

Cypress Semiconductor Automotive Package Qualification Report

**QTP# 171104 VERSION **
October 2017**

**20/28-Lead SSOP (209 mils)
NiPdAu Leadfinish, Au Wire
MSL3, 260C Reflow
Amkor-Philippines (M)**

**FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PACKAGE QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
163310	Qualification of 20/28-Lead SSOP (209mils) Automotive Package in Amkor-Philippines (M) using 1.0mil Au wire with G700LS mold compound, Ablestik 8290 die attach material, copper leadframe, NiPdAu (RuPPF) leadfinish at MSL3, 260C reflow temperature	Jan. 2017
171104	Qualification of Automotive Neutron device fabricated at HH Grace Fab 3 in 20/28-lead SSOP package at Amkor-Philippines (M) using 1.0mil Au wire with G700LS mold compound, Ablestik 8290 die attach material, copper leadframe and NiPdAu (RuPPF) leadfinish at MSL 3, 260C reflow temperature	Oct. 2017

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION

Package Designation:	SP20 / SP28
Package Outline, Type, or Name:	20/28L – SSOP (209mils)
Mold Compound Name/Manufacturer:	G700LS / Sumitomo
Mold Compound Flammability Rating:	UL-94 V-0
Mold Compound Alpha Emission Rate:	N/A (Not low alpha mold compound)
Oxygen Rating Index: >28%	54%
Lead Frame Designation:	Full Metal Pad
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Roughened NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	8290
Bond Diagram Designation	001-17469/001-45155
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au / 1.0 mil
Thermal Resistance Theta JA °C/W:	186.4 C/W
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	001-78330
Name/Location of Assembly (prime) facility:	Amkor-Philippines (M)
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION

Test Location:	CML (R)
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RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Acoustic	J-STD-020 Precondition: JESD22-A113 Moisture Sensitivity MSL 3 (192 Hrs., 30°C/60%RH + 260°C Reflow)	P
Constructional Analysis	Criteria: Meet external and internal characteristics of Cypress package	P
Dye Penetrant Test	Criteria: No Package Crack	P
Electrical Distribution	AEC-Q100-009	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	Charge Device Model (ESD-CDM) AEC-Q100-011 250V/500V All pins, 750V Corner pins	P
Electrostatic Discharge Human Body Model (ESD-HBM)	AEC-Q100-002 500V/1000V/2000V	
Final Visual	JESD22-B101	P
High Accelerated Saturation Test (HAST)	JESD22-A110, 130°C, 5.5V, 85%RH Precondition: JESD22-A113 Moisture Sensitivity MSL 3 (192 Hrs., 30°C/60%RH + 260°C Reflow)	P
High Temperature Operating Life Early Failure Rate	AEC-Q100-008 and JESD22-A108, 125°C Dynamic Operating Condition, Vcc Max = 5.5V	P
High Temperature Operating Life Latent Failure Rate	AEC-Q100-008 and JESD22-A108, 125°C Dynamic Operating Condition, Vcc Max = 5.5V	P
High Temp Storage	JESD22-A103: 150°C, no bias	P
Lead Integrity	JESD22-B105, MIL STD 883	P
NVM Endurance/Data Retention	AEC-Q100-005, 150°C	P
NVM Endurance /High Temperature Operating Life Latent Failure Rate	AEC-Q100-005 and JESD22-A108 Dynamic Operating Condition, Vcc Max = 5.5V, 125°C	P
Physical Dimensions	JESD22B100 and B108	P
Post Temperature Cycle Wire Bond Pull	Mil-Std 883, Method 2011	P
Pressure Cooker	JESD22-A102, 121°C, 100%RH, 15 Psig Precondition: JESD22-A113 Moisture Sensitivity MSL 3 (192 Hrs., 30°C/60%RH + 260°C Reflow)	P
Pre/Post LFR AC/DC Char	AC/DC Critical Parameter Char at 0 hour/408hrs	P
Solderability	JESD22-B102	P
Temperature Cycle	JESD22-A104, -65°C to 150°C Precondition: JESD22-A113 Moisture Sensitivity MSL 3 (192 Hrs., 30°C/60%RH + 260°C Reflow)	P
Wire Ball Shear	AEC-Q100-001	P
Wire Bond Pull	Mil-Std 883, Method 2011	P
X-Ray	MIL-STD-883 - 2012	P



