

DSF100, DSF200 DSF500 & FSO461



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T H E **X P** E R T S I N P O W E R

DSF100



- Active Surge Protection to MIL-STD-1275A/B/C & D
- MIL-STD-461E/F
- Reverse Polarity Protection
- 97% Efficiency
- -40 °C to +100 °C Operating Temperature
- MIL-STD 810F Shock & Vibration
- Comprehensive Control Functions

Introduction

DSF100 is a transient filter with up to 3.7 A or 100W of output power. It enables industrial grade DC-DC converters to be used in military vetronic electrical environments.

The filter enables industrial parts to be brought in compliance with susceptibility standards MIL-STD-461E, DEF-STAN 59-41, MIL-STD 1275A/B/C/D and DEF-STAN 61-5 Pt 6 issue 5.

The DSF100 is a compact 39.9 mm x 31.9 mm x 13 mm. It is encapsulated with thermally conductive compound and is packaged in a photo-etched nickel-silver case with an ROHS compliant conductive chromate finish aluminium base plate.



T H E X P E R T S I N P O W E R

Models & Ratings

Output Power	Input Voltage	Output		Typical Efficiency	Model Number
		Voltage	Max Current		
100 W	10-33 VDC	<36 VDC	3.7 A	98%	DSF100

Note:

1. For models without OTP add suffix -H to the model number, e.g. DSF100-H

Input Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	10	28	33	VDC	
Fusing					None fitted. External slow blow fuse or MCB recommended
Reverse Voltage Protection					Continuous protection with auto recovery

Output Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage			36	VDC	Tracks input voltage $V_{out} = V_{in} - (0.07\Omega \times I_{out})$ up to 36 V max
Output Current			3.7	A	
Output Power			100	W	
Overload Detection	4		7	A	See signals
Overtemperature Protection	100			°C	Auto reset typically 5 °C hysteresis, option without this fitted add suffix -H

General Specifications

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	95	97	98	%	
Isolation Voltage			500	VDC	Input and output to case
Series Resistance		0.07		Ω	10-33 VDC input
MTBF		2496		kHrs	MIL-STD 217F 40 °C GB
Packaging Style	Photo-etched nickel-silver case with RoHS compliant conductive chromate finish and aluminium baseplate				
Weight		0.11 (50)		lbs (g)	

Signals

Signals	Notes & Condition
Disable	Disables the output when short circuit to input/output zero volts or driven to <1V. Signal can exhibit voltages upto 40 V and is able to source 5 mA.
Inhibit	Open collector transistor referenced to input/output zero volts rated to 70 V and is able to sink 5 mA. The purpose of this pin is to inhibit the downstream DC-DC converter in the event of an overload condition. When the output current is higher than 4 A (see table) the pin is logic low. If the output current is lower, the pin is logic high.

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+100	°C	Baseplate temperature
Storage Temperature	-55		+100	°C	Ambient temperature
Salt Atmosphere			48	hrs	MIL-STD-810F. method 509.4
Shock			15	G	25 ms shock MIL-STD-810D
			40	G	3 axes MIL-STD-810F 516.5-1
Vibration			0.5	mm	5 Hz to 33 Hz, MIL-STD-167
	Minimum Integrity Test for Military equipment 1 hour/axes in 3 axes MIL-STD-810F method 514.5C-17				

Electromagnetic Compatibility & Immunity

Standard	Test Level	Criteria	Notes & Conditions
MIL-STD-461E	CE102		With external components. See Apps Note.
MIL-STD-1275A/B/C & D	Spikes Surges Ripple	± 250 V for 100 μ s 100 V for 50 ms at 0.5 m Ω 14 VAC pk-pk	
DEF-STAN 61-5	Pt 6, issue 5		
MIL-STD-704A	600 V input transient	Applied for 10 μ s 50 Ω source impedance	

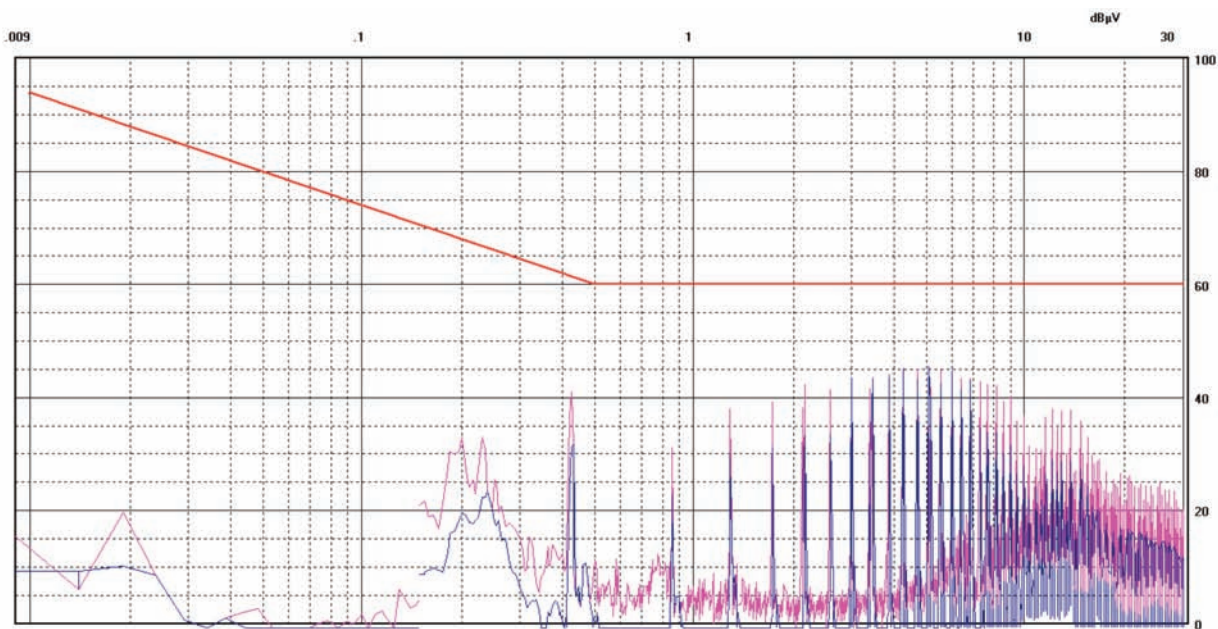
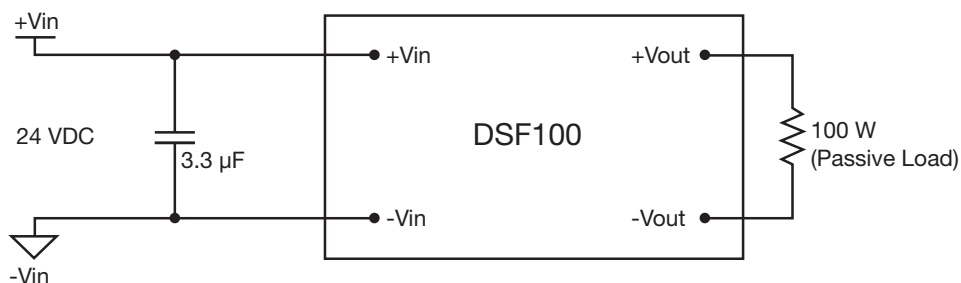
Safety Approvals

Standard	Category
CE Marked	Low Voltage Directive

Application Notes

MIL-STD-461E CE102.

