Wide Frequency range Timing-Safe™ Peak EMI reduction IC

General Features

- 1x , LVCMOS Timing-Safe™ Peak EMI Reduction
- Input frequency:
  12MHz - 150MHz @ 2.5V
  15MHz - 175MHz @ 3.3V
- Output frequency (Timing-Safe™):
  12MHz - 150MHz @ 2.5V
  15MHz - 175MHz @ 3.3V
- Analog Spread Selection up to ±1%
- External Input-Output Delay Control option
- Power Down option for Power Save mode
- Supply Voltage: 2.5V±0.2V
  3.3V ± 0.3V
- Commercial temperature range
- 8 pin, TSSOP, and TDFN(2X2) COL packages
- The First True Drop-in Solution

Functional Description

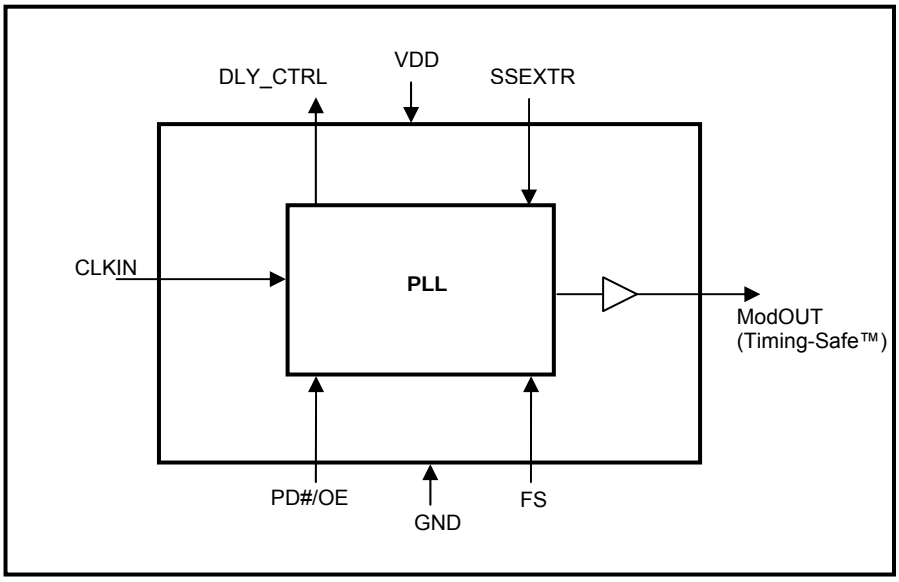
PCS3P73Z01BW is a 2.5V/3.3V versatile EMI reduction IC based on PulseCore Semiconductor's patent pending Timing-Safe™ technology. PCS3P73Z01BW accepts one input from an external reference, and locks on to it delivering a 1x Timing-Safe™ clock. PCS3P73Z01BW has a Frequency Selection (FS) control that facilitates selecting one of the two frequency ranges within the operating frequency range. *Refer to the frequency Selection table for details*. The device has an SSEXTR pin to select different deviations and associated Input-Output Skew (T_{SKEW}), depending upon the value of an external resistor connected between SSEXTR and GND. PCS3P73Z01BW has a DLY_CTRL for adjusting the Input-Output clock delay, depending upon the value of capacitor connected at this pin to GND. PD#/OE provides the Power Down option. Outputs will be tri-stated when power down is active.

PCS3P73Z01BW operates from a 2.5V/3.3V supply and is available in an 8 Pin TSSOP, and TDFN (2X2) COL Packages, over Commercial temperature range.

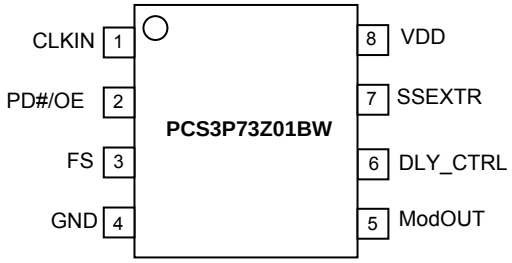
Application

PCS3P73Z01BW is targeted for use in Displays, Camera modules and high speed SDRAM memory interface systems.

Block Diagram



Pin Configuration



Pin Description

Pin #	Type	Pin Name	Description
1	I	CLKIN	External reference Clock input.
2	I	PD#/OE	Power Down. Pull LOW to enable Power Down. Outputs will be tri-stated when power down is enabled. Pull HIGH to disable power down and enable output.
3	I	FS	Frequency Select *(see Frequency Selection table for details).*
4	P	GND	Ground
5	O	ModOUT	Buffered modulated Timing-Safe™ clock output
6	O	DLY_CTRL	External Input-Output Delay control
7	I	SSEXTR	Analog Spread Selection through external resistor to GND.
8	P	VDD	2.5V / 3.3V supply Voltage

Frequency Selection Table

VDD	FS	Frequency(MHz)
2.5V	0	12-40
	1	40-150
3.3V	0	15-50
	1	50-175

Absolute Maximum Rating

Symbol	Parameter	Rating	Unit
V_{DD}	Voltage on any pin with respect to Ground	-0.5 to +4.6	V
T_{STG}	Storage temperature	-65 to +125	°C
T_s	Max. Soldering Temperature (10 sec)	260	°C
T_J	Junction Temperature	150	°C
T_{DV}	Static Discharge Voltage (As per JEDEC STD22- A114-B)	2	KV

Note: These are stress ratings only and are not implied for functional use. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.

Operating Conditions

Parameter	Description	Min	Max	Unit
$V_{DD(3.3V)}$	Supply Voltage	3.0	3.6	V
$V_{DD(2.5V)}$	Supply Voltage	2.3	2.7	V
T_A	Operating Temperature (Ambient Temperature)	0	+70	°C
C_L	Load Capacitance		10	pF
C_{IN}	Input Capacitance		7	pF

Electrical Characteristics for 2.5V Supply

Parameter	Description	Test Conditions		Min	Typ	Max	Unit
V_{DD}	Supply Voltage			2.3	2.5	2.7	V
V_{IL}	Input LOW Voltage					0.7	V
V_{IH}	Input HIGH Voltage			1.7			V
I_{IL}	Input LOW Current	V_{IN} = 0V				50	µA
I_{IH}	Input HIGH Current	V_{IN} = V_{DD}				50	µA
V_{OL}	Output LOW Voltage	I_{OL} = 8mA				0.6	V
V_{OH}	Output HIGH Voltage	I_{OH} = -8mA		1.8			V
I_{CC}	Static Supply Current	CLKIN & PD#/OE pins pulled to GND				2	µA
I_{DD}	Dynamic Supply Current	Unloaded Output	12MHz		3		mA
			40MHz		7		
			150MHz		15		
Z_o	Output Impedance				36		Ω

Electrical Characteristics for 3.3V Supply

Parameter	Description	Test Conditions		Min	Typ	Max	Unit
V_{DD}	Supply Voltage			3.0	3.3	3.6	V
V_{IH}	Input HIGH Voltage			2.0			V
V_{IL}	Input LOW Voltage					0.8	V
I_{IH}	Input HIGH Current	V_{IN} = V_{DD}				50	µA
I_{IL}	Input LOW Current	V_{IN} = 0V				50	µA
V_{OH}	Output HIGH Voltage	I_{OH} = -8mA		2.4			V
V_{OL}	Output LOW Voltage	I_{OL} =8mA				0.4	V
I_{CC}	Static Supply Current	CLKIN pulled Low, PD#/OE pulled Low				2	µA
I_{DD}	Dynamic Supply Current	Unloaded outputs	15MHz		5		mA
			50MHz		10		
			175MHz		25		
Z_o	Output Impedance				27		Ω

Switching Characteristics for 2.5V

Parameter	Test Conditions		Min	Typ	Max	Unit
Input Frequency	FS=0		12		40	MHz
	FS=1		40		150	
ModOUT	FS=0		12		40	
	FS=1		40		150	
Duty Cycle [1, 2]	Measured at V_{DD} /2	≤ 100MHz	45	50	55	%
		≥100MHz	40	50	60	
Rise Time [1, 2]	Measured between 20% to 80%			1.7		nS
Fall Time [1, 2]	Measured between 80% to 20%			0.9		nS
Cycle-to-Cycle Jitter[2]	Unloaded outputs	FS=0; @ 25 MHz		±175		pS
		FS=1; @ 66 MHz		±150		
Input-to-Output propagation Delay [2]	Unloaded outputs with SSEXTR pin OPEN, No load on DLY_CTRL	FS=0; @ 25 MHz		250		pS
		FS=1; @ 66 MHz				
PLL Lock Time [2]	Stable power supply, valid clock presented on CLKIN pin				3	mS

Notes:
1. All parameters are specified with 10 pF loaded outputs.
2. Parameter is guaranteed by design and characterization. Not 100% tested in production

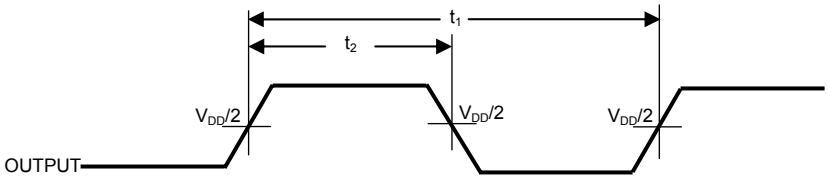
Switching Characteristics for 3.3V

Parameter	Test Conditions		Min	Typ	Max	Unit
Input Frequency	FS=0		15		50	MHz
	FS=1		50		175	
ModOUT	FS=0		15		50	
	FS=1		50		175	
Duty Cycle [3,4]	Measured at V_{DD} /2	≤ 100MHz	45	50	55	%
		≥100MHz	40	50	60	
Rise Time [3,4]	Measured between 20% to 80%			1.2		nS
Fall Time [3,4]	Measured between 80% to 20%			0.8		nS
Cycle-to-CycleJjitter [4]	Unloaded outputs	FS=0; @ 25 MHz		±150		pS
		FS=1; @ 66 MHz		±125		
Input-to-Output propagation Delay [4]	Unloaded outputs with SSEXTR pin OPEN, No load on DLY_CTRL	FS=0; @ 25 MHz		350		pS
		FS=1; @ 66 MHz				
PLL Lock Time[4]	Stable power supply, valid clock presented on CLKIN pin				3	mS

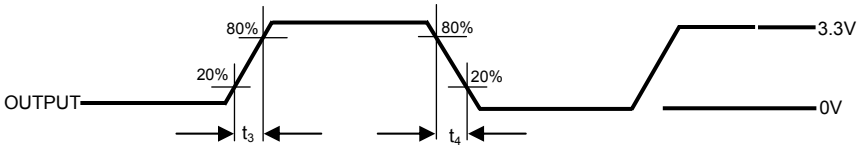
Notes:
3. All parameters are specified with 10 pF loaded outputs.
4. Parameter is guaranteed by design and characterization. Not 100% tested in production

