

# What is MGND

Keysight i1000 misreporting of failed card.  
Digital card is damaged but Analog card is reported as  
damaged instead.

## Introduction

MGND stands for Measurement Card Ground. It is a connection between the DUT board ground and system ground before completing analog test and powering up. It ensures same logic level for all ground.

In this document, the following items will be discussed:

- Where is MGND
- Impact of missing MGND
- How to connect MGND

This document explains the necessity of the MGND and provide solutions for missing MGND.



Impact of missing  
MGND:

- Encounter unknown shorts as i1000 test
- DGND relay stuck, but cannot be detected by diagnostics

## Where is the MGND located?

The MGND is a connected measurement card ground to system ground. The i1000 uses 8 sets of relays for its connections. As shown in the image below, the MGND relays are marked in the red rectangle.

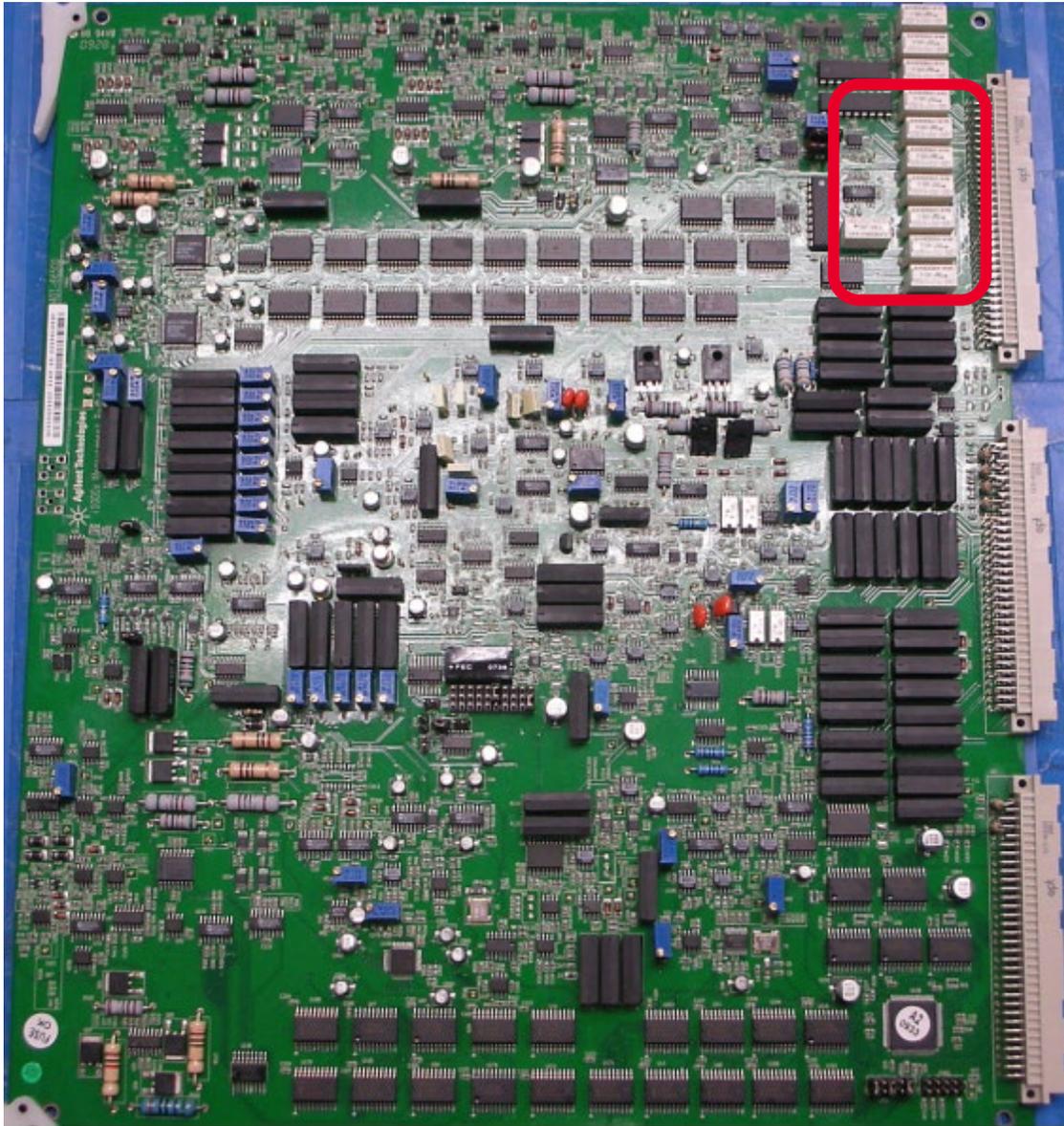


Figure 1-1: Measurement card with MGND

## Impact of missing MGND

Sometimes, i1000 users will encounter shorts issue during normal testing with unknown reasons, and no issues in the DUT board or fixture. Even the system diagnostics test passed without issues.

