

TRF7970A

7.75

Multiprotocol Fully Integrated 13.56 MHz RFID and Near Field Communication Transceiver

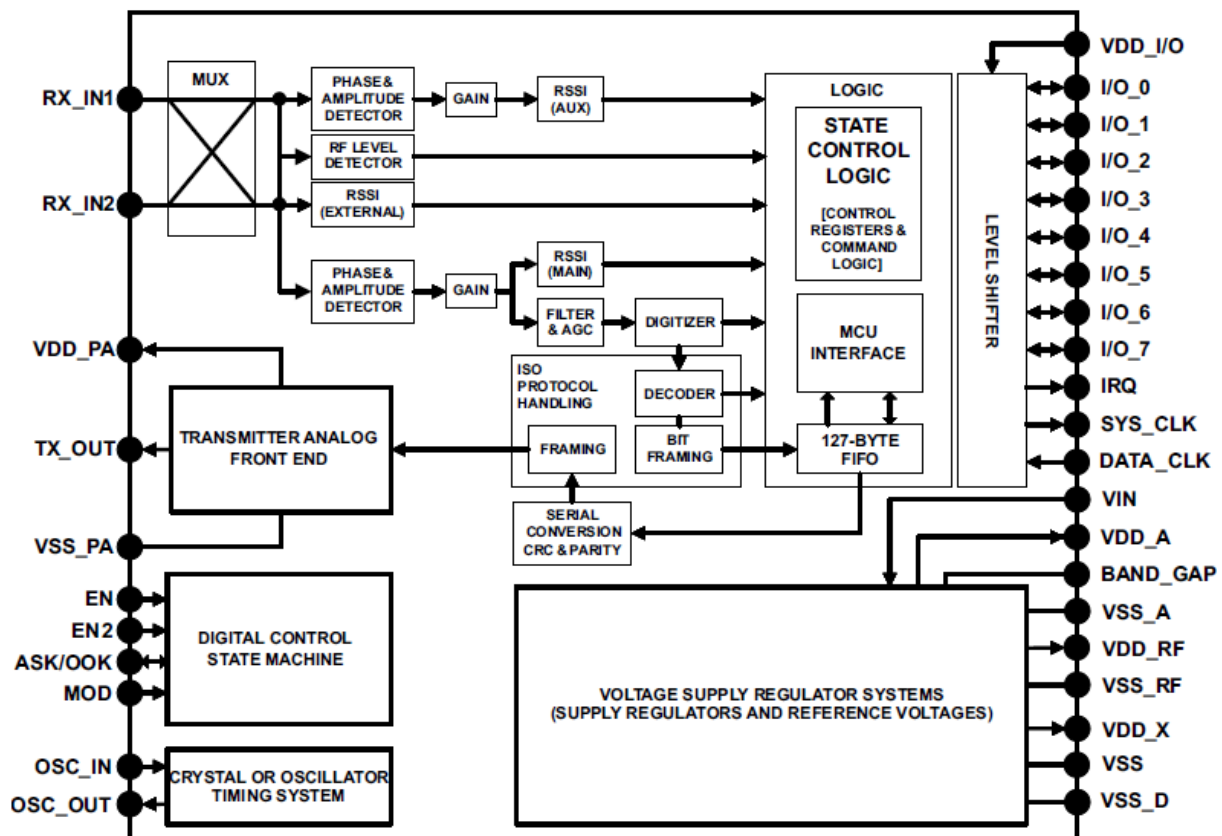
Description

- Supports NFC, Standards NFCIP-1 (ISO/IEC 18092) and NFCIP-2 (ISO/IEC 21481)
- Supports ISO14443A/B (RFID)
- Input voltage Range: 2.7 V to 5.5 V
- Programmable Output Power: 100mW or 200mW
- Dual Receiver Architecture With RSSI
- SPI Interface

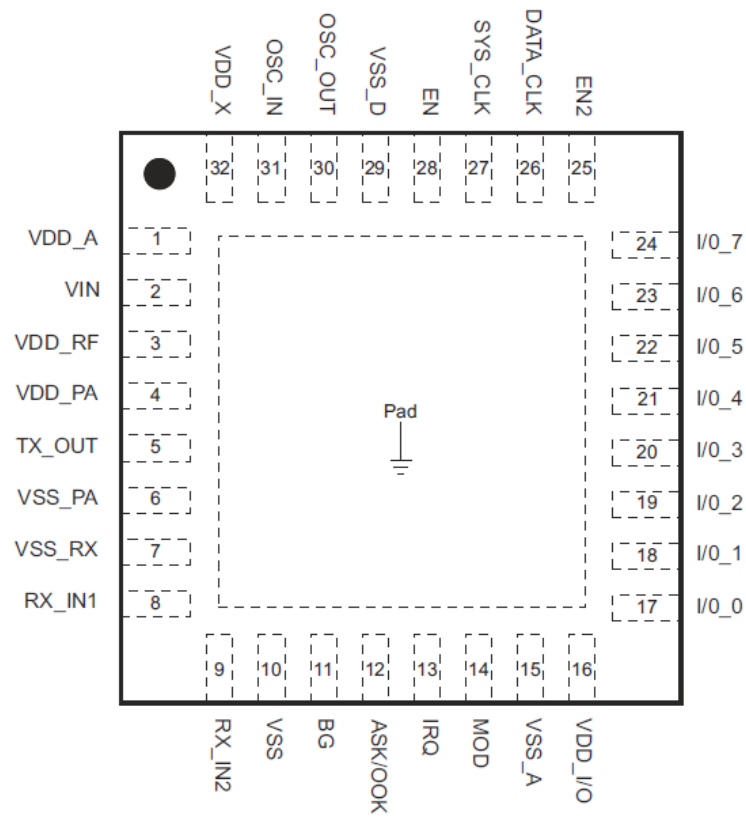
Power

V_{IN}	Input voltage range	-0.3 V to 6 V
I_{IN}	Maximum current V_{IN}	150 mA
T_J	Maximum operating virtual junction temperature	Any condition
		Continuous operation, long-term reliability ⁽³⁾