DSF100



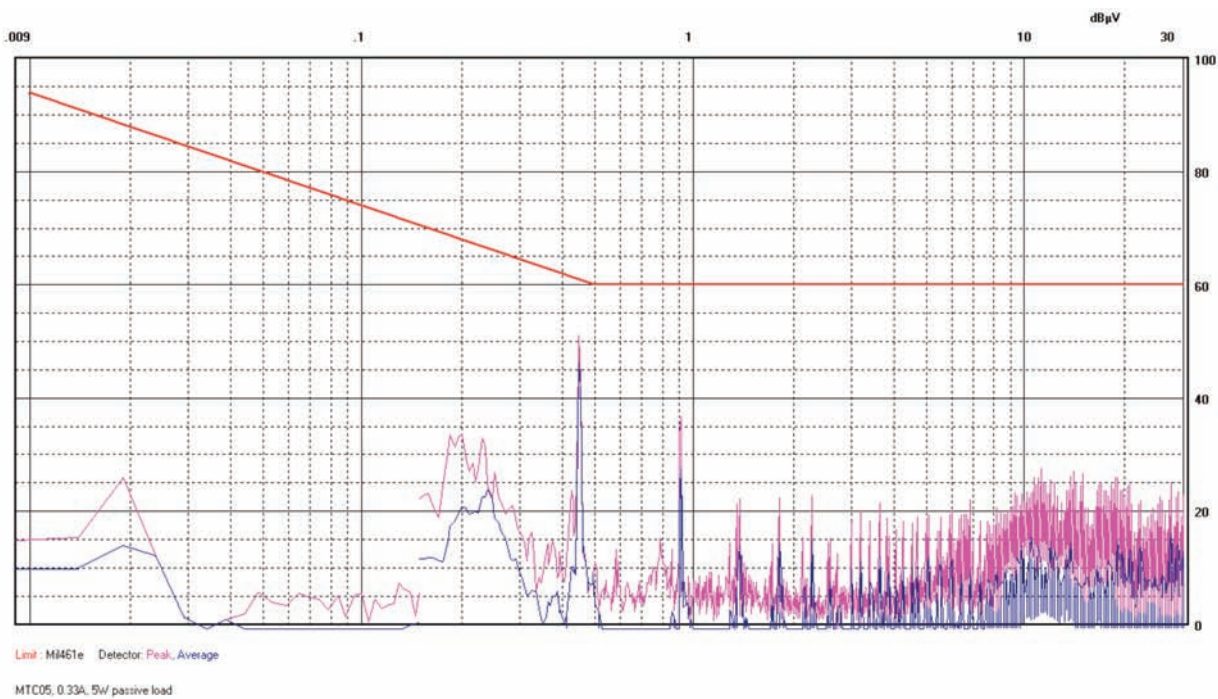
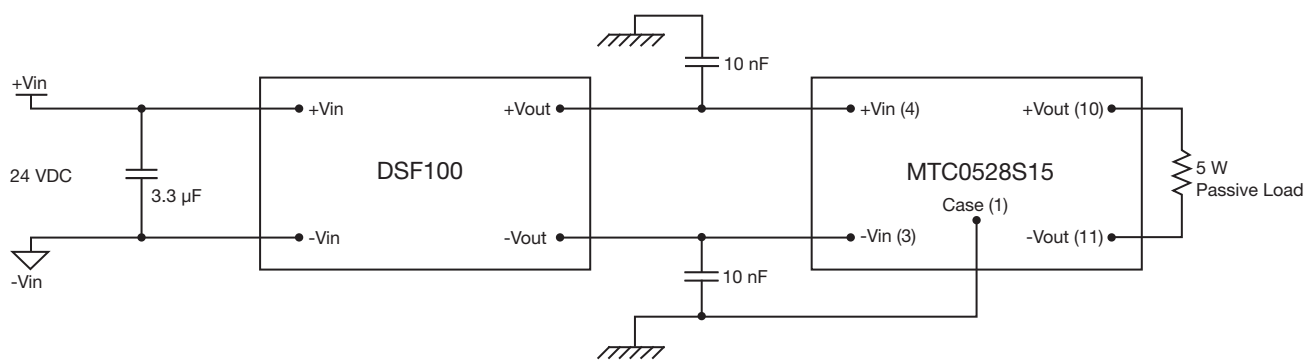
Limit: M461e Detector: Peak, Average

DSF100, 4.16A, 100W with external capacitor 3.3uF passive load

Application Notes cont'd.

MIL-STD-461E CE102

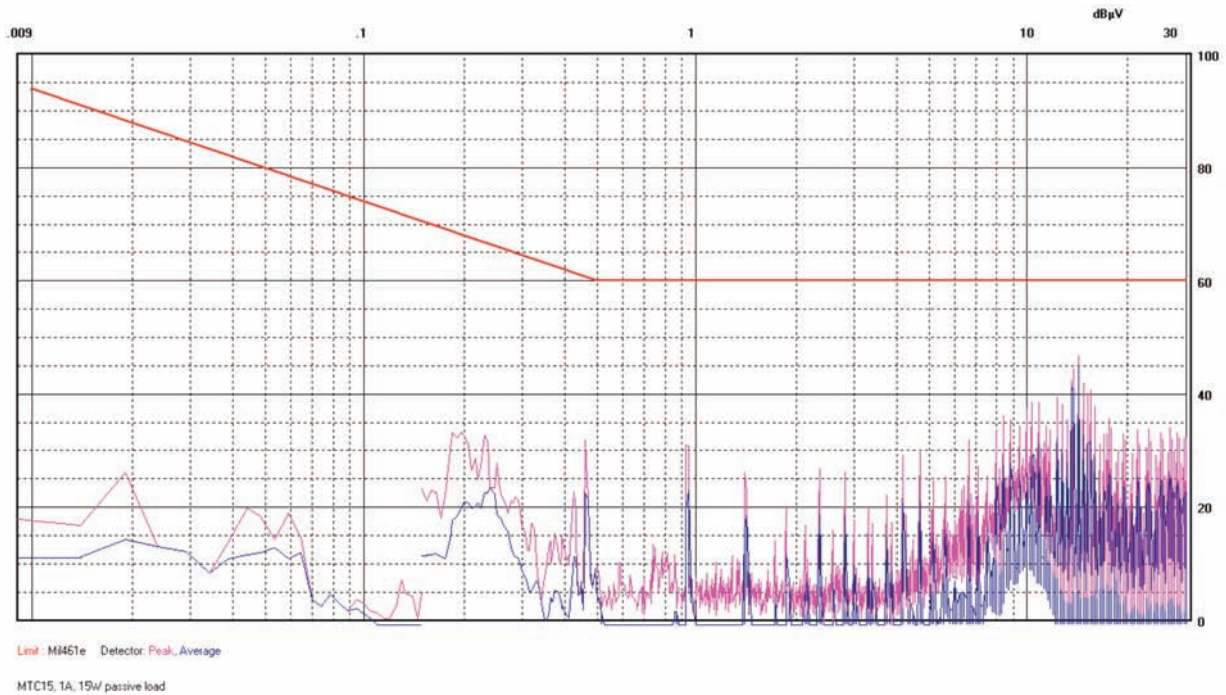
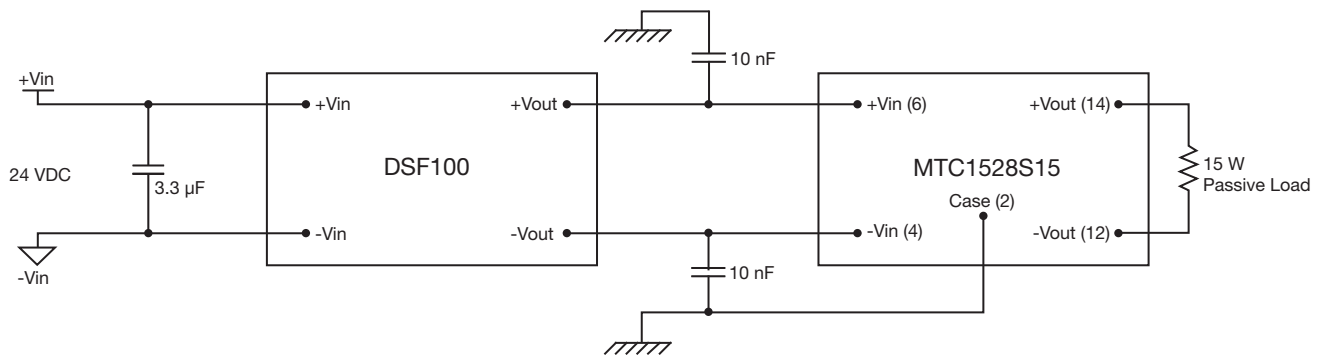
DSF100 & MTC0528S15



Application Notes cont'd.

MIL-STD-461E CE102

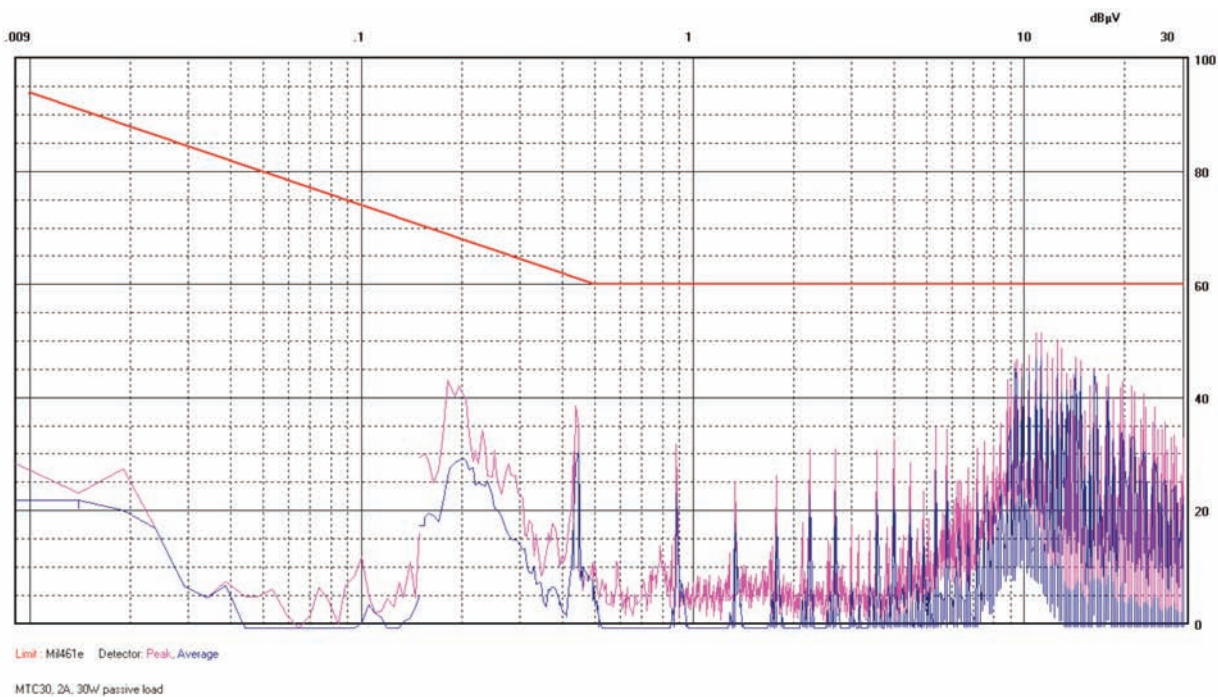
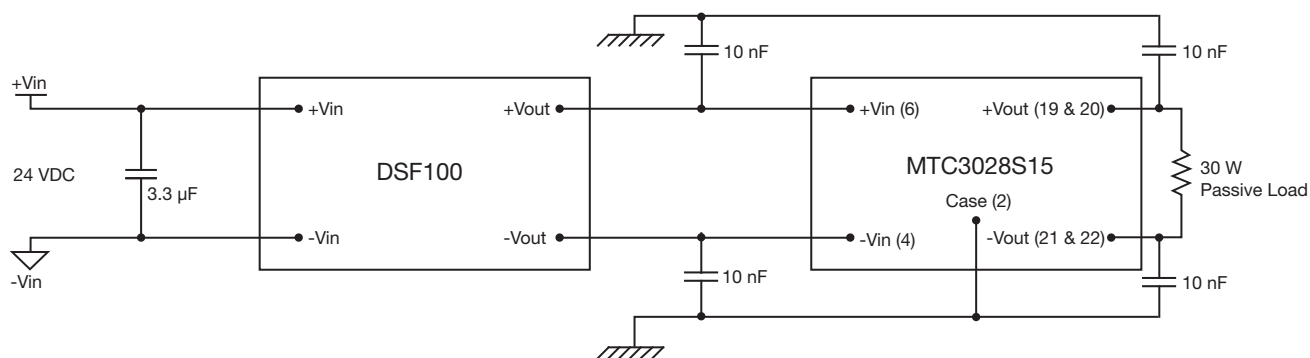
DSF100 & MTC1528S15



