

# Application Note



## 4200 Series- MTL Changes for Pure Pin Cards

Reference: 050-3



This document explains the changes to MTL for the support of the 4200 Series FA23 “Pure Pin” Test Point Card. This information will be particularly useful to those who are migrating programs from the Multiplexed FA03 test point cards.

## Drive and Monitor Voltages

The FA23 card has a more limited voltage range than the FA03 card. It has been designed for use with voltages within the range of 0 to 5 Volts only. Any attempts to use drive or monitor levels outside of this range will result in an error. For these voltages, the Multiplexed FA03 card may be more suitable.

CAPG has been enhanced to support the FA23 card, allowing the correct allocation of test channels in systems configured with a mixture of FA03 and FA23 cards.

## Node Forcing

The FA03 card can be run in Node Forcing (500mA current) or non-Node Forcing mode (50mA current). The FA23 Pure Pin card can ONLY be used in a node-forcing mode (Again with 500mA of current available). The MTL options to disable the node-forcing mode have no effect on this card, except to switch off the safety time-out. This could lead to damage of the UUT, especially during program development and debugging.

To avoid this situation, MTL will not allow the FA23 cards to be used with the node forcing timeout disabled unless the user specifies one of the following:

1. Within the TestModule for a device, set the variable:

```
Logic.AllowForceOff := True ;
```

Note: This is reset for the next TestModule

2. In the main program, set the variable:

```
Prog.LogicAllowForceOff := True ;
```

Note: This is set to False by calling the Prog.Begin function.

To avoid problems, always run with node forcing enabled whenever possible. If it must be disabled to extend the test period, ensure that the other devices are guarded to minimise the effects of node forcing.

## Static Guards

The GuardFloats function that provides Static Guards to hold floating inputs in a defined state will work with either type of test point card. The FA03 card has dedicated static guard drivers to provide this function; these are not required with the FA23. Due to it's non-multiplexed "Pure Pin" architecture the same function is performed using a standard driver/sensor.

## Drive Formats

The FA03 card supports six drive formats. These are NRZ, DNRZ, RZ, R1, RI and RC. The FA23 card only supports the NRZ (default) and RZ formats. Any test that attempts to use one of the other formats will generate an error if executed on an FA23 pin. CAPG can be used to ensure that an FA03 pin is allocated where a special format is required. In practice this should not be a limitation as NRZ does not use the window setting, hence NRZ and RZ can be used on the same FA23 provided all RZ pins share the same formatting.

The use of the variable TP.Timing is NOT supported by the FA23.

## Drive and Monitor Windows

Both test point cards support the use of separate Drive and Monitor windows. In the case of the multiplexed FA03, these can be selected on a per pin basis. However with the FA23 card, the windows can only be selected on a per card basis.

As a result, the use of the variables TP.DriveWindow and TP.MonWindow has changed:

TP.DriveWindow#c5l is valid for FA03, but NOT for FA23

TP.DriveWindow#c is valid for FA23, but NOT for FA03

An error message will be generated with this rule is not observed.

## Monitor Limitations

For FA23 pins, a monitor cannot be performed within the first 40ns of the test step. As it is unusual to monitor this early, this will not be a problem.

## Slew Rate

The FA03 card has two selectable slew rates, Slow and Fast. The FA23 Pure Pin card has a single fixed slew rate approximately between the Fast and Slow settings of the FA03.

Existing test programs that set the value of slew rate will work with the FA23 card; the value of Slew rate is just ignored.

## Learn RAM

The FA03 card has Learn RAM behind every test pin. For the FA23 card, the Learn RAM may only be enabled on a maximum of 4 test pins at any one time. In addition, the test pin(s) to be learnt MUST be enabled using the new variable TP.LearnEnable.

Up to FOUR Pins may be learnt as follows:

Any one pin from test pins 0 to 15 and 64 to 79

Plus Any one pin from test pins 16 to 31 and 80 to 95

Plus Any one pin from test pins 32 to 47 and 96 to 111

Plus Any one pin from test pins 48 to 63 and 112 to 127

Attempts to learn more than one pin per group will result in an error.

The learn RAM on the FA23 card is 64k deep (FA03 is 8k deep). The depth of learn RAM for any test pin can be tested by reading the variable TP.LearnRamDepth.

TP.LearnCount will return the number of entries in the learn RAM. If this value is greater than the depth of RAM, an overflow has occurred. This can also be tested by reading the variable TP.LearnOverflow.

## Terminators

To use the Terminator resistors on the FA23 card, the pin driver must actually be turned on. This means they cannot be used as a pull up/down on an output device pin (Where the pin is only monitored).

By default, FA23 pins have the HiZ terminator enabled and connected to voltage midway between the programmed MNL and MNH levels. If the terminator is explicitly set to off, the pin will float to zero volts (The FA03 would float to approx 2.5 Volts).

## Logic Families

By default, MTL will detect certain family errors when the program is executed rather than at load time. This allows a program to be loaded and edited on a system fitted with different test point cards. This behaviour can be changed by setting the variable Logic.CompileMode as follows:

Normal No other errors reported at load time (Default)

AllFA03 Assumes all cards are Multiplexed FA03. Reports errors.

AllFA23 Assumes all cards are Non-Multiplexed FA23. Reports errors.

AsHardware Reports errors based on actual hardware configuration.

Note: Further errors may be reported at run time depending on the type of cards fitted. Use with care otherwise programs that are correct may not load.

### **Qtest**

The drive test pin for both Qtest 1 and 2 has to drive a negative voltage therefore an FA23 pin cannot be used for this driver. For Qtest 1 you must use a FA03 pin, for Qtest 2 you can either use an FA03 pin OR use the integral driver of the QMUX card. FA23 pins may be used for the actual device pins.

### **CAPG SRF File**

The CAPG SRF files defines which test point cards are fitted to the system. Valid types are:

FA03	Multiplexed Universal Test Point Cards
FA13	Analog only Test Point Cards
FA23	Non-Multiplexed "Pure Pin" Cards

In addition, a generic type of FAUTP can be used. This will allow either type of card to be used, providing the allocation requirements can be met (i.e. voltages are within range and it does not cause a multiplexing error).

### **General Points**

Prior to MTL V3.5, certain pin variables would accept a card reference rather than a single pin (It actually defaulted to pin zero, so #c would really be #c0).

This was an error but has now been resolved; any attempt to program a complete test point board will now generate an error message.

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