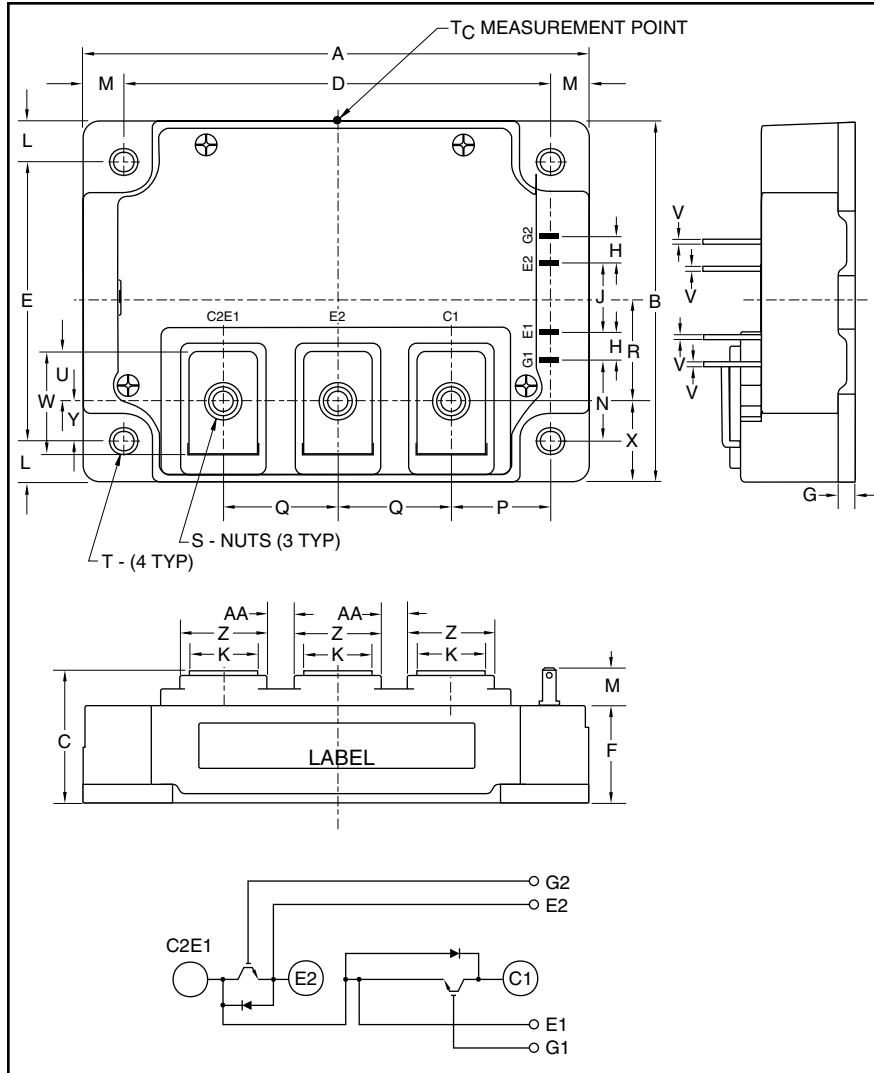


Dual IGBTMOD™ NFH-Series Module 400 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.33	110.0
B	3.15	80.0
C	1.14+0.04/-0.02	29.0+1.0/-0.5
D	3.66±0.01	93.0±0.25
E	2.44±0.01	62.0±0.25
F	0.83	21.2
G	0.16	4.0
H	0.24	6.0
J	0.59	15.0
K	0.55	14.0
L	0.35	9.0
M	0.33	8.5
N	0.69	17.5

Dimensions	Inches	Millimeters
P	0.85	21.5
Q	0.98	25.0
R	0.86	21.75
S	M6 Metric	M6
T	0.26 Dia.	6.5 Dia.
U	0.4	10.0
V	0.02	0.5
W	0.87	22.2
X	0.72	18.25
Y	0.36	9.25
Z	0.71	18.0
AA	0.28	7.0



Description:

Powerex IGBTMOD™ Modules are designed for use in 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 ESW(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 part module number you desire from the table below -i.e. CM400DU-24NFH is a 1200V (V_{CEs}), 400 Ampere Dual IGBTMOD™ Power Module.

