



Optocoupler with Phototransistor Output

Description

The K817P/ K827PH/ K847PH consist of a photo-transistor optically coupled to a gallium arsenide infrared-emitting diode in an 4-lead up to 16-lead plastic dual inline package.

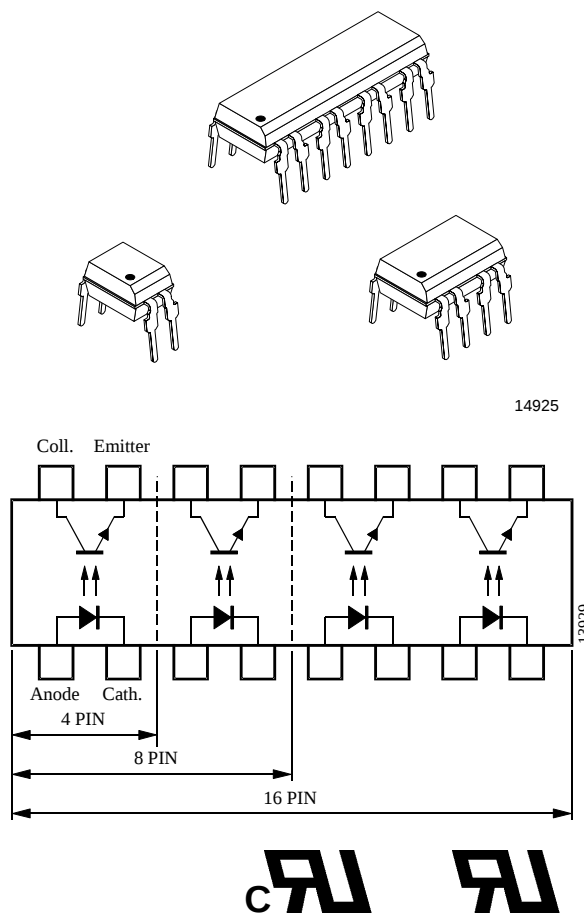
The elements are mounted on one leadframe using a **coplanar technique**, providing a fixed distance between input and output for highest safety requirements.

Applications

Programmable logic controllers, modems, answering machines, general applications

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)** selected into groups
- 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
K817P	50 to 600%	4 Pin = Single channel
K827PH	50 to 600%	8 Pin = Dual channel
K847PH	50 to 600%	16 Pin = Quad channel
K817P1	40 to 80%	4 Pin = Single channel
K817P2	63 to 125%	4 Pin = Single channel
K817P3	100 to 200%	4 Pin = Single channel
K817P4	160 to 320%	4 Pin = Single channel
K817P5	50 to 150%	4 Pin = Single channel
K817P6	100 to 300%	4 Pin = Single channel
K817P7	80 to 160%	4 Pin = Single channel
K827P8	130 to 260%	4 Pin = Single channel
K817P9	200 to 400%	4 Pin = Single channel

Absolute Maximum Ratings**Input (Emitter)**

Parameter	Test Conditions	Symbol	Value	Unit
Reverse voltage		V_R	6	V
Forward current		I_F	60	mA
Forward surge current	$t_p \leq 10 \mu s$	I_{FSM}	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	$^\circ C$

¹⁾ 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	$I_F = 50 \text{ mA}$	V_F		1.25	1.6	V
Junction capacitance	$V_R = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_j		50		pF

