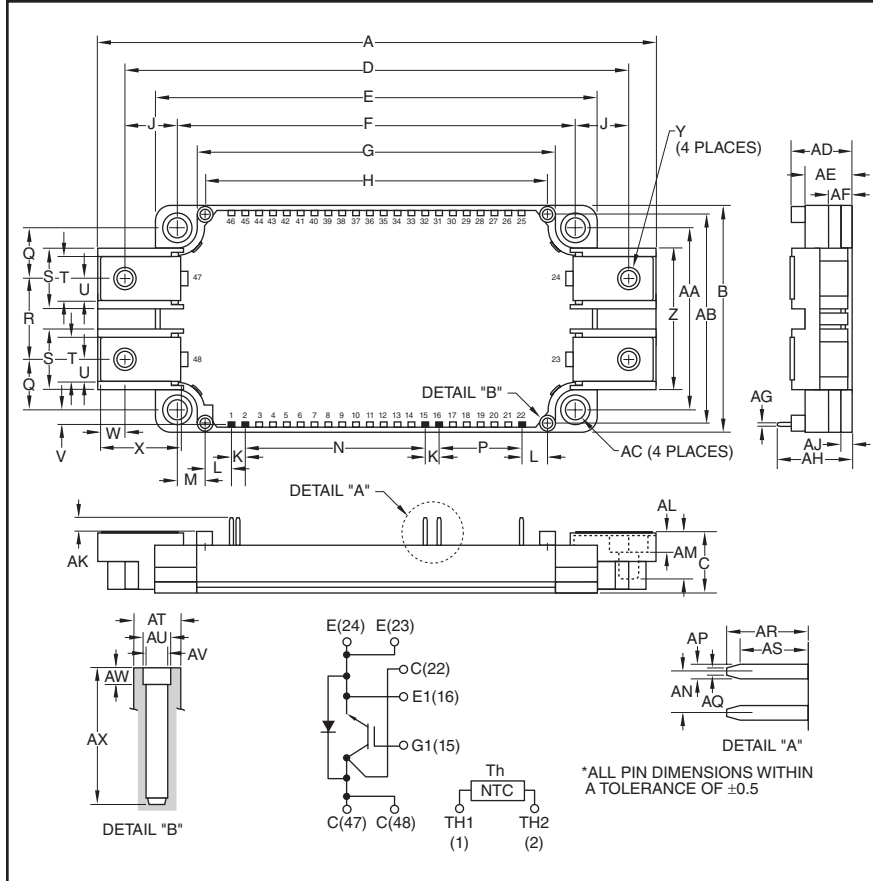


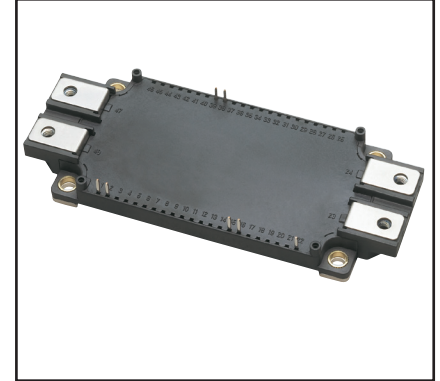
Single IGBTMOD™ NX-Series Module 600 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.98	152.0
B	2.44	62.0
C	0.67	17.0
D	5.39	137.0
E	4.79	121.7
F	4.33 ± 0.02	110.0 ± 0.5
G	3.89	99.0
H	3.72	94.5
J	0.53	13.5
K	0.15	3.8
L	0.28	7.25
M	0.30	7.75
N	1.95	49.54
P	0.9	22.86
Q	0.55	14.0
R	0.87	22.0
S	0.67	17.0
T	0.48	12.0
U	0.24	6.0
V	0.16	4.2
W	0.37	6.5
X	0.83	21.14
Y	M6	M6

Dimensions	Inches	Millimeters
Z	1.53	39.0
AA	1.97 ± 0.02	50.0 ± 0.5
AB	2.26	57.5
AC	0.22 Dia.	5.5 Dia.
AD	0.67 $\pm 0.04/-0.02$	17.0 $\pm 1.0/-0.5$
AE	0.51	13.0
AF	0.27	7.0
AG	0.03	0.8
AH	0.81	20.5
AJ	0.12	3.0
AK	0.14	3.5
AL	0.21	5.4
AM	0.49	12.5
AN	0.15	3.81
AP	0.05	1.15
AQ	0.025	0.65
AR	0.29	7.4
AS	0.24	6.2
AT	0.17 Dia.	4.3 Dia.
AU	0.10 Dia.	2.5 Dia.
AV	0.08 Dia.	2.1 Dia.
AW	0.06	1.5
AX	0.49	12.5



Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor in a single configuration with a reverse connected rectifier grade 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 $V_{CE(sat)}$
- ☐ Rectifier Grade 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.

QIS1260015 is a 1200V (V_{CES}), 600 Ampere Single IGBTMOD™ Power Module.

QIS1260015

Single IGBTMOD™ NX-Series Module

600 Amperes/1200 Volts

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

Characteristics	Symbol	QIS1260015	Units
Power Device Junction Temperature	T_j	-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, M6 Main Terminal Screws	—	40	in-lb
Module Weight (Typical)	—	330	Grams
Baseplate Flatness, On Centerline X, Y (See Below)	—	$\pm 0 \sim +100$	μm
Isolation Voltage (Terminals to Baseplate, $f = 60\text{Hz}$, AC 1 minute)	V_{ISO}	2500	Volts

Inverter Sector

Collector-Emitter Voltage ($V_{GE} = 0\text{V}$)	V_{CES}	1200	Volts
Gate-Emitter Voltage ($V_{CE} = 0\text{V}$)	V_{GES}	± 20	Volts
Collector Current (DC, $T_C = 90^\circ\text{C}$)*1,*5,*9	I_C	600	Amperes
Peak Collector Current (Pulse)*4	I_{CM}	1200	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$)*1,*5	P_C	3785	Watts
Emitter Current ($T_C = 25^\circ\text{C}$)*1,*5,*9	I_E^{*3}	600	Amperes
Peak Emitter Current (Pulse)*4	I_{EM}^{*3}	1200	Amperes

*1 Case temperature (T_C) and heatsink temperature (T_H) measured point is just under the chips.

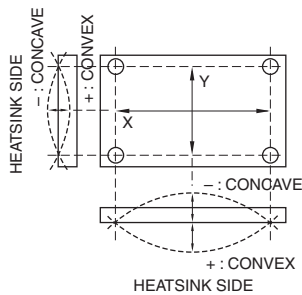
*3 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).

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

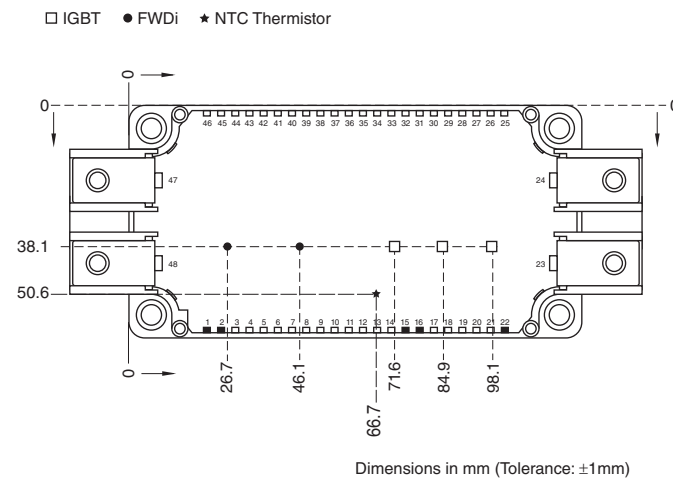
*5 Junction temperature (T_j) should not increase beyond maximum junction temperature ($T_{j(max)}$) rating.

*9 Use both of each main terminal (collector and emitter) to connect external wiring.

BASEPLATE FLATNESS MEASUREMENT POINT



CHIP LOCATION (TOP VIEW)



