

## Design and RF Measurement Results of Schottky Pickup for Recycler and Tevatron

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### Design

Four identical Schottky pickups are made for Recycler and Tevatron. These pickups are similar to pickups and kickers used in p-bar debuncher and accumulator core stochastic cooling system [1]. The design goal of these Schottky pickups is to achieve high impedance while narrower band width is acceptable.

Shown in Figure 1 is a schematic drawing of a pickup consisting of beam pipe, top and bottom waveguides, and slots cut through the metal wall between beam pipe and waveguides. The slotted metal wall is made of 0.010" thick aluminum foils to minimize coupling loss through the slots. Basic parameters of a pickup are listed in Table 1. Shown in Figure 2 is designed performance of a pickup (plot of square root of forward impedance versus frequency.) The frequency of peak impedance is 1.745 GHz for delta (difference) mode and 1.813 GHz for sum mode.

### Measurement results

Shown in Figure 3 is delta mode S parameters of a pickup (as designed.) Shown in Figure 4 is delta mode S parameters of one of assembled pickups measured by Network Analyzer (all four pickups have almost the same measurement results.) The delta mode field is created by using two 180 degree hybrids. Compare Figure 4 and 3 one can see the assembled pickup is very close to the designed one (second peak in Figure 4 is ~ 40 MHz lower than that in Figure 3.)

### Acknowledgments

The author would like to thank Dave McGinnis for his advice, design code and pioneer R&D effort on slotted waveguide structures.

### References

[1] D. McGinnis, "Slotted Waveguide Slow-wave Stochastic Cooling Arrays," P-bar Note 626, 1999

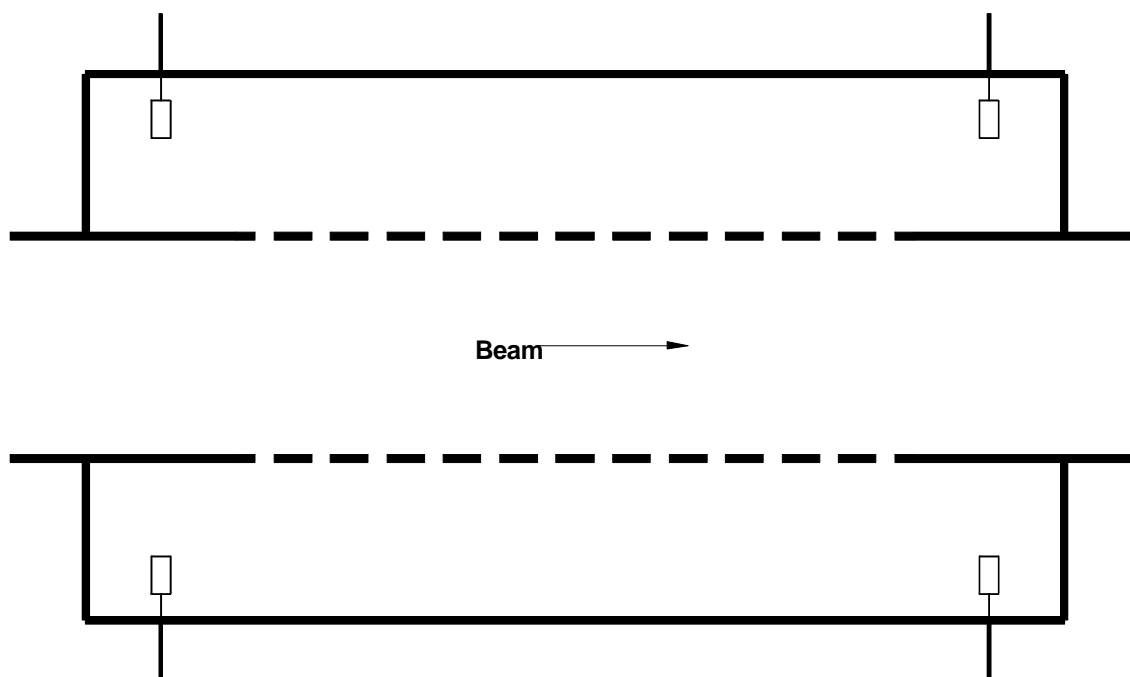


Figure 1. Schematic drawing of Schottky pickup

Table 1. Parameters of Schottky Pickup

Slot length	Slot width	Spacing	Number of Slot	Waveguide width	Waveguide height	Beam pipe width	Beam pipe height
2.449"	0.08"	0.08"	216	4.300"	2.150"	4.300"	2.953"

