

TECHNICAL MANUAL
EXHIBIT II

(PRELIMINARY)

ITS-5724

**DIGITAL
TRANSMITTER**

REV: 0

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**ITS-5724
UPCONVERTER/AMPLIFIER**

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TECHNICAL DESCRIPTION

Technical Specifications

Type of Emissions6M00D7W
Frequency Range..... 2305 to 2320 and 2345 to 2360 MHz (any of four 6 MHz channels)
Output Power Rating 15 watts average
DC voltage and total current of final amplifier stage..... 10 volts DC at 28 amps
(Class A - Not RF power dependent)

Performance Specifications

Operating Frequency Range..... 2305 to 2320 and 2345 to 2360 MHz
RF output - Nominal:
Power 15 watts average
Impedance 50 ohms
Connector Type N

Input (Modulator) QAM, MPEG-2 Transport Stream
Impedance:..... 75Ω (BNC)

Out-of-Band Power:
2350-2345 MHz $80 + 10\log(15W)\text{dB} = 91.8\text{dB max}$
below 2300 MHz and above 2370 MHz $70 + 10\log(15W)\text{dB} = 81.8\text{dB max}$
2300-2320 MHz and 2345-2370 MHz $43 + 10\log(15W)\text{dB} = 54.8\text{dB max}$

Electrical Requirements

Power Line Voltage
Modulator 90 to 132 VAC, 47 to 63 Hz
Upconverter/Amplifier 117 VAC $\pm 10\%$, 60 Hz or
220 VAC $\pm 10\%$, 50 Hz

Power Consumption
Modulator 55 watts
Upconverter/Amplifier 550 watts

Environmental

Maximum Altitude
Modulator 10,000 feet (3,050m)
Upconverter/Amplifier 12,000 feet (3,660m)

Ambient Temperature
Modulator +5° to +45°C
Upconverter/Amplifier 0° to +50°C

Mechanical

Dimensions: (WxDxH)
Modulator 16.9" x 17.7" x 1.73" (43.0cm x 45.0cm x 4.4cm)
Upconverter/Amplifier 19" x 21" x 8.75" (48.3cm x 53.3cm x 22.24cm)

Weight:
Modulator 11 lbs. (5.0 kgs)
Upconverter/Amplifier 47 lbs. (21.3 kgs)

ITS-5724

SYSTEM DESCRIPTION

The ITS-5724 is a digital transmitter capable of operating as a television transmitter at a nominal power of 15 watts average. The ITS-5724 is comprised of a modulator assembly (SAT Division Telecommunications PQM 2100), upconverter/amplifier tray and a Coleman Microwave 10 Pole Channel Filter. The ITS-5724 incorporates Automatic Level Control (ALC) to maintain a constant output power level.

Combining the latest in GaAs FET amplifier technology and Feed Forward distortion cancellation, the ITS-5724 delivers an output power of 15 watts (average).

The unit's circuitry is enclosed in a tray assembly designed for mounting in a standard 19" equipment rack. The unit comes complete with slide rail mounting hardware to allow the tray to move in and out of the rack for ease of service. The outside dimensions of the tray assembly are 19" x 21" x 8.75" (WxDxH).

The ITS-5724 is factory calibrated for a front panel LCD display power meter reading of 100%, which represents the rated output power of the unit (unless otherwise specified).

(if an external amp is present)

EXT AMP MODULE OK	EXT AMP MODULE FAULT
EXT AMP TEMP OK	EXT AMP TEMP FAULT
EXT PWR SUPPLY OK	EXT PWR SUPPLY FAULT

(if a modulator is present)

MODULATR VIDEO PRSNT	MODULATR VIDEO LOSS
MODULATR PLL LOCKED	MODULATR PLL FAULT
MODULATR INPUT OK	MODULATR INPUT FAULT

Setup Screens

NOTE: THE PARAMETER THAT IS TO BE SELECTED WILL BE FLASHING.

1. (MODEL SELECTIONS: 5722, 5723, 5724, 5725, 5726, 5727)

MODEL SETUP					
MODEL: 5524					
↑	↓	SEL	PRV	NXT	

2.

RF CHANNEL SETUP					
RF CHANNEL: A1					
↑	↓	SEL	PRV	NXT	

3.

SCADA ADDRESS SETUP					
SCADA ADDRESS: 32					
↑	↓	SEL	PRV	NXT	

4.

