

7294621 POWEREX INC

40C 00585

D 7-33-15

A-23

DATA SHEETS

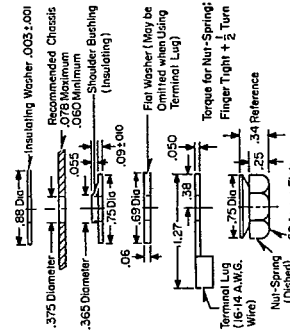
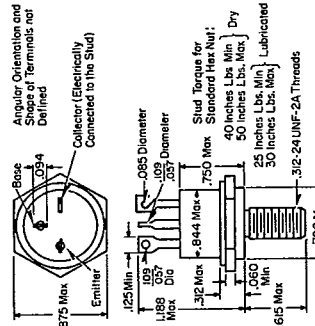


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Silicon Power Transistors JEDEC Types 2N2757-78*

30 Amperes, 200 Watts
Collector-to-Emitter Voltage 50 to 250 Volts

Dimensions in Inches



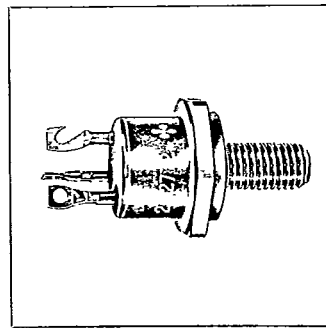
Application

The Westinghouse family of 30-ampere NPN silicon transistors is designed for high-power switching and amplifier applications. Extremely low saturation resistance, low thermal resistance, and high temperature capabilities give these devices optimum flexibility in circuit applications.

Like all Westinghouse silicon power transistors, these devices are guaranteed free from second breakdown when operated within their specified safe operating conditions. Hard solder construction assures freedom from thermal fatigue. These devices also feature Westinghouse exclusive quality assurance with 100 per cent power testing for the ultimate in application reliability. In addition, each production lot is further subjected to rigid environmental testing. All carry the Westinghouse Lifetime Guarantee.

***Westinghouse Lifetime Guarantee**
Westinghouse warrants to the original purchaser that it will correct any defect or defects in workmanship, by repair or replacement f.o.b. factory, for any silicon power semiconductor bearing this symbol $\pm$ tw during the life of the equipment in which it is originally installed, provided said device is used within manufacturer's published ratings and applied in accordance with good engineering practice. This warranty shall constitute a fulfillment of all Westinghouse liabilities in respect to said products. This warranty is exclusive and in lieu of all other warranties of quality, whether written, oral, or implied (including any warranty of merchantability or fitness for purpose). Westinghouse shall not be liable for any consequential damages.

Westinghouse



Thermal Characteristics

Thermal resistance, θ_{JC} , °C/watt, max. .05
Power dissipation, P_T at $T_C = 75^\circ\text{C}$
watts, max.200
Typical thermal drop, case to
heat sink, °C/watt.0.3

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Maximum Ratings

Voltage

Collector to emitter, 2N2757	2N2763	2N2769	2N2775	50
$V_{CE} @ V_{BE} = -15 \text{ Vdc}$, 2N2758	2N2764	2N2770	2N2776	100
2N2759	2N2765	2N2771	2N2777	150
2N2760	2N2766	2N2772	2N2778	200
2N2761				250

Emitter to base, V_{EB} , Vdc..... 15Collector to base, V_{CB} , Vdc..... equal to rated Vce

Current

Collector current, I_C , Adc.....	30
Base current, I_B , Adc.....	7.5

Temperature

Junction temperature, T_J , °C.....	+175
Storage temperature, T_{stg} , °C min.....	-65
max.....	+175

② The maximum collector to emitter voltage rating is guaranteed up to the maximum rated power dissipation of the transistor with the base emitter forward biased.

③ The maximum collector to emitter voltage rating is below the various "break-down" voltages, BV_{CES} , BV_{CES} , BV_{CES} and the $a_m = 1$ curve in the sustaining region, V_{CE} (sus). Each transistor is power tested within its maximum limits of V_{CE} , P_D and I_C . (e.g. figure 20).

