

DATA SHEET

NEC

GaAs INTEGRATED CIRCUIT μ PG2053K

GaAs MMIC DBS 4 x 2 IF SWITCH MATRIX

FEATURES

- HIGH ISOLATION : ISL = 38 dB TYP. @ f = 0.95 to 2.15 GHz, $V_{CONT} = +5.0$ V/0 V
- CONTROL VOLTAGE : $V_{CONT(H)} = +4.5$ to $+5.5$ V (+5.0 V TYP.)
: $V_{CONT(L)} = -0.5$ to $+0.5$ V (0 V TYP.)
- LOW INSERTION LOSS : $L_{INS} = 6.0$ dB TYP. @ f = 0.95 to 2.15 GHz, $V_{CONT} = +5.0$ V/0 V, $Z_0 = 50 \Omega$
- 20-PIN 4 x 4 mm SQUARE MICRO LEAD PACKAGE (20-pin plastic QFN (0.5 mm pitch))

APPLICATIONS

- Direct Broadcast Satellite (DBS)
- Switch Box
- 4 x 2 switch matrix to L, S band applications

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μ PG2053K-E3	20-pin plastic QFN (0.5 mm pitch)	G2053	<ul style="list-style-type: none">• Embossed tape 12 mm wide• Pin 1 to 5 face the perforation side of the tape• Qty 3 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: μ PG2053K

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Supply Voltage	V _{DD}	-1.0 to +6.0	V
Control Voltage	V _{CONT1 to 4}	-1.0 to +6.0	V
Total Power Dissipation	P _{tot}	2 ^{Note}	W
Input Power	P _{in}	+10	dBm
Operating Ambient Temperature	T _A	-40 to +85	°C
Storage Temperature	T _{stg}	-65 to +150	°C

Note Mounted on double-sided copper-clad 50 × 50 × 1.6 mm epoxy glass PWB, T_A = +85°C

RECOMMENDED OPERATING CONDITIONS (T_A = +25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V _{DD}	+4.5	+5.0	+5.5	V
Control Voltage (H)	V _{CONT (H)}	+4.5	+5.0	+5.5	V
Control Voltage (L)	V _{CONT (L)}	-0.5	0	+0.5	V

ELECTRICAL CHARACTERISTICS

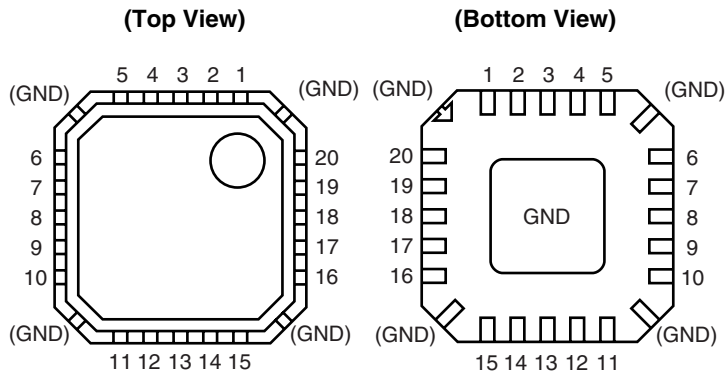
(T_A = +25°C, V_{DD} = +5.0 V, V_{CONT} = +5.0 V/0 V, P_{in} = 0 dBm, Z_o = 50 Ω, each port, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss	L _{INS}	f = 0.95 to 2.15 GHz	-	6.0	8.0	dB
Insertion Loss Flatness	ΔL _{INS}	L _{INS (0.95 GHz)} - L _{INS (2.15 GHz)}	-	0.5	1.5	dB
Isolation D/U-ratio ^{Note 1}	ISL	f = 0.95 to 2.15 GHz	35	38	-	dB
Output Return Loss	RL _{out}	f = 0.95 to 2.15 GHz	10	15	-	dB
Control Current ^{Note 2}	I _{CONT}	V _{CONT} = +5.0 V/0 V, non-RF	-	-	0.5	mA
Supply Current	I _{DD}	V _{CONT} = +5.0 V/0 V, non-RF	-	-	2.0	mA

