

1. Purpose

Establish a procedure to notify SanDisk of impending partner, supplier or subcontractor-initiated product or process changes, planned product discontinuations, and product alerts. Create an effective interface between partners, subcontractors, suppliers and SanDisk by specifying when and how to provide notification. This will assist SanDisk in managing changes that may affect SanDisk products, the transition of on-going requirements and end-of-life supply. Additionally, it will ensure continuity of supply to SanDisk's customers and fully compliant performance to the requirements of all specifications and contractual agreements.

2. Scope

Applies to all partners, direct material suppliers, subcontractors (contract manufacturers), ODM, Test, and Fulfillment Centers that are manufacturing, inspecting or testing SanDisk products, and all suppliers providing production parts or purchased products to SanDisk, or SanDisk's subcontractors.

3. Roles and Responsibilities

Primary Owner, Department: Corporate Procurement

Primary Implementation Department:

- Asia Supply Chain – Asia QA
- Fulfillment Centers – Customer Quality / Fulfillment Manager
- Silicon Suppliers – Corporate Silicon Procurement
- ODM – Asia QA
- Silicon Wafer Partners – Japan Operations

Review, approval and implementation Department(s): Asia Procurement, Asia QA, Customer Quality, Corporate Silicon Procurement, Japan Operations, Corporate Procurement, Retail / Systems Engineering, Supplier Quality Engineering (SQE), Supply Chain Management, Finance, Product/Program Management, relevant functions in Business Units (BU) as per CCB matrix.

4. Definitions

Supplier	Any entity supplying components or assemblies to SanDisk, including Original Equipment Manufacturers (OEM), Value-Added Resellers (VAR), Distributors, and Original Design Manufacturers (ODM).
Direct Material Supplier	A supplier who provides SanDisk specification products that are incorporated into finished goods,
Form	The composition of materials of a product and their physical arrangement (i.e., the weight, density, chemical or material composition, size, shape, structure, appearance, protocol, pattern, composition, configuration and marking identification of a product). Remark: Product versions that differ only in Form are interchangeable in use.
Fit	The suitability or readiness of a product for a particular application, including environmental extremes, marginal parameters, physical and signal compatibility with interfacing systems and surroundings, level of performance, safety margins, reliability, maintainability, and install ability. Remark: Fit changes create a new product.
Function	The set tasks or purposes of which the customer, including all the tasks generally, uses a product accepted for the product and those specifically

