

ODIN Enhanced MIT401+

Fiber Optic Transmitter for MOST[®]

AIM



Never stop thinking.

Previous Version:

Page	Subjects (major changes since last revision)

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Information

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Safety Hints:

Applications of new chip technologies lead to increasing optical efficiency and growing and higher levels of optical performance. We therefore recommend that the current versions of the IEC 60825-1 and EN 60825-1 standards are taken into account right from the outset, i.e. at the equipment development stage, and that suitable protection facilities are provided.

Features

Excellent solution for converting high speed data from TTL to Plastic Optical Fiber (POF)

- High speed transmitter up to 25 Mbit/s net data rate (50 MBaud)
- 95°C operating temperature over whole life time
- TTL Data Input (Logic to Light Function)
- Operating @ 5.0V Power Supply
- Power down mode
- Duty Cycle Adjust (DCA), yields to enhanced SP1 input range
- 650 nm for working in a low attenuation range of PMMA Fiber
- High coupled power in 1000 micron plastic fiber
- Qualified after “Automotive Application Recommendation for optical MOST[®] Interfaces”
- Fully compliant to “MOST[®] Specification of Physical Layer Rev 1.1”
- RoHS compliant (Lead free and halogen free)

Applications

- Optical Transmitter for MOST Systems

Description

The 4-pin MOST Optical Transmitter (ODIN Enhanced MIT401+) is a highly integrated CMOS IC combined with a high speed LED designed to transmit up to 25 Mbit/s optical data which is biphase coded (up to 50 Mbaud). The internal peaking circuit minimizes PWD. The current through the LED will be setup by an external resistor connected to V_{CC} . This makes it possible to control the optical output power of the LED. The power supply voltage is 5.0V. The power down mode switches the part into a low power mode if electrical data is not received.

Table 1 Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit
		min.	max.	
Supply Voltage	V_{CCMax}	-0.5	6.0	V
Storage Temperature Range	T_{STG}	-40	100	°C
Soldering Temperature (>2.5 mm from case bottom $t \leq 10s$)	T_S	–	260	°C
Voltage at any PIN		-0.5	$V_{CC} + 0.5$	V
Electrostatic Discharge Voltage Capability ¹⁾	<i>ESD</i>	–	2.0	kV

¹⁾ ESD Capability for all Pins HBM (human body model) according JESD22-A114B.

Attention: *Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

Table 2 Recommended Operating Conditions

Parameter	Symbol	Limit Values		Unit
		min.	max.	
Supply Voltage high	V_{CC_h}	4.75	5.25	V
Operating Temperature Range (ambient) ¹⁾	T_A	-40	95	°C

¹⁾ For details see application note “Handling, Storage, Operating and Processing Application Note of ODIN MOST4 Transceiver”

All the data in this specification refers to the operating conditions above and over life time unless otherwise stated.

Optical Signal Characteristics

(22.5 Mbit MOST Data, $V_{CC} = 4.75 \dots 5.25$ V, $R_{ext} = 15$ kOhm)

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Peak wavelength	λ_{Peak}	630	650	685	nm
Temperature coefficient λ_{Peak}	TC_{λ}	–	0.16	–	nm/K
Spectral bandwidth (FWHM)	Delta λ	–	20	30	nm
Average Output Power coupled into plastic fiber ¹⁾	P_{opt}	-9.0	-5.2	-2.0	dBm
Average Output Power coupled into plastic fiber (if $R_{ext} = 13.5k$ is used instead of $R_{ext} = 15k$) ¹⁾	P_{opt}	-8.5	-4.7	-1.5	dBm
Optical Output Power “Light off” ²⁾	P_{off}	–		-50	dBm

Optical Signal Characteristics (cont'd)

 (22.5 Mbit MOST Data, $V_{CC} = 4.75 \dots 5.25 \text{ V}$, $R_{ext} = 15 \text{ kOhm}$)

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Optical Rise Time (20% - 80%) ⁴⁾	t_r	–	2.5	6	ns
Optical Fall Time (20% - 80%) ⁴⁾	t_f	–	3.5	6	ns
Extinction Ratio	r_e	10	12	–	dB
Pulse Width Variation ^{3) 4)}	t_{PWV}	20.0	–	24.3	ns
Average Pulse Width Distortion ^{3) 4)}	t_{APWD}	-1.4	–	1.4	ns
Data Dependent Link Jitter ^{3) 4)}	t_{DDJ}	–	0.2	0.77	ns
Uncorrelated Link Jitter ^{3) 4)}	t_{UJ}	–	0.05	0.33	ns
Positive Overshoot within 0UI..2/3UI		-20	–	40	%
Negative Overshoot within -1UI..-1/4UI		-10	–	20	%
High Level Signal Ripple between 2/3UI and 3/4U		-10	–	10	%

- 1) Average value, when transmitting modulated light @ signal timing paramters. The output power coupled into plastic fiber P_{opt} is measured with a large area detector at the end of 30 cm POF fiber with a NA = 0.5, which is ideally coupled to the transmitter.
- 2) Average value, when signal on Tx_Data is low.
- 3) The electrical input signal has to fulfill following requirements: $t_{PWV(min)} = 20.1 \text{ ns}$, $t_{PWV(max)} = 24.1 \text{ ns}$, $t_{APWD(min)} = -1.5 \text{ ns}$ and $t_{APWD(max)} = 1.5 \text{ ns}$, $t_{DDJ(max)} = 0.22 \text{ ns}$, $t_{UJ(max)} = 0.10 \text{ ns}$.
- 4) Characterized with Infineon Characterization Boards as described in the Application note “Application Note MOST circuit for Infineon ODIN Transceiver“

Table 3 DC Characteristics

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Low Level Input Voltage	V_{IL}	-0.3	–	0.8	V
High Level Input Voltage	V_{IH}	2.0	–	$V_{CC} + 0.3$	V
Input Leakage Current ($V_{CC} = 5.0\text{ V}$, $V_I = 0.0\text{ V}$ or $V_I = 5.0\text{ V}$)	I_L	–	–	± 20	μA
Input Capacitance	C_I	–	–	7	pF
Input Resistance	R_I	2	–	–	k Ω
Supply Current ($R_{ext} = 15\text{ k}\Omega$) ON state, biphase coded data ¹⁾	I_{CC}	–	25	35	mA
Supply Current ($R_{ext} = 15\text{ k}\Omega$) OFF state ²⁾	I_{LP2}	–	7	20	μA

1) The current through the LED and therefore the optical output power and overall power consumption depends on the settings of R_{ext} . The nominal value for R_{ext} is 15 k Ω . With $R_{ext} = 30\text{ k}\Omega$ the optical output power is about -3 dB of the nominal value. Typical behavior see Figure 1.

Important: The external resistor of R_{ext} must be within the range of 13.5 k Ω to 33 k Ω . For values of R_{ext} out of this range functionality may not be given over the whole temperature range and the device lifetime. Using values below 13 k Ω for R_{ext} can damage the transmitter.

2) If the transmitter is in full power mode it is switched OFF 1 ms (max.) after TX DATA is low. If the transmitter is in low power mode it is switched ON 6 ms (max.) after TX DATA transmission starts.

Table 4 AC Electrical Characteristics

Parameter	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Power Up Time	T_{PU}	–	0.01	6.0	ms	Zero → MOST Data
Power Down Time	T_{PD}	–	0.01	1.0	ms	MOST Data → Zero

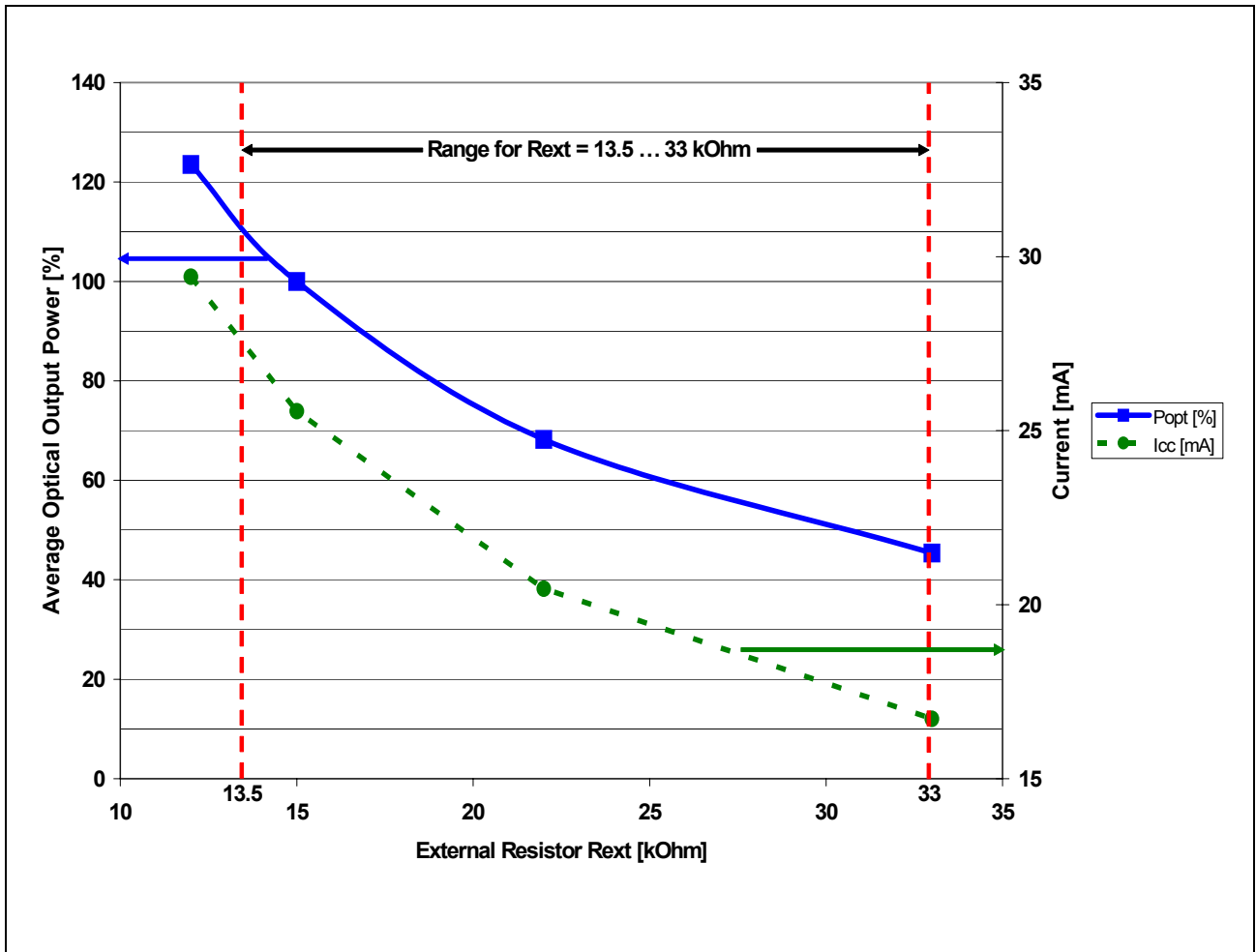
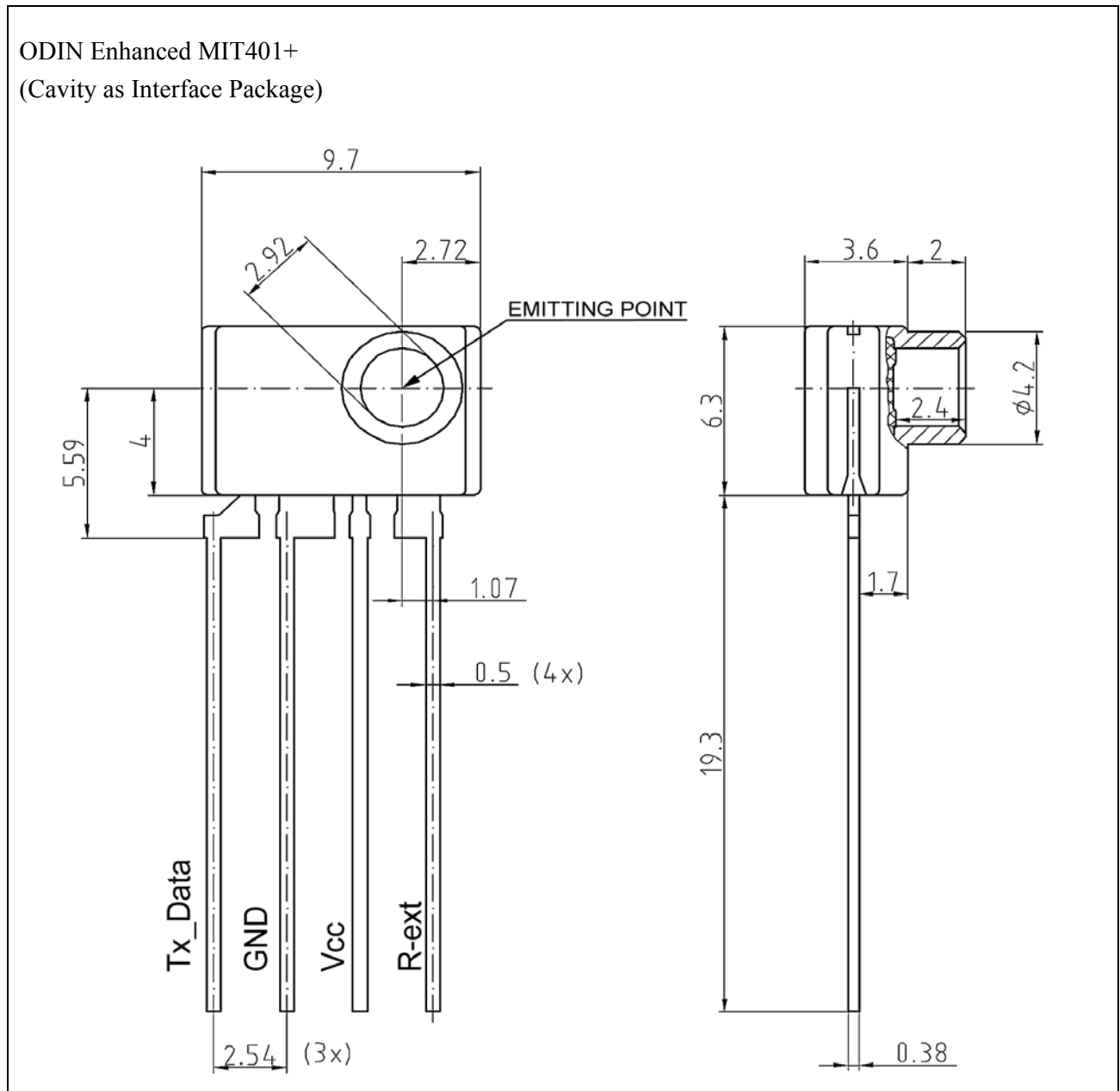


Figure 1 Typical Dependency of Average Optical Output Power P_{opt} and Supply Current versus External Resistor R_{ext} (22.5 Mbit MOST Data, $V_{CC} = 5.0$ V, $T_A = 25$ °C)

Package Outlines



For a more detailed drawing please contact the Infineon Technologies offices in Germany or the Infineon Technologies companies and representatives worldwide.

Dimensions in mm

Notes: