MUN5111DW1T1G Series, SMUN5111DW1T1G Series

Dual Bias Resistor Transistors

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 MUN5111DW1T1G series, two 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
- S 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°C unless otherwise noted, common for Q_1 and Q_2)

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

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.

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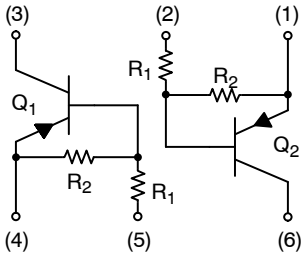
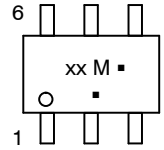
SC−88 / SOT−363
CASE 419B
STYLE 1



MARKING DIAGRAM



xx = Device Code (Refer to page 2)
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

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

DEVICE MARKING INFORMATION

See specific marking information in the device marking table on page 2 of this data sheet.

THERMAL CHARACTERISTICS

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

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

ORDERING INFORMATION, DEVICE MARKINGS AND RESISTOR VALUES

Device	Package	Marking	R1 (K)	R2 (K)	Shipping†
MUN5111DW1T1G, SMUN5111DW1T1G	SOT−363 (Pb−Free)	0A	10	10	3,000/Tape & Reel
MUN5112DW1T1G, SMUN5112DW1T1G	SOT−363 (Pb−Free)	0B	22	22	3,000/Tape & Reel
MUN5113DW1T1G, SMUN5113DW1T1G	SOT−363 (Pb−Free)	0C	47	47	3,000/Tape & Reel
MUN5114DW1T1G, SMUN5114DW1T1G	SOT−363 (Pb−Free)	0D	10	47	3,000/Tape & Reel
MUN5115DW1T1G, SMUN5115DW1T1G	SOT−363 (Pb−Free)	0E	10	∞	3,000/Tape & Reel
MUN5116DW1T1G, SMUN5116DW1T1G	SOT−363 (Pb−Free)	0F	4.7	∞	3,000/Tape & Reel
MUN5130DW1T1G	SOT−363 (Pb−Free)	0G	1.0	1.0	3,000/Tape & Reel
MUN5131DW1T1G, SMUN5131DW1T1G	SOT−363 (Pb−Free)	0H	2.2	2.2	3,000/Tape & Reel
MUN5132DW1T1G	SOT−363 (Pb−Free)	0J	4.7	4.7	3,000/Tape & Reel
MUN5133DW1T1G	SOT−363 (Pb−Free)	0K	4.7	47	3,000/Tape & Reel
MUN5134DW1T1G	SOT−363 (Pb−Free)	0L	22	47	3,000/Tape & Reel
MUN5135DW1T1G	SOT−363 (Pb−Free)	0M	2.2	47	3,000/Tape & Reel
MUN5136DW1T1G	SOT−363 (Pb−Free)	0N	100	100	3,000/Tape & Reel
MUN5137DW1T1G	SOT−363 (Pb−Free)	0P	47	22	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.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, common for Q_1 and Q_2)

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
MUN5111DW1T1G, SMUN5111DW1T1G		–	–	−0.5	
MUN5112DW1T1G, SMUN5112DW1T1G		–	–	−0.2	
MUN5113DW1T1G, SMUN5113DW1T1G		–	–	−0.1	
MUN5114DW1T1G, SMUN5114DW1T1G		–	–	−0.2	
MUN5115DW1T1G, SMUN5115DW1T1G		–	–	−0.9	
MUN5116DW1T1G, SMUN5116DW1T1G		–	–	−1.9	
MUN5130DW1T1G		–	–	−4.3	
MUN5131DW1T1G, SMUN5131DW1T1G		–	–	−2.3	
MUN5132DW1T1G		–	–	−1.5	
MUN5133DW1T1G		–	–	−0.18	
MUN5134DW1T1G		–	–	−0.13	
MUN5135DW1T1G		–	–	−0.2	
MUN5136DW1T1G		–	–	−0.05	
MUN5137DW1T1G		–	–	−0.13	
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)					
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$				Vdc
(I_C = −10 mA, I_B = −0.3 mA)					
MUN5111DW1T1G, SMUN5111DW1T1G		–	–	−0.25	
MUN5112DW1T1G, SMUN5112DW1T1G		–	–	−0.25	
MUN5113DW1T1G, SMUN5113DW1T1G		–	–	−0.25	
MUN5114DW1T1G, SMUN5114DW1T1G		–	–	−0.25	
MUN5135DW1T1G		–	–	−0.25	
MUN5136DW1T1G		–	–	−0.25	
(I_C = −10 mA, I_B = −5 mA)					
MUN5130DW1T1G		–	–	−0.25	
MUN5131DW1T1G, SMUN5131DW1T1G		–	–	−0.25	
MUN5137DW1T1G		–	–	−0.25	
(I_C = −10 mA, I_B = −1 mA)					
MUN5115DW1T1G, SMUN5115DW1T1G		–	–	−0.25	
MUN5116DW1T1G, SMUN5116DW1T1G		–	–	−0.25	
MUN5132DW1T1G		–	–	−0.25	
MUN5133DW1T1G		–	–	−0.25	
MUN5134DW1T1G		–	–	−0.25	
DC Current Gain	h_{FE}				
(V_{CE} = −10 V, I_C = −5.0 mA)					
MUN5111DW1T1G, SMUN5111DW1T1G		35	60	–	
MUN5112DW1T1G, SMUN5112DW1T1G		60	100	–	
MUN5113DW1T1G, SMUN5113DW1T1G		80	140	–	
MUN5114DW1T1G, SMUN5114DW1T1G		80	140	–	
MUN5115DW1T1G, SMUN5115DW1T1G		160	250	–	
MUN5116DW1T1G, SMUN5116DW1T1G		160	250	–	
MUN5130DW1T1G		3.0	5.0	–	
MUN5131DW1T1G, SMUN5131DW1T1G		8.0	15	–	
MUN5132DW1T1G		15	27	–	
MUN5133DW1T1G		80	140	–	
MUN5134DW1T1G		80	130	–	
MUN5135DW1T1G		80	140	–	
MUN5136DW1T1G		80	130	–	
MUN5137DW1T1G		80	140	–	

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

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, common for Q_1 and Q_2) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 4) (Continued)					
Output Voltage (on)	V_{OL}				Vdc
(V_{CC} = −5.0 V, V_B = −2.5 V, R_L = 1.0 kΩ)					
MUN5111DW1T1G, SMUN5111DW1T1G		–	–	−0.2	
MUN5112DW1T1G, SMUN5112DW1T1G		–	–	−0.2	
MUN5114DW1T1G, SMUN5114DW1T1G		–	–	−0.2	
MUN5115DW1T1G, SMUN5115DW1T1G		–	–	−0.2	
MUN5116DW1T1G, SMUN5116DW1T1G		–	–	−0.2	
MUN5130DW1T1G		–	–	−0.2	
MUN5131DW1T1G, SMUN5131DW1T1G		–	–	−0.2	
MUN5132DW1T1G		–	–	−0.2	
MUN5133DW1T1G		–	–	−0.2	
MUN5134DW1T1G		–	–	−0.2	
MUN5135DW1T1G		–	–	−0.2	
(V_{CC} = −5.0 V, V_B = −3.5 V, R_L = 1.0 kΩ)					
MUN5113DW1T1G, SMUN5113DW1T1G		–	–	−0.2	
(V_{CC} = −5.0 V, V_B = −5.5 V, R_L = 1.0 kΩ)					
MUN5136DW1T1G		–	–	−0.2	
(V_{CC} = −5.0 V, V_B = −4.0 V, R_L = 1.0 kΩ)					
MUN5137DW1T1G		–	–	−0.2	
Output Voltage (off)	V_{OH}				Vdc
(V_{CC} = −5.0 V, V_B = −0.5 V, R_L = 1.0 kΩ)					
MUN5111DW1T1G, SMUN5111DW1T1G		−4.9	–	–	
MUN5112DW1T1G, SMUN5112DW1T1G		−4.9	–	–	
MUN5113DW1T1G, SMUN5113DW1T1G		−4.9	–	–	
MUN5114DW1T1G, SMUN5114DW1T1G		−4.9	–	–	
MUN5133DW1T1G		−4.9	–	–	
MUN5134DW1T1G		−4.9	–	–	
MUN5135DW1T1G		−4.9	–	–	
MUN5136DW1T1G		−4.9	–	–	
(V_{CC} = −5.0 V, V_B = −0.05 V, R_L = 1.0 kΩ)					
MUN5130DW1T1G		−4.9	–	–	
(V_{CC} = −5.0 V, V_B = −0.25 V, R_L = 1.0 kΩ)					
MUN5115DW1T1G, SMUN5115DW1T1G		−4.9	–	–	
MUN5116DW1T1G, SMUN5116DW1T1G		−4.9	–	–	
MUN5131DW1T1G, SMUN5131DW1T1G		−4.9	–	–	
MUN5132DW1T1G		−4.9	–	–	
MUN5137DW1T1G		−4.9	–	–	
Input Resistor	R_1				k Ω
MUN5111DW1T1G, SMUN5111DW1T1G		7.0	10	13	
MUN5112DW1T1G, SMUN5112DW1T1G		15.4	22	28.6	
MUN5113DW1T1G, SMUN5113DW1T1G		32.9	47	61.1	
MUN5114DW1T1G, SMUN5114DW1T1G		7.0	10	13	
MUN5115DW1T1G, SMUN5115DW1T1G		7.0	10	13	
MUN5116DW1T1G, SMUN5116DW1T1G		3.3	4.7	6.1	
MUN5130DW1T1G		0.7	1.0	1.3	
MUN5131DW1T1G, SMUN5131DW1T1G		1.5	2.2	2.9	
MUN5132DW1T1G		3.3	4.7	6.1	
MUN5133DW1T1G		3.3	4.7	6.1	
MUN5134DW1T1G		15.4	22	28.6	
MUN5135DW1T1G		1.54	2.2	2.86	
MUN5136DW1T1G		70	100	130	
MUN5137DW1T1G		32.9	47	61.1	
Resistor Ratio	R_1/R_2				
MUN5111DW1T1G, SMUN5111DW1T1G		0.8	1.0	1.2	
MUN5112DW1T1G, SMUN5112DW1T1G		0.8	1.0	1.2	
MUN5113DW1T1G, SMUN5113DW1T1G		0.8	1.0	1.2	
MUN5114DW1T1G, SMUN5114DW1T1G		0.17	0.21	0.25	
MUN5115DW1T1G, SMUN5115DW1T1G		–	–	–	
MUN5116DW1T1G, SMUN5116DW1T1G		–	–	–	
MUN5130DW1T1G		0.8	1.0	1.2	
MUN5131DW1T1G, SMUN5131DW1T1G		0.8	1.0	1.2	
MUN5132DW1T1G		0.8	1.0	1.2	
MUN5133DW1T1G		0.055	0.12	0.185	
MUN5134DW1T1G		0.38	0.47	0.56	
MUN5135DW1T1G		0.038	0.047	0.056	
MUN5136DW1T1G		0.8	1.0	1.2	
MUN5137DW1T1G		1.7	2.15	2.6	

