

AN3794N

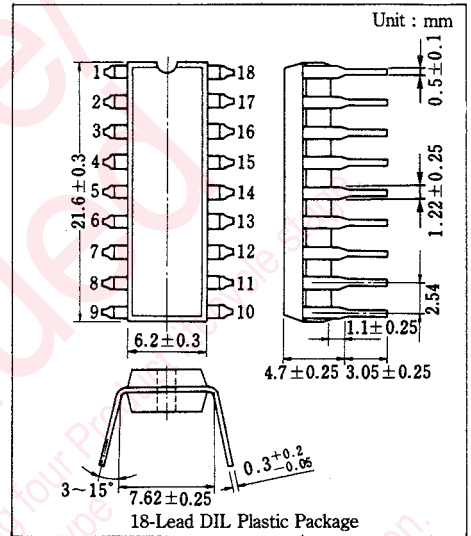
VTR Capstan Servo Interface Circuit

■ Outline

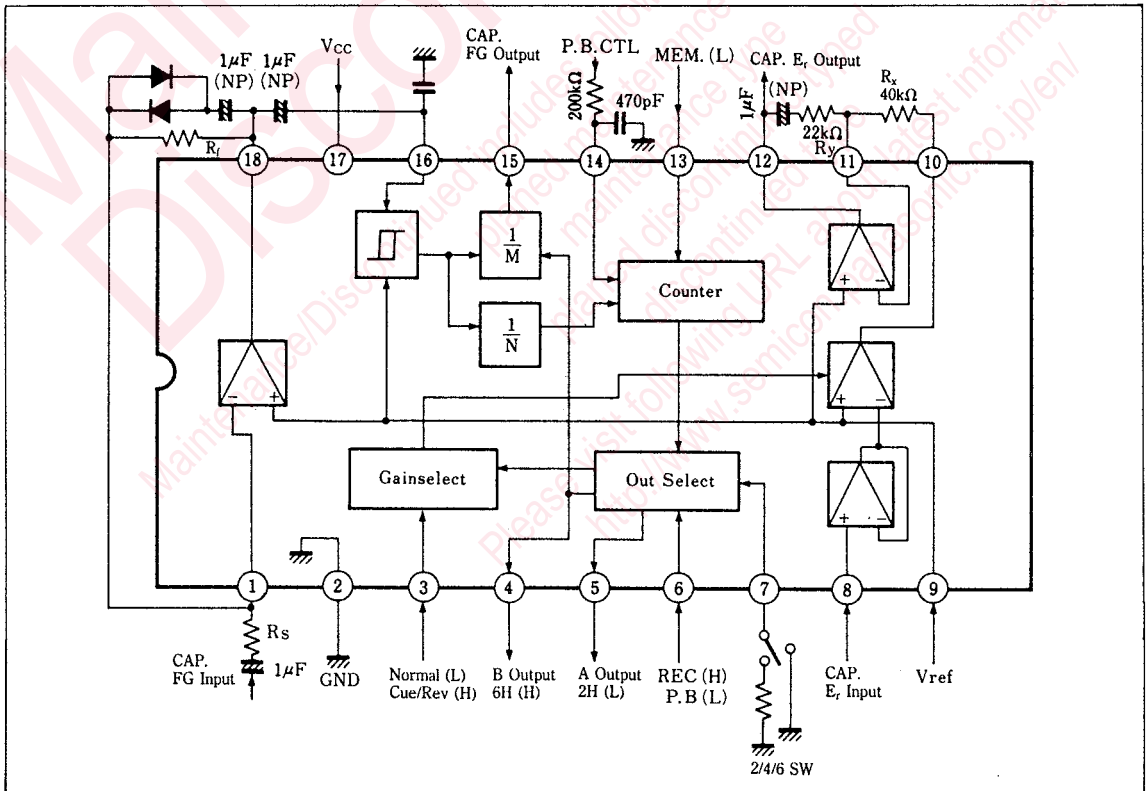
The AN3794N is an integrated circuit designed for VTR capstan servo interface. It forms the VTR servo circuit by combining the AN3792 with the MN6178.

