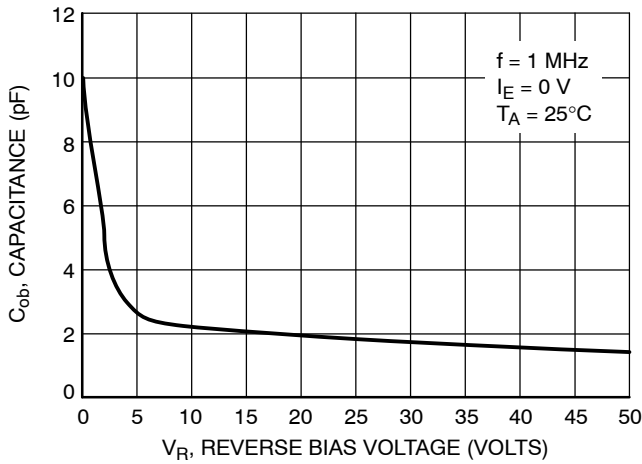


Figure 54. Output Capacitance

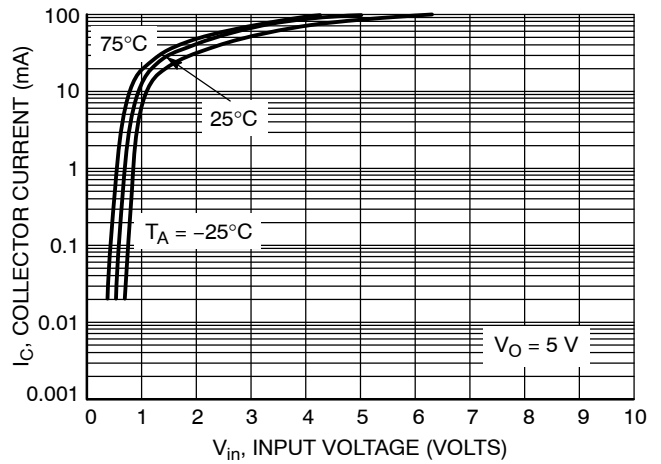


Figure 55. Output Current versus Input Voltage

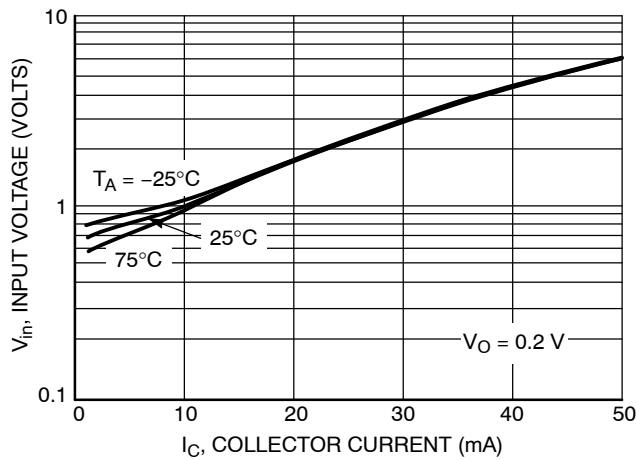


Figure 56. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5316DW1T1G PNP TRANSISTOR

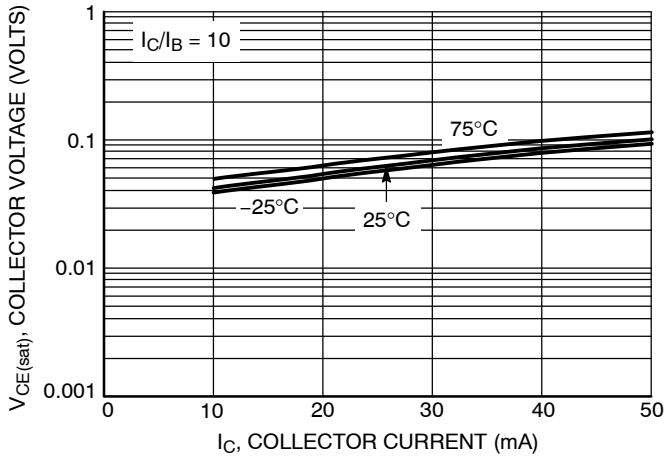


Figure 57. $V_{CE(sat)}$ versus I_C

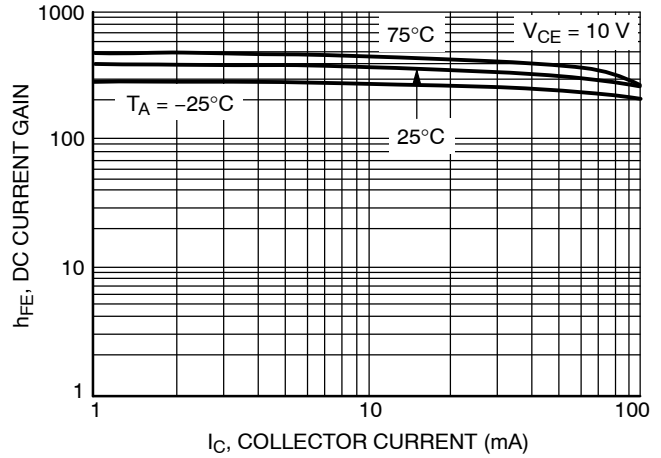


Figure 58. DC Current Gain

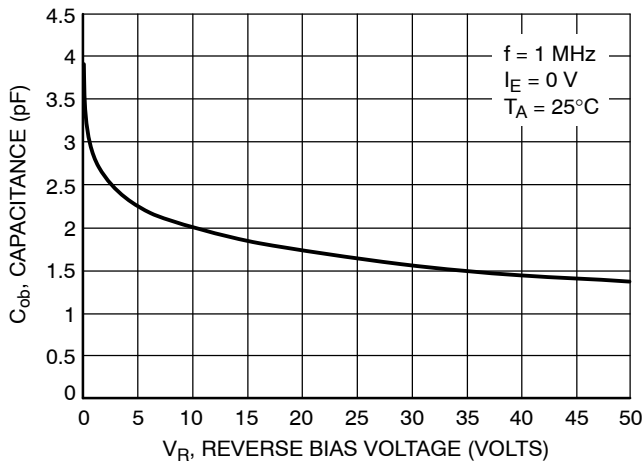


Figure 59. Output Capacitance

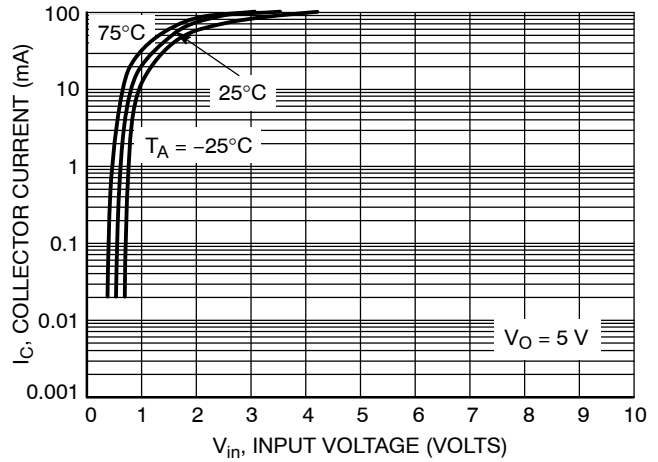


Figure 60. Output Current versus Input Voltage

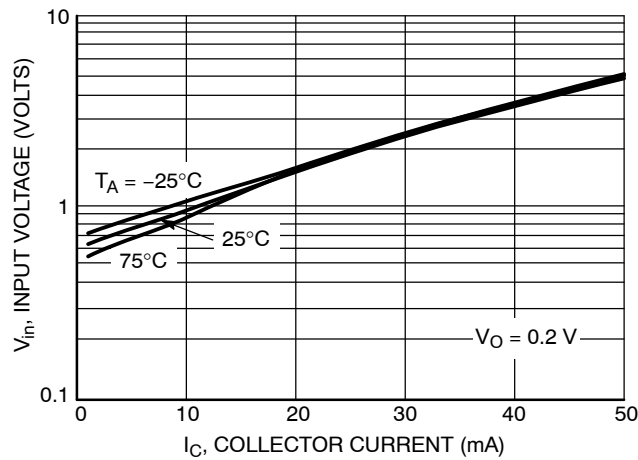


Figure 61. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5330DW1T1G NPN TRANSISTOR

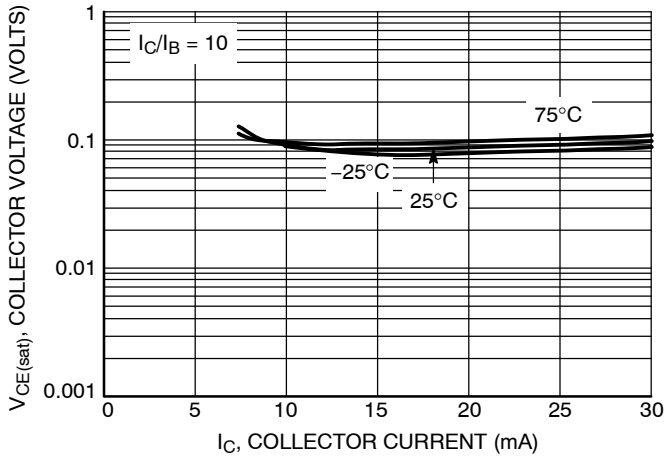


Figure 62. $V_{CE(sat)}$ versus I_C

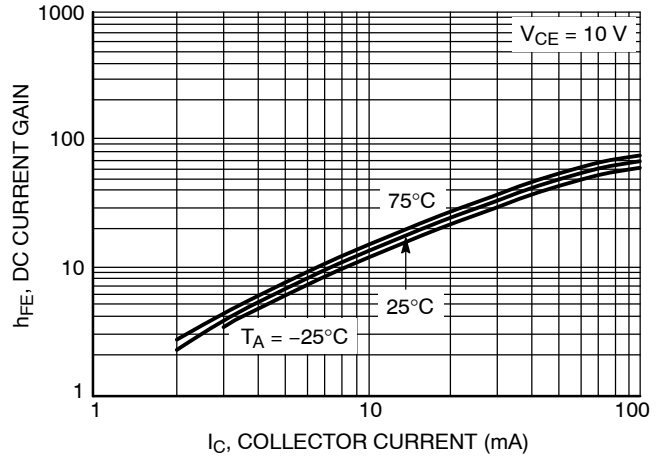


Figure 63. DC Current Gain

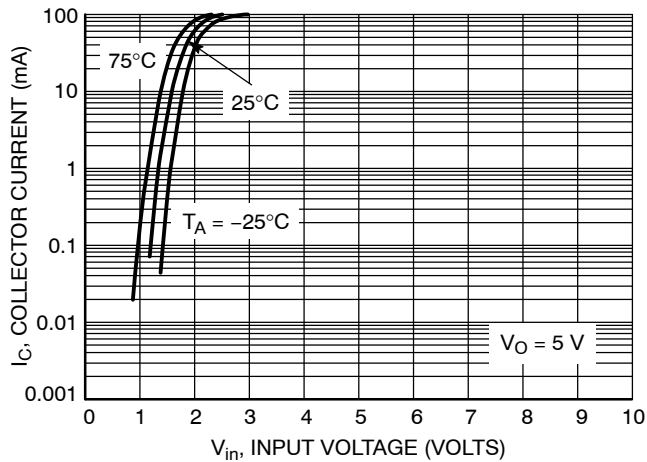


Figure 64. Output Current versus Input Voltage

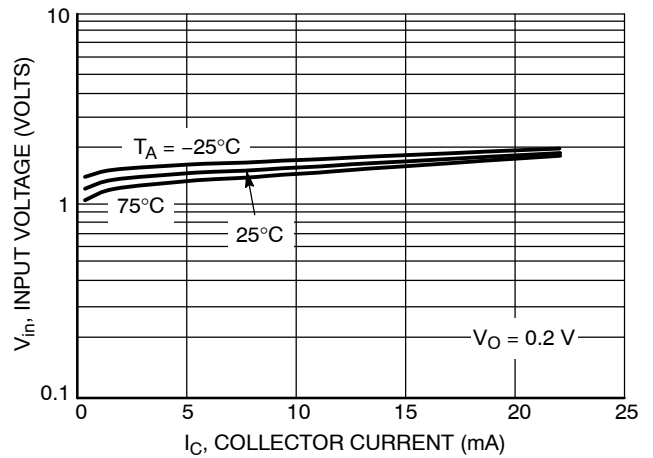


Figure 65. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5330DW1T1G PNP TRANSISTOR

