

## 50 GHz T-FF

### Features

- Maximum operating frequency: 50 GHz
- Output amplitude: 0.9 V<sub>pp</sub>
- Single-ended clock input

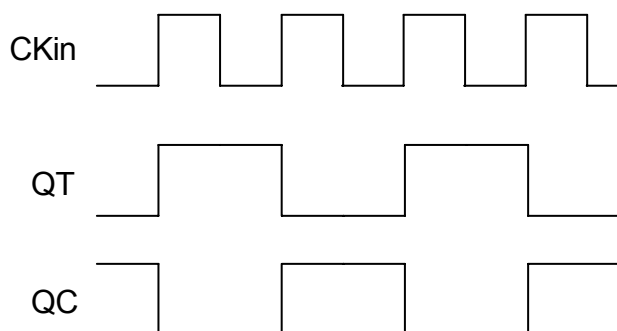
### General Description

The CI0084A is a dynamic T-type Flip Flop (T-FF) operating at rates from 20 GHz to 50 GHz. The I/O levels are SCFL (V<sub>H</sub>: 0.0 V, V<sub>L</sub>: -0.9 V). The IC is fabricated using a 0.1- $\mu$ m InP HEMT process. The CI0084A is provided in a hermetically-sealed package with V-connectors.

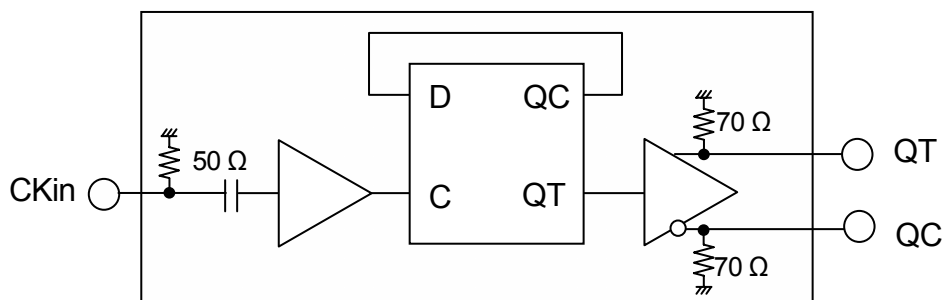
### Applications

- Frequency Divider

### Timing Chart



### Functional Diagram



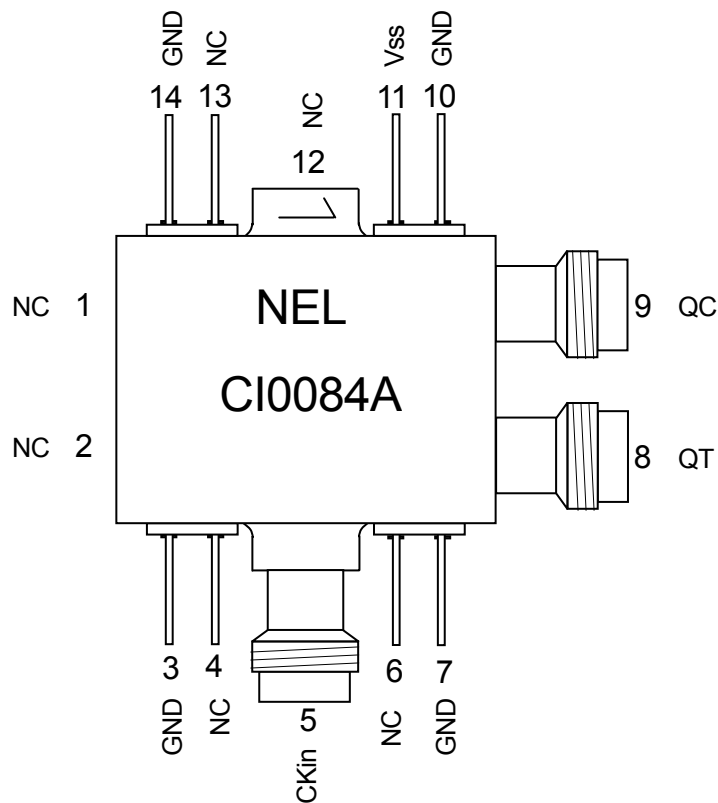
## Connection Table

No.	NAME	FUNCTION	No.	NAME	FUNCTION
1	NC	No Internal Connection	8	QT <sup>(1)</sup>	Signal Output (True)
2	NC	No Internal Connection	9	QC <sup>(1)</sup>	Signal Output (Complementary)
3	GND	Ground (0.0 V)	10	GND	Ground (0.0 V)
4	NC	No Internal Connection	11	Vss	Power Supply (-4.5 V)
5	CKin	Clock Input	12	NC	No Internal Connection
6	NC	No Internal Connection	13	NC	No Internal Connection
7	GND	Ground (0.0 V)	14	GND	Ground (0.0 V)

Note

(1) Terminate unused output connectors to GND through 50-ohm resistors.