■ Features

- Supply voltage : $V_{cc}=5V$
- Built-in detector circuit for 2/4/6 hours
- Built-in automatic gain control circuit for 2/4/6 hours



■ Block Diagram



■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	Op. Amp. Inverting Input	10	Op. Amp. 2 Output
2	GND	11	Op. Amp. 3 Inverting Input
3	Normal/Cue. Rev Changeover	12	Cap. Error Output
4	B Output	13	Memory
5	A Output	14	P.B. CTL Input
6	REC/P.B. Changeover	15	Cap. FG Output
7	2H/4H/6H Changeover (REC)	16	Cap. FG Input
8	Cap. Error Input	17	V _{cc}
9	Vref. Input	18	Op. Amp. Output

■ Absolute Maximum Ratings (T_a=25°C)

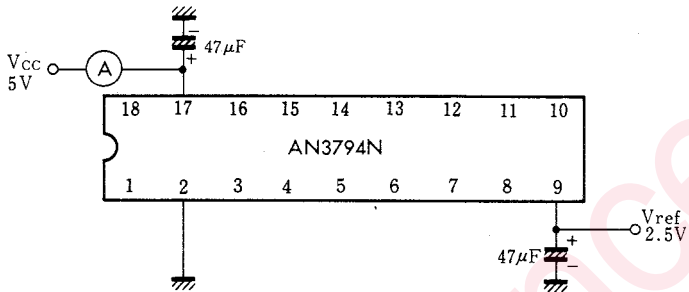
Item	Symbol	Rating	Unit
Supply Voltage	V _{CC}	6	V
Power Dissipation(T _a =70°C)	P _D	100	mW
Operating Ambient Temperature	T _{opr}	-20~+70	°C
Storage Temperature	T _{stg}	-55~+150	°C

■ Electrical Characteristics (T_a=25°C)

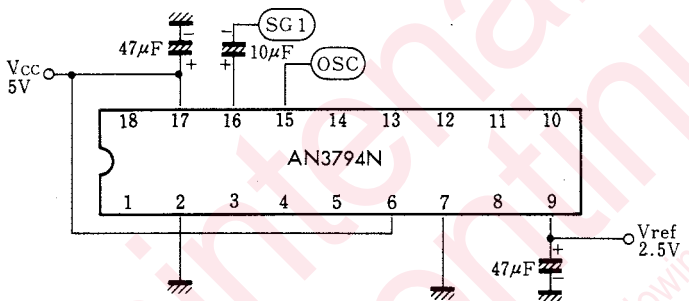
Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Circuit Current	I _{I7}	1	V _{CC} =5V, V _{ref} =2.5V	5		15	mA
FG Amp. Input Sensitivity	S ₁₆	2	V _{CC} =5V, V _{ref} =2.5V	30			mV _{P-P}
FG Divider Output High Level	V _{OH15}	3	V _{CC} =5V, V _{ref} =2.5V No load	4.6			V
FG Divider Output Low Level	V _{OL15}	3	V _{CC} =5V, V _{ref} =2.5V No load			0.4	V
A. B Output High Level	V _{OHA,B}	4	V _{CC} =5V, I=-1.5mA, V _{ref} =2.5V	3.6			V
A. B Output Low Level	V _{OLA,B}	4	V _{CC} =5V, I=1.0mA, V _{ref} =2.5V			0.5	V
P. B CTL Input Sensitivity	S ₁₄	5	V _{CC} =5V, V _{ref} =2.5V	3.0			V
Rec./P.B Changeover Sensitivity(Rec. Mode)	S _{6(Rec)}	6	V _{CC} =5V, V _{ref} =2.5V	3.0			V
Rec./P.B Changeover Sensitivity(P.B Mode)	S _{6(PB)}	6	V _{CC} =5V, V _{ref} =2.5V			1.0	V
Normal/Cue. Rev Changeover Sensitivity(Nomal Mode)	S _{3(NO)}	6	V _{CC} =5V, V _{ref} =2.5V			1.0	V
Normal/Cue. Rev Changeover Sensitivity(Cue. Rev Mode)	S _{3(C/R)}	6	V _{CC} =5V, V _{ref} =2.5V	3.0			V
2/4/6 Changeover Sensitivity(2H Mode)	S _{7(2H)}	6	V _{CC} =5V, V _{ref} =2.5V	4.5			V
2/4/6 Changeover Sensitivity(4H Mode)	S _{7(4H)}	6	V _{CC} =5V, V _{ref} =2.5V	2.0		3.5	V
2/4/6 Changeover Sensitivity(6H Mode)	S _{7(6H)}	6	V _{CC} =5V, V _{ref} =2.5V			1.0	V
OP. Amp.3 Output High Level	V _{OH12}	7	V _{CC} =5V, V _{ref} =2.5V No load	3.8			V
OP. Amp.3 Output Low Level	V _{OL12}	7	V _{CC} =5V, V _{ref} =2.5V No load			1.1	V
Total offset Voltage (2H×1 Mode)	V _{O(offset)}	8	V _{CC} =5V, V _{ref} =2.5V	-50		50	mV
OP. Amp.2 Gain(2H×1 Mode)	G _{V(2H)}	9	V _{CC} =5V, V _{ref} =2.5V	-2.5		2.0	dB
OP. Amp.2 Gain(4H×1 Mode)	G _{V(4H)}	9	V _{CC} =5V, V _{ref} =2.5V	-8.5		-4.0	dB
OP. Amp.2 Gain(6H×1 Mode)	G _{V(6H)}	9	V _{CC} =5V, V _{ref} =2.5V	-7.0		-2.5	dB
OP. Amp. Output High Level	V _{OH18}	10	V _{CC} =5V, V _{ref} =2.5V	3.8			V
OP. Amp. Output Low Level	V _{OL18}	10	V _{CC} =5V, V _{ref} =2.5V			1.1	V
OP. Amp. Gain	G _{VF}	11	V _{CC} =5V, V _{ref} =2.5V	50			dB

