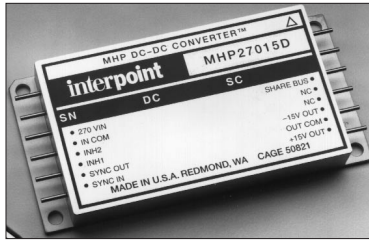


FEATURES

- -55° to $+125^{\circ}\text{C}$ operation
- 160 to 400 VDC input
- Fully isolated
- Magnetic feedback
- Fixed frequency, 600 kHz typical
- Topology –
Two Switch, Single Ended Forward
- 450 V / 50 ms transient protection
- Inhibit input side and output side
- Sync in and out
- Indefinite short circuit protection
- Remote sense on single models
- Up to 85% efficiency
- Parallelable: up to 5 converters

DC/DC CONVERTERS 270 VOLT INPUT



MHP270 SERIES 65 WATT

MODELS

VDC OUTPUT

SINGLE	DUAL
5	± 5
12	± 12
15	± 15
28	

Size (max.): 3.005 x 1.505 x 0.400 inches (76.33 x 38.23 x 10.16 mm)

See Figures 5 and 6 for dimensions.

Weight: 86 grams maximum

Screening: Standard or ES. See Table 1 for more information

DESCRIPTION

The MHP270 Series™ DC/DC converters provide up to 65 watts of output power over the full -55°C to 125°C temperature range. MHP270 models operate from a MIL-STD-704 nominal 270 volt DC power bus – from 160 to 400 VDC continuous operation with surges to 450 volts – and provide isolated outputs at 5, 12, 15, and 28 VDC. Parallel operation for all loading conditions is supported without any requirement for external components.

MHP270 DC/DC converters are constant frequency, pulse width modulated switching power supplies which use a quasi-square wave, two-switch single-ended forward converter design. Tight load regulation is achieved through a wide-bandwidth magnetic feedback circuit.

Up to five single output MHP converters may be used in parallel to power a single load by simply connecting the share pins of all units. Units in this configuration have a 85% current sharing accuracy over all loading conditions.

MHP Series of converters feature a flexible synchronization scheme in which units may be synchronized to an external clock or to one another by using sync in and sync out pins provided on each unit. MHP converters have a nominal switching frequency of 600 kHz, but may be synchronized at any frequency from 525 to 675 kHz.

MHP converters meet a wide variety of military/aerospace performance and environmental specifications. Their continuous operation input voltage (160 to 400) meets the normal operating limits of MIL-STD-704. The unit shuts down above approximately 425 volts, but it is rated to withstand a surge of up to 450 volts for 50 msec. The units are built as fully hermetic thick film hybrids in Interpoint's MIL-STD-1772 certified facilities.

The MHP270 Series offer a complete list of standard features which include:

Undervoltage lock-out – shuts down when the input line voltage falls below approximately 120 VDC to provide smooth initialization.

Continuous short circuit protection – current limit set at approximately 125%.

Soft-start – controlled start-up at turn-on, release from inhibit, and recovery from load fault conditions.

Remote sense – to provide automatic compensation for voltage drops on output lines on single output models.

MHP270 SERIES

65 WATT

DC/DC CONVERTERS

ABSOLUTE MAXIMUM RATINGS

- Input Voltage**
- 160 to 400 VDC
- Output Power**
- 50 to 65 watts depending on model
- Lead Soldering Temperature (10 sec)**
- 300°C
- Storage Temperature Range (Case)**
- -65°C to +150°C

RECOMMENDED OPERATING CONDITIONS

- Input Voltage Range**
- 160 to 400 VDC continuous
 - 450 VDC for 50 msec transient
- Case Operating Temperature (Tc)**
- -55 to +125°C full power
- Derating Output Power/Current**
- Linearly from 100% at 125°C to 0% at 135°C

SYNC AND INHIBIT (INH1, INH2)

- Sync In (525 to 675 kHz)**
- Duty cycle 40% min, 60% max
 - Logic low 0.8 V max
 - Logic high 4.5 V min
 - If not used, connect to input common
 - Referenced to input common
- Sync Out - Referenced to input common**
- Inhibit (INH1, INH2) TTL Open Collector**
- Logic low (output disabled)
 - INH1 referenced to input common
 - Logic low 0.8 V max
 - INH2 referenced to output common
 - Logic low 0.5 V max
 - Logic high (output enabled)
 - Open collector

