

SANYO

No.1374E

CMOS IC

LC7533**3V Electronic Volume Control****Use**

- Attenuation of signal

Features

- CMOS process 3V typ. operation
- Up/down operation is performed with SW input.
- 4-bit, 16-step counter. Step 6* is set with initial input ($\overline{\text{INIT}}$).
- Center tap provided.
- Maximum attenuation : - 60dB or less
- Attenuation curve : Pseudo curve A. Left/right simultaneous setting.
- * : Step 6 means mode 6.

Absolute Maximum Ratings at Ta = 25°C

			unit
Maximum Supply Voltage	V_{DD} max	V_{SS} to 6	V
Supply Voltage	V_I	V_{SS} to V_{DD}	V
Allowable Power Dissipation	P_d max	100	mW
Operating Temperature	T_{opr}	- 30 to + 75	°C
Storage Temperature	T_{stg}	- 40 to + 125	°C

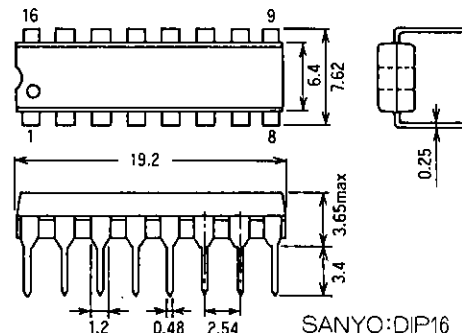
Allowable Operating Conditions at Ta = 25°C

			unit
Supply Voltage	V_{DD}	2.1 to 5.0	V
Input 'H'-Level Voltage	V_{IH1}	$\overline{\text{INIT}}, \text{CE pin}$	$0.7V_{DD}$ to V_{DD}
	V_{IH2}	$\overline{\text{UP}}, \overline{\text{DN}}, \text{CR pin}$	$0.9V_{DD}$ to V_{DD}
Input 'L'-Level Voltage	V_{IL1}	$\overline{\text{INIT}}, \text{CE}$	0 to $0.3V_{DD}$
	V_{IL2}	$\overline{\text{UP}}, \overline{\text{DN}}, \text{CR}$	V_{SS} to $0.1V_{DD}$

Electrical Characteristics at Ta = 25°C

			min	typ	max	unit
Signal Distortion	THD_1	$V_{DD} = 3V, R_L = 50k\Omega, f = 1kHz$			0.5	%
	THD_2	$V_{DD} = 2.1V, R_L = 50k\Omega, f = 1kHz$		1		%
Output at Attenuation Mode	X_{OUT}	0dBm input, 1kHz, 51k Ω load			- 60	dB

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Package Dimensions 3006B-D16IC
(unit: mm)

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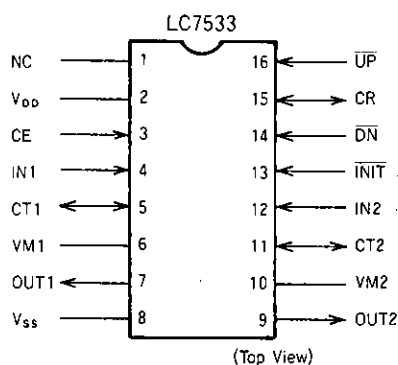
LC7533

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			min	typ	max	unit
Signal Transmit Delay Time	t_d	Between IN and OUT, no load		1		μs
Input Impedance	r_i	$\overline{\text{UP}}, \overline{\text{DN}}, \text{CE}$ only	100		400	$\text{k}\Omega$
Output Noise Voltage	V_{NO}	$V_{\text{DD}} = 3\text{V}, R_L = 50\text{k}\Omega, \text{STEP "0"}$			8	μV
Input 'H'-Level Current	I_{IH}	CE pin, $V_{\text{DD}} = 3\text{V}, V_I = 3\text{V}$			40	μA
Input 'L'-Level Current	I_{IL}	$\overline{\text{UP}}, \overline{\text{DN}}$ pin, $V_{\text{DD}} = 3\text{V}, V_I = 0\text{V}$	-55			μA
Attenuation Balance	ΔV	Pins OUT1,2, other than STEP "0" (Note 1)	-2	0	2	dB
Channel Balance	ΔV_0	Between pins OUT1,2, other than STEP "0" (Note 2)	-2		2	dB
Current Dissipation	I_{DD}	$V_{\text{DD}} = 3\text{V}, \text{CE} = V_{\text{DD}}, \overline{\text{INIT}} = V_{\text{DD}},$ other pins : OPEN			1	mA
	\overline{I}_{DD}	$V_{\text{DD}} = 3\text{V}, \text{CE} = V_{\text{SS}}, \overline{\text{INIT}} = V_{\text{DD}},$ other pins : OPEN			1	μA
Crosstalk between Channels	CT	$V_{\text{DD}} = 1.5\text{V}, V_{\text{SS}} = -1.5\text{V}, V_M = 0\text{V},$ $f = 1\text{k}\Omega, 1\text{V}_{\text{rms}}$ input, test side input : $1\text{k}\Omega$ short		85		dB
Minimum Pulse Width	$T_{\text{UP/DN}}$ T_{INIT}	$T = (\text{CR oscillation cycle}) \overline{\text{UP}}, \overline{\text{DN}}$ pin INIT pin		1.5T 2		ms μs