FWD PWR FLT SETPOINT					
POWER = 28 %					
↑	↓	SEL	PRV	NXT	

EXT REFLECTED PWR: 10%			
0	50		
100			
STB	STS	PRV	NXT

Status Screens

1.

TRANSMITTER STATUS			
ALC VOLTAGE: 6.7 V			
STB	SYS	PRV	NXT

2.

TRANSMITTER STATUS			
AFC VOLTAGE: 4.1 V			
STB	SYS	PRV	NXT

NOTE: TEXT FLASHES ON DISCRETE INPUT FAULT CONDITION FOR ALL SCREENS THAT DISPLAY A FAULT CONDITION. THE MOST RECENT FAULT SCREEN IS AUTOMATICALLY DISPLAYED.

3.

TRANSMITTER STATUS			
IF PRESENT			
STB	SYS	PRV	NXT

or

TRANSMITTER STATUS			
IF INPUT FAULT			
STB	SYS	PRV	NXT

In the transmitter status screen/menu, the second line will display the fault status of a particular item. A list of the items showing the normal and the fault condition is given below:

Second Line Information

Normal

IF PRESENT
 OUTPUT POWER OK
 PLL LOCKED
 EXT REF PRESENT
 AMP MODULE OK
 TEMP OK
 PWR SUPPLY OK
 PEAK VS AVG OK

Fault (flashing)

IF INPUT FAULT
 OUTPUT POWER FAULT
 PLL FAULT
 EXT REF FAULT
 AMP MODULE FAULT
 TEMP FAULT
 PWR SUPPLY FAULT
 PEAK VS AVG FAULT

ITS-5724
NTSC/PAL TRANSMITTER

FRONT PANEL LCD DISPLAY/KEYPAD DESCRIPTION:

Main Screens

1. (splash screen for 3 seconds on power up)

ADC ITS CORPORATION (LOGO)

2. (When the transmitter is in operate, the STB standby menu appears; when the transmitter is in standby the OPR operate menu appears.)

MODEL: 5724

RF CHANNEL: A1

STB STS PRV NXT

- 3.

VERSION: 1.0

SCADA ADDRESS: 32

STB STS PRV NXT

- 4.

OUTPUT PWR: 75%



0 50

100

STB STS PRV NXT

5. (display only if external amp present)

EXT OUTPUT PWR: 75%



0 50

100

STB STS PRV NXT

- 6.

