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Q series

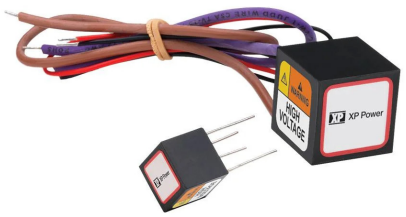
XP Power

0.5W Convection cooled

DC-HVDC converters

The Q Series is a broad line of ultra-miniature, high reliability DC to HVDC converters supplying up to 5kV in only 2.05cm³ (0.125in³) and up to 10kV in only 10.63cm³ (0.614in³). Input voltage can be +5V, +12V, +15V, or +24V. The output is directly proportional to the input voltage and is linear from <0.7V input to maximum input voltage, allowing for an adjustable output voltage. Output is load dependent. Isolation permits <±500V bias on output return and output power is 0.5W.

No external components or minimum load are required. Variations include dual output (center-tap), a separate control pin, and an external shield. These component-sized converters operate over a wide temperature range making them ideal for portable, battery powered equipment requiring minimal size and weight.



Features

- Output voltages up to 10kVDC
- Reversible, positive or negative polarity
- Dual output versions
- Isolated output voltage proportional to input voltage
- Input voltage +5V, +12V & +24VDC
- Low turn on voltage: <0.7VDC
- Very low I/O leakage current
- Low noise, quasi-sinewave resonant oscillator
- MTBF>3Mhrs
- 3 year warranty

Applications

High voltage

Instrumentation

Laboratory

Security

Dimensions

Q01 - Q50:

12.7 x 12.7 x 12.7mm (0.50” x 0.50” x 0.50”)

Q60 - Q80:

21.6 x 21.6 x 21.6mm (0.85” x 0.85” x 0.85”)

Documentation

For further information click the link or scan the code

→ xppower.com

Models & ratings

Model number	Output				Input		
	Output voltage[2]	Output current[1]	Ripple	Polarity[5]	Input voltage	Input current, No load	Input current, Full load
Q01-5	0 to 100VDC	5.00mA	<1.0%	Reversible	5VDC	<100mA	<250mA
Q01-5C	0 to 100VDC	5.00mA	<1.0%	Reversible	5VDC	<100mA	<250mA
Q01-12	0 to 100VDC	5.00mA	<1.0%	Reversible	12VDC	<40mA	<100mA
Q01-24	0 to 100VDC	5.00mA	<1.0%	Reversible	24VDC	<20mA	<50mA
Q015-5	0 to 150VDC	3.33mA	<0.50%	Reversible	5VDC	<100mA	<250mA
Q015-12CTRS	0 to ±75VDC	3.33mA	<0.50%	Dual	12VDC	<40mA	<100mA

Continued on page 2

Notes:

1. Maximum output current is available at maximum rated output voltage, and derates linearly as input voltage is decreased.
2. Output Voltage is load dependent. Under light or no-load conditions, reduce the Input Voltage so maximum rated Output Voltage is not exceeded.
3. Specifications are after 30 minute warm-up, full-load at +25°C, unless otherwise noted.
4. Proper thermal management techniques are required to maintain safe case temperature at maximum power output.
5. See page 7 for connection diagrams.
6. All orderable part numbers are listed on the data sheet.
7. Other voltages available on request - please contact our dedicated support team: xppower.com/contact.

