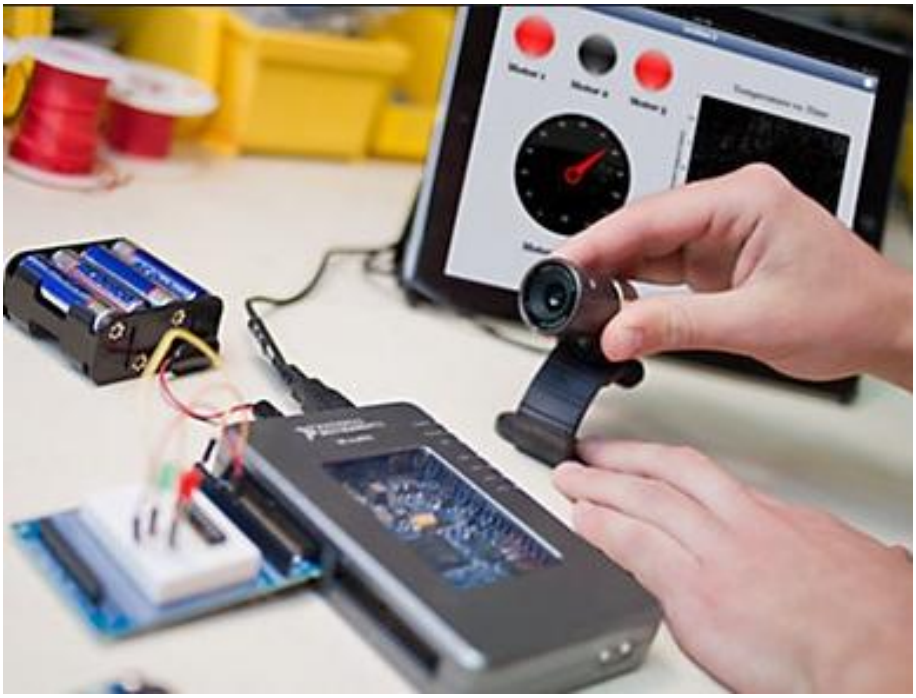

Prácticas con NI myRIO

Controlar un motor por medio de PWM

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Contenido

Requerimientos

Software

- NI LabVIEW 2013
- NI Real Time Module (*Required Software DVD 1*)

Hardware

- NI myRIO
- Fuente de alimentación (*incluido con myRIO*)
- Cable USB (*incluido con myRIO*)
- Protoboard
- Motor DC de 6-12V para juguetes [2]

Componentes Electrónicos

- Transistor de Potencia TIP122 [3]

Controlar un motor por medio de PWM

Ejercicio 1. Habilitar el modulo de PWM del NI myRIO

Objetivo

- Habilitar el módulo para PWM del NI myRIO
- Realizar un control básico de la velocidad de un motor

Introducción

El PWM (*Pulse Width* Modulation) es una técnica que consiste en variar el ancho de pulso de una señal de voltaje cuadrada. Con esto se controla la cantidad de potencia administrada a dispositivos electrónicos, especialmente aquellos con cargas inerciales como los motores.

El NI myRIO tiene la habilidad de generar señales de pulso moduladas para controlar la cantidad de potencia suministrada a dispositivos electrónicos.

Desarrollo

1. Conecte su NI myRIO a la fuente de alimentación y a su vez a la toma eléctrica. El indicador *POWER* se debe de encender.

Figura 1. Alimentar el NI myRIO

2. Conecte el cable USB que viene con el myRIO a su computadora. Cuando el dispositivo sea reconocido se abrirá la siguiente ventana.

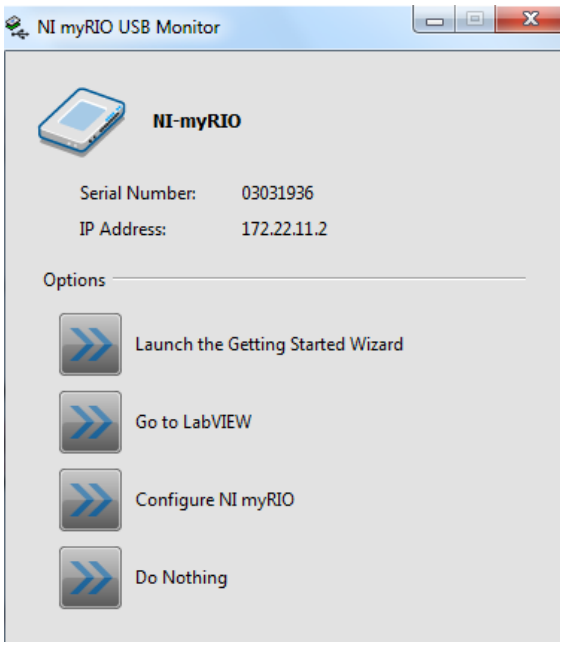

Figura 2. Ventana de inicio del NI myRIO.

3. Seleccione *Go to LabVIEW* para comenzar a trabajar.

4. Desde la ventana principal de LabVIEW seleccione *File >> Create Project*

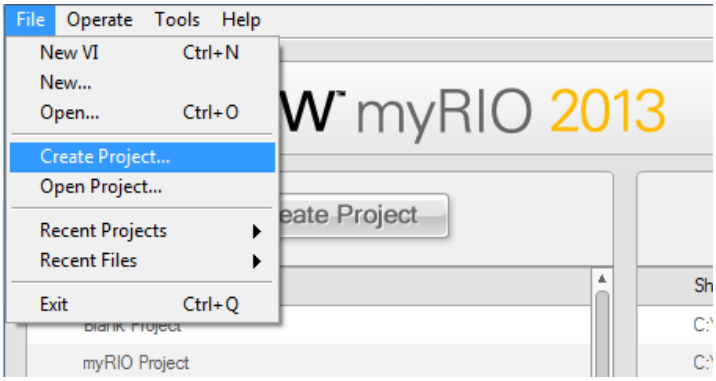

Figura 3. Crear un nuevo proyecto en LabVIEW

5. De la sección *Templates* seleccione *myRIO >> myRIO Project*

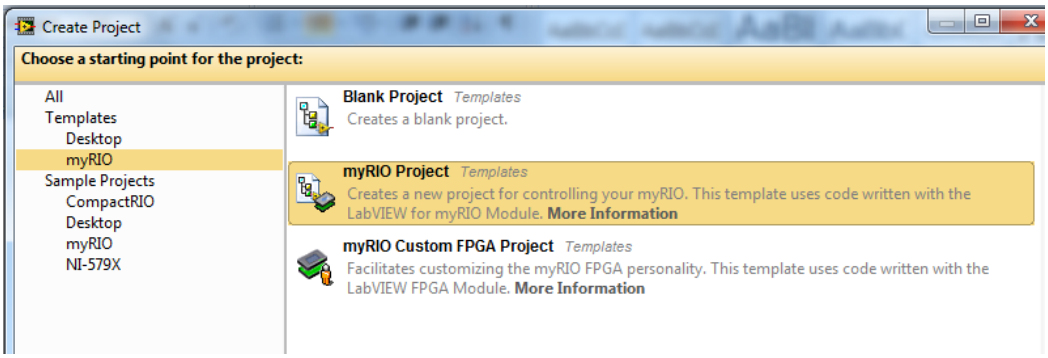

Figura 4. Escoger una plantilla ejemplo

6. Nombre el proyecto y seleccione la ruta en donde será guardado

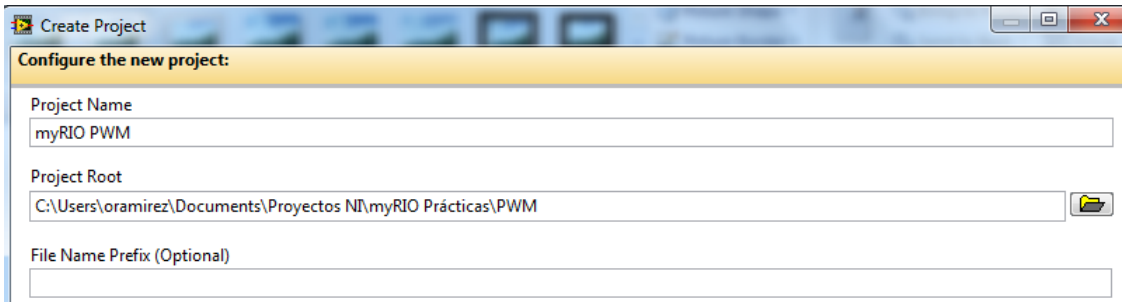

Figura 5. Nombrar y seleccionar la ruta del proyecto

7. Seleccione el dispositivo con el que va a trabajar y presione *Finish*[*]

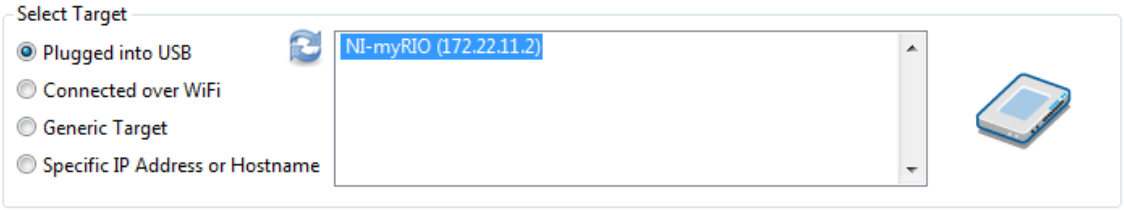

Figura 6. Seleccionar el dispositivo con el que se trabajara

8. Una vez creado el proyecto, abra el VI de ejemplo *Main.vi*

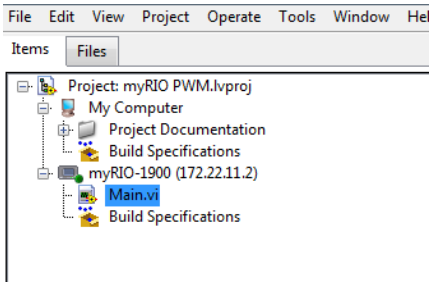

Figura 7. Abrir el programa de ejemplo Main.vi

9. En el diagrama de bloques, elimine el código que viene por default dentro del ciclo *while* en este VI de ejemplo. Lo modificaremos para habilitar una salida PWM.

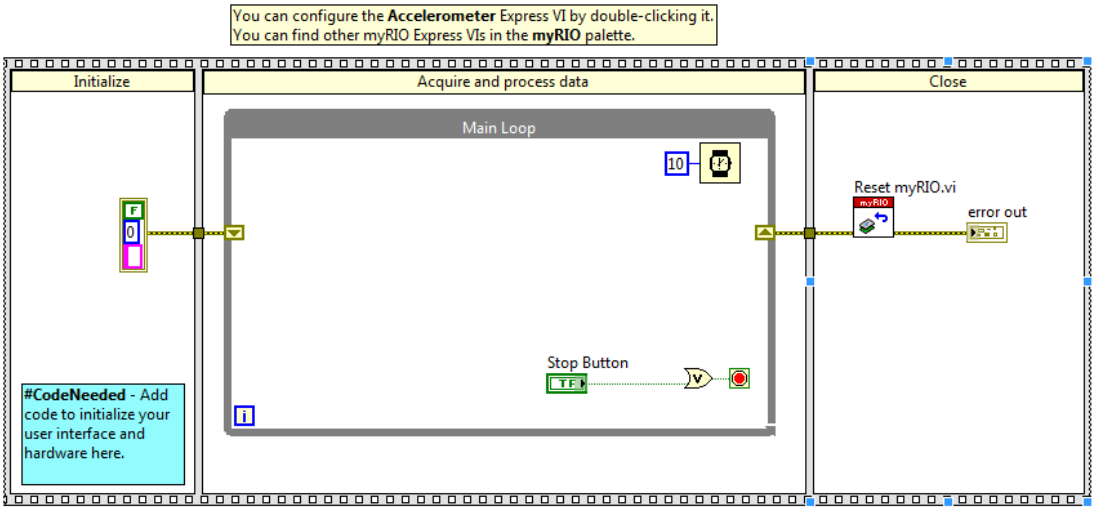

Figura 8. Modificar el programa de ejemplo

[*] En este caso, trabajaremos con el myRIO conectado vía USB. Sin Embargo, puede configurar su myRIO para trabajar de manera inalámbrica vía WiFi.

10. Presione click derecho y seleccione *myRIO >> PWM* para agregar un *Express VI* dentro del ciclo *while* que permitirá habilitar uno de los puertos como un pulso modulado.

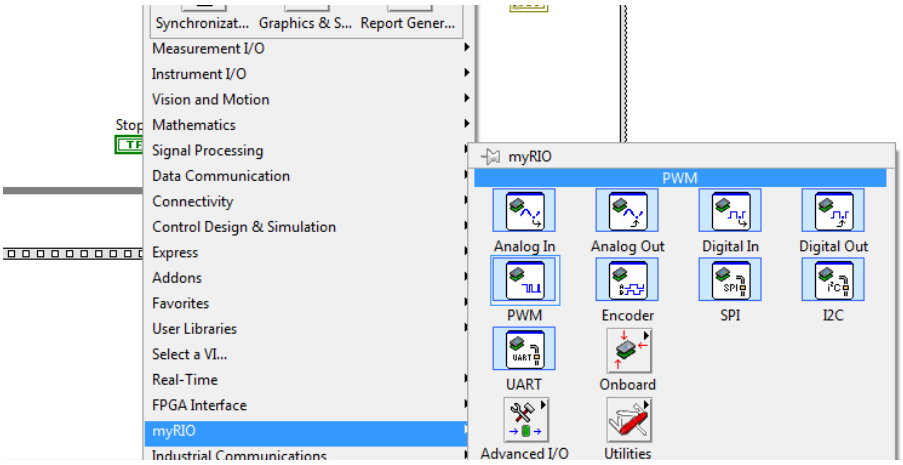

Figura 9. Express VI para PWM

11. Una vez que agregue el *Express VI* dentro del ciclo while, se abrirá una ventana de configuración. Configure dicha ventana para que el puerto C/PWM0 (DIO3) sea la salida del pulso modulado. La ventana debe quedar como se muestra a continuación.

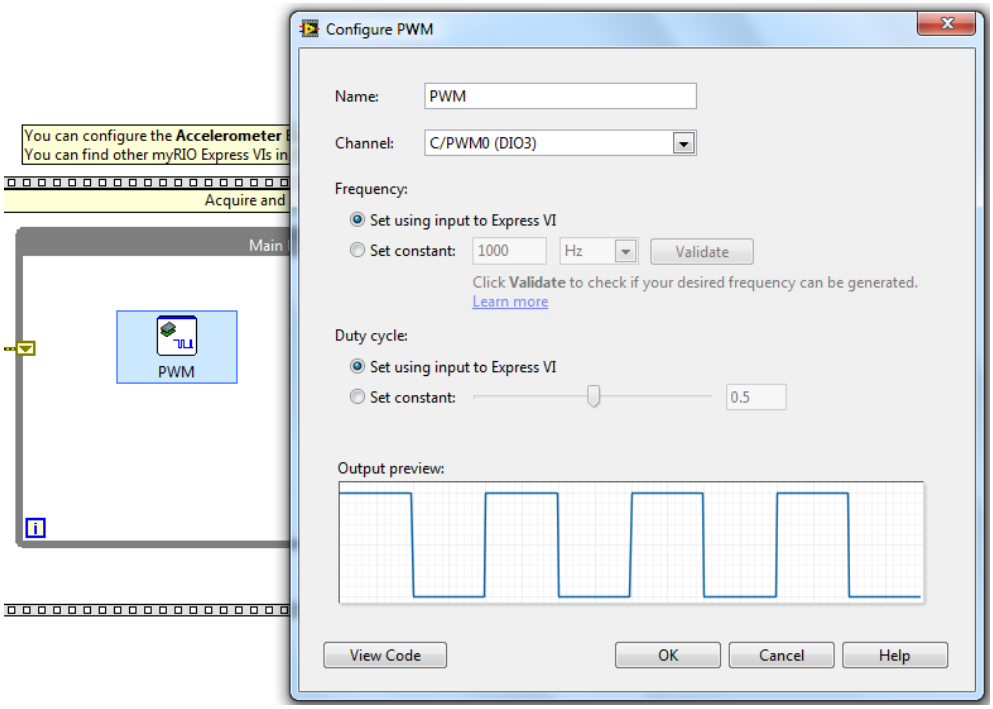

Figura 10. Ventana de Configuración del Express VI para PWM

12. Presione OK al terminar

13. En el Panel Frontal agregar un *Slider* presionando click derecho sobre el panel frontal y seleccione *Silver >> Numeric >> Horizontal Pointer Slide.* Nombrarlo como PWM.

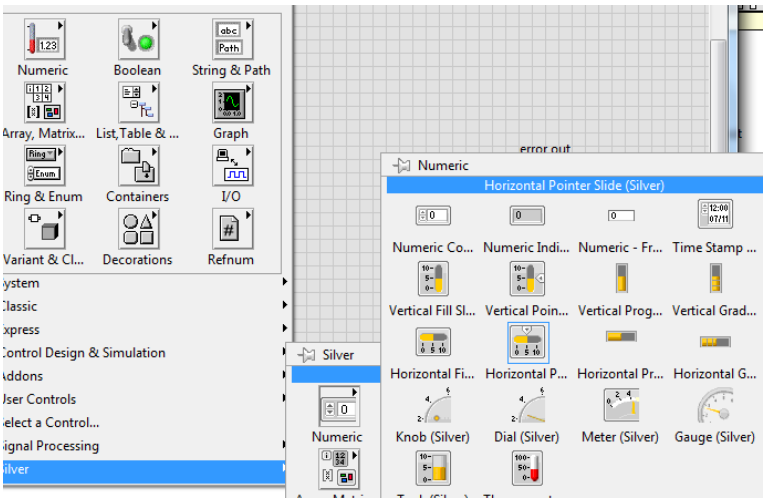

Figura 11. Control Slider

14. Modifique el rango del *Slider* para que vaya de 0 a 1. Doble click sobre el límite superior y escribir 1.

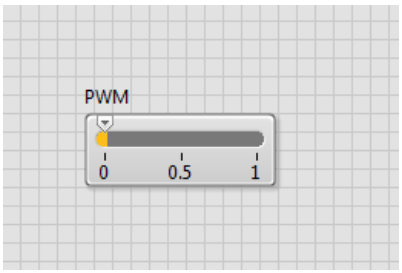

Figura 12. Modificar el rango del Slider de 0 a 1

15. En el diagrama de bloques conecte el control recién creado a la entrada *Duty Cycle* del *Express VI*

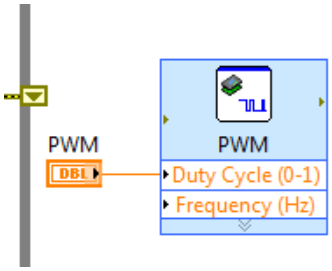

Figura 13. Conectar el control a la entrada del Express VI

16. Cree un nuevo control a la entrada *Frequency* del *Express VI*. Click derecho sobre la entrada, y seleccione *Create >> Control.*

17. Conecte las terminales de error a las terminales del *Express VI.* Al final el diagrama de bloques debe quedar como se muestra a continuación.

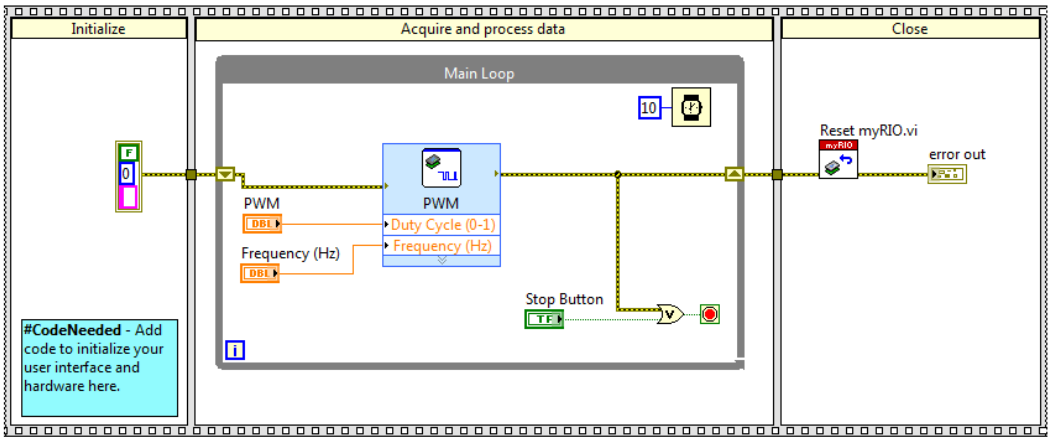

Figura 14. Programa para generar una salida PWM terminado

18. A continuación arme el siguiente circuito en un protoboard. Conecte la salida DIO3 a la Base del amplificador de potencia.

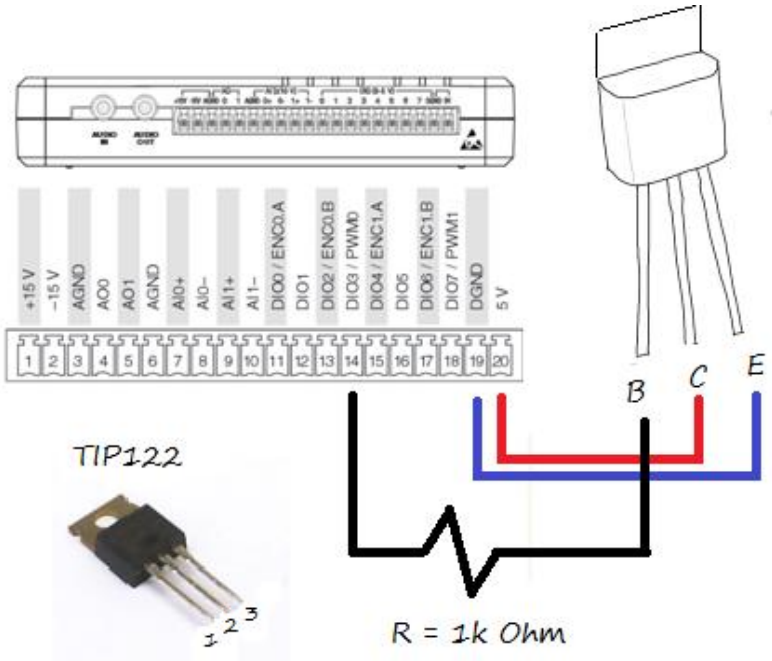

Figura 15. Amplificador de potencia para controlar un motor por medio de PWM

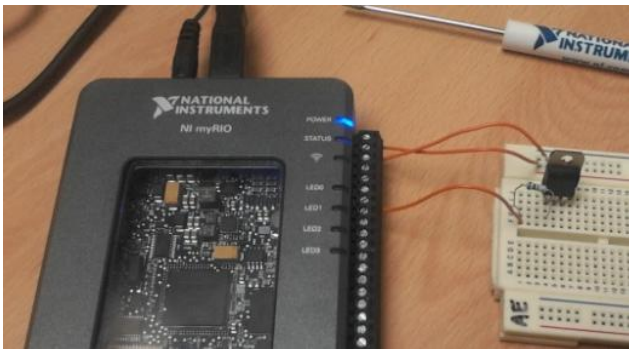

Figura 16. Circuito conectado físicamente al myRIO

19. Una vez que el circuito esté listo, seleccione una frecuencia de 1000Hz y corra el VI

Figura 17. Panel Frontal del programa

20. Conecte el motor a las terminales Colector y Emisor (Pin 2 y 3) del integrado.

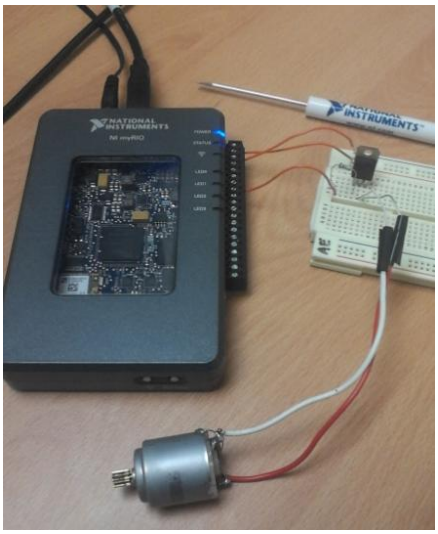

Figura 17. Control de la velocidad de un motor por medio de PWM

21. Varíe el slider y note como la velocidad del motor está siendo controlada.

FIN DEL EJERCICIO

Referencias

1. Hoja de datos NI myRIO
   http://www.ni.com/pdf/manuals/376047a.pdf

2. Hoja de datos del motor que se utilizó
   http://www.mabuchi-motor.co.jp/cgi-bin/catalog/e_catalog.cgi?CAT_ID=rc_280sa

3. Hoja de datos del transistor de potencia TIP122
   http://pdf1.alldatasheet.es/datasheet-pdf/view/2770/MOSPEC/TIP122.html