Output (Detector)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector emitter voltage	$I_C = 100 \text{ }\mu\text{A}$	V_{CEO}	70			V
Emitter collector voltage	$I_E = 100 \text{ }\mu\text{A}$	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	$I_F = 10 \text{ mA}$, $I_C = 1 \text{ mA}$	V_{CEsat}			0.3	V
Cut-off frequency	$I_F = 10 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $R_L = 100 \text{ }\Omega$	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	$V_{CE} = 5 \text{ V}$, $I_F = 5 \text{ mA}$	K817P	CTR	0.5		6.0	
	$V_{CE} = 5 \text{ V}$, $I_F = 5 \text{ mA}$	K827PH	CTR	0.5		6.0	
	$V_{CE} = 5 \text{ V}$, $I_F = 5 \text{ mA}$	K847PH	CTR	0.5		6.0	
	$V_{CE} = 5 \text{ V}$, $I_F = 10 \text{ mA}$	K817P1	CTR	0.4		0.8	
	$V_{CE} = 5 \text{ V}$, $I_F = 10 \text{ mA}$	K817P2	CTR	0.63		1.25	
	$V_{CE} = 5 \text{ V}$, $I_F = 10 \text{ mA}$	K817P3	CTR	1.0		2.0	
	$V_{CE} = 5 \text{ V}$, $I_F = 10 \text{ mA}$	K817P4	CTR	1.6		3.2	
	$V_{CE} = 5 \text{ V}$, $I_F = 5 \text{ mA}$	K817P5	CTR	0.5		1.5	
	$V_{CE} = 5 \text{ V}$, $I_F = 5 \text{ mA}$	K817P6	CTR	1.0		3.0	
	$V_{CE} = 5 \text{ V}$, $I_F = 5 \text{ mA}$	K817P7	CTR	0.8		1.6	
	$V_{CE} = 5 \text{ V}$, $I_F = 5 \text{ mA}$	K817P8	CTR	1.3		2.6	
	$V_{CE} = 5 \text{ V}$, $I_F = 5 \text{ mA}$	K817P9	CTR	2.0		4.0	



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	μs
Rise time		t_r	3.0	μs
Fall time		t_f	4.7	μs
Storage time		t_s	0.3	μs
Turn-on time		t_{on}	6.0	μs
Turn-off time		t_{off}	5.0	μs
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	μs
Turn-off time		t_{off}	18.0	μs

