



ams AG
Tobelbader Strasse 30
8141 Premstaetten
Austria

T +43 3136 500-0
F +43 3136 525-01
sensor@ams.com
www.ams.com

Premstätten, March 8, 2021

Process Change Notification PCN12- 2021

FAB process change TE2585

I. Description and Purpose:

The purpose of this PCN is to notify the customer regarding an upcoming process change for the TE2585 family of device. The current Inter metal dielectric (IMD) process for the TE2585 device uses FOX process and the proposed change will include the change of the IMD process from FOX to SOG process (additional process details included in sec 3). The reason for this proposed change is that UMC is discontinuing the use of FOX material in their process. Both UMC fabs 8AB and 8E are qualified fabs for this product. Fab 8AB is running the SOG IMD process already since the beginning. Therefore, this process change affects only Fab 8E.

The SOG IMD process is a mature process at UMC and is currently used in mass production in other AMS products manufactured in UMC and AMS has shipped several millions of these products. The SOG IMD process qualification for Fab8E has been completed and passed.

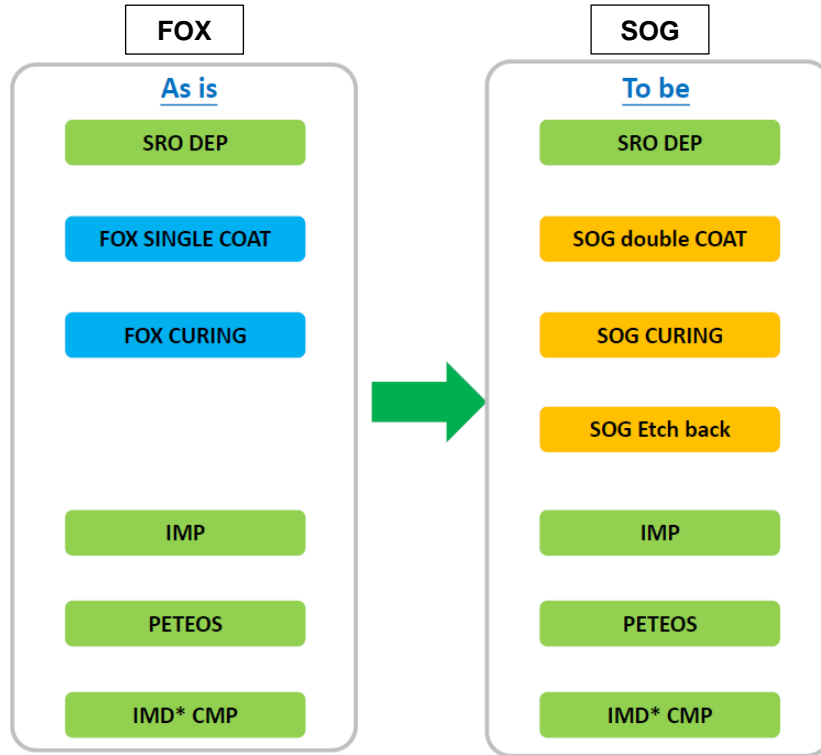
II. Scope and Limitation

This PCN document only applies to TE2585 family of devices, which includes following products:

PN	Ordering Code	Description
300150004	TSL25911FN	TSL25911FN ODFN6 LF T&RDP
300150006	TSL25913FN	TSL25913HFN ODFN6 LF T&RDP
300150008	TSL25603	TSL25603 ODFN6 LF T&RDP
300150009	TSL256033M	TSL25603M ODFN6 LF T&RDP
300150011	TSL25913FN	TSL25913HFN ODFN6 LF T&RDP

III. Process flow, Process Qualification and Product Qualification Plan:

The below table shows a process flow comparison of the IMD process.



