CT2–RX/TX IC

Description

The IC realized with TELEFUNKEN's most advanced UHF process features low noise and low current consumption. In conjunction with TEMICs RF-frontend, Twin PLL, I/Q modulator and AMDs CT2 PhoX^{TM} controller AM 79C410 a complete CT2 IC kit is available.

Features

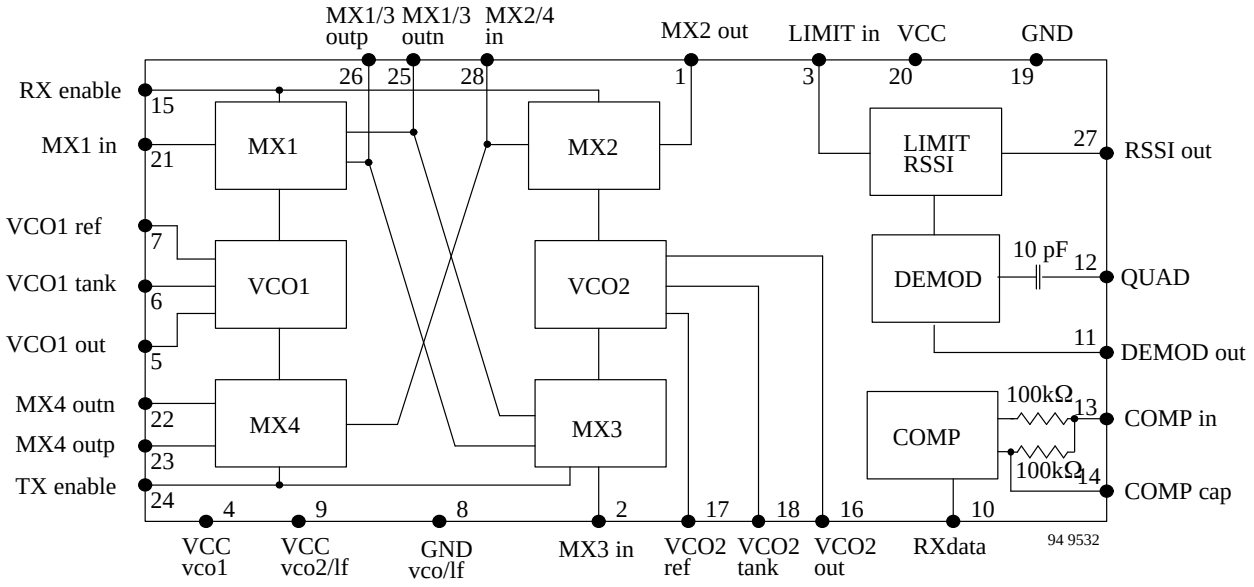
- Low supply voltage 2.9 V typical (min. 2.7 V)
- Provides down conversion to the data stream, up conversion from the first IF.
- Integrated UHF and VHF VCOs
- Low noise figure of RX path (NF 10 dB)
- RX and TX power down
- First IF filter used for transmit as well receive mode
- Temperature compensated logarithmic **R**eceiver **S**ignal **S**trength **I**ndicator (RSSI) with a 75 dB dynamic range
- Low power consumption in Rx and Tx mode

Benefits

- Low power consumption results in extended talk time
- Few external components and very small package save space
- No manual tuning in complete phone

Case: SSO-28 plastic package

Block Diagram (Simplified Schematic)



Ordering Information

Extended Type Number	Package	Remarks
U2760B-AFS	SSO28	Rail, MOQ 600pcs.
U2760B-AFS G3	SSO28	Tape + reel, MOQ 4000 pcs.

Functional Description

MX1

Mixer 1 converts the RF signal to the first IF (254.05 MHz). An external filter is placed at its input to reject the image frequency band.

MX2

The second mixer provides the second down conversion to 800 kHz. An external filter is placed at its input to provide rejection of the second image frequency and spurious signals that go through the RF filtering.

RSSI

The receive signal strength indicator is a high gain (~100 dB) limiter circuit. It provides an output voltage proportional to the input power and a limited signal at 800 kHz for the demodulation.

Demod

The quadrature demodulator in the receiving path contains an internal 10 pF quadrature capacitor to couple the IF signal to the external parallel RLC resonant circuit that provides the 90 degree phase shift. The circuit uses an external bit slicer to reshape the bits, and a sample and hold circuit to maintain the average dc value at the demodulator when switching the signal between transmission and reception.