REFLECTED PWR: 10%



0 50

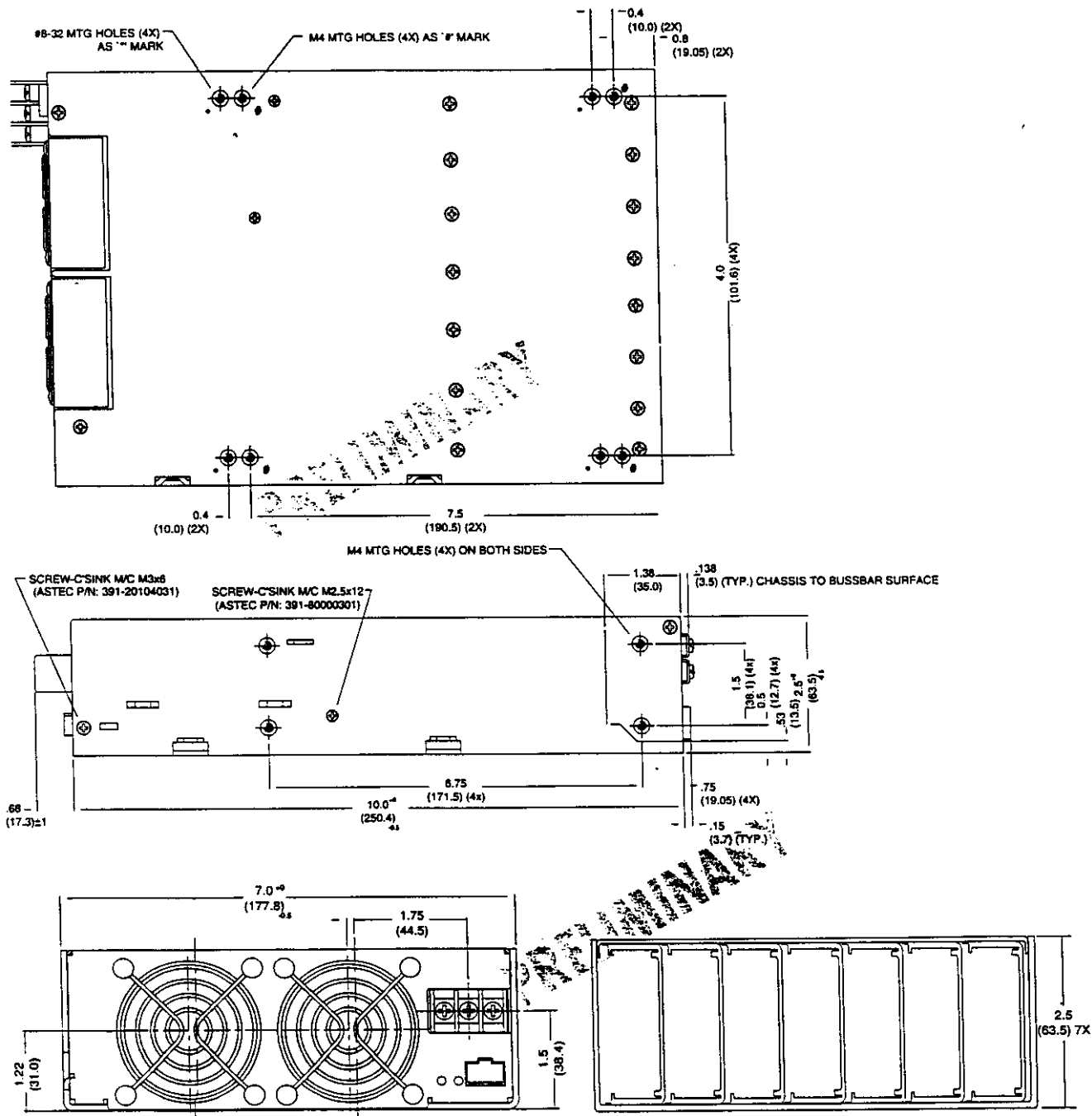
100

STB STS PRV NXT

7. (display only if external amp present)

DRAWINGS • MVP PRISM MP8

7-inch Case Size 2.5" x 7" x 10



NOTES

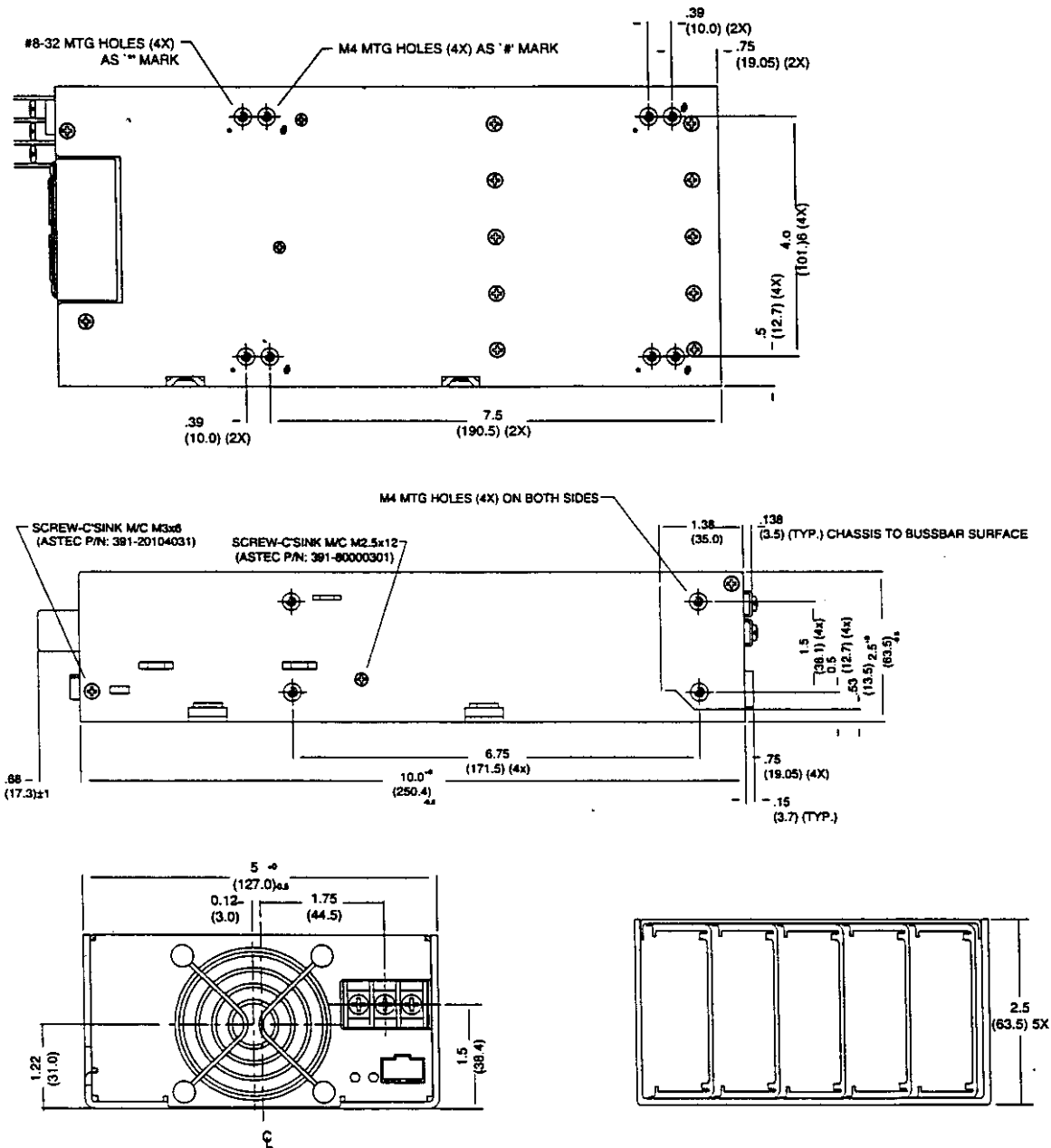
1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers).
2. Control connectors: (J1 and J2) 10 position Molex 90130-3210 housing, gold plated contacts. Mates with Molex 90153-0210 (IDT) housing, or 90142-0010 housing with 90119-2110 crimp contacts (Molex C - Grid III Series). Connector kit includes mating connector and 10 pins, Astec part #70-841-004.
3. Chassis material: aluminum with chemical film coating.
4. Bar code: code 39 extended.
5. All dimensions are in inches and (mm) and are typical.

