PCN

AO-PCN-2022-017-A

Introduction of 2nd source for classic InGaAlP chip for Micro SIDELED

Published by ams-OSRAM AG
Tobelbader Strasse 30, 8141 Premstaetten, Austria
Phone +43 3136 500-0
ams-osram.com

01.07.2022

Dear Customer,

please review this **PCN** and provide your feedback in the **Customer approval form** (at the end of this PCN document) to your ams OSRAM sales partner before **05.08.2022** *).

Please take note, that this PCN is published for the introduction of **additional source(s)**.

Your prompt reply will help ams OSRAM to assure a smooth and well executed transition. If ams OSRAM does not hear from your side by the due date, we will assume your (if you are a Distributor: and your customer's) full acceptance to this proposed change and its implementation.

ams OSRAM understands the time requirements your organization needs to approve this PCN.
However, if you can provide ams OSRAM an estimated date your organization will have finalized this PCN review, ams OSRAM can use this date to plan continued production to secure your order needs during the expansion with additional source(s).

Your attention and response to this matter is highly appreciated.

Please direct your inquiries to your local Sales office.

*) ams OSRAM aligns with the widely recognized JEDEC/ECIA/IPC Joint Standard No. 46, which stipulates:

- Customers should acknowledge receipt of the PCN within 30 days of delivery of the PCN.
- Lack of acknowledgement of the PCN within 30 days constitutes acceptance of the change.
- After acknowledgement, lack of additional response within the 90 day period constitutes acceptance of the change. If the customer requires additional time to perform sample testing, beyond the 90 day review period, an extension must be negotiated with the supplier.

Subject of change:	Introduction of 2nd source for classic InGaAlP chip for Micro SIDELED	
Affected products:	LS Y876, LY Y876, LO Y876, LG Y876	
Reason for change:	• Secure continuous supply • Introduction of additional supplier chips	
Description of change:	Current status Inhouse chips	New status Inhouse chips + 2nd (and 3rd) source chips provided by supplier(s)
	For details refer to file 2_cip_AO-PCN-2022-017-A	
Time schedule for PCN material: (after implementation of change):	Final qualification report:	01.08.2022
	Samples available:	01.08.2022*) *) For details refer to file 2_cip_AO-PCN-2022-017-A
	Intended Start of delivery:	01.12.2022**) **) or earlier if released by customer and upon mutual agreement
	Customer Review Finalization:	01.07.2023***) ***) Expected final feedback of customer. Released order volume is related to deliveries of material from both previous and additional source(s).
Assessment:	**No change in fit, form and reliability → no change in Datasheets**	
Documentation:	Customer information package 2_cip_AO-PCN-2022-017-A 3_cip_AO-PCN-2022-017-A_Qual	

Note:
Pre-PCN material: Products of current status, means before implementation of the changes as described in the PCN.
PCN material: Products with implementation of the changes as described in the PCN.

Customer approval form
AO-PCN-2022-017-A

Introduction of 2nd source for classic InGaAlP chip for Micro SIDELED

Please list product(s) affected in your application(s):

Please check the appropriate box below:

○ **Approval:** We agree with the proposed change and accept start of the shipment upon availability of PCN material	○ **Not relevant:** Change is not relevant for products in use.

○ **Change cannot be accepted:**

- ○ **We have objections:**
- ○ **We request following Information:**
- ○ **We request following Samples:**
- ○ **Expected approval date:**
- ○ **Volume requirements for Pre-PCN material:**

○ **Remarks:**

Sender:

Company:

Address / Location:

Signature: **Date:**

Please return this approval form to your Sales partner.

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Customer information package

S&MK EM FQE/OS Q CQM A ITR
2022-07-01

Agenda

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Introduction of 2nd source for classic InGaAlP chip for Micro SIDELED

Reason for change

Item	Description
1.	Secure continuous supply
2.	Introduction of additional supplier chips

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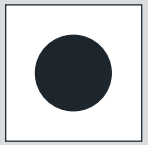
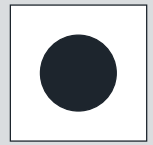
Description of change for standard chips

Item	Current status	2nd source chip A	2nd source chip B	2nd source chip C
Wafer size [mm]	100	100		
Wafer substrate	GaAs	GaAs		
Height [µm]	220	180		
Chip dicing process	Sawing	Sawing		
Picture (schematic)				
Chip size [µm]	200 x 200	200 x 200	180 x 180	180 x 180
Front metal type	Al	Au		
Front metal thickness [µm]	1.5	2.25 - 2.9		
Back metal type	Au	Au		
Back metal thickness [µm]	0.25	0.05 - 0.50		
Bond pad size [µm]	100	100		

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Changes in the datasheets

No change in fit, form and function of affected devices → no change in Datasheets

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Introduction of 2nd source for classic InGaAlP chip for Micro SIDELED

List of affected products

Brand	Standard
Micro SIDELED	LS Y876
	LO Y876
	LY Y876
	LG Y876

Due to complexity not all device/chip source combinations will be available at start of series production.

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PCN Samples

Standard
LS Y876
LO Y876
LY Y876
LG Y876

Color code: available on 01.08.2022 on request

AO-PCN-2022-017-A
Introduction of 2nd source for classic InGaAlP chip for Micro SIDELED

Time schedule

for PCN material (after implementation of change):		
Final qualification report	01.08.2022	
Samples available	01.08.2022	
Intended Start of delivery	01.12.2022*)	*) or earlier if released by customer and upon mutual agreement

Customer Review Finalization:	01.07.2023 **)	**) Expected final feedback of customer. Released order volume is related to deliveries of material from both previous and additional source(s).