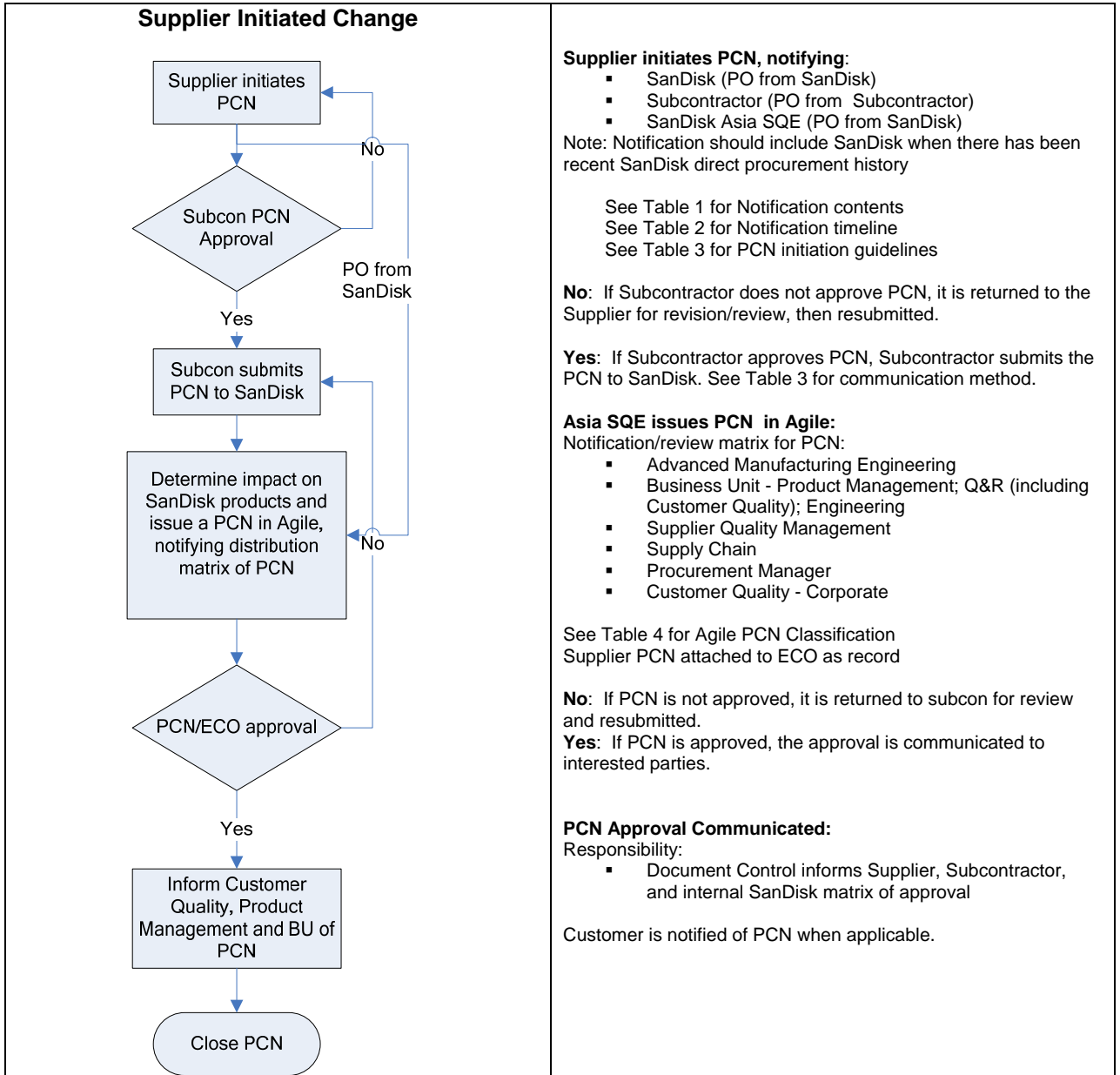
	designated by the customer.
	Remark: Function changes create a new product.
Reliability	The probability that a product can perform its intended function for a specified interval under stated conditions.
Change	An alteration to a product and/or related process, that may or may not result in an impact to form, fit, function or reliability of the product.
Major Change	An alteration to a product and/or related process, which may result in an impact to form, fit, function or reliability of the product.
Minor Change	An alteration to a product and/or related process, which does not result in an impact to form, fit, function or reliability of the product.
Process	The materials, equipment, and methods used to manufacture the product.
Product or Process Change Notice (PCN)	A document sent to customers describing product or process changes, the reasons for the change, and the projected impact of the change.
Product discontinuance	Discontinuation of product that will not be available for any reason.
Product (Quality) Alert	A formal written notification that a product has an issue that may adversely affects its use or reliability.
Purchased Product	A finished assembly purchased from a supplier to be sold to SanDisk customers after going through a back end process that may include labeling, packaging, inspection and test before shipping.
Implementation Date	The date on which the supplier / subcontractor expects to begin applying changes to their product or related processes.
Last Time Buy (LTB) Date	The last date that the supplier / subcontractor will accept and honor a purchase order for the unchanged or obsolete product.
Last Time Ship Date	This is the date at which the supplier / subcontractor expects to have completed shipment of product placed via LTB orders. The product shipped is guaranteed to be the obsolete part (not its replacement), or the unchanged product.
Notification	A formal written document from the supplier / subcontractor regarding product/process change, product discontinuance or product (quality) alert.

