CAN1630G SPDT Switch

Datasheet

Rev 1.2 April, 2019

This datasheet is intended for customer's evaluation and application of the CAN1630G device. Under no circumstances it should be circulated outside the customer's company. This datasheet is preliminary and CanaanTek reserves the right to modify and to improve the data.

PRODUCT DESCRIPTION

CAN1630G is a single pole, dual-throw (SPDT) LTE MMMB transmit/receive switch. Switching is controlled by an integrated GPIO interface with a single control pin. Depending on the logic voltage level applied to the logic control pin, the antenna port is connected to one of the switched RF ports (RF1 or RF2) through a low insertion loss path, while the path between the antenna port and the other RF port is in a high isolation high impedance state.

No external DC blocking capacitors are required as long as no DC voltage is applied to RF ports.

The CAN1630G is manufactured using a state-of-the-art Silicon-On-Insulator (SOI) process and is provided in a compact 1.1 x 0.7 x 0.45 mm, 6-pin surface mount Dual Flat No-Lead (DFN) package.

A functional block diagram is shown in

Table 1. CAN1630G Signal Descriptions

Pin#	Name	Description	Pin#	Name	Description
1	RF2	RF I/O, throw 2	4	VDD	Voltage supply
2	GND	Ground	5	ANT	RF I/O, switch pole
3	RF1	RF I/O, throw 1	6	VCTL[1]	Switch control line

Note 1: If VDD is powered down, VCTL should be low level.

Electrical and Mechanical Specifications

The absolute maximum ratings of the CAN1630G are provided in Table 2.

Electrical specifications are provided in Table 3.

The state of the CAN1630G is determined by the logic provided in Table 4.

Table 2. CAN1630G Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Unit
Supply voltage	VDD	1.6	5.0	V
Digital control voltage	VCTL	0.0	3.3	V
RF input power	P_{IN}		35	dBm
Supply ripple	V_{PP}		20	mV_{PP}
Operating temperature	T_{OP}	-40	+85	℃
Storage temperature	T_{STG}	-55	+150	℃

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 1 0 0f3/F2 9.96 Tf1 0 0 1 dr369.850.45 69.384

Table 3. CAN1630G Electrical Specifications (Note 1)

(V_{DD} = 2.85V, T_{OP} = +27 °C, Characteristic Impedance [Z_O] = 50 Ω, Unless Otherwise Specified)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
DC Specifications						
Supply voltage	VDD		1.60	2.85	4.5	V
Control voltage: Low High	 VCTL_L VCTL_H		 0 1.20	 0 1.80	 0.40 VDD	 V V
Current on VCTL pin	I_CTL				5	µA
Supply current	IDD	VDD = 2.85 V, VCTL = VCTL_H		35	60	µA
RF path switching time	tSW	Measured from VCTL_HIGH minimum or VCTL_LOW maximum to RF output power ± 1 dB (Note 2), PIN = +26 dBm, T_{OP} = -10 °C to +85 °C.		1	3	µs
RF Specifications						
Insertion loss (RF1 or RF2 to ANT pin)	IL	0.1 to 1.0 GHz 1.0 to 2.2 GHz 2.2 to 2.7 GHz		0.30 0.35 0.37	0.50 0.55 0.60	dB dB dB
Isolation from any active port to any other port	Iso	0.1 to 1.0 GHz 1.0 to 2.2 GHz 2.2 to 2.7 GHz	30 28 20	35 33 25		dB dB dB
0.1 dB Input Compression Point	P0.1dB	VDD=2.85V		34.5		dBm
Voltage Standing Wave Ratio, all ports	VSWR	Referenced to 50 Ω,0.1 to 2.7 GHz		1.2:1	1.5:1	-
Harmonic RF1 or RF2 to ANT	Harm	fo = 0.1 to 2.7 GHz, PIN = +26 dBm, VSWR = 2.5:1		-65	-55	dBm

Note 1:

Table 4. CAN1630G Truth Table

State	Active Path	VCTL (Pin 6)
0		

Timing Requirements

It is important that the user adheres to the correct timing sequences in order to avoid leakage power consumption.

