Ordering number : EN982D

SANYO Semiconductors
DATA SHEET

LA2000 — Monolithic Linear IC Audio Level Sensor

DISCONTINUED PRODUCT

Overview

The LA2000 is an IC for detecting interprogram spaces to pick out the starting point of a program immediately preceding or following a musical program recorded on tape, and to detect end of tape.

Used in

- Radio-cassette recorders
- Cassette decks
- Car stereos

Applications

- Detection of spaces between programs recorded on tape
- Detection of end of tape
- Other

Features

- Has transistors capable of driving plungers with maximum 600mA, and a protective diode to prevent induced reverse voltages.
- Can provide designated time delays by externally connected capacitors and resistors.
- Has a comparator with stable hysteresis to handle variations in power supply voltage.
- Detects unrecorded portions of tape.

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		15	V
Flow-in current	I_6 max		600	mA
Allowable power dissipation	Pd max		540	mW
Operating temperature	Topr		-20 to +75	°C
Storage temperature	Tstg		-40 to +125	°C

Note : 1. The voltage at pin 8 must not exceed the supply voltage at pin 9.
2. The maximum current flowing into pin 8 should be no greater than 0.5mA.

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Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Operating voltage range	V_{CC} op		3.5 to 14	V

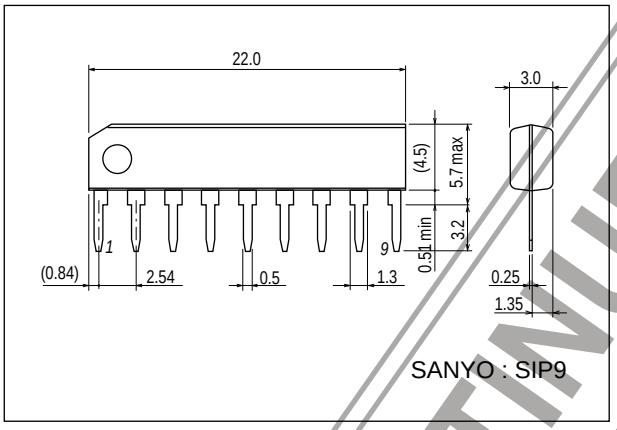
Electrical Characteristics at Ta = 25°C, V_{CC} = 9.0V, f = 1kHz

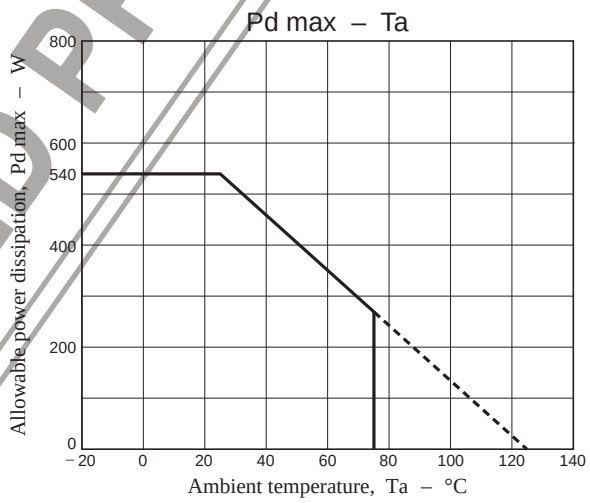
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current	I_{CC}	f = 1kHz, V_{IN} = -45dB		6	12	mA
Output transistor saturating voltage	$V_{CE\ (sat)}$	I_6 = 600mA		1.5	2.5	V
Output diode forward voltage	V_F	I_F = 600mA		1.5	2.0	V
Output-off level in input equivalent	V_{IN}	f = 1kHz	-43	-50	-54	dBm
Comparator-on level	V_{TH-H}		3.0	3.5	4.0	V
Comparator-off level	V_{TH-L}		1.8	2.2	2.6	V
Pin 8 high level	V_8 pin		0.45	0.55		V
Output transistor leakage current	I_{L-TR}				100	µA
Output diode leakage current	I_{L-Di}				100	µA

Package Dimensions

unit : mm (typ)

3017D





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1. Description of external parts

C1 • Input coupling capacitor : 0.47 to 2.2μF recommended.

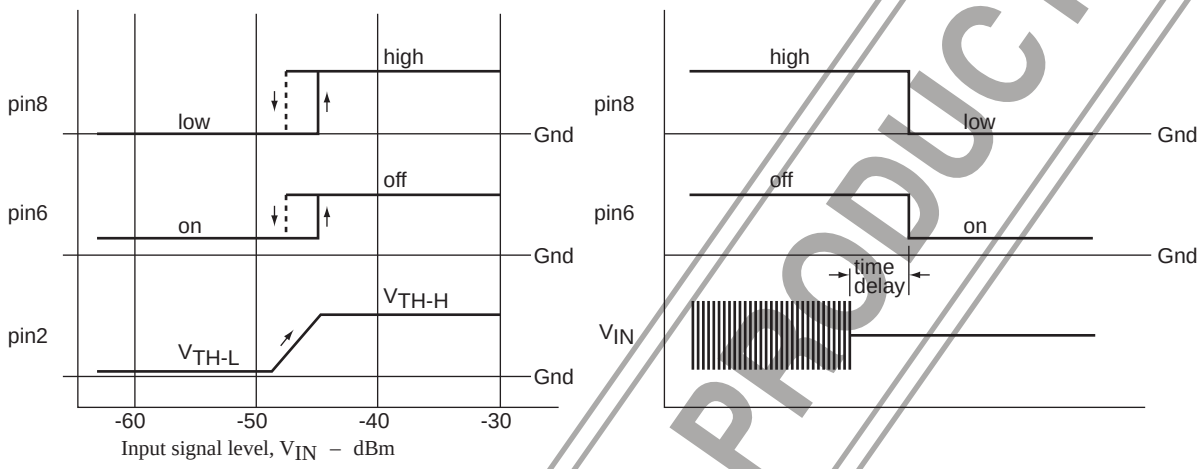
C2 • NF capacitor : Capacitance is reduced, so the off level in input equivalent becomes lower in the bass frequency range. We recommend 1 to 10μF.

C3, R1 • For designation of time delays : Any time delay can be obtained by adequate choice of C3 and R1. We recommend 150k to 500kΩ for R1.

C4, R3 • Power supply ripple filter

R2 • Bias resistor : For diode when pin 8 is used to drive external transistors. A 1kΩ resistor is recommen.

2. Individual pins and their operations



As shown above, when input level is raised and the pin 2 voltage reaches the V_{TH-H} level of the comparator, pins 6 and 8 turn over. (V_{IN} = -45dBm).

- Pin 6 is for driving plungers, When it is on the "L" side, pin 6 turns on and can draw current up to 600mA maximum (restricted by duty-cycle chart). It is not to be on continuously for more than 3 seconds.
- Pin 7 is a diode that prevents reverse voltages induced when the plunger is turned off from on.
- Pin 8 functions in phase with pin 6 and can drive external transistors (such as for MUTE).

3. Time delays and obtaining CRs

When input signals that have been applied at a level not less than -45dBm are removed, discharging occurs through the CR connected at pin 2, lowering pin 2 potential. A time delay is provided before the hysteresis comparator turns over.

