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Final Technical Report
Part I, Gallium-Doped Germanium
Evaluation of Photoconductors

W. J. MOORE
Semiconductors Branch
Electronics Technology Division

(NASA-CR-152222) GALLIUM-DOPED GERMANIUM,
EVALUATION OF PHOTOCONDUCTORS, PART 1 Final
Research Lab.) 56 p HC A04/ME A01 CSCL 201

April 12, 1979

NASA Contract RA 32035-B

NAVAL RESEARCH LABORATORY
Washington, D.C.

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Introduction

An extended program has been carried out to determine the characteristics of gallium-doped germanium detectors produced by the Santa Barbara Research Center. Particular attention has been paid to those characteristics which were believed to be unusual or otherwise of an unpredictable nature with respect to IRAS performance.

Some general conclusions are possible based on these tests and, although many are self-evident, they will be repeated here.

(1) These devices can operate in the background limited (BLIP) condition for backgrounds in the 6-7 x 10^8 phot sec^{-1}cm^{-2} range (or perhaps lower) at a temperature of 2.5K. Under these conditions the NEP is of the order of 4x10^{-17} watt Hz^{-\frac{1}{2}}.

(2) Operation at 3K imposes a severe penalty in that it produces conditions equivalent to a background of approximately 2x10^{10} photons sec^{-1}cm^{-2} and may increase the 1/f noise above thermal g-r noise. At 3K the NEP is limited to about 1.5x10^{-16} watt Hz^{-\frac{1}{2}}.

(3) Anomalous signal and noise characteristics were observed with some, but not all, detectors. These anomalies are most severe at the lowest temperatures used in these tests (i.e. 2K). The device exhibiting the greatest anomalies would have optimum performance between 3K and 2K.

(4) Cosmic ray pulse fall times observed on both the 3- and 4-
series of detectors were of the order of 2 msec with a transimpedance amplifier and these observed times were amplifier limited.

(5) Noise spectra increase approximately as \( P_n \propto f^{-1} \), where \( P_n \) is the noise power and \( f \) is the frequency, from 1 Hz down to at least .03 Hz.

(6) Signal responsivities were in excellent agreement with the manufacturer's data. Variations from the manufacturer's data occurred only as a result of differences in the operating conditions here and at SBRC. In general, a device would have substantially higher resistance at a given temperature and background in these tests than indicated by the manufacturer.\(^1\)

(7) The responsivity of these devices was high. Scaling previous Ge:Ga data calculated by the "power inband" method to the dimensions of these devices (a factor of 170) predicts responsivities of the order of 180 mho watt\(^{-1}\); whereas maximum measured responsivities for these devices were greater than 200 mho watt\(^{-1}\). It is concluded that the material from which these devices were constructed is at least as good as the best NRL material and that no serious damage occurs in processing.

(8) Signal vs frequency data determined from device response to a signal step indicate rolloff due to a single 6 dB/octave rolloff with a 3 dB point in the 1-3 Hz range at 3K. Some reduction in 3 dB frequency to about 0.2 to 1 Hz occurs at 2.5K. At 2K a second, slower, time constant appears and introduces additional signal reduction.

(9) Interfacing these devices to preamplifiers presents significant problems. These devices will have resistances of the order of \( 1 \times 10^{12} \) ohms at minimum background (\( \phi \approx 5 \times 10^8 \) phot sec\(^{-1}\)) at 2.5K and consider-
ably lower resistance at higher backgrounds and higher temperature.

As a result it is difficult to interface these devices optimally to transimpedance amplifiers for all possible operating conditions. This has been a substantial problem in these tests.

**Experimental Details and Results**

A. Signal and NEP Measurements

The requirements of these tests (low background, low temperature) necessitated the design and construction of the third calibration system to be used in this series of tests. This system is based on the dipstick system built by the author at Cornell University. The major changes from the Cornell system were an increase in the dipstick diameter and inclusion of a movable aperture block which served as a low speed chopper for frequencies at or below 1Hz. The design of this system is shown in Fig. 1. Results reported here will not include data on sample 3-2b1-4 which was measured early in the program nor will the details of the anomalous signal response with time at 2K be reviewed. Both these topics were covered in interim reports. A typical calibration run consisted of strip chart recordings of the output of the source-follower preamplifier for bias off, bias on-signal off, and bias on-signal on. These measurements were repeated for various values of bias and as a function of both blackbody and detector temperatures. Results are presented in Appendix A.

The data in Appendix A include a number of entries for each calibration condition. These entries are described below.

**TEMP.** The detector temperature as determined by a carbon resistor
on the detector mounting block. The entire enclosure was flooded with He gas for thermal equilibrium with the bath.

BB INTEGRATED FROM ... TO ... \equiv All responsivities (both power and photon) were calculated using all blackbody power in the approximate spectral band of the detector with cold crystal sapphire and crystal quartz filters.

BB TEMP \equiv The temperature of the calibration blackbody as measured with a type E thermocouple. Both room temperature and liquid nitrogen temperature reference junctions were used during this study.

BIAS \equiv The applied bias across the detector plus load.

BIAS DELTA V \equiv The change in output of the source-follower preamplifier for a change from bias-off to bias-on. This value is the potential drop across the detector times the preamplifier gain. The preamplifier gain was approximately 0.9.

SIG DEL V \equiv The change in source-follower output for a change from signal radiation off to signal on. Signal radiation was turned off with the movable shutter.

DC/1 Hz \equiv This ratio is the ratio of peak dc signal volts to peak-to-peak signal volts when chopping with the movable shutter at 1 Hz.

NOISE \equiv The rms noise value observed on a wave analyzer at 1 Hz.

BLACKBODY OUTPUT \equiv The calculated blackbody radiation incident on the detector-sensitive area for the temperature and integration band given.

SIG. CONDUCTANCE (DC) \equiv This is a derived quantity equal to the change in conductance per watt (or photon per sec) of signal. The calculation uses the large signal equations to derive a number characteristic of the device which is relatively independent of bias and measurement.
conditions.

VOLT. RESP. (DC) ≡ The voltage responsivity calculated with the large-signal equations. When the signal is, in fact, large the calculation determines the correct small-signal responsivity.

CURR. RESP. (DC) ≡ The current responsivity.

SIG. CONDUCTANCE (1 Hz) ≡ As above but calculated using the 1 Hz signal as determined from the DC/1 Hz ratio.

VOLT. RESP. (1 Hz) ≡ As above for 1 Hz.

CURR. RESP. (1 Hz) ≡ As above for 1 Hz.

DETECTOR RESISTANCE ≡ The resistance of the detector as calculated from the values of total bias, bias across detector, and load resistance. The major uncertainty is in the load resistance. An error as great as 40% is possible. Note that the SBRC data sheets assume a load resistance independent of temperature below 3K. An error in excess of 100% is possible with that assumption.

DETECTOR BIAS ≡ A number equal to the bias delta V divided by preamp gain.

BACKGROUND PHOTON FLUX DENSITY ≡ The photon flux density required to produce the measured detector resistance calculated using the measured signal conductance. Note that the value calculated assumes that the detector resistance is optically (not thermally) limited. For a thermally limited resistance the background can be considered to be an optical equivalent of the operating temperature.

PC GAIN (Q.E. = 0.3) ≡ This quantity (and the following quantities) are calculated using both the ac and dc responsivities described above with an assumed quantum efficiency of 0.3. Calculation of device parameters
using the ac responsivity implies that the lower ac response is the
ing result of a slow process within the detector and not a result of RC
rolloff prior to the preamp. A comparison of experimental NEP data with
theoretical BLIP NEP values indicates that the ac results are appropriate
for a detector at 2.5K (i.e. slow processes within the detector dominate
the signal rolloff at 2.5K) while the dc results apply at 3K (i.e. RC
rolloff dominates the signal rolloff at 3K).

SHOT NOISE ≡ A calculated shot noise assuming a quantum efficiency of
0.3.

BLIP NEP ≡ A calculated NEP for a noise equal to the shot noise.

QUAN EFFIC. IF BLIP ≡ The quantum efficiency required to make the mea-
sured NEP a background limited value. When this quantity is of the order
of 0.3 one can consider the detector to be, in fact, BLIP. Some of the
NEP data is shown graphically in Figs. 2, 3 and 4.

Signal vs frequency measurements were made by determining the
response to a step increase in signal. Analysis of these signal steps
indicated a predominantly one time constant rise for operating tempera-
tures of 2.5K or greater. At 2.5K the time constant ranged from 0.1 to
0.8 seconds and decreased to approximately .05 sec at 3K. Very slow
secondary time constants were observed at 2K where T ≈ 6 sec. These
rise times indicate 3 dB frequencies at 3Hz for 3K operation and from
0.2 to 1 Hz for 2.5K operation.

B. Spectral Response

Spectral response has been determined by two different experimental
techniques. Initial measurements were made with a grating spectrometer
and a Golay cell. These measurements indicated relatively little reduct-
ion in response at 50 microns with respect to the peak response near
100 microns. However, these measurements were considered to be of ques-
tionable value due to contamination of the spectrometer output by higher
order radiation in spite of a considerable effort to minimize out of
band signals.

In order to avoid these problems a new approach was taken. Detector
signal measurements were made as a function of blackbody temperature
over the 30K to 120K range. An assumed detector response was then fed
to a desktop computer which calculated and plotted the responsivity (mho
phot-1 sec) for each temperature. The spectral response was varied to
give the most consistent responsivity over the blackbody temperature
range used. This technique is not sensitive to details in the spectral
response curve but does not have serious out-of-band radiation problems.
The major weakness of this method is contamination by light leaks around
the blackbody. These tend to cause an underestimation of the short
wavelength response and therefore result in a worst case spectrum. Short
wavelength response will be at least as good as indicated from these
measurements.

A series of plots for two detectors are given in Figs. 5 through
14. The detector (with quartz and sapphire filters) is assumed to turn
on at L1 microns, the smallest sensitive wavelength, rise linearly to
L2 microns and fall to zero at L3 microns. The relative response at
L1 is given by G1. The average conductance responsivity is given by
G. An inset shows the assumed spectral response.
C. Noise vs Frequency

As originally envisioned the noise vs frequency measurements below 1 Hz would have been done with an analog-to-digital converter and a computer. Equipment malfunctions prevented the use of this technique and forced reliance on an analog approach. This limited the lowest frequency at which we could make measurements to .03 Hz rather than the planned .01 Hz but did pay a dividend by making apparent a possible problem with digital noise data.

Detectors of the size of the SBRC Ge:Ga devices (0.05 x 0.15 x 0.3 cm) exhibit a cosmic ray noise pulse every few minutes at sea level. Digital noise data consists of many digitized samples taken from the noise waveform over several minutes. In order to prevent aliasing of the Fourier transform a high frequency cutoff filter limits the maximum frequency present to half the inverse of the sampling period. That is \( f_{\text{max}} = \frac{1}{2T} \), where \( T \) is the sampling period. Therefore at least two samples are taken per period of the highest frequency present. A cosmic ray pulse passing through such filters is considerably reduced in amplitude and broadened but not eliminated. These pulses then contribute to the measured noise at low frequencies.

The analog system used here consists of an FM analog tape recorder on which the noise is recorded at minimum tape speed (1 7/8 ips) and played back at maximum tape speed (60 ips) resulting in a frequency multiplication by a factor of 32. On playback the noise is measured with a wave analyzer down to 1 Hz. With this system the cosmic ray pulses are very apparent and contribute to the noise spectrum if the result is read on the meter. This problem was avoided by recording the
wave analyzer output on a strip chart recorder and reading between the pulses.

The results on two detectors indicate that the noise increases approximately as 1/f below 1 Hz for the conditions of the tests. These conditions were not optimum for sample Ge:Ga 4-5bl-1 in that the background was higher than desired, and the noise was masked by pulses for f > 0.1 Hz. The data are given in Fig. 15. However, for sample 3-2bl-3 the conditions were nearly optimum (Φ ≈ 5 x 10^8 phot sec^-1 cm^-2). These data are given in Fig. 16.

The noise spectrum for sample 3-2bl-3 is an interesting one in that it appears to consist of a section of noise above about 1 Hz which has been rolled off by the RC time constant and a section of 1/f noise below 1 Hz which is free of RC rolloff. This interpretation is consistent with the observation that this device appears to be nearly BLIP at 1 Hz under these conditions. Above about 2 Hz the device is amplifier noise limited. It is concluded from these spectra that the device noise has a 1/f spectrum throughout the region below 1 Hz.