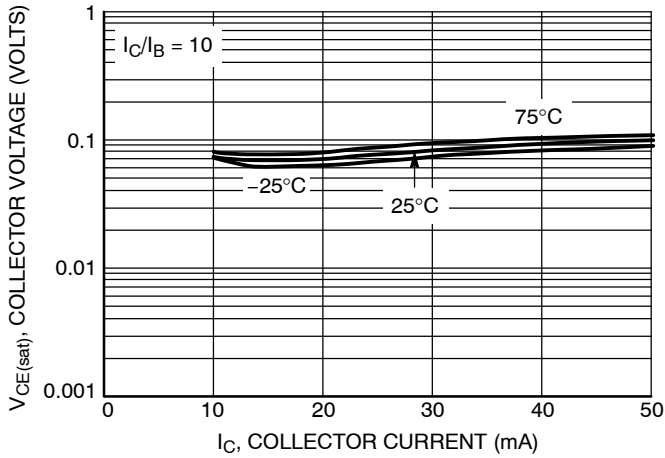


Figure 66. $V_{CE(sat)}$ versus I_C

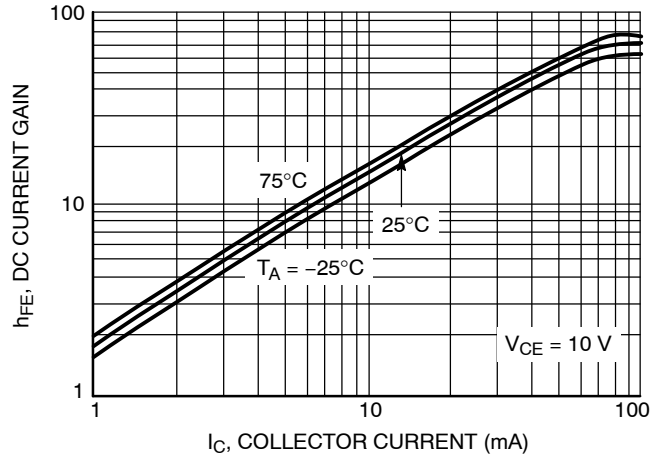


Figure 67. DC Current Gain

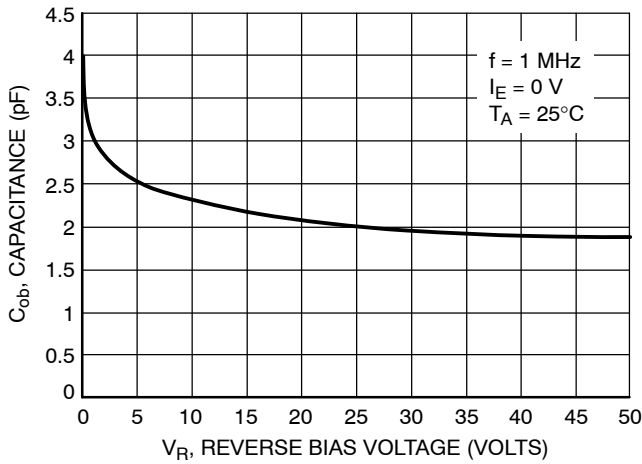


Figure 68. Output Capacitance

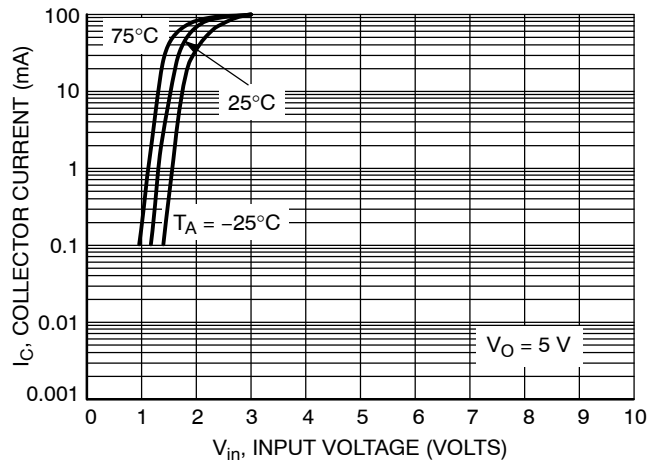


Figure 69. Output Current versus Input Voltage

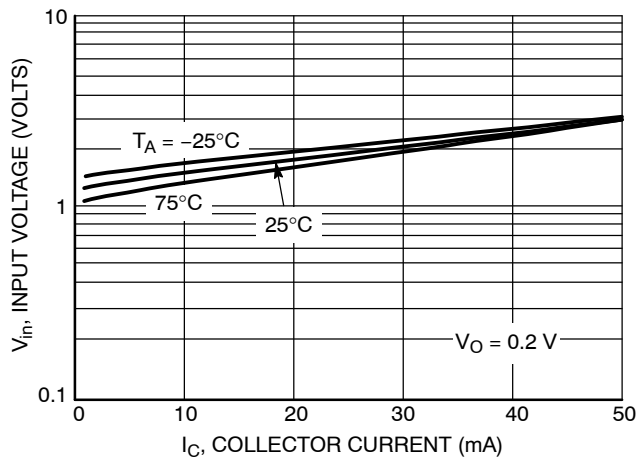


Figure 70. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5311DW1T1G NPN TRANSISTOR

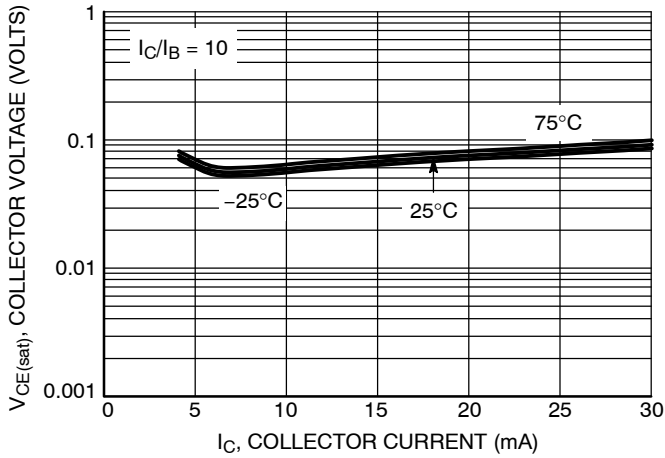


Figure 71. $V_{CE(sat)}$ versus I_C

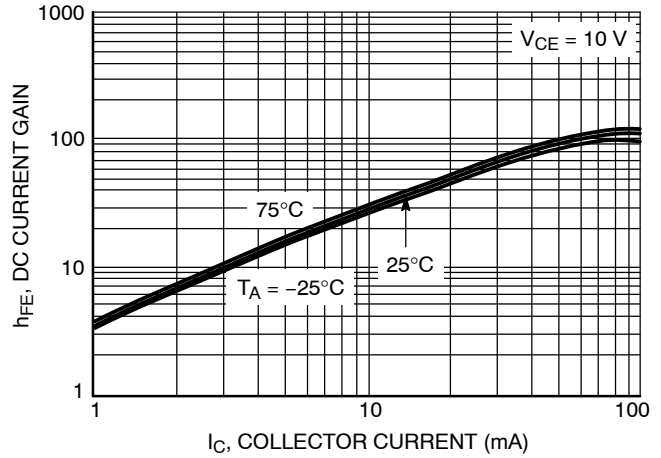


Figure 72. DC Current Gain

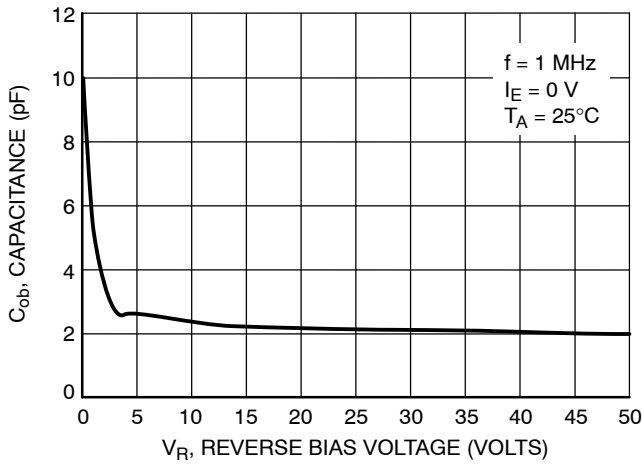


Figure 73. Output Capacitance

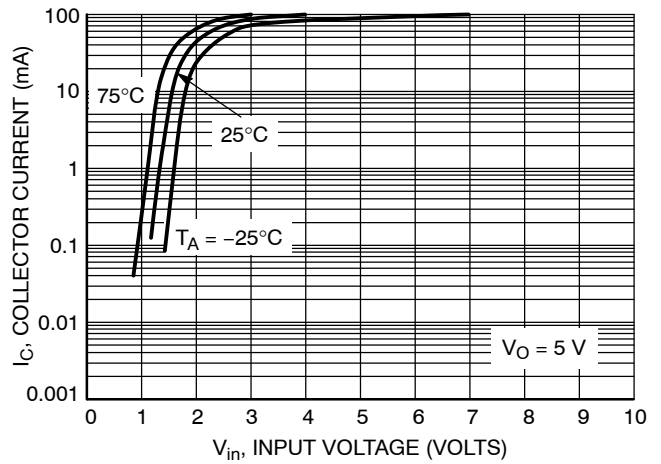


Figure 74. Output Current versus Input Voltage

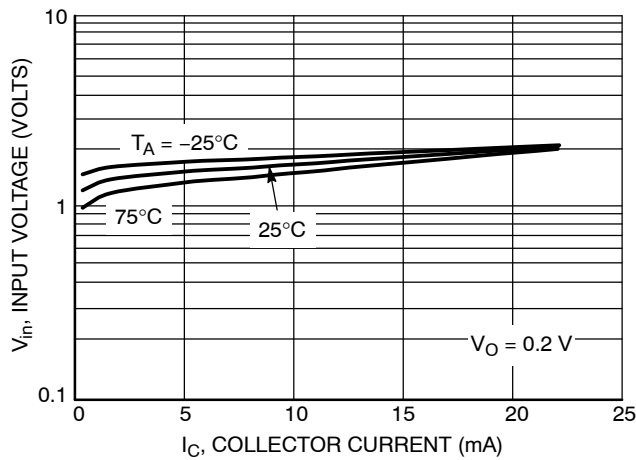


Figure 75. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5311DW1T1G PNP TRANSISTOR