There is an unexpected occurrence of the ground node of board 1 shorting the other nodes of board 2.

```
+++++
==== Board 1 ====
Short Report
Short #1, Thresh:8      Nail      Ohms
From:1%GND              1
<1%OTHER. -1>
<1%R103.1>
<1%R107.1>
<1%R1121.1>
<1%R1125.1>
To :2%P12V_STBY_PCI    28      1
<IC:2%U91.59>
2%P12V_STBY            90      1
2%CT_P1V8_BU_SYNC     38      1
<IC:2%U73.2>
2%P5V_VCC_P1V8_BU     134     1
<IC:2%U73.9>
2%CT_P2V5_DDR4_BU_PHASE 40      1
<IC:2%U4.5>
-----
```

**Figure 2-1: Board 1 short to board 2**

Experienced engineers may suspect the digital card to be the cause of this issue. The find pin window is launched (Alt + P hotkey) to probe. Although the find pin probe does not touch any test probe at this moment, but one node is displayed in find pin window as shown below:



**Figure 2-2: Find Pin Window**

Normally the find pin probe is connected to the system ground. If it is not touching any test probes, then nothing will be displayed.

In most cases, Nail 1 is the DUT board ground and all odd pins of the digital card are digital ground. Any time the DGND relay is stuck because of the board ground and digital card ground are connected to the ground plate, the board ground is then shorted to system ground via digital card ground.

There are several digital cards in the i1000 system, making it difficult to identify the damaged digital card when such issue is encountered.

User needs to use certain methods to identify the damaged digital card, such as dichotomization or by removing the digital cards one by one.

Due to the relay's characteristics, shaking it will revert the shrapnel back to its original state. This results in the user being unable to find out which DGND relay is stuck using DMM.

## How to connect MGND

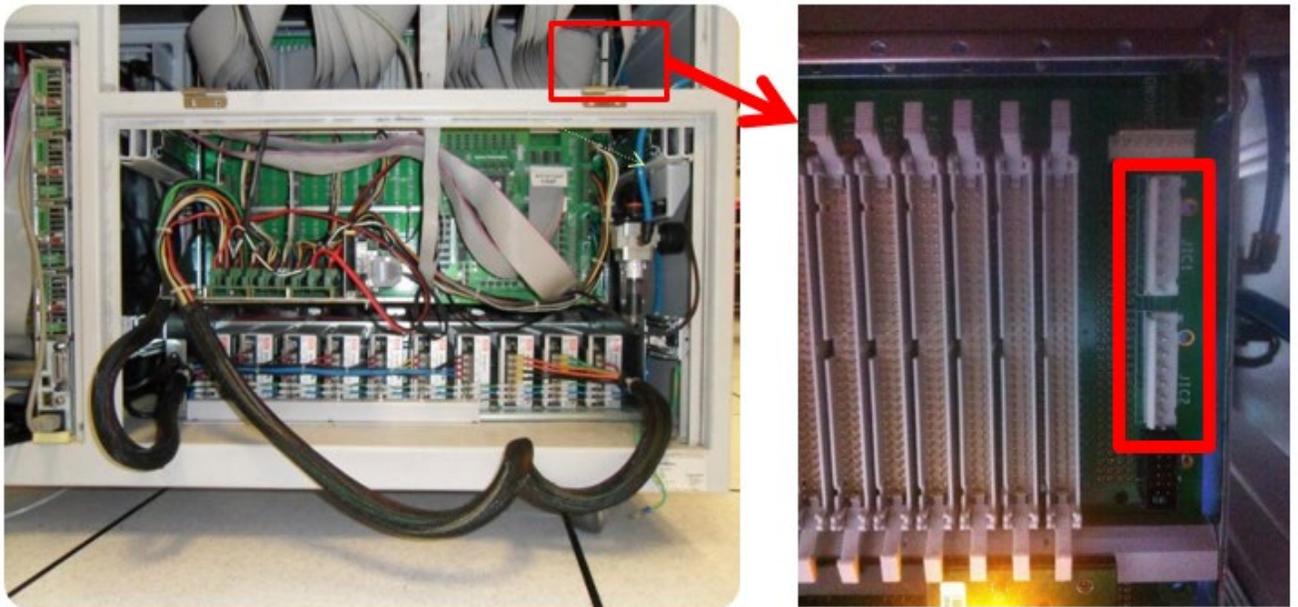
The above digital card DGND issue is caused by missing MGND wires. When the test is powered up, the DUT board ground needs to be linked to the system ground. If it is the MGND is not wired to the i1000 system, only the DGND relay can be used to implement the test. The DGND is designed just for digital signal, as such the rated current is small. Whenever a high current flows over the DGND, the DGND relay is at risk of being stuck. Therefore, any test fixture that needs to be powered up must connect to the MGND wire.

