



THCV2712

V-by-One® HS Distributor

General Description

The THCV2712 is a high performance 1:2 signal distributor for V-by-One® HS with data rates up to 4Gbps and integrated 2:1 and 1:2 signal switcher support bi-directional communication.

The THCV2712 features the distribution function which duplicates a V-by-One® HS signal and the switch function which changes the path of signals. All configurations are supported by external pins.

All driver outputs and receiver inputs are internally terminated which no require external components.

Features

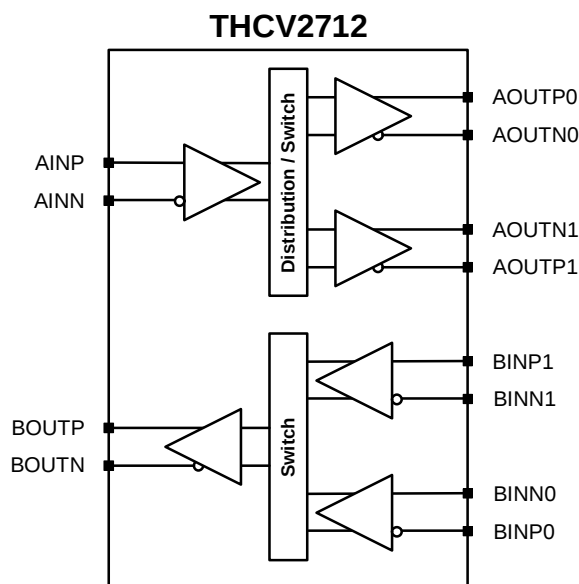
- Unidirectional Distribution
- Bi-directional Switch (1:2 and 2:1)
- Transmit VOD Control : 600 to 1300 mVp-p
- Available in single supply voltage 3.3V with integrated LDO
- ESD: HBM ± 4 kV
- QFN40 (5.0mm x 5.0mm)

