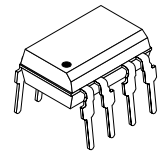
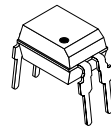
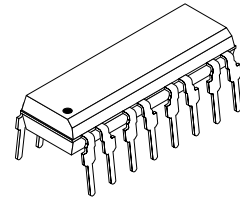




# Optocoupler with Phototransistor Output

## Description

The K814P/K824P/K844P consist of a phototransistor optically coupled to 2 gallium arsenide infrared-emitting diodes (reversed polarity) in an 4-lead up to 16-lead plastic dual inline package. The elements are mounted on one leadframe using a **coplanar technique**, providing a fixed distance between input and output for highest safety requirements.



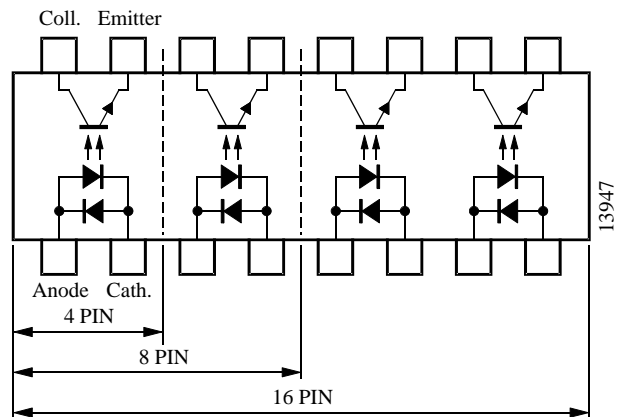
## Applications

Feature phones, answering machines, PABX, fax machines

14925

## Features

- Endstackable to 2.54 mm (0.1') spacing
- DC isolation test voltage  $V_{IO} = 5 \text{ kV}$
- Low coupling capacitance of typical 0.3 pF
- **Current Transfer Ratio (CTR)** of typical 100%
- Low temperature coefficient of CTR
- Wide ambient temperature range
- **Underwriters Laboratory (UL) 1577** recognized, file number E-76222
- **CSA (C-UL) 1577** recognized, file number E-76222 – Double Protection
- Coupling System U



## Order Instruction

Ordering Code	CTR Ranking	Remarks
K814P	< 20%	4 Pin Single channel
K824P	< 20%	8 Pin Dual channel
K844P	< 20%	16 Pin Quad channel



### Absolute Maximum Ratings

#### Input (Emitter)

Parameter	Test Conditions	Symbol	Value	Unit
Reverse voltage		$V_R$	6	V
Forward current		$I_F$	$\pm 60$	mA
Forward surge current	$t_p \leq 10 \mu s$	$I_{FSM}$	$\pm 1.5$	A
Power dissipation	$T_{amb} \leq 25^\circ C$	$P_V$	100	mW
Junction temperature		$T_j$	125	$^\circ C$

#### Output (Detector)

Parameter	Test Conditions	Symbol	Value	Unit
Collector emitter voltage		$V_{CEO}$	70	V
Emitter collector voltage		$V_{ECO}$	7	V
Collector current		$I_C$	50	mA
Peak collector current	$t_p/T = 0.5, t_p \leq 10 ms$	$I_{CM}$	100	mA
Power dissipation	$T_{amb} \leq 25^\circ C$	$P_V$	150	mW
Junction temperature		$T_j$	125	$^\circ C$

#### Coupler

Parameter	Test Conditions	Symbol	Value	Unit
AC Isolation test voltage (RMS)	$t = 1 min$	$V_{IO}^{1)}$	5	kV
Total power dissipation	$T_{amb} \leq 25^\circ C$	$P_{tot}$	250	mW
Operating ambient temperature range		$T_{amb}$	-40 to +100	$^\circ C$
Storage temperature range		$T_{stg}$	-55 to +125	$^\circ C$
Soldering temperature	2 mm from case, $t \leq 10 s$	$T_{sd}$	260	$^\circ C$