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

ALL MUN5111DW1T1G SERIES DEVICES

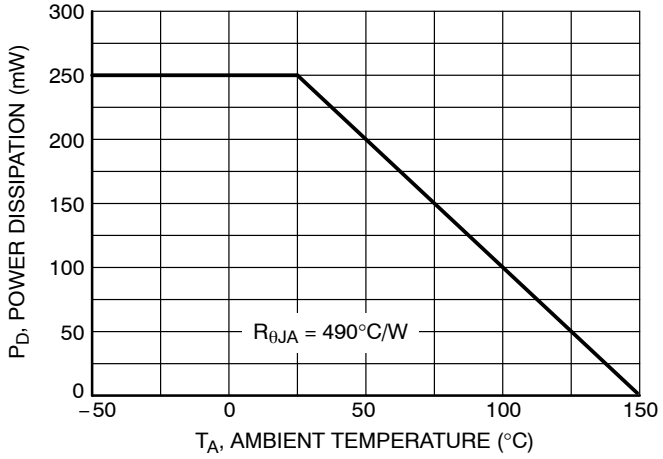


Figure 1. Derating Curve − ALL DEVICES

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5111DW1T1G, SMUN5111DW1T1G

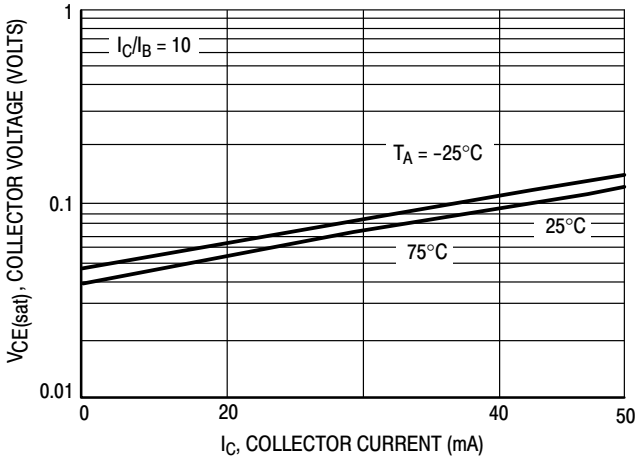


Figure 2. $V_{CE(sat)}$ versus I_C

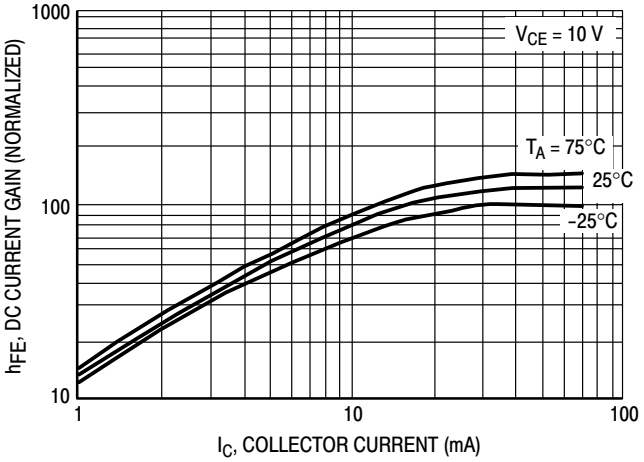


Figure 3. DC Current Gain

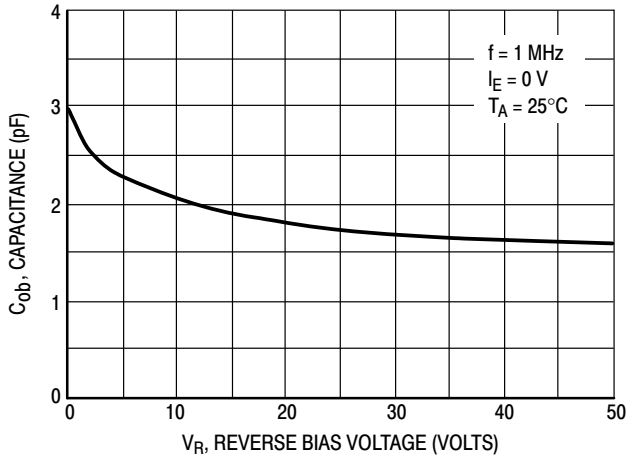


Figure 4. Output Capacitance

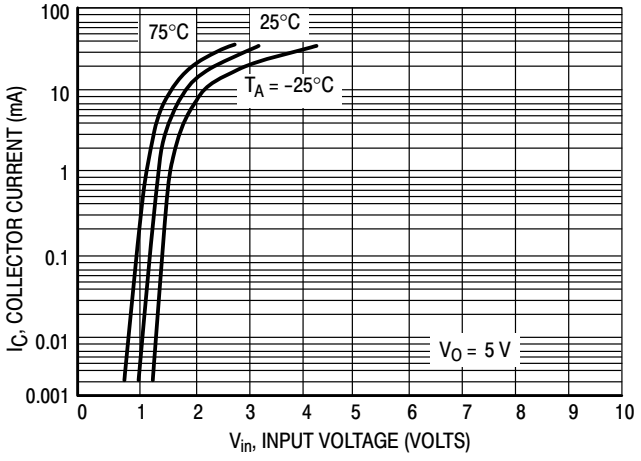


Figure 5. Output Current versus Input Voltage

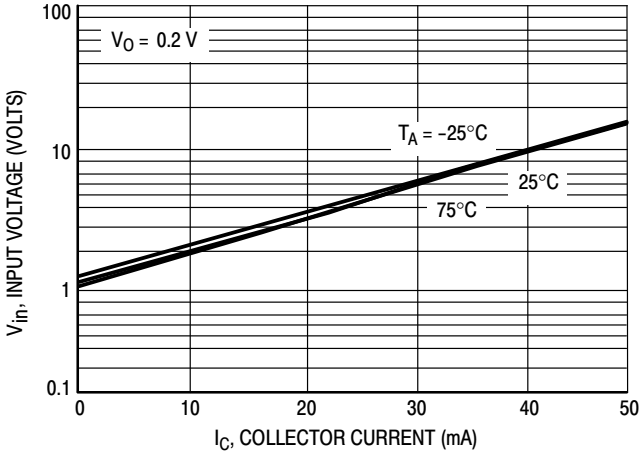


Figure 6. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5112DW1T1G, SMUN5112DW1T1G

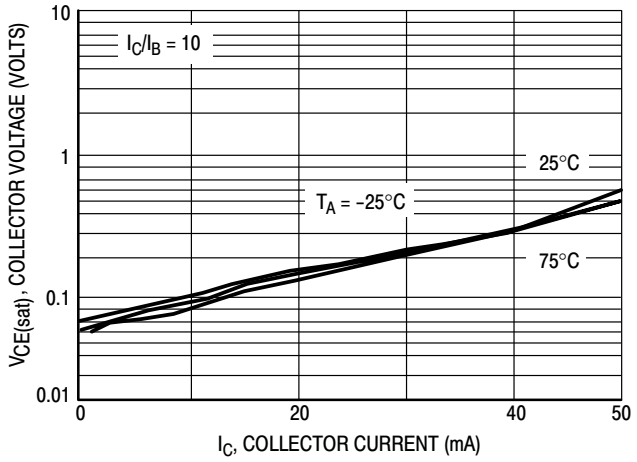


Figure 7. $V_{CE(sat)}$ versus I_C

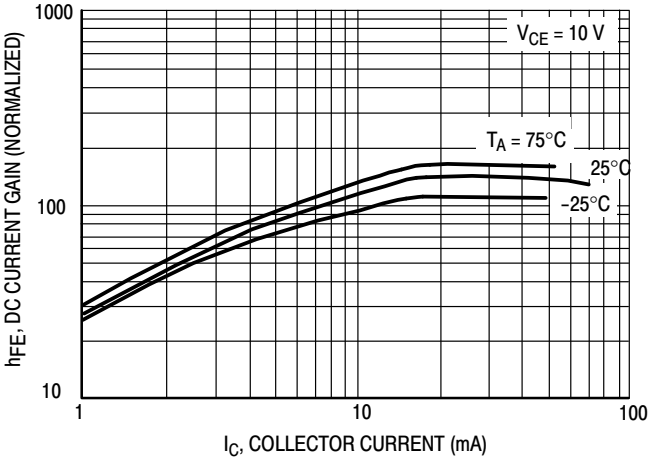


Figure 8. DC Current Gain

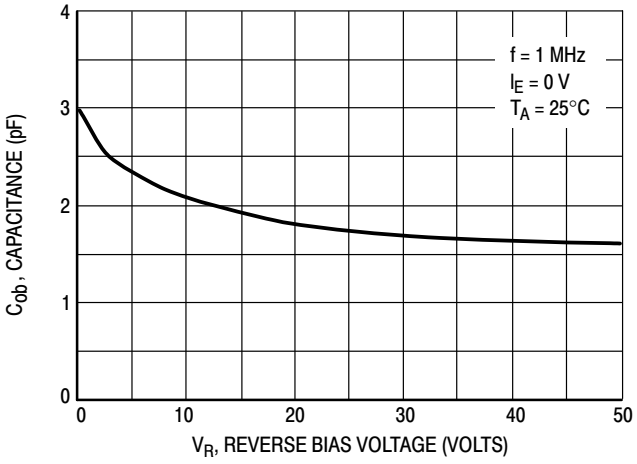


Figure 9. Output Capacitance

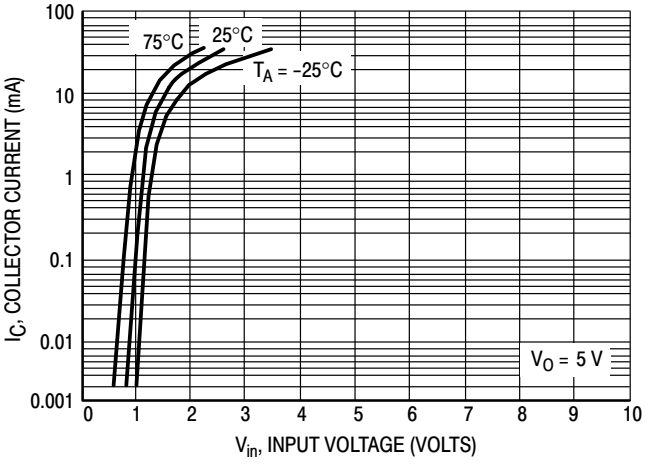


Figure 10. Output Current versus Input Voltage

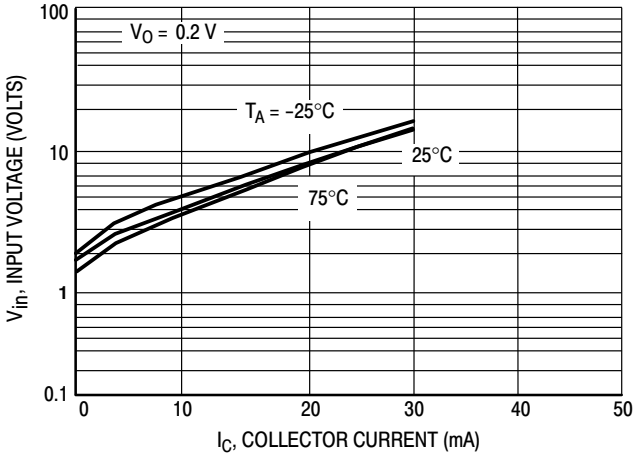


Figure 11. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5113DW1T1G, SMUN5113DW1T1G

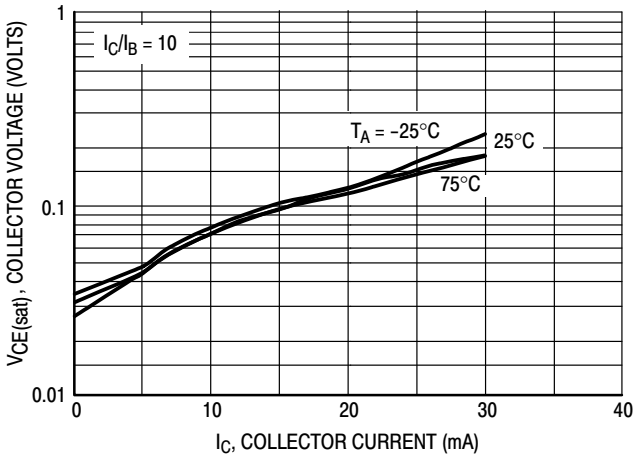


Figure 12. $V_{CE(sat)}$ versus I_C

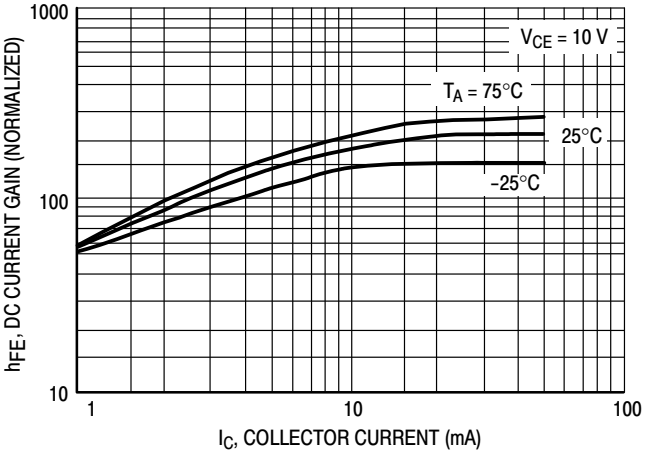


Figure 13. DC Current Gain

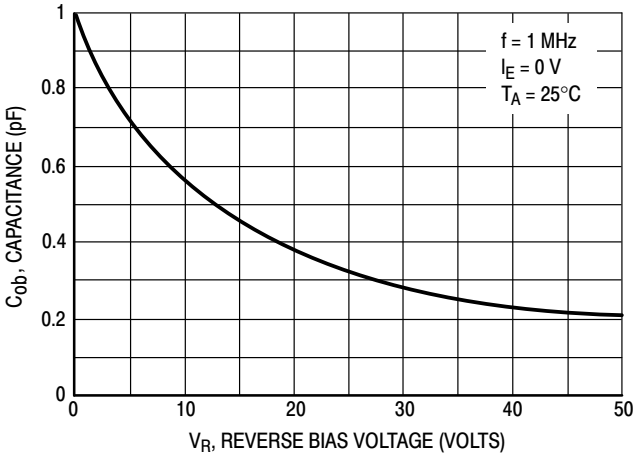


Figure 14. Output Capacitance

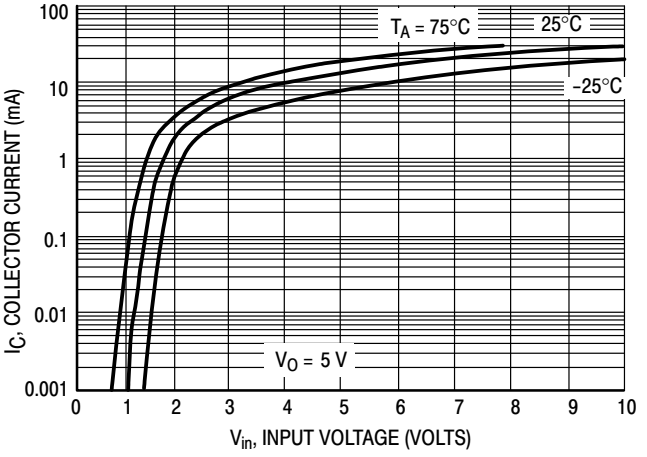


Figure 15. Output Current versus Input Voltage

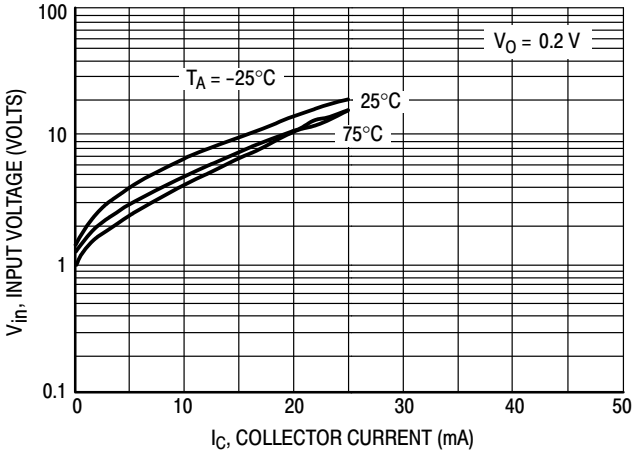


Figure 16. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5114DW1T1G, SMUN5114DW1T1G

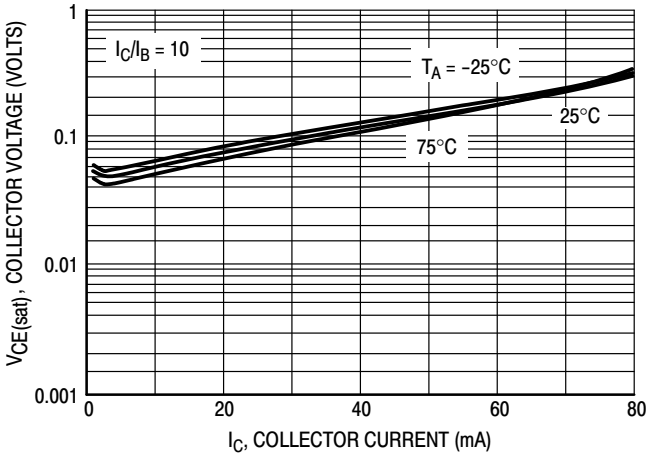


Figure 17. $V_{CE(sat)}$ versus I_C

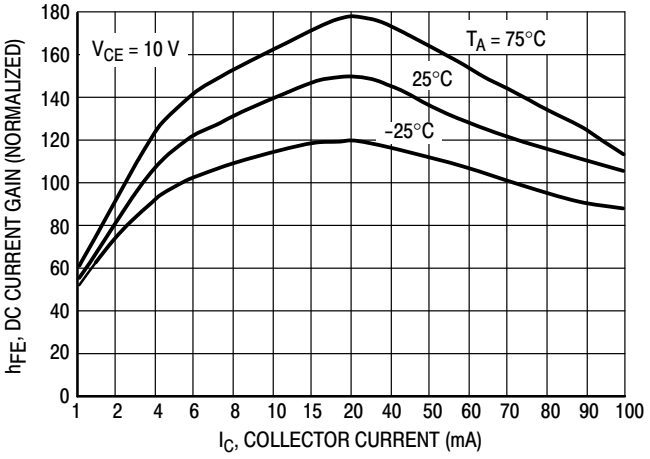


Figure 18. DC Current Gain

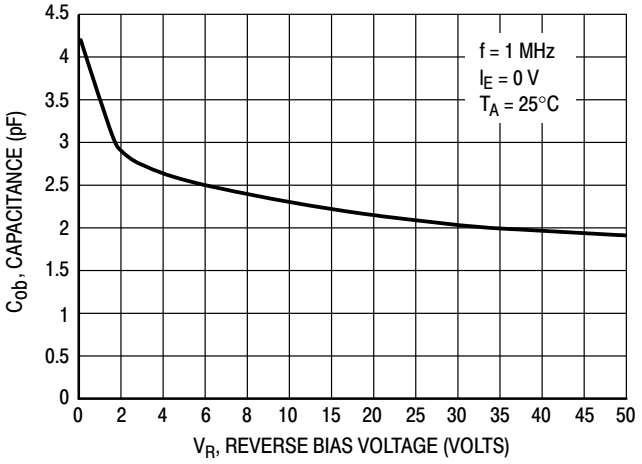


Figure 19. Output Capacitance

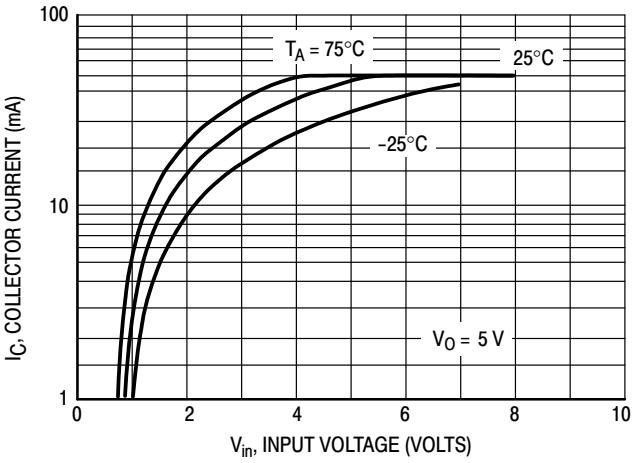


Figure 20. Output Current versus Input Voltage

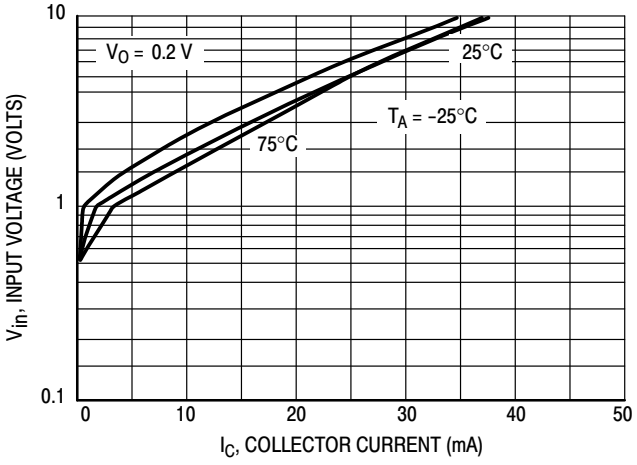


Figure 21. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5115DW1T1G, SMUN5115DW1T1G

