

Replaces DS5536-3.0

DIM2400ESM12-A000

Single Switch IGBT Module

DS5536-4 October 2010 (LN27615)

FEATURES

- 10µs Short Circuit Withstand
- High Thermal Cycling Capability
- Non Punch Through Silicon
- Isolated AISiC Base with AIN Substrates
- Lead Free construction

APPLICATIONS

- High Reliability Inverters
- Motor Controllers
- Traction Drives

The Powerline range of high power modules includes half bridge, chopper, dual, single and bi-directional switch configurations covering voltages from 1200V to 6500V and currents up to 2400A.

The DIM2400ESM12-A000 is a single switch 1200V, n-channel enhancement mode, insulated gate bipolar transistor (IGBT) module. The IGBT has a wide reverse bias safe operating area (RBSOA) plus 10µs 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:

DIM2400ESM12-A000

Note: When ordering, please use the complete part number

KEY PARAMETERS

V _{CES}		1200V
V _{CE(sat)} *	(typ)	2.2V
lc	(max)	2400A
I _{C(PK)}	(max)	4800A

* Measured at the power busbars, not the auxiliary terminals



Fig. 1 Circuit configuration



Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures

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.

T_{case} = 25°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
V _{CES}	Collector-emitter voltage	$V_{GE} = 0V$	1200	V
V_{GES}	Gate-emitter voltage		±20	V
Ι _C	Continuous collector current	T _{case} = 85°C	2400	А
I _{C(PK)}	Peak collector current	1ms, T _{case} = 115°C	4800	А
P _{max}	Max. transistor power dissipation	$T_{case} = 25^{\circ}C, T_j = 150^{\circ}C$	20830	W
l ² t	Diode I ² t value	$V_R = 0, t_p = 10ms, T_j = 125^{o}C$	900	kA ² s
V _{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	2500	V
Q _{PD}	Partial discharge – per module	IEC1287, $V_1 = 1300V$, $V_2 = 1000V$, 50Hz RMS	10	рС

THERMAL AND MECHANICAL RATINGS

Internal insulation material:	AIN
Baseplate material:	AISiC
Creepage distance:	33mm
Clearance:	20mm
CTI (Comparative Tracking Index):	600

Symbol	Parameter	Test Conditions	Min	Тур.	Мах	Units
R _{th(j-c)}	Thermal resistance – transistor	Continuous dissipation - junction to case	-	-	6	°C/kW
R _{th(j-c)}	Thermal resistance – diode	Continuous dissipation - junction to case	-	-	13	°C/kW
R _{th(c-h)}	Thermal resistance – case to heatsink (per module)	Mounting torque 5Nm (with mounting grease)	-	-	6	°C/kW
Tj	Junction temperature	Transistor	-	-	150	°C
		Diode	-	-	125	°C
T_{stg}	Storage temperature range	-	-40	-	125	°C
		Mounting – M6	-	-	5	Nm
	Screw torque	Electrical connections – M4	-	-	2	Nm
		Electrical connections – M8	-	-	10	Nm

ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
		$V_{GE} = 0V, V_{CE} = V_{CES}$			3	mA
I _{CES}	Collector cut-off current	$V_{GE} = 0V, V_{CE} = V_{CES}, T_{case} = 125^{\circ}C$			75	mA
I _{GES}	Gate leakage current	$V_{GE} = \pm 20V, V_{CE} = 0V$			12	μA
V _{GE(TH)}	Gate threshold voltage	I_{C} = 120mA, V_{GE} = V_{CE}	4.5	5.5	6.5	V
v t	Collector-emitter	V _{GE} = 15V, I _C = 2400A		2.2	2.8	V
V _{CE(sat)} [†]	saturation voltage	$V_{GE} = 15V, I_C = 2400A, T_j = 125^{\circ}C$		2.6	3.3	V
I _F	Diode forward current	DC			2400	А
I _{FM}	Diode maximum forward current	t _p = 1ms			4800	А
+		I _F = 2400A		2.1	2.4	V
V_{F}^{\dagger}	Diode forward voltage	I _F = 2400A, T _j = 125°C		2.1	2.4	V
C _{ies}	Input capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		270		nF
Qg	Gate charge	±15V		26		μC
C _{res}	Reverse transfer capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz				nF
L _M	Module inductance			10		nH
R _{INT}	Internal transistor resistance			90		μΩ
SC _{Data}	Short circuit current, I _{SC}	$\begin{split} T_{j} &= 125^{\circ}C, \ V_{CC} = 900V \\ t_{p} &\leq 10 \mu s, \ V_{GE} \leq 15V \\ V_{CE \ (max)} &= V_{CES} - L^{*} x \ dl/dt \\ IEC \ 60747-9 \end{split}$		13500		A

Note:

 † Measured at the power busbars, not the auxiliary terminals * 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			1370		ns
t _f	Fall time	I _C = 2400A V _{GE} = ±15V		230		ns
E _{OFF}	Turn-off energy loss	$V_{GE} = \pm 10V$ $V_{CE} = 600V$		520		mJ
t _{d(on)}	Turn-on delay time	$R_{G(ON)} = 1.0\Omega$ $R_{G(OFF)} = 1.0\Omega$ $L_{S} \sim 50 \text{nH}$		250		ns
t _r	Rise time			230		ns
E _{ON}	Turn-on energy loss			180		mJ
Q _{rr}	Diode reverse recovery charge	I _F = 2400A		310		μC
I _{rr}	Diode reverse recovery current	V _{CE} = 600V		1000		А
E _{rec}	Diode reverse recovery energy	dI _F /dt = 9500A/µs		150		mJ

T_{case} = 125°C unless stated otherwise

Symbol	Parameter	Test Conditions	Min	Тур.	Max	Units
t _{d(off)}	Turn-off delay time			1570		ns
t _f	Fall time	I _C = 2400A V _{GE} = ±15V		230		ns
E _{OFF}	Turn-off energy loss	$V_{GE} = \pm 10V$ $V_{CE} = 600V$		600		mJ
t _{d(on)}	Turn-on delay time	$R_{G(ON)} = 1.0\Omega$ $R_{G(OFF)} = 1.0\Omega$ $L_{S} \sim 50 \text{nH}$		360		ns
t _r	Rise time			290		ns
E _{ON}	Turn-on energy loss			200		mJ
Q _{rr}	Diode reverse recovery charge	I _F = 2400A		540		μC
I _{rr}	Diode reverse recovery current	$V_{CE} = 600V$		1260		А
E _{rec}	Diode reverse recovery energy	dI _F /dt = 8500A/µs		260		mJ



Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures



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PACKAGE DETAILS

For further package information, please visit our website or contact Customer Services. All dimensions in mm, unless stated otherwise. **DO NOT SCALE.**



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