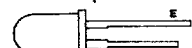
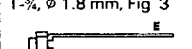
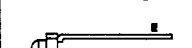


Photo Detectors

T-41-61

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Phototransistors in Clear Plastic Package

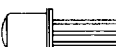
Package Dimensions see page 49-51	Type	Photo sensitive area mm ²	Characteristics										
			φ	I_{ca} $V_{CE}=5\text{ V}$ mA	E_o $\lambda=$ 950 nm mW/cm ²	$V_{(BR)CEO}$ $I_C=1\text{ mA}$ V	I_{CEO} at V_{CE} nA	V_{CE} V	$\lambda_p/\lambda_{0.5}$ nm	t_r and f_g at I_C and R_L $V_{CE}=5\text{ V}$, $\lambda=820\text{ nm}$ μs kHz	I_C and R_L $V_{CE}=5\text{ V}$, $\lambda=820\text{ nm}$ mA k Ω		
T-1½, $\varnothing$ 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-1½, $\varnothing$ 5 mm, Fig. 17 	BPW 96 A	0.18	$\pm 20^\circ$	1.5...4.5	1	>70	10 (<200)	20	830/ 560...980	1.5	180	5	0.1
	BPW 96 B			2.5...7.5									
	BPW 96 C			4.5...15									
T-1, $\varnothing$ 3 mm, Fig. 8 	BPW 85 A	0.18	$\pm 25^\circ$	0.8...2.5	1	>70	10 (<200)	20	830/ 560...980	1.5	180	5	0.1
	BPW 85 B			1.5...4.0									
	BPW 85 C			3.0...8.0									
T-¾, $\varnothing$ 1.8 mm, Fig. 3 	BPW 16 N	0.36	$\pm 40^\circ$	0.14 (>0.07)	1	>32	10 (<200)	20	780/ 520...950	3.7	120	5	0.1
T-¾, $\varnothing$ 1.8 mm, Fig. 5 	BPW 17 N	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	Type	Photo sensitive area mm ²	Characteristics										
			φ	I_{ca} $V_{CE}=5\text{ V}$ mA	E_o $\lambda=$ 950 nm mW/cm ²	$V_{(BR)CEO}$ $I_C=1\text{ mA}$ V	I_{CEO} nA	V_{CE} V	$\lambda_p/\lambda_{0.5}$ nm	t_r and f_g at I_C and R_L $V_{CE}=5\text{ V}$, $\lambda=820\text{ nm}$ μs kHz	I_C and R_L $V_{CE}=5\text{ V}$, $\lambda=820\text{ nm}$ mA k Ω		
T-1½, $\varnothing$ 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-¾, $\varnothing$ 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

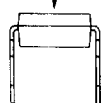
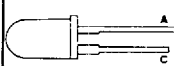
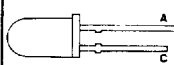
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Phototransistors in Hermetically Sealed Package

Package	Type	Photo sensitive area mm ²	Characteristics									
			ϕ	I_{ca} $V_{CE} = 5 \text{ V}$ mA	E_a $\lambda = 950 \text{ nm}$ mW/cm ²	$V_{(BR)CEO}$ $I_C = 1 \text{ mA}$ V	I_{CEO} $V_{CE} = 20 \text{ V}$ nA	$\lambda_p/\lambda_{0.5}$ nm	t_r and f_g at I_C and R_L $V_{CE} = 5 \text{ V}$, $\lambda = 820 \text{ nm}$ μs kHz mA kΩ			
TO 18, Fig. 56 	BPW 47 A	0.28 ($\phi 0.6$) ⁴⁾	$\pm 40^\circ$	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
	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								
TO 18, Fig. 58 	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								
TO 18, Fig. 57 	BPX 43	0.76	$\pm 15^\circ$	>0.8	0.5	>70	10(<200)	950/ 630...1040	—	10	12	15
	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								
	BPX 99R-2	0.21	$\pm 12.5^\circ$	10(>4)	0.3	>32	10(<200)	800/ 600...900	80	5	5	0.1
TO 52, Fig. 55 	BPX 99R-3			20(>10)								

Photodarlington

Photo PIN Diodes in Clear Plastic Package

Package	Type	Photo sensitive area mm ²	Characteristics										
			φ	I_a and V_o at λ $E_e = 1 \text{ mW/cm}^2$ $V_R = 5 \text{ V}$ μA mV nm			$V_{(BR)}$ $I_R = 100 \mu\text{A}$ V	I_{ro} $V_R = 10 \text{ V}$ nA	$S(\lambda)$ $V_R = 5 \text{ V}$ $\lambda = 870 \text{ nm}$ A/W	$\lambda_p/\lambda_{0.5}$ nm	t_{on}/t_{off} at V_R and R_L $\lambda = 820 \text{ nm}$ ns V Ω		
Dimensions see page 50-53 Top view, Fig 42 	BPW 34	7.5	±65°	50(>40)	350	950	>60	2 (<30)	0.6	900/ 530...1050	100	10	1000
Side view, Fig 36 	BPW 46	7.5	±65°	50(>40)	350	950	>60	2 (<30)	0.6	900/ 530...1050	100	10	1000
T-1 ¹⁾ , $\varnothing 5 \text{ mm}$, Fig 14 	BPW 43	0.25	±25°	8(>4)	300	950	>60	1 (<10)	0.6	900/ 500...1000	4 ¹⁾	10	50
T-1 ¹⁾ , $\varnothing 5 \text{ mm}$, Fig 15 	BPV 10	0.78 ($\varnothing 1 \text{ mm}$)	±17.5°	65(>38)	450	950	>60	1 (<5) ²⁾	0.55 ³⁾	950/ 630...1050	2.5 ¹⁾	50	50

630...1050

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

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

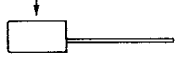
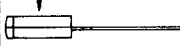
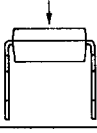
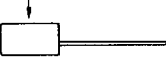
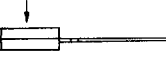
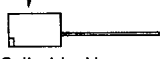
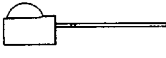
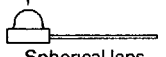
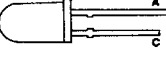
Package Dimensions see page 53	Type	Photo sensitive area mm ²	Characteristics										
			φ	I_{ra} and V_o $E_e=1 \text{ mW/cm}^2, \lambda=870 \text{ nm}$ $V_R=5 \text{ V}$ μA	V_o mV	$V_{(BR)}$ $I_R=$ $100 \mu\text{A}$ V	I_{ro} at V_R nA	V	$S(\lambda)$ $V_R=5 \text{ V}$ $\lambda=870 \text{ nm}$ A/W	$\lambda_p/\lambda_{0.5}$ nm	$t_{on}/$ at V_R and R_L t_{off} ns	$\lambda=820 \text{ nm}$ V	Ω
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 ²	Characteristics										
			φ	I_{ra} and $E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$ $V_R = 5 \text{ V}$ μA	V_o 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	Ω
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 41 N	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  Cylindrical lens	BPV 20 F	7.5	$\pm 65^\circ$	60 (>40)	350	>60	2 (<30)	10	0.6	950/ 830...1050	100	10	1000
	BPV 21 F	5.7	$\pm 65^\circ$	38 (>27)	350	>60	2 (<30)	10	0.6	950/ 830...1050	70	10	1000
Side view, Fig. 40  Spherical lens	BPV 22 F	7.5	$\pm 60^\circ$	80 (>55)	350	>60	2 (<30)	10	0.6	950/ 830...1050	100	10	1000
	BPV 23 F	5.7	$\pm 60^\circ$	63 (>45)	350	>60	2 (<30)	10	0.6	950/ 830...1050	70	10	1000
Side view, Fig. 38  Spherical lens	S 288 P	0.78	$\pm 15^\circ$	50 (>30)	450	>60	2 (<30)	5	0.6	930/ 820...1040	2.5 ¹⁾	50	50
T-1%, $\varnothing 5 \text{ mm}$, Fig. 15 	BPV 10 F	0.78	$\pm 17.5^\circ$	60 (>30)	450	>60	1 (<5)	20	0.6	950/ 820...1040	2.5 ¹⁾	50	50

¹⁾ t_r, t_f

Photo PIN Diodes in Hermetically Sealed Package for Standard Applications

Package	Type	Photo sensitive area	φ	Characteristics										
				I_{ra} at V_R $E_0=1 \text{ mW/cm}^2$ $\lambda=950 \text{ nm}$		V_o $E_A=1 \text{ klx}$	$V_{(BR)}$ $I_R=100 \mu\text{A}$	I_{ro} at V_R		$S_{(\lambda)}$ $V_R=5 \text{ V}$ $\lambda=870 \text{ nm}$ A/W	$\lambda_p/\lambda_{0.5}$	$t_{on}/$ at V_R and R_L t_{off}		
Dimensions see page 54		mm ²		μA	V	mV	V	nA	V		nm	ns	V	Ω
</														

¹⁾ t_r, t_f

Photo PIN Diodes in Hermetically Sealed Package for High Speed Applications

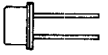
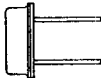
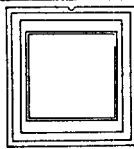
Package	Type	NA	Photo sensitive area	ϕ	Characteristics								
					I_{ra} $V_R=50 \text{ V}$ $E_0=1 \text{ mW/cm}^2$ $\lambda=870 \text{ nm}$ μA	$V_{(BR)}$ $I_R=100 \mu\text{A}$ V	I_{ro} $V_R=50 \text{ V}$ nA	$S_{(\lambda)}$ $V_R=5 \text{ V}$ $\lambda=870 \text{ nm}$ A/W	λ_p nm	C_D $V_R=50 \text{ V}$ $f=1 \text{ MHz}$ pF	t_r, t_f at λ and f_g at $V_R=50 \text{ V}, R_L=50 \Omega$ $\lambda=820 \text{ nm}$		
Dimensions see page 54			mm^2		μA	V	nA	A/W	nm	pF	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 (0.5×0.5)	$\pm 55^\circ$	2.5 (>2)	>60	1 (<5)	0.6	930	1.2	2.5	850	0.2
	BPW 87	0.24	0.25 (0.5×0.5)	$\pm 55^\circ$	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 (0.8×0.8)	$\pm 55^\circ$	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	ϕ	Characteristics									
					I_{ra} $V_R=50 \text{ V}$ $E_0=1 \text{ mW/cm}^2$ $\lambda=870 \text{ nm}$ μA	$V_{(BR)}$ $I_R=100 \mu\text{A}$ V	I_{ro} $V_R=50 \text{ V}$ nA	$S_{(\lambda)}$ $V_R=5 \text{ V}$ $\lambda=870 \text{ nm}$ A/W	λ_p nm	C_D at V_R $f=1 \text{ MHz}$ pF	V	t_r, t_f at λ and f_g at $V_R=50 \text{ V}, R_L=50 \Omega$ 820 nm		
Dimensions see page 55			mm^2		μA	V	nA	A/W	nm	pF	V	ns	nm	GHz
 TO 18, Fig. 54 High precision flat window	BPW 97	0.24	0.25 (0.5×0.5)	$\pm 55^\circ$	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 Diodes for Special Applications

Package	Type	Photo sensitive area mm ²	Characteristics									
			φ	V_o and I_k and I_{ra} at $E_A=1 \text{ klx}$ mV	$R_L<100 \Omega$ μA	$V_R=5 \text{ V}$ μA	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 $I_{ph}=100 \mu\text{A}$ $R_L=1 \text{ k}\Omega$ μs
Dimensions see page 54/55												
≈ TO 39, Fig 52 	BPW 20 R	7.5	±50°	500 (>330)	61 (>20)	61 (>20)	>10	2 (<30)	5	400	5	3.5
	BPW 21 R with V(λ)-filter	7.5	±50°	450 (>280)	9 (>4.5)	9 (>4.5)	>10	2 (<30)	5	400	5	3.5
 Ceramic package, Fig 65	S 284 P	100	±60°	390	800	800	30	3 (<100)	10	280	5	2.3

Avalanche Photo Diodes

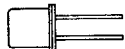
Package	Type	Photo sensitive area mm ²	Characteristics						
			φ	P_V mW	$V_{(BR)}$ V	η $\lambda = 910 \text{ nm}$ %	G_B GHz	I_{ro} $M = 100$ nA	C_D $V_R = 100 \text{ V}, f = 1 \text{ MHz}$ pF
Dimensions see page 54 TO 18, Fig 47 	BPW 28	$\varnothing 0.2$	$\pm 35^\circ$	100	140...200	>20	>200	1 (<5)	1 (<1.2)

Photo Quadrant Detector

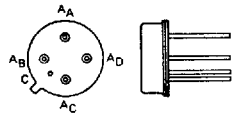
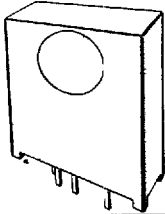
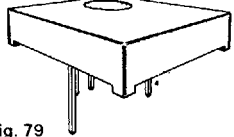
Package	Type	Photo sensitive area mm ²	Gap size μm	Characteristics					
				I_{ra} per quadrant $V_R = 12 \text{ V}, E_o = 1 \text{ mW/cm}^2$ $\lambda = 870 \text{ nm}$ μA	I_{ro} nA	$s(\lambda)$ $V_R = 12 \text{ V}$ $\lambda = 850 \text{ nm}$ A/W	λ_p nm	C_1 $V_R = 12 \text{ V}$ 1 MHz pF	t_r/t_f $V_R = 12 \text{ V}$ $R_L = 1 \text{ k}\Omega$ $\lambda = 830 \text{ nm}$ 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 ²	Characteristics				Features:
			φ	λ nm	V_S V	E_{smin} mW/m ²	
Dimensions see page 57  Fig. 78	TFMS 4...0	7.5	$\pm 70^\circ$	950	5	0.5	● Photo detector and preamplifier in one package ● Package designed as IR filter and shield ● Internal filter for carrier frequency ● Available for following carrier frequencies: 30, 36, 38, 40 and 56 kHz (see "Designation Systems") ● Integrating output
 Fig. 79	TFMT 4...0						