Note : Operating Supply Voltage Range: V_{cc}=4.5~5.5V

Test Circuit 1 (I₁₇)

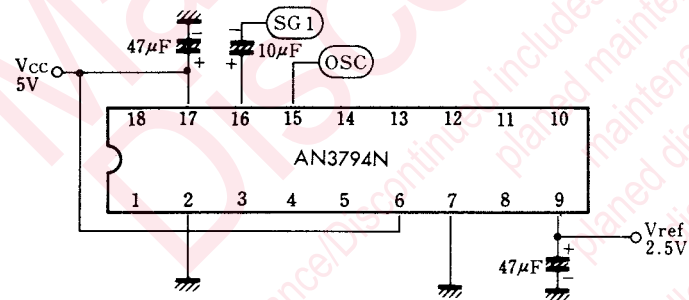


Test Circuit 2 (S₁₆)



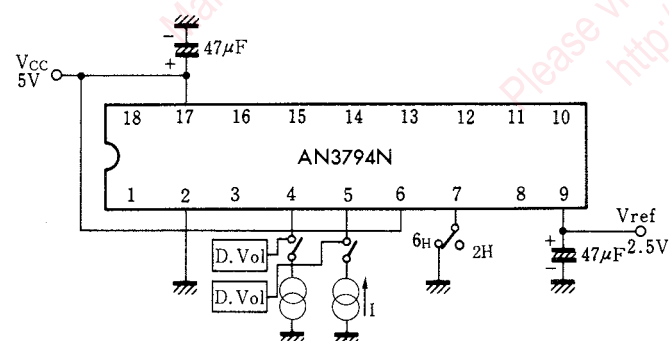
- SG1 input signal
triangular wave $f = 1\text{kHz}$
- Rec. 6H mode

Test Circuit 3 (V_{OH15}, V_{OL15})



