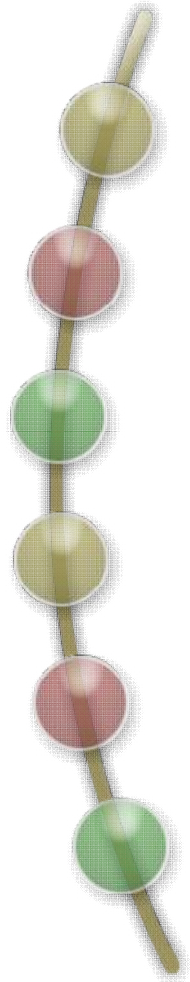
1xnm 64GB e-NAND Delivery Sheet [H26M78208CMR]

2015. 7. 15

Flash Technical Marketing Team

Contents



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◆ 1xnm 64GB ODP eMMC5.1 Venus

Product Device No.	Nand Flash	Controller
H26M78208CMR	1xnm 64Gb MLC *8	Venus (eMMC5.1)

Reliability Data

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1xnm 64Gb MLC Reliability Test Results

대 외 비

2015-05-16 ~ 2015-05-15

Reliability Item	Stress Condition	Sample Size	Criteria	Duration	Result
EFR	Reflow 260℃ 1Cycle + Erase/Program/Read @ 125℃, 3.7V	2,500	400ppm	48Hrs	PASS (0ppm)
HTOL	Read Stress @ 125℃, 3.6V	116	0	1008Hrs	PASS
LTOL	Read Stress @ -10℃, 3.6V	76	0	1008Hrs	PASS
Endurance	Erase/Program @ 25℃, 3.6V	231	0	3K	PASS
HTDR	Pre-E/W 300/3K cycle @ 85℃, 3.6V Retention Bake @ 125℃	231	0	100/10Hrs	PASS
LTDR	Pre-E/W 3K cycle @ 25℃, 3.6V Retention Bake @ 25℃	116	0	504Hrs	PASS
Read Disturb	Pre-E/W 300/3K cycle @ 25℃, 3.6V Read Stress @ 25℃, 3.6V	116	0	30K/3K	PASS

1xnm 64GB e-NAND Environment Test Results

대 외 비

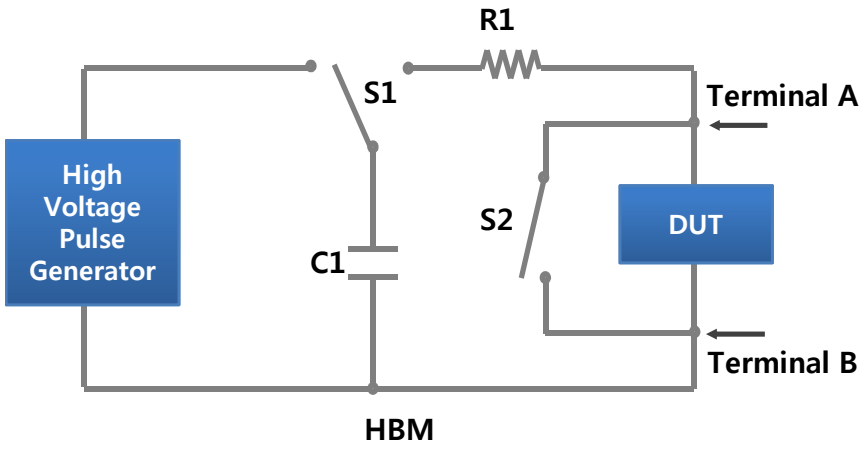
2015-05-16 ~ 2015-05-15

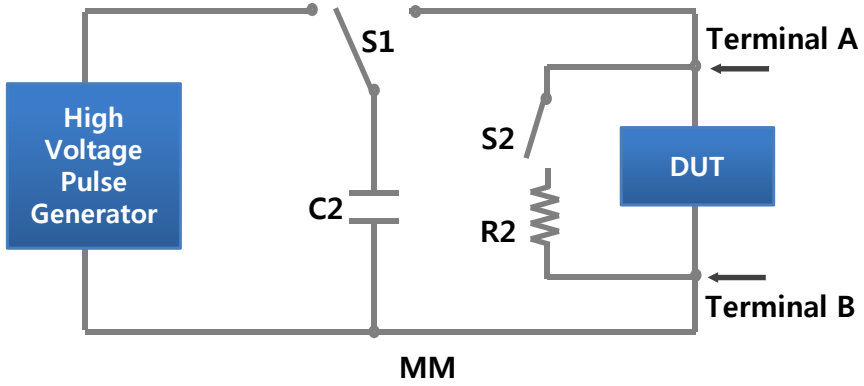
Test Item	Stress Condition	Sample Size	Criteria	Duration	Result	Remark
Reflow DR	PGM +260℃ Reflow 3Times + Read + Retention Bake @125℃+ Read	231	0	1000Hrs	Pass	
UCHTDR	260℃ Reflow 3Times + PGM + Retention Bake @125℃+ Read	231	0	1000Hrs	Pass	
HTS	150℃ Storage	231	0	1008Hrs	Pass	
LTS	-65℃ Storage	231	0	1008Hrs	Pass	
THB	85℃ / 85%RH / 3.6V	231	0	1008Hrs	Pass	
T/C	-55 ℃ / 125 ℃	231	0	1000cyc	Pass	
HAST	130℃ / 85%RH / 3.6V	231	0	96Hrs	Pass	
Unbiased-HAST	110℃ / 85%RH	231	0	264Hrs	Pass	
ESD	HBM/MM/CDM(3/Mode)	3ea/Mode	2,000V/200V/500V	-	Pass	
Latch Up	Vsupply overvoltage/I Test	5ea/Mode	> Vmax*1.5 > Imax 100mA	-	Pass	
Package Crack	Preconditioning	22	0	-	Pass	
Warpage	Room, Reflow	22	0	-	Pass	

Note(*) : Preconditioning Condition Flow for Surface Mount Packages
T/C(-55℃/125℃, 5Cycles) + Bake (125℃, 24Hrs) + 85℃/85% (No Bias, 24Hrs) + Reflow (3Cycles, 260℃)

ESD Test Result

1. Test Circuit & Method





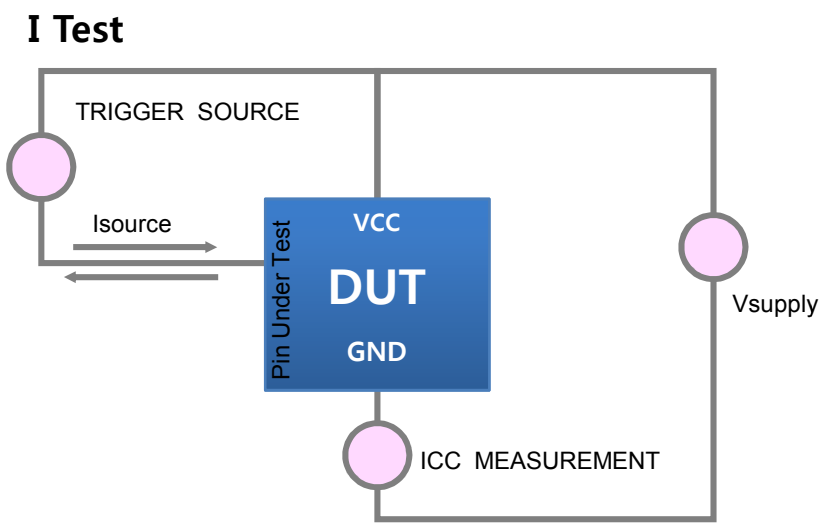
Model	Capacitor	Resister	Reference
HBM	C1=100pF	R1=1500 OHM	JEDEC
MM	C2=200pF	R2=10K to 10M OHM	JEDEC

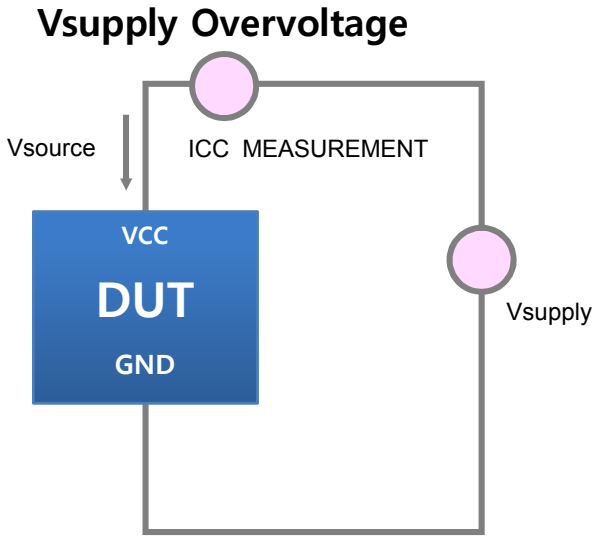
2. Test Result

Method	Target	Result	Remark
HBM (Human Body Model)	≥ 2,000V	≥ 4,000V	
MM (Machine Model)	≥ 200V	≥ 400V	
CDM (Charged Device Model)	≥ 500V	≥ 500V	