REFERENCES


Fig. 1 — A schematic drawing of the calibration apparatus. The calibrating source, a blackbody, is located in vacuum in the upper part of the drawing. A sapphire window separates the blackbody vacuum from the detector atmosphere: low pressure helium gas. A quartz filter, aperture, and manually operated chopper complete the optical components. The assembly is immersed in pumped liquid He for cooling. Temperatures are determined by a type E thermocouple in the blackbody and a carbon resistor on the sample mounting block.
Fig. 2 — NEP at 1 Hz vs bias for sample 4-3bi-1. The anomalous rising curve at 3K was due to excess noise at that temperature attributable to a noisy contact. This noise was absent at 2K but a slow signal response time limited the NEP at that temperature.
Fig. 3 — NEP at 1 Hz bias for sample 3-2b1-3. The dashed curves are calculated values for the BLIP NEP as discussed in the text.
Fig. 4 — NEP at 1 Hz vs bias for sample 4-5b1-1. The dashed curves are calculated values for the BLIP NEP as discussed in the text.
L1 = 40  L2 = 120  L3 = 135
G1 = 0.50
G = 7.43E-020 MHOS/PHOT/SEC
Ge : Ga 4-3b1-1 DATA OF 5/16/77

Fig. 5 — Relative conductance per photon per second for sample 4-3b1-1 as a function of blackbody temperature. The assumed spectral response is given in the inset.
Fig. 6 — Relative conductance per photon per second for sample 4-3bl-1 as a function of blackbody temperature. The assumed spectral response is given in the inset.
Fig. 7 — Relative conductance per photon per second for sample 4-3bl-1 as a function of blackbody temperature. The assumed spectral response is given in the inset.
Fig. 8 - Relative conductance per photon per second for sample 4-3bl-1 as a function of blackbody temperature. The assumed spectral response is given in the inset.
Fig. 9 - Relative conductance per photon per second for sample 4-3bl-1 as a function of blackbody temperature. The assumed spectral response is given in the inset.
Fig. 10 — Relative conductance per photon per second for sample 4-3bl-1 as a function of blackbody temperature. The assumed spectral response is given in the inset.
Fig. 11 — Relative conductance per photon per second for sample 3-2bl-3 as a function of blackbody temperature. The assumed spectral response is given in the insert. A constant light leak of $6 \times 10^6$ phot/sec ($8 \times 10^6$ phot sec$^{-1}$ cm$^{-2}$) has been assumed based on measurements of signal with a cold blackbody.
Fig. 12 — Relative conductance per photon per second for sample 3-2bl-3 as a function of blackbody temperature. The assumed spectral response is given in the insert. A constant light leak of $6 \times 10^6$ phot/sec ($8 \times 10^8$ phot sec$^{-1}$ cm$^{-2}$) has been assumed based on measurements of signal with a cold blackbody.
Fig. 13 — Relative conductance per photon per second for sample 3-2b1-3 as a function of blackbody temperature. The assumed spectral response is given in the insert. A constant light leak of $6 \times 10^6$ phot/sec ($8 \times 10^8$ phot sec$^{-1}$ cm$^{-2}$) has been assumed based on measurements of signal with a cold blackbody.
Fig. 14 — Relative conductance per photon per second for sample 3-2b1-3 as a function of blackbody temperature. The assumed spectral response is given in the insert. A constant light leak of $6 \times 10^6$ phot/sec ($8 \times 10^8$ phot sec$^{-1}$ cm$^{-2}$) has been assumed based on measurements of signal with a cold blackbody.
Fig. 15 — Noise vs frequency for sample 4-5b1-1. Data below about 0.1 Hz are uncertain due to interference from cosmic background radiation.
Fig. 16 — Noise vs frequency for sample 3-2bl-3
SAMPLE NO. GE:GA 4-3B1-1  RUN DATE 5/5/77  TEMP.=3 K
BB INTEGRATED FROM 48 TO 130 MICRONS STEP 0.2  LOAD= 5.00E+010
ETENDE= 2.35E-008

BB TEMP=114.5  BIAS=0.0500  BIAS DELTA V=0.0097
SIG DEL V=0.00792  DC/1HZ=1.19  NOISE=5.1E-6
BLACKBODY OUTPUT= 2.86E-012 WATTS  9.03E+008 PHOT/SEC
SIG.CONDUCTANCE ( DC)= 1.46E+002 MHOS/WATT  4.62E-019 MHOS/PHOT/SEC
VOLT. RESP. ( DC)= 3.69E+009 VOLT/WATT  1.17E-011 VOLT/PHOT/SEC
CURR. RESP. ( DC)= 1.42E+000 AMP/WATT  4.46E-021 AMP/PHOT/SEC
SIG.CONDUCTANCE (1HZ)= 7.18E+001 MHOS/WATT  2.27E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 3.00E+009 VOLT/WATT  9.48E-012 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 6.96E-001 AMP/WATT  2.28E-021 AMP/PHOT/SEC
NEP (1HZ)= 6.25E-016 WATTS/HZ^1/2  1.98E+005 PHOT/SEC-HZ^1/2
DETECTOR RESISTANCE = 1.35E+010 OHMS
DETECTOR BIAS= 1.07E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 1.04E+002 (AC)  2.13E+010 PHOTONS/SEC-CMT2
SHOT NOISE(Q.E.=0.3)= 1.55E-006 V/HZ^1/2 (AC)  1.03E-001 (DC)
BLIP NEP (Q.E.=0.3)= 5.16E-016 W/HZ^1/2 (AC)  2.21E-006 V/HZ^1/2 (DC)
QUAN.EFFIC.IF BLIP= 2.04E-001 (AC)  7.32E-206 V/HZ^1/2 (DC)

BB TEMP=124.2  BIAS=0.1000  BIAS DELTA V=0.0180
SIG DEL V=0.01356  DC/1HZ=1.19  NOISE=5.5E-6
BLACKBODY OUTPUT= 3.48E-012 WATTS  1.09E+009 PHOT/SEC
SIG.CONDUCTANCE ( DC)= 1.08E+002 MHOS/WATT  3.21E-019 MHOS/PHOT/SEC
VOLT. RESP. ( DC)= 5.21E+009 VOLT/WATT  1.67E-011 VOLT/PHOT/SEC
CURR. RESP. ( DC)= 1.32E+000 AMP/WATT  5.75E-021 AMP/PHOT/SEC
SIG.CONDUCTANCE (1HZ)= 5.44E+001 MHOS/WATT  1.74E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 4.25E+009 VOLT/WATT  1.36E-011 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 9.79E-001 AMP/WATT  3.13E-021 AMP/PHOT/SEC
NEP (1HZ)= 8.93E-016 WATTS/HZ^1/2  2.79E+005 PHOT/SEC-HZ^1/2
DETECTOR RESISTANCE = 1.23E+010 OHMS
DETECTOR BIAS= 1.98E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
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PC GAIN (Q.E.=0.3)= 1.37E-002 (AC)  3.37E+010 PHOTONS/SEC-CMT2
SHOT NOISE(Q.E.=0.3)= 2.44E-006 V/HZ^1/2 (AC)  1.32E-001 (DC)
BLIP NEP (Q.E.=0.3)= 5.74E-016 W/HZ^1/2 (AC)  3.32E-006 V/HZ^1/2 (DC)
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<td>VOLT. RESP. ( DC)</td>
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<td>CURR.RESP. ( DC)</td>
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<td>SIG.CONDUCTANCE(1HZ)</td>
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<td>VOLT. RESP. (1HZ)</td>
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<td>CURR.RESP. (1HZ)</td>
<td>0.000 AMP/WATT</td>
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<tr>
<td>NEP (1HZ)</td>
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<tr>
<td>DETECTOR RESISTANCE</td>
<td>0.000 OHMS</td>
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<tr>
<td>DETECTOR BIAS</td>
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THE FOLLOWING ARE CALCULATED FROM ABOVE DATA

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<tr>
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<td>CURR.RESP. ( DC)</td>
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<td>VOLT. RESP. (1HZ)</td>
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<td>0.000 OHMS</td>
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<td>DETECTOR BIAS</td>
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**SAMPLE NO:** 8E:8A 4=381-1  
**RUN DATE** 3/28/77  
**BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2**  
**ETENDUE=** 2.35E-008  
**LOAD=** 1.00E+011

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<td><strong>BLACKBODY OUTPUT</strong></td>
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<td><strong>SIG.CONDUCTANCE (1Hz)</strong></td>
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<tr>
<td><strong>VOLT. RESP. (1Hz)</strong></td>
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<td><strong>CURR. RESP. (1Hz)</strong></td>
<td>3.89E-002 AMP/WATT</td>
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<td><strong>NEP (1Hz)</strong></td>
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<td><strong>DETECTOR RESISTANCE</strong></td>
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<tr>
<td><strong>DETECTOR BIAS</strong></td>
<td>1.97E-002 VOLTS</td>
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**BIAS DELTA V=0.0179**

**NOISE=2E-6**

**LOAD=1.00E+011**

**BB TEMP=105.1**

**BIAS=0.0500**

**SIG DEL V=0.04250**

**BLACKBODY OUTPUT= 2.26E-012 WATTS**

**SIG.CONDUCTANCE (DC)= 9.68E+001 MHOS/WATT**

**VOLT. RESP. (DC)= 3.13E+011 VOLT/WATT**

**CURR. RESP. (DC)= 4.27E+000 AMP/WATT**

**SIG.CONDUCTANCE (1Hz)= 2.22E+006 MHOS/WATT**

**VOLT. RESP. (1Hz)= 1.05E+018 VOLT/WATT**

**CURR. RESP. (1Hz)= 9.88E-002 AMP/WATT**

**NEP (1Hz)= 2.64E-016 WATT/HZ1/2**

**DETECTOR RESISTANCE= 4.45E+012 OHMS**

**DETECTOR BIAS= 4.89E-002 VOLTS**

**THE FOLLOWING ARE CALCULATED FROM ABOVE DATA**

<table>
<thead>
<tr>
<th>Parameter</th>
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<tbody>
<tr>
<td><strong>BACKGROUND PHOTON FLUX DENSITY</strong></td>
<td>7.56E+007 PHOTONS/SEC-CMT2</td>
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<td><strong>PC GAIN (Q.E.=0.3)=</strong></td>
<td>2.78E-003 (AC)</td>
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<tr>
<td><strong>SHOT NOISE (Q.E.=0.3)=</strong></td>
<td>2.17E-007 V/HZ1/2 (AC)</td>
</tr>
<tr>
<td><strong>BLIP NEP (Q.E.=0.3)=</strong></td>
<td>5.28E-017 W/HZ1/2 (AC)</td>
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<tr>
<td><strong>QUAN.EFFIC.IF BLIP=</strong></td>
<td>3.56E-003 (AC)</td>
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**BIAS DELTA V=0.0445**

**NOISE=2.8E-6**

**LOAD=1.00E+011**

**BB TEMP=104.5**

**BIAS=0.0500**

**SIG DEL V=0.04250**

**BLACKBODY OUTPUT= 2.26E-012 WATTS**

**SIG.CONDUCTANCE (DC)= 9.68E+001 MHOS/WATT**

**VOLT. RESP. (DC)= 3.13E+011 VOLT/WATT**

**CURR. RESP. (DC)= 4.27E+000 AMP/WATT**

**SIG.CONDUCTANCE (1Hz)= 2.22E+006 MHOS/WATT**

**VOLT. RESP. (1Hz)= 1.05E+018 VOLT/WATT**

**CURR. RESP. (1Hz)= 9.88E-002 AMP/WATT**

**NEP (1Hz)= 2.64E-016 WATT/HZ1/2**

**DETECTOR RESISTANCE= 4.45E+012 OHMS**

**DETECTOR BIAS= 4.89E-002 VOLTS**

**THE FOLLOWING ARE CALCULATED FROM ABOVE DATA**

<table>
<thead>
<tr>
<th>Parameter</th>
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<tbody>
<tr>
<td><strong>BACKGROUND PHOTON FLUX DENSITY</strong></td>
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<td><strong>PC GAIN (Q.E.=0.3)=</strong></td>
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<td><strong>SHOT NOISE (Q.E.=0.3)=</strong></td>
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<td><strong>BLIP NEP (Q.E.=0.3)=</strong></td>
<td>5.97E-017 W/HZ1/2 (AC)</td>
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<td><strong>QUAN.EFFIC.IF BLIP=</strong></td>
<td>1.54E-002 (AC)</td>
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**BIAS DELTA V=0.0179**