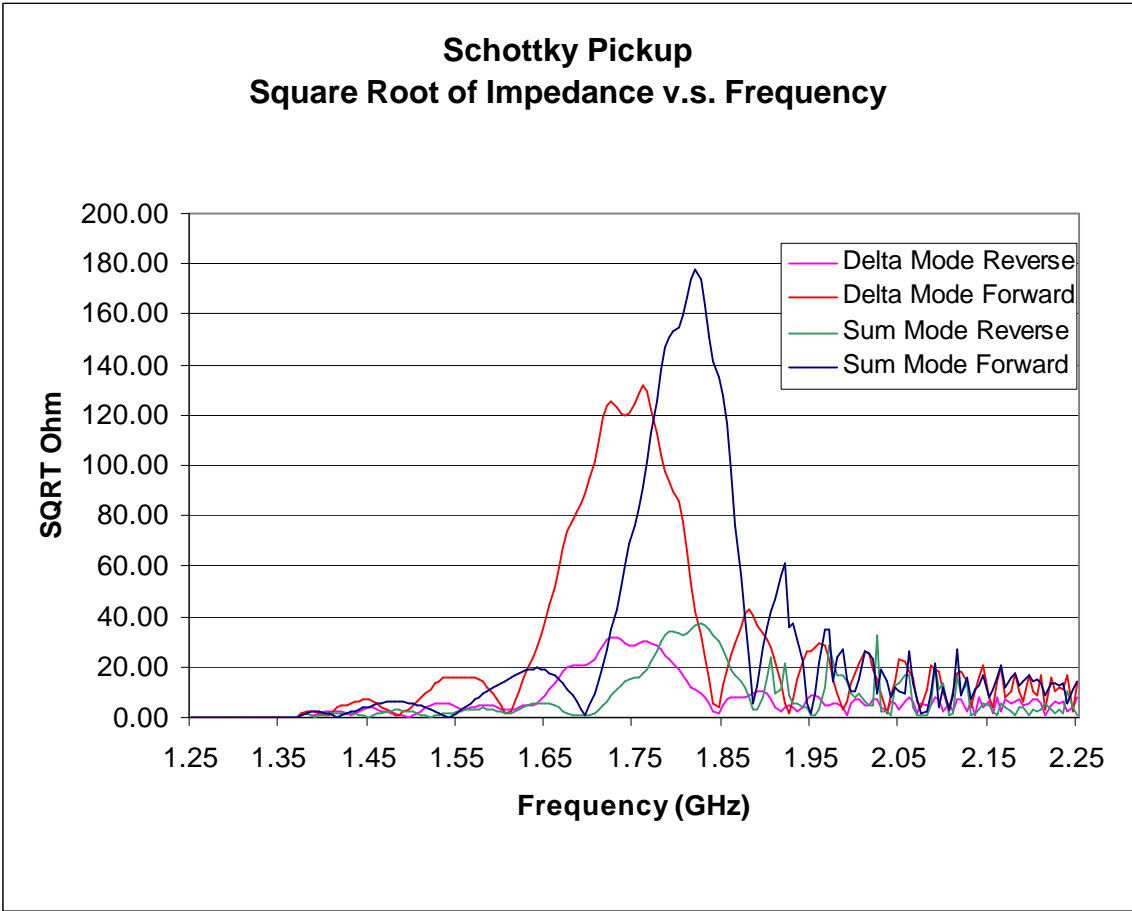


Figure 2. Impedance of Schottky pickup

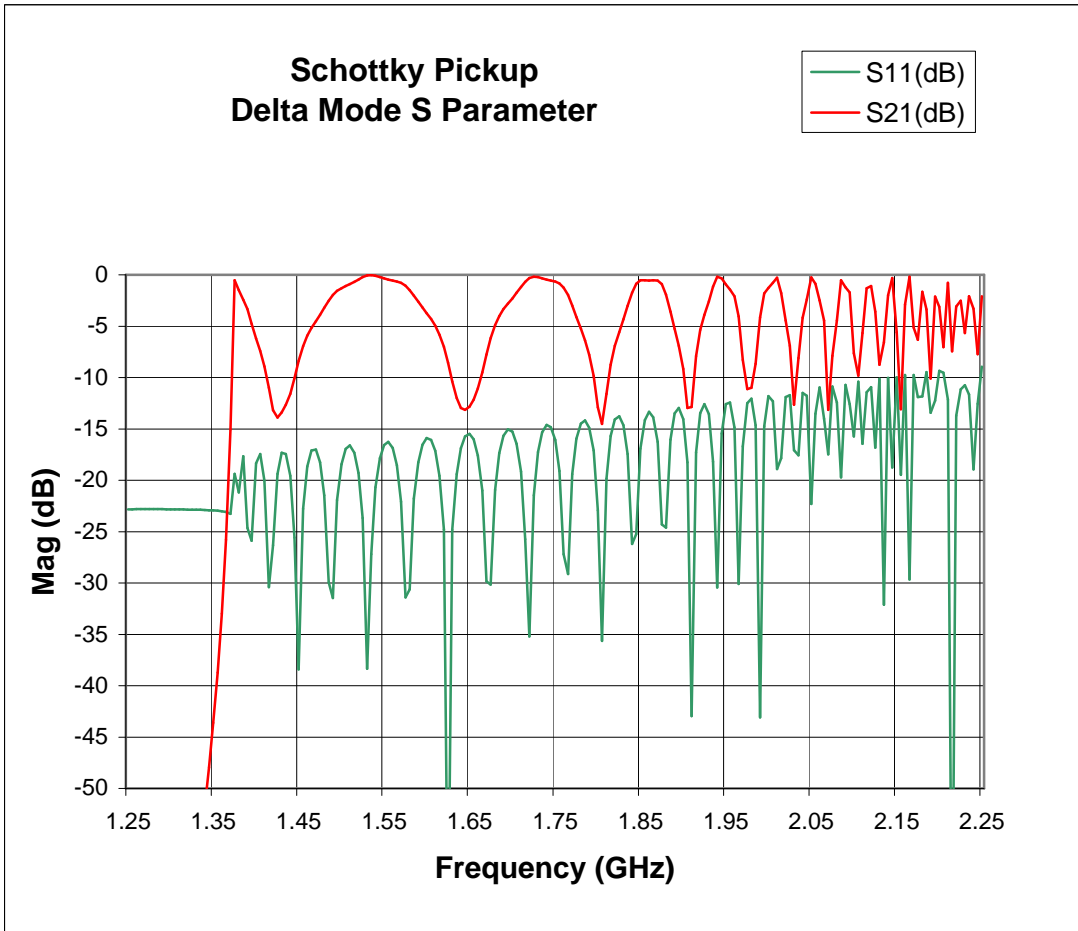


Figure 3. Delta Mode S