Applications

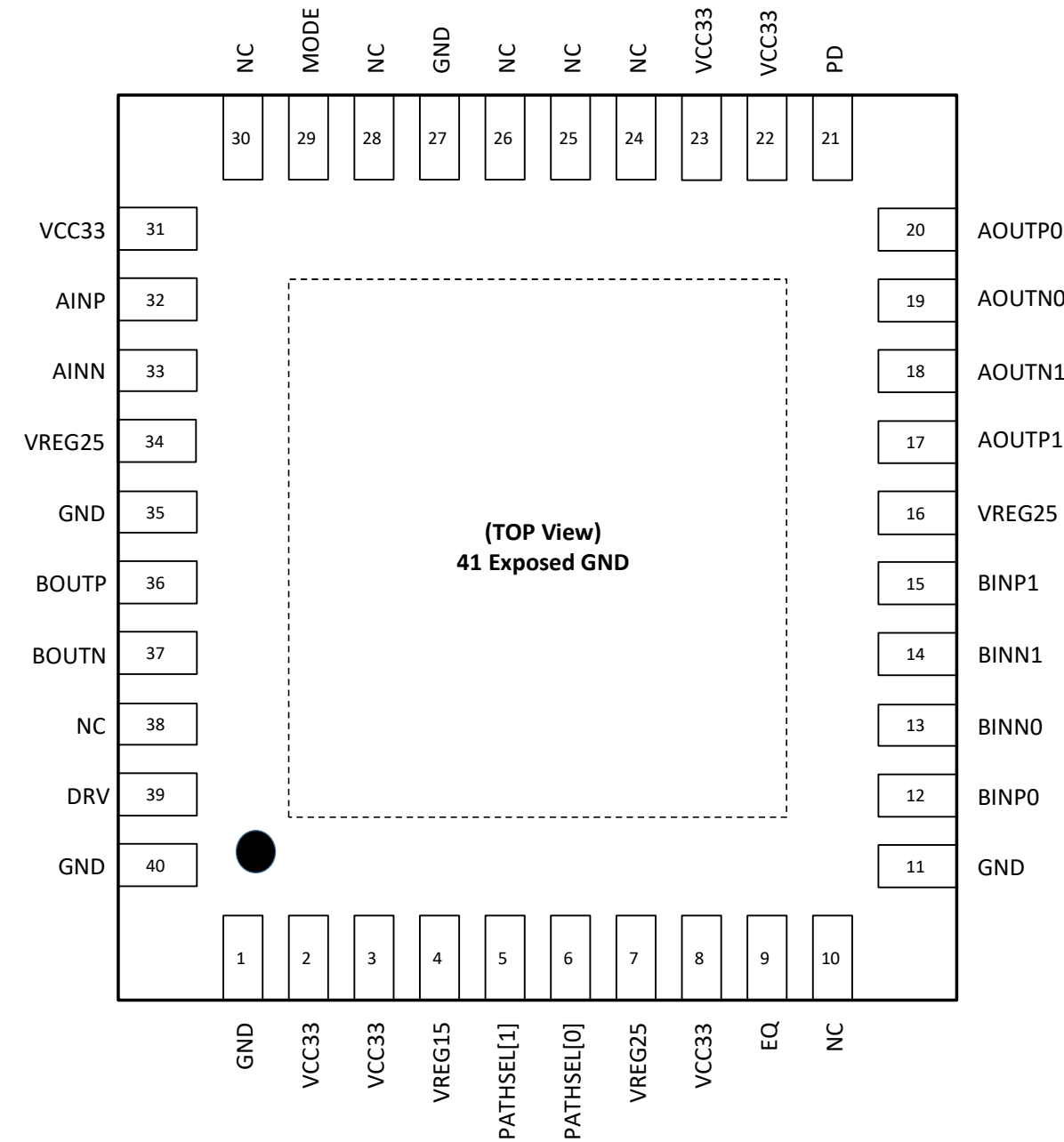
All V-by-One® HS applications such as

- Digital Signage
- Digital Blackboard
- Multi-Function Printer
- Production Printer
- Medical Imaging
- Machine Vision
- Image Sensor
- Camera

Block Diagram



Pin Configuration



Pin Description

Pin Name	Pin No	Type	Description
AINP	32	CI	High-Speed CML Channel A (CHA) Signal Input
AINN	33	CI	High-Speed CML Channel A (CHA) Signal Input
BOUTP	36	CO	High-Speed CML Channel B (CHB) Signal Output
BOUTN	37	CO	High-Speed CML Channel B (CHB) Signal Output
AOUTP1	17	CO	High-Speed CML Port 1 of CHA Signal Output
AOUTN1	18	CO	High-Speed CML Port 1 of CHA Signal Output
AOUTP0	20	CO	High-Speed CML Port 0 of CHA Signal Output
AOUTN0	19	CO	High-Speed CML Port 0 of CHA Signal Output
BINP1	15	CI	High-Speed CML Port 1 of CHB Signal Input
BINN1	14	CI	High-Speed CML Port 1 of CHB Signal Input
BINP0	12	CI	High-Speed CML Port 0 of CHB Signal Input
BINN0	13	CI	High-Speed CML Port 0 of CHB Signal Input
PD	21	I	Power Down 0: Operation 1: Chip Power Down
MODE	29	I	Mode select 0 : Distribution 1 : Switch
PATHSEL[1:0]	5,6	I	Select Switch Input / Output
EQ	9	3LI	Rx equalizer setting.
DRV	39	3LI	Tx output swing control
VREG15	4	PWR	Decoupling Capacitor Pin for On-chip Regulator.
VREG25	7,16,34	PWR	Decoupling Capacitor Pin, 2.5V output.
VCC33	2,3,8,22, 23,31	PWR	Power supply pin for on-chip regulator.
GND	1,11,27, 35,40,41	GND	Ground. Must be tied to the PCB ground plane through an array of vias. Pin#41 is exposed pad ground.
NC	10,24,25, 26,28,30, 38	NC	Non-connection pin. Must be open.