Application Notes cont'd.

MIL-STD-461E CE102

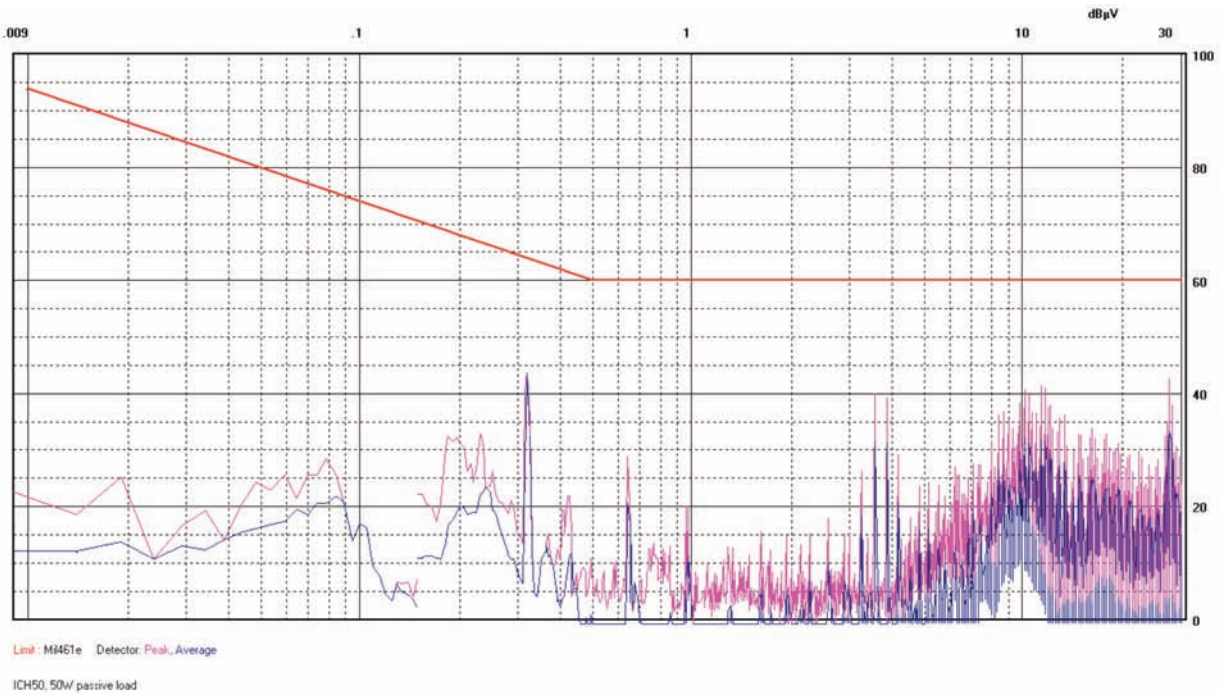
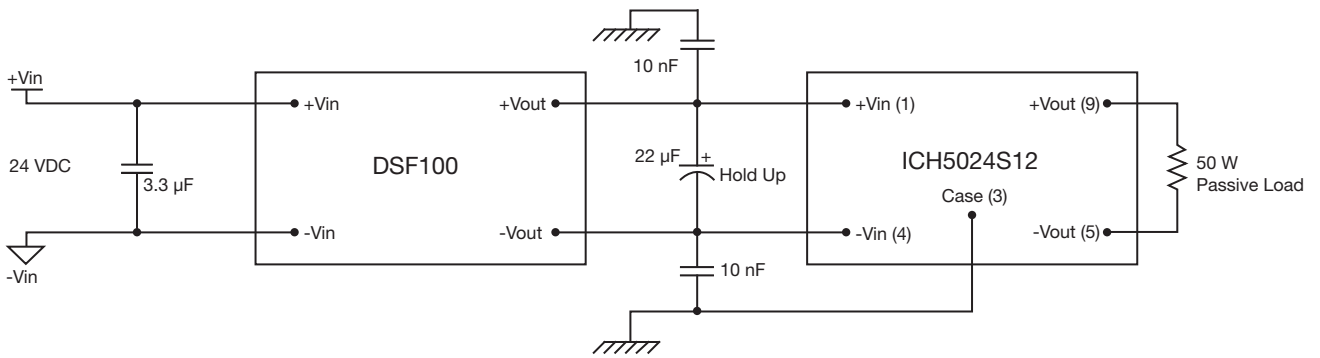
DSF100 & MTC3028S15



Application Notes cont'd.

MIL-STD-461E CE102

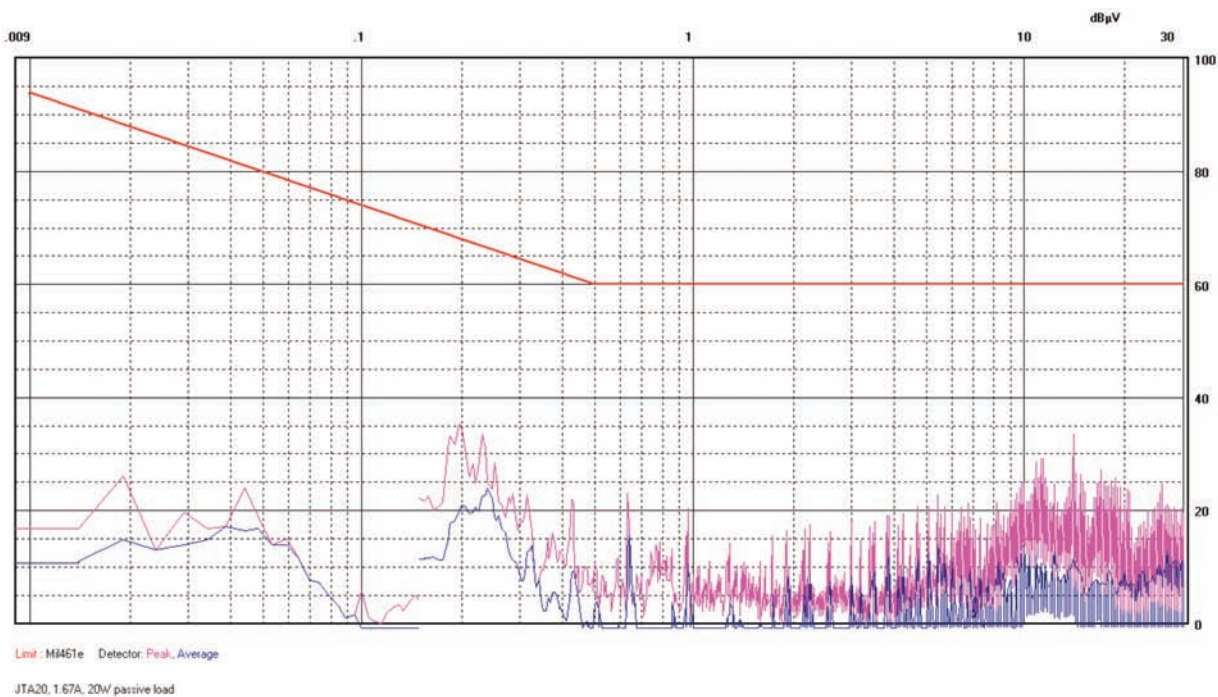
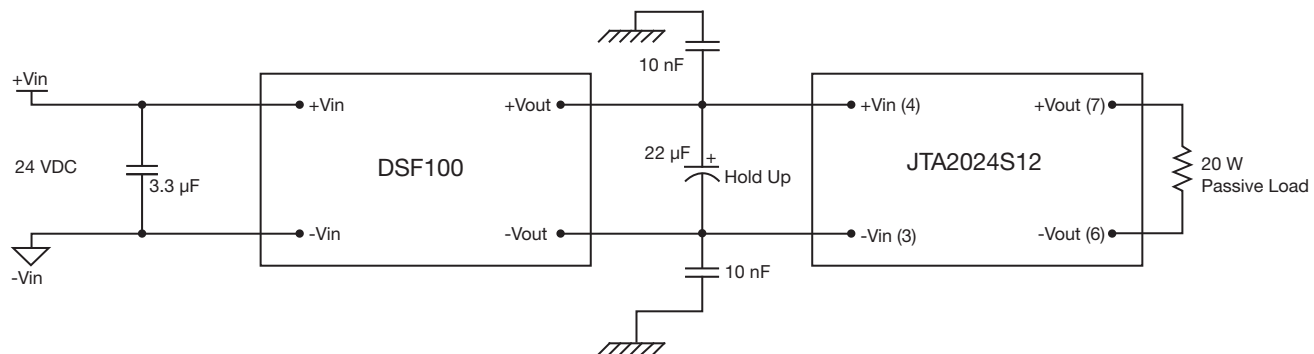
DSF100 & ICH5024S12



Application Notes cont'd.

