1.3 GHz PLL with I²C Bus for TV Tuner

Description

The U6207B is a single chip frequency synthesizer with I²C bus control. This IC contains a high frequency prescaler which can be switched off. The maximum input frequency at switched off prescaler is 220 MHz, so that special channels, e.g. weather forecast channels, can be received. 3 open collector switching outputs are available.

Features

- 1.3 GHz divide-by-8 prescaler integrated (can be bypassed)
- 15 bit counter accepts input frequencies up to 220 MHz
- µP-controlled by I²C bus
- 3 switching outputs (open collector)
- 4 addresses selectable at Pin 7 for multituner application
- 62.5 kHz (–1.3 GHz)/ 7.8125 kHz (–220 MHz) tuning steps
- Electrostatic protection according to MIL-STD 883
- SO14 package

Block Diagram

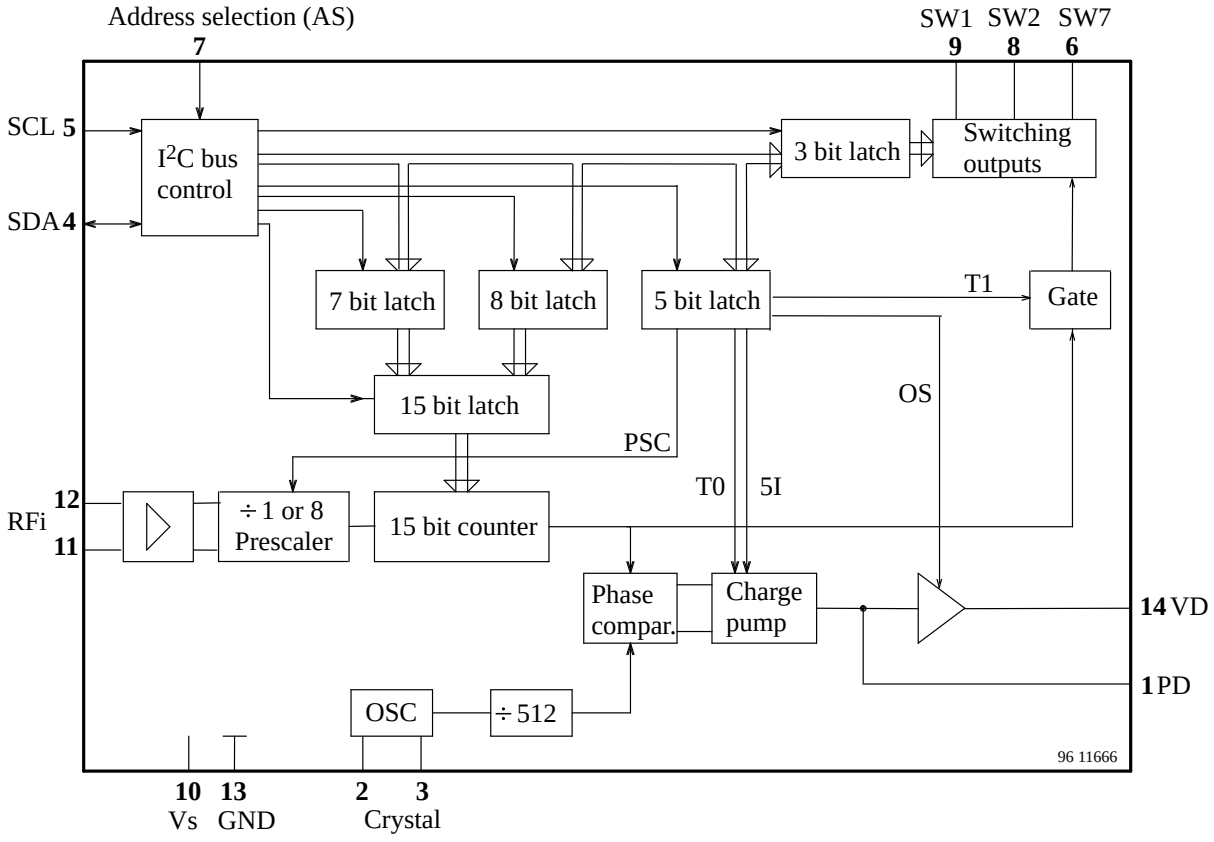


Figure 1.

