

900-MHz ISM Band Transmitter

Description

The transmitter IC U2763B is specifically designed for cordless telephone applications in the 900-MHz ISM band. The IC is manufactured using Atmel Wireless & Microcontrollers' advanced UHF process. It consists of a 900-MHz VCO and mixer, 0-dBm PA and buffers. The device features 2.9-V operation. In conjunction with Atmel Wireless & Microcontrollers' receiver IC U2762B

and the PLL U2781B, a complete ISM RF IC kit is available which fits perfectly with AMD's PhoX controllers AM79C432A and AM79C433.

Electrostatic sensitive device.
Observe precautions for handling.



Features

- 0-dBm PA and RX/TX VCO integrated
- Buffer for PLL and mixer integrated
- Supply-voltage range 2.7 V to 3.3 V
- Low current consumption, typical 16 mA
- SSO20 package

Benefits

- Single VCO for entire RF part saves cost
- Integrated PA stage with 50-Ω output saves external components and board space
- Integrated mixer to increase duplex spacing

Block Diagram

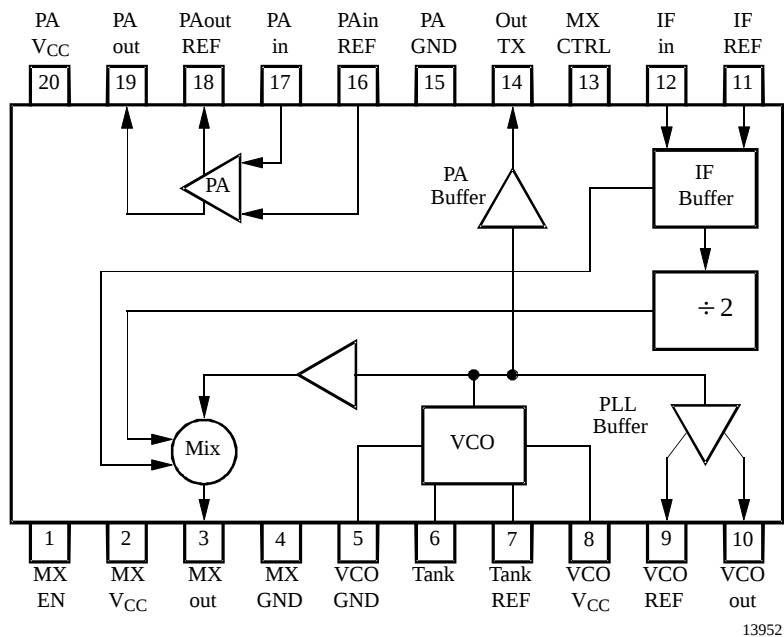


Figure 1. Block diagram

Ordering Information

Extended Type Number	Package	Remarks
U2763B-AFS	SSO20	Tube, MOQ 830 pcs
U2763B-AFSG3	SSO20	Taped and reeled, MOQ 4000 pcs

Functional Description

VCO

Symmetrical cross-coupled pair type VCO with external tank circuit. It can be used with LC or $\lambda/4$ resonator circuit.

PA

The PA is designed to drive a 50- Ω load with 0 dBm (1 mW, compliant with FCC rules) and can be connected directly to the TX/RX switch.

PA Buffer

The PA buffer decouples the VCO from the PA to reduce VCO pulling when the PA is turned on and off.

PLL Buffer

The PLL buffer is a dedicated output to drive a PLL circuit.

Divide-by-2 Stage + Mixer

The duplex frequency offset can be increased by shifting the RX LO frequency via the PLL xtal frequency and optionally by half of the xtal frequency. These functions are activated by MX CTRL (Pin 13).

