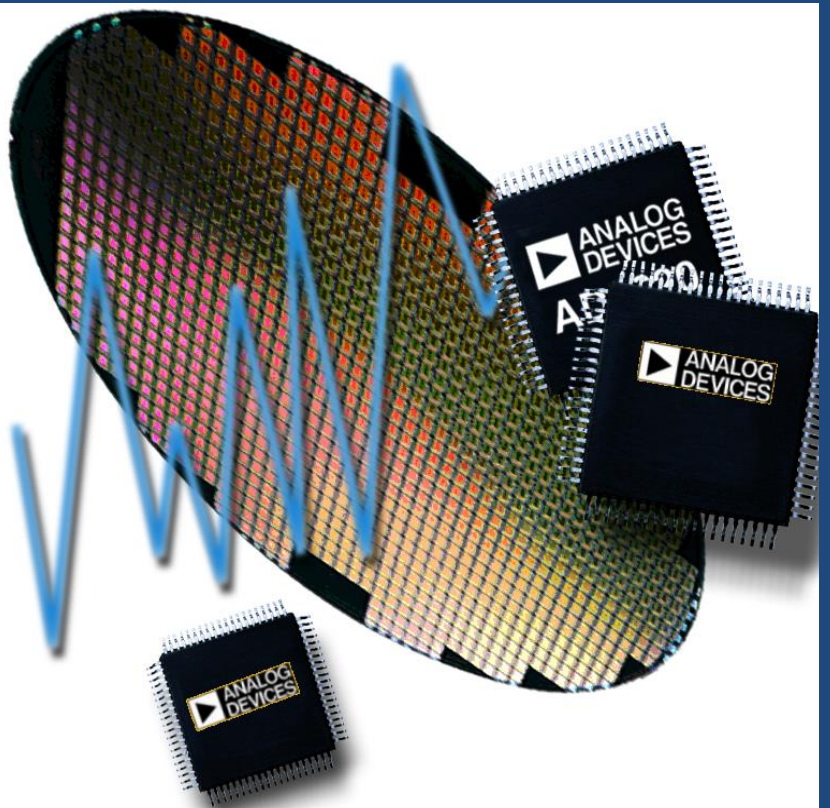


Analog Devices Welcomes Hittite Microwave Corporation

NO CONTENT ON THE ATTACHED DOCUMENT HAS CHANGED





Reliability Report

Report Title:	Qualification Test Report
Report Type:	See Attached
Date:	See Attached

Package Qualification Report

QTR: 2014- 00145

Rev: 05

Package: LP3, LP4, LP5 & LP5G

HMC507LP5	HMC943LP5	HMC1165LP5
HMC508LP5	HMC951BLP4	HMC1166LP5
HMC509LP5	HMC952LP5	HMC1167LP5
HMC510LP5	HMC964LP4	HMC1168LP5
HMC511LP5	HMC965LP5	HMC1169LP5
HMC512LP5	HMC978LP4	HMC7357LP5G
HMC513LP5	HMC992LP5	
HMC514LP5	HMC993LP5	
HMC515LP5	HMC994LP5	
HMC529LP5	HMC995LP5G	
HMC530LP5	HMC996LP4	
HMC531LP5	HMC998LP5	
HMC534LP5	HMC1040LP3	
HMC582LP5	HMC1082LP4	
HMC583LP5	HMC1113LP5	
HMC584LP5	HMC1160LP5	
HMC632LP5	HMC1161LP5	
HMC637ALP5	HMC1162LP5	
HMC734LP5	HMC1163LP5	
HMC735LP5	HMC1164LP5	

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Package Qualification Report

