

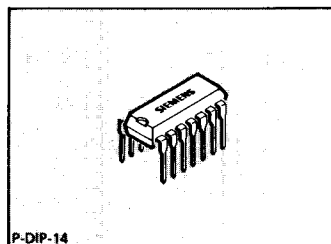
## Proximity Switch

TCA 205

### Features

- Large supply voltage range
- High output current
- Antivalent outputs
- Adjustable switching distance
- Adjustable hysteresis
- Turn-on delay

Bipolar IC

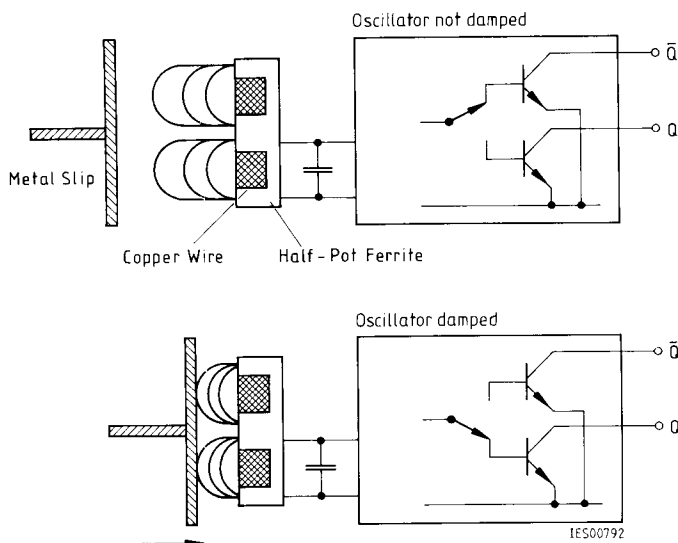


| Type        | Ordering Code | Package  |
|-------------|---------------|----------|
| ■ TCA 205 A | Q67000-A1034  | P-DIP-14 |

■ Not for new design.

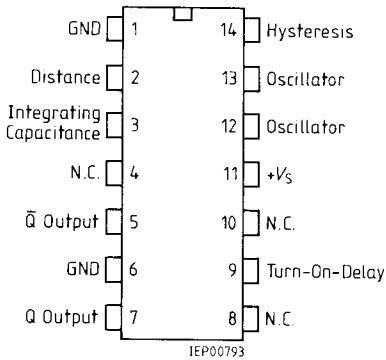
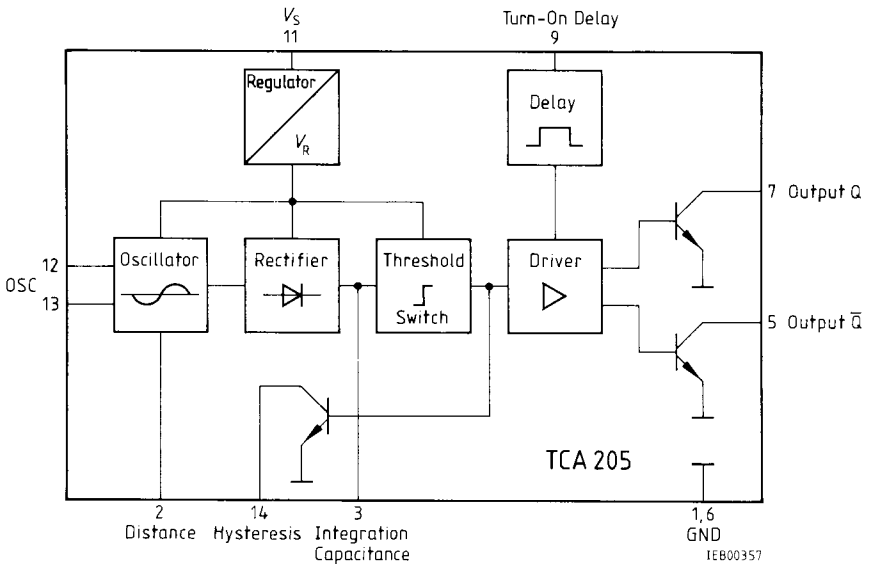
This IC is intended for applications in inductive proximity switches. The outputs switch when the oscillation is damped, e.g. by the approach of a metal object.

### Operation Schematic



**Pin Configurations**

(top view)

**Block Diagram**

**Absolute Maximum Ratings**

| Parameter                                    | Symbol      | Limit Values | Unit |
|----------------------------------------------|-------------|--------------|------|
| Supply voltage                               | $V_S$       | 30           | V    |
| Output voltage                               | $V_Q$       | 30           | V    |
| Output current                               | $I_Q$       | 50           | mA   |
| Junction temperature                         | $T_j$       | 150          | °C   |
| Storage temperature range                    | $T_{stg}$   | –55 to 125   | °C   |
| Thermal resistance<br>system – air TCA 205 A | $R_{th SA}$ | 85           | K/W  |

**Operating Range**

|                     |       |            |    |
|---------------------|-------|------------|----|
| Supply voltage      | $V_S$ | 4.75 to 30 | V  |
| Ambient temperature | $T_A$ | –25 to 85  | °C |

