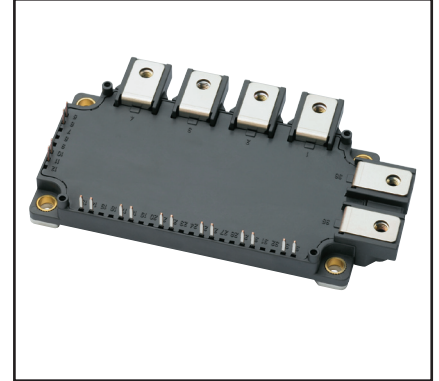
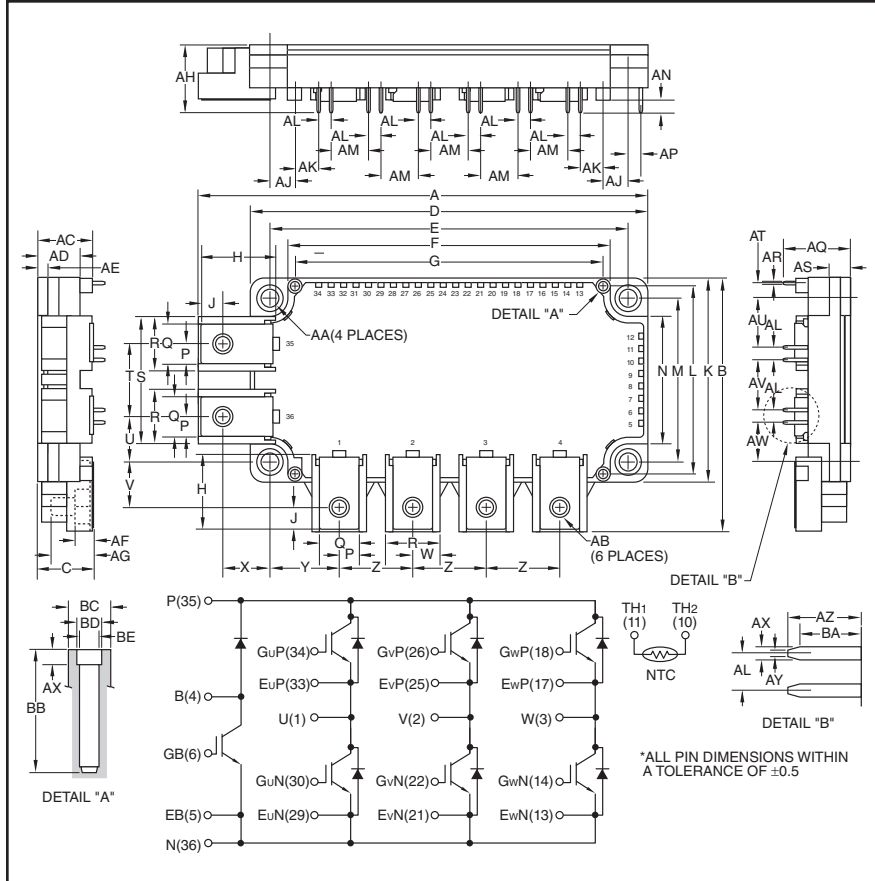


Six IGBTMOD™ + Brake NX-S Series Module 100 Amperes/1200 Volts



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. CM100RX-24S is a 1200V (V_{CES}), 100 Ampere Six-IGBTMOD™ + Brake Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	100	24

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.

