

MUN5211T1 Series

DEVICE MARKING AND RESISTOR VALUES

Device	Package	Marking	R1 (K)	R2 (K)	Shipping [†]
MUN5211T1	SC-70/SOT-323	8A	10	10	3000 / Tape & Reel
MUN5211T1G	SC-70/SOT-323 (Pb-Free)	8A	10	10	3000 / Tape & Reel
MUN5212T1	SC-70/SOT-323	8B	22	22	3000 / Tape & Reel
MUN5212T1G	SC-70/SOT-323 (Pb-Free)	8B	22	22	3000 / Tape & Reel
MUN5213T1	SC-70/SOT-323	8C	47	47	3000 / Tape & Reel
MUN5213T1G	SC-70/SOT-323 (Pb-Free)	8C	47	47	3000 / Tape & Reel
MUN5214T1	SC-70/SOT-323	8D	10	47	3000 / Tape & Reel
MUN5214T1G	SC-70/SOT-323 (Pb-Free)	8D	10	47	3000 / Tape & Reel
MUN5215T1	SC-70/SOT-323	8E	10	∞	3000 / Tape & Reel
MUN5215T1G	SC-70/SOT-323 (Pb-Free)	8E	10	∞	3000 / Tape & Reel
MUN5216T1 (Note 3)	SC-70/SOT-323	8F	4.7	∞	3000 / Tape & Reel
MUN5216T1G (Note 3)	SC-70/SOT-323 (Pb-Free)	8F	4.7	∞	3000 / Tape & Reel
MUN5230T1	SC-70/SOT-323	8G	1.0	1.0	3000 / Tape & Reel
MUN5230T1G	SC-70/SOT-323 (Pb-Free)	8G	1.0	1.0	3000 / Tape & Reel
MUN5231T1 (Note 3)	SC-70/SOT-323	8H	2.2	2.2	3000 / Tape & Reel
MUN5231T1G (Note 3)	SC-70/SOT-323 (Pb-Free)	8H	2.2	2.2	3000 / Tape & Reel
MUN5232T1	SC-70/SOT-323	8J	4.7	4.7	3000 / Tape & Reel
MUN5232T1G	SC-70/SOT-323 (Pb-Free)	8J	4.7	4.7	3000 / Tape & Reel
MUN5233T1	SC-70/SOT-323	8K	4.7	47	3000 / Tape & Reel
MUN5233T1G	SC-70/SOT-323 (Pb-Free)	8K	4.7	47	3000 / Tape & Reel
MUN5234T1 (Note 3)	SC-70/SOT-323	8L	22	47	3000 / Tape & Reel
MUN5234T1G (Note 3)	SC-70/SOT-323 (Pb-Free)	8L	22	47	3000 / Tape & Reel
MUN5235T1	SC-70/SOT-323	8M	2.2	47	3000 / Tape & Reel
MUN5235T1G	SC-70/SOT-323 (Pb-Free)	8M	2.2	47	3000 / Tape & Reel
MUN5236T1 (Note 3)	SC-70/SOT-323	8N	100	100	3000 / Tape & Reel
MUN5236T1G (Note 3)	SC-70/SOT-323 (Pb-Free)	8N	100	100	3000 / Tape & Reel
MUN5237T1 (Note 3)	SC-70/SOT-323	8P	47	22	3000 / Tape & Reel
MUN5237T1G (Note 3)	SC-70/SOT-323 (Pb-Free)	8P	47	22	3000 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

3. New devices. Updated curves to follow in subsequent data sheets.

MUN5211T1 Series

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Base Cutoff Current (V _{CB} = 50 V, I _E = 0)	I _{CBO}	-	-	100	nAdc
Collector-Emitter Cutoff Current (V _{CE} = 50 V, I _B = 0)	I _{CEO}	-	-	500	nAdc
Emitter-Base Cutoff Current (V _{EB} = 6.0 V, I _C = 0)	I _{EBO}	-	-	0.5	mAdc
MUN5211T1, G		-	-	0.2	
MUN5212T1, G		-	-	0.1	
MUN5213T1, G		-	-	0.2	
MUN5214T1, G		-	-	0.9	
MUN5215T1, G		-	-	1.9	
MUN5216T1, G		-	-	4.3	
MUN5230T1, G		-	-	2.3	
MUN5231T1, G		-	-	1.5	
MUN5232T1, G		-	-	0.18	
MUN5233T1, G		-	-	0.13	
MUN5234T1, G		-	-	0.2	
MUN5235T1, G		-	-	0.05	
MUN5236T1, G		-	-	0.13	
MUN5237T1, G		-	-		
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)

DC Current Gain (V _{CE} = 10 V, I _C = 5.0 mA)	MUN5211T1, G MUN5212T1, G MUN5213T1, G MUN5214T1, G MUN5215T1, G MUN5216T1, G MUN5230T1, G MUN5231T1, G MUN5232T1, G MUN5233T1, G MUN5234T1, G MUN5235T1, G MUN5236T1, G MUN5237T1, G	h _{FE}	35 60 80 80 160 160 3.0 8.0 15 80 80 80 80 80	60 100 140 140 350 350 5.0 15 30 200 150 140 150 140	- - - - - - - - - - - - - -	
Collector-Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.3 mA)	MUN5211T1, G MUN5212T1, G MUN5213T1, G MUN5214T1, G MUN5236T1, G	V _{CE(sat)}	- - - - -	- - - - -	0.25 0.25 0.25 0.25 0.25	Vdc
(I _C = 10 mA, I _B = 5 mA)	MUN5230T1, G MUN5231T1, G MUN5237T1, G		- - -	- - -	0.25 0.25 0.25	
(I _C = 10 mA, I _B = 1 mA)	MUN5215T1, G MUN5216T1, G MUN5232T1, G MUN5233T1, G MUN5234T1, G MUN5235T1, G		- - - - - -	- - - - - -	0.25 0.25 0.25 0.25 0.25 0.25	

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

MUN5211T1 Series

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 5) (Continued)					
Output Voltage (on) (V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 kΩ)	V _{OL}	-	-	0.2	Vdc
MUN5211T1, G		-	-	0.2	
MUN5212T1, G		-	-	0.2	
MUN5214T1, G		-	-	0.2	
MUN5215T1, G		-	-	0.2	
MUN5216T1, G		-	-	0.2	
MUN5230T1, G		-	-	0.2	
MUN5231T1, G		-	-	0.2	
MUN5232T1, G		-	-	0.2	
MUN5233T1, G		-	-	0.2	
MUN5234T1, G		-	-	0.2	
MUN5235T1, G		-	-	0.2	
(V _{CC} = 5.0 V, V _B = 3.5 V, R _L = 1.0 kΩ)		-	-	0.2	
MUN5213T1, G		-	-	0.2	
(V _{CC} = 5.0 V, V _B = 5.5 V, R _L = 1.0 kΩ)		-	-	0.2	
MUN5236T1, G		-	-	0.2	
(V _{CC} = 5.0 V, V _B = 4.0 V, R _L = 1.0 kΩ)		-	-	0.2	
MUN5237T1, G		-	-	0.2	
Output Voltage (off) (V _{CC} = 5.0 V, V _B = 0.5 V, R _L = 1.0 kΩ)	V _{OH}	4.9	-	-	Vdc
MUN5211T1, G		4.9	-	-	
MUN5212T1, G		4.9	-	-	
MUN5213T1, G		4.9	-	-	
MUN5214T1, G		4.9	-	-	
MUN5234T1, G		4.9	-	-	
MUN5235T1, G		4.9	-	-	
(V _{CC} = 5.0 V, V _B = 0.05 V, R _L = 1.0 kΩ)		4.9	-	-	
MUN5230T1, G		4.9	-	-	
(V _{CC} = 5.0 V, V _B = 0.25 V, R _L = 1.0 kΩ)		4.9	-	-	
MUN5215T1, G		4.9	-	-	
MUN5216T1, G		4.9	-	-	
MUN5231T1, G		4.9	-	-	
MUN5232T1, G		4.9	-	-	
MUN5233T1, G		4.9	-	-	
MUN5236T1, G		4.9	-	-	
MUN5237T1, G		4.9	-	-	
Input Resistor	R ₁	7.0	10	13	kΩ
MUN5211T1, G		15.4	22	28.6	
MUN5212T1, G		32.9	47	61.1	
MUN5213T1, G		7.0	10	13	
MUN5214T1, G		7.0	10	13	
MUN5215T1, G		7.0	10	13	
MUN5216T1, G		3.3	4.7	6.1	
MUN5230T1, G		0.7	1.0	1.3	
MUN5231T1, G		1.5	2.2	2.9	
MUN5232T1, G		3.3	4.7	6.1	
MUN5233T1, G		3.3	4.7	6.1	
MUN5234T1, G		15.4	22	28.6	
MUN5235T1, G		1.54	2.2	2.86	
MUN5236T1, G		70	100	130	
MUN5237T1, G		32.9	47	61.1	
Resistor Ratio	R ₁ /R ₂	0.8	1.0	1.2	
MUN5211T1, G		0.8	1.0	1.2	
MUN5212T1, G		0.8	1.0	1.2	
MUN5213T1, G		0.8	1.0	1.2	
MUN5214T1, G		0.17	0.21	0.25	
MUN5215T1, G		-	-	-	
MUN5216T1, G		-	-	-	
MUN5230T1, G		0.8	1.0	1.2	
MUN5231T1, G		0.8	1.0	1.2	
MUN5232T1, G		0.8	1.0	1.2	
MUN5233T1, G		0.055	0.1	0.185	
MUN5234T1, G		0.38	0.47	0.56	
MUN5235T1, G		0.038	0.047	0.056	
MUN5236T1, G		0.8	1.0	1.2	
MUN5237T1, G		1.7	2.1	2.6	

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

MUN5211T1 Series

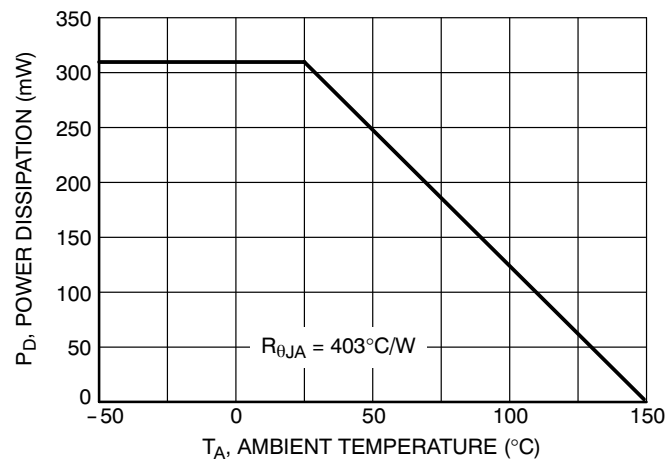


Figure 1. Derating Curve

MUN5211T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5211T1

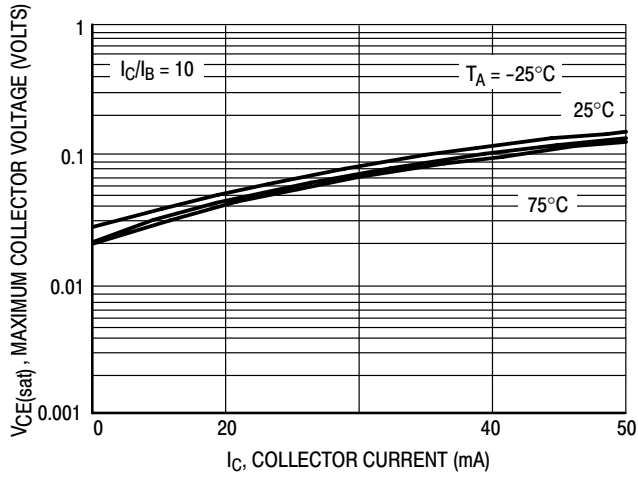


Figure 2. $V_{CE(sat)}$ versus I_C

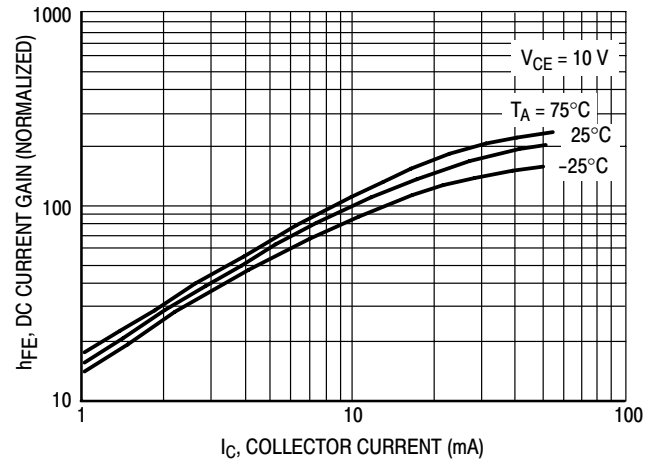


Figure 3. DC Current Gain

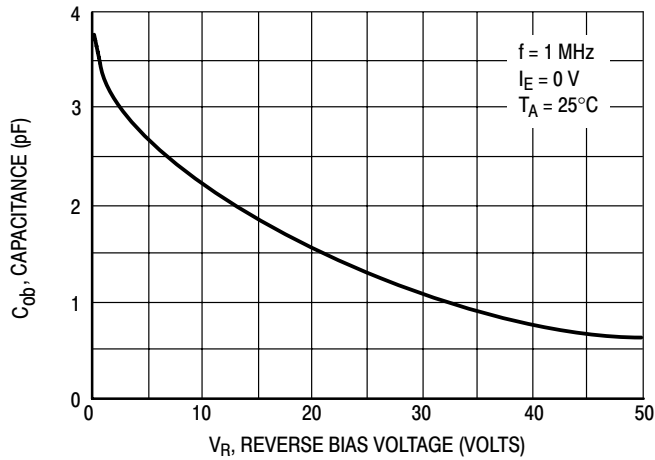


Figure 4. Output Capacitance

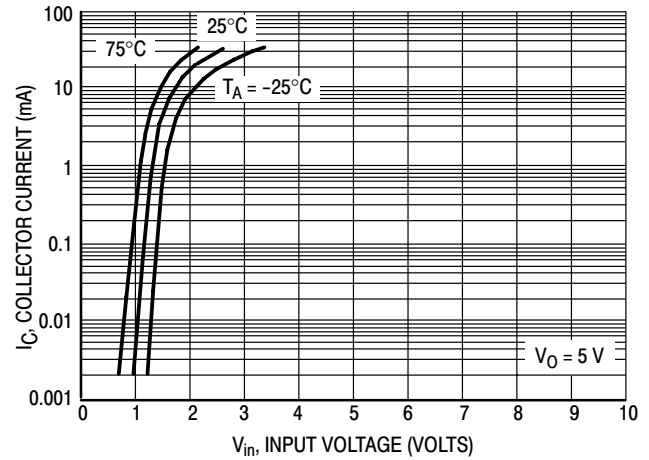


Figure 5. Output Current versus Input Voltage

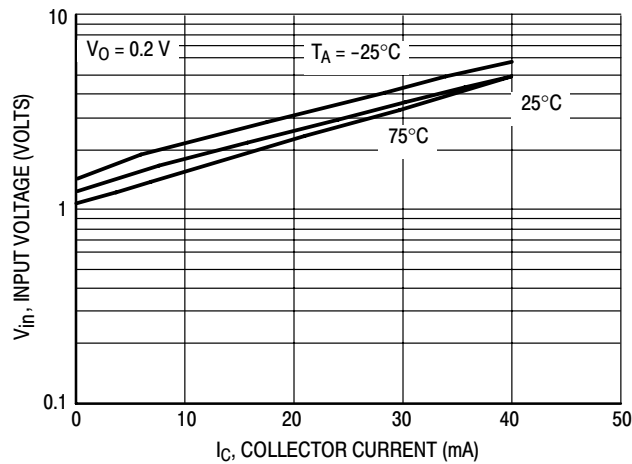


Figure 6. Input Voltage versus Output Current

MUN5211T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5212T1

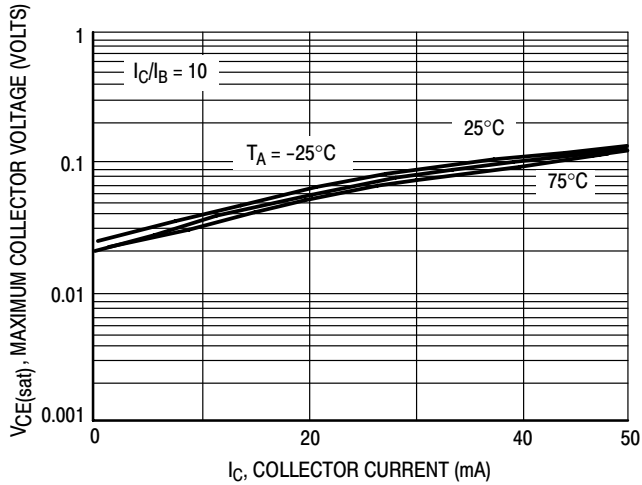


Figure 7. $V_{CE(sat)}$ versus I_C

