

## WS7844QA-10/TR

### 0.1G – 3.8GHz SP4T Antenna Tuning Switch

#### Descriptions

The WS7844QA-10/TR is CMOS silicon-on-insulator (SOI), SP4T switch. The device is optimized for high performance antenna tuning applications. All RF path performance is enhanced with ultra-low on state resistance. WS7844QA-10/TR allows the creation of advanced tuning topologies to maximize TRP & TIS performance in space constrained applications. The WS7844QA-10/TR switch is provided in a compact QFN 1.1 x 1.5 x 0.45 mm package.

#### Features

- Broadband frequency range: 0.1G to 3.8GHz
- Low On-resistance, 1.2Ω
- High RF peak-voltage handing, 45V typical
- OFF Ports, “Close Type”, high isolation
- Very Small 1.1mm X 1.5mm, QFN Package

#### Applications

- Antenna Tuning
- Band Switching
- Impedance Tuning

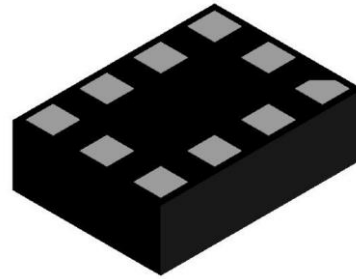


Figure 1 QFN1511-10L(Bottom View)

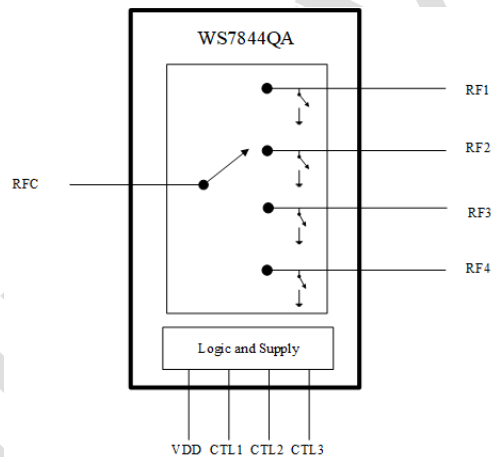
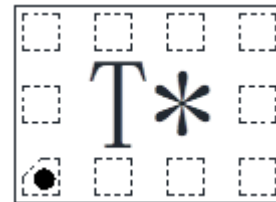


Figure 2 Functional Block Diagram



T = Device code

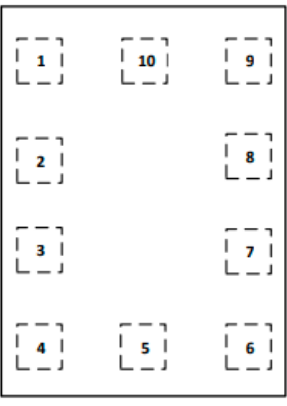
\* = Month code (A-Z)

Figure 3 Marking(Top view)

#### Order Information

Device	Package	Shipping
WS7844QA-10/TR	QFN1511-10L	3000/Reel&Tape

### Pin information

Pin	Function	Description	Transparent top view
1	RF1	RF port 1	
2	RF2	RF port 2	
3	CTL3	DC Control Voltage 3	
4	VDD	DC Power Supply	
5	CTL1	DC Control Voltage 1	
6	CTL2	DC Control Voltage 2	
7	GND	Ground	
8	RF4	RF port 4	
9	RF3	RF port 3	
10	RFC	RF common port	

