

NQ1H-1W Series



1W 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 82%
- -40 ~ 95°C Operation Temperature Range
- Suitable for IGBT applications
- "X" Option for Input / Output Clearance > 9mm with alternative pinout



PART NUMBER STRUCTURE

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

(1) Series

(2) Watt

1 - 1 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)			
NQ1H-053R3S	4.5-5.5	50	253.17	3.3	0	303	79	2200	CE
NQ1H-0505S	4.5-5.5	50	250	5	0	200	80	1000	UL / CB / CE
NQ1H-0509S	4.5-5.5	50	243.91	9	0	111	82	1000	CE
NQ1H-0512S	4.5-5.5	50	243.91	12	0	83.3	82	470	UL / CB / CE
NQ1H-0515S	4.5-5.5	60	253.17	15	0	66.7	79	470	UL / CB / CE
NQ1H-123R3S	10.8-13.2	30	106.84	3.3	0	303	78	2200	CE
NQ1H-1205S	10.8-13.2	30	104.17	5	0	200	80	1000	UL / CB / CE
NQ1H-1209S	10.8-13.2	30	102.89	9	0	111	81	1000	CE
NQ1H-1212S	10.8-13.2	30	100.41	12	0	83.3	83	470	UL / CB / CE
NQ1H-1215S	10.8-13.2	30	102.89	15	0	66.7	81	470	UL / CB / CE
NQ1H-153R3S	13.5-16.5	20	83.34	3.3	0	303	80	2200	CE
NQ1H-1505S	13.5-16.5	25	82.31	5	0	200	81	1000	CE
NQ1H-1509S	13.5-16.5	25	81.31	9	0	111	82	1000	CE
NQ1H-1512S	13.5-16.5	25	82.31	12	0	83.3	81	470	CE
NQ1H-1515S	13.5-16.5	25	82.31	15	0	66.7	81	470	CE
NQ1H-243R3S	21.6-26.4	20	55.56	3.3	0	303	75	2200	CE
NQ1H-2405S	21.6-26.4	20	54.83	5	0	200	76	1000	UL / CB / CE
NQ1H-2409S	21.6-26.4	20	52.75	9	0	111	79	1000	CE
NQ1H-2412S	21.6-26.4	20	53.42	12	0	83.3	78	470	UL / CB / CE
NQ1H-2415S	21.6-26.4	20	54.12	15	0	66.7	77	470	UL / CB / CE
NQ1H-053R3D	4.5-5.5	50	250	±3.3	0	±151	80	±1000	CE
NQ1H-0505D	4.5-5.5	50	243.91	±5	0	±100	82	±470	UL / CB / CE
NQ1H-0509D	4.5-5.5	50	238.1	±9	0	±55.5	84	±470	CE
NQ1H-0512D	4.5-5.5	50	243.91	±12	0	±41.7	82	±220	UL / CB / CE
NQ1H-0515D	4.5-5.5	60	253.17	±15	0	±33.3	79	±220	UL / CB / CE
NQ1H-051509D	4.5-5.5	50	240.97	+15 / -9	0	+33.3 / -55.6	83	+68 / -220	UL / CB / CE
NQ1H-123R3D	10.8-13.2	30	104.17	±3.3	0	±151	80	±1000	CE
NQ1H-1205D	10.8-13.2	30	102.89	±5	0	±100	81	±470	UL / CB / CE
NQ1H-1209D	10.8-13.2	30	99.21	±9	0	±55.5	84	±470	CE
NQ1H-1212D	10.8-13.2	30	99.21	±12	0	±41.7	84	±220	UL / CB / CE
NQ1H-1215D	10.8-13.2	30	101.63	±15	0	±33.3	82	±220	UL / CB / CE
NQ1H-121509D	10.8-13.2	30	101.63	+15 / -9	0	+33.3 / -55.6	82	+68 / -220	UL / CB / CE
NQ1H-153R3D	13.5-16.5	25	83.34	±3.3	0	±151	80	±1000	CE
NQ1H-1505D	13.5-16.5	25	81.31	±5	0	±100	82	±470	CE
NQ1H-1509D	13.5-16.5	25	79.37	±9	0	±55.5	84	±470	CE
NQ1H-1512D	13.5-16.5	25	81.31	±12	0	±41.7	82	±220	CE
NQ1H-1515D	13.5-16.5	25	82.31	±15	0	±33.3	81	±220	CE
NQ1H-151509D	13.5-16.5	30	87.72	+15 / -9	0	+33.3 / -55.6	76	+68 / -220	CE
NQ1H-243R3D	21.6-26.4	20	54.12	±3.3	0	±151	77	±1000	CE
NQ1H-2405D	21.6-26.4	20	54.12	±5	0	±100	77	±470	UL / CB / CE
NQ1H-2409D	21.6-26.4	20	51.45	±9	0	±55.5	81	±470	CE
NQ1H-2412D	21.6-26.4	20	52.75	±12	0	±41.7	79	±220	UL / CB / CE
NQ1H-2415D	21.6-26.4	20	52.75	±15	0	±33.3	79	±220	UL / CB / CE
NQ1H-241509D	21.6-26.4	25	55.56	+15 / -9	0	+33.3 / -55.6	75	+68 / -220	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	0.4			A
	12V Input	0.2			
	15V Input	0.2			
	24V Input	0.1			
Note :					
1. Measured with a simulated source inductance of 12μH 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	-10		+10	%
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output	-5		+5	%
Ripple & Noise (1)	20MHz bandwidth			100	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 type				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 ± 8kV, 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

