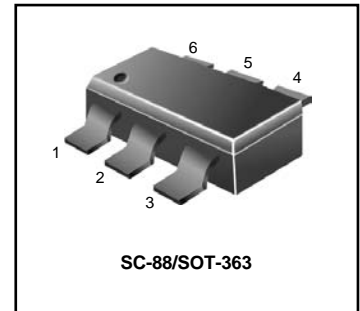


The BRT (Bias Resistor Transistor) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. These digital transistors are designed to replace a single device and its external resistor bias network. The BRT eliminates 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.

- . Simplifies Circuit Design
- . Reduces Board Space
- . Reduces Component Count
- . Available in 8 mm, 7 inch/3000 Unit Tape and Reel
- . We declare that the material of product compliance with RoHS requirements.
- . S - Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

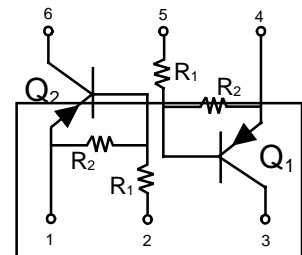


### Ordering Information

Device	Package	Shipping
MUN5111DW1T1G Series S-MUN5111DW1T1G Series	SC-88 SC-88	3000/Tape&Reel
MUN5111DW1T3G Series S-MUN5111DW1T3G Series	SC-88 SC-88	10000/Tape&Reel

### MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted, common for Q<sub>1</sub> and Q<sub>2</sub>)

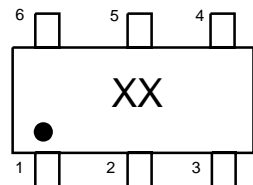
Rating	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-50	Vdc
Collector-Emitter Voltage	V <sub>CEO</sub>	-50	Vdc
Collector Current	I <sub>C</sub>	-100	mAdc



### THERMAL CHARACTERISTICS

Characteristic (One Junction Heated)	Symbol	Max	Unit
Total Device Dissipation T <sub>A</sub> = 25°C	P <sub>D</sub>	187 (Note 1.) 256 (Note 2.)	mW
Derate above 25°C		1.5 (Note 1.) 2.0 (Note 2.)	mW/°C
Thermal Resistance – Junction-to-Ambient	R <sub>θJA</sub>	670 (Note 1.) 490 (Note 2.)	°C/W
Characteristic (Both Junctions Heated)	Symbol	Max	Unit
Total Device Dissipation T <sub>A</sub> = 25°C	P <sub>D</sub>	250 (Note 1.) 385 (Note 2.)	mW
Derate above 25°C		2.0 (Note 1.) 3.0 (Note 2.)	mW/°C
Thermal Resistance – Junction-to-Ambient	R <sub>θJA</sub>	493 (Note 1.) 325 (Note 2.)	°C/W
Thermal Resistance – Junction-to-Lead	R <sub>θJL</sub>	188 (Note 1.) 208 (Note 2.)	°C/W
Junction and Storage Temperature	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

### MARKING DIAGRAM



xx = Device Marking  
(See Page 2)

### DEVICE MARKING INFORMATION

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

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

### DEVICE MARKING AND RESISTOR VALUES

Device	Package	Marking	R <sub>1</sub> (K)	R <sub>2</sub> (K)	V <sub>IN</sub> (V)	Shipping
MUN5111DW1T1G	SOT-363	0A	10	10	-10~+40	3000/Tape & Reel
MUN5112DW1T1G	SOT-363	0B	22	22	-10~+40	3000/Tape & Reel
MUN5113DW1T1G	SOT-363	0C	47	47	-10~+40	3000/Tape & Reel
MUN5114DW1T1G	SOT-363	0D	10	47	-6~+40	3000/Tape & Reel
MUN5115DW1T1G	SOT-363	0E	10	—	-6~+40	3000/Tape & Reel
MUN5116DW1T1G	SOT-363	0F	4.7	—	-6~+30	3000/Tape & Reel
MUN5130DW1T1G	SOT-363	0G	1.0	1.0	-10~+10	3000/Tape & Reel
MUN5131DW1T1G	SOT-363	0H	2.2	2.2	-10~+12	3000/Tape & Reel
MUN5132DW1T1G	SOT-363	0J	4.7	4.7	-10~+30	3000/Tape & Reel
MUN5133DW1T1G	SOT-363	0K	4.7	47	-5~+30	3000/Tape & Reel
MUN5134DW1T1G	SOT-363	0L	22	47	-8~+40	3000/Tape & Reel
MUN5135DW1T1G	SOT-363	0M	2.2	47	-6~+12	3000/Tape & Reel
MUN5136DW1T1G	SOT-363	0N	100	100	-10~+40	3000/Tape & Reel
MUN5137DW1T1G	SOT-363	0P	47	22	-10~+40	3000/Tape & Reel

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted, common for Q<sub>1</sub> and Q<sub>2</sub>)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Base Cutoff Current (V <sub>CB</sub> = -50 V, I <sub>E</sub> = 0)	I <sub>CBO</sub>	-	-	-100	nAdc
Collector-Emitter Cutoff Current (V <sub>CE</sub> = -50 V, I <sub>B</sub> = 0)	I <sub>CEO</sub>	-	-	-500	nAdc
Emitter-Base Cutoff Current (V <sub>EB</sub> = -6.0 V, I <sub>C</sub> = 0)	I <sub>EBO</sub>	-	-	-0.5	mAdc
	MUN5111DW1T1G	-	-	-0.2	
	MUN5112DW1T1G	-	-	-0.1	
	MUN5113DW1T1G	-	-	-0.2	
	MUN5114DW1T1G	-	-	-0.9	
	MUN5115DW1T1G	-	-	-1.9	
	MUN5116DW1T1G	-	-	-4.3	
	MUN5130DW1T1G	-	-	-2.3	
	MUN5131DW1T1G	-	-	-1.5	
	MUN5132DW1T1G	-	-	-0.18	
	MUN5133DW1T1G	-	-	-0.13	
	MUN5134DW1T1G	-	-	-0.2	
	MUN5135DW1T1G	-	-	-0.05	
	MUN5136DW1T1G	-	-	-0.13	
	MUN5137DW1T1G	-	-	-	
Collector-Base Breakdown Voltage (I <sub>C</sub> = -10 μA, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	-50	-	-	Vdc
Collector-Emitter Breakdown Voltage (Note 3) (I <sub>C</sub> = -2.0 mA, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	-50	-	-	Vdc

3. New resistor combinations. Updated curves to follow in subsequent data sheets.

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

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted, common for  $Q_1$  and  $Q_2$ .) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>ON CHARACTERISTICS</b> (Note 4.)						
Collector-Emitter Saturation Voltage ( $I_C = -10\text{ mA}$ , $I_B = -0.3\text{ mA}$ )	MUN5111DW1T1G MUN5112DW1T1G MUN5113DW1T1G MUN5114DW1T1G MUN5135DW1T1G MUN5136DW1T1G MUN5137DW1T1G	$V_{CE(sat)}$	-	-	-0.25	Vdc
( $I_C = -10\text{ mA}$ , $I_B = -5\text{ mA}$ )	MUN5130DW1T1G MUN5131DW1T1G		-	-	-0.25	
( $I_C = -10\text{ mA}$ , $I_B = -1\text{ mA}$ )	MUN5115DW1T1G MUN5116DW1T1G MUN5132DW1T1G MUN5133DW1T1G MUN5134DW1T1G		-	-	-0.25	
DC Current Gain ( $V_{CE} = -10\text{ V}$ , $I_C = -5.0\text{ mA}$ )	MUN5111DW1T1G MUN5112DW1T1G MUN5113DW1T1G MUN5114DW1T1G MUN5115DW1T1G MUN5116DW1T1G MUN5130DW1T1G MUN5131DW1T1G MUN5132DW1T1G MUN5133DW1T1G MUN5134DW1T1G MUN5135DW1T1G MUN5136DW1T1G MUN5137DW1T1G	$h_{FE}$	35 60 80 80 160 160 3.0 8.0 15 80 80 80 80 80	60 100 140 140 250 250 5.0 15 27 140 130 140 130 140	- - - - - - - - - - - - - -	
Output Voltage (on) ( $V_{CC} = -5.0\text{ V}$ , $V_B = -2.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5111DW1T1G MUN5112DW1T1G MUN5114DW1T1G MUN5115DW1T1G MUN5116DW1T1G MUN5130DW1T1G MUN5131DW1T1G MUN5132DW1T1G MUN5133DW1T1G MUN5134DW1T1G MUN5135DW1T1G	$V_{OL}$	-	-	-0.2	Vdc
( $V_{CC} = -5.0\text{ V}$ , $V_B = -3.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5113DW1T1G		-	-	-0.2	
( $V_{CC} = -5.0\text{ V}$ , $V_B = -5.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5136DW1T1G		-	-	-0.2	
( $V_{CC} = -5.0\text{ V}$ , $V_B = -4.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5137DW1T1G		-	-	-0.2	
Output Voltage (off) ( $V_{CC} = -5.0\text{ V}$ , $V_B = -0.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5111DW1T1G MUN5112DW1T1G MUN5113DW1T1G MUN5114DW1T1G MUN5133DW1T1G MUN5134DW1T1G MUN5135DW1T1G MUN5136DW1T1G MUN5137DW1T1G	$V_{OH}$	-4.9	-	-	Vdc
( $V_{CC} = -5.0\text{ V}$ , $V_B = -0.05\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5130DW1T1G		-4.9	-	-	
( $V_{CC} = -5.0\text{ V}$ , $V_B = -0.25\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5115DW1T1G MUN5131DW1T1G MUN5132DW1T1G		-4.9	-	-	

4. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty Cycle < 2.0%

### ELECTRICAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  unless otherwise noted, common for  $Q_1$  and  $Q_2$ .) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>ON CHARACTERISTICS</b> (Note 5.)						
Input Resistor	MUN5111DW1T1G	$R_1$	7.0	10	13	$k\ \Omega$
	MUN5112DW1T1G		15.4	22	28.6	
	MUN5113DW1T1G		32.9	47	61.1	
	MUN5114DW1T1G		7.0	10	13	
	MUN5115DW1T1G		7.0	10	13	
	MUN5116DW1T1G		3.3	4.7	6.1	
	MUN5130DW1T1G		0.7	1.0	1.3	
	MUN5131DW1T1G		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	MUN5111DW1T1G	$R_1/R_2$	0.8	1.0	1.2	
	MUN5112DW1T1G		0.8	1.0	1.2	
	MUN5113DW1T1G		0.8	1.0	1.2	
	MUN5114DW1T1G		0.17	0.21	0.25	
	MUN5115DW1T1G		-	-	-	
	MUN5116DW1T1G		-	-	-	
	MUN5130DW1T1G		0.8	1.0	1.2	
	MUN5131DW1T1G		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	

