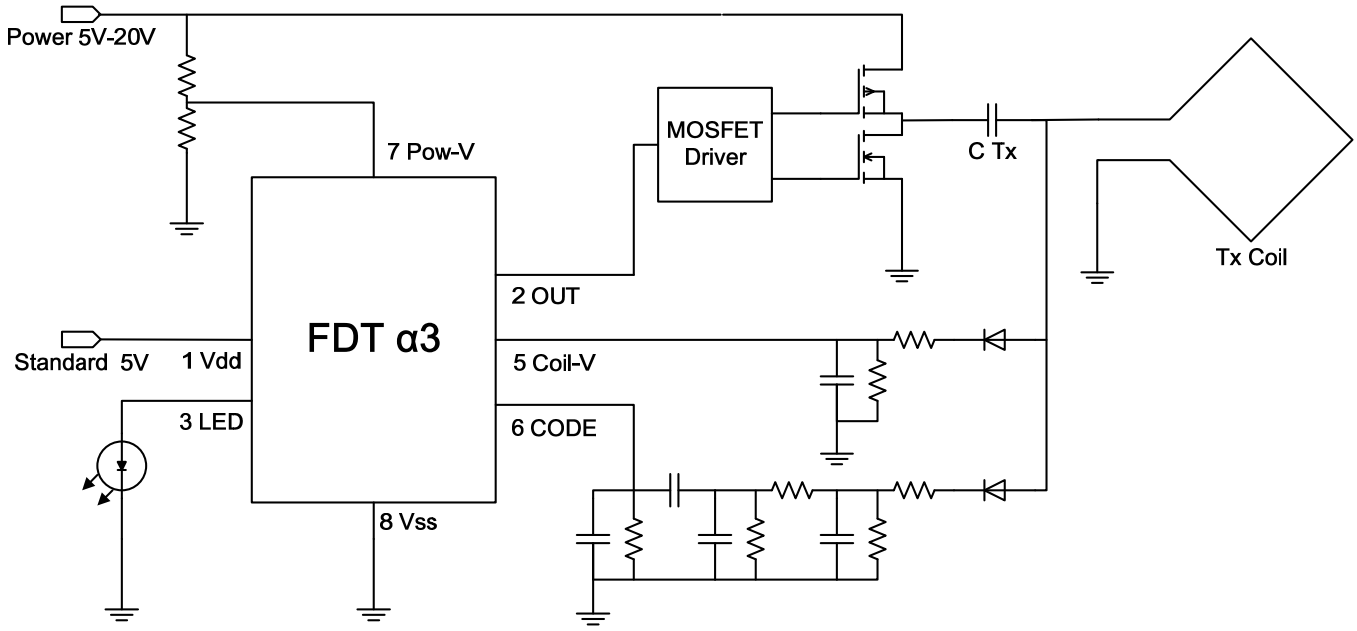
## FEATURES

- This IC can output frequency for being used in the wireless power supply system.
- System Operation frequency is from 50KHz to 500KHz.
- Standby current dissipation 0.5mA when operation voltage under 5V.
- Resonant control is by coil.
- Once the object is identified then this IC will output power by automatic adjustment.
- Provide the protection of power overload and metal sensing.
- LED light indicating the charging activity.
- Provided with the code mechanism by advanced technology and several patent protections.
- Simplified package of SOIC-8.
- Function along with $\beta$3 control IC.

## APPLICATIONS

- For electronics product use which power is under 40W.
- Effective sensing distances less than 20mm.
- Wireless power supply system for smart phone and e-book application product.
- Easy to put into mass production by provided application circuit.

