SIEMENS

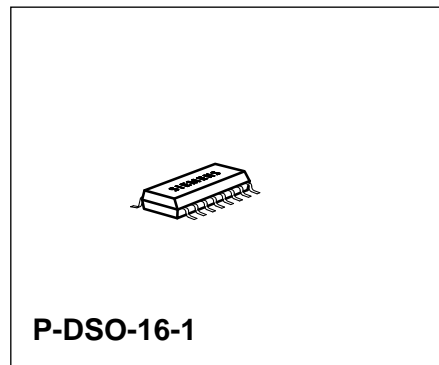## TV SAT IF-FM-Demodulator   TDA 6140-5X

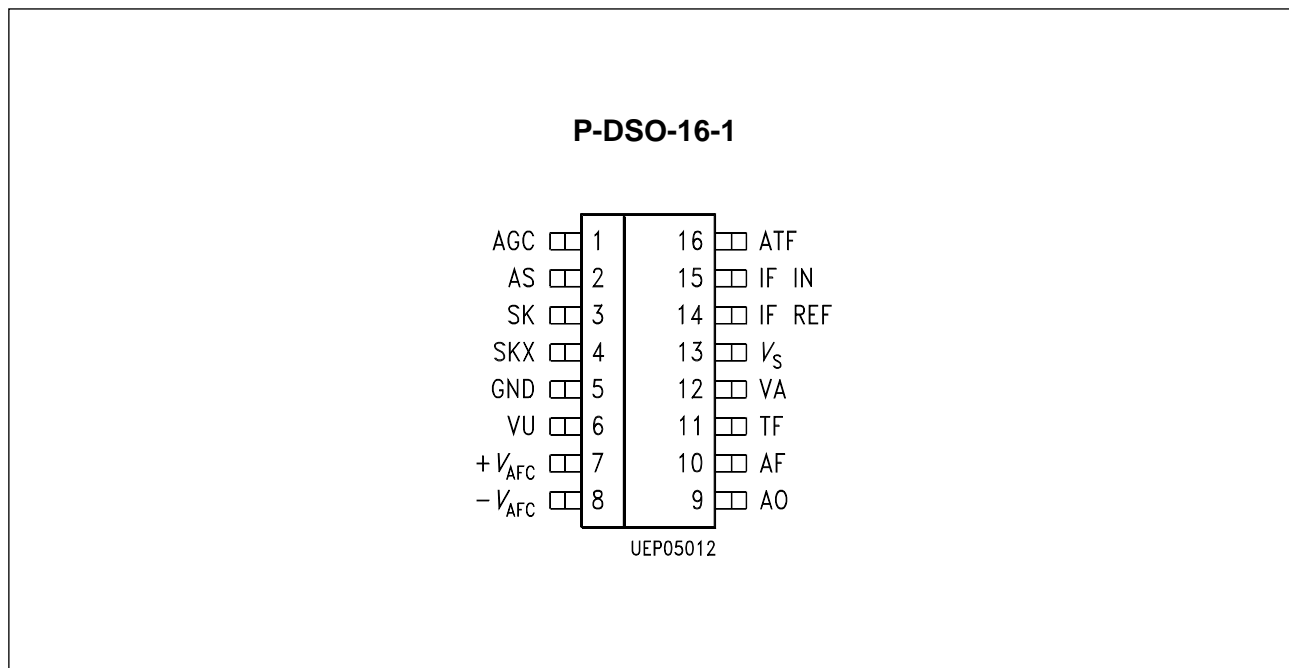**Preliminary Data**   **Bipolar IC**

Features

● Input sensitivity approx. – 40 dBm
● Symmetrical, low impedance IF-Input
● Two AFC-Outputs for up and down direction of tuning
● AFC-offset adjustable by an external control voltage
● Reduced external components

