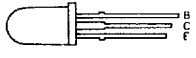
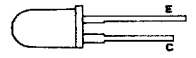
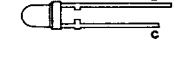
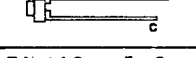
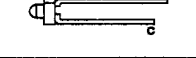


## Photo Detectors

T-41-61

## Phototransistors in Clear Plastic Package

Package Dimensions see page 49-51	Type	Photo sensitive area mm <sup>2</sup>	Characteristics										
			$\varphi$	$I_{ca}$ $V_{CE}=5V$ mA	$E_o$ $\lambda=$ 950 nm mW/cm <sup>2</sup>	$V_{(BR)CEO}$ $I_C=1 mA$ V	$I_{CEO}$ at $V_{CE}$ nA	$V_{CE}$ V	$\lambda_p/\lambda_{0.5}$ nm	$t_r$ and $f_g$ at $I_C$ and $R_L$ $V_{CE}=5V,$ $\lambda=820 nm$ $\mu s$ $kHz$ $mA$ $k\Omega$			
T-1 $\frac{1}{2}$ , $\varnothing$ 5 mm, Fig. 22 	BPV 11	0.36	$\pm 15^\circ$	10(>3)	1	>70	3(<50)	10	800/ 600...1050	3.3	—	5	0.1
T-1 $\frac{1}{4}$ , $\varnothing$ 5 mm, Fig. 17 	BPW 96A	0.18	$\pm 20^\circ$	1.5...4.5	1	>70	10(<200)	20	830/ 560...980	1.5	180	5	0.1
	BPW 96B			2.5...7.5									
	BPW 96C			4.5...15									
T-1, $\varnothing$ 3 mm, Fig. 8 	BPW 85A	0.18	$\pm 25^\circ$	0.8...2.5	1	>70	10(<200)	20	830/ 560...980	1.5	180	5	0.1
	BPW 85B			1.5...4.0									
	BPW 85C			3.0...8.0									
T- $\frac{3}{4}$ , $\varnothing$ 1.8 mm, Fig. 3 	BPW 16N	0.36	$\pm 40^\circ$	0.14(>0.07)	1	>32	10(<200)	20	780/ 520...950	3.7	120	5	0.1
T- $\frac{1}{2}$ , $\varnothing$ 1.8 mm, Fig. 5 	BPW 17N	0.36	$\pm 12.5^\circ$	1.0(>0.5)	1	>32	10(<200)	20	780/ 520...950	3.7	120	5	0.1

## Phototransistors with Filter Matched for GaAs IREDs in Plastic Package




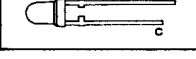
Package Dimensions see page 49-52	Type	Photo sensitive area mm <sup>2</sup>	Characteristics										
			$\varphi$	$I_{ca}$ $V_{CE}=5V$ mA	$E_o$ $\lambda=$ 950 nm mW/cm <sup>2</sup>	$V_{(BR)CEO}$ $I_C=1 mA$ V	$I_{CEO}$ at $V_{CE}$ nA	$V_{CE}$ V	$\lambda_p/\lambda_{0.5}$ nm	$t_r$ and $f_g$ at $I_C$ and $R_L$ $V_{CE}=5V,$ $\lambda=820 nm$ $\mu s$ $kHz$ $mA$ $k\Omega$			
T-1 $\frac{1}{2}$ , $\varnothing$ 5 mm, Fig. 22 	BPV 11 F	0.36	$\pm 15^\circ$	9(>3)	1	>70	3(<50)	10	900/ 730...1050	3.3	—	5	0.1
T- $\frac{3}{4}$ , $\varnothing$ 1.8 mm, Fig. 3 	S 350 P	0.36	$\pm 40^\circ$	1.0(>0.2)	1	>32	10(<200)	20	900/ 730...1050	3.7	170	5	0.1
Side view, Fig. 33 	BPW 78 A	0.36	$\pm 25^\circ$	1...3.0	1	>32	10(<100)	20	880/ 790...1000	3.8	110	5	0.1
	BPW 78 B			4(>2.0)									
T1, $\varnothing$ 3 mm, Fig. 8 	S 289 P	0.21	$\pm 25^\circ$	15(>4)	0.3	>32	10(<200)	20	900/ 820...1000	80	5	5	0.1