COMP

The comparator circuit with a 100 kΩ input resistor and external input biasing has a 10 mV hysteresis, and is designed to square up the demodulated data signal.

MX3

This mixer converts the 800 kHz signal coming from the modulator circuit to the 254.05 MHz IF frequency.

MX4

This mixer is designed for the up conversion of the second IF. The image rejection is obtained by external RF filtering at the output of the mixer.

The same first IF filter is used for the transmit path and the receive path. In the transmit path this filter is supposed to eliminate the mixing products from MX3, in particular , the harmonics of the IF frequency.

VCO1

The UHF VCO covers the frequency band from 610 MHz to 698 MHz.

VCO2

This VCO runs at the VHF frequency of 253.25 MHz.

Pin Description

Pin	Symbol	Function
1	MX2 out	Mixer2 output
2	MX3 in	Mixer3 input
3	LIMIT in	Limiter/RSSI input
4	$VCCvco_1$	Power supply voltage VCO1
5	VCO1out	VCO1 output (to PLL)
6	VCO1tank	VCO1 resonator pin1
7	VCO1ref	VCO1 resonator pin2, blocked
8	GNDvco/lf	Ground VCO1, lf circuits
9	$VCCvco_2$/lf	Power supply VCO2/lf circuits
10	RXdata	RX data output
11	DEMODout	Demodulator output
12	QUAD	Quadrature filter
13	COMPin	Comparator input
14	COMPcap	Comparator blocking capacitor

Pin	Symbol	Function
15	RXenable	RX enable
16	VCO2out	VCO2 output (to PLL)
17	VCO2ref	VCO2 resonator pin2, blocked
18	VCO2tank	VCO2 resonator pin1
19	GND	Ground
20	VCC	Power supply voltage
21	MX1in	Mixer1 input
22	MX4outn	Mixer 4 output n
23	MX4outp	Mixer 4 output p
24	TXenable	TX enable
25	MX1/3outn	Mixer1/Mixer3 output n
26	MX1/3outp	Mixer1/Mixer3 output p
27	RSSIout	Signal strength output
28	MX2/4in	Mixer2/Mixer4 input

Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Supply voltage	Vcc	0 to +5	V
Input voltages Pins 2, 3, 6, 13, 14, 15, 19 26 and 28	Vin	0 to Vcc	V
Input voltage Pin 21	Vin	0.5	V
Junction temperature	Tj	125	°C
Storage temperature range	Tstg	–40 to +125	°C

Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient SSO28	R_{thJA}	130	K/W

Operating Conditions

Parameters	Symbol	Value	Unit
Supply voltage	Vcc	2.7 to 3.3	V
Operating temperature		–5 to +45	°C

Electrical Characteristics: Receiver Input Mixer (MX1)

Test conditions (unless otherwise specified): Vcc = 2.9 V, T_{amb} = 25°C, referred to test circuit
f_{RF} = 866 MHz, f_{IF1} = 254 MHz.

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 20	Vcc	2.7	2.9	3.3	V
Supply current	@ Vcc = 2.9 V, Pin 20	Is		3		mA
Input impedance	Pin 21	Zin		25		Ω
Power gain	Pins 21, 25 and 26	Gp		8		dB
Noise figure	Pins 21, 25 and 26	NF		8	10	dB
Compression	Pins 21, 25 and 26	P_1dB	–18			dBm
Third order input intercept point	Pins 22, 25 and 26	IIP3	–8			dBm
LO to RF isolation	Pin 21	$Isol_{LO}$	20			dB
LO ± (IF/2) response	Pin 21 @ P_{in} = –84 dBm				–10	dB

Electrical Characteristics: Receiver IF Mixer (MX2)

Test conditions (unless otherwise specified): Vcc = 2.9 V, T_{amb} = 25°C, referred to test circuit, f_{IF1} = 254 MHz, f_{IF2} = 800 kHz.

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 20	Vcc	2.7	2.9	3.3	V
Supply current	@ Vcc = 2.9 V, Pin 20	Is		3		mA
Input impedance	Pin 28	Zin	130	200	300	Ω
Power gain	Pins 1 and 28	Gp	10	11		dB
Noise figure	Pins 1 and 28	NF			20	dB
Compression	Pins 1 and 28	P_1dB	–20			dBm
Third order input intercept point	Pins 1 and 28	IIP3	–10			dBm
LO to RF isolation	Pin 28	$Isol_{LO}$	20			dB
LO ± (IF/2) response	Pin 28 @ P_{in} = –40 dBm				–35	dB

Electrical Characteristics: RSSI/Limiter Amplifier

Test conditions (unless otherwise specified): Vcc = 2.9 V, T_{amb} = 25°C, referred to test circuit, f_{LIMIT} = 800 kHz.

