

MOS DIGITAL INTEGRATED CIRCUIT

μ PD2813C

CLOCK AND RADIO FREQUENCY COUNTER/DISPLAY CIRCUIT

CMOS LSI

The μ PD2813C is a CMOS LSI very suitable for U.S. band automotive radios and stereos.

The μ PD2813C is packaged in a 42 pin plastic dual in-line package (DIP).

CLOCK FEATURES

1. Standard Clock
 - 12 hour clock (With AM/PM display)
 - Hour and minute display
 - Easy time set controls
2. Elapsed Time Counter
 - Measures elapsed time (Max. 19 hours 59 minutes)
 - Easy reset/start control
3. Calendar Function
 - Month and day display
 - Automatic calendar correction (for 4 years)
 - Easy calendar set controls

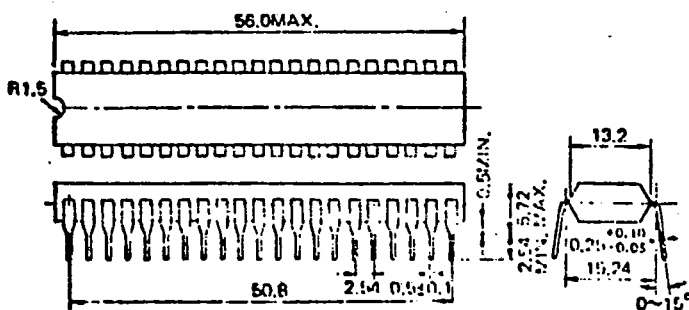
RADIO FEATURES

- Measures standard AM and FM frequencies
- Display frequencies on 3½ digit display
- External programmable IF offset (AM only)

GENERAL FEATURES

- Low power due to CMOS $I_{DD} = 8.0\text{mA (MAX.)}$
- Single power supply $V_{DD} = 5.0 \pm 0.5\text{ volts}$
- Display blanking

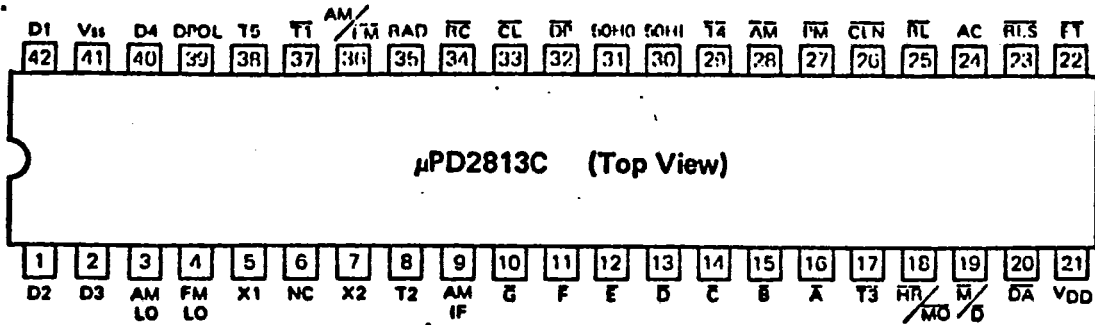
PACKAGE DIMENSIONS (Unit: mm)



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μPD2813C

PIN CONNECTION



PIN NO.	SYMBOL	DESCRIPTION	PIN NO.	SYMBOL	DESCRIPTION
1	D2	Digit pulse "D2" output	22	\overline{ET}	Elapsed time call input
2	D3	Digit pulse "D3" output	23	\overline{RES}	Elapsed time reset/start input
3	AM LO	AM local frequency input	24	AC	Clock counter all clear input
4	FM LO	FM frequency input (1/40)	25	\overline{BL}	Display blanking input
5	X1	10.24 MHz oscillator input	26	\overline{CLN}	Segment signal "COLON" output
6	NC	No connection	27	\overline{PM}	Segment signal "PM" output
7	X2	10.24 MHz oscillator output	28	\overline{AM}	Segment signal "AM" output
8	T2	Test terminal 2 (Normal open)	29	$\overline{T4}$	Test terminal 4 (Normal VDD)
9	AM IF	AM IF offset	30	50HI	50Hz clock pulse input
10	\overline{G}	Segment signal "G" output	31	50HO	50Hz clock pulse output
11	\overline{F}	Segment signal "F" output	32	\overline{DP}	Segment signal "DP" output
12	\overline{E}	Segment signal "E" output	33	\overline{CL}	Timing circuit clearing input
13	\overline{D}	Segment signal "D" output	34	\overline{RC}	Radio frequency call input
14	\overline{C}	Segment signal "C" output	35	RAD	Radio power indicating input
15	\overline{B}	Segment signal "B" output	36	AM/ \overline{FM}	AM/FM switching input
16	\overline{A}	Segment signal "A" output	37	$\overline{T1}$	Test terminal 1 (Normal VDD)
17	$\overline{T3}$	Test terminal 3 (Normal VDD)	38	T5	Test terminal 5 (Normal open)
18	$\overline{HR/MO}$	Hour or month set control	39	DPOL	Digit polarity selection input
19	$\overline{M/D}$	Minute or day set control	40	D4	Digit pulse "D4" output
20	\overline{DA}	Calendar call input	41	Vss	System ground (0V)
21	VDD	Power supply (+5 ± 0.5V)	42	D1	Digit pulse "D1" output