Photo Detectors

T-41-61

Phototransistors in Hermetically Sealed Package

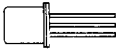

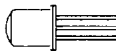
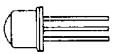
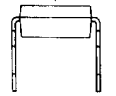

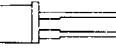

Package Dimensions see page 55	Type	Photo sensitive area mm <sup>2</sup>	Characteristics										
			$\phi$	$I_{ca}$ $V_{CE} = 5V$ mA	$E_a$ $\lambda = 950\text{ nm}$ mW/cm <sup>2</sup>	$V_{(BR)CEO}$ $I_C = 1\text{ mA}$ V	$I_{CEO}$ $V_{CE} = 20V$ nA	$\lambda_p/\lambda_{0.5}$ nm	$t_r$ and $t_f$ at $I_C$ and $R_L$ $V_{CE} = 5V$ , $\lambda = 820\text{ nm}$ μs   kHz   mA   kΩ				
	BPW 47 A	0.28 ( $\phi 0.6$ ) <sup>4)</sup>	$\pm 40^\circ$	0.32...0.63	1	$>70$	10(<100)	800/ 600...1050	1.3	150	5	0.1	
	BPW 47 B			0.5...1.0									
	BPW 47 C			0.8...1.6									
	BPW 76 A	0.36	$\pm 40^\circ$	0.4...0.6	1	$>70$	10(<100)	800/ 600...1050	3.8	110	5	0.1	
	BPW 76 B			1.2(>0.6)									
	BPX 38	0.76	$\pm 40^\circ$	$>0.2$	0.5	$>70$	10(<200)	950/ 630...1040	10	12	15	20	25
	BPX 38-2			0.2...0.4									
	BPX 38-3			0.32...0.63									
BPX 38-4	0.5...1.0												
BPX 38-5	0.8...1.6												
BPX 38-6	$>1.25$												
	BPW 77 NA	0.36	$\pm 10^\circ$	7.5...15	1	$>70$	10(<100)	800/ 600...1050	3.8	110	5	0.1	
	BPW 77 NB			20(>10)									
	S252 P (L14 G1)	0.18	$\pm 10^\circ$	$>1.5$	1	$>45$	10(<100)	780/ 520...950	1.7	170	5	0.1	
	S253 P (L14 G2)			$>0.75$									
S254 P (L14 G3)	$>3.0$												
	BPX 43	0.76	$\pm 15^\circ$	$>0.8$	0.5	$>70$	10(<200)	950/ 630...1040	10	12	15	20	25
	BPX 43-2			0.8...1.6									
	BPX 43-3			1.25...2.5									
	BPX 43-4			2.0...4.0									
	BPX 43-5			3.2...6.3									
	BPX 43-6			$>5$									
 Photodarlington	BPX 99R-2	0.21	$\pm 12.5^\circ$	10(>4)	0.3	$>32$	10(<200)	800/ 600...900	80	5	5	0.1	
	BPX 99R-3			20(>10)									

Photo PIN Diodes in Clear Plastic Package

Package Dimensions see page 50-53	Type	Photo sensitive area mm <sup>2</sup>	Characteristics										
			$\phi$	$I_{ra}$ and $V_o$ at $\lambda$ $E_a = 1\text{ mW/cm}^2$ $V_R = 5V$ μA   mV   nm			$V_{(BR)}$ $I_R = 100\text{ μA}$ V	$I_{ro}$ $V_R = 10V$ nA	$S(\lambda)$ $V_R = 5V$ $\lambda = 870\text{ nm}$ A/W	$\lambda_p/\lambda_{0.5}$ nm	$t_{on}/$ at $V_R$ and $R_L$ $t_{off}$ ns   λ=820 nm V   Ω		
	BPW 34	7.5	$\pm 65^\circ$	50(>40)	350	950	$>60$	2 (<30)	0.6	900/ 530...1050	100	10	1000
	BPW 46	7.5	$\pm 65^\circ$	50(>40)	350	950	$>60$	2 (<30)	0.6	900/ 530...1050	100	10	1000
	BPW 43	0.25	$\pm 25^\circ$	8(>4)	300	950	$>60$	1 (<10)	0.6	900/ 500...1000	4 <sup>1)</sup>	10	50
	BPV 10	0.78 ( $\phi 1\text{ mm}$ )	$\pm 17.5^\circ$	65(>38)	450	950	$>60$	1 (<5) <sup>2)</sup>	0.55 <sup>3)</sup>	950/ 630...1050	2.5 <sup>1)</sup>	50	50

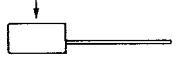
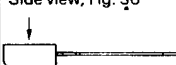
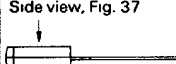
<sup>1)</sup>  $t_r, t_f$ ; <sup>2)</sup>  $V_R = 20V$ ; <sup>3)</sup>  $\lambda = 950\text{ nm}$ ; <sup>4)</sup> No bond in photo sensitive area



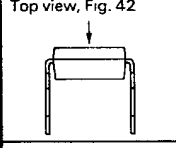

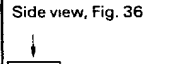
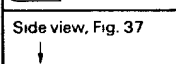
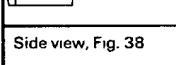
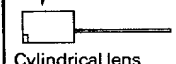
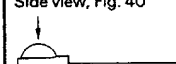
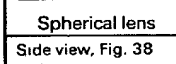

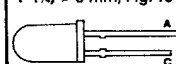
## Photo Detectors

T-41-61

## Photo PIN Diodes with Filter matched for GaAlAs IREDs in Plastic Package

Package Dimensions see page 53	Type	Photo sensitive area mm <sup>2</sup>	Characteristics									
			$\varphi$	$I_{ra}$ and $V_o$ $E_e=1 \text{ mW/cm}^2, \lambda=870 \text{ nm}$ $V_R=5 \text{ V}$ $\mu\text{A}$   mV	$V_{(BR)}$ $I_R=$ $100 \mu\text{A}$ V	$I_{ro}$ at $V_R$ nA   V	$S(\lambda)$ $V_R=5 \text{ V}$ $\lambda=870 \text{ nm}$ A/W	$\lambda_p/\lambda_{0.5}$ nm	$t_{on/}$ at $V_R$ and $R_L$ $t_{off}$ ns	$\lambda=820 \text{ nm}$ V   $\Omega$		
Top view, Fig. 35 	BPW 82	7.5	$\pm 65^\circ$	48 (>41)   350	>60	2 (<30)   10	0.6	920/ 750...1040	100	10   1000		
Side view, Fig. 36 	BPW 83	7.5	$\pm 65^\circ$	50 (>41)   350	>60	2 (<30)   10	0.6	920/ 750...1040	100	10   1000		
Side view, Fig. 37 	BPW 84	7.5	$\pm 65^\circ$	48 (>41)   350	>60	2 (<30)   10	0.6	920/ 750...1040	100	10   1000		

## Photo PIN Diodes with Filter matched for GaAs IREDs in Plastic Package


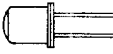
Package Dimensions see page 50-53	Type	Photo sensitive area mm <sup>2</sup>	Characteristics									
			$\varphi$	$I_{ra}$ and $V_o$ $E_e=1 \text{ mW/cm}^2, \lambda=950 \text{ nm}$ $V_R=5 \text{ V}$ $\mu\text{A}$   mV	$V_{(BR)}$ $I_R=$ $100 \mu\text{A}$ V	$I_{ro}$ at $V_R$ nA   V	$S(\lambda)$ $V_R=5 \text{ V}$ $\lambda=950 \text{ nm}$ A/W	$\lambda_p/\lambda_{0.5}$ nm	$t_{on/}$ at $V_R$ and $R_L$ $t_{off}$ ns	$\lambda=820 \text{ nm}$ V   $\Omega$		
Top view, Fig. 42 	BP 104	7.5	$\pm 65^\circ$	45 (>40)   350	>60	2 (<30)   10	0.6	925/ 800...1000	100	10   1000		
Side view, Fig. 35 	BPW 41N	7.5	$\pm 65^\circ$	45 (>41)   350	>60	2 (<30)   10	0.6	950/ 820...1040	100	10   1000		
Side view, Fig. 36 	S 186 P	7.5	$\pm 65^\circ$	45 (>41)   350	>60	2 (<30)   10	0.6	920/ 820...1040	100	10   1000		
Side view, Fig. 37 	BPW 75	7.5	$\pm 65^\circ$	48 (>41)   350	>60	2 (<30)   10	0.6	950/ 820...1040	100	10   1000		
Side view, Fig. 38 	BPV 20F	7.5	$\pm 65^\circ$	60 (>40)   350	>60	2 (<30)   10	0.6	950/ 830...1050	100	10   1000		
Cylindrical lens Side view, Fig. 40 	BPV 21F	5.7	$\pm 65^\circ$	38 (>27)   350	>60	2 (<30)   10	0.6	950/ 830...1050	70	10   1000		
Spherical lens Side view, Fig. 40 	BPV 22F	7.5	$\pm 60^\circ$	80 (>55)   350	>60	2 (<30)   10	0.6	950/ 830...1050	100	10   1000		
Spherical lens Side view, Fig. 38 	BPV 23F	5.7	$\pm 60^\circ$	63 (>45)   350	>60	2 (<30)   10	0.6	950/ 830...1050	70	10   1000		
Spherical lens Side view, Fig. 38 	S 288 P	0.78	$\pm 15^\circ$	50 (>30)   450	>60	2 (<30)   5	0.6	930/ 820...1040	2.5 <sup>1)</sup>	50   50		
T-1%, $\varnothing 5 \text{ mm}$ , Fig. 15 	BPV 10F	0.78	$\pm 17.5^\circ$	60 (>30)   450	>60	1 (<5)   20	0.6	950/ 820...1040	2.5 <sup>1)</sup>	50   50		

<sup>1)</sup>  $t_r, t_f$ 

## Photo Detectors

T-41-61

## Photo PIN Diodes in Hermetically Sealed Package for Standard Applications

Package	Type	Photo sensitive area mm <sup>2</sup>	$\phi$	Characteristics										
				$I_{ra}$ at $V_R$ $E_0=1\text{ mW/cm}^2$ $\lambda=950\text{ nm}$ $\mu\text{A}$	$V_o$ $E_A=1\text{ kV}$ mV	$V_{(BR)}$ $I_R=100\mu\text{A}$ V	$I_{ro}$ at $V_R$ nA V		$S(\lambda)$ $V_R=5\text{ V}$ $\lambda=870\text{ nm}$ A/W	$\lambda_p/\lambda_{0.5}$ nm	$t_{on}/t_{off}$ at $V_R$ and $R_L$ ns V $\Omega$			
$\approx$ TO 56, Fig. 52 	S 153P	7.5	$\pm 50^\circ$	50 (>40)	5	350	>50	2 (<30)	10	0.6	900/ 530...1050	100	10	1000
TO 18, Fig. 48 	BPW 24R	0.78	$\pm 12^\circ$	65 (>45)	20	350	>60	1 (<5)	50	0.6	900/ 550...1100	7 <sup>1)</sup>	20	50

<sup>1)</sup>  $t_r, t_f$ 

## Photo PIN Diodes in Hermetically Sealed Package for High Speed Applications

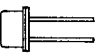
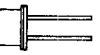
Package	Type	NA	Photo sensitive area mm <sup>2</sup>	$\phi$	Characteristics								
					$I_{ra}$ $V_R=50\text{ V}$ $E_0=1\text{ mW/cm}^2$ $\lambda=870\text{ nm}$ $\mu\text{A}$	$V_{(BR)}$ $I_R=100\mu\text{A}$ V	$I_{ro}$ $V_R=50\text{ V}$ nA	$S(\lambda)$ $V_R=5\text{ V}$ $\lambda=870\text{ nm}$ A/W	$\lambda_p$ nm	$C_D$ $V_R=50\text{ V}$ $f=1\text{ MHz}$ pF	$t_r, t_f$ at $\lambda$ and $f_g$ at $V_R=50\text{ V}, R_L=50\Omega$ $\lambda=820\text{ nm}$ ns nm GHz		
TO 18, Fig. 43  High precision flat window	BPW 48	0.45	0.78 ( $\phi 1.0$ )	$\pm 55^\circ$	4.5 (>4)	>60	1 (< 5)	0.6	930	3	2.5	850	0.2
	BPW 86	0.24	0.25 (0.5x0.5)	$\pm 55^\circ$	2.5 (>2)	>60	1 (< 5)	0.6	930	1.2	2.5	850	0.2
	BPW 87	0.24	0.25 (0.5x0.5)	$\pm 55^\circ$	1.3 (>1)	>60	1 (< 5)	0.5	810	2	0.6	850	1
	BPW 88	0.45	0.78 ( $\phi 1.0$ )	$\pm 55^\circ$	6.5 (>4)	>60	1 (< 5)	0.6	930	1.6	2.5	850	0.2
	BPW 89	0.45	0.78 ( $\phi 1.0$ )	$\pm 55^\circ$	4.5 (>3)	>60	1 (< 5)	0.5	810	4.5	0.6	850	1
	S 191 P	0.37	0.64 (0.8x0.8)	$\pm 55^\circ$	8.0 (>6)	>60	2 (<10)	0.6	900	2.5	2.5	820	1
TO 18, Fig. 44  High precision flat window	S 203 P	0.1	0.03 ( $\phi 0.2$ )	$\pm 55^\circ$	0.25 (>0.15)	>110	1 (< 5)	0.29	750	1.8	0.4	810	1
	S 213 P	0.15	0.07 ( $\phi 0.3$ )	$\pm 55^\circ$	0.4 (>0.3)	>110	1 (< 5)	0.3	750	1.8	0.4	810	1

Photo PIN Diodes in Hermetically Sealed Package for High Speed Applications  
(Anode and Cathode Insulated from Case)

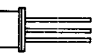
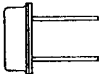
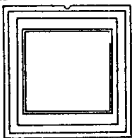
Package	Type	NA	Photo sensitive area mm <sup>2</sup>	$\phi$	Characteristics									
					$I_{ra}$ $V_R=50\text{ V}$ $E_0=1\text{ mW/cm}^2$ $\lambda=870\text{ nm}$ $\mu\text{A}$	$V_{(BR)}$ $I_R=100\mu\text{A}$ V	$I_{ro}$ $V_R=50\text{ V}$ nA	$S(\lambda)$ $V_R=5\text{ V}$ $\lambda=870\text{ nm}$ A/W	$\lambda_p$ nm	$C_D$ at $V_R$ $f=1\text{ MHz}$ pF V	$t_r, t_f$ at $\lambda$ and $f_g$ at $V_R=50\text{ V}, R_L=50\Omega$ 820 nm ns nm GHz			
TO 18, Fig. 54  High precision flat window	BPW 97	0.24	0.25 (0.5x0.5)	$\pm 55^\circ$	1.3 (>1)	>60	1 (< 5)	0.5	810	2	50	0.6	850	1
	BPW 98	0.45	0.78 ( $\phi 1\text{ mm}$ )	$\pm 55^\circ$	4.5 (>4)	>60	1 (< 5)	0.6	930	4.5	12	2.5	850	0.2

