FEATURES

- –55° to +125°C operation
- 16 to 50 VDC input
- · Fully Isolated
- 28 VOLT INPUT • Opto 高调"Mdd 1/2805DF/883"供应商
- · Fixed switching frequency 600 kHz typical,
- Topology -
 - **Dual Single Ended Flybacks**
- 80 V / 120 ms transient protection (12 Vout single and dual to 75 V, 15 Vout single and dual to 60V)
- · Inhibit and sync functions
- · Trim on single output models
- Up to 84% efficiency
- Low output noise



DC/DC CONVERTERS

MHV SERIES 15 WATT

MODELS							
V	DC OUTPU	Т					
SINGLE	DUAL	TRIPLE					
3.3	±5	+5 & ±12					
5	±12	+5 & ±15					
12	±15						
15							

Size (max.): Non flanged Single and dual output models, case H2, 2.125 x 1.125 x 0.400 inches (53.98 x 28.58 x 10.16 mm)

Triple output models, case F1, 1.950 x 1.350 x 0.405 inches (49.53 x 34.29 x 10.29 mm)

Flanged Single and dual output models, case K3, 2.910 x 1.125 x 0.400 inches (73.91 x 28.58 x 10.16 mm)

Triple output models, case J1, 2.720 x 1.350 x 0.405 inches (69.09 x 34.29 x 10.29 mm)

See Section B8, cases H2, F1, K3, and J1 for dimensions.

60 grams maximum. Weight:

Screening: Standard, ES, or 883 (Class H). See Section C2 for

screening options, see Section A5 for ordering information.

DESCRIPTION

Interpoint's MHV Series™ of DC/DC converters offer a wide input voltage range of 16 to 50 VDC and a choice of nine different output voltage configurations comprised of single, dual or triple outputs. The converters will withstand transients of up to 80 V for up to 120 milliseconds while maintaining output voltages (with the exception of the 12 volt single and dual outputs which will withstand transients up to 75 volts and the 15 volt single and dual outputs which will withstand up to 60 volts). The MHV Series operates at a full 15 watts of output power (10 watts for the 3.3 volt single output) over the military temperature range of -55°C to +125°C while maintaining low input and output noise.

CONVERTER DESIGN

MHV Series DC/DC converters are switching regulators that use continuous flyback conversion topology with a clock frequency of approximately 600 kHz. MHV Series converters incorporate two internal converters with one converter phase shifted 180° from the other to create a dual phase/phase-shifted operation. Each of the internal converters operates at approximately one-half of the clock frequency. This proprietary technology eliminates cross regulation, minimizes input ripple, greatly reduces output ripple and improves efficiency. On the triple output models, this design provides completely independent regulation with no cross regulation effect between the main and auxiliary outputs and no minimum loading required on the main output.

INHIBIT FUNCTION

Open collector TTL levels control the inhibit circuit. The converter is enabled when the inhibit terminal is left unconnected or when the inhibit terminal is connected to a voltage between 11.5 and 50 V.

When a low (0.8 V) is applied to the inhibit terminal the converter shuts down, typically drawing 8.4 mA of input current. Inhibit terminal resistance is 3.3 k ohms and draws 8.4 mA, typical.

SYNCHRONIZATION FUNCTION

Applying an external signal of 40% to 60% duty cycle and 500 to 700 kHz will synchronize the converter to your system requirements. Free run clock frequency is approximately 600 kHz. If not used, the sync terminal must be left unconnected.

TRIM

Single output converters feature a trim range of as low as 80% to as high as 110% of Vout nominal, depending on the model. To trim up. connect a resistor from output common (pin 4) to the trim terminal (pin 3). To trim down, connect a resistor from the positive output (pin 5) to the trim terminal (pin 3). See Figure 4 and trim tables for more information.

UNDERVOLTAGE LOCKOUT

An undervoltage lockout of approximately 7 VDC keeps system current levels low during startup.

SHORT CIRCUIT PROTECTION

Under short circuit conditions of 130% or more of full load current. the converter will protect itself by shutting down. Short circuit duration should be brief because power dissipation may cause internal temperatures to rise rapidly. Restart is automatic upon removal of the short circuit.



