Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)

- Rochester is a critical supplier to DLA and meets all industry and DLA standards.
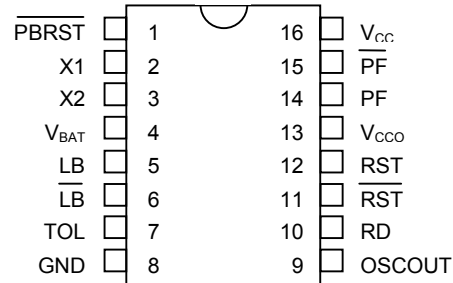
Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

DS1632
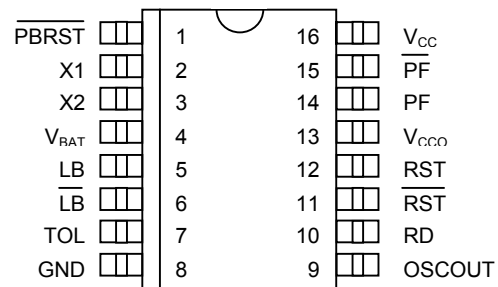## PC Power-Fail and Reset Controller

FEATURES

- Power-fail detector for personal computers and workstations
- Connects directly to popular personal computer chip sets
- On chip 32.768 kHz oscillator for real time clock
- Provides battery backup power to clock chip
- Pushbutton reset input
- Accurate 5% or 10% +5-volt power supply monitoring
- Complementary outputs for reset, power-fail, and low battery
- Provides for reset pulse width of either 95 ms or 190 ms
- Eliminates the need for discrete components
- Low-power CMOS circuitry
- 16-pin DIP or SOIC surface mount package
- 0°C to 70°C operation

PIN ASSIGNMENT

$\overline{PBRST}$	1	16	V_{CC}
X1	2	15	$\overline{PF}$
X2	3	14	PF
V_{BAT}	4	13	V_{CCO}
LB	5	12	RST
$\overline{LB}$	6	11	$\overline{RST}$
TOL	7	10	RD
GND	8	9	OSCOUT

16-Pin DIP (300-mil)
See Mech. Drawings Section

$\overline{PBRST}$	1	16	V_{CC}
X1	2	15	$\overline{PF}$
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LB	5	12	RST
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TOL	7	10	RD
GND	8	9	OSCOUT

16-Pin SOIC (300-mil)
See Mech. Drawings Section

PIN DESCRIPTION

$\overline{PBRST}$	- Pushbutton Reset Input
X1, X2	- Crystal Inputs
V_{BAT}	- Battery Input
LB, $\overline{LB}$	- Low Battery Outputs
RST, $\overline{RST}$	- Reset Outputs
RD	- Reset Duration
TOL	- Selects 5% Or 10% Detection
GND	- Ground
OSCOUT	- Oscillator Out
V_{CCO}	- Switched Power Out
PF, $\overline{PF}$	- Power-Fail Outputs
V_{CC}	- +5-Volt Power In

DESCRIPTION

The DS1632 PC Power-Fail and Reset Controller is designed to do various functions involving battery backup and other functions typically accomplished with discrete components. The DS1632 provides a 32.768 kHz battery-backed crystal oscillator and switched V_{CC}/V_{BAT} power via V_{CCO} for the real time clock function located in accompanying chip sets. In addition, the DS1632 provides for reset on both

power-up and via pushbutton input, power-fail status signals for the processor, and low battery warning signals. The DS1632 is capable of detecting power failure at both the 5% and 10% power supply tolerances, and the reset pulse width can be set for either 95 ms or 190 ms. The device is designed to connect directly to popular laptop and notebook chip sets which eliminates the need for discrete components and reduces cost.

