CAN1628T SP3T Switch

Product Datasheet

Rev 1.0 July, 2018

This datasheet is intended for customer's evaluation and application of the CAN1628T 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

CAN1628T is a CMOS silicon-on-insulator (SOI), single-pole, triple-throw (SP3T) switch. The high linearity performance and low insertion loss makes the device an ideal choice for both the SGLTE and CSFB 4G LTE handsets applications.

The CAN1628T SP3T switch is provided in a compact Quad Flat No-Lead (QFN) 1.1 x 1.1 mm package.

A functional block diagram is shown in Figure 1. The pin configuration and package are shown in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.

FEATURES

- Broadband frequency range: 0.1 to 3.0GHz
- Low insertion loss: 0.46 dB @ 2.7 GHz
- High isolation: 25 dB up to 2.7 GHz
- No external DC blocking capacitors required
- Positive low voltage control: VCTL = 1.30 to 3.30 V, VDD = 2.5 to 5.0 V
- HBM ESD exceeds 2kV in all ports
- Small, QFN (9-pin, 1.1 x 1.1 mm) package (MSL1, 260 °C per JEDEC J-STD-020)

APPLICATIONS

- 4G LTE bands and PA mode switching
- Antenna switch for multimode systems

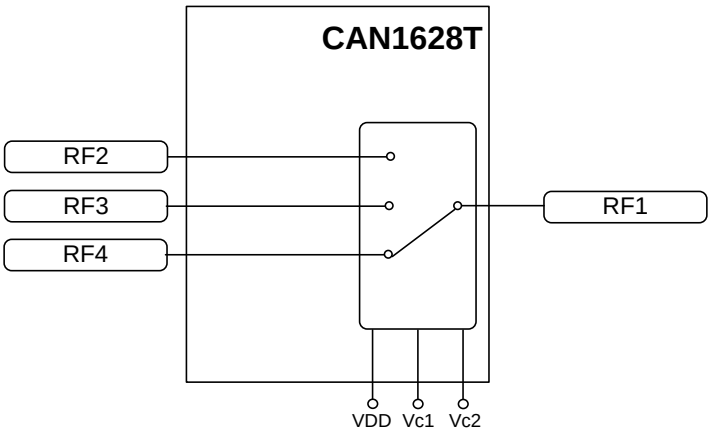


Figure 1. CAN1628T Block Diagram

(QFN Top View)

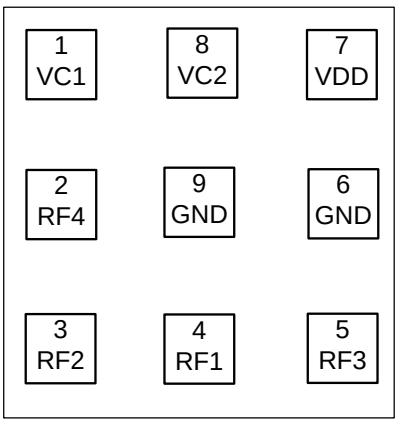


Figure 2. CAN1628T Pin out – 9-Pin QFN

Table 1. CAN1628T Signal Pin Descriptions

Pin	Name	Description
1	VC1	Switch logic control input
2	RF4	RF port
3	RF2	RF port
4	RF1	Antenna (Common port)
5	RF3	RF port
6	GND	Ground
7	VDD	Supply Voltage
8	VC2	Switch logic control input
9	GND	Ground

Note: Exposed pad must be grounded.

Functional Description

The CAN1628T includes an internal negative voltage generator and decoder that eliminate the need for external DC blocking capacitors on the RF ports. No external components are required for proper operation. DC decoupling capacitors may be added on the VDD and control lines if necessary.

Switching is controlled by two control voltage inputs, VC1 and VC2. Depending on the logic voltage level applied to the control pins, the RF1 (RF common) pin is connected to one of three switched RF outputs (RF2, RF3, or RF4) through a low insertion path, while the path between the RF1 pin and the other RF pins is in a high isolation state.

