



BREAKTHROUGH SIMPLICITY



**SKYWORKS™**  
**Product Qualification Report**

**Part Number: SKY65111-348LF**

**Package Type: 16L MLQP (3.0 X 3.0 mm)**

**Report No: 301028**

**Qualification Team**

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<b>REVISION HISTORY</b>			
<b>Rev</b>	<b>Description of Change</b>	<b>Author</b>	<b>Submit Date</b>
1	Initial Release	Tom Wood	01/5/2007

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## 1 Summary

This document describes the qualification results for the SKY65111-348LF, a 3 stage power amplifier assembled in a 3.0 mm x 3.0 mm 16 lead MLPQ package.

The SKY65111-348LF meets Skyworks' reliability requirements for production and is rated at JEDEC MSL 1 – 260C for moisture sensitivity.

## 2 Reference Documents

### 2.1 *Skyworks Documents*

SQ02-0013 Qualification Standard

SQ03-0023 Wafer Process Qualification Requirements

SQ03-0024 Package and Assembly Qualification Requirements

SQ03-0025 Product Qualification Requirements

### 2.2 *Other Supporting Documents*

JESD22 JEDEC Standard Test Methods

JESD47 Stress-Test-Driven Qualification of Integrated Circuits

MIL-STD-883F Department of Defense Test Method Standard, Microcircuits

### 3 Product Description and Information

3.1 *Reliability File Number: 301028*

3.2 *Product Information*

*Test Vehicle: SKY65111 – 348LF*

*Product Function/Frequency: 3 Stage Power Amplifier / 800 to 1100 MHz*

3.3 *Die Information*

Mask Info		Size in mm		Fabrication Information		
Die	Mask	Size X	Size Y	Foundry	Fab	Process
63635	01	.95	1.0	Skyworks	Newbury Park	HBT4

3.4 *Assembly and Package Information*

*Package Supplier: Carsem*

*Package Family & Name: MLPQ*

*Package Body Dimensions: 3.0 x 3.0 mm*

*Paddle Dimensions: 1.7 x 1.7 mm*

*Package Drawing: SKY65111-348LF*

3.5 *Material Information and Selected Dimensions*

*Die Attach: Conductive Epoxy QMI-519*

*Wirebond: 1.0 Gold Wire*

*Mold Compound: Sumitomo 7730LF*

*Branding method: Laser*

**Product Reliability Testing Requirements**
**General Information**

<b>Total sample requirements (#parts x # lots):</b>	450 Parts x 1 Lot
<b>Part Number:</b>	SKY65111-348LF
<b>Package:</b>	16 MLPQ (3.0 x 3.0 mm)
<b>LOT Number:</b>	3235210

**3.6 Product Level Reliability Requirements for Qualification**

<b>Test <sup>1</sup></b>	<b>Qty</b>	<b>Endpoints</b>	<b>Results</b>
<b>HTOL</b> Ta = 125°C (JESD22-A108)	77 x 1 lot	ATE test at 168 Hours 504 Hours 1000 Hours	Pass 0 Fail / 77
<b>Preconditioning <sup>2</sup></b> MSL Level 1– Temp 260 (JESD22-A113)	160 x 1 lot	Bake 125C 24 Hours Moisture Soak 3x Reflow ATE Test	Pass 0 Fail / 160
<b>Temperature Cycling</b> -65°C to +150°C/500cyc (JESD22-A104)	77 x 1 lot (from preconditioning)	500 cycles (condition C)	Pass 0 Fail / 77
<b>HAST</b> 130°C, 85% RH, 33 PSIA, nominal bias (JESD22-A110)	77 x 1 lot (from preconditioning)	96 hours	Pass 0 Fail / 77
<b>High Temp Storage</b> 150°C (JESD22-A103)	77 x 1 lot	1008 hours	Pass 0 Fail / 77
<b>ESD – HBM</b> (JESD22-A114)	3 per level	Post-zap 1 positive discharge and 1 negative discharge per pin for each pin combination	Class 0 200V
<b>ESD – MM</b> (JESD22-A115)	3 per level	Post-zap 1 positive discharge and 1 negative discharge per pin for each pin combination	Class A 100V
<b>ESD – CDM</b> (JESD22-C101)	3 per level	Post-zap 5 discharges per pin; field- induced, charge-discharge method	Class I 150V

<sup>1</sup> All stress tests are performed by the procedures referenced in SQ03-0025.

<sup>2</sup> Preconditioning is required before TC, and HAST/THB/Autoclave stresses.

## 4 Failure Rate Predictions

The following HTOL results for the SKY65111-348LF are used in the Failure Rate equation below. Using an activation energy of 1.3 eV,  $\chi^2(90\%,0)=4.61$  at a 90% upper confidence level with no observed failures, results in the following estimates for the FIT and MTTF.

$\chi^2(90\%,0)$	Qty Tested, N	Duration, t (Hours)	Stress Case Temp (°C)	Activation Energy (eV)
4.61	77	1000	125	1.3

Parameters used in the Failure Rate Equation.

$$\text{Failure Rate} = \frac{\chi^2}{2N * t * A_t} \times 10^9 \text{ (FITS)}$$

where:

$\chi^2$  = Chi Square Factor w/ corresponding degrees of freedom and confidence level.

**N** = Quantity Tested

**T** = Test Duration

**A<sub>t</sub>** = Thermal Acceleration Factor

Use Temperature	A <sub>t</sub>	Equivalent Device Hours	Failure Rate (FITS)	MTTF (Hours)
85°C	68.8	5.3 x 10 <sup>6</sup>	435	2.3x10 <sup>6</sup> hrs
55°C	3236.8	2.5 x 10 <sup>8</sup>	9.2	1.1x10 <sup>8</sup> hrs

Failure Rate Predictions for the SKY65111-348LF.