Ordering number : ENA0394

SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

Monolithic Linear IC

LA42031 — Audio Output for TV application 5W Monaural Power Amplifier

Overview

LA42031 is 5W monaural AF power amplifier intended for televisions.

Functions

- 3W Monaural (V_{CC} = 9V, R_L = 8Ω, THD = 10%).
- 5W Monaural (V_{CC} = 11V, R_L = 8Ω, THD = 10%).
- Built-in standby function.
- Built-in mute function.
- Built-in various protection circuit (short to V_{CC}/short to groumd/load shorting/overheating).

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	No signal	16	V
Allowable power dissipation	Pd max	Infinitely large heat sink	15	W
Maximum junction temperature	Tj max		150	°C
Thermal resistance	θjc		3	°C/W
Operating temperature	Topr		-25 to +75	°C
Storage temperature	Tstg		-40 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		9	V
Recommended load resistance	R_L		8	Ω
Allowable operating supply voltage range	V_{CC} op		5.5 to 15	V

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SANYO Semiconductor Co., Ltd.
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Electrical Characteristics at Ta = 25°C, V_{CC} = 9V, R_L = 8Ω, f = 1kHz, Rg = 600Ω

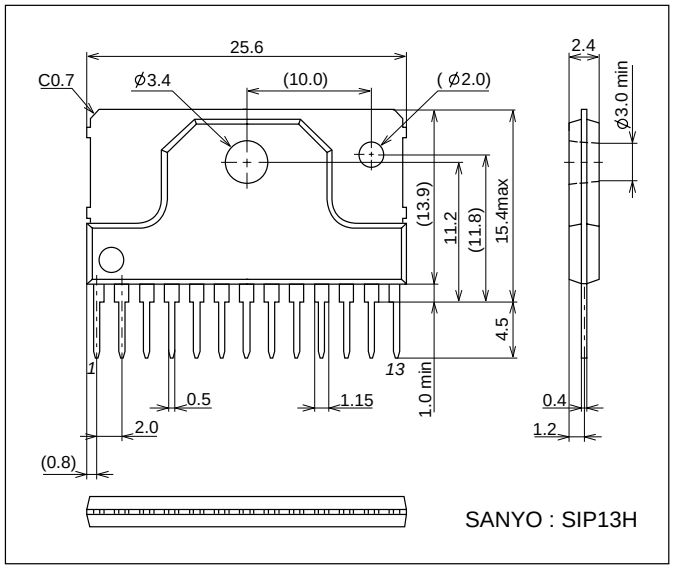
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby current	Ist	Amplifier OFF		0	10	μA
Quiescent current	I_{CCO}	Rg = 0, R_L = OPEN	25	45	90	mA
Output power	P_O1	THD = 10%	2	3		W
	P_O2	V_{CC} = 11V, THD = 10%		5		W
Total harmonic distortion	THD	P_O = 1W		0.06	0.2	%
Voltage gain	VG	V_O = 0dBm	33	35	37	dB
Output noise voltage	V_{NO}	Rg = 0, BPF = 20Hz to 20kHz		0.2	0.4	mVrms
Ripple rejection ratio	SVRR	Rg = 0, fR = 100Hz, V_{CC}R = 0dBm	40	50		dB
Mute attenuation value	ATT	V_O = 1Vrms, BPF = 20Hz to 20kHz	80	90		dB
Mute control voltage (pin 6)	Vmute	Mute ON *1	1.7		3.0	V
		Mute OFF	0		0.5	V
Standby control voltage (pin 5)	Vst	Amplifier ON *1	2.5		15	V
		Amplifier OFF	0		0.5	V
Input resistance	Ri		21	30	39	kΩ

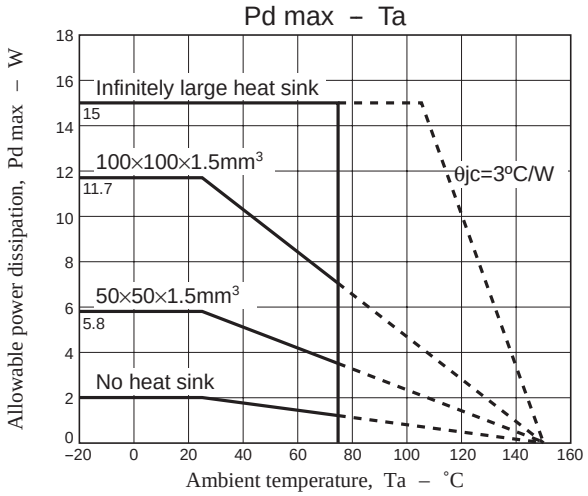
*1 : Note that the STANDBY pin (pin 5) and MUTE pin (pin 6) incorporate the anti-static diode and that decrease of the V_{CC} 7 pin potential below that of pin 5/6 causes the current to flow through the diode.

Package Dimensions

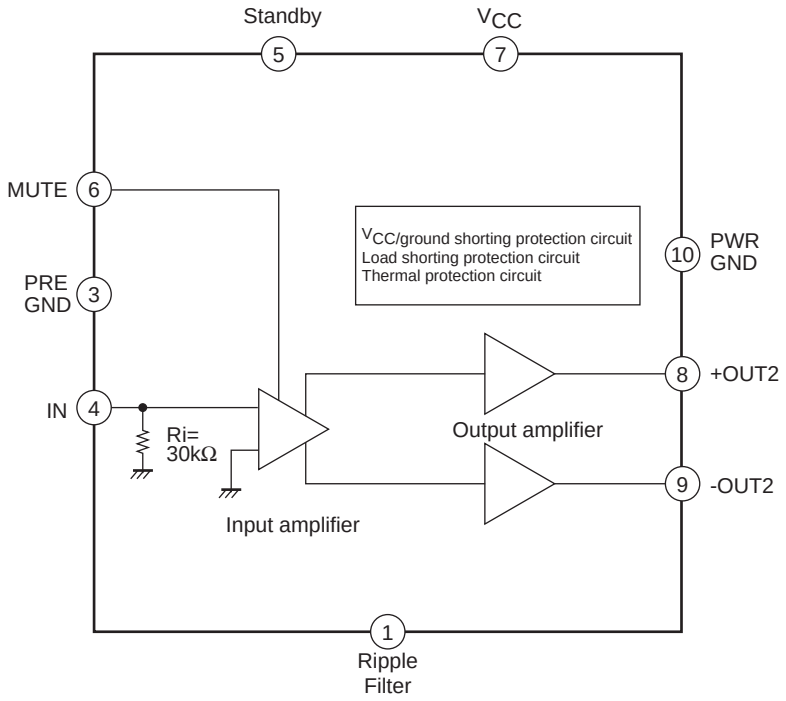
unit : mm (typ)

3107B

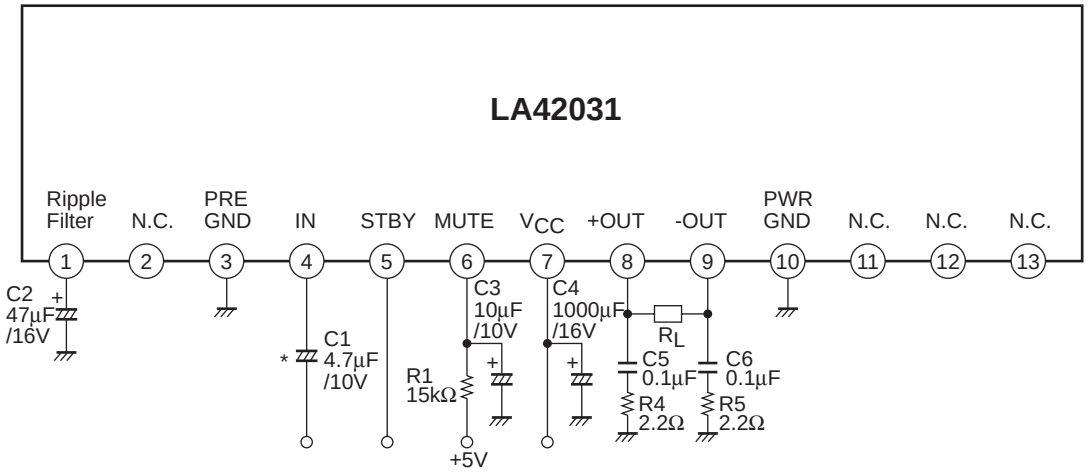




Block Diagram



Test Circuit



* LA42031 employs the zero-bias type input circuit, with the input pin potential being nearly zero (about 0.01V). Accordingly, the polarity must be determined according to the DC potential of a circuit connected to the previous stage of LA42031.

External Components

C1 : The input coupling capacitors, for which 4.7μF or less is recommended. LA42031 employs the zero-bias type input circuit, with the input pin potential being nearly zero (about 0.01V). Accordingly, the polarity must be determined according to the DC potential of a circuit connected to the previous stage of LA42031.

C2 : Capacitor for starting time of the ripple filter and amplifier, for which 47μF is recommended.

C3, R1 : Capacitor and resistor for mute. C3 is necessary even when the mute function is not used.

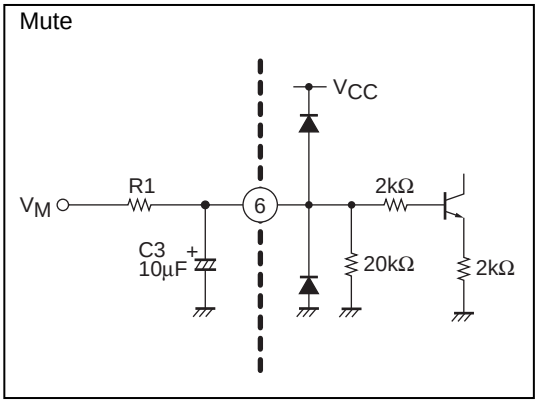
C4 : Power capacitor.

C5, C6 : Capacitor and resistor for oscillation prevention. For C5, C6, the polyester film capacitor with superior

R2, R3 temperature characteristics (Mylar capacitor) is recommended. Use R2, R3 of 2.2Ω along with the capacitor.

1. Mute function (pin 6)
   With the pin 6 voltage of 1.7V (minimum) or more, the mute function is turned ON.
   Set the V_M application voltage so that the pin 6 voltage becomes. 1.7V or more.
   The mute time constant is determined by R1 and C3. Determine the constant after careful review because it is related to the pop sound at mute ON/OFF.
   C3 is necessary even when the mute function is not used because it is related to the pop sound when the amplifier is turned ON.

   Note that the MUTE pin (pin 6) incorporates the anti-static diodo and that decrease of the V_{CC} pin 7 potential below that of pin 6 causes the current to flow through the diode.



2. Standby function (pin 5)
   The amplifier is turned ON when the voltage of 2.5V (minimum) or more is applied to pin 5.

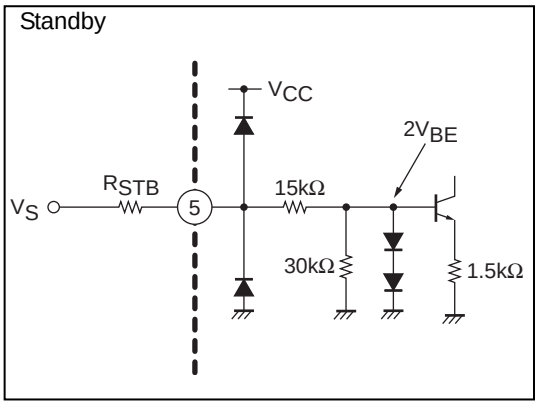
   Pin 5 control voltage

Pin 5 voltage	Amplifier	Standby
0 to 0.5	OFF	ON
2.5 to 15	ON	OFF

   To suppress the inrush current to pin 5 when the V_{STB} application voltage is high, insert the control resistor (R_{STB}).

   Example : Tosuppress the pin 5 inrush current to 500μA or less

$$R_{STB} = \frac{\text{Applied voltage } (V_{STB}) - 2V_{BE} \text{ (About 1.4V)}}{500\mu A} - 15k\Omega$$



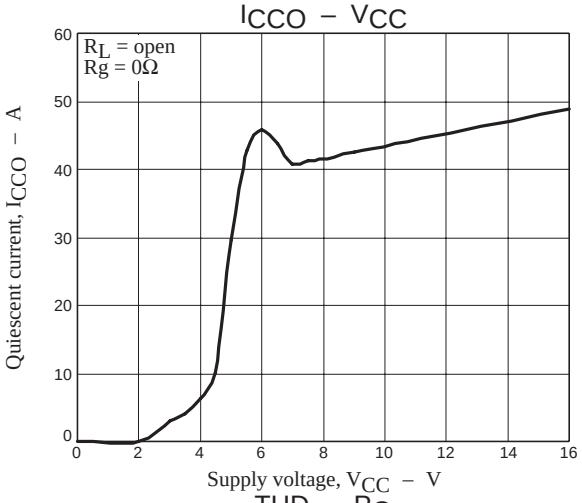
   Note that the standby pin (pin 5) incorporates the anti-electrostatic diode, allowing the cu orrent to flow through the diode when the potential of V_{CC} pin 7 decreases below that of pin 5.

