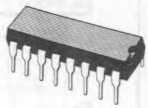
SGS-THOMSON MICROELECTRONICS

TDA3190

COMPLETE TV SOUND CHANNEL

The TDA3190 is a monolithic integrated circuit in a 16-lead dual in-line plastic package. It performs all the functions needed for the TV sound channel :

- IF LIMITER AMPLIFIER
- ACTIVE LOW-PASS FILTER
- FM DETECTOR
- DC VOLUME CONTROL
- AF PREAMPLIFIER
- AF OUTPUT STAGE



DIP-16

ORDER CODE : TDA3190

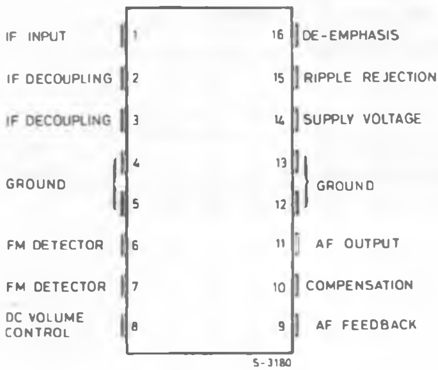
DESCRIPTION

The TDA3190 can give an output power of 4.2 W (d = 10 %) into a 16 Ω load at V_S = 24 V, or 1.5 W (d = 10 %) into an 8 Ω load at V_S = 12 V. This performance, together with the FM-IF section characteristics of high sensitivity, high AM rejection and low distortion, enables the device to be used in almost every type of television receivers.

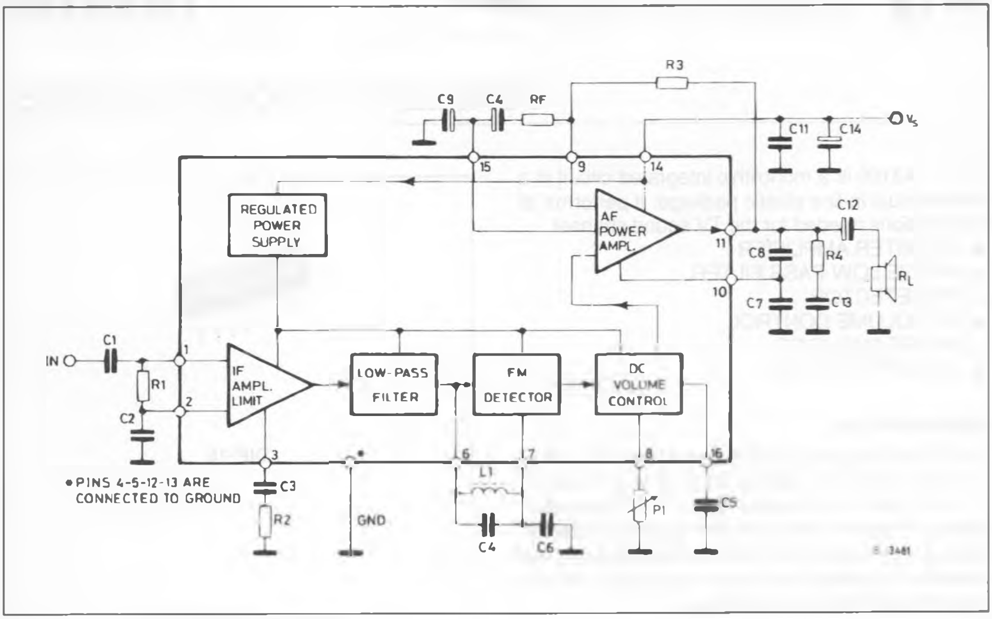
The device has no irradiation problems, hence no external screening is needed.

The TDA3190 is a pin to pin replacement of TDA1190Z.

CONNECTION DIAGRAM



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

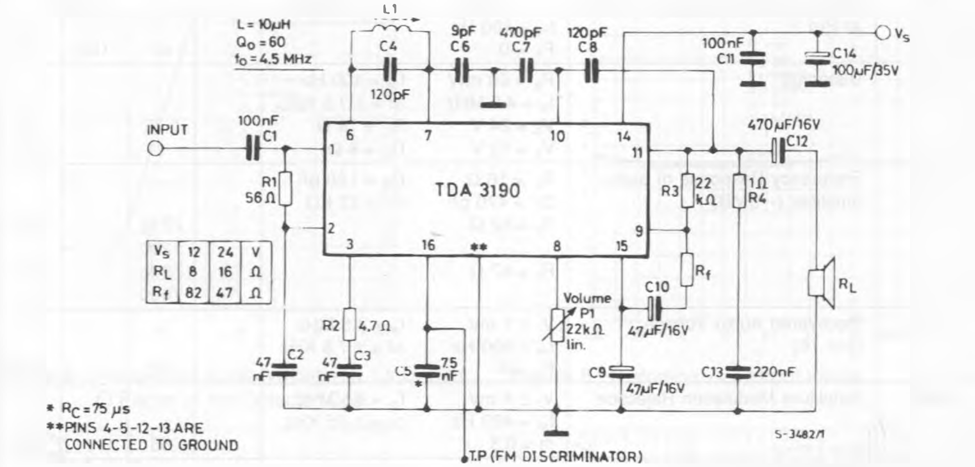
Symbol	Parameter	Value	Unit
V_S	Supply Voltage (pin 10)	28	V
V_i	Input Signal Voltage (pin 1)	1	V
I_o	Output Peak Current (non-repetitive)	2	A
I_o	Output Peak Current (repetitive)	1.5	A
P_{tot}	Power Dissipation : at T_{pins} = 90 °C at T_{amb} = 70 °C (free air)	4.3 1	W W
T_{stg}, T_j	Storage and Junction Temperature	– 40 to 150	°C

THERMAL DATA

$R_{th\ j\text{-}pins}$	Thermal Resistance Junction-pins	Max	14	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	80*	°C/W

* Obtained with the GND pins soldered to printed circuit with minimized copper area.

TEST CIRCUIT



ELECTRICAL CHARACTERISTICS (refer to the test circuit, V_s = 24 V, T_{amb} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_s	Supply Voltage (pin 14)			9		28	V
V_o	Quiescent Output Voltage (pin 11)	V_s = 24 V V_s = 12 V		11 5.1	12 6	13 6.9	V V
I_d	Quiescent Drain Current	P_1 = 22 KΩ V_s = 24 V V_s = 12 V		 11	 22 19	 45 40	 mA mA
Po	Output Power	d = 10 % f_o = 4.5 MHz V_s = 24 V V_s = 12 V	f_m = 400 Hz Δf = ± 25 KHz R_L = 16 Ω R_L = 8 Ω		 4.2 1.5		 W W
		d = 2 % f_o = 4.5 MHz V_s = 24 V V_s = 12 V	f_m = 400 Hz Δf = ± 25 KHz R_L = 16 Ω R_L = 8 Ω		 3.5 1.4		 W W

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_i	Input Limiting Voltage (– 3 dB) at Pin 1	f_o = 4.5 MHz Δf = ± 7.5 KHz f_m = 400 Hz P_1 = 0		40	100	µV
d	Distortion	P_o = 50 mW f_m = 400 Hz f_o = 4.5 MHz Δf = ± 7.5 KHz V_s = 24 V R_L = 16 Ω V_s = 12 V R_L = 8 Ω		0.75 1		% %
B	Frequency Response of audio-amplifier (– 3 dB)	R_L = 16 Ω C_8 = 120 pF C_7 = 470 pF P_1 = 22 KΩ R_f = 82 Ω R_f = 47 Ω		70 to 1200 70 to 7000		Hz Hz
V_o	Recovered Audio Voltage (pin 16)	$V_i \geq$ 1 mV f_o = 4.5 MHz f_m = 400 Hz Δf = ± 7.5 KHz P_1 = 0		120		mV
AMR	Ampliture Modulation Rejection	$V_i \geq$ 1 mV f_o = 4.5 MHz f_m = 400 Hz Δ_f = ± 25 KHz m = 0.3		55		dB
$\frac{S+N}{N}$	Signal to Noise Ratio	$V_i \geq$ 1 mV V_o = 4 V f_o = 4.5 MHz f_m = 400 Hz Δf = ± 25 KHz	50	65		dB
R_3	External Feedback Resistance (between pins 9 and 11)				25	KΩ
R_i	Input Resistance (pin 1)	V_i = 1 mV fo = 4.5 MHz		30		KΩ
C_i	Input Capacitance (pin 1)			5		pF
SVR	Supply Voltage Rejection	R_L = 16 Ω f_{ripple} = 120 Hz P_1 = 22 KΩ		46		dB
A_v	DC Volume Control Attenuation	P_1 = 12 KΩ		90		dB

Figure 1 : Relative Audio Output Voltage and Output Noise vs. Input Signal.

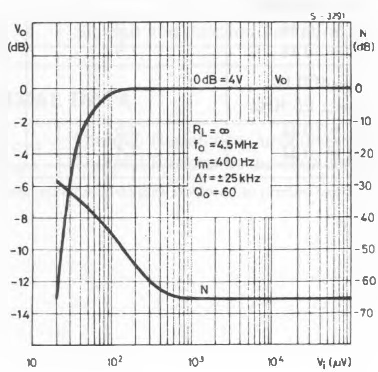


Figure 2 : Output Voltage Attenuation vs. DC Volume Control Resistance.

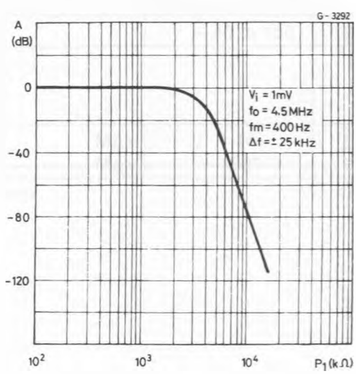


Figure 3 : Amplitude Modulation Rejection vs. Input Signal.

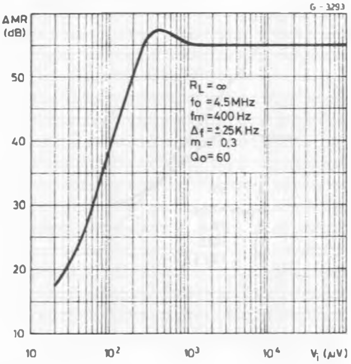


Figure 4 : Δ AMR vs. Tuning Frequency Change.

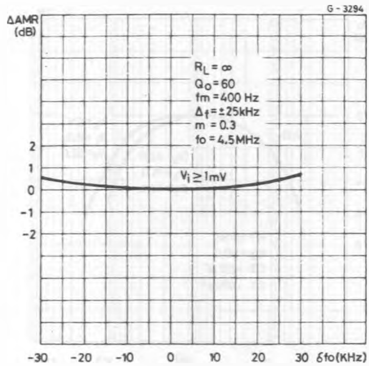


Figure 5 : Recovered Audio Voltage vs. Unloaded Q Factor of the Detector Coil.

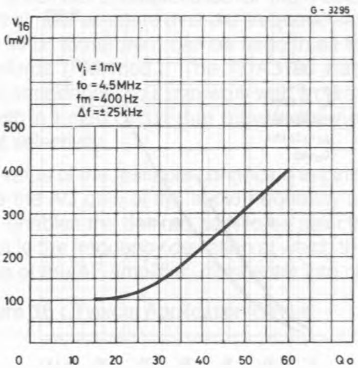


Figure 6 : Distortion vs. Output Power.

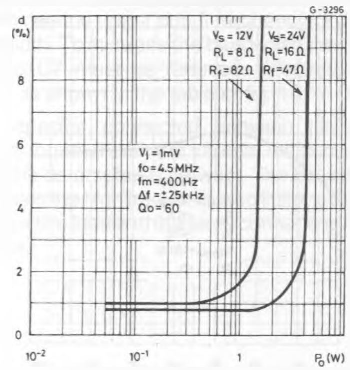


Figure 7 : Distortion vs. Frequency Deviation.

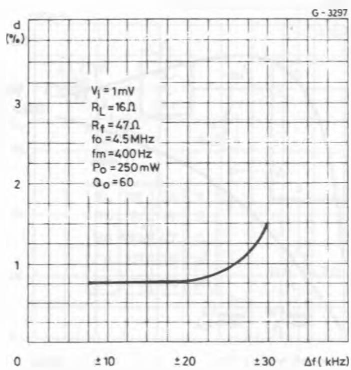


Figure 8 : Distortion vs. Tunning Frequency Change.

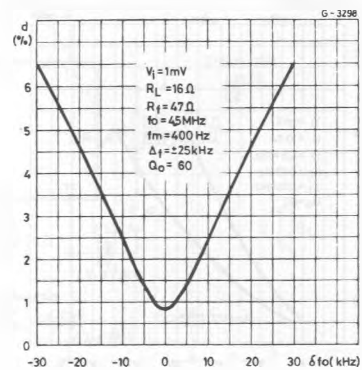


Figure 9 : Audio Amplifier Frequency Response.

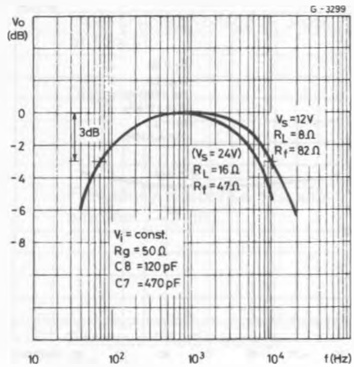


Figure 10 : Supply Voltage Ripple Rejection vs.

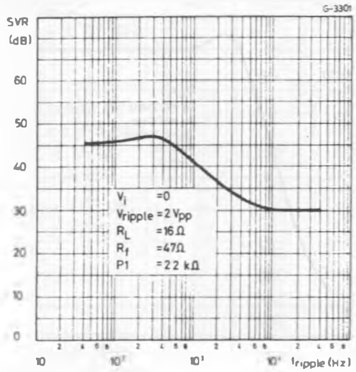


Figure 11 : Supply Voltage Ripple Rejection vs; Volume Control Attenuation.

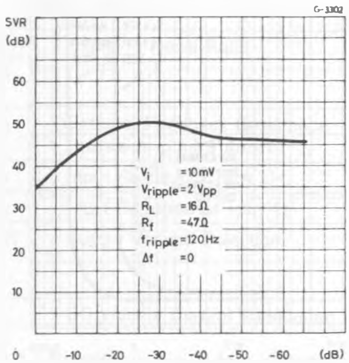


Figure 12 : Output Power vs. Supply Voltage.

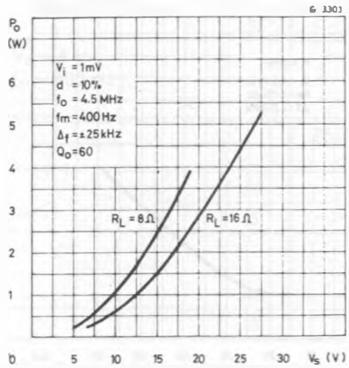


Figure 13 : Maximum Power Dissipation vs. Supply Voltage (sine wave operation).

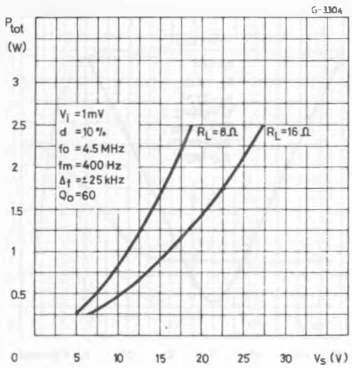


Figure 14 : Power Dissipation and Efficiency vs. Output Power.

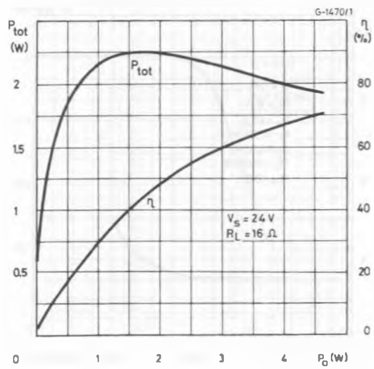
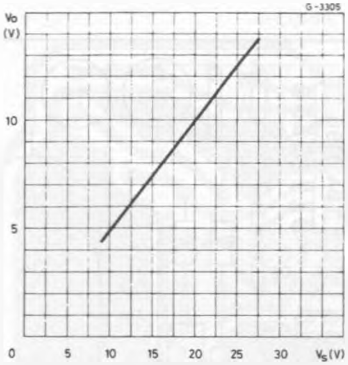


Figure 15 : Quiescent Output Voltage (pin 11) vs. Supply Voltage.



APPLICATION INFORMATION

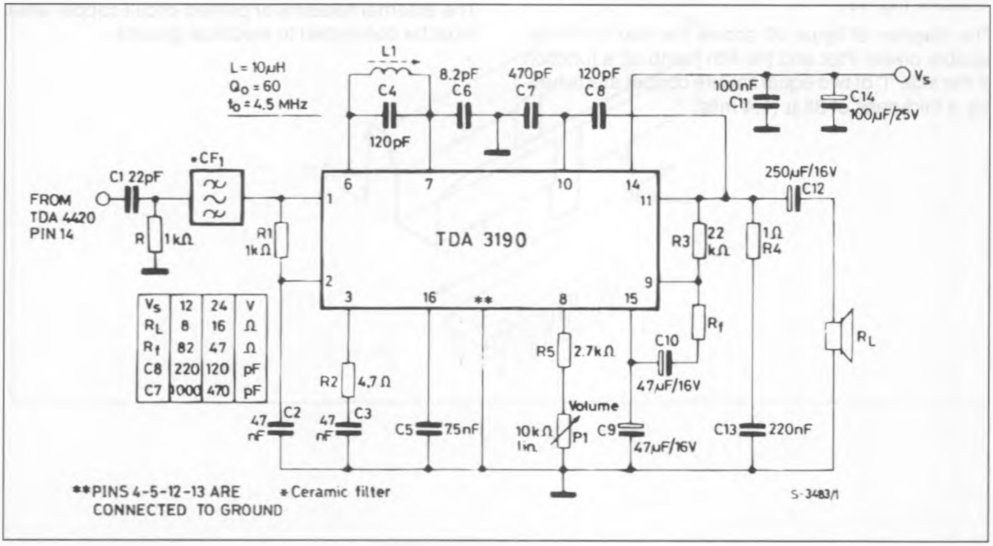
The electrical characteristics of the TDA3190 remain almost constant over the frequency range 4.5 to 6 MHz, therefore it can be used in all television standards (FM mod.). The TDA3190 has a high input impedance, so it can work with a ceramic filter or with a tuned circuit that provide the necessary input selectivity.

The value of the resistors connected to pin 9, determine the AC gain of the audio frequency amplifier. This enables the desired gain to be selected in relation to the frequency deviation at which the output stage of the AF amplifier, must enter into clipping.

Capacitor C8, connected between pins 10 and 11, determines the upper cutoff frequency of the audio bandwidth. To increase the bandwidth the values of C8 and C7 must be reduced, keeping the ratio C7/C8 as shown in the table of fig. 16.

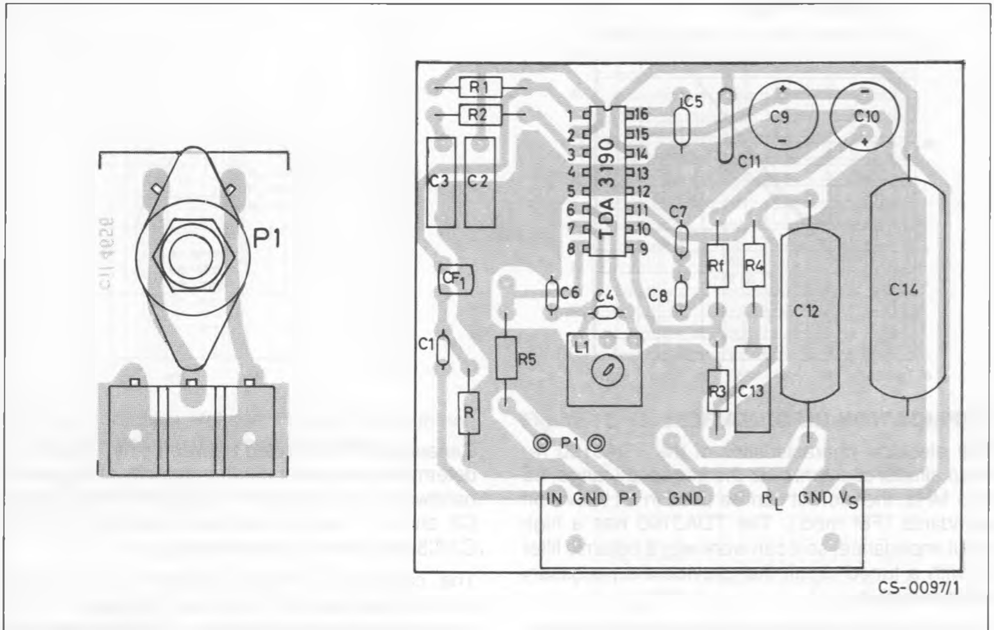
The capacitor connected between pin 16 and ground, together with the internal resistor of 10 KΩ forms the de-emphasis network. The Boucherot cell eliminates the high frequency oscillations caused by the inductive load and the wires connecting the loudspeaker.

Figure 16 : Typical Application Circuit.



V_S	12	24	V
R_L	8	16	Ω
R_f	82	47	Ω
C8	220	120	pF
C7	1000	470	pF

Figure 17 : P.C. Board and Component Layout of the Circuit Shown in Fig. 16 (1 : 1 scale).



MOUNTING INSTRUCTION

The Rth j-amb of the TDA3190 can be reduced by soldering the GND pins to a suitable copper area of the printed circuit board (fig. 18) or to an external heatsink (fig. 19).

The diagram of figure 20 shows the maximum dissipable power Ptot and the Rth j-amb as a function of the side "l" of two equal square copper areas having a thickness of 35 μ (1.4 mils).

During soldering the pins temperature must not exceed 260 °C and the soldering time must not be longer than 12 seconds.

The external heatsink or printed circuit copper area must be connected to electrical ground.

Figure 18 : Example of P.C. Board Copper Area which is used as Heatsink.

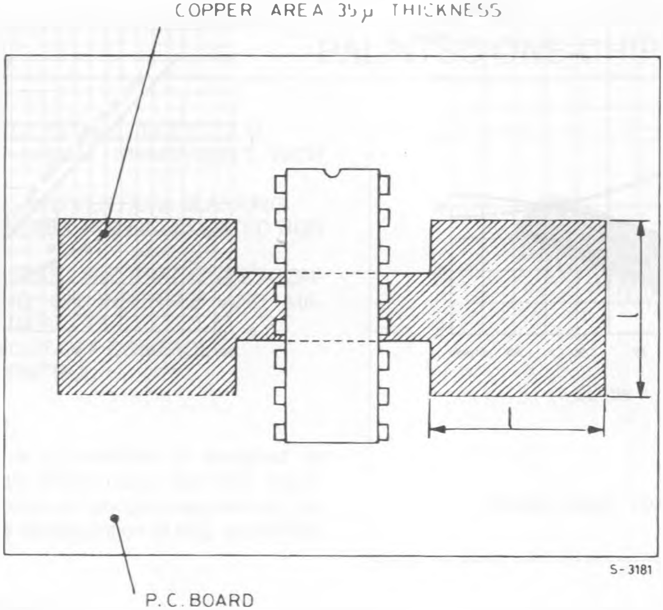


Figure 19 : External Heatsink Mounting Example.

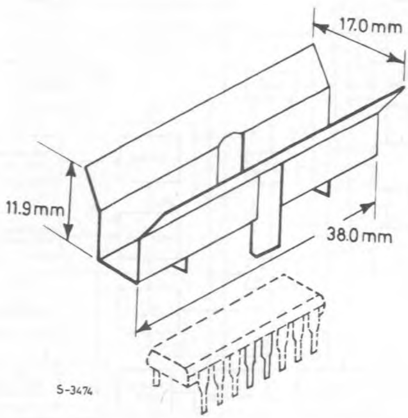


Figure 20 : Maximum Dissipable Power and Junction to Ambient Thermal Resistance vs. Side "l"

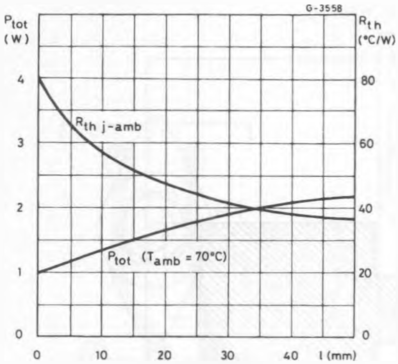


Figure 21 : Maximum Allowable Power Dissipation vs. Ambient Temperature.