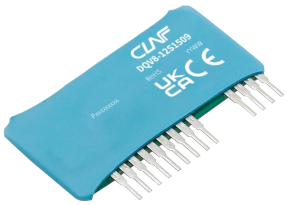
Descriptions IGBT Driver



RoHS

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Built-in isolated DC-DC power supply; Single power supply drive topology
- High isolation voltage of 3750VAC
- Input signal frequency up to 20kHz
- Built-in fault circuit with a pin for fault feedback
- Drive signal ignored during blocking time, fault circuit reset after blocking time end
- Adjustable controlled time of fault detection circuit
- Adjustable protective soft cut-off time
- SIP package

Applications

- Universal inverter
- AC servo drive system
- Uninterruptible Power Supply (UPS)
- Electric welding machine
- Compatible IGBTs:
- 600V Series IGBT (Current≤600A)
- 1200V Series IGBT (Current≤400A)
- 1700V Series IGBT (Current≤200A)

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output			Capacitive load (uF) Max.
			Output High-level Voltage VOH (VDC)	Output Low-level Voltage VOL (VDC)	Driving Current (A)Max.	
EN/BS EN	DQV8-12S1509	12	15	-9	±8	2200

Notes: *Product images are for reference only; the actual product shall prevail.

Maximum ratings

Item	Symbol	Testing Conditions	Value	Unit
Power Supply Input Voltage	V_D	DC	13	V
Input Impulse High-level Current	I_{IH}	Between PIN3 and PIN4	25	mA
Output Voltage	V_o	The input signal is high	VCC	V
Driver Output Peak Current	$I_{g\,on}$	Pulse width 2us Frequency f=20kHz	+8	A
Fault Output Current	I_{goff}		-8	
Fault Output Current	I_{fo}		20	mA
Max. Input Voltage to Fault Detect Pin	V_{R1}	Applied Pin13	50	V

Specifications

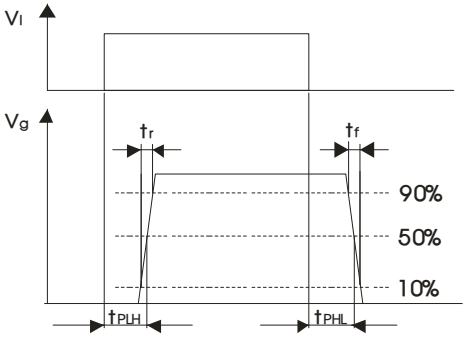
Product Specifications	Item		Symbol	Testing Conditions	Min.	Typ.	Max.	Unit
Input Specifications	Power Supply		V_D		11.6	12	12.4	V
	Maximum incoming current		I_{In}		--	180	290	mA
	High-level Input Current		I_{IH}		10	16	20	
Output Specifications	Isolated Power Supply Voltage		V_{CC}	VD=12V	14.5	--	18	V
			V_{EE}	VD=12V	-7	--	-10	
	Drive Output	High-level Voltage	V_{OH}	10kΩConnected Between PIN9-11	13.5	15.0	17.0	
		Low-level Voltage	V_{OL}	10kΩConnected Between PIN9-11	-6	-9	-10	
		Rise Time	t_r	IIH=10mA	--	0.3	1	μs
		Fall Time	t_f	IIH=10mA	--	0.3	1	
General Specifications	Operating Frequency		f		0	--	20	kHz
	Input Impulse and Drive Output	Rise Delay Time	t_{PLH}	IIH =10mA	--	0.5	1	us
		Fall Delay Time	t_{PHL}	IIH =10mA	--	1	1.3	
	Controlled Time of Detect Fault Circuit		t_{trip}	VD = 12V, fault protection function	--	1.6	--	
	Fault Soft Turn-off Time		t_{cf}	VD = 12V, fault protection function	--	4.5	--	
	Fault Reset Time		t_{timer}	Time from start to end of protection signal	1	1.4	2	ms
	Fault Threshold Voltage		V_{ocp}	VD=12V	--	9.5	--	V
	SC Detect Voltage		V_{SC}	Collector Voltage of Module	15	--	--	
	Fault Output Current		I_{FO}	PIN15 Input Current, R=4.7kΩ	--	5	--	mA
	Gate Resistant		R_g		2	--	--	Ω
	Insulation Test		V_{iso}	Sine Wave 50Hz/60Hz, 1min, leakage current <1mA	--	--	3750	VAC
	Operating Temperature		T_{op}		-40	--	70	℃
	Storage Temperature		T_{st}		-50	--	125	

	Weight	W		--	6.0	--	g
	Safety Class			CLASS III			

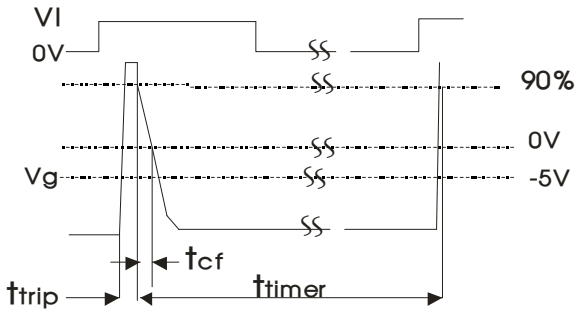
Design Reference

1.Description of Characteristic

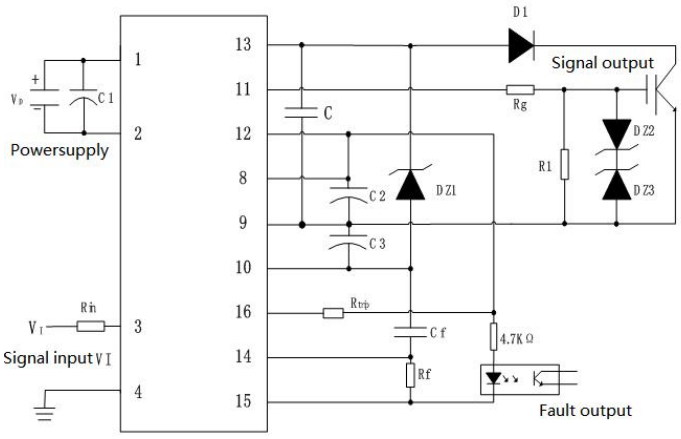
1)Definition of Fault-free Characteristic



2)Definition of Fault Characteristic



2.Typical application



VD	12V
VI	5V±5%
C1	100μF/35V(Low impedance)
C2	100μF/35V(Low impedance)
C3	100μF/35V(Low impedance)
Ctrip	set as required (optional)
Cf	set as required (optional)
Rf	set as required (optional)
Rg	5Ω
R1	10kΩ 0.25W
DZ1	TVS(30V , 0.5W)

Note:

1. For further ripple & noise reduction, connect an additional capacitor each with a value between 1uF and 10uF in parallel with capacitors C2 and C3.

2. If the input impulse voltage is too high, the current-limiting resistance can be adjusted to meet the requirements of the input impulse current. A high-speed opto-coupler LED with a 150Ω series resistance is connected in between the signal input terminals and the current-limiting resistance can be calculated according to the following formula:

$$R_{in} = \frac{V_I\text{-}1.7V}{16mA}\text{-}150\Omega$$

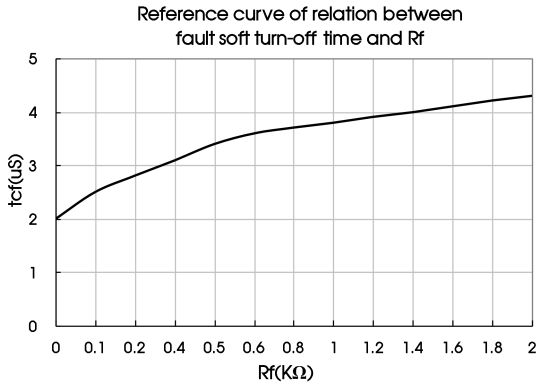
3. If the application environment is poor, a ceramic capacitor C can be added between pin 9 and pin 13, the recommended capacity value is 0.1uF. In fact, the selection needs to be combined with the customer's application environment.

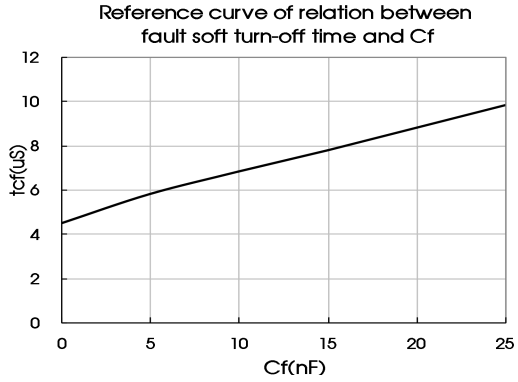
4. D1 should be selected according to the voltage of the bus. Generally, it should be greater than or equal to twice the voltage of the bus. In practice, selection should be based on the customer's application environment.

1. Fault soft turn-off time adjustment:

When a short-circuit or an over-current condition occurs, the driver protection circuit activates and slowly turns off the IGBT. The default turn-off time is 4.5μs, and this turn-off time can be adjusted by connecting an external resistor Rf to reduce the time, or capacitor Cf to increase the time. The adjustment range is 2.5μs to 10μs. The values for protective turn-off time adjustment in the table below are for reference only and must be verified to suite the actual application.

Reference values for Fault soft turn-off time adjustment			
Rf (kΩ)	tcf (μs)	Cf (nF)	tcf (μs)
–	4.5	-	4.5
1.5	4.0	1	4.9
0.5	3.5	3.3	5.3
0.3	3.0	10	6.5
0.11	2.5	22	9.3





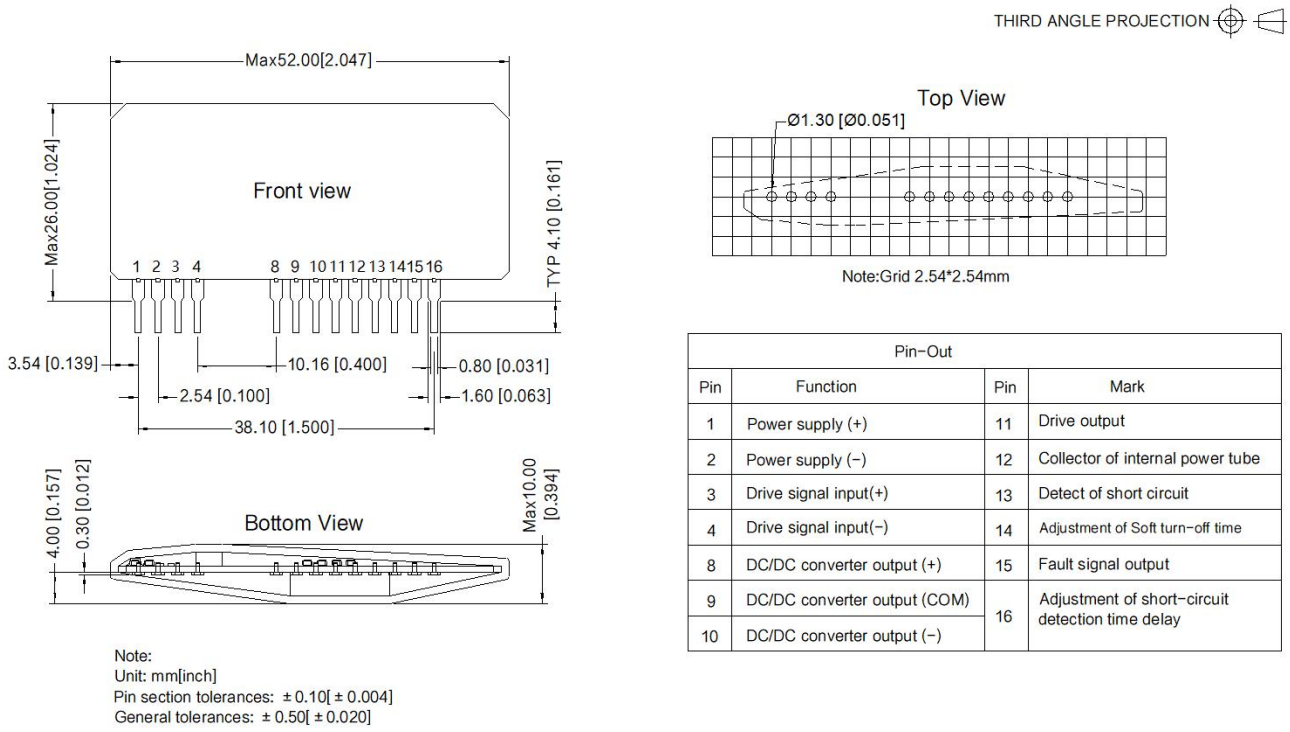
2. Controlled fault detection time adjustment:

When a short circuit or an over current condition occurs, the time from the moment the driver detects a short circuit or an over current condition to when the gate potential drops to 90% of the normal amplitude is called "Controlled Time of Fault Detection". The driver sets the default minimum controlled time for the fault detection circuit and the user can increase this time, by connecting an external Ctrip capacitance. The maximum time that can be adjusted is 3.5μs. The values for adjustment controlled short circuit time detection in the table below are for reference only and must be verified to suite the actual application

Reference values for Controlled fault detection time adjustment	
Ctrip (nF)	ttrip(μs)
--	1.6
0.10	1.8
0.33	2.0
2.20	2.4
3.30	2.8

Ttrip(uS)

Dimensions and Recommended



Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]

Pin-Out			
Pin	Function	Pin	Mark
1	Power supply (+)	11	Drive output
2	Power supply (−)	12	Collector of internal power tube
3	Drive signal input(+)	13	Detect of short circuit
4	Drive signal input(−)	14	Adjustment of Soft turn-off time
8	DC/DC converter output (+)	15	Fault signal output
9	DC/DC converter output (COM)	16	Adjustment of short-circuit detection time delay
10	DC/DC converter output (−)		

Note:
1. The built-in isolated DC-DC power supply is for internal driver use only and cannot be used for external connections.
2. The driver must be wired as short as possible to the IGBT module's gate and emitter terminals (1m max.);
3. Twisted pair is recommended for the connection of the driver to the gate and emitter of the IGBT;
4. In order to reduce the high peak voltage generated at the collector of the IGBT turn-off, it is recommended to increase the gate resistance appropriately;
5. The additional capacitor or resistor should be placed as close as possible to the driver terminals. Do not exceed the recommended maximum values;
6. Select electrolytic capacitors for C2 and C3 with a low ESR and placed them as close as possible to the driver terminals;
7. Select a fast recovery diode D1 (connected to pin 13) with a peak reverse voltage that is higher than the peak value of the IGBT collector voltage;
8. The 30V Zener diode DZ1 is connected between pin 13 and pin 10, protecting the driver from the reverse recovery characteristic of the diode D1 which could generate an excessive voltage on pin 13;
9. 4.7KΩ resistance can be connected between pin 13 and pin 9 if fault detection no required.(D1 and DZ1 is not required in this circuit).
10. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
11. All index testing methods in this datasheet are based on company corporate standards;
12. The above are the performance indicators of the product models listed in this datasheet. Some indicators of non-standard models will exceed the above requirements;
13. Products are related to laws and regulations: see "Features" ;
14. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
15. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.