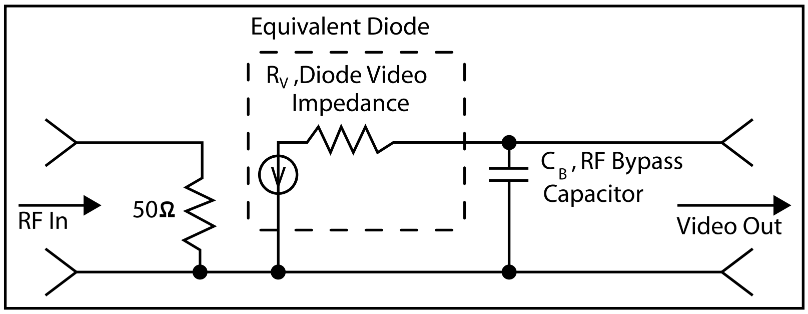
KRYTAR APPLICATIONS IDEA #4

Detector Risetime vs. RF Performance

Risetime of a detector, in many applications, is very important. Risetime is a function of the value of the Video Impedance, RF Bypass Capacitance and Load Resistance. See Figure 1, below, for an Equivalent Circuit of Krytar Detectors



R_V (diode video impedance
C_B (RF bypass capacitor)=

$$T_R \text{ (10 to 90\% risetime)} = 2.2 \frac{(R_{LOAD})(R_V)}{R_{LOAD} + R_V} (C_B + C_{LOAD})$$

Figure 1: Equivalent Circuit for Krytar Detectors

Video Impedance is partially controlled by the type detector diode used to manufacture the detector. For example, the Planar Doped Detector Video Impedance is typically between 0.8 to 3.0 K ohms. The Zero Biased Schottky Detector is typically between 2.0 to 3.0 K ohms.

The Video Bypass Capacitance Value is chosen to set the low frequency performance of the detector. For example, 3.0 pF is chosen for fastest risetime. This establishes the lowest operating frequency at 100 MHz. A value of 30 pF establishes the lowest operating frequency at 10 MHz. The higher value of Video Bypass Capacitance causes a longer risetime. Krytar standard detectors have a output capacitance of either 3.0 pF or 30 pF. The user must then decide whether low operating frequency or risetime is more important for his application and choose the appropriate detector.

Load resistance seen by the detector also affects risetime. High Load Resistance will yield longer risetime, but will result in higher Video (DC) output voltage. If risetime is the most important parameter, the lowest Load Resistance capable of yielding an adequate Video (DC) output voltage from the detector should be chosen. The user should review temperature performance as shown in figures 2 and 4 to be sure that DC Output Voltage is adequate for the operating temperature range of the specific application. If risetime is not important and Video (DC) Output Voltage is critical, then a high Load Resistance should be chosen. See figures 3 and 5 for typical output voltage vs. input power curves for various R_L/R_V, ratios for both the Planar Doped Barrier and Zero Bias Schottky Detectors.

VISIT KRYTAR WEBSITE: www.krytar.com for specifications on all Krytar Detectors

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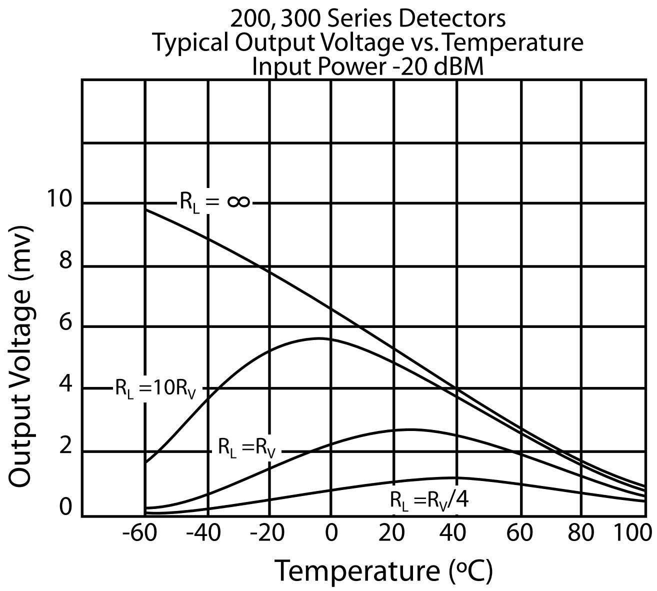
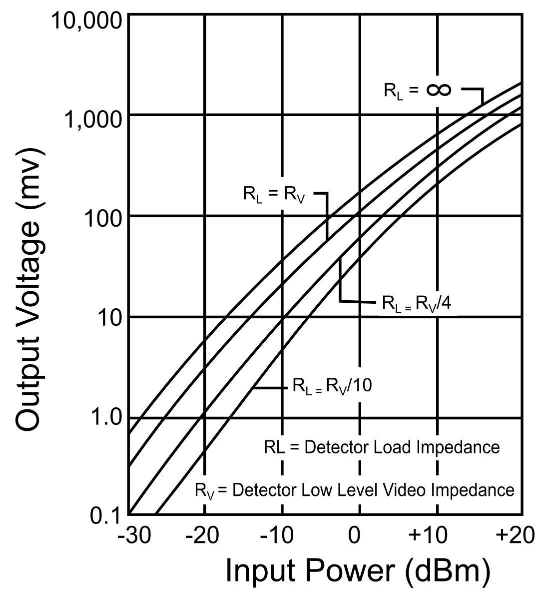
KRYTAR APPLICATIONS IDEA #4

Detector Risetime vs. RF Performance
Planar Doped Barrier vs. Zero Bias Schottky Detectors



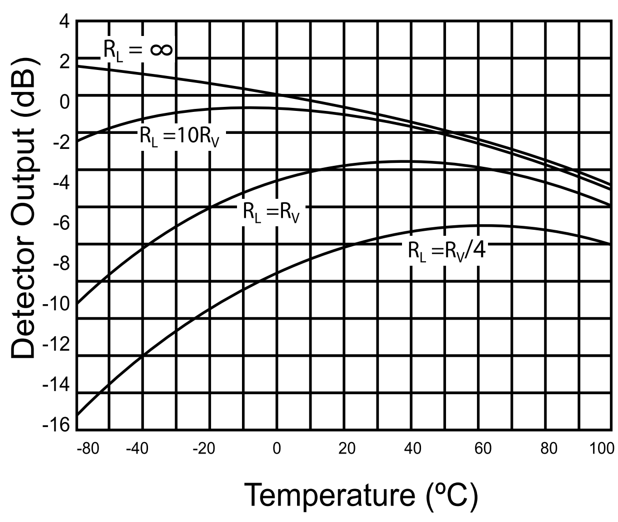
Zero Bias Schottky Detectors.
Typical Low Level (P_{in}=-20 dBm) Output Response vs. Temperature Curves For Various R_L/R_V Ratios

Figure 2



Zero Bias Schottky Detectors.
Typical Output Voltage vs. Input Power Curves for Various R_L/R_V Ratios T_a=20 Degrees C

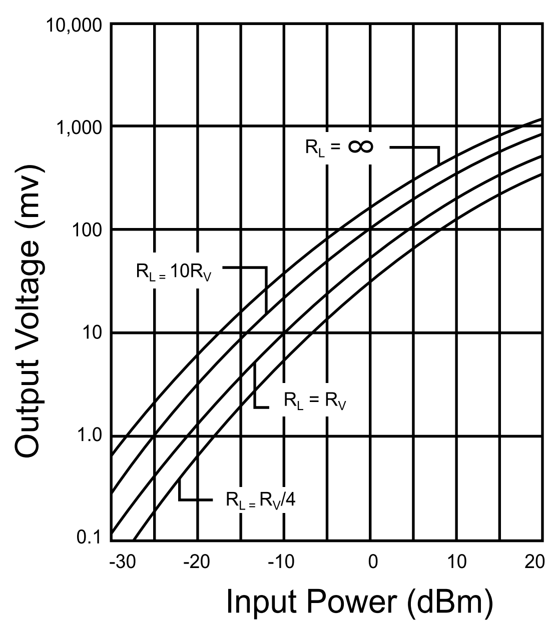
Figure 3



Curves are normalized to $R_L = \infty$ and T_a=20°C.
R_V corresponds to the load that drops the open circuit output voltage in half (3dB) at 20°C.

Planar Doped Barrier Detectors.
Typical Low Level (P_{in}=-20 dBm) Output Response vs. Temperature Curves For Various R_L/R_V Ratios

Figure 4



Planar Doped Barrier Detectors.
Typical Output Voltage vs. Input Power Curves for Various R_L/R_V Ratios T_a=20 Degrees C

Figure 5

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