Electrical Characteristics, 2N2757-61 Series

 $T_C = 25^\circ\text{C}$ unless otherwise specified

Symbol	Minimum	Typical	Max.	Units
Min. collector-emitter sustaining voltage at $I_C = 200 \text{ mA}$, $I_B = 0$ ②				
Collector current at $V_{CE} = V_{CE}$ (Ref. voltage ratings), $T_C = 175^\circ\text{C}$, $V_{BE} = -1.5 \text{ Vdc}$				mA
Emitter current at $V_{BE} = -15 \text{ Vdc}$, $I_C = 0$, $T_C = 175^\circ\text{C}$				mAdc
Saturation voltage at $I_C = 10 \text{ Adc}$, $I_B = 2 \text{ Adc}$ ③				Vdc
Dc current gain at $V_{CE} = 4 \text{ Vdc}$, $I_C = 10 \text{ Adc}$ ③				
Base voltage, at $I_C = 10 \text{ Adc}$, $I_B = 2 \text{ Adc}$ ③				Vdc
Beta cut-off frequency at $V_{CE} = 12 \text{ Vdc}$, $I_C = 2.5 \text{ Adc}$				kHz
Turn-on time at $I_C = 10 \text{ Adc}$, $I_B \text{ on} = 3 \text{ Adc}$, $V_{CE} = 12 \text{ Vdc}$				$t_d + t_r$
Turn-off time at $I_C = 10 \text{ Adc}$, $I_B \text{ off} = -3 \text{ Adc}$, $V_{CE} = 12 \text{ Vdc}$, $V_{BE} \text{ off} = -15 \text{ Vdc}$				$t_d + t_f$

③ Pulsed dc test; pulse duration 300 μsec ; duty cycle $\leq 2\%$.

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Typical Characteristics, 2N2757-61 Series

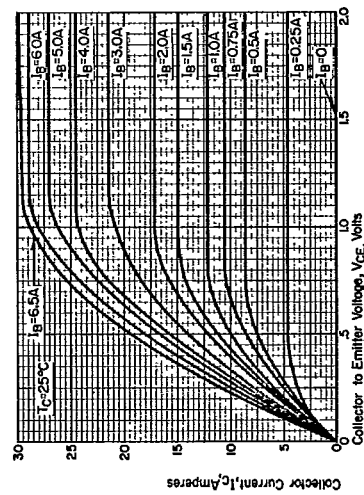


Figure 1. Output characteristics - saturation region.

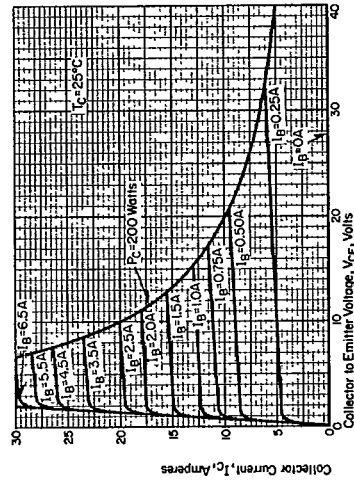


Figure 2. Output characteristics.

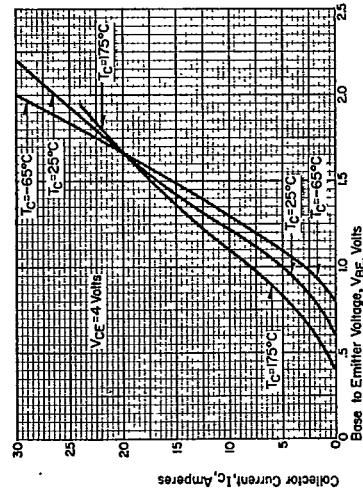


Figure 3. Transconductance characteristics.

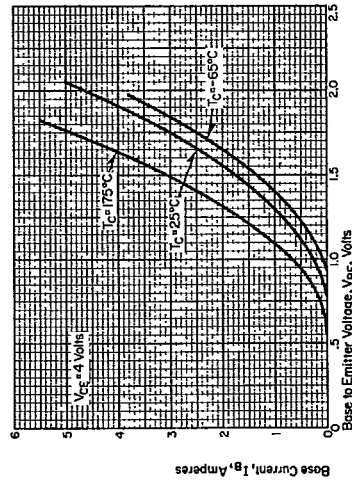


Figure 4. Input characteristics.

