

EMM5135ZB

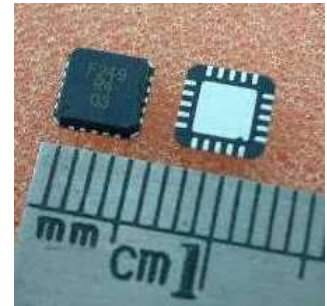
Ku-Band Up-Converter MMIC

FEATURES

- Integrated Monolithic Up-Converter (LOAMP, MIXER, RFAMP)
- Conversion Gain = 8dB (typ.)
- LO Leakage Power @RF Port = -16dBm (typ.)
- Single Supply Voltage Operation
- QFN 20pin Plastic Mold Package (ZB)

DESCRIPTION

The EMM5135ZB is an Up-converter MMIC using a double balanced mixer, designed for standard communications band in the 13.75-14.5 GHz frequency range. This product is well suited for VSAT applications. Eudyna Devices's stringent Quality Assurance Program assures the highest reliability and consistent performance.



ABSOLUTE MAXIMUM RATING

Item	Symbol	Rating	Unit
Drain-Source Voltage	VDD	6	V
IF Input Power	Pin(IF)	8	dBm
LO Input Power	Pin(Lo)	15	dBm
Storage Temperature	Tstg	-55 to +125	°C

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Condition	Unit
Drain-Source Voltage	VDD	5	V
IF Input Power	Pin(IF)	-5	dBm
LO Input Power	Pin(Lo)	2	dBm
Operating Backside Temperature	Top	-40 to +85	°C

ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25°C)

Item	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
RF Frequency Range	f(RF)	VDD=5V f(LO)=12.80GHz Pin(LO)=2dBm Pin(IF)=-5dBm	13.75		14.5	GHz
IF Frequency Range	f(IF)		0.95		1.70	GHz
Conversion Gain (USB)	Gc		5	8	13	dB
Gain Flatness	ΔG		---	---	3	dB
3rd Order Output Intercept Point	OIP3		---	22	---	dBm
Image Rejection	IR		---	-15	-8	dBc
LO Leakage Power @ IF port	PLO@IF		---	-30	---	dBm
LO Leakage Power @ RF port	PLO@RF		---	-15	-10	dBm
IF Return Loss	RL(IF)		---	8	---	dB
RF Return Loss	RL(RF)		---	10	---	dB
LO Return Loss	RF(LO)		---	11	---	dB
Total RF Current Consumption	IDD		---	130	170	mA

ESD	Class 0	~ 250V
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Note : Based on JEDEC JESD22-A114C

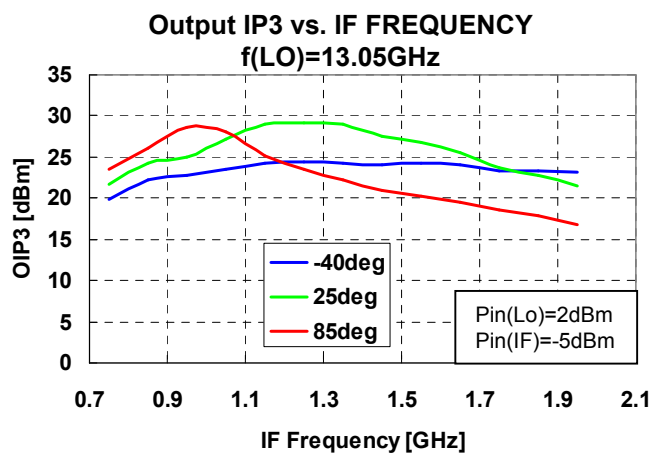
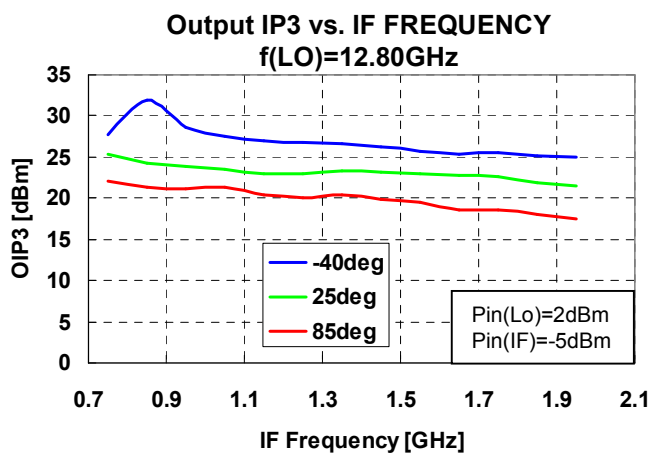
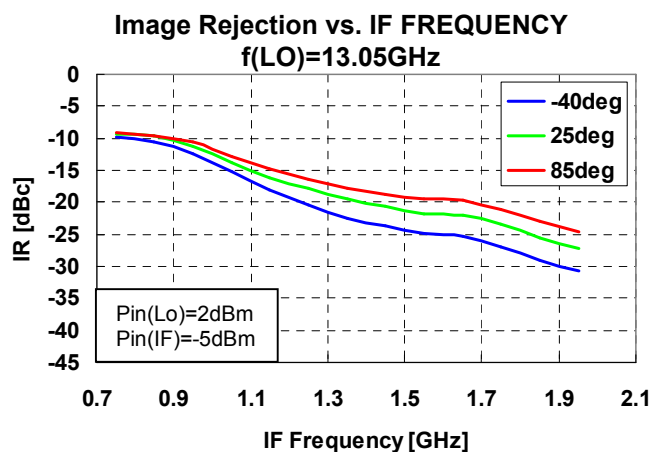
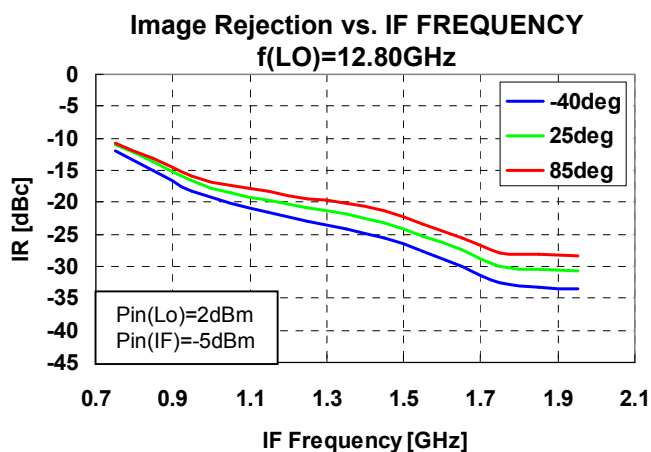
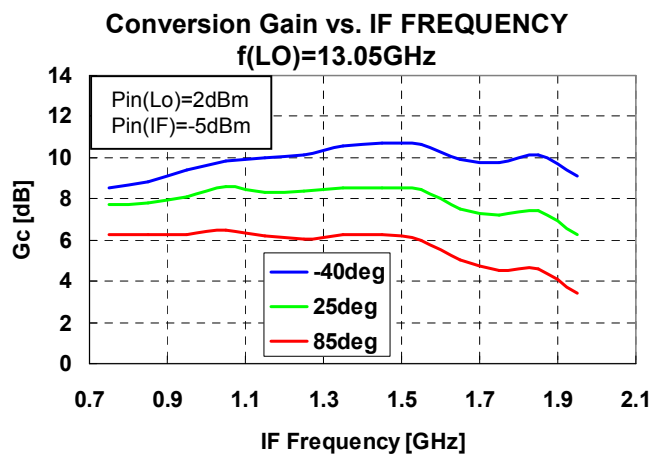
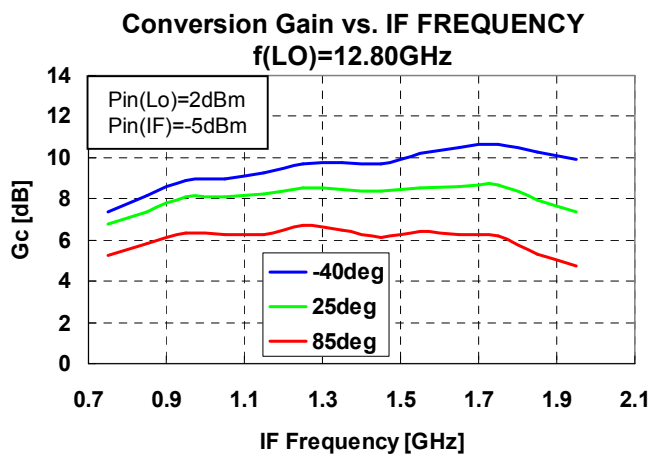
MSL	3
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Note : Based on IPC/JEDEC J-STD-020C