**NOISE=2E-6**

**LOAD=1.00E+011**

**BB TEMP=105.1**

**BIAS=0.0200**

**SIG DEL V=0.01710**

**BLACKBODY OUTPUT= 2.30E-012 WATTS**

**SIG.CONDUCTANCE (DC)= 9.46E+001 MHOS/WATT**

**VOLT. RESP. (DC)= 1.35E+011 VOLT/WATT**

**CURR. RESP. (DC)= 1.69E+008 AMP/WATT**

**SIG.CONDUCTANCE (1Hz)= 2.17E+000 MHOS/WATT**

**VOLT. RESP. (1Hz)= 4.17E+009 VOLT/WATT**

**CURR. RESP. (1Hz)= 3.89E-002 AMP/WATT**

**NEP (1Hz)= 4.75E-016 WATT/HZ1/2**

**DETECTOR RESISTANCE= 5.97E+012 OHMS**

**DETECTOR BIAS= 1.97E-002 VOLTS**

**THE FOLLOWING ARE CALCULATED FROM ABOVE DATA**

<table>
<thead>
<tr>
<th>Parameter</th>
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<td><strong>BACKGROUND PHOTON FLUX DENSITY</strong></td>
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<td><strong>PC GAIN (Q.E.=0.3)=</strong></td>
<td>7.05E-003 (AC)</td>
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<td><strong>SHOT NOISE (Q.E.=0.3)=</strong></td>
<td>6.27E-007 V/HZ1/2 (AC)</td>
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<td><strong>BLIP NEP (Q.E.=0.3)=</strong></td>
<td>5.97E-017 W/HZ1/2 (AC)</td>
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<td><strong>QUAN.EFFIC.IF BLIP=</strong></td>
<td>1.54E-002 (AC)</td>
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SAMPLE NO. GE: GA 4-361-1

BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 2.35E-008
LOAD= 1.00E+011

BB TEMP= 76.8
SIG DEL V=0.01290
BLACKBODY OUTPUT= 9.21E-013 WATTS
SIG. CONDUCTANCE( DC)= 2.76E+001 MHOS/WATT
VOLT. RESP. ( DC)= 5.26E+010 VOLT/WATT
CURR. RESP. ( DC)= 5.00E-001 AMP/WATT
SIG. CONDUCTANCE(1HZ)= 3.68E+000 MHOS/WATT
VOLT. RESP. (1HZ)= 7.02E+009 VOLT/WATT
CURR. RESP. (1HZ)= 6.48E-002 AMP/WATT
NEP (1HZ)= 2.84E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 9.00E+012 OHMS
DETECTOR BIAS= 1.98E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E. =0.3)= 4.35E-003 (AC)
SHOT NOISE (Q.E. =0.3)= 2.23E-007 V/HZ1/2 (AC)
BLIP NEP (Q.E. =0.3)= 3.17E-017 W/HZ1/2 (AC)
QUAN. EFFIC. IF BLIP = 3.74E-003 (AC)

BB TEMP= 76.5
SIG DEL V=0.03450
BLACKBODY OUTPUT= 9.10E-013 WATTS
SIG. CONDUCTANCE( DC)= 3.33E+001 MHOS/WATT
VOLT. RESP. ( DC)= 1.72E+011 VOLT/WATT
CURR. RESP. ( DC)= 1.53E+000 AMP/WATT
SIG. CONDUCTANCE(1HZ)= 3.83E+000 MHOS/WATT
VOLT. RESP. (1HZ)= 1.95E+010 VOLT/WATT
CURR. RESP. (1HZ)= 1.75E-001 AMP/WATT
NEP (1HZ)= 2.84E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 1.53E+013 OHMS
DETECTOR BIAS= 5.83E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E. =0.3)= 1.18E-002 (AC)
SHOT NOISE (Q.E. =0.3)= 4.35E-003 (AC)
BLIP NEP (Q.E. =0.3)= 2.31E-017 W/HZ1/2 (AC)
QUAN. EFFIC. IF BLIP = 7.72E-003 (AC)

BIAS DELTA V= 0.0180
NOISE= 2E-6
3.15E+008 PHOT/SEC
8.13E-020 MHOS/PHOT/SEC
1.55E-010 VOLT/PHOT/SEC
1.46E-021 AMP/PHOT/SEC
1.06E-020 MHOS/PHOT/SEC
2.08E-011 VOLT/PHOT/SEC
1.90E-022 AMP/PHOT/SEC
9.69E+004 PHOT/SEC-HZ1/2
9.00E+012 OHMS
1.93E-082 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E. =0.3)= 4.35E-003 (AC)
SHOT NOISE (Q.E. =0.3)= 2.23E-007 V/HZ1/2 (AC)
BLIP NEP (Q.E. =0.3)= 3.17E-017 W/HZ1/2 (AC)
QUAN. EFFIC. IF BLIP = 3.74E-003 (AC)

BIAS DELTA V= 0.0458
NOISE= 2.8E-6
3.11E+008 PHOT/SEC
9.76E-020 MHOS/PHOT/SEC
5.84E-010 VOLT/PHOT/SEC
4.47E-021 AMP/PHOT/SEC
6.72E-002 V/HZ1/2 (DC)
6.48E-002 V/HZ1/2 (DC)
8.86E-017 W/HZ1/2 (DC)
2.86E-002 (DC)

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SAMPLE NO. GE:GA 3-281-3  RUN DATE 6/9/78
ETENUE= 6.84E-009  LOAD= 5.00E+018

BB TEMP= 59.5  BIAS= 0.0050  BIAS DELTA V= 0.0030
SIG DEL V= 0.00120  DC/1HZ= 2
BLACKBODY OUTPUT= 1.10E-013 WATTS
SIG. CONDUCTANCE (DC)= 1.84E+002 MHOS/WATT
VOLT. RESP. (DC)= 1.63E+010 VOLT/WATT
CURR. RESP. (DC)= 5.53E-001 AMP/WATT
SIG. CONDUCTANCE (1HZ)= 6.91E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 6.82E+009 VOLT/WATT
CURR. RESP. (1HZ)= 2.87E-001 AMP/WATT
NEP (1HZ)= 2.66E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 9.66E+010 OHMS
DETECTOR BIAS= 3.30E-003 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 1.30E-002 (AC)
SHOT NOISE (Q.E.=0.3)= 5.94E-007 V/HZ1/2 (AC)
BLIP NEP (Q.E.=0.3)= 7.28E-017 W/HZ1/2 (AC)
QUAN. EFFIC. IF BLIP= 2.24E-002 (AC)

BB TEMP= 59.2  BIAS= 0.0100  BIAS DELTA V= 0.0058
SIG DEL V= 0.00225  DC/1HZ= 2
BLACKBODY OUTPUT= 1.08E-013 WATTS
SIG. CONDUCTANCE (DC)= 1.85E+002 MHOS/WATT
VOLT. RESP. (DC)= 3.95E+010 VOLT/WATT
CURR. RESP. (DC)= 1.87E-000 AMP/WATT
SIG. CONDUCTANCE (1HZ)= 7.02E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 1.31E+010 VOLT/WATT
CURR. RESP. (1HZ)= 4.87E-001 AMP/WATT
NEP (1HZ)= 1.54E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 8.79E+010 OHMS
DETECTOR BIAS= 6.37E-003 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 2.54E-002 (AC)
SHOT NOISE (Q.E.=0.3)= 9.95E-007 V/HZ1/2 (AC)
BLIP NEP (Q.E.=0.3)= 7.59E-017 W/HZ1/2 (AC)
QUAN. EFFIC. IF BLIP= 7.26E-002 (AC)
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<th>Temp. = 3 K</th>
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<td>BB Integrated from 40 to 130 Microns Step 0.2</td>
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<tr>
<td>Etendue = 6.84E-009</td>
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</tr>
<tr>
<td>Load = 5.00E+010</td>
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</tbody>
</table>

| BB Temp | 59.2 | BIAS = 0.0200 | BIAS DELTA V = 0.0110 |
| Sig. Delta V | 0.00382 | DC/1Hz = 2 | NOISE = 3.6E-6 |
| Blackbody Output | 1.08E-013 Watts | |
| Sig. Conductance (DC) | 1.64E+002 Mhos/Watt | 4.46E-019 Mhos/Phot/sec |
| Volt. Resp. (DC) | 4.94E+010 Volts/Watt | 1.34E-010 Volts/Phot/sec |
| Curr. Resp. (DC) | 1.80E+000 Amps/Watt | 4.90E-021 Amps/Phot/sec |
| Sig. Conductance (1Hz) | 6.46E+001 Mhos/Watt | 1.76E-019 Mhos/Phot/sec |
| Volt. Resp. (1Hz) | 2.18E+010 Volts/Watt | 5.94E-011 Volts/Phot/sec |
| Curr. Resp. (1Hz) | 7.11E-001 Amps/Watt | 1.94E-021 Amps/Phot/sec |
| NEP (1Hz) | 1.53E-016 Watts/Hz^1/2 | 5.60E+004 Photons/Sec-Hz^1/2 |
| Detector Resistance | 7.64E+010 Ohms | |
| Detector Bias | 1.21E-002 Volts | |

The following are calculated from above data:
- Background Photon Flux Density
- pc Gain (Q.E. = 0.3) = 4.43E+002 (AC)
- Shot Noise (Q.E. = 0.3) = 1.84E-006 V/Hz^1/2 (AC)
- Blip NEP (Q.E. = 0.3) = 8.46E-017 W/Hz^1/2 (AC)
- QUAN. EFFIC. IF BLIP = 9.22E-002 (AC)

| BB Temp | 60.5 | BIAS = 0.0300 | BIAS DELTA V = 0.0155 |
| Sig. Delta V | 0.00590 | DC/1Hz = 2 | NOISE = 4.6E-6 |
| Blackbody Output | 1.17E-013 Watts | |
| Sig. Conductance (DC) | 1.85E+002 Mhos/Watt | 5.08E-019 Mhos/Phot/sec |
| Volt. Resp. (DC) | 7.08E+010 Volts/Watt | 1.94E-010 Volts/Phot/sec |
| Curr. Resp. (DC) | 2.87E+000 Amps/Watt | 7.88E-021 Amps/Phot/sec |
| Sig. Conductance (1Hz) | 7.09E+001 Mhos/Watt | 1.94E-019 Mhos/Phot/sec |
| Volt. Resp. (1Hz) | 3.11E+010 Volts/Watt | 8.53E-011 Volts/Phot/sec |
| Curr. Resp. (1Hz) | 1.19E+000 Amps/Watt | 3.01E-021 Amps/Phot/sec |
| NEP (1Hz) | 1.34E-016 Watts/Hz^1/2 | 4.89E+004 Photons/Sec-Hz^1/2 |
| Detector Resistance | 6.57E+010 Ohms | |
| Detector Bias | 1.70E-002 Volts | |

The following are calculated from above data:
- Background Photon Flux Density
- pc Gain (Q.E. = 0.3) = 3.92E+009 Photons/Sec-Cmt2
- Shot Noise (Q.E. = 0.3) = 1.12E-001 (DC)
- Blip NEP (Q.E. = 0.3) = 1.35E-016 Watts/Hz^1/2 (DC)
- QUAN. EFFIC. IF BLIP = 9.92E-002 (AC)

31
<table>
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<th>Parameter</th>
<th>Value</th>
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<td>etendue</td>
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</tr>
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<td>load</td>
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<td>Blackbody output</td>
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<td>Watts</td>
</tr>
<tr>
<td>Sig. conductance (dc)</td>
<td>1.92e+002</td>
<td>mhos/watt</td>
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<tr>
<td>Vol. resp. (dc)</td>
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<td>VOLT/WATT</td>
</tr>
<tr>
<td>Curr. resp. (dc)</td>
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<td>AMP/WATT</td>
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<tr>
<td>Sig. conductance (1hz)</td>
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<td>mhos/watt</td>
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<td>Nep (1hz)</td>
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<td>Watt/Hz^1/2</td>
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<td>Detector resistance</td>
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</tr>
<tr>
<td>Detector bias</td>
<td>2.88e-002</td>
<td>Volts</td>
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</table>

The following are calculated from above data:

Background photon flux density:

PC gain (Q.E. = 0.3) = 8.92e+002 (AC) = 4.72e+009 (AC)

Shot noise (Q.E. = 0.3) = 3.50e-006 (AC) = 2.26e-001 (DC)

Blip NEP (Q.E. = 0.3) = 9.45e+007 (AC) = 1.58e-016 (DC)

Quan. effic. if Blip = 3.90e-001 (DC)