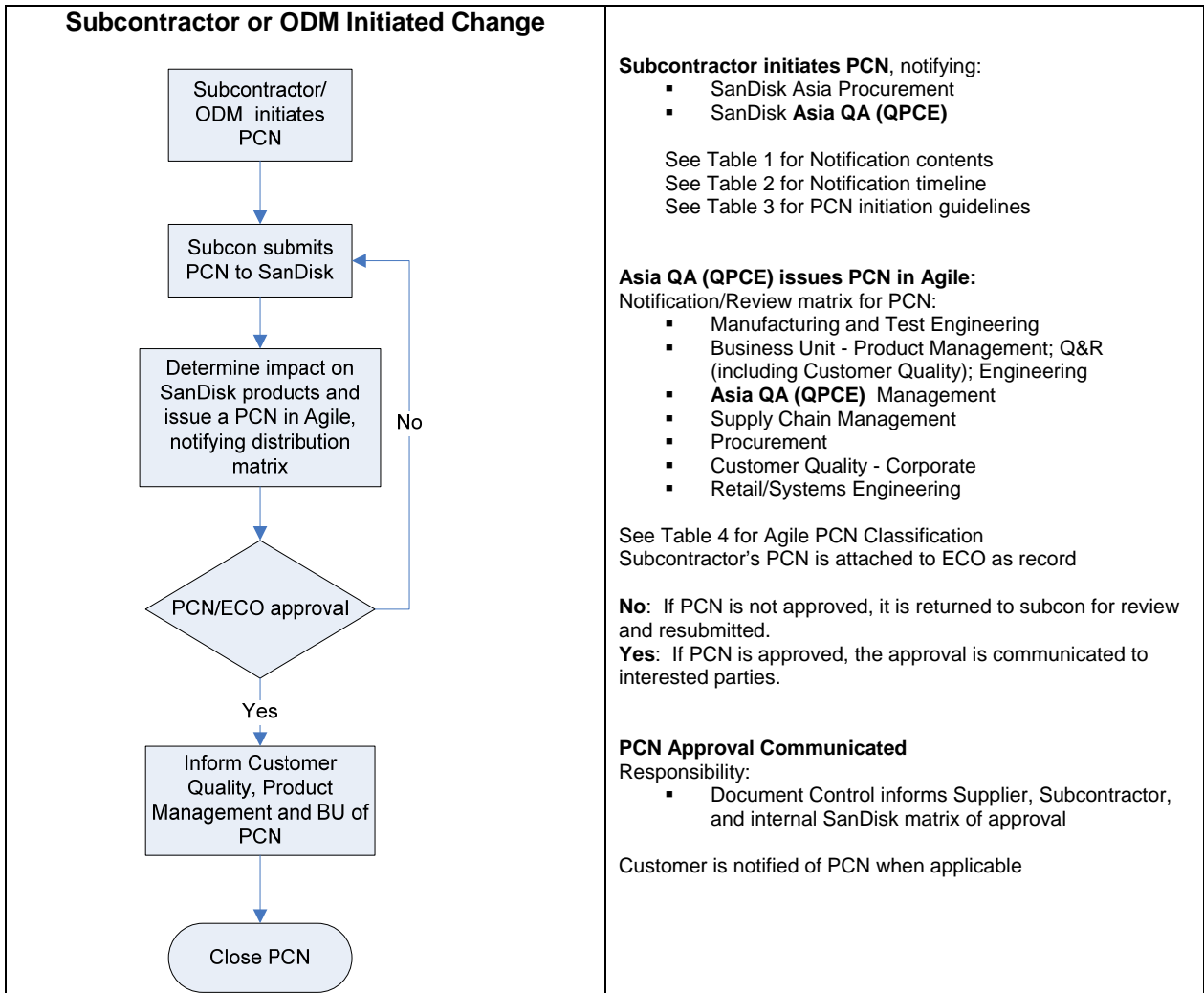
5. Requirements

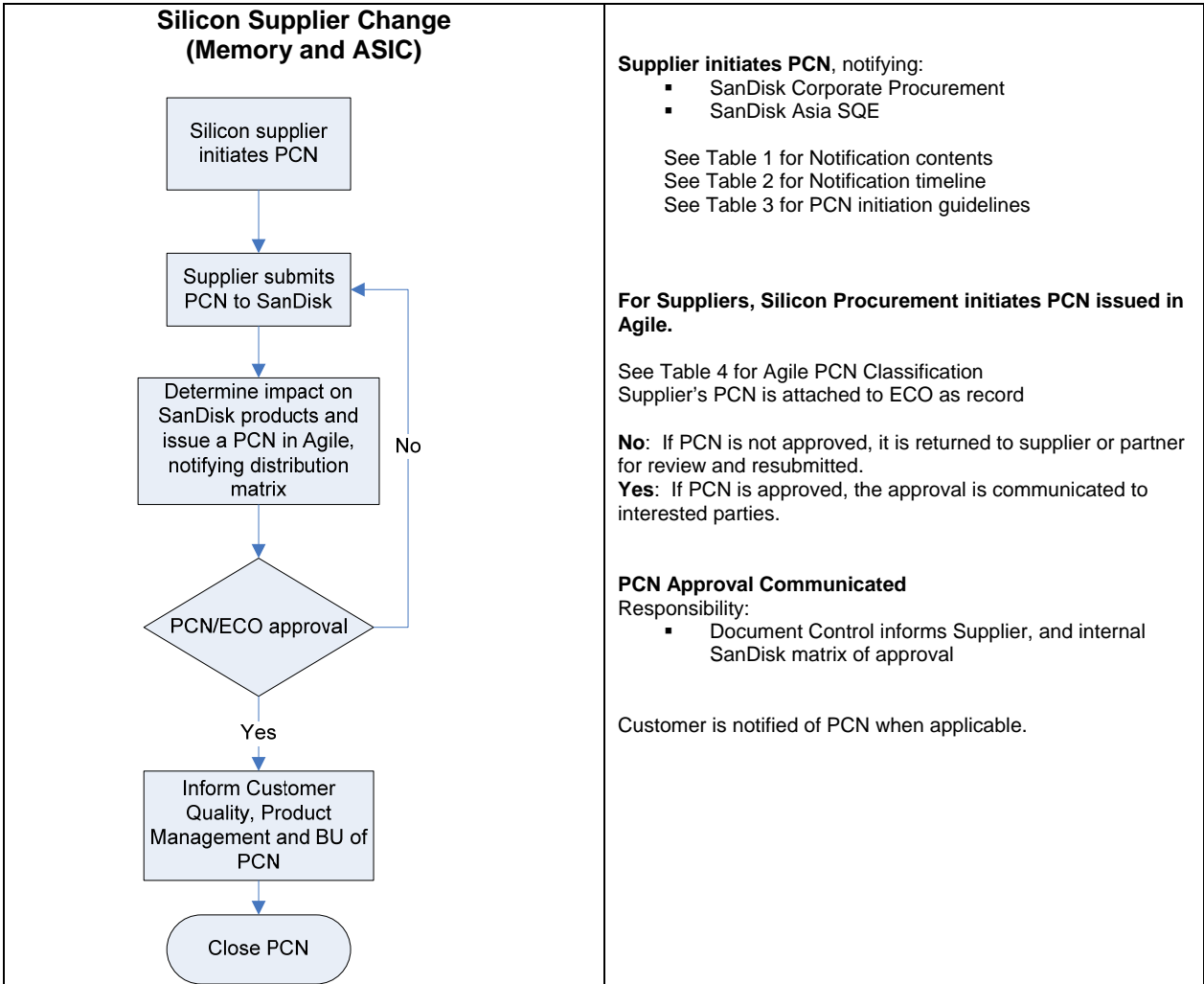
1. Procurement is responsible for the communication with Suppliers and Subcontractors, and to include this procedure in relevant contractual agreements, and notify supplier/subcontractors if a change is acceptable to SanDisk or not
2. All Suppliers and Subcontractors must have at least a PCN process compliant to JESD 46, and a product discontinuance process compliant with JESD 48. Refer to Process Flows Section 7.0
3. Direct Material Suppliers and Purchased Product Suppliers are responsible to follow this procedure, notifying SanDisk's Subcontractors or SanDisk Shanghai or ODM Procurement in a timely manner of impending changes, planned discontinuations, and alerts related to the products/processes they supply to SanDisk or SanDisk's Subcontractors or SanDisk's Retail Fulfillment Centers.
4. Silicon Supplier/Silicon Partner Supplier or Subcontractor or ODM of a product that is manufactured based on SanDisk' specifications (i.e. unique to SanDisk' part or a die level of a product) should be treated in the following way:
 - These providers are responsible for notifying SanDisk before making any change to a process whether the changes affect the form, fit, or function of the component or not.
 - Subcontractors will also notify SanDisk whenever they are notified of an impending change to any component used in the assembly of SanDisk products, by one of their suppliers.

- ODM Suppliers are to notify SanDisk whenever there is an impending change to an ODM product affecting form, fit, function or reliability of SanDisk products.
- 5. The Primary Implementation Department as specified in Section 3, Roles and Responsibilities, is responsible for initiating the PCN through Agile (refer to Document Control Procedure), and including, as appropriate, the qualifications data/reports as attachments.
- 6. Product Marketing is responsible to notify customers when required, per the Product Change Notification Procedure.
- 7. Product Management / Retail Engineering / BU Engineering are responsible to initiate ECO, as needed, to update SanDisk product documentation, refer to Product Reliability and Qualification Test Procedure and Document Control Procedure.