Latch-Up Test Result

3. Test Circuit & Method

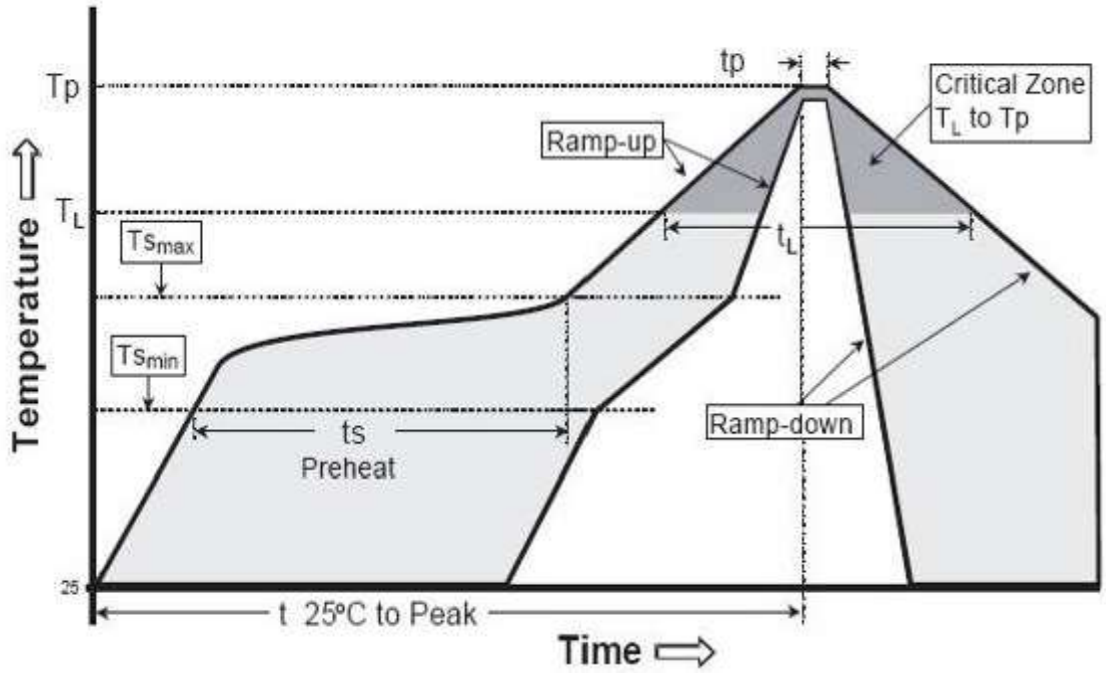




4. Test Result

Method	Target	Result	Remark
I Test (Positive / Negative)	≥ ±100mA	≥ ±500mA	JEDEC
Vsupply Overvoltage	≥ (1.5xVdd)	≥ 5.4V	

Reflow Profile



Profile Feature	Lead-free condition
Average Ramp-up Rate (Tsmax to Tp)	3℃ / second max.
Preheat : Temperature / Time	150℃ ~ 200℃ / 60 ~ 180seconds
Time maintained above : Temperature / Time	217℃ / 60 ~ 150seconds
Peak Temperature / Time	255℃ ~ 260℃ / 20 ~ 40seconds
Ramp-Down Rate	6℃/second max.
Time 25℃ to Peak Temperature	8 minutes max.

Reflow data

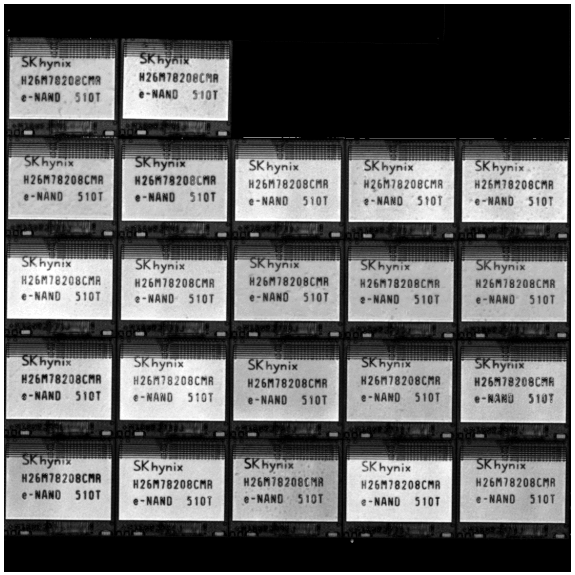
1. Pre-con. test result : Electrical Test

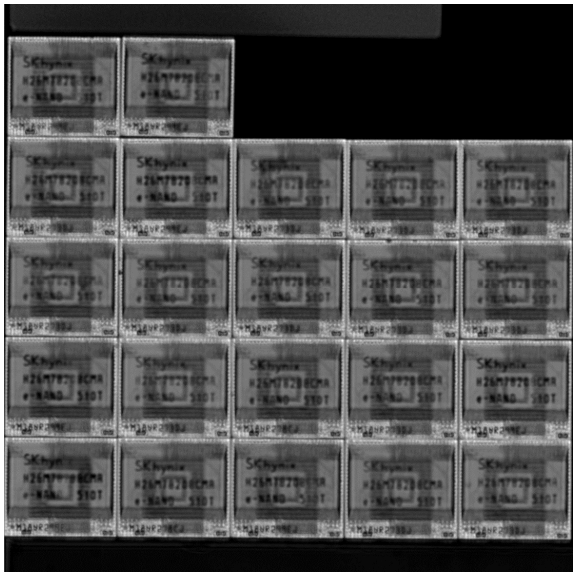
Sample Size	22 pcs
Test result	PASS
Remark	DC TEST (Open, Short, Pin leakage, ICC), Functional Test : Magnum, 25℃

2. Pre-con. test result : Internal Visual inspection

Sample Size	22 pcs
Test result	PASS
Remark	There is no crack or delamination.

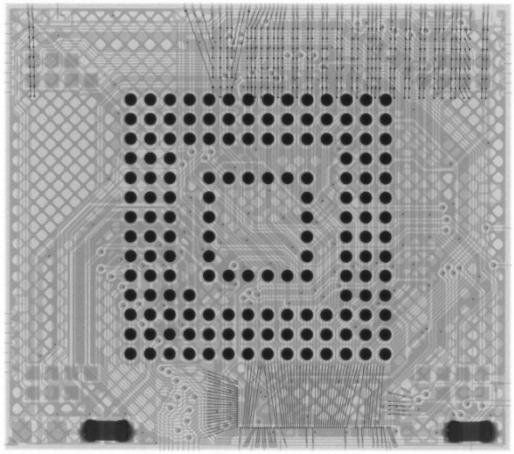
Note) SK hynix Preconditioning Flow :
T/C(-55℃~125 ℃) 5Cycle + Bake(125 ℃) 24Hours + 85 ℃ /85%RH 24Hours + Reflow (260 ℃) 3Cycle





