

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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Phase-out/Discontinued

GaAs MMIC DPDT SWITCH FOR 2.4 GHz AND 5 GHz DUALBAND WIRELESS LAN

DESCRIPTION

The μPG2035T5F is a GaAs MMIC DPDT switch for 2.4 GHz and 5 GHz dualband wireless LAN. High isolation and dualband operations suit to dualband wireless LAN system.

FEATURES

- Operating frequency : $f = 2.4$ to 2.5 GHz and 4.9 to 6.0 GHz
- Low insertion loss : $L_{INS1} = 0.8$ dB TYP. @ $f = 2.4$ to 2.5 GHz
: $L_{INS2} = 1.2$ dB TYP. @ $f = 4.9$ to 6.0 GHz
- Handling power : $P_{in(1\text{ dB})} = +31$ dBm TYP. @ $f = 2.4$ to 2.5 GHz
: $+30$ dBm TYP. @ $f = 4.9$ to 6.0 GHz
- Control voltage : $V_{cont} = +3.0$ V/0 V (Two control type)
- High isolation : $ISL1$ (INPUT to OUTPUT) = 34 dB TYP. @ $f = 2.4$ to 2.5 GHz
: $ISL2$ (INPUT to OUTPUT) = 33 dB TYP. @ $f = 4.9$ to 6.0 GHz
: $ISL3$ (TX to RX, ANT1 to ANT2) = 24 dB TYP. @ $f = 2.4$ to 2.5 GHz
: $ISL4$ (TX to RX, ANT1 to ANT2) = 22 dB TYP. @ $f = 4.9$ to 6.0 GHz
- Input/output return loss : $RL_{in}/RL_{out} = 15$ dB TYP.
- Switching speed : 50 ns @ t_{RISE}/t_{FALL} (10/90% RF)
- 12-pin plastic QFN package ($3.0 \times 3.0 \times 0.75$ mm)

APPLICATION

- 2.4 GHz and 5 GHz dualband wireless LAN: IEEE802.11a+b/g

★ ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPG2035T5F-E2	μPG2035T5F-E2-A	12-pin plastic QFN (Pb-Free)	2035	<ul style="list-style-type: none"> • Embossed tape 8 mm wide • Pin 1 indicates roll-in direction of tape • Qty 3 kpcs/reel

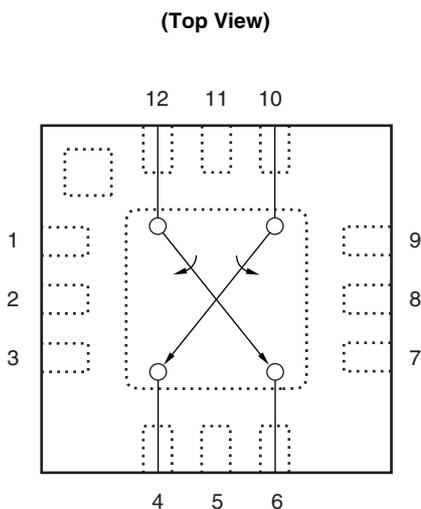
Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: μPG2035T5F

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

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PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



Pin No.	Pin Name	Description
1	NC	Ground
2	NC	Ground
3	V _{cont1}	Control 1
4	ANT1	Antenna Port 1
5	NC	Ground
6	ANT2	Antenna Port 2
7	V _{cont2}	Control 2
8	NC	Ground
9	NC	Ground
10	RX	Receive Port
11	NC	Ground
12	TX	Transmit Port
EXPOSED PAD	GND	Ground

Remark NC is functionally non-connection pin but actually grounding is recommended.

TRUTH TABLE

V _{cont1}	V _{cont2}	ANT1-RX	ANT1-TX	ANT2-TX	ANT2-RX
2.7 to 5.0 V	0 ± 0.2 V	ON	OFF	ON	OFF
0 ± 0.2 V	2.7 to 5.0 V	OFF	ON	OFF	ON

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

Parameter	Symbol	Ratings	Unit
Switch Control Voltage	V _{cont}	-6.0 to +6.0 ^{Note 1}	V
Input Power	P _{in}	+36	dBm
Total Power Dissipation	P _{tot}	0.15 ^{Note 2}	W
Operating Ambient Temperature	T _A	-45 to +85	°C
Storage Temperature	T _{stg}	-55 to +150	°C

Notes 1. |V_{cont1} - V_{cont2}| ≤ 6.0 V

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

RECOMMENDED OPERATING RANGE (TA = +25°C)