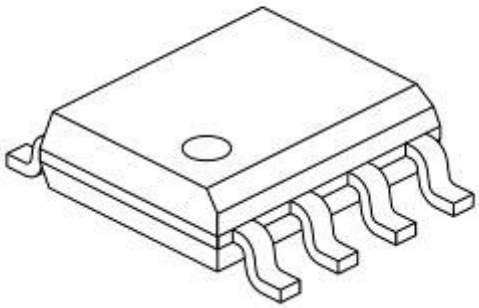
## TYPICAL APPLICATION CIRCUIT

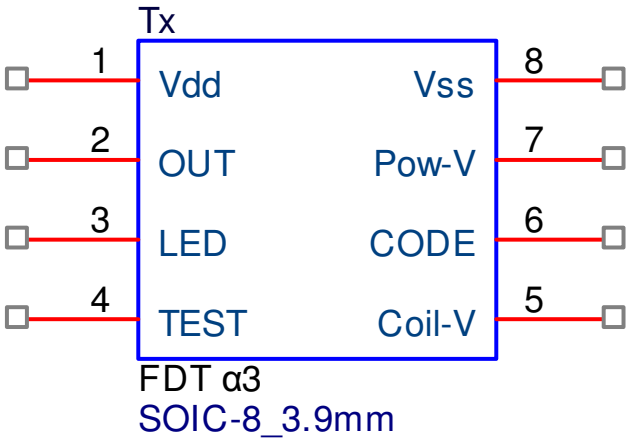


## IC PACKAGE and PIN FUNCTION

SOIC-8 Narrow,3.90mm






## PIN FUNCTIONS

| Pin # | Name | Description |
|---|---|---|
| 1 | Vdd | Operating power supply of IC. Standard voltage is 5V. |
| 2 | OUT | Output wireless charging operation frequency. The signal is square wave between 50KHz and 500KHz. |
| 3 | LED | Motivating LED to show system conditions. When it is standby, LED does not shine. In summary: Standby- No light; Charging- Twinkling; Shut-down mode (from Rx's feedback)- Keep bright |
| 4 | TEST | System testing pin. In normal usage, this pin can be floating or connected to Vdd. If it is going to be in test, the pin should be GND to be the debugging mode. |
| 5 | Coil-V | Used for inspecting coil resonant voltage to analyze and adjust automatically the status of coil resonance. |
| 6 | CODE | Analyze information code from Rx for distinguishing objects to adjust automatically. |
| 7 | Pow-V | Inspecting operating voltage to adjust primary sensing voltage of Rx. |
| 8 | Vss | System Ground. |

## ABSOLUTE MAXIMUM RATINGS

| Parameter | Value | | Units |
|---|---|---|---|
| | Min | Max | |
| Working environment temperature | -40 | +85 | ℃ |
| Storage temperature | -65 | +150 | ℃ |
| Relative voltage of Vdd pin to Vss pin | -0.3 | +6.5 | V |
| Relative voltage of other pins to Vss pin | -0.3 | Vdd+0.3 | V |
| Largest input current of Vdd | | 800 | mA |

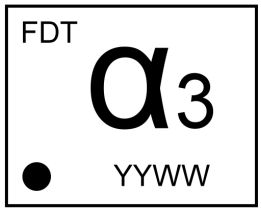
| | | | |
|---|---|---|---|
| Largest output current of Vss | | 80 | mA |
| Largest output current of other pins | | 25 | mA |

## ELECTRICAL CHARACTERISTICS

| Parameters | Symbol | Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Operating Voltage | Vdd | Standard (1) | 4.5 | 5 | 5.5 | V |
| Supply Current (Standby) | I | Standard (1) | | 0.3 | 1 | mA |
| Supply Current (In operation) | I | Standard (1) | | 3 | 6 | mA |
| Pull High Current Pin4 TEST | Iph4 | Vdd=5V | | 100 | 200 | μA |
| Power-Up Timer | Powtmr | | | 100 | 180 | mS |

(1) Design for typical use of circuit

## Marking Details





● ： **Pin 1 indicator**

**FDT** ：**Fa Da Tong Technology**

**α3** ：**A3TX, Product Name**

**YYWW**：**Date code**

## ORDERING INFORMATION

| Part Number | Package | Top Marking | Free Air Temperature (TA) |
|---|---|---|---|
| FDT-A3TX-SO8 | SOIC8 | FDT α3 | - 40℃ TO + 85 ℃ |

