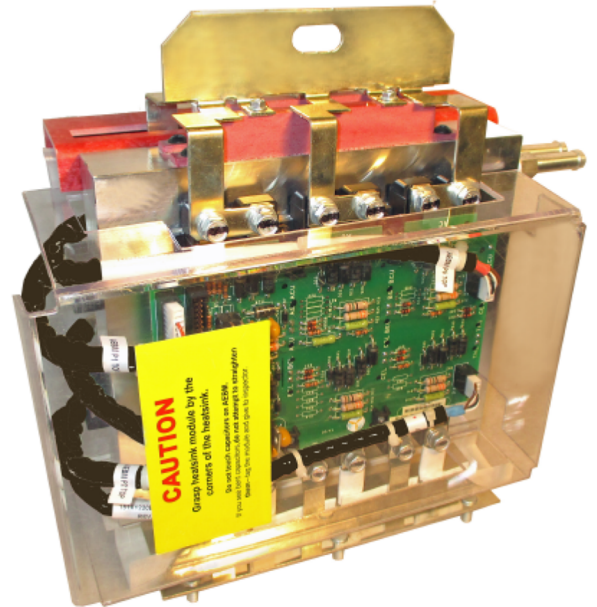




Rotor and Line Side Insulated Gate and Bipolar Transistors (IGBT) and Circuit

WS20010 Line IGBT WS20011 Rotor IGBT

Rotor and Line Side Insulated Gate and Bipolar Transistors (IGBT) and circuit board meets, or exceeds, the OEM's specifications.



Circuit Board Overview

With high level of quality control, including temperature controlled soldering and antistatic control.

Backplate / Heatsink Overview

The IGBT heatsinks are pressure tested to ensure proper operation when installed. Fabricated through precision machinery and welding.



INDUSTRIAL
CLUTCH PARTS

Industrial Clutch Parts Ltd, Bingswod Industrial Estate,
Whaley Bridge, High Peak, United Kingdom SK23 7LY

Tel: +44 (0) 1663 734 627 Fax: +44 (0) 1663 733 023

www.IndustrialClutch.com

sales@IndustrialClutch.com



Rotor and Line Side Insulated Gate and Bipolar Transistors (IGBT) and Circuit

IGBT Inverter Technical Information

Inverter Maximum Rated Values		
Collector-Emitter Voltage (V_{CES})	$T_{vj} = 25^{\circ}\text{C}$	1700 V
Continuous DC Collector Current	$T_c = 80^{\circ}\text{C}, T_{vj \text{ max}} = 150^{\circ}\text{C}$	450 Amps ($I_{c \text{ nom}}$)
	$T_c = 25^{\circ}\text{C}, T_{vj \text{ max}} = 150^{\circ}\text{C}$	605 Amps (I_c)
Repetitive Peak Collector Current (I_{CRM})	$t_p = 1 \text{ ms}$	900 Amps
Total Power Dissipation (P_{tot})	$T_c = 25^{\circ}\text{C}, T_{vj \text{ max}} = 150^{\circ}\text{C}$	2250 W
Gate-Emmitter Peak Voltage (V_{GES})		+/- 20 V

