AN_651X_015 APRIL 2005

Migration from the 71M6511/71M6511H to the 71M6521

The Teridian Semiconductor family of metering chips will soon be expanded by adding a new member, the 71M6521, which can be a very low-cost alternative for single-phase metering applications. This application note explains what considerations apply when migrating from the 71M6511 to the 71M6521 and how designs based on the 71M6511 can be adapted host both the 71M6511 and the 71M6521.

Differences in Pin-Out

Table 1 shows the 71M6511 and 71M6521 pin assignments in comparison. The usage of the pin in question on the 71M6511 Demo Board is also explained in Table 1.

Pin Number	71M6521 Pin Name	71M6511 Pin Name	Comment	Usage on 6511 Demo Board
2	E_RXTX/SEG38	E_RXTX	Added LCD segment pin, not needed when migrating design	As E_RXTX only
3	OPT_TX/DIO2	OPT_TX	Added feature, not needed when migrating design	As OPT_TX only
7	VP3P3D	VDRV	No 5V LCD on 71M6521. V3P3D is output on 71M6521.	As VDRV
8	CKTEST/SEG19	CKTEST	Different pin used for SEG19 output	As CKTST output
9	V3P3SYS	V3P3D	Internal switch: V3P3D = V3P3SYS or V3P3D = VBAT	As V3P3D
36	ICE_E	SEG19	Multiplexes ICE pins w/ SEG32, SEG33, SEG38	As SEG19
48	RESET	RESETZ	Polarity change	Low-active reset
52	VB	VBIAS	Added Sense Input, not needed when migrating design	As VBIAS
57	OPT_RX/DIO01	OPT_RX	Added DIO port, not needed when migrating design	As OPT_RX only
58	X4MHZ	GNDA	Crystal select pin, not needed when migrating design	Connected to GND
62	PB	VLCD	Added feature, not needed when migrating design	VLCD used to generate 5V for LCD
63	E_RST/SEG32	E_RST	Added additional LCD segment, not needed when migrating design	As E_RST only
64	E_TCLK/SEG32	E_TCLK	Added additional LCD segment, not needed when migrating design	As E_TCLK only

Table 1: Comparison of pins

Considerations for Migration

A few questions should be asked when considering migrating from the 71M6511 to the 71M6521:

Flash memory space: Obviously, with less flash memory space in the 71M6521, the code has to be carefully examined in order to determine whether it will fit in the 8, 16, or 32Kbytes of the 71M6521. Simulating the future application using a 71M6511 can be a useful tool to judge code space requirements. If a bottleneck is encountered, migration of code segments to assembler can help.

Furthermore, when comparing the 71M6521 with the 71M6511, it is useful to know that the command line interface in the 3.04 Demo Code for the 71M6511 occupies roughly 20Kbytes. This means that the rest of the code fits in 44Kbytes while offering a comprehensive feature set such as flexible display, auto-calibration, EEPROM storage/recall, and more.

LCD: Only 3.3V-compatible LCDs can be operated with the 71M6521. Unlike the 71M6511, the 71M6521 does not have a VLCD pin that allows supplying 5VDC from outside into the LCD driver circuitry of the chip.

SSI Port: The SSI port is offered in the 71M6511 to enable external controllers or DSPs to access data blocks provided by the CE at high speed. This feature is very unlikely to be needed in a low-cost meter.

Pin-Out: The pin-out of the 71M6521 is slightly different when comparing the 64-pin LQFP packages. This is of importance when a board design is required to be compatible with both chips.

Specifications of 71M6521 Pins Important for Migration

Pin 7: This pin is connected to V3P3D, the internal digital supply voltage. The V3P3D voltage is connected to either V3P3SYS or to VBAT by an internal switch, depending on the operation mode. V3P3D is an output for the 71M6521,driving the external components that are to function in both mission and battery modes.

Pin 8: This pin can be configured as either CKTEST or SEG19 under software control.

Pin 36: The voltage applied to this pin selects either the primary or secondary function for pins 2, 63, and 64.

Pin 48: This pin is the reset input to the chip. The reset signal is high-active, i.e. a logical 1 resets the chip.

Pin 52: This pin is the additional analog input (voltage for phase B).

Pin 62: A voltage transition at this pin forces the chip out of sleep or LCD mode into brown-out mode. When connected to ground, no wake-up will occur.

Changing an Existing 71M6511 Design to Accommodate both the 71M6521 and 71M6511

In this section, it will be shown how a 71M6511 board design can easily be modified to accommodate both the 71M6511 and the 71M6521 (in the LQFP-64 package). The Demo Board 71M6511-B-DB REV2.0, as presented in the Demo Board User Manuals, will serve as an example. Modifications shown for the Demo Board 71M6511-B-DB can be applied to any existing meter design.

Figure 1 shows a partial view of the schematic page 3 of the Demo Board design with the necessary modifications applied.