Switching Waveforms

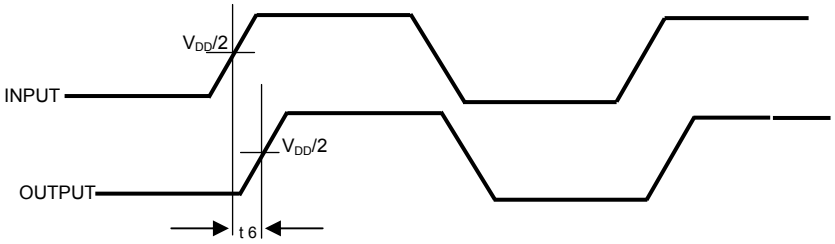
Duty Cycle Timing



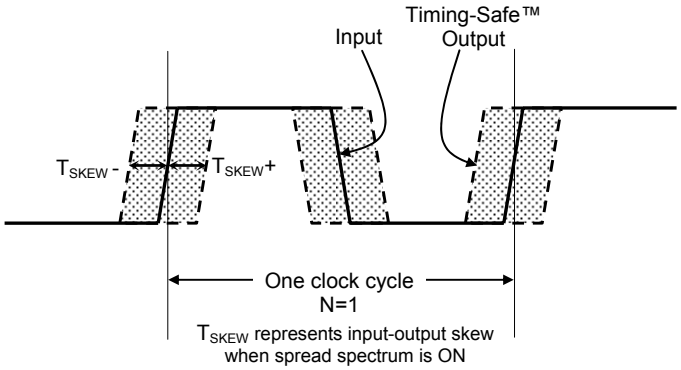
All Outputs Rise/Fall Time



Input - Output Propagation Delay



Input-Output Skew

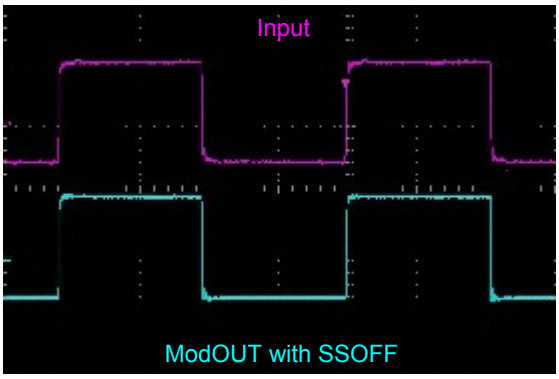


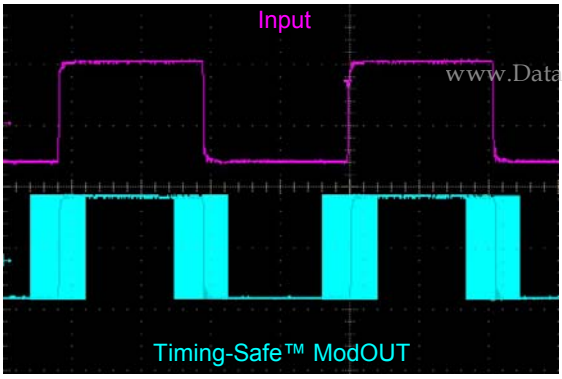
T_{SKEW} represents input-output skew when spread spectrum is ON

For example, T_{SKEW} = ± 0.20 for an Input clock of 12MHz, translates in to (1/12MHz) * 0.20=16.66nS

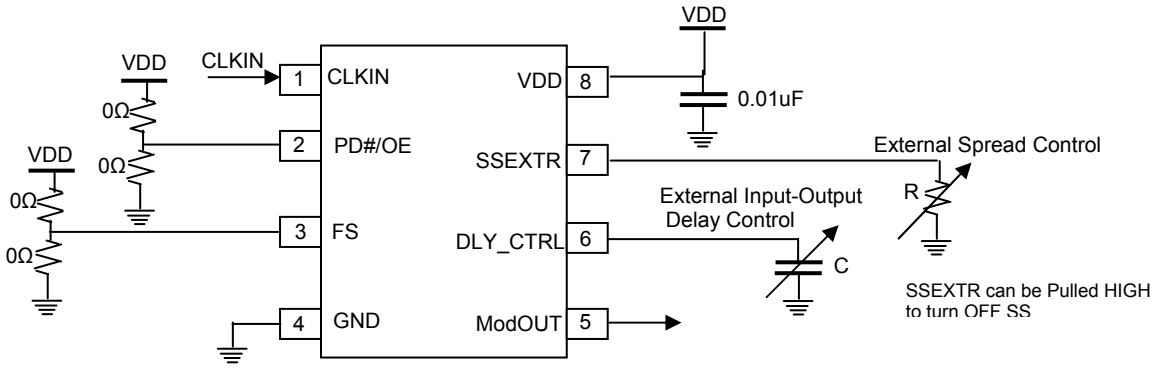
Note: Tskew is measured in units of Clock Period

Typical example of Timing-Safe™ waveform





Typical Application Schematic



Note: Refer to Pin Description table for Functionality details

Charts (for VDD=2.5V±0.2V)

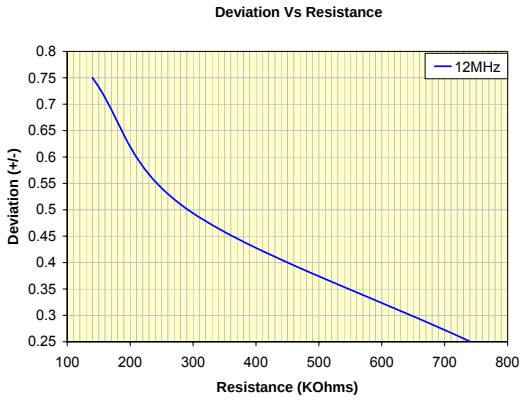


Fig1: Deviation Vs Resistance (12MHz, FS=0)

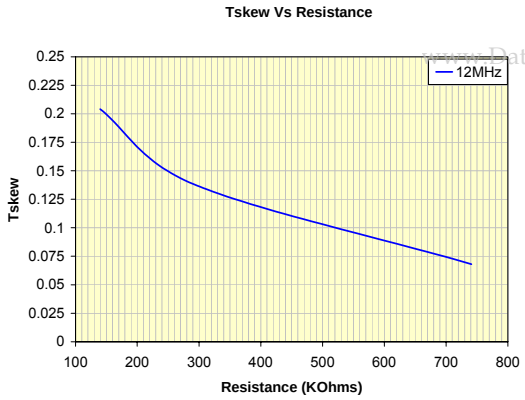


Fig2: Tskew Vs Resistance (12MHz, FS=0)

Charts (for VDD=2.5V±0.2V and 3.3V±0.3V)

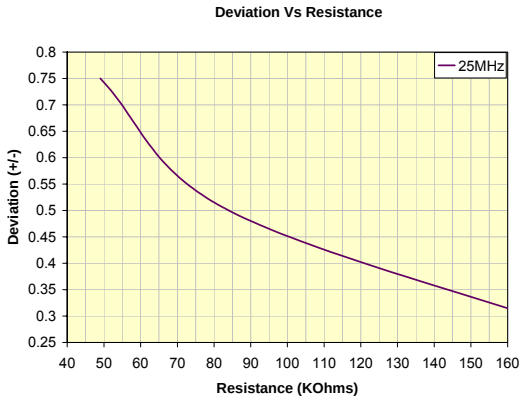


Fig3: Deviation Vs Resistance (25MHz, FS=0)

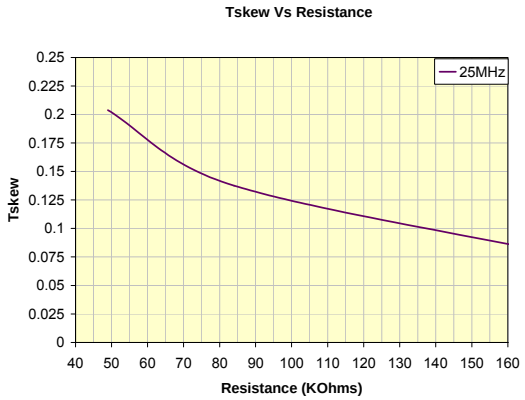


Fig4: Tskew Vs Resistance (25MHz, FS=0)

