

# FT7521 Reset Timer with Fixed Delay and Reset Pulse

#### **Features**

- Fixed Reset Delay: 7.5 Seconds
- One Input Reset Pin
- Open-Drain Output Pin with Fixed 400ms Pulse
- 1.8V to 5.0V Operation (T<sub>A</sub>=-40°C to +85°C)
- 1.7V to 5.0V Operation (T<sub>A</sub>=-25°C to +85°C)
- 1.65V to 5.00V Operation (T<sub>A</sub>=0°C to +85°C)
- <1µA I<sub>CCQ</sub> Consumption
- Zero-Second Test-Mode Enable
- Integrated Pull-Up Resistor on /SRO

#### **Applications**

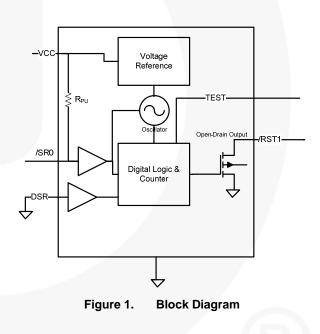
- Cell Phones
- Portable Media Players
- Tablets
- Mobile Devices
- Consumer Medical

### Description

The FT7521 is a timer for resetting a mobile device where long reset times are needed. The long delay helps avoid unintended resets caused by accidental key presses. It has a fixed delay of 7.5  $\pm$ 20% seconds. The DSR pin enables Test Mode operation by immediately forcing /RST1 LOW for factory testing.

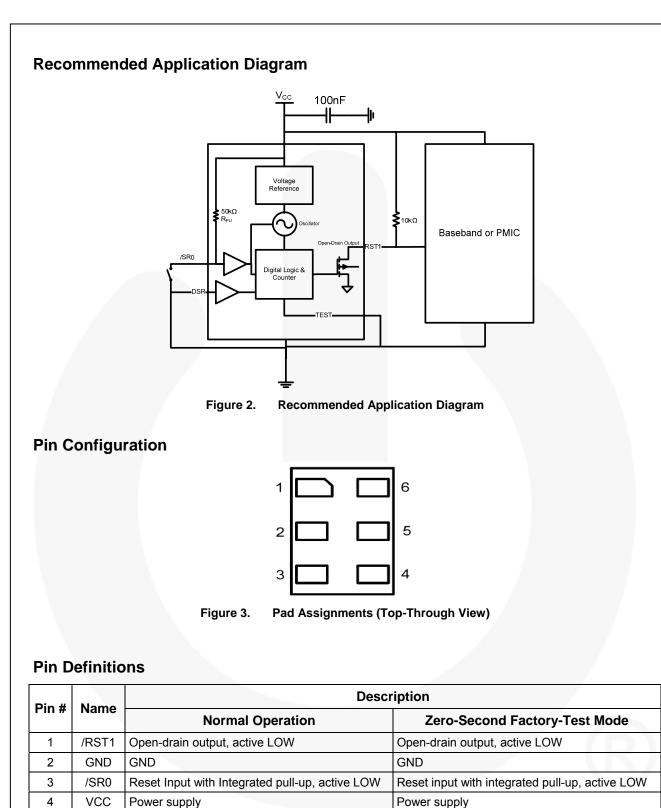
The FT7521 has one input for single-button resetting capability. The device has a single open-drain output with 0.5mA pull-down drive.

FT7521 draws minimal  $I_{CC}$  current when inactive and functions over a power supply range of 1.65V to 5.0V.



#### **Ordering Information**

| Part Number | Operating<br>Temperature Range | Package                                      | Packing<br>Method              |  |  |
|-------------|--------------------------------|--|--------------------------------|--|--|
| FT7521L6X   | -40°C to +85°C                 | 6-Lead, MicroPak™ 1.0 x 1.45mm, JEDEC MO-252 | 5000 Units on<br>Tape and Reel |  |  |



© 2009 Fairchild Semiconductor Corporation FT7521 • Rev. 1.0.5

DSR

TEST

operation.(1)

normal operation.

5

6

Note:

Delay selection input. Pull HIGH to enable Zero-

Used for device testing; tie to GND during

second delay for factory test.

normal operation.

Delay selection input; tie to GND during normal

Used for device testing; tie to GND during

1. This pin must always be tied to either GND or VCC. It must not float.

# **Absolute Maximum Ratings**

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol           | Parameter                                       | Condition                         | Min. | Max. | Unit |
|------------------|---|-----------------------------------|------|------|------|
| V <sub>CC</sub>  | Supply Voltage                                  |                                   | -0.5 | 7.0  | V    |
| V <sub>IN</sub>  | DC Input Voltage                                | /SR0, DSR                         | -0.5 | 7.0  | V    |
| V <sub>OUT</sub> | Output Voltage <sup>(2)</sup>                   | /RST1                             | -0.5 | 7.0  | V    |
| I <sub>IK</sub>  | DC Input Diode Current                          | V <sub>IN</sub> < 0V              |      | -50  | mA   |
| Ι <sub>ΟΚ</sub>  | DC Output Diode Current                         | V <sub>OUT</sub> < 0V             |      | -50  | mA   |
| I <sub>OL</sub>  | DC Output Sink Current                          |                                   |      | +50  | mA   |
| I <sub>CC</sub>  | DC $V_{CC}$ or Ground Current per Sup           |                                   | ±100 | mA   |      |
| T <sub>STG</sub> | Storage Temperature Range                       |                                   | -65  | +150 | °C   |
| TJ               | Junction Temperature Under Bias                 |                                   |      | +150 | °C   |
| TL               | Junction Lead Temperature, Soldering 10 Seconds |                                   |      | +260 | °C   |
| PD               | Power Dissipation                               |                                   |      | 5    | mW   |
| FOD              | Electrostatic Discharge Capability              | Human Body Model, JESD22-A114     |      | 4    |      |
| ESD              |   | Charged Device Model, JESD22-C101 |      | 2    | kV   |

Note:

2. All output current Absolute Maximum Ratings must be observed.

# **Recommended Operating Conditions**

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

| Symbol           | Parameter                                      | Condition  | Min. | Max. | Unit |
|------------------|--|--|------|------|------|
|                  |  | -40°C to +85°C                                       | 1.8  | 5.0  |      |
| V <sub>cc</sub>  | Supply Voltage <sup>(3)</sup>                  | -25°C to +85°C                                       | 1.7  | 5.0  | V    |
|                  |  | 0°C to +85°C   | 1.65 | 5.00 |      |
| t <sub>RFC</sub> | V <sub>CC</sub> Recovery Time After Power Down | V <sub>CC</sub> =0V After Power Down, Rising to 0.5V | 5    |      | ms   |
| V <sub>IN</sub>  | Input Voltage <sup>(3)</sup>                   | /SR0   | 0    | 5    | V    |
| V <sub>OUT</sub> | Output Voltage                                 | /RST1  | 0    | 5    | V    |
| I <sub>OL</sub>  | DC Output Sink Current                         | /RST1, V <sub>CC</sub> =1.8V to 5.0V                 |      | +0.5 | mA   |
| T <sub>A</sub>   | Free-Air Operating Temperature                 |  | -40  | +85  | °C   |
| Θja              | Thermal Resistance                             |  |      | 350  | °C/W |

Note:

3. V<sub>CC</sub> supply should never be allowed to float while input pins are driven.

# **DC Electrical Characteristics**

Conditions of T<sub>A</sub>=-40 to 80C with V<sub>CC</sub>=1.8 - 5.0V <u>OR</u> T<sub>A</sub>=-25 to 85C with V<sub>CC</sub>=1.7 - 5V <u>OR</u> T<sub>A</sub>=0 to 85C with V<sub>CC</sub>=1.65 - 5V produce the performance characteristics below.

