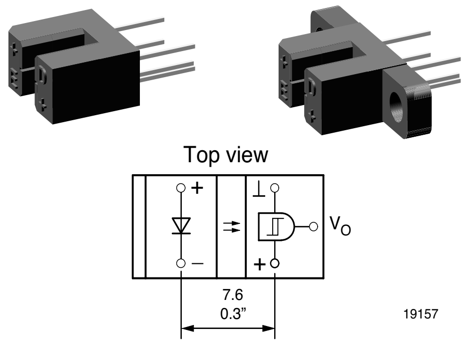
Transmissive Optical Sensor with Schmitt-Trigger Logic Output

Description

The TCSS1100 and TCSS2100 are transmissive sensors which include an infrared emitter and Photo Schmitt-Trigger with digital output interface, located face-to-face on the optical axes, in a leaded package which blocks visible light.

TCSS1100 TCSS2100



Features

- Package type: Leaded
- Detector type: Photo Schmitt-Trigger
- Dimensions TCSS2100:
  L 24.5 mm x W 6 mm x H 10.8 mm
- Dimensions TCSS1100:
  L 11.9 mm x W 6 mm x H 10.8 mm
- Gap: 3.1 mm
- Aperture: 1 mm
- Typical output current under test: I_C = 16 mA
- Output voltage level is LOW, if I_R beam is not interrupted
- Output device TTL compliant, open collector
- Daylight blocking filter
- Emitter wavelength: 950 nm
- Lead (Pb)-free soldering released
- Lead (Pb)-free component in accordance with RoHS 2002/95/EC and WEEE 2002/96/EC
- Minimum order quantity: 1020 pcs, 85 pcs/bulk

Applications

- Detection of opaque material, documents etc.
- Paper position sensor in copy machines
- Position sensor for shaft encoder

Handling Precaution

Connect a capacitor of more than 100 nF between V_{S1} and ground in order to stabilize power supply voltage!

Order Instructions

Part Number	Remarks	Resolution, Aperture	Minimum Order Quantity
TCSS1100	Without mounting flange	0.6 mm, 1 mm	1020 pcs, 85 pcs/tube
TCSS2100	With mounting flange	0.6 mm, 1 mm	1020 pcs, 85 pcs/tube

Absolute Maximum Ratings

Coupler

Parameter	Test condition	Symbol	Value	Unit
Total power dissipation	$T_{amb} \leq 25$ °C	P_{tot}	250	mW
Ambient temperature range		T_{amb}	- 25 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 100	°C
Soldering temperature	Distance to package: 2 mm, t ≤ 5 s	T_{sd}	260	°C

Input (Emitter)

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	6	V
Forward current		I_F	60	mA
Forward surge current	$t_p \leq 10\ \mu s$	I_{FSM}	3	A
Power dissipation	$T_{amb} \leq 25\ °C$	P_V	100	mW
Junction temperature		T_j	100	°C

Output (Detector)

Parameter	Test condition	Symbol	Value	Unit
Supply voltages		V_{S1}	6.5	V
		V_{S2}	18	V
Output current		I_O	20	mA
Power dissipation	$T_{amb} \leq 25\ °C$	P_V	250	mW
Junction temperature		T_j	100	°C

Electrical Characteristics

Coupler

T_{amb} = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Supply current	V_{S1} = 16 V	I_{S1}		3	5	mA
Output current	$V_{S1} = V_{S2}$ = 16 V, I_F = 0	I_{OH}			1	µA
Input threshold current	V_{S1} = 5 V	I_{FT}		5	10	mA
Hysteresis	V_{S1} = 5 V	I_{Foff}/I_{Fon}		80		%
Output voltage	I_{OL} = 16 mA, $I_F \geq I_{TF}$, V_{S1} = 5 V	V_{OL}		0.15	0.4	V
Switching frequency	I_F = 3x I_{FT}, $V_{S1} = V_{S2}$ = 5 V, R_L = 1 kΩ	f_{sw}		200		kHz

Input (Emitter)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	I_F = 50 mA	V_F		1.25	1.6	V
Junction capacitance	V_R = 0, f = 1 MHz	C_j		50		pF

Output (Detector)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Supply voltage range		V_{S1}	4.75		5.25	V
		V_{S2}	4.0		16	V

Switching Characteristics

T_{amb} = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Rise time	$V_{S1} = V_{S2}$ = 5 V, I_F = 3 x I_{FT}, R_L = 1 kΩ (see figure 1)	t_r		50.0		ns
Turn-on time	$V_{S1} = V_{S2}$ = 5 V, I_F = 3 x I_{FT}, R_L = 1 kΩ (see figure 1)	t_{on}		1.0		µs
Fall time	$V_{S1} = V_{S2}$ = 5 V, I_F = 3 x I_{FT}, R_L = 1 kΩ (see figure 1)	t_f		20.0		ns
Turn-off time	$V_{S1} = V_{S2}$ = 5 V, I_F = 3 x I_{FT}, R_L = 1 kΩ (see figure 1)	t_{off}		3.0		µs

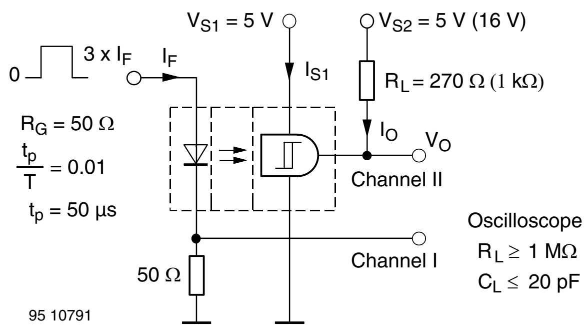


Figure 1. Test circuit for: t_r, t_{on}, t_f, t_{off}

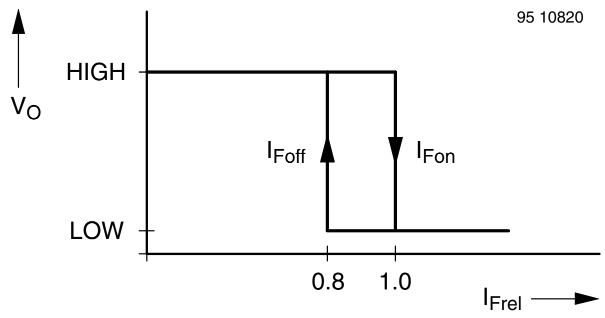


Figure 3. Hysteresis

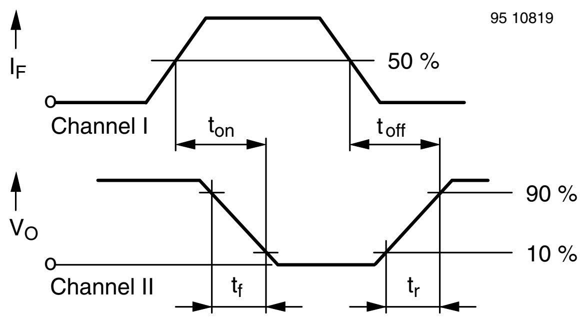


Figure 2. Pulse Diagram

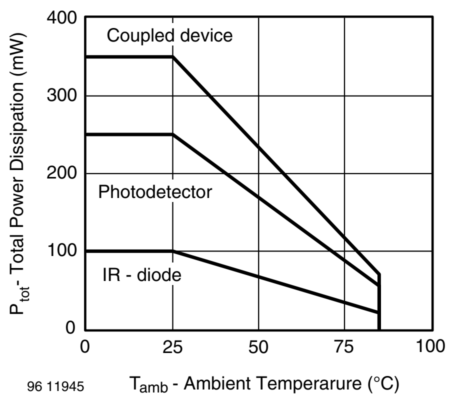


Figure 4. Power Dissipation Limit vs. Ambient Temperature

Typical Characteristics

T_{amb} = 25 °C, unless otherwise specified

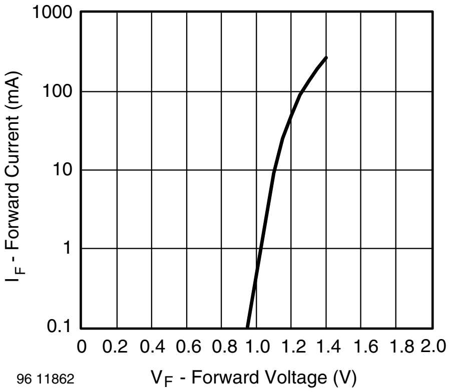


Figure 5. Forward Current vs. Forward Voltage

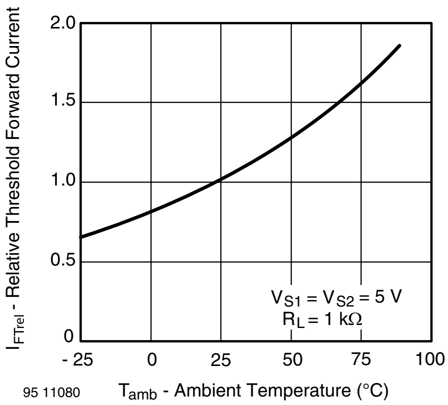


Figure 6. Relative Threshold Forward Current vs. Ambient Temperature

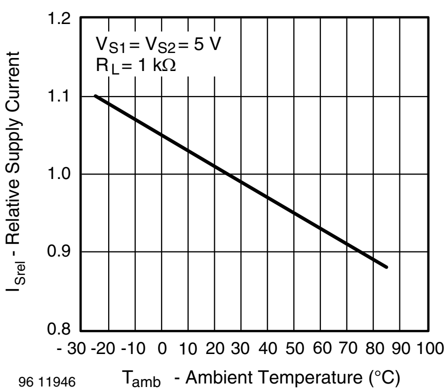


Figure 7. Rel. Supply Current vs. Ambient Temperature

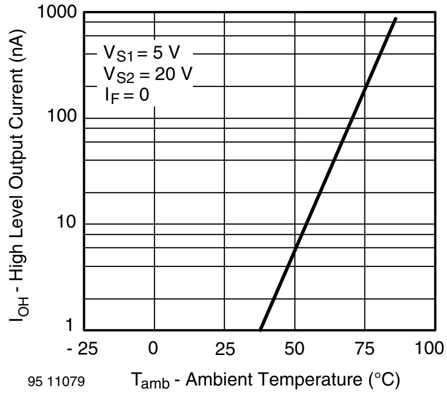
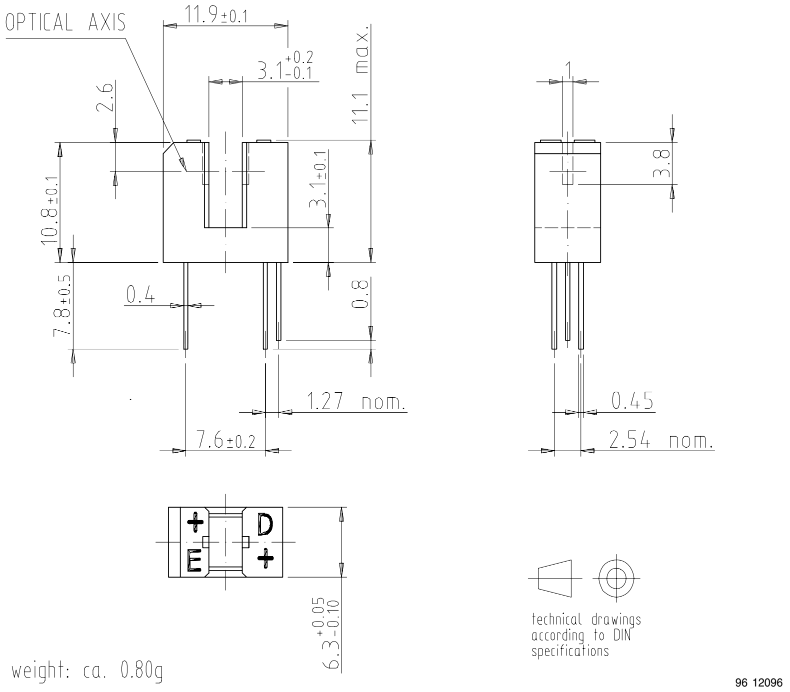
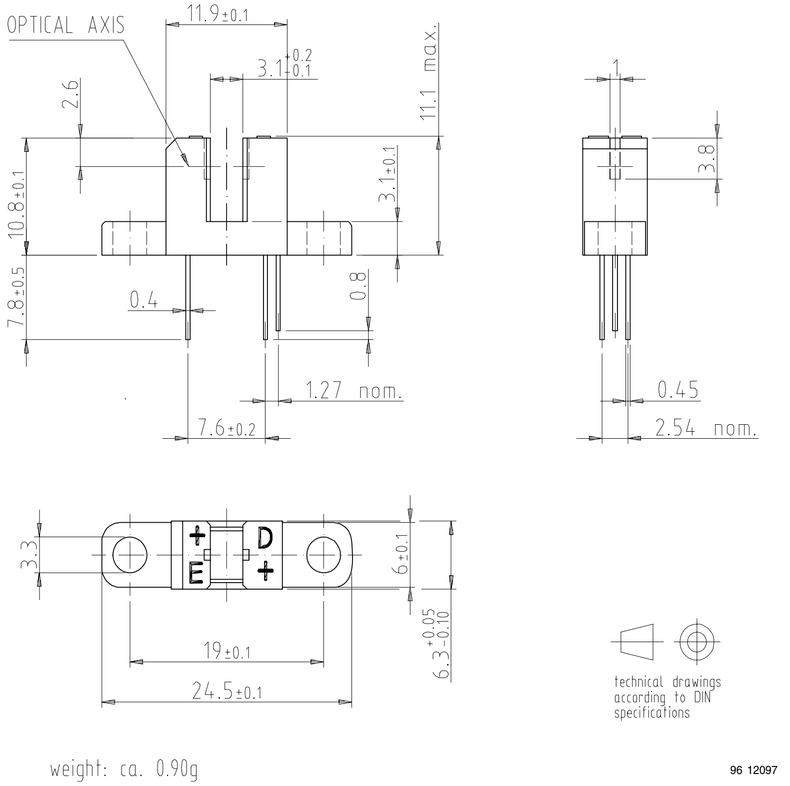


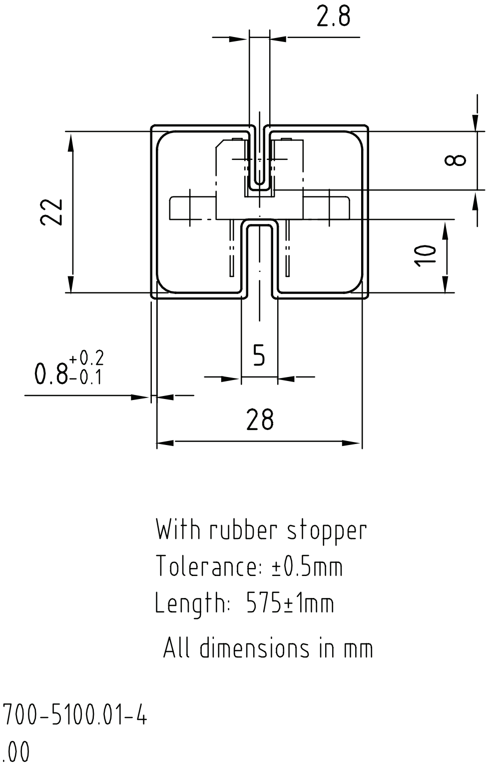
Figure 8. High Level Output Current vs. Ambient Temperature

Package Dimensions in mm





Tube Dimensions



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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 operating systems 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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