Photo Detectors

T-41-61

Photo Diodes for Special Applications

Package	Type	Photo sensitive area mm <sup>2</sup>	Characteristics									
			$\phi$	$V_o$ and $I_k$ and $I_{ra}$ at $E_A=1 \text{ klx}$ $R_L < 100 \Omega$ mV $\mu\text{A}$ $\mu\text{A}$	$V_{BR}$ $I_R=100 \mu\text{A}$ V	$I_{ro}$ at $V_R$ nA	$V$	$C_j$ at $V_R$ $f=1 \text{ MHz}$ pF	$V$	$t_r/t_f$ $I_{ph}=100 \mu\text{A}$ $R_L=1 \text{ k}\Omega$ $\mu\text{s}$		
≈ TO 39, Fig 52 	BPW 20R	7.5	$\pm 50^\circ$	500 (>330)	61 (>20)	61 (>20)	>10	2 (<30)	5	400	5	3.5
	BPW 21R with $V(\lambda)$ -filter	7.5	$\pm 50^\circ$	450 (>280)	9 (>4.5)	9 (>4.5)	>10	2 (<30)	5	400	5	3.5
 Ceramic package, Fig 65	S 284P	100	$\pm 60^\circ$	390	800	800	30	3 (<100)	10	280	5	2.3

Avalanche Photo Diodes


Package	Type	Photo sensitive area mm <sup>2</sup>	Characteristics						
			$\phi$	$P_V$ mW	$V_{(BR)}$ V	$\eta$ $\lambda=910 \text{ nm}$ %	$G_B$ GHz	$I_{ro}$ $M=100$ nA	$C_D$ $V_R=100 \text{ V}, f=1 \text{ MHz}$ pF
TO 18, Fig 47 	BPW 28	$\phi 0.2$	$\pm 35^\circ$	100	140...200	>20	>200	1 (<5)	1 (<1.2)

Photo Quadrant Detector

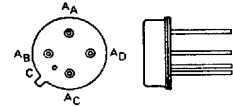
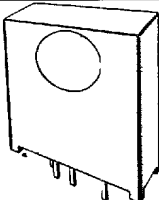
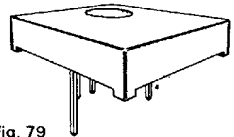
Package	Type	Photo sensitive area mm <sup>2</sup>	Gap size $\mu\text{m}$	Characteristics						
				$I_{ra}$ per quadrant $V_R=12 \text{ V}, E_g=1 \text{ mW/cm}^2$ $\lambda=870 \text{ nm}$ $\mu\text{A}$	$I_{ro}$ nA	$s(\lambda)$ $V_R=12 \text{ V}$ $\lambda=850 \text{ nm}$ A/W	$\lambda_p$ nm	$C_j$ $V_R=12 \text{ V}$ $1 \text{ MHz}$ pF	$t_r/t_f$ $V_R=12 \text{ V}$ $R_L=1 \text{ k}\Omega$ $\lambda=830 \text{ nm}$ ns	
Dimensions see page 55  Fig. 59	S 239 P	4x2.25	10	15 (>10)	1 (<25)	0.50	880	16	150	

Photo Modules for Remote Control Systems

Package	Type	Photo sensitive area mm <sup>2</sup>	Characteristics				Features:
			$\phi$	$\lambda$ nm	$V_S$ V	$E_{min}$ mW/m <sup>2</sup>	
Dimensions see page 57  Fig. 78	TFMS 4...0	7.5	$\pm 70^\circ$	950	5	0.5	<ul style="list-style-type: none"> <li>● Photo detector and preamplifier in one package</li> <li>● Package designed as IR filter and shield</li> <li>● Internal filter for carrier frequency</li> <li>● Available for following carrier frequencies: 30, 36, 38, 40 and 56 kHz (see "Designation Systems")</li> <li>● Integrating output</li> </ul>
 Fig. 79	TFMT 4...0						

