



Applications

- USB3.1, PCIE Gen3, PCIE Gen4, 20Gbps Ethernet & Thunderbolt3

Features

- Small footprint and integrated loopback circuit with 4 inductors & 2 capacitors
 - > Inductor is designed specifically for broadband applications : up to 13GHz
 - > Cutoff Frequency for Inductor Path : Under 70MHz
- Low DC Resistance : 0.7ohm
- Surface mounted component with high reliability
- Package size : 4.7x 5.0 x 2.7mm (W x L x H mm)
- Package cap is hermetically sealed and protects inductors
- The capacitance of 2 capacitors can be determined by user requirement

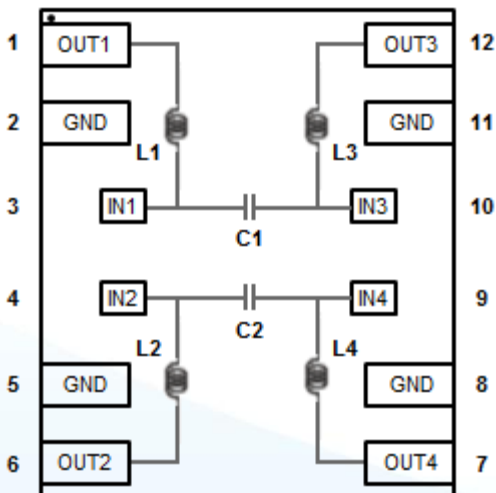
Electrical Specification		Environmental Specification	
Inductance*1 (Tolerance : ±5%)	230nH @ 100MHz	Thermal Shock	200 cycles, -65°C ~ +150°C
SRF (Typ.)	20.8GHz	Pressure Cooker Test	+130°C, 85% RH, 96Hrs
Idc (Max)	230mA	Operating Temperature Range	-55°C ~ +85°C
DCR *3	0.7±0.1Ω		

*1. Measurement Instrument : Impedance Analyzer Agilent 4294 & 42941A(Probe Kit)

*2. Idc Measurement Condition : The DC resistance changes were observed by supplying 5V and maintaining 230mA current for 30 minutes at room temperature

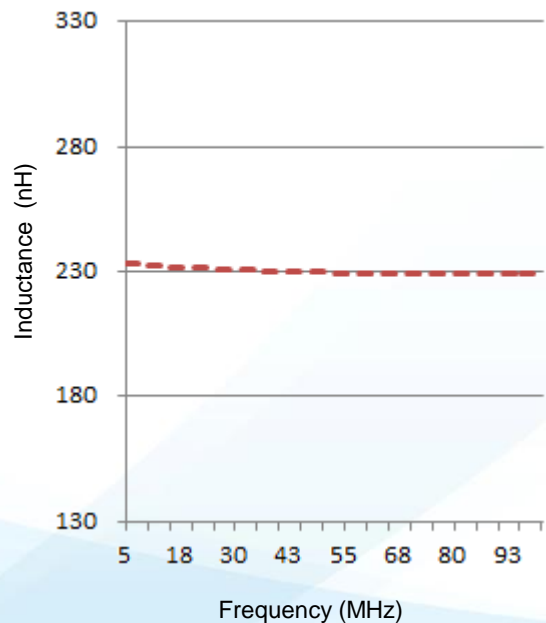
*3. Measurement Instrument : Keithley 2000

