

LAMPIRAN

E50S Series

Diameter ø50mm Shaft type Incremental Rotary Encoder

Line-up

Features

- 12-24VDC power supply of line driver output(Line-up)
- Suitable for measuring angle, position, revolution, speed, acceleration and distance
- Power supply : 5VDC, 12-24VDC ±5%

Applications

- Various tooling machinery, packing machine and general industrial machinery etc.



⚠ Please read "Caution for your safety" in operation manual before using.



Ordering information (Former name : ENB)

E50S	8	8000	3	N	24	
Series	Shaft diameter	Pulse/1Revolution	Output phase	Output	Power supply	Cable
Diameter ø50mm, shaft type	ø8mm	Refer to resolution	2: A, B 3: A, B, Z 4: A, Ā, B, B̄ 6: A, Ā, B, B̄, Z, Z̄	T: Totem pole output N: NPN open collector output V: Voltage output L: Line driver output	5 :5VDC ±5% 24:12-24VDC ±5%	No mark: Cable type C: Connector cable type(X) CR: Axial connector type CS: Radial connector type

X Standard : E50S8 (Pulse) 3-N-24

X Cable length : 250mm

Specifications

Item	Diameter ø50mm shaft type of incremental rotary encoder			
Resolution(P/R) ¹⁾	*1, *2, *5, 10, 12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 5000, 6000, 8000			
Output phase	A, B, Z phase(Line driver : A, Ā, B, B̄, Z, Z̄ phase)			
Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)			
Electrical specification	Control output	Totem pole output	• Low - Load current: Max. 30mA, Residual voltage : Max. 0.4VDC • High - Load current: Max. 10mA, Output voltage(Power voltage 5VDC) : Min. (Power voltage-2.0)VDC, Output voltage(Power voltage 12-24VDC) : Min. (Power voltage-3.0)VDC	
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC	
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC	
		Line driver output	• Low - Load current : Max. 20mA, Residual : Max. 0.5VDC • High - Load current : Max. -20mA, Output voltage(Power voltage 5VDC) : Min. 2.5VDC, Output voltage(Power voltage 12-24VDC) : Min. (Power voltage-3.0)VDC	
Electrical specification	Response time (Rise/Fall)	Totem pole output	• Measuring condition - Cable length : 2m, I sink = 20mA	
		NPN open collector output		Max. 1µs
		Voltage output		Max. 0.6µs
		Line driver output		
Electrical specification	Max. Response frequency	30kHz		
Electrical specification	Power supply	• 5VDC ±5%(Ripple P-P : Max. 5%) • 12-24VDC ±5%(Ripple P-P : Max. 5%)		
Electrical specification	Current consumption	Max. 80mA(disconnection of the load), Line driver output : Max. 50mA(disconnection of the load)		
Electrical specification	Insulation resistance	Min. 100MΩ(at 500VDC megger between all terminals and case)		
Electrical specification	Dielectric strength	750VAC 50/60Hz for 1 minute(Between all terminals and case)		
Electrical specification	Connection	Cable type, 250mm connector cable type, Connector type(Axial, Radial)		
Mechanical specification	Starting torque	Max. 70gf·cm(0.007N·m) ²⁾ / Max. 800gf·cm(0.08N·m) ³⁾		
	Moment of inertia	Max. 80g·cm ² (8×10 ⁻⁵ kg·m ²) ²⁾ / Max. 400g·cm ² (4×10 ⁻⁵ kg·m ²) ³⁾		
	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf		
	Max. allowable revolution ⁴⁾	5000rpm		
Mechanical specification	Vibration	1.5mm amplitude or 300m/s ² at frequency of 10 to 55Hz(for 1 min.) in each of X, Y, Z directions for 2 hours		
Mechanical specification	Shock	Approx. Max. 75G		
Environment	Ambient temperature	-10 to 70°C, storage : -25 to 85°C		
	Ambient humidity	35 to 85%RH, storage : 35 to 90%RH		
Protection	Cable type, Connector cable type: IP60(IEC standard) ⁵⁾ , Connector type: IP65(IEC standard)			
Cable	ø5, 5-wire, Length : 2m, Shield cable(Line driver output : ø5, 8-wire) (AWG 24, Core diameter : 0.08mm, Number of cores : 40, Insulator out diameter : ø1)			
Accessory	ø8mm coupling, bracket			
Approval	Cable type (Except for line driver output)			
Unit weight	Approx. 275g, Connector type : 180g			

TLP250

Transistor Inverter
 Inverter For Air Conditioner
 IGBT Gate Drive
 Power MOS FET Gate Drive

The TOSHIBA TLP250 consists of a GaAlAs light emitting diode and a integrated photodetector.
 This unit is 8-lead DIP package.
 TLP250 is suitable for gate driving circuit of IGBT or power MOS FET.

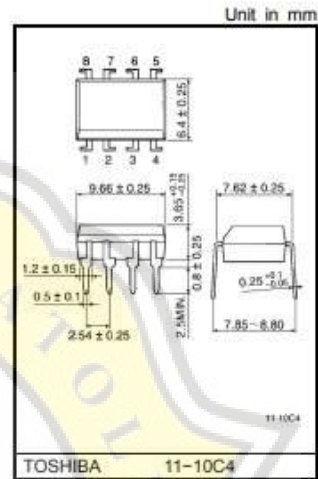
- Input threshold current: $I_F=5\text{mA}(\text{max.})$
- Supply current (I_{CC}): $11\text{mA}(\text{max.})$
- Supply voltage (V_{CC}): 10-35V
- Output current (I_O): $\pm 1.5\text{A}(\text{max.})$
- Switching time (t_{pLH}/t_{pHL}): $0.5\mu\text{s}(\text{max.})$
- Isolation voltage: $2500V_{\text{rms}}(\text{min.})$
- UL recognized: UL1577, file No.E67349
- Option(D4)

VDE Approved : DIN EN60747-5-2
 Maximum Operating Insulation Voltage : $890V_{\text{PK}}$
 Highest Permissible Over Voltage : $4000V_{\text{PK}}$

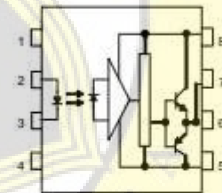
(Note):When a EN60747-5-2 approved type is needed,
 Please designate "Option(D4)"

Truth Table

Input LED	On	Off	Tr1	Tr2
	On	Off	On	Off
	Off	On	Off	On

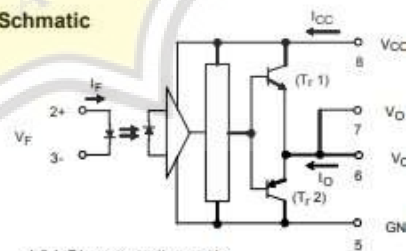


Pin Configuration (top view)



- 1 : N.C.
- 2 : Anode
- 3 : Cathode
- 4 : N.C.
- 5 : GND
- 6 : V_O (Output)
- 7 : V_O
- 8 : V_{CC}

Schematic



A 0.1 μF bypass capacitor must be connected between pin 8 and 5 (See Note 5).

This chapter describes the electrical and switching characteristics for Cyclone® IV devices. Electrical characteristics include operating conditions and power consumption. Switching characteristics include transceiver specifications, core, and periphery performance. This chapter also describes I/O timing, including programmable I/O element (IOE) delay and programmable output buffer delay.

This chapter includes the following sections:

- “Operating Conditions” on page 1-1
- “Power Consumption” on page 1-16
- “Switching Characteristics” on page 1-16
- “I/O Timing” on page 1-37
- “Glossary” on page 1-37

Operating Conditions

When Cyclone IV devices are implemented in a system, they are rated according to a set of defined parameters. To maintain the highest possible performance and reliability of Cyclone IV devices, you must consider the operating requirements described in this chapter.

Cyclone IV devices are offered in commercial, industrial, extended industrial and, automotive grades. Cyclone IV E devices offer -6 (fastest), -7, -8, -8L, and -9L speed grades for commercial devices, -8L speed grades for industrial devices, and -7 speed grade for extended industrial and automotive devices. Cyclone IV GX devices offer -6 (fastest), -7, and -8 speed grades for commercial devices and -7 speed grade for industrial devices.

For more information about the supported speed grades for respective Cyclone IV devices, refer to the *Cyclone IV FPGA Device Family Overview* chapter.

Cyclone IV E devices are offered in core voltages of 1.0 and 1.2 V. Cyclone IV E devices with a core voltage of 1.0 V have an ‘L’ prefix attached to the speed grade.

In this chapter, a prefix associated with the operating temperature range is attached to the speed grades; commercial with a ‘C’ prefix, industrial with an ‘I’ prefix, and automotive with an ‘A’ prefix. Therefore, commercial devices are indicated as C6, C7, C8, C8L, or C9L per respective speed grade. Industrial devices are indicated as I7, I8, or I8L. Automotive devices are indicated as A7.

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Current Transducer HX 03..50-P/SP2

$$I_{PN} = 3 \dots 50 \text{ A}$$

For the electronic measurement of currents: DC, AC, pulsed, mixed, with a galvanic isolation between the primary circuit (high power) and the secondary circuit (electronic circuit).



Electrical data

Primary nominal current rms I_{PN} (A)	Primary current measuring range ¹⁾ I_{PM} (A)	Primary conductor diameter x turns (mm)	Type	RoHS since date code
3	± 9	0.6d x 20T	HX 03-P/SP2	46128
5	± 15	0.8d x 12T	HX 05-P/SP2	46019
10	± 30	1.1d x 6T	HX 10-P/SP2	45352
15	± 45	1.4d x 4T	HX 15-P/SP2	46133
20	± 60	1.6d x 3T	HX 20-P/SP2	planned
25	± 75	1.6d x 2T	HX 25-P/SP2	46233
50	± 150	1.2 x 6.3 x 1T	HX 50-P/SP2	46152

V_{OUT}	Output voltage (Analog) @ $\pm I_{PM}$, $R_L = 2 \text{ k}\Omega$, $T_A = 25^\circ\text{C}$	$V_{DE} \pm 0.625$	V
R_{OUT}	Output internal resistance	< 50	Ω
R_L	Load resistance	≥ 2	k Ω
V_C	Supply voltage ($\pm 5\%$)	+ 12 .. 15	V
I_C	Current consumption	< 15	mA
V_{AC}	Rms voltage for AC isolation test, 50 Hz, 1 min	> 3	kV
V_{PD}	Partial discharge extinction voltage rms @ 10 pC	≥ 1	kV
V_{WI}	Impulse withstand voltage, 1.2/50 μs	≥ 6	kV

Accuracy-Dynamic performance data

X	Accuracy @ I_{PM} , $T_A = 25^\circ\text{C}$ (excluding offset)	$< \pm 1$	% of I_{PN}
ϵ_L	Linearity error ($0 \dots \pm I_{PN}$)	$< \pm 1$	% of I_{PN}
V_{OE}	Electrical offset voltage @ $T_A = 25^\circ\text{C}$	$+ 2.5V \pm 50$	mV
V_{OH}	Hysteresis offset voltage @ $I_P = 0$: after an excursion of $1 \times I_{PN}$	$< \pm 10$	mV
TCV _{OE}	Temperature coefficient of V_{OE}	$< \pm 1.5$	mV/K
TCV _{OUT}	Temperature coefficient of V_{OUT} (% of reading)	± 0.1	%/K
t_r	Response time to 90% of I_{PN} step	≤ 3	μs
BW	Frequency bandwidth (-3 dB) ²⁾	50	kHz

General data

T_A	Ambient operating temperature	-25 .. +85	$^\circ\text{C}$
T_S	Ambient storage temperature	-25 .. +85	$^\circ\text{C}$
m	Mass	8	g
dCp	Creepage distance	≥ 5.5	mm
	Isolation material group	I	
	Standards	EN50178: 1997	

Features

- Galvanic isolation between primary and secondary circuit
- Hall effect measuring principle
- Isolation voltage 3000V
- Low power consumption
- Extended measuring range ($3 \times I_{PN}$)
- Isolated plastic case recognized according to UL94-V0.

Special feature

- Single supply from +12V to +15V

Advantages

- Low insertion losses
- Easy to mount with automatic handling system
- Small size and space saving
- Only one design for wide current ratings range
- High immunity to external interference.

Applications

- Switched Mode Power Supplies (SMPS)
- AC variable speed drives
- Uninterruptible Power Supplies (UPS)
- Electrical appliances
- Battery supplied applications
- DC motor drives

Application domain

- Industrial

Notes : ¹⁾ With $R_L = 2 \text{ k}\Omega$

²⁾ Small signal only to avoid excessive heating of the magnetic core

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