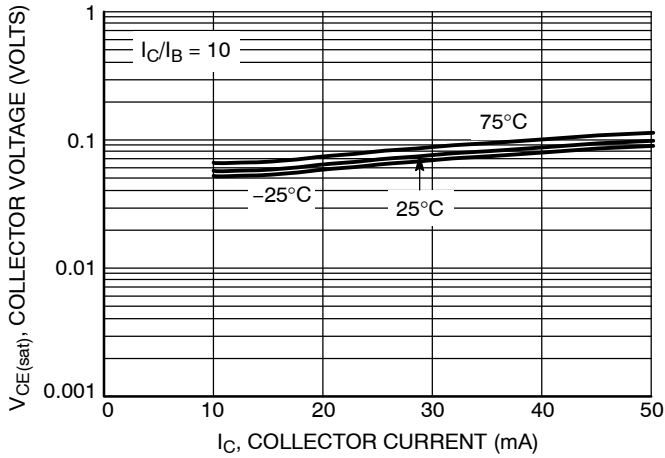


Figure 76. $V_{CE(sat)}$ versus I_C

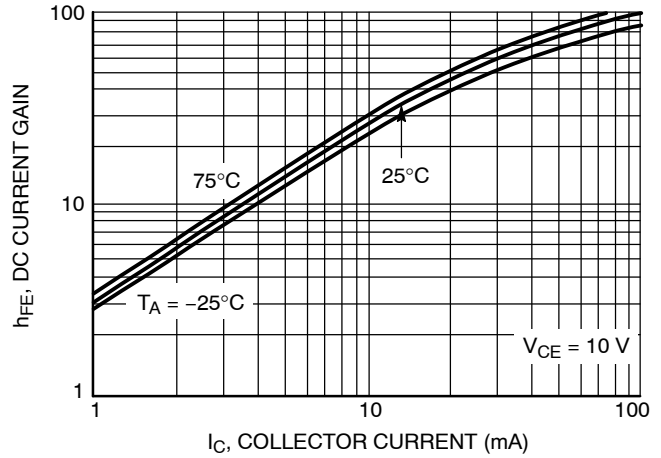


Figure 77. DC Current Gain

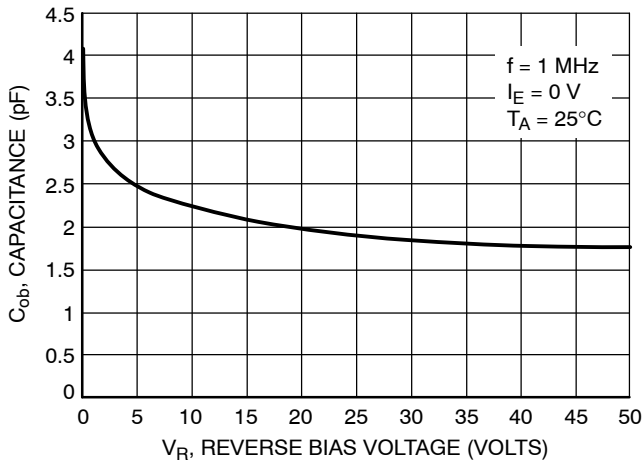


Figure 78. Output Capacitance

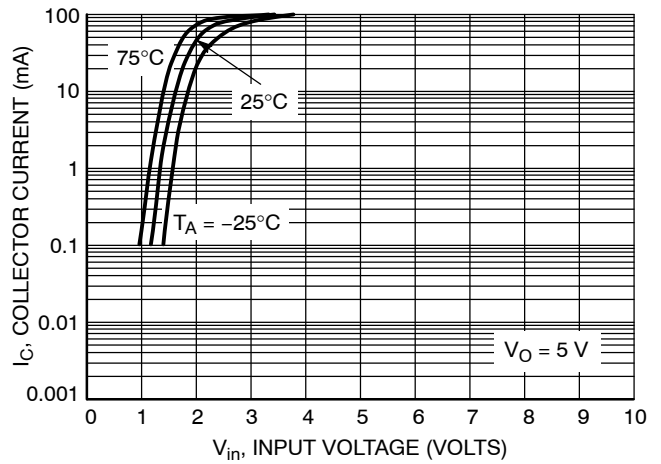


Figure 79. Output Current versus Input Voltage

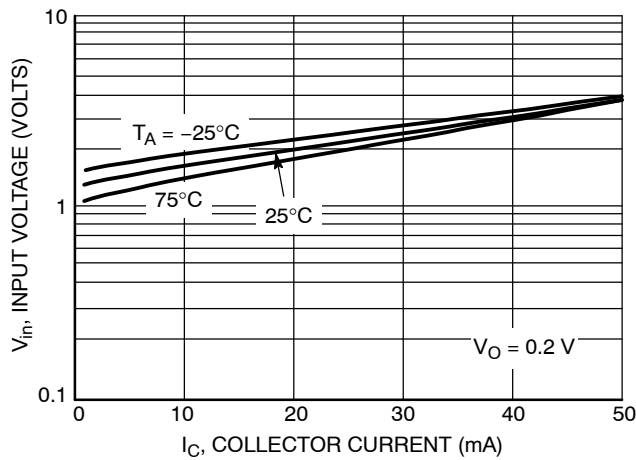


Figure 80. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5332DW1T1G NPN TRANSISTOR

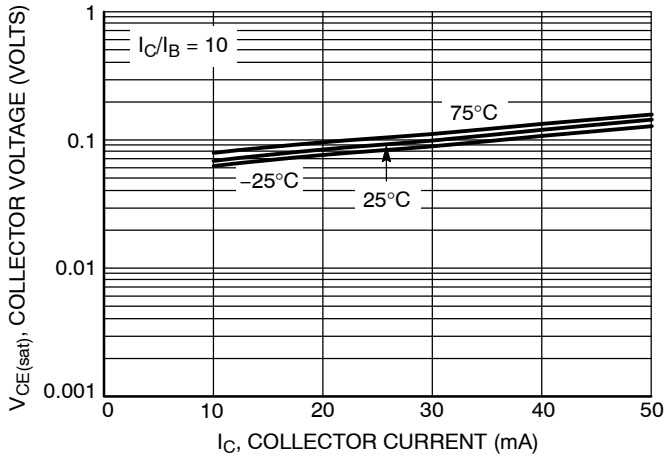


Figure 81. $V_{CE(sat)}$ versus I_C

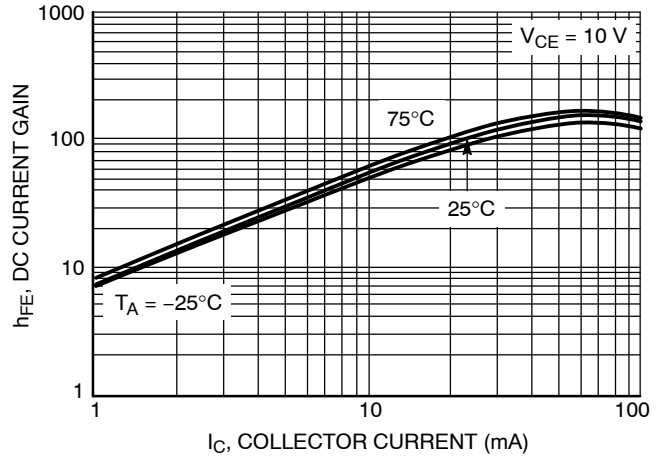


Figure 82. DC Current Gain

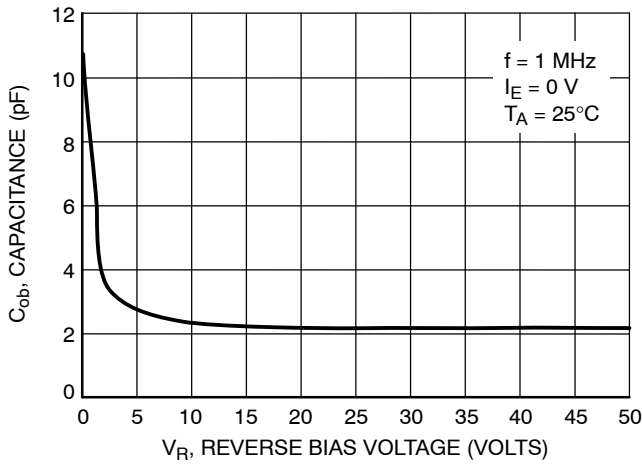


Figure 83. Output Capacitance

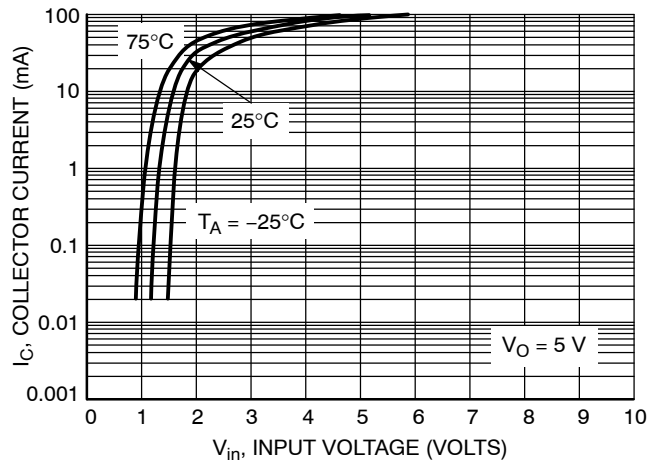


Figure 84. Output Current versus Input Voltage

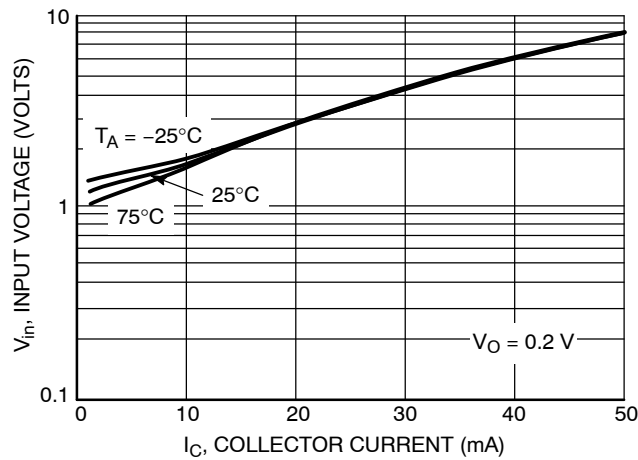


Figure 85. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5332DW1T1G PNP TRANSISTOR