MIL-STD-461E CE102

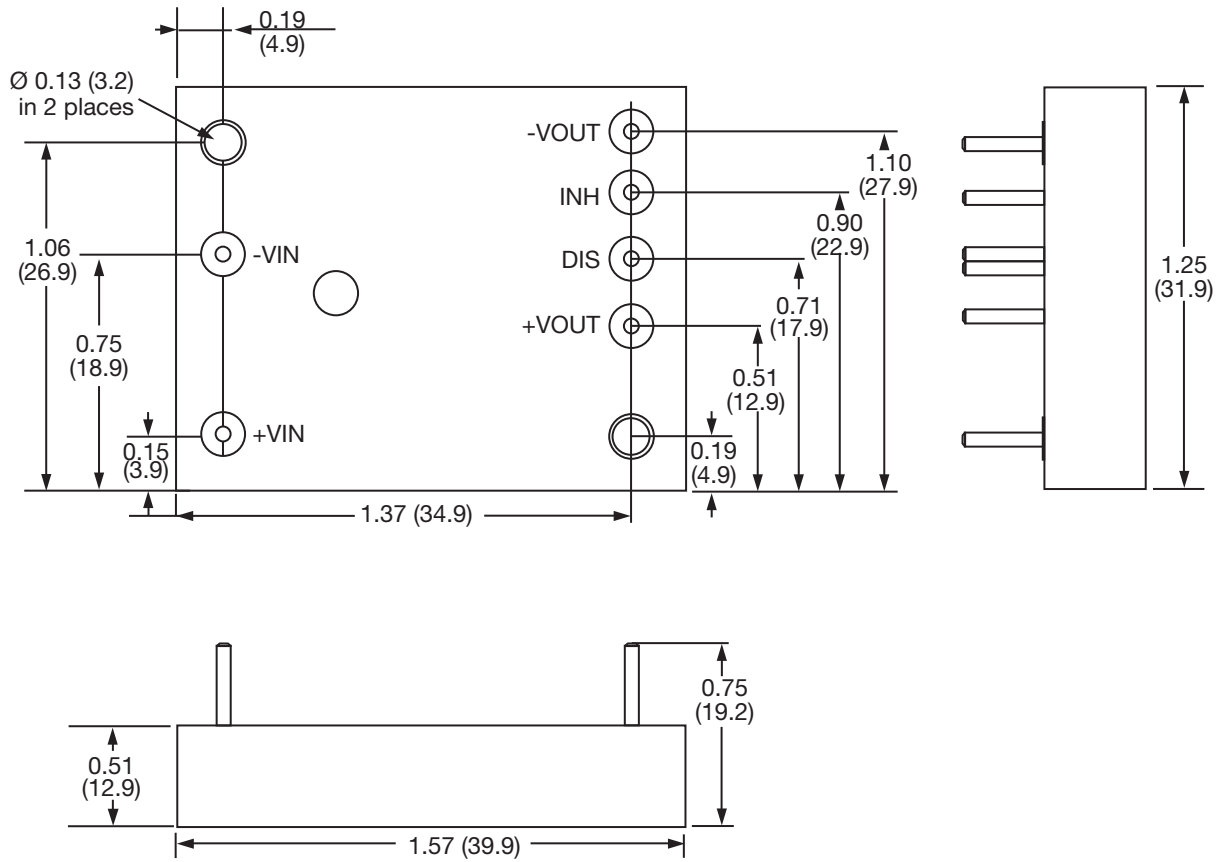
DSF100 & JTA2024S12



Mechanical Details

All dimensions in inches (mm).

DSF100



Weight: 0.11 lbs (50 g).
All dimensions in inches (mm).

Pin diameter 0.04 (1.0)
Tolerance ± 0.008 (± 0.2)

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T H E X P E R T S I N P O W E R

DSF200LV



- 7 A Output Current
- Active Surge Protection
- MIL-STD-461E
- DEF-STAN 59-41
- MIL-STD 1275A/B
- DEF STAN 61-5 Pt 6
- Reverse Voltage Protection

Introduction

DSF200LV is an input EMC filter with up to 200W of output power. It enables industrial grade DC-DC converters, including JTA, ICH, DCH/CBS, V24 series and others to be used in military vetronic and avionic electrical environments.

The filter enables industrial parts to be brought in compliance with conducted emissions and susceptibility standards MIL-STD-461E, DEF-STAN 59-41, MIL-STD 1275A/B and DEF-STAN 61-5 Pt 6.

The DSF200LV is a compact 36.8 mm x 61.2mm x 12.9 mm. It is encapsulated with thermally conductive compound and is packaged in photo-etched steel conductive case with aluminium cooling base plate.



T H E X P E R T S I N P O W E R

Input Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	10	28	33	VDC	
Input Reverse Voltage Protection					Continuous

Output Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage			36	VDC	Clamped
Output Current			3	A	10-18 V
			7		18-33 V
Output Power	30		54	W	10-18 V
	126		230		18-33 V
Disable (DIS)			110	°C	>110 °C DIS pin is pulled low
Inhibit (INH)			7.77	A	>7.77 A INH pin is logic low (open collector) <7.77 A INH pin is logic high (open collector)

General Specifications

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	92	94	96	%	
Isolation Voltage			500	VDC	Input and output to case
Series Resistance		0.26		Ω	28 VDC input
Disable Input Current			25	mA	
Disable (DIS)					Disabled when connected to 0 VDC
No Load Current		47		mA	
Packaging Style	Photo-etched nickel-silver case with RoHS compliant conductive chromate finish and aluminium cooling baseplate				

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+100	°C	Baseplate temperature
Storage Temperature	-55		+100	°C	Ambient temperature
Salt Atmosphere			48	hrs	MIL-STD-810F, method 509.1
Shock				G	
			40	G	3 axes MIL-STD-810F 516.5-1
Vibration	Minimum Integrity Test for Military equipment 1 hour/axes in 3 axes MIL-STD-810F method 514.5C-17				

Electromagnetic Compatibility & Immunity

Standard	Test Level	Criteria	Notes & Conditions
MIL-STD-461E	CE102		
DEF-STAN-59-41	DCE01 / DCE02		
MIL-STD-1275A/B	Spikes	±250 V for 100 µs	
	Surges	100 V for 50 ms at 0.5 mΩ	
	Ripple	14 VAC pk-pk	
DEF-STAN 61-5	Pt 6		
MIL-STD-704A	600 V input transient	Applied for 10 µs 50 Ω source impedance	

Safety Approvals

Standard	Category
CE Marked	Low Voltage Directive

Disable Function (DIS)

This function is used to turn the DSF200LV module off by applying a signal to the DIS pin.

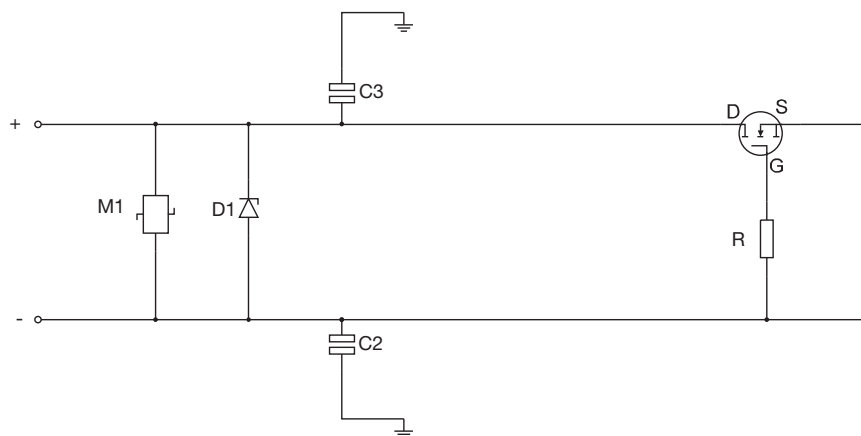
High or open circuit = ON
Low or short circuit = OFF

Inhibit Function (INH)

When the output current is $> 7.77\text{A}$ then the INH pin is pulled low. This function can be used to turn the downstream DC-DC converter off. See Configuration Diagrams. This is an automatic function and the pin is high when the current is $< 7.77\text{A}$.

Reverse Polarity Protection

The filter is continuously protected against reverse polarity as well as surges and spikes. In order to maximize efficiency a MOSFET solution has been implemented giving significant improvement in performance compared to traditional series diode techniques.



