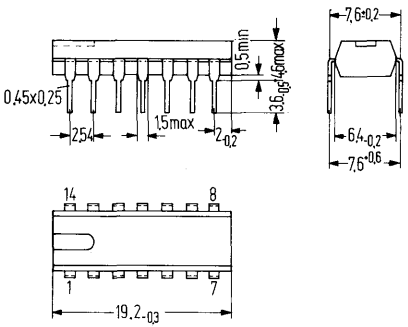
The TCA 965 is a monolithic integrated window discriminator in package similiar to 20 A 14 DIN 41886 (TO 116). It is particularly suitable for control systems as follow-up and adjusting control device with dead space. It can also be used in measuring systems of dc should remain within the tolerated deviations from the required values.

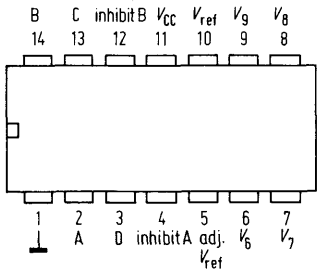
Type	Ordering code
TCA 965	Q67000-A982

Package outlines



Plastic plug-in package
20 A 14 DIN 41866
14 pins, dual-in-line
Weight approx. 1.1 g
Dimensions in mm

Pin configuration



Maximum ratings

Supply voltage	V_{CC}	27	V
Input voltage between 2 inputs	V_i	V_{CC}	V
Output current	I_q	50	mA
Junction temperature	T_j	150	°C
Storage temperature	T_s	−55 to +125	°C
Thermal resistance system-ambient air	R_{thSamb}	120	K/W

Range of operation

Supply voltage	V_{CC}	4.75 to 27	V
Ambient temperature in operation	T_{amb}	−25 to +85	°C

Operating characteristics (T_{amb} = 25°C; V_{CC} = 10 V)

		min	typ	max	
Supply current (pin 2 and pin 13 high state)	I_{CC}		4	5	mA
Input current (pin 6, 7, 8)	I_i		50		nA
Input current (pin 9)	I_i		−400		nA
Input offset voltage (pin 6/8, pin 7/8)	V_{io}		±10		mV
Input voltage range (pin 6, 7, 8)	V_i	1.5		$V_{CC}-1.0$	V
Input voltage range (pin 9)	V_i	.05		$.5 \times V_{CC}$	V
Reference voltage (without load)	V_5	2.8	3.0	3.2	V
Stabilized voltage (without external resistor, $V_{CC} \geqq 7.9$ V)	V_{10}	5.5	6.0	6.5	V
Temperature coefficient of V_5	αV_5		.5		mV/K
Sensitivity of V_5 to supply voltage variations	$\frac{\Delta V_5}{\Delta V_{CC}}$		3		mV/V
Output saturation voltage (I_q = 10 mA)	V_{qsat}		100	200	mV
Hysteresis (window level)	V_H		7		mV
Inhibit voltage at pin 4, 12[1])	$V_{4,12}$		1.5		V
Inhibit current at pin 4, 12	$I_{4,12}$		−100		µA

[1]) Inhibition occurs, if pin 4, pin 12 are grounded.

Application:

The window discriminator analyses the height of the input voltage between two externally adjustable limits. The window within which the circuit reacts "well" can be entered either by an upper limit (V_6) or a lower limit (V_7) or through the middle of the window (V_8) and, independently thereof, by a voltage V (V_9) which corresponds to half of the window width and is offered to ground. A Schmitt-Trigger characteristic with low hysteresis appears at the switching points. Four output signals are available which have the following meanings: input signal within, outside of the window (well, bad), too high, too low. All outputs have open collectors which are supplying up to 50 mA for the control of small relays, glow lamps, LED's. All usual logic families can directly be operated with only little additional circuitry. Moreover, the IC comprises a reference voltage from which all thresholds can be derived. It is practically independent of temperature and supply voltage.

