

# MUN5111DW1T1 Series

Preferred Devices

## Dual Bias Resistor Transistors

### PNP Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

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 MUN5111DW1T1 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

#### MAXIMUM RATINGS

( $T_A = 25^\circ\text{C}$  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

#### THERMAL CHARACTERISTICS

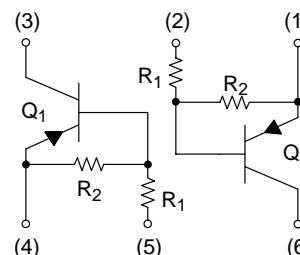
Characteristic (One Junction Heated)	Symbol	Max	Unit
Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	187 (Note 1.) 256 (Note 2.) 1.5 (Note 1.) 2.0 (Note 2.)	mW mW/ $^\circ\text{C}$
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	670 (Note 1.) 490 (Note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

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



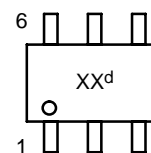
ON Semiconductor®

<http://onsemi.com>



SOT-363  
CASE 419B  
STYLE 1

#### MARKING DIAGRAM



XX = Specific Device Code  
<sup>d</sup> = Date Code  
(See Page 2)

#### DEVICE MARKING INFORMATION

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

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

# MUN5111DW1T1 Series

## DEVICE MARKING AND RESISTOR VALUES

Device	Package	Marking	R1 (K)	R2 (K)	Shipping
MUN5111DW1T1	SOT-363	0A	10	10	3000/Tape & Reel
MUN5112DW1T1	SOT-363	0B	22	22	3000/Tape & Reel
MUN5113DW1T1	SOT-363	0C	47	47	3000/Tape & Reel
MUN5114DW1T1	SOT-363	0D	10	47	3000/Tape & Reel
MUN5115DW1T1	SOT-363	0E	10	∞	3000/Tape & Reel
MUN5116DW1T1	SOT-363	0F	4.7	∞	3000/Tape & Reel
MUN5130DW1T1	SOT-363	0G	1.0	1.0	3000/Tape & Reel
MUN5131DW1T1	SOT-363	0H	2.2	2.2	3000/Tape & Reel
MUN5132DW1T1	SOT-363	0J	4.7	4.7	3000/Tape & Reel
MUN5133DW1T1	SOT-363	0K	4.7	47	3000/Tape & Reel
MUN5134DW1T1	SOT-363	0L	22	47	3000/Tape & Reel
MUN5135DW1T1	SOT-363	0M	2.2	47	3000/Tape & Reel
MUN5136DW1T1	SOT-363	0N	100	100	3000/Tape & Reel
MUN5137DW1T1	SOT-363	0P	47	22	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
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### OFF CHARACTERISTICS

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)	MUN5111DW1T1	-	-	-0.5	mAdc
	MUN5112DW1T1	-	-	-0.2	
	MUN5113DW1T1	-	-	-0.1	
	MUN5114DW1T1	-	-	-0.2	
	MUN5115DW1T1	-	-	-0.9	
	MUN5116DW1T1	-	-	-1.9	
	MUN5130DW1T1	-	-	-4.3	
	MUN5131DW1T1	-	-	-2.3	
	MUN5132DW1T1	-	-	-1.5	
	MUN5133DW1T1	-	-	-0.18	
	MUN5134DW1T1	-	-	-0.13	
	MUN5135DW1T1	-	-	-0.2	
	MUN5136DW1T1	-	-	-0.05	
MUN5137DW1T1	-	-	-0.13		
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

### ON CHARACTERISTICS (Note 3.)

Collector-Emitter Saturation Voltage (I <sub>C</sub> = -10 mA, I <sub>E</sub> = -0.3 mA) (I <sub>C</sub> = -10 mA, I <sub>B</sub> = -5 mA) MUN5130DW1T1/MUN5131DW1T1 (I <sub>C</sub> = -10 mA, I <sub>B</sub> = -1 mA) MUN5115DW1T1/MUN5116DW1T1 MUN5132DW1T1/MUN5133DW1T1/MUN5134DW1T1	V <sub>CE(sat)</sub>	-	-	-0.25	Vdc
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3. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

## MUN5111DW1T1 Series

### 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.) (Continued)						
DC Current Gain ( $V_{CE} = -10\text{ V}$ , $I_C = -5.0\text{ mA}$ )	MUN5111DW1T1 MUN5112DW1T1 MUN5113DW1T1 MUN5114DW1T1 MUN5115DW1T1 MUN5116DW1T1 MUN5130DW1T1 MUN5131DW1T1 MUN5132DW1T1 MUN5133DW1T1 MUN5134DW1T1 MUN5135DW1T1 MUN5136DW1T1 MUN5137DW1T1	$h_{FE}$	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) ( $V_{CC} = -5.0\text{ V}$ , $V_B = -2.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5111DW1T1 MUN5112DW1T1 MUN5114DW1T1 MUN5115DW1T1 MUN5116DW1T1 MUN5130DW1T1 MUN5131DW1T1 MUN5132DW1T1 MUN5133DW1T1 MUN5134DW1T1 MUN5135DW1T1 ( $V_{CC} = -5.0\text{ V}$ , $V_B = -3.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ ) MUN5113DW1T1 ( $V_{CC} = -5.0\text{ V}$ , $V_B = -5.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ ) MUN5136DW1T1 ( $V_{CC} = -5.0\text{ V}$ , $V_B = -4.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ ) MUN5137DW1T1	$V_{OL}$	- - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - -	-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 -0.2 -0.2 -0.2	Vdc
Output Voltage (off) ( $V_{CC} = -5.0\text{ V}$ , $V_B = -0.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ ) ( $V_{CC} = -5.0\text{ V}$ , $V_B = -0.05\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ ) ( $V_{CC} = -5.0\text{ V}$ , $V_B = -0.25\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5130DW1T1 MUN5115DW1T1 MUN5116DW1T1 MUN5131DW1T1 MUN5133DW1T1	$V_{OH}$	-4.9	-	-	Vdc
Input Resistor	MUN5111DW1T1 MUN5112DW1T1 MUN5113DW1T1 MUN5114DW1T1 MUN5115DW1T1 MUN5116DW1T1 MUN5130DW1T1 MUN5131DW1T1 MUN5132DW1T1 MUN5133DW1T1 MUN5134DW1T1 MUN5135DW1T1 MUN5136DW1T1 MUN5137DW1T1	$R_1$	7.0 15.4 32.9 7.0 7.0 3.3 0.7 1.5 3.3 3.3 15.4 1.54 70 32.9	10 22 47 10 10 4.7 1.0 2.2 4.7 4.7 22 2.2 100 47	13 28.6 61.1 13 13 6.1 1.3 2.9 6.1 6.1 28.6 2.86 130 61.1	k $\Omega$
Resistor Ratio	MUN5111DW1T1/MUN5112DW1T1/ MUN5113DW1T1/MUN5136DW1T1 MUN5114DW1T1 MUN5115DW1T1/MUN5116DW1T1 MUN5130DW1T1/MUN5131DW1T1/MUN5132DW1T1 MUN5133DW1T1 MUN5134DW1T1 MUN5135DW1T1 MUN5137DW1T1	$R_1/R_2$	0.8 0.17 - 0.8 0.055 0.38 0.038 1.7	1.0 0.21 - 1.0 0.1 0.47 0.047 2.1	1.2 0.25 - 1.2 0.185 0.56 0.056 2.6	

