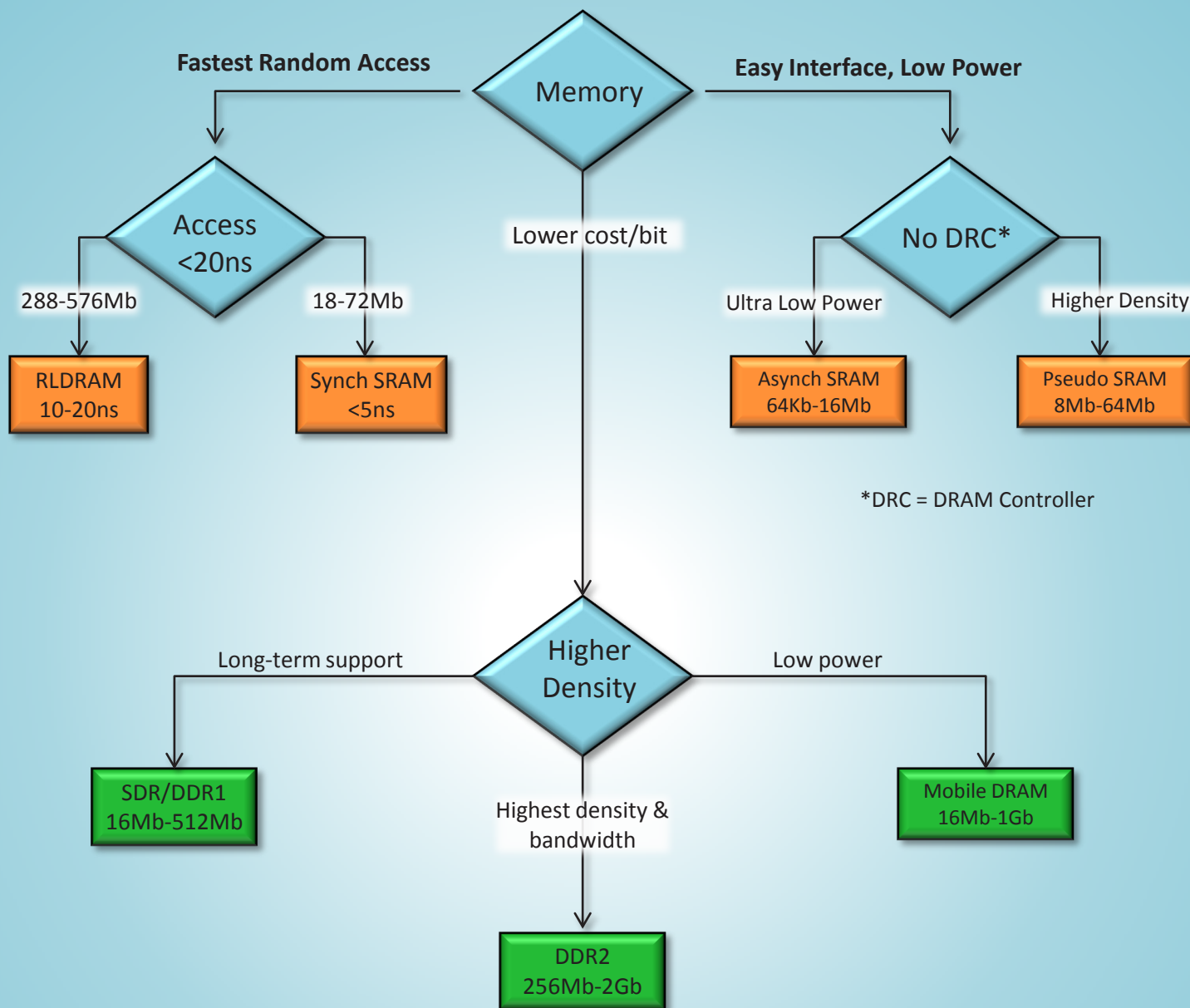


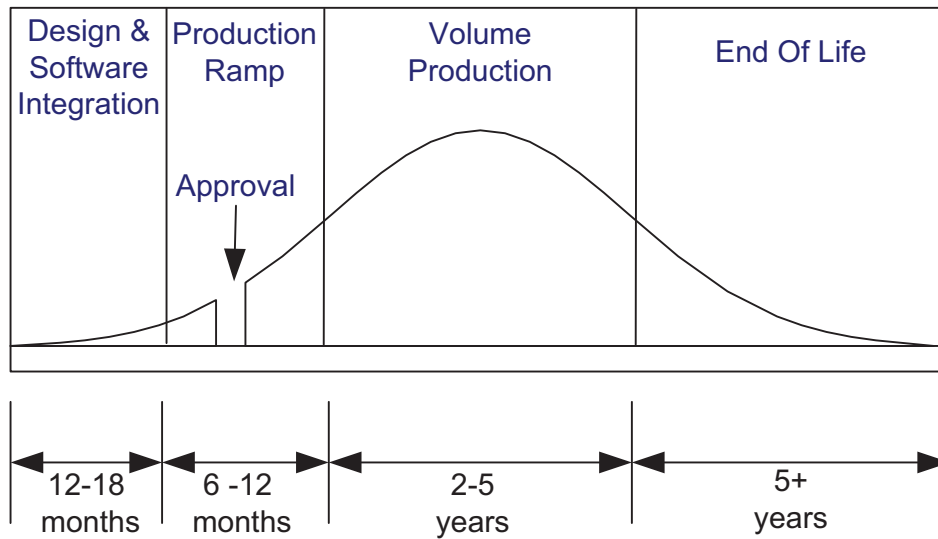
## Selecting the Right ISSI Industrial Grade Memory



### Long-Term Support from ISSI - replace other vendors End Of Life (EOL) products

<b>Easy Cross Reference</b>	Email part numbers for other vendors EOL product to find equivalent ISSI part number. Email: DRAM@issi.com or SRAM@issi.com
<b>Free Samples</b>	Request a free sample of the equivalent ISSI product
<b>Special Support for Sync. SRAMs</b>	Save \$\$\$ by replacing Samsung EOL products with ISSI Synchronous SRAMs with no need for Last Time Buys or system redesigns

## Industrial Systems Requiring Long-life Support for Memory



**Typical Industrial System Product Life Cycle**

High-mix, low volume industrial market segments have special needs in terms of industry specifications, strict qualification cycles, long-life requirements (without product changes permitted), and extremely long in-field use with the highest reliability standards expected.

The challenge for memory vendors is to ensure that by the end of the design cycle, they meet the requirement for long-term support covering extended production time with minimal design changes. ISSI's strategy is based on supporting our customer's needs for these long-life markets, so you can rely on ISSI for all your SRAM and DRAM needs.

## Select ISSI for Your Industrial Memory Applications!

Industrial Electronics Requirements	ISSI Solutions
Long term support	7 to 10 years is typical life for an ISSI product
Temperature Range: -40°C to +85°C	All ISSI products are designed and tested for industrial temperature
Leaded Package Option	ISSI supports leaded package as well as ROHS
x32 Organization	ISSI offers broadest range of x32 products and aligns with typical 32-bit embedded processors
Support for 5V products	ISSI has 5V SRAMs and EDO/FP DRAMs
Rugged products – high ESD tolerant	ISSI test all devices for HBM and MM. Min spec 2KV HBM
Support for mature products	ISSI still support 64Kb SRAMs and all SDRAMs
Roadmaps for long-term support	ISSI offers optional die shrink products for long term support & cost down roadmap



## SDR Ordering Options

Density	Config.	Part Number <sup>(1)</sup>	Package		Temperature Grade		
			TSOP2	BGA	Com.	Ind.	Auto.
16Mbit	1M x 16	IS42S16100E, IS42S16100F	■	■	■	■	■
64Mbit	4M x 16	IS42S16400F, IS42S16400J	■	■	■	■	■
	2M x 32	IS42S32200E, (IS42S32200L)	■	■	■	■	■
128Mbit	16M x 8	IS42S81600E, (IS42S81600F)	■		■	■	■
	8M x 16	IS42S16800E, (IS42S16800F)	■	■	■	■	■
	4M x 32	IS42S32400E, (IS42S32400F)	■	■	■	■	■
256Mbit	32M x 8	IS42S83200D, (IS42S83200G)	■	■	■	■	
	16M x 16	IS42S16160D, (IS42S16160G)	■	■	■	■	■
	8M x 32	IS42S32800D, (IS42S32800G)	■	■	■	■	■
512Mbit	64M x 8	IS42S86400B, IS42S86400D	■		■	■	
	32M x 16	IS42S16320B, IS42S16320D	■	■	■	■	■
	16M x 32	IS42S32160C, (IS42S32160D)		■	■	■	

