




# IGBT ECONO3 Module, 100 A



ECONO 3 4 pack

### FEATURES

- Gen 5 non punch through (NPT) technology
- 10  $\mu$ s short circuit capability
- Square RBSOA
- HEXFRED low  $Q_{rr}$ , low switching energy
- Positive  $V_{CE(on)}$  temperature coefficient
- Copper baseplate
- Operating frequencies 8 kHz to 60 kHz
- Low stray inductance design
- UL approved file E78996 
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT

PRIMARY CHARACTERISTICS	
$V_{CES}$	1200 V
$V_{CE(on)}$ typ. at 100 A	3.52 V
$I_{C(DC)}$ at $T_C = 64\text{ }^\circ\text{C}$	100 A
Package	ECONO 3
Circuit configuration	4 pack with thermistor

### BENEFITS

- Benchmark efficiency for SMPS appreciation in particular HF welding
- Rugged transient performance
- Low EMI, requires less snubbing
- Direct mounting to heat sink space saving
- PCB solderable terminals
- Low junction to case thermal resistance

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	$V_{CES}$		1200	V
Continuous collector current	$I_C$	$T_C = 25\text{ }^\circ\text{C}$	127	A
		$T_C = 80\text{ }^\circ\text{C}$	87	
Pulsed collector current	$I_{CM}$		260	
Clamped inductive load current	$I_{LM}$		260	
Diode continuous forward current	$I_F$	$T_C = 25\text{ }^\circ\text{C}$	71	
		$T_C = 80\text{ }^\circ\text{C}$	49	
Diode maximum forward current	$I_{FSM}$		370	
Gate to emitter voltage	$V_{GE}$		$\pm 20$	V
Power dissipation, IGBT	$P_D$	$T_C = 25\text{ }^\circ\text{C}$	625	W
		$T_C = 80\text{ }^\circ\text{C}$	350	
MODULE				
Operating junction temperature range	$T_J$		-55 to +150	$^\circ\text{C}$
Storage temperature range	$T_{Stg}$		-40 to +125	
RMS isolation voltage	$V_{ISOL}$	Any terminal to case, $t = 1\text{ s}$	3500	V



<b>ELECTRICAL SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{BR(CES)}$	$V_{GE} = 0\text{ V}, I_C = 500\text{ }\mu\text{A}$	1200	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 50\text{ A}$	-	2.67	-	
		$V_{GE} = 15\text{ V}, I_C = 100\text{ A}$	-	3.52	4.0	
		$V_{GE} = 15\text{ V}, I_C = 50\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	2.88	-	
		$V_{GE} = 15\text{ V}, I_C = 100\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	3.9	-	
Gate threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 1\text{ mA}$	4.1	5.3	6.5	
Temperature coefficient of threshold voltage	$\Delta V_{GE(th)}/\Delta T_J$	$V_{CE} = V_{GE}, I_C = 1\text{ mA}$ ( $25\text{ }^\circ\text{C}$ to $125\text{ }^\circ\text{C}$ )	-	-12.2	-	mV/ $^\circ\text{C}$
Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}$	-	6.5	80	$\mu\text{A}$
		$V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	0.85	-	mA
Forward voltage drop	$V_{FM}$	$I_F = 50\text{ A}, V_{GE} = 0\text{ V}$	-	2.59	3.15	V
		$I_F = 100\text{ A}, V_{GE} = 0\text{ V}$	-	3.38	-	
		$I_F = 50\text{ A}, V_{GE} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	2.69	-	
		$I_F = 100\text{ A}, V_{GE} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	3.74	-	
Gate to emitter leakage current	$I_{GES}$	$V_{GE} = \pm 20\text{ V}$	-	-	$\pm 440$	nA

<b>SWITCHING CHARACTERISTICS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Total gate charge (turn-on)	$Q_G$	$I_C = 50\text{ A},$	-	400	-	nC	
Gate-to-emitter charge (turn-on)	$Q_{GE}$	$V_{CC} = 600\text{ V},$	-	43	-		
Gate-to-collector charge (turn-on)	$Q_{GC}$	$V_{GE} = 15\text{ V}$	-	187	-		
Turn-on switching loss	$E_{on}$	$I_C = 100\text{ A}, V_{CC} = 600\text{ V},$	-	2.86	-	mJ	
Turn-off switching loss	$E_{off}$	$V_{GE} = 15\text{ V}, R_g = 4.7\text{ }\Omega,$	-	3.43	-		
Total switching loss	$E_{tot}$	$L = 500\text{ }\mu\text{H}, T_J = 25\text{ }^\circ\text{C}$	-	6.29	-		
Turn-on switching loss	$E_{on}$	$I_C = 100\text{ A}, V_{CC} = 600\text{ V},$	-	4.32	-		
Turn-off switching loss	$E_{off}$	$V_{GE} = 15\text{ V}, R_g = 4.7\text{ }\Omega,$	-	4.48	-		
Total switching loss	$E_{tot}$	$L = 500\text{ }\mu\text{H}, T_J = 125\text{ }^\circ\text{C}$	-	8.8	-		
Turn-on delay time	$t_{d(on)}$	$I_C = 100\text{ A}, V_{CC} = 600\text{ V},$ $V_{GE} = 15\text{ V}, R_g = 4.7\text{ }\Omega,$ $L = 500\text{ }\mu\text{H}, T_J = 125\text{ }^\circ\text{C}$	-	275	-		ns
Rise time	$t_r$		-	71	-		
Turn-off delay time	$t_{d(off)}$		-	305	-		
Fall time	$t_f$		-	116	-		
Reverse bias safe operating area	RBSOA	$T_J = 150\text{ }^\circ\text{C}, I_C = 260\text{ A}, V_{GE} = 15\text{ V to } 0\text{ V},$ $R_g = 4.7\text{ }\Omega, V_{CC} = 600\text{ V}, V_p = 1200\text{ V}$					
Short circuit safe operating area	SCSOA	$T_J = 150\text{ }^\circ\text{C}, R_g = 10\text{ }\Omega, V_{GE} = 15\text{ V to } 0\text{ V},$ $V_{CC} = 900\text{ V}, V_p = 1200\text{ V}$	10	-	-	$\mu\text{s}$	
Diode reverse recovery time	$t_{rr}$	$I_F = 50\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s},$ $V_R = 400\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	190	-	ns
			$T_J = 125\text{ }^\circ\text{C}$	-	293	-	
Diode peak reverse current	$I_{rr}$		$T_J = 25\text{ }^\circ\text{C}$	-	12	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	18.6	-	
Diode recovery charge	$Q_{rr}$		$T_J = 25\text{ }^\circ\text{C}$	-	1140	-	nC
			$T_J = 125\text{ }^\circ\text{C}$	-	2725	-	