

## 1100 MHz Twin PLL

### Description

The IC U2782B is a low power twin PLL manufactured with TELEFUNKEN's advanced UHF process. The maximum operating frequency is 1100 MHz for both PLLs. It features a wide supply voltage range from 2.7 to

5.5 V. Prescaler 64/65 and power down function for both PLL's is integrated. Applications are CT1, GSM, IS54, JDC etc.

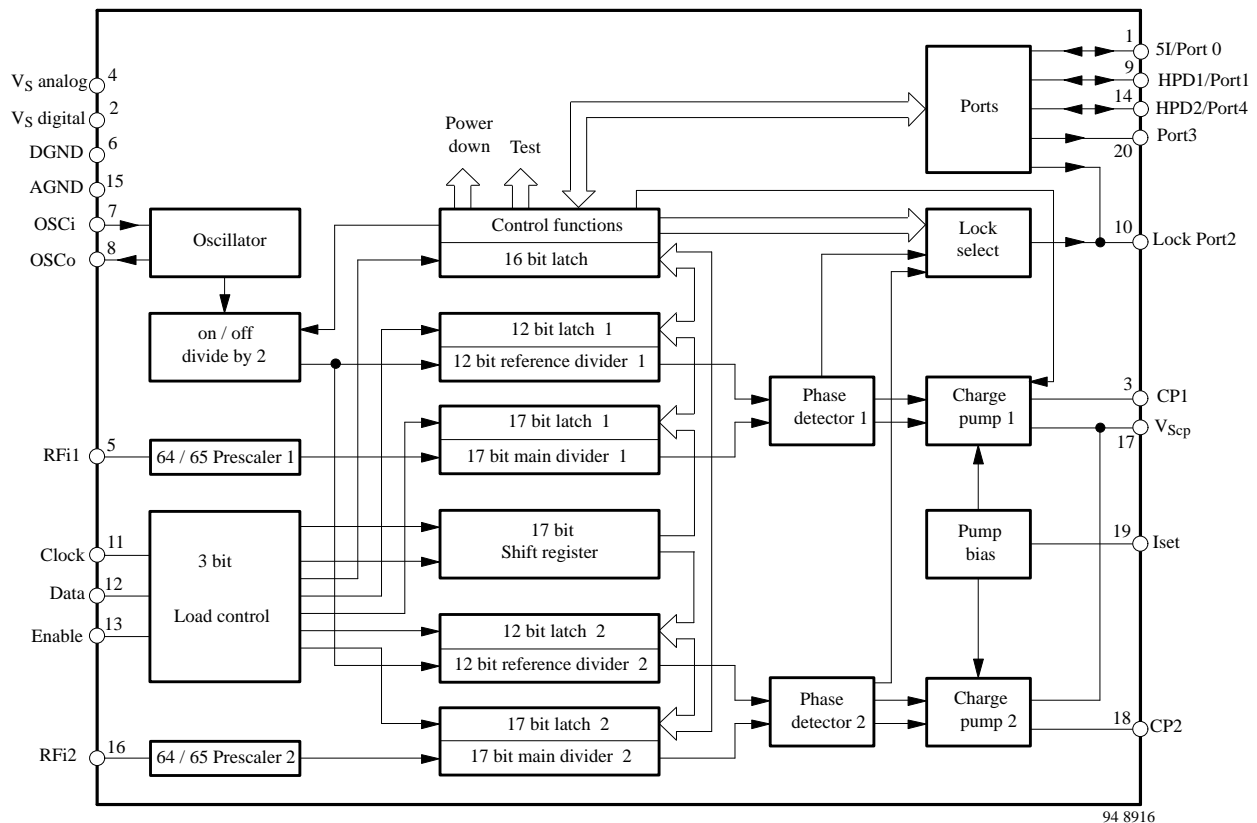
### Features

- Very low current consumption (typical 3 V/11 mA)
- Supply voltage range 2.7 V – 5.5 V
- Maximum input frequency: 1100 for both PLLs
- 2 pins for separate power down functions
- Output for PLL lock status
- Prescaler 64/65 for both inputs
- SSO-20 package
- ESD protected according to MIL-STD 883C method 3015 cl.2

