Application Notes

Application Note 101

Simplify faultfinding by storing alternate vendor signatures

Variations in signatures due to different vendor input protection schemes can produce false FAIL comparison results in good devices. You can reduce spurious FAIL results by acquiring reference signatures for each of your device vendors.

Testing digital devices with ASA

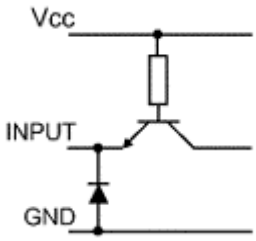
When you test a digital IC using Analog Signature Analysis techniques you are actually displaying the analog behaviour of the input protection circuitry. A large number of device failures in digital devices are due to damage in the input/output region of the device. A digital device may well perform its logical functions correctly even when its input protection is damaged. Damage to the I/O region of a digital device will not necessarily be caught by an in-circuit test system but will be easily revealed using ASA. This is one reason why ASA is so effective in locating faulty ICs where other methods fail.

Signature variations

Most manufacturers use proprietary systems of input protection so signatures on devices of the same type from different vendors can show significant variations. Even a change in chip geometry from a single manufacturer can cause variations in signature shape. Deviation results are based on the shape of the signature and can therefore show significant dissimilarities between vendors for good devices of the same device type.

Saving reference signatures

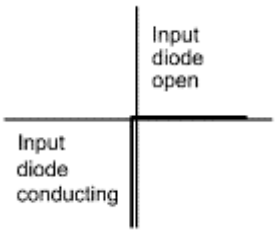
The PFL allows the user to store reference signatures for components from each of your device vendors. The PFL tests a device against all stored references until a match is found.



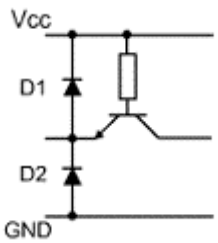
Simple input diode protection

Input protection circuits

The input protection circuitry for a digital IC can be as simple as the single diode configuration to the left, which protects the input transistor from large negative transients.

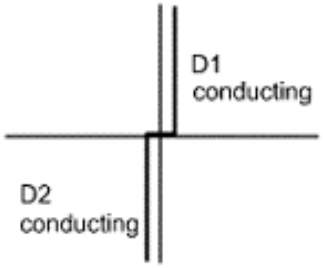


For this configuration the negative portion of the PFL sinusoidal drive voltage will cause the protection diode to conduct so the signature will appear as in the diagram to the left (the actual shape will depend on the PFL voltage range).



Positive and negative transient protection

Most protection circuits will be more complex however. In the circuit, to the left, the input is protected from large positive and negative transients.



In this case the positive and negative excursions of the PFL drive voltage will cause both diodes to conduct so the signature will appear as to the left.

Other protection circuits include resistances in series with one or both diodes so the signatures will assume the characteristic resistive slope. The slope will be especially apparent on the **Junction** range.

Alternative vendor signatures

When you acquire your first set of reference signatures the PFL assigns them to the Default vendor (displayed in the list box on the Tool Bar). In many cases this is the only set of reference signatures you'll need. If signature variations between vendors are causing false FAIL results on good devices, acquire references for each manufacturer.

To acquire reference signatures for the same device from another vendor, clip and test the device. Press Save to store the signatures as reference and enter the new vendor name. The vendor names are shown in the list box on the Tool Bar. Now when the PFL executes a test it always tests against all the vendors in the list until a match is found. The results of an acquisition can be viewed against any of your stored vendors-just click the down arrow and select the vendor from the list.

If you have a trouble-shooting technique you would like to share with other Polar fault locator users please fax or email Polar Instruments on the number below.

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