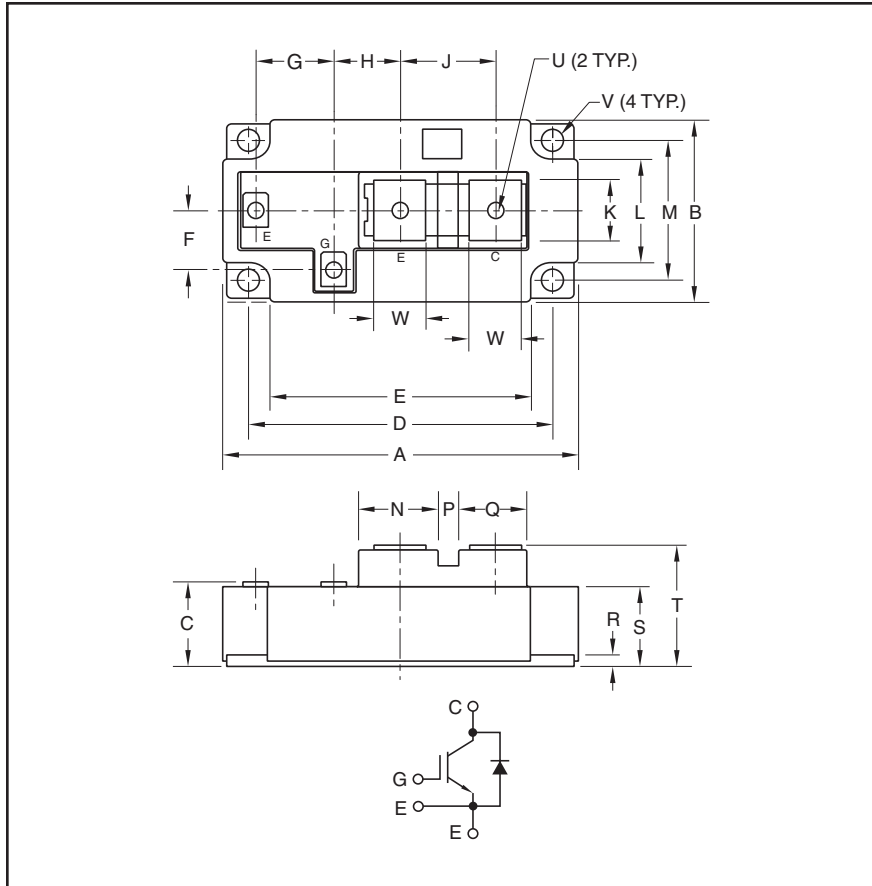


Single IGBT NFM-Series Module 600 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dim.	Inches	Millimeters
A	4.25	108.0
B	2.44	62.0
C	1.016	25.8
D	3.66±0.01	93.0±0.25
E	3.15	80.0
F	0.79	20.0
G	0.94	24.0
H	0.79	20.0
J	1.14	29.0
K	0.80	20.4
L	1.38	35.0

Dim.	Inches	Millimeters
M	1.89	48.0
N	0.94	24.0
P	0.23	6.0
Q	0.85	21.5
R	0.14	3.5
S	0.96	24.4
T	1.45+0.04/-0.02	36.8+1.0/-0.5
U	M6	M6
V	0.26 Dia.	6.5 Dia.
W	0.62	15.8



Description:

Powerex NFM IGBT Modules are designed for use in hard switching (15-30 kHz) applications. Each module consists of one IGBT Transistor in a single configuration with 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 Drive Power
- ☐ Low $E_{SW(off)}$
- ☐ Discrete Super-Fast Recovery Free-Wheel Diode
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:

- ☐ Power Supplies
- ☐ UPS
- ☐ Battery Powered Supplies
- ☐ Induction Heating

Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e. CM600HC-24NFM is a 1200V (V_{CES}), 600 Ampere Single IGBT Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	600	24

CM600HC-24NFM
Single IGBT NFM-Series Module
 600 Amperes/1200 Volts

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

Ratings	Symbol	CM600HC-24NFM	Units
Junction Temperature	T_j	-40 to 150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^\circ\text{C}$
Collector-Emitter Voltage (G-E Short)	V_{CES}	1200	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	± 20	Volts
Collector Current	I_C	600	Amperes
Peak Collector Current	I_{CM}	1200*	Amperes
Emitter Current**	I_E	600	Amperes
Peak Emitter Current**	I_{EM}	1200*	Amperes
Maximum Collector Dissipation*** ($T_C = 25^\circ\text{C}$)****	P_C	3670	Watts
Mounting Torque, M6 Main Terminal	—	40	in-lb
Mounting Torque, M6 Mounting	—	40	in-lb
Mounting Torque, G(E) Terminal M4	—	15	in-lb
Weight	—	370	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{ISO}	2500	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0V$	—	—	1.0	mA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 60\text{mA}, V_{CE} = 10V$	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage*****	$V_{CE(sat)}$	$I_C = 600A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	3.0	4.5	Volts
		$I_C = 600A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	3.0	—	Volts
Total Gate Charge	Q_G	$V_{CC} = 600V, I_C = 600A, V_{GE} = 15V$	—	2700	—	nC
Emitter-Collector Voltage**	V_{EC}	$I_E = 600A, V_{GE} = 0V$	—	2.3	3.3	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}		—	—	95	nF
Output Capacitance*****	C_{oes}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	8.0	nF
Reverse Transfer Capacitance	C_{res}		—	—	1.8	nF
Inductive	Turn-on Delay Time	$t_{d(on)}$	—	—	400	ns
Load	Rise Time	t_r	—	—	120	ns
Switch	Turn-off Delay Time	$t_{d(off)}$	—	—	700	ns
Time	Fall Time	t_f	—	60	200	ns
Diode Reverse Recovery Time**	t_{rr}	Switching Operation,	—	130	210	ns
Diode Reverse Recovery Charge**	Q_{rr}	$I_E = 600A$	—	28	—	μC

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

**Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

***Junction temperature (T_j) should not increase beyond 150°C .

**** T_C , T_f measured point is just under the chips.

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

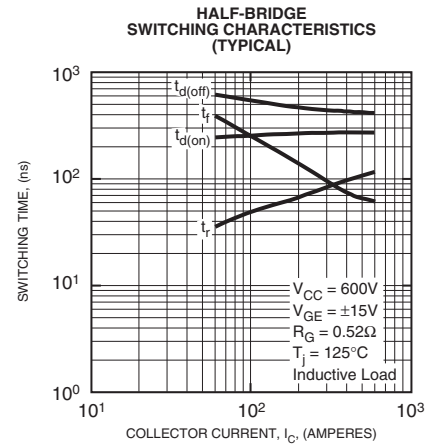
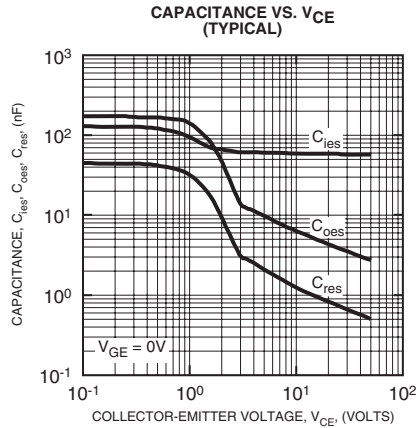
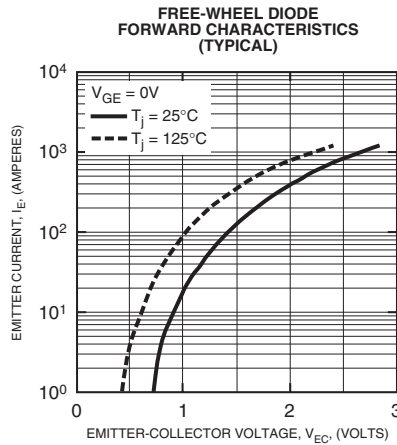
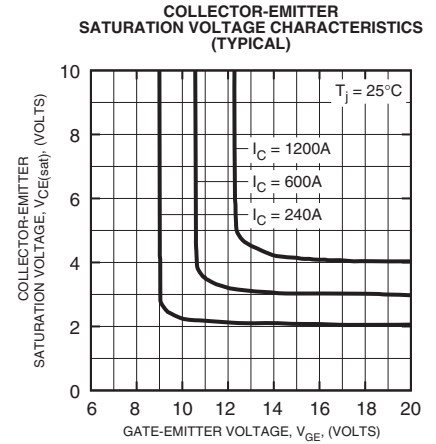
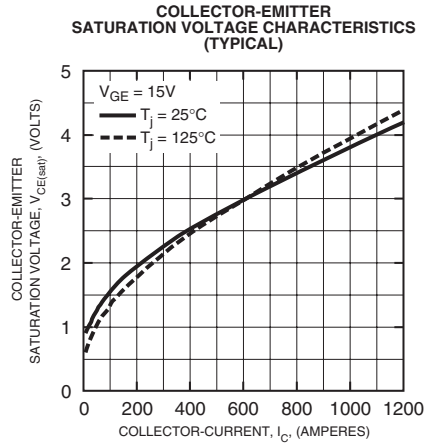
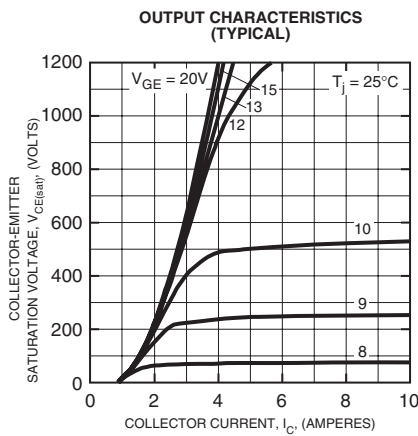
CM600HC-24NFM