5. Pulse Test: Pulse Width < 300 ms, Duty Cycle < 2.0%

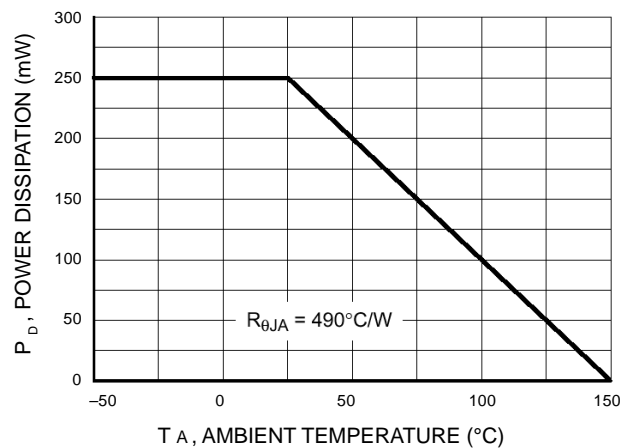
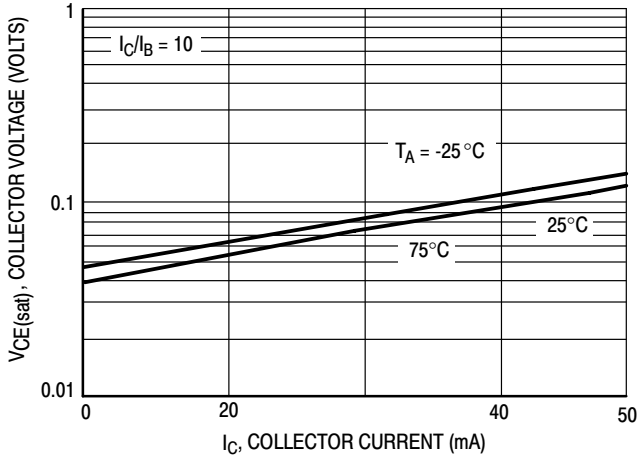
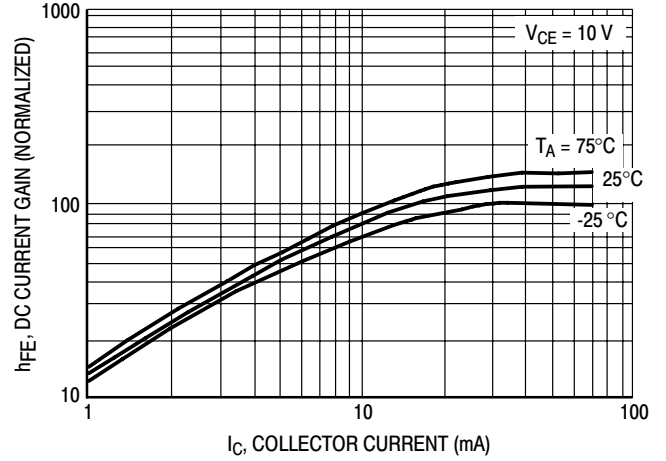


Figure 1. Derating Curve

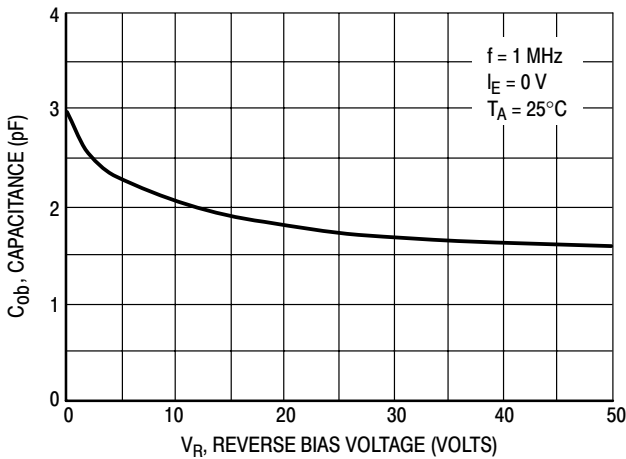
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5111DW1T1G**



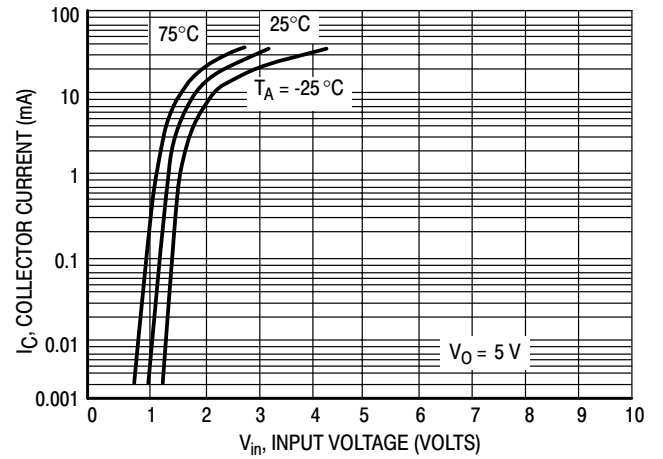
**Figure 2.  $V_{CE(sat)}$  versus  $I_C$**



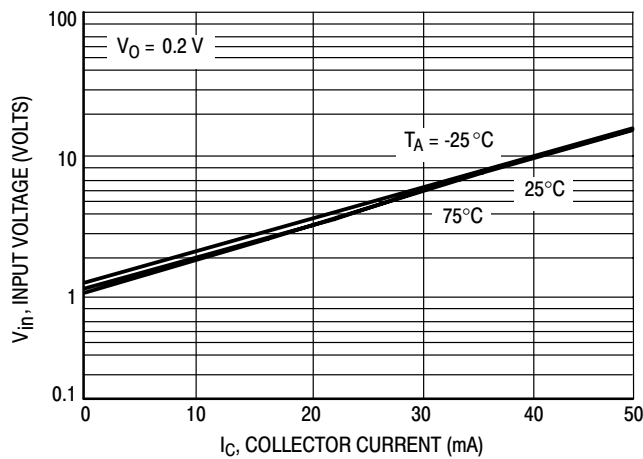
**Figure 3. DC Current Gain**



**Figure 4. Output Capacitance**

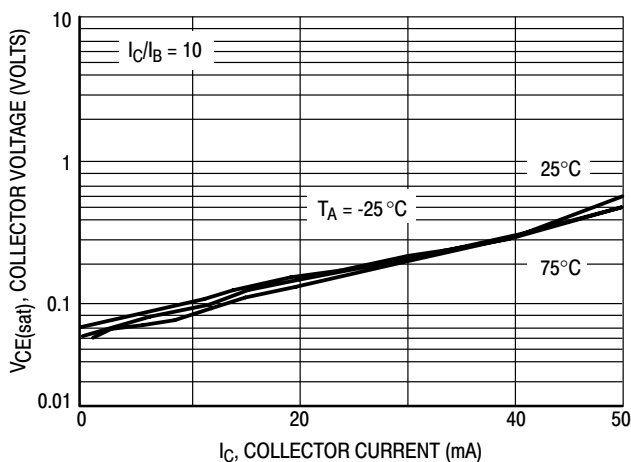


**Figure 5. Output Current versus Input Voltage**

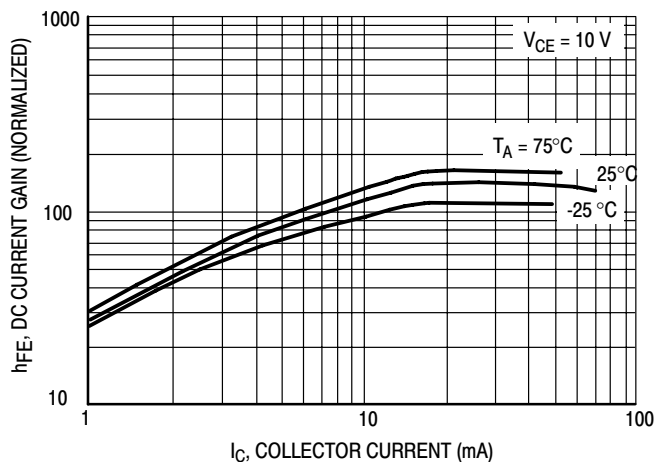


**Figure 6. Input Voltage versus Output Current**

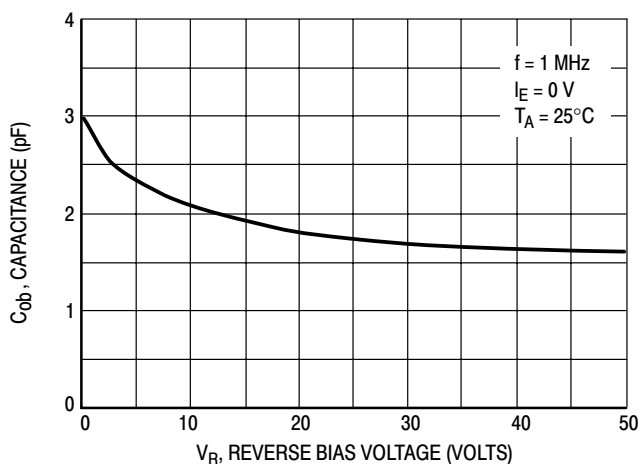
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5112DW1T1G**



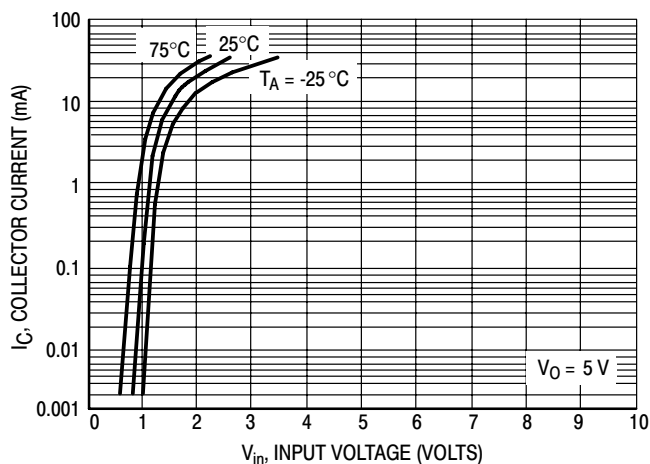
**Figure 7.  $V_{CE(sat)}$  versus  $I_C$**



