

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

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
- S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- 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	mA _{dc}

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.

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

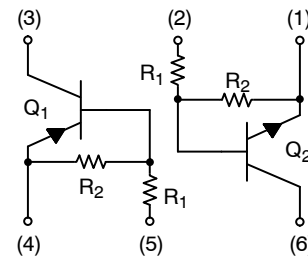


ON Semiconductor®

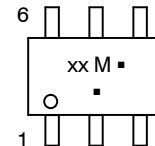
<http://onsemi.com>



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.

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

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	$^\circ\text{C}$

- FR-4 @ Minimum Pad
- FR-4 @ 1.0 x 1.0 inch Pad

ORDERING, SHIPPING, DEVICE MARKING AND RESISTOR VALUES

Device	Package	Marking	R1 (K)	R2 (K)	Shipping [†]
MUN5311DW1T1G, SMUN5311DW1T1G, SMUN5311DW1T2G	SOT-363 (Pb-Free)	11	10	10	3,000 / Tape & Reel
MUN5312DW1T1G, SMUN5312DW1T1G	SOT-363 (Pb-Free)	12	22	22	3,000 / Tape & Reel
MUN5313DW1T1G, SMUN5313DW1T1G	SOT-363 (Pb-Free)	13	47	47	3,000 / Tape & Reel
MUN5314DW1T1G, SMUN5314DW1T1G	SOT-363 (Pb-Free)	14	10	47	3,000 / Tape & Reel
MUN5315DW1T1G, SMUN5315DW1T1G	SOT-363 (Pb-Free)	15	10	∞	3,000 / Tape & Reel
MUN5316DW1T1G	SOT-363 (Pb-Free)	16	4.7	∞	3,000 / Tape & Reel
MUN5330DW1T1G, SMUN5330DW1T1G	SOT-363 (Pb-Free)	30	1.0	1.0	3,000 / Tape & Reel
MUN5331DW1T1G	SOT-363 (Pb-Free)	31	2.2	2.2	3,000 / Tape & Reel
MUN5332DW1T1G, NSVMUN5332DW1T1G	SOT-363 (Pb-Free)	32	4.7	4.7	3,000 / Tape & Reel
MUN5333DW1T1G, NSVMUN5333DW1T1G	SOT-363 (Pb-Free)	33	4.7	47	3,000 / Tape & Reel
MUN5334DW1T1G, NSVMUN5334DW1T1G	SOT-363 (Pb-Free)	34	22	47	3,000 / Tape & Reel
MUN5335DW1T1G, SMUN5335DW1T1G, SMUN5335DW1T2G	SOT-363 (Pb-Free)	35	2.2	47	3,000 / Tape & Reel

[†]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, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

ELECTRICAL CHARACTERISTICS

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Base Cutoff Current (V _{CB} = 50 V, I _E = 0)	I _{CBO}	–	–	100	nAdc
Collector-Emitter Cutoff Current (V _{CE} = 50 V, I _B = 0)	I _{CEO}	–	–	500	nAdc
Emitter-Base Cutoff Current (V _{EB} = 6.0 V, I _C = 0)	I _{EBO}				mAdc
MUN5311DW1T1G, SMUN5311DW1T1G		–	–	0.5	
MUN5312DW1T1G, SMUN5312DW1T1G		–	–	0.2	
MUN5313DW1T1G, SMUN5313DW1T1G		–	–	0.1	
MUN5314DW1T1G, SMUN5314DW1T1G		–	–	0.2	
MUN5315DW1T1G, SMUN5315DW1T1G		–	–	0.9	
MUN5316DW1T1G		–	–	1.9	
MUN5330DW1T1G, SMUN5330DW1T1G		–	–	4.3	
MUN5331DW1T1G		–	–	2.3	
MUN5332DW1T1G, NSVMUN5332DW1T1G		–	–	1.5	
MUN5333DW1T1G, NSVMUN5333DW1T1G		–	–	0.18	
MUN5334DW1T1G, NSVMUN5334DW1T1G		–	–	0.13	
MUN5335DW1T1G, SMUN5335DW1T1G		–	–	0.2	
Collector-Base Breakdown Voltage (I _C = 10 µA, I _E = 0)	V _{(BR)CBO}	50	–	–	Vdc
Collector-Emitter Breakdown Voltage (Note 3) (I _C = 2.0 mA, I _B = 0)	V _{(BR)CEO}	50	–	–	Vdc

ON CHARACTERISTICS (Note 3)

DC Current Gain (V _{CE} = 10 V, I _C = 5.0 mA)	h _{FE}				
MUN5311DW1T1G, SMUN5311DW1T1G		35	60	–	
MUN5312DW1T1G, SMUN5312DW1T1G		60	100	–	
MUN5313DW1T1G, SMUN5313DW1T1G		80	140	–	
MUN5314DW1T1G, SMUN5314DW1T1G		80	140	–	
MUN5315DW1T1G, SMUN5315DW1T1G		160	350	–	
MUN5316DW1T1G		160	350	–	
MUN5330DW1T1G, SMUN5330DW1T1G		3.0	5.0	–	
MUN5331DW1T1G		8.0	15	–	
MUN5332DW1T1G, NSVMUN5332DW1T1G		15	30	–	
MUN5333DW1T1G, NSVMUN5333DW1T1G		80	200	–	
MUN5334DW1T1G, NSVMUN5334DW1T1G		80	150	–	
MUN5335DW1T1G, SMUN5335DW1T1G		80	140	–	
Collector-Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.3 mA)	V _{CE(sat)}				Vdc
MUN5311DW1T1G, SMUN5311DW1T1G		–	–	0.25	
MUN5312DW1T1G, SMUN5312DW1T1G		–	–	0.25	
MUN5313DW1T1G, SMUN5313DW1T1G		–	–	0.25	
MUN5314DW1T1G, SMUN5314DW1T1G		–	–	0.25	
MUN5335DW1T1G, SMUN5335DW1T1G		–	–	0.25	
(I _C = 10 mA, I _B = 5 mA)					
MUN5330DW1T1G, SMUN5330DW1T1G		–	–	0.25	
MUN5331DW1T1G		–	–	0.25	
(I _C = 10 mA, I _B = 1 mA)					
MUN5315DW1T1G, SMUN5315DW1T1G		–	–	0.25	
MUN5316DW1T1G		–	–	0.25	
MUN5332DW1T1G, NSVMUN5332DW1T1G		–	–	0.25	
MUN5333DW1T1G, NSVMUN5333DW1T1G		–	–	0.25	
MUN5334DW1T1G, NSVMUN5334DW1T1G		–	–	0.25	

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 3)					
Output Voltage (on) ($V_{CC} = 5.0\text{ V}$, $V_B = 2.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) MUN5311DW1T1G, SMUN5311DW1T1G MUN5312DW1T1G, SMUN5312DW1T1G MUN5314DW1T1G, SMUN5314DW1T1G MUN5315DW1T1G, SMUN5315DW1T1G MUN5316DW1T1G MUN5330DW1T1G, SMUN5330DW1T1G MUN5331DW1T1G MUN5332DW1T1G, NSVMUN5332DW1T1G MUN5333DW1T1G, NSVMUN5333DW1T1G MUN5334DW1T1G, NSVMUN5334DW1T1G MUN5335DW1T1G, SMUN5335DW1T1G ($V_{CC} = 5.0\text{ V}$, $V_B = 3.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) MUN5313DW1T1G, SMUN5313DW1T1G	V_{OL}	– – – – – – – – – – – – –	– – – – – – – – – – – – –	0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	Vdc
Output Voltage (off) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) MUN5311DW1T1G, SMUN5311DW1T1G MUN5312DW1T1G, SMUN5312DW1T1G MUN5313DW1T1G, SMUN5313DW1T1G MUN5314DW1T1G, SMUN5314DW1T1G MUN5333DW1T1G, NSVMUN5333DW1T1G MUN5334DW1T1G, NSVMUN5334DW1T1G MUN5335DW1T1G, SMUN5335DW1T1G ($V_{CC} = 5.0\text{ V}$, $V_B = 0.050\text{ V}$, $R_L = 1.0\text{ k}\Omega$) MUN5330DW1T1G, SMUN5330DW1T1G ($V_{CC} = 5.0\text{ V}$, $V_B = 0.25\text{ V}$, $R_L = 1.0\text{ k}\Omega$) MUN5315DW1T1G, SMUN5315DW1T1G MUN5316DW1T1G MUN5331DW1T1G MUN5332DW1T1G, NSVMUN5332DW1T1G	V_{OH}	4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9	– – – – – – – – – – – – – – –	– – – – – – – – – – – – – – –	Vdc
Input Resistor MUN5311DW1T1G, SMUN5311DW1T1G MUN5312DW1T1G, SMUN5312DW1T1G MUN5313DW1T1G, SMUN5313DW1T1G MUN5314DW1T1G, SMUN5314DW1T1G MUN5315DW1T1G, SMUN5315DW1T1G MUN5316DW1T1G MUN5330DW1T1G, SMUN5330DW1T1G MUN5331DW1T1G MUN5332DW1T1G, NSVMUN5332DW1T1G MUN5333DW1T1G, NSVMUN5333DW1T1G MUN5334DW1T1G, NSVMUN5334DW1T1G MUN5335DW1T1G, SMUN5335DW1T1G	R1	7.0 15.4 32.9 7.0 7.0 3.3 0.7 1.5 3.3 3.3 15.4 1.54	10 22 47 10 10 4.7 1.0 2.2 4.7 4.7 22 2.2	13 28.6 61.1 13 13 6.1 1.3 2.9 6.1 6.1 28.6 2.86	k Ω
Resistor Ratio MUN5311DW1T1G/SMUN5311DW1T1G/MUN5312DW1T1G/ SMUN5312DW1T1G/MUN5313DW1T1G/SMUN5313DW1T1G MUN5314DW1T1G/SMUN5314DW1T1G MUN5315DW1T1G/SMUN5315DW1T1G/MUN5316DW1T1G MUN5330DW1T1G/SMUN5330DW1T1G/MUN5331DW1T1G/ MUN5332DW1T1G/NSVMUN5332DW1T1G MUN5333DW1T1G/NSVMUN5333DW1T1G MUN5334DW1T1G/NSVMUN5334DW1T1G MUN5335DW1T1G/SMUN5335DW1T1G	R1/R2	0.8 0.17 – 0.8 0.055 0.38 0.038	1.0 0.21 – 1.0 0.1 0.47 0.047	1.2 0.25 – 1.2 0.185 0.56 0.056	

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

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

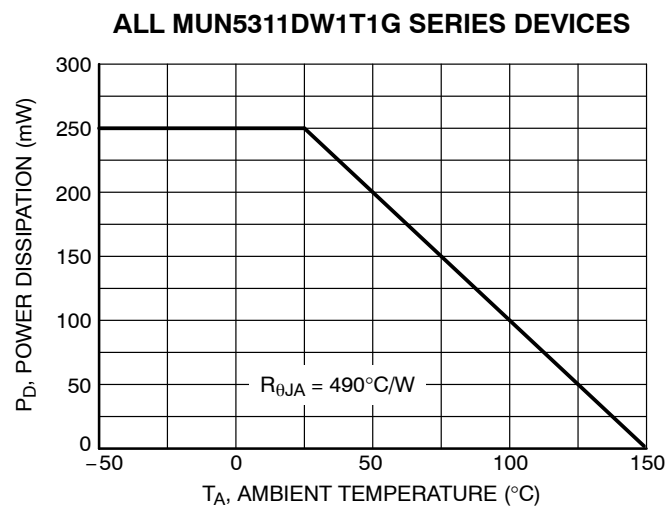


Figure 1. Derating Curve

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5311DW1T1G, SMUN5311DW1T1G NPN TRANSISTOR

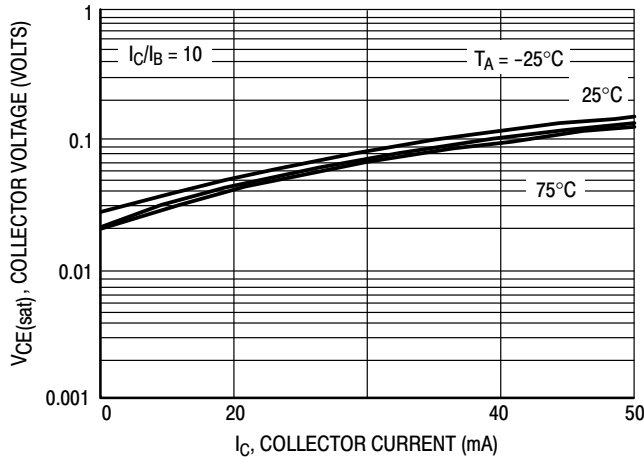


Figure 2. $V_{CE(sat)}$ versus I_C

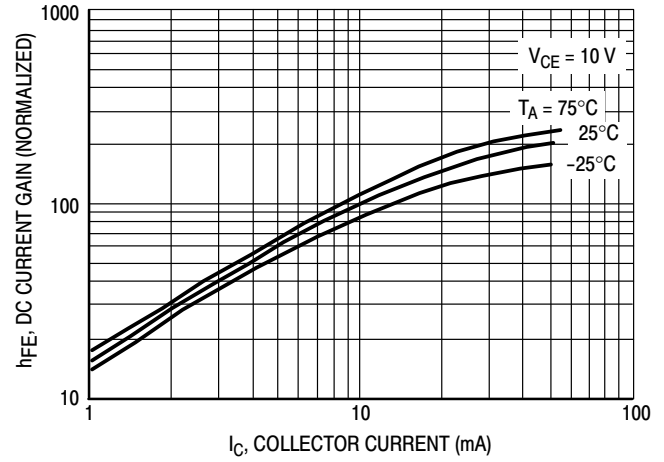


Figure 3. DC Current Gain

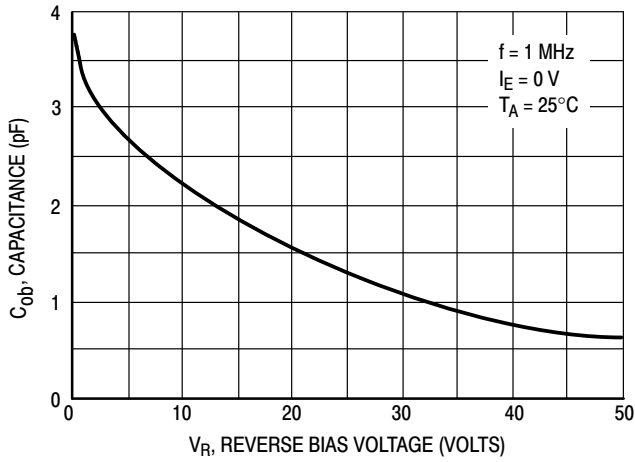


Figure 4. Output Capacitance

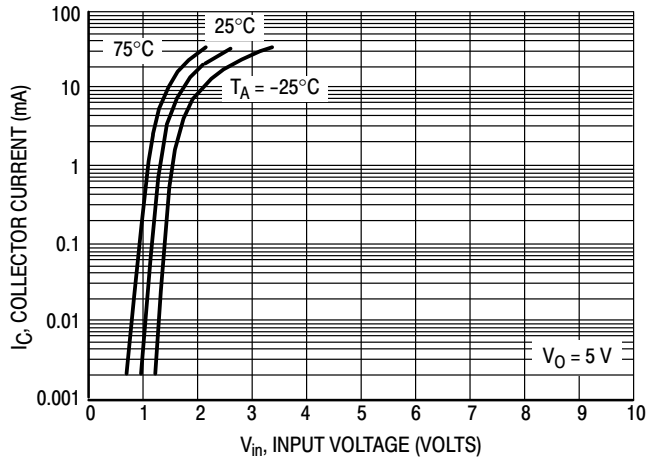


Figure 5. Output Current versus Input Voltage

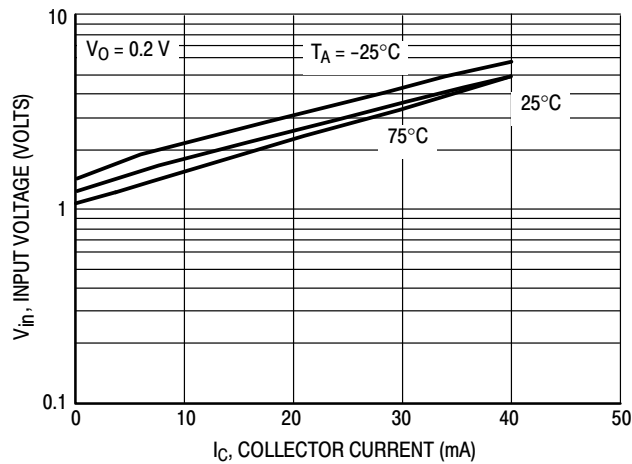


Figure 6. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5311DW1T1G, SMUN5311DW1T1G PNP TRANSISTOR

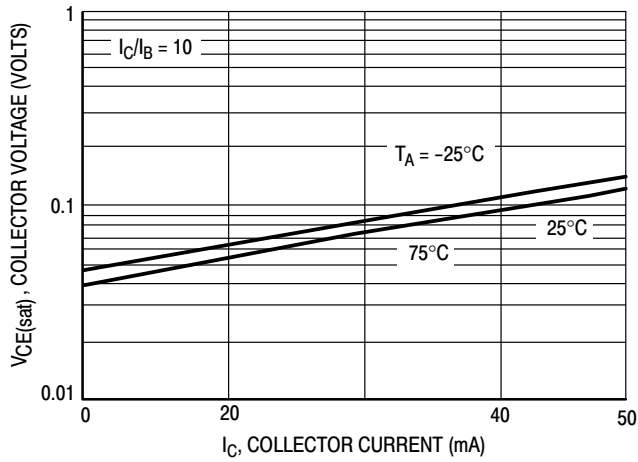


Figure 7. $V_{CE(sat)}$ versus I_C

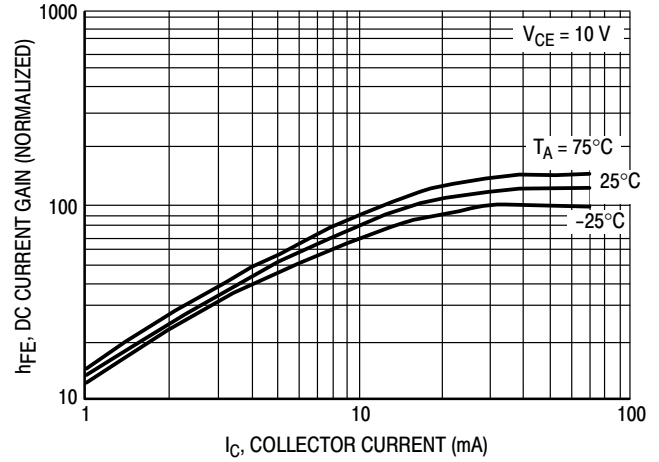


Figure 8. DC Current Gain

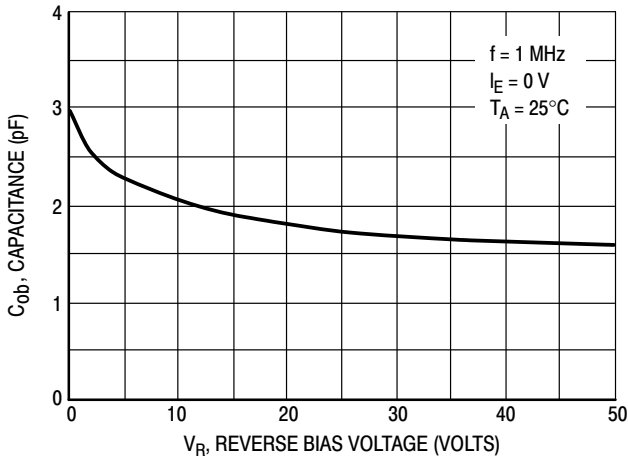


Figure 9. Output Capacitance

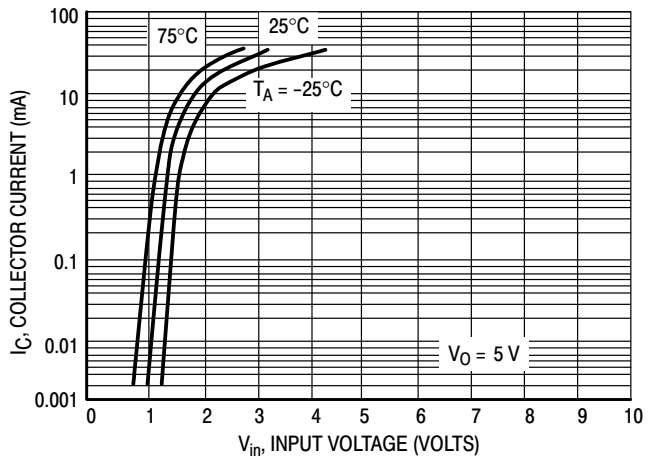


Figure 10. Output Current versus Input Voltage

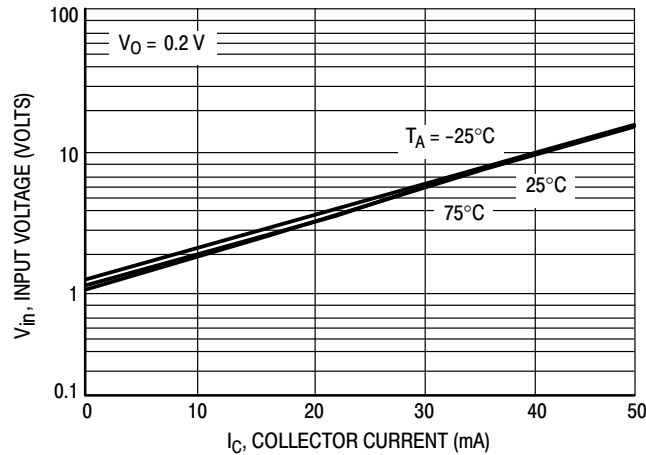


Figure 11. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5312DW1T1G, SMUN5312DW1T1G NPN TRANSISTOR

