TOSHIBA CMOS Linear Integrated Circuit Silicon Monolithic

TCWA1225G

1. RF SPDT Switch

High power antenna Switch

2. Features

TarfSOI™
GPIO Control I/F
Wide band (0.7-5.0 GHz)
Low Insertion Loss
WCSP package (1.9 mm×1.9 mm)

3. Pad Assignment

Top View (Pad Side Down)

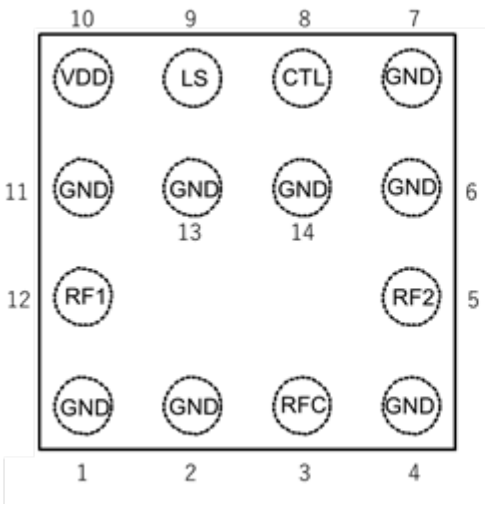


Figure 1 Pad Assignment

Marking (Top View)

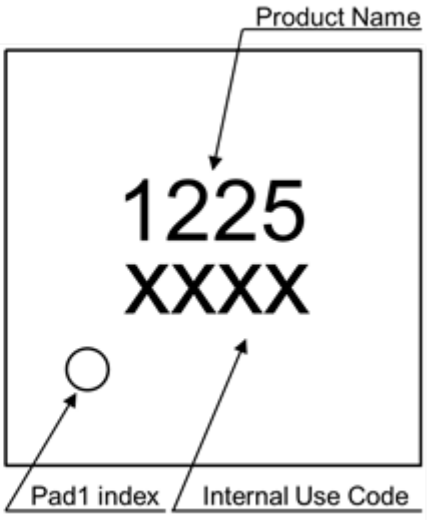


Figure 2 Marking

4. Notice

This device is sensitive to electrostatic discharge. Please ensure equipment and tools are adequately earthed when handling.

TarfSOI™ (Toshiba advanced RF SOI) is a trademark of TOSHIBA CORPORATION

Start of commercial production
2024-04

5. Block Diagram

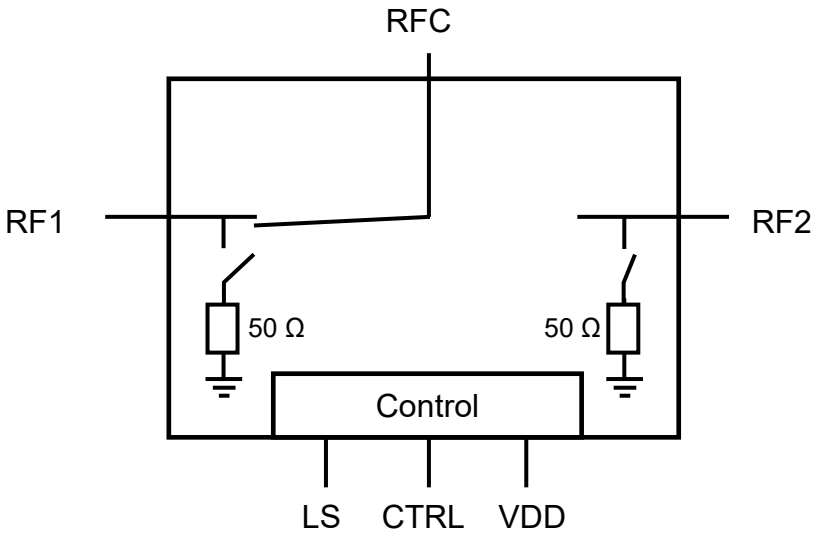


Figure 3 Function Block Diagram

6. Control Logic

Table 1 Control Logic

LS	CTRL	RFC-RF1	RFC-RF2
0	0	OFF	ON
0	1	ON	OFF
1	0	ON	OFF
1	1	OFF	ON

7. Pad Description

Table 2 Pad Description

Pad No.	Symbol	Description
1	GND	Ground
2	GND	Ground
3	RFC	RF common port
4	GND	Ground
5	RF2	RF port2
6	GND	Ground
7	GND	Ground
8	CTRL	Control
9	LS	Logic select
10	VDD	Voltage Supply
11	GND	Ground
12	RF1	RF port1
13	GND	Ground
14	GND	Ground

8. Absolute Maximum Ratings (Note)

Ta = +25 ˚C, otherwise noted.

