



## ● Product Features

- Excellent Insertion Loss and Isolation performance
- High Linearity
- GPIO Control Interface
- Broadband frequency range: 0.1 to 3 GHz
- Small package: QFN-10-pin, 1.1mm x 1.5mm x 0.45mm
- No DC blocking capacitors required
- 1kV HBM ESD Protection on all pins

## Product Applications

- Band Selecting
- Antenna Tuning

## Product Description

The LX8544A is a Silicon On Insulator (SOI) Single Pole, Four-Throw (SP4T) antenna tuner which require very low insertion loss, high isolation and high linearity performance.

The high linearity performance and low insertion loss for 5G and 4G LTE applications.

The LX8544A SP4T tuner is manufactured in a compact 1.1mm x 1.5mm x 0.45mm, 10-pin surface mount Quad Flat No-Lead (QFN) package.

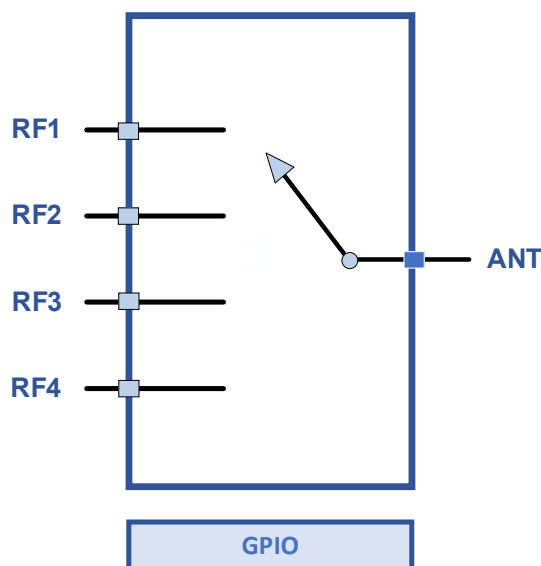


Figure 1 Functional Block Diagram

## Absolute Maximum Conditions

| Parameters                 | Symbol           | Minimum | Maximum | Units |
|----------------------------|------------------|---------|---------|-------|
| Supply voltage             | V <sub>DD</sub>  | -0.3    | +4.8    | V     |
| Control voltage            | VC               | -0.3    | +3.3    | V     |
| RF input power             | P <sub>in</sub>  |         | +43     | dBm   |
| Storage temperature        | T <sub>STG</sub> | -55     | +150    | °C    |
| Operating temperature      | T <sub>OP</sub>  | -40     | +90     | °C    |
| Human Body Model, Class 1C | ESD              | 1000    |         | V     |

**1: Test condition 50% duty cycle, VSWR=1:1, +25 °C**

**Note:** Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

## General Electrical Specifications

| Parameters                                 | Symbol           | Test Condition                                                   | Min. | Typ. | Max.        | Units |
|--------------------------------------------|------------------|------------------------------------------------------------------|------|------|-------------|-------|
| Supply voltage                             | V <sub>DD</sub>  |                                                                  | 2.5  | 2.8  | 4.2         | V     |
| Supply current, active mode                | I <sub>DD</sub>  |                                                                  |      | 60   | 100         | μA    |
| Control signal:<br>High<br>Low             | V <sub>CT</sub>  |                                                                  | 1.35 | 1.8  | 3.00<br>0.3 | V     |
| Control current:<br>High<br>Low            | I <sub>CTL</sub> |                                                                  |      | 1    | 3           | μA    |
| RF Operating Voltage<br>(ANT to RF1/2/3/4) | V <sub>P</sub>   |                                                                  |      | 60   |             | V     |
| Turn-on time<br>(PIN = +27 dBm)            | T <sub>ON</sub>  | Measured from 50% of final VDD supply voltage to 90% of RF power |      | 5    | 10          | μs    |
| Switching time<br>(PIN = +27 dBm)          | T <sub>SW</sub>  | Measured from 50% of final VDD supply voltage to 90% of RF power |      | 3    | 5           | μs    |

**(VDD = 2.85 V, VCT = 1.8 V, TOP = +25 °C, Characteristic Impedance [ZO] = 50 Ω, Unless Otherwise Noted)**

## RF Specifications

| Parameters                                           | Symbol           | Test Condition                                  | Min.           | Typ.                 | Max.                 | Units |
|------------------------------------------------------|------------------|-------------------------------------------------|----------------|----------------------|----------------------|-------|
| Operating frequency                                  | f                |                                                 | 0.1            |                      | 3.0                  | GHz   |
| Insertion loss                                       | IL               | Up to 1.0 GHz<br>Up to 2.2 GHz<br>Up to 3.0 GHz |                | 0.30<br>0.40<br>0.65 | 0.35<br>0.65<br>0.90 | dB    |
| Isolation (ANT port to any receive port)             | I <sub>so</sub>  | Up to 1.0 GHz<br>Up to 2.2 GHz<br>Up to 3.0 GHz | 21<br>16<br>13 | 26<br>22<br>16       |                      | dB    |
| 2nd Order harmonics                                  | 2fo              | Pin = +26 dBm,900MHz<br>Pin = +35 dBm,900MHz    | -79<br>-64     | -74<br>-62           |                      | dBm   |
| 3rd Order harmonics                                  | 3fo              | Pin = +26 dBm,900MHz<br>Pin = +35 dBm,900MHz    | -75<br>-68     | -68<br>-57           |                      | dBm   |
| 0.1 dB Compression Point<br>50% duty cycle, VSWR=1:1 | P0.1dB           | 900M, 50Ω                                       |                | +43                  |                      | dBm   |
| On Resistance                                        | R <sub>on</sub>  | Switch on                                       |                | 1.1                  | 1.4                  | Ohm   |
| Off Capacitance                                      | C <sub>off</sub> | Switch off @500MHz                              |                | 140                  | 160                  | fF    |

## Truth Table

| V1 | V2 | V3 | ANT-RFX            |
|----|----|----|--------------------|
| 0  | 0  | 1  | All Ron            |
| 0  | 1  | 1  | ANT to RF1 and RF2 |
| 1  | 0  | 1  | ANT to RF3 and RF4 |
| 0  | 0  | 0  | ANT to RF1         |
| 0  | 1  | 0  | ANT to RF2         |
| 1  | 0  | 0  | ANT to RF3         |
| 1  | 1  | 0  | ANT to RF4         |
| 1  | 1  | 1  | All Isolation      |

## Pin-out Information

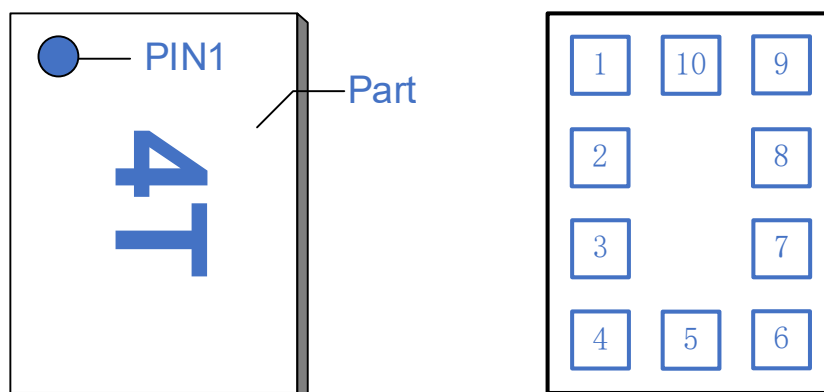


Figure 2 Pin-out Information

Table 1. Pin Description

| Pin # | Name | Description             | Pin # | Name | Description             |
|-------|------|-------------------------|-------|------|-------------------------|
| 1     | RF1  | RF Port 1               | 6     | V2   | Logic Control Voltage 2 |
| 2     | RF2  | RF Port 2               | 7     | GND  | Ground                  |
| 3     | V3   | Logic Control Voltage 3 | 8     | RF4  | RF Port 4               |
| 4     | VDD  | DC Power Supply         | 9     | RF3  | RF Port 3               |
| 5     | V1   | Logic Control Voltage 1 | 10    | ANT  | Antenna in              |