Note:
PCN material: Products with implementation of the changes as described in the PCN.

Sensing is life

Qualification Results overview 220118C1

Subject	Qualification for 2nd source Chip introduction for classic InGaAlP Micro SIDELED devices
Date	01.07.2022
Tested device	Chip A: LY Y876, LG Y876 Chip B: LS Y876, LY Y876, LO Y876 Chip C: LS Y876, LO Y876, LG Y876
Brand (including sub brands)	Micro SIDELED
Applies to	LG Y876, LO Y876, LS Y876, LY Y876

ams-OSRAM AG
Tobelbader Strasse 30
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Pre-conditioning according to Jedec Level II where applicable as per AEC-Q102 AEC-Q102 #A1 **LY Y876 (Chip A)**

Test Performed	Condition	Duration	Sample Size	Failures El. AEC-Q102 #E1	Failures Opt. AEC-Q102 #E1	Failures Vis AEC-Q102 #E0
Wet High Temperature Operating Life WHTOL1 *JESD22-A101* AEC-Q102 #A2a Test PCB: IMS-Al	T_A = 85°C; r.H. = 85%; T_s = 95°C; T_j = 105°C I_F = 20 mA $T_{on/off}$ = 30 min	1000 h	2x26	0	0	0
Wet High Temperature Operating Life WHTOL2 *JESD22-A101* AEC-Q102 #A2b Test PCB: FR4	T_A = 85°C; r.H. = 85% I_F = 5 mA	1000 h	2x26	0	0	0
Powered Temperature Cycle PTC *JESD22-A105* AEC-Q102 #A3a Test PCB: IMS-Al	T_A = -40°C/+85°C T_s = 95°C; T_j = 105°C I_F = 20 mA $t_{on/off}$ = 5 min	1000 c	2x26	0	0	0
Temperature Cycling TC *JESD22-A104* AEC-Q102 #A4a Test PCB: FR4	T_A = -40°C/+100°C 15 min each extreme	1000 c	2x26	0	0	0
High Temperature Operating Life HTOL1 *JESD22-A108* AEC-Q102 #B1a Test PCB: IMS-Al	T_A = 100°C; T_s = 105 °C T_j = 115 °C I_F = 15 mA	1000 h	2x26	0	0	0
High Temperature Operating Life HTOL2 *JESD22-A108* AEC-Q102 #B1b Test PCB: IMS-Al	T_A = 55°C; T_s = 70°C T_j = 85°C I_F = 30 mA	1000 h	2x26	0	0	0
Pulsed Operating Life PLT *JESD22-A108* AEC-Q102 #B3 Test PCB: FR4	T_A = 55°C I_F = 200 mA; t_p = 0,1ms; D = 3%	1000 h	2x26	0	0	0
Dew DEW *AEC-Q102-001* AEC-Q102#C7 Test PCB: FR4	$T_{A,min}$ = 10°C $T_{A,max}$ = 80°C r.H. = 53-100% I_F = 5 mA	10 c	2x26	0	0	0
Solderability SD *IEC 60068-2-58* AEC-Q102 #C10	T_A = 235°C method 2 (reflow simulation)	1x	2x10	-	-	0
Hydrogen Sulphide H2S *IEC 60068-2-43* AEC-Q102 #C12 Test PCB: FR4	15 ppm H_2S 40°C/90% r.H.	336 h	2x26	0	0	0
Flowing Mixed Gas FMG *IEC 60068-2-60* AEC-Q102 #C13 Test PCB: FR4	T_A = 25°C, r.H. = 75% Test method 4	500 h	2x26	0	0	0
Board Flex Test BF *AEC-Q102-002* AEC-Q102 #C14 Test PCB: FR4	2 mm	1x	2x10	0	0	0

Electrostatic Discharge HBM *ANSI/ESDA/ JEDEC JS-001* AEC-Q102 #E3 Test PCB: FR4	Human Body Model	2000 V	2x10	0	0	0
Constant Acceleration CA *MIL-STD-750-2* AEC-Q102 #G1	Method 2006 2000 gf; 1 min in x/y/z (+/- direction)	1x	2x10	for uncasted packages only		
Vibration Variable Frequency VVF *JESD22-B103* AEC-Q102 #G2	20g, 20-2000Hz; 4min / cy; 4cy/axis service condition 1	1x	sequential samples			
Mechanical Shock MS *JESD22-B110* AEC-Q102 #G3	1500g for 0.5ms, 5 blows, 3 orientations	1x	sequential samples			
Hermeticity HER *JESD22-A109* AEC-Q102 #G4	Leak Test: Fine & Gross	1x	sequential samples			

Additional Tests to AEC Q102

Test Performed	Condition	Duration	Sample Size	Failures El.	Opt.	Vis
Electrostatic Discharge MM *JESD22-A115* Test PCB: FR4	Machine Model	200 V	2x10	0	0	0

Note:

Failure criteria:

Electrical failures: V_f (I_f =20 mA) > 2,4 V; ± 10% from initial value

Optical failures: I_v (I_f =20 mA) absolute limit: ± 50% max.
λ_{dom} (I_f = 20 mA) ± 2 nm initial value

Visual failures: acc JEDEC JESD22-B101

The tested devices representing the product family as stated in the applies to section fulfill the reliability requirements of AEC-Q102 Rev-A.

