

Università degli studi di Padova

DEPARTMENT OF
INFORMATION
ENGINEERING
UNIVERSITY OF PADOVA



Sensore wireless per misure di potenza attiva in reti ZigBee/IEEE 1451

Laureando: Marco Piovesan

Relatore: Prof. Claudio Narduzzi

Padova, 21 luglio 2010

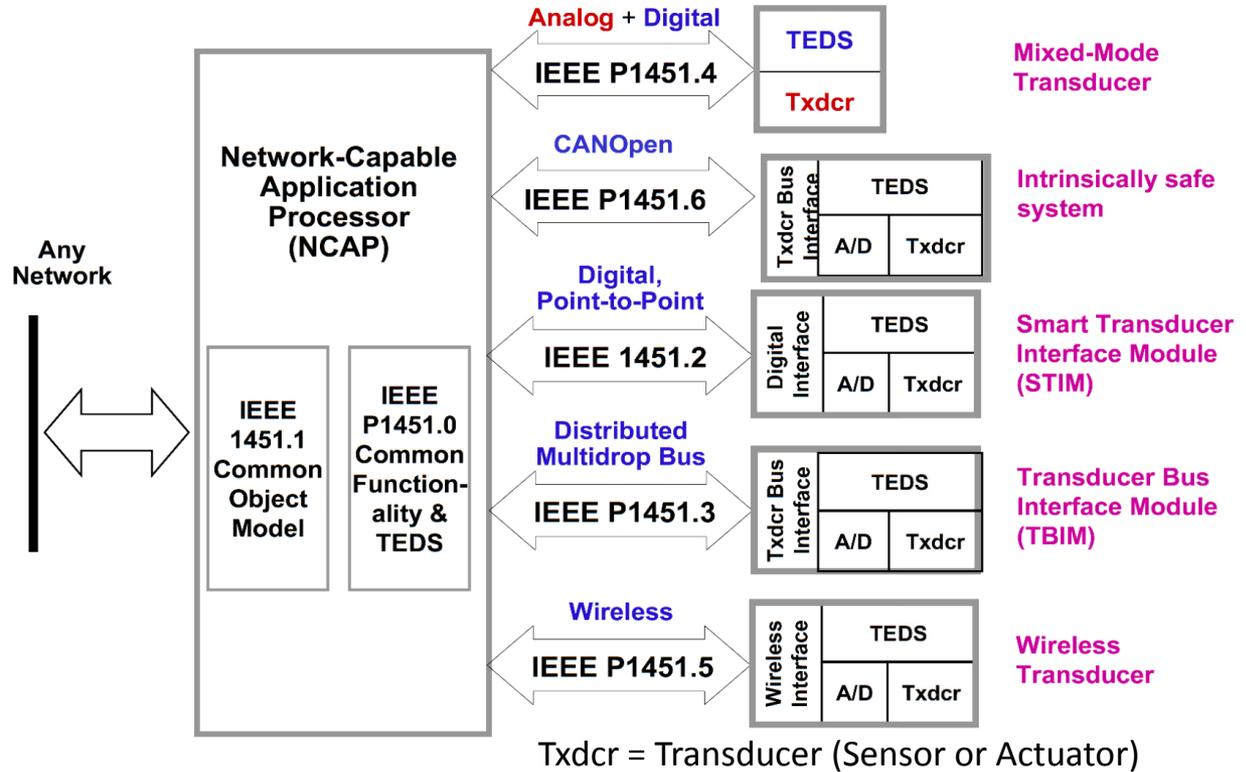
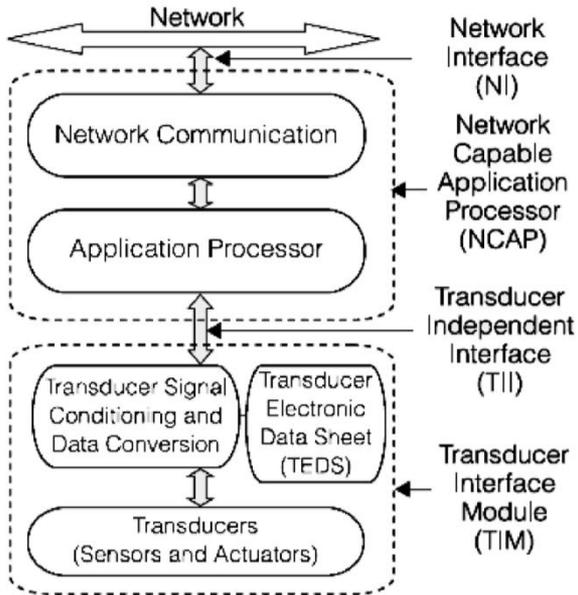
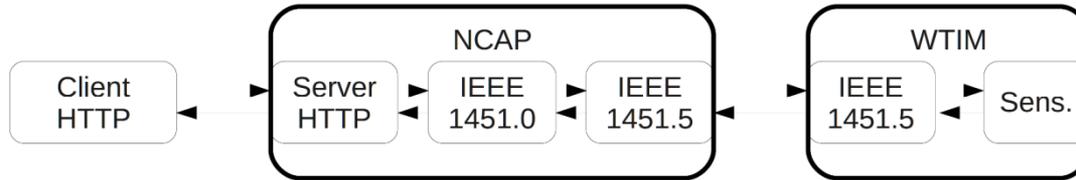
CORSO DI LAUREA TRIENNALE IN INGEGNERIA ELETTRONICA



Sommario

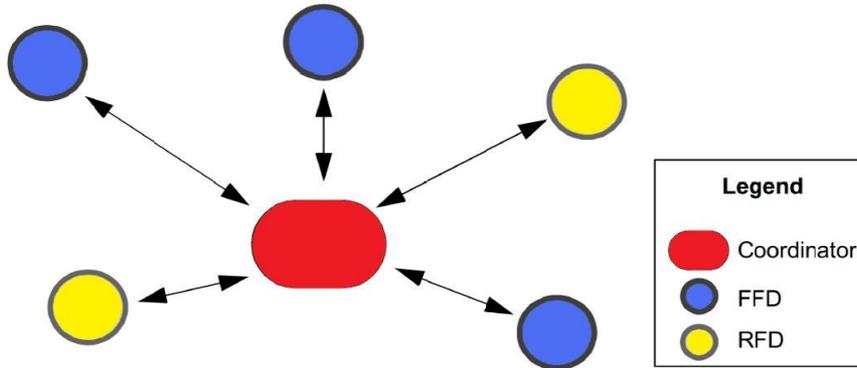
- Introduzione
- Standard IEEE 1451
- Standard ZigBee
- Energy Meter Microchip
- Implementazione dell'applicazione software
- Misure
- Conclusioni e sviluppi futuri.

Standard IEEE 1451

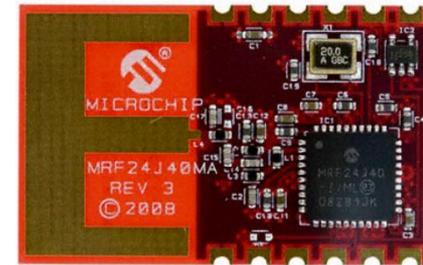


Standard ZigBee

Star Network Configuration



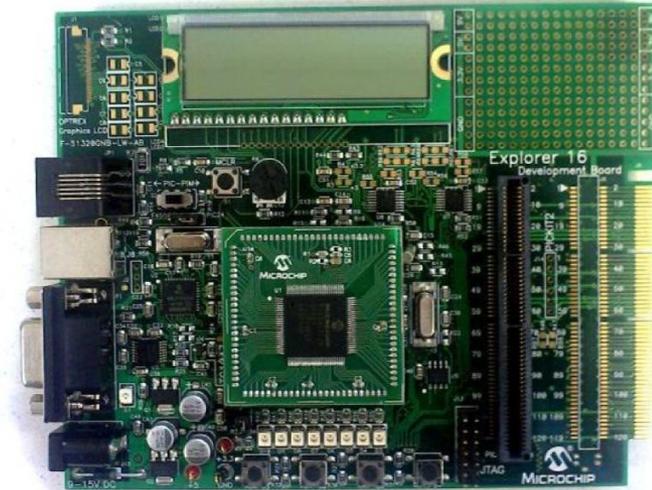
MRF24J40 IEEE 802.15.4
2.4 GHz RF Transceiver



WTIM – PIC18

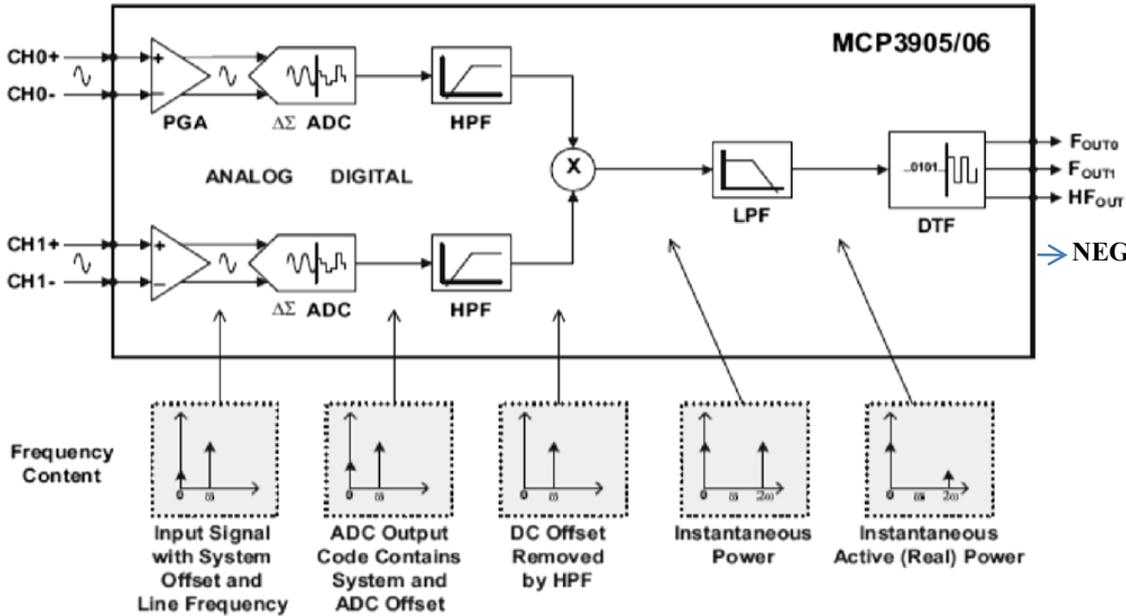


NCAP – PIC24





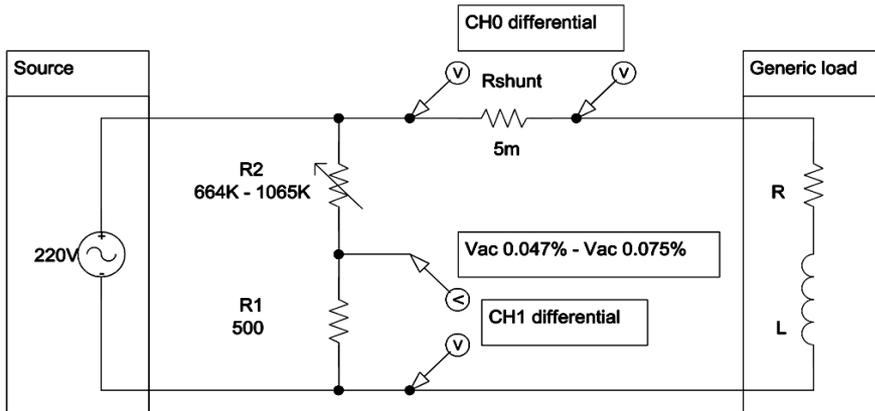
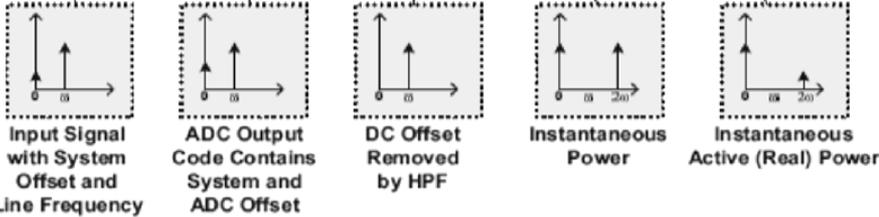
Energy Meter Microchip



$$F_{OUT0/1} = \frac{8.06 V_0 V_1 G F_C}{(V_{REF})^2} [Hz]$$

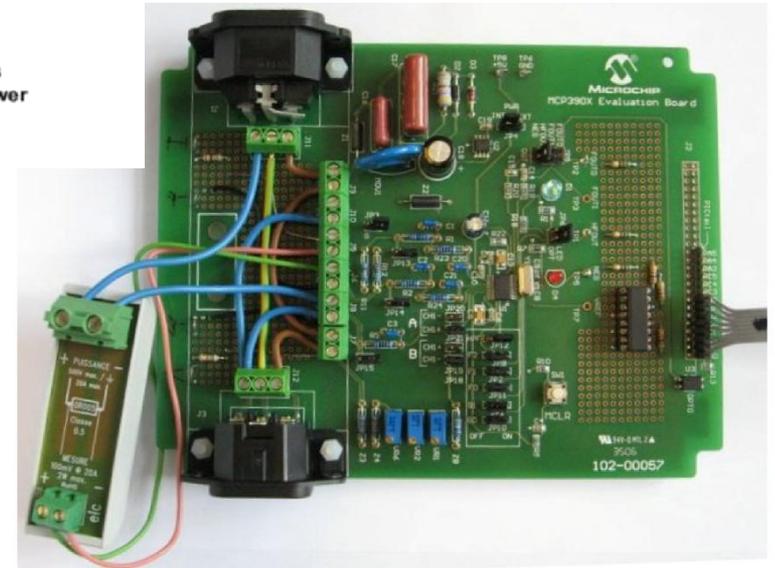
$$HF_{OUT} = \frac{8.06 V_0 V_1 G HF_C}{(V_{REF})^2} [Hz]$$

Frequency Content



Padova, 21/7/2010

4/10

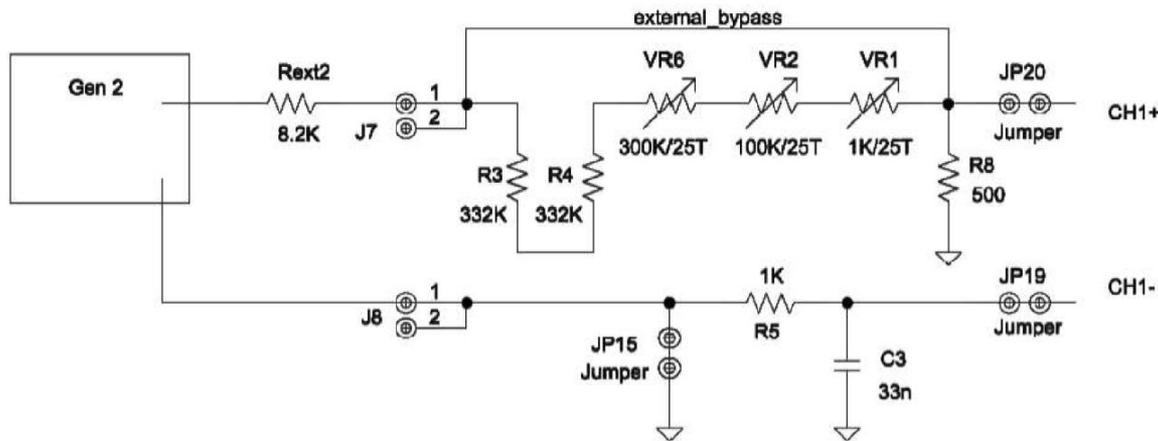
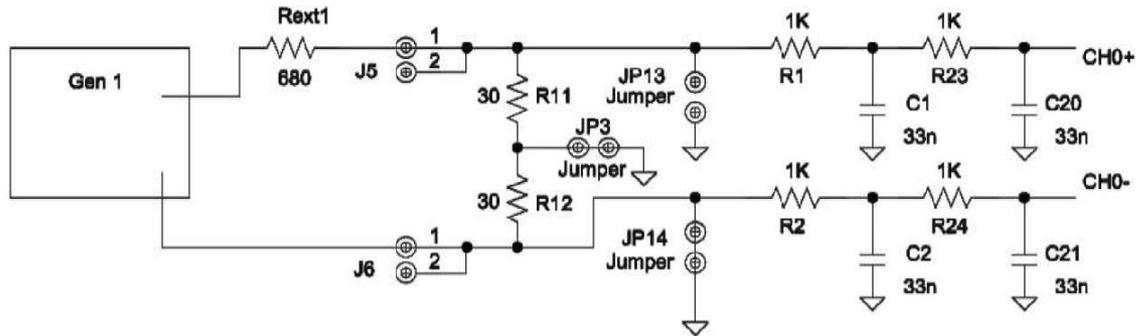


Marco Piovesan

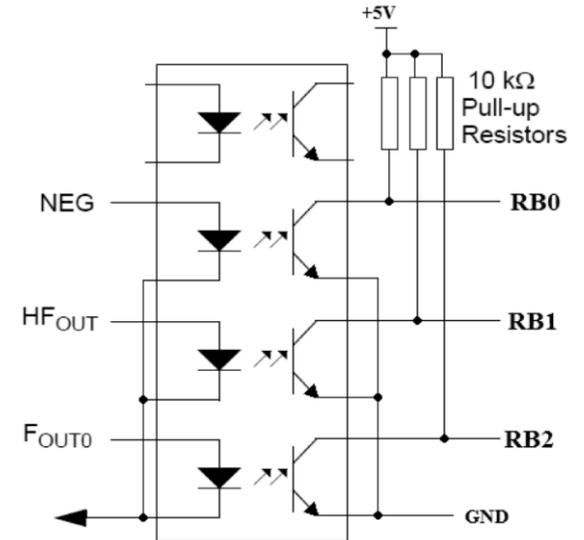


Modifiche hardware

PC845XJ0000F Series

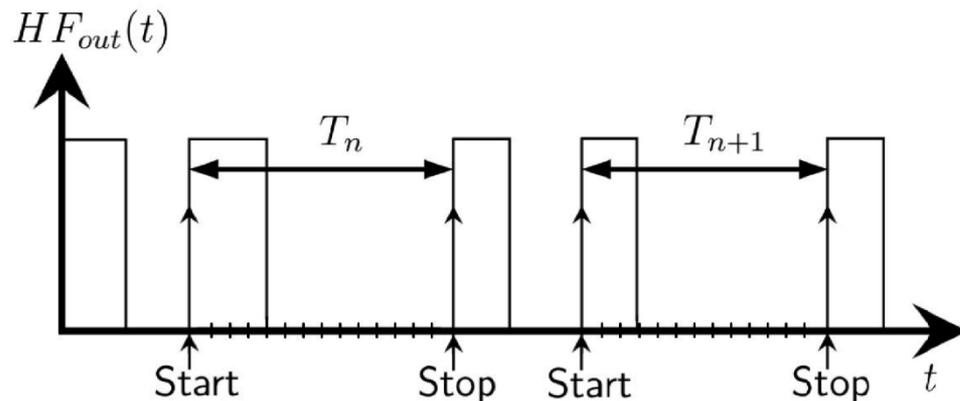


DIP 16pin (4-channel)
Darlington Phototransistor Output,
Photocoupler





Funzioni software implementate



WTIM (PIC18):

`void UserInterruptHandler(void)`

Misura di frequenza/periodo
e conversione in potenza

`BYTE GetPowerMeterString(char *buffer)`

Carica nel payload il buffer
di letture di potenza e la
lettura di energia

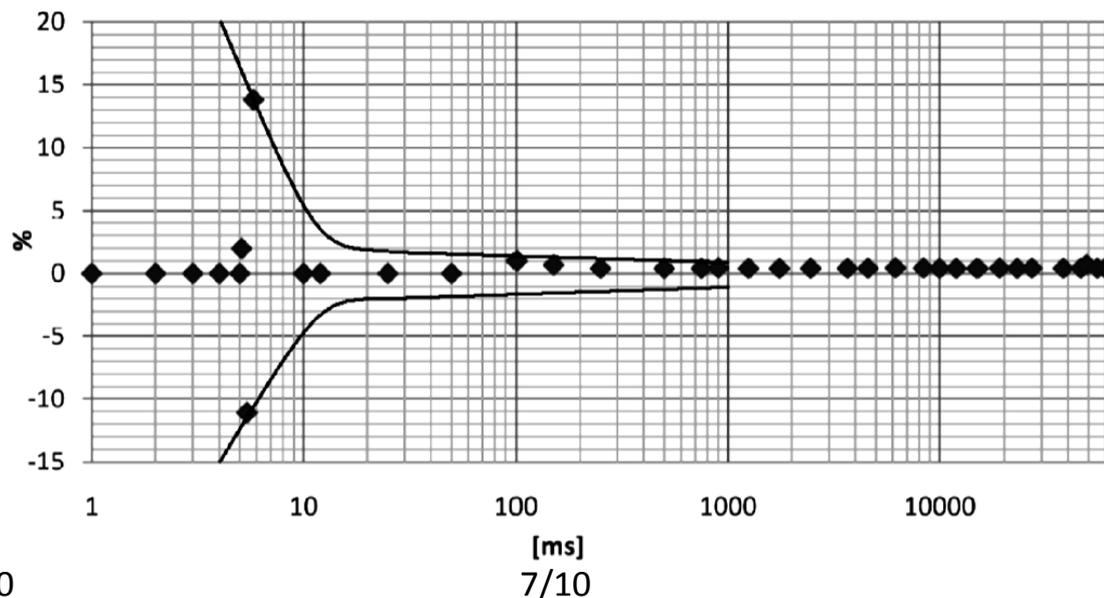
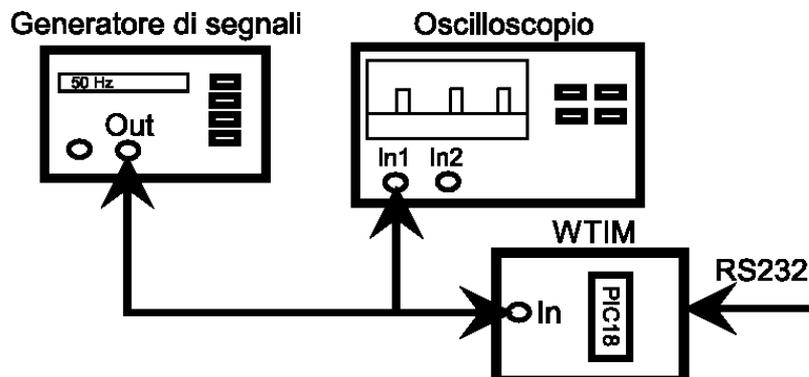
NCAP (PIC24):

Estrae dal payload le letture
di potenza ed energia

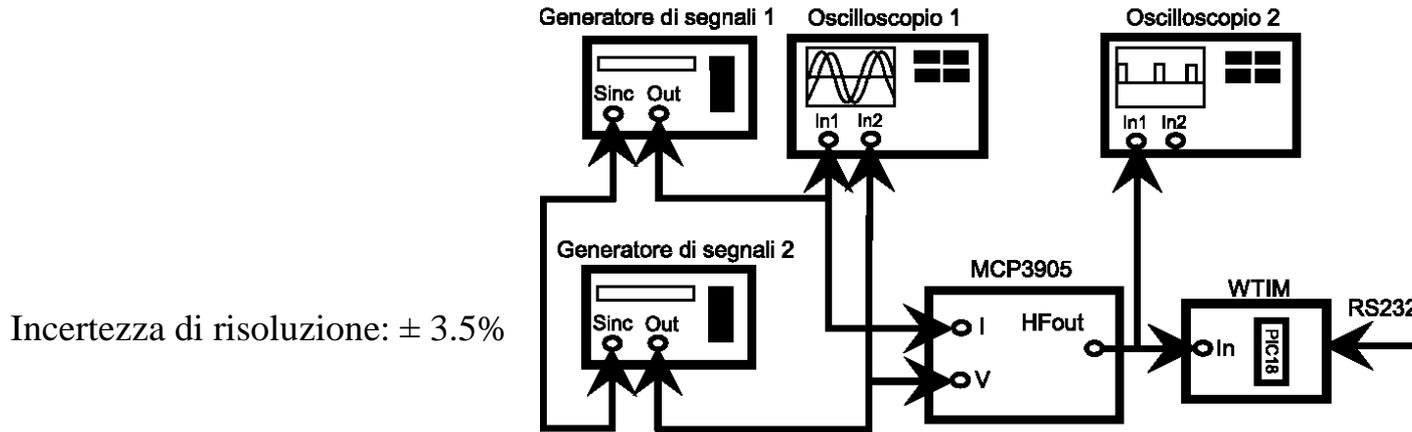
`UInt16 read(TimeDuration timeout, OctetArray *payload)`

Verifica misura di periodo

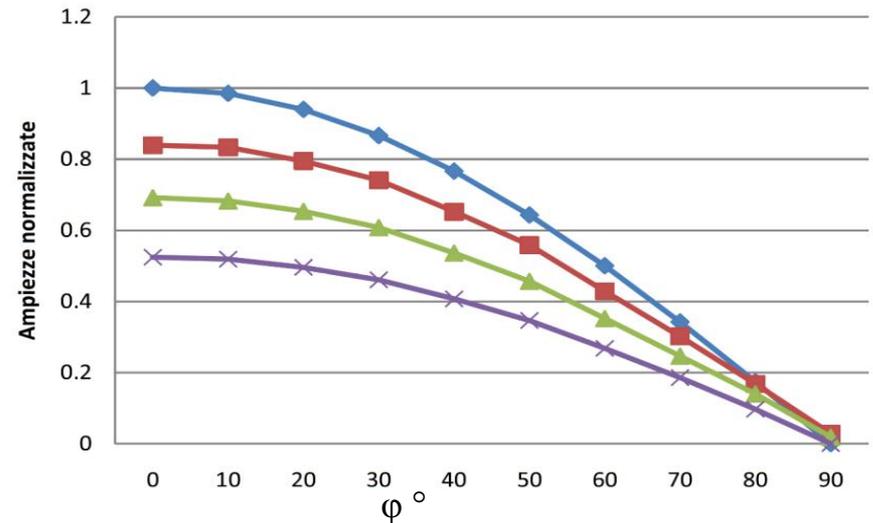
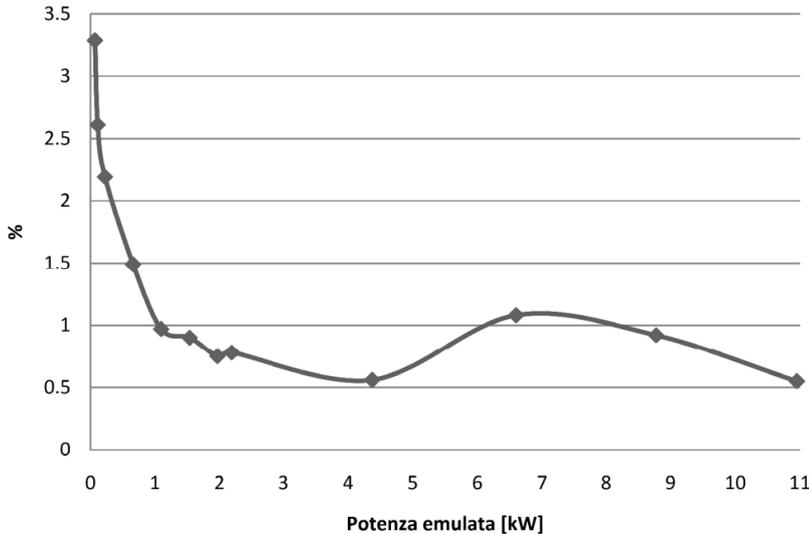
Incertezza di risoluzione: ± 1 ms
Base dei tempi: 1 ms



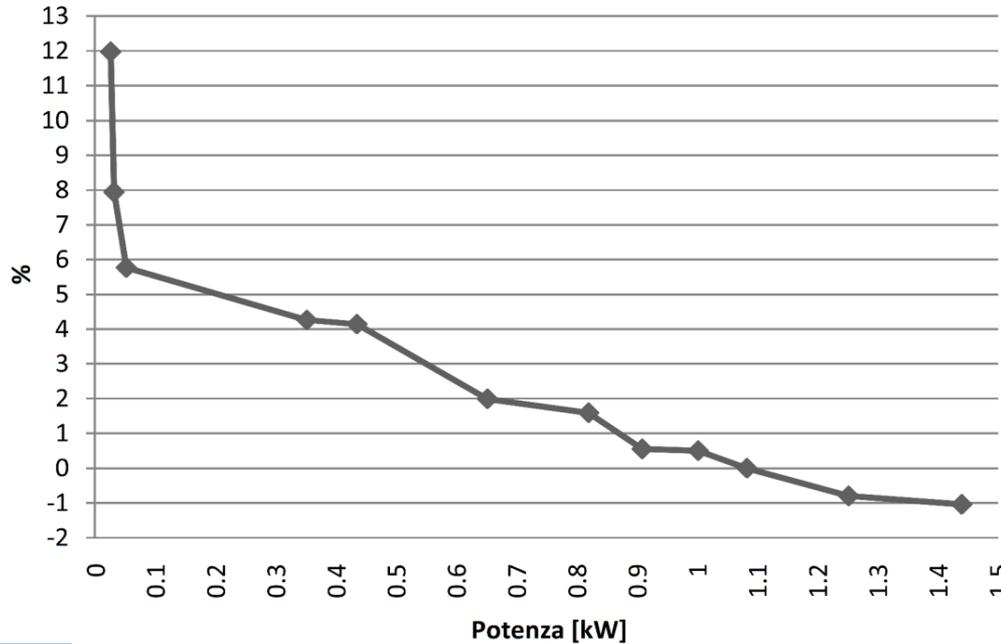
Emulazione di una misura di potenza attiva



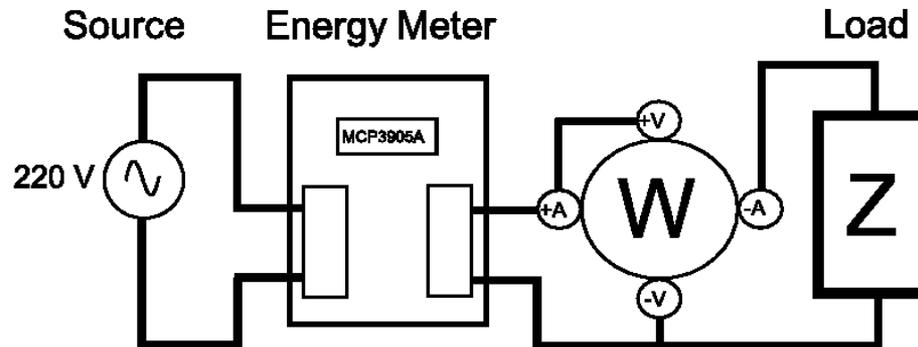
Incertezza di risoluzione: $\pm 3.5\%$



Misure con carico



R_{Shunt}	5	m Ω
I_{MAX}	20	A
P_{MAX}	4.4	kW
$T_{min} @ P_{MAX}$	42	ms
P_{min}	1	W



Carichi con regolazione:

ventilatore

lampada alogena

asciugacapelli

Carichi fissi:

pc

saldatore

monitor pc

Conclusioni e sviluppi futuri