1. VDD and VCTL cannot be powered on and off independently from one another. During power on sequence, the user must power up VDD first, then power up VCTL. During power off sequence, the user must power off VCTL first, then power off VDD. In the state of VDD=OFF(0 V) and VCTL=ON(1.8V), it may cause leakage power consumption as ESD protection circuit inside the switch.

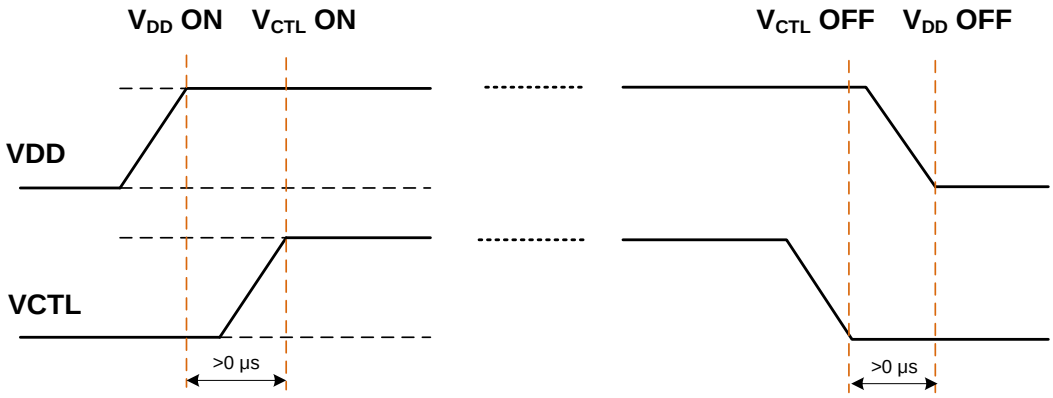


Figure 4. Allowable Power On Sequences

2. VDD and VCTL must be on for a minimum of 15us before applying RF power.

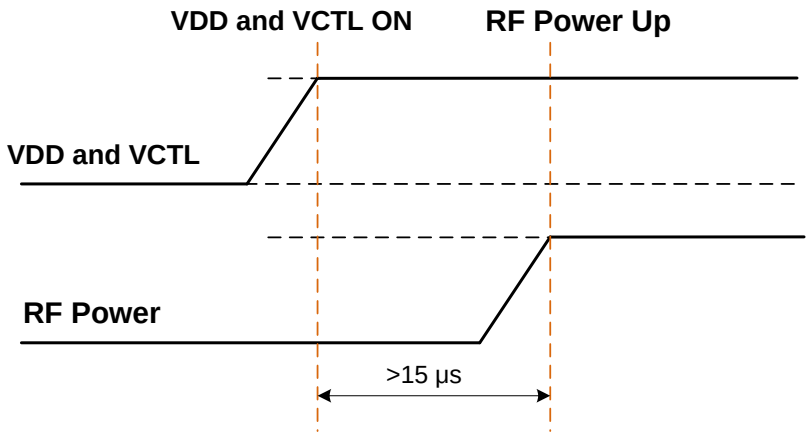


Figure 5. RF Power-Up Detail

Switch Model for RF ON/OFF state

Please note that Switch model for RF1 ON and RF2 ON as the following.

Refer to the Figure 6, when RF1 ON, RF1 port and ANT port will be connected directly in short circuit, while RF2 port will be connected to the Ground through internal switch, so it should avoid DC level applied on RF2 port.

Refer to the Figure 7, it's vise versa for RF2 ON.

