

Details of Change:

ASSY sites	Change contents (w/ : ○, w/o : -)					
	Chip structure		Mold resin	Bonding wire		Die-attach materials
	Pad-opening size 50→55μm	CVM-circuit revision	Mold resin materials Au→Cu wire	wire material Au→Cu	Wire Diameters 18→20μm	
RSC	○	○(Only 48,64,80,100pin)	○	○	○	○(Only 48,64pin)
Nishiki	○	○(Only 64,80,100pin)	○	○	○	○(Only 80,100,144pin)

Change items due to Cu bonding wire:

Wafer Process: Naka

Assy Process: RSC (Renesas Semiconductor (Suzhou) Co. Ltd.) and Nishiki factory

Target Products: RH850/F1 and R1 series

e.g.

Current P/N: R7F7010133AFP#BA4 **New P/N:** R7F7010133AFP-**C**#BA4

Current P/N: R7F7010184AFP#KA4 **New P/N:** R7F7010184AFP-**C**#KA4

Current P/N: R7F7010323AFP#KA4 **New P/N:** R7F7010323AFP-**C**#KA4

No	Item	New (after change)	Current
1	Change of the bonding wire materials	Cu wire, φ20μm	Au wire, φ18μm
2	Change of the mold resin	Mold resin for Cu wire	Mold resin for Au wire
3	Change of the pad opening size	55μm	50μm
4	Change of the Die-attach material	Renesas standard material (RH850 common material)	Conventional material

Change items due to Cu bonding wire:

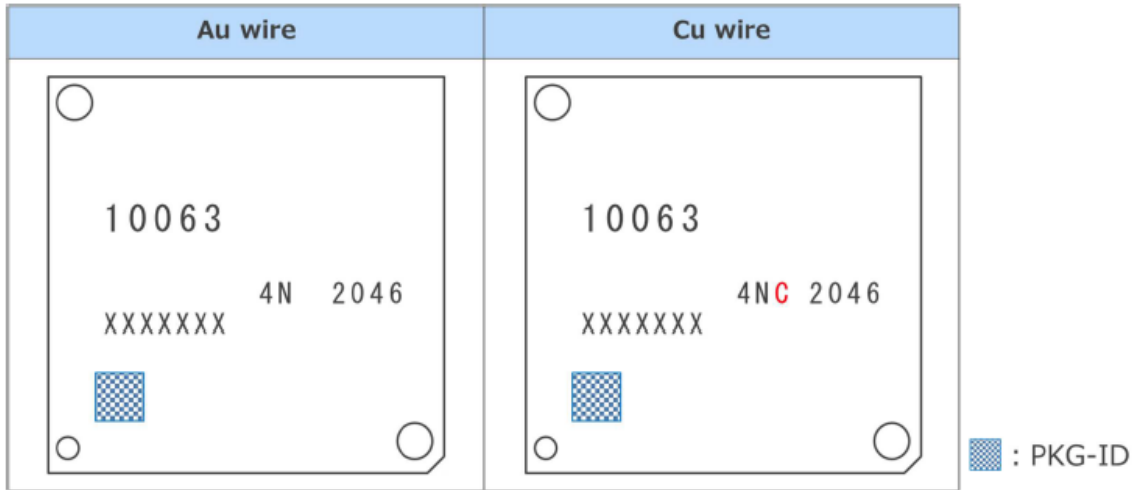
Photomasks have been revised to apply the same circuit as TSMC.

Product Identification:

Product identification through Mark printing on each PKG

Mark specifications : R7F7010063AFP-C#BA4 F1L-2M, 144pin (RSC ASSY)

In the case of laser mark for Cu-wire products, "C" is added in a part of mark (Red characters).



