T-74-05-01

LC7560

3057

CMOS LSI

Graphic Equalizer LCD Driver

Use

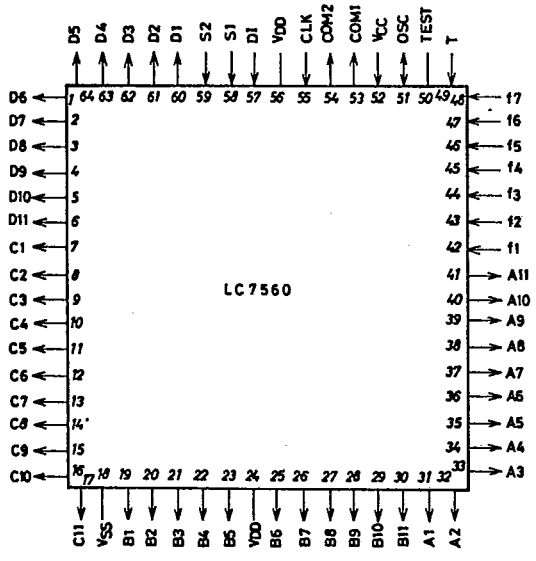
LCD driver for display of graphic equalizers LC7520, 7522, 7523.

Features

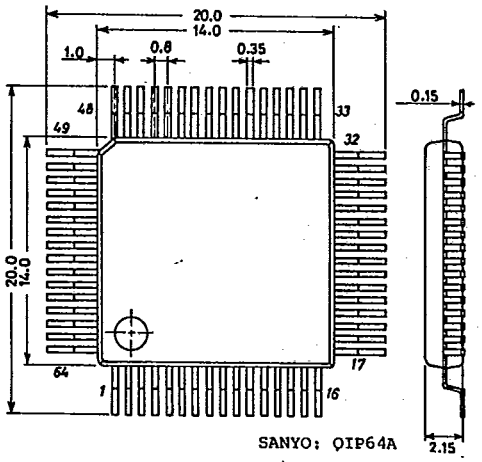
(1) 7-band display (+ accessory display or total display) : 11 x 8 segments.
- Display of bandpass signal strength → Spectrum analyzing display: 7 bands 2dB/step, 11-dot display
- Display of setting state in each band → Dot display: Flashable at the setting mode, R/L selectable
- Accessory display: 11 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)



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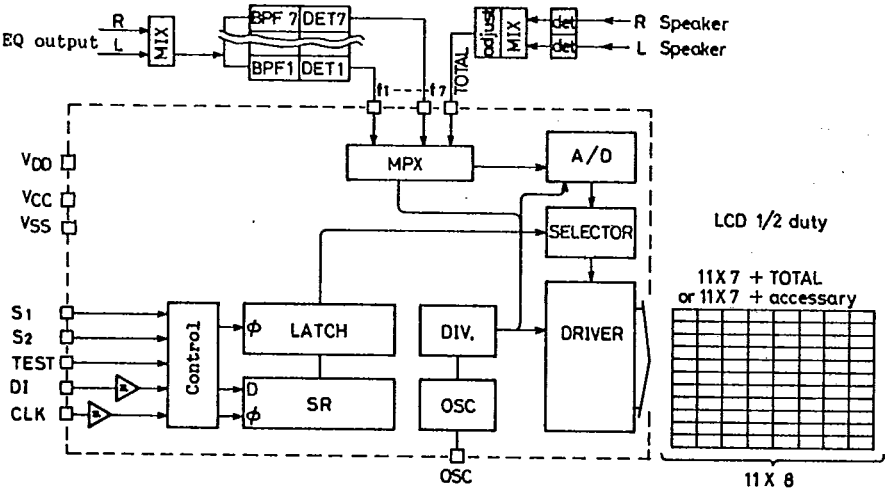
Equivalent Circuit Block Diagram



Absolute Maximum Ratings at Ta=25°C, V_{SS}=0V

				unit
Maximum Supply Voltage	V_{DD}max	V_{DD}	V_{SS} to V_{SS}+15	V
	V_{CC}max	V_{CC}	V_{SS} to V_{SS}+7	V
Maximum Input Voltage	V_{I1}max	CLK,DI	V_{SS}-0.3 to V_{CC}+0.3	V
	V_{I2}max	f1 to f7,T,TEST,S1,S2	V_{SS}-0.3 to V_{DD}+0.3	V
Maximum Output Voltage	$V_O$max	A1 to A11,B1 to B11,COM1 C1 to C11,D1 to D11,COM2	V_{SS}-0.3 to V_{CC}+0.3	V
Allowable Power Dissipation	Pdmax	Ta≦75°C	200	mW
Operating Temperature	Topg		-30 to +75	°C
Storage Temperature	Tstg		-40 to +125	°C