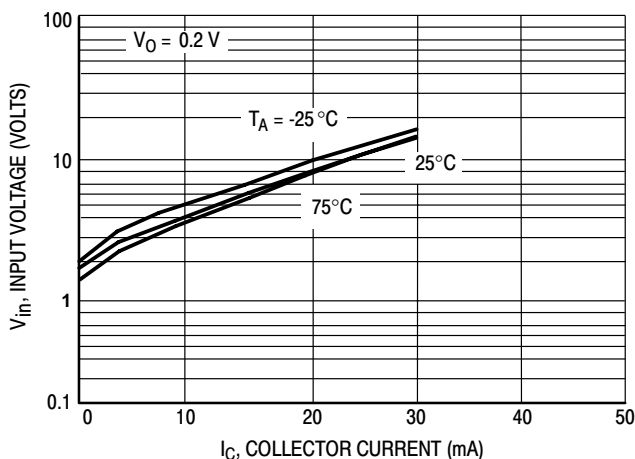
**Figure 8. DC Current Gain**



**Figure 9. Output Capacitance**

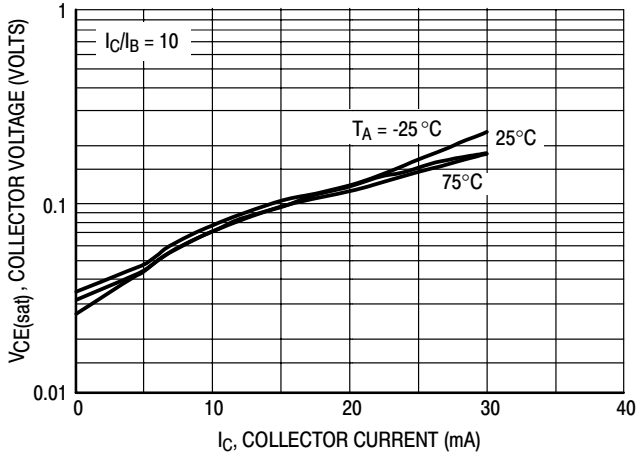


**Figure 10. Output Current versus Input Voltage**

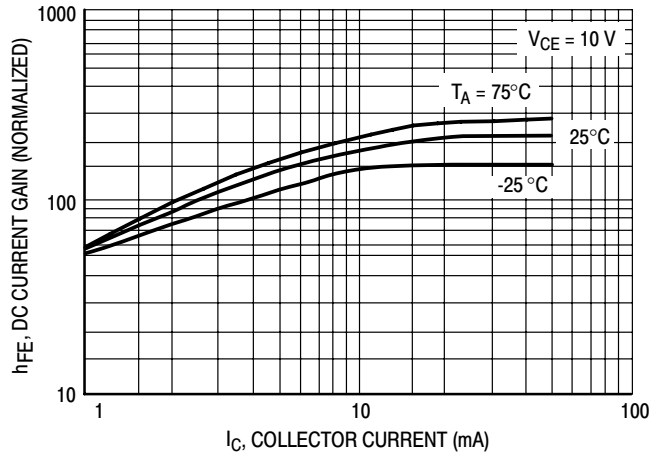


**Figure 11. Input Voltage versus Output Current**

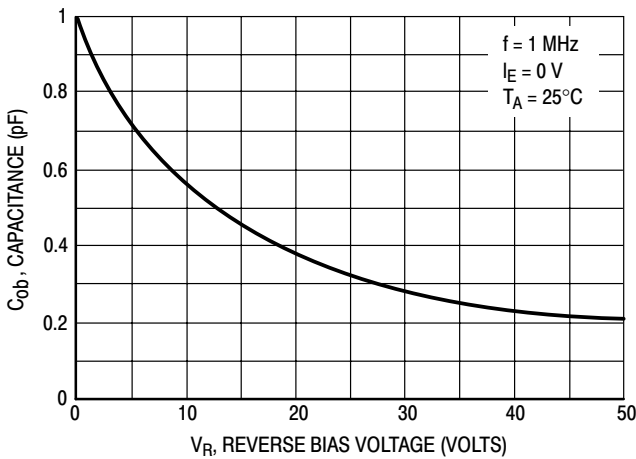
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5113DW1T1G**



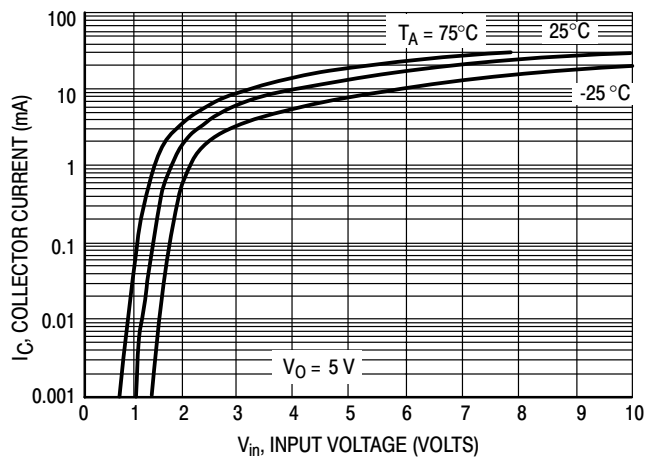
**Figure 12.  $V_{CE(sat)}$  versus  $I_C$**



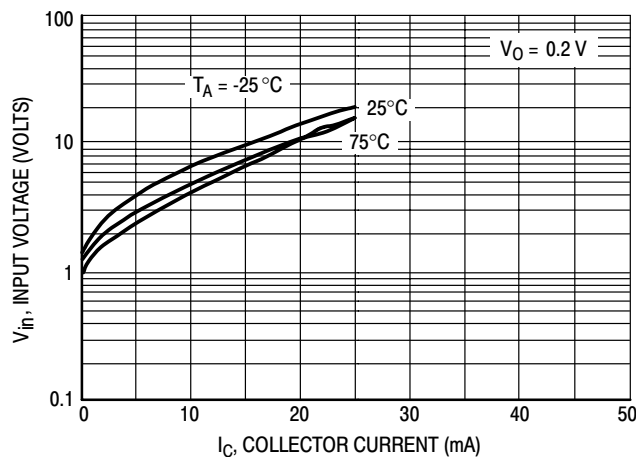
**Figure 13. DC Current Gain**



**Figure 14. Output Capacitance**

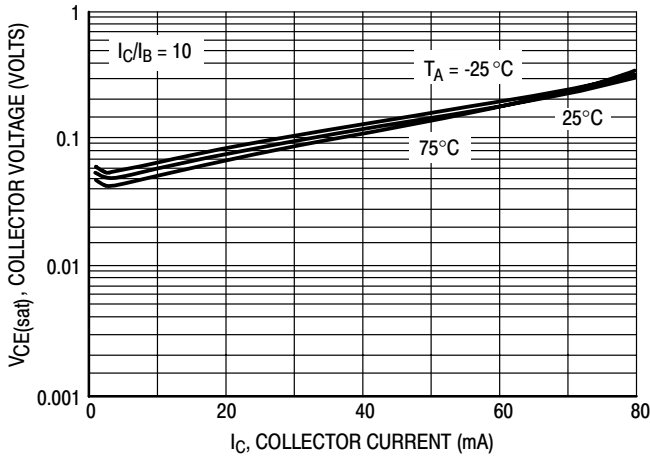


**Figure 15. Output Current versus Input Voltage**

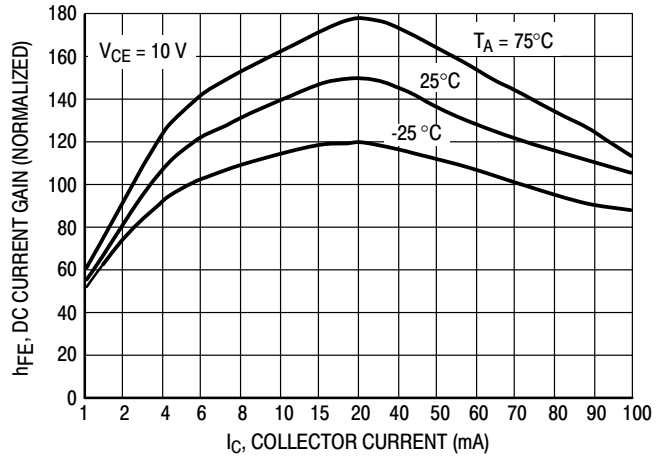


**Figure 16. Input Voltage versus Output Current**

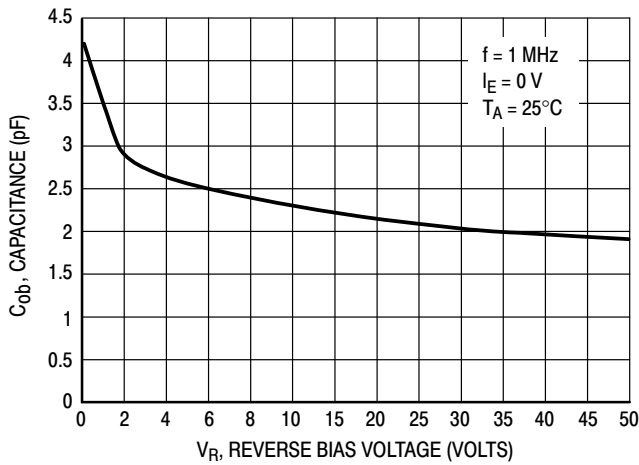
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5114DW1T1G**



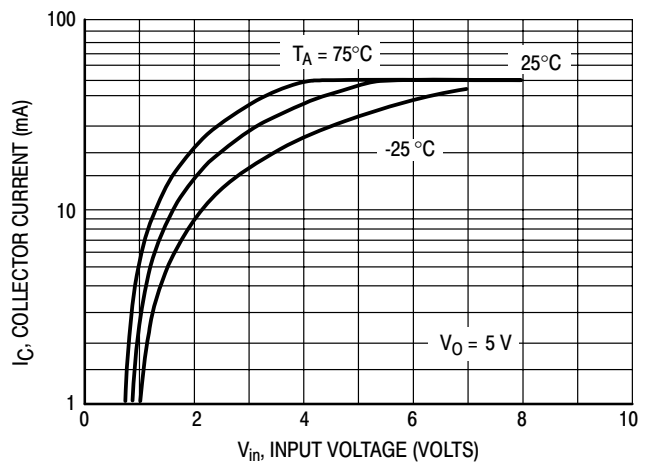
**Figure 17.  $V_{CE(sat)}$  versus  $I_C$**