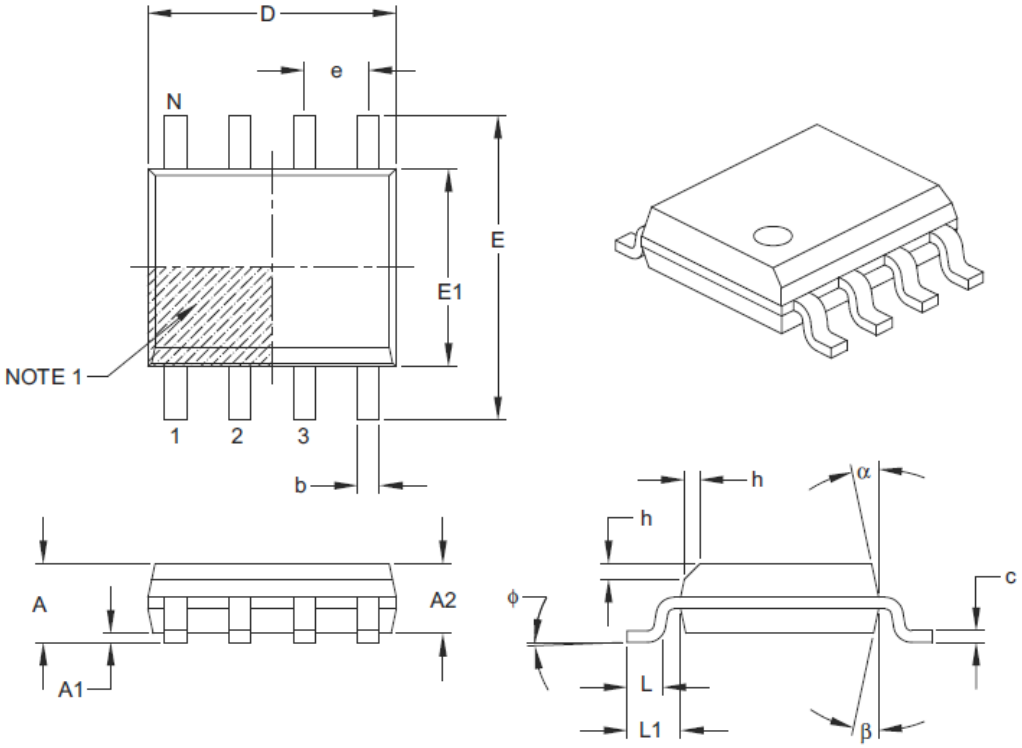
## PACKING INFORMATION

| Part Number | Package | Packing | Single Purchase Quantity |
|---|---|---|---|
| FDT-A3TX-SO8 | SOIC8 | TUBE | 100 PCS |
| FDT-A3TX-SO8 | SOIC8 | TAPE & REEL | 3000 PCS |

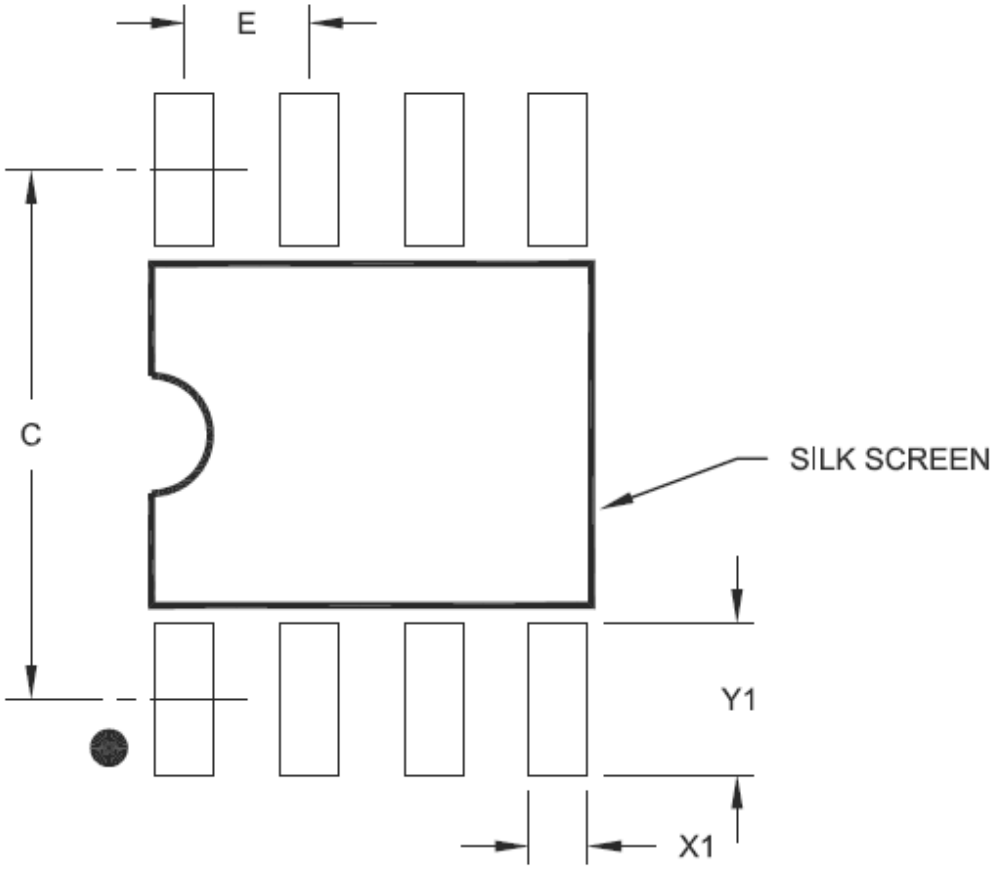
## PACKAGE INFORMATION

Narrow, 3.90 mm Body SOIC-8




| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Number of Pins | N | | 8 | |
| Pitch | e | | 1.27 BSC | |
| Overall Height | A | – | – | 1.75 |
| Molded Package Thickness | A2 | 1.25 | – | – |
| Standoff § | A1 | 0.10 | – | 0.25 |
| Overall Width | E | | 6.00 BSC | |
| Molded Package Width | E1 | | 3.90 BSC | |
| Overall Length | D | | 4.90 BSC | |
| Chamfer (optional) | h | 0.25 | – | 0.50 |
| Foot Length | L | 0.40 | – | 1.27 |
| Footprint | L1 | | 1.04 REF | |
| Foot Angle | ϕ | 0° | – | 8° |
| Lead Thickness | c | 0.17 | – | 0.25 |
| Lead Width | b | 0.31 | – | 0.51 |
| Mold Draft Angle Top | α | 5° | – | 15° |
| Mold Draft Angle Bottom | β | 5° | – | 15° |




RECOMMENDED LAND PATTERN

| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Contact Pitch | E | 1.27 BSC | | |
| Contact Pad Spacing | C | | 5.40 | |
| Contact Pad Width (X8) | X1 | | | 0.60 |
| Contact Pad Length (X8) | Y1 | | | 1.55 |

## Recommended coil design and capacitance

The theory of wireless charging system transmitting and receiving wireless charging power is based on the coil inductance and capacitance resonance. The resonant frequency is been decided by both coil and capacitance, which are the key to the system operation. IC $\alpha$ 3 has been designed by advanced technology of adjusting resonant frequency automatically. However, when designing products, developers still need to set resonant frequency in reasonable range to let the system work.

At the start of designing wireless charging system, coil design is the first step. Next, with the setting of capacitance, the operating frequency should be in appropriate range.

Capacitor is common product, and its capacity increases or decreases fractionally. Hence, the suggested selection of capacitance is shown in the table below. The specification is common in the market. As shown in the table, the recommended resonant frequency is between 90KHz and 110KHz since the system will be most stable.

There may be different inductances between Tx coil and Rx coils, but the resonant frequencies of Tx and Rx can be set the same by fitting various capacitances. With this design, the system will work at best efficiency.

The technique of automatic adjusting of IC $\alpha$ 3 will allow system working under the condition of 20% differences of resonant frequencies between Tx and Rx. Nonetheless, the optimal design is still the same resonant frequencies of these two coils.

The table below is coil and capacitance cross-reference. After the completion and inductance measurement of coil, please refer to the table finding suitable capacitance. The best value of coil inductance will be between 10μH and 30μH.

| Coil Inductance μH | Capacitor μF | Resonant Frequency | Design Suggestion |
|---|---|---|---|
| 1 | 2.200 | 107.3 KHz | Inappropriate section: the sensibility of coil below 5μ is poor. |
| 2 | 1.000 | 112.5 KHz | |
| 3 | 0.680 | 111.4 KHz | |
| 4 | 0.680 | 96.5 KHz | |
| 5 | 0.470 | 103.8 KHz | |
| 6 | 0.470 | 94.8 KHz | Feasible section: however, it is not the best system design. |
| 7 | 0.330 | 104.7 KHz | |
| 8 | 0.330 | 98.0 KHz | |
| 9 | 0.330 | 92.4 KHz | |
| 10 | 0.220 | 107.3 KHz | |
| 11 | 0.220 | 102.3 KHz | Best section: system will operate most |

| | | | |
|---|---|---|---|
| 12 | 0.220 | 98.0 KHz | efficiently. |
| 13 | 0.220 | 94.1 KHz | |
| 14 | 0.150 | 109.8 KHz | |
| 15 | 0.150 | 106.1 KHz | |
| 16 | 0.150 | 102.7 KHz | |
| 17 | 0.150 | 99.7 KHz | |
| 18 | 0.150 | 96.9 KHz | |
| 19 | 0.100 | 115.5 KHz | |
| 20 | 0.100 | 112.5 KHz | |
| 21 | 0.100 | 109.8 KHz | |
| 22 | 0.100 | 107.3 KHz | |
| 23 | 0.100 | 104.9 KHz | |
| 24 | 0.100 | 102.7 KHz | |
| 25 | 0.100 | 100.7 KHz | |
| 26 | 0.100 | 98.7 KHz | |
| 27 | 0.100 | 96.9 KHz | |
| 28 | 0.100 | 95.1 KHz | |
| 29 | 0.082 | 103.2 KHz | |
| 30 | 0.082 | 101.5 KHz | |
| 31 | 0.082 | 99.8 KHz | |
| 32 | 0.082 | 98.3 KHz | |
| 33 | 0.082 | 96.8 KHz | |
| 34 | 0.082 | 95.3 KHz | |
| 35 | 0.068 | 103.2 KHz | Feasible section: however, it is not the |
| 36 | 0.068 | 101.7 KHz | best system design. |
| 37 | 0.068 | 100.3 KHz | |
| 38 | 0.068 | 99.0 KHz | |
| 39 | 0.068 | 97.7 KHz | |
| 40 | 0.068 | 96.5 KHz | |

