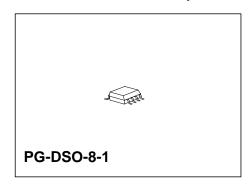
Proximity Switch

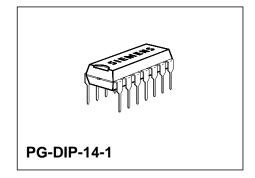
TCA 305 TCA 355

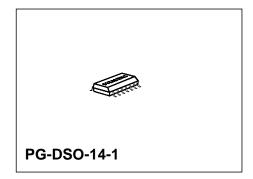
Bipolar IC

Features

- Lower open-loop current consumption; Is < 1 mA
- Lower output saturation voltage
- The temperature dependence of the switching distance is lower and compensation of the resonant circuit TC (temperature coefficient) is easier
- The sensitivity is higher, so that larger switching distances are possible and coils of a lower quality can be used
- The switching hysteresis remains constant as regards temperature, supply voltage and switching distance
- The TCA 305 even functions without external integrating capacitor. With an external capacitor (or with RC combination) good noise immunity can be achieved
- The outputs are temporarily short-circuit proof (approx.
 10 s to 1 min depending on package)
- The outputs are disabled when Vs < approx. 4.5 V and are enabled when the oscillator stabilizes (from Vs min = 5 V)
- Higher switching frequencies can be obtained
- Pb-free lead plating; RoHS compliant

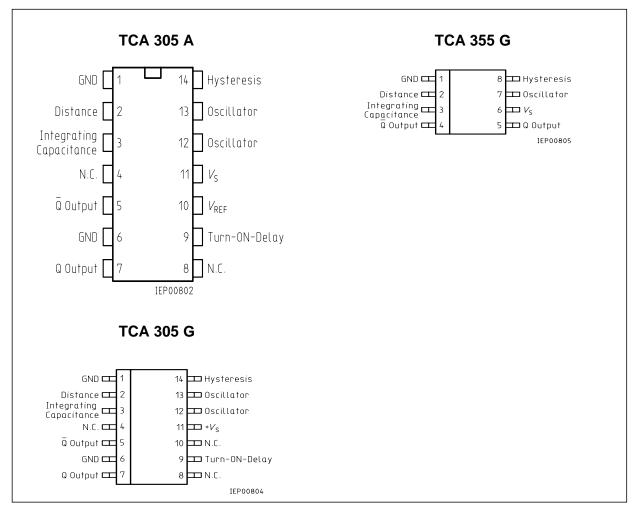






Туре	Ordering Code	Package
TCA 305 A	Q67000-A2291	PG-DIP-14-1
TCA 305 G	Q67000-A2305	PG-DSO-14-1 (SMD)
TCA 355 G	Q67000-A2444	PG-DSO-8-1 (SMD)

Not for new design



Pin Configurations (top view)

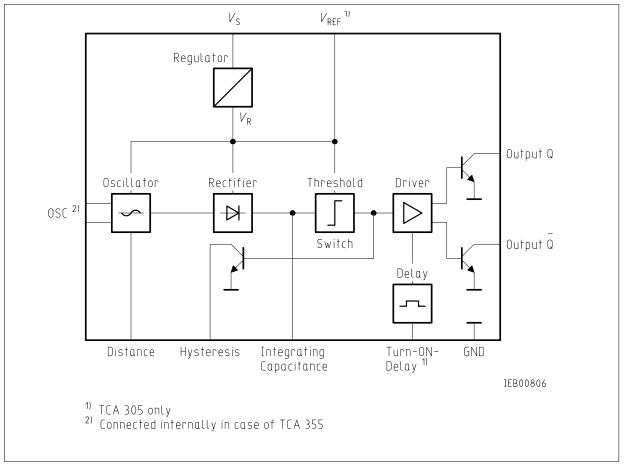
The devices TCA 305 and TCA 355 contain all the functions necessary to design inductive proximity switches. By approaching a standard metal plate to the coil, the resonant circuit is damped and the outputs are switched.

Operation Schematic: see TCA 205

The types TCA 305 and TCA 355 have been developed from the type TCA 205 and are outstanding for the following characteristics:

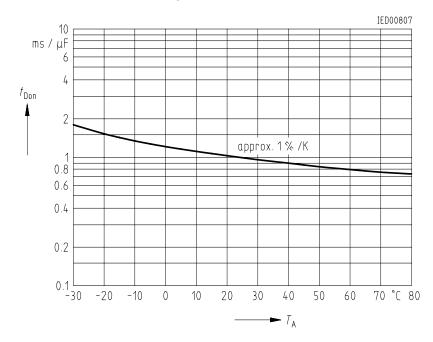
Logic Functions

Oscillator	Outputs Q		
not damped damped	H L	L H	



Block Diagram

Standard Turn-ON Delay Referred to T_A = 25 °C



Absolute Maximum Ratings

Parameter	Symbol	Limit Values	Unit	
Supply voltage	<i>V</i> s	35	V	
Output voltage	V_{Q}	35	V	
Output current	<i>I</i> Q	50	mA	
Distance, hysteresis resistance	RDi, R Hy	0	Ω	
Capacitances	<i>C</i> ı, <i>C</i> D	5	μF	
Junction temperature	Tj	150	°C	
Storage temperature range	T_{stg}	- 55 to 125	°C	
Thermal resistance				
system - air TCA 305 A	$ extit{R}$ th SA	85 (135) ²⁾	K/W	
TCA 305 G	Rth SA	140 (200) ²⁾	K/W	

Operating Range

Supply voltage	Vs	5 to 30 ³⁾	V
Oscillator frequency	<i>f</i> osc	0.015 to 1.5	MHz
Ambient temperature	TA	- 25 to 85	°C

Characteristics

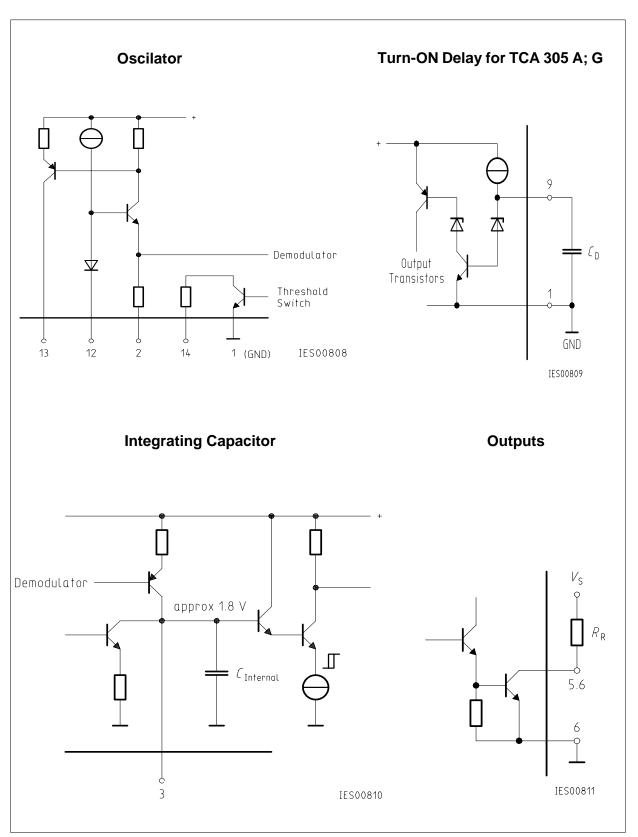
 $V_{\rm S} = 12 \text{ V}, T_{\rm A} = -25 \text{ to } 85 \,^{\circ}\text{C}$

Parameter	Symbol	Limit Values			Unit	Test
		min.	typ.	max.	- 	Condition
Open-loop current consumption	<i>I</i> s		0.6	0.9 (1.0) ²⁾	mA	outputs open
Reference voltage ¹⁾ L-output voltage per output	V_{REF} V_{QL} V_{QL}		3.2 0.04 0.10 0.22	0.15 0.35 0.75	V V V	I_{REF} < 10 μ A I_{QL} = 5 mA I_{QL} = 25 mA I_{QL} = 50 mA
H-output current per output	IQн			10	μА	<i>V</i> Qн = 30 V
Threshold at 3 Hysteresis at 3	Vs з V Hy	0.4	2.1 0.5	0.6	V V	
Turn-ON delay ¹⁾	td on	- 25 %	600	- 25 %	ms/μF	<i>T</i> _A = 25 °C
Switching frequency w/o Cı	Æ			5	kHz	

