



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

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

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

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



Description

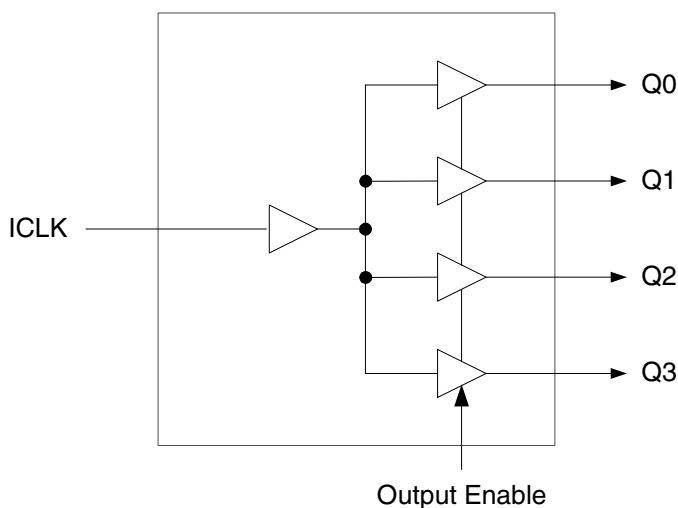
The 553S is a low skew, single input to four output, clock buffer. The 553S has best in class additive phase Jitter of sub 50 fsec.

IDT makes many non-PLL and PLL based low skew output devices as well as Zero Delay Buffers to synchronize clocks. Contact us for all of your clocking needs.

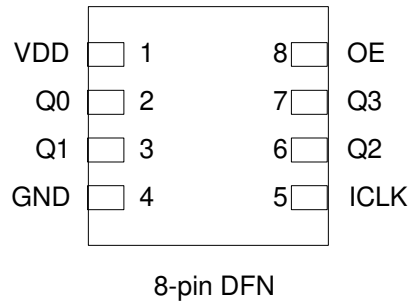
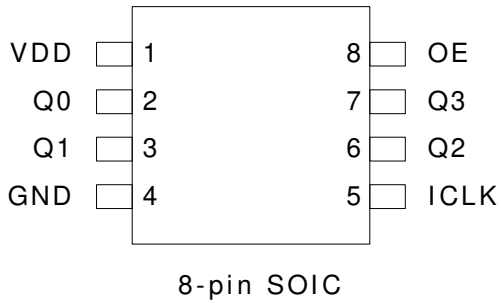
Features

- Low additive phase jitter RMS: 50fs
- Extremely low skew outputs (50ps)
- Low cost clock buffer
- Packaged in 8-pin SOIC and small 8-pin DFN package, Pb-free
- Input/Output clock frequency up to 200 MHz
- Ideal for networking clocks
- Operating Voltages: 1.8V to 3.3V
- Output Enable mode tri-states outputs
- Advanced, low power CMOS process
- Extended temperature range (-40°C to +105°C)

Block Diagram



Pin Assignments



Pin Descriptions

Pin Number	Pin Name	Pin Type	Pin Description
1	VDD	Power	Connect to +1.8V, +2.5 V, or +3.3 V.
2	Q0	Output	Clock output 0.
3	Q1	Output	Clock output 1.
4	GND	Power	Connect to ground.
5	ICLK	Input	Clock input.
6	Q2	Output	Clock Output 2.
7	Q3	Output	Clock Output 3.
8	OE	Input	Output Enable. Tri-states outputs when low. Connect to VDD for normal operation.

External Components

A minimum number of external components are required for proper operation. A decoupling capacitor of 0.01 μ F should be connected between VDD on pin 1 and GND on pin 4, as close to the device as possible. A 33 Ω series terminating resistor may be used on each clock output if the trace is longer than 1 inch.