Single IGBT NFM-Series Module

600 Amperes/1200 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	$R_{th(j-c)Q}$	Per IGBT 1/2 Module, T_C Measured Point Just Under Chips	—	—	0.034	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)D}$	Per FWDi 1/2 Module, T_C Measured Point Just Under Chips	—	—	0.07	$^\circ\text{C/W}$
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per 1/2 Module, Thermal Grease Applied	—	0.02	—	$^\circ\text{C/W}$
External Gate Resistance	R_G		0.52	—	5.2	Ω

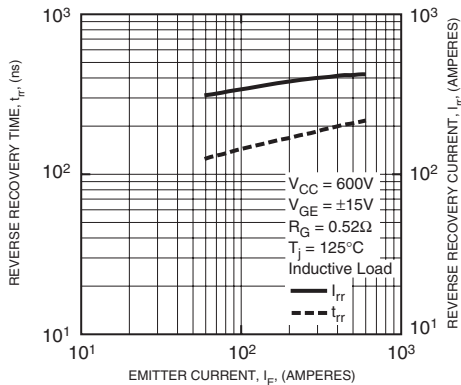


CM600HC-24NFM

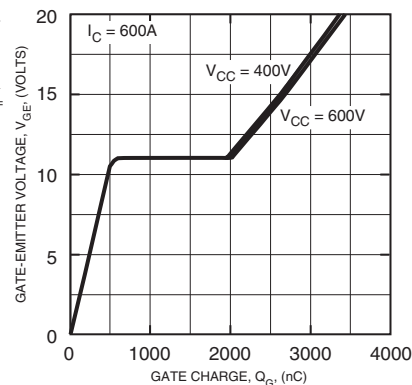
Single IGBT NFM-Series Module

600 Amperes/1200 Volts

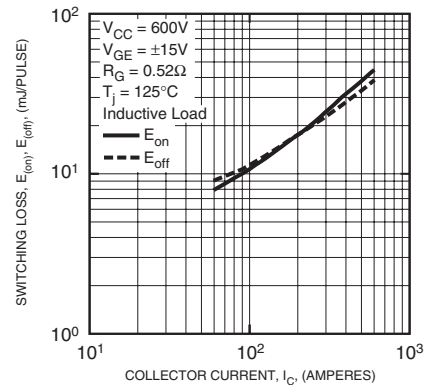
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



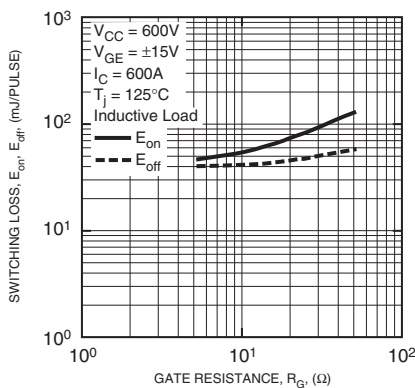
GATE CHARGE VS. V_{GE}



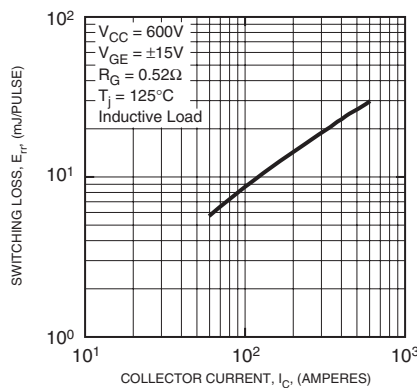
SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



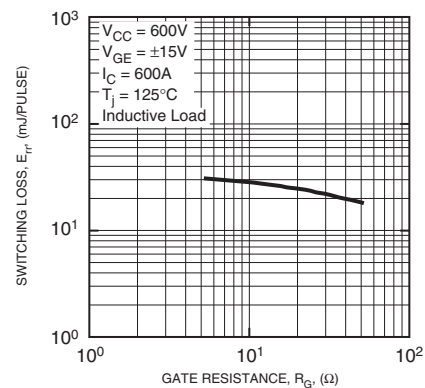
SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDI)