<sup>1)</sup> Related to standard climate 23/50 DIN 50014

**Electrical Characteristics** ( $T_{amb} = 25^{\circ}\text{C}$ )

## Input (Emitter)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Forward voltage	$I_F = \pm 50 \text{ mA}$	$V_F$		1.25	1.6	V
Reverse current	$V_R = \pm 6 \text{ V}$	$I_R$			10	$\mu\text{A}$

## Output (Detector)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector emitter voltage	$I_C = 100 \mu\text{A}$	$V_{CEO}$	70			V
Emitter collector voltage	$I_E = 100 \mu\text{A}$	$V_{ECO}$	7			V
Collector dark current	$V_{CE} = 20 \text{ V}, I_F = 0, E = 0$	$I_{CEO}$			100	nA

## Coupler

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector emitter saturation voltage	$I_F = \pm 10 \text{ mA}, I_C = 1 \text{ mA}$	$V_{CEsat}$			0.3	V
Cut-off frequency	$I_F = \pm 10 \text{ mA}, V_{CE} = 5 \text{ V}, R_L = 100 \Omega$	$f_c$		100		kHz
Coupling capacitance	$f = 1 \text{ MHz}$	$C_k$		0.3		pF

## Current Transfer Ratio (CTR)

Parameter	Test Conditions	Type	Symbol	Min.	Typ.	Max.	Unit
$I_C/I_F$	$V_{CE} = 5 \text{ V}, I_F = \pm 5 \text{ mA}$		CTR	0.2		3.0	



### Switching Characteristics

Parameter	Test Conditions	Symbol	Typ.	Unit
Delay time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ (see figure 1)	$t_d$	3.0	$\mu\text{s}$
Rise time		$t_r$	3.0	$\mu\text{s}$
Fall time		$t_f$	4.7	$\mu\text{s}$
Storage time		$t_s$	0.3	$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ (see figure 2)	$t_{on}$	6.0	$\mu\text{s}$
Turn-off time		$t_{off}$	5.0	$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ (see figure 2)	$t_{on}$	9.0	$\mu\text{s}$
Turn-off time		$t_{off}$	18.0	$\mu\text{s}$