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Q series

DC-HVDC converters

Models & ratings

Model number	Output				Input		
	Output voltage[2]	Output current[1]	Ripple	Polarity[5]	Input voltage	Input current, No load	Input current, Full load
Q02-5	0 to 200VDC	2.50mA	<0.25%	Reversible	5VDC	<100mA	<250mA
Q02-5CS	0 to 200VDC	2.50mA	<0.25%	Reversible	5VDC	<100mA	<250mA
Q02-5CTS	0 to ±100VDC	2.50mA	<0.25%	Dual	5VDC	<100mA	<250mA
Q02-5TR	0 to 200VDC	2.50mA	<0.25%	Reversible	5VDC	<100mA	<250mA
Q02-12	0 to 200VDC	2.50mA	<0.25%	Reversible	12VDC	<40mA	<100mA
Q02-12CTS	0 to ±100VDC	2.50mA	<0.25%	Dual	12VDC	<40mA	<100mA
Q02-24	0 to 200VDC	2.50mA	<0.25%	Reversible	24VDC	<20mA	<50mA
Q02CT-24R	0 to ±100VDC	2.50mA	<0.25%	Dual	24VDC	<20mA	<50mA
Q025-5	0 to 250VDC	2.00mA	<0.25%	Reversible	5VDC	<100mA	<250mA
Q025-5C	0 to 250VDC	2.00mA	<0.25%	Reversible	5VDC	<100mA	<250mA
Q025-12	0 to 250VDC	2.00mA	<0.25%	Reversible	12VDC	<40mA	<100mA
Q03-5	0 to 300VDC	1.67mA	<0.25%	Reversible	5VDC	<100mA	<250mA
Q03-12	0 to 300VDC	1.67mA	<0.25%	Reversible	12VDC	<40mA	<100mA
Q04-5	0 to 400VDC	1.25mA	<0.10%	Reversible	5VDC	<100mA	<250mA
Q04-5RS	0 to 400VDC	1.25mA	<0.10%	Reversible	5VDC	<100mA	<250mA
Q04-12	0 to 400VDC	1.25mA	<0.10%	Reversible	12VDC	<40mA	<100mA
Q04CT-12	0 to ±200VDC	1.25mA	<0.10%	Dual	12VDC	<40mA	<100mA
Q04-24	0 to 400VDC	1.25mA	<0.10%	Reversible	24VDC	<20mA	<50mA
Q04-24TR	0 to 400VDC	1.25mA	<0.10%	Reversible	24VDC	<20mA	<50mA
Q045-12	0 to 450VDC	1.11mA	<0.15%	Reversible	12VDC	<40mA	<100mA
Q05-5	0 to 500VDC	1.00mA	<0.15%	Reversible	5VDC	<100mA	<250mA
Q05-5C	0 to 500VDC	1.00mA	<0.15%	Reversible	5VDC	<100mA	<250mA
Q05-5CTRS	0 to ±250VDC	1.00mA	<0.15%	Dual	5VDC	<100mA	<250mA
Q05-5RS	0 to 500VDC	1.00mA	<0.15%	Reversible	5VDC	<100mA	<250mA
Q05-12	0 to 500VDC	1.00mA	<0.15%	Reversible	12VDC	<40mA	<100mA
Q05-12T	0 to 500VDC	1.00mA	<0.15%	Reversible	12VDC	<40mA	<100mA
Q05-15	0 to 500VDC	1.00mA	<0.15%	Reversible	15VDC	<32mA	<80mA
Q05-24	0 to 500VDC	1.00mA	<0.15%	Reversible	24VDC	<20mA	<50mA
Q06-5	0 to 600VDC	833µA	<0.10%	Reversible	5VDC	<100mA	<250mA
Q06-12	0 to 600VDC	833µA	<0.15%	Reversible	12VDC	<40mA	<100mA
Q06-24	0 to 600VDC	833µA	<0.15%	Reversible	24VDC	<20mA	<50mA
Q07-5	0 to 700VDC	714µA	<0.25%	Reversible	5VDC	<100mA	<250mA
Q07-12	0 to 700VDC	714µA	<0.25%	Reversible	12VDC	<40mA	<100mA
Q09-12	0 to 900VDC	556µA	<0.25%	Reversible	12VDC	<40mA	<100mA
Q09-12T	0 to 900VDC	556µA	<0.25%	Reversible	12VDC	<40mA	<100mA
Q09-24R	0 to 900VDC	556µA	<0.25%	Reversible	24VDC	<20mA	<50mA

Continued on page 3

Notes:

1. Maximum output current is available at maximum rated output voltage, and derates linearly as input voltage is decreased.
2. Output Voltage is load dependent. Under light or no-load conditions, reduce the Input Voltage so maximum rated Output Voltage is not exceeded.
3. Specifications are after 30 minute warm-up, full-load at +25°C, unless otherwise noted.
4. Proper thermal management techniques are required to maintain safe case temperature at maximum power output.
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Q series

DC-HVDC converters

Models & ratings

Model number	Output				Input		
	Output voltage[2]	Output current[1]	Ripple	Polarity[5]	Input voltage	Input current, No load	Input current, Full load
Q10-5	0 to +1000VDC	500µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q10-5RS	0 to +1000VDC	500µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q10-5TS	0 to +1000VDC	500µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q10N-5	0 to -1000VDC	500µA	<0.25%	Negative	5VDC	<100mA	<250mA
Q10N-5S	0 to -1000VDC	500µA	<0.25%	Negative	5VDC	<100mA	<250mA
Q10-12	0 to +1000VDC	500µA	<0.25%	Positive	12VDC	<40mA	<100mA
Q10N-12	0 to -1000VDC	500µA	<0.25%	Negative	12VDC	<40mA	<100mA
Q10-24R	0 to +1000VDC	500µA	<0.25%	Positive	24VDC	<20mA	<50mA
Q12-5	0 to +1200VDC	417µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q12-5R	0 to +1200VDC	417µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q12-5RS	0 to +1200VDC	417µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q12-5TS	0 to +1200VDC	417µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q12N-5	0 to -1200VDC	417µA	<0.25%	Negative	5VDC	<100mA	<250mA
Q12N-5RS	0 to -1200VDC	417µA	<0.25%	Negative	5VDC	<100mA	<250mA
Q12N-5TS	0 to -1200VDC	417µA	<0.25%	Negative	5VDC	<100mA	<250mA
Q12N-12	0 to -1200VDC	417µA	<0.25%	Negative	12VDC	<40mA	<100mA
Q15-5	0 to +1500VDC	333µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q15-5S	0 to +1500VDC	333µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q15-12S	0 to +1500VDC	333µA	<0.25%	Positive	12VDC	<40mA	<100mA
Q15-12TS	0 to +1500VDC	333µA	<0.25%	Positive	12 VDC	<40mA	<100mA
Q15N-24	0 to -1500VDC	333µA	<0.25%	Negative	24VDC	<20mA	<50mA
Q20-5	0 to +2000VDC	250µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q20-5RS	0 to +2000VDC	250µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q20-5TR	0 to +2000VDC	250µA	<0.25%	Positive	5VDC	<100mA	<250mA
Q20N-5	0 to -2000VDC	250µA	<0.25%	Negative	5VDC	<100mA	<250mA
Q20-12	0 to +2000VDC	250µA	<0.25%	Positive	12VDC	<40mA	<100mA
Q25-5	0 to +2500VDC	200µA	<0.50%	Positive	5VDC	<250mA	<400mA
Q25-5T	0 to +2500VDC	200µA	<0.50%	Positive	5VDC	<250mA	<400mA
Q25N-5TR	0 to -2500VDC	200µA	<0.50%	Negative	5VDC	<250mA	<400mA
Q30-5	0 to +3000VDC	167µA	<0.50%	Positive	5VDC	<250mA	<400mA
Q30N-5	0 to -3000VDC	167µA	<0.50%	Negative	5VDC	<250mA	<400mA
Q30-12	0 to +3000VDC	167µA	<0.50%	Positive	12VDC	<100mA	<250mA
Q30N-12	0 to -3000VDC	167µA	<0.50%	Negative	12VDC	<100mA	<250mA
Q30-24R	0 to +3000VDC	167µA	<0.50%	Positive	24VDC	<35mA	<75mA
Q30N-24R	0 to -3000VDC	167µA	<0.50%	Negative	24VDC	<35mA	<75mA
Q40-5	0 to +4000VDC	125µA	<0.50%	Positive	5VDC	<250mA	<400mA
Q40-12	0 to +4000VDC	125µA	<0.50%	Positive	12VDC	<100mA	<250mA
Q50-5	0 to +5000VDC	100µA	<0.50%	Positive	5VDC	<250mA	<400mA
Q50N-5	0 to -5000VDC	100µA	<0.50%	Negative	5VDC	<250mA	<400mA