Table 3 Absolute Maximum Ratings

Item		Symbol	Rating	Unit
Supply Voltage Range		V_{DD}	-0.3 to 3.9	V
Logic Input (LS, CTRL Pad)		V_I	-0.3 to 3.9	V
Peak Power Handling (8 dB PAR)		P_{pk}	46	dBm
50 Ω Termed Port Power Handling (CW)		P_{TP}	24	dBm
Power Disipation	Tc = +25 ˚C	PD_{25}	1.015	W
	Tc = +95 ˚C	PD_{95}	0.305	W
Storage Temperature Range		T_{stg}	-40 to 150	˚C
Junction Temperature		T_j	125	˚C

Note1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Note 2: Using continuously under heavy loads (e.g. the application of high temperature/ current/ voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/ current/ voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductors Reliability Handbook (“Handling Precautions”/ “Derating Concept and Methods”) and individual reliability data (i.e. reliability test Report and estimated failure rate, etc.).

9. Operating Ranges (Note)

Table 4 Operating Ranges

Item		Symbol	Min	Typ.	Max	Unit
Supply Voltage		V_{DD}	3.0	3.3	3.6	V
Logic Input Voltage	High Level	V_{IH}	1.65	-	3.6	V
	Low Level	V_{IL}	-0.3	-	0.4	V
Operation Temperature		T_{opr}	-40	25	95	˚C

Note 3: The operating ranges should be maintained to ensure the normal operation of the device.

10. Electrical Characteristics

10.1. DC Characteristics

Ta = +25 ˚C

Table 5 DC Characteristics

Item	Symbol	Test Condition	Min	Typ.	Max	Unit
Power Consumption Current	I_{DC}	V_{DD} = 3.6 V	-	50	200	μA

10.2. AC Characteristics

Ta = +25 ˚C, V_{DD} = 3.0 to 3.6 V, V_{IH} = 3.3 V, V_{IL} = 0 V

Table 6 AC Characteristics

Item	Symbol	Test Condition	Min	Typ.	Max	Unit
Switching time	T_{sw}	50 % CTRL to 10 % or 90 % of final value of RF signal	-	750	1500	ns

11. RF Characteristics1

Ta = +25 °C, V_{DD} = 3.0 to 3.6 V, V_{IH} = 3.3 V, V_{IL} = 0 V, Z_s = Z_l = 50 Ω, CW signal

Table 7 RF Characteristics1

Item	Symbol	Path	Test Condition	Min	Typ.	Max	Unit
Insertion loss	IL	RFC to RFX	0.7 to 3 GHz	-	0.5	0.7	dB
		RFC to RFX	3 to 5 GHz	-	0.6	0.9	dB
Isolation	ISO	RFC to RFX	0.7 to 3 GHz	45	50	-	dB
		RFC to RFX	3 to 5 GHz	41	46	-	dB
VSWR	VSWR	VSWR of RFX	0.7 to 5 GHz, RF1/2 ON-State	-	1.2	1.4	-
Input 1dB compression	IP1dB	RFC to RFX	at 2.6 GHz, Duty ratio 5 %	38.5	47.0	-	dBm
Input IP3	IIP3	RFC to RFX	2.6 GHz, 24 dBm	66.5	74.0	-	dBm
Input IP2	IIP2	RFC to RFX	2.6 GHz, 24 dBm	119	128	-	dBm

