Public Products List

Publict Products are off the shelf products. They are not dedicated to specific customers, they are available through ST Sales team, or Distributors, and visible on ST.com

PCN Title : SO-20 Products (Gold wire): Migration to SO20 IDF (Inter Digit Frame) line with new BOM and matte Tin plating process

PCN Reference : ADG/18/11215

Subject : Public Products List

Dear Customer,

Please find below the Standard Public Products List impacted by the change.

L9333MD	L93PI	L9333MD-TR
L9380-TR-LF	TDA7418TR	L9339-TR
TDA7418	L9339	L9380-LF
E-L9338MD	E-L9338MD/TR	

PRODUCT/PROCESS CHANGE NOTIFICATION

SUBJECT

SO-20 Products (Gold wire): Migration to SO20 IDF (Inter Digit Frame) line with new BOM and matte Tin plating process

IMPACTED PRODUCTS

ST Commercial Products:

L9333MD	L9380-TR-LF	TDA7418	MAR9125013TR-E
MAR9108TR-E	TDA7418TR	L9339	MAR9144TR
L93PI	L9339-TR	L9380-LF	E-L9338MD/TR
L9333MD-TR	MAR9134013TR	E-L9338MD	

IMPACTED MANUFACTURING STEPS

Assembly

INVOLVED PLANTS

ST Muar (Malaysia)

CHANGE REASON

Company Road Map

CHANGE DESCRIPTION

Migration to Inter Digit Frame line. Below summary of changes:

- From Pre-Plated Frame (PPF) to Matte Tin Plating Process
- Copper frame (SpAg/RgAg/SelAg) with ME2 treatment for rough surface
- Resin Sumitomo EME-G633CA
- Glue Loctite Ablestik ABP8302