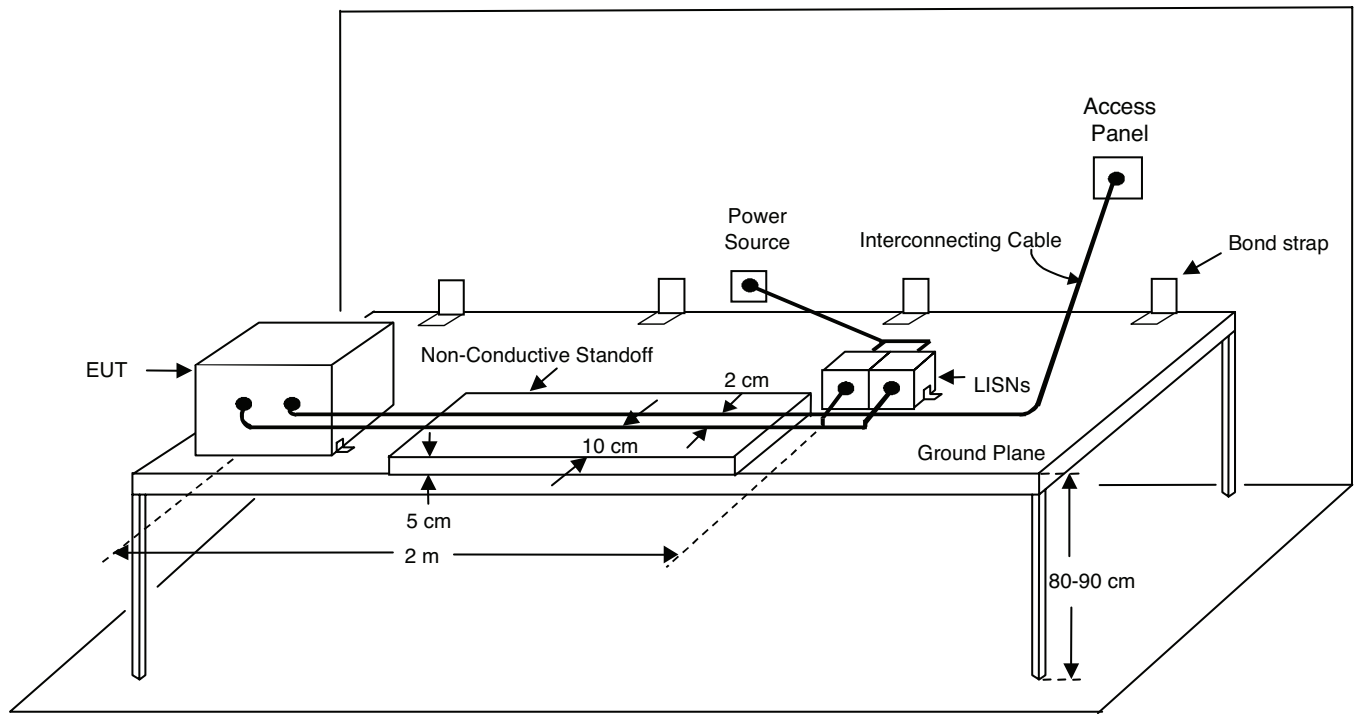
Reverse polarity protection and transient attenuation (fitted internally)

Over Temperature Protection

In order to protect the filter from over-heating; should the case temperature exceed 100°C a temperature sensor pulls the disable pin low and switches off the output power. This is an automatic circuit which will recover once the temperature reduces.

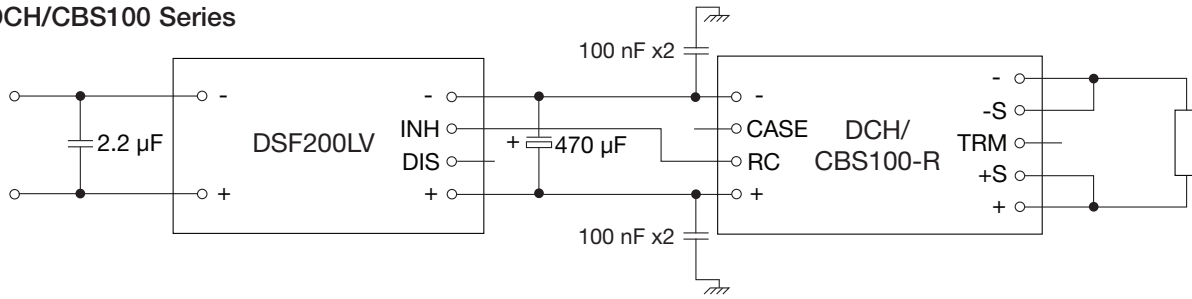
Test Set-up

Typical CE102 test set-up as recommended in MIL-STD-461E.

