



Test Contactors meet the Challenges of Precision Analog IC Device Testing

Precision Analog devices for industrial, medical, consumer, computer and communications applications need highly accurate and repeatable test results

Precision analog devices are designed into a variety of consumer, industrial and medical products today, from cell phones to video games to industrial process control systems and pacemakers. Analog systems place high demands on the performance of these ICs in applications that measure voltage, current, resistance, temperature, light, weight, and pressure. Precision analog devices include analog-to-digital and digital-to-analog converters, amplifiers/comparators, buffers, sensors (MEMS), signal conditioning, and numerous voltage references, regulators, and power management subsystems.

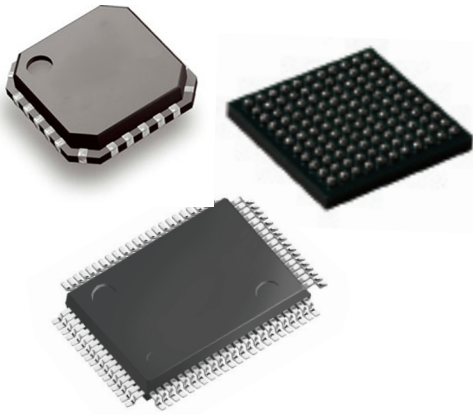
Defining Precision

The term precision is some times used interchangeably with the term accuracy. However the two have slightly different meanings. When referring to accuracy, we refer to hitting a target; when we refer to precision we refer to repeatability. The difference is significant, in one instance you can constantly hit a target but have a large amount of variability, in the second instance, you may never hit the target, but you constantly hit the same spot. The key is to be highly accurate and very precise, that is, you hit the target dead center every time.

The Importance of Johnstech Test Contactors for Precision Analog Testing

When using a Test Contactor in a precision analog application, the first critical feature is the ability to hit the target. This can only be accomplished if the Contactor has the necessary electrical performance, such as very low contact resistance, low inductance, low capacitance, high current carrying capacity and in general a low noise environment.

The second key element is precise repeatability; a Contactor that maintains consistent and repeatable electrical and mechanical results; a Contactor that maintains the same identical electrical characteristics, time after time. It is impossible to have precision, or for that matter any level of accuracy, when one or more of the electrical or mechanical characteristics are inconsistent. The combination of high accuracy and precise repeatability in a precision analog environment we call "Quiet Contacting."



Johnstech's patented solid contact design with its self-cleaning wipe action is recognized as a world leading technology in performance and repeatability (precision and accuracy); and Quiet Contacting ROL™ products are extremely well suited to the demanding precision and accuracy required in today's highly accurate analog and mixed signal applications. For example, analog to digital converters, are found in almost every segment of the market; the ability to make consistent and repeatable measurements at Least Significant Bit (LSB) levels of 24bits, and to have that measurement return the same result time after time, helps guarantee the highest first time yield.

Precision Analog specifications and testing - What does it mean to the engineer?

Accurate and repeatable specifications for precision analog products are directly related to yield, gross margin and profitability. Success depends on how well engineers can design, test and market these high performance devices. Test throughput is also a key economic indicator. A Contactor can influence the ability to accurately and repeatably measure and qualify specifications at these very low levels. Accurately and precisely measuring leakage current, noise floor, RDSON, Vref or various forms of low level distortion can mean the difference between wide or narrow guard bands, and high or low margins. Least significant bits (LSB) on high resolution converters can easily get lost in noise and parasitic inductive ground bounce (see figure 1). The same can be said for current carrying capability, and the ability to measure resistance in the milliohm range. The old cliché definitely applies: if you can't see it, you can't measure it.