## DDR Ordering Options

Density	Config.	Part Number <sup>(1)</sup>	Package			Temperature Grade		
			TSOP2-66	BGA-60	BGA-144	Com.	Ind.	Auto.
64Mbit	4M x 16	IS43R16400B	■			■	■	
128Mbit	8M x 16	IS43R16800CC, (IS43R16800E)	■			■	■	
	4M x 32	IS43R32400D, (IS43R32400E)			■	■	■	■
256Mbit	32M x 8	IS43R83200B, (IS43R83200D)	■			■	■	
	16M x 16	IS43R16160B, (IS43R16160D)	■	■		■	■	■
	8M x 32	IS43R32800B, (IS43R32800D)			■	■	■	■
512Mbit	64M x 8	IS43R86400D	■	■		■	■	
	32M x 16	IS43R16320D	■	■		■	■	■
	16M x 32	IS43R32160D			■	■	■	■

## Mobile DDR Ordering Options

Density	Config.	Part Number
32Mbit	2M x 16	IS43LR16200C
	1M x 32	IS43LR32100C
64Mbit	4M x 16	IS43LR16400B
	2M x 32	IS43LR32200B
128Mbit	8M x 16	IS43LR16800F
	4M x 32	IS43LR32400F
256Mbit	16M x 16	(IS43LR16160F)
	8M x 32	(IS43LR32800F)
512Mbit	32M x 16	IS43LR16320B
	16M x 32	IS43LR32160B

## Mobile SDRAM Ordering Options

Density	Config.	Part Number
16M	1M x 16	IS42xx16100G
32M	2M x 16	IS42xx16200C
	1M x 32	IS42xx32100C
64M	4M x 16	IS42xx16400K
	2M x 32	IS42xx32200K
128M	8M x 16	IS42xx16800G
	4M x 32	IS42xx32400G
256M	16M x 16	IS42xx16160D, (IS42xx16160E)
	8M x 32	IS42xx32800D, (IS42xx32800E)
512M	32M x 16	IS42xx16320D
	16M x 32	IS42xx32160C, IS42xx32160D

### Notes:

1. Automotive grade SDR part numbers begin with "IS45S" and Automotive grade DDR part numbers begin with "IS46R".
2. xx: VM for V<sub>DD</sub> = 1.8V, RM for V<sub>DD</sub> = 2.5V, SM for V<sub>DD</sub> = 3.3V. Production alternatives may be available.
3. Part numbers in parenthesis are sampling. All others in mass production.
4. Automotive grade Mobile DDR part numbers begin with "IS46LR".



## DDR2 SDRAM Product Features:

- Single supply voltage of 1.8V ± 0.1V
- SSTL\_18 compatible inputs
- Bidirectional differential or single-ended data strobe option
- Data masking per byte on Write commands
- Programmable burst length of 4 or 8
- Programmable CAS Latency of 3, 4, 5 or 6
- Auto-Refresh and Self-Refresh Modes
- OCD (Off-Chip Driver Impedance Adjustment)
- ODT (On Die Termination) supported
- Package options: 126-ball BGA for x32, 84-ball BGA for x16, 60-ball BGA for x8
- Long-Term Support for all densities
- Industrial and Automotive grade temperatures

## DDR2 SDRAM Ordering Options

Density	Config.	Part No.	Speeds	Pkg.	Ordering Options
256M	8Mx32	IS43DR32801A	DDR2-400B, DDR2-533C	BGA(126)	-5BBL, -5BBLI, -37CBL, -37CBLI
	8Mx32	IS46DR32801A	DDR2-400B	BGA(126)	-5BBLA1, -5BBLA2
	16Mx16	IS43DR16160A	DDR2-400B, DDR2-533C, DDR2-667D, DDR2-800E	BGA(84)	-5BBLI, -37CBL, -37CBLI, -3DBL, -3DBLI, -25EBL
	16Mx16	IS46DR16160A	DDR2-400B, DDR2-533C	BGA(84)	-5BBLA1, -37CBLA1, -5BBLA2
	32Mx8	IS43DR83200A	DDR2-533C	BGA(60)	-37CBLI
512M	32Mx16	IS43DR16320B	DDR2-533C, DDR2-667D, DDR2-800E, DDR2-800D	BGA(84)	-37CBL, -37CBLI, -3DBL, -3DBLI, -25EBL, -25EBLI, -25DBL, -25DBLI
	32Mx16	IS46DR16320B	DDR2-533C, DDR2-667D	BGA(84)	-37CBLA1, -3DBLA1, -37CBLA2, -3DBLA2
	64Mx8	IS43DR86400B	DDR2-533C, DDR2-667D, DDR2-800E, DDR2-800D	BGA(60)	-37CBLI, -3DBL, -3DBLI, -25EBLI, -25DBLI
1G	64Mx16	IS43DR16640A	DDR2-667D, DDR2-800E, DDR2-800D	BGA(84)	-3DBL, -3DBLI, -25EBL, -25EBLI, -25DBL, -25DBLI
	64Mx16	IS46DR16640A	DDR2-667D	BGA(84)	-3DBLA1, -3DBLA2
	128Mx8	IS43DR81280A	DDR2-667D, DDR2-800E, DDR2-800D	BGA(60)	-3DBL, -3DBLI, -25EBLI, -25DBLI
2G	128Mx16	IS43DR16128	DDR2-667D	BGA(84)	-3DBL, -3DBLI
	128Mx16	IS46DR16128	DDR2-667D	BGA(84)	-3DBLA1, -3DBLA2