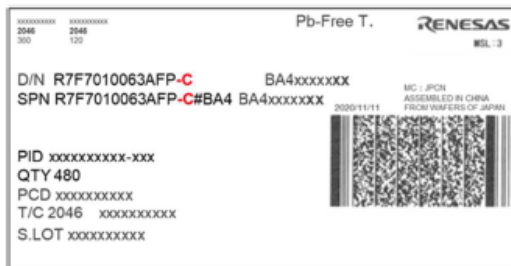
Product identification through each Label printing

Label example : R7F7010063AFP-C#BA4 F1L-2M, 144pin (RSC ASSY)

Before change : Au-wire Label image

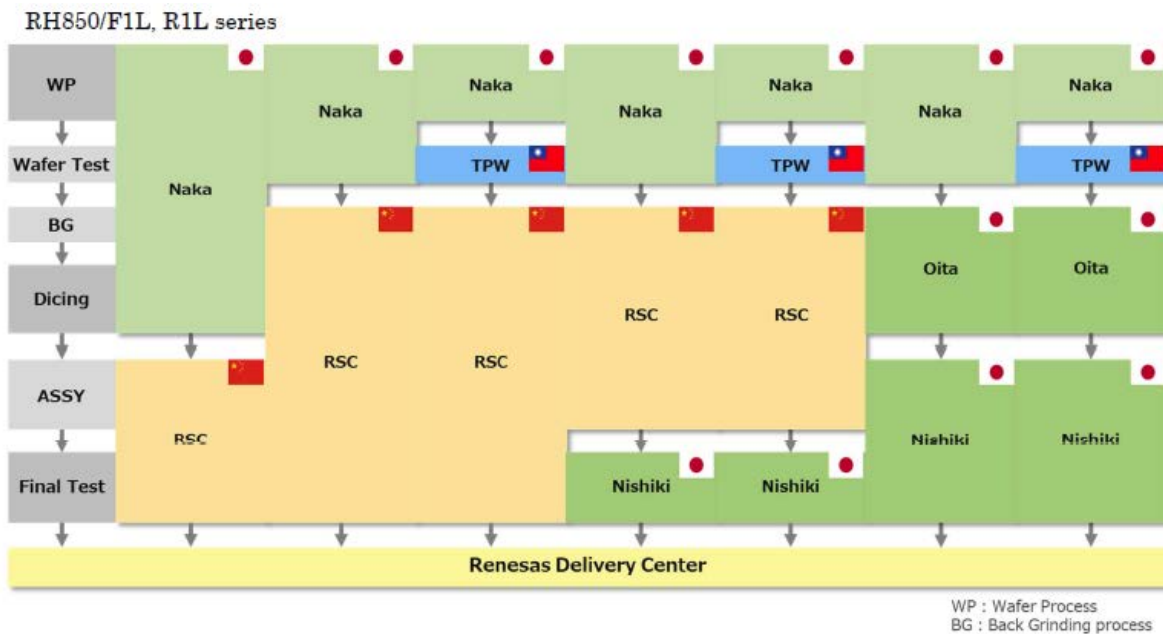


After change : Cu-wire Label image



Red characters are different from Au-wire products.

Production Flow:



*Alternative-BI has been applied to all production flows.

Qualification Test Results:

Naka / RSC:

[Note : Basically qualification tests were performed using a representative product with the same wafer process and the same package structure .]

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results (Fail of Total)	Comments: (N/A =Not Applicable)
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TEST GROUP A – ACCELERATED ENVIRONMENT STRESS TESTS

PC	A1	JESD22 A113 J-STD-020	Preconditioning: (Test @ Rm) SMD only; Moisture Preconditioning for THB/HAST, AC/UHST, TC, & PTC ; Peak Reflow Temp=260°C	Min.MSL=3			MSL=3	-
THB or HAST	A2	JESD22 A101	Temperature Humidity Bias: (Test @ Rm/Hot) Ta=85°C, RH=85%, 1000hrs	3	77	231	0 of 231	-
AC or UHST or TH	A3	JESD22 A118	Unbiased Highly Accelerated Stree Test: (Test @ Rm) Ta=110°C, 85% RH, 264h	3	77	231	0 of 231	-
TC	A4	JESD22 A104	Temperature Cycle: (Test @ Hot) Ta=-65°C to 150°C, 500cyc	3	77	231	0 of 231 0 Fails after TC (WBP)	-
PTC	A5	JESD22 A105	Power Temperature Cycle: (Test @ Rm/Hot)	-	-	-	-	N/A
HTSL	A6	JESD22 A103	High Temperature Storage Life: (Test @ Rm/Hot) Ta=150°C, 1000hrs	1	45	45	0 of 45	-

TEST GROUP B – ACCELERATED LIFETIME SIMULATION TESTS

HTOL	B1	JESD22 A108	High Temp Operating Life: (Test @ Rm/Cold/Hot) Ta=150°C, 1000hrs	3	77	231	0 of 231	-	
ELFR	B2	AEC-Q100-008	Early Life Failure Rate: (Test @ Rm/Hot) Ta=125°C, 48hrs	3	800	2400	0 of 2400	-	
EDR	B3	AEC-Q100-005	NVM Endurance & Data Retention Test: (Test @ Rm/Hot)	For HTOL	3	77	231	0 of 231	-
				For HTSL	1	45	45	0 of 45	-

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results (Fail of Total)	Comments: (N/A =Not Applicable)
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TEST GROUP C – PACKAGE ASSEMBLY INTEGRITY TESTS

WBS	C1	AEC-Q100-001 AEC-Q003	Wire Bond Shear Test: (Cpk > 1.67)	30 bonds	5 parts Min.	30 bonds	0 of 30bonds	Cpk>1.67
WBP	C2	Mil-STD-883 Method 2011 AEC-Q003	Wire Bond Pull: (Cpk > 1.67); Each bonder used	30 bonds	5 parts Min.	30 bonds	0 of 30bonds	Cpk>1.67
SD	C3	JESD22 B102 JSTD-002D	Solderability: (>95% coverage) 8 hr steam aging prior to testing	1	15	15	0 of 15	-
PD	C4	JESD22 B100, JESD22 B108 AEC-Q003	Physical Dimensions: (Cpk > 1.67)	3	10	30	0 of 30	Cpk>1.67
SBS	C5	AEC-Q100-010 AEC-Q003	Solder Ball Shear: (Cpk > 1.67); 5 balls from min. of 10 devices	-	-	-	-	N/A
LI	C6	JESD22 B105	Lead Integrity: (No lead cracking or breaking); Through-hole only; 10 leads from each of 5 devices	-	-	-	-	N/A

TEST GROUP D – DIE FABRICATION RELIABILITY TESTS

EM	D1	JESD61	Electromigration:	-	-	-	Pass	Confirmed by process TEG
TDDB	D2	JESD35	Time Dependant Dielectric Breakdown:	-	-	-	Pass	Confirmed by process TEG
HCI	D3	JESD60 & 28	Hot Carrier Injection:	-	-	-	Pass	Confirmed by process TEG
NBTI	D4	JESD90	Negative Bias Temperature Instability:	-	-	-	Pass	Confirmed by process TEG
SM	D5	JESD61,87 & 202	Stress Migration:	-	-	-	Pass	Confirmed by process TEG

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results (Fail of Total)	Comments: (N/A =Not Applicable)
TEST GROUP E- ELECTRICAL VERIFICATION								
TEST	E1	User/Supplier Specification	Pre and Post Stress Electrical Test:	All	All	All	0 of All	-
HBM	E2	AEC-Q100-002	Electrostatic Discharge, Human Body Model: (Test @ Rm/Hot); (2KV HBM / Class 2 or better)	1	3	3	0 of 3 ESD Level=HBM:2	HBM>2KV
CDM	E3	AEC-Q100-011	Electrostatic Discharge, Charged Device Model: (Test @ Rm/Hot); (750V corner leads, 500V all other leads / Class C4B or better)	1	3	3	0 of 3 ESD Level=CDM:C4B	Corner leads: 750V Pass All other leads:500V Pass
LU	E4	AEC-Q100-004	Latch-Up: (Test @ Rm/Hot)	1	6	6	0 of 6	-
ED	E5	AEC-Q100-009 AEC-Q003	Electrical Distributions: (Test @ Rm/Hot/Cold) (where applicable, Cpk> 1.67)	3	30	90	Cpk> 1.67	-
FG	E6	AEC-Q100-007	Fault Grading:	-	-	-	>98%	-
CHAR	E7	AEC-Q003	Characterization: (Test @ Rm/Hot/Cold)	-	-	-	Pass	According to Renesas standard procedure
EMC	E9	SAE J1752/3	Electromagnetic Compatibility (Radiated Emissions)	1	1	1	0 of 1	-
SC	E10	AEC Q100-012	Short Circuit Characterization	-	-	-	-	N/A
SER	E11	JESD89-1 JESD89-2 JESD89-3	Soft Error Rate	1	3	3	Pass	-
LF	E12	AEC-Q005	Lead (Pb) Free: (see AEC-Q005)	-	-	-	Pass	Solderability: See SD (C3) result. Solder heat resistance: N/A (Wave Solder is Not recommended.) Whisker: Performed on product TEG with test method based on JESD201.

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results (Fail of Total)	Comments: (N/A =Not Applicable)
TEST GROUP F – DEFECT SCREENING TESTS								
PAT	F1	AEC-Q001	Process Average Testing: (see AEC-Q001)	All	All	All	Reject units outside PAT limits	Apply to mass production according to Renesas standard procedure
SBA	F2	AEC-Q002	Statistical Bin/Yield Analysis: (see AEC-Q002)	All	All	All	Reject units outside criteria	Apply to mass production according to Renesas standard procedure

TEST GROUP G – CAVITY PACKAGE INTEGRITY TESTS (for Ceramic Package testing only)								
MS	G1	JESD22 B104	Mechanical Shock: (Test @ Rm)	-	-	-	-	N/A
VFV	G2	JESD22 B103	Variable Frequency Vibration: (Test @ Rm)	-	-	-	-	N/A
CA	G3	MIL-STD-883 Method 2001	Constant Acceleration: (Test @ Rm)	-	-	-	-	N/A
GFL	G4	MIL-STD-883 Method 1014	Gross and Fine Leak:	-	-	-	-	N/A
DROP	G5	-----	Drop Test: (Test @ Rm) MEMS cavity parts only. Drop part on each of 6 axes once from a height of 1.2m onto a concrete surface.	-	-	-	-	N/A
LT	G6	MIL-STD-883 Method 2004	Lid Torque:	-	-	-	-	N/A
DS	G7	MIL-STD-883 Method 2019	Die Shear:	-	-	-	-	N/A
IWV	G8	MIL-STD-883 Method 1018	Internal Water Vapor:	-	-	-	-	N/A

Product List (Naka/RSC):

[F1L series]

R7F7010033AFP-C	R7F7010524AFP-C
R7F7010034AFP-C	R7F7010533AFP-C
R7F7010063AFP-C	R7F7010534AFP-C
R7F7010064AFP-C	R7F7010543AFP-C
R7F7010073AFP-C	R7F7010544AFP-C
R7F7010074AFP-C	R7F7010553AFP-C
R7F7010143AFP-C	R7F7010554AFP-C
R7F7010144AFP-C	R7F7010563AFP-C
R7F7010153AFP-C	R7F7010564AFP-C
R7F7010154AFP-C	R7F7010573AFP-C
R7F7010193AFP-C	R7F7010574AFP-C
R7F7010194AFP-C	R7F701A003AFP-C
R7F7010203AFP-C	R7F701A004AFP-C
R7F7010204AFP-C	R7F701A013AFP-C
R7F7010243AFP-C	R7F701A014AFP-C
R7F7010244AFP-C	R7F7010023AFP-C
R7F7010253AFP-C	R7F7010024AFP-C
R7F7010254AFP-C	R7F7010083AFP-C
R7F7010263AFP-C	R7F7010084AFP-C
R7F7010264AFP-C	R7F7010093AFP-C
R7F7010273AFP-C	R7F7010094AFP-C
R7F7010274AFP-C	R7F7010103AFP-C
R7F7010283AFP-C	R7F7010104AFP-C
R7F7010284AFP-C	R7F7010113AFP-C
R7F7010293AFP-C	R7F7010114AFP-C
R7F7010294AFP-C	R7F7010123AFP-C
R7F7010303AFP-C	R7F7010124AFP-C
R7F7010304AFP-C	R7F7010133AFP-C
R7F7010323AFP-C	R7F7010134AFP-C
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R7F7010403AFP-C	R7F7010184AFP-C
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R7F7010423AFP-C	R7F7010224AFP-C
R7F7010424AFP-C	R7F7010233AFP-C
R7F7010433AFP-C	R7F7010234AFP-C
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R7F7010443AFP-C	R7F701A314AFP-C
R7F7010444AFP-C	R7F701A323AFP-C
R7F7010453AFP-C	R7F701A324AFP-C
R7F7010454AFP-C	R7F701A333AFP-C
R7F7010463AFP-C	R7F701A334AFP-C
R7F7010464AFP-C	R7F701A363AFP-C
R7F7010473AFP-C	R7F701A364AFP-C
R7F7010474AFP-C	R7F701A373AFP-C
R7F7010483AFP-C	R7F701A374AFP-C
R7F7010484AFP-C	R7F701A383AFP-C
R7F7010493AFP-C	R7F701A384AFP-C
R7F7010494AFP-C	R7F701A393AFP-C
R7F7010503AFP-C	R7F701A394AFP-C
R7F7010504AFP-C	R7F701A403AFP-C
R7F7010513AFP-C	R7F701A404AFP-C
R7F7010514AFP-C	R7F701A413AFP-C
R7F7010523AFP-C	R7F701A414AFP-C