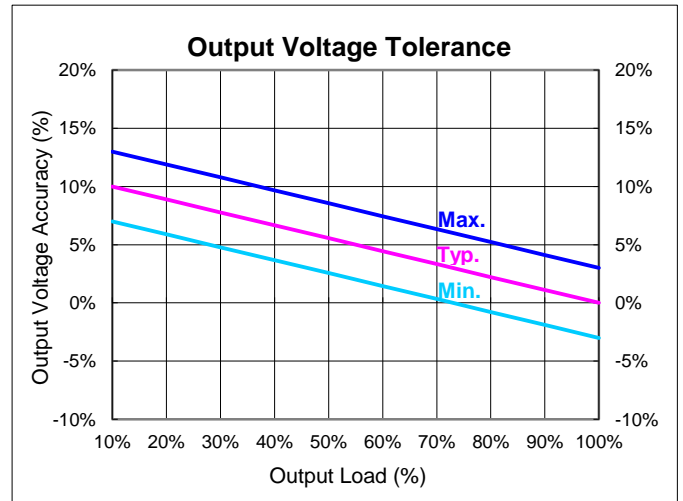
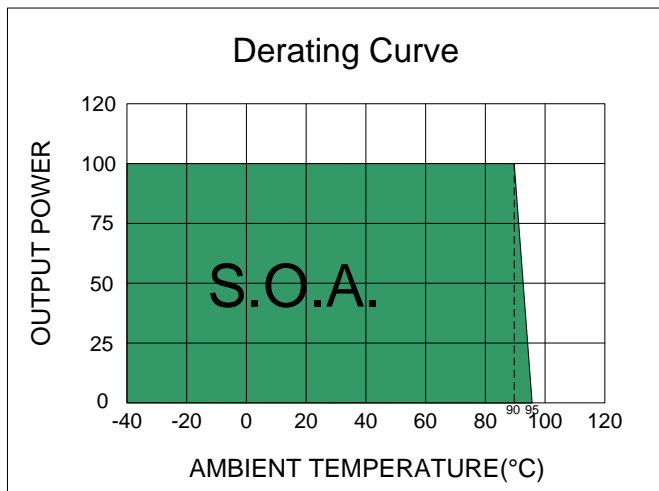
PHYSICAL SPECIFICATIONS	
Parameter	Value
Case Material	Nonconductive black plastic (UL94V-0 rated)
Pin Material	Tinned copper
Potting Material	Silicone (UL94V-0 rated)
Weight	4.2 g, typ.
Dimensions	0.77" x 0.39" x 0.49"

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.

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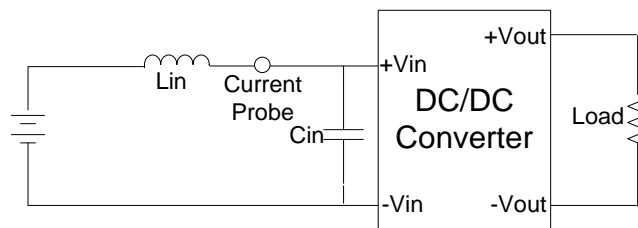
ELECTRICAL CHARACTERISTIC CURVES



TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

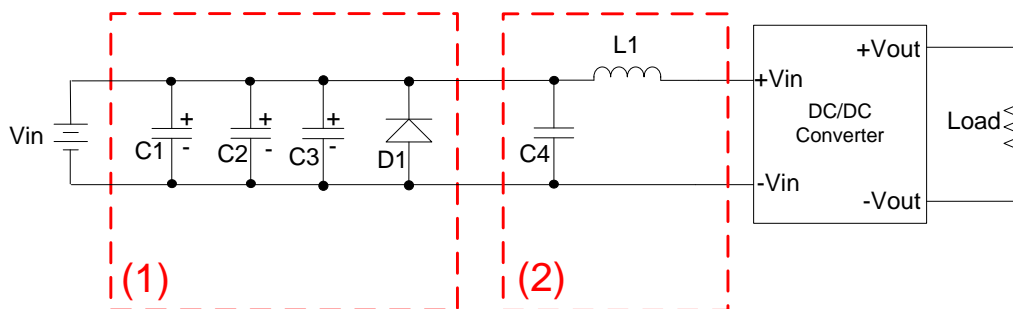
Input reflected ripple current is measured with a source inductor L_{in} ($12\mu H$) and a source capacitor C_{in} ($47\mu F$, $ESR < 1.0\Omega$ at $100kHz$) at nominal input and full load.



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.

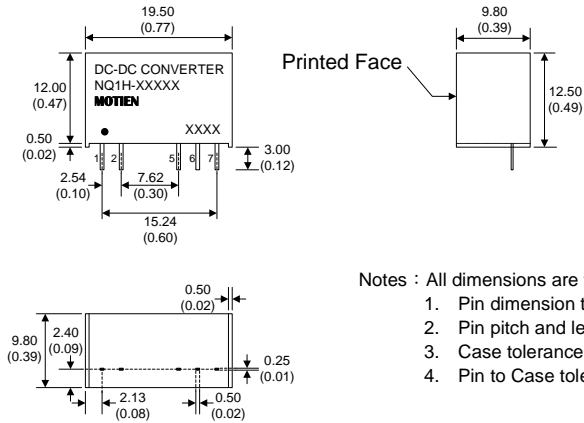


Vin	C1、C2	C3	D1	C4	L1
5V	NIPPON Chemi-con KY Series 680uF, 100V	NIPPON Chemi-con KY Series 680uF, 100V	SMDJ8.0A	MLCC 4.7uF, 50V	6.8uH
12V		SMDJ16.0A	MLCC 10uF, 50V		
15V		SMDJ18.0A	MLCC 10uF, 50V		
24V		SMDJ28.0A	MLCC 10uF, 50V		
		DNP			

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MECHANICAL SPECIFICATIONS

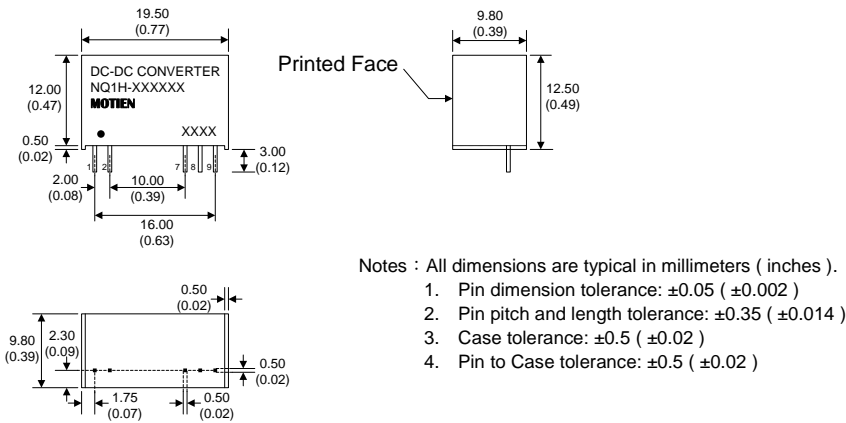
Standard Type:



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:

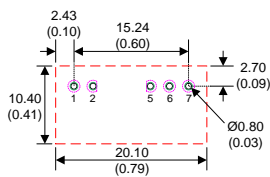


PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
7	-Vout	-Vout
8	N.P.	COM
9	+Vout	+Vout

*N.P. : No PIN

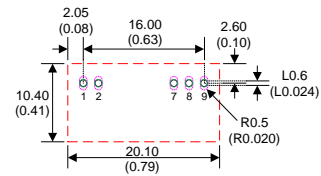
RECOMMEND FOOTPRINT DETAILS

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.