6. Process Flows







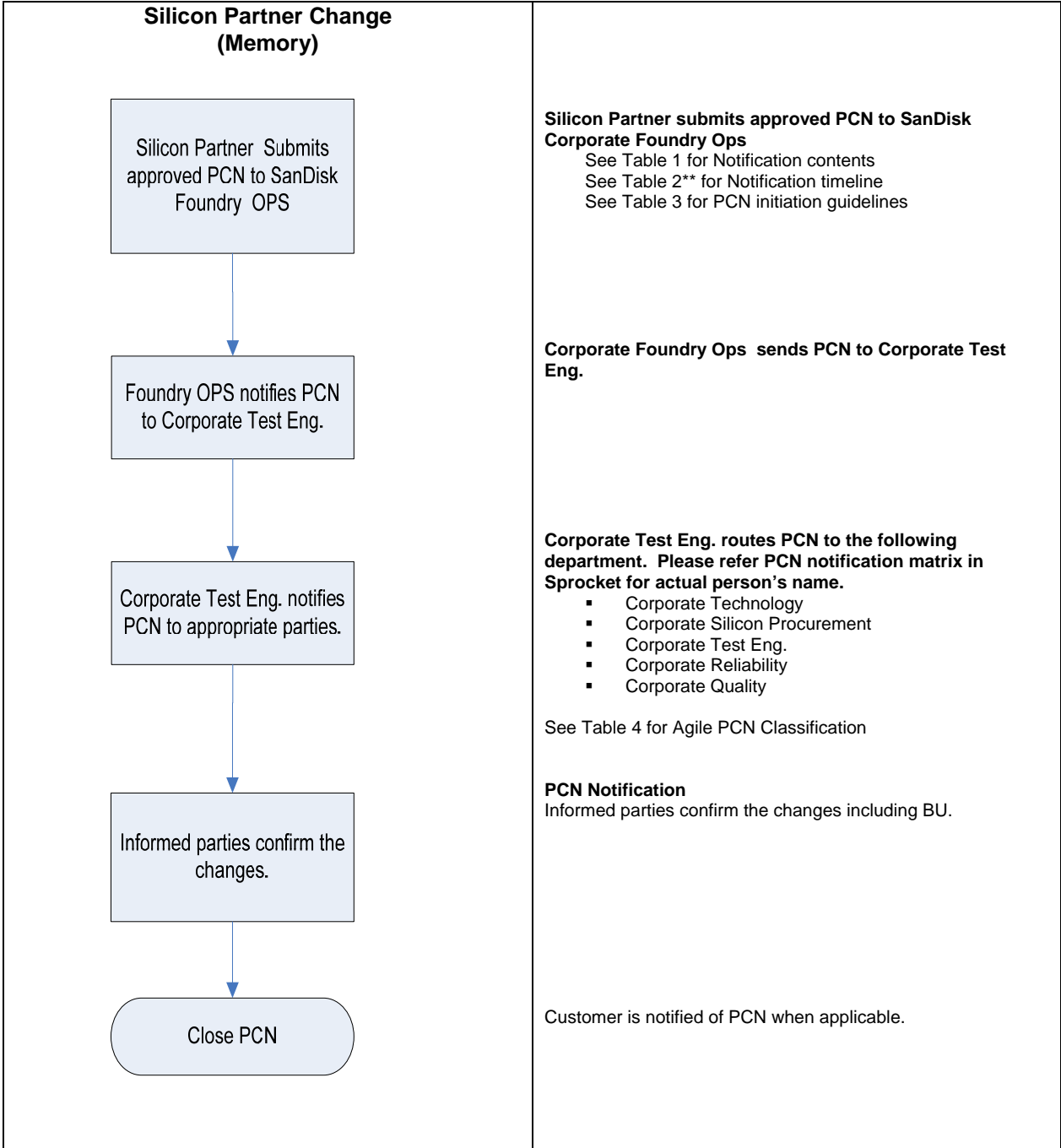


TABLE 1

NOTIFICATION CONTENTS

Type of Notification	Contents
Product and Process Change Notification	PCN tracking number
	Product Identification (e.g., supplier part number(s), affected product lines including specific package types, product family).
	Detailed description of change(s)
	Reason for change(s)
	Anticipated (positive and negative) impact on form, fit, function, or reliability.
	Anticipated (positive and negative) impact on cost.
	Supplier Qualification plan and results, where applicable
	Revised MDDS for material changes,
	Implementation date for change
	Date, if required, when qualification samples are available.
	Date, if required, when final qualification data are available.
	Last date, if applicable, of manufacture of the unchanged product.
	Name, address, telephone, email, and fax number of supplier contact
Product (Quality) Alert Notification	Alert tracking number
	Product Identification (e.g., supplier part number(s), affected product lines including specific package types, product family).
	Detailed description of problem(s) and symptom(s)
	Probable root cause(s)
	Anticipated impact on form, fit, function, or reliability.
	Anticipated (positive and negative) impact on cost.
	Workaround(s) and solution(s) for affected products and parts
	Containment plan
	Corrective/Preventive actions plan to eliminate the problem with implementation date(s)
	Name, address, telephone, email, and fax number of supplier contact
Product Discontinuation Notification	Product Identification (e.g., supplier part number(s), affected product lines including specific package types, product family).
	Last time buy (place a purchase order) date for the product.
	Last time ship date for the product.
	Information and technical data to help locate an alternate source and/or replacement part number (if applicable)
Other options to support on-going requirement (transfer of technology and tooling, establish wafer or die bank, etc. – if applicable)	

TABLE 2- NOTIFICATION TIMELINES

Type of Notification	Timeline
Product and Process Change Notification	Supplier /subcontractor notifies SanDisk at least 120 days before the scheduled shipment date of the product identified in the notification.
	SanDisk acknowledges receipt within 30 days of notification. Lack of acknowledgment within 30 days can be considered as acceptance of change.
	SanDisk communicates additional details (change rejection, requirements for qualification parts or documentation related to the change, requirements for additional pre-change parts, etc.) within 30 days of acknowledgment. Lack of additional communication within 90 days of acknowledgment can be considered as acceptance of change.
	Shipments may occur upon SanDisk's approval of the change.
Product (Quality) Alert Notification	Supplier / subcontractor notifies SanDisk immediately after discovering the problem.
Product Discontinuation Notification	Supplier / subcontractor notifies SanDisk at least 6 months before Last time buy (place a purchase order) date for the product identified in the notification.
	Supplier / subcontractor notifies SanDisk at least 12 months before Last time ship date for the product identified in the notification.

