

NQ2H-2W Series

2W Unregulated Single & Dual output



Features

- SIP7 Package
- Ultra-High I/O Isolation 5000VAC with Reinforced Insulation, rated for 300 Vrms working Voltage
- CMTI 65 KV/μs at 1KV Common mode Voltage
- Low coupling capacitance
- Continuous Short Circuit Protection
- Efficiency up to 86%
- -40 ~ 95°C Operation Temperature Range
- Suitable for IGBT applications
- "X" Option for Input / Output Clearance > 9mm with alternative pinout



PART NUMBER STRUCTURE

NQ **2** **H** - **24** **05** **S** **X**
(1) (2) (3) (5) (6) (7) (8)

(1) Series

(2) Watt

2 - 2 W

(3) High Isolation

(5) Input Voltage Range

05 - 4.5-5.5 V

12 - 10.8-13.2 V

15 - 13.5-16.5 V

24 - 21.6-26.4 V

(6) Output Voltage

3R3 - 3.3 V

05 - 5 V

09 - 9 V

12 - 12 V

15 - 15 V

(7) Output Type

S - Single Output

D - Dual Output

(8) Pinout Type

Blank - 2.54 mm Pin pitch

X - 2 mm Pin pitch

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

MODEL NUMBER	INPUT Voltage Range (VDC)	INPUT Current		OUTPUT Voltage (VDC)	OUTPUT Current		EFFICIENCY @FL (%, typ.)	Capacitive Load (μF, max.)	Certification
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)			
NQ2H-053R3S	4.5-5.5	50	501.26	3.3	0	600	79	3300	CE
NQ2H-0505S	4.5-5.5	60	506.33	5	0	400	79	1200	UL / CB / CE
NQ2H-0509S	4.5-5.5	60	493.33	9	0	222	81	1200	CE
NQ2H-0512S	4.5-5.5	60	477.14	12	0	167	84	680	UL / CB / CE
NQ2H-0515S	4.5-5.5	60	480.72	15	0	133	83	680	UL / CB / CE
NQ2H-123R3S	10.8-13.2	25	208.86	3.3	0	600	79	3300	CE
NQ2H-1205S	10.8-13.2	30	200.80	5	0	400	83	1200	UL / CB / CE
NQ2H-1209S	10.8-13.2	30	200.60	9	0	222	83	1200	CE
NQ2H-1212S	10.8-13.2	30	200.30	12	0	167	83	680	UL / CB / CE
NQ2H-1215S	10.8-13.2	30	200.30	15	0	133	83	680	UL / CB / CE
NQ2H-153R3S	13.5-16.5	25	167.09	3.3	0	600	79	3300	CE
NQ2H-1505S	13.5-16.5	30	162.60	5	0	400	82	1200	CE
NQ2H-1509S	13.5-16.5	30	162.44	9	0	222	83	1200	CE
NQ2H-1512S	13.5-16.5	30	159.04	12	0	167	84	680	CE
NQ2H-1515S	13.5-16.5	30	160.24	15	0	133	83	680	CE
NQ2H-243R3S	21.6-26.4	20	107.14	3.3	0	600	77	3300	CE
NQ2H-2405S	21.6-26.4	20	101.62	5	0	400	82	1200	UL / CB / CE
NQ2H-2409S	21.6-26.4	20	100.30	9	0	222	83	1200	CE
NQ2H-2412S	21.6-26.4	20	99.40	12	0	167	84	680	UL / CB / CE
NQ2H-2415S	21.6-26.4	20	100.15	15	0	133	83	680	UL / CB / CE
NQ2H-053R3D	4.5-5.5	50	493.77	±3.3	0	±303	81	±1500	CE
NQ2H-0505D	4.5-5.5	60	493.82	±5	0	±200	81	±470	UL / CB / CE
NQ2H-0509D	4.5-5.5	60	481.44	±9	0	±111	83	±470	CE
NQ2H-0512D	4.5-5.5	60	480.00	±12	0	±83	83	±330	UL / CB / CE
NQ2H-0515D	4.5-5.5	60	490.24	±15	0	±67	82	±330	UL / CB / CE
NQ2H-051509D	4.5-5.5	60	495.64	+15 / -9	0	+67 / -111	83	±330	UL / CB / CE
NQ2H-123R3D	10.8-13.2	25	203.23	±3.3	0	±303	82	±1500	CE
NQ2H-1205D	10.8-13.2	30	198.41	±5	0	±200	84	±470	UL / CB / CE
NQ2H-1209D	10.8-13.2	30	200.60	±9	0	±111	83	±470	CE
NQ2H-1212D	10.8-13.2	30	197.62	±12	0	±83	84	±330	UL / CB / CE
NQ2H-1215D	10.8-13.2	30	197.06	±15	0	±67	85	±330	UL / CB / CE
NQ2H-121509D	10.8-13.2	30	196.03	+15 / -9	0	+67 / -111	85	±330	UL / CB / CE
NQ2H-153R3D	13.5-16.5	25	164.59	±3.3	0	±303	81	±1500	CE
NQ2H-1505D	13.5-16.5	30	160.64	±5	0	±200	83	±470	CE
NQ2H-1509D	13.5-16.5	30	158.57	±9	0	±111	84	±470	CE
NQ2H-1512D	13.5-16.5	30	154.41	±12	0	±83	86	±330	CE
NQ2H-1515D	13.5-16.5	30	155.81	±15	0	±67	86	±330	CE
NQ2H-151509D	13.5-16.5	30	158.69	+15 / -9	0	+67 / -111	84	±330	CE
NQ2H-243R3D	21.6-26.4	20	104.15	±3.3	0	±303	80	±1500	CE
NQ2H-2405D	21.6-26.4	20	99.20	±5	0	±200	84	±470	UL / CB / CE
NQ2H-2409D	21.6-26.4	20	99.10	±9	0	±111	84	±470	CE
NQ2H-2412D	21.6-26.4	20	97.64	±12	0	±83	85	±330	UL / CB / CE
NQ2H-2415D	21.6-26.4	20	98.53	±15	0	±67	85	±330	UL / CB / CE
NQ2H-241509D	21.6-26.4	25	100.37	+15 / -9	0	+67 / -111	83	±330	UL / CB / CE

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INPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	5V Input	4.5	5	5.5	VDC
	12V Input	10.8	12	13.2	
	15V Input	13.5	15	16.5	
	24V Input	21.6	24	26.4	
Input Filter		Capacitor			
Input Reflected Ripple Current (1)			20		mApk-pk
Start up Time	Nominal Vin and constant resistive load		30		ms
Recommended input fuse (slow blow)	5V Input	1			A
	12V Input	0.4			
	15V Input	0.4			
	24V Input	0.2			
Note :					
1. Measured with a simulated source inductance of 22μH and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz).					

OUTPUT SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			-3		+3	%
Line Regulation	For 1% Vin Change		-1.2		+1.2	%
Load Regulation	From 10% to 100% Load	3.3V , 5V Output	-15		+15	%
		12V , 24V Output	-10		+10	
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output		-5		+5	%
Ripple & Noise	20MHz bandwidth.				150	mVpk-pk
Short Circuit Protection			Continuous (Automatic Recovery)			
Temperature Coefficient			-0.03		+0.03	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load		See Table			
Note :						
1. Measured with a 0.1μF MLCC.						

GENERAL SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, and rated for 60sec	5000			VAC
Isolation Resistance	Input-output	1000			MΩ
Isolation Capacitance	Input-output		10		pF
Clearance / Creepage		6			mm
Working voltage				300	Vrms
Overvoltage category		OV2			
Clearance / Creepage for X type		9			mm
Working voltage for X				300	Vrms
Overvoltage category for X type		OV3			
Switching Frequency		20			kHz
MTBF	MIL-HDBK-217 F @ 25°C	2.4			M hours
Safety Approval	IEC / EN / UL 62368-1	DK-131558-UL, E252573			
Insulation System		Reinforced Insulation			
Environmental compliance		RoHS			

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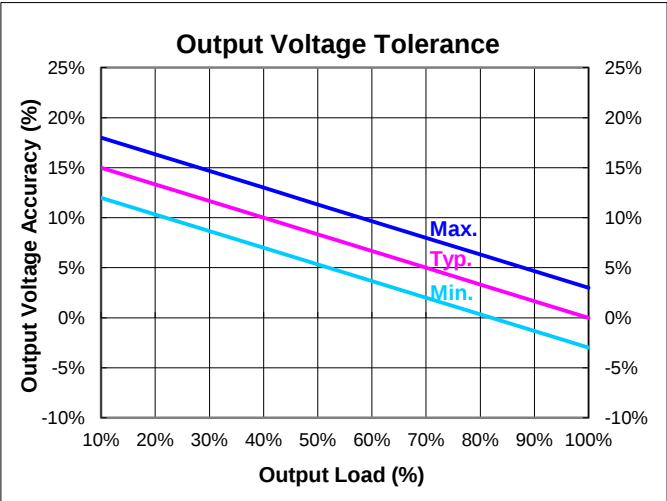
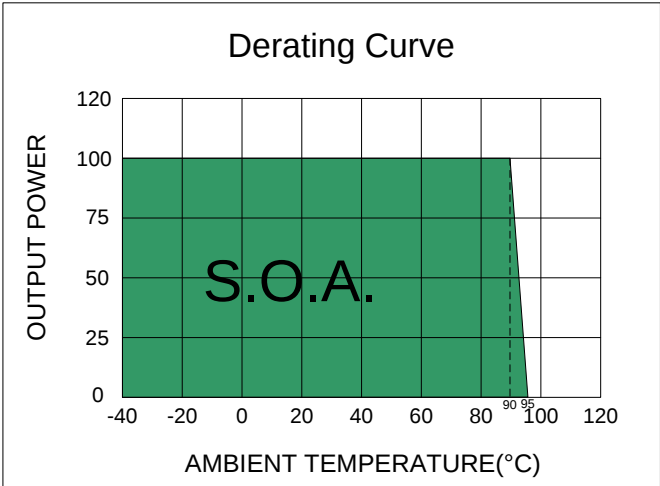
ENVIRONMENT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		95	°C
Maximum Case Temperature				115	°C
Thermal Impedance		30			°C/W
Operating Altitude				5000	m
Pollution Degree		PD2			
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			
Common Mode Transient Immunity	1KV Common mode Voltage	65			KV/μs

