μPG2418T6X

GaAs Integrated Circuit
0.5 to 3.0 GHz SPDT Switch with 50 Ω Termination

R09DS0024EJ0100
Rev.1.00
Jul 27, 2011

DESCRIPTION

The μPG2418T6X is a GaAs MMIC for L, S-band SPDT (Single Pole Double Throw) switch with 50 Ω termination for 2.4 GHz wireless LAN, mobile phone and other L, S-band applications.
This device operates with dual control switching voltages of 2.5 to 3.3 V. This device can operate at frequencies from 0.5 to 3.0 GHz, with low insertion loss and high isolation.
This device is housed in a 6-pin plastic TSON (Thin Small Out-line Non-leaded) (T6X) package and is suitable for high-density surface mounting.

FEATURES

- Switch control voltage : $V_{cont\ (H)}$ = 3.0 V TYP.
  : $V_{cont\ (L)}$ = 0 V TYP.
- Low insertion loss : L_{ins} = 0.45 dB TYP. @ f = 2.5 GHz
- High isolation : ISL = 21 dB TYP. @ f = 2.5 GHz
- Handling power : $P_{in\ (0.1\ dB)}$ = +29.0 dBm TYP. @ f = 0.5 to 3.0 GHz
- High-density surface mounting : 6-pin plastic TSON (T6X) package (1.5 × 1.5 × 0.37 mm)

APPLICATIONS

- W-LAN and Bluetooth™ etc.
- L, S-band digital cellular or cordless telephone

ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPG2418T6X-E2	μPG2418T6X-E2-A	6-pin plastic TSON (T6X) (Pb-Free)	G6K	• Embossed tape 8 mm wide • Pin 1, 6 face the perforation side of the tape • Qty 3 kpcs/reel

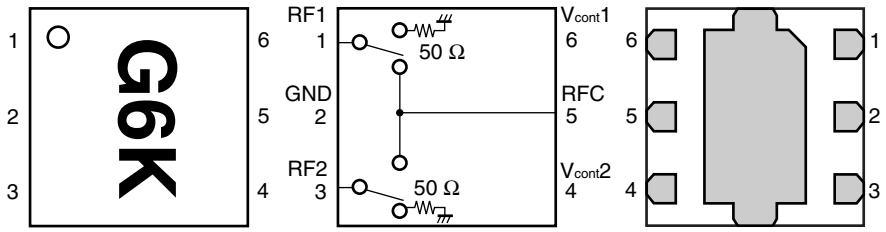
Remark To order evaluation samples, please contact your nearby sales office.
Part number for sample order: μPG2418T6X

CAUTION

Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

(Top View) (Top View) (Bottom View)



Pin No.	Pin Name
1	RF1
2	GND
3	RF2
4	$V_{cont}2$
5	RFC
6	$V_{cont}1$

Remark Exposed pad : GND

SW TRUTH TABLE

ON Path	$V_{cont}1$	$V_{cont}2$
RFC-RF1	High	Low
RFC-RF2	Low	High

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

Parameter	Symbol	Ratings	Unit
Switch Control Voltage	V_{cont}	+6.0 Note	V
Input Power (ON Port)	P_{in}	+33.0	dBm
Input Power (OFF Port)	P_{in}	+20.0	dBm
Operating Ambient Temperature	T_A	–45 to +85	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note: $|V_{cont}1 - V_{cont}2| \leq 6.0$ V

RECOMMENDED OPERATING RANGE (T_A = +25°C, unless otherwise specified)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency	f	0.5	–	3.0	GHz
Switch Control Voltage (H)	$V_{cont\ (H)}$	2.5	3.0	3.3	V
Switch Control Voltage (L)	$V_{cont\ (L)}$	–0.2	0	0.2	V
Control Voltage Difference	$\Delta V_{cont\ (H)}$, $\Delta V_{cont\ (L)}$ Note	–0.1	0	0.1	V

Note: $\Delta V_{cont\ (H)} = V_{cont}1_{\ (H)} - V_{cont}2_{\ (H)}$
$\Delta V_{cont\ (L)} = V_{cont}1_{\ (L)} - V_{cont}2_{\ (L)}$