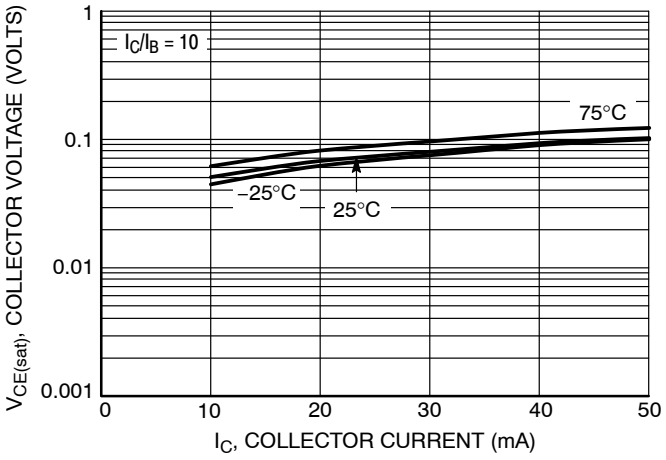


Figure 22. $V_{CE(sat)}$ versus I_C

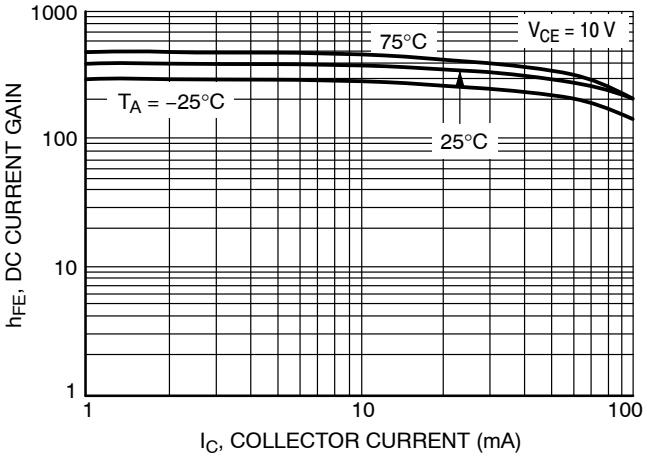


Figure 23. DC Current Gain

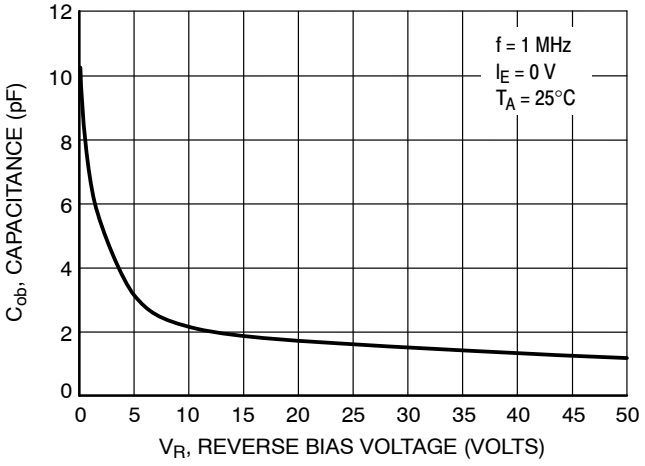


Figure 24. Output Capacitance

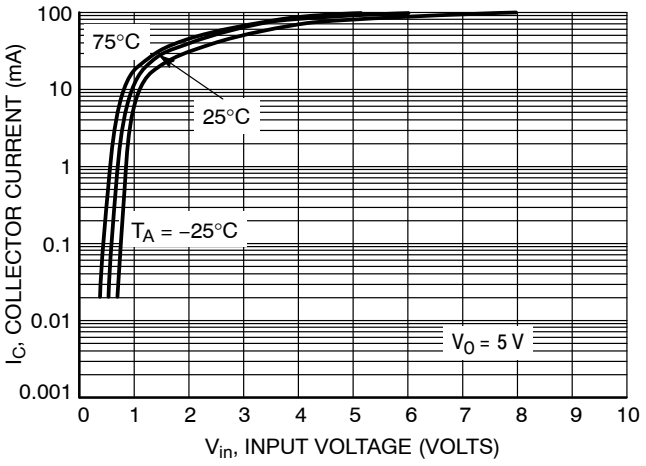


Figure 25. Output Current versus Input Voltage

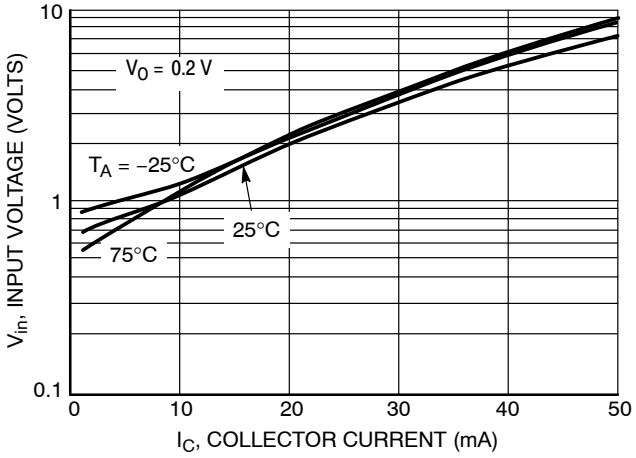


Figure 26. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5116DW1T1G, SMUN5116DW1T1G