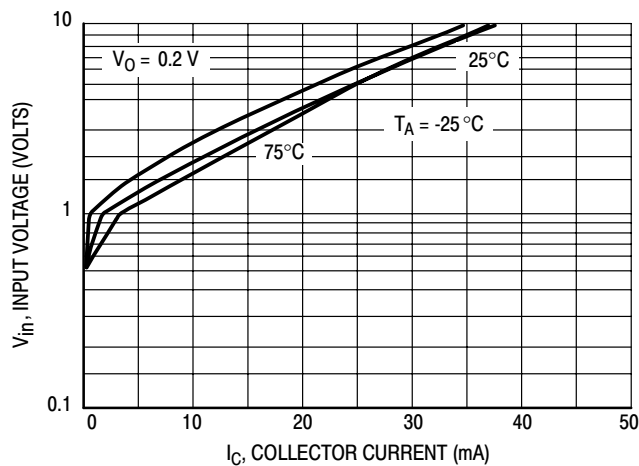
**Figure 18. DC Current Gain**



**Figure 19. Output Capacitance**



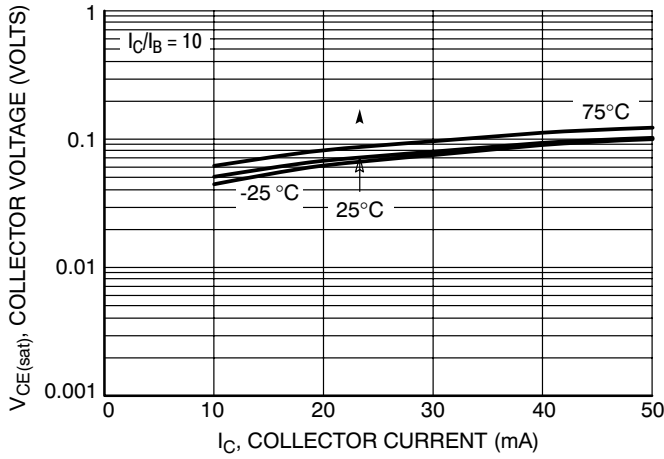
**Figure 20. Output Current versus Input Voltage**



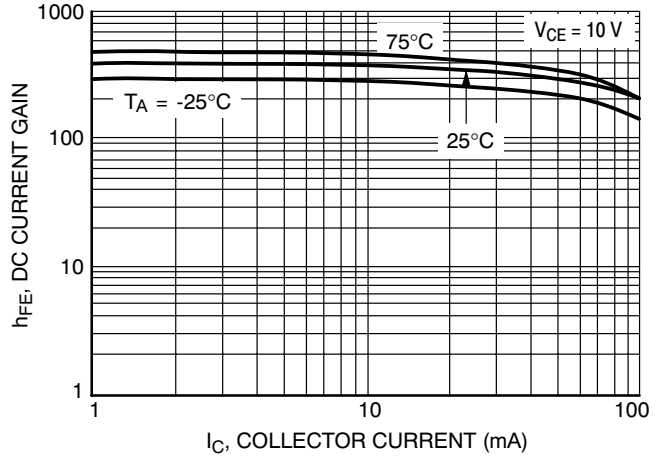
**Figure 21. Input Voltage versus Output Current**



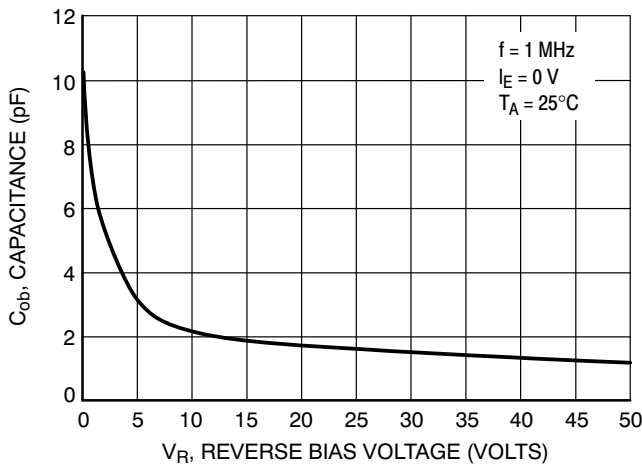
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5115DW1T1G**



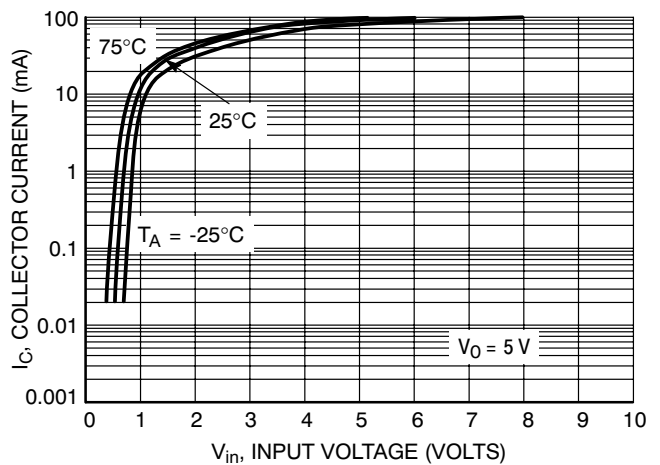
**Figure 22.  $V_{CE(sat)}$  versus  $I_C$**



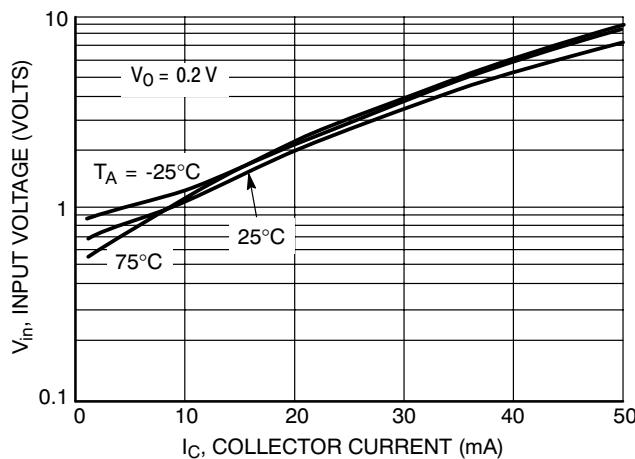
**Figure 23. DC Current Gain**



**Figure 24. Output Capacitance**

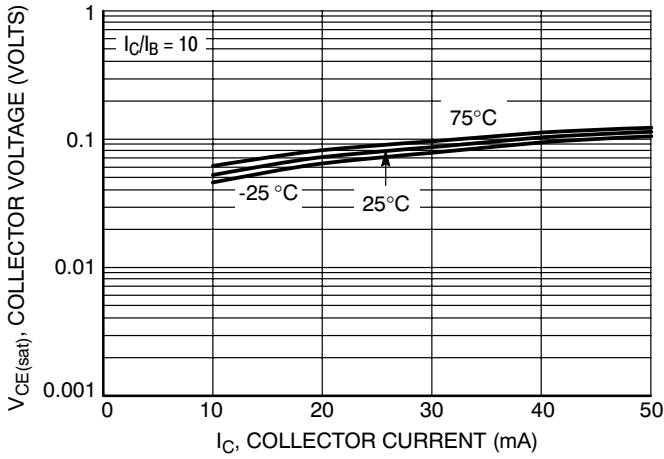


**Figure 25. Output Current versus Input Voltage**

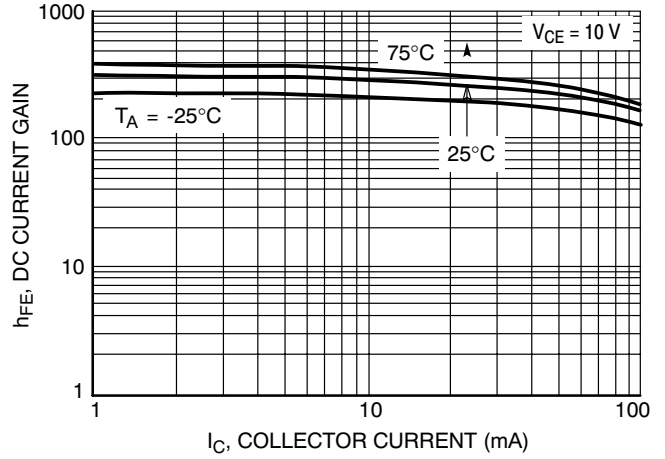


**Figure 26. Input Voltage versus Output Current**

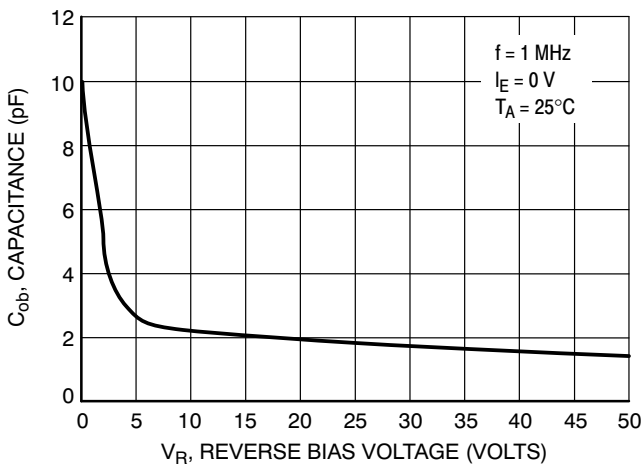
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5116DW1T1G**



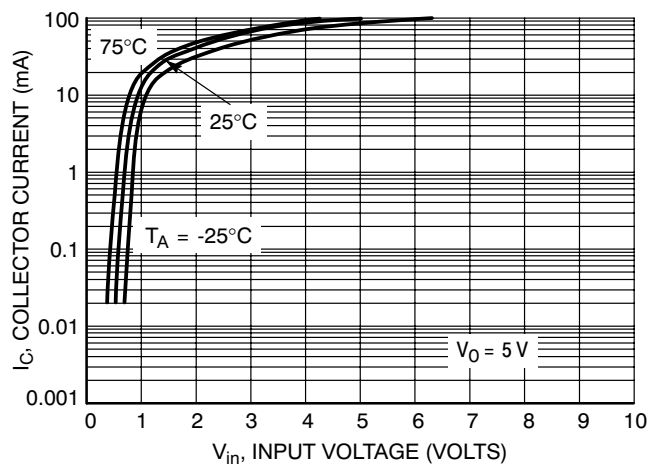
**Figure 27.  $V_{CE(sat)}$  versus  $I_C$**