Continued on page 4

Notes:

1. Maximum output current is available at maximum rated output voltage, and derates linearly as input voltage is decreased.
2. Output Voltage is load dependent. Under light or no-load conditions, reduce the Input Voltage so maximum rated Output Voltage is not exceeded.
3. Specifications are after 30 minute warm-up, full-load at +25°C, unless otherwise noted.
4. Proper thermal management techniques are required to maintain safe case temperature at maximum power output.
5. See page 7 for connection diagrams.
6. All orderable part numbers are listed on the data sheet.
7. Other voltages available on request - please contact our dedicated support team: xppower.com/contact.

Q series

DC-HVDC converters

Models & ratings

Model number	Output				Input		
	Output voltage[2]	Output current[1]	Ripple	Polarity[5]	Input voltage	Input current, No load	Input current, Full load
Q60-5	0 to +6000VDC	83.3µA	<1.0%	Positive	5VDC	<175mA	<250mA
Q60N-5	0 to -6000VDC	83.3µA	<1.0%	Negative	5VDC	<175mA	<250mA
Q80-5	0 to +8000VDC	62.5µA	<1.0%	Positive	5VDC	<175mA	<250mA
Q101-5	0 to +10,000VDC	50.0µA	<1.0%	Positive	5VDC	<175mA	<250mA
Q101N-5	0 to -10,000VDC	50.0µA	<1.0%	Negative	5VDC	<175mA	<250mA
Q101N-5RS	0 to -10,000VDC	50.0µA	<1.0%	Negative	5VDC	<175mA	<250mA

Notes:

1. Maximum output current is available at maximum rated output voltage, and derates linearly as input voltage is decreased.
2. Output Voltage is load dependent. Under light or no-load conditions, reduce the Input Voltage so maximum rated Output Voltage is not exceeded.
3. Specifications are after 30 minute warm-up, full-load at +25°C, unless otherwise noted.
4. Proper thermal management techniques are required to maintain safe case temperature at maximum power output.
5. See page 7 for connection diagrams.
6. All orderable part numbers are listed on the data sheet.
7. Other voltages available on request - please contact our dedicated support team: xppower.com/contact.

Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage	0.7		5, 12, 15, 24	VDC	See models and ratings table
Input current			400	mA	See models and ratings table
Control voltage input (optional)	Analog control voltage adjusts output from 0 to 100%, not to exceed input voltage, see application notes				

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage			10,000	Vdc	See models and ratings table
Output current			5	mA	See models and ratings table
Output voltage tolerance		±10		%	At max Vout, full load, measured from pin 3 to pin 4
Minimum load	No minimum load required				
Regulation	Unregulated, output is proportional to input. See application notes				
Short circuit protection	1			m	
Ripple and noise	0.1		1	%	See models and ratings table

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Q series

DC-HVDC converters

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Isolation: input to output			500	V	<±500VDC Bias on Output Return
Leakage current			250	mA	
Switching frequency	75		500	kHz	
Construction	Solid vacuum encapsulation, UL 94 V-0 rated.				
Mean time between failure	3			Mhrs	Per Bellcore TR 332

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature (case)	-25		+70	°C	Q01 to Q20, standard operating temperature
Operating temperature (case)	-55		+75	°C	Q01 to Q20, extended operating temperature
Operating temperature (case)	-25		+60	°C	Q25 to Q50, standard operating temperature
Operating temperature (case)	-55		+70	°C	Q25 to Q50, extended operating temperature
Operating temperature (case)	-10		+60	°C	Q60 to Q101, standard operating temperature
Storage temperature	-55		+105	°C	Q01 to Q50
Storage temperature	-20		+105	°C	Q60 to Q101
Cooling	Natural convection				
Humidity			95	%RH	Non-condensing