[R1L series]

R7F7010643AFP-C
R7F7010693AFP-C
R7F7010713AFP-C
R7F7010603AFP-C
R7F7010623AFP-C
R7F7010653AFP-C
R7F7010673AFP-C
R7F701A023AFP-C
R7F701A033AFP-C
R7F701A083AFP-C
R7F701A223AFP-C

Naka / Nishiki:

[Note : Basically qualification tests were performed using a representative product with the same wafer process and the same package structure .]

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results (Fail of Total)	Comments: (N/A –Not Applicable)
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TEST GROUP A – ACCELERATED ENVIRONMENT STRESS TESTS

PC	A1	JESD22 A113 J-STD-020	Preconditioning: (Test @ Rm) SMD only; Moisture Preconditioning for THB/HAST, AC/UHST, TC, &PTC ; Peak Reflow Temp=260°C	Min.MSL=3			MSL=3	-
THB HAST	A2	JESD22 A101	Temperature Humidity Bias: (Test @ Rm/Hot) Ta=85°C, RH=85%, 1000hrs	3	77	231	0 of 231	-
AC UHST HTH	A3	JESD22 A118	Unbiased Highly Accelerated Stress Test: (Test @ Rm) Ta=110°C, 85% RH, 264h	3	77	231	0 of 231	-
TC	A4	JESD22 A104	Temperature Cycle: (Test @ Hot) Ta=-65°C to 150°C, 500cyc	3	77	231	0 of 231 0 Fails after TC (WBP)	-
PTC	A5	JESD22 A105	Power Temperature Cycle: (Test @ Rm/Hot)	-	-	-	-	N/A
HTSL	A6	JESD22 A103	High Temperature Storage Life: (Test @ Rm/Hot) Ta=150°C, 1000hrs	1	45	45	0 of 45	-

TEST GROUP B – ACCELERATED LIFETIME SIMULATION TESTS

HTOL	B1	JESD22 A108	High Temp Operating Life: (Test @ Rm/Cold/Hot) Ta=150°C, 1000hrs	3	77	231	0 of 231	-	
ELFR	B2	AEC-Q100-008	Early Life Failure Rate: (Test @ Rm/Hot) Ta=125°C, 48hrs	3	800	2400	0 of 2400	-	
EDR	B3	AEC-Q100-005	NVM Endurance & Data Retention Test: (Test @ Rm/Hot)	For HTOL	3	77	231	0 of 231	-
				For HTSL	1	45	45	0 of 45	-

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results (Fail of Total)	Comments: (N/A –Not Applicable)
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TEST GROUP C – PACKAGE ASSEMBLY INTEGRITY TESTS

WBS	C1	AEC-Q100-001 AEC-Q003	Wire Bond Shear Test: (Cpk > 1.67)	30 bonds	5 parts Min.	30 bonds	0 of 30bonds	Cpk> 1.67
WBP	C2	Mil-STD-883 Method 2011 AEC-Q003	Wire Bond Pull: (Cpk > 1.67); Each bonder used	30 bonds	5 parts Min.	30 bonds	0 of 30bonds	Cpk> 1.67
SD	C3	JESD22 B102 JSTD-002D	Solderability: (>95% coverage) 8 hr steam aging prior to testing	1	15	15	0 of 15	-
PD	C4	JESD22 B100, JESD22 B108 AEC-Q003	Physical Dimensions: (Cpk > 1.67)	3	10	30	0 of 30	Cpk> 1.67
SBS	C5	AEC-Q100-010 AEC-Q003	Solder Ball Shear: (Cpk > 1.67); 5 balls from min. of 10 devices	-	-	-	-	N/A
LI	C6	JESD22 B105	Lead Integrity: (No lead cracking or breaking); Through-hole only; 10 leads from each of 5 devices	-	-	-	-	N/A

TEST GROUP D – DIE FABRICATION RELIABILITY TESTS

EM	D1	JESD61	Electromigration:	-	-	-	Pass	Confirmed by process TEG
TDDb	D2	JESD35	Time Dependant Dielectric Breakdown:	-	-	-	Pass	Confirmed by process TEG
HCI	D3	JESD60 & 28	Hot Carrier Injection:	-	-	-	Pass	Confirmed by process TEG
NBTI	D4	JESD90	Negative Bias Temperature Instability:	-	-	-	Pass	Confirmed by process TEG
SM	D5	JESD61,87 & 202	Stress Migration:	-	-	-	Pass	Confirmed by process TEG

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results (Fail of Total)	Comments: (N/A –Not Applicable)
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TEST GROUP E- ELECTRICAL VERIFICATION

TEST	E1	User/Supplier Specification	Pri and Post Stress Electrical Test:	All	All	All	0 of All	-
HBM	E2	AEC-Q100-002	Electrostatic Discharge, Human Body Model: (Test @ Rm/Hot); (2KV HBM / Class 2 or better)	1	3	3	0 of 3 ESD Level- HBM:2	HBM> 2KV
CDM	E3	AEC-Q100-011	Electrostatic Discharge, Charged Device Model: (Test @ Rm/Hot); (750V corner leads, 500V all other leads / Class C4B or better)	1	3	3	0 of 3 ESD Level- CDM:C4B	Corner leads: 750V Pass All other leads:500V Pass
LU	E4	AEC-Q100-004	Latch-Up: (Test @ Rm/Hot)	1	6	6	0 of 6	-
ED	E5	AEC-Q100-009 AEC-Q003	Electrical Distributions: (Test @ Rm/Hot/Cold) (where applicable, Cpl> 1.67)	3	30	90	Cpl>1.67	-
FG	E6	AEC-Q100-007	Fault Grading:	-	-	-	>98%	-
CHAR	E7	AEC-Q003	Characterization: (Test @ Rm/Hot/Cold)	-	-	-	Pass	According to Renesas standard procedure
EMC	E9	SAE J1752/3	Electromagnetic Compatibility (Radiated Emissions)	1	1	1	0 of 1	-
SC	E10	AEC-Q100-012	Short Circuit Characterization	-	-	-	-	N/A
SER	E11	JESD89-1 JESD89-2 JESD89-3	Soft Error Rate	1	3	3	Pass	-
LF	E12	AEC-Q005	Lead (Pb) Free: (see AEC-Q005)	-	-	-	Pass	Solderability: See SD (C3) result. Solder heat resistance: N/A (Wave Solder is Not recommended.) Whisker: Performed on product TEG with test method based on JESD201.

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results (Fail of Total)	Comments: (N/A –Not Applicable)
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TEST GROUP F – DEFECT SCREENING TESTS

PAT	F1	AEC-Q001	Process Average Testing: (see AEC-Q001)	All	All	All	Reject units outside PAT limits	Apply to mass production according to Renesas standard procedure
SBA	F2	AEC-Q002	Statistical Bin/Yield Analysis: (see AEC-Q002)	All	All	All	Reject units outside criteria	Apply to mass production according to Renesas standard procedure

TEST GROUP G – CAVITY PACKAGE INTEGRITY TESTS (for Ceramic Package testing only)

