

SANYO

No.1520B

LC7816

CMOS IC

2-Pole 4-Position Analog Function Switch

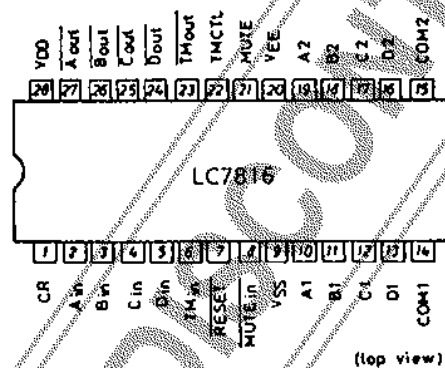
The LC7816 is a 2-pole 4-position analog function switch with 2 built-in CMOS analog switches (LC4966 type). A soft touch of a button enables switchover of the input signal source of an audio amplifier.

Use :

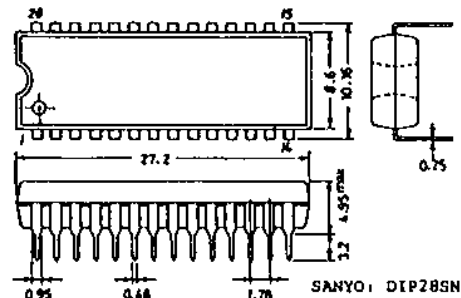
Function switchover of amplifier, receiver, etc. (2 poles 4 positions)

Features :

1. Good distortion characteristic because of built-in analog switches of LC4966 type : Distortion 0.01% max./ $V_i=1V_{rms}$, $V_{DD}-V_{EE}=15$ to 37V.
2. Capable of outputting audio muting control signal to minimize noise to be generated at the time of switchover.
3. Built-in controller for tape monitor switchover (using LC4966 together).
4. Built-in driver for LED which displays function mode, tape monitor mode.
5. Since control input can be operated from + supply alone when using dual supplies (+, -), interface with other circuits can be achieved easily.
6. Since audio muting control signal can be triggered independently from external pin (MUTEin), audio muting at the time of return from backup can be achieved easily.
7. Control input pin (RESET) to be used for turning OFF all analog switches.
8. Backup can be performed easily because of CMOS structure. (Backup voltage: 3V min.)
9. Operating voltage : $\pm 18V$ /dual supplies.
10. Package : DIP-28S (Shrink type)

Pin Assignment

Case Outline 3063-D28SNIC
(unit:mm)

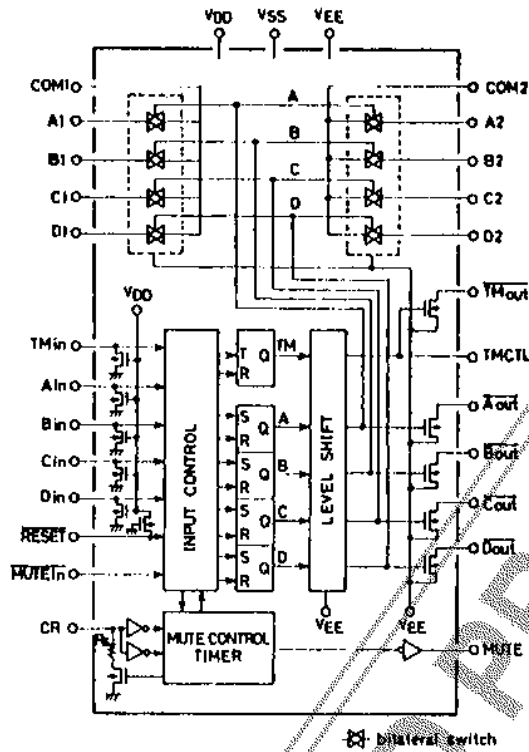


Specifications and information herein are subject to change without notice.