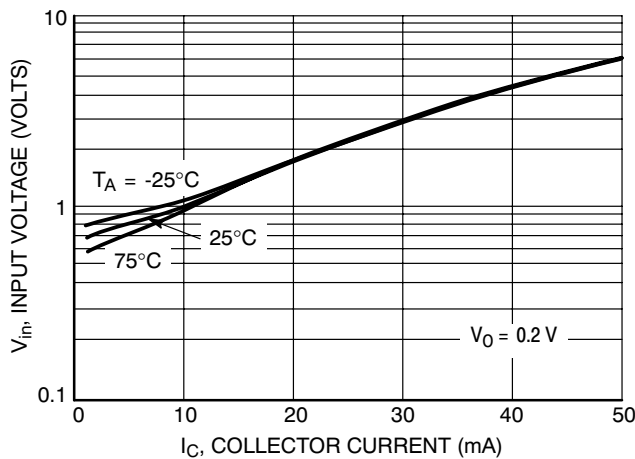
**Figure 28. DC Current Gain**



**Figure 29. Output Capacitance**

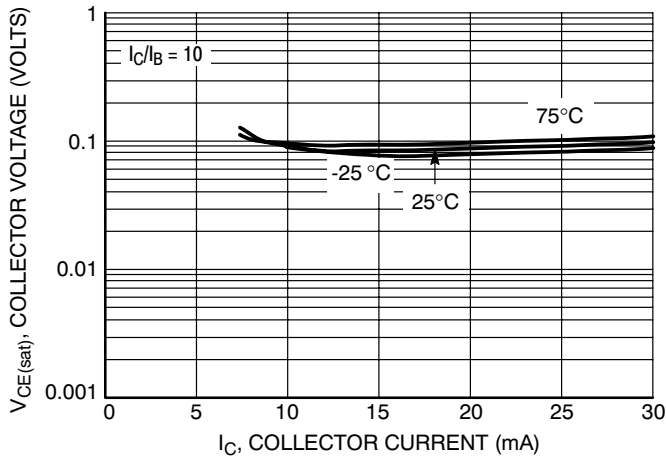


**Figure 30. Output Current versus Input Voltage**

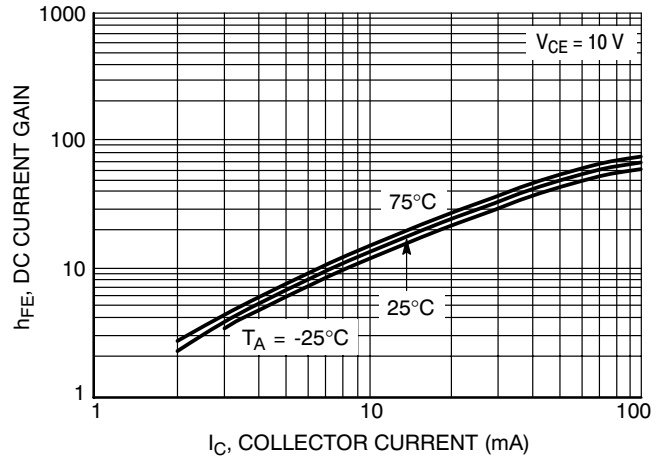


**Figure 31. Input Voltage versus Output Current**

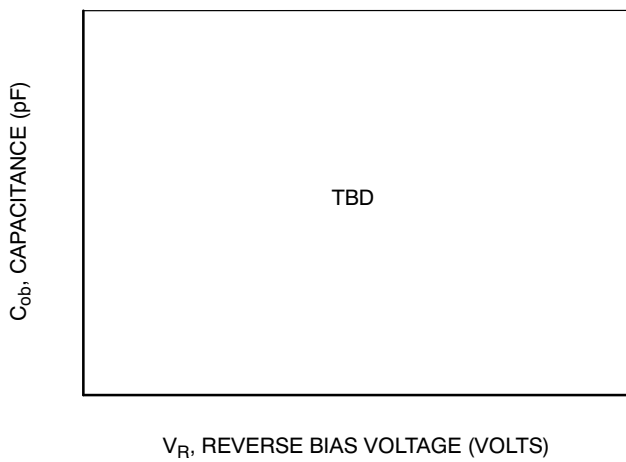
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5130DW1T1G**



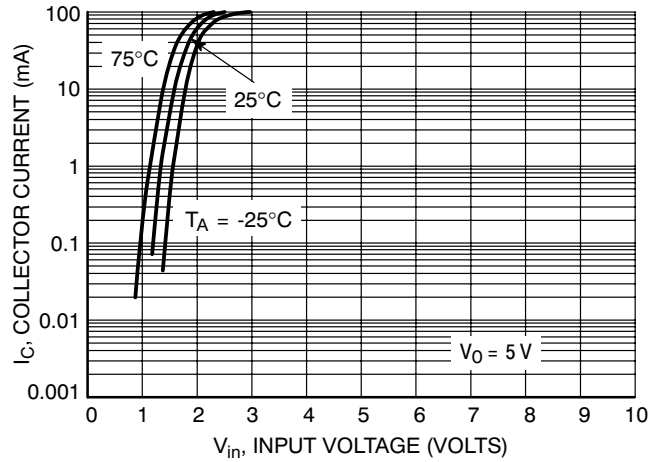
**Figure 32.  $V_{CE(sat)}$  versus  $I_C$**



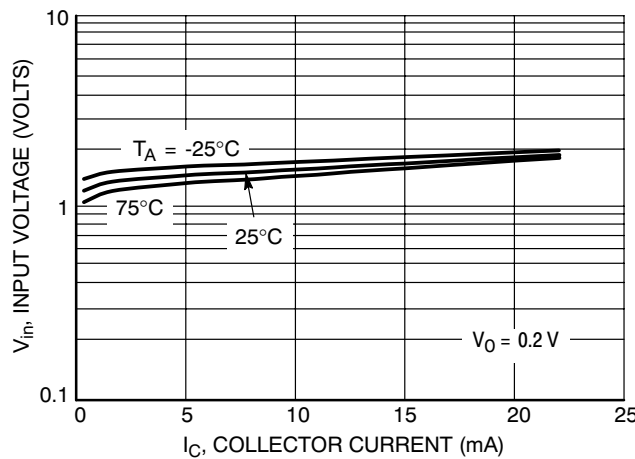
**Figure 33. DC Current Gain**



**Figure 34. Output Capacitance**

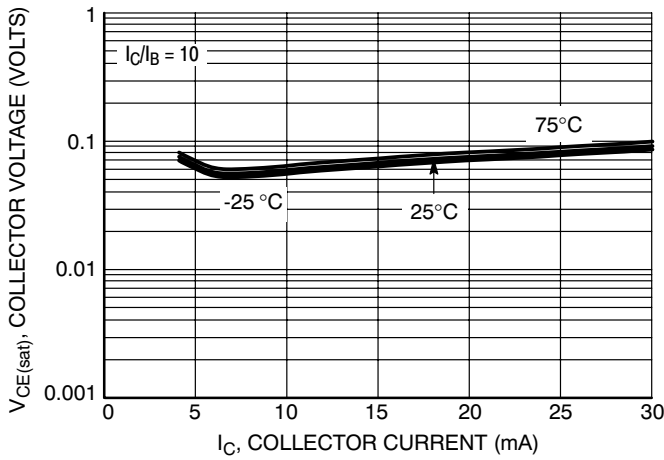


**Figure 35. Output Current versus Input Voltage**

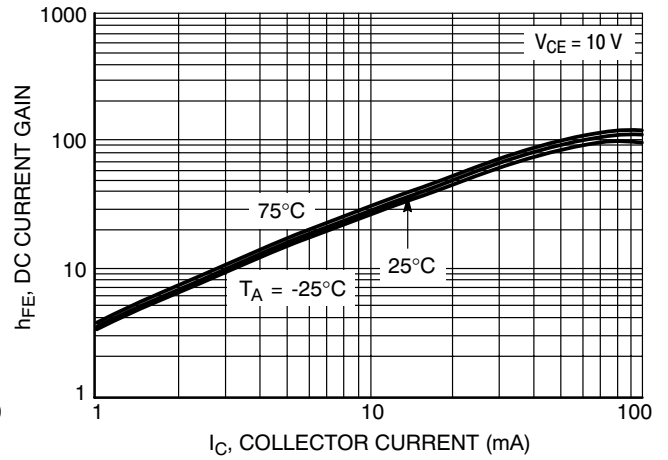


**Figure 36. Input Voltage versus Output Current**

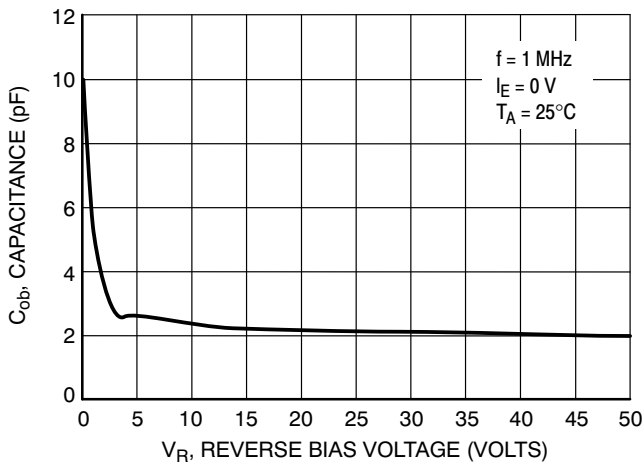
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5131DW1T1G**



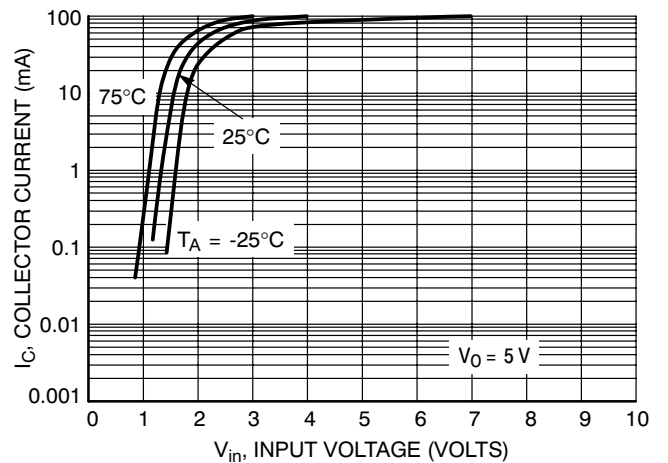
**Figure 37.  $V_{CE(sat)}$  versus  $I_C$**