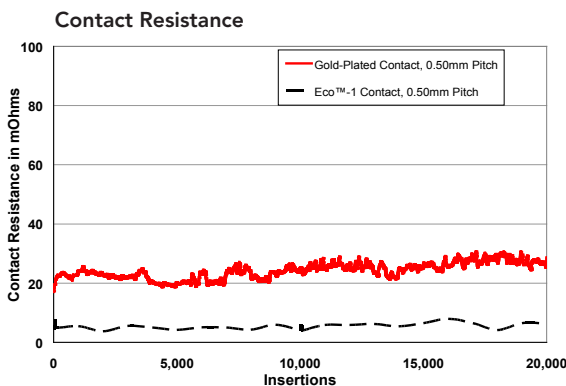
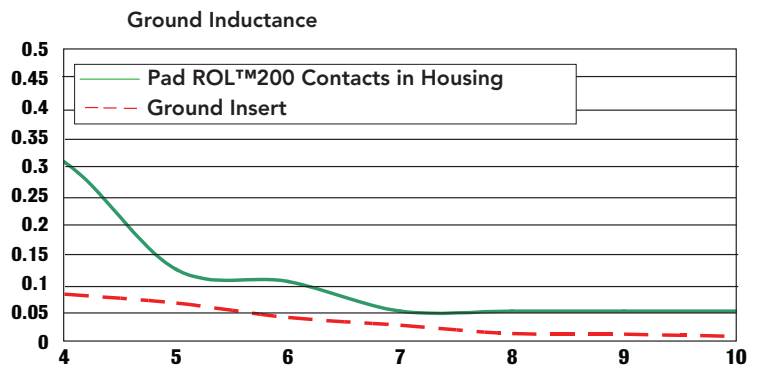
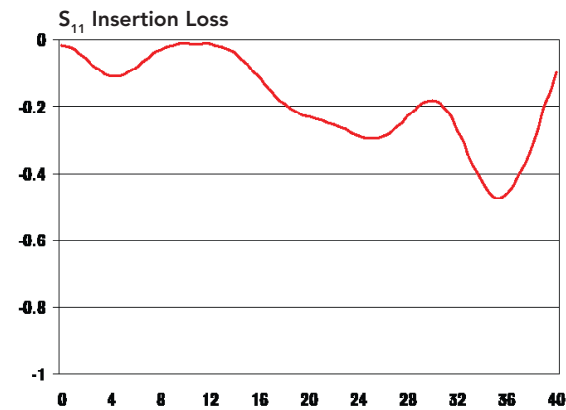
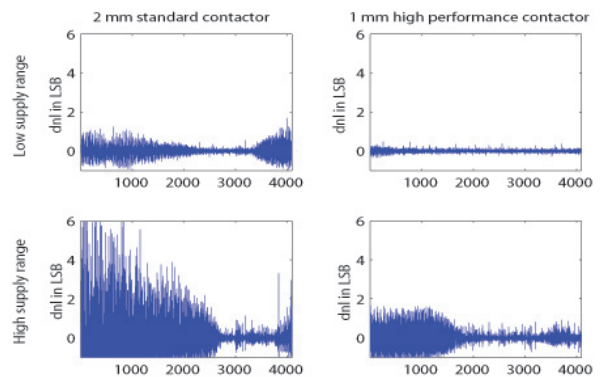
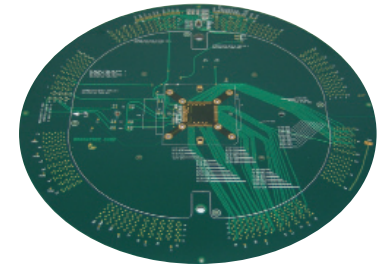


Figure 1



DNL for standard and high performance contactor at different supply range measured on the test setup.



Johnstech has charted a course in high-performance Contactors, specifically in the precision analog market. The Quiet Contactor features best-in-class, low resistance, inductance, capacitance and noise floor technology designed to minimize the effects of the Contactor and provide the test engineer a much clearer correlation between the intrinsic performance of the DUT versus a solder down device.

Johnstech's Precision Analog Contactor enhances test throughput by accurately and precisely measuring parameters without the need for averaging and time consuming algorithms that increase test time. Johnstech's Precision Analog Contactor solution complemented by our consulting and engineering services is your choice for success. If there's no margin for error, you can increase your margin of success with a Johnstech Precision Analog Contactor.

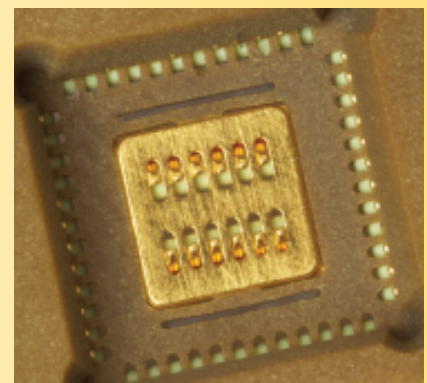


Mechanical Performance

- Johnstech Contactors provide the mechanical reliability, stability and cleaning action needed for high volume production test, with the mechanical attributes required for maintaining higher First Pass Yields (FPY), higher overall equipment efficiency (OEE), long mean time between assists (MTBA), and higher device throughput.
- When using multi-site handlers, Johnstech provides excellent site-to-site Contactor repeatability, enhancing OEE and minimizing downtime compared with competitive test socket technologies.
- Overall test efficiency is enhanced by repeatable Contactor performance and an optimized handler-to-Contactor interface.
- Johnstech's worldwide support and services provide the experience necessary to integrate Contactors with handling equipment and achieve optimum production test performance.

Thermal and High Current

- Johnstech contacting technology uses solid metal contacts. Current carrying capability is superior to non-solid contacting technologies such as spring pins. For example, even at 100% duty cycle, the ROL™200 easily carries in excess of 4A continuous with a temperature rise of only 20° C.
- IC devices often need to dissipate several Watts of power. It is important that Contactors provide adequate thermal grounding solutions that include contacts-in-housing, solid metal ground inserts, and metal inserts with contacts installed. All Johnstech grounding contacts provide superior electrical and thermal grounding.



Johnstech's grounding for a Pad ROL™100A Series Contactor.

Johnstech Services

Johnstech offers a full line of technical services to assist our customers in achieving the highest level of performance. Some of the services that are particularly useful and effective for precision analog testing are Johnstech's use of HFSS and ADS simulation software tools for modeling electrical performance of the Contactor and the interfaces between the device and the load board. Our thermal modeling service provides direction when selecting the best Contactor ground configuration and establishing the optimal load board trace layout. Johnstech's test floor services will help you enhance your yields, increase your performance and maintain an efficient test floor.

Contact Johnstech

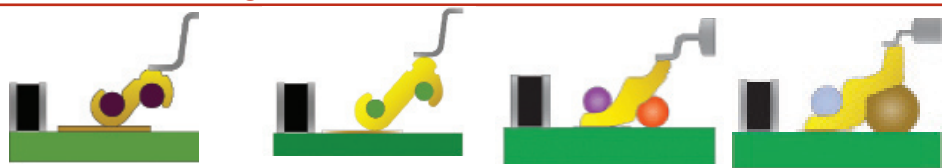
To learn more about Johnstech's patented solutions and services that maximize your precision analog testing performance, reduce your engineering risk, and provide repeatable production test results, contact your local Johnstech Sales Representative at www.johnstech.com.

Johnstech Contactors for QFN/DFN Packages



		2mm	ROL™ 200	ROL™ 100A
Inductance	Self:	0.50 nH	0.42 nH	0.23 nH
	Mutual:	0.07 nH	0.24 nH	0.14 nH
Capacitance:	Ground:	0.50 pF	0.22 pF	0.16 pF
	Mutual:	0.031 pF	0.13 pF	0.05 pF
S21 Insertion Loss		-1dB @ 11 GHz	-1dB @ 24 GHz	-1dB @ 40+ GHz
S11 Return Loss		-20dB @ 9 GHz	-20dB @ 5 GHz	-20dB @ 14.5 GHz
S41 Crosstalk		-20dB @ 14 GHz	-20dB @ 22 GHz	-20dB @ 32 GHz
Current Carrying Capability:		5.20 A	4 A	4 A
Contact Compliance:		0.20 mm	0.20 mm	0.175 – 0.20 mm
Testing Scenario:		Engr/LVM	Engr/HVM	Engr/HVM
Device Platings		SnPb/Mtin	SnPb/Mtin/NiPdAu	SnPb/Mtin/NiPdAu
Grounding Types		STH, SCI, EI, CI	RTH, RCI, CI, EI	RTH, RCI, CI

Johnstech Contactors for SOIC/QFP Packages



		2mm	4mm	ROL™ 200	ROL™ 400
Inductance	Self:	0.47 nH	0.61 nH	0.42 nH	0.75 nH
	Mutual:	0.20 nH	0.27 nH	0.16 nH	0.33 nH
Capacitance:	Ground:	0.34 pF	0.92 pF	0.23 pF	0.83 pF
	Mutual:	0.15 pF	0.36 pF	0.14 pF	0.30 pF
S21 Insertion Loss		-1dB @ 15.3 GHz	-1dB @ 4.6 GHz	-1dB @ 20.7 GHz	-1dB @ 5.6 GHz
S11 Return Loss		-20dB @ 5.4 GHz	-20dB @ 1.1 GHz	-20dB @ 4.4 GHz	-20dB @ 1.6 GHz
S41 Crosstalk		-20dB @ 33.9 GHz	-20dB @ 3.0 GHz	-20dB @ 16.7 GHz	-20dB @ 4 GHz
Current Carrying Capability:		6.50 A	5.70 A	6.70 A	5.70 A
Contact Compliance:		0.20 mm	0.23 mm	0.20 mm	0.23 mm
Testing Scenario:		Engr/LVM	Engr/LVM	Engr/HVM	Engr/HVM
Device Platings		SnPb/Mtin	SnPb/Mtin	SnPb/Mtin/NiPdAu	SnPb/Mtin/NiPdAu
Grounding Types		STH, SCI, C1	STH	RTH, RCI, CI	RTH

* LVM - Low Volume Manufacturing

* HVM - High Volume Manufacturing

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