MHV SERIES 15 WATT

DC/DC CONVERTERS

全部的で例外が必805でアッタ83"供应商 SYNC AND Input Voltage Sync In (500 to 700 kHz)

16 to 50 VDC

Output Power

- 15 watts (10 watts MHV283R3S)
- Lead Soldering Temperature (10 sec per lead)

Storage Temperature Range (Case)

• -65°C to +150°C

RECOMMENDED OPERATING CONDITIONS Input Voltage Range

- 16 to 50 VDC continuous
- Transient: see Electrical Characteristics tables

Case Operating Temperature (Tc)

- -55°C to +125°C full power
- -55°C to +130°C absolute
- **Derating Output Power/Current**

. Linearly from 100% at 125°C to 0% at 130°C

SYNC AND INHIBIT

- Duty cycle 40% min, 60% max
- Logic low 0.8 V max
- Logic high 4.5 V min, 10 V max
- · Referenced to input common
- · If not used, leave unconnected
- Inhibit TTL Open Collector · Logic low (output disabled)
 - Logic low voltage ≤0.8 V Inhibit pin current
 - 8.4 mA typical, 10 mA maximum
 - · Referenced to input common
 - · Logic high (output enabled) Open collector

Unconnected or 11.5 to 50 V

TYPICAL CHARACTERISTICS

Output Voltage Temperature Coefficient

• 100 ppm/°C typical

Undervoltage Lockout

· 7 V input typical Current Limit

- 130% of full load typical at 25°C Isolation
- 100 megohm minimum at 500 V

Audio Rejection

30 dB typical

Conversion (Switching) Frequency

- Free run mode 300 kHz
- typical 245 kHz. min, 355 kHz. max

Clock Frequency

• External sync range 500 to 700 kHz.

Inhibit Pin Voltage (unit enabled)

· 11 V typical

Electrical Characteristics: 25°C Tc, 28 VDC Vin, 100% load, free run, unless otherwise specified.

SINGLE OUTPUT MODELS		MHV283R3S		MHV2805S		MHV2812S			MHV2815S					
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	UNITS
OUTPUT VOLTAGE		3.27	3.30	3.33	4.95	5.00	5.05	11.88	12.00	12.12	14.85	15.00	15.15	VDC
OUTPUT CURRENT	V _{IN} = 16 to 50 VDC	0	_	3.03	0	_	3.0	0	_	1.25	0	_	1.0	Α
OUTPUT POWER	V _{IN} = 16 to 50 VDC	0	_	10	0	_	15	0	_	15	0	_	15	W
OUTPUT RIPPLE	10 kHz - 2 MHz													
VOLTAGE	Tc = -55°C to +125°C	_	5	60	_	10	60	_	7	60	_	5	60	mV p-p
LINE REGULATION	V _{IN} = 16 to 50 VDC	_	0	20	-	0	20	_	0	20	-	0	20	mV
LOAD REGULATION	NO LOAD TO FULL	_	15	45	 -	15	40	_	5	35	<u> </u>	5	40	mV
INPUT VOLTAGE	CONTINUOUS	16	28	50	16	28	50	16	28	50	16	28	50	VDC
NO LOAD TO FULL	TRANSIENT 120 ms	_	_	80	-	_	80	_	_	75	—	_	60	V
INPUT CURRENT	NO LOAD	_	23	45	T-	29	52	T	26	51	T-	28	57	mA
	FULL LOAD	_	489	518	_	687	724	T —	638	678	—	638	687	mA
	INHIBITED	_	8.4	10	-	8.4	10	_	8.4	10	-	8.4	10	mA
INPUT RIPPLE	10 kHz - 20 MHz													
CURRENT ¹	Tc = -55°C to +125°C	_	10	50	-	10	50	_	10	50	-	10	50	mA pp
EFFICIENCY		69	73	_	74	78	_	79	84	_	78	84	_	%
LOAD FAULT ²	POWER DISSIPATION													
	SHORT CIRCUIT ²	_	_	9.5	-	_	11	_	_	11	-	_	10.5	W
	RECOVERY	_	_	20	-	_	20	_	_	20	—	_	20	ms
	OUTPUT CURRENT													
	TRIP POINT	3.97	_	_	3.93	_	_	1.64	_	_	1.31	_	_	Α
STEP LOAD	50% - 100% - 50%													
RESPONSE ³	TRANSIENT	_	_	250	-	_	300	-	_	300	-	_	350	mV pk
	RECOVERY	_	_	700	-	_	1500	_	_	900	_	_	700	μs
START-UP	DELAY	_	5	20	-	5	20	_	5	20	_	5	20	ms
0 TO 28 V _{IN}	OVERSHOOT	_	50	100	-	0	50	-	0	120	-	0	150	mV pk

Notes

- 1. Lin = $5.5 \mu H$.
- 2. Load fault is a short circuit (<50 mΩ). Recovery is into a resistive load.
- 3. Load step transition \geq 10 $\mu s.$ Recovery = time to settle to within 1% of Vout final value.
- 4. Input step transition ≥ 10 μs. Recovery = time to settle to within 1% of Vout final value.



