56K1 AC/DC Power Supply

75-Watt Ruggedized Power Supply
Conduction-Cooled, Single and Dual Outputs

Proudly made in the USA

Description

NAI's 56K1 is a 75-Watt AC/DC Power Supply that accepts multiple AC inputs plus a +270 VDC input. This COTS unit provides full-power single, dual, or triple output at a baseplate temperature of +85°C.

Standard features include remote error sensing; remote digital (TTL) turn on/off; and protection against transients, over voltage, over-current, and short-circuits. Options such as ESS vibration testing and choice of output voltages are available, and additional options and special units can be ordered.

This conduction-cooled power supply is specifically designed with NAVMAT component derating for rugged defense and industrial applications. It is also designed to meet the many harsh environmental requirements of military applications.

Features

- Ideal for rugged, conduction-cooled, military applications
- Ordering information for single, dual, and triple outputs:
  - 56KS1 - single output
  - 56KD1 - dual output
  - 56KT1 – triple output
- Standard output voltages: 5V, 12V, 15V, 24V, 28V
- Integrated EMI filtering per MIL-STD-461D
- Input transient protection per MIL-STD-704D
- High power density
- Low profile packaging
- Low noise
- Operates at full load through the entire -55°C to +85°C temperature range
- Contact factory for additional options and special units

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Electrical Specifications

AC Input Characteristics	
Input	115/230 VAC, 270 VDC; (see tables of Pinout Designations and Input Connections for the J1 Connector, page 4); 270 VDC: input range of 170 VDC to 355 VDC
EMI/RFI	Designed to meet the requirements of MIL-STD-461D; CE 102
Input Transient Protection	Per MIL-STD-704D; For nominal 115 VAC input: 180 VAC for 0.1 second For nominal 230 VAC input: 292 VAC for 0.1 second
Input Frequency	47 Hz to 440 Hz
Inrush Current	Limited to 500% of nominal input current
DC Output Characteristics	
Output Power	See Output Power Deratings Table, page 3
Output Voltage	5 VDC to 28 VDC (see Output Power Deratings Table, page 3)
Efficiency (See Note Below*)	75% typical; 70% for dual output units; 55% to 66% for triple output units; 70% for 5 V units; 65% for 3 V units
Line Regulation	Within 0.1% or 10 mV (whichever is greater) for low to high line changes at constant load
Load Regulation	0.1% or 10 mV (whichever is greater) for 0 to 100% of rated load at nominal input line
Minimum Load Requirements	For single and dual output units: no minimum load; for triple output units: 20% minimum on main load, 150 mV for auxiliary outputs
PARD (Noise and Ripple)	50 mV p-p typical; 100 mV p-p maximum for 5 V outputs (20 MHz bandwidth); 1% of the output voltage, with a maximum of 200 mV p-p, for all other outputs (20 MHz bandwidth)
Load Transient Under/Overshoot	0.35 V maximum from nominal output voltage set point for 5 V outputs; all other outputs are 5%
Short Circuit Protection	Under any short circuit condition, continuous short circuit protection with auto recovery
Current Limiting	Limited to 130% of rated output at 85ºC
Over Voltage Protection	Automatic electronic shutdown if voltage exceeds 125% ±10%
Remote Error Sensing	Compensates for up to 0.5 V drop on output leads
Remote Turn On/Off	TTL logic 1 inhibits (turns off) the output; a floating input acts as a logic 0 (output on)
Isolation Voltage	1000 VDC input to output and input to case; 200 VDC output to case
Insulation Resistance	50 Mega Ohm at 50 VDC

All specifications are subject to change without notice.

**Note: Model 56KT1-000M0-02 efficiency is 55% minimum (57% typical).*

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Additional Specifications

Physical/Environmental	
Temperature Range	Operating: -55°C to +85°C at 100% load, 400 Hz input (temperature measured at baseplate, conduction via baseplate only); Storage: -55°C to +125°C (see Output Power Deratings Table below)
Temperature Coefficient	0.01% per °C
Shock	30 G's each axis per MIL-STD-810C, Method 516.2, Procedure 1; Hammer shock per MIL-S-901C
Acceleration	6 G's per MIL-STD-810C, Method 513.2, Procedure 11; 14 G's per Procedure 1
Vibration	Per MIL-STD-810C, Method 514.2, Procedure 1A
Reliability (MTBF)	200,000 hours, ground benign, at 50°C baseplate per MIL-HDBK-217F
Humidity	95% at 71°C per MIL-STD-810C, Method 507.1 (non-condensing)
Altitude	40,000 feet per MIL-STD-810C, Method 504.1, Category 6 Equipment; 0° to 71°C at baseplate
Dimensions	See Mechanical Dimensions Table, page 6
Salt & Fog	Per MIL-STD-810C, Method 509.1
Sand/Dust/Fungus	Per MIL-STD-810C
Enclosure	Aluminum housing to aluminum baseplate
Finish	Cover: black anodized; Baseplate: chemfilm
Interface	Connections via a D-subminiature connector (see Connector Specifications Table, page 4)
Weight	Single output = 11 ounces; Dual output = 12 ounces; Triple output = 13 ounces