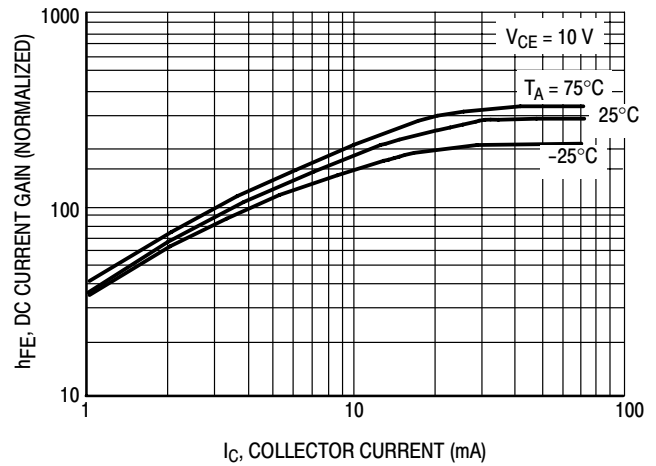


Figure 8. DC Current Gain

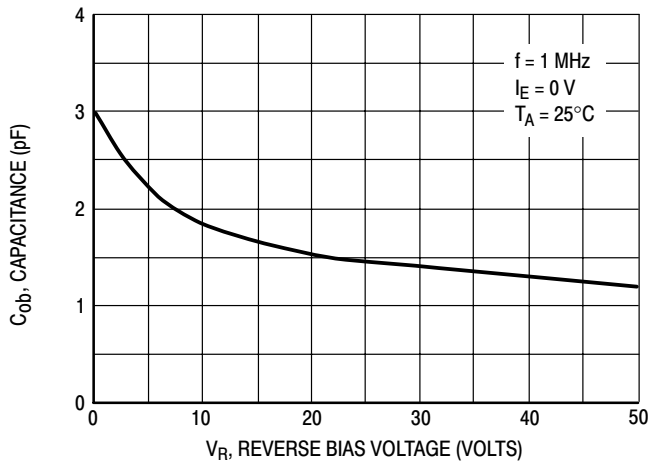


Figure 9. Output Capacitance

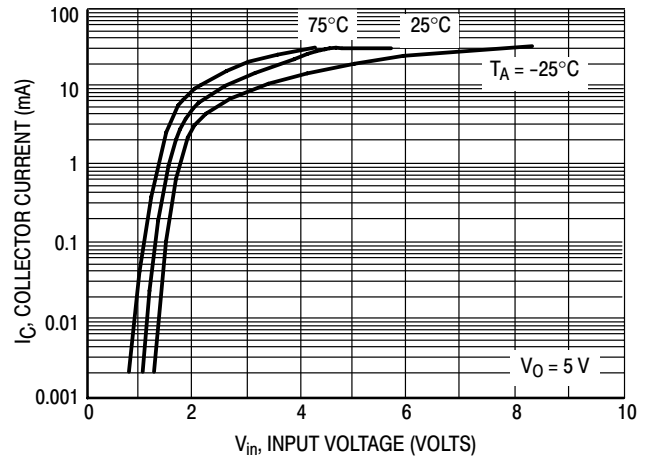


Figure 10. Output Current versus Input Voltage

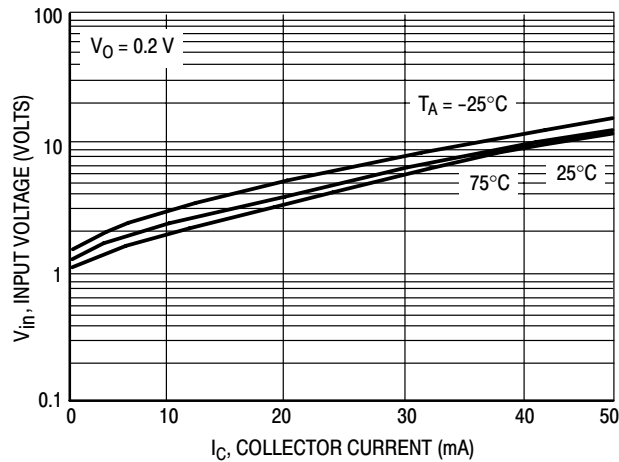


Figure 11. Input Voltage versus Output Current

MUN5211T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5213T1

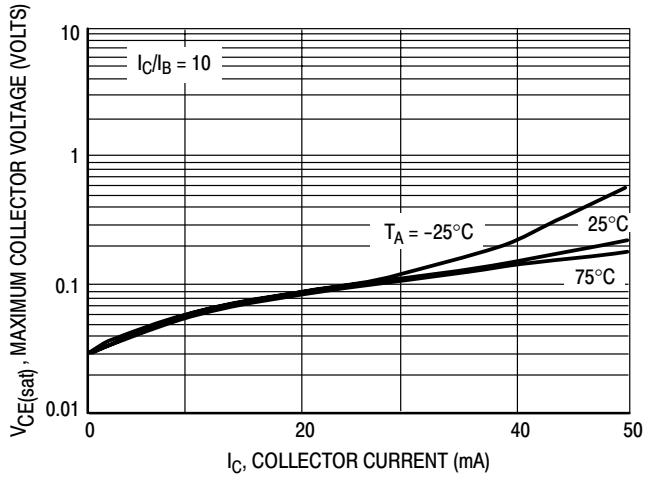


Figure 12. $V_{CE(sat)}$ versus I_C

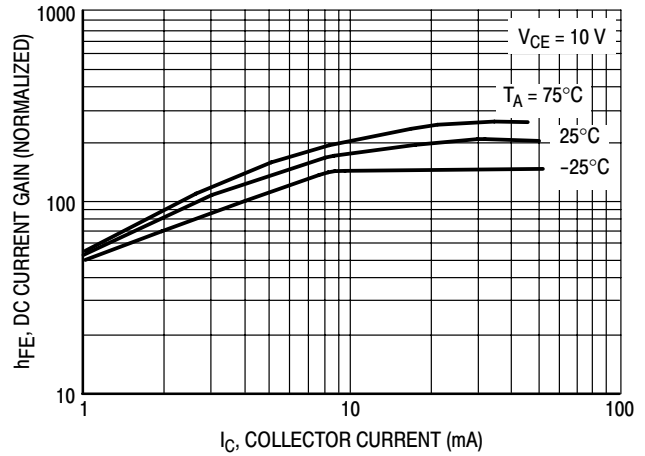


Figure 13. DC Current Gain

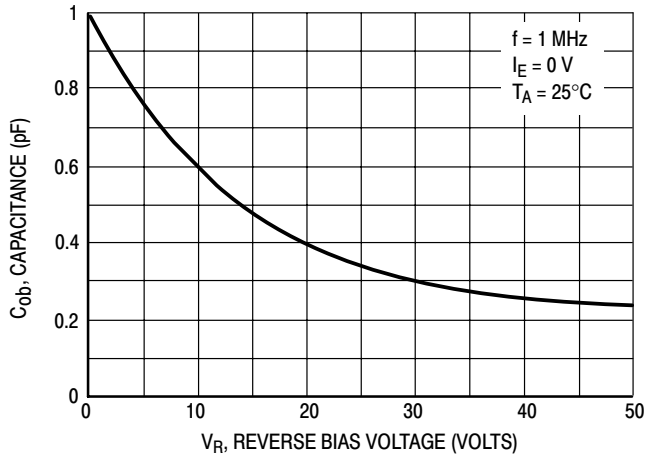


Figure 14. Output Capacitance

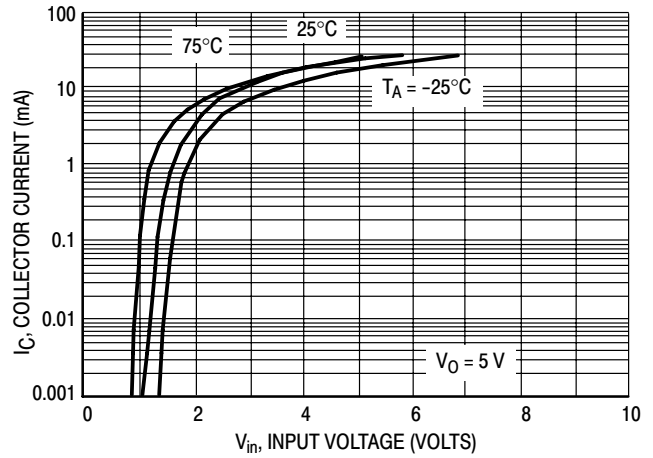


Figure 15. Output Current versus Input Voltage

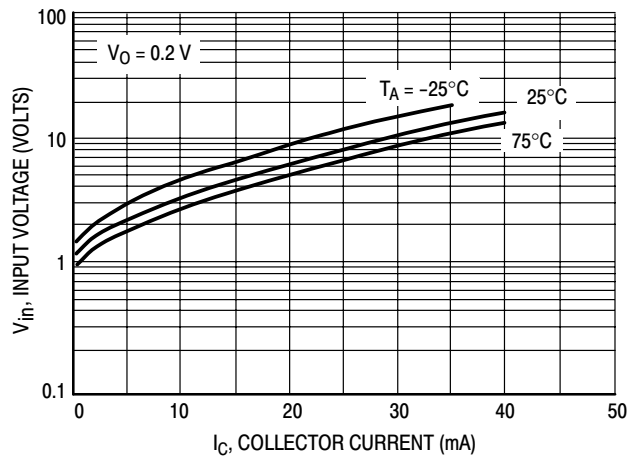