RoHs Compliance	Yes
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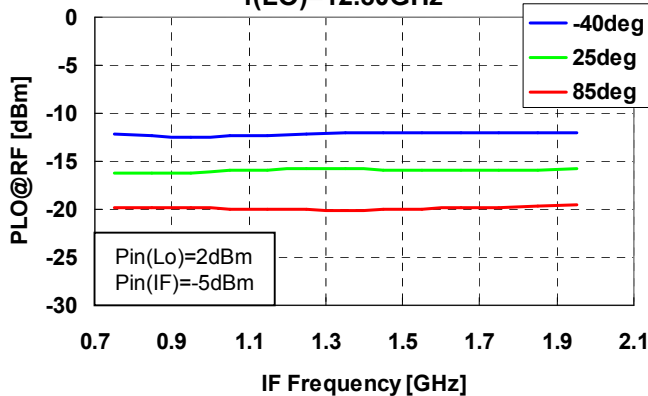
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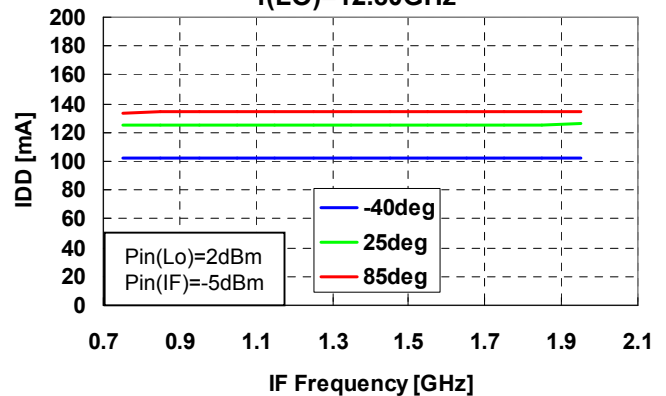
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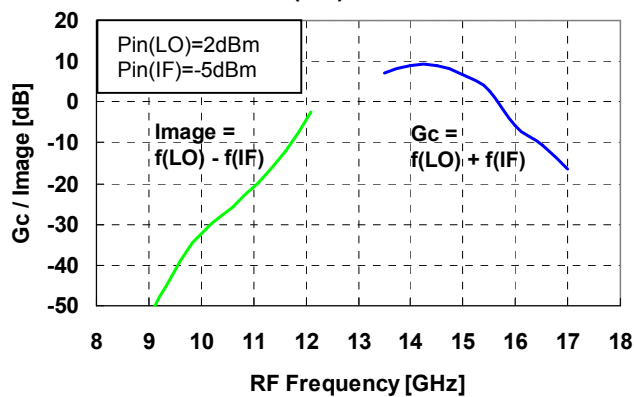
Local Leakage Power vs. IF FREQUENCY
 $f(\text{LO})=12.80\text{GHz}$



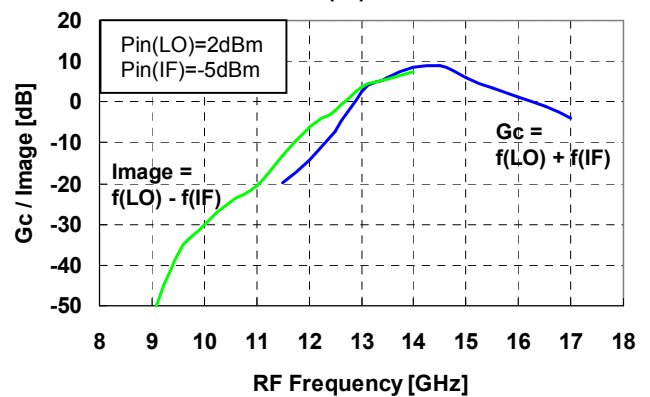
IDD vs. IF FREQUENCY
 $f(\text{LO})=12.80\text{GHz}$



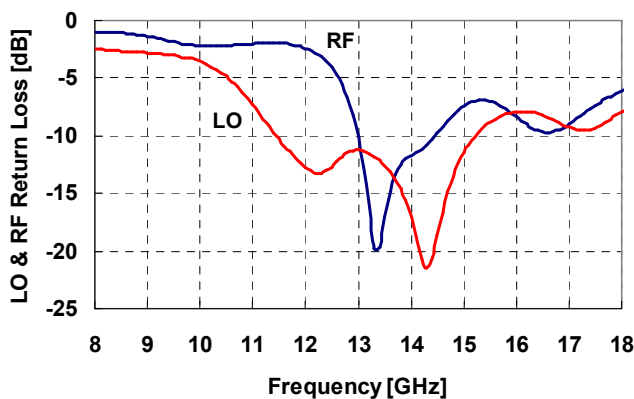
USB/LSB vs RF FREQUENCY
Fixed $f(\text{LO})=12.80\text{GHz}$



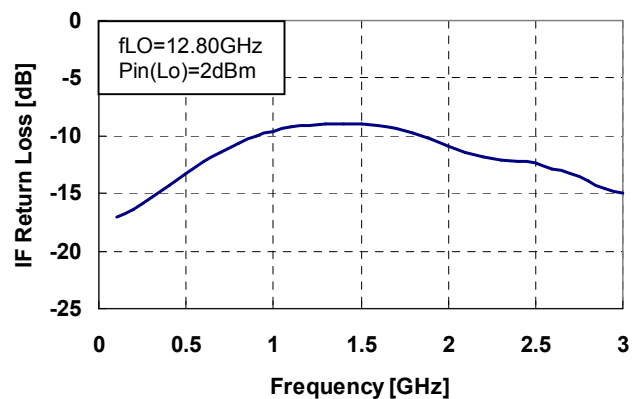
USB/LSB vs RF FREQUENCY
Fixed $f(\text{IF})=1.5\text{GHz}$



RF/LO Return Loss



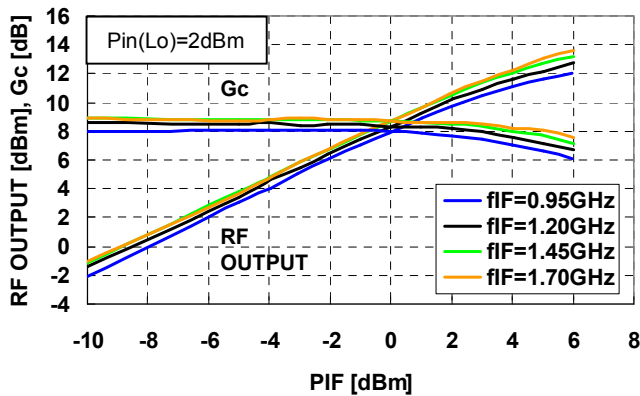
IF Return Loss



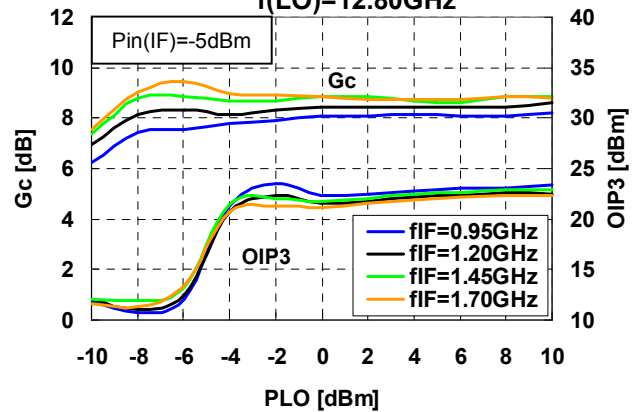
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RF output / Conversion Gain vs. IF power
 $f(\text{LO})=12.80\text{GHz}$



Conversion Gain / OIP3 vs. LO power
 $f(\text{LO})=12.80\text{GHz}$



■ $f(\text{LO}) \pm N \times f(\text{IF})$ Spurious

N x f(IF)	fLO	
	12.80GHz	13.05GHz
-3	-80	-75
-2	-75	-75
-1	-20	-15
0	-19	-19
1	0	0
2	-45	-45
3	-50	-42