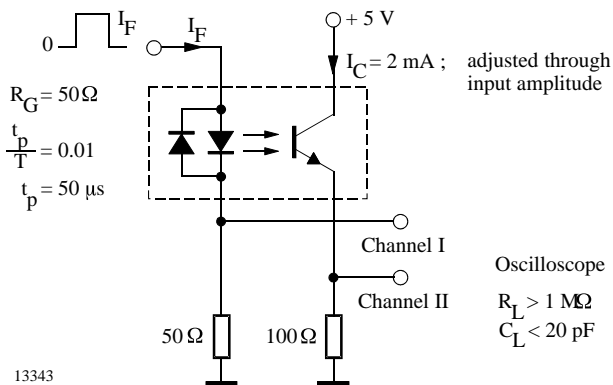


Figure 1. Test circuit, non-saturated operation

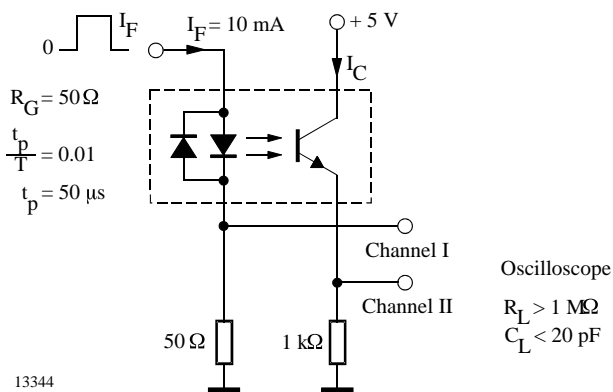


Figure 2. Test circuit, saturated operation

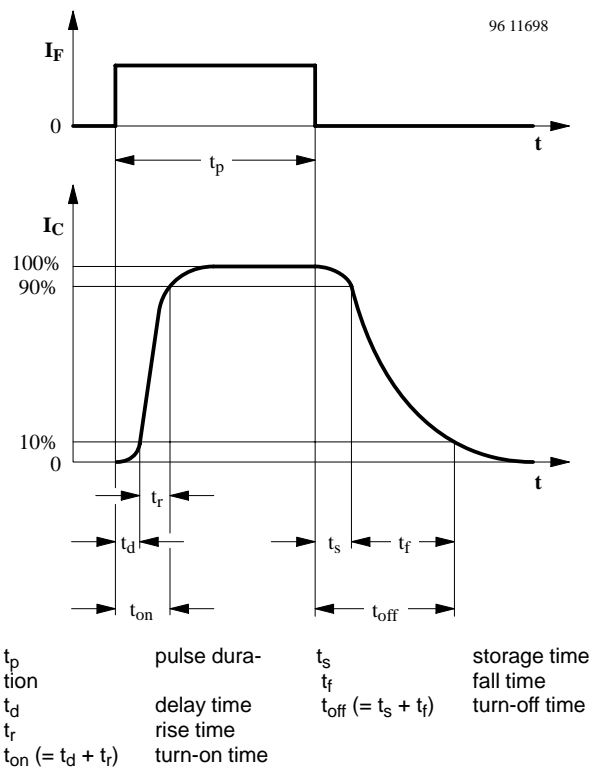


Figure 3. Switching times

### Typical Characteristics ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)

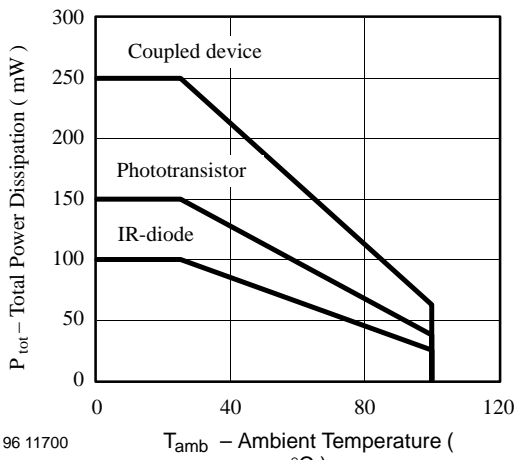


Figure 4. Total Power Dissipation vs. Ambient Temperature