Pin Assignment

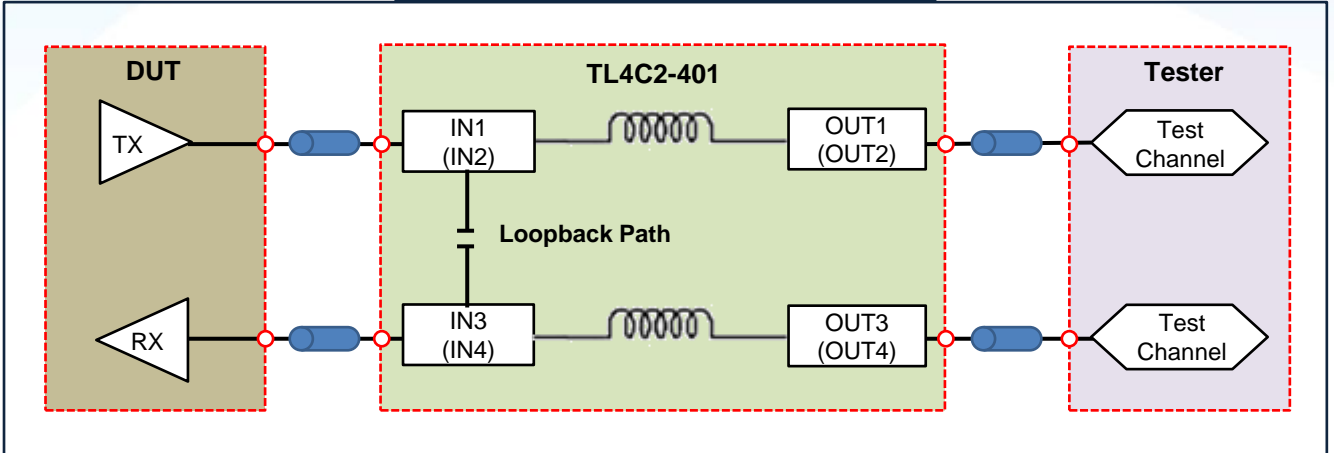


- L1~L4 : Broad Band Inductor
- C1,C2 : AC Coupling Capacitor
- AC Coupling Capacitor Specification : 100nF (±10%), 6.3V rated voltage

Inductance vs Frequency

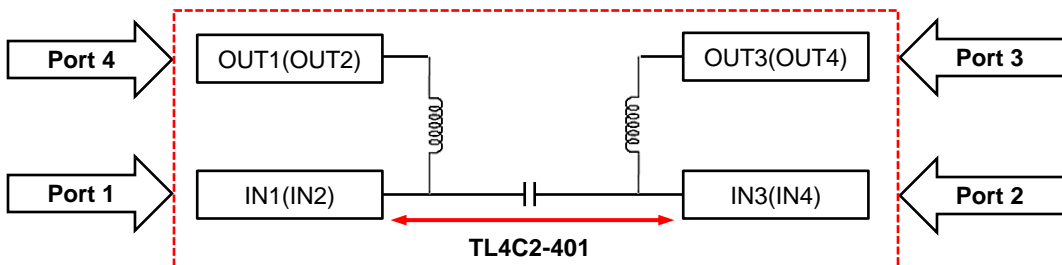


Typical Application

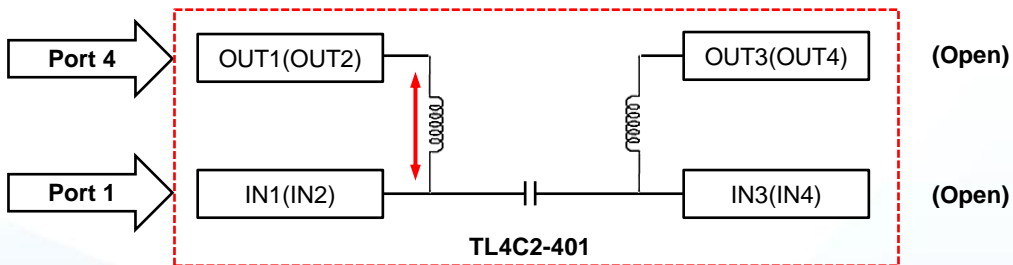


S-Parameter Measurement Set up

- Loopback Path



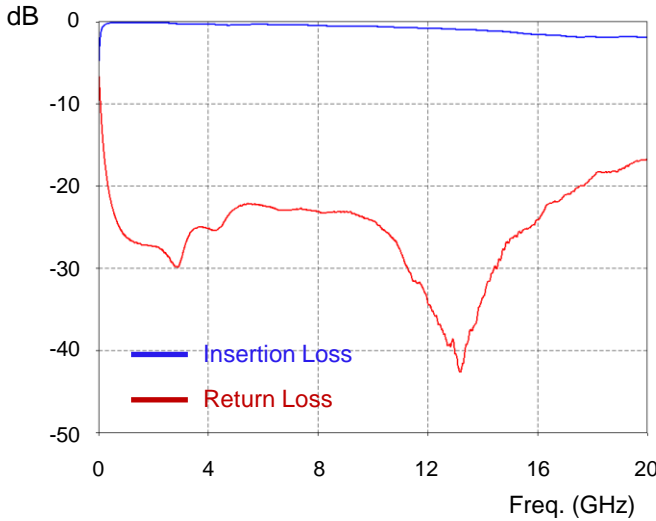
- Inductor Path (Test Channel Connection)



