SPECIAL NO. R719

(REVISION STATUS)

REV.	DATE	DESCRIPTION	PAGE NO.	ENGINEER
A	6-19-98	ORIGINAL RELEASE	ALL	V. LAKNER

COMMENTS:

DATE:06-22-1998
REVISION: A
W.O. NO: 65906
CUSTOMER:IRCON GMBH.
LOCATION:GERMANY

INFRARAIL SPECIAL NUMBER R719

PURPOSE AND DESCRIPTION:

CUSTOMER REQUIRES A INFRARAIL E SERIES, WITH A SPECIAL TEMPERATURE RANGE AND A SPECIAL OPTICAL RESOLUTION OF D/50 AT 30 INCHES. DETAILS ARE AS FOLLOWS :

MODEL: DNE99-99C
RANGE: 800° - 1400° C
OPTICAL RESOLUTION: D/50 AT 30 INCHES

GENERALITY OF APPLICATION AND RESTRICTIONS:

UNRESTRICTED: SUITABLE FOR USE WITH ALL STANDARD OPTIONS.

WRITTEN BY: J. LAKNER

APPROVED BY: DATE: 6-22-98

INFRARAIL SPECIAL NUMBER R719

REVISION: A
DATE:06-22-1998

PRODUCTION INSTRUCTIONS:

START WITH A MODEL DNE31-13C ELECTRONICS MODULE, AND INSTALL M1 MODULE AS PER BILL OF MATERIAL ON PAGE 3.

START WITH A MODEL DNE31-13C SENSOR AND MAKE THE FOLLOWING CHANGES:

1. USE DETECTOR FIELD STOP 45132-3(0.044 " I.D.).

CALIBRATION INSTRUCTIONS:

CALIBRATE AS PER STANDARD.
Isc @ Tbb 1400° C = 16.302 uA.
Isc @ Tbb 800° C = 0.079 uA

MANUAL INSTRUCTIONS:

GENERIC INFRARAIL SERIES MANUAL.

INFRARAIL SPECIAL NUMBER R719 CONTINUED,

BILL OF MATERIAL

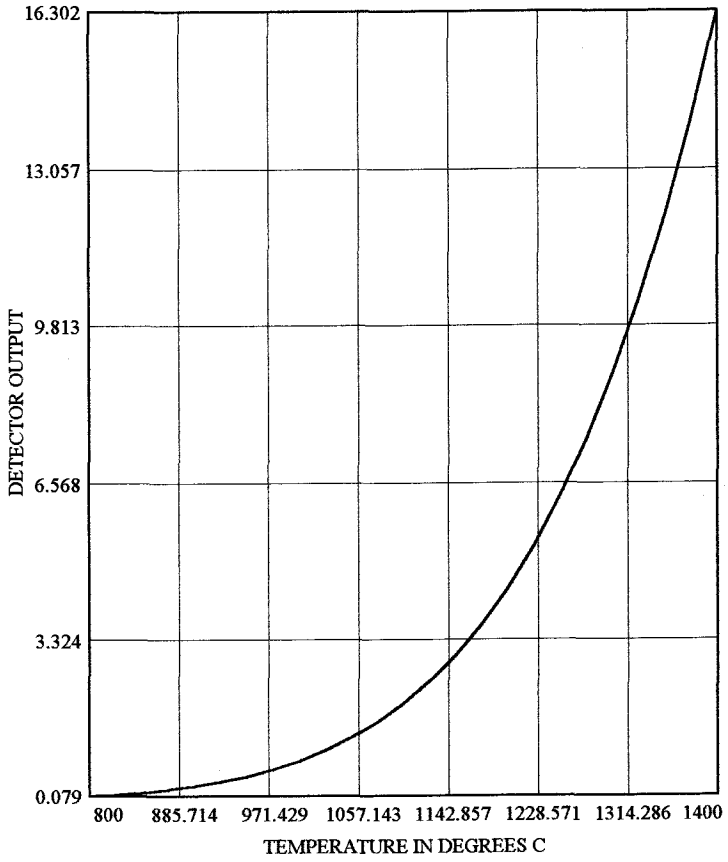
MODULE M1 REFERENCE: DWG.NO.C11194

SYMBOL	PART NO.	DESCRIPTION		
R1	101963011	RESISTOR	196 Kohm	METAL FILM 1/4W 1%
R44	101872011	RESISTOR	18.7 Kohm	METAL FILM 1/4W 1%
R54	101153011	RESISTOR	115 Kohm	METAL FILM 1/4W 1%
R45	101472011	RESISTOR	14.7 Kohm	METAL FILM 1/4W 1%
R55	105762011	RESISTOR	57.6 Kohm	METAL FILM 1/4W 1%
R46	109761011	RESISTOR	9.76 Kohm	METAL FILM 1/4W 1%
R56	109312011	RESISTOR	93.1 Kohm	METAL FILM 1/4W 1%
R47	106341011	RESISTOR	6.34 Kohm	METAL FILM 1/4W 1%
R57	101543011	RESISTOR	154 Kohm	METAL FILM 1/4W 1%
R48	103921011	RESISTOR	3.92 Kohm	METAL FILM 1/4W 1%
R58	102553011	RESISTOR	255 Kohm	METAL FILM 1/4W 1%
R49	102371011	RESISTOR	2.37 Kohm	METAL FILM 1/4W 1%
R59	104423011	RESISTOR	442 Kohm	METAL FILM 1/4W 1%
R50	101371011	RESISTOR	1.37 Kohm	METAL FILM 1/4W 1%
R60	107873011	RESISTOR	787 Kohm	METAL FILM 1/4W 1%
R51	107680011	RESISTOR	768 ohm	METAL FILM 1/4W 1%
R61	101434011	RESISTOR	1.43 Mohm	METAL FILM 1/4W 1%
R52	104120011	RESISTOR	412 ohm	METAL FILM 1/4W 1%
R53	104320011	RESISTOR	432 ohm	METAL FILM 1/4W 1%
R62	102674011	RESISTOR	2.67 Mohm	METAL FILM 1/4W 1%

INFRARAIL SPECIAL NUMBER R719
TEMPERATURE RANGE: 800 TO 1400 DEGREES C
SPECTRUM: 0.70 TO 1.00 MICRONS

TEMPERATURE DEGREES C	SENSOR OUTPUT IN uAMPS	INDICATOR OUTPUT mAMPS
800.0	0.0792	4.000
825.0	0.1105	4.667
850.0	0.1519	5.333
875.0	0.2061	6.000
900.0	0.2762	6.667
925.0	0.3657	7.333
950.0	0.4790	8.000
975.0	0.6210	8.667
1000.0	0.7972	9.333
1025.0	1.0140	10.000
1050.0	1.2786	10.667
1075.0	1.5990	11.333
1100.0	1.9842	12.000
1125.0	2.4441	12.667
1150.0	2.9895	13.333
1175.0	3.6324	14.000
1200.0	4.3857	14.667
1225.0	5.2634	15.333
1250.0	6.2807	16.000
1275.0	7.4538	16.667
1300.0	8.8000	17.333
1325.0	10.3377	18.000
1350.0	12.0867	18.667
1375.0	14.0675	19.333
1400.0	16.3020	20.000

TC	OUTPUT(TC)
1400	16.302
1375	14.068
1350	12.087
1325	10.338
1300	8.8
1275	7.454
1250	6.281
1225	5.264
1200	4.386
1175	3.633
1150	2.99
1125	2.444
1100	1.984
1075	1.599
1050	1.279
1025	1.014
1000	0.797
975	0.621
950	0.479
925	0.366
900	0.276
875	0.206
850	0.152
825	0.111
800	0.079



$$TC := TCHIGH, TCHIGH - TCSTEP .. TCLOW$$

$$TK(TC) := (TC + 273.15)$$

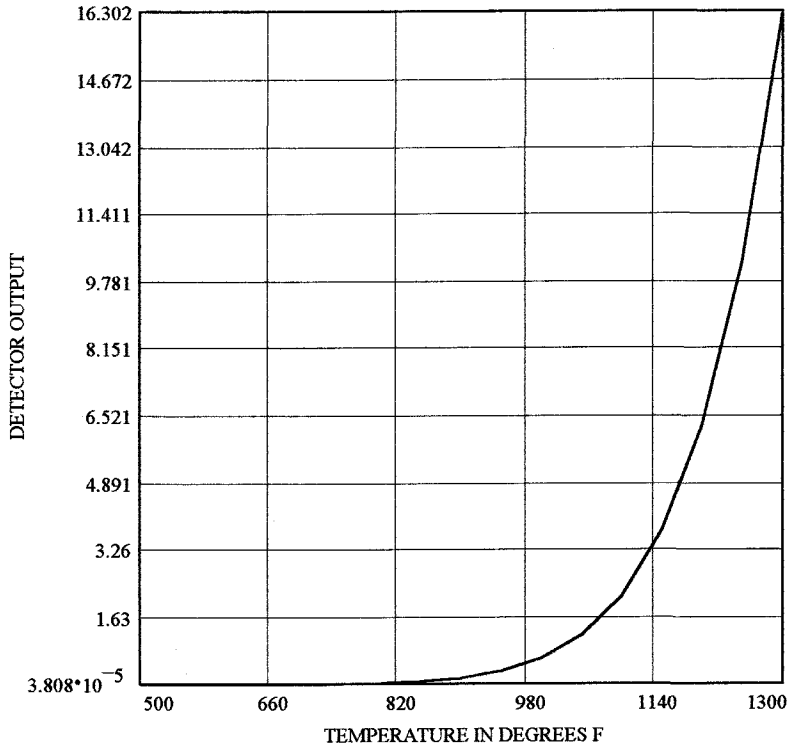
$$Q(TC,\lambda) := \frac{3.7469147 \cdot 10^{-16}}{\lambda^5 \cdot \exp\left(\frac{1.4388 \cdot 10^{-2}}{\lambda \cdot TK(TC)} - 1\right)} \qquad S(TC) := \int_{\lambda_1}^{\lambda_2} Q(TC,\lambda)\, d\lambda$$

$$S(TCHIGH) := \int_{\lambda_1}^{\lambda_2} Q(TCHIGH,\lambda)\, d\lambda$$

$$R(TC) := \frac{S(TC)}{S(TCHIGH)} \cdot IscFS$$

$$OUTPUT(TC) := R(TC)$$

TF	OUTPUT(TF)
1300	16.302
1250	10.244814
1200	6.267454
1150	3.723339
1100	2.142013
1050	1.189582
1000	0.635474
950	0.325208
900	0.158691
850	0.07344
800	0.032033
750	0.013073
700	0.00495
650	0.001721
600	0.000543
550	0.000153
500	0.000038



Ircon, Inc.
j. lakner

RELATIONSHIPS:

EVALUATED WAVELENGTHS USED: $\lambda_1 := .70 \cdot 10^{-6}$ $\lambda_2 := 1.0 \cdot 10^{-6}$

TEMPERATURE RANGE IN DEGREES F: TFLOW := 500 TFHIGH := 1300

TEMPERATURE RANGE IN DEGREES C: TCLOW := 800 TCHIGH := 1400

TARGET EMISSIVITY VARIABLE (E = 1.0 FOR CURRENT EXAMPLE) ETARGET := 1.0 **SET VARIABLE TO TARGET EMISSIVITY !!**

DETECTOR FULL SCALE CURRENT AT EMISSIVITY = 1.0: IscFS := 16.30200 **CURRENT IN MICROAMPS** 2.3888888

TEMPERATURE CONVERSION CENTIGRADE TO KELVIN:

DISPLAYED TEMPERATURE STEP SIZE USED: TFSTEP := 50

TCSTEP := 25

PLANCK CALCULATIONS TO DETERMINE DETECTOR CURRENT OVER TEMPERATURE SPAN AND GIVEN WAVELENGTHS:

CREATE TEMPERATURE RANGE VARIABLE:

$$TF := TFHIGH, TFHIGH - TFSTEP .. TFLOW$$

$$TK(TF) := \left[(TF - 32) \cdot \frac{5}{9} + 273.15 \right]$$

$$Q(TF, \lambda) := \frac{3.7469147 \cdot 10^{-16}}{\lambda^5 \cdot \exp\left(\frac{1.4388 \cdot 10^{-2}}{\lambda \cdot TK(TF)} - 1 \right)} \qquad S(TF) := \int_{\lambda_1}^{\lambda_2} Q(TF, \lambda)\, d\lambda$$

$$S(TFHIGH) := \int_{\lambda_1}^{\lambda_2} Q(TFHIGH, \lambda)\, d\lambda$$

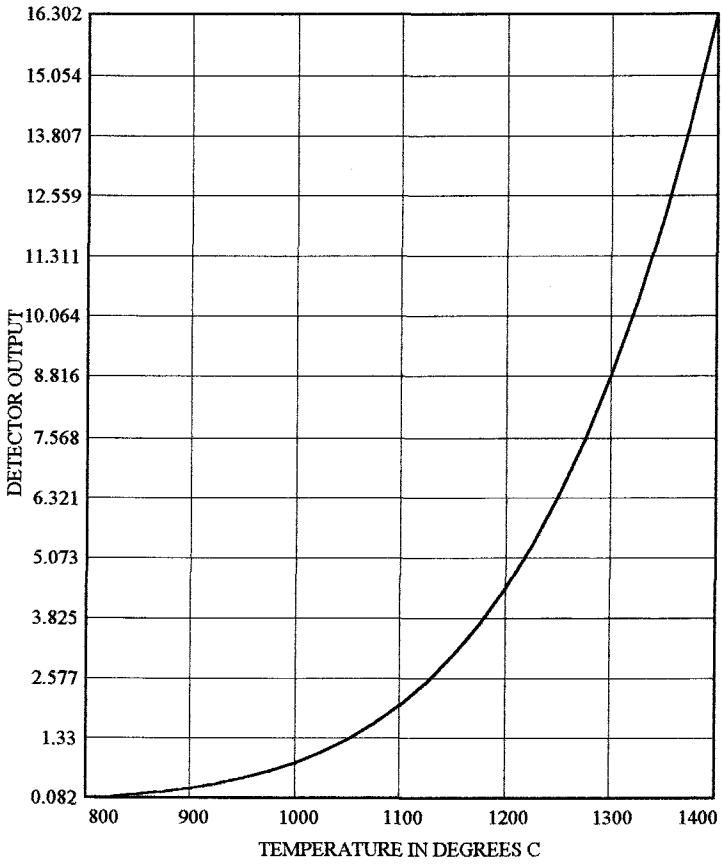
$$R(TF) := \frac{S(TF)}{S(TFHIGH)} \cdot IscFS \qquad OUTPUT(TF) := R(TF)$$

CONTINUED

Temp Isc(uA)

TC OUTPUT(TC)

1400	16.302
1375	14.084
1350	12.116
1325	10.376
1300	8.843
1275	7.5
1250	6.328
1225	5.31
1200	4.431
1175	3.675
1150	3.029
1125	2.48
1100	2.016
1075	1.627
1050	1.303
1025	1.035
1000	0.815
975	0.636
950	0.491
925	0.376
900	0.284
875	0.212
850	0.157
825	0.114
800	0.082