Keysight i1000 Press Down and SFP have different MGND wiring method.

### 1) Press Down type i1000 MGND wiring

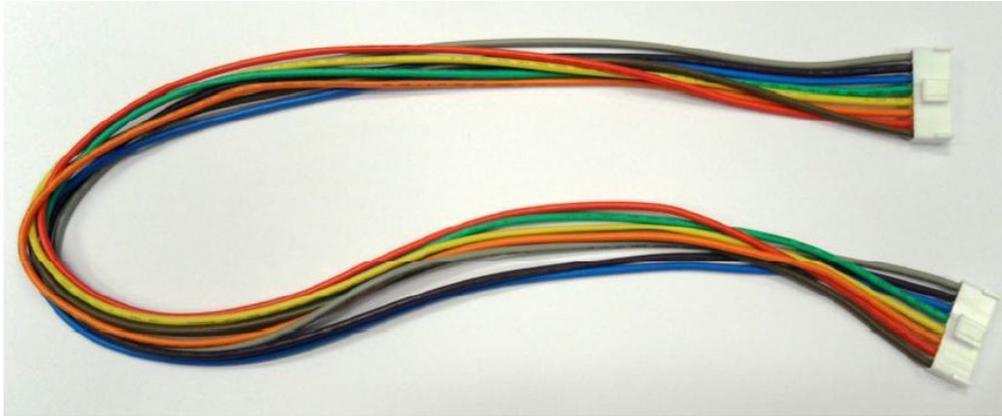
The i1000 Press Down type system must be manually connected to the MGND wire while exchanging each fixture. The two MDNG connectors are highlighted in the image below in the red rectangle.

Each connector has 8 pins, with a total of 16 pins.



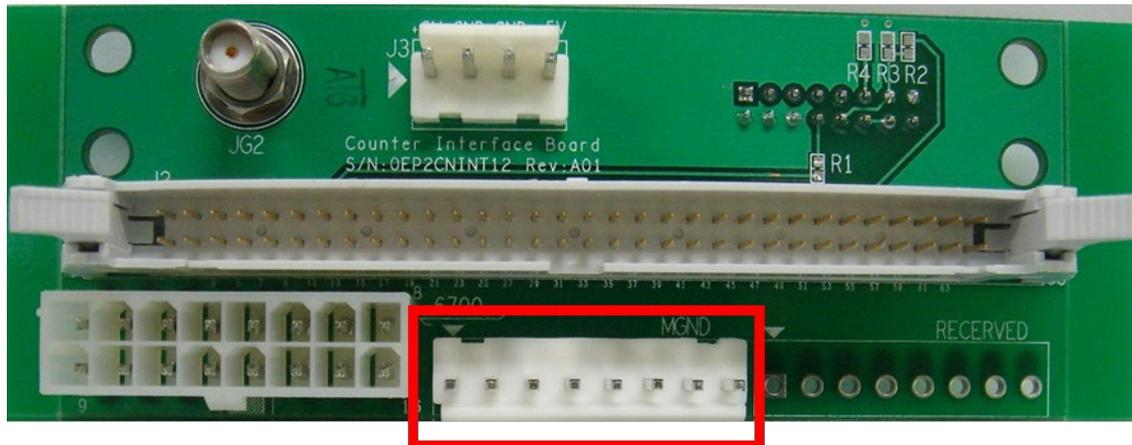
**Figure 3-1: i1000 Press Down System MGND Connector Location**

An 8-Pin cable is shipped together with the i1000 system shown below. It should be connected between the i1000 system and fixture's MGND connector.



**Figure 3-2: MGND Cable**

If the i1000 program needs to run power up test, the i1000 fixture must use Counter Interface Board. The MGND connector is highlighted in the image below with a red rectangle.



**Figure 3-3: MGND Connector on the fixture**

When building the fixture, the wire should be soldered to each pin of the MGND connector and each board's GND probes.

If the DUT board is a single board and it is not possible to solder all 8 pins together, then the wire can be soldered to the DUT board's GND probes.