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PIN EXPLANATIONS

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PIN NO.	NAME	DESCRIPTION
1, 2, 40, 42, 39	Digit Digit Polarity	These outputs are used as digit drivers for the display. These pins go to high/low level to select the appropriate digit with DPOL Terminal put to low/high level. DPOL is provided with internal pull up resistor.
3 4	AM Local FM Local	This input is the AM band local oscillator input. This input is the FM band local oscillator input. The frequency is divided by 40 using a prescaler (μ PB551C).
5, 7	Crystal Osc.	These pins are for connection to a 10.24MHz crystal.
8, 17, 29, 37, 38	Test	These pins are for testing. 8, 38 pin Normally use at open. 17, 29, 37 pin Normally connect to VDD.
10-16, 26-28, 32	Segments & COLON, PM, AM, DP	These outputs are used as segment drivers for the display. Active Low (An output is low for a segment to be on.)
18 19	Set Hours/Months Set Minutes /Days	A ground on these pins causes the hours or months and minutes or days to update at 1 per second rate. There is a one second delay before updating. These inputs are provided with internal pull up resistors.
20 22 23 34	Call Date Call Elapsed Time Reset/Start Elapsed Time Call Radio Freq.	A ground on this pin switches the display from standard time to date and remains there for 4 seconds. A ground on this pin switches the display from standard time to elapsed time and remains there for 4 seconds. A ground on this pin resets the elapsed time counter. The elapsed time counter starts automatically. A ground on this pin switches the display from standard time to radio frequency and remains there for 4 seconds. These inputs are provided with internal pull up resistors.
35 36 9	Radio Vcc AM/FM AM IF Offset	The display automatically switches time to frequency when radio is turned on and remains there for 4 seconds, and frequency to time as soon as radio is turned off. A high on this pin sets the logic to expect a AM frequency in. A low sets the internal logic to FM. This input is provided with internal pull up resistor. A high on this pin sets AM IF to 455kHz. A low sets to 262kHz. (Pull up resistor is installed.)
24 33	All Clear Clear	A high level resets the time counter. Normally pull down to ground with a resistor. A high level resets the timing circuit. Normally connect to VDD.
25	Display blanking	A low level inhibits the display and key inputs ($\overline{HR}/\overline{MO}$, $\overline{M/D}$, \overline{DA} , \overline{ET} , \overline{RES}). This input is provided with internal pull up resistor.

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ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Supply Voltage	VDD	-0.3 to +6.0	V
Input Voltage	VI	-0.3 to VDD	V
Output Voltage	VO	-0.3 to VDD	V
Operating Temperature	Topt	-30 to +75	°C
Storage Temperature	Tstg	-55 to +125	°C