QIS1260015
Single IGBTMOD™ NX-Series Module
600 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}	$V_{CE} = V_{CES}, V_{GE} = 0V$	—	—	1.0	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 60mA, V_{CE} = 10V$	6	7	8	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 600A, V_{GE} = 15V, T_j = 25^\circ\text{C}^{*6}$	—	2.0	2.6	Volts
		$I_C = 600A, V_{GE} = 15V, T_j = 125^\circ\text{C}^{*6}$	—	2.2	—	Volts
		$I_C = 600A, V_{GE} = 15V, T_j = 150^\circ\text{C}^{*6}$	—	1.9	—	Volts
Input Capacitance	C_{ies}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	100	nF
Output Capacitance	C_{oes}		—	—	9.0	nF
Reverse Transfer Capacitance	C_{res}		—	—	2.0	nF
Total Gate Charge	Q_G	$V_{CC} = 600V, I_C = 600A, V_{GE} = 15V$	—	3000	—	nC
Inductive	Turn-on Delay Time	$V_{CC} = 600V, I_C = 600A,$ $V_{GE} = \pm 15V,$	—	—	660	ns
Load	Turn-on Rise Time		—	—	190	ns
Switch	Turn-off Delay Time	$R_G = 2.2\Omega, I_E = 600A,$ Inductive Load Switching Operation	—	—	700	ns
Time	Turn-off Fall Time		—	—	600	ns
Emitter-Collector Voltage	V_{EC}^{*3}	$I_E = 600A, V_{GE} = 0V, T_j = 25^\circ\text{C}^{*6}$	—	1.0	1.2	Volts
		$I_E = 600A, V_{GE} = 0V, T_j = 125^\circ\text{C}^{*6}$	—	0.9	1.1	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Module Lead Resistance	R_{lead}	Main Terminals-Chip (Per Switch)	—	0.6	—	m Ω
Thermal Resistance, Junction to Case ^{*1}	$R_{th(j-c)Q}$	Per IGBT	—	—	0.033	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case ^{*1}	$R_{th(j-c)D}$	Per FWDi	—	—	0.028	$^\circ\text{C/W}$
Contact Thermal Resistance ^{*1} (Case to Heatsink)	$R_{th(c-f)}$	Thermal Grease Applied (Per 1 Module) ^{*2}	—	0.015	—	$^\circ\text{C/W}$
Internal Gate Resistance	R_{Gint}	$T_C = 25^\circ\text{C}$	0.7	1.0	1.3	Ω
		$T_C = 125^\circ\text{C}$	1.4	2.0	2.6	Ω
External Gate Resistance	R_G		1.0	—	10	Ω

NTC Thermistor Sector, $T_j = 25^\circ\text{C}$ unless otherwise specified

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

^{*1} Case temperature (T_C) and heatsink temperature (T_H) measured point is just under the chips.

^{*2} Typical value is measured by using thermally conductive grease of $\lambda = 0.9 \text{ [W/(m} \cdot \text{K)]}$.

^{*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.

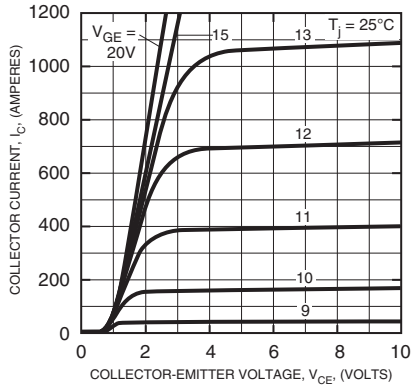
^{*9} $B_{(25/50)} = \ln\left(\frac{R_{25}}{R_{50}}\right) / \left(\frac{1}{T_{25}} - \frac{1}{T_{50}}\right)$ R_{25} : Resistance at Absolute Temperature T_{25} [K], R_{50} : resistance at Absolute Temperature T_{50} [K],
 $T_{25} = 25 [^\circ\text{C}] + 273.15 = 298.15 \text{ [K]}, T_{50} = 50 [^\circ\text{C}]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

QIS1260015

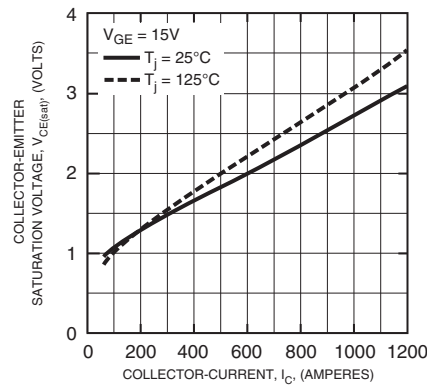
Single IGBTMOD™ NX-Series Module

600 Amperes/1200 Volts

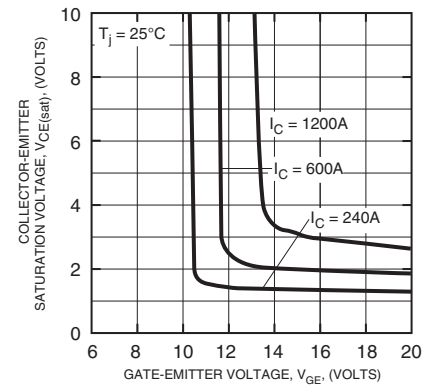
OUTPUT CHARACTERISTICS
(INVERTER PART - TYPICAL)



