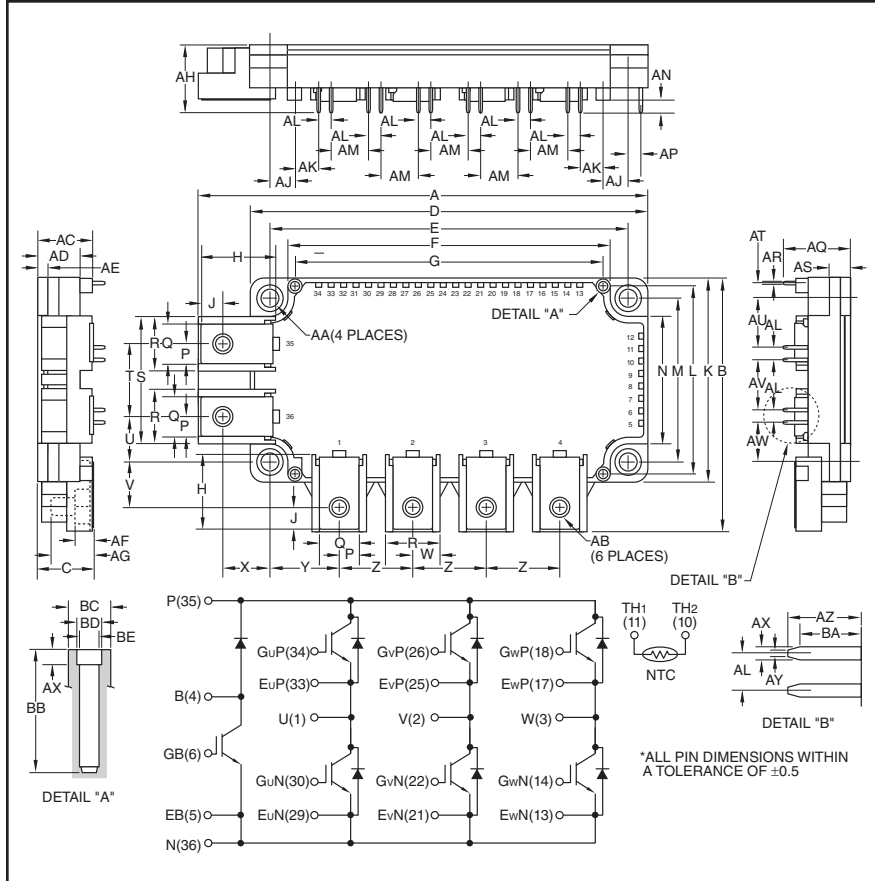


Six IGBTMOD™ + Brake NX-S Series Module 75 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.39	136.9
B	3.03	77.1
C	0.67	17.0
D	4.79	121.7
E	4.33±0.02	110.0±0.5
F	3.89	99.0
G	3.72	94.5
H	0.83	21.14
J	0.37	6.5
K	2.44	62.0
L	2.26	57.5
M	1.97±0.02	50.0±0.5
N	1.53	39.0
P	0.24	6.0
Q	0.48	12.0
R	0.67	17.0
S	1.53	39.0
T	0.87	22.0
U	0.55	14.0
V	0.54	13.64
W	0.33	8.5
X	0.53	13.5
Y	0.81	20.71
Z	0.9	22.86
AA	0.22 Dia.	5.5 Dia.
AB	M5	M5
AC	0.67	17.0

Dimensions	Inches	Millimeters
AD	0.51	13.0
AE	0.12	3.0
AF	0.21	5.4
AG	0.49	12.5
AH	0.81	20.5
AJ	0.30	7.75
AK	0.28	7.25
AL	0.15	3.81
AM	0.45	11.44
AN	0.14	3.5
AP	0.16	4.06
AQ	0.78	20.05
AR	0.03	0.8
AS	0.27	7.0
AT	0.16	4.2
AU	0.61	15.48
AV	0.60	15.24
AW	0.46	11.66
AX	0.04	1.15
AY	0.02	0.65
AZ	0.29	7.4
BA	0.24	6.2
BB	0.49	12.5
BC	0.17 Dia.	4.3 Dia.
BD	0.10 Dia.	2.5 Dia.
BE	0.08 Dia.	2.1 Dia.

Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of six IGBT Transistors in a three phase bridge configuration and a seventh IGBT with free-wheel diode for dynamic braking. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

Features:

- Low Drive Power
- Low $V_{CE(sat)}$
- Discrete Super-Fast Recovery Free-Wheel Diode
- Isolated Baseplate for Easy Heat Sinking

Applications:

- AC Motor Control
- Motion/Servo Control
- Photovoltaic/Fuel Cell

Ordering Information:

Example: Select the complete module number you desire from the table below -i.e. CM75RX-24S is a 1200V (V_{CES}), 75 Ampere Six-IGBTMOD™ + Brake Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	75	24



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

CM75RX-24S
Six IGBTMOD™ + Brake NX-S Series Module
 75 Amperes/1200 Volts

Absolute Maximum Ratings, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	CM75RX-24S	Units
Maximum Junction Temperature	$T_{j(max)}$	+175	$^\circ\text{C}$
Operating Power Device Junction Temperature	$T_{j(op)}$	-40 to 150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^\circ\text{C}$
Mounting Torque, M5 Mounting Screws	—	31	in-lb
Mounting Torque, M5 Main Terminal Screws	—	31	in-lb
Module Weight (Typical)	—	330	Grams
Isolation Voltage (Terminals to Baseplate, $f = 60\text{Hz}$, AC 1 minute)	V_{ISO}	2500	V_{rms}

Inverter Sector

Collector-Emitter Voltage ($V_{GE} = 0\text{V}$)	V_{CES}	1200	Volts
Gate-Emitter Voltage ($V_{CE} = 0\text{V}$)	V_{GES}	± 20	Volts
Collector Current (DC, $T_C = 121^\circ\text{C}$) ^{*1,*5}	I_C	75	Amperes
Collector Current (Pulse) ^{*4}	I_{CRM}	150	Amperes
Total Power Dissipation ($T_C = 25^\circ\text{C}$) ^{*1,*5}	P_{tot}	600	Watts
Emitter Current, Free Wheeling Diode Forward Current ($T_C = 25^\circ\text{C}$) ^{*1,*5}	I_E^{*3}	75	Amperes
Emitter Current, Free Wheeling Diode Forward Current (Pulse) ^{*4}	I_{ERM}^{*3}	150	Amperes

Brake Sector

Collector-Emitter Voltage ($V_{GE} = 0\text{V}$)	V_{CES}	1200	Volts
Gate-Emitter Voltage ($V_{CE} = 0\text{V}$)	V_{GES}	± 20	Volts
Collector Current (DC, $T_C = 125^\circ\text{C}$) ^{*1,*5}	I_C	50	Amperes
Collector Current (Pulse) ^{*4}	I_{CRM}	100	Amperes
Total Power Dissipation ($T_C = 25^\circ\text{C}$) ^{*1,*5}	P_{tot}	425	Watts
Repetitive Peak Reverse Voltage	V_{RRM}^{*3}	1200	Volts
Forward Current ($T_C = 25^\circ\text{C}$) ^{*1,*5}	I_F^{*3}	50	Amperes
Forward Current (Pulse) ^{*4}	I_{FM}^{*3}	100	Amperes

*1 Case temperature (T_C) and heatsink temperature (T_f) measured point is just under the chips.

*3 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWD).

*4 Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.

*5 Junction temperature (T_j) should not increase beyond maximum junction temperature ($T_{j(max)}$) rating.

CM75RX-24S
Six IGBTMOD™ + Brake NX-S Series Module
 75 Amperes/1200 Volts

Electrical and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

Inverter Sector

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0V$	—	—	1	mA
Gate Leakage Current	I_{GES}	$\pm V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 7.5\text{mA}, V_{CE} = 10V$	5.4	6	6.6	Volts
Collector-Emitter Saturation Voltage (Chip)	$V_{CE(sat)}$	$I_C = 75A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	1.7	2.15	Volts
		$I_C = 75A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	1.9	—	Volts
		$I_C = 75A, V_{GE} = 15V, T_j = 150^\circ\text{C}$	—	1.95	—	Volts
Collector-Emitter Saturation Voltage (Terminal)	$V_{CE(sat)}$	$I_C = 75A, V_{GE} = 15V, T_j = 25^\circ\text{C}^6$	—	1.8	2.25	Volts
		$I_C = 75A, V_{GE} = 15V, T_j = 125^\circ\text{C}^6$	—	2.0	—	Volts
		$I_C = 75A, V_{GE} = 15V, T_j = 150^\circ\text{C}^6$	—	2.05	—	Volts
Input Capacitance	C_{ies}		—	—	7.5	nF
Output Capacitance	C_{oes}	$V_{GE} = 0V, V_{CE} = 10V$	—	—	1.0	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.13	nF
Total Gate Charge	Q_G	$V_{CC} = 600V, I_C = 75A, V_{GE} = 15V$	—	175	—	nC
Inductive Load	Turn-on Delay Time	$V_{CC} = 600V, I_C = 75A, ^7$	—	—	300	ns
	Turn-on Rise Time					
Switch Time	Turn-off Delay Time	$V_{GE} = \pm 15V,$ $R_G = 36\Omega, \text{ Inductive Load}$	—	—	600	ns
	Turn-off Fall Time					
Reverse Recovery Time	t_{rr}^3	$I_E = 75A$	—	—	300	ns
Reverse Recovery Charge	Q_{rr}^3		—	4.0	—	μC
Turn-on Switching Loss per Pulse	E_{on}	$V_{CC} = 600V, I_C (I_E) = 75A, ^7$	—	12.5	—	mJ
Turn-off Switching Loss per Pulse	E_{off}	$V_{GE} = \pm 15V, R_G = 36\Omega,$	—	8	—	mJ
Reverse Recovery Loss per Pulse	E_{rec}^3	$T_j = 150^\circ\text{C}, \text{ Inductive Load}$	—	4.5	—	mJ
Emitter-Collector Voltage (Chip)	V_{EC}^3	$I_E = 75A, V_{GE} = 0V, T_j = 25^\circ\text{C}$	—	1.7	2.15	Volts
		$I_E = 75A, V_{GE} = 0V, T_j = 125^\circ\text{C}$	—	1.7	—	Volts
		$I_E = 75A, V_{GE} = 0V, T_j = 150^\circ\text{C}$	—	1.7	—	Volts
Emitter-Collector Voltage (Terminal)	V_{EC}^3	$I_E = 75A, V_{GE} = 0V, T_j = 25^\circ\text{C}^6$	—	1.8	2.25	Volts
		$I_E = 75A, V_{GE} = 0V, T_j = 125^\circ\text{C}^6$	—	1.8	—	Volts
		$I_E = 75A, V_{GE} = 0V, T_j = 150^\circ\text{C}^6$	—	1.8	—	Volts

Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case ^{*1}	$R_{th(j-c)Q}$	Per IGBT	—	—	0.25	K/W
Thermal Resistance, Junction to Case ^{*1}	$R_{th(j-c)D}$	Per FWDi	—	—	0.4	K/W
Internal Gate Resistance	r_g	Per Switch	—	0	—	Ω

^{*1} Case temperature (T_C) and heatsink temperature (T_I) measured point is just under the chips.
^{*3} Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
^{*6} Pulse width and repetition rate should be such as to cause negligible temperature rise.
^{*7} Recommended maximum collector supply voltage V_{CC} is 800V_{dc}.