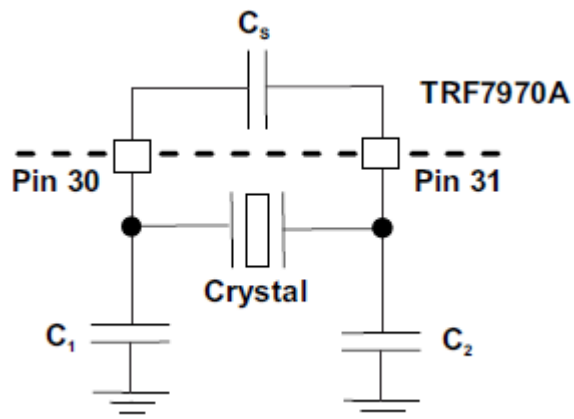
Block Diagram



Pin Layout



Clock Generation



Parameter	Specification
Frequency	13.56 MHz or 27.12 MHz
Mode of Operation	Fundamental
Type of Resonance	Parallel
Frequency Tolerance	± 20 ppm
Aging	< 5 ppm/year
Operation Temperature Range	-40°C to 85°C
Equivalent Series Resistance	$50\ \Omega$

Registers

Chip Status Control Register

Function: Control of Power mode, RF on/off, AGC, AM/PM, Direct Mode			
Default: 0x01, preset at EN = L or POR = H			
Bit	Name	Function	Description
B7	stby	1 = Standby Mode	Standby mode keeps all supply regulators, 13.56-MHz SYS_CLK oscillator running. (typical start-up time to full operation 100 μs)
		0 = Active Mode	Active Mode (default)
B6	direct	1 = Direct Mode 0 or 1	Provides user direct access to AFE (Direct Mode 0) or allows user to add their own framing (Direct Mode 1). Bit 6 of ISO Control register must be set by user before entering Direct Mode 0 or 1.
		0 = Direct Mode 2 (default)	Uses SPI or parallel communication with automatic framing and ISO decoders
B5	rf_on	1 = RF output active	Transmitter on, receivers on
		0 = RF output not active	Transmitter off
B4	rf_pwr	1 = half output power	TX_OUT (pin 5) = 8- Ω output impedance P = 100 mW (20 dBm) at 5 V, P = 33 mW (+15 dBm) at 3.3 V
		0 = full output power	TX_OUT (pin 5) = 4- Ω output impedance P = 200 mW (+23 dBm) at 5 V, P = 70 mW (+18 dBm) at 3.3 V
B3	pm_on	1 = selects Aux RX input	RX_IN2 input is used
		0 = selects Main RX input	RX_IN1 input is used
B2	agc_on	1 = AGC on	Enables AGC (AGC gain can be set in register 0x0A)
		0 = AGC off	AGC block is disabled
B1	rec_on	1 = Receiver activated for external field measurement	Forced enabling of receiver and TX oscillator. Used for external field measurement.
		0 = Automatic Enable	Allows enable of the receiver by Bit 5 of this register (0x00)
B0	vr5_3	1 = 5 V operation 0 = 3 V operation	Selects the V_{IN} voltage range

ISO Control Register

Bit	Signal Name	Function	Comments
B7	rx_crc_n	Receiving without CRC	1 = No RX CRC 0 = RX CRC
B6	dir_mode	Direct mode type	0 = output is subcarrier data 1 = output is bit stream and clock from decoder selected by ISO bits
B5	rfid	RFID mode	0 = RFID reader mode 1 = NFC or Card Emulator mode
B4	iso_4	RFID protocol, NFC target	RFID: Mode selection NFC: 0 = NFC target 1 = NFC initiator
B3	iso_3	RFID protocol, NFC mode	RFID: Mode selection (see Table 6-7) NFC: 0 = passive mode 1 = active mode
B2	iso_2	RFID protocol, Card Emulation	RFID: Mode selection NFC: 0 = NFC normal modes 1 = Card Emulation mode
B1	iso_1	RFID protocol, NFC bit rate	RFID: Mode selection NFC: Bit rate selection or Card Emulation selection (see Table 6-8)
B0	iso_0	RFID protocol, NFC bit rate	RFID: Mode selection NFC: Bit rate selection or Card Emulation selection (see Table 6-8)

Iso_4	Iso_3	Iso_2	Iso_1	Iso_0	Protocol	Remarks
0	0	0	0	0	ISO15693 low bit rate, one subcarrier, 1 out of 4	
0	0	0	0	1	ISO15693 low bit rate, one subcarrier, 1 out of 256	
0	0	0	1	0	ISO15693 high bit rate, one subcarrier, 1 out of 4	Default for RFID IC
0	0	0	1	1	ISO15693 high bit rate, one subcarrier, 1 out of 256	
0	0	1	0	0	ISO15693 low bit rate, double subcarrier, 1 out of 4	
0	0	1	0	1	ISO15693 low bit rate, double subcarrier, 1 out of 256	
0	0	1	1	0	ISO15693 high bit rate, double subcarrier, 1 out of 4	
0	0	1	1	1	ISO15693 high bit rate, double subcarrier, 1 out of 256	
0	1	0	0	0	ISO14443A, bit rate 106 kbps	
0	1	0	0	1	ISO14443 A high bit rate 212 kbps	RX bit rate when TX rate different from RX rate (see register 0x03)