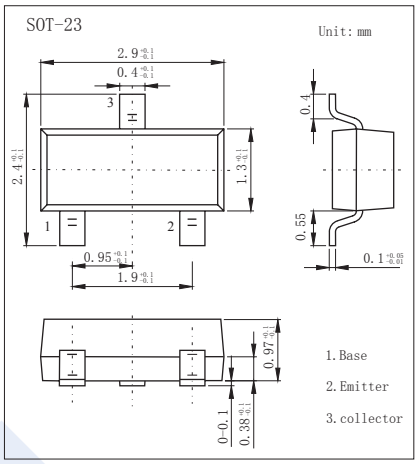
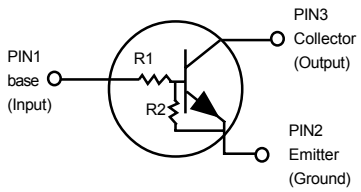
NPN Transistors

MUN2211 ~ MUN2234



■ Features

- Collector Current Capability I_C=100mA
- Collector Emitter Voltage V_{CEO}=50V



■ Absolute Maximum Ratings Ta = 25℃

Parameter	Symbol	Rating	Unit
Collector - Base Voltage	V_{CBO}	50	V
Collector - Emitter Voltage	V_{CEO}	50	
Emitter - Base Voltage	V_{EBO}	6	
Collector Current - Continuous	I_C	100	mA
Collector Power Dissipation	P_C	200	mW
Derate above 25°C		1.6	mW/℃
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	625	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature Range	T_{stg}	-65 to 150	

■ Electrical Characteristics Ta = 25℃

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Collector- base breakdown voltage	V_{CBO}	I_C= 100 μA, I_E= 0		50			V
Collector- emitter breakdown voltage	V_{CEO}	I_C= 2 mA, I_B= 0		50			
Emitter - base breakdown voltage	V_{EBO}	I_E= 100 μ A, I_C= 0		6			
Collector-base cut-off current	I_{CBO}	V_{CB}= 50 V , I_E= 0				100	nA
Collector- emitter cut-off current	I_{CEO}	V_{CE}= 50 V , I_E= 0				500	
Emitter cut-off current	I_{EBO}	V_{EB}= 6V , I_C=0	MUN2211			0.5	mA
			MUN2212			0.2	
			MUN2213			0.1	
			MUN2214			0.2	
			MUN2215			0.9	
			MUN2216			1.9	
			MUN2230			4.3	
			MUN2231			2.3	
			MUN2232			1.5	
			MUN2233			0.18	
			MUN2234			0.13	

NPN Transistors

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■ Electrical Characteristics Ta = 25℃

Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C=10 mA, I_B=0.3mA MUN2211~MUN2214			0.25	V
		I_C=10 mA, I_B=5mA MUN2230,MUN2231				
		I_C=10 mA, I_B=1mA MUN2215,MUN2216				
		I_C=10 mA, I_B=1mA MUN2232,MUN2233,MUN2234				
Output Voltage (on)	V_{OL}	V_{CC}=5V,V_B=2.5V, R_L=1KΩ			0.2	
		V_{CC}=5V,V_B=3.5V, R_L=1KΩ MUN2213				
Output Voltage (off)	V_{OH}	V_{CC}=5V,V_B=0.5V, R_L=1KΩ	4.9			
		V_{CC}=5V,V_B=0.05V, R_L=1KΩ MUN2230				
		V_{CC}=5V,V_B=0.25V, R_L=1KΩ MUN2215/16/33				
DC current gain	h_{FE}	V_{CE}= 10V, I_C= 5mA MUN2211	35			
		MUN2212	60			
		MUN2213,MUN2214	80			
		MUN2215,MUN2216	160			
		MUN2230	3			
		MUN2231	8			
		MUN2232	15			
		MUN2233	80			
		MUN2234	80			
Input Resistor	R1	MUN2211	7	10	13	KΩ
		MUN2212	15.4	22	28.6	
		MUN2213	32.9	47	61.1	
		MUN2214	7	10	13	
		MUN2215	7	10	13	
		MUN2216	3.3	4.7	6.1	
		MUN2230	0.7	1	1.3	
		MUN2231	1.5	2.2	2.9	
		MUN2232	3.3	4.7	6.1	
		MUN2233	3.3	4.7	6.1	
		MUN2234	15.4	22	28.6	
Resistor Ratio	R1/R2	MUN2211,MUN2212,MUN2213	0.8	1	1.2	
		MUN2214	0.17	0.21	0.25	
		MUN2215,MUN2216	-	-	-	
		MUN2230,MUN2231,MUN2232	0.8	1	1.2	
		MUN2233	0.055	0.1	0.185	
		MUN2234	0.38	0.47	0.56	