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Electrical Characteristics, 2N2763-66 Series

 $T_C = 25^\circ\text{C}$ unless otherwise specified

Symbol	Minimum	Typical	Max.	Units
Min. collector-emitter sustaining voltage at $I_C = 200\text{ mA}$, $I_B = 0$				Vdc
Collector current at $V_{CE} = V_{CE(sus)}$ (Ref. voltage ratings), $T_C = 175^\circ\text{C}$, $V_{BE} = -1.5\text{ Vdc}$		8	30	mAdc
Emitter current at $V_{BE} = -15\text{ Vdc}$, $I_C = 0$, $T_C = 175^\circ\text{C}$		4	25	mAdc
Saturation voltage at $I_C = 15\text{ Adc}$, $I_B = 3\text{ Adc}$		0.63	1.5	Vdc
Dc current gain at $V_{CE} = 4\text{ Vdc}$, $I_C = 15\text{ Adc}$		10	13.5	
Base voltage, at $I_C = 15\text{ Adc}$, $I_B = 3\text{ Adc}$		1.50	2.5	Vdc
Beta cut-off frequency at $V_{CE} = 12\text{ Vdc}$, $I_C = 3.75\text{ Adc}$		14.5		kHz
Turn-on time at $I_C = 15\text{ Adc}$, $I_B\text{ on} = 4.5\text{ Adc}$, $V_{CE} = 12\text{ Vdc}$		3.8		μsec
Turn-off time at $I_C = 15\text{ Adc}$, $I_B\text{ off} = -4.5\text{ Adc}$, $V_{CE} = 12\text{ Vdc}$		10		μsec

② Pulsed dc test, pulse duration 300 μsec , duty cycle $\leq 2\%$

Typical Characteristics, 2N2763-66 Series

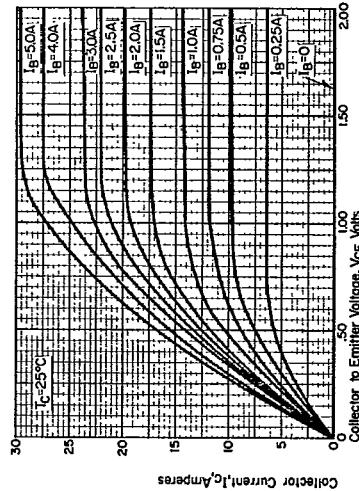


Figure 5. Output characteristics - saturation region.

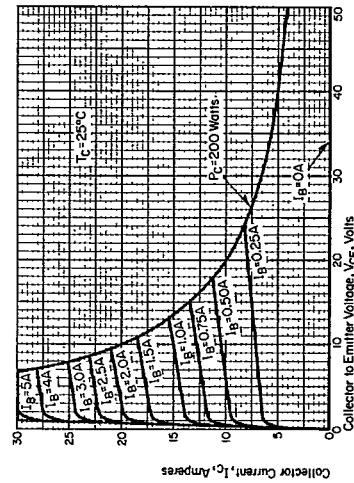


Figure 6. Output characteristics.

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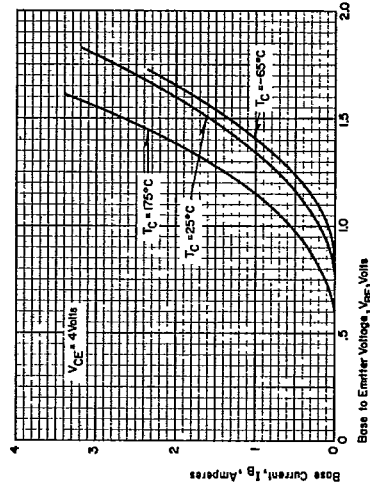


Figure 8. Input characteristics.

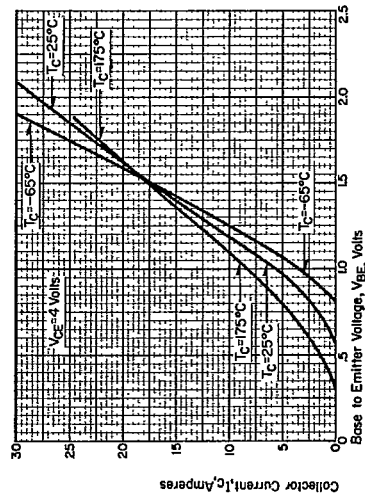


Figure 7. Transconductance characteristics.