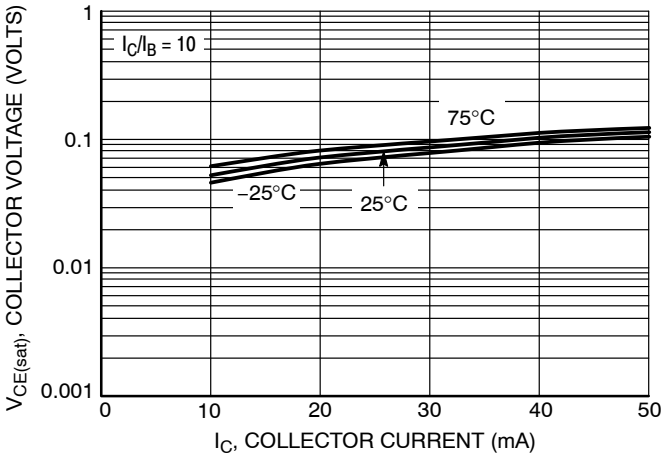


Figure 27. $V_{CE(sat)}$ versus I_C

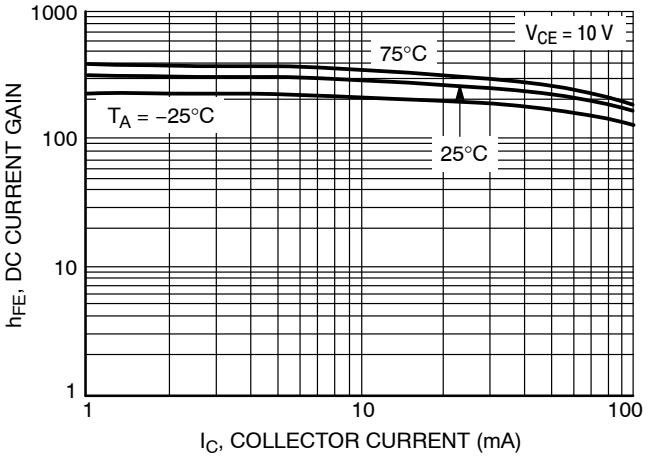


Figure 28. DC Current Gain

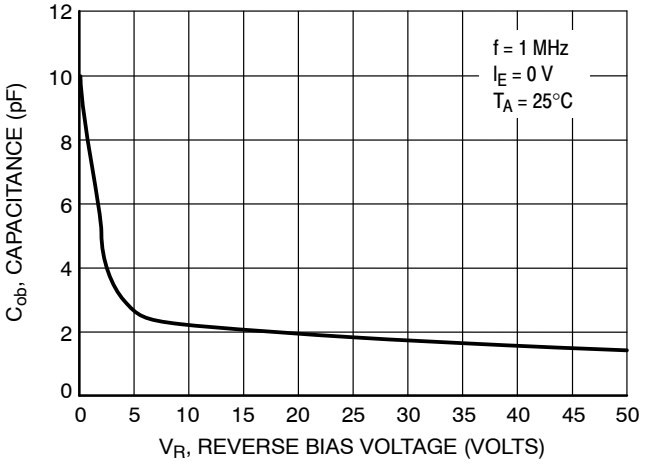


Figure 29. Output Capacitance

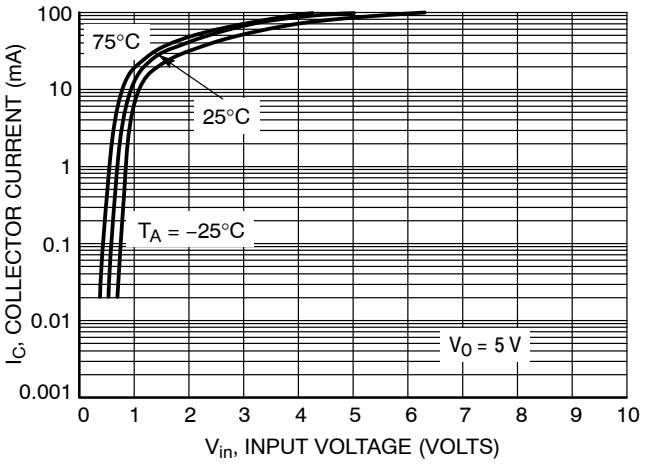


Figure 30. Output Current versus Input Voltage

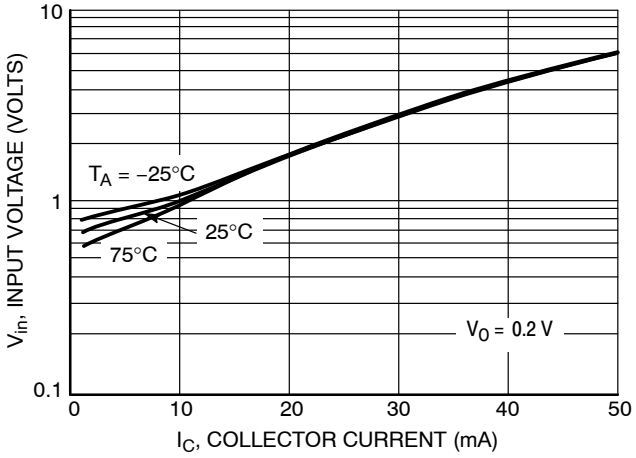


Figure 31. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5130DW1T1G

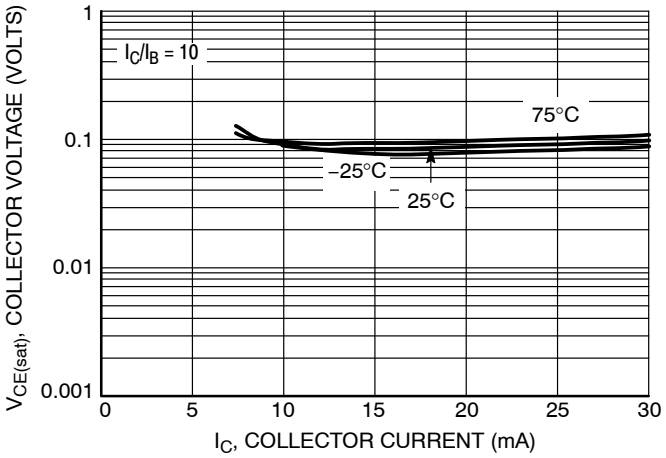


Figure 32. $V_{CE(sat)}$ versus I_C

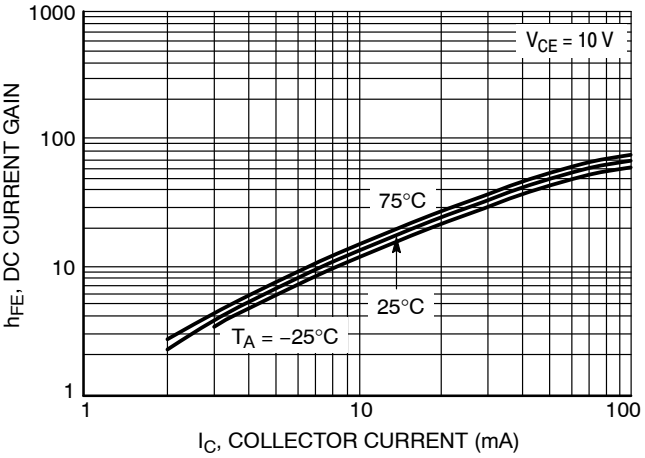


Figure 33. DC Current Gain

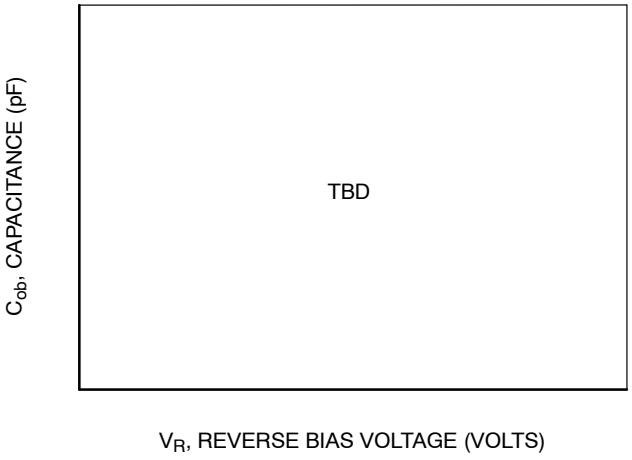


Figure 34. Output Capacitance

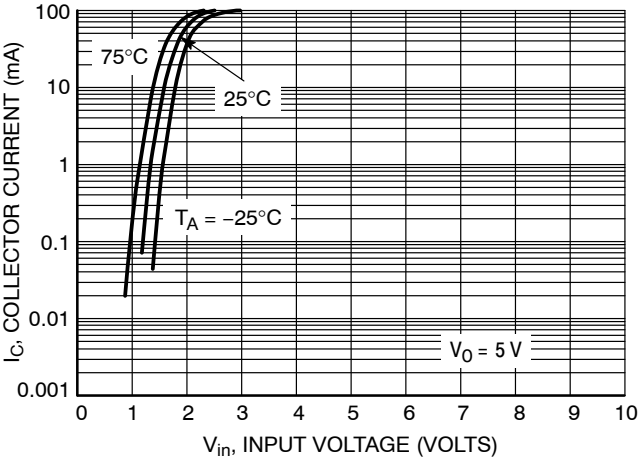


Figure 35. Output Current versus Input Voltage

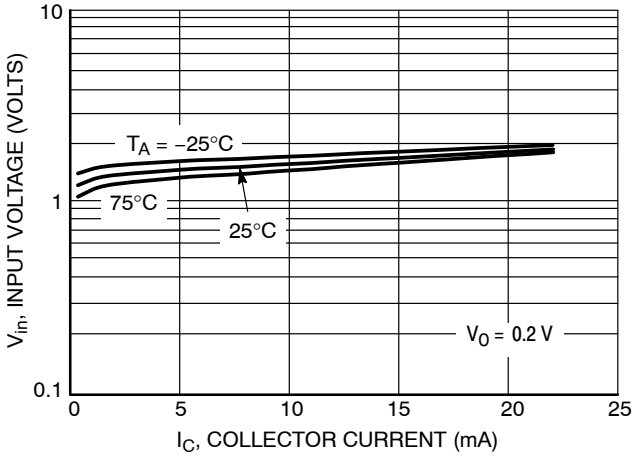


Figure 36. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5131DW1T1G, SMUN5131DW1T1G

