DIM800ECM33-F000



IGBT Chopper Module

DS5815-1.1 April 2006 (LN24543)

FEATURES

- 10µs Short Circuit Withstand
- High Thermal Cycling Capability
- Soft Punch Through Silicon
- Isolated MMC Base-plate with AIN Substrate

APPLICATIONS

- Choppers
- Motor controllers
- Power supplies

The Powerline range of high power modules includes half bridge, chopper, dual, single and bidirectional switch configurations covering voltages from 600V to 3300V and currents up to 3600A.

The DIM800ECM33-F000 is a 3300V, soft punch through, n channel enhancement mode, insulated gate bipolar transistor (IGBT) chopper module. The IGBT has a wide reverse bias safe operating area (RBSOA) plus full $10\mu s$ short circuit withstand. This device is optimised for traction drives and other applications requiring high thermal cycling capability.

The module incorporates an electrically isolated base plate and low inductance construction enabling circuit designers to optimise circuit layouts and utilise grounded heat sinks for safety.

ORDERING INFORMATION

Order As:

DIM800ECM33-F000

Note: When ordering, please use the whole part number.

KEY PARAMETERS

V _{CES}		3300V
V _{CE (sat)} *	(typ)	2.8V
I _C	(max)	A008
I _{C(PK)}	(max)	1600A

^{*(}measured at the auxiliary terminals)

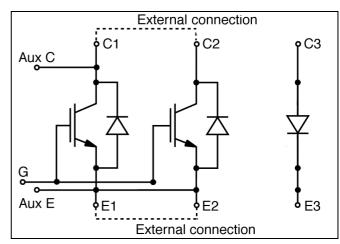


Fig. 1 Chopper module circuit diagram

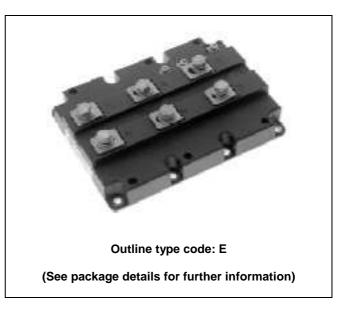


Fig. 2 Electrical connections (not to scale)



ABSOLUTE MAXIMUM RATINGS

Stresses above those listed under 'Absolute Maximum Ratings' may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed. Exposure to Absolute Maximum Ratings may affect device reliability.

Tcase = 25℃ unless stated otherwise

Symbol	Parameter	Test Conditions		Units
V _{CES}	Collector-emitter voltage	V _{GE} = 0V	3300	V
V _{GES}	Gate-emitter voltage		±20	V
Ic	Continuous collector current	T _{case} = 90℃	800	Α
I _{C(PK)}	Peak collector current	1ms, T _{case} =115℃	1600	Α
P _{max}	Max. transistor power dissipation	T _{case} = 25℃, T _j = 150℃	10.4	kW
l ² t	Diode I ² t value (IGBT arm)	$V_R = 0$, $t_P = 10$ ms, $T_{vj} = 125$ °C	320	kA 2S
V _{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	6000	V
Q_{PD}	Partial discharge – per module	IEC1287. V ₁ = 3500V, V ₂ = 2600V, 50Hz RMS	10	рС



THERMAL AND MECHANICAL RATINGS

Internal insulation material:

Baseplate material:

Creepage distance:

Clearance:

CTI (Critical Tracking Index):

AIN

AISiC

29mm

20mm

175

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Units
R _{th(j-c)}	Thermal resistance – transistor both arms	Continuous dissipation – junction to case	-	-	12	°C/kW
R _{th(j-c)}	Thermal resistance – diode, C3-E3 and C1-E1in parallel with C2-E2	Continuous dissipation – junction to case	-	-	24	℃/kW
R _{th(c-h)}	Thermal resistance – case to heatsink (per module)	Mounting torque 5Nm (with mounting grease)	-	-	6	℃/kW
Tj	Junction temperature	Transistor	-	-	150	Ĉ
		Diode	-	-	125	Ĉ
T _{stg}	Storage temperature range	-	-40	-	125	Ĉ
-	Screw torque	Mounting – M6	-	-	5	Nm
		Electrical connections – M4	-	-	2	Nm
		Electrical connections – M8	-	-	10	Nm



ELECTRICAL CHARACTERISTICS

T_{case} = 25℃ unless stated otherwise.