TC	OUTPUT(TC)
1400	16.302
1375	14.084
1350	12.116
1325	10.376
1300	8.843
1275	7.5
1250	6.328
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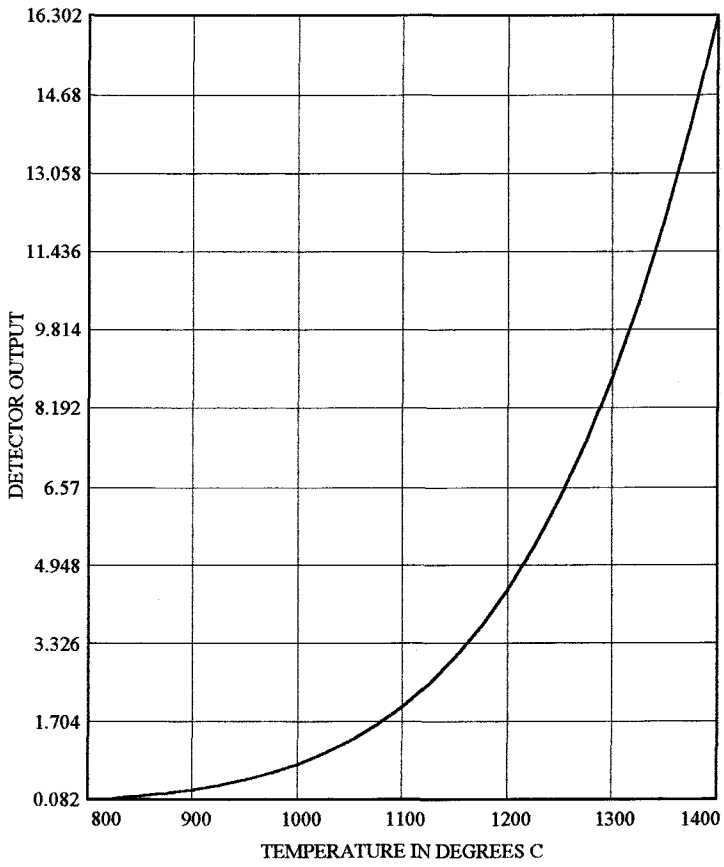


Acknowledgment

IRCON

IRCON, INC.
7300 N. Natchez Ave.
Niles, IL 60714 USA

Phone 847-967-5151
Toll Free 800-323-7660
Fax 847-647-0948

SCHEDULED SHIPPING WEEK ENDING — MONTH/DAY/YEAR: 10/10/98

SOLD TO — CUSTOMER NO.: 008241

OUR ORDER NO.: SA 065907/00 — ORDER DATE MONTH/DAY/YEAR: 06/17/98

YOUR ORDER NO.: D-6324

IRCON GMBH
POSTFACH 1361, D-65221
TAUNUSSTEIN, GRILLPARZERSTR 40
GERMANY

TERMS: NET 30 — X OTHER: NET 60

F.O.B.: X NILES, ILLINOIS

SHIPPING ADDRESS — TAX CODE: NO TAX

CODE: 999 .00

VIA: MSAS — PPD.: X — COLL.:

SPECIAL SHIPPING INSTRUCTIONS: TEST CERTIFICATES REQUIRED

BLUFF STEEL & FABRICATION INC.
ROUTE 7
ATTN: DARREYL WALKER
POPLAR BLUFF MO 63901

8/10/98 PAGE 1 **CHANGED ORDER**

LINE NO.	PART NO.	QTY.	DESCRIPTION	UNIT MEAS	DISCOUNT %	PRICE EACH U.S. DOLLAR	AMOUNT U.S. DOLLAR
01		36	INFRARAIL SENSING HEAD W/O CBL MODEL DNE99-99C SERIAL NBR 002479 THRU 002514 ********** * * SPECIAL ,Z999 * ********** !!!!!!!!!!WARNING!!!!!!!!!! ** SPL # TO BE DETERMINED ** ** SEE ENGINEERING DEPT. **	EA		604.15	21749.40
02		36	INFRARAIL SENSING HEAD W/O CBL MODEL DNE99-99C SERIAL NBR 002515 THRU 002550 ********** * * SPECIAL Z999 * ********** !!!!!!!!!!WARNING!!!!!!!!!! ** SPL # TO BE DETERMINED ** ** SEE ENGINEERING DEPT. ** ~~(CONTINUED ON NEXT~~ PAGE)	EA		604.15	21749.40

Eng Dept Request Body Special No R719 - Temp range 700 - 1400 C D/50 at 30 inches RWB 8/10/98 Same as Item 1.

