

TOSHIBA GaAs Linear Integrated Circuit GaAs Monolithic

TG2403CT

1.9GHz Band TX Fronted IC

PHS, Digital Cordless Telecommunication

Features

Common Block

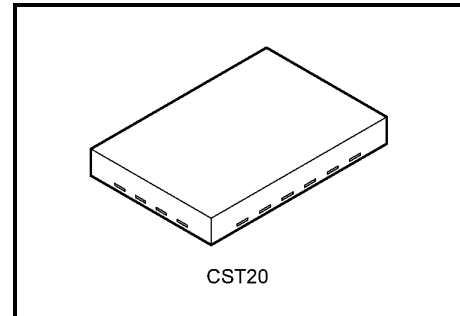
- Positive voltage operation:
VDD1 = VDD2 = VDD3 = VDD4 = 3.0 V (typ).
- Small package: CST20 (2.9 mm * 3.9 mm * 0.48 mm)

Power Amplifier Block

- High power gain: Gp = 36 dB (min)

Antenna Switch Block

- Low insertion loss: Loss = 0.5 dB (typ)
- High isolation : ISL = 25 dB (typ)



Weight: 0.020 g (typ)

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Supply voltage	VDD (Note1)	5	V
	VGG (Note2)	4	V
	VC (Note3)	3.65	V
Input power	Pin (PA Block)	1	mW
Power dissipation	Pd (Note4)	1.2	W
Operating temperature range	Topr	-40 to +85	°C
Storage temperature range	Tstg	-55 to +150	°C

Note1: VDD = VDD1 = VDD2 = VDD3 = VDD4 = VDD (SW)

Note2: VGG = VGG3 = VGG4

Note3: VC = VC1 = VC2

Note4: When mounted on a 30 mm * 35 mm * 0.4 mm FR4 substrate at Ta = 25 °C. (double-sided substrate: the reverse side is the ground connection.)

Caution

This product is a lead free article.

This device is sensitive to electrostatic discharge. When handling this product, ensure that the environment is protected against electrostatic discharge by using an earth strap, a conductive mat and an ionizer.

Electrical Characteristics

[Power Amplifier Block]

VDD1 = VDD2 = VDD3 = VDD4 = 3 V, VGG = (Note5), f = 1.92 GHz, Ta = 25°C, Zg = Zl = 50 Ω

[Antenna Switch Block]

VDD (SW) = 3 V, f = 1.92 GHz, Ta = 25°C

Characteristic	Symbol	Test condition	Min	Typ	Max	Unit
Operating frequency	f	—	1.884	—	1.920	GHz
Gate current (PA)	IGG	VGG = 0 V - 2 V	—	—	5.0	mA
Supply current (PA)	IT (Note7)	Pout = 20.5 dBmW, Pin = adjust	—	150	180	mA
Power gain	Gp		36	40	—	dB
Adjacent channel leakage power ratio	ACPR1	Δf = 600 kHz	—	—	-55	dB
	ACPR2	Δf = 900 kHz	—	—	-60	dB
Harmonics	2fo		—	—	-30	dB
	3fo		—	—	-30	dB
Output deviation	ΔPo	f = 1884, 1920 MHz, Pin = fixed	—	0.5	1.5	dB
Input VSWR	VSWRin	Pin = -30 dBmW	—	—	3.0	—
Load mismatch	—	VDD3,4 = 4.2 V, VGG per rank Pout = 20.5 dBmW, Pin = adjust, Zg = 50 Ω VSWR Load = 6:1 all phases (Note8)	No degradation			—
Stability	—	VDD3,4 = 2.7 to 4.2 V, VGG per rank Pin = -15 dBmW to -10 dBmW, Zg = 50 Ω VSWR Load = 6:1 all phases (Note8)	No spurious			—
Supply current (SW)	IDD	VC1 = 3 V, VC2 = 0 V or VC1 = 0 V, VC2 = 3 V	—	—	0.04	mA
Control current	IC1	VC1 = 3 V, VC2 = 0 V	—	—	0.04	mA
	IC2	VC1 = 0 V, VC2 = 3 V	—	—	0.04	mA
Insertion Loss	Loss	VC1 = 0 V, VC2 = 3 V, Pin = 0 dBmW ANT to Rx	—	0.5	1.0	dB
Isolation	ISL	VC1 = 3 V, VC2 = 0 V, Pout = 20.5 dBmW Tx to Rx	—	25	—	dB
		VC1 = 0 V, VC2 = 3 V, Pin = 0 dBmW ANT to Tx	—	15	—	dB