TABLE 2 - NOTIFICATION TIMELINES for Silicon Partner**

Type of Notification	Timeline
Product and Process Change Notification	Silicon Partner notifies SanDisk Japan OPS at least 120 days before the scheduled shipment date of the product identified in the notification.
Product (Quality) Alert Notification	Silicon Partner notifies SanDisk Japan OPS immediately after discovering the problem.
Product Discontinuation Notification	Silicon Partner notifies SanDisk Japan OPS at least 6 months before Last time buy (place a purchase order) date for the product identified in the notification.
	Silicon Partner notifies SanDisk Japan OPS at least 12 months before Last time ship date for the product identified in the notification.

Table 3: PCN INITIATION GUIDELINES

If there is any Major change, the Supplier, Subcontractor and ODM shall follow this procedure for notifying and requesting SanDisk approval.

Table 3 is divided into sections, Section 1 for ICs, Section 2 for Cards, Section 3 for Memory, Section 4 for Suppliers / ODM and Section 5 for Silicon suppliers.

Table 3 Section 1- IC		
A: IC Assembly		
#	Change Description	Type
1	Assembly location	Major
2	Package Outline	Major
3	Major inner lead frame / substrate design / dimension	Major
4	Lead frame / substrate concept (strip/matrix ..)	Major
5	Lead frame material (frame composition)	Major
6	Heatspreader/dimension or material	Major
7	Substrate material (composition/ amount of layers/ Gold(Au) plating process, Au roughness, Au brightness, Au Hardness)	Major
8	Lead frame / substrate plating (diepad / lead fingers)	Major
9	Lead frame finish (e.g. anti oxidation / anti resin bleed)	Major
10	Backgrind/die thickness or its tolerance	Major
11	Wafer dicing/polishing method	Major
12	Wafer foil used for dicing, backgrinding, polishing.	Major
13	Die attach material	Major
14	Die attach method (glue -> alloy, printing -> dispense)	Major
15	Basic bonding wire material	Major
16	Bonding wire parameters (not limit to 1 st /2 nd bond power, force and time, but include other bonding parameters such as looping parameters and temperature including pre-heat, post-heat and bonding temperature)	Major
17	Wire bond method	Major
18	Wire bond diameter	Major
19	Molding compound Vendor, Type(model), Material or Content	Major
20	Marking format	Major
21	Marking method (ink / laser)	Major
22	External lead finish/plating process (e.g addition of deletion of frequency of electrical deflash, time)	Major
23	Deflash method	Major
24	Bending/Forming or Singulation method	Major
25	Ball mounting / attachment method (BGA)	Major
26	Solder Ball/Solder Plating material or their composition	Major
27	Product separation (sawing/lead cutting/punching) method	Major
28	Addition or deletion of major ass'y process steps(e.g Polishing, Curing)	Major
29	Change in process parameters outside the process window approved (qualified) by SanDisk	Major
30	Change of equipment not on equipment list approved / qualified by SanDisk	Major
31	Change in accessory tooling	Minor
32	Production Floor layout changes (tooling and equipment are not changed)	Minor
33	Relocation of equipment from one level to another level within the same building	Minor
34	Relocation of equipment from one building to another building under same address	Major
35	Change of manufacturing site of direct material (from a same supplier)	Major
36	Equipment type/model	Major
37	Change of processing technique/technology	Major
38	Operation Flow Change (sequence change/skip or additional operation flow) or operation flow is different from SanDisk Quality Plan	Major

39	Frequency of Preventive Maintenance (P.M) or Calibration for SanDisk consigned equipment	Major
40	Frequency of Preventive Maintenance (P.M) or Calibration for Supplier owned equipment	Minor

Table 3 Section 1- IC		
B: IC Packing		
#	Change Description	Type
1	Shipping tray dimension	Major
2	Shipping tray material	Major
3	Tape/reel dimension	Major
4	Tape/reel material	Major
5	Packing method/quantity	Major
6	Packing box dimension	Major
7	Packing box material	Major
8	Packing labeling	Major
9	Invoice or Packing List Format	Major
10	Supplier for Packing material including tray/box	Minor