• FOX no need to the etch back due to the cage structure

Process qualification data completed for the 0.35 um SOG process

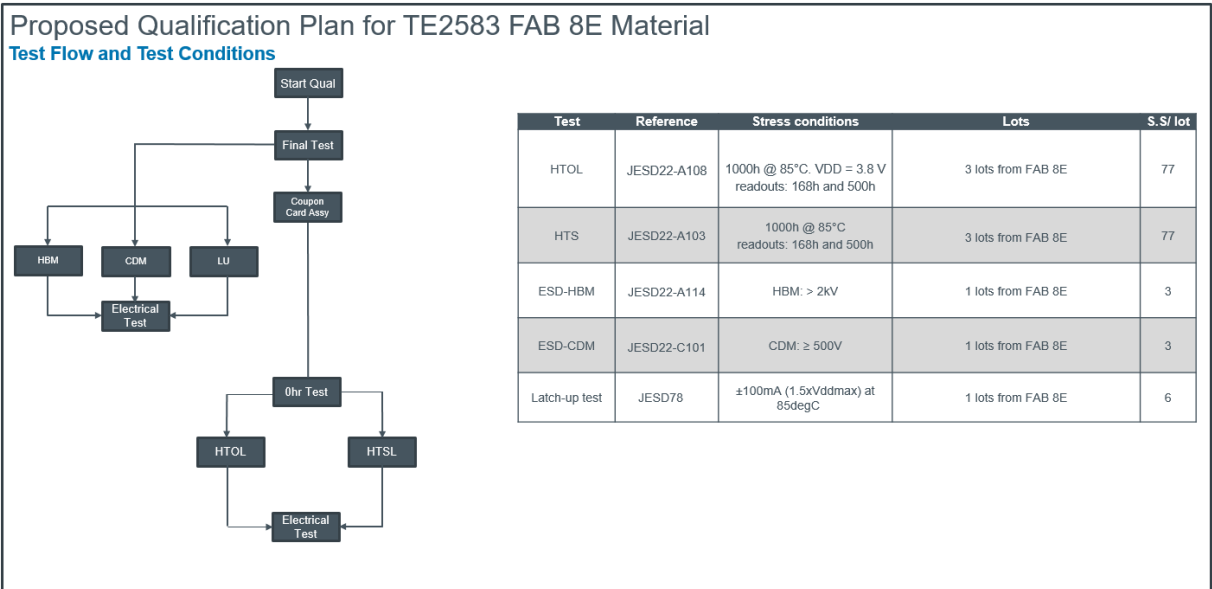
■ Reliability data at 8E 0.35um SOG process -- **Pass**

Item	Pattern	SPEC	1st lot	2nd lot	3rd lot
EM	M1	Lifetime > 10yrs	Pass	Pass	Pass
	M2	Lifetime > 10yrs	Pass	Pass	Pass
	TM	Lifetime > 10yrs	Pass	Pass	Pass
	Via1	Lifetime > 10yrs	Pass	Pass	Pass
	TVia1	Lifetime > 10yrs	Pass	Pass	Pass



Qualification Plan for TE2585 material with SOG process

The TE2585 device will be qualified using the TE2583 for the process technology qualification. The product level qualification will be done using the product CT817. This product uses the same SOG process from FAB 8E.



Qualification Timeline

Production materials available – CW 22, 2021

Qualification completion– Completed

IV. Key Milestones

Process Technology Qualification	Completed
Product Qualification	Completed



Please be advised that unless we received your written refusal concerning this PCN in writing within 30 days, the PCN shall be deemed accepted.

If you do have further questions, please do not hesitate to contact me.

Best Regards,

A handwritten signature in black ink, appearing to read 'Maximino de Leon'. The signature is stylized with a large initial 'M' and a horizontal line crossing through it.