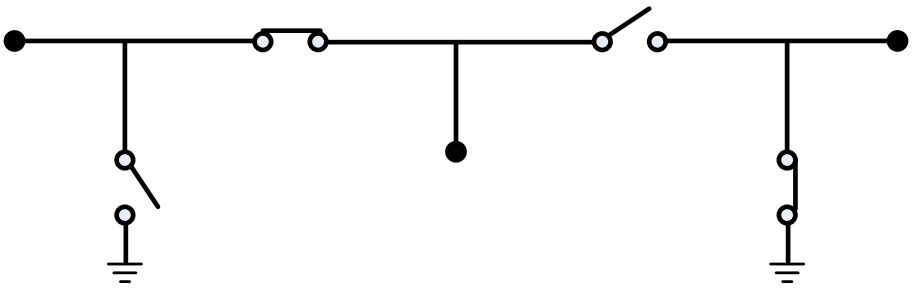


Figure 6. Switch model with RF1 ON

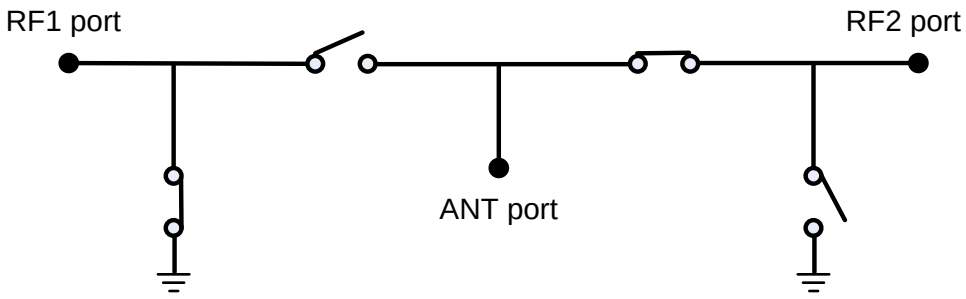
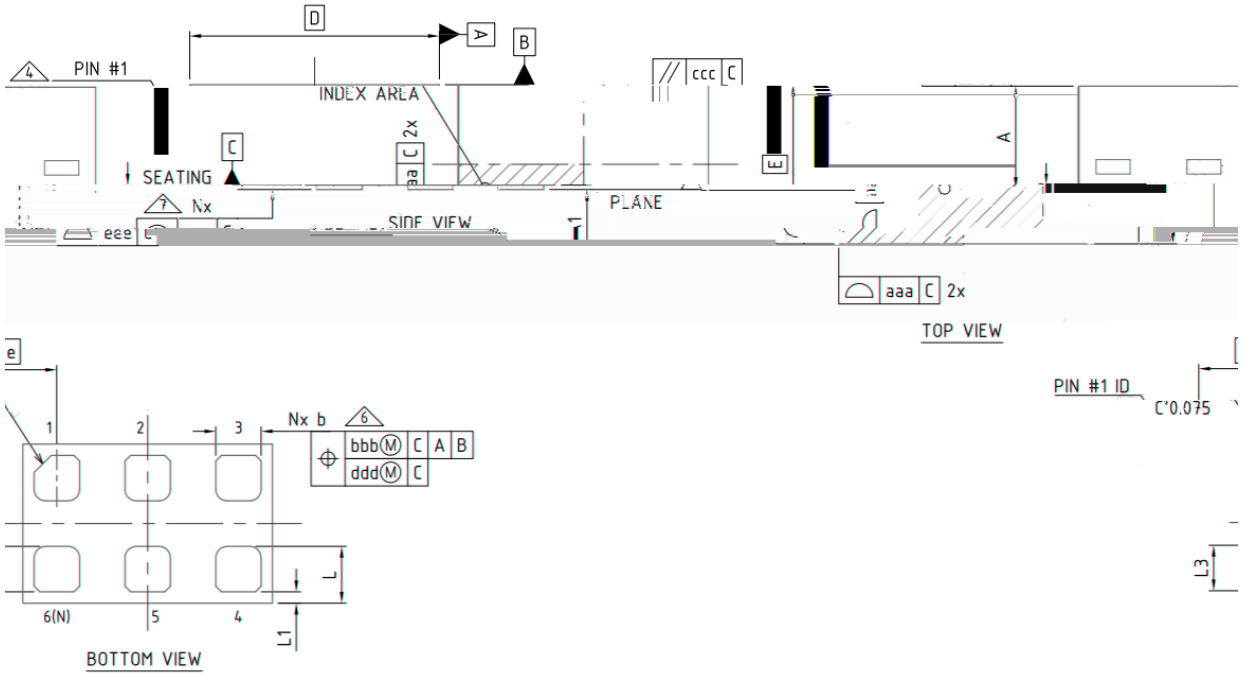


