

LOGIC REFERENCE GUIDE

Bipolar, BiCMOS, and CMOS Logic Technology



LOGIC OVERVIEW

Welcome to the world of TI Logic! Texas Instruments (TI) offers a full spectrum of logic functions and technologies from mature Bipolar and BiCMOS families to the latest advanced CMOS families. TI's process technologies offer the logic performance and features required for logic designs, while maintaining support for the traditional logic products.

TI also offers specialized, advanced logic products that improve overall system performance and address design issues, including testability, low skew requirements, bus termination, memory drivers, and low impedance drivers.

A wide variety of packaging options are a bonus for those looking to design with TI Logic. TI has made advancements in the logic industry by introducing logic in the latest packaging innovations, including the world's smallest logic package,

NanoStar™, and the latest in ball grid array packaging, MicroStar Jr.™ and MicroStar BGA™.

As the world leader in logic, TI offers logic families at every price/performance node, benchmark delivery reliability, and leading service and support. Start here to find the right TI Logic for your needs.

For additional logic information including application reports, samples, and datasheets, visit:

www.ti.com/sc/logic

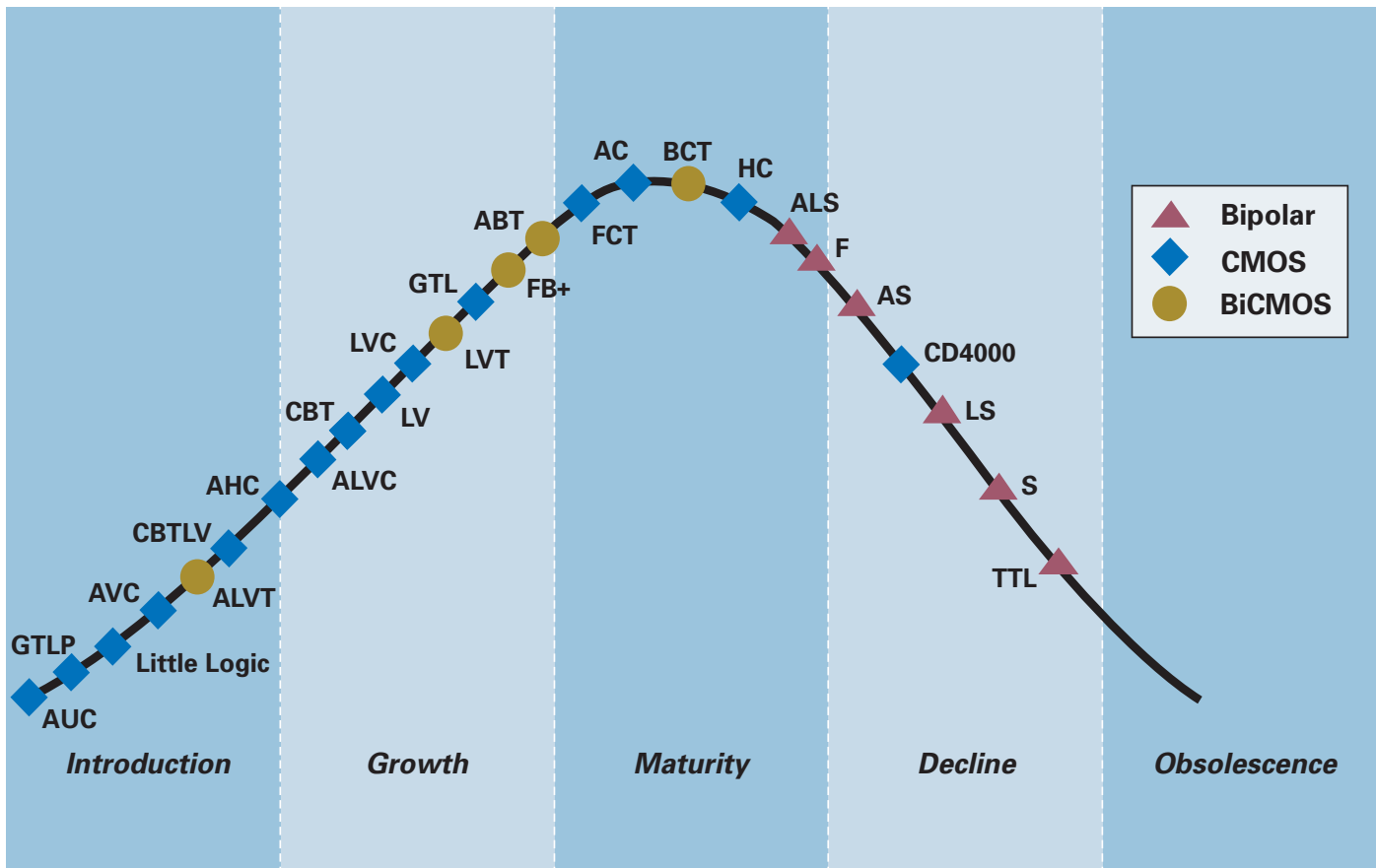
To access the TI Logic KnowledgeBase and get answers to your technical questions go to:

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To subscribe to LogicNews, a monthly newsletter featuring new products and other TI Logic news, visit:

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PRODUCT LIFE CYCLE



LOGIC INDUSTRY CROSS-REFERENCE

TI	Fairchild	Hitachi	IDT	ON	Pericom	Philips	Toshiba
Bipolar							
ALS	ALS	–	–	–	–	ALS	–
AS	AS	–	–	–	–	–	–
74F	F	–	–	F	–	F	–
LS	LS	–	–	LS	–	–	–
S	S	–	–	–	–	–	–
TTL	TTL	–	–	–	–	–	–
BiCMOS							
ABT	ABT	ABT	–	–	–	ABT	ABT
ALB	–	–	–	–	–	–	–
ALVT	–	–	–	–	ALVT	ALVT	–
BCT	BCT	–	–	BC	–	–	BC
LVT	LVT	LVT	–	–	–	LVT	–
CMOS							
AC/ACT	AC/ACT	AC/ACT	–	AC/ACT	–	–	AC/ACT
AHC/AHCT	VHC	–	–	VHC	–	AHC	VHC
ALVC	VCX	ALVC	ALVC	VCX	ALVC	ALVC	VCX
AUC	–	–	AUC	–	–	AUC	–
AVC	–	–	–	–	AVC	AVC	–
CBT	FST	–	FST/QS	–	PI5C	–	–
CBTLV	–	–	CBTLV	–	P13B	–	–
CD4K	CD4K	–	–	MC1400	–	–	–
FCT	–	–	FCT	–	FCT	–	–
HC/HCT	HC/HCT	HC/HCT	–	HC/HCT	–	HC/HCT	HC/HCT
LV-A	LVQ/LVX	LV	–	LVQ/LVX	–	LV	LVQ/LVX
LVC	LCX	LVC	LVC/LCX	LCX	LCX/LPT	LVC	LCX

SPECIALTY LOGIC

TI	Fairchild	Hitachi	IDT	ON	Pericom	Philips	Toshiba
Advanced Interface Logic							
GTL	–	–	–	–	–	GTL	–
GTLP	GTLP	–	–	–	GTLP	–	–
FB+ (BTL)	DS	–	–	–	–	FB	–
ABTE (ETL)	ETL/VME	–	–	–	–	–	–
Advanced Memory Drivers							
SSTV	SSTV	SSTV	SSTV	–	SSTV	SSTV	–
HSTL	–	–	–	–	–	–	–
SSTL	–	–	–	–	–	SSTL	–
I²C Bus							
PCA	–	–	–	–	–	PCA	–
PCF	–	–	–	–	–	PCF	–

LITERATURE

Selection Guides

Logic Selection Guide
 Little Logic Selection Guide
 Advanced Bus Interface Logic Selection Guide
 Design Considerations for Logic Products,
 Volume 3

Data Books

GTL/GTLP Data Book
 Little Logic Data Book
 Signal Switch Data Book
 CBT/CBTLV Data Book
 AVC Data Book
 ALVC Data Book
 AHC/AHCT Data Book

Lit. Number

SDYU001P
 SCYB001B
 SCYT126
 SDYA019
 SCED004A
 SCED010
 SCDD003
 SCDD001B
 SCED008B
 SCED006A
 SCLD003B

Brochures/Product Bulletins

NanoStar Design Summary
 MicroStar Junior Design Summary
 GTLP Brochure
 LV-A Brochure
 AVC Product Bulletin
 Bus Switches (CBT & CBTLV) Product Bulletin
 AUC Brochure

Lit. Number

SCET006
 SCET004
 SCEB005
 SCEB008
 SCEB003C
 SCDB002A
 SCEB011

To order any TI Logic literature listed, please contact the Texas Instruments Literature Response Center at 1-800-477-8924 and provide the literature number.

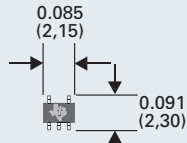
FAMILY PORTFOLIO

Technology Family	Voltage	Function												Little Logic	Gates
		Buffers/Drivers/ Bus Transceivers	Flip Flops/Latches	Bus Termination Arrays	Counters	Registers	Encoders/Data Selectors/ Multiplexers	Decoders/Demultiplexers	Comparators/Parity Generators and Checkers	Arithmetic Circuits	Gates	Universal Bus Drivers/ Transceivers	Bus Switches		
Bipolar															
ALS	5.0	✓	✓	-	✓	✓	✓	✓	✓	✓	-	✓	-	-	✓
AS	5.0	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓
74F	5.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓
LS	5.0	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓
S	5.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓
TTL	5.0	✓	✓	-	✓	-	✓	✓	✓	-	✓	✓	-	-	✓
BiCMOS															
ABT	5.0	✓	✓	-	-	-	✓	✓	-	-	-	-	✓	-	-
ALB	3.3	✓	-	-	-	-	-	-	-	-	-	-	-	-	-
ALVT	3.3	✓	✓	-	-	-	-	-	-	-	-	-	✓	-	-
BCT	5.0	✓	✓	-	-	-	-	✓	-	-	-	-	✓	-	-
LVT	3.3	✓	✓	-	-	-	-	-	-	-	-	-	✓	-	-
CMOS															
AC/ACT	5.0	✓	✓	✓	-	-	✓	✓	✓	-	-	✓	-	-	✓
AHC/AHCT	5.0	✓	✓	-	✓	✓	✓	✓	-	-	✓	✓	-	-	✓
ALVC	3.3	✓	✓	-	-	✓	-	-	-	-	-	✓	✓	-	✓
AUC	1.8	-	-	-	-	-	-	-	-	-	-	-	-	✓	-
AVC	2.5	✓	✓	-	-	-	-	-	-	-	-	-	✓	-	-
CBT	5.0	-	-	-	-	-	-	-	-	-	-	-	-	✓	-
CBTLV	3.3	-	-	-	-	-	-	-	-	-	-	-	-	✓	-
CD4K	5.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	-	✓	-
FCT	5.0	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	✓	-	✓
HC/HCT	5.0	✓	✓	-	✓	✓	✓	✓	✓	✓	-	✓	-	-	✓
LV-A	3.3	✓	✓	-	✓	✓	✓	✓	✓	-	-	✓	-	✓	✓
LVC	3.3	✓	✓	-	-	-	✓	✓	✓	-	-	✓	✓	✓	✓

SPECIALTY LOGIC PORTFOLIO

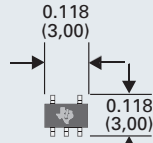
	Device Type/Application	Performance Details
Advanced Interface Logic		
GTL	Backplane Driver	Low-power consumption; live insertion; 3.3-V V _{CC} , 5-V tolerant; supports both GTL and GTL+ Logic levels
GTLP	Backplane Driver	4x more data throughput over traditional TTL Logic devices; 3.3-V V _{CC} , 5-V tolerant; device acts as 5-V TTL-to-GTLP, as well as 3.3-V LVTTTL-to-GTLP translators; TI-OPC™
FB+ (BTL)	Backplane Driver	Drive ≤100 mA; true live insertion
ABTE (ETL)	Backplane Driver	TTL backward compatible; live insertion; bus hold
Advanced Memory Drivers		
SSTL	High-Speed Memory Driver	High-speed memory interface for PC
SSTV	High-Speed Memory Driver	High-speed memory interface for PC1600/2100 (DDR1) and PC2400/2700 (DDR2)
HSTL	High-Speed Memory Driver	HSTL-to-LVTTTL memory address latches
I²C Bus		
PCA	I ² C Bus	Non-volatile 5-bit register
PCF	I ² C Bus	General purpose I/O expansion
Testability		
JTAG	IEEE 1149.1	Device, speed, system testability

PACKAGING



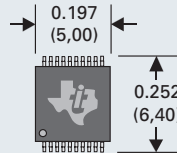
**5-pin
SC-70 (DCK)**

Lead pitch = 0.026 (0,65)
Height = 0.037 (0,95)
Area = 0.008 (4,95)



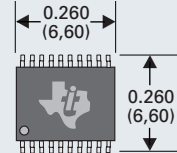
**5-pin
SOT-23 (DBV)**

Lead pitch = 0.037 (0,95)
Height = 0.047 (1,20)
Area = 0.014 (9)



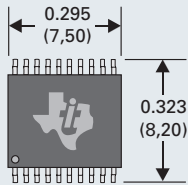
**20-pin
TVSOP (DGV)**

Lead pitch = 0.016 (0,40)
Height = 0.047 (1,20)
Area = 0.050 (32)



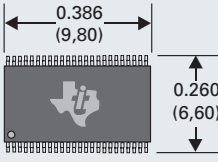
**20-pin
TSSOP (PW)**

Lead pitch = 0.026 (0,65)
Height = 0.047 (1,20)
Area = 0.068 (44)



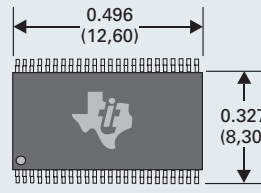
**20-pin
SSOP (DB)**

Lead pitch = 0.026 (0,65)
Height = 0.079 (2,0)
Area = 0.095 (62)



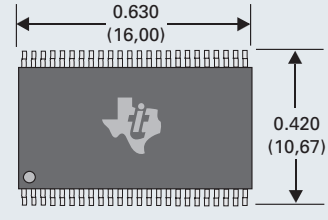
**48-pin Widebus™
TVSOP (DGV)**

Lead pitch = 0.016 (0,40)
Height = 0.047 (1,20)
Area = 0.100 (63)



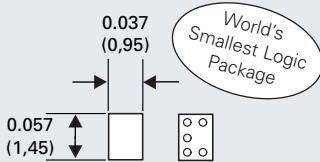
**48-pin Widebus™
TSSOP (DGG)**

Lead pitch = 0.020 (0,50)
Height = 0.047 (1,20)
Area = 0.162 (105)



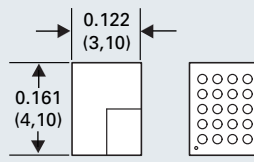
**48-pin Widebus™
SSOP (DL)**

Lead pitch = 0.025 (0,635)
Height = 0.110 (2,79)
Area = 0.265 (171)



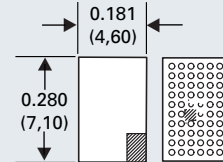
**5-ball
NanoStar™ BGA (YEA)**

Ball pitch = 0.020 (0,50)
Height = 0.020 (0,50)
Area = 0.002 (1,26)



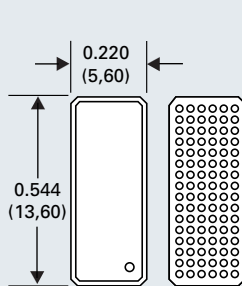
**20-ball
MicroStar Jr.™ BGA (GQN)**

Ball pitch = 0.026 (0,65)
Height = 0.039 (1,00)
Area = 0.020 (12,7)



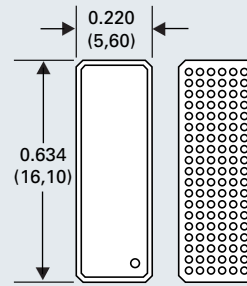
**56/48-ball
MicroStar Jr.™ BGA (GQL)**

Ball pitch = 0.026 (0,65)
Height = 0.039 (1,00)
Area = 0.051 (32,7)



**96-ball
MicroStar BGA™ (GKE)**

Ball pitch = 0.031 (0,80)
Height = 0.055 (1,40)
Area = 0.139 (90,2)



**114-ball
MicroStar BGA™ (GKF)**

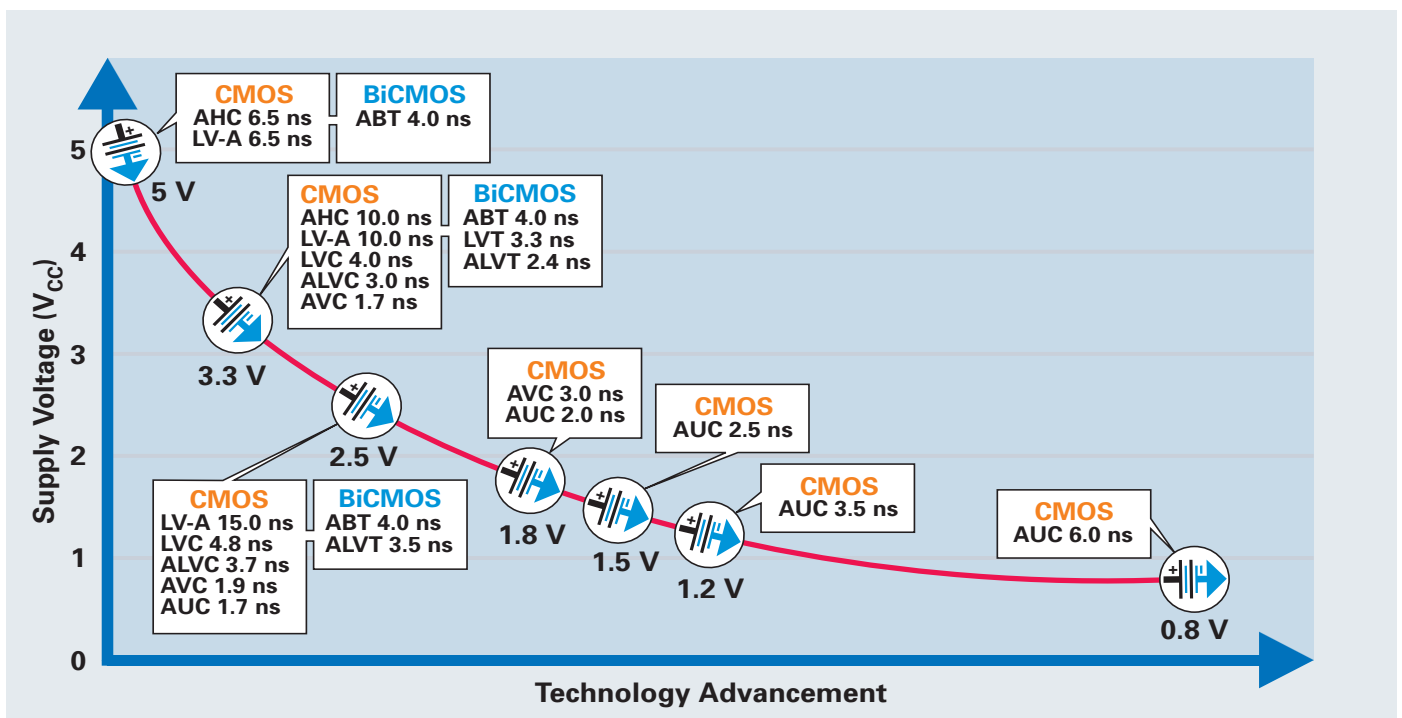
Ball pitch = 0.031 (0,80)
Height = 0.055 (1,40)
Area = 0.139 (90,2)

Dimensions are in inches (millimeters)

FAMILY SPECIFICATION COMPARISON

	Family	Technology	Compatibility		Drive I_{OL}/I_{OH} (mA)	Static Current I_{CC} (μ A)	Speed T_{pd} max (ns)
			Input V_{IL}/V_{IH}	Output V_{OL}/V_{OH}			
1.8 V							
('16245)	AUC	CMOS	CMOS	CMOS	8/-8	10	2.0
2.5 V							
('16245)	AVC	CMOS	CMOS	CMOS	8/-8	40	2.0
3.3 V							
('16244)	ALVT	BiCMOS	CMOS	LVTTTL	24/-8	4.5 mA	3.5
('16245)	LVT	BiCMOS	LVTTTL	LVTTTL	64/-32	190	3.5
('16245)	ALVC	CMOS	LVTTTL	LVTTTL	24/-24	40	3.0
('16245)	LVC	CMOS	LVTTTL	LVTTTL	24/-24	10	4.0
	ALB	BiCMOS	LVTTTL	LVTTTL	25/-25	800	2.0
	AC	CMOS	CMOS	CMOS	12/-12	20	8.5
	AHC	CMOS	CMOS	CMOS	4/-4	20	11.9
	LV	CMOS	LVTTTL	LVTTTL	8/-8	20	14.0
5 V							
	FCT	BiCMOS	TTL	TTL	64/-15	80	7.0
	ABT	BiCMOS	TTL	TTL	64/-32	250	3.5
	AHC	CMOS	CMOS	CMOS	8/-8	40	7.5
	AHCT	CMOS	TTL	CMOS	8/-8	40	7.7
	AC	CMOS	CMOS	CMOS	24/-24	40	6.5
	ACT	CMOS	TTL	CMOS	24/-24	40	8.0
	74F	Bipolar	TTL	TTL	64/-15	120 mA	6.0
	BCT	BiCMOS	TTL	TTL	64/-15	90 mA	6.6
	HC	CMOS	CMOS	CMOS	6/-6	80	21.0
	HCT	CMOS	TTL	CMOS	6/-6	80	30.0
	AS	Bipolar	TTL	TTL	64/-15	143 mA	7.5
	ALS	Bipolar	TTL	TTL	24/-15	58 mA	10.0
	LS	Bipolar	TTL	TTL	24/-15	95 mA	12.0
	S	Bipolar	TTL	TTL	64/-15	180 mA	9.0
('00)	TTL	Bipolar	TTL	TTL	16/-0.4	22 mA	22.0

LOGIC MIGRATION



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SCYB004

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