P-DSO-16-1

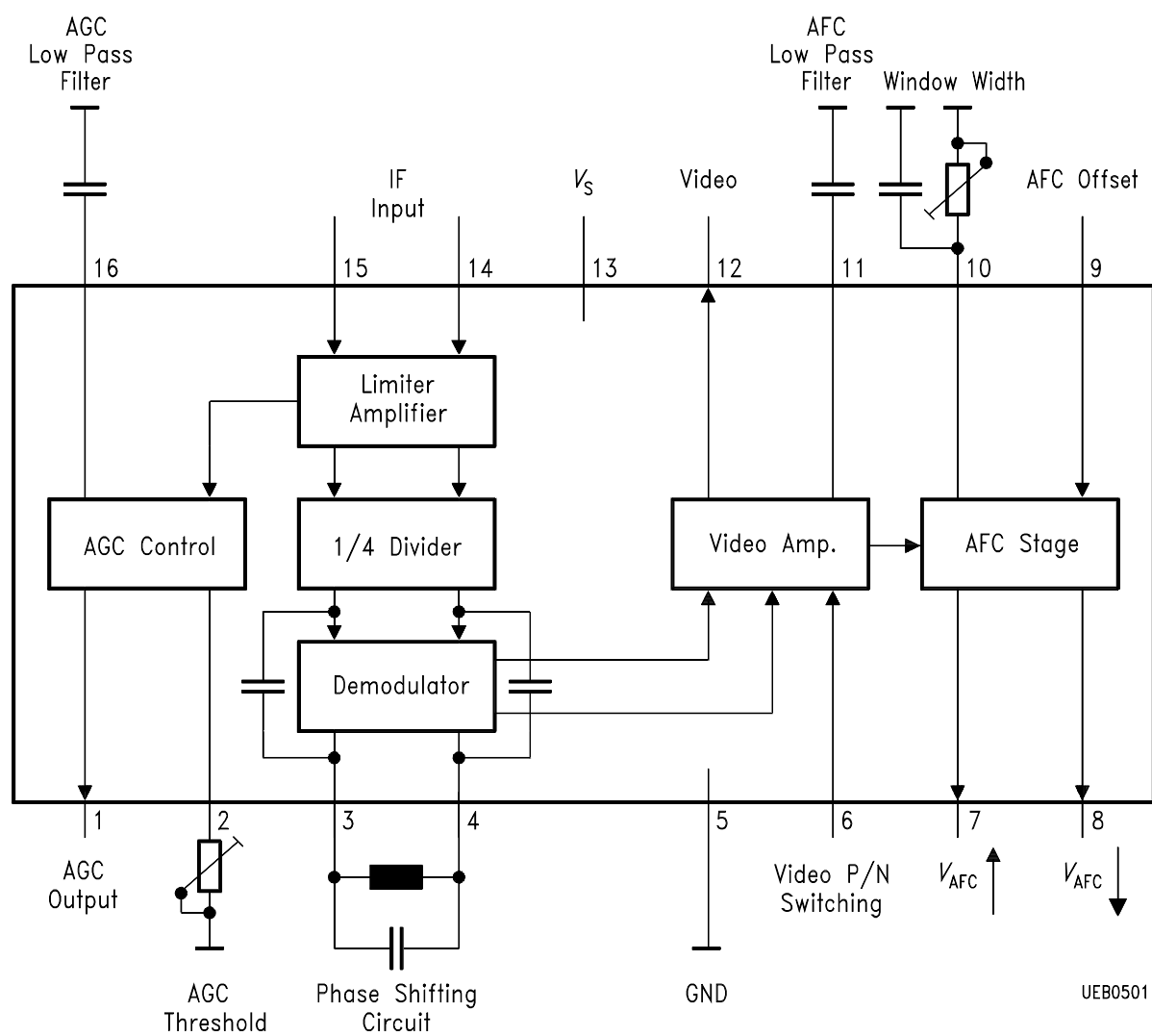| Type	Ordering Code	Package
TDA 6140-5X	Q67000-A5172	P-DSO-16-1 (SMD)

Amplifier and IF demodulator for satellite applications, consisting of: two-stage limiter amplifier; divider by 4; video amplifier; AGC; AFC-stage; reverse polarity switch for video signals.

Pin Configuration
(top view)

P-DSO-16-1

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        AGC ▢  1      16  ▢ ATF
         AS ▢  2      15  ▢ IF  IN
         SK ▢  3      14  ▢ IF  REF
        SKX ▢  4      13  ▢ V_S
        GND ▢  5      12  ▢ VA
         VU ▢  6      11  ▢ TF
     + V_AFC ▢  7     10  ▢ AF
     − V_AFC ▢  8      9  ▢ AO
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UEP05012

Pin Definitions and Functions

Pin No.	Symbol	Function
1	AGC	AGC-control voltage output
2	AS	AGC-threshold adjust
3	SK	Demodulator tank circuit
4	$\overline{SK}$	Demodulator tank circuit
5	GND	Ground
6	VP	Video polarity switch input for positive or negative modulation
7	$+ V_{AFC}$	Output for AFC-control (up)
8	$- V_{AFC}$	Output for AFC-control (down)
9	A0	External AFC-offset voltage input
10	AF	AFC-window width-adjust
11	TF	AFC-lowpass filter
12	VA	Video output
13	V_S	Supply voltage
14	IFREF	IF-reference input
15	IFIN	IF-input
16	ATF	AGC-lowpass filter

AGC
Low Pass
Filter

AFC
Low Pass
Filter   Window Width

IF
Input V_S Video   AFC Offset

16   15   14   13   12   11   10   9

Limiter
Amplifier

AGC Control   1/4 Divider   Video Amp.   AFC Stage

Demodulator

1   2   3   4   5   6   7   8

AGC
Output

AGC
Threshold

Phase Shifting
Circuit

GND

Video P/N
Switching

V_{AFC} V_{AFC}

UEB05011

Block Diagram

Circuit Description

By capacitive coupling, the FM modulated satellite IF-signal is fed into the input of a symmetrical limiter amplifier. Asymmetrical operation of this limiter amplifier is also possible, if one of the two inputs is blocked against high frequency signals. The output signal of the amplifier is divided by four and sent directly as well as phase shifted to the quadrature demodulator. The phase shifting is done using an external LC tank circuit. The demodulated video signal is amplified and available on the video output.

The AFC stage detects frequency offsets. The output signals of the AFC stage are available at the AFC "up" and AFC "down" control pins as an information to be processed in a microprocessor. A channel-dependent offset of the AFC curve can be adjusted by an external DC-voltage applied to the "AFC offset voltage" input pin. The AFC window width can be adjusted in the range of 0.5 to 1.5 MHz by means of an external resistance.

The information for the field strength of the FM modulated IF satellite signal is available as a DC voltage at the AGC-output. The AGC-threshold can be adjusted by a potentiometer.

The polarity of the demodulated video signal can be inverted by an external switching voltage fed into the polarity switch input pin (positive or negative modulation).

Absolute Maximum Ratings

T_A = 0 to 70 °C

Parameter	Symbol	Limit Values		Unit	Test Condition
		min.	max.		
Supply voltage	V_S	0	6	V	
AGC-control voltage output	V_1	1	13	V	Open collector
AGC-threshold input	V_2	0.3	2	V	
Demodulator LC-circuit input	$V_{3, 4}$	− 0.3	3	V	
Video P/N-switching	V_6	− 0.3	6	V	
AFC-control	$V_{7, 8}$	0	6	V	Open collector
AFC-offset input	V_9	0	5	V	
AFC-window width	V_{10}	0.3	2	V	
AFC-lowpass filter	V_{11}	0	5	V	
Video output	V_{12}	1	5	V	
IF-inputs	$V_{14, 15}$	− 0.3	3	V	
AGC-lowpass filter	V_{16}	− 0.3	5	V	
Junction temperature	T_j		150	°C	
Storage temperature	T_{stg}	− 40	125	°C	
Thermal resistance	$R_{th\,SA}$		125	K/W	

Operating Range

Supply voltage	V_S	4.5	5.5	V	
Input frequency range	f_{15}	300	900	MHz	
Ambient temperature during operation	T_A	0	70	°C	

Characteristics

$T_A = 25\ °C$; $V_S = 5\ V$ **(test circuit 1)**

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Power consumption	I_S	30	40	50	mA	

Static Specifications
Input Sensitivity

IF-input	a_{15}	− 40		3	dBm	f_{15} = 480 MHz
Input impedance	$R_{14, 15}$		500		Ω	Parallel equivalent circuit
	$C_{14, 15}$		1.3		pF	Parallel equivalent circuit

Video Output

Voltage (Frequency deviation Δf = 13.5 MHz)	V_{12}	300		700	mV	
Distortion factor	THD		< 1		%	
Signal/noise ratio	S/N		70		dB	

Video P/N-Switching

Positive polarity	V_6	3.5			V	
Input current	$I_{6\,H}$			50	µA	
Negative polarity	V_6			1	V	
Input current	$I_{6\,L}$			− 50	µA	

AGC-Current (Open-collector current limited)

a_{15} = − 22 dBm	I_1		10		µA	V_1 = 8 V; Pin 2 on ground
a_{15} = − 8 dBm	I_1		500		µA	V_1 = 8 V; Pin 2 on ground