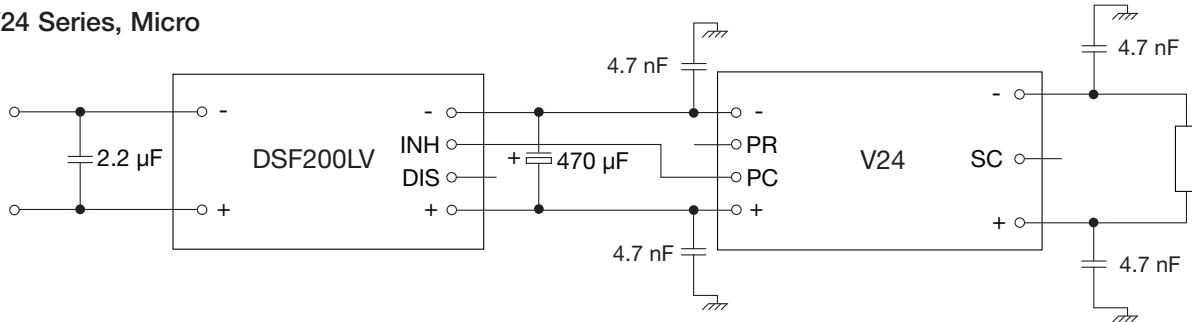


Configuration Diagrams

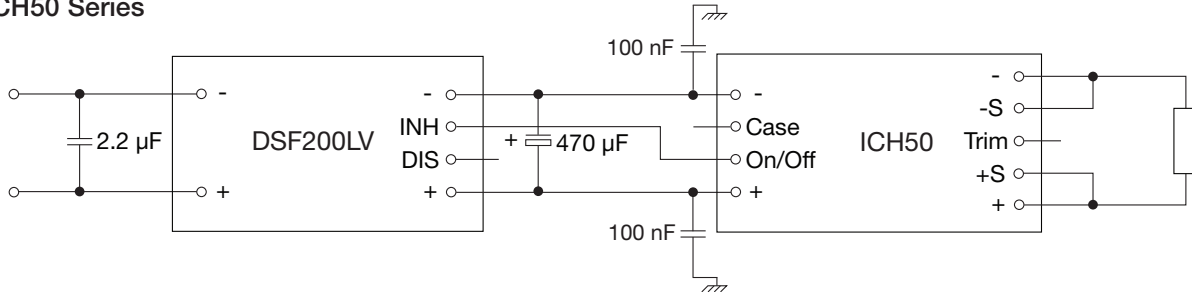
DCH/CBS100 Series



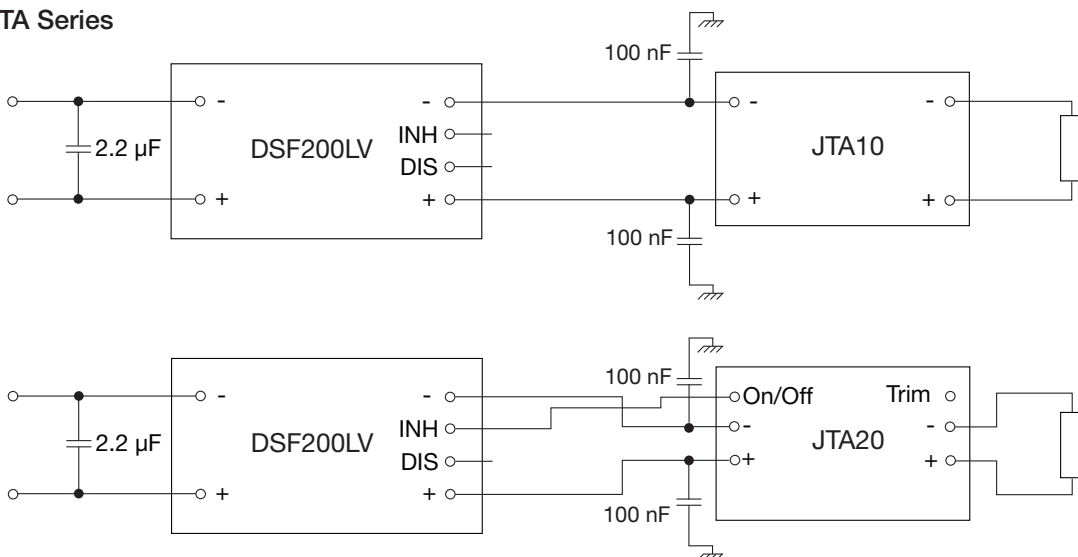
V24 Series, Micro



ICH50 Series

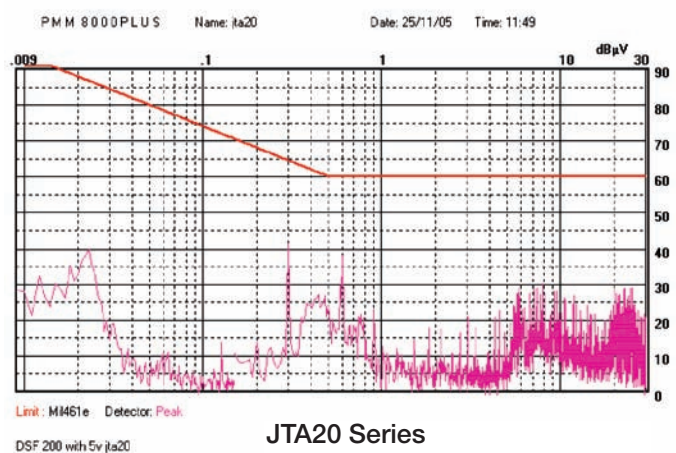
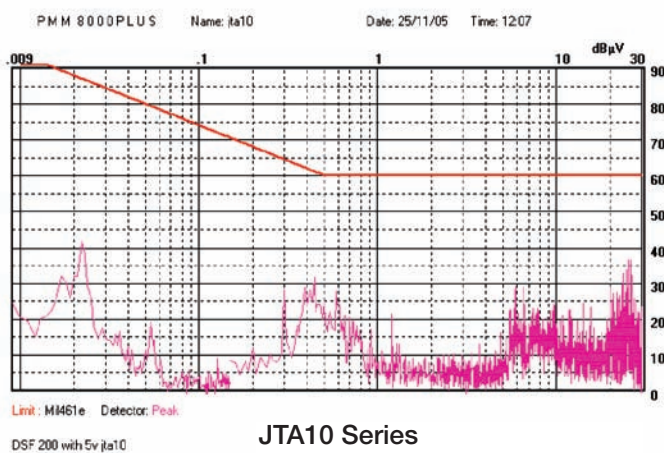
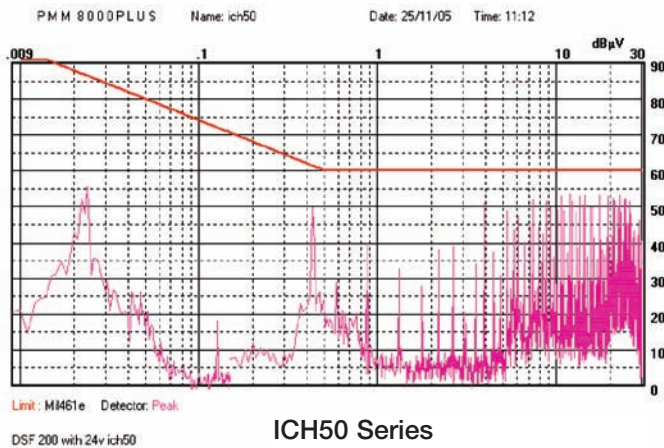
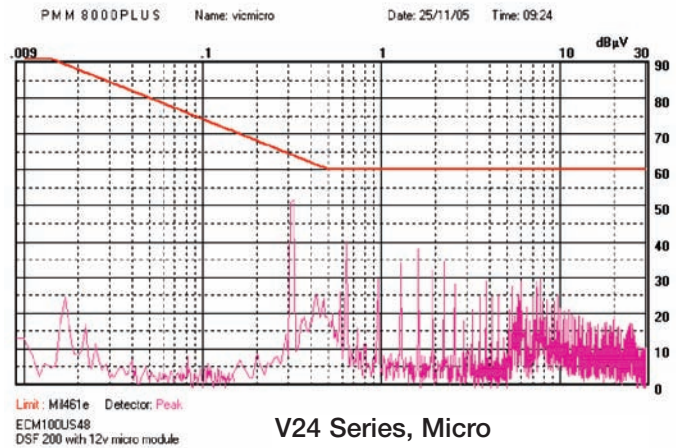
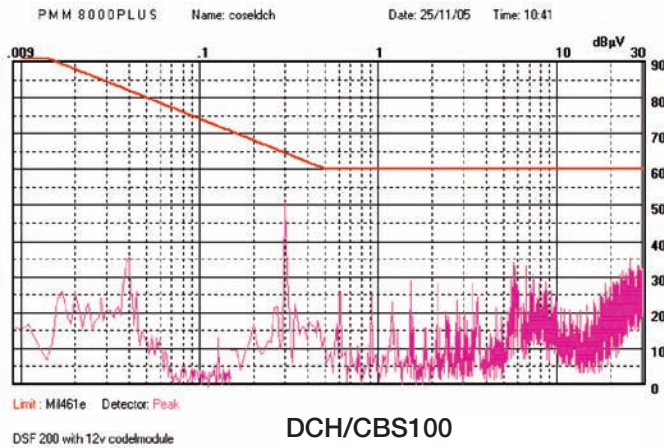


JTA Series

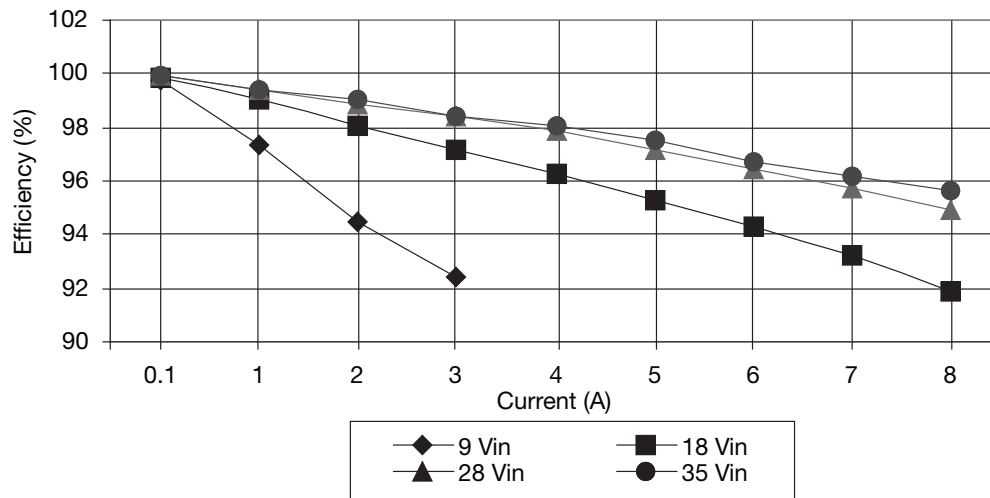


Conducted Emission Test Results

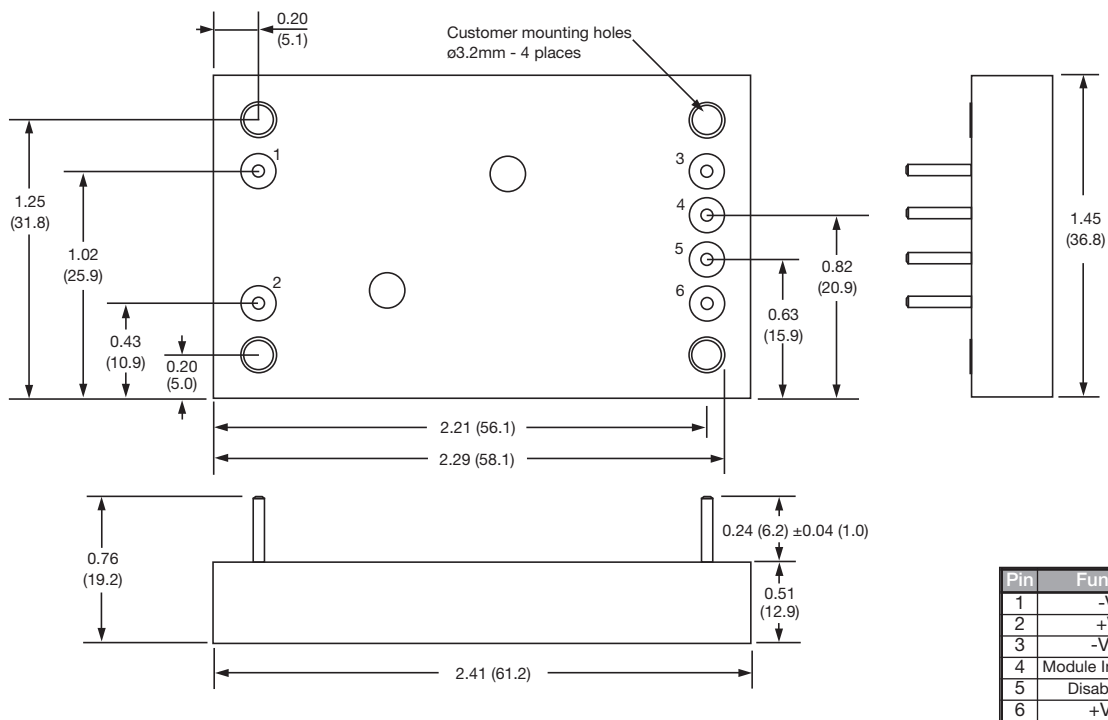
Test results measured against MIL-STD-461E CE102 peak limits.



Electrical Characteristics - Efficiency



Mechanical Details



Pin	Function
1	-VIN
2	+VIN
3	-VOUT
4	Module Inhibit (INH)
5	Disable (DIS)
6	+VOUT

All dimensions in inches (mm).
Pin diameter 0.04 (1.0).
Tolerance: ± 0.008 (± 0.2)
Weight: 0.18 lb (80g) approx.

