LAMPIRAN

LEM

Voltage Transducer LV 25-P

I_{PN} = 10 mA
V_{PN} = 10 .. 500 V

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

Electrical data

I_{PN}	Primary nominal r.m.s. current		10		mA
I_P	Primary current, measuring range		0 .. ± 14		mA
R_M	Measuring resistance		$R_{M\,min}$	$R_{M\,max}$	
	with ± 12 V	@ ± 10 mA max	30	190	Ω
		@ ± 14 mA max	30	100	Ω
	with ± 15 V	@ ± 10 mA max	100	350	Ω
		@ ± 14 mA max	100	190	Ω
I_{SN}	Secondary nominal r.m.s. current		25		mA
K_N	Conversion ratio		2500 : 1000		
V_C	Supply voltage (± 5 %)		± 12 .. 15		V
I_C	Current consumption		10 (@ ±15 V)+I_S		mA
V_d	R.m.s. voltage for AC isolation test [1], 50 Hz, 1 mn		2.5		kV

Accuracy - Dynamic performance data

X_G	Overall Accuracy @ I_{PN}, T_A = 25°C	@ ± 12 .. 15 V	± 0.9		%
		@ ± 15 V (± 5 %)	± 0.8		%
ε_L	Linearity		< 0.2		%
			Typ	Max	
I_O	Offset current @ I_P = 0, T_A = 25°C			± 0.15	mA
I_{OT}	Thermal drift of I_O	0°C .. + 25°C	± 0.06	± 0.25	mA
		+ 25°C .. + 70°C	± 0.10	± 0.35	mA
t_r	Response time [2] @ 90 % of $V_{P\,max}$		40		µs

General data

T_A	Ambient operating temperature	0 .. + 70	°C
T_S	Ambient storage temperature	- 25 .. + 85	°C
R_P	Primary coil resistance @ T_A = 70°C	250	Ω
R_S	Secondary coil resistance @ T_A = 70°C	110	Ω
m	Mass	22	g
	Standards [3]	EN 50178	

Features

- Closed loop (compensated) voltage transducer using the Hall effect
- Insulated plastic case recognized according to UL 94-V0

Principle of use

- For voltage measurements, a current proportional to the measured voltage must be passed through an external resistor **R**, which is selected by the user and installed in series with the primary circuit of the transducer.

Advantages

- Excellent accuracy
- Very good linearity
- Low thermal drift
- Low response time
- High bandwidth
- High immunity to external interference
- Low disturbance in common mode.

Applications

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

Notes : [1] Between primary and secondary
[2] R_M = 25 kΩ (L/R constant, produced by the resistance and inductance of the primary circuit)
[3] A list of corresponding tests is available

981125/14

LEM Components www.lem.com
Tope Co., Ltd. Tel: (02) 8228-0658 Fax: (02) 8228-0659 http://www.sensor.com.tw e-mail: tope@ms1.hinet.net

MICROCHIP

dsPIC30F4011/4012
Data Sheet

High-Performance,
16-Bit Digital Signal Controllers

 DS70135G

dsPIC30F4011/4012

High-Performance, 16-Bit Digital Signal Controllers

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 *"16-bit MCU and DSC Reference Manual"* (DS70157).

High-Performance, Modified RISC CPU:

- Modified Harvard architecture
- C compiler optimized instruction set architecture with flexible addressing modes
- 83 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 Kbyte of nonvolatile 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:
  - Three external interrupt sources
  - Eight user-selectable priority levels for each interrupt source
  - Four 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 are single cycle
- ±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^2C™ module supports Multi-Master/Slave mode and 7-bit/10-bit addressing
- Two UART modules with FIFO Buffers
- CAN module, 2.0B compliant

Motor Control PWM Module Features:

- Six PWM output channels:
  - Complementary or Independent Output modes
  - Edge and Center-Aligned modes
- Three 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:

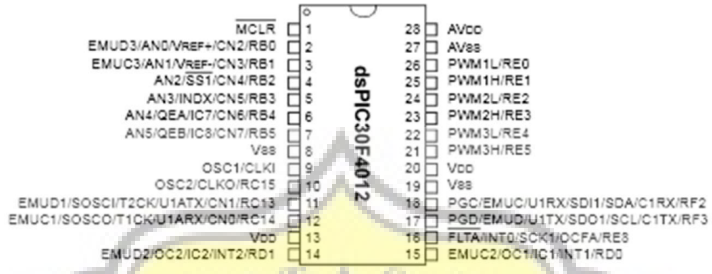
- Phase A, Phase B and Index Pulse input
- 16-bit up/down position counter
- Count direction status
- Position Measurement (x2 and x4) mode
- Programmable digital noise filters on inputs
- Alternate 16-bit Timer/Counter mode
- Interrupt on position counter rollover/underflow

Analog Features:

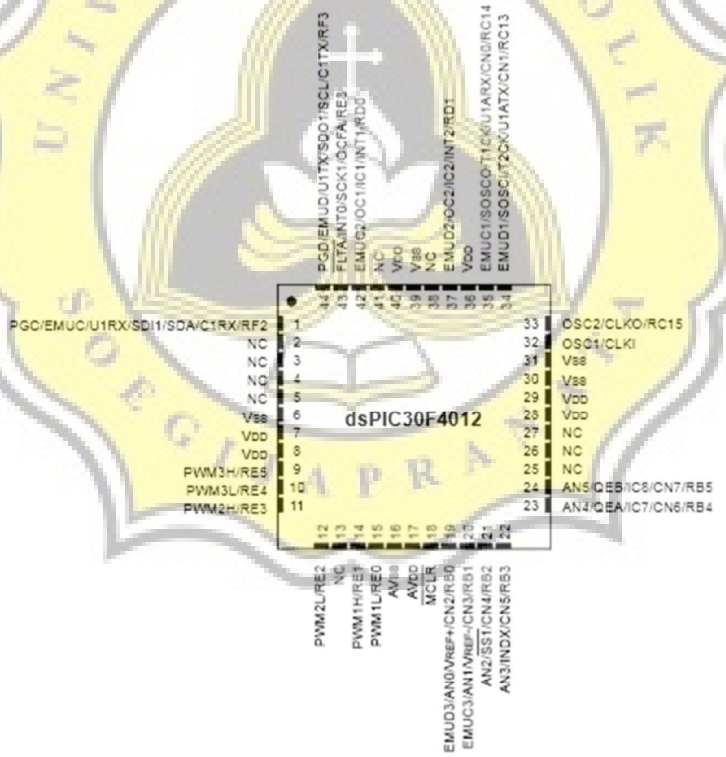
- 10-bit Analog-to-Digital Converter (ADC) with four Sample and Holde (S&H) inputs:
  - 1 Msps conversion rate
  - Nine input channels
  - Conversion available during Sleep and Idle
- Programmable Brown-out Reset

Pin Diagrams (Continued)

28-Pin SPDIP and SOIC



44-Pin QFN[1]



Note 1: The metal plane at the bottom of the device is not connected to any pins and is recommended to be connected to VSS externally.

QT OPTOELECTRONICS

HIGH SPEED TRANSISTOR OPTOCOUPLERS

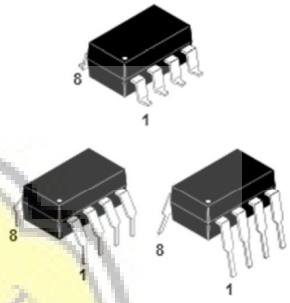
SINGLE-CHANNEL	DUAL-CHANNEL
6N135, 6N136	HCPL-2530
HCPL-2503	HCPL-2531
HCPL-4502	

DESCRIPTION

The HCPL-4502/HCPL-2503, 6N135/6 and HCPL-2530/HCPL-2531 optocouplers consist of an AlGaAs LED optically coupled to a high speed photodetector transistor.

A separate connection for the bias of the photodiode improves the speed by several orders of magnitude over conventional phototransistor optocouplers by reducing the base-collector capacitance of the input transistor.

An internal noise shield provides superior common mode rejection of 10kV/µs. An improved package allows superior insulation permitting a 480 V working voltage compared to industry standard 0f 220 V.

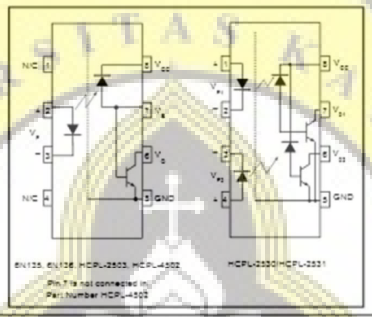


FEATURES

- High speed-1 MBit/s
- Superior CMR-10 kV/µs
- Dual-Channel HCPL-2530/HCPL-2531
- Double working voltage-480V RMS
- CTR guaranteed 0-70°C
- U.L. recognized (File # E90700)

APPLICATIONS

- Line receivers
- Pulse transformer replacement
- Output interface to CMOS-LSTTL-TTL
- Wide bandwidth analog coupling



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value	Units
Storage Temperature		T_{STG}	-55 to +125	°C
Operating Temperature		T_{OPR}	-55 to +100	°C
Lead Solder Temperature		T_{SOL}	260 for 10 sec	°C
EMITTER				
DC/Average Forward Input Current	Each Channel (Note 1)	I_F (avg)	25	mA
Peak Forward Input Current (50% duty cycle, 1 ms P.W.)	Each Channel (Note 2)	I_F (pk)	50	mA
Peak Transient Input Current - (≤ 1 µs P.W., 300 pps)	Each Channel	I_F (trans)	1.0	A
Reverse Input Voltage	Each Channel	V_R	5	V
Input Power Dissipation	(6N135/6N136 and HCPL-2503/4502) (HCPL-2530/2531) Each Channel (Note 3)	P_D	100 45	mW
DETECTOR				
Average Output Current	Each Channel	I_O (avg)	8	mA
Peak Output Current	Each Channel	I_O (pk)	16	mA
Emitter-Base Reverse Voltage	(6N135, 6N136 and HCPL-2503 only)	V_{ESR}	5	V
Supply Voltage		V_{CC}	-0.5 to 30	V
Output Voltage		V_O	-0.5 to 20	V
Base Current	(6N135, 6N136 and HCPL-2503 only)	I_B	5	mA
Output power dissipation	(6N135, 6N136, HCPL-2503, HCPL-4502) (Note 4)	P_D	100	mW
	(HCPL-2530, HCPL-2531) Each Channel		35	mW

200004A

International
IOR Rectifier

Data Sheet No. PD-6.033E

IR2132

3-PHASE BRIDGE DRIVER

Features

- Floating channel designed for bootstrap operation
  Fully operational to +600V
  Tolerant to negative transient voltage
  dV/dt immune
- Gate drive supply range from 10 to 20V
- Undervoltage lockout for all channels
- Over-current shutdown turns off all six drivers
- Independent half-bridge drivers
- Matched propagation delay for all channels
- Outputs out of phase with inputs

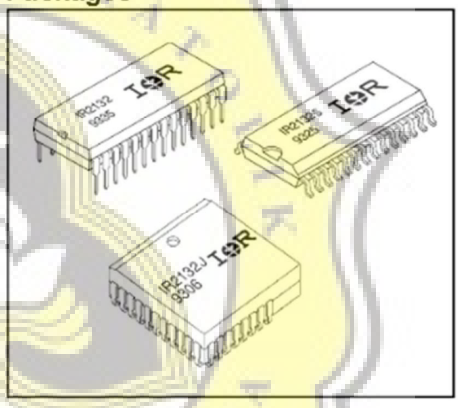
Product Summary

V_{OFFSET}	600V max.
I_O+/-	200 mA / 420 mA
V_{OUT}	10 - 20V
$t_{on/off}$ (typ.)	675 & 425 ns
Deadtime (typ.)	0.8 µs

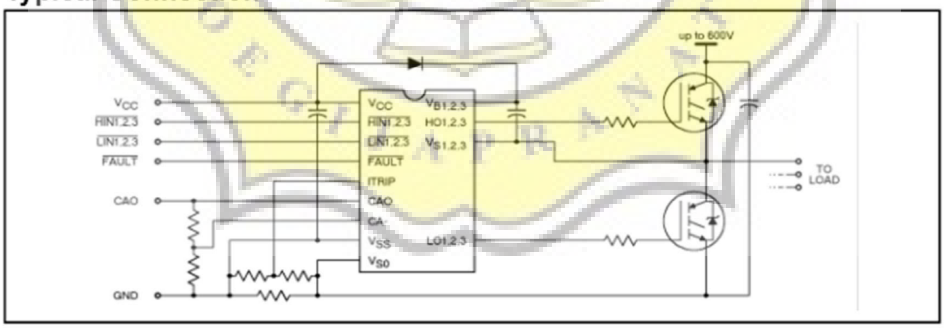
Description

The IR2132 is a high voltage, high speed power MOSFET and IGBT driver with three independent high and low side referenced output channels. Proprietary HVIC technology enables ruggedized monolithic construction. Logic inputs are compatible with 5V CMOS or LSTTL outputs. A ground-referenced operational amplifier provides analog feedback of bridge current via an external current sense resistor. A current trip function which terminates all six outputs is also derived from this resistor. An open drain FAULT signal indicates if an over-current or undervoltage shutdown has occurred. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. Propagation delays are matched to simplify use at high frequencies. The floating channels can be used to drive N-channel power MOSFETs or IGBTs in the high side configuration which operate up to 600 volts.

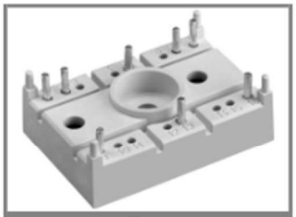
Packages



Typical Connection



SK 20 GB 123



SEMITOP® 2

IGBT Module

SK 20 GB 123
SK 20 GAL 123
SK 20 GAR 123
Preliminary Data

Features

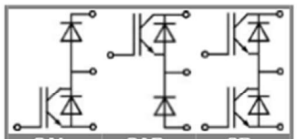
- Compact design
- One screw mounting
- Heat transfer and isolation through direct copper bonding aluminium oxide ceramic (DBC)
- High short circuit capability
- N channel, homogeneous silicon structure (NPT= Non punch-through IGBT)
- Low tail current with low temperature dependance

Typical Applications

- Switching (not for linear use)
- Inverter
- Switched mode power supplies
- UPS

Absolute Maximum Ratings		T_s = 25 °C, unless otherwise specified	
Symbol	**Conditions**	**Values**	**Units**
IGBT			
V_{CES}		1200	V
V_{GES}		± 20	V
I_C	T_s = 25 (80) °C;	23 (15)	A
I_{CM}	t_p < 1 ms; T_s = 25 (80) °C;	46 (30)	A
T_j		- 40 ... + 150	°C
Inverse / Freewheeling CAL diode			
I_F	T_s = 25 (80) °C;	24 (17)	A
I_{FM} = - I_{CM}	t_p < 1 ms; T_s = 25 (80) °C;	48 (34)	A
T_j		- 40 ... + 150	°C
T_{stg}		- 40 ... + 125	°C
T_{sol}	Terminals, 10 s	260	°C
V_{isol}	AC 50 Hz, r.m.s. 1 min. / 1 s	2500 / 3000	V

Characteristics		T_s = 25 °C, unless otherwise specified			
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Units**
IGBT					
$V_{CE(sat)}$	I_C = 15 A, T_j = 25 (125) °C		2,5 (3,1)	3 (3,7)	V
$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 0,0006 A	4,5	5,5	6,5	V
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, 1 MHz		1		nF
$R_{th(j-s)}$	per IGBT			1,4	K/W
	per module				K/W
	under following conditions:				
$t_{d(on)}$	V_{CC} = 600 V , V_{GE} = ± 15 V		35		ns
t_r	I_C = 15 A, T_j = 125 °C		45		ns
$t_{d(off)}$	R_{Gon} = R_{Goff} = 40 Ω		250		ns
t_f			45		ns
E_{on} + E_{off}	Inductive load		3,8		mJ
Inverse / Freewheeling CAL diode					
V_F = V_{EC}	I_F = 15 A, T_j = 25 (125) °C		2 (1,8)	2,5 (2,3)	V
$V_{(TO)}$	T_j = (125) °C		(1)	(1,2)	V
r_T	T_j = (125) °C		(53)	(73)	mΩ
$R_{th(j-s)}$				1,7	K/W
	under following conditions:				
I_{RRM}	I_F = 15 A, V_R = 600 V		16		A
Q_{rr}	dI_F/dt = -200 A/µs		2,7		µC
E_{off}	V_{GE} = 0 V, T_j = 125 °C		0,6		mJ
Mechanical data					
M1	mounting torque			2	Nm
w			19		g
Case	SEMITOP® 2		T 8		



GAL GAR GB

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SERTIFIKAT

DIBERIKAN KEPADA

Naomi Intan Hapsari

SEBAGAI

PEMAKALAH

Seminar Nasional Energi Telekomunikasi dan Otomasi (SNETO) 2017
dengan Tema:
Perkembangan Teknologi Sistem Otomasi dan Telekomunikasi dalam Menunjang Pembangunan Energi Baru
yang diselenggarakan pada Sabtu, 16 Desember 2017
di Kampus Institut Teknologi Nasional Bandung

Mengetahui
Ketua Jurusan Teknik Elektro

itenas
TEKNIK ELEKTRO

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Ketua Panitia
SNETO 2017

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