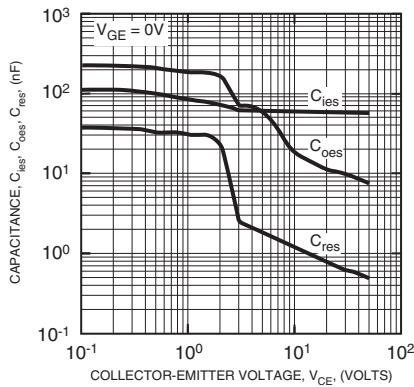
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(INVERTER PART - TYPICAL)



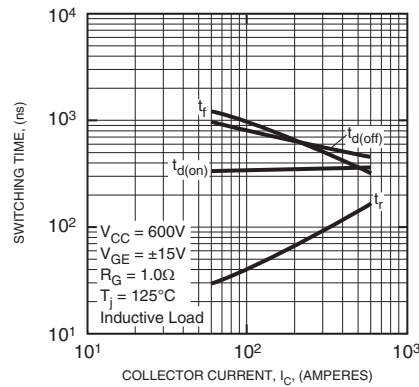
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(INVERTER PART - TYPICAL)



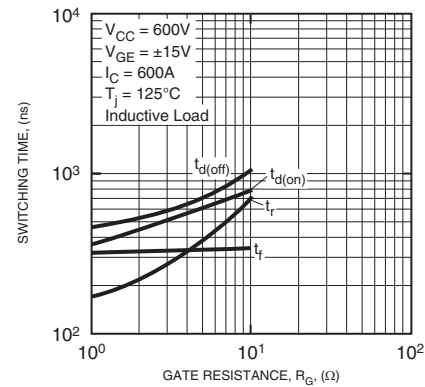
CAPACITANCE VS. V_{CE}
(INVERTER PART - TYPICAL)



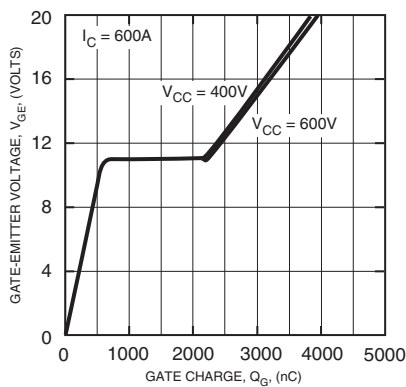
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(INVERTER PART - TYPICAL)



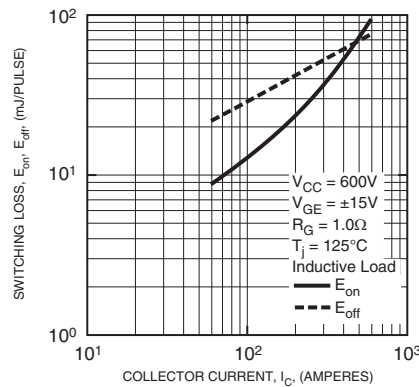
SWITCHING TIME VS.
GATE RESISTANCE
(INVERTER PART - TYPICAL)



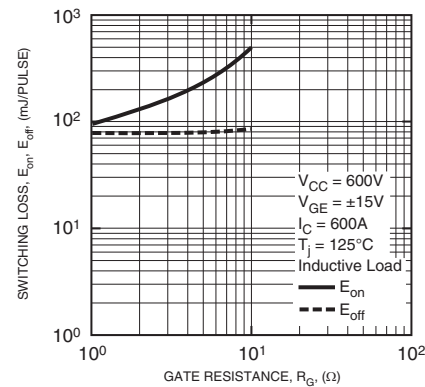
GATE CHARGE VS. V_{GE}
(INVERTER PART)



SWITCHING LOSS VS.
COLLECTOR CURRENT
(INVERTER PART - TYPICAL)



SWITCHING LOSS VS.
GATE RESISTANCE
(INVERTER PART - TYPICAL)



QIS1260015

Single IGBTMOD™ NX-Series Module

600 Amperes/1200 Volts

