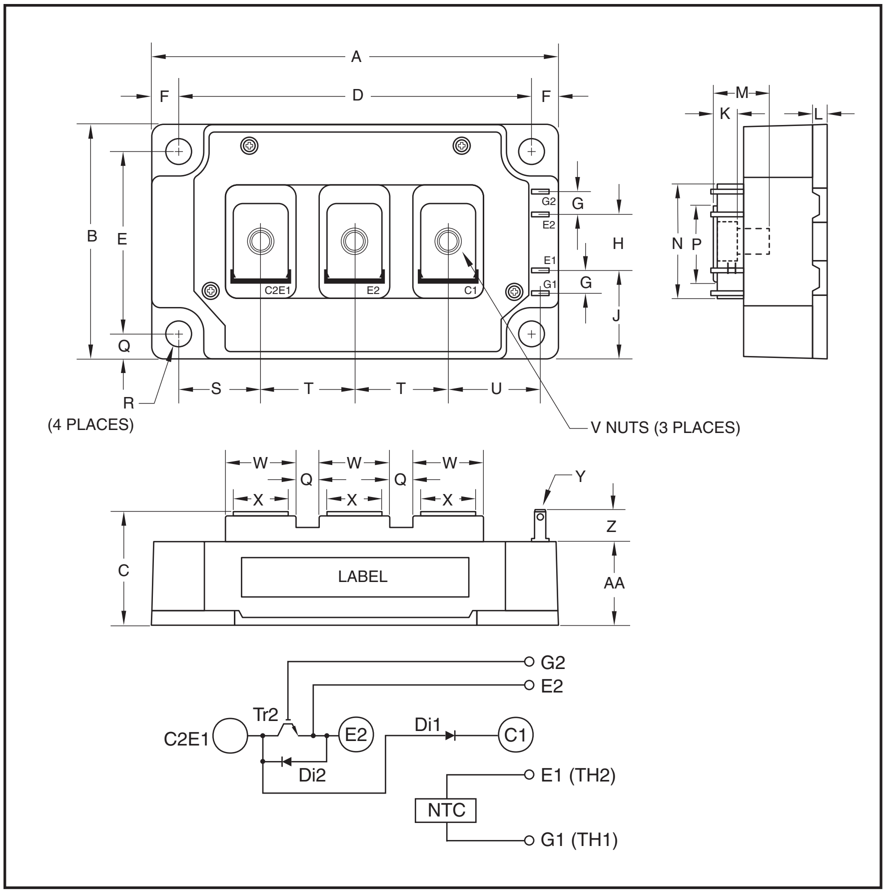
POWEREX

Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

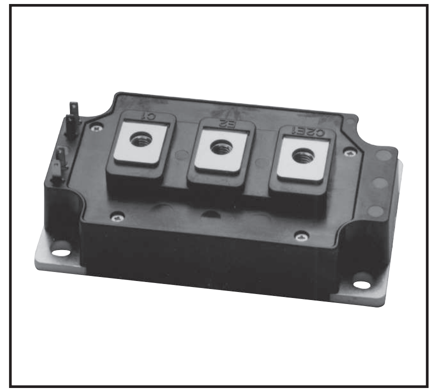
CM300E3Y6-24NFH

Chopper IGBTMOD™ NFH-Series Module

300 Amperes/1200 Volts



Outline Drawing and Circuit Diagram



Dimensions	Inches	Millimeters
A	4.25	108.0
B	2.44	62.0
C	1.18+0.4/-0.02	30.0+1.0/-0.5
D	3.66±0.01	93.0±0.25
E	1.89±0.01	48.0±0.25
F	0.29	7.5
G	0.24	6.0
J	0.689	17.5
H	0.59	15.0
K	0.244	6.2
L	0.16	4.0
M	0.56	14.2
N	1.18	30.0

Dimensions	Inches	Millimeters
P	0.79	20.0
Q	0.28	7.0
R	0.26 Dia.	Dia. 6.5
S	0.85	21.5
T	0.98	25.0
U	0.94	24.0
V	M6 Metric	M6
V	0.16	4.0
W	0.71	18.0
X	0.55	14.0
Y	0.02	0.5
Z	0.33	8.5
AA	0.87	22.2

Description:

Powerex IGBTMOD™ Modules are designed for use high frequency applications; 30 kHz for hard switching applications and 60 to 70 kHz for soft switching applications. Each module consists of two IGBT Transistors in a half-bridge configuration with each transistor having a reverse-connected super-fast recovery free-wheel diode. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

Features:

- ☐ Low $E_{SW(off)}$
- ☐ Discrete Super-Fast Recovery Free-Wheel Diode
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:

- ☐ Power Supplies
- ☐ Induction Heating
- ☐ Welders

Ordering Information:

Example: Select the complete module number you desire from the table below -i.e. CM300E3Y6-24NFH is a 1200V (V_{CES}), 300 Ampere Chopper IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	300	24

Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272 www.pwrx.com

CM300E3Y6-24NFH
Chopper IGBTMOD™ NFH-Series Module
300 Amperes/1200 Volts

Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Inverter IGBT/FWDi Part

Characteristics	Symbol	Rating	Units
Collector-Emitter Voltage (V_{GE} = 0V)	V_{CES}	1200	Volts
Gate-Emitter Voltage (V_{CE} = 0V)	V_{GES}	±20	Volts
Collector Current (Operation, T_C = 25°C)*3	I_C	300	Amperes
Collector Current (Pulse, Repetitive)*2	I_{CRM}	600	Amperes
Total Power Dissipation (T_C = 25°C)*2,*3	P_{tot}	1760	Watts
Emitter Current (Operation, T_C = 25°C)*3	I_E*1	50	Amperes
Emitter Current (Pulse, Repetitive)*2	I_{ERM}*1	100	Amperes

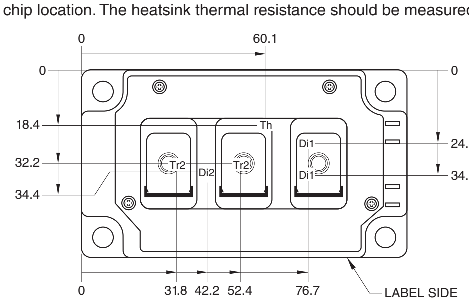
Clamp Diode Part

Characteristics	Symbol	Rating	Units
Repetitive Peak Reverse Voltage	V_{RRM}	1200	Volts
Forward Current (Operation, T_C = 25°C)*3	I_F	300	Amperes
Forward Current (Pulse, Repetitive)*2	I_{FRM}	600	Amperes

Module

Characteristics	Symbol	Rating	Units
Isolation Voltage (Charged Part to Baseplate, f= 60 Hz, AC 1 Minute)	V_{ISO}	2500	V_{rms}
Maximum Junction Temperature	$T_{j(max)}$	+150	°C
Operating Junction Temperature	$T_{j(op)}$	-40 to +150	°C
Storage Temperature	T_{stg}	-40 to +125	°C

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*2 Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.
*3 Case temperature (T_C) and heatsink temperature (T_s) is measured on the surface (mounting side) of the baseplate and the heatsink side just under the chips.
Refer to the figure to the right for chip location. The heatsink thermal resistance should be measured just under the chips.



Each mark points to the center position of each chip.
Tr2: IGBT Di2: FWDi
Di1: ClampDi Th: NTC Thermistor

Electrical Characteristics, T_j = 25°C unless otherwise specified

Inverter IGBT/FWDi Part

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_{GE} = 0V	—	—	1	mA
Gate-Emitter Leakage Current	I_{GES}	$\pm V_{GE} = V_{GES}$, V_{CE} = 0V	—	—	1	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 30mA, V_{CE} = 10V	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 300A, V_{GE} = 15V, T_j = 25°C*4	—	5.0	6.5	Volts
		I_C = 300A, V_{GE} = 15V, T_j = 125°C*4	—	5.0	—	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V	—	—	47	nF
Output Capacitance	C_{oes}		—	—	4.0	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.9	nF
Total Gate Charge	Q_G	V_{CC} = 600V, I_C = 300A, V_{GE} = 15V	—	1350	—	nC
Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 300A, V_{GE} = ±15V,	—	—	300	ns
Rise Time	t_r	R_G = 1.0Ω, Inductive Load	—	—	80	ns
Turn-off Delay Time	$t_{d(off)}$		—	—	500	ns
Fall Time	t_f		—	—	150	ns
Emitter-Collector Voltage	V_{EC}*1	I_E = 50A, V_{GE} = 0V*4	—	2.8	3.8	Volts
Internal Lead Resistance	$R_{CC' + EE'}$	I_C = 300A, T_C = 25°C, Chip - Terminals	—	0.53	—	mΩ
Internal Gate Resistance	r_g	T_C = 25°C	—	0.8	—	Ω
External Gate Resistance	R_G		1.0	—	10	Ω

Clamp Diode Part

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector Cutoff Current	I_{RRM}	$V_R = V_{RRM}$	—	—	1	mA
Reverse Recovery Time	t_{rr}	V_{CC} = 600V, I_F = 300A, V_{GE} = ±15V,	—	—	100	ns
Reverse Recovery Charge	Q_{rr}	R_G = 1.0Ω, Inductive Load	—	6.0	—	µC
Emitter-Collector Voltage	V_{FM}	I_F = 300A*4	—	5.5	7.0	Volts
Internal Lead Resistance	$R_{CC' + EE'}$	I_F = 300A, T_C = 25°C, Chip - Terminals	—	0.53	—	mΩ

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*4 Pulse width and repetition rate should be such as to cause negligible temperature rise.

CM300E3Y6-24NFH
Chopper IGBTMOD™ NFH-Series Module
300 Amperes/1200 Volts

Electrical Characteristics, T_j = 25°C unless otherwise specified

NTC Thermistor Part

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Zero Power Resistance	R_{25}	T_C = 25°C*3	4.85	5.00	5.15	kΩ
Deviation of Resistance	ΔR/R	R_{100} = 493Ω, T_C = 100°C*3	-7.3	—	+7.8	%
B Constant	$B_{(25/50)}$	Approximate by Equation*5	—	3375	—	K
Power Dissipation	P_{25}	T_C = 25°C*3	—	—	10	mW

Mechanical Characteristics

Mounting Torque	M_t	Main Terminals, M6 Screw	31	35	40	in-lb
Mounting Torque	M_s	Mounting, M6 Screw	31	35	40	in-lb
Weight	m		—	400	—	Grams
Flatness of Baseplate	e_c	On Centerline X, Y*6	-100	—	+100	µm

Thermal Resistance Characteristics, T_j = 25°C unless otherwise specified

Thermal Resistance, Junction to Case	$R_{th(j-c)}Q$	Per Inverter IGBT*3	—	—	0.071	K/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}D$	Per Inverter FWDi*3	—	—	0.43	K/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}D$	Per ClampDi*3	—	—	0.11	K/W
Contact Thermal Resistance, Case to Heatsink*2	$R_{th(c-s)}$	Thermal Grease Applied, per 1/2 Module*3,*7	—	0.02	—	K/W

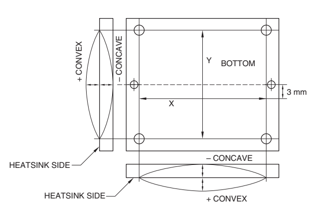
*3 Case temperature (T_C) is measured on the surface (mounting side) of the baseplate just under the chips. Refer to the figure to the right for chip location.

*5 $B_{(25/50)} = \ln(\frac{R_{25}}{R_{50}})/(\frac{1}{T_{25}} - \frac{1}{T_{50}})$

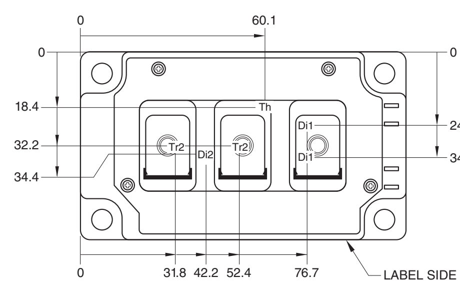
R_{25}; Resistance at Absolute Temperature T_{25} [K]; T_{25} = 25 [°C] + 273.15 = 298.15 [K]

R_{50}; Resistance at Absolute Temperature T_{50} [K]; T_{50} = 50 [°C] + 273.15 = 323.15 [K]

*6 Baseplate (mounting side) flatness measurement points (X, Y) are shown in the figure.



*7 Typical value is measured by using thermally conductive grease of λ = 0.9 [W/(m • K)].



Each mark points to the center position of each chip.

Tr2: IGBT Di2: FWDi

Di1: ClampDi Th: NTC Thermistor