DC/DC CONVERTERS

MHV SERIES 15 WATT

DUAL OUTPUT MODELS		MHV2805D			MHV2812D						
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	UNITS
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	VDC
OUTPUT CURRENT	V _{IN} = 16 TO 50 VDC	_	_	±1.50	_	_	±0.625	_	_	±0.500	Α
OUTPUT POWER ¹	V _{IN} = 16 TO 50 VDC	_	±7.5	15	_	±7.5	15	_	±7.5	15	W
OUTPUT RIPPLE	10 kHz- 2 MHz										
VOLTAGE	Tc = -55°C to +125°C										
	+V _{OUT} / -V _{OUT}	_	15	120	_	10	60	_	20	80	mVp-p
LINE REGULATION	V _{IN} = 16 TO 50 VDC ±V _{OUT}	_	0	20	_	0	20	_	0	20	mV
LOAD REGULATION	NO LOAD TO FULL ±V _{OUT}	_	5	40	_	5	40	_	5	40	mV
INPUT VOLTAGE	CONTINUOUS	16	28	50	16	28	50	16	28	50	VDC
NO LOAD TO FULL	TRANSIENT 120 msec	_	_	80	_	_	75	_	_	60	V
INPUT CURRENT	NO LOAD	_	18	25	_	30	40	_	35	45	
	FULL LOAD	_	670	705	_	634	670	_	635	670	mA
	INHIBITED	_	8.4	10	_	8.4	10	_	8.4	10	
INPUT RIPPLE	10 kHz - 20 MHz										
CURRENT ²	Tc = -55°C to +125°C	_	10	200	_	10	200	_	10	200	mA p-p
EFFICIENCY		76	80	_	80	85	_	80	84	_	%
LOAD FAULT ³	POWER DISSIPATION										
	SHORT CIRCUIT	_	_	9	_	_	10	_	_	10	W
	RECOVERY	_		15	_	_	25	_	_	25	ms
	OUTPUT CURRENT										
	TRIP POINT	1.97	_	_	0.819	_	_	0.655	_	_	Α
STEP LOAD	50% - 100% 50%										
RESPONSE ⁴ ± V _{OUT}	TRANSIENT			200	_		300	_		400	mV pk
	RECOVERY			500	_		700	_		900	μs
START-UP	DELAY		5	12		10	18		12	20	ms
0 TO 28 V _{IN}	OVERSHOOT	_	0	50	_	0	120	_	0	150	mV pk

Notes

- 1. Up to 7.5 watts is available from either output.
- 2. Lin = 2 μH.
- 3. Load fault is a short circuit (<50 m Ω). Recovery is into a resistive load.
- 4. Load step transition \geq 10 $\mu s.$ Recovery = time to settle to within 1% of Vout final value.
- 5. Input step transition \geq 10 μ s. Recovery = time to settle to within 1% of Vout final value.