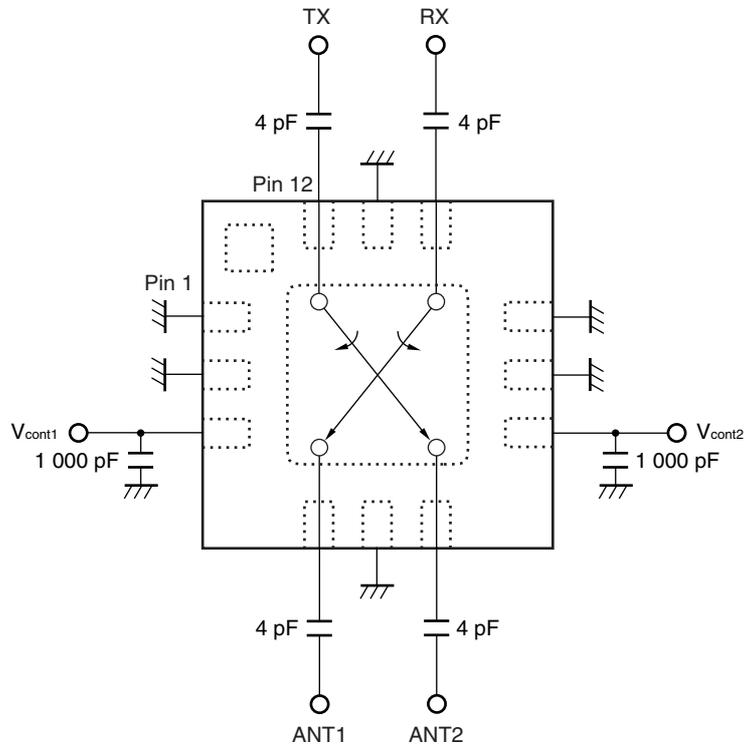
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency 1	f1	2.4	–	2.5	GHz
Operating Frequency 2	f2	4.9	–	6.0	GHz
Switch Control Voltage (H)	V _{cont (H)}	2.7	3.0	5.0	V
Switch Control Voltage (L)	V _{cont (L)}	–0.2	0	0.2	V

ELECTRICAL CHARACTERISTICS (TA = +25°C, V_{cont} = 3.0 V/0 V, Zo = 50 Ω, DC block capacitor = 4 pF, each port, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss 1	L _{ins1}	f = 2.4 to 2.5 GHz	–	0.8	1.0	dB
Insertion Loss 2	L _{ins2}	f = 4.9 to 6.0 GHz	–	1.2	1.4	dB
Isolation 1 (INPUT to OUTPUT)	ISL1	f = 2.4 to 2.5 GHz	25	34	–	dB
Isolation 2 (INPUT to OUTPUT)	ISL2	f = 4.9 to 6.0 GHz	25	33	–	dB
Isolation 3 (TX to RX, ANT1 to ANT2)	ISL3	f = 2.4 to 2.5 GHz	17	24	–	dB
Isolation 4 (TX to RX, ANT1 to ANT2)	ISL4	f = 4.9 to 6.0 GHz	17	22	–	dB
Input and Output Return Loss 1	RL1	f = 2.4 to 2.5 GHz	–	15	–	dB
Input and Output Return Loss 2	RL2	f = 4.9 to 6.0 GHz	–	15	–	dB
Switch Control Current 1	I _{cont1}	f = 2.4 to 2.5 GHz	–	0.7	1.5	μA
Switch Control Current 2	I _{cont2}	f = 4.9 to 6.0 GHz	–	0.7	1.5	μA
1 dB Gain Compression Input Power	P _{in (1 dB)}	f = 2.4 to 2.5 GHz	–	31	–	dBm
		f = 4.9 to 6.0 GHz	–	30	–	
3rd Order Distortion Input Intercept Point 1	IIP ₃₁	f = 2.4 to 2.5 GHz	–	45	–	dBm
3rd Order Distortion Input Intercept Point 2	IIP ₃₂	f = 4.9 to 6.0 GHz	–	45	–	dBm
Switch Control Speed 1	t _{sw1}	f = 2.4 to 2.5 GHz, t _{RISE} /t _{FALL} (10/90% RF)	–	50	–	ns
Switch Control Speed 2	t _{sw2}	f = 4.9 to 6.0 GHz, t _{RISE} /t _{FALL} (10/90% RF)	–	50	–	ns