Truth Table

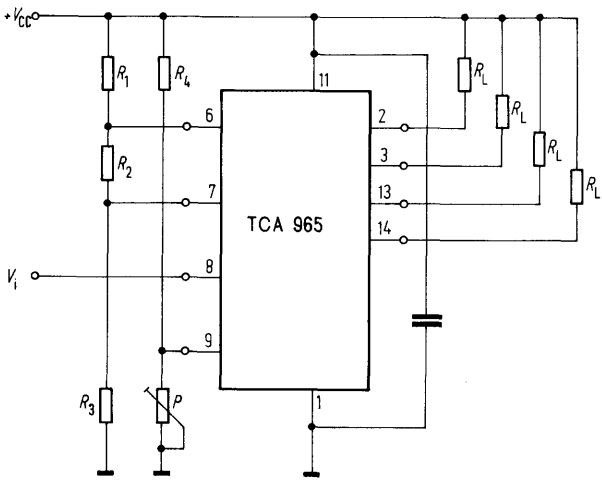
V_i	
application circuit I $V_i = V_8$	application circuit II $V_i = V_{6/7}$
$V_8 < (V_7 - V_9)$	$V_{6/7} > (V_8 + V_9)$
$V_8 > (V_6 + V_9)$	$V_{6/7} < (V_8 - V_9)$
$(V_6 + V_9) > V_8 > (V_7 - V_9)$	$(V_8 + V_9) > V_{6/7} > (V_8 - V_9)$
$V_6 + V_9$ upper window level $V_7 - V_9$ lower window level $(V_6 + V_9) - (V_7 - V_9)$ window width	V_8 window center V_9 half window width (versus ground)

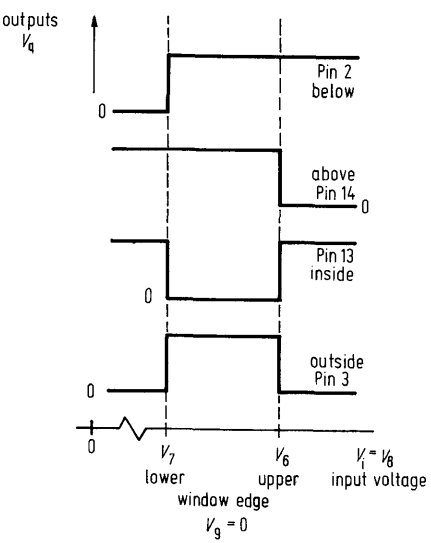
Outputs			
pin 2	pin 14	pin 13	pin 3
L(H)	H(H)	H(L)	L(H)[1]
H(H)	L(H)	H(L)	L(H)[2]
H	H	L	H

Values in brackets refer to external inhibition with pin 4 and pin 12
[1]) inhibition pin 4 to ground
[2]) inhibition pin 12 to ground

Application circuit I:

Outputs: pin 2 "below"
pin 3 "outside"
pin 13 "inside"
pin 14 "above"

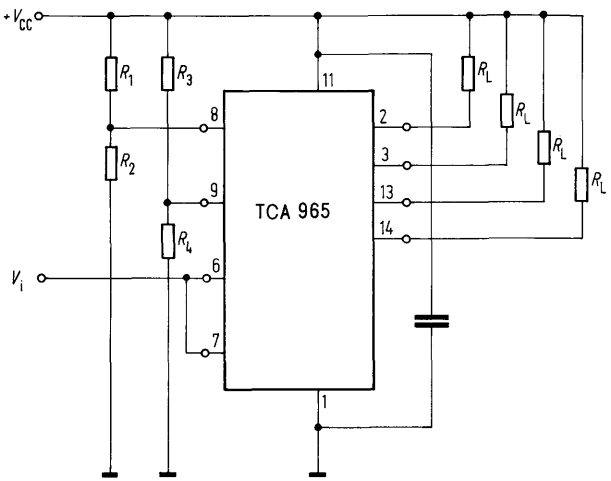


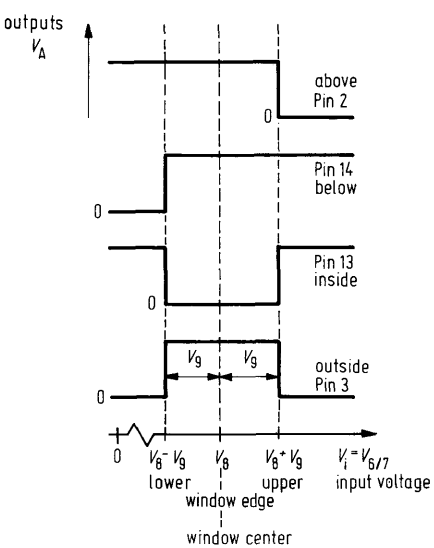


Outputs pin 2 and pin 14 can be inhibited externally, then they are H.

Application circuit II:

Outputs: pin 2 "above"
pin 3 "outside"
pin 13 "inside"
pin 14 "below"





V_8: window center
V_9: ± half window width
V_i: pin 6 and pin 7 connected

Outputs pin 2 and pin 14 can be inhibited externally, then they are H.

Block diagram