QTR: 2014- 00145

Rev: 05

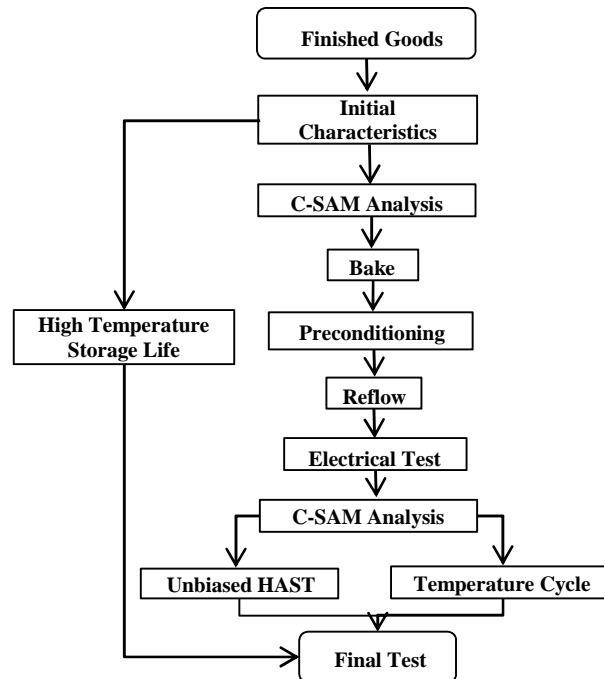
Package: LP3, LP4, LP5 & LP5G

Introduction

The Reliability tests summarized in this report are designed to satisfy the reliability requirements designated by Hittite Microwave Corporation. The testing was devised to simulate exposure to environments the product may experience during assembly, test, and life in the end user application. The pass/fail criteria are dependent upon DC and critical RF parameters determined by the appropriate catalog specifications. A complete data sheet for the devices tested can be found at www.hittite.com.

The Package Reliability Plan is as follows:

Package Reliability



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Glossary of Terms & Definitions:

1. **HAST:** Highly Accelerated Stress Test (biased). Devices are subjected to 96 hours of 85% relative humidity at a temperature of 130°C and pressure (18.6 PSIG), while DC biased. This test is performed in accordance with JESD22-A110.
2. **HTOL:** High Temperature Operating Life. This test is used to determine the effects of bias conditions and temperature on semiconductor devices over time. It simulates the devices' operating condition in an accelerated way, through high temperature and/or bias voltage, and is primarily for device qualification and reliability monitoring. This test was performed in accordance with JEDEC JESD22-A108.
3. **HTSL:** High Temperature Storage Life. Devices are subjected to 1000 hours at 150°C. This test is performed in accordance with JEDEC JESD22-A103.
4. **MSL3 Preconditioning:** Moisture sensitivity level 3 pre-conditioning is performed in accordance with JEDEC JESD22-A113, lead free, 260°C peak temperature (see Appendix 1 for reflow profile).
5. **Physical Dimensions:** Devices are inspected to the current package outline drawing to ensure all package dimensions are within specification (see Appendix 2 for applicable outline drawings).
6. **Solderability:** Devices are subjected to 8 hours of steam age and Method 1 Dip and Look testing in accordance with JEDEC JESD22-B102.
7. **Temperature Cycle:** Devices are subjected to 500 non-operating temperature cycling from -65°C to 150°C in accordance with JEDEC JESD22-A104.
8. **UHAST:** Unbiased Highly Accelerated Stress Test. Devices are subjected to 96 hours of 85% relative humidity at a temperature of 130°C and pressure (18.6 PSIG). This test was performed in accordance with JEDEC JESD22-A118.

Qualification Sample Selection:

All qualification devices used were manufactured and tested on standard production processes and met pre-stress acceptance test requirements.

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Package Qualification Report

QTR: 2014- 00145

Rev: 05

Package: LP3, LP4, LP5 & LP5G

Summary of Qualification Tests:

HMC965LP5 (QTR2011-00010)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial electrical Test	317	317	Pass	
HTSL	80	80	Complete	
HTSL Final Test	80	80	Pass	
HTOL	78	78	Complete	
HTOL Final test	78	78	Pass	
MSL Preconditioning	159	159	Complete	
MSL Preconditioning Final Test	159	159	Pass	
UHAST (preconditioned)	79	79	Complete	
UHAST Final Test	79	79	Pass	
Temp. Cycle (preconditioned)	80	80	Complete	
Temp. Cycle Final Test	80	80	Pass	
Physical Dimensions	15	15	Pass	
Solderability	15	15	Pass	
X-Ray Analysis	6	6	Pass	

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Package Qualification Report

QTR: 2014- 00145

Rev: 05

Package: LP3, LP4, LP5 & LP5G

HMC511LP5E (QTR2011-00013)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial electrical Test	554	554	Pass	
HTSL	137	137	Complete	
HTSL Final Test	137	137	Pass	
HTOL	159	159	Complete	
HTOL Final test	159	159	Pass	
MSL3 Preconditioning	554	554	Complete	
MSL3 Preconditioning Final Test	554	554	Pass	
UHAST (preconditioned)	80	80	Complete	
UHAST Final Test	80	80	Pass	
Temp. Cycle (preconditioned)	160	160	Complete	
Temp. Cycle Final Test	160	160	Pass	
Physical Dimensions	22	22	Pass	
Solderability	4	4	Pass	

