



## Graphic Equalizer LCD Driver

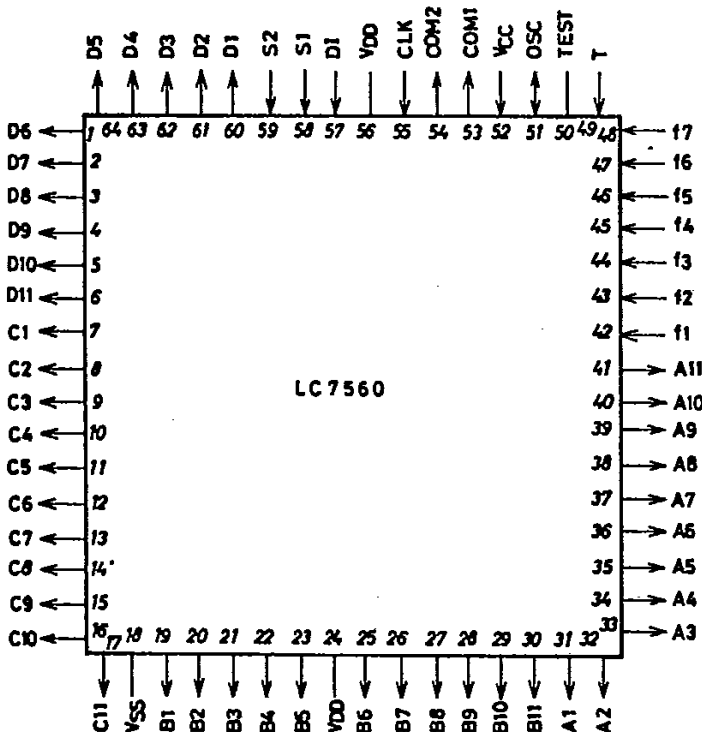
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**Use**  
LCD driver for display of graphic equalizers LC7520, 7522, 7523.

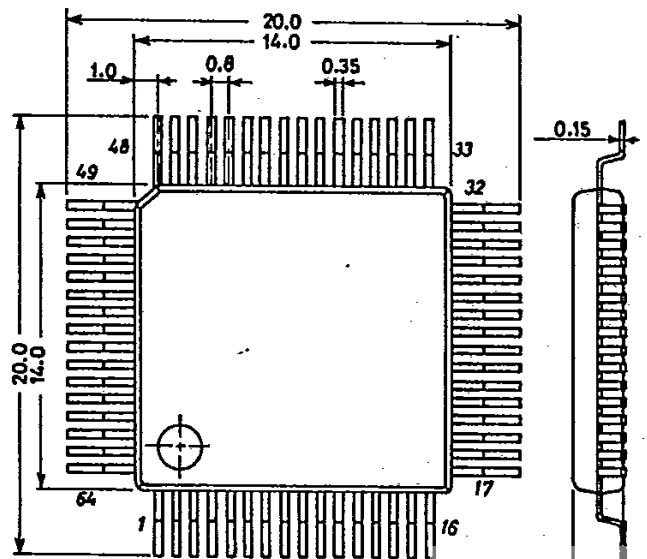
**Features**

- (1) 7-band display (+ accessory display or total display) : 11 x 8 segments.
  - . Display of bandpass signal strength → Spectrum analyzing display: 7 bands 2dB/step, 11-dot display
  - . Display of setting state in each band → Dot display: Flashable at the setting mode, R/L selectable
  - . Accessory display: 11 kinds of [MEMO], [M1] to [M5], [R], [L], [MIX], [LEVEL], [POSITION]. Total display also available.
- (2) In 1-chip applications, the signal strength display input is the L/R mixing input. (The mixing circuit is connected externally.)
- (3) Display unit: Dynamic drive of LCD. 1/2duty, 1/2bias (5V rating)
- (4) Bandpass filter for display: External equivalent filter.
- (5) System control: External microcomputer-controlled. Only 2 control buses.