MVP SERIES

400 - 800 WATTS

DRAWINGS • MVP PRISM MP4, MP6

5-inch Case Size 2.5" x 5" x 10" (11)



NOTES

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers).
2. Control connectors: (J1 and J2) 10 position Molex 90130-3210 housing, gold plated contacts. Mates with Molex 90153-0210 (IDT) housing, or 90142-0010 housing with 90119-2110 crimp contacts (Molex C - Grid III Series). Connector kit includes mating connector and 10 pins, Astec part #70-841-004.
3. Chassis material: aluminum with chemical film coating.
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OUTPUT CURRENTS

Single Output 3-digit Code Selection Chart

Voltage Code	Voltage	Module Code		
		1 Takes up 1 Slot Current	2 Takes up 2 slots Current	3 Takes up 3 slots Current
A	2 V	35	60	120
B	2.2 V	35	60	120
C	3 V	35	60	120
D	3.3 V	35	60	120
E	5 V	35	60	120
F	5.2 V	35	60	115
G	5.5 V	34	58	109
H	6.0 V	23	42	78
I	8.0 V	20	36	68
J	10 V	18	32	60
K	11 V	17	31	54.5
L	12 V	17	30	50
M	14 V	12.5	21	40.5
N	15 V	14	20	39
O	18 V	11	19	33.3
P	20 V	10.5	18	30
Q	24 V	8.5	15	23.5
R	28 V	6.7	11	21.4
S	30 V	6.5	11	20
T	33 V	6.2	10.9	18.2
U	36 V	5.8	10	16.6
V	42 V	4.2	7.5	12.5
W	48 V	4.0	7.5	12.5
X	54 V	3.7	6.0	11
Y	60 V	3.5	6.0	10

Example: 5V @ 60A Module Code — **2 E** — Voltage Code

Dual Output 3-digit Code Selection Chart

Voltage Code	Voltage	Takes up 1 slot Current	
		V1	V2
A	2 V		10
B	2.2 V		10
C	3 V		10
D	3.3 V		10
E	5 V	10	10
F	5.2 V		10
G	5.5 V		10
H	6.0 V		10
L	12 V	10	4
M	14 V	9	4
N	15 V	8	4
Q	24 V	4	2
R	28 V	3	2

*Note: Total loading not to exceed 144 watts.