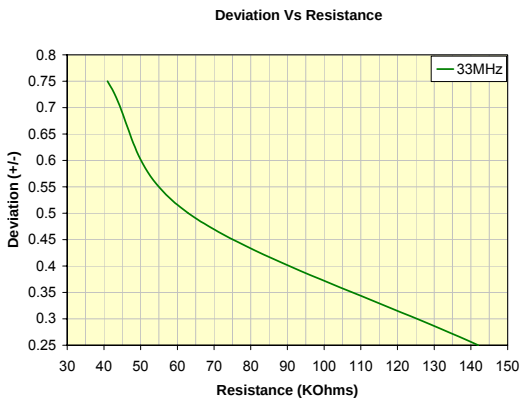


Fig5: Deviation Vs Resistance (33MHz, FS=0)

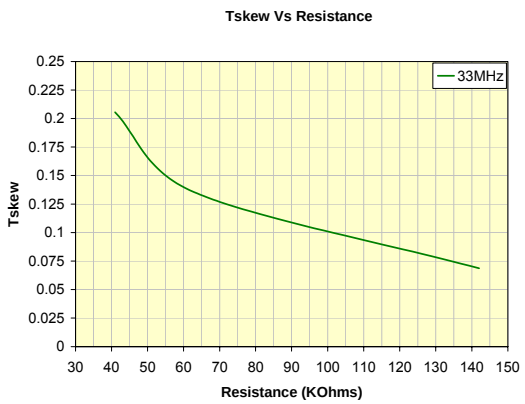


Fig6: Tskew Vs Resistance (33MHz, FS=0)

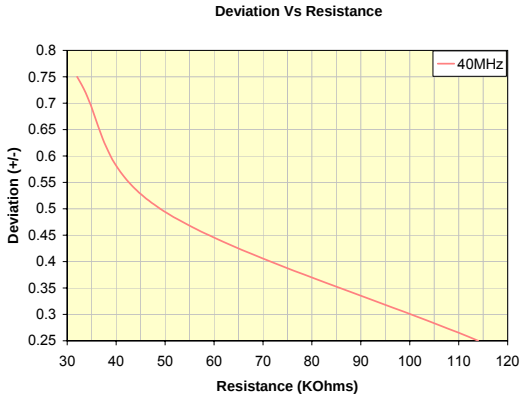


Fig7: Deviation Vs Resistance (40MHz, FS=0)

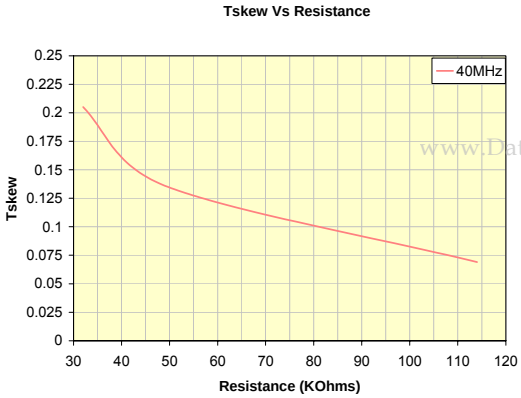


Fig8: Tskew Vs Resistance (40MHz, FS=0)

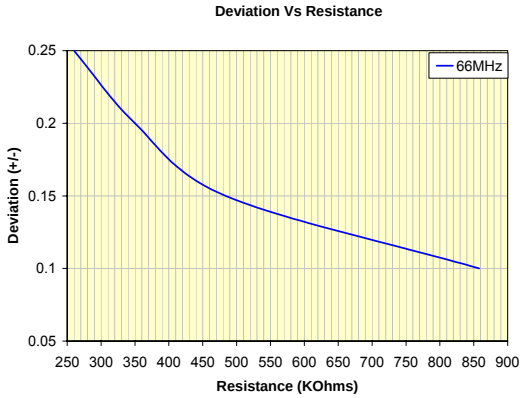


Fig9: Deviation Vs Resistance (66MHz, FS=1)

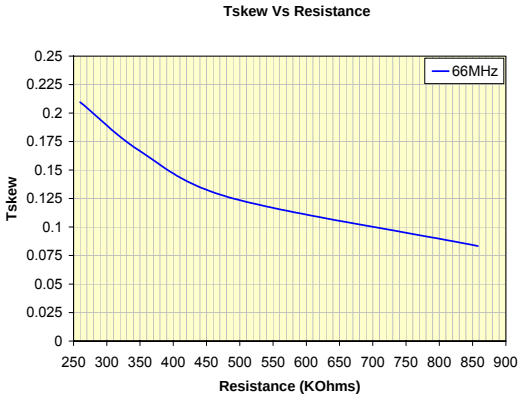


Fig10: Tskew Vs Resistance (66MHz, FS=1)

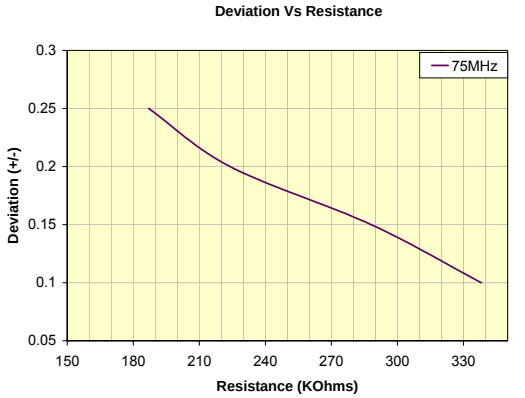


Fig11: Deviation Vs Resistance (75MHz, FS=1)

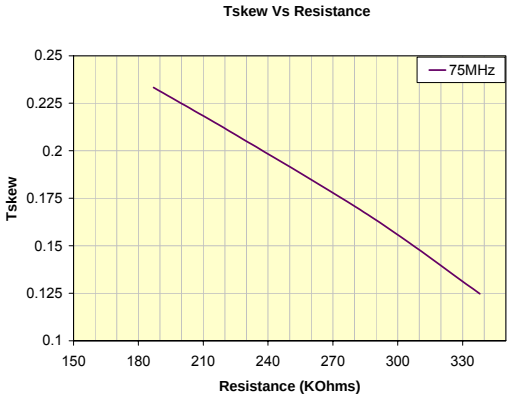


Fig12: Tskew Vs Resistance (75MHz, FS=1)