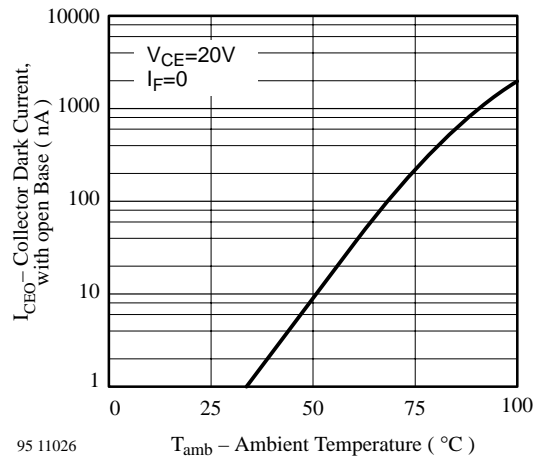


Figure 7. Collector Dark Current vs. Ambient Temperature

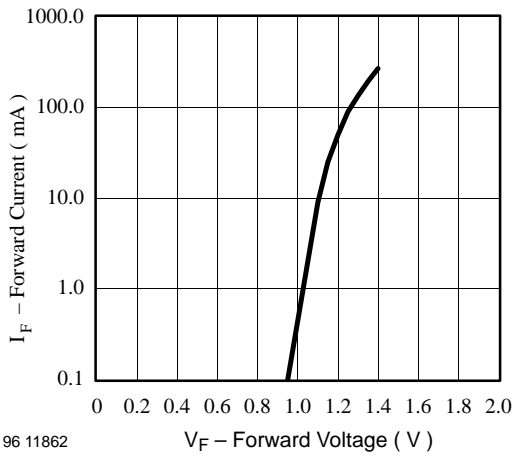


Figure 5. Forward Current vs. Forward Voltage

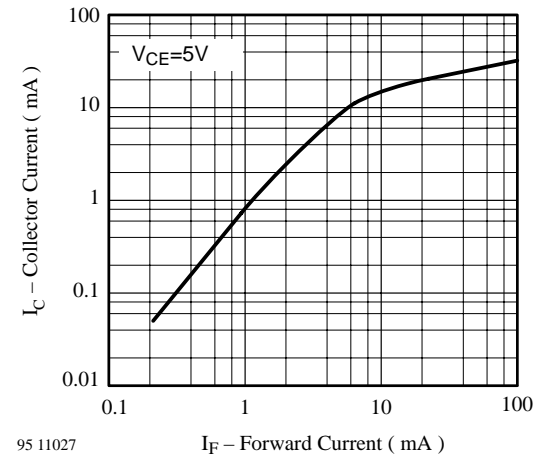


Figure 8. Collector Current vs. Forward Current

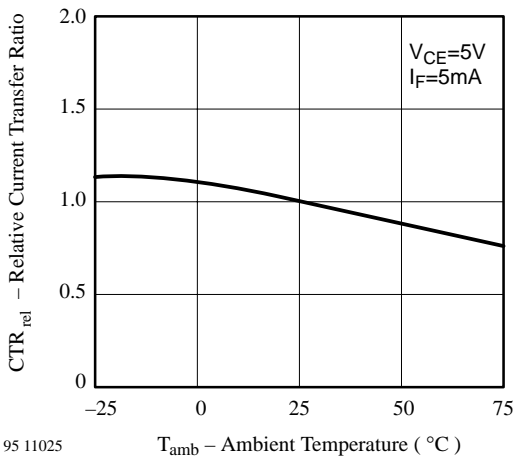


Figure 6. Relative Current Transfer Ratio vs. Ambient Temperature

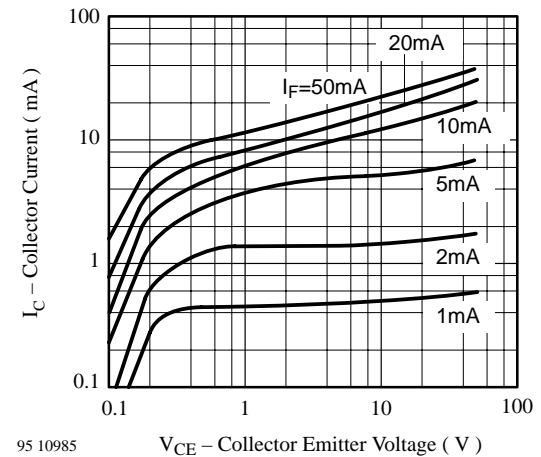
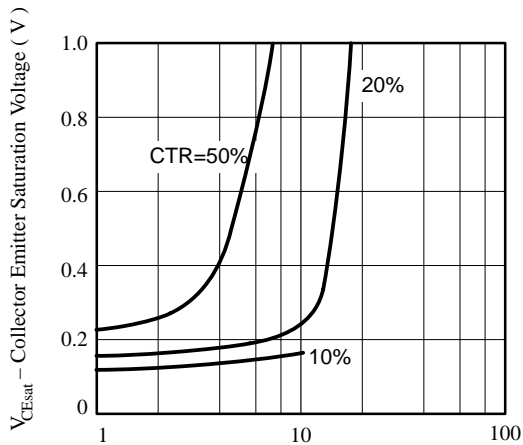