### Application information

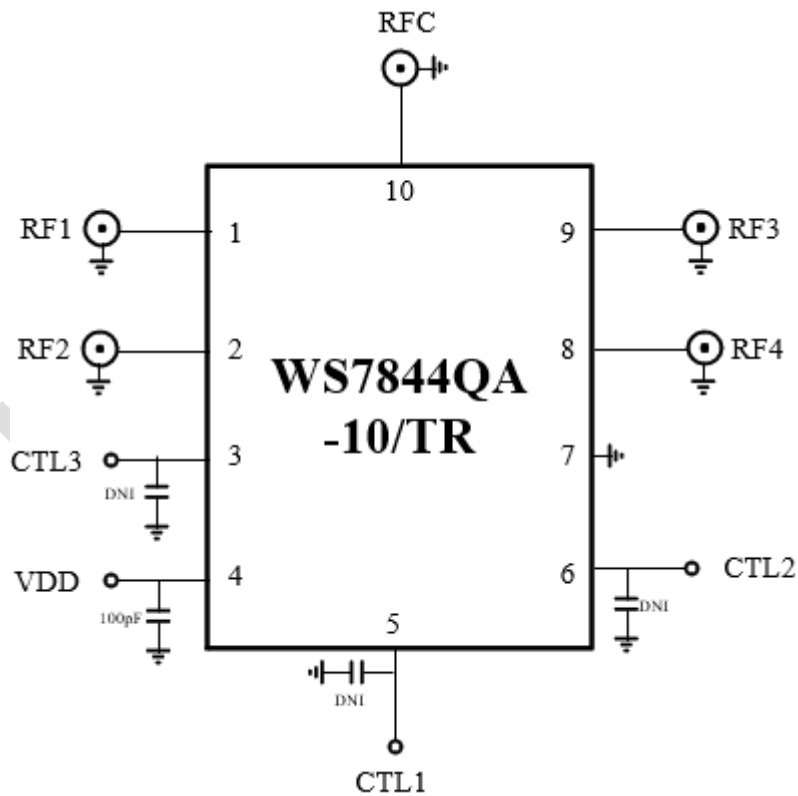


Figure 4 Application Circuit

### Absolute maximum ratings

Maximum ratings are absolute ratings, exceeding only one of these values may cause irreversible damage to the integrated circuit.

Parameter	Symbol	Condition	Min.	Max.	Unit
VDD Voltage	V <sub>DD</sub>	T <sub>A</sub> =25°C	-0.3	3.6	V
Control Voltage	V <sub>CTL</sub>	T <sub>A</sub> =25°C	-0.3	3.0	V
Maximum Input Power	P <sub>INMAX</sub>			43	dBm
Maximum RF Voltage	V <sub>peak</sub>			45	V
Operation Temperature	T <sub>OP</sub>		-40	+85	°C
Storage Temperature	T <sub>STG</sub>		-55	+150	°C
ESD Capability All Pins	V <sub>ESD(HBM)</sub>	Human Body Model	-1000	+1000	V

### Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	V <sub>DD</sub>	2.5	2.8	3.3	V
Power Supply Current	I <sub>DD</sub>		70	100	μA
Control Logic Voltage	V <sub>CTL_H</sub>	1.6	1.8	2.8	V
Switch Time	T <sub>SW</sub>		5	8	μs

## Electrical Characteristics

Nominal test condition unless otherwise stated. All unused ports are 50Ω terminated.  $V_{DD}= 2.8V$ , Temp = +25°C.

Parameters	Symbol	Conditions	Specifications			Unit
			Min.	Typ.	Max.	
Insertion Loss (RFx to RFx)	IL	617 - 960MHz		0.20		dB
		960 - 2170MHz		0.25		dB
		2170 - 2700MHz		0.35		dB
		3300 - 3800MHz		0.75		dB
Isolation (Direct operating mode)	ISO	617 - 960MHz		36		dB
		960 - 2170MHz		31		dB
		2170 - 2700MHz		25		dB
		3300 - 3800MHz		19		dB
On Resistance	Ron			1.2		Ω
Off Capacitance	Coff	500MHz		155		fF
2 <sup>nd</sup> harmonics	H2	PIN=+35dBm GSM850/900, 12.5%DC, VSWR=1:1		-66		dBm
3 <sup>rd</sup> harmonics	H3			-60		dBm
2 <sup>nd</sup> harmonics	H2	PIN=+33dBm GSM1800/1900, 12.5%DC, VSWR=1:1		-65		dBm
3 <sup>rd</sup> harmonics	H3			-63		dBm
2 <sup>nd</sup> Order Input Intercept Point	IIP2	F1=1950MHz, 20dBm; F2=4090MHz, -15dBm; Rx Freq=2140MHz		117		dBm
3 <sup>rd</sup> Order Input Intercept Point	IIP3	F1=1950MHz, 20dBm; F2=1760MHz, -15dBm; Rx Freq=2140MHz		75		dBm