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

# MUN5111DW1T1 Series

## ALL MUN5111DW1T1 SERIES DEVICES

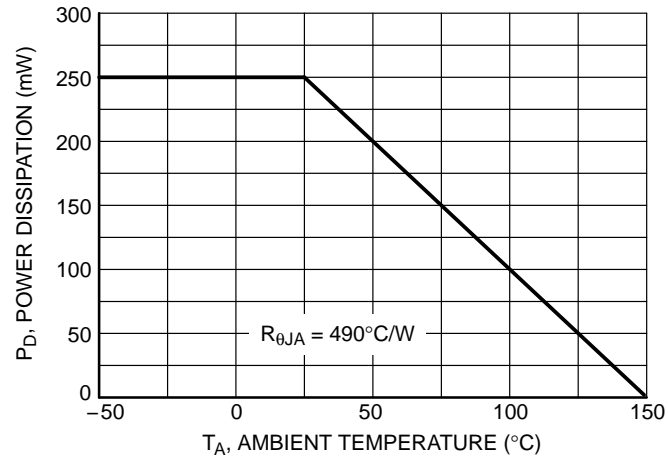


Figure 1. Derating Curve – ALL DEVICES

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5111DW1T1

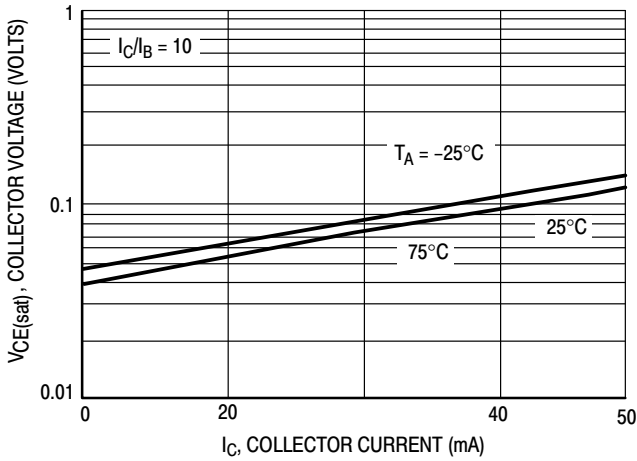


Figure 2.  $V_{CE(sat)}$  versus  $I_C$

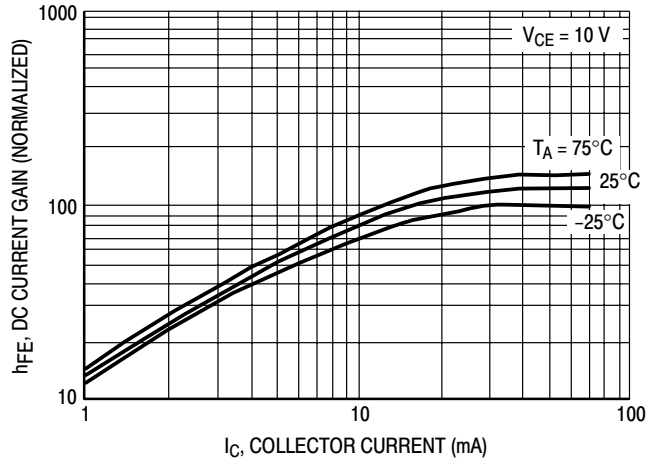


Figure 3. DC Current Gain

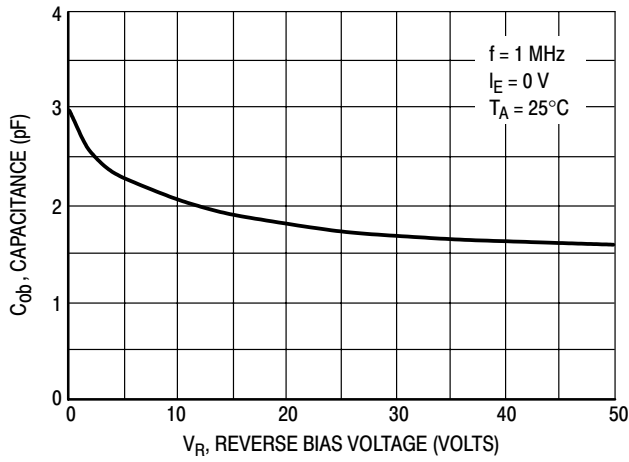


Figure 4. Output Capacitance

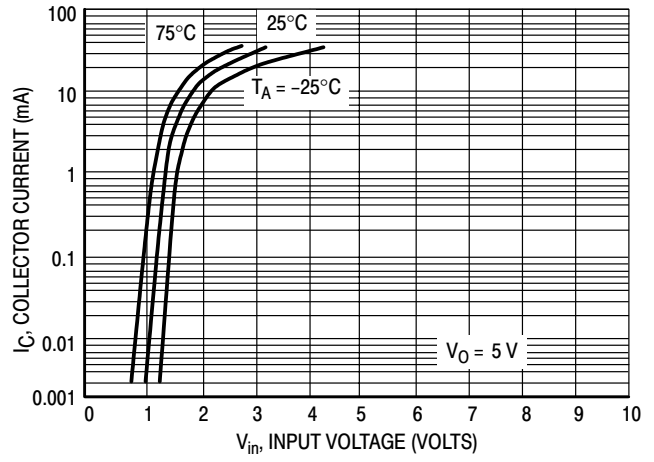


Figure 5. Output Current versus Input Voltage

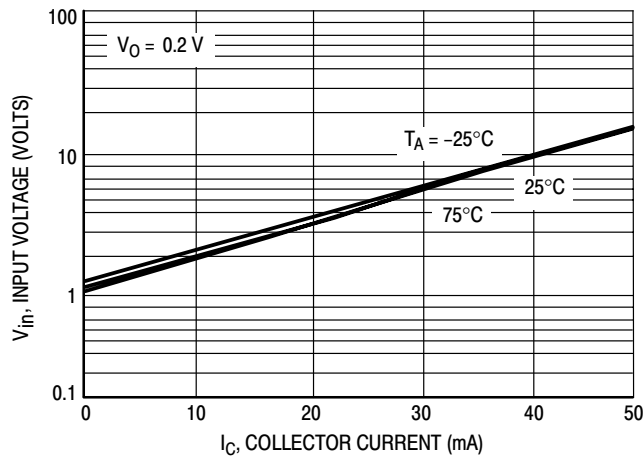


Figure 6. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5112DW1T1

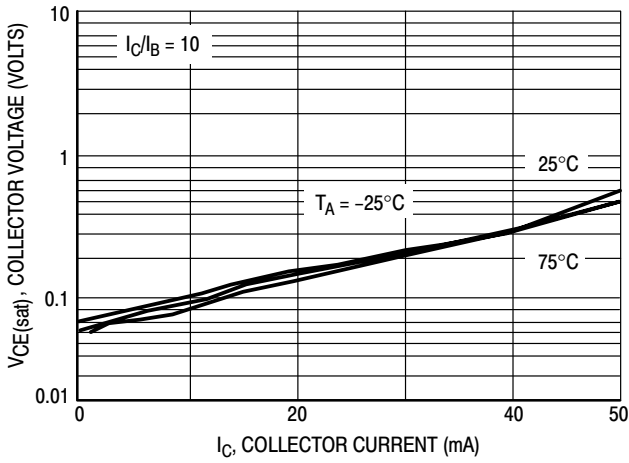


Figure 7.  $V_{CE(sat)}$  versus  $I_C$

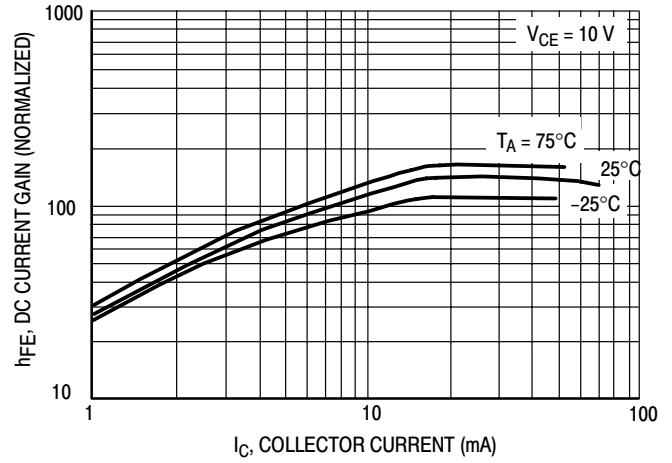


Figure 8. DC Current Gain

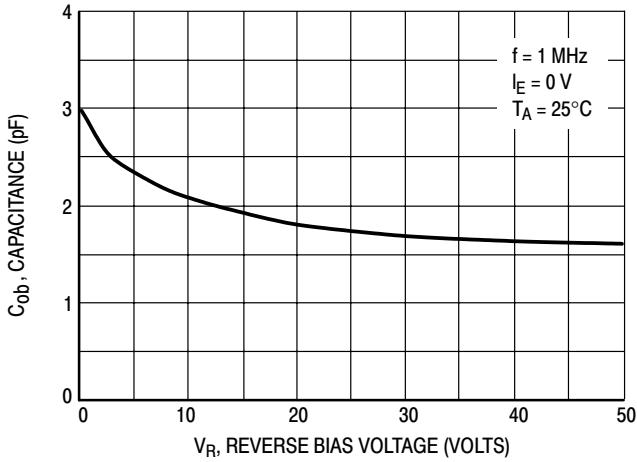


Figure 9. Output Capacitance

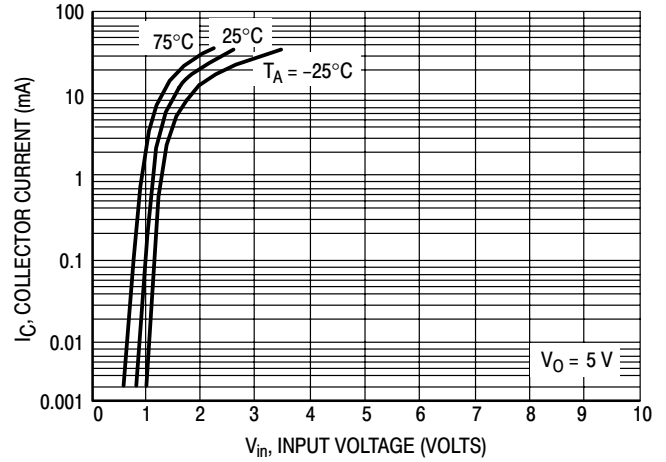


Figure 10. Output Current versus Input Voltage