No Changes Bonding Wire Material and Diameter

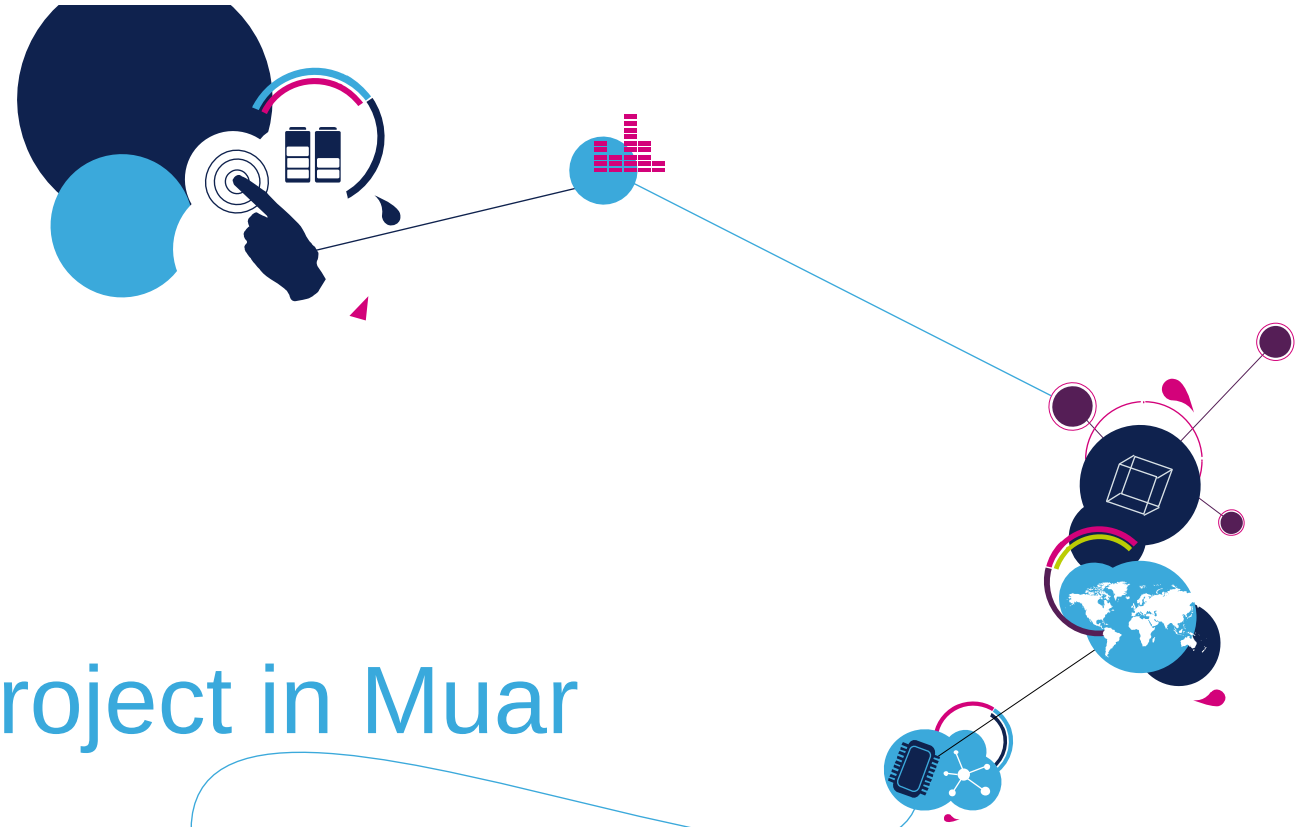
Details included below

TRACEABILITY

Dedicated Finished Good Code:

REPORTS

11215 Validation SO20IDF.pdf



SO20 IDF Project in Muar

- Migration to IDF line and new BOM introduction
- From Pre-Plated Frame (PPF) to Matte Tin Plating Process

November, 2018

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Change description

Migration from SO20 Matrix to High Density Line IDF (Inter Digit Frame)

New Bill of Material (BOM)

- Copper frame (SpAg/RgAg/SelAg) with ME2 treatment for rough surface
- Resin Sumitomo EME-G633CA
- Glue Loctite Ablestik ABP8302

No Changes Bonding Wire Material and Diameter

ME2 treatment has been introduced in order to improve the die attach material adhesion to the lead frame die pad.

Matte Tin plating process introduction

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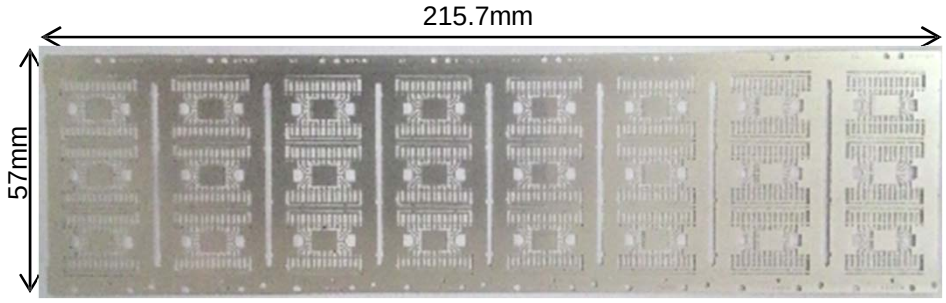
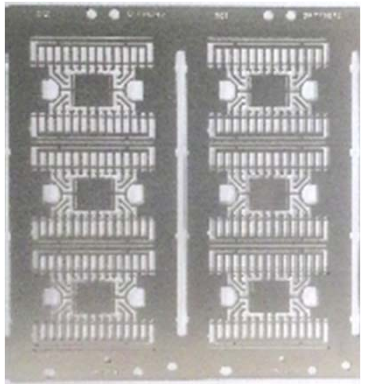
SO20 IDF Line

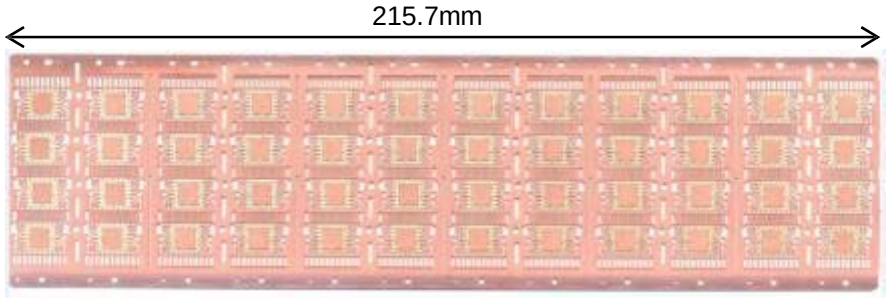
SO20 Matrix



Matrix Leadframe
3row x 8columns
24units



SO20 Inter Digit Frame (IDF)



IDF Leadframe
4row x 12columns
48units

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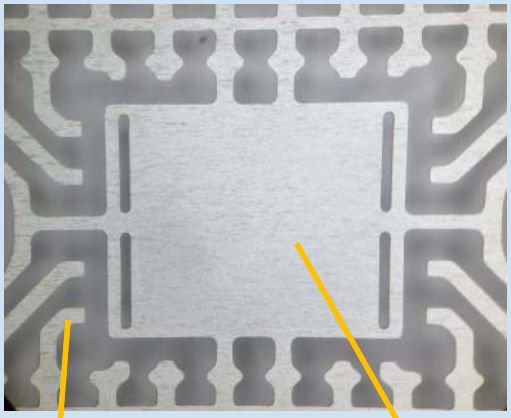
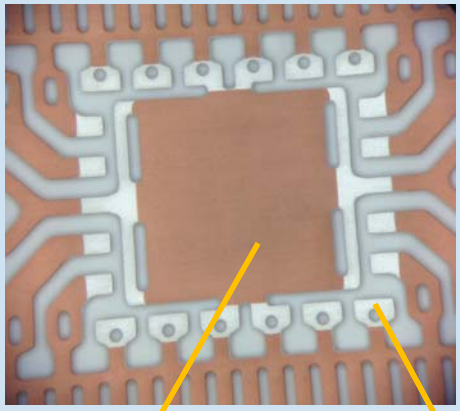
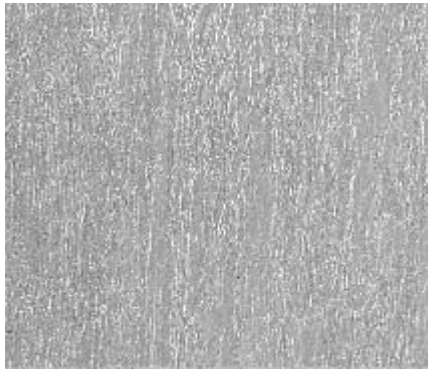
Existing frame vs ME2

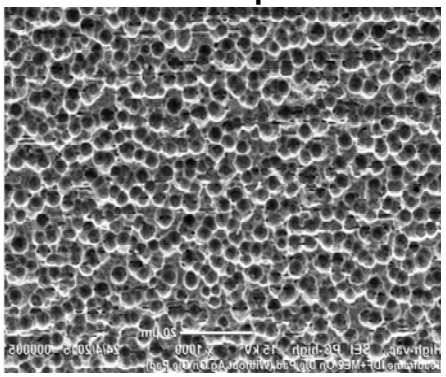
Adv.Micro PPF	IDF + Cu pad (with ME2)
	

Lead tip

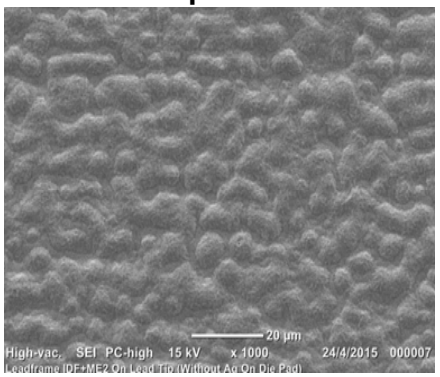


On die pad

On die pad



Lead tip



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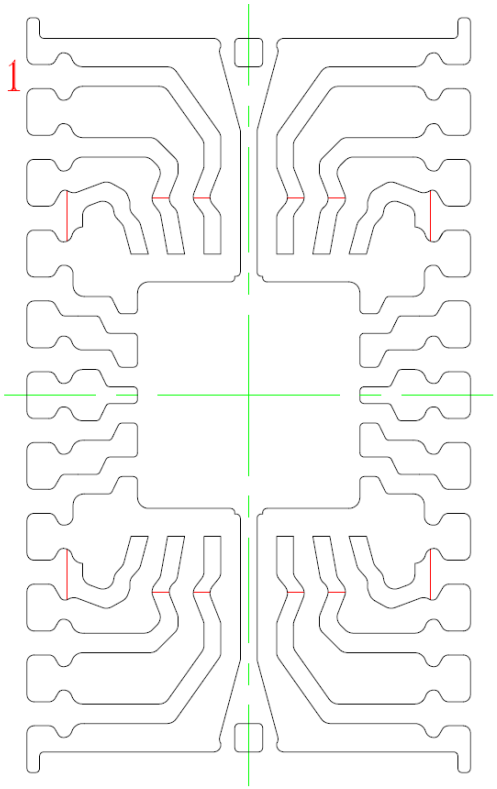
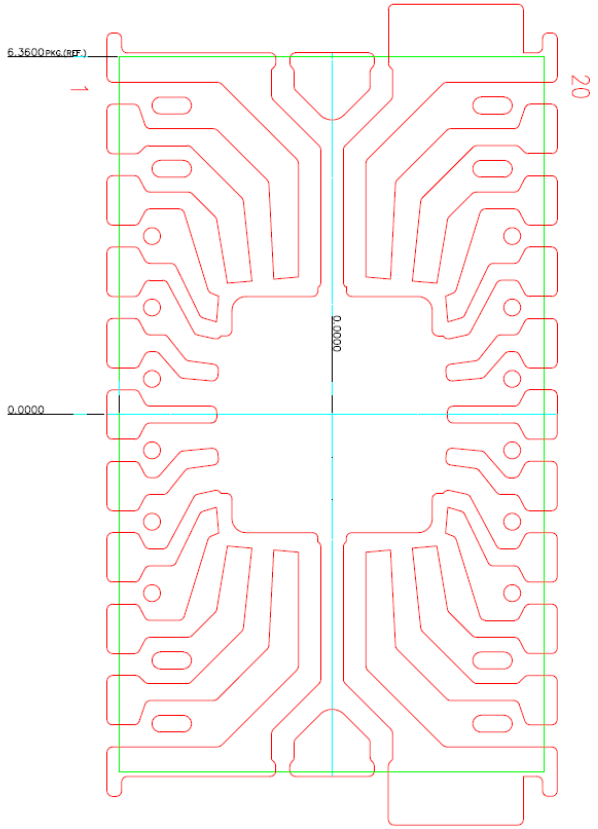
SEM images