Allowable Operating Conditions at Ta=25°C, V_{SS}=0V

				min	typ	max	unit
Supply Voltage	V_{DD}	V_{DD}	C of 0.1uF or greater must be connected.	7.5	13.0	14.0	V
	V_{CC}	V_{CC}		4.0	5.0	5.5	V
Input 'H'-Level Voltage	V_{IH1}	CLK,DI		0.8V_{CC}		V_{CC}	V
	V_{IH2}	S1,S2		0.9V_{DD}		V_{DD}	V
Input 'L'-Level Voltage	V_{IL1}	CLK,DI		V_{SS}		0.2V_{CC}	V
	V_{IL2}	S1,S2		V_{SS}		0.1V_{DD}	V
Input Pulse Width	$t_{\phi W}$	CLK		1			us
Setup Time	t_{setup}	DI		1			us
Hold Time	t_{hold}	DI		1			us
External CR	Rosc	OSC			75		kohm
	Cosc	OSC			0.0033		uF

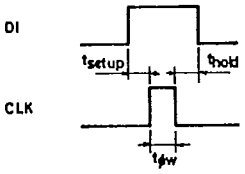
Electrical Characteristics at Ta=25°C, V_{SS}=0V

			min	typ	max	unit
Input Sensitivity	v_{in}	f1 to f7,T; V_{DD}=13V,0dB, lighted, Test Circuit *1		1.6		V
A/D Conversion Error	ΔB	f1 to f7,T; V_{DD}=13V,to 2dB step, Test Circuit *1	-1		1	dB
Current Dissipation	I_{DD}	V_{DD}			7	mA
	I_{CC}	V_{CC}			1	mA
Input OFF Leak Current	Ioff	f1 to 7,T			10	uA
Output 'H'-Level Voltage	V_{OH}	A1 to 11,B1 to 11,COM1, C1 to 11,D1 to 11,COM2	0.8V_{CC}		V_{CC}	V

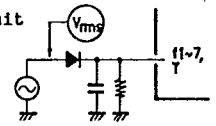
Continued on next page.

Continued from preceding page.

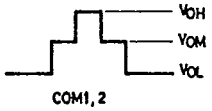
			min	typ	max	unit
Output 'L'-Level Voltage	V_{OL}	A1 to 11,B1 to 11,COM1, C1 to 11,D1 to 11,COM2	V_{SS}		$0.2V_{CC}$	V
Output 'M'-Level Voltage	V_{OM}	COM1,2 *2		$1/2V_{CC}$		V
Output Impedance	z_o	A1 to 11,B1 to 11,COM1, C1 to 11,D1 to 11,COM2		10		kohm