CM100RX-24S

Six IGBTMOD™ + Brake NX-S Series Module

100 Amperes/1200 Volts

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

Characteristics	Symbol	CM100RX-24S	Units
Maximum Junction Temperature	$T_{j(\max)}$	+175	$^\circ\text{C}$
Operating Power Device Junction Temperature	$T_{j(\text{op})}$	-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 ($V_{\text{GE}} = 0\text{V}$)	V_{CES}	1200	Volts
Gate-Emitter Voltage ($V_{\text{CE}} = 0\text{V}$)	V_{GES}	± 20	Volts
Collector Current (DC, $T_{\text{C}} = 118^\circ\text{C}$) ^{*1,*5}	I_{C}	100	Amperes
Collector Current (Pulse) ^{*4}	I_{CRM}	200	Amperes
Total Power Dissipation ($T_{\text{C}} = 25^\circ\text{C}$) ^{*1,*5}	P_{tot}	750	Watts
Emitter Current, Free Wheeling Diode Forward Current ($T_{\text{C}} = 25^\circ\text{C}$) ^{*1,*5}	$I_{\text{E}}^{\text{*3}}$	100	Amperes
Emitter Current, Free Wheeling Diode Forward Current (Pulse) ^{*4}	$I_{\text{ERM}}^{\text{*3}}$	200	Amperes

Brake Sector

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

*1 Case temperature (T_{C}) and heatsink temperature (T_{H}) 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.

CM100RX-24S
Six IGBTMOD™ + Brake NX-S Series Module
 100 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	$V_{GE(th)}$	$I_C = 10\text{mA}, V_{CE} = 10V$	5.4	6	6.6	Volts	
Collector-Emitter Saturation Voltage (Chip)	$V_{CE(sat)}$	$I_C = 100A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	1.7	2.15	Volts	
		$I_C = 100A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	1.9	—	Volts	
		$I_C = 100A, V_{GE} = 15V, T_j = 150^\circ\text{C}$	—	1.95	—	Volts	
Collector-Emitter Saturation Voltage (Terminal)	$V_{CE(sat)}$	$I_C = 100A, V_{GE} = 15V, T_j = 25^\circ\text{C}^{*6}$	—	1.8	2.25	Volts	
		$I_C = 100A, V_{GE} = 15V, T_j = 125^\circ\text{C}^{*6}$	—	2.0	—	Volts	
		$I_C = 100A, V_{GE} = 15V, T_j = 150^\circ\text{C}^{*6}$	—	2.05	—	Volts	
Input Capacitance	C_{ies}		—	—	10	nF	
Output Capacitance	C_{oes}	$V_{GE} = 0V, V_{CE} = 10V$	—	—	2.0	nF	
Reverse Transfer Capacitance	C_{res}		—	—	0.17	nF	
Total Gate Charge	Q_G	$V_{CC} = 600V, I_C = 100A, V_{GE} = 15V$	—	233	—	nC	
Inductive Load Switch Time	Turn-on Delay Time	$V_{CC} = 600V, I_C = 100A, ^{*7}$ $V_{GE} = \pm 15V,$ $R_G = 27\Omega, \text{ Inductive Load},$ $I_E = 100A$	—	—	300	ns	
	Turn-on Rise Time		t_r	—	—	200	ns
	Turn-off Delay Time		$t_{d(off)}$	—	—	600	ns
	Turn-off Fall Time		t_f	—	—	300	ns
Reverse Recovery Time	t_{rr}^{*3}		—	—	300	ns	
Reverse Recovery Charge	Q_{rr}^{*3}		—	5.3	—	μC	
Turn-on Switching Loss per Pulse	E_{on}	$V_{CC} = 600V, I_C (I_E) = 100A, ^{*7}$	—	16.7	—	mJ	
Turn-off Switching Loss per Pulse	E_{off}	$V_{GE} = \pm 15V, R_G = 27\Omega,$	—	10.7	—	mJ	
Reverse Recovery Loss per Pulse	E_{rec}^{*3}	$T_j = 150^\circ\text{C}, \text{ Inductive Load}$	—	6.0	—	mJ	
Emitter-Collector Voltage (Chip)	V_{EC}^{*3}	$I_E = 100A, V_{GE} = 0V, T_j = 25^\circ\text{C}$	—	1.7	2.15	Volts	
		$I_E = 100A, V_{GE} = 0V, T_j = 125^\circ\text{C}$	—	1.7	—	Volts	
		$I_E = 100A, V_{GE} = 0V, T_j = 150^\circ\text{C}$	—	1.7	—	Volts	
Emitter-Collector Voltage (Terminal)	V_{EC}^{*3}	$I_E = 100A, V_{GE} = 0V, T_j = 25^\circ\text{C}^{*6}$	—	1.8	2.25	Volts	
		$I_E = 100A, V_{GE} = 0V, T_j = 125^\circ\text{C}^{*6}$	—	1.8	—	Volts	
		$I_E = 100A, V_{GE} = 0V, T_j = 150^\circ\text{C}^{*6}$	—	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	—	—	0.20	K/W
Thermal Resistance, Junction to Case ^{*1}	$R_{th(j-c)D}$	Per FWDi	—	—	0.29	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}.