To achieve the low output skew that the 553S is capable of, careful attention must be paid to board layout. Essentially, all four outputs must have identical terminations, identical loads and identical trace geometries. If they do not, the output skew will be degraded. For example, using a 30 Ω series termination on one output (with 33 Ω on the others) will cause at least 15 ps of skew.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the 553S. 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	-0.5 V to VDD+0.5 V
ICLK	3.465V
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 (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, ICLK	V _{IH}	Note 1	0.7xVDD		VDD	V
Input Low Voltage, ICLK	V _{IL}	Note 1			0.3xVDD	V
Input High Voltage, OE	V _{IH}		0.7xVDD		VDD	V
Input Low Voltage, OE	V _{IL}				0.3xVDD	V
Output High Voltage	V _{OH}	I _{OH} = -10mA	1.3			V
Output Low Voltage	V _{OL}	I _{OL} = 10mA			0.35	V
Operating Supply Current	IDD	No load, 135MHz		15		mA
Nominal Output Impedance	Z _O			17		Ω
Input Capacitance	C _{IN}	ICLK, OE pin		5		pF

Notes: 1. Nominal switching threshold is VDD/2

VDD=2.5 V ±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, ICLK	V _{IH}	Note 1	0.7xVDD		VDD	V
Input Low Voltage, ICLK	V _{IL}	Note 1			0.3xVDD	V
Input High Voltage, OE	V _{IH}		0.7xVDD		VDD	V
Input Low Voltage, OE	V _{IL}				0.3xVDD	V
Output High Voltage	V _{OH}	I _{OH} = -16 mA	1.8			V
Output Low Voltage	V _{OL}	I _{OL} = 16 mA			0.5	V
Operating Supply Current	IDD	No load, 135 MHz		18		mA
Nominal Output Impedance	Z _O			17		Ω
Input Capacitance	C _{IN}	ICLK, OE pin		5		pF

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		3.15		3.45	V
Input High Voltage, ICLK	V _{IH}	Note 1	0.7xVDD		VDD	V
Input Low Voltage, ICLK	V _{IL}	Note 1			0.3xVDD	V
Input High Voltage, OE	V _{IH}		0.7xVDD		VDD	V
Input Low Voltage, OE	V _{IL}				0.3xVDD	V
Output High Voltage	V _{OH}	I _{OH} = -25 mA	2.2			V
Output Low Voltage	V _{OL}	I _{OL} = 25 mA			0.7	V
Operating Supply Current	IDD	No load, 135 MHz		22		mA
Nominal Output Impedance	Z _O			17		Ω
Input Capacitance	C _{IN}	ICLK, OE pin		5		pF

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	t _{OR}	0.36 to 1.44 V, C _L =5 pF		0.6	1.0	ns
Output Fall Time	t _{OF}	1.44 to 0.36 V, C _L =5 pF		0.6	1.0	ns
Propagation Delay	Note 1		2.5	3	3.5	ns
Buffer Additive Phase Jitter, RMS		125MHz, Integration Range: 12kHz-20MHz			0.05	ps
Output to Output Skew	Note 2	Rising edges at VDD/2		50	65	ps
Device to Device Skew		Rising edges at VDD/2			200	ps
Start-up Time	t _{START-UP}	Part start-up time for valid outputs after VDD ramp-up			2	ms
Output Enable Time	t _{EN}	C _L ≤ 5 pF			3	cycles
Output Disable Time	t _{DIS}	C _L ≤ 5 pF			3	cycles

VDD = 2.5 V ±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	t _{OR}	0.5 to 2.0 V, C _L =5 pF		0.6	1.0	ns
Output Fall Time	t _{OF}	2.0 to 0.5 V, C _L =5 pF		0.6	1.0	ns
Propagation Delay	Note 1		3	3.5	4	ns
Buffer Additive Phase Jitter, RMS		125MHz, Integration Range: 12kHz-20MHz			0.05	ps
Output to Output Skew	Note 2	Rising edges at VDD/2		40	65	ps
Device to Device Skew		Rising edges at VDD/2			200	ps
Start-up Time	t _{START-UP}	Part start-up time for valid outputs after VDD ramp-up			2	ms
Output Enable Time	t _{EN}	C _L ≤ 5 pF			3	cycles
Output Disable Time	t _{DIS}	C _L ≤ 5 pF			3	cycles

