



SILICON PHOTODIODES

FIL*

PHOTOCONDUCTIVE DEVICES (PC)

Parameter & Unit Model Number	Active Surface		Reference Diagram Letters	Typical Responsivity- R_λ		Typ. Junction Capacitance- C_j		Typ. Rise Time- t_r 10%-90%, F
	Area	Dimensions		$\lambda_0=930\text{nm}$	$\lambda=632.8\text{nm}$	10V	25V	10V
	mm^2	inches		A/W	A/W	pf	pf	ns
FIL-3C *	3.23	0.100 x 0.050	A-F, J	0.57	0.35	10	6	6
FIL-5C *	5.07	0.100 DIA	A-F, J	0.57	0.35	16	10	10
FIL-20C	20.3	0.200 DIA	A-F, J	0.57	0.35	60	38	35
FIL-100C	100	0.444 DIA	A-F, K	0.57	0.35	300	192	50
FIL-C4D ⁽²⁾	6.45	0.100 x 0.100	A-E, H, J	0.57	0.35	27	17	70
FIL-C10D ⁽²⁾	103	0.400 x 0.400	A-E, H, K	0.57	0.35	260	166	100
FIL-S2D ⁽¹⁾	6.45	0.100 x 0.105	A-E, I, J	0.57	0.35	11	7	15
FIL-S4D ⁽¹⁾	6.45	0.105 x 0.105	A-E, I, J	0.57	0.35	8	5	12
FIL-S9D ⁽¹⁾	60.6	0.394 DIA	A-E, I, K	0.57	0.35	62	40	30

PHOTOVOLTAIC DEVICES (PV)

Parameter & Unit Model Number	Active Surface		Reference Diagram Letters	Typical Responsivity- R_λ		Typ. Junction Capacitance- C_j	Typ. Rise Time- t_r 10%-90%, F
	Area	Dimensions		$\lambda_0=870\text{nm}$	$\lambda=632.8\text{nm}$	0V	0V
	mm^2	inches		A/W	A/W	pf	ns
FIL-3V *	3.23	0.100 x 0.050	A-E, G, J	0.55	0.40	290	
FIL-5V *	5.07	0.100 DIA	A-E, G, J	0.55	0.40	450	
FIL-20V	20.3	0.200 DIA	A-E, G, J	0.55	0.40	1800	30
FIL-100V	100	0.444 DIA	A-E, G, K	0.55	0.40	9000	150
FIL-C4D ⁽²⁾	6.45	0.100 X 0.100	A-E, H, J	0.55	0.40	100	30
FIL-C10D ⁽²⁾	103	0.400 x 0.400	A-E, H, K	0.55	0.40	1200	50
FIL-S2D ⁽¹⁾	6.45	0.100 x 0.105	A-E, I, J	0.55	0.40	50	
FIL-S4D ⁽¹⁾	6.45	0.105 x 0.105	A-E, I, J	0.55	0.40	30	
FIL-S9D ⁽¹⁾	60.6	0.394 DIA	A-E, I, K	0.55	0.40	300	15

Designers' Footnotes:

- These devices are segmented position sensing photodiodes; all specifications except dimensions are per element; refer to Data Sheet 20DS80 for additional information.
 - These devices are dual axis position sensing photodiodes.
 - Rise time is a function of capacitance and varies 20% due to process variability.
 - Maximum values equal twice typical shown here.
 - Unit rated at 20V for rise time.
 - Divide values by R_λ for corresponding saturation current at any given λ ; see Diagram E.
- $T_A = 22^\circ\text{C}$ for all specifications.
 - See UDT's "Selecting a Silicon Photodiode" for a discussion of these and other UDT devices.

Information in this brochure is believed to be accurate and reliable, however, no responsibility is assumed by UDT for use.

*Devices are now furnished in modified package. Consult factory for details and pricing.