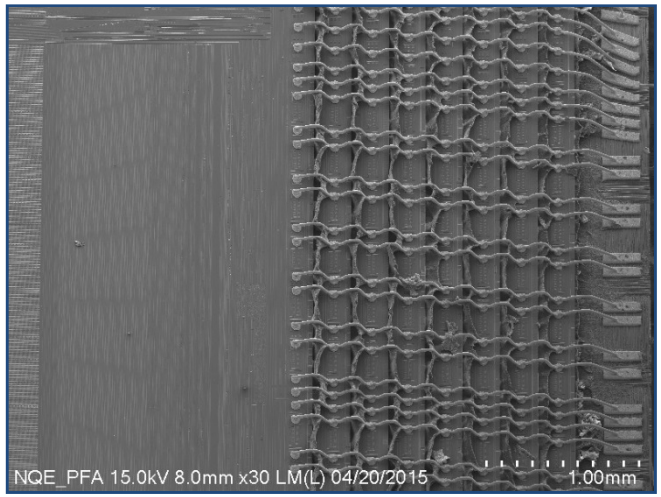
Package Construction

X-ray

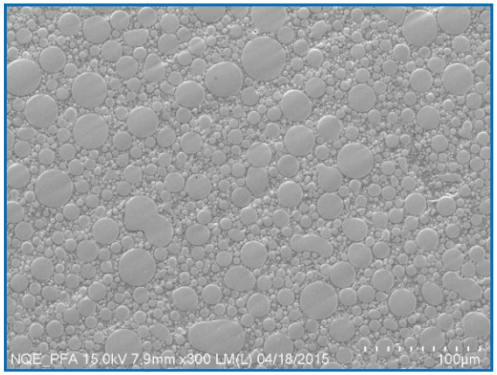


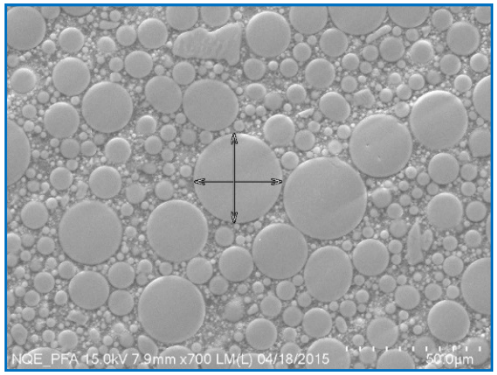
SAT

Wire Sweep Shape



EMC Void & Filler Shape





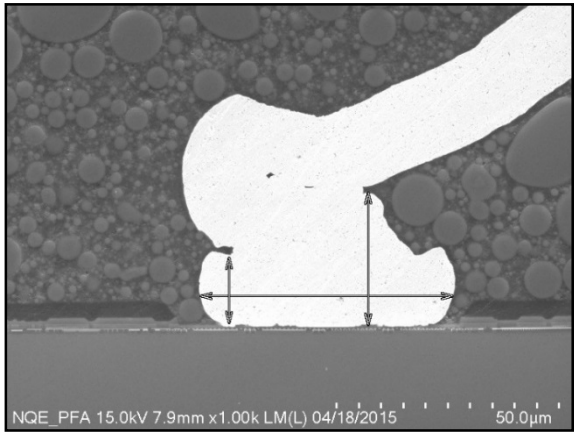
X-Axis	**32.4 um**
Y-Axis	**33.3 um**

Package Construction

대 외 비

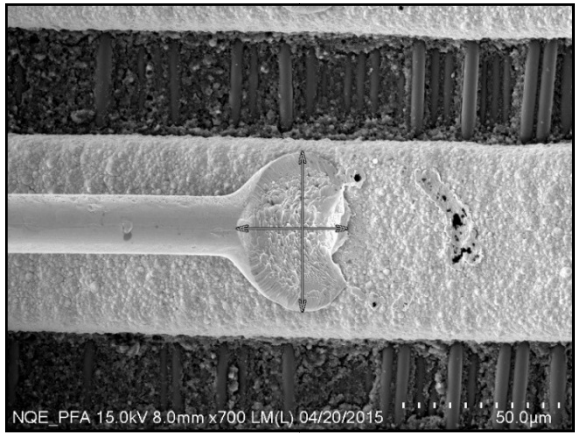
2015-05-16 ~ 2015-05-15

Ball Bonding Cross-Section



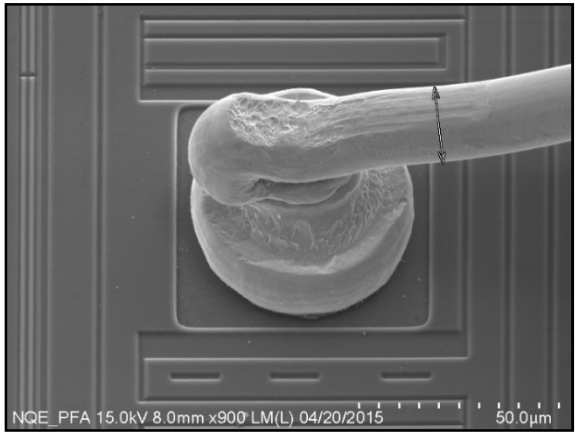
Ball Height	15.9 um
Bond Height	29.8 um
Ball Width	57.6 um

Stitch Bond Shape



X-Axis	36.1 um
Y-Axis	51.0 um

Ball Bonding Shape



Wire Diameter	19.1 um

Quality Control

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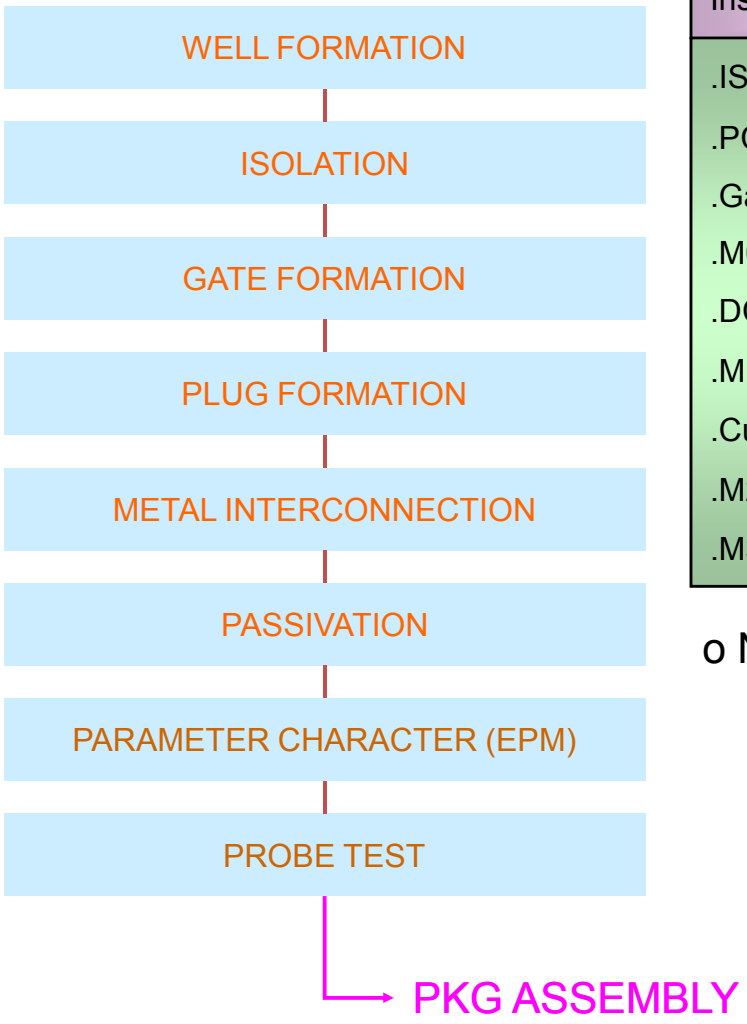
Fab Process Flow & Quality Control

Process Flow



o In-Line Inspection / Test

Inspection Step	Frequency	Sampling Plan
.ISO STI Etch CLN	Ending Lot #0,6	1WF / LOT
.PCL Etch CLN	Ending Lot #3,6,9	1WF / LOT
.Gate Etch CLN	Ending Lot #3,6,9	1WF / LOT
.M0 Etch CLN	Ending Lot #3,6,9	1WF / LOT
.DCT Etch CLN	Ending Lot #3,6,9	1WF / LOT
.M1 Etch CLN	Ending Lot #1,3,5,7,9	1WF / LOT
.Cu CMP CLN	Ending Lot #3,6,9	1WF / LOT
.M2 Etch CLN	Ending Lot #3,6,9	1WF / LOT
.M3 Etch CLN	Ending Lot #1,3,5,7,9	1WF / LOT

o Non-Conformance Lot Control

- NCRB (Non Conformance Review Board) Meeting : Weekly Meeting
- Member of NCRB: QC Eng'r, Process Eng'r, QRA Eng'r, Device Eng'r
- NCRB Lot
  1) Lots with values of response parameters out of specification limits
  2) Affected lot any non forecasted event occurring on equipment, environment, facilities.
  3) Non authorized rework lot

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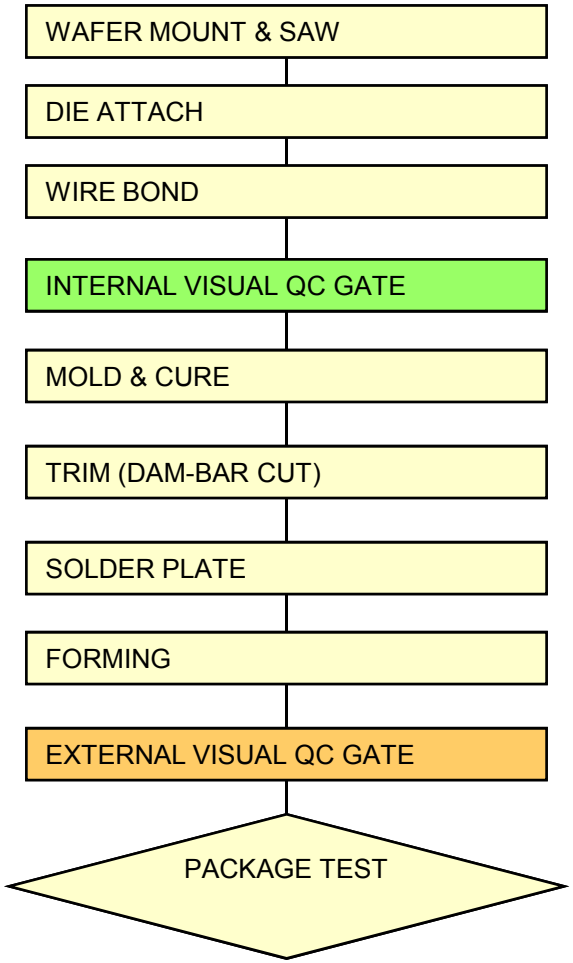
Package Process & Quality Control

Process Flow



o Incoming Inspection

MATERIAL	FREQUENCY	SAMPLING PLAN
. LEAD FRAME	EVERY LOT	AQL 0.10%
. GOLD WIRE	EVERY LOT	AQL 0.65%
. EPOXY MOLD COMPOUND	EVERY LOT	AQL 0.65%

o In-Line Inspection / Test

INSPECTION / TEST		FREQUENCY	SAMPLING
VISUAL INSPECTION MONITOR (By PROD)	• SAW	• Once/Mach/Run	• 2 Wafer(6Line)
	• DIE ATTACH	• Once/Mach/Lot	• 1 Strip
	• WIRE BOND	• Once/Mach/Lot	• 1 Strip
	• MOLD	• Once/Mach/Shift	• 1 Shot
	• SOLDER PLATE	• Once/Mach/Lot	• 5 Strip
	• FORMING	• Once/Mach/Lot	• 2Tray /Lot
QC VISUAL L/A	• INTERNAL VISUAL	• Every LOT	• LTPD 7%(0/1)
	• EXTERNAL VISUAL	• Every LOT	• LTPD 1,5%(0/1)
MECHANICAL TEST MONITOR (By QC)	• WIRE PULL	• Twice/Mach/Week	• 10 Wire
	• BALL SHEAR	• Twice/Mach/Week	• 10 Ball
	• BALL SIZE	• Once/Mach/Week	• 10 Ball
	• LOOP HEIGHT	• Once/Mach/Week	• 10 Wire
	• X-Ray INSPECTION	• Twice/Mach/Week	• 1 Shot
	• SAM	• Once/Mach/Week	• 1 Strip
	• COPLANARITY	• Twice/Mach/Week	• 10 Units
	• DEMENSION	• Twice/Mach/Week	• 10 Units