EMC SPECIFICATIONS			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032		B
ESD	IEC 61000-4-2	Air ± 15kV, Contact ± 6kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2kV with external components	A
Surge	IEC 61000-4-5	±2kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	100A/m	A

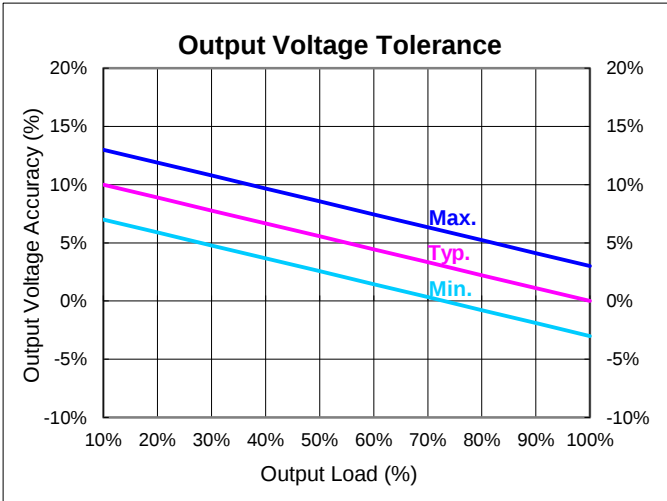
PHYSICAL SPECIFICATIONS	
Parameter	Value
Case Material	Nonconductive black plastic (UL94V-0 rated)
Pin Material	Tinned Copper
Potting Material	Silicone (UL94V-0 rated)
Weight	4.2 g, typ.
Dimensions	0.77" x 0.39" x 0.49"

ABSOLUTE MAXIMUM RATINGS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	5V Input			7	VDC
	12V Input			15	
	15V Input			18	
	24V Input			28	
Soldering Temperature	1.5mm from case 10sec max.			260	°C
Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

ELECTRICAL CHARACTERISTIC CURVES



3.3V and 5V output

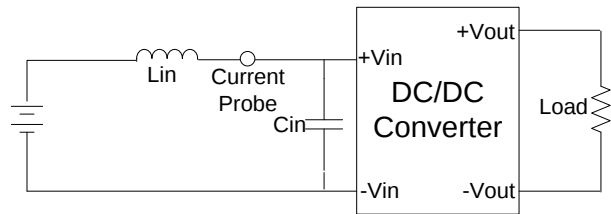


12V and 24V output

TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

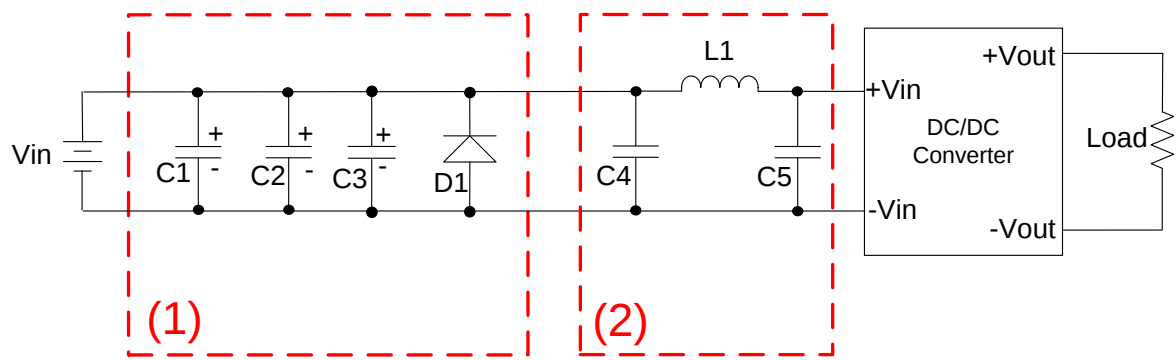
Input reflected ripple current is measured with a source inductor L_{in} ($22\mu H$) and a source capacitor C_{in} ($47\mu F$, $ESR < 1.0\Omega$ at $100kHz$) at nominal input and full load.



