Product Change Notification

Product Group: OPT/Mon Sep 19, 2022/PCN-OPT-1234-2022-REV-0

Changes of materials for TFDU4301

DESCRIPTION OF CHANGE: -Introduction of a new in-house designed IRDC IC. The Chaldene IC provides
20 percent longer distance (in meters) and improved ESD robustness
from current 1kV to 2kV.
-Introduction of a new Surface Emitting Technology Chip.
-Changeover of the Au wire Diameter from 30um to 25um.
We recommend to test the product in customers application.

REASON FOR CHANGE: - New IC:
The existing external IC Supplier will end the production. In order to assure a long-term product availability of IRDC products, Vishay developed an inhouse IC in cooperation with the worlds leading Chip Foundry.
-New Emitter Chip:
Changeover to latest Surface Emitting Technology to assure long-term
product availability.
-Au wire Diameter reduction:
In order to streamline the production and optimize the material supply chain, Vishay introduces a new Standardization of Au wire Diameter.
The material is qualified to high Standards.

EXPECTED INFLUENCE ON QUALITY/RELIABILTY/PERFORMANCE: No change on Quality/Reliability. Similar electrical and optical characteristics.

PART NUMBERS/SERIES/FAMILIES AFFECTED: Please see materials list on the succeeding page.

VISHAY BRAND(s): Vishay Semiconductors

TIME SCHEDULE:
Start Shipment Date: Sun Jan 1, 2023

SAMPLE AVAILABILITY: 25-Sep-2022

PRODUCT IDENTIFICATION: via date code

QUALIFICATION DATA: Q-Report is availablw in ww40.

This PCN is considered approved, without further notification, unless we receive specific customer concerns before Sun Nov 13, 2022 or as specified by contract.

ISSUED BY: Rainer Hauschildt, rainer.hauschildt@vishay.com

For further information, please contact your regional Vishay office.

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?TFDU4301-TR1	TFDU4301-TR3	TFDU4301-TT1	TFDU4301-TT3	TFDU4301D-TT3
TFDU4301E-TR1	TFDU4301E-TR3	TFDU4301E-TT3		

FAST FACTS

Product Group: Vishay Opto / **Sep** 2022

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Changes of materials for TFDU4301

Vishay Opto has published PCN-OPT-1234-2022, announcing the introduction of a new IC, a new Surface Emitter Chip and the usage of standardized 25µm Bond wires for the existing TFDU4301x IRDC Transceiver Series.

FAQ:

Q: Are there any technical differences (form/fit/function) expected?
A: Mechanically there are no changes.
Electrically/Optically the performance of the Transmitter changes in the following way.

Before material changes:

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, V_{CC1} = V_{CC2} = 2.4 V to 5.5 V unless otherwise noted)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
TRANSCEIVER						
Supply voltage		V_{CC1}	2.4	-	5.5	V
Operating temperature range		T_{amb}	-30	-	+85	°C
Data rates			9.6	-	115.2	kbit/s
Idle supply current at V_{CC1} (receive mode, no signal)	SD = low, T_{amb} = -25 °C to +85 °C independent of ambient light, V_{CC1} = V_{CC2} = 2.4 V to 5.5 V	I_{CC1}	40	70	150	µA
	SD = low, T_{amb} = 25 °C, V_{CC1} = V_{CC2} = 2.4 V to 5.5 V	I_{CC1}	40	70	100	µA
Average dynamic supply current, transmitting	I_{IRED} = 300 mA, 20 % duty cycle	I_{CC1}	-	0.6	2	mA
Standby (SD) (1) supply current	SD = high, T_{amb} = -25 °C to +85 °C independent of ambient light	I_{SD}	-	0.01	1	µA
RXD to V_{CC1} impedance		R_{RXD}	400	500	600	kΩ
Input voltage low (TXD, SD)	SD = high	V_{ILo}	-0.3	-	0.4	V
Input voltage high (SD)	For compliance with ISD spec.	V_{IHi}	V_{CC1} - 0.3	-	6	V
Input voltage high (TXD)		V_{IHi}	V_{CC1} - 0.5	-	6	V
Timing logic decision level			-	0.5 x V_{CC1}	-	
Input leakage current low	$V_{ILo} \leq 0.3$ V	I_{ILo}	-	0.01	10	µA
Input leakage current high	$V_{IHi} \geq V_{CC1}$ - 0.3 V	I_{IHi}	-	0.01	10	µA
Input capacitance (TXD, SD)		C_{IN}	-	-	5	pF
Output voltage low, RXD	C_{load} = 8 pF, $I_{OLo} \leq$ |+500 µA|	V_{OLo}	-	-	0.4	V
Output voltage high, RXD	I_{OH} = -200 µA	V_{OHi}	0.8 x V_{CC1}	-	V_{CC1}	V

OPTOELECTRONIC CHARACTERISTICS (T_{amb} = 25 °C, V_{CC1} = V_{CC2} = 2.4 V to 5.5 V unless otherwise noted)						
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
RECEIVER						
Minimum irradiance E_e in angular range [2]	9.6 kbit/s to 115.2 kbit/s, λ = 850 nm to 900 nm; α = 0°, 15°	E_e	-	40 (4)	80 (8)	mW/m² (µW/cm²)
Maximum irradiance E_e In Angular Range [3]	λ = 850 nm to 900 nm	E_e	-	5 (500)	-	kW/m² (mW/cm²)
Maximum no detection irradiance [1]	λ = 850 nm to 900 nm, t_r, t_f < 40 ns, t_{po} = 1.6 µs at f = 115 kHz, no output signal allowed	E_e	4 (0.4)	-	-	mW/m² (µW/cm²)
Rise time of output signal	10 % to 90 %, C_L = 8 pF	$t_{r(RXD)}$	10	30	80	ns
Fall time of output signal	90 % to 10 %, C_L = 8 pF	$t_{f(RXD)}$	10	30	80	ns
RXD pulse width of output signal	Input pulse length > 1.2 µs	t_{PW}	1.7	2.2	3	µs
Stochastic jitter, leading edge	Input irradiance = 100 mW/m², ≤ 115.2 kbit/s		-	-	350	ns
Standby/shutdown delay, receiver startup time	After shutdown active or power-on		-	100	500	µs
Latency		t_L	-	50	150	µs
TRANSMITTER (new surface emitter values introduced via PCN OPT-1210-2022)						
IRED operating current limitation	No external resistor for current limitation [4]	I_D	200	300	430	mA
Forward voltage of built-in IRED	I_f = 300 mA	V_f	1.4	1.8	1.9	V
Output leakage IRED current	TXD = 0 V, 0 < V_{CC1} < 5.5 V	I_{IRED}	-1	0.01	1	µA
Output radiant intensity	α = 0°, 15°, TXD = high, SD = low	I_e	50	200	400	mW/sr
	V_{CC1} = 5 V, α = 0°, 15°, TXD = low or SD = high (receiver is inactive as long as SD = high)	I_e	-	-	0.04	mW/sr
Output radiant intensity, angle of half intensity		α	-	± 30	-	°
Peak - emission wavelength [5]		λ_p	870	-	910	nm
Spectral bandwidth		$\Delta\lambda$	-	45	-	nm
Optical rise time, fall time		t_{ropt}, t_{fopt}	10	50	100	ns
Optical output pulse duration	Input pulse width 1.6 < t_{TXD} < 23 µs	t_{opt}	t_{TXD} - 0.15	-	t_{TXD} + 0.15	µs
	Input pulse width t_{TXD} ≥ 23 µs	t_{opt}	23	50	100	µs
Optical overshoot			-	-	25	%

After material changes:

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, V_{CC1} = V_{CC2} = 2.4 V to 5.5 V unless otherwise noted)						
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
TRANSCEIVER						
Supply voltage		V_{CC1}	2.4	-	5.5	V
Operating temperature range		T_{amb}	-25	-	+85	°C
Data rates			9.6	-	115.2	kbit/s
Idle supply current at V_{CC1} (receive mode, no signal)	SD = low, T_{amb} = -25 °C to +85 °C independent of ambient light, V_{CC1} = V_{CC2} = 2.4 V to 5.5 V	I_{CC1}	40	70	110	µA
Average dynamic supply current, transmitting	I_{IRED} = 300 mA, 20 % duty cycle	I_{CC1}	-	0.6	2	mA
Standby (SD) [1] supply current	SD = high, T_{amb} = -25 °C to +85 °C independent of ambient light	I_{SD}	-	0.01	1	µA
RXD to V_{CC1} impedance	SD = high	R_{RXD}	400	500	600	kΩ
Input voltage low (TXD, SD)		V_{ILo}	-0.3	-	0.4	V
Input voltage high (SD)	For compliance with ISD spec.	V_{IHi}	V_{CC1} - 0.3	-	6	V
Input voltage high (TXD)		V_{IHi}	V_{CC1} - 0.5	-	6	V
Timing logic decision level			-	0.5 x V_{CC1}	-	
Input leakage current low	V_{ILo} ≤ 0.3 V	I_{ILo}	-	0.01	10	µA
Input leakage current high	V_{IHi} ≥ V_{CC1} - 0.3 V	I_{IHi}	-	0.01	10	µA
Input capacitance (TXD, SD)		C_{IN}	-	-	5	pF
Output voltage low, RXD	C_{load} = 8 pF, I_{OLo} ≤ |+500 µA|	V_{OLo}	-	-	0.15 x V_{CC1}	V
Output voltage high, RXD	I_{OH} = 200 µA	V_{OHi}	0.8 x V_{CC1}	-	-	V

OPTOELECTRONIC CHARACTERISTICS (T_{amb} = 25 °C, V_{CC1} = V_{CC2} = 2.4 V to 5.5 V unless otherwise noted)						
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RECEIVER						
Minimum irradiance E_e in angular range (2)	9.6 kbit/s to 115.2 kbit/s, λ = 850 nm to 900 nm; α = 0°, 15°	E_e	-	20	50	mW/m²
Maximum irradiance E_e In Angular Range (3)	λ = 850 nm to 900 nm	E_e	2	5	-	kW/m²
Maximum no detection irradiance (1)	λ = 850 nm to 900 nm, t_r, t_f < 40 ns, t_{po} = 1.6 µs at f = 115 kHz, no output signal allowed	E_e	4 (0.4)	-	-	mW/m² (µW/cm²)
Rise time of output signal	10 % to 90 %, C_L = 8 pF	$t_{r(RXD)}$	10	30	80	ns
Fall time of output signal	90 % to 10 %, C_L = 8 pF	$t_{f(RXD)}$	10	30	80	ns
RXD pulse width of output signal	Input pulse length > 1.2 µs	t_{PW}	1.7	2.2	3	µs
Stochastic jitter, leading edge	Input irradiance = 100 mW/m², ≤ 115.2 kbit/s		-	-	350	ns
Standby/shutdown delay, receiver startup time	After shutdown active or power-on		-	100	500	µs
Latency		t_L	-	50	150	µs
TRANSMITTER						
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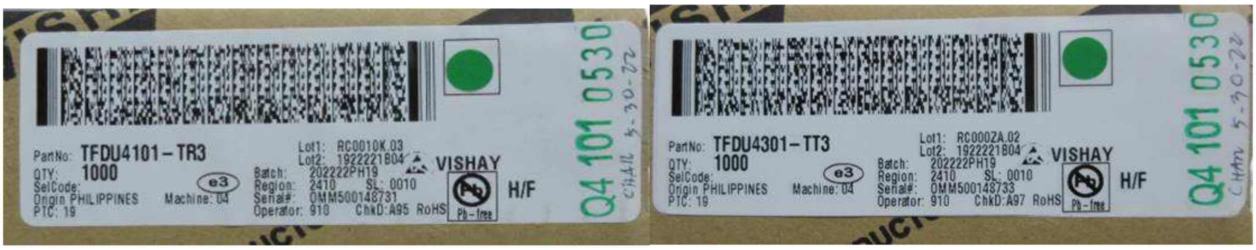
Output leakage IRED current	TXD = 0 V, 0 < V_{CC1} < 5.5 V	I_{IRED}	-1	0.01	1	µA
Output radiant intensity	α = 0°, 15°, TXD = high, SD = low	I_e	50	200	400	mW/sr
	V_{CC1} = 5 V, α = 0°, 15°, TXD = low or SD = high (receiver is inactive as long as SD = high)	I_e	-	-	0.04	mW/sr
Output radiant intensity, angle of half intensity		α	-	± 30	-	°
Peak - emission wavelength (5)		$λ_p$	870	-	910	nm
Spectral bandwidth		Δλ	-	45	-	nm
TRANSMITTER						
Optical rise time, fall time		t_{ropt}, t_{fopt}	10	50	100	ns
Optical output pulse duration	Input pulse width 1.6 < t_{TXD} < 23 µs	t_{opt}	t_{TXD} - 0.15	-	t_{TXD} + 0.15	µs
	Input pulse width t_{TXD} ≥ 23 µs	t_{opt}	23	50	100	µs
Optical overshoot			-	-	25	%

Q: Are datasheets with these new values available?
A: Datasheets of the new TFDU4301 are available on the Vishay´s website: IRDC Transceivers | Vishay . The header of the new datasheet states:
Datasheet Values Refer to PCN-OPT-1234-2022

Q: When do we plan to implement the new materials in production?
A: 01-Jan-2023.

Q: How can the customer distinguish products using existing materials or new materials?
A: The PCN announces a changeover date. This changeover date will be mentioned on the standard bar code labels as shown below (Batch 202222PH19→ produced in ww22 2022). Besides a green Sticker will be added to the box label only for products using new materials.



Q: Why has Vishay introduced these changes?
A: -New IC:
The existing external IC Supplier will end the production. In order to assure a long-term product availability of IRDC products, Vishay developed an inhouse IC in cooperation with the worlds leading Chip Foundry.
-New Emitter Chip:
Changeover to latest Surface Emitting Technology to assure long-term product availability.
-Au wire Diameter reduction:
In order to streamline the production and optimize the material supply chain, Vishay introduces a new Standardization of Au wire Diameter. The material is qualified to high Standards.

Q: Are there any technical advantages of the new materials?
A: Yes. The new generation of Chips offer longer link distance, improved ESD robustness, and a wider operating voltage.

Q: Are samples of the new TFDU4301 Series available?
A: Yes, samples can be ordered by contacting me or our Regional Marketing colleagues.

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