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T H E X P E R T S I N P O W E R

DSF500



- 28 A Output Current
- Active Surge Protection
- MIL-STD 1275
- Reverse Polarity Protection
- 97% Efficiency
- -40 °C to +100 °C Operating Temperature
- MIL-STD 810F Shock & Vibration
- Comprehensive Control Functions

Introduction

DSF500 is a transient filter with up to 28 A or 500W of output power. It enables industrial grade DC-DC converters to be used in military vetronic electrical environments.

The filter enables industrial parts to be brought in compliance with susceptibility standards MIL-STD-461F, DEF-STAN 59-411, MIL-STD 1275A-D and DEF-STAN 61-5 Pt 6.

The DSF500 is a compact 58 mm x 58 mm x 13 mm. It is encapsulated with thermally conductive compound and is packaged in a photo-etched steel conductive case with an aluminium base plate.



T H E X P E R T S I N P O W E R

Models & Ratings

Output Power	Input Voltage	Output		Typical Efficiency	Model Number
		Voltage	Max Current		
280 - 500 W	10-33 VDC	<36 VDC	28 A ⁽¹⁾	98%	DSF500
500 W	0-100 VDC	$V_{in} - I_{in} \times 0.013$	28.0 A	99%	FSO461 ⁽²⁾

Note:

1. For input voltages above 18 V, maximum load is 500 W.
2. FSO461 has filter circuitry only. To be used with DSF500 for conducted immunity compliance.
3. DSF500 has surge protection only. To meet stated EMC performance it must be used with FSO461.

Input Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	10	28	33	VDC	
Fusing					None fitted. External slow blow fuse or MCB recommended
Reverse Voltage Protection					Continuous protection with auto recovery

Output Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage			36	VDC	Tracks input voltage $V_{out} = V_{in} - (0.018 \Omega \times I_{out})$ up to 36 V max
Clamping Voltage	34.5		36	VDC	
Output Current			28	A	
Output Power			500	W	
Overload Detection	28		31	A	Inhibit pin pulls low after <50 ms ± 1 A over the temperature range.
Overtemperature Protection	100			°C	Auto reset typically 5 °C hysteresis, option without this fitted is (-H)

General Specifications

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	94	97	99	%	
Isolation Voltage			500	VDC	Input and output to case
Series Resistance		0.018		Ω	10-33 VDC input
MTBF		573		kHrs	MIL-STD 217F 40 °C GB
Packaging Style	Photo-etched nickel-silver case with RoHS compliant conductive chromate finish and aluminium baseplate				
Weight		0.29 (130)		lbs (g)	

Signals

Signals	Notes & Condition
Disable	Disables the output when short circuit to input/output zero volts or driven to < 1V. Signal can exhibit voltages upto 40 V and is able to source 5 mA.
Inhibit	Opto-coupler open collector transistor referenced to input/output zero volts rated to 70 V and is able to sink 5 mA. The purpose of this pin is to inhibit the downstream DC-DC converter in the event of an overload condition.

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+100	°C	Baseplate temperature
Storage Temperature	-55		+100	°C	Ambient temperature
Salt Atmosphere			48	hrs	MIL-STD-810F, method 509.1
Shock			15	G	25 ms shock MIL-STD-901D
			40	G	3 axes MIL-STD-810F 516.5-1
Vibration			0.5	mm	5 Hz to 33 Hz, MIL-STD-167
	Minimum Integrity Test for Military equipment 1 hour/axes in 3 axes MIL-STD-810F method 514.5C-17				

Electromagnetic Compatibility & Immunity

Standard	Test Level	Criteria	Notes & Conditions
MIL-STD-461E/F	CE102 CS101 CS114 CS115 CS116		With external components. See Apps Note.
DEF-STAN 59-411	DCE01/DCE02		
MIL-STD-1275A-D	Spikes Surges Ripple	± 250 V for 100 μ s 100 V for 50 ms at 0.5 m Ω 14 VAC pk-pk	
DEF-STAN 61-5	Pt 6. Iss. 5		
MIL-STD-704A	600 V input transient	Applied for 10 μ s 50 Ω source impedance	

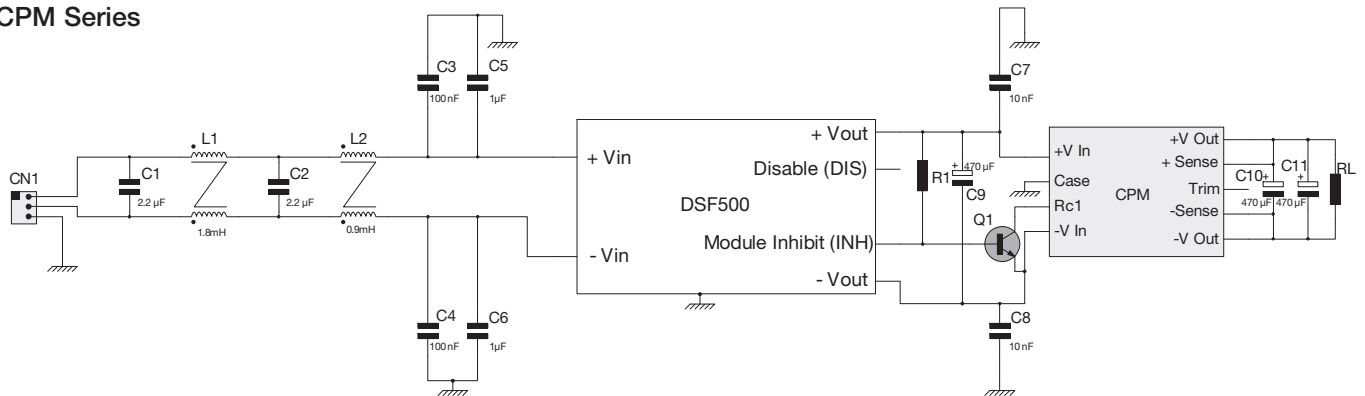
Safety Approvals

Standard	Category
CE Marked	Low Voltage Directive

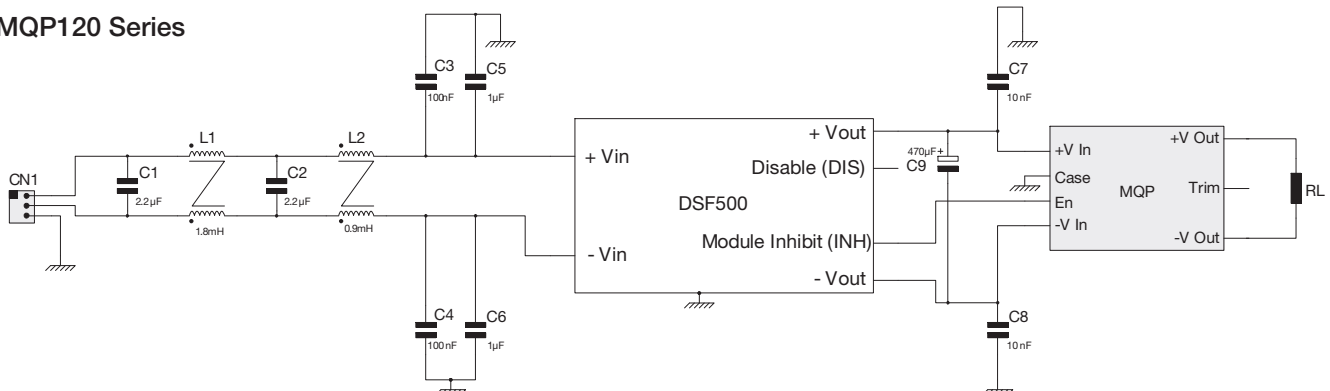
Application Notes

MIL-STD-461E CE102 filter circuits.