BLOCK DIAGRAM Figure 1
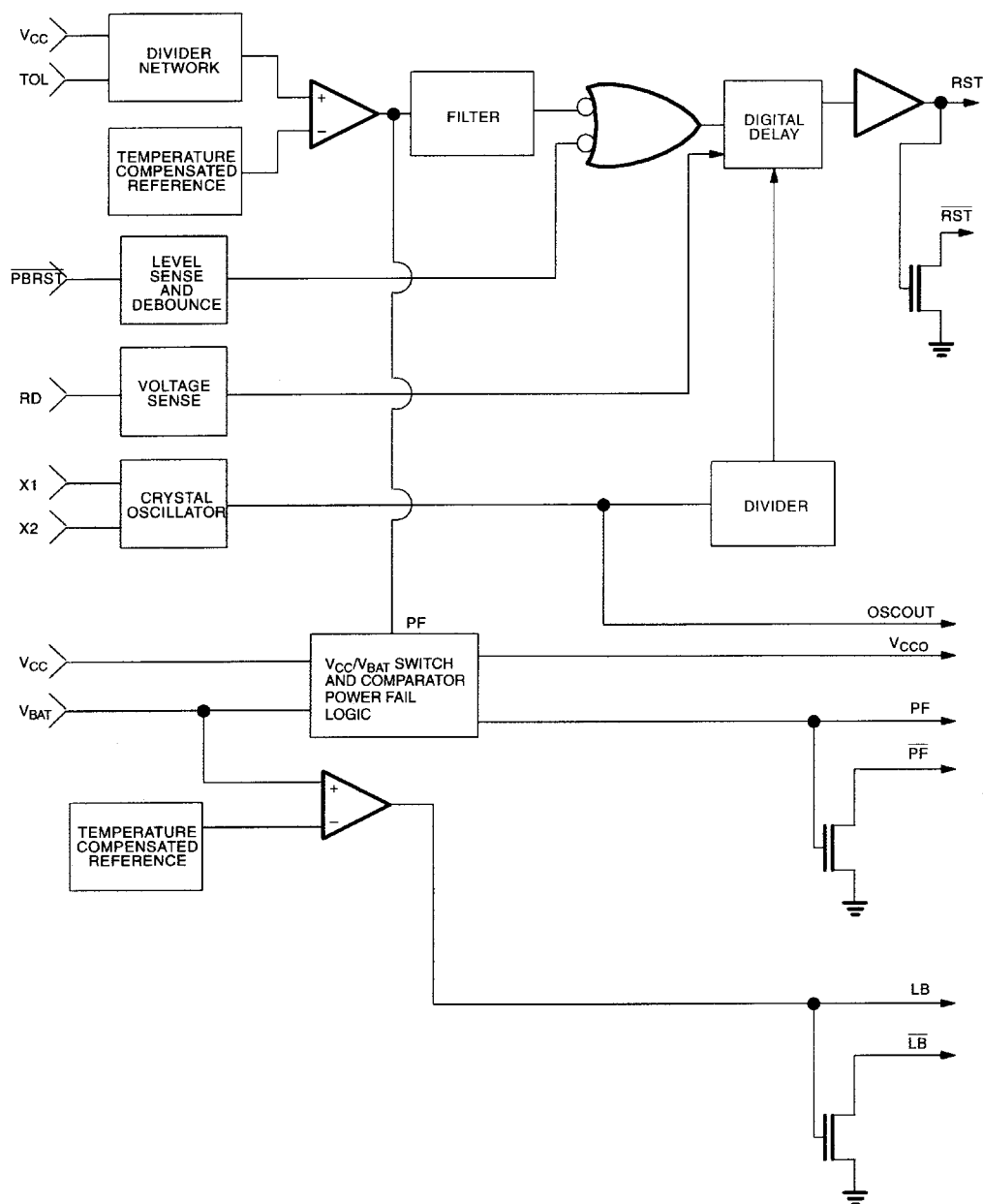
OPERATION - CRYSTAL OSCILLATOR SECTION

The DS1632 crystal oscillator is designed to be hooked directly to a 32.768 kHz crystal. By using the Daiwa Part No. DT26S, Seiko Part No. DS-VT-200 or equivalent, the oscillator will be accurate enough to run a real time clock to within ±2 minutes per month. If another crystal is to be selected, it should have a specified load capacitance (C_L) of 6 pF. The crystal oscillator will run as long as either V_{CC} or V_{BAT} is present, providing that V_{BAT} is greater than 2.3V. The oscillator output provides a rail to rail swing with regards to V_{CC} or V_{BAT}, whichever is greater. The crystal oscillator is also used internally as a time base.