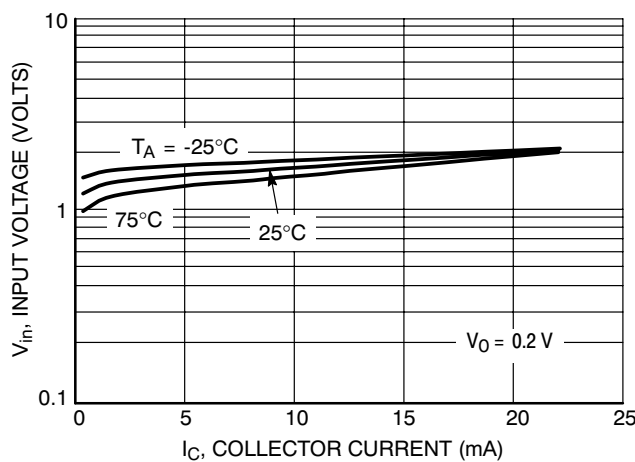
**Figure 38. DC Current Gain**



**Figure 39. Output Capacitance**

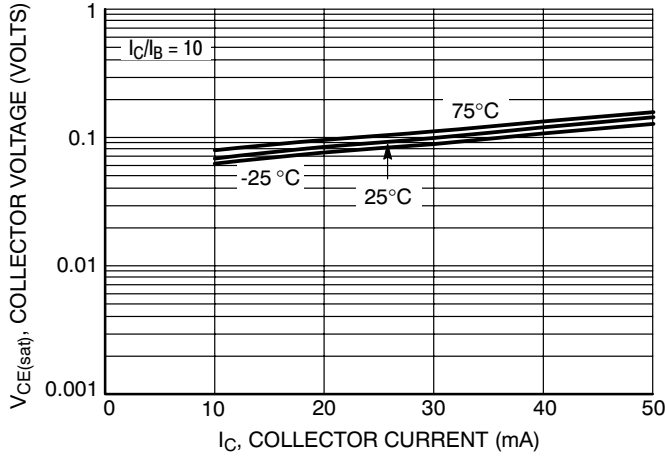


**Figure 40. Output Current versus Input Voltage**

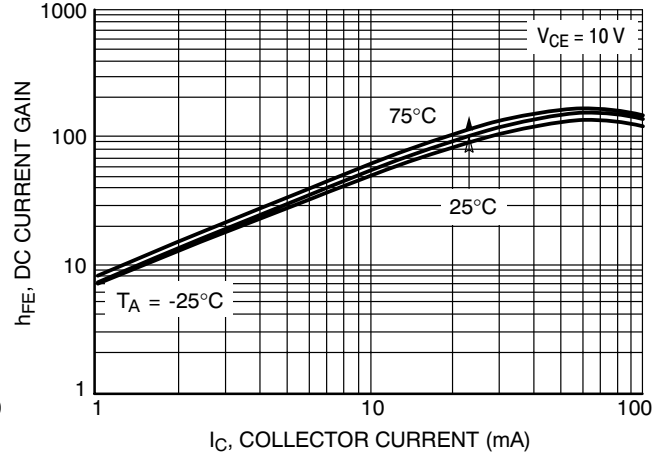


**Figure 41. Input Voltage versus Output Current**

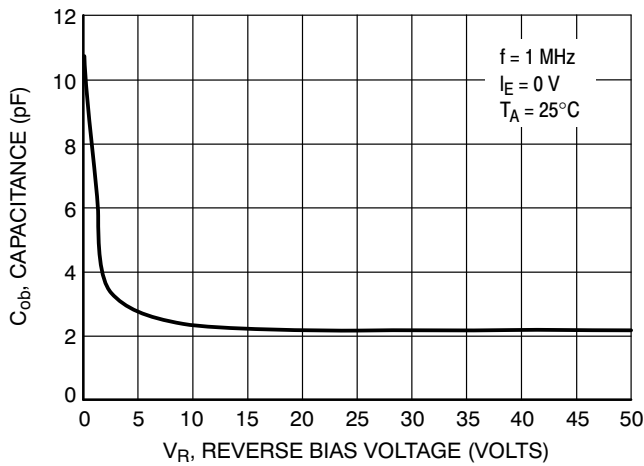
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5132DW1T1G**



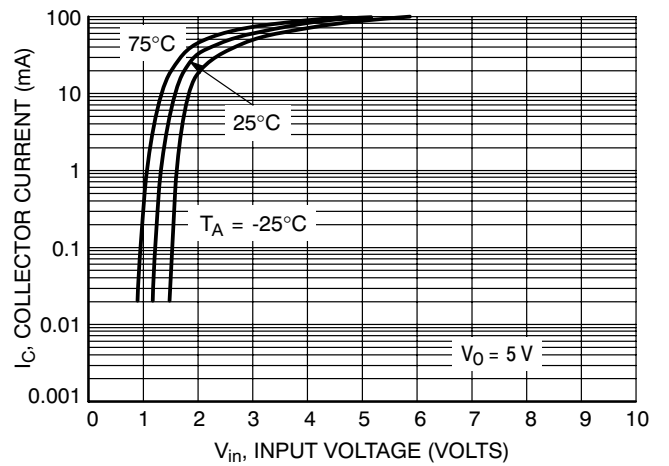
**Figure 42.  $V_{CE(sat)}$  versus  $I_C$**



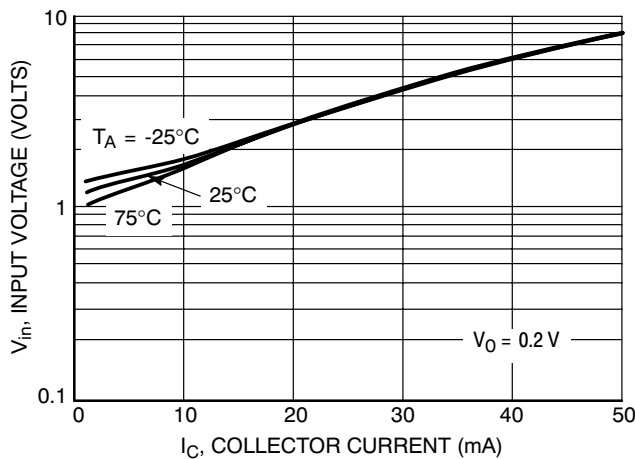
**Figure 43. DC Current Gain**



**Figure 44. Output Capacitance**

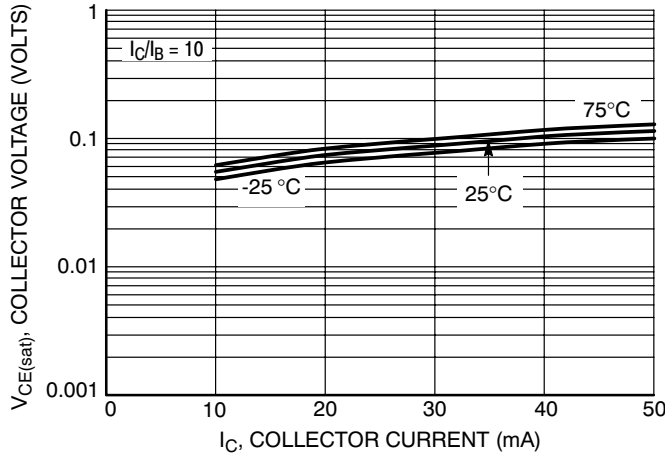


**Figure 45. Output Current versus Input Voltage**

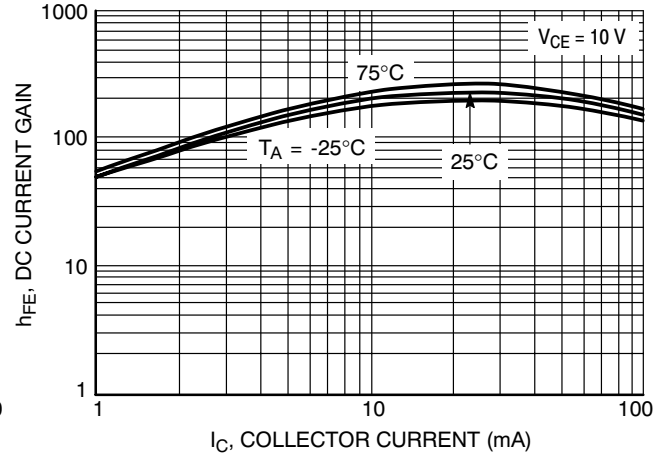


**Figure 46. Input Voltage versus Output Current**

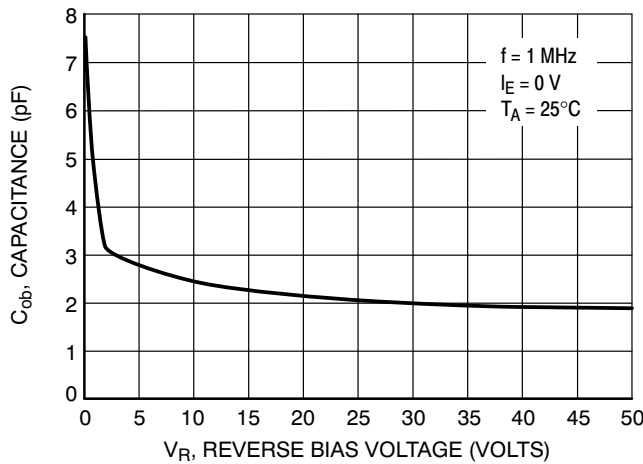
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5133DW1T1G**



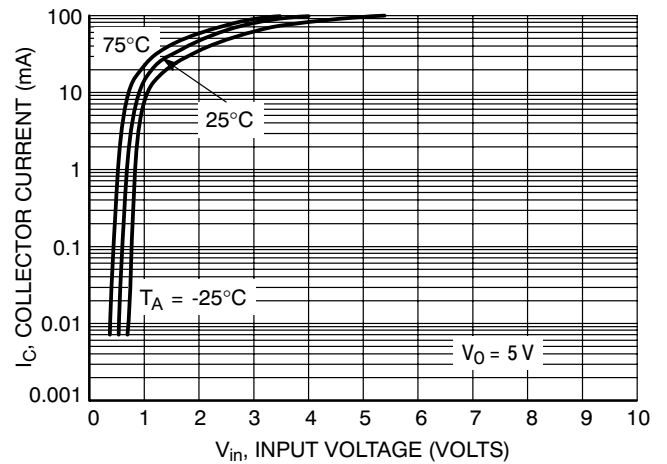
**Figure 47.  $V_{CE(sat)}$  versus  $I_C$**



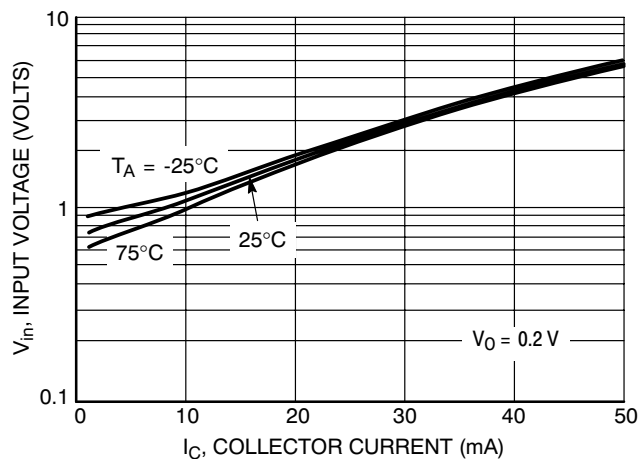
**Figure 48. DC Current Gain**



**Figure 49. Output Capacitance**

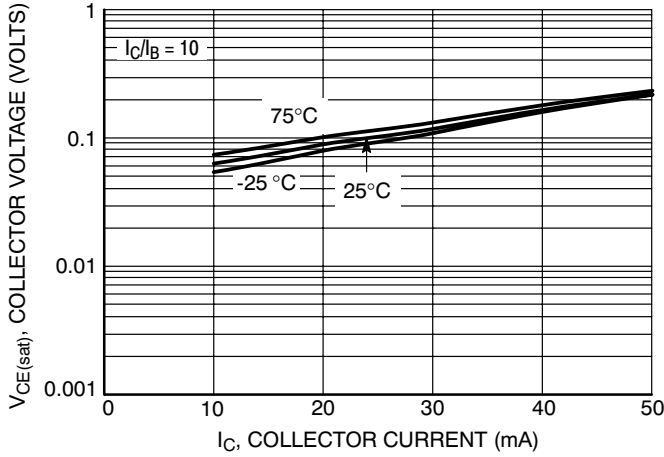


**Figure 50. Output Current versus Input Voltage**

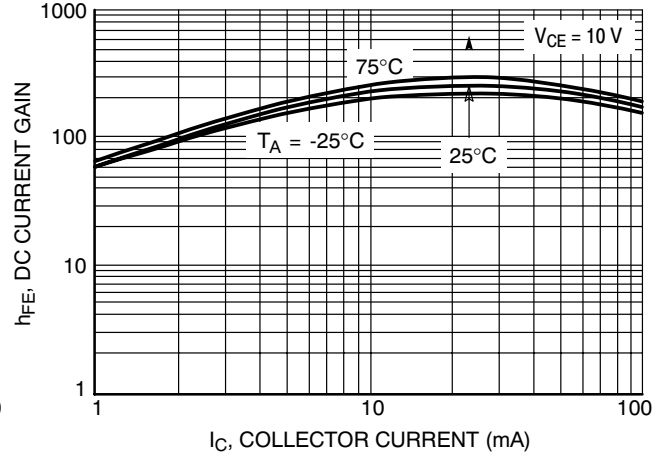


**Figure 51. Input Voltage versus Output Current**

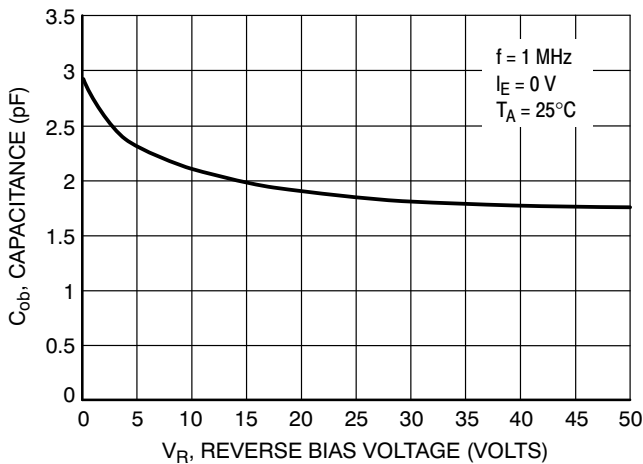
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5134DW1T1G**



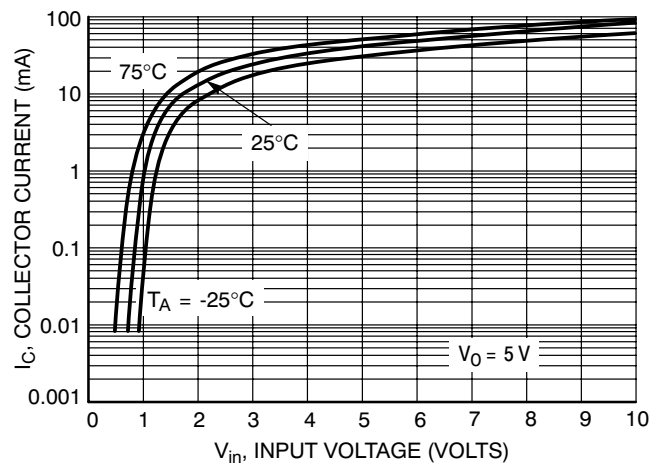
**Figure 52.  $V_{CE(sat)}$  versus  $I_C$**



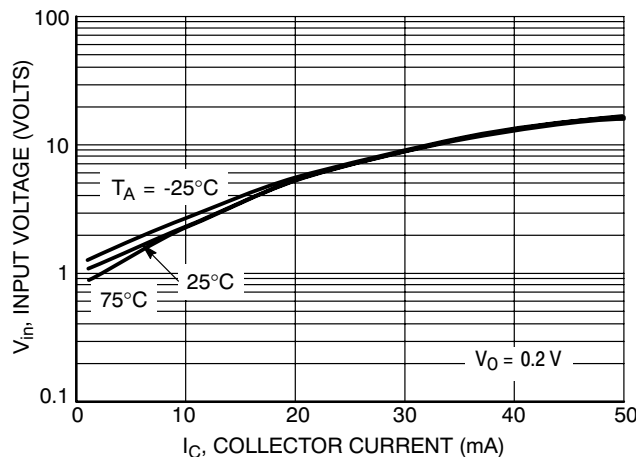
**Figure 53. DC Current Gain**



**Figure 54. Output Capacitance**

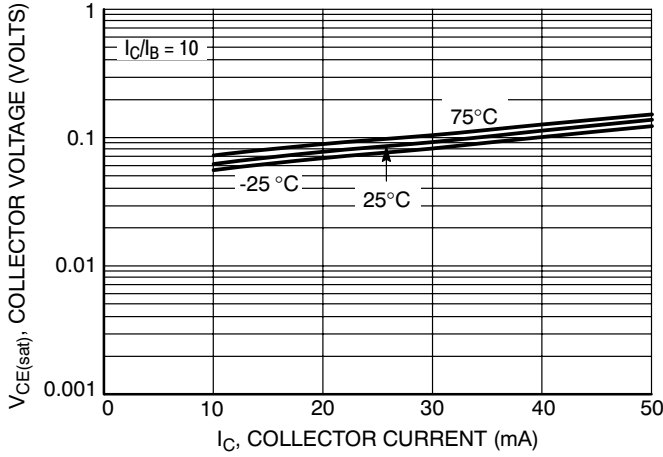


**Figure 55. Output Current versus Input Voltage**

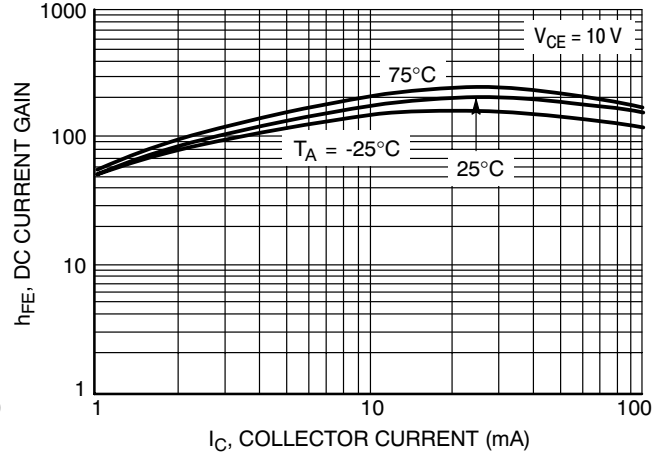


**Figure 56. Input Voltage versus Output Current**

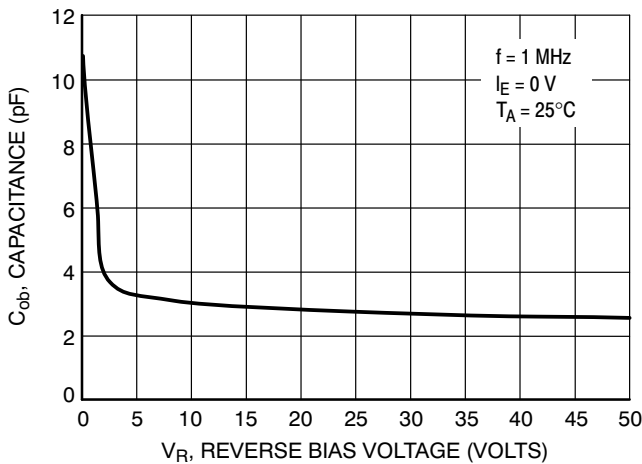
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5135DW1T1G**



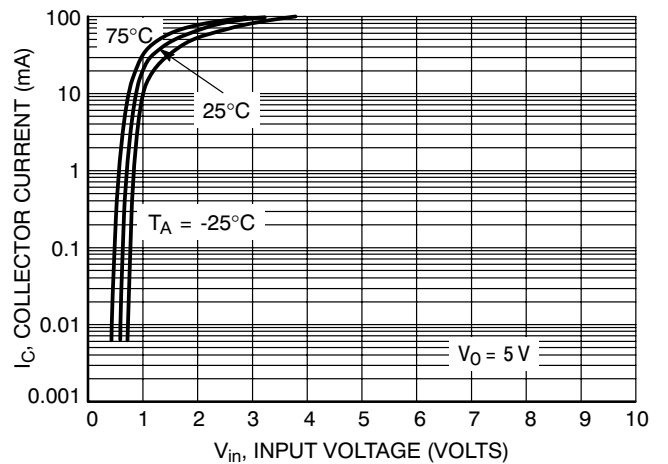
**Figure 57.  $V_{CE(sat)}$  versus  $I_C$**



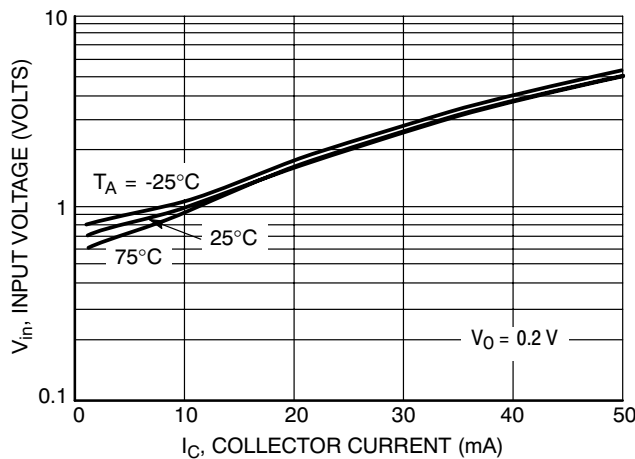
**Figure 58. DC Current Gain**



**Figure 59. Output Capacitance**



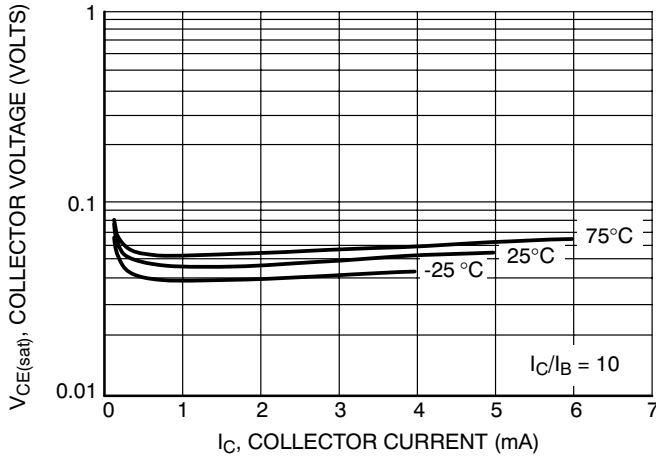
**Figure 60. Output Current versus Input Voltage**