THIS ORDER IS ACCEPTED SUBJECT TO TERMS AND CONDITIONS SHOWN ON THIS AND THE REVERSE SIDE

IF TAX EXEMPT, PLEASE PROVIDE COPY OF EXEMPTION OR DIRECT PAYMENT CERTIFICATE.

Ship To: IRCON, INC.
7300 N. NATCHEZ AVE.
NILES, IL 60714 USA

ORIGINAL

Acknowledgment

IRCON

IRCON, INC.
7300 N. Natchez Ave.
Niles, IL 60714 USA

Phone 847-967-5151
Toll Free 800-323-7660
Fax 847-647-0948

SCHEDULED SHIPPING WEEK MONTH/DAY/YEAR
ENDING 08/08/98

SOLD TO

IRCON GMBH
POSTFACH 1361, D-65221
TAUNUSSTEIN, GRILLPARZERSTR 40
GERMANY

CUSTOMER NO. 008241

OUR ORDER NO. SA 065906/00

ORDER DATE MONTH/DAY/YEAR 06/17/98

YOUR ORDER NO. D-6323

TERMS NET 30 — OTHER X NET 60

F.O.B. X NILES, ILLINOIS

SHIPPING ADDRESS

WILL ADVISE

TAX CODE NO TAX

CODE 999 .00

VIA MSAS

PPD. X COLL.

SPECIAL SHIPPING INSTRUCTIONS

6/17/98 PAGE 1

LINE NO.	PART NO.	QTY.	DESCRIPTION	UNIT MEAS	DISCOUNT %	PRICE EACH U.S. DOLLAR XXXXXXXX	AMOUNT U.S. DOLLAR XXXXXXXX
			Emp Chg # 10.9a				
01		42	INFRARAIL SENSING HEAD W/O CBL MODEL DNE99-99C SERIAL NBR 002395 THRU 002436 ********** * * * SPECIAL Z999 New Special E-Head with * D/50 Resolution, ********** !!!!!!!!!!WARNING!!!!!!!!!! ** SPL # TO BE DETERMINED ** ** SEE ENGINEERING DEPT. ** 30 INCH FOCUS and	EA		604.15	25374.30
02		42	INFRARAIL SENSING HEAD W/O CBL MODEL DNE99-99C SERIAL NBR 002437 THRU 002478 ********** * * * SPECIAL Z999 Same as Item 1 * * ********** !!!!!!!!!!WARNING!!!!!!!!!! ** SPL # TO BE DETERMINED ** ** SEE ENGINEERING DEPT. ** ~~(CONTINUED ON NEXT PAGE)~~	EA		604.15 Temp range 1400 C full 800C-2.5. Scale	25374.30

6/19

THIS ORDER IS ACCEPTED SUBJECT TO TERMS AND CONDITIONS SHOWN ON THIS AND THE REVERSE SIDE

IF TAX EXEMPT, PLEASE PROVIDE COPY OF EXEMPTION OR DIRECT PAYMENT CERTIFICATE.