Example: 5V @ 10A; 12V @ 4A* Module Code — **4 E L** — Voltage Code (always 4)

Triple Output 3-digit Code Selection Chart

Voltage Code	Voltage	Takes up 1 slot Current		
		V1	V2	V3
A	2 V	-	-	2
B	2.2 V	-	-	2
C	3 V	-	-	2
D	3.3 V	-	-	2
E	5 V	-	-	2
F	5.2 V	-	-	2
G	5.5 V	-	-	2
H	6.0 V	-	-	2
I	8.0 V	1	1	1
J	10 V	1	1	1
K	11 V	1	1	1
L	12 V	1	1	1
M	14 V	1	1	1
N	15 V	1	1	1
O	18 V	1	1	1
P	20 V	-	0.5	0.5
Q	24 V	-	0.5	0.5
R	28 V	-	0.5	0.5

*Note: Total loading not to exceed 36 watts.

Example: 12V @ 1A; 20V @ 0.5A; 5V @ 2A*

**No Module Code required

NOTES

Electrical Characteristics:

- DC OK minus 2 to 6% of nominal output voltage (tracking).
- Inhibit & Enable are both TTL compatible. ISOLATED requires 2-mA source, TYP.
- INPUT OK LED: Illuminated= Input OK.
- GLOBAL DC OK LED: Illuminated= Monitored outputs operating within tolerance.
- Specifications subject to change without notice.

INPUT ASSIGNMENTS

PFC Input

J1 CONTROL CONNECTOR

Pin No.	Function
1	INPUT OK - "Emitter"
2	INPUT OK + "Collector"
3	Global DC OK - "Emitter"
4	Global DC OK + "Collector"
5	Spare
6	Global Inhibit/Enable Logic "O"
7	Global Inhibit/Enable Logic "I"
8	Global Inhibit/Enable Return
9	SELV, 5V Housekeeping Bias
10	SELV, 5V Housekeeping Bias Return

Ten (10) position Molex 90130-3210 housing with select gold plated contacts.

DC Output Controls & Signals: Single/Dual Output modules

J1 CONTROL CONNECTOR

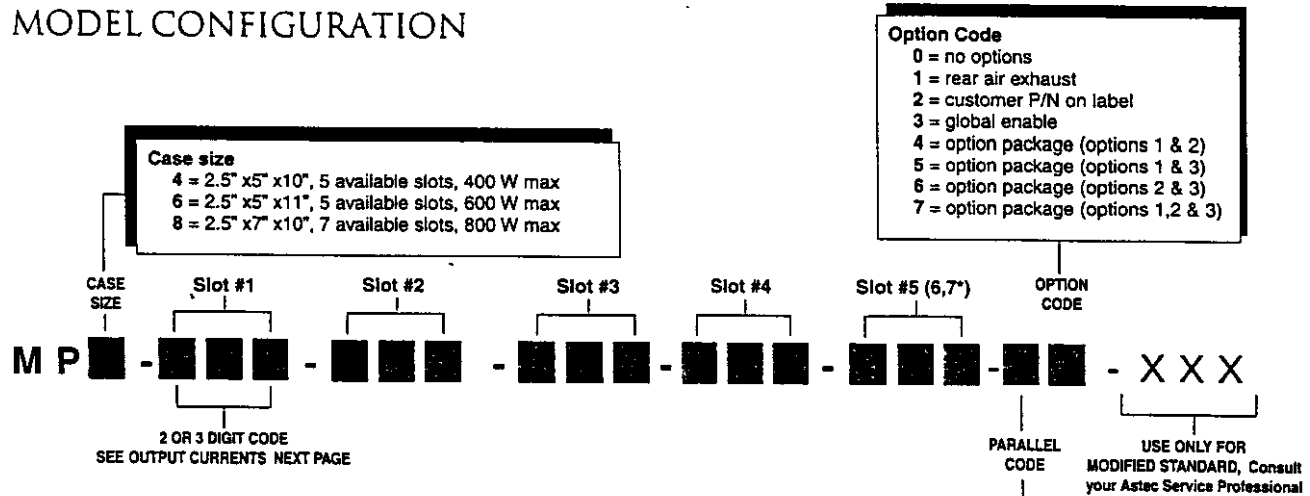
Pin No.	Function	
1 V1	+Remote Sense	single or dual o/p main
2 V1	Remote Margin / V. Program	single o/p
3 V1	Margin High	single o/p
4 V1	-Remote Sense / Margin Low	single or dual o/p main
5 V1	Spare	
6 V1	Module, Isolated Inhibit	single o/p
7 V1	Module Inhibit return	single o/p
8 V1	Current Share (SWP)	single or dual o/p main
9 V2	+ Remote Sense	dual o/p, single is spare
10 V2	- Remote Sense	dual o/p, single is spare

Ten (10) position Molex 90130-3210 housing with select gold plated contacts.

