Nisshinbo Micro Devices Inc.

NT1195FAAE2S

Low Current Consumption
GNSS Wideband Low Noise Amplifier

FEATURES

- Frequency range: 1164 MHz to 1610 MHz
- Supply voltage: 1.5 V to 3.7 V (1.8 V typ.)
- Low current: 1.9 mA typ.
- High gain: 18 dB typ. @ L1 band
  18.5 dB typ. @ L2/L5/L6 band
- Low NF: 0.7 dB typ. @ L1 band
  0.7 dB typ. @ L2/L5/L6 band
- With stand-by function
- Small package size: 0.7 x 1.1 mm typ.
  t = 0.39 mm max.
- Operating temperature: -40 to +105°C
- RoHS compliant and Halogen Free, MSL1

GENERAL DESCRIPTION

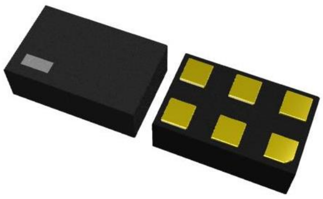
The NT1195 is a low current consumption GNSS wideband low noise amplifier (LNA) suitable for GNSS multi-band application.

This LNA features low current only 1.9 mA, and low noise figure and high gain in L1 and L2/ L5/ L6 all GNSS band. The stand-by function contributes to reducing current consumption. These characteristics are ideal for wearable and IoT devices.

The NT1195 achieves compact mounting area by 0.7 x 1.1 mm small size package and only two external components.

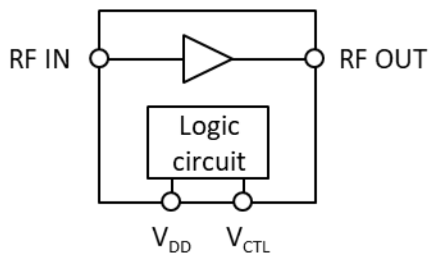
APPLICATIONS

- GNSS (GPS, GLONASS, Galileo, BeiDou, etc.) receiver applications
- Wearable devices (smart watch, health band, etc.)
- GNSS modules
- Tracking devices
- Drone



EPFFP-6-FA
0.7 × 1.1 × 0.39 (mm)

BLOCK DIAGRAM



■ PRODUCT NAME INFORMATION

NT1195 FA A E2 S

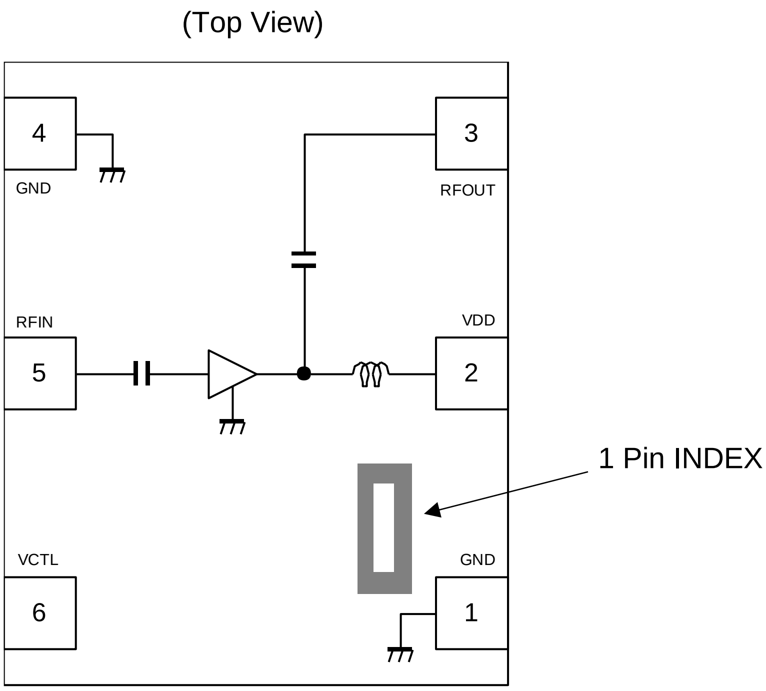
Description of configuration

Suffix	Parameter	Description
FA	Package code	Indicates the package. Refer to the order information.
A	Version	Indicates the product version. “A” is initial version.
E2	Packing	Refer to the packing specifications.
S	Grade	Indicates the quality grade. “S” means general-purpose and consumer application. Operating temperature range: −40°C to 105°C, Test temperature: 25°C

■ ORDER INFORMATION

PRODUCT NAME	PACKAGE	RoHS	HALOGEN-FREE	PLATING COMPOSITION	WEIGHT (mg)	QUANTITY (pcs/reel)
NT1195FAAE2S	EPFFP-6-FA	Yes	Yes	Au	0.7	5000

■ PIN DESCRIPTIONS



EPFFP-6-FA Pin Configuration

Pin No.	Pin Name	Description
1	GND	Ground terminal
2	VDD	Operating voltage supply terminal
3	RFOUT	RF output terminal
4	GND	Ground terminal
5	RFIN	RF input terminal
6	VCTL	Control signal input terminal

Please refer to "APPLICATION CIRCUIT" for details.

■ TRUTH TABLE

"H"=V_{CTL}(H), "L"=V_{CTL}(L)

V_{CTL}	Mode
H	Active mode
L	Stand-by mode

■ ABSOLUTE MAXIMUM RATINGS

General conditions: T_a = +25°C, Z_s = Z_l = 50Ω

	Symbol	Ratings	Unit
Supply voltage	V_{DD}	5	V
Control voltage	V_{CTL}	5	V
Input power	P_{IN} [*1]	+15	dBm
Power dissipation	P_D [*2]	430	mW
Operating temperature range	T_{opr}	−40 to +105	°C
Storage temperature range	T_{stg}	−55 to +150	°C

[*1] V_{DD} = 1.8 V
[*2] 4-layer FR4 PCB with through-hole (101.5 x 114.5 mm), T_j = 150°C

ABSOLUTE MAXIMUM RATINGS
Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause permanent damage and may degrade the lifetime and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

Calculate the power consumption of the IC from the operating conditions and calculate the junction temperature with the thermal resistance.

Please refer to "*THERMAL CHARACTERISTICS*" for the thermal resistance under our measurement board conditions.

■ THERMAL CHARACTERISTIC

Parameter	Measurement Result
Thermal Resistance (θja)	θja = 290.7 °C/W

θja: Junction-to-Ambient Thermal Resistance

■ ELECTROSTATIC DISCHARGE RATINGS

	Conditions	Pin No.	Pin Name	Protection Voltage	
				Ground	VDD
HBM	C = 100 pF, R = 1.5 kΩ	1	GND	COM.	±750 V
		2	VDD	±2000 V	COM.
		3	RFOUT	±2000 V	±750 V
		4	GND	COM.	±2000 V
		5	RFIN	±2000 V	±500 V
		6	VCTL	±2000 V	±500 V

	Conditions	Protection Voltage
CDM	Field Induced CDM	±1000 V

ELECTROSTATIC DISCHARGE RATINGS
The electrostatic discharge tests are done based on JEDEC JS-001 and JS-002. In the HBM method, ESD is applied using the power supply pin and GND pin as reference pins.

■ RECOMMENDED OPERATING CONDITIONS

	Symbol	Value	Unit
Supply voltage	V_{DD}	1.5 to 3.7	V
Control voltage	V_{CTL}	1.5 to 3.7	V
Operating temperature range	T_a	-40 to +105	°C

RECOMMENDED OPERATING CONDITIONS
All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

■ ELECTRICAL CHARACTERISTICS 1 (DC)

General conditions: T_a = +25°C, Z_s = Z_l = 50Ω

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Supply voltage	V_{DD}		1.5	1.8	3.7	V
Control voltage (High)	V_{CTL}(H)		1.5	1.8	3.7	V
Control voltage (Low)	V_{CTL}(L)		0	0	0.3	V
Operating current	I_{DD}	RF OFF, V_{DD} = 1.8 V, V_{CTL} = 1.8 V	-	1.9	3.2	mA
		RF OFF, V_{DD} = 2.8 V, V_{CTL} = 1.8 V	-	2	3.4	mA
		RF OFF, V_{DD} = 1.8 V, V_{CTL} = 0 V	-	0.1	3	µA
		RF OFF, V_{DD} = 2.8 V, V_{CTL} = 0 V	-	0.1	3	µA
Control current	I_{CTL}	RF OFF, V_{CTL} = 1.8 V	-	5	20	µA

■ ELECTRICAL CHARACTERISTICS 2 (RF)

General conditions: V_{DD} = 1.8 V, V_{CTL} = 1.8 V, f = 1164 MHz to 1610 MHz, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Small signal gain	Gain	f = 1176 MHz (L5 band), Exclude PCB, connector loss (0.16 dB)	16.5	18.5	-	dB
		f = 1227 MHz (L2 band), Exclude PCB, connector loss (0.16 dB)				
		f = 1278 MHz (L6 band), Exclude PCB, connector loss (0.17 dB)				
		f = 1575 MHz (L1 band), Exclude PCB, connector loss (0.21 dB)	16	18	-	
Noise figure	NF	f = 1176 MHz (L5 band), Exclude PCB, connector loss (0.07 dB)	-	0.7	1.05	dB
		f = 1227 MHz (L2 band), Exclude PCB, connector loss (0.07 dB)				
		f = 1278 MHz (L6 band), Exclude PCB, connector loss (0.07 dB)				
		f = 1575 MHz (L1 band), Exclude PCB, connector loss (0.09 dB)	-	0.7	1.05	
Isolation	ISL	f = 1176 MHz (L5 band)	26	30	-	dB
		f = 1227 MHz (L2 band)				
		f = 1278 MHz (L6 band)				
		f = 1575 MHz (L1 band)	28	33	-	
Input power at 1 dB gain compression point	P-1dB(IN)	f = 1176 MHz (L5 band)	-29	-20	-	dBm
		f = 1227 MHz (L2 band)				
		f = 1278 MHz (L6 band)				
		f = 1575 MHz (L1 band)	-33	-26	-	
Input 3rd order intercept point	IIP3	f1 = 1176 MHz, f2 = f1 + 1 MHz, P_{IN} = -45 dBm	-20	-7	-	dBm
		f1 = 1227 MHz, f2 = f1 + 1 MHz, P_{IN} = -45 dBm				
		f1 = 1278 MHz, f2 = f1 + 1 MHz, P_{IN} = -45 dBm				
		f1 = 1575 MHz, f2 = f1 + 1 MHz, P_{IN} = -45 dBm	-21	-10	-	
RFIN Return loss	RLi	f = 1176 MHz (L5 band)	6	11	-	dB
		f = 1227 MHz (L2 band)				
		f = 1278 MHz (L6 band)				
		f = 1575 MHz (L1 band)	6.5	9	-	
RFOUT Return loss	RLo	f = 1176 MHz (L5 band)	7.5	11	-	dB
		f = 1227 MHz (L2 band)				
		f = 1278 MHz (L6 band)				
		f = 1575 MHz (L1 band)	15	20	-	
k factor	k	f = 50 MHz to 10 GHz	1	-	-	-

■ ELECTRICAL CHARACTERISTICS 3 (RF)

General conditions: V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 1164 MHz to 1610 MHz, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit

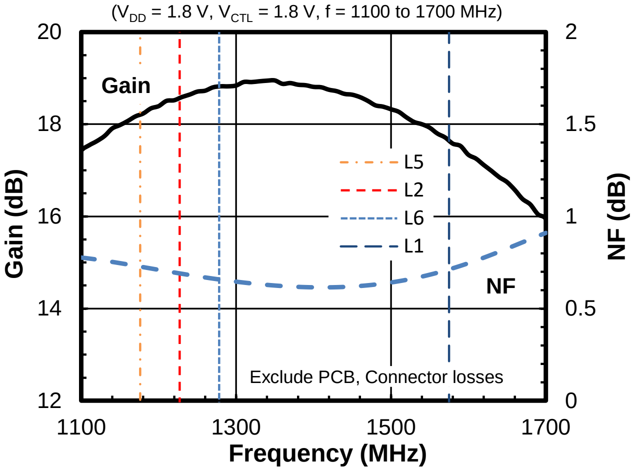
Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Small signal gain	Gain	f = 1176 MHz (L5 band), Exclude PCB, connector loss (0.16 dB)	-	18	-	dB
		f = 1227 MHz (L2 band), Exclude PCB, connector loss (0.16 dB)				
		f = 1278 MHz (L6 band), Exclude PCB, connector loss (0.17 dB)				
		f = 1575 MHz (L1 band), Exclude PCB, connector loss (0.21 dB)	-	18.5	-	
Noise figure	NF	f = 1176 MHz (L5 band), Exclude PCB, connector loss (0.07 dB)	-	0.7	-	dB
		f = 1227 MHz (L2 band), Exclude PCB, connector loss (0.07 dB)				
		f = 1278 MHz (L6 band), Exclude PCB, connector loss (0.07 dB)				
		f = 1575 MHz (L1 band), Exclude PCB, connector loss (0.09 dB)	-	0.7	-	
Isolation	ISL	f = 1176 MHz (L5 band)	-	32	-	dB
		f = 1227 MHz (L2 band)				
		f = 1278 MHz (L6 band)				
		f = 1575 MHz (L1 band)	-	33	-	
Input power at 1 dB gain compression point	P-1dB(IN)	f = 1176 MHz (L5 band)	-	-12	-	dBm
		f = 1227 MHz (L2 band)				
		f = 1278 MHz (L6 band)				
		f = 1575 MHz (L1 band)	-	-18	-	
Input 3rd order intercept point	IIP3	f1 = 1176 MHz, f2 = f1 + 1 MHz, P_{IN} = -35 dBm	-	-5	-	dBm
		f1 = 1227 MHz, f2 = f1 + 1 MHz, P_{IN} = -35 dBm				
		f1 = 1278 MHz, f2 = f1 + 1 MHz, P_{IN} = -35 dBm				
		f1 = 1575 MHz, f2 = f1 + 1 MHz, P_{IN} = -35 dBm	-	-10	-	
RFIN Return loss	RLi	f = 1176 MHz (L5 band)	-	10	-	dB
		f = 1227 MHz (L2 band)				
		f = 1278 MHz (L6 band)				
		f = 1575 MHz (L1 band)	-	9	-	
RFOUT Return loss	RLo	f = 1176 MHz (L5 band)	-	10	-	dB
		f = 1227 MHz (L2 band)				
		f = 1278 MHz (L6 band)				
		f = 1575 MHz (L1 band)	-	17	-	
k factor	k	f = 50 MHz to 10 GHz	1	-	-	-

■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 1.8 V, V_{CTL} = 1.8 V, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