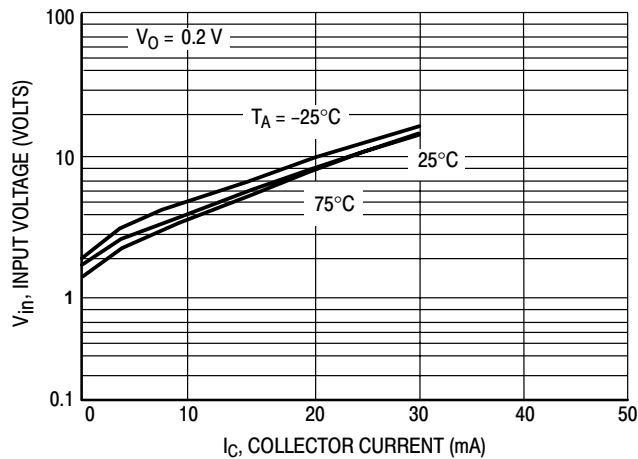


Figure 11. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5113DW1T1

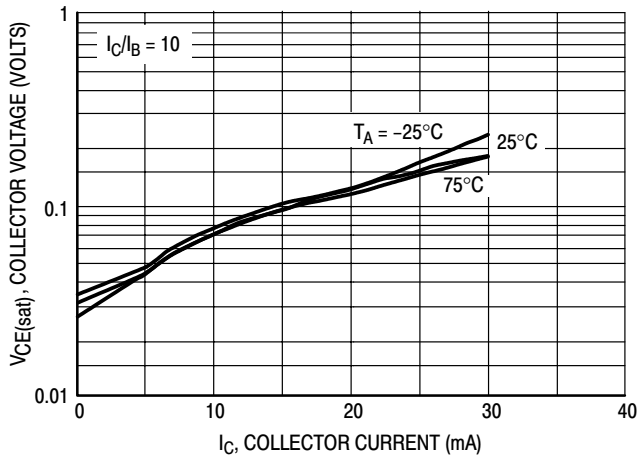


Figure 12.  $V_{CE(sat)}$  versus  $I_C$

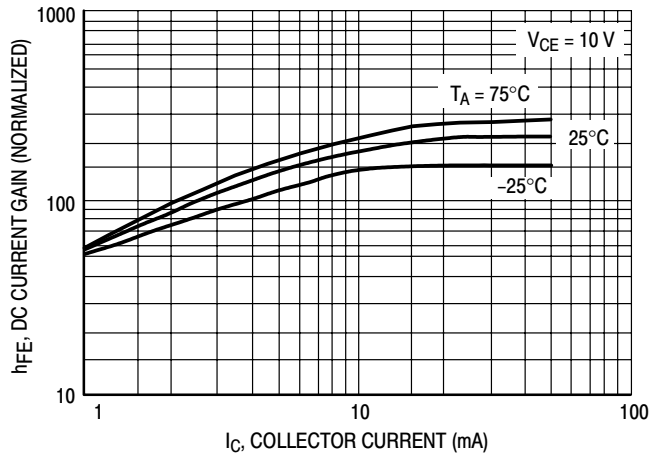


Figure 13. DC Current Gain

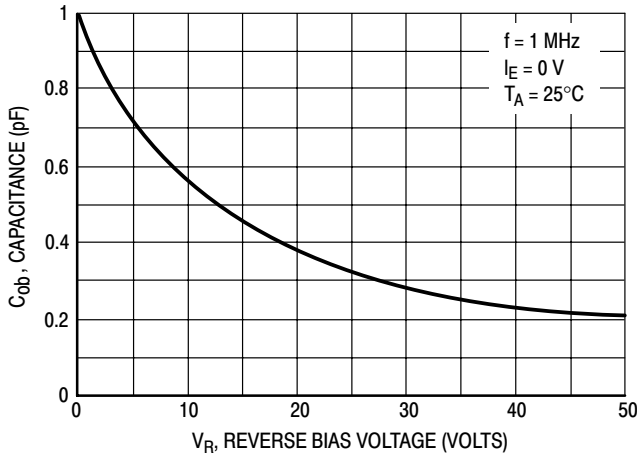


Figure 14. Output Capacitance

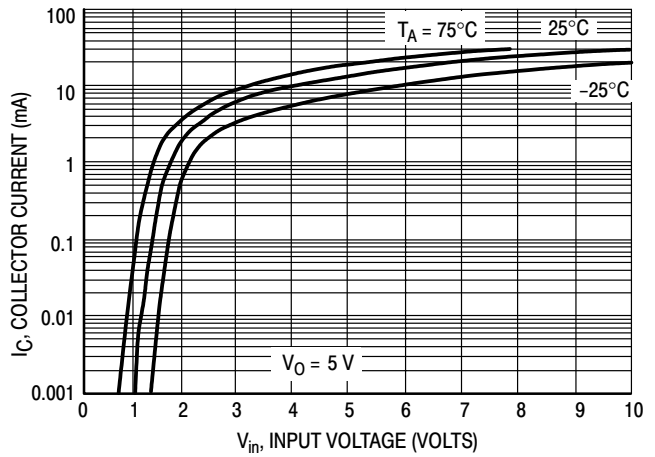


Figure 15. Output Current versus Input Voltage

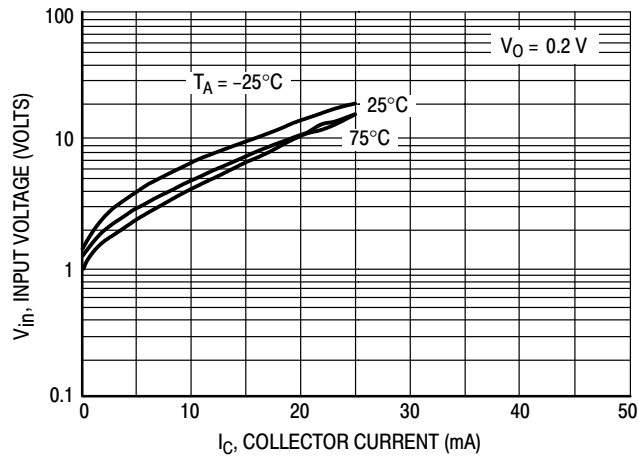


Figure 16. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5114DW1T1

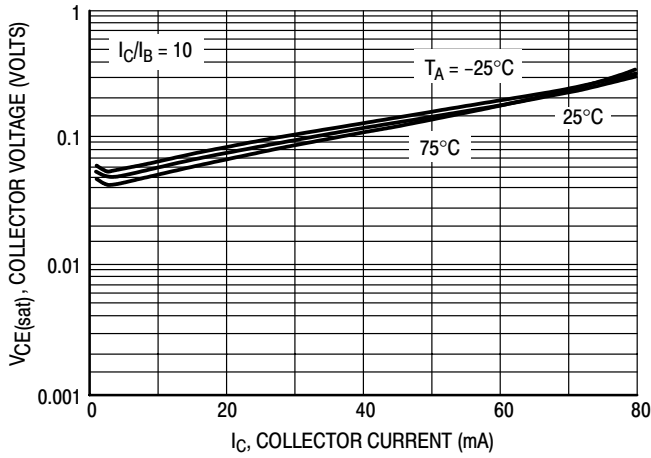


Figure 17.  $V_{CE(sat)}$  versus  $I_C$

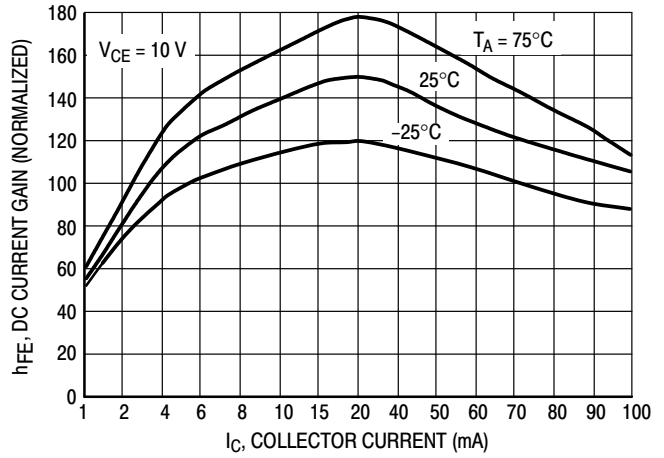


Figure 18. DC Current Gain

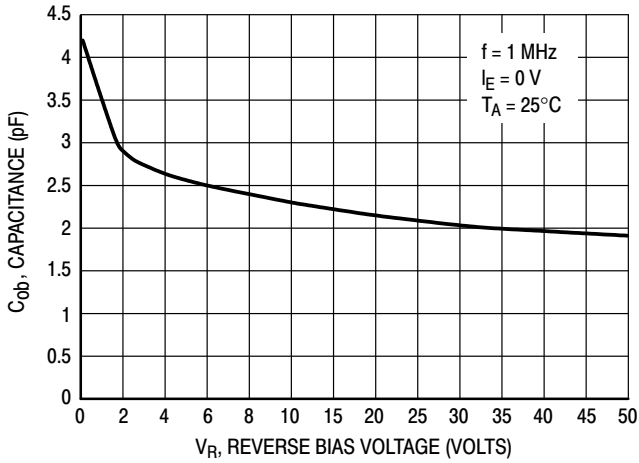


Figure 19. Output Capacitance

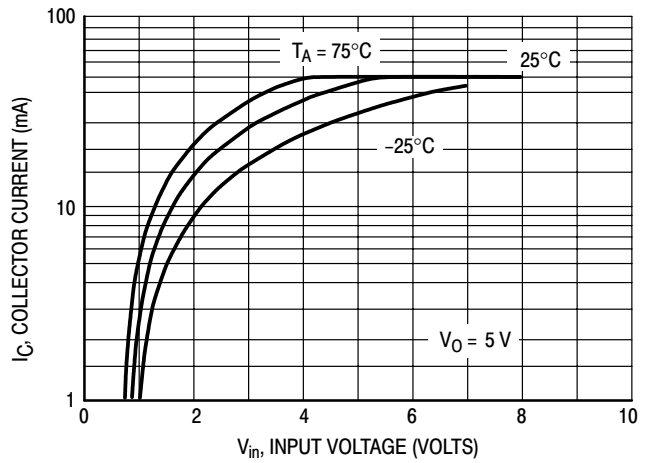


Figure 20. Output Current versus Input Voltage

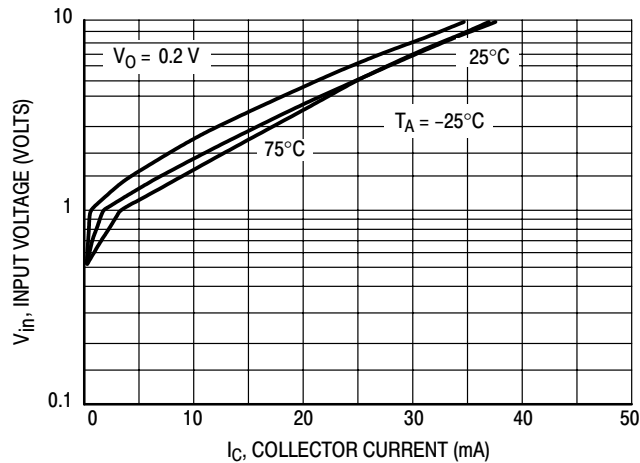


Figure 21. Input Voltage versus Output Current



# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5115DW1T1

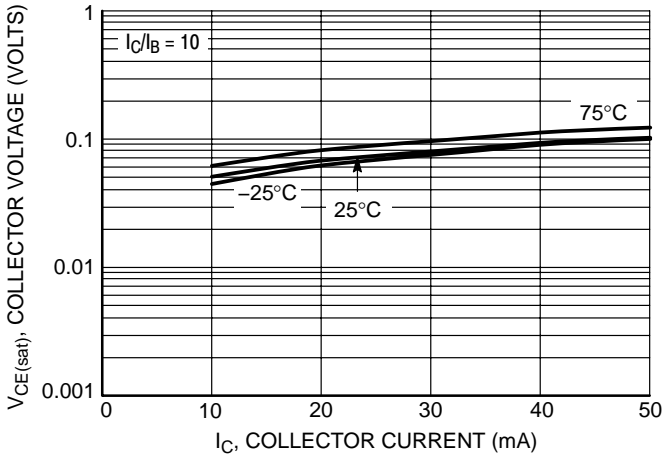


Figure 22.  $V_{CE(sat)}$  versus  $I_C$

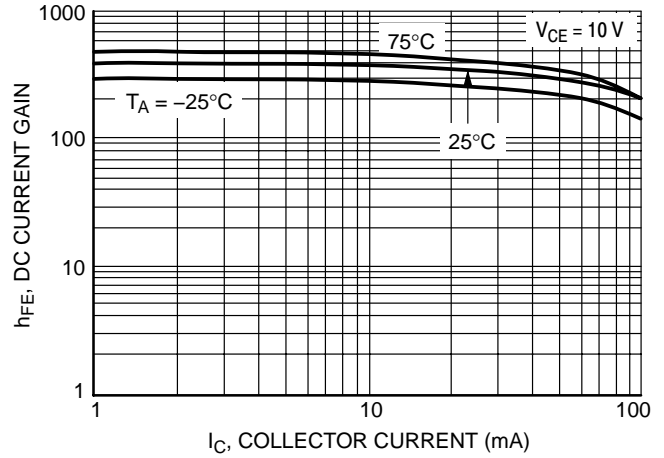


Figure 23. DC Current Gain

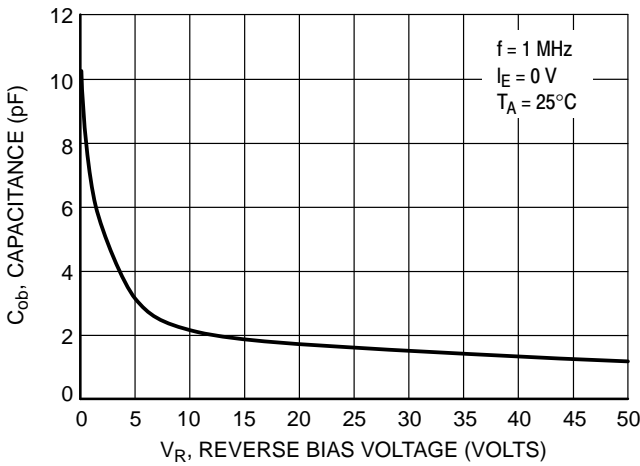


Figure 24. Output Capacitance

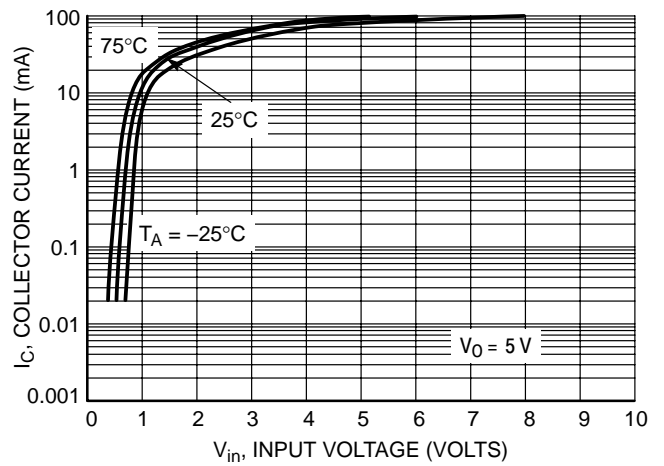


Figure 25. Output Current versus Input Voltage

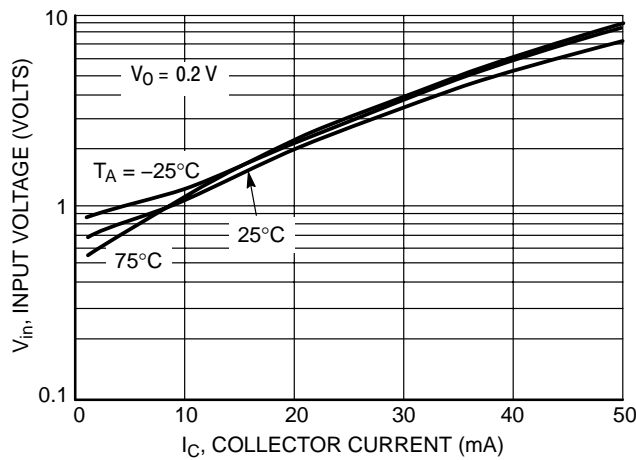


Figure 26. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5116DW1T1

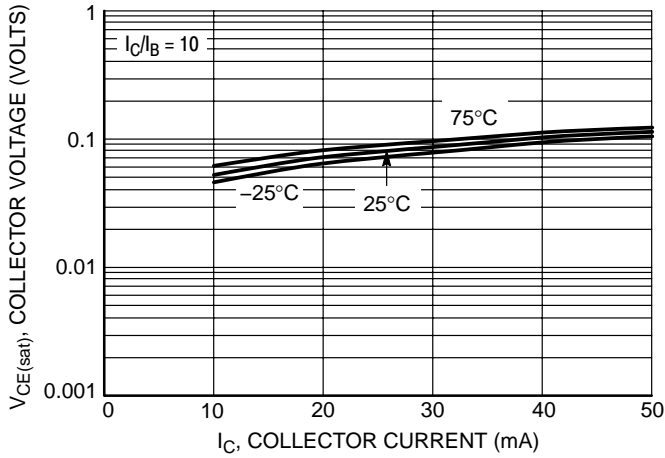


Figure 27.  $V_{CE(sat)}$  versus  $I_C$

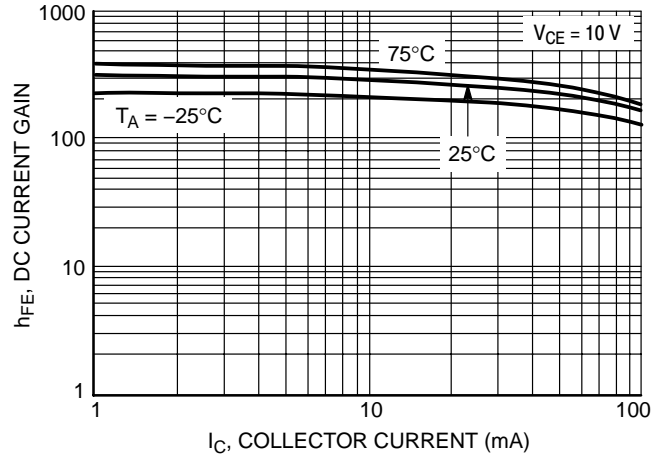


Figure 28. DC Current Gain

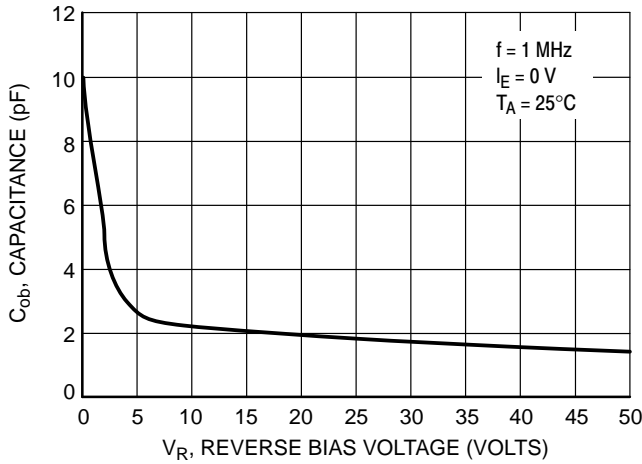


Figure 29. Output Capacitance

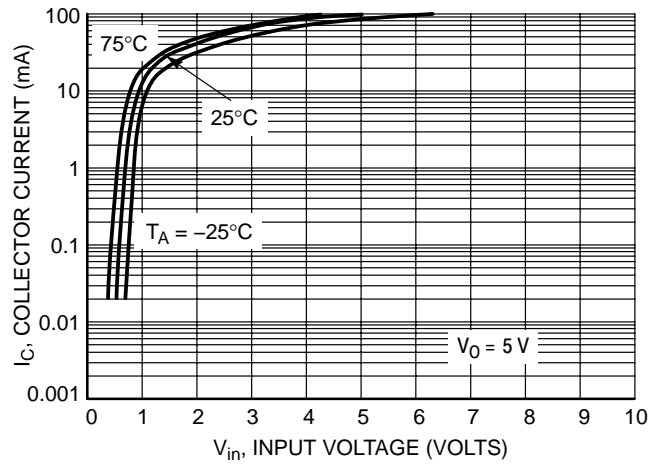


Figure 30. Output Current versus Input Voltage

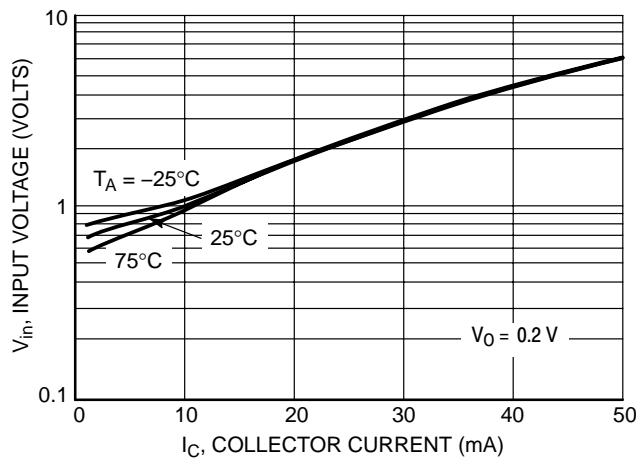


Figure 31. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5130DW1T1

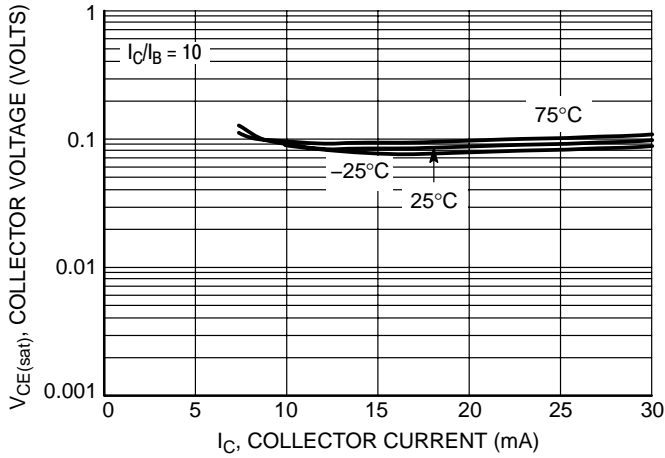


