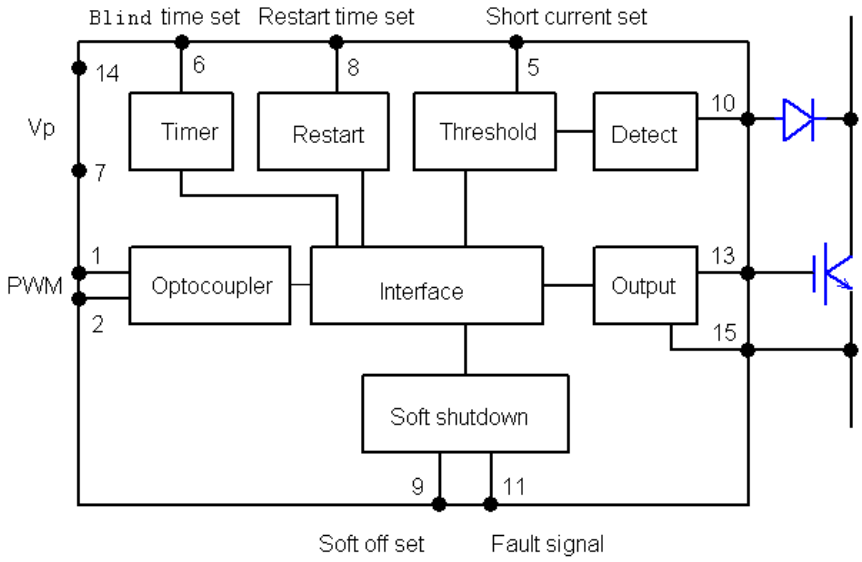
IGBT-Driving Hybrid IC

(TX-KA841)

Application Manual

Block Diagram



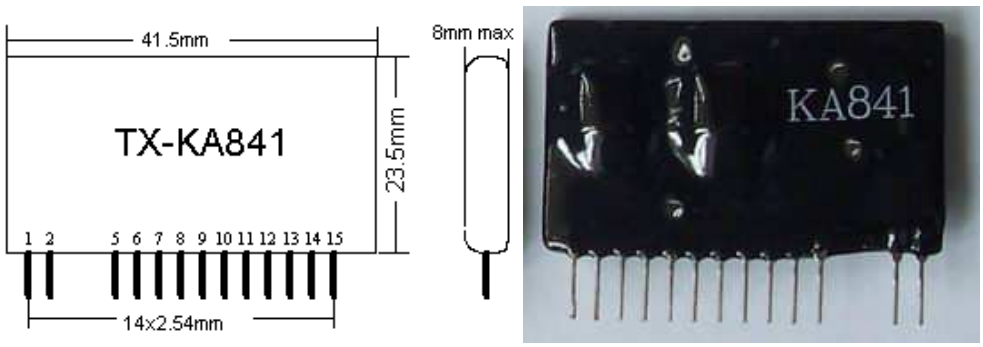
Features

- An IGBT driver for 300A/1200V or 500A/600V .
- Default value can generally use.Blind Time, Soft Shutdown Time and Restart Time after fault condition can also adjust with the requirement of application.
- Protect threshold of IGBT's short current can set exactly by a resistor, or roughly set by a traditional zener diode.
- Use only one single power supply. A negative power supply generated by driver itself which reduce the external devices.
- Wide range of power supply from 20－27V.
- Compatibility with EXB841. The pins are same. Default parameters are similar. Replace directly.

Application

- To drive IGBT for Inverter, Servo systems, Uninterrupted power supply (UPS), Welding applications.