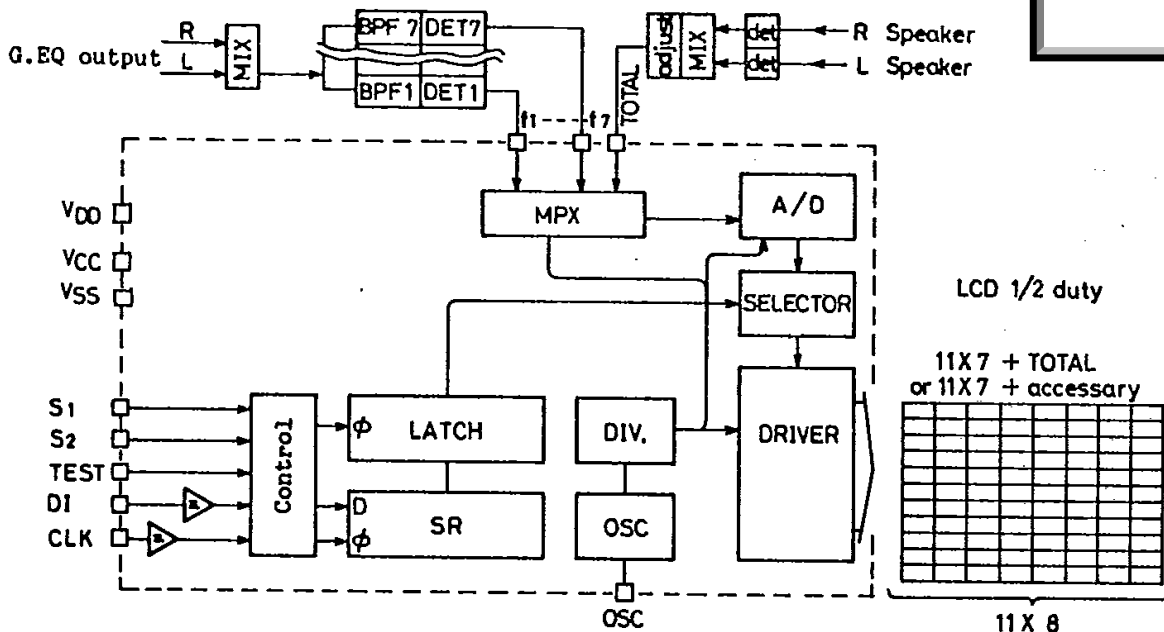
**Pin Assignment**



**Case Outline 3057-Q64AIC (unit:mm)**



Equivalent Circuit Block Diagram



Absolute Maximum Ratings at Ta=25°C, V <sub>SS</sub> =0V				unit
Maximum Supply Voltage	V <sub>DDmax</sub>	V <sub>DD</sub>	V <sub>SS</sub> to V <sub>SS</sub> +15	V
	V <sub>CCmax</sub>	V <sub>CC</sub>	V <sub>SS</sub> to V <sub>SS</sub> +7	V
Maximum Input Voltage	V <sub>I1max</sub>	CLK, DI	V <sub>SS</sub> -0.3 to V <sub>CC</sub> +0.3	V
	V <sub>I2max</sub>	f1 to f7, T, TEST, S1, S2	V <sub>SS</sub> -0.3 to V <sub>DD</sub> +0.3	V
Maximum Output Voltage	V <sub>Omax</sub>	A1 to A11, B1 to B11, COM1	V <sub>SS</sub> -0.3 to V <sub>CC</sub> +0.3	V
		C1 to C11, D1 to D11, COM2		
Allowable Power Dissipation	P <sub>dmax</sub>	Ta ≤ 75°C	200	mW
Operating Temperature	T <sub>opg</sub>		-30 to +75	°C
Storage Temperature	T <sub>stg</sub>		-40 to +125	°C

Allowable Operating Conditions at Ta=25°C, V <sub>SS</sub> =0V				min	typ	max	unit
Supply Voltage	V <sub>DD</sub>	V <sub>DD</sub>	C of 0.1uF or greater must be connected.	7.5	13.0	14.0	V
Input 'H'-Level Voltage	V <sub>IH1</sub>	V <sub>CC</sub>	CLK, DI	4.0	5.0	5.5	V
	V <sub>IH2</sub>	V <sub>CC</sub>	S1, S2	0.8V <sub>CC</sub>		V <sub>CC</sub>	V
Input 'L'-Level Voltage	V <sub>IL1</sub>	V <sub>DD</sub>	CLK, DI	0.9V <sub>DD</sub>		V <sub>DD</sub>	V
	V <sub>IL2</sub>	V <sub>SS</sub>	S1, S2	V <sub>SS</sub>		0.2V <sub>CC</sub>	V
Input Pulse Width	t <sub>pw</sub>	V <sub>SS</sub>	CLK	V <sub>SS</sub>		0.1V <sub>DD</sub>	V
Setup Time	t <sub>setup</sub>		CLK	1			us
Hold Time	t <sub>hold</sub>		DI	1			us
External CR	R <sub>osc</sub>		OSC			75	kohm
	C <sub>osc</sub>		OSC			0.0033	uF

Electrical Characteristics at Ta=25°C, V <sub>SS</sub> =0V				min	typ	max	unit
Input Sensitivity	v <sub>in</sub>	f1 to f7, T; V <sub>DD</sub> =13V, 0dB, lighted, Test Circuit #1			1.6		V
A/D Conversion Error	ΔB	f1 to f7, T; V <sub>DD</sub> =13V, to 2dB step, Test Circuit #1		-1		1	dB
Current Dissipation	I <sub>DD</sub>	V <sub>DD</sub>				7	mA
	I <sub>CC</sub>	V <sub>CC</sub>				1	mA
Input OFF Leak Current	I <sub>off</sub>	f1 to 7, T				10	uA
Output 'H'-Level Voltage	V <sub>OH</sub>	A1 to 11, B1 to 11, COM1, C1 to 11, D1 to 11, COM2	0.8V <sub>CC</sub>			V <sub>CC</sub>	V

Continued from preceding page.

Output 'L'-Level Voltage  $V_{OL}$

A1 to 11, B1 to 11, COM1, C1 to 11, D1 to 11, COM2

min	typ	max	unit
$V_{SS}$	$0.2V_{CC}$		V

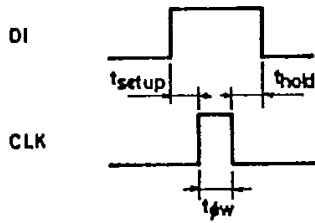
Output 'M'-Level Voltage  $V_{OM}$

COM1,2 \*2

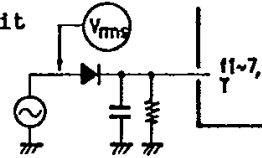
min	typ	max	unit
$1/2V_{CC}$			V
10			kohm

Output Impedance  $Z_O$

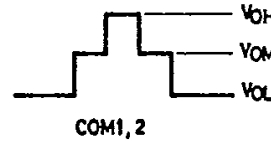
A1 to 11, B1 to 11, COM1, C1 to 11, D1 to 11, COM2



\*1 Test Circuit



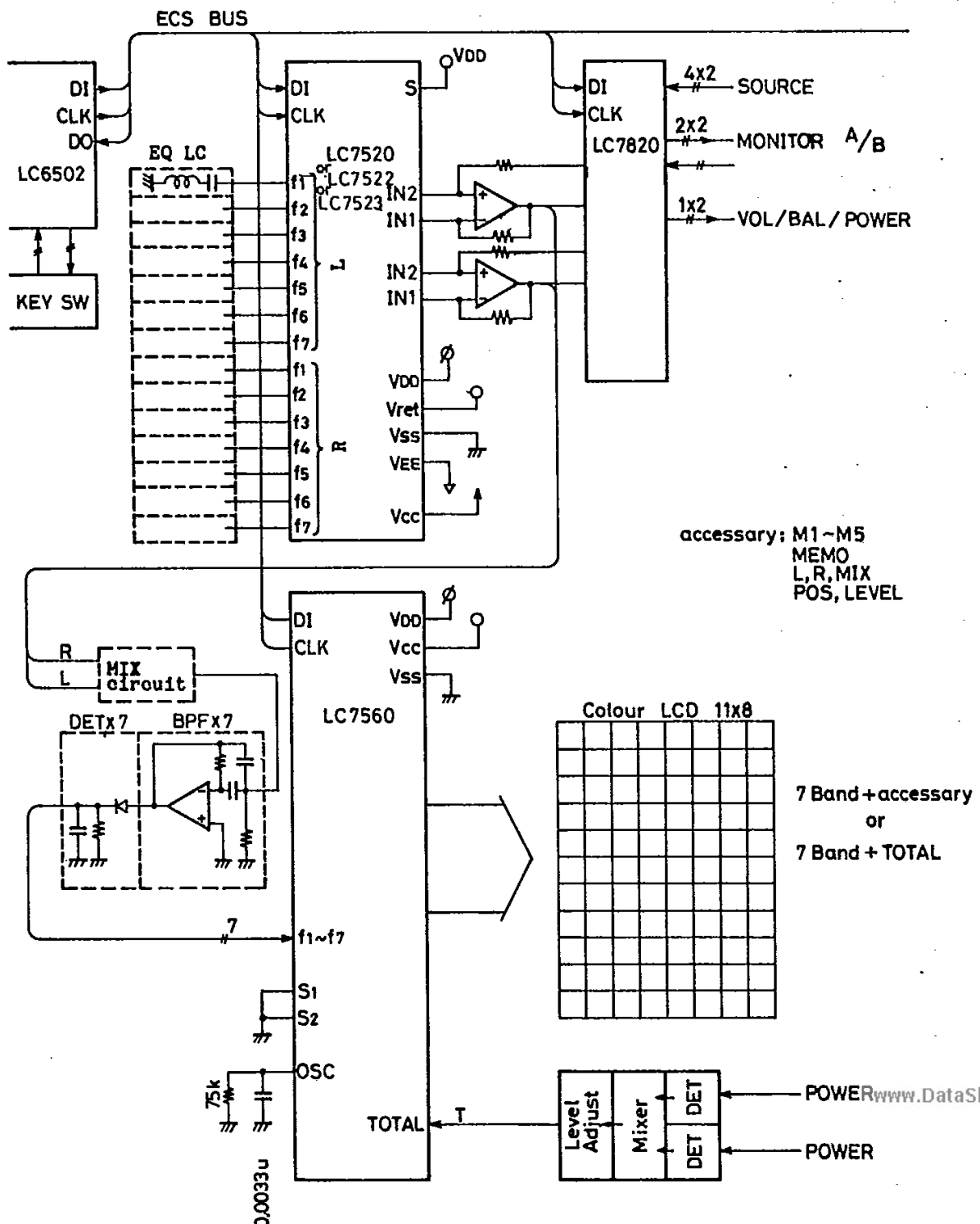
\*2



**Sample Application Circuit**

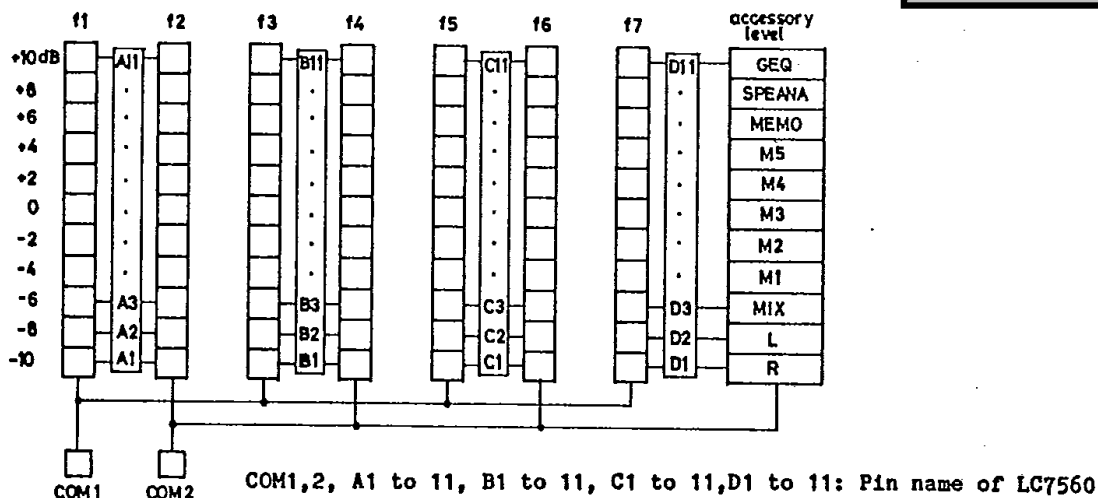