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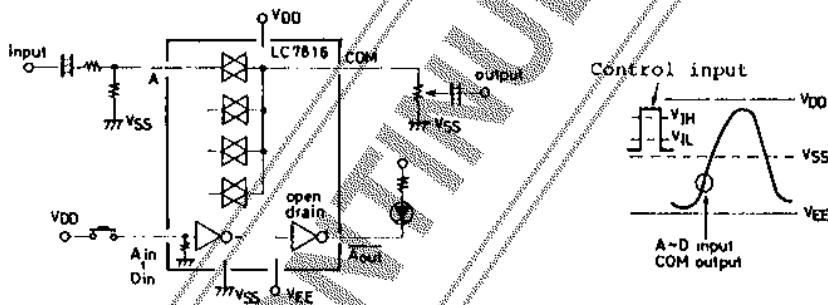
7048YT/8266KI/6194KI, TS No.1520-1/7

Equivalent Circuit Block Diagram

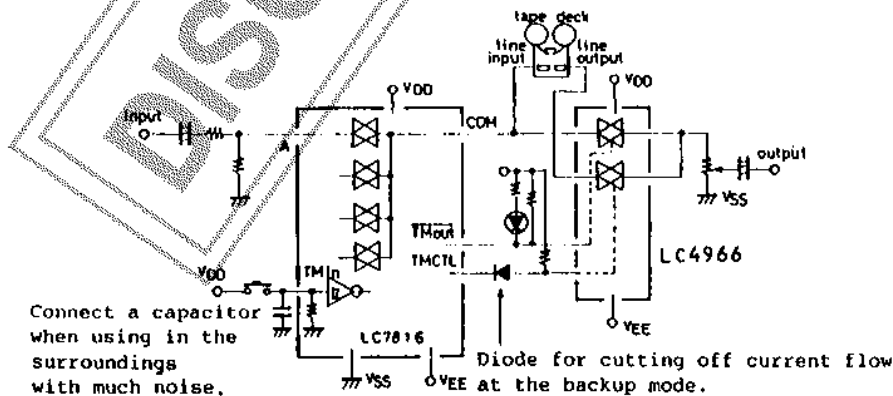


Sample Application Circuits

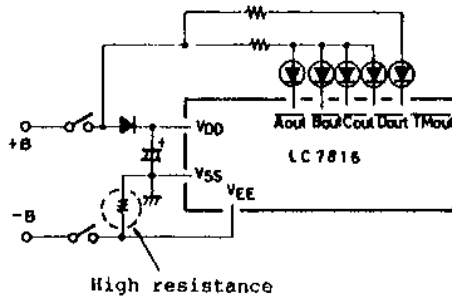
1. Without tape monitor function



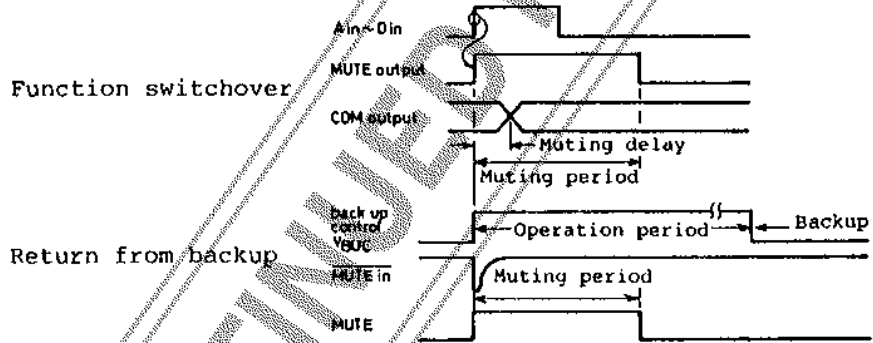
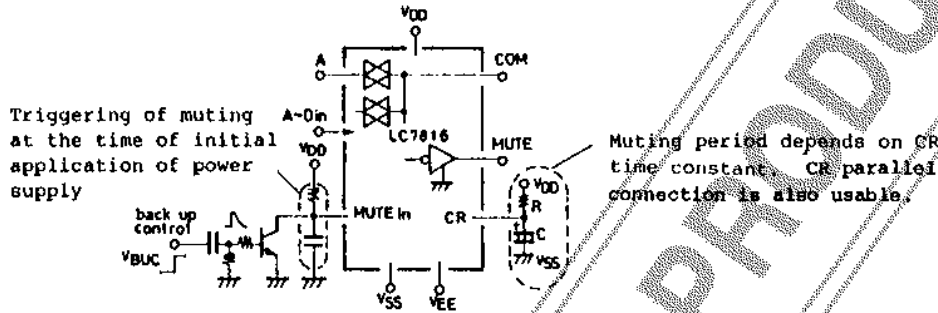
2. With tape monitor function



