

MODA and MODB Pin Control

The engineer can choose to select the operating mode of the 68HC(S)12 when the mcu resets by setting or clearing the MODA and MODB pins on the mcu. Mostly, these pins are hardwired in the application to select a particular mode of operation. However, some debuggers can connect to these pins and provide dynamic control over the operating modes. These pins can be easily optoisolated using the circuit shown in [Figure 4 . Opto Isolation of a unidirectional pin.](#)

Monitor Mode Connections For 68HC08

[Figure 9 . HC08 Monitor Mode Connection](#) shows the connections required to access monitor mode on the 68HC908AZ60A and a minimal debugging circuit. For other HC08 mcus the connections may vary, please refer to the monitor ROM chapter in the device datasheet for the exact connection. However, all HC08s require the following minimum connections: -

- PTA0 – a bi-directional data pin used to communicate between the mcu and debugging hardware
- RESET – a bi-directional pin used by the debugger to reset the mcu. It can also be used by the debugger to detect mcu-generated resets (eg, watchdog timeouts). In [Figure 9 . HC08 Monitor Mode Connection](#) reset is controlled by a switch that the user can toggle to reset the device

Other monitor mode pins (PTC0, PTC1, PTC3) can be 'hardwired' to allow monitor mode access, or they could be optoisolated using the circuit shown in [Figure 4 . Opto Isolation of a unidirectional pin](#). Note, isolating all the monitor mode set-up pins would involve adding significant additional current requirements on the application's power supply

[Figure 10 . Opto Isolation Circuit For Monitor Mode](#) shows the monitor mode circuit with optoisolation using circuits shown in [Figure 4 . Opto Isolation of a unidirectional pin](#) and [Figure 5 . Opto Isolation of a BiDirectional Pin](#).