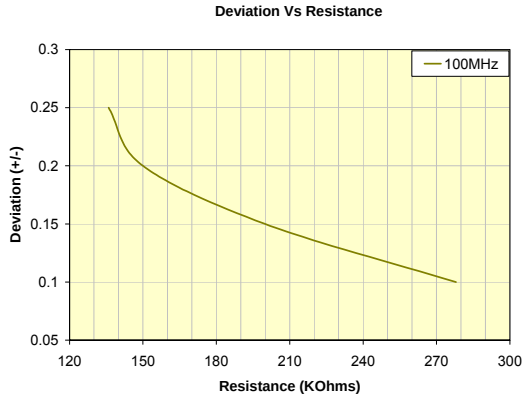


Fig13: Deviation Vs Resistance (100MHz, FS=1)

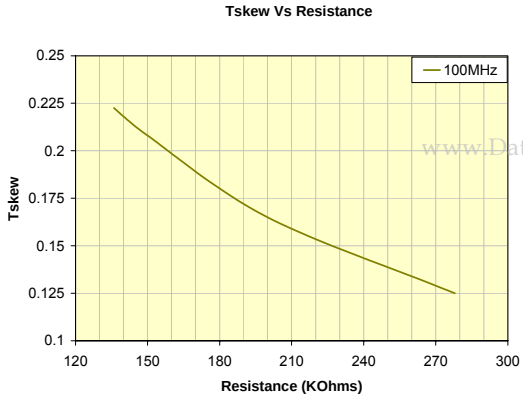


Fig14: Tskew Vs Resistance (100MHz, FS=1)

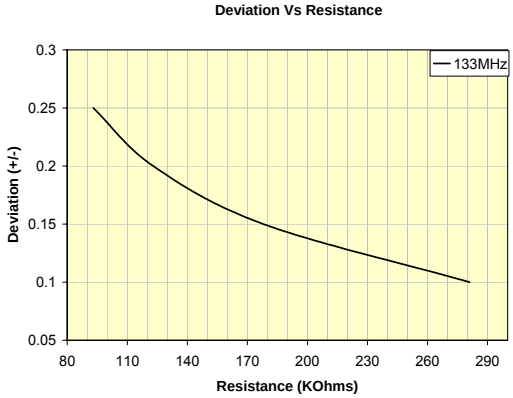


Fig15: Deviation Vs Resistance (133MHz, FS=1)

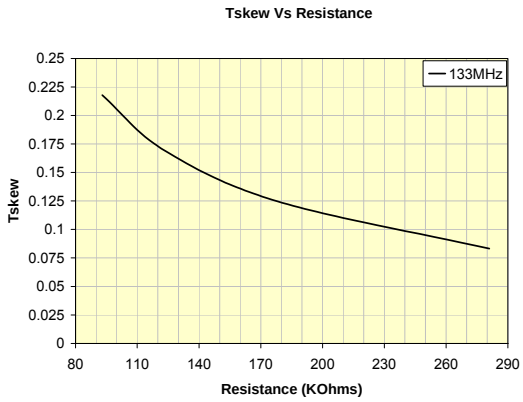


Fig16: Tskew Vs Resistance (133MHz, FS=1)

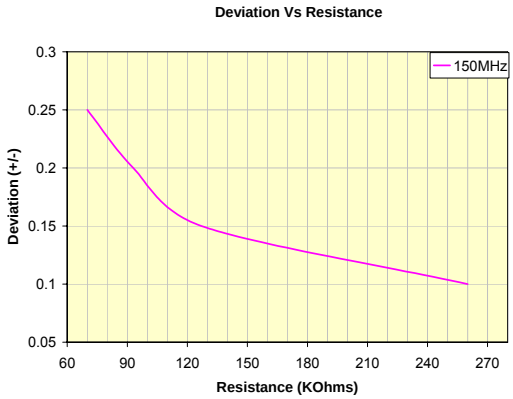


Fig17: Deviation Vs Resistance (150MHz, FS=1)

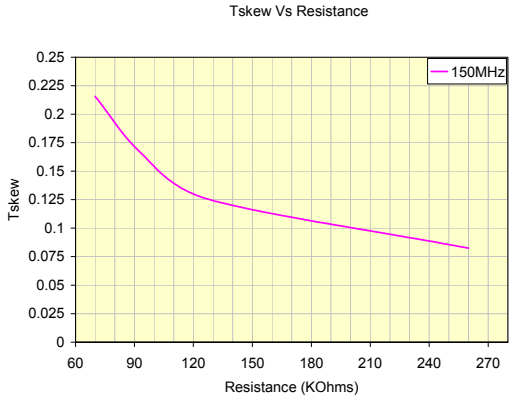


Fig18: Tskew Vs Resistance (150MHz, FS=1)

Charts (for VDD= 3.3V±0.3V)

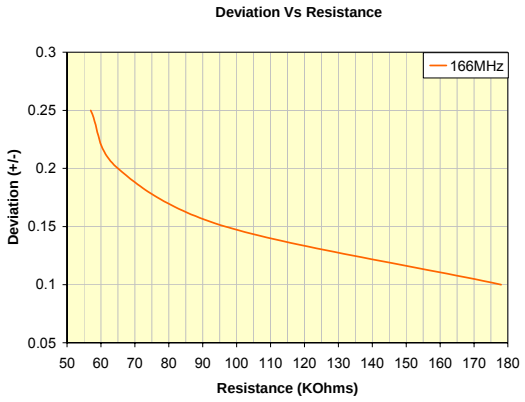


Fig19: Deviation Vs Resistance (166MHz, FS=1)

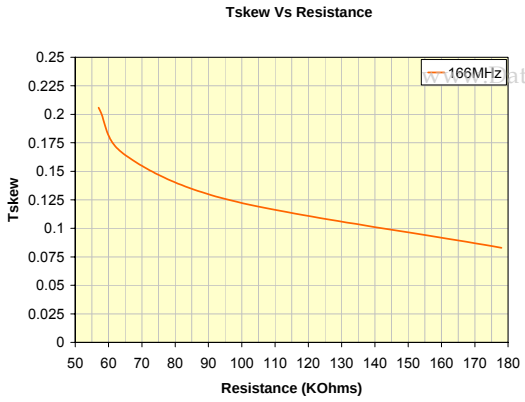


Fig20: Tskew Vs Resistance (166MHz, FS=1)

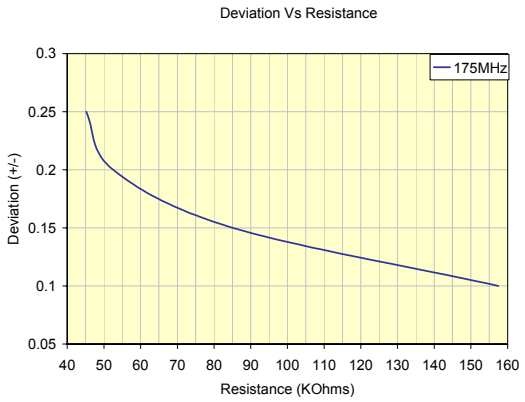


Fig21: Deviation Vs Resistance (175MHz, FS=1)