Table 3 Section 1- IC		
C: IC Quality Assurance		
#	Description	Type
1	QA test standards	Major
2	Mechanical/visual inspection specification	Major
3	Outgoing M/V sampling plan	Major
4	Outgoing electrical sampling plan	Major
5	Flow changes in QA control	Major
6	Environmental criteria (temp./dust/humidity/light)	Major
7	Wafer visual inspection specification	Major

Table 3 Section 2- Card		
A: Card Assembly		
#	Description	Type
1	Assembly location	Major
2	Product Outline	Major
3	Basic process parameters outside the released range for all assembly process steps	Major
4	Change in process parameters outside the process window approved (qualified) by SanDisk	Major
5	Change of equipment not on equipment list approved / qualified by SanDisk	Major
6	Change in accessory tooling	Minor
7	Production Floor layout changes (tooling and equipment are not changed)	Minor
8	Change in manufacturing assembly process	Major
9	Change in test process	Major
10	Manufacturing location change (assembly/test subcontractor)	Major
11	Change in material including lid(set), adhesive(attached with lid set), mask label	Major
12	Change in specification of any materials or components	Major
13	Mechanical design change	Major
14	Change in mechanical dimensions	Major
15	Change in color, texture, and appearance of raw materials	Major
16	New component supplier	Major

Table 3 Section 2- Card		
B: Card Packing		
#	Change Description	Type
1	Packing method/quantity	Major
2	Packing box dimension	Major
3	Packing box/tray material	Major
4	Packing box/tray/label dimension	Major
5	Supplier in Packing material including tray/box	Minor

Table 3 Section 2- Card		
C: Card Back-End Flow of Testing process (e.g. Baking, Packing, FVI, FQC, OQC)		
#	Description	Type
1	Operation Flow Change(skip or additional operation flow) or operation flow is different from SNDK quality plan)	Major
2	Change/Dimension Design or Additional Hardware including Handler, Change Kits(e.g. DUTs, Buffer Tray, Test Tray, Aligner). Hifix is introduced.	Major
3	Vendor or Supplier Change for Hardware including Change Kits(e.g. DUTs, Socket, Buffer Tray, Test Tray, Aligner) , Hifix, Probe Card	Minor
4	Measurement Methodology for Testing Condition (e.g. testing temp, current, voltage, resistance)	Major
5	New machine model or vendor is introduced	Major
6	Frequency of Preventive Maintenance(P.M) or Calibration for SanDisk consigned equipment	Major
7	Frequency of Preventive Maintenance(P.M) or Calibration for Supplier owned equipment	Minor

Table 3 Section 2- Card		
D: Quality Assurance		
#	Description	Type
1	QA test standards	Major
2	Visual/Mechanical(V/M) inspection specification or V/M Limit Sample	Major
3	Outgoing V/M sampling plan	Major
4	Outgoing electrical sampling plan(OQC or Out of Box Quality)	Major
5	Flow changes in QA control Gate	Major
6	Environmental criteria (temp./dust/humidity/light)	Major
7	Sampling plan for Final Visual Inspection(e.g. loose from 100% inspection to sampling)	Major

Table 3 Section 3- Memory (including Burn-In/Function Test/ Wafer)		
A: Testing		
#	Description	Type
1	Operation Flow Change(skip or additional operation flow) or operation flow is different from SNDK quality plan)	Major
2	Change/Dimension Design or Additional Hardware including Handler, Change Kits(e.g. DUTs, Buffer Tray, Test Tray, Aligner). Hifix is introduced.	Major
3	Vendor or Supplier Change for Hardware including Change Kits(e.g. DUTs, Socket, Buffer Tray, Test Tray, Aligner) , Hifix, Probe Card	Minor
4	Measurement Methodology for Testing Condition (e.g. testing temp, current, voltage, resistance)	Major
5	New machine model or vendor is introduced	Major
6	Frequency of Preventive Maintenance(P.M) or Calibration for SanDisk consigned	Major

	equipment	
7	Frequency of Preventive Maintenance(P.M) or Calibration for Supplier owned equipment	Minor

Table 3 Section 3- Memory (including Burn-In/Function Test/ Wafer)		
B: Packing		
#	Description	Type
1	(Dry)Packing method/quantity	Major
2	(Dry) Packing box dimension	Major
3	Packing box/tray material	Major
4	Supplier for Packing material including box/tray	Minor
5	Packing box/tray/label dimension	Major
6	Packing List/Invoice Format	Major
7	Supplier for Packing material including wafer carriers, tray/box	Minor

Table 3 Section 3- Memory (including Burn-In/Function Test/ Wafer)		
C: Quality Assurance		
#	Description	Type
1	Outgoing Quality sampling plan	Major
2	Visual/Mechanical Inspection Item or Specification(Tolerance)	Major
3	Sampling plan for Final Visual Inspection (e.g. loose from 100% to sampling)	Major

