

LC7267,
7268



3025B

CMOS LSI

T-77-05-05

Receiving Frequency + Time Display

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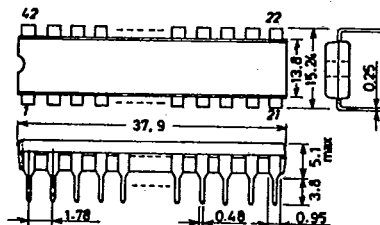
Functions

- (1) Capable of selecting receiving frequency display/time display.
- (2) Display of receiving frequency at each band of FM/MW/LW

	Display Element	Static/Dynamic	Withstand Voltage at Output Pin	Max. Current
LC7267	LED	Static	15V	18mA ($V_{DD} = 6.0$ to $10.0V$)
LC7268	FLT	Static	$V_{DD} - 20V$	-3mA

- (3) Number of display digits: FM: 5 digits, MW, LW: 4 digits
- (4) Covers intermediate frequencies shown below.
 - FM: +10.700, +10.725, +10.750, +10.675 MHz
-10.700, -10.725, -10.675, -10.650 MHz
 - MW, LW: +450 kHz(1) --- 10 kHz-step display
+450 kHz(2) --- 1 kHz-step display
+455 kHz --- 1 kHz-step display
+469 kHz --- 1 kHz-step display
- (5) In FM reception applications, the LB3500 ($\div 8$ prescaler) is used jointly.
- (6) Two selections of display system (12-hour system with PM sign, 24-hour system).
- (7) Easy to set time by the time signal.
- (8) Inhibit pin for inhibiting time setting with display unlighted.
- (9) 7.2 MHz crystal for reference frequency.
- (10) Supply voltage V_{DD} : 4.5 to 10.0 V.

Case Outline 3025B-D42SIC
(unit: mm)

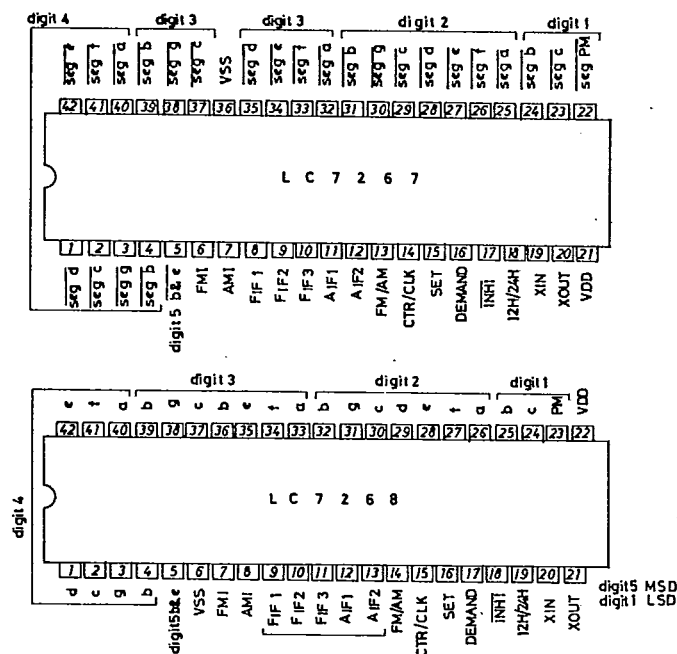


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Pin Assignment



Configuration and Display Font

4 or 4-1/2-digit segment LED's are used to display time and frequency in the display font shown below.

Display font 1234567890

Lighting System

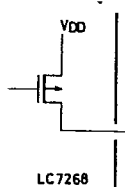
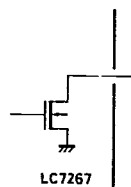
Static lighting

Display Range

- Frequency (MW, LW) 000 kHz to 1999 kHz (The highest-order digit "0" is blanked out.)
- Frequency (FM) 00.00 MHz to 199.95 MHz (The highest-order digit "0" is blanked out.)
- Clock (12-hour) PM12:00 to PM11:59 → 12:00 to 11:59
- Clock (24-hour) 0:00 to 23:59 (The highest-order digit "0" is blanked out.)

Pin Description (The LC7267/68 have the same pin name, function except output driver pins, provided that the pin No. is not necessarily the same.)

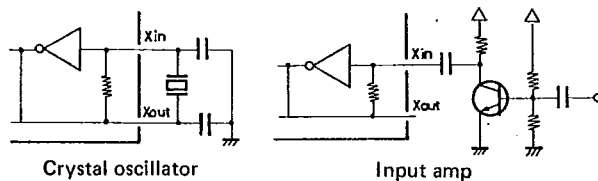
- $\bar{a} \sim \bar{g}, \overline{PM}, \bar{b} \& \bar{e} \dots$ LED (LC7267) driver pin
- $a \sim g, PM, b \& e \dots$ FLT (LC7268) driver pin



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- ☐ V_{DD}, V_{SS}Power supply pin
- ☐ X_{IN}, X_{OUT}Crystal oscillator, input amp pin



- ☐ $F_{IF}(1), F_{IF}(2), F_{IF}(3)$ FM IF offset value select pin

$F_{IF}(1)$	0	0	0	0	1	1	1	1
$F_{IF}(2)$	0	0	1	1	0	0	1	1
$F_{IF}(3)$	0	1	0	1	0	1	0	1
$I F (MHz)$	+10.700	+10.725	+10.675	+10.750	-10.700	-10.725	-10.675	-10.650

- ☐ $A_{IF}(1), A_{IF}(2)$ AM IF offset value select pin

$A_{IF}(1)$	0	0	1	1
$A_{IF}(2)$	1	0	0	1
$I F (kHz)$	+450(1)	+450(2)	+455	+469
Display Step	10kHz	1 kHz step		