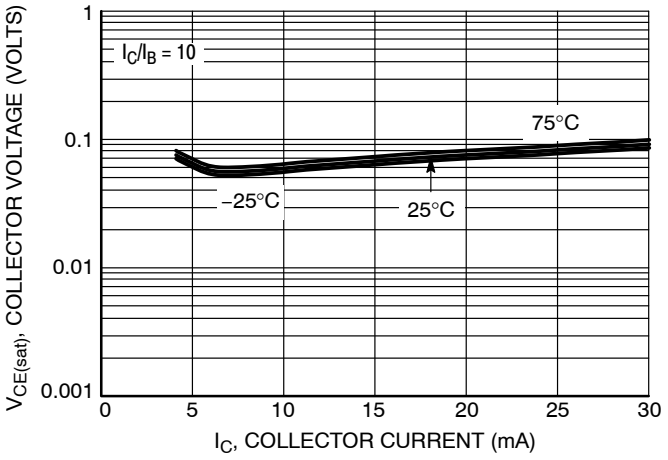


Figure 37. $V_{CE(sat)}$ versus I_C

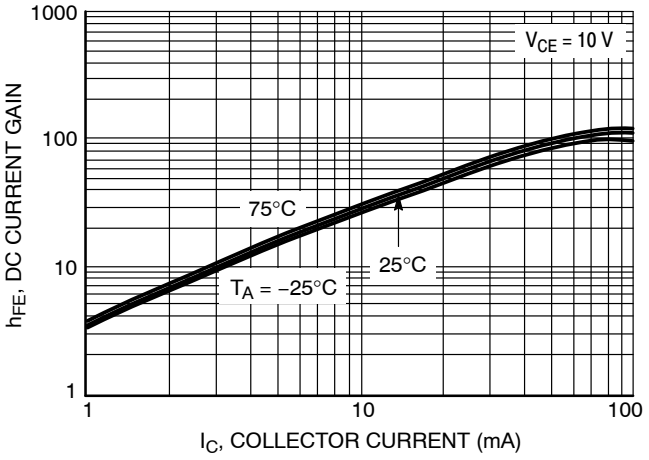


Figure 38. DC Current Gain

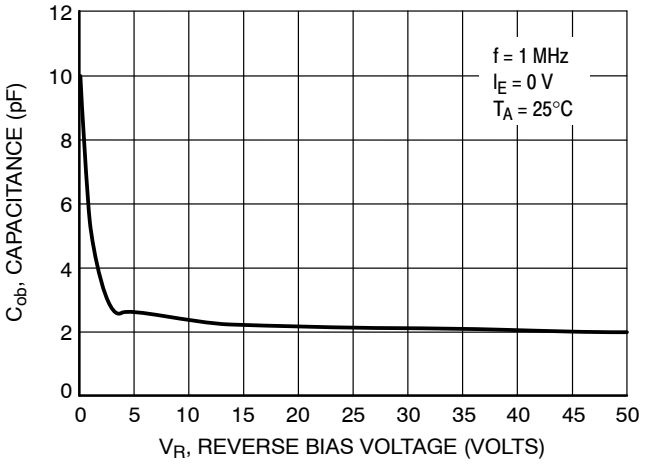


Figure 39. Output Capacitance

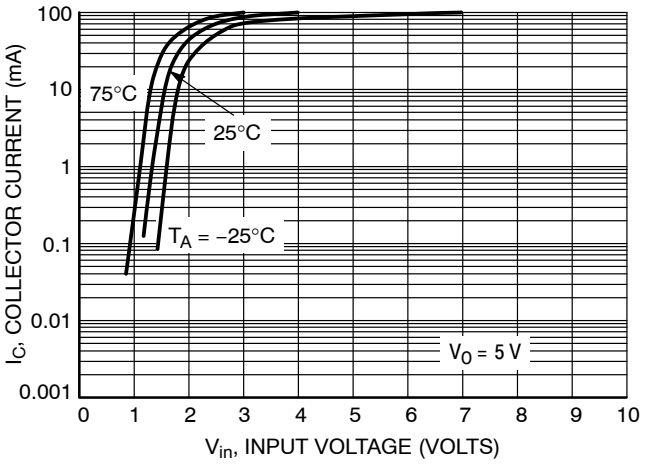


Figure 40. Output Current versus Input Voltage

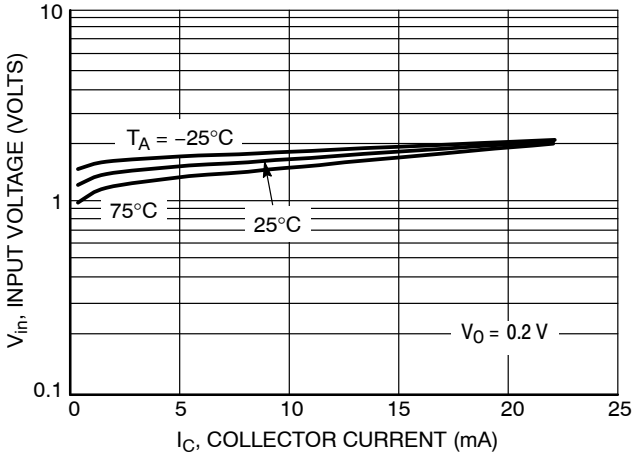


Figure 41. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5132DW1T1G

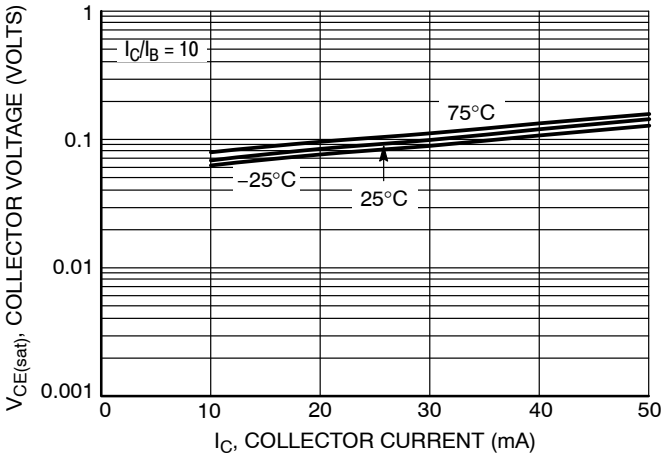


Figure 42. $V_{CE(sat)}$ versus I_C

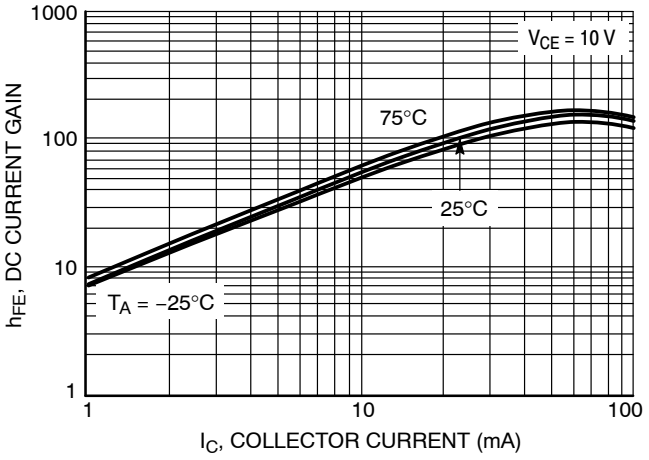


Figure 43. DC Current Gain

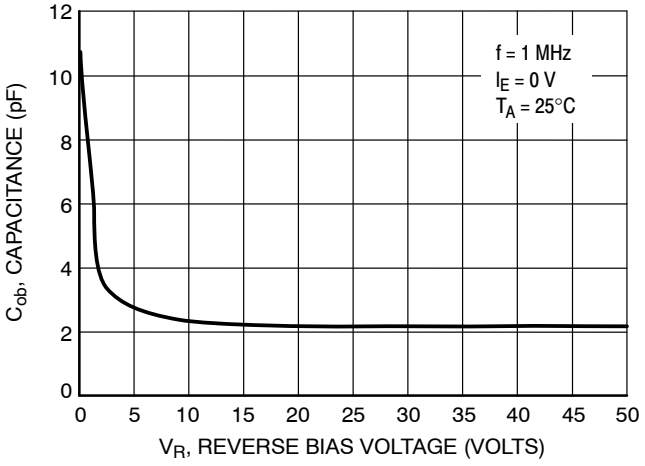


Figure 44. Output Capacitance

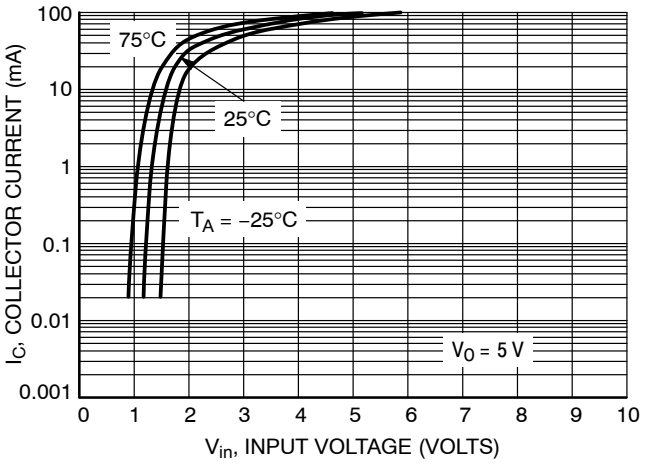


Figure 45. Output Current versus Input Voltage

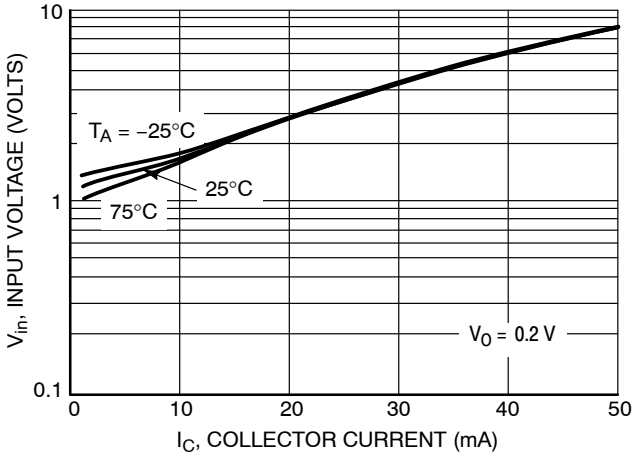


Figure 46. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5133DW1T1G

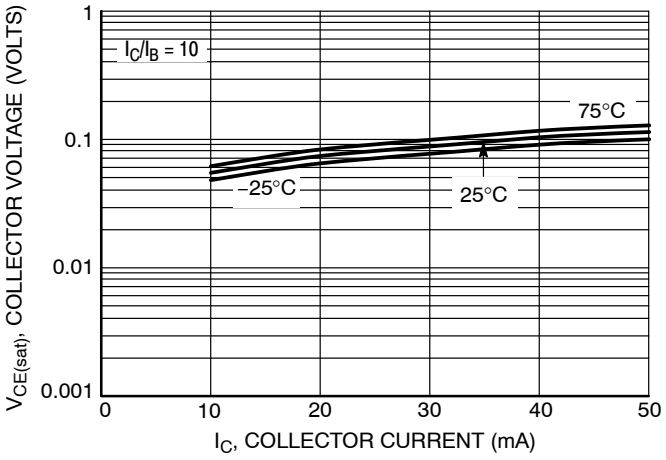


Figure 47. $V_{CE(sat)}$ versus I_C

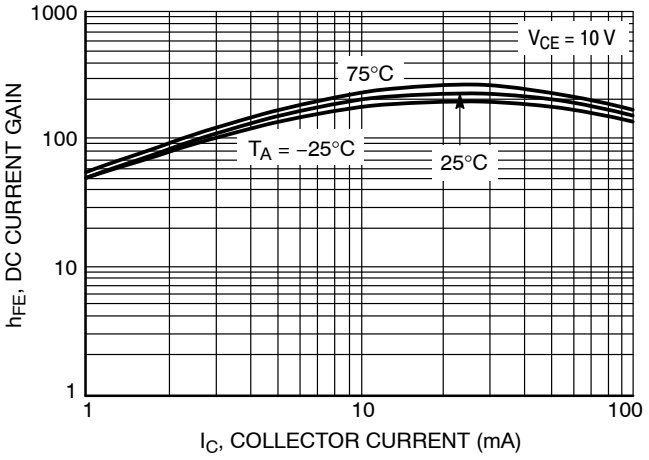


Figure 48. DC Current Gain

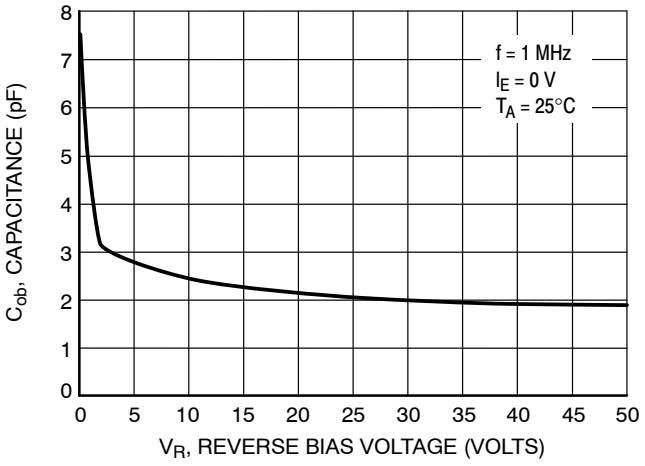


Figure 49. Output Capacitance

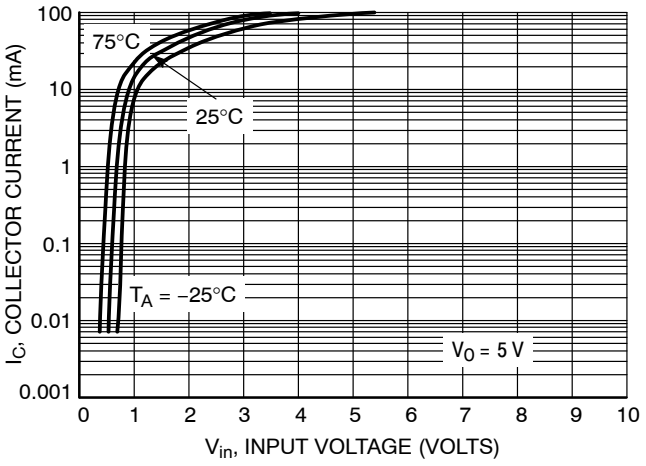


Figure 50. Output Current versus Input Voltage