[Note: SEM Mag 1000X]

Leadframe drawing comparison

ST Line: U750, U538





Current leadframe
die pad 157x160mils

New leadframe
die pad140x165mils

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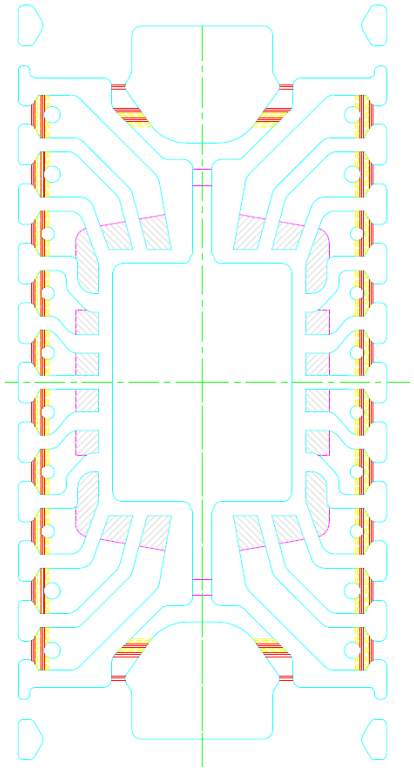
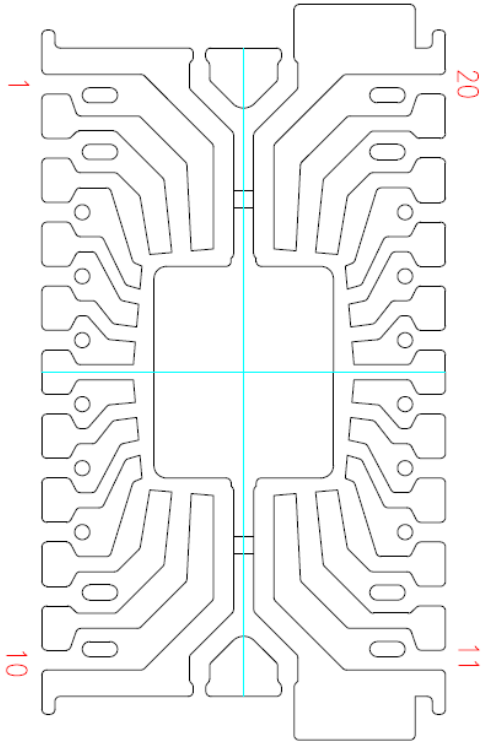
Leadframe drawing comparison