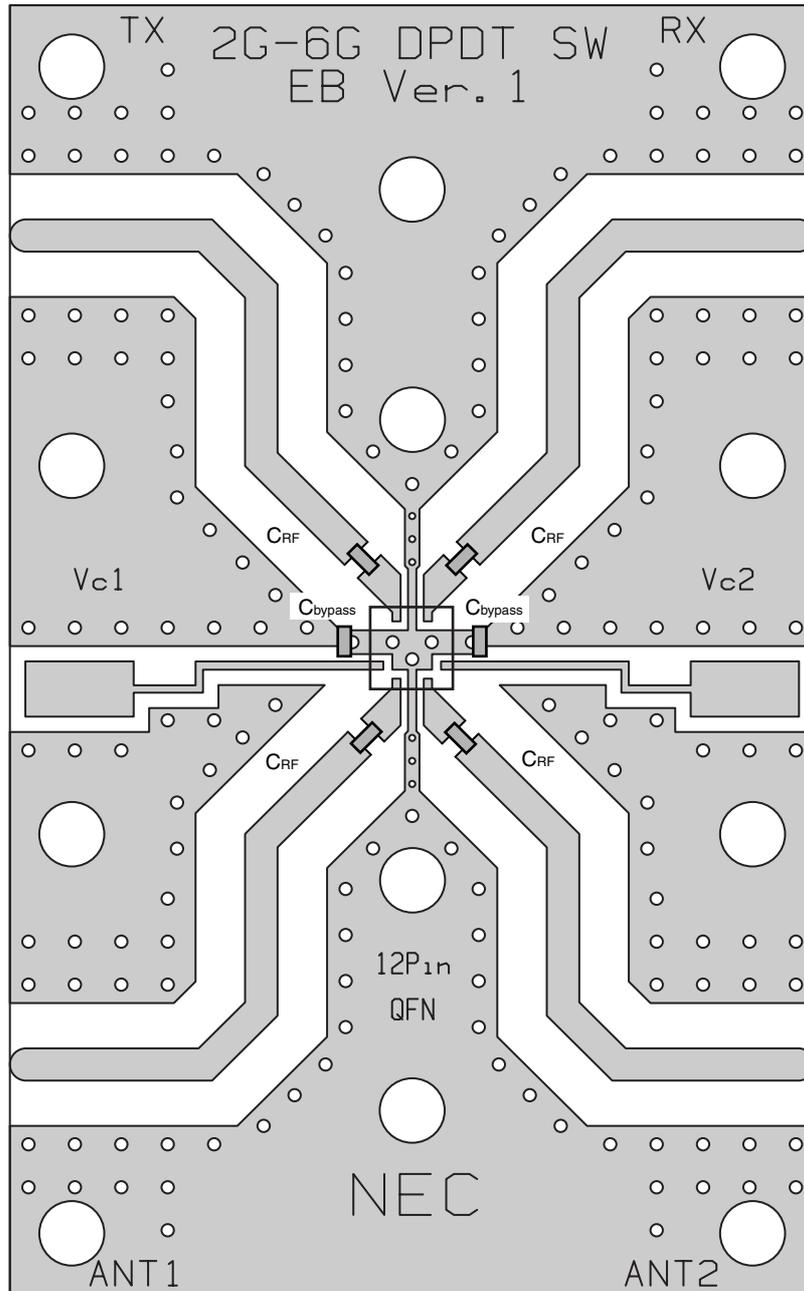
EVALUATION CIRCUIT

(Top View)



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

★ ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD

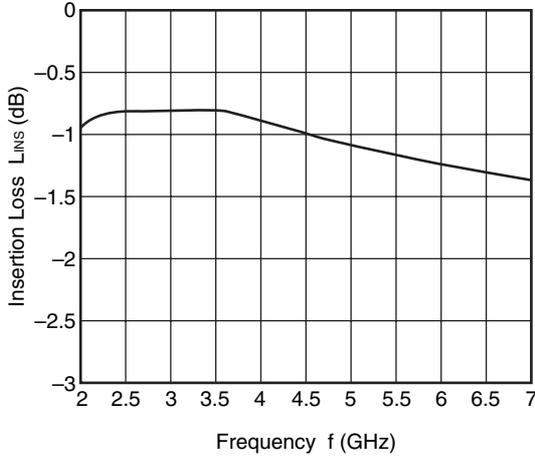


USING THE NEC EVALUATION BOARD

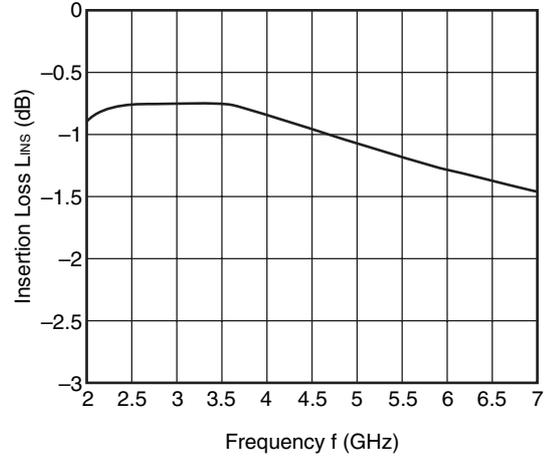
Symbol	Form	Rating	Part Number	Manufacturer
CRF	Chip Capacitor	4 pF	GRM1552C1H4R0CZ01B	muRata
Cbypass	Chip Capacitor	1 000 pF	GRM155B11H102KA01B	muRata
–	PC Terminal	–	A2-2PA-2.54DSA	Hirose
–	RF Connector	–	142-0721-821	Johnson
–	PWB	–	RO4003 (t = 0.51 mm)	Rogers

★ **TYPICAL CHARACTERISTICS** ($T_A = +25^\circ\text{C}$, $V_{\text{cont}} = 3.0 \text{ V/0 V}$, $Z_0 = 50 \Omega$, DC block capacitor = 4 pF using test fixture, unless otherwise specified)

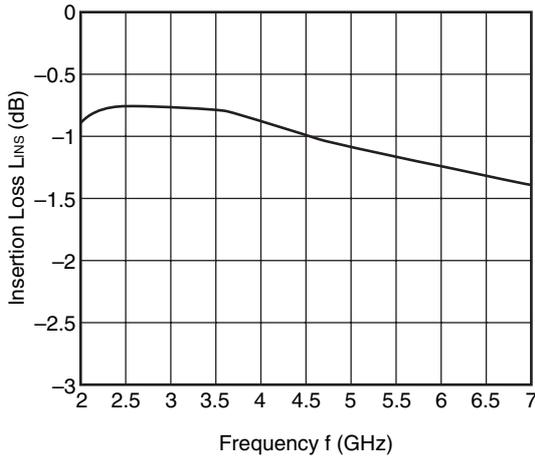
TX-ANT1 INSERTION LOSS vs. FREQUENCY
(When TX-ANT1 and ANT2-RX are ON)



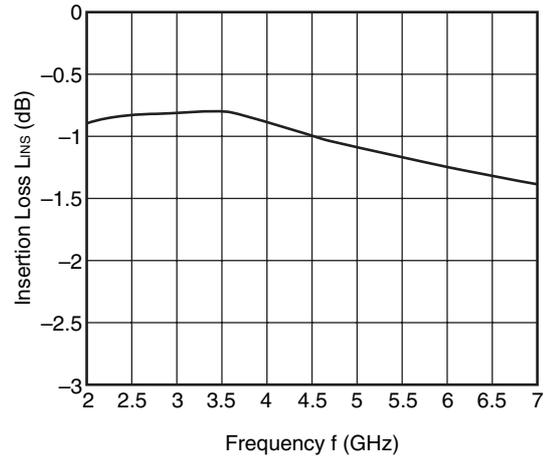
ANT1-RX INSERTION LOSS vs. FREQUENCY
(When TX-ANT2 and ANT1-RX are ON)



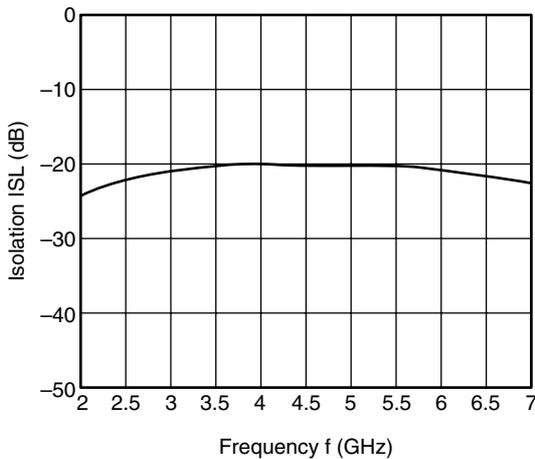
TX-ANT2 INSERTION LOSS vs. FREQUENCY
(When TX-ANT2 and ANT1-RX are ON)