parameters of Schottky pickup (designed)

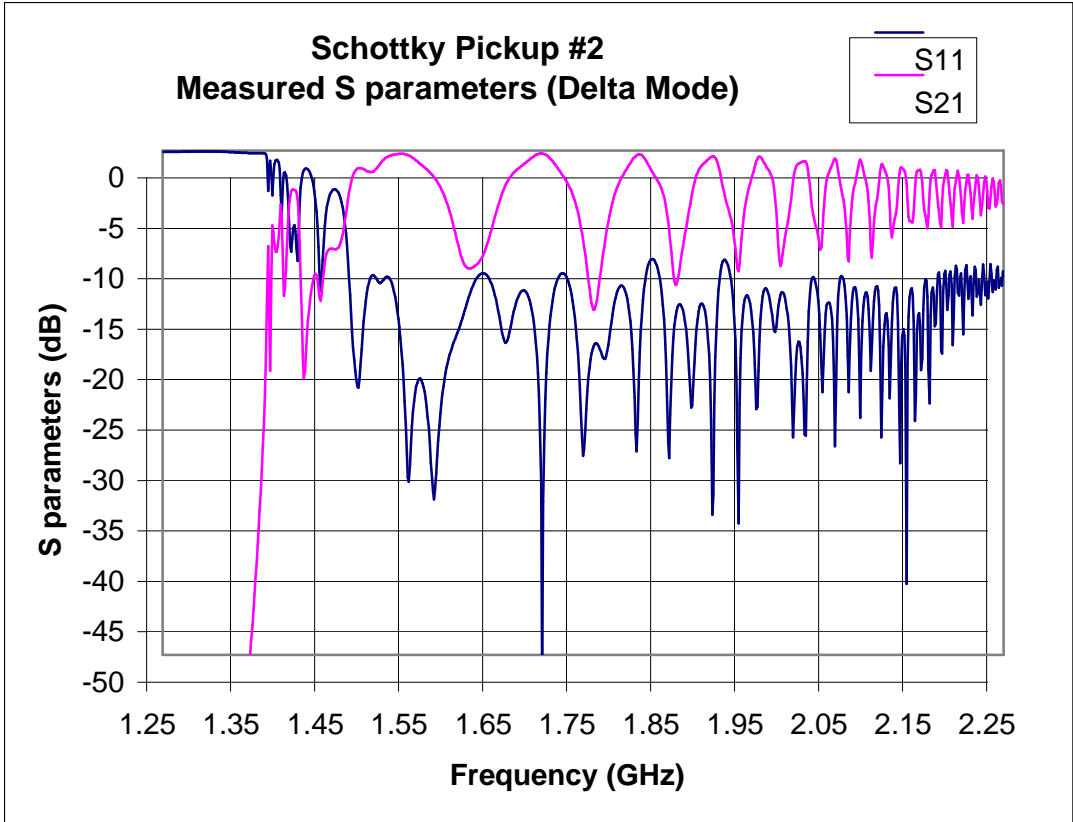


Figure 4. Delta Mode S parameters of Schottky pickup (measured)