Known Good Die (KGD) & Wafer Solutions

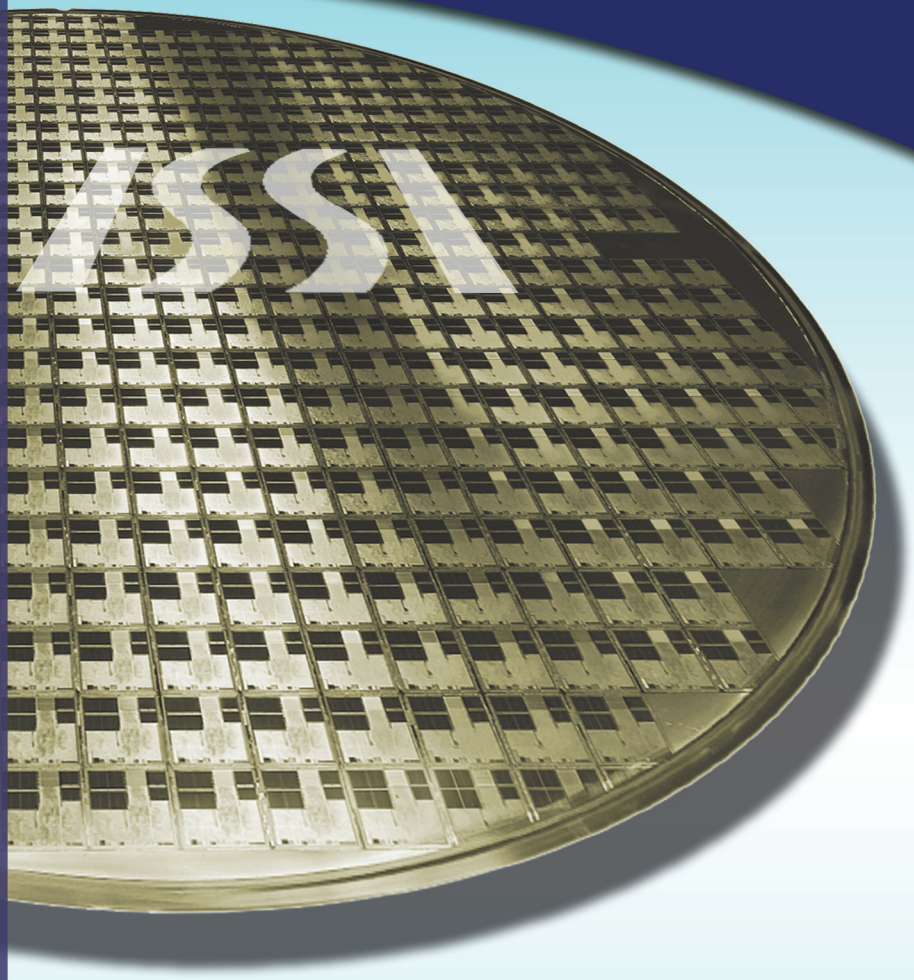
High Speed and Low Power Wafer/Die Solutions

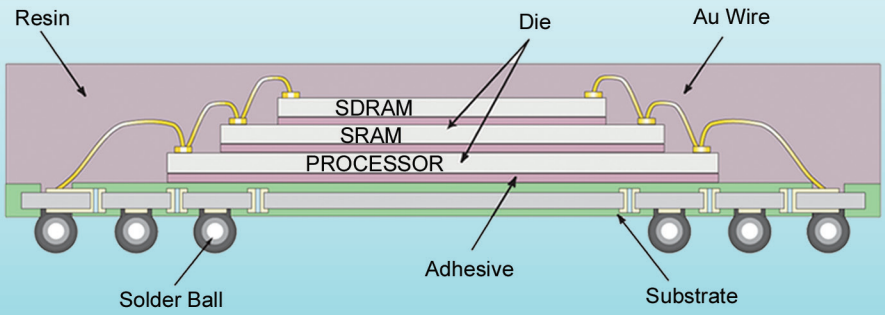
DRAM
Mobile SDR
Mobile DDR
SDR/DDR/DDR2
EDO/Fast Page

SRAM
5V Asynchronous
- High Speed
- Low Power
Synchronous
-DDR-II/QUAD

PSRAM
Asynch/Page
CRAM

APPLICATIONS
Mobile processors
(PMP, PDA, MID, Mobile TV)
Display (TCON)
Consumer products
Flash MCPs
Industrial/High Reliability
Automotive





ISSI Integrated Silicon Solution, Inc.