## Application circuit

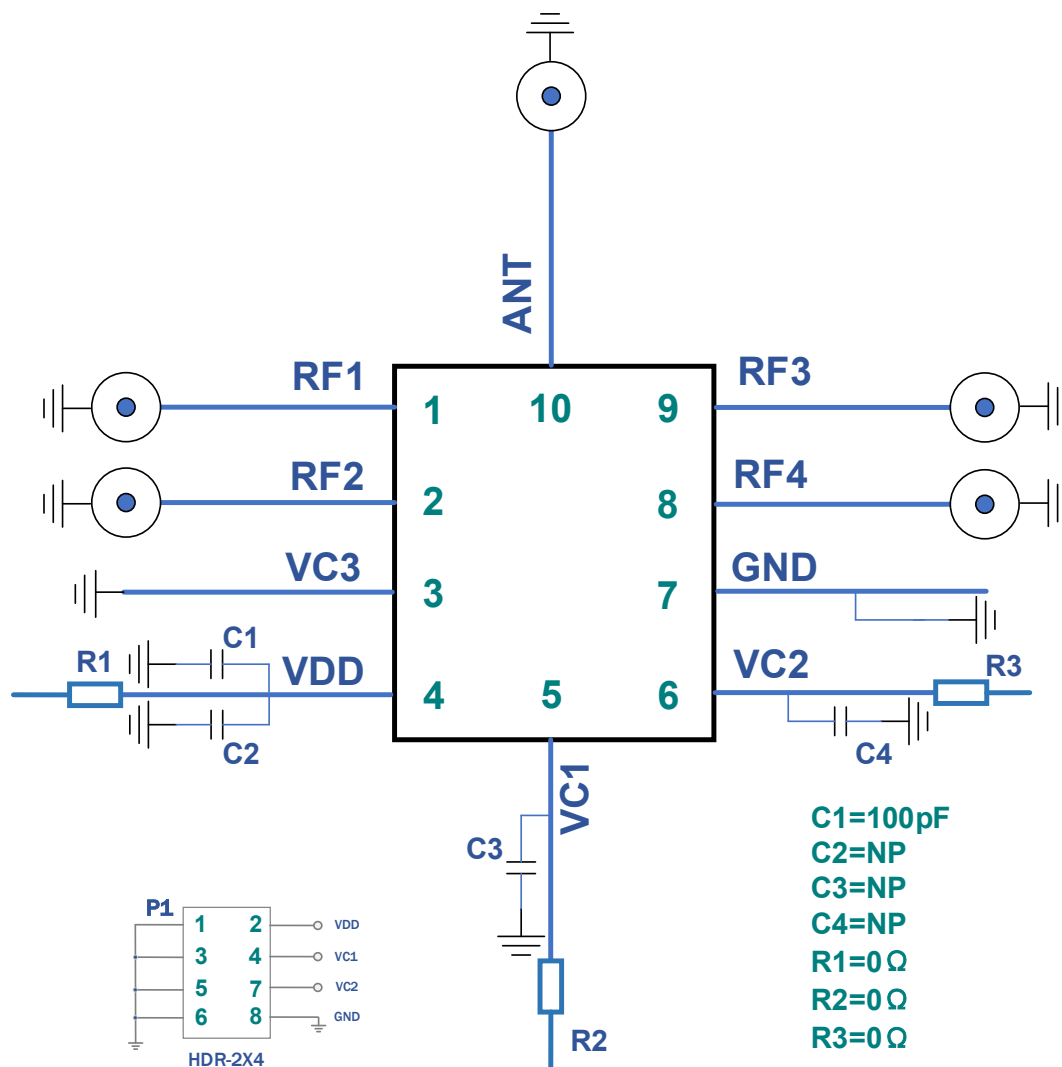


Figure 3 Application circuit

## Evaluation Board

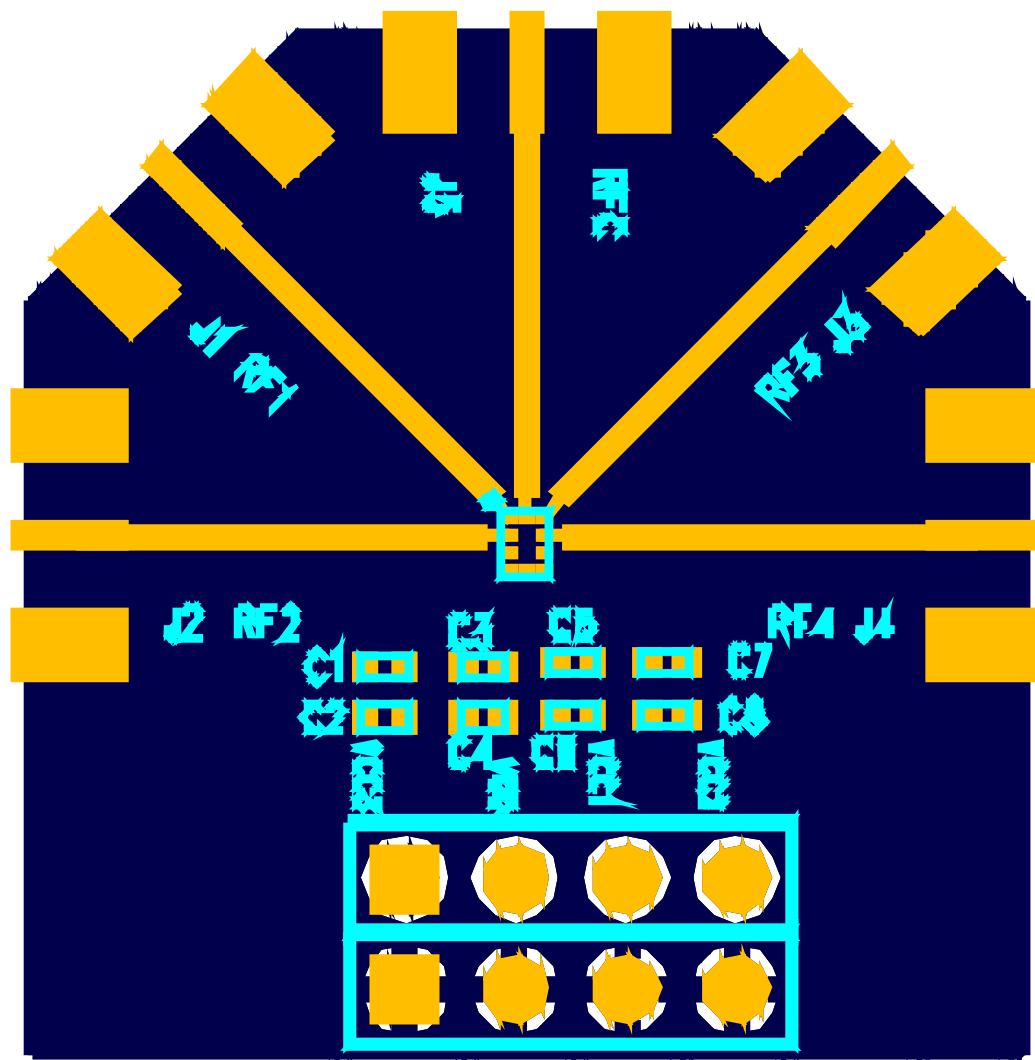
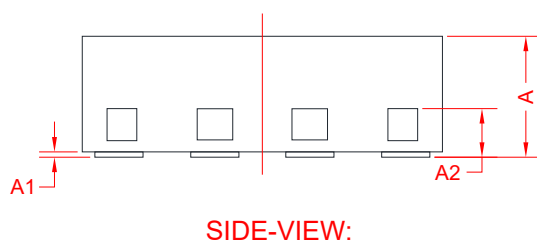
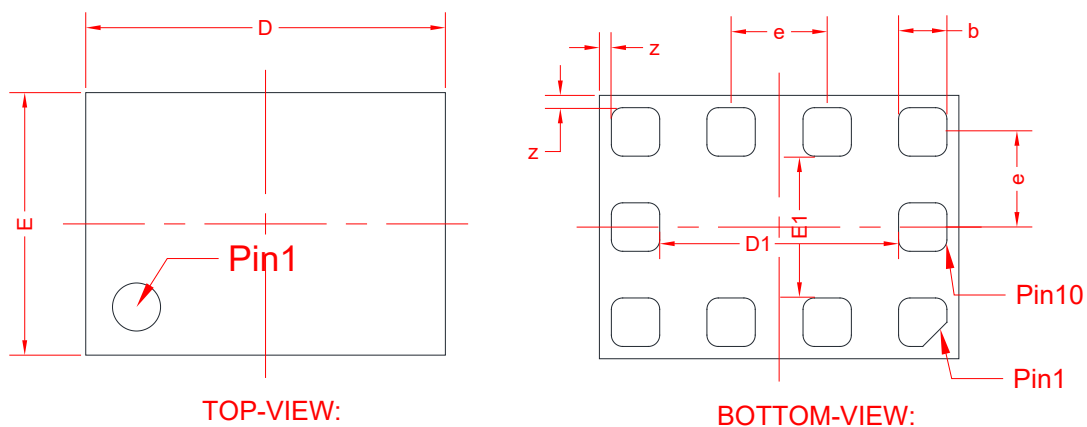


Figure 4 Evaluation Board Assembly Diagram

## Package Outline Dimension

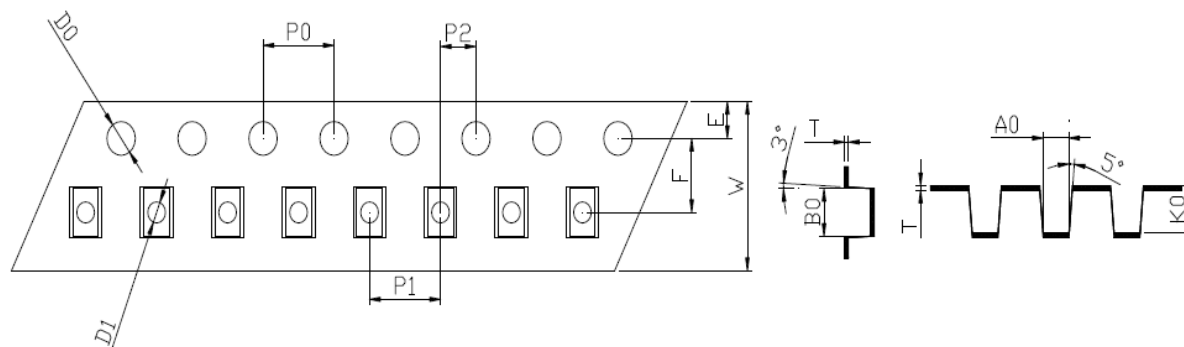


| SYMBOL | MILLIMETER |      |       |
|--------|------------|------|-------|
|        | MIN        | NOM  | MAX   |
| A      | 0.40       | 0.45 | 0.50  |
| A1     | 0.00       | 0.02 | 0.05  |
| A2     | 0.127REF   |      |       |
| b      | 0.17       | 0.20 | 0.23  |
| D      | 1.45       | 1.50 | 1.55  |
| E      | 1.05       | 1.10 | 1.15  |
| D1     | 0.950      | 1.00 | 1.050 |
| E1     | 0.550      | 0.60 | 0.650 |
| e      | 0.375      | 0.40 | 0.425 |
| z      | 0.05REF    |      |       |