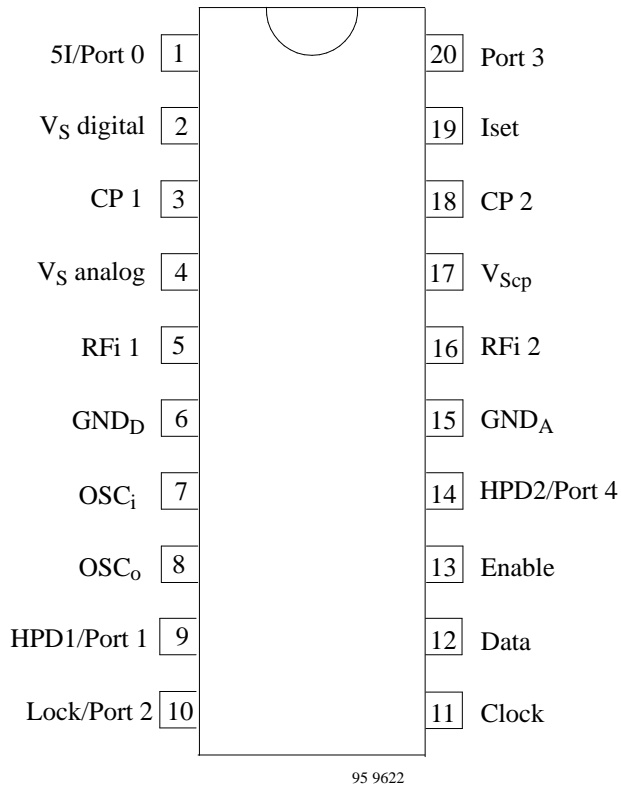
### Benefits

- Low current consumption leads to extended talk time
- Twin PLL saves costs and space
- One foot print for all TEMIC twin PLL's saves design-in time

### Block Diagram



### Pin Description



Pin	Symbol	Function
1	5I/Port 0	5I – Control input / o.c.output
2	V <sub>S</sub> digital	Power supply digital section
3	CP 1	Charge pump output of synthesizer 1
4	V <sub>S</sub> analog	Power supply analog section
5	RFi 1	RF divider input synthesizer
6	GND <sub>D</sub>	Ground for digital section
7	OSC <sub>i</sub>	Reference oscillator input
8	OSC <sub>o</sub>	Reference oscillator output
9	HPD 1/ Port 1	Hardware power down input of synthesizer 1 / o.c.output
10	Lock/ Port 2	Lock output / o.c.output / testmode output
11	Clock	3-wire-bus: serial clock input
12	Data	3-wire-bus: serial data input
13	Enable	3-wire-bus: serial enable input
14	HPD 2/ Port 4	Hardware power down input of synthesizer 2 / o.c.output
15	GND <sub>A</sub>	Ground for analog section
16	RFi 2	RF divider input synthesizer 2
17	V <sub>Scp</sub>	Charge pump supply voltage
18	CP 2	Charge pump output of synthesizer 2
19	Iset	Reference pin for charge pump currents
20	Port 3	o.c.output

### Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Supply voltage Pins 2, 4 and 17	V <sub>S</sub> , V <sub>Scp</sub>	6	V
Input voltage Pins 1, 3, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18 and 20	V <sub>i</sub>	0 to V <sub>S</sub>	V
Junction temperature	T <sub>j</sub>	125	°C
Storage temperature range	T <sub>stg</sub>	-40 to +125	°C

### Operating Range

Parameters	Symbol	Value	Unit
Supply voltage Pins 2, 4 and 17	V <sub>S</sub> , V <sub>Scp</sub>	2.7 to 5.5	V
Ambient temperature range	T <sub>amb</sub>	-30 to +85	°C

### Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient SSO-20	R <sub>thja</sub>	140	K/W

## Electrical Characteristics

$T_{amb} = 25^{\circ}\text{C}$ ,  $V_S = 2.7$  to  $5.5$  V,  $V_{Scp} = 5$  V, unless otherwise specified

Parameters	Test conditions	Symbol	Min.	Typ.	Max.	Unit
<b>DC Supply</b>						
Supply current	$V_S = 3$ V	$I_S$		11		mA
Supply current CP	$V_{CP} = 5$ V, PLL in lock condition	$I_{CP}$		1		$\mu\text{A}$
<b>PLL 1 + PLL2</b>						
Input voltage	$f_{RFi1} = 200 - 1100$ MHz	$V_{RFi1}$	20		200	mV <sub>RMS</sub>
Scaling factor prescaler		$S_{PSC}$	64/65			
Scaling factor main counter		$S_M$	5		2047	
Scaling factor swallow counter		$S_S$	0		63	
Reference counter		$S_R$	5		4096	
<b>Reference oscillator</b>						
Recommended crystal series resistance			10		200	$\Omega$
External reference input frequency	AC coupled sinewave RF/2 = 0 RF/2 = 1	$OSC_i$	1 1		20 40	MHz
External reference input amplitude	AC coupled sinewave <sup>2)</sup>	$OSC_i$		100		mV <sub>RMS</sub>
<b>Logic input levels (Clock, Data, Enable, HPD1, HPD2, 5I)</b>						
High input level		$V_{iH}$	1.5			V
Low input level		$V_{iL}$	0		0.4	V
High input current		$I_{iH}$	-5		5	$\mu\text{A}$
Low input current		$I_{iL}$	-5		5	$\mu\text{A}$
<b>Logic output levels (Port 0, 1, 2, 3, 4, Lock)</b>						
Leakage current	$V_{OH} = 5.5$ V	$I_L$			10	$\mu\text{A}$
Saturation voltage	$I_{OL} = 0.5$ mA	$V_{SL}$			0.4	V
<b>Charge pump output (<math>R_{set} = \text{tbd.}</math>)</b>						
Source current	$V_{CP} \leq V_{Scp}/2$ 5I = L 5I = H	PLL2 PLL1 PLL1	$I_{source}$		-1 -0.2 -1	mA
Sink current	$V_{CP} \leq V_{Scp}/2$ 5I = L 5I = H	PLL2 PLL1 PLL1	$I_{sink}$		1 0.2 1	mA
Leakage current	$V_{CP} \leq V_{Scp}/2$		$I_L$		$\pm 5$	nA

<sup>1)</sup> RMS voltage at 50  $\Omega$ ; <sup>2)</sup>  $OSC_o$  is open if an external reference frequency is applied

### Serial Programming Bus

Reference and programmable counters can be programmed by the 3-wire-bus (Clock, Data and Enable). After setting Enable in high condition the data is transferred bit by bit during the rising edge of the clock into the shift register, starting with the MSB-bit. When Enable returns

low the programmed information is loaded according to the address bits into the selected latch. There is no check made how many clock pulses arrived during enable high. During powerdown mode the 3-wire-bus remains active and the IC can be reprogrammed.

### Bit Allocation

MSB																LSB				
Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15	Bit 16	Bit 17	Bit 18	Bit 19	Bit 20	
data bits																address bits				
D16	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0	A2	A1	A0	
PLL1 M10	M9	M8	M7	M6	M5	M4	M3	M2	M1	M0	S5	S4	S3	S2	S1	PLL1 S0	0	0	1	
					PLL1 R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	PL1 R0	0	1	0	
PLL2 M10	M9	M8	M7	M6	M5	M4	M3	M2	M1	M0	S5	S4	S3	S2	S1	PLL2 S0	0	0	1	
					PLL2 R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	PLL2 R0	1	0	0	
	RF/ 2	Test	5IP	TRI 2	TRI 1	PS2	PS1	H2P	H1P	LPB	LPA	P4	P3	P2	P1	P0	1	0	1	
															SPD 5I	SPD 2	SPD 1	1	1	0