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Mail: rd-01@rfidpower.com.tw

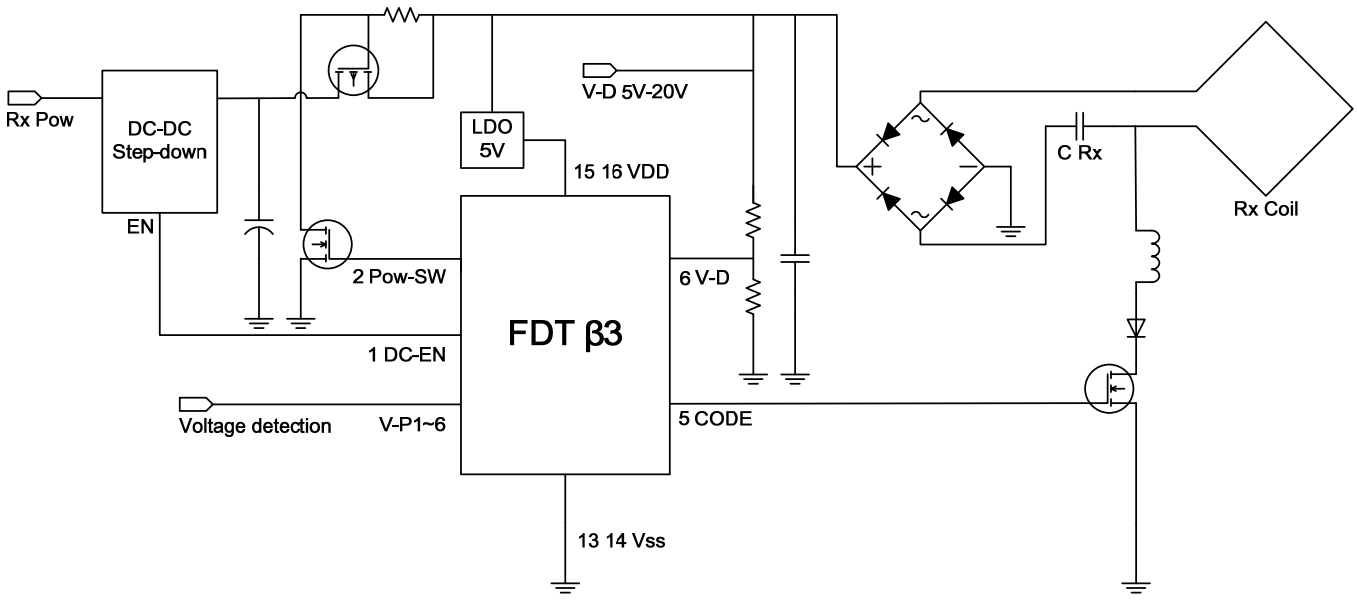
## FEATURES

- Signal receiving IC of wireless power supply system.
- Operation power subject to the transmits signal from α3 Tx.
- Signal feedback when system is activated.
- Signal feedback when power efficiency automatic justification.
- Prevent from power overload by multi-detective points.
- Provided the code mechanism by advanced technology and several patent protections.
- Micro package of QFN-16.
- Function along with α3 transmission IC.

## APPLICATIONS

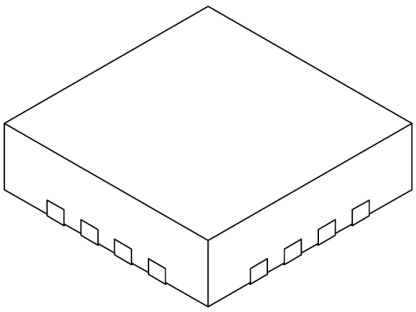
- Wireless power supply system for under 40W.
- Effective sensing distances less than 20mm between transmission & receiving.
- Wireless power supply system for smart phone and e-book application products.
- Easily mass-produced by provided application circuit.