All specifications are subject to change without notice.

Output Power Deratings

Volts	Current @ 400 Hz & 85ºC	Current @ 400 Hz & 100ºC	Current @ 60 Hz & 71ºC	Current @ 60 Hz & 100ºC
5.0	15.0	10.0	12.0	7.5
12.0	6.3	4.0	5.0	3.1
15.0	5.0	3.3	4.0	2.5
24.0	3.1	2.0	2.5	1.6
28.0	2.7	1.7	2.1	1.3
+/-12	3.1	2.0	2.5	1.6
+/-15	2.5	1.7	2.0	1.3
5/±12	10.0 / ±1.0	6.7 / ±0.7	8.0 / ±0.8	5.0 / ±0.5
5/±15	9.0 / ±1.0	6.0 / ±0.7	7.2 / ±0.8	4.5 / ±0.5

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Pinout Designations (J1)

Pin No.	Single Output	Pin No.	Dual Output	Pin No.	Triple Output
1	INPUT	1	INPUT	1	INPUT
2	INPUT (Neutral)	2	INPUT (Neutral)	2	INPUT (Neutral)
3	–TTL (Return)	3	–TTL (Return)	3	NC
4	+TTL	4	+TTL	4	–TTL (Return)
5	+SENSE	5	+SENSE (Output 1)	5	+TTL
6	OUTPUT	6	OUTPUT 1	6	OUTPUT 2
7	OUTPUT	7	OUTPUT RETURN 1	7	OUTPUT RETURN 2
8	OUTPUT	8	+SENSE (Output 2)	8	OUTPUT RETURN 3
9	INPUT (3Ø & 230 V)	9	INPUT (3Ø & 230v)	9	OUTPUT 3
10	INPUT (3Ø)	10	INPUT (3Ø & 230v)	10	+SENSE
11	GROUND	11	GROUND	11	OUTPUT 1
12	–SENSE (Return)	12	-SENSE 1 (Return)	12	OUTPUT 1
13	OUTPUT RETURN	13	OUTPUT 2	13	OUTPUT 1
14	OUTPUT RETURN	14	OUTPUT RETURN 2	14	INPUT (3Ø & 230 V)
15	OUTPUT RETURN	15	–SENSE 2 (Return)	15	INPUT (3Ø & 230 V)
				16	NC
				17	GROUND
				18	NC
				19	NC
				20	NC
				21	NC
				22	–SENSE (Return)
				23	OUTPUT RETURN 1
				24	OUTPUT RETURN 1
				25	OUTPUT RETURN 1

Notes:

- Use all pins which have been allotted for the main output and return lines.
- TTL logic 1 inhibits (turns off) the output; a floating input acts as a logic 0 (output on); (Remote Turn On/Off feature).
- Remote sense feature (SENSE) is available on 1st output of the single and triple output versions; on dual output version it is available on both outputs (see Output Wiring Diagrams, page 6).

Input Connections (J1)

AC Type	Connection for Single & Dual Outputs	Connection for Triple Outputs
115 VAC, 1∅	1, 2 (Neutral)	1, 2 (Neutral)
115 VAC, 3∅ Δ	1, 9,10	1, 14, 15
115 VAC, 3∅, Y	1, 9, 10, 2 (Neutral)	1, 14, 15, 2 (Neutral)
230 VAC, 1∅	1, 9	14, 15
230 VAC, 3∅ Δ	1, 9, 10	1, 14, 15
270 VDC	1 (Positive), 9 (Return)	1 (Positive), 14 (Return)

Connector Specifications

Connector	Part # - Series
Unit – Single/Dual	DAMME15PR
Mating – Single/Dual	DAMM15S
Unit - Triple	DBMME25PR
Mating - Triple	DBMM25S