Note5: Be sure to adjust the VGG to the VGG value correspondent to the VGG rank code indicated on the reel. The VGG rank code is defined in the following table. Product orders for particular ranks cannot be accepted.

Rank Code	VGG Value (V)
000	0.0
010	1.0
020	2.0

Note6: Po in this datasheet includes insertion loss of ANT-SW.

Note7: IT does not include IGG.

Note8: The load condition of the STABILITY TEST and LOAD MISMATCH TEST is formed with SHORT STAB connected to ANT (Pin No.9) and adjusted to all phases.

Note9: All tests for ELECTRICAL CHARACTERISTICS are measured with the following "TEST BOARD".

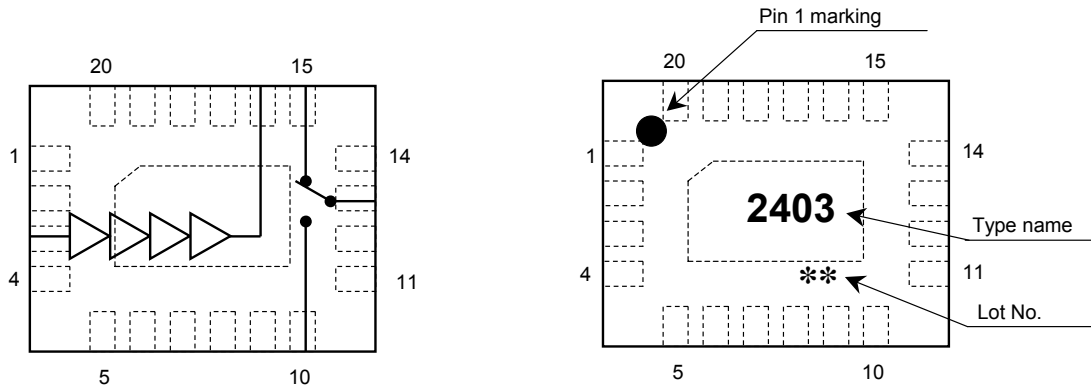
Note10: Input signal is modulated to π/4QPSK (α = 0.5). Bit rate is 384 kbps.

Note11: 1/2 duty operation.