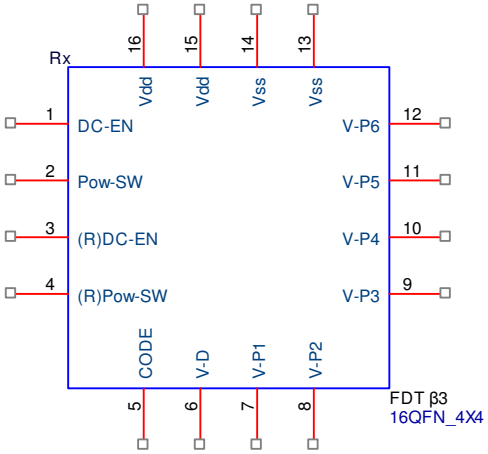
## TYPICAL APPLICATION CIRCUIT



## IC PACKAGE and PIN FUNCTION

**QFN-16 , 4X4X0.9mm**






### PIN FUNCTIONS

| Pin # | Name | Description |
|---|---|---|
| 1 | DC-EN | Control initiation signal of back-end DC-DC step-down IC. |
| 2 | Pow-SW | Control switch signal of back-end power supply channel. |
| 3 | (R)DC-EN | Control positive and negative signals of DC-EN. When this pin is GND, DC-EN outputs Hi potential to initiate back-end DC-DC step-down IC. This pin is typical GND. |
| 4 | (R) Pow-SW | Control positive and negative signals of Pow-SW. When this pin is GND, Pow-SW outputs Hi potential with the need to lead the back-end power supply. This pin is typical GND. |
| 5 | CODE | Output pin of the feedback signal from Rx to Tx. |
| 6 | V-D | Detecting signal of voltage in primary stage after coil sensing for Tx to analyze and adjust. |
| 7-11 | V-P1 ~ V-P5 | Detecting voltages of other pins in the system. When the voltage is more than 1/2, Vdd will cut off. Rx outputs power, and Tx still transmits power. If this pin is not used, please connect it to GND. |
| 12 | V-P6 | Detection pin of stopping power supply. If this pin is GND, it notifies Tx to stop supplying power and leads Tx LED to keep bright. Under regular power supply mode, this pin is not connected to any objects. |
| 13 14 | Vss | System Ground |
| 15 16 | Vdd | Operating power supply of IC. Standard voltage is 5V. |

**ABSOLUTE MAXIMUM RATINGS**

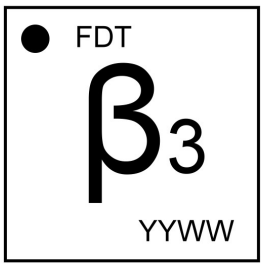
| Parameter | Value | | Units |
|---|---|---|---|
| | Min | Max | |
| Working environment temperature | -40 | +85 | ℃ |
| Storage temperature | -65 | +150 | ℃ |
| Relative voltage of Vdd pin to Vss pin | -0.3 | +6.5 | V |
| Relative voltage of other pins to Vss pin | -0.3 | Vdd+0.3 | V |
| Largest input current of Vdd | | 80 | mA |
| Largest output current of Vss | | 80 | mA |
| Largest output current of other pins | | 25 | mA |

**ELECTRICAL CHARACTERISTICS**

| Parameters | Symbol | Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Operating Voltage | Vdd | Standard (1) | 4.5 | 5 | 5.5 | V |
| Supply Current (In operation) | I | Standard (1) | | 1.5 | 2 | mA |

(1) Design for typical use of circuit

## Marking Details





● ： **Pin 1 indicator**

**FDT ：Fa Da Tong Technology**

**β3 ：B3RX, Product Name**

**YYWW：Date code**

## ORDERING INFORMATION

| Part Number | Package | Top Marking | Free Air Temperature (TA) |
|---|---|---|---|
| FDT-B3RX-QFN16 | QFN16 | FDT β3 | - 40℃ TO + 85 ℃ |