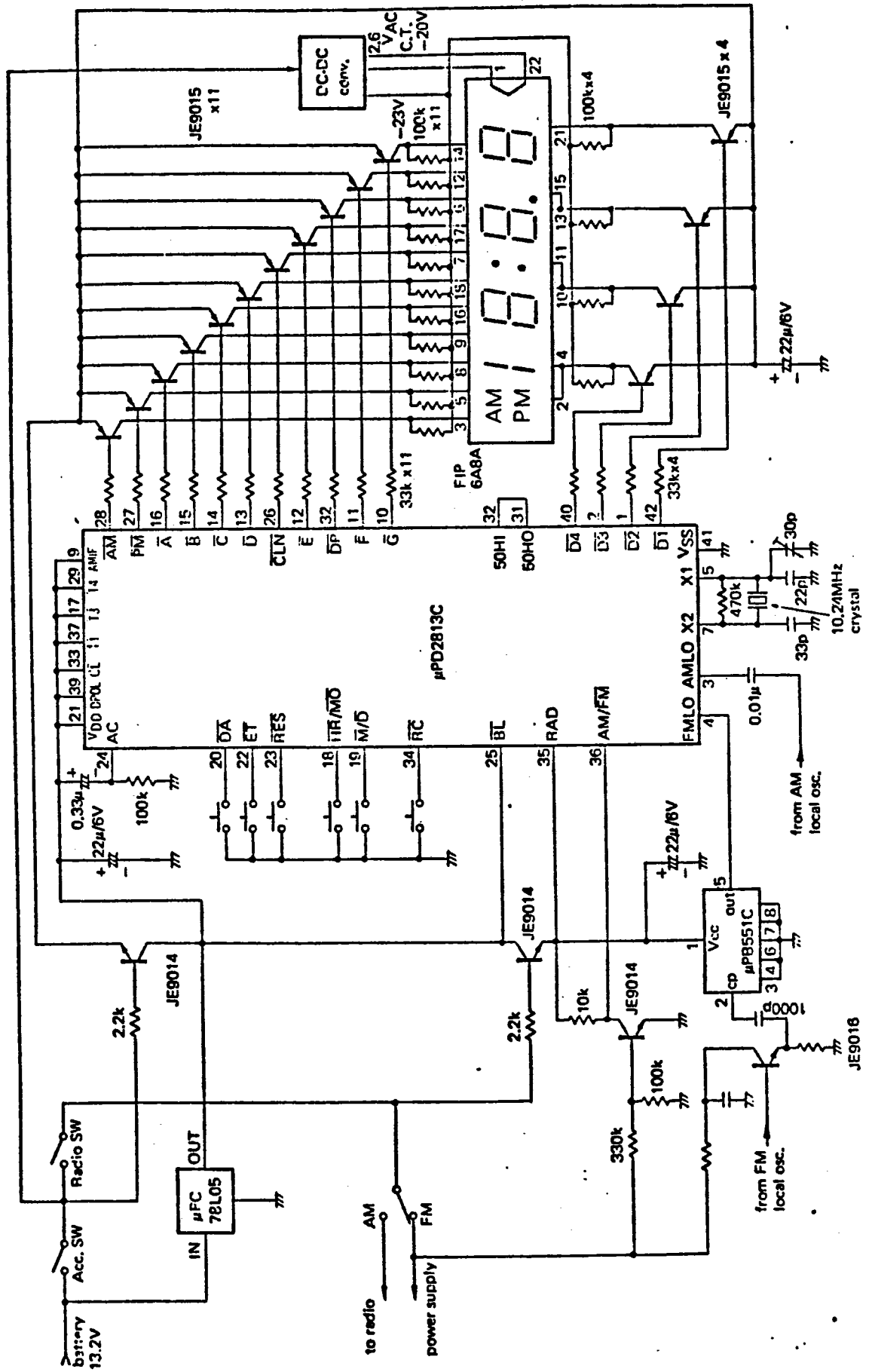
ELECTRICAL CHARACTERISTICS (Ta=-30 to +75°C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Power Supply Voltage	VDD	4.5	5.0	5.5	V	
High Level Input Voltage	VIH	0.75VDD		VDD	V	All inputs except
Low Level Input Voltage	VIL	0		0.25VDD	V	3pin, $\overline{T1}$, $\overline{T3}$ and $\overline{T4}$
High Level Output Voltage	VOH1	0.75VDD			V	I _{OH} =-1.3mA, *1
Low Level Output Voltage	VOL1			0.25VDD	V	I _{OL} = 1.3mA, *1
High Level Output Voltage	VOH2	0.75VDD			V	I _{OH} =-0.5mA, *2
Low Level Output Voltage	VOL2			0.25VDD	V	I _{OL} = 0.5mA, *2
Maximum Frequency Response	fdmax	11.0			MHz	X1-X2, divider
	f _{pmax1}	3.1			MHz	FM input divider
	f _{pmax2}	2.1			MHz	AM input divider
AM Local Input Voltage	V _{am}	1.0			V _{p-p}	C coupled input
Power Supply Current	I _{DD}			8.0	mA	X1-X2, divider

*1 : 1, 2, 40, 42 pin (digit output)

*2 : 10 to 16, 26 to 28, 32 pin (segment, AM, PM, colon and decimal point output).

TYPICAL APPLICATION CIRCUIT



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BLOCK DIAGRAM OF A FM/AM AUTOMOTIVE STEREO USING μPD2813C