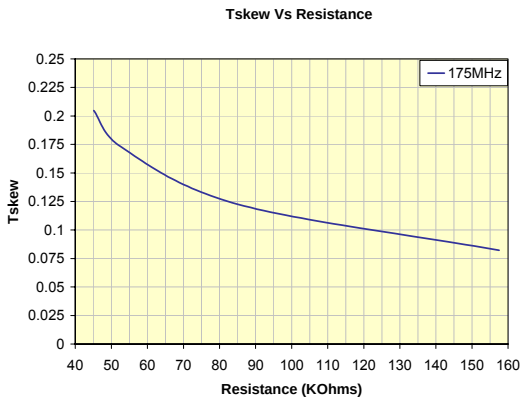


Fig22: Tskew Vs Resistance (175MHz, FS=1)

Charts (for VDD=2.5V±0.2V)

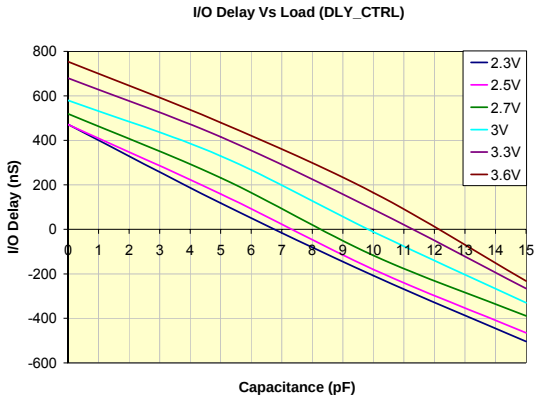


Fig23: I/O Delay Vs Load (DLY_CTRL)
(For 12MHz, FS=0)

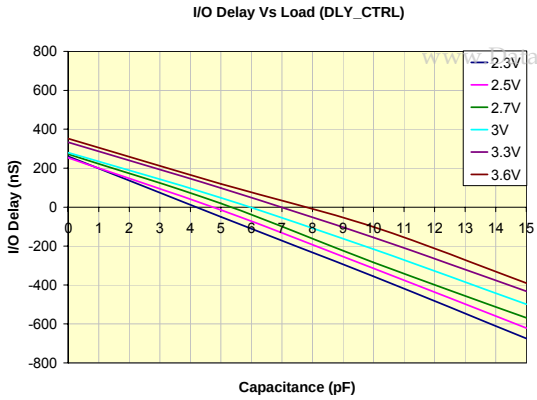


Fig24: I/O Delay Vs Load (DLY_CTRL)
(For 25MHz, FS=0)

Charts (for VDD=2.5V±0.2V and 3.3V±0.3V)

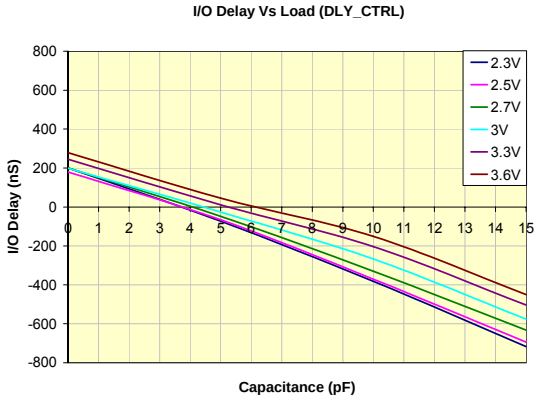


Fig25: I/O Delay Vs Load (DLY_CTRL)
(For 33MHz, FS=0)

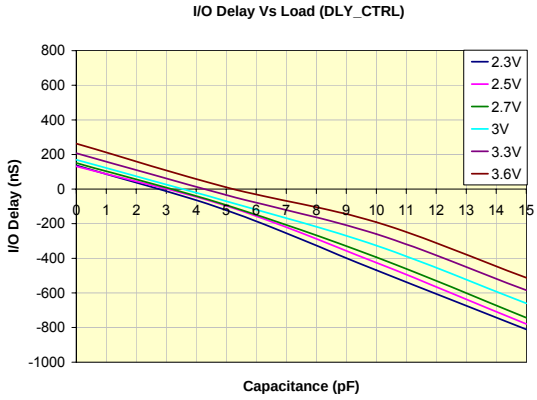


Fig26: I/O Delay Vs Load (DLY_CTRL)
(For 40MHz, FS=0)

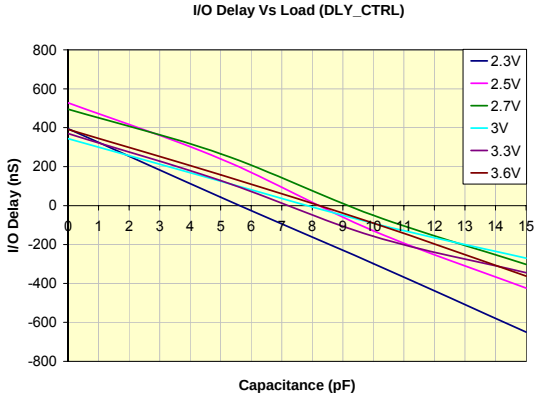


Fig27: I/O Delay Vs Load (DLY_CTRL)
(For 66MHz, FS=1)

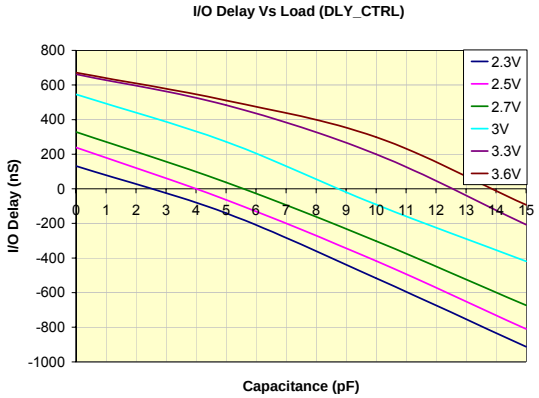


Fig28: I/O Delay Vs Load (DLY_CTRL) (For 75MHz, FS=1)