Truth Table of ANT-SW

VDD (SW)	VC1	VC2	Tx	Rx
3 V	3 V	0 V	ON	OFF
3 V	0 V	3 V	OFF	ON

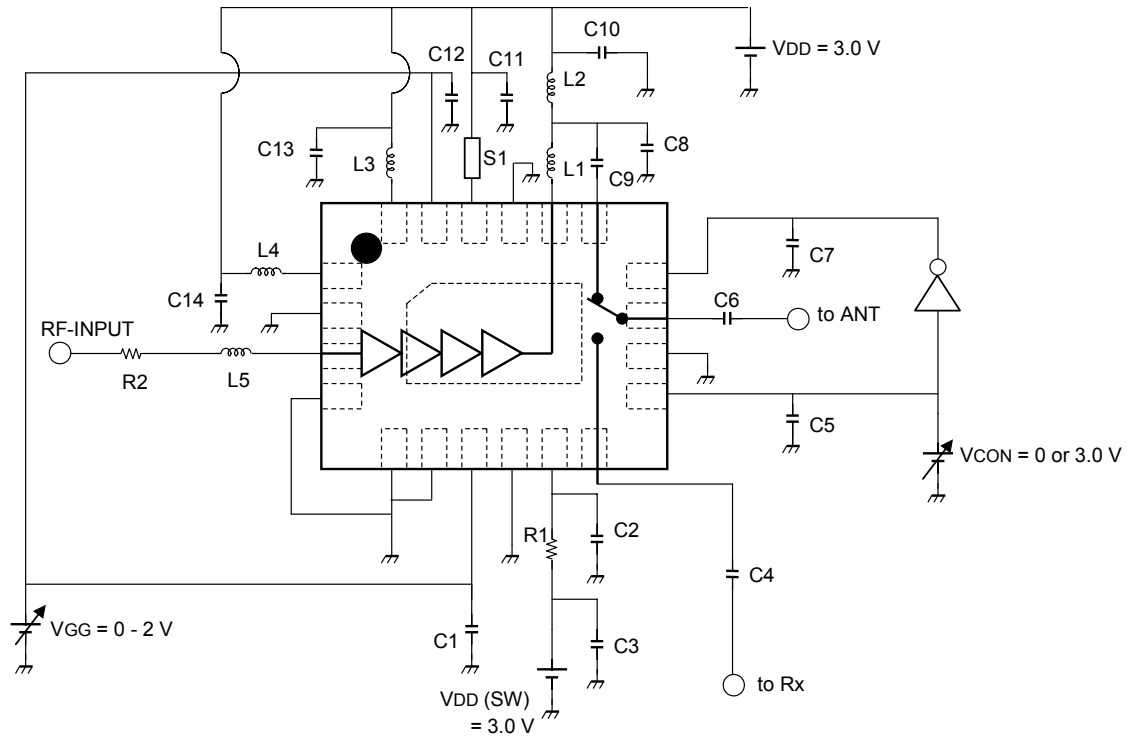
Block Diagram, Marking (Top view)



Pin Assignment and Comments

Number of pin	Name of pin	function and comment
1	VDD1	Supply pin of PA.
2	GND	Ground.
3	Pin	RF input. DC blocking capacitor is built-in.
4	NC	Not connected to the pellet. Please connect to GND pattern.
5	GND	Ground.
6	GND	Ground.
7	VGG4	Gate voltage input pin of PA.
8	GND	Ground.
9	VDD (SW)	Supply pin of ANT-SW.
10	Rx	Rx pin of ANT-SW. Please connect to receiver IC via external DC blocking capacitor.
11	VC2	Control pin of ANT-SW.
12	GND	Ground.
13	ANT	ANT pin of ANT-SW. External DC blocking capacitor is necessary.
14	VC1	Control pin of ANT-SW.
15	Tx	Tx pin of ANT-SW. External DC blocking capacitor is necessary.
16	VDD4	Supply pin and RF output pin of PA. Please connect to Tx pin via RF matching circuit.
17	GND	Ground.
18	VDD3	Supply pin of PA.
19	VGG3	Gate voltage input pin of PA.
20	VDD2	Supply pin of PA.
21	GND_Bed	Ground. This pin also works as heat dissipation pin.