| Symbol          | Parameter                                 | Condition                         | Min.                      | Тур. | Max.                      | Unit |  |
|-----------------|---|-----------------------------------|---------------------------|------|---------------------------|------|--|
| VIH             | Input High Voltage                        | DSR, /SR0                         | 0.65 x<br>V <sub>CC</sub> |      |                           | V    |  |
| VIL             | Input Low Voltage                         | DSR, /SR0                         |                           |      | 0.25 x<br>V <sub>CC</sub> | V    |  |
| V <sub>OL</sub> | Low Level Output Voltage                  | RST, I <sub>OL</sub> =500µA       |                           |      | 0.3                       | V    |  |
| R <sub>PU</sub> | Integrated Pull-Up Resistor on /SR0       |                                   |                           | 50   |                           | kΩ   |  |
|                 | Input Leakage Current /SR0                | V <sub>IN</sub> = V <sub>CC</sub> |                           |      | ±1.0                      |      |  |
| I <sub>IN</sub> | Input Leakage Current DSR                 | $0V \le V_{IN} \le 5.0V$          |                           |      | ±1.0                      | μA   |  |
| Icc             | Quiescent Supply Current (Timer Inactive) | /SR0=V <sub>CC</sub>              |                           |      | 1                         | μA   |  |
|                 | Dynamic Supply Current (Timer Active)     | /SR0=0V                           |                           |      | 200                       |      |  |

## **AC Electrical Characteristics**

Conditions of  $T_A$ =-40 to 80C with  $V_{CC}$ =1.8 - 5.0V <u>OR</u>  $T_A$ =-25 to 85C with  $V_{CC}$ =1.7 - 5V <u>OR</u>  $T_A$ =0 to 85C with  $V_{CC}$ =1.65 - 5V produce the performance characteristics below.

| Symbol            | Parameter                        | Condition                             | Min. | Тур. | Max. | Unit |
|-------------------|----------------------------------|---------------------------------------|------|------|------|------|
| t <sub>PHL1</sub> | Timer Delay, /SR0 to RST (DSR=0) | $C_L=5pF, R_L=5K\Omega, See Figure 4$ | 6.0  | 7.5  | 9.0  | s    |
| t <sub>REC</sub>  | Reset Timeout Delay              |                                       | 320  | 400  | 480  | ms   |

# **Capacitance Specifications**

T<sub>A</sub>=+25°C.

| Symbol           | Parameter          | Condition             | Тур. | Unit |
|------------------|--------------------|-----------------------|------|------|
| CIN              | Input Capacitance  | V <sub>CC</sub> =GND  | 4    | pF   |
| C <sub>OUT</sub> | Output Capacitance | V <sub>CC</sub> =5.0V | 5    | pF   |

#### **Functional Description**

Default operation time N is 7.5s. If the DSR pin is pulled HIGH prior to V<sub>CC</sub> ramp, the FT7521 enters Test Mode and the reset output, /RST1, is immediately pulled LOW for factory testing. The DSR pin MUST be forced to GND during normal operation. The DSR pin should never be driven HIGH or left to FLOAT during normal operation. The DSR PIN state should never be changed during device operation; it must be biased prior to supplying the V<sub>CC</sub> supply. If there is a need to use the DSR=VCC Test Mode, the /SR0 must be HIGH when the DSR pin is moved from LOW to HIGH to enter Zero-Second Factory-Test Mode. To return to the standard 7.5-second reset time, the same procedure must be followed with DSR=GND. The DSR pin should never be allowed to change state while the /SR0 pin is LOW. The VCC supply pin should never be left to float while other input pins are driven. If the VCC pin is allowed to float, care should be taken to ensure that /SR0 is not driven to any voltage greater than GND.

#### **Operation Modes**

A low input signal on /SR0 starts the oscillator. There are two scenarios for counting: short duration and long duration. In the short-duration scenario, output /RST1 is not affected. In the long-duration scenario, the output

/RST1 goes LOW after /SR0 has been held LOW for ≥7.5s. The /RST1 output returns to its original HIGH state 400ms after time  $t_{REC}$  has expired, regardless of the state of /SR0. The /RST1 output is an open-drain driver. When the count time exceeds time 7.5s, the /RST1 output pulls LOW.