$$\frac{E1}{E0} = -\frac{t}{e^{\tau}}$$

E0 : Initial voltage
E1 : Threshold voltage
τ : Time constant

Accordingly,

$$t = -\tau \ln \frac{E1}{E0}$$

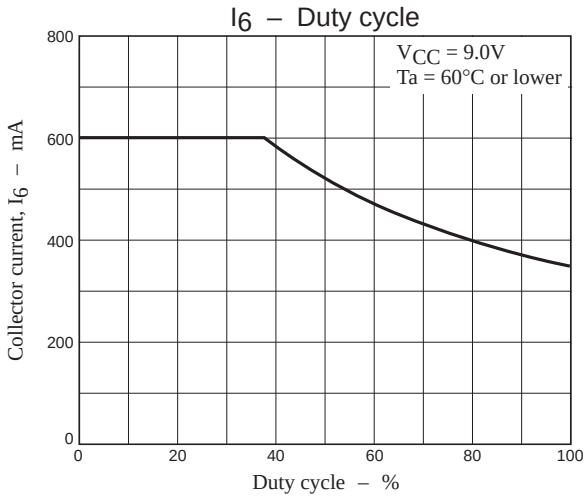
E1/E0, within the IC, is 0.26. A desired time is obtained by an appropriate choice of τ (τ = C3R1). Therefore, the time delay is obtained by the following formula :

$$t = 1.34 \times C3R1 \text{ (sec)}$$

We recommend 150k to 500kΩ for R when determining CR.

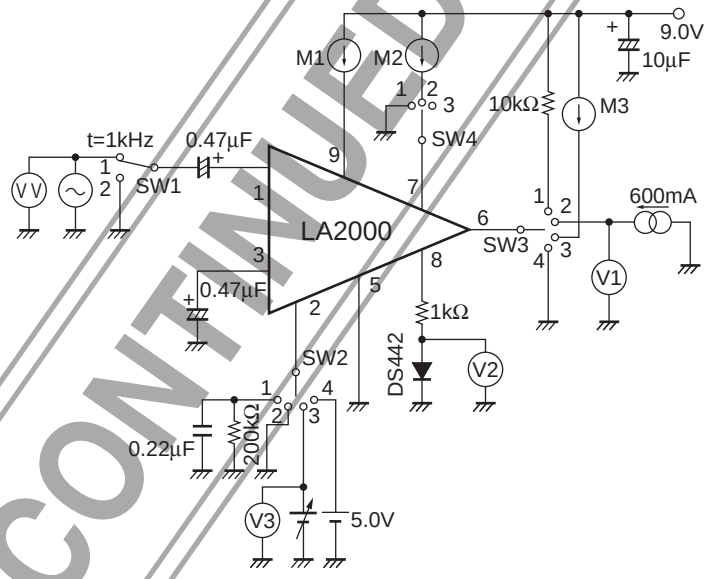
DISCONTINUED PRODUCT

4. IC usage notes
   - Maximum ratings
     When maximum ratings are surpassed, destruction or deterioration may result. Use the IC in the range where the maximum rating is not exceeded.
   - Interpin short circuits and reverse insertions
     These cause destruction or deterioration of the IC : be careful when mounting on circuit board.
   - Voltage applied to pin 8 should never exceed pin 9 voltage.
   - The current flowing into pin 8 is to be 0.5mA maximum.
   - Pin 4 is unconnected, but is not to be used for GND or an interconnecting terminal.



Note : I_C = 600mA continuous is within 3 seconds
I_C = 300mA continuous is within 30 seconds
I_C = 100mA or less can be left on at all times.

Test Circuit

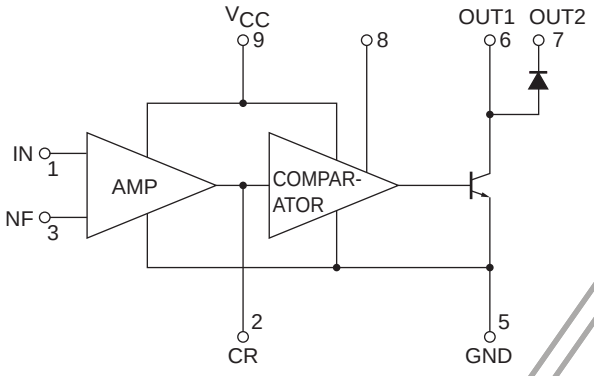


Test Conditions

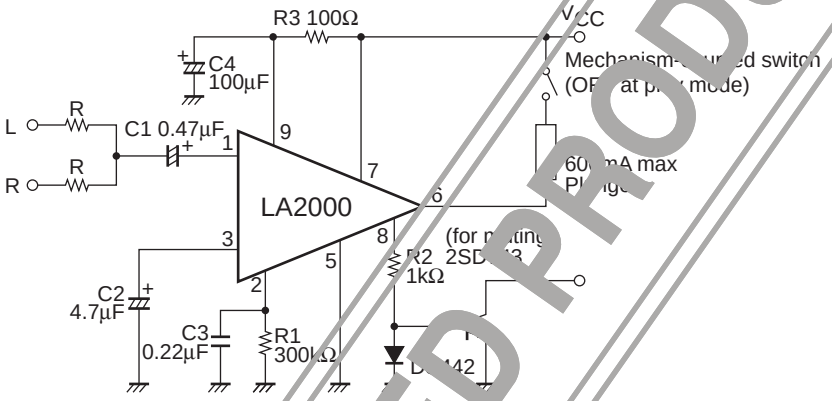
Test items	Symbol	SW-1	SW-2	SW-3	SW-4	Conditions
Circuit current	I_{CC}	1	1	1	3	Measure current flowing into pin 9 at V_{IN} = -45dB
Output transistor saturation voltage	$V_{CE(sat)}$	2	2	2	3	Measure V_{IN} at pin 6
Output diode forward voltage	V_F	2	4	2	1	Measure V_{IN} at pin 6
Output-off level in input equivalent	V_{IN}	1	1	1	3	Input level (V.V) when pin 6 turns over
Comparator-on leve	V_H	2	3	1	3	Measure V3 When pin 6 turns over
Comparator-off level	V_L	2	3	1	3	Measure V3 When pin 6 turns over
Pin 8 high level	Vp-8	2	4	1	3	Measure V2 at pin 8
Output transistor leakage current	I_{TL}	2	4	3	3	Measure M3
Output diode leakage current	I_{DL}	2	4	4	2	Measure M2

DISCONTINUED PRODUCT

Block Diagram

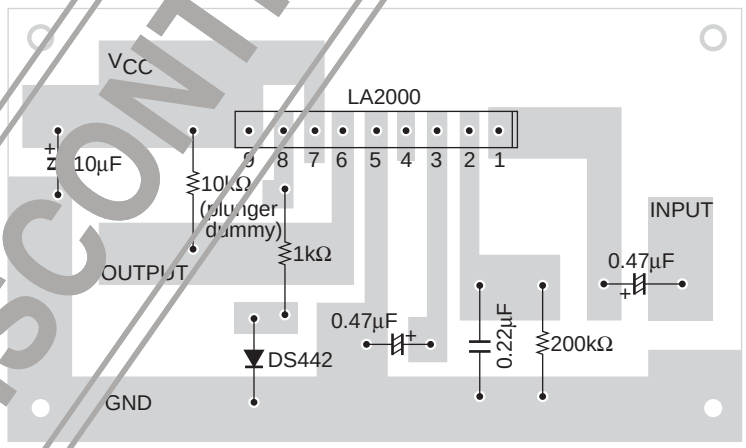


Sample Application Circuit 1



Pin 4 is unconnected but is not h use for GND or an interconnection terminal.

Sample Printed Pattern (copper foil side)