If there is a panel board, each MGND pin should be soldered to each board's GND probes. If there are more than 9 boards in a panel, the 9<sup>th</sup> board's MGND wire should be restarted from the first pin of the MGND connector.

## 2) i1000 SFP MGND wiring

The MGND wire has already been linked to the 33<sup>rd</sup> interface connector of the i1000 SFP system. Shown below is the 33<sup>rd</sup> connector pin map.

Pin 33 to pin 64 are the MGND wires, with a total of 16 sets. If a panel board has more than 17 boards, the MGND wire for the 17<sup>th</sup> board should be restarted at MGND1.

### Connector #33

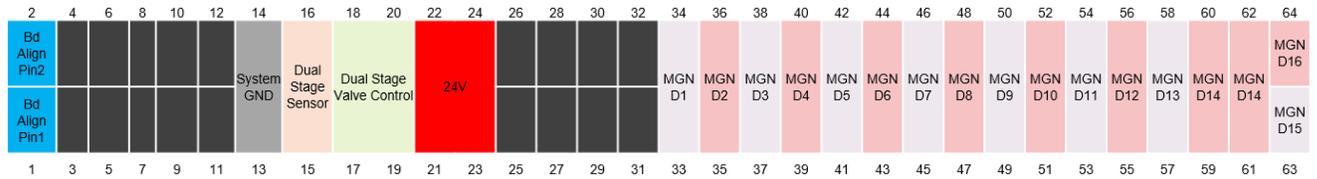


Figure 3-5: SFP MGND Interface

Note: When using i1000 TPG to develop programs, select SFP inline type regardless of the system type being SFP offline or SFP inline. This is because the TPG will generate MGND wiring information in the Fixture\_build.txt file.

```

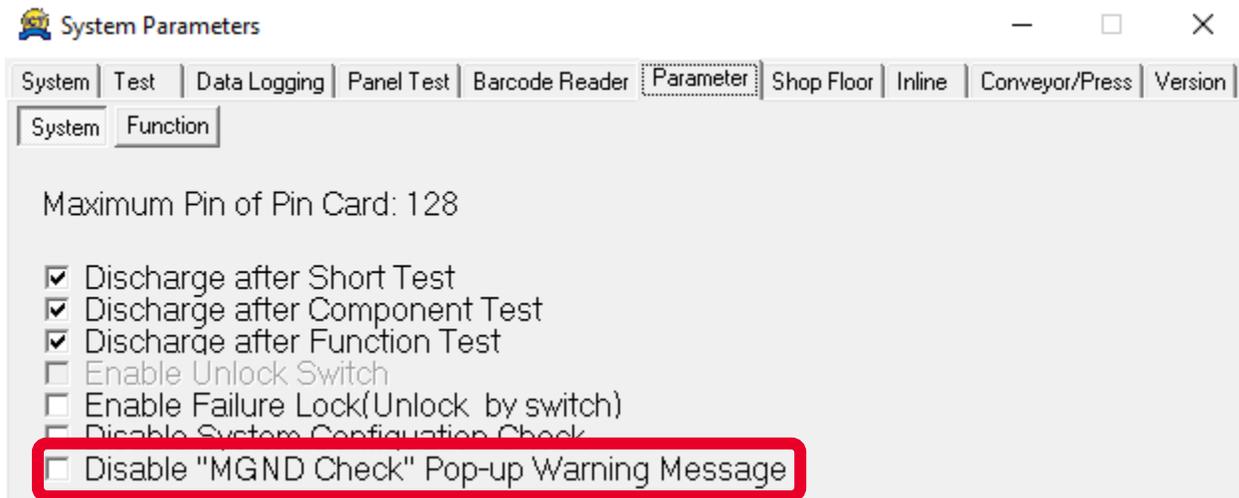
-----
Measurement GND Wiring
-----
NO#           |           | Nail | Net
-----
Slot 33,Pin37-38 | wire to | $281 | 3%GND
-----

```

Figure 3-6: MGND wiring

## Conclusions

MGND is designed to connect the DUT board's ground to system ground. The DGND relay of the digital card will hang if the MGND wire is missing. If this is the case, then the programmer should inform the fixture maker to wire the MGND. Please reconnect the MGND wires if it is not yet connected in the current fixture.



**Figure 4-1: Disable MGND Check Pop-up window**

Now, the i1000 software will close the MGND before closing the DGND while preparing to increase power. The i1000 software will also check if the MGND wire is available.

If the software has been upgraded to the latest version but the MGND wiring has yet to be added to the fixture, then you may temporarily skip the MGND checking function by disabling it as shown in the figure above.

Once the MGND wiring has been added, the MGND wiring checking function should be enabled.

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