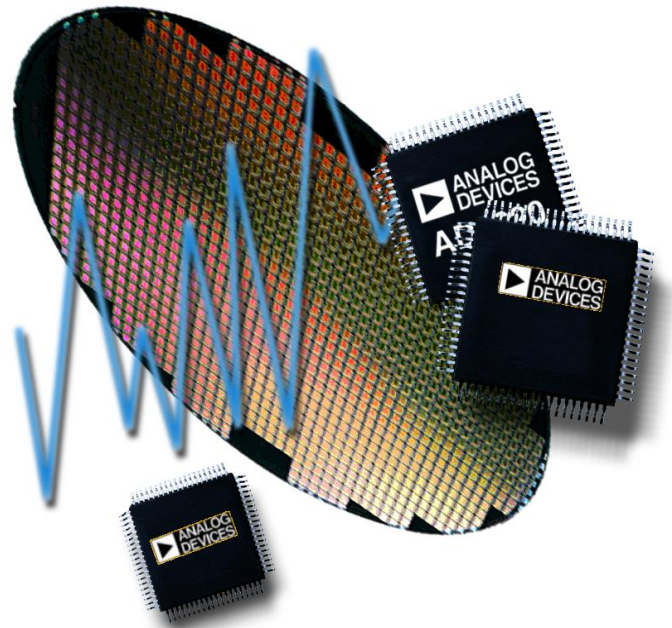




Reliability Report

Report Title:	LTM4656 Material Set Change Qualification
Report Number:	24171
Revision:	A
Date:	5 October 2025

Summary

This report documents the successful completion of the reliability qualification requirements for the conditional release of the alternate inductor used in LTM4656/ LTM4656-1 products, in a 144-CSP_BGA package. The LTM4656 is a complete high-efficiency boost μ Module (power module) regulator with the switching controller, power FETs, inductor, and all supporting components.

Die/Fab Product Characteristics

Table 1: Die/Fab Product Characteristics- > LTM4656

Product Characteristics	Product(s) to be qualified	
Generic/Root Part #	LTM4656	
Die Id	4363F2	3786
Die Size (mm)	1.65 x 2.59	1.47 x 1.45
Wafer Fabrication Site	ADI Camas	ADI Camas
Wafer Fabrication Process	>2.5 μ m ² Bipolar	BiCMOS
Die Substrate	Si	Si
Metallization/ # Layers	AlSiCu/1	AlCu/2
Polyimide	No	No
Passivation	oxide/SiN	oxide/SiN

Die/Fab Test Results

Table 2: Die/Fab Test Results – LTM4656

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	JESD22-A110	110C 85%RH 17.7 psia, Biased, 264 hours	LTM4656	Q24171.1.BHAST ²	0/30
				Q14259.1RCMHAST	0/30
				EO9562K.RCMB	0/30
High Temperature Operating Life (HTOL)	JESD22-A108	Ta = 125C, Biased, 500 hours [®]	LTM4656	Q24171.1.HTOL ²	0/77
		Ta=125°C, Biased, 1,000 Hours		Q14259.1	0/77
				Q14259.3	0/77
				Q14259.4	0/77
High Temperature Storage Life (HTSL)	JESD22- A103	150°C, 2,000 Hours	LTM4656	EO9077F.HTB	0/77
				EO9265F.HTS	0/77
				EO9266F.HTS	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 4) prior to the start of the stress test. Level 4 preconditioning consists of the following: Bake: 48 hrs @ 125°C, Unbiased Soak: 96 hrs @ 30°C, 60%RH, Reflow: 3 passes through an reflow oven with a peak temperature of 245°C.

² Alternate inductor

© Conditional Release. 1000hrs full release targeted by end of November.

Package/Assembly Product Characteristics

Table 3: Package/Assembly Product Characteristics - 144-CSP_BGA at ADI Penang

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	LTM4656
Package	144-CSP_BGA
Body Size (mm)	16.00 x 16.00 x 7.07
Assembly Location	ADI Penang
MSL/Peak Reflow Temperature(°C)	4 / 245
Mold Compound	Hitachi GE-100LFCWA
Die Attach	95Sn/5Sb
Substrate Material	BT Resin
Solder Ball Composition	96.5Sn_3.0Ag_0.5Cu
Solder Ball Size (mm)	0.76
Wire Bond Material/Diameter (mils)	GOLD / 1.00

Qualified Components

ADI Part Number
SE009373-01
SE009373-02

Package/Assembly Test Results

Table 4: Package/Assembly Test Results - CSP_BGA at ADI Penang

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	JESD22-A110	110C 85%RH 17.7 psia, Biased, 264 hours	LTM4656	Q24171.1.BHAST ²	0/30
				Q14259.1RCMHAST	0/30
				EO9562K.RCMB	0/30
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 2,000 Hours	LTM4656	EO9077F.HTB	0/77
				EO9265F.HTS	0/77
				EO9266F.HTS	0/77
Solder Heat Resistance (SHR)	J-STD-020	MSL-4	LTM4656	Q24171.1.MSL4 ²	0/77
Temperature Cycling (TC) ¹	JESD22-A104	-55°C/+125°C, 1,000 Cycles	LTM4656	Q24171.1.TC3 ²	0/77
		-55°C/+125°C, 2,000 Cycles		EO9077B1.TC	0/77
				EO9265B1.TC	0/77
				EO9266B1.TC	0/77
Unbiased HAST (UHST) ¹	JESD22-A118	110C 85%RH 17.7 psia, 264 hours	LTM4656	Q24171.1.UHAST ²	0/77
		130C 85%RH 33.3 psia, 96 hours		EO9077K1.UHAST	0/77
				EO9265K1.UHAST	0/77
				EO9266K1.UHAST	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 4) prior to the start of the stress test. Level 4 preconditioning consists of the following: Bake: 48 hrs @ 125°C, Unbiased Soak: 96 hrs @ 30°C, 60%RH, Reflow: 3 passes through an reflow oven with a peak temperature of 245°C.

² Alternate inductor

³ Note: J-STD-020 rework compatibility was verified passing by performing Bake: 48 hrs @ 125°C, Unbiased Soak: 8 hrs @ 30°C, 60%RH, Reflow: 1 pass through a reflow oven with a peak temperature of 260°C.

ESD and Latch-Up Test Results

Table 5: ESD Test Result

ESD Model	Generic/Root Part #	Package	ESD Test Spec	RC Network	Highest Pass Level	Class
FICDM	LTM4656	144-CSP_BGA	JS-002	1 Ω , Cpkg	$\pm 1000V$	C3
HBM	LTM4656	144-CSP_BGA	ESDA/JEDEC JS-001- 2011	1.5k Ω , 100pF	$\pm 3500V$	2

Table 6: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T _A)	Class
JESD78	LTM4601HV	+200mA, -200mA	+36V/+6V/+5V/+2V	Ambient	I

Approvals

Reliability Engineer: Lay Yong Ong