

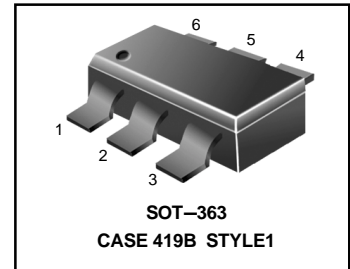
# Dual Bias Resistor Transistors

## 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.

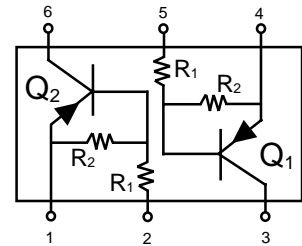
- . Simplifies Circuit Design
- . Reduces Board Space
- . Reduces Component Count
- . Available in 8 mm, 7 inch/3000 Unit Tape and Reel

### MUN5111DW1T1 Series



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

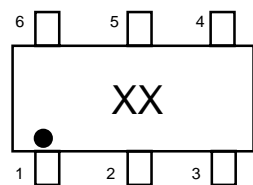
Rating	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-50	Vdc
Collector-Emitter Voltage	V <sub>CEO</sub>	-50	Vdc
Collector Current	I <sub>C</sub>	-100	mAdc



#### 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

MUN5111DW1T1 Series

DEVICE MARKING AND RESISTOR VALUES

Device	Package	Marking	R <sub>1</sub> (K)	R <sub>2</sub> (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 (Note 3.)	SOT-363	0E	10	–	3000/Tape & Reel
MUN5116DW1T1 (Note 3.)	SOT-363	0F	4.7	–	3000/Tape & Reel
MUN5130DW1T1 (Note 3.)	SOT-363	0G	1.0	1.0	3000/Tape & Reel
MUN5131DW1T1 (Note 3.)	SOT-363	0H	2.2	2.2	3000/Tape & Reel
MUN5132DW1T1 (Note 3.)	SOT-363	0J	4.7	4.7	3000/Tape & Reel
MUN5133DW1T1 (Note 3.)	SOT-363	0K	4.7	47	3000/Tape & Reel
MUN5134DW1T1 (Note 3.)	SOT-363	0L	22	47	3000/Tape & Reel
MUN5135DW1T1 (Note 3.)	SOT-363	0M	2.2	47	3000/Tape & Reel
MUN5136DW1T1 (Note 3.)	SOT-363	0N	100	100	3000/Tape & Reel
MUN5137DW1T1 (Note 3.)	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	I <sub>EBO</sub>	–	–	-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 4.) (I <sub>C</sub> = -2.0 mA, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	-50	–	–	Vdc	

ON CHARACTERISTICS (Note 4.)

Collector-Emitter Saturation Voltage (I <sub>C</sub> = -10mA, I <sub>E</sub> = -0.3 mA) (I <sub>C</sub> = -10mA, I <sub>B</sub> = -5mA) MUN5130DW1T1/MUN5131DW1T1 (I <sub>C</sub> = -10mA, I <sub>B</sub> = -1mA) MUN5115DW1T1/MUN5116DW1T1 MUN5132DW1T1/MUN5133DW1T1/MUN5134DW1T1	V <sub>CE(sat)</sub>	–	–	-0.25	Vdc
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3. New resistor combinations. Updated curves to follow in subsequent data sheets.

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

**MUN5111DW1T1 Series**

**ELECTRICAL CHARACTERISTICS**

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

Characteristic	Symbol	Min	Typ	Max	Unit		
<b>ON CHARACTERISTICS</b> (Note 5.)							
DC Current Gain (V <sub>CE</sub> = -10 V, I <sub>C</sub> = -5.0 mA)	MUN5111DW1T1	h <sub>FE</sub>	35	60	-		
	MUN5112DW1T1		60	100	-		
	MUN5113DW1T1		80	140	-		
	MUN5114DW1T1		80	140	-		
	MUN5115DW1T1		160	250	-		
	MUN5116DW1T1		160	250	-		
	MUN5130DW1T1		3.0	5.0	-		
	MUN5131DW1T1		8.0	15	-		
	MUN5132DW1T1		15	27	-		
	MUN5133DW1T1		80	140	-		
	MUN5134DW1T1		80	130	-		
	MUN5135DW1T1		80	140	-		
	MUN5135DW1T1		80	130	-		
	MUN5135DW1T1		80	140	-		
Output Voltage (on) (V <sub>CC</sub> = -5.0 V, V <sub>B</sub> = -2.5 V, R <sub>L</sub> = 1.0 kΩ)	MUN5111DW1T1	V <sub>OL</sub>	-	-	-0.2	Vdc	
	MUN5112DW1T1		-	-	-0.2		
	MUN5114DW1T1		-	-	-0.2		
	MUN5115DW1T1		-	-	-0.2		
	MUN5116DW1T1		-	-	-0.2		
	MUN5130DW1T1		-	-	-0.2		
	MUN5131DW1T1		-	-	-0.2		
	MUN5132DW1T1		-	-	-0.2		
	MUN5133DW1T1		-	-	-0.2		
	MUN5134DW1T1		-	-	-0.2		
	MUN5135DW1T1		-	-	-0.2		
	(V <sub>CC</sub> = -5.0 V, V <sub>B</sub> = -3.5 V, R <sub>L</sub> = 1.0 kΩ)	MUN5113DW1T1		-	-	-0.2	
	(V <sub>CC</sub> = -5.0 V, V <sub>B</sub> = -5.5 V, R <sub>L</sub> = 1.0 kΩ)	MUN5136DW1T1		-	-	-0.2	
(V <sub>CC</sub> = -5.0 V, V <sub>B</sub> = -4.0 V, R <sub>L</sub> = 1.0 kΩ)	MUN5137DW1T1		-	-	-0.2		
Output Voltage (off) (V <sub>CC</sub> = -5.0 V, V <sub>B</sub> = -0.5 V, R <sub>L</sub> = 1.0 kΩ)	MUN5130DW1T1	V <sub>OH</sub>	-4.9	-	-	Vdc	
	MUN5115DW1T1						
	MUN5116DW1T1						
	MUN5131DW1T1						
	MUN5133DW1T1						