Notes 1. Isolation D/U-ratio = |(Signal leakage (off-state)) - (Insertion loss (on-state))|

2. Per 1 control pin

PIN CONNECTIONS



Pin No.	Pin Name	Pin No.	Pin Name
1	V _{CONT1}	11	V _{CONT4}
2	N.C.	12	IN-C
3	GND	13	GND
4	IN-A	14	N.C.
5	V _{CONT2}	15	V _{CONT3}
6	IN-B	16	OUT2
7	GND	17	GND
8	V _{DD}	18	N.C.
9	GND	19	GND
10	IN-D	20	OUT1

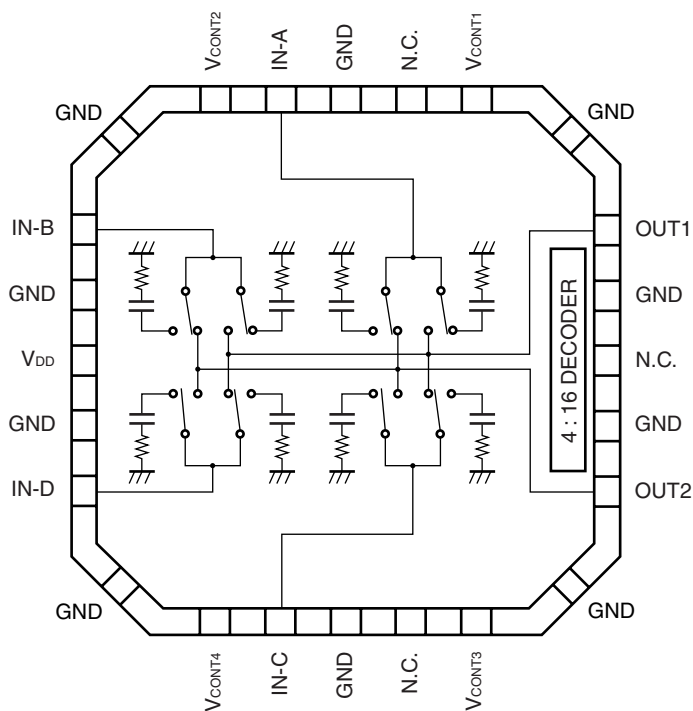
Remark N.C. : Non Connection

TRUTH TABLE

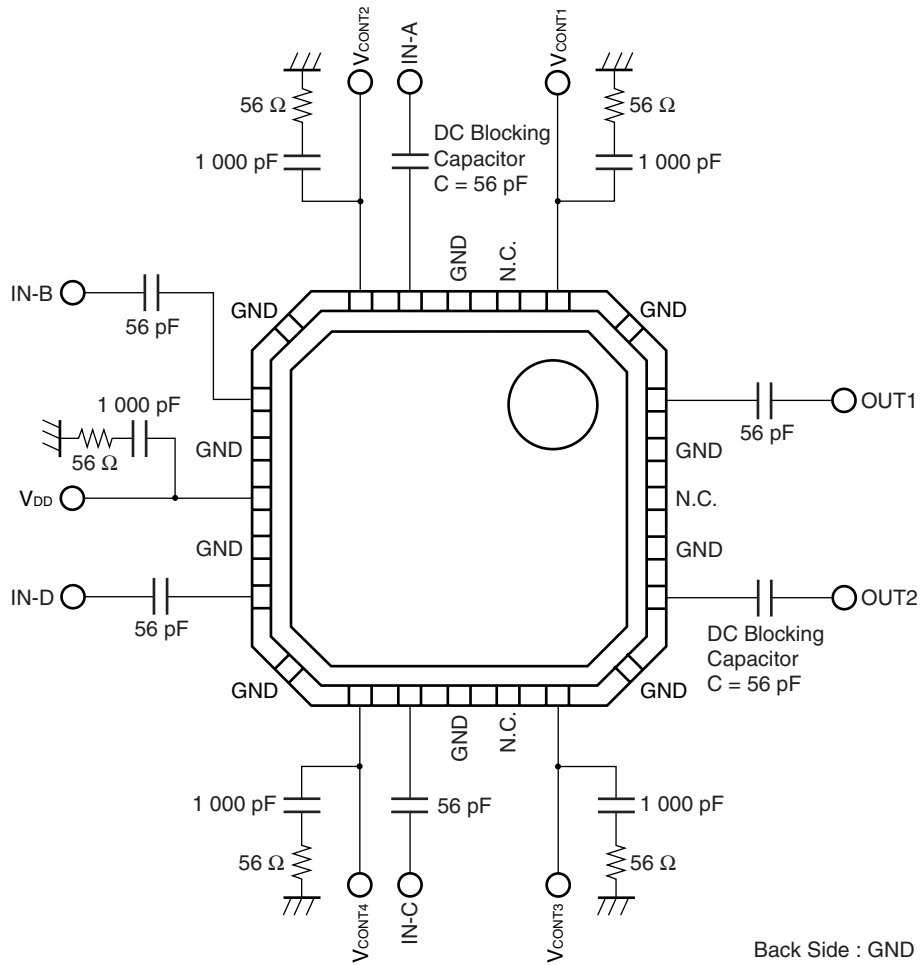
State	ON CHANNEL		CONTROL PINS			
	OUT1	OUT2	V _{CONT1}	V _{CONT2}	V _{CONT3}	V _{CONT4}
1	IN-A	IN-A	Low	Low	Low	Low
2		IN-B	Low	Low	Low	High
3		IN-C	Low	Low	High	Low
4		IN-D	Low	Low	High	High
5	IN-B	IN-A	Low	High	Low	Low
6		IN-B	Low	High	Low	High
7		IN-C	Low	High	High	Low
8		IN-D	Low	High	High	High
9	IN-C	IN-A	High	Low	Low	Low
10		IN-B	High	Low	Low	High
11		IN-C	High	Low	High	Low
12		IN-D	High	Low	High	High
13	IN-D	IN-A	High	High	Low	Low
14		IN-B	High	High	Low	High
15		IN-C	High	High	High	Low
16		IN-D	High	High	High	High

Remark High : +5 Vdc, Low : 0 Vdc.

FUNCTIONAL DIAGRAM



EVALUATION CIRCUIT ($V_{DD} = +5.0\text{ V}$, $V_{CONT} = +5.0\text{ V/0 V}$, $Z_o = 50\ \Omega$)