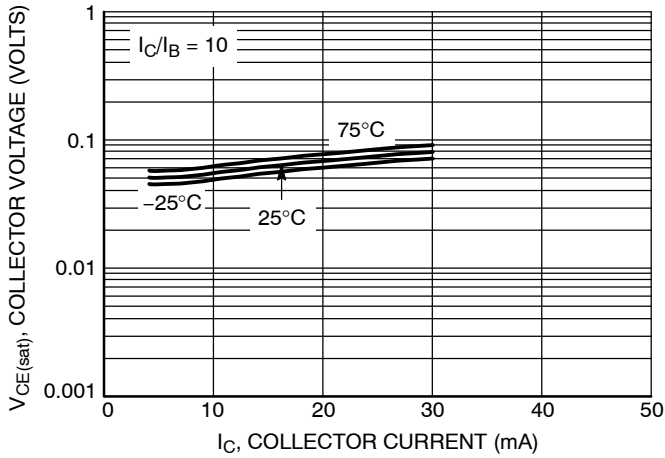


Figure 86. $V_{CE(sat)}$ versus I_C

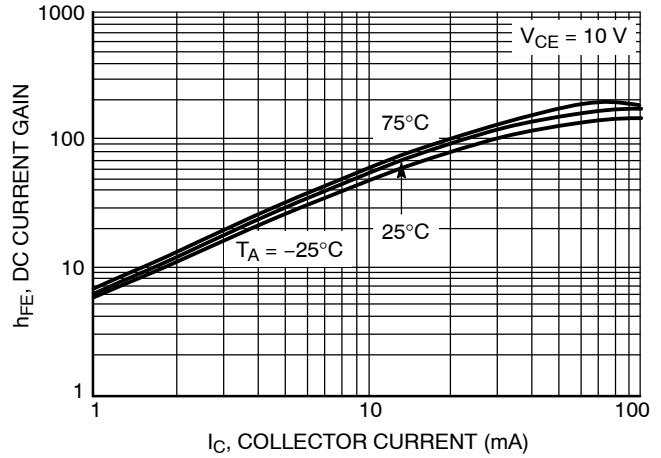


Figure 87. DC Current Gain

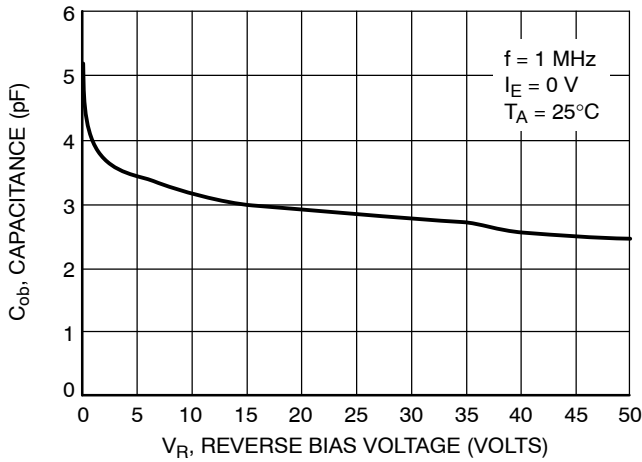


Figure 88. Output Capacitance

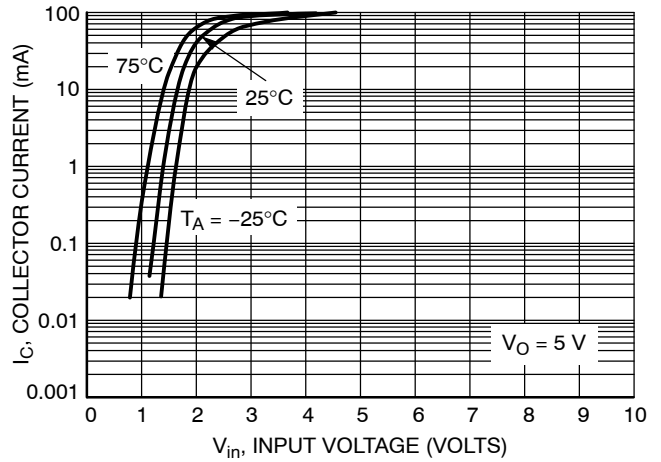


Figure 89. Output Current versus Input Voltage

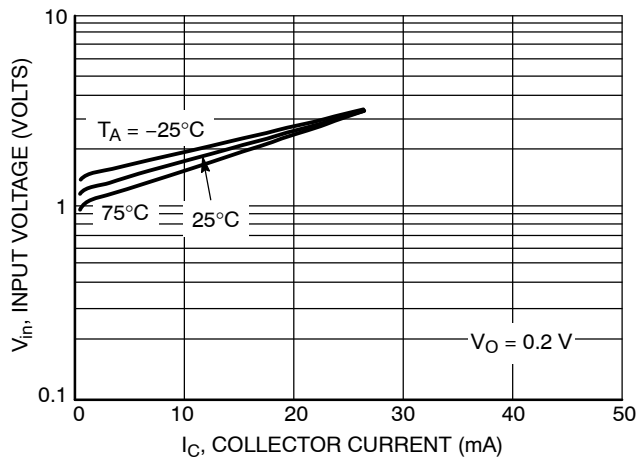


Figure 90. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5333DW1T1G NPN TRANSISTOR

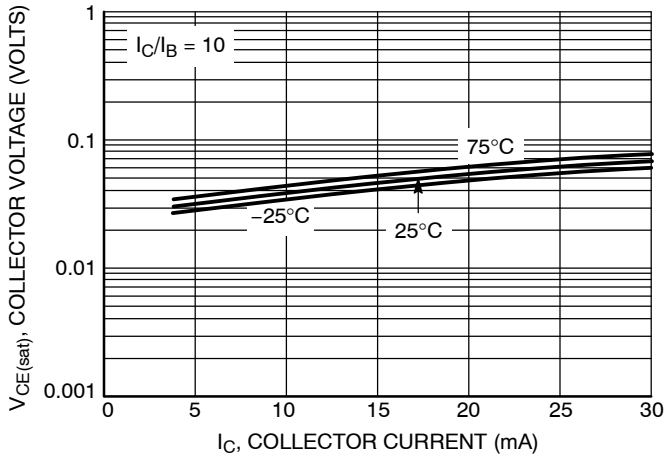


Figure 91. $V_{CE(sat)}$ versus I_C

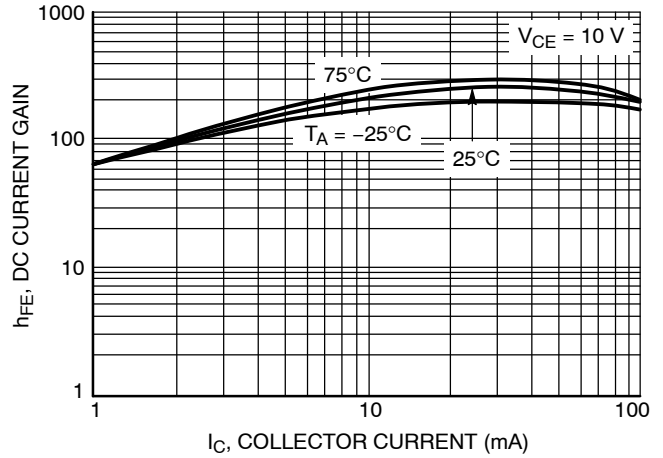


Figure 92. DC Current Gain

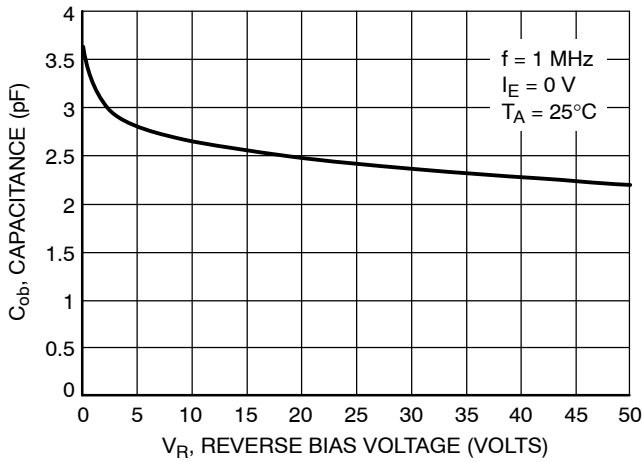


Figure 93. Output Capacitance

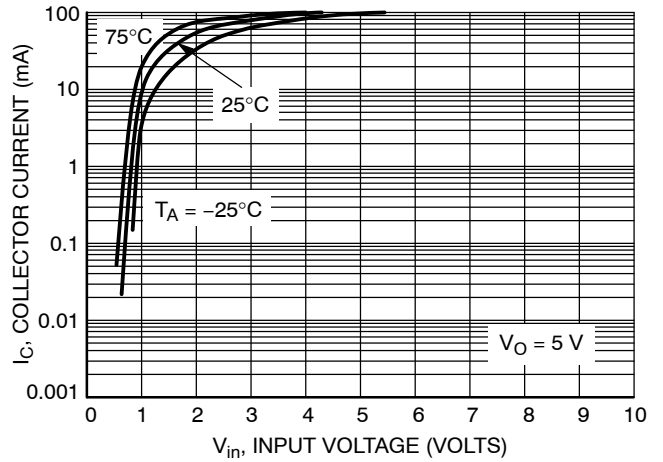


Figure 94. Output Current versus Input Voltage

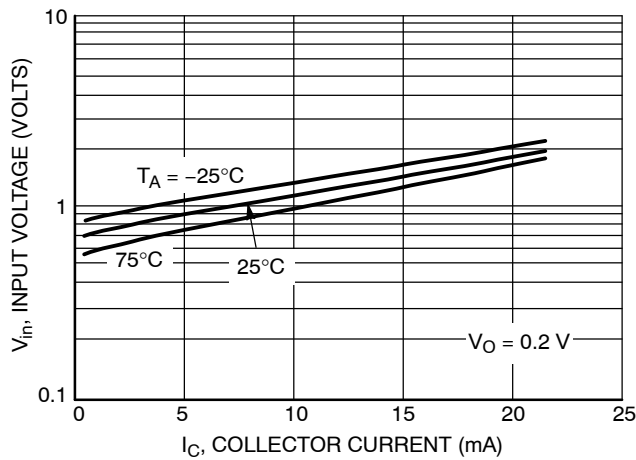


Figure 95. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5333DW1T1G PNP TRANSISTOR

