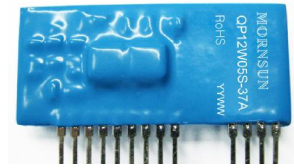


QP12W05S-37A Hybrid Integrated IGBT Driver



RoHS

QP12W05S-37A is a hybrid integrated IGBT driver designed for driving IGBT modules. This device is a fully isolated gate drive circuit consisting of an optimally isolated gate drive amplifier and an isolated DC-to-DC converter. The gate driver provides an over-current protection function based on desaturation detection and fault output.

Features

- I Built in high CMRR opto-coupler (CMR: Typical: 30kV/μs, Min.: 15kV/μs)
- I Single supply drive topology
- I Built in the isolated type DC/DC converter for gate drive
- I SIP package
- I CMOS&TTL compatible
- I Electrical isolation voltage between input and output is 3750VRMS (for 1 minute)
- I Built in short circuit protection circuit with a pin for fault output
- I Soft turn-off time is adjustable
- I The drive signal is ignored in the blocking time and the protection circuit reset at the end of it
- I Controlled time detect short circuit is adjustable
- I Switching frequency up to 20kHz

Application

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

Recommended modules

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

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Absolute Maximum Ratings

Item	Test Conditions	Ratings	Units
Supply Voltage	V _D DC	13	V
Input Current	I _{in} Between pin3 and pin4	25	mA
Out Voltage	V _O When the Output voltage "H"	V _{CC}	V
Output Current	I _{g on} Pulse width 2μs	+5	A
	I _{g off} Frequency f=20kHz	-5	A
Isolation Voltage	V _{iso} Sine wave voltage 50Hz/60 Hz, 1 min.	3750	V
Operation Temperature	T _{op}	-40 ~ +70	°C
Storage Temperature	T _{st}	-50 ~ +125	°C
Fault Output Current	I _{FO} Pin15 input current	20	mA
Input Voltage	V _{R1} Applied pin13	50	V

Notes: 1. Ta=25°C; V_D=12V, unless otherwise specified

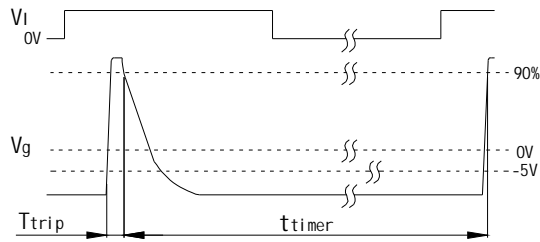
Electrical Characteristic

Characteristics	Test Conditions	Limit			Units
		Min	Typ.	Max	
Supply Voltage	V _D Recommended Range	11.6	12	12.4	V
"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 =12V	14.5		18.0	V
	V _{EE} V _D =12V	-7		-10	V
"H" output voltage	V _{OH} 10KΩconnected between pin9-11	13.5	15.3	17.0	V
"L" output voltage	V _{OL} 10KΩconnected 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 =12V		9.5	15	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: ≥15V, Pin 16: open		1.6		μs
Soft turn-off time	T _{of} PIN 13≥15V, Pin 14: open		4.5		μs
SC detect voltage	V _{SC} Collector voltage of module	15			V

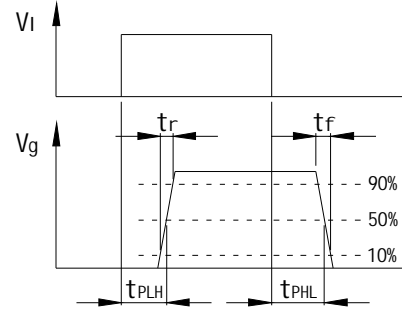
Notes: 1. Ta=25°C, V_D=12V, R_g=5Ω, unless otherwise specified
2. "H" represents high level; "L" represents low level.

Definition of Characteristics

1) Operation of short circuit protection



2) Switching operation

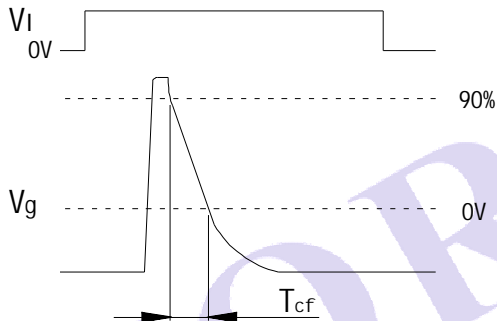


Definition of Adjustment

1) Adjustment of soft turn-off time:

(Operation of short circuit protection)

When a desaturation is detected the hybrid gate driver performs a soft shutdown of the IGBT. The Soft turn-off time is 4.5μS. You can connect an Rf or Cf to adjust the Soft turn-off time. (Connecting Rf will decrease the soft turn-off time and connecting Cf will increase the soft turn-off time.) The soft turn-off time must be set $2.5\mu\text{S} < T_{cf} < 10\mu\text{S}$. Please refer to the below table.

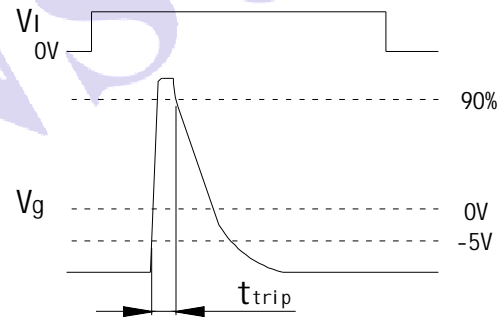


Rf (Ω)	Tcf (μS)	Cf (nF)	Tcf(μS)
—	4.5	—	4.5
1500	4.0	1	4.9
500	3.5	3.3	5.3
300	3.0	10	6.5
110	2.5	22	9.3

2) Adjustment of short-circuit detection time delay

(Operation of short circuit protection)

The short-circuit detection time delay is defined between the time in which a desaturation is detected and the time in which the gate voltage fall down to 90% of extent. This diver have a minimum short-circuit detection time delay, and you can adjust the short-circuit detection time delay by connecting the capacitor (Ctrip) between PIN12 and 16. But the short-circuit detection time delay must be set less than 3.5μS. Please refer to below table.(the data only for refer)



Ctrip (nF)	Ttrip(μS)
—	1.6
0.33	1.8
1.0	2.2
2.2	2.4
3.3	2.6

