

Dual Bias Resistor Transistors

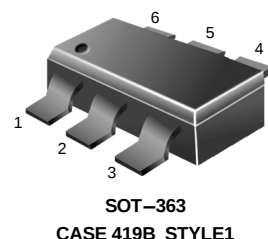
PNP Silicon Surface Mount Transistors

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.

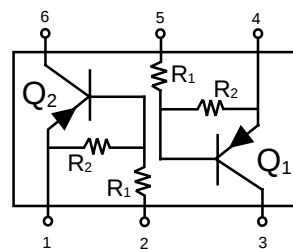
- . Simplifies Circuit Design
- . Reduces Board Space
- . Reduces Component Count
- . Available in 8 mm, 7 inch/3000 Unit Tape and Reel

MUN5111DW1T1 Series



MAXIMUM RATINGS (T_A = 25°C unless otherwise noted, common for Q₁ and Q₂)

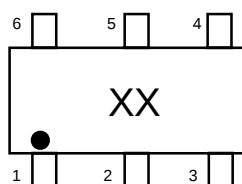
Rating	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	-50	Vdc
Collector-Emitter Voltage	V _{CEO}	-50	Vdc
Collector Current	I _C	-100	mAdc



THERMAL CHARACTERISTICS

Characteristic (One Junction Heated)	Symbol	Max	Unit
Total Device Dissipation T _A = 25°C	P _D	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 _{θJA}	670 (Note 1.) 490 (Note 2.)	°C/W
Characteristic (Both Junctions Heated)	Symbol	Max	Unit
Total Device Dissipation T _A = 25°C	P _D	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 _{θJA}	493 (Note 1.) 325 (Note 2.)	°C/W
Thermal Resistance – Junction-to-Lead	R _{θJL}	188 (Note 1.) 208 (Note 2.)	°C/W
Junction and Storage Temperature	T _J , T _{stg}	-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 ₁ (K)	R ₂ (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_A = 25°C unless otherwise noted, common for Q₁ and Q₂)

Characteristic	Symbol	Min	Typ	Max	Unit
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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}	—	—	-0.5	mAdc
	MUN5111DW1T1	—	—	-0.2	
	MUN5112DW1T1	—	—	-0.1	
	MUN5113DW1T1	—	—	-0.2	
	MUN5114DW1T1	—	—	-0.9	
	MUN5115DW1T1	—	—	-1.9	
	MUN5130DW1T1	—	—	-4.3	
	MUN5131DW1T1	—	—	-2.3	
	MUN5132DW1T1	—	—	-0.18	
	MUN5133DW1T1	—	—	-0.13	
	MUN5134DW1T1	—	—	-0.2	
	MUN5135DW1T1	—	—	-0.05	
	MUN5136DW1T1	—	—	-0.13	
	MUN5137DW1T1	—	—	—	
Collector-Base Breakdown Voltage (I _C = -10 μA, I _E = 0)	V _{(BR)CBO}	-50	—	—	Vdc
Collector-Emitter Breakdown Voltage (Note 4.) (I _C = -2.0 mA, I _B = 0)	V _{(BR)CEO}	-50	—	—	Vdc

ON CHARACTERISTICS (Note 4.)

Collector-Emitter Saturation Voltage (I _C = -10mA, I _E = -0.3 mA)	V _{CE(sat)}	—	—	-0.25	Vdc
(I _C = -10mA, I _B = -5mA) MUN5130DW1T1/MUN5131DW1T1					
(I _C = -10mA, I _B = -1mA) MUN5115DW1T1/MUN5116DW1T1					
MUN5132DW1T1/MUN5133DW1T1/MUN5134DW1T1					