Series

* Field of view exceeding 145° In-line compatible package Low cost for high volume OEM use

Response Time $\tau_L = 50\Omega$ (3)	Noise Equivalent Power-NEP λ_0 , 1KHz, 1Hz	Saturation Current $I_L - 1\%$ (6)	Typical Dark Current - I_D (4)		Min. Reverse Breakdown Voltage- V_B		Series Resistance - R_S
25V	10v	Typ.	10V	25V	10 μ A	25 μ A	Typ.
ns	WHZ ^{-1/2}	mA	nA	nA	V	V	Ω
4	1.0×10^{-13}	1.0	10	30	50	—	10
6	1.2×10^{-13}	2.0	50	100	50	—	10
23	1.5×10^{-13}	2.0	75	150	50	—	10
30	2.0×10^{-13}	4.0	100	250	—	50	10
50 ⁽⁵⁾	1.8×10^{-13}	1.0	50	500	25	—	10
70 ⁽⁵⁾	2.2×10^{-13}	1.0	150	1500	25	—	10
11	6.5×10^{-14}	1.0	5.0	9.0	50	—	10
10	5.0×10^{-14}	1.0	3.0	6.0	50	—	10
15	9.5×10^{-14}	1.0	10	30	—	50	10

Response Time $\tau_L = 50\Omega$ (3)	Noise Equivalent Power-NEP λ_0 , 1KHz, 1Hz	Saturation Current $I_L - 1\%$ (6)	Series Resistance - R_S		Source Resistance - R_{SO}	
V	OV	Typ.	Typ.	Max.	Min.	Typ.
s	WHZ ^{-1/2}	mA	Ω	Ω	M Ω	M Ω
15	1.0×10^{-14}	2.0	10	100	100	300
30	1.6×10^{-14}	2.0	10	100	40	150
30	3.3×10^{-14}	5.0	10	100	20	50
30	5.9×10^{-14}	10.0	10	100	2	12
50	2.3×10^{-14}	1.0	25	250	—	100
30	7.3×10^{-14}	1.0	25	250	—	10
75	2.3×10^{-14}	1.0	20	200	—	100
30	2.3×10^{-14}	1.0	20	200	—	100
50	1.6×10^{-15}	1.0	20	200	—	50

Chips, Wafers and Detector/Filter Combinations

All of the devices listed above can be provided with:

- a. CIE photometric filter
b. red optimized CIE filter
c. flat radiometric filter
- by adding suffix { AP
RP
DF } to the existing model number.

As a result of top contact technology, UDT offers all of the FIL Series devices in chip and wafer form. These photodiodes are especially suited for high volume and OEM applications. To order, substitute prefix CHP (chip) or WFR (wafer) in place of FIL.

All standard FIL devices are filled with optical epoxy. To obtain glass window versions, add suffix G to the appropriate model number.

Additional Characteristics of FIL Devices:

- Chip centering within .003" (.076mm)
- Linear output throughout ten decades within 5%
- Temperature range (°C): storage -55 to +100 operation -25 to +80