Maximino de Leon

ams AG

Director, Key Customer Quality



CT817

PCN 12-2021

Qualification Report

Prepared By: David Mauriello
Product Quality Engineer

Approved By: Blaine Anderson
Product Quality Engineering Manager

Date: February 22, 2021



Revision History

Revision	Date	Description
A	February 2, 2021	Report
B	February 22, 2021	Added ESD and Latch-Up Test Results



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I. Introduction

The CT817 are very-high sensitivity light-to-digital converters that transform light intensity into a digital signal output capable of direct I2C interface. The devices combine one broadband photodiode (visible plus infrared) and one infrared-responding photodiode on a single CMOS integrated circuit capable of providing a near-photopic response over an effective 16-bit dynamic range (16-bit resolution). Two integrating ADCs convert the photodiode currents to a digital output that represents the irradiance measured on each channel. This digital output can be input to a microprocessor where illuminance (ambient light level) in lux is derived using an empirical formula to approximate the human eye response.

The devices support a traditional level style interrupt that remains asserted until the firmware clears it.

While useful for general purpose light sensing applications, the CT809 and CT817 are designed particularly for display panels (LCD, OLED, etc.) with the purpose of extending battery life and providing optimum viewing in diverse lighting conditions. Display panel backlighting, which can account for up to 30 to 40 percent of total platform power, can be automatically managed. The devices are also ideal for controlling keyboard illumination based upon ambient lighting conditions. Illuminance information can further be used to manage exposure control in digital cameras. The devices are ideal in notebook/tablet PCs, LCD monitors, flat-panel televisions, cell phones, and digital cameras. In addition, other applications include street light control, security lighting, sunlight harvesting, machine vision, and automotive instrumentation clusters.

II. Objective

To produce objective evidence that the CT817 wafer fab process change per PCN 42-2021 produced at the UMC wafer fab passes qualification testing.

III. Summary of Results

All units passed electrical and optical test after the different reliability stress tests. The qualification results indicate that the product either meets or exceeds customer's application requirements.

IV. General Product Information

Device:	CT817
Function:	ALS Sensor
Process Technology:	UMC 0.3 micron
Package:	DFN
Assembly Sites:	Hana AYT (Thailand)
Test Site:	Hana AYT (Thailand)
Wafer Fab Sites:	UMC (Taiwan)