Type	Current Rating Amperes	V _{CEs} Volts (x 50)
CM	400	24

CM400DU-24NFH
Dual IGBTMOD™ NFH-Series Module
 400 Amperes/1200 Volts

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

Ratings	Symbol	CM400DU-24NF	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 ($T_C = 25^\circ\text{C}$)	I_C	400*	Amperes
Peak Collector Current	I_{CM}	800*	Amperes
Emitter Current** ($T_C = 25^\circ\text{C}$)	I_E	400*	Amperes
Peak Emitter Current**	I_{EM}	800*	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$)	P_C	1040	Watts
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$)	P_C	2500	Watts
Mounting Torque, M6 Main Terminal	—	40	in-lb
Mounting Torque, M6 Mounting	—	40	in-lb
Weight	—	580	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}	$V_{\text{CE}} = V_{\text{CES}}$, $V_{\text{GE}} = 0\text{V}$	—	—	1.0	mA
Gate Leakage Current	I_{GES}	$V_{\text{GE}} = V_{\text{GES}}$, $V_{\text{CE}} = 0\text{V}$	—	—	1.4	μA
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$I_C = 40\text{mA}$, $V_{\text{CE}} = 10\text{V}$	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 400\text{A}$, $V_{\text{GE}} = 15\text{V}$, $T_j = 25^\circ\text{C}$	—	5.0	6.5	Volts
		$I_C = 400\text{A}$, $V_{\text{GE}} = 15\text{V}$, $T_j = 125^\circ\text{C}$	—	5.0	—	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 600\text{V}$, $I_C = 400\text{A}$, $V_{\text{GE}} = 15\text{V}$	—	1800	—	nC
Emitter-Collector Voltage**	V_{EC}	$I_E = 400\text{A}$, $V_{\text{GE}} = 0\text{V}$	—	—	3.5	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}	$V_{\text{CE}} = 10\text{V}$, $V_{\text{GE}} = 0\text{V}$	—	—	63	nf
Output Capacitance	C_{oes}		—	—	5.3	nf
Reverse Transfer Capacitance	C_{res}		—	—	1.2	nf
Inductive	Turn-on Delay Time	$V_{\text{CC}} = 600\text{V}$, $I_C = 400\text{A}$, $V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}$, $R_G = 0.78\Omega$, Inductive Load	—	—	300	ns
Load	Rise Time		—	—	100	ns
Switch	Turn-off Delay Time		—	—	500	ns
Time	Fall Time		—	—	150	ns
Diode Reverse Recovery Time**	t_{rr}	Switching Operation,	—	—	250	ns
Diode Reverse Recovery Charge**	Q_{rr}	$I_E = 400\text{A}$	—	16	—	μC