Pin Description

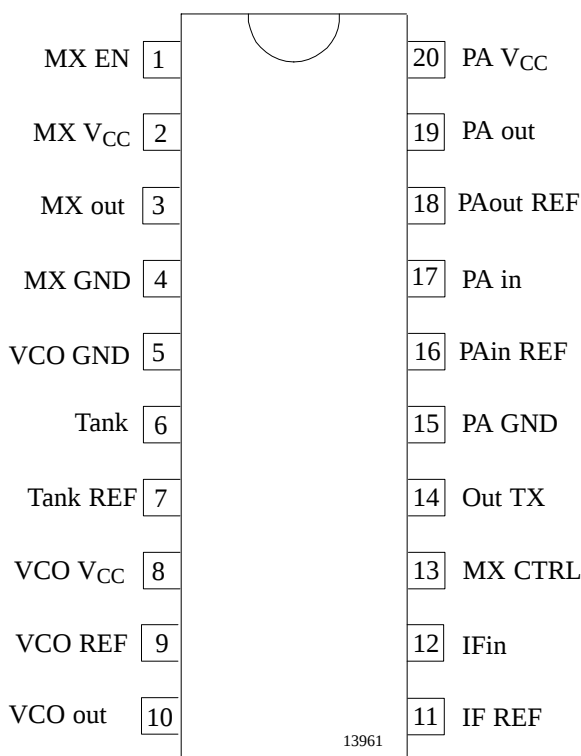


Figure 2. Pinning

Pin	Symbol	Function
1	MX EN	Mixer enable
2	MX V _{CC}	Power supply mixer
3	MX out	Mixer output
4	MX GND	Mixer ground
5	VCO GND	VCO ground
6	Tank	Resonator
7	Tank REF	Resonator reference
8	VCO V _{CC}	Power supply VCO
9	VCO REF	VCO output reference
10	VCO out	VCO output
11	IF REF	IF input reference
12	IF in	IF input
13	MX CTRL	Control pin for mixer modi
14	Out TX	Transmit-signal output
15	PA GND	Power-amplifier ground
16	PAin REF	Power-amplifier input reference
17	PA in	Power-amplifier input
18	PAout REF	Power-amplifier output reference
19	PA out	Power-amplifier output
20	PA V _{CC}	Power supply for power amplifier

Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Supply voltage	V_{CC}	0 to +3.5	V
Input voltages Pins 1 and 13	V_{in}	0 to V_{CC}	V
Input voltages Pins 3, 6, 7, 9, 10, 11, 12, 14, 16, 17, 18 and 19	V_{in}	0.5 to $V_{CC} - 1$ V	V
Junction temperature	T_j	125	°C
Storage-temperature range	T_{stg}	-40 to +125	°C

Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient SSO20	R_{thJA}	140	K/W

Operating Range

Parameters	Symbol	Value	Unit
Supply voltage	V_{CC}	2.7 to 3.3	V
Ambient temperature	T_{amb}	0 to +70	°C

Electrical Characteristics VCO

$V_{CC} = 2.9 \text{ V}$ at Pin 8

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply-voltage range	Pin 8	V_{CC}	2.7	2.9	3.3	V
Supply current	Pin 8	I_{CC}		6		mA
Frequency bandwidth		f_{BW}			1200	MHz
Sensitivity	Externally defined	f_S		7		MHz/V
Phase noise $\pm 100 \text{ kHz}$		P_N		-86		dBc/Hz
Output impedance TX port	Pin 14			50		Ω
Output impedance PLL port	Pin 10			50		Ω
Output power TX	50- Ω termination single ended Pin 14	P_{TXout}		-15		dBm
Output power VCO	50- Ω termination single ended Pin 10	P_{VCOout}		-10		dBm

Electrical Characteristics PA

$V_{CC} = 2.8 \text{ V}$ at Pin 20

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply-voltage range	Pin 20	V_{CC}	2.7	2.8	3.3	V
Supply current	Pin 20	I_{CC}		11.5		mA
PA input impedance	Pin 17	Z_{PAin}		50		Ω
PA output impedance	Pin 19	Z_{PAout}		50		Ω
Operation frequency		f_{PA}			1200	MHz
Input power	Pin 17	PA_{in}		-16		dBm
Output power	50- Ω termination single ended Pin 19	PA_{out}	-2	-0.5	2	dBm
Output -1dB compression		P_{1dB}	-1	0		dBm