3. Backup



4. Muting



DISCONTINUED PRODUCT

Pin Description

Pin Name	Pin No.	Type of Input/Output	Pin Functions																											
VDD VSS VEE	28 9 20		<ul style="list-style-type: none"> Power supply pins Dual supplies (+-): VSS=GND, VEE=(-)V 																											
Ain, Bin, Cin, Din	2, 3, 4, 5		<ul style="list-style-type: none"> Input pins for turning ON individual analog switches Priority order of simultaneous push(Ain>Bin>Cin>Din) Prevention of malfunction attributable to pulse noise (Pulse width is discriminated by muting delay time.) 																											
AOUT BOUT COUT DOUT	27, 26, 25, 24		<ul style="list-style-type: none"> Output of driver for LED which displays ON state corresponding to individual analog switches N channel open drain(Source is connected to VEE) 																											
A1, B1, C1, D1 A2, B2, C2, D2 COM1 COM2	10, 11, 12, 13 19, 18, 17, 16 14 15		<ul style="list-style-type: none"> A to D: Audio signal input pins COM: Audio signal output pins Signal inputs (A to D)conduct according to signal inputs(Ain to Din) as follows: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>COM output</th> <th>An</th> <th>Bn</th> <th>Cn</th> <th>Dn</th> <th></th> </tr> </thead> <tbody> <tr> <td rowspan="4">Specified input</td> <td>Ain</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Bin</td> <td>*</td> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>Cin</td> <td>*</td> <td>*</td> <td>1</td> <td>0</td> </tr> <tr> <td>Din</td> <td>*</td> <td>*</td> <td>*</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: right;">* Don't care</p>	COM output	An	Bn	Cn	Dn		Specified input	Ain	1	0	0	0	Bin	*	1	0	0	Cin	*	*	1	0	Din	*	*	*	1
COM output	An	Bn	Cn	Dn																										
Specified input	Ain	1	0	0	0																									
	Bin	*	1	0	0																									
	Cin	*	*	1	0																									
	Din	*	*	*	1																									
TMin	6		<ul style="list-style-type: none"> Input pin for specifying tape monitor mode ON/OFF Rise of input signal is detected; monitor mode ON/OFF are inverted to monitor mode OFF/ON respectively. 																											
TMCTL	22		<ul style="list-style-type: none"> Output pin for controlling external analog switch (IC4966) for tape monitor Source of N channel transistor of complementary buffer output is connected to VEE. 																											
TMout	23		<ul style="list-style-type: none"> Output pin for driver for LED which displays tape monitor state as well as for control of external switch (IC4966) for tape monitor. TMout is opposite in polarity to TMCTL. 																											
MUTEin	8		<ul style="list-style-type: none"> Input pin for forcing audio muting control signal (MUTE) to be triggered externally If fixed at 'L' level, MUTE output becomes 'H' level. 																											
MUTE	21		<ul style="list-style-type: none"> Output pin for audio muting control signal Signal with pulse width to be determined by external constant at CR pin is output at the time of function switchover or MUTEin input. 																											
CR	1		<ul style="list-style-type: none"> CR time constant pin for determining time interval of audio muting control signal Time lag(muting delay) between muting signal rise and analog switch switchover depends on C.Rg time constant at the time of transistor ON. CR parallel connection also usable. 																											
RESET	7		<ul style="list-style-type: none"> Input pin for turning OFF all analog switches and resetting tape monitor flip-flop('L' level active) 																											

LC7816

Absolute Maximum Ratings at Ta=25±2°C		unit
Maximum Supply Voltage	VDD max	VSS-0.3 to VEE+40 V
	VEE max	VDD-40 to VSS+0.3 V
Output Current	IOUT	$\frac{A_{out}, B_{out}, C_{out}, D_{out}, T_{mout}}{30}$ mA
Output Voltage	VOUT	VEE-0.3 to VDD+0.3 V
Voltage Difference at Analog Switch ON	ΔV_{on}	Switch ON 0.5 V
Allowable Power Dissipation	Pd max	Ta≤85°C 350 mW
Operating Temperature	Topg	-40 to +85 °C
Storage Temperature	Tstg	-40 to +125 °C