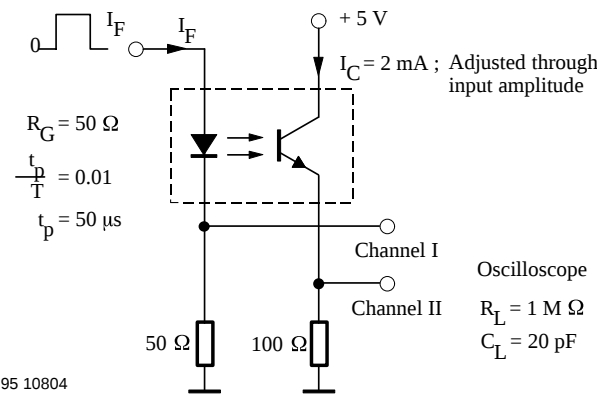


Figure 1. Test circuit, non-saturated operation

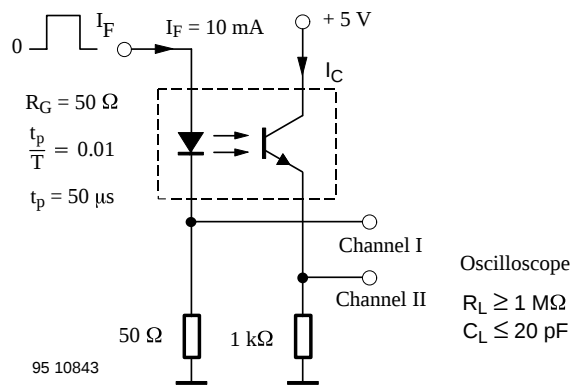


Figure 2. Test circuit, saturated operation

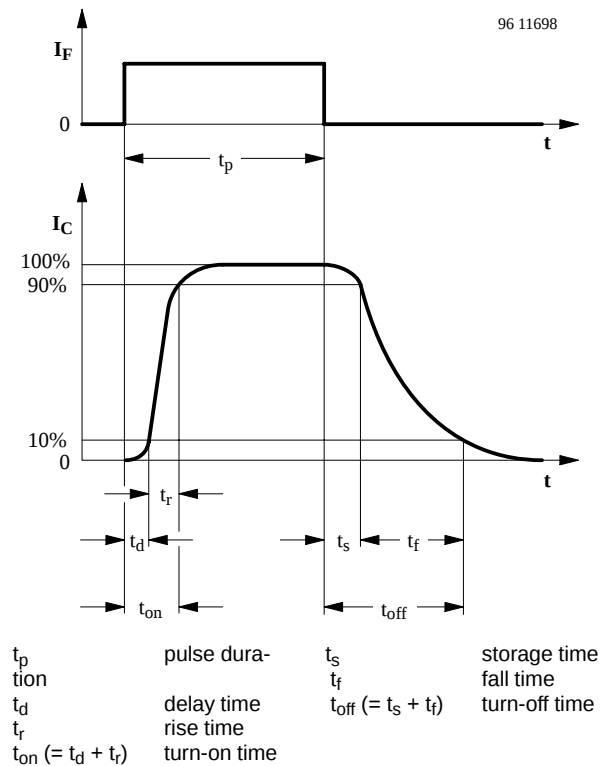


Figure 3. Switching times

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

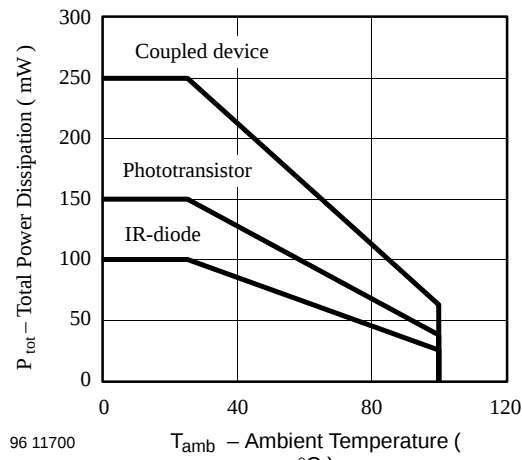


Figure 4. Total Power Dissipation vs. Ambient Temperature

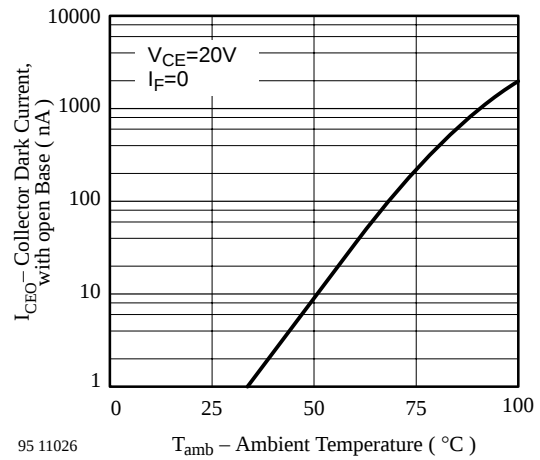


Figure 7. Collector Dark Current vs. Ambient Temperature

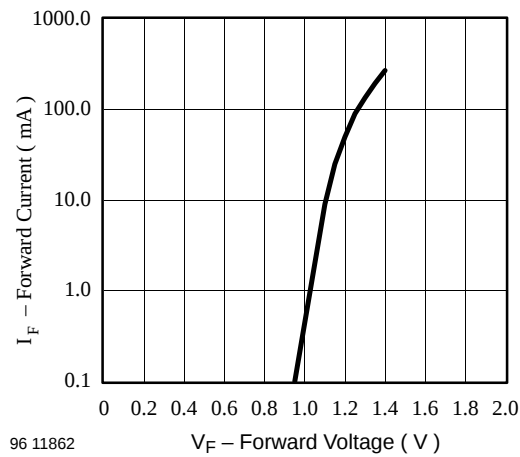


Figure 5. Forward Current vs. Forward Voltage

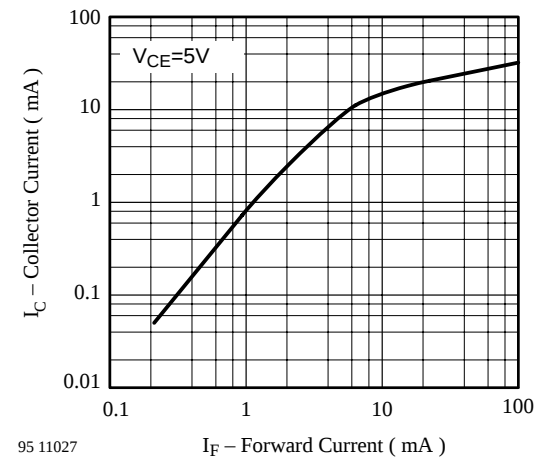


Figure 8. Collector Current vs. Forward Current

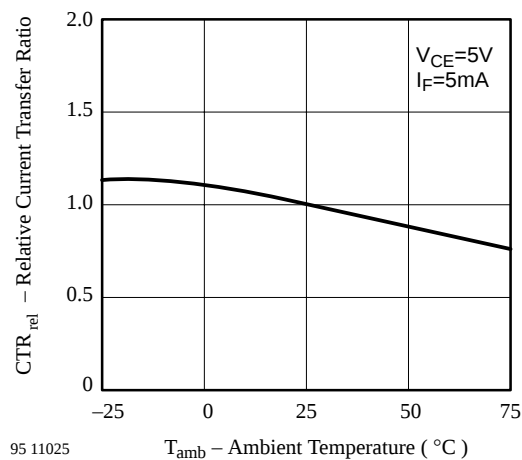


Figure 6. Relative Current Transfer Ratio vs. Ambient Temperature

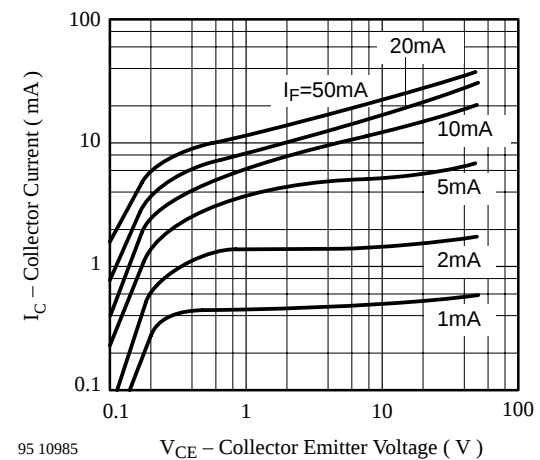
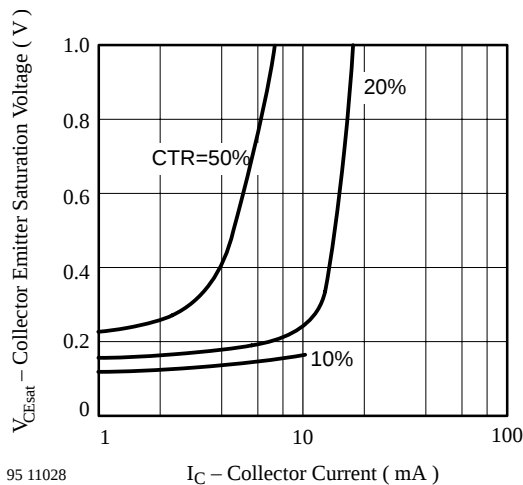
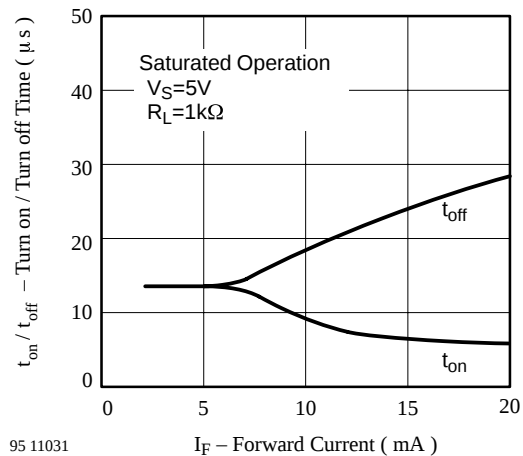


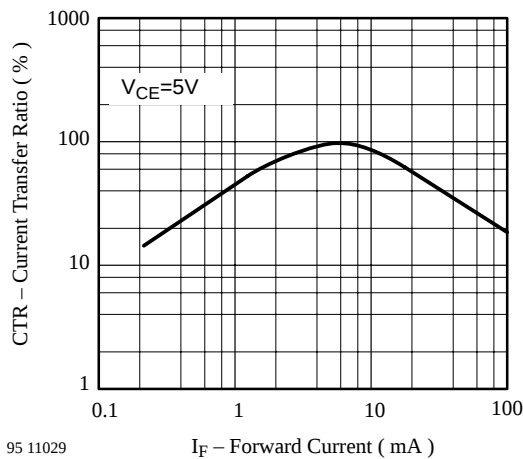
Figure 9. Collector Current vs. Collector Emitter Voltage



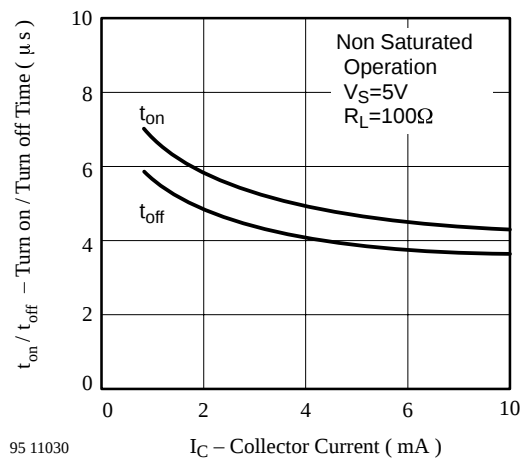
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Figure 10. Collector Emitter Saturation Voltage vs. Collector Current



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



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Figure 11. Current Transfer Ratio vs. Forward Current



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

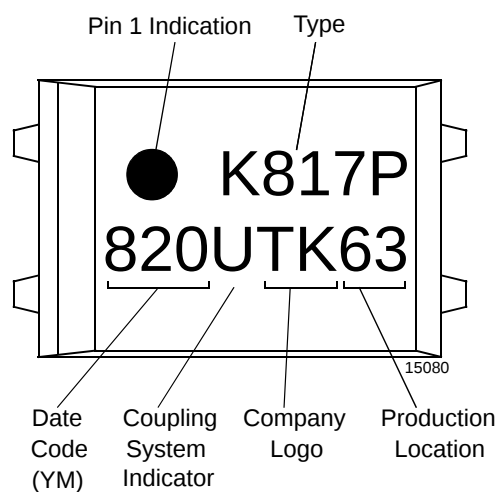
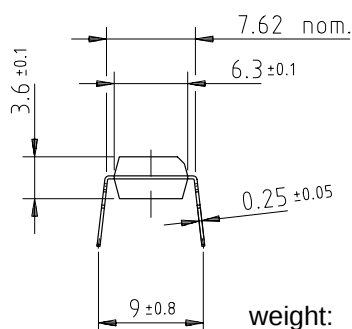
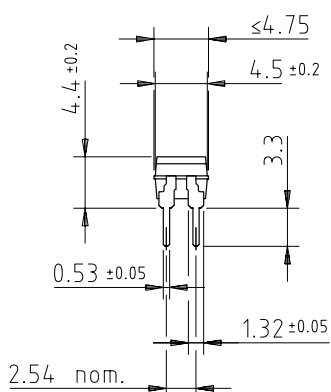