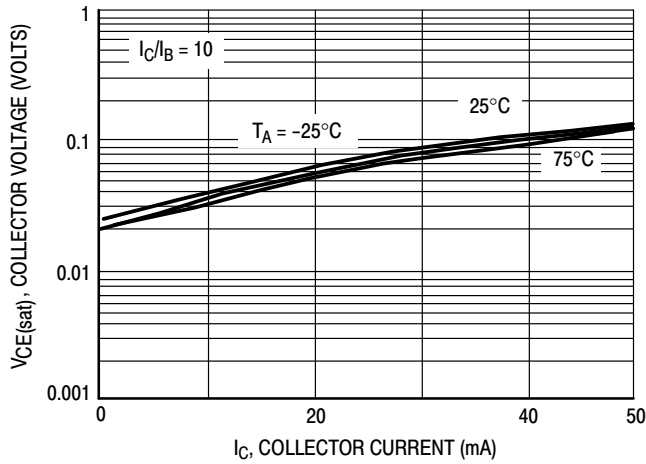


Figure 12. $V_{CE(sat)}$ versus I_C

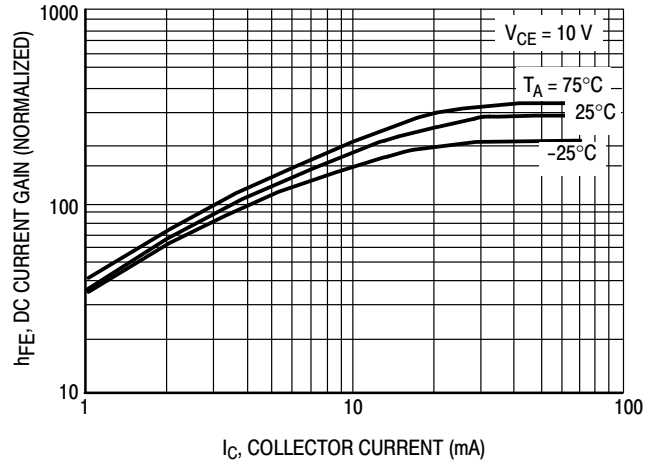


Figure 13. DC Current Gain

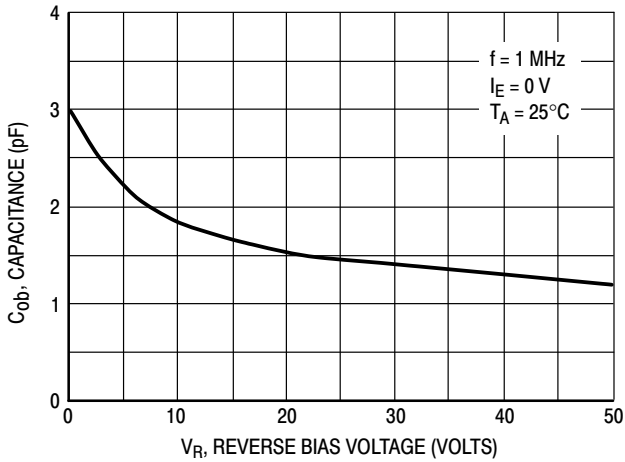


Figure 14. Output Capacitance

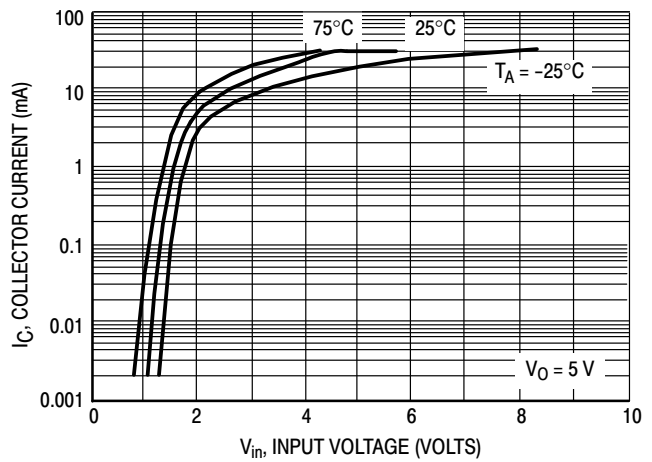


Figure 15. Output Current versus Input Voltage

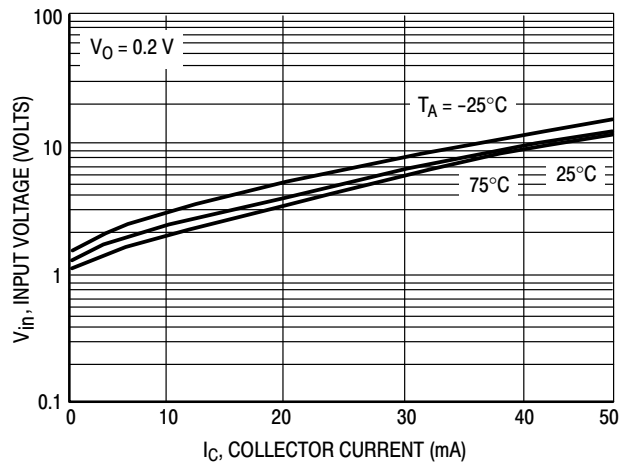


Figure 16. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5312DW1T1G, SMUN5312DW1T1G PNP TRANSISTOR

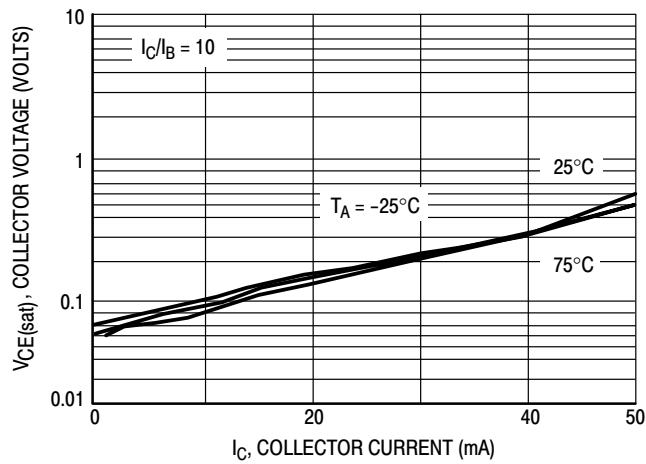


Figure 17. $V_{CE(sat)}$ versus I_C

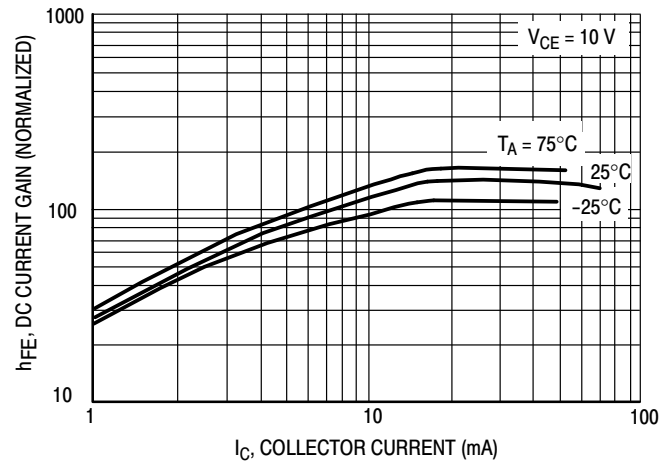


Figure 18. DC Current Gain

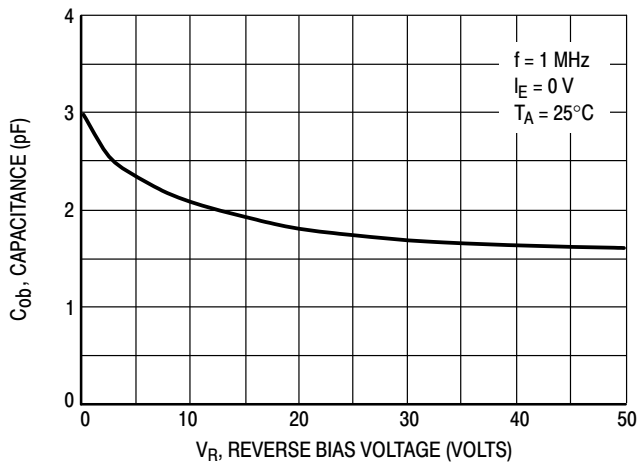


Figure 19. Output Capacitance

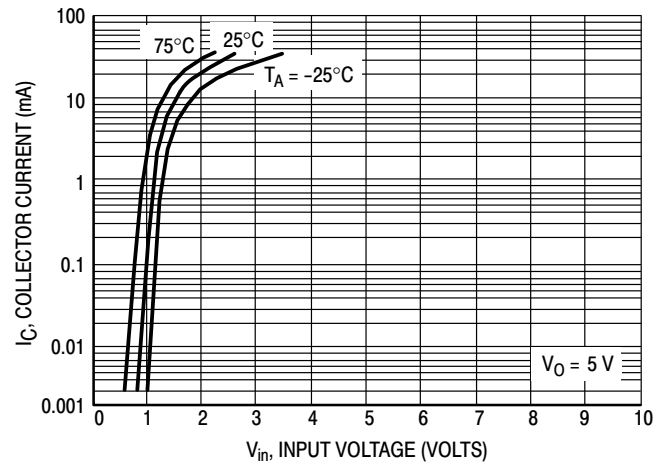


Figure 20. Output Current versus Input Voltage

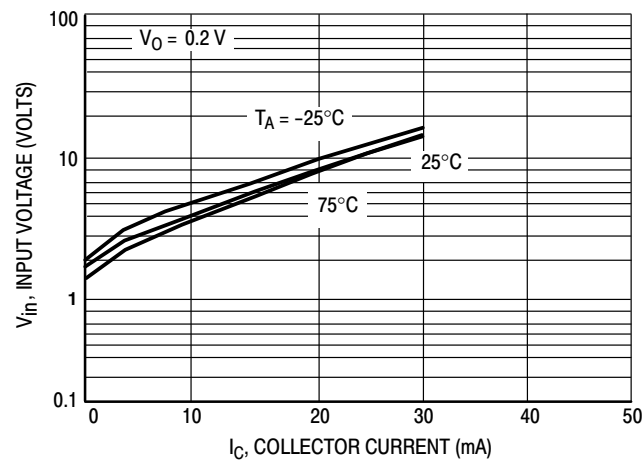


Figure 21. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5313DW1T1G, SMUN5313DW1T1G NPN TRANSISTOR

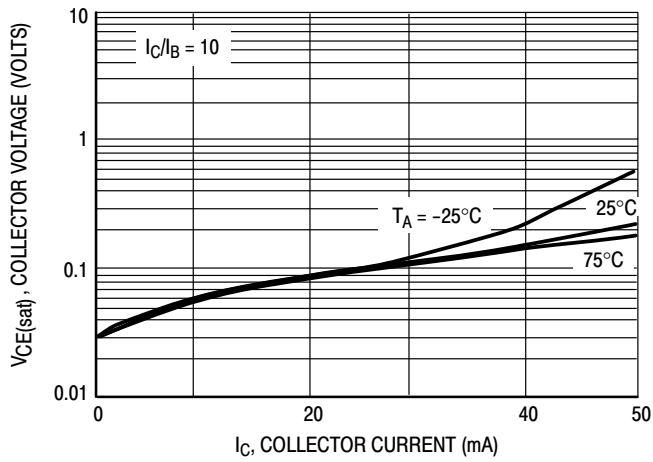


Figure 22. $V_{CE(sat)}$ versus I_C

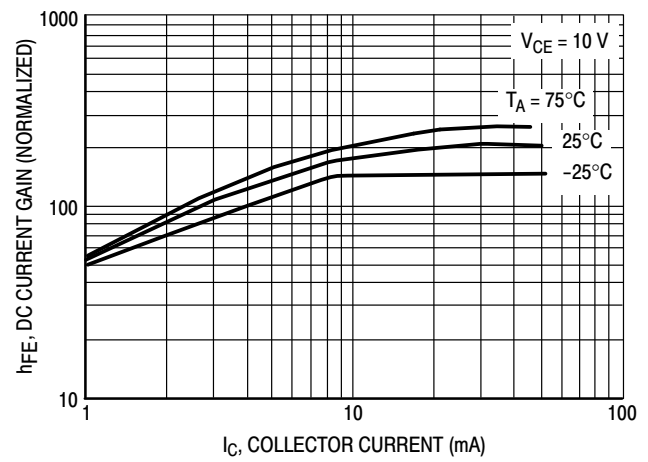


Figure 23. DC Current Gain

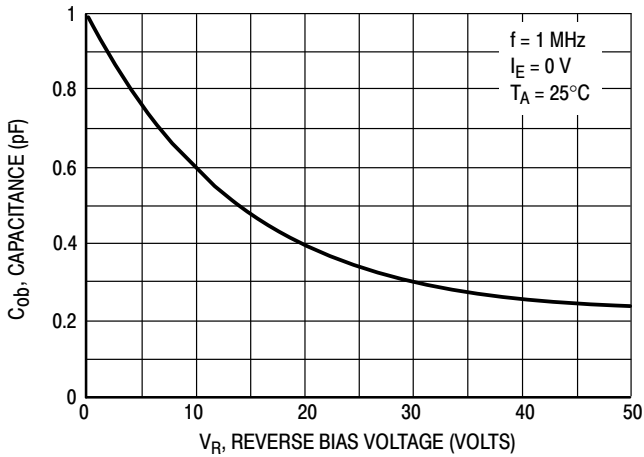


Figure 24. Output Capacitance

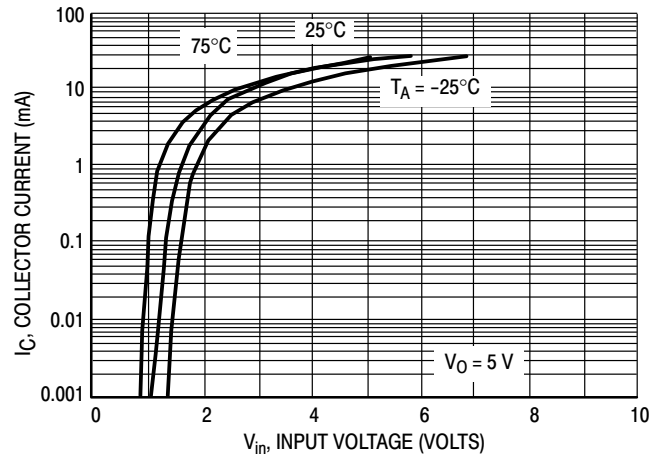


Figure 25. Output Current versus Input Voltage

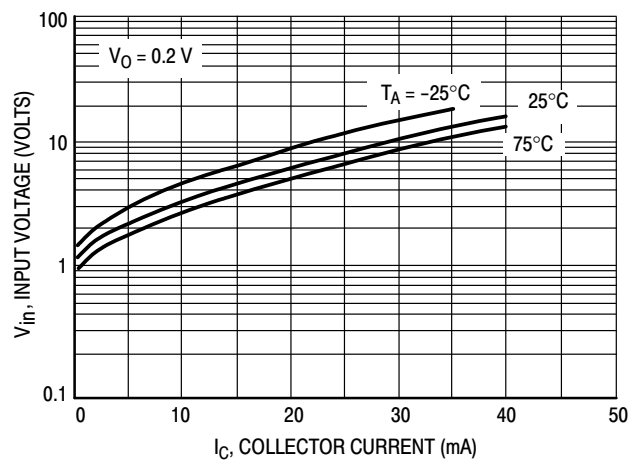


Figure 26. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5313DW1T1G, SMUN5313DW1T1G PNP TRANSISTOR

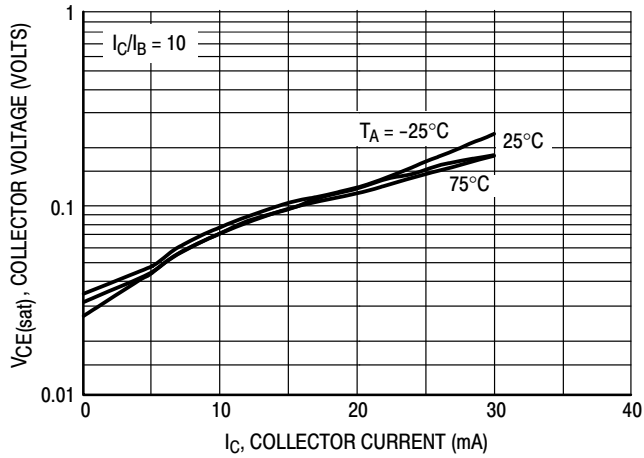


Figure 27. $V_{CE(sat)}$ versus I_C

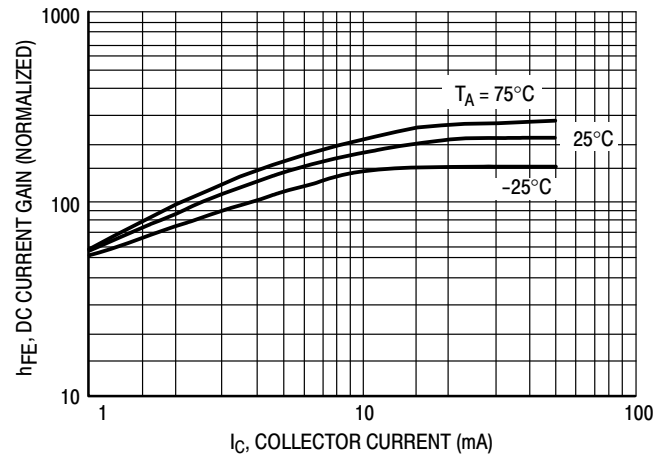


Figure 28. DC Current Gain

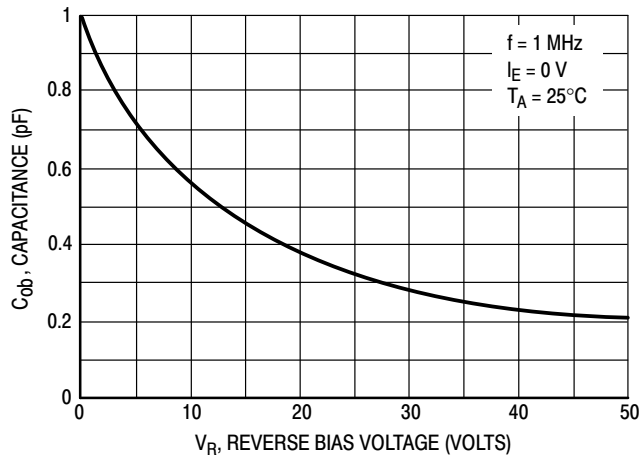


Figure 29. Output Capacitance

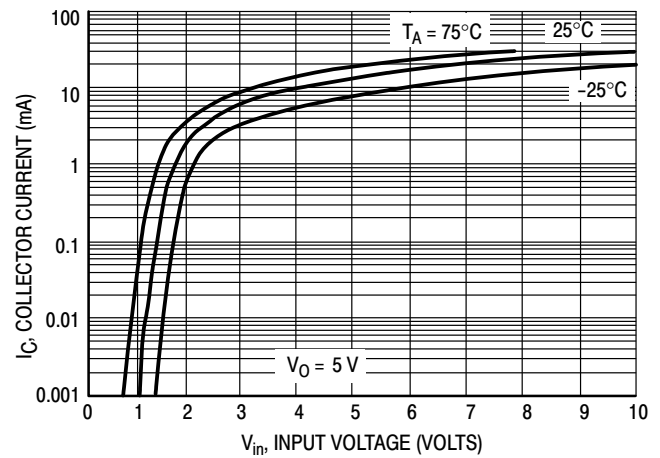


Figure 30. Output Current versus Input Voltage

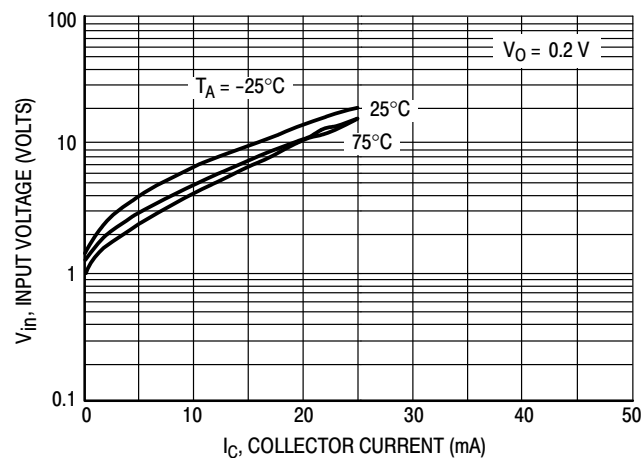


Figure 31. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5314DW1T1G, SMUN5314DW1T1G
NPN TRANSISTOR

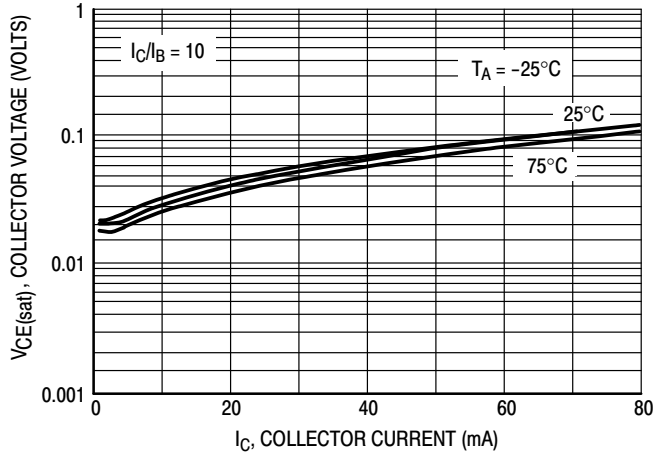


Figure 32. $V_{CE(sat)}$ versus I_C

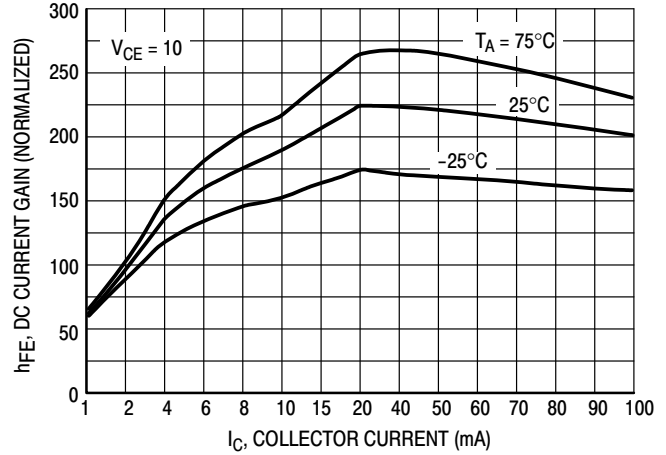


Figure 33. DC Current Gain

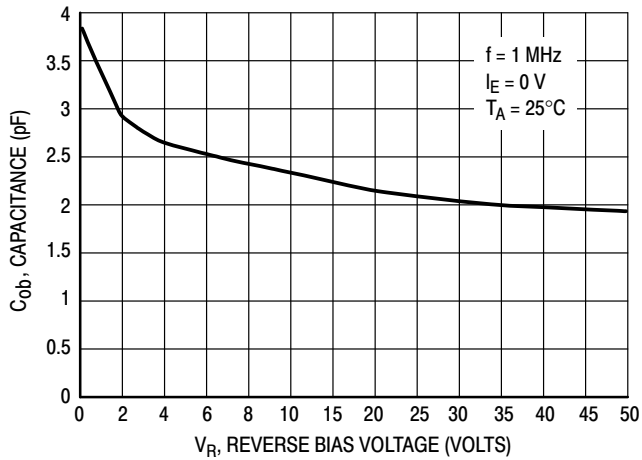


Figure 34. Output Capacitance

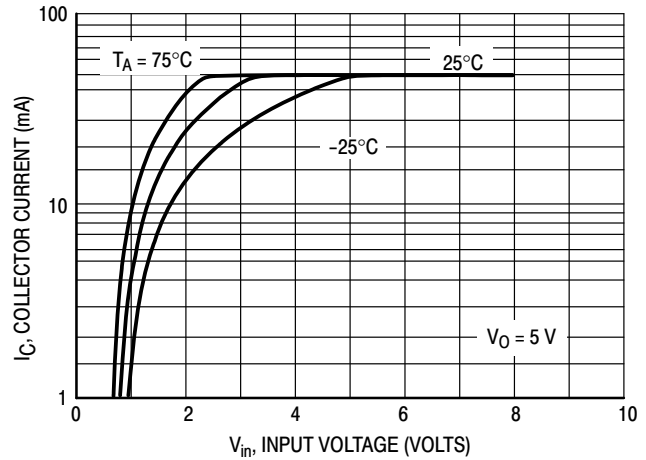


Figure 35. Output Current versus Input Voltage

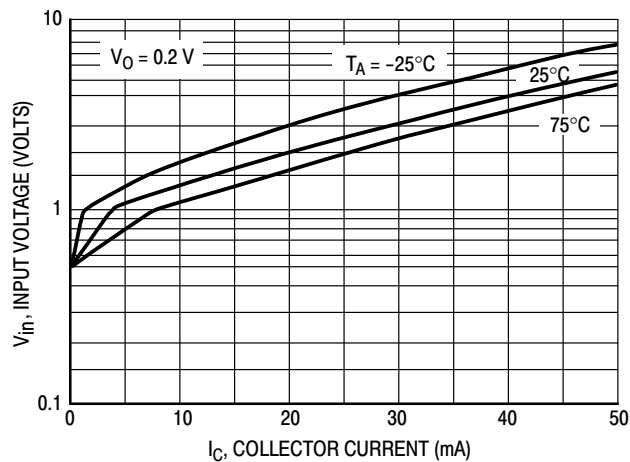


Figure 36. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5314DW1T1G, SMUN5314DW1T1G
PNP TRANSISTOR

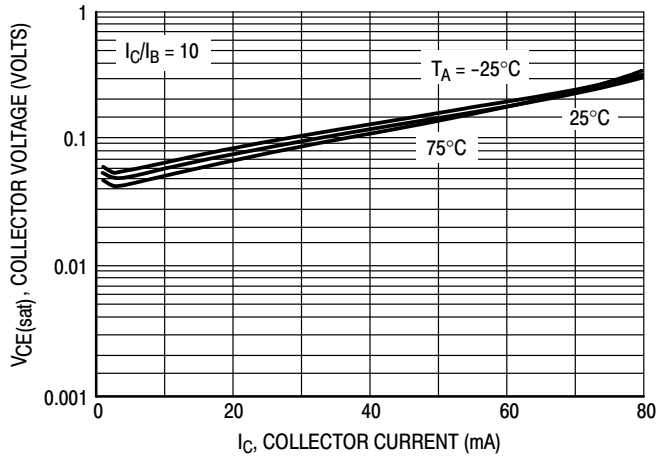


Figure 37. $V_{CE(sat)}$ versus I_C

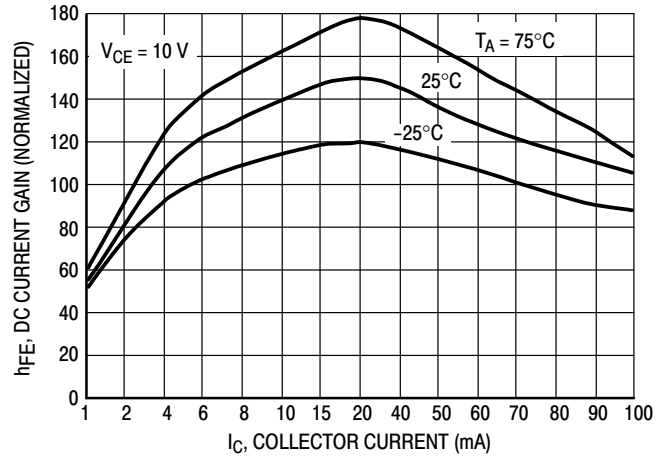


Figure 38. DC Current Gain

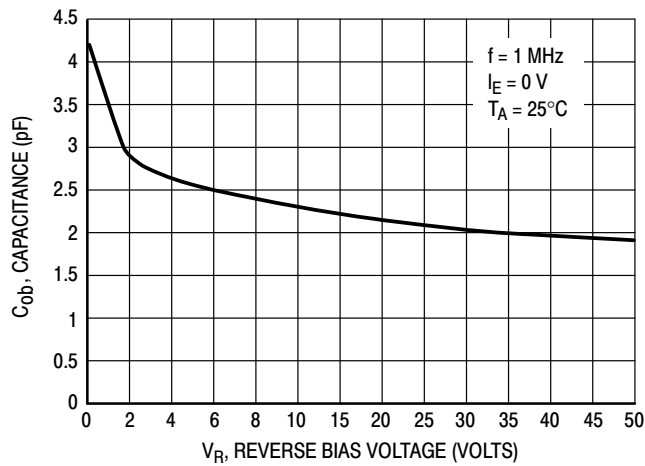


Figure 39. Output Capacitance

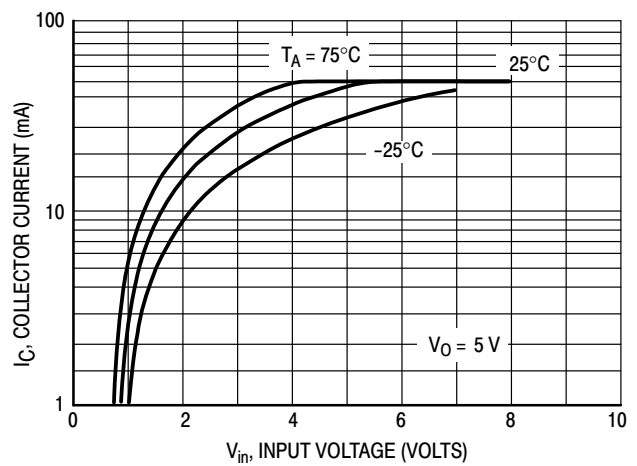


Figure 40. Output Current versus Input Voltage

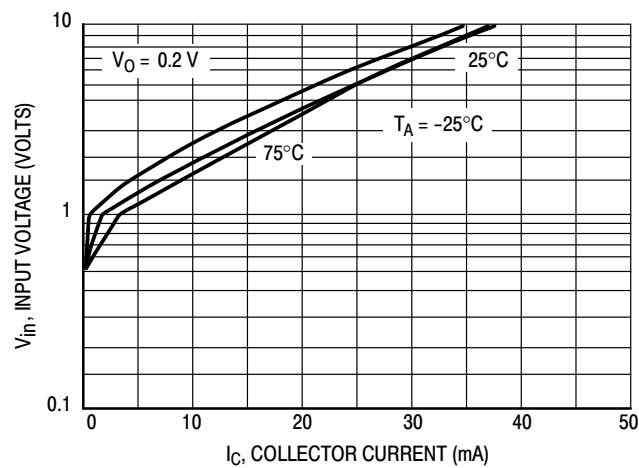


Figure 41. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5315DW1T1G, SMUN5315DW1T1G
NPN TRANSISTOR

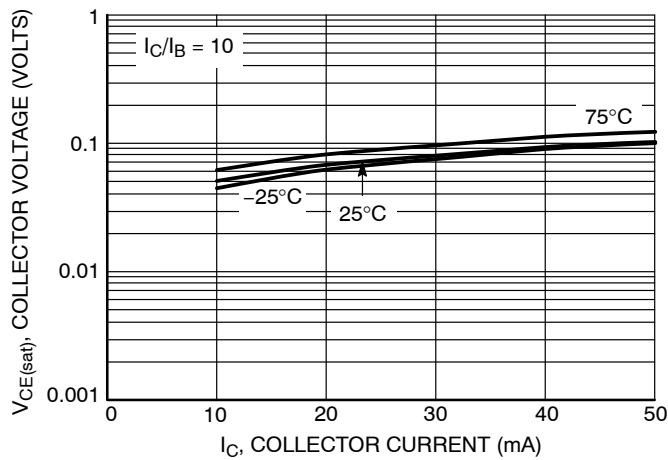


Figure 42. $V_{CE(sat)}$ versus I_C

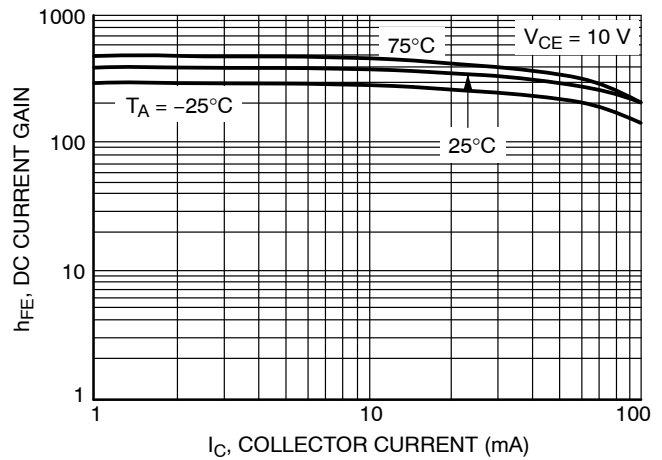


Figure 43. DC Current Gain

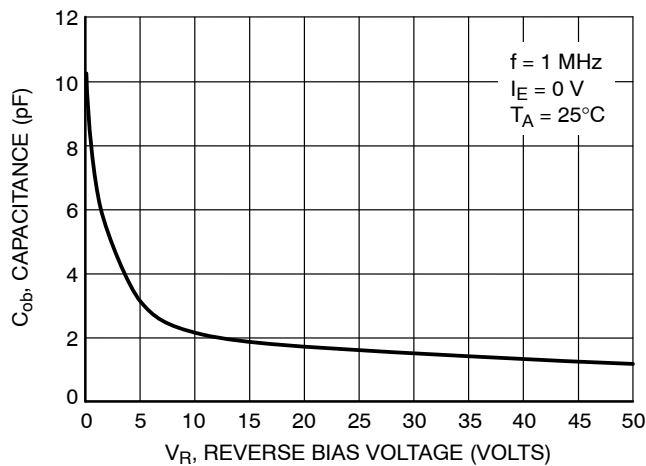


Figure 44. Output Capacitance

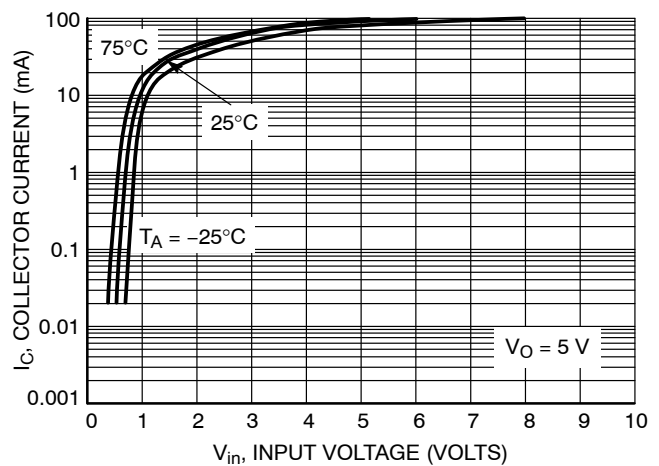


Figure 45. Output Current versus Input Voltage

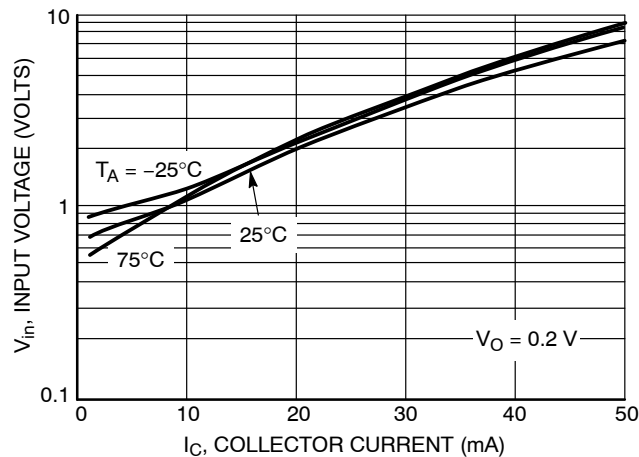


Figure 46. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5315DW1T1G, SMUN5315DW1T1G
PNP TRANSISTOR

