

S29GL128P Known Good Die

128 Megabit, 3.0 Volt-only Page Mode Flash Memory
featuring 90 nm MirrorBit® Process Technology



Supplement

Distinctive Characteristics

Architectural Advantages

- **Single power supply operation**
 - 3 volt read, erase, and program operations
- **Manufactured on 90 nm MirrorBit process technology**
- **Secured Silicon Sector region**
 - 128-word/256-byte sector for permanent, secure identification through an 8-word/16-byte random Electronic Serial Number, accessible through a command sequence
 - May be programmed and locked at the factory or by the customer
- **Flexible sector architecture**
 - One hundred twenty-eight 64 Kword (128 Kbyte) sectors
- **Compatibility with JEDEC standards**
 - Provides pinout and software compatibility for single-power supply flash, and superior inadvertent write protection
- **100,000 erase cycles per sector typical**
- **20-year data retention typical**

Performance Characteristics

- **High performance**
 - 110 ns access time
 - 8-word/16-byte page read buffer
 - 25 ns page read times
 - 32-word/64-byte write buffer reduces overall programming time for multiple-word updates

- **Low power consumption
(typical values at 3.0 V, 5 MHz)**
 - 30 mA typical active read current;
 - 50 mA typical erase/program current
 - 1 μ A typical standby mode current

Software & Hardware Features

- **Software features**
 - Program Suspend and Resume: read other sectors before programming operation is completed
 - Erase Suspend and Resume: read/program other sectors before an erase operation is completed
 - Data# polling and toggle bits provide status
 - Unlock Bypass Program command reduces overall multiple-word programming time
 - CFI (Common Flash Interface) compliant: allows host system to identify and accommodate multiple flash devices
- **Hardware features**
 - Advanced Sector Protection
 - WP#/ACC input accelerates programming time (when high voltage is applied) for greater throughput during system production. Protects first or last sector regardless of sector protection settings
 - Hardware reset input (RESET#) resets device
 - Ready/Busy# output (RY/BY#) detects program or erase cycle completion

KGD Features

- **Tested to datasheet specifications at temperature**
- **Quality and reliability levels equivalent to standard packaged components**

1. General Description

The S29GL128P in Known Good Die (KGD) form is an 128 Mbit, 3.0 volt-only Flash memory. Spansion defines KGD as standard product in die form, tested for functionality and speed. Spansion KGD products have the same reliability and quality as Spansion products in packaged form.