Inverter Characteristic Values			
Collector-Emitter Saturation Voltage ($V_{CE \text{ sat}}$)	$I_c = 450\text{A}, T_{GE} = 15\text{V}, T_{vj} = 25^{\circ}\text{C}$		2.00V (avg), 2.45V (max)
	$I_c = 450\text{A}, T_{GE} = 15\text{V}, T_{vj} = 125^{\circ}\text{C}$		2.40V (avg)
Gate Threshold Voltage (V_{GEth})	$I_c = 18.0\text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		5.2V (min), 5.8V (avg), 6.4V (max)
Gate Charge (Q_G)	$V_{GE} = -15\text{V to } +15\text{V}$		5.10 μC
Internal Gate Resistor (R_{Gint})	$T_{vj} = 25^{\circ}\text{C}$		1.7 Ω
Input Capacitance (C_{ies})	$f = 1\text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{V}, V_{GE} = 0\text{V}$		40.5 nF
Reverse Transfer Capacitance (C_{res})	$f = 1\text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{V}, V_{GE} = 0\text{V}$		1.3 nF
Collector-Emitter Cut Off Current (I_{CES})	$V_{CE} = 1700\text{V}, V_{GE} = 0\text{V}, T_{vj} = 25^{\circ}\text{C}$		3.0 mA (max)
Gate-Emitter Leakage Current (I_{GES})	$V_{CE} = 0\text{V}, V_{GE} = 20\text{V}, T_{vj} = 25^{\circ}\text{C}$		400 nA (max)
Turn-on Delay Time, Inductive Load ($t_{d \text{ on}}$)	$I_c = 450\text{A}, V_{CE} = 900\text{V}, V_{GE} = \pm 15\text{V}$ $T_{vj} = 25^{\circ}\text{C}, R_{Gon} = 3.3 \Omega$	$T_{vj} = 25^{\circ}\text{C}$	0.28 μs
		$T_{vj} = 125^{\circ}\text{C}$	0.30 μs
Rise Time, Inductive Load (t_r)	$I_c = 450\text{A}, V_{CE} = 900\text{V}, V_{GE} = \pm 15\text{V}$ $R_{Gon} = 3.3 \Omega$	$T_{vj} = 25^{\circ}\text{C}$	0.08 μs
		$T_{vj} = 125^{\circ}\text{C}$	0.10 μs
Turn Off Delay Time, Inductive Load ($t_{d \text{ off}}$)	$I_c = 450\text{A}, V_{CE} = 900\text{V}, V_{GE} = \pm 15\text{V}$ $R_{Goff} = 3.3 \Omega$	$T_{vj} = 25^{\circ}\text{C}$	0.81 μs
		$T_{vj} = 125^{\circ}\text{C}$	1.00 μs
Fall Time, Inductive Load (t_f)	$I_c = 450\text{A}, V_{CE} = 900\text{V}, V_{GE} = \pm 15\text{V}$ $R_{Goff} = 3.3 \Omega$	$T_{vj} = 25^{\circ}\text{C}$	0.18 μs
		$T_{vj} = 125^{\circ}\text{C}$	0.30 μs
Turn On Energy Loss Per Pulse (E_{on})	$I_c = 450\text{A}, V_{CE} = 900\text{V}, V_{GE} = \pm 15\text{V}$ $L_s = 80\text{nH}, R_{Gon} = 3.3 \Omega$	$T_{vj} = 25^{\circ}\text{C}$	96.5 mJ
		$T_{vj} = 125^{\circ}\text{C}$	140 mJ
Turn Off Energy Loss Per Pulse (E_{off})	$I_c = 450\text{A}, V_{CE} = 900\text{V}, V_{GE} = \pm 15\text{V}$ $L_s = 80\text{nH}, R_{Goff} = 3.3 \Omega$	$T_{vj} = 25^{\circ}\text{C}$	96.5 mJ
		$T_{vj} = 125^{\circ}\text{C}$	140 mJ
SC Data (I_{sc})	$V_{GE} = \leq 15\text{V}, V_{cc} = 1000\text{V},$ $V_{CEmax} = V_{CES} - L_{sCE} * di/dt, t_p \leq 10\mu\text{s}$	$T_{vj} = 125^{\circ}\text{C}$	1800 A
Thermal Resistance, Junction to Case (R_{thJC})	per IGBT		0.055 K/W (max)
Thermal Resistance, Case to Heatsink (R_{thCH})	per IGBT $\lambda_{grease} = 1 \text{ W}/(\text{m}^*\text{k})$		0.047 K/W
Temperature Under Switching Conditions ($T_{vj \text{ op}}$)			-40 $^{\circ}\text{C}$ (min) 125 $^{\circ}\text{C}$ (max)



INDUSTRIAL
CLUTCH PARTS

Industrial Clutch Parts Ltd, Bingswod Industrial Estate,
Whaley Bridge, High Peak, United Kingdom SK23 7LY

