Automotive Sensor Network Transceiver

Features

- System Features:
  - 1 Master Node + up to 16 Slave Nodes in Daisy Chain
  - Up to 15 Meter between Nodes
  - Low Latency communication
  - Multichannel I2S/TDM/PDM Data
  - Local Power or Bus Power
  - I2C Control ASN Network
  - Auto Initialization between Devices to Negotiate Device Address
  - GPIO and Interrupt over Distance
  - Cross-bar for Flexible Digital Microphone Connections
  - Configuration Setting to Optimize EMI/EMC
  - AEC-Q100 Qualified for Automotive Applications. Device Temperature Grade 2: –40℃ to +105℃ Ambient Operating Temperature Range
- High Speed Link Features
  - Half Duplex Bi-directional Serial Signal Transmission
  - Baud Rate is 98.304 MHz, Data Rate is 49.152 Mbps
  - 2 Ports per Device, Up-streaming Port and Down-streaming Port
  - Spectrum Spreading Clock Support
  - Control Frame and Data Frame in High Speed Link
- Audio Interface Features
  - 2 Full Duplex I2S/TDM
  - 2 PDM Ports
  - Flexible Audio Channels Mapping between High-speed Link and Audio Interface.
- Control Interface Features
  - 100-kbps and 400-kbps I2C in Master and Slave Devices
  - Support Remote I2C to Configure Nodes and Peripheral Devices
  - The interrupt via high-speed link is triggered by external device accessing mailbox registers in Slave device triggers
  - The pin interrupt of Slave device is triggered by Master device accessing mailbox registers in Slave device triggers
  - GPIO Reflection from Master to Slave Device and from Slave to Master Devices
- Debug Features
  - Single Node Audio Loop back
  - Multiple Node Bus Loop back
  - Data Path Loop back
  - Error Counter
  - Line Fault Detection

Applications

- Automotive Audio/Sensor Network
- Conference System
- Active Noise Cancellation (ANC) and Road Noise Cancellation (RNC)
- Microphone Arrays for Beamforming and Hands-free Communication
- E-Call

Description

Automotive Sensor Network (ASN) is an ultra-low latency differential twisted pair daisy chain network used for remote transmission of configuration and sensor data (such as multi-channel PCM audio streams, accelerometer data, etc.) between multiple devices. The distance between adjacent devices can reach up to 15 meters, and the total distance of the entire single network can reach up to 80 meters.

The ASN network uses a daisy chain network architecture consisting of a master device and multiple slave devices. Each device is a transceiver with two ports, namely the Tm port (Toward Master) and the Ts port (Toward Slave). Each device has an I2C control interface and a PCM/TDM or PDM data interface. All network initialization configurations are initiated by the main processor (possibly SOC, MCU, etc.) for device enumeration. The master device is directly configured by the main processor by the I2C bus. All slave devices and other I2C peripherals attached to the slave device (such as audio ADC/DAC or digital power amplifier ICs) are remotely configured by the main processor through the main device and network link, thereby saving the cost of the master controller on the slave device side.

Typical Application Circuit

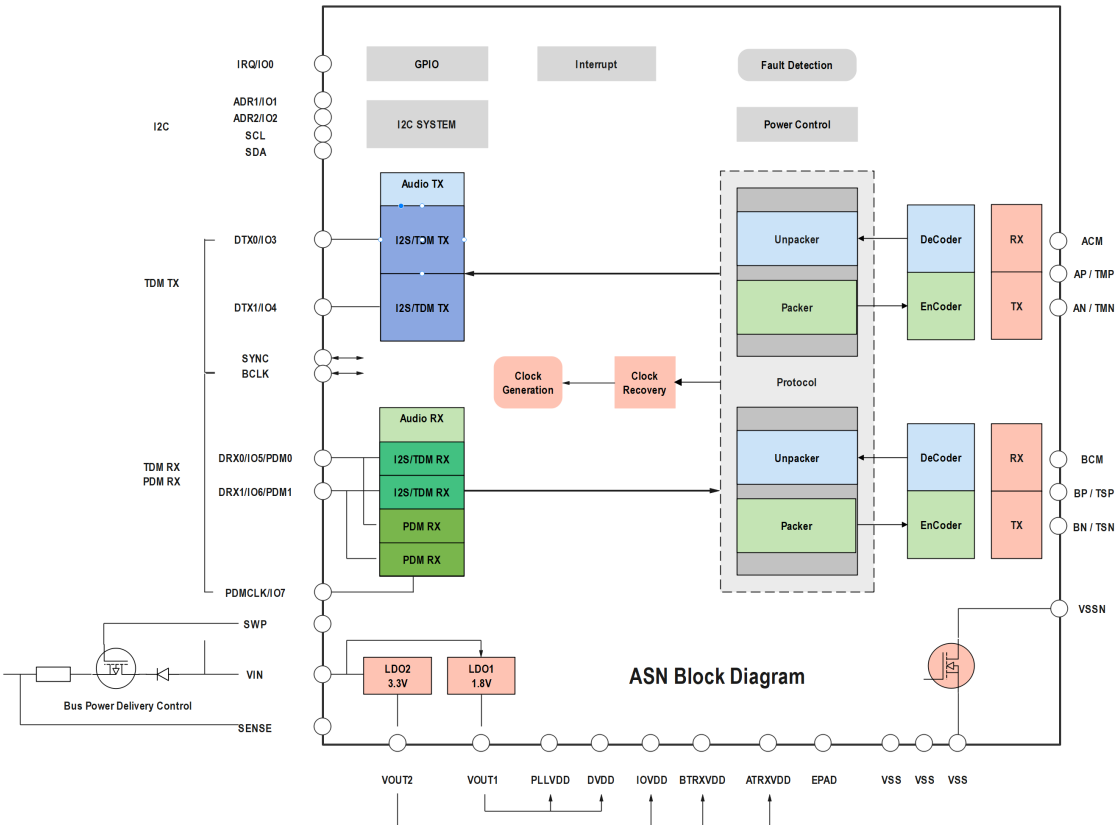
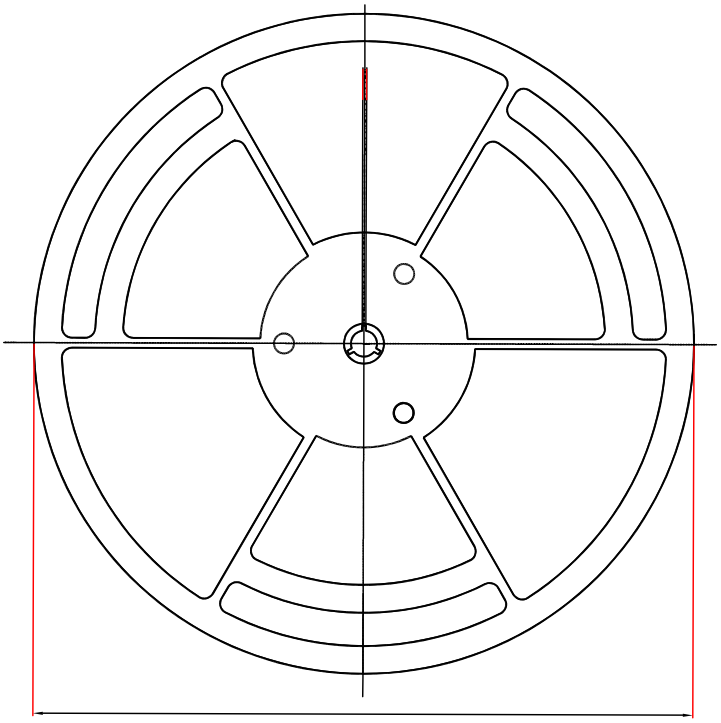


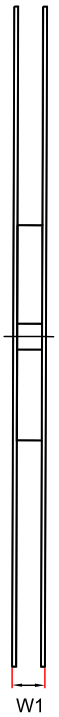
Table of Contents

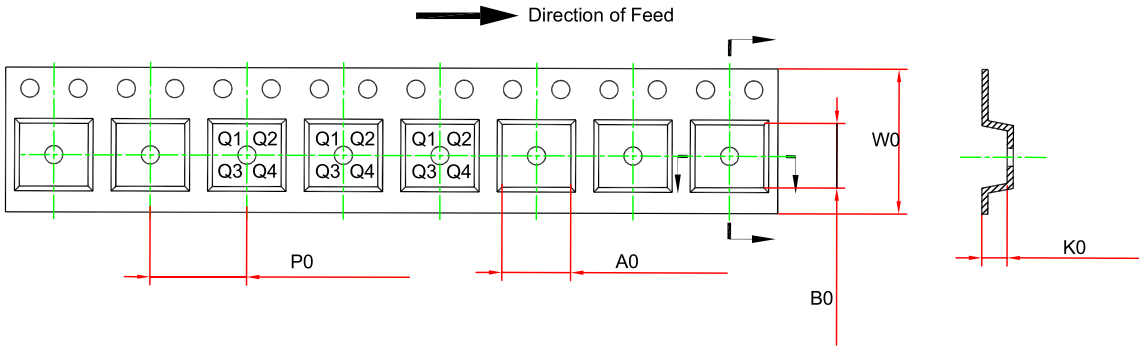
Product Family Table

Order Number	Master/Slave	Function	Quality Rating	Maximum Nodes	Marker	MSL	Package
TPDA1000Q-QFVR-S	Master and Slave	Full version,	Automotive	16+1	ASN00	3	QFN5x5-32
TPDA1001Q-QFVR-S	Slave Only	PDM Only. TDM Disabled	Automotive	16+1	ASN01	3	QFN5x5-32
TPDA1008-QFVR	Master and Slave	Full version	Industrial	16+1	ASN08	3	QFN5x5-32
TPDA1009-QFZR	Master and Slave	TDM Only. PDM Disabled	Industrial	16+1	ASN09	3	QFN5x5-32

Tape and Reel Information





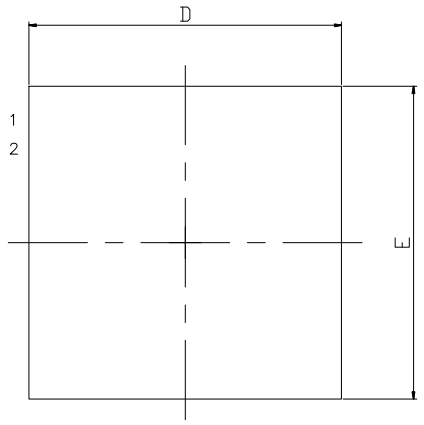


Order Number	Package	D1 (mm)	W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	W0 (mm)	Pin1 Quadrant
TPDA1000Q-QFVR-S	QFN5X5-32	330	17.6	5.3	5.3	1.1	8	12	Q1
TPDA1001Q-QFVR-S	QFN5X5-32	330	17.6	5.3	5.3	1.1	8	12	Q1
TPDA1008-QFVR-S	QFN5X5-32	330	17.6	5.3	5.3	1.1	8	12	Q1
TPDA1009-QFZR-S	QFN5X5-32	330	17.6	5.3	5.3	1.1	8	12	Q1

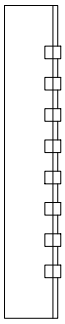
Package Outline Dimensions

QFN5X5-32-WET-H

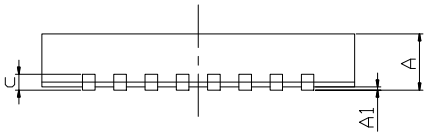
Package Outline Dimensions QFZ(QFN5X5-32-WET-H)



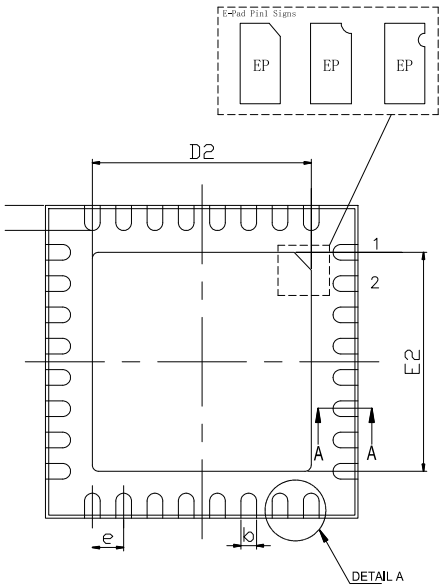
TOP VIEW



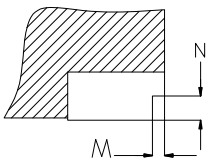
SIDE VIEW



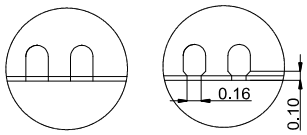
SIDE VIEW



BOTTOM VIEW



Section A-A



引脚根部 Option A 引脚根部 Option B

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
b	0.180	0.300	0.007	0.012
c	0.180	0.250	0.007	0.010
D	4.900	5.100	0.193	0.201
E	4.900	5.100	0.193	0.201
e	0.500 BSC		0.020 BSC	
D2	3.400	3.600	0.134	0.142
E2	3.400	3.600	0.134	0.142
L	0.350	0.450	0.014	0.018
M	0.010	0.090	0.000	0.004
N	0.080	0.180	0.003	0.007

NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.
3. The many types of E-pad Pin1 signs may appear in the product.

Order Information

Order Number	Operating Temperature Range	Package	Marking Information	MSL	Transport Media, Quantity	Eco Plan
TPDA1000Q-QFVR-S	−40 to 105°C	QFN5X5-32	ASN00	MSL3	Tape and Reel, 3000	Green
TPDA1001Q-QFVR-S	−40 to 105°C	QFN5X5-32	ASN01	MSL3	Tape and Reel, 3000	Green
TPDA1008-QFVR	−40 to 85°C	QFN5X5-32	ASN08	MSL3	Tape and Reel, 3000	Green
TPDA1009-QFZR	−40 to 85°C	QFN5X5-32	ASN09	MSL3	Tape and Reel, 3000	Green

Order Number	Description	Eco Plan
EVM_TPDA100X_Master	Master Node Evaluation Board, DSP Board, +12V Power Adapter, UTP Cable 1 meter	Green
EVM_TPDA100X_Slave	Slave Node Evaluation Board, UTP Cable 1 meter	Green
EVM_USB_TO_SPI_IIC	USB to I2C Translator Board, 10pin Cable, USB-C to USB-A Cable.	Green
EVM_TPDA100X_KIT	EVM_TPDA100X_Master + EVM_TPDA100X_Slave + EVM_USB_TO_SPI_IIC, Build 1 Master and 1 Slave Demo System	Green

Green: 3PEAK defines "Green" to mean RoHS compatible and free of halogen substances.

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