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 9	Vcc	2.7	2.9	3.3	V
Supply current	@ Vcc = 2.9 V, Pin 9	Is		1.5		mA
Input impedance	Pin 3	Zin		1500		Ω
Voltage Gain	Pin 3	Gv		100		dB
Frequency range	Pin 3	f_{LIMIT}	0.5	0.8	5	MHz
RSSI range	Pins 3 and 27		– 90		– 15	dBm
RSSI voltage at Pmin	Pins 3 and 27		0.2		0.4	V
RSSI voltage at Pmax	Pins 3 and 27		2.4		2.6	V
RSSI accuracy	Pins 3 and 27		– 2		2	dB
Output impedance	Pins 27	R_{RSSI}	19	24	29	kΩ
Rise time	Pin 27, C_{RSSI} = 1nF				50	µs
Fall time	Pin 27, C_{RSSI} = 1nF				50	µs

Electrical Characteristics: Demodulator

Test conditions (unless otherwise specified): Vcc = 2.9 V, T_{amb} = 25°C, referred to test circuit, f_{LIMIT} = 800 kHz.

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 9	Vcc	2.7	2.9	3.3	V
Supply current	@ Vcc = 2.9 V, Pin 9	Is		0.2		mA
Output voltage	Pins 3, 12, ±18 kHz deviation	Vout		± 120		mV rms

Electrical Characteristics: Comparator

Test conditions (unless otherwise specified): Vcc = 2.9 V, T_{amb} = 25°C, referred to test circuit.

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 9	Vcc	2.7	2.9	3.3	V
Supply current	@ Vcc = 2.9 V, Pin 9	Is		0.15		mA
Input hysteresis	Pins 13 and 14			10		mV
Output HIGH voltage	Pin 16, R_{Load} to GND 500 k		2.3			V
Output LOW voltage	Pin 16, R_{Load} to Vcc 50 k				0.6	V

Electrical Characteristics Transmitter IF Mixer (MX3)

Test conditions (unless otherwise specified): Vcc = 2.9 V, T_{amb} = 25°C, referred to test circuit,
fin = 800 kHz, f_{IF} = 254 MHz.

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 20	Vcc	2.7	2.9	3.3	V
Supply current	@ Vcc = 2.9 V, Pin 20	Is		1.3		mA
Input impedance	Pin 2	Zin		1500		Ω
Output power	Pins 25 and 26, Vin = 320 mV pp	Pout		– 16		dBm
Noise figure	Pins 2, 25 and 26	NF			25	dB

Electrical Characteristics Transmitter Output Mixer (MX4)

Test conditions (unless otherwise specified): Vcc = 2.9 V, T_{amb} = 25°C, referred to test circuit,
f_{IF} = 254 MHz, f_{RF} = 866 MHz.

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 20	Vcc	2.7	2.9	3.3	V
Supply current	@ Vcc = 2.9 V, Pin 20	Is		3.5	4	mA
Input impedance	Pin 28	Zin	130	200	300	Ω
Output power	Pins 28, 22 and 23, P_{In} = –22 dBm	Pout		– 14		dBm
Noise figure	Pins 28, 22 and 23	NF			12	dB
LO leakage	Pins 22 and 23	Lk_{LO}			–34	dBm
IF leakage	Pins 28, 22 and 23	Lk_{IF}			–45	dBm
(2*IF) leakage	Pins 28, 22 and 23	Lk_{2IF}			– 55	dBm
(3*IF) leakage	Pins 28, 22 and 23	Lk_{3IF}			– 65	dBm
(n*IF) leakage, n > 3	Pins 28, 22 and 23	Lk_{nIF}			– 60	dBm

Electrical Characteristics: UHF Voltage Controlled Oscillator (VCO1)

Test conditions (unless otherwise specified): Vcc = 2.9 V, T_{amb} = 25°C, referred to test circuit.