Bb temp = 59.0

Sig. del v = 0.00600

Blackbody output = 1.06e-013 WATTS

Sig. conductance (DC) = 1.63e+002 mhos/watt

Vol. resp. (DC) = 8.56e+010 VOLT/WATT

Curr. resp. (DC) = 3.75e+000 AMP/WATT

Sig. conductance (1HZ) = 6.68e+001 mhos/watt

Vol. resp. (1HZ) = 3.92e+010 VOLT/WATT

Curr. resp. (1HZ) = 1.54e+000 AMP/WATT

NEP (1HZ) = 1.41e-016 Watt/Hz^1/2

Detector resistance = 5.11e+010 Ohms

Detector bias = 2.53e-002 Volts

The following are calculated from above data:

Background photon flux density:

PC gain (Q.E. = 0.3) = 9.58e-002 (AC) = 5.68e+009 (AC)

Shot noise (Q.E. = 0.3) = 4.00e-006 (AC) = 2.33e-001 (DC)

Blip NEP (Q.E. = 0.3) = 1.02e-016 (AC) = 1.58e-016 (DC)

Quan. effic. if Blip = 3.86e-001 (DC)
SAMPLE NO. GE: GA 3-2B1-3  RUN DATE 6/9/78  TEMP. = 3 K
BB INTEGRATED FROM 48 TO 130 MICRONS STEP 0.2
ETENDUE = 6.84E-009  LOAD = 5.00E+018

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SAMPLE NO. GE:GA 3-281-3  RUN DATE 6/9/78  TEMP.=3 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009  LOAD= 5.00E+010

BB TEMP= 59.0  BIAS=0.0700  BIAS DELTA V=0.0248
SIG DEL V=0.08850  DC/1HZ=2  NOISE=8E-6
BLACKBODY OUTPUT= 1.86E-013 WATTS 3.90E+007 PHOT/SEC
SIG.CONDUCTANCE( DC)= 2.52E+002 MHOS/WATT 6.86E-019 MHOS/PHOT/SEC
VOLT. RESP. ( DC)= 1.81E+011 VOLT/WATT 2.76E-010 VOLT/PHOT/SEC
CURR. RESP. ( DC)= 6.25E+000 AMP/WATT 1.78E-020 AMP/PHOT/SEC
SIG.CONDUCTANCE(1HZ)= 1.00E+002 MHOS/WATT 2.72E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 4.71E+010 VOLT/WATT 1.28E-018 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 2.48E+008 AMP/WATT 6.75E-021 AMP/PHOT/SEC
NEP (1HZ)= 1.51E-016 WATT/Hz1/2 5.54E+004 PHOT/SEC-Hz1/2
DETECTOR RESISTANCE = 3.19E+010 OHMS
DETECTOR BIAS= 2.73E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY= 6.10E+009 PHOTONS/SEC-CMT2
PC GAIN (Q.E.=0.3)= 1.54E-001 (AC) 3.90E-001 (DC)
SHOT NOISE(Q.E.=0.3)= 5.15E-006 V/Hz1/2 (AC) 8.18E-006 V/Hz1/2 (DC)
BLIP NEP (Q.E.=0.3)= 1.09E-016 W/Hz1/2 (AC) 1.74E-016 W/Hz1/2 (DC)
QUAN.EFFIC.IF BLIP= 1.58E-001 (AC) 3.98E-001 (DC)

BB TEMP= 58.9  BIAS=0.0800  BIAS DELTA V=0.0268
SIG DEL V=0.01100  DC/1HZ=2  NOISE=8.E-6
BLACKBODY OUTPUT= 1.86E-013 WATTS 3.88E+007 PHOT/SEC
SIG.CONDUCTANCE( DC)= 2.96E+002 MHOS/WATT 8.05E-019 MHOS/PHOT/SEC
VOLT. RESP. ( DC)= 1.35E+011 VOLT/WATT 3.67E-010 VOLT/PHOT/SEC
CURR. RESP. ( DC)= 8.52E+000 AMP/WATT 2.32E-020 AMP/PHOT/SEC
SIG.CONDUCTANCE(1HZ)= 1.13E+002 MHOS/WATT 3.07E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 6.19E+010 VOLT/WATT 1.68E-018 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 3.26E+008 AMP/WATT 8.85E-021 AMP/PHOT/SEC
NEP (1HZ)= 1.20E-016 WATT/Hz1/2 4.42E+004 PHOT/SEC-Hz1/2
DETECTOR RESISTANCE = 3.27E+010 OHMS
DETECTOR BIAS= 3.16E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY= 5.06E+009 PHOTONS/SEC-CMT2
PC GAIN (Q.E.=0.3)= 2.83E-001 (AC) 5.31E-001 (DC)
SHOT NOISE(Q.E.=0.3)= 6.38E-006 V/Hz1/2 (AC) 1.03E-005 V/Hz1/2 (DC)
BLIP NEP (Q.E.=0.3)= 1.03E-016 W/Hz1/2 (AC) 1.67E-016 W/Hz1/2 (DC)
QUAN.EFFIC.IF BLIP= 2.20E-001 (AC) 5.77E-001 (DC)
SAMPLE NO. GE:GA 3-2B1-3	 RUN DATE 6/9/78	 TEMP.=3 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009	 LOAD= 5.80E+010

BB TEMP= 58.9	 BIAS=0.00000	 BIAS DELTA V=0.02950
SIG DEL V=0.00955	 DC/1HZ=2	 NOISE=9E-6
BLACKBODY OUTPUT= 1.06E-013 WATTS
SIG.CONDUCTANCE( DC)= 2.52E+002 MHOS/WATT
VOLT. RESP. (DC)= 1.19E+011 VOLT/WATT
CURR.RESP.( DC)= 7.43E+009 AMP/WATT
SIG.CONDUCTANCE(1HZ)= 1.02E+002 MHOS/WATT
VOLT. RESP. (1HZ)= 5.28E+010 VOLT/WATT
CURR.RESP.(1HZ)= 3.90E+000 AMP/WATT
NEP (1HZ)= 1.52E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 2.81E+010 OHMS
DETECTOR BIAS= 3.24E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (D.E.=0.3)= 1.87E-001 (AC)
SHOT NOISE(Q.E.=0.3)= 6.00E-006 V/HZ1/2 (AC)
BLIP NEP (Q.E.=0.3)= 1.15E-016 W/HZ1/2 (AC)
QUAN.EFFIC.IF BLIP= 1.73E-001 (AC)

BB TEMP= 58.8	 BIAS=0.10000	 BIAS DELTA V=0.0316
SIG DEL V=0.01010	 DC/1HZ=2	 NOISE=1E-5
BLACKBODY OUTPUT= 1.05E-013 WATTS
SIG.CONDUCTANCE( DC)= 2.58E+002 MHOS/WATT
VOLT. RESP. (DC)= 1.19E+011 VOLT/WATT
CURR.RESP.( DC)= 8.15E+009 AMP/WATT
SIG.CONDUCTANCE(1HZ)= 1.04E+002 MHOS/WATT
VOLT. RESP. (1HZ)= 5.60E+010 VOLT/WATT
CURR.RESP.(1HZ)= 3.30E+000 AMP/WATT
NEP (1HZ)= 1.59E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 2.66E+010 OHMS
DETECTOR BIAS= 3.47E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (D.E.=0.3)= 2.05E-001 (AC)
SHOT NOISE(Q.E.=0.3)= 6.55E-006 V/HZ1/2 (AC)
BLIP NEP (Q.E.=0.3)= 1.17E-016 W/HZ1/2 (AC)
QUAN.EFFIC.IF BLIP= 1.62E-001 (AC)
SAMPLE NO. GE:GA 3-2B1-3  RUN DATE 6/9/78  TEMP.=2.5 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.4E-009  LOAD= 7.00E+010

BB TEMP= 59.0  BIAS= 0.0050
SIG DEL V=0.00202  DC/1HZ=2.2
BLACKBODY OUTPUT= 1.46E+002 MHOS/WATT
VOLT. RESP. (DC)= 3.76E+010 VOLT/WATT
CURR. RESP. (DC)= 5.97E-001 AMP/WATT
SIG. CONDUCTANCE (DC)= 4.33E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 1.19E+010 VOLT/WATT
CURR. RESP. (1HZ)= 1.77E-001 AMP/WATT
NEP (1HZ)= 2.94E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 6.22E+011 OHMS
DETECTOR BIAS= 4.49E-003 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (O.E.0.3)= 1.10E-002 (AC)
SHOT NOISE (O.E.0.3)= 4.99E-007 V/HZ1/2 (AC)
BLIP NEP (O.E.0.3)= 3.44E-017 W/HZ1/2 (AC)
QUAN. EFFIC. IF BLIP= 8.50E-003 (AC)

BB TEMP= 58.9  BIAS= 0.0100
SIG DEL V=0.00419  DC/1HZ=2.2
BLACKBODY OUTPUT= 1.06E-013 WATTS
VOLT. RESP. (DC)= 3.76E+010 VOLT/WATT
CURR. RESP. (DC)= 5.97E-001 AMP/WATT
SIG. CONDUCTANCE (DC)= 4.33E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 1.19E+010 VOLT/WATT
CURR. RESP. (1HZ)= 1.77E-001 AMP/WATT
NEP (1HZ)= 2.94E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 6.22E+011 OHMS
DETECTOR BIAS= 4.49E-003 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (O.E.0.3)= 2.26E-002 (AC)
SHOT NOISE (O.E.0.3)= 7.49E-007 V/HZ1/2 (AC)
BLIP NEP (O.E.0.3)= 2.99E-017 W/HZ1/2 (AC)
QUAN. EFFIC. IF BLIP= 2.82E-002 (AC)

36
BB TEMP: 58.8  BIAS=0.0100  BIAS DELTA V=0.0061
SIG DEL V=0.00395  DC/1HZ=2.2  NOISE=2.5E-6
BLACKBODY OUTPUT= 1.06E-023 WATTs
SIG.CDNDUCTANCE( DC)= 1.46E+002 MHOS/WATT
VOLT. RESP. ( DC)= 7.31E+010 VOLT/WATT
CURR.RESP. ( DC)= 1.18E+000 AMP/WATT
SIG.CDNDUCTANCE(1HZ)= 4.36E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 2.34E+010 VOLT/WATT
CURR.RESP. (1HZ)= 3.53E-001 AMP/WATT
NEP (1HZ)= 1.03E-016 WATT/HZT1/2
DETECTOR RESISTANCE = 5.66E+011 OHMS
DETECTOR BIAS= 8.96E-003 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY= 5.94E+008 PHOTONS/SEC-CMT2
PC GAIN (Q.E. =0.3)= 2.20E-002( AC)  7.34E-002( DC)
SHOT NOISE(Q.E. =0.3)= 8.42E-007 V/HZT1/2 (AC)  1.54E-006 V/HZT1/2 (DC)
BLIP NEP (Q.E. =0.3)= 3.59E-017 W/HZT1/2 (AC)  6.57E-017 W/HZT1/2 (DC)
QUAN.EFFIC.IF BLIP= 3.62E-002 (AC)

BB TEMP: 58.8  BIAS=0.0200  BIAS DELTA V=0.0160
SIG DEL V=0.00625  DC/1HZ=2.2  NOISE=2.5E-6
BLACKBODY OUTPUT= 1.05E-013 WATTs
SIG.CDNDUCTANCE( DC)= 1.65E+002 MHOS/WATT
VOLT. RESP. ( DC)= 1.58E+011 VOLT/WATT
CURR.RESP. ( DC)= 2.64E+000 AMP/WATT
SIG.CDNDUCTANCE(1HZ)= 4.74E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 4.95E+010 VOLT/WATT
CURR.RESP. (1HZ)= 7.50E-001 AMP/WATT
NEP (1HZ)= 4.87E-017 WATT/HZT1/2
DETECTOR RESISTANCE = 5.08E+011 OHMS
DETECTOR BIAS= 1.76E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY= 5.84E+008 PHOTONS/SEC-CMT2
PC GAIN (Q.E. =0.3)= 4.72E-002( AC)  1.64E-001( DC)
SHOT NOISE(Q.E. =0.3)= 1.81E-006 V/HZT1/2 (AC)  3.37E-006 V/HZT1/2 (DC)
BLIP NEP (Q.E. =0.3)= 3.66E-017 W/HZT1/2 (AC)  6.82E-017 W/HZT1/2 (DC)
QUAN.EFFIC.IF BLIP= 1.69E-001 (AC)  5.88E-001 (DC)
SAMPLE NO. GE:GA 3-2B1-3  RUN DATE 6/9/78  TEMP.=2.5 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009  LOAD= 7.00E+010