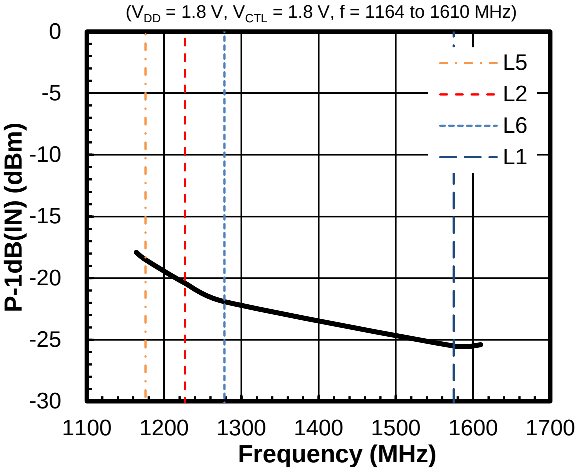
Gain, NF vs. Frequency

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, f = 1100 to 1700 MHz)



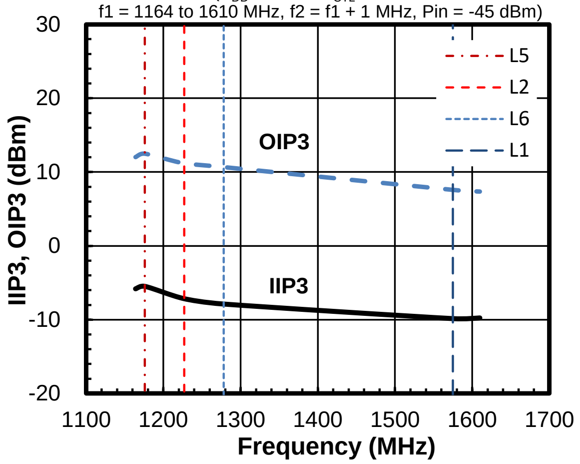
P-1dB(IN) vs. Frequency

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, f = 1164 to 1610 MHz)



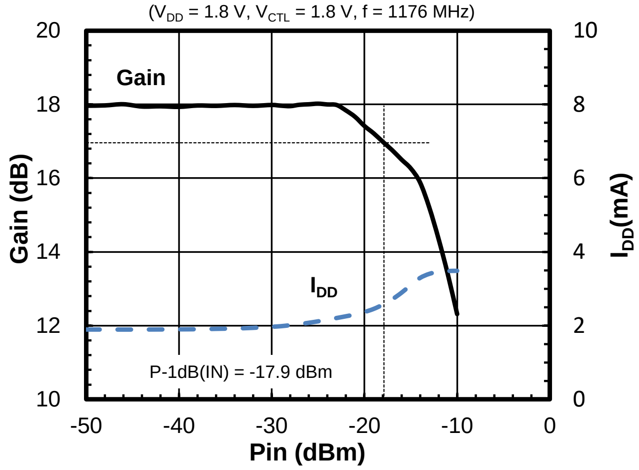
IIP3, OIP3 vs. Frequency

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V,
f1 = 1164 to 1610 MHz, f2 = f1 + 1 MHz, Pin = -45 dBm)



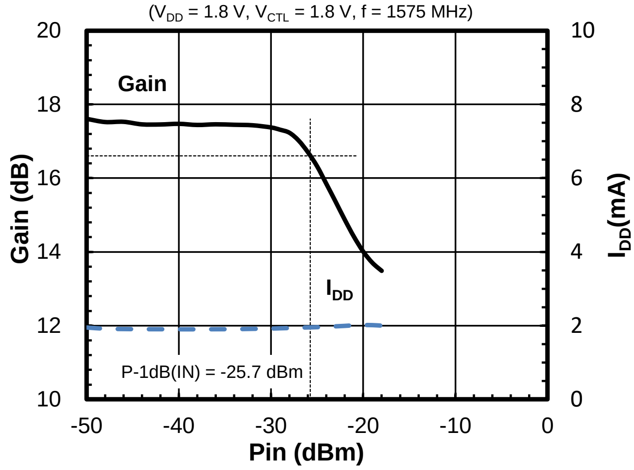
Gain, I_{DD} vs. Pin

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, f = 1176 MHz)



Gain, I_{DD} vs. Pin

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, f = 1575 MHz)

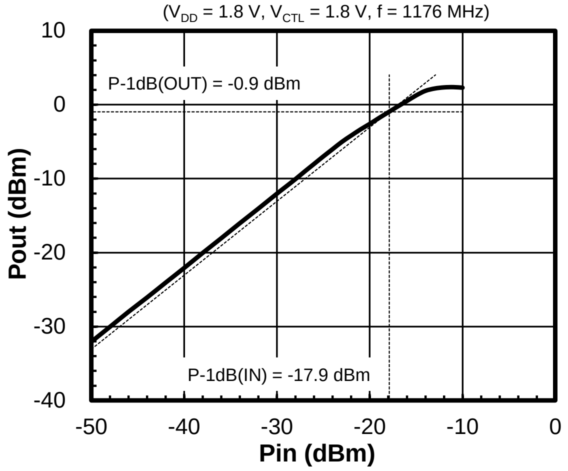


■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 1.8 V, V_{CTL} = 1.8 V, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

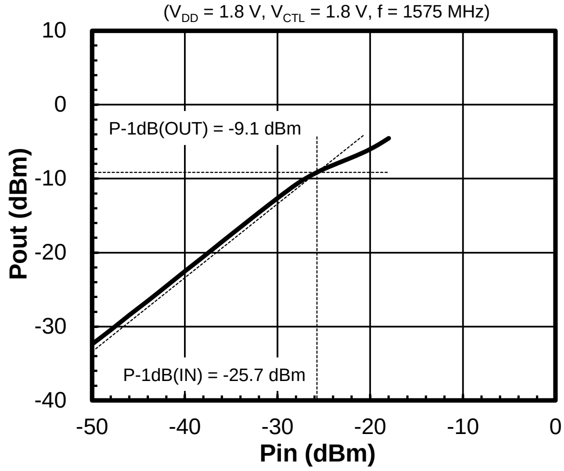
Pout vs. Pin

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, f = 1176 MHz)



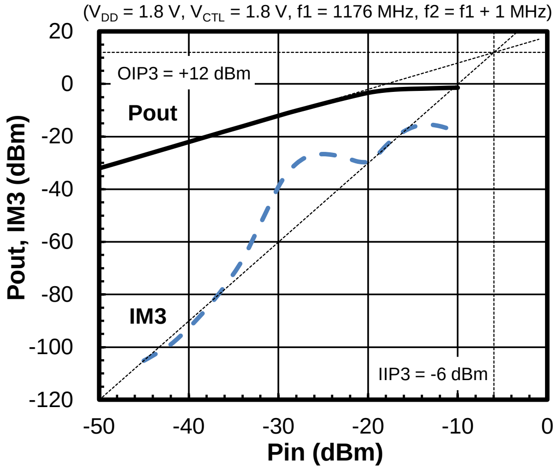
Pout vs. Pin

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, f = 1575 MHz)



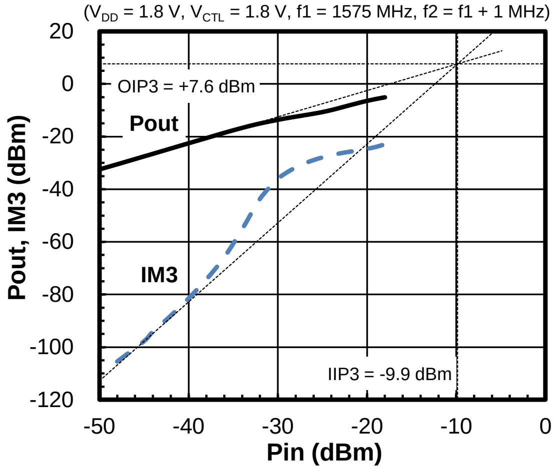
Pout, IM3 vs. Pin

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, f1 = 1176 MHz, f2 = f1 + 1 MHz)



Pout, IM3 vs. Pin

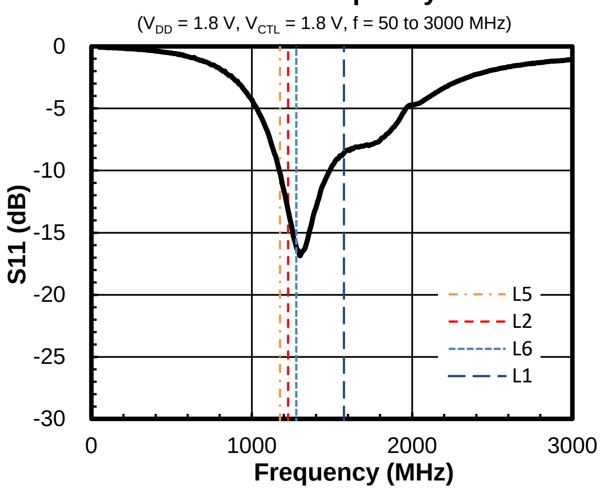
(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, f1 = 1575 MHz, f2 = f1 + 1 MHz)



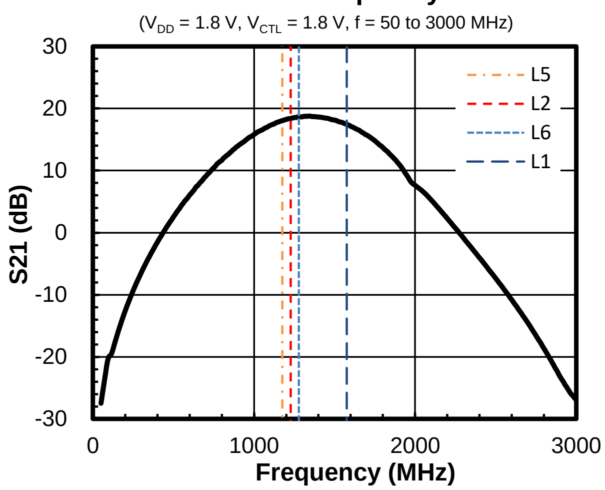
■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 1.8 V, V_{CTL} = 1.8 V, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

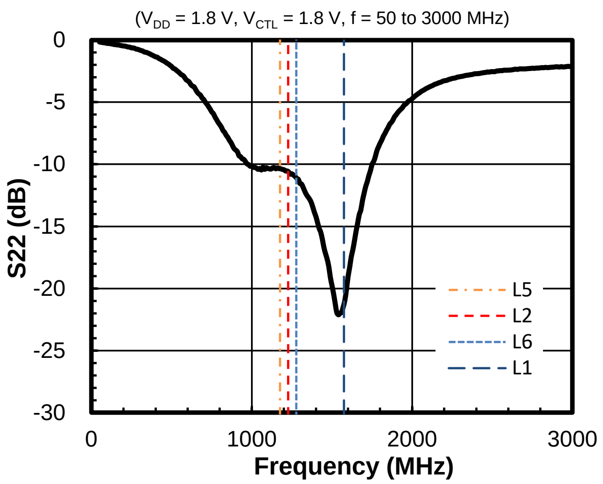
S11 vs. Frequency



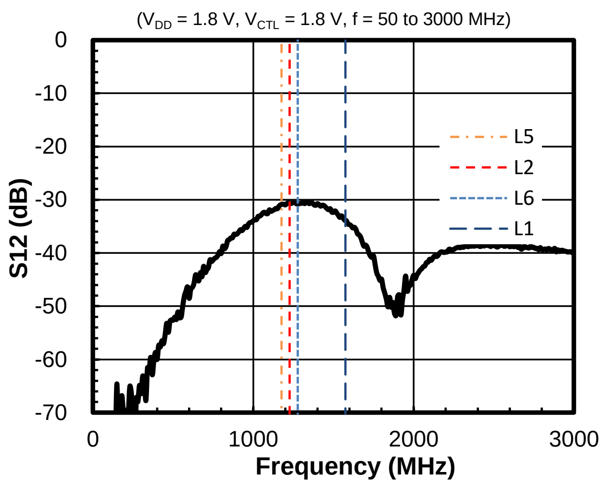
S21 vs. Frequency

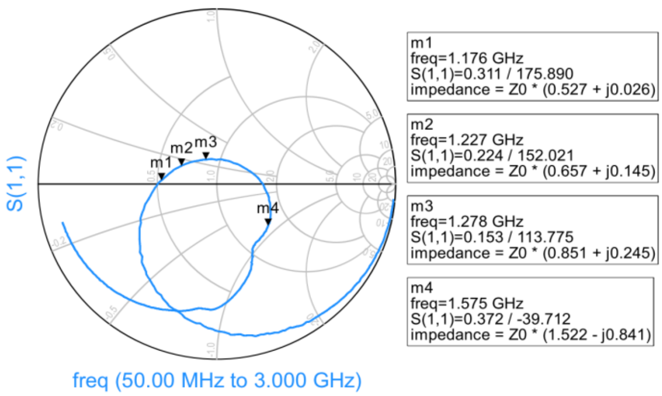


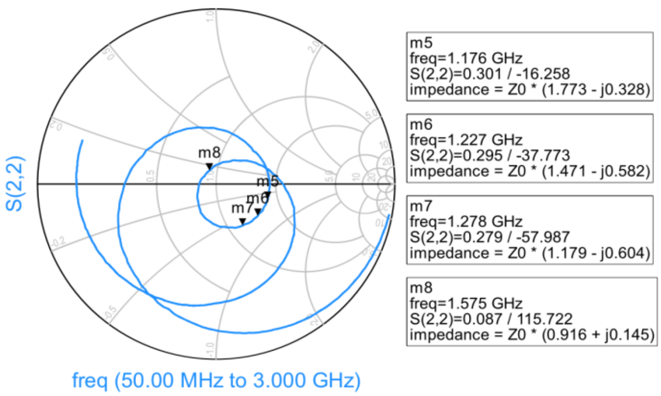
S22 vs. Frequency



S12 vs. Frequency

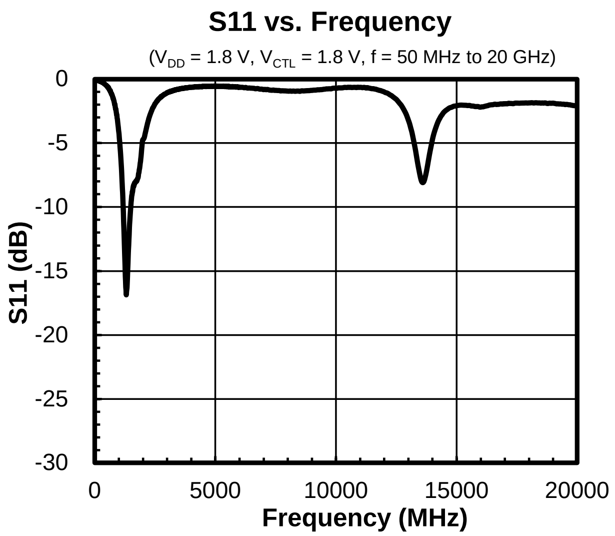


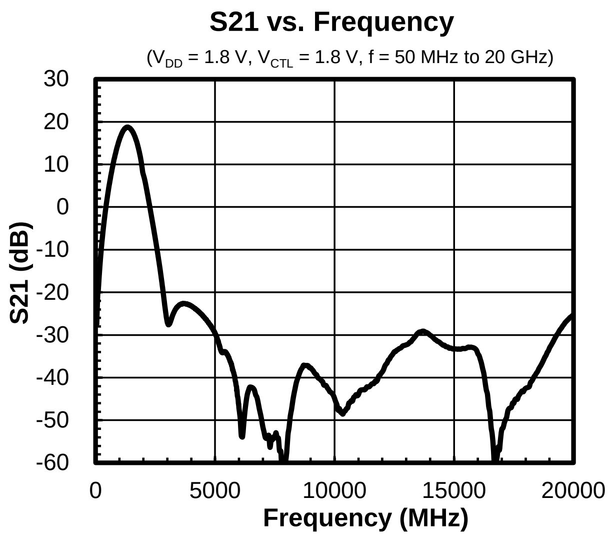


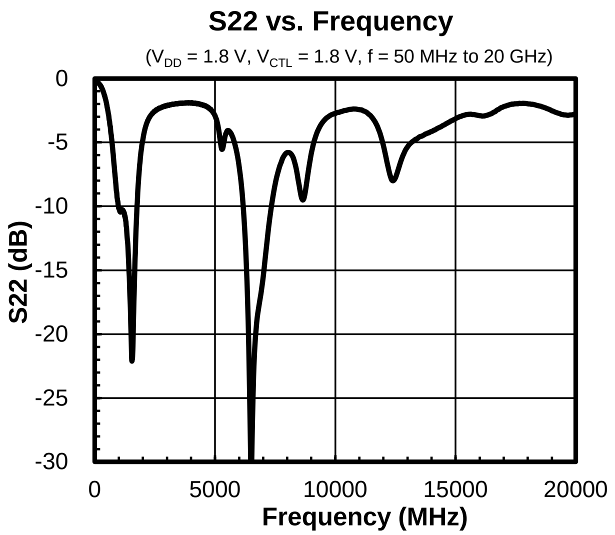


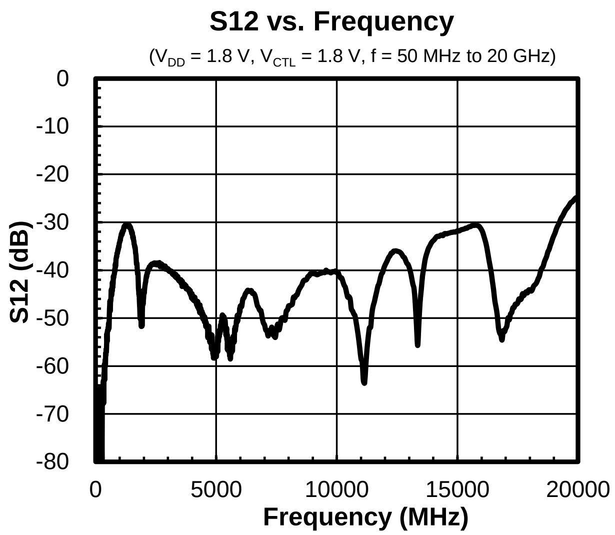
■ TYPICAL CHARACTERISTICS

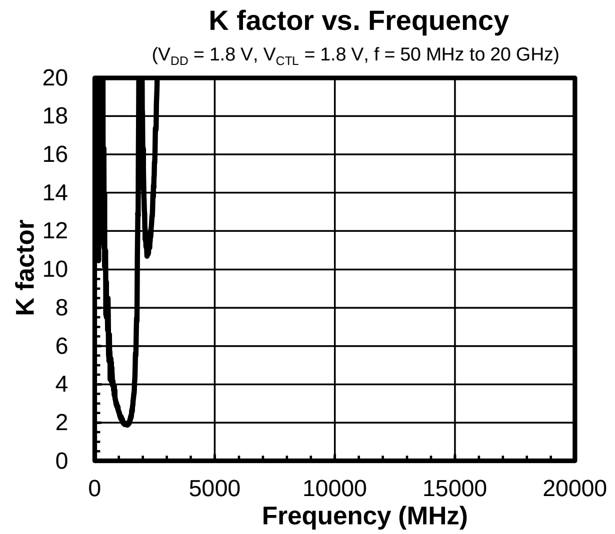
General conditions: V_{DD} = 1.8 V, V_{CTL} = 1.8 V, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)









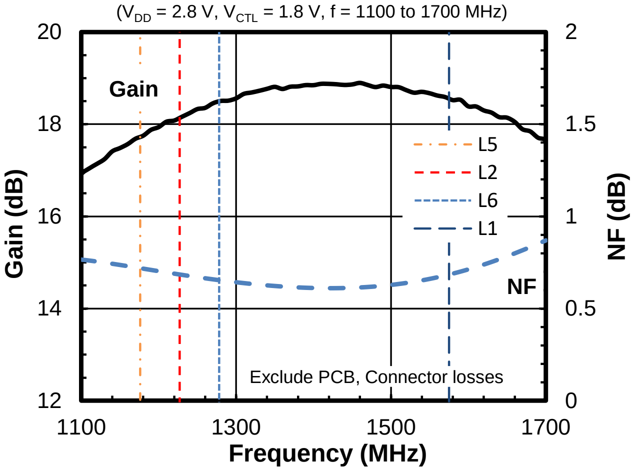


■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 2.8 V, V_{CTL} = 1.8 V, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

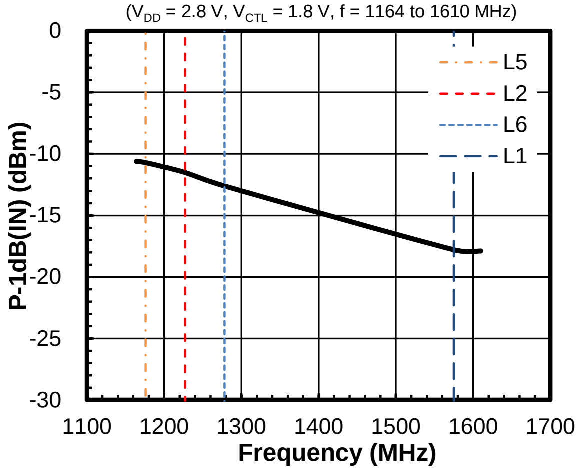
Gain, NF vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 1100 to 1700 MHz)



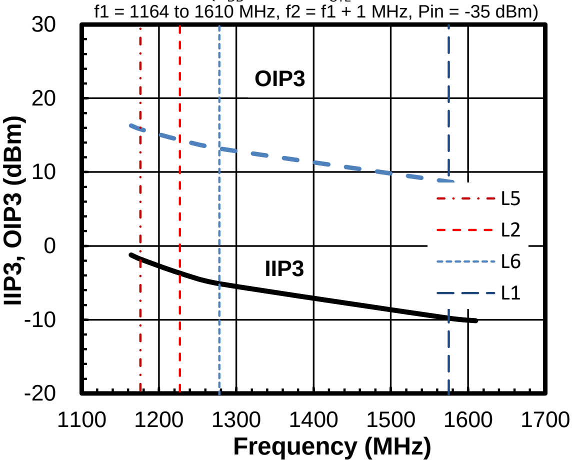
P-1dB(IN) vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 1164 to 1610 MHz)



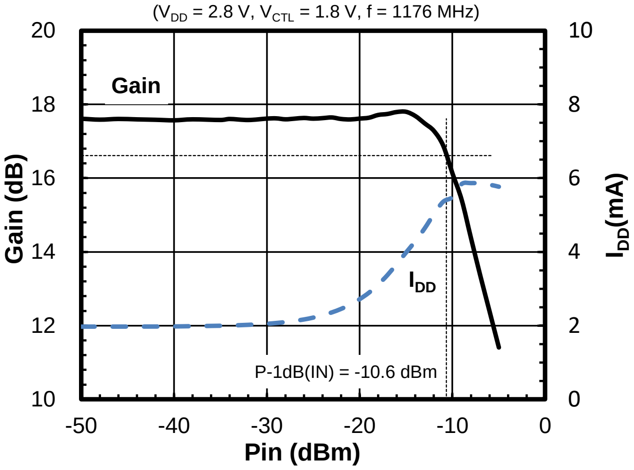
IIP3, OIP3 vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V,
f1 = 1164 to 1610 MHz, f2 = f1 + 1 MHz, Pin = -35 dBm)



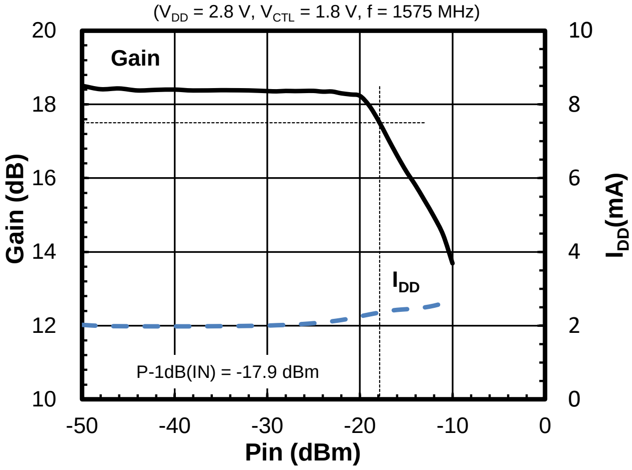
Gain, I_{DD} vs. Pin

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 1176 MHz)



Gain, I_{DD} vs. Pin

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 1575 MHz)

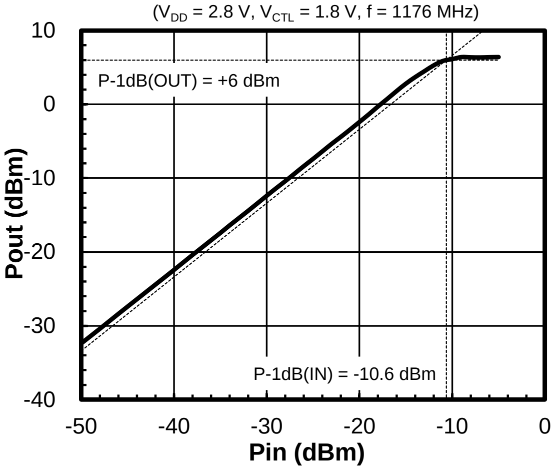


■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 2.8 V, V_{CTL} = 1.8 V, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

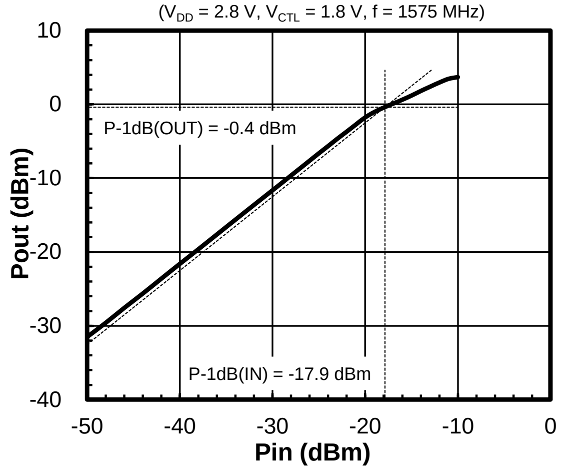
Pout vs. Pin

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 1176 MHz)



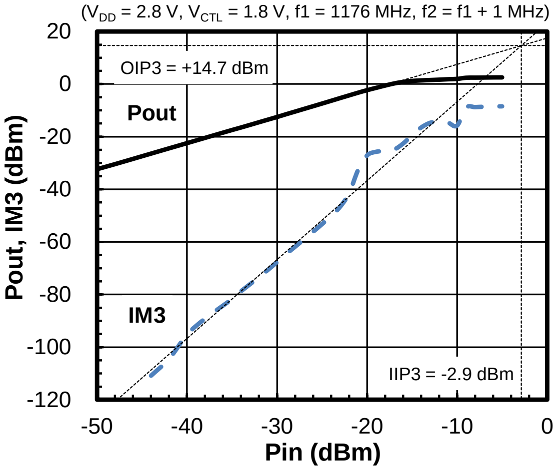
Pout vs. Pin

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 1575 MHz)



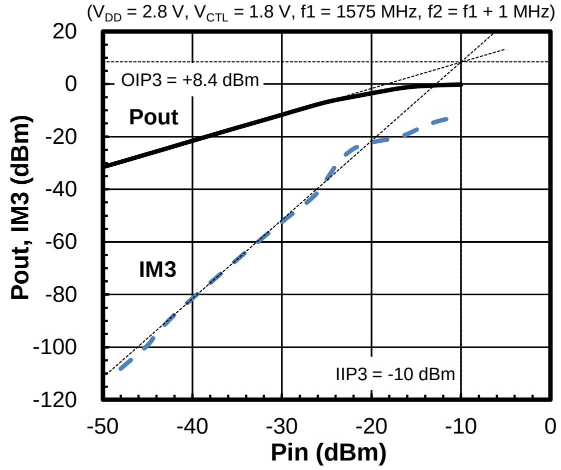
Pout, IM3 vs. Pin

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f1 = 1176 MHz, f2 = f1 + 1 MHz)



Pout, IM3 vs. Pin

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f1 = 1575 MHz, f2 = f1 + 1 MHz)

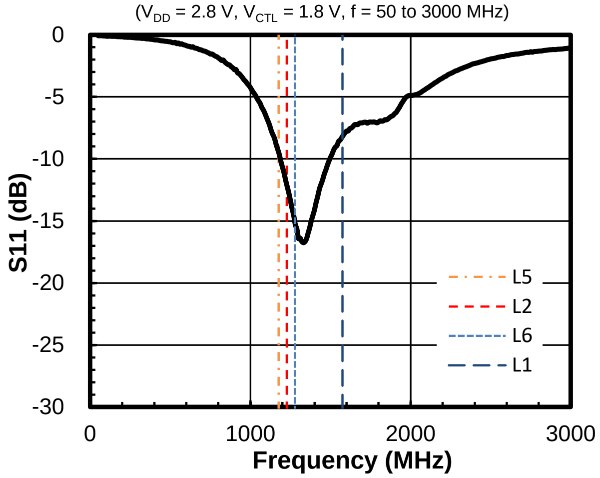


■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 2.8 V, V_{CTL} = 1.8 V, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

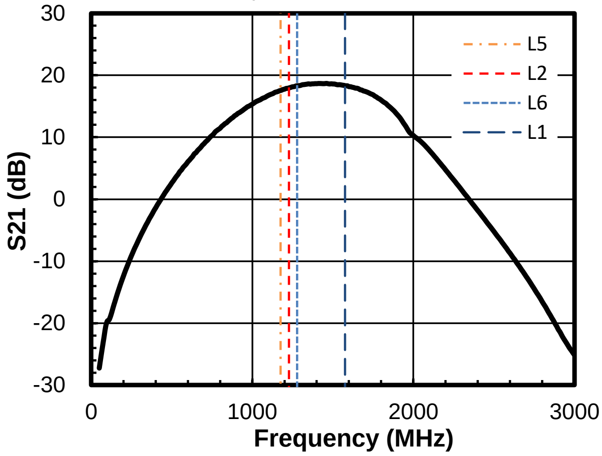
S11 vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 50 to 3000 MHz)



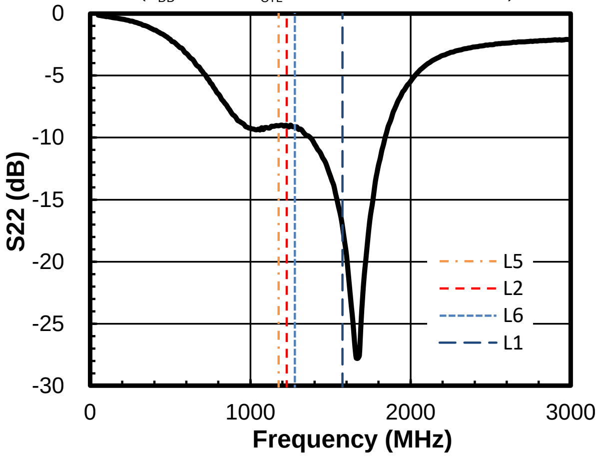
S21 vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 50 to 3000 MHz))



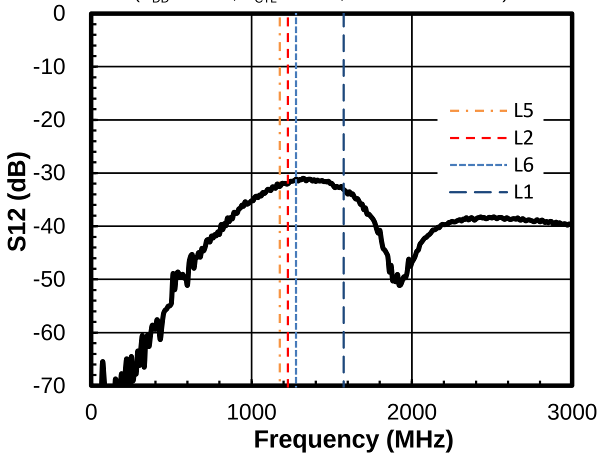
S22 vs. Frequency

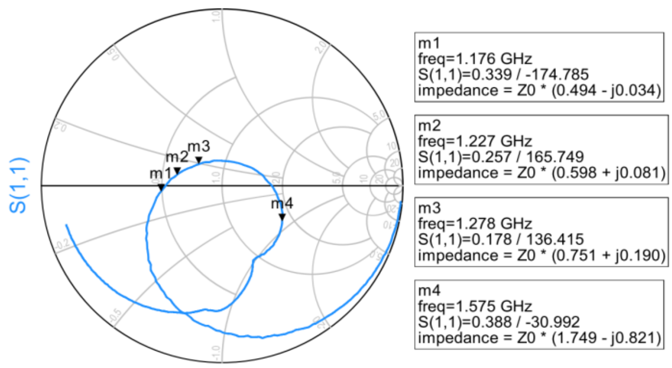
(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 50 to 3000 MHz)



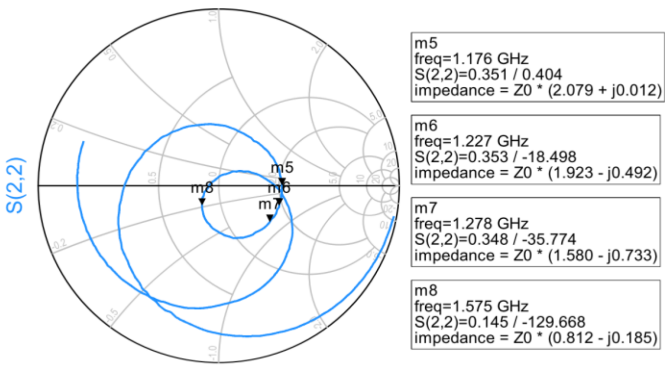
S12 vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 50 to 3000 MHz)





freq (50.00 MHz to 3.000 GHz)



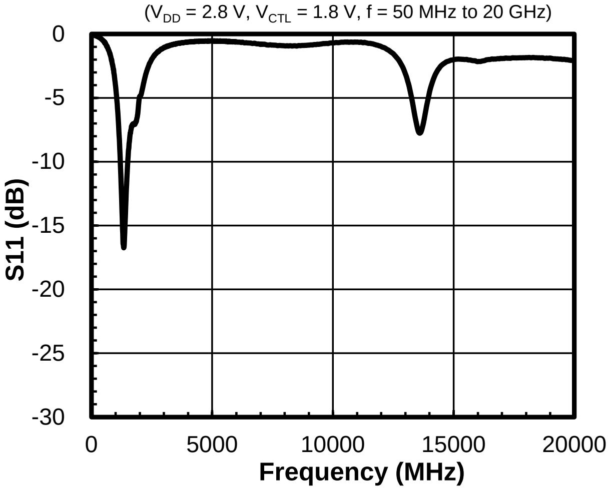
freq (50.00 MHz to 3.000 GHz)

■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 2.8 V, V_{CTL} = 1.8 V, T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

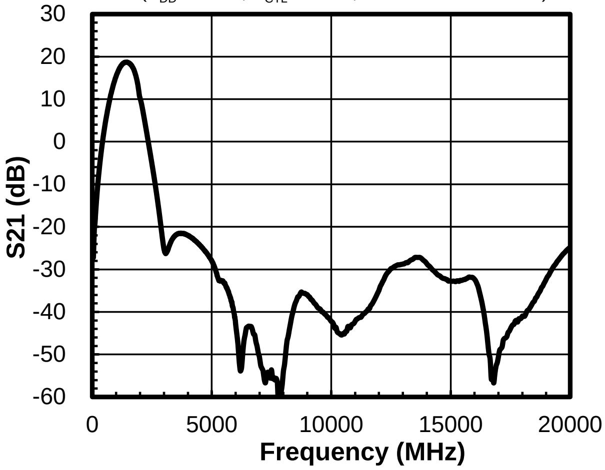
S11 vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 50 MHz to 20 GHz)



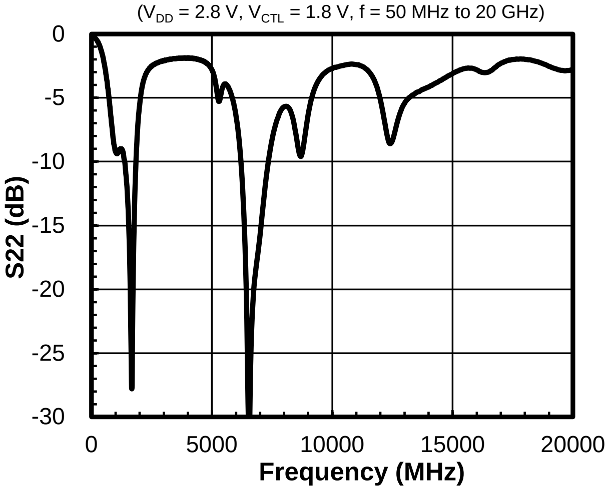
S21 vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 50 MHz to 20 GHz)



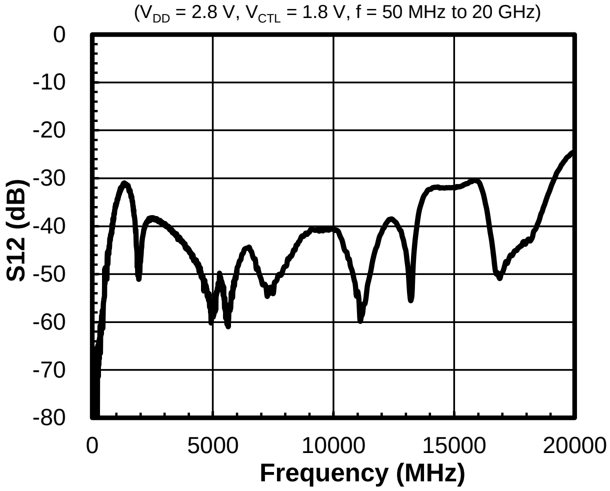
S22 vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 50 MHz to 20 GHz)



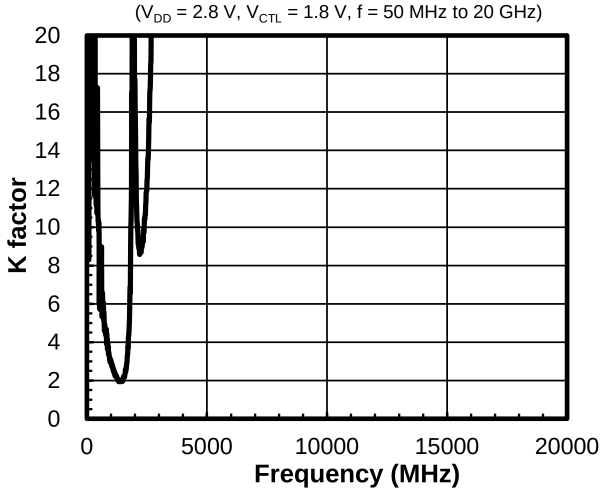
S12 vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 50 MHz to 20 GHz)



K factor vs. Frequency

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, f = 50 MHz to 20 GHz)



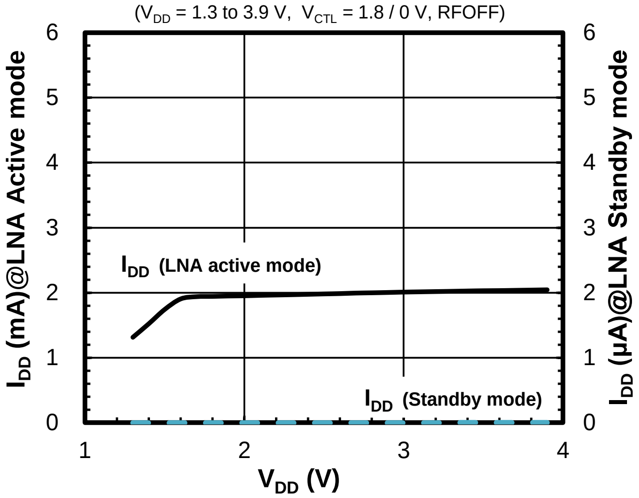
■ TYPICAL CHARACTERISTICS

General conditions: T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit

(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

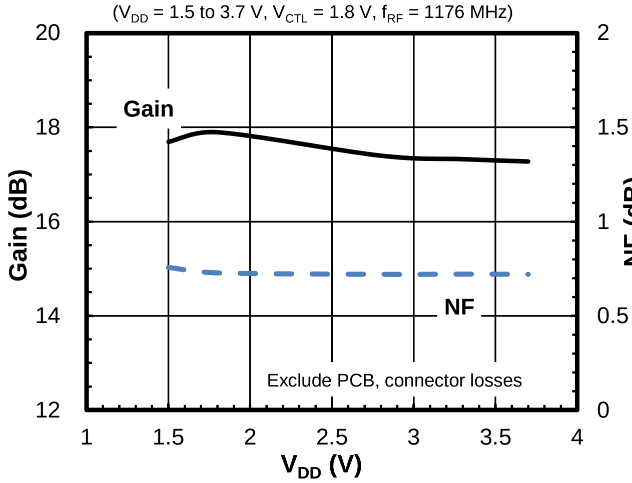
I_{DD} vs. V_{DD}

(V_{DD} = 1.3 to 3.9 V, V_{CTL} = 1.8 / 0 V, RFOFF)



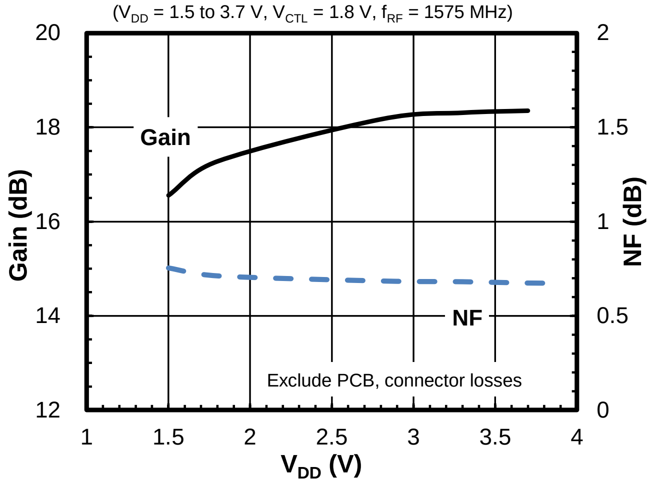
Gain, NF vs. V_{DD}

(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8 V, f_{RF} = 1176 MHz)



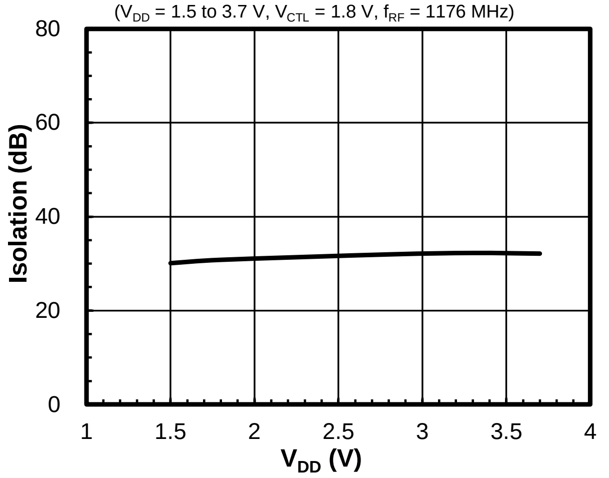
Gain, NF vs. V_{DD}

(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8 V, f_{RF} = 1575 MHz)



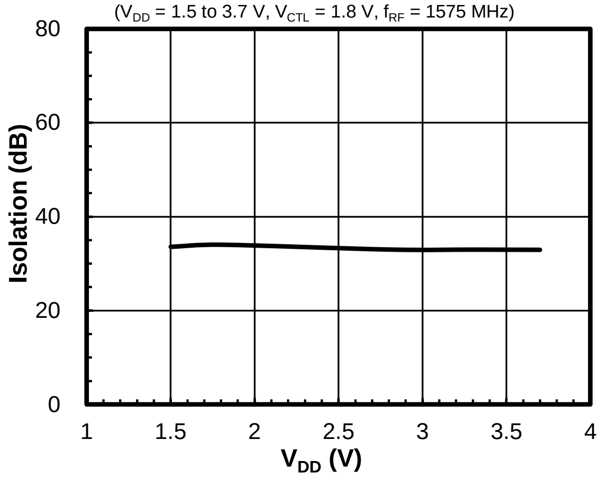
Isolation vs. V_{DD}

(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8 V, f_{RF} = 1176 MHz)



Isolation vs. V_{DD}

(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8 V, f_{RF} = 1575 MHz)



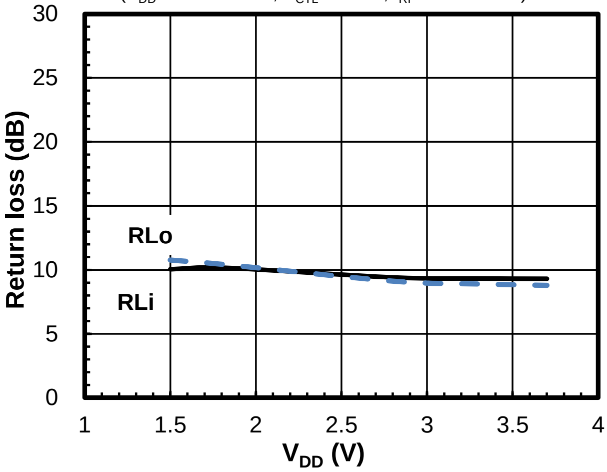
■ TYPICAL CHARACTERISTICS

General conditions: T_a = +25°C, Z_s = Z_l = 50Ω, with application circuit

(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

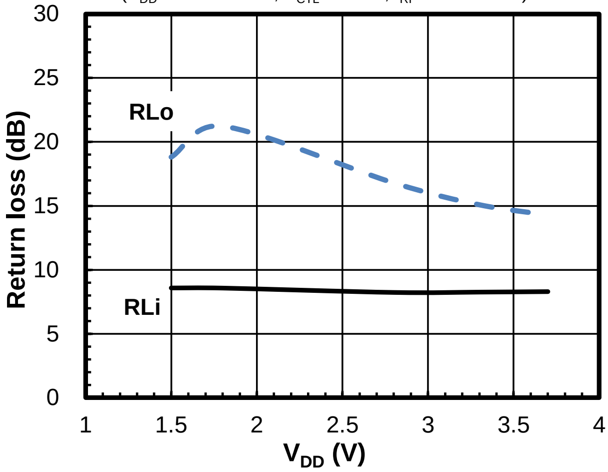
Return loss vs. V_{DD}

(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8 V, f_{RF} = 1176 MHz)



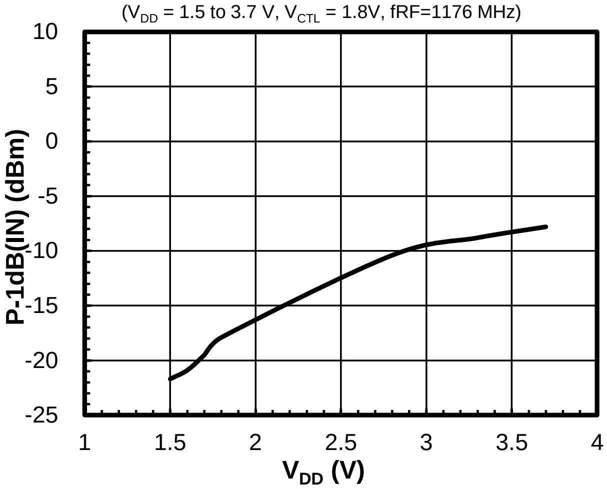
Return loss vs. V_{DD}

(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8 V, f_{RF} = 1575 MHz)



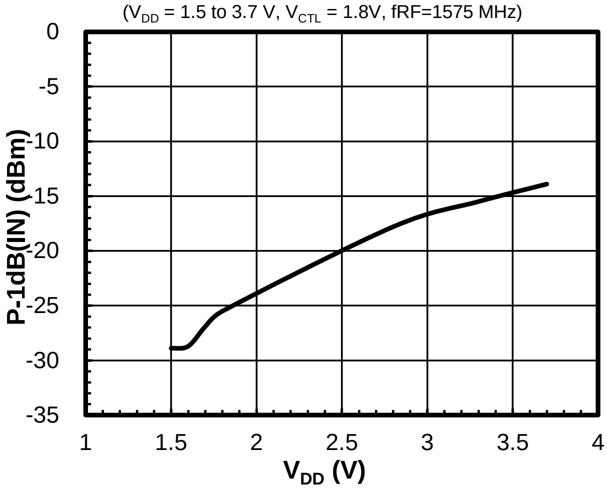
P-1dB(IN) vs. V_{DD}

(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8V, fRF=1176 MHz)



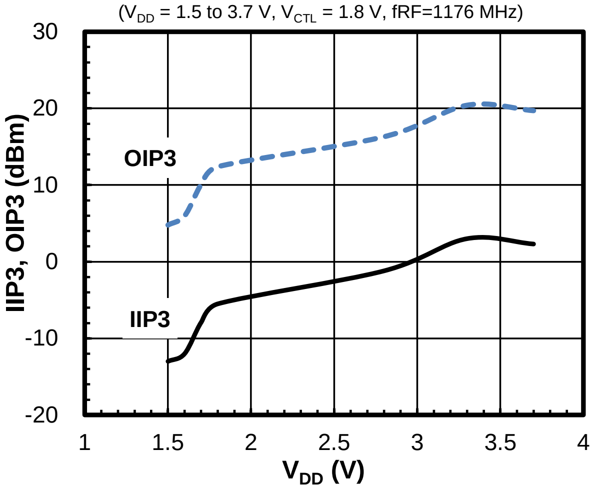
P-1dB(IN) vs. V_{DD}

(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8V, fRF=1575 MHz)



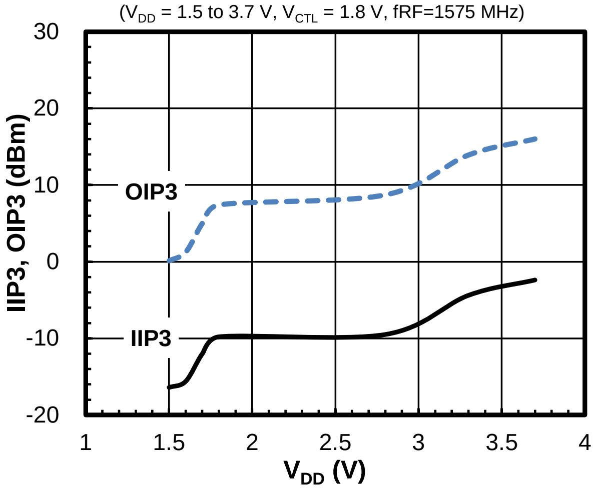
IIP3, OIP3 vs. V_{DD}

(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8 V, fRF=1176 MHz)



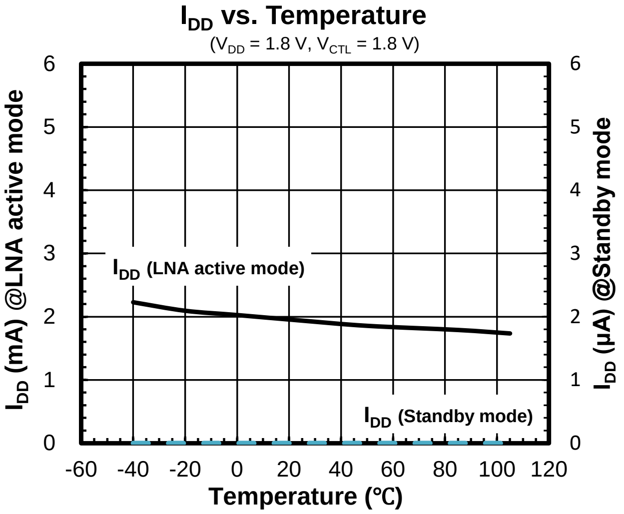
IIP3, OIP3 vs. V_{DD}

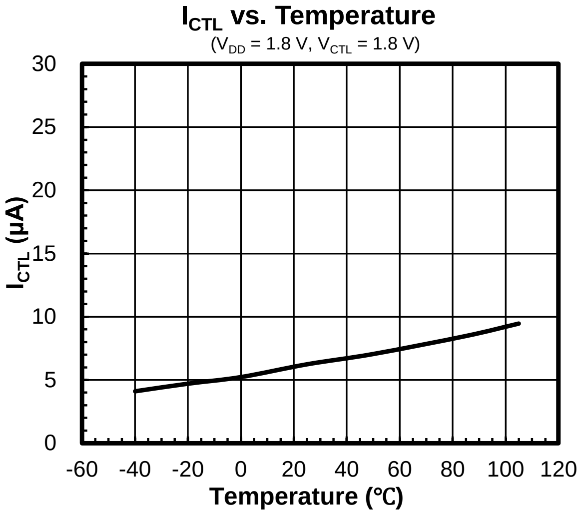
(V_{DD} = 1.5 to 3.7 V, V_{CTL} = 1.8 V, fRF=1575 MHz)

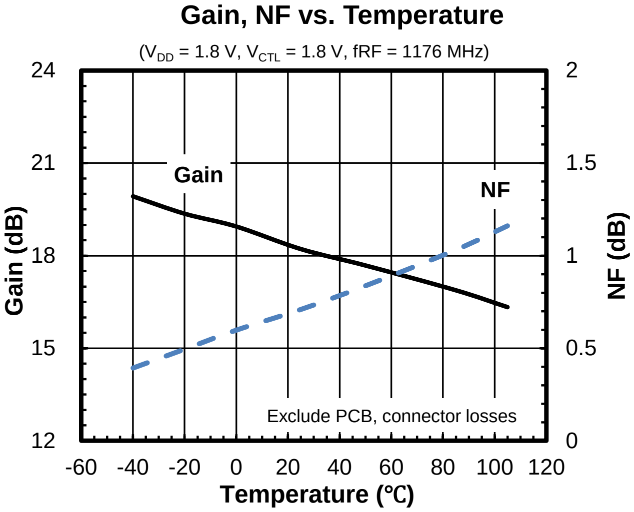


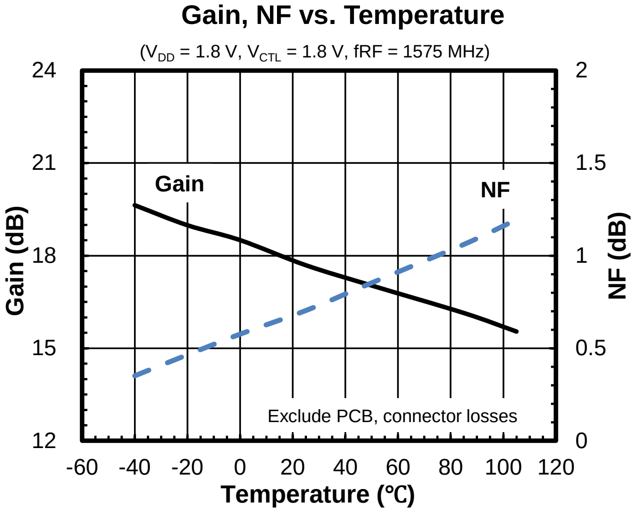
■ TYPICAL CHARACTERISTICS

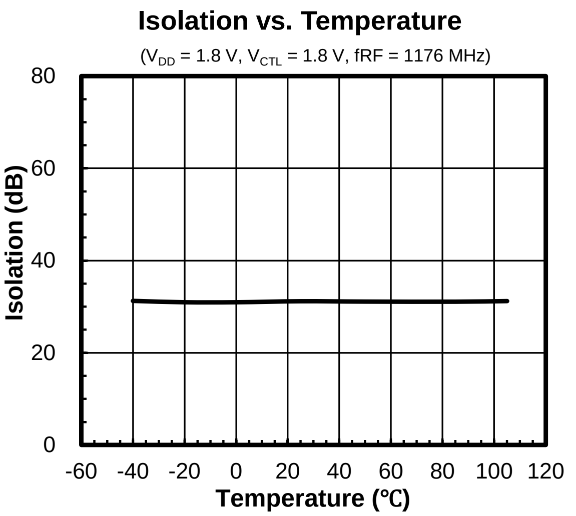
General conditions: V_{DD} = 1.8 V, V_{CTL} = 1.8 V, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

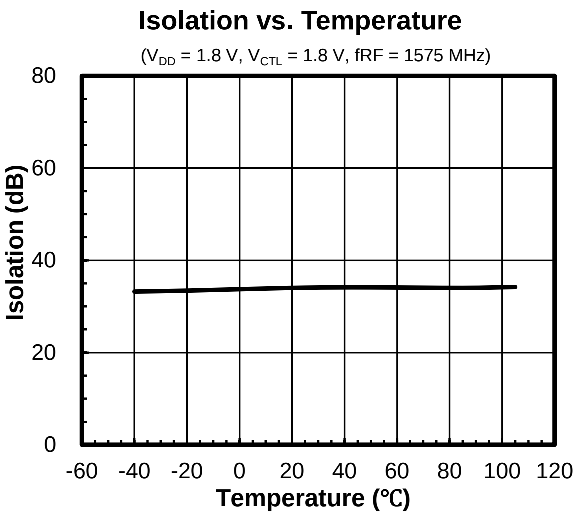










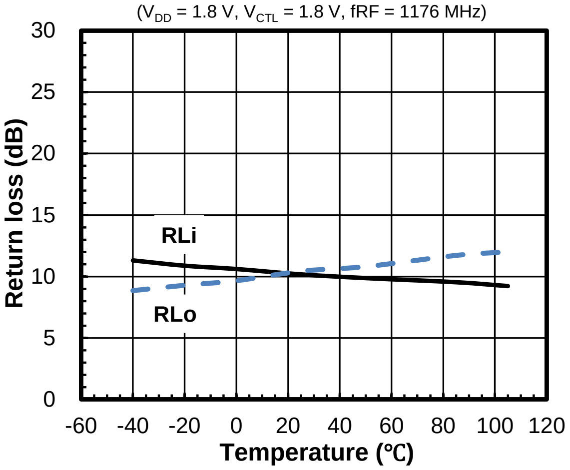


■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 1.8 V, V_{CTL} = 1.8 V, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

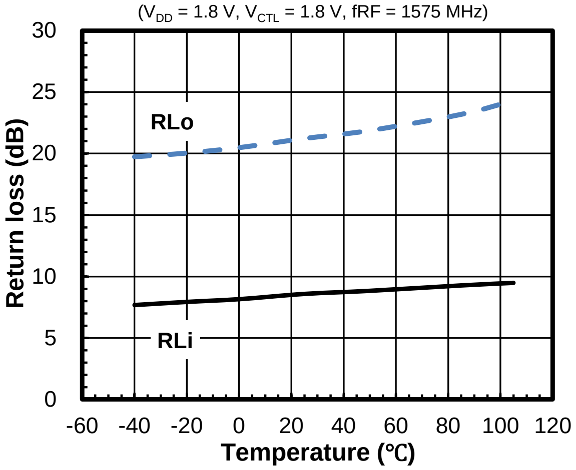
Return loss vs. Temperature

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, fRF = 1176 MHz)



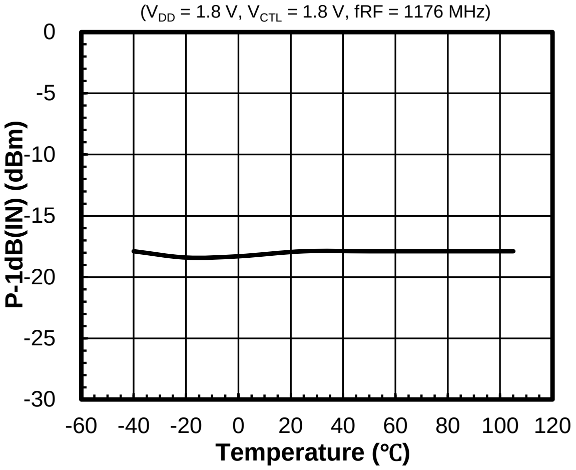
Return loss vs. Temperature

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, fRF = 1575 MHz)



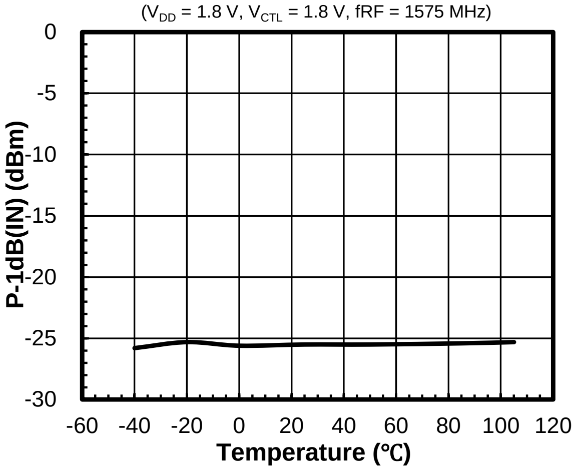
P-1dB(IN) vs. Temperature

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, fRF = 1176 MHz)



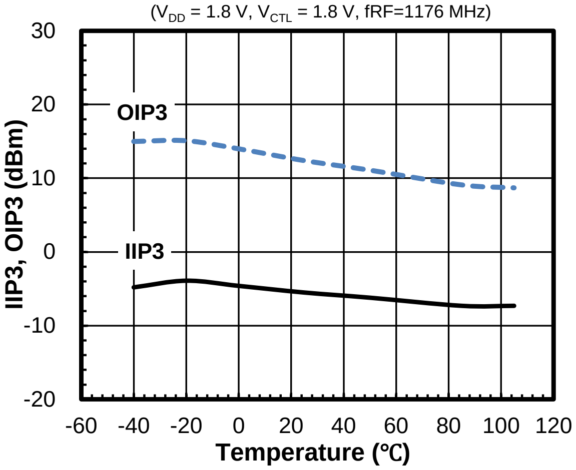
P-1dB(IN) vs. Temperature

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, fRF = 1575 MHz)



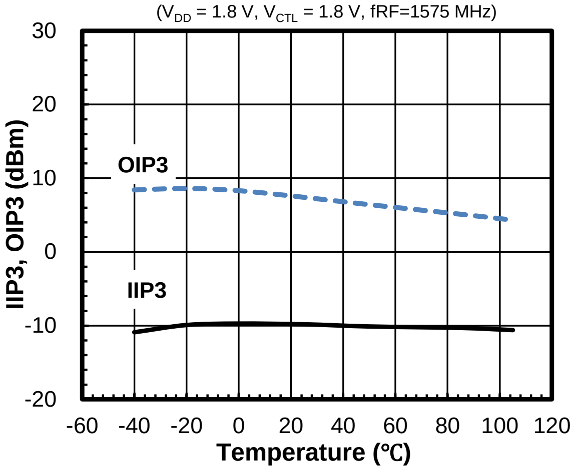
IIP3, OIP3 vs. Temperature

(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, fRF=1176 MHz)



IIP3, OIP3 vs. Temperature

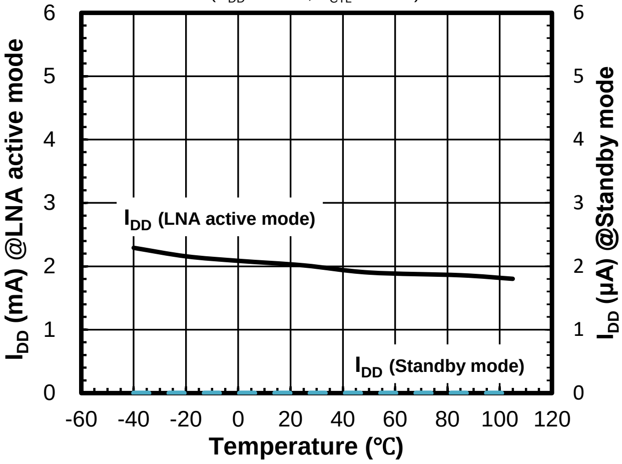
(V_{DD} = 1.8 V, V_{CTL} = 1.8 V, fRF=1575 MHz)



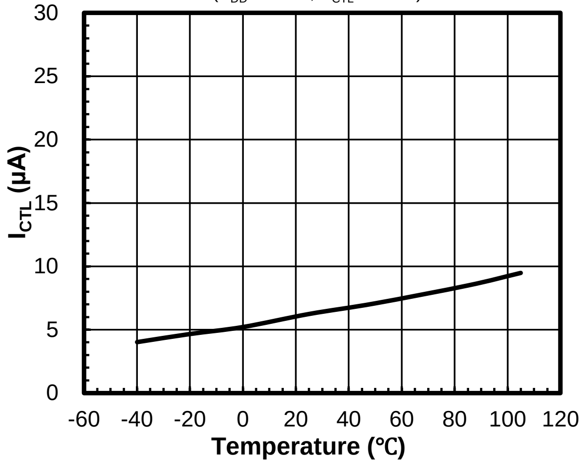
■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 2.8 V, V_{CTL} = 1.8 V, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

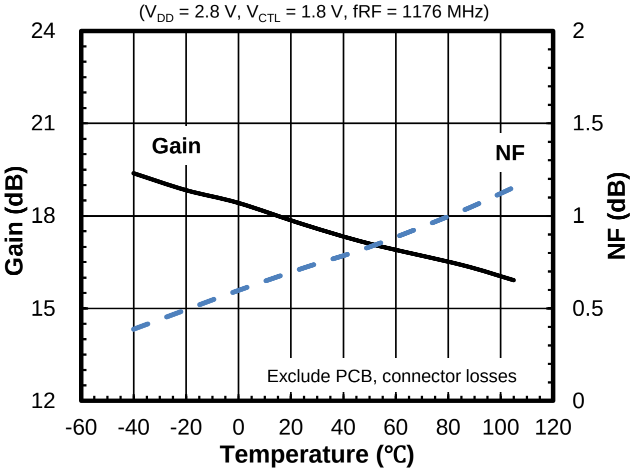
I_{DD} vs. Temperature
(V_{DD} = 2.8 V, V_{CTL} = 1.8 V)



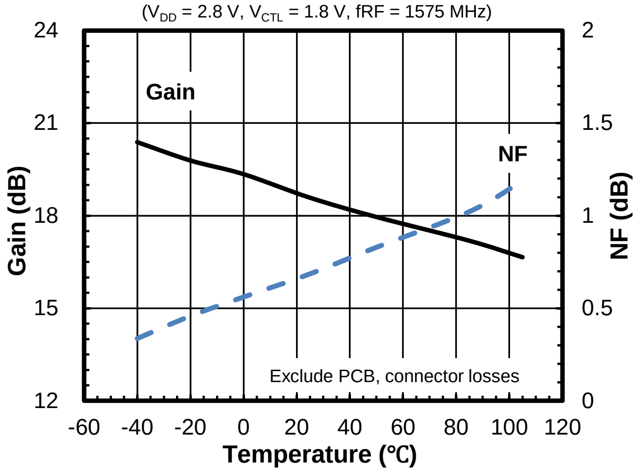
I_{CTL} vs. Temperature
(V_{DD} = 2.8 V, V_{CTL} = 1.8 V)



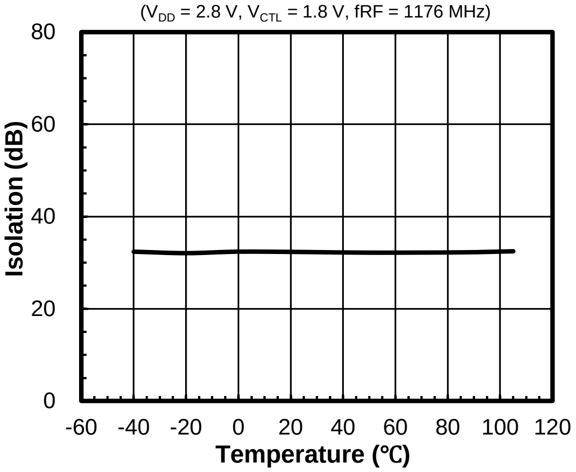
Gain, NF vs. Temperature
(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF = 1176 MHz)



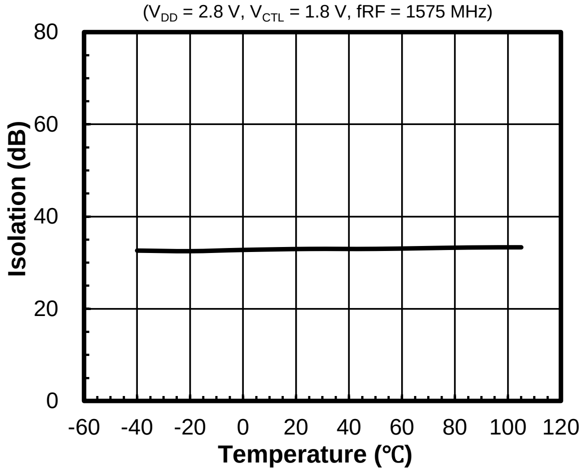
Gain, NF vs. Temperature
(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF = 1575 MHz)



Isolation vs. Temperature
(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF = 1176 MHz)



Isolation vs. Temperature
(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF = 1575 MHz)

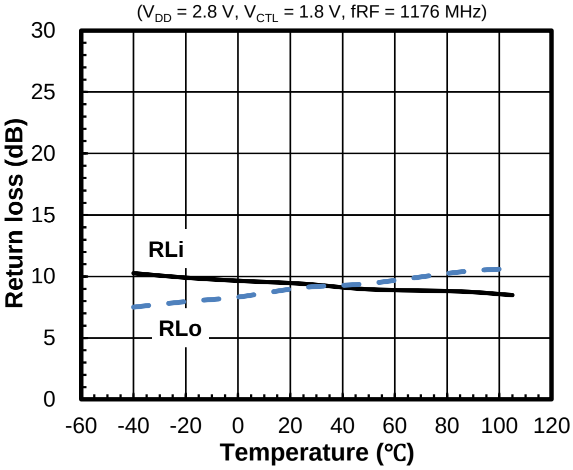


■ TYPICAL CHARACTERISTICS

General conditions: V_{DD} = 2.8 V, V_{CTL} = 1.8 V, Z_s = Z_l = 50Ω, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)

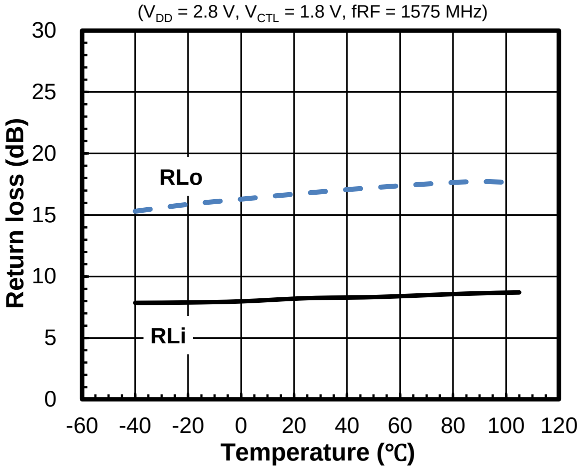
Return loss vs. Temperature

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF = 1176 MHz)



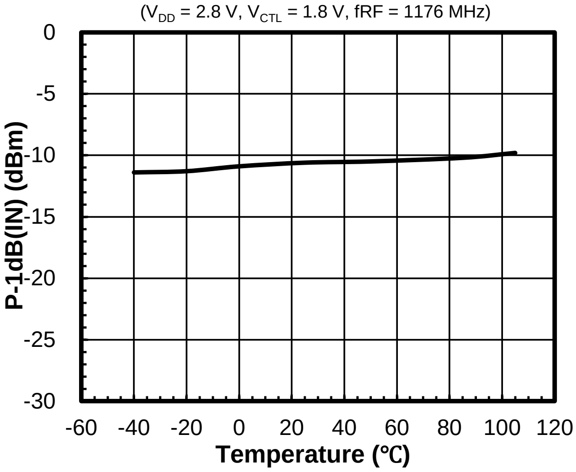
Return loss vs. Temperature

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF = 1575 MHz)



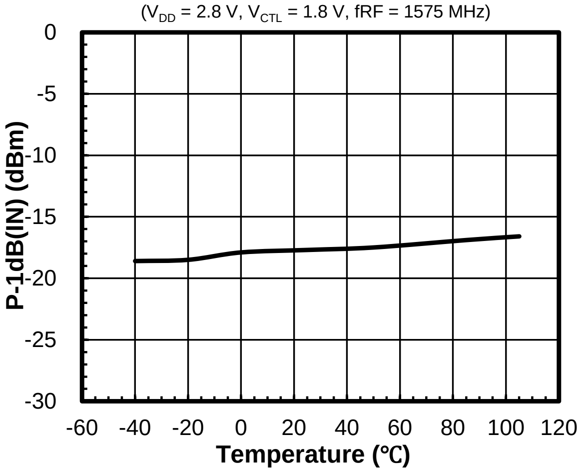
P-1dB(IN) vs. Temperature

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF = 1176 MHz)



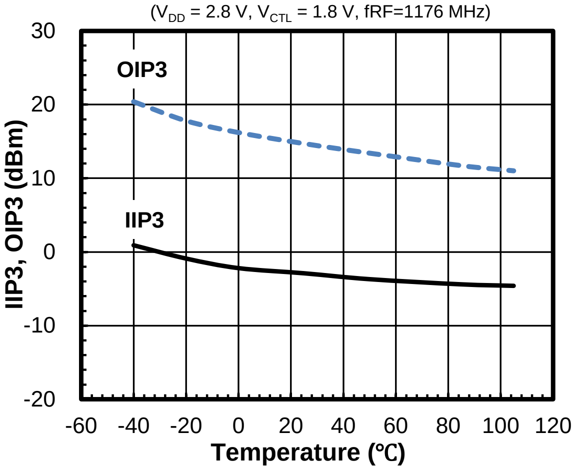
P-1dB(IN) vs. Temperature

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF = 1575 MHz)



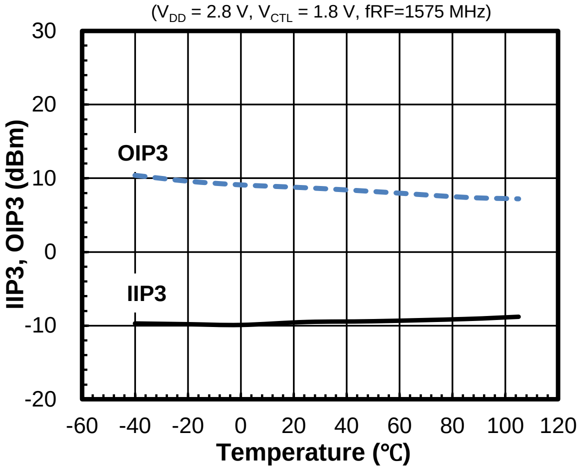
IIP3, OIP3 vs. Temperature

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF=1176 MHz)

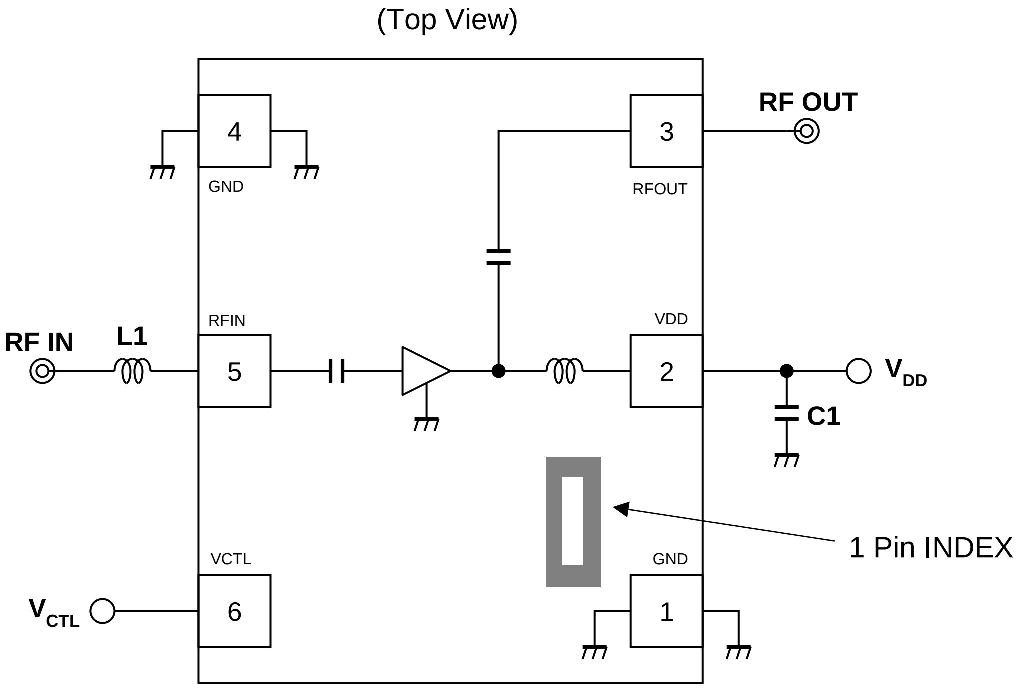


IIP3, OIP3 vs. Temperature

(V_{DD} = 2.8 V, V_{CTL} = 1.8 V, fRF=1575 MHz)



■ **APPLICATION CIRCUIT**



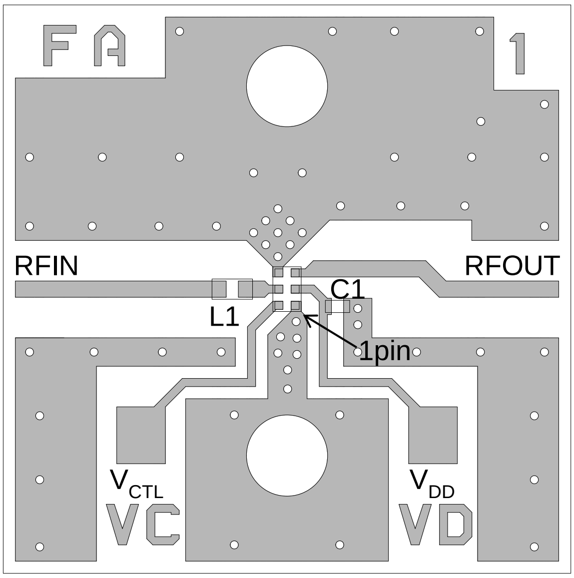
NT1195FAAE2S Typical Application Circuit

<Parts list>

Part ID	Value	Notes
L1	13 nH	LQW15AN series (MURATA)
C1	1000 pF	GRM03 series (MURATA)

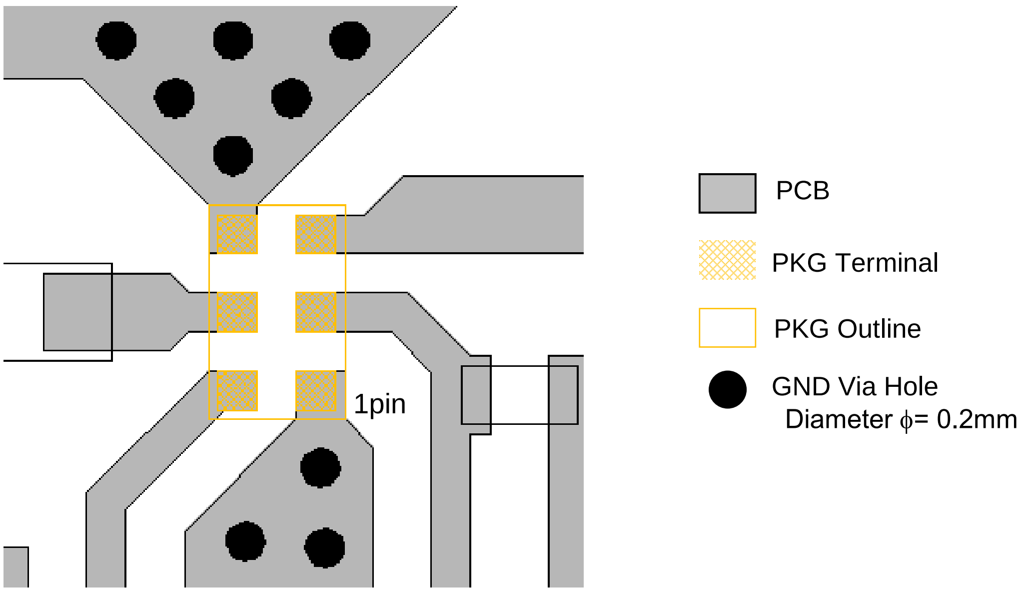
- **Evaluation Board / PCB layout**

(Top View)



PCB
Substrate: FR-4
Thickness: 0.2 mm
Microstrip line width: 0.4 mm (Z_0=50Ω)
Size: 14.0 x 14.0 mm

- **PCB layout guideline**

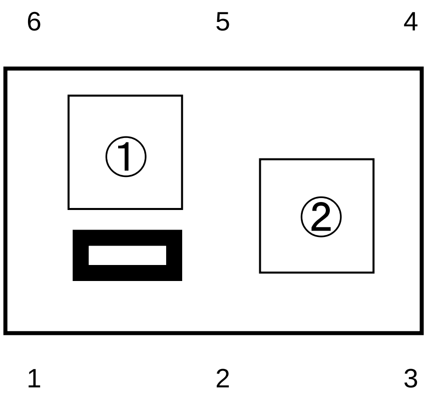


- **PRECAUTIONS**

• All external parts should be placed as close as possible to the LNA.
• For good RF performance, all GND terminals must be connected to PCB ground plane of substrate, and via-holes for GND should be placed near the LNA.

■ MARKING SPECIFICATION

① : Product Code
② : Lot Number ··· Alphanumeric Serial Number



EPFFP-6-FA Marking Specification

NOTICE
There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact our sales or distributor before attempting to use AOI.

EPFFP-6-FA Marking List

Product Name	①
NT1195FAAE2S	A

■ APPLICATION NOTES

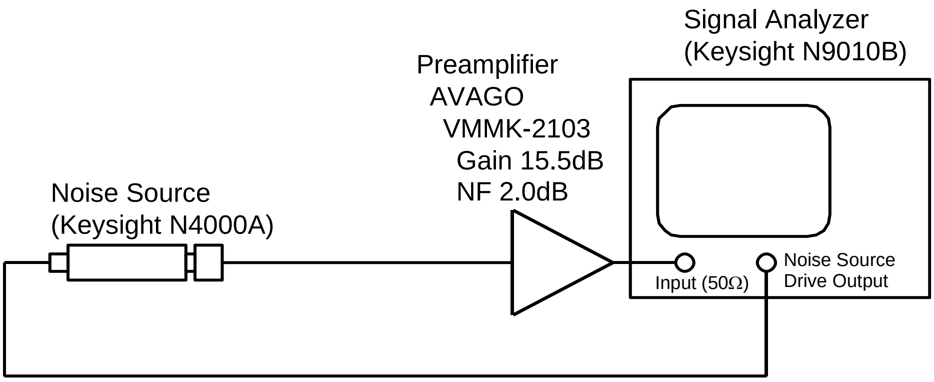
● NF Measurement Block Diagram

Measuring Instruments

Signal Analyzer	: Keysight N9010B
Noise Source	: Keysight N4000A

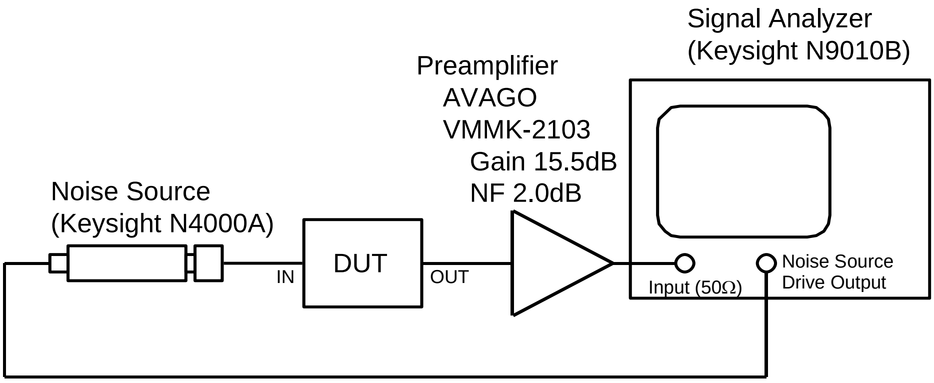
Setting the Signal analyzer

Mode/Measurement/View Selector	
Mode	: Noise Figure
Measurement	: Noise Figure
Frequency	
Center Frequency	: 1.4 GHz
Span	: 600 MHz
Points	: 61
Amplitude	
Attenuation	: 0 dB
Signal Path	: Internal Preamp on (Auto)
BW	
Res BW	: 4 MHz (Auto)
Meas Setup	
Averaging	: On
Avg/Hold Num	: 16
Tcold	: SNS Tcold On



*Preamplifier is used to improve NF measurement accuracy.
* Noise source, preamplifier and NF analyzer are connected directly.

Calibration Setup



* Noise source, DUT, preamplifier and NF analyzer are connected directly.

Measurement Setup

■ **Revision History**

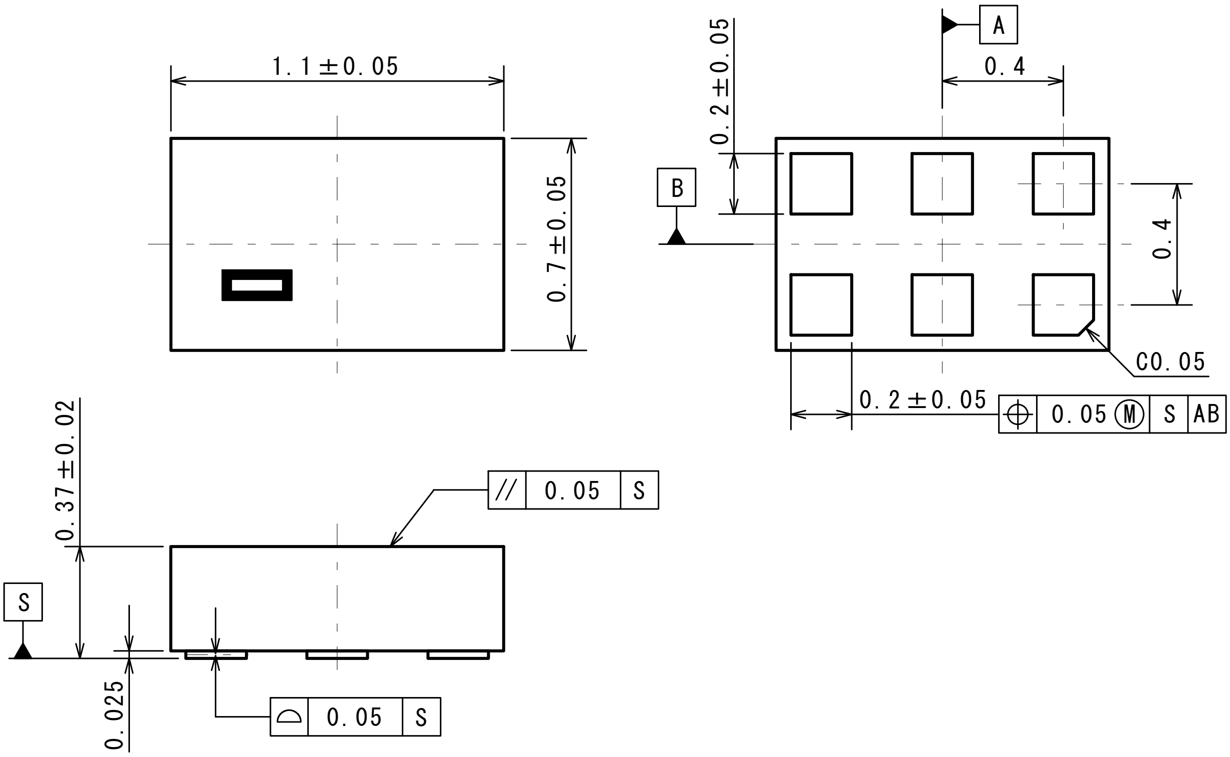
Date	Revision	Changes
November 11, 2024	Ver. 1.0	Initial release

Nisshinbo Micro Devices Inc.

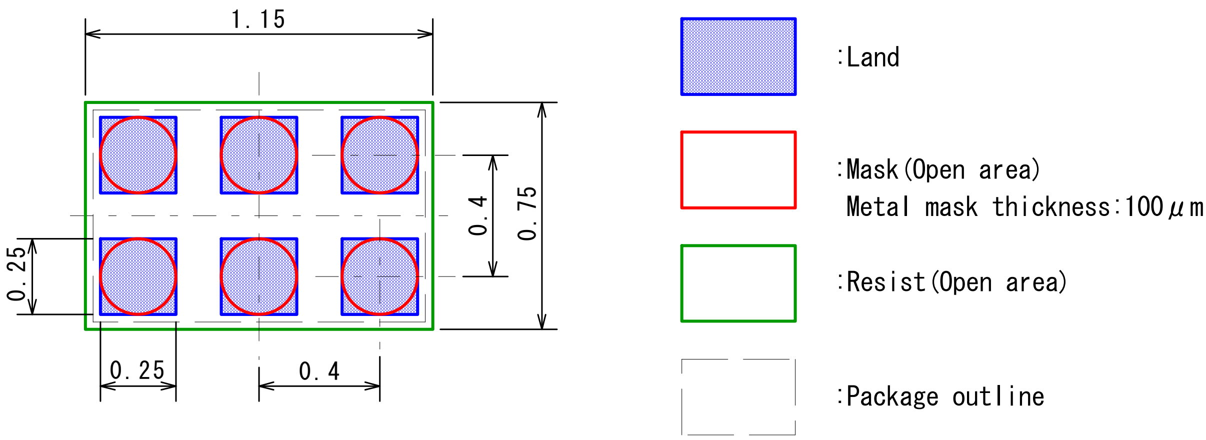
EPFFP-6-FA

■ PACKAGE DIMENSIONS

UNIT: mm



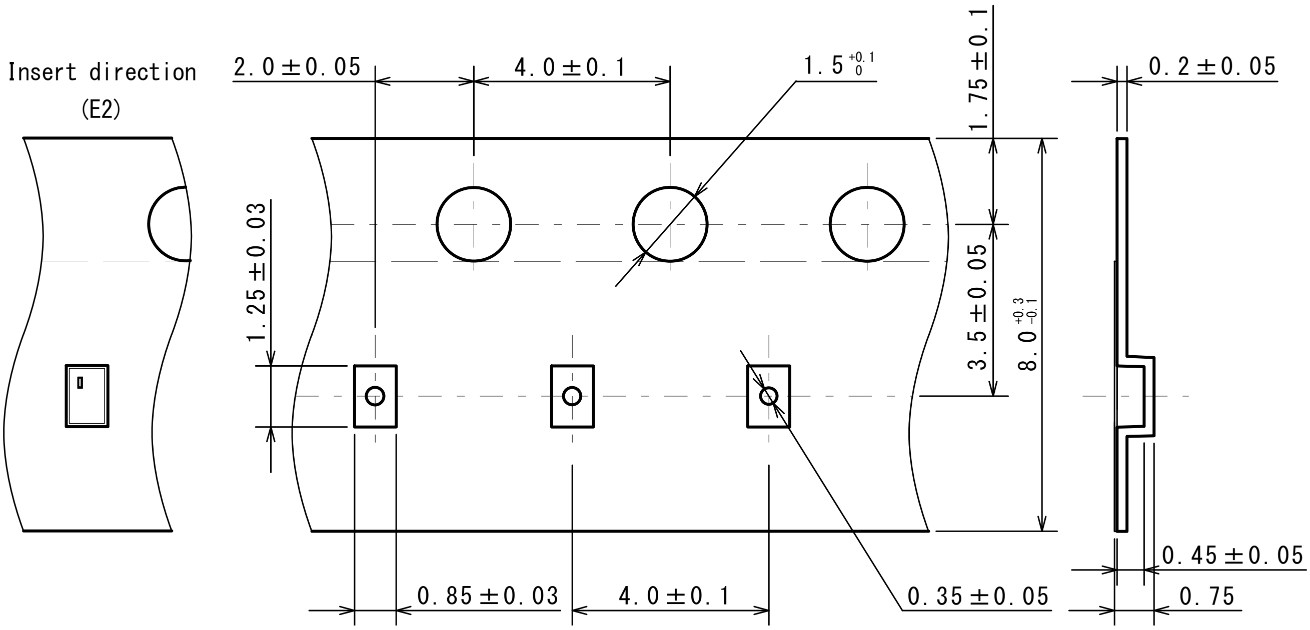
■ EXAMPLE OF SOLDER PADS DIMENSIONS



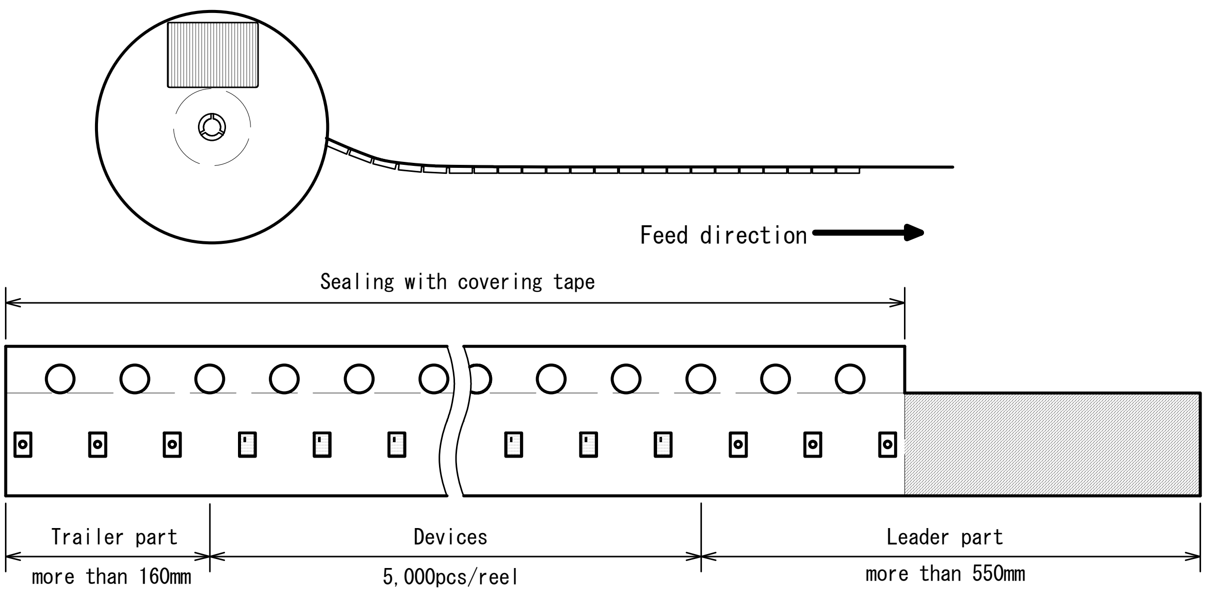
■ **PACKING SPEC**

UNIT: mm

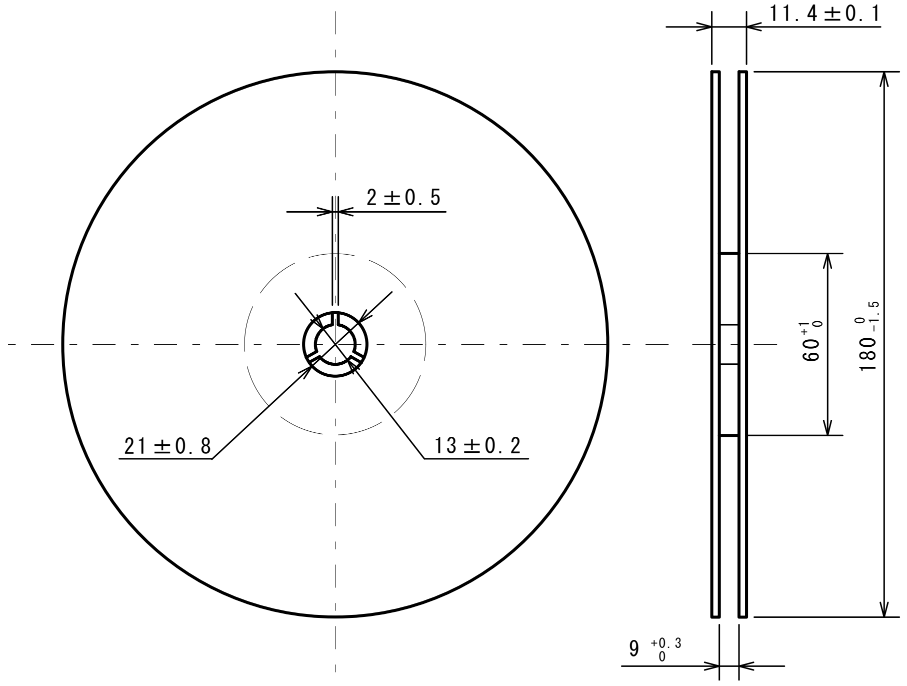
(1) Taping dimensions / Insert direction



(2) Taping state



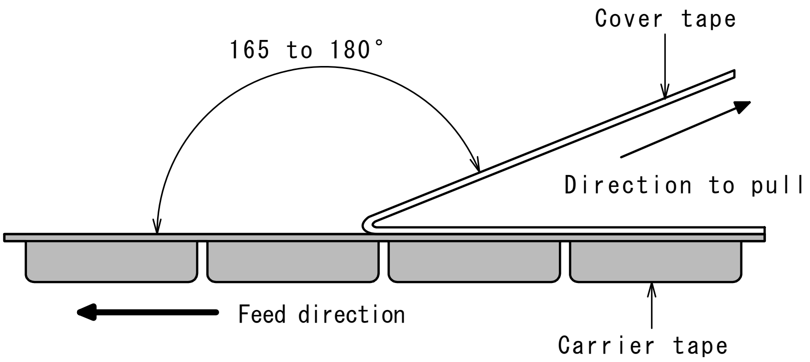
(3) Reel dimensions



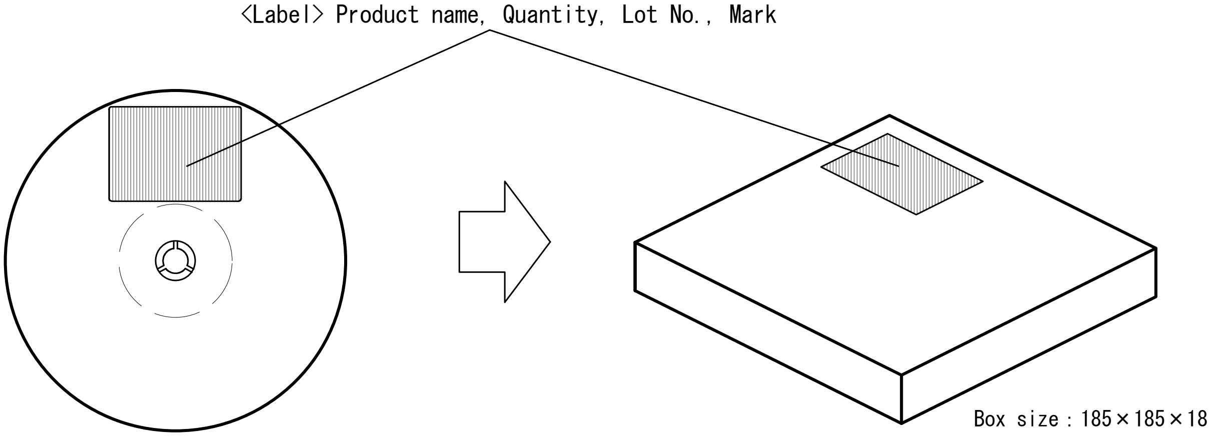
(4) Peeling strength

Peeling strength of cover tape

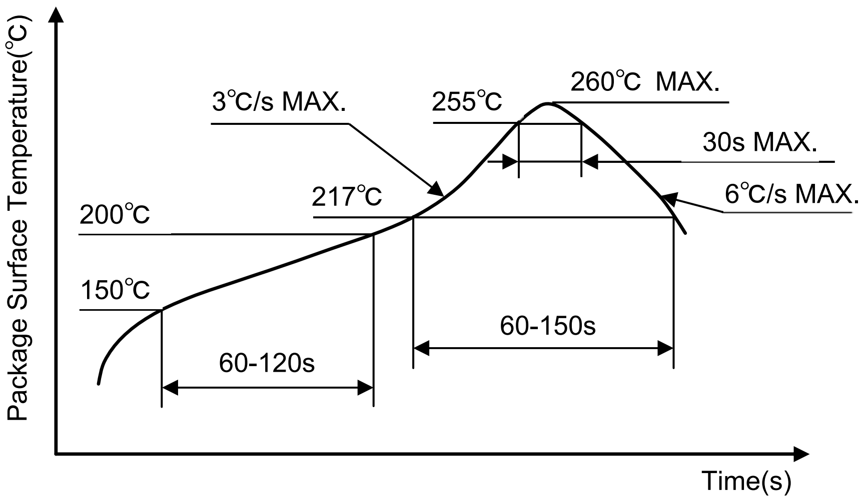
- Peeling angle 165 to 180° degrees to the taped surface.
- Peeling speed 300mm/min
- Peeling strength 0.1 to 1.0N



(5) Packing state



■ **HEAT-RESISTANCE PROFILES**



Reflow profile

NISSHINBO

Nisshinbo Micro Devices Inc.

Official website
https://www.nisshinbo-microdevices.co.jp/en/

Purchase information
https://www.nisshinbo-microdevices.co.jp/en/buy/