**Characteristics**

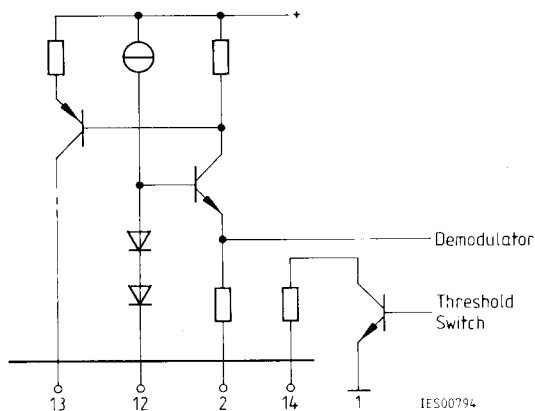
$V_S = 12\text{ V}$ ,  $T_A = 25\text{ °C}$

| Parameter                                              | Symbol               | Limit Values                       |             |          | Unit     | Test Conditions                                            |
|--------------------------------------------------------|----------------------|------------------------------------|-------------|----------|----------|------------------------------------------------------------|
|                                                        |                      | min.                               | typ.        | max.     |          |                                                            |
| Open-loop supply<br>current consumption                | $I_S$                |                                    | 1           | 2        | mA       | open pins                                                  |
| L-output voltage per output                            | $V_{QL}$<br>$V_{QL}$ |                                    | 0.8<br>1.25 | 1<br>1.5 | V<br>V   | $I_{QL} = 5\text{ mA}$<br>$I_{QL} = 50\text{ mA}$          |
| H-output current per output                            | $I_{QH}$             |                                    |             | 10       | μA       | $V_{QH} = 30\text{ V}$                                     |
| Integrating capacitance                                | $C_I$                |                                    | 10          |          | nF       |                                                            |
| Internal resistance at 3                               | $R_{I3}$             | 200                                | 350         | 660      | kΩ       |                                                            |
| Threshold voltage at 3                                 | $V_{S3}$             |                                    | 1.3         | 1.5      | V        |                                                            |
| Distance adjustment<br>Hysteresis adjustment circuit 1 | $R_{Di}$<br>$R_{Hy}$ | 6<br>0                             |             |          | kΩ<br>kΩ |                                                            |
| Distance adjustment<br>Hysteresis adjustment circuit 2 | $R_{Di}$<br>$R_{Hy}$ | 6 <sup>1)</sup><br>6 <sup>1)</sup> |             |          | kΩ<br>kΩ | $R_{Hy} \rightarrow \infty$<br>$R_{Di} \rightarrow \infty$ |
| Turn-on delay                                          | $t_{Don}$            |                                    | 200         |          | ms/μF    |                                                            |
| Oscillating frequency                                  | $f_{OSC}$            | 0.015                              |             | 1.5      | MHz      |                                                            |
| Switching frequency without $C_I$                      | $f_S$                |                                    |             | 5        | kHz      |                                                            |

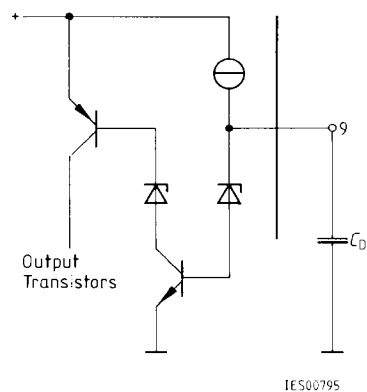
<sup>1)</sup> Parallel connection of  $R_{Hy}$  to  $R_{Di}$  may at least amount to 6 kΩ

## Schematic Circuit Diagrams

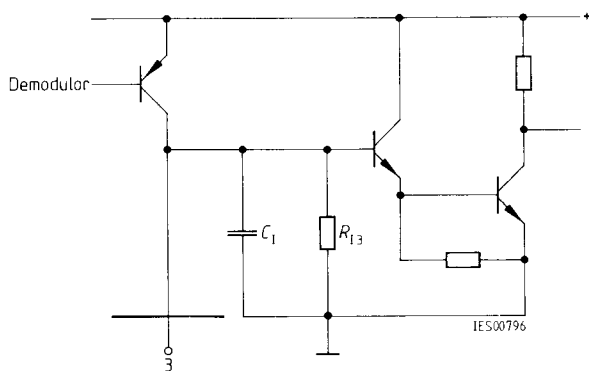
### Oscillator



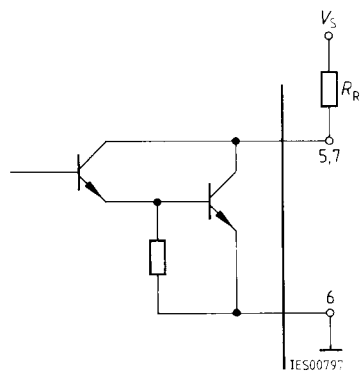
### Turn-on delay



### Integrating capacitor



### Outputs





### Application Example for a Proximity Switch

**Coil data**  
 pot core B65939-A-X22  
 coil former B65940-A-M1  
 $\varnothing = 25 \text{ mm} \times 8.9 \text{ mm}$   
 $L = 642 \mu\text{H}$   
 $n = 100 \text{ CuLS } 30 \times 0.05$

**Measuring plate** 30 mm x 30 mm x 1 mm, Fe

**Circuitry**  
 $R_{D1} = 56 \text{ to } 200 \text{ k}\Omega$ , metal layer  
 $R_{Hy} = \infty$   
 $C_0 = 1500 \text{ pF}$ , STYROFLEX  
 $f = 162 \text{ kHz}$

} circuit 2

Switching distance versus  
ambient temperature