Table 3 Section 4- Supplier /ODM Products		
A: Component Supply/Manufacturing Location		
#	Description	Type
1	Major Component Source Change	Major
2	Minor Component Source Change (with no change to specification)	Minor
3	Minor Component Source change (with change to specification)	Major
4	Location change for SMT (ODM outsourcing)	Major
5	Location change for Assembly and Test (ODM outsourcing)	Major

Table 3 Section 4- Supplier/ ODM Products		
B: Product Assembly and Test		
#	Description	Type
1	Assembly location	Major
2	Product Outline	Major
3	Basic process parameters outside the released range for all assembly process steps	Major
4	Change in process parameters outside the process window approved (qualified) by SanDisk	Major
5	Change of equipment not on equipment list approved / qualified by SanDisk	Major
6	Change in small tooling	Minor
7	Production Floor layout changes (tooling and equipment are not changed)	Minor
8	Change in manufacturing assembly process	Major
9	Change in test process	Major
10	Change in specification of any materials or components	Major
11	Mechanical design change	Major
12	Change in mechanical dimensions	Major
13	Change in color, texture, and appearance of raw materials	Major

Table 3 Section 4- Supplier/ ODM Products		
C: Product Packing		

#	Change Description	Type
1	Packing method/quantity	Major
2	Packing box dimension	Major
3	Packing box/tray material	Major
4	Packing box/tray/label dimension	Major
5	Supplier for Packing material including tray/box	Minor

Table 3 Section 4 – Supplier/ ODM Products		
D: Back-End Flow of Testing process		
#	Description	Type
1	Operation Flow Change(skip or additional operation flow) or operation flow is different from approved quality plan)	Major
2	Vendor or Supplier Change for Hardware including test systems and fixtures	Major
3	Measurement Methodology for Testing	Major
4	Frequency of Preventive Maintenance(P.M) or Calibration for SanDisk consigned equipment	Major
5	Frequency of Preventive Maintenance(P.M) or Calibration for Supplier owned equipment	Minor

Table 3 Section 4 – Supplier/ ODM Products		
E: Quality Assurance		
#	Description	Type
1	QA test standards	Major
2	Visual/Mechanical(V/M) inspection specification or V/M Limit Sample	Major
3	Outgoing V/M sampling plan	Major
4	Outgoing sampling plan(OQC or Out of Box Quality)	Major
5	Flow changes in QA control Gate	Major
6	Environmental criteria (temp./dust/humidity/light)	Major
7	Sampling plan for Final Visual Inspection(e.g. loose from 100% inspection to sampling)	Major

Table 3 Section 5 – Silicon Suppliers		
A: Process and Equipment		
#	Description	Type
1	Additional equipment, same vendor, same model, used at a different site where the equipment/vendor is not qualified	Major
2	EPI deposition method	Major
3	Doping process method (diff. Vs. implant)	Major
4	Process sequence change affecting x-section	Major
5	Exposure method	Major
6	Etch method (wet vs. dry)	Major
7	Metal deposition method	Major
8	Dielectric deposition method	Major
9	Planarization method	Major
10	Planarizing layer thickness	Major
11	Addition/deletion of a critical process step	Major
12	Process sequence change affecting device performance or reliability	Major
13	Final die thickness	Major
14	Backside conditioning method (chemical vs. mechanical)	Major
15	Backside conditioning, for die level products only	Major
16	Design Rule changes which affect device performance	Major
17	Additional equipment, same vendor, same model, used at a different site where the	Major

equipment/vendor is not qualified	
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Table 3 Section 5 – Silicon Suppliers		
B: Material		
#	Description	Type
1	EPI dopant species	Major
2	Photoresist type (positive vs. negative)	Major
3	Diffusion dopant species source	Major
4	Metal deposition material	Major
5	Planarization material	Major

Table 3 Section 5 – Silicon Suppliers		
C: Transfers		
#	Description	Type
1	Product transfer from a qualified site to an unqualified site	Major
2	Transfer of an existing process or portion of a process from one site to another site	Major
3	Transfer of an existing process or portion of a process within a site using a different tool set	Major
4	Product/ transfer from one qualified site to another qualified site	Major

Table 3 Section 5 – Silicon Suppliers		
D: Quality Assurance		
#	Description	Type
1	In-process and Final test standards	Major
2	Visual/Mechanical(V/M) inspection specification	Major
3	Outgoing V/M sampling plan	Major
4	In-process sampling plans	Minor
5	Flow changes in QA control Gates	Major
6	Environmental criteria (temp./dust/humidity/light)	Major

Table 4 PCN Classification in Agile		
Cover Page of Change:		
#	Classification	
1	Design Correction	
2	Packaging Update	
3	Process Correction	
4	Program File Correction	
5	Specification/Drawing Correction	
6	Technology Update	