

Features

- 2.4 - 2.5GHz Frequency Range
- Low TX Current for direct battery connection
- 80mA at +20dBm Output Power
- Ultra-Low Shutdown Current
- 1-Bit Control Line
- 2mm x 2mm x 0.45mm 8-Pin DFN Package
- -40°C to 125°C Temperature Range
- 3.3V Nominal Operating Voltage

Applications

- Bluetooth® Low Energy (BLE) Devices
- IoT (Internet of Things) / M2M Connectivity
- Bluetooth® Mesh Networks
- Consumer Electronics, Toys
- Smart Home Appliances
- Remote Controllers
- Wireless Sensor Nodes
- Beacons
- Proximity Sensors
- Range Extenders

Description

The 8TR7201 is a compact PA intended for range extension of Bluetooth® Smart, 802.15.4 ZigBee™/ Thread, ANT+, and proprietary ISM wireless systems in the 2.4GHz band.

This application-friendly RFIC provides PA in an ultra-compact package. It requires only a single supply voltage and a single logic control signal.

The 8TR7201 comes in a 2mm x 2mm x 0.45mm 8-pin DFN package and is integrated with filter networks plus input /output matching circuitry. This device is ideal for extended range BLE applications for Class 1 operation.

The 8TR7201 is rated for Moisture Sensitivity Level 1 (MSL1), reflow 260°C per JEDEC J-STD-020. Refer to IPC/JEDEC J-STD-020D.1 for detail solder reflow temperature and profile.

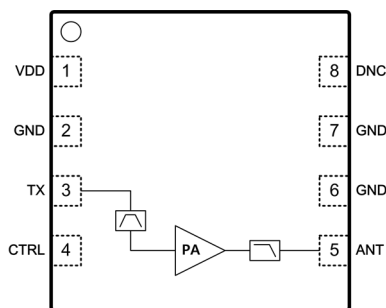
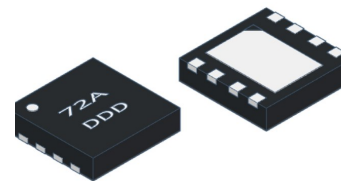


Figure 1: Functional Block Diagram

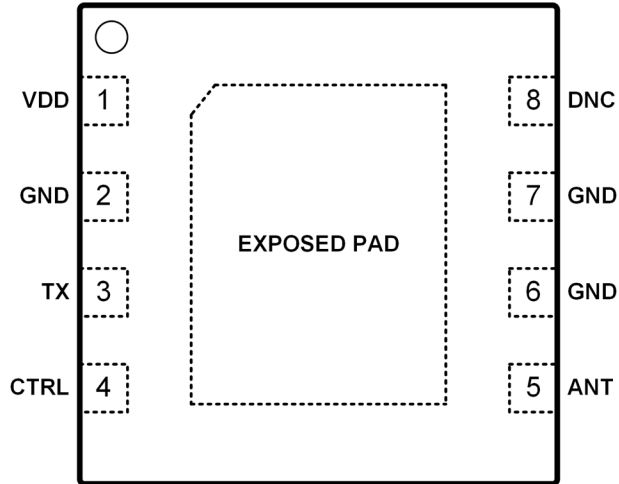


8-Lead 2mm x 2mm x 0.45mm, DFN Package

Figure 2: Package Type

Ordering Information

Part Number	Description
8TR7201	2.4GHz PA RFIC in 2mm x 2mm x 0.45mm 8-Pin DFN
8TR7201-EVB	Fully Tested and Characterized Evaluation Board
8TR7201-DWF	2.4GHz RF PA Die in Wafer Form

Pin Descriptions

Figure 3 :Pin Description (Top View)
Table 1: 8TR7201 Pin Signal Descriptions

Pin	Name	Description	Pin	Name	Description
1	VDD	DC voltage Supply	9	ANT	Antenna Port (DC Shorted to GND)
2	GND	Ground	10	GND	Ground
3	TX	Transmit Port (DC shorted to GND)	11	GND	Ground
4	CTRL	Control Logic pin	12	DNC	Do Not Connect
EXPOSED PAD		Exposed pad should be connected to GND.			

