



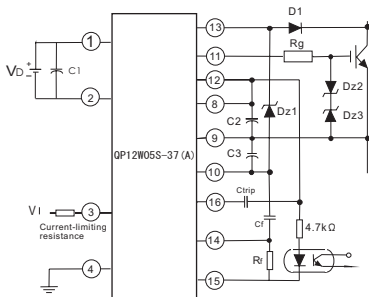
QP12W05S-37(A) Hybrid Integrated IGBT Driver

QP12W05S-37(A) is a hybrid integrated IGBT driver designed for driving N-channel IGBT modules in any gate amplifier application. This device includes the isolated type DC-DC converter for a gate drive. The device provides the required electrical isolation between input and output with the opto-coupler. Short circuit protection is provided by a built-in desaturation detector. A fault signal is provided if the short circuit protection is activated.

FEATURES

- Built in high CMRR opto-coupler (CMR: Typical: 30kV/μs, Min: 15kV/μs)
- Single supply drive topology
- Built in the isolated type DC/DC converter for gate drive
- CMOS & TTL compatible input interface
- Electrical isolation voltage between input and output is 3750VRMS (for 1 minute)
- Built in short circuit protection circuit with a pin for fault output
- Soft IGBT turn-off and the time is adjustable
- Fault blank off and protection circuit time is adjustable
- Adjustment of Controlled time detect short circuit
- Switching frequency up to 20kHz

APPLICATION EXAMPLE

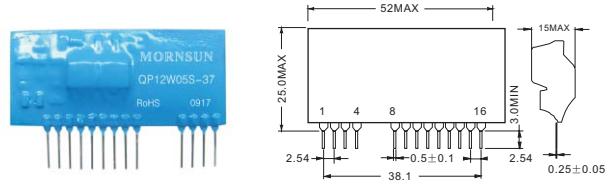


$V_D=15V$
 $V_I=5V \pm 5\%$
 $C1: 100\mu F$ (Low impedance)
 $C2: 100\mu F$ (Low impedance)
 $C3: 100\mu F$ (Low impedance)
 C_{trip} : Depend on need. (Can NC)
 C_f : Depend on need (Can NC)
 R_f : Depend on need (Can NC)
 $R_g: 5\Omega$
 $DZ1: 30V$
 $DZ2, DZ3: 18V$
 $D1$: Fast recovery diode (trr) $\leq 0.2\mu s$

ABSOLUTE MAXIMUM RATINGS

Item	Test Conditions	Ratings	Units
Supply Voltage	V_D DC	QP12W05S-37:16 QP12W05S-37A:13	V
Input Current	I_{in} Between pin13 and pin14	25	mA
Output Voltage	V_o When the Output voltage "H"	V_{CC}	V
	$I_{g\ on}$ Pulse width 2μs	+5	A
Output Current	$I_{g\ off}$ Frequency f=20kHz	-5	A
	Isolation Voltage	V_{iso} Sine wave voltage 50Hz/60Hz, 1 min	3750
Operating Temperature	T_{op}	-40~+70	°C
Storage Temperature	T_{st}	-50~+125	°C
Fault Output Current	I_F	20	mA
Input Voltage	V_R Applied pin13	50	V

Notes: 1. $T_a=25^\circ C$; unless otherwise specified
 QP12W05S-37: $V_D=15V$; QP12W05S-37A: $V_D=12V$,



Notes: Unit: mm

Pin Function

Pin	Function
1	Power supply(+)
2	Power supply(-)
3	Drive signal input(+)
4	Drive signal input(-)
8	DC/DC converter output(+)
9	DC/DC converter output(COM)
10	DC/DC converter output(-)
11	Drive output
12	Collector
13	Detect of short circuit
14	Adjustment of soft turn-off time
15	Fault signal output
16	Adjustment of Controlled time detect short circuit

APPLICATIONS

- General-purpose Inverter
- AC Servo Systems
- Uninterruptable Power Supplies(UPS)
- Welding Machines

