Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
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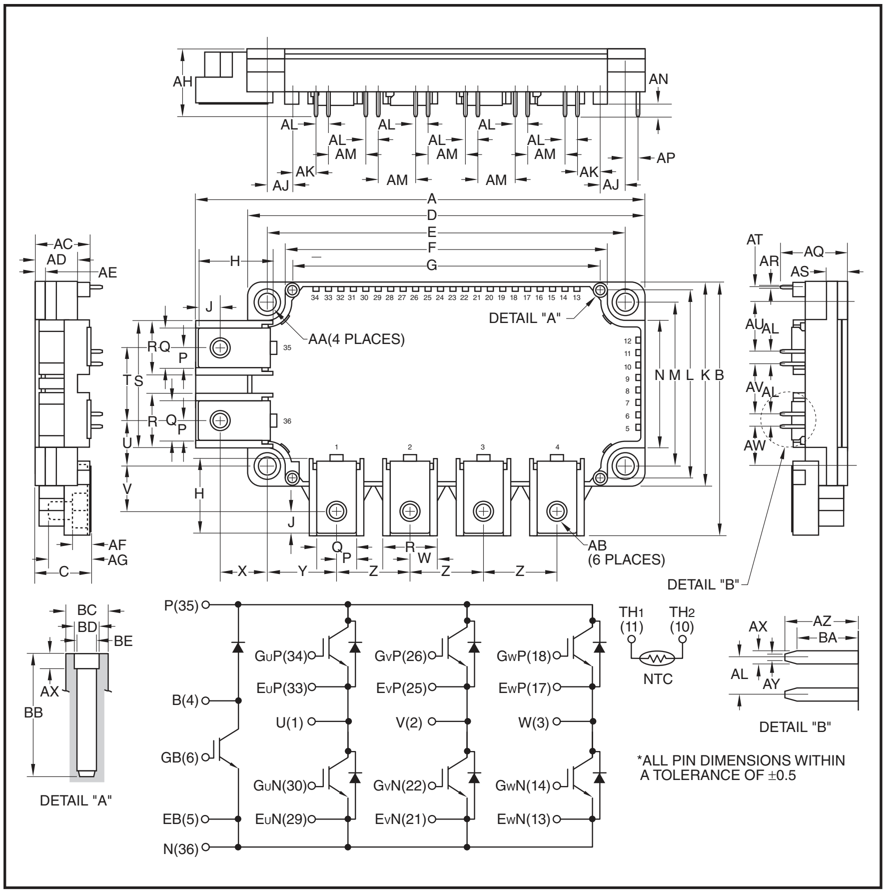
Six IGBTMOD™ + Brake NX-S Series Module

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.	2.1Dia.

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

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

Characteristics	Symbol	CM75RX-24S	Units
Maximum Junction Temperature	$T_{j(max)}$	+175	°C
Operating Power Device Junction Temperature	$T_{j(op)}$	-40 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°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 = 60Hz, AC 1 minute)	V_{ISO}	2500	V_{rms}

Inverter Sector

Characteristics	Symbol	CM75RX-24S	Units
Collector-Emitter Voltage (V_{GE} = 0V)	V_{CES}	1200	Volts
Gate-Emitter Voltage (V_{CE} = 0V)	V_{GES}	±20	Volts
Collector Current (DC, T_C = 121°C)*1,*5	I_C	75	Amperes
Collector Current (Pulse)*4	I_{CRM}	150	Amperes
Total Power Dissipation (T_C = 25°C)*1,*5	P_{tot}	600	Watts
Emitter Current, Free Wheeling Diode Forward Current (T_C = 25°C)*1,*5	I_E*3	75	Amperes
Emitter Current, Free Wheeling Diode Forward Current (Pulse)*4	I_{ERM}*3	150	Amperes

Brake Sector

Characteristics	Symbol	CM75RX-24S	Units
Collector-Emitter Voltage (V_{GE} = 0V)	V_{CES}	1200	Volts
Gate-Emitter Voltage (V_{CE} = 0V)	V_{GES}	±20	Volts
Collector Current (DC, T_C = 125°C)*1,*5	I_C	50	Amperes
Collector Current (Pulse)*4	I_{CRM}	100	Amperes
Total Power Dissipation (T_C = 25°C)*1,*5	P_{tot}	425	Watts
Repetitive Peak Reverse Voltage	V_{RRM}*3	1200	Volts
Forward Current (T_C = 25°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 (FWDi).
*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.