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Package Qualification Report

QTR: 2014- 00145

Rev: 05

Package: LP3, LP4, LP5 & LP5G

HMC995LP5G (QTR2012-00025)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial electrical Test	309	309	Pass	
HTSL	77	77	Complete	
HTSL Final Test	77	77	Pass	
HTOL	78	78	Complete	
HTOL Final test	78	78	Pass	
MSL Preconditioning	154	154	Complete	
MSL Preconditioning Final Test	154	154	Pass	
HAST (preconditioned)	77	77	Complete	
HAST Final Test	77	77	Pass	
Temp. Cycle (preconditioned)	77	77	Complete	
Temp. Cycle Final Test	77	77	Pass	
Physical Dimensions	15	15	Pass	
Solderability	15	15	Pass	
X-Ray Analysis	6	6	Pass	

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Package Qualification Report

QTR: 2014- 00145

Rev: 05

Package: LP3, LP4, LP5 & LP5G

HMC514LP5E (QTR2012-00305)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial electrical Test	320	320	Pass	
HTSL	80	80	Complete	
HTSL Final Test	80	80	Pass	
HTOL	80	80	Complete	
HTOL Final test	80	80	Pass	
MSL3 Preconditioning	160	160	Complete	
MSL3 Preconditioning Final Test	160	160	Pass	
UHAST (preconditioned)	80	80	Complete	
UHAST Final Test	80	80	Pass	
Temp. Cycle (preconditioned)	80	80	Complete	
Temp. Cycle Final Test	80	80	Pass	
Physical Dimensions	15	15	Pass	
Solderability	6	6	Pass	

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Package Qualification Report

QTR: 2014- 00145

Rev: 05

Package: LP3, LP4, LP5 & LP5G

HMC6XXXLP5 (QTR2012-00460)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial electrical Test	316	316	Pass	
HTSL	80	80	Complete	
HTSL Final Test	80	80	Pass	
HTOL	79	79	Complete	
HTOL Final test	79	79	Pass	
MSL3 Preconditioning	157	157	Complete	
MSL3 Preconditioning Final Test	157	157	Pass	
UHAST (preconditioned)	78	78	Complete	
UHAST Final Test	78	78	Pass	
Temp. Cycle (preconditioned)	79	79	Complete	
Temp. Cycle Final Test	79	79	Pass	

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Package Qualification Report

QTR: 2014- 00145

Rev: 05

Package: LP3, LP4, LP5 & LP5G

Cumulative Summary of All MSL3 LP3, LP4, LP5 & LP5G Package Tests

TEST	Total Units Tested	Total Units Passed	Total Units Failed	Comments
HTSL, 1000 hours	454	454	0	
HAST (Preconditioned)	77	77	0	
UHAST (Preconditioned)	317	317	0	
Temperature Cycle (Preconditioned)	476	476	0	
Solderability	40	40	0	
Physical Dimensions	52	52	0	

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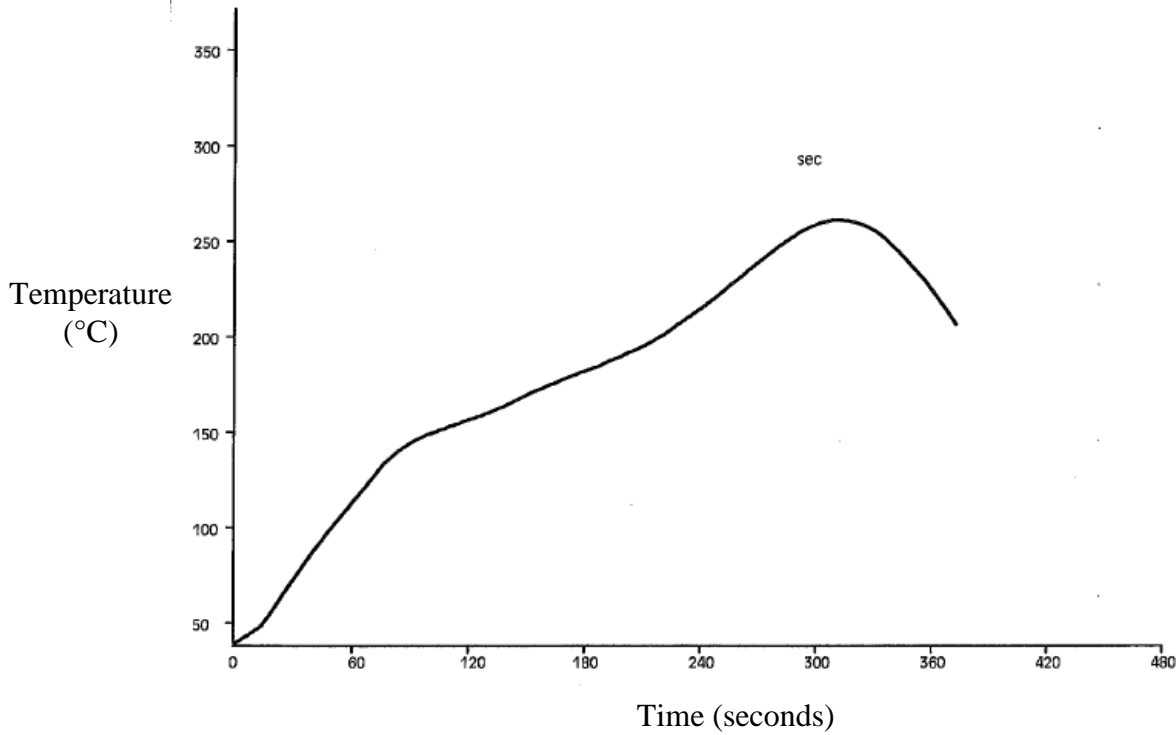
Package Qualification Report

QTR: 2014- 00145

Rev: 05

Package: LP3, LP4, LP5 & LP5G

Appendix 1



Hittite Microwave Corporation is committed to:

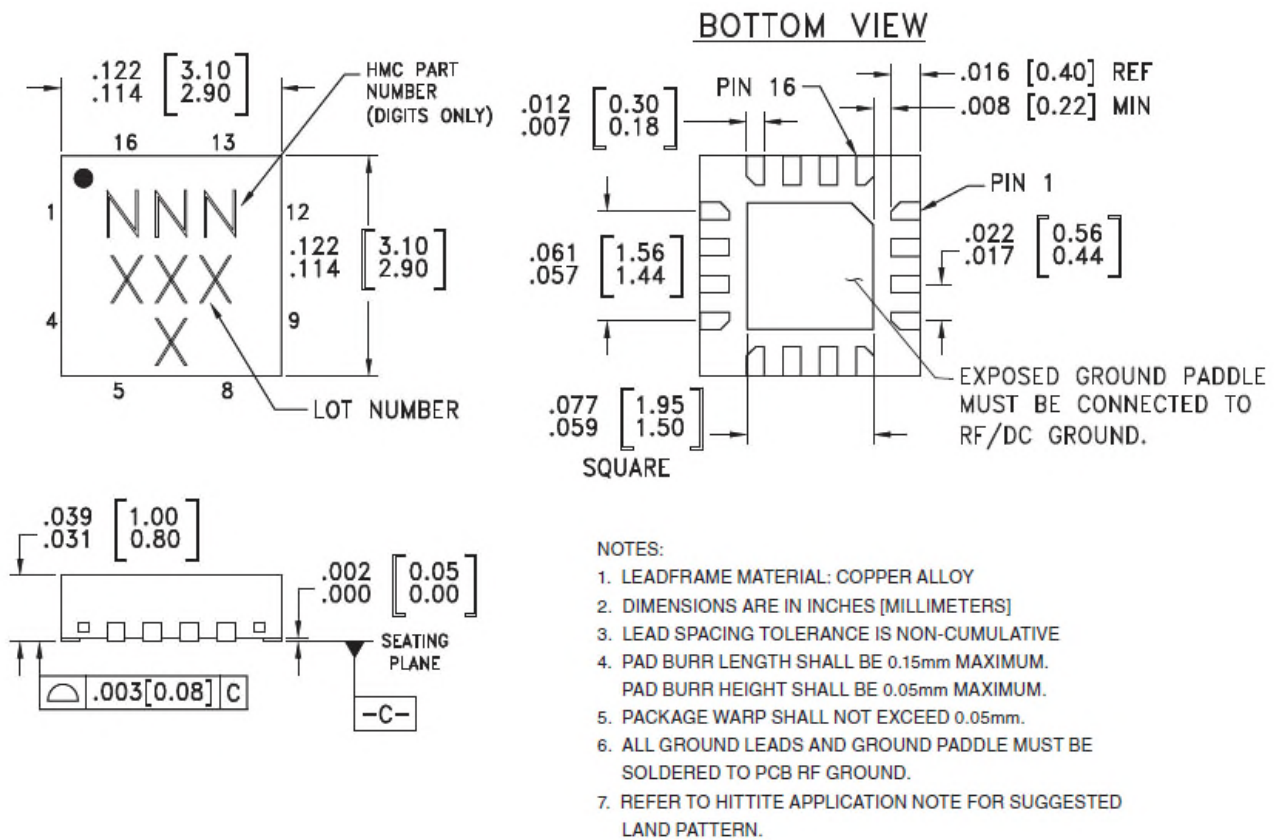
- Supplying products of the highest quality
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Appendix 2