ELECTRICAL CHARACTERISTICS
(T_A = +25°C, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V, Z_O = 50 Ω, DC blocking capacitors = 56 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss	L_{ins}	f = 0.5 to 1.0 GHz	–	0.30	0.50	dB
		f = 1.0 to 2.0 GHz	–	0.37	0.57	dB
		f = 2.0 to 2.5 GHz	–	0.45	0.65	dB
		f = 2.5 to 3.0 GHz	–	0.50	0.70	dB
Isolation	ISL	f = 0.5 to 2.0 GHz	19	23	–	dB
		f = 2.0 to 2.5 GHz	17	21	–	dB
		f = 2.5 to 3.0 GHz	16	20	–	dB
Input Return Loss	RL_{in}	f = 0.5 to 3.0 GHz	15	20	–	dB
Output Return Loss	RL_{out}	f = 0.5 to 3.0 GHz	15	20	–	dB
Unused Port Return Loss	URL	f = 2.0 to 2.4 GHz	–	15	–	dB
		f = 2.4 to 2.5 GHz	12	17	–	dB
		f = 2.5 to 3.0 GHz	–	18	–	dB
0.1 dB Loss Compression Input Power Note1	$P_{in\ (0.1\ dB)}$	f = 2.0/2.5 GHz	+26.0	+29.0	–	dBm
		f = 0.5 to 3.0 GHz	–	+29.0	–	dBm
1 dB Loss Compression Input Power Note2	$P_{in\ (1\ dB)}$	f = 2.0/2.5 GHz	+29.0	+32.0	–	dBm
		f = 0.5 to 3.0 GHz	–	+32.0	–	dBm
Input 3rd Order Intercept Point	IIP_3	f = 0.5 to 3.0 GHz, 2 tone, 5 MHz spicing	–	+60	–	dBm
2nd Harmonics	2f0	f = 2.5 GHz, P_{in} = +20 dBm	–	75	–	dBc
3rd Harmonics	3f0	f = 2.5 GHz, P_{in} = +20 dBm	–	75	–	dBc
Switch Control Current	I_{cont}	No RF input	–	0.3	20	μA
Switch Control Speed	t_{SW}	50% CTL to 90/10% RF	–	50	500	ns

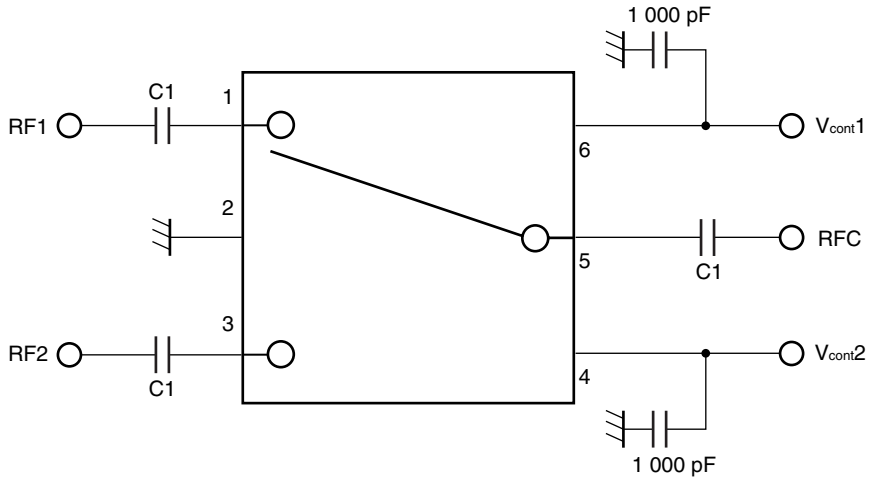
Notes: 1. $P_{in\ (0.1\ dB)}$ is the measured input power level when the insertion loss increases 0.1 dB more than that of the linear range.

2. $P_{in\ (1\ dB)}$ is the measured input power level when the insertion loss increases 1 dB more than that of the linear range.

CAUTION

It is necessary to use DC blocking capacitors with this device.
The value of DC blocking capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system.