LTPD : Lot Tolerance Percent Defective / AQL : Acceptable Quality Level

* Mach : Machine

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TOP Marking Information

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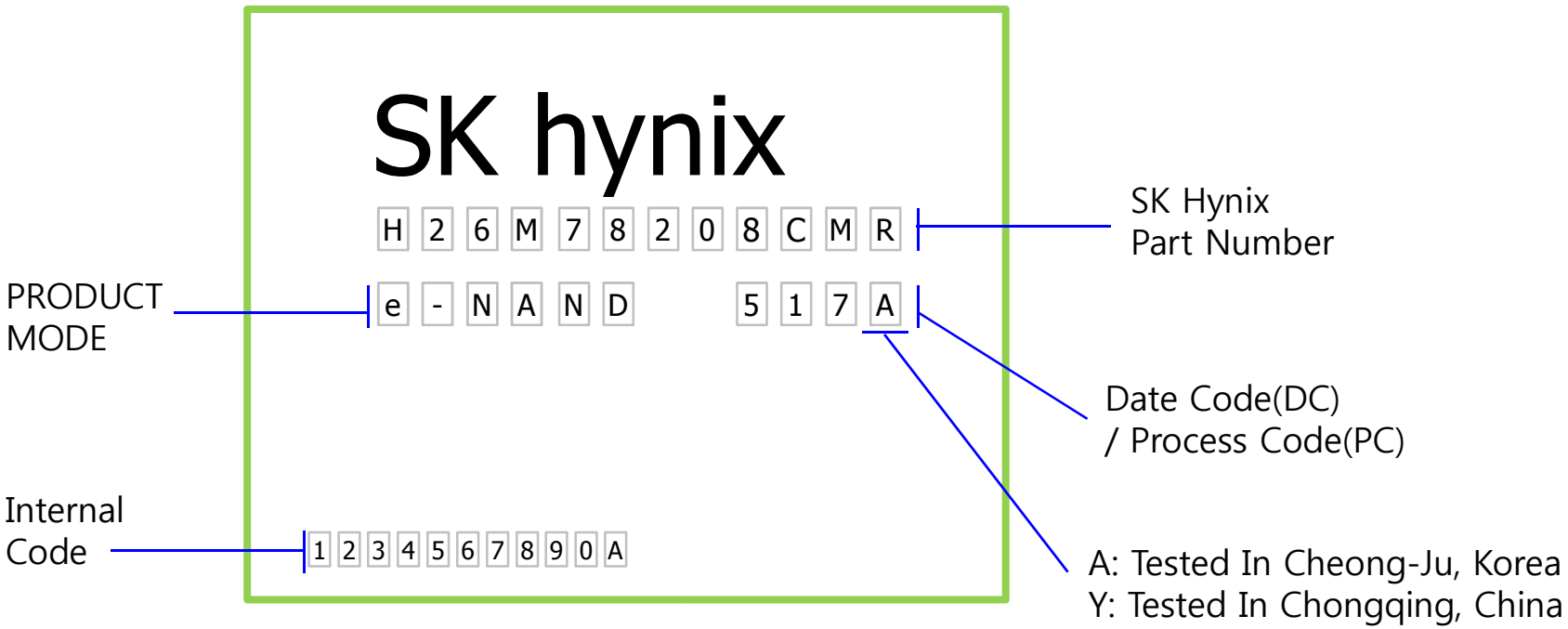
e-NAND Top Side Marking

Top Side



ICP Data

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ICP Test Report

대 외 비

2015-07-06 ~ 2016-07-06

Report No : RQ150416984991-1

Client

√ Name : Young-Eui Cho

√ Company : SK HYNIX INC.

√ Address : San 136-1 Ami-ri Bubal-eub Icheon-si Kyoungki-do 467-701, Korea

√ Date Of Receipt : 2015-04-24

Use of Report : Qualification

Test Sample : H26M78208CMR_Z3

Sample Description : Component

Date of Test : 2015-04-24

Testing Environment :

Test Results

Substance	Unit	D.L.	Result	Test Method	Equipment
Cadmium and its compounds	mg/kg	5	**n.d**	IEC 62321:2008	ICP-OES
Hexavalent chromium compounds	mg/kg	1	**n.d**	IEC 62321:2008	UV-Visible
Lead and its compounds	mg/kg	5	**15**	IEC 62321:2008	ICP-OES
Mercury and its compounds	mg/kg	1	**n.d**	IEC 62321:2008	ICP-OES
PBBs (Polybrominated biphenyls)	mg/kg	5	**n.d**	IEC 62321:2008	GC-MS
PBDEs (Polybrominated diphenyl ethers)	mg/kg	5	**n.d**	IEC 62321:2008	GC-MS

Tester	KANG JI SUK	Technical Manager	KIM AH JIN

Note :

1. D.L.: Detection Limit, n.d. : Not detected
2. The result(s) is (are) related only to the sample(s) tested
3. The result(s) could not be on advertisement and trial acts
4. The report shall not be reproduced without the written approval of SK HYNIX INC.

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Composition Data

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Composition Table

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2015-07-06 ~ 2016-07-06

Raw Material	(%)	Homogeneous Material	Chemical Maaterial	CAS No.	Mass.(g)	Average (%)	ppm
CAPACITOR	0	Capacitor	BaTiO3 type	12047-27-7	0.0005	0.163265306	1,632.65306122
		Capacitor	Ni	7440-02-0	0.00003	0.009795918	97.95918367
		Capacitor	Cu	7440-50-8	0.00001	0.003265306	32.65306122
FILM ADHESIVE	0.02	Film Adhesive	Polymer	29690-82-2	0.01761	5.750204082	57,502.04081632
GOLD WIRE	0	Gold Wire	Gold	7440-57-5	0.00198	0.646530612	6,465.30612244
MOLD COMPOUND	0.18	Epoxy Resin	Polymer	29690-82-2	0.01762	5.753469388	57,534.69387755
		Filler	Silica fused	60676-86-0	0.15858	51.78122449	517,812.24489795
SOLDER BALL(SF)	0.02	Solder Ball	Tin	7440-31-5	0.01578	5.152653061	51,526.53061224
Si CHIP	0.05	Si Chip	Aluminium	7429-90-5	0.00011	0.035918367	359.18367346
		Si Chip	Silicon	7440-21-3	0.04574	14.935510204	149,355.10204081
		Si Chip	Titanium	7440-32-6	0.00009	0.029387755	293.87755102
		Si Chip	Tungsten	7440-33-7	0.00005	0.016326531	163.26530612
SUBSTRATE	0.05	Substrate	Polymer	29690-82-2	0.02119	6.919183673	69,191.83673469
		Substrate	Nickel	7440-02-0	0.01107	3.614693878	36,146.93877551
		Substrate	Copper	7440-50-8	0.01577	5.149387755	51,493.87755102
		Substrate	Gold	7440-57-5	0.00012	0.039183673	391.83673469
					0.30625	100	1,000,000

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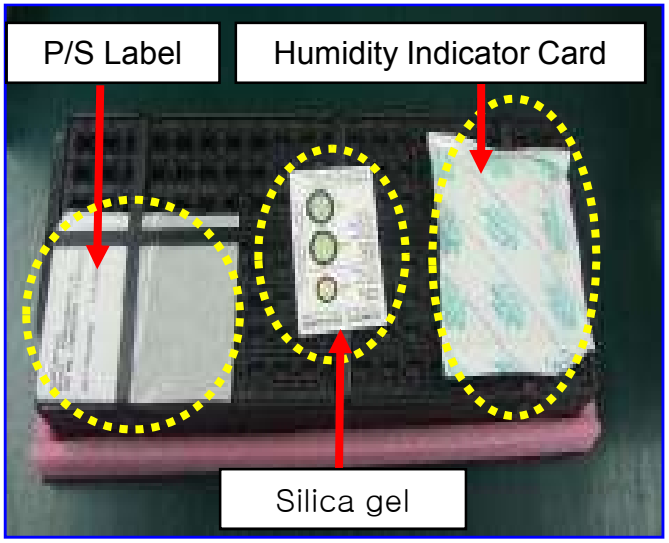
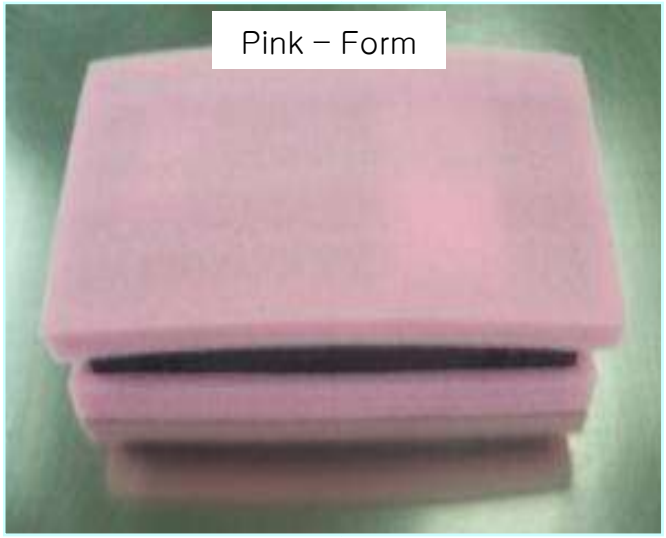
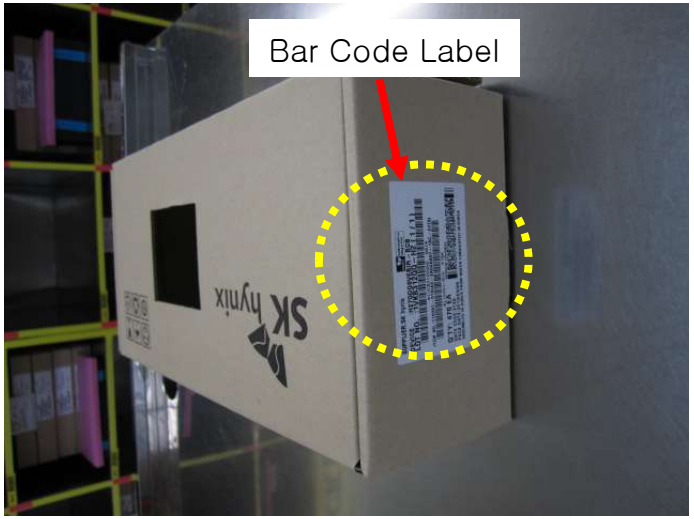
Product delivery type