V. Qualification Test Flow

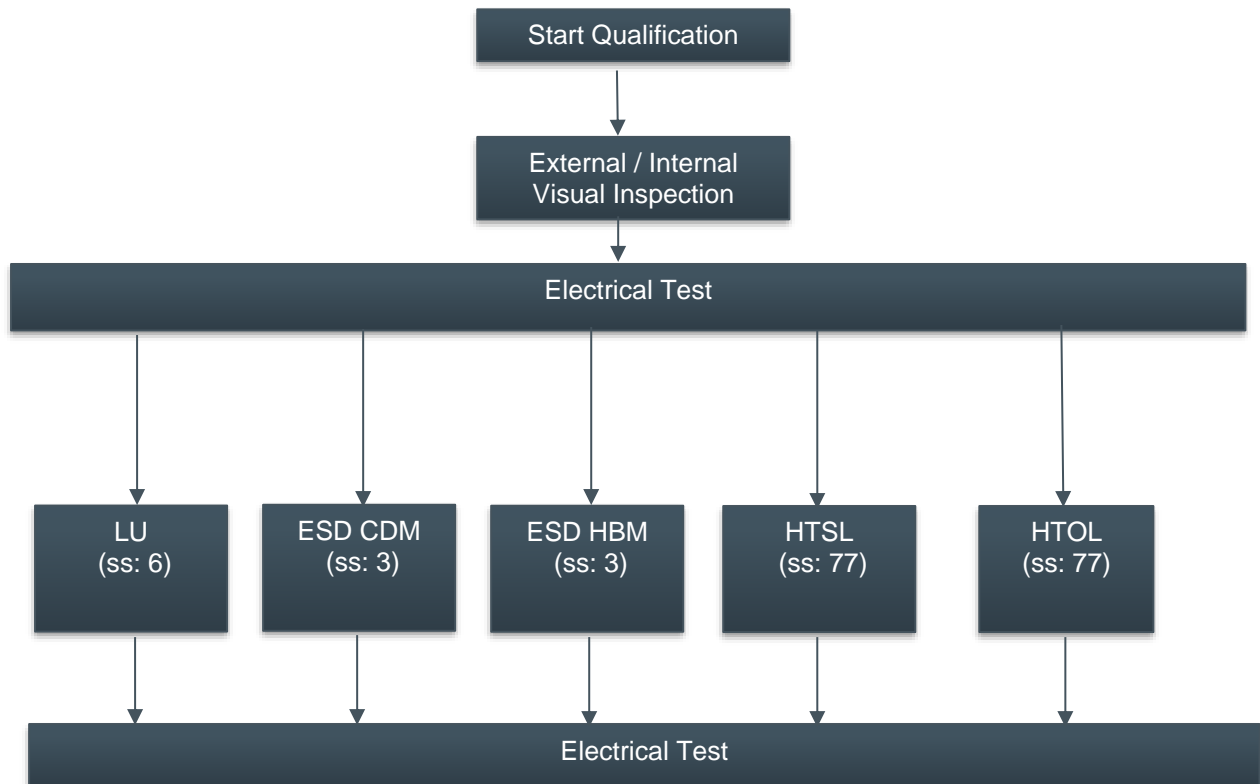


Figure 1. Qualification Test Flow, with full electrical test coverage.



VI. Test Conditions and Standards

Table 1: Reliability Test Conditions

TEST	STANDARD	TEST CONDITIONS	SAMPLE SIZE/LOTS
Start Qualification		Samples having passed the final outgoing quality control	204 samples/3 lots
External / Internal Visual Inspection		Per Visual Inspection Criteria	204 samples/3 lots
Electrical Test		Full Electrical Test according device specification at room temperature	204 samples/3 lots
Pre-conditioning	J-STD-020	MSL 3: 5 cycles +60°C to -40°C; 24 hour bake @ 85°C; 40 hours 60°C/60%RH, 3x solder reflow with peak temp 260°C	50 samples/3 lots
High Temperature Operating Life (HTOL)	JESD22-A108	85°C, dynamic, 3.8V, readouts at 168hrs, 500hrs, 1000hrs	77 samples/3 lots
High Temperature Storage Life (HTSL)	JESD22-A103	85°C, readout at 168hrs, 500hrs 1000hrs	77 samples/3 lots
ESD HBM	JS-001-2017	2000V	3 Samples/1 lot
ESD CDM	JS-002-2014	500V	3 Samples/1 lot
Latch-Up	JESD78E	Class II (70°C) +/-100mA	6 Samples/1 lot



VII. Detailed Qualification Test Results

Table 1. HTOL Results

Stress:	HTOL	
Condition:	3.8V , 85°C Dynamic	
Test Readouts:	168, 500 & 1000 Hours	
Sample Size:	77 pcs/lot	
Test Results:	Pass	Fail
Lot 1: U1TWP.09	77	0
Lot 2: U1TWL.07	77	0
Lot 3: U1TWK.07	77	0

Table 2 HTSL Results

Stress:	HTSL	
Condition:	85°C	
Test Readouts:	168, 500 & 1000 Hours	
Sample Size:	77 pcs/lot	
Test Results:	Pass	Fail
Lot 1: U1TWP.09	77	0
Lot 2: U1TWL.07	77	0
Lot 3: U1TWK.07	77	0

Table 4. ESD HBM Results

Lot ID	ESD HBM 2000V
Lot 1: U1TWP.09	0/3

Table 5. ESD CDM Results

Lot ID	ESD CDM 500V
Lot 1: U1TWP.09	0/3



Table 6. Latch-up Results

Lot ID	Latch-Up
Lot 1: U1TWP.09	0/6

VIII. Conclusion

The CT817 product passed all qualification testing with no failures.