CI: CML Input buffer, CO: CML Output buffer

I: LVCMOS Input buffer, 3LI: 3-Level LVCMOS Input buffer,

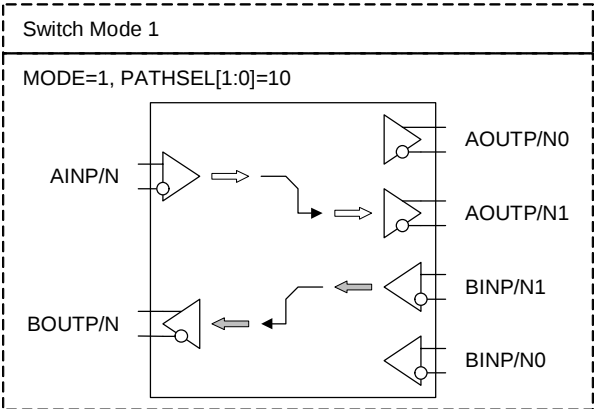
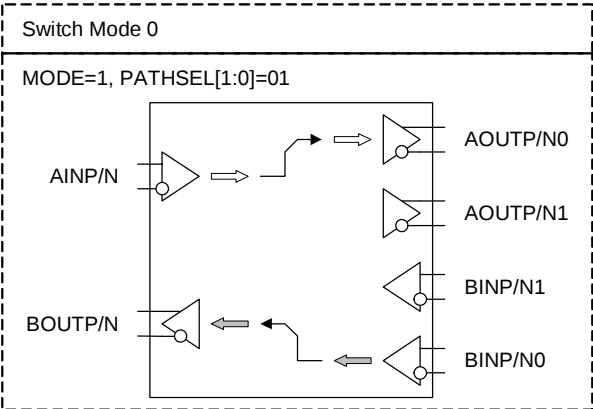
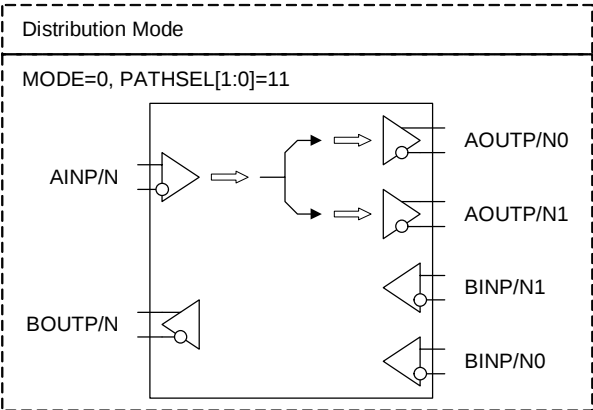
PWR: Power supply, GND: Ground, NC: Non-connection pin

Operation Mode Settings

Table1 shows the operation mode setting.

Table 1. Operation Mode Setting

Pin Settings			Operation Mode
PD	MODE	PATHSEL[1:0]	
0	0	11	Distribution Mode
	1	01	Switch Mode Port 0 Enable
		10	Switch Mode Port 1 Enable
1	Ignore	Ignore	Chip Power Down.



LOCKN/HTPDN signals are not be distributed and switched. The signals should be bypassed THCV2712.