MVP SERIES

400 - 800 WATTS

MODEL CONFIGURATION



Notes:

- 1) Omit digits that do not apply.
 - 2) Specify modules from lowest number of outputs to highest. (Single/Dual/triple)
 - 3) If number of outputs are equal, specify modules from highest to lowest power increments. If power increments are equal, specify highest to lowest output current.
 - 4) Always start with SLOT 1.
 - 5) All MVP model configurations created using this selection guide are standard MVP products with standard availability and lead times.
- * Follow same modeling number convention for MP8 Slots 6&7.

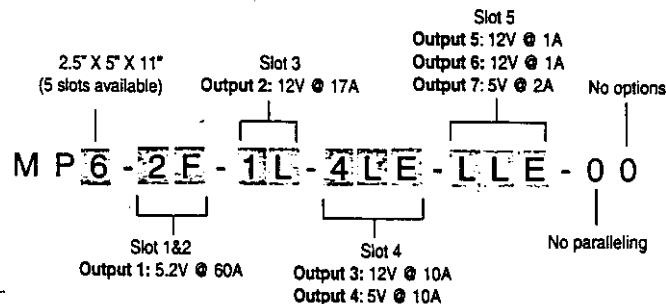
MP4 & MP6 available slots	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1		
MP8 available slots	Slot 7	Slot 6	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1

***Standard**

Parallel Codes	7	6	5	4	3	2	1
0 = no parallel	•	•	•	•	•	•	•
1 = 1 & 2	•	•	•	•	•	•	•
2 = 2 & 3	•	•	•	•	•	•	•
3 = 3 & 4	•	•	•	•	•	•	•
4 = 4 & 5	•	•	•	•	•	•	•
5 = 3 & 4 & 5	•	•	•	•	•	•	•
6 = 3 & 4 + 5 & 6	•	•	•	•	•	•	•
7 = 3 & 4 + 6 & 7	•	•	•	•	•	•	•

*For custom parallel configurations, contact your Astec Service Professional.

EXAMPLES



Examples of Model Numbers - SINGLE OUTPUTS			
Total Power	Volts/ Amps	Size	Model Number
360 W	2 / 180	2.5 x 5 x 10	MP4-3A-2A-30
400 W	5 / 80	2.5 x 5 x 10	MP4-3E-00
400 W	2 / 200	2.5 x 7 x 11	MP8-3A-2A-1A-50
600 W	2 / 275	2.5 x 7 x 11	MP8-3A-3A-1A-70
600 W	5 / 120	2.5 x 5 x 11	MP6-3E-00
600 W	48 / 12.5	2.5 x 5 x 11	MP6-3W-00
800 W	5 / 160	2.5 x 5 x 10	MP8-3E-2E-30
800 W	48 / 16.6	2.5 x 7 x 10	MP8-3W-1W-30

Examples of Model Numbers - MULTIPLE OUTPUTS								
Total Power	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Size	Model Number
400 W	5 / 60	3.3 / 35	12 / 1	12 / 1	12 / 1		2.5 x 5 x 10	MP4-2E-1D-LLL-00
400 W	24 / 15	12 / 17	5 / 30				2.5 x 5 x 10	MP4-2Q-1L-1E-00
400 W	5 / 60	12 / 17	12 / 10	5 / 10			2.5 x 5 x 10	MP4-2E-1L-4LE-00
400 W	5 / 35	12 / 10	3.3 / 10	12 / 1	12 / 1		2.5 x 5 x 10	MP4-1E-4LD-LLE-00
600 W	5 / 60	3 / 60	12 / 10	12 / 4			2.5 x 5 x 11	MP6-2E-2C-4LL-00
600 W	6 / 60	5 / 35	24 / 8.5	24 / 4	12 / 4		2.5 x 5 x 11	MP6-2H-1E-1Q-4QL-00
600 W	5 / 120	12 / 17	12 / 10	5 / 10			2.5 x 5 x 11	MP6-3E-1L-4LE-00
600 W	12 / 30	5 / 35					2.5 x 5 x 11	MP6-2L-1E-00
800 W	36 / 16.6	24 / 4	5 / 10	12 / 10	12 / 4		2.5 x 7 x 10	MP8-3U-4QE-4LL-00
800 W	5 / 120	3.3 / 35	12 / 17	12 / 10	12 / 4		2.5 x 7 x 10	MP8-3E-1D-1L-4LL-00
800 W	15 / 20	5 / 35	15 / 14	24 / 8.5	15 / 8		2.5 x 7 x 10	MP8-2N-1E-1N-1Q-4NE-00
800 W	2 / 180	5 / 60					2.5 x 7 x 10	MP8-3A-2A-2E-30