Electrical and Mechanical Characteristics, T_j = 25°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 = 7.5mA, V_{CE} = 10V	5.4	6	6.6	Volts
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	I_C = 75A, V_{GE} = 15V, T_j = 25°C	—	1.7	2.15	Volts
		(Chip)	I_C = 75A, V_{GE} = 15V, T_j = 125°C	—	1.9	—	Volts
			I_C = 75A, V_{GE} = 15V, T_j = 150°C	—	1.95	—	Volts
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	I_C = 75A, V_{GE} = 15V, T_j = 25°C*6	—	1.8	2.25	Volts
		(Terminal)	I_C = 75A, V_{GE} = 15V, T_j = 125°C*6	—	2.0	—	Volts
			I_C = 75A, V_{GE} = 15V, T_j = 150°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	Turn-on Delay Time	$t_{d(on)}$		—	—	300	ns
Load	Turn-on Rise Time	t_r	V_{CC} = 600V, I_C = 75A, *7	—	—	200	ns
Switch	Turn-off Delay Time	$t_{d(off)}$	V_{GE} = ±15V,	—	—	600	ns
Time	Turn-off Fall Time	t_f	R_G = 36Ω, Inductive Load	—	—	300	ns
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} = ±15V, R_G = 36Ω,	—	8	—	mJ
Reverse Recovery Loss per Pulse		E_{rec}*3	T_j = 150°C, Inductive Load	—	4.5	—	mJ
Emitter-Collector Voltage		V_{EC}*3	I_E = 75A, V_{GE} = 0V, T_j = 25°C	—	1.7	2.15	Volts
		(Chip)	I_E = 75A, V_{GE} = 0V, T_j = 125°C	—	1.7	—	Volts
			I_E = 75A, V_{GE} = 0V, T_j = 150°C	—	1.7	—	Volts
Emitter-Collector Voltage		V_{EC}*3	I_E = 75A, V_{GE} = 0V, T_j = 25°C*6	—	1.8	2.25	Volts
		(Terminal)	I_E = 75A, V_{GE} = 0V, T_j = 125°C*6	—	1.8	—	Volts
			I_E = 75A, V_{GE} = 0V, T_j = 150°C*6	—	1.8	—	Volts

Thermal and Mechanical Characteristics, T_j = 25°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_f) 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 $800V_{dc}$.

Electrical and Mechanical Characteristics, T_j = 25°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 = 5mA, V_{CE} = 10V	5.4	6	6.6	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$ (Chip)	I_C = 50A, V_{GE} = 15V, T_j = 25°C	—	1.7	2.15	Volts
		I_C = 50A, V_{GE} = 15V, T_j = 125°C	—	1.9	—	Volts
		I_C = 50A, V_{GE} = 15V, T_j = 150°C	—	1.95	—	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$ (Terminal)	I_C = 50A, V_{GE} = 15V, T_j = 25°C*6	—	1.8	2.25	Volts
		I_C = 50A, V_{GE} = 15V, T_j = 125°C*6	—	2.0	—	Volts
		I_C = 50A, V_{GE} = 15V, T_j = 150°C*6	—	2.05	—	Volts
Input Capacitance	C_{ies}	V_{GE} = 0V, V_{CE} = 10V	—	—	5.0	nF
Output Capacitance	C_{oes}		—	—	1.0	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.08	nF
Total Gate Charge	Q_G	V_{CC} = 600V, I_C = 50A, 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 = 50A, V_{GE} = 0V, T_j = 25°C	—	1.7	2.15	Volts
		I_E = 50A, V_{GE} = 0V, T_j = 125°C	—	1.7	—	Volts
		I_E = 50A, V_{GE} = 0V, T_j = 150°C	—	1.7	—	Volts
Forward Voltage Drop	V_{EC}*3 (Terminal)	I_E = 50A, V_{GE} = 0V, T_j = 25°C*6	—	1.8	2.25	Volts
		I_E = 50A, V_{GE} = 0V, T_j = 125°C*6	—	1.8	—	Volts
		I_E = 50A, V_{GE} = 0V, T_j = 150°C*6	—	1.8	—	Volts

Thermal and Mechanical Characteristics, T_j = 25°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°C unless otherwise specified

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

*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 λ = 0.9 [W/(m • 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 $B_{(25/50)} = \ln(\frac{R_{25}}{R_{50}})/(\frac{1}{T_{25}} - \frac{1}{T_{50}})$ R_{25}; Resistance at Absolute Temperature T_{25} [K], R_{50}; resistance at Absolute Temperature T_{50} [K],
T_{25} = 25 [°C] + 273.15 = 298.15 [K], T_{50} = 50 [°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°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Lead Resistance (Main Terminals-Chip)	R_{lead}	T_C = 25°C (Per Switch)	—	—	2.4	mΩ
Contact Thermal Resistance*1 (Case to Heatsink)	$R_{th(c-f)}$	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 λ = 0.9 [W/(m • K)].