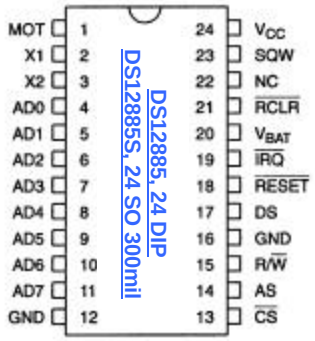
DS12885/DS12885Q/DS12885T
Real-Time Clock

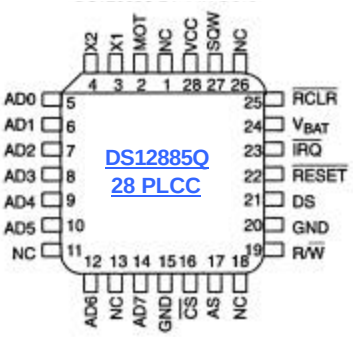
www.maxim-ic.com

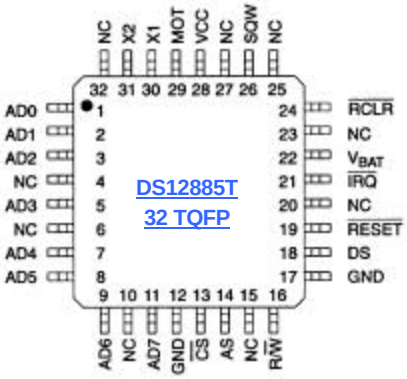
FEATURES

- Drop-in replacement for IBM AT computer clock/calendar
- Pin configuration closely matches MC146818B and DS1285
- Counts seconds, minutes, hours, days, day of the week, date, month, and year with leap-year compensation valid up to 2100
- Binary or BCD representation of time, calendar, and alarm
- 12-hour or 24-hour clock with AM and PM in 12-hour mode
- Daylight Savings Time option
- Selectable between Motorola and Intel bus timing
- Multiplex bus for pin efficiency
- Interfaced with software as 128 RAM locations
- 14 bytes of clock and control registers
- 114 bytes of general purpose RAM
- Programmable square-wave output signal
- bus-compatible interrupt signals ($\overline{IRQ}$)
- Three interrupts are separately software-maskable and testable
- Time-of-day alarm once/second to once/day
- Periodic rates from 122µs to 500ms
- End-of-clock update cycle
- Optional 28-pin PLCC surface mount package or 32-pin TQFP
- Optional industrial temperature range available
- Underwriters Laboratory (UL) recognized

PIN ASSIGNMENT (Top View)







Package Dimension Information

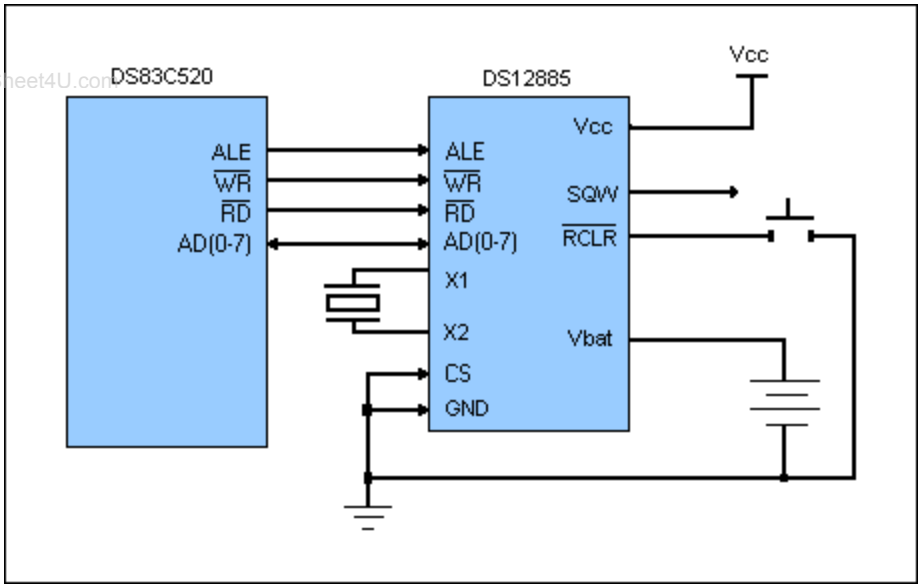
http://www.maxim-ic.com/TechSupport/DallasPackInfo.htm

Note: *Some revisions of this device may incorporate deviations from published specifications known as errata. Multiple revisions of any device may be simultaneously available through various sales channels. For information about device errata, click here: http://www.maxim-ic.com/errata.*

DESCRIPTION

The DS12885 real-time clock plus RAM is designed to be a direct replacement for the DS1285. The DS12885 is identical in form, fit, and function to the DS1285, and has an additional 64 bytes of general purpose RAM. Access to this additional RAM space is determined by the logic level presented on AD6 during the address portion of an access cycle. An external crystal and battery are the only components required to maintain time-of-day and memory status in the absence of power. For a complete description of operating conditions, electrical characteristics, bus timing, and pin descriptions other than X1, X2, V_{BAT}, and $\overline{RCLR}$, see the DS12887 data sheet.