### Truth Table for Operation

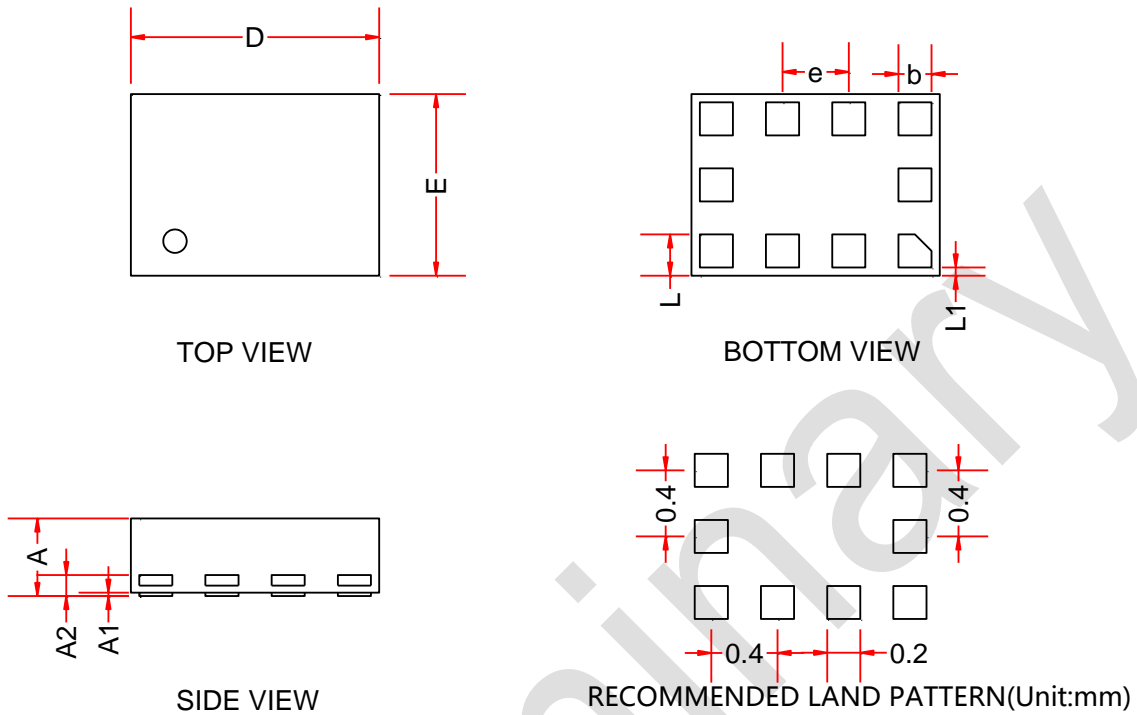
Mode	CTL1	CTL2	CTL3
All On	0	0	1
RF1 and RF2 to RFC	0	1	1
RF3 and RF4 to RFC	1	0	1
RF1 to RFC	0	0	0
RF2 to RFC	0	1	0
RF3 to RFC	1	0	0
RF4 to RFC	1	1	0
All Isolation	1	1	1

NOTE: Any state other than that described in this Table places the switch into an undefined state. An undefined state will not damage the device.