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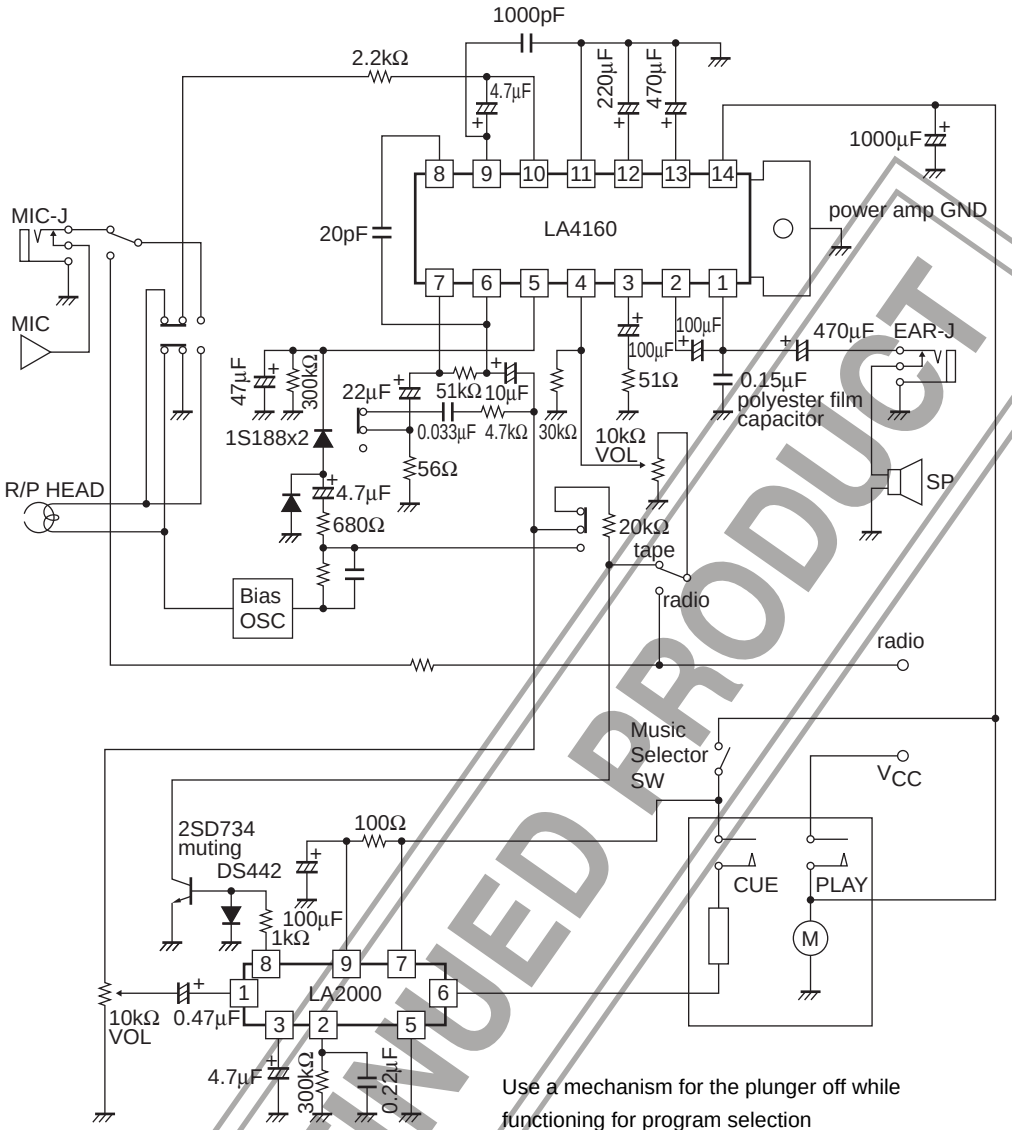
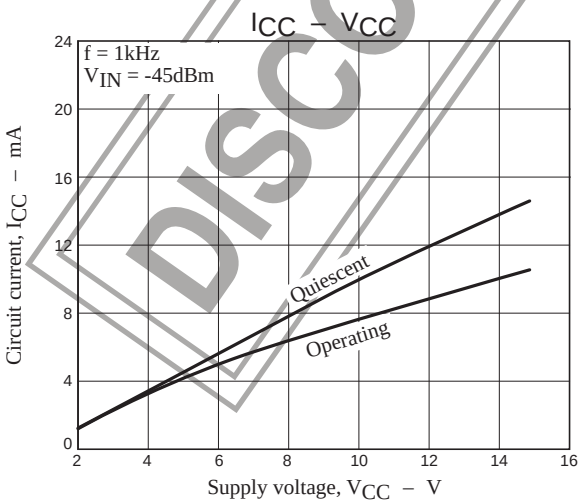
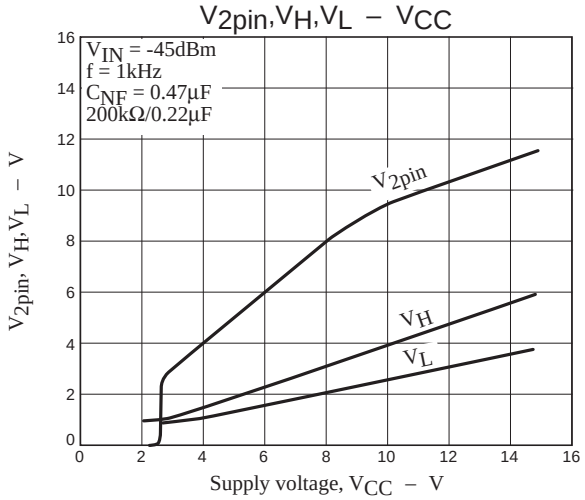
Sample Application Circuit 2