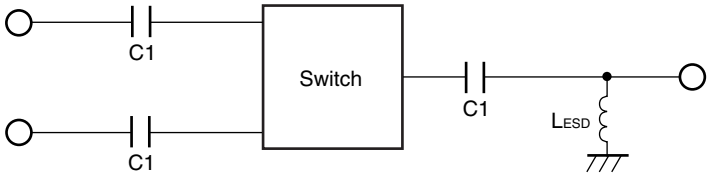
EVALUATION CIRCUIT



Remark C1: 56 pF

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

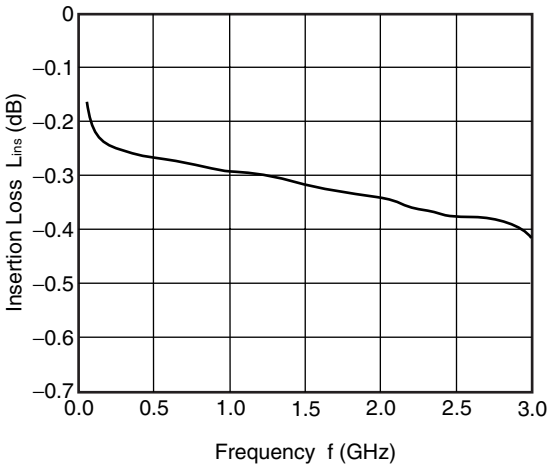
APPLICATION INFORMATION



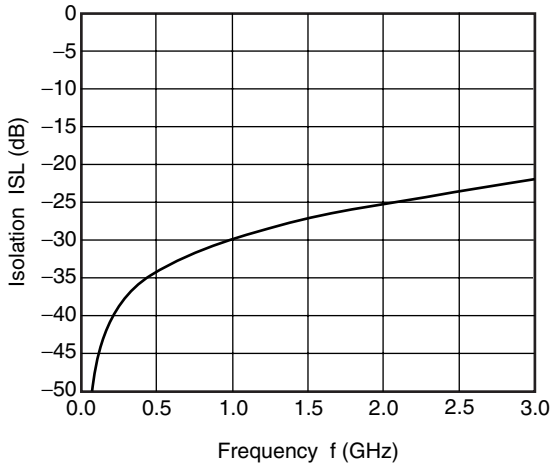
- L_{ESD} provides a means to increase the ESD protection on a specific RF port, typically the port attached to the antenna.
- The value may be tailored to provide specific electrical responses.
- The RF ground connections should be kept as short as possible and connected to directly to a good RF ground for best performance.

TYPICAL CHARACTERISTICS
(T_A = +25°C, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V, Z_O = 50 Ω, DC blocking capacitors = 56 pF, unless otherwise specified)

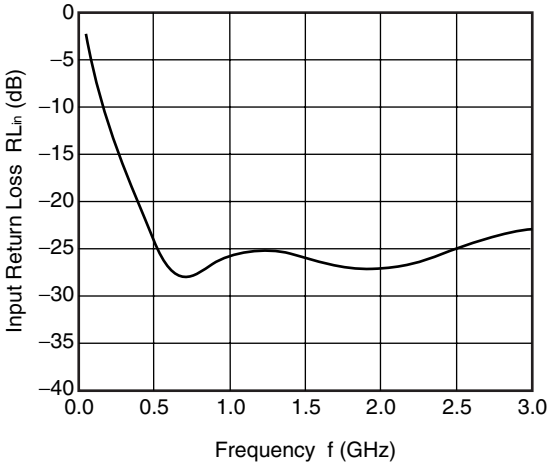
RFC-RF1/RF2
INSERTION LOSS vs. FREQUENCY