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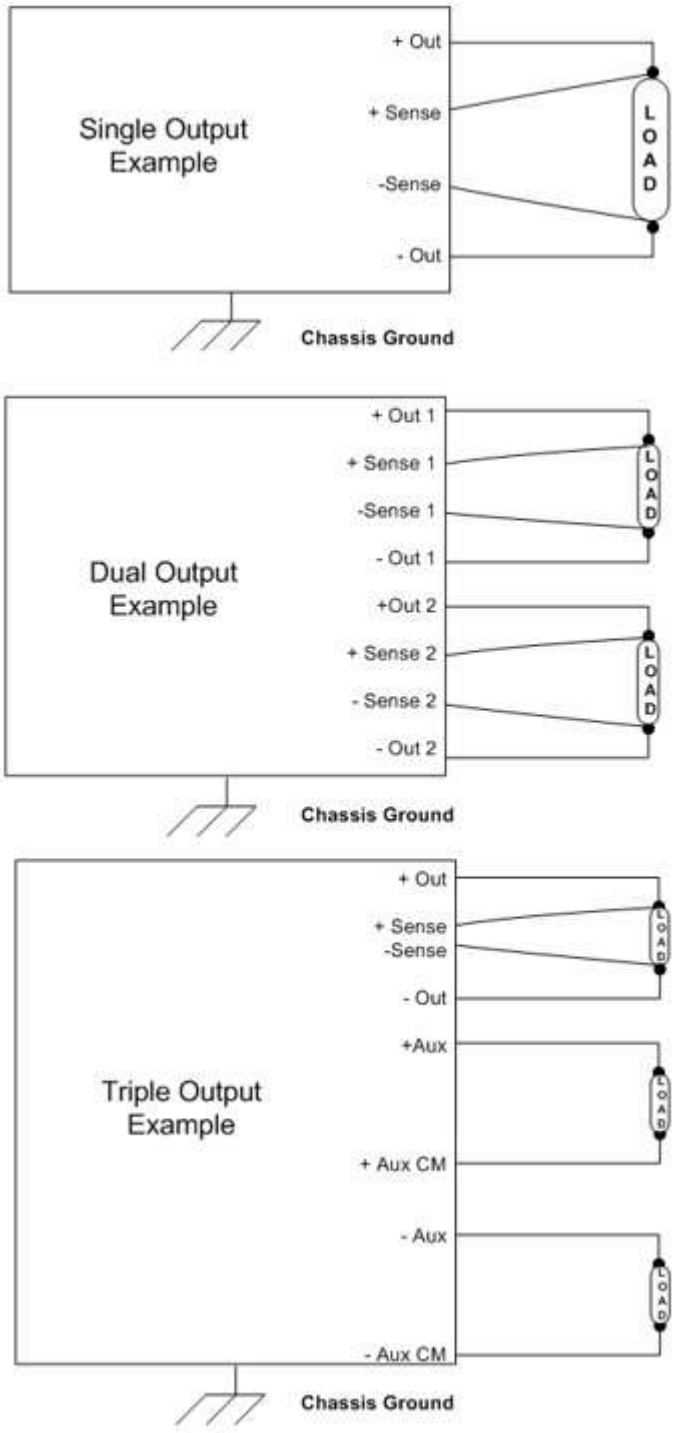
Output Wiring Diagrams



