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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Description

The 5PB11xx is a high-performance LVCMOS Clock Buffer Family. It has best-in-class additive phase jitter of 50fsec RMS.

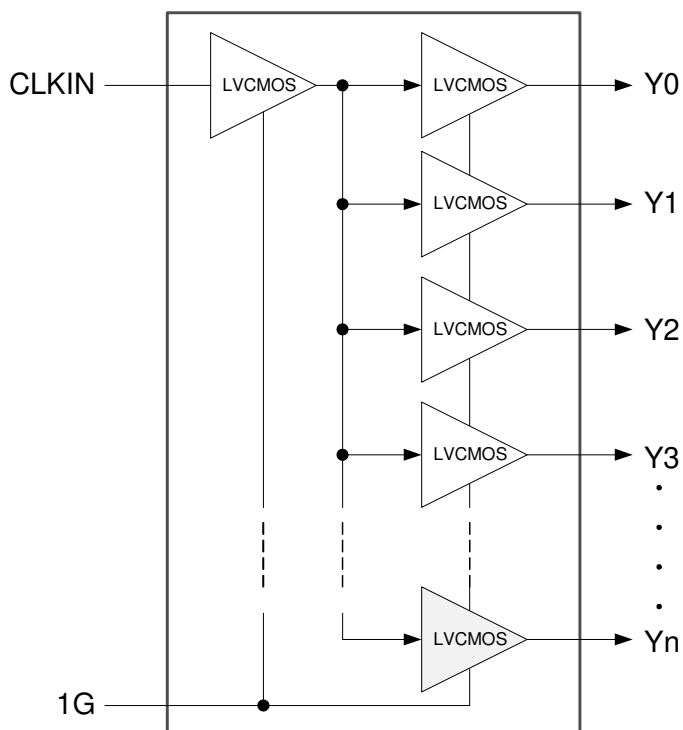
There are five different fan-out variations, 1:2 to 1:10, available.

The IDT5PB11xx also supports a synchronous glitch-free Output Enable function to eliminate any potential intermediate incorrect output clock cycles when enabling or disabling outputs. It comes in various packages and can operate from a 1.8V to 3.3V supply.

Features

- High performance 1:2, 1:4, 1:6, 1:8, 1:10 LVCMOS clock buffer
- Very low pin-to-pin skew < 50ps
- Very low additive jitter < 50fs
- Supply voltage: 1.8V to 3.3V
- fMAX = 200MHz
- Integrated serial termination for 50Ω channel
- Packaged in 8-, 14-, 16-, 20-pin TSSOP and as small as 2 × 2 mm DFN and QFN packages
- Industrial (-40°C to +85°C) and extended (-40°C to +105°C) temperature ranges

Block Diagram



Pin Assignments for TSSOP Packages

CLKIN	1	8	Y1
1G	2	7	NC
Y0	3	6	VDD
GND	4	5	NC

5PB1102PGG

CLKIN	1	8	Y1
1G	2	7	Y3
Y0	3	6	VDD
GND	4	5	Y2

5PB1104PGG

CLKIN	1	14	Y1
1G	2	13	Y3
Y0	3	12	VDD
GND	4	11	Y2
VDD	5	10	GND
Y4	6	9	Y5
GND	7	8	VDD

5PB1106PGG

CLKIN	1	16	Y1
1G	2	15	Y3
Y0	3	14	VDD
GND	4	13	Y2
VDD	5	12	GND
Y4	6	11	Y5
GND	7	10	VDD
Y6	8	9	Y7

5PB1108PGG

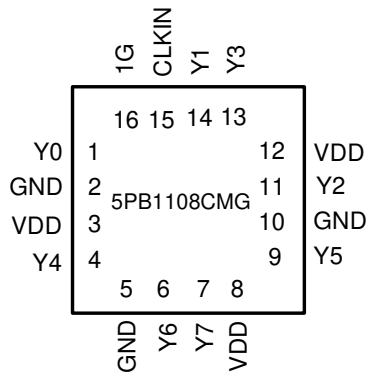
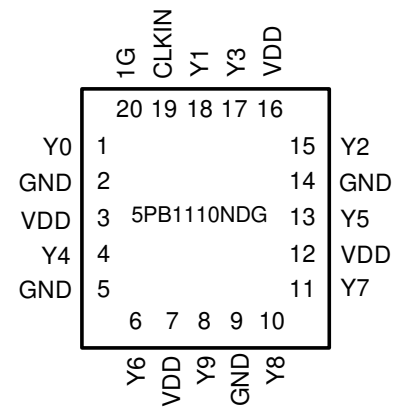
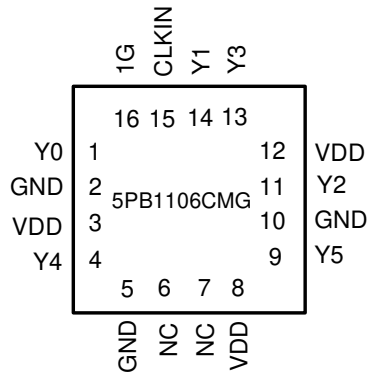
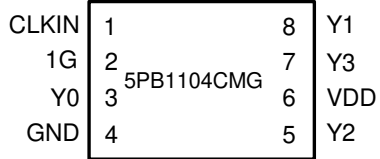
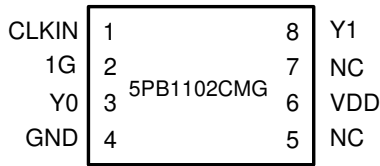
CLKIN	1	20	Y1
1G	2	19	Y3
Y0	3	18	VDD
GND	4	17	Y2
VDD	5	16	GND
Y4	6	15	Y5
GND	7	14	VDD
Y6	8	13	Y7
VDD	9	12	Y8
Y9	10	11	GND

5PB1110PGG

Pin Descriptions for TSSOP Packages

Device Number	LVC MOS Clock Input	Clock Output Enable	LVC MOS Clock Output	Supply Voltage	Ground
	CLKIN	1G	Y0, Y1, . . . Y9	VDD	GND
5PB1102PGG	1	2	3, 8	6	4
5PB1104PGG	1	2	3, 8, 5, 7	6	4
5PB1106PGG	1	2	3, 14, 11, 13, 6, 9	5, 8, 12	4, 7, 10
5PB1108PGG	1	2	3, 16, 13, 15, 6, 11, 8, 9	5, 10, 14	4, 7, 12
5PB1110PGG	1	2	3, 20, 17, 19, 6, 15, 8, 13, 12, 10	5, 9, 14, 18	4, 7, 11, 16

Pin Assignments for DFN/QFN Packages



Pin Descriptions for DFN/QFN Packages

Device Number	LVC MOS Clock Input	Clock Output Enable	LVC MOS Clock Output	Supply Voltage	Ground
	CLKIN	1G	Y0, Y1, . . . Y9	VDD	GND
5PB1102CMG	1	2	3, 8	6	4
5PB1104CMG	1	2	3, 5, 7, 8	6	4
5PB1106CMG	15	16	1, 4, 9, 11, 13, 14	3, 8, 12	2, 5, 10
5PB1108CMG	15	16	1, 4, 6, 7, 9, 11, 13, 14	3, 8, 12	2, 5, 10
5PB1110NDG	19	20	1, 4, 6, 8, 10, 11, 13, 15, 17, 18	3, 7, 12, 16	2, 5, 9, 14