ENVIRONMENTAL

Operating temperature: -20°C to 50°C (derate each output linearly to 50% at 70°C)

Shock/Vibration: Mil-Hdbk 810E

Humidity: 95% non-condensing

Storage temperature: -40°C to +85°C

Temperature coefficient: 0.02% per °C

Cooling: Internal DC fan (Field replaceable)

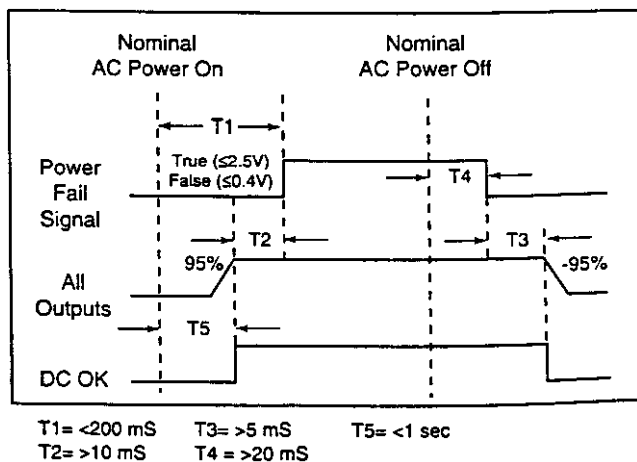
Input

Input voltage 85 to 264 VAC
 120 to 350 VDC
 Frequency 47 to 440 Hz
 Inrush current 40 A max
 Efficiency 70% - 80% @ full case
 load 115VAC
 Power factor 0.99 typical
 Turn-on time AC / 1 sec; Inhibit / 150
 ms max
 EMI filter CISPR 22, EN55022
 Curve B
 conducted/radiated
 Leakage current ... 0.3 mA max at 230 VAC
 Holdover storage ... 20 ms minimum/25 ms
 typical independent of
 VAC

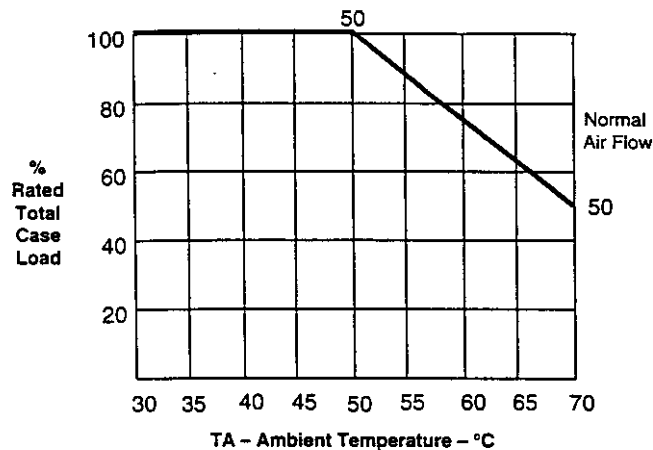
AC OK

warning time > 5ms (power fail)
 Harmonic Distortion.. Meets EN61000-3-2
 Isolation 3750 VDC Input to
 Output/Chassis
 Global Inhibit/Enable . TTL, Either Logic