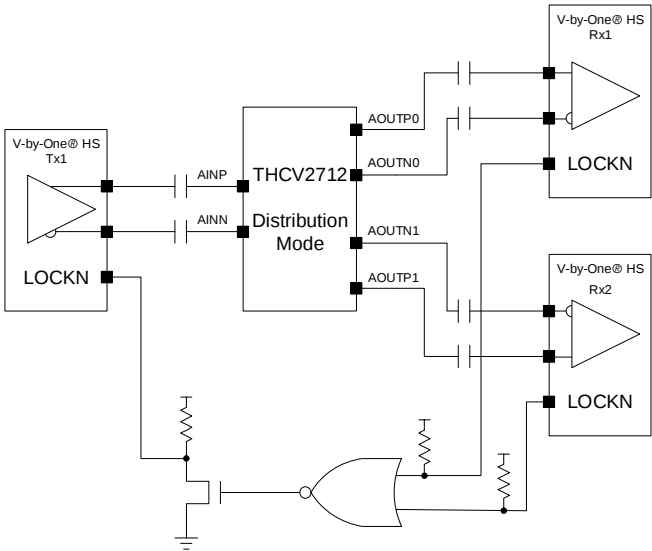


Figure 1. LOCKN circuits in Distribution Mode

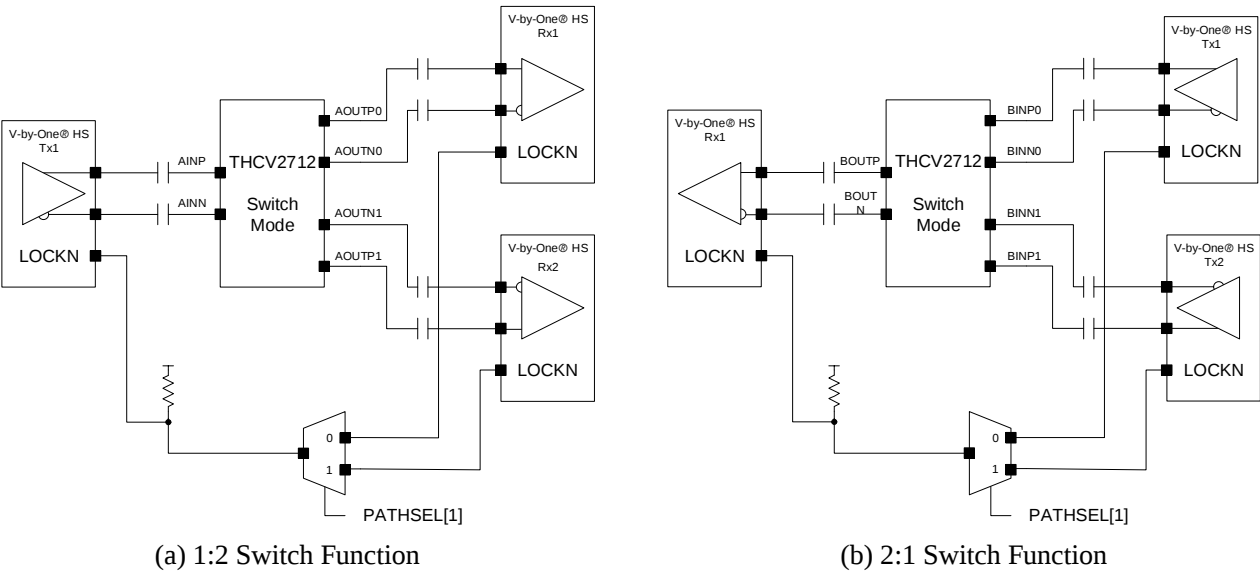


Figure 2. LOCKN circuits in Switch Mode

Absolute Maximum Ratings

Table 2. Absolute Maximum Ratings

Parameter		Min	Typ	Max	Unit
Supply Voltage(VCC33)		-0.3	-	4.0	V
LVCMOS Input Voltage		-0.3	-	VCC33+0.3	V
Level Control LVCMOS Input Voltage		-0.3	-	VCC33+2.5	V
3-Level LVCMOS Input Voltage		-0.3	-	VCC33+0.3	V
CML Receiver Input Voltage		-0.3	-	3.0	V
CML Transmitter Output Voltage		-0.3	-	3.0	V
ESD Rating	HBM	-	-	±4	kV
	CDM	-	-	±500	V
Storage Temperature		-55	-	125	°C
Junction Temperature		-	-	125	°C
Reflow Peak Temperature/Time		-	-	260/10	°C/sec

Recommended Operating Conditions

Table 3. Recommended Operating Condition

Parameter		Min	Typ	Max	Unit
Supply Voltage(VCC33)		3.0	3.3	3.6	V
Supply Ramp Requirement		0.1	-	50	ms
Operating Temperature		-40	-	85	°C

Electrical Specification

LVC MOS DC Specification

Table 4. LVC MOS DC Specification

Over recommended operating supply and temperature range unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V _{IH}	High Level Input Voltage	-	2.0	-	VCC33	V
V _{IL}	Low Level Input Voltage	-	0	-	0.7	V
V _{OH}	High Level Output Voltage	I _{oh} =-2mA	2.4	-	VCC33	V
V _{OL}	Low Level Output Voltage	I _{ol} =8mA	0	-	0.4	V
I _{OZH}	Output Leak Current High in Hi-Z State	-	-15	-	15	uA
I _{OZL}	Output Leak Current Low in Hi-Z State	-	-15	-	15	uA

3-Level LVC MOS DC Specification

Table 5. 3-Level LVC MOS DC Specification

Over recommended operating supply and temperature range unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V _{THL}	Low-Level Threshold Voltage	*	0.42	0.83	1.25	V
V _{THH}	High-Level Threshold Voltage	*	1.25	1.67	2.08	V
I _{IH_3L}	High Level Input Leak Current	VIN=VCC33	-100	-	100	uA
I _{IL_3L}	Low Level Input Leak Current	VIN=GND	-100	-	100	uA