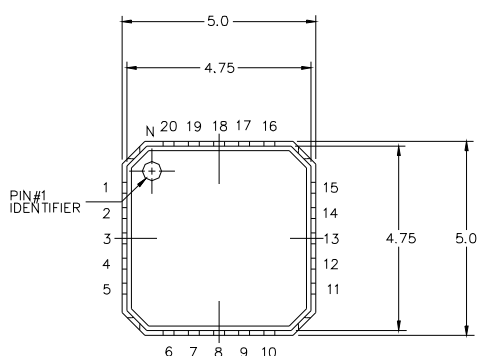
$\text{Pin}(\text{Lo})=2\text{dBm}$

$f(\text{IF})=1.20\text{GHz}$

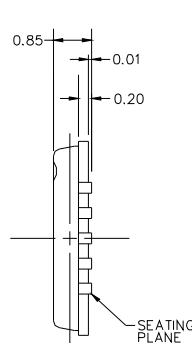
$\text{Pin}(\text{IF})=-5\text{dBm}$

All value in dBc below RF(=f(LO)+f(IF)) power level

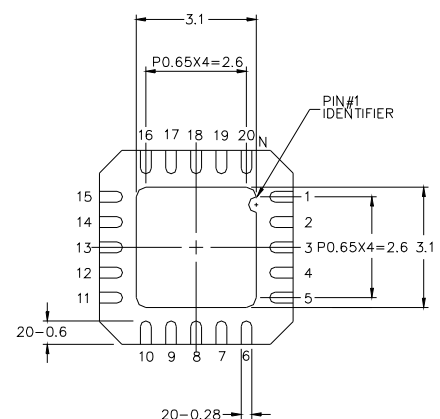
■ Package Outline and Pin Assignment



TOP VIEW



SIDE VIEW



BOTTOM VIEW

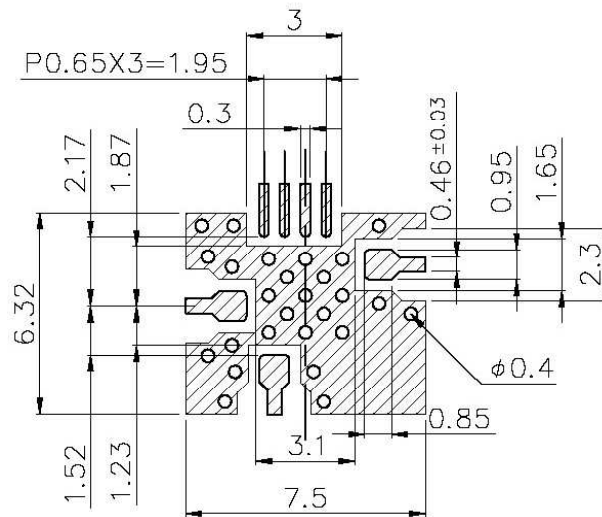
Unit : mm

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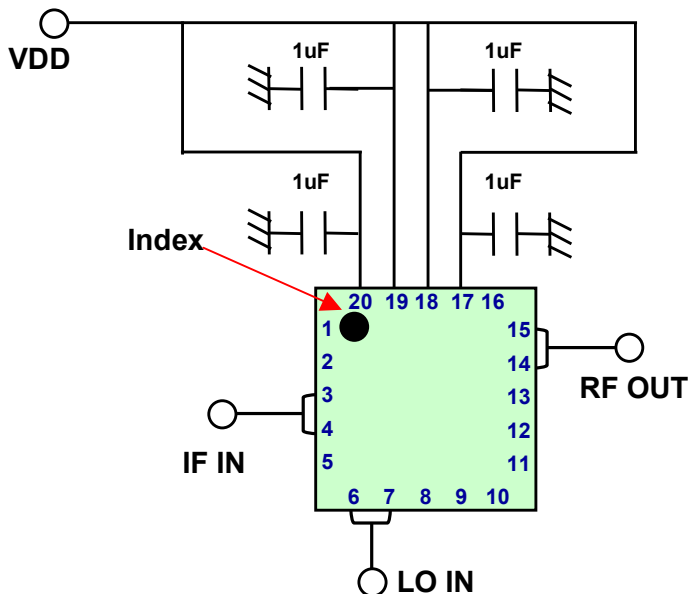
■ PCB Pads and Solder-resist Pattern



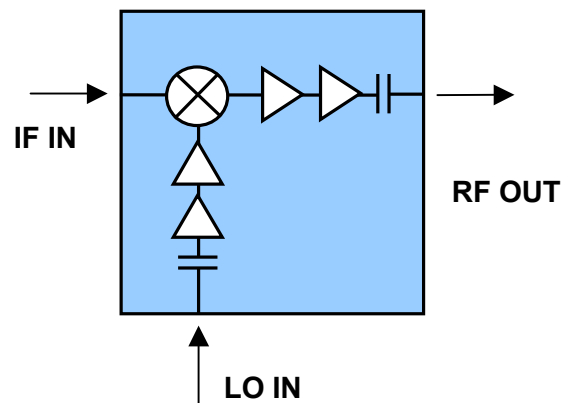
Notes :

1.LAMINATE : Rogers Corporation RO4003, Thickness $t=0.2\text{mm}$, Cu Foil $18\mu\text{m}$
Finish to copper foil ; Ni $0.1\mu\text{m}$ min./Au $0.1\pm0.08\mu\text{m}$ (Both side)

■ Recommended Bias Network



■ Block Diagram



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■ Mounting Instructions for ZB Package for Lead-free solder

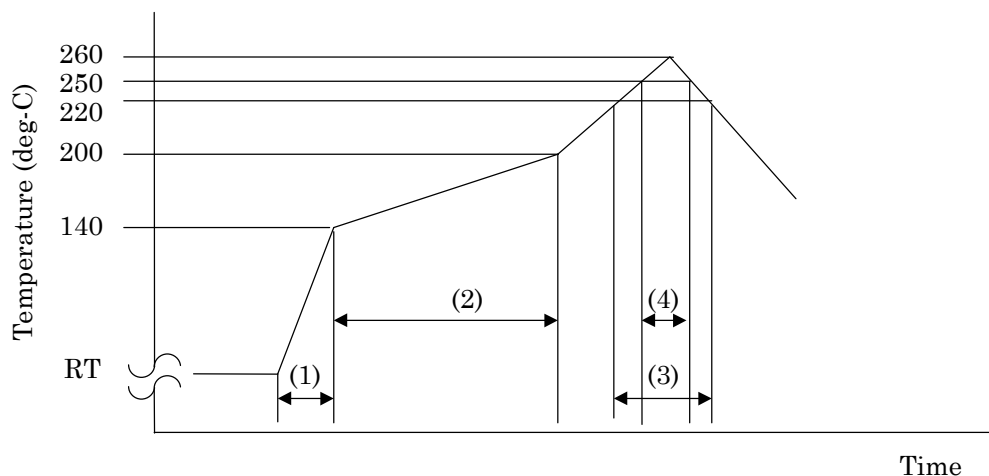
Mounting Condition

1. For soldering, Lead-free solder (Sn-3.0Ag-0.5Cu)*¹ or equivalent shall be used.
(*1: The figure displays with weight %. A predominantly tin-rich alloy with 3.0% silver and 0.5% copper.)
2. A rosin type flux with a chlorine content of 0.2% or less shall be used. The rosin flux with low halogen content is recommended.
3. When soldering, use one of the following time/ temperature methods for acceptable solder joints.
Make sure the devices have been properly prepared with flux prior soldering.

* Reflow soldering method (Infrared reflow / Heat circulation reflow / Hot plate reflow):

Limit solder to 3 reflow cycles because resin is used in the modules manufacturing process.
Excessive reflow will effect the resin resulting in a potential failure or latent defect.
The recommended reflow temperature profile is shown below. The temperature of the reflow profile must be measured at the device lead.

Reflow temperature profile and condition:



- | | | |
|-----------------------|----------------|-------------------------|
| (1) Temperature rise: | 5deg-C/sec. | |
| (2) Preheating: | 140 - 220deg-C | 60 - 120sec. |
| (3) Main heating: | 220deg-C over. | 10 - 40sec. |
| (4) Main heating: | 250deg-C over. | 10 sec. (260deg-C max.) |

* Measurement point: Device lead.

4. The above-recommended conditions were confirmed using the manufacture's equipment and materials.
However, when soldering these products, the soldering condition should be verified by customer using their equipment and materials.

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Eudyna Devices Inc. products contain **gallium arsenide (GaAs)** which can be hazardous to the human body and the environment. For safety, observe the following procedures:

- Do not put these products into the mouth.
- Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.
- Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.

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