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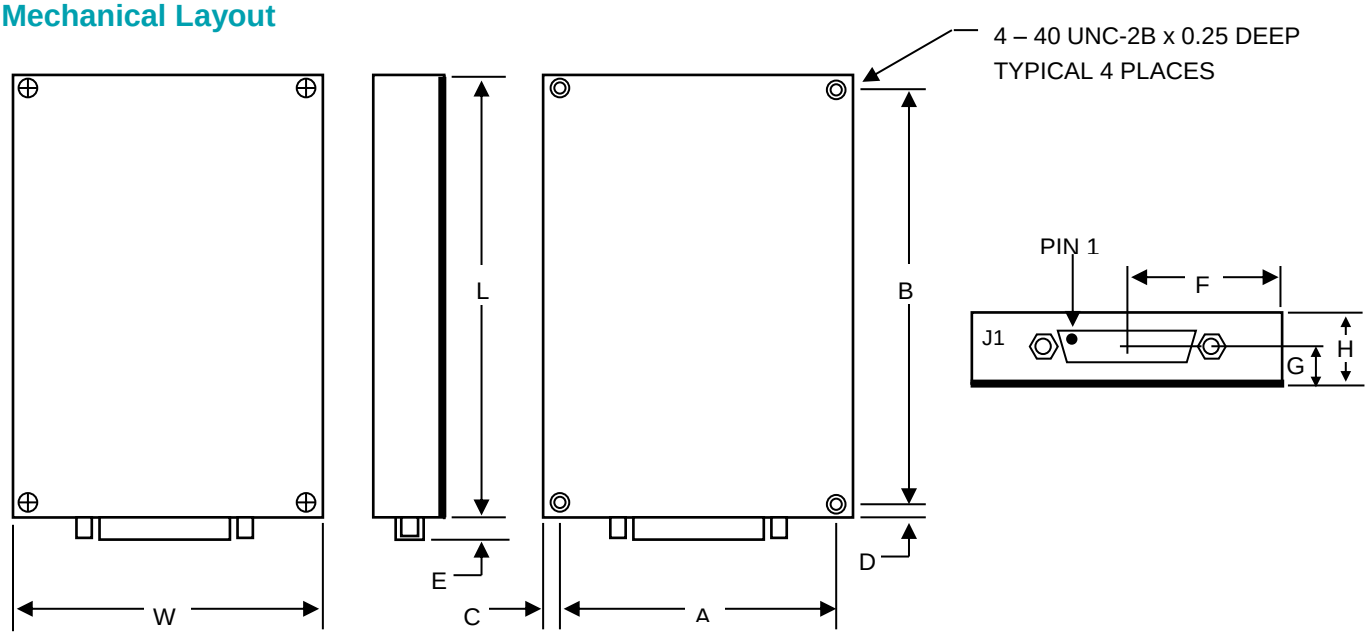
Mechanical Layout



TOP **BOTTOM**

See tables below for Mechanical Dimensions.

Mechanical Dimensions

Case*	Units	W	L	H	A	B	F
1	inches	3.25	4.5	0.80	2.85	4.10	1.63
1	mm	82.6	114.3	20.3	72.39	104.14	41.3
2	inches	4.5	5.0	0.80	4.10	4.6	2.25
2	mm	114.3	127	20.3	104.14	116.84	57.5

** Use Case 1 for Single Power Supply; Case 2 for Dual and Triple Power Supply.*

Additional Dimensions

Dimension	Inches	Millimeters
C & D	0.2	5.1
E	0.23	5.84
G	0.455	11.56
H	0.8	20.3

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Ordering Information

56 K S1 – 005 M 0 – XX

Code: Used only for Special Orders (see Code Table below).

Options: 0 = Standard Testing (Includes ESS Temperature Cycling per NAVMAT).
1 = Standard Testing plus ESS Vibration Testing (per NAVMAT).

Reliability: M = COTS-Mil-Type: -55°C to +85°C; Mil-Type Components.
Designed to meet the requirements of MIL-STD-461C and MIL-STD-810C.
Designed per NAVMAT Guidelines.

Output Voltages:

Single Output	**Dual Output**	Triple Output
000 Special Voltage*	000 = Special Voltage*	512 = 5, ±12 V
005 = 5 V	012 = ±12 V	515 = 5, ±15V
012 = 12 V	015 = ±15V	
015 = 15 V		
024 = 24 V		
028 = 28 V		

*See Code Table below

Outputs: S1 = Single
D1 = Dual
T1 = Triple

Wattage: K = 75 W

Series: 56 = AC/DC

Examples: 56KD1-012M1 = AC/DC; 75 Watt; Dual Output; ±12 V; COTS-Mil-Type; ESS Vibration Testing
56KT1-515M1 = AC/DC; 75 Watt; Triple Output; 5 V, ±15 V; COTS-Mil-Type; ESS Vibration Testing

Code Table for Special Orders

Code	Model Number	Description
01	56KD1-000M0-01	56KD1 Modified for +12 VDC @ 3.0 A and +15 VDC @ 2 A
02	56KT1-000M0-02	56KT1 Modified for +5 VDC @ 1.0 A, +12 VDC @ 700 mA, and +24 VDC @ 800 mA
03	Add code 03 to end of desired p/n	Potted. Designed to meet MIL-STD-810C, Procedure I, Category 6, 70,000 feet. Adds 0.9 lbs of weight to unit.
04	56KT1-000M0-04	Dual output: +5 V @ 8 A, +12 V @ 3 A; max operating temp = +71°C

Consult Factory for Additional Options and/or Special Units

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