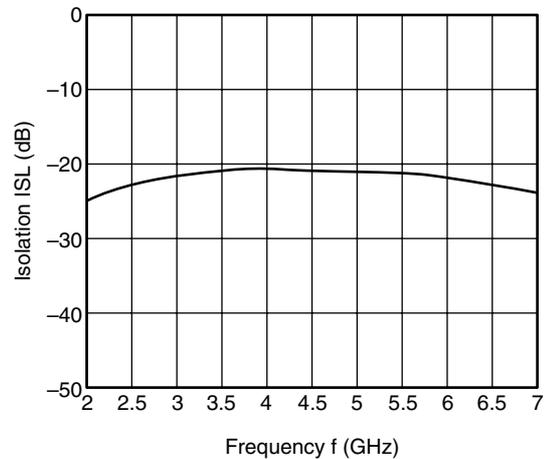
ANT2-RX INSERTION LOSS vs. FREQUENCY
(When TX-ANT1 and ANT2-RX are ON)



TX-RX ISOLATION vs. FREQUENCY
(When TX-ANT2 and ANT1-RX are ON)

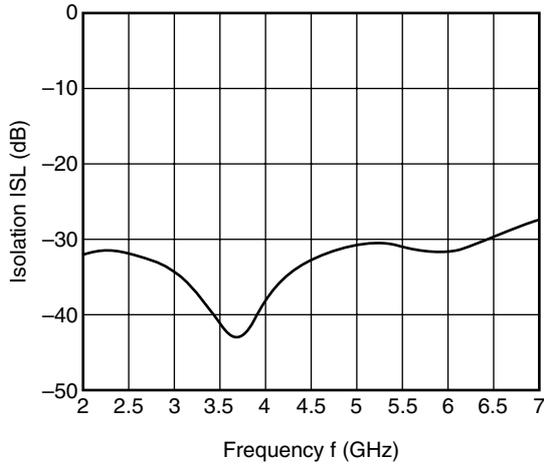


TX-RX ISOLATION vs. FREQUENCY
(When TX-ANT1 and ANT2-RX are ON)

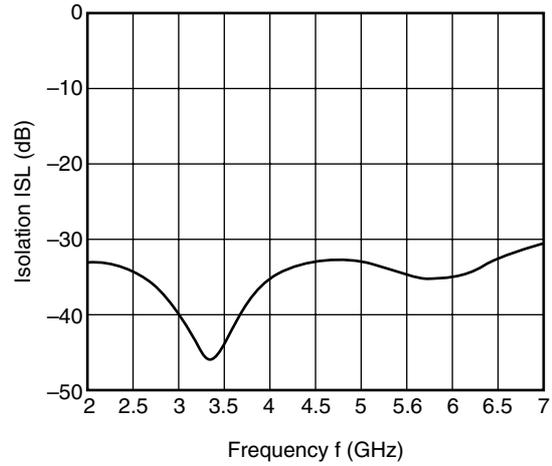


Remark The graphs indicate nominal characteristics.

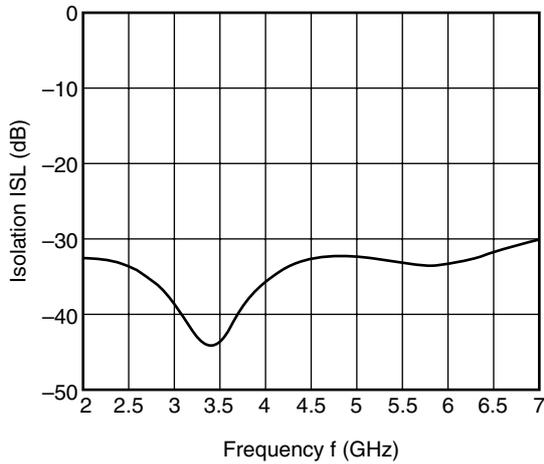
TX-ANT1 ISOLATION vs. FREQUENCY
(When TX-ANT2 and ANT1-RX are ON)



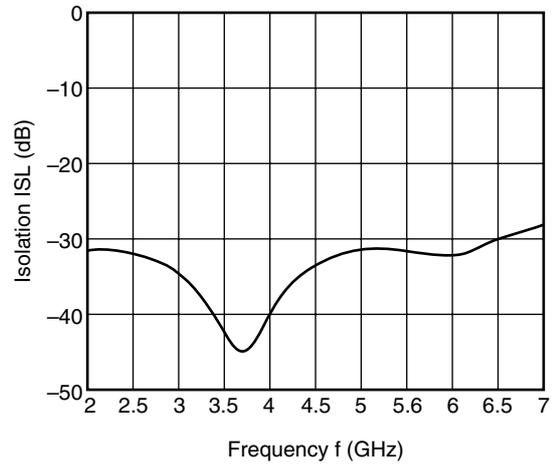
ANT1-RX ISOLATION vs. FREQUENCY
(When TX-ANT1 and ANT2-RX are ON)