### Notes:

1. Automotive grade DDR2 part numbers begin with "IS46DR".
2. Contact ISSI for other ordering options.

## RLDRAM® Memory

Reduced Latency (RL) DRAM is a low-latency, high-bandwidth memory technology that is designed for high-performance applications such as networking, test equipment and other performance critical applications

Density	Common I/O / Separate I/O	Config.	Part Number
288Mbit	SIO	x9	IS49NLS93200
		x18	IS49NLS18160
	CIO	x9	IS49NLC93200
		x18	IS49NLC18160
		x36	IS49NLC36800
		x36	IS49NLC36160
576Mbit	SIO	x9	IS49NLS96400
		x18	IS49NLS18320
	CIO	x9	IS49NLC96400
		x18	IS49NLC18320
		x36	IS49NLC36160
		x36	IS49NLC36160

### Notes:

- 144-ball BGA Package: Leaded/Lead-free
- Temperature grades: Commercial/Industrial
- Speeds: 300MHz, 400MHz
- RLDRAM is a registered trademark of Micron, Technology, Inc.



## Asynchronous SRAMs

Density	Config.	Legacy	High Speed	Ultra Low Power	PSRAM/CRAM
64Kb	x8	■			
256Kb	x8	■	■	■	
512Kb	x16	■	■		
1Mb	x8	■	■	■	
	x16	■	■	■	
2Mb	x8		■	■	
	x16		■	■	
4Mb	x8	■	■	■	
	x16	■	■	■	
8Mb	x8	■	■	■	
	x16	■	■	■	■
	x32		■		
16Mb	x8		■	■	
	x16		■	■	■
	x32		■		
32Mb	x16				■
64Mb	x16				■

**Key**  
 ■ = High Speed Product  
 ■ = High Speed + Low Power options  
 ■ = Ultra Low Power

Voltage*	5V	1.65-3.6V	1.65-3.6V	1.8V, 2.7-3.6V PSRAM 1.8V CRAM
Speed*(typ)	HS 10-12ns LP 25-55ns	HS 8-20ns LP 25-35ns	35-55ns	70ns
Package(s)*	SOJ TSOP BGA (8Mb only)	SOJ TSOP mBGA	SOJ TSOP mBGA	TSOP (8Mb only) BGA(48) PSRAM BGA(54) CRAM

\*Check datasheets for specific part number.

## Synchronous SRAMs

Density	Config.	PipeLine / Flow Through	No Wait (equiv to ZBT™)	QUAD / DDR-II	QUADP / DDR-IIP†
2Mb	x18		■		
	x32	■	■		
	x36	■	■		
4Mb	x18	■	■		
	x32	■	■		
	x36	■	■		
8Mb	x18	■	■		
	x32	■			
	x36	■	■		
18Mb	x18	■	■	■	■
	x36	■	■	■	■
	x72	■	■		
36Mb	x18	■	■	■	■
	x36	■	■	■	■
72Mb	x18			■	■
	x36			■	■

Voltage*	3.3V/2.5V	3.3V/2.5V	1.8V	1.8V
Speed*	133-250 MHz	133-250 MHz	250-333MHz	300-550MHz
Package(s)*	TQFP PBGA BGA	TQFP PBGA BGA	BGA(165)	BGA(165)

†Equivalent to QDR™/QDR-II and DDR/DDR-II

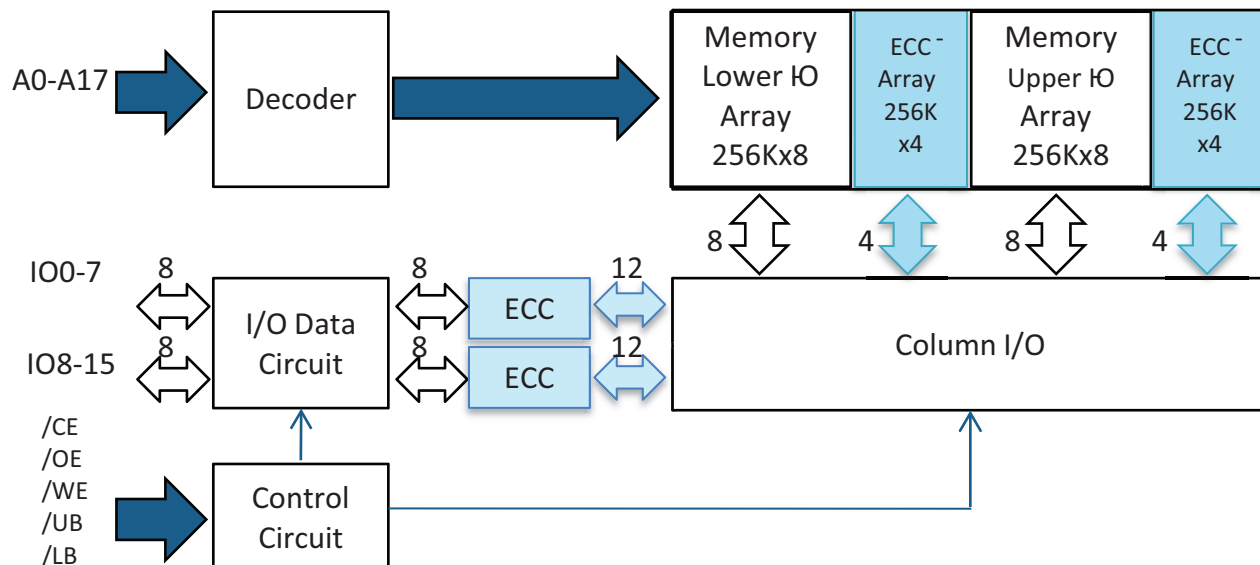
ZBT is a trademark of Integrated Device Technology Inc.  
 QDR SRAM is a trademark of the QDT Consortium



## Innovative Design Reinforces ISSI's Long-Term Commitment to SRAMs

### Error Correction Code (ECC) High Speed Low Power SRAMs

This first Error Correction Code (ECC) based Asynchronous SRAM meets high quality requirements in automotive, industrial, military-aerospace, and other applications.



#### Features:

- Independent ECC with hamming code for each byte
- Detect and correct one bit error per each byte
- Better reliability than parity code schemes which can only detect an error but not correct an error
- Backward Compatible: Drop in replacement to current in industry standard devices (without ECC)
- 2Mb, 4Mb, 8Mb Asynch SRAMs products
- Synchronous SRAM products in design

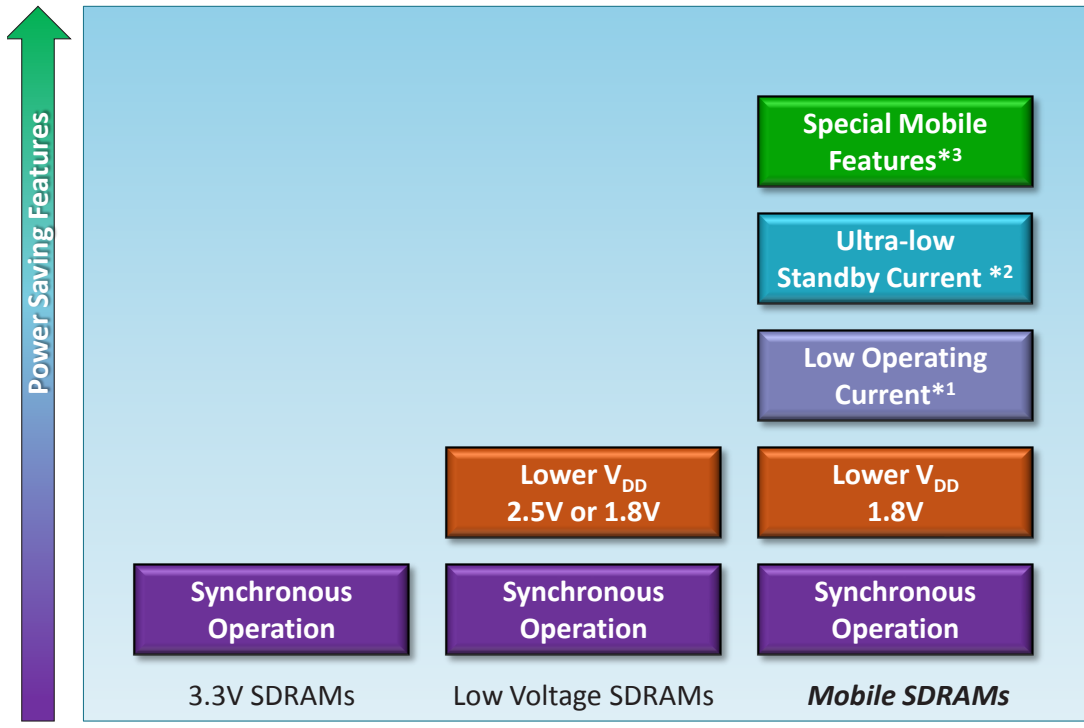
### Ultra Low Power SRAMs

ISSI's family of Ultra-Low Power (ULP) SRAMs offer significant power savings compared to other versions. Products are offered in densities of 1Mb, 2Mb, 4Mb, 8Mb and 16Mb, with options for x8 or x16 in a range of package types.

	IS62WV1288DBLL 128Kx8 Ultra Low Power	IS65WV1288DBLL 128Kx8 Ultra Low Power	Comments
<b>Temperature Support</b>	Industrial (-40°C to +85°C)	Automotive (-40°C to +125°C)	
<b>Standby Current</b>	4 µA	18 µA	Typical value 0.6 µA
<b>Operating Current</b>	8 mA	12 mA	Typical value 4 mA <b>BEST in the INDUSTRY!</b>
<b>Data Retention Current</b>	4 µA	18 µA	Typical value 0.5 µA
<b>Packaging</b>	TSOP-I (32 pins) sTSOP (32 pins) SOP (32 pins) BGA (36 pins)	TSOP-I (32 pins) sTSOP (32 pins) SOP (32 pins) BGA (36 pins)	Lead-free and Leaded, RoHS Compliant
<b>Speed</b>	45 ns**	45 ns	** 35ns Refer to datasheet

## Mobile SDRAMs - Ideal for Power Sensitive Applications

ISSI's Low Power Mobile SDRAMs are ideal for applications where both high performance and low power consumption are important.



- \*1. Mobile SDRAM Operating Current typically **33-50% lower** than standard SDRAM
- \*2. Mobile SDRAM Standby Current typically **90% lower** than standard SDRAM
- \*3. Special **Mobile Features** reduce power even more !

### Mobile Features

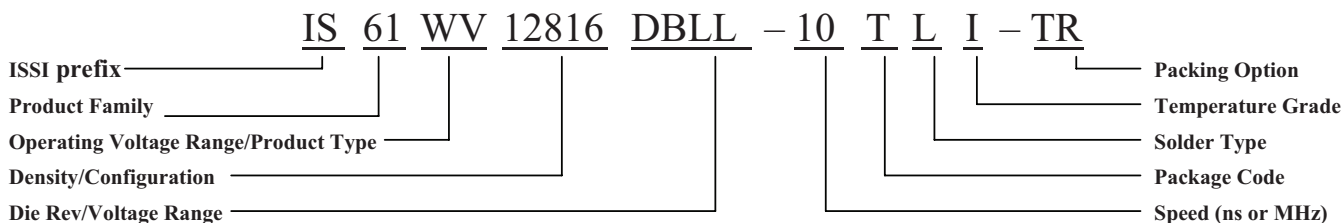
Temperature Compensated Self Refresh (TCSR)	Adjust refresh rate based on temperature to minimize power consumption at lower temperatures
Partial Array Self Refresh (PASR)	Eliminates unnecessary refresh to minimize power
Deep Power Down (DPD)	Lowest power state when data retention is not required
Drive Strength (DS)	Adjust output drive to actual bus loading to minimize power

### Chipset Support for Memory Types

Chipset		SRAM			DRAM			
		Asynch.	Synch	Pseudo	SDR/DDR	LP DDR	DDR2	RLDRAM
FPGA	Low-Mid End	■	■	■	■	■	■	■
	High End	■	■	■	■	■	■	■
ASIC		■	■	■	■	■	■	■
MCU	Low-End (no DRC)	■		■				
	High End	■		■	■	■	■	
MPU		■	■	■	■	■	■	
DSP		■	■	■	■	■	■	
Network Processor			■				■	■



## ORDERING INFORMATION FOR ISSI SRAM DEVICES



**SRAM Product Family**  
 61/63 = High Speed  
 62 = Low Power  
 64 = Automotive High Speed  
 65 = Automotive Low Power  
 66 = Pseudo SRAM  
 67 = Automotive PSRAM

**Density/Configuration**  
 Example:  
 25636 = 256Kx36  
 51216 = 512Kx16  
 1M36 = 1Mx36

**Die Rev/Voltage Range**  
Die Rev  
 Blank-Z  
Voltage Range (WV)  
 ALL = 1.65V to 2.2V  
 BLL = 2.5V to 3.6V

**Operating Voltage Range/ Product Type**  
Asynchronous SRAM  
 C = 5V  
 LV = 3.3V  
 WV = Wide Voltage Range

Synchronous SRAM  
 P = Pipeline, F = Flowthrough  
 NLP/NLF/NVP/NVF = No-Wait Option  
 LP/LF: Vcc = 3.3V, VccQ = 3.3V/2.5V  
 VP/VF: Vcc = 2.5V, VccQ = 2.5V  
 QD = QUAD, DD = DDR-II Common I/O: Vcc = 1.8V, VccQ = 1.8V/1.5V

**Packing Option**  
 Blank = Tray or Tube  
 TR = Tape & Reel

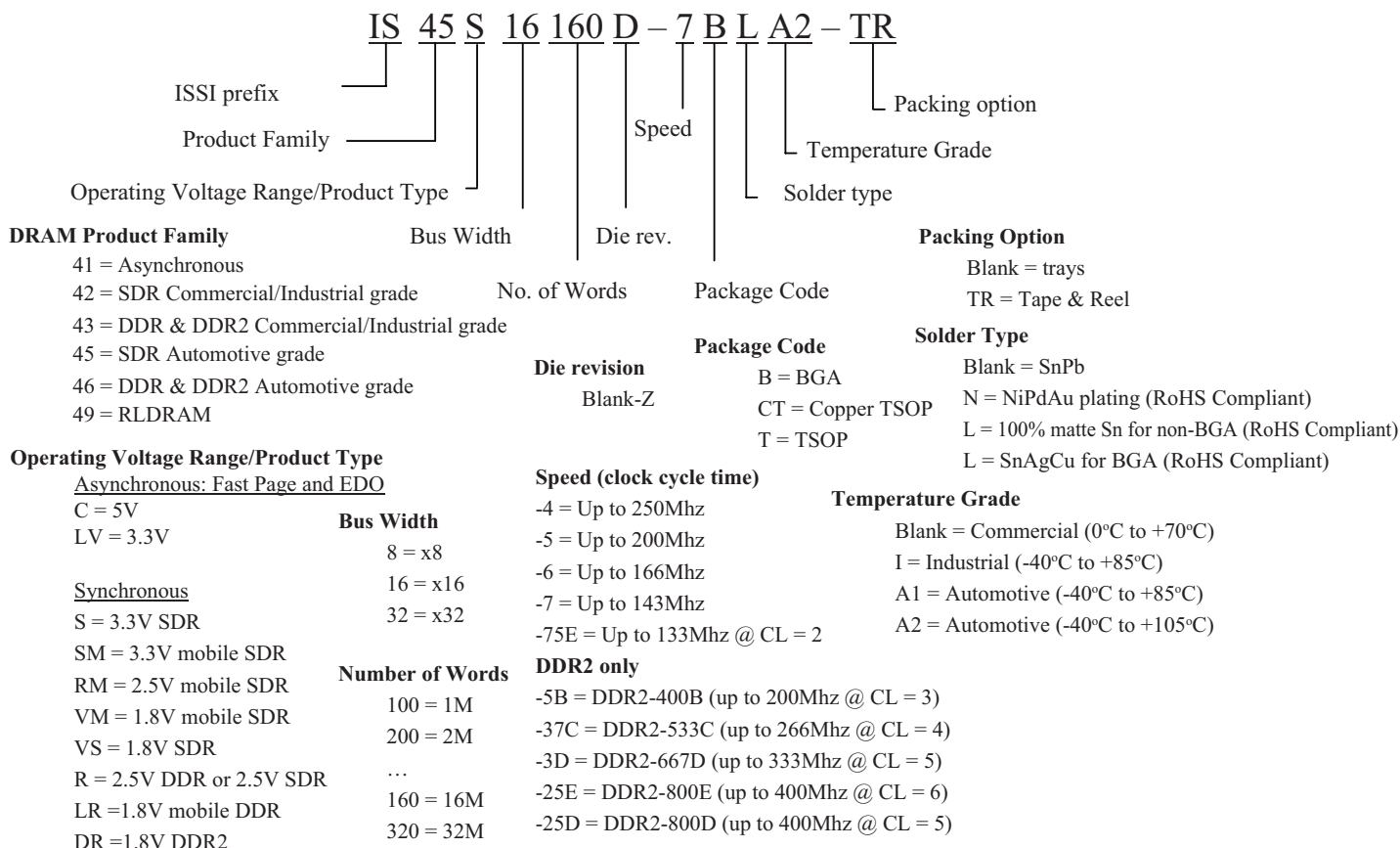
**Temperature Grade**  
 Blank = Commercial (0°C to 70°C)  
 I = Industrial (-40°C to 85°C)  
 A1 = Automotive (-40°C to 85°C)  
 A2 = Automotive (-40°C to 105°C)  
 A3 = Automotive (-40°C to 125°C)

**Solder Type**  
 Blank = SnPb  
 L = Lead-free (RoHS Compliant)

**Package Code**  
 B, B1, B2, B3 = BGA  
 CT = Copper TSOP  
 H = sTSOP  
 J = 300-mil SOJ  
 K = 400-mil SOJ  
 LQ = LQFP  
 M, M3, = BGA  
 Q = SOP  
 T/T2 = TSOP  
 TQ = TQFP  
 U = SOP

**Speed (ns or MHz)**  
 Example:  
 8 = 8ns  
 200 = 200MHz

## ORDERING INFORMATION FOR ISSI DRAM DEVICES



**DRAM Product Family**  
 41 = Asynchronous  
 42 = SDR Commercial/Industrial grade  
 43 = DDR & DDR2 Commercial/Industrial grade  
 45 = SDR Automotive grade  
 46 = DDR & DDR2 Automotive grade  
 49 = RLDRAM

**Operating Voltage Range/Product Type**  
Asynchronous: Fast Page and EDO  
 C = 5V  
 LV = 3.3V

Synchronous  
 S = 3.3V SDR  
 SM = 3.3V mobile SDR  
 RM = 2.5V mobile SDR  
 VM = 1.8V mobile SDR  
 VS = 1.8V SDR  
 R = 2.5V DDR or 2.5V SDR  
 LR = 1.8V mobile DDR  
 DR = 1.8V DDR2

**Bus Width**  
 8 = x8  
 16 = x16  
 32 = x32

**Number of Words**  
 100 = 1M  
 200 = 2M  
 ...  
 160 = 16M  
 320 = 32M

**Die revision**  
 Blank-Z

**Speed (clock cycle time)**  
 -4 = Up to 250Mhz  
 -5 = Up to 200Mhz  
 -6 = Up to 166Mhz  
 -7 = Up to 143Mhz  
 -75E = Up to 133Mhz @ CL = 2

**DDR2 only**  
 -5B = DDR2-400B (up to 200Mhz @ CL = 3)  
 -37C = DDR2-533C (up to 266Mhz @ CL = 4)  
 -3D = DDR2-667D (up to 333Mhz @ CL = 5)  
 -25E = DDR2-800E (up to 400Mhz @ CL = 6)  
 -25D = DDR2-800D (up to 400Mhz @ CL = 5)

**Packing Option**  
 Blank = trays  
 TR = Tape & Reel

**Package Code**  
 B = BGA  
 CT = Copper TSOP  
 T = TSOP

**Solder Type**  
 Blank = SnPb  
 N = NiPdAu plating (RoHS Compliant)  
 L = 100% matte Sn for non-BGA (RoHS Compliant)  
 L = SnAgCu for BGA (RoHS Compliant)

**Temperature Grade**  
 Blank = Commercial (0°C to +70°C)  
 I = Industrial (-40°C to +85°C)  
 A1 = Automotive (-40°C to +85°C)  
 A2 = Automotive (-40°C to +105°C)