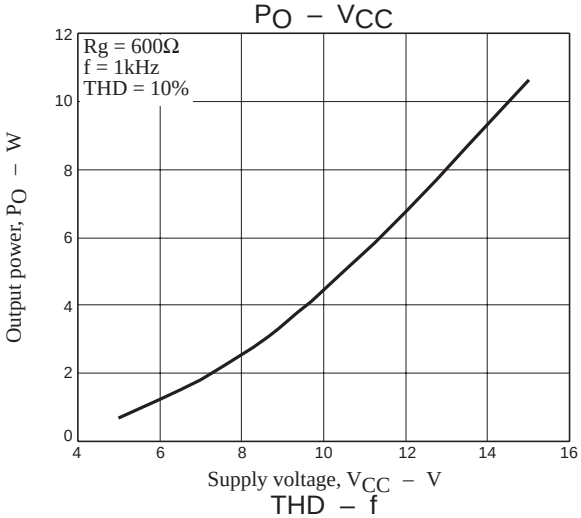
Cautions for us

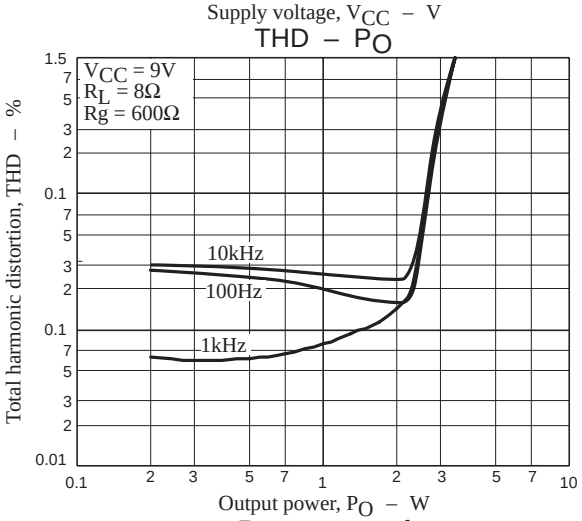
1. Short-circuit (power-output short-circuit), ground fault (GND-output short-circuit), and load short-circuit protective circuits are incorporated. They are activated in case of abnormal connection.
   These circuits remain active while such abnormal connection continues and is reset automatically when the abnormality is removed.
   In certain conditions, the protective circuits may be locked and continue to be active even when the abnormality is removed. In this case, either enter the standby mode or turn OFF the power supply.

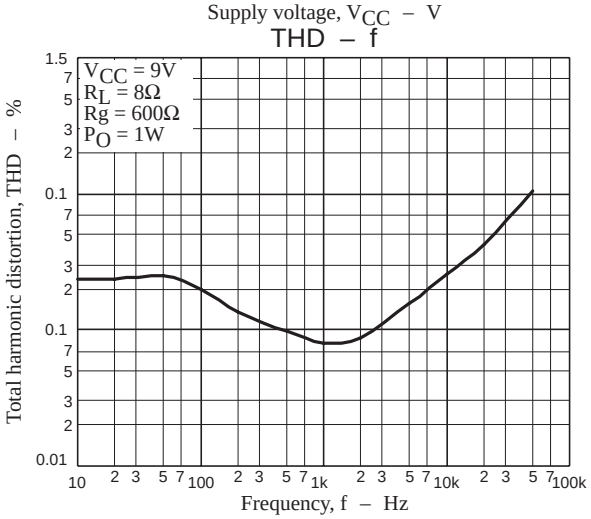
2. The thermal protection circuit is incorporated and is activated when the junction temperature (Tj) rises to about 160°C or more. The output is controlled to return gradually to the attenuated state.

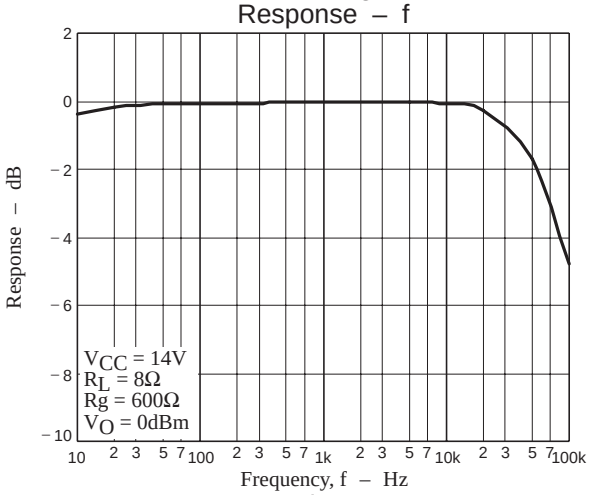
3. When the product is used near the maximum rating, even the slightest change in the condition may cause exceeding of the maximum rating, resulting possibly in breakdown. Take the sufficient margin for the supply voltage, etc. and always use the product within a range never exceeding the maximum rating.

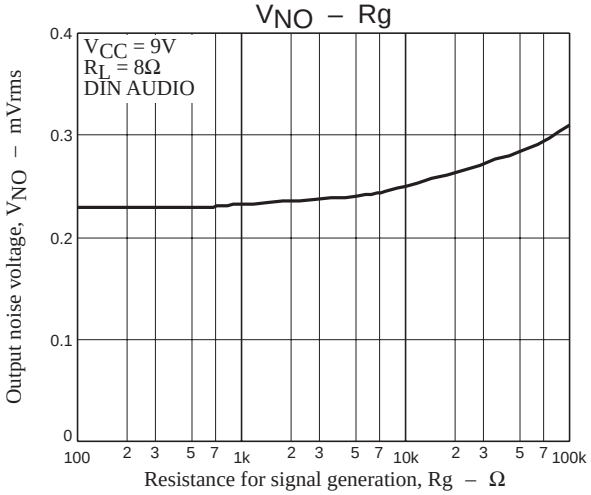

ICCO – VCC
RL = open
Rg = 0Ω
Quiescent current, ICCO – A
Supply voltage, VCC – V

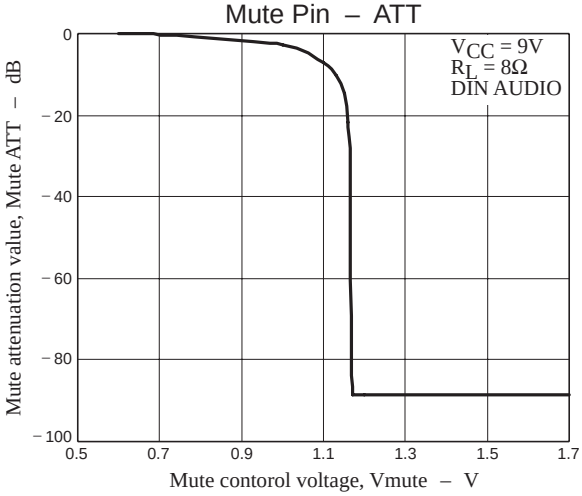

PO – VCC
Rg = 600Ω
f = 1kHz
THD = 10%
Output power, PO – W
Supply voltage, VCC – V

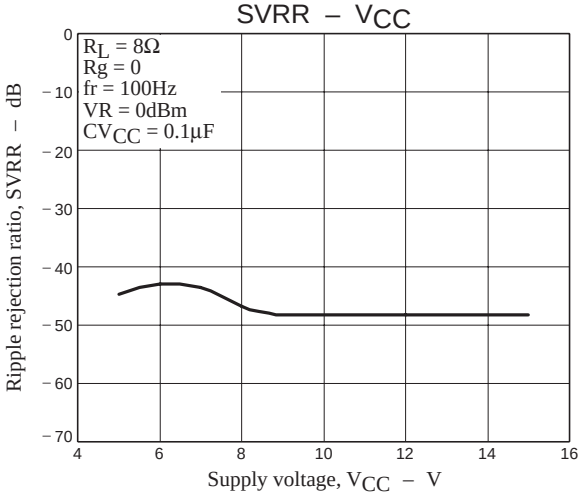

THD – PO
VCC = 9V
RL = 8Ω
Rg = 600Ω
10kHz
100Hz
1kHz
Total harmonic distortion, THD – %
Output power, PO – W


THD – f
VCC = 9V
RL = 8Ω
Rg = 600Ω
PO = 1W
Total harmonic distortion, THD – %
Frequency, f – Hz

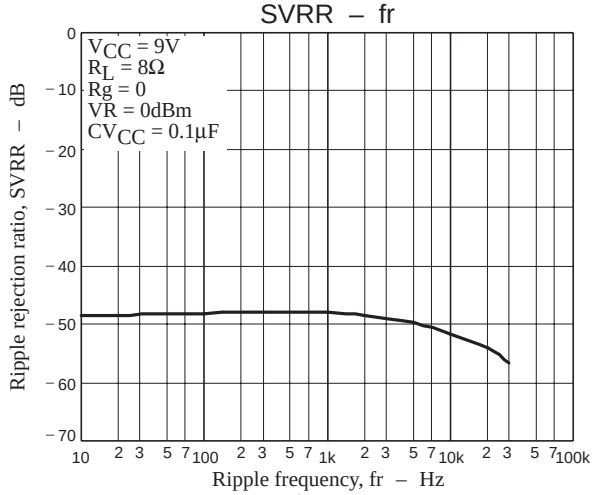

Response – f
VCC = 14V
RL = 8Ω
Rg = 600Ω
VO = 0dBm
Response – dB
Frequency, f – Hz


VNO – Rg
VCC = 9V
RL = 8Ω
DIN AUDIO
Output noise voltage, VNO – mVrms
Resistance for signal generation, Rg – Ω

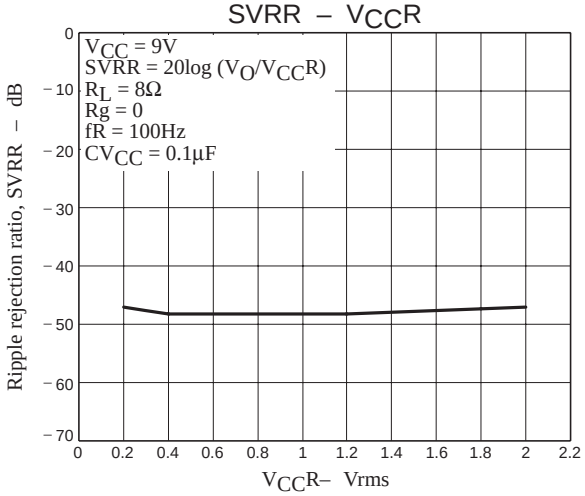

Mute Pin – ATT
VCC = 9V
RL = 8Ω
DIN AUDIO
Mute attenuation value, Mute ATT – dB
Mute contorol voltage, Vmute – V


SVRR – VCC
RL = 8Ω
Rg = 0
fr = 100Hz
VR = 0dBm
CVCC = 0.1µF
Ripple rejection ratio, SVRR – dB
Supply voltage, VCC – V

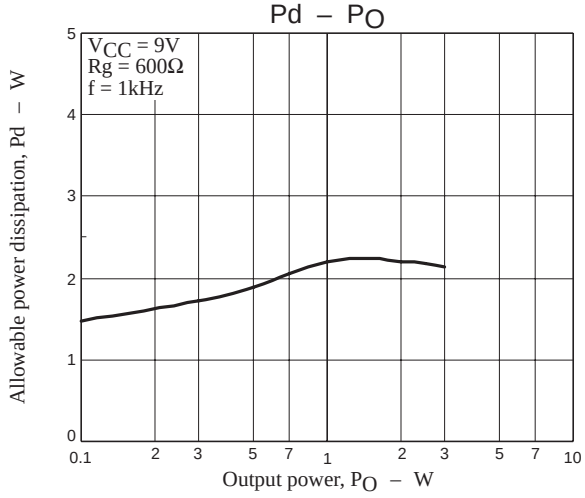
SVRR – fr



SVRR – VCCR



Pd – PO



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