Ordering Information

Extended Type Number	Package	Remarks
U6207B-FPG3	SO14 plastic package	Taped and reeled

Pin Description

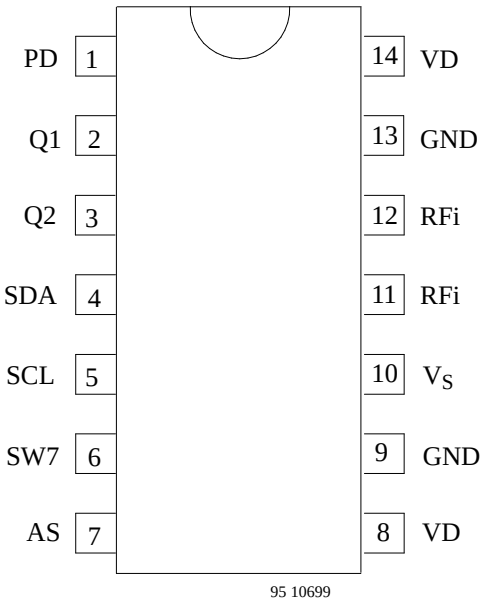


Figure 2.

Pin	Symbol	Function
1	PD	Charge pump output
2	Q1	Crystal
3	Q2	Crystal
4	SDA	Data in/output
5	SCL	Clock
6	SW7	Switching output (open collector)
7	AS	Address select
8	SW2	Switching output (open collector)
9	SW1	Switching output (open collector)
10	V_S	Supply voltage
11	RFi	RF input
12	RFi	RF input
13	GND	Ground
14	VD	Active filter output

Absolute Maximum Ratings

All voltages are referred to GND (Pin 13).

Parameters		Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Pin 10	V_S	–0.3		6	V
RF input voltage	Pin 11, 12	RFi	–0.3		Vs	V
Bus input/output voltage	Pin 4 Pin 5	VSDA VSCL	–0.3 –0.3		Vs Vs	V V
SDA output current (open collector)	Pin 4	ISDA	–1		5	mA
Address select voltage	Pin 7	VAS	–0.3		V_S	V
Current switching outputs (open collector)	Pin 9, 8, 6	SW 1,2,7	–1		15	mA
Junction temperature		T_j	–40		125	°C
Storage temperature		T_{stg}	–40		125	°C

Operating Range

All voltages are referred to GND (Pin 13).

Parameters	Test Conditions / Pins		Symbol	Min.	Typ.	Max.	Unit
Supply voltage		Pin 10	V_S	4.5		5.5	V
Ambient temperature			T_{amb}	0		70	°C
Input frequency	PSC = 1	Pin 11, 12	RFi	64		1300	MHz
Input frequency	PSC = 0	Pin 11, 12	RFi	1		220	MHz
Prog. divider			SF	256		32767	

Thermal Resistance

Parameter	Symbol	Test Condition	Value	Unit
Junction ambient	R_{thJA}	Soldered to PCB	110	K/W

Electrical Characteristics

Test conditions (unless otherwise specified) V_S = 5 V, T_{amb} = 25°C

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply current	Pin 10					
	SW 1, 2, 7 = 0; PSC = 1	Is	32	42	52	mA
	SW 1, 2, 7 = 0; PSC = 0	Is	22	28	35	mA
Input sensitivity						
fi = 80 - 1000 MHz	PSC = 1 Pin 11	Vi [1]			10	mV
fi = 1300 MHz	PSC = 1 Pin 11	Vi [1]			40	mV
fi = 10 - 220 MHz	PSC = 0 Pin 11	Vi [1]			10	mV
Maximum input signal	PSC = 0 / 1 Pin 11	Vimax [1]	315			mV
Open collector switching outputs (SW 1,2,7)	Pin 9,8,6					
Reserve current	VH = 13.5 V	IRH			10	µA
Saturation voltage	IL = 10 mA	VSL [2]			0.5	V
Phase detector output						
Charge pump current “H”	5I = 1, VPD = 2 V, Pin 1	IPDH		±180		µA
Charge pump current “L”	5I = 0, VDP = 2 V, Pin 1	IPDL		±50		µA
Charge pump leakage current	T0 = 0, VPD = 2 V, Pin 1	IPDTRI		±5		nA
Bus inputs (SDA,SCL)						
Input voltage	Pin 4, 5	Vi “H”	3		5.5	V
	Pin 4, 5	Vi “L”			1.5	V
Input current	VSCL “H” = Vs, Pin 4, 5	li “H”			10	µA
	VSCL “L” = 0 V, Pin 4, 5	li “L”	–20			µA
Output voltage SDA (open collector)	ISDA “L” = 2 mA , Pin 4	VSDA “L”			0.4	V
Address selection (AS)						
Input current	VAS “H” = Vs Pin 7	liAS “H”			10	µA
	VAS “L” = 0 V Pin 7	liAS “L”	–100			µA
Bus timing						
Rise time SDA, SCL		tR			15	µs
Fall time SDA, SCL		tF			15	µs
Clock frequency SCL		fSCL	0		100	kHz
Clock “H” Pulse		tHIGH	4			µs
Clock “L” Pulse		tLOW	4			µs
Hold time start		tHSTA	4			µs
Set-up time stop		tSSTO	4			µs
Set-up time data		tSDAT	0.3			µs
Hold time data		tHDAT	0			µs

[1] RMS-voltage calculated from the measured available power on 50 Ω.
[2] Tested with one switch active.

I²C Bus Description

Data Formats

Description	Data Format								
	MSB							LSB	
Address byte	1	1	0	0	0	AS1	AS2	0	A
Progr. divider byte 1	0	n14	n13	n12	n11	n10	n9	n8	A
Progr. divider byte 2	n7	n6	n5	n4	n3	n2	n1	n0	A
Control byte 1	1	5I	T1	T0	X	X	PSC	OS	A
Control byte 2	SW7	X	X	X	X	SW2	SW1	X	A

A = Acknowledge; X = not used; Unused bits of controlbyte 2 should be 0 for lowest power consumption.

n0 ... n14:	Scaling factor (SF)	SF = 16384*n14 + 8192*n13 + ... +2*n1 + n0
PSC	Prescaler on/off	PSC = 1: prescaler on (PSF = 8) PSC = 0: prescaler off (PSF = 1)
T0, T1	Testmode selection	T1 = 1: divider test mode on T1 = 0: divider test mode off T0 = 1: charge pump disable T0 = 0: charge pump enable
SW 1, 2, 7	Switching outputs	SW1, SW2, SW7 = 1: open collector active
5I	Charge pump current switch	5I = 1: high current 5I = 0: low current
OS	Output switch	OS = 1: varicap drive disable OS = 0: varicap drive enable

AS1, AS2 Address selection pin 7

AS1	AS2	Address	Dec. Value	Voltage at pin7
0	1	1	194	open
0	0	2	192	0 to 10% Vs
1	0	3	196	40 to 60% Vs
1	1	4	198	90 to 100% Vs

Oscillator Frequency Calculation

$f_{osc} = f_{ref} * SF * PSF$

f_{osc} Locked oscillator frequency
f_{ref} Reference frequency 4 MHz / 512 = 7.8125 kHz
SF Scaling factor of programmable 15-bit-divider
PSF Scaling factor of prescaler

I²C Bus Description (continued)

Pulse Diagram

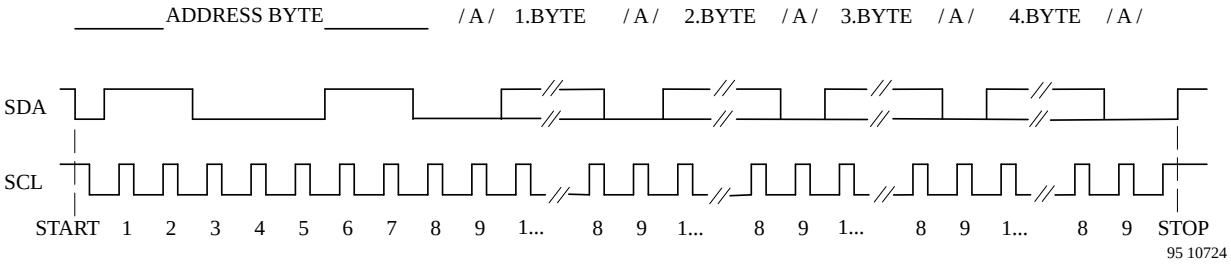


Figure 3.

