

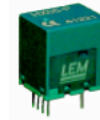
# LAMPIRAN



## 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 r.m.s. current $I_{PN}$ (A)	Primary current measuring range $I_p$ (A) <sup>1)</sup>	Primary Conductor Diameter x Turns (mm)	Type
3	± 9	0.6d x 20T	HX 03-P/SP2
5	± 15	0.8d x 12T	HX 05-P/SP2
10	± 30	1.1d x 6T	HX 10-P/SP2
15	± 45	1.4d x 4T	HX 15-P/SP2
20	± 60	1.6d x 3T	HX 20-P/SP2
25	± 75	1.6d x 2T	HX 25-P/SP2
50	± 150	1.2 x 6.3 x 1T	HX 50-P/SP2

$V_{OUT}$	Output voltage @ $\pm I_{PN}$ , $R_L = 2 \text{ k}\Omega$ , $T_A = 25^\circ\text{C}$	$V_{OE} \pm 0.625$	V
$R_{OUT}$	Output impedance	< 50	$\Omega$
$R_L$	Load resistance	$\geq 2$	$\text{k}\Omega$
$V_C$	Supply voltage ( $\pm 5\%$ )	+12 .. +15	V
$I_C$	Current consumption	< 15	mA
$V_d$	R.m.s. voltage for AC isolation test, 50/60Hz, 1 mn > 3		kV
$V_e$	R.m.s. voltage for partial discharge extinction at 10pC	$\geq 1$	kV
	Impulse withstand voltage, 1.2/50 $\mu$ s	$\geq 6$	kV

### Features

- Galvanic isolation between primary and secondary circuit
- Hall effect measuring principle
- Isolation voltage 3000V
- Low power consumption
- Extended measuring range (3x  $I_{PN}$ )
- Single supply from +12V to +15V
- Material according to UL94-V0

### 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

### Accuracy-Dynamic performance data

$X$	Accuracy @ $I_{PN}$ , $T_A = 25^\circ\text{C}$ (without offset)	< $\pm 1$	% of $I_{PN}$
$\epsilon_L$	Linearity (0 .. $\pm I_{PN}$ )	< $\pm 1$	% 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 $3 \times I_{PN}$	< $\pm 10$	mV
$V_{OT}$	Thermal drift of $V_{OE}$	max. $\pm 1.5$	mV/K
$TC\epsilon_s$	Thermal drift of the gain (% of reading)	$\pm 0.1$	%/K
$t_f$	Response time @ 90% of $I_p$	$\leq 3$	$\mu$ s
$f$	Frequency bandwidth (-3 dB) <sup>2)</sup>	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
	Min. internal creepage distance/clearance	$\geq 5.5$	mm
	Isolation material group	I	
	Standards	EN50178	

Notes : <sup>1)</sup> With  $R_L = 2\text{k}\Omega$

<sup>2)</sup> Small signal only to avoid excessive heating of the magnetic core

030806/3

LEM Components

www.lem.com

# TLP250

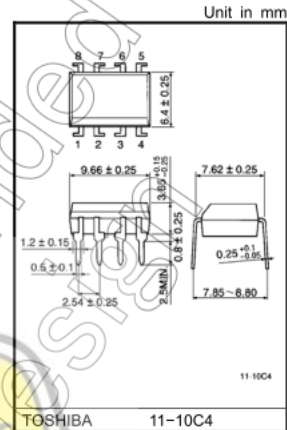
Transistor Inverter  
 Inverter For Air Conditioner  
 IGBT Gate Drive  
 Power MOS FET Gate Drive

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 ( $V_{CC}$ ):  $10\text{--}35\text{V}$
- 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:  $2500\text{V}_{\text{rms}}(\text{min.})$
- UL recognized: UL1577, file No.E67349
- Option(D4)

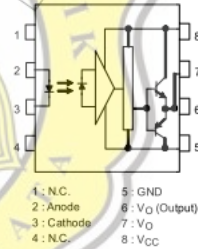
VDE Approved : DIN EN60747-5-2  
 Maximum Operating Insulation Voltage :  $890\text{V}_{\text{PK}}$   
 Highest Permissible Over Voltage :  $4000\text{V}_{\text{PK}}$

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



Weight: 0.54 g (typ.)

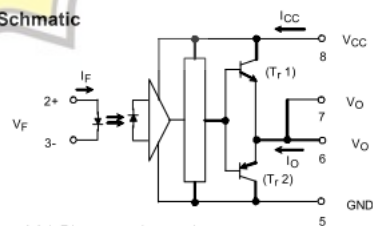
**Pin Configuration (top view)**



**Truth Table**

Input LED	$T_{r1}$		$T_{r2}$
	On	On	Off
On	On	Off	Off
Off	Off	Off	On

**Schematic**



A 0.1 $\mu\text{F}$  bypass capacitor must be connected between pin 8 and 5 (See Note 5).



# dsPIC30F4011/4012

## dsPIC30F4011/4012 Enhanced Flash 16-bit Digital Signal Controller

**Note:** This data sheet summarizes features of this group of dsPIC30F devices and is not intended to be a complete reference source. For more information on the CPU, peripherals, register descriptions and general device functionality, refer to the *dsPIC30F Family Reference Manual* (DS70046). For more information on the device instruction set and programming, refer to the *dsPIC30F Programmer's Reference Manual* (DS70030).

### High Performance Modified RISC CPU:

- Modified Harvard architecture
- C compiler optimized instruction set architecture with flexible addressing modes
- 84 base instructions
- 24-bit wide instructions, 16-bit wide data path
- 48 Kbytes on-chip Flash program space (16K Instruction words)
- 2 Kbytes of on-chip data RAM
- 1 Kbytes of non-volatile data EEPROM
- Up to 30 MIPS operation:
  - DC to 40 MHz external clock input
  - 4 MHz-10 MHz oscillator input with PLL active (4x, 8x, 16x)
- 30 interrupt sources
  - 3 external interrupt sources
  - 8 user selectable priority levels for each interrupt source
  - 4 processor trap sources
- 16 x 16-bit working register array

### DSP Engine Features:

- Dual data fetch
- Accumulator write back for DSP operations
- Modulo and Bit-Reversed Addressing modes
- Two, 40-bit wide accumulators with optional saturation logic
- 17-bit x 17-bit single cycle hardware fractional/integer multiplier
- All DSP instructions single cycle
- $\pm$  16-bit single cycle shift

### Peripheral Features:

- High current sink/source I/O pins: 25 mA/25 mA
- Timer module with programmable prescaler:
  - Five 16-bit timers/counters; optionally pair 16-bit timers into 32-bit timer modules
- 16-bit Capture input functions
- 16-bit Compare/PWM output functions
- 3-wire SPI™ modules (supports 4 Frame modes)
- I<sup>2</sup>C™ module supports Multi-Master/Slave mode and 7-bit/10-bit addressing
- 2 UART modules with FIFO Buffers
- 1 CAN modules, 2.0B compliant

### Motor Control PWM Module Features:

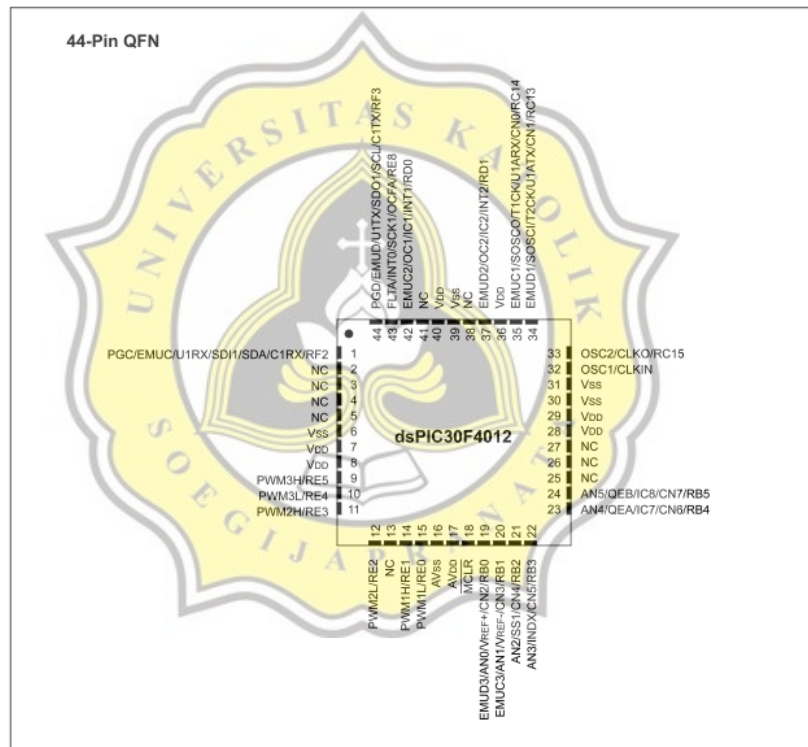
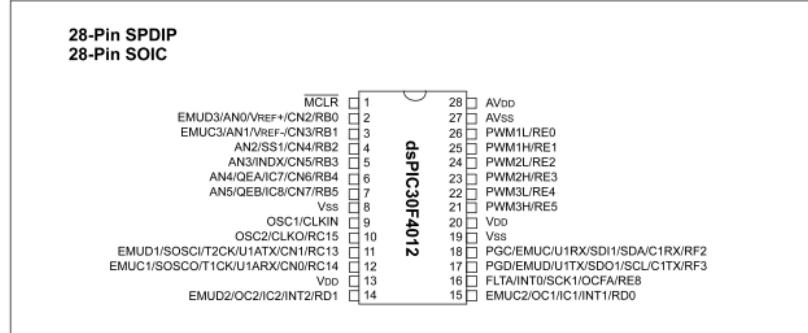
- 6 PWM output channels
  - Complementary or Independent Output modes
  - Edge and Center Aligned modes
- 3 duty cycle generators
- Dedicated time base
- Programmable output polarity
- Dead-time control for Complementary mode
- Manual output control
- Trigger for A/D conversions

### Quadrature Encoder Interface Module Features:

- Phase A, Phase B and Index Pulse input
- 16-bit up/down position counter
- Count direction status
- Position Measurement (x2 and x4) mode
- Programmable digital noise filters on inputs
- Alternate 16-bit Timer/Counter mode
- Interrupt on position counter rollover/underflow

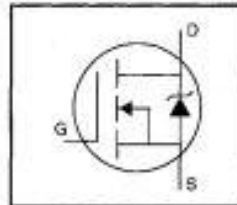
# dsPIC30F4011/4012

## Pin Diagrams (Continued)



HEXFET® Power MOSFET

- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Isolated Central Mounting Hole
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements



$V_{DSS} = 500V$

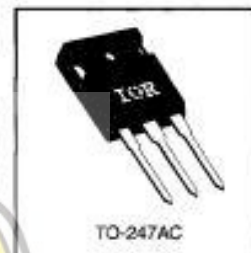
$R_{DS(on)} = 0.27\Omega$

$I_D = 20A$

**Description**

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-247 package is preferred for commercial/industrial applications where higher power levels preclude the use of TO-220 devices. The TO-247 is similar but superior to the earlier TO-218 package because of its isolated mounting hole. It also provides greater creepage distance between pins to meet the requirements of most safety specifications.



TO-247AC

DATA SHEETS

**Absolute Maximum Ratings**

Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	20	A
$I_D @ T_C = 100^\circ C$	13	
$I_{DM}$	80	
$P_D @ T_C = 25^\circ C$	280	W
	2.2	W/°C
$V_{GS}$	±20	V
$E_{AS}$	960	mJ
$I_{AR}$	20	A
$E_{AR}$	28	mJ
dv/dt	8.5	V/ns
$T_J$	-55 to +150	°C
$T_{STG}$		
	300 (1.6mm from case)	
	10 lbf•in (1.1 Nm)	

**Thermal Resistance**

Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	—	—	0.45	°C/W
$R_{\theta CS}$	—	0.24	—	
$R_{\theta JA}$	—	—	40	



DC/DC Converter  
B\_S-1WR2 & B\_D-1WR2 series



1W, Fixed input voltage, isolated & unregulated single output



FEATURES

- Continuous short-circuit protection
- Operating temperature range: +40°C to +105°C
- Conversion efficiency high up to 80%
- Miniature SIP/DIP package, International standard pin-out
- Isolation voltage: 1.5K VDC
- EN60950, UL60950 Approval



B\_S-1WR2 & B\_D-1WR2 series are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for

1. Where the voltage of the input power supply is stable (voltage variation: ±10%/V)
2. Where isolation between input and output is necessary (isolation voltage: <math>\le 1500\text{VDC}</math>)
3. Where the output voltage regulation and the ripple & noise of the output voltage is not strictly required
4. Typical applications: digital circuit condition; normal low-frequency artificial circuit condition; relay drive circuit and data switching circuit condition, etc.

Selection Guide							
Certification	Part No.	Input Voltage (VDC)		Output		Efficiency (%Min./Typ.) @ Full Load	Max. Capacitive Load( $\mu\text{F}$ )
		Nominal (Range)	Output Voltage (VDC)	Output Current (mA)(Max./Min.)			
UL/CE	B0005-1WR2	3.3 (2.97-3.63)	3.3	300/30	68/72	75/80	200
	B0005-1WR2		5	200/20			
	B00125-1WR2		12	86/9			
B00330-1WR2	3.3		300/30				
B00330-1WR2	5		200/20				
B00330-1WR2	3.3		300/30				
UL/CE	B05055-1WR2	5 (4.5-5.5)	5	200/20	68/72	75/80	
	B05055-1WR2		5	200/20	75/80		
	B05095-1WR2		9	111/12	75/80		
	B05125-1WR2		12	86/9	75/80		
	B05155-1WR2		15	67/7	75/80		
	B05245-1WR2		24	40/4	75/80		
UL/CE	B05330-1WR2	12 (10.8-13.2)	3.3	300/30	68/72	75/80	
	B05330-1WR2		5	200/20	75/80		
	B05090-1WR2		9	111/12	75/80		
	B05120-1WR2		12	86/9	75/80		
	B05150-1WR2		15	67/7	75/80		
	B05240-1WR2		24	40/4	75/80		
UL/CE	B12035-1WR2	12 (10.8-13.2)	3.3	300/30	68/72	75/80	
	B12055-1WR2		5	200/20	75/80		
	B12095-1WR2		9	111/12	75/80		
	B12125-1WR2		12	86/9	75/80		
	B12155-1WR2		15	67/7	75/80		
	B12245-1WR2		24	40/4	75/80		
UL/CE	B12030-1WR2	12 (10.8-13.2)	3.3	300/30	68/72	75/80	
	B12050-1WR2		5	200/20	75/80		
	B12090-1WR2		9	111/12	75/80		
	B12120-1WR2		12	86/9	75/80		
	B12150-1WR2		15	67/7	75/80		
	B12240-1WR2		24	40/4	75/80		

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Conference Chair



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## Report #10296366

BAB IPENDAHULUAN Latar Belakang Kendaraan berbasis motor bakar merupakan alat transportasi yang paling banyak digunakan di era sekarang. Namun penggunaan motor bakar memiliki kekurangan diantaranya berbahan bakar fosil yang terbatas dan menghasilkan gas buang yang menimbulkan polusi udara. Dari kekurangan motor bakar tersebut dikembangkan kendaraan yang menggunakan kendali listrik. Kendaraan listrik memiliki beberapa keunggulan yaitu efisiensi tinggi, nol emisi, bebas dari bahan bakar fosil, pengoperasian yang tenang dan halus[1].

10 Motor Switched Reluctance (SRM) merupakan salah satu motor modern yang diaplikasikan pada kendaraan listrik. Konstruksi dari motor switched reluctance terbilang sederhana karena hanya memiliki rotor yang terbuat dari besi dengan kutub berbentuk salient. Motor switched reluctance memiliki rangkaian kontrol analog yang relatif kompleks akan tetapi dapat diselesaikan dengan solusi menggunakan kontrol digital sehingga SRM menjadi salah satu alternatif untuk diterapkan pada kendaraan listrik[1]. Sebagian energi terbuang pada saat proses pengereman pada kendaraan listrik karena masih menggunakan piringan cakram saat proses pengereman. Namun hal tersebut dapat diatasi dengan menerapkan sistem pengereman regenerative pada kendaraan listrik. Pengereman regenerative dapat mengkonversi energi yang