## Connection Diagram (Top View)



## Absolute Maximum Ratings

SYMBOL	PARAMETER	RATING	UNIT
VSS	Power Supply Voltage	-5.0 to +0.1	V
Vin	Applied Voltage Amplitude at Clock Input (CKin)	1.2	Vpp
Vinck	Applied Voltage at Clock Input (CKin)	-1.2 to +1.2	V
Vout	Applied Voltage at Signal Outputs (QT, QC)	-1.5 to +0.2	V
Tstor	Storage Temperature	TBD	°C
Tc <sup>(1)</sup>	Case Temperature under Bias	TBD	°C

TBD: To Be Determined

## Recommended Operating Conditions

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
VSS	Power Supply	-4.7	-4.5	-4.3	V
CKin	Clock Input Interface	DC coupling (see DC Characteristics) or AC coupling (see AC Characteristics)			
QT, QC	Signal Output Interface	DC coupling (see DC Characteristics) , Terminate to GND through 50 Ω			

## DC Characteristics

(Vss = -4.5 V, GND = 0.0 V, Tc<sup>(1)</sup> = 30 °C)

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
ISS	Power Supply Current		240	TBD	mA
VOH	Output Voltage, High (QT, QC)	TBD	0.0		V
VOL	Output Voltage, Low (QT, QC)		-0.9	TBD	V
VIH	Input Voltage, High (CKin)	TBD	0.0		V
VIL	Input Voltage, Low (CKin)		-0.9	TBD	V

TBD: To Be Determined

Note

(1) Tc: Temperature at package base.