Pre-conditioning according to Jedec Level II where applicable as per AEC-Q102 AEC-Q102 #A1 **LG Y876 (Chip A)**

Test Performed	Condition	Duration	Sample Size	Failures El. AEC-Q102 #E1	Failures Opt. AEC-Q102 #E1	Failures Vis AEC-Q102 #E0
Wet High Temperature Operating Life WHTOL1 *JESD22-A101* AEC-Q102 #A2a Test PCB: IMS-Al	T_A = 85°C; r.H. = 85%; T_s = 95°C; T_j = 105°C I_F = 20 mA $T_{on/off}$ = 30 min	1000 h	1x26	0	0	0
Wet High Temperature Operating Life WHTOL2 *JESD22-A101* AEC-Q102 #A2b Test PCB: FR4	T_A = 85°C; r.H. = 85% I_F = 5 mA	1000 h	1x26	0	0	0
Powered Temperature Cycle PTC *JESD22-A105* AEC-Q102 #A3a Test PCB: IMS-Al	T_A = -40°C/+85°C T_s = 95°C; T_j = 105°C I_F = 20 mA $t_{on/off}$ = 5 min	1000 c	1x26	0	0	0
Temperature Cycling TC *JESD22-A104* AEC-Q102 #A4a Test PCB: FR4	T_A = -40°C/+100°C 15 min each extreme	1000 c	1x26	0	0	0
High Temperature Operating Life HTOL1 *JESD22-A108* AEC-Q102 #B1a Test PCB: IMS-Al	T_A = 100°C; T_s = 105 °C T_j = 115 °C I_F = 15 mA	1000 h	1x26	0	0	0
High Temperature Operating Life HTOL2 *JESD22-A108* AEC-Q102 #B1b Test PCB: IMS-Al	T_A = 55°C; T_s = 70°C T_j = 85°C I_F = 30 mA	1000 h	1x26	0	0	0
Pulsed Operating Life PLT *JESD22-A108* AEC-Q102 #B3 Test PCB: FR4	T_A = 55°C I_F = 200 mA; t_p = 0,1ms; D = 3%	1000 h	1x26	0	0	0
Dew DEW *AEC-Q102-001* AEC-Q102#C7 Test PCB: FR4	$T_{A,min}$ = 10°C $T_{A,max}$ = 80°C r.H. = 53-100% I_F = 5 mA	10 c	1x26	0	0	0
Solderability SD *IEC 60068-2-58* AEC-Q102 #C10	T_A = 235°C method 2 (reflow simulation)	1x	1x10	-	-	0
Hydrogen Sulphide H2S *IEC 60068-2-43* AEC-Q102 #C12 Test PCB: FR4	15 ppm H_2S 40°C/90% r.H.	336 h	1x26	0	0	0
Flowing Mixed Gas FMG *IEC 60068-2-60* AEC-Q102 #C13 Test PCB: FR4	T_A = 25°C, r.H. = 75% Test method 4	500 h	1x26	0	0	0
Board Flex Test BF *AEC-Q102-002* AEC-Q102 #C14 Test PCB: FR4	2 mm	1x	1x10	0	0	0

Electrostatic Discharge HBM *ANSI/ESDA/ JEDEC JS-001* AEC-Q102 #E3 Test PCB: FR4	Human Body Model	2000 V	1x10	0	0	0
Constant Acceleration CA *MIL-STD-750-2* AEC-Q102 #G1	Method 2006 2000 gf; 1 min in x/y/z (+/- direction)	1x	1x10	for uncasted packages only		
Vibration Variable Frequency VVF *JESD22-B103* AEC-Q102 #G2	20g, 20-2000Hz; 4min / cy; 4cy/axis service condition 1	1x	sequential samples			
Mechanical Shock MS *JESD22-B110* AEC-Q102 #G3	1500g for 0.5ms, 5 blows, 3 orientations	1x	sequential samples			
Hermeticity HER *JESD22-A109* AEC-Q102 #G4	Leak Test: Fine & Gross	1x	sequential samples			

Additional Tests to AEC Q102

Test Performed	Condition	Duration	Sample Size	Failures El.	Opt.	Vis
Electrostatic Discharge MM *JESD22-A115* Test PCB: FR4	Machine Model	200 V	1x10	0	0	0

Note:

Failure criteria:

Electrical failures: V_f (I_f =20 mA) > 2,4 V; ± 10% from initial value

Optical failures: I_v (I_f =20 mA) absolute limit: ± 50% max.
λ_{dom} (I_f = 20 mA) ± 2 nm initial value

Visual failures: acc JEDEC JESD22-B101

The tested devices representing the product family as stated in the applies to section fulfill the reliability requirements of AEC-Q102 Rev-A.

Pre-conditioning according to Jedec Level II where applicable as per AEC-Q102 AEC-Q102 #A1 **LS Y876 (Chip B)**