Electrical Characteristics Divide-by-2 Stage + Mixer

$V_{CC} = 2.9 \text{ V}$ at Pin 2

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply-voltage range	Pin 2	V_{CC}	2.7	2.9	3.3	V
Supply current ¹⁾	$MX_{EN} < 0.3 \text{ V}$ Pin 2	I_{SMXon}		9		mA
Supply current	$MX_{EN} \geq V_{CC} - 0.3 \text{ V}$ Pin 2	I_{SMXoff}			500	μA
MX turn-on time		t_{MXon}		2.5		μs
MX output impedance	@ 900 MHz Pin 3	Z_{MXout}		50		Ω
MX IF input frequency		f_{MXIFin}			22	MHz
Output frequency	Pin 3	f_{MXout}	800	950	1200	MHz
Output power ²⁾ IF buffer linear, Mixer active	50- Ω termination single ended $V_{IFin} = 50 \text{ mV}_{rms}$ $MX_{EN} < 0.3 \text{ V}$ $MX_{CTRL} = V_{CC}$ Pin 3	P_{MXout}		-15		dBm
Output power ²⁾ $\div 2$ active, Mixer active	50- Ω termination single ended $V_{IFin} = 50 \text{ mV}_{rms}$ $MX_{EN} < 0.3 \text{ V}$ $V_{CTRL} = V_{CC}$ $MX_{CTRL} = 0 \text{ V}$ Pin 3	P_{MXout}		-15		dBm
Output power Mixer = buffer stage	50- Ω termination single ended $MX_{EN} < 0.3 \text{ V}$ $MX_{CTRL} = \text{open}$ Pin 3	P_{MXout}		-10		dBm
Noise figure	SSB	N_F		18		dB
LO leakage ³⁾	$MX_{out-port}$, $V_{IFin} = 50 \text{ mV}_{rms}$ Pin 3	Lk_{LO}		-25		dBm
IF leakage	$MX_{out-port}$, $V_{IFin} = 50 \text{ mV}_{rms}$ Pin 3	Lk_{IF}		-45		dBm
(2 $\times$ IF) leakage	$MX_{out-port}$, $V_{IFin} = 50 \text{ mV}_{rms}$ Pin 3	Lk_{2IF}		-35		dBm
(3 $\times$ IF) leakage	$MX_{out-port}$, $V_{IFin} = 50 \text{ mV}_{rms}$ Pin 3	Lk_{3IF}		-55		dBm
IF input frequency		f_{IFin}	10	12.8	22	MHz
IF input voltage level		V_{IFin}	40	50	125	mV
IF input impedance	Base input $MX_{EN} \geq V_{CC} - 0.3 \text{ V}$ $MX_{EN} \leq 0.3 \text{ V}$ Pin 12	Z_{IFin}	1 1			k Ω k Ω

Comment: The IF signal is limited when divided by two.

Note: ¹⁾ Including IF buffer
²⁾ Each sideband
³⁾ In mixing mode

Internal Pin Configuration

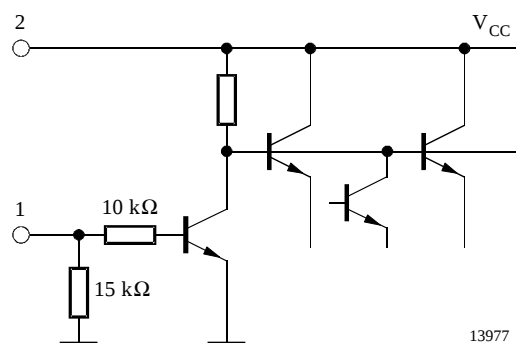


Figure 3. Pin 1: Mixer enable

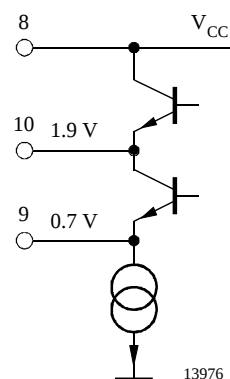


Figure 6. Pins 9/11: PLL buffer

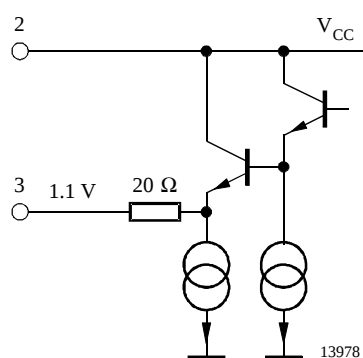


Figure 4. Pin 3: Mixer output

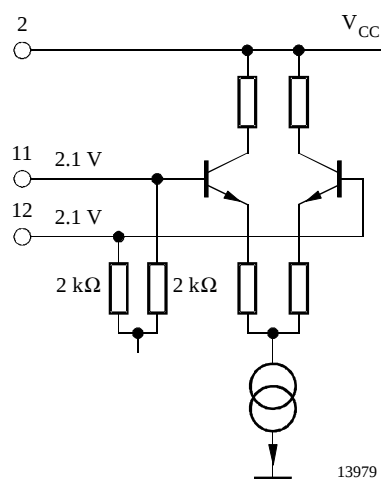


Figure 7. Pins 11/12: IF input

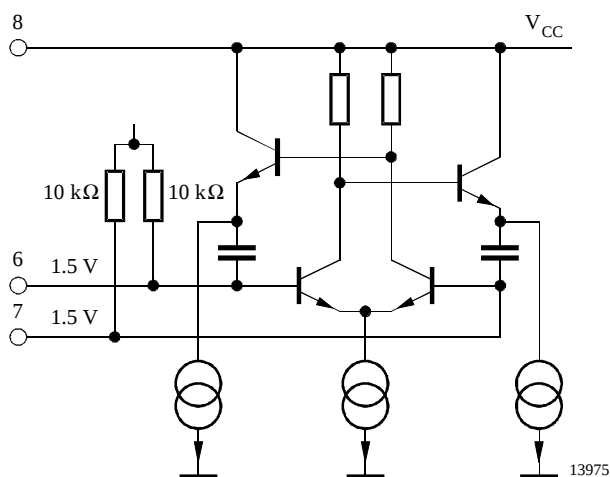


Figure 5. Pins 6/7: VCO

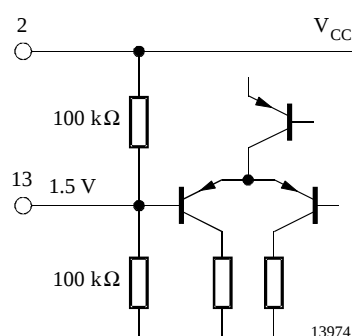


Figure 8. Pin 13: Control pin for mixer mode

Internal Pin Configuration (continued)