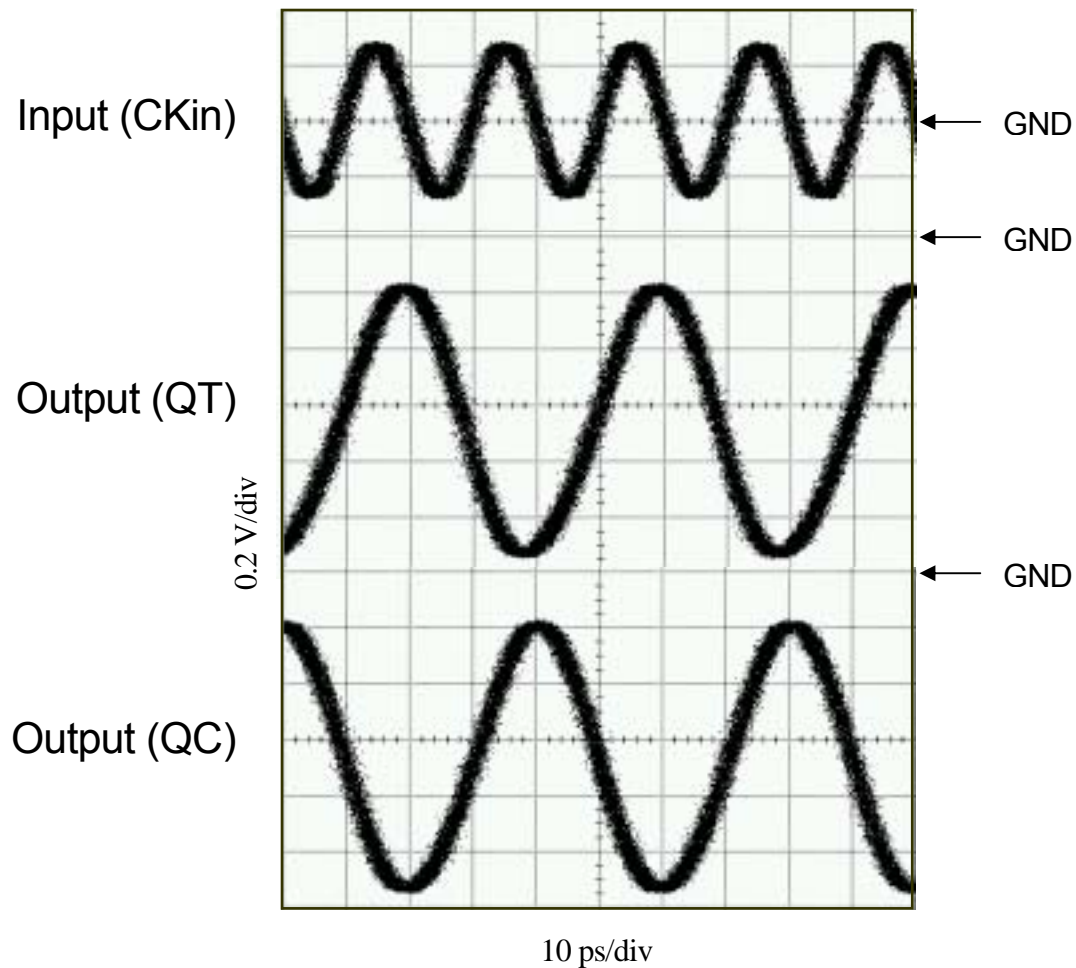
## AC Characteristics (50 GHz)

(V<sub>SS</sub> = -4.5 V, GND = 0.0 V)

SYMBOL	PARAMETER	T <sub>c</sub> =30 °C			UNIT
		MIN.	TYP.	MAX.	
V <sub>in</sub>	Clock Input Voltage Amplitude	TBD	0.9		V <sub>pp</sub>
V <sub>center</sub>	Clock Input Center Voltage	-0.5		0.5	V
f <sub>MAX</sub>	Maximum Clock Frequency	50			GHz
f <sub>MIN</sub>	Minimum Clock Frequency		20		GHz
V <sub>amp</sub>	Output Voltage Amplitude (QT, QC)	TBD	0.9		V <sub>pp</sub>
t <sub>r</sub>	Output Rise Time (QT, QC) 20 - 80%		10	TBD	ps
t <sub>f</sub>	Output Fall Time (QT, QC) 20 - 80%		10	TBD	ps

TBD: To Be Determined

**Sample Waveforms (50 GHz)**

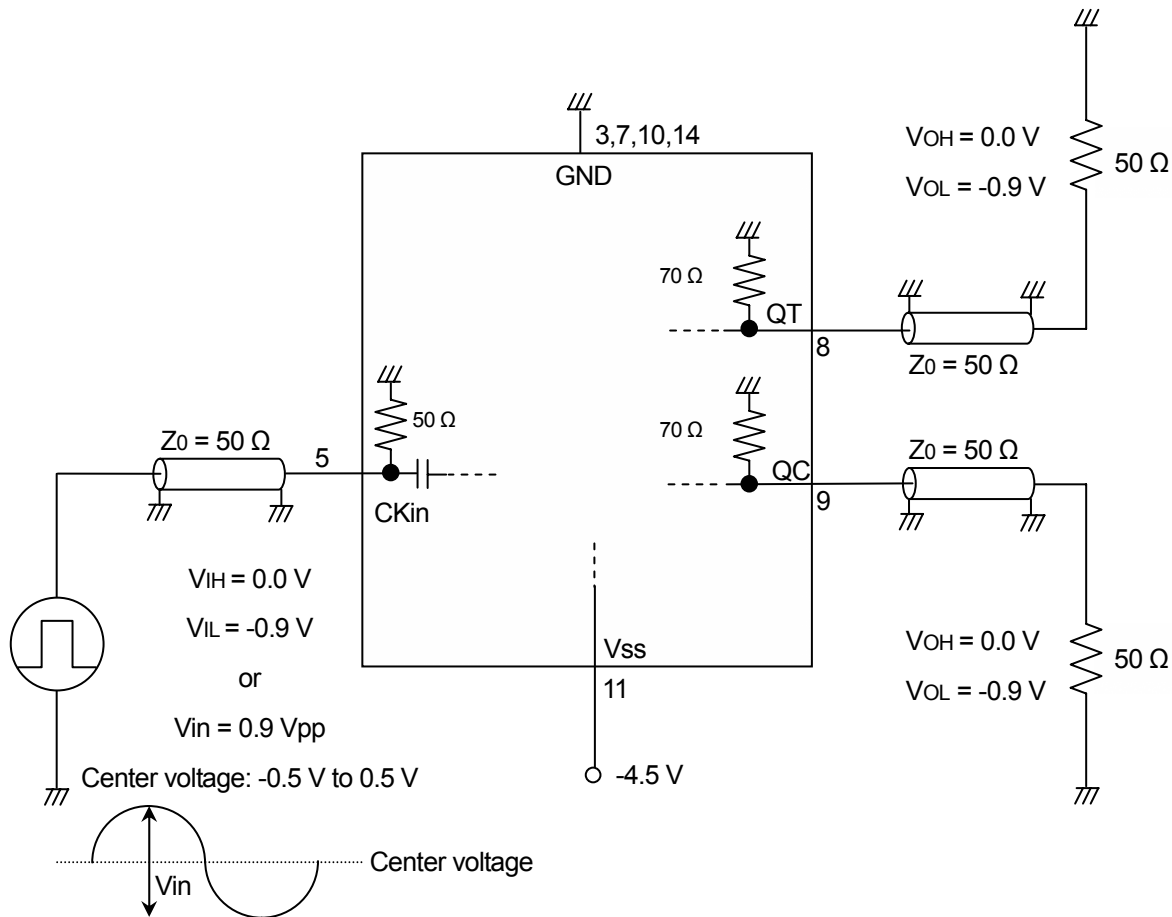


**Measurement Conditions**

V<sub>ss</sub> = -4.5 V, Input Clock: 50 GHz

## Sample Implementation

Note: Each number corresponds to a pin or a connector as shown in Connection Diagram