*1 Test Circuit



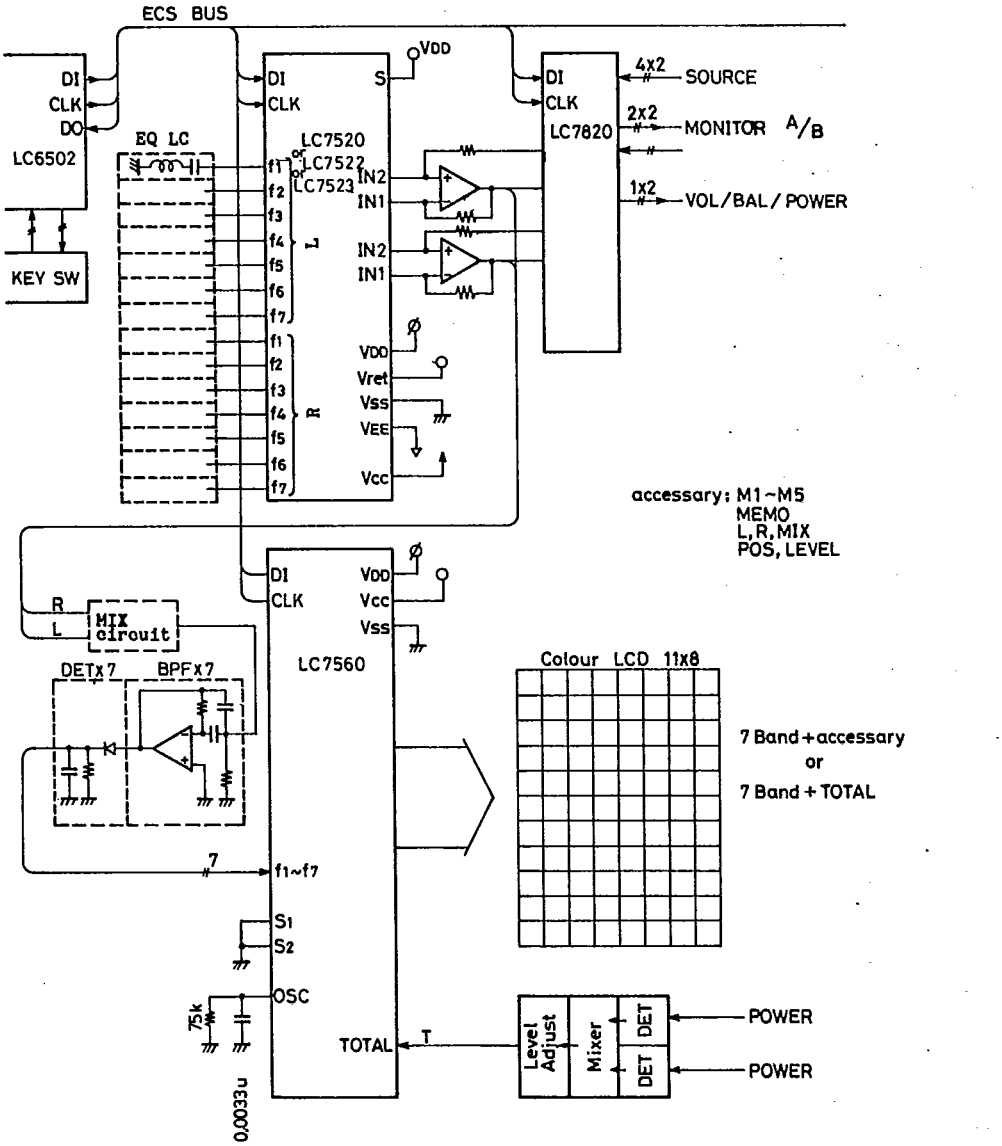
*2



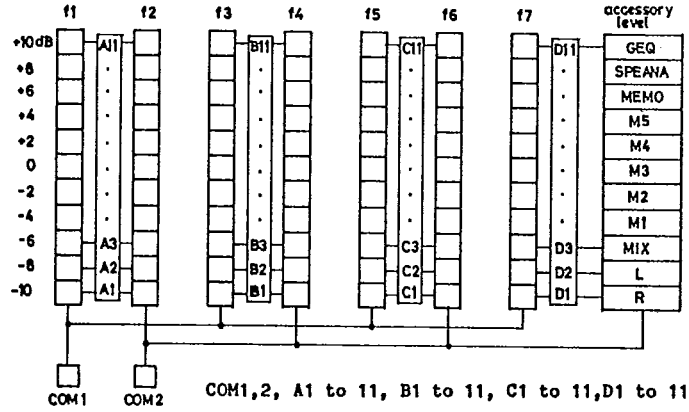
Sample Application Circuit

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

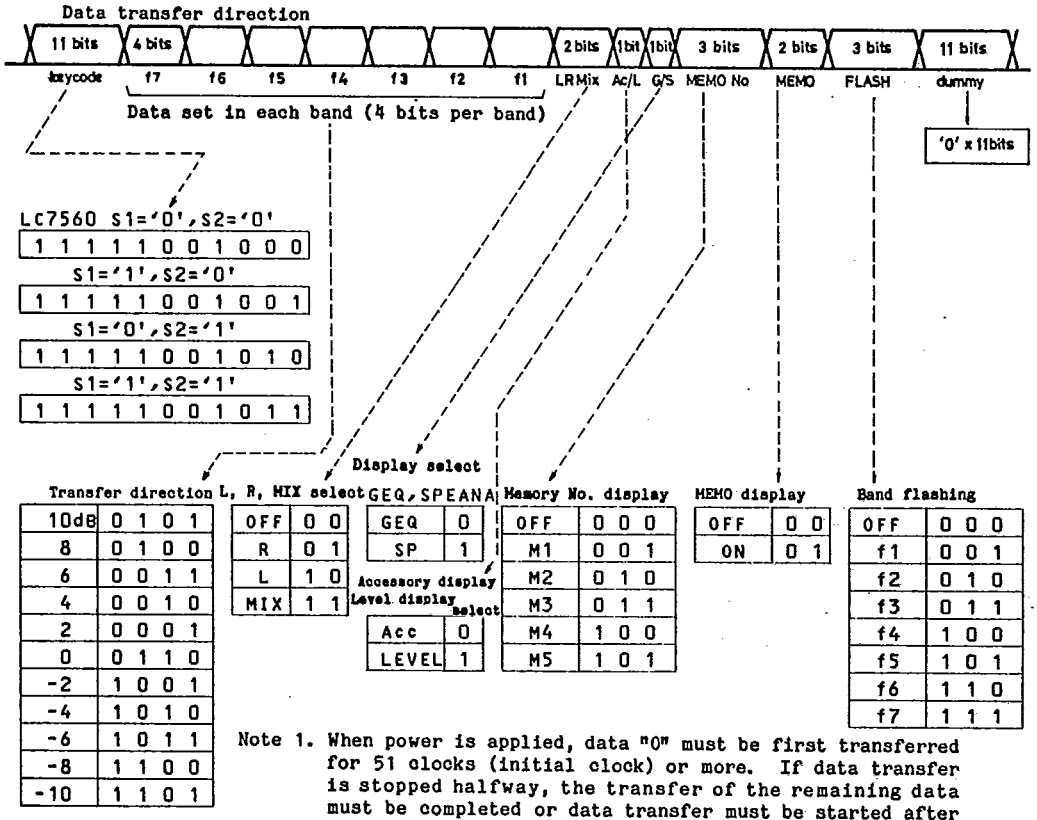


COM1,2, A1 to 11, B1 to 11, C1 to 11,D1 to 11: Pin name of LC7560

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.

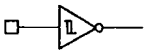
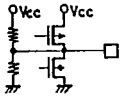
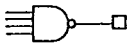
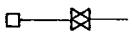
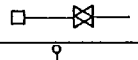
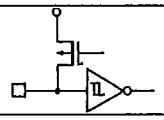
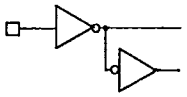
Data Code



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

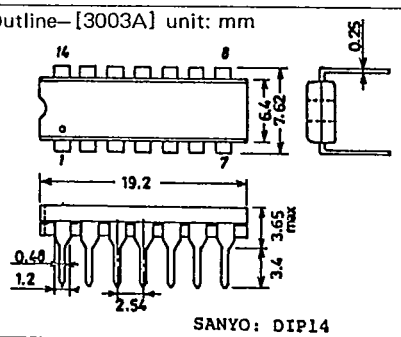
Pin Name	Pin No.	Pin Configuration	Description
V_{DD}	24, 56		Power supply pin, +13Vtyp., Power supply for A/D conversion
V_{CC}	52		Power supply pin, +5V, power supply for logic drive
V_{SS}	18		Power supply pin, 0V
DI	57		. Used to input data from CPU . Schmitt inverter type
CLK	55		. Used to input CLK from CPU . Schmitt inverter type
COM1 COM2	53 54		. Output pin to LCD common
A1 to 11	31 to 41		. Output pin to LCD segment . Bands f1, f2
B1 to 11	19 to 23 25 to 30		. Output pin to LCD segment . Bands f3, f4
C1 to 11	7 to 17		. Output pin to LCD segment . Bands f5, f6
D1 to 11	60 to 64 1 to 6		. Output pin to LCD segment . Band f7, total display or accessory display
f1 to f7	42 to 48		. Used to input detection output of audio signal
T	49		. Input pin for total display . Used to input detection output
OSC	51		. Open drain type output buffer . Used to connect external CR for OSC
S1,S2	58,59		. Select pin in applications where a plurality of chips (4 pcs. max.) are used
TEST	50		. IC test pin . Open during operation