Note 1 (1) $\Delta\text{V} = 20\log_{10} V_{\text{OUT}}/V_{\text{TYP}}$
 V_{OUT} : OUT1 (OUT2) output level
 V_{TYP} : Standard output level
 (2) Satisfy $V_{\text{OUT}}(\text{STEP } N) < V_{\text{OUT}}(\text{STEP } N + 1)$
 Note 2 (1) $\Delta\text{V}_0 = 20\log_{10} V_{\text{OUT1}}/V_{\text{OUT2}}$

Pin Assignment



Note 1 : No bonding exists on the inside of NC pin. It is recommended that the outside should be shorted to $V_{\text{DD}}, V_{\text{SS}}$, etc. on the printed circuit board.

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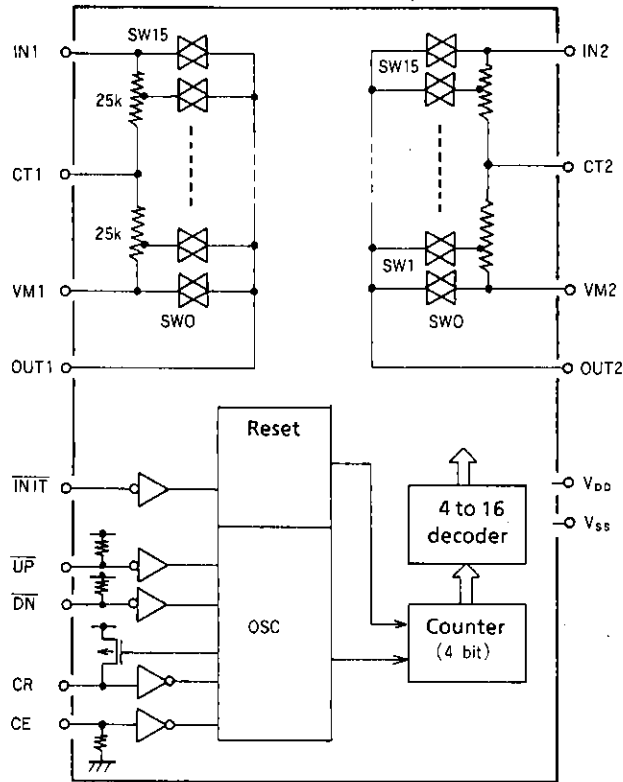
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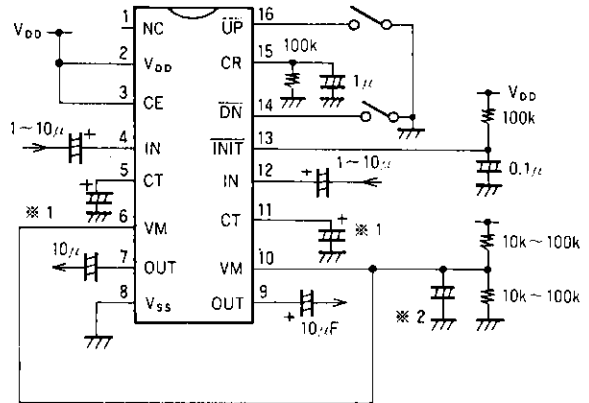
Equivalent Circuit Block Diagram

[Common to LC7533]



Note 1 : The TEST pin is bonded only when the MFP20 is used.

Sample Application Circuit [LC7533 DIP16]



For V_M , $1/2V_{DD}$ bias is recommended.

- ※1 For low-band boost (approx. $1\mu F$)
- ※2 The larger the capacity is (approx. $100\mu F$), the better the characteristics of attenuation and crosstalk.

Unit (resistance: Ω , capacitance: F)

Pin Description

Pin Name	Pin Number	Description
IN1, IN2	4, 12	Input pin for volume control
OUT1, OUT2	7, 9	Output pin for volume control
V_{M1}, V_{M2}	6, 10	Bias pin. When operated form single supply, $1/2V_{DD}$ is applied to this pin.
CT_1, CT_2	5, 11	Tap pin provided at the center of volume control. By connecting C and R to this pin, the loudness can be controlled.
CE	3	When this pin is set to "L", the current dissipation is reduced. This pin must be "L" at backup mode.
\overline{INIT}	13	Initial pin. When set to "L", the 6th step is reached.
\overline{UP}	16	When the level on this pin is made to fall, the step rises and the volume goes up. When held at "L", the volume goes up; if set to "H", the volume stops going up at a step reached at that moment. The step stops at the MSB position.
\overline{DN}	14	The \overline{DN} operation is the reverse of UP. When the $\overline{UP}, \overline{DN}$ are set to "L" at the same time, the \overline{UP} is given priority. The step stops at the LSB position.
CR	15	Pin for connecting R, C on which the rate of step depends.
V_{DD}	2	Power supply pin (+)
V_{SS}	8	Ground
NC	1	No bonding exists on the inside of NC pin. Connected to V_{DD} or V_{SS} is recommended.