12. RF Characteristics2

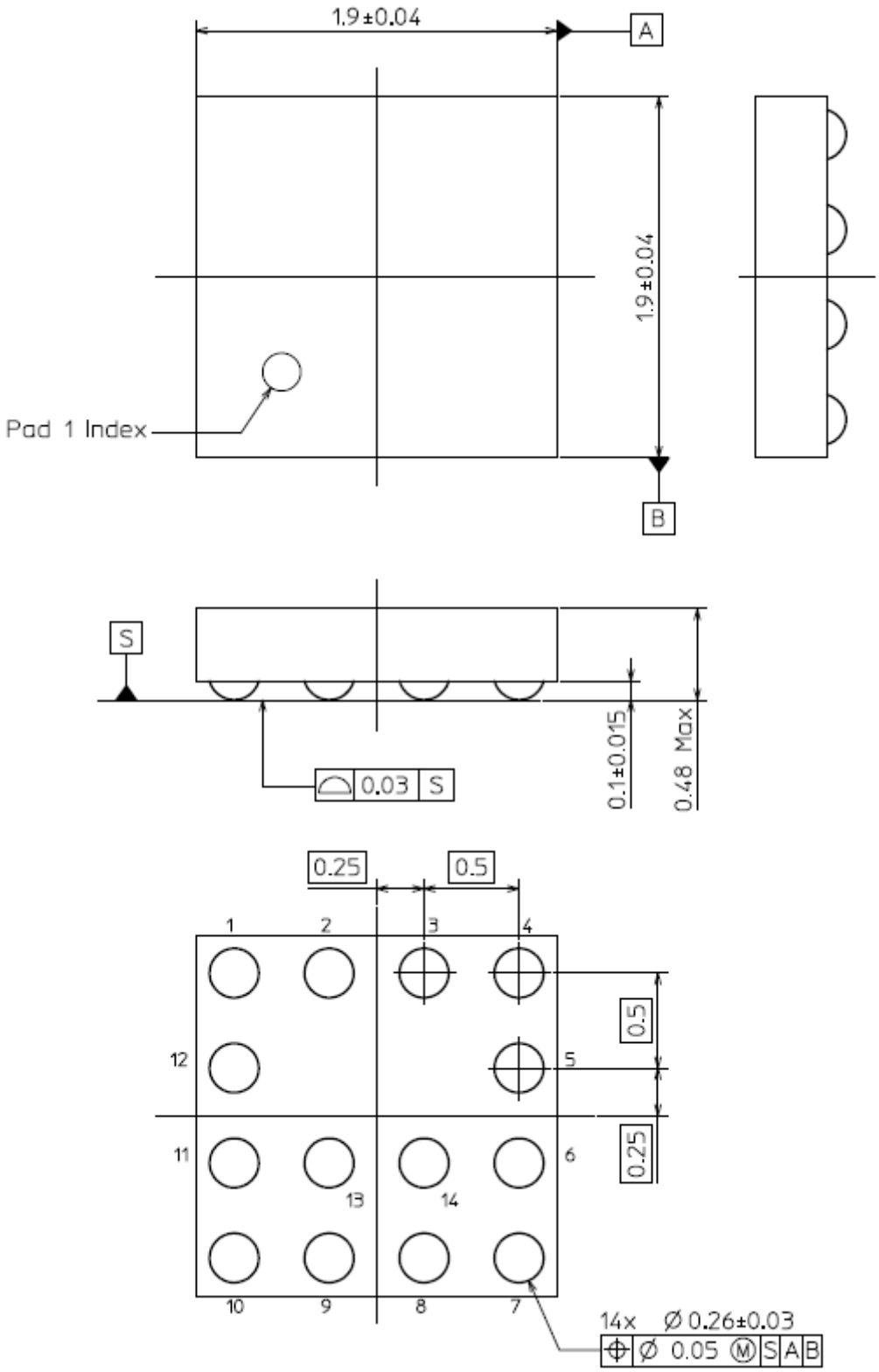
Tc = -40 to +95 °C, V_{DD} = 3.0 to 3.6 V, V_{IH} = 3.3 V, V_{IL} = 0 V, Z_s = Z_l = 50 Ω, CW signal

Table 8 RF Characteristics2

Item	Symbol	Path	Test Condition	Min	Typ.	Max	Unit
Insertion loss	IL	RFC to RFX	0.7 to 3 GHz	-	-	0.8	dB
		RFC to RFX	3 to 5 GHz	-	-	1.0	dB
Isolation	ISO	RFC to RFX	0.7 to 3 GHz	43	-	-	dB
		RFC to RFX	3 to 5 GHz	39	-	-	dB
VSWR	VSWR	VSWR of RFX	0.7 to 5 GHz, RF1/2 ON-State	-	-	1.5	-
Input 1dB compression	IP1dB	RFC to RFX	at 2.6 GHz, Duty ratio 5 %	38	-	-	dBm
Input IP3	IIP3	RFC to RFX	2.6 GHz, 24 dBm	65	-	-	dBm
Input IP2	IIP2	RFC to RFX	2.6 GHz, 24 dBm	116	-	-	dBm

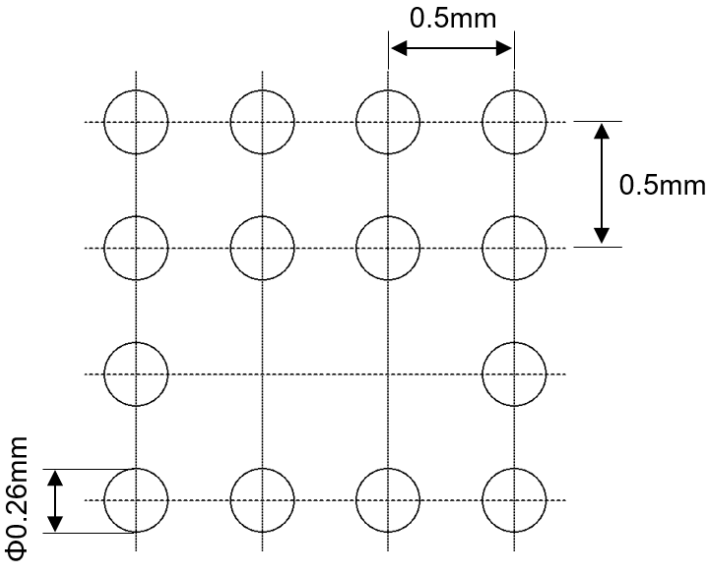
13. Packaging Dimensions

Unit : mm



Weight: 3.3 mg (typ.)

14. Land pattern dimensions for reference only



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