Test Performed	Condition	Duration	Sample Size	Failures El. AEC-Q102 #E1	Failures Opt. AEC-Q102 #E1	Failures Vis AEC-Q102 #E0
Wet High Temperature Operating Life WHTOL1 *JESD22-A101* AEC-Q102 #A2a Test PCB: IMS-Al	T_A = 85°C; r.H. = 85%; T_s = 95°C; T_j = 105°C I_F = 20 mA $T_{on/off}$ = 30 min	1000 h	1x26	0	0	0
Wet High Temperature Operating Life WHTOL2 *JESD22-A101* AEC-Q102 #A2b Test PCB: FR4	T_A = 85°C; r.H. = 85% I_F = 5 mA	1000 h	1x26	0	0	0
Powered Temperature Cycle PTC *JESD22-A105* AEC-Q102 #A3a Test PCB: IMS-Al	T_A = -40°C/+85°C T_s = 95°C; T_j = 105°C I_F = 20 mA $t_{on/off}$ = 5 min	1000 c	1x26	0	0	0
Temperature Cycling TC *JESD22-A104* AEC-Q102 #A4a Test PCB: FR4	T_A = -40°C/+100°C 15 min each extreme	1000 c	1x26	0	0	0
High Temperature Operating Life HTOL1 *JESD22-A108* AEC-Q102 #B1a Test PCB: IMS-Al	T_A = 100°C; T_s = 105 °C T_j = 115 °C I_F = 15 mA	1000 h	1x26	0	0	0
High Temperature Operating Life HTOL2 *JESD22-A108* AEC-Q102 #B1b Test PCB: IMS-Al	T_A = 55°C; T_s = 70°C T_j = 85°C I_F = 30 mA	1000 h	1x26	0	0	0
Pulsed Operating Life PLT *JESD22-A108* AEC-Q102 #B3 Test PCB: FR4	T_A = 55°C I_F = 125 mA; t_p = 0,1ms; D = 3%	1000 h	1x26	0	0	0
Dew DEW *AEC-Q102-001* AEC-Q102#C7 Test PCB: FR4	$T_{A,min}$ = 10°C $T_{A,max}$ = 80°C r.H. = 53-100% I_F = 5 mA	10 c	1x26	0	0	0
Solderability SD *IEC 60068-2-58* AEC-Q102 #C10	T_A = 235°C method 2 (reflow simulation)	1x	1x10	-	-	0
Hydrogen Sulphide H2S *IEC 60068-2-43* AEC-Q102 #C12 Test PCB: FR4	15 ppm H_2S 40°C/90% r.H.	336 h	1x26	0	0	0
Flowing Mixed Gas FMG *IEC 60068-2-60* AEC-Q102 #C13 Test PCB: FR4	T_A = 25°C, r.H. = 75% Test method 4	500 h	1x26	0	0	0
Board Flex Test BF *AEC-Q102-002* AEC-Q102 #C14 Test PCB: FR4	2 mm	1x	1x10	0	0	0

Electrostatic Discharge HBM *ANSI/ESDA/ JEDEC JS-001* AEC-Q102 #E3 Test PCB: FR4	Human Body Model	2000 V	1x10	0	0	0
Constant Acceleration CA *MIL-STD-750-2* AEC-Q102 #G1	Method 2006 2000 gf; 1 min in x/y/z (+/- direction)	1x	1x10	for uncasted packages only		
Vibration Variable Frequency VVF *JESD22-B103* AEC-Q102 #G2	20g, 20-2000Hz; 4min / cy; 4cy/axis service condition 1	1x	sequential samples			
Mechanical Shock MS *JESD22-B110* AEC-Q102 #G3	1500g for 0.5ms, 5 blows, 3 orientations	1x	sequential samples			
Hermeticity HER *JESD22-A109* AEC-Q102 #G4	Leak Test: Fine & Gross	1x	sequential samples			

Additional Tests to AEC Q102

Test Performed	Condition	Duration	Sample Size	Failures El.	Opt.	Vis
Electrostatic Discharge MM *JESD22-A115* Test PCB: FR4	Machine Model	200 V	1x10	0	0	0

Note:

Failure criteria:

Electrical failures: V_f (I_f =20 mA) > 2,3 V; ± 10% from initial value

Optical failures: I_v (I_f =20 mA) absolute limit: ± 50% max.
λ_{dom} (I_f = 20 mA) ± 2 nm initial value

Visual failures: acc JEDEC JESD22-B101

The tested devices representing the product family as stated in the applies to section fulfill the reliability requirements of AEC-Q102 Rev-A.

Pre-conditioning according to Jedec Level II where applicable as per AEC-Q102 AEC-Q102 #A1 **LY Y876 (Chip B)**

Test Performed	Condition	Duration	Sample Size	Failures El. AEC-Q102 #E1	Failures Opt. AEC-Q102 #E1	Failures Vis AEC-Q102 #E0
Wet High Temperature Operating Life WHTOL1 *JESD22-A101* AEC-Q102 #A2a Test PCB: IMS-Al	T_A = 85°C; r.H. = 85%; T_s = 95°C; T_j = 105°C I_F = 20 mA $T_{on/off}$ = 30 min	1000 h	1x26	0	0	0
Wet High Temperature Operating Life WHTOL2 *JESD22-A101* AEC-Q102 #A2b Test PCB: FR4	T_A = 85°C; r.H. = 85% I_F = 5 mA	1000 h	1x26	0	0	0
Powered Temperature Cycle PTC *JESD22-A105* AEC-Q102 #A3a Test PCB: IMS-Al	T_A = -40°C/+85°C T_s = 95°C; T_j = 105°C I_F = 20 mA $t_{on/off}$ = 5 min	1000 c	1x26	0	0	0
Temperature Cycling TC *JESD22-A104* AEC-Q102 #A4a Test PCB: FR4	T_A = -40°C/+100°C 15 min each extreme	1000 c	1x26	0	0	0
High Temperature Operating Life HTOL1 *JESD22-A108* AEC-Q102 #B1a Test PCB: IMS-Al	T_A = 100°C; T_s = 105 °C T_j = 115 °C I_F = 15 mA	1000 h	1x26	0	0	0
High Temperature Operating Life HTOL2 *JESD22-A108* AEC-Q102 #B1b Test PCB: IMS-Al	T_A = 55°C; T_s = 70°C T_j = 85°C I_F = 30 mA	1000 h	1x26	0	0	0
Pulsed Operating Life PLT *JESD22-A108* AEC-Q102 #B3 Test PCB: FR4	T_A = 55°C I_F = 125 mA; t_p = 0,1ms; D = 3%	1000 h	1x26	0	0	0
Dew DEW *AEC-Q102-001* AEC-Q102#C7 Test PCB: FR4	$T_{A,min}$ = 10°C $T_{A,max}$ = 80°C r.H. = 53-100% I_F = 5 mA	10 c	1x26	0	0	0
Solderability SD *IEC 60068-2-58* AEC-Q102 #C10	T_A = 235°C method 2 (reflow simulation)	1x	1x10	-	-	0
Hydrogen Sulphide H2S *IEC 60068-2-43* AEC-Q102 #C12 Test PCB: FR4	15 ppm H_2S 40°C/90% r.H.	336 h	1x26	0	0	0
Flowing Mixed Gas FMG *IEC 60068-2-60* AEC-Q102 #C13 Test PCB: FR4	T_A = 25°C, r.H. = 75% Test method 4	500 h	1x26	0	0	0
Board Flex Test BF *AEC-Q102-002* AEC-Q102 #C14 Test PCB: FR4	2 mm	1x	1x10	0	0	0