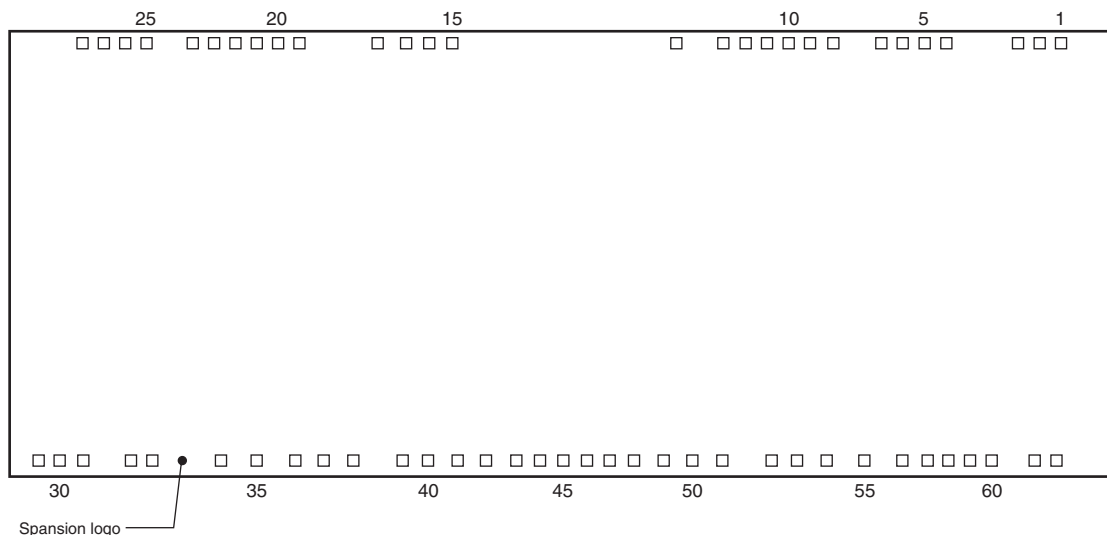
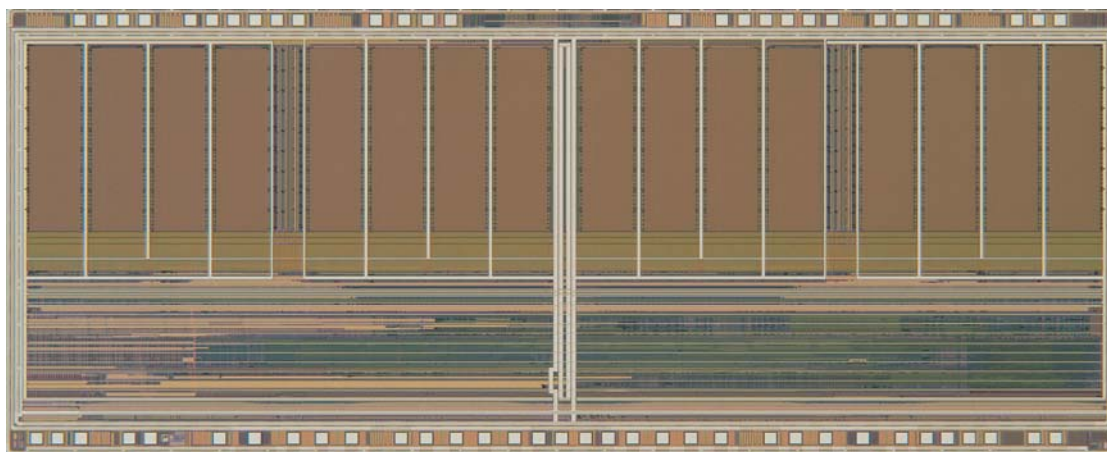
1.1 Electrical Specifications

Refer to the S29GL128P data sheet, publication number S29GL-P_00, for full electrical specifications on the S29GL128P in KGD form.

2. Product Selector Guide

Family Part Number	S29GL128P KGD
Speed Option ($V_{CC} = 2.7 - 3.6$ V)	110
Max Access Time, t_{ACC} (ns)	110
Max CE# Access, t_{CE} (ns)	110
Max OE# Access, t_{OE} (ns)	25

3. Die Photograph & Pad Locations



Note

Wirebond must be 100% within bond pad opening.