Figure 16. Input Voltage versus Output Current

MUN5211T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5214T1

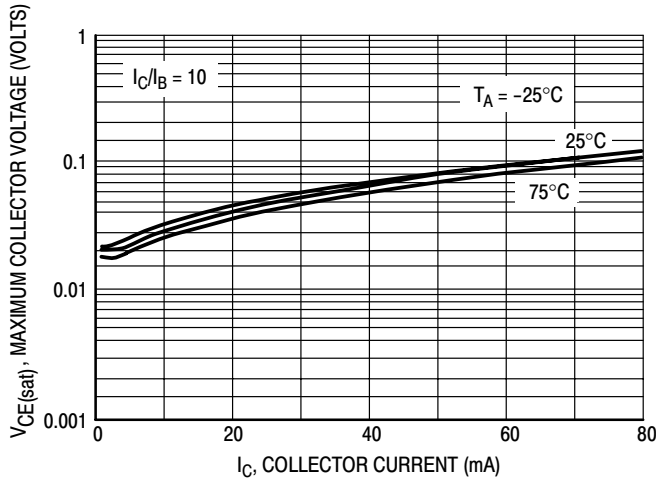


Figure 17. $V_{CE(sat)}$ versus I_C

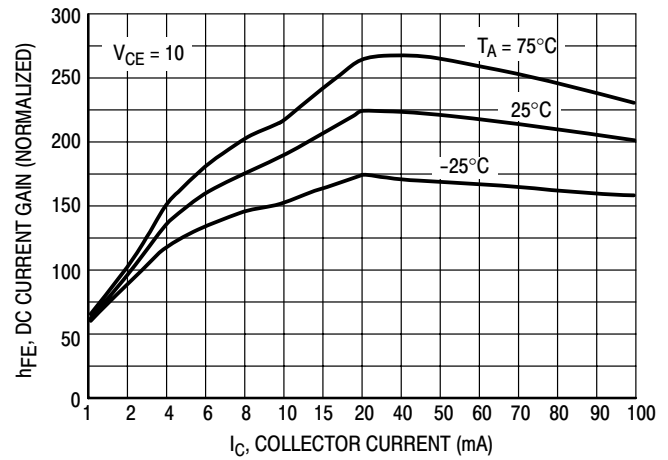


Figure 18. DC Current Gain

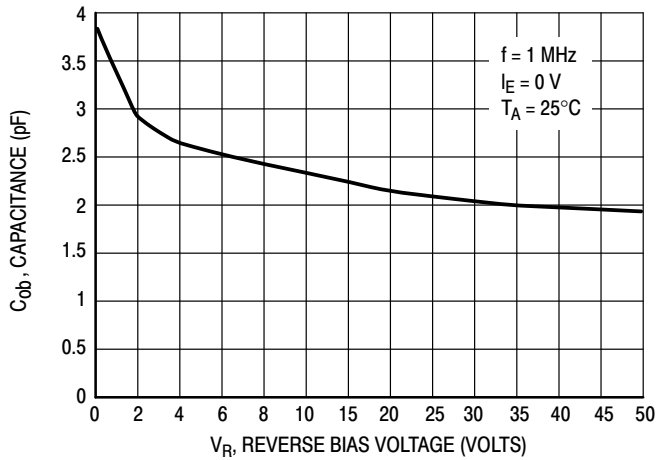


Figure 19. Output Capacitance

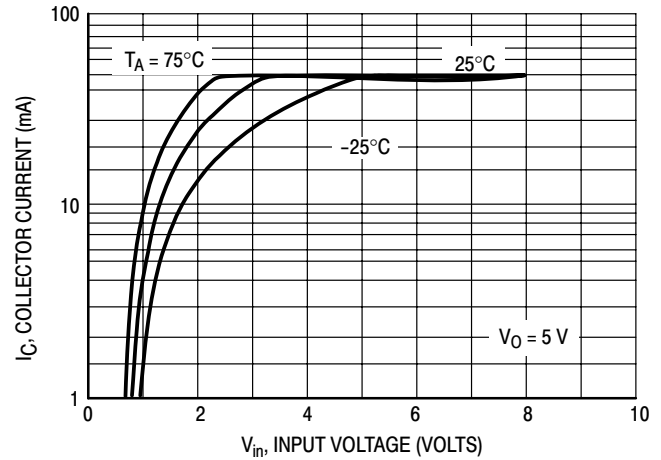


Figure 20. Output Current versus Input Voltage

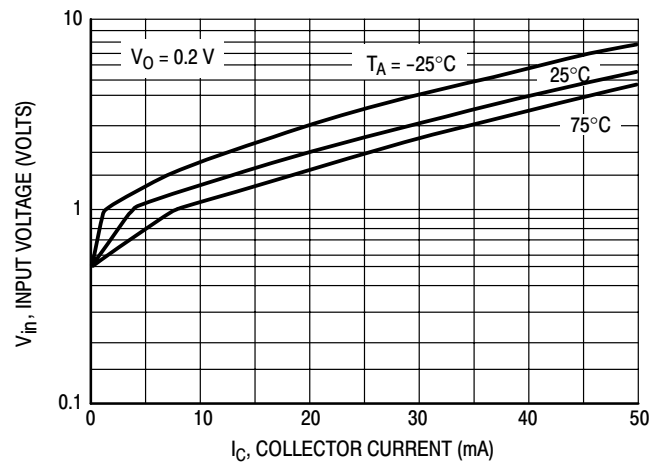


Figure 21. Input Voltage versus Output Current

MUN5211T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5215T1

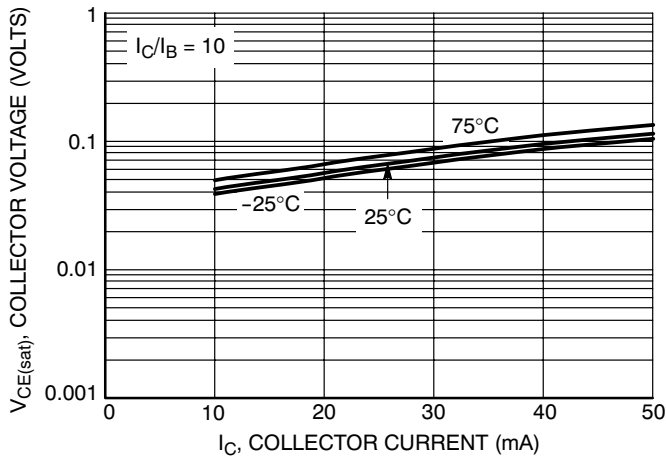


Figure 22. $V_{CE(sat)}$ versus I_C

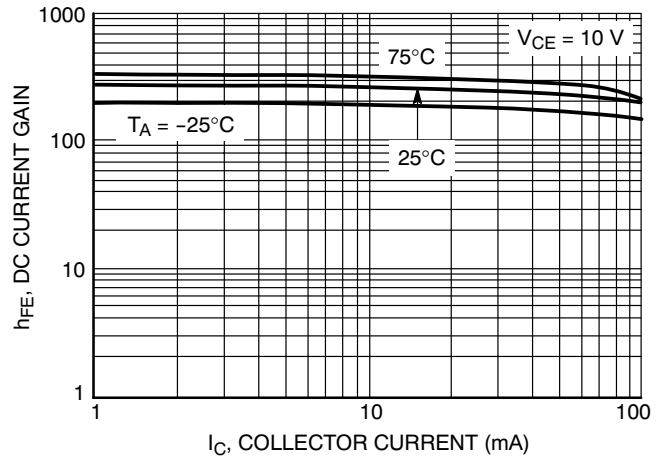


Figure 23. DC Current Gain