Bus Timing

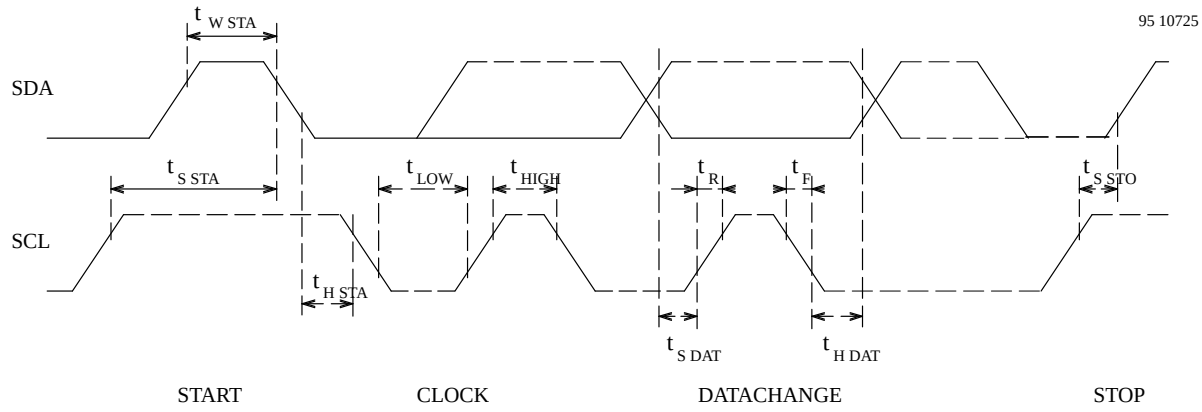


Figure 4.

Typical Prescaler Input Sensitivity (PSC = 1)

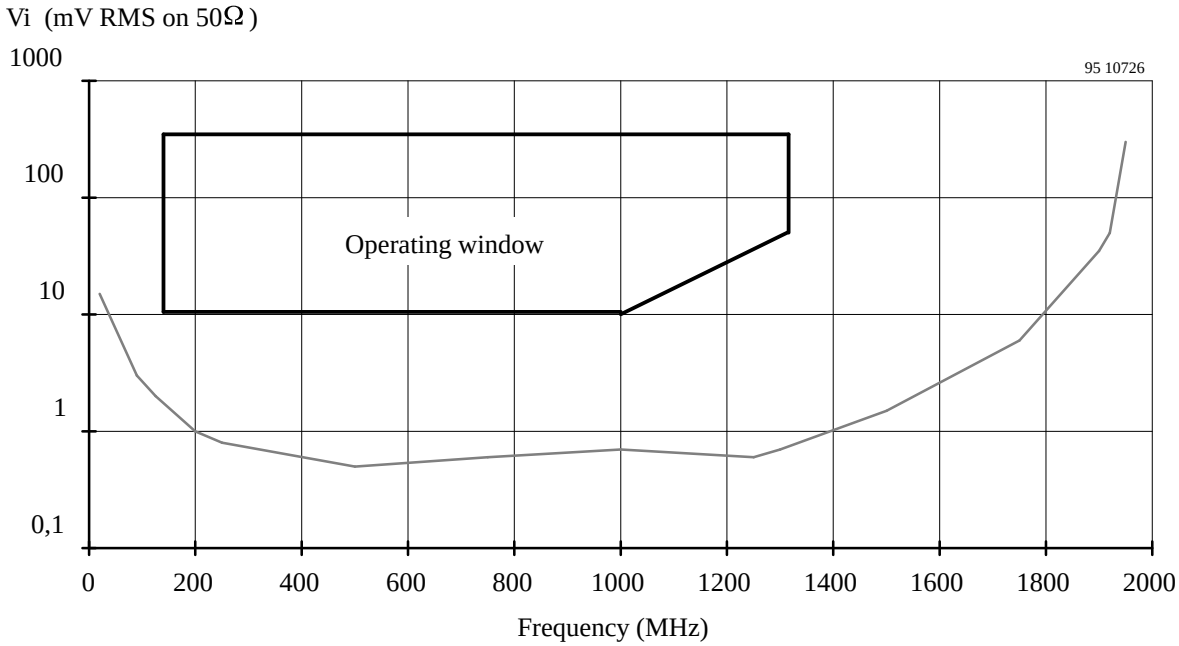


Figure 5.