Dimensions (mm)



Electrical Characteristics (Ta=25℃, Vp=20V, Fop=50KHz, CL=100nF, unless otherwise stated)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Supply Voltage(1)	Vp		20	24	27	V
Standby Current	Iio	CL=0		10		mA
Supply Current	Iil	CL=100nF		100		
Input Signal Current Peak Value(2)	Ipwm		9	10	12	mA
Output Voltage(3)	Voh	Rg=2Ω	14	14.5	15	V
	Vol	CL=100nF	-4	-4.5	-5	
Output Current	Iohp	Fop=20KHz, Ton=2μS		6		A
	Iolp	Fop=20KHz, Toff=2μS		-6		
Output Charge	Qout			2000	2800	nC
Isolation Voltage	VISO	50 or 60Hz/1 min		3500		Vrms
Operation Frequency	Fop	CL=100nF	0		60	KHz
Duty Cycle	δ		0		100	%
Minimum Pulse Width	Tonmin	CL=100nF		0.8		μS
Rise Delay	Trd	Rg=2Ω,Ipwm=10mA		0.2	0.4	μS
Fall Delay	Tfd			0.4	0.7	
Rise Time	Tr	Rg=2Ω,CL=100nF		0.6	0.8	
Fall Time	Tf			0.5	0.7	
Protective Threshold(4)	Vn	User set, Typ. Value as Default		8.5		V
Blind Time(5)	Tblind	User set, Min. Value as Default	1			μS
Soft Shutdown Time(6)	Tsoft	User set, Typ. Value as Default		4.6		μS
Restart Time after Shortage(7)	Trst	User set, Typ. Value is Default		1.1	10	mS
Output Fault Signal Current	Iflt			5	10	mA
Fault Signal Delay	Tflt			50		nS
Common Mode Transient Immunity	CMR			30		KV/μS
Operation Temperature	Top		-30		80	℃
Storage Temperature	Tst		-50		120	℃

Notes:

1 . The 24V supply voltage for driver is recommended.

2 . A resistor Ri is connected to input ports in series. Ri makes the input signal current as Ipwm, that is Ri=(Vim－1.5)/Ipwm=(Vim－1.5)/10mA. Vim is the peak value of input signal. A capacitor Ci is paralleled with R1, Ci=220pF.

3 . Output negative value are relevant with supply voltage Vp, Vol=Vp-15.

4 . The voltage of pin 10 as the protect function is triggered. As the potential between pins 10 and 15 (15 is the emitter of IGBT) rise to 8.5V, the driver's protect function will be performed. Connect a resistor Rn between pins 5 and 15, to fall the threshold value of over-current protect. And a 10nf capacitor keep parallel with the resistor for immunity. The relations between the resistor and threshold is: Rn/Vn（KΩ/V）＝∞/8.3, 220/7.7, 100/7.2, 68/6.8, 47/6.3, 33/5.7, 27/5.3, 22/4.9, 18/4.5, 15/4.1, 12/3.7, 10/3.3. When users test, it should use a smaller value of Rn than the designed value which will raise the protection sensitivity and make IGBT more safely.

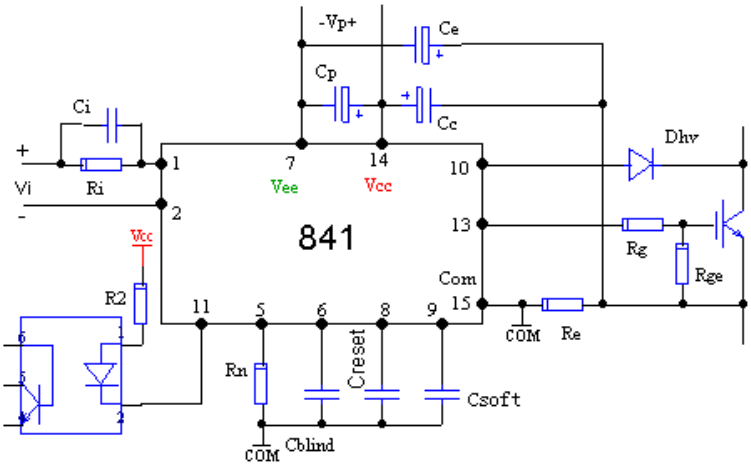
5 . Drivers' response time for protection, namely, from the time of IGBT collector's potential is higher than the driver's protective threshold to the time which driver begin soft shutdown IGBT. There are several of transient disturb. But not all the disturb will damage IGBT. So it's necessary to setting dead time Tdead so that the driver will not pause the running of IGBT frequently. The giving data in form are measured in the case of 6V/μS slope signal added on pin 10. The slope is a simulated signal as the voltage of collector. As for the sudden fault condition of short circuit, the actual Tdead is 1μs longer approximately than the form data. Connecting a capacitor Cdead between pins 6 and 15 will set longer Tdead, the relation is: Cdead/Tdead(pF/μs)＝0/1, 22/1.7, 47/2.2, 68/3, 100/4.1, 150/6.1 . When users test, it should use a smaller value of Cdead than the designed value to raise the protection sensitivity and make IGBT more safely.

6 . The duration time of the driving pulse falls to zero. Connecting a capacitor Csoft between the pins 9 and 7 will set a longer soft shutdown time Toff, in the case of Vp=24V, the relation is: Csoft/Toff(nF/μS)＝0/4.6, 2.2/6, 4.7/7.5, 10/10.

After the beginning of soft shutdown, the driver will block the input PWM signal. Even if the PWM signal become zero volt, the driver do not output negative pulse immediately and it will continue the process of soft shutdown. At the time of beginning of soft shutdown, the driver output a low-level fault signal from pin 11. A photocoupler can be connected and it will transmit the fault signal to control circuits.

7 . After short fault, the driver shut off IGBT softly. If the control circuits have no reaction, the driver will output PWM driving pulse again to IGBT after the restart time Trst. Connect a capacitor Creset between pins 8 and 14, and the restart time Trst become longer. In the case of Vp=20V, the relation is: Creset/Trst(nF/mS)＝0/0.7, 1/1.4, 2/2.0, linearity approximately.

Application Circuit

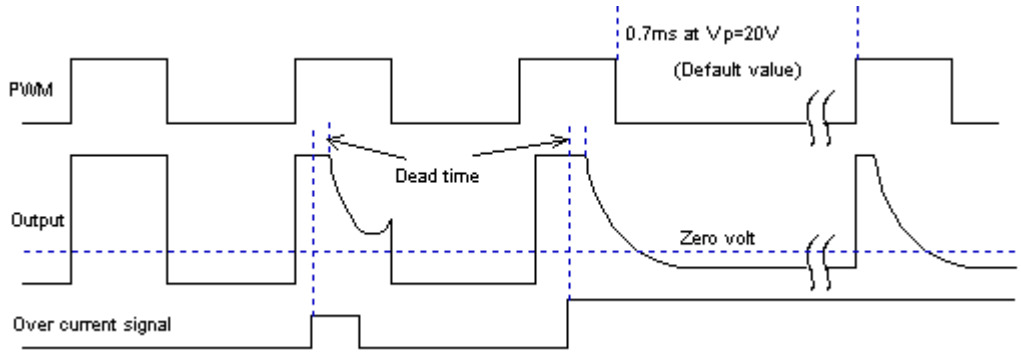


Note1: Filter capacitor Cc, Ce and Cp are 22-47μF of electrolytic capacitor, each one are paralleled with a 0.22μF or more CBB capacitors. Cc、Ce>=25V，Cp>=35V.

Note2: Re＝330Ω。

Reminded：Beware output short circuit between pin 13 and pin 15.

Protect Waveform at Shorted：



Pins Descriptions：

1、2：Input signal.

5：Short current set.

6：Dead time set.

7：Negative port of power supply Vp.

8：Restart time set port, after fault condition of short circuit.

9：Soft shutdown time set.

10：IGBT current detect port, connected to the collector of IGBT.

11：Output port of fault signal.

12：Not used.

13：Output port of driver, connected to the gate of IGBT.

14：Positive port of power supply Vp.

15: Ground reference of driver circuit, connected to the emitter of IGBT.