MS	G1	JESD22 B104	Mechanical Shock: (Test @ Rm)	-	-	-	-	N/A
VIV	G2	JESD22 B103	Variable Frequency Vibration: (Test @ Rm)	-	-	-	-	N/A
CA	G3	MIL-STD-883 Method 2001	Constant Acceleration: (Test @ Rm)	-	-	-	-	N/A
GFL	G4	MIL-STD-883 Method 1014	Gross and Fine Leak:	-	-	-	-	N/A
DROP	G5	-----	Drop Test: (Test @ Rm) MEMS cavity parts only. Drop part on each of 6 axes once from a height of 1.2m onto a concrete surface.	-	-	-	-	N/A
LT	G6	MIL-STD-883 Method 2004	Lad Torque:	-	-	-	-	N/A
DS	G7	MIL-STD-883 Method 2019	Die Shear:	-	-	-	-	N/A
IWV	G8	MIL-STD-883 Method 1018	Internal Water Vapor:	-	-	-	-	N/A

Product List (Naka/Nishiki):

[F1L series]

R7F7010033AFP-C	R7F7010484AFP-C
R7F7010034AFP-C	R7F7010493AFP-C
R7F7010063AFP-C	R7F7010494AFP-C
R7F7010064AFP-C	R7F7010543AFP-C
R7F7010143AFP-C	R7F7010544AFP-C
R7F7010144AFP-C	R7F7010553AFP-C
R7F7010153AFP-C	R7F7010554AFP-C
R7F7010154AFP-C	R7F701A003AFP-C
R7F7010193AFP-C	R7F701A004AFP-C
R7F7010194AFP-C	R7F7010023AFP-C
R7F7010203AFP-C	R7F7010024AFP-C
R7F7010204AFP-C	R7F7010113AFP-C
R7F7010243AFP-C	R7F7010114AFP-C
R7F7010244AFP-C	R7F7010123AFP-C
R7F7010253AFP-C	R7F7010124AFP-C
R7F7010254AFP-C	R7F7010133AFP-C
R7F7010263AFP-C	R7F7010134AFP-C
R7F7010264AFP-C	R7F7010163AFP-C
R7F7010273AFP-C	R7F7010164AFP-C
R7F7010274AFP-C	R7F7010173AFP-C
R7F7010283AFP-C	R7F7010174AFP-C
R7F7010284AFP-C	R7F7010183AFP-C
R7F7010293AFP-C	R7F7010184AFP-C
R7F7010294AFP-C	R7F7010213AFP-C
R7F7010303AFP-C	R7F7010214AFP-C
R7F7010304AFP-C	R7F7010223AFP-C
R7F7010403AFP-C	R7F7010224AFP-C
R7F7010404AFP-C	R7F7010233AFP-C
R7F7010413AFP-C	R7F7010234AFP-C
R7F7010414AFP-C	R7F701A323AFP-C
R7F7010423AFP-C	R7F701A324AFP-C
R7F7010424AFP-C	R7F701A333AFP-C
R7F7010433AFP-C	R7F701A334AFP-C
R7F7010434AFP-C	R7F701A363AFP-C
R7F7010443AFP-C	R7F701A364AFP-C
R7F7010444AFP-C	R7F701A373AFP-C
R7F7010453AFP-C	R7F701A374AFP-C
R7F7010454AFP-C	R7F701A383AFP-C
R7F7010463AFP-C	R7F701A384AFP-C
R7F7010464AFP-C	R7F701A403AFP-C
R7F7010473AFP-C	R7F701A404AFP-C
R7F7010474AFP-C	R7F701A413AFP-C
R7F7010483AFP-C	R7F701A414AFP-C

[R1L series]

R7F7010643AFP-C
R7F7010693AFP-C
R7F7010713AFP-C
R7F7010603AFP-C
R7F7010623AFP-C
R7F7010653AFP-C
R7F7010673AFP-C
R7F701A023AFP-C
R7F701A033AFP-C
R7F701A083AFP-C
R7F701A223AFP-C

Current P/N	After Change P/N	Series
R7F7010033AFP#BA2	R7F7010033AFP-C#BA2	F1L series
R7F7010033AFP#KA2	R7F7010033AFP-C#KA2	F1L series
R7F7010034AFP#BA2	R7F7010034AFP-C#BA2	F1L series
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R7F701A033AFP#KA8	R7F701A033AFP-C#KA8	R1L series
R7F701A083AFP#BA4	R7F701A083AFP-C#BA4	R1L series
R7F701A083AFP#KA4	R7F701A083AFP-C#KA4	R1L series
R7F701A223AFP#BA4	R7F701A223AFP-C#BA4	R1L series