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

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 5.)					
DC Current Gain	MUN5111DW1T1	h_{FE}	35	60	—
($V_{CE} = -10\text{ V}$, $I_C = -5.0\text{ mA}$)	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_{OL}			Vdc
($V_{CC} = -5.0\text{ V}$, $V_B = -2.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	MUN5111DW1T1		—	—	-0.2
	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
($V_{CC} = -5.0\text{ V}$, $V_B = -3.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	MUN5113DW1T1		—	—	-0.2
($V_{CC} = -5.0\text{ V}$, $V_B = -5.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	MUN5136DW1T1		—	—	-0.2
($V_{CC} = -5.0\text{ V}$, $V_B = -4.0\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	MUN5137DW1T1		—	—	-0.2
Output Voltage (off) ($V_{CC} = -5.0\text{ V}$, $V_B = -0.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$)		V_{OH}	-4.9	—	Vdc
($V_{CC} = -5.0\text{ V}$, $V_B = -0.05\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	MUN5130DW1T1				
($V_{CC} = -5.0\text{ V}$, $V_B = -0.25\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	MUN5115DW1T1				
	MUN5116DW1T1				
	MUN5131DW1T1				
	MUN5133DW1T1				

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
ON CHARACTERISTICS(Note 5.)						
Input Resistor	MUN5111DW1T1	R_1	7.0	10	13	$k\Omega$
	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_1/R_2	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%

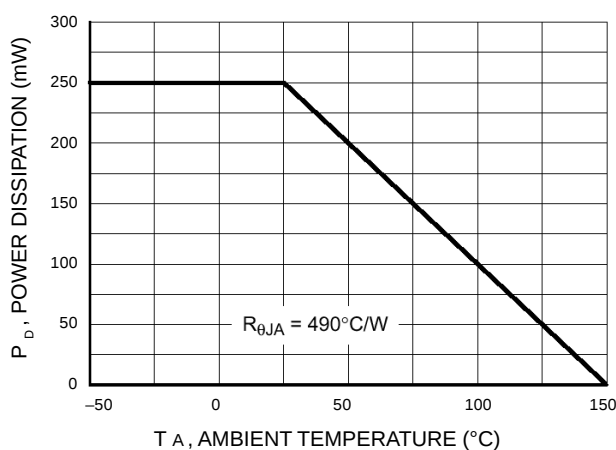


Figure 1. Derating Curve

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5111DW1T1

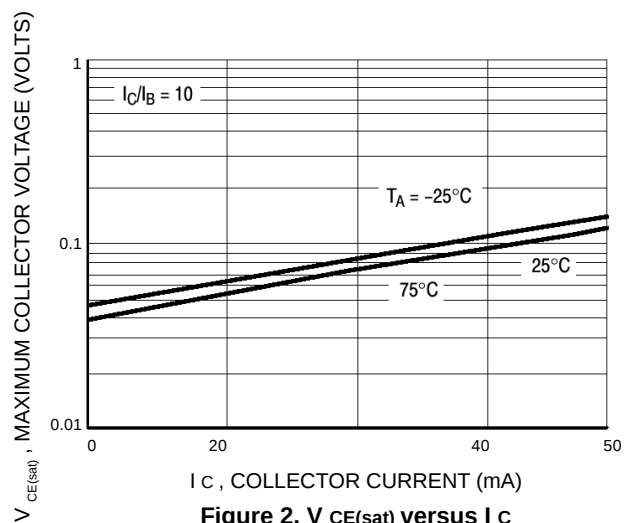


Figure 2. $V_{CE(sat)}$ versus I_C

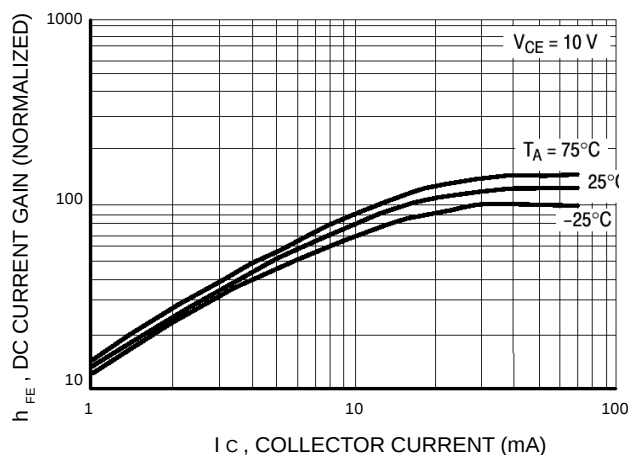


Figure 3. DC Current Gain

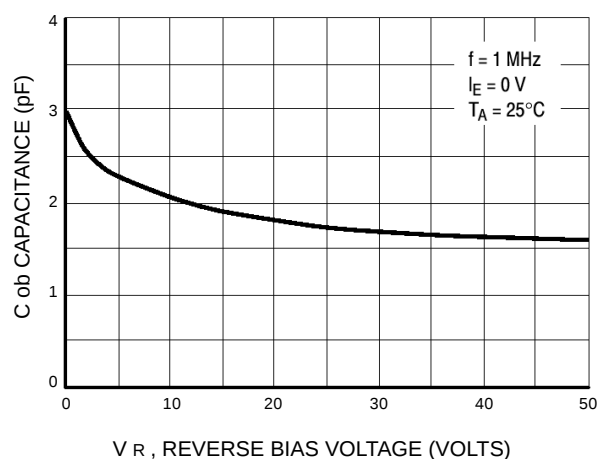


Figure 4. Output Capacitance

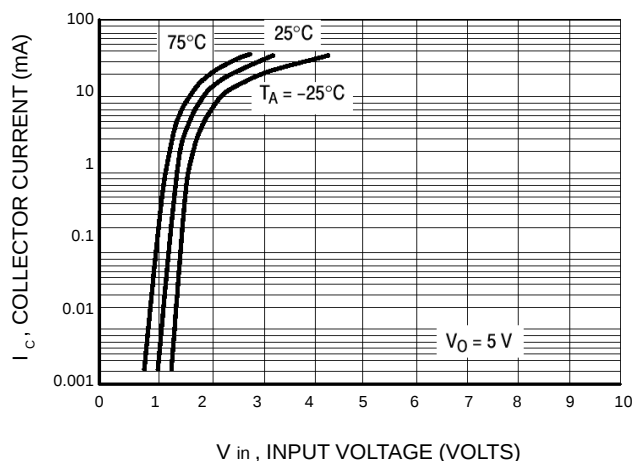


Figure 5. Output Current versus Input Voltage

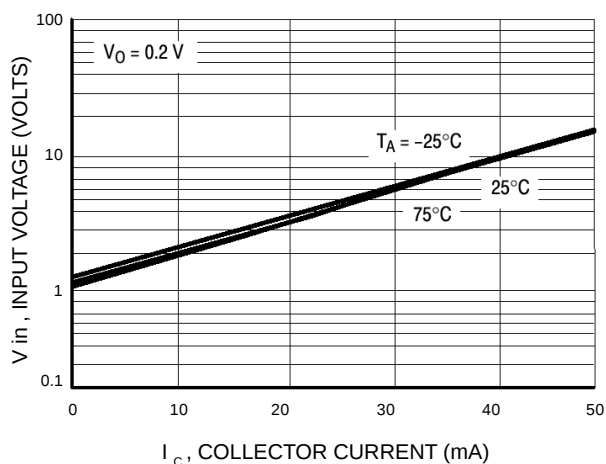


Figure 6. Input Voltage versus Output Current

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5112DW1T1

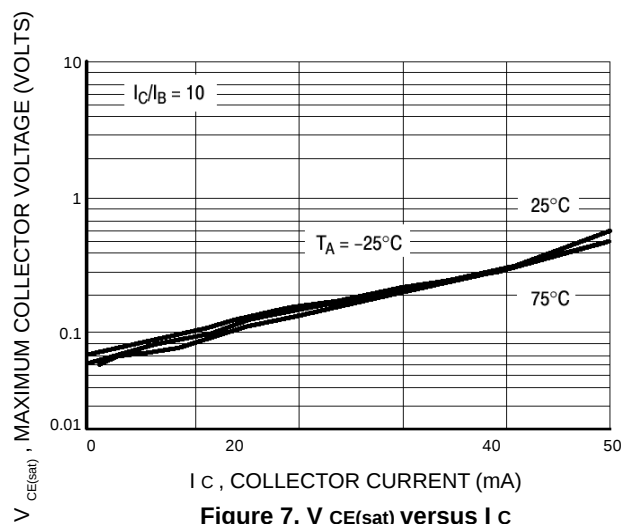


Figure 7. $V_{CE(sat)}$ versus I_C

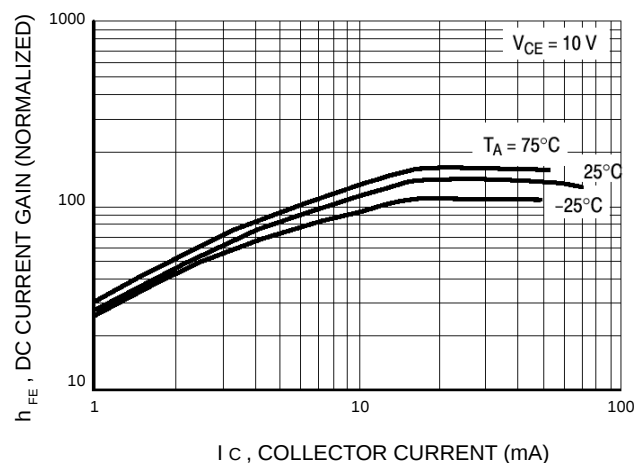


Figure 8. DC Current Gain

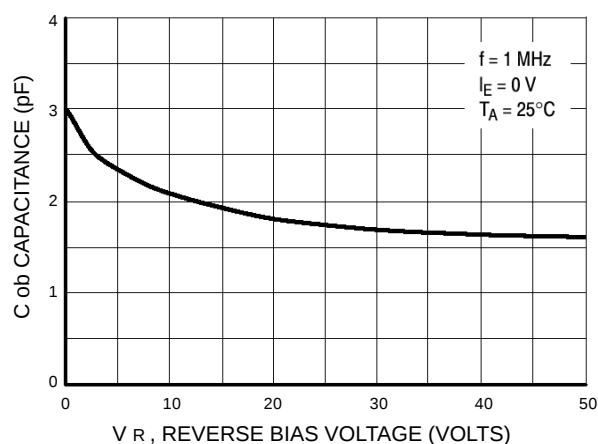


Figure 9. Output Capacitance

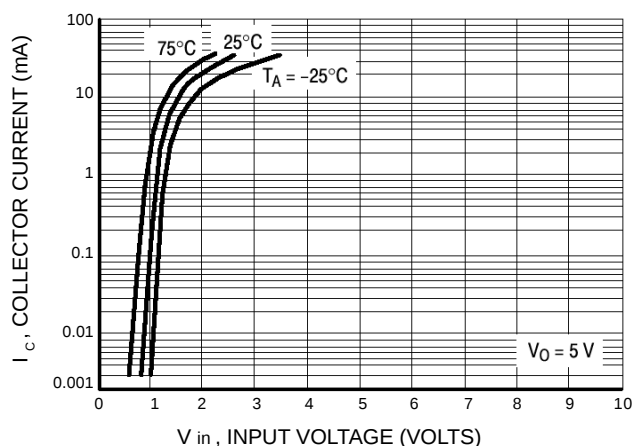


Figure 10. Output Current versus Input voltage

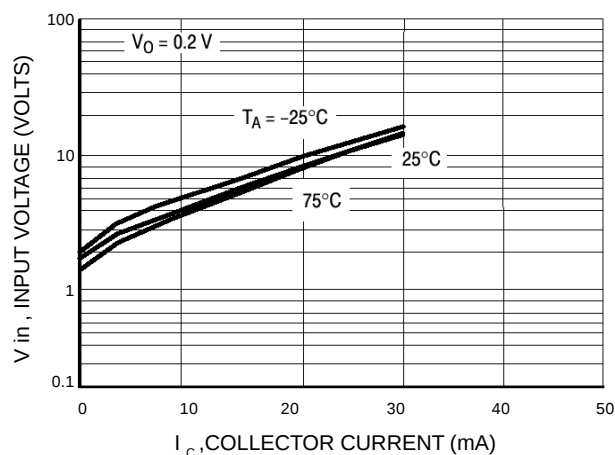


Figure 11. Input Voltage versus Output Current

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5113DW1T1

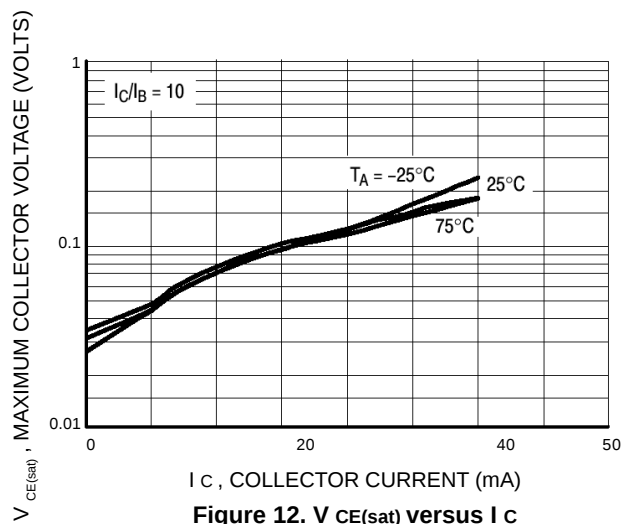


Figure 12. $V_{CE(sat)}$ versus I_C

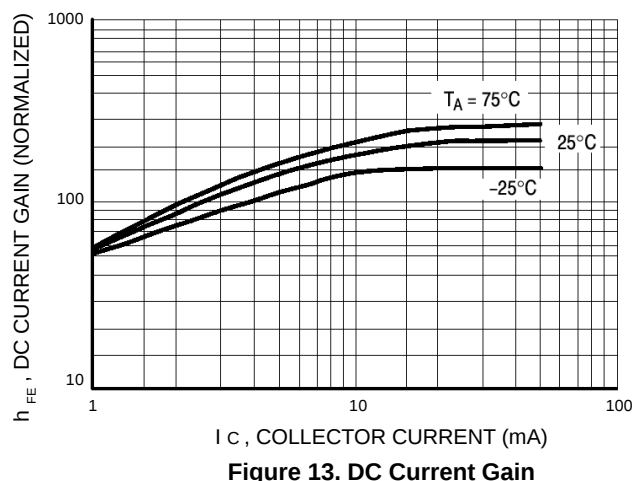


Figure 13. DC Current Gain

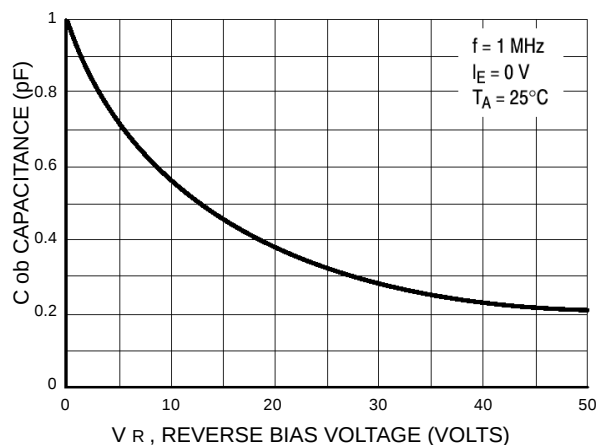


Figure 14. Output Capacitance