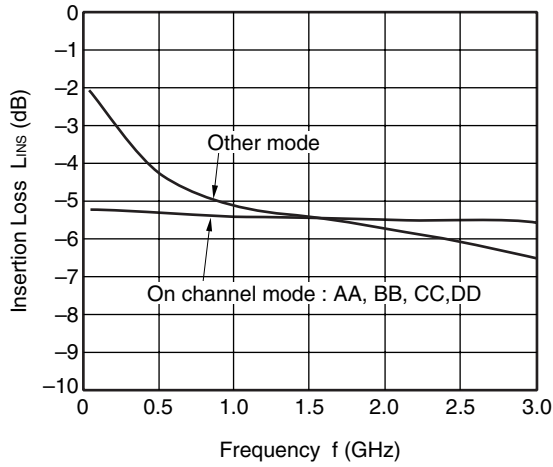


The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

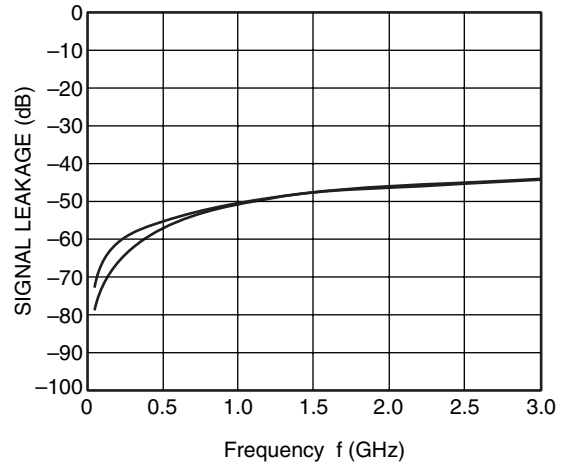
TYPICAL CHARACTERISTICS

($T_A = +25^\circ\text{C}$, $V_{DD} = +5.0\text{ V}$, $V_{CONT} = +5.0\text{ V/0 V}$, $P_{in} = 0\text{ dBm}$, $Z_o = 50\ \Omega$, unless otherwise specified)