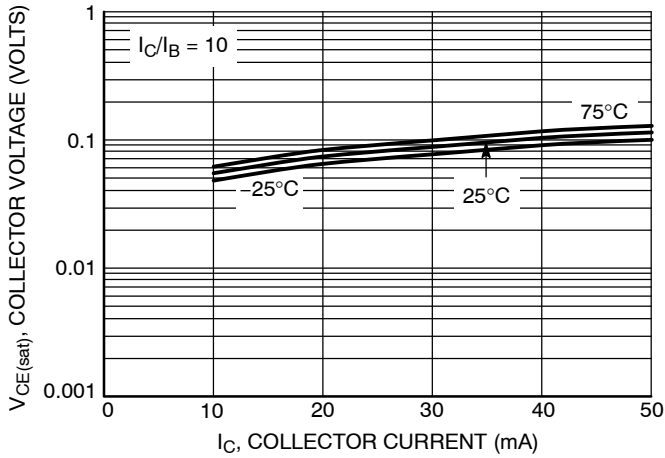


Figure 96. $V_{CE(sat)}$ versus I_C

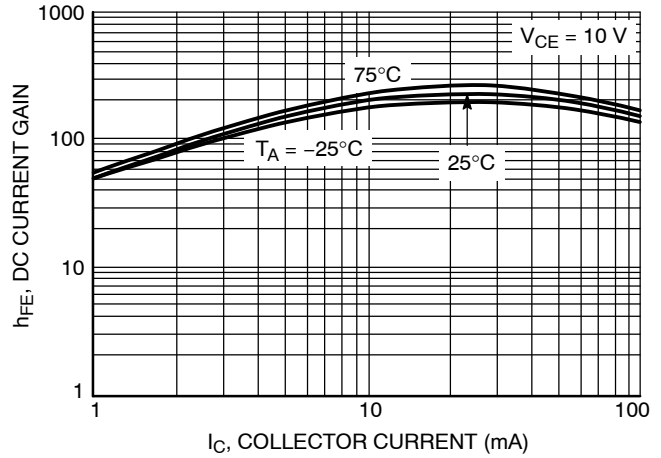


Figure 97. DC Current Gain

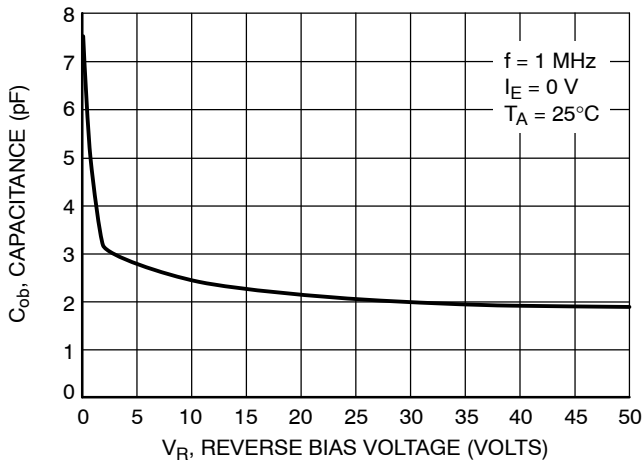


Figure 98. Output Capacitance

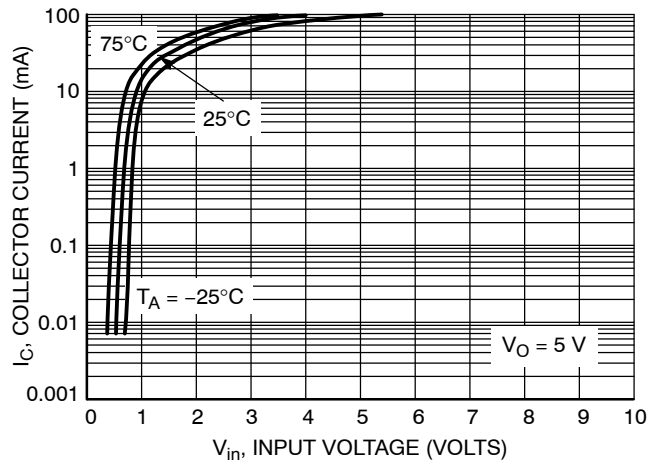


Figure 99. Output Current versus Input Voltage

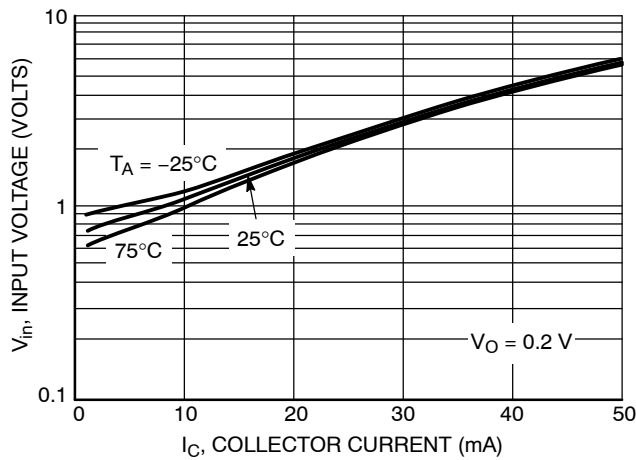


Figure 100. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5334DW1T1G NPN TRANSISTOR

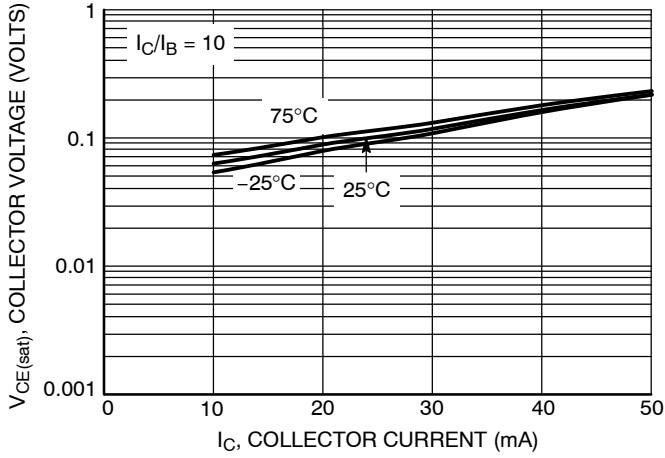


Figure 101. $V_{CE(sat)}$ versus I_C

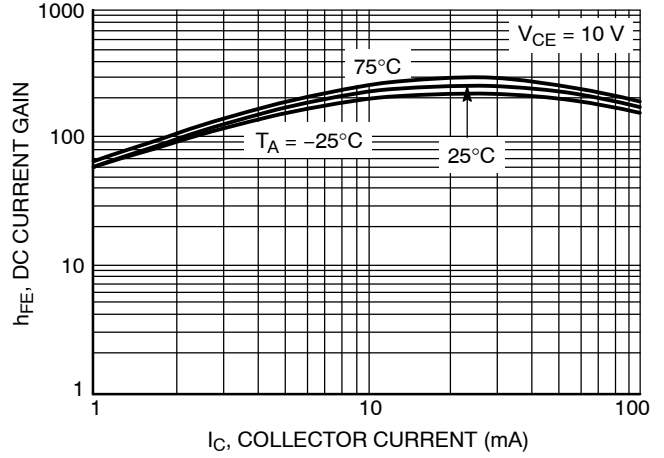


Figure 102. DC Current Gain

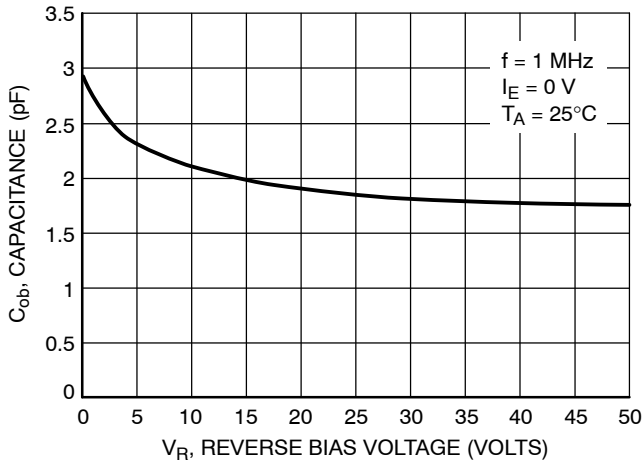


Figure 103. Output Capacitance

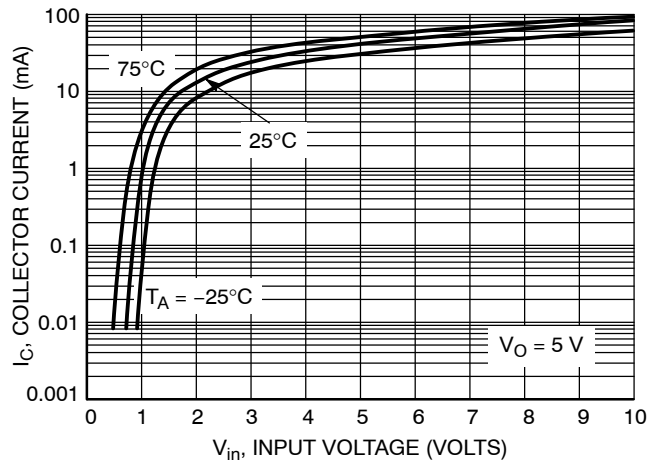


Figure 104. Output Current versus Input Voltage

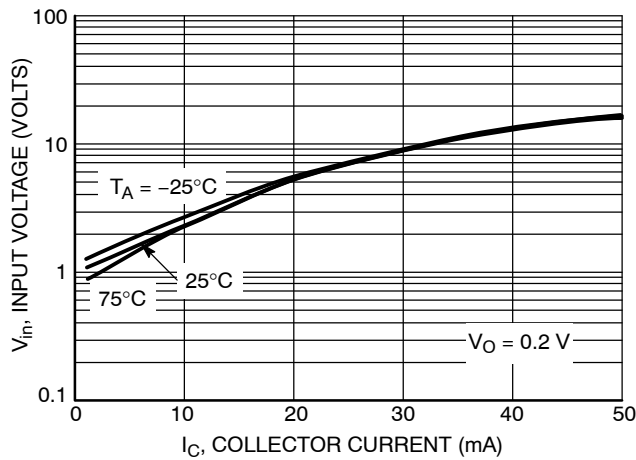


Figure 105. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5334DW1T1G PNP TRANSISTOR

