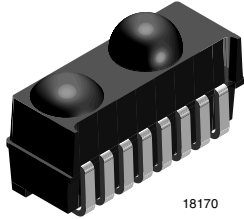


Low Profile Transceiver Module PIN Photodiode and Infrared Emitter


FEATURES

- Package dimension: L 7.3 mm x W 4.55 mm x H 2.75 mm
- SMD side view
- Fast PIN photodiode for SIR and FIR applications
- Detector with high efficiency and high speed at low bias voltage
- Only 30 mA IRED peak current during transmission for IrDA SIR low power standard
- Qualified for lead (Pb)-free and Sn/Pb processing (MSL4)
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC


RoHS
COMPLIANT

DESCRIPTION

The miniaturized TFDU2201 is an ideal pin photodiode transmitter combination in a unique package for applications in telecommunications like mobile phones and pagers. The device is mechanically designed for lowest profile with a height of only 2.8 mm. The device is designed to be compatible to the IrDA standard when using an external receiver IC and IRED driver.

APPLICATIONS

- Mobile phones, pagers, personal digital assistants (PDA)
- Handheld battery operated equipment

PRODUCT SUMMARY

PART NUMBER	DATA RATE (kbit/s)	DIMENSIONS H x L x W (mm x mm x mm)	LINK DISTANCE (m)	OPERATING VOLTAGE (V)	IDLE SUPPLY CURRENT (mA)
TFDU2201	any rate	2.75 x 7.3 x 4.55	-	2.4 to 5.5	-

PARTS TABLE

PART	DESCRIPTION	QTY/REEL
TFDU2201-TR1	Orientated in carrier tape for side view mounting	750 pcs
TFDU2201-TR3	Orientated in carrier tape for side view mounting	2250 pcs

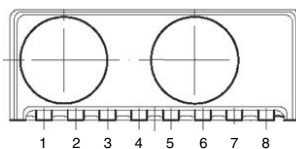
PIN DESCRIPTION

PIN NUMBER	FUNCTION	DESCRIPTION
1	IRED GND	IRED cathode, ground, to be used as heat sink
2	IRED GND	IRED cathode, ground, to be used as heat sink
3	IRED anode	IRED anode, to be driven by a current source
4	NC	The pins 4, 5, 6 are internally not connected. No modulated sources or voltages > 5 V should be applied to these pins. It is recommended to ground these pins. In this case the lead frame structure will work as an internal EMI shield.
5		
6		
7	D _{anode}	Detector anode
8	D _{cathode}	Detector cathode

PINOUT

TFDU2201

Weight 100 mg



18228

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Photo pin diode, reverse voltage range		V_r	- 0.3		12	V
Photo pin diode, reverse photo current					10	mA
Average IRED current		$I_{IRED(DC)}$			100	mA
Repetitive pulsed IRED current	< 90 μ s, t_{on} < 20 %	$I_{IRED(RP)}$			550	mA
IRED, reverse voltage range		V_{rIRED}	- 0.3		5	V
Power dissipation	See figure 3	P_{tot}			200	mW
Junction temperature		T_J			125	$^{\circ}$ C
Ambient temperature range (operating)		T_{amb}	- 25		+ 85	$^{\circ}$ C
Storage temperature range		T_{stg}	- 40		+ 85	$^{\circ}$ C
Soldering temperature	See the chapter "Soldering conditions" for lead-bearing and Pb-free processing				260	$^{\circ}$ C
Virtual source size	Method: (1 - 1/e) encircled energy	d		2		mm

Note

Compatible to class 1 operation of IEC 60825 or EN60825 with worst case IrDA SIR pulse pattern, 115.2 kbit/s

ELECTRICAL CHARACTERISTICS						
PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
TRANSCEIVER						
Supported data rates	Base band		9.6		4000	kbit/s

Note

Tested for the following parameters (T = 25 $^{\circ}$ C, unless otherwise stated)

OPTOELECTRONIC CHARACTERISTICS						
PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
RECEIVER						
Spectral sensitivity	$ \alpha \leq \pm 15^{\circ}$, $V_r = 2$ V, $\lambda = 875$ nm	S_{λ}	1	1.2	1.8	nA/(mW/m ²)
Bias voltage range, detector		V_{Rev}			12	V
Reverse leakage current				0.2		nA
Spectral bandwidth		λ	800		950	nm
Max. operating irradiance	$ \alpha \leq \pm 90^{\circ}$ C, $V_{CC} = 2$ V	$E_{e, max.}$	8000	15 000		W/m ²
Rise time at load: R = 50 Ω	$V_r = 2$ V, $\lambda = 875$ nm	t_r		40		ns
Fall time at load: R = 50 Ω	$V_r = 2$ V, $\lambda = 875$ nm	t_f		40		ns
TRANSMITTER						
Forward current operating condition for low power IrDA operation	$I_e = 4$ mW/sr to 28 mW/sr in $ \alpha \leq \pm 15^{\circ}$	I_{F1}		30		mA
Output radiant intensity	$ \alpha \leq \pm 15^{\circ}$, $I_{F1} = 35$ mA, 25 % duty cycle	I_e	4	8	14	mW/sr
	$ \alpha \leq \pm 15^{\circ}$, $I_{F1} = 350$ mA, 25 % duty cycle	I_e	35			mW/sr
Forward voltage	$I_f = 50$ mA	V_f	1.2		1.45	V
Peak emission wavelength		λ_p	880		900	nm
Spectral emission bandwidth				45		nm
Optical rise/fall time	2 MHz square wave signal (duty cycle 1:1)			38		ns

Note

Tested for the following parameters (T = 25 $^{\circ}$ C, unless otherwise stated)

RECOMMENDED SOLDER PROFILES

Solder Profile for Sn/Pb Soldering

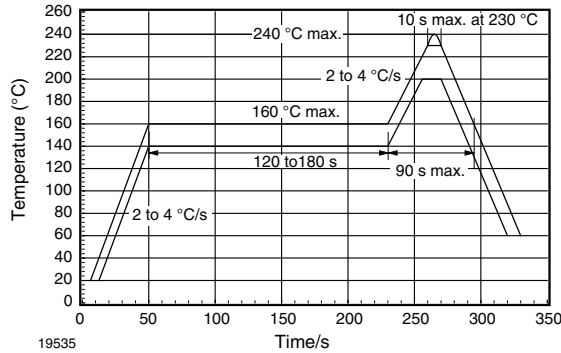


Fig. 1 - Recommended Solder Profile for Sn/Pb Soldering

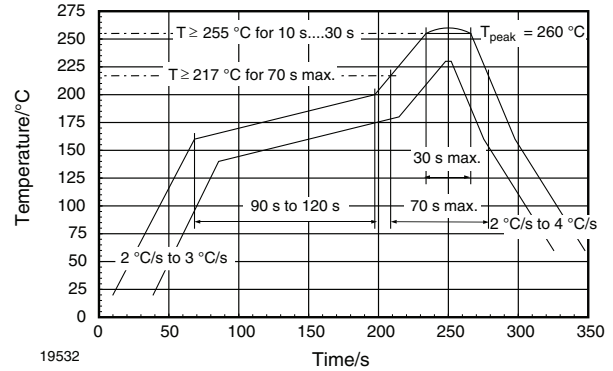


Fig. 2 - Solder Profile, RSS Recommendation

Lead (Pb)-free, Recommended Solder Profile

The TFDU2201 is a lead (Pb)-free transceiver and qualified for lead (Pb)-free processing. For lead (Pb)-free solder paste like $\text{Sn}_{(3.0 - 4.0)}\text{Ag}_{(0.5 - 0.9)}\text{Cu}$, there are two standard reflow profiles: Ramp-Soak-Spike (RSS) and Ramp-To-Spike (RTS). The Ramp-Soak-Spike profile was developed primarily for reflow ovens heated by infrared radiation. With widespread use of forced convection reflow ovens the Ramp-To-Spike profile is used increasingly. Shown in figure 2 and 3 are Vishay's recommended profiles for use with the TFDU2201 transceivers. For more details please refer to the application note "SMD Assembly Instructions".

A ramp-up rate less than 0.9 °C/s is not recommended. Ramp-up rates faster than 1.3 °C/s could damage an optical part because the thermal conductivity is less than compared to a standard IC.

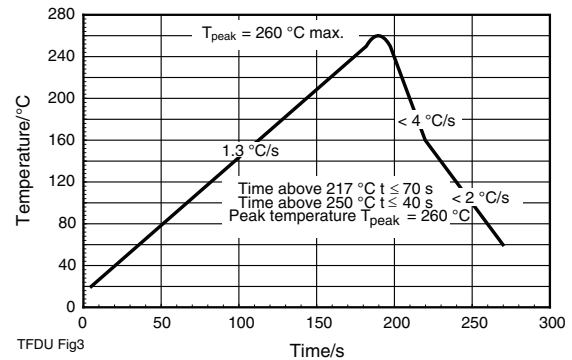


Fig. 3 - RTS Recommendation

Wave Soldering

For TFDUxxxx and TFBSxxxx transceiver devices wave soldering is not recommended.

Manual Soldering

Manual soldering is the standard method for lab use. However, for a production process it cannot be recommended because the risk of damage is highly dependent on the experience of the operator. Nevertheless, we added a chapter to the above mentioned application note, describing manual soldering and desoldering.

Storage

The storage and drying processes for all Vishay transceivers (TFDUxxxx and TFBSxxx) are equivalent to MSL4.

The data for the drying procedure is given on labels on the packing and also in the application note "Taping, Labeling, Storage and Packing".

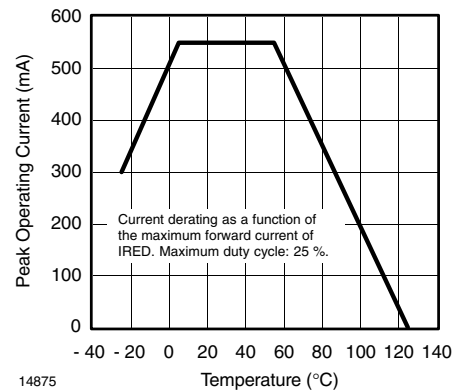
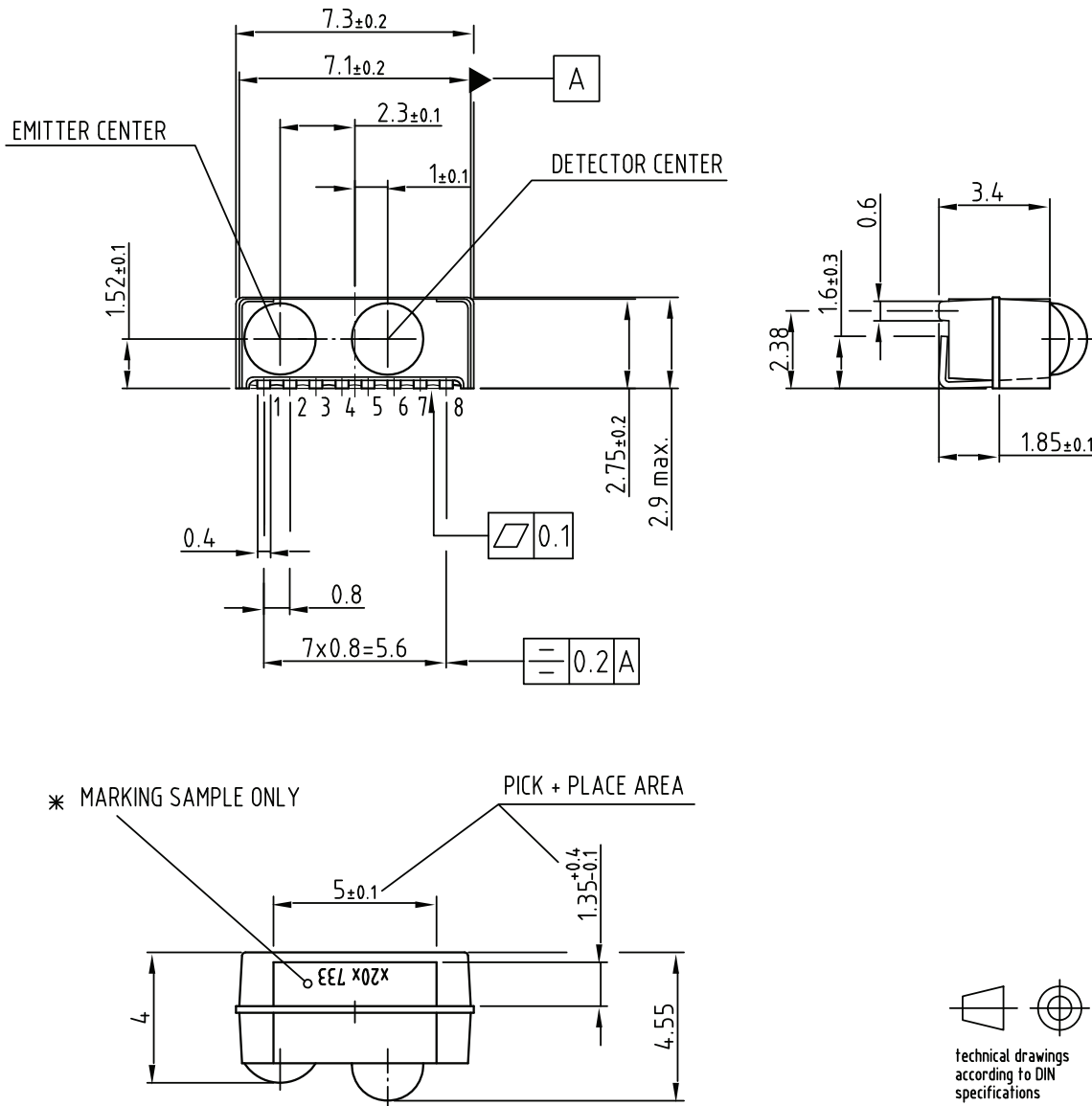
CURRENT DERATING DIAGRAM


Fig. 4 - Current Derating Diagram

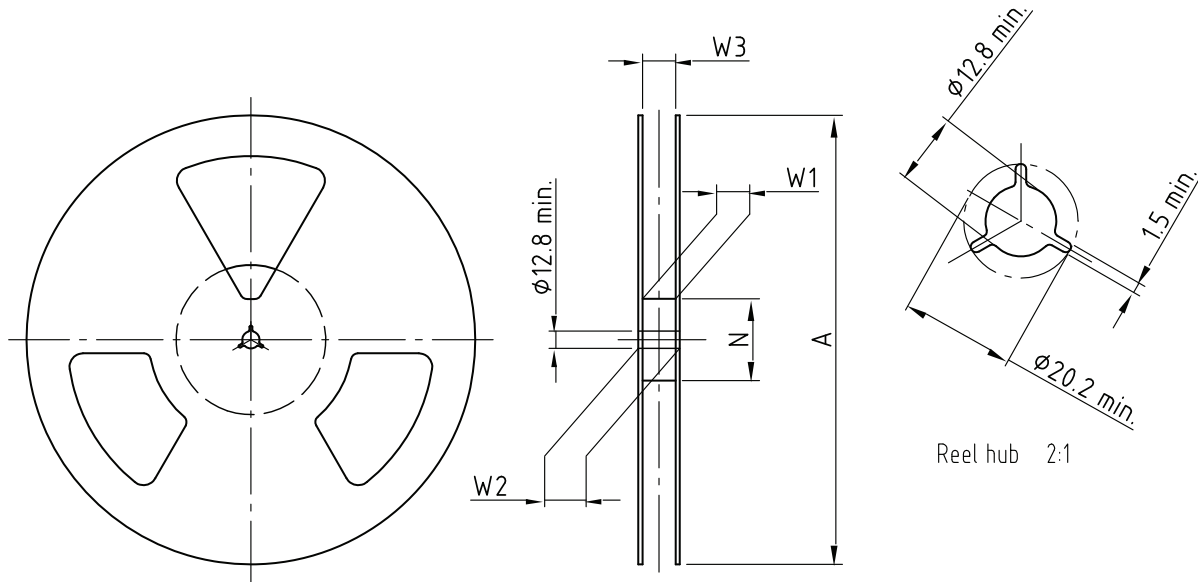
PACKAGE DIMENSIONS in millimeters



* MARKING ORIENTATION
180 DEGREES ALLOWED

Drawing-No.: 6.550-5185.01-4
Issue: 5; 02.09.05
19821

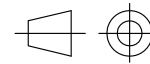
Fig. 5 - Package Drawing, TFDU2201

REEL DIMENSIONS in millimeters


Drawing-No.: 9.800-5090.01-4
 Issue: 1; 29.11.05
 14017

Form of the leave open
 of the wheel is supplier specific.

Dimension acc. to IEC EN 60 286-3



technical drawings
 according to DIN
 specifications

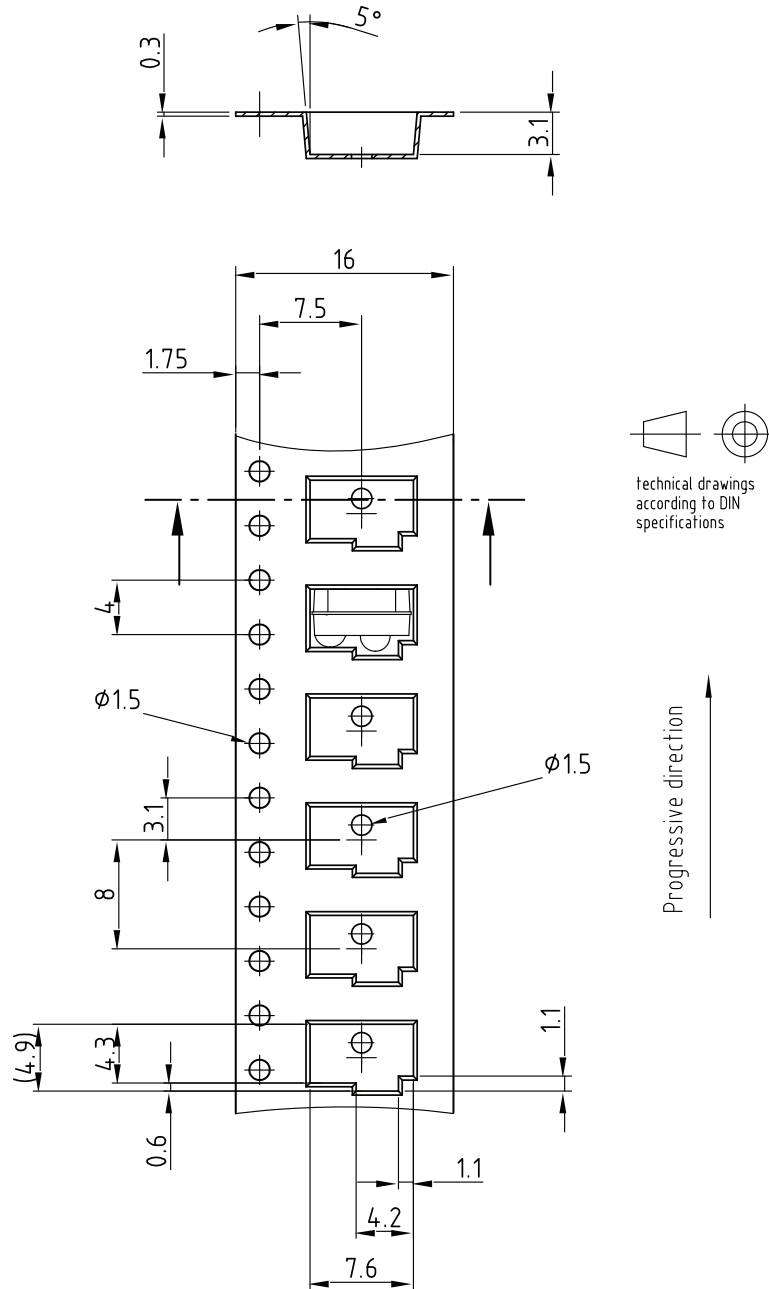
	TAPE WIDTH (mm)	A MAX. (mm)	N (mm)	W ₁ MIN. (mm)	W ₂ MAX. (mm)	W ₃ MIN. (mm)	W ₃ MAX. (mm)
TFDU2201-TR1	16	180	60	16.4	22.4	15.9	19.4
TFDU2201-TR3	16	330	50	16.4	22.4	15.9	19.4

TFDU2201

Vishay Semiconductors Low Profile Transceiver Module PIN
Photodiode and Infrared Emitter



TAPE DIMENSIONS in millimeters



Drawing-No.: 9.700-5227.01-4
Issue: 3; 03.09.99
19820

Fig. 6 - Tape Drawing, TF DU2201 for Side View Mounting



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.