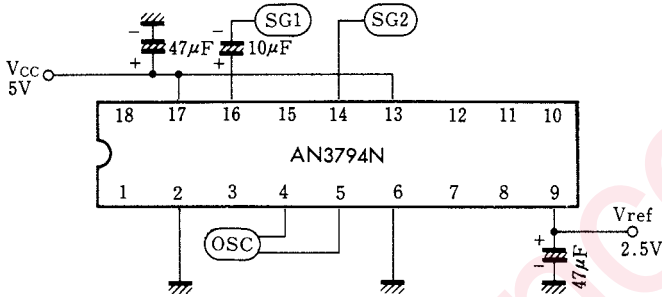
- SG1 input signal
rectangular wave $f = 1\text{kHz}$, 100mV_{P-P}
- Rec. 6H mode

Test Circuit 4 (V_{OH4}, V_{OH5}, V_{OL4}, V_{OL5})



- V_{OH4}, V_{OL4} Pin ④ output
- V_{OH5}, V_{OL5} Pin ⑤ output
- ※ In Rec. 6H mode (Pin ⑦ GND), take out 1.5mA current from Pins ④ and ⑤ to measure the high level voltage (V_{OH4,5}) with a voltmeter.
- ※ In Rec. 2H mode (Pin ⑦ open), take out 1mA current from Pins ④ and ⑤ to measure the high level voltage (V_{OL4,5}) with a voltmeter.

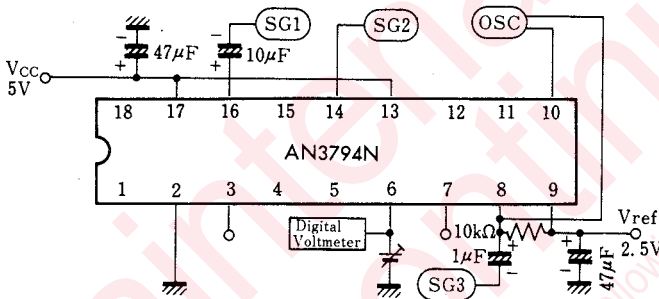
Test Circuit 5 (S₁₄)



- SG1. Input signal rectangular wave $f=3.6\text{kHz}$, 100mV_{P-P}
- SG2. input signal rectangular wave $f=300\text{Hz}$

※When the sufficient large CTL signal is input, 6H mod (Pins ④ and ⑤ H) is set. However, when the CTL signal is less than input sensitivity, 2H mode (Pins ④ and ⑤ L_a) is forcibly set.

Test Circuit 6 (S_{6(Rec.)}, S_{6(PB)}, S_{3(NO)}, S_{3(C/R)}, S_{7(2H)}, S_{7(4H)}, S_{7(6H)})

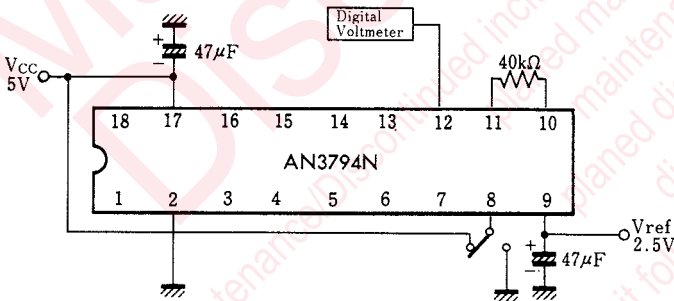


- SG1. Input signal rectangular wave $f=360\text{Hz}$, 100mV_{P-P}
- SG2. input signal rectangular wave $f=30\text{Hz}$, 5V_{O-P}
- SG3. input signal sine wave $f=500\text{Hz}$, 3V_{O-P}
- OSC is used in X-Y mode.

※The figure left shows the changeover of Rec./P.B. As in the same manner for Pin ③, measure the voltage of gain changeover.

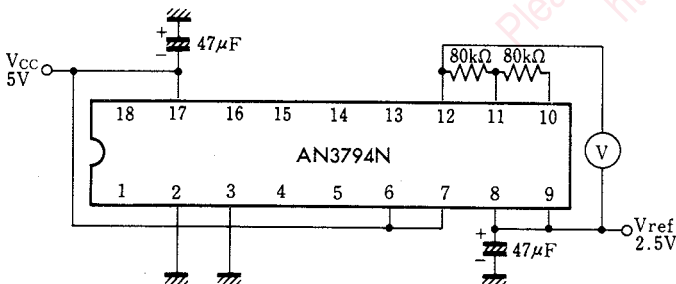
※For Pin ⑦ measurement, Pin ⑥ is regarded as V_{cc} to measure the voltage of gain changeover.

Test Circuit 7 (V_{OH12}, V_{OL12})



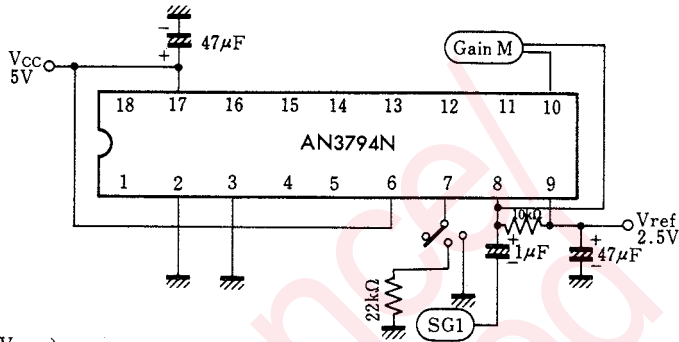
- V_{OH12} Pin⑧ V_{cc}
- V_{OH12} Pin⑧ GND

Test Circuit 8 (V_{O(offset)})



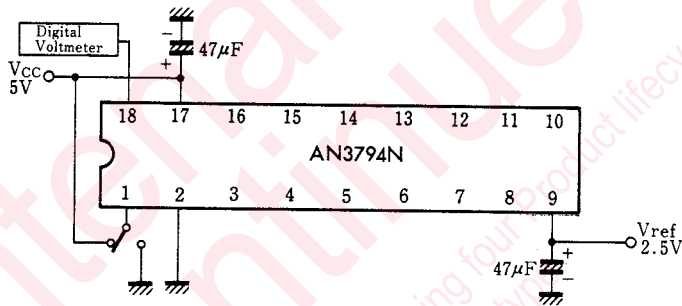
- REC 2H × 1 mode

Test Circuit 9 ($G_{V(2H)}$, $G_{V(4H)}$, $G_{V(6H)}$)



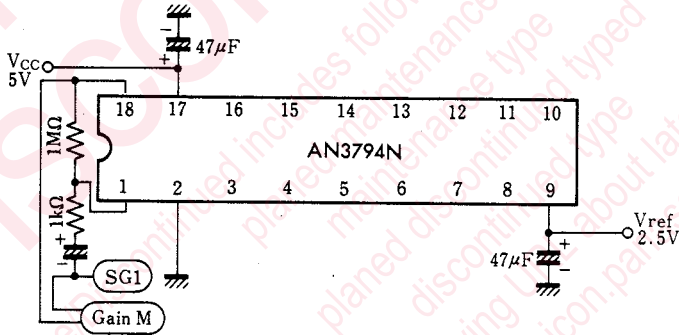
- SG1: input signal sine wave $f = 500\text{Hz}$, $1V_{P-P}$

Test Circuit 10 (V_{OH18} , V_{OL18})



- V_{OH18} Pin①GND
- V_{OL18} Pin① V_{CC}

Test Circuit 11 (G_{VF})



- SG1: input signal sine wave $f = 1\text{kHz}$, $2mV_{P-P}$

Functional Explanation

1. Capstan FG Divider Function

Mode	2H	4H	6H
FGin (Hz)	1080	540	360
FGout(Internal) (Hz)	360 (1/3)	180 (1/3)	120 (1/3)
FGout(Main) (Hz)	540 (1/2)	270 (1/2)	360 (1/1)

2. Recording Mode Auto Detection Function

Mode	2H	4H	6H
FG Frequency(Hz)	1080	540	360
Threshold (Hz)		735	465
Aout	L	H	H
Bout	L	L	H