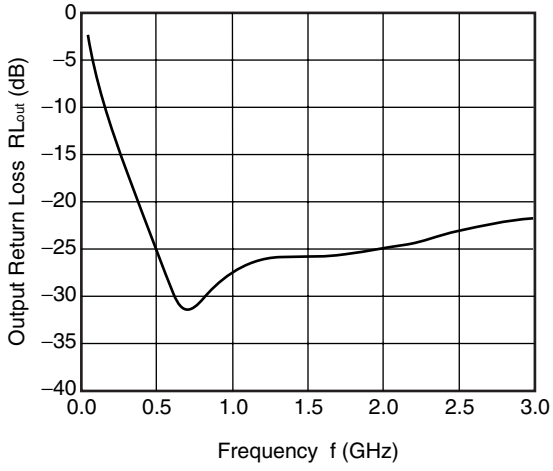
RFC-RF1/RF2
ISOLATION vs. FREQUENCY



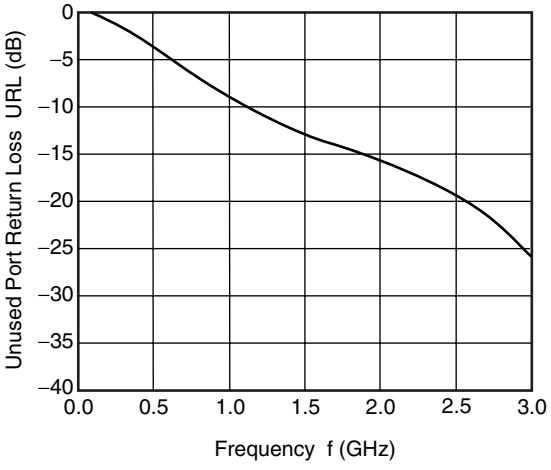
INPUT (RFC) RETURN LOSS
vs. FREQUENCY



OUTPUT (RF1/RF2) RETURN LOSS
vs. FREQUENCY

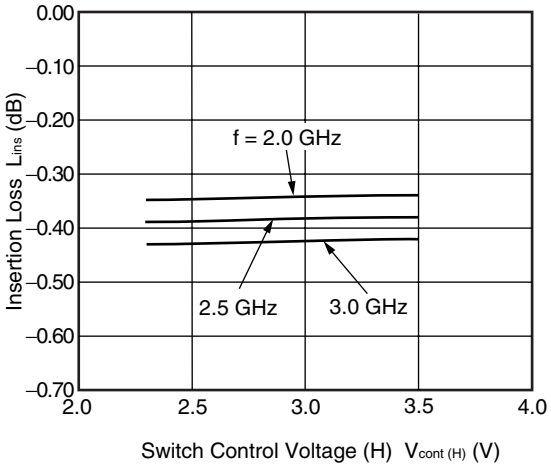


RFC-RF1/RF2
UNUSED PORT RETURN LOSS vs. FREQUENCY

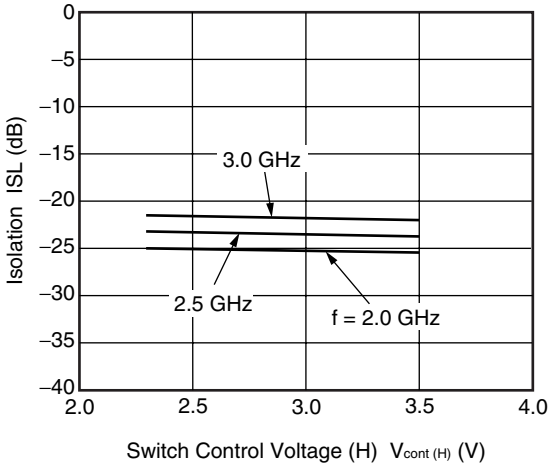


Remark The graphs indicate nominal characteristics.

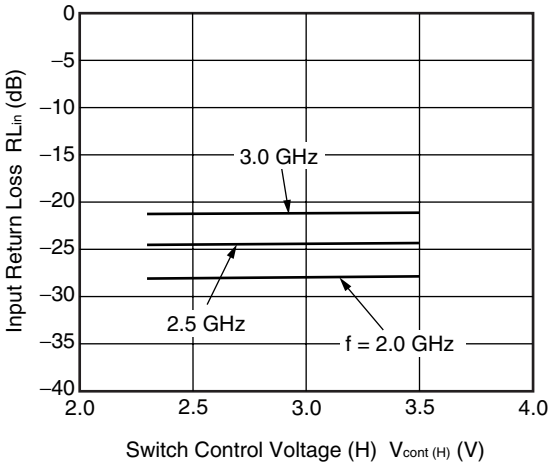
RFC-RF1/RF2 INSERTION LOSS,
vs. SWITCH CONTROL VOLTAGE (H)