**7-Band MIX Display**

(LC7520 x 1, LC7560 x 1 or LC7522 x 1, LC7560 x 1 or LC7523 x 1, LC7560 x 1)





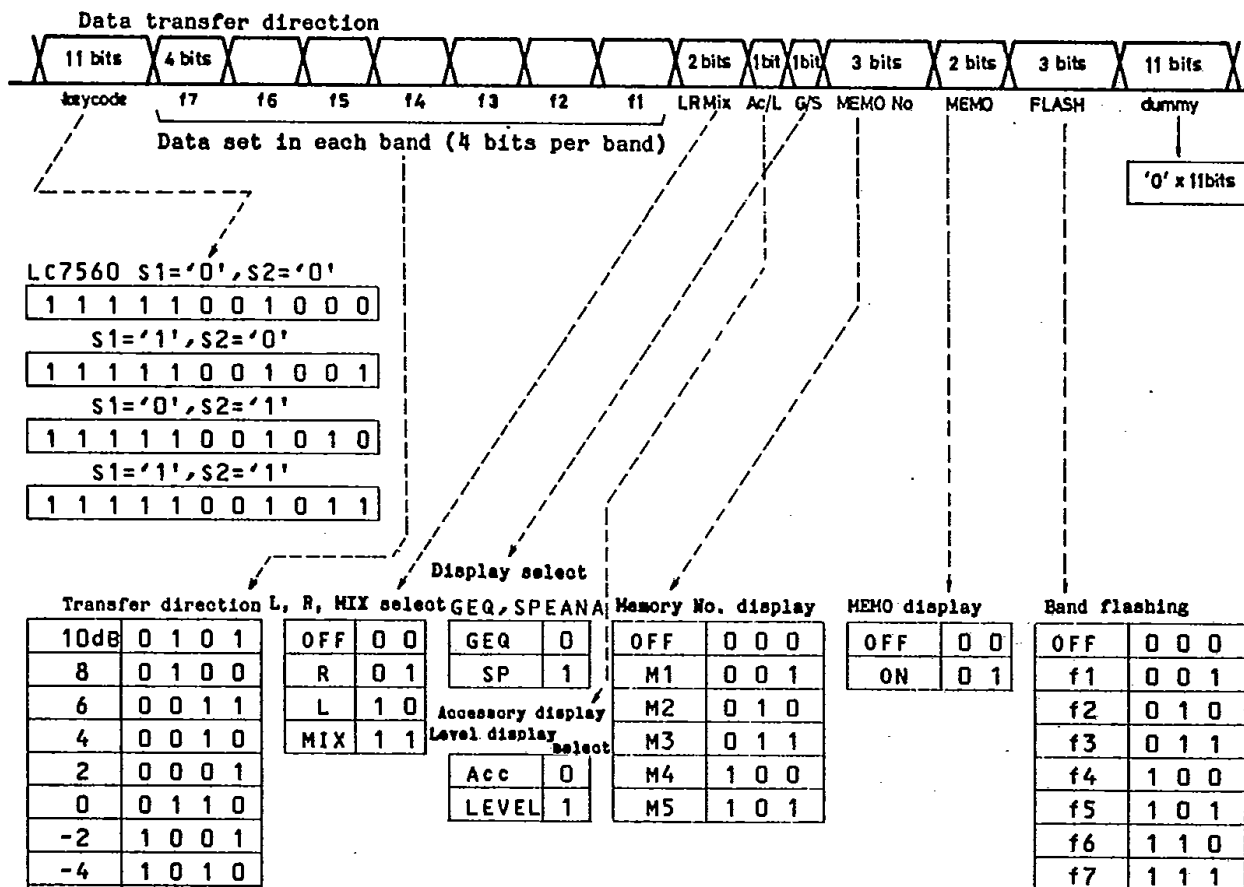
Segment Assignment



The following restrictions are imposed on accessory display.

- (1) All of R, L, MIX are unlighted or one of them is lighted.
- (2) All of M1 to 5 are unlighted or one of them is lighted.
- (3) MEMO can be turned ON/OFF independently.
- (4) Either GEQ or SPEANA is lighted. Lighting of GEQ/SPEANA is synchronized with the setting dot mode/spectrum analyzing mode respectively.

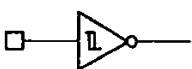
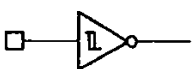
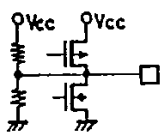
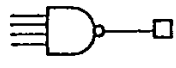
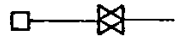
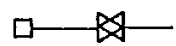
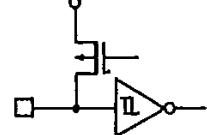
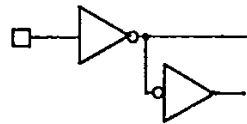
Data Code



Note 1. When power is applied, data "0" must be first transferred for 51 clocks (initial clock) or more. If data transfer is stopped halfway, the transfer of the remaining data must be completed or data transfer must be started after the initial clocks have been transferred.

Note 2. When the DI, CLK pins are shared with the LC7520, etc., the maximum initial clocks for such device must be transferred.

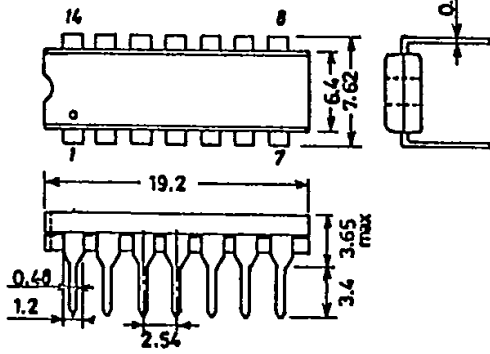
## Pin Description

Pin Name	Pin No.	Pin Configuration	Description															
V <sub>DD</sub>	24, 56		Power supply pin, +13Vtyp., Power supply for A/D conversion															
V <sub>CC</sub>	52		Power supply pin, +5V, power supply for logic drive															
V <sub>SS</sub>	18		Power supply pin, 0V															
DI	57		<ul style="list-style-type: none"> <li>Used to input data from CPU</li> <li>Schmitt inverter type</li> </ul>															
CLK	55		<ul style="list-style-type: none"> <li>Used to input CLK from CPU</li> <li>Schmitt inverter type</li> </ul>															
COM1 COM2	53 54		<ul style="list-style-type: none"> <li>Output pin to LCD common</li> </ul>															
A1 to 11	31 to 41		<ul style="list-style-type: none"> <li>Output pin to LCD segment</li> <li>Bands f1, f2</li> </ul>															
B1 to 11	19 to 23 25 to 30		<ul style="list-style-type: none"> <li>Output pin to LCD segment</li> <li>Bands f3, f4</li> </ul>															
C1 to 11	7 to 17		<ul style="list-style-type: none"> <li>Output pin to LCD segment</li> <li>Bands f5, f6</li> </ul>															
D1 to 11	60 to 64 1 to 6		<ul style="list-style-type: none"> <li>Output pin to LCD segment</li> <li>Band f7, total display or accessory display</li> </ul>															
f1 to f7	42 to 48		<ul style="list-style-type: none"> <li>Used to input detection output of audio signal</li> </ul>															
T	49		<ul style="list-style-type: none"> <li>Input pin for total display</li> <li>Used to input detection output</li> </ul>															
OSC	51		<ul style="list-style-type: none"> <li>Open drain type output buffer</li> <li>Used to connect external CR for OSC</li> </ul>															
S1,S2	58,59		<ul style="list-style-type: none"> <li>Select pin in applications where a plurality of chips (4 pcs. max.) are used</li> </ul> <table border="1" data-bbox="917 1456 1308 1646"> <thead> <tr> <th>S2</th> <th>S1</th> <th>Key code</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>7CB</td> </tr> <tr> <td>1</td> <td>0</td> <td>7CA</td> </tr> <tr> <td>0</td> <td>1</td> <td>7C9</td> </tr> <tr> <td>0</td> <td>0</td> <td>7C8</td> </tr> </tbody> </table>	S2	S1	Key code	1	1	7CB	1	0	7CA	0	1	7C9	0	0	7C8
S2	S1	Key code																
1	1	7CB																
1	0	7CA																
0	1	7C9																
0	0	7C8																
TEST	50		<ul style="list-style-type: none"> <li>IC test pin</li> <li>Open during operation</li> </ul>															

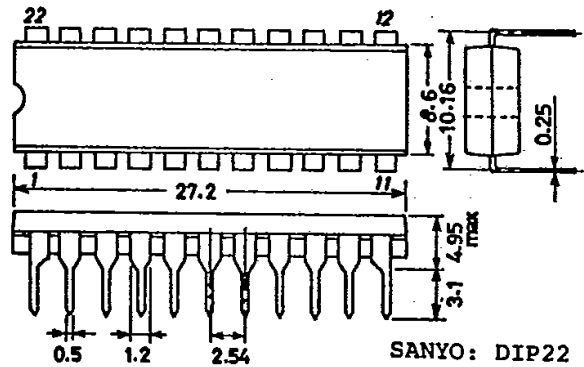
# AUDIO-USE MOS IC CASE OUTLINES

- All of Sanyo audio-use MOS IC case outlines are illustrated below.
- All dimensions are in mm, and dimensions which are not followed by min. or max. are represented by typical values.
- No marking is indicated.