Box Label







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Box Label

대 외 비

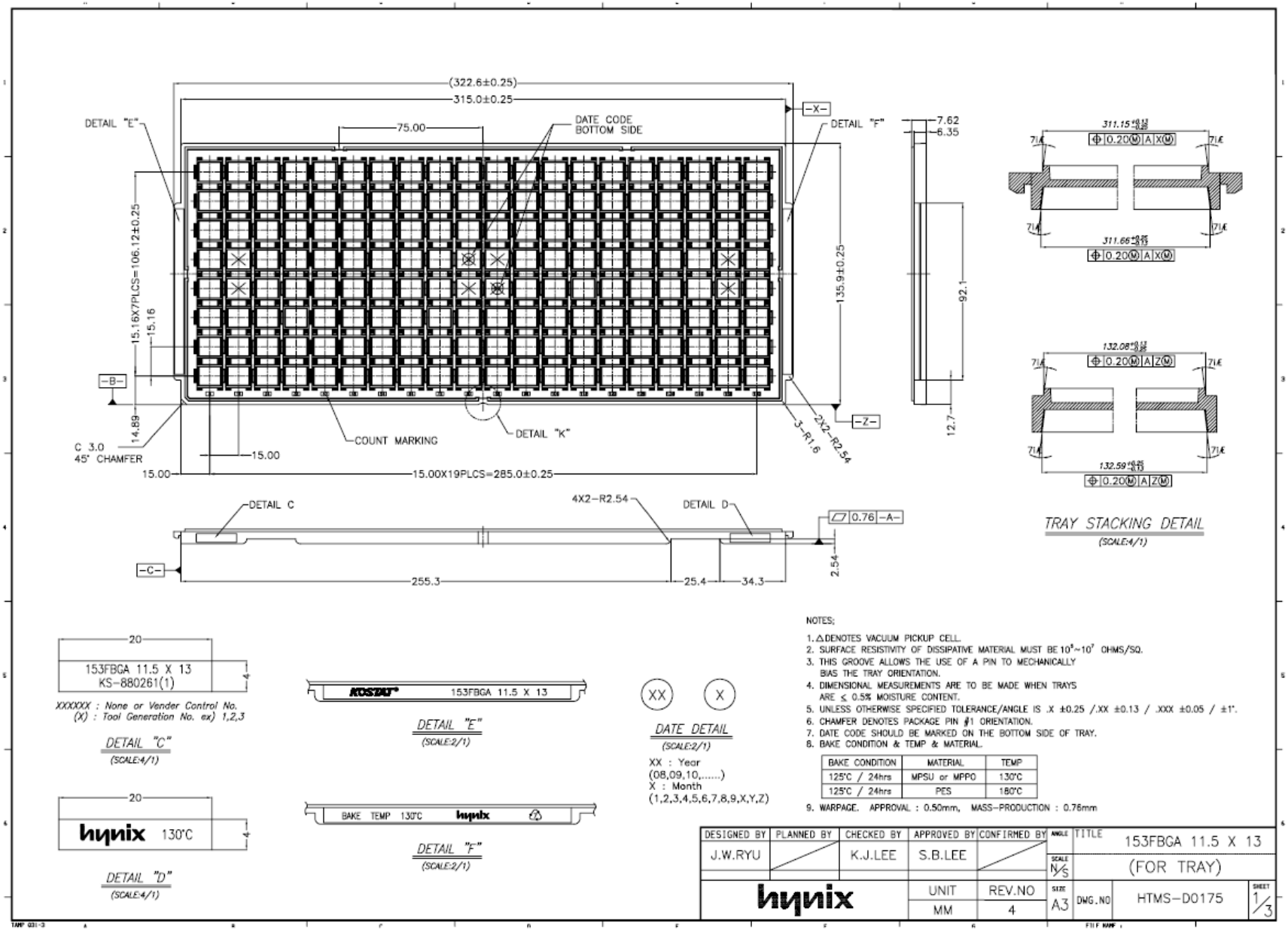
2015-07-06 ~ 2016-07-06

No	Item	Detail
01	▪ SUPPLIER	▪ hynix
02	▪ Logo	▪ Logo
03	▪ DEVICE	▪ Device code
04	▪ LOT NO	▪ LOT NO
05	▪ Sequence NO	▪ LOT
06	▪ BAR CODE	▪ LOT NO& BAR CODE
07	▪ BAR CODE	▪ LOT NO& BAR CODE
08	▪ ITEM NO	▪ SAP CODE
09	▪ Batch	▪ Batch code
10	▪ BAR CODE	▪ SAP CODE
11	▪ 10th BAR CODE	▪ SAP CODE
12	▪ Q'TY	▪ Q'ty
13	▪ Additional information	▪ Additional information
14	▪ DATE CODE	▪ MARK WW
15	▪ 2D BARCODE	▪ 2D BARCODE
16	▪ PACK DATE	▪ PACK DATE
17	▪ Origin	▪ Origin

Tray for 153FBGA 11.5 x 13 PKG

대 외 비

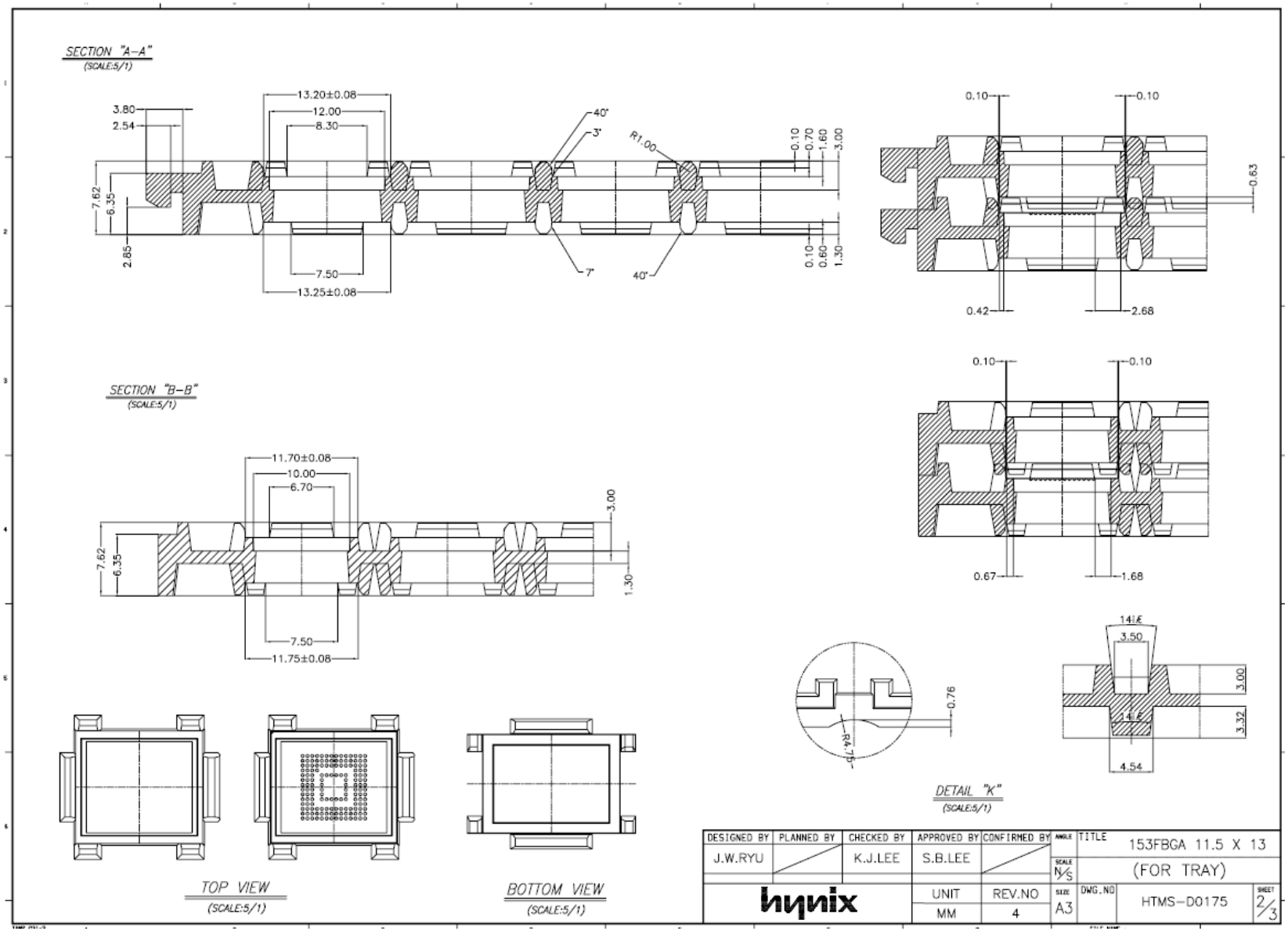
2015-07-06 ~ 2016-07-06



Tray for 153FBGA 11.5 x 13 PKG

대 외 비

2015-07-06 ~ 2016-07-06



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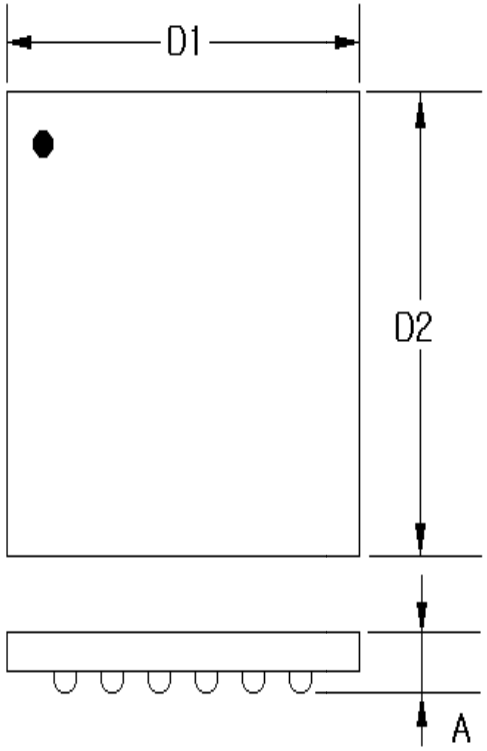
Package Dimension



Unit : mm

SYMBOL	A		D1		D2	
	MIN	MAX	MIN	MAX	MIN	MAX
DIMENSION	0.9	1.0	11.40	11.50	12.90	13.00

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Packing Specification

- LOT SIZE : 2K PCS / REEL

- PACKING LIST
  - . CUSTOMER NAME AND CUSTOMER PART NAMBER.
  - . LOT NUMBER AND DATE NUMBER.
  - . MANUFACTURER PART NUMBER.
  - . QUANTITY OF COMPONENTS PER REEL.
  - . COMPONENT TYPE, REELING DATE AND REEL NUMBER.

- PACKING BAG : DRY PACKING USING Al LAMINATED BAG WITH THE PRINTED CAUTION STICKER

- DESICCANT : SILICAGEL(50gr) WITH HUMIDITY INDICATOR IN PACKING BAG

- SEALING METHOD : HEAT SEALING

- TAPE(COVER & CARRIER) SELF LIFE : ONE YEAR

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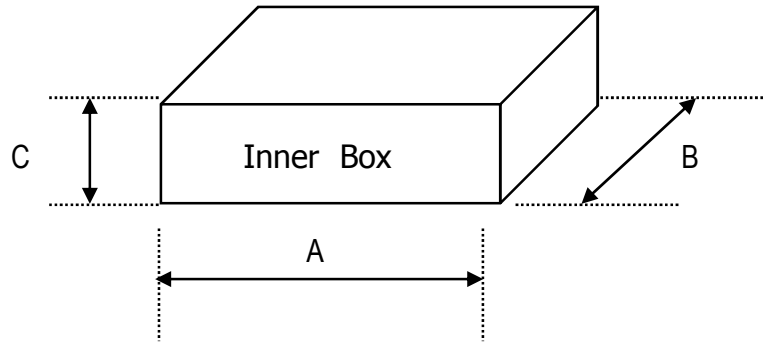
Packing Quantity

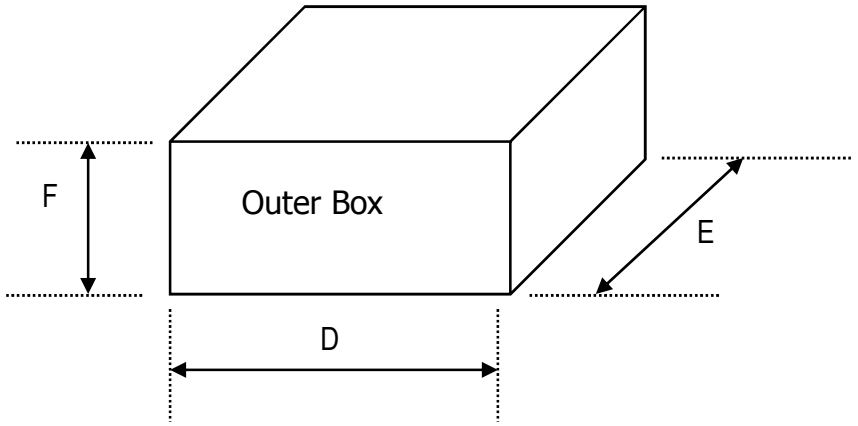
Item	FBGA (Tape & Reel)
Quantity per 1PM	2,000 pcs
Quantity per 1 antistatic Bag	2,000 pcs
PM Quantity per 1 antistatic Bag	1 reel
Quantity per 1 Inner Box	2,000 pcs
Quantity per 1 Outer Box	10,000 pcs

* PM : Packing Material

Packing Specification

-. BOX SIZE





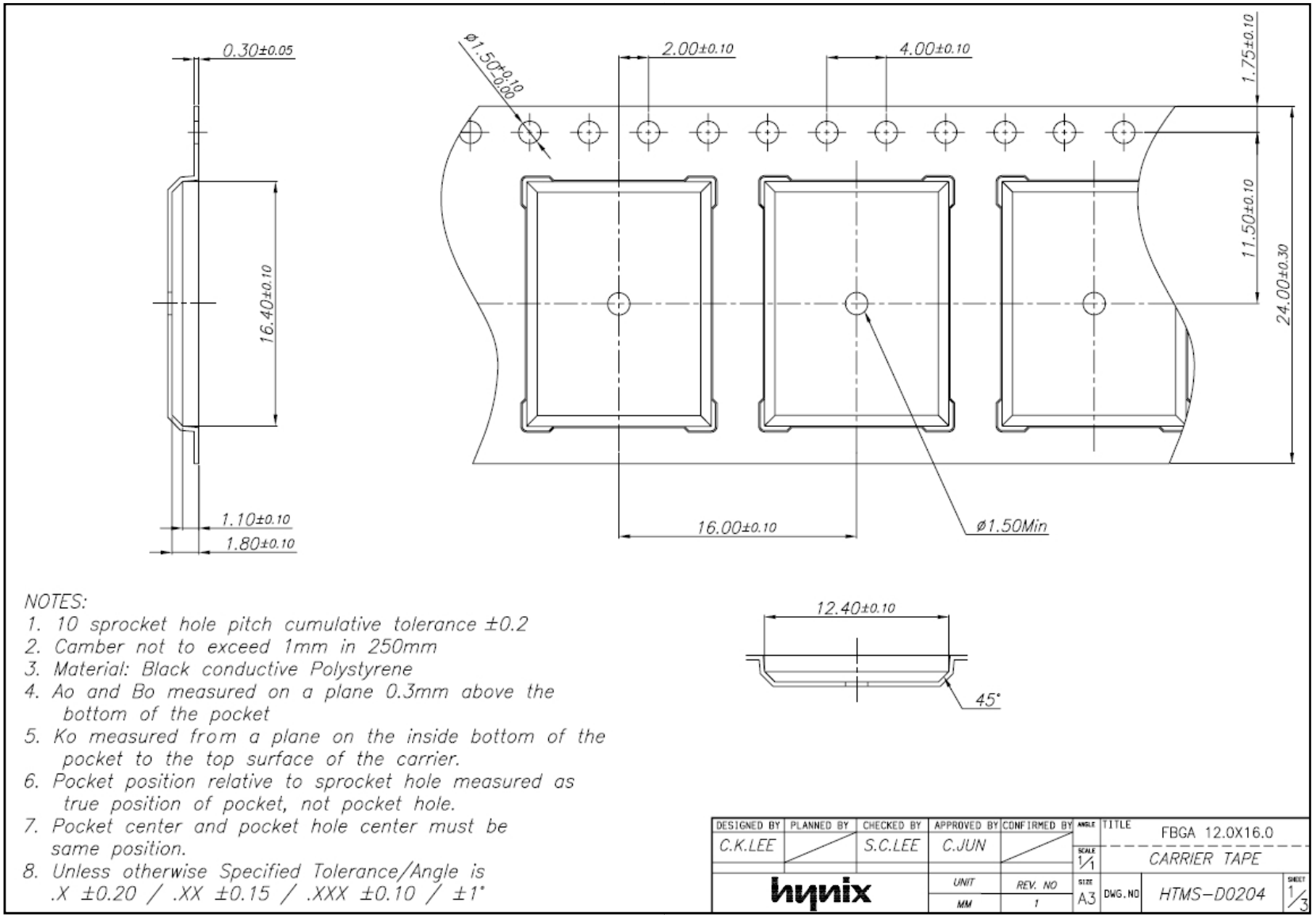
unit : mm

Item	Inner Box			Outer Box		
	A	B	C	D	E	F
Tape & Reel	370	350	55	385	330	370

Carrier Tape Spec.

대 외 비

2015-07-06 ~ 2016-07-06



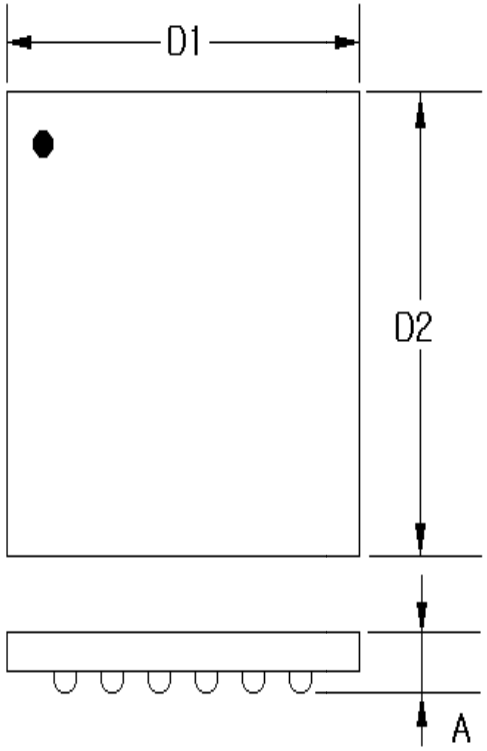
NOTES:

1. 10 sprocket hole pitch cumulative tolerance ±0.2
2. Camber not to exceed 1mm in 250mm
3. Material: Black conductive Polystyrene
4. Ao and Bo measured on a plane 0.3mm above the bottom of the pocket
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.
7. Pocket center and pocket hole center must be same position.
8. Unless otherwise Specified Tolerance/Angle is .X ±0.20 / .XX ±0.15 / .XXX ±0.10 / ±1°