BB TEMP= 58.8  BIAS=0.0300  BIAS DELTA V=0.0234
SIG DEL V=0.01250  DC/1HZ=2.2  NOISE=UNDEFINED
BLACKBODY OUTPUT= 1.95E-013 WATTS 3.86E+007 PHOT/SEC
SIG. CONDUCTANCE (DC)= 1.82E+002 MHOS/WATT 4.95E-019 MHOS/PHOT/SEC
VOLT. RESP. (DC)= 2.42E+011 VOLT/WATT 6.57E-018 VOLT/PHOT/SEC
CURR. RESP. (DC)= 4.26E+000 AMP/WATT 1.16E-020 AMP/PHOT/SEC
SIG. CONDUCTANCE (1HZ)= 5.18E+001 MHOS/WATT 1.39E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 7.52E+010 VOLT/WATT 2.04E-018 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 1.19E+000 AMP/WATT 3.24E-021 AMP/PHOT/SEC
DETECTOR RESISTANCE= 4.20E+011 OHMS
DETECTOR BIAS= 2.57E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 7.42E-002 (AC) 6.41E+008 PHOTONS/SEC-CMT2
SHOT NOISE (Q.E.=0.3)= 2.94E-006 V/HZ1/2 (AC) 2.65E-001 (DC)
BLIP NEP (Q.E.=0.3)= 3.92E-017 W/HZ1/2 (AC) 4.27E-006 V/HZ1/2 (DC)

BB TEMP= 58.8  BIAS=0.0400
SIG DEL V=0.01650  DC/1HZ=2.2
BLACKBODY OUTPUT= 1.95E-013 WATTS 3.86E+007 PHOT/SEC
SIG. CONDUCTANCE (DC)= 1.82E+002 MHOS/WATT 5.49E-019 MHOS/PHOT/SEC
VOLT. RESP. (DC)= 3.16E+011 VOLT/WATT 8.60E-018 VOLT/PHOT/SEC
CURR. RESP. (DC)= 6.06E+000 AMP/WATT 1.65E-020 AMP/PHOT/SEC
SIG. CONDUCTANCE (1HZ)= 5.18E+001 MHOS/WATT 1.58E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 7.52E+010 VOLT/WATT 2.66E-018 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 1.19E+000 AMP/WATT 4.49E-021 AMP/PHOT/SEC
NEP (1HZ)= 3.34E-017 WATT/HZ1/2 1.23E+004 PHOT/SEC-HZ1/2
DETECTOR RESISTANCE= 3.28E+011 OHMS
DETECTOR BIAS= 3.30E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 1.03E-001 (AC) 7.40E+008 PHOTONS/SEC-CMT2
SHOT NOISE (Q.E.=0.3)= 4.27E-006 V/HZ1/2 (AC) 4.27E-006 V/HZ1/2 (DC)
BLIP NEP (Q.E.=0.3)= 4.31E-017 W/HZ1/2 (AC) 8.18E-006 V/HZ1/2 (DC)
QUAN. EFFIC. IF BLIP= 5.00E-001 (AC) 1.83E+000 (DC)
SAMPLE NO. GE:GA 3-281-3  RUN DATE 6/9/78  TEMP =2.5 K
BB INTEGRATED FROM 48 TO 130 MICRONS STEP 0.2
ETENDE= 6.84E-009
LOAD= 7.08E+018

BB TEMP= 58.5  BIAS=0.0500
SIG DEL V=0.02050  DC/1HZ=2.2
BLACKBODY OUTPUT= 1.03E-013 WATTS
SIG.CONDUCTANCE( DC)= 1.95E+002 MHOS/WATT
VOLT. RESP.( DC)= 3.99E+011 VOLT/WATT
CURR.RESP.( DC)= 7.48E+000 AMP/WATT
SIG.CONDUCTANCE(1HZ)= 5.40E+001 MHOS/WATT
VOLT. RESP.(1HZ)= 1.25E+011 VOLT/WATT
CURR.RESP.(1HZ)= 2.05E+000 AMP/WATT
DETECTOR RESISTANCE = 3.55E+011 OHMS,
DETECTOR BIAS= 4.18E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY= 7.11E+008 PHOTONS/SEC-CM2
PC GAIN (Q.E.=0.3)= 1.26E-001 ( AC)
SHOT NOISE(Q.E.=0.3)= 5.22E-006 V/HZ1/2 (AC)
BLIP NEP (Q.E.=0.3)= 4.17E-017 W/HZ1/2 (AC)

BB TEMP= 58.3  BIAS=0.0600
SIG DEL V=0.02400  DC/1HZ=2.2
BLACKBODY OUTPUT= 1.02E-013 WATTS
SIG.CONDUCTANCE( DC)= 2.44E+002 MHOS/WATT
VOLT. RESP.( DC)= 4.64E+011 VOLT/WATT
CURR.RESP.( DC)= 1.02E+001 AMP/WATT
SIG.CONDUCTANCE(1HZ)= 6.42E+001 MHOS/WATT
VOLT. RESP.(1HZ)= 1.48E+011 VOLT/WATT
CURR.RESP.(1HZ)= 2.70E+000 AMP/WATT
NEP (1HZ)= 3.13E-017 WATT/HZ1/2
DETECTOR RESISTANCE = 2.33E+011 OHMS,
DETECTOR BIAS= 4.62E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY= 8.64E+008 PHOTONS/SEC-CM2
PC GAIN (Q.E.=0.3)= 1.67E-001 ( AC)
SHOT NOISE(Q.E.=0.3)= 7.13E-006 V/HZ1/2 (AC)
BLIP NEP (Q.E.=0.3)= 4.83E-017 W/HZ1/2 (AC)
QUAN.EFFIC.IF BLIP= 7.13E-001 (AC)
SAMPLE NO. GE:GA 3-2B1-3
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009
LOAD= 7.00E+010

BB TEMP= 58.2
BIAS= 0.0600
BIAS DELTA V= 0.0420

SIG DEL V= 0.02400
DC/1HZ= 2.2
NOISE= UNDEFINED

BLACKBODY OUTPUT=
1.01E-013 WATTS
6.65E-019 MHOS/PHOT/SEC

SIG.CONGDUCTANCE (DC)=
2.46E+002 MHOS/WATT
1.26E-008 VOLT/PHOT/SEC

VOLT. RESP. (DC)=
4.67E+011 VOLT/WATT
2.79E-020 AMP/PHOT/SEC

CURR. RESP. (DC)=
1.03E+001 AMP/WATT
1.75E-019 MHOS/PHOT/SEC

SIG. CONDUCTANCE (1HZ)=
6.46E+001 MHOS/WATT
4.03E-010 VOLT/PHOT/SEC

VOLT. RESP. (1HZ)=
1.49E+011 VOLT/WATT
7.3E-021 AMP/PHOT/SEC

CURR. RESP. (1HZ)=
2.71E+000 AMP/WATT
3.72E+007 PHOT/SEC

DETECTOR RESISTANCE = 2.33E+011 OHMS
DETECTOR BIAS= 4.62E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA

BACKGROUND PHOTON FLUX DENSITY=
8.59E+008 PHOTONS/SEC-CM^2

PC GAIN (Q.E.=0.3)=
1.66E-001 (AC)
6.48E-001 (DC)

SHOT NOISE (Q.E.=0.3)=
7.15E-006 V/HZ^1/2 (AC)
1.39E-005 V/HZ^1/2 (DC)

BLIP NEP (Q.E.=0.3)=
4.81E-017 W/HZ^1/2 (AC)
9.39E-017 W/HZ^1/2 (DC)

BB TEMP= 58.2
BIAS= 0.0700
BIAS DELTA V= 0.0480

SIG DEL V= 0.02700
DC/1HZ= 2.2
NOISE= UNDEFINED

BLACKBODY OUTPUT=
1.01E-013 WATTS
6.65E-019 MHOS/PHOT/SEC

SIG. CONDUCTANCE (DC)=
2.46E+002 MHOS/WATT
1.26E-008 VOLT/PHOT/SEC

VOLT. RESP. (DC)=
4.67E+011 VOLT/WATT
2.79E-020 AMP/PHOT/SEC

CURR. RESP. (DC)=
1.03E+001 AMP/WATT
1.75E-019 MHOS/PHOT/SEC

SIG. CONDUCTANCE (1HZ)=
6.46E+001 MHOS/WATT
4.03E-010 VOLT/PHOT/SEC

VOLT. RESP. (1HZ)=
1.49E+011 VOLT/WATT
7.3E-021 AMP/PHOT/SEC

CURR. RESP. (1HZ)=
2.71E+000 AMP/WATT
3.72E+007 PHOT/SEC

DETECTOR RESISTANCE = 2.33E+011 OHMS
DETECTOR BIAS= 4.62E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA

BACKGROUND PHOTON FLUX DENSITY=
9.51E+008 PHOTONS/SEC-CM^2

PC GAIN (Q.E.=0.3)=
1.92E-001 (AC)
7.28E-001 (DC)

SHOT NOISE (Q.E.=0.3)=
8.36E-006 V/HZ^1/2 (AC)
1.62E-005 V/HZ^1/2 (DC)

BLIP NEP (Q.E.=0.3)=
5.06E-017 W/HZ^1/2 (AC)
9.76E-017 W/HZ^1/2 (DC)
SAMPLE NO. GE:GA 3-2B1-3  RUN DATE 6/9/78  TEMP.=2.5 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009  LOAD= 7.00E+010

BB TEMP= 58.1  BIAS= 0.0800  BIAS DELTA V= 0.0530
SIG DEL V= 0.03000  DC/1HZ= 2.2  NOISE= 7E-6
BLACKBODY OUTPUT= 1.00E-013 WATTS
SIG.CONDUCTANCE( DC)= 2.56E+002 MHOS/WATT
VOLT. RESP. ( DC)= 5.68E+011 VOLT/WATT
CURR. RESP. ( DC)= 1.35E+001 AMP/WATT
SIG.CONDUCTANCE(1HZ)= 6.79E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 1.84E+011 VOLT/WATT
CURR. RESP. (1HZ)= 3.69E+000 AMP/WATT
NEP (1HZ)= 3.48E-017 WATT/Hz^1/2
DETECTOR RESISTANCE = 1.87E+011 OHMS
DETECTOR BIAS= 5.82E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 2.23E-001 (AC)
SHOT NOISE(Q.E.=0.3)= 9.77E-006 V/Hz^1/2 (AC)
BLIP NEP (Q.E.=0.3)= 5.31E-017 W/Hz^1/2 (AC)
QUAN.EFFIC.IF BLIP= 6.99E-001 (AC)

BB TEMP= 58.1  BIAS= 0.0900  BIAS DELTA V= 0.0555
SIG DEL V= 0.03200  DC/1HZ= 2.2  NOISE= UNDEFINED
BLACKBODY OUTPUT= 1.00E-013 WATTS
SIG.CONDUCTANCE( DC)= 2.87E+002 MHOS/WATT
VOLT. RESP. ( DC)= 5.76E+011 VOLT/WATT
CURR. RESP. ( DC)= 1.59E+001 AMP/WATT
SIG.CONDUCTANCE(1HZ)= 7.47E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 1.94E+011 VOLT/WATT
CURR. RESP. (1HZ)= 4.15E+000 AMP/WATT
DETECTOR RESISTANCE = 1.47E+011 OHMS
DETECTOR BIAS= 6.10E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 2.57E-001 (AC)
SHOT NOISE(Q.E.=0.3)= 9.13E-005 V/Hz^1/2 (AC)
BLIP NEP (Q.E.=0.3)= 5.81E-017 W/Hz^1/2 (AC)
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009  LOAD= 7.98E+010

BB TEMP= 58.1  BIAS=0.1000  BIAS DELTA V=0.0580
SIG DEL V=0.03400  DC/1HZ=2.2  NOISE=9E-6
BLACKBODY OUTPUT= 1.90E-013 WATTS
SIG. CONDUCTANCE (DC)= 3.17E+002 MHOS/WATT
VOLT. RESP. (DC)= 5.95E+011 VOLT/WATT
CURR. RESP. (DC)= 1.84E+001 AMP/WATT
SIG. CONDUCTANCE (1HZ)= 8.13E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 2.04E+011 VOLT/WATT
CURR. RESP. (1HZ)= 4.71E+000 AMP/WATT
NEP (1HZ)= 3.89E-017 WATT/HZ^1/2
DETECTOR RESISTANCE = 1.23E+011 OHMS
DETECTOR BIAS= 6.37E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY= 1.26E+009 PHOTONS/SEC-CMT2
PC GAIN (O.E.=0.3)= 2.92E-001 (AC)
SHOT NOISE (O.E.=0.3)= 1.26E-005 V/HZ^1/2 (AC)
BLIP NEP (O.E.=0.3)= 6.19E-017 W/HZ^1/2 (AC)
QUAN. EFFIC. IF BLIP= 7.58E-001 (AC)