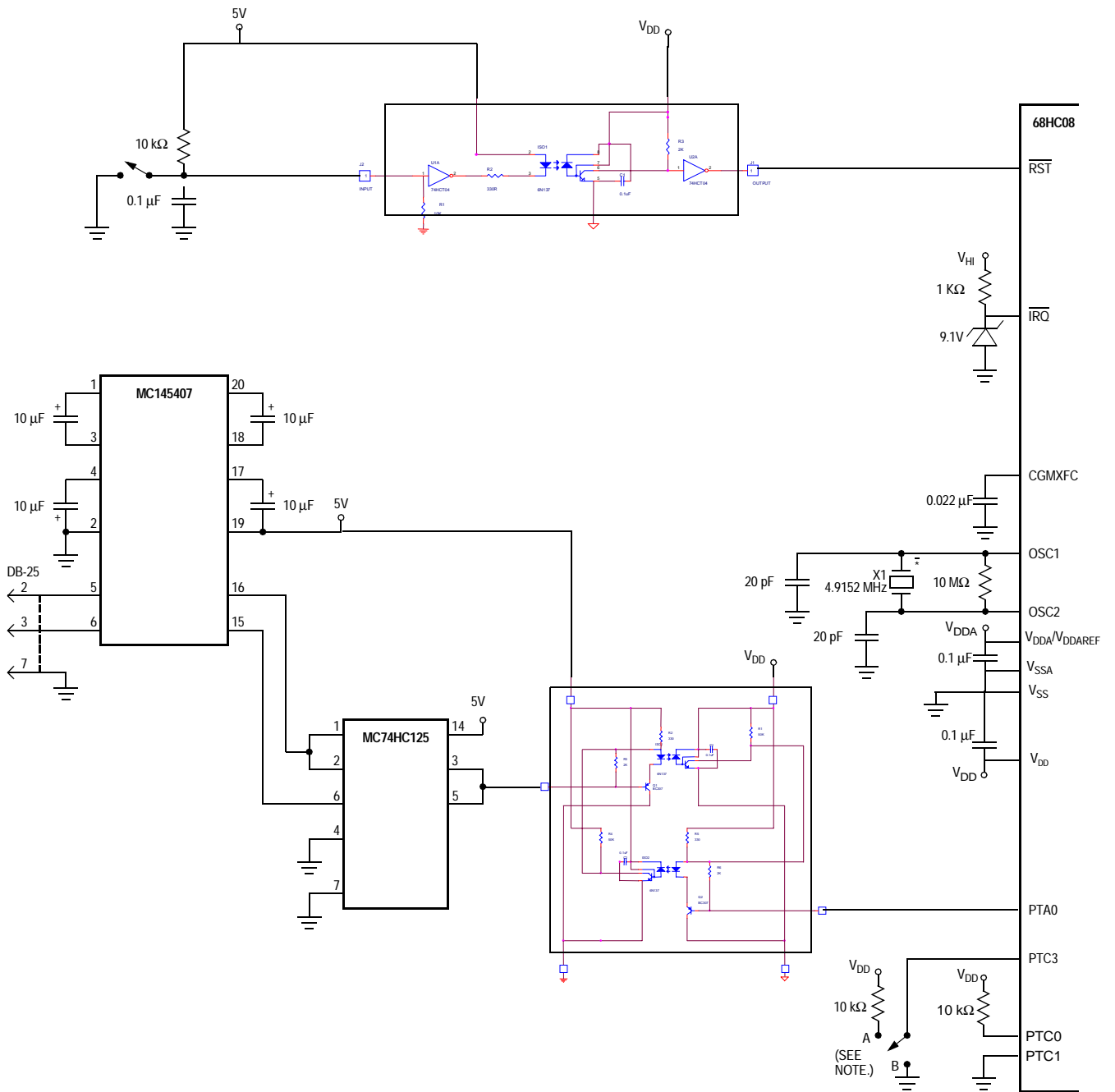


Figure 10. Opto Isolation Circuit For Monitor Mode

IRQ Pin Control

For correct entry to monitor mode on the 68HC908AZ60A and many other 68HC08 mcus, the IRQ pin must be supplied with a voltage level of $V_{dd} + 4.5V$. For debugging purposes when using an optically isolated interface, this voltage can be hardwired on the application board side of the optical barrier. If the user wishes to control switching of the IRQ voltage, it can be achieved using the circuit shown in **Figure 11 . IRQ Pin Optical Isolation Circuit**.

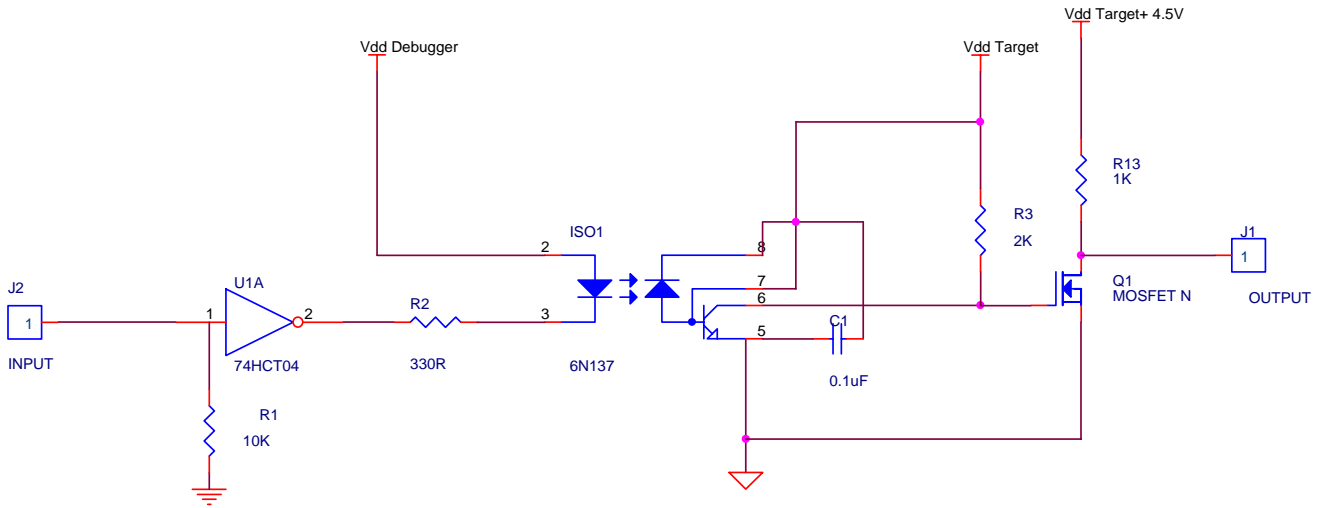


Figure 11. IRQ Pin Optical Isolation Circuit

Summary

This application note details 2 circuits for optically isolating unidirectional and bi-directional digital pins. It explains how these circuits can be used to allow development engineers to safely and efficiently develop non-isolated ac line powered applications.

References

1. M68HC908AZ60A Technical Data
2. MC9S12DP256 Technical Data

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