Electrical Characteristics, 2N2769-72 Series $T_C = 25^\circ\text{C}$ unless otherwise specified

Symbol	Minimum	Typical	Max.	Units
Min. collector-emitter sustaining voltage at $I_C = 200\text{ ma}$, $I_B = 0$				V _{CE} (SUS)
Collector current at $V_{CE} = V_{CE}$ (Ref. voltage ratings), $T_C = 175^\circ\text{C}$, $V_{BE} = -1.5\text{ Vdc}$				I _{CX}
Emitter current at $V_{BE} = -15\text{ Vdc}$, $I_C = 0$, $T_C = 175^\circ\text{C}$				I _{EO}
Saturation voltage at $I_C = 20\text{ Adc}$, $I_B = 4\text{ Adc}$				V _{CE} (sat)
Dc current gain at $V_{CE} = 4\text{ Vdc}$, $I_C = 20\text{ Adc}$				h _{FE}
Base voltage, at $I_C = 20\text{ Adc}$, $I_B = 4\text{ Adc}$				V _{BE} (sat)
Beta cut-off frequency at $V_{CE} = 12\text{ Vdc}$, $I_C = 5\text{ Ac}$				f _{hfe}
Turn-on time at $I_C = 20\text{ Adc}$, $I_B\text{ on} = 6\text{ Adc}$, $V_{CE} = 12\text{ Vdc}$				t _d + t _r
Turn-off time at $I_C = 20\text{ Adc}$, $I_B\text{ off} = -6\text{ Adc}$, $V_{CE} = 12\text{ Vdc}$, $V_{BE}\text{ off} = -15\text{ Vdc}$				t _s + t _f

② Pulsed dc test; pulse duration 300 μsec , duty cycle $\leq 2\%$.

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Typical Characteristics, 2N2769-72 Series

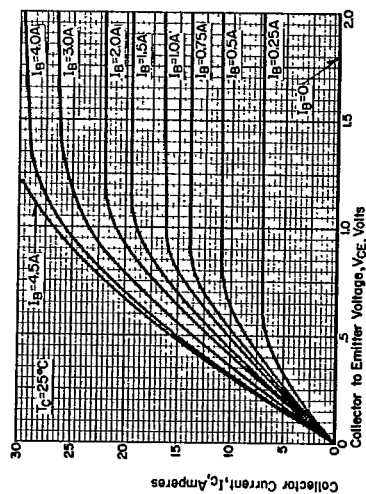


Figure 9. Output characteristics - saturation region.

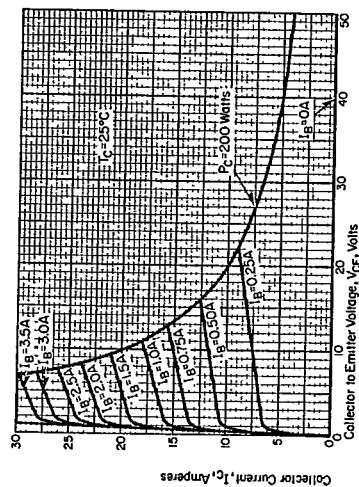


Figure 10. Output characteristics.

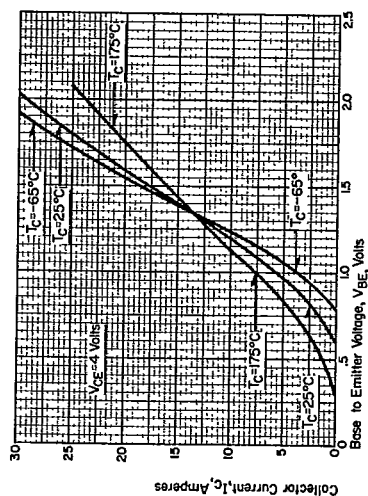


Figure 11. Transconductance characteristics.

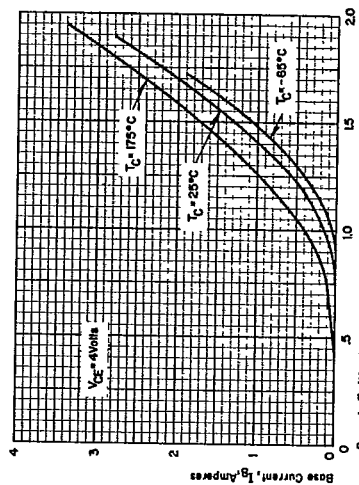


Figure 12. Input characteristics.