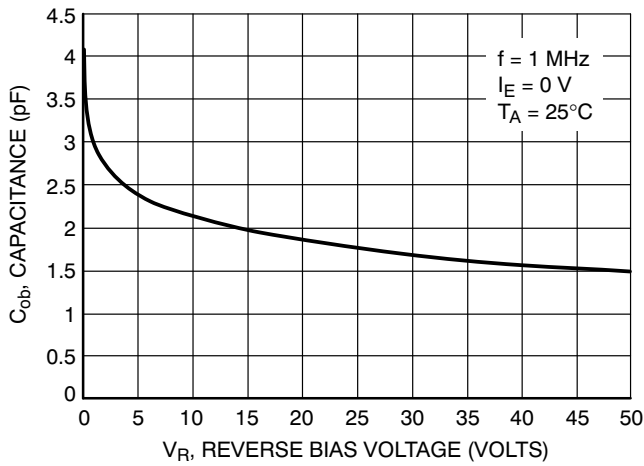


Figure 24. Output Capacitance

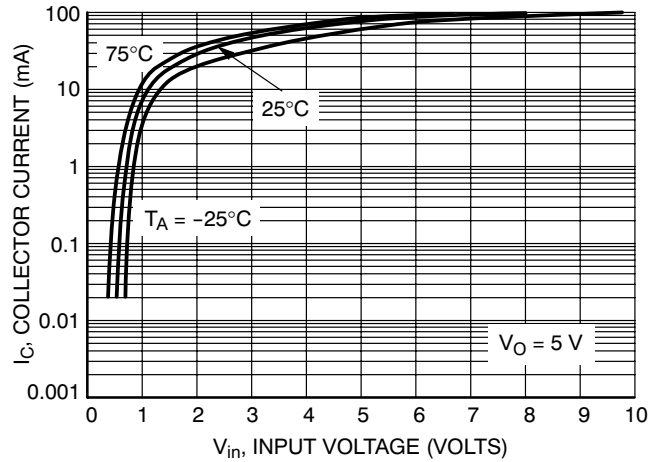


Figure 25. Output Current versus Input Voltage

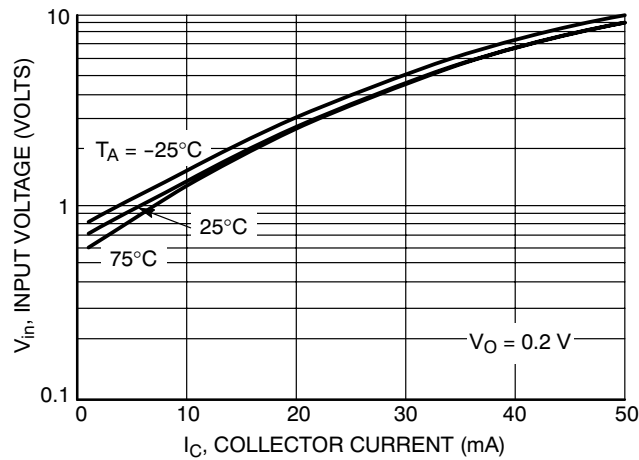


Figure 26. Input Voltage versus Output Current

MUN5211T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5230T1

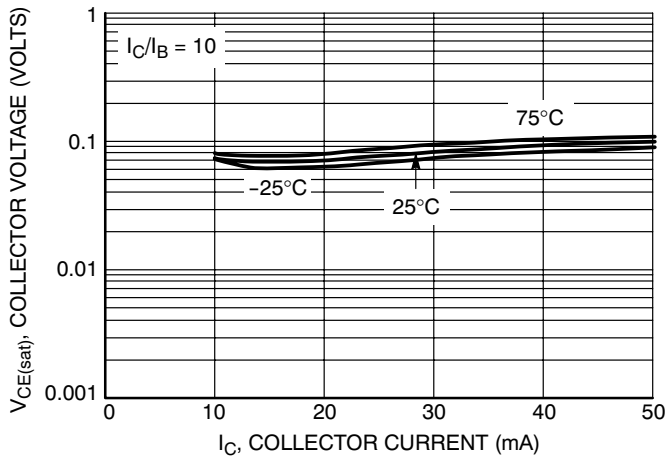


Figure 27. $V_{CE(sat)}$ versus I_C

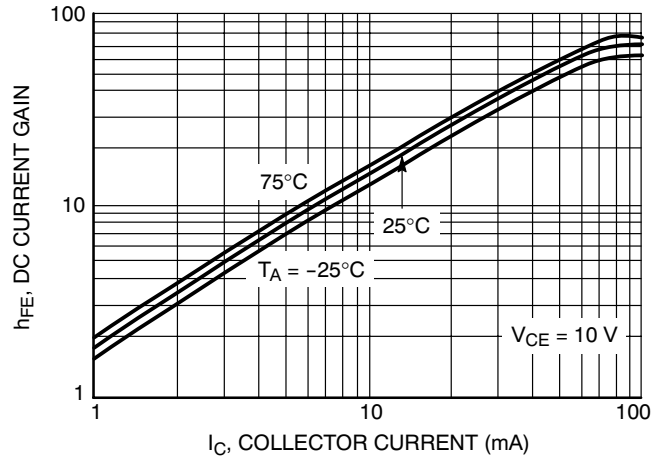


Figure 28. DC Current Gain

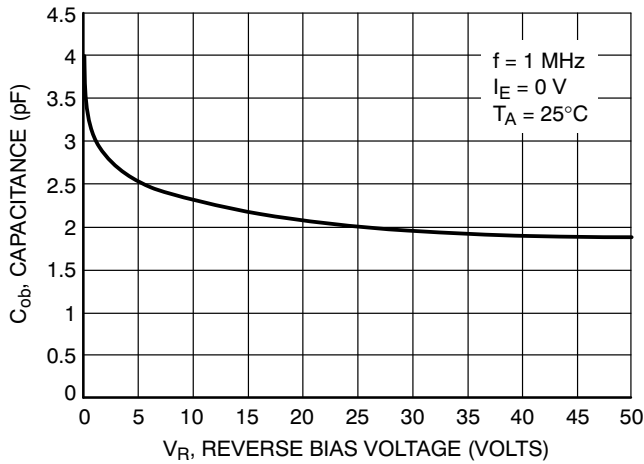


Figure 29. Output Capacitance

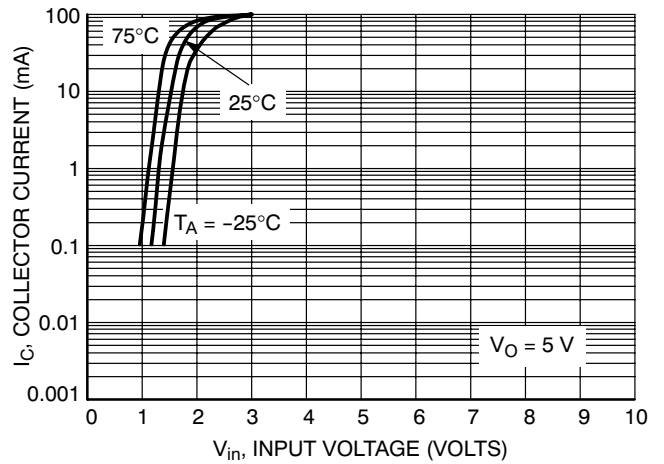


Figure 30. Output Current versus Input Voltage

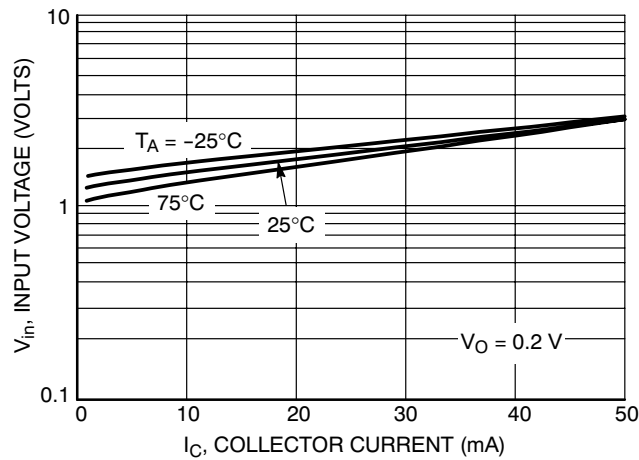


Figure 31. Input Voltage versus Output Current

MUN5211T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5232T1

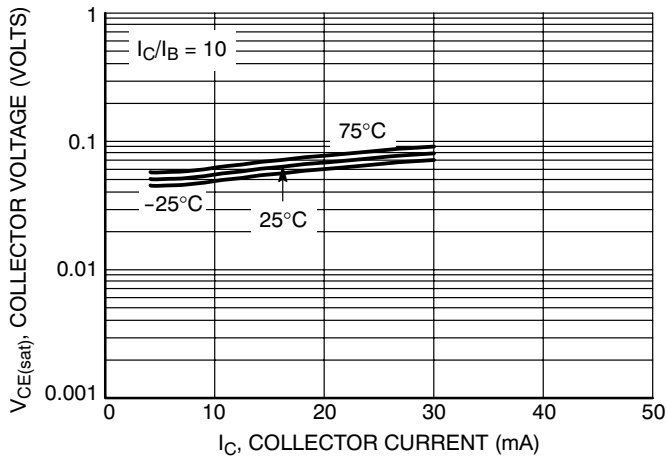


Figure 32. $V_{CE(sat)}$ versus I_C

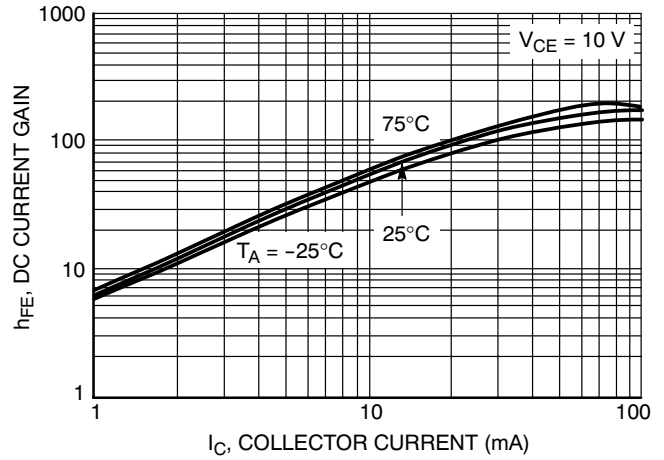


Figure 33. DC Current Gain

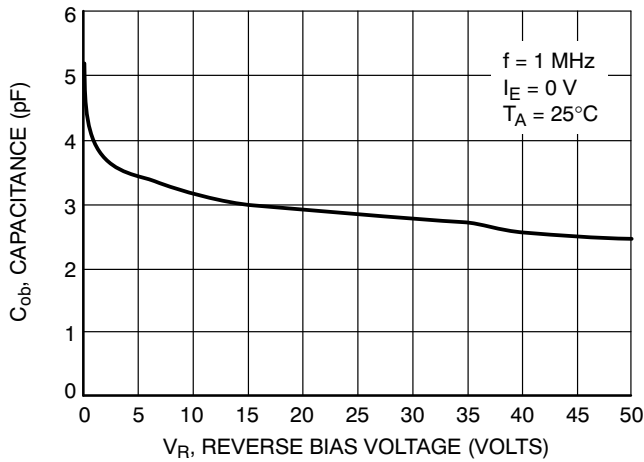


Figure 34. Output Capacitance

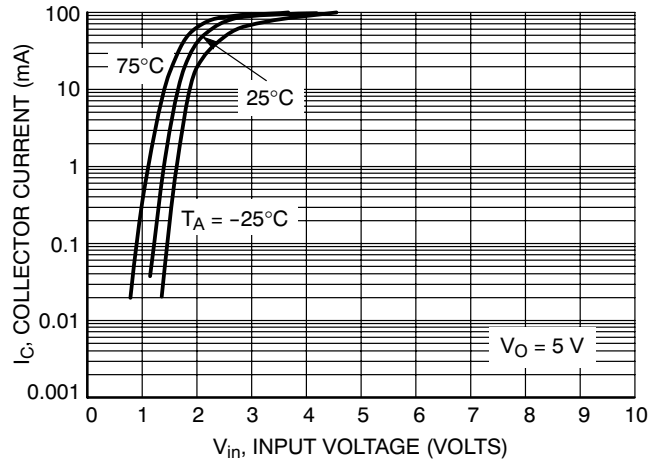


Figure 35. Output Current versus Input Voltage

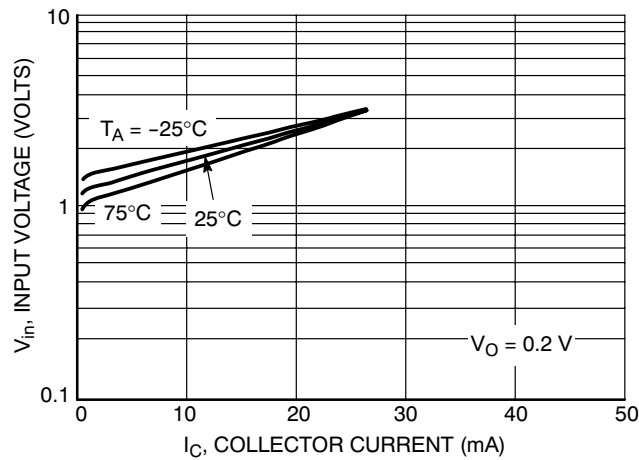


Figure 36. Input Voltage versus Output Current

MUN5211T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5233T1

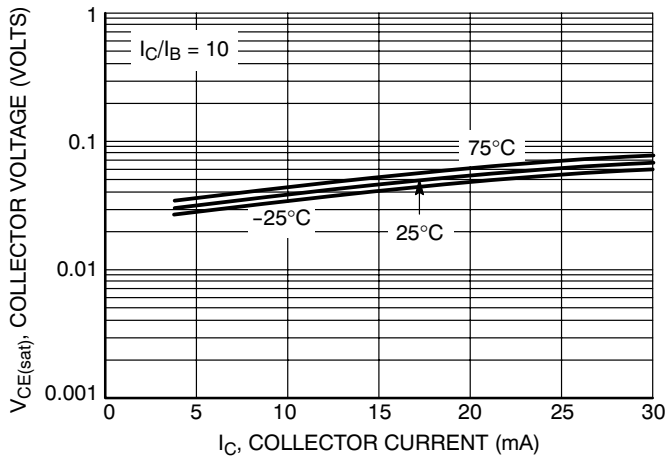


Figure 37. $V_{CE(sat)}$ versus I_C

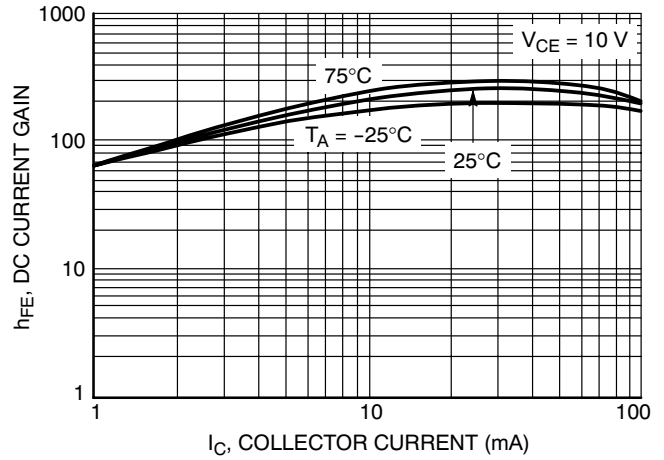


Figure 38. DC Current Gain

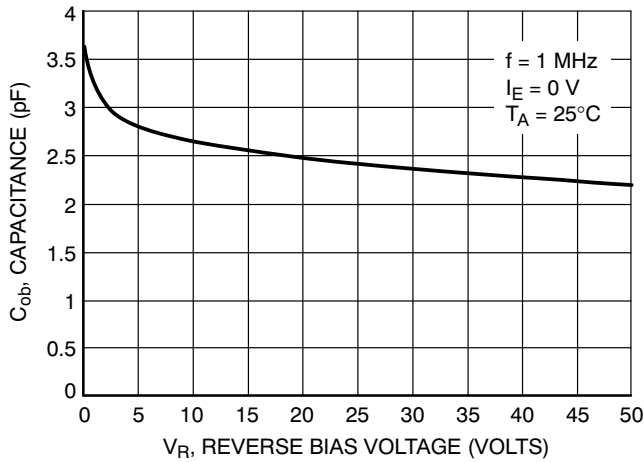


Figure 39. Output Capacitance

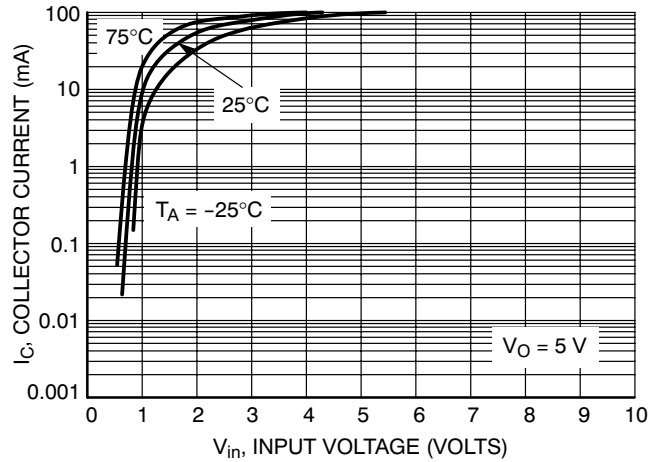