Advanced Memory Solutions
Quality, Service, and Support

Known Good Die (KGD)/Wafer Level Memories

Introduction

Die-level customers require a memory partner who can meet their many unique needs for high quality, long term support, guaranteed availability, and low total cost of ownership. ISSI is a provider of high quality specialty memory solutions for DRAMs, PSRAMs and SRAMs. Core to our strategy is to provide long term support for applications such as automotive, communications and industrial markets where design cycles can be 3-4 years from concept to production, followed by 5-6 years product life. Recognizing the unique fit of ISSI products with die-level customers needs, ISSI created a business unit to focus on die-level products to provide highest quality products with long term support.

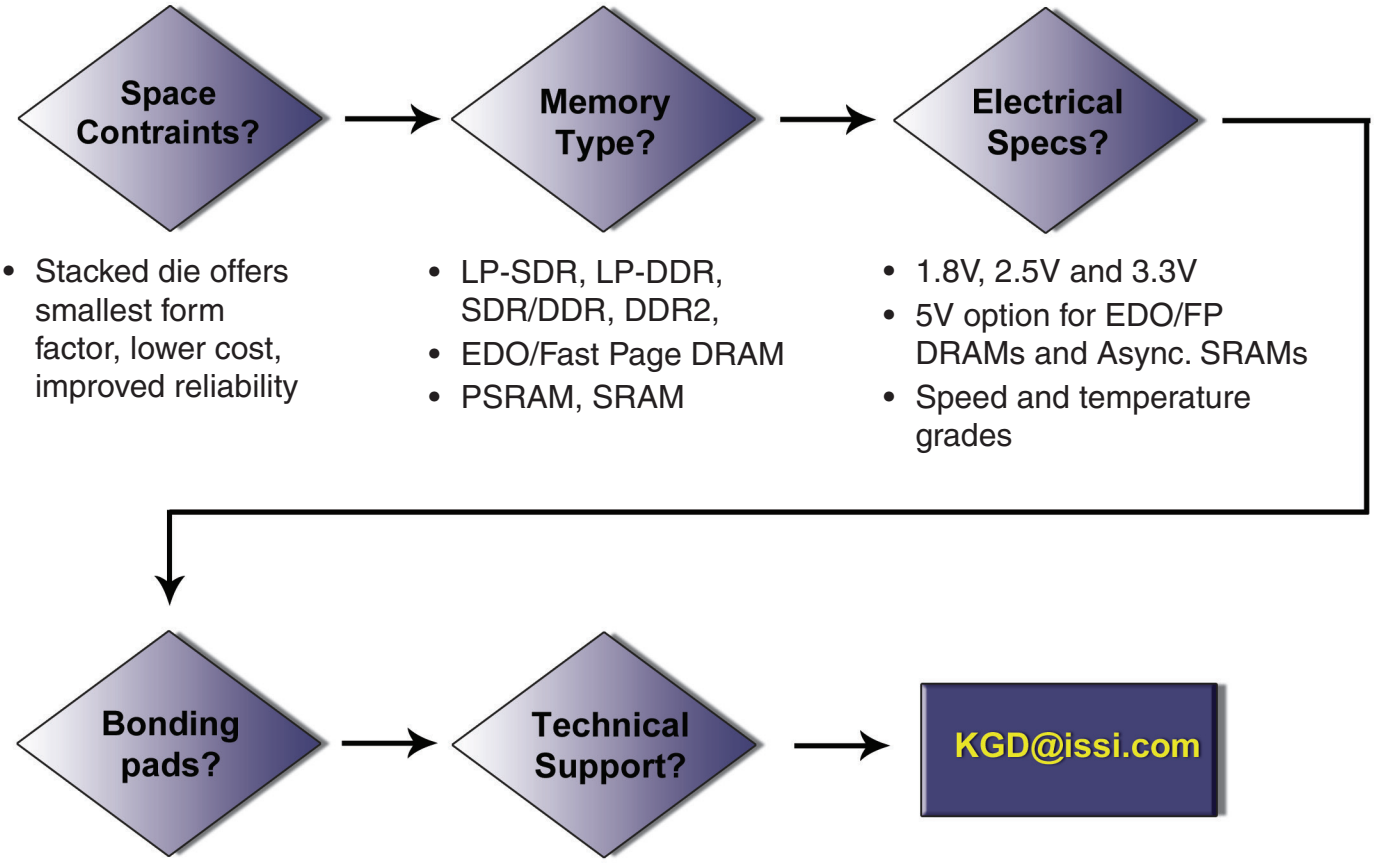
For your stacked die product to be successful you require a memory supplier who has extensive experience directly supporting the die-level market. This means a dedicated engineering team developing products which are specifically defined, designed, and tested to meet die customer needs.

KGD CUSTOMER NEEDS	ISSI SOLUTIONS
Product Portfolio	• Low to medium density SDRAMs: 16Mb-512Mb, SDR, DDR, DDR2 • Broadest portfolio of SRAMs and PSRAMs in the industry
Low Power Solutions	• Lowest power mobile devices in the industry • 16Mb-512Mb LP-SDR & LP-DDR options, PSRAMs, Ultra-Low Power SRAMs
Long Life Cycle	• Long product life: 7-10 years typical • Advanced process nodes for future products
High Quality (Low ppm)	• KGD test flow includes Wafer Level Burn In (WLBI) & Speed-Sort • MCP Final Test Yield Target >99.9% for KGD
Reliable Supply	• Wafer Bank to support volume production • Volume wafer purchase for lower total cost
Test Flow options	• Full KGD test flow option • Proprietary voltage and temperature stress scheme emulates package level burn-in
Custom Pad Layout	• Pad layouts designed for KGD use • ReDistribution Layer (RDL) or Bumped Die for custom pad layout

Summary

ISSI has a proven track record providing wafer & die solutions to many leading chipset and system companies. We are committed to working with our customers to provide them with the most cost-effective and highest quality products, so when you begin planning your next generation MCP or Stacked Die contact ISSI and see how we can “enable your MCP to be successful”.

Selecting a Die Product



- Stacked die offers smallest form factor, lower cost, improved reliability

- LP-SDR, LP-DDR, SDR/DDR, DDR2,
- EDO/Fast Page DRAM
- PSRAM, SRAM

- 1.8V, 2.5V and 3.3V
- 5V option for EDO/FP DRAMs and Async. SRAMs
- Speed and temperature grades

- Bonding pads on two-edges
- RDL & bumped die options for flip chip and CSP

- Technical support, assembly information, SIP/ MCP level testing

Terminology

- Wafer probe = Test die in wafer form using Probe Card
- CP = Chip Probe (aka wafer probe test step)
- WLBI = Wafer Level Burn In
- Speed Sort = High speed wafer test
- Sorted Die or Tested Die = Die that has limited testing, i.e. Sort test only

- KGD = **K**nown **G**ood **D**ie (fully tested die including WLBI and speed sort)
- SIP = System In Package
- MCP = Multi Chip Package
- MCM = Multi-Chip Module
- POP = Package on Package
- COB = Chip On Board
- SOC = System On Chip

SDRAM and PSRAM Selection Guide

MEMORY TYPE[1]		DENSITY	CONFIG.[2]	PART # / DIE REVISION	VDD	MAX. SPEED	STATUS
MOBILE PRODUCTS	LP-SDR	16Mb	1Mx16	IS42SM16100G	3.3V	200Mhz	Prod
				IS42RM16100G	2.5V	166Mhz	Prod
				IS42VM16100G	1.8V	166Mhz	Prod
		32Mb	2Mx16, 1Mx32	IS42SM16200C / 32100C	3.3V	200Mhz	Prod
				IS42RM16200C / 32100C	2.5V	200Mhz	Prod
				IS42VM16200C / 32100C	1.8V	166Mhz	Prod
		64Mb	4Mx16, 2Mx32	IS42SM16400G / 32200G	3.3V	200Mhz	Prod
				IS42RM16400G / 32200G	2.5V	166Mhz	Prod
				IS42VM16400G / 32200G	1.8V	166Mhz	Prod
				IS42SM16400K / 32200K[3]	3.3V	200Mhz	S=Q1/11
				IS42RM16400K / 32200K[3]	2.5V	200Mhz	S=Q1/11
				IS42VM16400K / 32200K[3]	1.8V	200Mhz	S=Q1/11
		128Mb	8Mx16, 4Mx32	IS42SM16800G / 32400G	3.3V	200Mhz	Prod Q1/11
				IS42RM16800G / 32400G	2.5V	200Mhz	Prod Q1/11
				IS42VM16800G / 32400G	1.8V	166Mhz	Prod Q1/11
	LP-DDR	32Mb	2Mx16, 1Mx32	IS43LSR16200C / 32100C	3.3V	200Mhz	Prod
				IS43LRR16200C / 32100C	2.5V	200Mhz	Prod
				IS43LR16200C / 32100C	1.8V	166Mhz	Prod
		64Mb	4Mx16, 2Mx32	IS43LSR16400B / 32200B	3.3V	200Mhz	S=Q1/11
				IS43LRR16400B / 32200B	2.5V	200Mhz	S=Q1/11
				IS43LR16400B / 32200B	1.8V	200Mhz	S=Q1/11
		128Mb	8Mx16, 4Mx32	IS43LSR16800F / 32400F	3.3V	200Mhz	Prod Q1/11
				IS43LRR16800F / 32400F	2.5V	200Mhz	Prod Q1/11
				IS43LR16800F / 32400F	1.8V	200Mhz	Prod Q1/11
		256Mb	16Mx16, 8Mx32	IS43LSR16160E / 32800E	3.3V	200Mhz	Contact Marketing
				IS43LRR16160E / 32800E	2.5V	200Mhz	Contact Marketing
				IS43LR16160E / 32800E	1.8V	166Mhz	Contact Marketing
		512Mb	32Mx16, 16Mx32	IS43LSR16320C / 32160C	3.3V	200Mhz	Contact Marketing
				IS43LRR16320C / 32160C	2.5V	200Mhz	Contact Marketing
				IS43LR16320C / 32160C	1.8V	166Mhz	Contact Marketing
	PSRAM / CRAM	16Mb	1Mx16	IS66WVC1M16ALL	1.8V	133Mhz	Prod Q1/11
				IS66WVD1M16ALL	1.8V	133Mhz	Prod Q1/11
				IS66WVE1M16ALL/BLL	1.8V/3.0V	70ns	Prod Q1/11
		32Mb	2Mx16	IS66WVC2M16ALL	1.8V	133Mhz	Contact Marketing
				IS66WVD2M16ALL	1.8V	133Mhz	Contact Marketing
				IS66WVE2M16ALL/BLL	1.8V/3.0V	70ns	Contact Marketing
		64Mb	4Mx16	IS66WVC4M16ALL	1.8V	133Mhz	Prod
				IS66WVD4M16ALL	1.8V	133Mhz	Prod
				IS66WVE4M16ALL/BLL	1.8V/3.0V	70ns	Prod
SYNCHRONOUS DRAM	SDR	16Mb	1Mx16	IS42S16100F	3.3V	200Mhz	Prod
				IS42R16100F	2.5V	200Mhz	Prod
				IS42VS16100F	1.8V	133Mhz	Prod Q1/11
		64Mb	4Mx16	IS42S16400F / 16401F	3.3V	200Mhz	Prod
				IS42S16400J[3]	3.3V	200Mhz	S=Q1/11
		128Mb	8Mx16, 4Mx32	IS42S16800F / 32400F	3.3V	200Mhz	Contact Marketing
		256Mb	16Mx16, 8Mx32	IS42S16160G / 32800G	3.3V	200Mhz	Contact Marketing
		512Mb	32Mx16, 16Mx32	IS42S16320D / 32160D	3.3V	200Mhz	S=Q1/11
	DDR[4]	64Mb	4Mx16, 2Mx32	IS43R16400A / 32200A	2.5V	200Mhz	S=Q1/11
				IS43R16401A / 32201A	2.5V	200Mhz	S=Q1/11
			4Mx16	IS43R16400B[3]	2.5V	200Mhz	S=Q1/11
		128Mb	8Mx16, 4Mx32	IS43R16800E / 32400E	2.5V	200Mhz	Contact Marketing
		256Mb	16Mx16, 8Mx32	IS43R16160D / 32800D	2.5V	200Mhz	Contact Marketing
		512Mb	32Mx16, 16Mx32	IS43R16320D / 32160D	2.5V	200Mhz	S=Q1/11

Notes:
1. SDR = Single Data rate, DDR = Double Data rate, LP = Low Power or Mobile
2. x16 and x32 configuration selected by bonding option
3. Die Shrink - recommended for new designs
4. ISSI continues to introduce new DDR2 devices in a range of densities

Status:
S = Samples
Prod = Production

EDO & Fast Page Mode DRAM Selection Guide

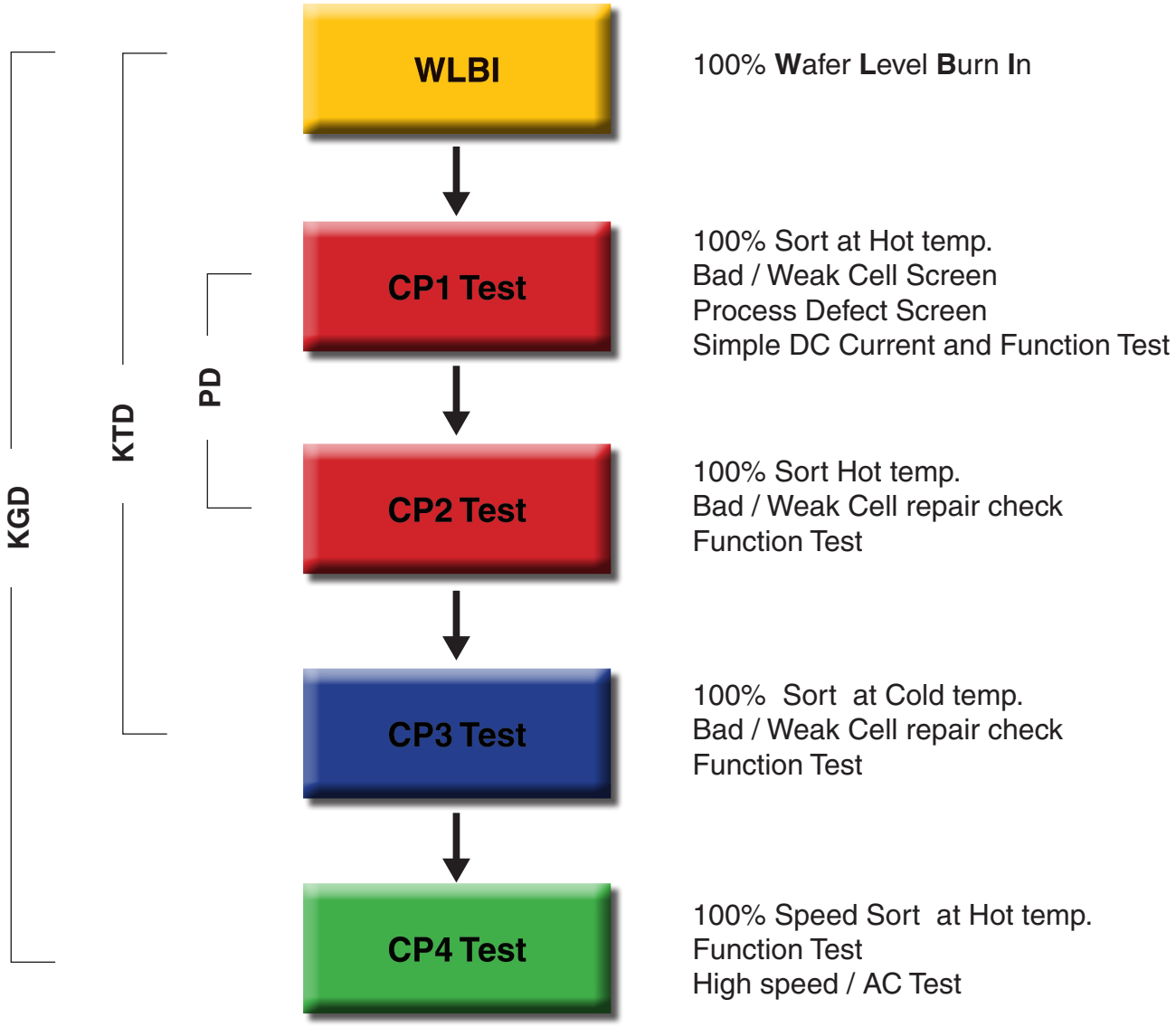
MEMORY TYPE[1]		DENSITY	CONFIG.[2]	PART # / DIE REVISION	VDD	MAX. SPEED	STATUS
ASYNCHRONOUS DRAM	EDO	4Mb	256Kx16	IS41LV16256C	3.3V	35ns	Prod Q1/11
				IS41C16256C	5.0V	35ns	Prod Q1/11
			1Mx4	IS41LV4100C	3.3V	35ns	Prod Q1/11
				IS41C4100C	5.0V	35ns	Prod Q1/11
		16M	4Mx4	IS41LV44002C	3.3V	50ns	Prod Q1/11
				IS41C44002C	5.0V	50ns	Prod Q1/11
			1Mx16	IS41LV16100C	3.3V	50ns	Prod Q1/11
				IS41C16100C	5.0V	50ns	Prod Q1/11
	Fast Page (FP)	4M	256Kx16	IS41LV16257C	3.3V	35ns	Prod Q1/11
				IS41C16257C	5.0V	35ns	Prod Q1/11
			1Mx4	IS41LV4105C	3.3V	35ns	Prod Q1/11
				IS41C4105C	5.0V	35ns	Prod Q1/11
		16M	4Mx4	IS41LV44052C	3.3V	50ns	Prod Q1/11
				IS41C44052C	5.0V	50ns	Prod Q1/11
			1Mx16	IS41LV16105C	3.3V	50ns	Prod Q1/11
				IS41C16105C	5.0V	50ns	Prod Q1/11
				IS41LV16100C	3.3V	50ns	Prod Q1/11
				IS41C16100C	5.0V	50ns	Prod Q1/11

SRAM Selection Guide

MEMORY TYPE[1]		VOLTAGE[2]	CONFIG[3]	64K	256K	512K	1M	2M	4M	8M	16M	18M	36M	72M
SYNCHRONOUS	5V Legacy	5V High Speed	x8	✓	✓		✓		✓					
			x16			✓	✓		✓					
		5V Low Power	x8		✓		✓		✓	✓				
			x16							✓				
	High Speed	3.3V	x8		✓		✓	✓	✓	✓				
			x16			✓	✓	✓	✓	✓				
		2.5V-3.6V	x16				✓	✓	✓	✓	✓			
		1.65 - 3.6V	x8				✓		✓	✓	✓			
			x16				✓	✓	✓	✓	✓			
			x32							✓	✓			
	Low Power	3.3V	x8		✓									
		1.65 - 3.6V	x8				✓	✓	✓	✓	✓			
			x16				✓	✓	✓	✓	✓			
ASYNCHRONOUS	Pipeline/ Flow Thru	3.3V	x18						✓	✓		✓	✓	
			x32					✓	✓	✓				
			x36					✓	✓	✓		✓	✓	
			x72									✓		
		2.5V	x18						✓	✓		✓	✓	
			x36						✓	✓		✓	✓	
			x72									✓		
	No-Wait (aka ZBT)	3.3V	x18					✓	✓	✓		✓	✓	
			x32					✓	✓					
			x36					✓	✓	✓		✓	✓	
			x72									✓		
		2.5V	x18					✓	✓	✓		✓	✓	
			x36					✓	✓	✓		✓	✓	
			x72									✓		
	QUAD/ QUADP	1.8V	x18										✓	✓
			x36										✓	✓
	DDR-II/ DDR-IIP	1.8V	x18										✓	✓
			x36										✓	✓

Note:
1. Refer to ISSI Product Selector Guide for complete list of SRAM types and part #. All products can be supported as Probed (sorted) Die
2. Check product datasheet for VCC and VCCQ specs
3. ISSI can support different speed/power and configurations. Contact Marketing for details.

Known Good Die (KGD) Production Flow Options



Notes:

- Specific details are defined in the test flow for each device with temperature and voltage guard-bands
- High Speed Tester and "Speed Probe Card" used for CP4

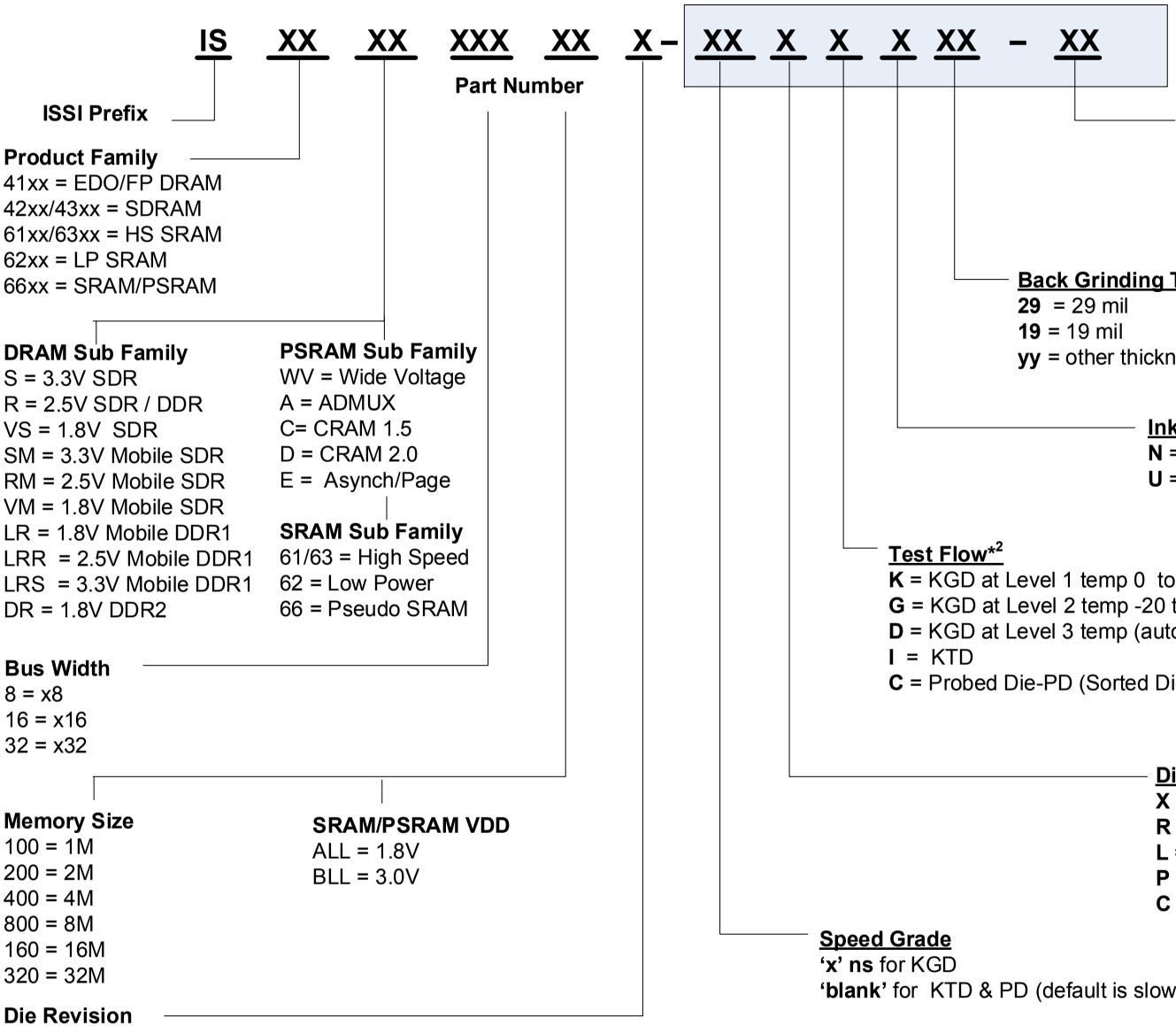
Test Flow Definitions:

KGD = Known Good Die: includes WLBI and Speed Sort

KTD = Known Test Die: same as KGD, without Speed Sort

PD = Probed (Sorted) Die: No WLBI, speed or temp sort, CP1 (Hot Temp.) + CP2 (Room Temp.) only

ISSI DIE ORDERING INFORMATION



Confirm exact part # from ISSI Die Datasheet

1* Jar Pack is default wafer packing option. For other options please contact KGD Product Marketing
2* Not all products are supported with all test flows. Contact KGD Product Marketing for detailed availability.

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Memory Products in Wafer Form

Addressing the market need for a smaller form factor, lower cost solution, extreme temperature, or custom package, ISSI offers a broad range of memory products in die or wafer form. Consumer products require multi-chip packages (MCPs) to meet the stringent space requirements of cell phones, digital cameras, PDA's and many other mobile-products. ISSI has experience providing low power KGD at millions of units per month run rate. For other applications such as harsh operating conditions ISSI can supply probed die in volumes starting from a single wafer. Whatever your application or volume requirements ISSI's wafer level products provide the memories you are familiar with, in a fully tested wafer form, that can be readily used in your MCP or custom package.

ISSI Specialist Die Distributors

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Mouser Electronics

Authorized Distributor

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