TYPICAL OPERATING CIRCUIT



ORDERING INFORMATION

PART	PIN-PACKAGE	TEMP RANGE
DS12885	24 DIP	0°C to +70°C
DS12885N	24 DIP	-40°C to +85°C
DS12885S	24 SO	0°C to +70°C
DS12885N	24 SO	-40°C to +85°C
DS12885Q	28 PLCC	0°C to +70°C
DS12885QN	28 PLCC	-40°C to +85°C
DS12885Q/T&R	28 PLCC/Tape and Reel	0°C to +70°C
DS12885T	32 TQFP	0°C to +70°C
DS12885TN	32 TQFP	-40°C to +85°C
DS12885T/T&R	32 TQFP/Tape and Reel	0°C to +70°C

PIN DESCRIPTION

AD0–AD7	– Multiplexed Address/Data Bus
N.C.	– No Connection
MOT	– Bus Type Selection
$\overline{CS}$	– Chip Select
AS	– Address Strobe
R/$\overline{W}$	– Read/Write Input
DS	– Data Strobe
$\overline{RESET}$	– Reset Input
$\overline{IRQ}$	– Interrupt Request Output (Open Drain)
SQW	– Square-Wave Output
V_{CC}	– +5V Supply
GND	– Ground
X1, X2	– 32.768kHz Crystal Connections
V_{BAT}	– +3V Battery Input
$\overline{RCLR}$	– RAM Clear

PIN DESCRIPTION

X1, X2 – Connections for a standard 32.768kHz quartz crystal. The internal oscillator circuitry is designed for operation with a crystal having a specified load capacitance (C_L) of 6pF. The crystal is connected directly to the X1 and X2 pins. There is no need for external capacitors or resistors. Note: X1 and X2 are very high-impedance nodes. It is recommended that they and the crystal be guard-ringed with ground and that high-frequency signals be kept away from the crystal area. For more information about crystal selection and crystal layout considerations, refer to *Application Note 58* "Crystal Considerations with Dallas Real Time Clocks."

Oscillator startup times are highly dependent upon crystal characteristics and layout. High ESR and escessive capactitive loads are the major contributors to long startup times. A circuit using a crystal with the recommended characteristics and following the recommended layout usually start within one second.

V_{BAT} – Battery input for any standard 3V lithium cell or other energy source. Battery voltage must be held between 2.5V and 4V for proper operation. A maximum load of 0.5µA at +25°C in the absence of power should be used to size the external energy source. Maximum load is measured using a recommended crystal type connected to X1 and X2.

The battery should be connected directly to the V_{BAT} pin. A diode must not be placed in series with the battery to the V_{BAT} pin. Furthermore, a diode is not necessary because reverse charging-current protection circuitry is provided internally to the device and has passed the requirements of Underwriters Laboratories for UL listing.

See "Conditions of Acceptability" at http://www.maxim-ic.com/TechSupport/QA/ntrl.htm.

$\overline{RCLR}$ – The $\overline{RCLR}$ pin is used to clear (set to logic 1) all 114 bytes of general purpose RAM but does not affect the RAM associated with the real-time clock. In order to clear the RAM, $\overline{RCLR}$ must be forced to an input logic "0" (-0.3V to +0.8V) during battery-backup mode when V_{CC} is not applied. The $\overline{RCLR}$ function is designed to be used by human interface (shorting to ground manually or by switch) and not to be driven with external buffers. This pin is internally pulled up. Do not use an external pullup resistor on this pin.

CLOCK ACCURACY

The accuracy of the clock is dependent upon the accuracy of the crystal and the accuracy of the match between the capacitive load of the oscillator circuit and the capacitive load for which the crystal was trimmed. Additional error is added by crystal frequency drift caused by temperature shifts. External circuit noise coupled into the oscillator circuit can result in the clock running fast. Refer to *Application Note 58* "Crystal Considerations with Dallas Real-Time Clocks" for detailed information.

RECOMMENDED LAYOUT FOR CRYSTAL