DATA SHEET

CEL

GaAs HBT INTEGRATED CIRCUIT

μPG2318T5N

2.4 GHz SINGLE BAND POWER AMPLIFIER FOR W-LAN

DESCRIPTION

The μPG2318T5N is a GaAs HBT MMIC power amplifier for 2.4 GHz band wireless LAN.

This device realizes high efficiency, high gain and high output power by using InGaP HBT.

This device is housed in a 6-pin plastic TSON (Thin Small Out-line Non-leaded) package, and is suitable for high-density surface mounting.

FEATURES

- Operating frequency : f_{opt} = 2 400 to 2 500 MHz (2 450 MHz TYP.)
- Supply voltage : $V_{CC}1, 2$ = 3.0 to 4.6 V (3.3 V TYP.)
- Control voltage : V_{enable} = 0 to 3.0 V (2.8 V TYP.)
- Circuit current : I_{CC} = 120 mA TYP. @ $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.8 V, P_{out} = +18 dBm (at OFDM modulation : 64QAM/54 Mbps)
- Power gain : G_P = 28 dB TYP. @ $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.8 V, P_{out} = +18 dBm (at OFDM modulation : 64QAM/54 Mbps)
- Gain flatness : ΔG_P = 0.8 dB TYP. @ f = 2.4 to 2.5 GHz, $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.8 V, P_{out} = +18 dBm (at OFDM modulation : 64QAM/54 Mbps)
- Error vector magnitude : EVM = 2.5% TYP. @ $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.8 V, P_{out} = +18 dBm (at OFDM modulation : 64QAM/54 Mbps)
- Harmonics : 2f0 = 30 dBc TYP. @ $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.8 V, P_{out} = +18 dBm (at OFDM modulation : 64QAM/54 Mbps)
- High-density surface mounting : 6-pin plastic TSON package (1.5 × 1.5 × 0.37 mm)

APPLICATIONS

- Power Amplifier for 802.11b/g
- 2.4 GHz ISM Band Transceivers

ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPG2318T5N-E2	μPG2318T5N-E2-A	6-pin plastic TSON (Pb-Free)	G5G	• Embossed tape 8 mm wide • Pin 1, 6 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: μPG2318T5N-A

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

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Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.

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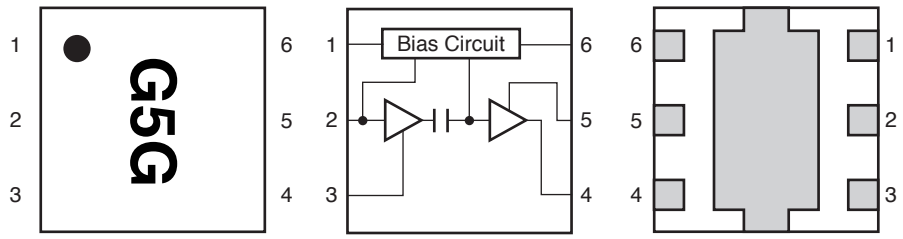
The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

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



Pin No.	Pin Name
1	V_{enable}
2	INPUT
3	$V_{CC}1$
4	OUTPUT
5	$V_{CC}2$
6	V_{det}

Remark Exposed pad : GND

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

Parameter	Symbol	Ratings	Unit
Supply Voltage	$V_{CC}1, 2$	5.0	V
Control Voltage	V_{enable}	4.0	V
Input Power	P_{in}	+10	dBm
Power Dissipation	P_D	500 Note	mW
Operating Ambient Temperature	T_A	−45 to +85	°C
Storage Temperature	T_{stg}	−55 to +150	°C

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

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

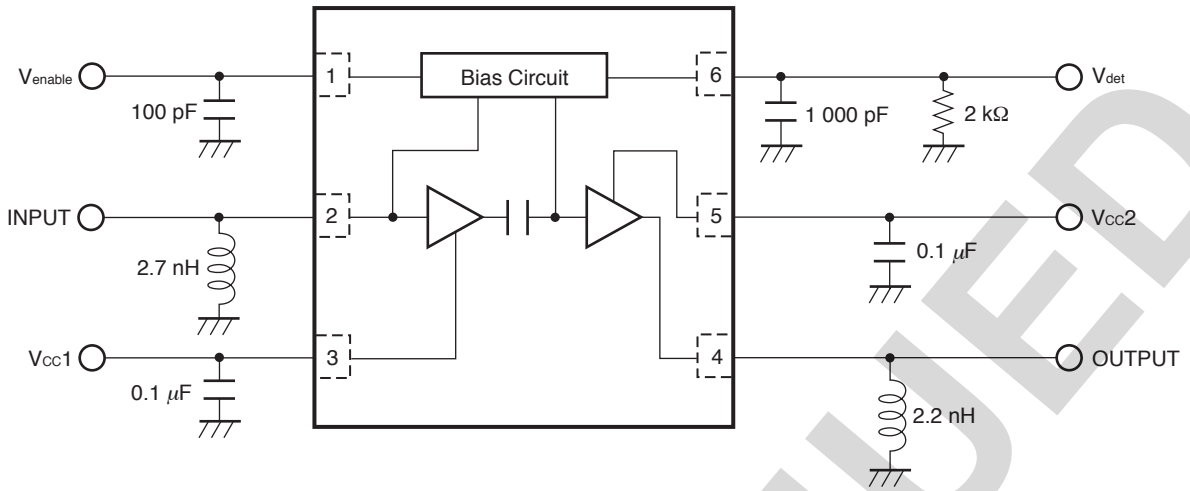
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency	f_{opt}	2 400	2 450	2 500	MHz
Supply Voltage	$V_{CC}1, 2$	3.0	3.3	4.6	V
Control Voltage	V_{enable}	0	2.8	3.0	V

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, f = 2 400 to 2 500 MHz, OFDM modulation : 64QAM/54 Mbps, $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.8 V, external input and output matching, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	I_{CC}	P_{out} = +18 dBm	–	120	140	mA
Power Gain	G_P	P_{out} = +18 dBm	25.5	28	–	dB
Gain Flatness	ΔG_P	P_{out} = +18 dBm	–	0.8	1.3	dB
Control Current	I_{enable}	P_{out} = +18 dBm	–	3.2	–	mA
Error Vector Magnitude	EVM	P_{out} = +18 dBm	–	2.5	–	%
Input Return Loss	RL_{in}	P_{out} = –30 dBm (no-modulation)	–	15	–	dB
Output Return Loss	RL_{out}	P_{out} = –30 dBm (no-modulation)	–	5	–	dB
2nd Harmonics	2f0	P_{out} = +18 dBm	–	30	–	dBc
3rd Harmonics	3f0	P_{out} = +18 dBm	–	48	–	dBc
Power Detector Voltage	V_{det}	P_{out} = +18 dBm	–	0.7	–	V

<R> EVALUATION CIRCUIT

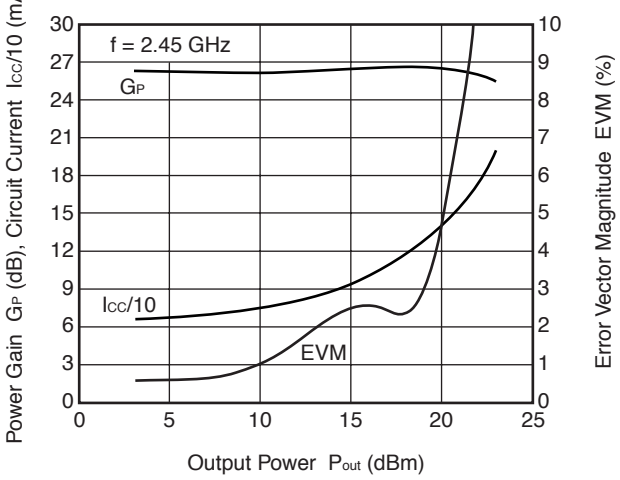


The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

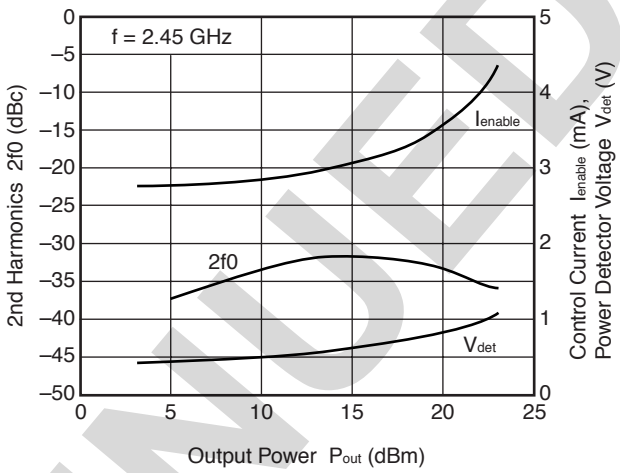
TYPICAL CHARACTERISTICS 1

(T_A = +25°C, $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.8 V, OFDM modulated signal : 64QAM/54 Mbps, with external input and output matching circuits, unless otherwise specified)

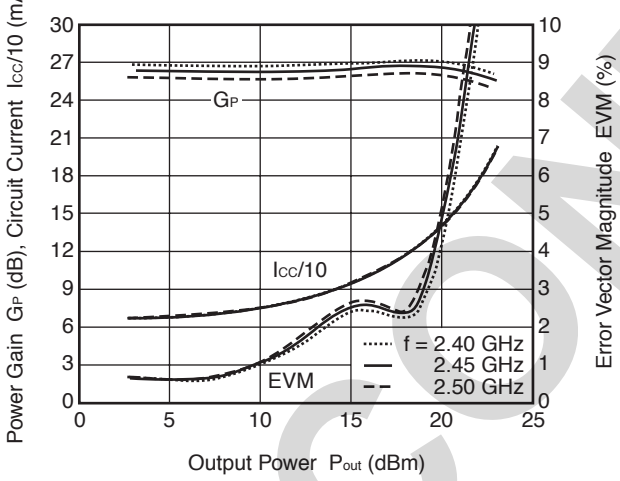
POWER GAIN, CIRCUIT CURRENT, EVM vs. OUTPUT POWER



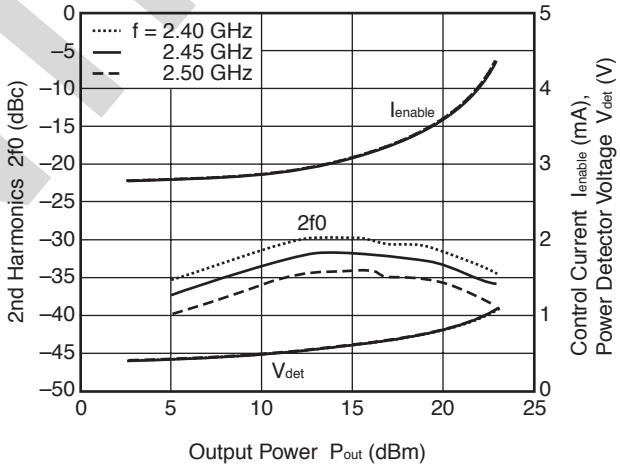
2f0, CONTROL CURRENT, V_{det}, vs. OUTPUT POWER



POWER GAIN, CIRCUIT CURRENT, EVM vs. OUTPUT POWER



2f0, CONTROL CURRENT, V_{det}, vs. OUTPUT POWER

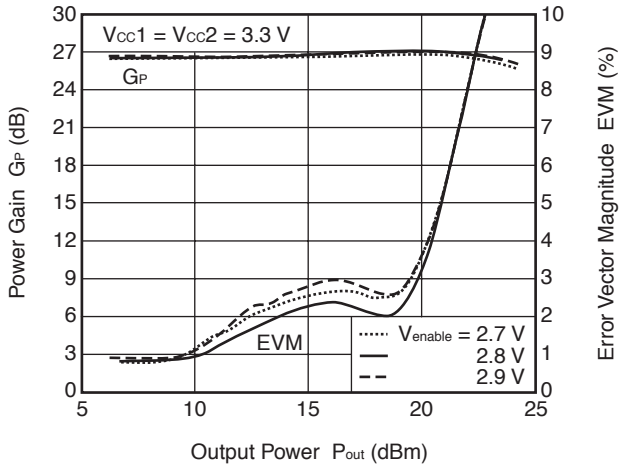


Remark The graphs indicate nominal characteristics.

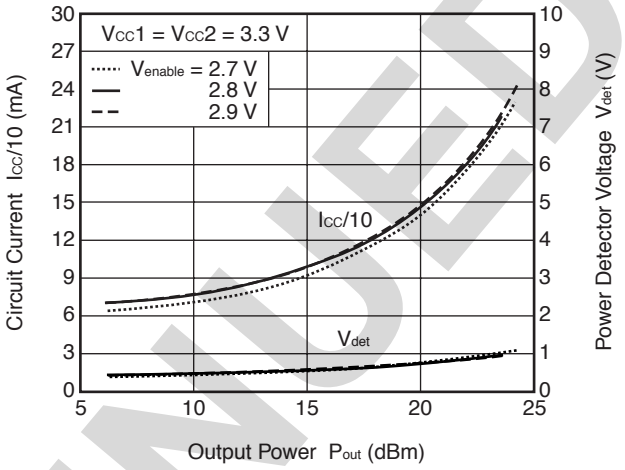
TYPICAL CHARACTERISTICS 2

(T_A = +25°C, f = 2.45 GHz, OFDM modulated signal : 64QAM/54 Mbps, with external input and output matching circuits, unless otherwise specified)

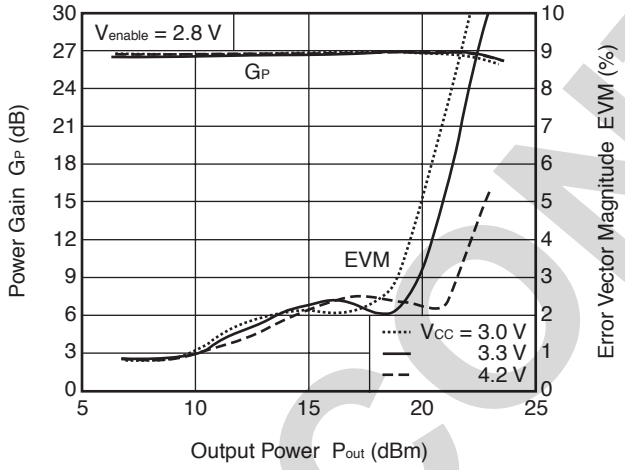
POWER GAIN, EVM vs. OUTPUT POWER



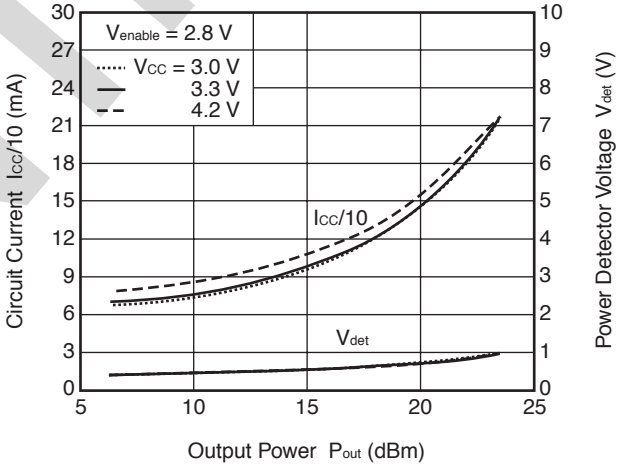
CIRCUIT CURRENT, V_{det}, vs. OUTPUT POWER



POWER GAIN, EVM vs. OUTPUT POWER



CIRCUIT CURRENT, V_{det}, vs. OUTPUT POWER

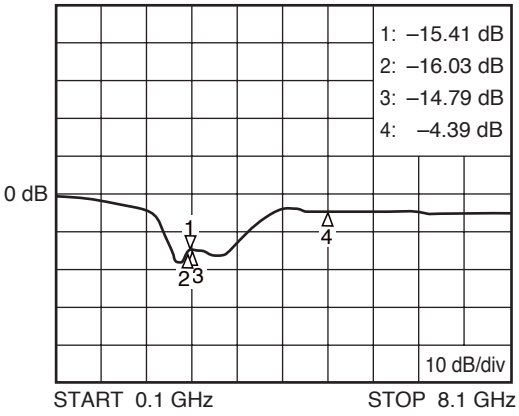


Remark The graphs indicate nominal characteristics.

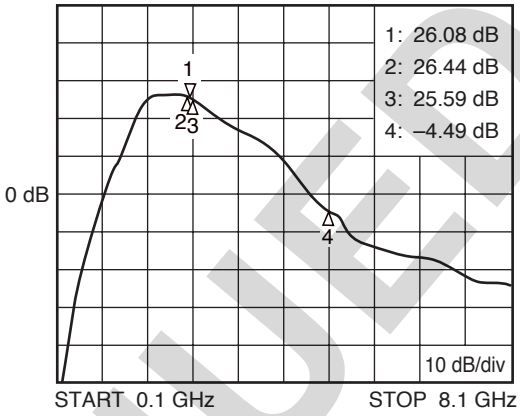
<R> **S-PARAMETERS (Reference Data) –This data is included external matching components–**

Condition : T_A = +25°C, f = 0.1 to 8.1 GHz, V_{CC}1, 2 = 3.3 V, V_{enable} = 2.8 V, P_{in} = –30 dBm

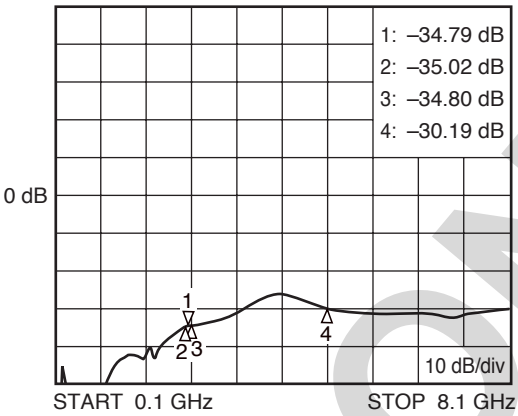
S_{11}-FREQUENCY



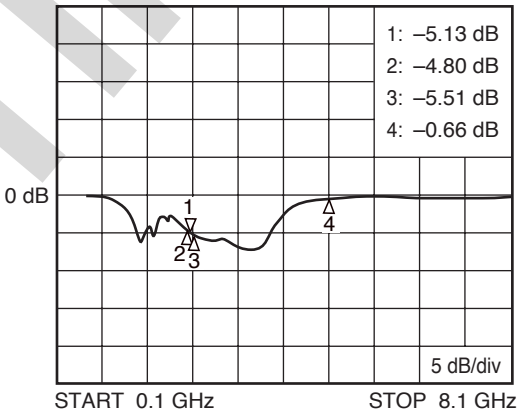
S_{21}-FREQUENCY



S_{12}-FREQUENCY



S_{22}-FREQUENCY



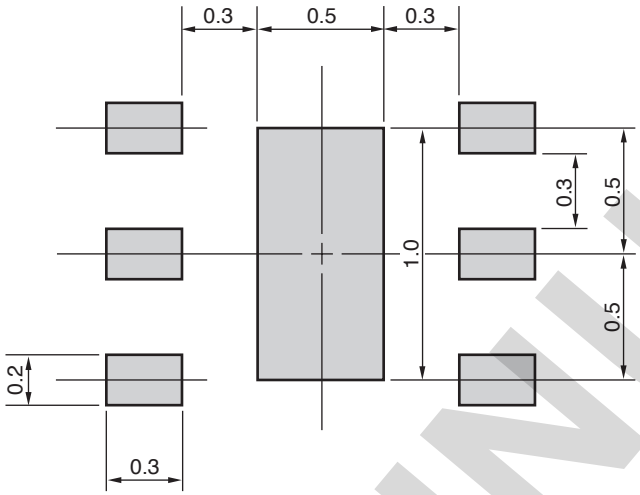
Remark 1. The graphs indicate nominal characteristics.