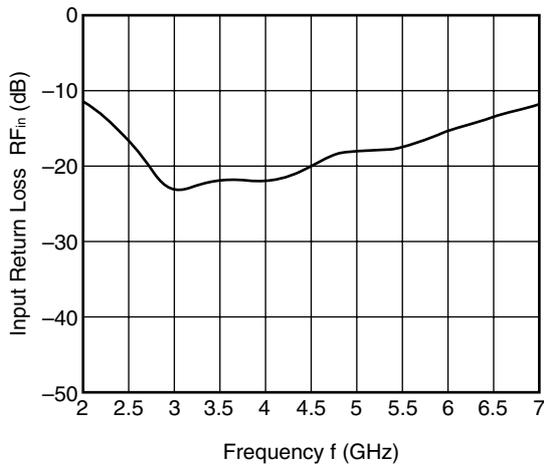
TX-ANT2 ISOLATION vs. FREQUENCY
(When TX-ANT1 and ANT2-RX are ON)



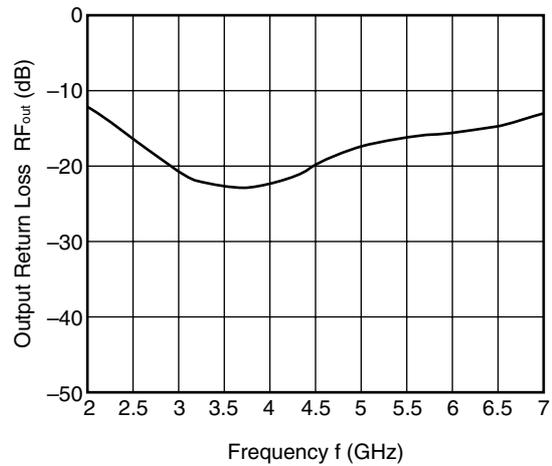
ANT2-RX ISOLATION vs. FREQUENCY
(When TX-ANT2 and ANT1-RX are ON)



TX-ANT1 INPUT RETURN LOSS vs. FREQUENCY
(When TX-ANT1 and ANT2-RX are ON)

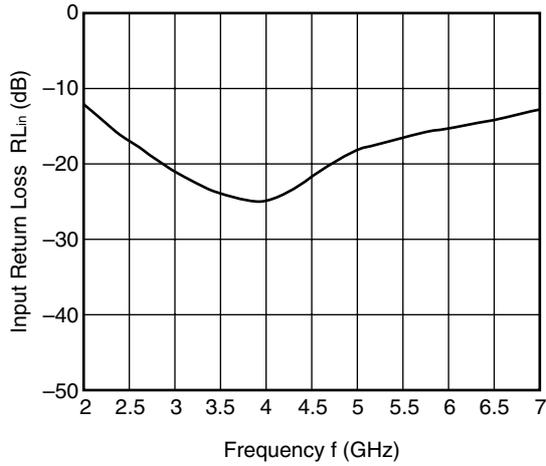


ANT1-RX OUTPUT RETURN LOSS vs. FREQUENCY
(When TX-ANT2 and ANT1-RX are ON)

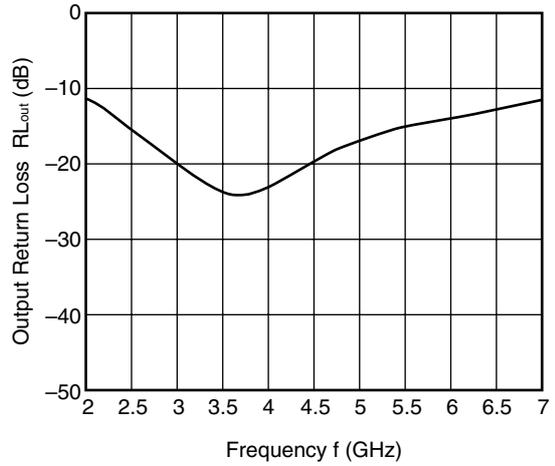


Remark The graphs indicate nominal characteristics.