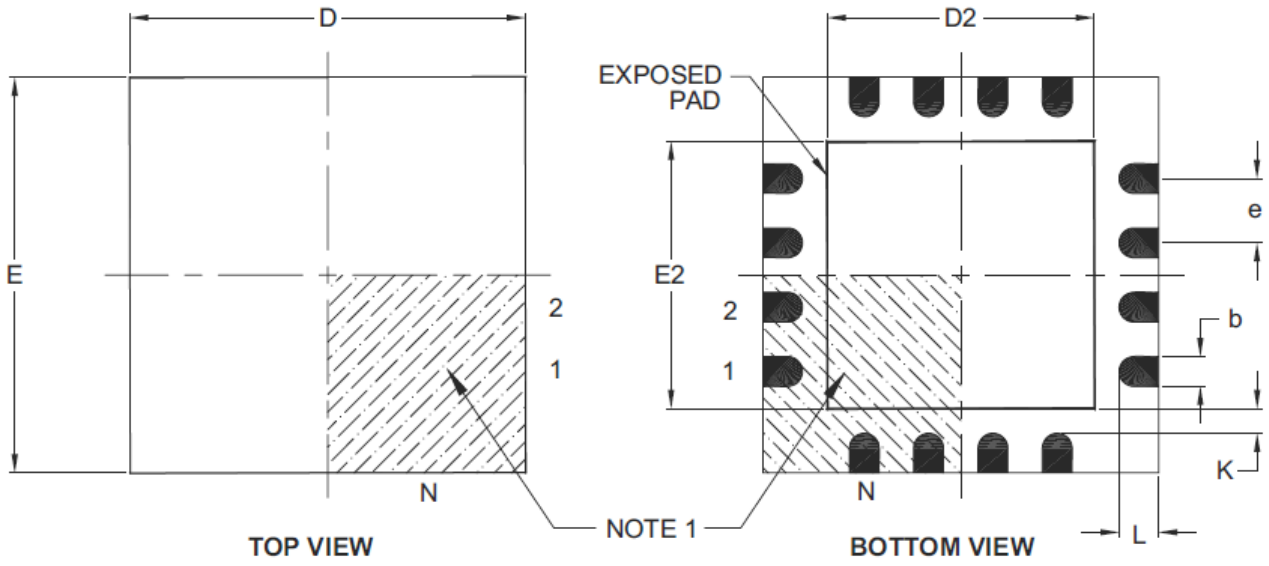
## PACKING INFORMATION

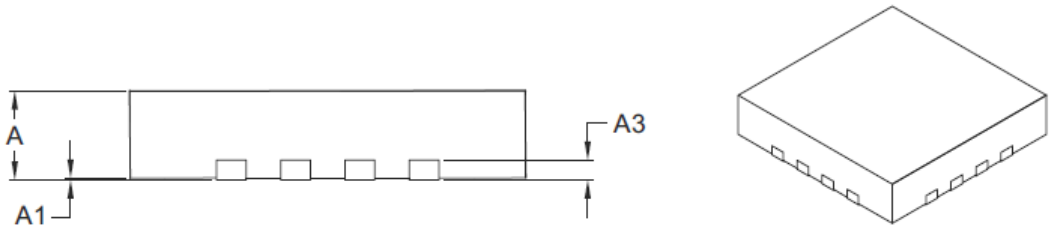
| Part Number | Package | Packing | Single Purchase Quantity |
|---|---|---|---|
| FDT-B3RX-QFN16 | QFN16 | TUBE | 91 PCS |
| FDT-B3RX-QFN16 | QFN16 | TAPE & REEL | 3000 PCS |