DESIGNED BY	PLANNED BY	CHECKED BY	APPROVED BY	CONFIRMED BY	ANGLE	TITLE	FBGA 12.0X16.0	
C.K.LEE		S.C.LEE	C.JUN		SCALE 1/1		CARRIER TAPE	
hynix			UNIT MM	REV. NO 1	SIZE A3	DWG.NO	HTMS-D0204	SHEET 1/3

SK hynix

Package Dimension



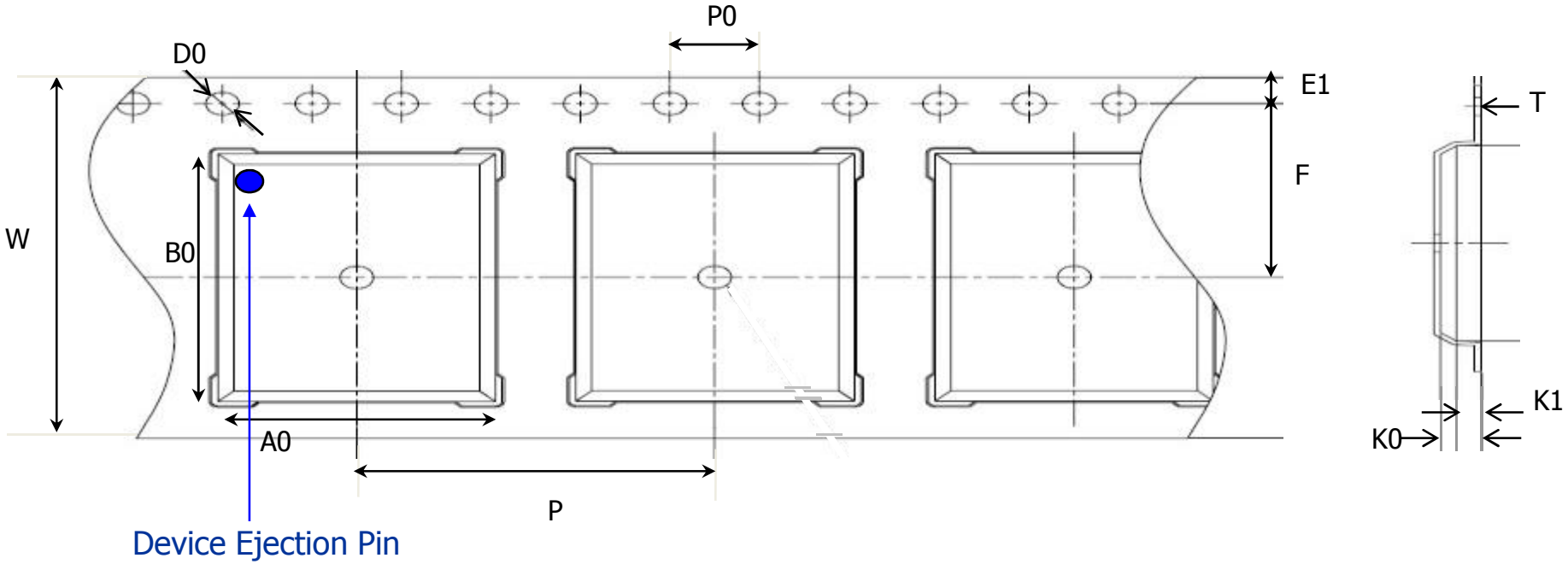
Unit : mm

SYMBOL	A		D1		D2	
	MIN	MAX	MIN	MAX	MIN	MAX
DIMENSION	0.9	1.0	11.90	12.00	15.90	16.00

SK hynix

Carrier Tape Dimension

대 외 비
2015-07-06 ~ 2016-07-06



Unit : mm

symbol	W	P	A0	B0	K0	K1	T	D0	P0	E1	F
Dimension	24.0±0.3	16.0±0.1	12.40±0.1	16.40±0.1	1.80±0.1	1.10±0.1	0.30±0.05	1.50 +0.1 -0.0	4.00±0.1	1.75±0.10	11.50±0.10

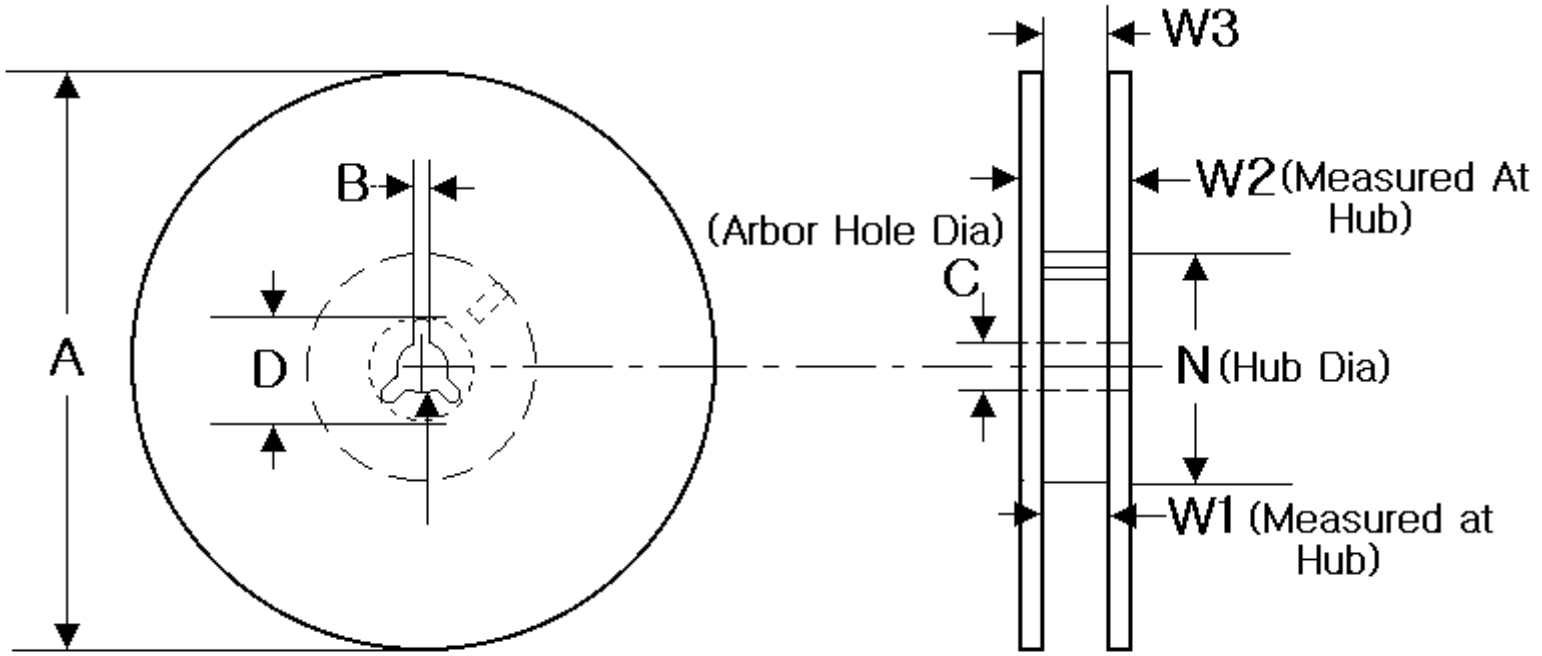
SK hynix

Cover Tape Dimension

Unit : mm

Item	Dimension
Carrier Width	W = 24.0 ± 0.3 mm
Thickness	0.055 ± 0.005
Cover Tape Width	21.3 ± 0.1

Reel Dimension



UNIT : mm

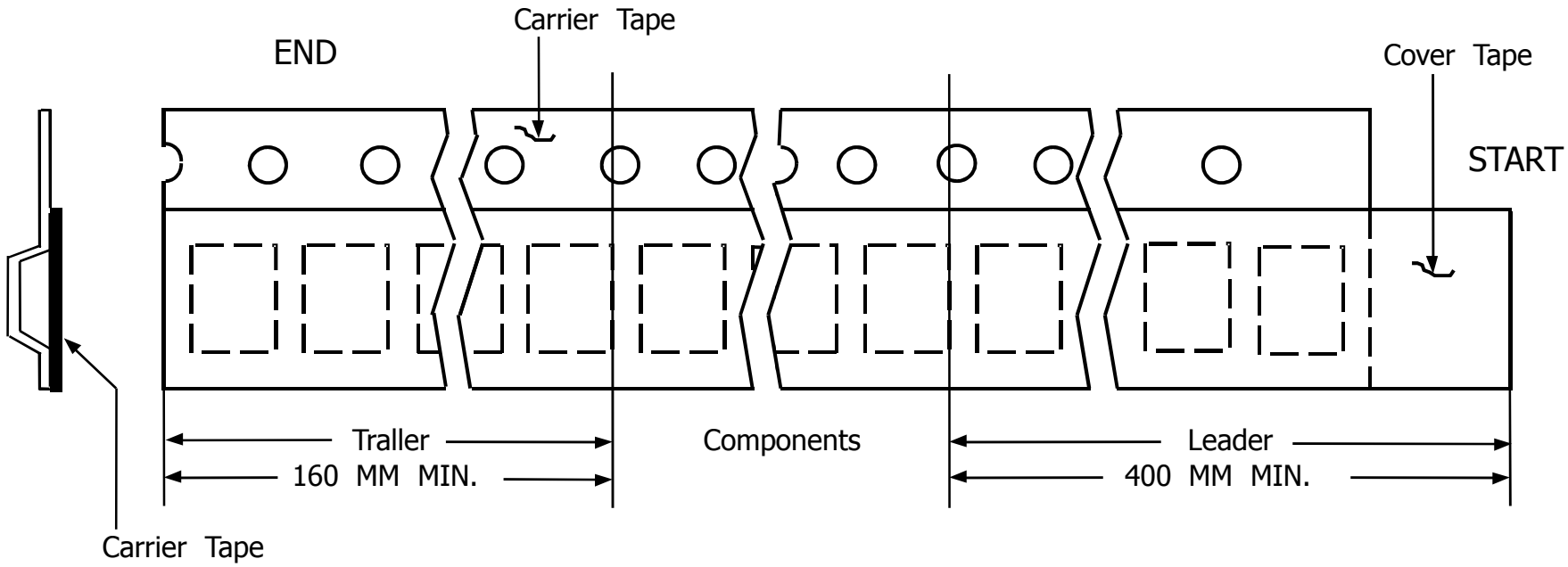
TYPE (W)	A	B (MIN)	C (+0.5) (-0.2)	D	N	W1 (+2.0) (-0.0)	W2 (MAX)	W3
24 mm	330±2.0	1.5	13.0	20.2(MIN)	100±2.0	24.4	30.4	23.9~27.4