Reliability Test Data

QTP #: 163310

<i>Device</i>	<i>Package</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej Failure Mechanism</i>
STRESS: ACOUSTIC, MSL3							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	22	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	COMP	22	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	COMP	22	0
STRESS: BALL SHEAR							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	30	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	COMP	30	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	COMP	30	0
STRESS: BOND PULL							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	30	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	COMP	30	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	COMP	30	0
STRESS: CONSTRUCTIONAL ANALYSIS							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	5	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	COMP	5	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	COMP	5	0
STRESS: DYE PENETRANT							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	15	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	COMP	15	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	COMP	15	0
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 5.5V, Vcc Max							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	96	80	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	96	80	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	96	80	0
STRESS: FINAL VISUAL							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	541	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	COMP	715	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	COMP	548	0



Reliability Test Data

QTP #: 163310

Device	Package	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HI-ACCEL SATURATION TEST, 130C, 5.5V, 85%RH, PRE COND 192 HR 30C/60%RH, MSL3								
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	96	80	0	
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	192	77	0	
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	96	80	0	
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	192	80	0	
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	96	80	0	
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	192	80	0	
STRESS: HIGH TEMPERATURE STORAGE								
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	1000	45	0	
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	1000	45	0	
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	1000	45	0	
STRESS: LEAD INTEGRITY								
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	5	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 5.5V, Vcc Max								
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	1000	80	0	
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	1000	80	0	
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	1000	80	0	
STRESS: PRESSURE COOKER TEST								
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	96	80	0	
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	168	80	0	
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	96	80	0	
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	168	79	0	
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	96	80	0	
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	168	79	0	
STRESS: PHYSICAL DIMENSION								
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	10	0	
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	COMP	10	0	
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	COMP	10	0	

Reliability Test Data

QTP #: 163310

<i>Device</i>	<i>Package</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej Failure Mechanism</i>
STRESS: POST TCT BOND PULL							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	500	5	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	500	5	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	500	5	0
STRESS: SOLDERABILITY							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	15	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	COMP	15	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	COMP	15	0
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	500	85	0
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	1000	80	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	500	85	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	1000	80	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	500	84	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	1000	79	0
STRESS: X-RAY							
CY8C21534 (8A21534AC) SP28		4507653	611612741	AMKOR-M	COMP	15	0
CY8C29466 (8A29466AC) SP28		4506339	611612743	AMKOR-M	COMP	15	0
CY8C21334 (8A21334AC) SP20		4507653	611612738	AMKOR-M	COMP	15	0