**PACKAGE INFORMATION**

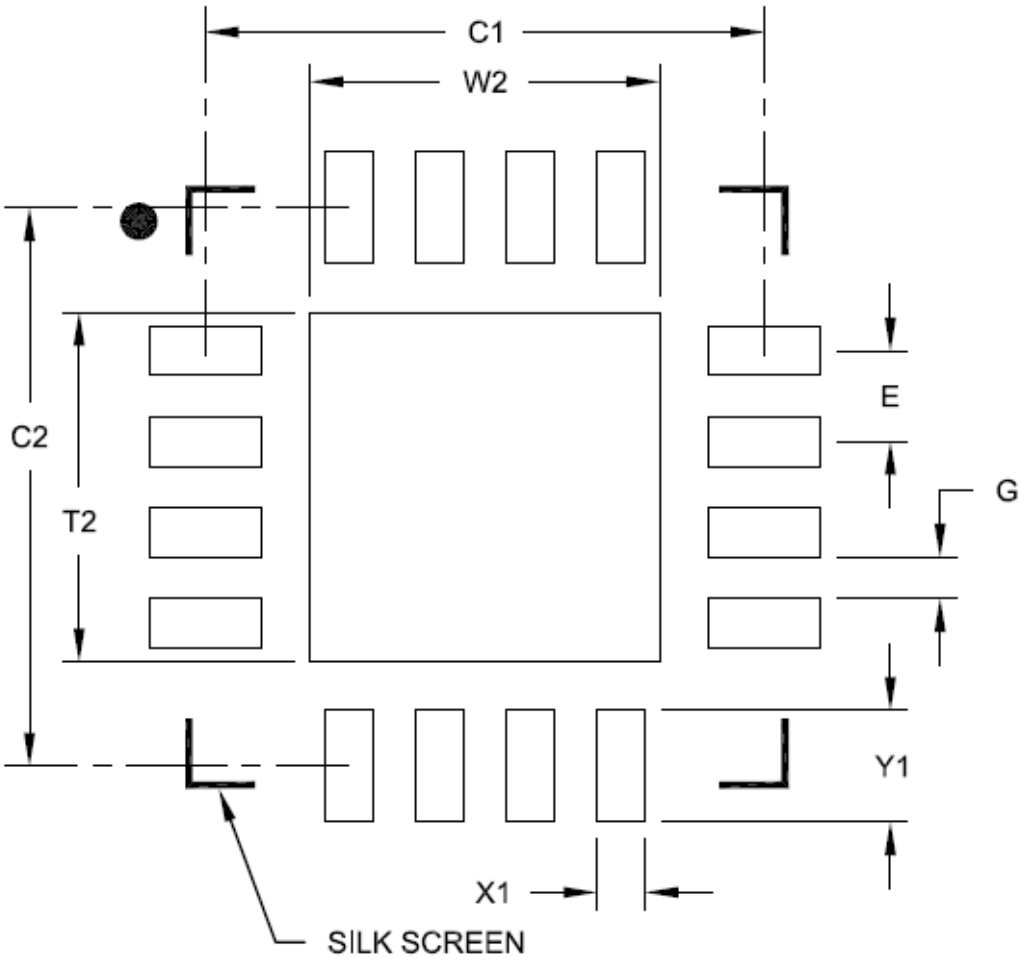
4X4X0.9mm Body QFN16




| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Number of Pins | N | | 16 | |
| Pitch | e | | 0.65 BSC | |
| Overall Height | A | 0.80 | 0.90 | 1.00 |
| Standoff | A1 | 0.00 | 0.02 | 0.05 |
| Contact Thickness | A3 | | 0.20 REF | |
| Overall Width | E | | 4.00 BSC | |
| Exposed Pad Width | E2 | 2.50 | 2.65 | 2.80 |
| Overall Length | D | | 4.00 BSC | |
| Exposed Pad Length | D2 | 2.50 | 2.65 | 2.80 |
| Contact Width | b | 0.25 | 0.30 | 0.35 |
| Contact Length | L | 0.30 | 0.40 | 0.50 |
| Contact-to-Exposed Pad | K | 0.20 | – | – |




RECOMMENDED LAND PATTERN

| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Contact Pitch | E | | 0.65 BSC | |
| Optional Center Pad Width | W2 | | | 2.50 |
| Optional Center Pad Length | T2 | | | 2.50 |
| Contact Pad Spacing | C1 | | 4.00 | |
| Contact Pad Spacing | C2 | | 4.00 | |
| Contact Pad Width (X16) | X1 | | | 0.35 |
| Contact Pad Length (X16) | Y1 | | | 0.80 |
| Distance Between Pads | G | 0.30 | | |

## Recommended coil design and capacitance

The theory of wireless charging system transmitting and receiving wireless charging power is based on the coil inductance and capacitance resonance. The resonant frequency is been decided by both coil and capacitance, which are the key to the system operation. IC $\alpha$ 3 has been designed by advanced technology of adjusting resonant frequency automatically. However, when designing products, developers still need to set resonant frequency in reasonable range to let the system work.

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| 6 | 0.470 | 94.8 KHz | Feasible section: however, it is not the best system design. |
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| 11 | 0.220 | 102.3 KHz | Best section: system will operate most |

 

| | | | |
|---|---|---|---|
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| 13 | 0.220 | 94.1 KHz | |
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| 15 | 0.150 | 106.1 KHz | |
| 16 | 0.150 | 102.7 KHz | |
| 17 | 0.150 | 99.7 KHz | |
| 18 | 0.150 | 96.9 KHz | |
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| 22 | 0.100 | 107.3 KHz | |
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| 25 | 0.100 | 100.7 KHz | |
| 26 | 0.100 | 98.7 KHz | |
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| 38 | 0.068 | 99.0 KHz | |
| 39 | 0.068 | 97.7 KHz | |
| 40 | 0.068 | 96.5 KHz | |

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