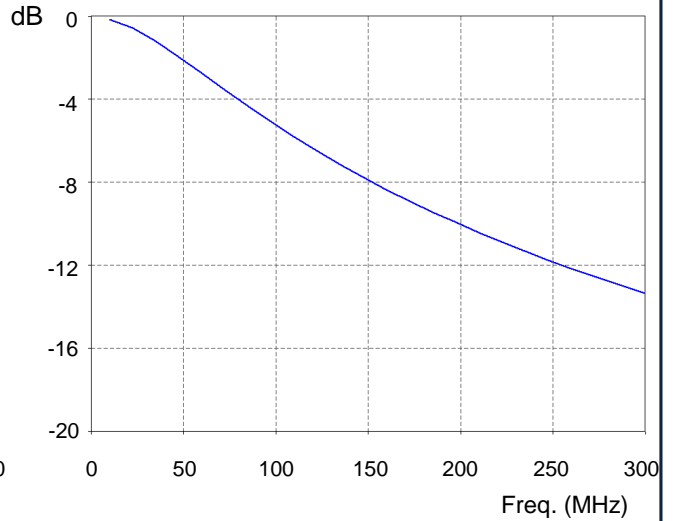
[Note] Other pads are open except probing pads

S-Parameter

- Loopback Path S-Parameter



- Inductor Path S-Parameter (Test Channel Connection)



- Loopback Path S-Parameter

Frequency	Insertion Loss(dB)	Return Loss(dB)
1 GHz	-0.09	-26.2
2 GHz	-0.10	-27.3
4 GHz	-0.28	-25.1
8 GHz	-0.46	-23.1
10 GHz	-0.58	-24.3
12 GHz	-0.81	-34.0
13 GHz	-0.93	-40.2
15 GHz	-1.28	-26.3

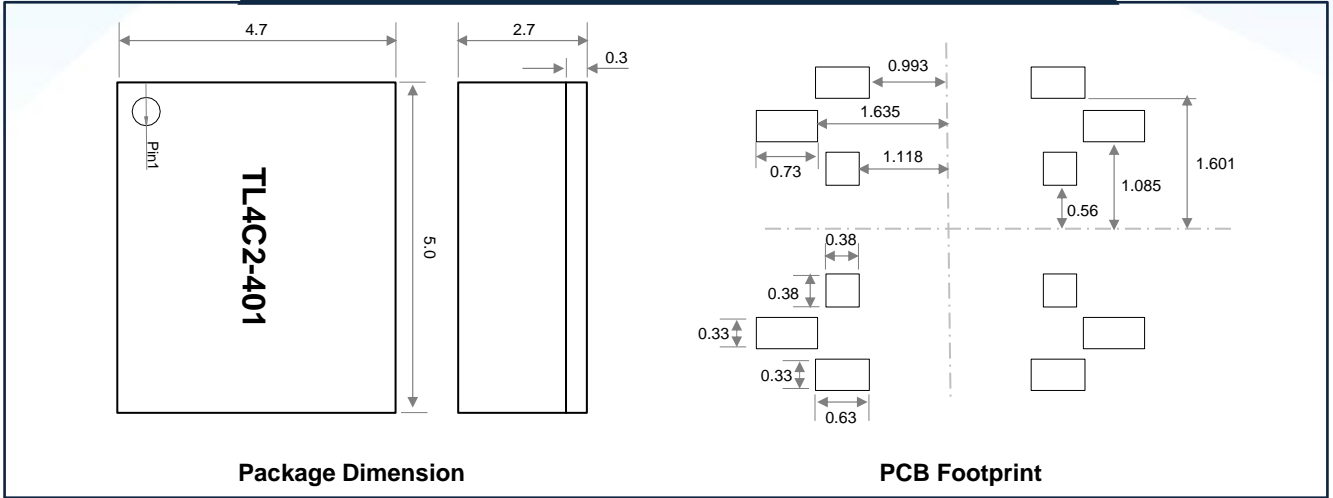
- Inductor Path (Test Channel Connection) S-Parameter

Frequency	Insertion Loss(dB)
20 MHz	-0.50
50 MHz	-2.12
100 MHz	-5.24
200 MHz	-10.0

* Measurement Instrument : VNA Keysight N5224A

TL4C2-401

PKG Dimension & PCB Footprint (Unit : mm)



SMT Reflow Profile (for Lead Free)

Parameter	Specification
Preheat and Soak [Temperature min (T _{smin}) Temperature max (T _{smax}) Time (T _{smin} to T _{smax})	150 °C 200 °C 60~120 seconds
Average ramp-up rate (T _{smax} to T _p)	3 °C/second maximum
Liquidous temperature (T _L) Time at liquidous (t _L)	217 °C 60~150 seconds
Peak temperature in reflow (T _p)	260 °C (+0/-5 °C)
Time(t _p) within 5 °C of the specified classification temperature (T _c)	20 seconds
Average ramp-down rate (T _p to T _{smax})	6 °C/second max
Time 25 °C to peak temperature	8 minutes max

[Note] Prior to SMT, bake TL4C2-401 for 1.5hour at 120 °C if it was stored over 3days at room temperature after unpacking.
A one year warranty before opening vacuum pack from the date of delivery of the components & 3 months warranty after opening vacuum pack.

