RFSW2040

DC TO 20GHz SPST pHEMT GaAs SWITCH

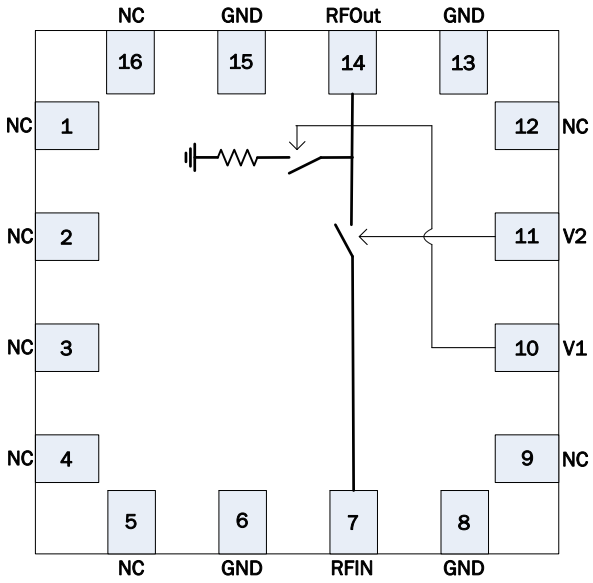
Package: QFN, 16 pin, 0.8mm x 3mm x 3mm

Features

- Low Insertion Loss: 1.4dB at 20GHz
- High Isolation: 37dB at 20GHz
- Excellent Return Loss
- 21nS Switching Speed
- GaAs pHEMT Technology
- Compact 3mm x 3mm QFN package

Applications

- Broadband Communications
- Test Instrumentation
- Fiber Optics
- Military
- Aerospace



Functional Block Diagram

Product Description

RFMD's RFSW2040 is a broadband absorptive SPST GaAs microwave monolithic integrated circuit (MMIC) switch designed to operate from DC to 20GHz using the RFMD FD05 0.5µm switch process. It features low insertion loss of 1.4dB at 20GHz and high isolation of 37dB at 20GHz while being packaged in a compact low cost 3mm x 3mm QFN package for easy end use assembly. The switch uses complementary control logic of -5/0V and does not require a separate bias supply.

Ordering Information

RFSW2040S2	2-Piece sample bag
RFSW2040SB	5-Piece bag
RFSW2040SQ	25-Piece bag
RFSW2040SR	100 Pieces on 7" reel
RFSW2040TR7	750 Pieces on 7" reel
RFSW2040PCK-410	Evaluation board with 2-piece sample bag

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	☑ GaAs pHEMT	☐ GaN HEMT
☐ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	☐ BiFET HBT
☐ InGaP HBT	☐ SiGe HBT	☐ Si BJT	

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Absolute Maximum Ratings

Parameter	Rating	Unit
Drain Bias Voltage (V_{CTRL})	-10	V_{DC}
RF Input Power (Any State)	+30	dBm
RF Output Power (ON State)	+30	dBm
RF Output Power (OFF State)	+21	dBm
Storage Temperature	-55 to +150	°C
Operating Temperature	-55 to +85	°C
ESD JESD22-A114 Human Body Model (HBM)	Class 1A (All pads)	

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Operating Frequency	DC		20	GHz	
Insertion Loss (0GHz to 5GHz)		0.65	1.1	dB	ON State, All Temps
Insertion Loss (5GHz to 10GHz)		0.8	1.8	dB	ON State, All Temps
Insertion Loss (10GHz to 15GHz)		1.2	1.8	dB	ON State, All Temps
Insertion Loss (15GHz to 20GHz)		1.4	2.2	dB	ON State, All Temps
Isolation (DC to 20GHz)	39	40		dB	ON State, All Temps
Input Return Loss (DC to 20GHz)	9	20		dB	ON State, All Temps
Output Return Loss (DC to 20GHz)	11	16		dB	ON State, All Temps
Output Return Loss (DC to 20GHz)	6	10		dB	OFF State, All temps
OIP3 (2GHz to 20GHz)	42	48		dBm	100MHz spacing, 2dBm input, 25 °C
OIP2 (4GHz to 20GHz)	90	105		dBm	100MHz spacing, 2dBm input, 25 °C
Switching Speed		21	25	ns	50% control to 90% RF, All Temps
Control Current		4	6	µA	Sum of all control lines, 25 °C
Control Voltage		0/-5		V	

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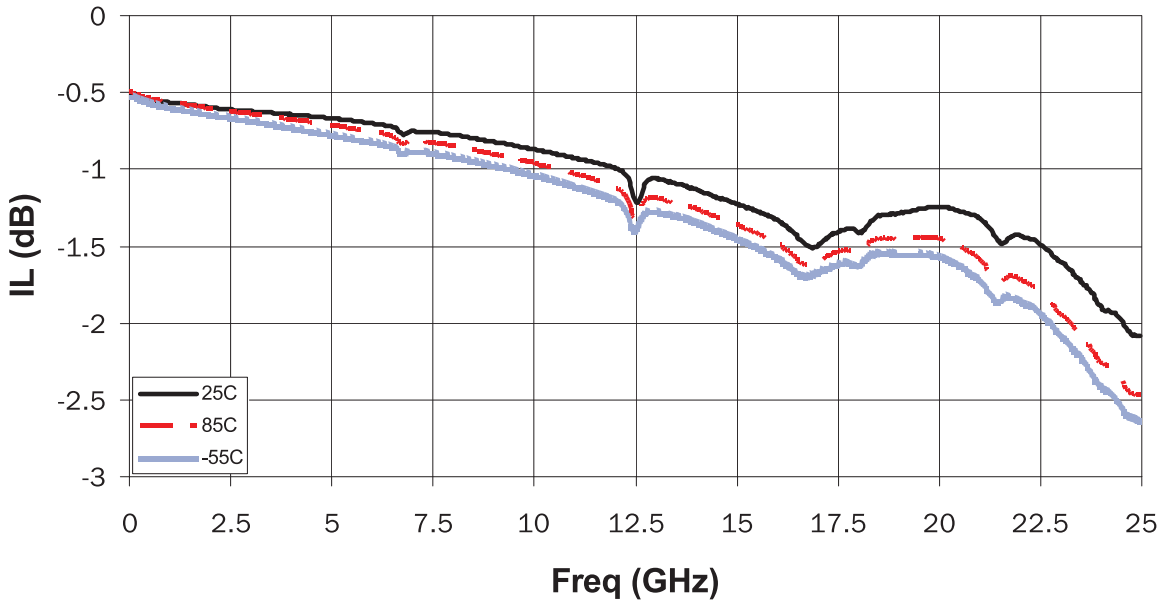
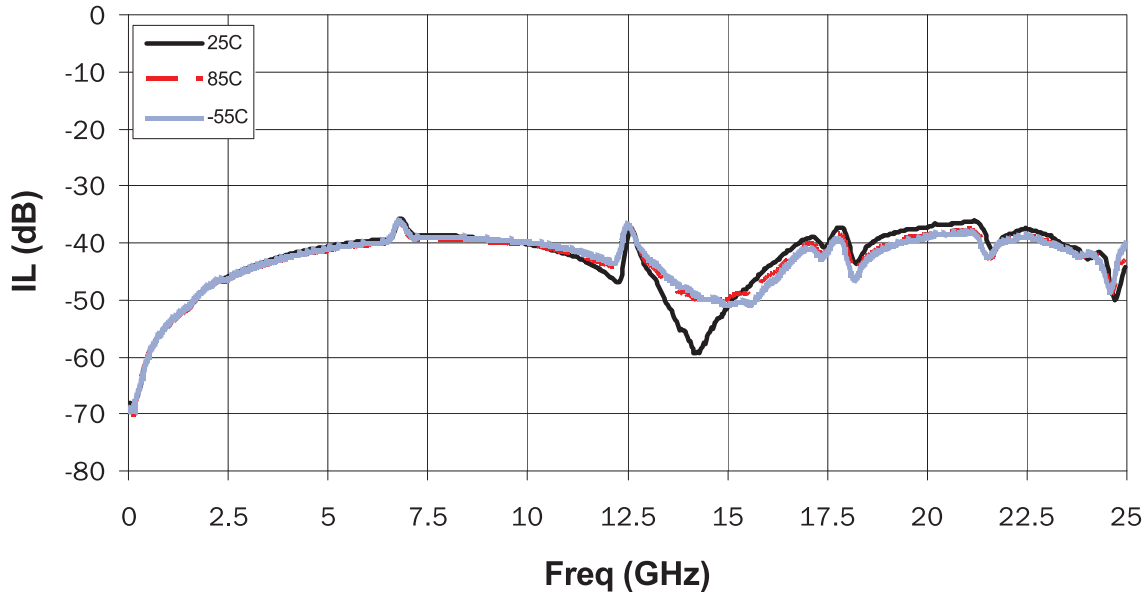
Insertion Loss vs. Temp (Vcontrol = -5V)



Isolation vs. Temp (RF Off, Vcontrol = -5V)



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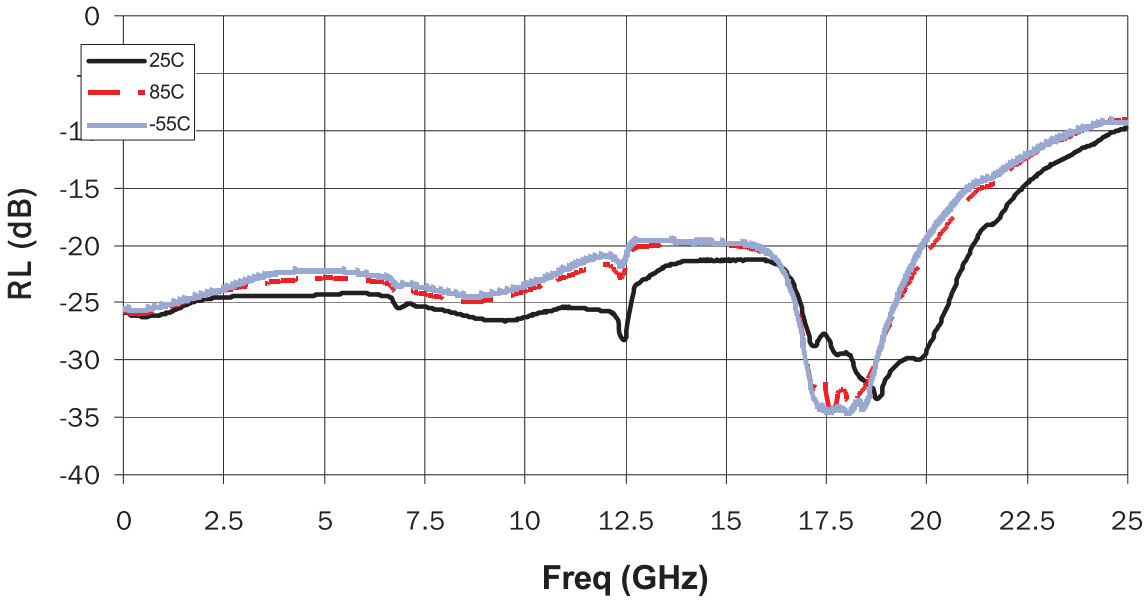
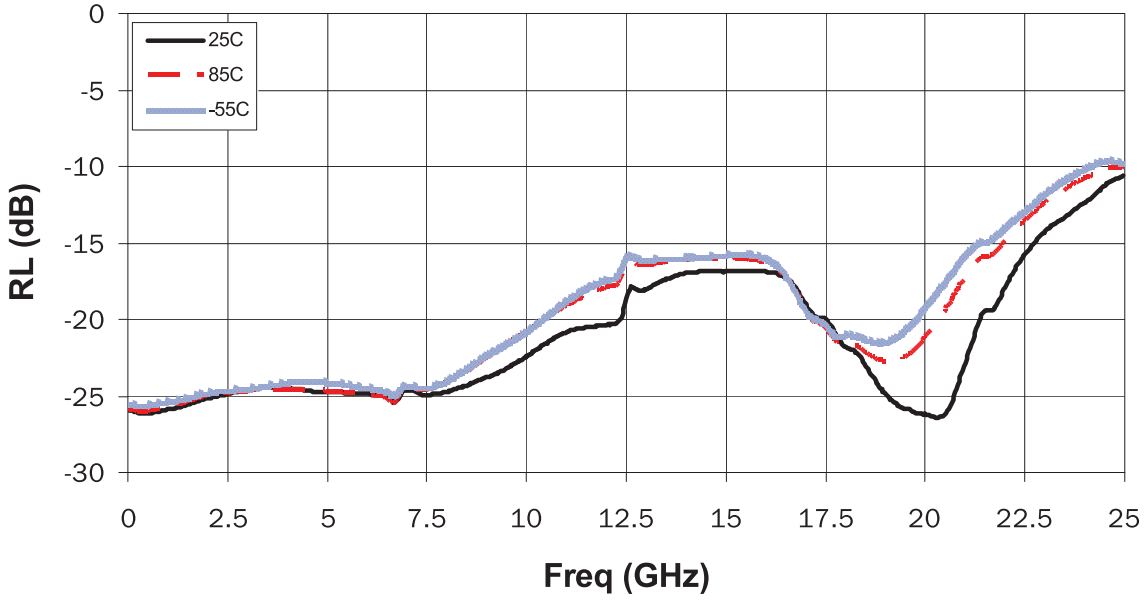
Input Return Loss vs. Temp (RFOn, Vcontrol = -5V)