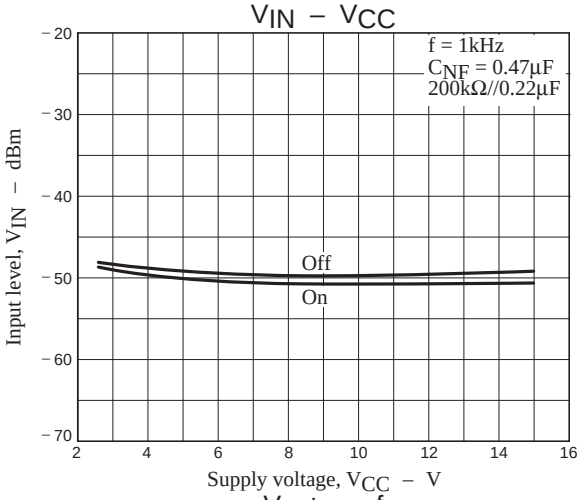
Use a mechanism for the plunger off while functioning for program selection

DISCONTINUED PRODUCT

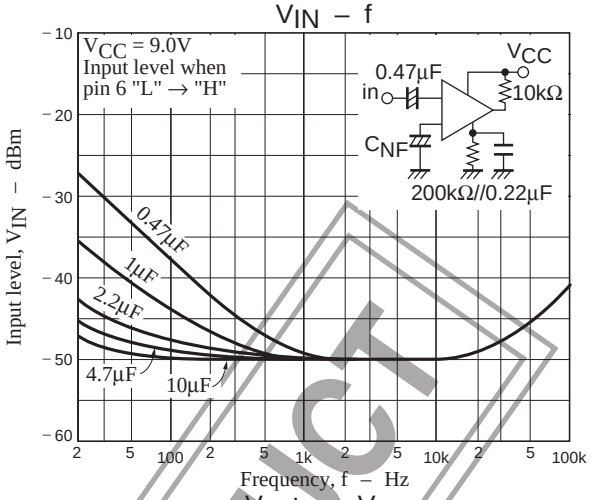




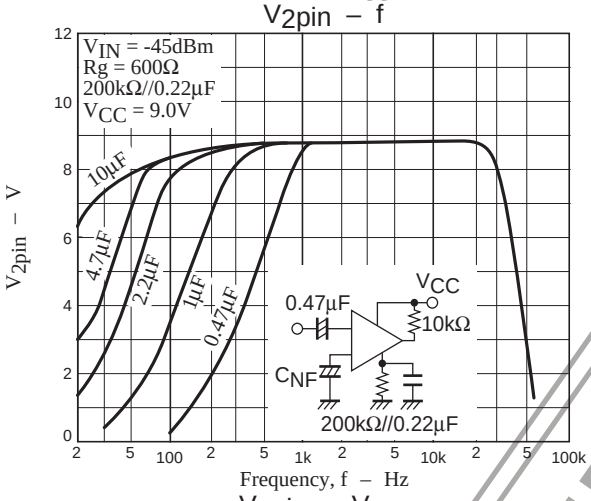
V_{IN} – V_{CC}



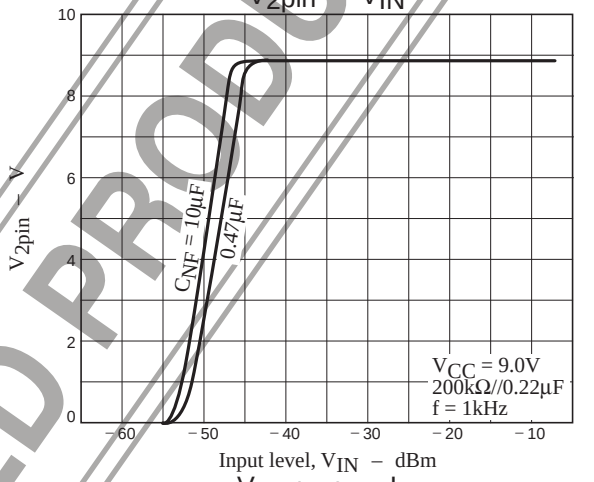