ST Line: UF34



Current leadframe
die pad 150x200mils



New leadframe
die pad 140x165mils

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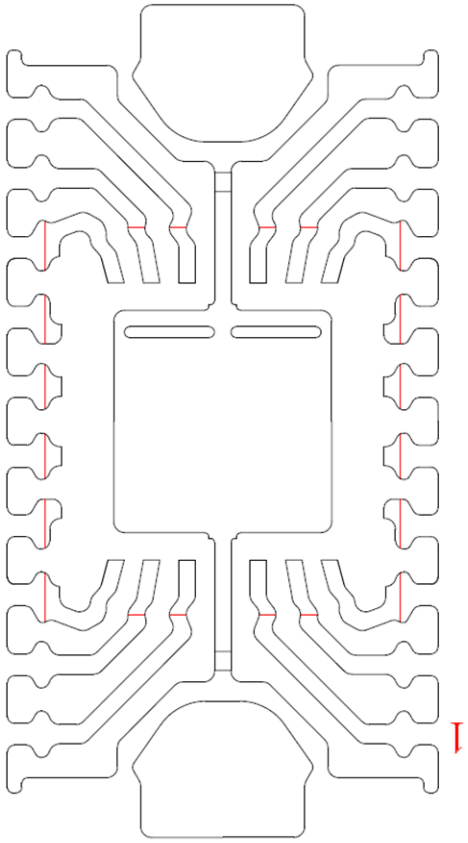
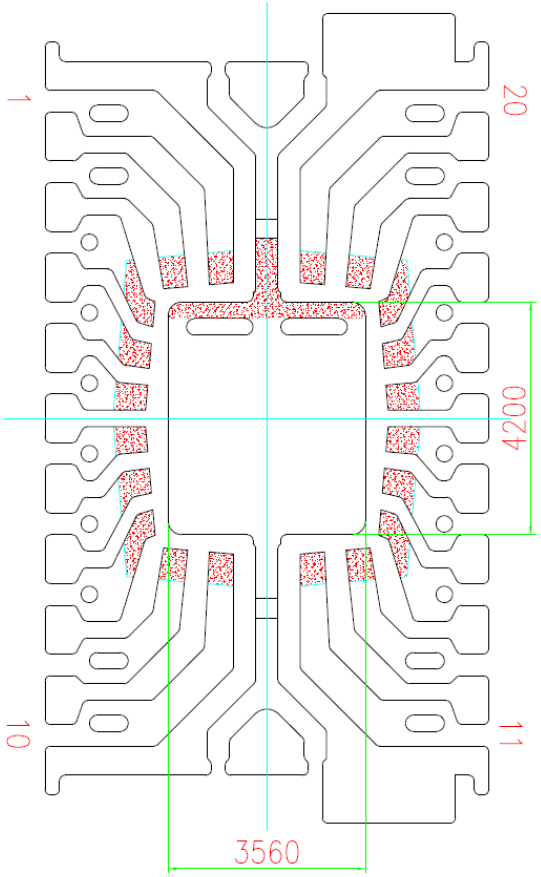
leadframe drawing comparison

Product Line: U569, U717



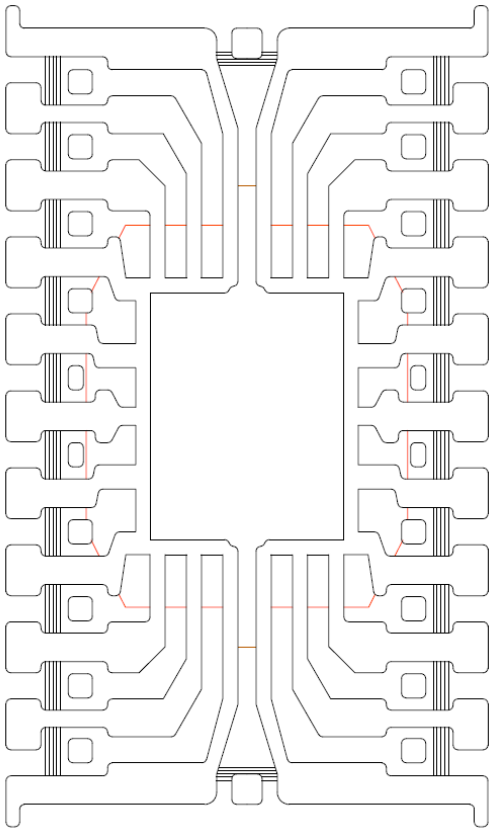
Current leadframe
die pad 157x160mils



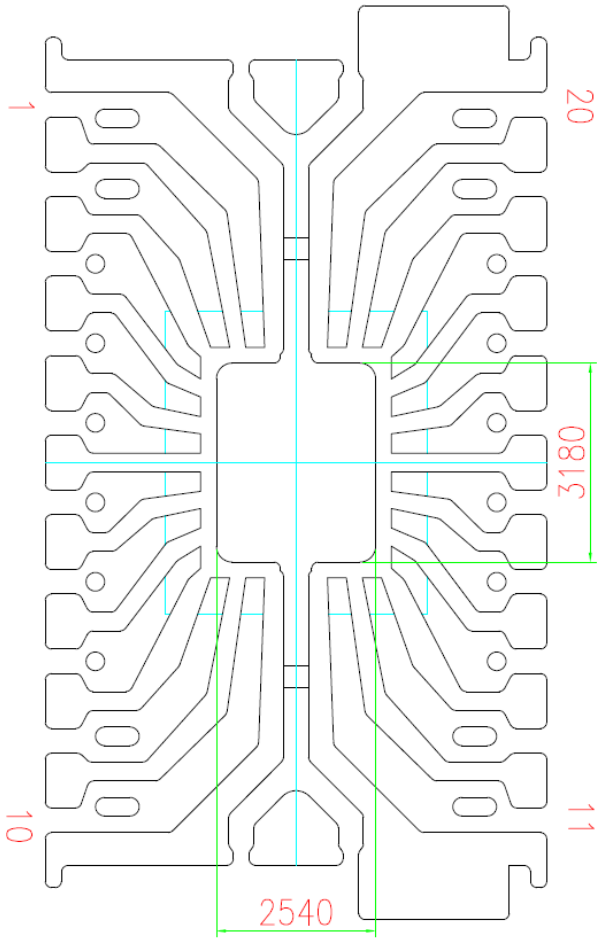
New leadframe
die pad 140x165mils

leadframe drawing comparison

Product Line: UH03



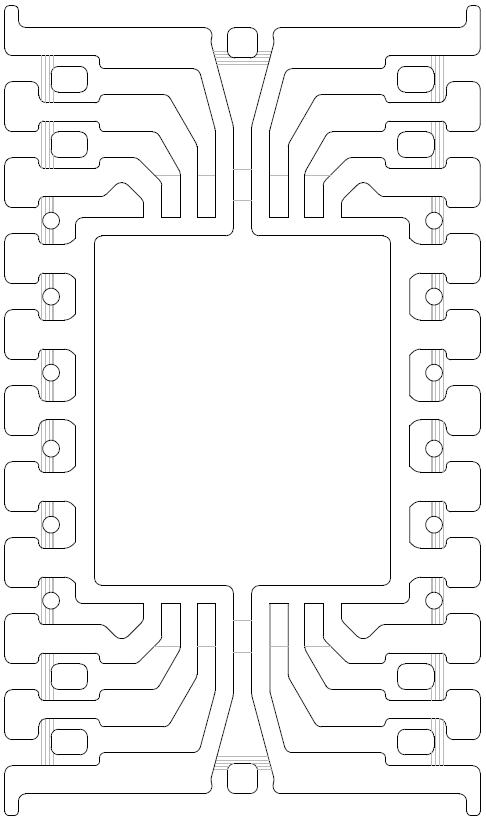
Current leadframe
die pad 125x160mils



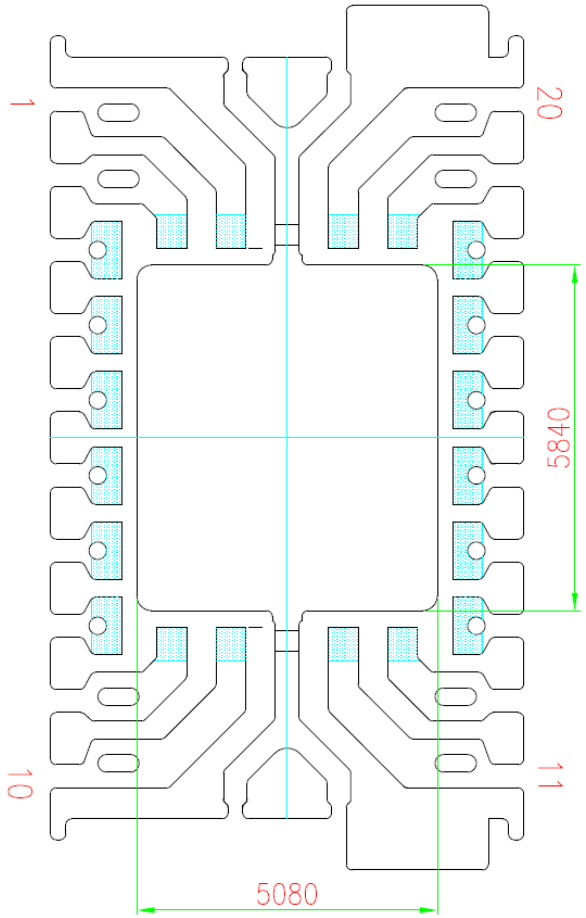
New leadframe
die pad 100x125mils

leadframe drawing comparison

Product Line: A108, A205, A139



Current leadframe
die pad 195x230mils



New leadframe
die pad 200x230mils

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Leadframe Comparison

ITEM	EXISTING	NEW
Frame size	(215.7 x 57 mm)	(215.7 x 57 mm)
Units/Strip	24	48
Inner Lead Plating	PPF (NiPdAuAg or TNPd)	Selective Ag or Ring Ag
Frame base material	C194	C194
Frame process	Etched	Stamped
Plating	PPF (NiPdAuAg or TNPd)	Sn
Leadframe Supplier	DCI	ASM
Surface treatment	No	ME2