S2	S1	Key code
1	1	7CB
1	0	7CA
0	1	7C9
0	0	7C8

AUDIO-USE MOS IC CASE OUTLINES

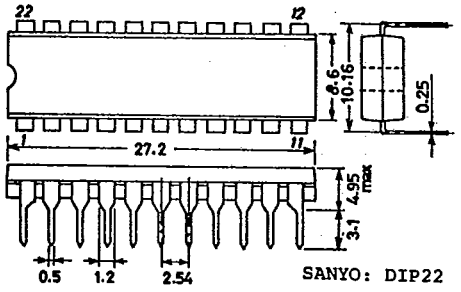
- All of Sanyo audio-use MOS IC case outlines are illustrated below.
- All dimensions are in mm, and dimensions which are not followed by min. or max. are represented by typical values.
- No marking is indicated.

Case Outline—[3003A] unit: mm



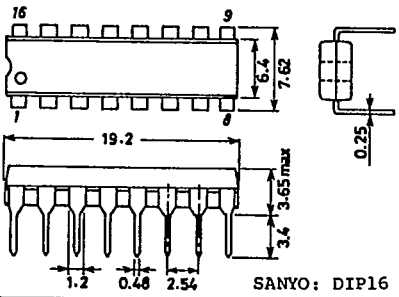
SANYO: DIP14

Case Outline—[3010A] unit: mm



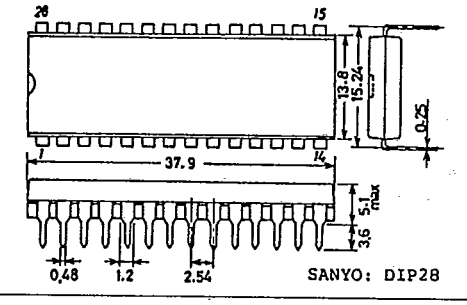
SANYO: DIP22

Case Outline—[3006B] unit: mm



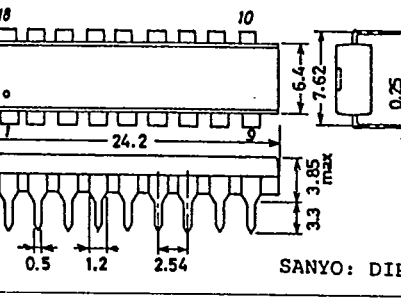
SANYO: DIP16

Case Outline—[3012A] unit: mm



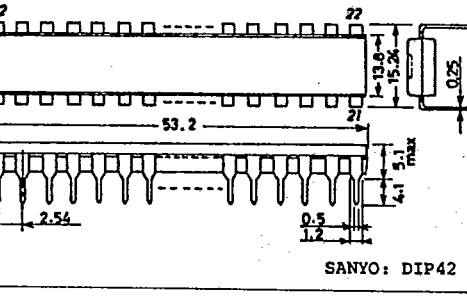
SANYO: DIP28

Case Outline—[3007A] unit: mm



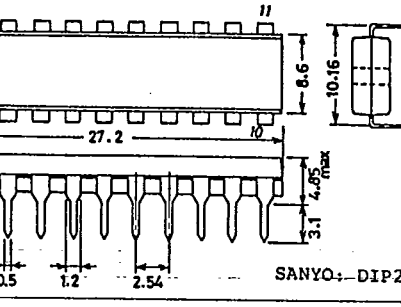
SANYO: DIP18

