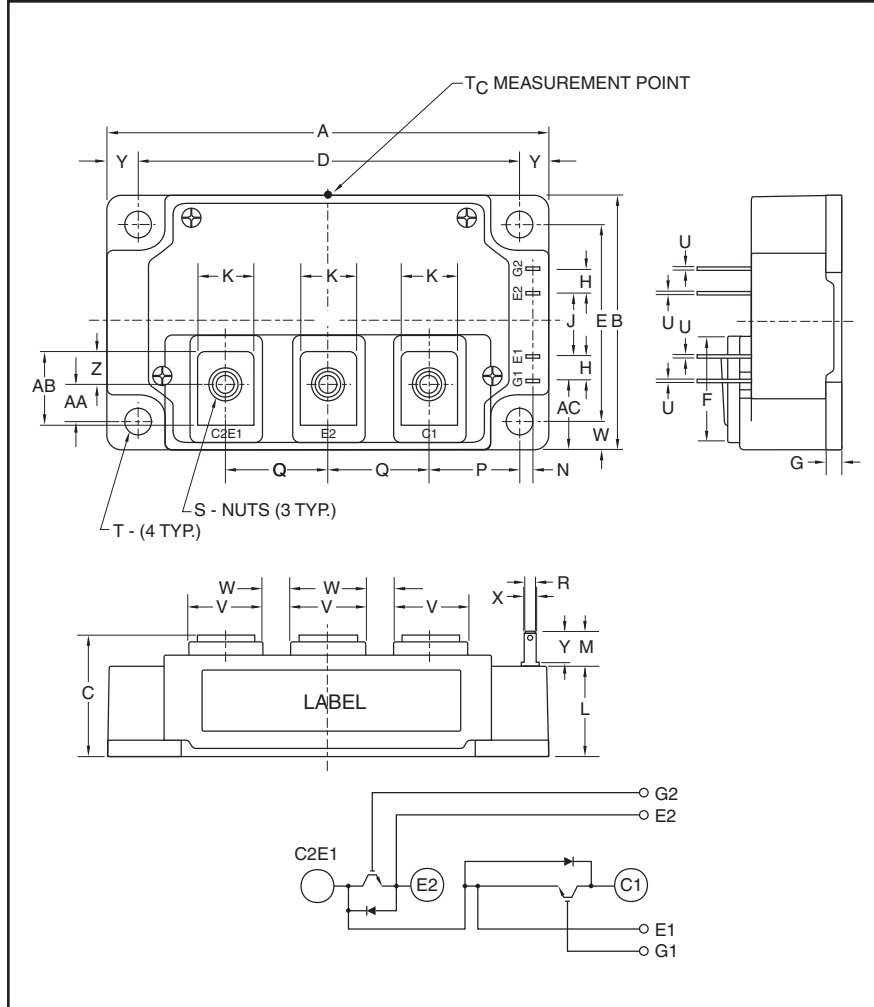


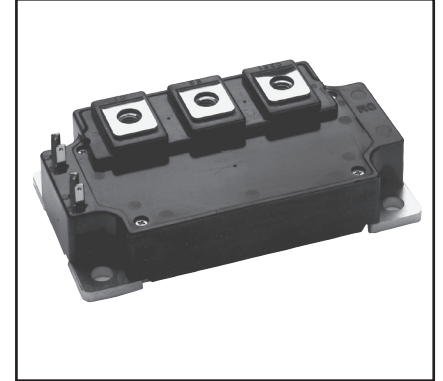
Chopper IGBT NFH-Series Module 600 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.25	108.0
B	2.44	62.0
C	1.14+0.04/-0.02	29.0+1.0/-0.5
D	3.66±0.01	93.0±0.25
E	1.89±0.01	48.0±0.25
F	1.012	25.7
G	0.16	4.0
H	0.24	6.0
J	0.59	15.0
K	0.55	14.0
L	0.87	22.0
M	0.33	8.5
N	0.10	2.5
P	0.85	21.5

Dimensions	Inches	Millimeters
Q	0.98	25.0
R	0.11	2.8
S	M6 Metric	M6
T	0.26 Dia.	6.5 Dia.
U	0.002	0.5
V	0.71	18.0
W	0.28	7.0
X	0.16	4.0
Y	0.3	7.5
Z	0.325	8.25
AA	0.35	8.85
AB	0.709	18.0
AC	0.69	17.5



Description:

Powerex Chopper IGBT Modules are designed for use in switching applications. Each module consists of one IGBT Transistor having a reverse-connected super-fast recovery free-wheel diode and an anode-collector 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 $V_{CE(sat)}$
- ☐ Discrete Super-Fast Recovery (150ns) Free-Wheel Diode
- ☐ High Frequency Operation (15-20kHz)
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:

- ☐ DC Motor Control
- ☐ Boost Regulator

Ordering Information:

Example: Select the complete module number you desire from the table - i.e. CM600E3U-12NFH is a 600V (V_{CES}), 600 Ampere Chopper IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	600	12