1: High level
0: Low level

(Note) 450 kHz (1): 10 kHz-step display, others: 1 kHz-step display

- ☐ F_{MI}, A_{MI} Local OSC signal input pin

F_{MI} : For FM
 A_{MI} : For MW, LW

- ☐ F_{M}/A_{M} FM/MW, LW select pin

F_{M} : High level
 MW, LW : Low level

- ☐ CTR/CLK Frequency display/time display select pin

CTR (Counter): High level
 CLK (Clock): Low level

- ☐ $DEMAND$ Input pin for instructing execution of setting

CTR/CLK	$DEMAND$	MODE
0	1	Mode of setting by the time signal and hours-minutes setting mode
0	0	Time display mode

- ☐ SET Input pin for setting hours-minutes

This pin is set at "M" level normally. The input signal of "H"/"L" level acts as follows:

When in the mode of setting by the time signal and hours-minutes setting mode ($CTR/CLK = "L"$)
 $DEMAND = "H"$)

High level: Execution of hours setting

Advance at a 2 Hz rate 1.2 seconds after the pin is set to "H" level.

Low level: Execution of setting by the time signal and minutes setting

Advance at a 2 Hz rate 1.2 seconds after the pin is set to "L" level.

Setting by the time signal is executed when the pin is set to "M" level within 1.0 second after set to "L" level. No carry to high-order digit occurs.

- $\overline{\text{INH1}}$ Input pin for turning OFF the segment pins, inhibiting the SET/DEMAND pin from functioning, and preventing the AMI amp from operating

High level: Normal operation

Low level: Segment pin OFF, SET/DEMAND pin function inhibit

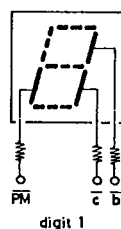
- 12H/24H..... Input pin for selecting 12-hour system with PM sign/24-hour system

High level: 12-hour system with PM sign

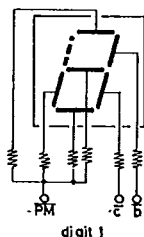
Low level: 24-hour system

Make connection of the highest-order digit as shown below.

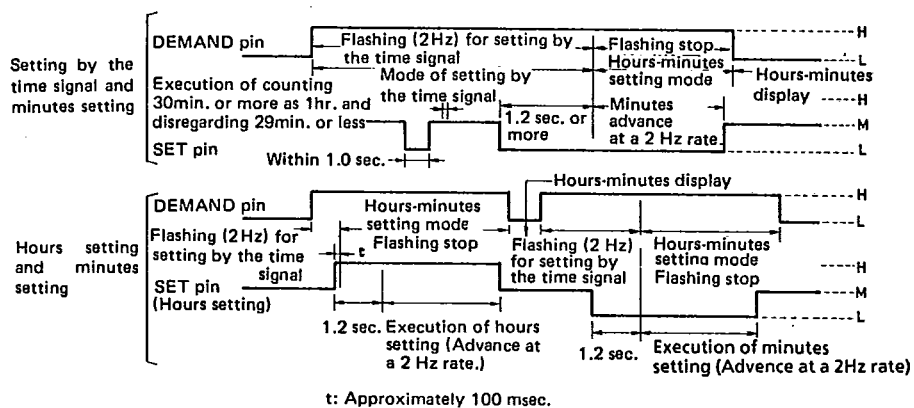
12-hour system



24-hour system



Timing Chart: Time setting (CTR/CLK = "L")



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Sample Display at Each Display (Setting by the time signal, hours-minutes display, hours-minutes setting)

Setting by the time signal: Setting to PM 12:00

1158

Execute setting by the time signal with the SET pin.

Flashing at a 2Hz rate when in the mode of setting by the time signal

.1200

PM sign

Flashing at a 2Hz rate

When setting by the time signal is executed, minutes become 00. If the minutes display is at 30 to 59, hours are incremented by 1 (counting 30 or more as 1hr. and disregarding 29 or less).

Hours-minutes display: Display of PM 12:34

.1234

PM sign

The PM sign flashes in the afternoon when in the mode of setting by the time signal, hours-minutes display, hours-minutes setting. (for 12-hour system).

Hours-minutes setting: Setting to PM 11:45 from PM 11:23

.1123

PM sign

Flashing at a 2Hz rate

Set the SET pin to VDD or VSS. After lapse of 1.2sec., flashing stops and hours or minutes advance at a 2Hz rate.

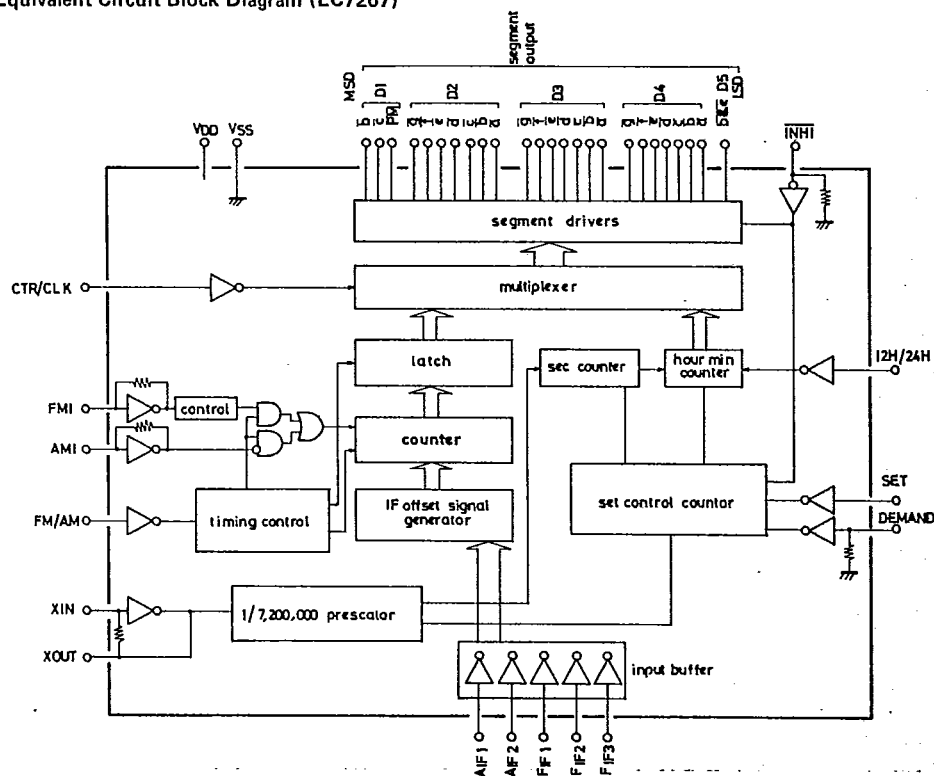
.1145

PM sign

Set the SET pin to VSS, and setting is executed.

Set the SET pin to VDD, and setting is executed.

Equivalent Circuit Block Diagram (LC7267)



Note: For the LC7268, (bar) over the output segment signal sign is removed.

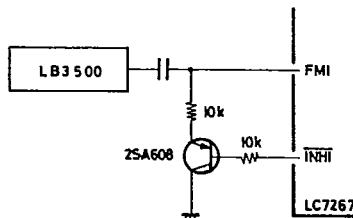
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*: Ceramic capacitor (Must be mounted as close to each pin as possible.)

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[illegible]

To reduce current dissipation when display is turned off (INH: 'L'), the circuit shown below must be connected to the FMI pin.



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Main Specifications

[LC7267]

Absolute Maximum Ratings at $V_{SS} = 0V$

			unit
Maximum Supply Voltage	$V_{DD\ max}$	- 0.3 to + 11	V
Input Voltage	V_{IN}	- 0.3 to $V_{DD} + 0.3$	V
Output Voltage	$V_O(1)$ Xout	- 0.3 to $V_{DD} + 0.3$	V
Output Voltage	$V_O(2)$ Output pins other than Xout, output : off	0 to 15	V
Allowable Power Dissipation	$P_d\ max$ $T_a \leq 65^\circ C$	550	mW
Allowable Power Dissipation of Segment Outputs	$P_d\ seg\ 1$ $\overline{PM}$ $V_{DD} = 4.5\ to\ 6V, I_{OL} = 50mA$	35	mW
	$P_d\ seg\ 2$ $\overline{b\&e}$ $V_{DD} = 4.5\ to\ 6V, I_{OL} = 33mA$	30	mW
	$P_d\ seg\ 3$ Other outputs $V_{DD} = 4.5\ to\ 6.5V,$ $I_{OL} = 16.5mA$	15	mW
	$P_d\ seg\ 4$ $\overline{PM}$ $V_{DD} = 6.0\ to\ 10V, I_{OL} = 54mA$	38	mW
	$P_d\ seg\ 5$ $\overline{b\&e}$ $V_{DD} = 6.0\ to\ 10V, I_{OL} = 36mA$	25	mW
	$P_d\ seg\ 6$ Other outputs $V_{DD} = 6.0\ to\ 10V,$ $I_{OL} = 18mA$	13	mW
Operating Temperature	T_{opg}	- 30 to + 65	$^\circ C$
Storage Temperature	T_{stg}	- 40 to + 125	$^\circ C$

Allowable Operating Conditions at $T_a = 25^\circ C, V_{SS} = 0V, V_{DD} = 4.5\ to\ 10V$

			min	typ	max	unit
Supply Voltage	V_{DD}		4.5		10	V
Input "H"-Level Voltage	$V_{IH\ 1}$	$\overline{INH}, CTR/CLK, DEMAND$	$0.8V_{DD}$		V_{DD}	V
Input "L"-Level Voltage	$V_{IL\ 1}$	$\overline{INH}, CTR/CLK, DEMAND$	0		$0.2V_{DD}$	V
Input "H"-Level Voltage	$V_{IH\ 2}$	SET, FM/AM	$0.85V_{DD}$		V_{DD}	V
Input "L"-Level Voltage	$V_{IL\ 2}$	SET, FM/AM	0		$0.15V_{DD}$	V
Input "H"-Level Voltage	$V_{IH\ 3}$	FIF1, FIF2, FIF3 AIF1, AIF2, 12H/24H	$0.9V_{DD}$		V_{DD}	V
Input "L"-Level Voltage	$V_{IL\ 3}$	FIF1, FIF2, FIF3 AIF1, AIF2, 12H/24H	0		$0.1V_{DD}$	V
Input "M"-Level Voltage	$V_{IM\ 1}$	SET	$0.45V_{DD}$		$0.55V_{DD}$	V
Input Frequency	$f_{IN\ 1}$	FMI, sine wave, capacitive coupling, $V_{IN\ 1} = 0.7V_{p-p}$	1		18	MHz
	$f_{IN\ 2}$	AMI, sine wave, capacitive coupling, $V_{IN\ 2} = 0.5V_{p-p}$	0.5		3	MHz
	$f_{IN\ 3}$	XIN, sine wave, capacitive coupling, $V_{IN\ 3} = 1V_{p-p}$	0.2		7.5	MHz
	$V_{IN\ 1}$	FMI, sine wave, capacitive coupling, $f_{IN\ 1} = 1\ to\ 18MHz$	0.7		$0.9V_{DD}$	Vp-p
	$V_{IN\ 2}$	AMI, sine wave, capacitive coupling, $f_{IN\ 2} = 0.5\ to\ 3MHz$	0.5		$0.9V_{DD}$	Vp-p
	$V_{IN\ 3}$	XIN, sine wave, capacitive coupling, $f_{IN\ 3} = 0.2\ to\ 7.5MHz$	1.0		$0.9V_{DD}$	Vp-p
Input Amplitude						
Segment Current (1)	$I_{seg\ 1}$	$\overline{PM}$			45	mA
Segment Current (2)	$I_{seg\ 2}$	$\overline{b\&e}$			30	mA
Segment Current (3)	$I_{seg\ 3}$	Other outputs seg			15	mA