VALIDATION REPORT

SO-20 Products Migration to SO20 IDF (Inter Digit Frame) line with new BOM and matte Tin plating process

ADG - Quality

November 2018

Reliability evaluations overview

Objective

This is the summary of reliability trials performed in order to validate the SO-20 Products Migration to SO20 IDF (Inter Digit Frame) line with new BOM and matte Tin plating process.

Results

Based on the overall positive results on below mentioned TVs we consider the change qualified

Product Line	**W023**	**A108**	**UB63**	**U447**
FE Technology	Bipolar	HF3CMOS	BCD2	BCD3
FE Diffusion Fab	AMK6 (Singapore)	AMK6 (Singapore)	AMK6 (Singapore)	AMK6 (Singapore)
Die size (un)	2160x1960	4420x2980	3500x3100	4120x2510
Passivation	SiN/POLYIMIDE	P-VAPOX(SiO2) / NITRIDE (SiN)	P-VAPOX (Si glass)	USG-PSG-SiON-PIX
Die finishing back	CHROMIUM/NICKEL	Raw Silicon	Raw Silicon	Raw Silicon
L/F description	SO 20 IDF	SO 20 IDF	SO 20 IDF	SO 20 IDF
Wire diameter (mils)	Au 1.3	Au 1.3	Au 1.3	Cu 2.0
Molding compound	EME-G633CA	EME-G633CA	EME-G633CA	EME-G633CA
Die attach	LOCTITE ABLESTIK ABP8302	LOCTITE ABLESTIK ABP8302	LOCTITE ABLESTIK ABP8302	LOCTITE ABLESTIK ABP8302

Validation was done according to AEC_Q100 Rev.H using above mentioned Test Vehicles

In the below table the applied stress test as well as a comparison between the AEC-Q100 and ZVEI Requirement is reported:

	Test Group A					Test Group B		Test Group C				Test Group D							Test Group E				
	THB	AC	TC	PTC	HTSL	HTOL	ELFR	WBS	WBP	SD	PD	EM	TDDB	HCI	NBTI	SM	HBM	CDM	LU	ED	GL	EMC	SC
AEC-Q100	x	x	x		x	x	x	x	x	x	x									x			
ZVEI	x	x	x		x	x	x	x	x	x	x									X			
ST	x	x	x		x	x	x	x	x	x	x									x			

Traceability

Wafer fab information				
	W023	**A108**	**UB63**	**U447**
Wafer fab manufacturing location	AMK6 (Singapore)	AMK6 (Singapore)	AMK6 (Singapore)	AMK6 (Singapore)
Wafer diameter(inches)	6	6	6	6
Silicon process technology	Bipolar	HF3CMOS	BCD2	BCD3
Die finishing back side	CHROMIUM/NICKEL	Raw Silicon	Raw Silicon	Raw Silicon
Die size (un)	2160x1960	4420x2980	3500x3100	4120x2510
Metal levels /materials	2 / AlSiCu	2 / Ti AlSiCu TiN	2 / AlSiCu	2 / AlSiCu
Passivation (front side)	SiN/POLYIMIDE	P-VAPOX(SiO2) / NITRIDE (SiN)	P-VAPOX (Si glass)	USG-PSG-SiON-PIX

Assembly Information				
	I6Z7*W023FB6	**I6Z7*A108BD6**	**I6Z7*UB63BB6**	**I9Z7*U447CA6**
Assembly plant location	ST Muar	ST Muar	ST Muar	ST Muar
Package description	SO 20 IDF	SO 20 IDF	SO 20 IDF	SO 20 IDF
Molding compound	EME-G633CA	EME-G633CA	EME-G633CA	EME-G633CA
Wires bonding material/diameter	Au 1.3	Au 1.3	Au 1.3	Cu 2.0
Die attach material	LOCTITE ABLESTIK ABP8302	LOCTITE ABLESTIK ABP8302	LOCTITE ABLESTIK ABP8302	LOCTITE ABLESTIK ABP8302
Assembly Lots #	997150KS01	9964318802	996221T101	996451F5RP
	997150KS02		996221T1RQ	996451F5RQ
	9973914201		996221T1RR	996451F5RR