Output Return Loss vs. Temp (RFOn, Vcontrol = -5V)



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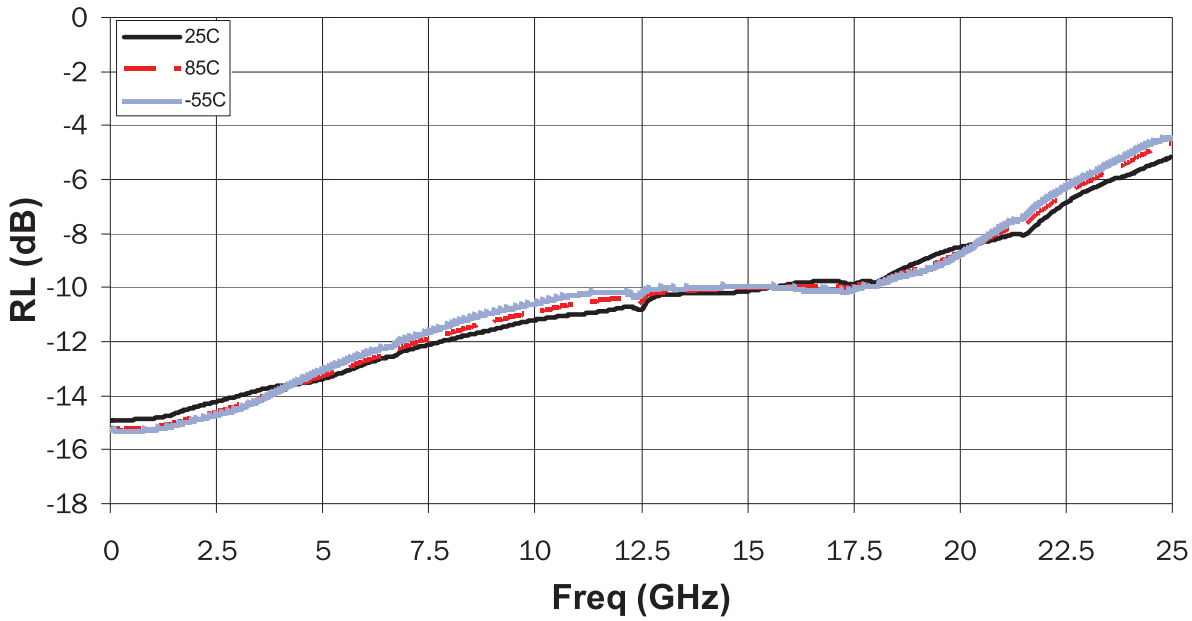
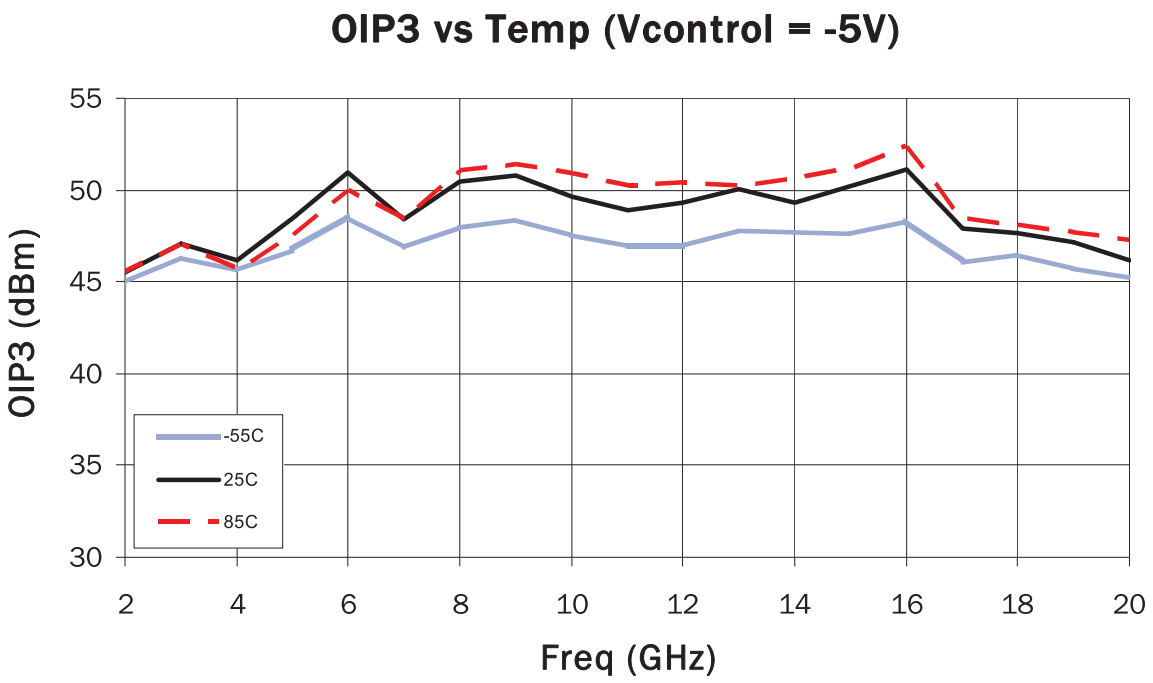
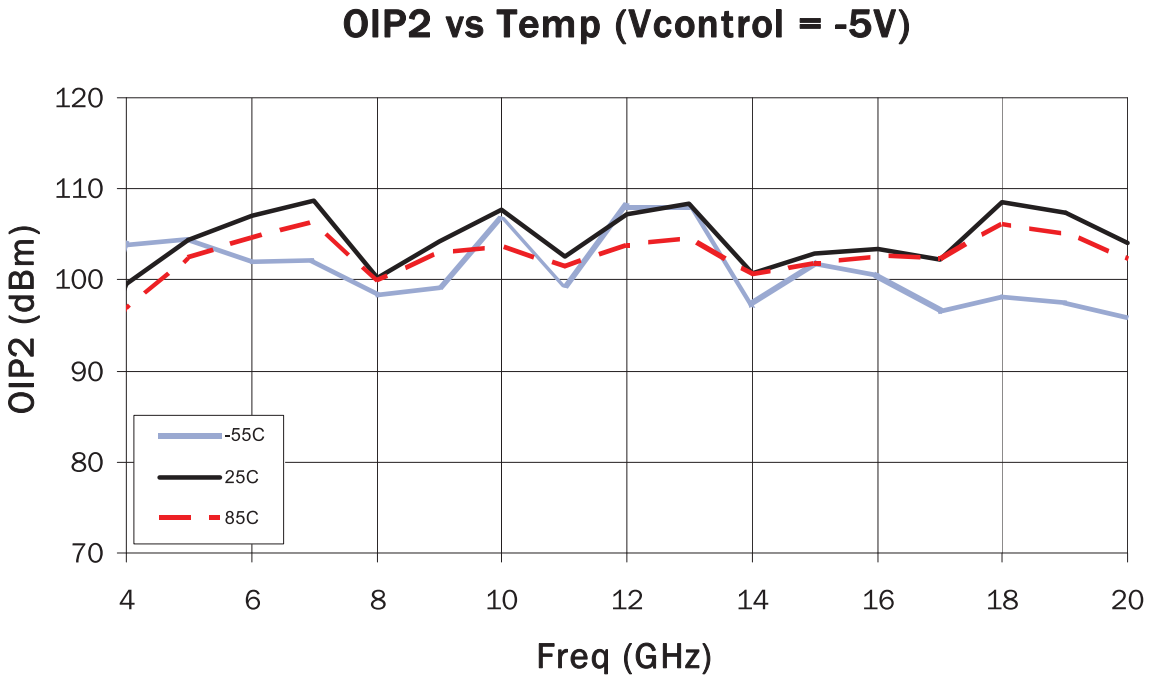
Output Return Loss vs. Temp (RFOff, Vcontrol = -5V)