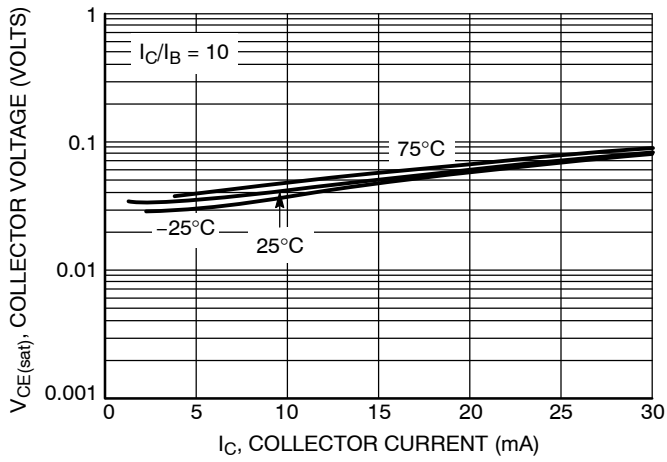


Figure 106. $V_{CE(sat)}$ versus I_C

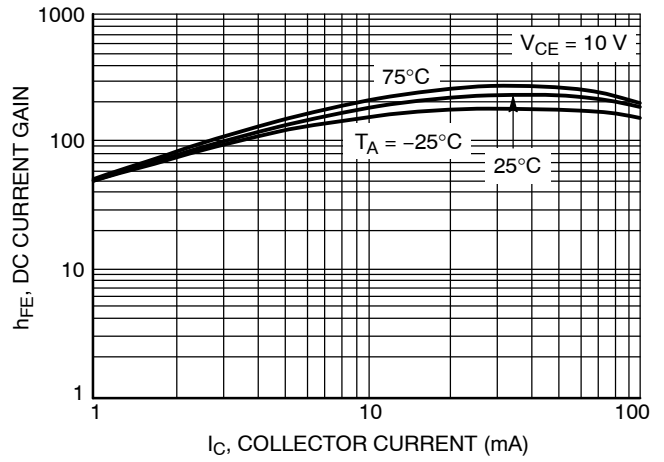


Figure 107. DC Current Gain

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5335DW1T1G NPN TRANSISTOR

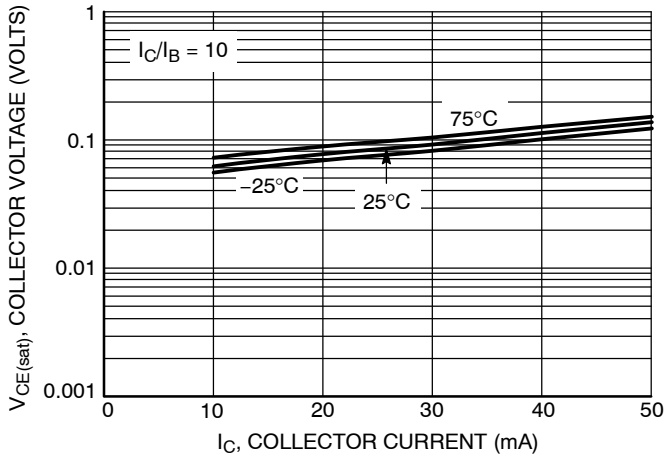


Figure 108. $V_{CE(sat)}$ versus I_C

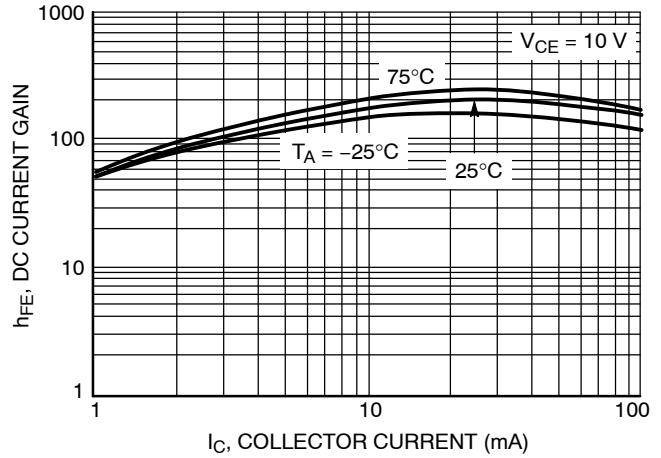


Figure 109. DC Current Gain

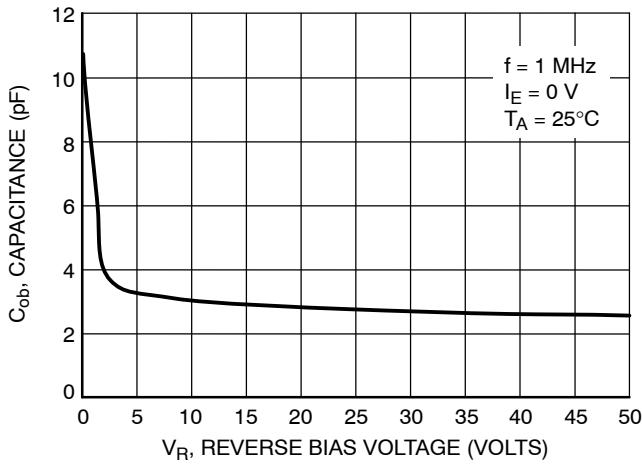


Figure 110. Output Capacitance

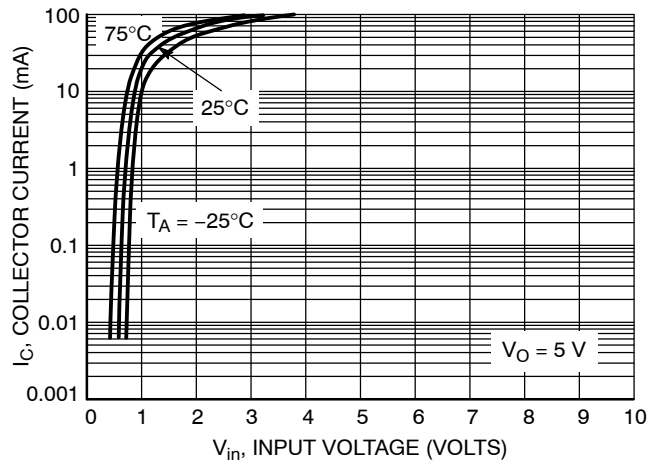


Figure 111. Output Current versus Input Voltage

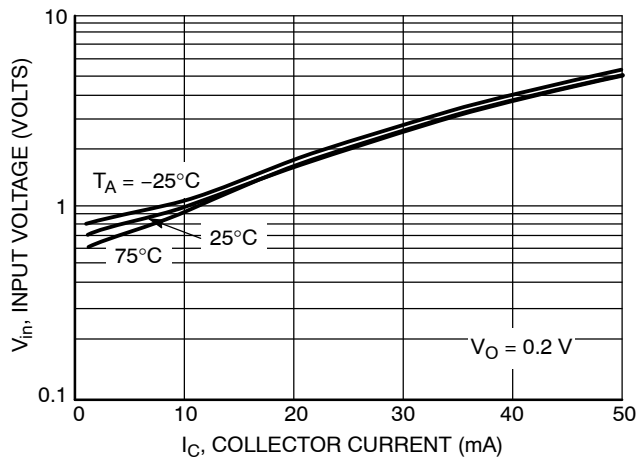


Figure 112. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5335DW1T1G PNP TRANSISTOR

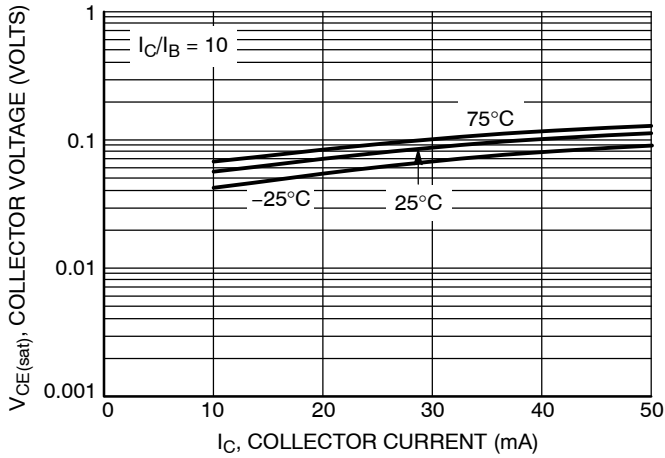


Figure 113. $V_{CE(sat)}$ versus I_C

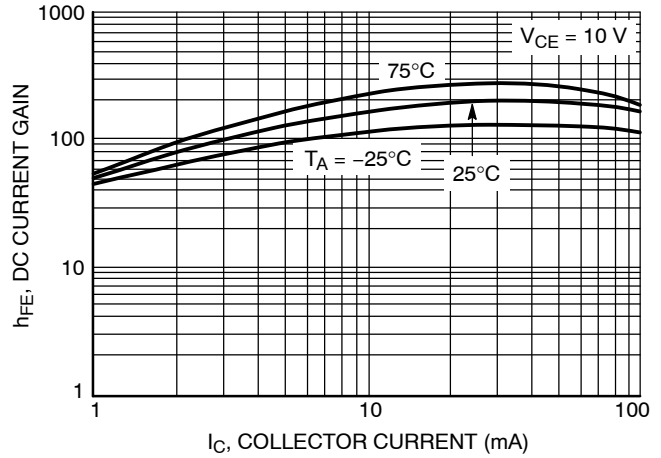


Figure 114. DC Current Gain

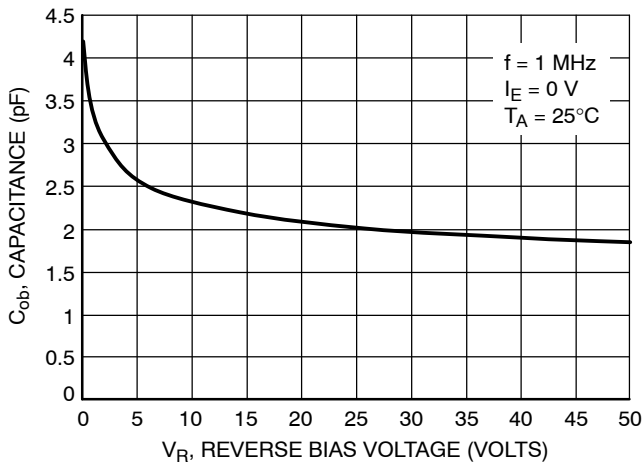


Figure 115. Output Capacitance

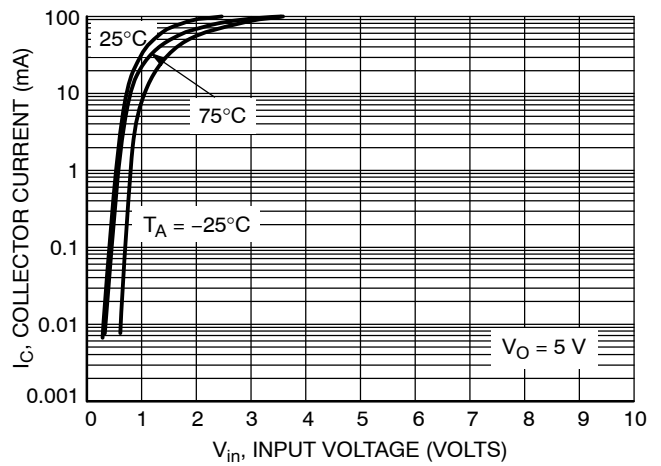


Figure 116. Output Current versus Input Voltage

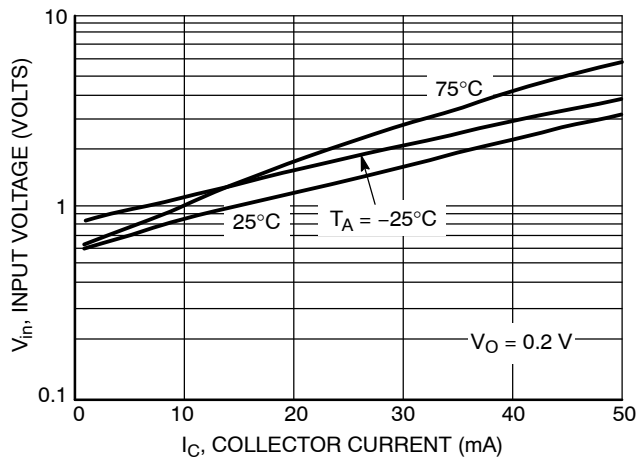


Figure 117. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5336DW1T1G NPN TRANSISTOR

