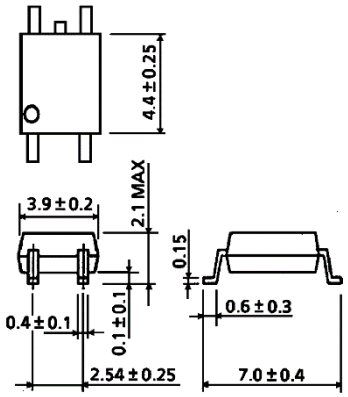
TOSHIBA Photocoupler IRED & Photo-MOSFET

TLP176D

Modem · Fax Card
PBX
Telecommunication

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	11-5H1

Weight: 0.1 g (typ.)

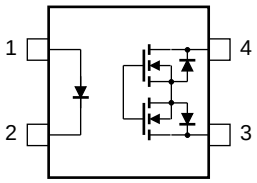
The TOSHIBA TLP176D consists of an infrared emitting diode optically coupled to a photo-MOSFET in a SOP, which is suitable for surface mount assembly.

The TLP176D is suitable for modem and PBX applications which require space savings.

- SOP 4 pin (2.54SOP4): 1-form-A
- Peak off-state voltage: 200 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 200 mA (max)
- On-state resistance: 8 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A
  File No.E67349
- VDE-approved: EN 60747-5-5 (Note 1)

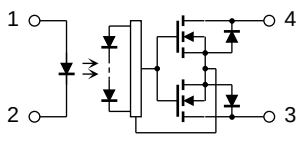
Note 1: When a VDE approved type is needed,
please designate the **Option(V4)**.

Pin Configuration (top view)



1: Anode
2: Cathode
3: Drain
4: Drain

Internal Circuit



Start of commercial production
1998-03

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
LED	Forward current	I_F	50	mA
	Forward current derating (Ta ≥ 25°C)	ΔI_F/°C	−0.5	mA/°C
	Pulse forward current (100 μs pulse, 100 pps)	I_{FP}	1	A
	Reverse voltage	V_R	5	V
	Diode power dissipation	P_D	50	mW
	Diode power dissipation derating (Ta ≥25°C)	ΔP_D /°C	-0.5	mW/°C
	Junction temperature	T_j	125	°C
Detector	Off-state output terminal voltage	V_{OFF}	200	V
	On-state current	I_{ON}	200	mA
	On-state RMS current derating (Ta ≥ 25°C)	ΔI_{ON}/°C	−2.0	mA/°C
	Output power dissipation	P_O	180	mW
	Output power dissipation derating (Ta ≥ 25°C)	ΔP_O / °C	−1.8	mW / °C
	Junction temperature	T_j	125	°C
Storage temperature range		T_{stg}	−55 to 125	°C
Operating temperature range		T_{opr}	−40 to 85	°C
Lead soldering temperature (10 s)		T_{sol}	260	°C
Isolation voltage (AC, 60 s, R.H. ≤ 60 %) (Note1)		BV_S	1500	Vrms

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note1: Device considered a two-terminal device: pins1 and 2 shorted together and pins 3 and 4 shorted together.

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{DD}	—	150	200	V
Forward current	I_F	5	7.5	25	mA
On-state current	I_{ON}	—	—	130	mA
Operating temperature	T_{opr}	−20	—	65	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

Individual Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	I_F = 10 mA	1.0	1.15	1.3	V
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance between terminals	C_T	V_F = 0 V, f = 1 MHz	—	30	—	pF
Detector	Off-state current	I_{OFF}	V_{OFF} = 200 V	—	—	1	μA
	Capacitance between terminals	C_{OFF}	V = 0 V, f = 1 MHz	—	100	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}	I_{ON} = 200 mA	—	1	3	mA
On-state resistance	R_{ON}	I_{ON} = 200 mA, I_F = 5 mA	—	5	8	Ω
Return LED current	I_{FC}	I_{OFF} = 100 μA	0.1	—	—	mA

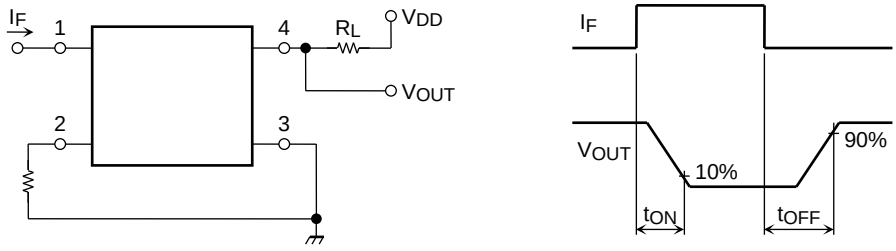
Isolation Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≤ 60 %	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 60 s	1500	—	—	Vrms

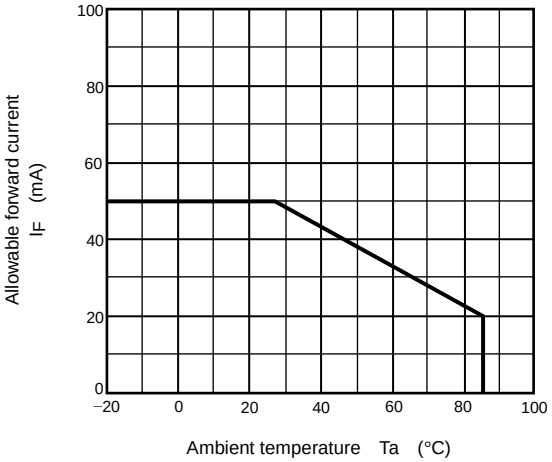
Switching Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}	R_L = 200 Ω (Note) V_{DD} = 20 V, I_F = 5 mA	—	0.6	1.5	ms
Turn-off time	t_{OFF}	R_L = 200 Ω (Note) V_{DD} = 20 V, I_F = 5 mA	—	0.1	1.0	ms

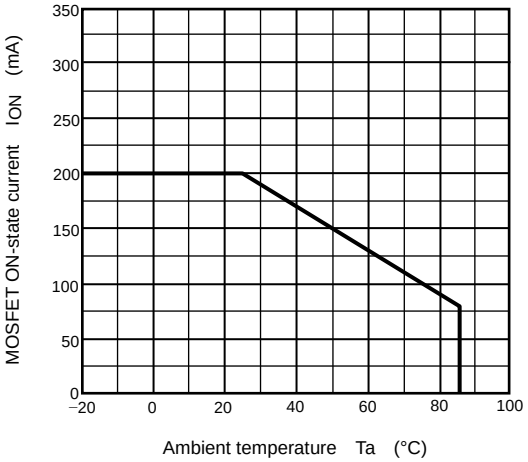
Note: Switching time test circuit



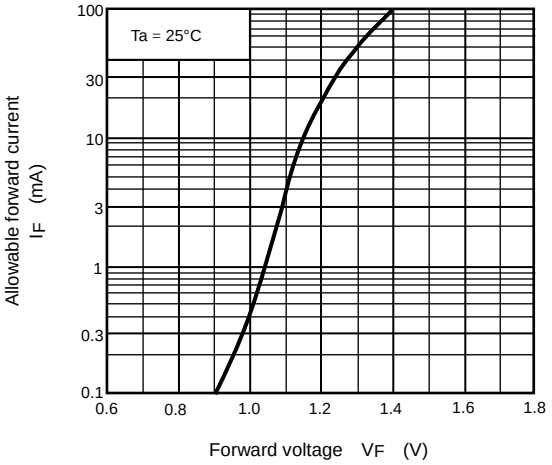
I_F – Ta



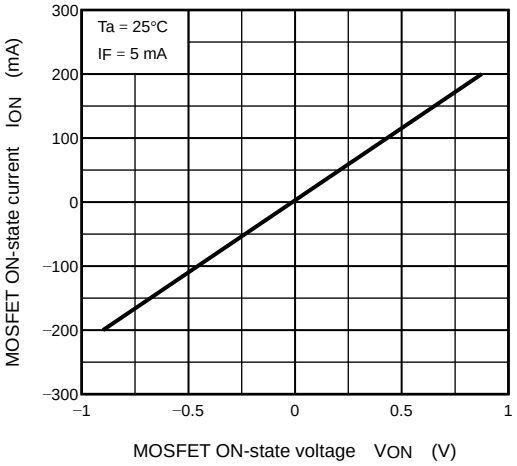
I_{ON} – Ta



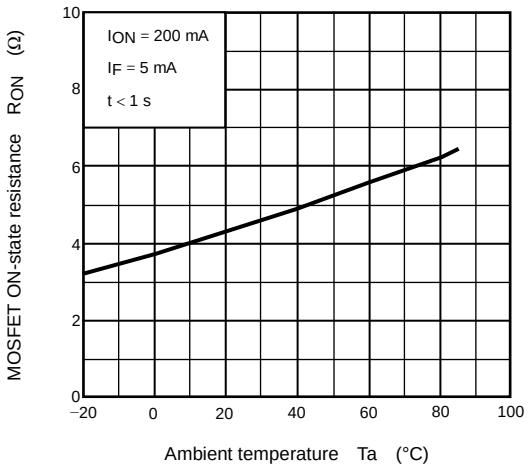
I_F – V_F



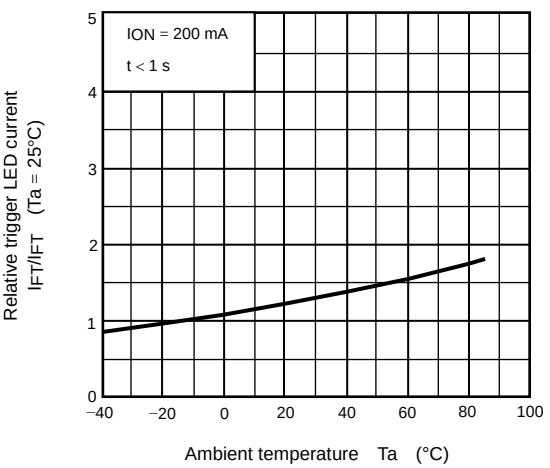
I_{ON} – V_{ON}



R_{ON} – Ta

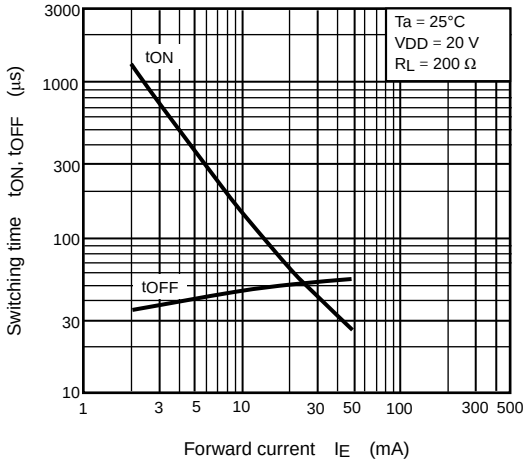


I_{FT} – Ta

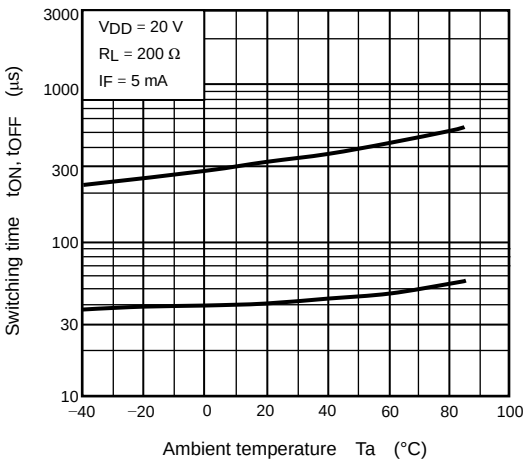


NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

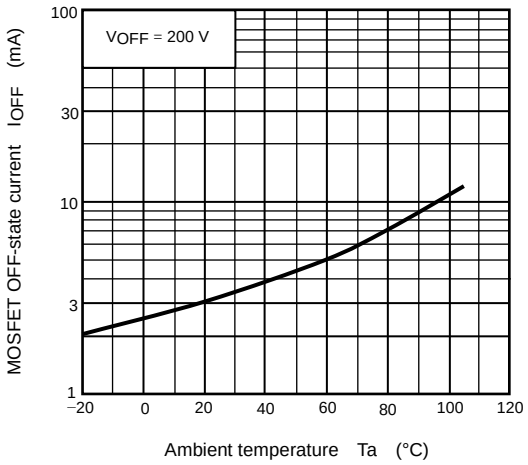
t_{ON}, t_{OFF} – I_F



t_{ON}, t_{OFF} – Ta



I_{OFF} – Ta



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