SK hynix

Tape Leader & Trailer Dimension

대 외 비

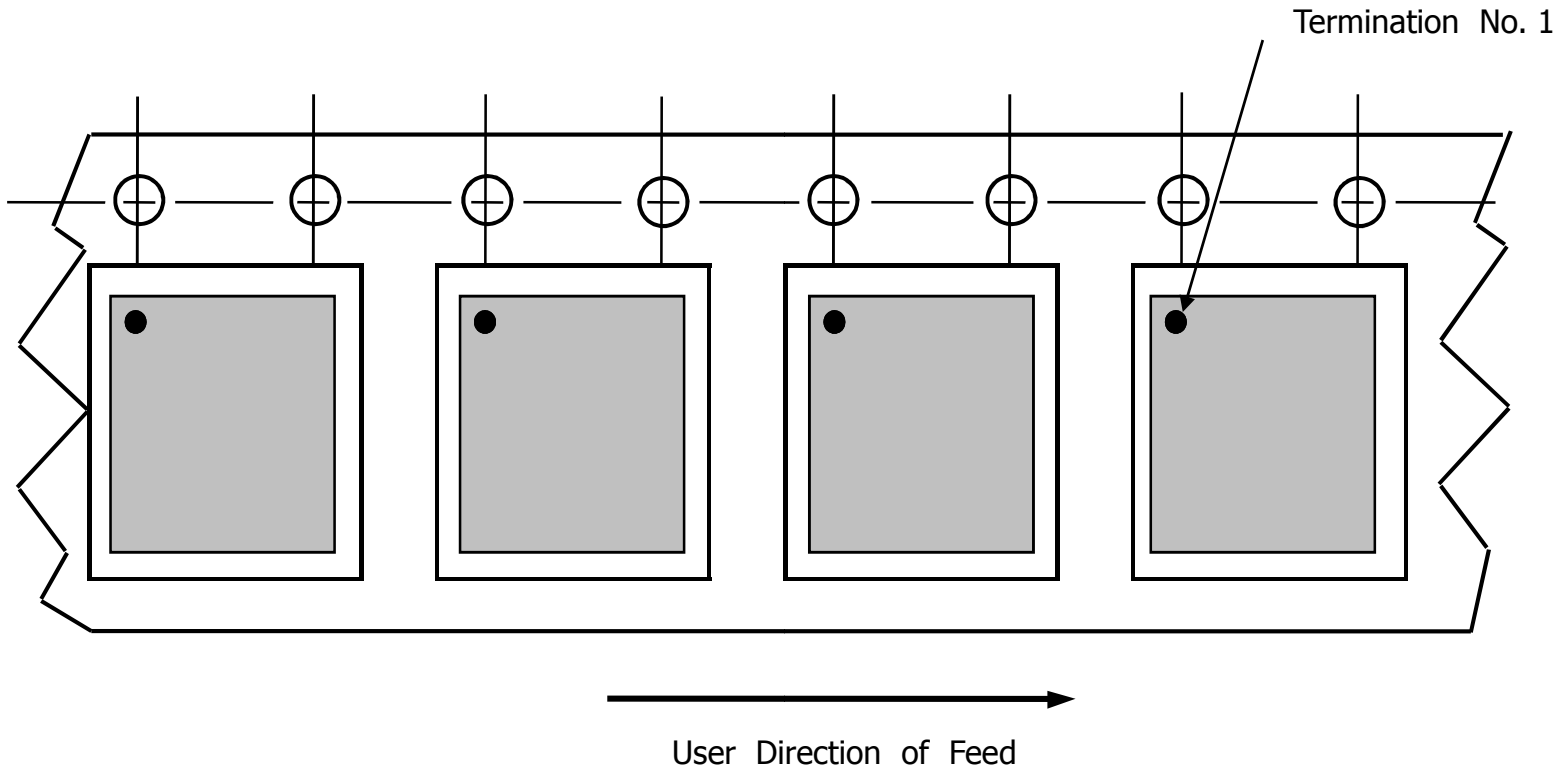
2015-07-06 ~ 2016-07-06



TAPE REELING DIRECTION : THE TAPE IS REELED IN A CLOCKWISE DIRECTION WHEN THE SPROCKET SIDE IS FURTHEST FROM YOU.

SK hynix

Mechanical Polarization



Carrier Tape Packing Image

Item	Pictures
Carrier tape &Reel	
Packing	
Inner-Box	
Outer Box (Inner-Box_5ea)	

The Keeping Condition

1) The keeping condition before open the dry packing.

12 month, < 40℃ / 90%RH below.

2) The keeping condition after open the dry packing.

30 ℃ / 60%RH below it has to use within 168hrs after open the dry packing or Stored at < 20%RH.

3) It's necessary to bake in case of using after 168hrs opened the day packing.

- Bake condition
  - Tray : 125 ℃ / 5hrs
  - Tape & reel : 40℃ / 192hrs (recommend condition), Do not over 50℃.
  - Reflow is allowed by 3 times after bake in the condition above.

4) If you have using the device within 168hrs after open the dry packing, the others will be keeping by Re-dry packing. (This device also allows 3times IR reflow.)

Attachment) Moisture Caution

Caution

This bag contains

MOISTURE-SENSITIVE DEVICES

Do not open except under controlled conditions

LEVEL 3

1. Calculated shelf life sealed bag : 12 months at < 40℃ and < 90% relative humidity(RH)
   在温度<40度和相对湿度<90%（RH）且在密封良好的情况下，相关产品的保质期为12个月。
2. After bag is opened, devices that will be subjected to reflow solder or high temperature process must
   在打开包装后，相关设备将受制于回流焊接机或高温影响，则必须
   a) Mounted within : 168 hours of factory conditions < 30℃ / 60%RH, or
      168小时内，在工厂条件为温度<30度，相对湿度<60%的情况下进行安装，或者
   b) Stored at < 20%RH
      在相对湿度<20%的条件下保管相关产品
3. Devices require bake, before mounting, if Humidity Indicator Card is > 10% when read at 23 ± 5℃
   如果湿度指示卡标示在23±5度即湿度>10%的情况下，安装前需要烘焙相关设备，
4. If baking is required, devices may be baked for 192hours at 40℃, < 5%RH or 5hours at 125℃
   烘焙相关设备时，设备应在温度40度，相对湿度<5%的情况下进行192小时烘焙，或在125度条件下烘焙 5个小时。
   Caution : Tape & Reel or tubes will melt at 125℃, Trays must be used at 125℃
   注　　意：胶带和卷轴或管子在125度时会发生融化，这时必须使用托盘进行烘焙。

SK hynix

Humidity Indicator Card

Humidity Indicator Card (HIC)

At minimum, the HIC shall have three (3) color spots with sensitivity values of 5%, 10% RH and 60% RH.
An example HIC is shown in Figure 1. The spots shall indicate the humidity with a significant,
perceptible change in color (hue) as indicated in Table 1, when tested using the test method in Appendix A(Please refer ot JEDEC Spec.).
The colors shall be described in writing on the card.

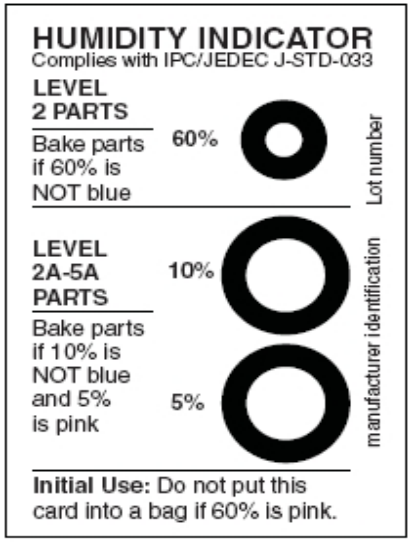


Figure 1. Humidity Indicator Card

Table 1. Typical HIC Spot Compliance

	Indication at 2% RH Environment	Indication At 5% RH Environment	Indication At 10% RH Environment	Indication At 55% RH Environment	Indication At 60% RH Environment	Indication At 65% RH Environment
5% Spot	Blue (dry)	Lavender (spot value) **change ≥7% hue**	Pink (wet)	Pink (wet)	Pink (wet)	Pink (wet)
10% Spot	Blue (dry)	Blue (dry)	Lavender (spot value) **change ≥10% hue**	Pink (wet)	Pink (wet)	Pink (wet)
60% Spot	Blue (dry)	Blue (dry)	Blue (dry)	Blue (dry)	Lavender (spot value) **change ≥10% hue**	Pink (wet)

Note: Other color schemes may be used