Electrical Characteristics at $V_{DD} = 4.5\ to\ 10V, V_{SS} = 0V$

			min	typ	max	unit
Input "H"-Level Current	$I_{IH\ 1}$	FIF1 to FIF3, AIF1 to AIF2, SET, FM/AM, 12H/24H CTR/CLK, $V_i = V_{DD}$	0		10	μA
Input "L"-Level Current	$I_{IL\ 1}$	FIF1 to FIF3, AIF1 to AIF2, SET, FM/AM, 12H/24H CTR/CLK, $V_i = V_{SS}$	- 10		0	μA

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			min	typ	max	unit
Input "H"-Level Current	I _{IH} 2	$\overline{\text{INH}}_1, V_1 = V_{SS}$	40		1000	μA
Input Floating Voltage	V _{IF} 1	$\overline{\text{INH}}_1, V_1 = \text{open}$	0		0.2	V
Input "H"-Level Current	I _{IH} 3	DEMAND, $V_1 = V_{DD}$	40		1000	μA
Input Floating Voltage	V _{IF} 2	DEMAND, $V_1 = \text{open}$	0		0.1V _{DD}	V
Output "L"-Level Voltage	V _{OL} 1	PM, $V_{DD} = 4.5$ to 10V, $I_{OL} = 45\text{mA}$	0		1.0	V
	V _{OL} 2	b&e, $V_{DD} = 4.5$ to 10V, $I_{OL} = 30\text{mA}$	0		1.0	V
	V _{OL} 3	Other outputs seg $V_{DD} = 4.5$ to 10V, $I_{OL} = 15\text{mA}$	0		1.0	V
Output Off Leakage Current	I _{OFF} 1	All segments output pins, $V_{out} = 13\text{V}$	0		10	μA
Current Dissipation	I _{DD} 1	FM mode, $\text{FM}/\text{AM} = V_{DD}$ $f_{IN} 1 = 18\text{MHz}, 0.7\text{Vp-p}$ or [AM mode, $\text{FM}/\text{AM} = V_{SS}$] $f_{IN} 2 = 3\text{MHz}, 0.5\text{Vp-p}$ $f_{IN} 3 = 7.2\text{MHz}, 1\text{Vp-p}$ $\text{FIF}1, \text{FIF}2, \text{FIF}3 = V_{DD}$ $\text{AIF}1, \text{AIF}2 = V_{DD}$ 12H/24H, CTR/CLK, $\overline{\text{INH}}_1, \text{DEMAND} = V_{DD}$			18	mA

[LC7268]

Absolute Maximum Ratings at $V_{SS} = 0\text{V}$

				unit
Maximum Supply Voltage	V _{DD} max		-0.3 to +11	V
Input Voltage	V _{IN}		-0.3 to V _{DD} + 0.3	V
Output Voltage	V _O (1)	Xout	-0.3 to V _{DD} + 0.3	V
	V _O (2)	Output pins other than Xout, output : off	V _{DD} - 20 to V _{DD} + 0.3	V
Allowable Power Dissipation	Pd max	Ta $\leq 75^\circ\text{C}$	300	mW
Allowable Power Dissipation of Segment Outputs	Pd seg 1	PM - I _{OH} < 12mA, Ta $\leq 75^\circ\text{C}$	9	mW
	Pd seg 2	b&e - I _{OH} < 6mA, Ta $\leq 75^\circ\text{C}$	3	mW
	Pd seg 3	Other outputs - I _{OH} < 3mA, Ta $\leq 75^\circ\text{C}$	1.5	mW
Operating Temperature	Topg		-30 to +75	$^\circ\text{C}$
Storage Temperature	Tstg		-40 to +125	$^\circ\text{C}$

Allowable Operating Conditions at Ta = 25°C, V_{SS} = 0V, V_{DD} = 4.5 to 10V

			min	typ	max	unit
Supply Voltage	V _{DD}		4.5		10	V
Input "H"-Level Voltage	V _{IH} 1	$\overline{\text{INH}}_1, \text{CTR}/\text{CLK}, \text{DEMAND}$	0.8V _{DD}		V _{DD}	V
Input "L"-Level Voltage	V _{IL} 1	$\overline{\text{INH}}_1, \text{CTR}/\text{CLK}, \text{DEMAND}$	0		0.2V _{DD}	V
Input "H"-Level Voltage	V _{IH} 2	SET, FM/AM	0.85V _{DD}		V _{DD}	V
Input "L"-Level Voltage	V _{IL} 2	SET, FM/AM	0		0.15V _{DD}	V
Input "H"-Level Voltage	V _{IH} 3	FIF1, FIF2, FIF3	0.9V _{DD}		V _{DD}	V
		AIF1, AIF2, 12H/24H				
Input "L"-Level Voltage	V _{IL} 3	FIF1, FIF2, FIF3	0		0.1V _{DD}	V
		AIF1, AIF2, 12H/24H				
Input "M"-Level Voltage	V _{IM} 1	SET	0.45V _{DD}		0.55V _{DD}	V
Input Frequency	f _{IN} 1	FMI, sine wave, capacitive coupling, V _{IN} 1 = 0.7Vp-p	1		18	MHz
	f _{IN} 2	AMI, sine wave, capacitive coupling, V _{IN} 2 = 0.5Vp-p	0.5		3	MHz
	f _{IN} 3	XIN, sine wave, capacitive coupling, V _{IN} 3 = 1Vp-p	0.2		7.5	MHz
Input Amplitude	V _{IN} 1	FMI, sine wave, capacitive coupling, f _{IN} 1 = 1 to 18MHz	0.7		0.9V _{DD}	Vp-p
	V _{IN} 2	AMI, sine wave, capacitive coupling, f _{IN} 2 = 0.5 to 3MHz	0.5		0.9V _{DD}	Vp-p
	V _{IN} 3	XIN, sine wave, capacitive coupling, f _{IN} 3 = 0.7 to 7.5MHz	1.0		0.9V _{DD}	Vp-p

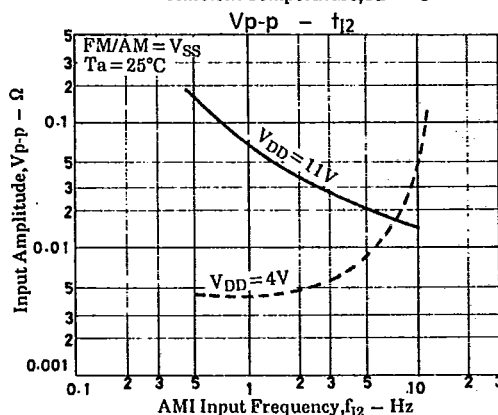
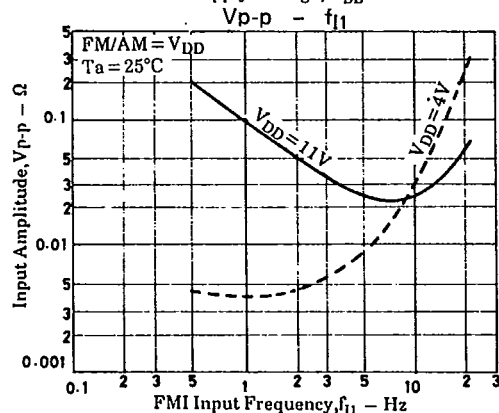
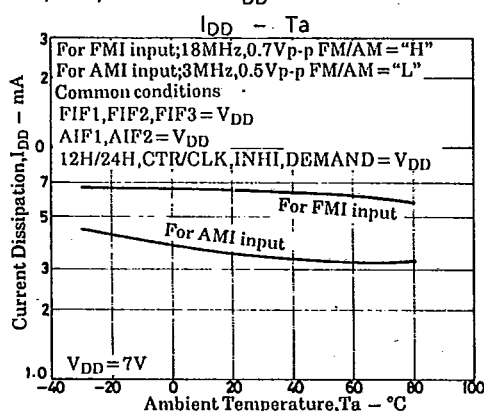
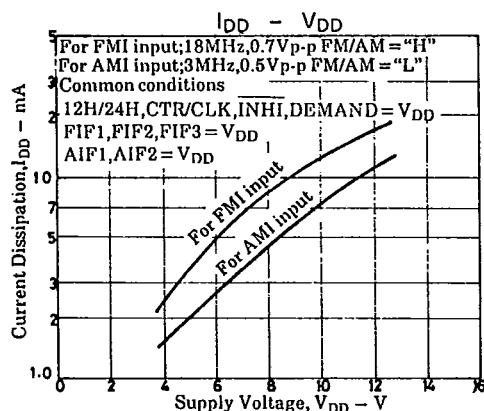
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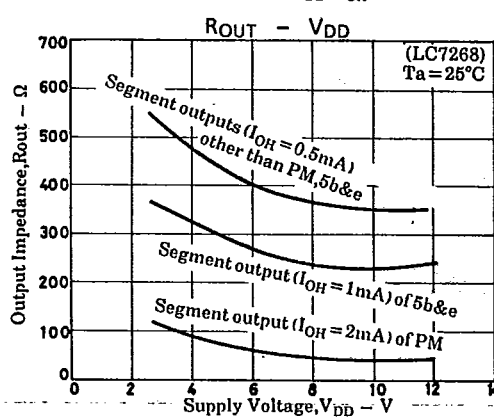
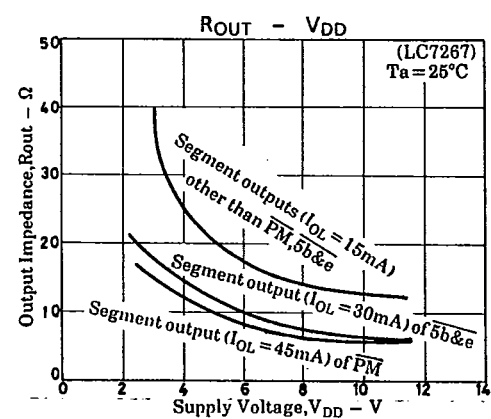
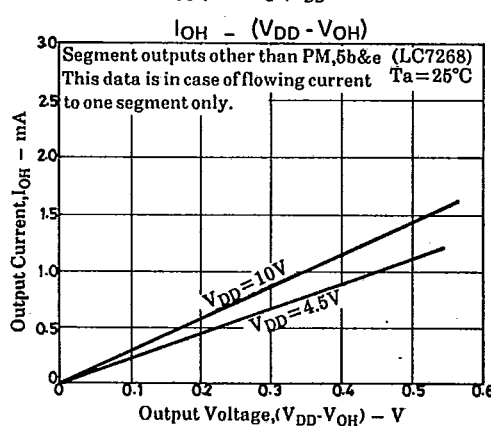
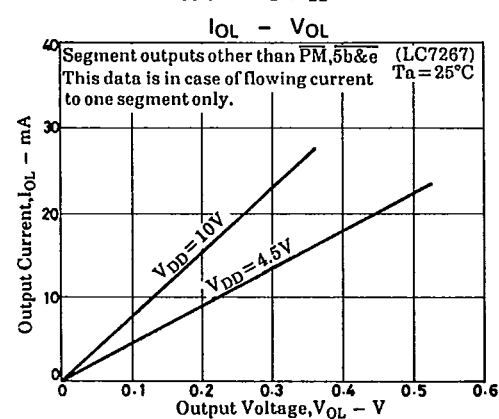
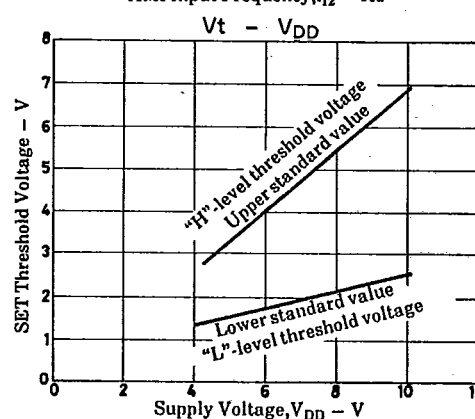
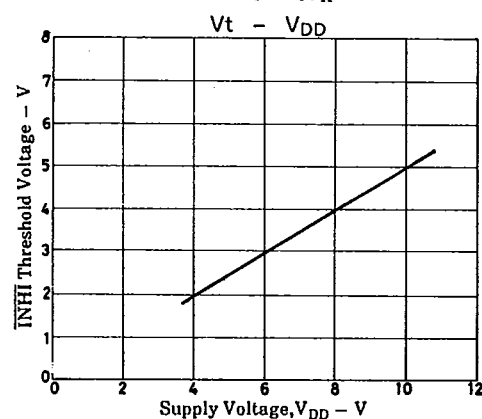
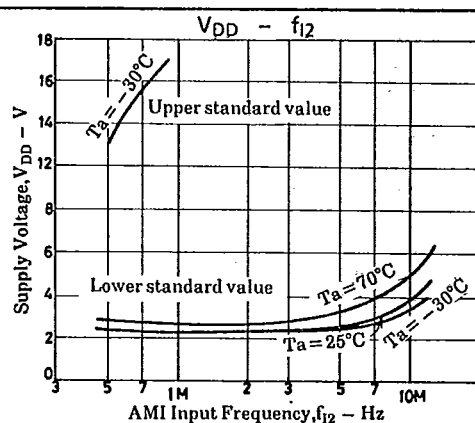
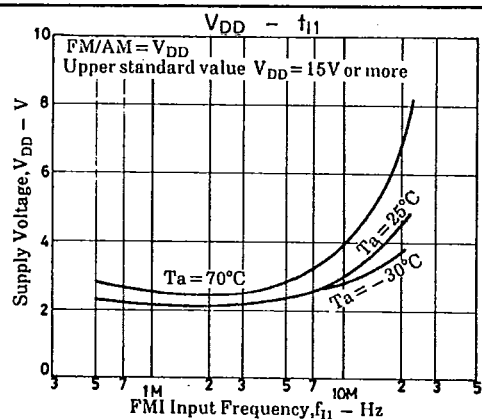
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			min	typ	max	unit
Segment Current (1)	I _{seg 1}	PM	0		9	mA
Segment Current (2)	I _{seg 2}	b&e	0		3	mA
Segment Current (3)	I _{seg 3}	Other outputs seg	0		1.5	mA
Electrical Characteristics at V _{DD} = 4.5 to 10V, V _{SS} = 0V						
Input "H"-Level Current	I _{IH 1}	FIF1 to FIF3, AIF1 to AIF2, SET, FM/AM, 12H/24H CTR/CLK, V _I = V _{DD}	0		10	μA
Input "L"-Level Current	I _{IL 1}	FIF1 to FIF3, AIF1 to AIF2, SET, FM/AM, 12H/24H CTR/CLK, V _I = V _{SS}	-10		0	μA
Input "H"-Level Current	I _{IH 2}	$\overline{\text{INH}}$, V _I = V _{SS}	40		1000	μA
Input Floating Voltage	V _{IF 1}	$\overline{\text{INH}}$, V _I = open	0		0.2	V
Input "H"-Level Current	I _{IH 3}	DEMAND, V _I = V _{DD}	40		1000	μA
Input Floating Voltage	V _{IF 2}	DEMAND, V _I = V _{SS}	0		0.1V _{DD}	V
Output "H"-Level Voltage	V _{OH 1}	PM, I _{OH} = -2mA	V _{DD} - 1		V _{DD}	V
	V _{OH 2}	b&e, I _{OH} = -1mA	V _{DD} - 1		V _{DD}	V
	V _{OH 3}	Other outputs seg I _{OH} = -0.5mA	V _{DD} - 1		V _{DD}	V
Output Off Leakage Current	I _{OFF 1}	All segments output pins, V _{out} = (V _{DD} - 18)V	-3		0	μA
Current Dissipation	I _{DD 1}	FM mode, FM/AM = V _{DD} f _{IN 1} = 18MHz, 0.7Vp-p or AM mode, FM/AM = V _{SS} , f _{IN 2} = 3MHz, 0.5Vp-p f _{IN 3} = 7.2MHz, 1Vp-p FIF1, FIF2, FIF3 = V _{DD} AIF1, AIF2 = V _{DD} 12H/24H, CTR/CLK, $\overline{\text{INH}}$, DEMAND = V _{DD}			18	mA



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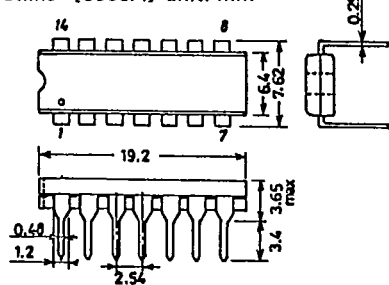


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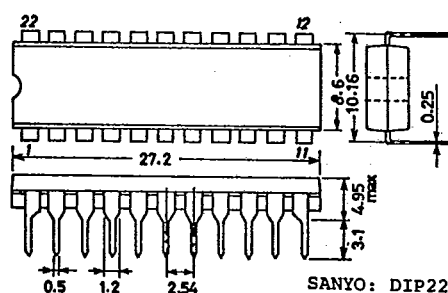
AUDIO-USE MOS IC CASE OUTLINES

- 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.

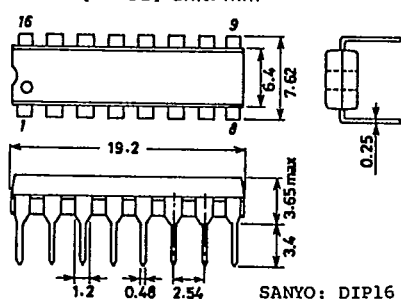
Case Outline—[3003A] unit: mm



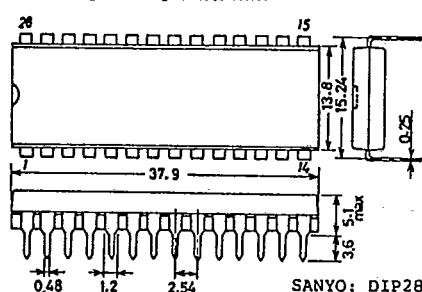
Case Outline—[3010A] unit: mm



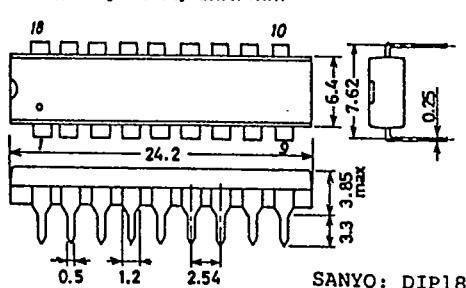
Case Outline—[3006B] unit: mm



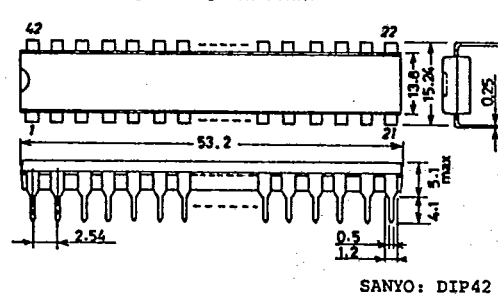
Case Outline—[3012A] unit: mm



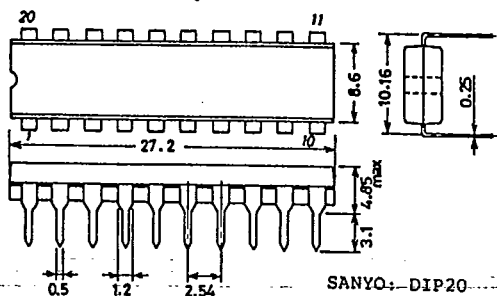
Case Outline—[3007A] unit: mm



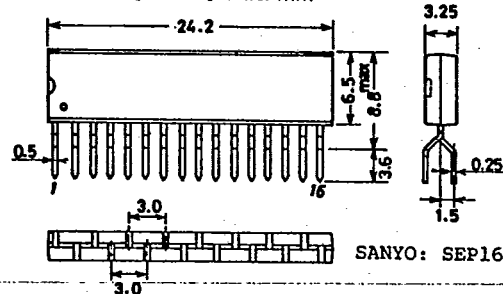
Case Outline—[3014A] unit: mm



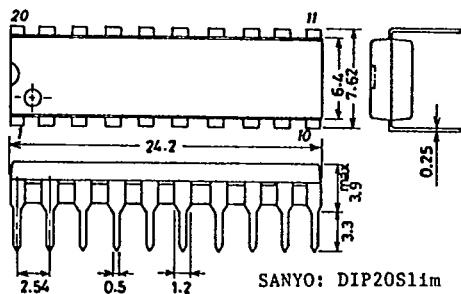
Case Outline—[3008A] unit: mm



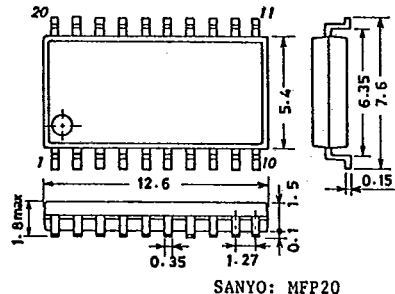
Case Outline—[3020A] unit: mm



Case Outline—[3021B] unit: mm

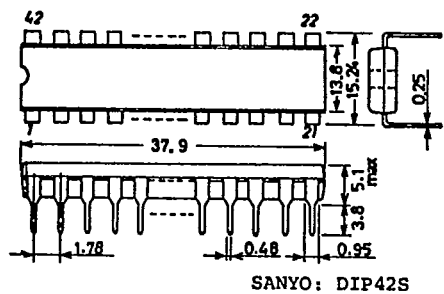


Case Outline—[3036B] unit: mm

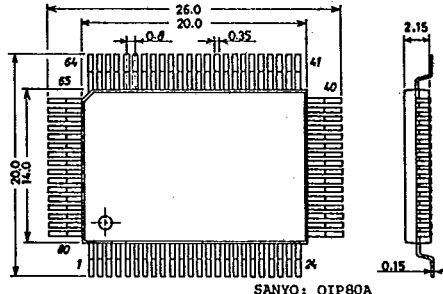


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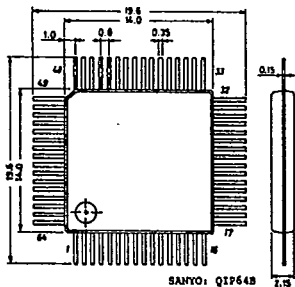
Case Outline—[3025B] unit: mm



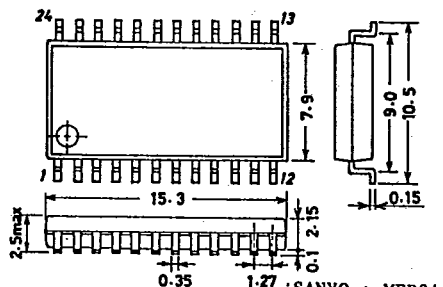
Case Outline—[3044B] unit: mm



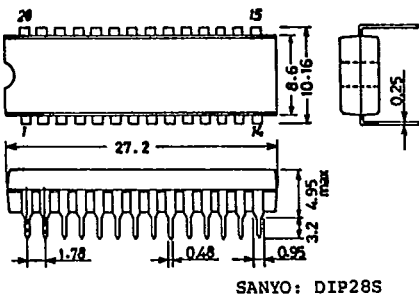
Case Outline—[3026B] unit: mm



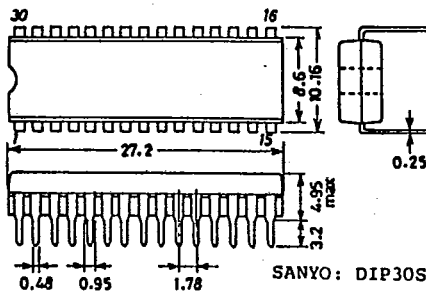
Case Outline—[3045B] unit: mm



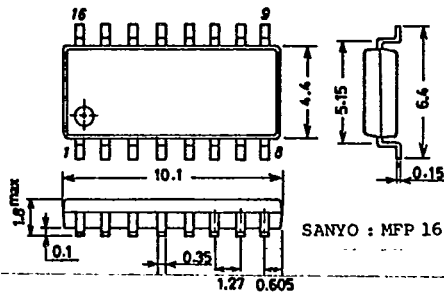
Case Outline—[3029A] unit: mm



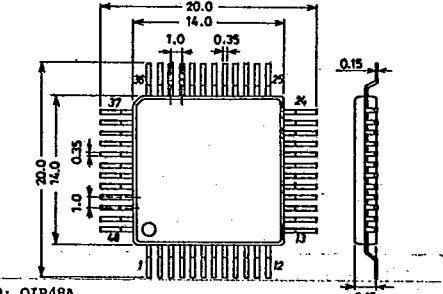
Case Outline—[3047A] unit: mm



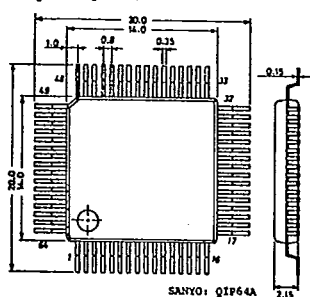
Case Outline—[3035A] unit: mm



Case Outline—[3052A] unit: mm



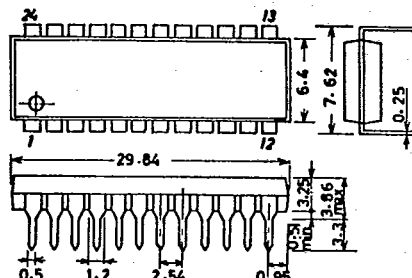
Case Outline—[3057] unit: mm



SANYO: OIP64A

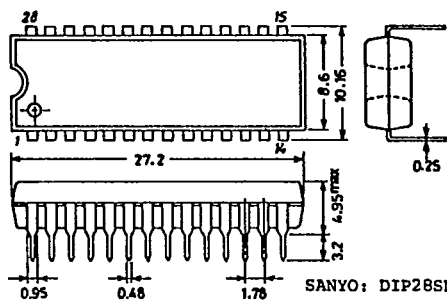
Case Outline—[3084] unit: mm

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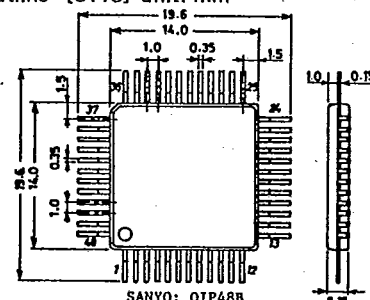
SANYO: DIP-24S11m

Case Outline—[3063] unit: mm



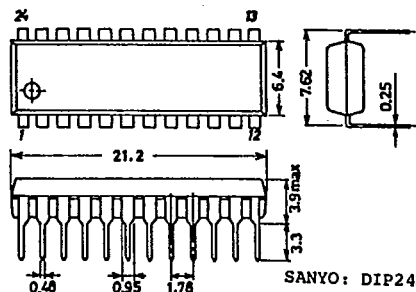
SANYO: DIP28SN

Case Outline-- [3118] unit: mm



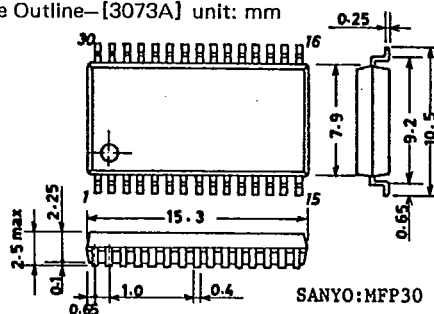
SANYO: QIP48B

Case Outline—[3067] unit: mm



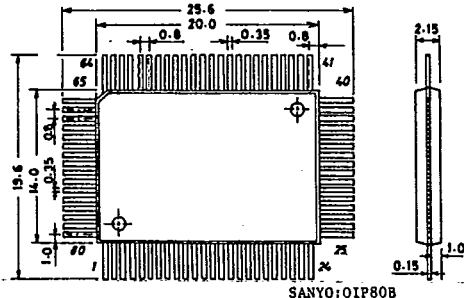
SANYO: DIP24S

Case Outline—[3073A] unit: mm



SANYO:MFP30

Case Outline—[3074] unit: mm



SANYO:QIP80B