Output Logic Table

Inputs		Output
CLKIN	1G	Yn
X	L	L
L	H	L
H	H	H

After at least three cycles of input clock toggling, Output Enable function is asynchronous to eliminate any intermediate incorrect output clock cycles during transition which may cause frequency peaking to the downstream device.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the 5PB11xx. These ratings, which are standard values for IDT commercially rated parts, are stress ratings only. Functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

Item	Rating
Supply Voltage, VDD	3.465V
Output Enable and All Outputs	-0.4 V to VDD+0.5 V
CLKIN	-0.4 V to 3.465V
Ambient Operating Temperature (industrial)	-40 to +85°C
Ambient Operating Temperature (extended)	-40 to +105°C
Storage Temperature	-65 to +150°C
Junction Temperature	125°C
Soldering Temperature	260°C

Recommended Operation Conditions

Parameter	Min.	Typ.	Max.	Units
Ambient Operating Temperature (industrial)	-40		+85	°C
Ambient Operating Temperature (extended)	-40		+105	°C
Power Supply Voltage (measured in respect to GND)	+1.71		+3.465	V

DC Electrical Characteristics

(VDD = 1.8V, 2.5V, 3.3V)

VDD = 1.8V ±5%, Ambient temperature -40° to +105°C, unless stated otherwise.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		1.71		1.89	V
Input High Voltage, CLKIN	V _{IH}	Note 1	0.7 x VDD		VDD	V
Input Low Voltage, CLKIN	V _{IL}	Note 1			0.3 x VDD	V
Input High Voltage, 1G	V _{IH}		1.6		VDD	V
Input Low Voltage, 1G	V _{IL}				0.6	V
Output High Voltage	V _{OH}	I _{OH} = -5mA	1.4			V
Output Low Voltage	V _{OL}	I _{OL} = 5mA			0.4	V
Nominal Output Impedance	Z _O			50		Ω
Input Capacitance	C _{IN}	CLKIN, 1G pin		5		pF
Operating Supply Current						
5PB1102	IDD	100MHz, No load, 25°C		8		mA
5PB1104		100MHz, No load, 25°C		12		
5PB1106		100MHz, No load, 25°C		16		
5PB1108		100MHz, No load, 25°C		21		
5PB1110		100MHz, No load, 25°C		25		

Notes: 1. Nominal switching threshold is VDD/2

VDD = 2.5V ±5%, Ambient temperature -40° to +105°C, unless stated otherwise.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		2.375		2.625	V
Input High Voltage, CLKIN	V _{IH}	Note 1	0.7 x VDD		VDD	V
Input Low Voltage, CLKIN	V _{IL}	Note 1			0.3 x VDD	V
Input High Voltage, 1G	V _{IH}		1.8		VDD	V
Input Low Voltage, 1G	V _{IL}				0.7	V
Output High Voltage	V _{OH}	I _{OH} = -8mA	1.9			V
Output Low Voltage	V _{OL}	I _{OL} = 8mA			0.5	V
Nominal Output Impedance	Z _O			50		Ω
Input Capacitance	C _{IN}	CLKIN, 1G pin		5		pF
Operating Supply Current						
5PB1102	IDD	100MHz, No load, 25°C		10		mA
5PB1104		100MHz, No load, 25°C		15		
5PB1106		100MHz, No load, 25°C		22		
5PB1108		100MHz, No load, 25°C		28		
5PB1110		100MHz, No load, 25°C		33		

VDD = 3.3V ±5%, Ambient temperature -40° to +105°C, unless stated otherwise.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		3.135		3.465	V
Input High Voltage, CLKIN	V _{IH}	Note 1	0.7 x VDD		VDD	V
Input Low Voltage, CLKIN	V _{IL}	Note 1			0.3 x VDD	V
Input High Voltage, 1G	V _{IH}		2		VDD	V
Input Low Voltage, 1G	V _{IL}				0.8	V
Output High Voltage	V _{OH}	I _{OH} = -12mA	2.4			V
Output Low Voltage	V _{OL}	I _{OL} = 12mA			0.7	V
Nominal Output Impedance	Z _O			50		Ω
Input Capacitance	C _{IN}	CLKIN, 1G pin		5		pF
Operating Supply Current						
5PB1102	IDD	100MHz, No load, 25°C		12		mA
5PB1104		100MHz, No load, 25°C		20		
5PB1106		100MHz, No load, 25°C		25		
5PB1108		100MHz, No load, 25°C		35		
5PB1110		100MHz, No load, 25°C		40		

AC Electrical Characteristics

(VDD = 1.8V, 2.5V, 3.3V)

VDD = 1.8V ±5%, Ambient Temperature -40° to +105°C, unless stated otherwise.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency			0		200	MHz
Output Rise Time (2pF load)	t _{OR}	0.36V to 1.44V, C _L = 2 pF		0.5	0.75	ns
Output Fall Time (2pF load)	t _{OF}	1.44V to 0.36V, C _L = 2 pF		0.5	0.75	ns
Output Rise Time (5pF load)	t _{OR}	0.36V to 1.44V, C _L = 5 pF		0.8	1.0	ns
Output Fall Time (5pF load)	t _{OF}	1.44V to 0.36V, C _L = 5 pF		0.8	1.0	ns
Start-up Time	t _{START-UP}	Part start-up time for valid outputs after VDD ramp-up			3	ms
Propagation Delay		Note 1	1.5	1.9	2.5	ns
Buffer Additive Phase Jitter, RMS		156.25MHz, Integration Range: 12kHz-20MHz			0.05	ps
Output to Output Skew (5PB1102/04)		Rising edges at VDD/2, Note 2		35	50	ps
Output to Output Skew (5PB1106)		Rising edges at VDD/2, Note 2		35	58	ps
Output to Output Skew (5PB1108/10)		Rising edges at VDD/2, Note 2		45	65	ps
Device to Device Skew		Rising edges at VDD/2			200	ps
Output Enable Time	t _{EN}	C _L ≤ 5pF			3	cycles
Output Disable Time	t _{DIS}	C _L ≤ 5pF			3	cycles

VDD = 2.5V ±5%, Ambient Temperature -40° to +105°C, unless stated otherwise.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency			0		200	MHz
Output Rise Time (2pF load)	t _{OR}	0.5V to 2.0V, C _L = 2 pF		0.4	0.7	ns
Output Fall Time (2pF load)	t _{OF}	2.0V to 0.5V, C _L = 2 pF		0.4	0.7	ns
Output Rise Time (5pF load)	t _{OR}	0.5V to 2.0V, C _L = 5 pF		0.75	1.0	ns
Output Fall Time (5pF load)	t _{OF}	2.0V to 0.5V, C _L = 5 pF		0.75	1.0	ns
Start-up Time	t _{START-UP}	Part start-up time for valid outputs after VDD ramp-up			3	ms
Propagation Delay (5PB1102/04)		Note 1	1.9	2.4	2.9	ns
Propagation Delay (5PB1106/08)			2.0	2.4	3.3	ns
Propagation Delay (5PB1110)			2.0	2.4	3.0	ns
Buffer Additive Phase Jitter, RMS		156.25MHz, Integration Range: 12kHz-20MHz			0.05	ps
Output to Output Skew (5PB1102/04)		Rising edges at VDD/2, Note 2		35	50	ps
Output to Output Skew (5PB1106)		Rising edges at VDD/2, Note 2		35	58	ps
Output to Output Skew (5PB1108/10)		Rising edges at VDD/2, Note 2		45	65	ps
Device to Device Skew		Rising edges at VDD/2			200	ps
Output Enable Time	t _{EN}	C _L ≤ 5pF			3	cycles
Output Disable Time	t _{DIS}	C _L ≤ 5pF			3	cycles

VDD = 3.3V ±5%, Ambient Temperature -40° to +105°C, unless stated otherwise.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency			0		200	MHz
Output Rise Time (2pF load)	t _{OR}	0.66V to 2.64V, C _L = 2pF		0.45	0.6	ns
Output Fall Time (2pF load)	t _{OF}	2.64V to 0.66V, C _L = 2pF		0.45	0.6	ns
Output Rise Time (5pF load)	t _{OR}	0.66V to 2.64V, C _L = 5pF		0.7	1.0	ns
Output Fall Time (5pF load)	t _{OF}	2.64V to 0.66V, C _L = 5pF		0.7	1.0	ns

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Start-up Time	$t_{START-UP}$	Part start-up time for valid outputs after VDD ramp-up			3	ms
Propagation Delay (5PB1102/04)		Note 1	1.7	2	2.4	ns
Propagation Delay (5PB1106/08)			1.7	2	2.7	ns
Propagation Delay (5PB1110)			1.7	2	2.5	ns
Buffer Additive Phase Jitter, RMS		156.25MHz, Integration Range: 12kHz-20MHz			0.05	ps
Output to Output Skew (5PB1102/04)		Rising edges at VDD/2, Note 2		35	50	ps
Output to Output Skew (5PB1106)		Rising edges at VDD/2, Note 2		35	58	ps
Output to Output Skew (5PB1108/10)		Rising edges at VDD/2, Note 2		45	65	ps
Device to Device Skew		Rising edges at VDD/2			200	ps
Output Enable Time	t_{EN}	$C_L \leq 5pF$			3	cycles
Output Disable Time	t_{DIS}	$C_L \leq 5pF$			3	cycles

Notes:

1. With rail to rail input clock
2. Between any 2 outputs with equal loading.
3. Duty cycle on outputs will match incoming clock duty cycle. Consult IDT for tight duty cycle clock generators.

Phase Noise Plots

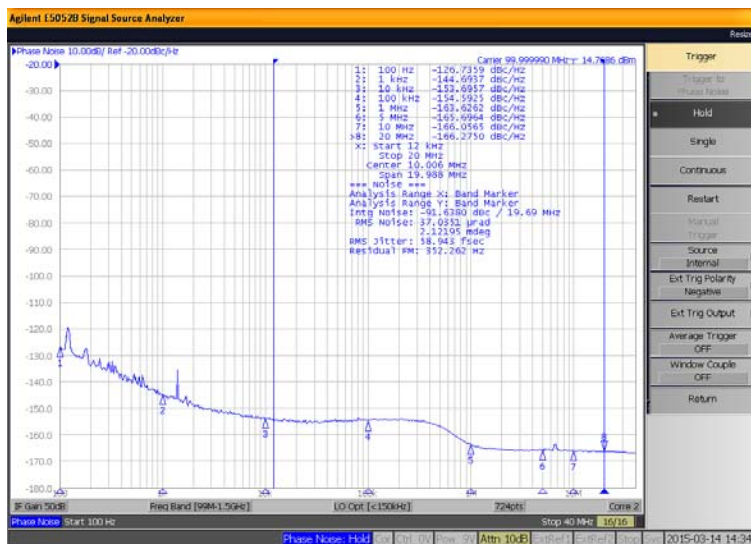


Figure 1. 5PB11xx Reference Phase Noise 58.9fs (12kHz to 20MHz)

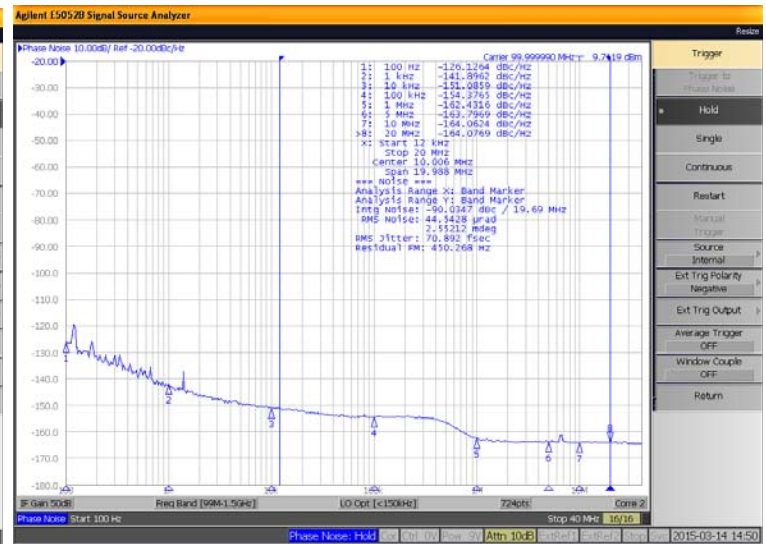
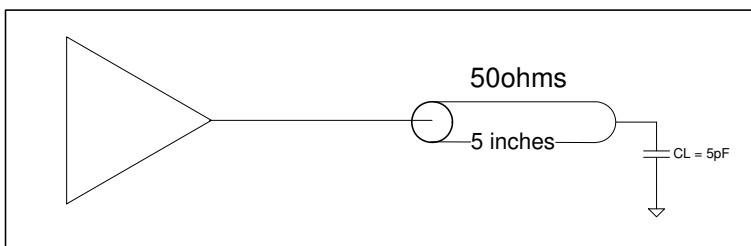


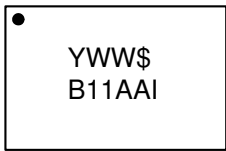
Figure 2. 5PB11xx Output Phase Noise 70.9fs (12kHz to 20MHz)

The phase noise plots above show the low additive jitter of the 5PB11xx high-performance buffer. With an integration range of 12kHz to 20MHz, the reference input has about 58.9fs of RMS phase jitter while the output of 5PB11xx has about 70.9fs of RMS phase jitter. This results in a low additive phase jitter of only 39fs.

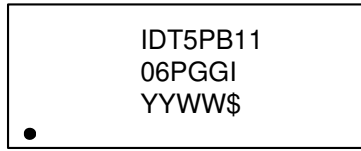
Test Load and Circuit



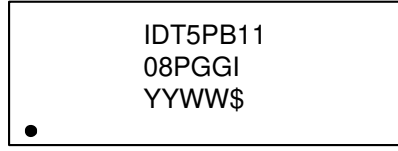
Marking Diagrams (industrial temperature range)



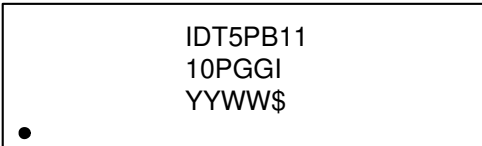
8-pin TSSOP



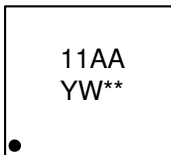
14-pin TSSOP



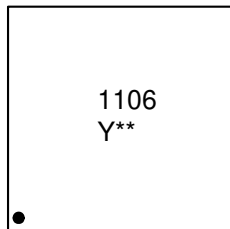
16-pin TSSOP



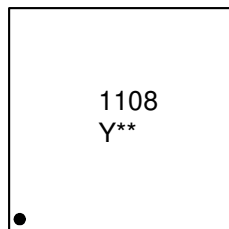
20-pin TSSOP



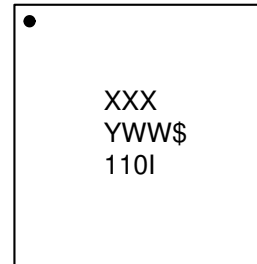
8-pin DFN



16-pin QFN



16-pin QFN

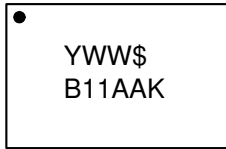


20-pin QFN

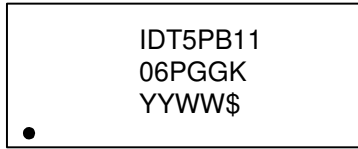
Notes:

1. "AA" denotes the last two digits of the part number for 8-pin TSSOP and DFN (e.g. 02, 04).
2. "**" is the lot sequence.
3. "XXX" denotes the last three characters of the Asm lot (20-pin QFN only).
4. "YYWW", "YWW", "YW", or "Y" is the last digit(s) of the year and week that the part was assembled.
5. "\$" denotes the mark code.
6. "G" after the two-letter package code denotes RoHS compliant package.
7. "I" denotes industrial temperature range device.
8. Bottom marking: LOT and COO (TSSOP only).

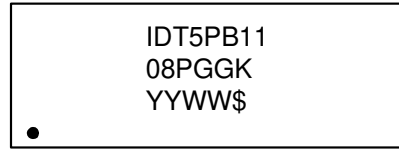
Marking Diagrams (extended temperature range)



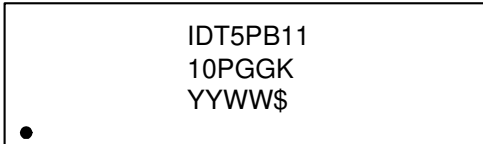
8-pin TSSOP



14-pin TSSOP



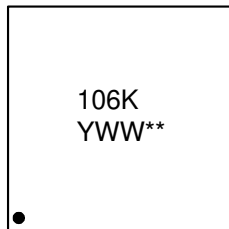
16-pin TSSOP



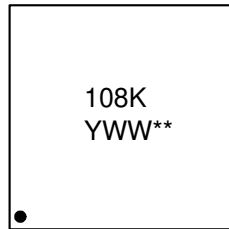
20-pin TSSOP



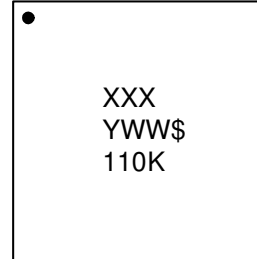
8-pin DFN



16-pin QFN



16-pin QFN



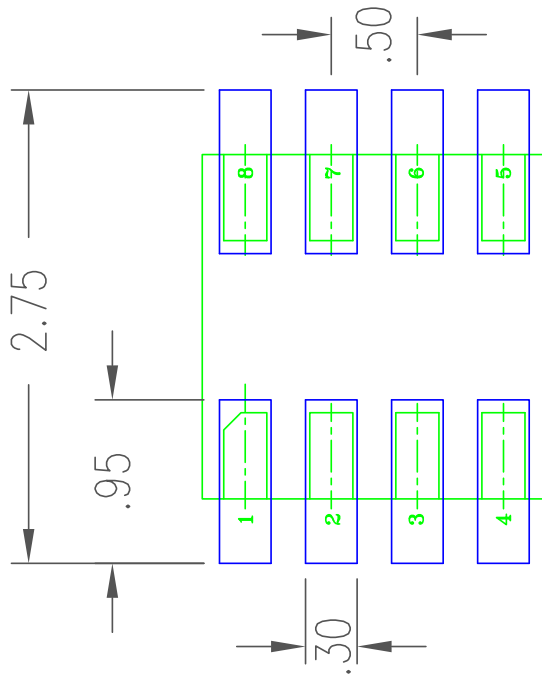
20-pin QFN

Notes:

1. "AA" denotes the last two digits of the part number for 8-pin TSSOP and DFN (e.g. 02, 04).
2. "**" is the lot sequence.
3. "XXX" denotes the last three characters of the Asm lot (20-pin QFN only).
4. "YYWW", "YWW", "YW", or "Y" is the last digit(s) of the year and week that the part was assembled.
5. "\$" denotes the mark code.
6. "G" after the two-letter package code denotes RoHS compliant package.
7. "K" denotes extended temperature range device.
8. Bottom marking: LOT and COO (TSSOP only).

Package Outline and Dimensions, cont. (8-pin DFN, 2mm x 2mm Body, 0.5mm pitch)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
00	INITIAL RELEASE	09/18/14	J.HUA


RECOMMENDED LAND PATTERN DIMENSION
NOTES:

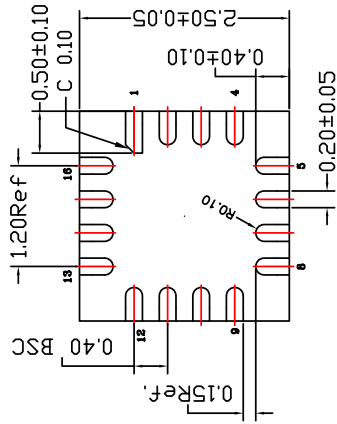
1. ALL DIMENSION ARE IN mm. ANGLES IN DEGREES.
2. TOP DOWN VIEW. AS VIEWED.
3. COMPONENT OUTLINE SHOW FOR REFERENCE IN GREEN.
4. LAND PATTERN IN BLUE. NSMD PATTERN ASSUMED.
5. LAND PATTERN RECOMMENDATION PER IPC-7351B GENERIC REQUIREMENT FOR MOUNT DESIGN AND LAND PATTERN.

TOLERANCES UNLESS SPECIFIED	DECIMAL	ANGULAR	±
APPROVALS	DATE	TITLE	CMG8 PACKAGE OUTLINE
DRAWN	04/09/14	SIZE	2.0 X 2.0 mm BODY
CHECKED		DRAWING No.	0.5 mm PITCH VFOFN
		REV	00
		C	PSC-4490
		DO NOT SCALE DRAWING	SHEET 2 OF 2

IDT
 6024 SILVER CREEK VALLEY ROAD
 San Jose, CA 95138
 PHONE: (408) 284-8200
 FAX: (408) 492-8674
 www.IDT.com

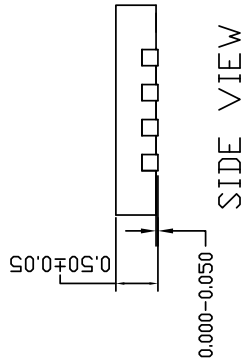
Package Outline and Dimensions (16-pin VFQFN, 2.5mm x 2.5mm Body, 0.4mm pitch)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
00	INITIAL RELEASE	04/03/14	JH
01	ADD PINTI CHAMFER	12/11/14	JH



TOP VIEW

BOTTOM VIEW



SIDE VIEW

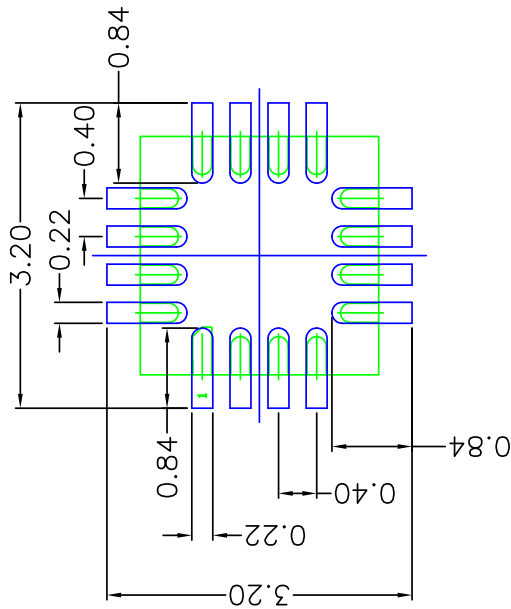
TOLERANCES UNLESS SPECIFIED DECIMAL XX± XXX±	INITIAL	DATE	6024 Silver Creek Valley Road San Jose CA 95138 PHONE: (408) 284-8200 FAX: (408) 284-8591 www.IDT.com
	ANGULAR ±1°	04/03/14	
APPROVALS	DRAWN	DATE	TITLE
	J%	04/03/14	CMG 16 PACKAGE OUTLINE
CHECKED			2.5 x 2.5 mm BODY
			0.40 mm PITCH VFQFN
	SIZE	DRAWING No.	REV
	C	PSC-4478	01
DO NOT SCALE DRAWING			SHEET 1 OF 2

NOTES:

1. ALL DIMENSIONING AND TOLERANCING CONFORM TO ANSI Y14.5M-1982
2. ALL DIMENSIONS ARE IN MILLIMETERS.

Package Outline and Dimensions, cont. (16-pin VFQFN, 2.5mm x 2.5mm Body, 0.4mm pitch)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
00	INITIAL RELEASE	04/03/14	JH
01	ADD PIN1 CHAMFER	12/11/14	JH



RECOMMENDED LAND PATTERN DIMENSION

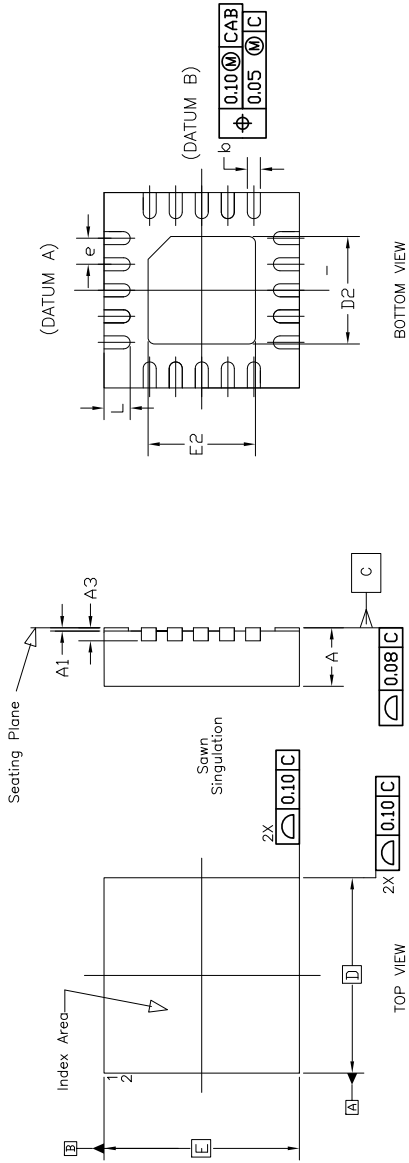
NOTES:

1. ALL DIMENSIONS ARE IN MM. ANGLES IN DEGREES.
2. TOP DOWN VIEW AS VIEWED ON PCB.
3. COMPONENT OUTLINE IS SHOWN FOR REFERENCE IN GREEN.
4. LAND PATTERN IN BLUE. NSMD PATTERN ASSUMED.
5. LAND PATTERN RECOMMENDATION PER IPC-7351B GENERIC REQUIREMENT FOR SURFACE MOUNT DESIGN AND LAND PATTERN.

TOLERANCES UNLESS SPECIFIED DECIMAL XX± ANGULAR ±1° XXX±		IDT™ 6024 Silver Creek Valley Road San Jose CA 95138 PHONE: (408) 284-8200 WWW.IDT.COM FAX: (408) 284-8591	
APPROVALS	DATE	TITLE	
DRAWN <i>DS</i>	04/03/14	CMG 16 PACKAGE OUTLINE	
CHECKED		2.5 x 2.5 mm BODY	
		0.40 mm PITCH VFQFN	
		SIZE	DRAWING No.
		C	PSC-4478
		REV	01
		DO NOT SCALE DRAWING	
		SHEET 2 OF 2	

Package Outline and Dimensions (20-pin QFN, 3mm x 3mm Body, 0.4mm pitch)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
00	INITIAL RELEASE	3/30/16	JH



Symbol	DIMENSION		
	Min	Norm	Max
A	0.80	0.90	1.00
A1	0	0.02	0.05
A3	0.20 Ref		
b	0.17	0.20	0.25
e	0.40 BASIC		
N	20		
ND	5		
NE	5		
D	3.00 BASIC		
E	3.00 BASIC		
D2	1.55	1.65	1.75
E2	1.55	1.65	1.75
L	0.30	0.40	0.50

- NOTE :
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
 2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
 3. COPLANARITY SHALL NOT EXCEED 0.05 mm.
 4. PACKAGE LENGTH / PACKAGE WIDTH ARE CONSIDERED AS SPECIAL CHARACTERISTIC. (S)
 5. REFER JEDEC MO-220.

6024 Silver Creek Valley Road
 San Jose CA 95138
 PHONE: (408) 284-8200
 WWW.IDT.COM FAX: (408) 284-8591

TOLERANCES UNLESS SPECIFIED
 DECIMAL ±1%
 XX±
 XXX±

APPROVALS _____ DATE _____
 DRAWN *ORAG* 3/30/16
 CHECKED _____

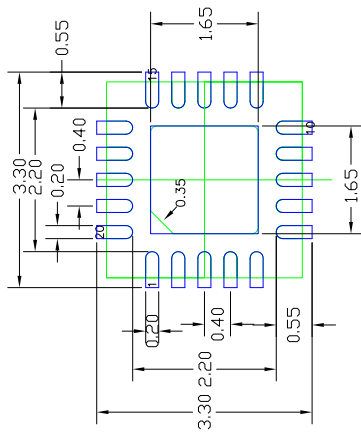
TITLE **ND/NDG 20 PACKAGE OUTLINE**
 3.0 x 3.0 mm BODY, EPAD 1.65 mm SQ
 0.40 PITCH QFN

SIZE	DRAWING No.	REV
C	PSC-4179-02	00

DO NOT SCALE DRAWING SHEET 1 OF 2

Package Outline and Dimensions, cont. (20-pin QFN, 3mm x 3mm Body, 0.4mm pitch)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
00	INITIAL RELEASE	3/30/16	JH



RECOMMENDED LAND PATTERN DIMENSION

NOTES:

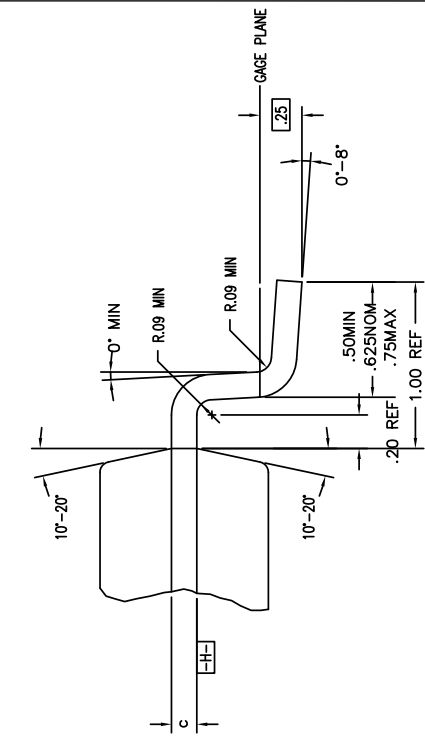
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. TOP-DOWN VIEW, AS VIEWED ON PCB.
3. COMPONENT OUTLINE SHOWS FOR REFERENCE IN GREEN.
4. LAND PATTERN IN BLUE. NSMD PATTERN ASSUMED.
5. LAND PATTERN RECOMMENDATION PER IPC-7351B GENERIC REQUIREMENT FOR SURFACE MOUNT DESIGN AND LAND PATTERN.

6024 Silver Creek Valley Road San Jose CA 95138 PHONE: (408) 284-8200 FAX: (408) 284-8591 WWW.IDT.COM		TITLE ND/NDG 20 PACKAGE OUTLINE 3.0 x 3.0 mm BODY, EPAD 1.65 mm SQ 0.40 PITCH QFN	
TOLERANCES UNLESS SPECIFIED	DATE	SIZE	REV
DECIMAL ±1°	3/30/16	C	00
XX±		DRAWING No. PSC-4179-02	
XXX±		DO NOT SCALE DRAWING	
APPROVALS	CHECKED	SHEET 2 OF 2	

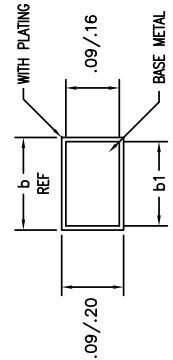
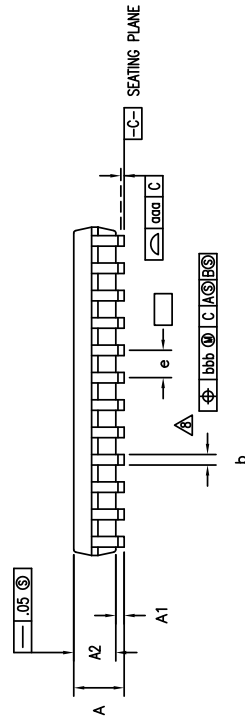
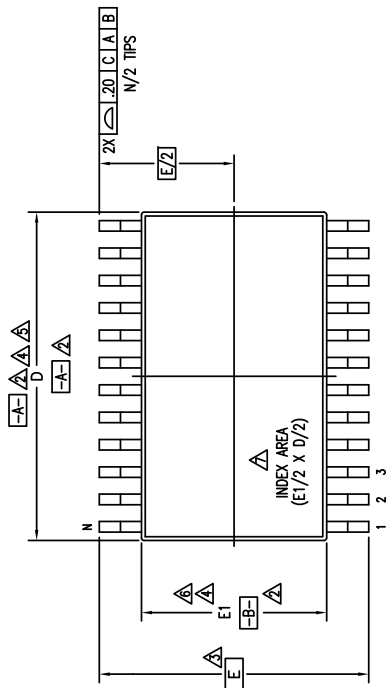
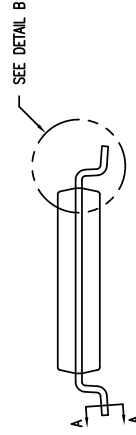
Package Outline and Dimensions (8-, 14-, 16-, 20-pin TSSOP)

DATE		REVISIONS	
CREATED	REV	DESCRIPTION	AUTHOR
08/25/98	02	ADD 14 & 16 LD	T. VU
07/10/99	03	ADD 8 LD	T. VU
5/23/01	04	ADDED TOPMARK TO TITLE	
10/14/04	05	ADD "GREEN" PGG NOMENCLATURE	TU VU
3/8/13	06	ADDED PACKAGE CODE	RAC
9/3/14	07	ADD TOLERANCE FOR A, A1, E AND b	CK LEE
3/10/17	08	ADD OPTION T1	R.TANH

NOTE: REFER TO DCP FOR OFFICIAL RELEASE DATE



DETAIL B



SECTION A-A

TOLERANCES UNLESS SPECIFIED DECIMAL ANGULAR ± XXXX DECIMAL SQUARE	2975 Stender Way Santa Clara, CA 95054 PHONE: (408) 727-8116 WWW.IDT.COM FAX: (408) 492-8874	TITLE PC/PGG PACKAGE OUTLINE (PG OR PA TOPMARK CODE) 4.4 mm BODY WIDTH TSSOP .65 mm PITCH
		SIZE DRAWING No. PSC-4056 REV 08 DO NOT SCALE DRAWING SHEET 1 OF 3

Package Outline and Dimensions, cont. (8-, 14-, 16-, 20-pin TSSOP)

DATE CREATED		REV DESCRIPTION		REVISIONS	
08/25/98	02	ADD 14 & 16 LD		REV	DESCRIPTION
07/10/99	03	ADD 8 LD		T. VU	
5/23/01	04	ADDED TOPMARK TO TITLE		T. VU	
10/14/04	05	ADD "GREEN" PGG NOMENCLATURE		TU VU	
3/8/13	06	ADDED PACKAGE CODE		RAC	
9/3/14	07	ADD TOLERANCE FOR A, A1, E AND b		CK LEE	
3/10/17	08	ADD OPTION T1		R.TANH	

NOTE: REFER TO DCP FOR OFFICIAL RELEASE DATE

SYMBOL	PG/PGC8						PG/PGC14						PG/PGC16						PG/PGC20						PG/PGC24						PG/PGC28					
	JEDEC VARIATION			N D T E			JEDEC VARIATION			N D T E			JEDEC VARIATION			N D T E			JEDEC VARIATION			N D T E			JEDEC VARIATION			N D T E			JEDEC VARIATION			N D T E		
	AA	MIN	NOM	MAX	MIN	NOM	MAX	AA-1	MIN	NOM	MAX	AB	MIN	NOM	MAX	AC	MIN	NOM	MAX	AD	MIN	NOM	MAX	AE	MIN	NOM	MAX	MIN	NOM	MAX						
A	.85	1.10	1.20	1.20	.85	1.10	1.20	.85	1.10	1.20	.85	1.10	1.20	.85	1.10	1.20	.85	1.10	1.20	.85	1.10	1.20	.85	1.10	1.20	.85	1.10	1.20	.85	1.10	1.20					
A1	.05	.10	.15	.15	.05	.10	.15	.05	.10	.15	.05	.10	.15	.05	.10	.15	.05	.10	.15	.05	.10	.15	.05	.10	.15	.05	.10	.15	.05	.10	.15					
A2	.80	1.00	1.05	1.05	.80	1.00	1.05	.80	1.00	1.05	.80	1.00	1.05	.80	1.00	1.05	.80	1.00	1.05	.80	1.00	1.05	.80	1.00	1.05	.80	1.00	1.05	.80	1.00	1.05					
D	2.90	3.00	3.10	4.5	4.90	5.00	5.10	4.5	4.90	5.00	5.10	4.5	4.90	5.00	5.10	4.5	4.90	5.00	5.10	4.5	4.90	5.00	5.10	4.5	4.90	5.00	5.10	4.5	4.90	5.00	5.10					
E	6.20	6.40	6.60	3	6.20	6.40	6.60	3	6.20	6.40	6.60	3	6.20	6.40	6.60	3	6.20	6.40	6.60	3	6.20	6.40	6.60	3	6.20	6.40	6.60	3	6.20	6.40	6.60					
E1	4.30	4.40	4.50	4.6	4.30	4.40	4.50	4.6	4.30	4.40	4.50	4.6	4.30	4.40	4.50	4.6	4.30	4.40	4.50	4.6	4.30	4.40	4.50	4.6	4.30	4.40	4.50	4.6	4.30	4.40	4.50					
e	.65 BSC																																			
b	.19	.25	.30		.19	.25	.30		.19	.25	.30		.19	.25	.30		.19	.25	.30		.19	.25	.30		.19	.25	.30		.19	.25	.30					
b1	.19	.22	.25		.19	.22	.25		.19	.22	.25		.19	.22	.25		.19	.22	.25		.19	.22	.25		.19	.22	.25		.19	.22	.25					
aaa	-	-	.10		-	-	.10		-	-	.10		-	-	.10		-	-	.10		-	-	.10		-	-	.10		-	-	.10					
bbb	-	-	.10		-	-	.10		-	-	.10		-	-	.10		-	-	.10		-	-	.10		-	-	.10		-	-	.10					
N	8																																			

NOTES:

- ALL DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5M-1994
- DATUMS **-A-** AND **-B-** TO BE DETERMINED AT DATUM PLANE **-H-**
- DIMENSION E TO BE DETERMINED AT SEATING PLANE **-C-**
- DIMENSIONS D AND E1 ARE TO BE DETERMINED AT DATUM PLANE **-H-**
- DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED .15 mm PER SIDE
- DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSIONS. INTERLEAD FLASH OR PROTRUSIONS SHALL NOT EXCEED .25 mm PER SIDE
- DETAIL OF PIN 1 IDENTIFIER IS OPTIONAL BUT MUST BE LOCATED WITHIN THE ZONE INDICATED
- LEAD WIDTH DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION IS .08 mm IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT
- THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .10 AND .25 mm FROM THE LEAD TIP
- ALL DIMENSIONS ARE IN MILLIMETERS
- THIS OUTLINE CONFORMS TO JEDEC PUBLICATION 95 REGISTRATION MO-153, VARIATION AA, AB-1, AB, AC, AD & AE

SYMBOL	OPTION T1						
	JEDEC VARIATION			N D T E			
	AB-1	MIN	NOM	MAX	MIN	NOM	MAX
A	.90	1.10	1.20		.90	1.10	1.20
A1	.05	.10	.15		.05	.10	.15
A2	.80	1.00	1.05		.80	1.00	1.05
D	4.90	5.00	5.10	4.5	4.90	5.00	5.10
E	6.20	6.40	6.60	3	6.20	6.40	6.60
E1	4.30	4.40	4.50	4.6	4.30	4.40	4.50
e	.65 BSC						
b	.19	.25	.30		.19	.25	.30
b1	.19	.22	.25		.19	.22	.25
c	.09	-	.20		.09	-	.20
aaa	-	-	.10		-	-	.10
bbb	-	-	.10		-	-	.10
N	14						

TOLERANCES UNLESS SPECIFIED DECIMAL ANGULAR XXXX±


 2975 Stender Way
 Santa Clara, CA 95054
 PHONE: (408) 727-6116
 FAX: (408) 492-8874

www.IDT.com

 TITLE PGC/PGC PACKAGE OUTLINE
 (PG OR PA TOPMARK CODE)

4.4 mm BODY WIDTH TSSOP .65 mm PITCH

SIZE DRAWING No. PSC-4056

REV 08

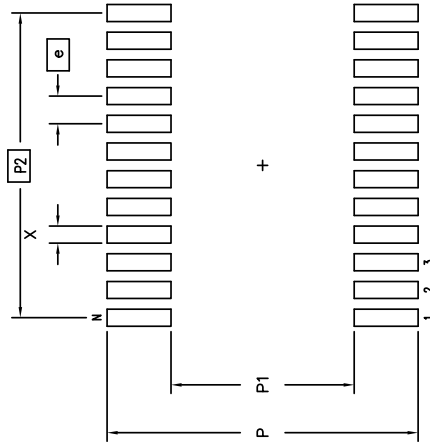
DO NOT SCALE DRAWING SHEET 2 OF 3

Package Outline and Dimensions, cont. (8-, 14-, 16-, 20-pin TSSOP)

DATE CREATED	REV	DESCRIPTION	AUTHOR
08/25/98	02	ADD 14 & 16 LD	T. VU
07/10/99	03	ADD 8 LD	T. VU
5/23/01	04	ADDED TOPMARK TO TITLE	
10/14/04	05	ADD "GREEN" PGG NOMENCLATURE	TU VU
3/8/13	06	ADDED PACKAGE CODE	RAC
9/3/14	07	ADD TOLERANCE FOR A, A1, E AND b	CK LEE
3/10/17	08	ADD OPTION T1	R.TANH

NOTE: REFER TO DCP FOR OFFICIAL RELEASE DATE

LAND PATTERN DIMENSIONS



	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
P	7.20	7.40	7.20	7.40	7.20	7.40	7.20	7.40	7.20	7.40	7.20	7.40
P1	4.20	4.40	4.20	4.40	4.20	4.40	4.20	4.40	4.20	4.40	4.20	4.40
P2	1.95 BSC		3.90 BSC		4.55 BSC		5.85 BSC		7.15 BSC		8.45 BSC	
X	.30	.50	.30	.50	.30	.50	.30	.50	.30	.50	.30	.50
e	.65 BSC		.65 BSC		.65 BSC		.65 BSC		.65 BSC		.65 BSC	
N	8		14		16		20		24		28	

2975 Stander Way
 Santa Clara, CA 95054
 PHONE: (408) 727-8116
 WWW.IDT.COM FAX: (408) 492-8674

TOLERANCES UNLESS SPECIFIED
 DECIMAL ±
 ANGULAR ±
 XXX±
 XXXX±

TITLE PGG/PGG PACKAGE OUTLINE
 (PG OR PA TOPMARK CODE)
 4.4 mm BODY WIDTH TSSOP .65 mm PITCH

DRAWING No. PSC-4056
 REV 08
 DO NOT SCALE DRAWING SHEET 3 OF 3

Ordering Information (industrial temperature range)

Part / Order Number	Marking	Shipping Packaging	Package	Temperature
5PB1102PGGI	see page 8	Tubes	8-pin TSSOP	-40 to +85 °C
5PB1102PGGI8		Tape and Reel	8-pin TSSOP	-40 to +85 °C
5PB1104PGGI		Tubes	8-pin TSSOP	-40 to +85 °C
5PB1104PGGI8		Tape and Reel	8-pin TSSOP	-40 to +85 °C
5PB1106PGGI		Tubes	14-pin TSSOP	-40 to +85 °C
5PB1106PGGI8		Tape and Reel	14-pin TSSOP	-40 to +85 °C
5PB1108PGGI		Tubes	16-pin TSSOP	-40 to +85 °C
5PB1108PGGI8		Tape and Reel	16-pin TSSOP	-40 to +85 °C
5PB1110PGGI		Tubes	20-pin TSSOP	-40 to +85 °C
5PB1110PGGI8		Tape and Reel	20-pin TSSOP	-40 to +85 °C
5PB1102CMGI		Cut Tape	8-pin DFN	-40 to +85 °C
5PB1102CMGI8		Tape and Reel	8-pin DFN	-40 to +85 °C
5PB1104CMGI		Cut Tape	8-pin DFN	-40 to +85 °C
5PB1104CMGI8		Tape and Reel	8-pin DFN	-40 to +85 °C
5PB1104CMGI/W		Tape and Reel	8-pin DFN	-40 to +85 °C
5PB1106CMGI		Cut Tape	16-pin QFN	-40 to +85 °C
5PB1106CMGI8		Tape and Reel	16-pin QFN	-40 to +85 °C
5PB1108CMGI		Cut Tape	16-pin QFN	-40 to +85 °C
5PB1108CMGI8		Tape and Reel	16-pin QFN	-40 to +85 °C
5PB1110NDGI		Tubes	20-pin QFN	-40 to +85 °C
5PB1110NDGI8	Tape and Reel	20-pin QFN	-40 to +85 °C	

Ordering Information (extended temperature range)

Part / Order Number	Marking	Shipping Packaging	Package	Temperature
5PB1102PGGK	see page 9	Tubes	8-pin TSSOP	-40 to +105 °C
5PB1102PGGK8		Tape and Reel	8-pin TSSOP	-40 to +105 °C
5PB1104PGGK		Tubes	8-pin TSSOP	-40 to +105 °C
5PB1104PGGK8		Tape and Reel	8-pin TSSOP	-40 to +105 °C
5PB1106PGGK		Tubes	14-pin TSSOP	-40 to +105 °C
5PB1106PGGK8		Tape and Reel	14-pin TSSOP	-40 to +105 °C
5PB1108PGGK		Tubes	16-pin TSSOP	-40 to +105 °C
5PB1108PGGK8		Tape and Reel	16-pin TSSOP	-40 to +105 °C
5PB1110PGGK		Tubes	20-pin TSSOP	-40 to +105 °C
5PB1110PGGK8		Tape and Reel	20-pin TSSOP	-40 to +105 °C
5PB1102CMGK		Cut Tape	8-pin DFN	-40 to +105 °C
5PB1102CMGK8		Tape and Reel	8-pin DFN	-40 to +105 °C
5PB1104CMGK		Cut Tape	8-pin DFN	-40 to +105 °C
5PB1104CMGK8		Tape and Reel	8-pin DFN	-40 to +105 °C
5PB1104CMGK/W		Tape and Reel	8-pin DFN	-40 to +105 °C
5PB1106CMGK		Cut Tape	16-pin QFN	-40 to +105 °C
5PB1106CMGK8		Tape and Reel	16-pin QFN	-40 to +105 °C
5PB1108CMGK		Cut Tape	16-pin QFN	-40 to +105 °C
5PB1108CMGK8		Tape and Reel	16-pin QFN	-40 to +105 °C
5PB1110NDGK		Tubes	20-pin QFN	-40 to +105 °C
5PB1110NDGK8	Tape and Reel	20-pin QFN	-40 to +105 °C	

“G” after the two-letter package code denotes Pb-Free configuration, RoHS compliant.

Revision History

Rev.	Date	Originator	Description of Change
A	03/20/15	B. Chandhoke	Initial release.
B	05/19/15	B. Chandhoke	1. Expanded Output Enable function text in General Description, and within the note under "Output Logic Table". 2. Updated all "Buffer Additive Phase Jitter, RMS" conditions from 125MHz to 156.25MHz.
C	06/09/15	B. Chandhoke	1. Corrected typos in part numbers in DC Electrical Tables. 2. Updated existing Output Rise/Fall Time specs for 5pF load. 3. Added additional Output Rise/Fall specs for 2pF load.
D	06/15/15	B. Chandhoke	Fixed typos in Output Rise/Fall Time 5pF specs for CL conditions; should be 5pF; not 2pF.
E	06/22/15	B. Chandhoke	Changed 3.3V Operating Voltage spec from 3.15V min to 3.135V min; 3.45V max to 3.465V max.
F	08/24/15	B. Chandhoke	1. Added 5PB1104CMGIW orderable part. 2. Updated Abs Max Ratings table for "Output Enable and All outputs" and "CLKIN"; changed -0.5 V to -0.4 and added -0.4 to... respectively.
G	05/13/16	H.G.	Replace NDG20 package outline drawing with latest version.
H	12/15/16	J. Chen	Updated marking diagrams for all TSSOP devices.
J	02/10/17	Y.G.	Change Propagation Delay maximum spec in 1.8V AC electrical characterization table from 2.2 to 2.5ns.
K	03/28/17	Y.G.	1. Updated Propagation Delay specifications for 5PB1106/08/10; 2.5V and 3.3V. 2. Updated output-output skew maximum specifications for 5PB1106; 1.8V, 2.5V, 3.3V. 3. Updated legal disclaimer. 4. Updated package outline drawings.



Corporate Headquarters
6024 Silver Creek Valley Road
San Jose, CA 95138 USA
www.idt.com

Sales
1-800-345-7015 or 408-284-8200
Fax: 408-284-2775
www.idt.com/go/sales

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