PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APG/07/2618
Notification Date 06/05/2007

POWERSO20/36 & HIQUAD-64 - GREEN COMPOUND HITACHI CEL9340HF10

APG - APG

Table 1. Change Identification

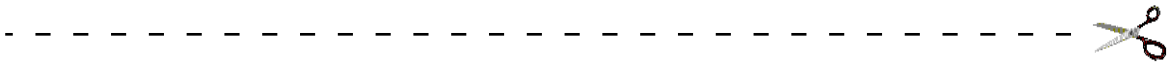
Product Identification (Product Family/Commercial Product)	ALL PRODUCTS IN POWERSO 20/36 & HIQUAD-64
Type of change	Package assembly material change
Reason for change	To qualify the leadfree package to IPC/JEDEC J-STD-020C
Description of the change	New qualification compliant to 245 C, with green (halogen-free) molding compound HITACHI CEL9340HF10
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	NO CHANGE
Manufacturing Location(s)	1]St Muar - Malaysia

Table 2. Change Implementation Schedule

Forecasted implementation date for change	15-Aug-2007
Forecasted availabillity date of samples for customer	15-Jun-2007
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	06-Jun-2007
Estimated date of changed product first shipment	04-Sep-2007

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt

PCN APG/07/2618

Please sign and return to STMicroelectronics Sales Office

Notification Date 06/05/2007

☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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DOCUMENT APPROVAL

Name	Function
Foletto, Giovanni	Division Marketing Manager
Maggioni, Giampietro	Division Marketing Manager
Pengo, Tullio	Division Marketing Manager
Russo, Alfio	Division Marketing Manager
Aparo, Sebastiano	Division Product Manager
Cassani, Fabrizio	Division Product Manager
Rivolta, Danilo	Division Product Manager
Amadeo, Matteo	Division Q.A. Manager
Mercandelli, Laura	Division Q.A. Manager
Parrino, Emanuele	Division Q.A. Manager

POWERSO20/36 & HIQUAD-64 - GREEN COMPOUND HITACHI CEL9340HF10

WHAT:

We have completed the qualification of a new green molding compound **HITACHI CEL9340HF10** for our products assembled in Powerso 20 / 36 & HIQUAD-64 packages compliant to IPC/JEDEC J-STD-020C, able to sustain 245°C as reflow temperature.

The qualification of a green molding compound (Halogen-free) is also compliant to the Company roadmap towards environmentally friendly components.

The change applies to all products in production, also to the ones still on leaded production, since the new compound does not impact leaded or leadfree soldering processes

We invite all the customers that have not yet switched to leadfree to do it as soon as possible.

WHY:

Company roadmap and compliancy to standard spec IPC/JEDEC J-STD-020C.

HOW:

Here attached you find the qualification report **ER002207AG6053** for the qualification of the new molding compound that covers all the different front-end processes and back-finishing of the involved products.

WHEN:

We will implement the new compound from August 2007. Samples available on customer's request through our Sales offices.

Pb-FREE PowerSO-20/36 / HiQUAD-64, MUAR GREEN MOLDING COMPOUND

RELIABILITY EVALUATION REPORT

Abstract

In the present report positive reliability results are summarized in order to qualify a new GREEN (halogen-free) molding compound on PowerSO-20/36 and HiQUAD-64 LEAD-FREE package families in MUAR.

Several test-vehicles have been selected in order to cover the key front-end technologies currently used in the concerned packages.

Stress-tests conditions have been applied in accordance with AEC-Q100 guidelines for operating temperature "GRADE 1" integrated circuits, and soldering simulation before reliability testing has been performed following IPC / Jedec J-STD-020C method (MSL 3 / Pb-free components / Reflow T_{PEAK}=245°C).

Conclusion

On the basis of the results summarized in the present report, the green molding compound HITACHI CEL 9240HF10 can be qualify for PowerSO-20/36 and HiQUAD-64 LEAD-FREE package families in MUAR.

Reliability test conditions and sample sizes (all tests completed without functional failures)

TEST NAME	CONDITIONS [SPEC]	TV1	TV2	TV3	TV4	TV5	TV6	NOTES
JL3	24h bake @ 125°C 192h @ 30°C / 60% RH 3 reflow cycles at T_{MAX}=245°C [IPC/Jedec J-STD-020C]	284	77	77	22	352	276	1
JL3 + TCT	Ta=-50/+150°C, 1000 cycles	77	77	77	-	95	77	2
JL3 + HTS	Ta=150°C, 1000h	45	-	-	-	95	45	3
JL3 + AC	P=2atm, Ta=121°C, 240h	-	-	-	-	100	-	
JL3 + ES	100 TC (-50/+150°C) + 96h PPT (2atm, 121°C)	77	-	-	-	-	77	
JL3 + OLT	Tj=150°C, t=1000h Dynamic bias (high I, high P_D)	40	-	-	-	38	77	
JL3+ THB	Vs=16V, Vcc=5V, P_D negligible RH=85%, Ta=85°C, 1000h	45	-	-	-	95	-	
JL3 + PTC	T_J=-40/+150°C 5min ON / 5min OFF, 1000h	-	-	-	22	24	-	
HTRB	Tj=150°C, t=1000h Static bias (high V_S, low P_D)	-	-	-	-	45	-	

NOTES:

1 SAM inspection on sample basis: acceptance criteria for delamination stated in J-STD-020C have been met.

2 All the test-vehicles have passed wire pull test requirement according to AEC-Q100.

3 Without JL3 on TV5.

Construction note

		TV1	TV2	TV3	TV4	TV5	TV6
Technical code	:	UH22	U475	L682	UT29	UT60	US16
Diffusion process	:	BCD4	BCD3	Bipolar	BCD5	BCD5	BCD3S
Wafer diameter	:	6”	6”	5”	8”	8”	6”
Diffusion site	:	Ang Mo Kio	Ang Mo Kio	Ang Mo Kio	Agrate	Agrate	Reutlingen
Die size (mm^2)	:	6.94x4.37	5.28x3.75	3.47x2.62	3.13x3.61	4.01x3.91	7.65x8.22
Metal levels	:	3	2	1	3	3	3
Final passivation	:	PIQ	PIQ	SiN	PIQ	PIQ	PIQ
Back finishing	:	CrNiAu	CrNiAu	CrNiAu	CrNiAu	CrNiAu	CrNiAu
Package name	:	PowerSO-36	PowerSO-20	PowerSO-20	PowerSO-20	HiQUAD-64	
Assembly site	:	ST MUAR (MALAYSIA)					
Die attach	:	SOFT SOLDER Pb/1Sn/1.5Ag					
Wire bonding	:	Au, 3mil	Au, 2mil	Au, 2mil	Au, 2mil	Au, 1.3mil	Au, 2mil
Molding compound	:	HITACHI CEL9340HF10					
Lead finishing	:	Matte Sn					

Attachments

1) Reliability tests description

ATTACHMENT 1: RELIABILITY TESTS DESCRIPTION

TEST NAME	DESCRIPTION	PURPOSE
JLn: Jedec Level n surface mounting simulation	The device is submitted to a typical temperature profile used for surface mounting, after a controlled moisture absorption.	As stand-alone test: to investigate the level of moisture sensitivity. As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination.
TCT: Temperature Cycles Test	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere.	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, moulding compound delamination, wire-bonds failure, die-attach layer degradation.
PPT: Pressure Pot Test	The device is stored in saturated steam, at fixed and controlled conditions of pressure and temperature.	To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.
HTS: High Temperature Storage	The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.	To investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding.
ES: Environmental Sequence	The device is submitted in sequence to TCT and PPT, sometimes preceded by JLn preconditioning.	To simulate the actual combination of environmental stresses interacting in the field application. The typical failure modes are those reported for JLn, TCT and PPT.
OLT: Operating Life Test	The device is stressed in dynamic configuration, approaching the operative max. absolute ratings in terms of junction temperature, load current, internal power dissipation.	To simulate the worst-case application stress conditions. The typical failure modes are related to electromigration, wire-bonds degradation, oxide faults.
THB: Temperature Humidity Bias Test	The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.	To investigate failure mechanisms activated in the die-package environment by electrical field and wet conditions. Typical failure mechanisms are electro-chemical corrosion and surface effects related to the moulding compound.
PTC: Power Temperature Cycling	The device is stressed in dynamic configuration with a duty cycle of 50% at cycled ambient temperature.	To simulate the application stress in terms of electrical and environmental conditions. The typical failure modes are related to active thermal fatigue in the die-packge system..

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