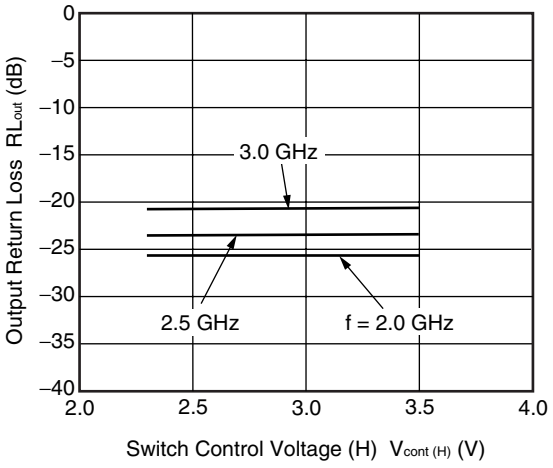
RFC-RF1/RF2 ISOLATION vs.
SWITCH CONTROL VOLTAGE (H)



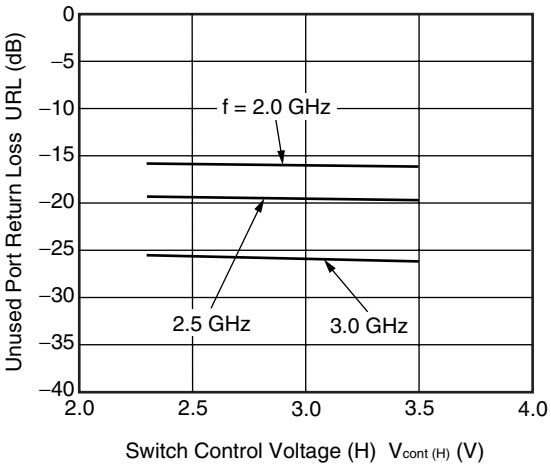
INPUT (RFC) RETURN LOSS
vs. SWITCH CONTROL VOLTAGE (H)



OUTPUT (RF1/RF2) RETURN LOSS
vs. SWITCH CONTROL VOLTAGE (H)

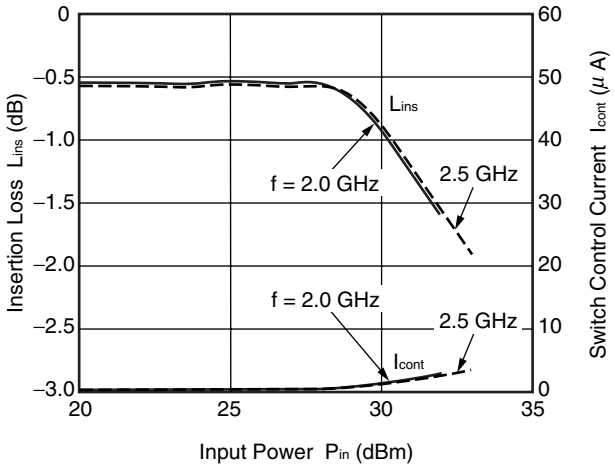


RFC-RF1/RF2 UNUSED PORT RETURN LOSS
vs. SWITCH CONTROL VOLTAGE (H)

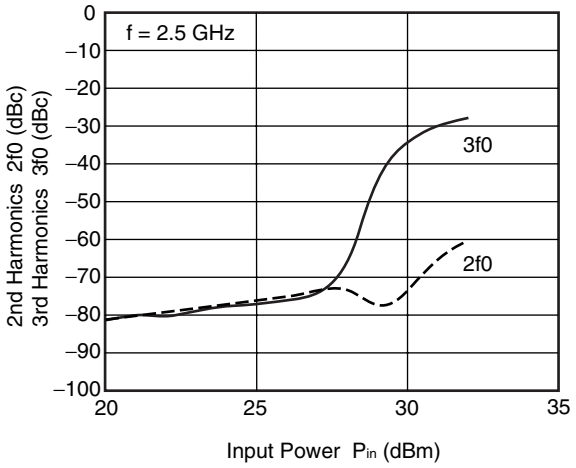


Remark The graphs indicate nominal characteristics.