Preliminary

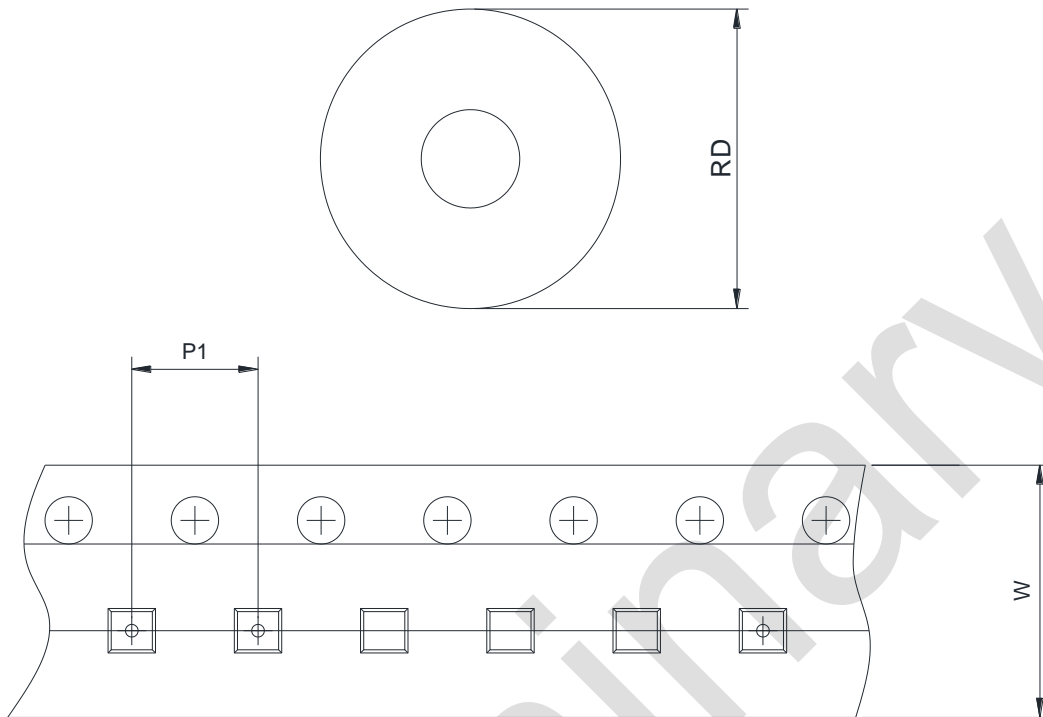
Package outline dimensions

QFN1511-10L

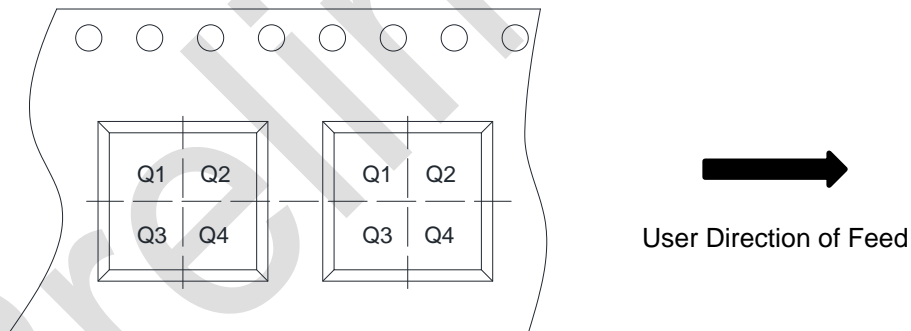


Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.40	0.45	0.50
A1	0.00	0.02	0.05
A2	0.127REF		
D	1.40	1.50	1.60
E9	1.00	1.10	1.20
b	0.15	0.20	0.25
e	0.40 BSC		
L	0.15	0.25	0.35
L1	---	0.05	---

## Tape and Reel Information



### Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch	<input type="checkbox"/> 13inch
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm	<input type="checkbox"/> 12mm <input type="checkbox"/> 16mm
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input checked="" type="checkbox"/> 4mm <input type="checkbox"/> 8mm
Pin1	Pin1 Quadrant	<input checked="" type="checkbox"/> Q1	<input type="checkbox"/> Q2 <input type="checkbox"/> Q3 <input type="checkbox"/> Q4