V_{IN} – f



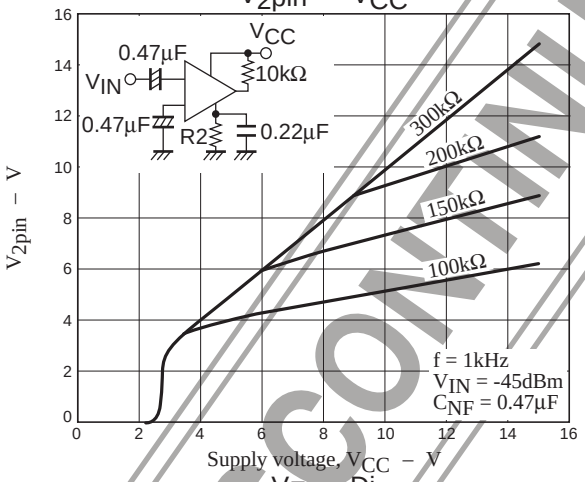
V_{2pin} – f



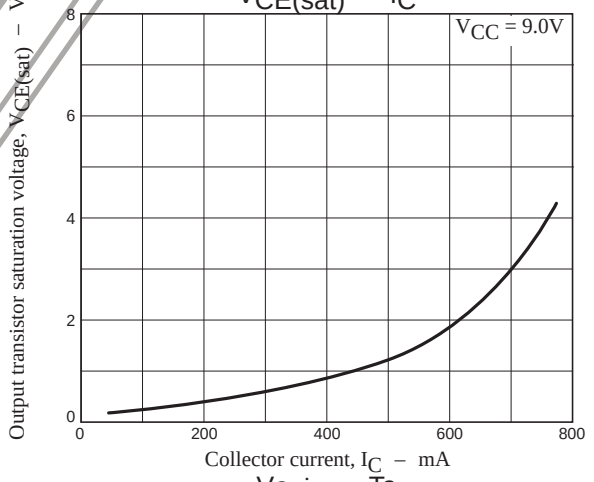
V_{2pin} – V_{IN}



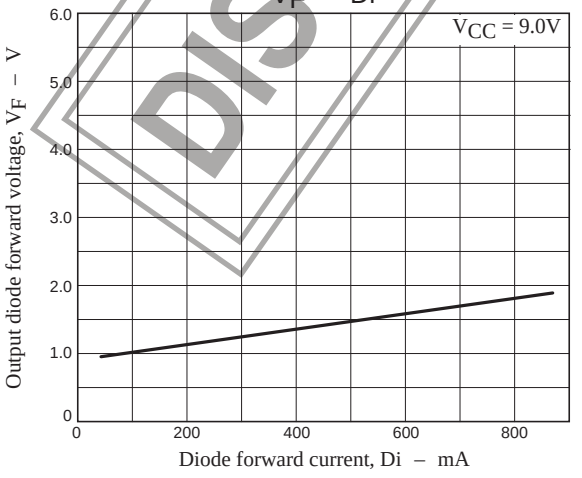
V_{2pin} – V_{CC}



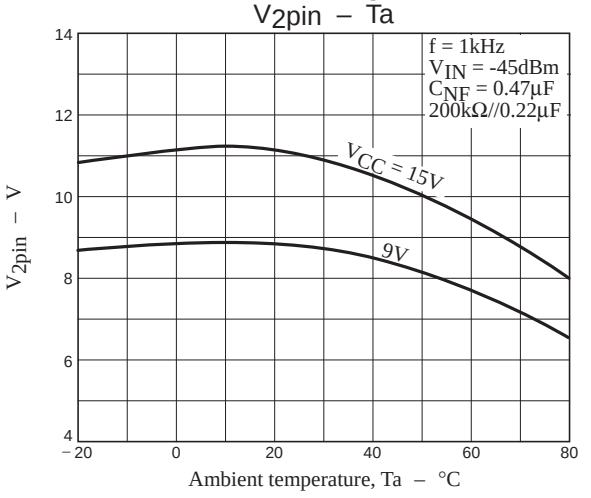
$V_{CE(sat)}$ – I_C