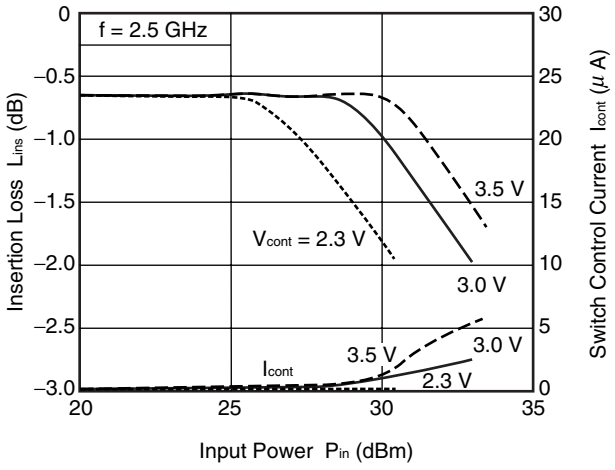
RFC-RF1/RF2
INSERTION LOSS, I_{cont} vs. INPUT POWER



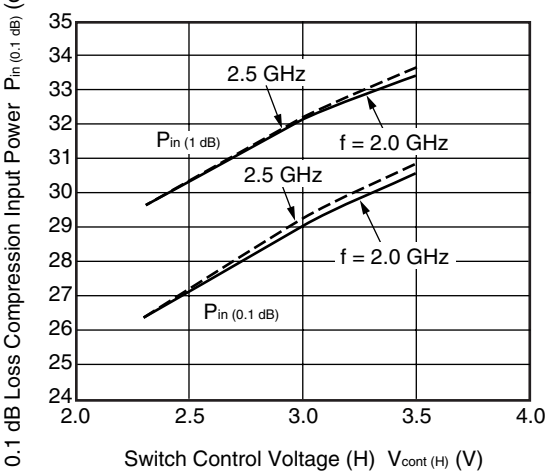
RFC-RF1/RF2 2f0, 3f0 vs. INPUT POWER



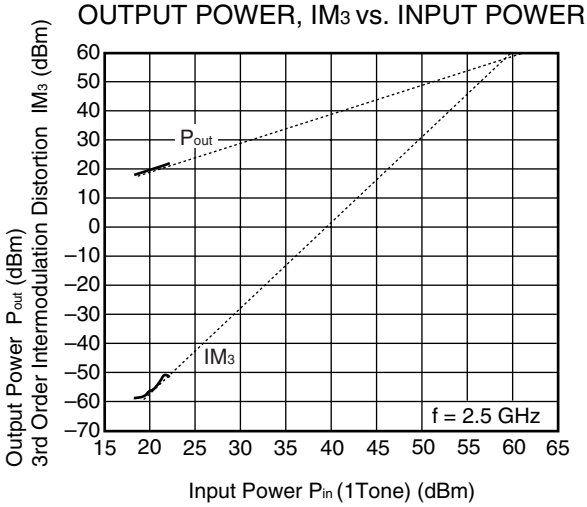
RFC-RF1/RF2
INSERTION LOSS, I_{cont} vs. INPUT POWER



RFC-RF1/RF2 $P_{in\ (1\ dB)}$, $P_{in\ (0.1\ dB)}$
vs. SWITCH CONTROL VOLTAGE (H)



RFC-RF1/RF2
OUTPUT POWER, IM_3 vs. INPUT POWER

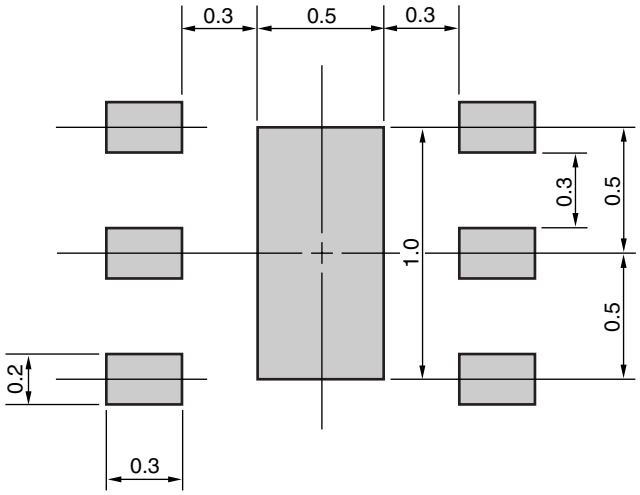


Remark The graphs indicate nominal characteristics.