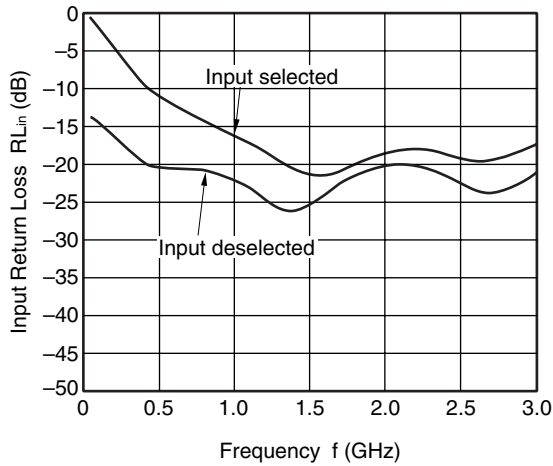
INSERTION LOSS vs. FREQUENCY



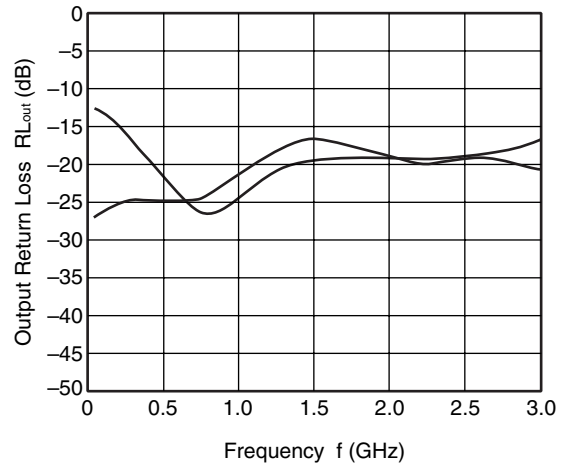
SIGNAL LEAKAGE vs. FREQUENCY



INPUT RETURN LOSS vs. FREQUENCY

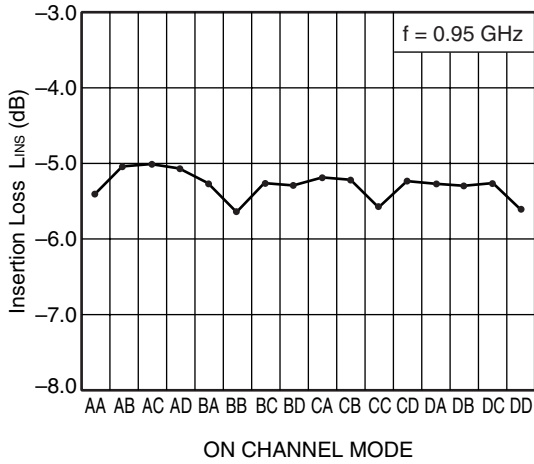


OUTPUT RETURN LOSS vs. FREQUENCY

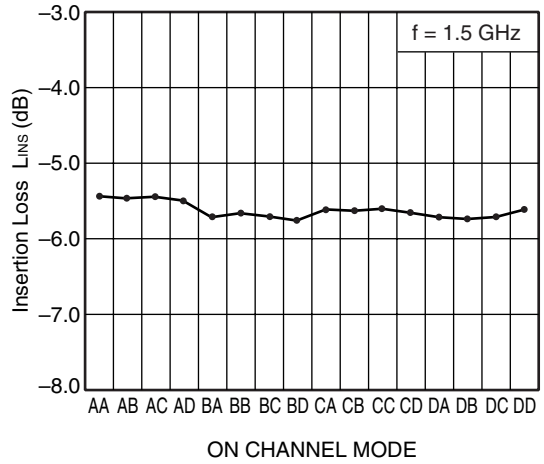


Remark The graphs indicate nominal characteristics.