SAMPLE NO. GE:GA 3-2B1-3  RUN DATE 6/9/78  TEMPERATURE=2.5 K
SAMPLE NO. GE:GA 4-581-1  RUN DATE 7/11/78  TEMP.=3 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009  LOAD= 5.00E+010

BB TEMP= 58.1  BIAS=0.0050  BIAS DELTA V=0.0007
SIG DEL V=0.00008  DC/1HZ=1.04  NOISE=UNDEFINED
BLACKBODY OUTPUT= 1.00E-013 WATTS  3.70E+007 PHOT/SEC
SIG CONDUCTANCE( DC)= 1.56E+002 MHOS/WATT  4.22E-019 MHOS/PHOT/SEC
VOLT. RESP.( DC)= 8.37E+008 VOLT/WATT  2.27E-012 VOLT/PHOT/SEC
CURR. RESP.( DC)= 1.09E-001 AMP/WATT  2.95E-022 AMP/PHOT/SEC
SIG CONDUCTANCE(1HZ)= 1.49E+002 MHOS/WATT  4.94E-019 MHOS/PHOT/SEC
VOLT. RESP.(1HZ)= 8.04E+008 VOLT/WATT  2.18E-012 VOLT/PHOT/SEC
CURR. RESP.(1HZ)= 1.04E-001 AMP/WATT  2.63E-022 AMP/PHOT/SEC
DETECTOR RESISTANCE = 9.08E+009 OHMS  BIAS=7.69E-004 VOLTS
DETECTOR BIAS=-  0.0050  DC/1HZ=1.04

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BLACKBODY OUTPUT-  1.00E-013 WATTS
SIG CONDUCTANCE( DC)= 1.56E+002 MHOS/WATT
VOLT. RESP.( DC)= 8.37E+008 VOLT/WATT
CURR. RESP.( DC)= 1.09E-001 AMP/WATT
SIG CONDUCTANCE(1HZ)= 1.49E+002 MHOS/WATT
VOLT. RESP.(1HZ)= 8.04E+008 VOLT/WATT
CURR. RESP.(1HZ)= 1.04E-001 AMP/WATT
DETECTOR RESISTANCE = 9.08E+009 OHMS
DETECTOR BIAS=-  0.0050  DC/1HZ=1.04

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN=-  6.47E-003( AC)  3.48E+010 PHOTONS/SEC-CMT2
SHOT NOISE =  1.31E-007 V/HZ\(1/2\) (AC)  6.76E-003( DC)
BLIP NEP=-  1.63E-016 W/HZ\(1/2\) (AC)

BB TEMP= 59.8  BIAS=0.0100  BIAS DELTA V=0.0012
SIG DEL V=0.00018  DC/1HZ=1.04  NOISE=UNDEFINED
BLACKBODY OUTPUT= 1.12E-013 WATTS  4.88E+007 PHOT/SEC
SIG CONDUCTANCE( DC)= 2.39E+002 MHOS/WATT  6.54E-019 MHOS/PHOT/SEC
VOLT. RESP.( DC)= 1.89E+009 VOLT/WATT  4.93E-012 VOLT/PHOT/SEC
CURR. RESP.( DC)= 2.87E-001 AMP/WATT  7.85E-022 AMP/PHOT/SEC
SIG CONDUCTANCE(1HZ)= 2.29E+002 MHOS/WATT  6.25E-019 MHOS/PHOT/SEC
VOLT. RESP.(1HZ)= 1.73E+009 VOLT/WATT  4.74E-012 VOLT/PHOT/SEC
CURR. RESP.(1HZ)= 2.74E-001 AMP/WATT  7.50E-022 AMP/PHOT/SEC
DETECTOR RESISTANCE = 7.59E+009 OHMS  BIAS=7.69E-004 VOLTS
DETECTOR BIAS=-  0.0100  DC/1HZ=1.04

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN=-  1.72E-002( AC)  2.68E+010 PHOTONS/SEC-CMT2
SHOT NOISE =  2.62E-007 V/HZ\(1/2\) (AC)  1.80E-002( DC)
BLIP NEP=  1.51E-016 W/HZ\(1/2\) (AC)  2.68E-007 V/HZ\(1/2\) (DC)
BLIP NEP=  1.51E-016 W/HZ\(1/2\) (DC)
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<tr>
<th>SAMPLE NO. GE:GA 4-581-1</th>
<th>RUN DATE 7/11/78</th>
<th>TEMP. = 3 K</th>
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<tr>
<td>BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2</td>
<td>LOAD = 5.0E+010</td>
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<tr>
<td>ETENDUE = 6.84E-009</td>
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</tr>
</tbody>
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<table>
<thead>
<tr>
<th>BB TEMP = 60.0</th>
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<tr>
<td>SIG DEL V = 0.00038</td>
<td>DC/1HZ = 1.04</td>
<td>NOISE = 2.6E-6</td>
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<td>BLACKBODY OUTPUT =</td>
<td>1.13E-013 WATTS</td>
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<tr>
<td>SIG. CONDUCTANCE (DC) =</td>
<td>2.07E+002 MHOS/WATT</td>
<td>4.14E+007 PHOT/SEC</td>
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<tr>
<td>VOLT. RESP. (DC) =</td>
<td>3.72E+009 VOLT/WATT</td>
<td>5.65E-019 MHOS/PHOT/SEC</td>
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<tr>
<td>CURR. RESP. (DC) =</td>
<td>5.39E+001 AMP/WATT</td>
<td>1.02E-011 VOLT/PHOT/SEC</td>
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<tr>
<td>SIG. CONDUCTANCE (1HZ) =</td>
<td>1.97E+002 MHOS/WATT</td>
<td>1.48E-021 AMP/PHOT/SEC</td>
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<tr>
<td>VOLT. RESP. (1HZ) =</td>
<td>3.57E+009 VOLT/WATT</td>
<td>5.40E-019 MHOS/PHOT/SEC</td>
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<tr>
<td>CURR. RESP. (1HZ) =</td>
<td>5.15E-001 AMP/WATT</td>
<td>9.77E-012 VOLT/PHOT/SEC</td>
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<tr>
<td>NEP (1HZ) =</td>
<td>6.48E-016 WATT/HZ^1/2</td>
<td>1.41E-021 AMP/PHOT/SEC</td>
</tr>
<tr>
<td>DETECTOR RESISTANCE =</td>
<td>8.37E+009 OHMS</td>
<td>2.34E+005 PHOT/SEC-HZ^1/2</td>
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<tr>
<td>DETECTOR BIAS =</td>
<td>2.87E-003 VOLTS</td>
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</tr>
</tbody>
</table>

The following are calculated from above data:

| BACKGROUND PHOTON FLUX DENSITY = | 2.82E+010 PHOTONS/SEC-CMT2 |
| PC GAIN (Q.E. = 0.3) = | 3.38E-002 (DC) |
| SHOT NOISE (Q.E. = 0.3) = | 1.14E-006 V/HZ^1/2 (AC) |
| BLIP NEP (Q.E. = 0.3) = | 1.43E-016 W/HZ^1/2 (DC) |
| BLIP QUAN. EFFIC. = | 1.71E+002 (AC) |

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<td>NOISE = 3.2E-6</td>
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<tr>
<td>BLACKBODY OUTPUT =</td>
<td>1.15E-013 WATTS</td>
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</tr>
<tr>
<td>SIG. CONDUCTANCE (DC) =</td>
<td>2.81E+002 MHOS/WATT</td>
<td>4.19E+007 PHOT/SEC</td>
</tr>
<tr>
<td>VOLT. RESP. (DC) =</td>
<td>8.31E+009 VOLT/WATT</td>
<td>5.41E-019 MHOS/PHOT/SEC</td>
</tr>
<tr>
<td>CURR. RESP. (DC) =</td>
<td>9.85E+001 AMP/WATT</td>
<td>2.77E-011 VOLT/PHOT/SEC</td>
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<tr>
<td>SIG. CONDUCTANCE (1HZ) =</td>
<td>1.92E+002 MHOS/WATT</td>
<td>2.78E-021 AMP/PHOT/SEC</td>
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<tr>
<td>VOLT. RESP. (1HZ) =</td>
<td>7.98E+009 VOLT/WATT</td>
<td>5.25E-019 MHOS/PHOT/SEC</td>
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<tr>
<td>CURR. RESP. (1HZ) =</td>
<td>9.40E-001 AMP/WATT</td>
<td>2.18E-011 VOLT/PHOT/SEC</td>
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<tr>
<td>NEP (1HZ) =</td>
<td>3.45E-016 WATT/HZ^1/2</td>
<td>2.57E-021 AMP/PHOT/SEC</td>
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<tr>
<td>DETECTOR RESISTANCE =</td>
<td>1.98E+010 OHMS</td>
<td>1.26E+006 PHOT/SEC-HZ^1/2</td>
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<tr>
<td>DETECTOR BIAS =</td>
<td>5.38E-003 VOLTS</td>
<td></td>
</tr>
</tbody>
</table>

The following are calculated from above data:

| BACKGROUND PHOTON FLUX DENSITY = | 2.21E+010 PHOTONS/SEC-CMT2 |
| PC GAIN (Q.E. = 0.3) = | 6.16E-002 (DC) |
| SHOT NOISE (Q.E. = 0.3) = | 1.12E-006 V/HZ^1/2 (AC) |
| BLIP NEP (Q.E. = 0.3) = | 1.39E-016 W/HZ^1/2 (DC) |
| BLIP QUAN. EFFIC. = | 4.90E-002 (AC) |
SAMPLE NO. GE:GA 4-5B1-1  RUN DATE 7/11/78  TEMP. = 3 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009  LOAD= 5.00E+010

BB TEMP= 60.3  BIAS= 0.0400  BIAS DELTA V= 0.0066
SIG DEL V= 0.00120  DC/1HZ= 1.04  NOISE= 4E-6
BLACKBODY OUTPUT= 1.15E-013 WATTS  4.21E+007 PHOT/SEC
SIG.CONDUCTANCE (DC)= 2.01E+002 MHOS/WATT  5.50E-019 MHOS/PHOT/SEC
VOLT. RESP. (DC)= 1.18E+010 VOLT/WATT  3.24E-011 VOLT/PHOT/SEC
CURR. RESP. (DC)= 1.36E+000 AMP/WATT  3.72E-021 AMP/PHOT/SEC
SIG.CONDUCTANCE (1HZ)= 1.91E+002 MHOS/WATT  5.25E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 1.13E+010 VOLT/WATT  3.11E-011 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 1.38E+000 AMP/WATT  3.55E-021 AMP/PHOT/SEC
NEP (1HZ)= 3.02E-016 WATT/HZ1/2  1.10E+005 PHOT/SEC-HZ1/2
DETECTOR RESISTANCE= 1.14E+018 OHMS
DETECTOR BIAS= 7.44E-003 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (O.E.-0.3)= 8.13E-002 (AC)  2.12E+010 PHOTONS/SEC-CMT2
SHOT NOISE (O.E.-0.3)= 1.56E-006 V/HZ1/2 (AC)  8.53E-002 (DC)
BLIP NEP (O.E.-0.3)= 1.37E-016 V/HZ1/2 (AC)  1.41E-006 V/HZ1/2 (DC)
QUAN. EFFIC. IF BLIP= 6.28E-002 (AC)  6.50E-002 (DC)

BB TEMP= 60.4  BIAS= 0.0500  BIAS DELTA V= 0.0063
SIG DEL V= 0.00141  DC/1HZ= 1.04  NOISE= 5.1E-6
BLACKBODY OUTPUT= 1.16E-013 WATTS  4.24E+007 PHOT/SEC
SIG.CONDUCTANCE (DC)= 1.93E+002 MHOS/WATT  5.50E-019 MHOS/PHOT/SEC
VOLT. RESP. (DC)= 1.38E+010 VOLT/WATT  3.78E-011 VOLT/PHOT/SEC
CURR. RESP. (DC)= 1.60E+000 AMP/WATT  4.40E-021 AMP/PHOT/SEC
SIG.CONDUCTANCE (1HZ)= 1.84E+002 MHOS/WATT  5.05E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 1.32E+010 VOLT/WATT  3.63E-011 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 1.53E+000 AMP/WATT  4.19E-021 AMP/PHOT/SEC
NEP (1HZ)= 3.33E-016 WATT/HZ1/2  1.21E+005 PHOT/SEC-HZ1/2
DETECTOR RESISTANCE= 1.12E+018 OHMS
DETECTOR BIAS= 9.12E-003 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (O.E.-0.3)= 9.60E-002 (AC)  2.26E+010 PHOTONS/SEC-CMT2
SHOT NOISE (O.E.-0.3)= 1.86E-006 V/HZ1/2 (AC)  1.01E-002 (DC)
BLIP NEP (O.E.-0.3)= 1.41E-016 V/HZ1/2 (AC)  1.90E-006 V/HZ1/2 (DC)
QUAN. EFFIC. IF BLIP= 5.37E-002 (AC)  1.44E-016 V/HZ1/2 (DC)
SAMPLE NO. GE:GA 4-581-1  RUN DATE 7/11/78      TEMP. = 3 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE = 6.84E-009     LOAD = 5.08E+010