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Electrical Characteristics, 2N2775-2778 Series

$T_C = 25^\circ\text{C}$ unless otherwise specified

Symbol	Minimum	Typical	Max.	Units
Min. collector-emitter sustaining voltage at $I_C = 200\text{ mA}$, $I_B = 0$	$V_{CE(sus)}$			
Collector current at $V_{CE} = V_{CE(sus)}$ (Ref. voltage ratings), $T_C = 175^\circ\text{C}$, $V_{BE} = -1.5\text{ Vdc}$	I_{CEX}	8	30	mA
Emitter current at $V_{BE} = -1.5\text{ Vdc}$, $I_C = 0$, $T_C = 175^\circ\text{C}$	I_{EBO}	4	25	mA
Saturation voltage at $I_C = 25\text{ Adc}$, $I_B = 5\text{ Adc}$	$V_{CE(sat)}$	0.87	1.50	Vdc
Dc current gain at $V_{CE} = 4\text{ Vdc}$, $I_C = 25\text{ Adc}$	h_{FE}	10	12.0	
Base voltage, at $I_C = 25\text{ Adc}$, $I_B = 5\text{ Adc}$	$V_{BE(sat)}$	1.9	2.5	Vdc
Beta cut-off frequency at $V_{CE} = 12\text{ Vdc}$, $I_C = 5\text{ Adc}$	f_{β}	14.0		kHz
Turn-on time at $I_C = 25\text{ Adc}$, $I_B \text{ on} = 7.5\text{ Adc}$, $V_{CE} = 12\text{ Vdc}$	t_{on}	4.5		μsec
Turn-off time at $I_C = 25\text{ Adc}$, $I_B \text{ off} = -7.5\text{ Adc}$, $V_{CE} = 12\text{ Vdc}$	t_{off}	10.0		μsec

② Pulsed dc test; pulse duration 300 μsec ; duty cycle $\leq 2\%$.

Typical Characteristics, 2N2775-2778 Series

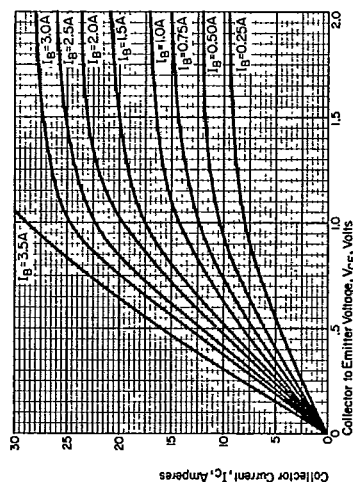


Figure 13. Output characteristics - saturation region.

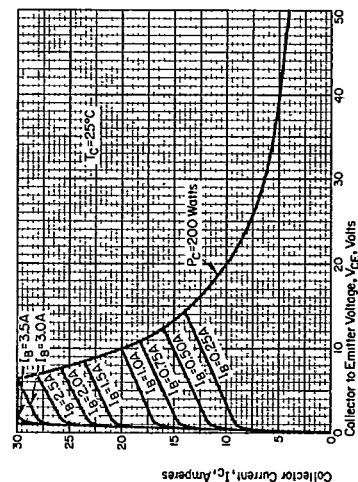


Figure 14. Output characteristics.

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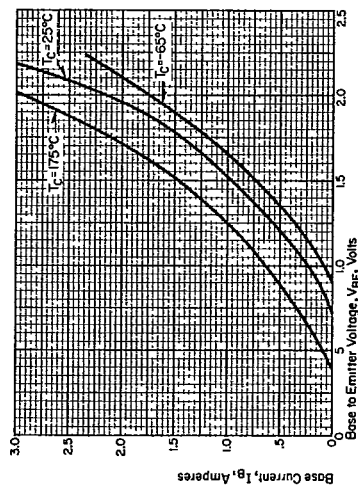


Figure 16. Input characteristics.

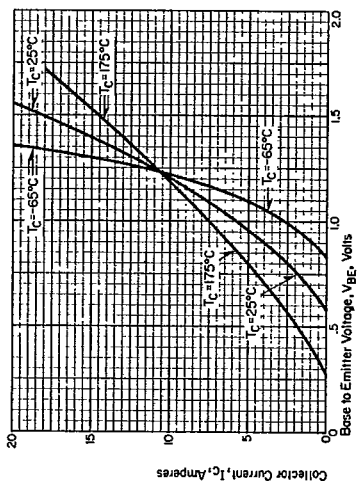


Figure 15. Transconductance characteristics.

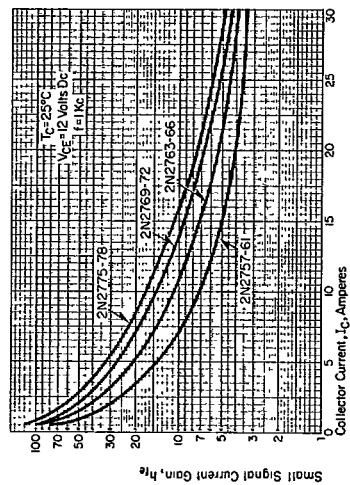


Figure 18. Small signal gain versus collector current.

Typical Characteristics, 2N2757-2778 Series

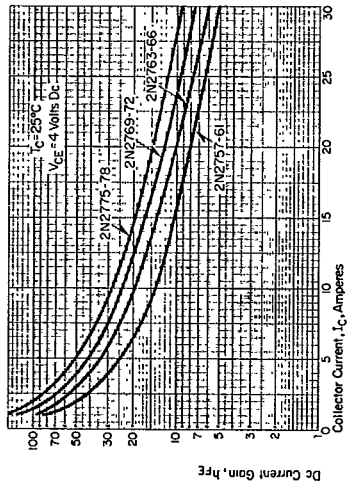


Figure 17. D-c current gain versus collector current.

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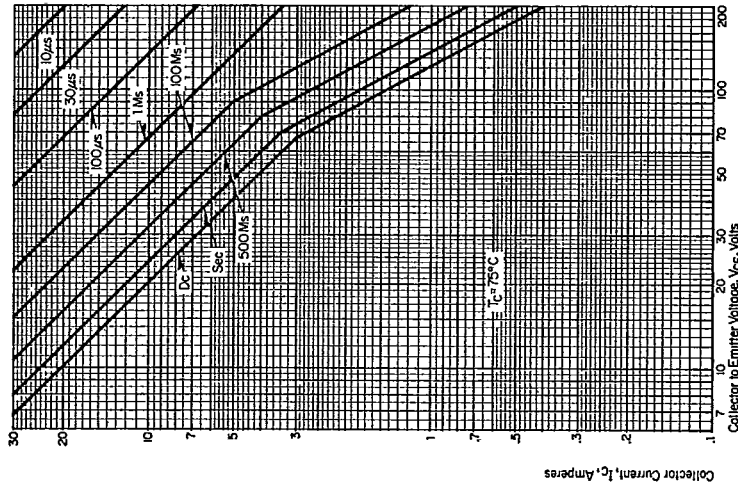


Figure 21. Forward bias safe operating conditions for 2N2760, 2N2766, 2N2772 and 2N2776.

August, 1987
Supersedes TD 64-662, pages 15 to 18, dated March, 1963
E, C/2116/DB; E, D, C/2117

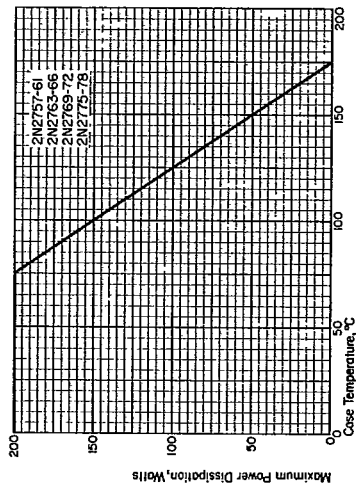


Figure 19. Derating curve for thermally limited operation.

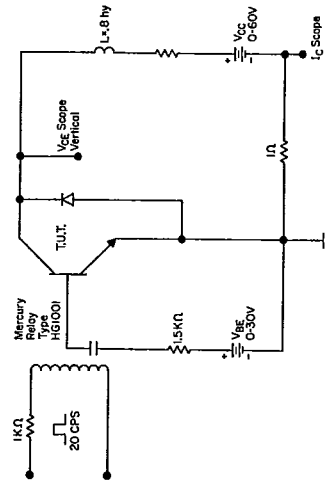


Figure 20. V_{CE} (a.u.) circuit.