4. Pad Description

Table 4.1 Pads Relative to Die Center

Pad	Signal	Pad Center (mils)		Pad Center (mm)		Pad	Signal	Pad Center (mils)		Pad Center (mm)	
		X	Y	X	Y			X	Y	X	Y
1	A22	3227.005	1451.80	127.047	57.157	30	A0	-3268.05	-1434.20	-128.663	-56.47
2	A15	3087.005	1451.80	121.536	57.157	31	CE#	-3116.035	-1434.20	-122.679	-56.47
3	A14	2947.005	1451.80	116.024	57.157	32	VSS	-2803.875	-1434.20	-110.389	-56.47
4	A13	2481.655	1451.80	97.703	57.157	33	VSS	-2666.035	-1434.20	-104.962	-56.47
5	A12	2341.655	1451.80	92.191	57.157	34	OE#	-2218.455	-1434.20	-87.341	-56.47
6	A11	2201.655	1451.80	86.679	57.157	35	IO0	-1990.88	-1434.20	-78.381	-56.47
7	A10	2061.655	1451.80	81.168	57.157	36	IO8	-1739.025	-1434.20	-68.466	-56.47
8	VSS	1750.4	1451.80	68.913	57.157	37	IO1	-1555.555	-1434.20	-61.242	-56.47
9	A9	1601.005	1451.80	63.032	57.157	38	IO9	-1361.245	-1434.20	-53.592	-56.47
10	A8	1461.005	1451.80	57.52	57.157	39	VCCQ	-1041.62	-1434.20	-41.009	-56.47
11	A19	1321.005	1451.80	52.008	57.157	40	IO2	-878.62	-1434.20	-34.591	-56.47
12	A20	1181.005	1451.80	46.496	57.157	41	IO10	-684.31	-1434.20	-26.941	-56.47
13	VCC	1036.565	1451.80	40.81	57.157	42	IO3	-500.84	-1434.20	-19.718	-56.47
14	WE#	732.38	1451.80	28.834	57.157	43	IO11	-306.53	-1434.20	-12.068	-56.47
15	RESET#	-721.045	1451.80	-28.388	57.157	44	VCCQ	-148.535	-1434.20	-5.848	-56.47
16	A21	-868.795	1451.80	-34.205	57.157	45	VSS	-1.535	-1434.20	-0.06	-56.47
17	WP#/ACC	-1023.12	1451.80	-40.28	57.157	46	VCC	154.505	-1434.20	6.083	-56.47
18	RDY	-1206.285	1451.80	-47.492	57.157	47	VCC	301.47	-1434.20	11.869	-56.47
19	A18	-1707.835	1451.80	-67.238	57.157	48	IO4	459.475	-1434.20	18.09	-56.47
20	A17	-1847.835	1451.80	-72.749	57.157	49	IO12	653.785	-1434.20	25.74	-56.47
21	A7	-1987.835	1451.80	-78.261	57.157	50	IO5	837.255	-1434.20	32.963	-56.47
22	A6	-2127.835	1451.80	-83.773	57.157	51	IO13	1031.565	-1434.20	40.613	-56.47
23	A5	-2267.835	1451.80	-89.285	57.157	52	VCCQ	1352.025	-1434.20	53.229	-56.47
24	VCCQ	-2407.115	1451.80	-94.768	57.157	53	IO6	1515.695	-1434.20	59.673	-56.47
25	A4	-2703.45	1451.80	-106.435	57.157	54	IO14	1710.005	-1434.20	67.323	-56.47
26	A3	-2843.45	1451.80	-111.947	57.157	55	IO7	1950.445	-1434.20	76.789	-56.47
27	A2	-2983.45	1451.80	-117.459	57.157	56	IO15	2202.15	-1434.20	86.699	-56.47
28	A1	-3123.45	1451.80	-122.97	57.157	57	VSS	2364.515	-1434.20	93.091	-56.47
29	SPI#	-3404.87	-1434.20	-134.05	-56.47	58	VSS	2497.99	-1434.20	98.346	-56.47
						59	BYTEBSCK	2639.985	-1434.20	103.936	-56.47
						60	A16SI	2779.985	-1434.20	109.448	-56.47
						61	AMP1EXT	3059.985	-1434.20	120.472	-56.47
						62	AMP1INT	3199.985	-1434.20	125.984	-56.47

