NEC

GaAs INTEGRATED CIRCUIT

μPG188GR

GaAs MMIC DBS 4 × 2 IF SWITCH MATRIX

DESCRIPTION

The μPG188GR is intended for use in Direct Broadcast Satellite (DBS) applications within the Low Noise Block (LNB) down-converter for systems where at least multi LNB are required.

FEATURES

- High isolation : ISL = 30 dB TYP. (D/U-ratio)
- Control voltage : V_{cont} = 0 V/+5 V
- Insertion loss : L_{INS} = 8 dB TYP. (Z_O = 50 Ω)
- 16-pin plastic HTSSOP package

ORDERING INFORMATION

Part Number	Package	Supplying Form
μPG188GR-E1	16-pin plastic HTSSOP	• Embossed tape 12 mm wide • Qty 3 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPG188GR

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

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

Parameter	Symbol	Ratings	Unit
Control Voltage 1 to 8	$V_{cont1\ to\ 8}$	–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 RENGE (T_A = +25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Control Voltage (High)	$V_{cont(H)}$	+4.5	+5.0	+5.5	V
Control Voltage (Low)	$V_{cont(L)}$	–0.5	0	+0.5	V

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{cont} = 0 V/+5 V, P_{in} = 0 dBm, Z_O = 50 Ω, Each Port, unless otherwise specified)

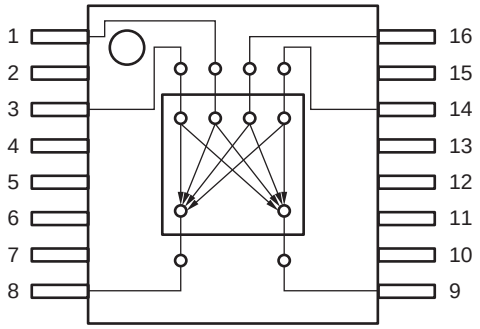
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss 1	L_{INS1}	f = 0.95 to 1.5 GHz	–	7.0	9.0	dB
Insertion Loss 2	L_{INS2}	f = 1.5 GHz to 2.15 GHz	–	8.0	10.0	dB
Insertion Loss Flatness	ΔL_{INS}	$\lvert L_{INS}$ (0.95 GHz) – L_{INS} (2.15 GHz) $\rvert$	–	1.5	3.0	dB
Isolation D/U-ratio 1 Note1	ISL1	f = 0.95 to 1.5 GHz	29	32	–	dB
Isolation D/U-ratio 2 Note1	ISL2	f = 1.5 to 2.15 GHz	27	30	–	dB
Output Return Loss	RL_{OUT}	f = 0.95 to 2.15 GHz	10	15	–	dB
Control Current Note2	I_{cont}	V_{cont} = +5 V/0 V, RF OFF	–	–	0.5	mA

Notes 1. 'Isolation D/U-ratio' = $\lvert$'signal leakage (off-state)' – 'insertion loss (on-state)'$\rvert$

2. per 1 control pin

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

Top View



Pin No.	Pin Name	Pin No.	Pin Name
1	IN-C	9	OUT1
2	GND	10	V_{cont4}
3	IN-D	11	V_{cont3}
4	V_{cont5}	12	V_{cont2}
5	V_{cont6}	13	V_{cont1}
6	V_{cont7}	14	IN-A
7	V_{cont8}	15	GND
8	OUT2	16	IN-B

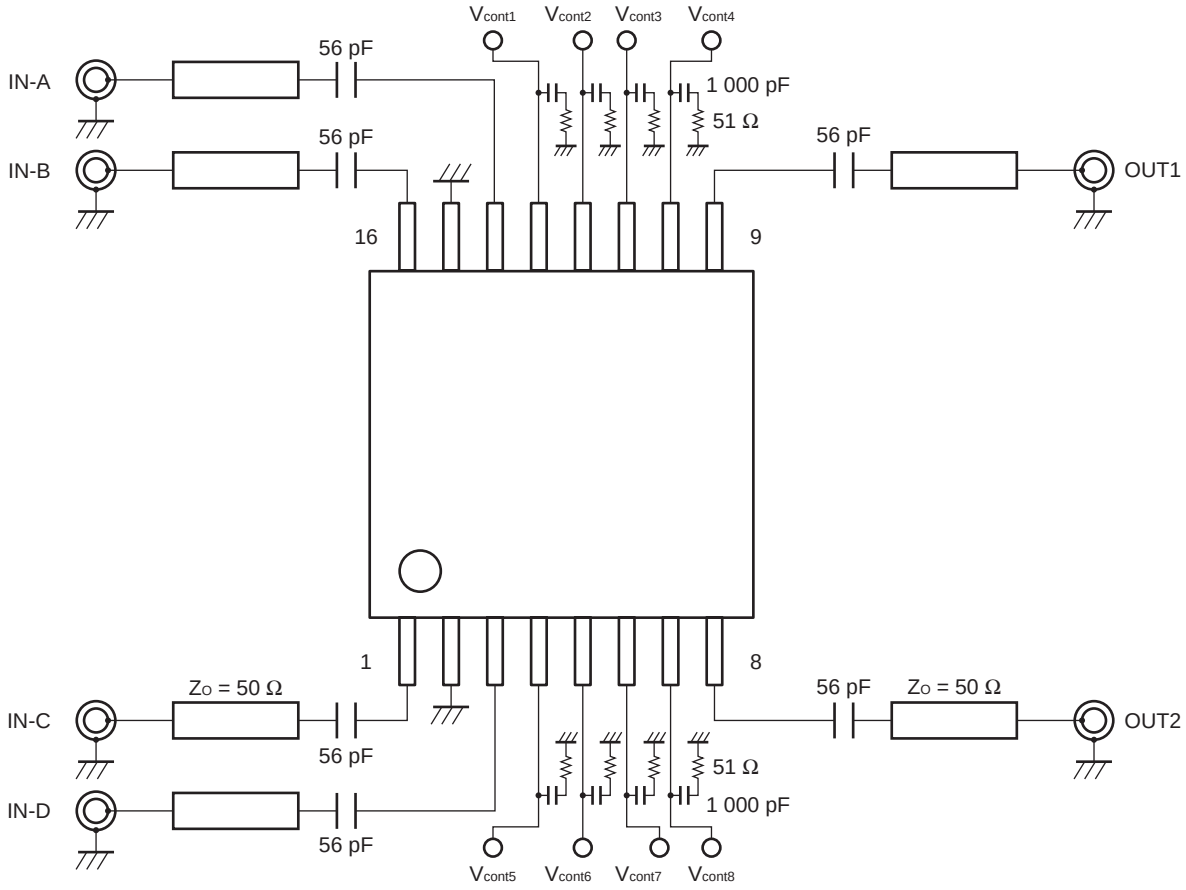
Remark Backside: GND

TRUTH TABLE

On Channel		Control Pin							
OUT1	OUT2	V_{cont1}	V_{cont2}	V_{cont3}	V_{cont4}	V_{cont5}	V_{cont6}	V_{cont7}	V_{cont8}
IN-A	–	High	Low	High	Low	–	–	–	–
IN-B	–	Low	High	High	Low	–	–	–	–
IN-C	–	High	Low	Low	High	–	–	–	–
IN-D	–	Low	High	Low	High	–	–	–	–
–	IN-A	–	–	–	–	Low	High	Low	High
–	IN-B	–	–	–	–	High	Low	Low	High
–	IN-C	–	–	–	–	Low	High	High	Low
–	IN-D	–	–	–	–	High	Low	High	Low

EVALUATION CIRCUIT (Reference Only)

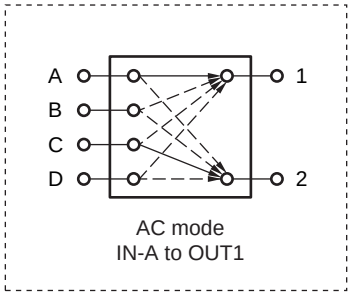
V_{cont1} to V_{cont8} = 0 V/+5 V, P_{in} = 0 dBm, Z_O = 50 Ω, DC Blocking Capacitor = 56 pF



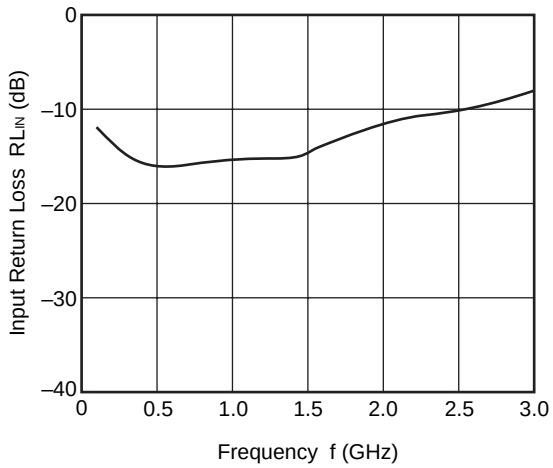
Caution For DC lines, chip capacitors and resistors are used to suppress unintended resonance.