Diagram A
TEMPERATURE VARIATION
VS. SPECTRAL RESPONSE

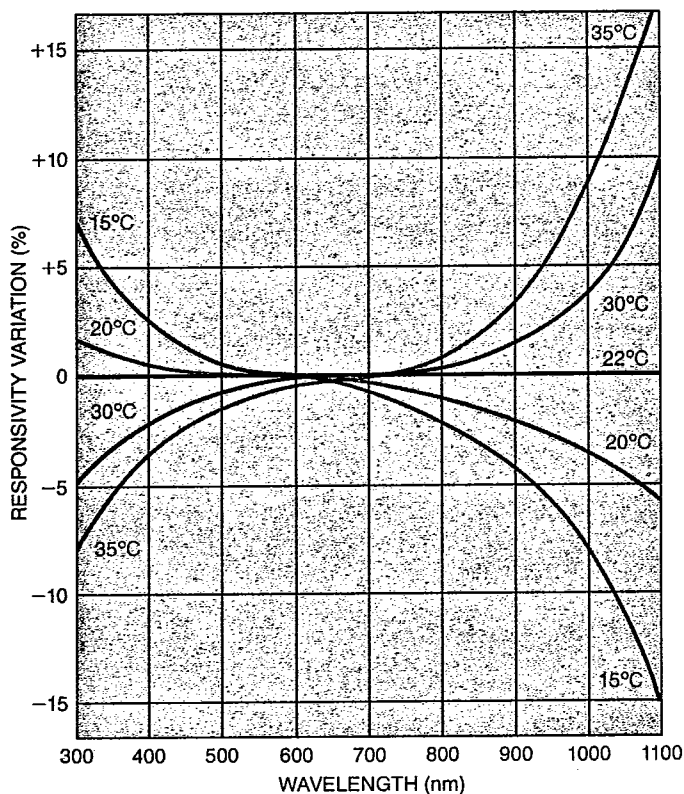


Diagram B
RELATIVE CAPACITANCE VS.
REVERSE BIAS VOLTAGE

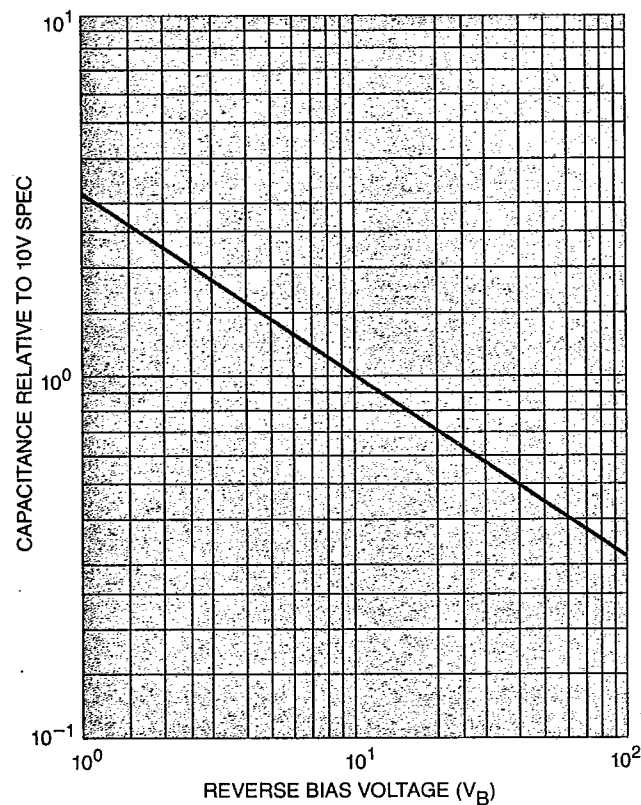


Diagram C
RELATIVE SOURCE RESISTANCE
VS. TEMPERATURE