Figure 5 Package Outline Dimension



## Package Dimensions (5000pcs)



|    |                 |    |                 |    |                 |
|----|-----------------|----|-----------------|----|-----------------|
| W  | $8.00 \pm 0.05$ | T  | $0.20 \pm 0.02$ | D1 | $0.80 \pm 0.10$ |
| E  | $1.75 \pm 0.10$ | F  | $3.50 \pm 0.10$ | D0 | $1.60 \pm 0.10$ |
| P0 | $4.00 \pm 0.10$ | P1 | $4.00 \pm 0.10$ | P2 | $2.00 \pm 0.10$ |
| A0 | $1.25 \pm 0.05$ | B0 | $1.88 \pm 0.05$ | K0 | $0.75 \pm 0.05$ |

Figure 6 Tape and Reel Dimensions

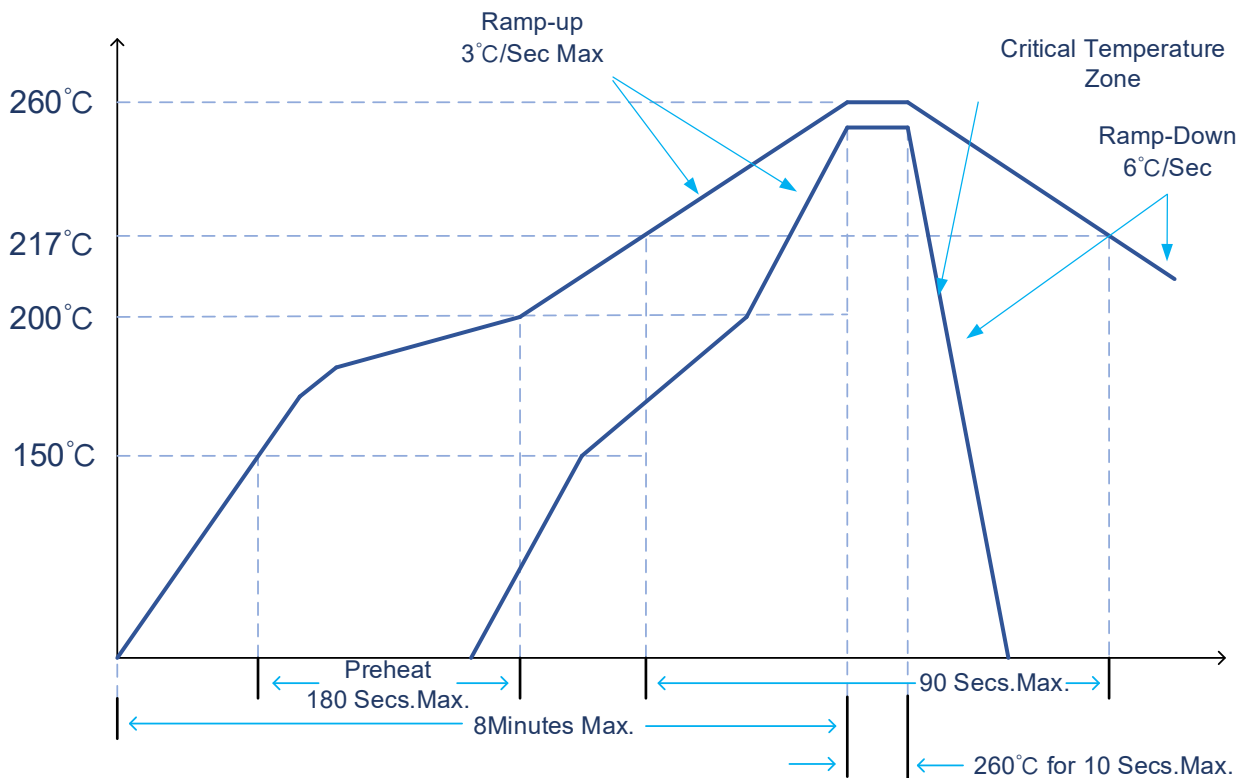
## Declaration of No Harmful Substances

This part is compliant with 2005/20/EC packaging directive, 1907/2006/EC REACH directive and the 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment), as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead free
- Halogen Free (Chlorine, Bromine)
- SVHC Free

## Reflow Chart



NOTE: Reflow Profile with 240°C peak also acceptable.