CM100RX-24S

Six IGBTMOD™ + Brake NX-S Series Module

100 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	$I_{RRM}^{\ast3}$	$V_R = V_{RRM}$	—	—	1	mA
Forward Voltage Drop	$V_{EC}^{\ast3}$ (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	$V_{EC}^{\ast3}$ (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

^{*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.

CM100RX-24S
Six IGBTMOD™ + Brake NX-S Series Module
 100 Amperes/1200 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

Module, T_j = 25°C unless otherwise specified

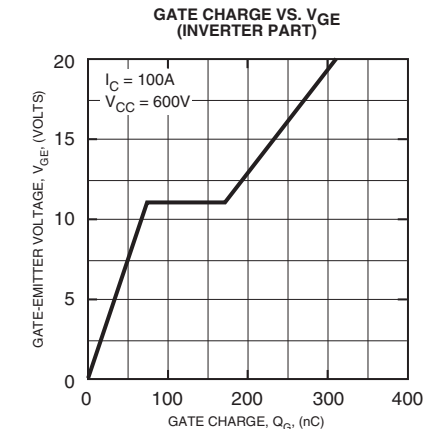
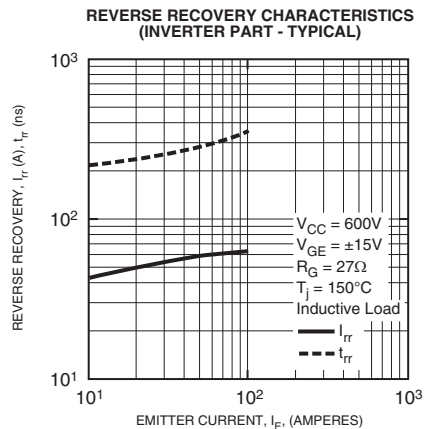
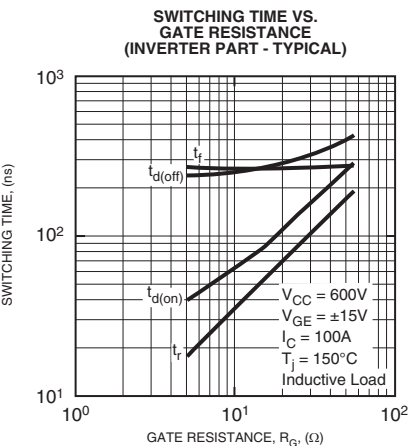
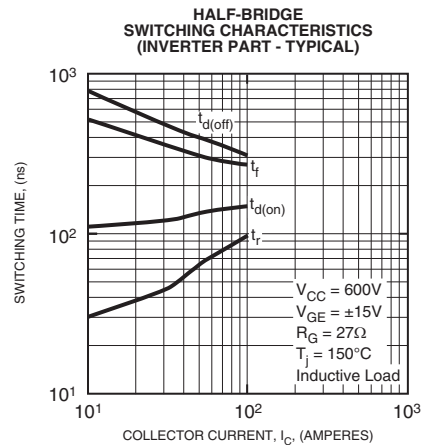
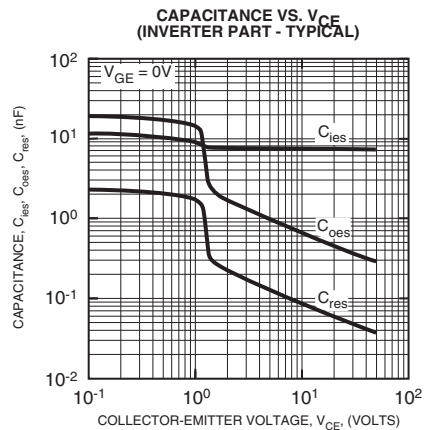
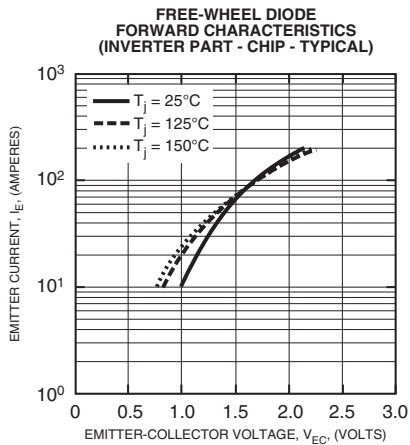
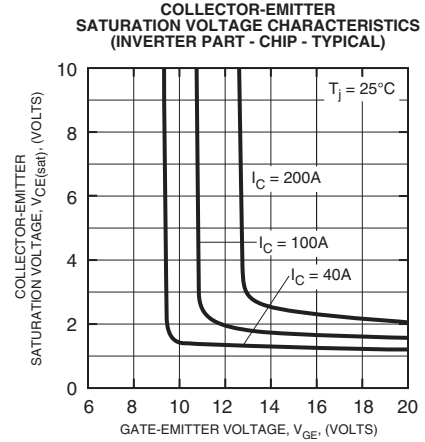