MHV SERIES 15 WATT

DC/DC CONVERTERS

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TRIPLE OUTPUT MODELS			IHV28512	2T	IV				
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	UNITS	
OUTPUT VOLTAGE	MAIN	4.95	5.0	5.05	4.95	5.0	5.05		
	+ AUXILIARY	11.88	12.0	12.12	14.85	15.0	15.15	VDC	
	– AUXILIARY	11.82	12.0	12.18	14.77	15.0	15.23		
OUTPUT CURRENT ¹	MAIN	0	_	2.0	0	_	2.0		
V _{IN} = 16 TO 50	+ AUXILIARY	_	_	0.333	_	_	0.267	_	
	– AUXILIARY	_	_	0.333	_	_	0.267	A	
	TOTAL	_	_	2.416	_	_	2.333		
OUTPUT POWER ²	MAIN	_	_	10	_	_	10		
V _{IN} = 16 TO 50	+ AUXILIARY	_	_	4	_	_	4	w	
	– AUXILIARY	_	_	4	_	_	4		
	TOTAL	_	_	15	_	_	15		
OUTPUT RIPPLE	10 kHz to 2 MHz MAIN	_	5	30	_	10	35	.,	
VOLTAGE	10 kHz to 2 MHz ± AUXILIARY	_	5	30	_	10	35	mV p-p	
LINE REGULATION	MAIN	_	0	20	_	0	20		
V _{IN} = MIN. TO MAX.	+AUXILIARY	_	1	35	_	5	35	mV	
	– AUXILIARY	_	1	35	_	5	35	1	
LOAD REGULATION	MAIN	_	10	25	_	10	25		
	+AUXILIARY	_	10	45	_	15	55	mV	
	– AUXILIARY	_	10	65	_	15	80		
CROSS REGULATION ³	CONDITION A	_	300	500	_	300	500		
– AUXILIARY	CONDITION B	_	400	700	_	400	700	mV	
INPUT VOLTAGE	CONTINUOUS	16	28	50	16	28	50		
	TRANSIENT 120 ms	_	_	80	_	_	80	VDC	
INPUT CURRENT	NO LOAD	_	23	32	_	28	37		
	FULL LOAD	_	670	705	_	670	705	mA	
	INHIBITED	_	8.4	10	_	8.4	10	-	
INPUT RIPPLE CURRENT	10 kHz to 10 MHz	_	10	40	_	15	40	mA p-p	
EFFICIENCY		76	80	_	76	80	_	%	
LOAD FAULT ⁴	SHORT CIRCUIT								
	POWER DISSIPATION								
	MAIN	_	_	9	_	_	9		
	± AUXILIARY	_		8	_		8	W	
STEP LOAD RESPONSE ^{5, 6}	TRANSIENT								
OTEL LOAD TIEGI GIVOL	MAIN			250	_	_	250		
	± AUXILIARY	_		500	_		500	mV	
	RECOVERY								
	MAIN			2.5			2.5	ms	
START-UP ⁶ 0 TO 28 V _{IN}	± AUXILIARY			4		_	3.5	1113	

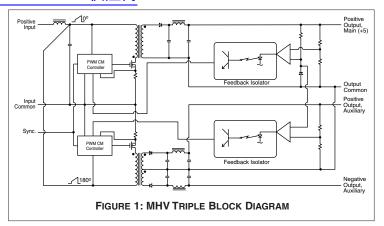
Notes

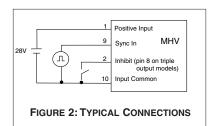
- The sum of the 12 volt auxiliary output currents may not exceed 416 mA.
 The sum of the 15 volt auxiliary output currents may not exceed 333 mA.
- 2. The sum of the auxiliary output power may not exceed 5 watts.
- Cross regulation occurs between the two auxiliaries and is measured on –aux.
 is held constant at 2.0 A. Cross regulation is specified for two conditions:
 Positive aux. = 2.5 W; negative aux. = 2.5 W to 0.5 W.
 - B. Negative aux. = 4 W to 1 W; positive aux. = 1 W to 4 W, simultaneous.
- 4. Load fault is a short circuit (<50 m Ω). Recovery is into a resistive load.
- Load step transition ≥ 10 µs. Recovery = time to settle to within 1% of Vout final value.
- 6. Input step transition \geq 10 μ s. Recovery = time to settle to within 1% of Vout final value.
- 7. Lin = $5.5 \mu H$.

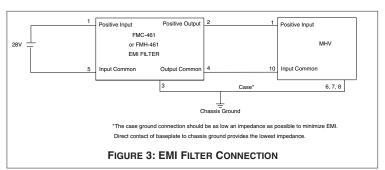


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DIAGRAMS







TRIM - SINGLE OUTPUT MODELS ONLY

Calculated Trim

Trim down:
$$R_T(k\Omega) = \left(\frac{(V_0 - 2.5)}{V_{o nominal} - V_0}\right) A - B$$

Trim up:
$$R_T(k\Omega) = \left(\frac{2.5A}{V_o - V_o \text{ nominal}}\right) - B$$

 V_0 = desired output voltage

Formula Values by Model

-				
	3.3V	5V	12V	15V
Α	3.7	3.7	14	18.2
В	10	10	30	30

Notes

If calculated result is a negative value, the desired output voltage is outside the allowed trim range. Calculated values of R_T are $\pm 15\%$.