■ Marking

NO	MUN2211	MUN2212	MUN2213	MUN2214	MUN2215	MUN2216
Marking	8A	8B	8C	8D	8E	8F

NO	MUN2230	MUN2231	MUN2232	MUN2233	MUN2234
Marking	8G	8H	8J	8K	8L

NPN Transistors

MUN2211 ~ MUN2234

■ Typical Characterisitics

MUN2211

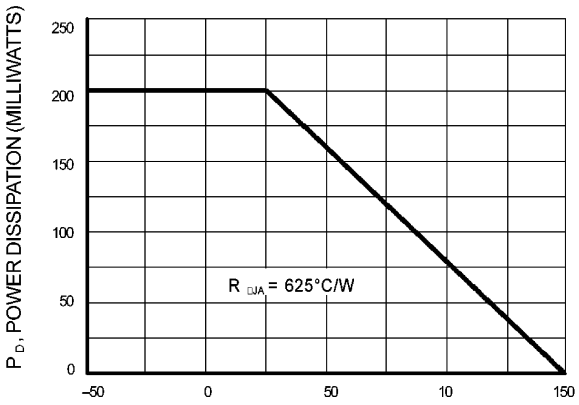

Figure 1. Derating Curve

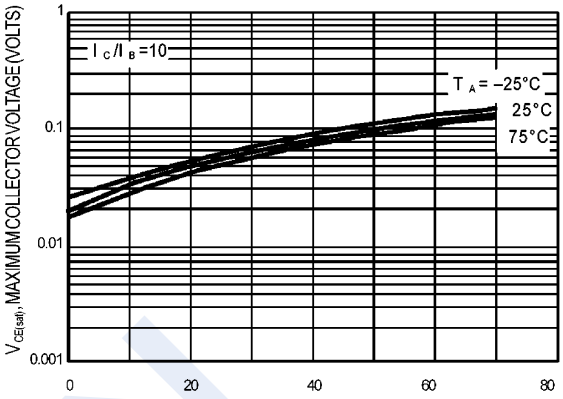

Figure 2. $V_{CE(sat)}$ versus I_C

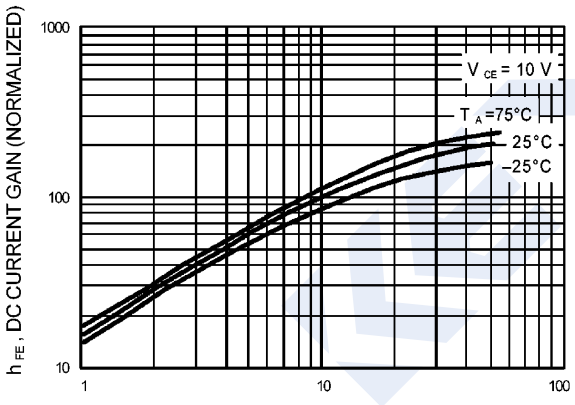

Figure 3. DC Current Gain

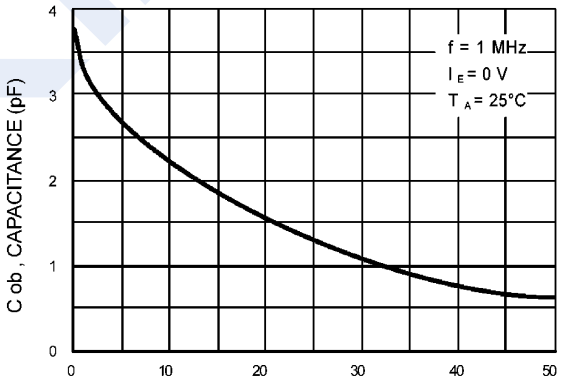