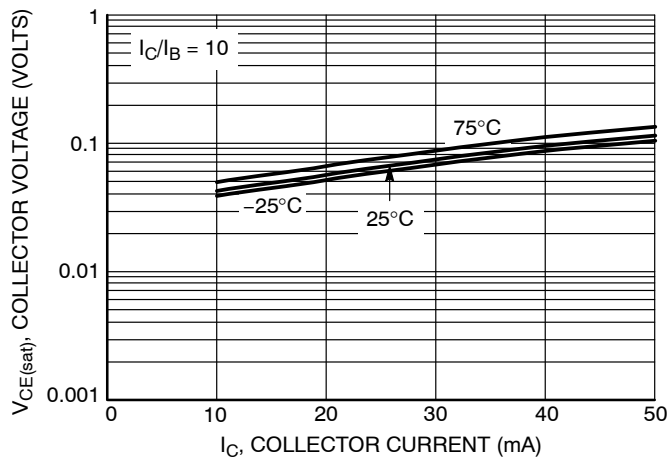


Figure 47. $V_{CE(sat)}$ versus I_C

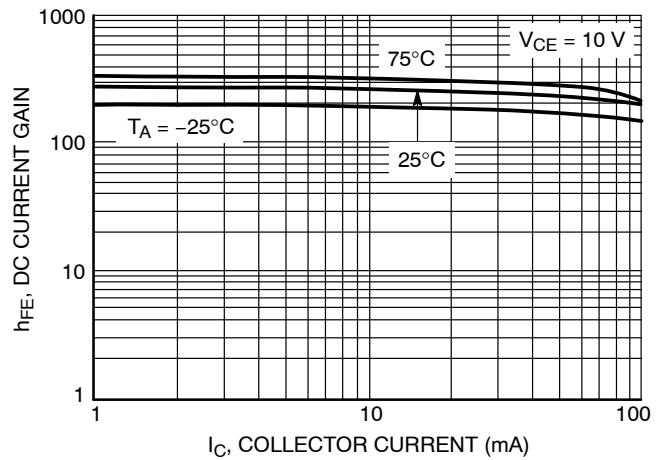


Figure 48. DC Current Gain

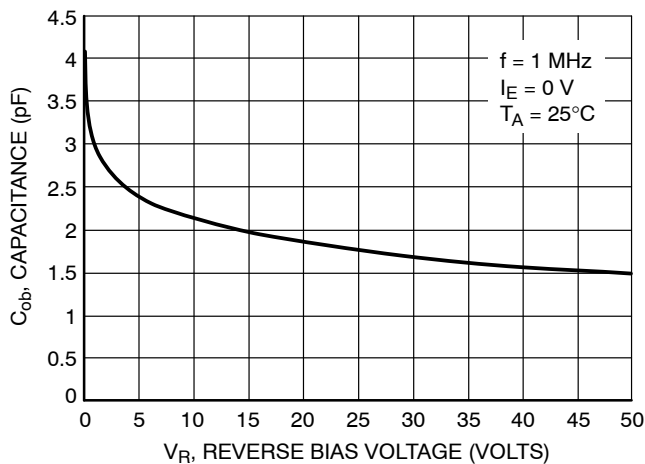


Figure 49. Output Capacitance

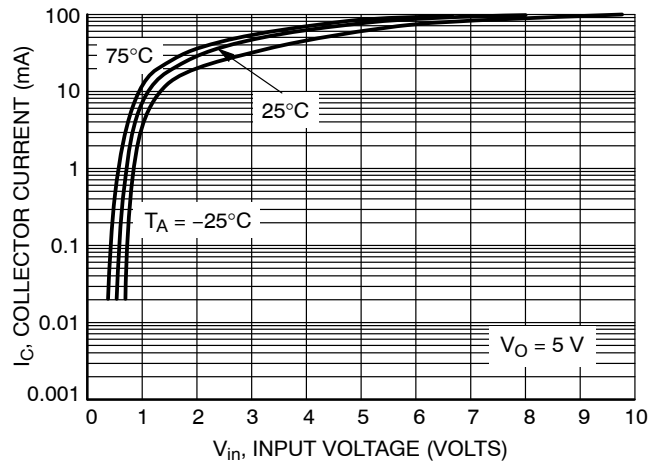


Figure 50. Output Current versus Input Voltage

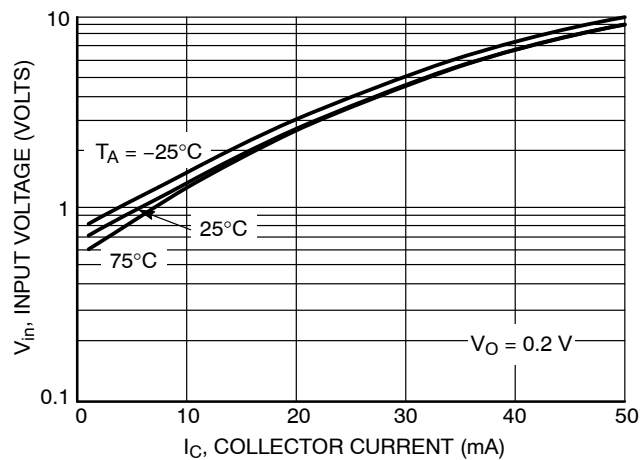


Figure 51. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5316DW1T1G NPN TRANSISTOR

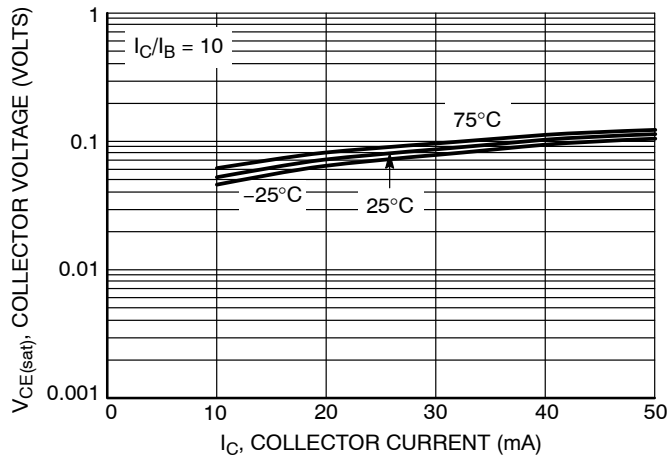


Figure 52. $V_{CE(sat)}$ versus I_C

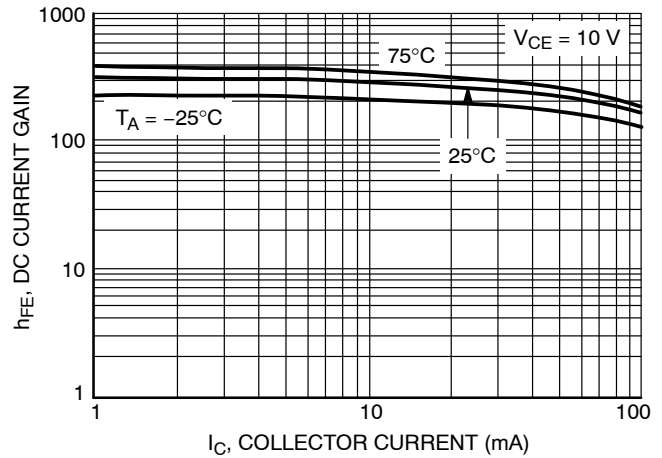


Figure 53. DC Current Gain

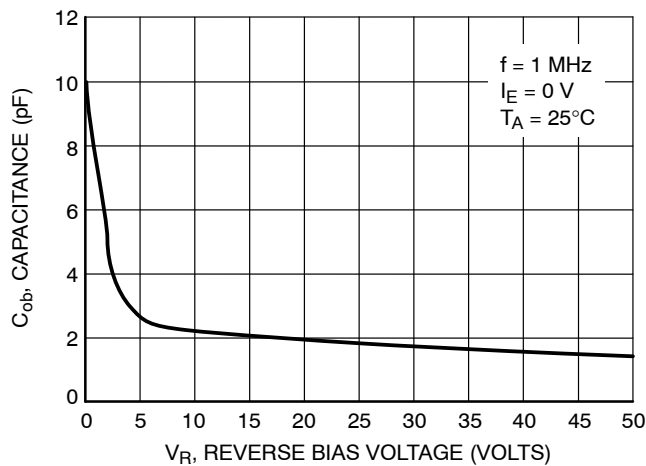


Figure 54. Output Capacitance

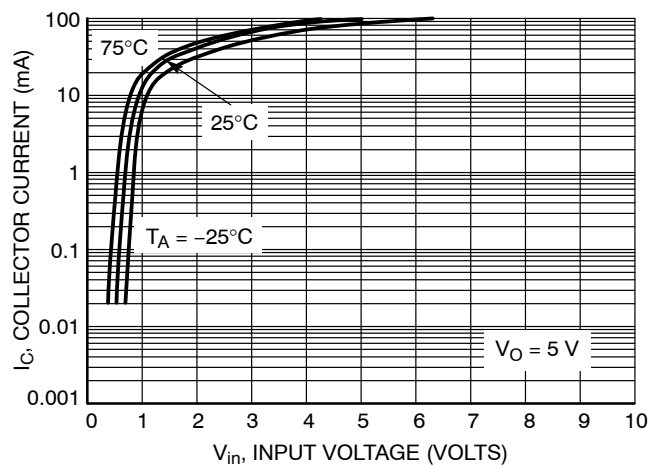


Figure 55. Output Current versus Input Voltage

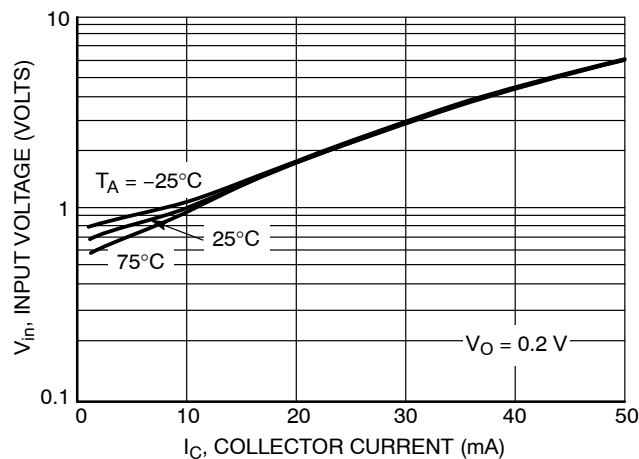


Figure 56. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5316DW1T1G PNP TRANSISTOR

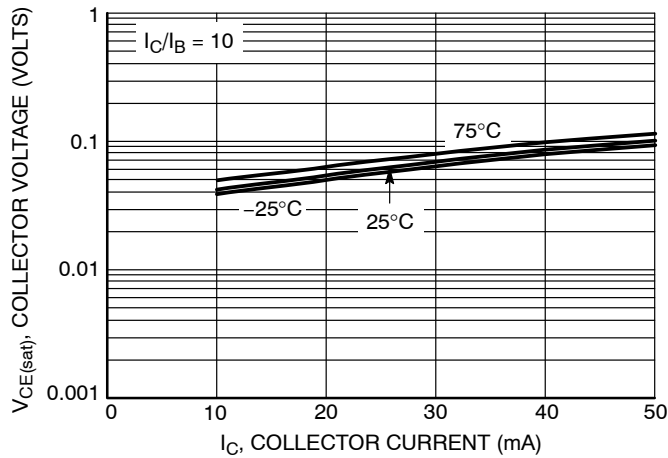


Figure 57. $V_{CE(sat)}$ versus I_C

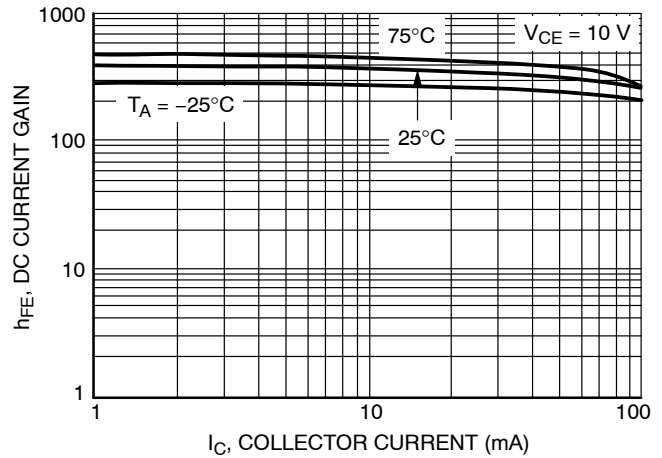


Figure 58. DC Current Gain

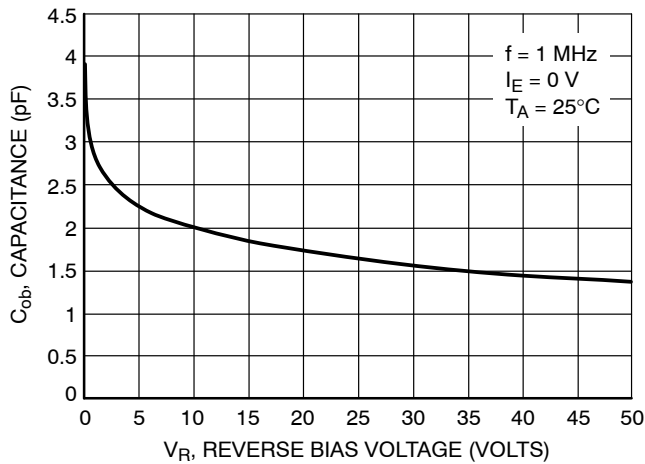


Figure 59. Output Capacitance

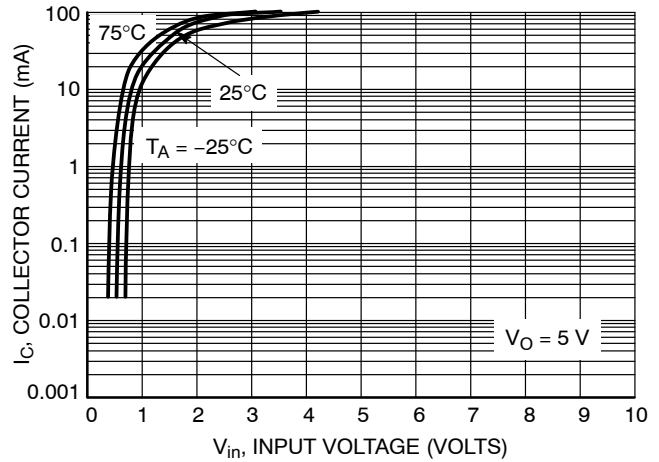


Figure 60. Output Current versus Input Voltage

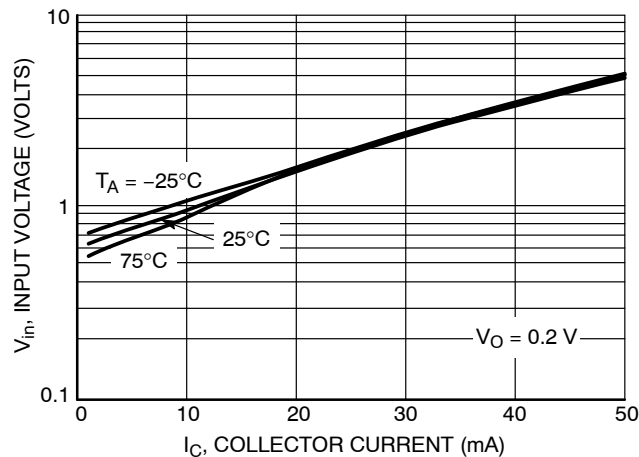


Figure 61. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5330DW1T1G, SMUN5330DW1T1G NPN TRANSISTOR

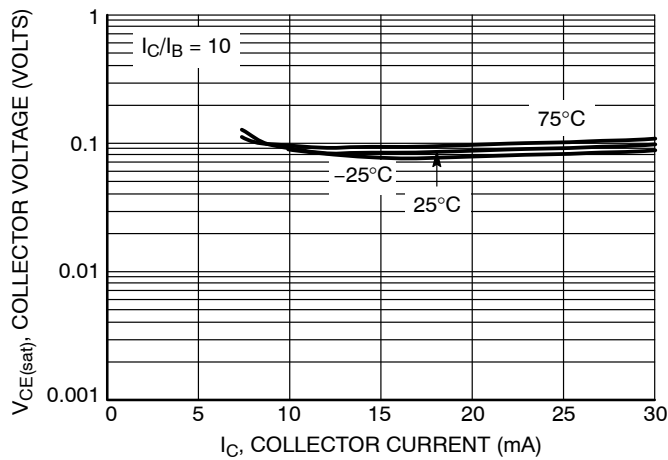


Figure 62. $V_{CE(sat)}$ versus I_C

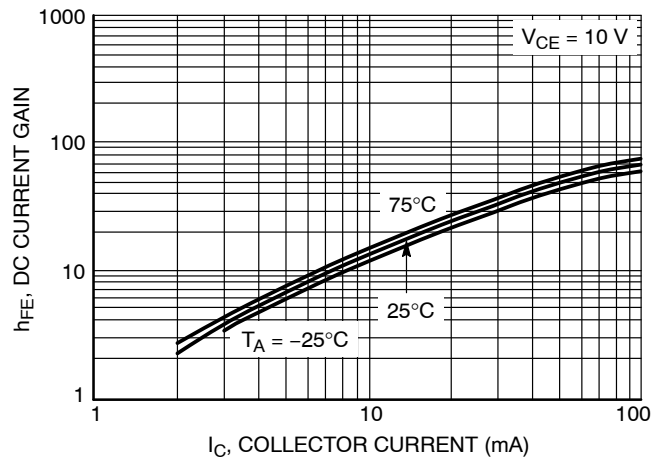


Figure 63. DC Current Gain

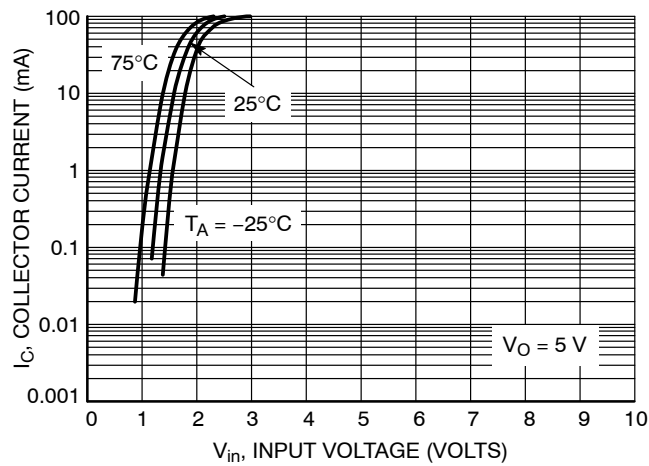


Figure 64. Output Current versus Input Voltage

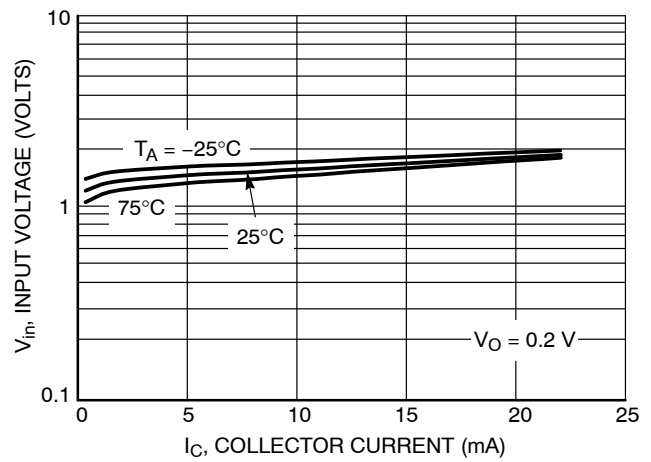


Figure 65. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5330DW1T1G, SMUN5330DW1T1G
PNP TRANSISTOR