When trimming up, do not exceed the maximum output power.

When trimming down, do not exceed the maximum output current.

Quick Reference Trim Table

MODEL	% V _{OUT} NOMINAL								
WODEL	110	106	102	95	90	80			
	R _{TRIM (} (R _T) k ohms								
MHV283R3S	18	36	128	4	n/a	n/a			
MHV2805S	8	20	81	23	5	n/a			
MHV2812S	n/a	19	116	177	67	11			
MHV2815S	0.3	21	122	255	104	28			

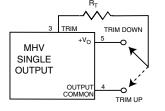


FIGURE 4: MHV SINGLE OUTPUT TRIM



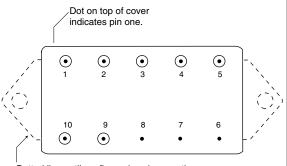
MHV SERIES 15 WATT

DC/DC CONVERTERS

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Pin	Single Output	Dual Output	Triple Output						
1	Positive Input	Positive Input	Positive Input						
2	Inhibit	Inhibit	Main (+5) Output						
3	Trim	Positive Output	Output Common						
4	Output Common	Output Common	Neg. Aux. Output						
5	Positive Output	Negative Output	Pos. Aux. Output						
6,7	Case Ground	Case Ground	Case Ground						
8	Case Ground	Case Ground	Inhibit						
9	Sync In	Sync In	Sync In						
10	Input Common	Input Common	Input Common						

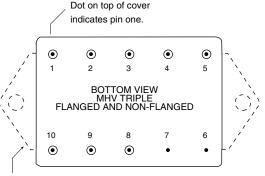
Leave sync pin (pin 9) unconnected if not used.



Dotted line outlines flanged package option.

See Section B8, cases H2 and K3 for dimensions.

FIGURE 5: PIN OUT SINGLES AND DUALS

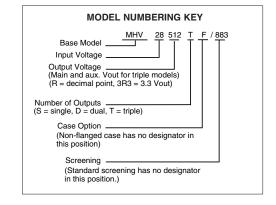


Dotted line outlines flanged package option.

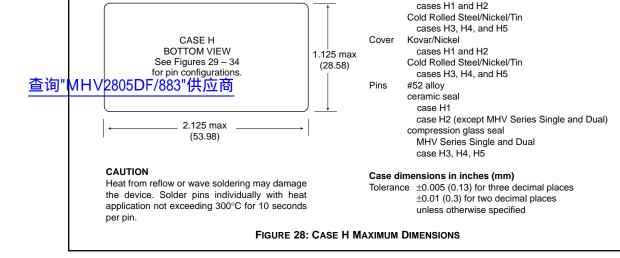
See Section B8, cases F1, J1, and J2 for dimensions.

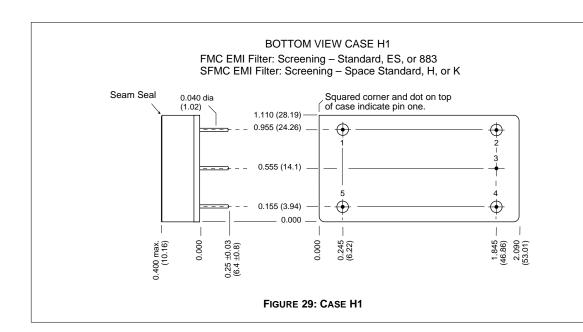
FIGURE 6: PIN OUT TRIPLE

Flanged SMD numbers for the MHV Series of converters have the suffix HZC instead of HXC. For exact specifications for an SMD product, refer to the SMD drawing. Call your Interpoint representative for status on MHV SMD releases. See Section A3, SMDs, for more information.









