

NT1741FBAE2S

BLE Rx Booster

FEATURES

- Frequency range: 2400 MHz to 2500 MHz
- Supply voltage: 1.8 V typ. (1.6 V to 3.7 V)
- Current consumption: 1.5 mA typ. @LNA mode
1 μ A typ. @ Bypass mode
- Gain: 13 dB typ.
- NF: 2.3 dB typ.
- P-1dB(IN): -13 dBm typ.
- IIP3: 0 dBm typ.
- Package size: 1.0 $\times$ 1.0 mm typ.
t = 0.39 mm max.
- Operating temperature range: -40 to +105 $^{\circ}$ C
- Only one external component at VDD terminal
- RoHS compliant and Halogen Free, MSL1

APPLICATIONS

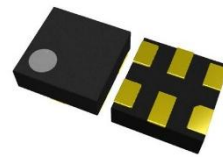
- Hearing aids
- AI glasses
- Earphones, headphones
- 2.4 GHz applications such as BLE, Thread, and Zigbee

GENERAL DESCRIPTION

The NT1741 is a BLE Rx booster featuring low current consumption.

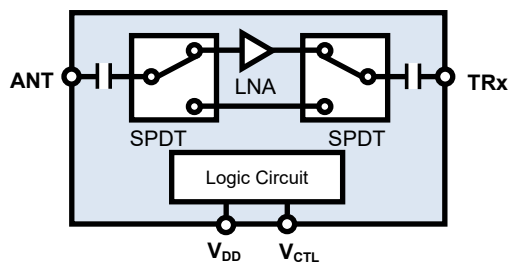
The NT1741 integrates a high-gain, low-noise LNA and a transmit bypass path. With low current consumption in both LNA mode and bypass mode, the NT1741 is ideally suited for compact BLE applications requiring long battery life, such as hearing aids and wireless earphones, and so on.

The NT1741 adapts a compact 1.0 $\times$ 1.0 mm package and integrates complete input/output matching circuits, including DC-blocking capacitors. This integration benefits to reduce the number of required external components and to minimize the PCB mounting area.



EPFFP-6-FB
1.0 $\times$ 1.0 $\times$ 0.39 (mm)

BLOCK DIAGRAM



■ PRODUCT NAME INFORMATION

NT1741 FB A E2 S

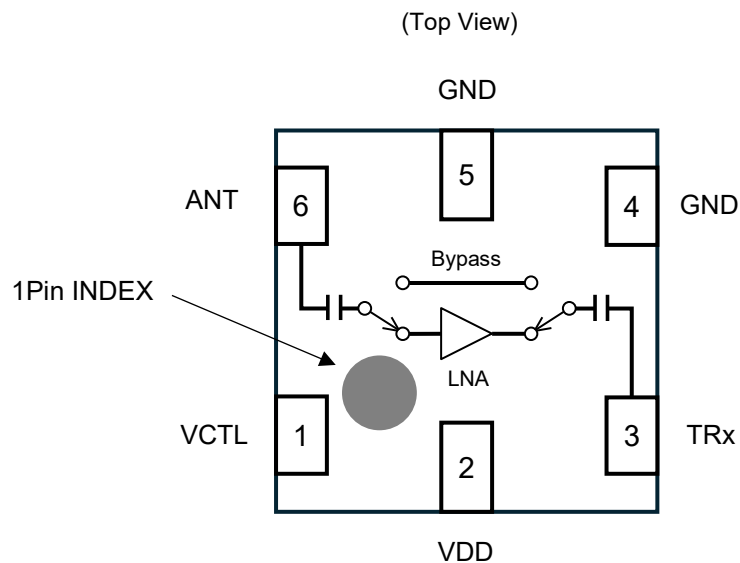
Description of configuration

Suffix	Parameter	Description
FB	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)
NT1741FBAE2S	EPFFP-6-FB	Yes	Yes	Au	0.87	5000

■ PIN DESCRIPTIONS



EPFFP-6-FB Pin Configuration

Pin No.	Pin Name	Description
1	VCTL	Mode control
2	VDD	Operating voltage supply
3	TRx	Tx input / LNA output
4	GND	Ground
5	GND	Ground
6	ANT	LNA input / Tx output

Please refer to "[APPLICATION CIRCUIT](#)" for details.

■ TRUTH TABLE

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

V_{CTL}	Mode
H	LNA mode
L	Bypass mode

■ ABSOLUTE MAXIMUM RATINGS

General conditions: $T_a = +25^{\circ}\text{C}$, $Z_s = Z_l = 50\Omega$

	Symbol	Ratings	Unit
Supply Voltage	V_{DD}	5.0	V
Control voltage	V_{CTL}	5.0	V
ANT Input power	$P_{in_ANT}^{*1}$	+15	dBm
TRx Input power	$P_{in_TRx}^{*2}$	+20	dBm
Power Dissipation	P_D^{*3}	590	mW
Operating Temperature	T_a	-40 to +105	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^{\circ}\text{C}$

*1 $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 1.8\text{ V}$ *2 $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 0\text{ V}$ *3 4-layer FR4 PCB with through-hole (101.5 x 114.5 mm), $T_j = 150^{\circ}\text{C}$

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 (θ_{ja})	$\theta_{ja} = 216\text{ }^{\circ}\text{C/W}$
Thermal Characterization Parameter (ψ_{jt})	$\psi_{jt} = 52\text{ }^{\circ}\text{C/W}$

 θ_{ja} : Junction-to-Ambient Thermal Resistance ψ_{jt} : Junction-to-Top Thermal Characterization Parameter

■ ELECTROSTATIC DISCHARGE RATINGS

	Conditions	Protection Voltage	
		Ground	VDD
HBM	$C = 100\text{ pF}$, $R = 1.5\text{ k}\Omega$	$\pm 2000\text{ V}$	$\pm 2000\text{ V}$

	Conditions	Protection Voltage
CDM	Field Induced CDM	$\pm 1000\text{ V}$

ELECTROSTATIC DISCHARGE RATINGS

The electrostatic discharge tests are done based on JEDEC JS-001 and JS-002.

■ RECOMMENDED OPERATING CONDITIONS

	Symbol	Value	Unit
Supply Voltage	V_{DD}	1.6 to 3.7	V
Control Voltage	V_{CTL}	1.6 to 3.7	V
Operating Temperature	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: $T_a = +25^{\circ}\text{C}$, $Z_s = Z_L = 50\Omega$

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Supply Voltage	V_{DD}		1.6	1.8	3.7	V
Control Voltage (High)	$V_{CTL(H)}$		1.6	1.8	3.7	V
Control Voltage (Low)	$V_{CTL(L)}$		0	0	0.3	V
Operating Current	I_{DD}	RF OFF, $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 1.8\text{ V}$	-	1.5	2.2	mA
		RF OFF, $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 0\text{ V}$	-	1	3	μA
Control Current	I_{CTL}	RF OFF, $V_{CTL} = 1.8\text{ V}$	-	4	8	μA

■ ELECTRICAL CHARACTERISTICS 2 (LNA mode)

General conditions: $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 1.8\text{ V}$, $f = 2400\text{ MHz to }2500\text{ MHz}$, $T_a = +25^\circ\text{C}$, $Z_s = Z_l = 50\Omega$, with application circuit

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Small Signal Gain	Gain	Exclude PCB, connector loss (0.32 dB)	11	13	-	dB
Noise Figure	NF	Exclude PCB, connector loss (0.16 dB)	-	2.3	2.9	dB
Input Power at 1 dB Gain Compression Point	P-1dB(IN)		-18	-13	-	dBm
Input 3rd Order Intercept Point	IIP3	$f_1 = f_{RF}$, $f_2 = f_1 + 100\text{ kHz}$, Pin = -35 dBm	-10	0	-	dBm
ANT Return Loss	RL_ANT		10	14	-	dB
TRx Return Loss	RL_TRx		10	14	-	dB
LNA switching time	Tsw_LNA	Bypass to LNA active mode to be within 1 dB of the final gain	-	1.0	2.0	μs
Bypass switching time	Tsw_Bypass	LNA active to Bypass mode to be within 1 dB of the final insertion loss	-	0.4	0.8	μs
k factor	k	$f = 50\text{ MHz to }10\text{ GHz}$	1	-	-	-

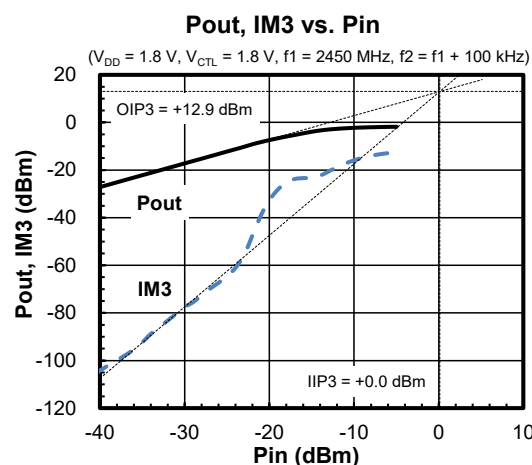
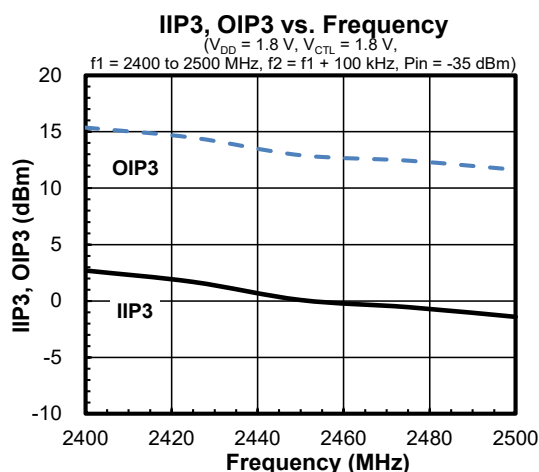
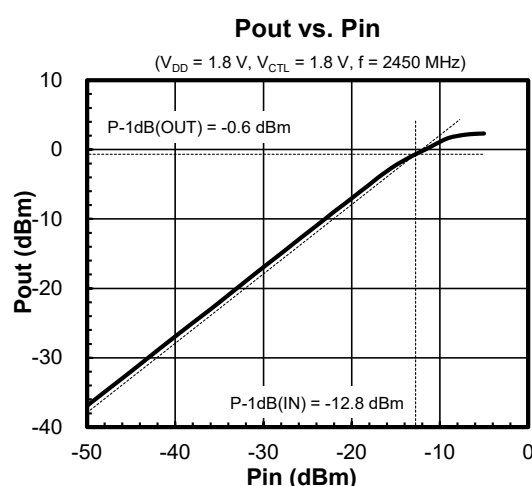
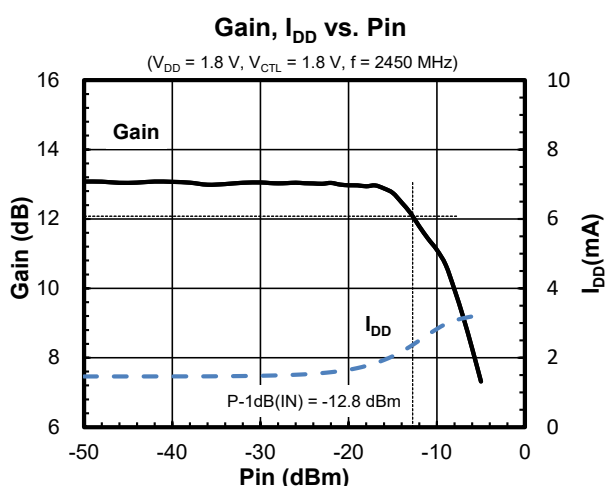
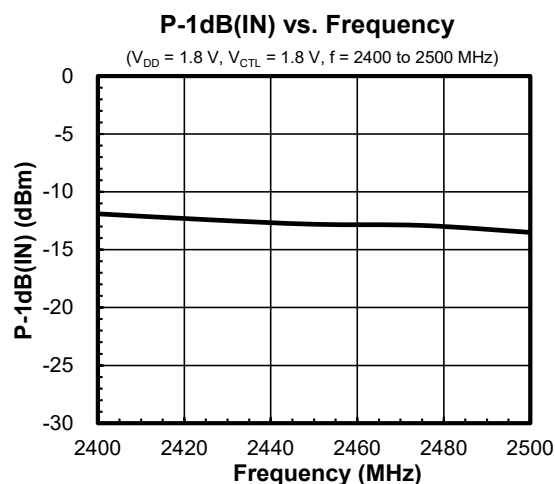
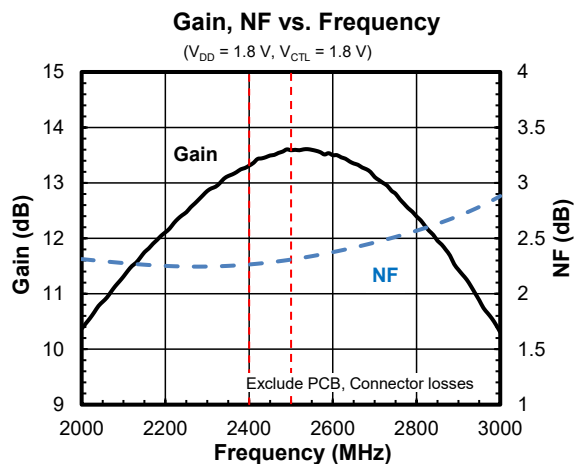
■ ELECTRICAL CHARACTERISTICS 3 (Bypass mode)

General conditions: $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 0\text{ V}$, $f = 2400\text{ MHz to }2500\text{ MHz}$, $T_a = +25^\circ\text{C}$, $Z_s = Z_l = 50\Omega$, with application circuit

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Bypass Loss	Loss	Exclude PCB, connector loss (0.32 dB)	-	1.0	1.5	dB
Input Power at 0.2 dB Compression Point	P-0.2dB(IN)		+18	+20	-	dBm
ANT Return Loss	RL_ANT		14	16	-	dB
TRx Return Loss	RL_TRx		13.5	15	-	dB

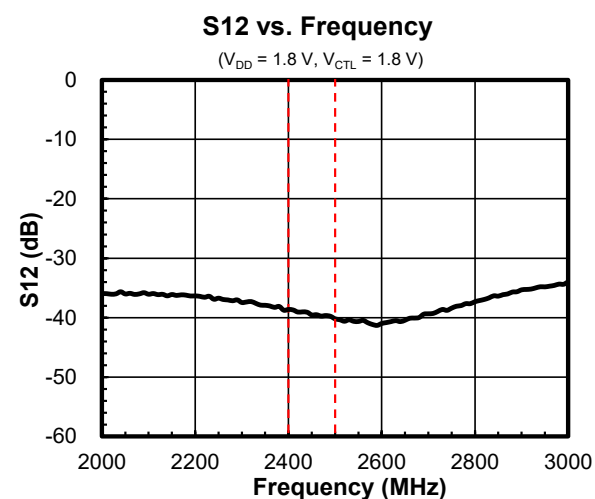
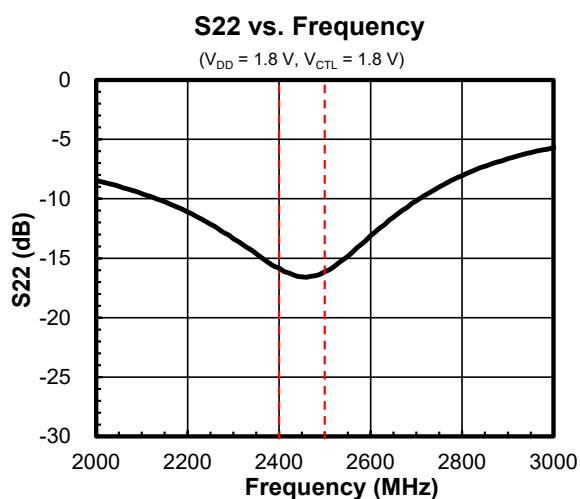
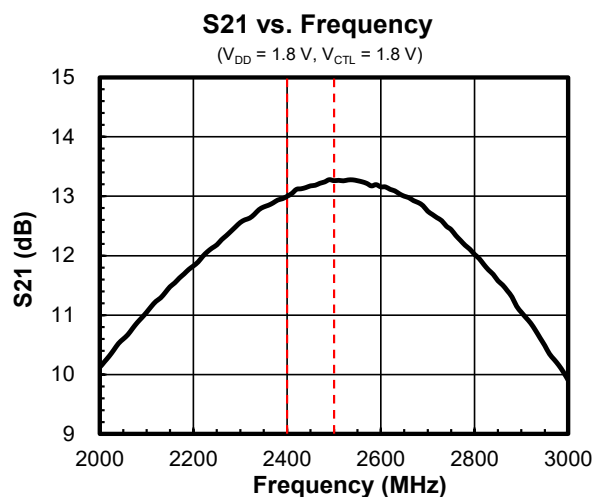
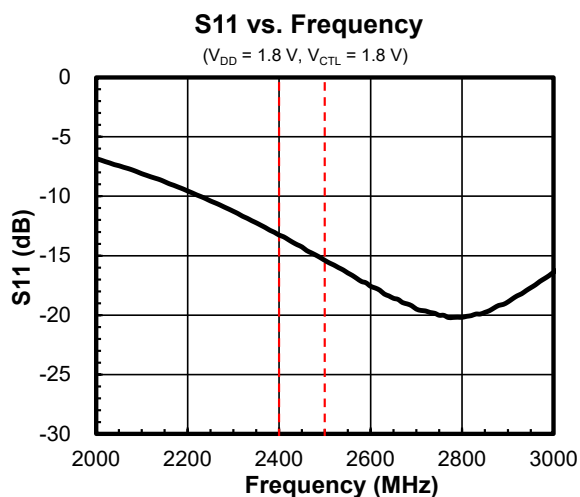
■ TYPICAL CHARACTERISTICS (LNA mode)

General conditions: $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 1.8\text{ V}$, $T_a = +25^\circ\text{C}$, $Z_s = Z_L = 50\Omega$, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)



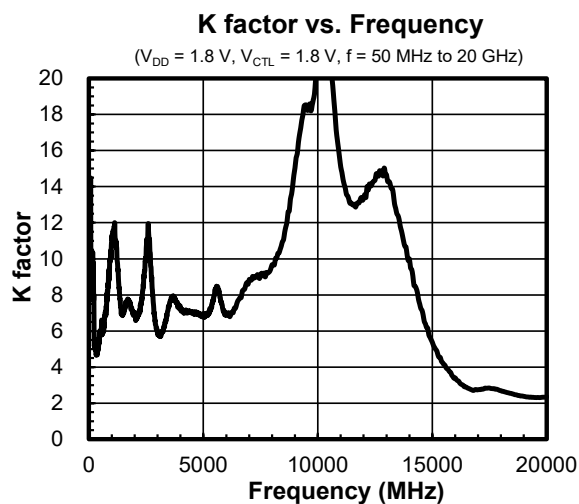
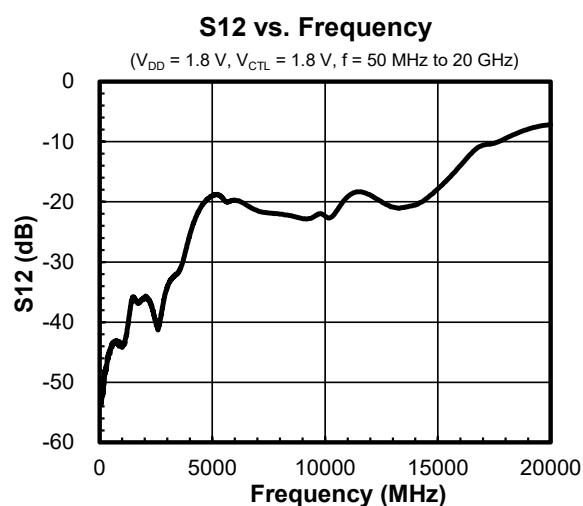
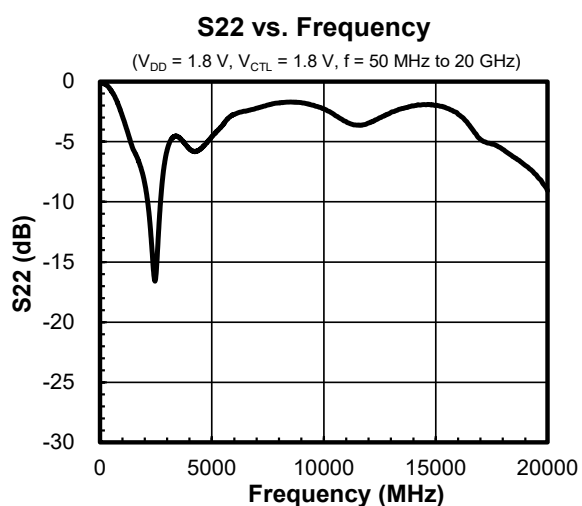
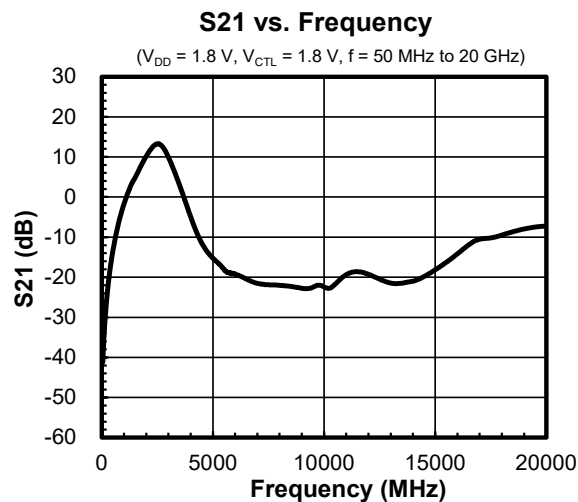
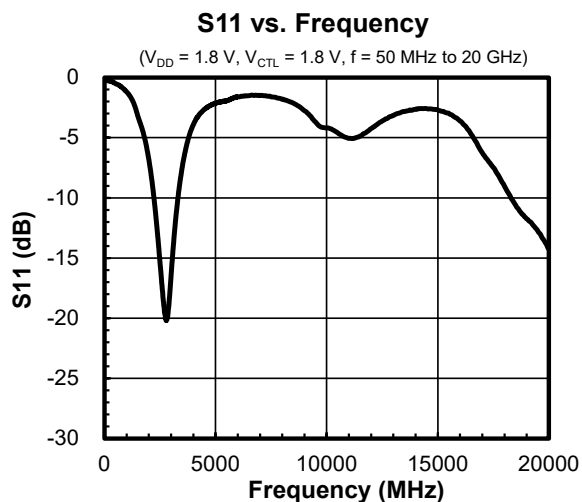
■ TYPICAL CHARACTERISTICS (LNA mode)

General conditions: $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 1.8\text{ V}$, $T_a = +25^\circ\text{C}$, $Z_s = Z_L = 50\Omega$, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)



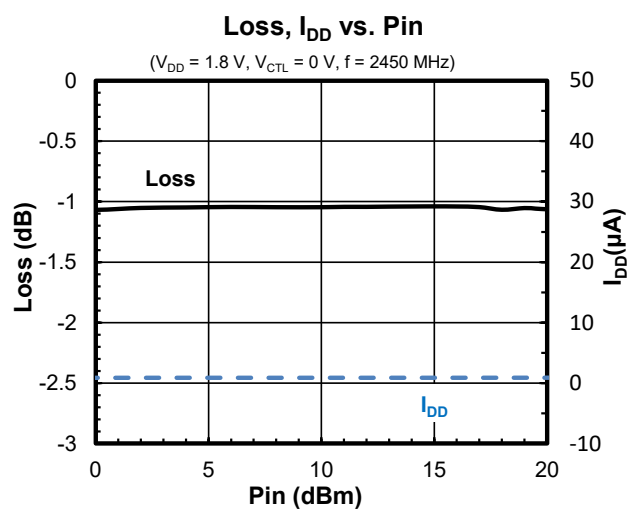
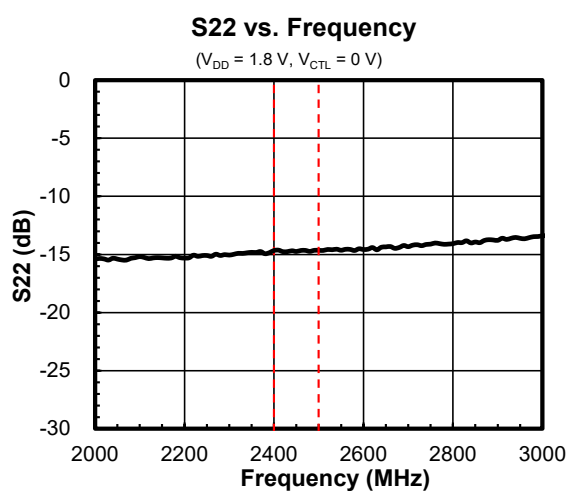
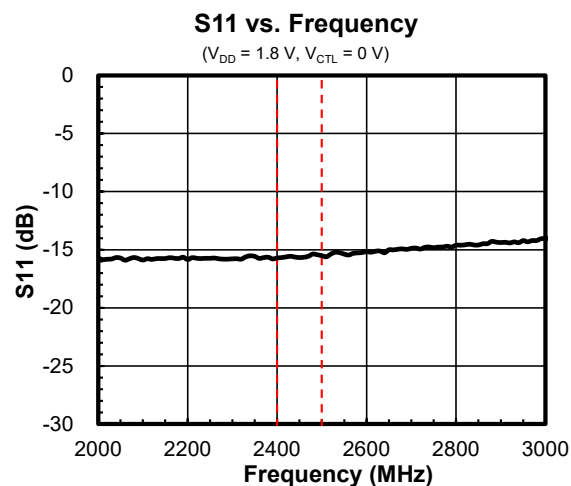
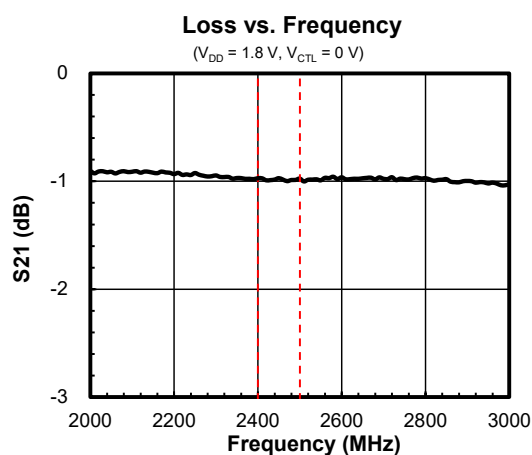
■ TYPICAL CHARACTERISTICS (LNA mode)

General conditions: $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 1.8\text{ V}$, $T_a = +25^\circ\text{C}$, $Z_s = Z_L = 50\Omega$, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)



■ TYPICAL CHARACTERISTICS (Bypass mode)

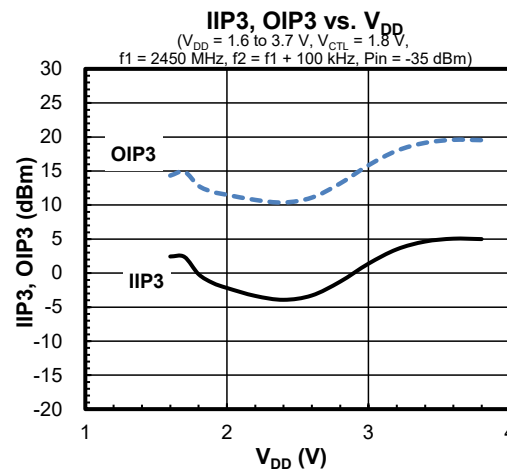
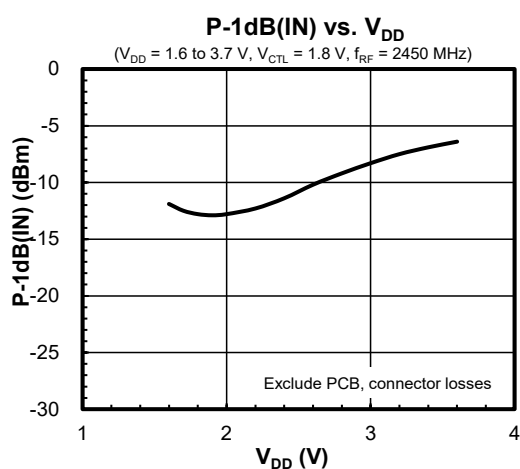
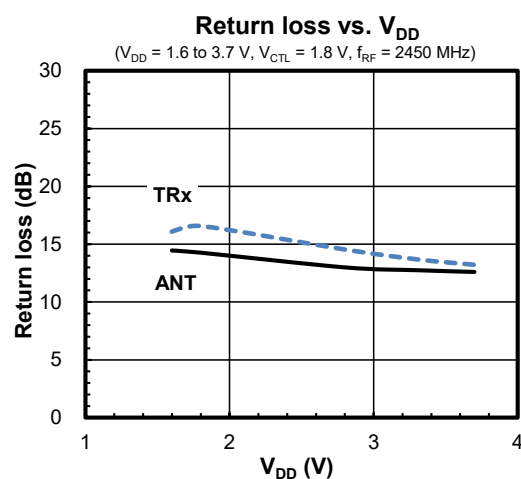
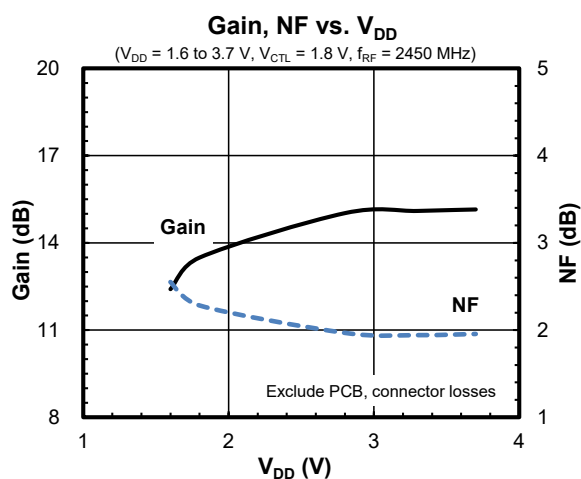
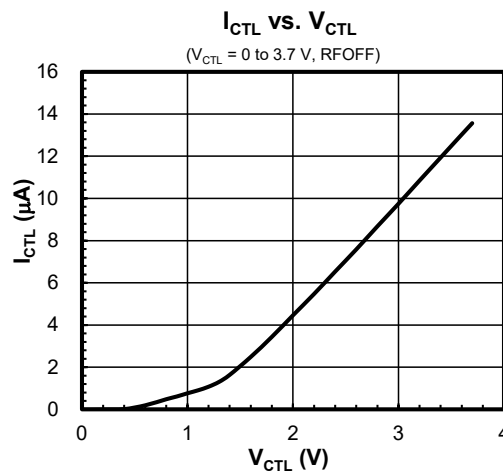
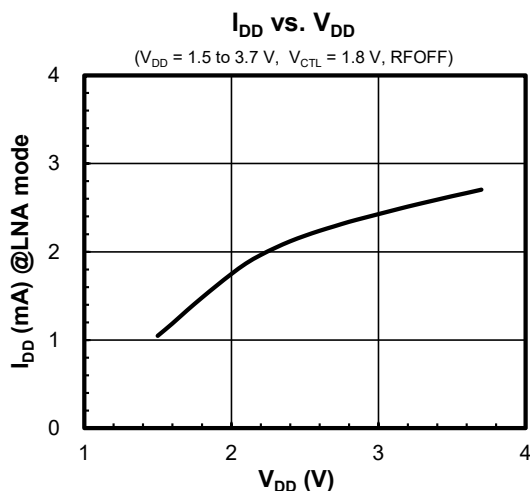
General conditions: $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 0\text{ V}$, $T_a = +25^\circ\text{C}$, $Z_s = Z_l = 50\Omega$, with application circuit
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)



■ TYPICAL CHARACTERISTICS (LNA mode)

General conditions: $T_a = +25^{\circ}\text{C}$, $Z_s = Z_l = 50\Omega$, with application circuit

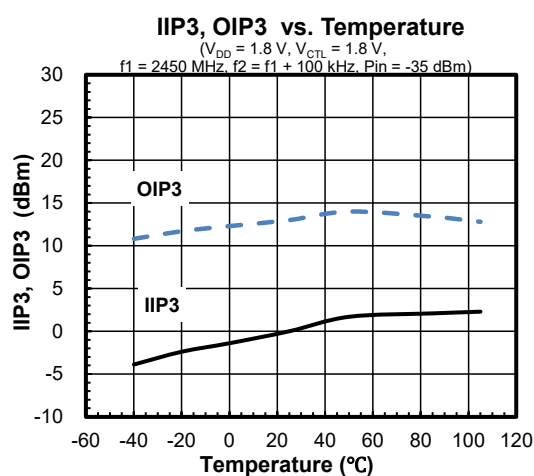
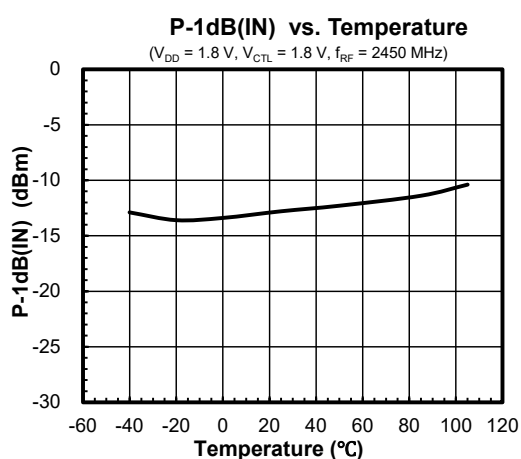
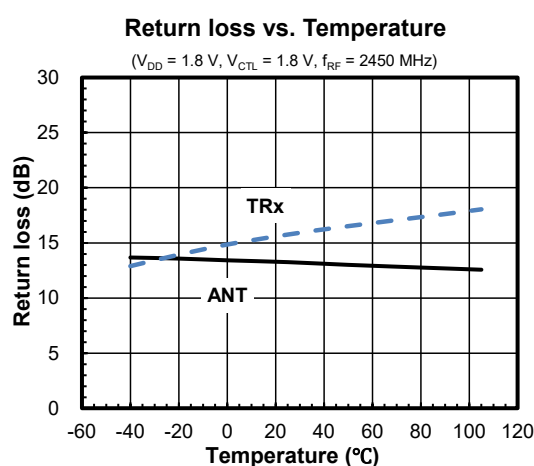
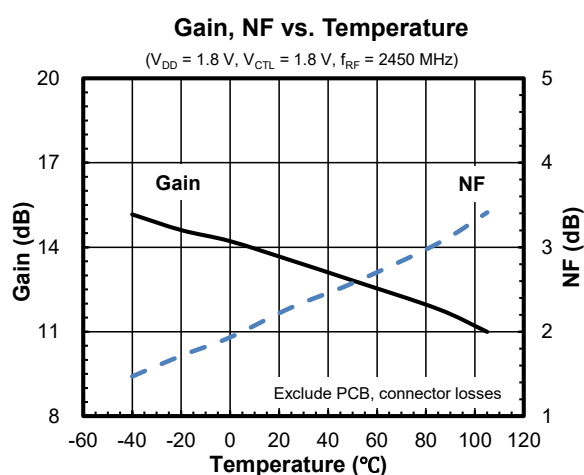
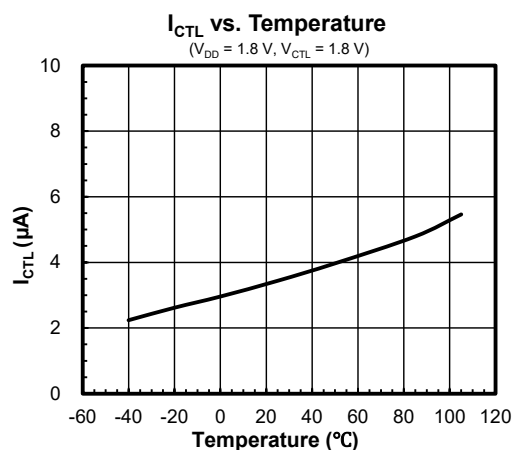
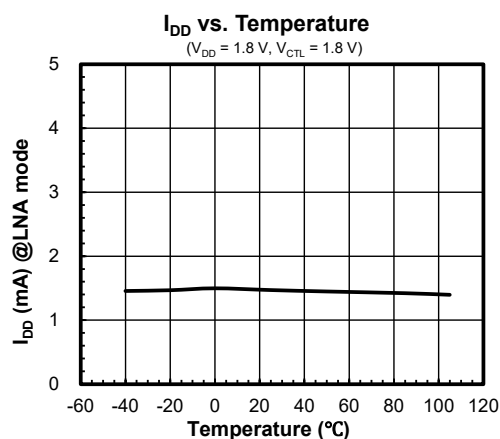
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)



■ TYPICAL CHARACTERISTICS (LNA mode)

General conditions: $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 1.8\text{ V}$, $Z_s = Z_l = 50\Omega$, with application circuit

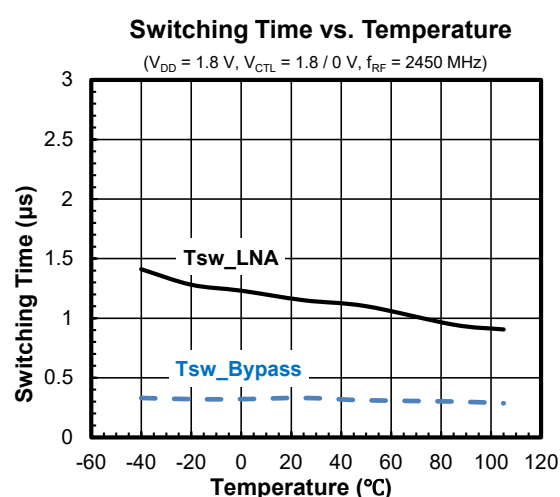
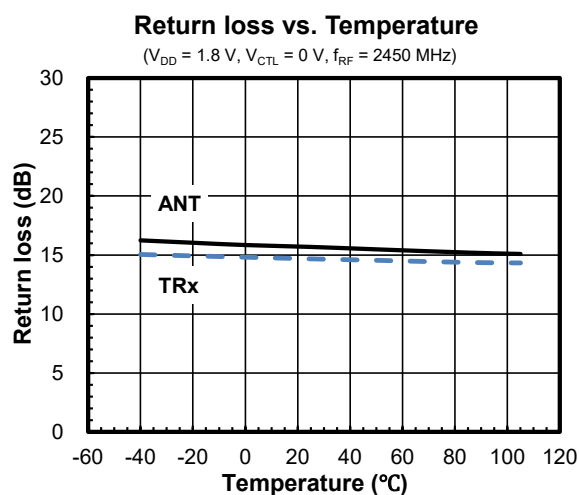
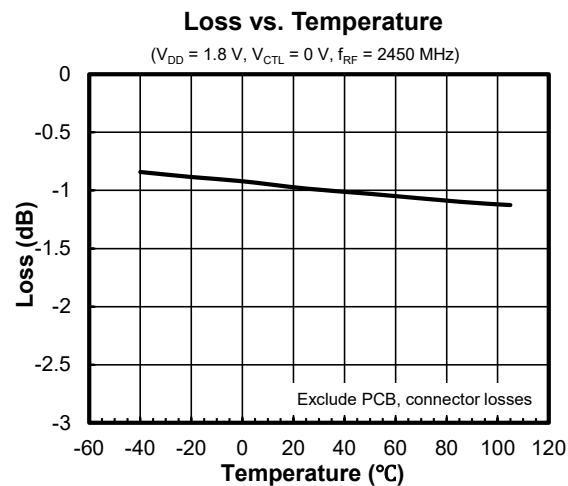
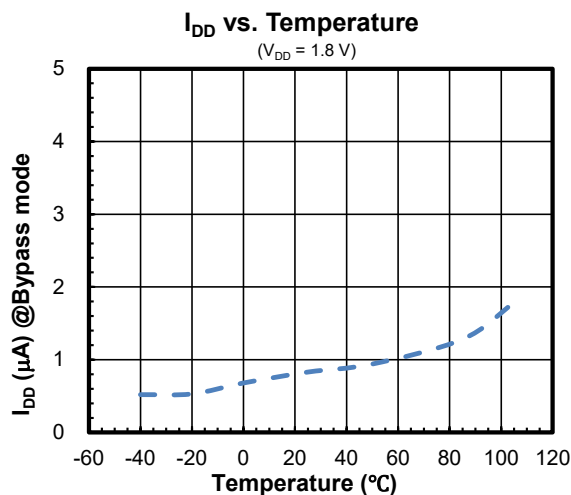
(Typical Characteristics are intended to be used as reference data; they are not guaranteed.)



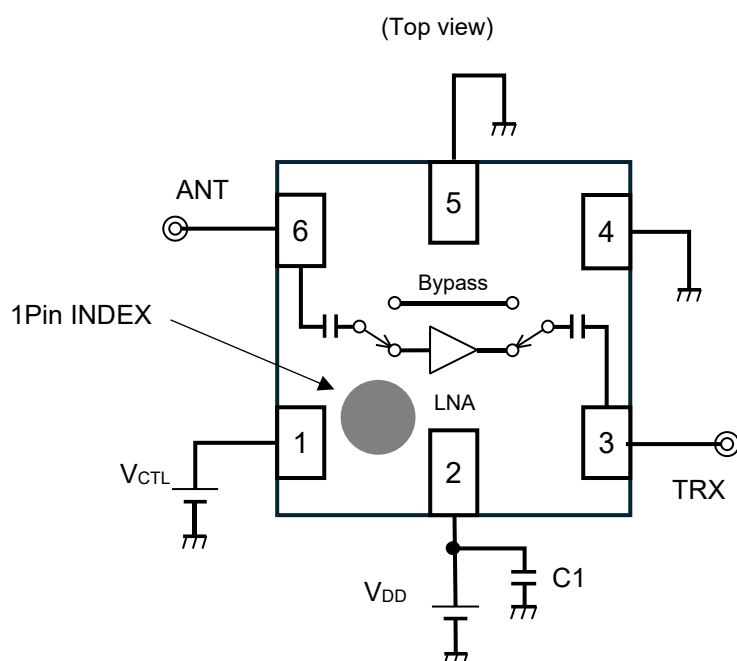
■ TYPICAL CHARACTERISTICS (Bypass mode)

General conditions: $V_{DD} = 1.8\text{ V}$, $V_{CTL} = 0\text{ V}$, $Z_s = Z_l = 50\Omega$, with application circuit

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



■ APPLICATION CIRCUIT

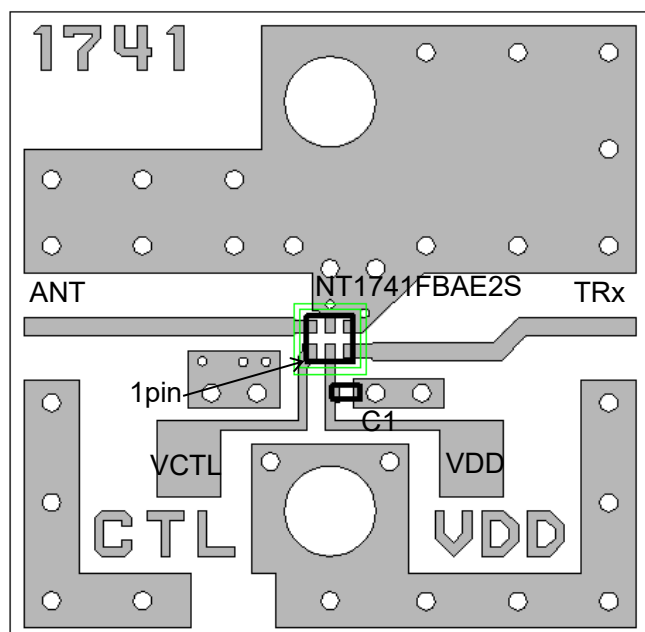


NT1741FBAE2S Typical Application Circuit

<Parts list>

Part ID	Value	Notes
C1	1000 pF	GRM03 series (MURATA)

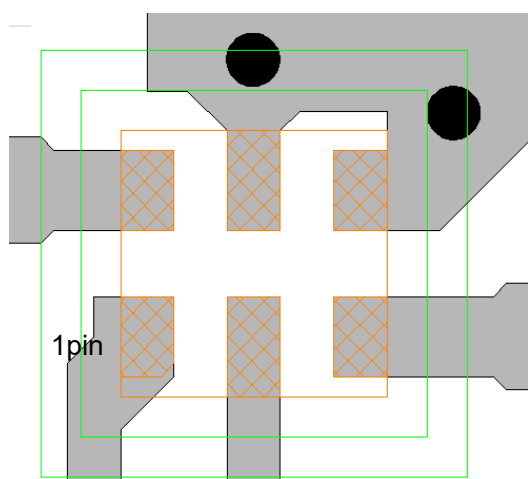
● Evaluation Board / PCB layout



PCB

Substrate: FR-4
 Thickness: 0.2 mm
 Microstrip line width: 0.38 mm ($Z_0=50\Omega$)
 Size: 14.0 x 14.0 mm

● PCB layout guideline



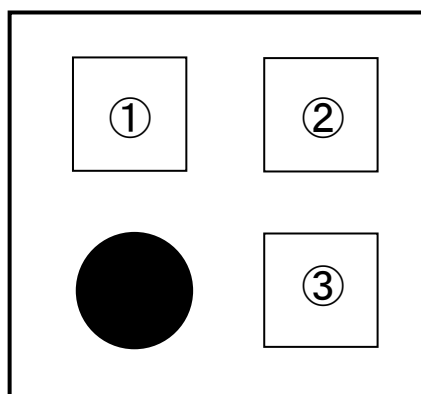
-  PCB
-  PKG Terminal
-  PKG Outline
-  GND Via Hole
Diameter $\phi=0.2\text{mm}$

● PRECAUTIONS

- The external part should be placed as close as possible to the IC.
- 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 IC.

■ MARKING SPECIFICATION

- ①, ②: Lot Number ... Alphanumeric Serial Number
 ③: Product Code



EPFFP-6-FB 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-FB Marking List

Product Name	③
NT1741FBAE2S	5

■ APPLICATION NOTES

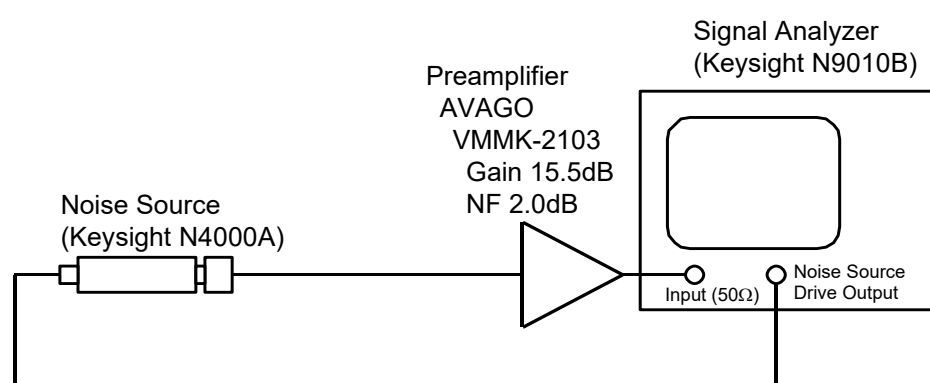
● NF Measurement Block Diagram

Measuring Instruments

Signal Analyzer : Keysight N9010B
Noise Source : Keysight N4000A

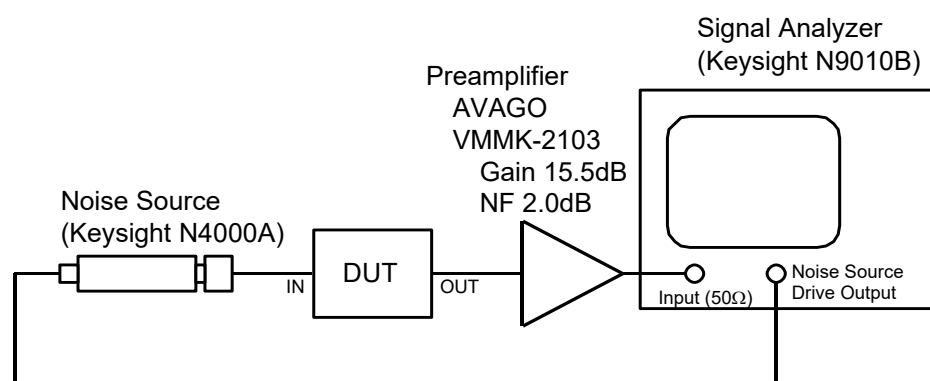
Setting the Signal analyzer

Mode/Measurement/View Selector
Mode : Noise Figure
Measurement : Noise Figure
Frequency
Center Frequency : 2.5 GHz
Span : 1000 MHz
Points : 101
Amplitude
Attenuation : 0 dB
Signal Path : Internal Preamp on (Auto)
BW
Res BW : 4 MHz (Auto)
Meas Setup
Averaging : On
Avg/Hold Num : 8
Tcold : SNS Tcold On



Calibration Setup

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



Measurement Setup

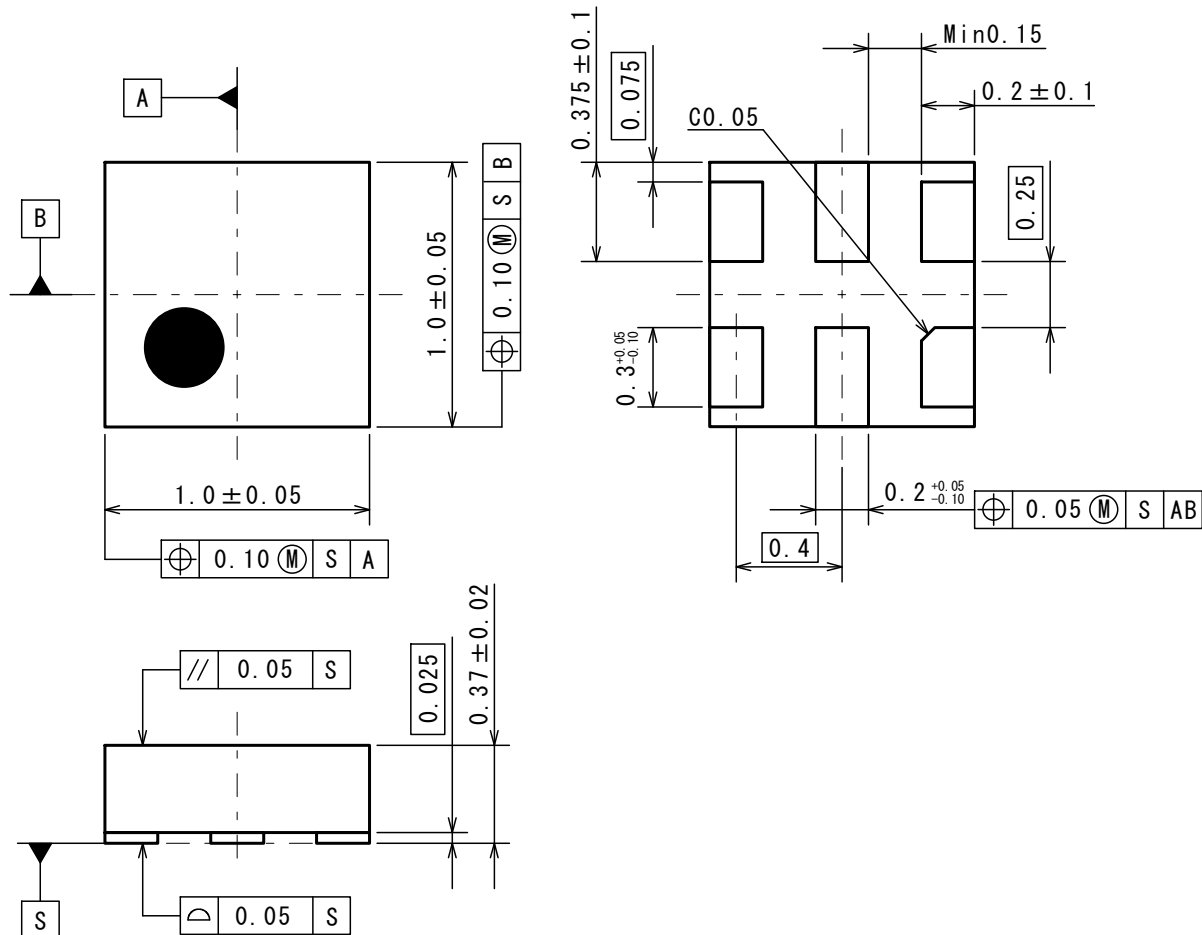
* Noise source, DUT, preamplifier and NF analyzer are connected directly.

■ Revision History

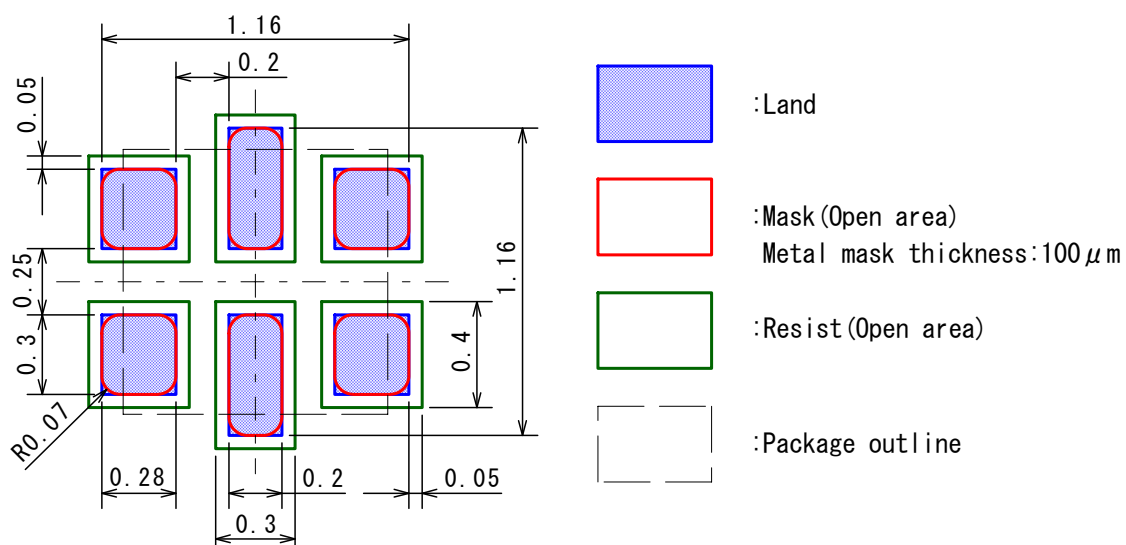
Date	Revision	Changes
July 31, 2026	Ver. 1.0	Initial release

■ PACKAGE DIMENSIONS

UNIT: mm



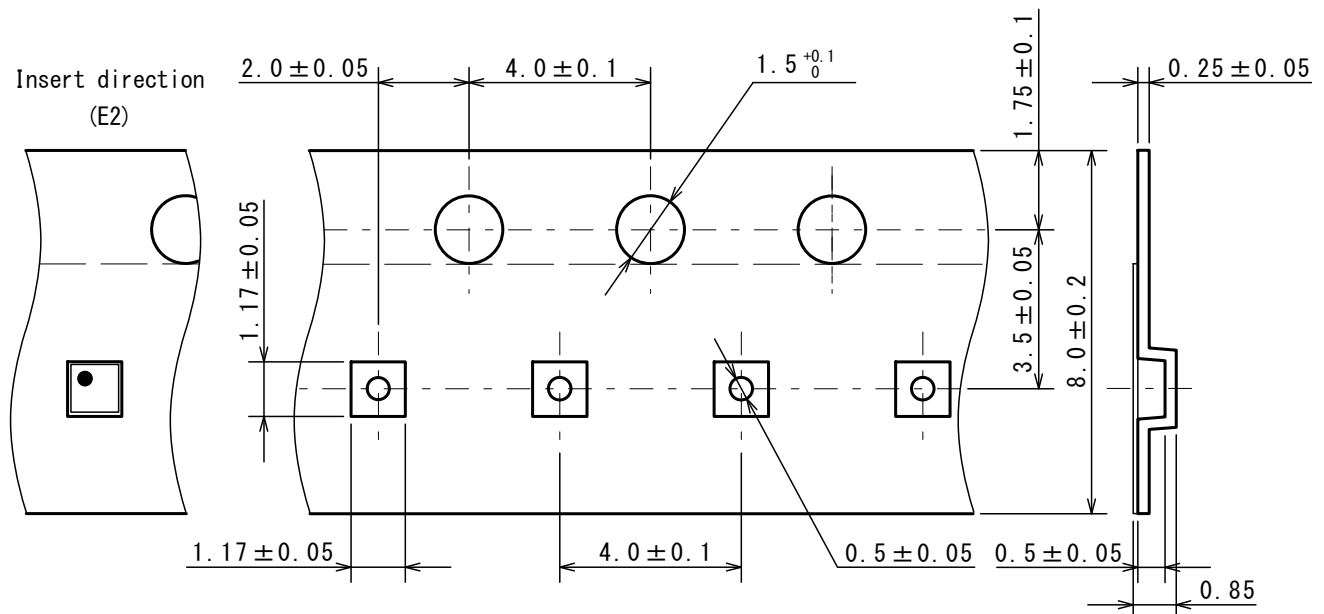
■ EXAMPLE OF SOLDER PADS DIMENSIONS



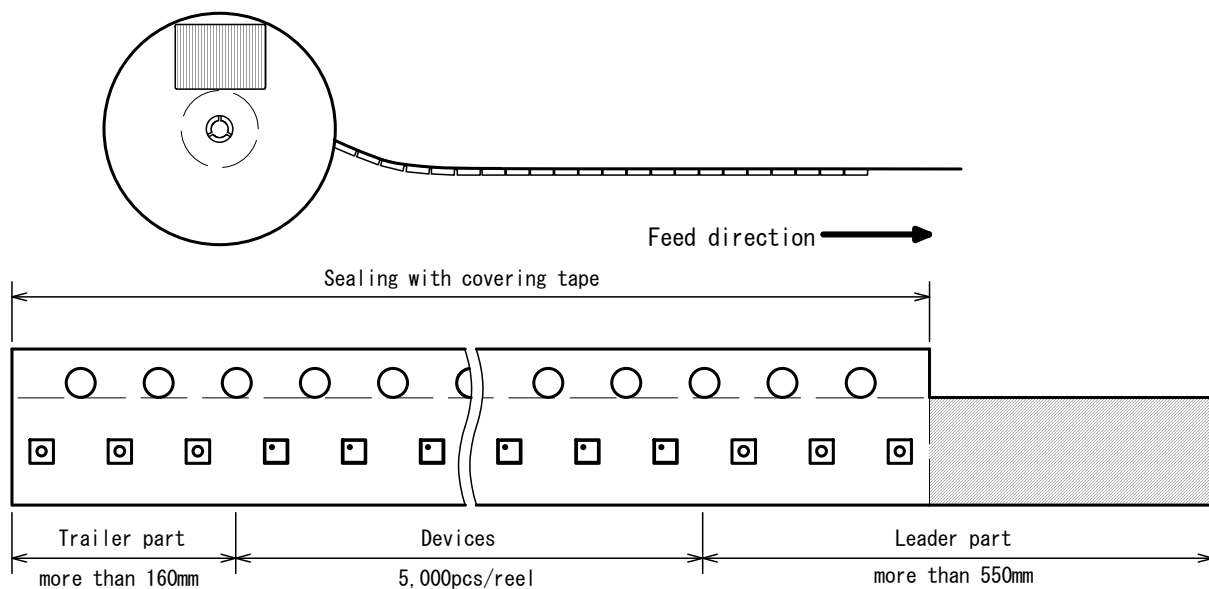
■ PACKING SPEC

UNIT: mm

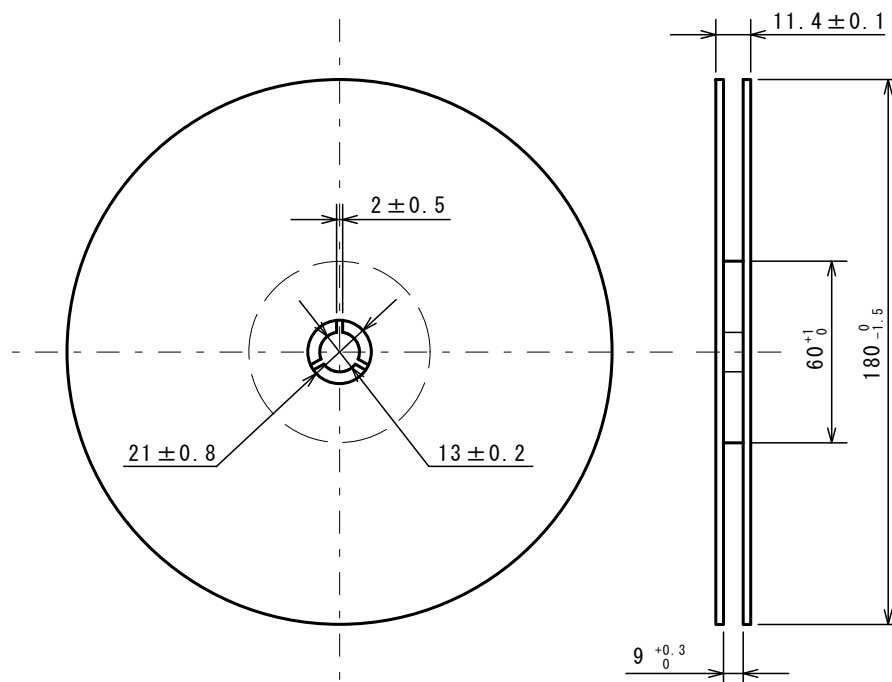
(1) Taping dimensions / Insert direction



(2) Taping state



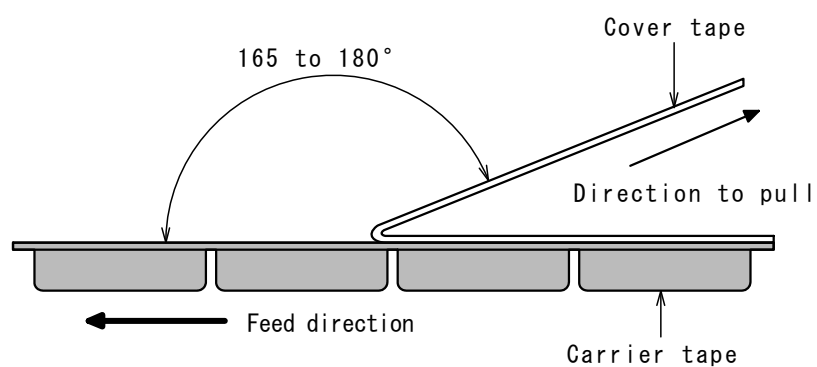
(3) Reel dimensions



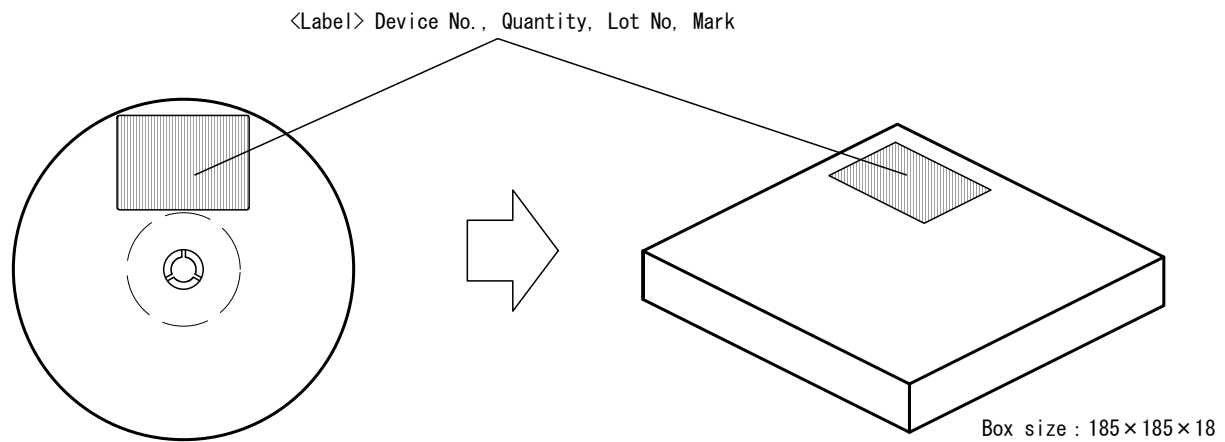
(4) Peeling strength

Peeling strength of cover tape

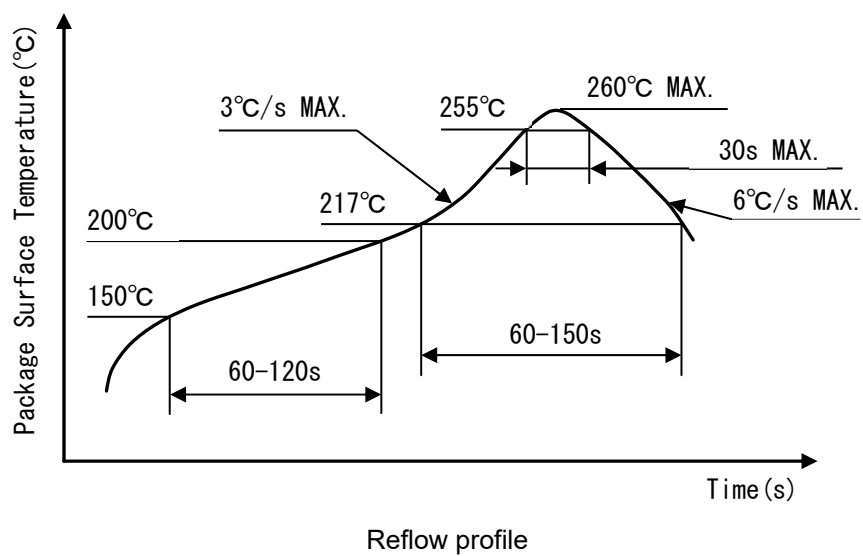
- Peeling angle 165 to 180° degrees to the taped surface.
- Peeling speed 300mm/min
- Peeling strength 0.1 to 1.0N



(5) Packing state



■ HEAT-RESISTANCE PROFILES



1. The products and the product specifications described in this document are subject to change or discontinuation of production without notice for reasons such as improvement. Therefore, before deciding to use the products, please refer to our sales representatives for the latest information thereon.
2. The materials in this document may not be copied or otherwise reproduced in whole or in part without the prior written consent of us.
3. This product and any technical information relating thereto are subject to complementary export controls (so-called KNOW controls) under the Foreign Exchange and Foreign Trade Law, and related politics ministerial ordinance of the law. (Note that the complementary export controls are inapplicable to any application-specific products, except rockets and pilotless aircraft, that are insusceptible to design or program changes.) Accordingly, when exporting or carrying abroad this product, follow the Foreign Exchange and Foreign Trade Control Law and its related regulations with respect to the complementary export controls.
4. The technical information described in this document shows typical characteristics and example application circuits for the products. The release of such information is not to be construed as a warranty of or a grant of license under our or any third party's intellectual property rights or any other rights.
5. The products listed in this document are intended and designed for use as general electronic components in standard applications (office equipment, telecommunication equipment, measuring instruments, consumer electronic products, amusement equipment etc.). Those customers intending to use a product in an application requiring extreme quality and reliability, for example, in a highly specific application where the failure or misoperation of the product could result in human injury or death should first contact us.
 - Aerospace Equipment
 - Equipment Used in the Deep Sea
 - Power Generator Control Equipment (nuclear, steam, hydraulic, etc.)
 - Life Maintenance Medical Equipment
 - Fire Alarms / Intruder Detectors
 - Vehicle Control Equipment (automotive, airplane, railroad, ship, etc.)
 - Various Safety Devices
 - Traffic control system
 - Combustion equipment

In case your company desires to use this product for any applications other than general electronic equipment mentioned above, make sure to contact our company in advance. Note that the important requirements mentioned in this section are not applicable to cases where operation requirements such as application conditions are confirmed by our company in writing after consultation with your company.

6. We are making our continuous effort to improve the quality and reliability of our products, but semiconductor products are likely to fail with certain probability. In order to prevent any injury to persons or damages to property resulting from such failure, customers should be careful enough to incorporate safety measures in their design, such as redundancy feature, fire containment feature and fail-safe feature. We do not assume any liability or responsibility for any loss or damage arising from misuse or inappropriate use of the products.
7. The products have been designed and tested to function within controlled environmental conditions. Do not use products under conditions that deviate from methods or applications specified in this datasheet. Failure to employ the products in the proper applications can lead to deterioration, destruction or failure of the products. We shall not be responsible for any bodily injury, fires or accident, property damage or any consequential damages resulting from misuse or misapplication of the products.
8. **Quality Warranty**
 - 8-1. **Quality Warranty Period**
In the case of a product purchased through an authorized distributor or directly from us, the warranty period for this product shall be one (1) year after delivery to your company. For defective products that occurred during this period, we will take the quality warranty measures described in section 8-2. However, if there is an agreement on the warranty period in the basic transaction agreement, quality assurance agreement, delivery specifications, etc., it shall be followed.
 - 8-2. **Quality Warranty Remedies**
When it has been proved defective due to manufacturing factors as a result of defect analysis by us, we will either deliver a substitute for the defective product or refund the purchase price of the defective product.
Note that such delivery or refund is sole and exclusive remedies to your company for the defective product.
 - 8-3. **Remedies after Quality Warranty Period**
With respect to any defect of this product found after the quality warranty period, the defect will be analyzed by us. On the basis of the defect analysis results, the scope and amounts of damage shall be determined by mutual agreement of both parties. Then we will deal with upper limit in Section 8-2. This provision is not intended to limit any legal rights of your company.
9. Anti-radiation design is not implemented in the products described in this document.
10. The X-ray exposure can influence functions and characteristics of the products. Confirm the product functions and characteristics in the evaluation stage.
11. WLCSP products should be used in light shielded environments. The light exposure can influence functions and characteristics of the products under operation or storage.
12. Warning for handling Gallium and Arsenic (GaAs) products (Applying to GaAs MMIC, Photo Reflector). These products use Gallium (Ga) and Arsenic (As) which are specified as poisonous chemicals by law. For the prevention of a hazard, do not burn, destroy, or process chemically to make them as gas or power. When the product is disposed of, please follow the related regulation and do not mix this with general industrial waste or household waste.
13. Please contact our sales representatives should you have any questions or comments concerning the products or the technical information.



Nisshinbo Micro Devices Inc.

Official website

<https://www.nisshinbo-microdevices.co.jp/en/>

Purchase information

<https://www.nisshinbo-microdevices.co.jp/en/buy/>