Reliability Test Data

QTP #: 171104

<i>Device</i>	<i>Package</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: BALL SHEAR								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	30	0	
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	COMP	30	0	
CY8C21534 (8A21534BK)	SP28	5647062	611712591	AMKOR-M	COMP	30	0	
STRESS: BOND PULL								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	30	0	
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	COMP	30	0	
CY8C21534 (8A21534BK)	SP28	5647062	611712591	AMKOR-M	COMP	30	0	
STRESS: CONSTRUCTIONAL ANALYSIS								
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	COMP	5	0	
STRESS: DYE PENETRANT								
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	COMP	15	0	
STRESS: ELECTRICAL DISTRIBUTION								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	30	0	
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	COMP	30	0	
CY8C21534 (8A21534BK)	SP28	5647062	611712591	AMKOR-M	COMP	30	0	
CY8C213125 (8A21312CK)	SP20	5634001	611728130	AMKOR-M	COMP	30	0	
CY8C213125 (8A21312CK)	SP20	5647058	611729411	AMKOR-M	COMP	30	0	
CY8C213125 (8A21312CK)	SP20	5647062	611729410	AMKOR-M	COMP	30	0	
STRESS: ENDURANCE/DATA RETENTION								
CY8C22345 (8A22345AK)	SP28	4932232	610931673	AMKOR-M	1000	79	0	
CY8C22345 (8A22345AK)	SP28	4934794	610932830	AMKOR-M	1000	80	0	
CY8C22345 (8A22345AK)	SP28	4942780	610942047	AMKOR-M	1000	80	0	
STRESS: ENDURANCE / HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 5.5V, Vcc Max								
CY8C22345 (8A22345AK)	SP28	4932232	610931673	AMKOR-M	1000	80	0	
CY8C22345 (8A22345AK)	SP28	4934794	610932830	AMKOR-M	1000	80	0	
CY8C22345 (8A22345AK)	SP28	4942780	610942047	AMKOR-M	1000	80	0	



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STRESS: ESD-CHARGE DEVICE MODEL, 250V –All pins								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	3	0	
CY8C213125 (8A21312CK)	SP20	5634001	611728130	AMKOR-M	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V –All pins								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	3	0	
CY8C213125 (8A21312CK)	SP20	5634001	611728130	AMKOR-M	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 750V –Corner pins								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	3	0	
CY8C213125 (8A21312CK)	SP20	5634001	611728130	AMKOR-M	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	500	3	0	
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	1000	3	0	
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	2000	3	0	
STRESS: FINAL VISUAL INSPECTION								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	1247	0	
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	COMP	1287	0	
CY8C21534 (8A21534BK)	SP28	5647062	611712591	AMKOR-M	COMP	1291	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 5.5V, 85%RH, PRE COND 192 HR 30C/60%RH, MSL3								
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	96	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 5.5V, Vcc Max								
CY8C22345 (8A22345AK)	SP28	4932232	610931673	AMKOR-M	48	3709	0	
CY8C22345 (8A22345AK)	SP28	4934794	610932830	AMKOR-M	48	3664	0	
CY8C22345 (8A22345AK)	SP28	4942780	610942047	AMKOR-M	48	3782	0	
STRESS: LEAD INTEGRITY								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	5	0	
STRESS: PRESSURE COOKER TEST								
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	96	80	0	
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	168	80	0	

Reliability Test Data

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STRESS: PHYSICAL DIMENSION								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	30	0	
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	COMP	30	0	
CY8C21534 (8A21534BK)	SP28	5647062	611712591	AMKOR-M	COMP	30	0	
STRESS: POST TCT BOND PULL								
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	1000	5	0	
STRESS: PRE/POST LFR CRITICAL PARAMETERS								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	0	80	0	
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	408	80	0	
STRESS: SOLDERABILITY								
CY8C21534 (8A21534AC)	SP28	4507653	611612741	AMKOR-M	COMP	15	0	
CY8C29466 (8A29466AC)	SP28	4506339	611612743	AMKOR-M	COMP	15	0	
CY8C21334 (8A21334AC)	SP20	4507653	611612738	AMKOR-M	COMP	15	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH								
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	500	85	0	
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	1000	85	0	
STRESS: X-RAY								
CY8C21534 (8A21534BK)	SP28	5634001	611707644	AMKOR-M	COMP	15	0	
CY8C21534 (8A21534BK)	SP28	5647058	611710168	AMKOR-M	COMP	15	0	
CY8C21534 (8A21534BK)	SP28	5647062	611712591	AMKOR-M	COMP	15	0	



Document History Page

Document Title: QTP# 171104: AUTOMOTIVE 20/28-LEAD SSOP (209MIL) NIPDAU LEADFINISH, AU WIRE
MSL3, 260C REFLOW AMKOR-PHILIPPINES (M)

Document Number: 002-21622

Rev.	ECN No.	Orig. of Change	Description of Change
**	5909416	JYF	Initial spec release