Power On/Off Sequence



Power Derating Curve



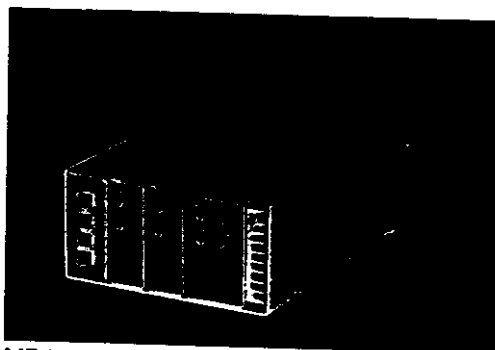
Output

Adjustment range ... $\pm 10\%$ minimum
 Margining $\pm 5\%$ nominal
 Overall reg. 0.4% or 20 mV max
 (36W modules 4% max)
 Ripple RMS: 0.1% or 10 mV
 P-P: 1.0% or 50 mV
 Bandwidth limited to 20 MHz
 Dynamic response... <2% or 100 mV with 25% load
 step. <2% or 150 mV on dual
 output module
 Recovery time To within 1% in < 300µsec
 Overvoltage
 protection 2 to 5.5 V 122% to 134% of
 output voltage; 6 to 60 V 110%
 to 120%; recycle AC to reset
 Overload
 protection Single O/P modules: 105% to
 120% of rated current
 Dual/Triple modules: Limited
 by total power
 Short circuit
 protection Protected for continuous short
 circuit, recovery automatic
 Reverse voltage
 protection 100% of rated output current
 Thermal protection .. All O/P's disabled when
 internal temp exceeds safe
 operating range. >5mSec
 warning
 Remote sense Up to 0.5 V total drop
 Single wire parallel .. Current share to within 2% of
 total rated current
 DC OK -2% to -6% of nominal of any
 monitored output
 Minimum load Not required on single output
 modules. 10% required on dual
 output modules
 Bias voltage 5VDC @ 250 mA max present
 whenever input is applied
 Module Inhibit TTL, isolated



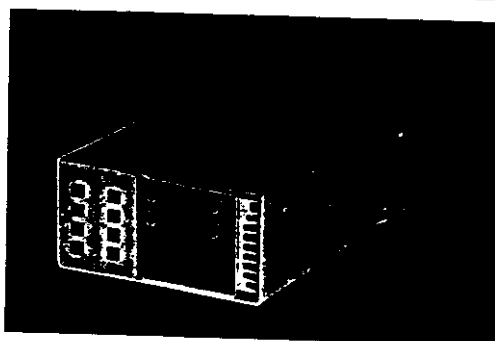
MVP SERIES

400 - 800 WATTS



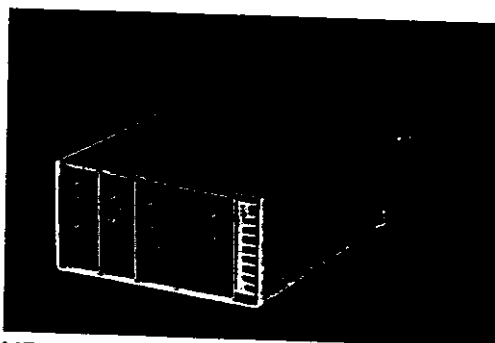
MP4 - 2Q - 1L - 1E - 00

..... 400W total



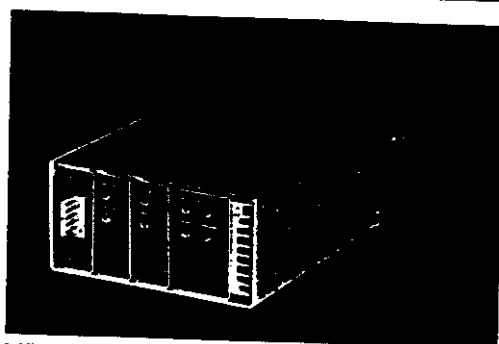
MP4 - 3Q - 00

..... 400W total



MP6 - 3E - 1L - 4LE - 00

..... 600W total



MP6 - 2N - 1E - IN - LLE - 00

..... 600W total

MVP Series

400-800 Watts • 1 to 10 Outputs

MVP is a full-featured medium power modular product with a PFC front end as a standard input. It is available in both single and multiple output versions with over one million different output combinations as standard. Offering a very compact footprint, the 400 watt package measures 2.5" x 5" x 10", the 600 watt package measures 2.5" x 5" x 11", and the 800 watt package measures 2.5" x 7" x 10".

SPECIAL FEATURES

- Power factor correction
- IEC EN61000-3-2 harmonic distortion compliance
- CISPR 22, EN55022 Curve B conducted / radiated EMI
- IEC 801 immunity standards
- European CE Mark requirements
- Current share on all outputs with ratings of 10 Amps or greater
- Remote sense on all outputs with ratings greater than 2A
- Overload protection on all outputs
- Voltage adjustment on all outputs
- Margining on all single output modules
- Input OK signal and status indicator LED
- Global DC OK signal and status indicator LED
- Global and individual module inhibits/enable
- 1 year warranty
- Forced air cooling, field replaceable fan
- Isolated 5V bias voltage

SAFETY

UL	UL1950; UL2601 (non-patient connected)
CSA	CSA22.2 No. 234 Level 5
IEC	IEC950, Class 1
VDE	EN60950
BABT	Compliance to EN 60950, BS 7002
CB	Certificate and report
CE	Mark