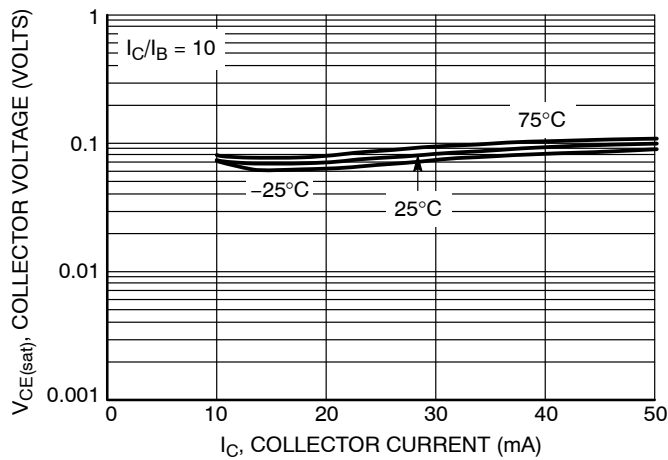


Figure 66. $V_{CE(sat)}$ versus I_C

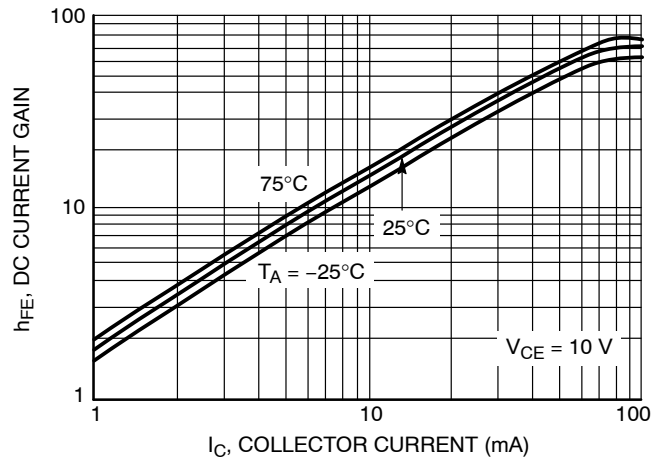


Figure 67. DC Current Gain

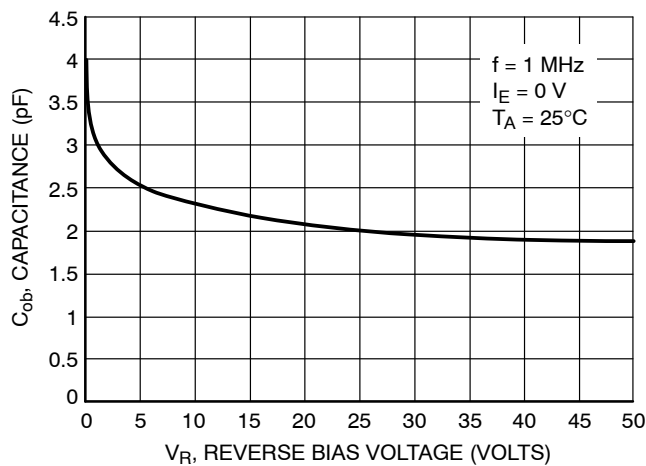


Figure 68. Output Capacitance

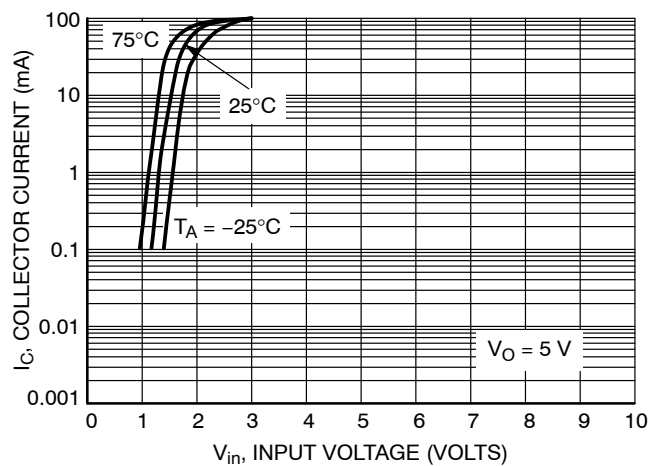


Figure 69. Output Current versus Input Voltage

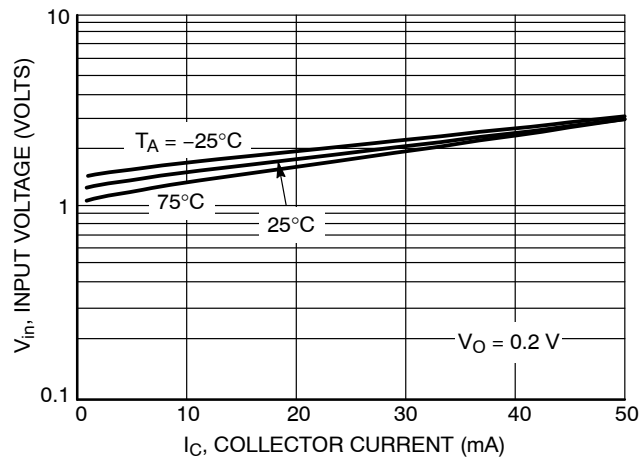


Figure 70. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5331DW1T1G NPN TRANSISTOR

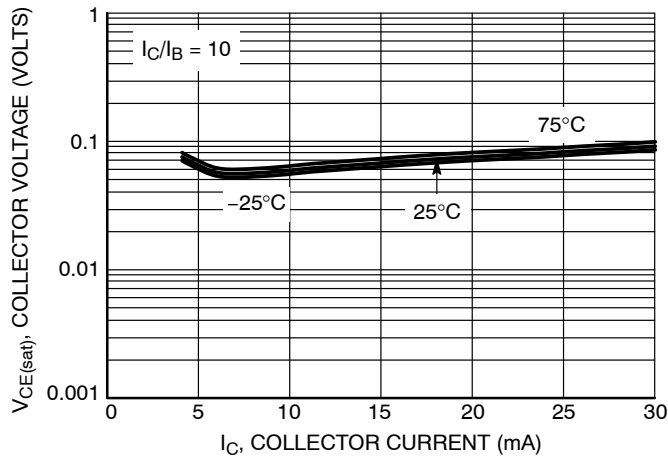


Figure 71. $V_{CE(sat)}$ versus I_C

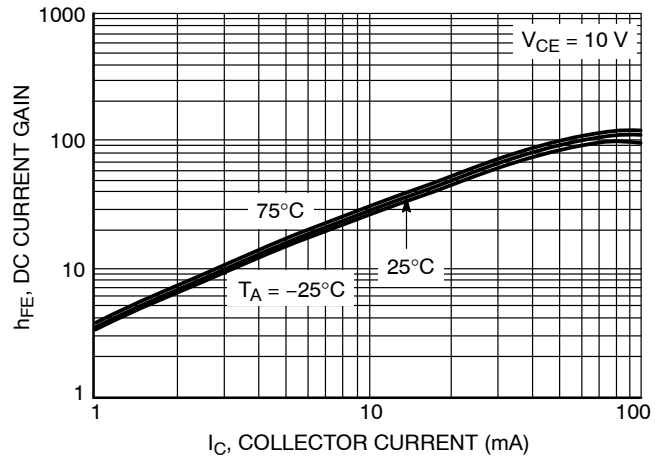


Figure 72. DC Current Gain

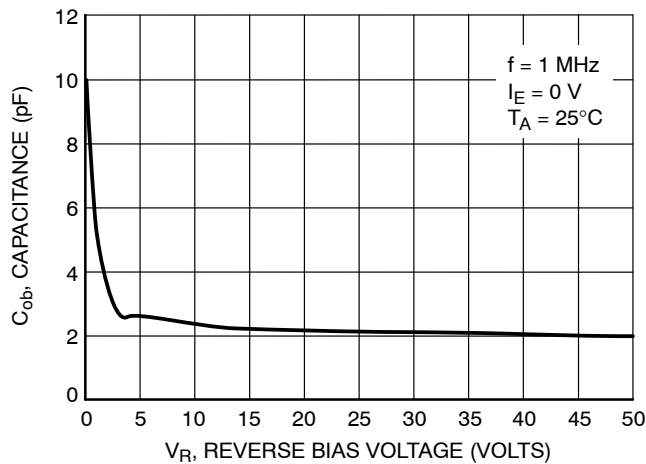


Figure 73. Output Capacitance

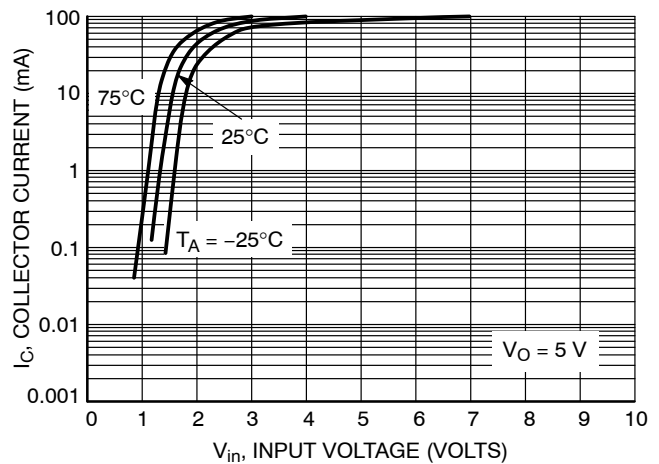


Figure 74. Output Current versus Input Voltage

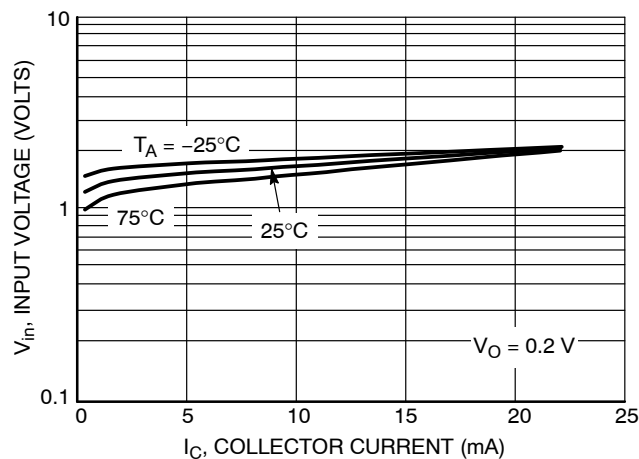


Figure 75. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5331DW1T1G PNP TRANSISTOR

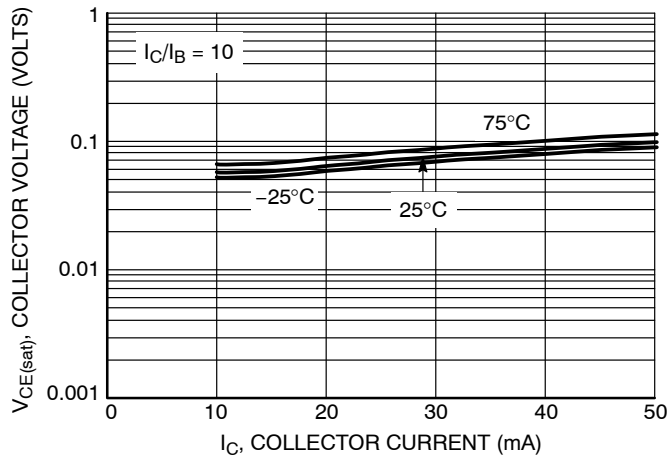


Figure 76. $V_{CE(sat)}$ versus I_C

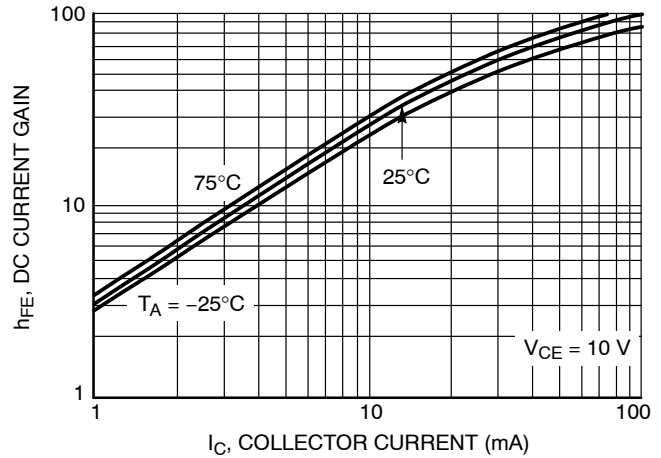


Figure 77. DC Current Gain

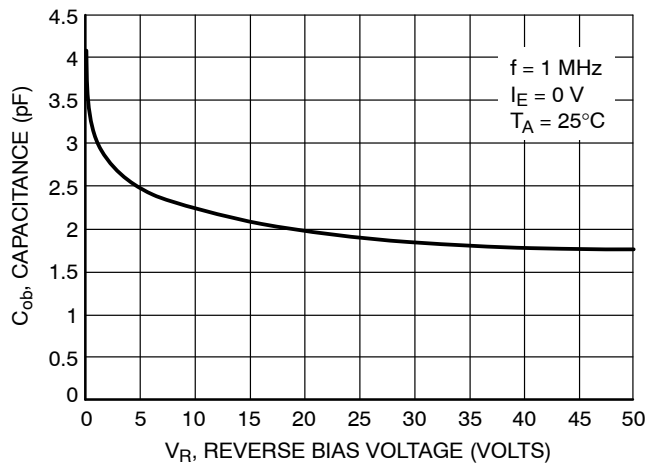


Figure 78. Output Capacitance

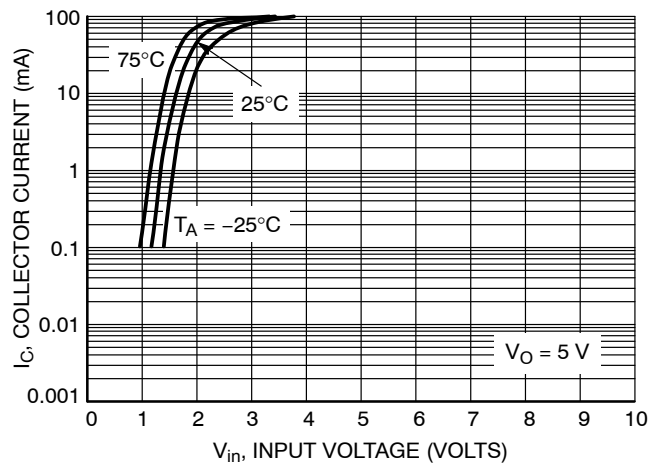


Figure 79. Output Current versus Input Voltage

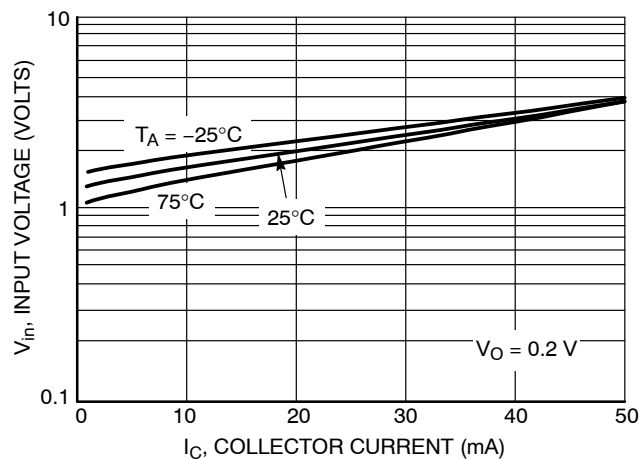


Figure 80. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5332DW1T1G, NSVMUN5332DW1T1G NPN TRANSISTOR

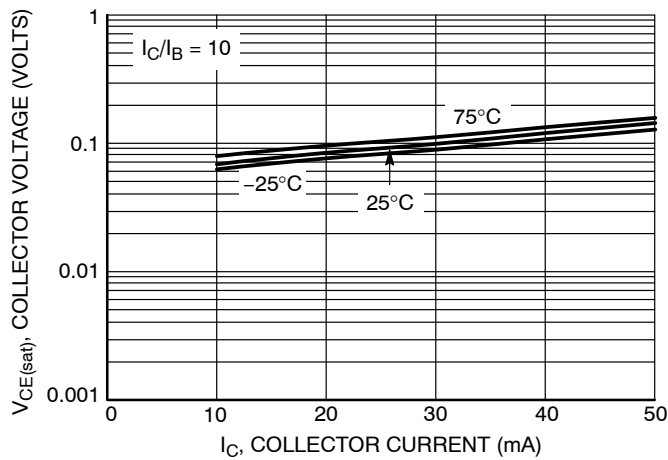


Figure 81. $V_{CE(sat)}$ versus I_C

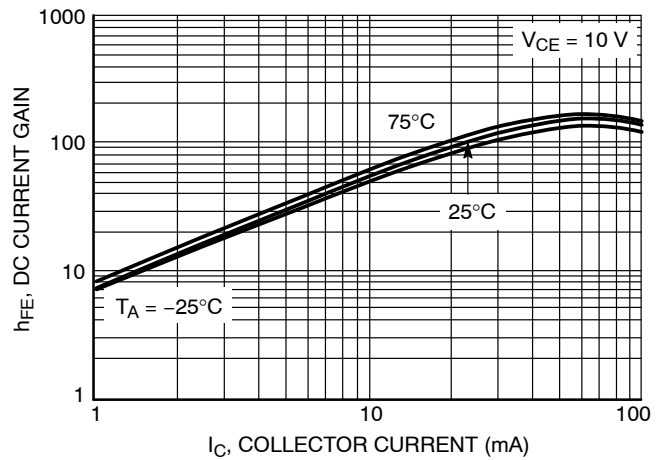


Figure 82. DC Current Gain

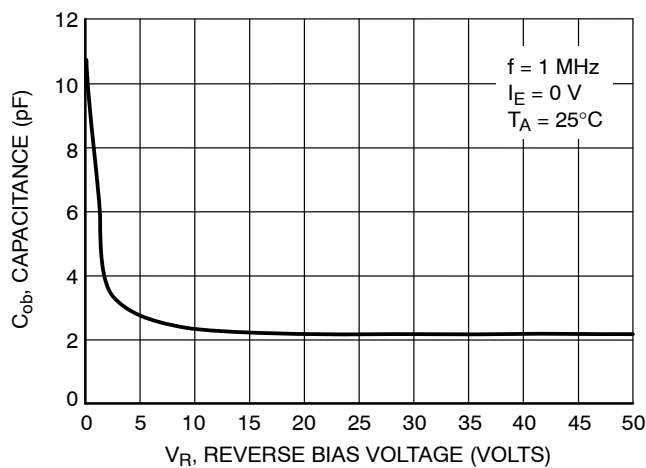


Figure 83. Output Capacitance

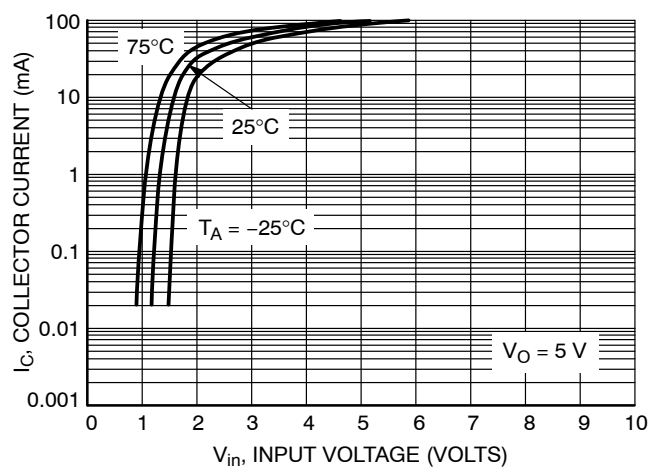


Figure 84. Output Current versus Input Voltage

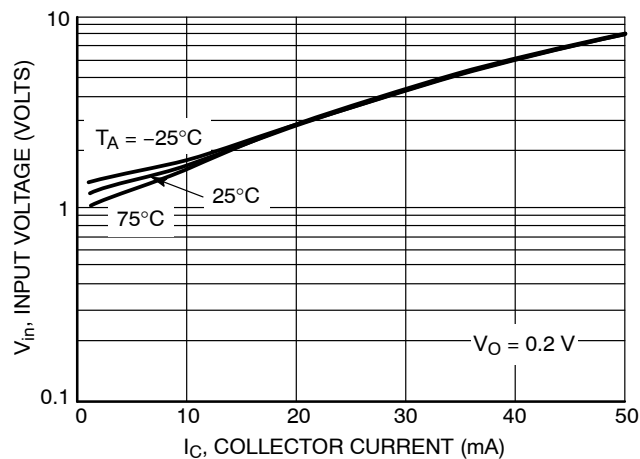


Figure 85. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5332DW1T1G, NSVMUN5332DW1T1G PNP TRANSISTOR