Electrostatic Discharge HBM *ANSI/ESDA/ JEDEC JS-001* AEC-Q102 #E3 Test PCB: FR4	Human Body Model	2000 V	1x10	0	0	0	
Constant Acceleration CA *MIL-STD-750-2* AEC-Q102 #G1	Method 2006 2000 gf; 1 min in x/y/z (+/- direction)	1x	1x10				for uncasted packages only
Vibration Variable Frequency VVF *JESD22-B103* AEC-Q102 #G2	20g, 20-2000Hz; 4min / cy; 4cy/axis service condition 1	1x	sequential samples				
Mechanical Shock MS *JESD22-B110* AEC-Q102 #G3	1500g for 0.5ms, 5 blows, 3 orientations	1x	sequential samples				
Hermeticity HER *JESD22-A109* AEC-Q102 #G4	Leak Test: Fine & Gross	1x	sequential samples				

Additional Tests to AEC Q102

Test Performed	Condition	Duration	Sample Size	Failures El.	Opt.	Vis
Electrostatic Discharge MM *JESD22-A115* Test PCB: FR4	Machine Model	200 V	1x10	0	0	0

Note:

Failure criteria:

Electrical failures:	V_f (I_f =20 mA)	> 2,3 V; ± 10% from initial value
Optical failures:	I_v (I_f =20 mA)	absolute limit: ± 50% max.
	λ_{dom} (I_f = 20 mA)	± 2 nm initial value
Visual failures:	acc JEDEC JESD22-B101	

The tested devices representing the product family as stated in the applies to section fulfill the reliability requirements of AEC-Q102 Rev-A.

Pre-conditioning according to Jedec Level II where applicable as per AEC-Q102 AEC-Q102 #A1 **LO Y876 (Chip B)**

Test Performed	Condition	Duration	Sample Size	Failures El. AEC-Q102 #E1	Failures Opt. AEC-Q102 #E1	Failures Vis AEC-Q102 #E0
Wet High Temperature Operating Life WHTOL1 *JESD22-A101* AEC-Q102 #A2a Test PCB: IMS-Al	T_A = 85°C; r.H. = 85%; T_s = 95°C; T_j = 105°C I_F = 20 mA $T_{on/off}$ = 30 min	1000 h	1x26	0	0	0
Wet High Temperature Operating Life WHTOL2 *JESD22-A101* AEC-Q102 #A2b Test PCB: FR4	T_A = 85°C; r.H. = 85% I_F = 5 mA	1000 h	1x26	0	0	0
Powered Temperature Cycle PTC *JESD22-A105* AEC-Q102 #A3a Test PCB: IMS-Al	T_A = -40°C/+85°C T_s = 95°C; T_j = 105°C I_F = 20 mA $t_{on/off}$ = 5 min	1000 c	1x26	0	0	0
Temperature Cycling TC *JESD22-A104* AEC-Q102 #A4a Test PCB: FR4	T_A = -40°C/+100°C 15 min each extreme	1000 c	1x26	0	0	0
High Temperature Operating Life HTOL1 *JESD22-A108* AEC-Q102 #B1a Test PCB: IMS-Al	T_A = 100°C; T_s = 105 °C T_j = 115 °C I_F = 15 mA	1000 h	1x26	0	0	0
High Temperature Operating Life HTOL2 *JESD22-A108* AEC-Q102 #B1b Test PCB: IMS-Al	T_A = 55°C; T_s = 70°C T_j = 85°C I_F = 30 mA	1000 h	1x26	0	0	0
Pulsed Operating Life PLT *JESD22-A108* AEC-Q102 #B3 Test PCB: FR4	T_A = 55°C I_F = 125 mA; t_p = 0,1ms; D = 3%	1000 h	1x26	0	0	0
Dew DEW *AEC-Q102-001* AEC-Q102#C7 Test PCB: FR4	$T_{A,min}$ = 10°C $T_{A,max}$ = 80°C r.H. = 53-100% I_F = 5 mA	10 c	1x26	0	0	0
Solderability SD *IEC 60068-2-58* AEC-Q102 #C10	T_A = 235°C method 2 (reflow simulation)	1x	1x10	-	-	0
Hydrogen Sulphide H2S *IEC 60068-2-43* AEC-Q102 #C12 Test PCB: FR4	15 ppm H_2S 40°C/90% r.H.	336 h	1x26	0	0	0
Flowing Mixed Gas FMG *IEC 60068-2-60* AEC-Q102 #C13 Test PCB: FR4	T_A = 25°C, r.H. = 75% Test method 4	500 h	1x26	0	0	0
Board Flex Test BF *AEC-Q102-002* AEC-Q102 #C14 Test PCB: FR4	2 mm	1x	1x10	0	0	0