TYPICAL CHARACTERISTICS

- Output Voltage Temperature Coefficient**
- 100 ppm/°C typical
- Isolation**
- 100 megohm minimum at 500 V
- Conversion Frequency**
- Free run mode 600 kHz typical
 - 525 kHz. min., 675 kHz max
 - External sync range: 525 to 675 kHz
- Inhibit Pin Voltage (unit enabled)**
- INH1 = 12 V typ., INH2 = 5 V typ
- Low Line Drop Out - Vout drops 50 mv**
- Input voltage 155 VDC max
- Undervoltage Lockout**
- Input voltage 110 VDC min

Electrical Characteristics: 25°C Tc, 270 VDC Vin, 100% load, free run, unless otherwise specified.

SINGLE OUTPUT MODELS		MHP27005S			MHP27012S			MHP27015S			MHP27028S			UNITS
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE		4.95	5.00	5.05	11.88	12.00	12.12	14.85	15.00	15.15	27.22	28.00	28.28	VDC
OUTPUT CURRENT	V _{IN} = 160 TO 400 VDC	0	—	10	0	—	5	0	—	4.33	0	—	2.32	A
OUTPUT POWER	V _{IN} = 160 TO 400 VDC	0	—	50	0	—	60	0	—	65	0	—	65	W
OUTPUT RIPPLE														
VOLTAGE	10 kHz - 2 MHz	—	—	50	—	—	50	—	—	75	—	—	280	mV p-p
LINE REGULATION	V _{IN} = 160 TO 400 VDC	—	—	50	—	—	120	—	—	150	—	—	280	mV
LOAD REGULATION	NO LOAD TO FULL	—	—	50	—	—	120	—	—	150	—	—	280	mV
INPUT VOLTAGE	CONTINUOUS	160	270	400	160	270	400	160	270	400	160	270	400	VDC
	TRANSIENT ¹ 50 ms	—	—	450	—	—	450	—	—	450	—	—	450	V
INPUT CURRENT	NO LOAD	—	—	20	—	—	20	—	—	20	—	—	20	mA
	INHIBITED - INH1	—	—	8	—	—	10	—	—	7	—	—	10	mA
	INHIBITED - INH2	—	—	15	—	—	15	—	—	15	—	—	15	
INPUT RIPPLE														
CURRENT	10 kHz - 10 MHz	—	—	50	—	—	50	—	—	45	—	—	50	mA p-p
EFFICIENCY		77	—	—	81	—	—	82	—	—	80	—	—	%
LOAD FAULT ²	POWER DISSIPATION SHORT CIRCUIT	—	—	19	—	—	19	—	—	9	—	—	23	W
	V _{OUT}	—	—	1.5	—	—	1.5	—	—	1.0	—	—	1.0	VDC
STEP LOAD RESP.	50% - 100% - 50%													
	TRANSIENT	—	—	300	—	—	700	—	—	700	—	—	1800	mV pk
	RECOVERY ³	—	—	300	—	—	500	—	—	300	—	—	1000	μs

Notes

- Unit will shut down above approximately 425V but will be undamaged and will restart when voltage drops into normal range.
- Indefinite short circuit protection not guaranteed above 125°C case.
- Recovery time is measured from application of the transient to point at which Vout is within 1% of final value.

Electrical Characteristics: 25°C Tc, 270 VDC Vin, 100% load, free run, unless otherwise specified.

