

Detector Selector

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The selection of the proper Schottky diode for a detector application depends upon several factors, and must be carefully done. The circuit designer must consider the relative values of R_s (diode parasitic series resistance), R_j (diode junction resistance) and C_j (diode junction capacitance), as illustrated in Figure 1. These three elements constitute the linear equivalent circuit for the diode chip itself, and neglect package parasitics^[1]. Tradeoffs exist in the design of diodes -- for example, lowering the value of R_s generally requires a larger contact or thinner epi, resulting in an increase in the value of C_j . Small signal zero bias detector diodes are p-type silicon, with higher values of R_s than n-type silicon diodes. Small signal detectors operate with very high values of R_j (often in excess of $8K\Omega$), which makes junction capacitance more important than it is for a large signal detector^[2] having $R_j \approx 100\Omega$.

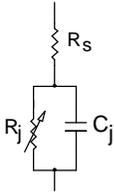


Figure 1 - diode equivalent circuit

Hewlett-Packard's surface mount RF and microwave Schottky diodes have a part number of the form "HSMS-28ZX", where **Z** indicates the type of chip inside the package and **X** indicates the package configuration. Thus it is that the HSMS-285x indicates the Hewlett-Packard line of zero bias diodes for small signal detectors.

To obtain the best performance from your detector circuit, always choose your diode using Table 1 as your guide.

	freq < 1.5 GHz	1.5 GHz < freq < 4 GHz	4 GHz < freq < 12 GHz
Large signal $P_{in} > -20$ dBm	biased: HSMS-282x zero bias: HSMS-282x	biased: HSMS-282x zero bias: HSMS-282x	biased: HSMS-286x zero bias: HSMS-286x
Small signal $P_{in} < -20$ dBm	biased: HSMS-282x zero bias: HSMS-285x	biased: HSMS-286x	biased: HSMS-286x

Table 1 -- Detector Selector

^[1] Hewlett-Packard Application Note 1124, "Linear Models for Diode Surface Mount Packages."

^[2] Hewlett-Packard Design Tip D001, "Choosing the Right Diode For Your AGC Detector."