3. Memory Function

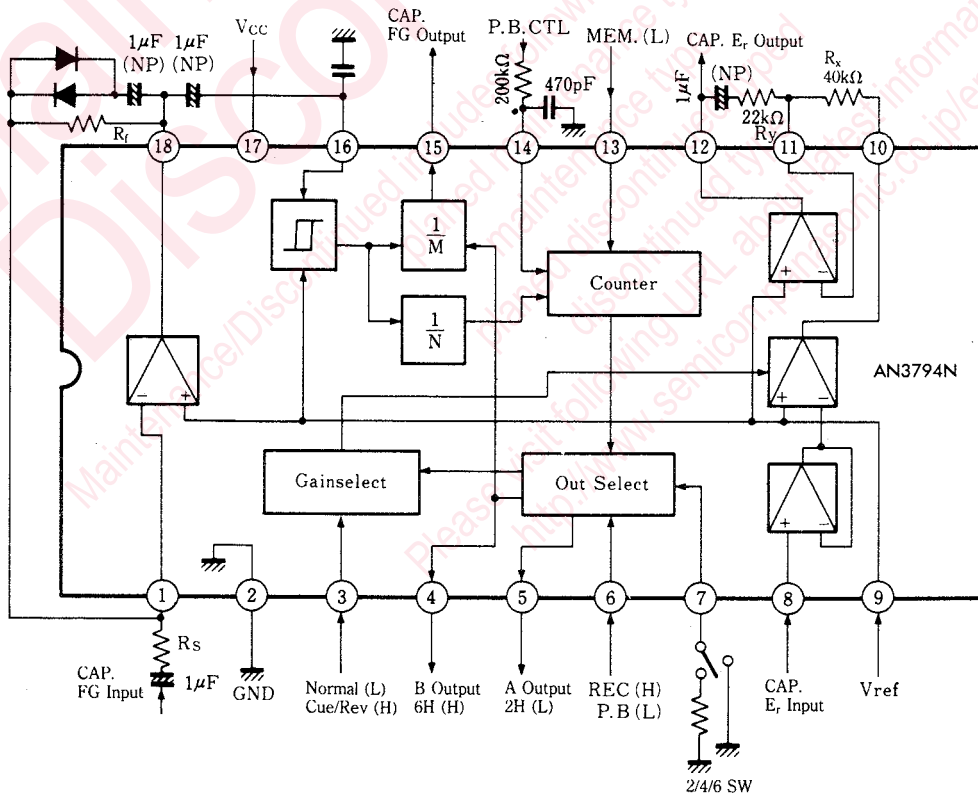
Setting Pin 13 to L during playback enables the recording of playback mode at the time of setting Pin 13. This function is available during special playback such as still, slow, etc.

4. Capstan Loop Gain Compensating Function

This function incorporates the loop gain compensating circuit for capstan speed control and carries out recording or automatically gain compensation according to the playback time mode.

C/R	L				H	
	Normal		2	4		
	Double	dB	Double	dB	Double	dB
2H	1.0	0	2.0	6.02		
4H	0.5	-6.02			2.0	6.02
6H	0.6	-4.44			2.4	7.60

■ Application Circuit



Request for your special attention and precautions in using the technical information and semiconductors described in this book

- (1) If any of the products or technical information described in this book is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially, those with regard to security export control, must be observed.
- (2) The technical information described in this book is intended only to show the main characteristics and application circuit examples of the products. No license is granted in and to any intellectual property right or other right owned by Panasonic Corporation or any other company. Therefore, no responsibility is assumed by our company as to the infringement upon any such right owned by any other company which may arise as a result of the use of technical information described in this book.
- (3) The products described in this book are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
 - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
 - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the range of absolute maximum rating and the guaranteed operating conditions (operating power supply voltage and operating environment etc.). Especially, please be careful not to exceed the range of absolute maximum rating on the transient state, such as power-on, power-off and mode-switching. Otherwise, we will not be liable for any defect which may arise later in your equipment.
 - Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.
- (6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.
- (7) This book may be not reprinted or reproduced whether wholly or partially, without the prior written permission of our company.



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.