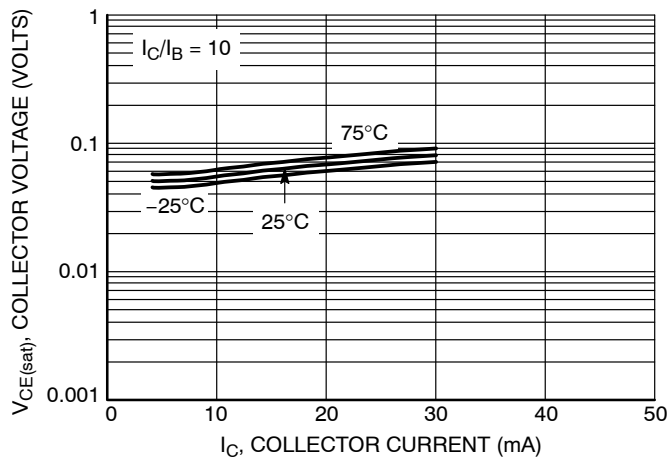


Figure 86. $V_{CE(sat)}$ versus I_C

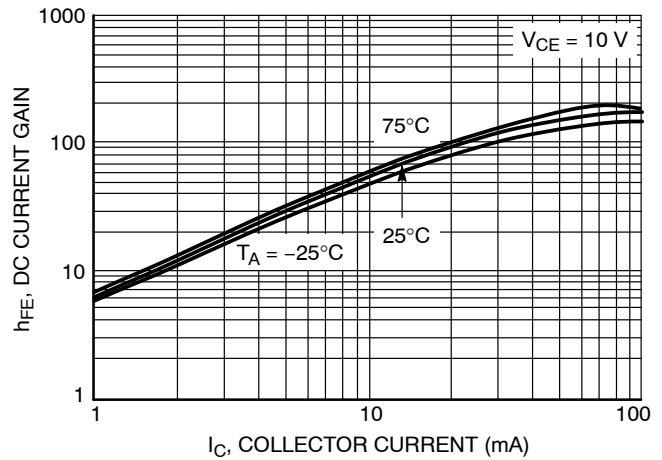


Figure 87. DC Current Gain

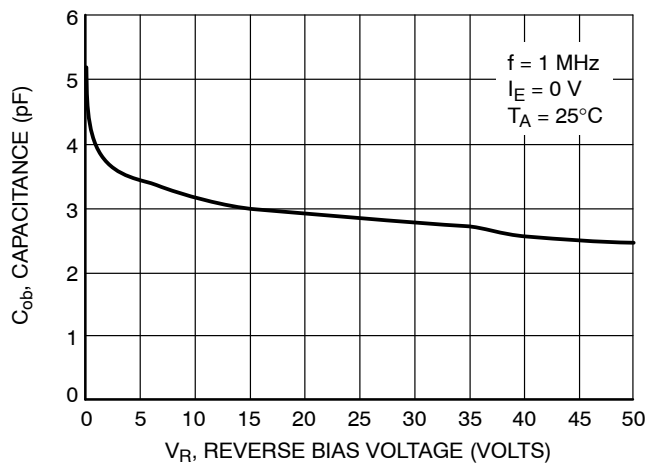


Figure 88. Output Capacitance

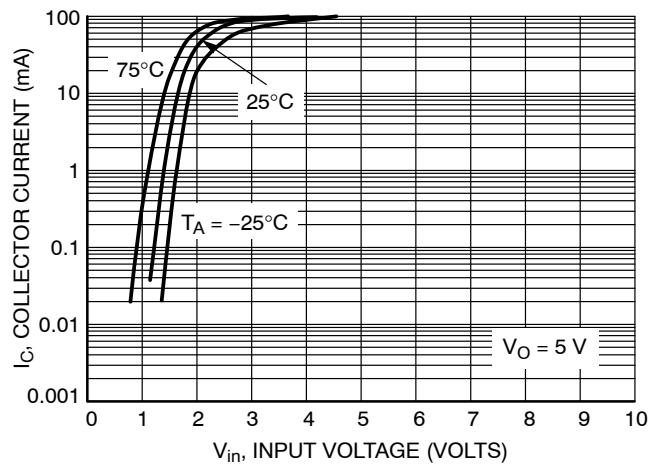


Figure 89. Output Current versus Input Voltage

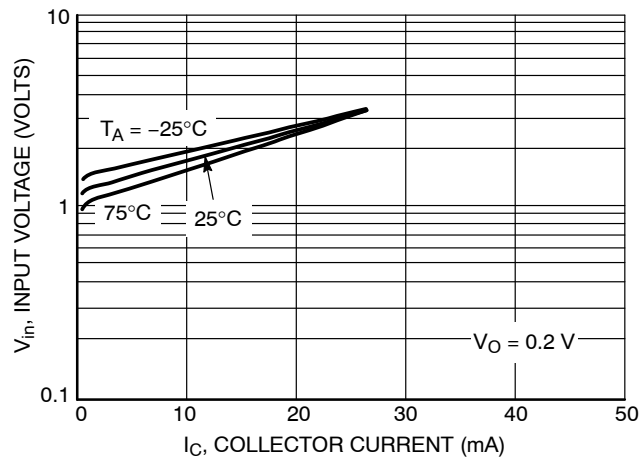


Figure 90. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5333DW1T1G, NSVMUN5333DW1T1G NPN TRANSISTOR

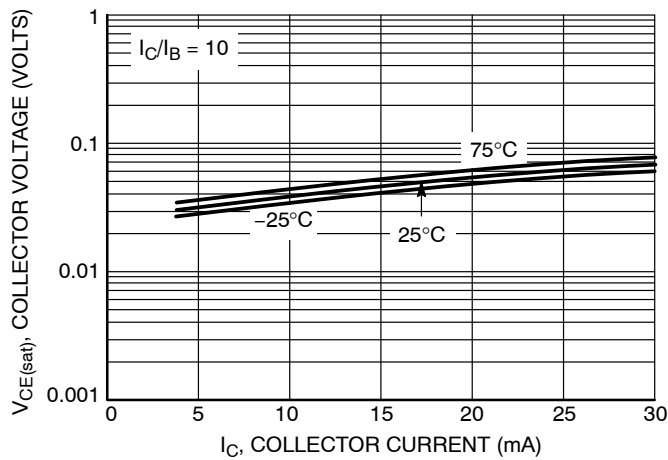


Figure 91. $V_{CE(sat)}$ versus I_C

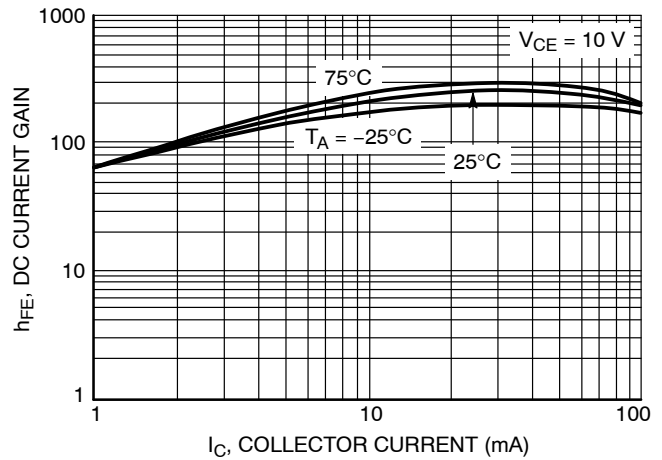


Figure 92. DC Current Gain

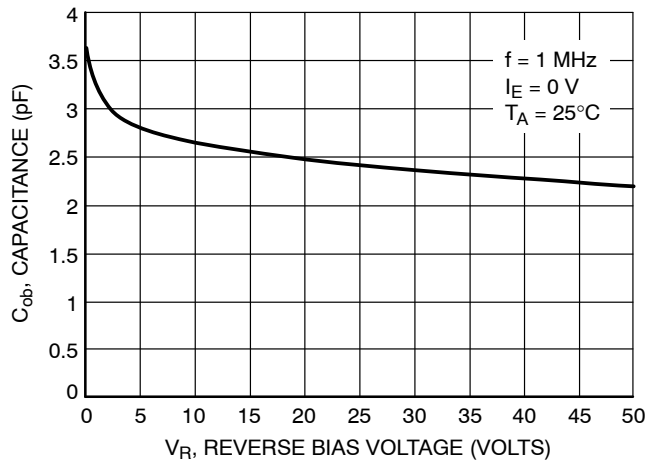


Figure 93. Output Capacitance

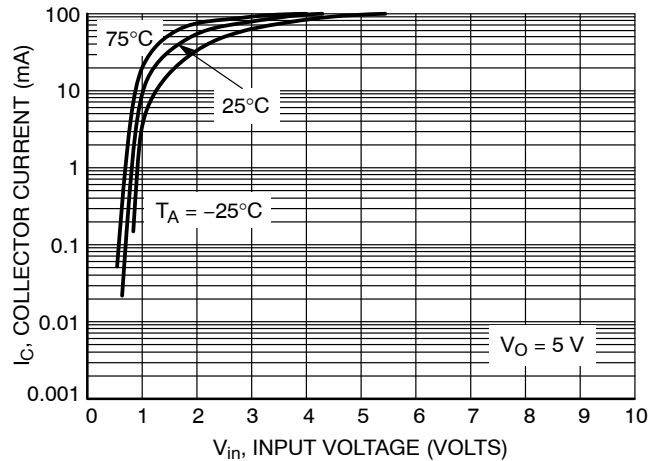


Figure 94. Output Current versus Input Voltage

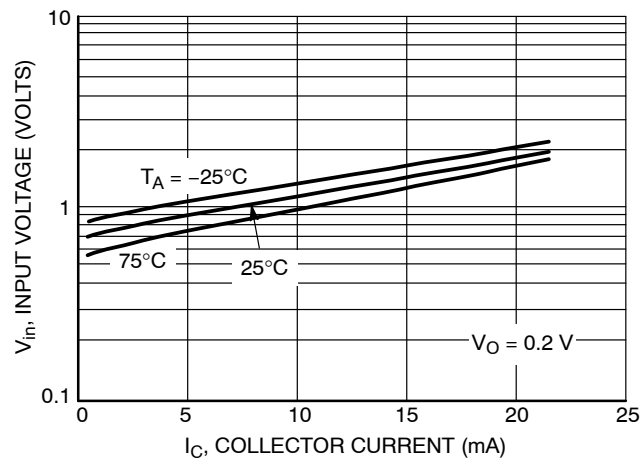


Figure 95. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5333DW1T1G, NSVMUN5333DW1T1G
PNP TRANSISTOR

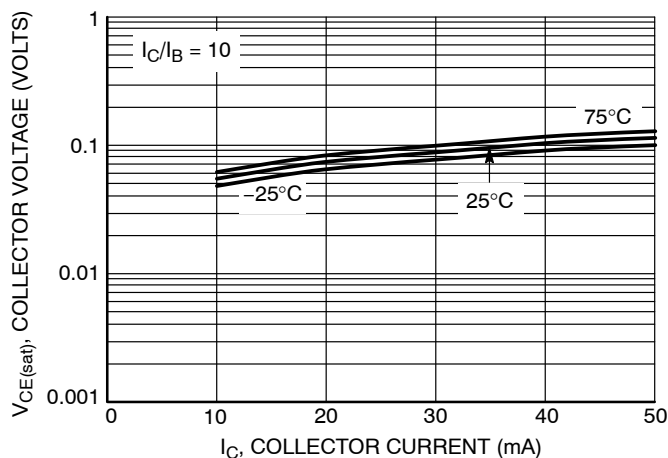


Figure 96. $V_{CE(sat)}$ versus I_C

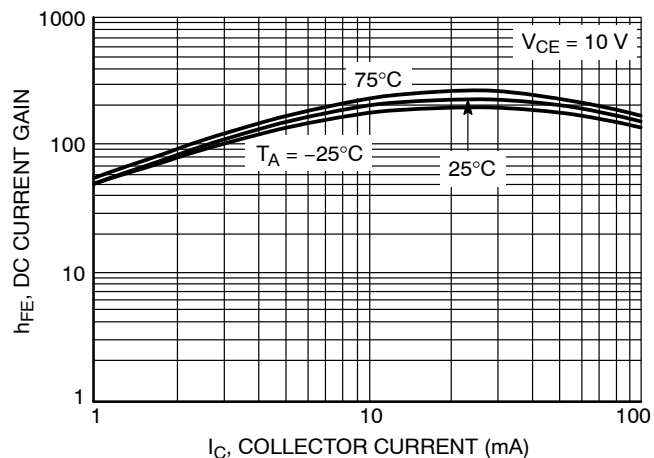


Figure 97. DC Current Gain

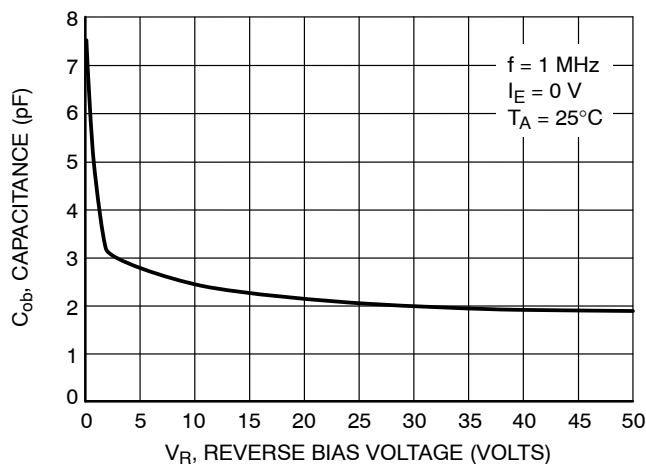


Figure 98. Output Capacitance

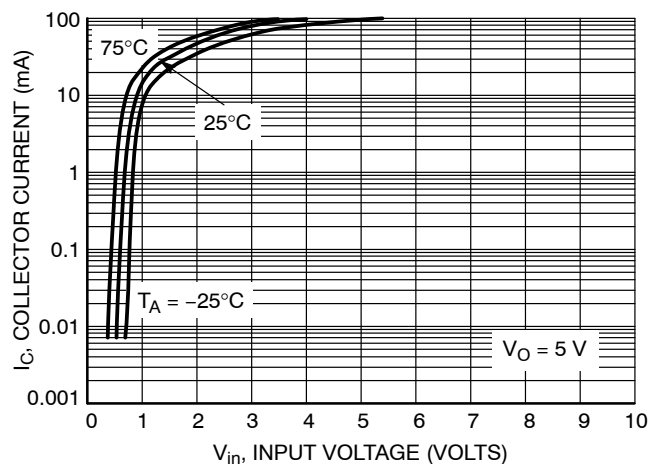


Figure 99. Output Current versus Input Voltage

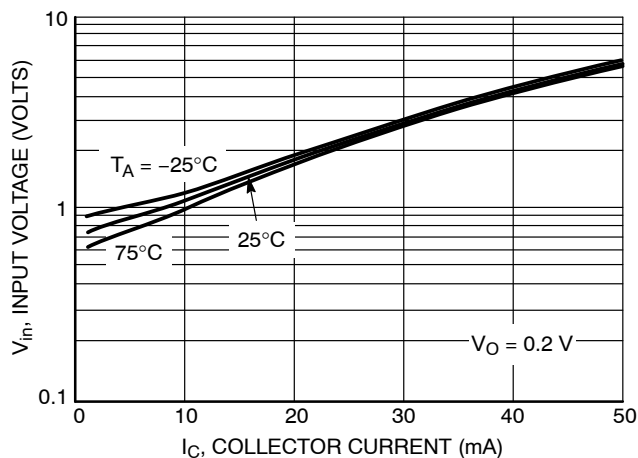


Figure 100. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5334DW1T1G, NSVMUN5334DW1T1G
NPN TRANSISTOR