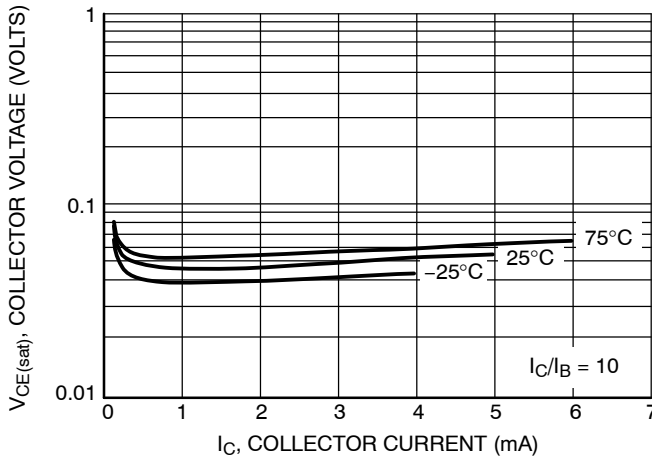


Figure 118. $V_{CE(sat)}$ versus I_C

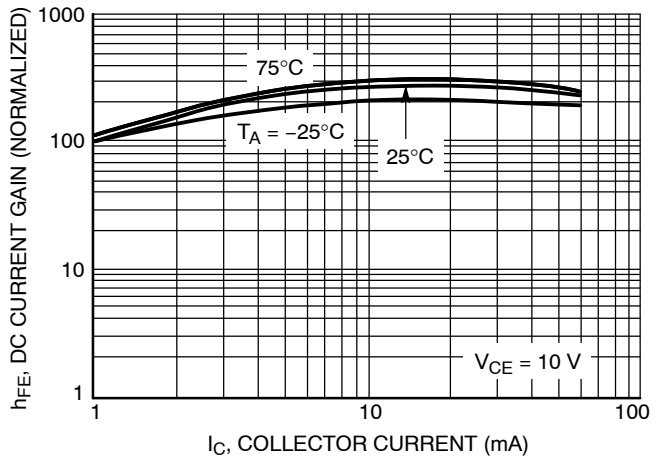


Figure 119. DC Current Gain

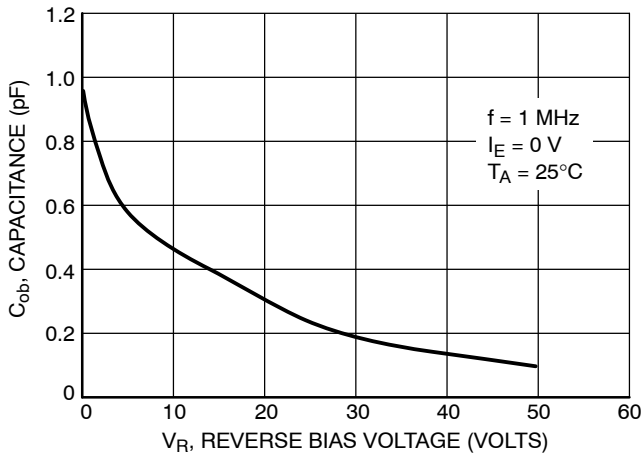


Figure 120. Output Capacitance

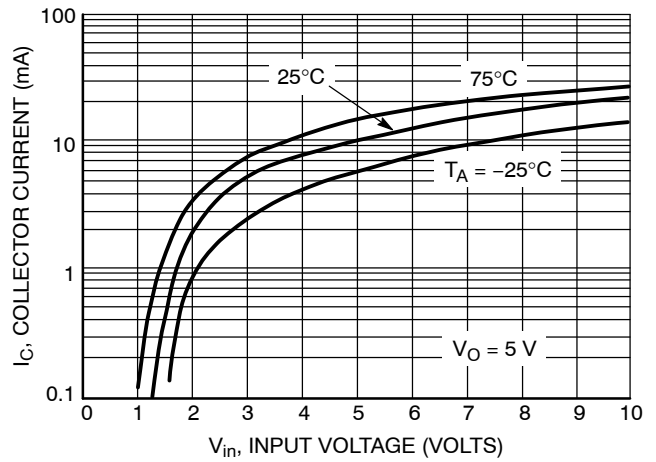


Figure 121. Output Current versus Input Voltage

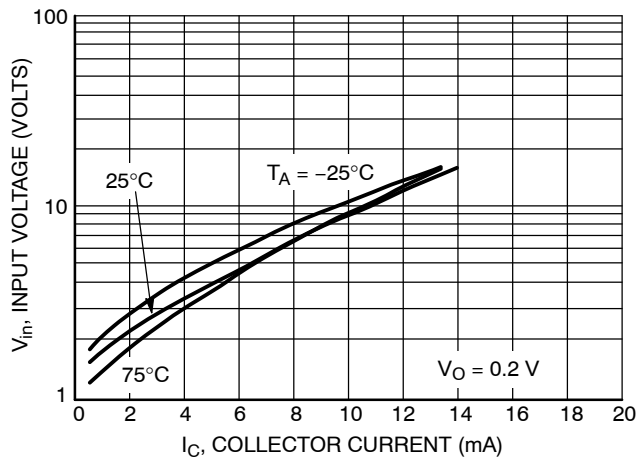


Figure 122. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5336DW1T1G PNP TRANSISTOR

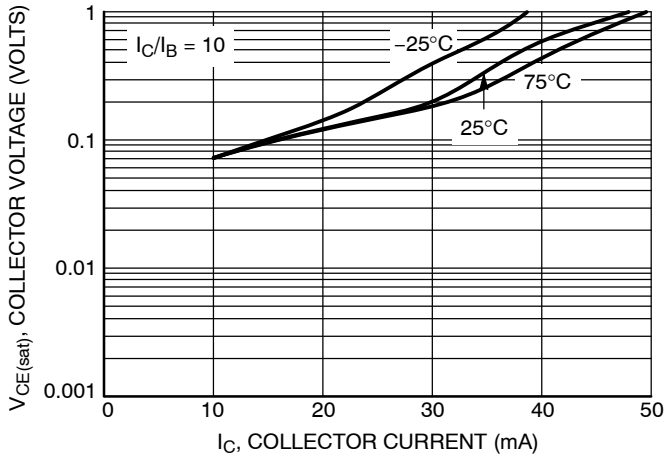


Figure 123. $V_{CE(sat)}$ versus I_C

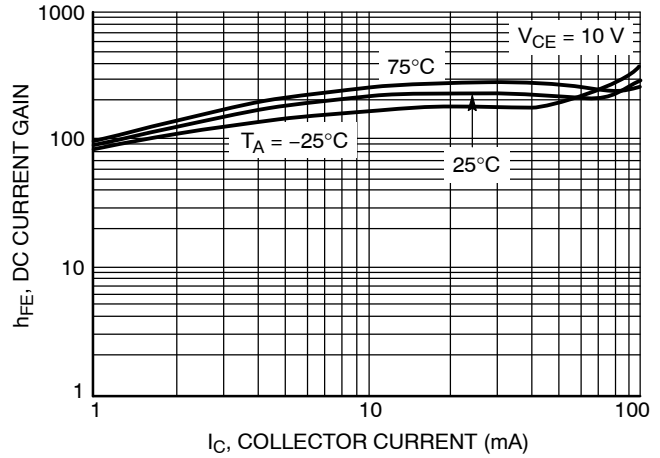


Figure 124. DC Current Gain

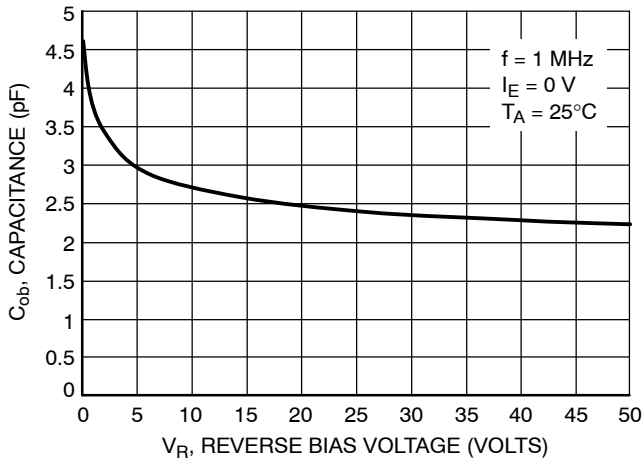


Figure 125. Output Capacitance

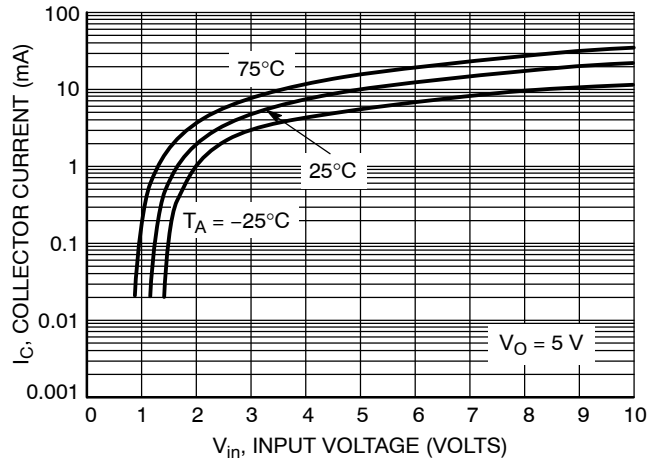


Figure 126. Output Current versus Input Voltage

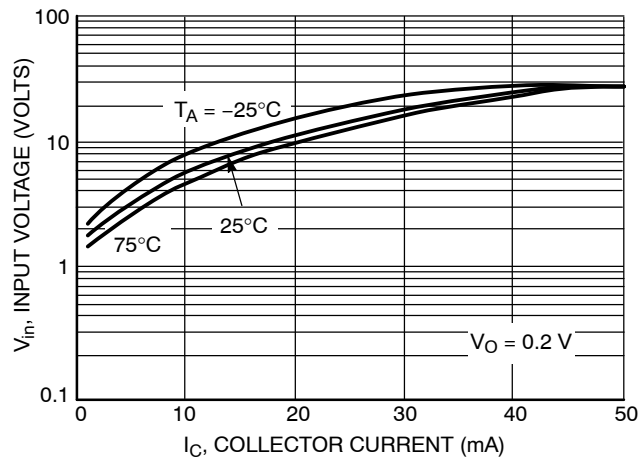


Figure 127. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5337DW1T1G NPN TRANSISTOR