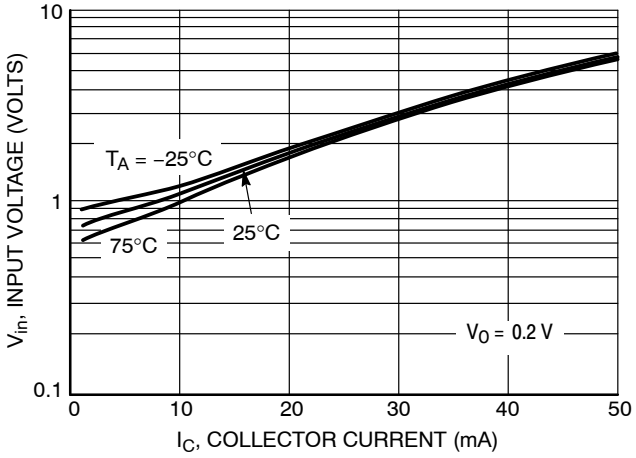


Figure 51. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5134DW1T1G

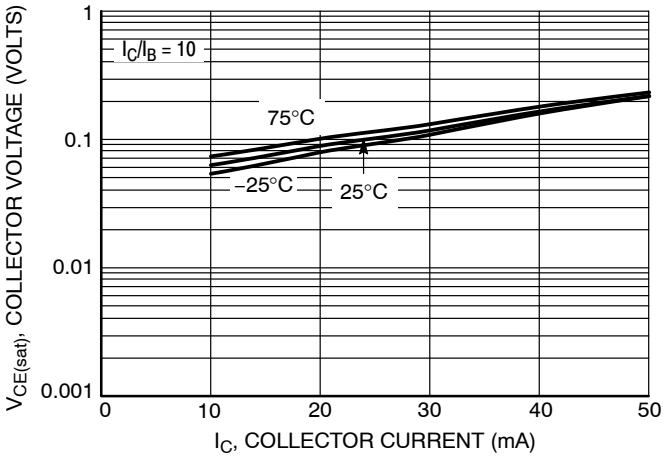


Figure 52. $V_{CE(sat)}$ versus I_C

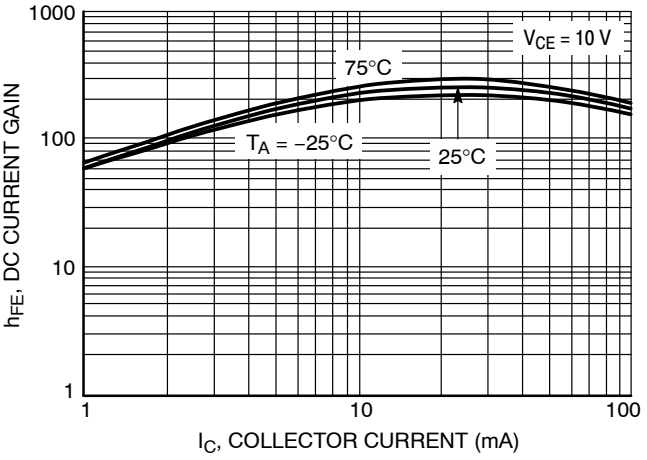


Figure 53. DC Current Gain

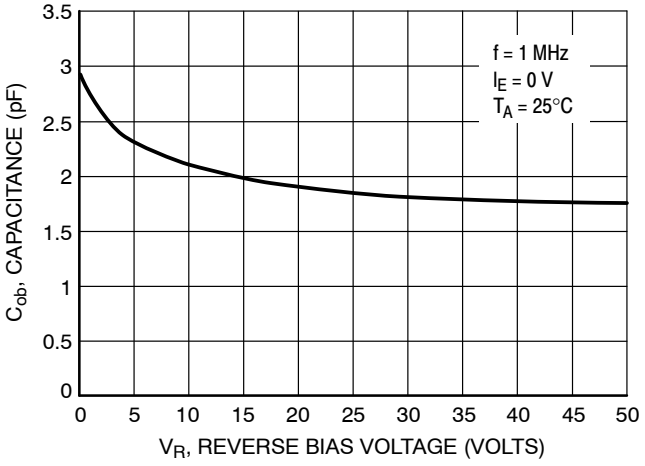


Figure 54. Output Capacitance

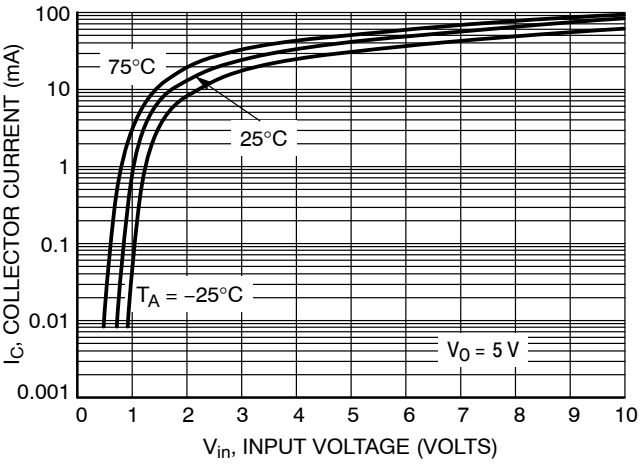


Figure 55. Output Current versus Input Voltage

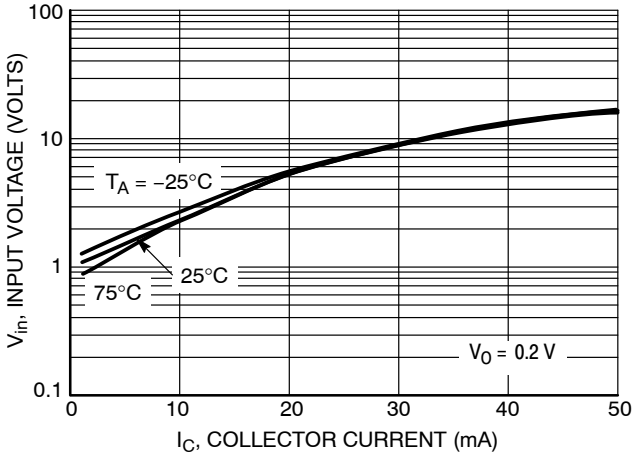


Figure 56. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5135DW1T1G

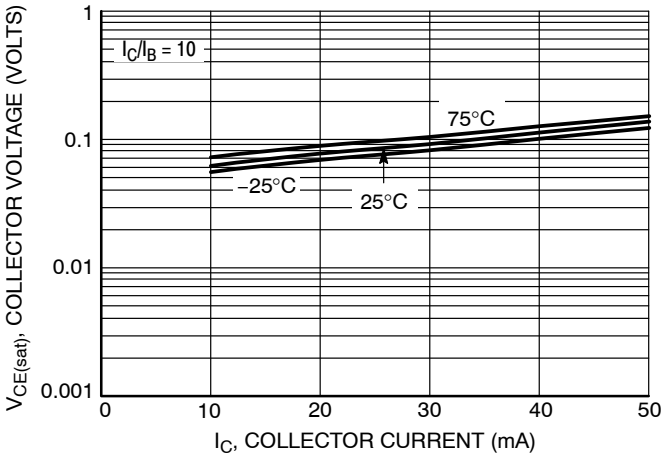


Figure 57. $V_{CE(sat)}$ versus I_C

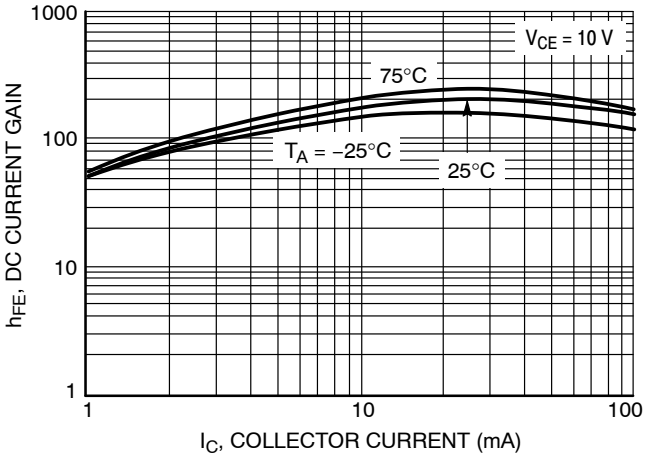


Figure 58. DC Current Gain

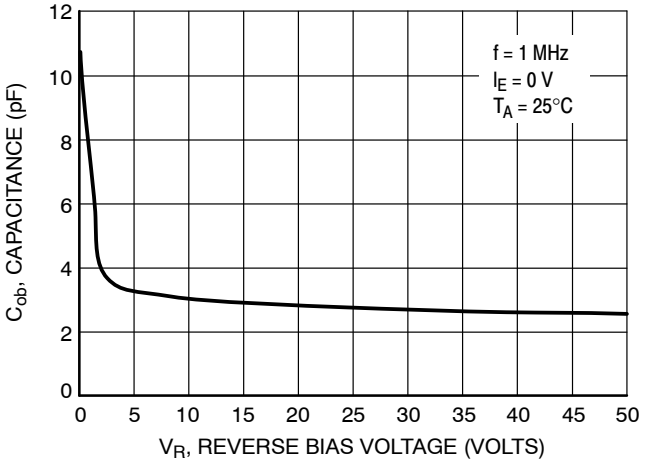


Figure 59. Output Capacitance

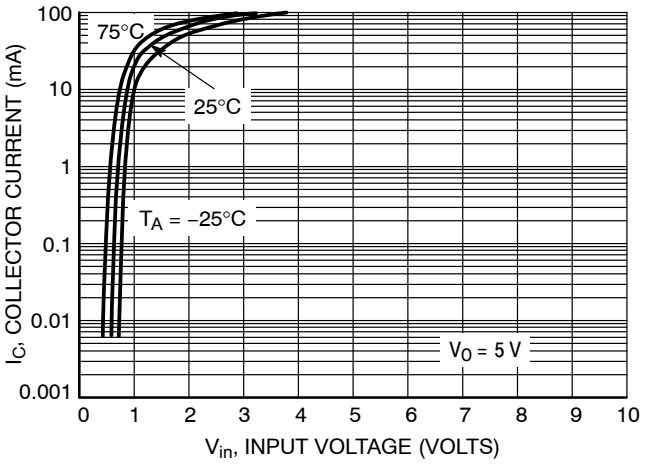


Figure 60. Output Current versus Input Voltage

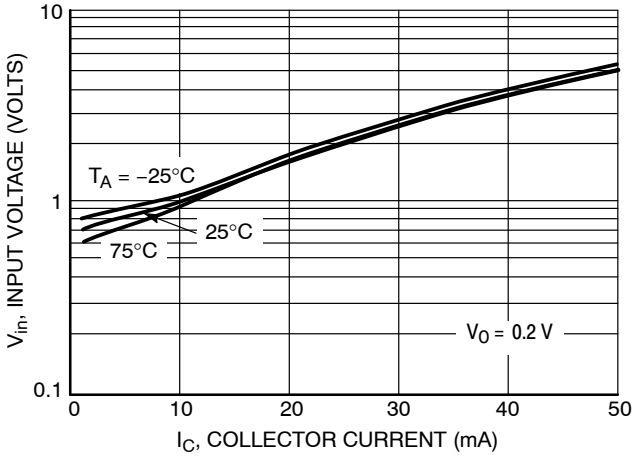


Figure 61. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5136DW1T1G

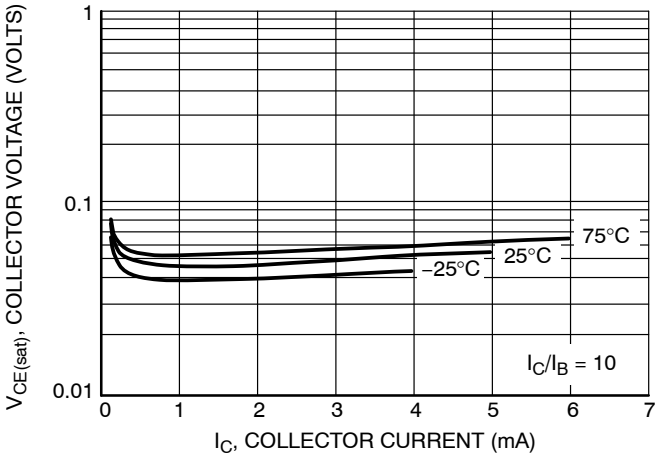


Figure 62. $V_{CE(sat)}$ versus I_C

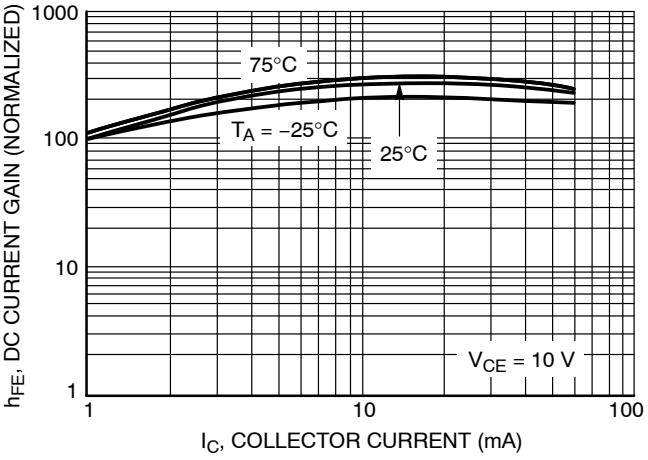


Figure 63. DC Current Gain