RECOMMENDED MODULES

- 600V Series IGBT (up to 600A)
- 1200V Series IGBT (up to 400A)
- 1700V Series IGBT (up to 200A)

ELECTRICAL CHARACTERISTICS

Characteristics	Test Conditions	Limit			Units
		Min	Typ	Max	
Supply Voltage (QP12W05S-37)	V_D Recommended Range	14.5	15	15.5	V
Supply Voltage (QP12W05S-37A)	V_D Recommended Range	11.6	12	12.4	V
I _H input current	I_{IH} Recommended Range	10	16	20	mA
Switching frequency	f Recommended Range	0		20	KHz
Gate resistant	R_G Recommended Range	2			Ω
Gate supply voltage	V_{CC} $V_D=15$	14.5		18.0	V
	V_{EE} $V_D=15$	-7		-10	V
"H" output voltage	V_{OH} 15KΩ connected between pin9-11	13.5	15.3	17.0	V
"L" output voltage	V_{OL} 15KΩ connected between pin9-11	-6		-10	V
"L-H" propagation delay time	t_{PLH} $I_{IH}=10mA$		0.5	1	μs
"L-H" rise time	T_r $I_{IH}=10mA$		0.3	1	μs
"H-L" propagation delay time	T_{PHL} $I_{IH}=10mA$		1	1.3	μs
"H-L" fall time	T_f $I_{IH}=10mA$		0.3	1	μs
Protection threshold voltage	V_{OCP} $V_D=15V$		9.5		V
Protection reset time	t_{timer} Between start and cancel	1	1.4	2	ms
Fault output current	I_{FO} Pin15 input current, R=4.7K		5		mA
Short-circuit detection time delay	T_{trip1} Pin 13: $\geq 15V$, Pin 16: open		1.6		μs
Soft turn-off time	T_{cf} PIN 13 $\geq 15V$, Pin 14: open		4.5		μs
SC detect voltage	V_{SC} Collector voltage of module	15			V

Notes: 1. $T_a=25^\circ C$; unless otherwise specified
 QP12W05S-37: $V_D=15V, R_g=5\Omega$;
 QP12W05S-37A: $V_D=12V, R_g=5\Omega$
 2. "H" represents high level; "L" represents low level.



IGBT Driver

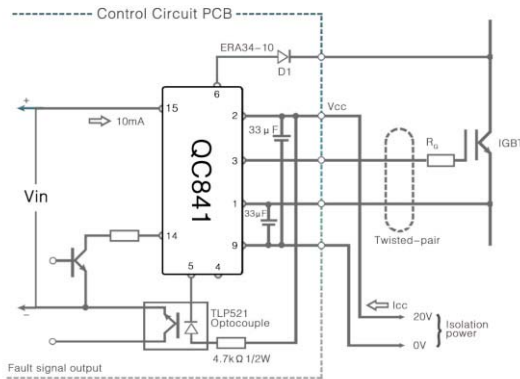
QC 841 Hybrid Integrated IGBT Driver

QC841 is a hybrid integrated IGBT driver built-in electrical isolation between power devices and control circuits with the high CMRR opto-coupler. Short circuit protection is provided by a built-in desaturation detector. A fault signal is provided if the shortcircuit protection is activated.

FEATURES

- Built in high CMRR opto-coupler: (CMR: Typical: 30kV/μs, Min.: 15kV/μs)
- Electrical isolation voltage between input and output with opto-couplers (Viso=3750VRMS/min)
- Switching frequency up to 20kHz
- Single supply drive topology
- Built in short circuit protection circuit with a pin for fault output
- Soft IGBT turn-off and protection circuit time reset
- Pins are compatible with EXB841

APPLICATION EXAMPLE



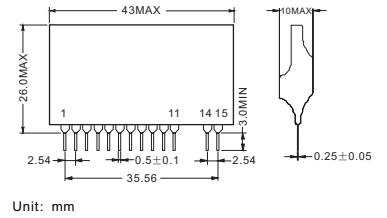
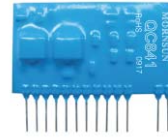
TTL compatible input interface
 Duty: 50%
 $V_{in} = 5V$
 $D1$: Fast Recovery Diode ($t_{rr} \leq 0.2\mu s$)

$f = 20kHz$
 $V_{cc} = 20V$
 $R_g = 3.1\Omega$

ABSOLUTE MAXIMUM RATINGS

Item	Test Conditions	Limit	Units
Supply Voltage*	V_{cc} DC	25	V
Input current	I_{in} Between Pin14 and Pin15	25	mA
Output current	$I_{g on}$ Pulse width 2μs	+5	A
	$I_{g off}$ Frequency f=20kHz	-5	A
Isolation Voltage	V_{iso} Sinewave voltage 50Hz/60Hz 1 min.	3750	V
Operating Temperature	T_{opr}	-20~+70	°C
Storage Temperature	T_{stg}	-40~+125	°C
Fault Output Current	I_{FO}	20	mA
Input Voltage	V_{R1} Pin6 input voltage	50	V

Notes: $T_a = 25^\circ C$; unless otherwise specified



PIN FUNCTION:

Pin	Function
1	Connected to smoothing capacitor for reverse bias
2	Power supply(+)
3	Drive output
5	Fault signal output
6	Fault detect
9	Gnd
14	Drive signal input(-)
15	Drive signal input(+)
4, 7, 8, 10, 11	Not connected

APPLICATIONS

- General-purpose Inverter
- AC Servo Systems
- Uninterruptable Power Supplies(UPS)
- Welding Machines

RECOMMENDED MODULES

- 600V Series IGBT (up to 600A)
- 1200V Series IGBT (up to 400A)
- 1700V Series IGBT (up to 200A)

ELECTRICAL CHARACTERISTIC

Characteristics	Test Conditions	Limit			Units	
		Min	Typ	Max		
Supply Voltage	V_{cc}	Recommended Range	18	20	22	V
Reverse bias power supply voltage	V_{RB}	Recommended Range		-5		V
Switching frequency	f	Recommended Range	0		20	KHz
Gate resistant	R_g	Recommended Range	2			Ω
Ii input current	I_{IH}	Recommended Range	10	16	20	mA
Ii output voltage	V_{OH}	$V_{cc}=20V$		14		V
I output voltage	V_{OL}	$V_{cc}=20V$		-5		V
L-H Propagation	T_{PLH}	$I_{IH}=16mA$		0.5	1	μs
L-H rise time	T_r	$I_{IH}=16mA$		0.6	1	μs
H-L Propagation	T_{PHL}	$I_{IH}=16mA$		1	1.3	μs
H-L fall time	T_f	$I_{IH}=16mA$		0.4	1	μs
Protection threshold voltage	V_{OCP}	$V_{cc}=20V$		8.5		V
Protection reset time	t_{timer}		1	1.4	2	ms
Fault output current	I_{FO}	Pin5 input current, $R=4.7K$			5	mA
Soft turn-off time	T_{off2}	Pin6: $\geq 15V$		5		μs
Controlled time detect short circuit 1	T_{trip1}	Pin6: $\geq 15V$		2.6		μs

Notes: 1. $T_a = 25^\circ C$, $V_{cc} = 20V$, unless otherwise specified
 2. "H" represents high level; "L" represents low level.



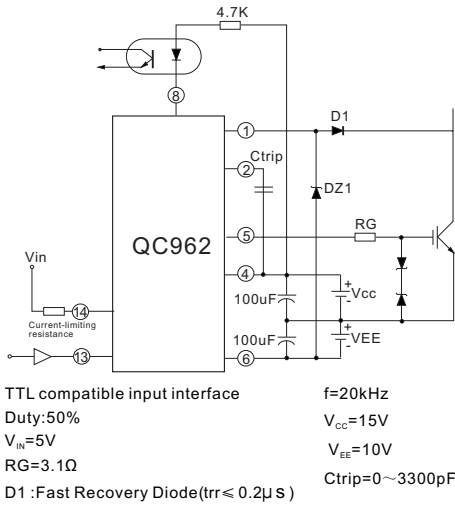
QC 962 Hybrid Integrated IGBT Driver

QC962 is a hybrid integrated IGBT driver designed for driving N-channel IGBT modules in any gate amplifier application. The device provides the required electrical isolation between input and output with the opto-coupler. Short circuit protection is provided by a built-in desaturation detector. A fault signal is provided if the short circuit protection is activated.

FEATURES

- Built in high CMRR opto-coupler (CMR: Typical: 30kV/μs, Min.: 15kV/μs)
- Two supply drive topology
- TTL compatible input interface
- Electrical isolation voltage between input and output with opto-couplers (Viso=3750VRMS/min)
- Built in short circuit protection circuit with a pin for fault output
- Soft IGBT turn-off and protection circuit time reset
- Controlled time detected short circuit
- Switching frequency up to 20kHz
- Pins and characteristics are compatible with M57962AL

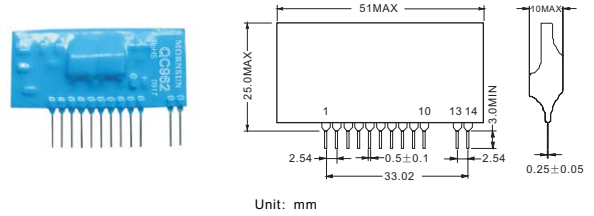
APPLICATION EXAMPLE



ABSOLUTE MAXIMUM RATINGS

Item	Test Conditions	Limit	Units
Supply Voltage*	Vcc	18	V
	VEE	-15	V
Input Current	Iin Between pin13 and pin14	25	mA
Output Voltage	Output voltage "H"	Vcc	V
Output Current	Igon Pulse width 2μs	+5	A
	Igoff Frequency f=20kHz	-5	A
Isolation Voltage	Sine wave voltage 50Hz/60Hz, 1 min.	3750	V
Junction Temperature	Tj	150	°C
Operation Temperature	Top	-20~+70	°C
Storage Temperature	Tst	-40~+125	°C
Fault Output Current	Ifo	20	mA
Input Voltage	VR1 Pin 1 voltage	50	V

Notes: 1. Ta=25°C unless otherwise specified.
2. *20V<Vcc-VEE<28V.



PIN FUNCTION:

Pin	Function
1	Fault detect
2	Reaction time
4	Power supply(+)
5	Drive output
6	Power supply(-)
8	Fault signal output
13	Drive signal input(-)
14	Drive signal input(+)
3, 7, 9, 10	Not connected

APPLICATIONS

- General-purpose Inverter
- AC Servo Systems
- Uninterruptable Power Supplies(UPS)
- Welding Machines

RECOMMENDED MODULES

- 600V Series IGBT (up to 600A)
- 1200V Series IGBT (up to 400A)
- 1700V Series IGBT (up to 200A)

ELECTRICAL CHARACTERISTIC

Characteristics	Test Conditions	Limit			Units
		Min	Typ	Max	
Supply Voltage	Vcc	14	15		V
	VEE	-7		-10	V
Switching frequency	f	0		20	KHz
Gate resistant	RG	2			Ω
II input current	IiH	10	16	20	mA
II output voltage	VOH	13	14		V
I output voltage	VOL	-6		-9	V
L-H Propagation	tPLH IiH=16mA		0.5	1	μs
L-I rise time	Tr IiH=16mA		0.6	1	μs
II-L propagation	TpHL IiH=16mA		1	1.3	μs
II-L fall time	Tf IiH=16mA		0.4	1	μs
Protection threshold voltage	Vocp Vcc=15V, VEE=-10V		8.4		V
Protection reset time	ttimer	1	1.3	2	ms
Fault output current	Ifo Pin8 input current, R=4.7K		5		mA
Controlled time detect short circuit 1	Ttrip1 Pin1: ≥15V, Pin2: open		2.6		μs
Controlled time detect short circuit 2	Ttrip2 Pin1: ≥15V, Pin2- Pin4: 1000pF		3		μs
Soft turn-off time	Toff2 PIN1: ≥15V		5		μs
SC detect voltage	Vsc Collector voltage of module	15			V

Notes: 1. Ta=25°C, Vcc=15V, VEE=-10V, unless otherwise specified
2. "H" represents high level; "L" represents low level.



IGBT Driver

QA01, QA02, QA03, QA04

Specially Designed For IGBT Driver DC-DC Converter

QA01,QA02,QA03,QA04 is specially designed for the IGBT driver which needs two isolation power supply. With two independent outputs, it can be better to supply power to the ON/OFF driver. The module also provides functions of short circuit protection and self-recovery capability.

FEATURES

- Input Voltage Range: As table
- Miniature Size, Light weight
- 3000VAC Isolation(Input,Output; Tested for 1min/1mA)
- Short circuit protection

SPECIFICATIONS

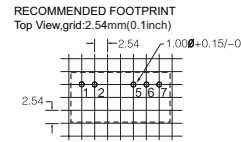
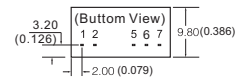
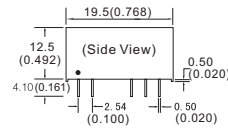
Operating temperature.....	-40℃~+85℃(QA01,QA02,QA03)
	-40℃~+105℃(QA04)
Efficiency.....	80%
Input voltage range.....	QA01: 14.5~15.5VDC
	QA02: 11.6~12.4VDC
	QA03: 23.3~24.7VDC
	QA04: 9~15VDC
Line regulation(V _{in} change of 1%).....	1.5%(max)(QA01,QA02,QA03)
	(V _{in} change of 25%)...1.5%(max)(QA04)
Isolation capacitor.....	6.6pF(typ)(QA01,QA02,QA03)
	10pF(typ)(QA04)
Ripple & Noise(I _{O1} =80mA).....	150mVp-p(max)(QA01,QA02,QA03)
	(I _{O1} =100mA).....200mVp-p(max)(QA04)
Short circuit protection.....	Continuous short-circuit protection for 10 minutes, self-restart
Storage temperature.....	-50℃~+125℃
MTBF.....	≥3,500,000 hours
Certificate.....	RoHS



Size: 19.5x9.8x12.5(mm)

QA0x

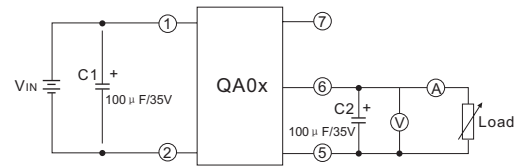
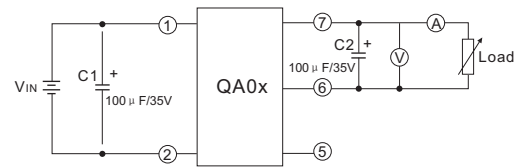
- Serial number
- Dedicated power supply for IGBT Driver
- Product series code



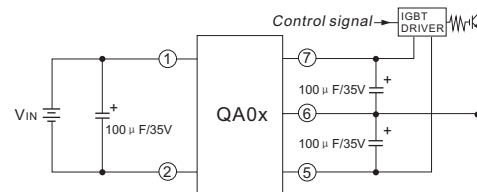
Pin Function

1	V _{in}
2	GND
5	-V _o
6	0V(com)
7	+V _o

TEST EXAMPLE



APPLICATION EXAMPLE



Series	Input (VDC)	Positive output(VDC)	Negative output(VDC)	Input Range	Max. Output average current	Efficiency	Isolation (VAC)	Package
QA01	15	+15	-8.7	±3%	80mA/40mA	80%	3000	SIP
QA02	12	+15	-9	±3%	80mA/40mA	80%	3000	SIP
QA03	24	+15	-9	±3%	80mA/40mA	80%	3000	Sip
QA04	12	+15	-8	±25%	100mA/80mA	80%	3000	SIP