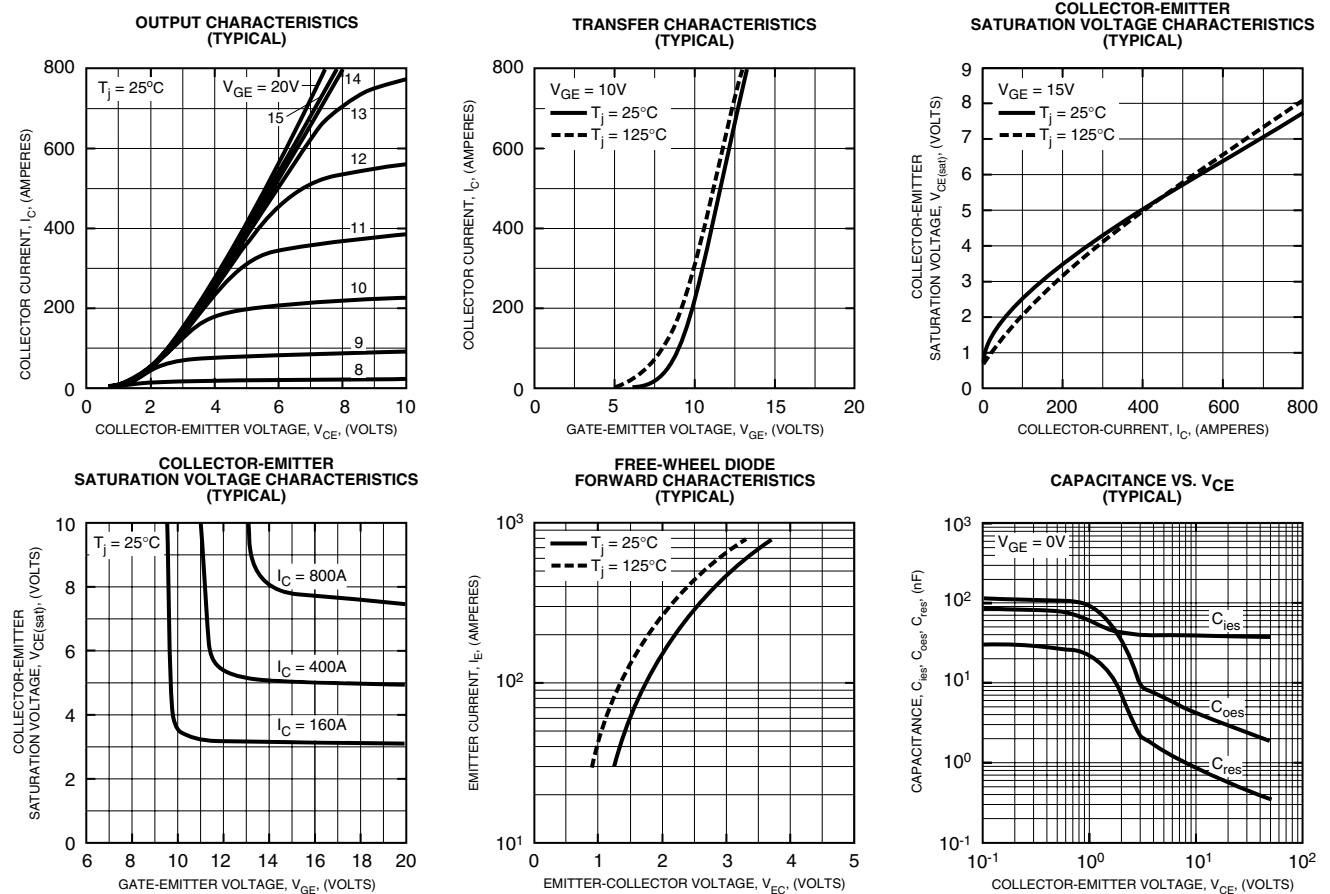
* Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(\text{max})}$ rating.

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

CM400DU-24NFH
Dual IGBTMOD™ NFH-Series Module
 400 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 Reference Point per Outline Drawing	—	—	0.12	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)D}$	Per FWDi 1/2 Module, T_C Reference Point per Outline Drawing	—	—	0.23	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)'Q}$	Per IGBT 1/2 Module, T_C Reference Point Under Chips	—	—	0.051	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)'D}$	Per FWDi 1/2 Module, T_C Reference Point per Outline Drawing	—	—	0.093	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Per 1/2 Module, Thermal Grease Applied	—	0.02	—	$^\circ\text{C/W}$
External Gate Resistance	R_G		0.78	—	7.8	Ω