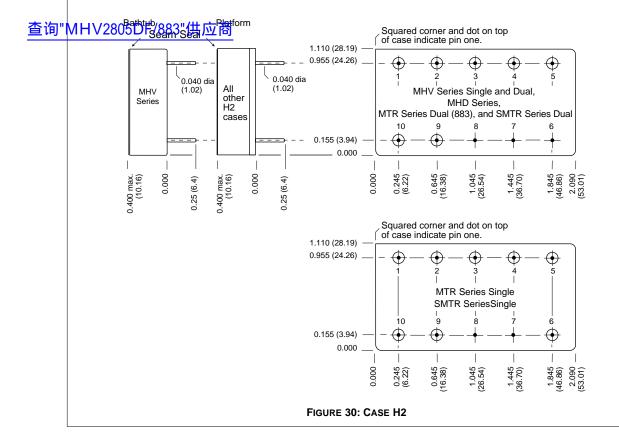
Note: Although every effort has been made to render the case drawings at actual size, variations in the printing process may cause some distortion. Please to the numerical dimensions for accuracy.



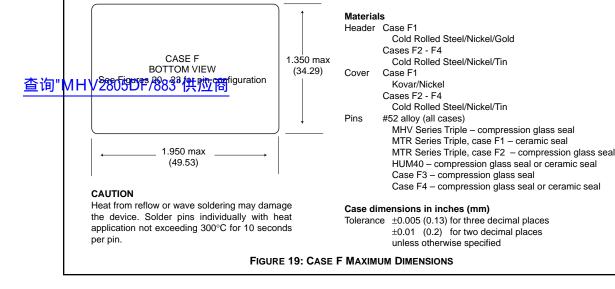
WIR Selies Single, MAY Selies Single and Dual, and MAD Selies. Screening - Standard, ES, or 883