Figure 14. Marking example

Dimensions of K817P. in mm

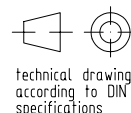
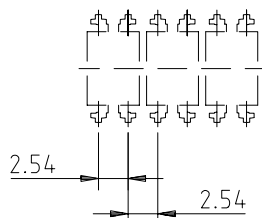
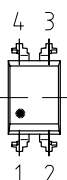


weight: ca. 0.25 g
creepage distance: $\geq 6 \text{ mm}$
air path: $\geq 6 \text{ mm}$

after mounting on PC board

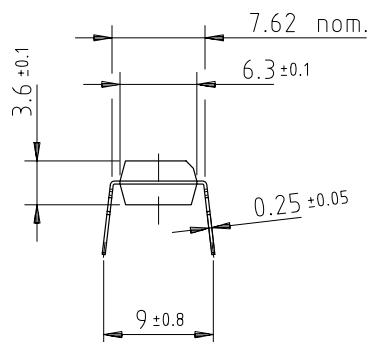
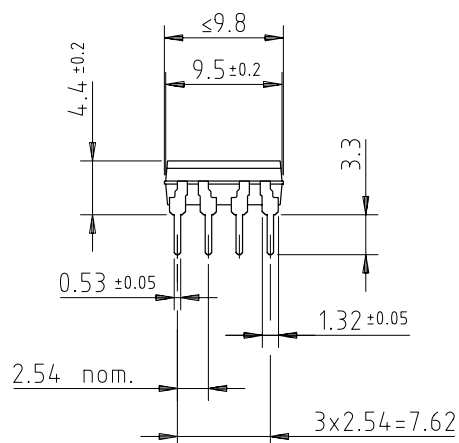
E.g.:

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



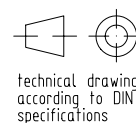
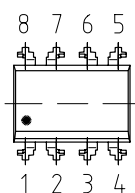
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Dimensions of K827PH in mm



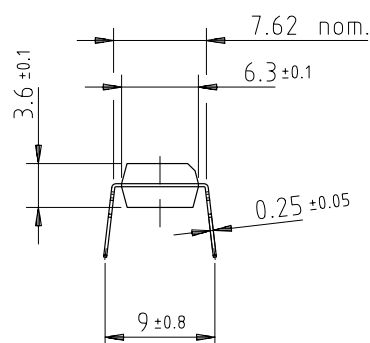
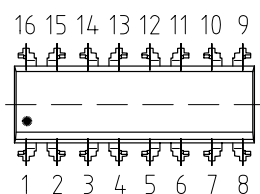
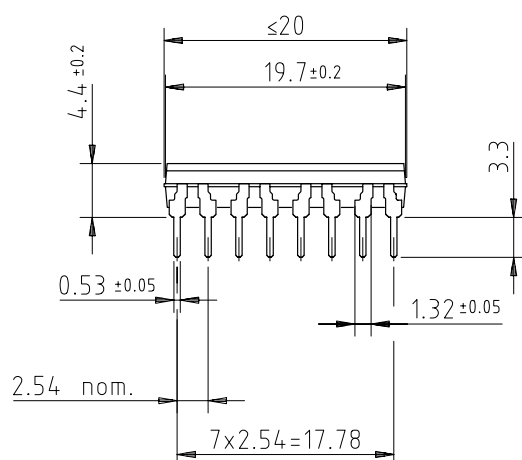
weight: ca. 0.55 g
creepage distance: $\geq 6 \text{ mm}$
air path: $\geq 6 \text{ mm}$

after mounting on PC board



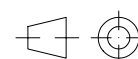
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Dimensions of K847PH in mm



weight: ca. 1.0 g
 creepage distance: ≥ 6 mm
 air path: ≥ 6 mm

after mounting on PC board



technical drawings
 according to DIN
 specifications

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