



The importance of grounding for signal integrity

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Rapid advancement in cutting-edge semiconductor devices driven by the exponential growth in delivering smart HDTV, smartphone, Google goggles, tablets electric vehicle (EV), personal healthcare and so on.

Electrical noise can be defined as any undesired voltage and current. An occasional burst of electrical noise in the amplitude will cause the desired signal to be obliterated. The presence of the noise can severely attenuate the desired signal strength.

Apparently the electrical energy being propagated in the signal medium (*contact element*); the properties of inductance will be observed. The values of the inductance capacitance and resistance present depend on various physical factors, and the effects of the line associated reactance also depend on the frequency applied.

In this case, the electrical signal in a signal medium is carried by the perimeter contact elements with respect to the center ground which is called an unbalanced signal.

Physical factors are one of the crucial aspects in grounding element design.

- Profile (*Structural design*)
- Contact surface
- Compliant feature (*actuation*)
White paper • Sep/Oct • 2013

Most of the factors above could contribute to the constriction resistance that will limit the flow of current due to surface asperity.

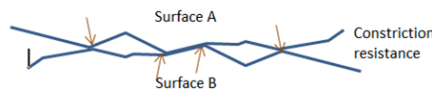


Figure 1.0- Constriction resistance illustration

$$R = \rho \ell / A$$

Where;

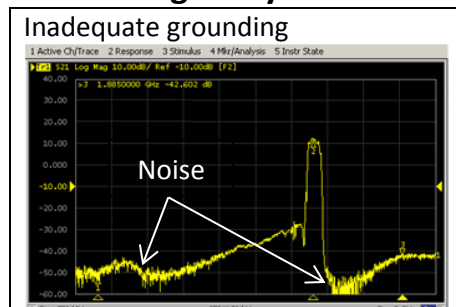
- ℓ is the length of the contact element,
- A is the cross-section area of the contact element

Rate of oxide formation

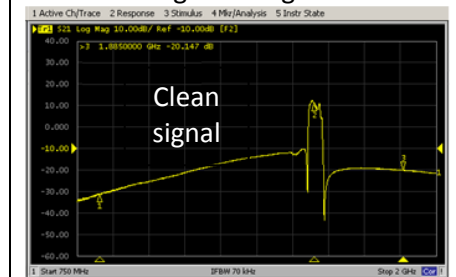
Time	Au	Ag	Cu	Ni
20 sec			1.0-2.5	
1-2 min		0.3	0.5-4.0	0.5
10min	0-1.0		10.0	
1-2 h			6.0	2.0
2 days	1.0		2.0-10.0	2.0

Source: Probe Technology, 1998

Grounding analysis



An effective grounding

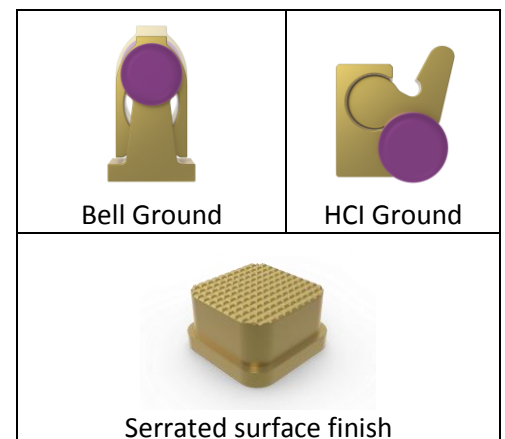


The effect of grounding is important to ensure a signal is moved from destination A to B with sufficient quality to allow effective signal transmission, which is named as signal integrity (SI).

An effective Grounding contact element was developed from all areas associated with the device under test (*package requirements*), process and real-life application.

Core values of JF grounding solution

- Enhance *constriction resistance* (micro-contacts)
- Self-consistent in engagement system
- Adequate penetration to oxide layer for better contact (*especially for matte tin devices*)
- Compliant grounding allow soft device resting on the contactor.



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