General Specifications
Table 2: 8TR7201 Absolute Maximum Ratings

Parameter	Units	Minimum	Maximum
Supply Voltage (VDD)	V	0	3.7
Control Logic Pin (CTRL)	V	0	VDD
Transmit Output Power at ANT Port	dBm		21
Transmit Input Power at TX Port	dBm		10
Storage Temperature	°C	-40	150

Note: Sustained operation at or above the Absolute Maximum Ratings for any single or combinations of the parameters above may result in permanent damage to the device and is not recommended. All Maximum RF Input Power Ratings assume 50Ω terminal impedance.

Table 3: 8TR7201 Recommended Operating Conditions

Parameter	Units	Minimum	Typical	Maximum
Supply Voltage (VDD, recommended)	V	2.7	3.3	3.6
Supply Voltage (VDD, extend supply voltage)**	V	1.8		3.6
Control Pin - Logic High State	V	1.2		VDD*
Control Pin - Logic Low State	V	0		0.4
Control Pin Current (Logic High, 1.8V)	uA		0.2	
Operating Frequency Range	GHz	2.4		2.5
Operating Temperature	°C	-40	25	125

*For Control Voltages > 3.0V, a 10kΩ series resistor should be used at the Control Logic Pins.

**Functional working with degraded performance for the supply voltage range 1.8V to 2.7V.

Table 4: 8TR7201 Transmit Electrical Specifications

 (VDD = 3.3V, T_{Ambient} = 25°C, With External Harmonic Filter, Excluding PCB and Connector Loss, Unless Otherwise Noted)

Parameter	Units	Min	Typ	Max	Test Conditions
Frequency Range	GHz	2.4		2.5	
Saturated Output Power	dBm		21		
Small-Signal Gain	dB		23		
Large-signal Gain	dB		22		+20dBm Pout
Current Consumption	mA		80		+20dBm Pout
			18		No RF applied
Shutdown Current	mA		1		
Second Harmonic	dBm/MHz		-47		Up to +20dBm with external harmonic Filter as specified
Third Harmonic	dBm/MHz		-47		
Input Return Loss	dB		-10		
Load VSWR for Stability			6:1		All Non-harmonic Spurs Less than -43dBm/MHz
Load VSWR for Ruggedness			10:1		No Damage

Table 5: 8TR7201 Switching Time Specifications

 (VDD = 3.3V, T_{Ambient} = 25°C, With External Harmonic Filter, Unless Otherwise Noted)

Parameter	Units	Min	Typ	Max	Test Conditions
TX enable	usec		0.8		From 50% of CTRL to 90% of RF

Table 6: 8TR7201 Control Logic

"1" = Logic High, "0" = Logic Low

CTRL	Operational Mode
0	Shutdown Mode
1	PA Mode

Application Notes

The 8TR7201 Application note provides detailed descriptions and test data over various operating conditions. Visit www.berex.com or contact BeRex at sales@berex.com to request additional documentation.

Application Schematic and PCB Layout

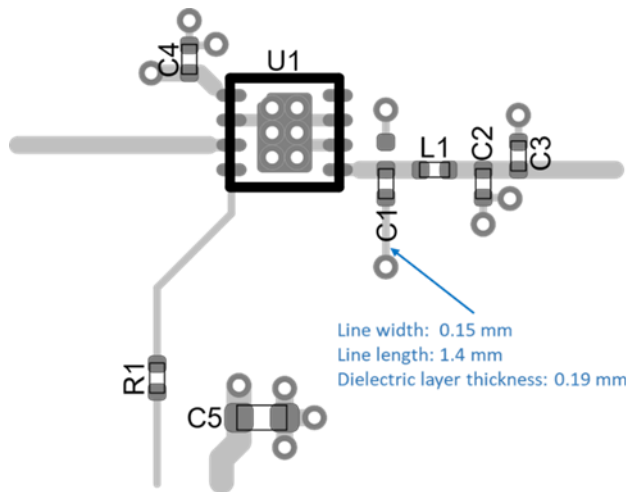
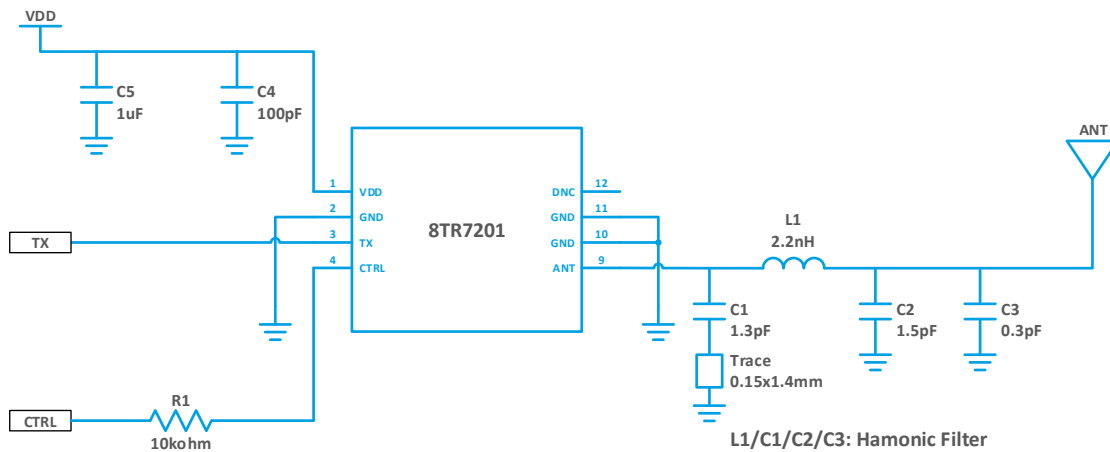
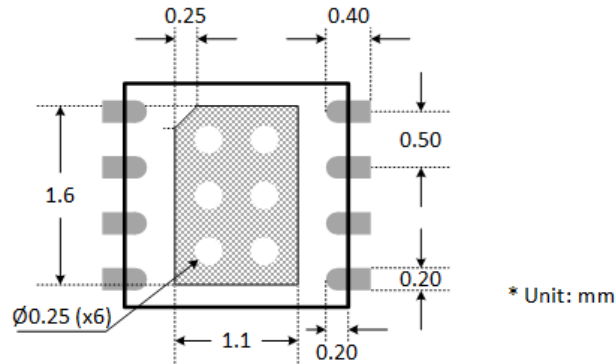
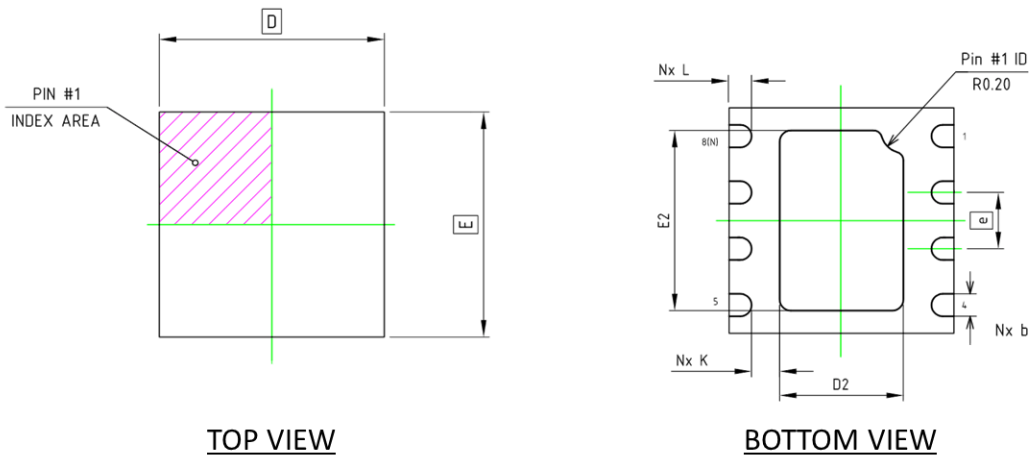
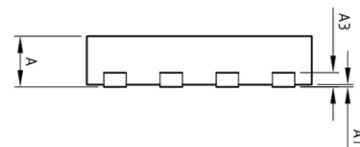