Tel: +44 (0) 1663 734 627 Fax: +44 (0) 1663 733 023



Rotor and Line Side Insulated Gate and Bipolar Transistors (IGBT) and Circuit

IGBT Diode Technical Information

Diode, Inverter Maximum Rated Values		
Repetitive Peak Reverse Voltage (V_{RRM})	$T_{vj} = 25^{\circ}\text{C}$	1700 V
Continuous DC Forward Current (I_F)		450 A
Repetitive Peak Forward Current (I_{FRM})	$t_p = 1\text{ms}$	900 A
I^2t Value (I^2t)	$V_R = 0\text{V}, t_p = 10\text{ms}, T_{vj} = 125^{\circ}\text{C}$	20000 A^2s

Diode Characteristic Values			
Forward Voltage (V_F)	$I_F = 450\text{A}, V_{GE} = 0\text{V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	1.80 V (avg), 2.20 V (max) 1.90 V (avg)
Peak Reverse Recovery Current (I_{RM})	$I_F = 450\text{A}, V_R = 900\text{V}, V_{GE} = -15\text{V}$ $-di_f/dt = 4450\text{A}/\mu\text{s} (T_{vj} = 125^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	525 A (avg) 570 A (avg)
Recovered Charge (Q_R)	$I_F = 450\text{A}, -di_f/dt = 4450\text{A}/\mu\text{s} (T_{vj} = 125^{\circ}\text{C})$ $V_R = 900\text{V}, V_{GE} = -15\text{V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	115 μC (avg) 195 μC (avg)
Reverse Recovery Energy (E_{rec})	$I_F = 450\text{A}, -di_f/dt = 4450\text{A}/\mu\text{s} (T_{vj} = 125^{\circ}\text{C})$ $V_R = 900\text{V}, V_{GE} = -15\text{V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	60.5 mJ (avg) 110 mJ (avg)
Thermal Resistance Junction to Case (R_{thJC})	per diode		0.10 K/W (max)
Thermal Resistance Case to Heatsink (R_{thCH})	per diode $\lambda_{grease} = 1\text{ W}/(\text{m}^2\text{K})$		0.085 K/W
Temperature Under Switching Conditions ($T_{vj op}$)			-40 $^{\circ}\text{C}$ (min) 125 $^{\circ}\text{C}$ (max)

IGBT Diode Technical Information

Thermistor Characteristic Values		
Rated Resistance (R_{25})	$T_C = 25^{\circ}\text{C}$	5.00 k Ω
Deviation of R_{100} ($\Delta R/R$)	$T_C = 100^{\circ}\text{C}, R_{100} = 493\ \Omega$	- 5 % (min) 5 % (max)
Power Dissipation (P_{25})	$T_C = 25^{\circ}\text{C}$	20.0 mW
B-Value ($B_{25/50}$)	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15\text{K}))]$	3375 K



INDUSTRIAL
CLUTCH PARTS

Industrial Clutch Parts Ltd, Bingswod Industrial Estate,
Whaley Bridge, High Peak, United Kingdom SK23 7LY

Tel: +44 (0) 1663 734 627 Fax: +44 (0) 1663 733 023



Rotor and Line Side Insulated Gate and Bipolar Transistors (IGBT) and Circuit

IGBT Module Technical Information

Module Characteristic Values		
Isolation Test Voltage (V_{ISOL})	RMS, $f = 50\text{Hz}$, $t = 1\text{min}$	3.4 kV
Material of Module Baseplate		Cu
Internal Isolation	Basic Insulation (class 1, IEC 61140)	Al_2O_3
Creepage Distance	Terminal to Heatsink Terminal to Terminal	14.5 mm
Clearance	Terminal to Heatsink Terminal to Terminal	10.0 mm
Comparative Tracking Index (CTI)		> 225
Thermal Resistance Case to Heatsink (R_{thCH})	per Module $\lambda_{grease} = 1 \text{ W/(m}^2\text{K)}$	0.005 K/W
Stray Inductance Module (L_{sCE})		20 nH
Module Lead Resistance Terminals - Chip (R_{CC+EE})	$T_{vj} = 25^\circ\text{C}$, per switch	1.10 m Ω
Storage Temperature (T_{stg})		-40 °C (min) 125 °C (max)
Mounting Torque for Module Mounting (M)	Screw M5	3.00 Nm (min) 6.00 Nm (max)
Terminal Connection Torque (M)	Screw M6	3.0 Nm (min) 6.0 Nm (max)
Weight		916 g

