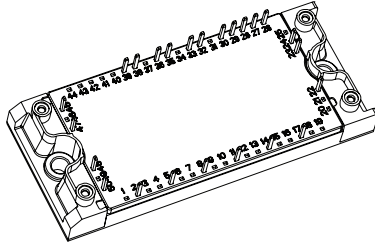


IGBT PIM Module, 13 A


ECONO2 PIM
FEATURES

- Low $V_{CE(on)}$ non punch through IGBT technology
- Low diode V_F
- 10 μ s short circuit capability
- Square RBSOA
- HEXFRED[®] antiparallel diode with ultrasoft reverse recovery characteristics
- Positive $V_{CE(on)}$ temperature coefficient
- Ceramic DBC substrate
- Low stray inductance design
- Speed 8 to 60 kHz
- Totally lead (Pb)-free
- Designed and qualified for industrial market


RoHS
COMPLIANT

PRODUCT SUMMARY	
V_{CES}	1200 V
$V_{CE(on)}$ (typical)	2.68 V
t_{sc} at $T_J = 150\text{ }^\circ\text{C}$	> 10 μ s
I_C at $T_C = 80\text{ }^\circ\text{C}$	13 A

BENEFITS

- Benchmark efficiency for motor control
- Rugged transient performance
- Low EMI, requires less snubbing
- Direct mounting to heatsink
- PCB solderable terminals
- Low junction to case thermal resistance
- UL approved E78996

ABSOLUTE MAXIMUM RATINGS						
	PARAMETER	SYMBOL	TEST CONDITIONS		MAX.	UNITS
Inverter	Collector to emitter voltage	V_{CES}			1200	V
	Gate to emitter voltage	V_{GES}			± 20	
	Continuous collector current	I_C	$T_C = 25\text{ }^\circ\text{C}$		20	A
			$T_C = 80\text{ }^\circ\text{C}$		13	
	Pulsed collector current See fig. C.T.5	I_{CM}			40	A
	Diode maximum forward current	I_{FM}	Pulsed		40	A
Power dissipation	P_D	One IGBT	25 $^\circ\text{C}$	88	W	
Input rectifier	Repetitive peak reverse voltage	V_{RRM}			1600	V
	Average output current	$I_{F(AV)}$	50/60 Hz sine pulse	80 $^\circ\text{C}$	13	A
	Surge current (non-repetitive)	I_{FSM}	Rated V_{RRM} applied, 10 ms, sine pulse		120	
	I^2t (non-repetitive)	I^2t			72	A ² s
Brake	Collector to emitter voltage	V_{CES}			1200	V
	Gate to emitter voltage	V_{GES}			± 20	
	Continuous collector current	I_C	$T_C = 25\text{ }^\circ\text{C}$		20	A
			$T_C = 80\text{ }^\circ\text{C}$		13	
	Pulsed collector current See fig. C.T.5	I_{CM}			40	A
	Power dissipation	P_D	One IGBT	25 $^\circ\text{C}$	88	W
	Maximum operating junction temperature	T_J			150	$^\circ\text{C}$
	Storage temperature range	T_{Stg}			- 40 to 125	
Isolation voltage	V_{ISOL}	AC (1 min)		2500	V	



THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Junction to case inverter IGBT thermal resistance	R_{thJC}	-	-	1.42	°C/W
Junction to case inverter FRED thermal resistance		-	-	1.97	
Junction to case brake DIODE thermal resistance		-	-	197	
Junction to case brake IGBT thermal resistance		-	-	1.42	
Junction to case input rectifier thermal resistance		-	-	1.11	
Case to sink, flat, greased surface	R_{thCS}	-	0.05	-	
Mounting torque (M5)		2.7	-	3.3	Nm
Weight		-	170	-	g

ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ unless otherwise noted)							
	PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Inverter IGBT	Collector to emitter breakdown voltage	$BV_{(CES)}$	$V_{GE} = 0\text{ V}, I_C = 500\text{ }\mu\text{A}$	1200	-	-	V
	Temperature coefficient of breakdown voltage	$\Delta V_{(BR)CES}/\Delta T_J$	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$ (25 °C to 125 °C)	-	1.33	-	V/°C
	Collector to emitter voltage	$V_{CE(on)}$	$I_C = 10\text{ A}, V_{GE} = 15\text{ V}$	-	2.68	3.03	V
			$I_C = 20\text{ A}, V_{GE} = 15\text{ V}$	-	3.68	4.55	
			$I_C = 10\text{ A}, V_{GE} = 15\text{ V}, T_J = 125\text{ °C}$	-	3.19	3.61	
			$I_C = 20\text{ A}, V_{GE} = 15\text{ V}, T_J = 125\text{ °C}$	-	4.52	5.17	
	Gate threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 250\text{ }\mu\text{A}$	4	-	6	
	Threshold voltage temperature coefficient	$\Delta V_{GE(th)}/\Delta T_J$	$V_{CE} = V_{GE}, I_C = 1\text{ mA}$ (25 °C to 125 °C)	-	-9.7	-	mV/°C
	Zero gate voltage collector current	I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}$	-	-	100	μA
			$V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}, T_J = 125\text{ °C}$	-	750	-	
	Gate to emitter leakage current	I_{GES}	$V_{GE} = \pm 20\text{ V}$	-	-	± 200	nA
	Total gate charge (turn-on)	Q_G	$I_C = 10\text{ A}$	-	48	72	nC
	Gate to emitter charge (turn-on)	Q_{GE}	$V_{CC} = 600\text{ V}$	-	8	15	
	Gate to collector charge (turn-on)	Q_{GC}	$V_{GE} = 15\text{ V}$	-	22	33	
	Turn-on switching loss	E_{ON}	$I_C = 10\text{ A}, V_{CC} = 600\text{ V}$ $V_{GE} = 15\text{ V}, R_G = 22\text{ }\Omega$ $L = 1\text{ mH}, T_J = 25\text{ °C}^{(1)}$	-	0.96	1.44	mJ
	Turn-off switching loss	E_{OFF}		-	0.46	0.70	
	Total switching loss	E_{TOT}		-	1.42	2.14	
	Turn-on switching loss	E_{ON}	$I_C = 10\text{ A}, V_{CC} = 600\text{ V}$ $V_{GE} = 15\text{ V}, R_G = 22\text{ }\Omega$ $L = 1\text{ mH}, T_J = 125\text{ °C}^{(1)}$	-	1.25	1.88	
	Turn-off switching loss	E_{OFF}		-	0.69	0.95	
	Total switching loss	E_{TOT}		-	1.94	2.83	
	Turn-on delay time	$t_{d(on)}$	$I_C = 10\text{ A}, V_{CC} = 600\text{ V}$ $V_{GE} = 15\text{ V}, R_G = 22\text{ }\Omega$ $L = 1\text{ mH}, T_J = 125\text{ °C}$	-	86	130	ns
	Rise time	t_r		-	21	32	
Turn-off delay time	$t_{d(off)}$	-		118	180		
Fall time	t_f	-		274	410		
Input capacitance	C_{ies}	$V_{GE} = 0\text{ V}$ $V_{CC} = 30\text{ V}$ $f = 1\text{ MHz}$	-	750	1150	pF	
Output capacitance	C_{oes}		-	190	290		
Reverse transfer capacitance	C_{res}		-	20	35		