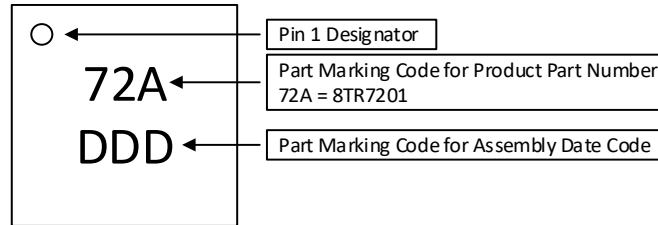
Figure 4: 8TR7201 Reference Design Schematic and PCB Layout

Package Dimensions

Figure 5: 8TR7201 Recommended PCB Layout Footprint


	MIN.	NOM.	MAX.
A	0.41	0.45	0.50
A1	0.00	0.02	0.05
A3	---	0.127 Ref	---
b	0.15	0.20	0.25
D	2.00 BSC		
E	2.00 BSC		
e	0.50 BSC		
D2	1.00	1.10	1.20
E2	1.50	1.60	1.70
K	0.20	---	---
L	0.10	0.20	0.30
N	8		


SIDE VIEW
Figure 6: 8TR7201 Package Dimension

Package Marking



Note: The part marking: 72A represents the Product Part Number: 8TR7201. Due to the size limitations of this package, only three (3) characters can be marked on each of the two (2) rows. Therefore the Product Part Number is represented in the part marking by a 3-character code.

Figure 7: 8TR7201 Typical Part Marking

ESD Handling Information

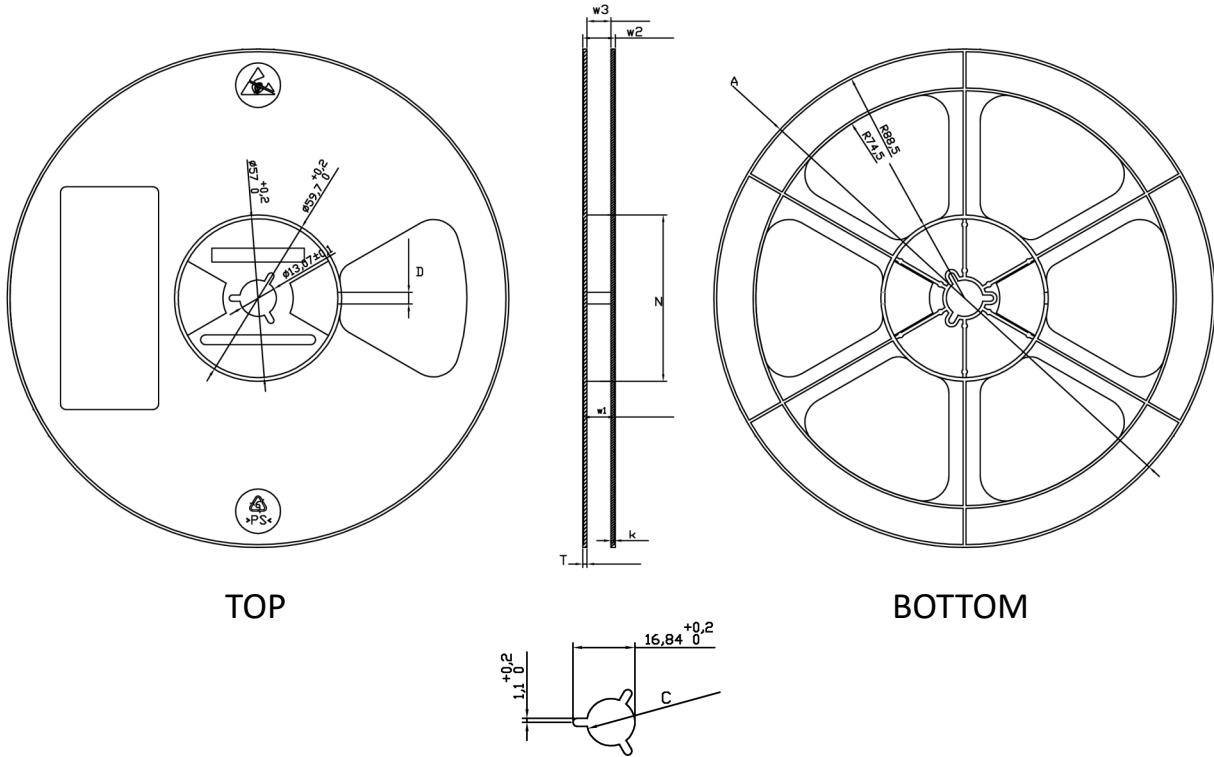
Electro Static Discharge (ESD) can cause immediate (or latent) failures in semiconductor Integrated Circuits (ICs). BeRex, Inc. RFIC products are designed with integral ESD protection structures, and all IC products are tested to meet industry standards for ESD event survival. Users must adhere to all precautions for handling ESD sensitive devices throughout the manufacturing, test, shipping, handling, or operational processes, and during field service operations in order to achieve optimum system performance and life expectancy. Production quantities of this product are shipped in a standard tape and reel format. Electrostatic Discharge Rating - 3000V