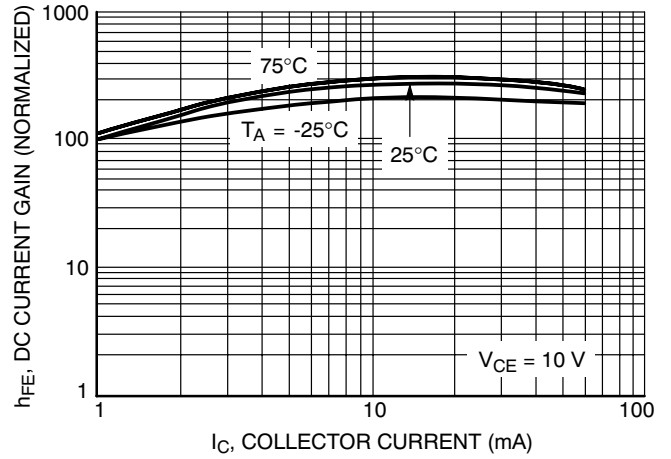
**Figure 61. Input Voltage versus Output Current**



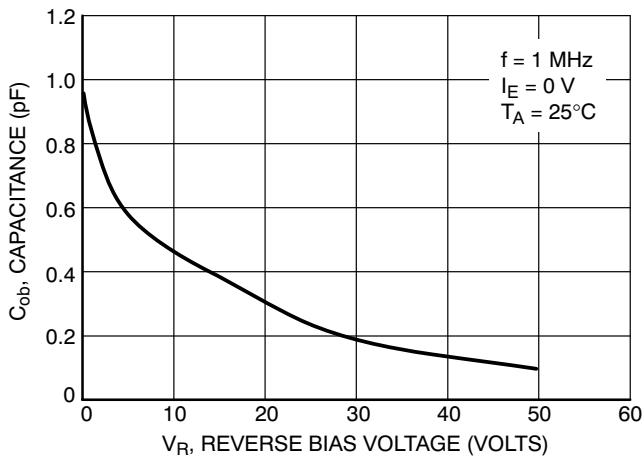
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5136DW1T1G**



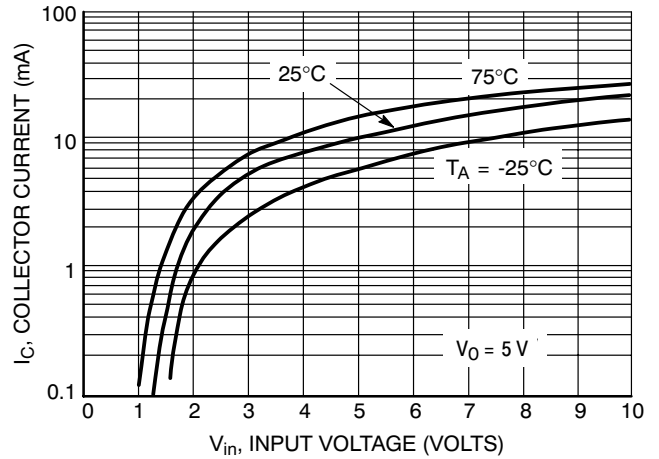
**Figure 62.  $V_{CE(sat)}$  versus  $I_C$**



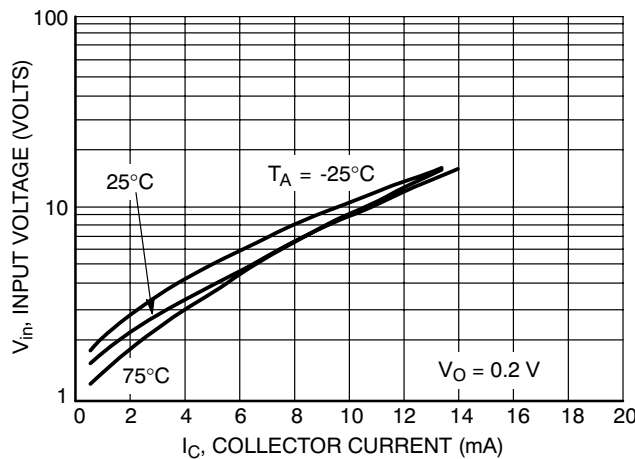
**Figure 63. DC Current Gain**



**Figure 64. Output Capacitance**

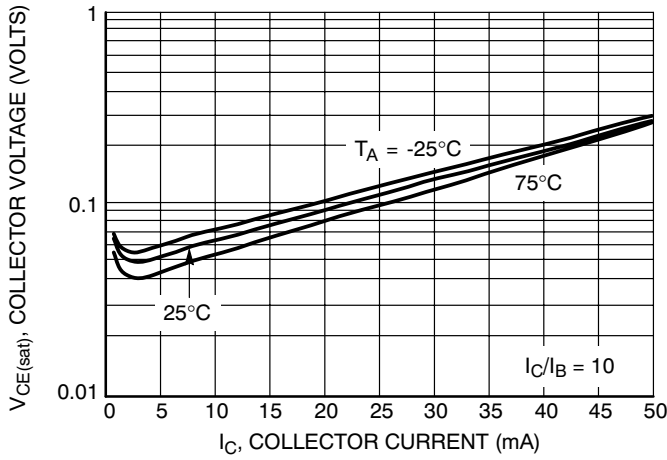


**Figure 65. Output Current versus Input Voltage**

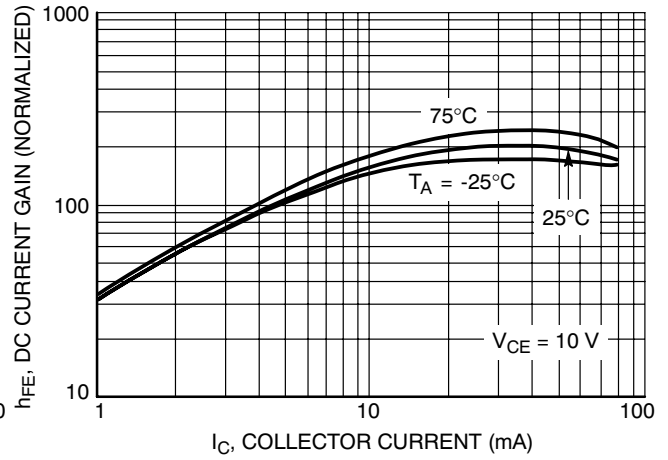


**Figure 66. Input Voltage versus Output Current**

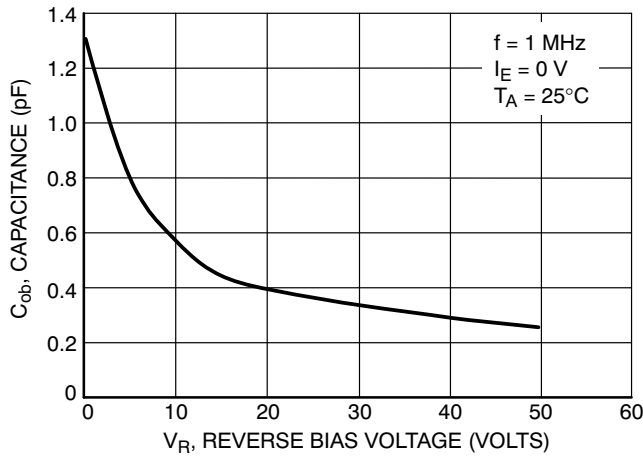
**TYPICAL ELECTRICAL CHARACTERISTICS – MUN5137DW1T1G**



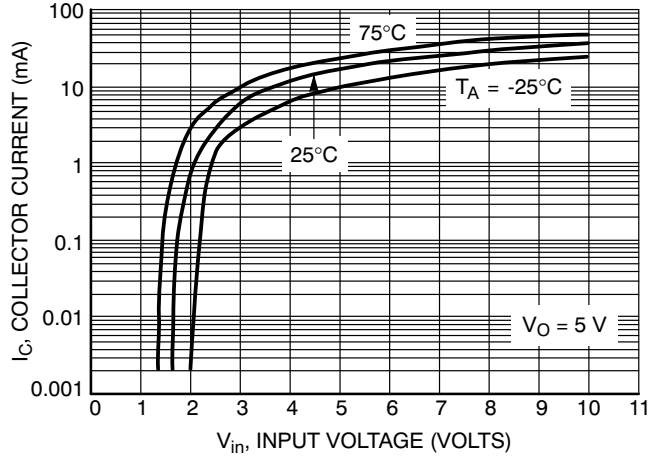
**Figure 67.  $V_{CE(sat)}$  versus  $I_C$**



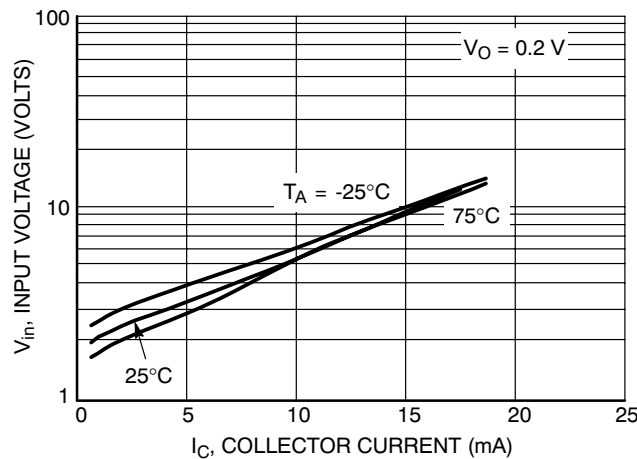
**Figure 68. DC Current Gain**



**Figure 69. Output Capacitance**

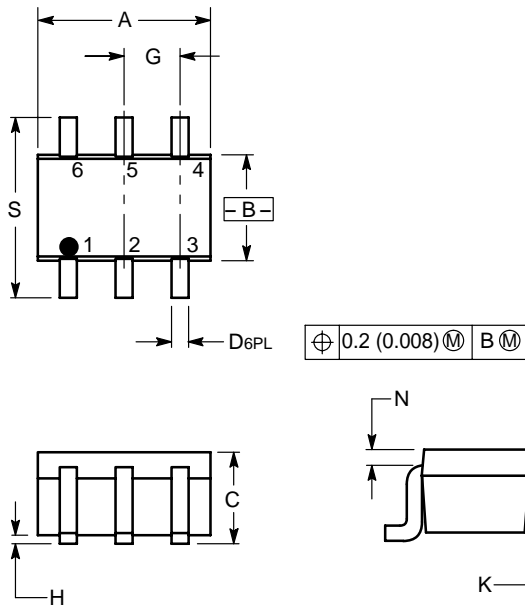


**Figure 70. Output Current versus Input Voltage**



**Figure 71. Input Voltage versus Output Current**

## SC-88/SOT-363



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

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