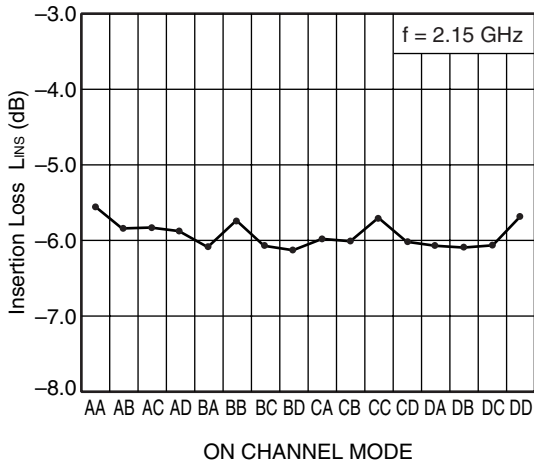
INSERTION LOSS
vs. ON CHANNEL MODE



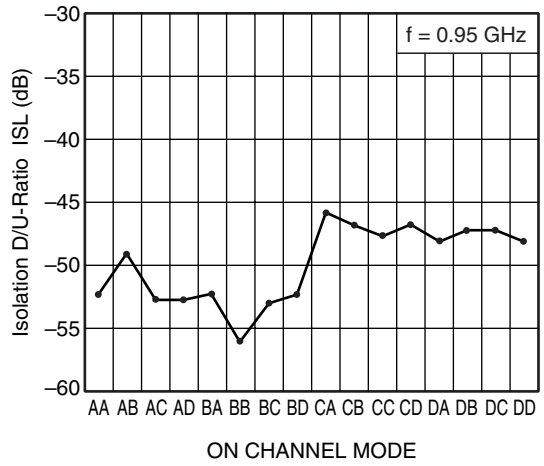
INSERTION LOSS
vs. ON CHANNEL MODE



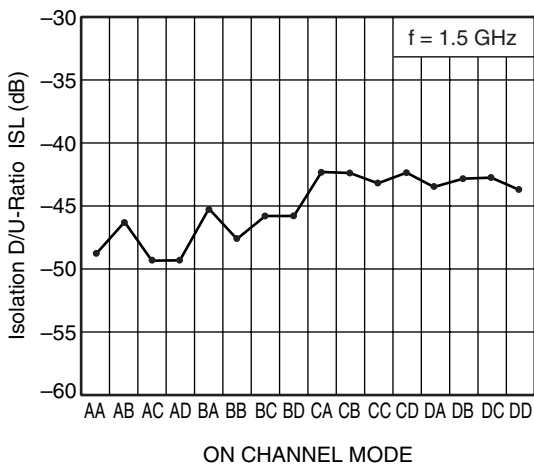
INSERTION LOSS
vs. ON CHANNEL MODE



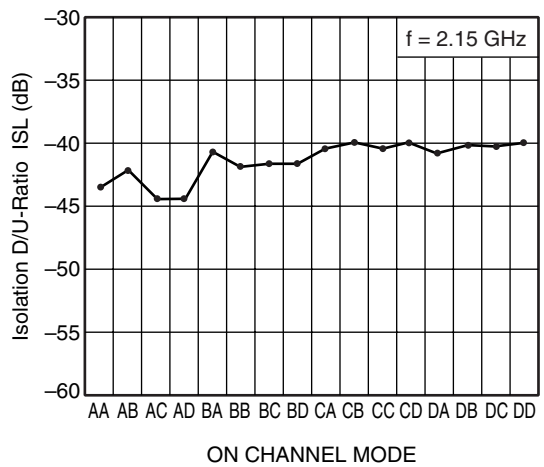
ISOLATION D/U-RATIO
vs. ON CHANNEL MODE



ISOLATION D/U-RATIO
vs. ON CHANNEL MODE

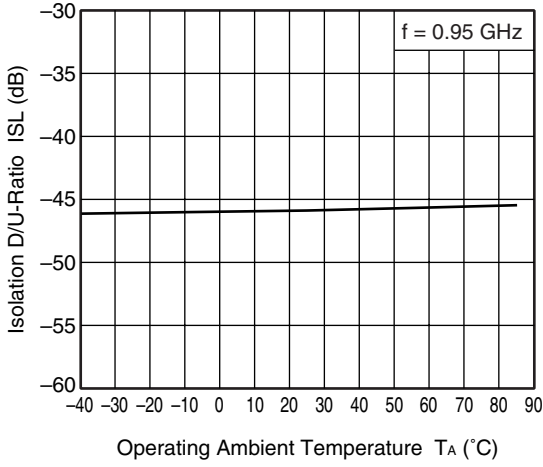


ISOLATION D/U-RATIO
vs. ON CHANNEL MODE

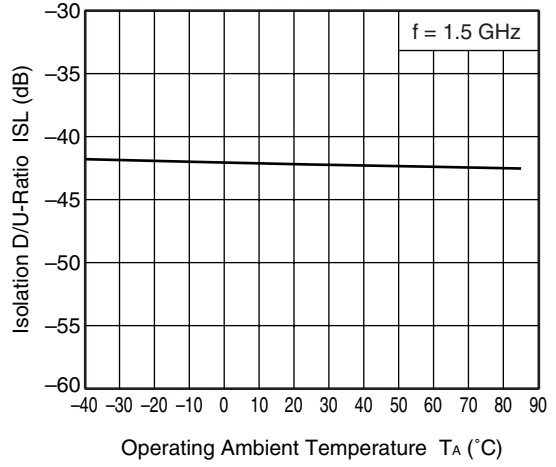


Remark The graphs indicate nominal characteristics.

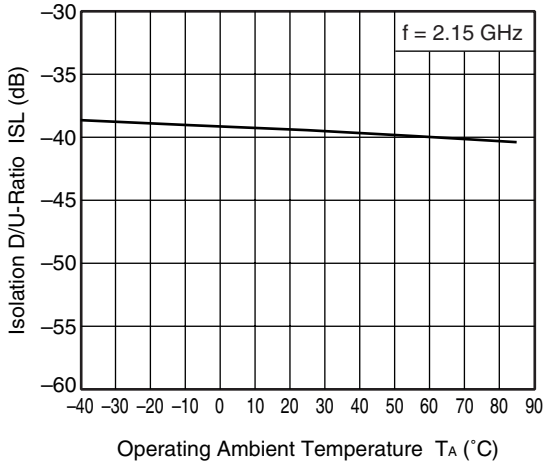
ISOLATION D/U-RATIO vs. OPERATING AMBIENT TEMPERATURE



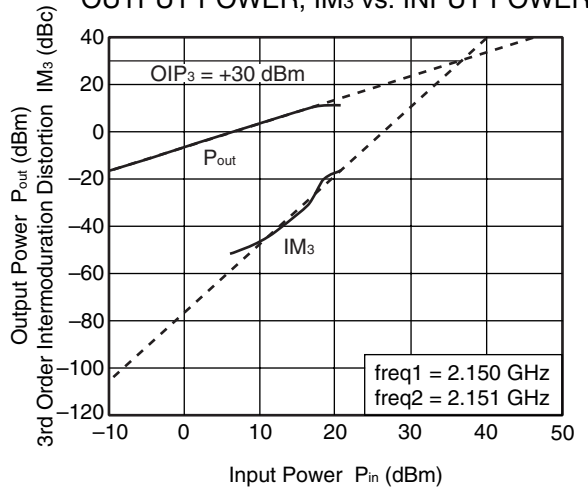
ISOLATION D/U-RATIO vs. OPERATING AMBIENT TEMPERATURE



ISOLATION D/U-RATIO vs. OPERATING AMBIENT TEMPERATURE



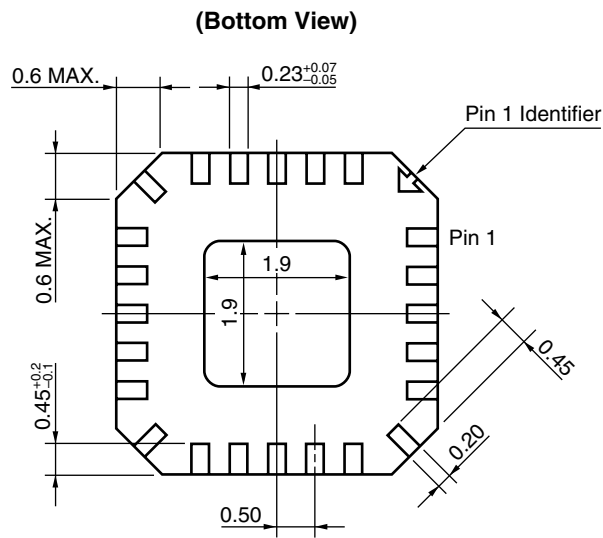
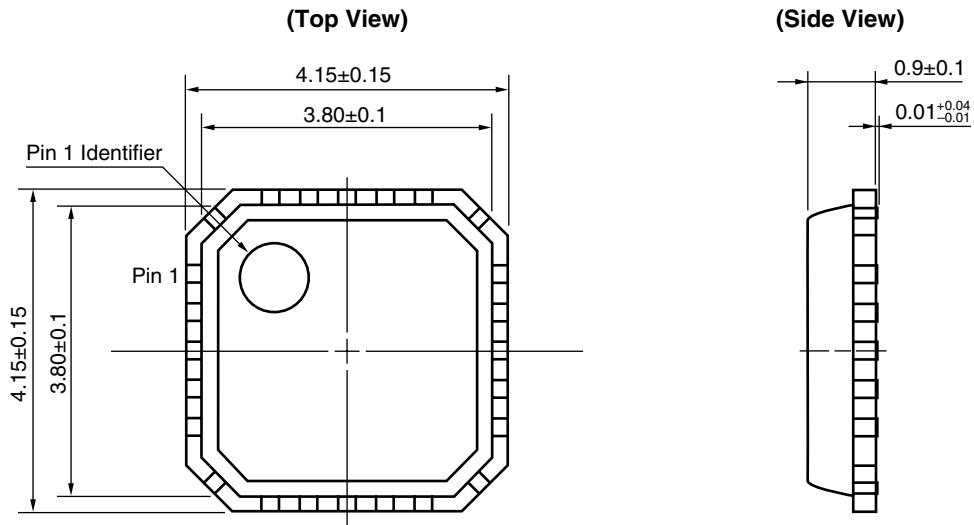
OUTPUT POWER, IM_3 vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

20-PIN 4 × 4 mm SQUARE MICRO LEAD PACKAGE (20-PIN QFN (0.5 mm pitch)) (UNIT: mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

Soldering Method	Soldering Conditions	Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	IR260
Partial Heating	Peak temperature (pin temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	HS350

Caution Do not use different soldering methods together (except for partial heating).

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M8E 00.4-0110

<p>Caution</p>	<p>GaAs Products</p>	<p>This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.</p> <ul style="list-style-type: none"> • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. <ol style="list-style-type: none"> 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.
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► For further information, please contact

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