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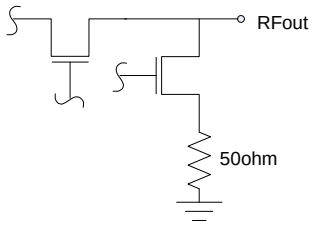
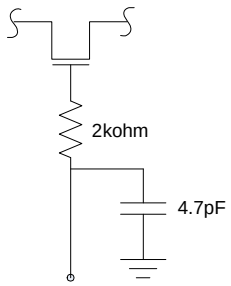
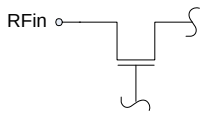
Pin Names and Descriptions

Pin	Name	Description	Interface Schematic
1, 2, 3, 4, 5, 9, 12, 16	NC	No Connect	
6, 8, 13, 15	GND	Ground. Grounding via should be located as close as possible to this pin.	
14	RFOUT	RF output. These pins are DC coupled and matched to 50Ω from DC to 20GHz.	
10, 11	DC	DC control for switch operation. Nominal operating voltage is -5V.	
7	RFIN	RF input. This pin is DC coupled and matched to 50Ω from DC to 20GHz.	

Truth Table

High = -5V ± 0.2V, Low = 0V, ± 0.2V

Control Line		RF Path
V1	V2	RF_{IN} - RF_{OUT}
High	Low	ON (low loss)
Low	High	OFF (high isolation)

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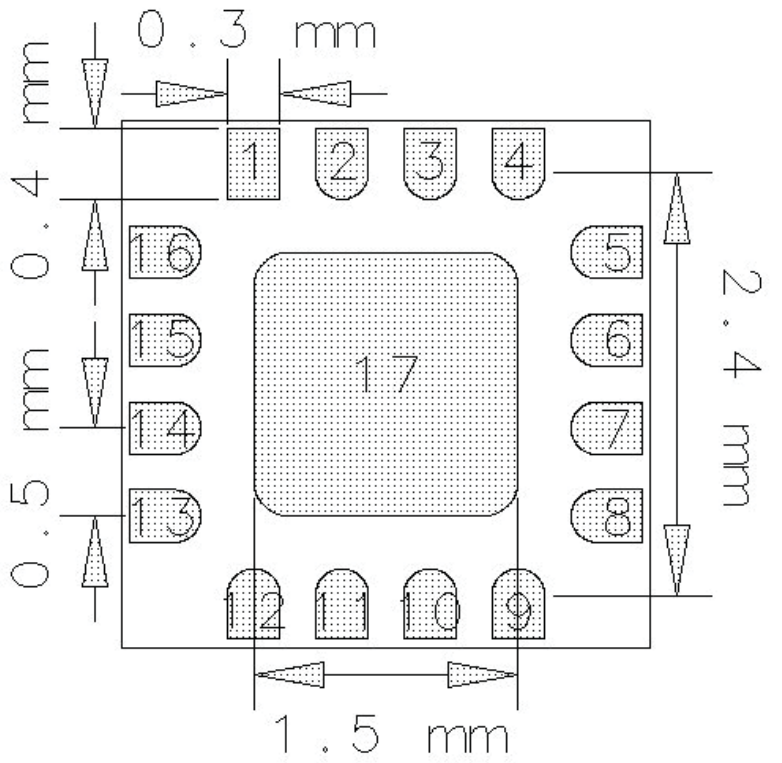
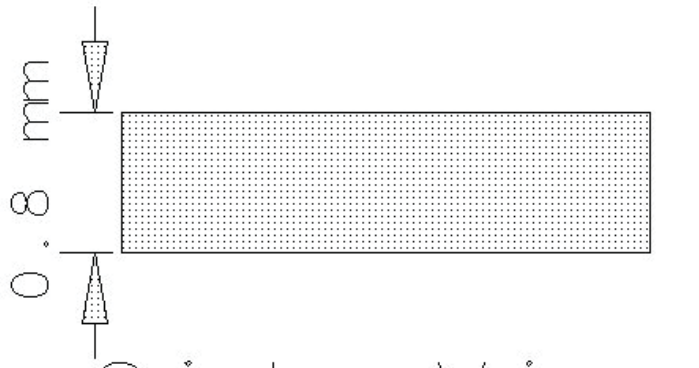
Package Drawing



Bottom View



Side View

Maximum Height = 1.0mm
Dimensional Tolerance = +0.05mm

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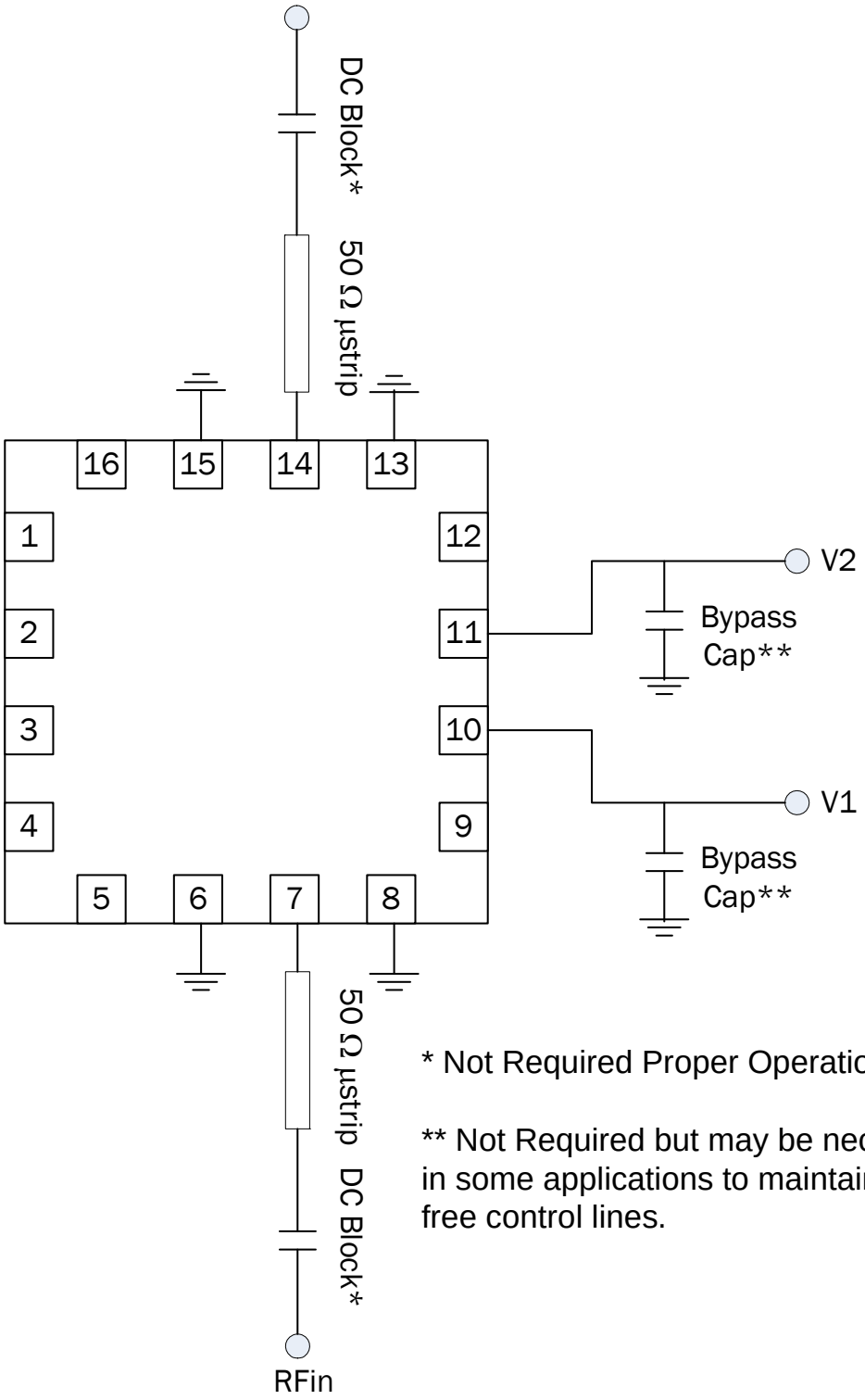
Application Schematic



* Not Required Proper Operation

** Not Required but may be necessary in some applications to maintain noise free control lines.

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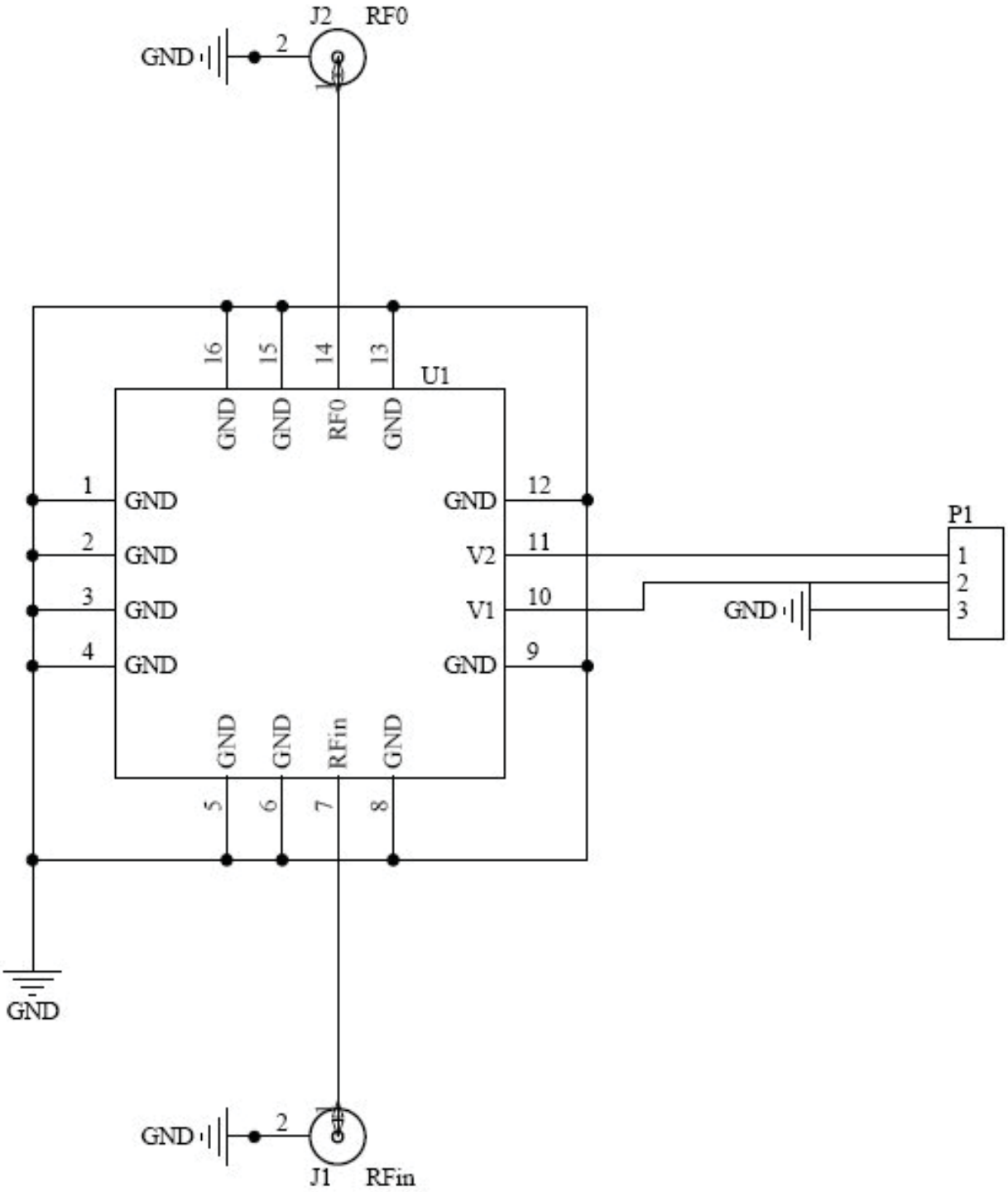
Evaluation Board Schematic



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Evaluation Board Layout