Figure 4. Output Capacitance

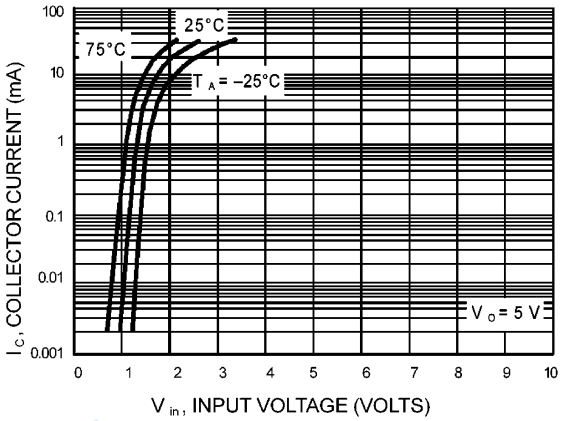

Figure 5. Output Current versus Input Voltage

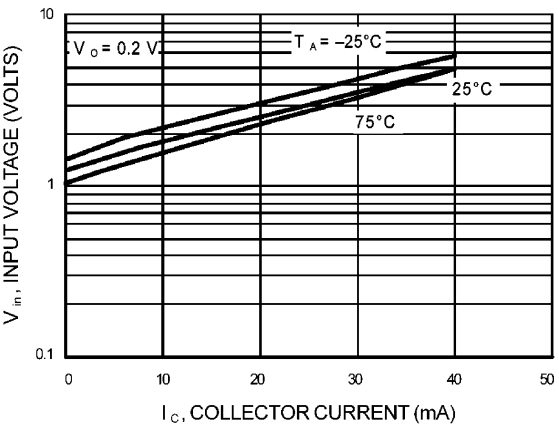

Figure 6. Input Voltage versus Output Current

NPN Transistors

MUN2211 ~ MUN2234

■ Typical Characterisitics

MUN2212

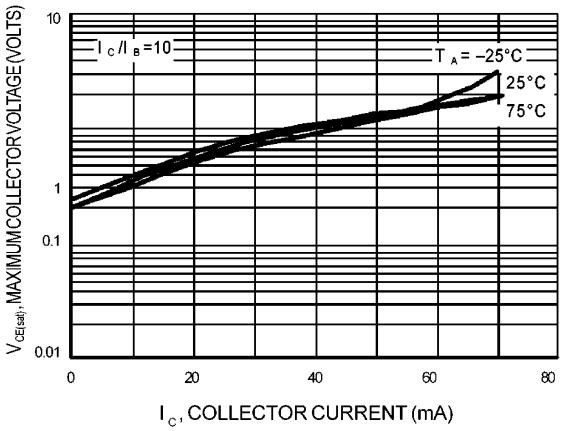

Figure 7. $V_{CE(sat)}$ versus I_C

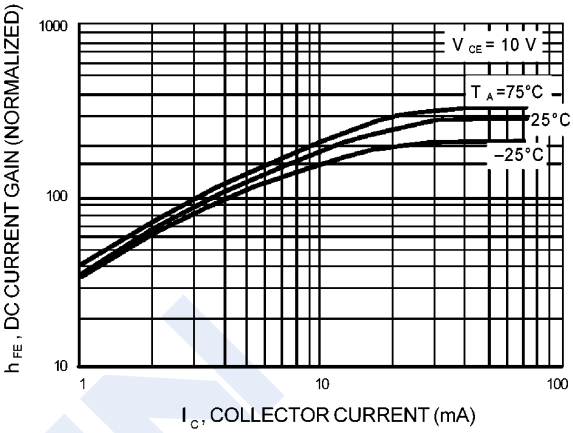

Figure 8. DC Current Gain

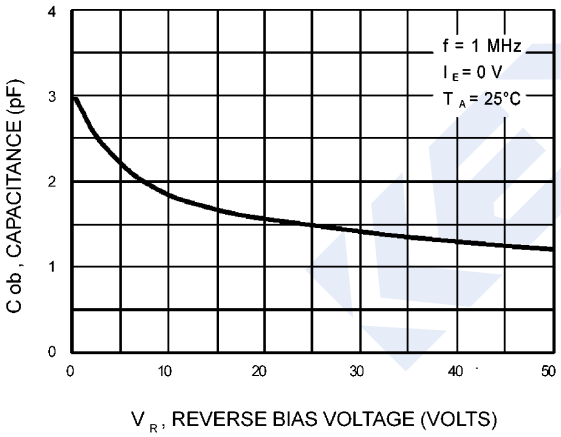

Figure 9. Output Capacitance

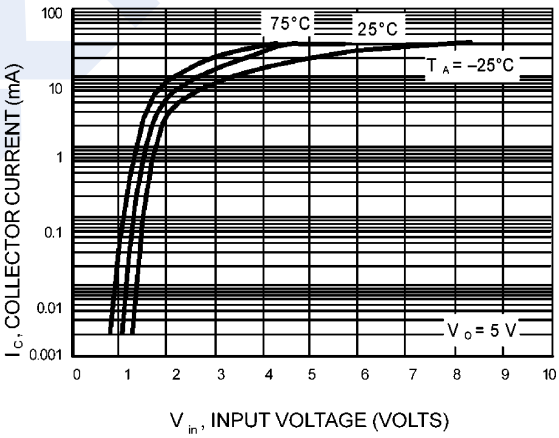

Figure 10. Output Current versus Input Voltage

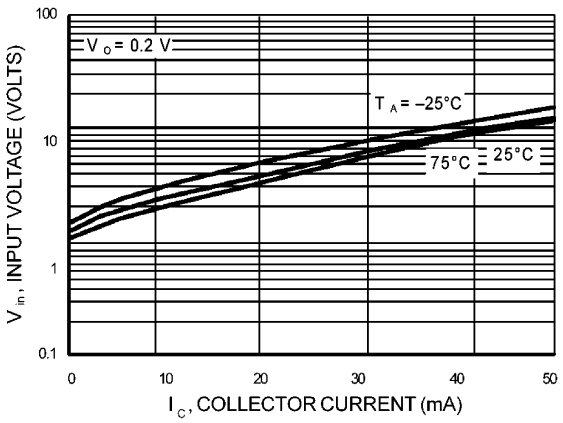

Figure 11. Input Voltage versus Output Current

NPN Transistors

MUN2211 ~ MUN2234

■ Typical Characterisitics

MUN2213

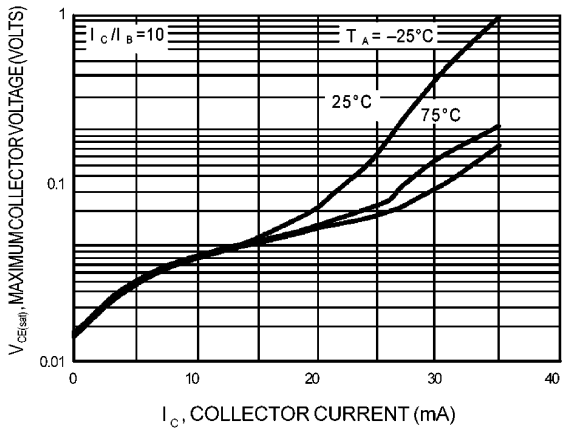

Figure 12. $V_{CE(sat)}$ versus I_C

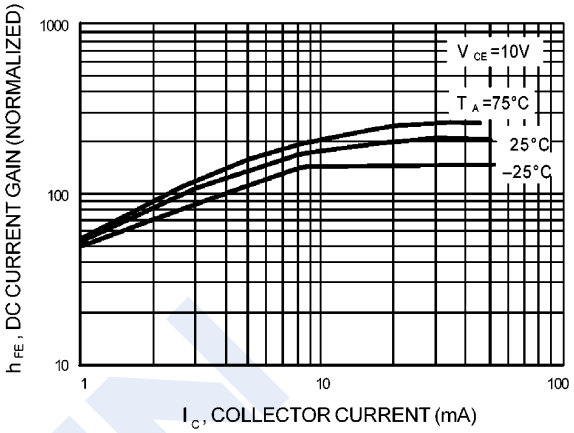

Figure 13. DC Current Gain

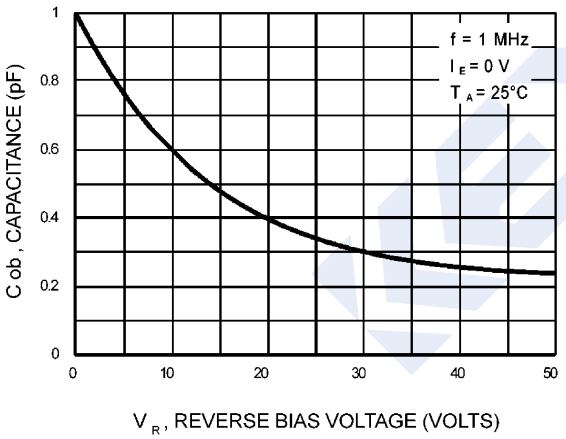

Figure 14. Output Capacitance

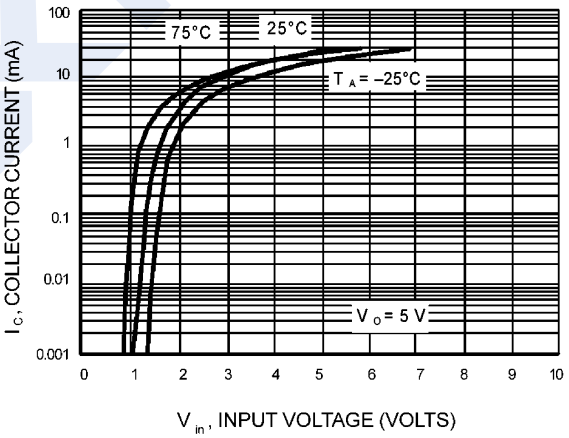