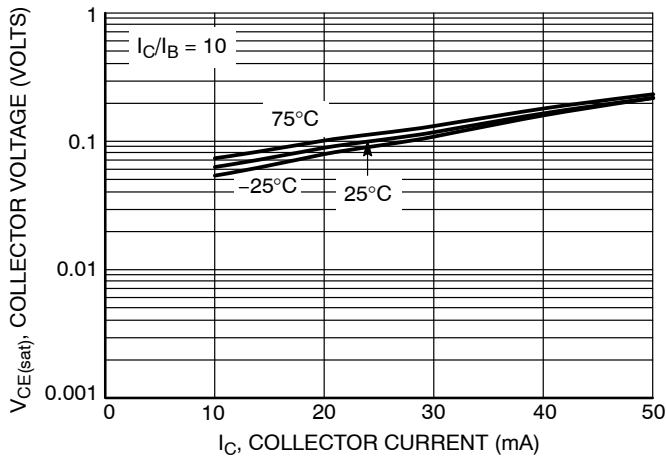


Figure 101. $V_{CE(sat)}$ versus I_C

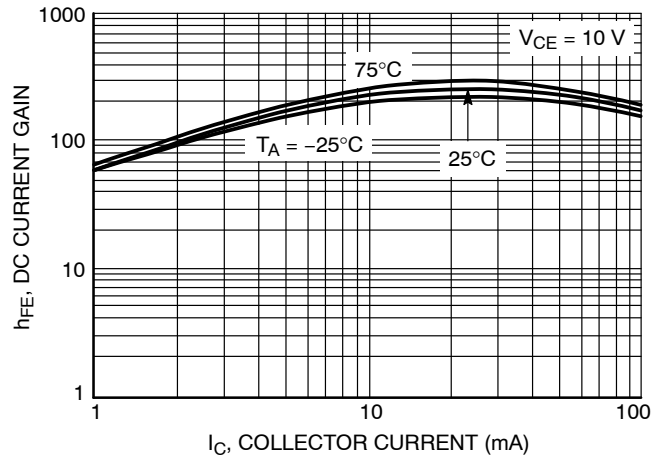


Figure 102. DC Current Gain

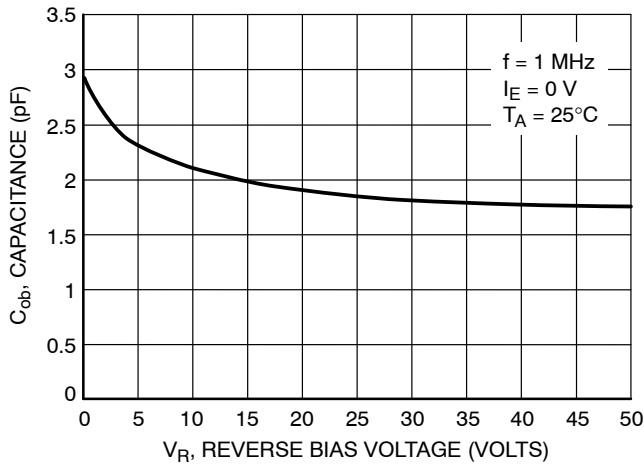


Figure 103. Output Capacitance

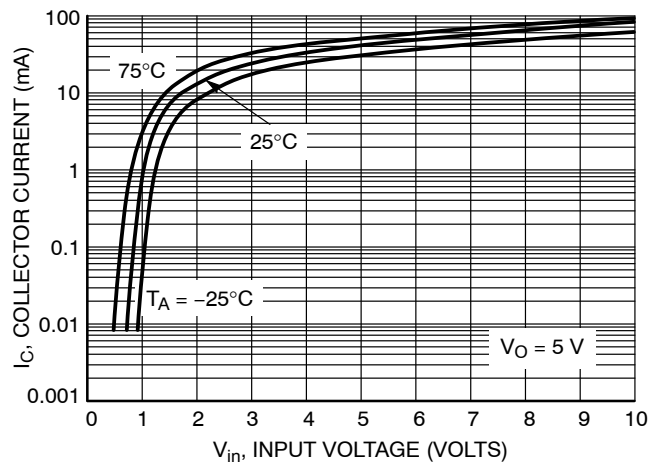


Figure 104. Output Current versus Input Voltage

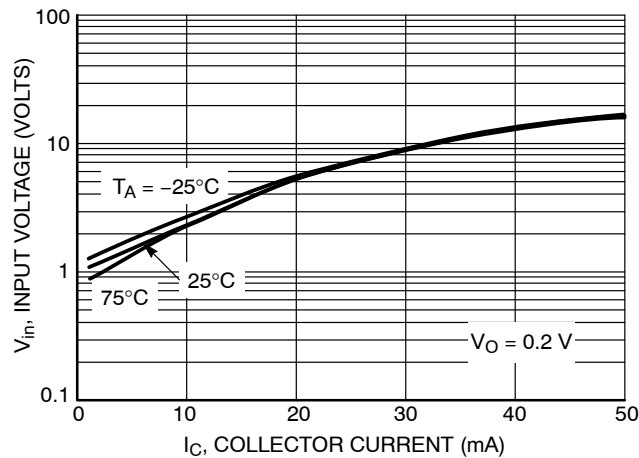


Figure 105. Input Voltage versus Output Current

MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5334DW1T1G, NSVMUN5334DW1T1G PNP TRANSISTOR

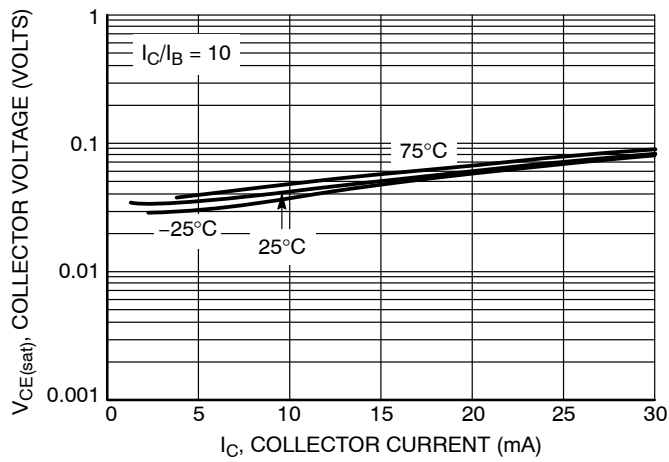


Figure 106. $V_{CE(sat)}$ versus I_C

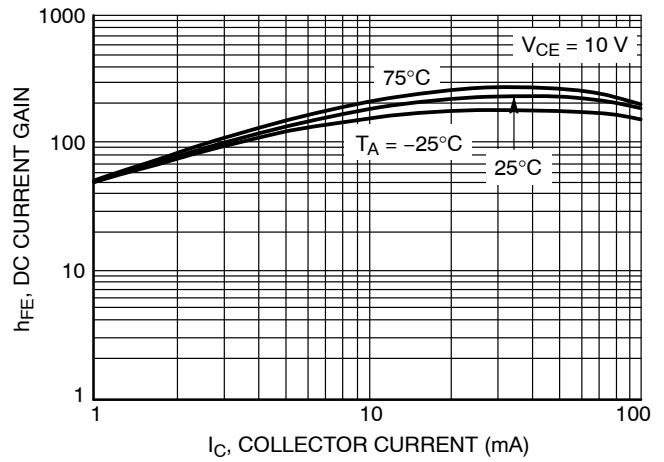


Figure 107. DC Current Gain

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5335DW1T1G, SMUN5335DW1T1G
NPN TRANSISTOR

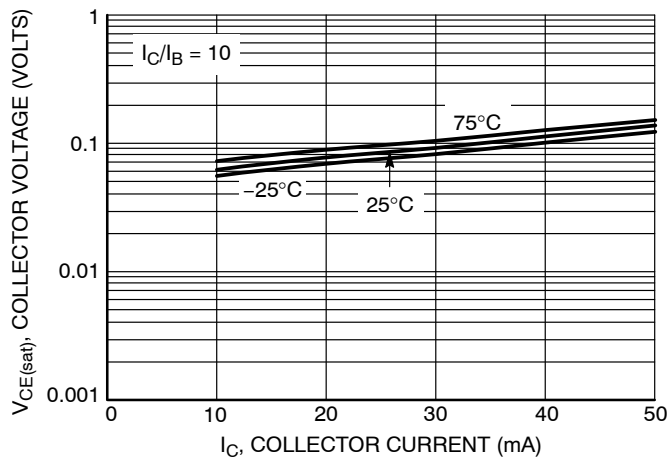


Figure 108. $V_{CE(sat)}$ versus I_C

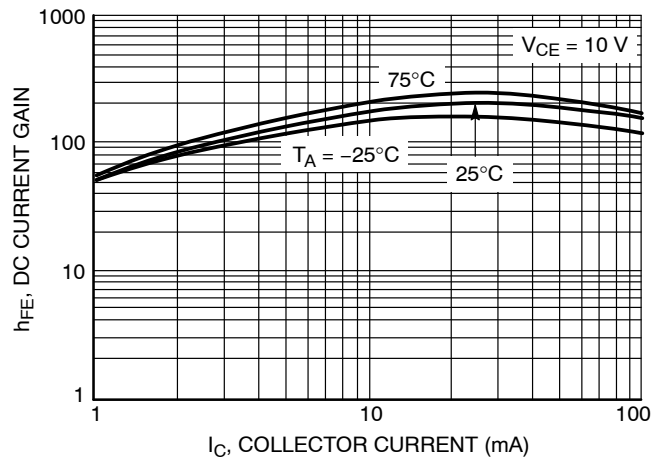


Figure 109. DC Current Gain

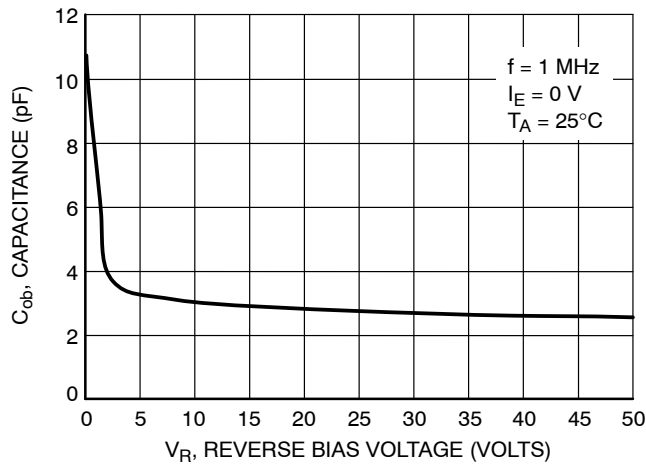


Figure 110. Output Capacitance

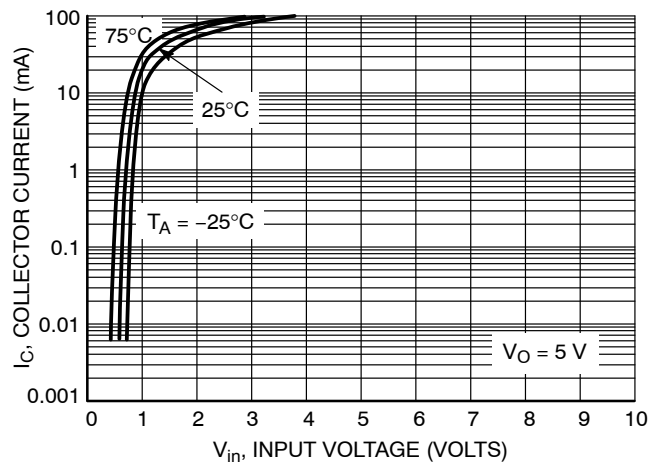


Figure 111. Output Current versus Input Voltage

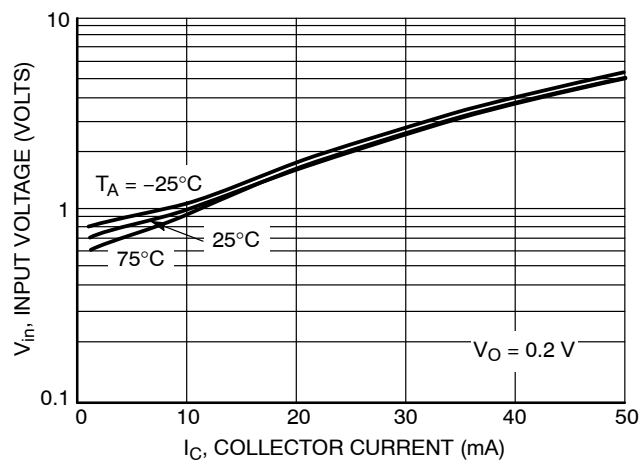


Figure 112. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5335DW1T1G, SMUN5335DW1T1G
PNP TRANSISTOR

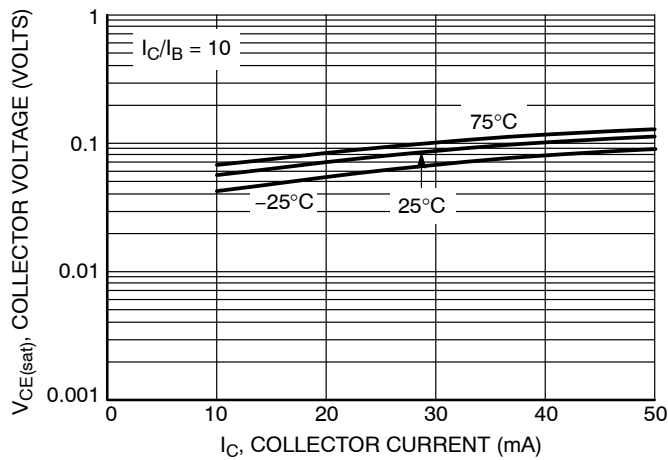


Figure 113. $V_{CE(sat)}$ versus I_C

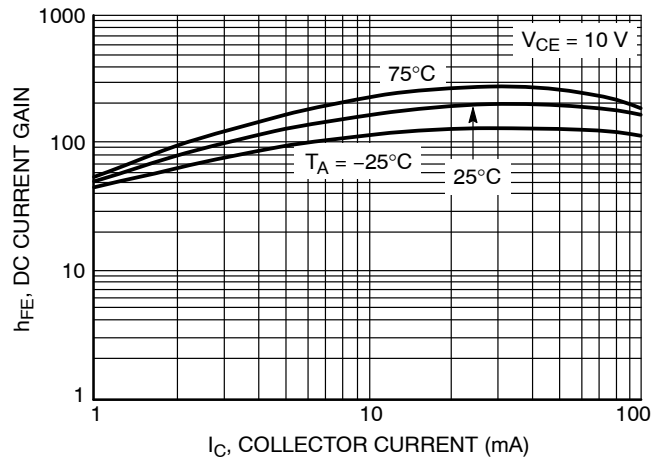


Figure 114. DC Current Gain

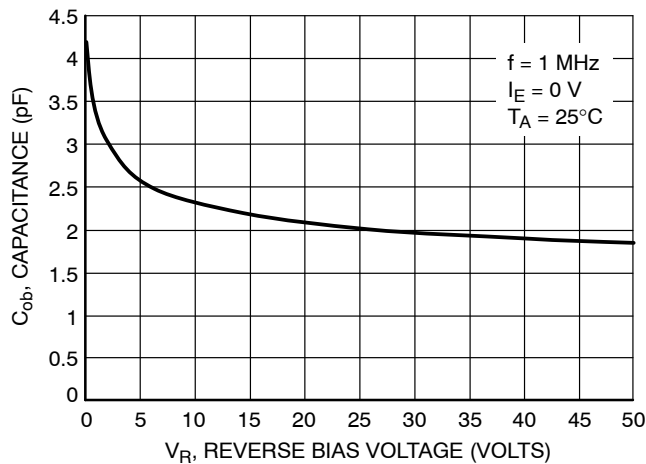


Figure 115. Output Capacitance

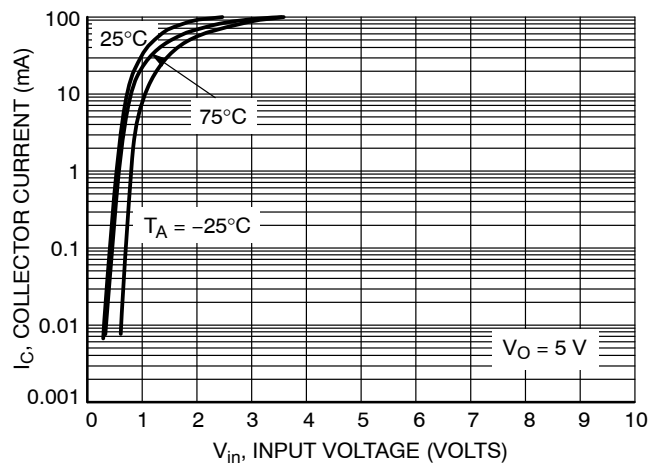


Figure 116. Output Current versus Input Voltage

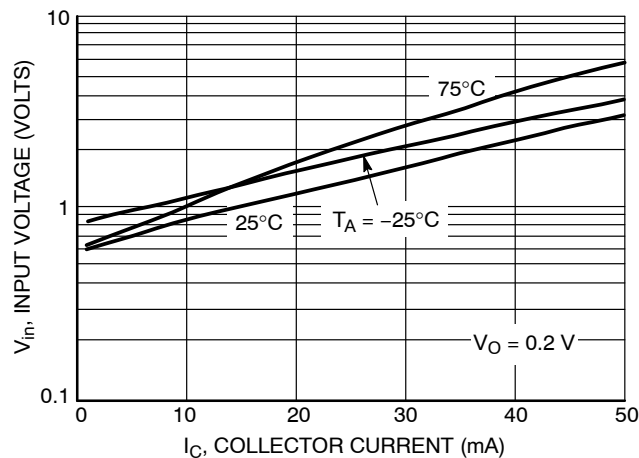


Figure 117. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5336DW1T1G NPN TRANSISTOR

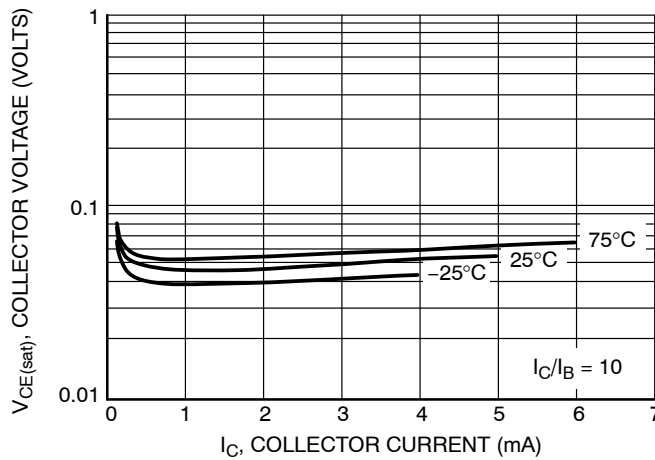


Figure 118. $V_{CE(sat)}$ versus I_C

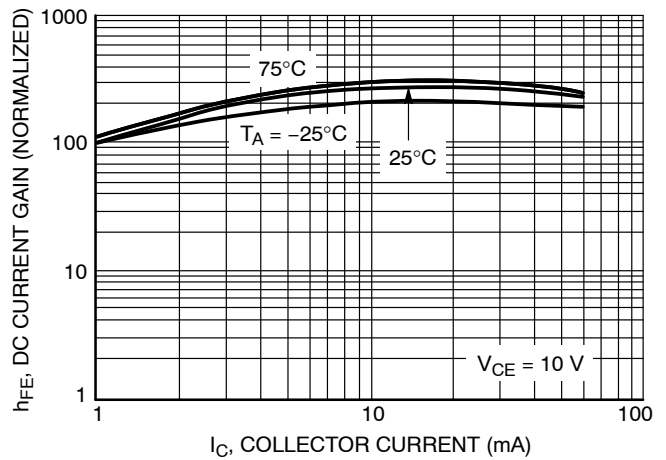


Figure 119. DC Current Gain

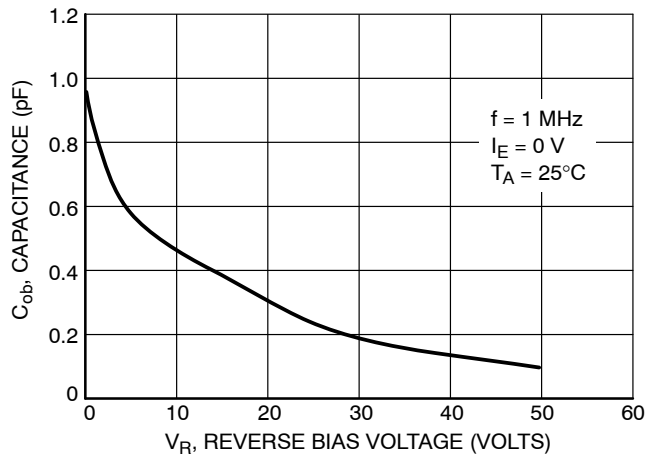


Figure 120. Output Capacitance

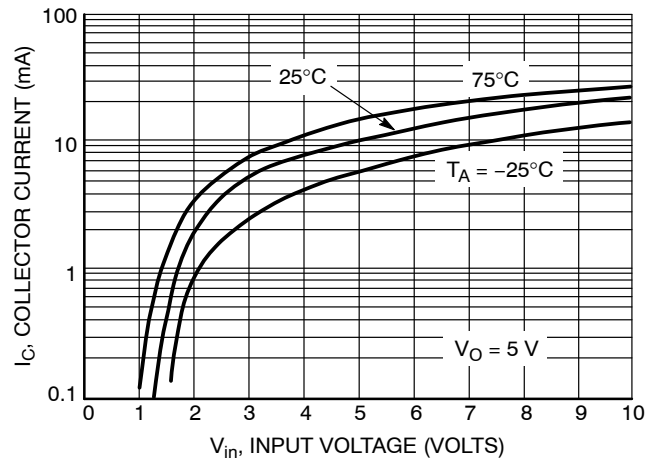


Figure 121. Output Current versus Input Voltage

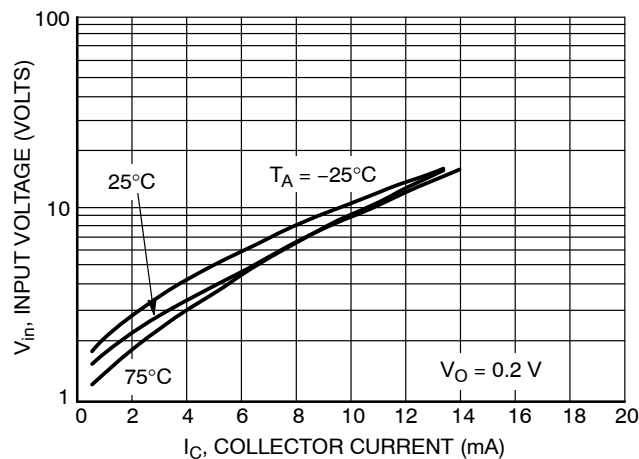


Figure 122. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5336DW1T1G PNP TRANSISTOR