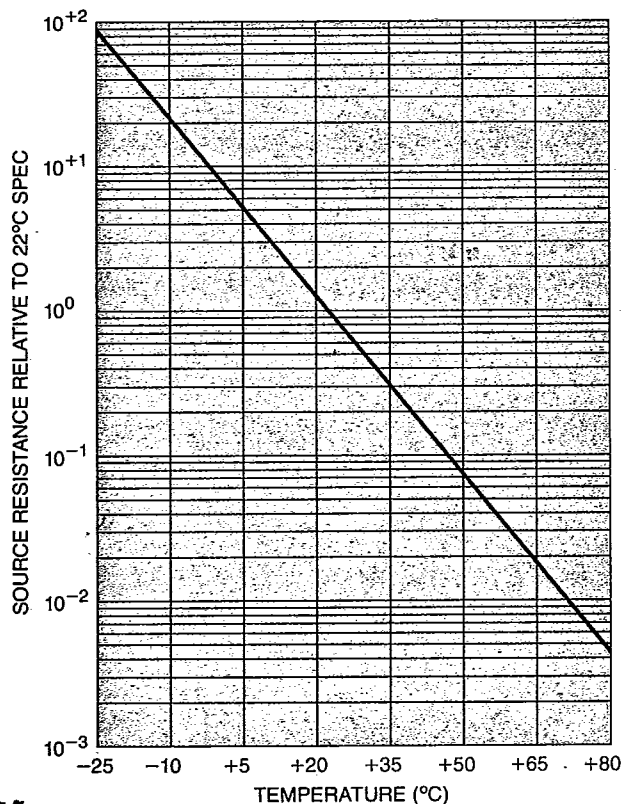


Diagram D
RELATIVE DARK CURRENT
VS. TEMPERATURE

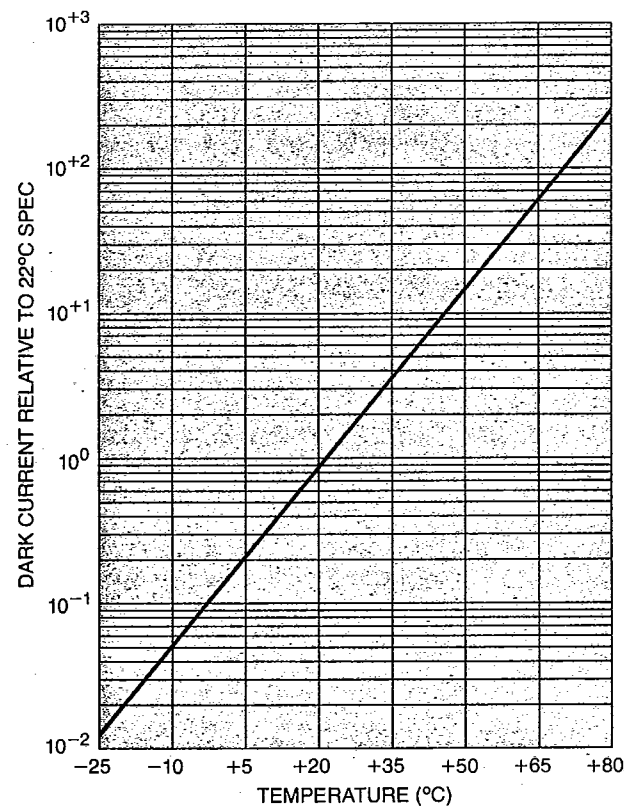


Diagram E TYPICAL RESPONSIVITY CURVES FOR UDT FIL SERIES

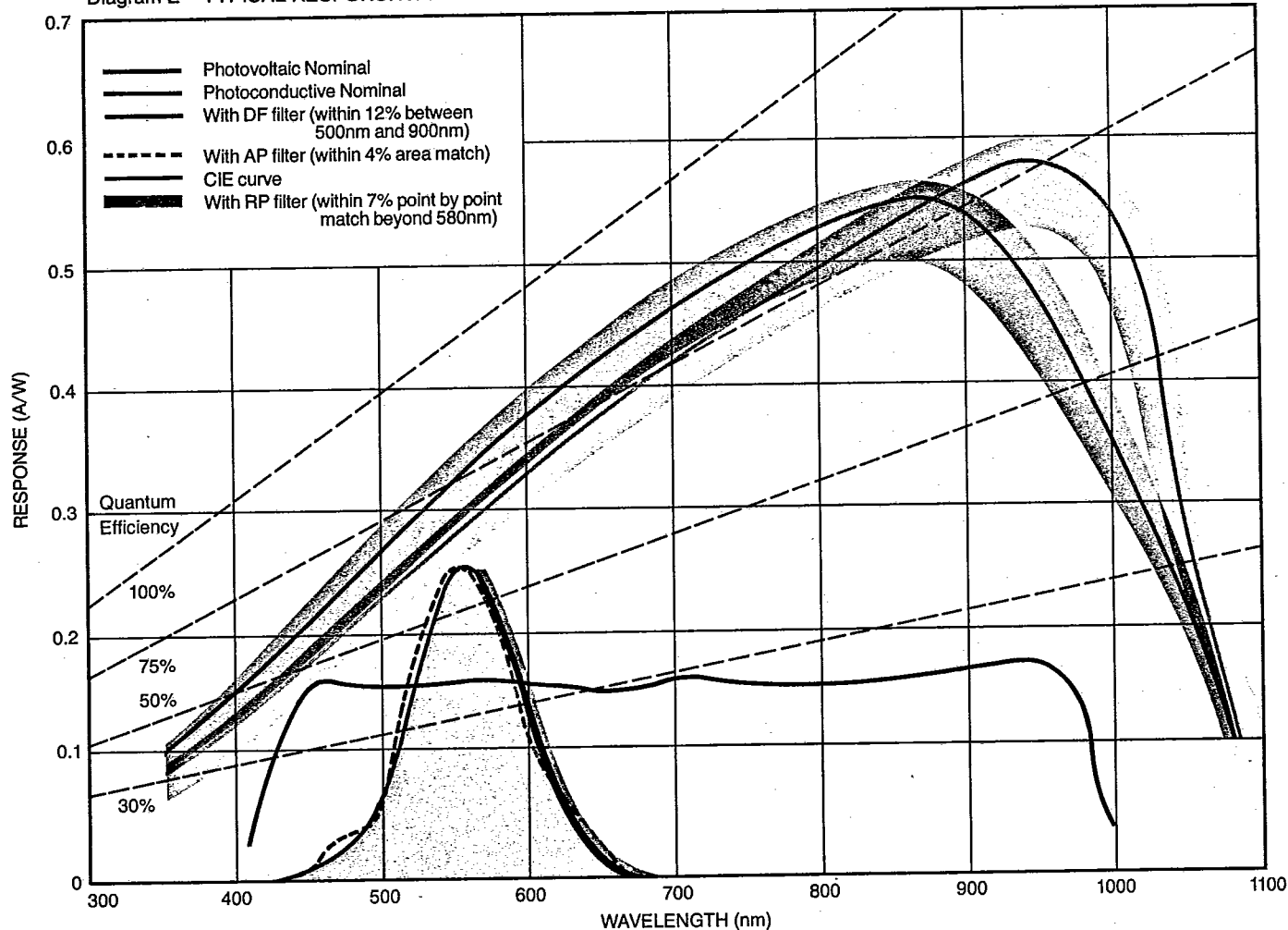
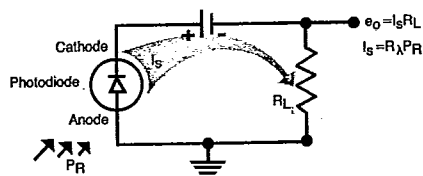