DUAL OUTPUT MODELS		MHP27005D			MHP27012D			MHP27015D			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	+V _{OUT}	4.95	5.00	5.05	11.88	12.00	12.12	14.85	15.00	15.15	VDC
	-V _{OUT}	4.95	5.00	5.05	11.88	12.00	12.12	14.85	15.00	15.15	
OUTPUT CURRENT ¹	V _{IN} = 160 TO 400 VDC	0	±5	8.0	0	±2.5	4.0	0	±2.16	3.46	mA
OUTPUT POWER	V _{IN} = 160 TO 400 VDC	0	—	50	0	—	60	0	—	65	W
OUTPUT RIPPLE	10 kHz - 2 MHz	—	—	—	—	—	—	—	—	—	—
VOLTAGE	± V _{OUT}	—	50	100	—	50	125	—	50	125	mV p-p
LINE REGULATION	V _{IN} = 160 TO 400 VDC	—	—	—	—	—	—	—	—	—	—
	± V _{OUT}	—	—	100	—	—	120	—	—	150	mV
LOAD REGULATION ^{2, 3}	NO LOAD TO FULL	—	—	—	—	—	—	—	—	—	—
	± V _{OUT}	—	—	100	—	—	120	—	—	150	mV
CROSS REGULATION ⁴	EFFECT ON -V _{OUT}	—	—	1000	—	—	800	—	—	750	mV
INPUT VOLTAGE	CONTINUOUS	160	270	400	160	270	400	160	270	400	VDC
	TRANSIENT ⁵ 50 ms	0	—	450	0	—	450	0	—	450	V
INPUT CURRENT	NO LOAD	—	—	20	—	—	20	—	—	20	mA
	FULL LOAD	—	—	2.5	—	—	2.80	—	—	3.00	A
	INHIBITED - INH1	—	—	10	—	—	10	—	—	8	mA
	INHIBITED - INH2	—	—	15	—	—	15	—	—	15	
INPUT RIPPLE	10 kHz - 10 MHz	—	—	45	—	—	45	—	—	45	mA p-p
CURRENT	BALANCED LOAD	74	—	—	81	—	—	82	—	—	%
EFFICIENCY	POWER DISSIPATION	—	—	—	—	—	—	—	—	—	—
LOAD FAULT ⁶	SHORT CIRCUIT	—	—	8	—	—	7.5	—	—	19	W
	V _{OUT}	—	—	±2.0	—	—	±1.0	—	—	±1.5	V
STEP LOAD	50 %-100% LOAD ⁷	—	—	—	—	—	—	—	—	—	—
RESPONSE ± V _{OUT}	TRANSIENT	—	—	300	—	—	900	—	—	900	mV pk
	RECOVERY	—	—	500	—	—	500	—	—	500	µs

Notes

- Up to 80% of the total output power is available from either output.
- Connect Share pin (12) to Output Common (8) when not in use.
- Assumes balanced loads on the outputs.
- Effect on the negative output under the following conditions:
+I_{OUT} 70% to 30% of total power; -I_{OUT} 30% to 70% of total power

- Unit will shut down above approximately 425V but will be undamaged and will restart when voltage drops into normal range.
- Indefinite short circuit protection not guaranteed above 125°C case.
- Second output at 50%
- Recovery time is measured from application of the transient to point at which V_{out} is within 1% of final value.