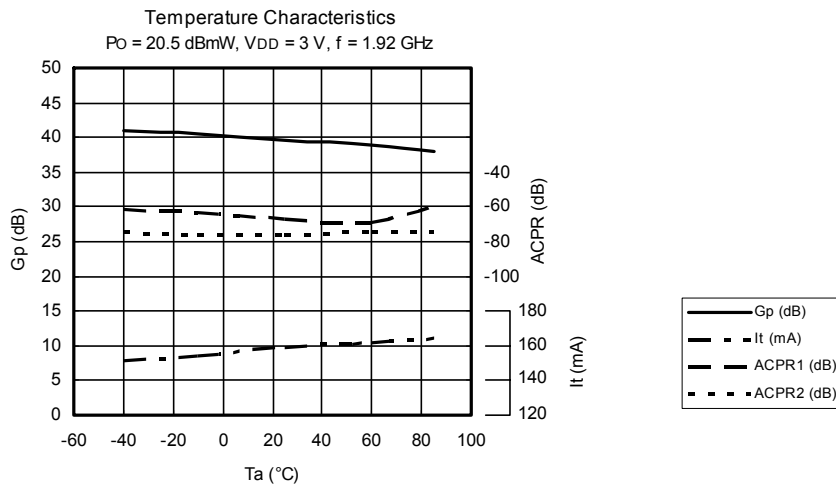
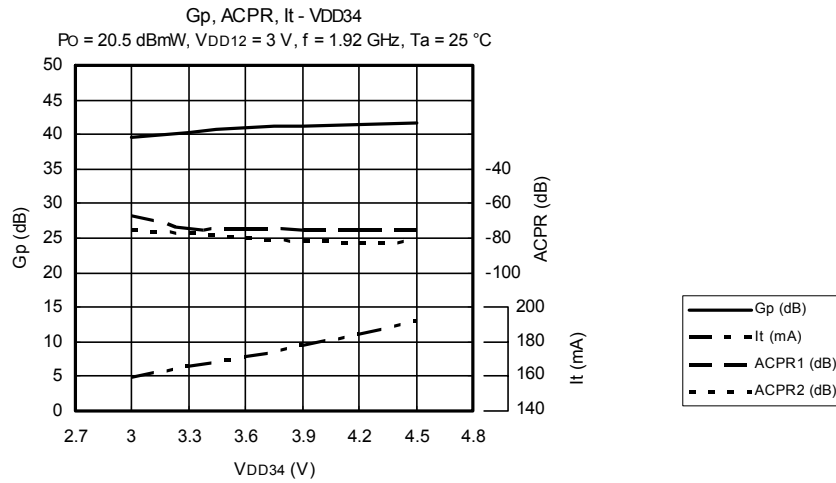
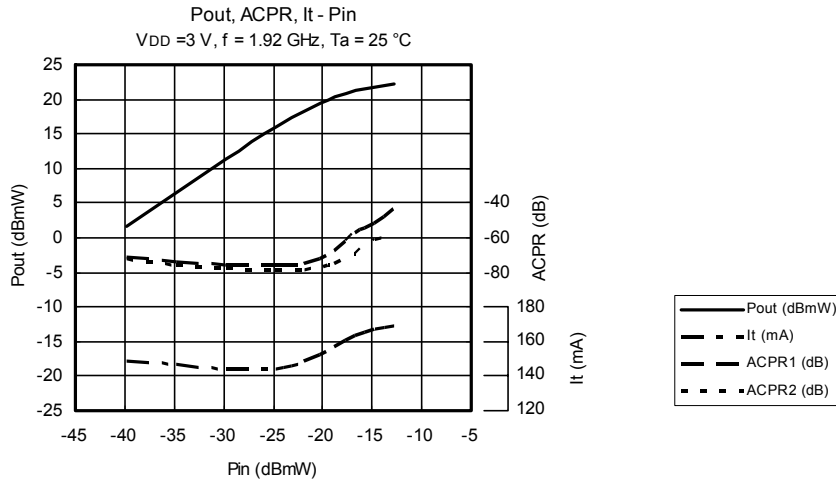
Typical Application Circuit (TEST BOARD)



Comment of external chip parts

Parts Number	Value	Chip parts series	Manufacturer	Comment
C1	1000 pF	GRM36 series	MURATA	Decoupling capacitor
C2	4 pF	GRM36 series	MURATA	Decoupling capacitor of ANT-SW
C3	0.1 uF	GRM36 series	MURATA	Decoupling capacitor
C4	100 pF	GRM36 series	MURATA	DC block capacitor
C5	1000 pF	GRM36 series	MURATA	Decoupling capacitor
C6	100 pF	GRM36 series	MURATA	DC block capacitor
C7	1000 pF	GRM36 series	MURATA	Decoupling capacitor
C8	1.5 pF	GRM36 series	MURATA	PA output matching
C9	10 pF	GRM36 series	MURATA	PA output matching and DC block capacitor
C10	0.1 uF	GRM36 series	MURATA	Decoupling capacitor
C11	0.1 uF	GRM36 series	MURATA	Decoupling capacitor
C12	1000 pF	GRM36 series	MURATA	Decoupling capacitor
C13	0.1 uF	GRM36 series	MURATA	Decoupling capacitor
C14	0.1 uF	GRM36 series	MURATA	Decoupling capacitor
L1	1.5 nH	LQG15 series	MURATA	PA output matching
L2	18 nH	LQG15 series	MURATA	PA output matching
L3	3.9 nH	LQG15 series	MURATA	PA matching
L4	4.7 nH	LQG15 series	MURATA	PA matching
L5	7.5 nH	LQG15 series	MURATA	PA input matching
R1	3.9 kΩ	MCR01 series	ROHM	RF block resistor
R2	24 Ω	MCR01 series	ROHM	PA input matching
S1	-	-	-	Micro-strip line (length = 6 mm, width = 0.25 mm)