CM600E3U-12NFH
Chopper IGBT NFH-Series Module
 600 Amperes/600 Volts

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

Ratings	Symbol	CM600E3U-12NFH	Units
Collector-Emitter Voltage (G-E SHORT)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E SHORT)	V_{GES}	± 20	Volts
Collector Current	I_C	600	Amperes
Collector Current (Pulse) ^{*2}	I_{CM}	1200	Amperes
Emitter Current ($T_C = 25^\circ\text{C}$) ^{*6}	I_E^{*1}	30	Amperes
Emitter Current (Pulse) ^{*2}	I_{EM}^{*1}	60	Amperes
Maximum Power Dissipation ($T_C = 25^\circ\text{C}$) ^{*6}	P_C^{*3}	1420	Watts
Maximum Power Dissipation ($T_C = 25^\circ\text{C}$) ^{*8}	P_C^{*3}	2460	Watts
Repetitive Peak Reverse Voltage (Clamp Diode Part)	V_{RRM}	600	Volts
Forward Current ($T_C = 25^\circ\text{C}$, Clamp Diode Part)	I_F	600	Amperes
Forward Current (Pulse, Clamp Diode Part) ^{*2}	I_{FM}	1200	Amperes
Isolation Voltage (Charged Part to Baseplate, AC 1 min.)	V_{iso}	2500	Volts
Junction Temperature	T_j	$-40 \sim +150$	$^\circ\text{C}$
Storage Temperature	T_{stg}	$-40 \sim +125$	$^\circ\text{C}$

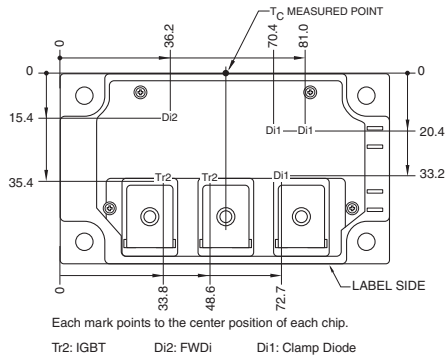
*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDI).

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

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

*6 Case temperature (T_C) measured point is baseplate side.

*8 Case temperature (T_s) measured point is just under the chips as shown in the following figure.



CM600E3U-12NFH
Chopper IGBT NFH-Series Module
600 Amperes/600 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	mA
Gate Leakage Current	I_{GES}	$\pm V_{GE} = V_{GES}, V_{CE} = 0V$	–	–	1	μA
Repetitive Peak Reverse Current	I_{RRM}	$V_{RM} = V_{RRM}$, Clamp Diode Part	–	–	1	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 60\text{mA}, V_{CE} = 10V$	5	6	7	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 600\text{A}, V_{GE} = 15V, T_j = 25^\circ\text{C}^{*3}$	–	2.0	2.7	Volts
		$I_C = 600\text{A}, V_{GE} = 15V, T_j = 125^\circ\text{C}^{*3}$	–	1.95	–	Volts
Forward Transfer Admittance	$ y_{fs} $	$I_C = 600\text{A}, V_{CE} = 10V^{*3}$	420	–	–	S
Input Capacitance	C_{ies}	$V_{GE} = 0V, V_{CE} = 10V$	–	–	166	nF
Output Capacitance	C_{oes}		–	–	11	nF
Reverse Transfer Capacitance	C_{res}		–	–	6.0	nF
Total Gate Charge	Q_G	$V_{CC} = 300V, I_C = 600\text{A}, V_{GE} = 15V$	–	3720	–	nC
Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 300V,$	–	–	800	ns
Turn-on Rise Time	t_r	$I_C = 600\text{A}, I_E = 30\text{A},$	–	–	400	ns
Turn-off Delay Time	$t_{d(off)}$	$V_{GE1} = V_{GE2} = 15V,$	–	–	1100	ns
Turn-off Fall Time	t_f	$R_G = 2.0\Omega,$	–	–	200	ns
Reverse Recovery Time	t_{rr}^{*1}	Inductive Load	–	–	110	ns
Reverse Recovery Charge	Q_{rr}^{*1}	Switching Operation	–	0.08	–	μC
Emitter-Collector Voltage	V_{EC}^{*1}	$I_E = 30\text{A}, V_{GE} = 0V$	–	–	2.8	Volts
Forward Voltage Drop	V_{FM}	$I_F = 600\text{A}$, Clamp Diode Part	–	–	2.5	Volts
Reverse Recovery Time	t_{rr}	Clamp Diode Part	–	–	200	ns
Reverse Recovery Charge	Q_{rr}	$V_{CC} = 300V, I_F = 600\text{A},$	–	10	–	μC
		$V_{GE1} = V_{GE2} = 15V, R_G = 2.0\Omega,$ Inductive Load Switching Operation				
External Gate Resistance	R_G		0.2	–	2	Ω

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

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

CM600E3U-12NFH
Chopper IGBT NFH-Series Module
 600 Amperes/600 Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)Q}$	IGBT Part ^{*6}	—	—	0.088	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)R}$	Clamp Diode Part ^{*6}	—	—	0.08	$^{\circ}\text{C/W}$
Contact Thermal Resistance	$R_{th(c-s)}$	Case to Heatsink, Per 1/2 Module, Thermal Grease Applied ^{*7}	—	0.04	—	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c')Q}$	IGBT Part ^{*8}	—	—	0.053	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c')R}$	Clamp Diode Part ^{*8}	—	—	0.052	$^{\circ}\text{C/W}$

Mechanical Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Mounting Torque	M_t	Main Terminals, M6 Screw	31	35	40	in-lb
	M_s	Mounting Holes, M6 Screw	31	35	40	in-lb
Weight			—	400	—	Grams

^{*6} Case temperature (T_C) measured point is baseplate side.

^{*7} Typical value is measured by using thermally conductive grease of $\lambda = 0.9\text{ W/(m}\cdot\text{K)}$.

^{*8} Case temperature (T_s) measured point is just under the chips as shown in the following figure.