SINGLE OUTPUT MODELS CONNECTION DIAGRAM - SENSE

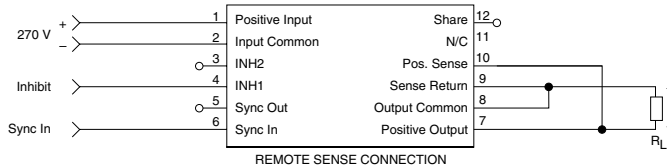
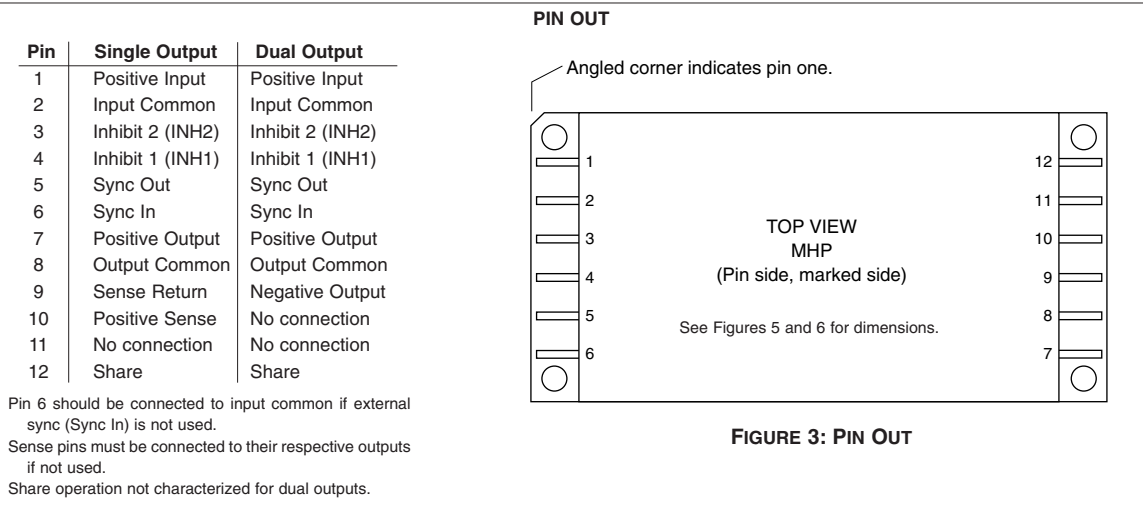
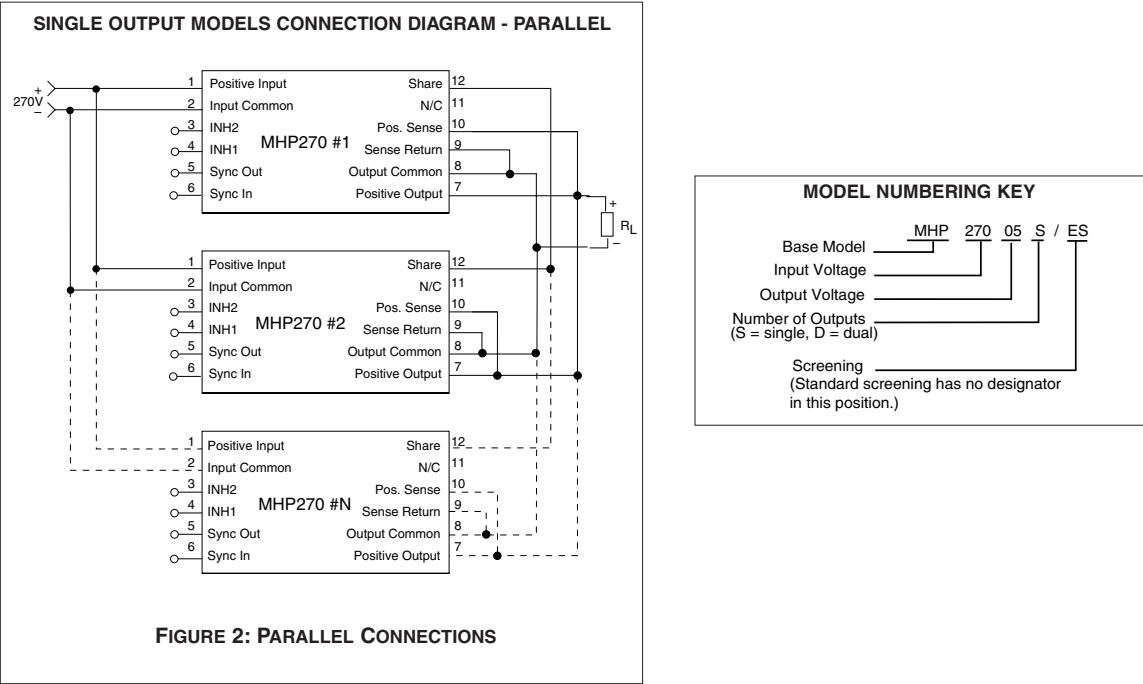