Electrostatic Discharge HBM *ANSI/ESDA/ JEDEC JS-001* AEC-Q102 #E3 Test PCB: FR4	Human Body Model	2000 V	1x10	0	0	0
Constant Acceleration CA *MIL-STD-750-2* AEC-Q102 #G1	Method 2006 2000 gf; 1 min in x/y/z (+/- direction)	1x	1x10	for uncasted packages only		
Vibration Variable Frequency VVF *JESD22-B103* AEC-Q102 #G2	20g, 20-2000Hz; 4min / cy; 4cy/axis service condition 1	1x	sequential samples			
Mechanical Shock MS *JESD22-B110* AEC-Q102 #G3	1500g for 0.5ms, 5 blows, 3 orientations	1x	sequential samples			
Hermeticity HER *JESD22-A109* AEC-Q102 #G4	Leak Test: Fine & Gross	1x	sequential samples			

Additional Tests to AEC Q102

Test Performed	Condition	Duration	Sample Size	Failures El.	Opt.	Vis
Electrostatic Discharge MM *JESD22-A115* Test PCB: FR4	Machine Model	200 V	1x10	0	0	0

Note:

Failure criteria:

Electrical failures: V_f (I_f =20 mA) > 2,35 V; ± 10% from initial value

Optical failures: I_v (I_f =20 mA) absolute limit: ± 50% max.
λ_{dom} (I_f = 20 mA) ± 2 nm initial value

Visual failures: acc JEDEC JESD22-B101

The tested devices representing the product family as stated in the applies to section fulfill the reliability requirements of AEC-Q102 Rev-A.

Pre-conditioning according to Jedec Level II where applicable as per AEC-Q102 AEC-Q102 #A1 **LS Y876 (Chip C)**

Test Performed		Condition	Duration	Sample Size	Failures El. AEC-Q102 #E1	Opt. AEC-Q102 #E1	Vis AEC-Q102 #E0
Wet High Temperature Operating Life WHTOL1	*JESD22-A101* AEC-Q102 #A2a Test PCB: IMS-Al	T_A = 85°C; r.H. = 85%; T_s = 95°C; T_j = 105°C I_F = 20 mA $T_{on/off}$ = 30 min	1000 h	1x26	0	0	0
Wet High Temperature Operating Life WHTOL2	*JESD22-A101* AEC-Q102 #A2b Test PCB: FR4	T_A = 85°C; r.H. = 85% I_F = 5 mA	1000 h	1x26	0	0	0
Powered Temperature Cycle PTC	*JESD22-A105* AEC-Q102 #A3a Test PCB: IMS-Al	T_A = -40°C/+85°C T_s = 95°C; T_j = 105°C I_F = 20 mA $t_{on/off}$ = 5 min	1000 c	1x26	0	0	0
Temperature Cycling TC	*JESD22-A104* AEC-Q102 #A4a Test PCB: FR4	T_A = -40°C/+100°C 15 min each extreme	1000 c	1x26	0	0	0
High Temperature Operating Life HTOL1	*JESD22-A108* AEC-Q102 #B1a Test PCB: IMS-Al	T_A = 100°C; T_s = 105 °C T_j = 115 °C I_F = 15 mA	1000 h	1x26	0	0	0
High Temperature Operating Life HTOL2	*JESD22-A108* AEC-Q102 #B1b Test PCB: IMS-Al	T_A = 55°C; T_s = 70°C T_j = 85°C I_F = 30 mA	1000 h	1x26	0	0	0
Pulsed Operating Life PLT	*JESD22-A108* AEC-Q102 #B3 Test PCB: FR4	T_A = 55°C I_F = 125 mA; t_p = 0,1ms; D = 3%	1000 h	1x26	0	0	0
Dew DEW	*AEC-Q102-001* AEC-Q102#C7 Test PCB: FR4	$T_{A,min}$ = 10°C $T_{A,max}$ = 80°C r.H. = 53-100% I_F = 5 mA	10 c	1x26	0	0	0
Solderability SD	*IEC 60068-2-58* AEC-Q102 #C10	T_A = 235°C method 2 (reflow simulation)	1x	1x10	-	-	0
Hydrogen Sulphide H2S	*IEC 60068-2-43* AEC-Q102 #C12 Test PCB: FR4	15 ppm H_2S 40°C/90% r.H.	336 h	1x26	0	0	0
Flowing Mixed Gas FMG	*IEC 60068-2-60* AEC-Q102 #C13 Test PCB: FR4	T_A = 25°C, r.H. = 75% Test method 4	500 h	1x26	0	0	0
Board Flex Test BF	*AEC-Q102-002* AEC-Q102 #C14 Test PCB: FR4	2 mm	1x	1x10	0	0	0

