Quality and Reliability Report

Epoxy filled Via PCB

BT-0010SMG-2

051-07813

Marki Microwave Inc.
345 Digital Drive,
Morgan Hill, CA 95037
Phone: (408) 778-4200 / FAX: (408) 778-4300
Email: info@markimicrowave.com

Contents

1. Summary

This document describes the qualification results for the Surface Mount Bias Tees Gold Process assembly and materials. The reliability data was obtained through the performance of specified accelerated stress tests described. This summary shows the devices current status and steps for completed qualification testing.

Base Part Number	Description
BT-0010SMG-2	Bias Tee 20 MHz to 10 GHz BTSM
BT-0014SMG-1	SM Bias Tee 14 GHz BTSM
BT-0024SMG-1	SM Bias Tee 24 GHz BTSM
BT-0030SMG-1	Bias Tee 10MHz – 30GHz BTSM
BT-0034SMG-1	Bias Tee 500KHz – 34GHz BTSM
BTX0299-1	Bias Tee 500 KHz – 6GHz 38V

2. Scope

The qualification was performed to validate the reliability of SMG product assemblies. The results of this report are not limited to the specific product described herein; they apply to a family of products designed at Marki Microwave which use the same assembly materials and processes.

3. Product Description and Information

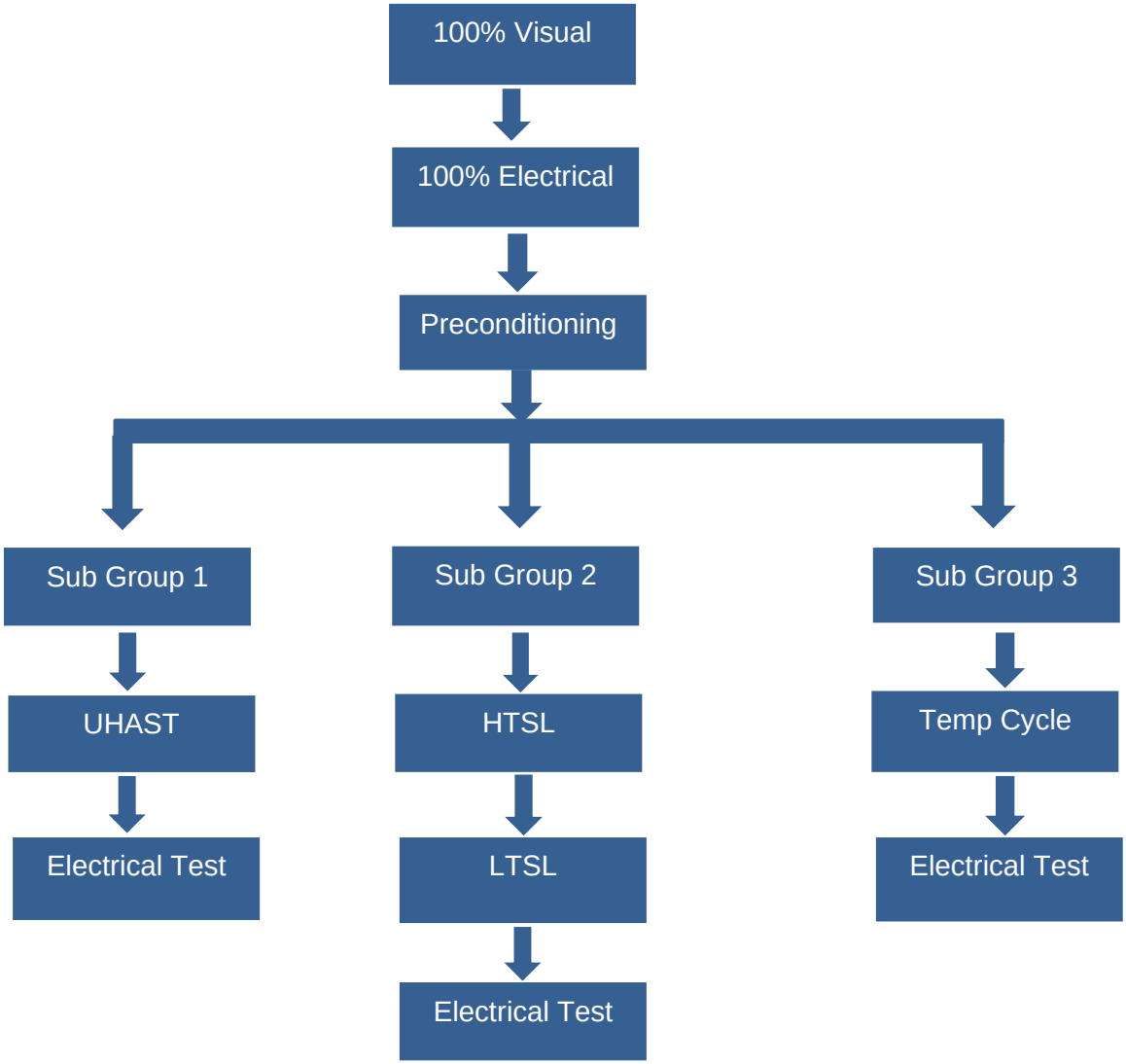
BT Assembly and Package Information

Package Style:	Surface Mount Gold (SMG)
Circuit:	311-07177 Rev-
Circuit Plating:	Electroless Nickel Immersion Gold (ENIG)
Capacitor:	240-0000 0402 1 uf 35V
Solder:	932-00182 Gold-Tin Eutectic
Wire:	940-00004 Bias 40awg HPN-180 Red
ROHS Compliant:	Yes
MSL Level:	1

4. Product Qualification Requirements

Qualification testing is being performed to validate the reliable operation of Marki Microwave SMG packages. Tests are included to specifically address failure mechanisms related to elevated temperature, temperature cycling and environmental stress.

4.1 Qualification Plan



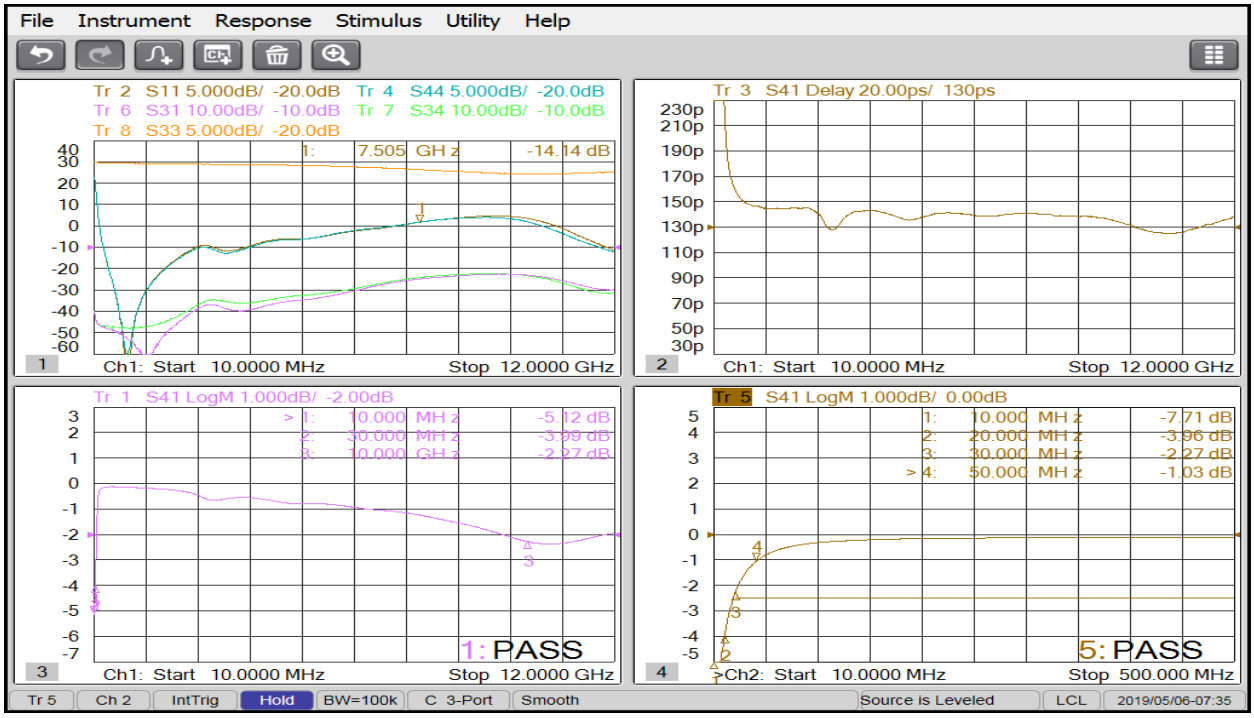
Qual Plan		Qty	BT-0010SMG-2	MT3
Subgroup 1	UHAST	10	5	5 IP
Subgroup 2	LT/HTSL	11	6	5 IP
Subgroup 3	Temp cycle	11	6	5 IP
	Total	32	17	15