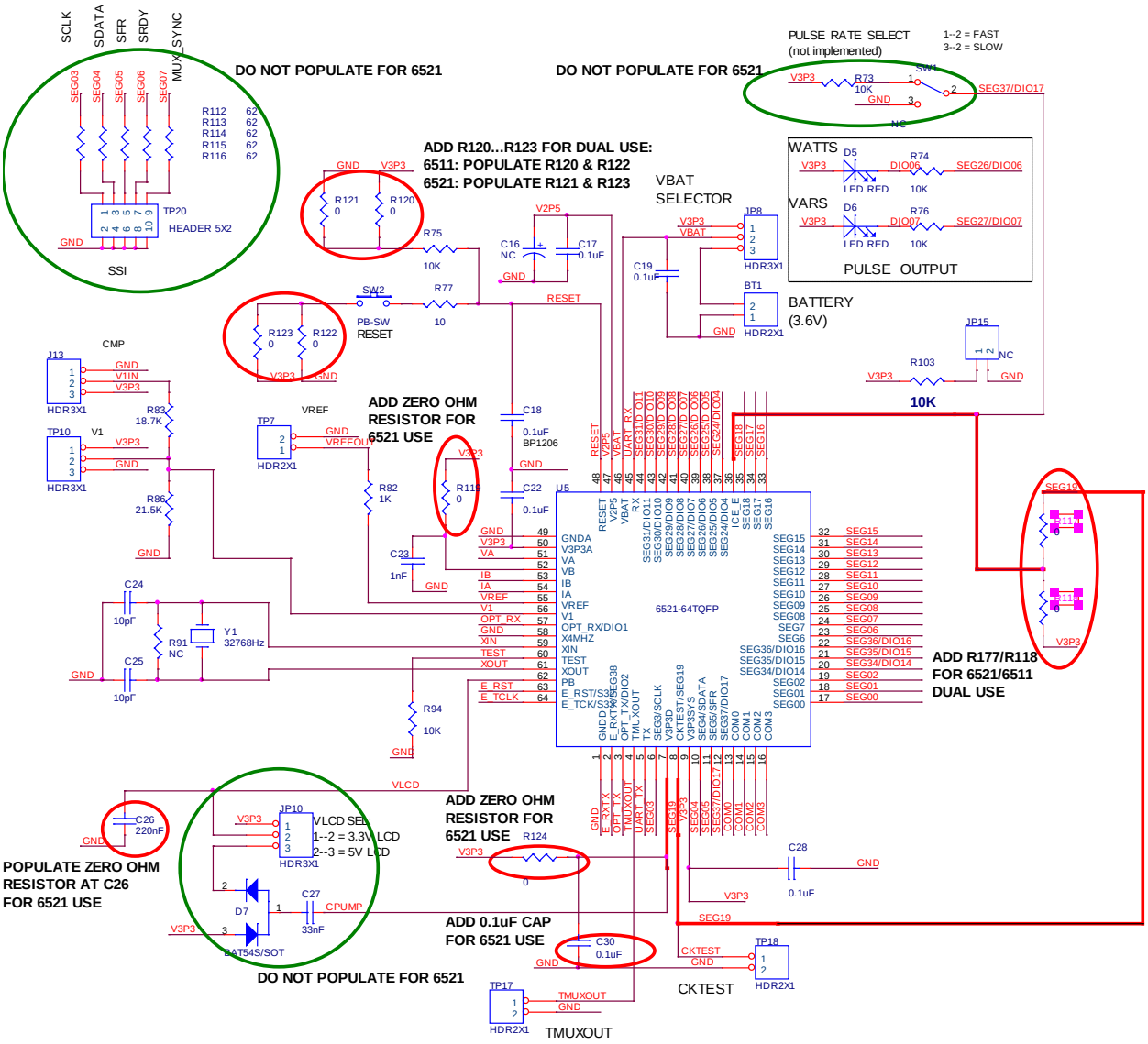

Figure 1: Modifications to the Demo Board

Green ovals mark the components that have to be omitted (i.e. not populated) when operating the board with a 71M6521. Red ovals mark the components that have to be added to enable operation with the 6521. In some cases, 71M6511 or 71M6521 operation can be selected by either populating or not populating zero-ohm resistors.

The modifications are essentially patches for pin-out differences between the two chips and are as follows:

1) In the 6521 mode, pin 7 (V3P3D output) must be connected to the V3P3 net by populating R124.
2) In the 6521 mode, pin 8 (SEG19) must be connected to the LCD pin that had been connected to pin 36. In 6511 mode, pin 8 remains the CKTEST output.
3) Pin 36 must be connected to R117 and R118. In 6511 mode R117 is populated. In 6521 mode, R118 is populated.
4) R119 must be populated in 6521 mode in order to disable the VB input.
5) In 6521 mode JP10, D7, C27, and C26 are not populated, and C26 is replaced with a zero-ohm resistor that ties pin 62 ground, disabling the pushbutton wakeup function. In 6511 mode, JP10, D7, C27, and C26 are populated, enabling the charge pump.
6) In 6521 mode resistors R121 and R123 are populated, enabling high-active reset signal. In 6511 mode resistors R120 and R122 are populated, enabling low-active reset signal.
7) In 6521 mode resistors R112 to R116 and the SSI header TP20 are not populated.
8) In 6521 mode a 3.3V-compatible LCD is to be used.

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