Safety approvals

Safety agency	Standard	Notes & conditions
UL	IEC/UL/CSA/EN 62368	
CE	CE Directive, RoHs and LVD	Where applicable
RoHS	RoHS 2 and 3 Directive (2011/65/EU)	Where applicable

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Q series

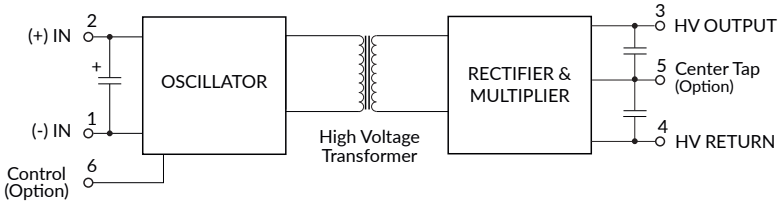
DC-HVDC converters

Application notes

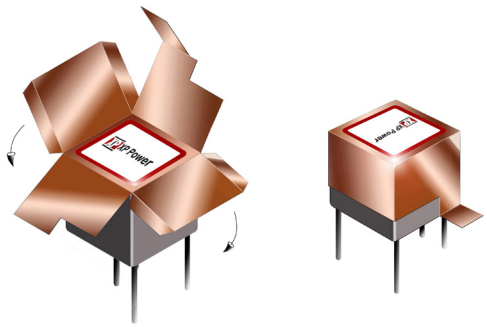
Option codes

Code	Meaning	Code	Meaning
CT-	Center Tap, Dual Output	-S	External Copper Shield
-C	Control Pin	-R	RoHS Designator for Legacy Model
-T	Extended Operating Temperature		