Case Outline—[3014A] unit: mm



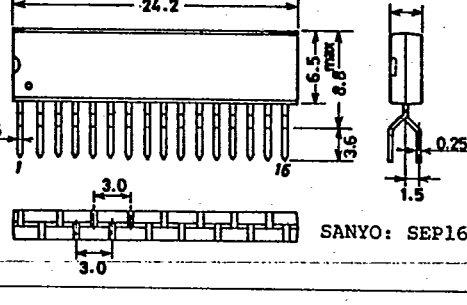
SANYO: DIP42

Case Outline—[3008A] unit: mm



SANYO: DIP20

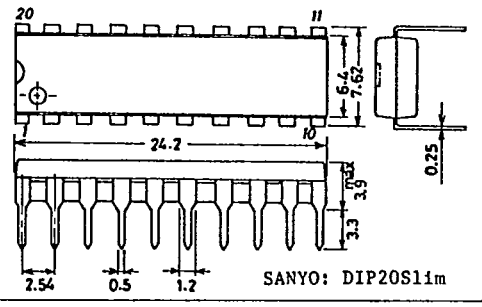
Case Outline—[3020A] unit: mm



SANYO: SEP16

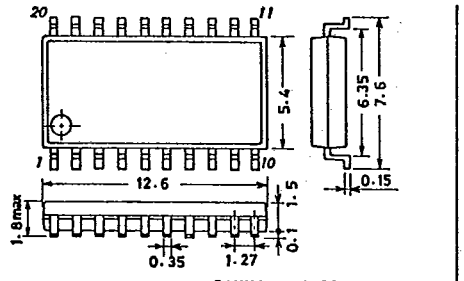
T-90-20

Case Outline—[3021B] unit: mm



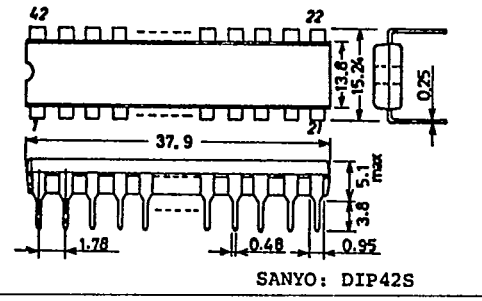
SANYO: DIP20S1im

Case Outline—[3036B] unit: mm



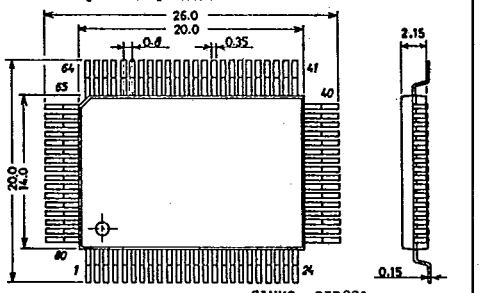
SANYO: MFP20

Case Outline—[3025B] unit: mm



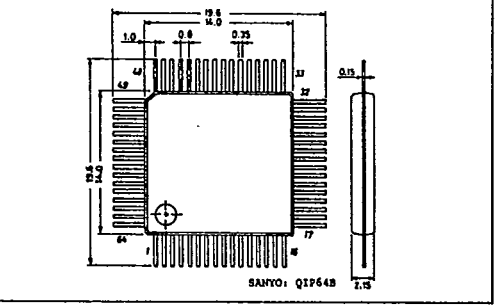
SANYO: DIP42S

Case Outline—[3044B] unit: mm



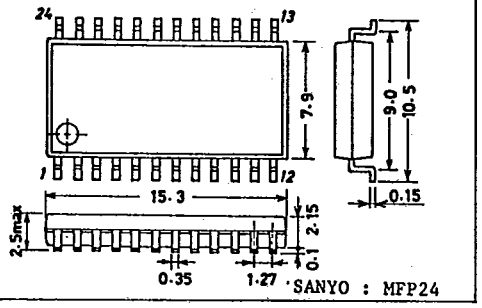
SANYO: QIP80A

Case Outline—[3026B] unit: mm



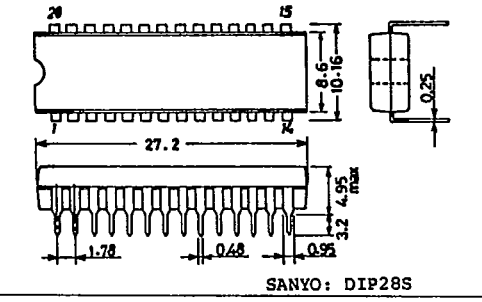
SANYO: QIP64B

Case Outline—[3045B] unit: mm



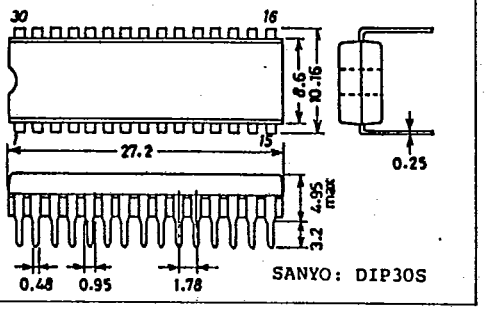