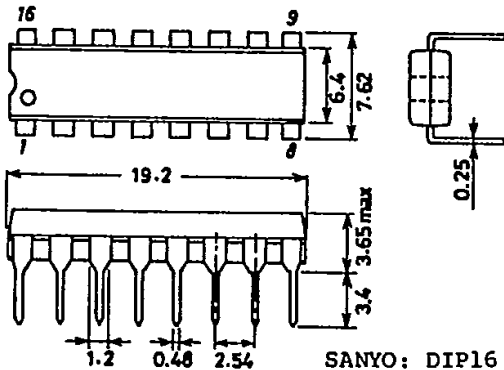
Case Outline—[3003A] unit: mm



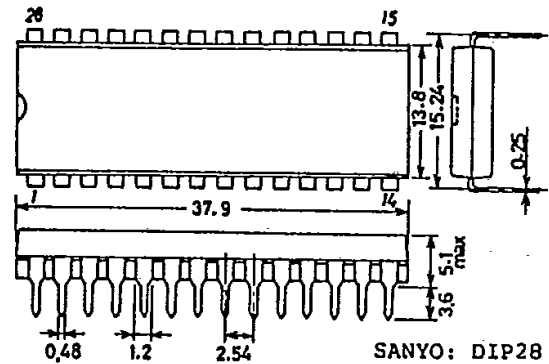
Case Outline—[3010A] unit: mm



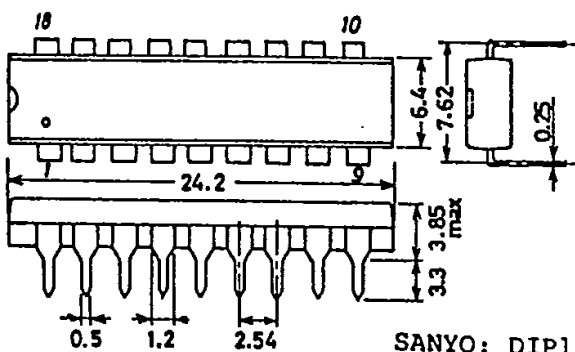
Case Outline—[3006B] unit: mm



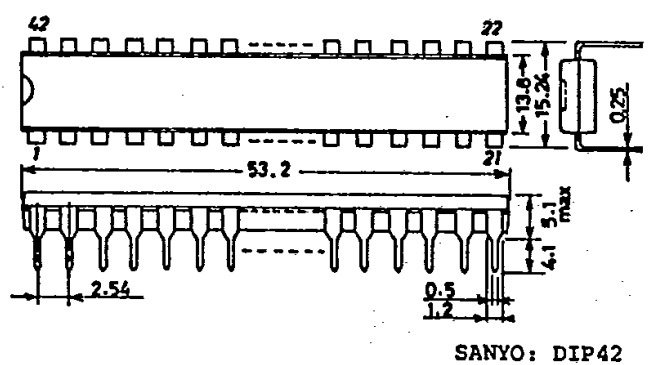
Case Outline—[3012A] unit: mm



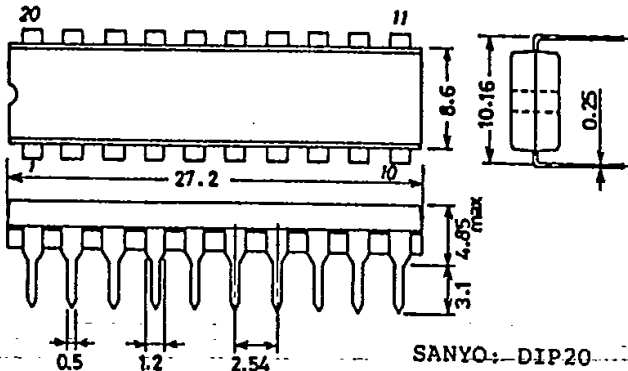
Case Outline—[3007A] unit: mm



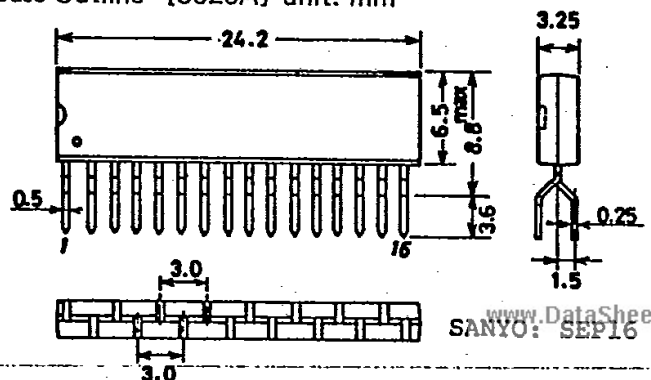
Case Outline—[3014A] unit: mm



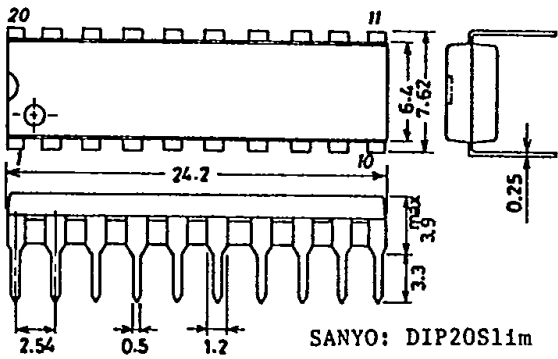
Case Outline—[3008A] unit: mm



Case Outline—[3020A] unit: mm

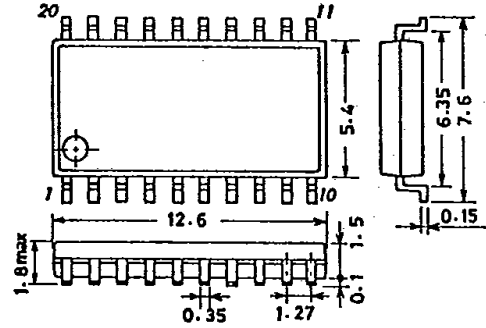


Case Outline—[3021B] unit: mm



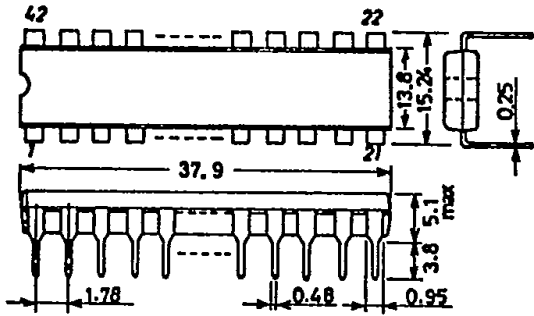
SANYO: DIP20S11m

Case Outline—[3036B] unit: mm



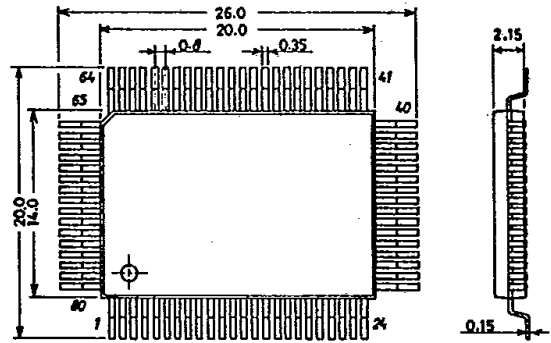
SANYO: MFP20

Case Outline—[3025B] unit: mm



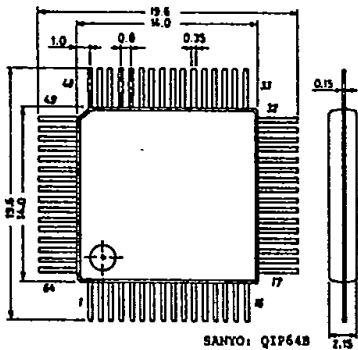
SANYO: DIP42S

Case Outline—[3044B] unit: mm



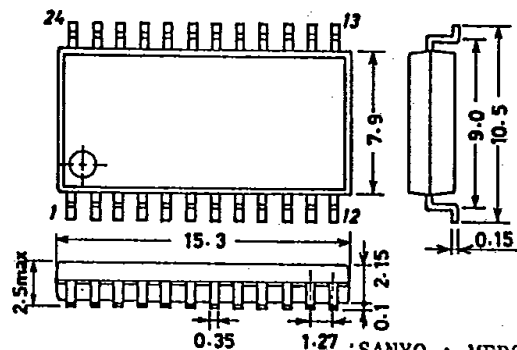
SANYO: QIP80A

Case Outline—[3026B] unit: mm



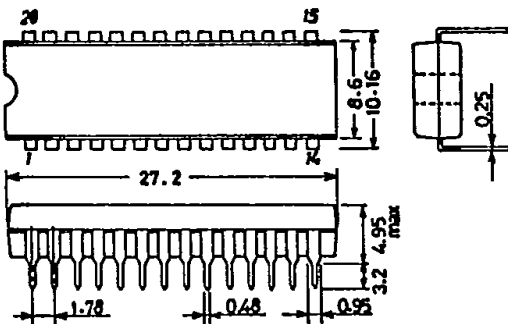
SANYO: QIP64B

Case Outline—[3045B] unit: mm



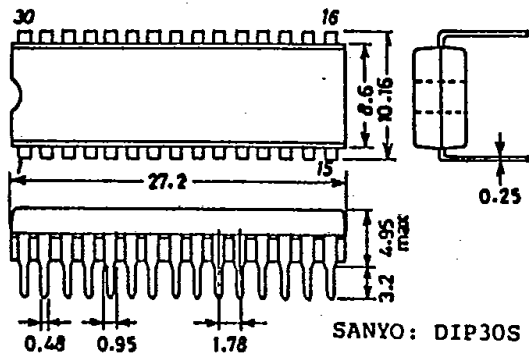
SANYO: MFP24

Case Outline—[3029A] unit: mm



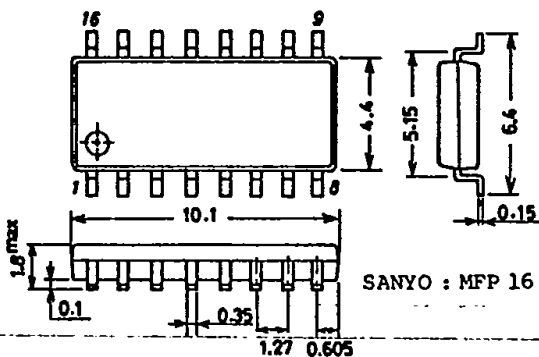
SANYO: DIP28S

Case Outline—[3047A] unit: mm



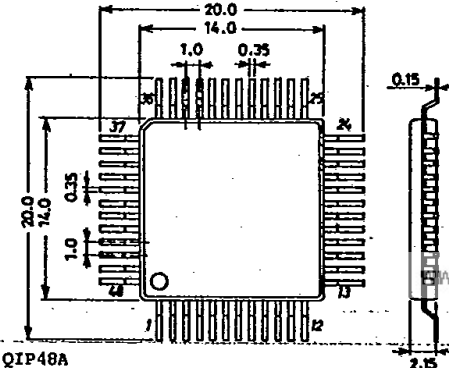
SANYO: DIP30S

Case Outline—[3035A] unit: mm