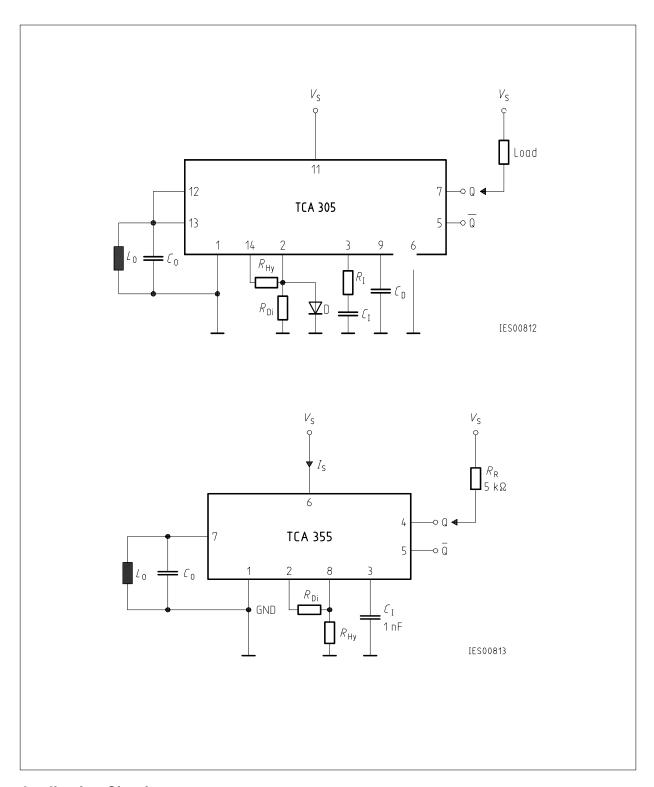
¹⁾ TCA 305 only

²⁾ Values in parenthesis apply to TCA 355 only

Operation at voltages less than 5 V (between approx. 2.5 and 5 V) is possible, if $V_{\rm REF}$ is connected to $V_{\rm S}$. In this case $V_{\rm REF}$ is no longer internally stabilized. Additionally, the pin "turn-on delay" is to be applied as follows: If no turn-on delay is needed, this pin has to be connected to $V_{\rm S}$. If, however, a turn-on delay is required, the charge current for $D_{\rm D}$ has to be adjusted with an external resistor between this pin and $V_{\rm S}$ (recommended value 390 k¹²).



Schematic Circuit Diagram



Application Circuit

<i>L</i> o, <i>C</i> o	Resonant circuit
RHy	Hysteresis adjustment
$ extit{R}$ Di	Distance adjustment
D	Temperature compensation of the resonant circuit; possibly with series resistance for the purpose of adjustment. The diode is not absolutely necessary. Whether it is used or not depends on the temperature coefficient of the resonant circuit.
<i>R</i> ı; <i>C</i> ı	Integration element. At pin 3 (integrating capacitance) we recommend a capacitor of typ. 1 nF. To increase noise immunity this capacitor can be substituted by an RC circuit with, e.g., $R_1 = 1 \text{ M}^{5,2}$ and $C_1 = 10 \text{ nF}$.
CD	Delay capacitor

Dimensioning Examples in Accordance with CENELEC Standard (flush)

	M 12	M 18	M 30
Ferrite pot core	M 33 (7.35 × 3.6) mm	N 22 (14.4 × 7.5) mm	N 22 (25 × 8.9) mm
Number of turns	100	80	100
Cross section of wire	0.1 CuL	20 × 0.05	10 × 0.1
Lo	206 μΗ	268 μH	585 μH
C_0 (STYROFLEX®)	1000 pF	1.2 nF	3.3 nF
<i>f</i> osc	appr. 350 kHz	appr. 280 kHz	appr. 115 kHz
Sn	4 mm	8 mm	15 mm
R_A (Metal)	8.2 k ¹ + 330 12	33 k ₇	22 k ¹ + 2.7 k ¹
<u>C</u> D	100 nF	100 nF	100 nF