LP3 Outline



Hittite Microwave Corporation is committed to:

- Supplying products of the highest quality
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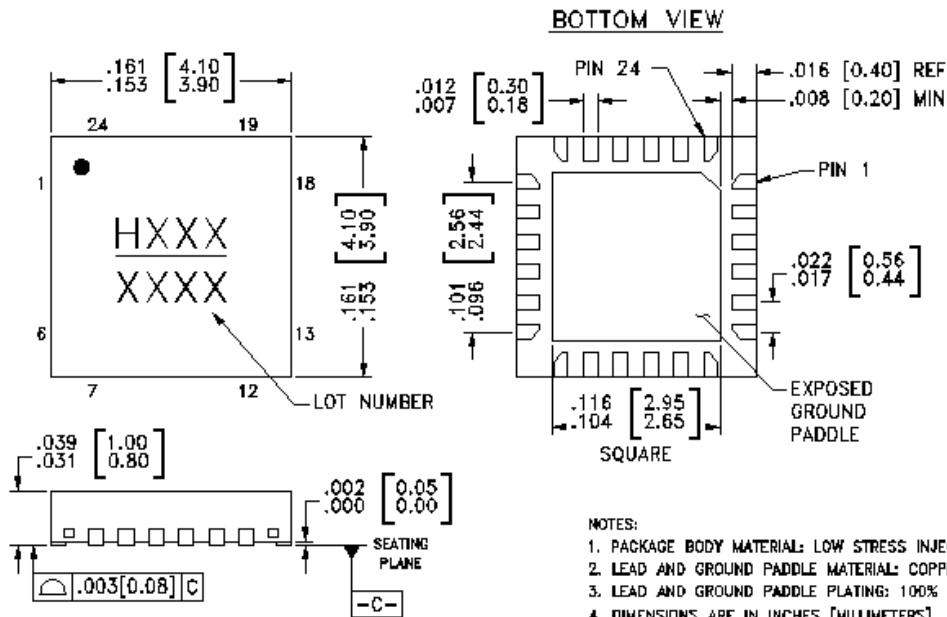
Package Qualification Report

QTR: 2014- 00145

Rev: 05

Package: LP3, LP4, LP5 & LP5G

LP4 Outline



NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY.
3. LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
6. CHARACTERS TO BE HELVETICA MEDIUM, .025 HIGH, WHITE INK, OR LASER MARK LOCATED APPROX. AS SHOWN.
7. PAD BURR LENGTH SHALL BE 0.15mm MAX. PAD BURR HEIGHT SHALL BE 0.05mm MAX.
8. PACKAGE WARP SHALL NOT EXCEED 0.05mm
9. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
10. REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED PCB LAND PATTERN.