Figure 7. Switch model with RF2 ON

Package Dimensions

Package dimensions for the CAN1630G are shown in Figure 5.



	MILLMETER		
SYMBOL	MIN	NOR	MAX
A	0.41	0.45	0.50
A1			

Figure 8. CAN1630G Package Dimensions

PCB Metal, Solder, and Stencil Patterns

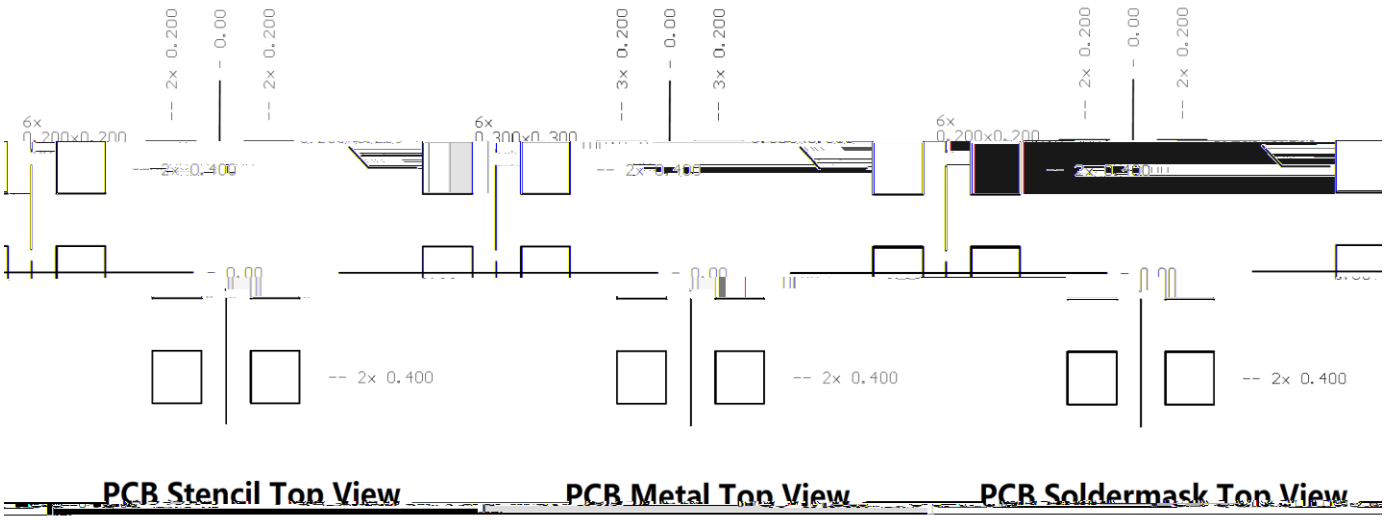


Figure 9. CAN1630G PCB Metal, Solder, and Stencil Patterns

Package and Handling Information

Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

THE CAN1630G is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It can be used for lead or lead-free soldering.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.

Revision History

Revision	Comments
Rev1.0	First Draft
Rev 1.1	Add PCB Metal, Solder, and Stencil Patterns
Rev 1.2	Add timing requirement, RF ON/OFF model description and Typo correct