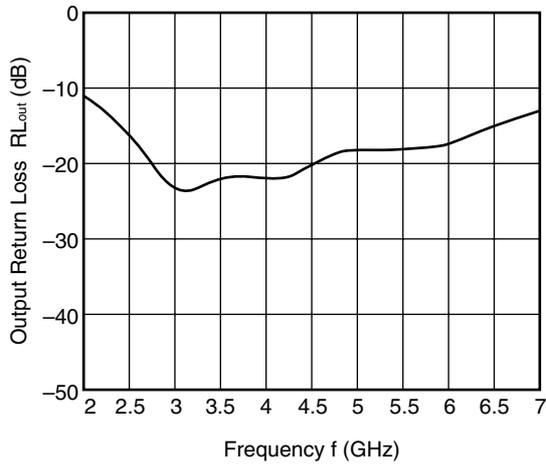
TX-ANT2 INPUT RETURN LOSS vs. FREQUENCY
(When TX-ANT2 and ANT1-RX are ON)



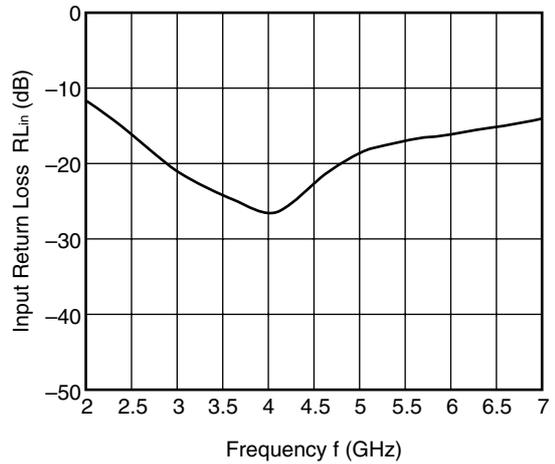
ANT2-RX OUTPUT RETURN LOSS vs. FREQUENCY
(When TX-ANT1 and ANT2-RX are ON)



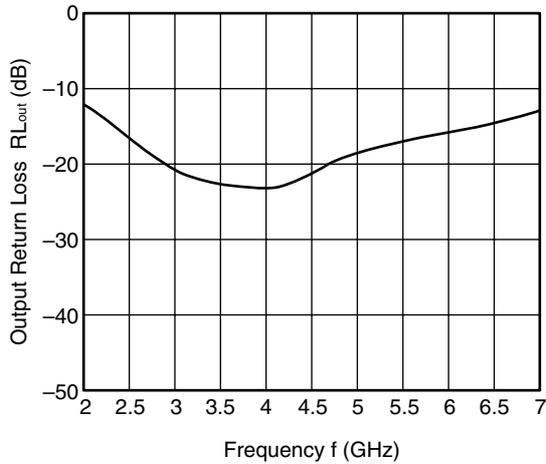
TX-ANT1 OUTPUT RETURN LOSS vs. FREQUENCY
(When TX-ANT1 and ANT2-RX are ON)



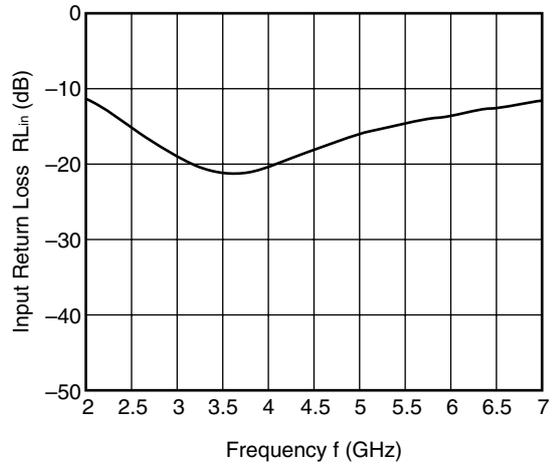
ANT1-RX INPUT RETURN LOSS vs. FREQUENCY
(When TX-ANT2 and ANT1-RX are ON)



TX-ANT2 OUTPUT RETURN LOSS vs. FREQUENCY
(When TX-ANT2 and ANT1-RX are ON)

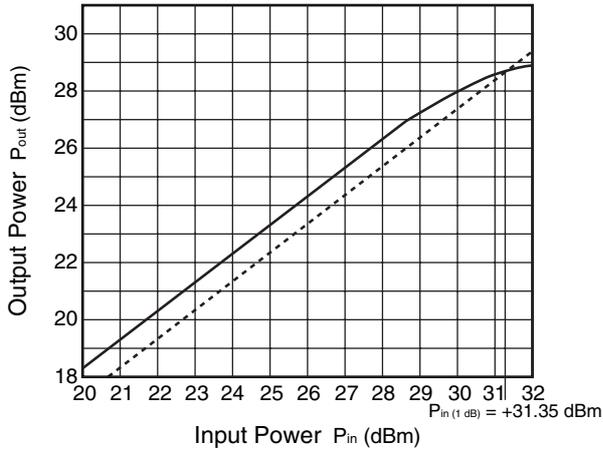


ANT2-RX INPUT RETURN LOSS vs. FREQUENCY
(When TX-ANT1 and ANT2-RX are ON)

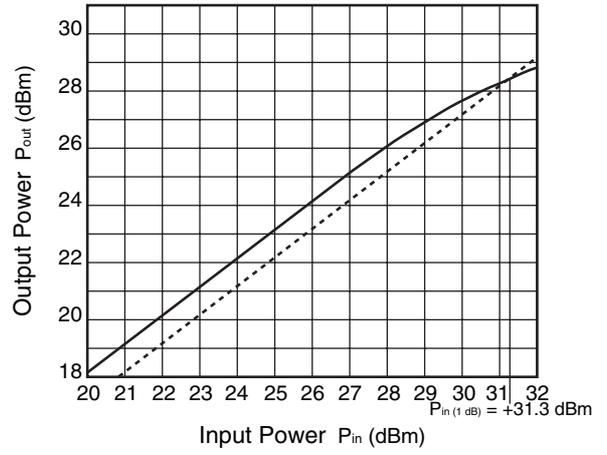


Remark The graphs indicate nominal characteristics.

OUTPUT POWER vs. INPUT POWER
(f = 2.4 GHz)



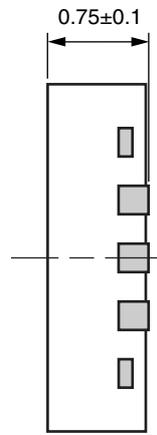
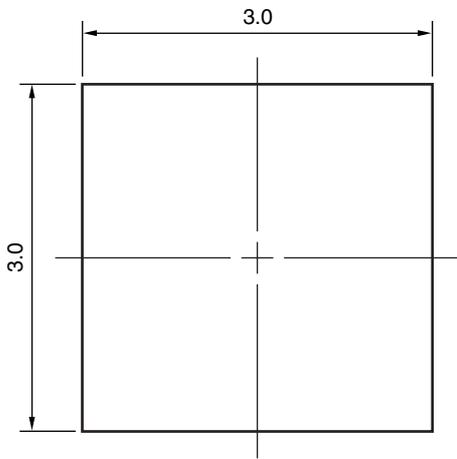
OUTPUT POWER vs. INPUT POWER
(f = 5.8 GHz)



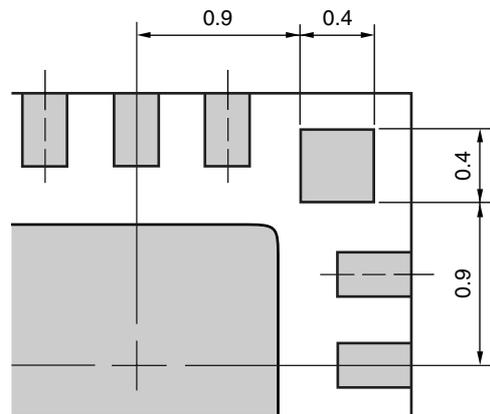
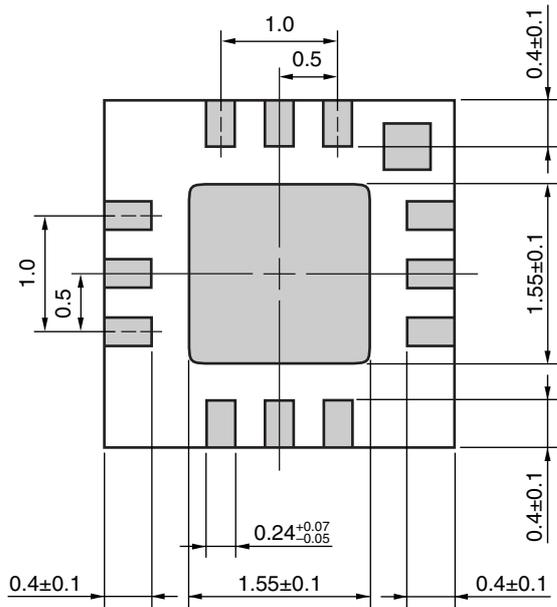
Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

12-PIN PLASTIC QFN (UNIT: mm)



(Bottom View)



Dimensions of pin No.1 indication

★ **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
Wave Soldering	Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	WS260
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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"Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
"Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.
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M8E 00.4-0110

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