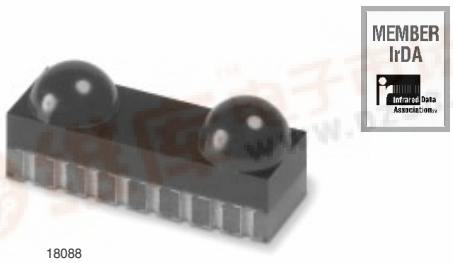
Low Profile 4 Mbit/s (FIR) Infrared Transceiver Module with independent Logic Supply Voltage

Description

The Vishay TFBS6614 is the lowest profile (2.7 mm) 4 Mbit/s Infrared Data Transceiver module available. A photo PIN diode, an infrared emitter (IRED) and a low-power CMOS control IC are integrated in a single package that provides a total front-end solution.

V_{LOGIC} - allows a low-voltage controller to connect directly to TxD, RxD and SD/Mode logic signals of the transceiver hence eliminating the need for costly signal level converter and reducing power consumption.

The TxD-echo function is enabled for internal self-test. During transmission the TxD signals are echoed at RxD output to perform the internal self-test.



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The Shut Down (SD) feature cuts current consumption to less than 10 nA.

Features

- Smallest FIR Transceiver available:
  H 2.7 mm x D 3.33 mm x L 7.98 mm
- 1.0 m Link distance
- Battery & Power Management Features:
  > Receive - 2 mA Typical
  > Shutdown - 10 nA Typical
  > Independent LED Anode Power Supply
  > Wide Voltage Range 2.7 V - 5.5 V
  > Power Up Latency < 100 µs
  > High V_{CC} Noise Rejection > 100 m VPP
- The TxD-Echo function is enabled
- V_{LOGIC} (1.5 V - 5.5 V) - Independent Digital supply voltage
- Shutdown Tri-States Receiver Output and Disables TxD allowing Bus Interfacing
- High Immunity to Fluorescent Light Noise and AC Field. No external shield required
- High DC Ambient Rejection - Operates Outdoors
- Receiver Latency Less than 100 µs
- Directly Interfaces with Various Super I/O and Controller Devices

Applications

PDAs
Mobile Phones
Notebook Computers, Desktop PCs
Digital Still and Video Cameras
External Infrared Adapters (Dongles)
Diagnostics Systems
Medical and Industrial Data Collection Devices
GPS

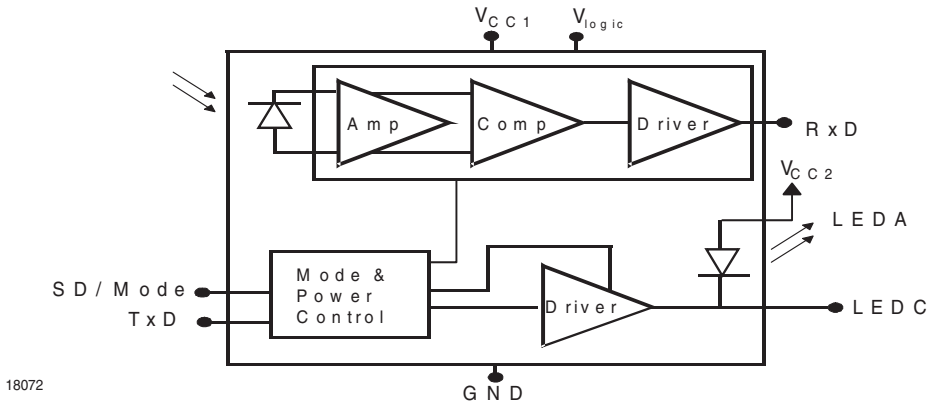
Footnotes

Product Disclaimer
This product is under development. Specifications are subject to change.

Parts Table

Part	Description	Qty / Reel
TFBS6614-TR3	Oriented in carrier tape for side view surface mounting	2500 pcs

Functional Block Diagram



Pin Description

Pin Number	Function	Description	I/O	Active
1	V_{CC2}, IRED Anode	Connect IRED Anode directly to V_{CC}.To decrease the LED current add a resistor between V_{CC} and IRED Anode. A non-regulated separate power supply can be used at this pin.		
2	IRED Cathode	IRED Cathode, internally connected to driver transistor		
3	TxD	Transmit Data Input	I	HIGH
4	RxD	Received Data Output, capable of driving a standard CMOS or TTL load. No external pull-up or pull-down resistor is required. Pin is floating when device is in shutdown mode and is not quiet during data transmission.	O	LOW
5	SD/ Mode	Places the device in shutdown mode and switches bandwidth together with TxD	I	HIGH
6	V_{CC1}	Analog Supply Voltage		
7	V_{LOGIC}	Digital Supply Voltage		
8	GND	Ground		

