IGD1205W

Hybrid Integrated Isolated N-Channel IGBT Driver

Key Features:

- Internal DC/DC Converter
- Internal OptoCoupler
- 30 kV/μS CMR
- V_{ISO} = 3,750V
- TTL Compatible Input
- Short Circuit Protected
- Fault Signal Output
- Switching Freq. to 20 kHz
- Compact SIP Package

Recommended For:

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

RoHS

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Electrical Specifications

Absolute Maximum Ratings, T_A = 25 ºC, V_D = 12V or 15V, R_G = 5Ω, unless otherwise noted.

Parameter		Conditions	Min.	Typ.	Max.	Units
Supply Voltage	V_D	IGD1205W-12			13	VDC
	V_D	IGD1205W-15			16	
Input Voltage	V_{IN}	See Note 3			50	VDC
Input Current	I_{IN}	See Note 4			25	mA
Output Voltage	V_O	When Output is “H”			V_{CC}	VDC
Output Current	I_{GON}	Pulse Width 2μS, Frequency ≦ 20 kHz			+5.0	A
	I_{GOFF}				-5.0	
Isolation Voltage	V_{ISO}	Sine Wave Voltage 50 Hz/ 60 Hz , 1 Min			3,750	VAC
Operating Temperature	T_{OP}		-40		+70	ºC
Storage Temperature	T_{ST}		-50		+125	ºC
Fault Output Current	I_{FO}	See Note 5			20	mA

Electrical Characteristics, T_A = 25 ºC, V_{CC} = 15 VDC, V_{EE} = -10 VDC unless otherwise noted.

Parameter		Conditions	Min.	Typ.	Max.	Units
Supply Voltage	V_D	IGD1205W-12 Recommended Range	11.6	12	12.4	VDC
	V_D	IGD1205W-15 Recommended Range	14.5	15	15.5	
Switching Frequency	f	Recommended Range	0		20	kHz
Gate Resistor	R_G		2			Ω
Gate Supply Voltage	V_{CC}		14.5		18.0	VDC
	V_{EE}		-7.0		-10.0	
Input CMR			15	30		kV/μS
“H” Input Current	I_{IH}	Recommended Range	10	16	20	mA
“H” Output Voltage	V_{OH}		13.5	15.3	17.0	VDC
“L” Output Voltage	V_{OL}		-6		-10	VDC
“L-H” Propagation	T_{PLH}	I_{IH} = 16 mA		0.5	1.0	μS
“L-H” Rise Time	T_R	I_{IH} = 16 mA		0.3	1.0	μS
“H-L” Propagation	T_{PHL}	I_{IH} = 16 mA		1.0	1.3	μS
“H-L” Fall Time	T_F	I_{IH} = 16 mA		0.3	1.0	μS
Protection Threshold Voltage	V_{OCP}			9.5		
Protection Reset Time	T_{TIMER}	Between Start & Cancel	1.0	1.4	2.0	mS
Fault Output Current	I_{FO}	See Note 6		5.0		mA
Controlled Time Detect	T_{TRIP1}	Short Circuit 1, See Note 7		1.6		μS
Soft Turn-Off Time	T_{CF}	See Note 8		4.5		μS
SC Detect Voltage	V_{SC}	Collector Voltage of Module	15			VDC

Notes:
1. Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.
2. ”H” = high level signal. “L” = low level signal.
3. The voltage applied to pin 3.
4. The current measured between pins 3 and 4.
5. The current at pin 15.
6. The current at pin 15. R_F (on connection diagram) = 4.7 kΩ.
7. Pin 13 ≧ 15 VDC. Pin 16 open.
8. Pin 13 ≧ 15 VDC. Pin 14 open.

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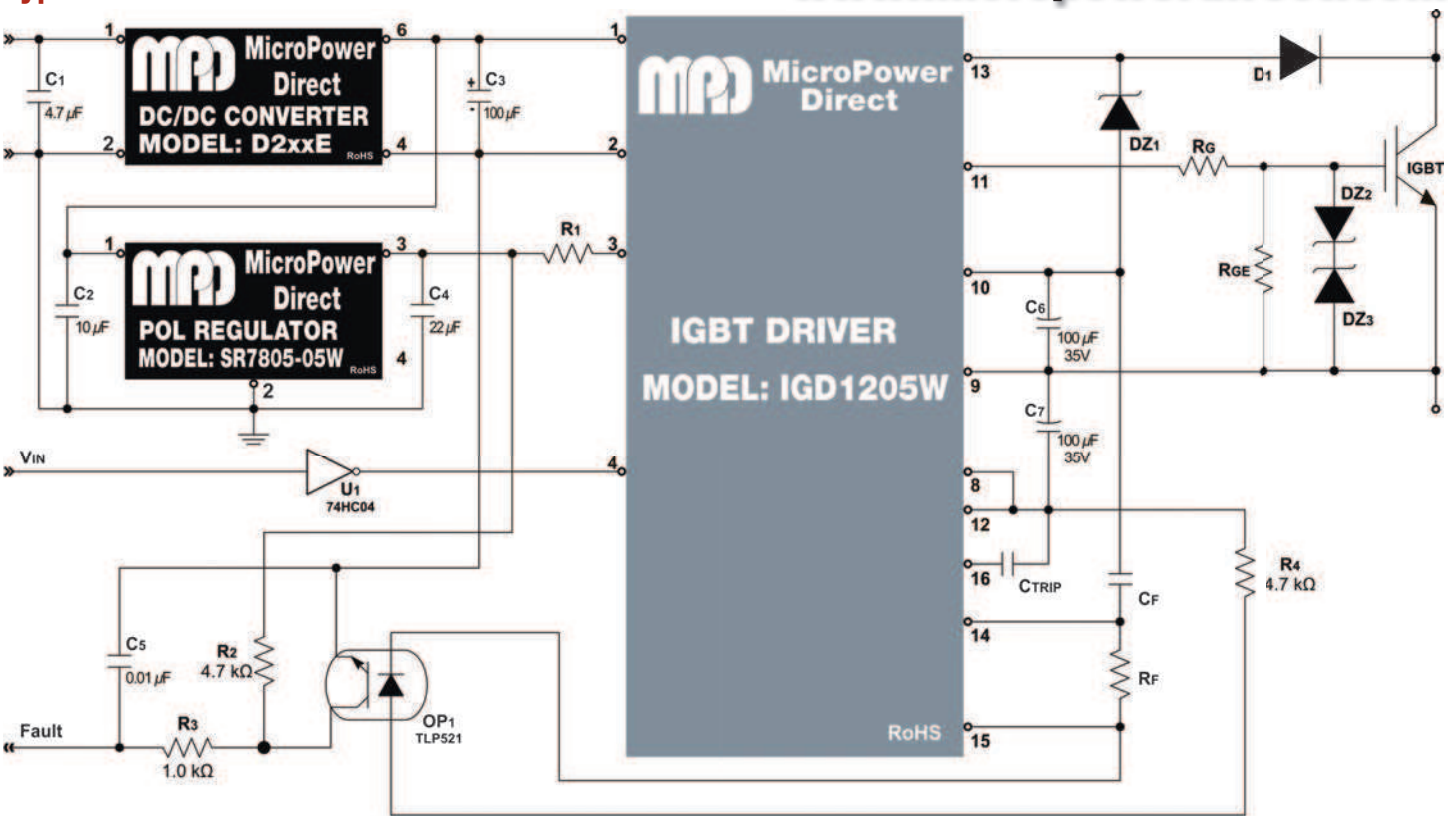
Typical Connection



Connection Notes:
To minimize the potential for problems (and/or failures) caused by induced noise, EMI interference and/or oscillation, the connection of the gate driver must be done with great care. Some recommendations would include:

1 The **D200E** is a 2W DC/DC converter. It will convert a 5, 12, or 24V bus voltage to the 12 or 15V needed to power the **IGD1205W**. The **SR7805** is a switching POL regulator. It provides a stable 5V input signal voltage to the input (pin 3) of the **IGD1205W**.

2 The input signal voltage (pin 3) cannot exceed 5.0V. The internal dissipation caused by the resultant increase in input current could damage the input optocoupler. A current limiting resistor (R_1) is used to help prevent this. The resistor value is calculated by the formula:

$$R_1 = \frac{V_{IN} - 1.7V}{16\,mA} - 150X$$

3 The gate wiring of the IGBT gate-emitter drive loop must be shorter than 1 meter.

4 Twisted pair wiring is recommended for the gate-emitter drive loop to minimize mutual induction.

5 If a large voltage spike is generated at the IGBT collector, the value of the gate resistor (R_G) should be increased.

6 The **IGD1205W** includes an internal DC/DC converter that provides isolated gate drive power at pin 8 (V_{CC}, 15V) and pin 10 (V_{EE}, -8V). These outputs share a common ground at pin 9. This allows the IGD to provide a floating gate drive suitable for high or low side switching. Low impedance electrolytic capacitors (C_6 and C_7) are used to decouple the internal supply outputs. It is important that these components be selected for low impedance and a maximum allowable ripple current that is sufficinet for the application. Assuming the ripple current in the decoupling capacitors is about equal to the rms gate current, it can be estimated by the formula:

$$I_{RMS} = I_P \sqrt{\frac{t_P \times f}{3}}$$

Where I_P = peak current; t_P = base width of pulse; and f = frequency. Capacitors C_6 and C_7 should be mounted as close to the driver as possible.

7 The peak reverse voltage rating of D_1 must be higher than the peak value of the IGBT collector voltage.

8 The voltage level at pin 13 could go "High" depending on the reverse recovery characteristics of D_1. A 30V zener diode DZ_1 is connected between pin 13 and pin 10 to prevent any problems caused by this.

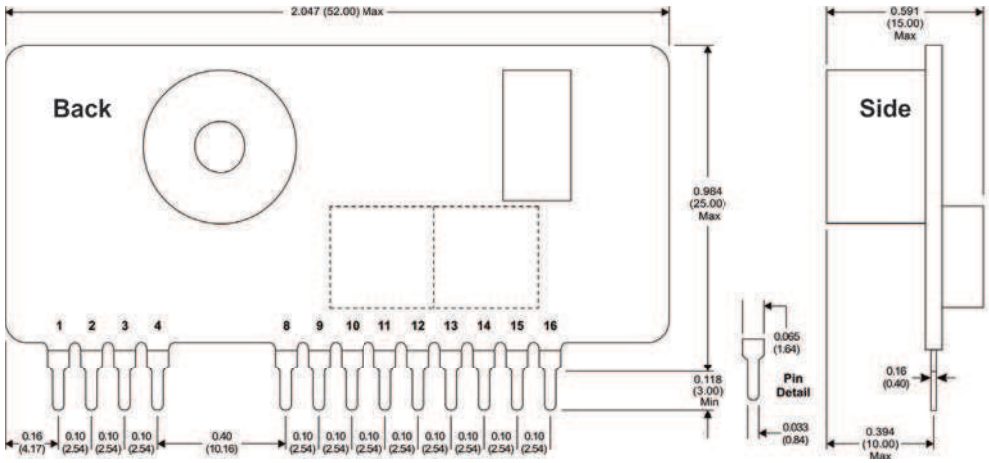
9 If the short cicuit protection circuit is not used, a 4.7 kΩ should be connected between pin 4 and pin 8.

10 The **IGD1205W** has a short circuit detection time delay of 1.6 µS, sufficient for most applications. If required, this can be extended by connecting a capacitor (C_{TRIP}) between pin 16 and pin 8. Contact the factory for details. If used, C_{TRIP} should be mounted as close to the driver as possible.

11 To help limit any transient voltage surges that could occur when a shor circuit is interrupted, a soft shutdown is provided by the **IGD1205W**. The default time is set to 4.5 µS, but it can be adjusted from 2.5 µS to 10 µS by using either C_F or R_F. Contact the factory for details.

12 If the **IGD1205W** short circuit protection is activated, it will immediately shut down the gate drive and pull pin 15 low to indicate a fault (via OP_1). During normal operation, the collector of OP_1 is pulled high by R_2. In the event of a fault, the driver output is disabled and a fault signal is produced that lasts a minimum of 1 mS. The RC filter (C_5 and R_3) help provide noise immunity. If the short circuit protection circuit is not used, these components can be eliminated and pin 15 should be left open.

Mechanical Dimensions



Model Selection Guide

Model Number	Input Power (V_{DD})
IGD1205W-12	12 VDC
IGD1205W-15	15 VDC

Pin Connections

Pin	Function	Pin	Function
1	+V_{DD} (+ Power Supply)	11	Drive Output
2	-V_{DD} (- Power Supply)	12	Internal Power Tube
3	Drive Signal Input (+)	13	Fault Detection
4	Drive Signal Input (-)	14	Soft Turn-Off Adj
8	DC/DC Ouput (+)	15	Fault Signal Output
9	DC/DC Ouput (Comm)	16	Control Pin (For T_{TRIP})
10	DC/DC Ouput (-)		

Notes:
- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.01 (±0.25)

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