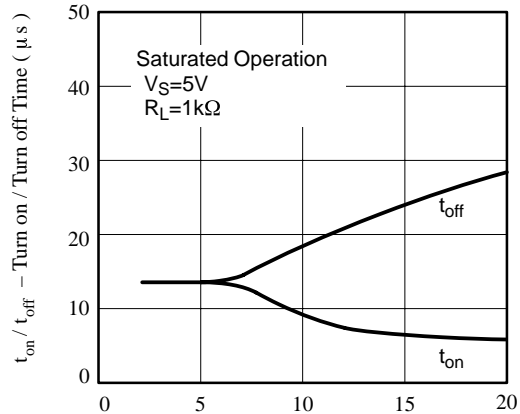
Figure 9. Collector Current vs. Collector Emitter Voltage



95 11028

$I_C$  – Collector Current (mA)

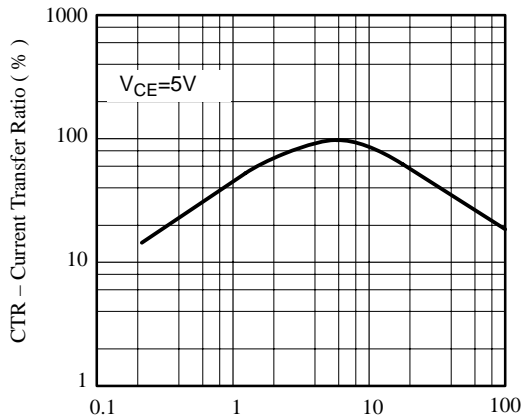
Figure 10. Collector Emitter Saturation Voltage vs. Collector Current



95 11031

$I_F$  – Forward Current (mA)

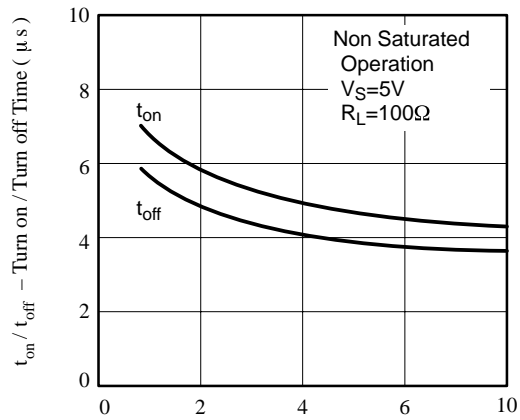
Figure 12. Turn on / off Time vs. Forward Current



95 11029

$I_F$  – Forward Current (mA)

Figure 11. Current Transfer Ratio vs. Forward Current



95 11030

$I_C$  – Collector Current (mA)

Figure 13. Turn on / off Time vs. Collector Current

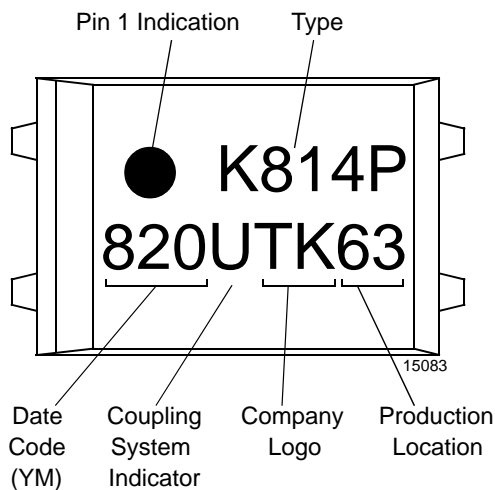
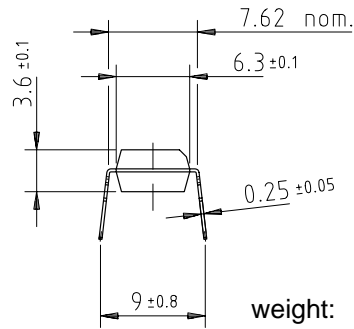
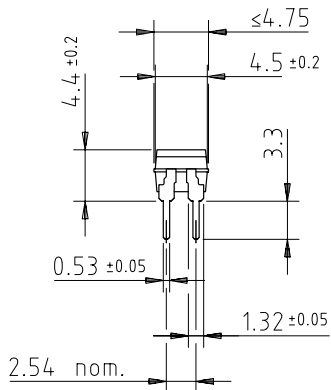