Figure 15. Output Current versus Input Voltage

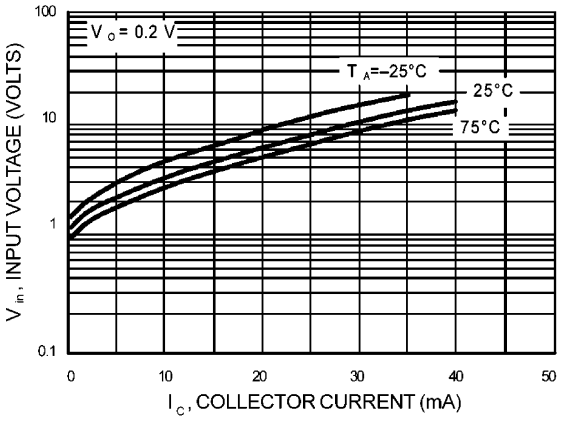

Figure 16. Input Voltage versus Output Current

NPN Transistors

MUN2211 ~ MUN2234

■ Typical Characterisitics

MUN2214

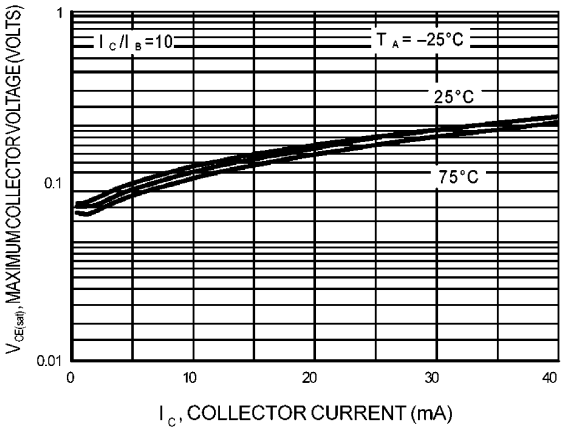

Figure 17. $V_{CE(sat)}$ versus I_C

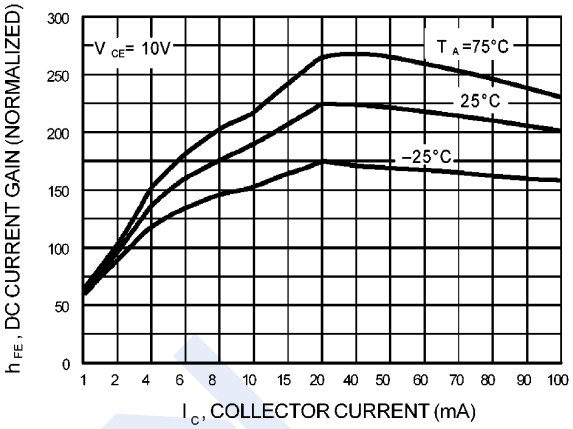

Figure 18. DC Current Gain

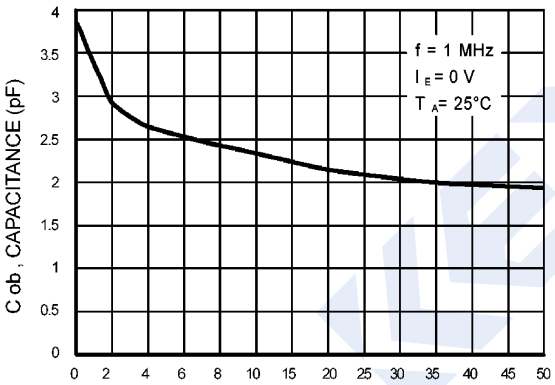

Figure 19. Output Capacitance

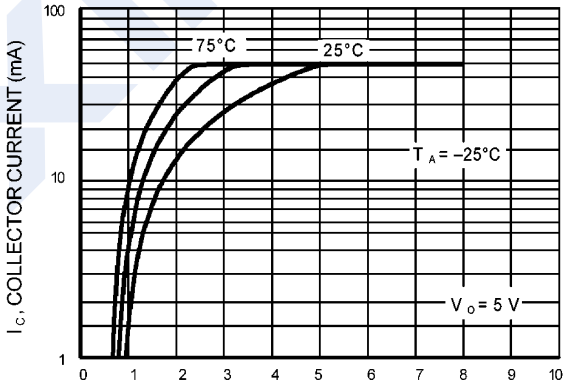