CM75RX-24S

Six IGBTMOD™ + Brake NX-S Series Module

75 Amperes/1200 Volts

Electrical and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

Brake Sector

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0V$	—	—	1	mA
Gate Leakage Current	I_{GES}	$\pm V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 5\text{mA}, V_{CE} = 10V$	5.4	6	6.6	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$ (Chip)	$I_C = 50\text{A}, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	1.7	2.15	Volts
		$I_C = 50\text{A}, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	1.9	—	Volts
		$I_C = 50\text{A}, V_{GE} = 15V, T_j = 150^\circ\text{C}$	—	1.95	—	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$ (Terminal)	$I_C = 50\text{A}, V_{GE} = 15V, T_j = 25^\circ\text{C}^6$	—	1.8	2.25	Volts
		$I_C = 50\text{A}, V_{GE} = 15V, T_j = 125^\circ\text{C}^6$	—	2.0	—	Volts
		$I_C = 50\text{A}, V_{GE} = 15V, T_j = 150^\circ\text{C}^6$	—	2.05	—	Volts
Input Capacitance	C_{ies}		—	—	5.0	nF
Output Capacitance	C_{oes}	$V_{GE} = 0V, V_{CE} = 10V$	—	—	1.0	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.08	nF
Total Gate Charge	Q_G	$V_{CC} = 600V, I_C = 50\text{A}, V_{GE} = 15V$	—	117	—	nC
Repetitive Peak Reverse Current	I_{RRM}^{*3}	$V_R = V_{RRM}$	—	—	1	mA
Forward Voltage Drop	V_{EC}^{*3} (Chip)	$I_E = 50\text{A}, V_{GE} = 0V, T_j = 25^\circ\text{C}$	—	1.7	2.15	Volts
		$I_E = 50\text{A}, V_{GE} = 0V, T_j = 125^\circ\text{C}$	—	1.7	—	Volts
		$I_E = 50\text{A}, V_{GE} = 0V, T_j = 150^\circ\text{C}$	—	1.7	—	Volts
Forward Voltage Drop	V_{EC}^{*3} (Terminal)	$I_E = 50\text{A}, V_{GE} = 0V, T_j = 25^\circ\text{C}^6$	—	1.8	2.25	Volts
		$I_E = 50\text{A}, V_{GE} = 0V, T_j = 125^\circ\text{C}^6$	—	1.8	—	Volts
		$I_E = 50\text{A}, V_{GE} = 0V, T_j = 150^\circ\text{C}^6$	—	1.8	—	Volts

Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case ^{*1}	$R_{th(j-c)Q}$	Per IGBT	—	—	0.35	K/W
Thermal Resistance, Junction to Case ^{*1}	$R_{th(j-c)D}$	Per Clamp Diode	—	—	0.63	K/W
Internal Gate Resistance	R_g	Per Switch	—	0	—	Ω

NTC Thermistor Sector, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Zero Power Resistance	R	$T_C = 25^\circ\text{C}$	4.85	5.00	5.15	k Ω
Deviation of Resistance	$\Delta R/R$	$T_C = 100^\circ\text{C}, R_{100} = 493\Omega$	-7.3	—	+7.8	%
B Constant	$B_{(25/50)}$	Approximate by Equation ^{*9}	—	3375	—	K
Power Dissipation	P_{25}	$T_C = 25^\circ\text{C}$	—	—	10	mW

^{*1} Case temperature (T_C) and heatsink temperature (T_H) measured point is just under the chips.

^{*2} Typical value is measured by using thermally conductive grease of $\lambda = 0.9 \text{ [W/(m} \cdot \text{K)]}$.

^{*3} Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).

^{*6} Pulse width and repetition rate should be such as to cause negligible temperature rise.

^{*9} $B_{(25/50)} = \ln\left(\frac{R_{25}}{R_{50}}\right) / \left(\frac{1}{T_{25}} - \frac{1}{T_{50}}\right)$; Resistance at Absolute Temperature T_{25} [K], R_{50} ; resistance at Absolute Temperature T_{50} [K],
 $T_{25} = 25 [^\circ\text{C}] + 273.15 = 298.15$ [K], $T_{50} = 50 [^\circ\text{C}] + 273.15 = 323.15$ [K]



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CM75RX-24S
Six IGBTMOD™ + Brake NX-S Series Module
75 Amperes/1200 Volts

Module, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Lead Resistance (Main Terminals-Chip)	R_{lead}	$T_C = 25^\circ\text{C}$ (Per Switch)	—	—	2.4	m Ω
Contact Thermal Resistance* ¹ (Case to Heatsink)	$R_{\text{th(c-f)}}$	Thermal Grease Applied (Per 1 Module)* ²	—	0.015	—	K/W

*¹ Case temperature (T_C) and heatsink temperature (T_f) measured point is just under the chips.

*² Typical value is measured by using thermally conductive grease of $\lambda = 0.9$ [W/(m • K)].