OPERATION – POWER-FAIL, BATTERY BACKUP

The DS1632 provides a switch to direct power from the battery (V_{BAT}) or the incoming supply (V_{CC}), depending on which is greater. This switch has a voltage drop of less than 0.3 volts. The V_{CC} input is constantly monitored by a precision comparator for an out-of-tolerance condition. When such a condition occurs, the power-fail signals are driven to their active state immediately. The reset signals are also driven active, but this action is delayed by a time determined by the level of the input on the reset duration pin (RD). If RD is tied to ground then reset signals will become active after 9 ms. If RD is tied to V_{CC}, then reset signals will become active after 18 ms. Once active, both the reset signals and the power-fail signals will remain active as long as a (V_{CC}) out-of-tolerance condition persists. If an out-of-tolerance condition is not long enough to activate the reset signals, then only the power-fail signals would be affected. When power returns to within nominal limits the power-fail signals will return immediately to the inactive state. However, the reset signals remain in the active state for a time which is dependent on the state of the RD pin. If RD is tied to ground, the reset signals will remain active for 95 ms. If RD is tied to V_{CC}, then the reset signals will remain active for 190 ms after power is within nominal limits. The delay action on the reset signals allows time for the power supply and microprocessor clock oscillators to stabilize. The tolerance pin (TOL) selects the point at which power-fail detection occurs. With the tolerance pin grounded, power-fail detection occurs in the range of 4.75V to 4.5V. If the tolerance pin is connected to V_{CC}, then power-fail detection occurs in the range of 4.5V to 4.25V. During most power supply conditions the V_{CC} input will supply power to all functions within the chip and also to the V_{CCO} pin. The battery pin (V_{BAT}) only supplies power when V_{CC} is less than V_{BAT}. When V_{CC} is below the level of V_{BAT} only the V_{CCO} and the OSC OUT pin remain powered by V_{BAT}. All other outputs will be driven to ground when in a logic low state and will be driven to V_{CC} when in a logic high state. This is done to preserve battery capacity by avoiding battery drain resulting from loads on these outputs. The output ground level will be maintained for all levels of V_{CC}, even V_{CC} = GND. However, the output V_{CC} level will be maintained only for $V_{CC} > 2.0V$. Internal battery power consumption is less than 2 μA while V_{BAT} is supplying power. The external load on OSC OUT and V_{CCO} must be added to internal consumption to determine the total load on the battery.

OPERATION - PUSHBUTTON RESET

The DS1632 provides an input pin for direct connection to a pushbutton. The pushbutton reset input $\overline{PBRST}$ requires an active low level input. While TTL levels are sufficient to properly activate this input, it has been primarily designed for contact closure. Internally, this input is debounced and timed such that RST and $\overline{RST}$ signals of 95ms or 190 ms minimum are generated. If RD is tied to ground, then a reset pulse of 95 ms is generated. If RD is tied to V_{CC} then a reset pulse of 190 ms is generated. The delay time is started as the pushbutton reset input is released from low level.

OPERATION - LOW BATTERY WARNING

The DS1632 provides outputs which warn of a low battery condition. Whenever V_{CC} is within nominal limits, the V_{BAT} input is continuously monitored. If the V_{BAT} input is out of tolerance, the low battery outputs are driven to their active states, and will remain in the active state as long as V_{CC} is within nominal limits or until the battery input is restored to an in limit status. On power-up, if the V_{BAT} input is out of tolerance, the low battery outputs are not guaranteed active until power-fail is deactivated, but guaranteed active prior to reset inactive. When V_{CC} is below the V_{CC} fail trip point both LB and $\overline{LB}$ will be driven to ground.

For application information, please reference Application Note 64, published separately.

ABSOLUTE MAXIMUM RATINGS*

Voltage on V_{CC} Pin Relative to Ground	-0.5V to +7.0V
Voltage on I/O Relative to Ground	-0.5V to V_{CC} + 0.5V
Operating Temperature	0°C to 70°C
Storage Temperature	-55°C to +125°C
Soldering Temperature	260°C for 10 seconds

* This is a stress rating 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.