VDD = 3.3 V ±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	t _{OR}	0.66 to 2.64 V, C _L =5 pF		0.6	1.0	ns
Output Fall Time	t _{OF}	2.64 to 0.66 V, C _L =5 pF		0.6	1.0	ns
Propagation Delay	Note 1		2.5	3	3.5	ns
Buffer Additive Phase Jitter, RMS		125MHz, Integration Range: 12kHz-20MHz			0.05	ps
Output to Output Skew	Note 2	Rising edges at VDD/2		25	65	ps
Device to Device Skew		Rising edges at VDD/2			200	ps
Start-up Time	t _{START-UP}	Part start-up time for valid outputs after VDD ramp-up			2	ms
Output Enable Time	t _{EN}	C _L ≤ 5 pF			3	cycles
Output Disable Time	t _{DIS}	C _L ≤ 5 pF			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

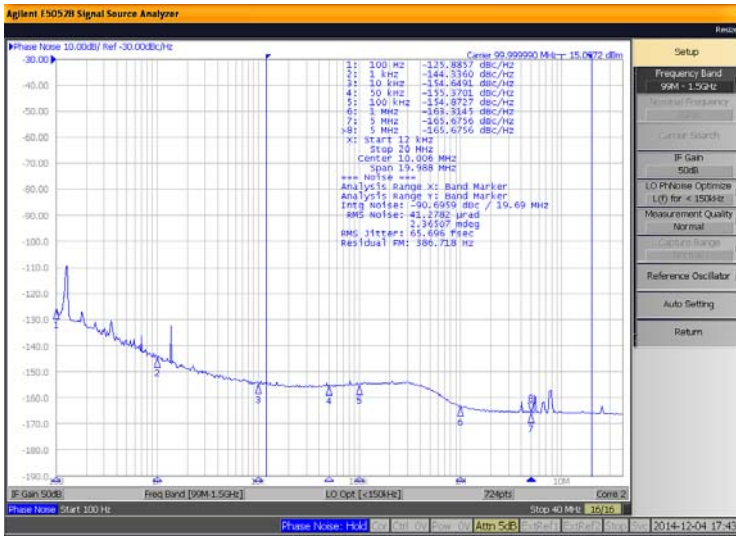


Figure 1. 553S Reference Phase Noise 66fs (12kHz to 20MHz)

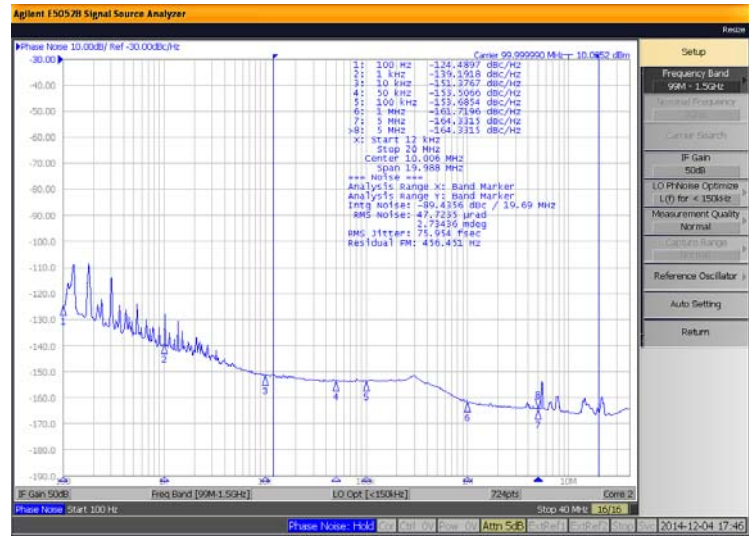
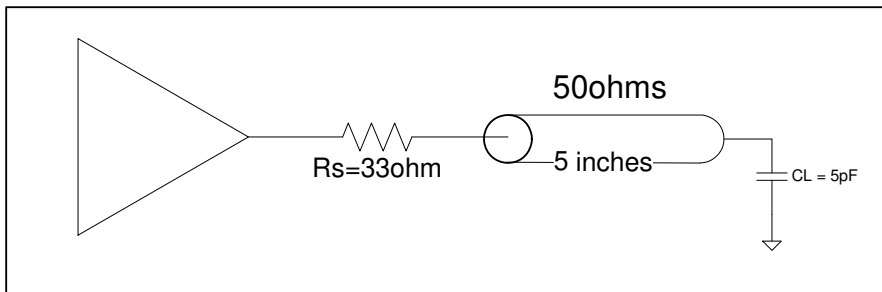


Figure 2. 553S Output Phase Noise 76fs (12kHz to 20MHz)

The phase noise plots above show the low Additive Jitter of the 553S high-performance buffer. With an integration range of 12kHz to 20MHz, the reference input has about 66fs of RMS phase jitter while the output of 553S has about 76fs of RMS phase jitter. This results in a low Additive Phase Jitter of only 37fs.

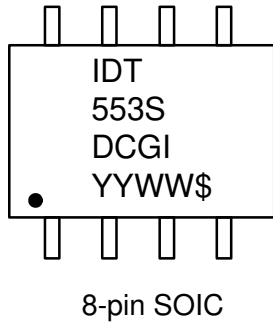
Test Load and Circuit



Thermal Characteristics (8SOIC)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Thermal Resistance Junction to Ambient	θ_{JA}	Still air		150		°C/W
	θ_{JA}	1 m/s air flow		140		°C/W
	θ_{JA}	3 m/s air flow		120		°C/W
Thermal Resistance Junction to Case	θ_{JC}			40		°C/W

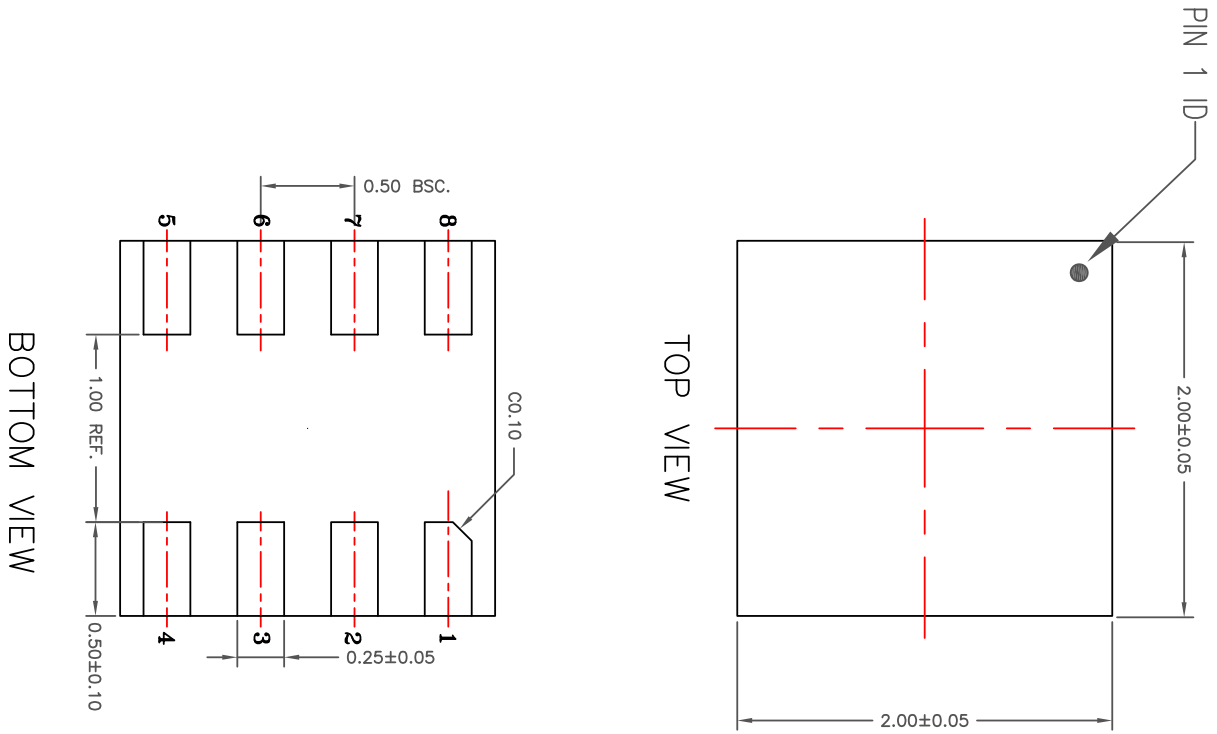
Marking Diagrams



Notes:

1. “**” is the lot number.
2. “YYWW” or “YW” are the last digits of the year and week that the part was assembled.
- 3 “G” denotes RoHS compliant package.
4. “\$” denotes mark code.
5. “I” denotes extended temperature range device.

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

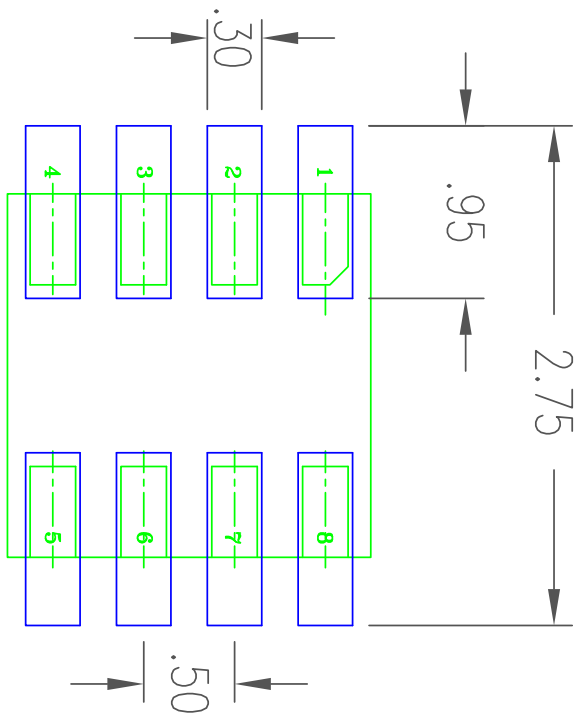


- NOTES:
1. ALL DIMENSIONING AND TOLERANCING CONFORM TO ANSI Y14.5M-1982
 2. ALL DIMENSIONS ARE IN MILLIMETERS

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

TOLERANCES UNLESS SPECIFIED DECIMAL ANGULAR XXX # XXXX		6024 SILVER CREEK VALLEY ROAD SAN JOSE, CA 95138 PHONE: (408) 284-8200 FAX: (408) 492-8674	
APPROVALS DRAWN: <i>[Signature]</i> 09/10/14 CHECKED: <i>[Signature]</i> 09/10/14	DATE 09/10/14	TITLE CMG8 PACKAGE OUTLINE 2.0 X 2.0 mm BODY 0.5mm PITCH VFOFN	
SIZE C	DRAWING No. PSC-4490	DO NOT SCALE DRAWING	REV 00

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



RECOMMENDED LAND PATTERN DIMENSION

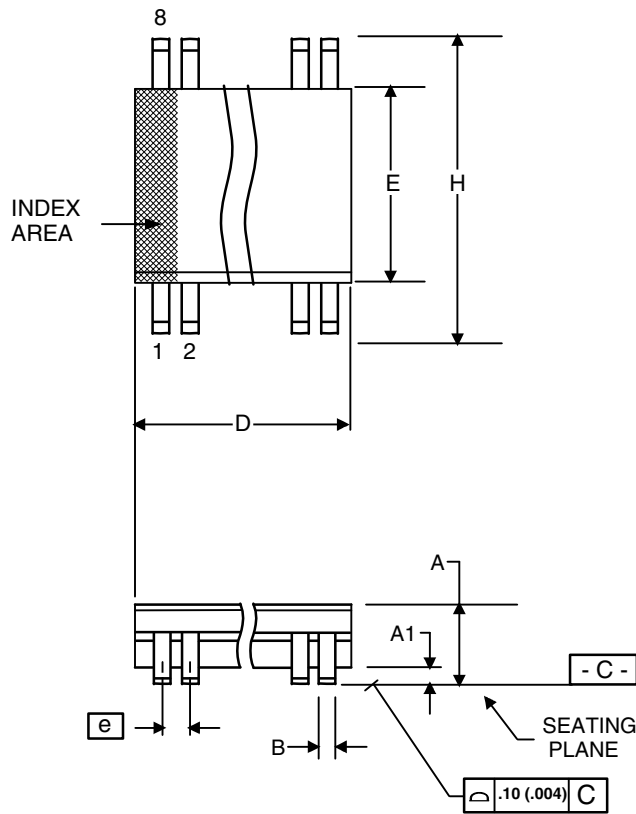
NOTES:

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.

REVISIONS		
REV	DESCRIPTION	DATE
00	INITIAL RELEASE	08/18/14

TOLERANCES UNLESS SPECIFIED		<p>6024 SILVER CREEK VALLE San Jose, CA 95138 PHONE: (408) 284-8200 FAX: (408) 492-8674</p>
DECIMAL	ANGULAR	
xxx±	±	
xxxx±	xxxx±	
APPROVALS	DATE	TITLE
DRAWN: <i>Rad/09/10/14</i>		CM08 PACKAGE OUTLINE
CHECKED:		2.0 X 2.0 mm BODY 0.5 mm PITCH VQFN
SIZE	DRAWING No.	
C	PSC-4490	
DO NOT SCALE DRAWING		SHEET

Package Outline and Package Dimensions (8-pin SOIC, 150 Mil. Narrow Body)



Symbol	Millimeters		Inches*	
	Min	Max	Min	Max
A	1.35	1.75	.0532	.0688
A1	0.10	0.25	.0040	.0098
B	0.33	0.51	.013	.020
C	0.19	0.25	.0075	.0098
D	4.80	5.00	.1890	.1968
E	3.80	4.00	.1497	.1574
e	1.27 BASIC		0.050 BASIC	
H	5.80	6.20	.2284	.2440
h	0.25	0.50	.010	.020
L	0.40	1.27	.016	.050
a	0°	8°	0°	8°

*For reference only. Controlling dimensions in mm.

Ordering Information

Part / Order Number	Marking	Shipping Packaging	Package	Temperature
553SDCGI	see page 7	Tubes	8-pin SOIC	-40 to +105 °C
553SDCGI8		Tape and Reel	8-pin SOIC	-40 to +105 °C
553SCMGI		Cut Tape	8-pin DFN	-40 to +105 °C
553SCMGI8		Tape and Reel	8-pin DFN	-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	03/18/15	B. Chandhoke	Initial release.



Corporate Headquarters
6024 Silver Creek Valley Road
San Jose, CA 95138 USA

Sales
1-800-345-7015 or 408-284-8200
Fax: 408-284-2775
www.IDT.com

Tech Support
email: clocks@idt.com

DISCLAIMER Integrated Device Technology, Inc. (IDT) and its subsidiaries reserve the right to modify the products and/or specifications described herein at any time and at IDT's sole discretion. All information in this document, including descriptions of product features and performance, is subject to change without notice. Performance specifications and the operating parameters of the described products are determined in the independent state and are not guaranteed to perform the same way when installed in customer products. The information contained herein is provided without representation or warranty of any kind, whether express or implied, including, but not limited to, the suitability of IDT's products for any particular purpose, an implied warranty of merchantability, or non-infringement of the intellectual property rights of others. This document is presented only as a guide and does not convey any license under intellectual property rights of IDT or any third parties.

IDT's products are not intended for use in applications involving extreme environmental conditions or in life support systems or similar devices where the failure or malfunction of an IDT product can be reasonably expected to significantly affect the health or safety of users. Anyone using an IDT product in such a manner does so at their own risk, absent an express, written agreement by IDT.

Integrated Device Technology, IDT and the IDT logo are registered trademarks of IDT. Product specification subject to change without notice. Other trademarks and service marks used herein, including protected names, logos and designs, are the property of IDT or their respective third party owners.

Copyright ©2015 Integrated Device Technology, Inc.. All rights reserved.