Figure 40. Output Current versus Input Voltage

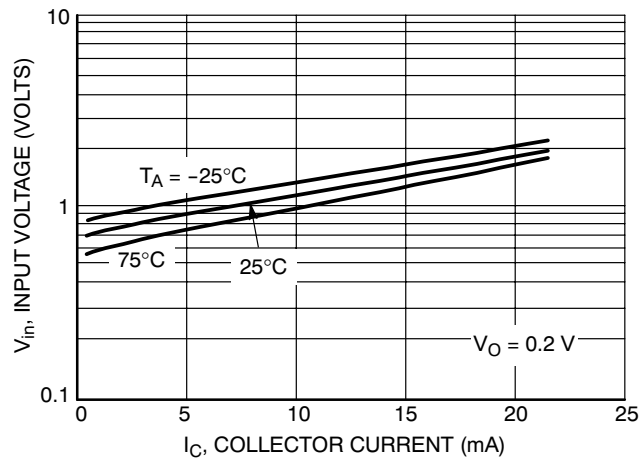


Figure 41. Input Voltage versus Output Current

MUN5211T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5235T1

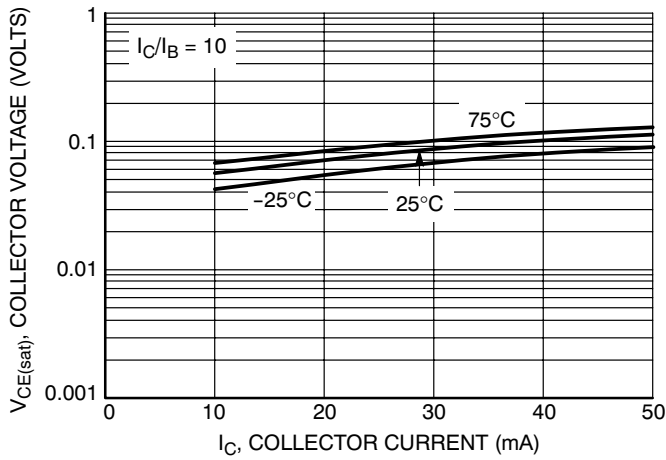


Figure 42. $V_{CE(sat)}$ versus I_C

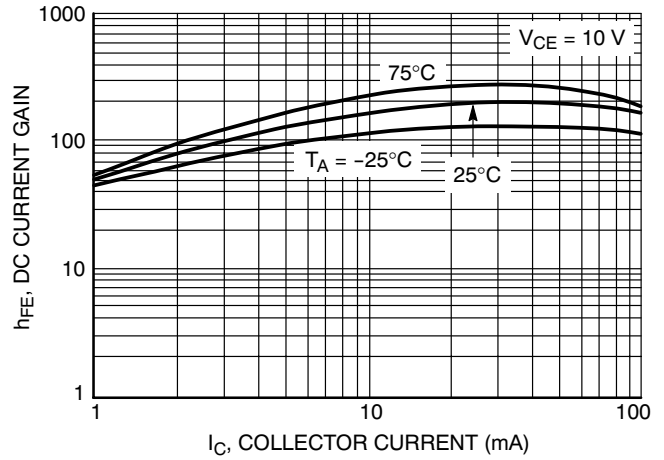


Figure 43. DC Current Gain

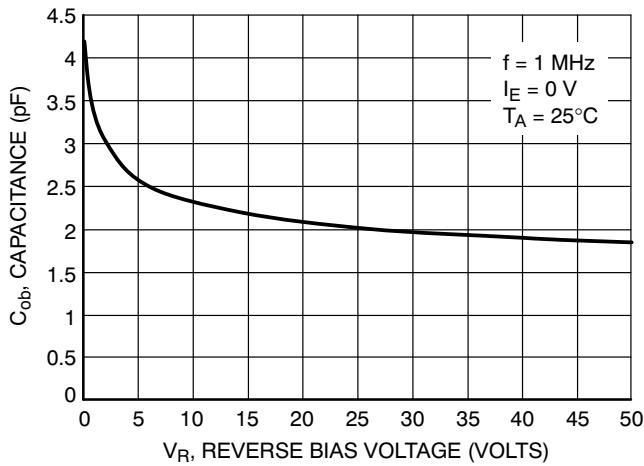


Figure 44. Output Capacitance

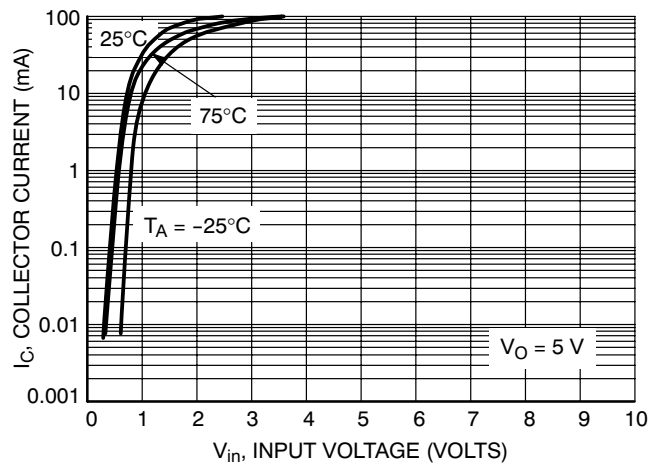


Figure 45. Output Current versus Input Voltage

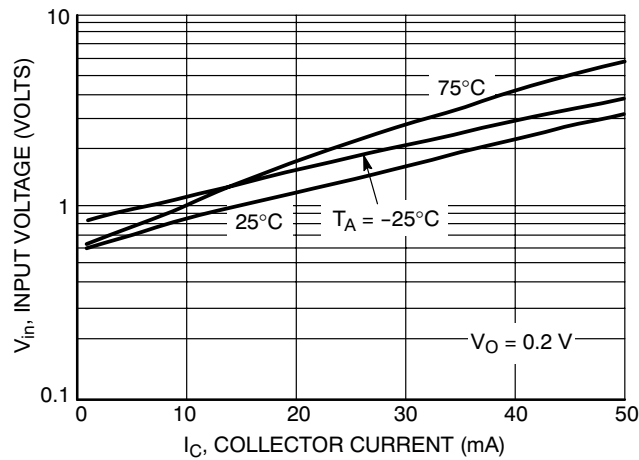


Figure 46. Input Voltage versus Output Current

MUN5211T1 Series

TYPICAL APPLICATIONS FOR NPN BRTs

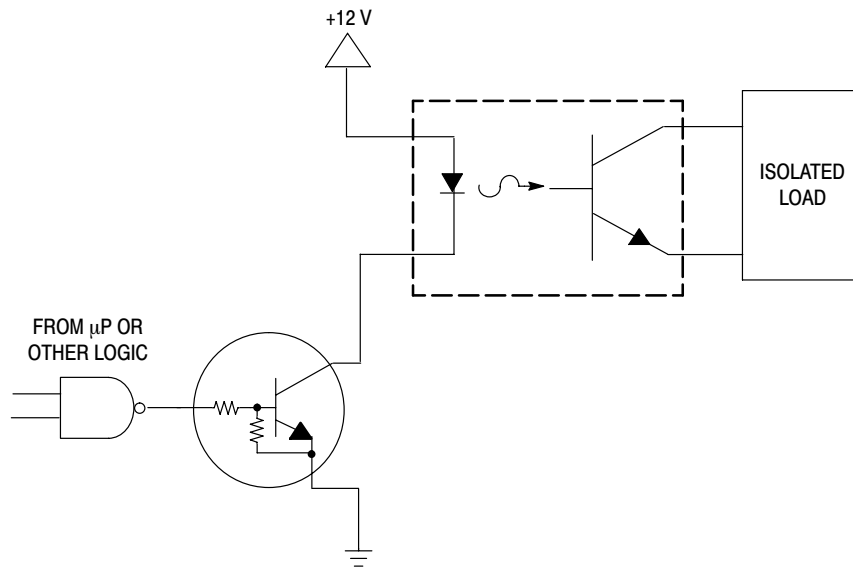


Figure 47. Level Shifter: Connects 12 or 24 Volt Circuits to Logic