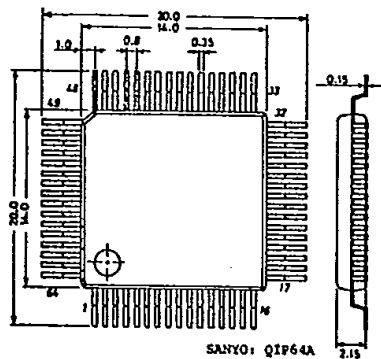
SANYO: MFP 16

Case Outline—[3052A] unit: mm



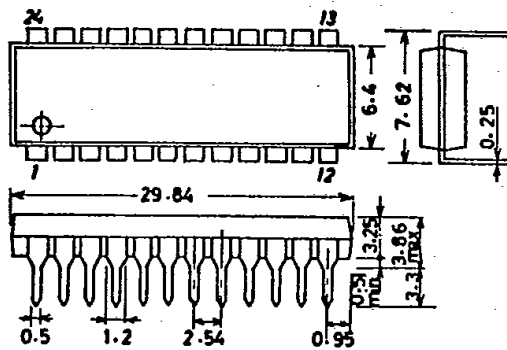
SANYO: QIP48A

Case Outline—[3057] unit: mm



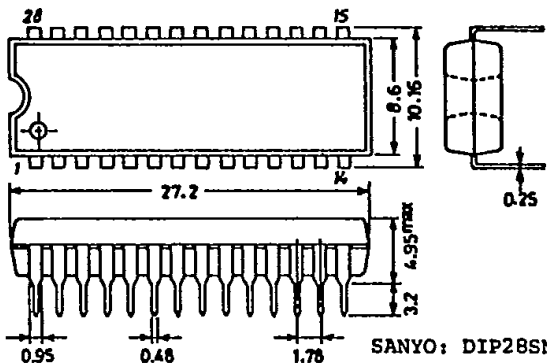
SANYO: QIP64A

Case Outline—[3084] unit: mm



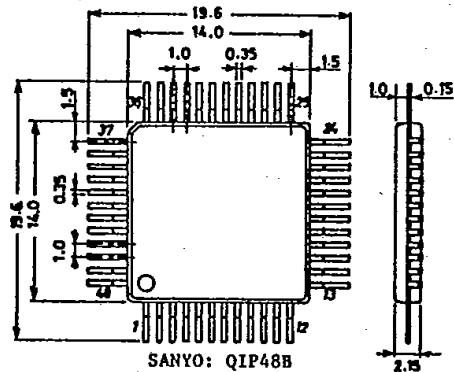
SANYO: DIP-24S11m

Case Outline—[3063] unit: mm



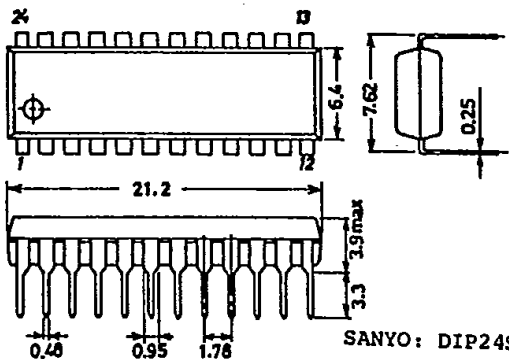
SANYO: DIP28SN

Case Outline—[3118] unit: mm



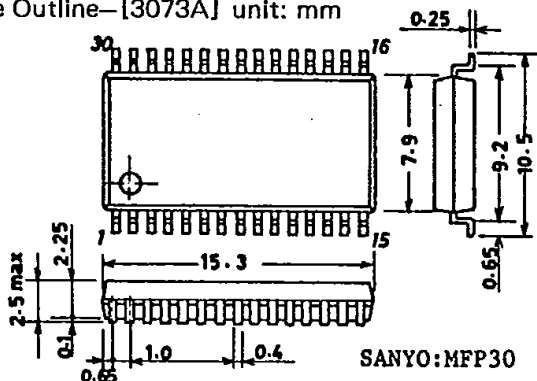
SANYO: QIP48B

Case Outline—[3067] unit: mm



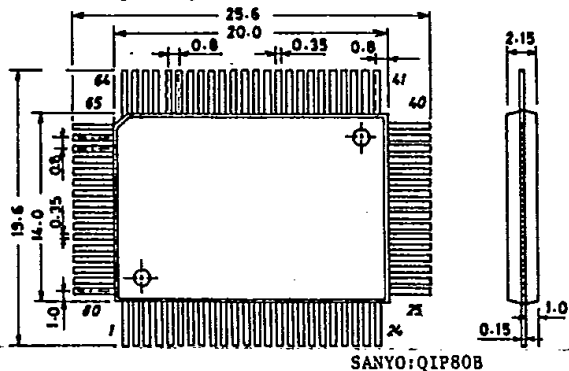
SANYO: DIP24S

Case Outline—[3073A] unit: mm



SANYO: MFP30

Case Outline—[3074] unit: mm



SANYO: QIP80B