Allowable Operating Conditions at Ta=-40 to +85°C

	Pin No.	Conditions	min	typ	max	unit
Supply Voltage	VDD1 VDD(28)	VEE≤VSS-4.5	VSS+4.5		VEE+37	V
	VEE VEE(20)	VDD≥VSS+4.5	VDD-37		VSS-4.5	V
	VDD2 VDD(28)	Backup VEE≤VSS	VSS+3		VSS+37	V
'H' Level Input Voltage	VIH1	Ain(2) to Din(5), RESET(7), MUTE in(8)	0.75VDD		VDD	V
	VIH2	TMin(6)	0.8VDD		VDD	V
'L' Level Input Voltage	VIL1	Ain(2) to Din(5), RESET(7), MUTE in(8)	VSS	0.25VDD		V
	VIL2	TMin(6)	VSS	0.2VDD		V
Analog Switch Input Voltage	VIN	A1(10) to D1(13), A2(19) to D2(16)	VEE		VDD	V
External Capacitance for Muting Timer	C	CR(1)			10	uF
External Resistance for Muting Timer	R	CR(1)	VDD-VSS=4.5V	40	100	kohm
			14V>VDD-VSS≥9V	80	300	kohm
			18V>VDD-VSS≥14V	90	300	kohm
			37V>VDD-VSS≥18V	100	300	kohm
Input Receiving Pulse Width	TIN	Ain(2) to Din(5) VDD=9V, TMin(6) C=3.3uF, R=220kohms	120			ms

Electrical Characteristics at Ta=25±2°C, VSS=0V

	Pin NO.	Conditions	min	typ	max	unit
'H' Level Output Voltage	VOH1	TMCTL(22)	IOH=-0.1mA	0.8VDD	VDD	V
	VOH2	MUTE(21)	IOH=-0.4mA, VDD=4.5V	VDD-1.5	VDD	V
			" , VDD=9V	VDD-0.5	VDD	V
'L' Level Output Voltage	VOL1	TMCTL(22)	IOL=0.1mA	VEE	0.2x (VDD-VEE)	V
	VOL2	MUTE(21)	IOL=0.4mA, VDD=4.5V	0	1.5	V
			" , VDD≥9V	0	0.5	V
	VOL3	AOUT(27), DOUT(24), TMOUT(23)	IOL=7mA, VDD-VEE=4.5V	VEE	VEE+2	V
IOL=30mA, VDD-VEE=9V			VEE	VEE+4	V	
Analog Switch ON Resistance	Ron	A1(10), B1(11), C1(12), D1(13), COM1(14), A2(19), B2(18), C2(17), D2(16), COM2(15)	I=1mA, VDD-VEE=4.5V	400		ohm
			" , VDD-VEE=9V	120		ohm
			" , VDD-VEE=18V	80		ohm
			" , VDD-VEE=37V	70		ohm

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			min	typ	max	unit
Input/Output OFF-Leak Current	IOFF1	\overline{AOUT} (27) to \overline{DOUT} (24)				Output transistor
		\overline{TMOUT} (23)				OFF $V_o = V_{EE} + 18V$
						Output transistor
						OFF $V_o = V_{EE} + 37V$
	IOFF2	CR(1)				Output transistor
						OFF $V_o = V_{SS} + 18V$
	IOFF3	A1(10) to D1(13), COM1(14), A2(19) to D2(16), COM2(15)				Analog switch OFF -10
						$V_{IN} = V_o = V_{EE}$ to $V_{EE} + 37V$
Total Harmonic Distortion	THD1	COM1(14), COM2(15)				$V_{IN} = 1V_{rms}$, $f = 1kHz$, $V_{DD} - V_{EE} = 15$ to $37V$, Refer to Fig.1.
	THD2	" "				$V_{IN} = 0.1V_{rms}$, $f = 1kHz$, $V_{DD} - V_{EE} = 4.5V$, Refer to Fig.1.
Feedthrough (Switch OFF)	FTH	A1(10) to COM1(14) D1(13) to COM1(14) A2(19) to COM2(15) D2(16) to COM2(15)				$V_{DD} - V_{EE} = 37V$, $f = 10kHz$, $V_{IN} = 0.77V_{rms}$, Refer to Fig.2. $R_L = 47kohms$
Crosstalk	CT	A1(10) to COM2(15) D1(13) to COM2(15) A2(19) to COM1(14) D2(16) to COM1(14)				$V_{DD} - V_{EE} = 37V$, $f = 10kHz$, $V_{IN} = 0.77V_{rms}$, Refer to Fig.3. $R_L = 47kohms$
Muting Time	TM1	MUTE(21)	350	580	1000	ms $V_{DD} = 9V$, Refer to Fig.4. $C = 3.3\mu F \pm 20\%$, $R = 220kohms \pm 5\%$
	TM2	MUTE(21)	450	580	800	ms $V_{DD} = 9V$, $C = 3.3\mu F \pm 0\%$, $R = 220kohms \pm 0\%$
Switch Switchover Delay Time	TSWD	Ain(2) to Din(5) TMin(6)	30	50	120	ms $V_{DD} = 9V$, Refer to Fig.5. $C = 3.3\mu F$, $R = 220kohms$
Supply Current	IDDI	VDD(28)				Operating, Refer to Fig.6. $V_{DD} - V_{EE} = 37V$
Input Floating Voltage	VIP(1)	Ain(2) to Din(5)				$V_{DD} = 4.5$ to $37V$
	TMin(6) VIF(2)	\overline{RESET} (7)				$V_{DD} = 4.5$ to $37V$ $V_{DD} - 0.75$