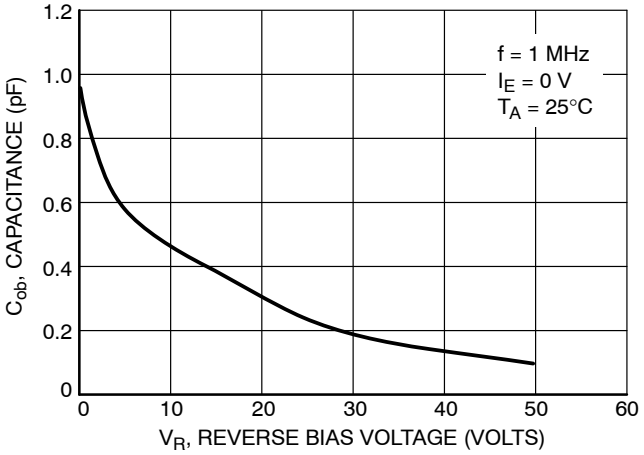


Figure 64. Output Capacitance

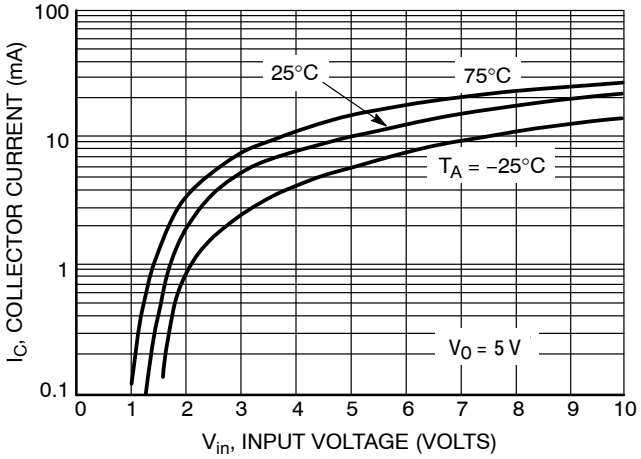


Figure 65. Output Current versus Input Voltage

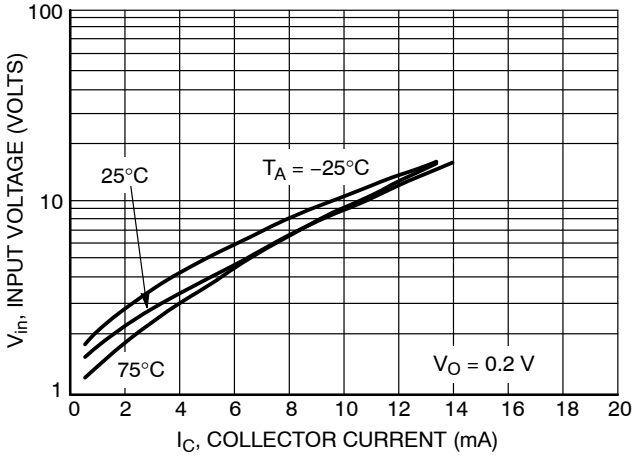


Figure 66. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5137DW1T1G

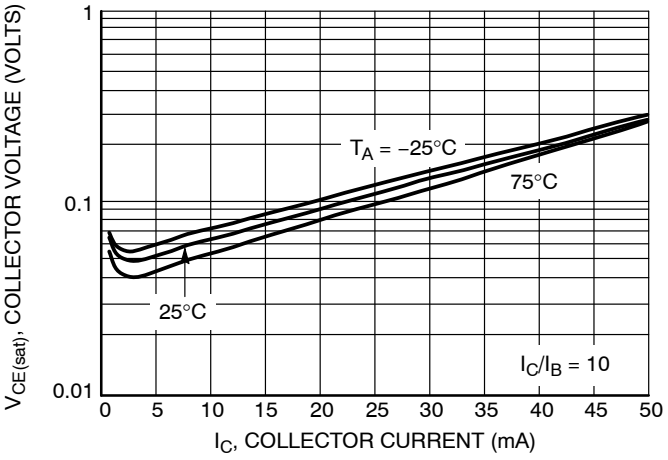


Figure 67. $V_{CE(sat)}$ versus I_C

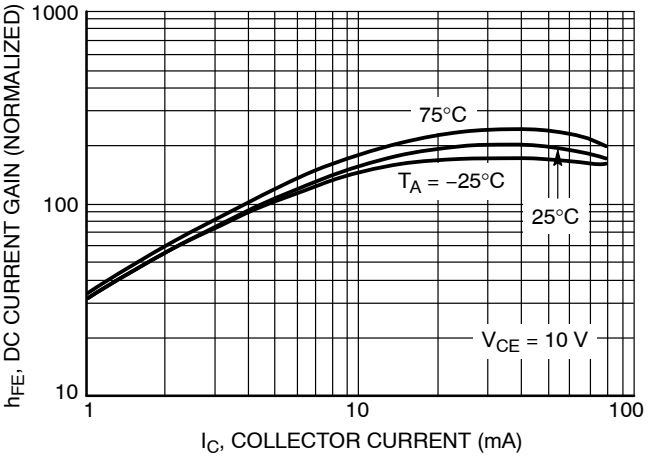


Figure 68. DC Current Gain

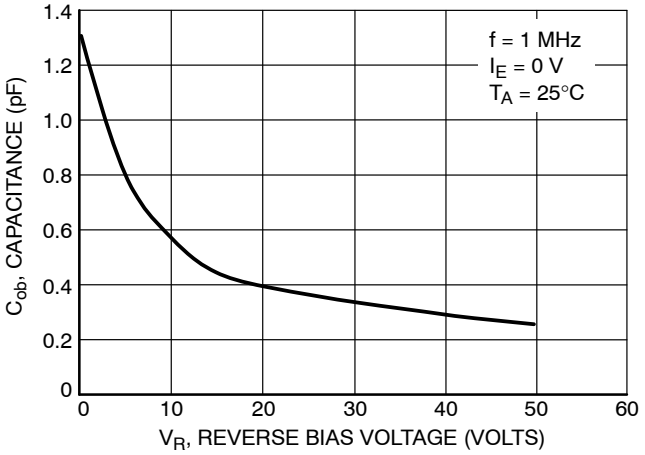


Figure 69. Output Capacitance

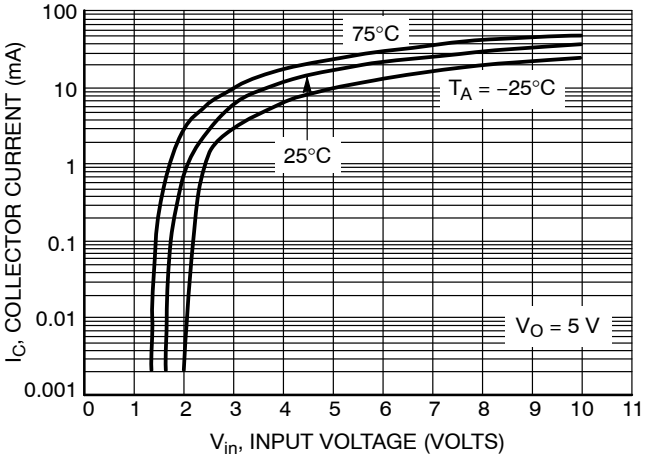


Figure 70. Output Current versus Input Voltage

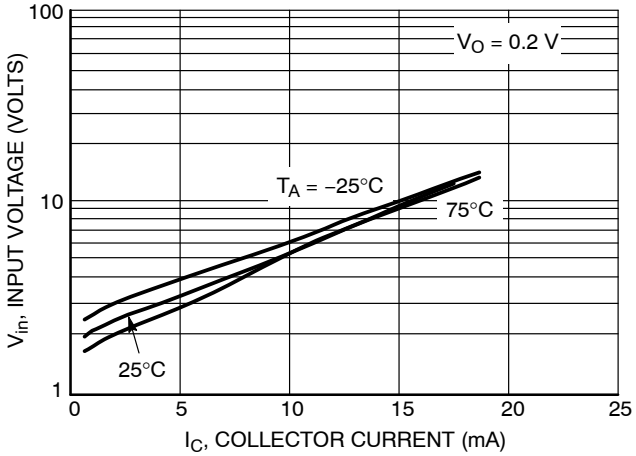
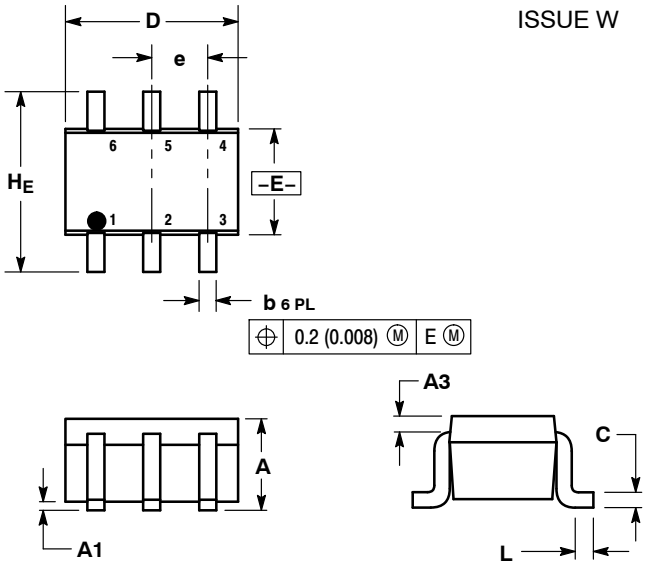


Figure 71. Input Voltage versus Output Current

PACKAGE DIMENSIONS

SC−88 (SOT−363)
CASE 419B−02
ISSUE W

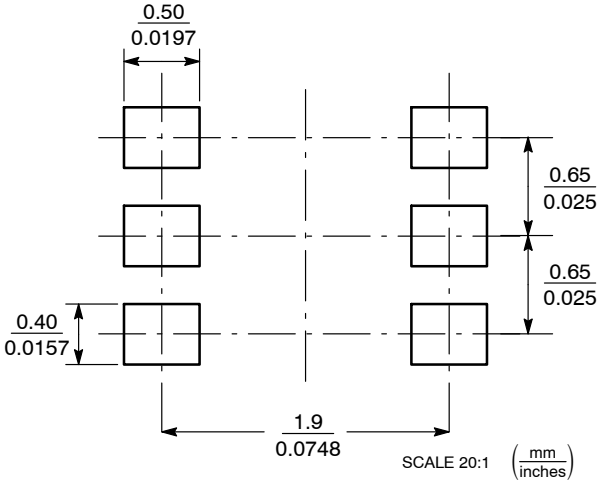


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B−01 OBSOLETE, NEW STANDARD 419B−02.

	MILLIMETERS			INCHES		
DIM	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
H_E	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*



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

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