Absolute Maximum Ratings

Reference Point Ground, Pin 8, unless otherwise noted

Parameter	Testconditions	Symbol	Value	Unit
Analog Supply Voltage Range, all states		V_{CC1}	- 0.5 to 6.0	V
Digital Supply Voltage Range		V_{DD}	- 0.5 to 6.0	V
Input Current	During Transmit, V_{CC} = 5.0 V, TxD = V_{DD}		10.0	mA
Output Sink Current, RxD			25.0	mA
Peak IRED Current	V_{CC1} = 2.7 V, TxD = V_{DD}, 125 ns pulse		650	mA
Average IRED Current	V_{CC2} = 2.7 V		125	mA
Power Dissipation			500	mW
Junction Temperature			125	°C
Ambient Temperature Range (Operating)		T_A	- 25 to + 85	°C
Storage Temperature Range		T_S	- 25 to + 85	°C
Soldering Temperature	t = 20 s @ 215 °C		215 (≤ 240)	°C
Transmitter Data and Shutdown Input Voltage		V_{TxD}, V_{SD}	- 0.5 to V_{DD} + 0.5	V
Receiver Data Output Voltage		RxD	- 0.5 to V_{DD} + 0.5	V

Optoelectronic Characteristics

Receiver

T_A = 25 °C, V_{CC} = 2.7 V to 5.5 V unless othervise noted

Parameter	Testconditions	Symbol	Min	Typ.	Max	Unit
Minimum Detection Threshold Irradiance	4.0 Mbits/s, l = 850 nm to 900 nm	E_e			100	mW/m^2
Analog Supply Voltage Range	Specified operation	V_{CC}	2.7		5.5	V
Digital Supply Voltage Range	Specified operation	V_{DD}	1.5		5.5	V
Maximum LED Anode Voltage		V_{LEDA}			V_{CC} + 4	V
I_{CC} Shut Down Current	V_{CC} = 5 V	I_{CC1}		0.01	2.0	nA
I_{CC} Idle Current	V_{CC} = 5 V	I_{CC2}		1.6		mA

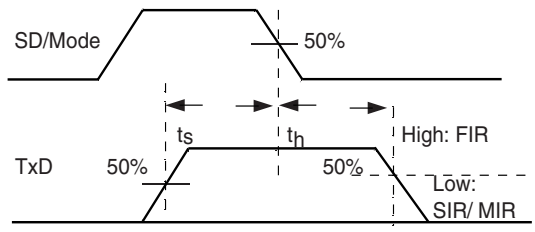
Transmitter

T_A = 25 °C, V_{CC} = 2.7 V to 5.5 V unless othervise noted

Parameter	Testconditions	Symbol	Min	Typ.	Max	Unit
Output Radiant Intensity	α = 0 °C, 15 °C, TxD = High, SD = Low	I_e		110		mW/Sr

Mode Switching

Upon power-up the TFBS6614 module initializes in the SIR (9.6 Kbit/s to 115.2 Kbit/s) mode.The module can be switched to higher bandwidth and vice versa by using the sequence described bellow:



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Setting to the High Bandwidth Mode (0.576 Mbits/s to 4 Mbit/s)

1. Set SD/ Mode input to logic "High".
2. Set TxD input to logic "High". Wait ts ≥ 200 ns.
3. Set SD/ Mode to logic "Low" (the negative edge latches state of TxD, which determines data rate setting).
4. After waiting th ≥ 200 ns TxD can be set to logic "Low". The hold time of TxD is limited by the maximum allowed pulse width.

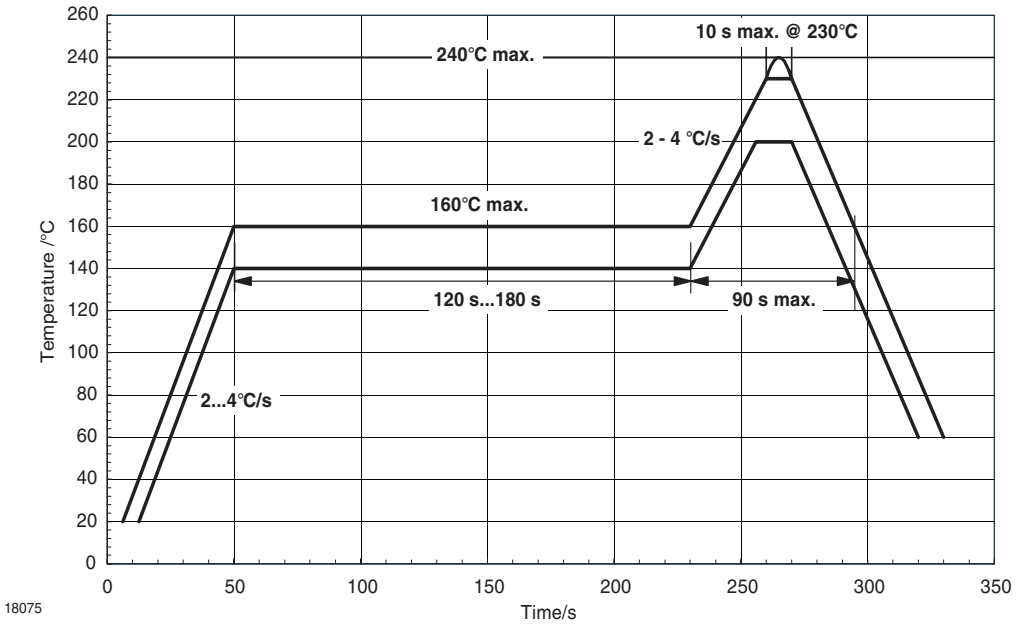
TxD is now enabled as normal TxD input for the high bandwidth mode.

Setting to the Lower Bandwidth Mode (9.6 Kbit/s to 115.2 Kbit/s)

1. Set SD/ Mode input to logic "High".
2. Set TxD input to logic "Low". Wait ts ≥ 200 ns.
3. Set SD/ Mode to logic "Low" (the negative edge latches state of TxD, which determines data rate setting).
4. After waiting th ≥ 200 ns TxD can be set to logic "Low". The hold time of TxD is limited by the maximum allowed pulse width.

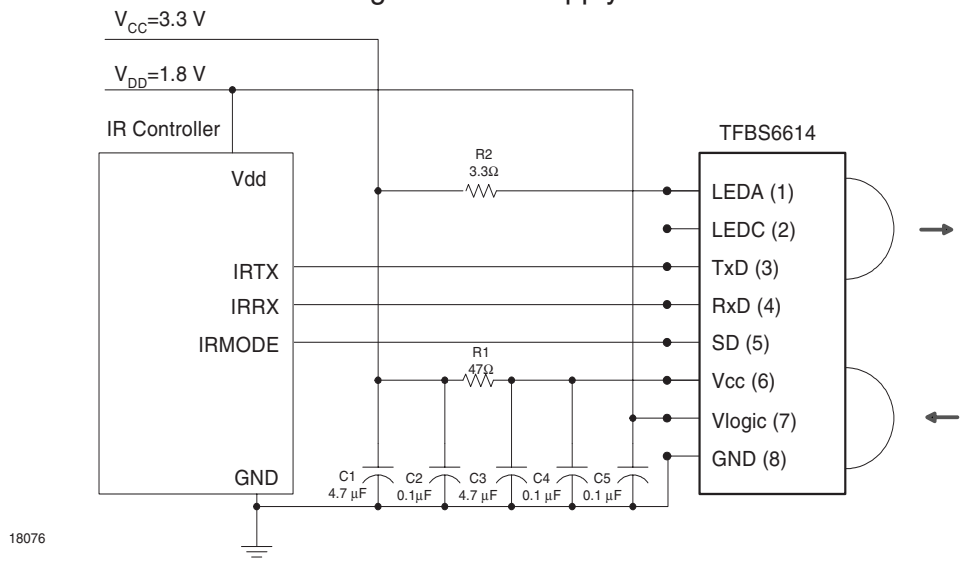
TxD is now enabled as normal TxD input for the lower bandwidth mode.

Recommended Solder Profile

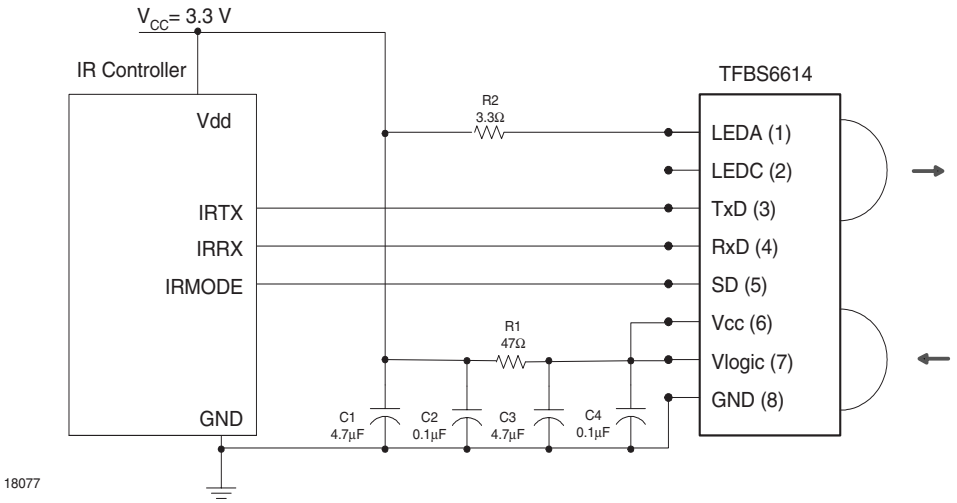


Recommended Circuits

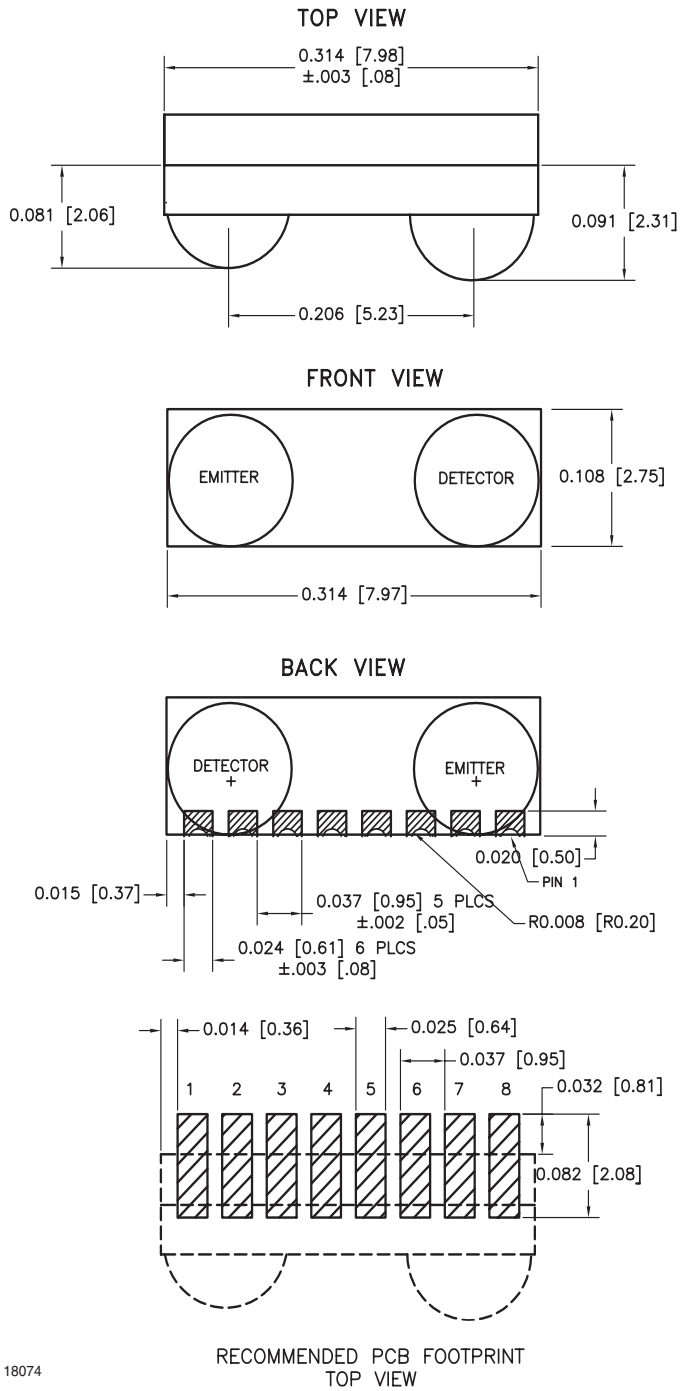
Block Diagram of Transceiver with Digital Power Supply



Block Diagram of Transceiver with Common Power Supply



Package Dimensions in Inches (mm)



Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operatingsystems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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