BB TEMP= 60.7  BIAS= 0.0600     BIAS DELTA V= 0.0100
SIG DEL V= 0.00172 DC/1HZ= 1.04    NOISE= UNDEFINED
BLACKBODY OUTPUT= 1.94E+002 MHOS/WATT
SIG. CONDUCTANCE (DC)= 1.94E+002 MHOS/WATT
VOLT. RESP. (DC)= 1.65E+010 VOLT/WATT
CURR. RESP. (DC)= 1.93E+000 AMP/WATT
SIG. CONDUCTANCE (1HZ)= 1.94E+002 MHOS/WATT
VOLT. RESP. (1HZ)= 1.56E+010 VOLT/WATT
CURR. RESP. (1HZ)= 1.64E+000 AMP/WATT
DETECTOR RESISTANCE = 1.1E+010 OHMS
DETECTOR BIAS= 1.09E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY= 2.25E+010 PHOTONS/SEC-CMT2
PC GAIN (O.E. = 0.3)= 1.1E-001 (AC)
SHOOT NOISE (O.E. = 0.3)= 2.23E-006 V/HZ1/2 (AC)
BLIP NEP (O.E. = 0.3)= 1.44E-016 W/HZ1/2 (AC)

BB TEMP= 60.7  BIAS= 0.0700     BIAS DELTA V= 0.0120
SIG DEL V= 0.00202 DC/1HZ= 1.04    NOISE= 5.8E-6
BLACKBODY OUTPUT= 1.18E-013 WATTS
SIG. CONDUCTANCE (DC)= 1.82E+002 MHOS/WATT
VOLT. RESP. (DC)= 1.94E+010 VOLT/WATT
CURR. RESP. (DC)= 2.18E+000 AMP/WATT
SIG. CONDUCTANCE (1HZ)= 1.73E+002 MHOS/WATT
VOLT. RESP. (1HZ)= 1.85E+010 VOLT/WATT
CURR. RESP. (1HZ)= 2.06E+000 AMP/WATT
NEP (1HZ)= 2.69E-16 WATT/HZ1/2
DETECTOR RESISTANCE = 1.1E+010 OHMS
DETECTOR BIAS= 1.32E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY= 2.38E+010 PHOTONS/SEC-CMT2
PC GAIN (O.E. = 0.3)= 1.31E-001 (AC)
SHOOT NOISE (O.E. = 0.3)= 2.64E-006 V/HZ1/2 (AC)
BLIP NEP (O.E. = 0.3)= 1.42E-016 W/HZ1/2 (AC)
QUAN. EFFIC. IF BLIP= 8.33E-002 (AC)

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| Sample No. GE:GA 4-5B1-1 | Run Date 7/11/78 | Temp. = 3 K |
| sample from 40 to 130 microns step 0.2 | Load = 5.80E-013 |

**BB Temp** = 60.6  
**Bias** = 0.0800  
**Bias Delta V** = 0.0138

**Signal** = V = 0.00238  
**DC/1Hz** = 1  
**Noise** = 6.7E-6

**Blackbody Output** = 1.16E-013 Watts  
**Blackbody Conductance** (DC) = 1.87E+002 mhos/watt  
**Voltage Response (DC)** = 2.90E+010 V/watt  
**Current Response (DC)** = 2.56E+000 amp/watt  
**NEP (1Hz)** = 2.49E-016 Watt/Hz\(^{1/2}\)  
**Detector Resistance** = 1.17E+010 Ohms  
**Detector Bias** = 1.52E-002 Volts

The following are calculated from above data:

**Background Photon Flux Density** = 2.22E+010 photons/sec-cm\(^2\)  
**PC Gain** (Q.E. = 0.3) = 1.62E-001 (AC)  
**Shot Noise** (Q.E. = 0.3) = 3.16E-006 V/Hz\(^{1/2}\) (AC)  
**Quan. Effic. If Blip** = 9.14E-002 (AC)  
**Bias Delta V** = 0.0162

**Background Photon Flux Density** = 2.37E+010 photons/sec-cm\(^2\)  
**PC Gain** (Q.E. = 0.3) = 1.69E-001 (AC)  
**Shot Noise** (Q.E. = 0.3) = 3.56E-006 V/Hz\(^{1/2}\) (AC)  
**Quan. Effic. If Blip** = 7.00E-002 (AC)
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Run Date</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE:GA 4-5B1-1</td>
<td>7/11/78</td>
<td>3 K</td>
</tr>
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</table>

**Integrated BB from 40 to 130 Microns Step 0.2**

<table>
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<tr>
<th>ETENDEU</th>
<th>LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.84E-009</td>
<td>5.80E+010</td>
</tr>
</tbody>
</table>

**Sample Temperature**: 60.4

**Bias**: 0.1000

**Blackbody Output**: 1.16E+013 WATTS

**Signal Conductance (DC)**: 1.98E+002 MHOS/WATT

**Voltage Response (DC)**: 2.78E+010 VOLT/WATT

**Current Response (DC)**: 3.81E+008 AMP/WATT

**Signal Conductance (1Hz)**: 1.98E+002 MHOS/WATT

**Voltage Response (1Hz)**: 2.78E+010 VOLT/WATT

**Current Response (1Hz)**: 3.81E+008 AMP/WATT

**NEP (1Hz)**: 3.26E-016 WATT/HZ1/2

**Detector Resistance**: 1.00E+010 OHMS

**Detector Bias**: 1.67E-002 VOLTS

**Background Photon Flux Density**

**PC Gain (O.E. = 0.3)**: 1.89E-082 PHOTONS/SEC-CMT2

**Shot Noise (O.E. = 0.3)**: 3.26E-006 W/HZ1/2 (AC)

**Blip NEP (O.E. = 0.3)**: 1.43E-016 W/HZ1/2 (AC)

**Quan. Efficiency If Blip**

**Bias Delta V**: 0.0152

**Noise**: 9E-6

**Background Photon Flux Density**

**PC Gain (O.E. = 0.3)**: 1.89E-082 PHOTONS/SEC-CMT2

**Shot Noise (O.E. = 0.3)**: 3.26E-006 W/HZ1/2 (AC)

**Blip NEP (O.E. = 0.3)**: 1.43E-016 W/HZ1/2 (AC)

**Quan. Efficiency If Blip**

**Bias Delta V**: 0.0266

**Noise**: 1.8E-5

**Background Photon Flux Density**

**PC Gain (O.E. = 0.3)**: 3.86E+010 PHOTONS/SEC-CMT2

**Shot Noise (O.E. = 0.3)**: 5.81E-006 V/HZ1/2 (AC)

**Blip NEP (O.E. = 0.3)**: 1.40E-016 W/HZ1/2 (AC)

**Quan. Efficiency If Blip**

**Bias Delta V**: 4.12E-002 (DC)
SAMPLE NO. GE:GA 4-581-1  RUN DATE 7/11/78  TEMPERATURE = 3 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE = 5.84E-009  LOAD = 5.00E+010

BB TEMP = 60.4  BIAS = 0.3000  BIAS DELTA V = 0.0036
SIG DEL V = 0.00425  DC/1HZ = 9  NOISE = 2E-5
BLACKBODY OUTPUT = 4.16E-013 WATTS 4.24E+007 PHOT/SEC
SIG. CONDUCTANCE (DC) = 1.58E+002 MHOS/WATT 4.32E-019 MHOS/PHOT/SEC
VOLT. RESP. (DC) = 4.99E+010 VOLT/WATT 1.12E-010 VOLT/PHOT/SEC
CURR. RESP. (DC) = 5.96E+000 AMP/WATT 1.63E-020 AMP/PHOT/SEC
SIG. CONDUCTANCE (1HZ) = 1.78E+002 MHOS/WATT 4.87E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ) = 4.55E+010 VOLT/WATT 1.25E-010 VOLT/PHOT/SEC
CURR. RESP. (1HZ) = 6.71E+000 AMP/WATT 1.84E-020 AMP/PHOT/SEC
NEP (1HZ) = 3.92E-016 WATT/Hz1/2 1.43E+005 PHOT/SEC-HZ1/2
DETECTOR RESISTANCE = 8.04E+009 OHMS
DETECTOR BIAS = 4.15E-002 Volts

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY = 3.84E+010 PHOTONS/SEC-CMT2
PC GAIN (O.E. = 0.3) = 4.21E-010 (AC) 3.74E-001 (DC)
SHOT NOISE (O.E. = 0.3) = 7.44E-006 V/Hz1/2 (AC) 7.01E-006 V/Hz1/2 (DC)
BLIP NEP (O.E. = 0.3) = 1.64E-016 W/Hz1/2 (AC) 1.54E-016 W/Hz1/2 (DC)
QUAN. EFFIC. IF BLIP = 5.23E-002 (AC) 4.64E-002 (DC)

BB TEMP = 60.3  BIAS = 0.4000  BIAS DELTA V = 0.00456
SIG DEL V = 0.00475  DC/1HZ = 9  NOISE = 2.1E-5
BLACKBODY OUTPUT = 1.15E-013 WATTS 4.21E+007 PHOT/SEC
SIG. CONDUCTANCE (DC) = 1.61E+002 MHOS/WATT 4.41E-019 MHOS/PHOT/SEC
VOLT. RESP. (DC) = 4.58E+010 VOLT/WATT 1.26E-010 VOLT/PHOT/SEC
CURR. RESP. (DC) = 7.34E+000 AMP/WATT 2.01E-020 AMP/PHOT/SEC
SIG. CONDUCTANCE (1HZ) = 1.81E+002 MHOS/WATT 4.96E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ) = 5.10E+010 VOLT/WATT 1.40E-010 VOLT/PHOT/SEC
CURR. RESP. (1HZ) = 8.26E+000 AMP/WATT 2.26E-020 AMP/PHOT/SEC
NEP (1HZ) = 3.69E-016 WATT/Hz1/2 1.35E+005 PHOT/SEC-HZ1/2
DETECTOR RESISTANCE = 7.16E+009 OHMS
DETECTOR BIAS = 5.01E-002 Volts

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY = 4.22E+010 PHOTONS/SEC-CMT2
PC GAIN (O.E. = 0.3) = 5.18E-001 (AC) 4.46E-001 (DC)
SHOT NOISE (O.E. = 0.3) = 8.68E-006 V/Hz1/2 (AC) 8.18E-006 V/Hz1/2 (DC)
BLIP NEP (O.E. = 0.3) = 1.70E-016 W/Hz1/2 (AC) 1.60E-016 W/Hz1/2 (DC)
QUAN. EFFIC. IF BLIP = 6.37E-002 (AC) 5.66E-002 (DC)
SAMPLE NO. GE:GA 4-5B1-1 RUN DATE 7/11/78 TEMP.=3 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009 LOAD= 5.00E+010

BB TEMP= 68.3 BIAS=0.5000 BIAS DELTA V=0.0520
SIG DEL V=0.00570 DC/1HZ= .9 NOISE=2.2E-5
BLACKBODY OUTPUT= 1.15E-013 WATTS 4.21E+007 PHOT/SEC
SIG.CONDUCTANCE( DC)= 1.87E+002 MHOS/WATT 5.12E-019 MHOS/PHOT/SEC
VOLT. RESP. ( DC)= 5.50E+010 VOLT/WATT 1.51E-018 VOLT/PHOT/SEC
CURR. RESP. ( DC)= 9.71E+008 AMP/WATT 2.66E-020 AMP/PHOT/SEC
SIG.CONDUCTANCE(1HZ)= 2.10E+002 MHOS/WATT 5.76E-019 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 6.12E+010 VOLT/WATT 1.68E-018 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 1.09E+001 AMP/WATT 3.00E-020 AMP/PHOT/SEC
NEP (1HZ)= 3.20E-016 WATT/Hz1/2 1.17E+005 PHOT/SEC-Hz1/2
DETECTOR RESISTANCE = 6.45E+009 OHMS
DETECTOR BIAS= 5.71E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 6.86E-001 (AC) 6.86E-001 (DC)
SHOT NOISE(Q.E.=0.3)= 1.03E-006 V/Hz1/2 (AC) 9.66E-006 V/Hz1/2 (DC)
BLIP NEP (Q.E.=0.3)= 1.66E-016 W/Hz1/2 (AC) 1.58E-016 W/Hz1/2 (DC)
QUAN.EFFIC.IF BLIP= 8.22E-002 (AC) 7.29E-002 (DC)
SAMPLE NO. GE:GA 4-5B1-1	 RUN DATE 7/11/78
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009	 LOAD= 7.00E+010

BB TEMP= 59.7	 BIAS= 0.0050
SIG DEL V= 0.00148	 DC/1HZ= 4.7
BLACKBODY OUTPUT= 1.11E-013 WATTS
SIG.CONDUCTANCE( DC)= 7.14E+001 MHOS/WATT
VOLT. RESP. ( DC)= 2.17E+010 VOLT/WATT
CURR.RESP. ( DC)= 3.07E-001 AMP/WATT
SIG.CONDUCTANCE (1HZ)= 1.08E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 3.35E+009 VOLT/WATT
CURR.RESP. (1HZ)= 4.62E-002 AMP/WATT
NEP (1HZ)= 5.65E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 1.20E+012 OHMS
DETECTOR BIAS= 4.73E-003 VOLTS

BIAS DELTA V= 0.0043
NOISE= 1.9E-6
4.07E+007 PHOT/SEC
1.95E-019 MHOS/PHOT/SEC
5.93E-011 VOLT/PHOT/SEC
8.39E-022 AMP/PHOT/SEC
9.14E-012 VOLT/PHOT/SEC
2.07E+005 PHOT/SEC/HZ1/2

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 2.89E-003 (AC)
SHOT NOISE (Q.E.=0.3)= 1.62E-007 V/HZ1/2 (AC)
BLIP NEP (Q.E.=0.3)= 4.85E-017 W/HZ1/2 (AC)
QUAN.EFFIC.IF BLIP= 2.21E-003 (AC)

BB TEMP= 59.6	 BIAS= 0.0100
SIG DEL V= 0.00300	 DC/1HZ= 4.7
BLACKBODY OUTPUT= 1.10E-013 WATTS
SIG.CONDUCTANCE ( DC)= 7.14E+001 MHOS/WATT
VOLT. RESP. ( DC)= 4.45E+010 VOLT/WATT
CURR.RESP. ( DC)= 6.21E-001 AMP/WATT
SIG.CONDUCTANCE (1HZ)= 1.08E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 6.83E+000 VOLT/WATT
CURR.RESP. (1HZ)= 9.33E-002 AMP/WATT
NEP (1HZ)= 2.77E-016 WATT/HZ1/2
DETECTOR RESISTANCE = 1.48E+012 OHMS
DETECTOR BIAS= 9.55E-003 VOLTS

BIAS DELTA V= 0.0087
NOISE= 1.9E-6
4.07E+007 PHOT/SEC
1.95E-019 MHOS/PHOT/SEC
5.93E-011 VOLT/PHOT/SEC
8.39E-022 AMP/PHOT/SEC
9.14E-012 VOLT/PHOT/SEC
2.07E+005 PHOT/SEC/HZ1/2

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 5.83E-003 (AC)
SHOT NOISE (Q.E.=0.3)= 2.98E-007 V/HZ1/2 (AC)
BLIP NEP (Q.E.=0.3)= 4.36E-017 W/HZ1/2 (AC)
QUAN.EFFIC.IF BLIP= 7.44E-003 (AC)

4.61E-008 PHOTONS/SEC-CMT2
1.92E-002 (DC)
4.16E-007 V/HZ1/2 (AC)
1.25E-016 W/HZ1/2 (DC)
1.92E-002 (DC)
4.95E-002 (DC)

5.68E-008 PHOTONS/SEC-CMT2
1.92E-002 (DC)
4.18E-007 V/HZ1/2 (AC)
1.25E-016 W/HZ1/2 (DC)
1.92E-002 (DC)
4.95E-002 (DC)

4.61E-008 PHOTONS/SEC-CMT2
1.92E-002 (DC)
4.16E-007 V/HZ1/2 (AC)
1.25E-016 W/HZ1/2 (DC)
1.92E-002 (DC)
4.95E-002 (DC)
SAMPLE NO. GE:GA 4-5B1-1  RUN DATE 7/11/78  TEMP.=2.5 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009  LOAD= 7.00E+010

BB TEMP= 59.4  BIAS=0.0200  BIAS DELTA V=0.0168
SIG DEL V=0.00600  DC/1HZ=4.8  NOISE=1.8E-6
BLACKBODY OUTPUT= 1.09E-013 WATTS
SIG. CONDUCTANCE (DC)= 7.89E+001 MHOS/WATT
VOLT. RESP. (DC)= 9.02E+010 VOLT/WATT
CURR. RESP. (DC)= 1.33E+000 AMP/WATT
SIG. CONDUCTANCE (1HZ)= 1.14E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 1.35E+010 VOLT/WATT
CURR. RESP. (1HZ)= 1.92E-001 AMP/WATT
NEP (1HZ)= 1.32E-016 WATT/Hz^1/2
DETECTOR RESISTANCE = 8.48E+011 OHMS
DETECTOR BIAS= 1.85E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 1.29E-002 (AC)
SHOT NOISE (Q.E.=0.3)= 7.63E-007 V/Hz^1/2 (AC)
BLIP NEP (Q.E.=0.3)= 5.64E-017 W/Hz^1/2 (AC)
QUAN. EFFIC. IF BLIP= 5.46E-002 (AC)

BB TEMP= 59.0  BIAS=0.0400  BIAS DELTA V=0.0337
SIG DEL V=0.01400  DC/1HZ=4.8
BLACKBODY OUTPUT= 1.06E-013 WATTS
SIG. CONDUCTANCE (DC)= 1.03E+002 MHOS/WATT
VOLT. RESP. (DC)= 2.35E+011 VOLT/WATT
CURR. RESP. (DC)= 3.48E+000 AMP/WATT
SIG. CONDUCTANCE (1HZ)= 1.38E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 3.28E+010 VOLT/WATT
CURR. RESP. (1HZ)= 4.64E-001 AMP/WATT
NEP (1HZ)= 5.75E-017 WATT/Hz^1/2
DETECTOR RESISTANCE = 8.74E+011 OHMS
DETECTOR BIAS= 3.70E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 2.39E-002 (AC)
SHOT NOISE (Q.E.=0.3)= 1.65E-006 V/Hz^1/2 (AC)
BLIP NEP (Q.E.=0.3)= 5.03E-017 W/Hz^1/2 (AC)
QUAN. EFFIC. IF BLIP= 2.30E-001 (AC)
SAMPLE NO. GE:GA 4-581-1  RUN DATE 7/11/78  TEMP.=2.5 K
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009  LOAD= 7.00E+010

BB TEMP= 50.2  BIAS=0.0500  BIAS DELTA V=0.0416
SIG DEL V=0.01810  NOISE=2E-6
BLACKBODY OUTPUT= 1.96E-013 WATTS
SIG.CONGDUCTANCE( DC)= 1.12E+002 MHOS/WATT
VOLT. RESP. ( DC)= 3.07E+011 VOLT/WATT
CURR. RESP. ( DC)= 4.65E+000 AMP/WATT
SIG.CONGDUCTANCE(1HZ)= 1.36E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 4.02E+011 VOLT/WATT
CURR. RESP. (1HZ)= 5.75E-001 AMP/WATT
NEP (1HZ)= 4.94E-017 WATT/Hz^1/2
DETECTOR RESISTANCE = 7.47E+011 OHMS
DETECTOR BIAS= 4.57E+002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 3.5E-002( AC)
SHOT NOISE(Q.E.=0.3)= 2.16E-006 V/Hz^1/2 (AC)
BLIP NEP (Q.E.=0.3)= 5.44E-017 W/Hz^1/2 (AC)
QUAN.EFFIC.IF BLIP= 3.64E-001 (AC)

BB TEMP= 50.2  BIAS=0.0600  BIAS DELTA V=0.0495
SIG DEL V=0.02100  NOISE=2.5E-6
BLACKBODY OUTPUT= 1.03E-013 WATTS
SIG.CONGDUCTANCE( DC)= 1.13E+002 MHOS/WATT
VOLT. RESP. ( DC)= 3.6E+011 VOLT/WATT
CURR. RESP. ( DC)= 5.5E+000 AMP/WATT
SIG.CONGDUCTANCE(1HZ)= 1.42E+001 MHOS/WATT
VOLT. RESP. (1HZ)= 4.86E+011 VOLT/WATT
CURR. RESP. (1HZ)= 7.03E-001 AMP/WATT
NEP (1HZ)= 5.10E-017 WATT/Hz^1/2
DETECTOR RESISTANCE = 8.79E+011 OHMS
DETECTOR BIAS= 5.44E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (Q.E.=0.3)= 4.37E-002( AC)
SHOT NOISE(Q.E.=0.3)= 2.73E-006 V/Hz^1/2 (AC)
BLIP NEP (Q.E.=0.3)= 5.62E-017 W/Hz^1/2 (AC)
QUAN.EFFIC.IF BLIP= 3.65E-001 (AC)

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SAMPLE NO. GE:GA 4-581-1  RUN DATE 7/11/78
BB INTEGRATED FROM 40 TO 130 MICRONS STEP 0.2
ETENDUE= 6.84E-009  LOAD= 7.00E+010

BB TEMP= 58.5  BIAS=0.0800  BIAS DELTA V=0.0620
SIG DEL V=0.82700  DC/1HZ=5.2  NOISE=5E-6
BLACKBODY OUTPUT= 1.83E-013 WATTS  3.79E+007 PHOT/SEC
SIG.CONDUCTANCE( DC)= 1.26E+002 MHOS/WATT  3.41E-019 MHOS/PHOT/SEC
VOLT. RESP. ( DC)= 4.59E+011 VOLT/WATT  1.24E-009 VOLT/PHOT/SEC
CURR. RESP. ( DC)= 7.80E+000 AMP/WATT  2.12E-020 AMP/PHOT/SEC
SIG.CONDUCTANCE(1HZ)= 1.49E+001 MHOS/WATT  4.05E-020 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 5.97E+010 VOLT/WATT  1.62E-010 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 9.24E-001 AMP/WATT  2.51E-021 AMP/PHOT/SEC
NEP (1HZ)= 8.26E-017 WATT/HZ1/2  3.04E+004 PHOT/SEC-HZ1/2
DETECTOR RESISTANCE = 4.02E+011 OHMS
DETECTOR BIAS= 6.81E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (O.E.=0.3)= 5.74E-002 ( AC)
SHOT NOISE(O.E. =0.3)= 4.28E-006 V/HZ1/2 (AC)
BLIP NEP (O.E. =0.3)= 7.17E-017 W/HZ1/2 (AC)
QUAN.EFFIC.IF BLIP= 2.26E-001 (AC)

BB TEMP= 58.6  BIAS=0.1800  BIAS DELTA V=0.0663
SIG DEL V=0.82600  DC/1HZ=5.3  NOISE=6E-6
BLACKBODY OUTPUT= 1.84E-013 WATTS  3.81E+007 PHOT/SEC
SIG.CONDUCTANCE( DC)= 1.22E+002 MHOS/WATT  3.32E-019 MHOS/PHOT/SEC
VOLT. RESP. ( DC)= 3.66E+011 VOLT/WATT  1.05E-009 VOLT/PHOT/SEC
CURR. RESP. ( DC)= 8.10E+000 AMP/WATT  2.29E-020 AMP/PHOT/SEC
SIG.CONDUCTANCE(1HZ)= 1.51E+001 MHOS/WATT  4.11E-020 MHOS/PHOT/SEC
VOLT. RESP. (1HZ)= 5.58E+010 VOLT/WATT  1.49E-010 VOLT/PHOT/SEC
CURR. RESP. (1HZ)= 1.00E+000 AMP/WATT  2.72E-021 AMP/PHOT/SEC
NEP (1HZ)= 1.42E-016 WATT/HZ1/2  5.24E+004 PHOT/SEC-HZ1/2
DETECTOR RESISTANCE = 1.88E+011 OHMS
DETECTOR BIAS= 7.29E-002 VOLTS

THE FOLLOWING ARE CALCULATED FROM ABOVE DATA
BACKGROUND PHOTON FLUX DENSITY=
PC GAIN (O.E.=0.3)= 6.24E-002 ( AC)
SHOT NOISE(O.E. =0.3)= 5.77E+006 V/HZ1/2 (AC)
BLIP NEP (O.E. =0.3)= 1.86E-016 W/HZ1/2 (AC)
QUAN.EFFIC.IF BLIP= 1.63E-001 (AC)

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