SANYO : MFP24

Case Outline—[3029A] unit: mm



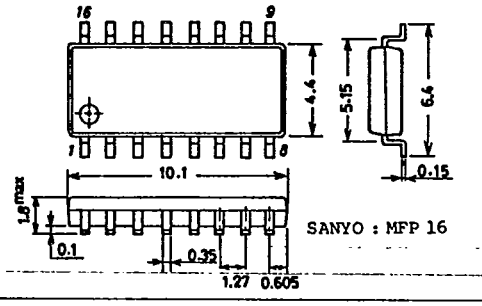
SANYO: DIP28S

Case Outline—[3047A] unit: mm



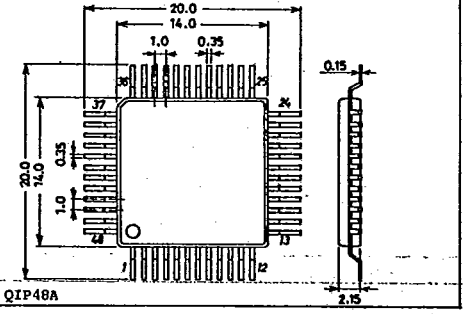
SANYO: DIP30S

Case Outline—[3035A] unit: mm



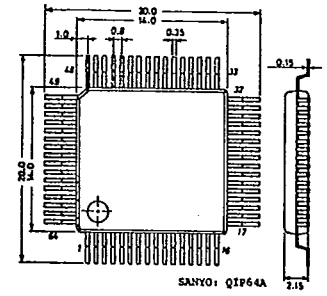
SANYO : MFP 16

Case Outline—[3052A] unit: mm

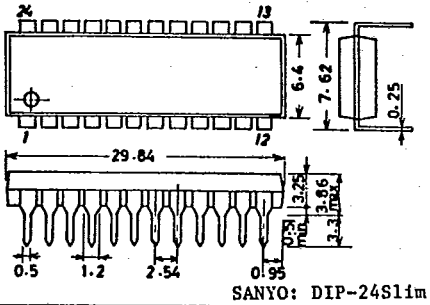


SANYO: QIP48A

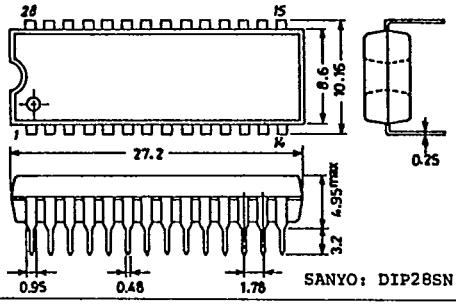
Case Outline—[3057] unit: mm



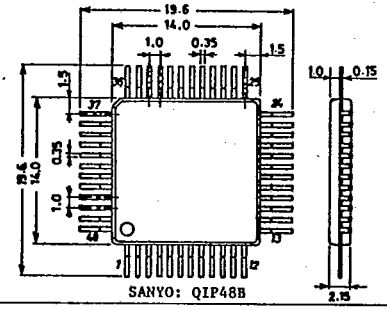
Case Outline—[3084] unit: mm



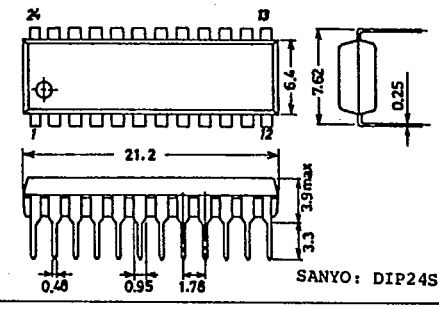
Case Outline—[3063] unit: mm



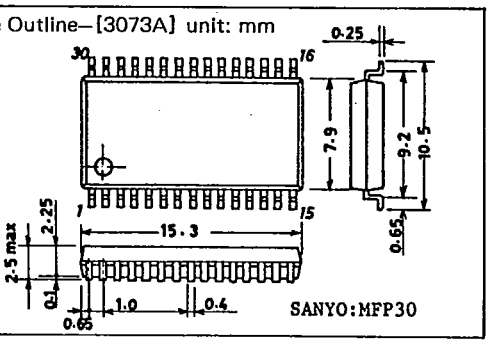
Case Outline—[3118] unit: mm



Case Outline—[3067] unit: mm



Case Outline—[3073A] unit: mm



Case Outline—[3074] unit: mm