TYPICAL CHARACTERISTICS

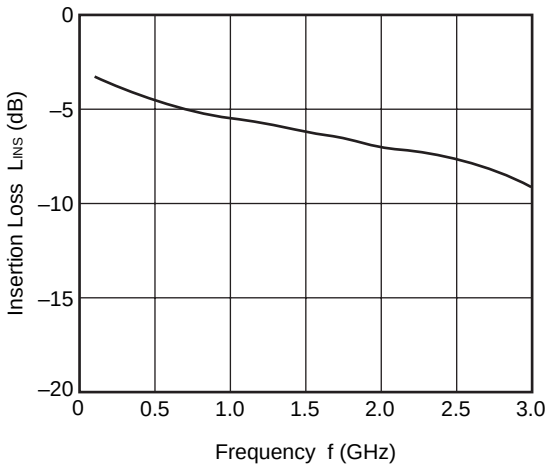
ON ROUTE



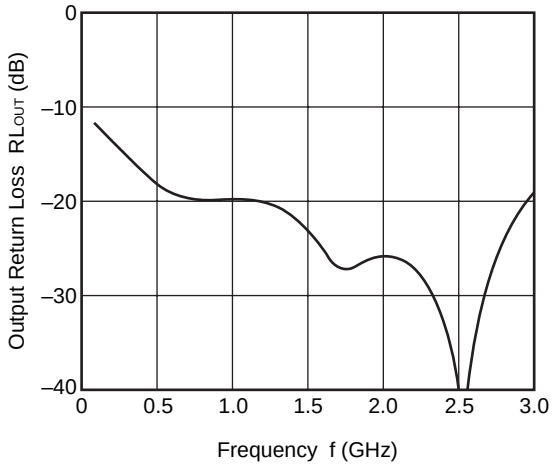
INPUT RETURN LOSS vs. FREQUENCY



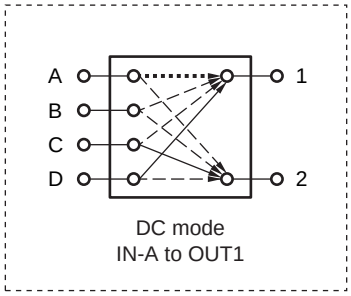
INSERTION LOSS vs. FREQUENCY



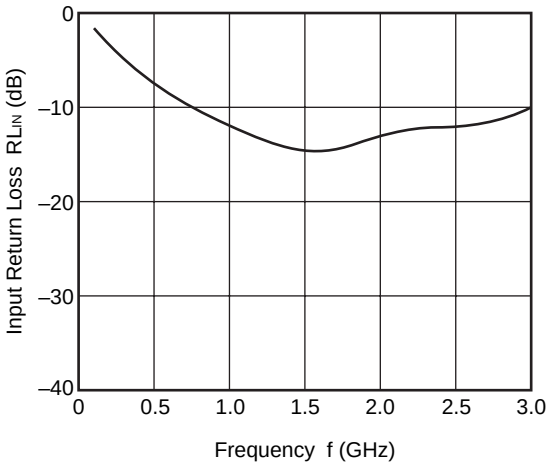
OUTPUT RETURN LOSS vs. FREQUENCY



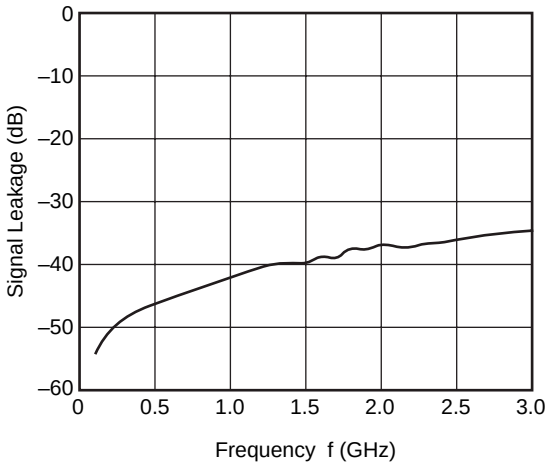
OFF ROUTE



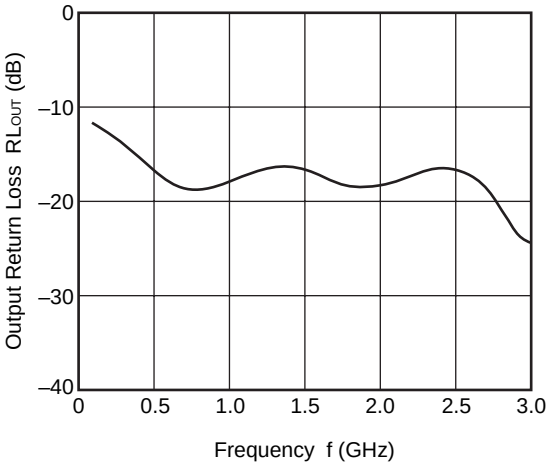
INPUT RETURN LOSS vs. FREQUENCY



SIGNAL LEAKAGE vs. FREQUENCY



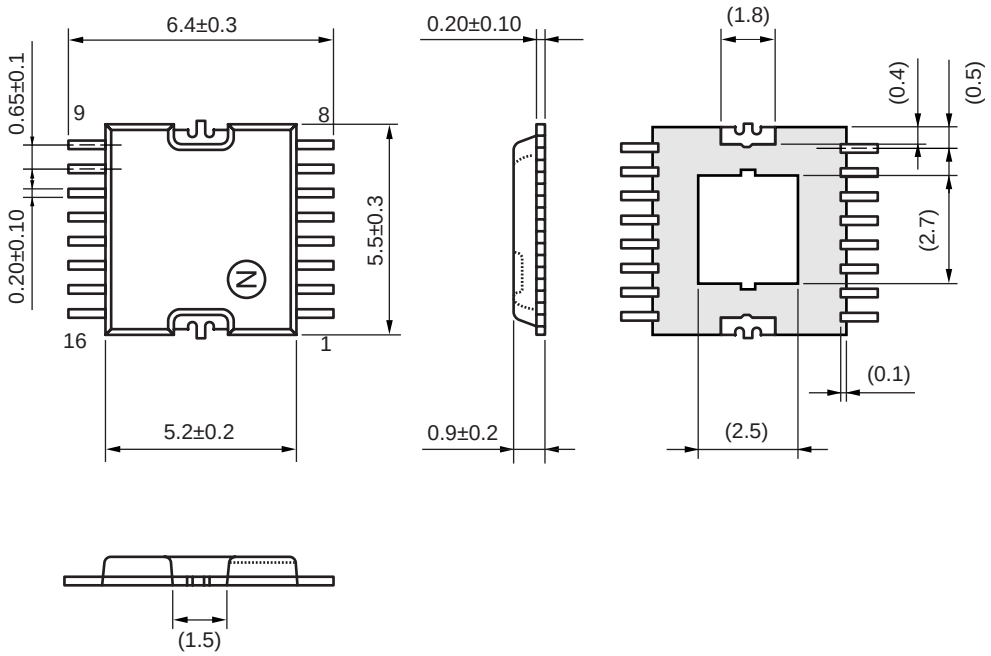
OUTPUT RETURN LOSS vs. FREQUENCY



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

16-PIN PLASTIC HTSSOP (UNIT: mm)



Remark ( ): Reference value

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) Time at peak temperature Time at temperature of 220°C or higher Preheating time at 120 to 180°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 60 seconds or less : 120±30 seconds : 3 times : 0.2%(Wt.) or below	IR260
VPS	Peak temperature (package surface temperature) Time at temperature of 200°C or higher Preheating time at 120 to 150°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 215°C or below : 25 to 40 seconds : 30 to 60 seconds : 3 times : 0.2%(Wt.) or below	VP215
Wave Soldering	Peak temperature (molten solder temperature) Time at peak temperature Preheating temperature (package surface temperature) Maximum number of flow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 120°C or below : 1 time : 0.2%(Wt.) or below	WS260
Partial Heating	Peak temperature (pin temperature) Soldering time (per side of device) Maximum chlorine content of rosin flux (% mass)	: 350°C or below : 3 seconds or less : 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

SAFETY INFORMATION ON THIS PRODUCT

Caution GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.

▶Business issue

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▶Technical issue

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