#### Short Duration (t<sub>w</sub> < 7.5s)

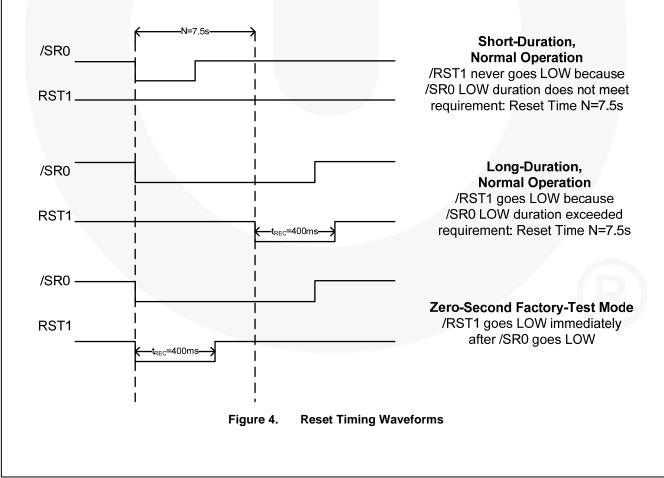
When the /SR0 input goes LOW, the internal timer starts counting. If the /SR0 input goes HIGH before 7.5s has elapsed, the timer stops counting and resets and no changes occur on the outputs.

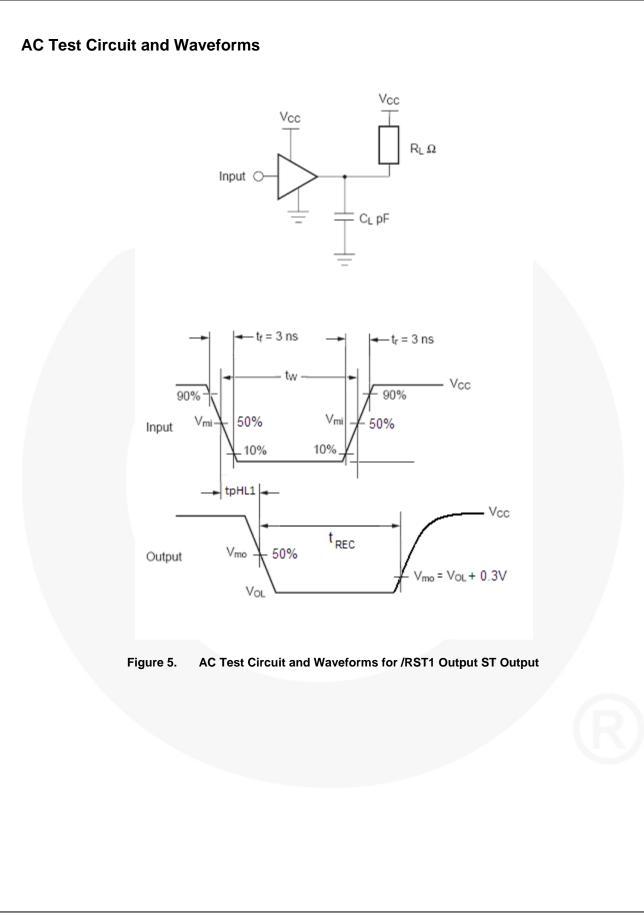
#### Long Duration (tw > 7.5s)

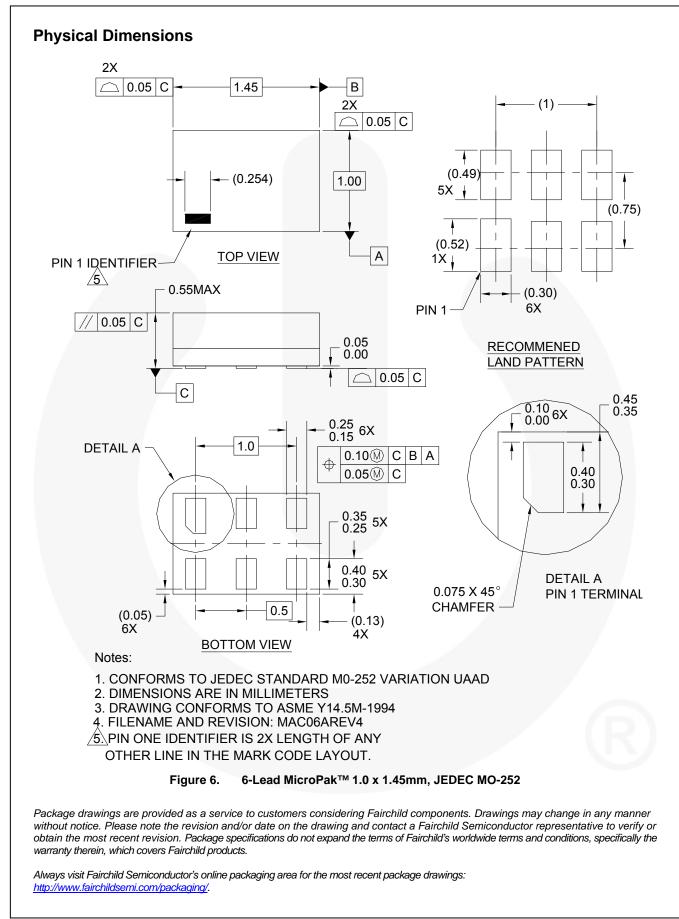
When the /SR0 input goes LOW, the internal timer starts counting. If the /SR0 input stays LOW for at least 7.5s, the RST output is enabled and pulled LOW. The output RST is held LOW for  $t_{REC}$ , 400ms, as soon as the reset time of 7.5s is met, regardless of the state of the /SR0 pin. When the /SR0 input has returned HIGH and the  $t_{REC}$  has expired, the internal timer resets and awaits the next RESET event.