Figure 20. Output Current versus Input Voltage

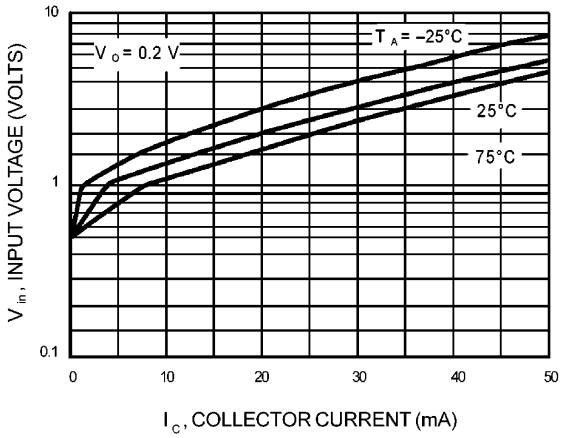

Figure 21. Input Voltage versus Output Current

NPN Transistors

MUN2211 ~ MUN2234

■ Typical Characterisitics

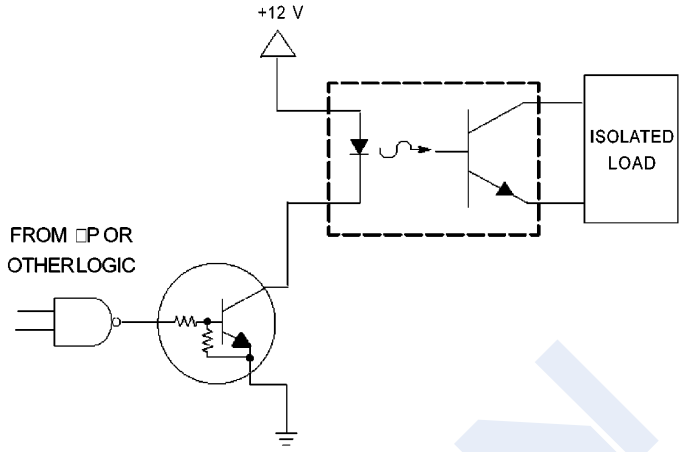

Figure 22. Level Shifter:
Connects 12 or 24 Volt Circuits to Logic

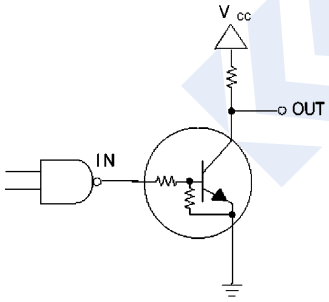

Figure 23. Open Collector Inverter:
Inverts the Input Signal

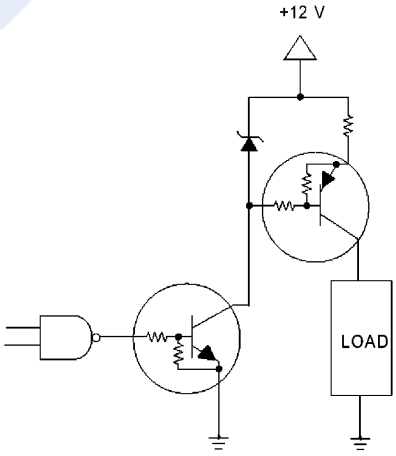

Figure 24. Inexpensive, Unregulated
Current Source