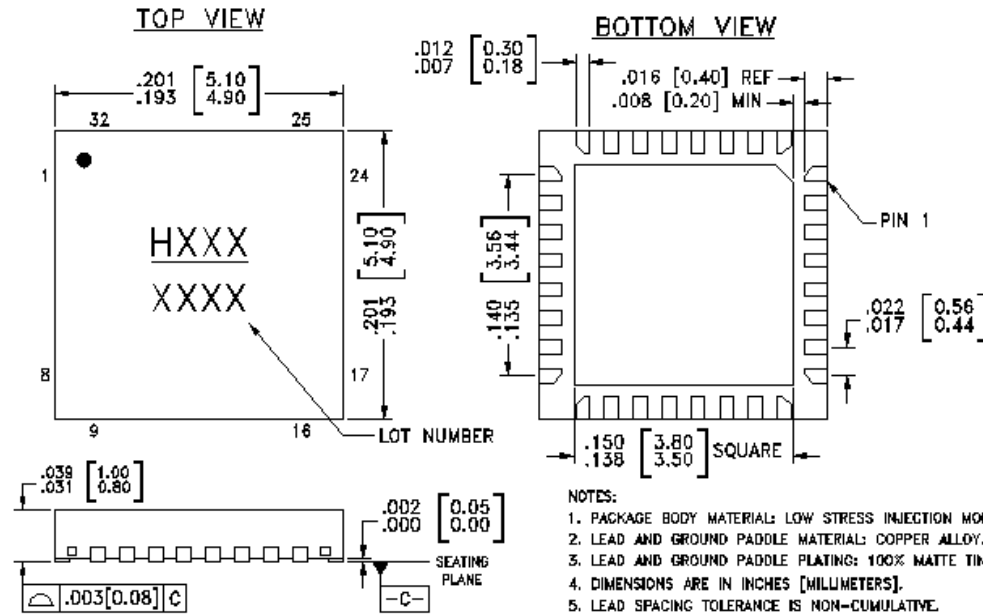
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LP5 Outline



NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY.
3. LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
6. CHARACTERS TO BE HELVETICA MEDIUM, .025 HIGH, WHITE INK, OR LASER MARK LOCATED APPROX. AS SHOWN.
7. PAD BURR LENGTH SHALL BE 0.15mm MAX. PAD BURR HEIGHT SHALL BE 0.25mm MAX.
8. PACKAGE WARP SHALL NOT EXCEED 0.05mm
9. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
10. REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED PCB LAND PATTERN.

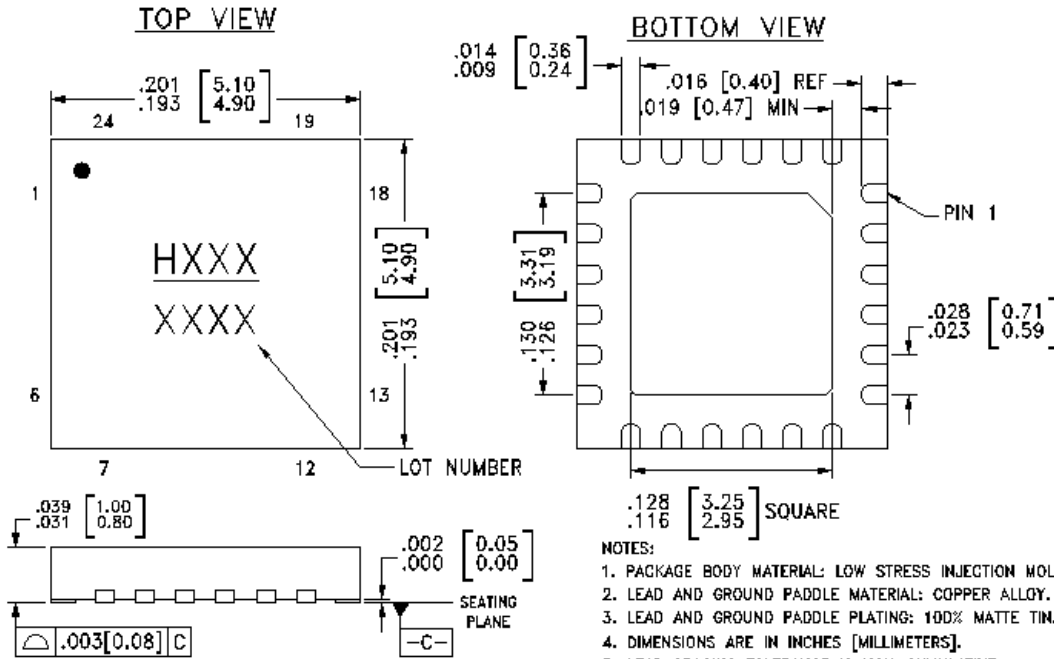
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LP5G Outline



NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY.
3. LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
6. CHARACTERS TO BE HELVETICA MEDIUM, .025 HIGH, WHITE INK, OR LASER MARK LOCATED APPROX. AS SHOWN.
7. PAD BURR LENGTH SHALL BE 0.15mm MAX. PAD BURR HEIGHT SHALL BE 0.25mm MAX.
8. PACKAGE WARP SHALL NOT EXCEED 0.05mm
9. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
10. REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED PCB LAND PATTERN. PROPRIETARY TO HITTITE MICROWAVE CORPORATION

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