Typical Operating Characteristics (Curve Data)



Notice

The circuits and measurements contained in this document are given only in the context of examples of applications for these products.

Moreover, these example application circuits are not intended for mass production since the high-frequency characteristics (the AC characteristics) of these devices will be affected by the external components the customer uses, by the design of the circuit and by various other conditions.

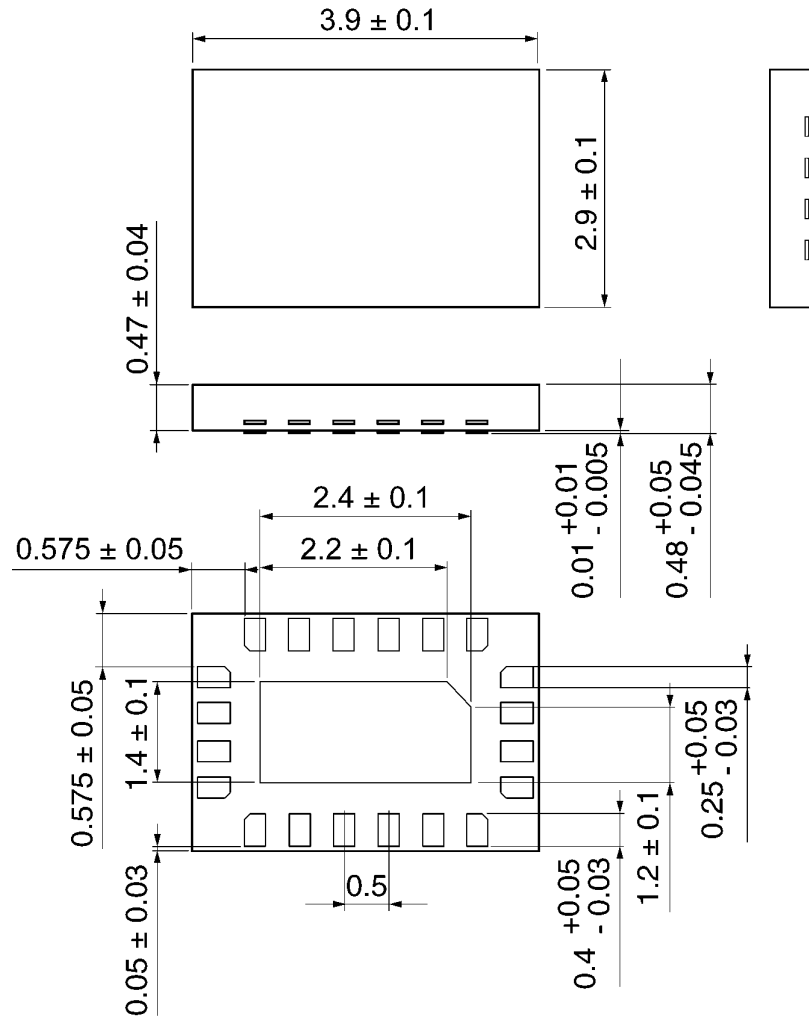
It is the responsibility of the customer to design external circuits that correctly implement the intended application, and to check the characteristics of the design.

TOSHIBA assume no responsibility for the integrity of customer circuit designs or applications.

Package Dimensions

CST20

Unit: mm



Weight: 0.020 g (Typ)

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