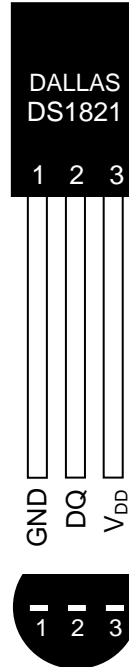


FEATURES

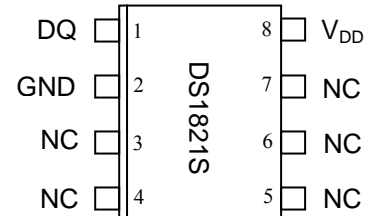
- Requires no external components
- Unique 1-Wire[®] interface requires only one port pin for communication
- Operates over a -55°C to +125°C (-67°F to +257°F) temperature range
- Functions as a standalone thermostat with user-definable trip-points
- Provides 8-bit (1°C resolution) centigrade temperature measurements
- Accuracy is ±1°C over 0°C to +85°C range
- Converts temperature to a digital word in 1 second (max)
- Available in 3-pin PR35 and 8-pin SO packages
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermally sensitive system

PIN ASSIGNMENT



(BOTTOM VIEW)

PR35
(DS1821)



8-pin 208-mil SO
(DS1821S)

PIN DESCRIPTION

- GND - Ground
- DQ - Data In/Out and Thermostat Output
- V_{DD} - Power Supply Voltage
- NC - No Connect

DESCRIPTION

The DS1821 can function as a standalone thermostat with user-programmable trip-points or as 8-bit temperature sensor with a 1-Wire digital interface. The thermostat trip-points are stored in nonvolatile memory, so DS1821 units can be programmed prior to system insertion for true standalone operation. The DS1821 has an operating temperature range of -55°C to +125°C and is accurate to ±1°C over a range of 0°C to +85°C. Communication with the DS1821 is accomplished through the open-drain DQ pin; this pin also serves as the thermostat output.

ORDER INFORMATION

ORDERING NUMBER	PACKAGE MARKING	DESCRIPTION
DS1821	DS1821	DS1821 in 3-pin PR35
DS1821+	DS1821 (See Note)	DS1821 in 3-pin PR35
DS1821S	DS1821S	DS1821 in 208 mil 8-pin SO
DS1821S/T&R	DS1821S	DS1821 in 208 mil 8-pin SO, 2000 Piece Tape-and-Reel
DS1821S+	DS1821S (See Note)	DS1821 in 208 mil 8-pin SO
DS1821S+T&R	DS1821S (See Note)	DS1821 in 208 mil 8-pin SO, 2000 Piece Tape-and-Reel

Note: A "+" symbol will also be marked on the package.

+ Denotes lead-free package.

DETAILED PIN DESCRIPTIONS Table 1

PR35	8-PIN SO*	SYMBOL	DESCRIPTION
1	2	GND	Ground pin.
2	1	DQ	Open drain data input/output pin – 1-Wire operation; Open drain thermostat output pin – thermostat operation.
3	8	V _{DD}	Power supply pin.

*All pins not specified in this table are "No Connect" pins.

OVERVIEW

Figure 1 shows a block diagram of the DS1821 and pin descriptions are given in Table 1. The DS1821 can operate as a standalone thermostat with user-programmable trip-points or as 8-bit temperature sensor with a 1-Wire digital interface. The open-drain DQ pin functions as the thermostat output for thermostat operation and as the data I/O pin for 1-Wire communications. The 1-Wire interface provides user access to the nonvolatile (EEPROM) thermostat trip-point registers (T_H and T_L), the status/configuration register, and the temperature register.

When configured as standalone thermostat, temperature conversions start immediately at power-up. In this mode, the DQ pin becomes active when the temperature of the DS1821 exceeds the limit programmed into the T_H register, and remains active until the temperature drops below the limit programmed into the T_L register.

The DS1821 uses Dallas' exclusive 1-Wire bus protocol that implements bus communication with one control signal. This system is explained in detail in the 1-Wire BUS SYSTEM section of this datasheet.

ABSOLUTE MAXIMUM RATINGS*

Voltage on any pin relative to ground	-0.5V to +7.0V
Operating temperature	-55°C to +125°C
Storage temperature	-55°C to +125°C
Soldering temperature	See-JTD-020A Specification

*These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

DC ELECTRICAL CHARACTERISTICS (-55°C to +125°C; $V_{DD}=2.7V$ to 5.5V)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNITS	NOTES
Supply Voltage	V_{DD}		+2.7		+5.5		1
Thermometer Error	t_{ERR}	0°C to +85°C $V_{DD} = 3.6V$ to 5.5V			±1	°C	2,3,4
		-55°C to +125°C $V_{DD} = 3.6V$ to 5.5V		See Typical Curve (Figure 11)			
DQ Logic Low	V_{IL}		-0.3		+0.8	V	1,5
DQ Logic High	V_{IH}		+2		The lower of +5.5 or $V_{DD} + 0.3$	V	1,6
Sink Current	I_L	$V_{DQ} = 0.4V$ $V_{DD} = 3.6V$ to 5.5V	4			mA	1
Standby Current	I_Q	-55°C to +85°C		1	3	µA	7
Active Current	I_{DD}	$V_{DD} = 5V$		500	1000	µA	8
DQ Input Current	I_{DQ}			5		µA	9

NOTES:

- All voltages are referenced to ground.
- Thermometer error reflects the sensor accuracy as tested during calibration.
- See typical performance curve in Figure 11 for specification limits outside the 0°C to +85°C range.
- For $T < 0°C$, accuracy degrades by 0.5°C/V for $V_{DD} < 4.3V$.
- Logic low voltages are specified at a sink current of 4 mA.
- Logic high voltages are specified at a source current of 1 mA.
- Standby current is typically 5 µA at 125°C.
- Active current refers to supply current during active temperature conversions or EEPROM writes.
- DQ line is high (“hi-Z” state).

AC ELECTRICAL CHARACTERISTICS: (-55°C to +125°C; $V_{DD}=3.6V$ to 5.5V)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Temperature Conversion Time	t_{CONV}		0.4	1.0	s	
EEPROM Write Time	t_{WR}		10	50	ms	
Time Slot	t_{SLOT}	60		120	μs	1
Recovery Time	t_{REC}	1			μs	1
Write 0 Low Time	t_{LOW0}	60		120	μs	1
Write 1 Low Time	t_{LOW1}	1		15	μs	1
Read Data Valid	t_{RDV}			15	μs	1
Reset Time High	t_{RSTH}	480			μs	1
Reset Time Low	t_{RSTL}	480			μs	1,2
Presence Detect High	t_{PDHIGH}	15		60	μs	1
Presence Detect Low	t_{PDLow}	60		240	μs	1
V_{DD} Low to Mode Toggle Clock Low	t_{PC}	100			ns	1,3
Mode Toggle Clock 16 High to V_{DD} High	t_{CP}	100			ns	1
Mode Toggle Clock Pulse Low Time	t_{CL}	0.1		10	μs	1
Mode Toggle Clock Pulse High Time	t_{CH}	0.1			μs	1
Mode Toggle Clock High-to-Low or Low-to-High Transition Time	t_T			100	ns	1
Capacitance	$C_{IN/OUT}$			25	pF	

NOTES:

1. Refer to timing diagrams in Figure 13.
2. If $t_{RSTL} > 960 \mu s$, a power-on-reset may occur.
3. Time required for part to disable thermostat output.