RECOMMENDED DC OPERATING CONDITIONS   (0°C to 70°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Supply Voltage	V_{CC}	4.5	5.0	5.5	V	1
$\overline{PBRST}$ Input High Level	V_{IH}	2.0		V_{CC}+0.3	V	1, 3
$\overline{PBRST}$ Input Low Level	V_{IL}	-0.3		+0.8	V	1, 3
Battery Supply Voltage	V_{BAT}	2.3	3.0	3.5	V	1

DC ELECTRICAL CHARACTERISTICS   (0°C to 70°C; V_{CC}=4.5 to 5.5V)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Output Current @ 2.4V	I_{OH}	1			mA	5, 7
Output Current @ 0.4V	I_{OL}	4			mA	7
Output Voltage @ -500 μA	V_{OH}	V_{CC}-0.5V	V_{CC}-0.1V		V	1, 6
Low Level @ RST	V_{OL}			0.4	V	1
Operating Current	I_{CC}		0.5	2.0	mA	2
V_{CC} Trip Point (TOL=GND)	V_{CCTP}	4.50	4.62	4.75	V	1
V_{CC} Trip Point (TOL=V_{CC})	V_{CCTP}	4.25	4.37	4.50	V	1
Battery Fail Trip Point	V_{BATTP}	2.30	2.45	2.55	V	1
Supply Voltage Output	V_{CCO}	V_{CC}-0.3			V	
Supply Current Output	I_{CCO1}			100	mA	4

DC ELECTRICAL CHARACTERISTICS   (0°C; V_{CC}=<V_{BAT})

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Battery Current	I_{BAT}			2	μA	
Battery Backup Current	I_{CCO2}			500	μA	4

CAPACITANCE   (t_A=25°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Input Capacitance	C_{IN}			5	pF	
Output Capacitance	C_{OUT}			7	pF	

AC ELECTRICAL CHARACTERISTICS (0°C to 70°C; V$_{CC}$=5V ± 10%)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
$\overline{PBRST}$ = V$_{IL}$	t$_{PB}$	t$_{RPD}$			ms	
Reset Pulse Width	t$_{RST}$	95		105	ms	RD=GND
Reset Pulse Width	t$_{RST}$	190		210	ms	RD=V$_{CC}$
Reset Active on Power-Up	t$_{RPU}$	95		105	ms	RD=GND
Reset Active on Power-Up	t$_{RPU}$	190		210	ms	RD=V$_{CC}$
Reset Active on Power-Down	t$_{RPD}$	9		11	ms	RD=GND
Reset Active on Power-Down	t$_{RPD}$	18		22	ms	RD=V$_{CC}$
V$_{CC}$ Slew Rate Power-Down	t$_F$	300			μs	
V$_{CC}$ Slew Rate Power-Down	t$_{FB}$	10			μs	
V$_{CC}$ Slew Rate Power-Up	t$_R$	10			μs	