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 20	Vcc	2.7	2.9	3.3	V
Supply current	@ Vcc = 2.9 V, Pin 20	Is		3		mA
Frequency bandwidth	Pins 5, 6 and 7	f_{Bw}	610		698	MHz
Phase noise ±100 kHz	Pins 5, 6 and 7	P_N			– 86	dBc/Hz
Phase noise ±200 kHz	Pins 5, 6 and 7	P_N			– 104	dBc/Hz
Phase noise ±300 kHz	Pins 5, 6 and 7	P_N			– 109	dBc/Hz
Phase noise ±400 kHz	Pins 5, 6 and 7	P_N			– 125	dBc/Hz
Phase noise @ 50 MHz	Pins 5, 6 and 7	P_N			– 150	dBc/Hz
Output power	Pins 5, 50 Ω termination	Pout	– 15			dBm

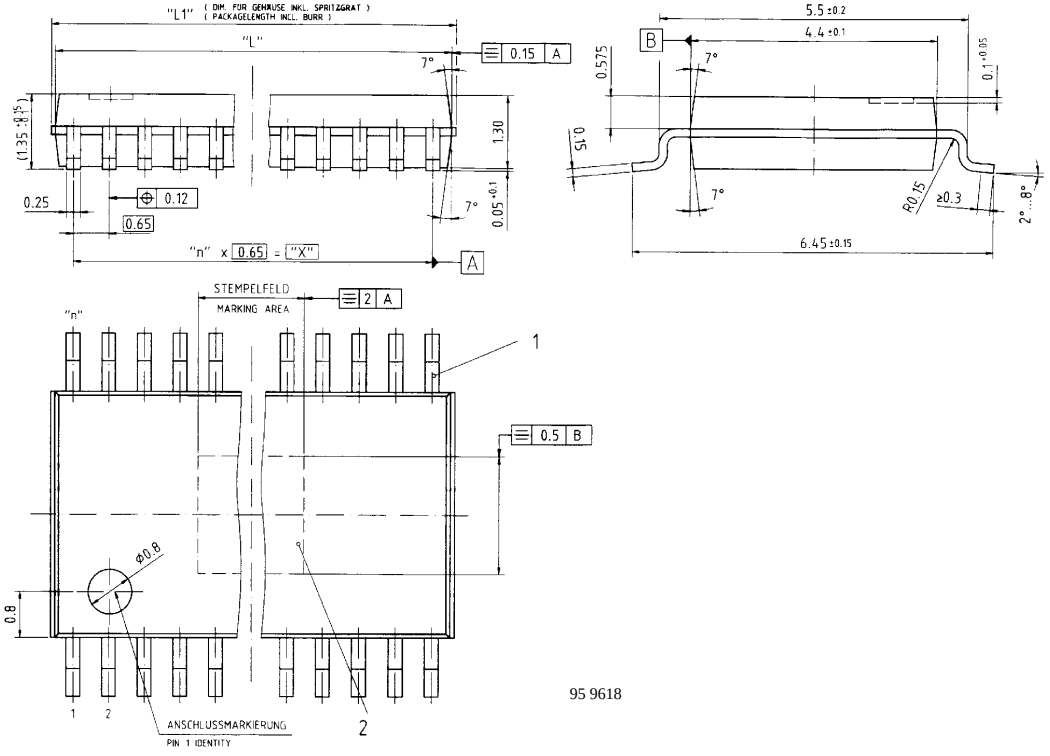
Electrical Characteristics: VHF Voltage Controlled Oscillator (VCO2)

Test conditions (unless otherwise specified): Vcc = 2.9 V, T_{amb} = 25C, referred to test circuit.

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 20	Vcc	2.7	2.9	3.3	V
Supply current	@ Vcc = 2.9 V, Pin 20	Is		2.5		mA
Frequency bandwidth	Pins 16, 17 and 18	f_{Bw}		252.45		MHz
Phase noise 100 kHz	Pins 16, 17 and 18	P_N			– 86	dBc/Hz
Phase noise 200 kHz	Pins 16, 17 and 18	P_N			– 114	dBc/Hz
Phase noise 300 kHz	Pins 16, 17 and 18	P_N			– 119	dBc/Hz
Phase noise 400 kHz	Pins 16, 17 and 18	P_N			– 135	dBc/Hz
Phase noise @ 50 MHz	Pins 16, 17 and 18	P_N			– 150	dBc/Hz
Output power	Pin 16, 50 Ω termination	Pout	– 15			dBm

Dimensions in mm

Package: SSO 28



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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