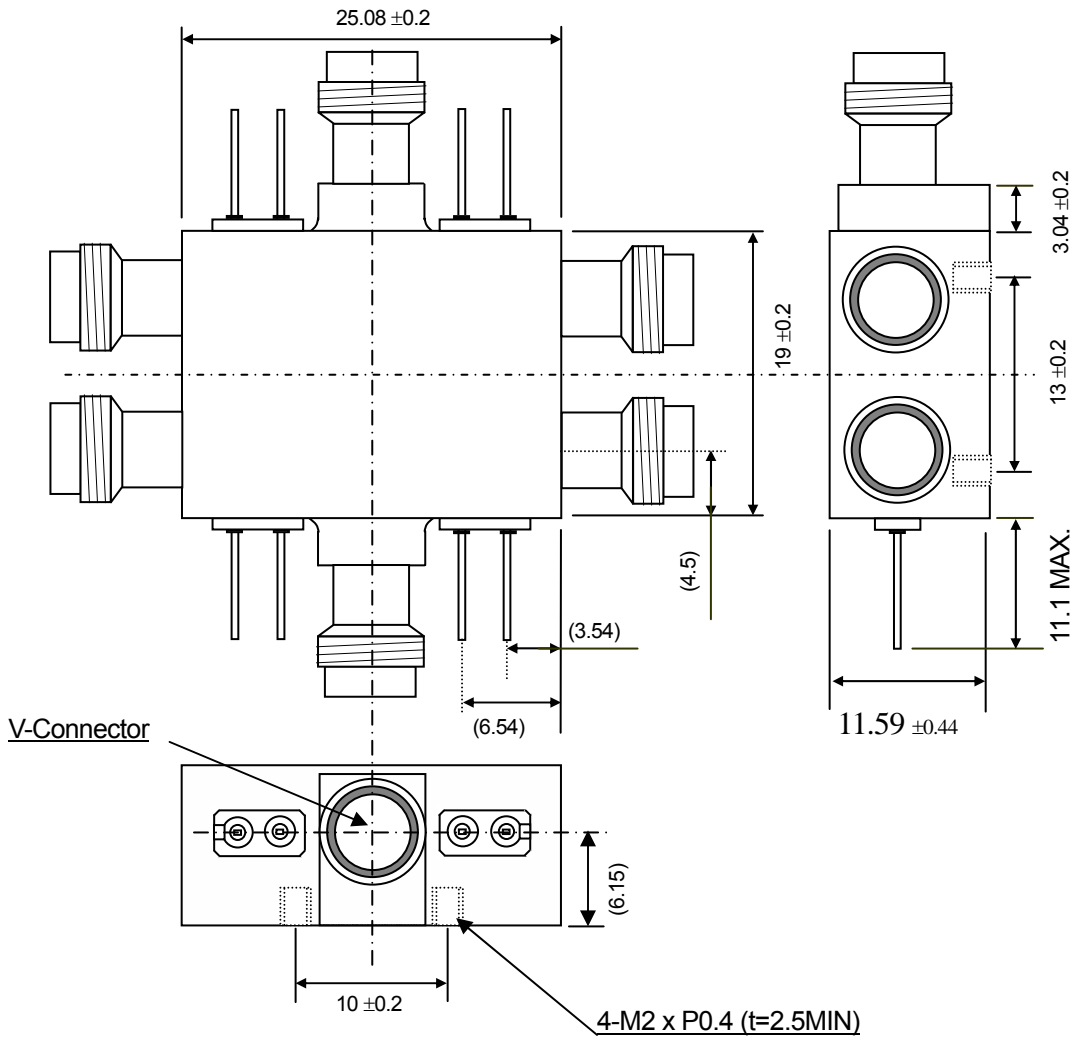
## Power Supply Sequence

- (1) When Vss is OFF, do not keep the clock input applied to the Ckin port for a certain length of time. (Approximately for over 1min.)
- (2) When Vss is ON, do not keep the device under the condition that the outputs are showing constant high or low level for a certain length of time. (Approximately for over 10min.)

### Note

Use power supplies that do not generate over-voltages such as spikes. Many power supplies generate over-voltages when their outputs are turned on or turned off. To avoid these over-voltages, connect power supplies to Vss after the power supply outputs are turned on and set to 0 V. Disconnect power supplies from Vss after the power supply outputs are set to 0 V but before the outputs are turned off.

**SCMD Package Dimension (mm)**



## Handling Instructions

Since the IC is fabricated using InP HEMT process, users are recommended to follow the instructions below to prevent damage to the chip from electro-static discharge.

- 1) Use a conductive working desk connected to the ground (or, a conductive table top connected to the ground).
- 2) Require all handling personnel to wear a conductive bracelet or wrist-strap connected to the ground through a 1 MΩ resistor.
- 3) Ground all test equipment.
- 4) Ground all soldering iron tops.
- 5) Store IC's and other devices such as chip capacitors in their conductive carriers until they are soldered.

## Caution

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