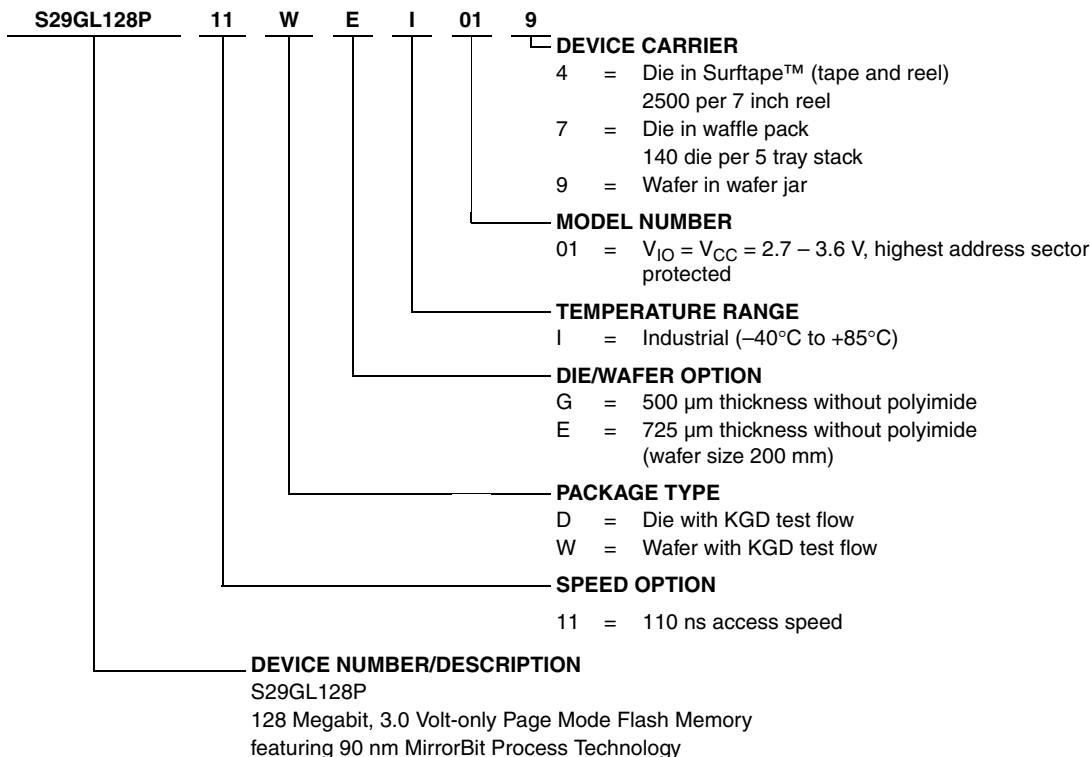
Note

The coordinates above are relative to the die center and can be used to operate wire bonding equipment.

5. Ordering Information

Standard Products

Spansion KGD products are available in different configurations. The order number (Valid Combination) is formed by a combination of the elements below.



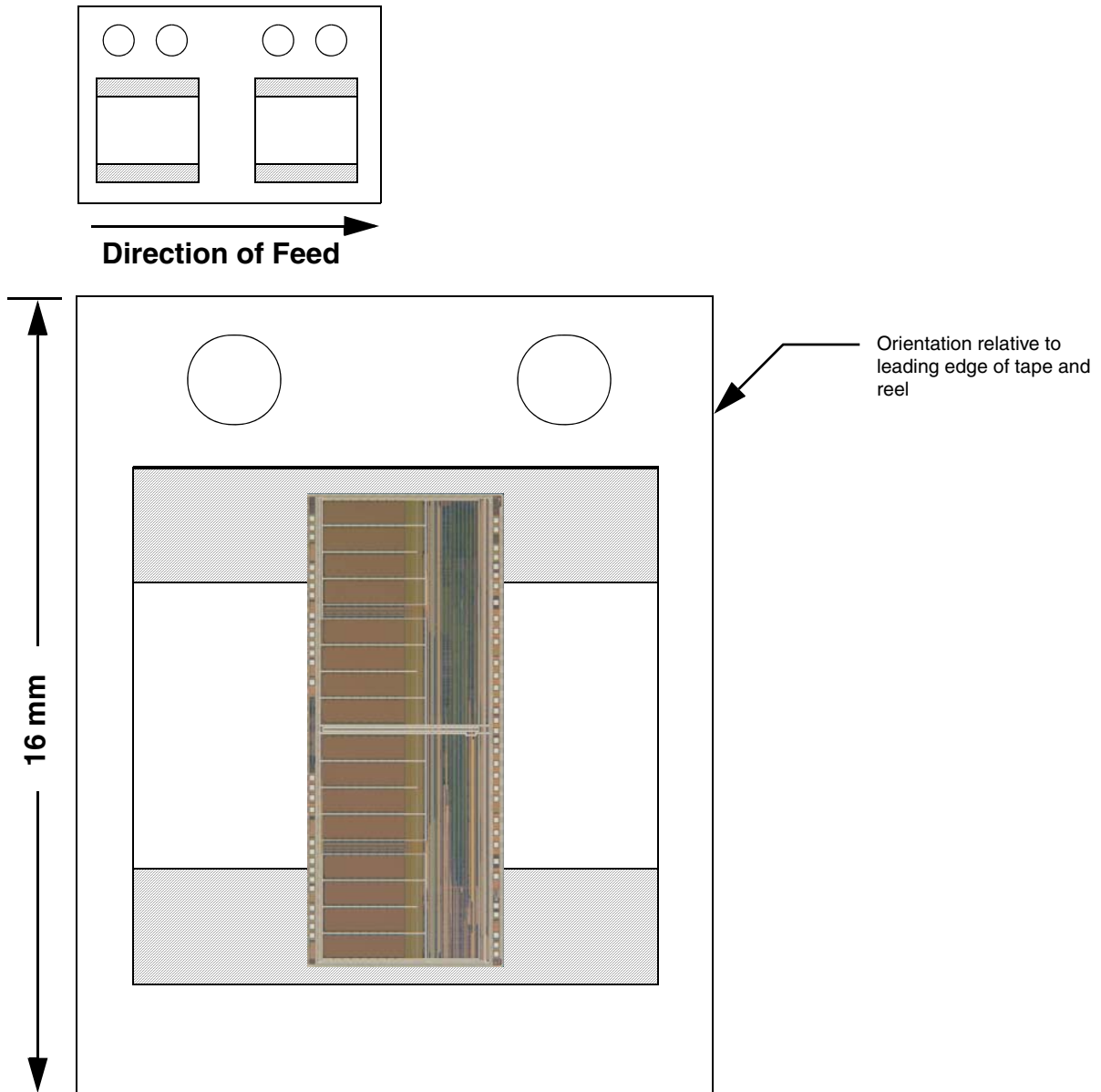
S29GL128P Valid Combinations				
Device Number	Speed Option	Package Type, and Temperature Range	Model Number	Die Revision
S29GL128P	11	DEI, DGI	01	4, 7
		WEI, WGI		9

Valid Combinations

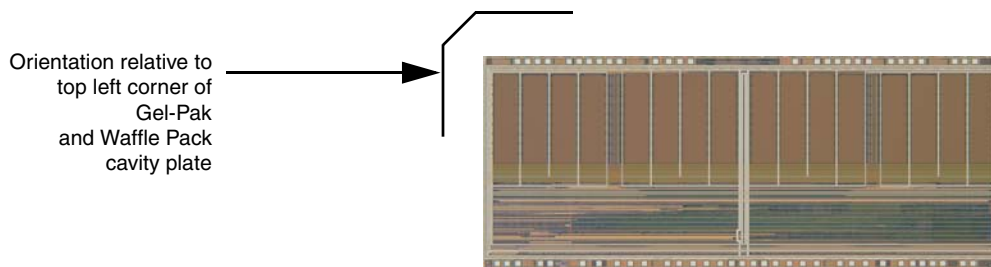
Valid Combinations list configurations planned to be supported in volume for this device. Consult the local Spansion sales office to confirm availability of specific valid combinations and to check on newly released combinations.

6. Packaging Information

6.1 Surftape Packaging



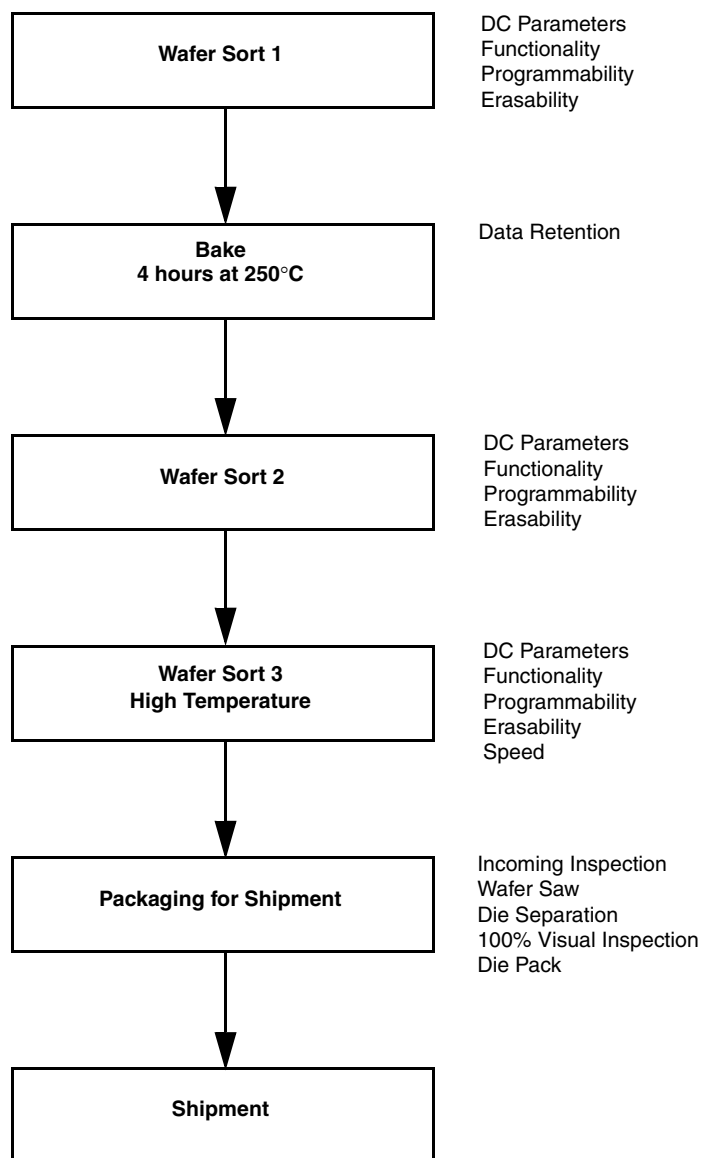
6.2 Gel-Pak and Waffle Pack Packaging



7. Product Test Flow

Figure 7.1 provides an overview of Spansion's Known Good Die test flow. For more detailed information, refer to the S29GL128P product qualification database supplement for KGD. Spansion implements quality assurance procedures throughout the product test flow. In addition, an off-line quality monitoring program (QMP) further guarantees Spansion quality standards are met on Known Good Die products. These QA procedures also allow Spansion to produce KGD products without requiring or implementing burn-in.

Figure 7.1 Spansion KGD Product Test Flow



8. Physical Specifications

Description	Specification
Die dimensions	7.236 mm x 3.125 mm
Die Thickness	725 μm , 500 μm
Bond Pad Size	76 μm x 76 μm
Pad Area Free of Passivation	5,776 μm^2
Pads Per Die	62
Bond Pad Metalization	500 Å Ta/10000 Å Al-0.5%Cu
Die Backside	Non-gold
Passivation	SiN / TEOS

9. DC Operating Conditions

Description	Specification
V _{CC} (Supply Voltage)	2.7 V to 3.6 V
Industrial Operating Temperature	–40°C to +85°C

10. Manufacturing Information

Description	Specification
Manufacturer	Spansion
Test Location	Fab 25
Manufacturing ID	01h
Preparation for Shipment	Penang, Malaysia
Fabrication Process	CS129
Die Revision	2.2

11. Special Handling Instructions

11.1 Processing

Do not expose KGD products to ultraviolet light or process them at temperatures greater than 250°C. Failure to adhere to these handling instructions will result in irreparable damage to the devices. For best yield, Spansion recommends assembly in a Class 10K clean room with 30% to 60% relative humidity. Take caution with assembly plasma cleaning since high dosage plasma could alter the device factory programmed settings. Factory program settings includes the (V_t) threshold voltage reference setting and the “Autoselect Device ID”.

11.2 Storage

Store at a maximum temperature of 30°C in a nitrogen-purged cabinet or vacuum-sealed bag. Observe all standard ESD handling procedures.

12. Terms and Conditions of Sale for Spanion Non-Volatile Memory Die

All transactions relating to unpackaged die under this agreement shall be subject to Spanion's standard terms and conditions of sale, or any revisions thereof, which revisions Spanion reserves the right to make at any time and from time to time. In the event of conflict between the provisions of Spanion's standard terms and conditions of sale and this agreement, the terms of this agreement shall be controlling.

Spanion warrants its manufactured unpackaged die whether shipped to customer in individual dice or wafer form ("Known Good Die," "KGD", "Die," "Known Good Wafer", "KGW", or Wafer(s)) will meet Spanion's published specifications and against defective materials or workmanship for a period of one (1) year from date of shipment.

This limited warranty does not extend beyond the first purchaser of said Die or Wafer(s).

Buyer assumes full responsibility to ensure compliance with the appropriate handling, assembly and processing of KGD or KGW (including but not limited to proper Die preparation, Die attach, backgrinding, singulation, wire bonding and related assembly and test activities), and compliance with all guidelines set forth in Spanion's specifications for KGD or KGW, and Spanion assumes no responsibility for environmental effects on KGD or KGW or for any activity of Buyer or a third party that damages the Die or Wafer(s) due to improper use, abuse, negligence, improper installation, improper backgrinding, improper singulation, accident, loss, damage in transit, or unauthorized repair or alteration by a person or entity other than Spanion ("Limited Warranty Exclusions")

The liability of Spanion under this limited warranty is limited, at Spanion's option, solely to repair the Die or Wafer(s), to send replacement Die or Wafer(s), or to make an appropriate credit adjustment or refund in an amount not to exceed the original purchase price actually paid for the Die or Wafer(s) returned to Spanion, provided that: (a) Spanion is promptly notified by Buyer in writing during the applicable warranty period of any defect or nonconformity in the Die or Wafer(s); (b) Buyer obtains authorization from Spanion to return the defective Die or Wafer(s); (c) the defective Die or Wafer(s) is returned to Spanion by Buyer in accordance with Spanion's shipping instructions set forth below; and (d) Buyer shows to Spanion's satisfaction that such alleged defect or nonconformity actually exists and was not caused by any of the above-referenced Warranty Exclusions. Buyer shall ship such defective Die or Wafer(s) to Spanion via Spanion's carrier, collect. Risk of loss will transfer to Spanion when the defective Die or Wafer(s) is provided to Spanion's carrier. If Buyer fails to adhere to these warranty returns guidelines, Buyer shall assume all risk of loss and shall pay for all freight to Spanion's specified location. The aforementioned provisions do not extend the original limited warranty period of any Die or Wafer(s) that has either been replaced by Spanion.

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Buyer agrees that it will make no warranty representations to its customers which exceed those given by Spanion to Buyer unless and until Buyer shall agree to indemnify Spanion in writing for any claims which exceed Spanion's limited warranty. Known Good Die or Known Good Wafer(s) are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of the Die or Wafer(s) can reasonably be expected to result in a personal injury. Buyer's use of Known Good Die or Known Good Wafer(s) for use in life support applications is at Buyer's own risk and Buyer agrees to fully indemnify Spanion for any damages resulting in such use or sale.

Known Good Die or Known Good Wafer are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of the die or wafer can reasonably be expected to result in a personal injury. Buyer's use of Known Good Die or Known Good Wafer for use in life support applications is at Buyer's own risk and Buyer agrees to fully indemnify Spanion for any damages resulting in such use or sale.

13. Revision History

Section	Description
Revision 01 (February 2, 2007)	
	Initial release.
Revision 02 (February 18, 2008)	
Ordering Information & Valid Combination	Changed speed designator in OPN
Special Handling Instructions	Added additional info in "Processing" section on plasma cleaning
Revision 03 (October 27, 2008)	
Product Test Flow	Changed bake time between Sort 1 & Sort 2
Revision 04 (February 2, 2009)	
Distinctive Characteristics	Removed VIO
Ordering Information	Added 725 μm wafer thickness option
Physical Specifications	Added to <i>Die Thickness</i>

Colophon

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