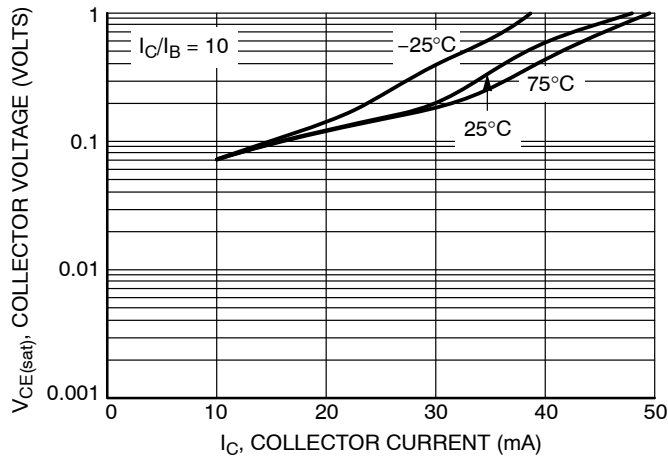


Figure 123. $V_{CE(sat)}$ versus I_C

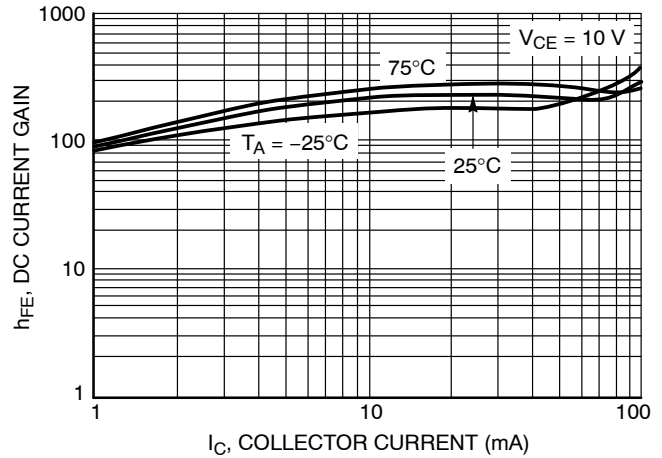


Figure 124. DC Current Gain

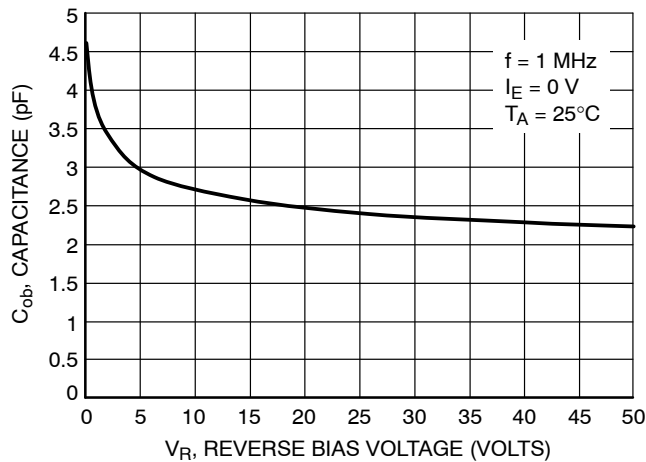


Figure 125. Output Capacitance

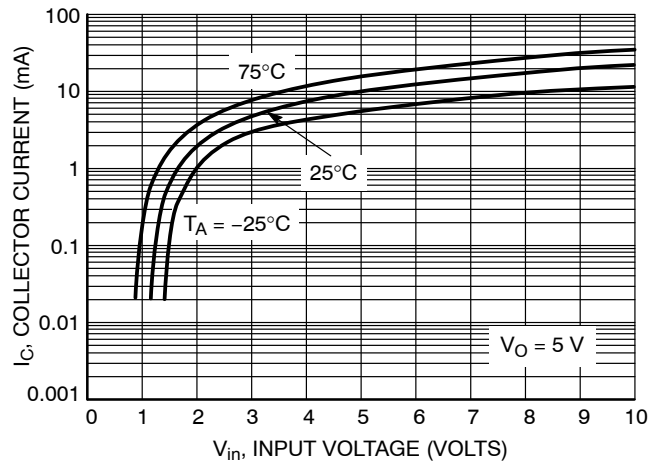


Figure 126. Output Current versus Input Voltage

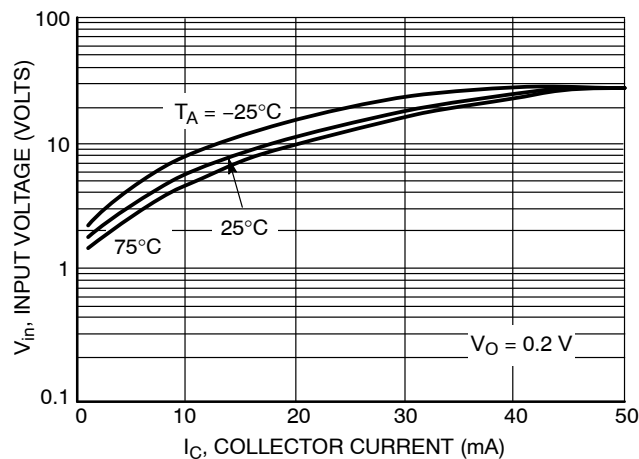


Figure 127. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5337DW1T1G NPN TRANSISTOR

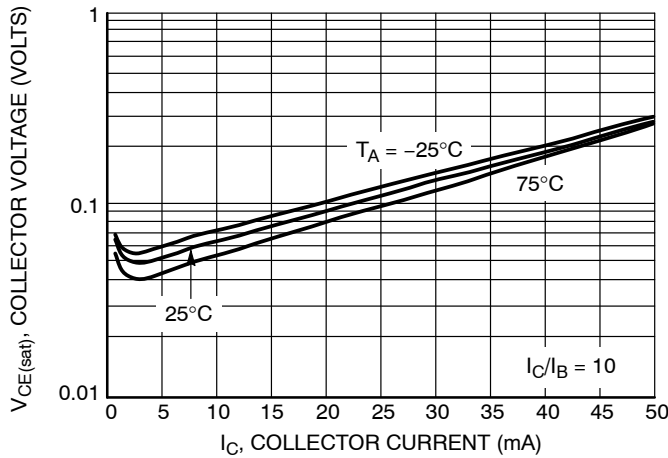


Figure 128. $V_{CE(sat)}$ versus I_C

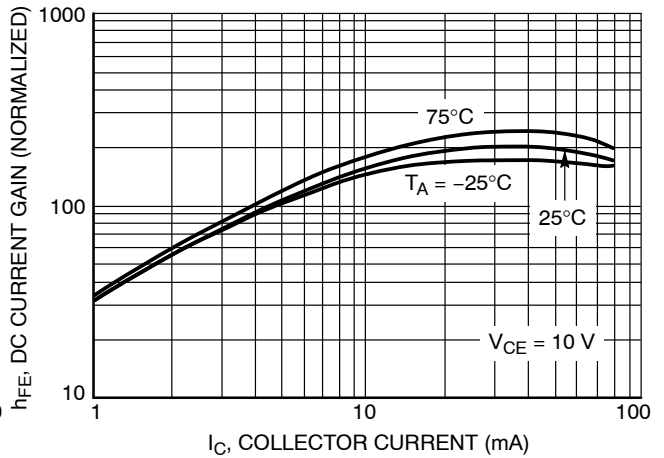


Figure 129. DC Current Gain

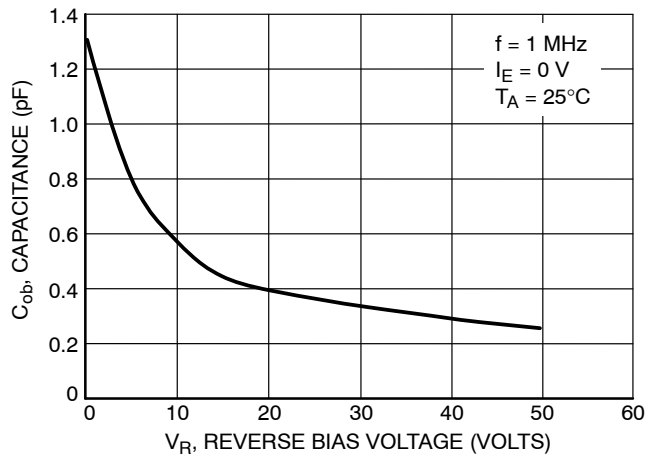


Figure 130. Output Capacitance

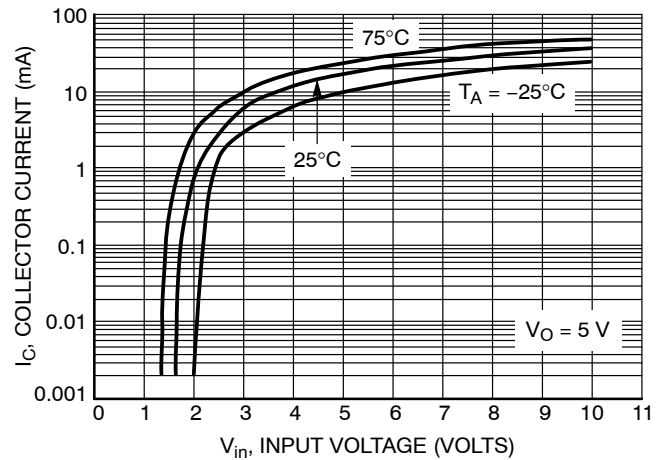


Figure 131. Output Current versus Input Voltage

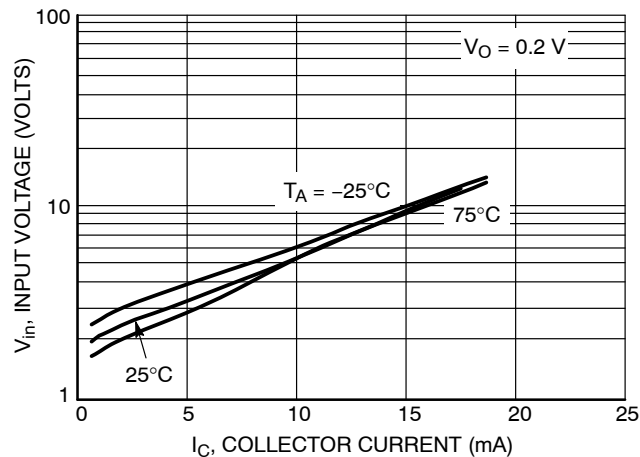


Figure 132. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5337DW1T1G PNP TRANSISTOR

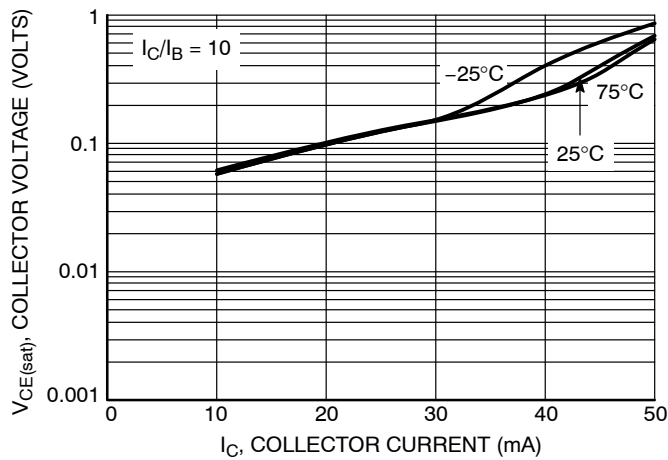


Figure 133. $V_{CE(sat)}$ versus I_C

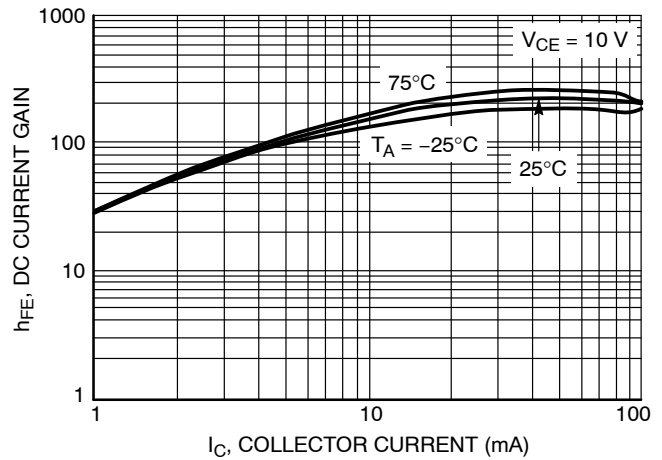


Figure 134. DC Current Gain

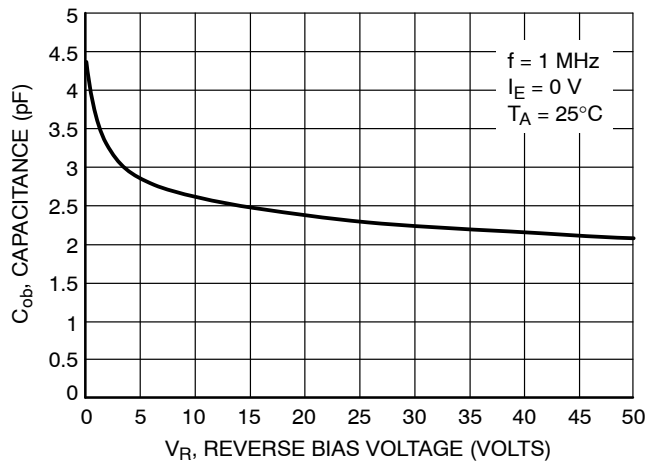


Figure 135. Output Capacitance

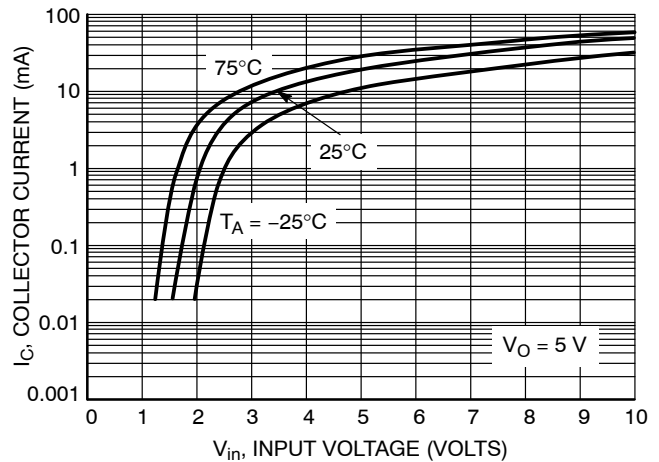


Figure 136. Output Current versus Input Voltage

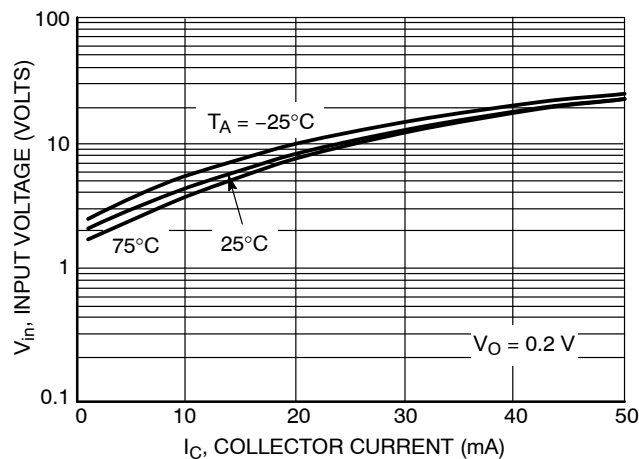


Figure 137. Input Voltage versus Output Current

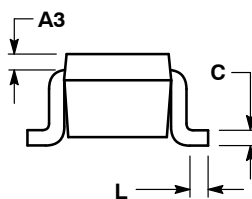
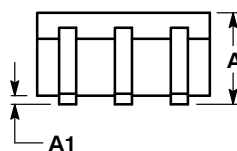
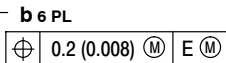
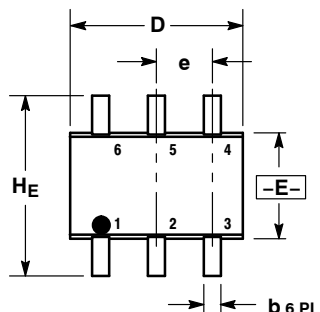
MUN5311DW1T1G, SMUN5311DW1T1G, NSVMUN5311DW1T1G Series

PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363

CASE 419B-02

ISSUE W



NOTES:

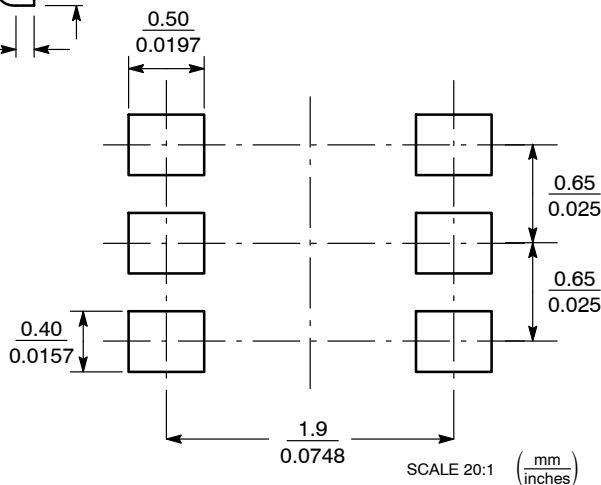
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

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
- BASE 2
- COLLECTOR 1
- EMITTER 1
- BASE 1
- 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, SOLDERM/D.

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