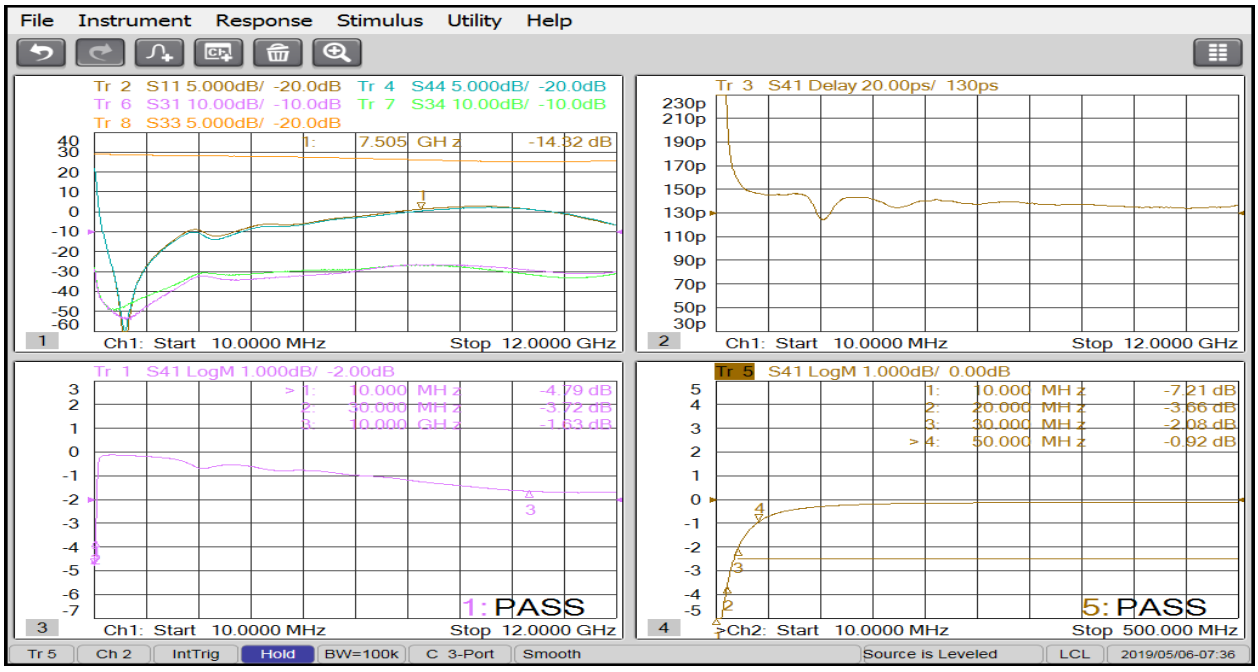
4.2 Flow and Conditions

Test Method	Reference	Time / Cycles	Qty	Condition
Preconditioning				
Lead Free Reflow	N/A	3 Cycles	17	Peak 260°C
Visual Inspection	N/A	N/A		
Electrical Test	N/A	N/A		N/A
Temperature Cycling	JESD22-A104	10 Cycles, 10Min Dwells		100°C to -55°C
Electrical Test	N/A	N/A		N/A
Sub Group 1				
Unbiased Highly Accelerated Temperature and Humidity Stress Test (UHAST)	JESD22-A118	352Hrs	5	105°C, 85%RH
Sub Group 2				
Low Temperature Storage Life (LTSL)	JESD22-A119	168Hrs	6	-40°C
High Temperature Storage Life (HTSL)	JESD22-A103	500Hrs		100°C
Sub Group 3				
Temperature Cycling	JESD22-A104	500 Cycles, 10Min Dwells	6	100°C to -55°C