TIMING DIAGRAM: PUSHBUTTON RESET
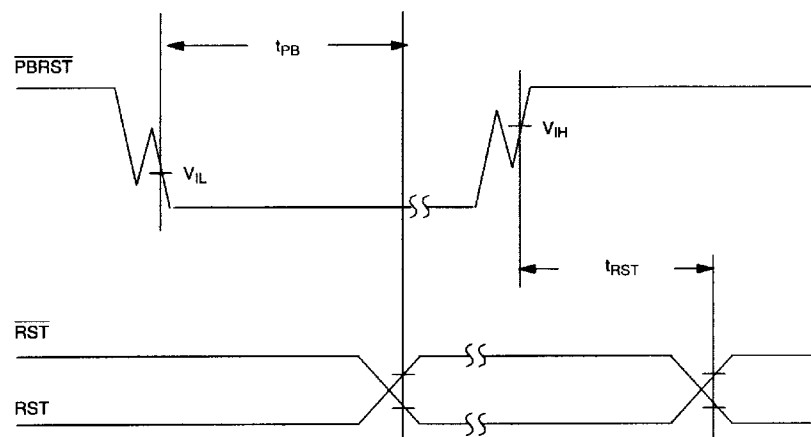
TIMING DIAGRAM: POWER-DOWN
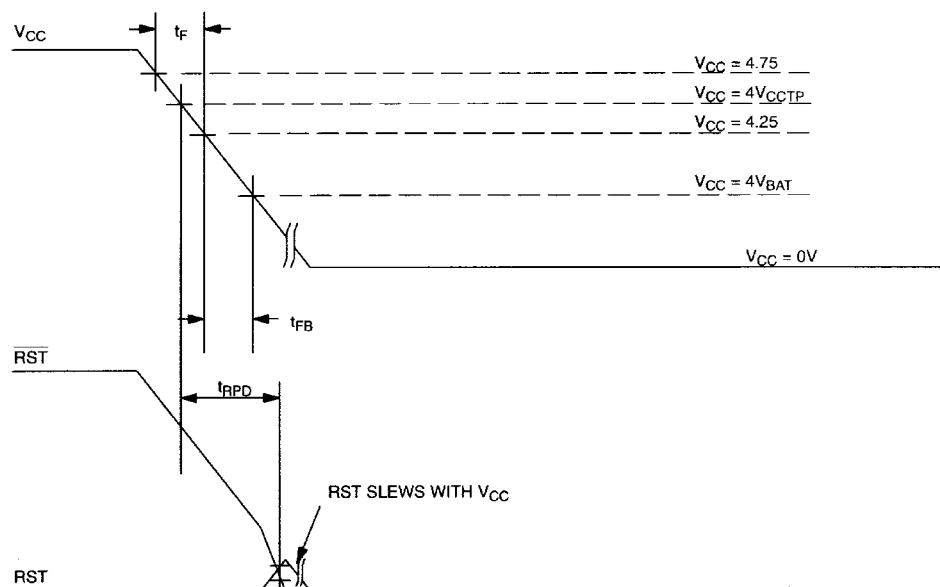
TIMING DIAGRAM: POWER-UP
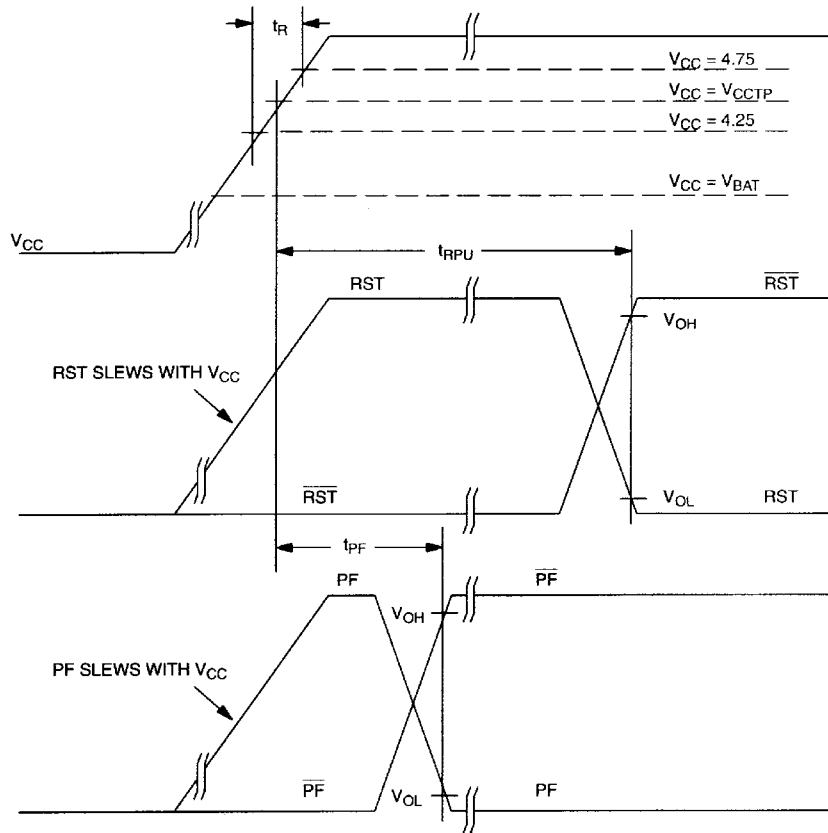
NOTES:

1. All voltages are referenced to ground.

2. Measured with outputs open.

3. The $\overline{\text{PBRST}}$ input has an internal pull-up of 10kΩ to V$_{CC}$.

4. Supply current output is specified with 0.3V drop from V$_{BAT}$ or V$_{CC}$.

5. $\overline{\text{RST}}$, $\overline{\text{PF}}$, and $\overline{\text{LB}}$ are open-drain outputs.

6. RST and PF remain within 0.5 volts of V$_{CC}$ on power down until V$_{CC}$ drops below 2.0V.

7. Sink and source currents apply to all outputs except OSC OUT which has a drive capability of sourcing 500 µA at V$_{OH}$ = V$_{CCO}$ - 0.5V and sinking 1 mA at V$_{OL}$ = 0.5 V.