RoHS Compliance

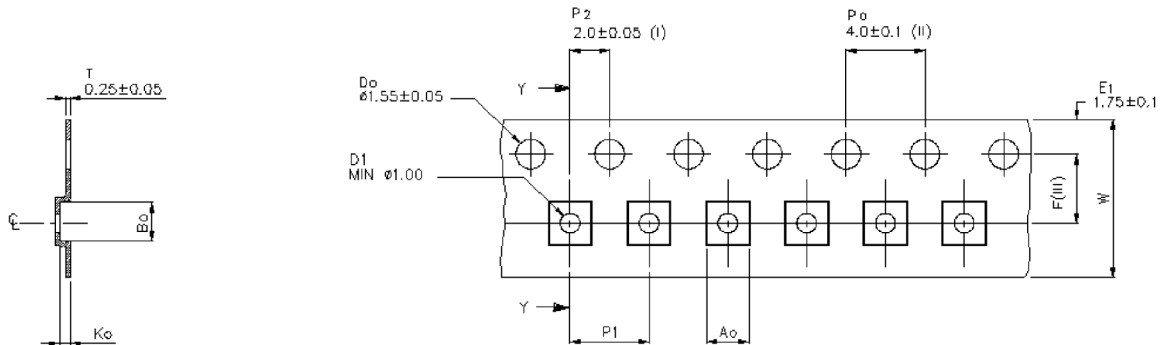
This part is compliant with Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2011/65/EU as amended by Directive 2015/863/EU.

This product also is compliant with a concentration of the Substances of Very High Concern (SVHC) candidate list which are contained in a quantity of less than 0.1%(w/w) in each components of a product and/or its packaging placed on the European Community market by the BeRex and Suppliers.

Tape & Reel



TYPE	A	N	C	D	w1	w2	w3	T	k
8MM	$\phi 180^{+2}_{-2}$	$\phi 60^{+1}_{-1}$	$\phi 13.1^{+0.2}_{-0.2}$	4.2 ± 0.5	8.4^{+1}_{-0}	11.6^{+1}_{-1}	8.75^{+1}_{-1}	1.5 ± 0.15	$1.25^{+0.1}_{-0.05}$



SECTION Y-Y

A ₀	2.20 +/- 0.05
B ₀	2.20 +/- 0.05
K ₀	0.55 +/- 0.05
F	3.50 +/- 0.05
P1	4.00 +/- 0.10
W	8.00 +0.3/-0.1

- (i) Measured from centreline of sprocket hole to centreline of pocket.
- (ii) Cumulative tolerance of 10 sprocket Hole is ± 0.20 .
- (iii) Measured from centreline of sprocket hole to centreline of pocket.

ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED

Figure 8: 8TR7201 Tape and Reel Dimension