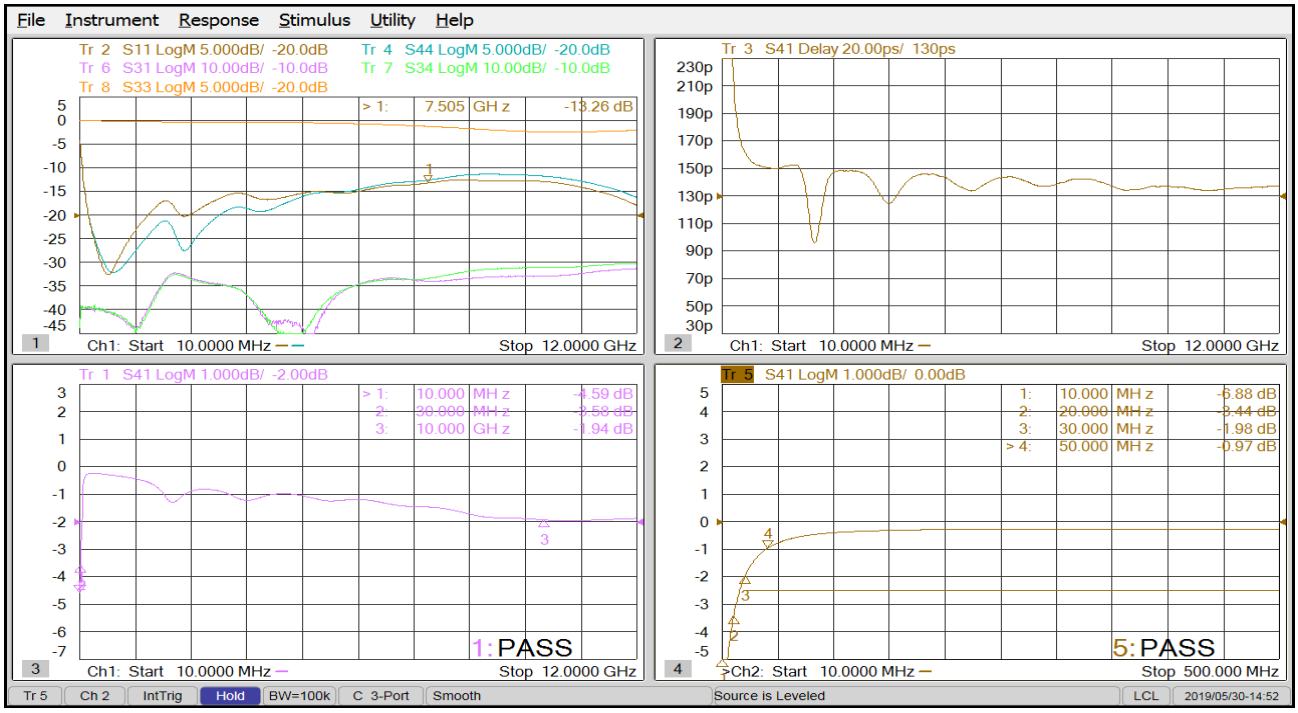
5. Qualification Results

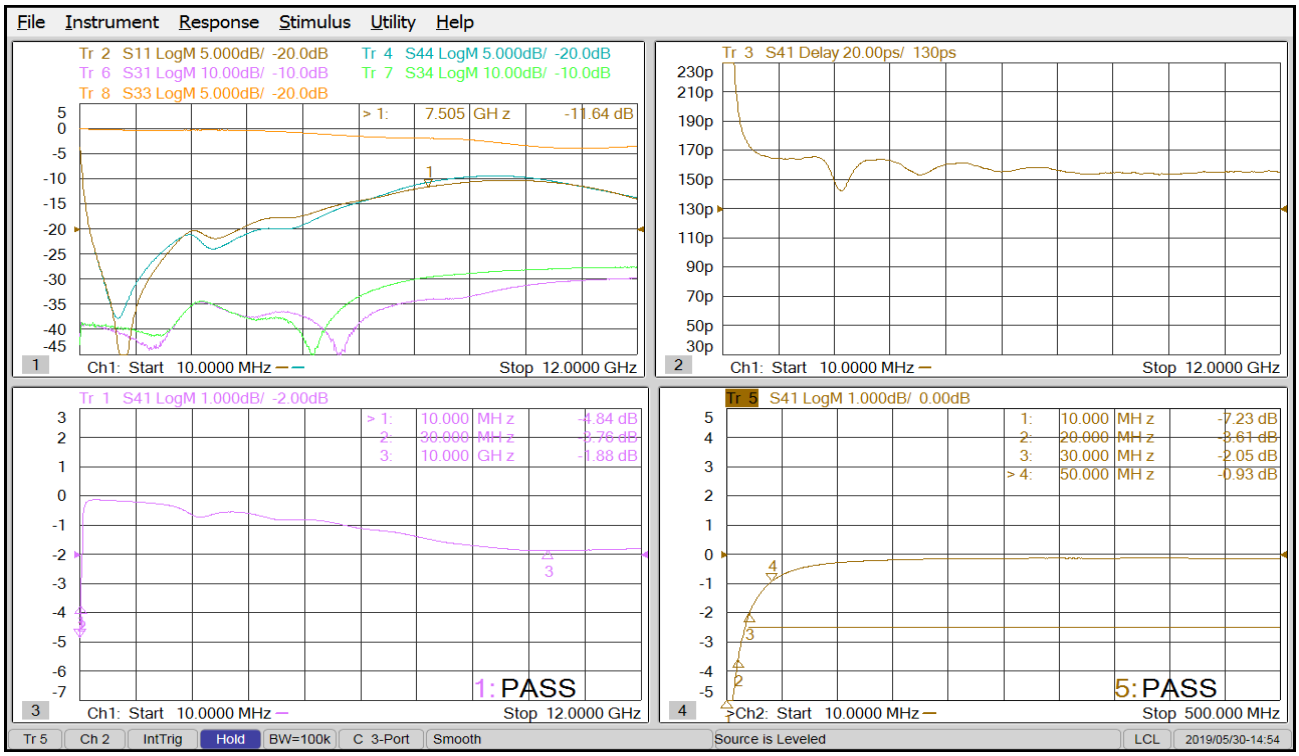
5.1 Test Results UHAST (Representative Data)