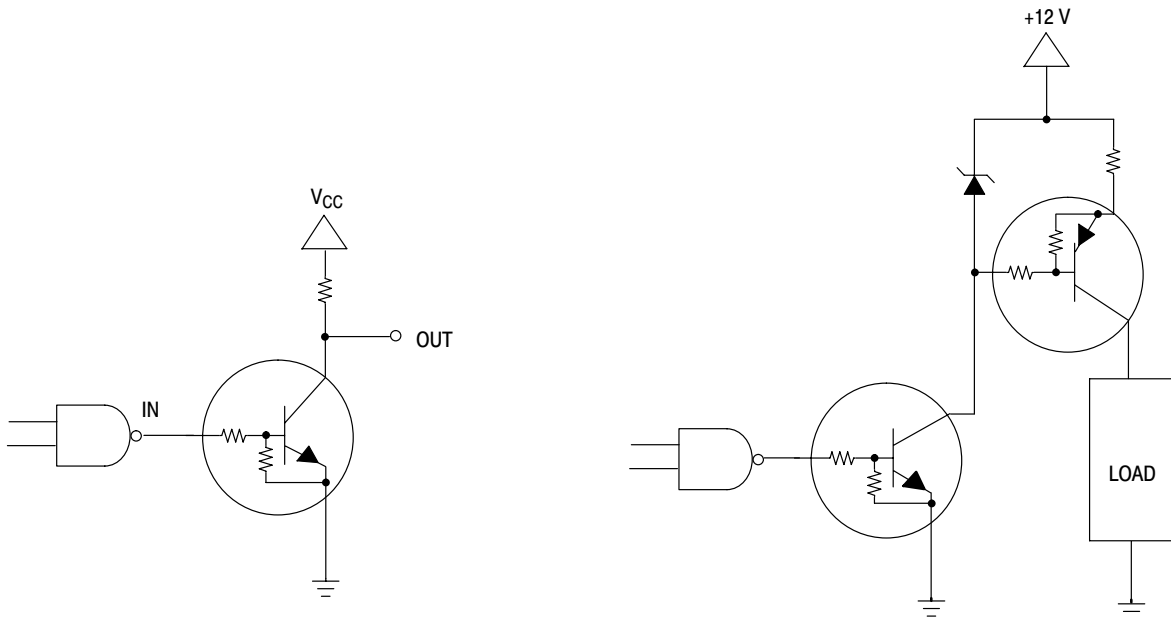


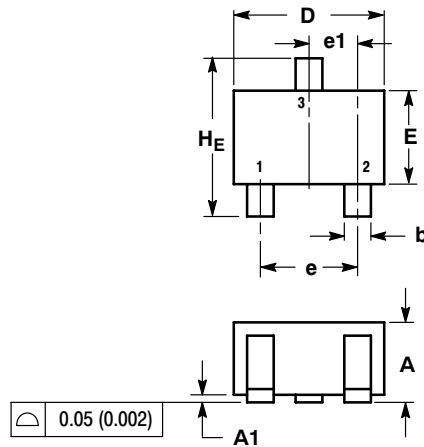
Figure 48. Open Collector Inverter:
Inverts the Input Signal

Figure 49. Inexpensive, Unregulated Current Source

MUN5211T1 Series

PACKAGE DIMENSIONS

SC-70/SOT-323
CASE 419-04
ISSUE M

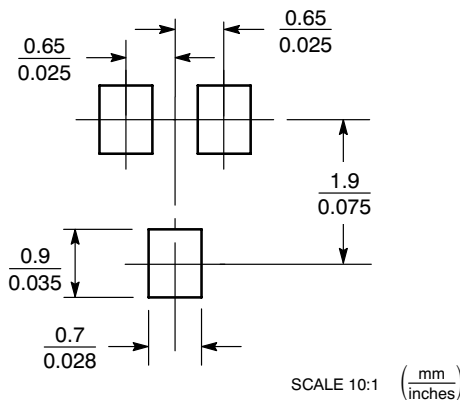


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI
Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.7 REF			0.028 REF		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.425 REF			0.017 REF		
HE	2.00	2.10	2.40	0.079	0.083	0.095

STYLE 3:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



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

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