AFC-Control (Open-collector current limited)

f_{15} = 480 MHz	$V_{7/8}$		0.5		V	R_{AFC} = ∞
f_{15} = 480 MHz +200 kHz	V_7		V_S − 0.5		V	R_{AFC} = ∞ (V_8 = Low)
f_{15} = 480 MHz − 200 kHz	V_8		V_S − 0.5		V	R_{AFC} = ∞ (V_7 = Low)

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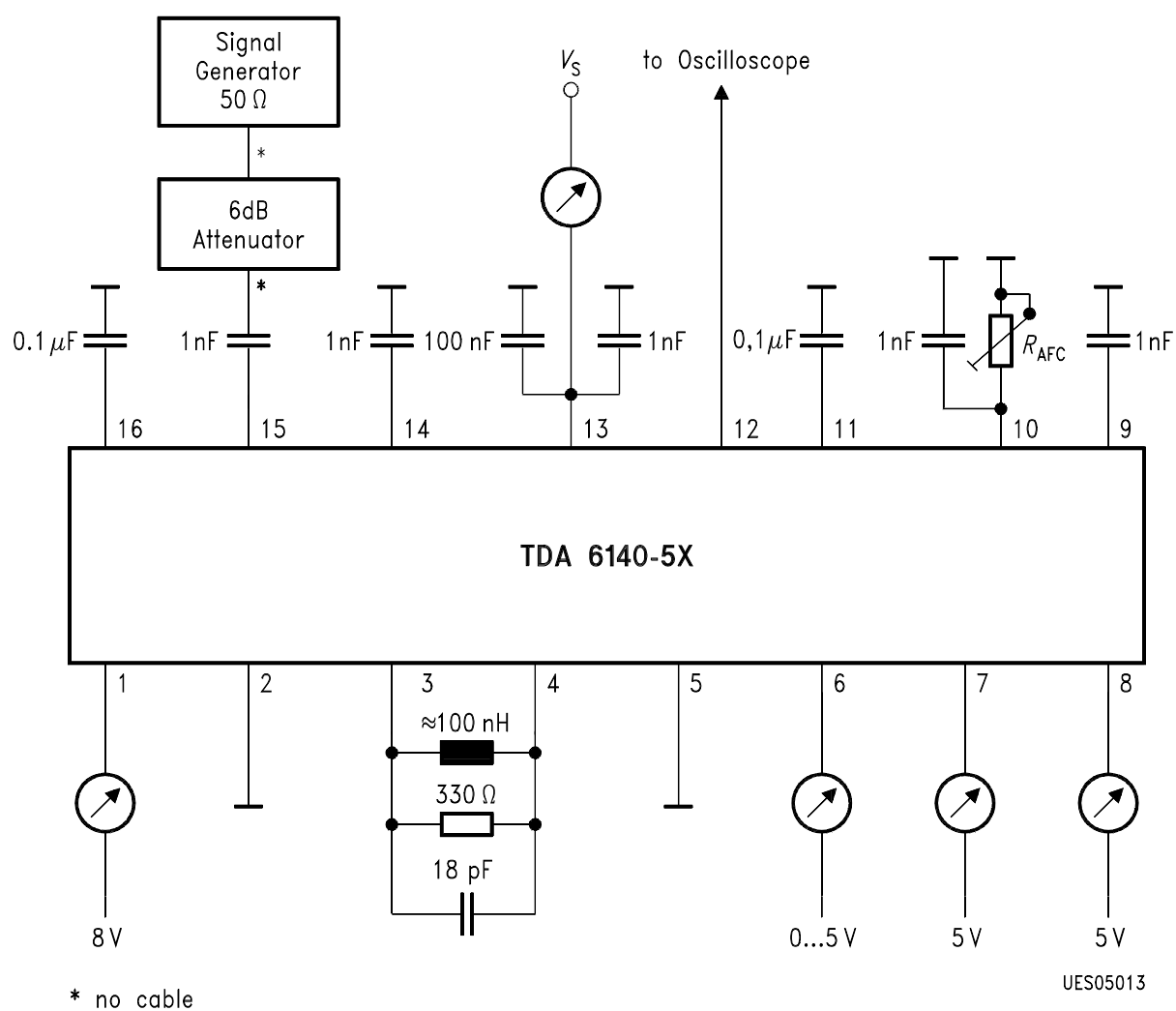
Test Circuit 1

Application Circuit