Reliability qualification plan and results

Test group A: Accelerated Environment Stress					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
A1	**PC** Pre Cond	Preconditioning according to JedecJESD22-A113F including 5 Temperature Cycling Ta=-40ºC/+60ºC Reflow according to leve 3 Jedec JSTD020D-1 100 Temperature Cycling Ta=-50ºC/+150ºC	Before THB, AC,TC,HTOL		
A2	**THB** Temp Humidity Bias	Ta=85ºCR, H=85%V, cc=24Vfor 1000hours	77/3	0/77/3	A108 excluded
A3	**AC** Autoclave	**ENV. SEQ.** Enviromental Sequence **TC** (Ta=-65ºC+/ 150ºCfor 100 cycles) + **AC** (Ta=121ºC, Pa=2atm for 96 hours)	77/3	0/77/3	Each Test vehicle
A4	**TC** Temp. Cycling	Ta=-65ºC+/ 150ºC for 500 cycles	77/3	0/77/3	Each Test vehicle
A5	**PTC** Power Temp. Cycling	Ta=-40ºC+/ 125ºC for 1000 cycles	N/A	N/A	
A6	**HTSL** High Temp. Storage Life	Ta=150ºC for 1000 hours	77/3	0/77/3	Each Test vehicle

Test group B: Accelerated Lifetime Simulation

AEC #	Test Name	STM Test Conditions	Sample Size/ Lots	Results Fails/SS/Lots	Comments
B1	**HTOL** High Temp. Op Life	Bias Dynamic stress (JESD22- A108) Ta=125°C, Vcc=28V for 1000 hours	77/3	0/77/3	A108 excluded
B2	**ELFR** Early Life Failure Rate	Part submitted to **HTOL** per JESD22-A108 requirements; GRADE1: 24hours at 150°C	1000/3	0/1000/3	U447 only
B3	**EDR** Endurance Data Retention	Only for memory devices	N/A	N/A	

Test group C: Package Assembly Integrity

AEC #	Test Name	STM Test Conditions	Sample Size/ Lots	Results Fails/SS/Lots	Comments
C1	**WBS** Wire Bond Shear	Per AEC-Q100-001	30/3	0/30/3	Each Test vehicle
C2	**WBP** Wire Bond Pull	Per MIL-STD883, M2011 Condition C o D	30/3	0/30/3	Each Test vehicle
C3	**SD** Solderability	Wetting balance	10/3	0/10/3	Each Test vehicle
C4	**PD** Physical Dimensions		10/3	0/10/3	Each Test vehicle
C5	**SBS** Solder Ball Shear	Only for BGA package	N/A	N/A	
C6	**LI** Lead Integrity	Not required for Surface Mount Devices			

Test group D: Die Fabrication Reliability					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
D1	**EM** Electromigration		N/A	N/A	
D2	**TDDB** Time Dependent Dielectric Breakdown		N/A	N/A	
D3	**HCI** Hot Carrier Injection		N/A	N/A	
D4	**NBTI** Negative Bias Temperature Instability		N/A	N/A	
D5	**SM** Stress Migration		N/A	N/A	

Test group E: Electrical Verification

AEC #	Test Name	STM Test Conditions	Sample Size/ Lots	Results Fails/SS/Lots	Comments
E2	**ESD** HBM	HBM=[R=1.5kΩC, =150pF]	N/A	N/A	
E3	**ESD** CDM		N/A	N/A	
E4	**LU** Latch-Up	Injection current ±:100mA Over voltage 1.5 x Vop max	N/A	N/A	
E5	**ED** Electrical Distributions		30/3	0/30/3	U447 only
E7	**CHAR** Characterization		N/A	N/A	
E8	**GL** Gate Leakage		N/A	N/A	
E9	**EMC** Electromagnetic Compatibility		N/A	N/A	
E10	**SC** Short Circuit Characterization	Accordingto **AEC-Q100-012**	N/A	N/A	

Test group F: Defects Screening Tests

AEC #	Test Name	STM Test Conditions	Sample Size/ Lots	Results Fails/SS/Lots	Comments
F1	**PAT** Process Average Testing		Not performed. Implemented in production		
F2	**SBA** Statistical Bin/Yield Analysis				

Test group G: Cavity Package Integrity Tests					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
G1	**MS** Mechanical Shock	Not Applicable: Not for plastic package devices			
G2	**VFV** Variable Frequency Vibration				
G3	**CA** Constant Acceleration				
G4	**GFL** Gross/Fine Leak				
G5	**DROP** Package Drop				
G6	**LT** Lid Torque				
G7	**DS** Die Shear				
G8	**IWV** Internal Water Vapor				

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