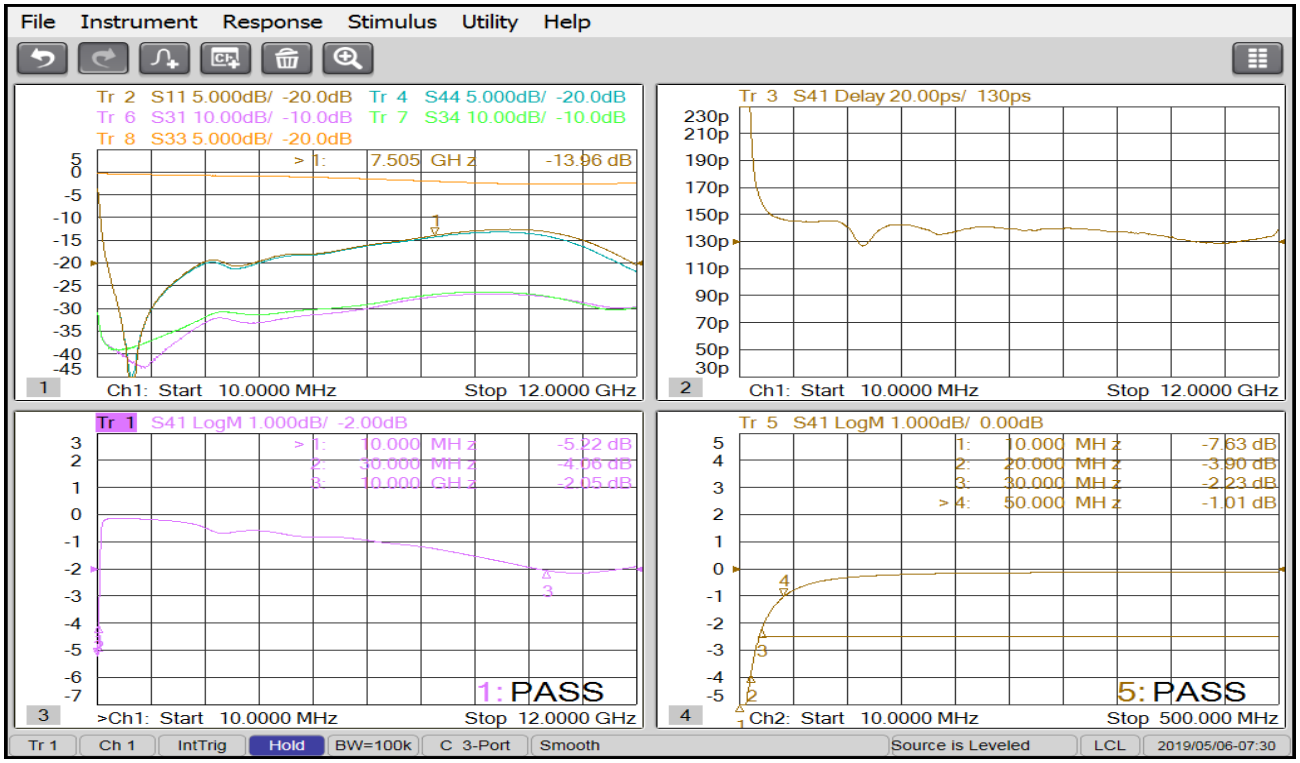


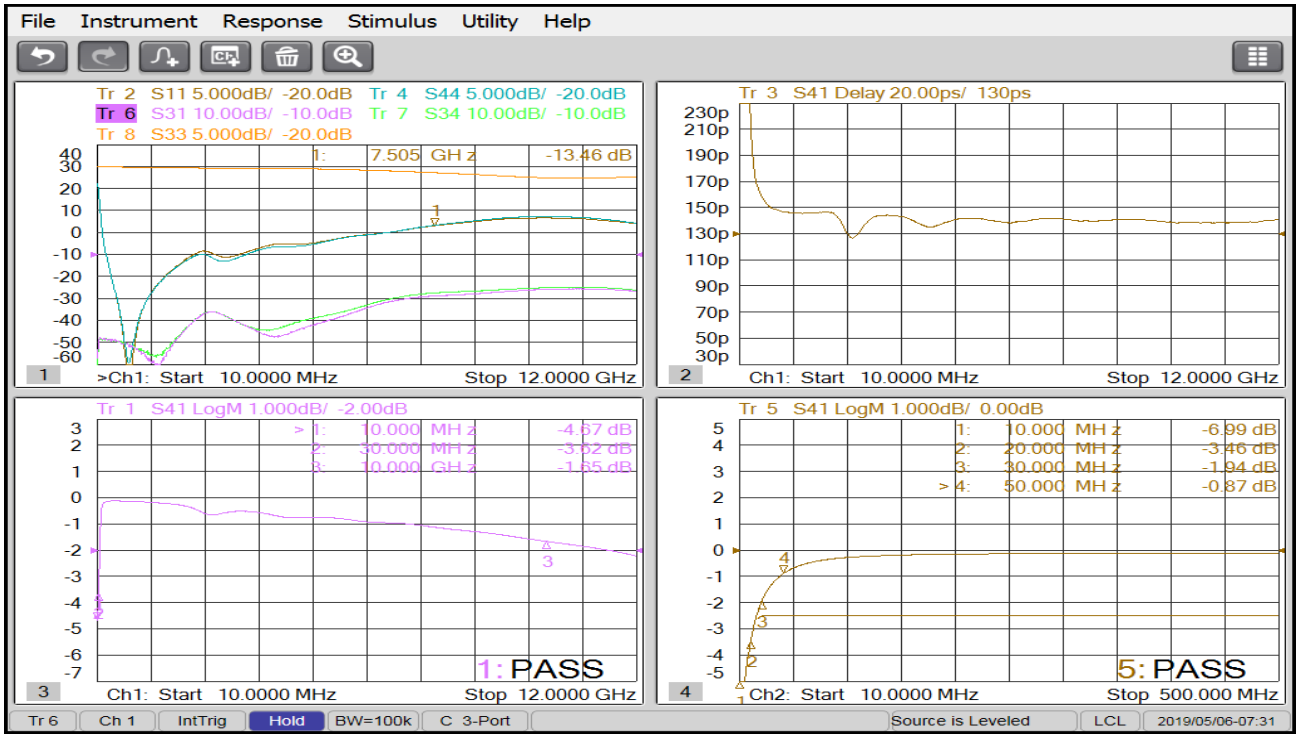
5.2 Test Results HTSL – LTSL (Representative Data)





5.3 Test Results Temp Cycle (Representative Data)





6. Bias Tee Epoxy filled Vias Qualification and MSL determination Traveler

Description	Method JEDEC	Condition	Date	Status
Electrical Test		100% Read and Record	3/18/19	Pass
Lead free reflow cycles		3 Cycles Peak at 260°C	3/19/19	Pass
Visual Inspection			3/19/19	Pass
Electrical Test		100% Read and Record	4/2/19	Pass
Temperature Cycling (TC)	JESD22-A104 10 Cycles	Ts (min) = -55°C Ts (max) = +100°C Dwell Time = 10 minutes	4/3/19	Pass
Electrical Test		100% Read and Record Xfer to subgroups	4/9/19	Pass
QA Review		Pre- Production Release	4/9/19	Pass
Subgroup 1				
Highly Accelerated Temperature and Humidity Stress Test (UHAST)	JESD22-A118 352 Hours	Temp = 105°C, RH = 85%	5/3/19	Pass
Electrical Test		100% Read and Record	5/6/19	Pass
Subgroup 2				
High Temperature Storage Life (HTSL)	JESD22-A103 500 Hours	Temp = 100°C In: 4/9/19	5/21/19	Pass
Low Temperature Storage Life (LTSL)	JESD22-A119 168 Hours	Temp = -40°C In: 5/21/19	5/28/19	Pass
Electrical Test		100% Read and Record	5/30/19	Pass
Subgroup 3				
Temperature Cycling (TC)	JESD22-A104 100 Cycles then 400	Ts (min) = -55°C Ts (max) = +100°C Dwell Time = 10 minutes In: 4/9/19	5/6/19	Pass
Electrical Test		100% Read and Record	5/6/19	Pass
ALL UNITS TO MSL Test (post screening and life tests, 22 units)				
Electrical Test		100% Read and Record	5/30/19	Pass
High Temperature Storage Life (HTSL)	JESD22-A103	Temp = 100°C for 24Hrs	6/21/19	Pass
Preconditioning & MSL	J-STD-020	105°C and 85%RH for 56Hrs	6/24/19	Pass
Lead free reflow cycles		3 Cycles Peak at 260°C	6/24/19	Pass
Electrical Test			6/24/19	Pass
Temperature Cycle	JESD22-A104	-55°C to 100°C for 100 Cycles. Dwells = 10 min In: 6/24/19	7/1/19	Pass
Electrical Test			7/1/19	Pass
Review				

7. Reference Documents

7.1 MIL_STD-883-1008 “High Temperature Storage Life”
7.2 MIL_STD-883-1010 “Temperature Cycling””
7.3 MIL-STD-883 “Department of Defense Test Method Standard, Microcircuit”
7.4 JESD22-A102E “Accelerated Moisture Resistance – Unbiased Autoclave”
7.5 JESD22-A118B “Accelerated Moisture Resistance – Unbiased HAST”
7.6 J-STD-020 “Moisture Reflow Sensitivity Classification”
7.7 JESD22-A113 Preconditioning & MSL
7.8 JESD22-A108 / JESD74 Early life Failure Rate (ELFR)
7.9 JESD22-A108 / JESD85 High Temperature Operating Life (HTOL)
7.10 JESD22-A110 Highly Accelerated Temperature and Humidity Stress Test (HAST)
7.11 JESD22-A103 High Temperature Storage Life (HTSL)
7.12 JESD22-A119 Low Temperature Storage Life (LTSL)
7.13 JESD22-A102 Accelerated Moisture Resistance (Autoclave)
7.14 JESD22-A104 Temperature Cycling (TC)

Revision History

Version 1.0 – 9/28/21