Figure 14. Marking example

### Dimensions of K814P in mm

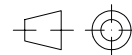
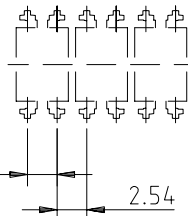
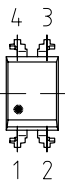


weight: ca. 0.25 g  
 creepage distance:  $\geq 6$  mm  
 air path:  $\geq 6$  mm

after mounting on PC board

E.g.:

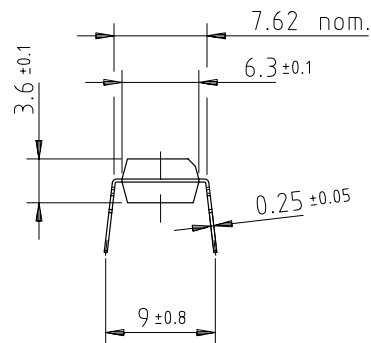
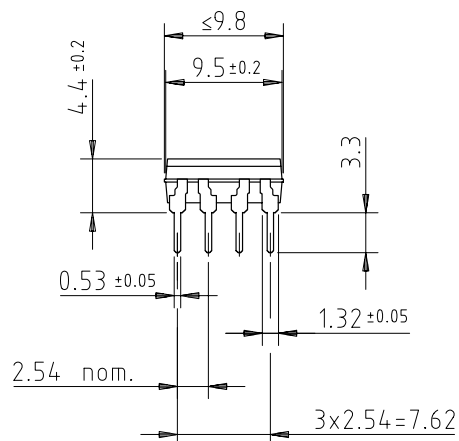
special Features: endstackable to 2.54mm ( .100" ) spacing



technical drawings according to DIN specifications

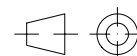
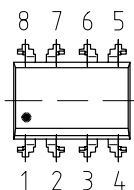
14789

### Dimensions of K824P in mm



weight: ca. 0.55 g  
 creepage distance:  $\geq 6$  mm  
 air path:  $\geq 6$  mm

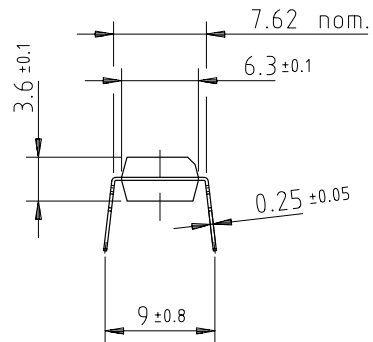
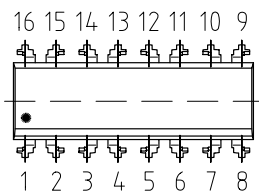
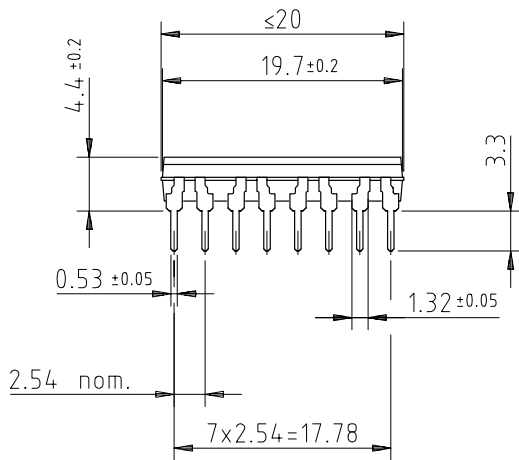
after mounting on PC board



technical drawings according to DIN specifications

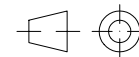
14784

## Dimensions of K844P in mm



weight: ca. 1.0 g  
 creepage distance:  $\geq 6$  mm  
 air path:  $\geq 6$  mm

after mounting on PC board



technical drawings  
 according to DIN  
 specifications

14783