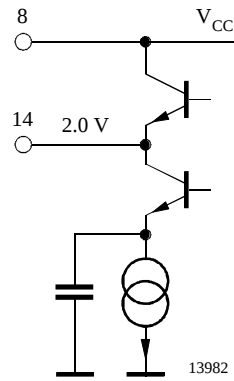


Figure 9. Pin 14: Transmit-signal output

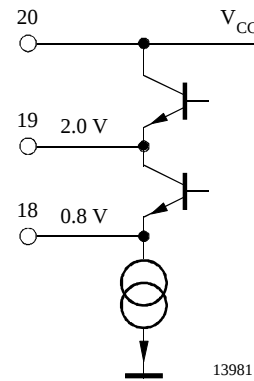


Figure 11. Pins 18/19: Power amplifier output

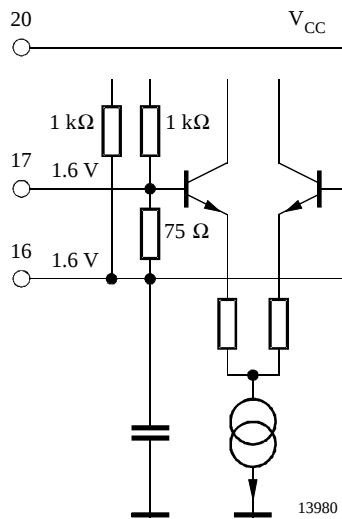


Figure 10. Pins 16/17: Power amplifier input

Application Circuit

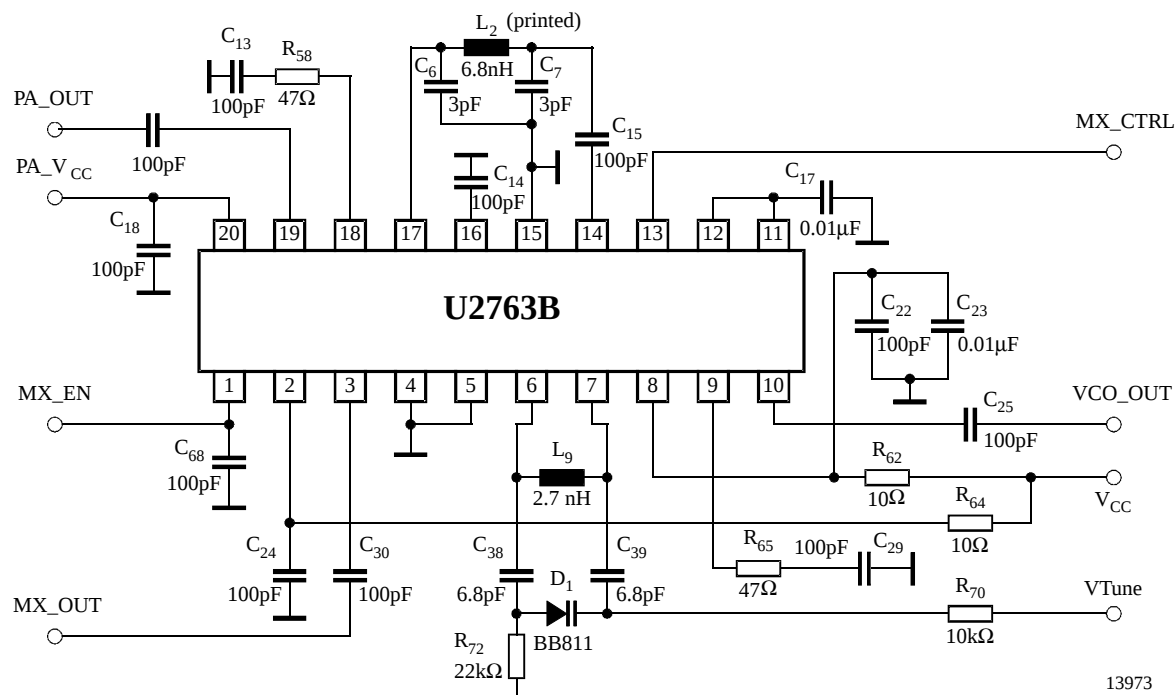
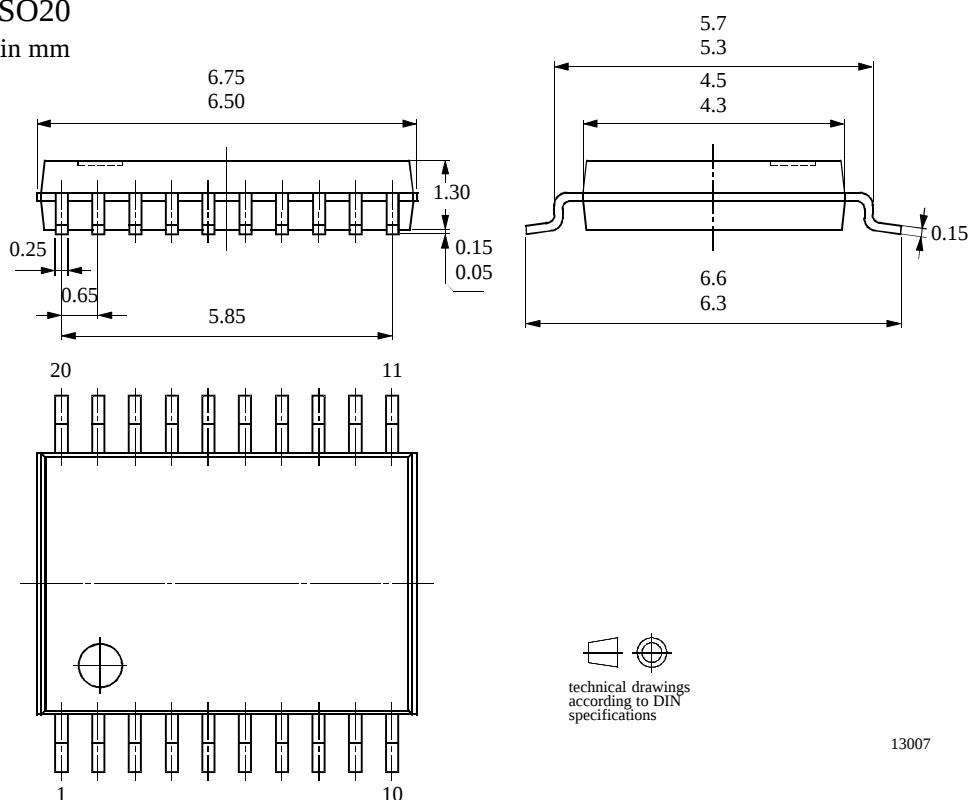


Figure 12. Application circuit

Package Information

Package SSO20

Dimensions in mm



13007

Ozone Depleting Substances Policy Statement

It is the policy of **Atmel Germany 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.

Atmel Germany GmbH 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.

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

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Atmel Wireless & Microcontrollers products for any unintended or unauthorized application, the buyer shall indemnify Atmel Wireless & Microcontrollers against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Data sheets can also be retrieved from the Internet: <http://www.atmel-wm.com>

Atmel Germany GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany
Telephone: 49 (0)7131 67 2594, Fax number: 49 (0)7131 67 2423