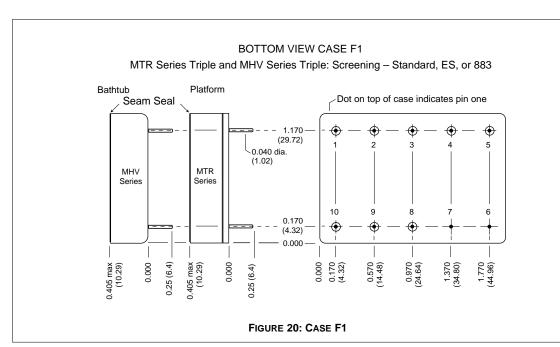
MTR Series Dual: Screening - 883

SMTR Series Single and Dual: Screening - Space Standard, H, or K









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



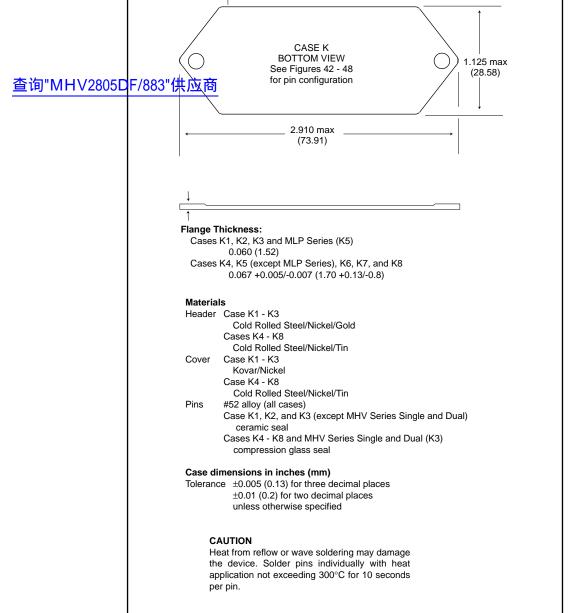


FIGURE 41: CASE K MAXIMUM DIMENSIONS

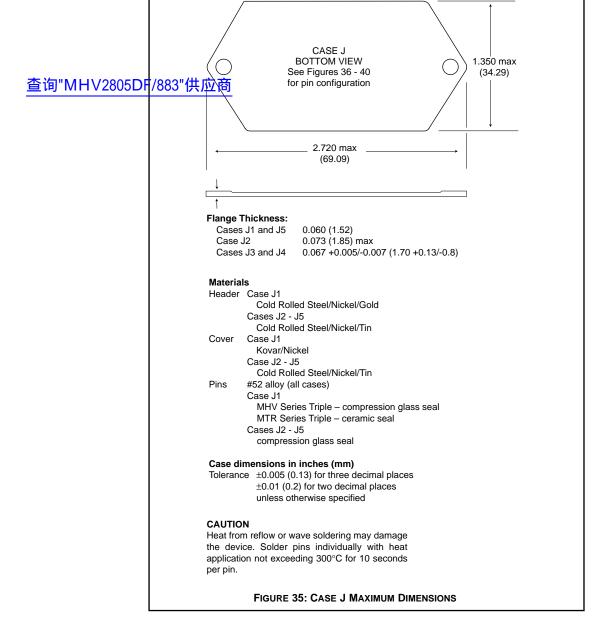


Screening – Standard, ES, or 883 MTR Series Dual: Screening – 883 SMTR Series: Screening - Space Standard, H, or K Platform Dot on top of case indicates pin one 查询"MHV2805DF/883"供应商1.110 (28.19) 0.040 dia (1.02)MHD Series, 0.555 (14.1) MTR Series Dual (883), and SMTR Series Dual 10 9 6 0.155 (3.94) 0.000 0.400 max. (10.16) (5.84) 0.245 (6.22) 0.645 (16.38) 1.445 (36.70) 0.000 1.045 (26.54) 1.845 (46.86) 2.320 (58.93) 0.25 ± 0.03 (6.4 ± 0.8) 0.000 Platform Dot on top of case indicates pin one Seam Seal 1.110 (28.19) - 0.955 (24.26) 0.040 dia (1.02)MTR Series Single and 0.555 (14.1) -SMTR Series Single 10 9 \bigoplus \oplus 0.155 (3.94) 0.000 0.230 (5.84) 0.245 (6.22) 0.645 (16.38) 1.045 (26.54) 1.845 (46.86) 0.400 max. (10.16) 0.25 ± 0.03 (6.4 ± 0.8) 0.000 Bathtub Dot on top of case indicates pin one Seam Seal 1.110 (28.19) 0.955 (24.26) 0.040 dia (1.02)0.555 (14.1) -MHV Series Single and Dual 10 \bigoplus 0.155 (3.94) 0.000 0.400 max. (10.16) 0.230 (5.84) 0.000 0.245 (6.22) 0.645 1.845 (46.86) 0.000 0.25 ± 0.03 (6.4 ±0.8) FIGURE 44: CASE K3

Flanged cases: Designator required in Case Option position of model number.

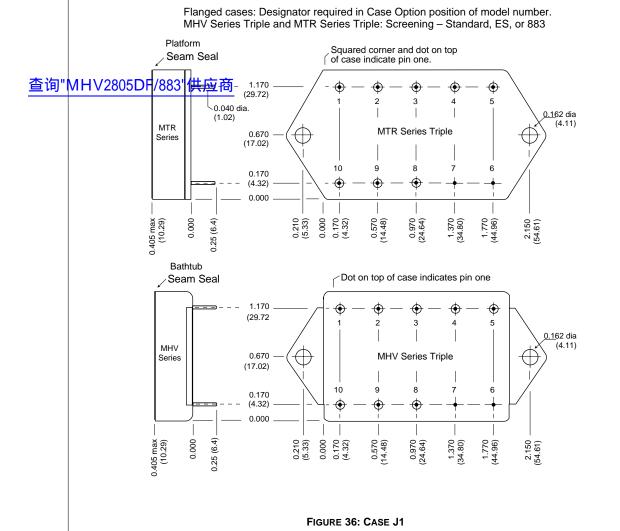
MTR Series Single, MHV Series Single and Dual, MHD Series:





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







		/883 (Class H) ³
yes	yes	yes
,		1
<u> </u>		'
no	no	yes
no	yes	no
no	no	yes
no	yes	no
<u>'</u>		!
no	no	yes
no	yes	no
		!
no	no	yes
yes	yes	no
no	VOC	VAS
	'	yes
	'	yes
yes	TIO	no
yes	yes	yes
	no no no no no yes	no no yes no yes yes no yes yes no yes yes no yes no yes yes

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

Applies to the following products

MGH Series **MOR Series** FMGA EMI Filter MHD Series MFLHP Series MCH Series MHV Series FMSA EMI Filter FM-704A EMI Filter MHF+ Series **HUM Modules**** MFL Series MHP Series MHF Series** FMD**/FME EMI Filter LCM Modules** MTR Series MGA Series FMC EMI Filter LIM Modules MQO Series** **MSA Series FMH EMI Filter**

**MFLHP Series, MQO Series, MHF Series, FMD EMI Filters, Hum Modules, and LCM Modules do not o '883" screening.





^{*883} products are built with element evaluated components and are 100% tested and guaranteed ov the full military temperature range of –55°C to +125°C.