Typical Prescaler Input Sensitivity (PSC = 0)

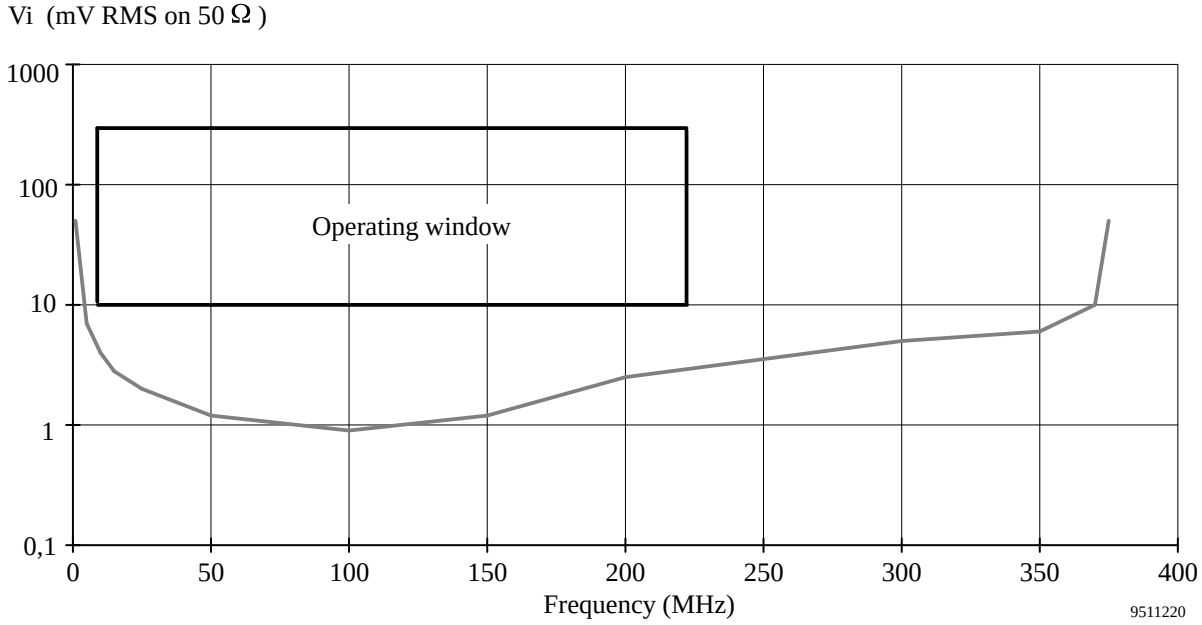


Figure 6.

Application Circuit

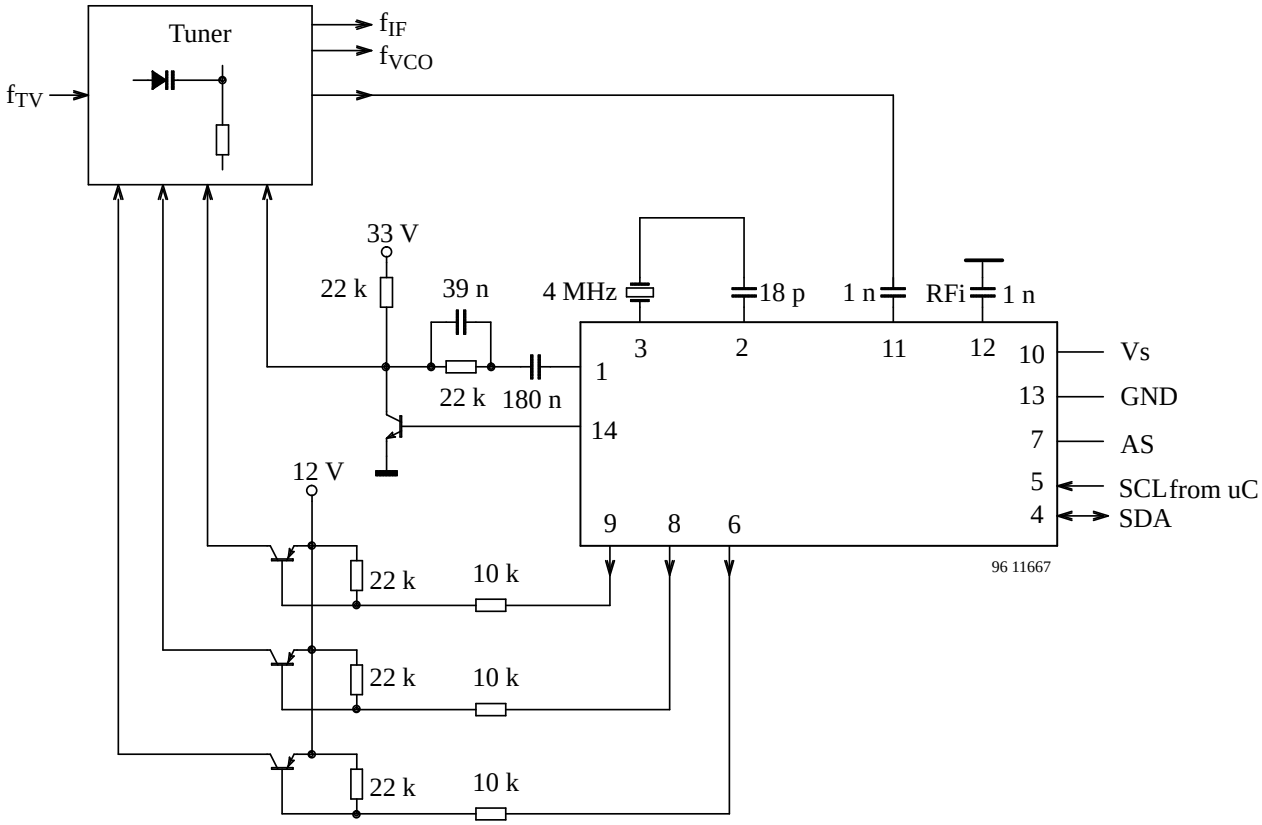
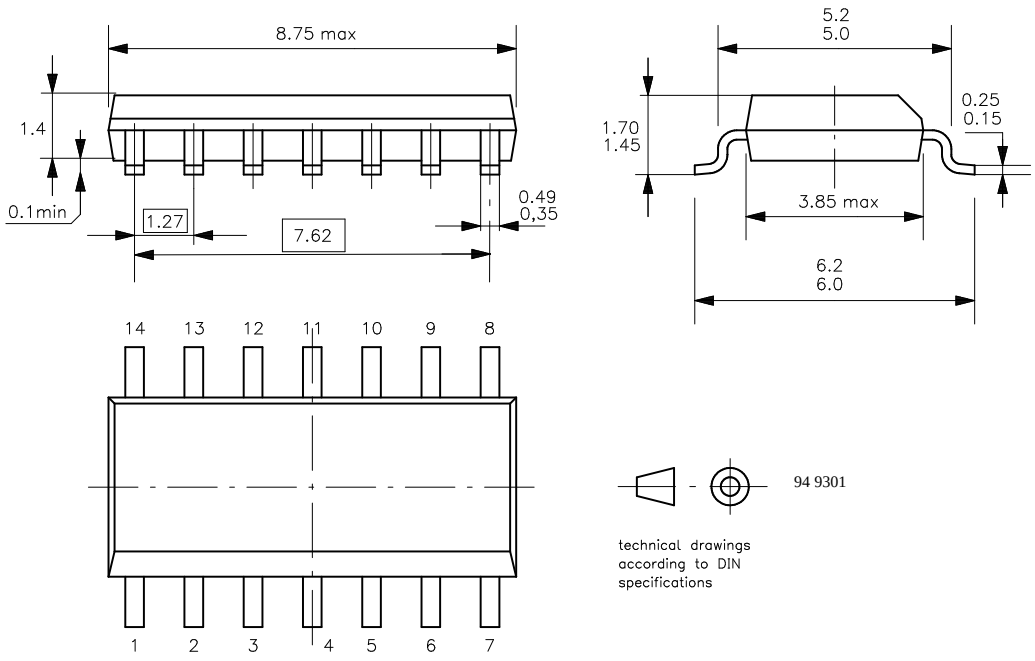


Figure 7.

Package Dimensions

Small outline plastic package, 14 pin-SO 14
Dimensions in mm



Ozone Depleting Substances Policy Statement

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements.

2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively

2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA

3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

TEMIC can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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