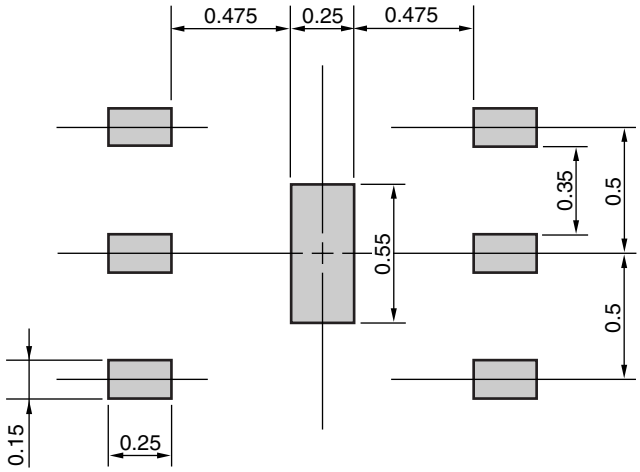
MOUNTING PAD AND SOLDER MASK LAYOUT DIMENSIONS

6-PIN PLASTIC TSON (UNIT: mm)

MOUNTING PAD



SOLDER MASK

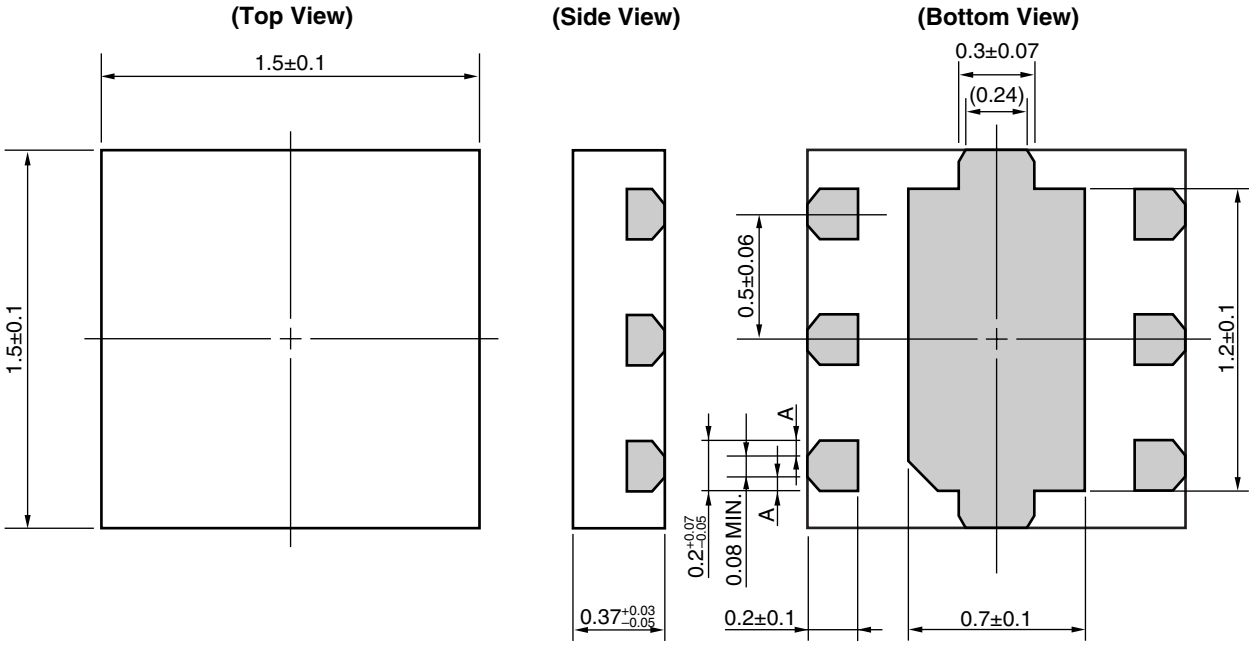


Solder thickness : 0.08 mm

Remark The mounting pad and solder mask layouts in this document are for reference only.
When designing PCB, please consider workability of mounting, solder joint reliability, prevention of solder bridge and so on, in order to optimize the design.

PACKAGE DIMENSIONS

6-PIN PLASTIC TSON (T6X) (UNIT: mm)



Remark A>0

( ) : 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) : 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 (terminal 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).

Caution GaAs Products	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. • 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. 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.

Revision History	μPG2418T6X Data Sheet

Rev.	Date	Description	
		Page	Summary
1.00	Jul 27, 2011	–	First edition issued

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Colophon 1.1