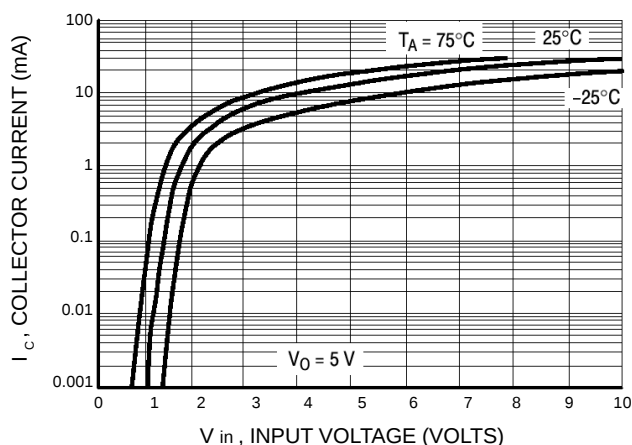


Figure 15. Output Current versus Input voltage

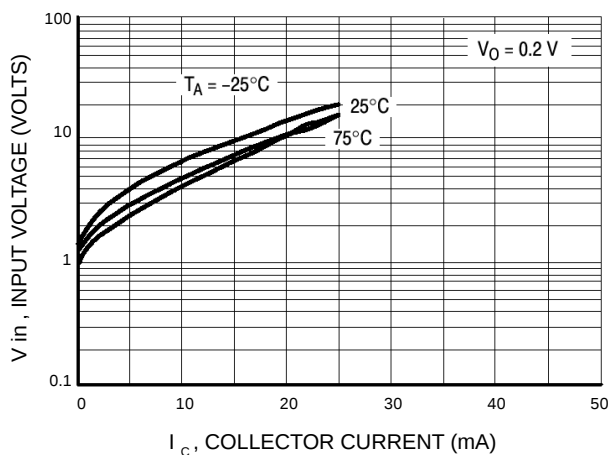
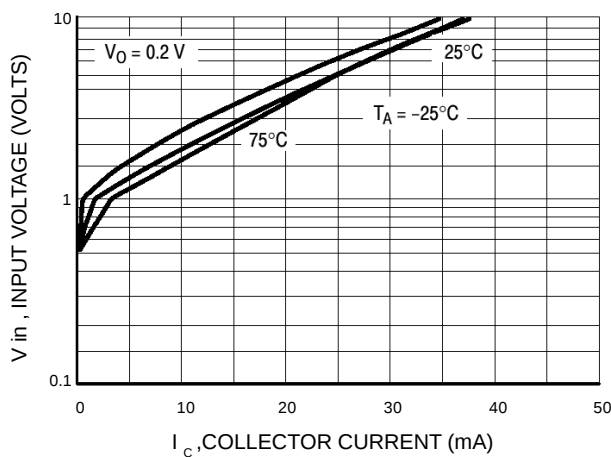
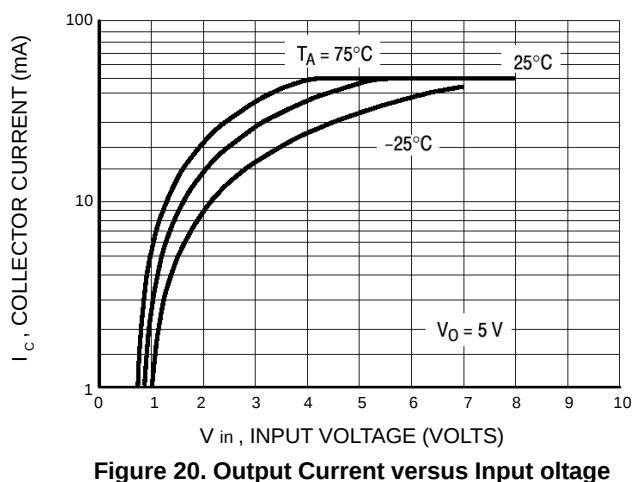
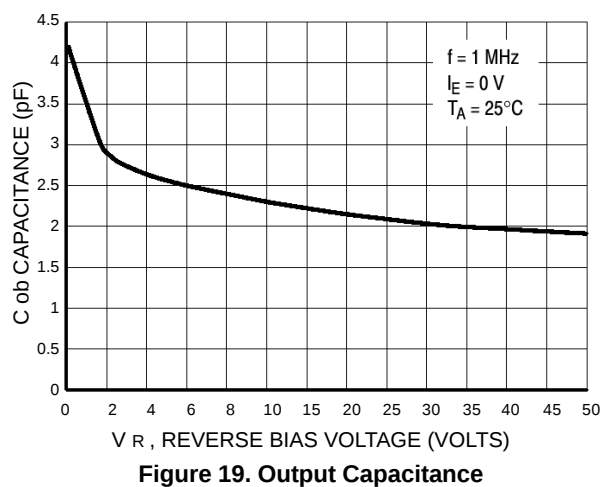
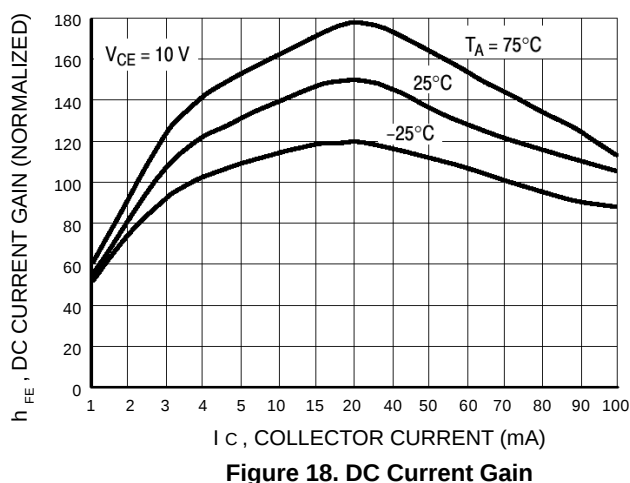
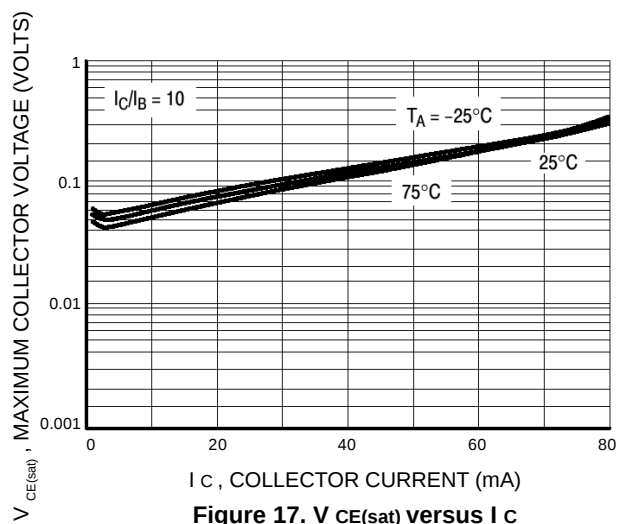


Figure 16. Input Voltage versus Output Current

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5114DW1T1



MUN5311DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5115DW1T1

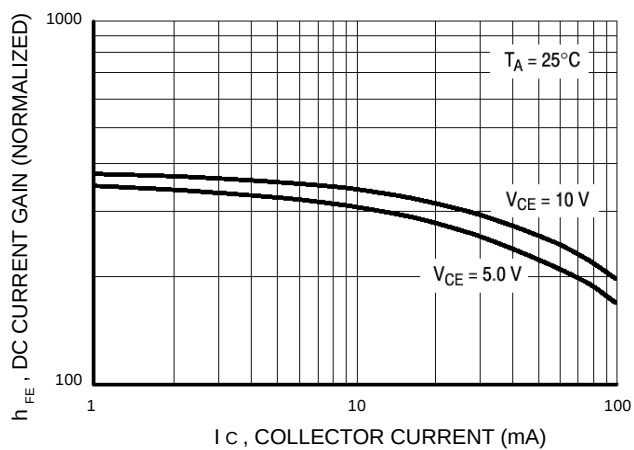


Figure 22. DC Current Gain

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5116DW1T1

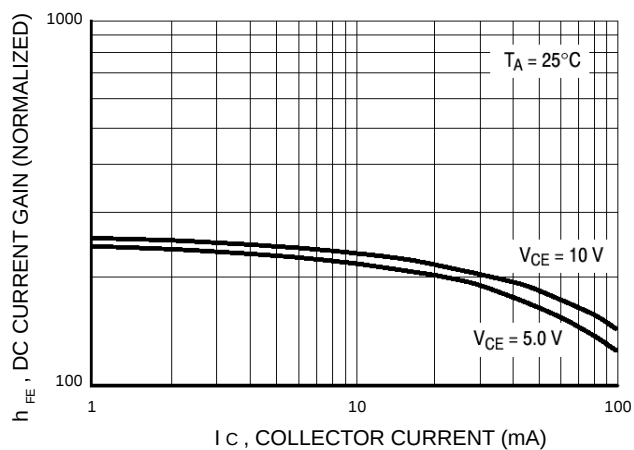
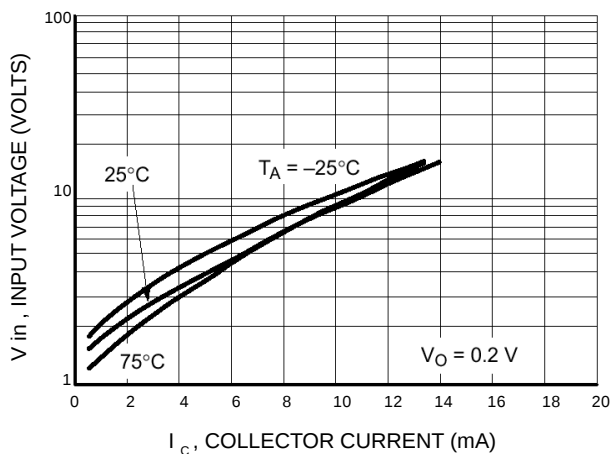
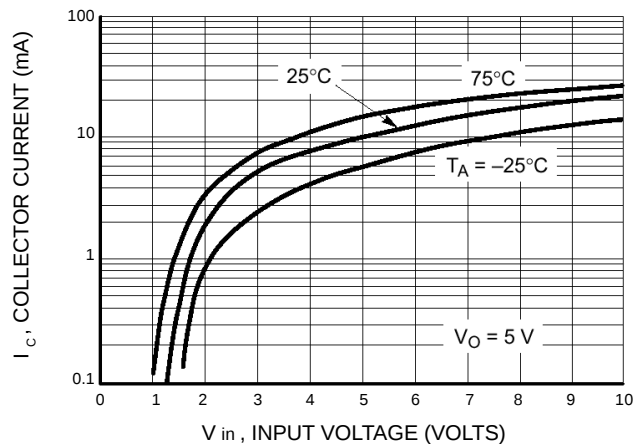
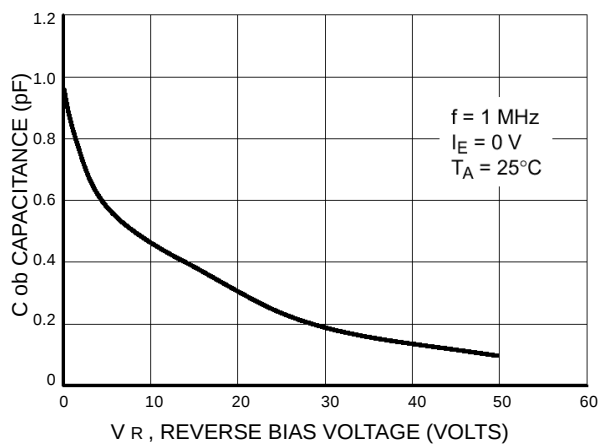
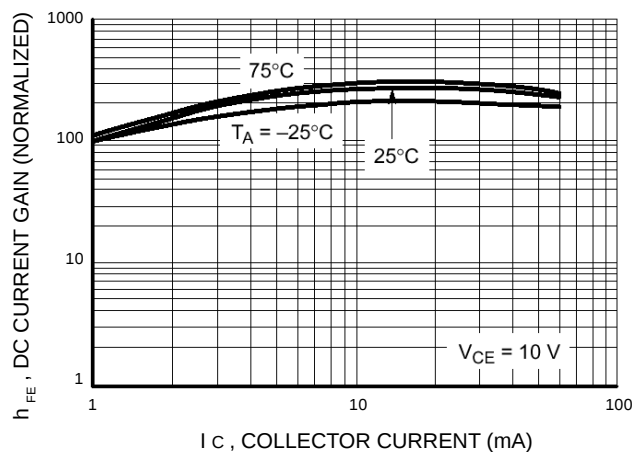
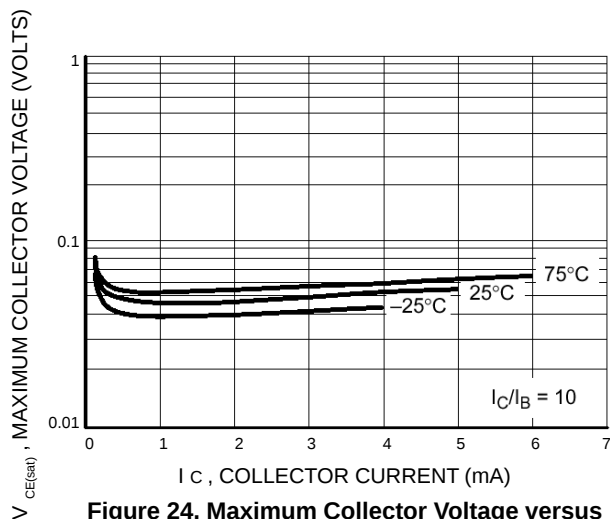


Figure 23. DC Current Gain

MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5136DW1T1



MUN5111DW1T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5137DW1T1