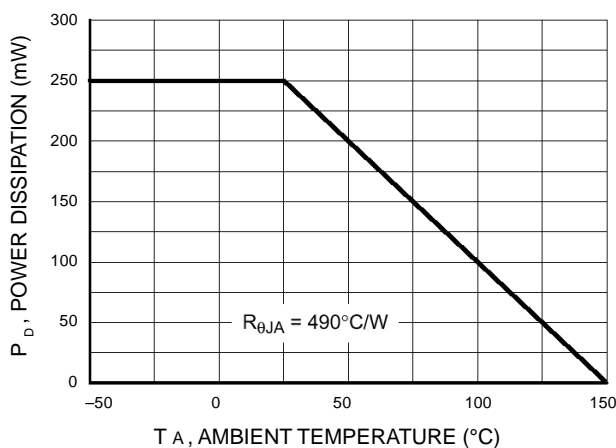
**MUN5111DW1T1 Series**

**ELECTRICAL CHARACTERISTICS**

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

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>ON CHARACTERISTICS</b> (Note 5.)						
Input Resistor	MUN5111DW1T1	R <sub>1</sub>	7.0	10	13	kΩ
	MUN5112DW1T1		15.4	22	28.6	
	MUN5113DW1T1		32.9	47	61.1	
	MUN5114DW1T1		7.0	10	13	
	MUN5115DW1T1		7.0	10	13	
	MUN5116DW1T1		3.3	4.7	6.1	
	MUN5130DW1T1		0.7	1.0	1.3	
	MUN5131DW1T1		1.5	2.2	2.9	
	MUN5132DW1T1		3.3	4.7	6.1	
	MUN5133DW1T1		3.3	4.7	6.1	
	MUN5134DW1T1		15.4	22	28.6	
	MUN5135DW1T1		1.54	2.2	2.86	
	MUN5136DW1T1		70	100	130	
	MUN5137DW1T1		32.9	47	61.1	
Resistor Ratio	MUN5111DW1T1/MUN5112DW1T1/ MUN5113DW1T1/MUN5136DW1T1	R <sub>1</sub> /R <sub>2</sub>	0.8	1.0	1.2	
	MUN5114DW1T1		0.17	0.21	0.25	
	MUN5115DW1T1/MUN5116DW1T1		—	—	—	
	MUN5130DW1T1/MUN5131DW1T1/MUN5132DW1T1		0.8	1.0	1.2	
	MUN5133DW1T1		0.055	0.1	0.185	
	MUN5134DW1T1		0.38	0.47	0.56	
	MUN5135DW1T1		0.038	0.047	0.056	
	MUN5137DW1T1		1.7	2.1	2.6	

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



**Figure 1. Derating Curve**

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5111DW1T1

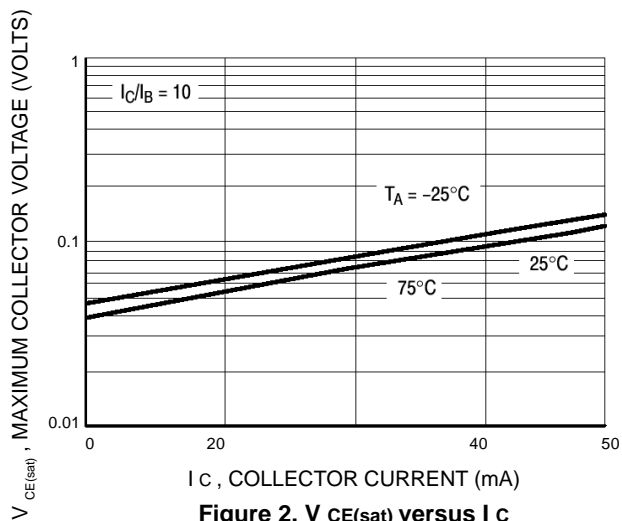


Figure 2.  $V_{CE(sat)}$  versus  $I_C$

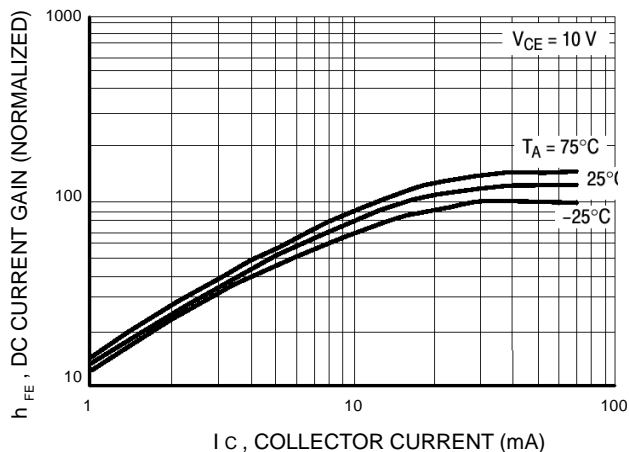


Figure 3. DC Current Gain

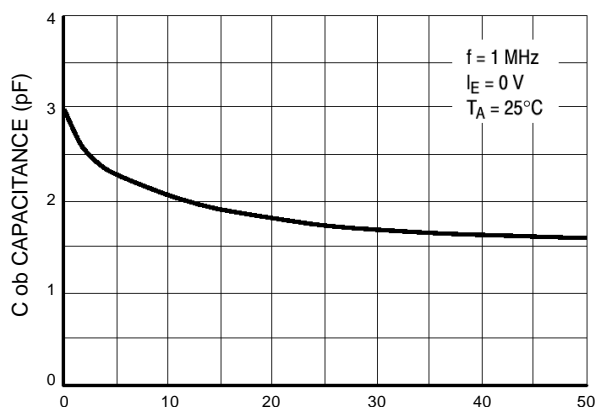


Figure 4. Output Capacitance

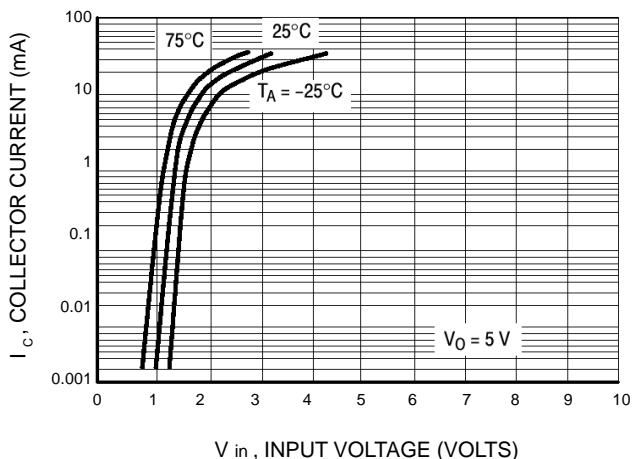


Figure 5. Output Current versus Input Voltage

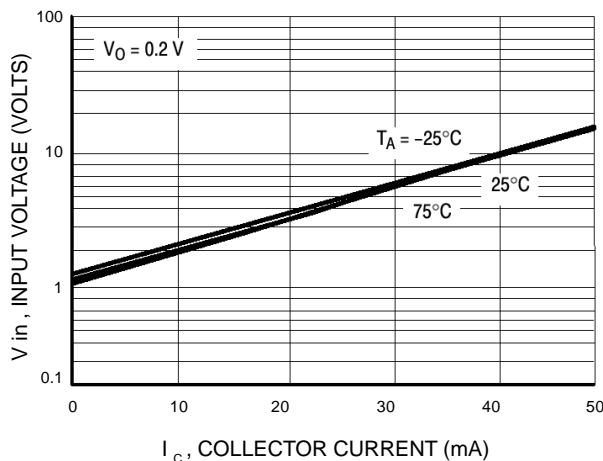


Figure 6. Input Voltage versus Output Current

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5112DW1T1

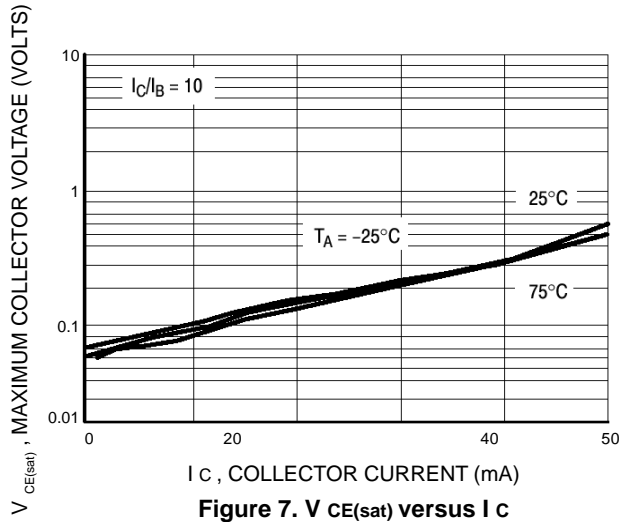


Figure 7.  $V_{CE(sat)}$  versus  $I_c$

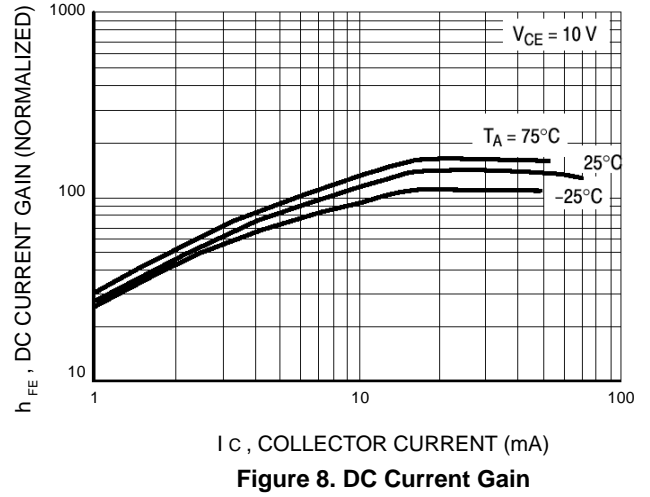


Figure 8. DC Current Gain

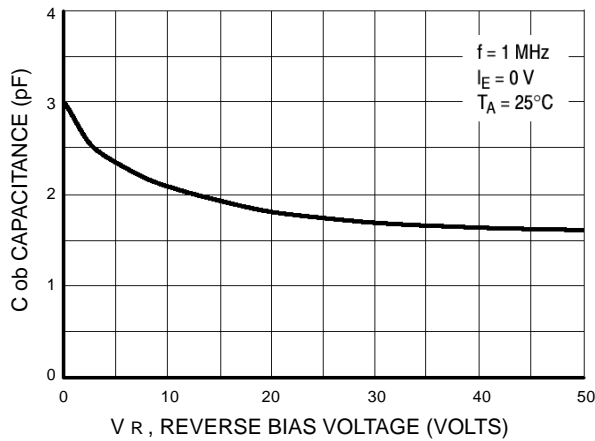


Figure 9. Output Capacitance

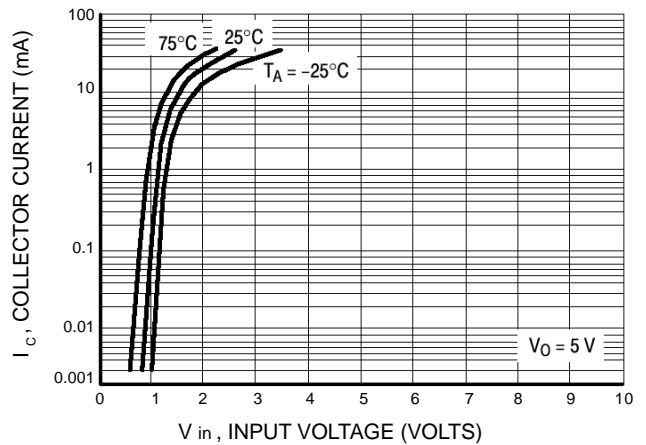


Figure 10. Output Current versus Input voltage

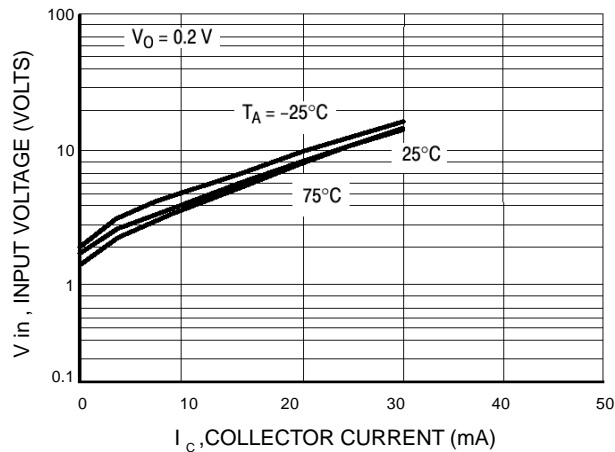


Figure 11. Input Voltage versus Output Current

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5113DW1T1

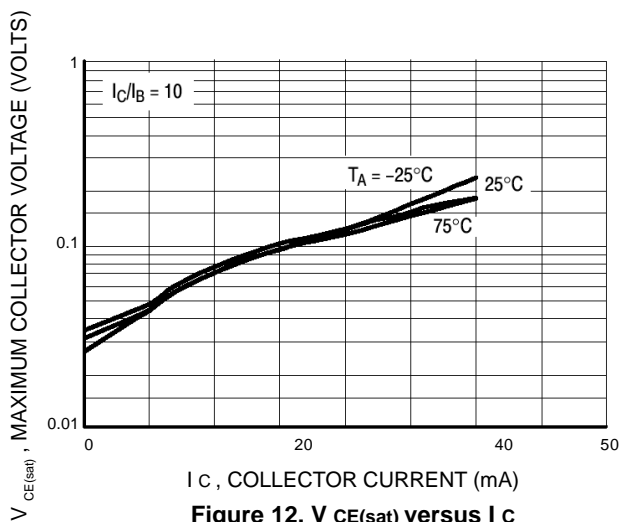


Figure 12.  $V_{CE(sat)}$  versus  $I_C$

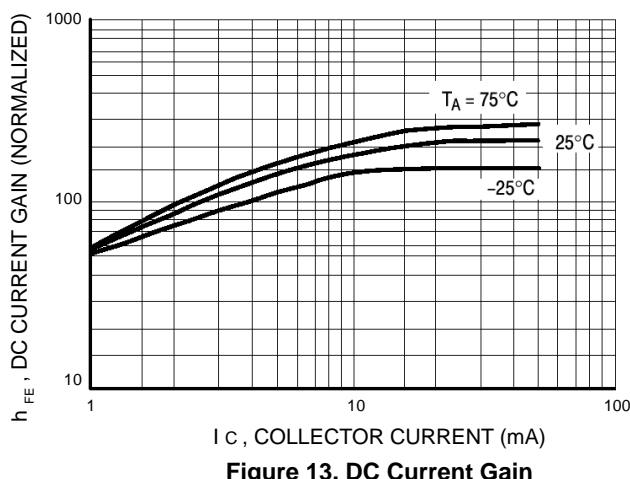


Figure 13. DC Current Gain

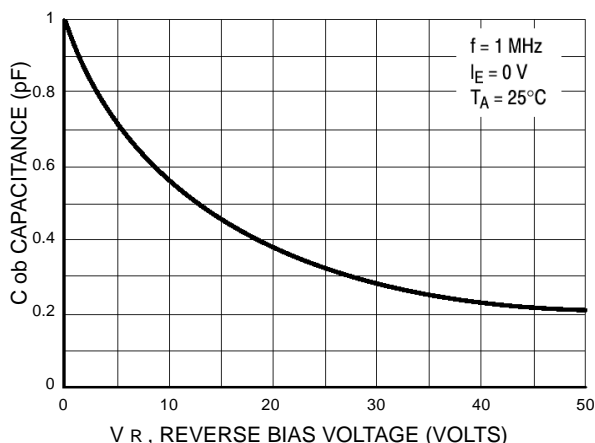


Figure 14. Output Capacitance

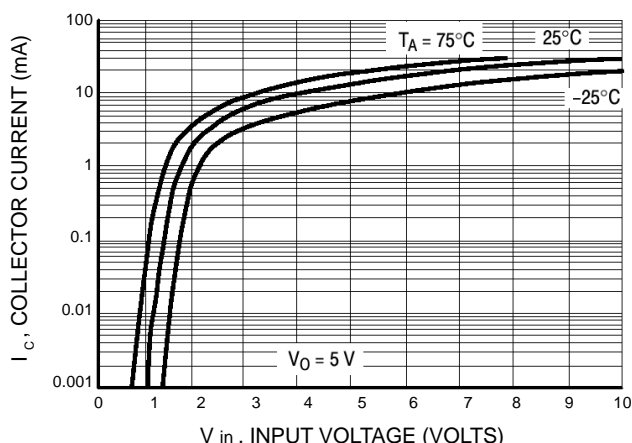


Figure 15. Output Current versus Input Voltage

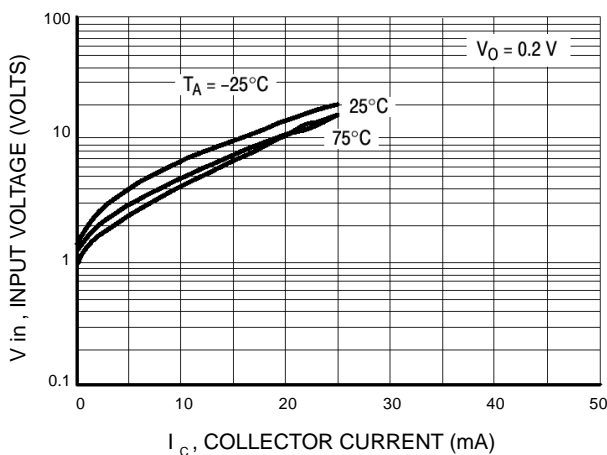
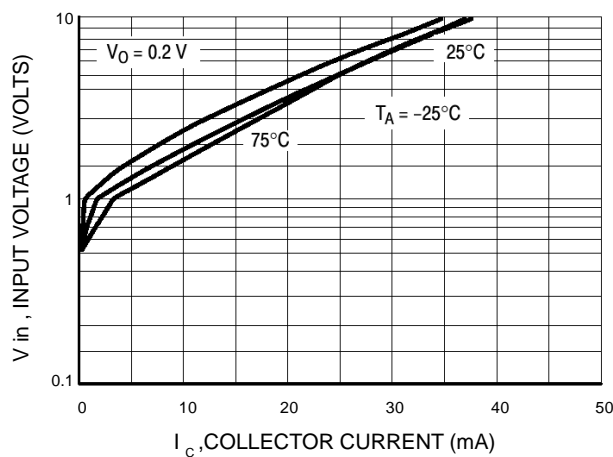
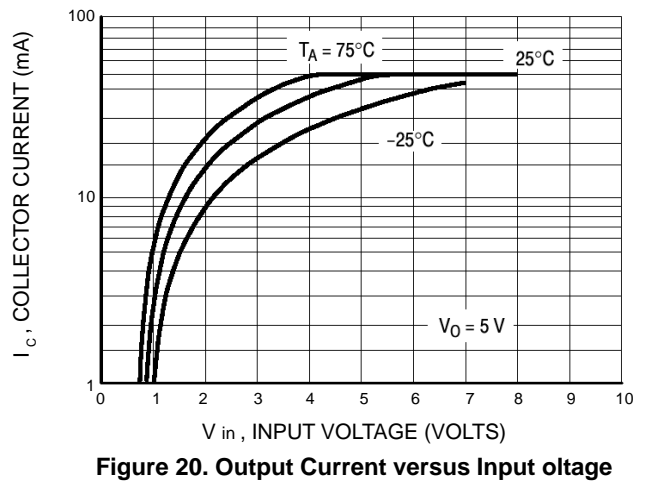
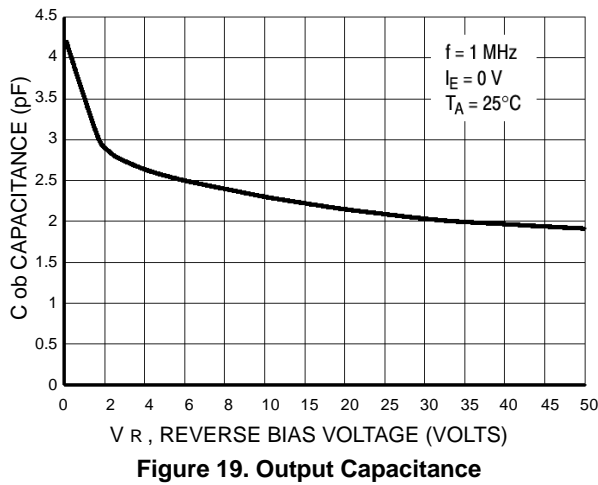
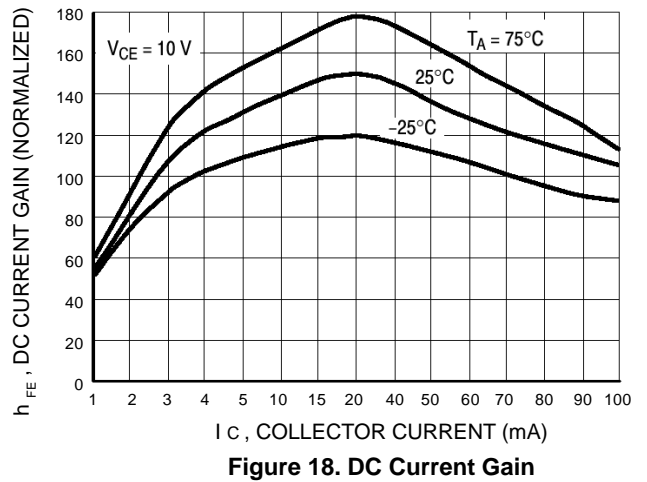
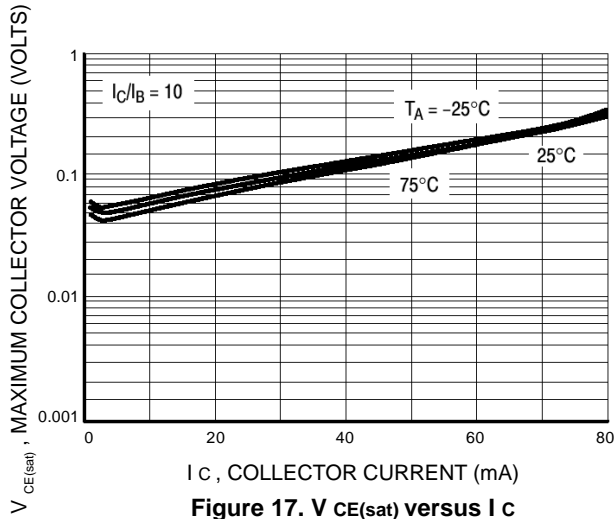


Figure 16. Input Voltage versus Output Current

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5114DW1T1





MUN5311DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5115DW1T1

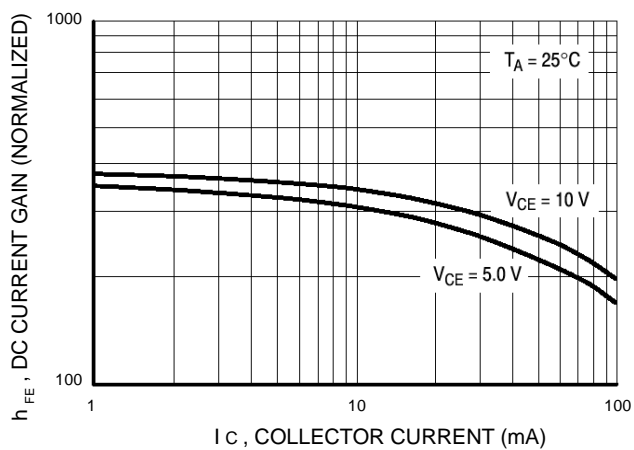


Figure 22. DC Current Gain

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5116DW1T1

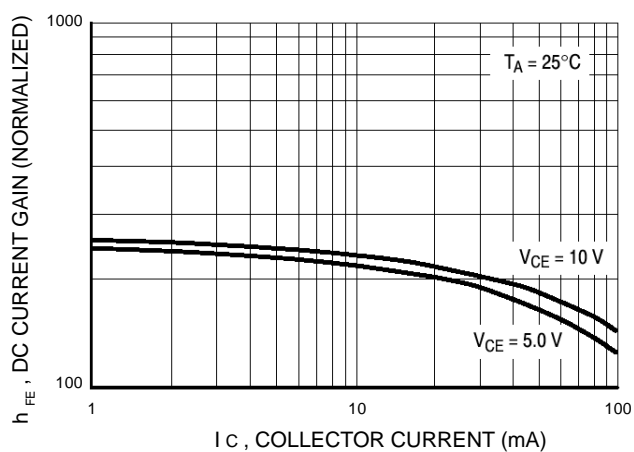


Figure 23. DC Current Gain

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5136DW1T1

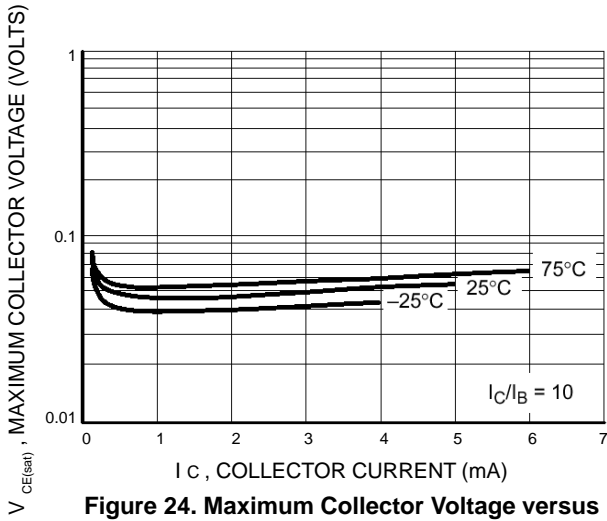


Figure 24. Maximum Collector Voltage versus Collector Current

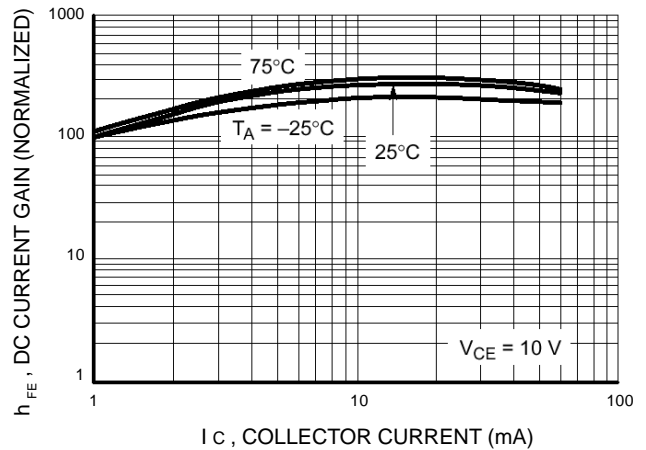


Figure 25. DC Current Gain

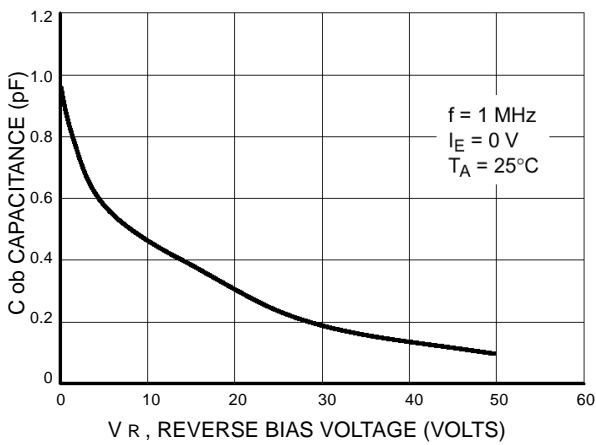


Figure 26. Output Capacitance

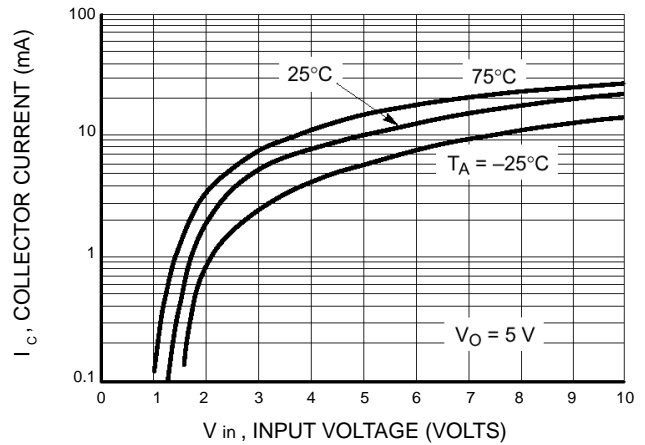


Figure 27. Output Current versus Input Voltage

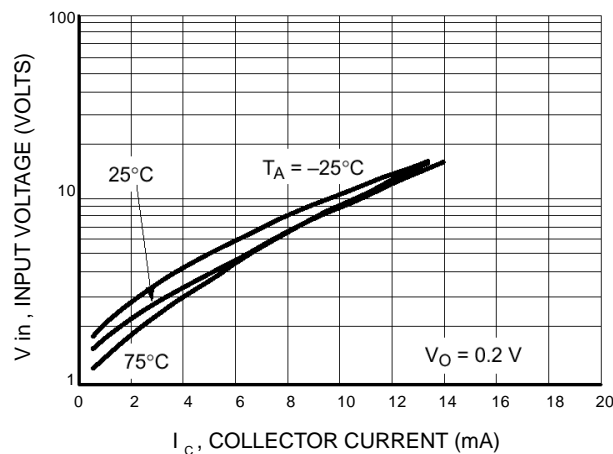


Figure 28. Input Voltage versus Output Current

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5137DW1T1

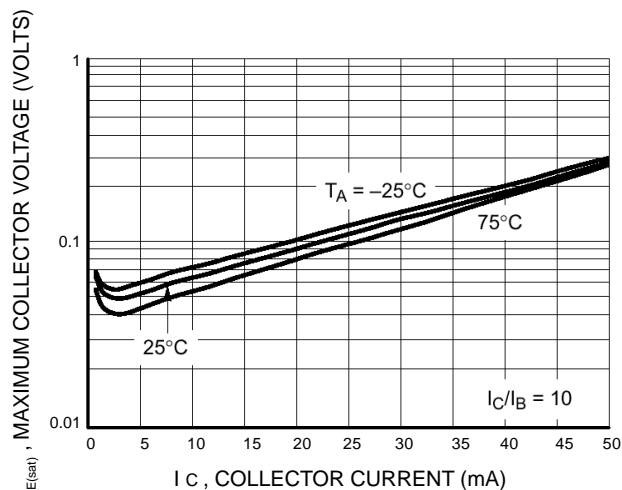


Figure 29. Maximum Collector Voltage versus Collector Current

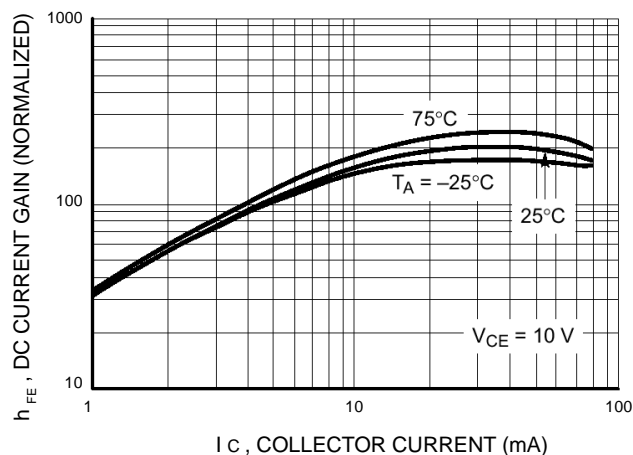


Figure 30. DC Current Gain

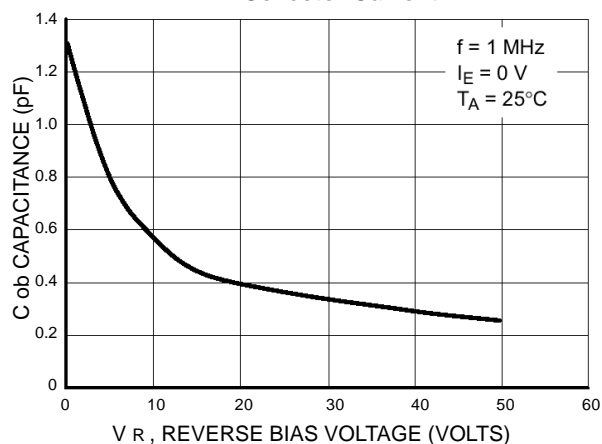


Figure 31. Output Capacitance

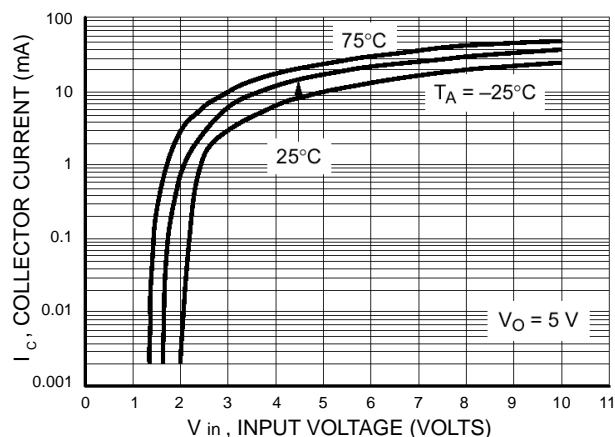


Figure 32. Output Current versus Input Voltage

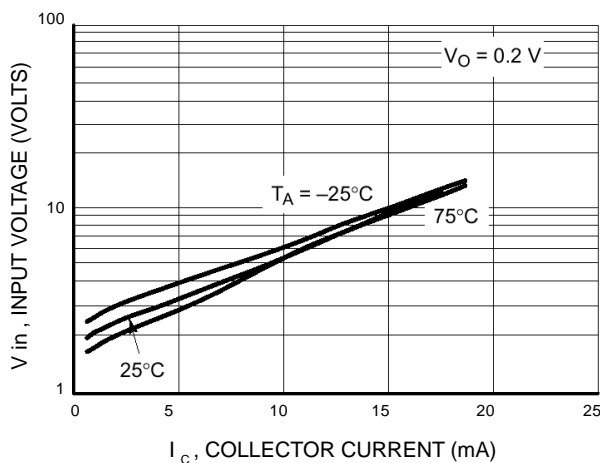


Figure 33. Input Voltage versus Output Current