Diagram F TYPICAL HOOKUP PHOTOCONDUCTIVE SERIES



Symbol

e_0 resultant voltage potential

I_s current signal

P_R incident radiant power on active area

R_F feedback resistance

R_L load resistance

R_λ responsivity at wavelength λ

Pin numbers for

Anode

Cathode

Package J

Package K

Example

PC

3.8mV

3.8μA

10μW

1KΩ

0.38A/W

PV

43mV

4.3μA

10μW

10KΩ

0.43A/W

Diagram G TYPICAL HOOKUP PHOTOVOLTAIC SERIES

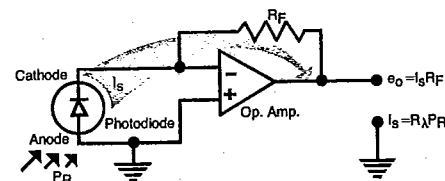


Diagram H TYPICAL HOOKUP for FIL-C4D and C10D

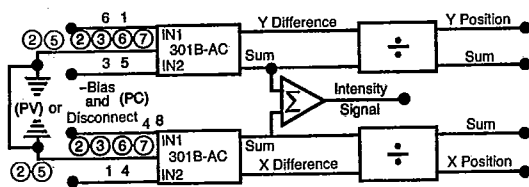


Diagram I TYPICAL HOOKUP for FIL-S2D, S4D and S9D

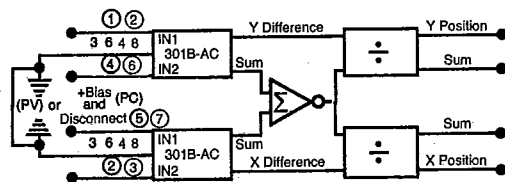
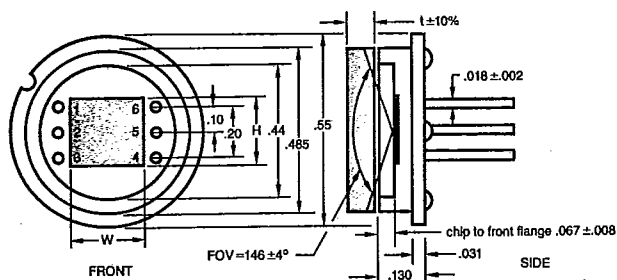


Diagram J



FIL	W	H	FIL	W	H	AP	RP	DF	G
3C, 3V	.079	.129	20C, 20V	.233	.233	t-	.165	.157	.079 .028
5C, 5V	.153	.153	C4D, S2D, S4D	.153	.153				

Diagram K