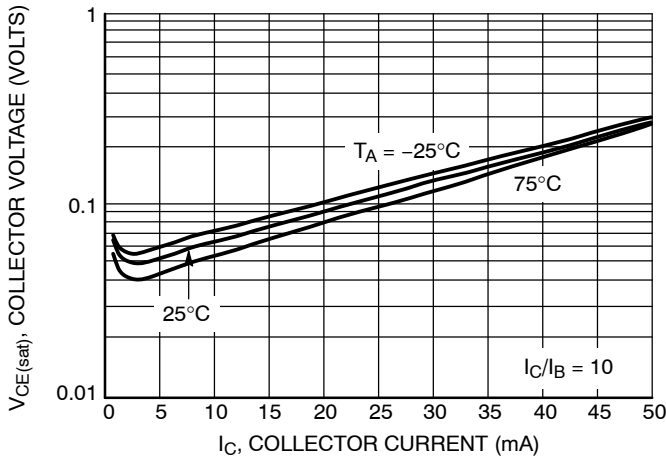


Figure 128. $V_{CE(sat)}$ versus I_C

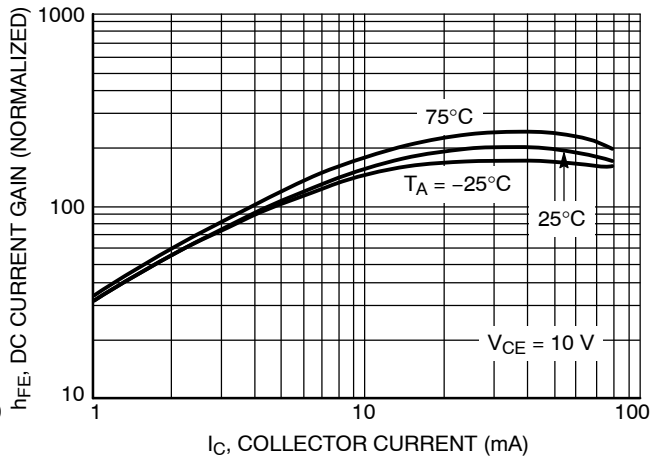


Figure 129. DC Current Gain

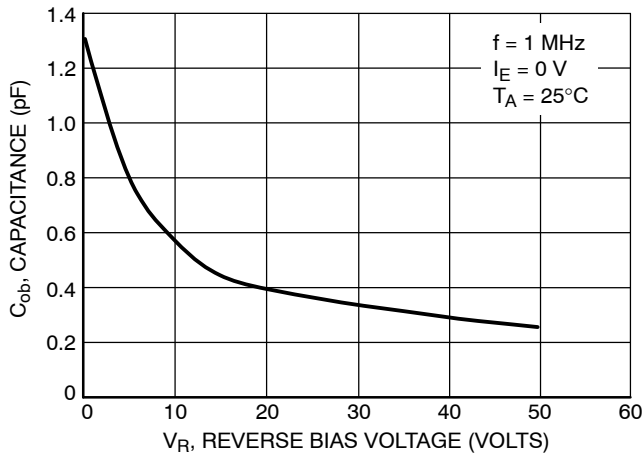


Figure 130. Output Capacitance

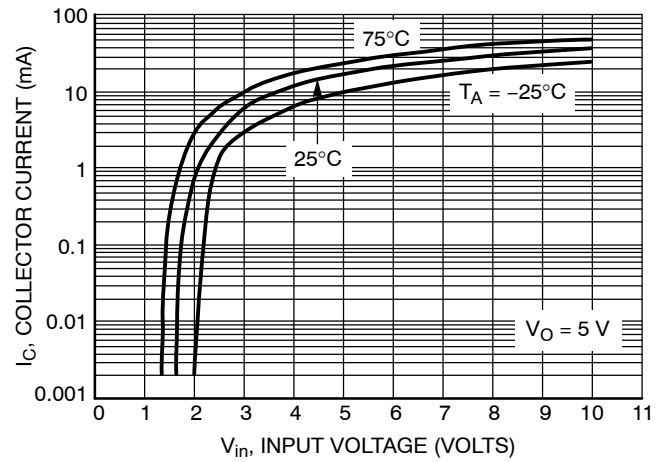


Figure 131. Output Current versus Input Voltage

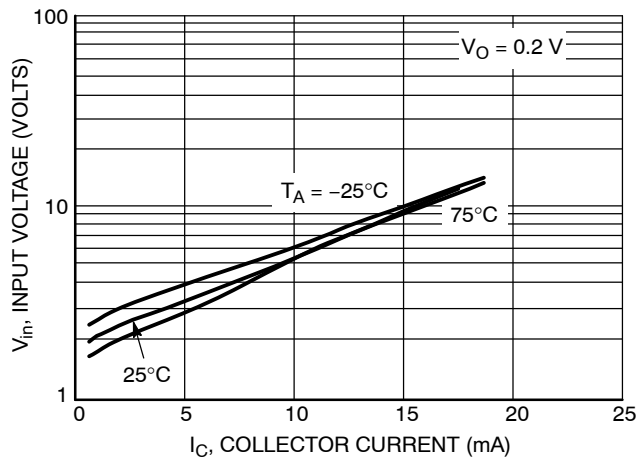


Figure 132. Input Voltage versus Output Current

MUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5337DW1T1G PNP TRANSISTOR

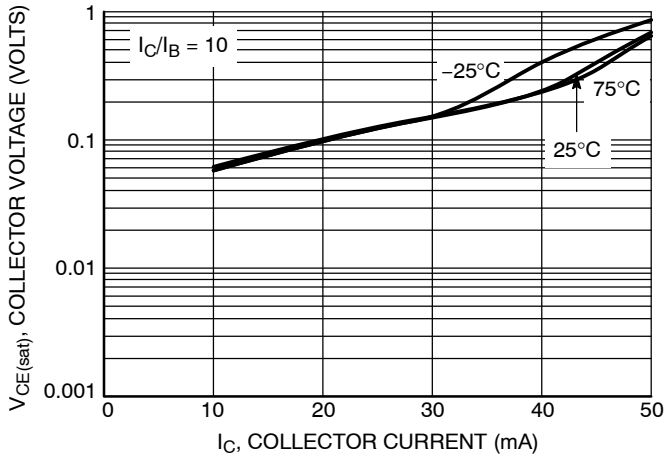


Figure 133. $V_{CE(sat)}$ versus I_C

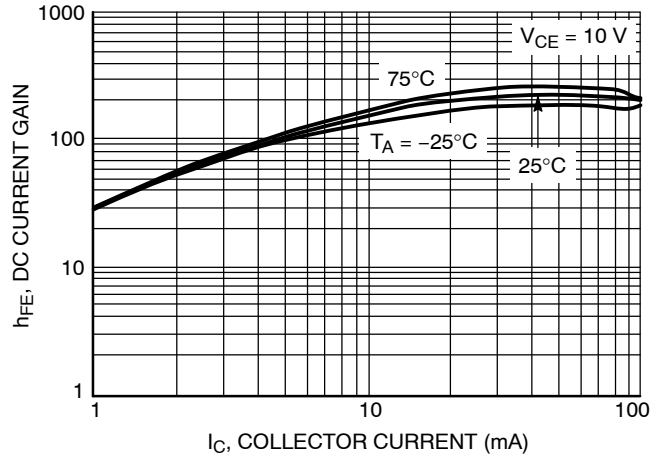


Figure 134. DC Current Gain

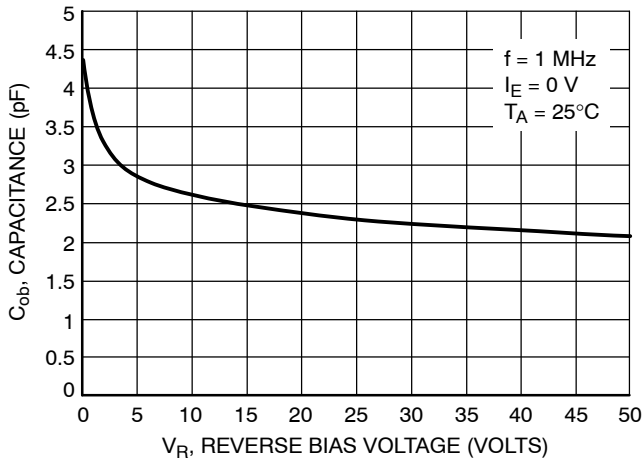


Figure 135. Output Capacitance

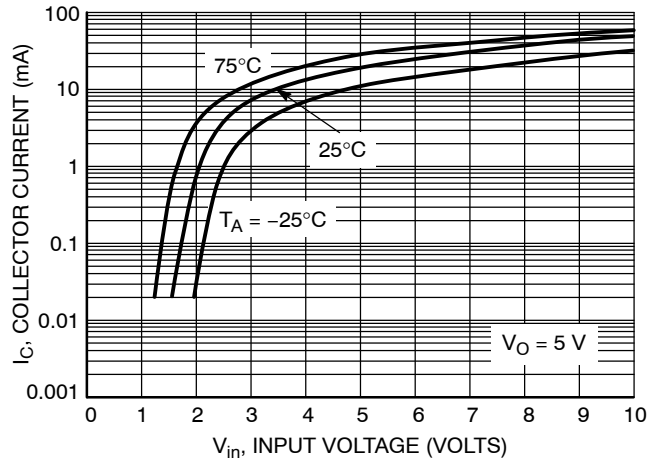


Figure 136. Output Current versus Input Voltage

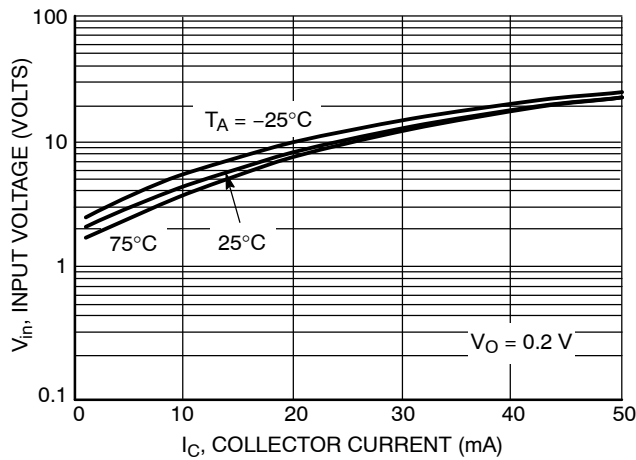
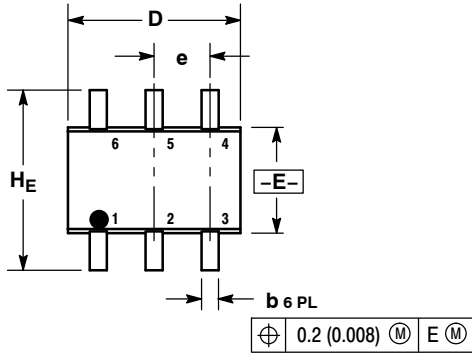


Figure 137. Input Voltage versus Output Current

MUN5311DW1T1G Series

PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363
CASE 419B-02
ISSUE W



NOTES:

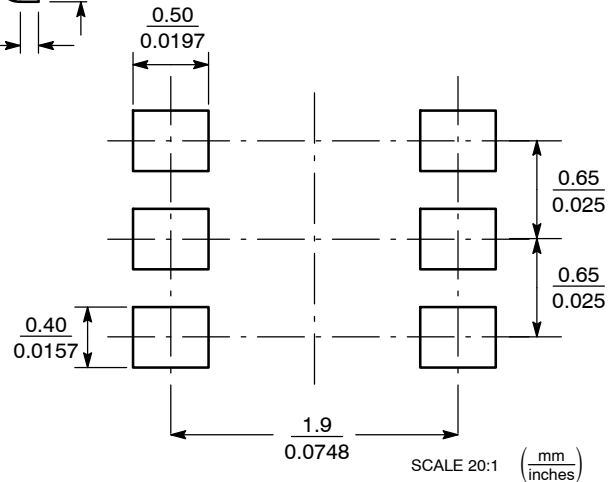
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|-----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | 0.95 | 1.10 | 0.031 | 0.037 | 0.043 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| A3 | 0.20 REF | | | 0.008 REF | | |
| b | 0.10 | 0.21 | 0.30 | 0.004 | 0.008 | 0.012 |
| C | 0.10 | 0.14 | 0.25 | 0.004 | 0.005 | 0.010 |
| D | 1.80 | 2.00 | 2.20 | 0.070 | 0.078 | 0.086 |
| E | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.10 | 0.20 | 0.30 | 0.004 | 0.008 | 0.012 |
| HE | 2.00 | 2.10 | 2.20 | 0.078 | 0.082 | 0.086 |

STYLE 1:

- PIN 1: EMITTER 2
2: BASE 2
3: COLLECTOR 1
4: EMITTER 1
5: BASE 1
6: COLLECTOR 2

SOLDERING FOOTPRINT*



SC-88/SC70-6/SOT-363

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative