

Descriptions IGBT Driver

CE Report
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 $\leq$ 600A)
 - 1200V Series IGBT (Current $\leq$ 400A)
 - 1700V Series IGBT (Current $\leq$ 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	DQV8-15S1509	15	15	-9	± 8	5400

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	16	V
Input Impulse High-level Current	I_{IH}	Between PIN3 and PIN4	25	mA
Output Voltage Driver Output Peak Current	$I_{g\ on}$	Pulse width 2us Frequency f=20kHz	+8	A
	$I_{g\ off}$		-8	
Fault Output Current	I_{fo}		20	mA
Max. Input Voltage to Fault Detect Pin	V_{R1}	Applied Pin13	50	V

Specifications

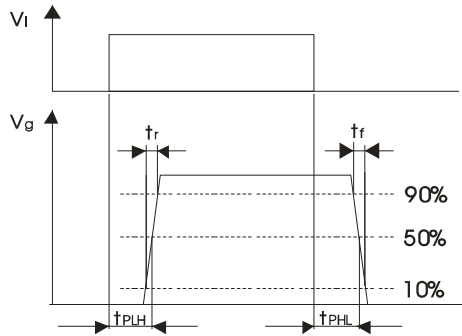
Product Specifications	Item		Symbol	Testing Conditions	Min.	Typ.	Max.	Unit
Input Specifications	Power Supply		V_D		14.5	15	15.5	V
	Maximum incoming current		I_{In}	$V_D=15V, f=20kHz, D=0.5, Q=0\mu C$	--	46	--	mA
				$V_D=15V, f=20kHz, D=0.5, Q=3.0\mu C$	--	165	--	
	High-level Input Current		I_{IH}		10	--	20	
High-level Input Voltage		V_I		3.7	--	5.7	V	
Output Specifications	Isolated Power Supply Voltage		V_{CC}	$V_D=15V, f=20kHz, D=0.5$	14.5	16	18	V
			V_{EE}	$V_D=15V, f=20kHz, D=0.5$	-7	-8.5	-10	
	Drive Output	High-level Voltage	V_{OH}	$V_D=15V, f=20kHz, D=0.5, Q=3.0\mu C$	14.5	15.0	--	
		Low-level Voltage	V_{OL}	$V_D=15V, f=20kHz, D=0.5, Q=3.0\mu C$	-7	-9	--	
		Rise Time	t_r		--	0.3	1	μs
		Fall Time	t_f		--	0.3	1	
	TotalCharge		Q	$V_D=15V, f=20kHz, D=0.5$	--	--	3.0	μC
General Specifications	Operating Frequency		f		--	--	20	kHz
	Input Impulse and Drive Output	Rise Delay Time	t_{PLH}		--	0.5	1.2	μs
		Fall Delay Time	t_{PHL}		--	1	1.2	
	Controlled Time of Detect Fault Circuit		t_{trip}	$V_D=15V$, fault protection function	--	3.5	4.0	
	Fault Soft Turn-off Time		t_{cf}	$V_D=15V$, fault protection function	--	4.5	7.0	
	Fault Reset Time		t_{timer}	Time from start to end of protection signal	1	1.4	2	ms
	Fault Threshold Voltage		V_{ocp}	$V_D=15V$	--	9.5	--	V
	Fault Output Terminal Voltage		V_{fo}	$V_D=15V$, fault protection function	--	-8.0	--	
	Safety Standard			EN62368-1(Report)				
	Insulation Test		V_{iso}	Sine Wave 50Hz/60Hz, 1min, leakage current <1mA	--	--	3750	VAC
	Operating Temperature		T_{op}		-40	--	71	$^{\circ}C$
	Storage Temperature		T_{st}		-50	--	+125	

	Weight	<i>W</i>	--	6.7	--	g
	Safety Class		CLASS III			

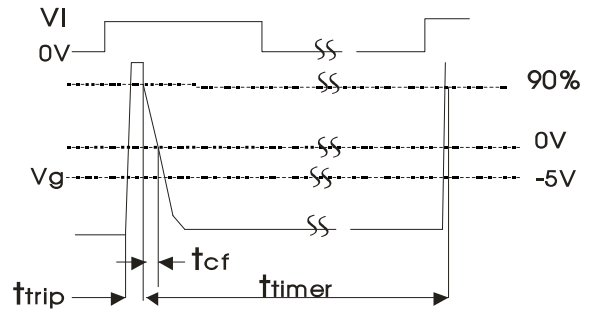
Design Reference

1.Description of Characteristic

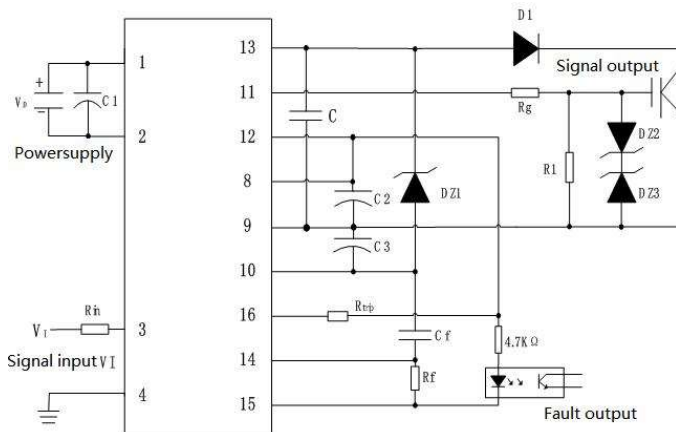
1)Definition of Fault-free Characteristic



2)Definition of Fault Characteristic



2.Typical application



C1	100μF
C2	100μF
C3	100μF
Rtrip	set as required (optional) set as
Cf	required (optional)
Rf	set as required (optional)
Rg	5Ω
R1	10kΩ
DZ1	TVS(30V , 0.5W)
DZ1, DZ3	TVS(18V , 1 W)
D1	fast recovery diode (trr ≤0.2μs)

Note:

- For further ripple & noise reduction, connect an additional capacitor each with a value between 1uF and 10uF in parallel with capacitors C2 and C3.
- 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 200Ω series resistance is connected in between the signal input terminals and the current-limiting resistance can be calculated according to the following formula:

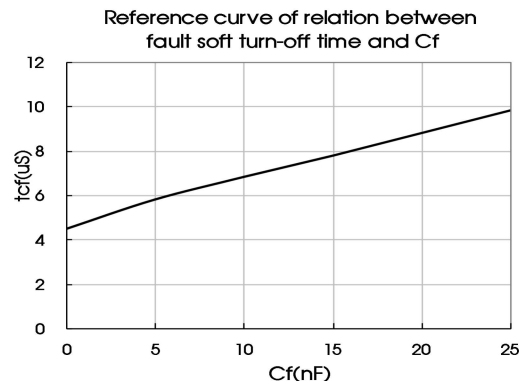
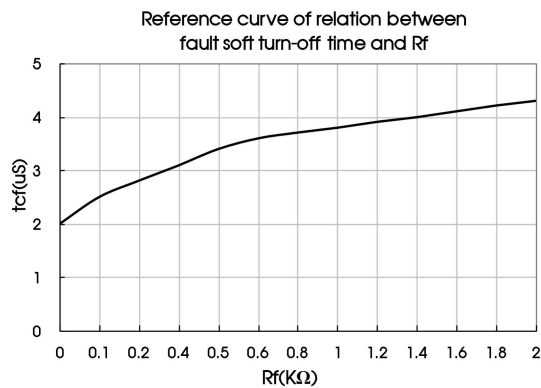
$$R_{in} = \frac{V_i - 1.7V}{I_{IH}} \rightarrow 200\Omega$$

- 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.
- 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 $4.5\mu\text{s}$, and this turn-off time can be adjusted by connecting an external resistor R_f to reduce the time, or capacitor C_f to increase the time. The adjustment range is $2.5\mu\text{s}$ to $10\mu\text{s}$. 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.

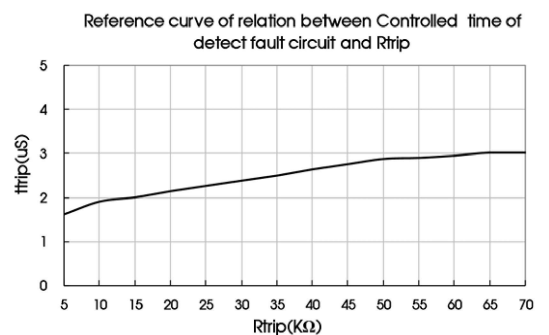
Reference values for Fault soft turn-off time adjustment			
R_f (k Ω)	t_{cf} (μs)	C_f (nF)	t_{cf} (μs)
—	4.5	—	4.5
1.5	4.0	1	4.9
0.5	3.5	3.3	5.3
0.3	3.0	10	6.5
0.11	2.5	22	9.3



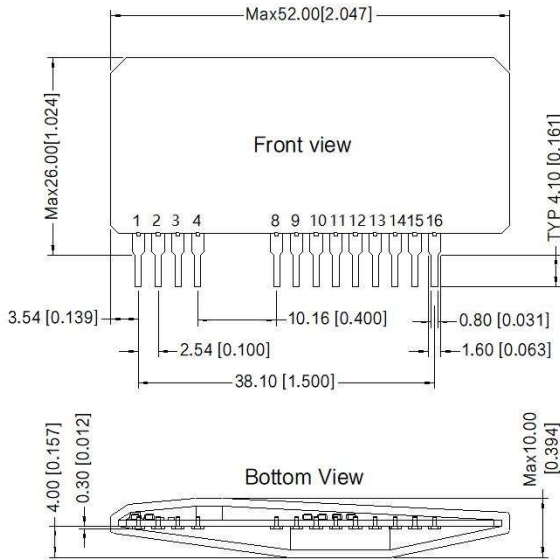
2. Controlled fault detection time adjustment:

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 maximum controlled time for the fault detection circuit and the user can reduce this time, by connecting an external R_{trip} resistor. The minimum time that can be adjusted is $1.6\mu\text{s}$. 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

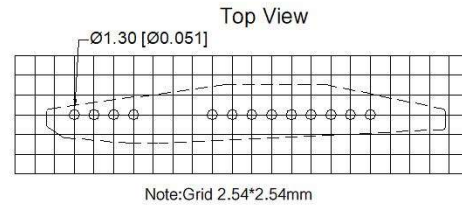
Reference values for Controlled fault detection time adjustment	
R_{trip} (nF)	$T_{trip}(\mu\text{s})$
—	3.50
68	3.00
51	2.80
30	2.48
20	2.28
15	2.00
10	1.90
5.1	1.60



Dimensions and Recommended

THIRD ANGLE PROJECTION 

Note:
Unit: mm[inch]
Pin section tolerances: $\pm 0.10 [\pm 0.004]$
General tolerances: $\pm 0.50 [\pm 0.020]$



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:

- The built-in isolated DC-DC power supply is for internal driver use only and cannot be used for external connections, We recommend the output filter capacitor value not to exceed 220uF;
- The driver must be wired as short as possible to the IGBT module's gate and emitter terminals (1m max.);
- Twisted pair is recommended for the connection of the driver to the gate and emitter of the IGBT;
- 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;
- The additional capacitor or resistor should be placed as close as possible to the driver terminals. Do not exceed the recommended maximum values;
- Select electrolytic capacitors for C2 and C3 with a low ESR and placed them as close as possible to the driver terminals;
- 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;
- 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;
- 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).
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on company corporate standards;
- 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; For details, please contact our technical staff;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" ;
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;