### Scaling factors

S0 ... S5: These bits are setting the swallow counter  $S_S$ .  
 $T_S = S0 \cdot 2^0 + S1 \cdot 2^1 + \dots + S4 \cdot 2^4 + S5 \cdot 2^5$   
 allowed scaling factors for  $S_S$ : 0 ... 63,  $T_S < T_M$

M0 ... M10: These bits are setting the main counter  $S_M$ .  
 $T_M = M0 \cdot 2^0 + M1 \cdot 2^1 + \dots + M9 \cdot 2^9 + M10 \cdot 2^{10}$   
 allowed scaling factors for  $S_M$ : 5 ... 2047

SPGT: Total scaling factor of the programmable counter:  
 $S_{PGT} = (64 \cdot S_M) + S_S$  Condition:  $S_S < S_M$

R0 ... R11: These bits are setting the reference counter  $S_R$ .  
 $S_R = R0 \cdot 2^0 + \dots + R10 \cdot 2^{10} + R11 \cdot 2^{11}$   
 allowed scaling factors for  $S_R$ : 5 ... 4096

SRFT: Total scaling factor of the reference counter:

RF/2 = 1:  $S_{RFT} = 2 \cdot S_R$

RF/2 = 0:  $S_{RFT} = S_R$

## Serial Programming Bus

### Control bits:

P0 ... P4: o.c. output ports (1 = high impedance)

LPA, LPB:	selection of P2 output or locksignal	LPA	LPB	function of pin 10
		0	0	o.c. output P2
		0	1	locksignal of synthesizer 2
		1	0	locksignal of synthesizer 1
		1	1	wiredor locksignal of both synthesizer

H1P, H2P: selection of P1/4 output or hardware power down input of synthesizer 1/2 (0 = Port / 1 = HPD)

5IP: selection of P0 output or high current switching input for the charge pump current of synthesizer 1 (0 = Port / 1 = charge pump 1 current switch input)

PS1, PS2: phase selection of synthesizer 1 and synthesizer 2 (1 = normal / 0 = invers)

	PS-PLL1/2 = 1	PS-PLL1/2 = 0
	CP1/2	CP1/2
$f_R > f_P$	$I_{sink}$	$I_{source}$
$f_R < f_P$	$I_{source}$	$I_{sink}$
$f_R = f_P$	0	0

RF/2: divide by 2 prescaler for reference divider (0 = off / 1 = on)

SPD1, SPD2: software power down bit of synthesizer 1/2 (0 = powerdown / 1 = powerup)

5I: software switch for the charge pump current of synthesizer 1 (0 = low current / 1 = high current)

TRI1, TRI2: enables tristate for the charge pump of synthesizer 1/2 (0 = normal / 1 = tristate)

TEST: enables counter testmode (0 = disabled / 1 = enabled)

TEST	LPA	LPB	PS1	PS2	Testsignal at pin 10
1	1	0	1	x	RFT1
1	1	0	0	x	PGT1
1	0	1	x	1	RFT2
1	0	1	x	0	PGT2

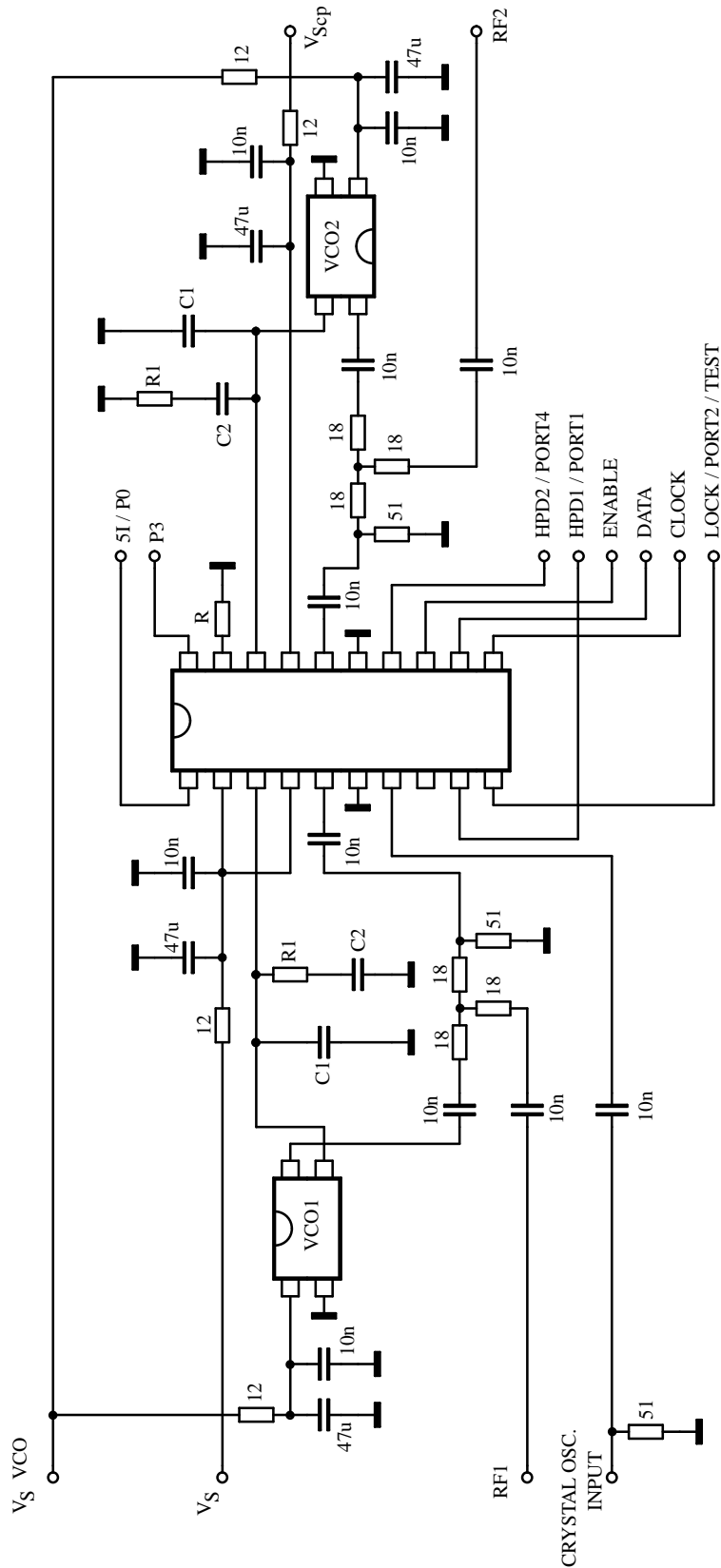
Preset condition at hard power up (supply voltage switched on):

P0 ... P4	= 1	high impedane
LPA, LPB	= 1	common lock signal
H1P, H2P	= 1	hardware power down enable
5IP	= 1	current switching input synthesizer 1 enabled
PS1, PS2	= 1	normal value for passive loop filter
RF/2	= 0	divide by 2 prescaler for reference divider off
SPD1, SPD2	= 0	software power down active
5I	= 1	synthesizer 1 high current charge pump active
TRI1, TRI2	= 0	tristate off
TEST	= 0	testmode off

The device is in power up condition when SPD-PLL1/2 = 1 and if H1P/H2P = 1 the hardware power down pins 9/14 are in high state.