2. Marker1 : 2.45 GHz
Marker2 : 2.40 GHz
Marker3 : 2.50 GHz
Marker4 : 4.90 GHz

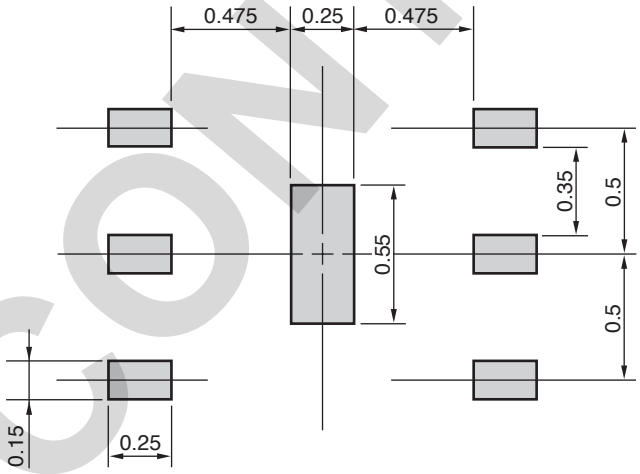
MOUNTING PAD AND SOLDER MASK LAYOUT DIMENSIONS

6-PIN PLASTIC TSON (UNIT: mm)

MOUNTING PAD



SOLDER MASK

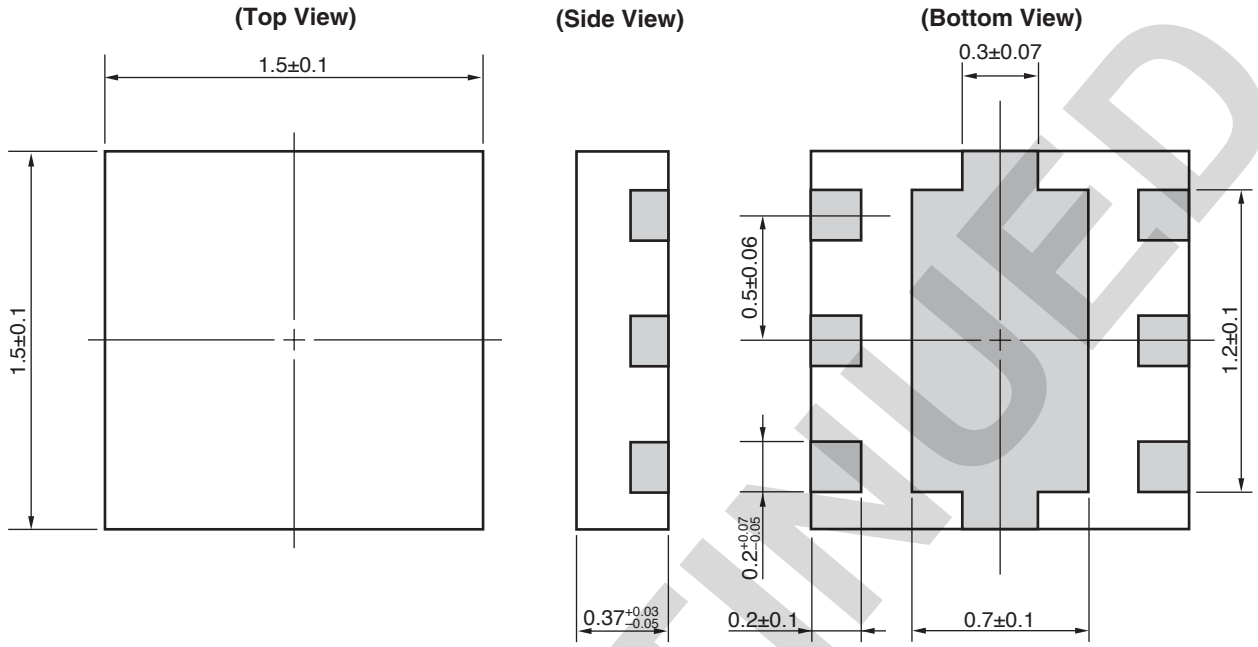


Solder thickness : 0.08 mm

Remark The mounting pad and solder mask layouts in this document are for reference only.

PACKAGE DIMENSIONS

6-PIN PLASTIC TSON (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) 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
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 (terminal 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 02. 11-1

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.

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Subject: Compliance with EU Directives

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CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
Lead (Pb)	< 1000 PPM	-A	-AZ
		Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.