DESIGN & FEATURE CONFIGURATIONS

EMC Filter

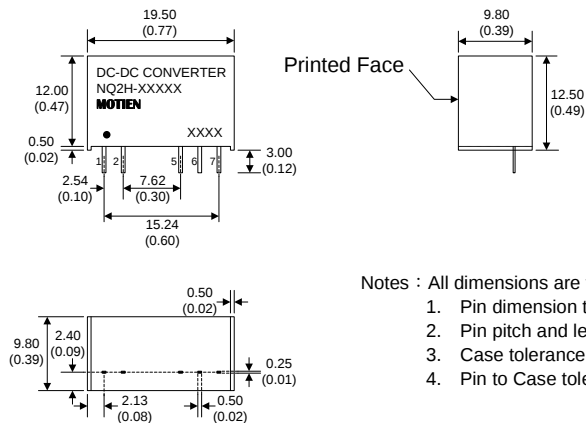
The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



Vin	C1 、 C2	C3	D1	C4	L1	C5
5V	NIPPON Chemi-con KY Series 680uF, 100V	NIPPON Chemi-con KY Series 680uF, 100V	SMDJ8.0A	MLCC 4.7uF, 50V	6.8uH	DNP
12V		DNP	SMDJ16.0A	MLCC 10uF, 50V		MLCC 4.7uF, 50V
15V			SMDJ18.0A	MLCC 10uF, 50V		MLCC 4.7uF, 50V
24V			SMDJ28.0A	MLCC 10uF, 50V		MLCC 4.7uF, 50V

MECHANICAL SPECIFICATIONS

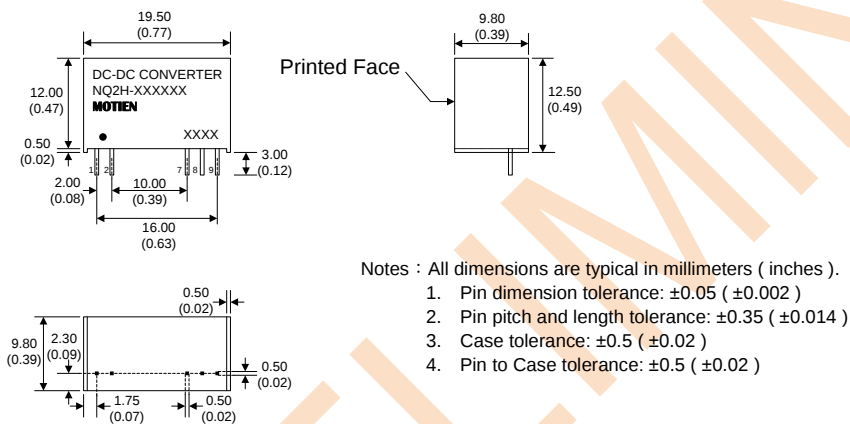
Standard Type:



PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
5	-Vout	-Vout
6	N.P.	COM
7	+Vout	+Vout

*N.P. : No PIN

X Type:

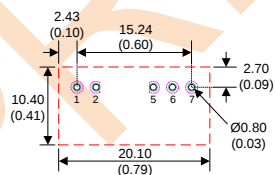


PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
7	-Vout	-Vout
8	N.P.	COM
9	+Vout	+Vout

*N.P. : No PIN

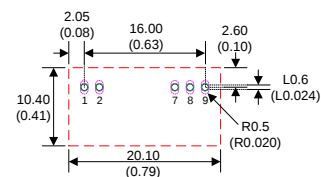
RECOMMEND FOOTPRINT DETAILS

Standard Type:



- Notes : 1. All dimensions are typical in mm (inches).
- Through hole 1 ~ 7: $\varnothing 0.80$ (0.031)
 - Top view pad 1 ~ 7: $\varnothing 1.00$ (0.039)
 - Bottom view pad 1 ~ 7: $\varnothing 1.60$ (0.063)
 - pad 2 to pad 5 spacing: 6.00 (0.236)
2. There should be at least 6mm distance between primary and secondary circuit.

X Type :



- Notes : 1. All dimensions are typical in mm (inches).
- Through hole 1 ~ 9: $\varnothing 0.90$ (0.035)
 - Top view pad 1 ~ 9: $\varnothing 1.00$ (0.039)
 - Bottom view pad 1 ~ 9: Groove R0.50 (0.020) L0.80 (0.031)
2. There should be at least 9mm distance between primary and secondary circuit.