

RFLA2018

Variable Gain Low Noise High Linearity Amplifier 2500 MHz to 2570 MHz

The RFLA2018 is an analog-controlled voltage variable gain amplifier featuring high linearity and very low noise figure. The LNA with bypass mode and variable attenuator provides a minimum of 35 dB of dynamic range. The RFLA2018 has a +3.3 V control range with maximum gain at 0 V. The LNA is temperature compensated to reduce gain variation. Noise figure is 1.0 dB and Input IP3 of +3 dBm makes this component ideal for receiver input lineups. The RFLA2018 is packaged in a small 8.0 mm x 8.0 mm leadless MCM that is internally matched to 50 Ω on all RF ports.

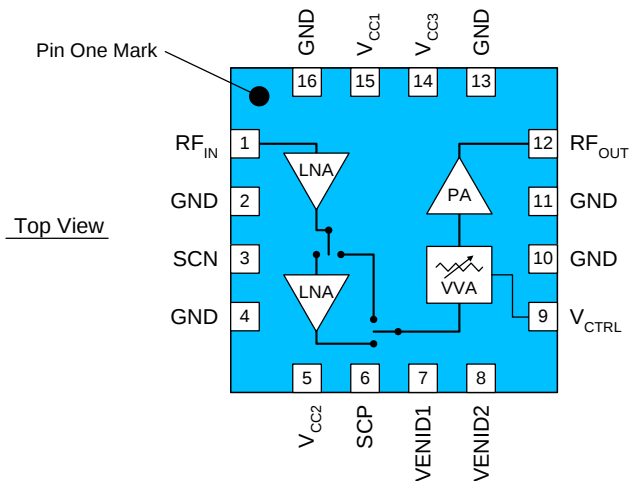


Package: MCM, 16-pin,
8.0 mm x 8.0 mm

Features

- 2500 MHz to 2570 MHz Operation
- Internally Matched to 50 Ω on All RF Ports
- Analog Voltage Variable Attenuator with +3.3 V Control Range
- Bypass Mode of LNA for High Dynamic Range
- Max Gain = 35 dB Min.
- Noise Figure of 1.0 dB Typical
- Gain Control Range > 33 dB
- High IIP3 = +3 dBm
- Single +5 V Supply
- Small 16-Pin, 8.0 mm x 8.0 mm, Multi-Chip Module (MCM)

Functional Block Diagram



Ordering Information

RFLA2018SQ	Sample bag with 25 pieces
RFLA2018SR	7" Reel with 100 pieces
RFLA2018TR13	13" Reel with 2500 pieces
RFLA2018PCK-410	2500 – 2570 MHz PCBA with 5-piece sample bag

Applications

- Cellular Base Station, Remote Radio Heads
- Active Antenna Radios
- 3G, LTE Infrastructure
- Low Noise, Variable Gain with High Linearity

Absolute Maximum Ratings

Parameter	Rating	Units
Supply Voltage	+5.5	V
Control Voltage	+5.5	V
DC Supply Current	400	mA
Power Dissipation	2000	mW
Max RF Input Power	+22	dBm
Storage Temperature	-40 to +150	°C
ESD Rating (HBM)	1000 (Class 1C)	V
ESD Rating (CDM)	1000 (Class C3)	V
Moisture Sensitivity Level	MSL3	-



Caution! ESD sensitive device.



RFMD Green: RoHS status based on EU Directive 2011/65/EU (at time of this document revision), halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

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.

Recommended Operating Conditions

Parameter	Specifications			Units
	Min	Typ	Max	
Operating Temperature Range	-40		+85	°C
Operating Junction Temperature			+160	°C
Supply Voltage	+4.75	+5.0	+5.25	V

Electrical Specifications - High Gain Mode, 2500 MHz to 2570 MHz

Parameter	Specification			Units	Conditions
	Min	Typ	Max		
Test conditions unless otherwise noted: Temp. = -40 °C to +85 °C, V _{CC} = +4.75V to +5.25 V, High Gain Mode, Standard Application Circuit					
Operating Frequency Range	2500		2570	MHz	
Max Gain	35	39		dB	Attenuation = Min, VVA_CV = 0 Volts
Max Gain	36	39		dB	Attenuation = Min, VVA_CV = 0 Volts, Temp = +25°C
Gain Flatness		0.2	0.8	dB	
Gain Range HG	+14		+35	dB	
Output IP3 (Max Gain)		+38		dBm	Attenuation = Min, VVA_CV = 0 Volts
Input IP3	-1	+1.5		dBm	19 dB to 35 dB Gain
OP1dB (Max Gain)		+26		dBm	Attenuation = Min, VVA_CV = 0 Volts
Input P1dB	-13.5	-10		dBm	33 dB to 35 dB Gain
	-12.5	-6		dBm	19 dB to 32 dB Gain
NF (Max Gain)		1.0	1.45	dB	Attenuation = Min, VVA_CV = 0 Volts
Input Return Loss ⁽¹⁾	20	23		dB	25 dB to 35 dB Gain
	18	23			19 dB to 24 dB Gain
Output Return Loss ⁽¹⁾	15	20		dB	19 dB to 35 dB Gain
S11 Phase Variation			100	Deg	2535 MHz, IRL is between 20 dB and 25 dB over temperature range +25°C to +85°C

Notes:

1. Minimum Return Loss Specifications can be relaxed 2 dB between -10°C to -40°C

Electrical Specifications - Low Gain Mode, 2500 MHz to 2570 MHz

Parameter	Specification			Units	Conditions
	Min	Typ	Max		
Test conditions unless otherwise noted: Temp. = -40 °C to +85 °C, V _{CC} = +4.75V to +5.25 V, Low High Gain Mode, Standard Application Circuit					
Frequency Range	2500		2570	MHz	
Max Gain LG	19	23			Attenuation = Min, VVA_CV = 0 Volts
Gain Range LG	-2		23	dB	
Output IP3 (Max Gain)		+38		dBm	Attenuation = Min, VVA_CV = 0 Volts
Input IP3	+12	+17		dBm	2 dB to 18 dB Gain
Output P1dB (Max Gain)		+26		dBm	Attenuation = Min, VVA_CV = 0 Volts
Input P1dB	+5.5	+6		dBm	15 dB to 18 dB Gain
	+6.5	+10		dBm	2 dB to 14 dB Gain
NF (Max Gain)		4.0	9.7	dB	Attenuation = Min, VVA_CV = 0 Volts
Input Return Loss ⁽¹⁾	18	23		dB	2 dB to 18 dB Gain
Output Return Loss ⁽¹⁾	15	20		dB	2 dB to 18 dB Gain

Notes:

1. Minimum Return Loss Specifications can be relaxed 2 dB between -10°C to -40°C

Electrical Specifications - Power Supply

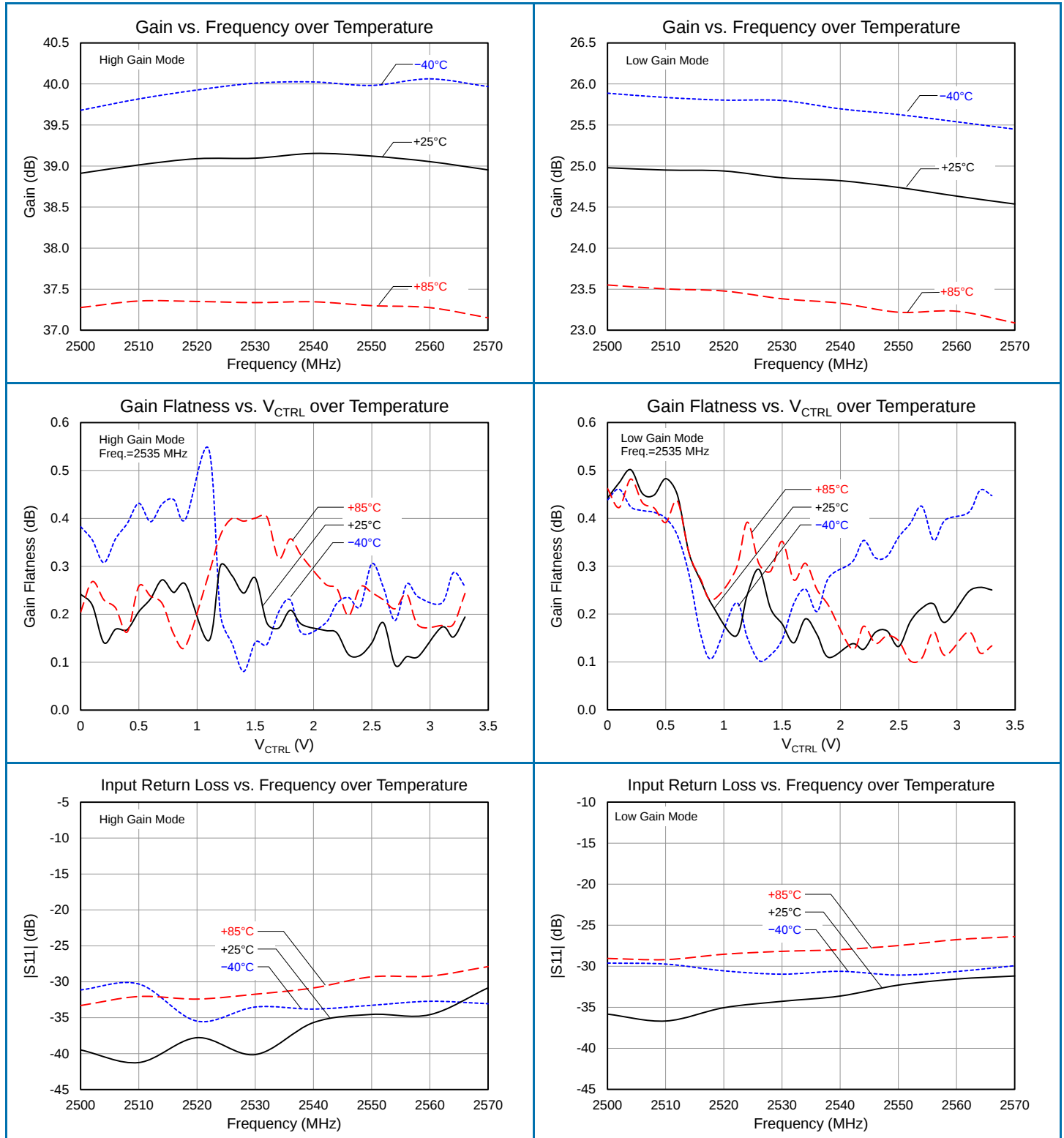
Parameter	Specification			Units	Conditions
	Min	Typ	Max		
Test conditions unless otherwise noted: Temp. = -40 °C to +85 °C, V _{CC} = +4.75V to +5.25 V, Low High Gain Mode, Standard Application Circuit					
V _{CTRL} Voltage	0		+3.3	V	
Logic High	+2		+5	V	
Logic Low	0		+1	V	
Thermal Resistance		37.3		°C/W	+85 °C at +5.25 V, T _{REF} = Backside of module

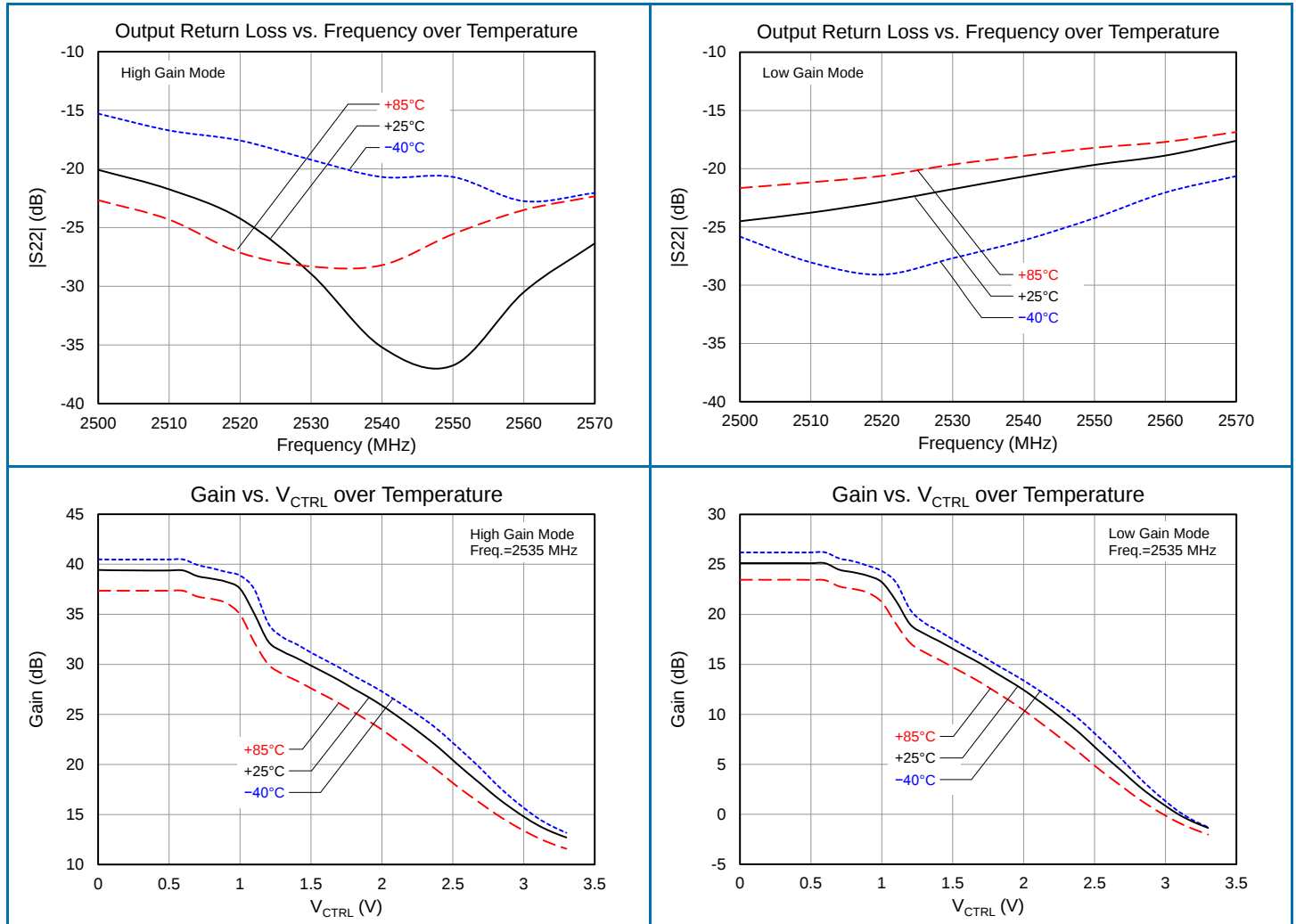
Electrical Specifications - Current

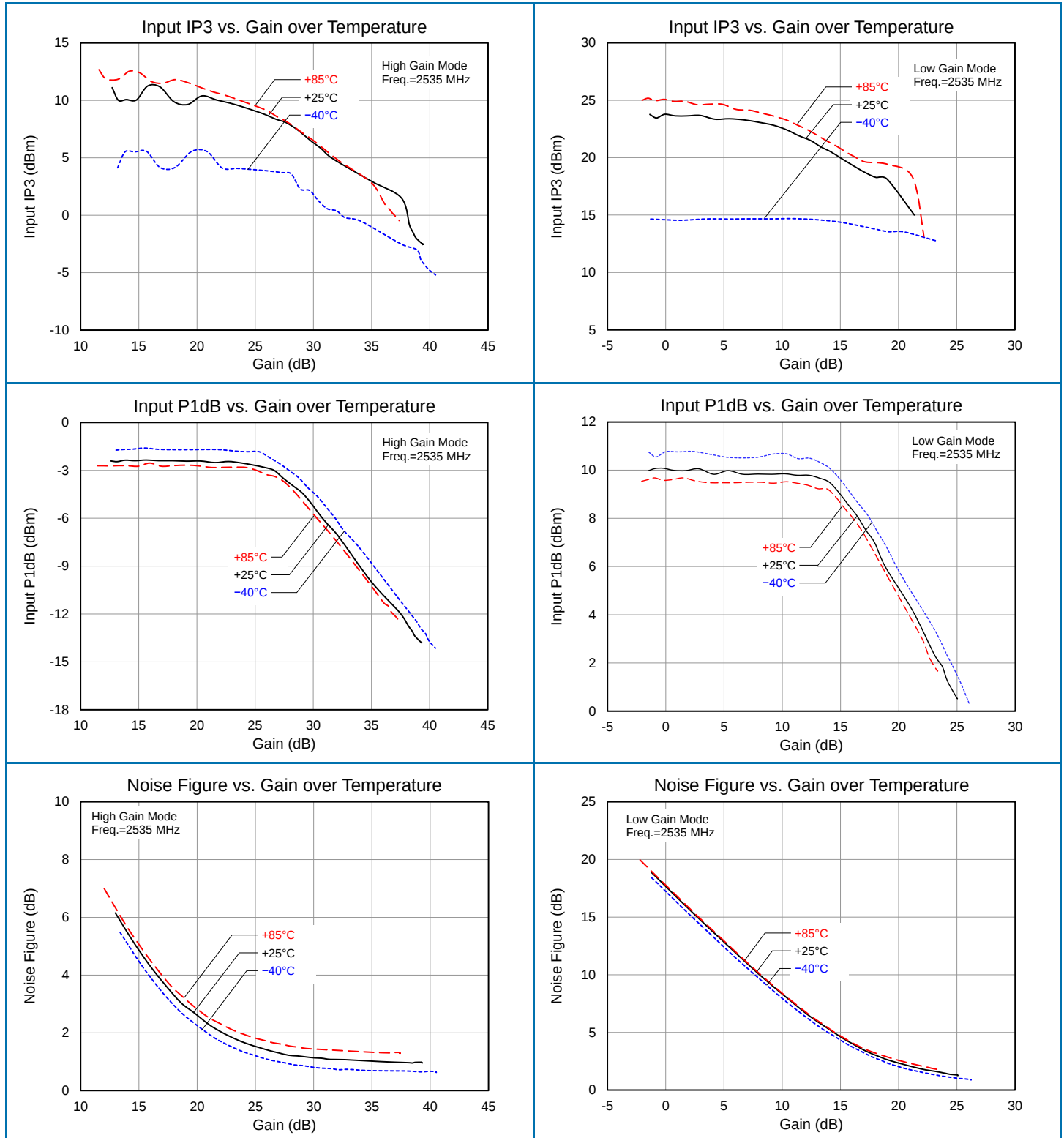
Parameter	Power Supply Voltage			Units	Conditions
	+4.75 V	+5.0 V	+5.25 V		
Supply Current HG Mode		265	320	mA	
Supply Current LG Mode		190	240	mA	
Vctrl Current			10	mA	
SCN/SCP Current			5	mA	

Truth Table

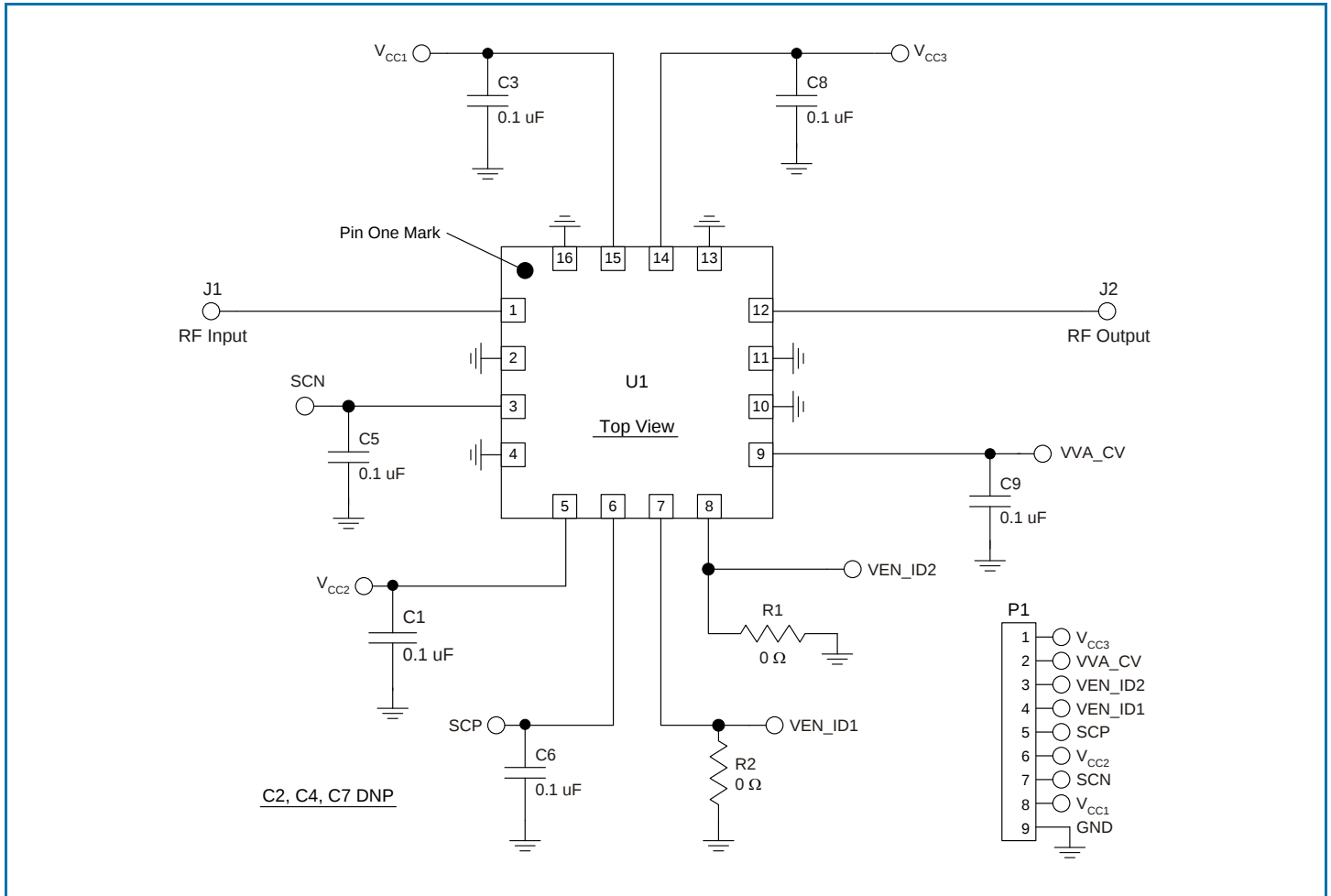
	SC_N	SC_P
High Gain	0	1
Low Gain	1	0

Typical Performance $T = +25^{\circ}\text{C}$, $V_{\text{CC}} = +5\text{V}$ unless otherwise noted


Typical Performance $T = +25^{\circ}\text{C}$, $V_{CC} = +5\text{V}$ unless otherwise noted


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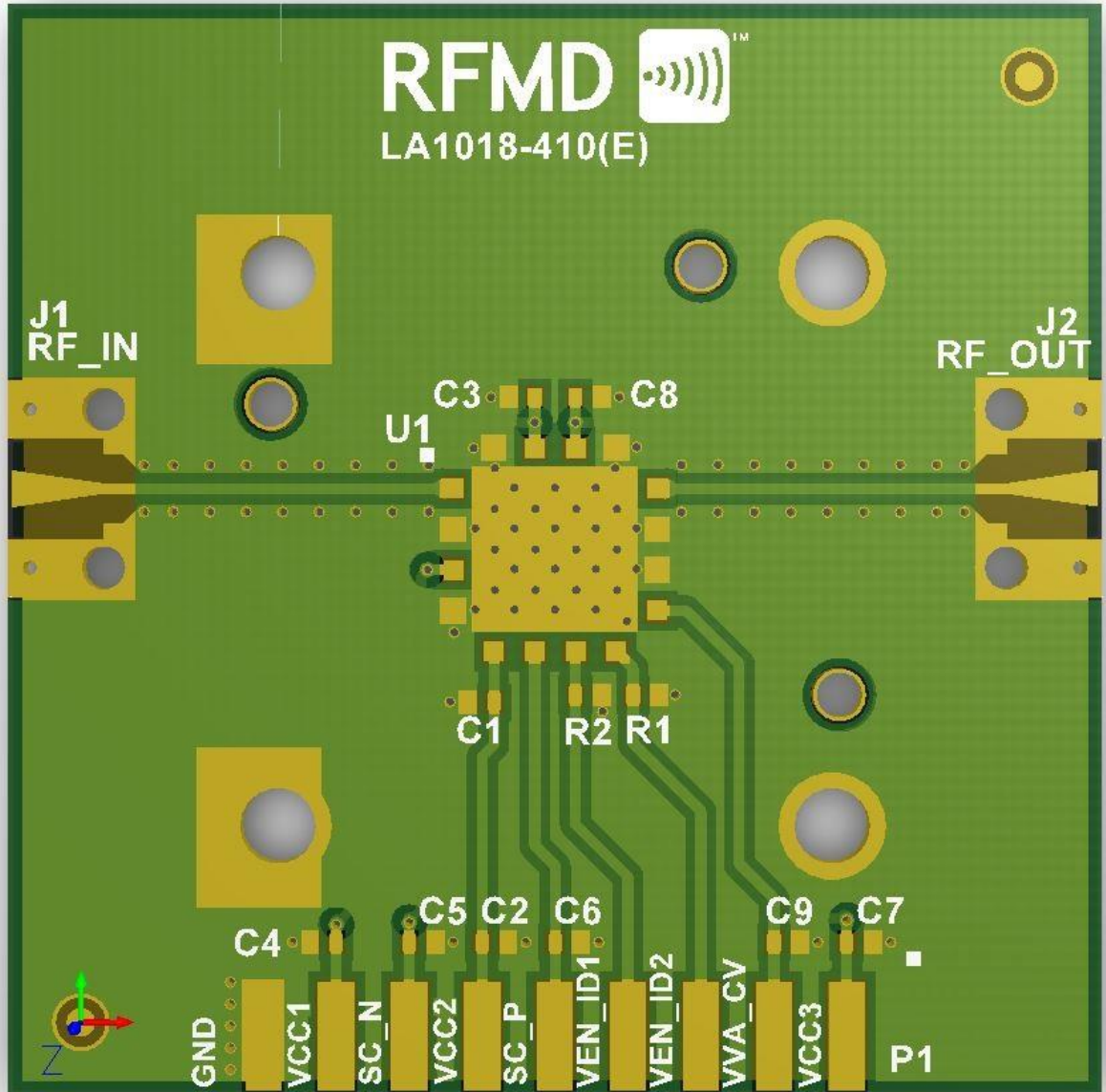
Evaluation Board Schematic



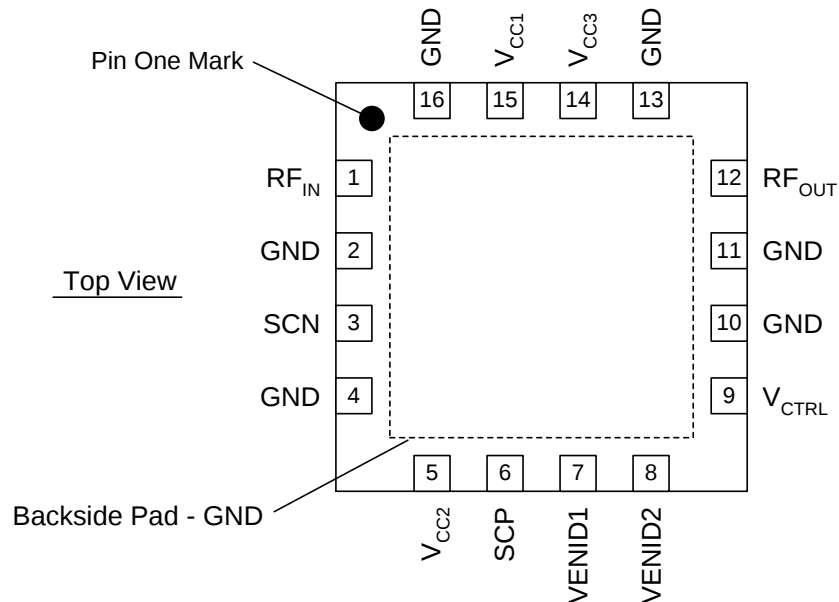
Evaluation Board Bill of Materials (BOM) 2500 MHz to 2570 MHz Application Circuit

Description	Reference Designator	Manufacturer	Manufacturer's P/N
Evaluation Board		DDI	LA1018410(E)
CAP, 0.1 μ F, 10%, 16 V, X7R, 0402	C1, C3, C5 – C6, C8 – C9	Murata Electronics	GRM155R71C104KA88D
CONN, SMA, END LNCH, UNIV, HYB MNT, FLT	J1-J2	Heilind Electronics	PER MAT-21-1058
RES, 0 Ω , 0402	R1-R2	Kamaya, Inc.	RMC1/16SJPTH
CONN, HDR, ST, PLRZD, 9-PIN	P1	ITW Pancon	MPSS100-9-C
RFLA2018 Module	U1	RFMD	RFLA2018

Evaluation Board PCB

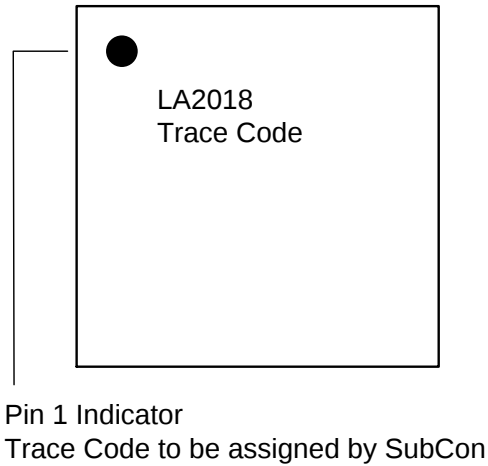


Pin Configuration and Description

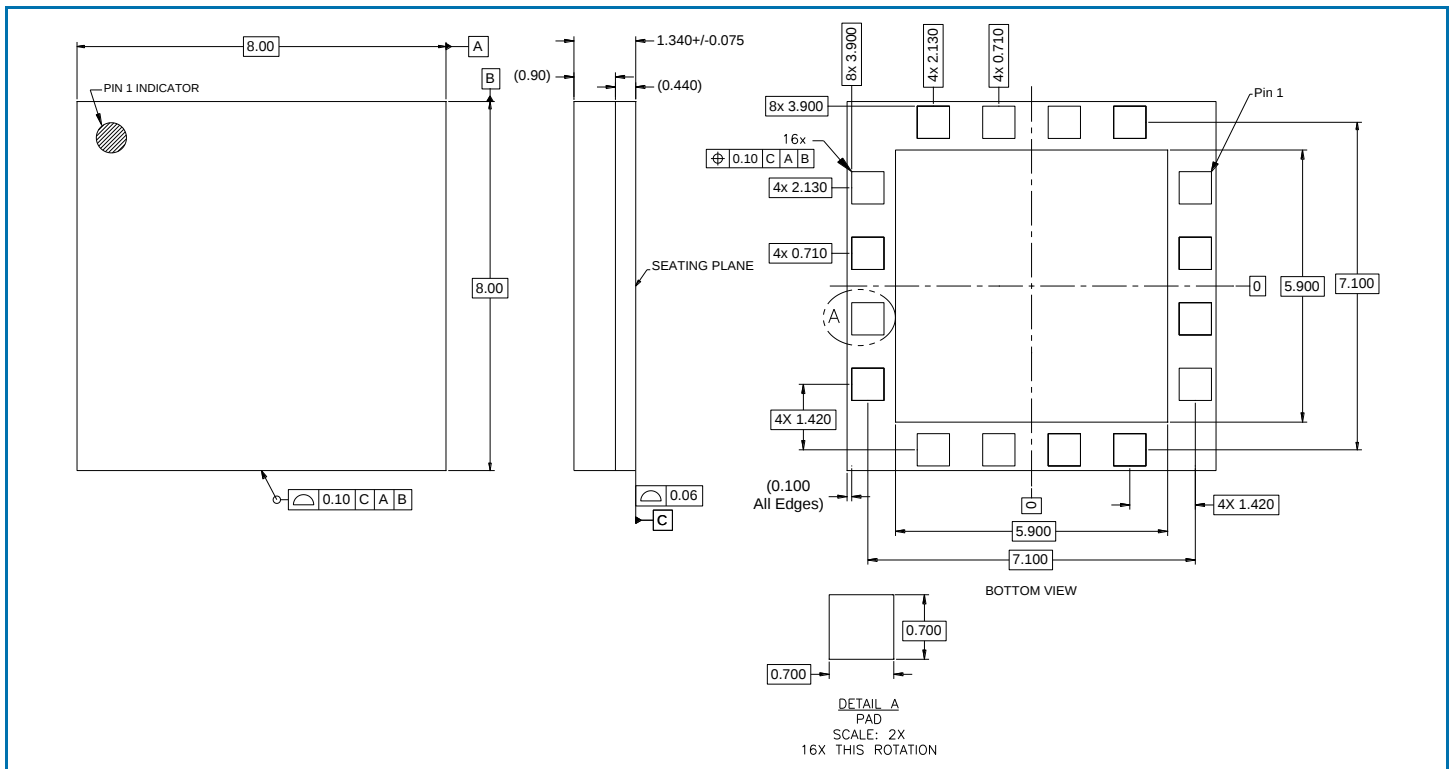


Pin	Label	Description
1	RFIN	RF Input; Internally 50 Ω matched and DC blocked
2	GND	Connect to low inductive path to ground
3	SCN	Switch Control Line; See truth table
4	GND	Connect to low inductive path to ground
5	V _{CC2}	V _{CC} Supplied; 0.1 μ F decoupled internal, supply voltage to 2nd stage LNA; disable V _{CC} supply in bypass mode to save DC current
6	SCP	Switch Control Line; See truth table
7	VEN_ID1	Pin grounded in module
8	VEN_ID2	Pin grounded in module
9	V _{CTRL}	Voltage Variable Attenuator Control Line; Max gain 0 V
10	GND	Connect to low inductive path to ground
11	GND	Connect to low inductive path to ground
12	RFOUT	RF Output; Internally 50 Ω matched and external DC block required
13	GND	Connect to low inductive path to ground
14	V _{CC3}	V _{CC} Supply; 0.1 μ F decoupled internal; supply voltage to stage 3 amplifier
15	V _{CC1}	V _{CC} Supply; 0.1 μ F decoupled internal; supply voltage to 1st stage amplifier
16	GND	Connect to low inductive path to ground

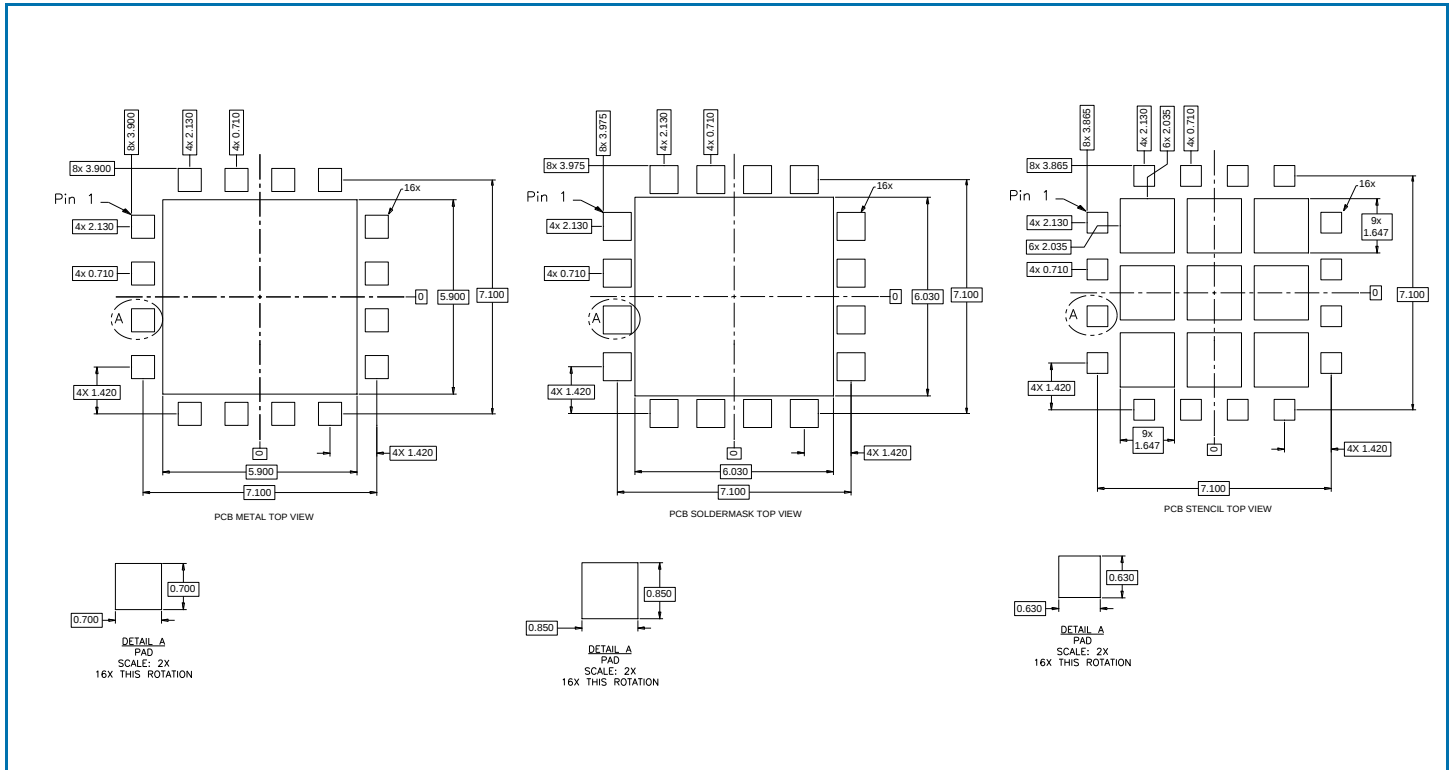
Package Marking



Package Outline (Dimensions in millimeters)



PCB/ PCB Soldermask/ PCB Stencil Drawing (Dimensions in millimeters)



RFLA2018



Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.rfmd.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

For information about the merger of RFMD and TriQuint as Qorvo:

Web: www.qorvo.com

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