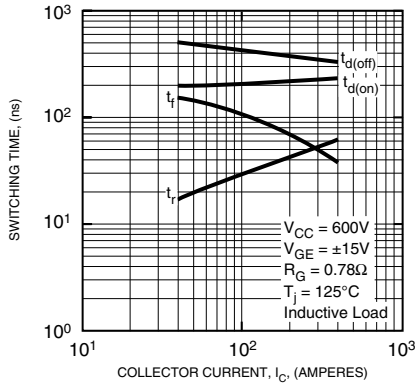


CM400DU-24NFH

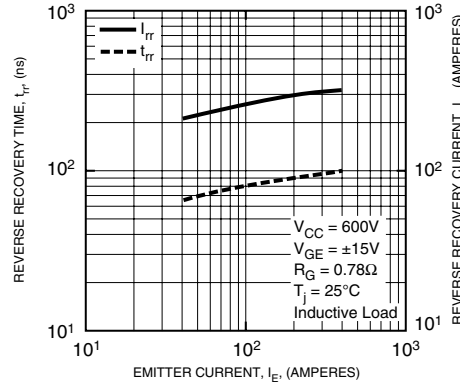
Dual IGBTMOD™ NFH-Series Module

400 Amperes/1200 Volts

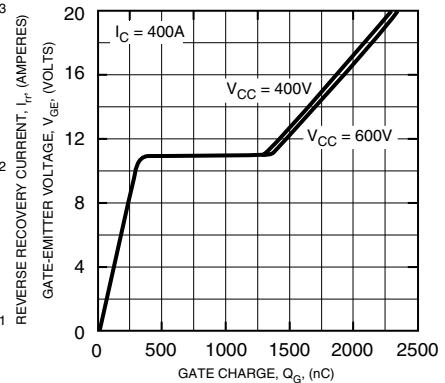
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)**



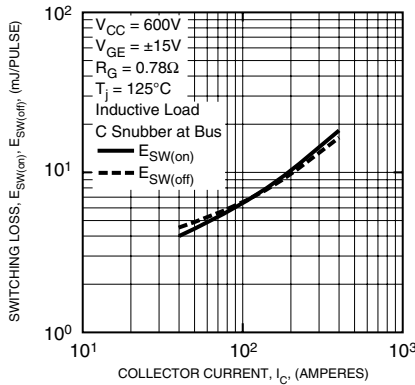
**REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)**



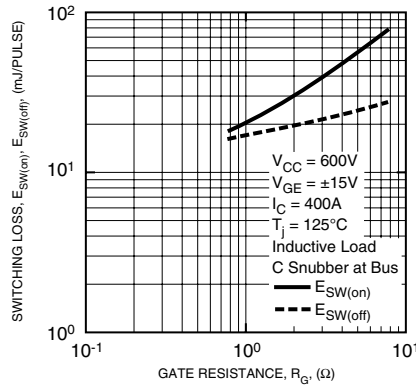
GATE CHARGE VS. V_GE



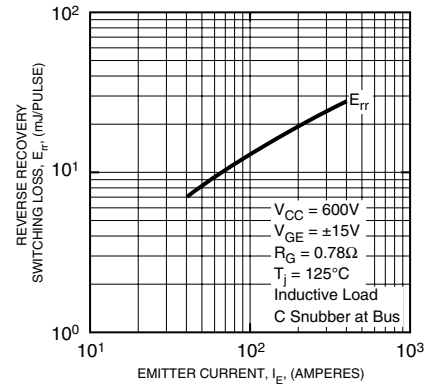
**SWITCHING LOSS VS.
COLLECTOR CURRENT
(TYPICAL)**



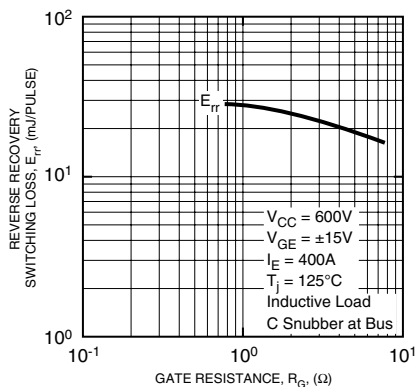
**SWITCHING LOSS VS.
GATE RESISTANCE
(TYPICAL)**



**REVERSE RECOVERY SWITCHING LOSS VS.
EMITTER CURRENT
(TYPICAL)**



**REVERSE RECOVERY SWITCHING LOSS VS.
GATE RESISTANCE
(TYPICAL)**



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT & FWDi)**