Symbol	Parameter	Test Conditions		Min.	Тур.	Max.	Units
I _{ces}	Collector cut-off current	V _{GE} = OV, V _{CE} = V _{CES}		-	-	4	mA
		V _{GE} = OV, V _{CE} = V _{CES} , T _{case} = 125℃	;	-	-	60	mA
I _{ces}	Gate leakage current	V _{GE} = ±20V, V _{CE} = 0V		-	-	1	μΑ
V _{GE(TH)}	Gate threshold voltage	I _C = 80mA, V _{GE} = V _{CE}		5.5	6.5	7.0	V
$V_{CE(sat)^{\dagger}}$	Collector-emitter saturation voltage	V _{GE} = 15V, I _C = 800A		-	2.8		V
		V _{GE} = 15V, I _C = 800A, T _{case} = 125℃		-	3.6	-	V
I _F	Diode forward current	DC		-	800	-	Α
I _{FM}	Diode maximum forward current	t _p = 1ms		-	1600	-	Α
V_{F^\dagger}	Diode forward voltage	I _F = 800A		-	2.9	-	V
		I _F = 800A, T _{case} = 125℃		-	3.0	-	V
C _{ies}	Input capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz			144	-	nF
C _{res}	Reverse transfer capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		-	2.2	-	nF
L _M	Module inductance	-		-	15	-	nΗ
R _{INT}	Internal transistor resistance	-		-	0.135	-	mΩ
SC _{Data}	Short circuit. I _{sc}	$T_j = 125$ °C, $V_{cc} = 2500$ V,	I ₁	-	4000	-	Α
		$t_p \le 10\mu s, \ V_{CE(max)} = V_{Ces} \cdot L^*.di/dt$ IEC 60747-9	l ₂	-	3700	-	А

 $^{^{\}scriptscriptstyle \dag}$ Measured at the auxiliary terminals $^{\scriptscriptstyle \star}$ L is the circuit inductance + L_{M}



ELECTRICAL CHARACTERISTICS

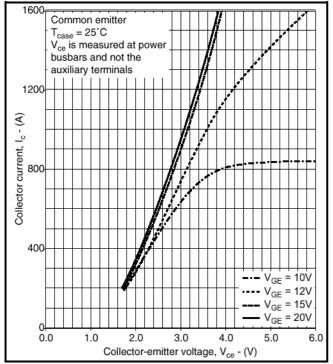
 T_{case} = 25°C unless stated otherwise.

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Units
t _{d(off)}	Turn-off delay time	I _C = 800A	-	2150	-	ns
t _f	Fall time	$V_{GE} = \pm 15V$	-	230	-	ns
E _{OFF}	Turn-off energy loss	V _{CE} = 1800V	-	1050	-	mJ
t _{d(on)}	Turn-on delay time	$R_{G(\text{ON})} = 2.7\Omega, \; R_{G(\text{OFF})} = 3.9\Omega$	-	1300	-	ns
t _r	Rise time	L ~ 100nH	-	275	-	ns
Eon	Turn-on energy loss	C _{ge} = 220nF	-	1250	-	mJ
Qg	Gate charge		-	20	-	μC
Qrr	Diode reverse recovery charge	I _F = 800A, V _R = 1800V,	-	320	-	μC
I _{rr}	Diode reverse current	$dI_F/dt = 4000A/\mu s$	-	670	-	А
E _{REC}	Diode reverse recovery energy		-	300	-	mJ

T_{case} = 125°C unless stated otherwise.

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Units
t _{d(off)}	Turn-off delay time	I _C = 800A	-	2200	-	ns
t _f	Fall time	$V_{GE} = \pm 15V$	-	240	-	ns
E _{OFF}	Turn-off energy loss	V _{CE} = 1800V	-	1200	-	mJ
t _{d(on)}	Turn-on delay time	$R_{G(\text{ON})} = 2.7\Omega, \; R_{G(\text{OFF})} = 3.9\Omega$	-	1200	-	ns
t _r	Rise time	L ~ 100nH	-	315	-	ns
E _{ON}	Turn-on energy loss	C _{ge} =220nF	-	1750	-	mJ
Qrr	Diode reverse recovery charge	I _F = 800A, V _R = 1800V,	-	600	-	μC
Irr	Diode reverse current	$dI_F/dt = 4000A/\mu s$	-	800	-	Α
E _{REC}	Diode reverse recovery energy		-	600	-	mJ





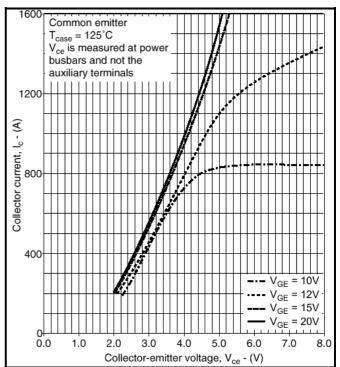
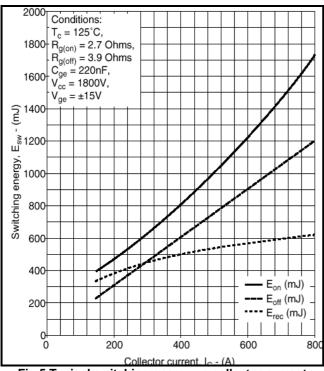
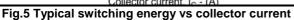