V_F – Di



V_{2pin} – Ta



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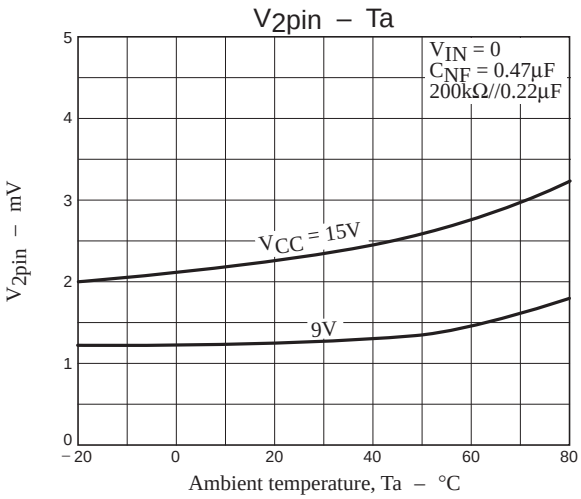

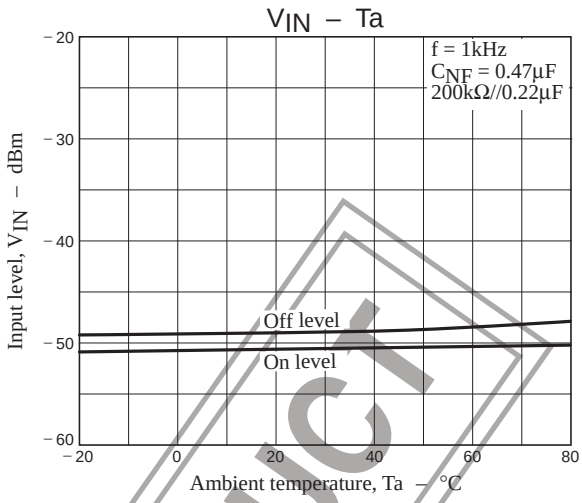

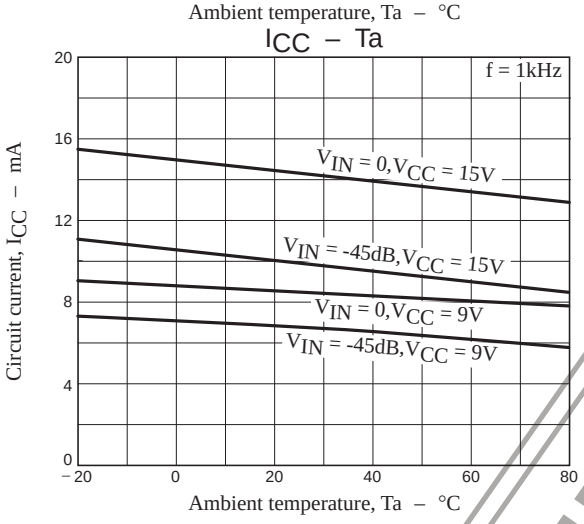

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