LAMPIRAN

MICROCHIP

dsPIC33EPXXX(GP/MC/MU)806/810/814 and PIC24EPXXX(GP/GU)810/814

16-Bit Microcontrollers and Digital Signal Controllers with High-Speed PWM, USB and Advanced Analog

Operating Conditions

- 3.0V to 3.6V, -40°C to +125°C, DC to 60 MIPS
- 3.0V to 3.6V, -40°C to +85°C, DC to 70 MIPS

Core: 16-Bit dsPIC33E/PIC24E CPU

- Code-Efficient (C and Assembly) architecture
- Two 40-Bit Wide Accumulators
- Single-Cycle (MAC/MPY) with Dual Data Fetch
- Single-Cycle Mixed-Sign MUL Plus Hardware Divide
- 32-Bit Multiply Support

Clock Management

- 2% Internal Oscillator
- Programmable PLLs and Oscillator Clock Sources
- Fail-Safe Clock Monitor (FSCM)
- Independent Watchdog Timer
- Fast Wake-up and Start-up

Power Management

- Low-Power Management modes (Sleep, Idle, Doze)
- Integrated Power-on Reset and Brown-out Reset
- 1.0 mA/MHz Dynamic Current (typical)
- 60 µA IPD Current (typical)

High-Speed PWM

- Up to Seven PWM Pairs with Independent Timing
- Dead Time for Rising and Falling Edges
- 8.32 ns PWM Resolution
- PWM Support for:
  - DC/DC, AC/DC, Inverters, PFC, Lighting
  - BLDC, PMSM, ACIM, SRM
- Programmable Fault Inputs
- Flexible Trigger Configurations for ADC Conversions

Advanced Analog Features

- Two Independent ADC modules:
  - One ADC configurable as 10-bit, 1.1 Msps with four S&H or 12-bit, 500 ksps with one S&H
  - One 10-bit ADC, 1.1 Msps with four S&H
  - Eight S&H using both ADC 10-bit modules
  - 24 analog channels (64-pin devices) up to 32 analog channels (100/121/144-pin devices)
- Flexible and Independent ADC Trigger Sources
- Comparators:
  - Up to three Analog Comparator modules
  - Programmable references with 32 voltage points

Timers/Output Compare/Input Capture

- 27 General Purpose Timers:
  - Nine 16-bit and up to four 32-bit Timers/Counters
  - 16 OC modules configurable as Timers/Counters
  - Two 32-bit Quadrature Encoder Interface (QEI) modules configurable as Timers/Counters
- 16 IC modules
- Peripheral Pin Select (PPS) to allow Function Remap
- Real-Time Clock and Calendar (RTCC) module

Communication Interfaces

- USB 2.0 OTG-Compliant Full-Speed Interface
- Four UART modules (15 Mbps)
  - Supports LIN/J2602 protocols and IrDA®
- Four 4-Wire SPI modules (15 Mbps)
- Two ECAN™ modules (1 Mbaud) CAN 2.0B Support
- Two I^2C modules (up to 1 Mbaud) with SMBus Support
- Data Converter Interface (DCI) module with Support for I^2S and Audio Codecs
- PPS to allow Function Remap
- Parallel Master Port (PMP)
- Programmable Cyclic Redundancy Check (CRC)

Direct Memory Access (DMA)

- 15-Channel DMA with User-Selectable Priority Arbitration
- UART, USB, SPI, ADC, ECAN™, IC, OC, Timers, DCI/I^2S, PMP

Input/Output

- Sink/Source 10 mA on All Pins
- 5V Tolerant Pins
- Selectable Open-Drain, Pull-ups and Pull-Downs
- Up to 5 mA Overvoltage Clamp Current
- External Interrupts on All I/O pins

Qualification and Class B Support

- AEC-Q100 REVG (Grade 1 -40°C to +125°C) Planned
- AEC-Q100 REVG (Grade 0 -40°C to +150°C) Planned
- Class B Safety Library, IEC 60730

Debugger Development Support

- In-Circuit and In-Application Programming
- Five Program and Three Complex Data Breakpoints
- IEEE 1149.2 Compatible (JTAG) Boundary Scan
- Trace and Run-Time Watch

TOSHIBA Photocoupler GaAlAs Ired & Photo-IC

TLP250

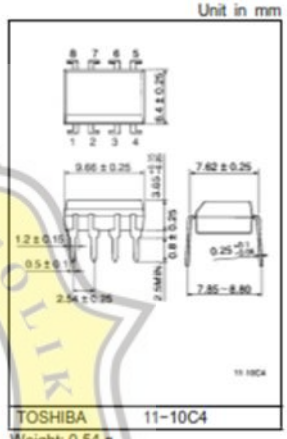
Transistor Inverter
Inverter For Air Conditionor
IGBT Gate Drive
Power MOS FET Gate Drive

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=5mA(max.)
- Supply current (I_{CC}): 11mA(max.)
- Supply voltage (V_{CC}): 10~35V
- Output current (I_O): ±1.5A (max.)
- Switching time (t_{pLH}/t_{pHL}): 1.5μs(max.)
- Isolation voltage: 2500V_{rms}(min.)
- UL recognized: UL1577, file No.E67349
- Option (D4) type
  VDE approved: DIN VDE0884/06.92,certificate No.76823
  Maximum operating insulation voltage: 630V_{PK}
  Highest permissible over voltage: 4000V_{PK}

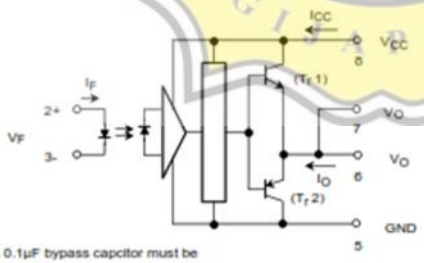
  (Note) When a VDE0884 approved type is needed, please designate the "option (D4)"
- Creepage distance: 6.4mm(min.)
  Clearance: 6.4mm(min.)

Unit in mm



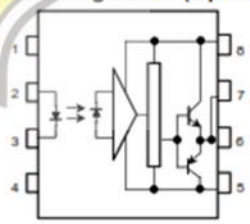
TOSHIBA 11-10C4
Weight: 0.54 g

Schmatic



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

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}

Truth Table

		Tr1	Tr2
Input LED	On	On	Off
	Off	Off	On

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.

CE

■ 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(※1) CR: Axial connector type CS: Radial connector type

※Standard : E50S8-8000-3-N-24 ※Cable length: 250mm

■ Specifications

Item			Diameter ø50mm shaft type of incremental rotary encoder	
Resolution(P/R)※1			1, 2, 4, 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	
Electrical specification	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)	
	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. 35mA, 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	
	Response time (Rise/Fall)	Totem pole output	Max. 1μs	• Measuring condition - Cable length : 2m, I sink = 20mA
		NPN open collector output		
		Voltage output		
		Line driver output	Max. 0.5μs	
	Max. Response frequency		300kHz	
	Power supply		• 5VDC ±5%(Ripple P-P : Max. 5%) • 12-24VDC ±5%(Ripple P-P : Max. 5%)	
	Current consumption		Max. 80mA(disconnection of the load), Line driver output : Max. 50mA(disconnection of the load)	
	Insulation resistance		Min. 100MΩ(at 500VDC megger between all terminals and case)	
	Dielectric strength		750VAC 50/60Hz for 1 minute(Between all terminals and case)	
	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•cm²(8×10⁻⁶ kg•m²)※2 / Max. 400g•cm²(4×10⁻⁵ kg•m²)※3	
	Shaft loading		Radial : 10kgf, Thrust : 2.5kgf	
	Max. allowable revolution※4		5000rpm	
Vibration			1.5mm amplitude or 300m/s² at frequency of 10 to 55Hz(for 1 min.) in each of X, Y, Z directions for 2 hours	
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: IP50(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 CE(Except for line driver output)	
Unit weight			Approx. 275g, Connector type : 180g	

※1: '*' pulse is only for A, B phase(Line driver output is for A, Ā, B, B̄ phase). ※2: This value is for Cable type, Connector cable type(Protection: IP50).
※3: This value is for Cable type, Connector cable type(Protection: IP64)/Connector type (Protection: IP65)
※4: Make sure that max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.

$$\text{Max. response resolution(rpm)} = \frac{\text{Max. response frequency}}{\text{Resolution}} \times 60\ \text{sec}$$

※5: 'Cable type, Connector cable type is option as IP64 protection.
※Environment resistance is rated at no freezing or condensation.

LEM

Current Transducer HX 03 ... 50-P

I_{PN} = 3 ... 50 A

For the electronic measurement of currents: DC, AC, pulsed..., with galvanic separation between the primary and the secondary circuit.

Electrical data

Type	Primary nominal RMS current I_{PN} (A)	Primary current, measuring range I_{PM} (A)	Primary conductor diameter × turns (mm)
HX 03-P	3	±9	0.6 d × 20 T
HX 05-P	5	±15	0.8 d × 12 T
HX 10-P	10	±30	1.1 d × 6 T
HX 15-P	15	±45	1.4 d × 4 T
HX 20-P	20	±60	1.6 d × 3 T
HX 25-P	25	±75	1.6 d × 2 T
HX 50-P	50	±150	1.2 × 6.3 × 1 T

U_{out}	Output voltage (Analog) @ $\pm I_{PM}$, R_L = 10 kΩ, T_A = 25 °C	±4	V
R_L	Load resistance	≥ 10	kΩ
R_{out}	Output internal resistance	< 50	Ω
U_C	Supply voltage (±5 %) [1]	±15	V
I_C	Current consumption	≤ ±15	mA

Accuracy - Dynamic performance data

ε	Error @ I_{PN}, T_A = 25 °C (excluding offset)	< ±1	% of I_{PN}
ε_L	Linearity error (0 ... $\pm I_{PM}$)	< ±1	% of I_{PN}
U_{OE}	Electrical offset voltage @ T_A = 25 °C	< ±40	mV
U_{OH}	Hysteresis offset voltage @ I_P = 0, after an excursion of 1 × I_{PN}	±15 (typ)	mV
TCU_{OE}	Temperature coefficient of U_{OE}	< ±1.5	mV/K
TCU_{out}	Temperature coefficient of U_{out} (% of reading)	±0.1	%/K
$t_{D\,90}$	Delay time to 90 % of I_{PN}	≤ 3	µs
BW	Frequency bandwidth (−3 dB) [2]	50	kHz

General data

T_A	Ambient operating temperature	−25 ... +85	°C
T_S	Ambient storage temperature	−25 ... +85	°C
m	Mass	8	g
	Standard	EN 50178: 1997	

Notes: [1] Also operate at U_C = ±12 V, with measuring range reduced to ±2.5 × I_{PN}
[2] Small signal only to avoid excessive heating of the magnetic cores.

Features

- Open loop technology current transducer using the Hall effect
- Insulated voltage 3000 V
- Extended measuring range (3 x I_{PN})
- Power supply from ±12 V to ±15 V
- Insulating plastic case recognized according to UL 94-V0.

Advantages

- Low insertion losses
- Low power consumption
- 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

- AC variable speed drives and servo motor drives
- Static converters for DC motor drives
- Battery supplied applications
- Uninterruptible Power Supplies (UPS)
- Switched Mode Power Supplies (SMPS)
- Power supplies for welding applications.

Application domain

PLAGIARISM CHECK.ORG

2.02% PLAGIARISM APPROXIMATELY

Report #12303233

BAB I PENDAHULUAN Latar Belakang Dalam perkembangan teknologi yang begitu pesat membuat motor bakar mulai tergantikan dengan motor listrik yang ramah lingkungan. Macam-macam motor listrik seperti motor direct current (DC), motor alternating current (AC), brushless direct current(BLDC), dan SRM mulai diaplikasikan pada kendaraan listrik [1], [2], [3]. SRM memiliki keunggulan dibandingkan dengan motor listrik lainnya. SRM memiliki konstruksi lebih sederhana seperti rotor tidak memiliki belitan atau magnet permanen sehingga menjadi lebih ekonomis[4]. Informasi posisi rotor diperlukan untuk pengoperasian SRM[2], [5], [6]. SRM umumnya menggunakan sensor hall effect dalam deteksi posisi rotor, namun sensor hall effect memiliki kelemahan yaitu kepresisian. Keluaran dari sensor hall effect berupa sektor interval eksitasi yang dipasang pada posisi tertentu, sehingga sulit untuk mengatur waktu menyalakan dan mematikan sudut fasa[2]. Dari kekurangan sensor hall effect diganti dengan rotary encoder dalam proses deteksi posisi rotor SRM. Alat ini memiliki tingkat kepresisian yang tinggi serta dapat mengatur sudut yang diperlukan dengan mengatur keluaran sinyal pulsa. Proses menyalakan dan mematikan sudut fasa secara tepat mempengaruhi kinerja SRM[7]. Kinerja SRM yang baik adalah menghasilkan torka positif yang lebih besar dari torka negatif. Dalam penilitian

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