ACPM-7051

Reliability Data Sheet

Description

The ACPM- 7051 is a multiband multimode PA which supports GMSK and 8-PSK modulation schemes and UMTS bands 1 and 5. There are two amplifier chains, one is to support low band (GSM850/900 and UMTS Band5), and the other is to support high band (DCS1800/PCS1900 and UMTS band1).

CoolPAM technology, Avago Technologies' Power Amplifier technologies, provides extended talk time with extremely low quiescent current and enhanced efficiency at low and medium power modes.

Reliability Prediction Model

Failure rate predictions are based on HTOL test results. The prediction uses an exponential cumulative failure function (constant failure rate) as the reliability prediction model to predict failure rate and mean time to failure (MTTF) at various temperatures as shown in Table 2. The wear out mechanisms is therefore not considered. The Arrhenius temperature de-rating equation is used. We assume no failure mechanism change between stresses and use conditions. Bias and temperature are alterable stresses and must be considered with the thermal resistance of the devices when determining the stress condition. The failure rate will have a direct relationship to the life stress. The failure rate prediction was calculated using activation energy of 1.58eV as a conservative estimate. Confidence intervals are based upon the chi-squared prediction method associated with exponential distribution.

Table 1. Life prediction:

Demonstrated Performance

Test Name	Stress Condition	Total Units Tested	Total Device Hours	Number of Failed Units
DC-High Temperature Operating Life	Tjunction=150°C	75	37800 hrs	0/75

Table 2. Estimated for Various Channel Temperatures are as follows:

Channel Temp. (°C)	Point Typical Performance MTTF (yrs/failure)	90% Confidence MTTF (yrs)	Point Typical Performance FIT	90% Confidence FIT
150	4.31	1.87	26455.03	60978.84
125	65.64	28.48	1737.88	4005.81
100	1439.39	624.46	79.25	182.68
85	11289.53	4897.84	10.10	23.29
60	527941.41	229041.83	0.22	0.50

Point typical MTTF is simply the total device hours divided by the number of failures. Since no failures were observed, the point estimate is calculated under the assumption that one unit failed. FIT rates shown are relatively high due to the limited device hours at product release.

Table 3. Environmental Test Results:

Stress	Conditions	Duration	Failures / Number tested
High Temperature Storage	Ta=150°C JESD22-A103	504 hours	0/75
Unbiased Highly Accelerated Temperature and Humidity Stress	130°C/85%RH, 230kPa, No Bias JESD22-A118	96 hours	0/75
Temperature Cycling	Cond.B: -55°C/+125°C, 15min Dwell, Air to Air JESD22-A104	700 cycles	0/75

Table 4. Operating Life Tests Results:

Stress	Conditions	Duration	Failures / Number tested
High Temperature Operating Life (HTOL)	Tj=150°C, VBATT=VUMTS=VGSM=3.4V, Ven=1.8V, Vmode=1.8V; Middle frequency, maximum Pout into 50 Ω JESD22-A108	504 hours	0/75
Temperature Humidity with Bias (THB)	Ta=85'C/85%RH VBATT=VUMTS=VGSM=3.4V, Ven=0V, Vmode=0V; RF ports into 50 Ω JESD22-A101	504 hours	0/75

Table 5. Mechanical Tests Information:

Stress	Conditions	Duration	Failures / Number tested
Drop Test	Peak acceleration: 1500Gs. Pulse duration: 0.5ms half-sine pulse. JESD22-B111	30 drops	0/60
Cycle Bending Test	Amplitude 1.0mm, total displacement 2.0mm Bending rate 80mm per minute	5x	0/30
Shear Test	Force=10N for 60 seconds, 4 sides separately IEC60068-2-21	60 sec/side	0/30
Bending Test	Bending up to 5mm with 1mm increment. Maintained in bend state for 5±1sec for every 1mm increment IEC60068-2-21	5mm	0/30

Table 6. Thermal Resistance Information:

Stress	Product	Theta Jc
Thermal Resistance GSM HB	Vcc=3.5V ; Ven_HB=1.8V ;mode=0V; Vmode0/1=0V (HPM)	9.56 °C/W
Thermal Resistance GSM LB	Vcc=3.5V ; Ven_LB=1.8V ;mode=0V; Vmode0/1=0V (HPM)	11.37 °C/W
Thermal Resistance UMTS HB	Vcc=3.4V ; Ven_HB=1.8V ;mode=1.8V; Vmode0/1=0V (HPM)	9.72 °C/W
Thermal Resistance UMTS LB	Vcc=3.0V ; Ven_LB= 1.8V ;mode=1.8V; Vmode0/1=0V (HPM)	12.15 °C/W

Table 7. ESD Ratings:

ESD test	Reference	Results
Human Body Model	JESD22-A114	1500 V (Class 1C)
Machine Model	JESD22-A115	150 V (Class A)
Charge Device Model	JESD22-C101	500 V (Class III)

HBM

Class 0 is ESD voltage level < 250V, Class 1A is voltage level between 250V and 500V, Class 1B is voltage level between 500V and 1000V, Class 1C is voltage level between 1000V and 2000V, Class 2 is voltage level between 2000V and 4000V, Class 3A is voltage level between 4000V and 8000V, Class 3B is voltage level > 8000V.

MM

Class A is ESD voltage level <200V, Class B is voltage level between 200V and 400V, Class C is voltage level > 400V.

ESD Sensitivity

Note: ESD Sensitivity Level for Human Body Model and Machine Model necessitate the following handling precautions:

1. Ensure Faraday cage or conductive shield bag is used during transportation processes,
2. If the static charge at SMT assembly station is above device sensitivity level, place an ionizer near to the device for charge neutralization purposes.
3. Personal grounding must be worn at all times when handling the devices.

CDM

Class I <200 volts, Class II 200 to <500 volts, Class III 500 to 1000 volts, Class IV >1000 volts

Moisture Sensitivity Classification: Level 3`

Preconditioning per JESD22-A113-D Level 3 was performed on all devices prior to reliability testing except ESD and mechanical tests

MSL3 Preconditioning (JESD22-A113D): 125°C HTSL for 24hrs + 60°C/60%RH for 40hrs + 3XIR Reflow, 260°C peak.

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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