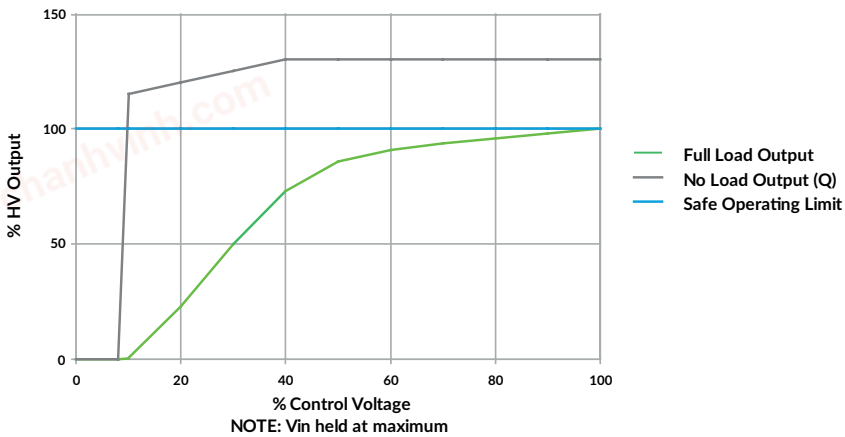
Block diagram



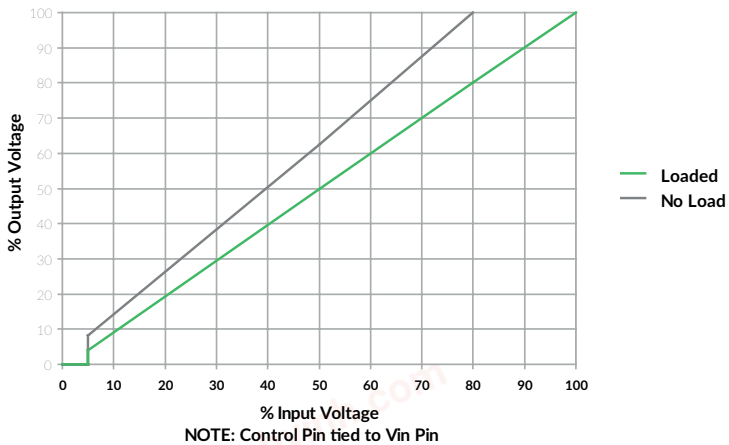
Copper sheild placement



Typical HV Output vs. Control Voltage



Typical Output vs. Input Voltage

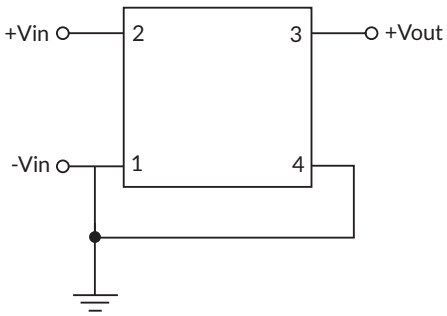


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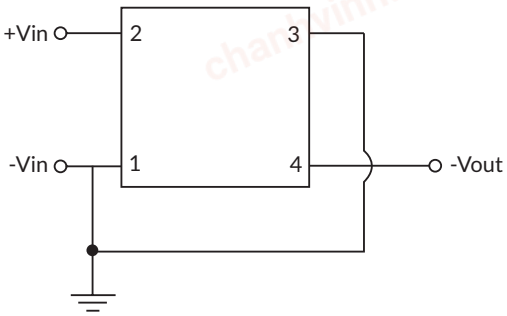
Application notes

Connection diagrams

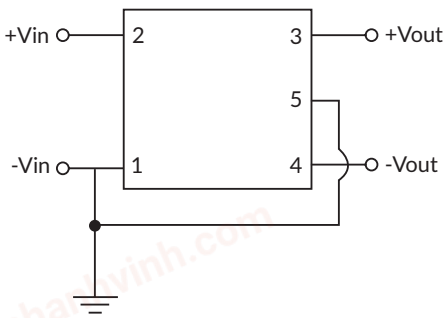
Q01-Q09 - positive output for reversible models



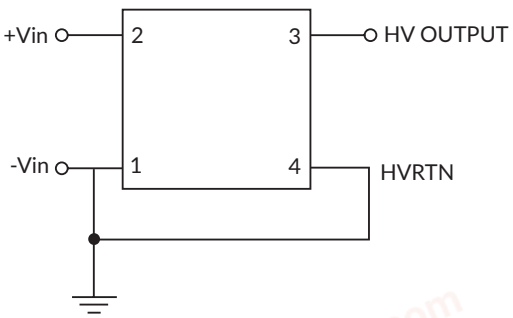
Q01-Q09 - negative output for reversible models



Q01CT-Q09CT - dual output



Q10-Q101 - output is positive or negative by model number

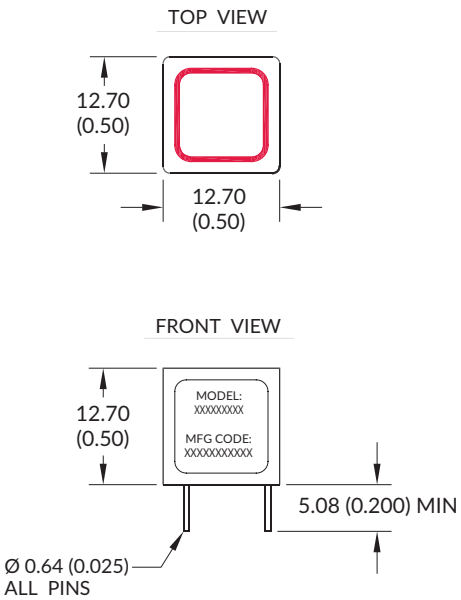


Q series

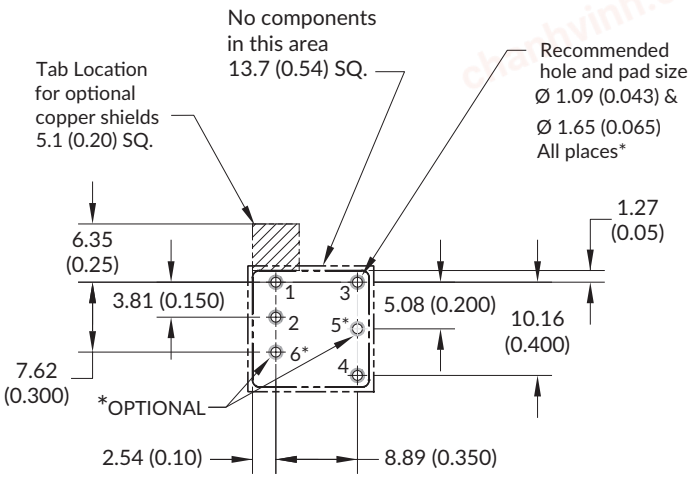
DC-HVDC converters

Mechanical details

Q01-Q20



PCB Layout

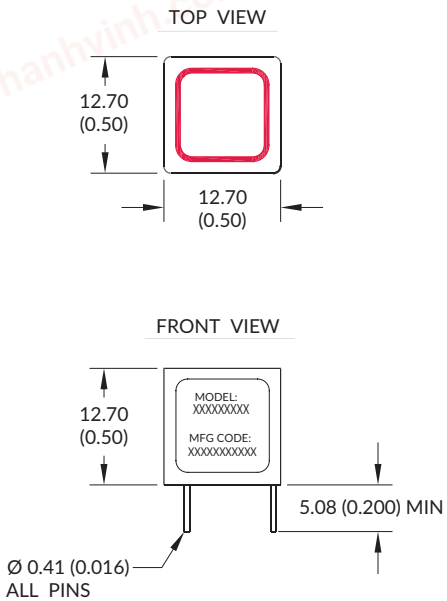


Pin	Q01-Q09
1	Input (-)
2	Input (+)
3	Output (+)
4	Output (-)
5*	Center Tap
6*	Control Pin

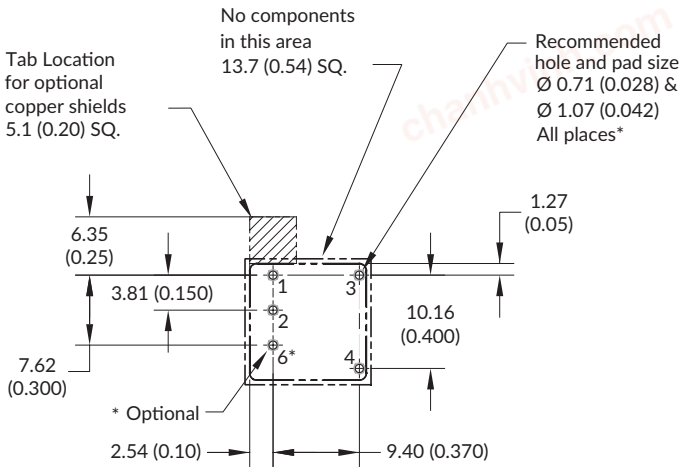
Pin	Q10-Q20
1	Input (-)
2	Input (+)
3	HV Output
4	HV Return
5*	
6*	Control Pin

*Pins 5 & 6 are optional

Q25-Q50



PCB Layout



Pin	Q25-Q50
1	Input (-)
2	Input (+)
3	HV Output
4	HV Return
5*	
6*	

*Pins 5 & 6 are optional

Notes:

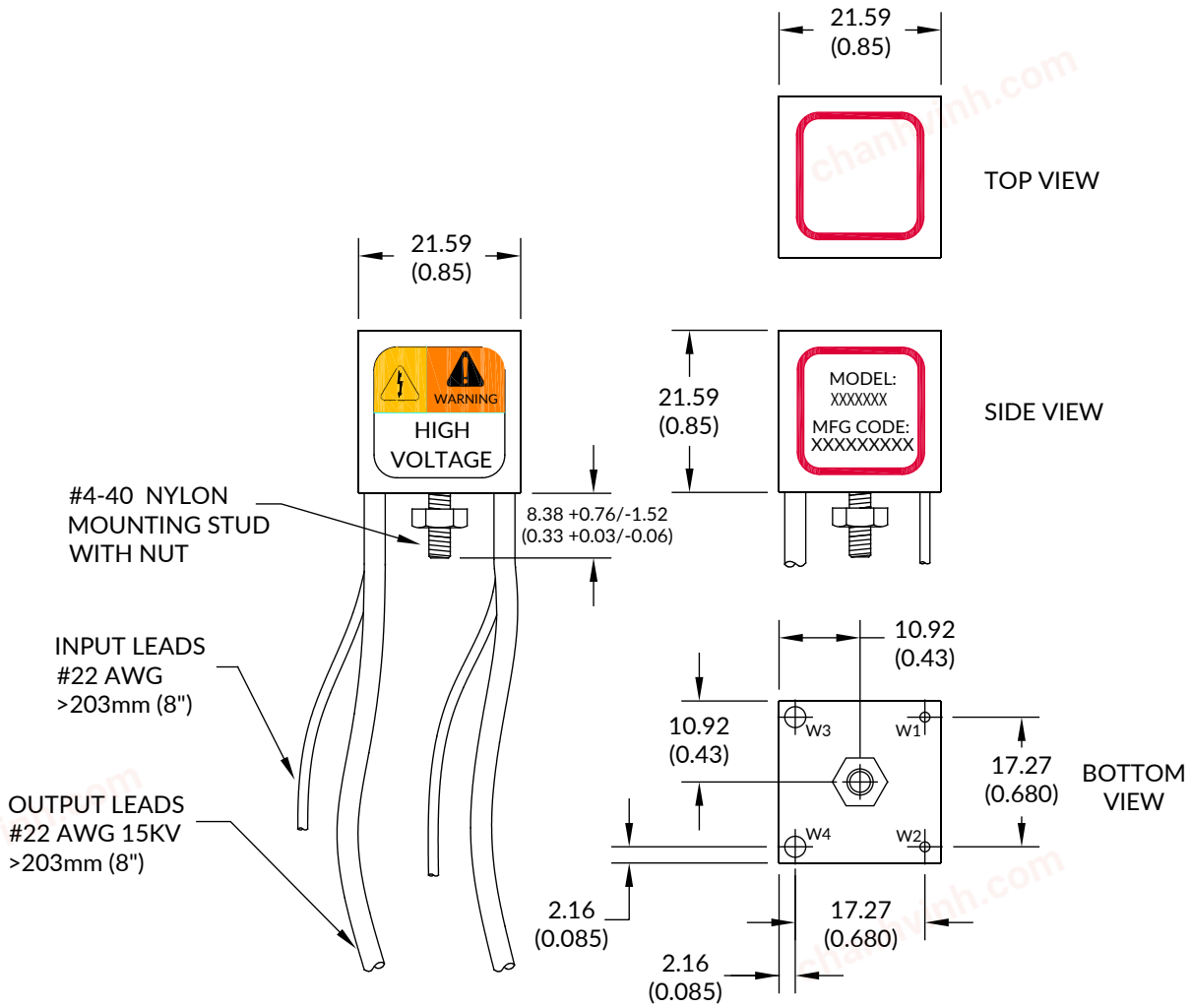
1. All dimensions are in mm (inches).
2. Weight: Q01-Q50: 4.25g (0.15oz).
3. Tolerance: X.XX±0.51 (0.02)
4. Pin Tolerance: ±0.127 (0.005)

Q series

DC-HVDC converters

Mechanical details

Q60-Q101



Wire	Color	Function
1	Red	Input (+)
2	Black	Input (-)
3	Brown	HV Output
4	Violet	HV Return

Notes:

1. All dimensions are in mm (inches)
2. Weight: Q01-Q50: 4.25g (0.15oz).
3. Tolerance: X.XX±0.51 (0.02)
4. Pin Tolerance: ±0.127 (0.005)