Fig.3 Typical output characteristics







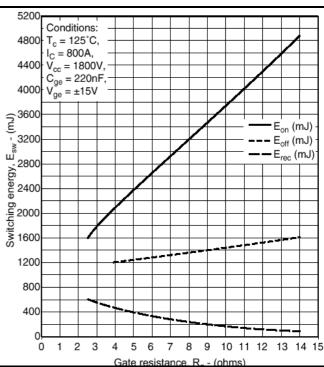
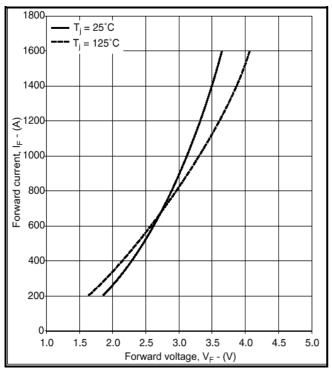


Fig.6 Typical switching energy vs gate resistance





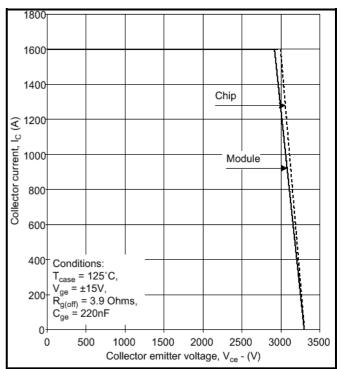
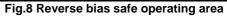
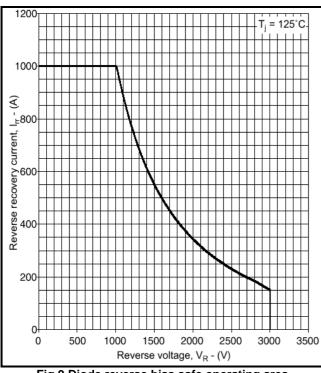


Fig.7 Diode typical forward characteristics





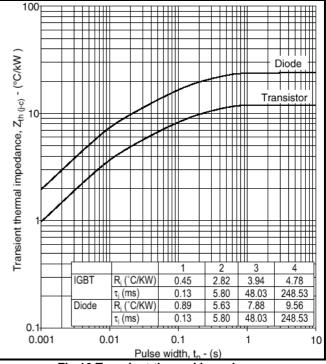


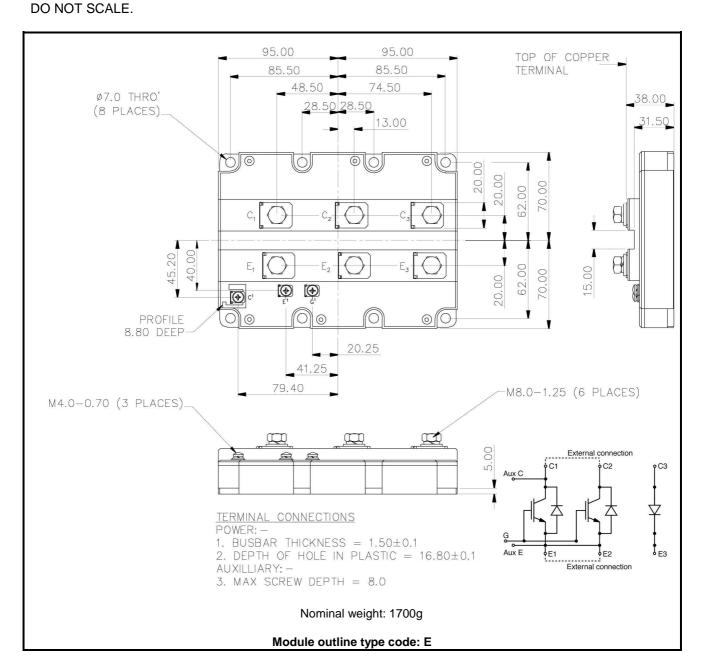
Fig.9 Diode reverse bias safe operating area

Fig.10 Transient thermal impedance



PACKAGE DETAILS

For further package information, please visit our website or contact Customer Services. All dimensions in mm, unless stated otherwise.





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We offer an extensive range of air and liquid cooled assemblies covering the full range of circuit designs in general use today. The Assembly group offers high quality engineering support dedicated to designing new units to satisfy the growing needs of our customers.

Using the latest CAD methods our team of design and applications engineers aim to provide the Power Assembly Complete Solution (PACs).

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The Power Assembly group has its own proprietary range of extruded aluminium heatsinks which have been designed to optimise the performance of Dynex semiconductors. Data with respect to air natural, forced air and liquid cooling (with flow rates) is available on request.

For further information on device clamps, heatsinks and assemblies, please contact your nearest sales representative or Customer Services.



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