Ship To: IRCON, INC.
7300 N. NATCHEZ AVE.
NILES, IL 60714 USA

ORIGINAL

TO: ~~Werner~~ Dick

Page 1/2

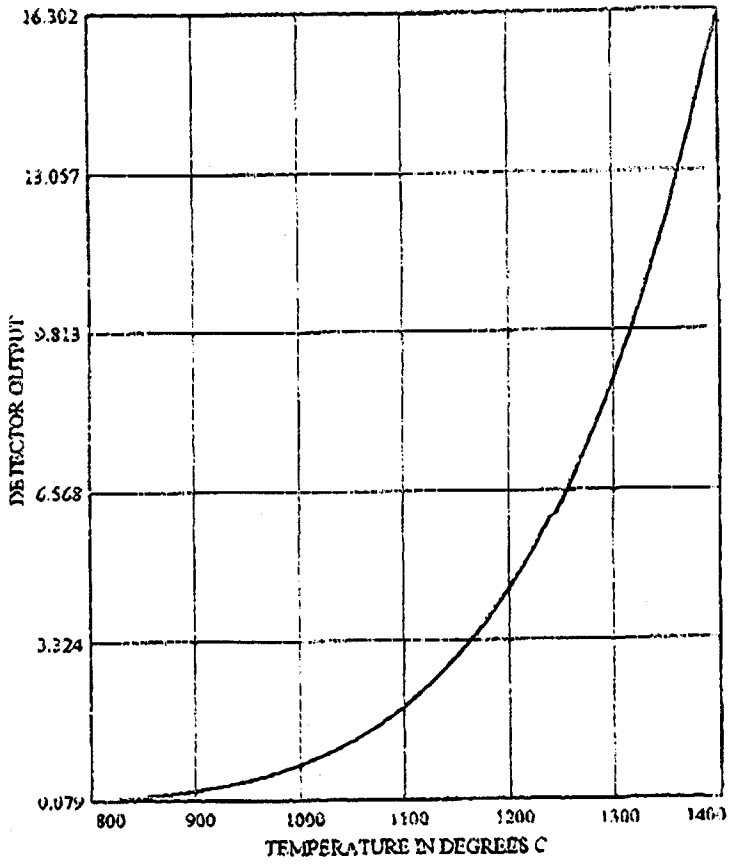
Re P.O.P-63273

Here is output for 1400 C

page 4
Ircon, Inc.
j. lakner

Isc uA

TC	OUTPUT(TC)
1400	16.302
1375	14.068
1350	12.087
1325	10.338
1300	8.8
1275	7.454
1250	6.281
1225	5.264
1200	4.386
1175	3.633
1150	2.99
1125	2.444
1100	1.984
1075	1.599
1050	1.279
1025	1.014
1000	0.797
975	0.621
950	0.479
925	0.366
900	0.276
875	0.206
850	0.152
825	0.111
800	0.079



Dick, please let me know which spectral response was used to run this calculation. I gave the customer already the planck funktion for Infrarail Sensor enclosed and there are deviation of 3/4 % between both

Regards

LVE ESSEN HERR TAMBERG ABT KONSTRUKTION

BETR.: PROZENTUALES AUSGANGSSIGNAL MESSKOPF
DNE 35 (OA 35)

1300 °C = 8,8 µA

Page 2/2

MFG
W. Waldel

WT 11-13-95

PLANCK FUNCTION FOR INFRARAIL SENSOR

WAVELENGTH : $\lambda_1 = 0.7$ $\lambda_2 = 1$

TEMP. RANGE : TZS = 800 TFS = 1300

TEMP. SCALE : DEGREE C.

$T_{1,N}$	$P_{1,N}$	$T_{2,N}$	$P_{2,N}$	$T_{3,N}$	$P_{3,N}$	$T_{4,N}$	$P_{4,N}$	$T_{5,N}$	$P_{5,N}$
781	0.714732	906	3.439593	1031	12.378106	1156	35.896673	1281	88.272996
782	0.7248	907	3.478602	1032	12.493679	1157	36.177639	1282	88.860898
783	0.734992	908	3.517989	1033	12.610159	1158	36.460423	1283	89.451984
784	0.745308	909	3.557757	1034	12.727551	1159	36.745034	1284	90.046265
785	0.75575	910	3.597908	1035	12.845862	1160	37.031481	1285	90.643755
786	0.766318	911	3.638446	1036	12.965096	1161	37.319773	1286	91.244467
787	0.777015	912	3.679375	1037	13.085259	1162	37.609919	1287	91.848413
788	0.787841	913	3.720696	1038	13.206358	1163	37.901929	1288	92.455607
789	0.798798	914	3.762413	1039	13.328398	1164	38.195811	1289	93.066061
790	0.809887	915	3.804529	1040	13.451385	1165	38.491575	1290	93.679789
791	0.82111	916	3.847048	1041	13.575325	1166	38.789231	1291	94.296804
792	0.832467	917	3.889971	1042	13.700223	1167	39.088787	1292	94.917118
793	0.843961	918	3.933304	1043	13.826085	1168	39.390252	1293	95.540745
794	0.855592	919	3.977048	1044	13.952918	1169	39.693637	1294	96.167698
795	0.867362	920	4.021207	1045	14.080727	1170	39.998951	1295	96.79799
796	0.879272	921	4.065784	1046	14.209518	1171	40.306202	1296	97.431634
797	0.891324	922	4.110782	1047	14.339297	1172	40.615401	1297	98.068644
798	0.903519	923	4.156205	1048	14.47007	1173	40.926556	1298	98.709033
799	0.915859	924	4.202055	1049	14.601844	1174	41.239678	1299	99.352814
800	0.928344	925	4.248337	1050	14.734623	1175	41.554776	1300	100
801	0.940977	926	4.295053	1051	14.868415	1176	41.871859	1301	100.650605
802	0.953759	927	4.342207	1052	15.003225	1177	42.190937	1302	101.304643
803	0.966691	928	4.389801	1053	15.13906	1178	42.51202	1303	101.962126
804	0.979775	929	4.43784	1054	15.275926	1179	42.835117	1304	102.623068
805	0.993012	930	4.486327	1055	15.413828	1180	43.160238	1305	103.287483
806	1.006403	931	4.535265	1056	15.552773	1181	43.487392	1306	103.955384
807	1.019951	932	4.584657	1057	15.692767	1182	43.81659	1307	104.626784
808	1.033657	933	4.634507	1058	15.833817	1183	44.147842	1308	105.301698
809	1.047522	934	4.684819	1059	15.975929	1184	44.481156	1309	105.980138
810	1.061548	935	4.735595	1060	16.119109	1185	44.816543	1310	106.662119
811	1.075736	936	4.78684	1061	16.263363	1186	45.154012	1311	107.347655
812	1.090089	937	4.838557	1062	16.408698	1187	45.493575	1312	108.036757
813	1.104606	938	4.890749	1063	16.55512	1188	45.835239	1313	108.729442
814	1.119291	939	4.94342	1064	16.702635	1189	46.179016	1314	109.425722
815	1.134145	940	4.996573	1065	16.851251	1190	46.524916	1315	110.125611
816	1.149169	941	5.050213	1066	17.000973	1191	46.872948	1316	110.829122
817	1.164365	942	5.104342	1067	17.151808	1192	47.223122	1317	111.536271
818	1.179735	943	5.158964	1068	17.303762	1193	47.575448	1318	112.24707
819	1.19528	944	5.214084	1069	17.456842	1194	47.929938	1319	112.961534
820	1.211001	945	5.269704	1070	17.611055	1195	48.2866	1320	113.679676

88,7

FaxTransmittal Fax Transmittal

IRCON

IRCON, INC.
7300 North Natchez Avenue
Niles, Illinois 60714 USA

Telephone 847-967-5151
Admin Fax 847-647-0070
Sales /Service Fax 847-647-0948

ISO 9001
Quality System Certified

Date 6-30-98

To IRCON GMBH

Fax No

Attn WERNER

From Joe LaKner

No. of pages (including this page) 2

Attached is a new curve. Original curve used thermal response for detector output. New curve uses quantum detector output. Sorry for any problems this may have caused.

Sincerely

Joe