Electrical and Mechanical Specifications

The absolute maximum ratings of the CAN1628T are provided in Table 2. Electrical specifications are provided in Table 3.

The state of the CAN1628T is determined by the logic provided in Table 4.

Table 2. CAN1628T Absolute Maximum Ratings (Note 1)

	Symbol	Minimum	Maximum	Units
Supply voltage	V_{DD}	2.5	5.0	V
Control voltage (Note 2)	V_{CTL}	1.30	3.30	V
Input power	P_{IN}		+36	dBm
Storage temperature	T_{STG}	-40	+125	℃
Operating temperature	T_{OP}	-40	+85	℃
Electrostatic Discharge: Human Body Model (HBM), Class 2	ESD	2000		V

Note1: 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 below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

Note 2: Any bias voltage applied to the VC1, VC2 pins may damage the device if there is no bias voltage also present on the VDD pin. Maximum control voltage cannot exceed VDD.

CAUTION: Although this device is designed to be as robust as possible, Electrostatic Discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

Table 3. CAN1628T Electrical Specifications (Note 1)

(VDD = 2.85 V, VC1 = VC2 = 1.8V, TOP = +25 °C, PIN = 0 dBm, Characteristic Impedance [Z0] = 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
RF Specifications						
Insertion loss	IL	0.8 to 1.0 GHz 1.0 to 2.2 GHz 2.2 to 3.0 GHz		0.36 0.40 0.46	0.56 0.60 0.70	dB dB dB
Isolation	ISO	0.8 to 1.0 GHz 1.0 to 2.2 GHz 2.2 to 3.0 GHz	28 24 20	35 29 25		dB dB dB
Return loss	|S11|	0.8 to 3.0 GHz	18	23		dB
Input 0.1 dB compression point	$P_{0.1dB}$	0.8 to 3.0 GHz, RF1 to RF2, RF3 and RF4		+34		dBm
2nd harmonic	2fo	0.8 to 3.0 GHz, PIN = +26 dBm		+88		dBc
3rd harmonic	3fo	0.8 to 3.0 GHz, PIN = +26 dBm		+83		dBc
Switching rise time		10/90% RF		250		ns
Switching fall time		90/10% RF		250		ns
Switching on time		50% VCTL to 10/90% RF		1500		ns
Switching off time		50% VCTL to 90/10% RF		1500		ns
Startup time		Shutdown state to any RF switch state		20		µs
DC Specifications						
Control voltage: High Low	 V_{CTL}_HIGH V_{CTL}_LOW		 1.30 0	 1.80 	 3.30 (Note2) 0.4	 V V
Supply voltage	V_{DD}		2.5	2.85	5.0	V
Supply current	I_{DD}			65		µA
Control current	Ictl	V1 = V2 = 1.8 V		1		µA
Shutdown mode supply current	Ioff	V_{DD} = 2.85V, V1 = V2 = 0 V		10		µA

Note1: Performance is guaranteed only under the conditions listed in this Table.

Note 2: Control voltage should not exceed supply voltage.

Table 4. CAN1628T Truth Table

Mode	VC1	VC2
RF1-RF3	0	1
RF1-RF2	1	0
RF1-RF4	1	1

Note: “1” = 1.20 to 3.30 V; “0” = 0 to 0.4 V. Any state other than described in this Table places the switch into an undefined state.

Evaluation Board Description

The CAN1628T Evaluation Board is used to test the performance of the CAN1628T SP3T Switch. The impedance of all RF traces is 50 Ω.

An Evaluation Board schematic diagram is provided in Figure 3. An assembly drawing for the Evaluation Board is shown in Figure 4.

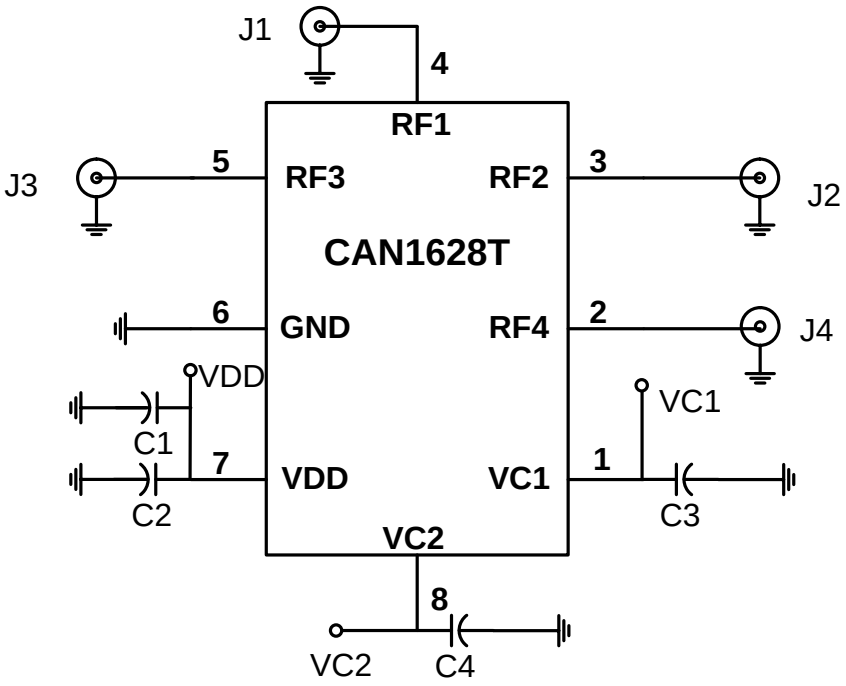


Figure 3. CAN1628T Evaluation Board Schematic

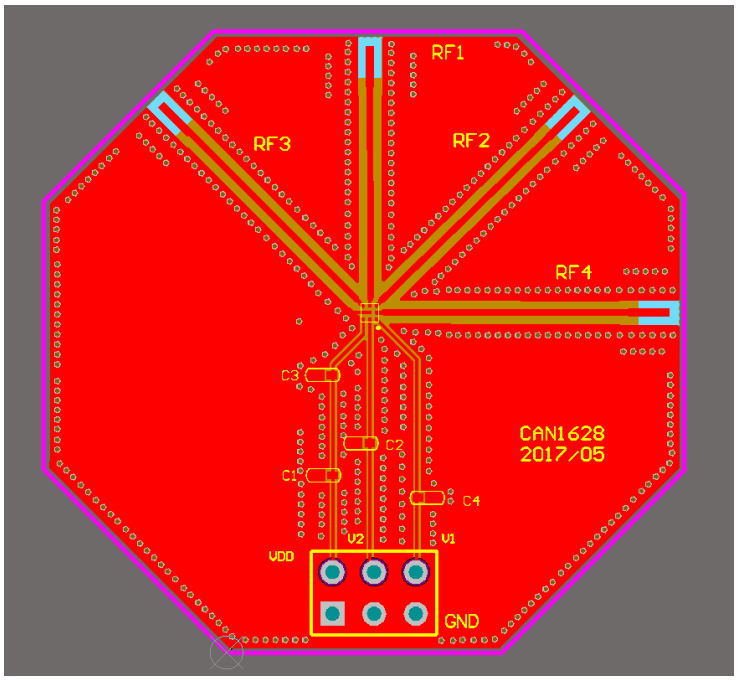
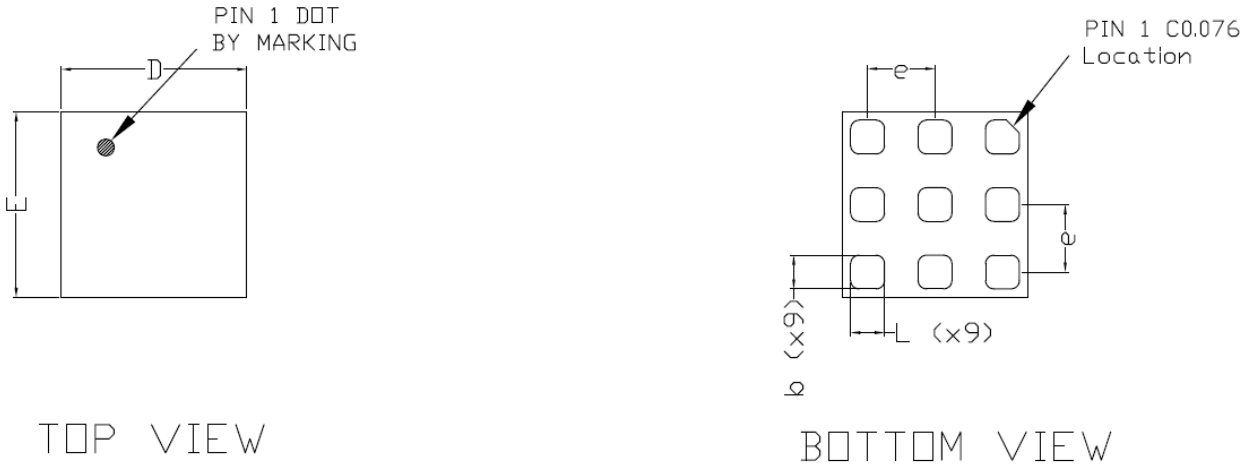


Figure 4. CAN1628T Evaluation Board Assembly Diagram

Package Dimensions

Package dimensions for the CAN1628T are shown in Figure 5.

Package Outline



COMMON DIMENSIONS(MM)			
PKG. REF.	UTULTRA THIN		
	MIN.	NOM.	MAX
A	>0.50	0.55	0.60
A1	0.00	–	0.05
A3	0.15 REF.		
D	1.05	1.10	1.15
E	1.05	1.10	1.15
L	0.150	0.200	0.250
b	0.150	0.200	0.250
e	0.40 BSC		

PCB Metal, Solder, and Stencil Patterns

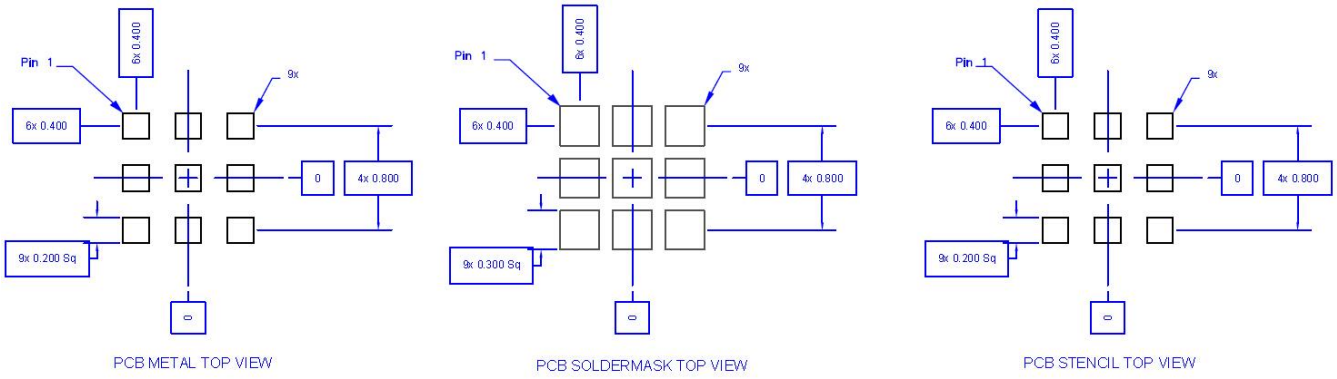


Figure 5. CAN1628T Package Dimensions

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 CAN1628T 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	Release Date	Description
Rev1.0	2018.07	First Version

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