#### Zero-Second Test Mode

/RST1 goes LOW immediately after /SR0 goes LOW.







FT7521 — Reset Timer with Fixed Delay and Reset Pulse

#### FAIRCHILD SEMICONDUCTOR TRADEMARKS The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks. 2CoolTN F-PESTM PowerTrench<sup>®</sup> The Power Franchise FRFET® AccuPower™ PowerXS<sup>TI</sup> wer Global Power Resource<sup>SM</sup> AX-CAP™\* Programmable Active Droop™ franchi GreenBridge™ QFET BitSiC™ TinyBoost" Build it Now™ Green FPS™ QSTM TinyBuck™ Green FPS™ e-Series™ Quiet Series™ CorePLUS™ TinyCalc™ RapidConfigure™ CorePOWER™ Gmax™ TinyLogic<sup>®</sup> GTO™ CROSSVOLT TINYOPTOM IntelliMAX<sup>TM</sup> CTL™ Saving our world, 1mW/W/kW at a time™ TinyPower™ **ISOPLANAR™** Current Transfer Logic™ SignalWise™ TinyPWM™ Making Small Speakers Sound Louder DEUXPEED® TinyWire™ SmartMax™ and Better Dual Cool™ SMART START Tran SiC™ EcoSPARK<sup>®</sup> MegaBuck™ TriFault Detect™ Solutions for Your Success™ MICROCOUPLER™ EfficientMax™ TRUECURRENT®\* SPM® **MicroFET™** ESBC<sup>Th</sup> STEALTH™ µSerDes™ MicroPak™ SuperFET MicroPak2™ SuperSOT™-3 Fairchild® Miller Drive™ SuperSOT™-6 Fairchild Semiconductor® UHC Motion Max<sup>™</sup> SuperSOT™-8 FACT Quiet Series™ Ultra FRFET™ mWSaver™ SupreMOS® FACT UniFET™ FAST® OntoHiT™ SyncFET™ VCX™ **OPTOLOGIC<sup>®</sup>** Sync-Lock™ FastvCore™ VisualMax™ **OPTOPLANAR®** GENERAL®\* **FETBench**<sup>™</sup> VoltagePlus™ FlashWriter®\* XST **FPSTM** \* Trademarks of System General Corporation, used under license by Fairchild Semiconductor. DISCLAIMER FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN. WHICH COVERS THESE PRODUCTS LIFE SUPPORT POLICY FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein 1. Life support devices or systems are devices or systems which, (a) are 2. A critical component in any component of a life support, device, or intended for surgical implant into the body or (b) support or sustain system whose failure to perform can be reasonably expected to life, and (c) whose failure to perform when properly used in cause the failure of the life support device or system, or to affect its accordance with instructions for use provided in the labeling, can be safety or effectiveness. reasonably expected to result in a significant injury of the user ANTI-COUNTERFEITING POLICY Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors. **PRODUCT STATUS DEFINITIONS Definition of Terms** Datasheet Identification **Product Status** Definition Datasheet contains the design specifications for product development. Specifications may change Advance Information Formative / In Design in any manner without notice. Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Preliminary First Production Semiconductor reserves the right to make changes at any time without notice to improve design. Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make No Identification Needed **Full Production** changes at any time without notice to improve the design. Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. Obsolete Not In Production The datasheet is for reference information only. Rev. 162

T7521 —

Reset Timer with Fixed Delay and Reset Pulse