Fig. 1 Total harmonic distortion

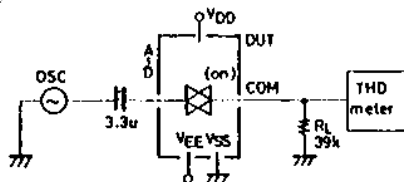
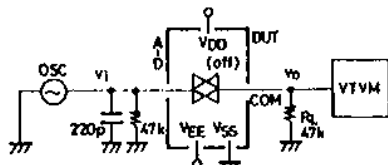


Fig. 2 Feedthrough



$$FTH = 20 \log \frac{V_o}{V_i} \text{ (dB)}$$

$V_i = 770mV_{rms}$
 $V_{DD} - V_{EE} = 37V$

Fig. 3 Crosstalk

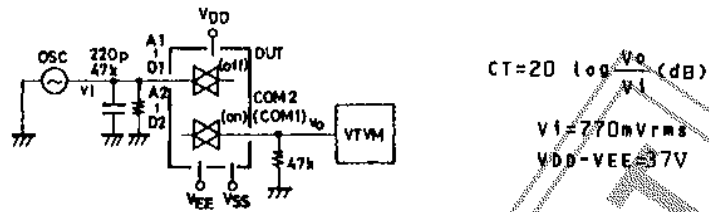


Fig. 4 Muting period

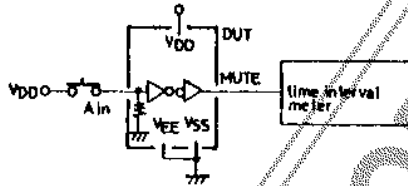


Fig. 5 Switch switchover delay time

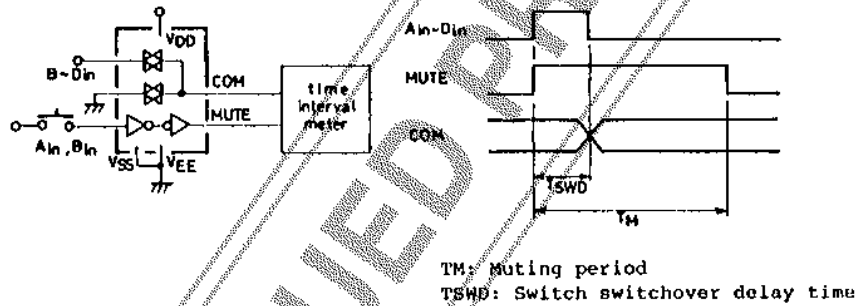
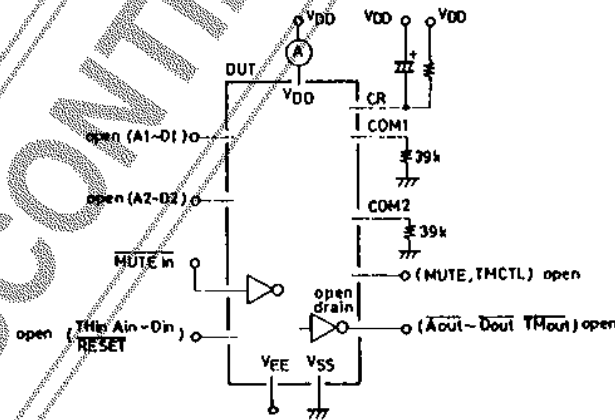


Fig. 6 Supply current



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