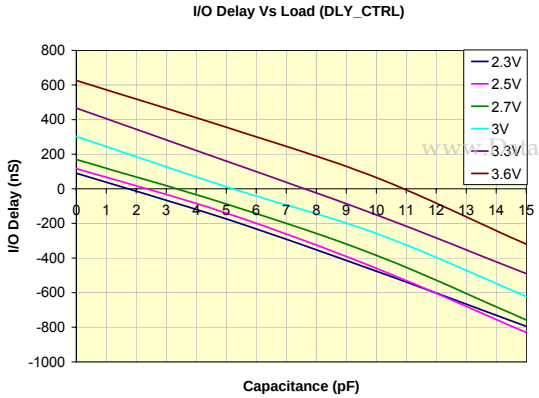


Fig29: I/O Delay Vs Load (DLY_CTRL) (For 100MHz, FS=1)

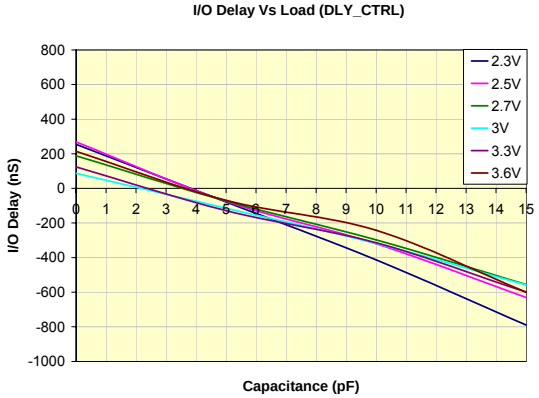


Fig30: I/O Delay Vs Load (DLY_CTRL) (For 133MHz, FS=1)

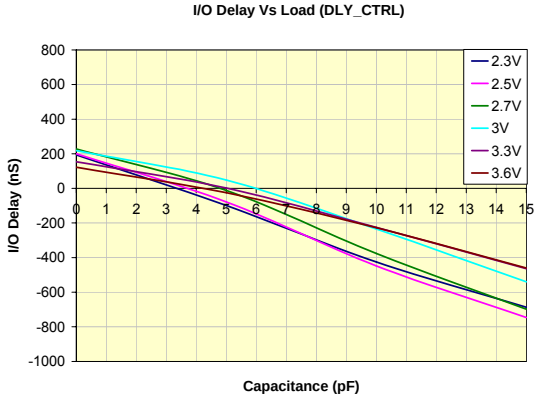


Fig31: I/O Delay Vs Load (DLY_CTRL) (For 150MHz, FS=1)

Charts (for VDD= 3.3V±0.3V)

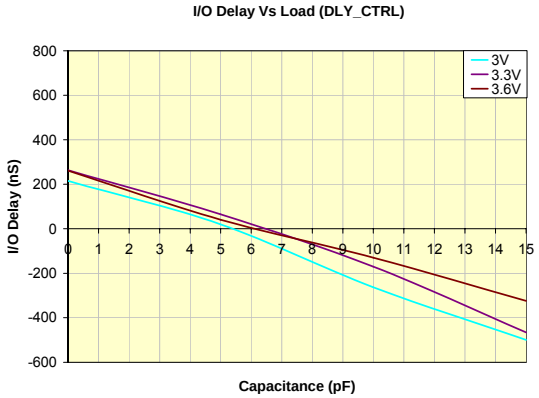


Fig32: I/O Delay Vs Load (DLY_CTRL) (For 166MHz, FS=1)

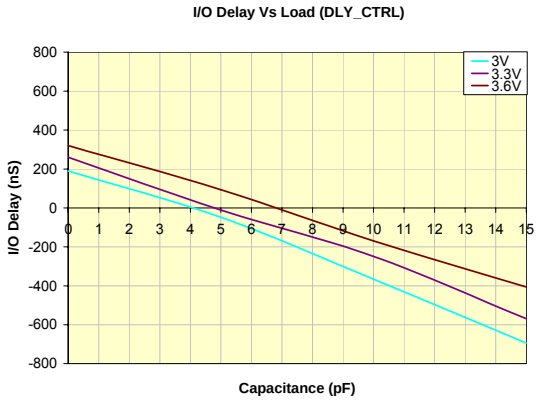
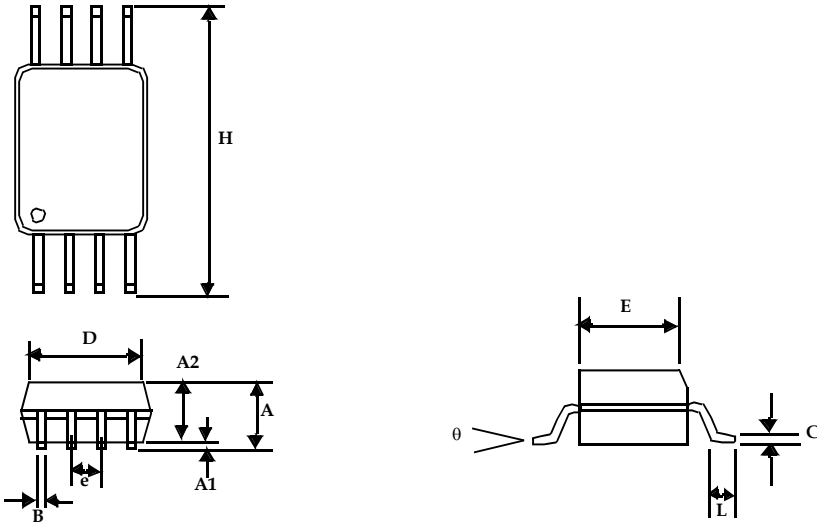


Fig33: I/O Delay Vs Load (DLY_CTRL) (For 175MHz, FS=1)

Note: Device to Device variation of Deviation and I/O delay is ± 10%

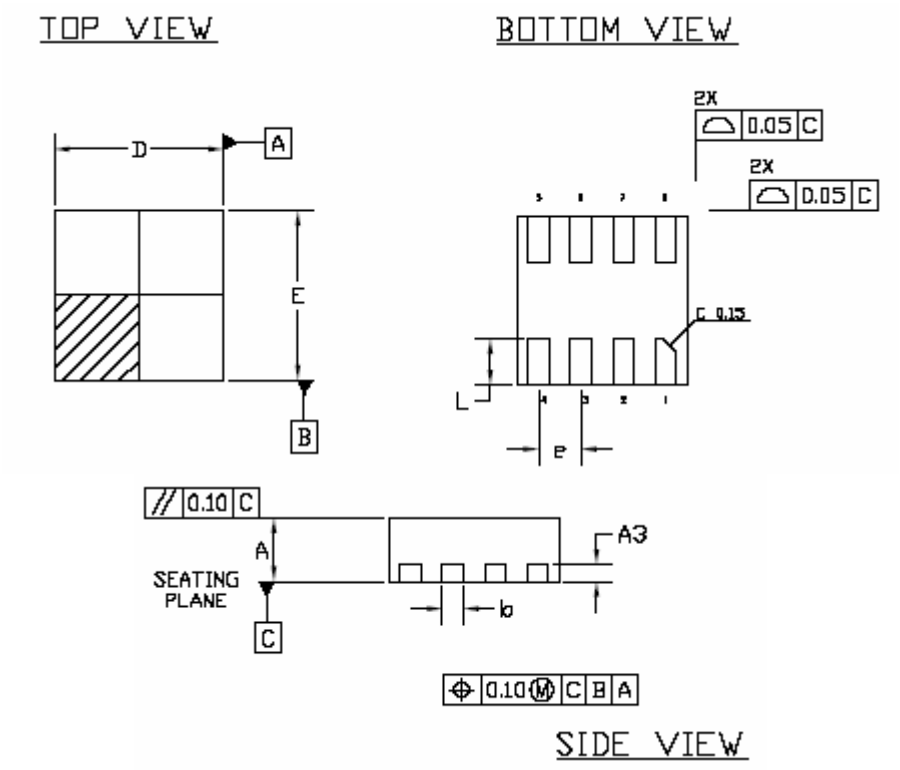
Package Information

8-lead TSSOP Package (4.40-MM Body)



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	0.012	0.19	0.30
c	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
θ	0°	8°	0°	8°

TDFN COL 2x2 8L package Outline drawing



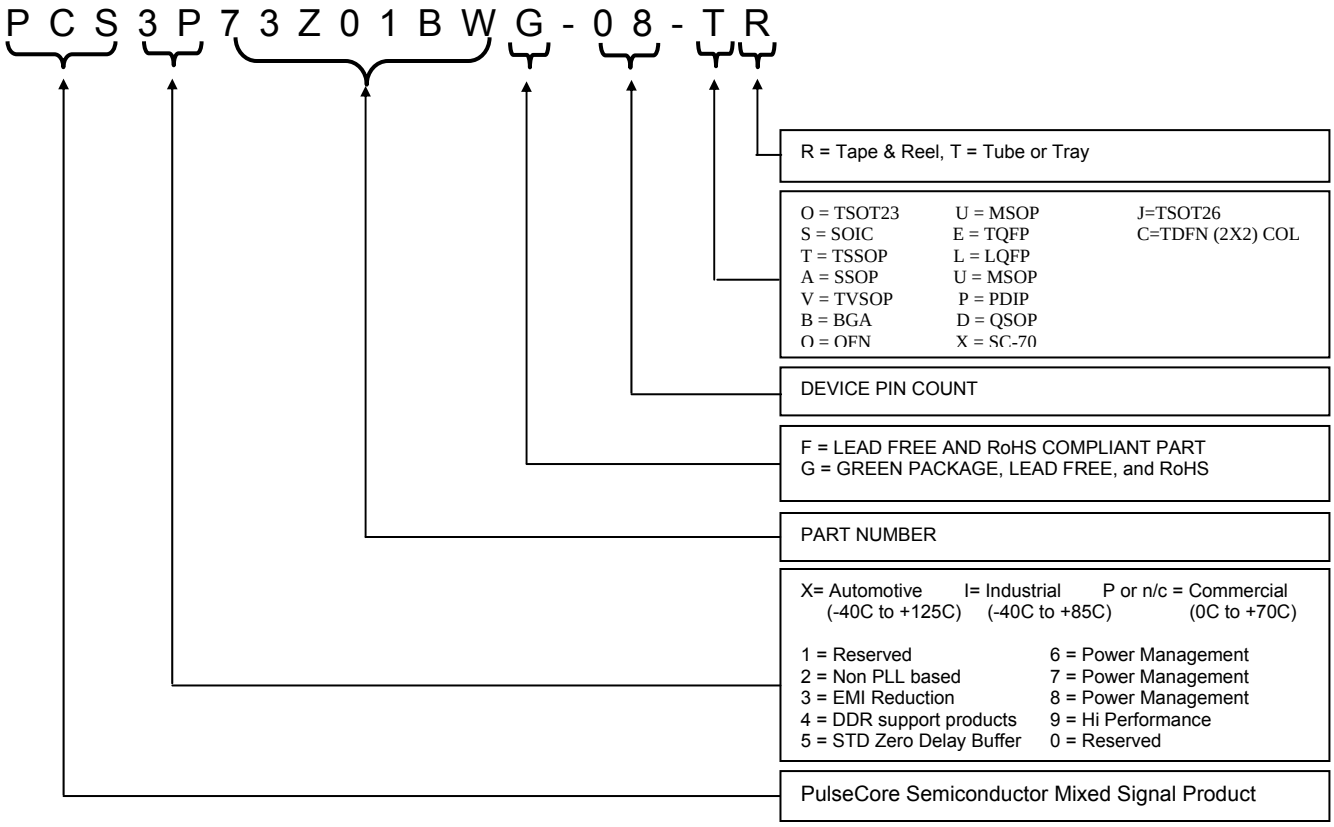
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.027	0.0315	0.70	0.80
A3	0.008 BSC		0.203 BSC	
b	0.008	0.012	0.20	0.30
D	0.079 BSC		2.00 BSC	
E	0.078 BSC		2.00 BSC	
e	0.020 BSC		0.50 BSC	
L	0.020	0.024	0.50	0.60

Ordering Codes

Ordering Code	Marking	Package Type	Temperature
PCS3P73Z01BWG-08-TT	3P73Z01BWG	8-pin 4.4-mm TSSOP - TUBE, Green	Commercial
PCS3P73Z01BWG-08-TR	3P73Z01BWG	8- pin 4.4-mm TSSOP - TAPE & REEL, Green	Commercial
PCS3P73Z01BWG-08-CR	AF1LL	8- pin 2-mm TDFN COL - TAPE & REEL, Green	Commercial

LL = 2 Character LOT #

Device Ordering Information



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Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to PulseCore Semiconductor, dated 11-11-2003
Many PulseCore Semiconductor products are protected by issued patents or by applications for patent