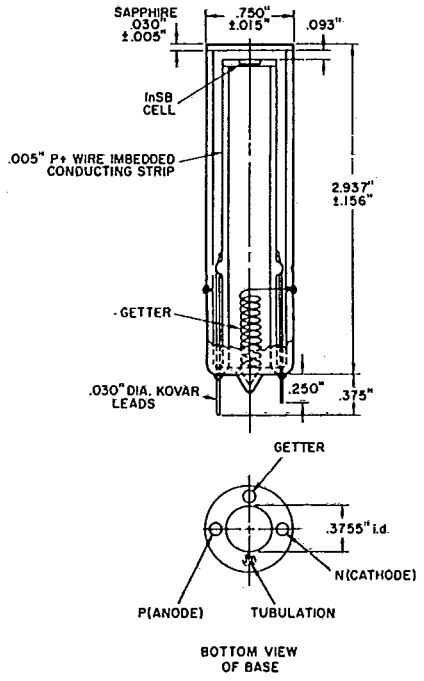
Ford Aerospace & Communications Corporation
ELECTRO-OPTICAL DEVICES

InSb INFRARED DETECTORS
ISC-302 SERIES

FEATURES

- 2.0 TO 5.5 μm SPECTRAL RESPONSE
- BACKGROUND LIMITED PERFORMANCE
- PASSIVATED InSb DIFFUSED JUNCTION
- HIGH VACUUM INTEGRITY DEWAR
- LINEARITY OF RESPONSE TO 1000 WATTS/cm^2
- 45 MINUTE LIQUID NITROGEN HOLD TIME
- LOW HEAT LOAD

DIMENSIONAL OUTLINE AND MECHANICAL SPECIFICATIONS



NOTES
Cell Area; Circular/1.25 mm dia.
35 to 60 min Liq N_2 Hold Time

DESCRIPTION

The ISC-302 series are photovoltaic infrared detectors designed for operation at liquid nitrogen temperatures. The photosensitive element is of single crystal indium antimonide with an extremely uniform, broad-area p-n junction which exhibits a long wavelength cut-off near six microns. Single crystal technology yields high sensitivity and excellent reproducibility.

The ISC-302 series of detectors are available in a wide range of sensitivities. These detectors offer the highest sensitivity in the long wavelength area with the widest range of practical applications

A custom single and multi-element capability is available. Cooled filters, apertures, narcissus and reticles may be incorporated in a variety of custom packages for liquid nitrogen, cryostat or cryogenic refrigerator cooling. LED self-test capability and silicon diode or thermistor temperature sensing are available.

ISC-302 SERIES D* CHARACTERISTICS

TYPE	MINIMUM DETECTIVITY D^*_{BB} IN cmHz$^{1/2}$/watt	IMPEDANCE IN OHMS
ISC-302A	6×10^9	25 TO 400K
ISC-302B	9×10^9	25 TO 400K
ISC-302C	12×10^9	25 TO 400K
ISC-302D	15×10^9	25 TO 400K
ISC-302E	18×10^9	25 TO 400K
ISC-302F	20×10^9	25 TO 400K

TEST CONDITIONS

Blackbody Temperature	500°K
Chopping Frequency	900 cps
Bandwidth	6 cps
Background Temperature	300°K

TYPICAL ISC-302 ELECTRICAL CHARACTERISTICS (T = 77°K)

D^*_{BB}(500,900,1)	17×10^9 cmHz$^{1/2}$/watt
D^*_λ (5,900,1) (Note 1)	94×10^9 cmHz$^{1/2}$/watt
Time Constant	1×10^{-6} sec
Responsivity	2.0 amp/watt
Impedance (short-circuit)	100×10^3 ohms
Field of View	120 degrees
NEP (500,900,1)	0.7×10^{-11} watts

Note 1: D_λ^* (λ_{max}, 900,1) is typically 5.5 x D* (500,900,1)

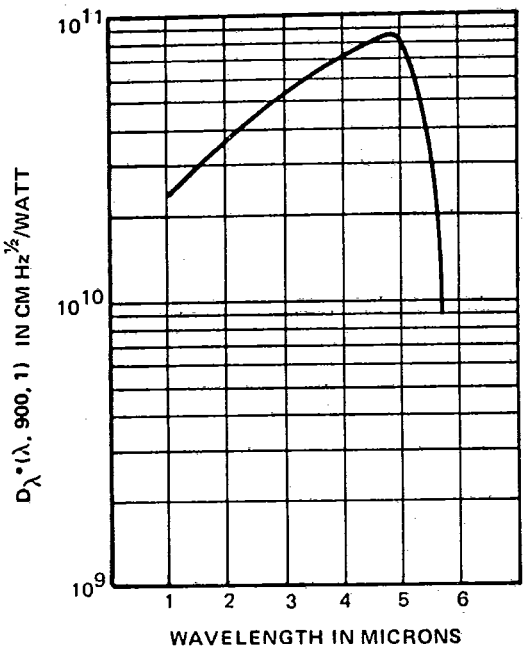
Typical values are not guaranteed and appear for guidance only.

DEFINITIONS

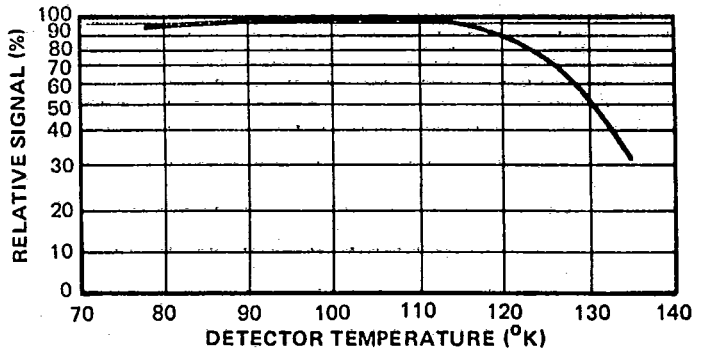
NEI, Noise Equivalent Input is the radiant flux density (H) required to produce a signal-to-noise ratio (S/N) of 1 when the noise is normalized to unit bandwidth (Units, watts/cm^2).

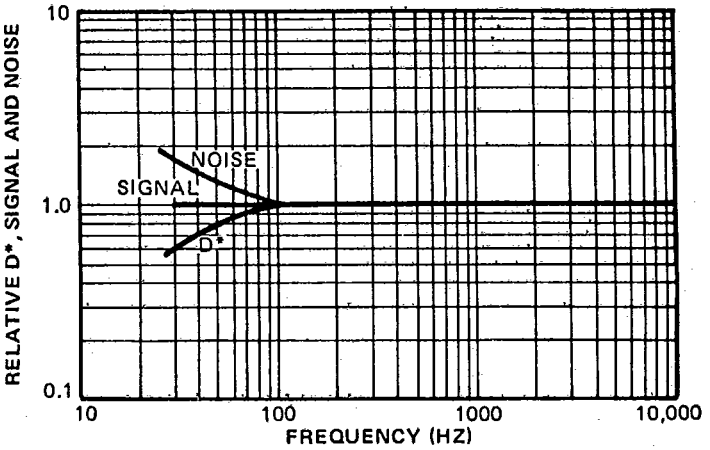
NEP, Noise Equivalent Power is the product of NEI and the area (cm^2) of the sensitive surface (Units, watts).

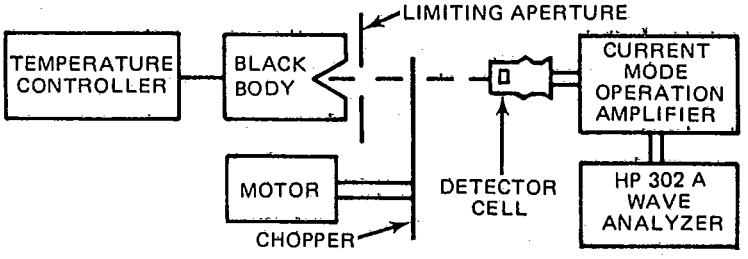
D*, Dectectivity is the square root of the area (cm^2) divided by the NEP (Units, cm Hz$^{1/2}$/watt).



TYPICAL ABSOLUTE SPECTRAL RESPONSE AT 77°K FOR ISC-302 WITH D* (500,900,1) = 17 X 10^9 CM Hz$^{1/2}$/WATT







BLOCK DIAGRAM OF TEST CIRCUIT

APPLICATION NOTES

The ISC-302 photovoltaic indium antimonide is background limited at an operating temperature of 77°K. Measurements are typical of 300°K background.

Impedance, responsivity and time constant are functions of the mode of operation. Back bias and short circuit operation yield higher responsivity and impedance, while open circuit operation yields shorter RC time constants.

The detector is not saturable under normally encountered backgrounds in any of these modes of operation. Highest responsivity is obtained with zero-bias mode of operation. Signal response is linear from the limits of detectability to over 1000 watts/cm^2.

Cooling may be accomplished by filling the dewar reservoir with liquid nitrogen, by use of liquid (spray) system or by cryostats.

Ford Aerospace & Communications Corporation
Aeronutronic Division
Ford Road
Newport Beach, California 92663

For further information, please contact:
John Roschen
714/720-6151
TWX: 910-596-1354