Electrostatic Discharge HBM *ANSI/ESDA/ JEDEC JS-001* AEC-Q102 #E3 Test PCB: FR4	Human Body Model	2000 V	1x10	0	0	0
Constant Acceleration CA *MIL-STD-750-2* AEC-Q102 #G1	Method 2006 2000 gf; 1 min in x/y/z (+/- direction)	1x	1x10	for uncasted packages only		
Vibration Variable Frequency VVF *JESD22-B103* AEC-Q102 #G2	20g, 20-2000Hz; 4min / cy; 4cy/axis service condition 1	1x	sequential samples			
Mechanical Shock MS *JESD22-B110* AEC-Q102 #G3	1500g for 0.5ms, 5 blows, 3 orientations	1x	sequential samples			
Hermeticity HER *JESD22-A109* AEC-Q102 #G4	Leak Test: Fine & Gross	1x	sequential samples			

Additional Tests to AEC Q102

Test Performed	Condition	Duration	Sample Size	Failures El.	Opt.	Vis
Electrostatic Discharge MM *JESD22-A115* Test PCB: FR4	Machine Model	200 V	1x10	0	0	0

Note:

Failure criteria:

Electrical failures: V_f (I_f =20 mA) > 2,3 V; ± 10% from initial value

Optical failures: I_v (I_f =20 mA) absolute limit: ± 50% max.
λ_{dom} (I_f = 20 mA) ± 2 nm initial value

Visual failures: acc JEDEC JESD22-B101

The tested devices representing the product family as stated in the applies to section fulfill the reliability requirements of AEC-Q102 Rev-A.

Pre-conditioning according to Jedec Level II where applicable as per AEC-Q102 AEC-Q102 #A1 **LO Y876 (Chip C)**

Test Performed	Condition	Duration	Sample Size	Failures El. AEC-Q102 #E1	Failures Opt. AEC-Q102 #E1	Failures Vis AEC-Q102 #E0
Wet High Temperature Operating Life WHTOL1 *JESD22-A101* AEC-Q102 #A2a Test PCB: IMS-Al	T_A = 85°C; r.H. = 85%; T_s = 95°C; T_j = 105°C I_F = 20 mA $T_{on/off}$ = 30 min	1000 h	1x26	0	0	0
Wet High Temperature Operating Life WHTOL2 *JESD22-A101* AEC-Q102 #A2b Test PCB: FR4	T_A = 85°C; r.H. = 85% I_F = 5 mA	1000 h	1x26	0	0	0
Powered Temperature Cycle PTC *JESD22-A105* AEC-Q102 #A3a Test PCB: IMS-Al	T_A = -40°C/+85°C T_s = 95°C; T_j = 105°C I_F = 20 mA $t_{on/off}$ = 5 min	1000 c	1x26	0	0	0
Temperature Cycling TC *JESD22-A104* AEC-Q102 #A4a Test PCB: FR4	T_A = -40°C/+100°C 15 min each extreme	1000 c	1x26	0	0	0
High Temperature Operating Life HTOL1 *JESD22-A108* AEC-Q102 #B1a Test PCB: IMS-Al	T_A = 100°C; T_s = 105 °C T_j = 115 °C I_F = 15 mA	1000 h	1x26	0	0	0
High Temperature Operating Life HTOL2 *JESD22-A108* AEC-Q102 #B1b Test PCB: IMS-Al	T_A = 55°C; T_s = 70°C T_j = 85°C I_F = 30 mA	1000 h	1x26	0	0	0
Pulsed Operating Life PLT *JESD22-A108* AEC-Q102 #B3 Test PCB: FR4	T_A = 55°C I_F = 125 mA; t_p = 0,1ms; D = 3%	1000 h	1x26	0	0	0
Dew DEW *AEC-Q102-001* AEC-Q102#C7 Test PCB: FR4	$T_{A,min}$ = 10°C $T_{A,max}$ = 80°C r.H. = 53-100% I_F = 5 mA	10 c	1x26	0	0	0
Solderability SD *IEC 60068-2-58* AEC-Q102 #C10	T_A = 235°C method 2 (reflow simulation)	1x	1x10	-	-	0
Hydrogen Sulphide H2S *IEC 60068-2-43* AEC-Q102 #C12 Test PCB: FR4	15 ppm H_2S 40°C/90% r.H.	336 h	1x26	0	0	0
Flowing Mixed Gas FMG *IEC 60068-2-60* AEC-Q102 #C13 Test PCB: FR4	T_A = 25°C, r.H. = 75% Test method 4	500 h	1x26	0	0	0
Board Flex Test BF *AEC-Q102-002* AEC-Q102 #C14 Test PCB: FR4	2 mm	1x	1x10	0	0	0

Electrostatic Discharge HBM *ANSI/ESDA/ JEDEC JS-001* AEC-Q102 #E3 Test PCB: FR4	Human Body Model	2000 V	1x10	0	0	0	
Constant Acceleration CA *MIL-STD-750-2* AEC-Q102 #G1	Method 2006 2000 gf; 1 min in x/y/z (+/- direction)	1x	1x10				for uncasted packages only
Vibration Variable Frequency VVF *JESD22-B103* AEC-Q102 #G2	20g, 20-2000Hz; 4min / cy; 4cy/axis service condition 1	1x	sequential samples				
Mechanical Shock MS *JESD22-B110* AEC-Q102 #G3	1500g for 0.5ms, 5 blows, 3 orientations	1x	sequential samples				
Hermeticity HER *JESD22-A109* AEC-Q102 #G4	Leak Test: Fine & Gross	1x	sequential samples				

Additional Tests to AEC Q102

Test Performed	Condition	Duration	Sample Size	Failures El.	Opt.	Vis
Electrostatic Discharge MM *JESD22-A115* Test PCB: FR4	Machine Model	200 V	1x10	0	0	0

Note:

Failure criteria:

Electrical failures: V_f (I_f =20 mA) > 2,35 V; ± 10% from initial value

Optical failures: I_v (I_f =20 mA) absolute limit: ± 50% max.
λ_{dom} (I_f = 20 mA) ± 2 nm initial value

Visual failures: acc JEDEC JESD22-B101

The tested devices representing the product family as stated in the applies to section fulfill the reliability requirements of AEC-Q102 Rev-A.

Pre-conditioning according to Jedec Level II where applicable as per AEC-Q102 AEC-Q102 #A1 **LG Y876 (Chip C)**

Test Performed	Condition	Duration	Sample Size	Failures El. AEC-Q102 #E1	Failures Opt. AEC-Q102 #E1	Failures Vis AEC-Q102 #E0
Wet High Temperature Operating Life WHTOL1 *JESD22-A101* AEC-Q102 #A2a Test PCB: IMS-Al	T_A = 85°C; r.H. = 85%; T_s = 95°C; T_j = 105°C I_F = 20 mA $T_{on/off}$ = 30 min	1000 h	1x26	0	0	0
Wet High Temperature Operating Life WHTOL2 *JESD22-A101* AEC-Q102 #A2b Test PCB: FR4	T_A = 85°C; r.H. = 85% I_F = 5 mA	1000 h	1x26	0	0	0
Powered Temperature Cycle PTC *JESD22-A105* AEC-Q102 #A3a Test PCB: IMS-Al	T_A = -40°C/+85°C T_s = 95°C; T_j = 105°C I_F = 20 mA $t_{on/off}$ = 5 min	1000 c	1x26	0	0	0
Temperature Cycling TC *JESD22-A104* AEC-Q102 #A4a Test PCB: FR4	T_A = -40°C/+100°C 15 min each extreme	1000 c	1x26	0	0	0
High Temperature Operating Life HTOL1 *JESD22-A108* AEC-Q102 #B1a Test PCB: IMS-Al	T_A = 100°C; T_s = 105 °C T_j = 115 °C I_F = 15 mA	1000 h	1x26	0	0	0
High Temperature Operating Life HTOL2 *JESD22-A108* AEC-Q102 #B1b Test PCB: IMS-Al	T_A = 55°C; T_s = 70°C T_j = 85°C I_F = 30 mA	1000 h	1x26	0	0	0
Pulsed Operating Life PLT *JESD22-A108* AEC-Q102 #B3 Test PCB: FR4	T_A = 55°C I_F = 200 mA; t_p = 0,1ms; D = 3%	1000 h	1x26	0	0	0
Dew DEW *AEC-Q102-001* AEC-Q102#C7 Test PCB: FR4	$T_{A,min}$ = 10°C $T_{A,max}$ = 80°C r.H. = 53-100% I_F = 5 mA	10 c	1x26	0	0	0
Solderability SD *IEC 60068-2-58* AEC-Q102 #C10	T_A = 235°C method 2 (reflow simulation)	1x	1x10	-	-	0
Hydrogen Sulphide H2S *IEC 60068-2-43* AEC-Q102 #C12 Test PCB: FR4	15 ppm H_2S 40°C/90% r.H.	336 h	1x26	0	0	0
Flowing Mixed Gas FMG *IEC 60068-2-60* AEC-Q102 #C13 Test PCB: FR4	T_A = 25°C, r.H. = 75% Test method 4	500 h	1x26	0	0	0
Board Flex Test BF *AEC-Q102-002* AEC-Q102 #C14 Test PCB: FR4	2 mm	1x	1x10	0	0	0

Electrostatic Discharge HBM *ANSI/ESDA/ JEDEC JS-001* AEC-Q102 #E3 Test PCB: FR4	Human Body Model	2000 V	1x10	0	0	0	
Constant Acceleration CA *MIL-STD-750-2* AEC-Q102 #G1	Method 2006 2000 gf; 1 min in x/y/z (+/- direction)	1x	1x10				for uncasted packages only
Vibration Variable Frequency VVF *JESD22-B103* AEC-Q102 #G2	20g, 20-2000Hz; 4min / cy; 4cy/axis service condition 1	1x	sequential samples				
Mechanical Shock MS *JESD22-B110* AEC-Q102 #G3	1500g for 0.5ms, 5 blows, 3 orientations	1x	sequential samples				
Hermeticity HER *JESD22-A109* AEC-Q102 #G4	Leak Test: Fine & Gross	1x	sequential samples				

Additional Tests to AEC Q102

Test Performed	Condition	Duration	Sample Size	Failures El.	Opt.	Vis
Electrostatic Discharge MM *JESD22-A115* Test PCB: FR4	Machine Model	200 V	1x10	0	0	0

Note:

Failure criteria:

Electrical failures: V_f (I_f =20 mA) > 2,4 V; ± 10% from initial value

Optical failures: I_v (I_f =20 mA) absolute limit: ± 50% max.
λ_{dom} (I_f = 20 mA) ± 2 nm initial value

Visual failures: acc JEDEC JESD22-B101

The tested devices representing the product family as stated in the applies to section fulfill the reliability requirements of AEC-Q102 Rev-A.

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ams-OSRAM AG
Tobelbader Strasse 30
8141 Premstaetten, Austria
Phone +43 3136 500-0
ams-osram.com