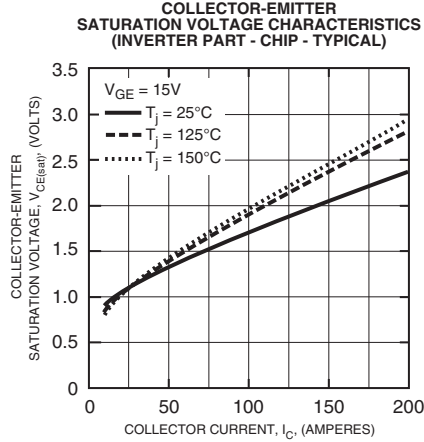
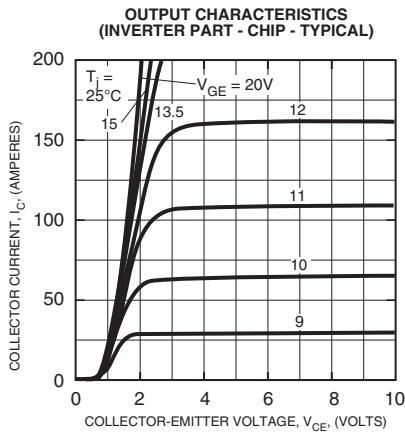
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Lead Resistance (Main Terminals-Chip)	R _{lead}	T _C = 25°C (Per Switch)	—	—	2.2	mΩ
Contact Thermal Resistance*1 (Case to Heatsink)	R _{th(c-f)}	Thermal Grease Applied (Per 1 Module)*2	—	0.015	—	K/W

*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)].

*9 $B_{(25/50)} = \ln\left(\frac{R_{25}}{R_{50}}\right) / \left(\frac{1}{T_{25}} - \frac{1}{T_{50}}\right)$ R₂₅: Resistance at Absolute Temperature T₂₅ [K], R₅₀: resistance at Absolute Temperature T₅₀ [K],
 T₂₅ = 25 [°C] + 273.15 = 298.15 [K], T₅₀ = 50 [°C] + 273.15 = 323.15 [K]

CM100RX-24S
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 100 Amperes/1200 Volts



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