*Must be tied for setting each level

Low: Tie 1k Ω $\pm$ 5% to GND

Float: Leave pin open

High: Tie 1k Ω $\pm$ 5% to VCC33

Supply Current

Table 6. Supply Current

Over recommended operating supply and temperature range unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
ICCW	Active Mode Supply Current	PD=0, MODE=1 EQ=High DRV=High	-	-	170	mA
		PD=0, MODE=1 EQ=Low DRV=Low	-	90	-	mA
		PD=0, MODE=0	-	-	250	mA
ICCS	Power Down Supply Current	PD=1	-	1.0	2.0	mA

Receiver DC/AC Specification

Table 7. Receiver DC/AC Specification

Over recommended operating supply and temperature range unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{RX-TH}	CML Differential Input High Threshold		-	-	50	mV
V_{RX-TL}	CML Differential Input Low Threshold		-50	-	-	mV
V_{RX-RIN}	CML Differential Input Resistance		80	100	120	Ω
$V_{RX-EQ-LOW}$	Input Equalization@2GHz	EQ=Low	-	3.2	-	dB
$V_{RX-EQ-FLOAT}$	Input Equalization@2GHz	EQ=Float	-	4.6	-	dB
$V_{RX-EQ-HIGH}$	Input Equalization@2GHz	EQ=High	-	7.6	-	dB

Transmitter DC / AC specifications

Table 8. Transmitter DC / AC specification

Over recommended operating supply and temperature range unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$V_{TX-DIFF-PP-LOW}$	Differential p-p Tx Voltage Swing	DRV=Low	0.4	0.6	0.8	V
$V_{TX-DIFF-PP-FLOQT}$	Differential p-p Tx Voltage Swing	DRV=Float	0.8	1.0	1.2	
$V_{TX-DIFF-PP-HIGH}$	Differential p-p Tx Voltage Swing	DRV=High	1.0	1.3	1.6	
$R_{TX-DIFF-DC}$	DC Differential Impedance	-	80	100	120	Ω
$V_{TX-DC-CM}$	Transmitter DC Common-mode Voltage	-	-	1.9	-	V
$I_{TX-SHORT}$	Transmitter Short-circuit Current Limit	-	-	20	60	mA
T_{ACTIVE}	PD Low to CML Output Delay				200	ns
$T_{POWERDOWN}$	PD High to CML Output High Fix Delay				10	ns
T_{SKEW}	CML Output Inter-pair skew				25	ps
$T_{PROPAGATION}$	Differential Propagation Delay	-	-	150	-	ps
$\Delta T_{PROPAGATION}$	Delta Propagation Delay		-	-	90	ps
T_{SWITCH}	Switching Time	-	-	-	10	ns

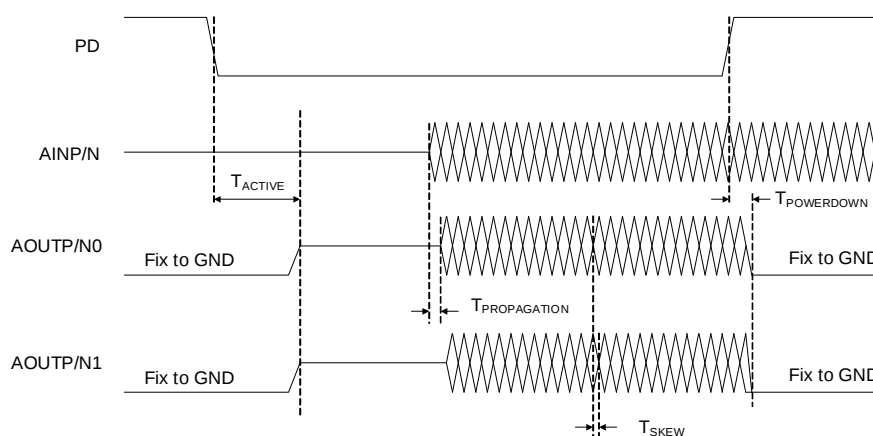


Figure 3 Power on Sequence (Distribution Mode)

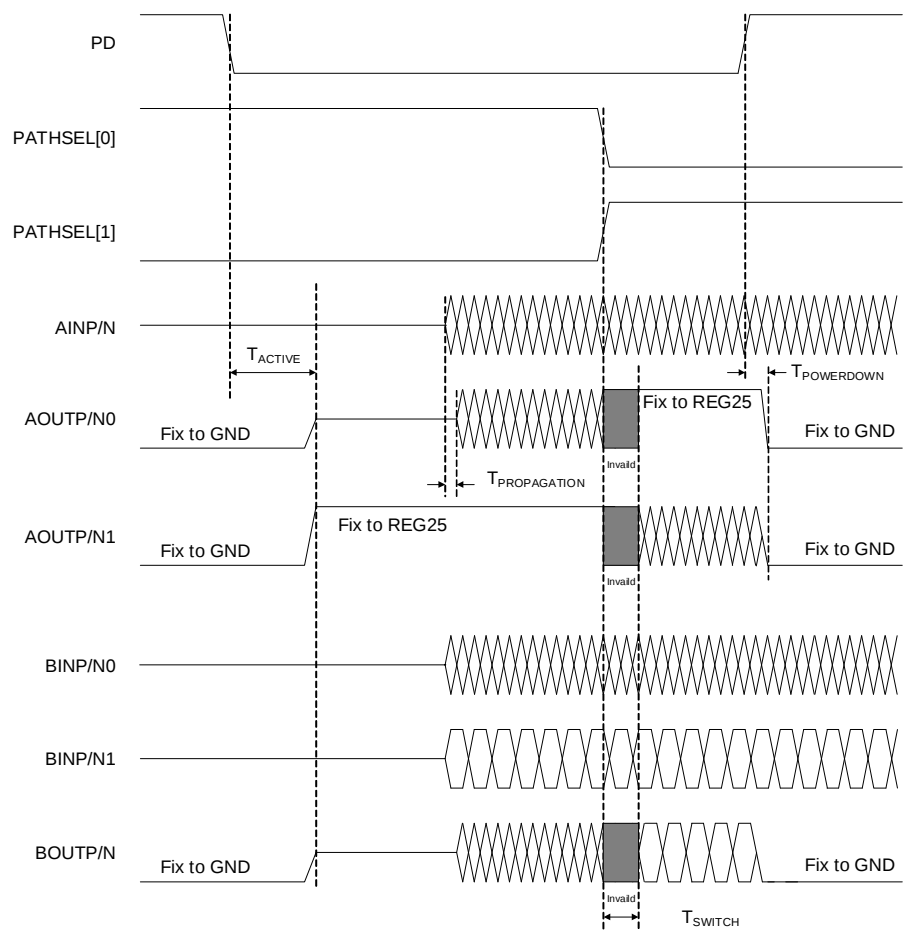


Figure 4. Power on Sequence (Switch Mode)

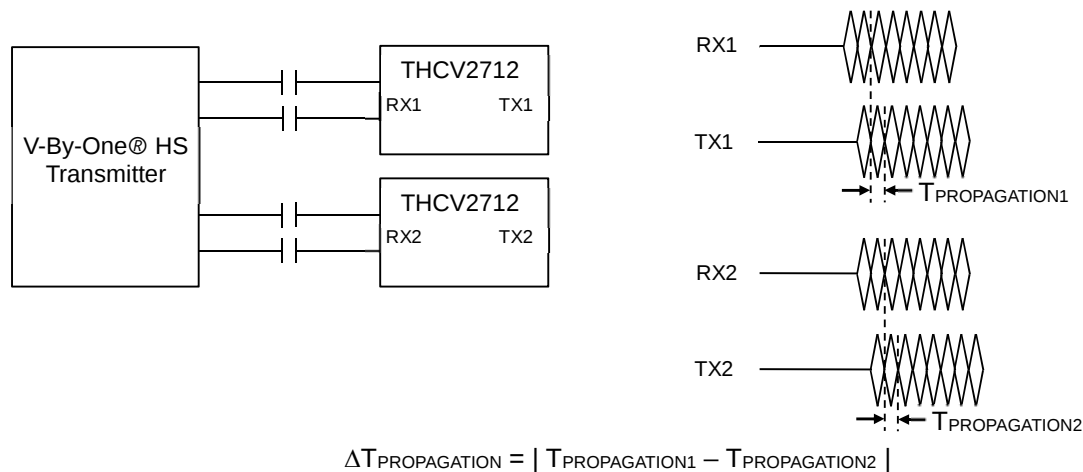
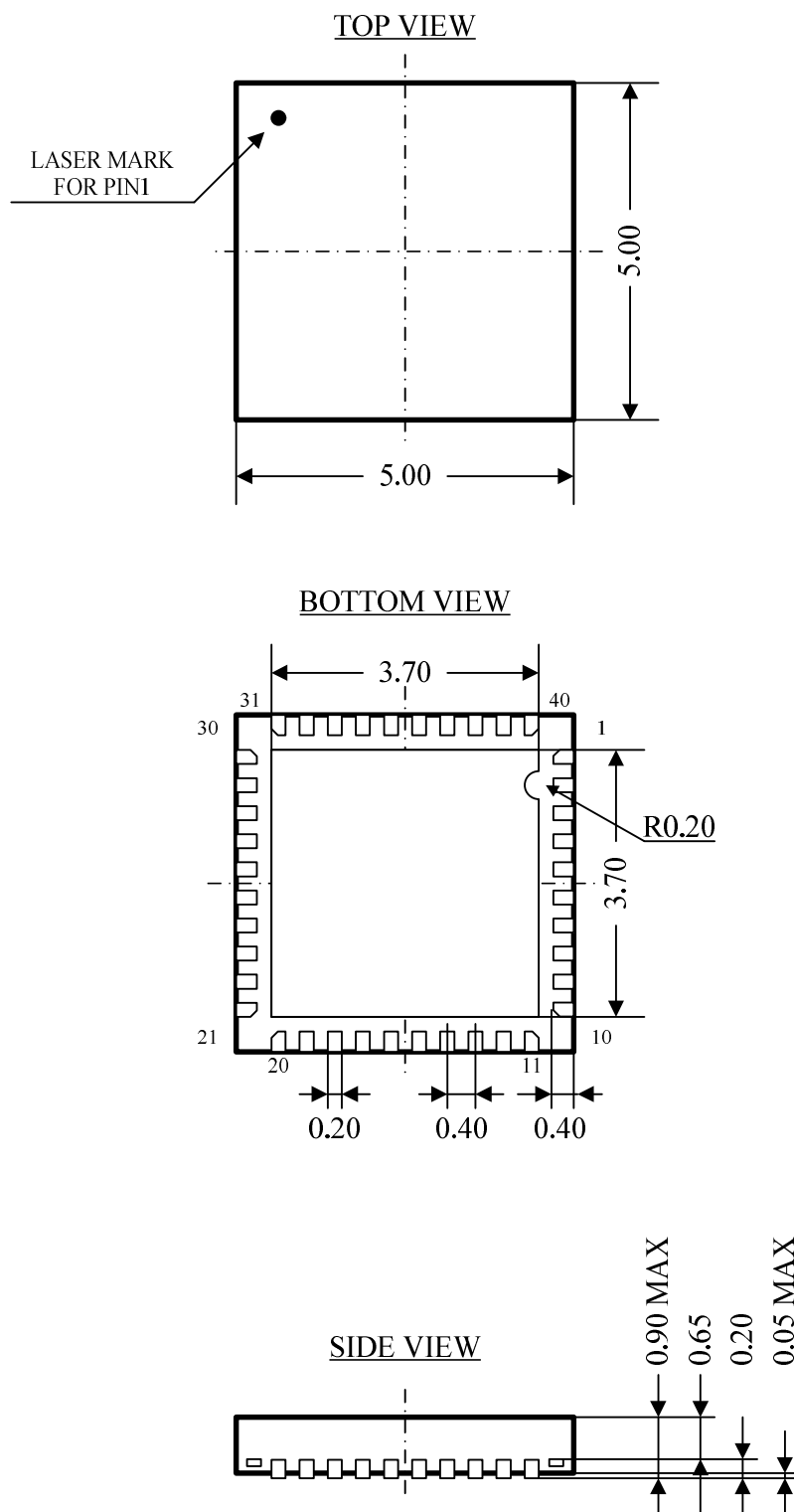


Figure 5. CML Propagation Delay Timing

Package



Unit : mm

Figure 6. 40-pin QFN package physical dimension

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