Figure 32.  $V_{CE(sat)}$  versus  $I_C$

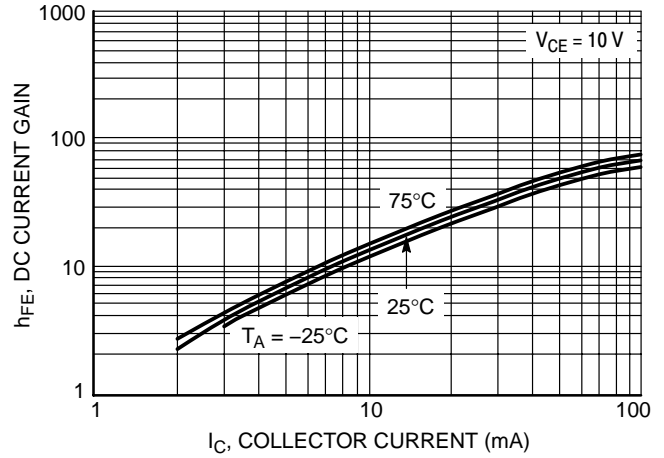


Figure 33. DC Current Gain

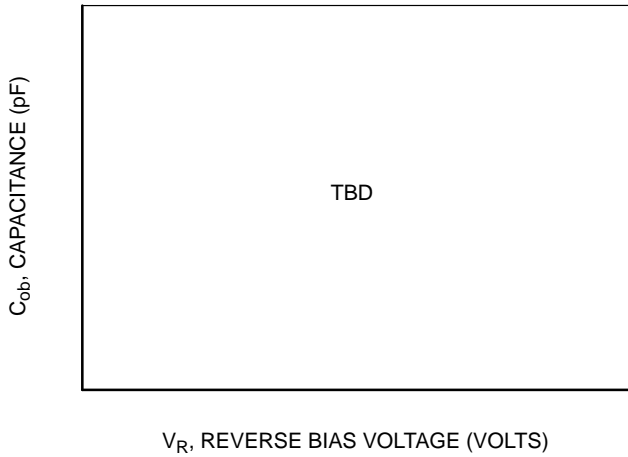


Figure 34. Output Capacitance

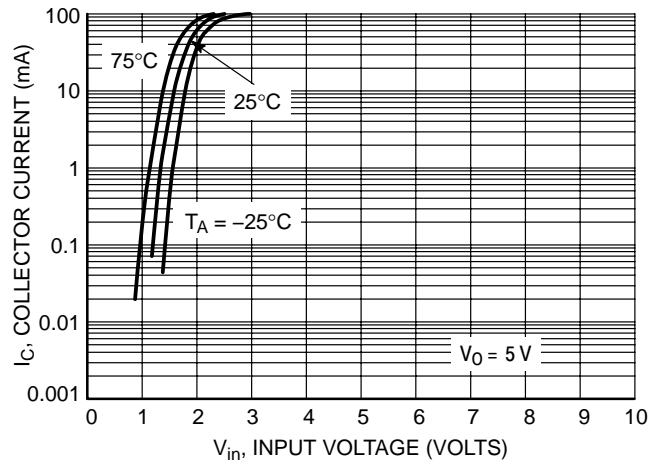


Figure 35. Output Current versus Input Voltage

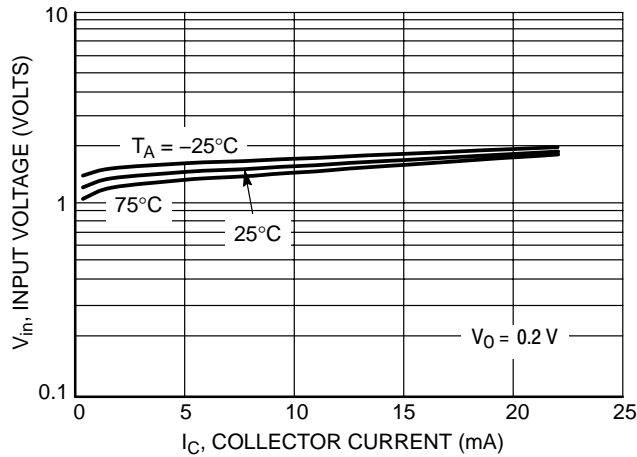


Figure 36. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5131DW1T1

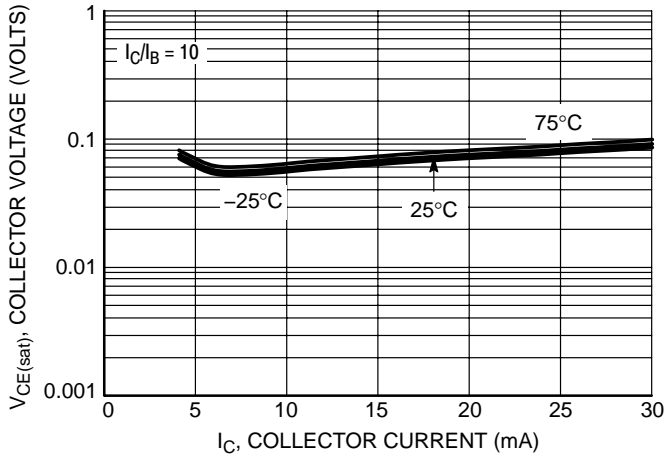


Figure 37.  $V_{CE(sat)}$  versus  $I_C$

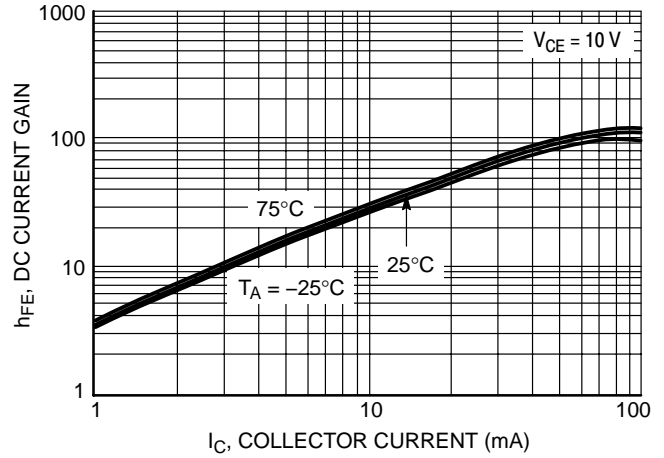


Figure 38. DC Current Gain

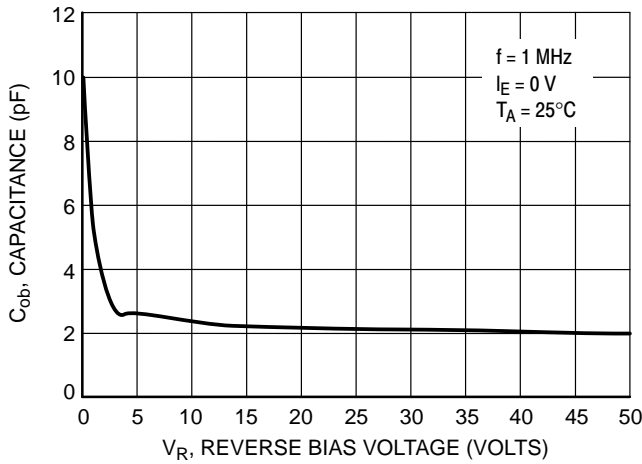


Figure 39. Output Capacitance

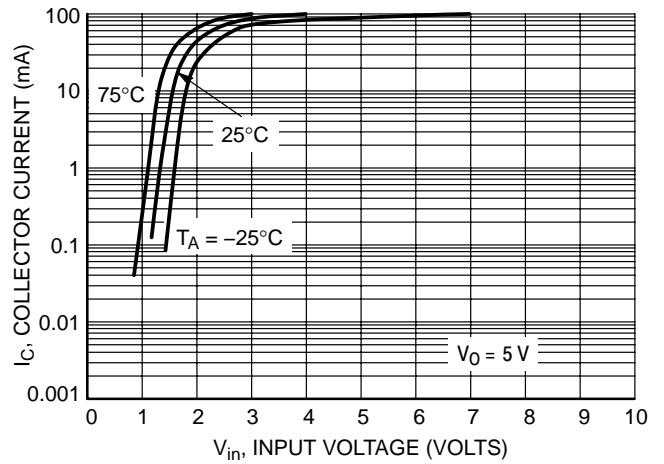


Figure 40. Output Current versus Input Voltage

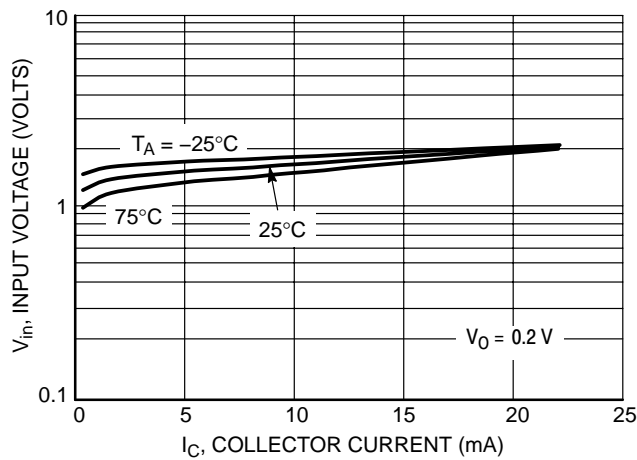


Figure 41. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5132DW1T1

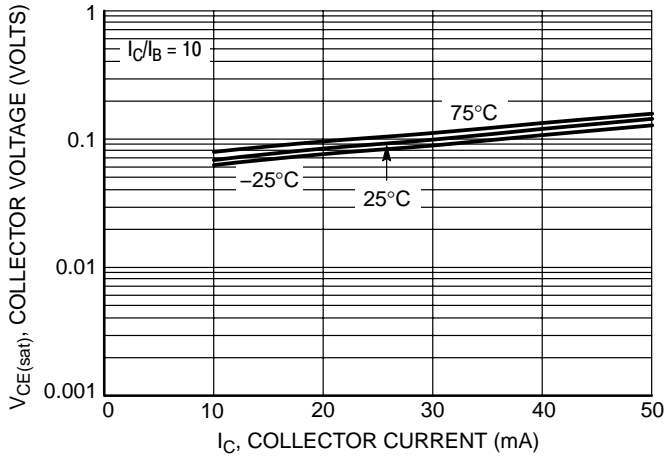


Figure 42.  $V_{CE(sat)}$  versus  $I_C$

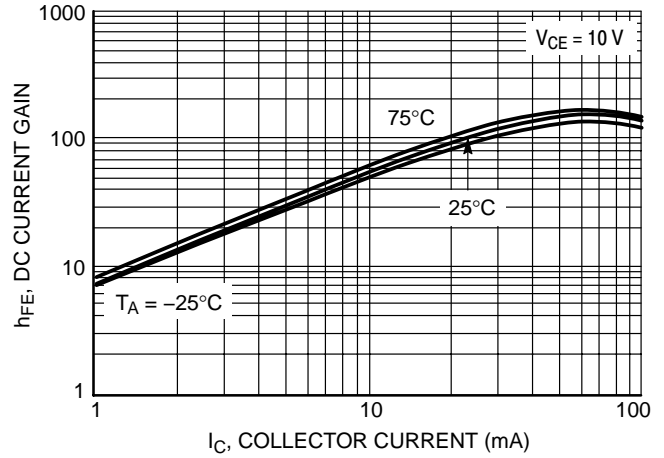


Figure 43. DC Current Gain

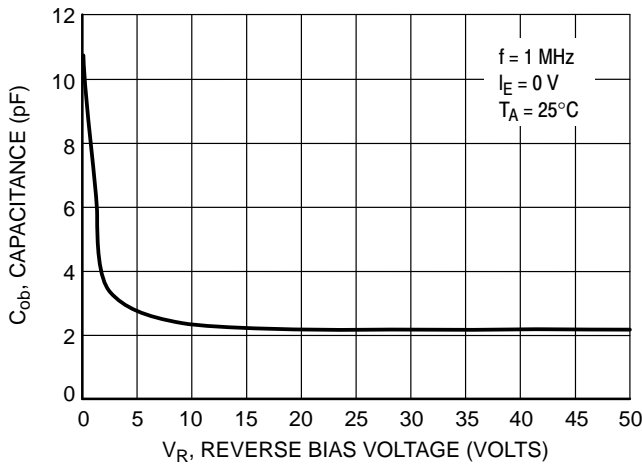


Figure 44. Output Capacitance

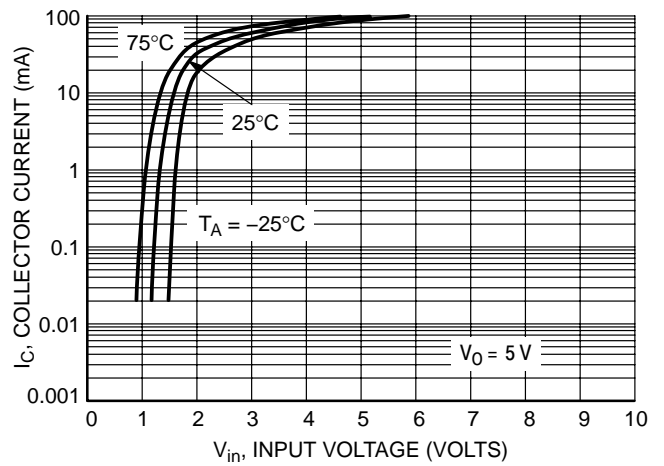


Figure 45. Output Current versus Input Voltage

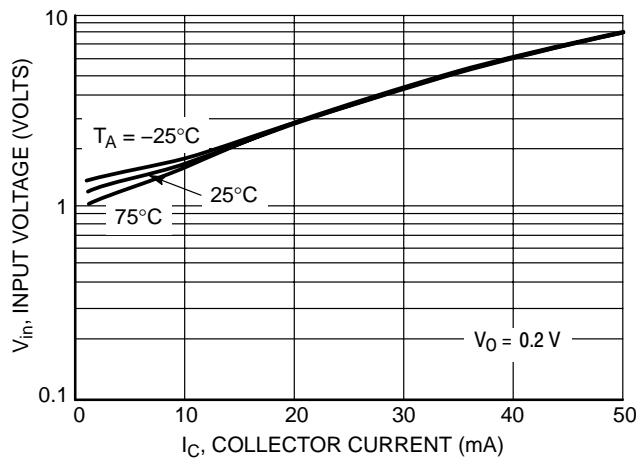


Figure 46. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5133DW1T1

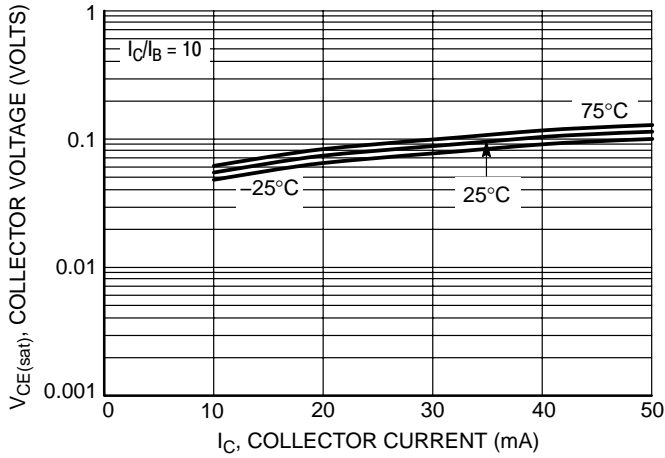


Figure 47.  $V_{CE(sat)}$  versus  $I_C$

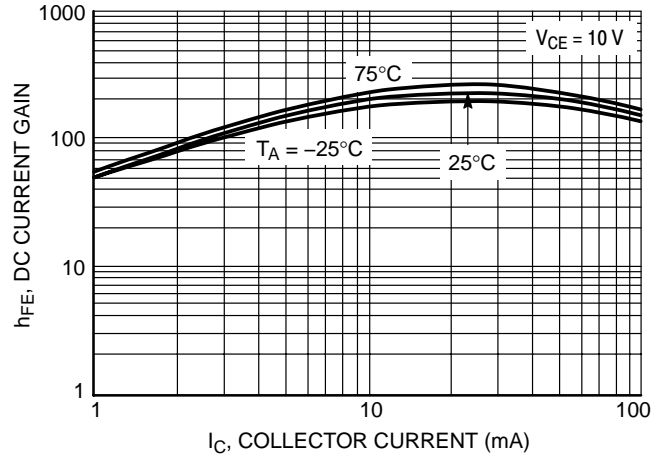


Figure 48. DC Current Gain

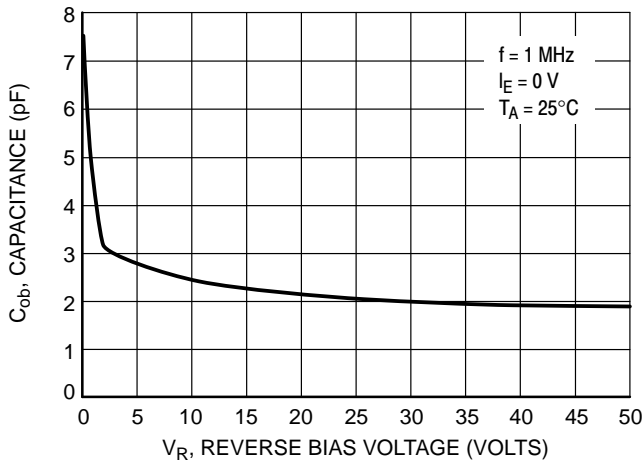


Figure 49. Output Capacitance

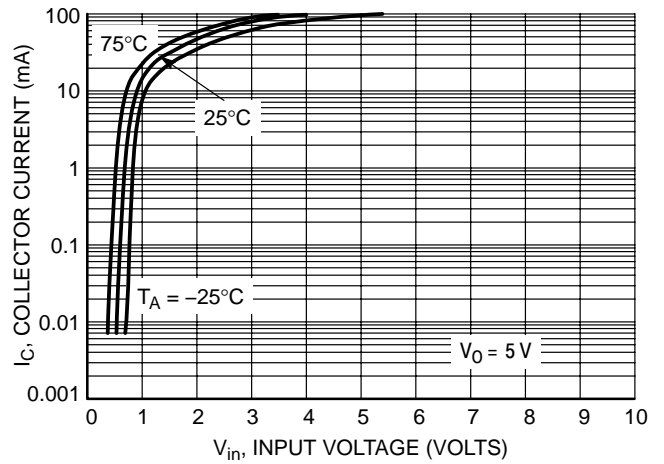


Figure 50. Output Current versus Input Voltage

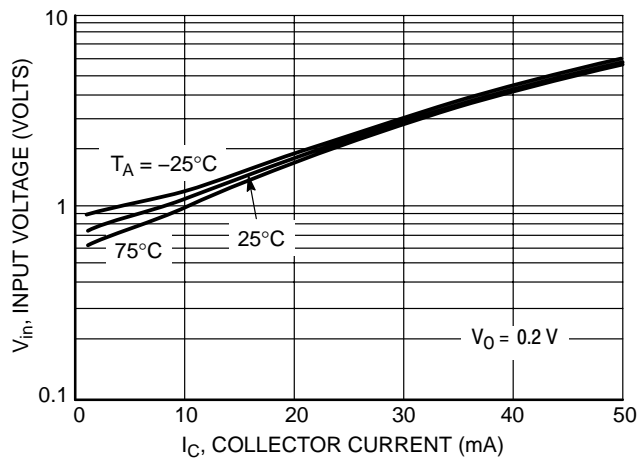


Figure 51. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5134DW1T1

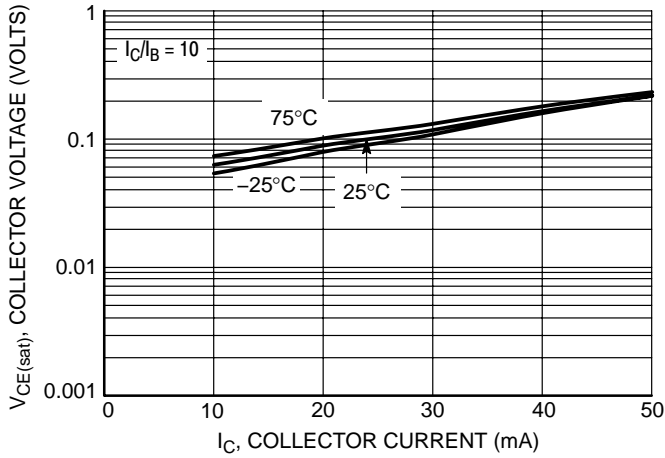


Figure 52.  $V_{CE(sat)}$  versus  $I_C$

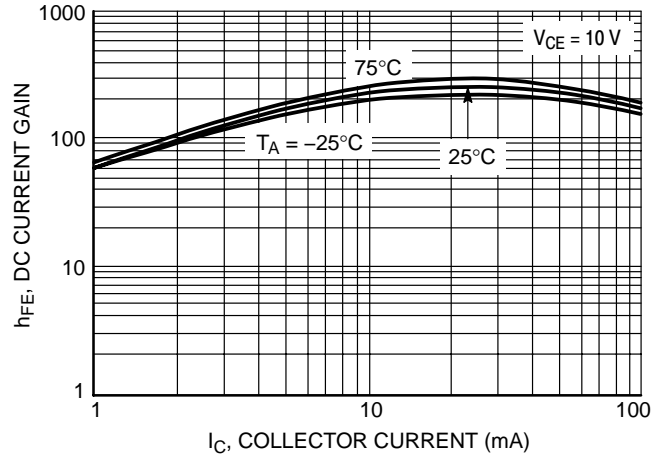


Figure 53. DC Current Gain

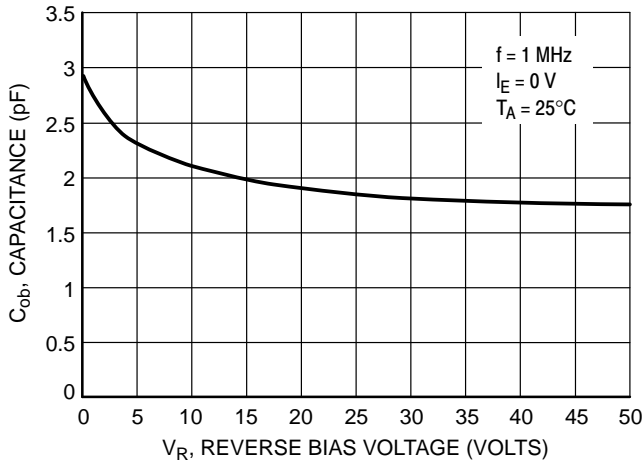


Figure 54. Output Capacitance

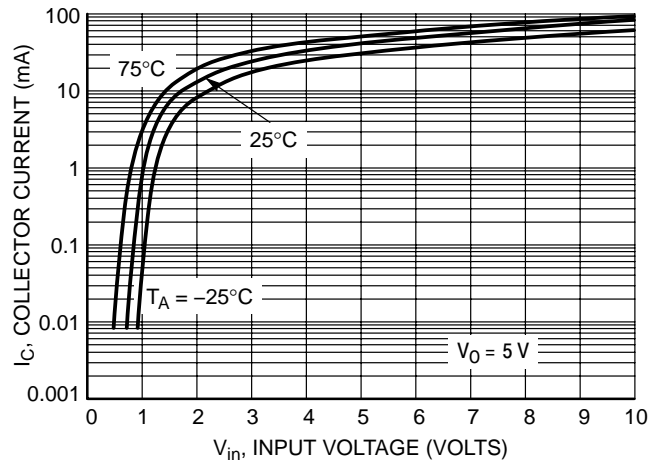


Figure 55. Output Current versus Input Voltage

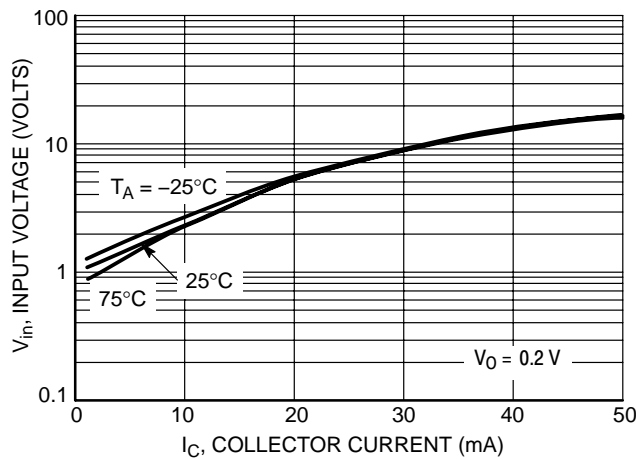


Figure 56. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5135DW1T1

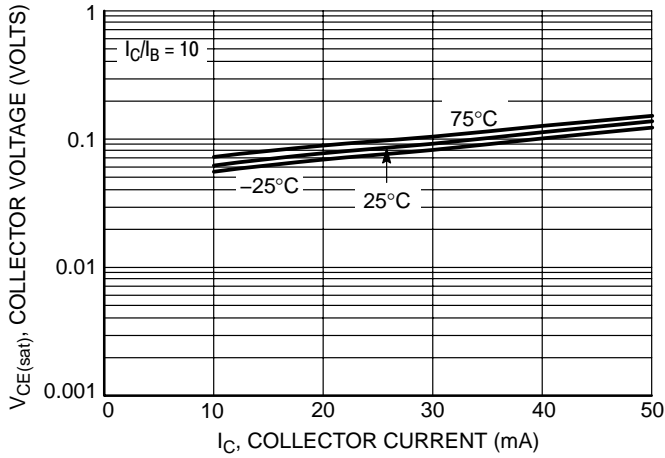


Figure 57.  $V_{CE(sat)}$  versus  $I_C$

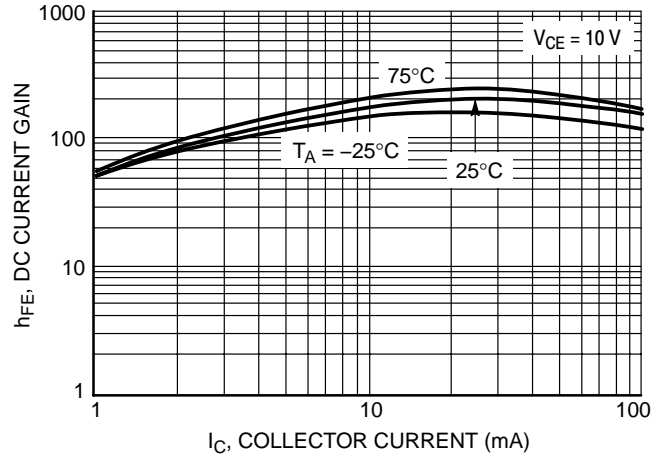


Figure 58. DC Current Gain

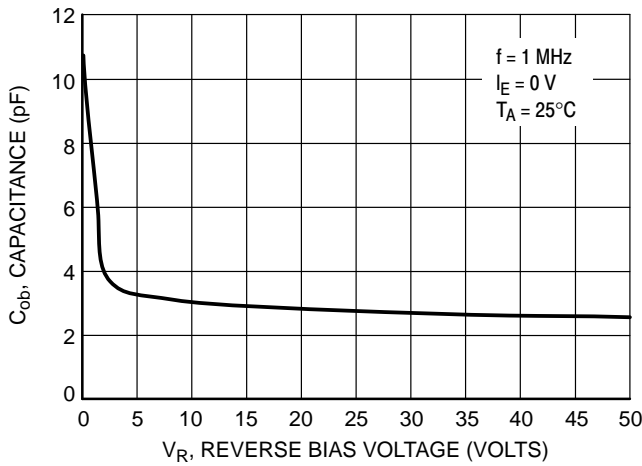


Figure 59. Output Capacitance

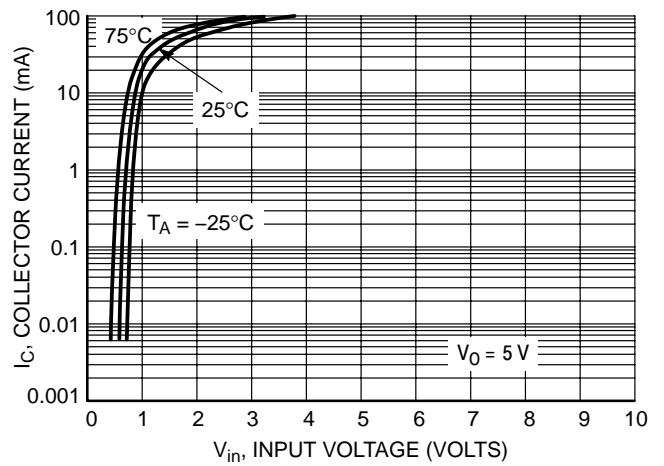


Figure 60. Output Current versus Input Voltage

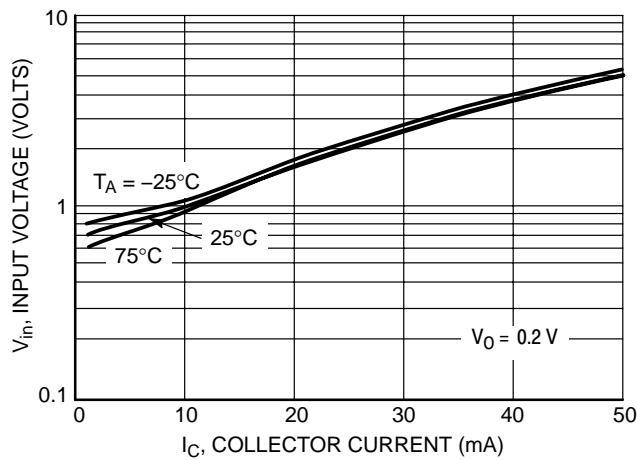


Figure 61. Input Voltage versus Output Current



# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5136DW1T1

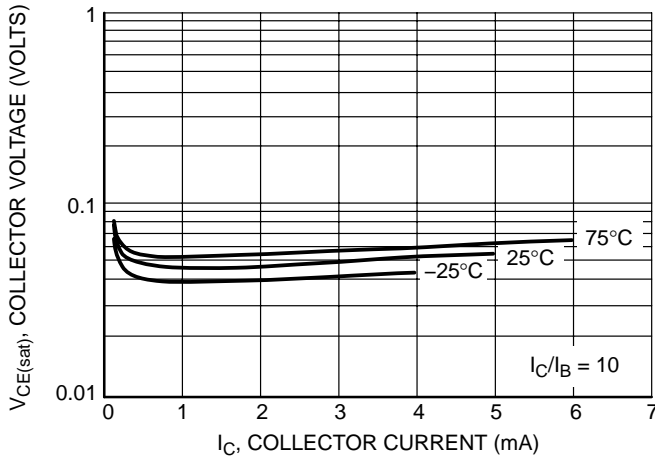


Figure 62.  $V_{CE(sat)}$  versus  $I_C$

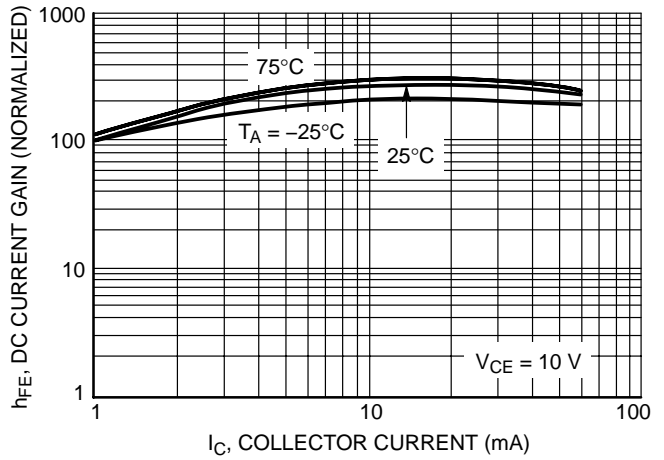


Figure 63. DC Current Gain

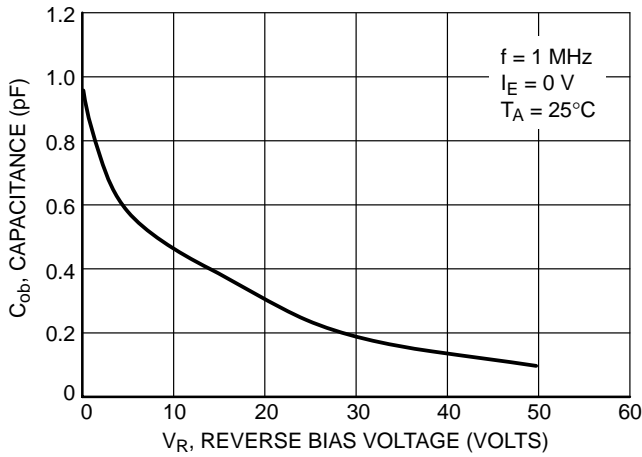


Figure 64. Output Capacitance

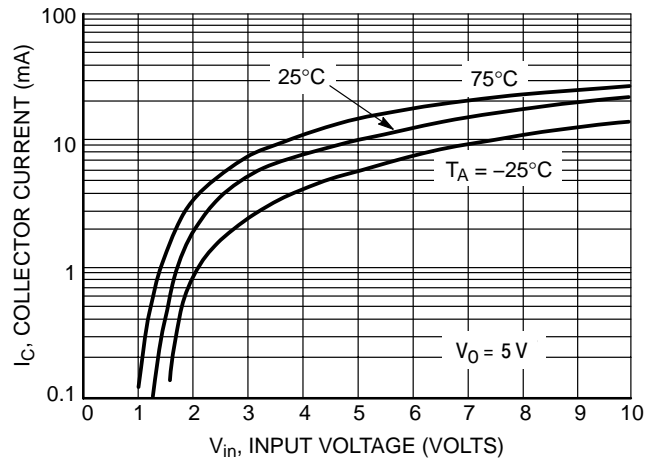


Figure 65. Output Current versus Input Voltage

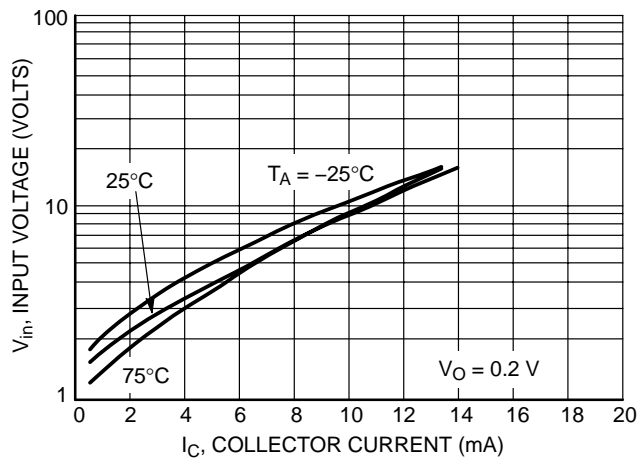


Figure 66. Input Voltage versus Output Current

# MUN5111DW1T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS — MUN5137DW1T1

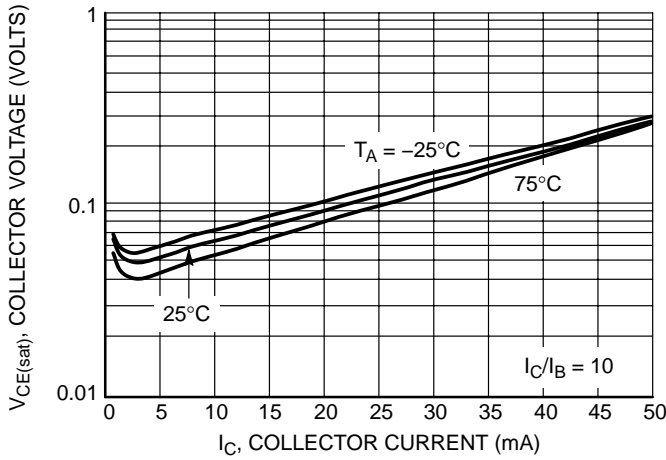


Figure 67.  $V_{CE(sat)}$  versus  $I_C$

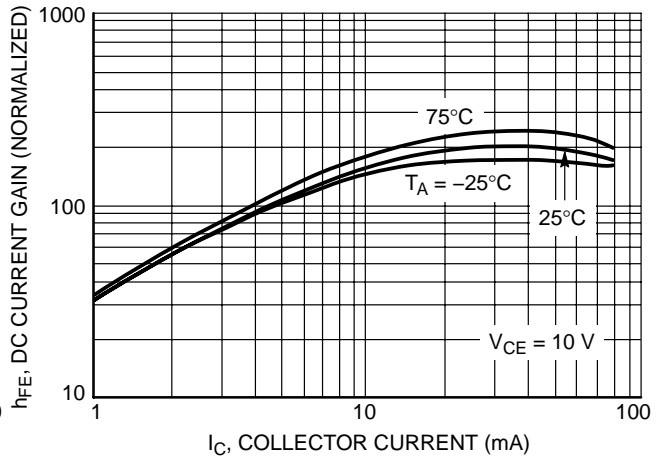


Figure 68. DC Current Gain

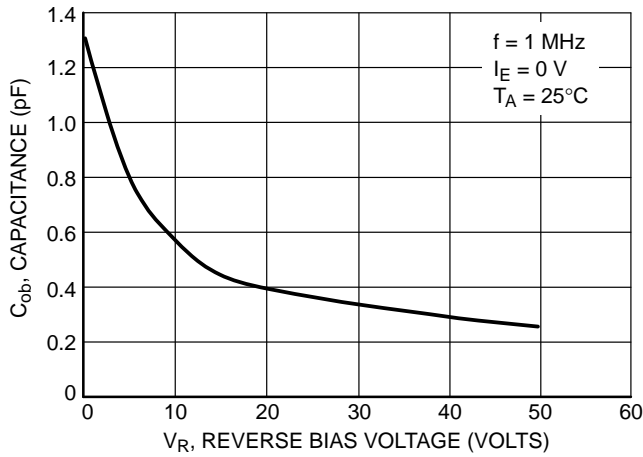


Figure 69. Output Capacitance

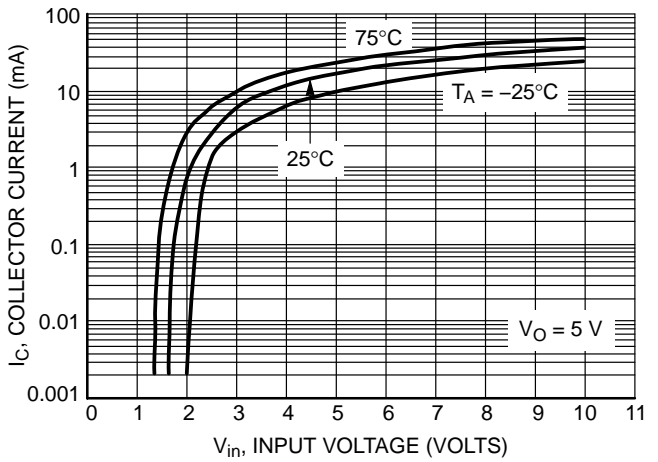


Figure 70. Output Current versus Input Voltage

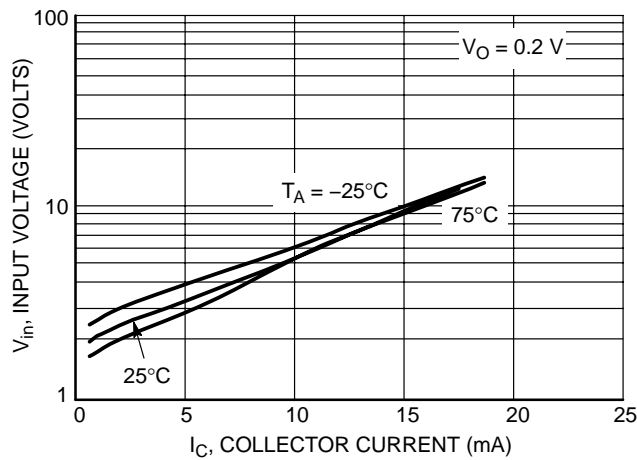
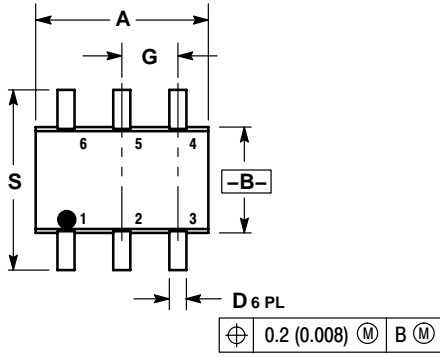


Figure 71. Input Voltage versus Output Current

# MUN5111DW1T1 Series

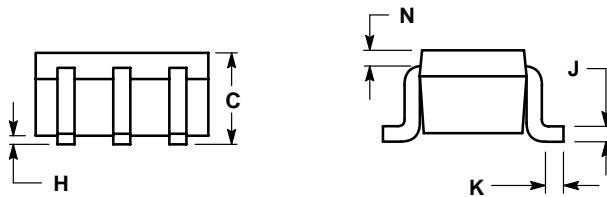
## PACKAGE DIMENSIONS

SC-88 (SOT-363)  
CASE 419B-02  
ISSUE T



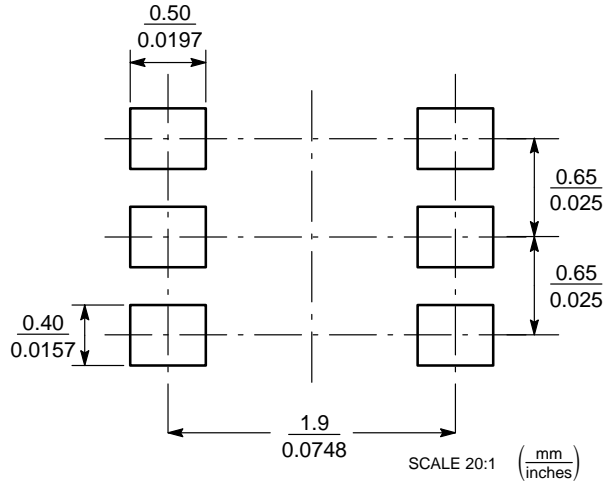
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

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



- STYLE 1:
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.

# MUN5111DW1T1 Series

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