FIGURE 1: SENSE CONNECTIONS

MHP270 SERIES

65 WATT

DC/DC CONVERTERS



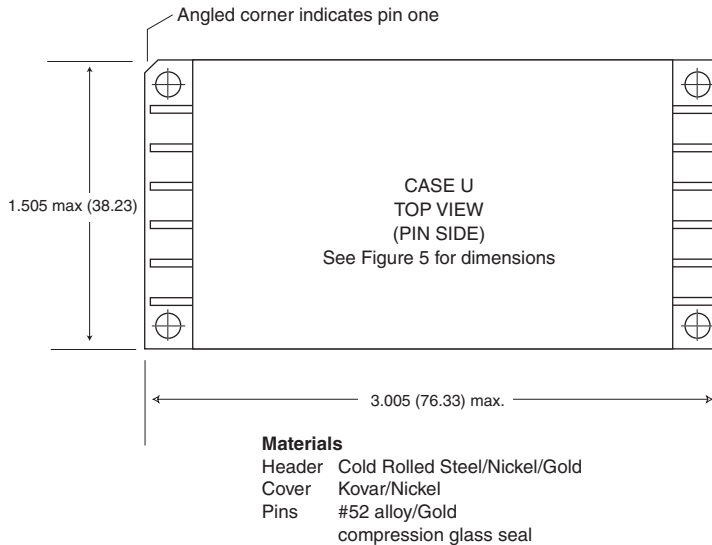


FIGURE 5: CASE U MAXIMUM DIMENSIONS

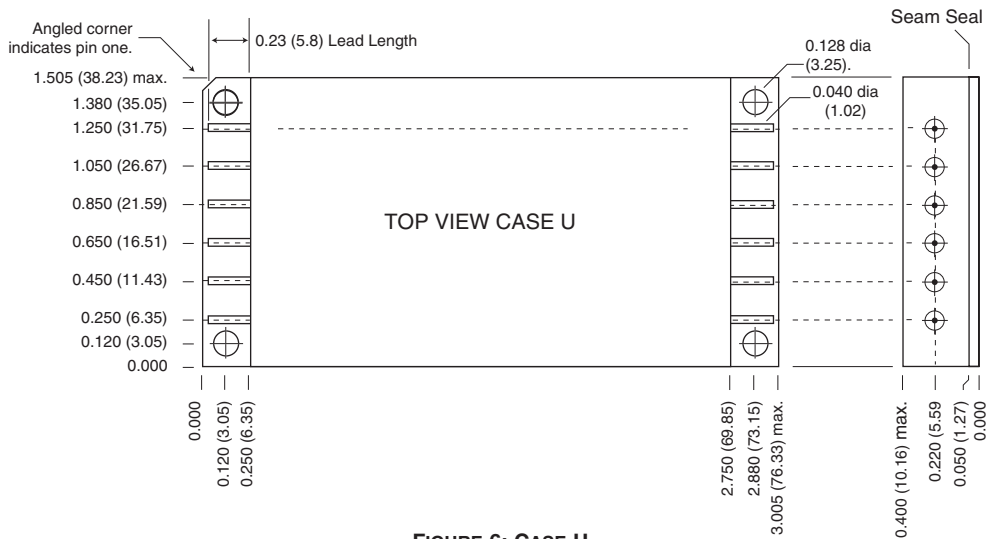


FIGURE 6: CASE U

CAUTION

Heat from reflow or wave soldering may damage the device. Solder pins individually with heat application not exceeding 300°C for 10 seconds per pin.

Case dimensions in inches (mm)

Tolerance ± 0.005 (0.13) for three decimal places, ± 0.01 (0.2) for two decimal places unless otherwise specified

Although every effort has been made to render the case drawings at actual size, variations in the printing process may cause some distortion. Please refer to the numerical dimensions for accuracy.

TABLE 1: ENVIRONMENTAL SCREENING

TEST (125°C Products)	STANDARD	/ES
PRE-CAP INSPECTION Method 2017, 2032	yes	yes
TEMPERATURE CYCLE (10 times) Method 1010, Cond. B, -55°C to 125°C	no	yes
CONSTANT ACCELERATION Method 2001, 500 g	no	yes
BURN-IN 96 hours at 125°C case (typical)	no	yes
FINAL ELECTRICAL TEST MIL-PRF-38534, Group A Subgroups 1 and 4: +25°C case	yes	yes
HERMETICITY TESTING Fine Leak, Method 1014, Cond. A	no	yes
Gross Leak, Method 1014, Cond. C	no	yes
Gross Leak, Dip (1 x 10 ⁻³)	yes	no
FINAL VISUAL INSPECTION Method 2009	yes	yes

Test methods are referenced to MIL-STD-883 as determined by MIL-PRF-38534.

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