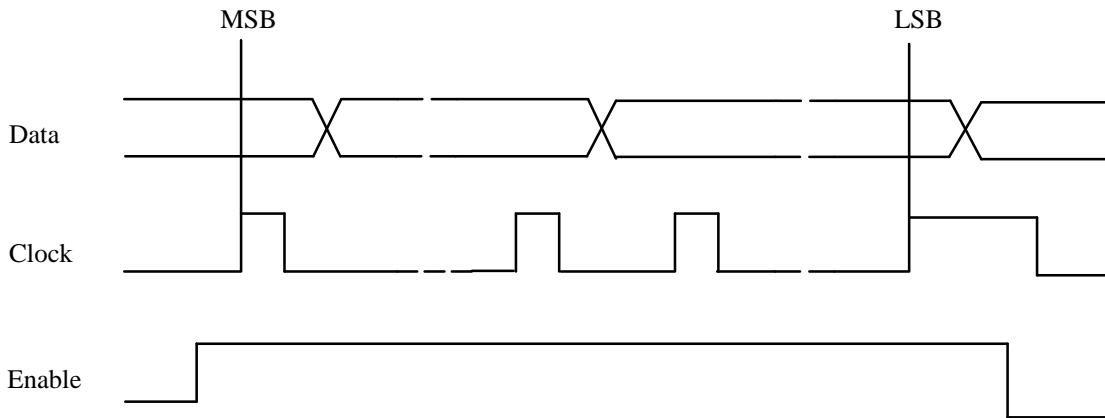
High current of charge pump synthesizer 1 is active when 5I = 1 and if 5IP = 1 the charge pump current control input pin 1 is in high state.

## Application Circuit



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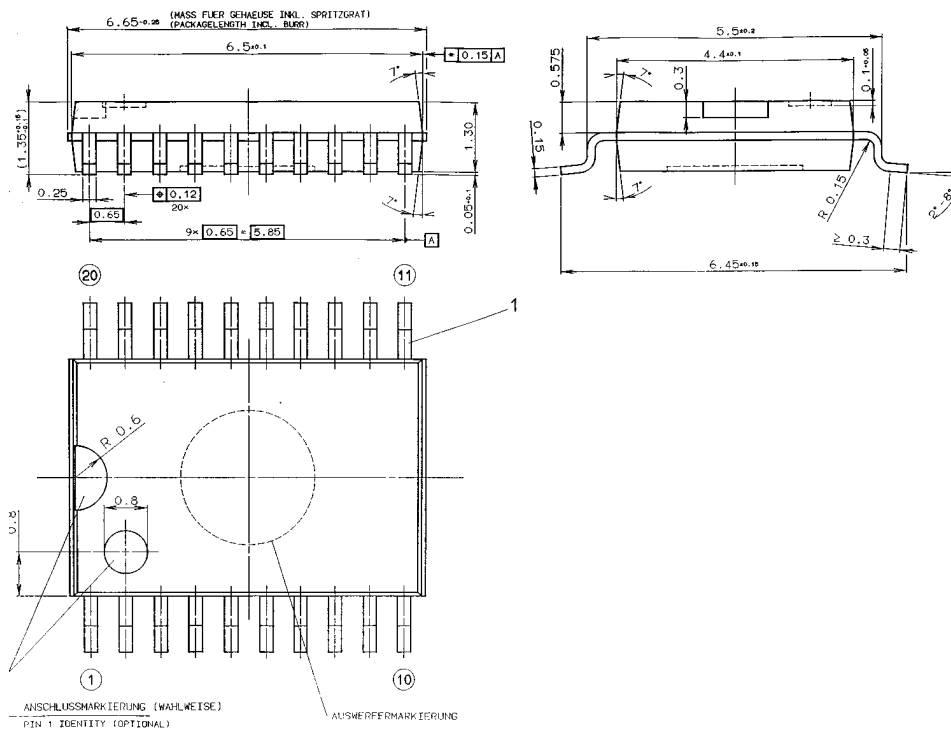
## Timing Diagram Serial Bus



94 8917

## Dimensions in mm

SSO-20



**We reserve the right to make changes to improve technical design without further notice.**

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