CPM Series



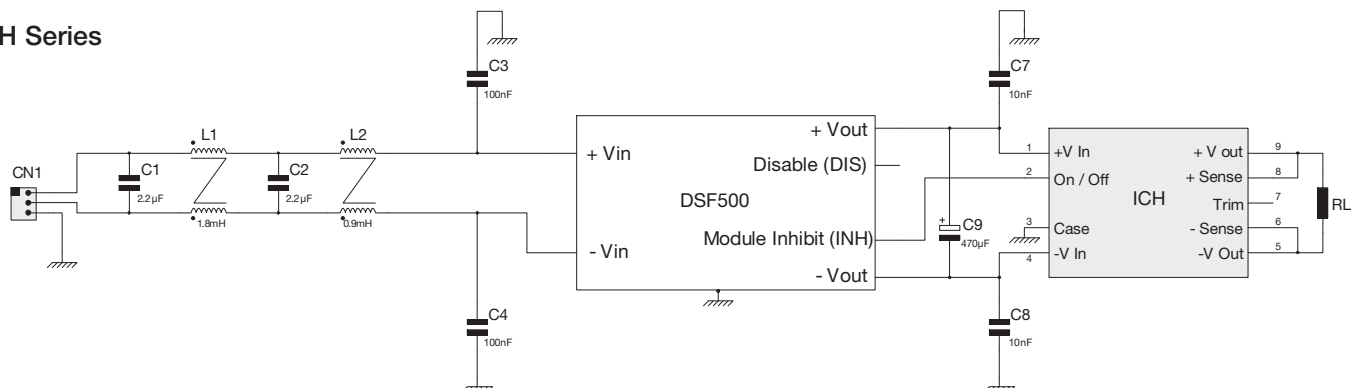
MQP120 Series



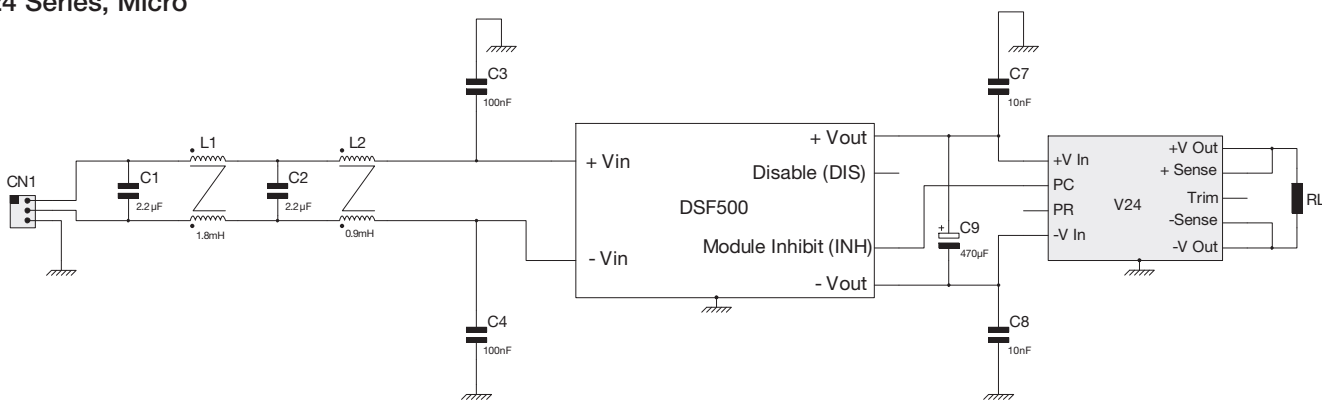
Application Notes cont' d.

MIL-STD-461E CE102 filter circuits.

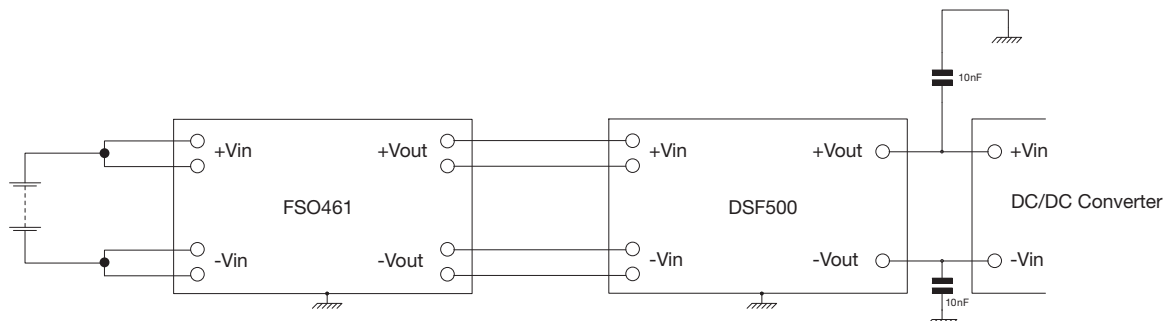
ICH Series



V24 Series, Micro



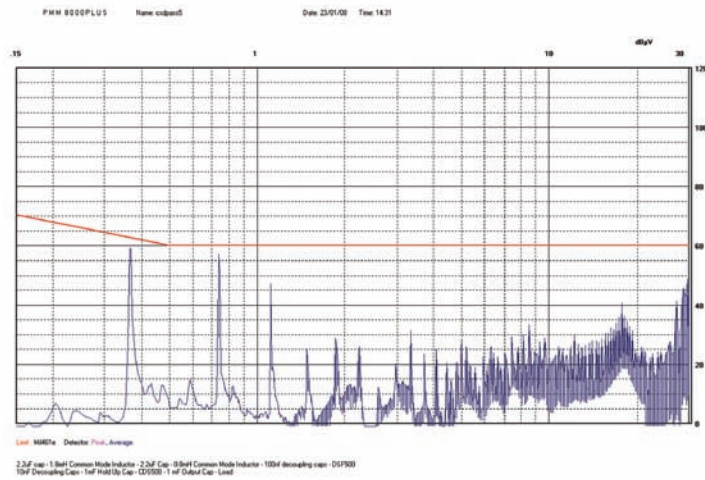
FSO461 & DSF500 Connection Diagram



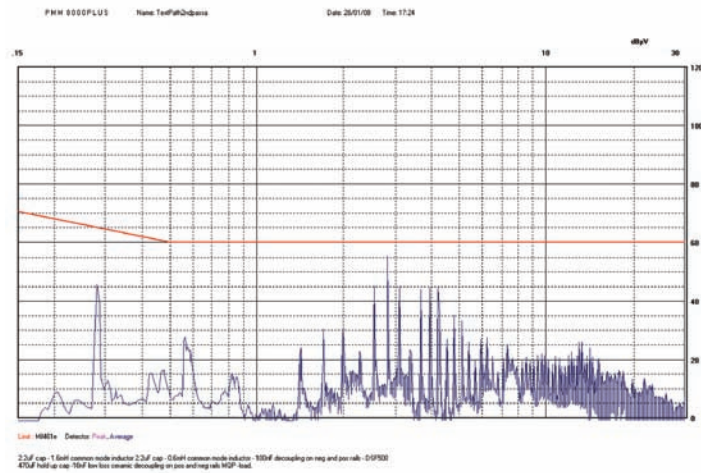
Conducted Emission Test Results

Test results measured against MIL-STD-461E CE102 peak limits.

CPM Series



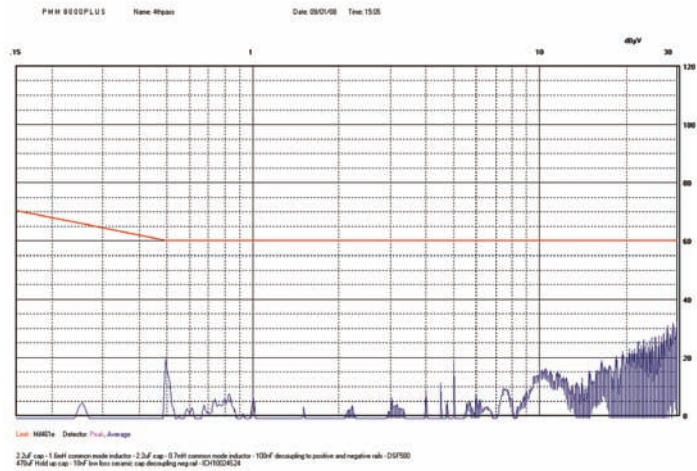
MQP120 Series



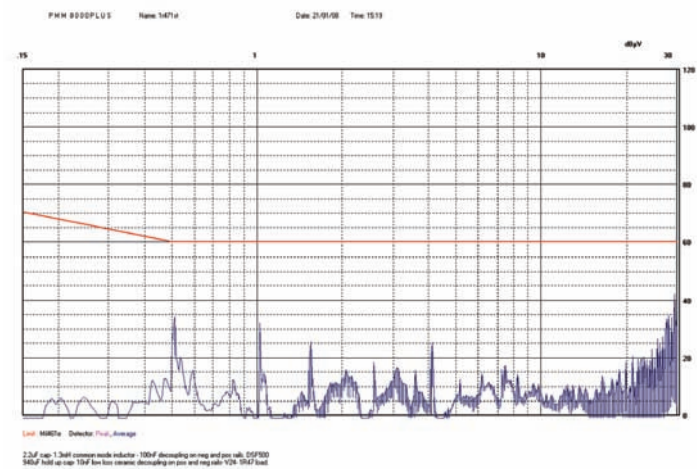
Conducted Emission Test Results cont' d.

Test results measured against MIL-STD-461E CE102 peak limits.

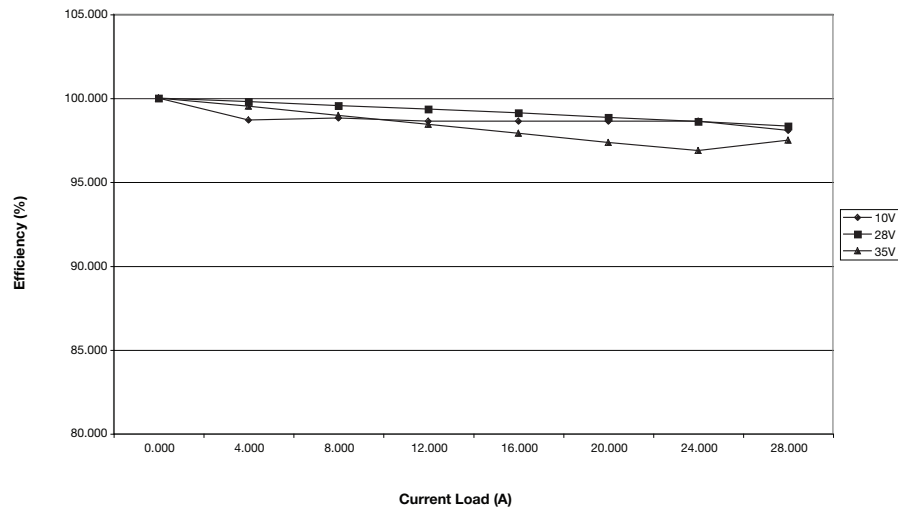
ICH Series



V24 Series, Micro



Electrical Characteristics - Efficiency versus input voltage and load



Mechanical Details

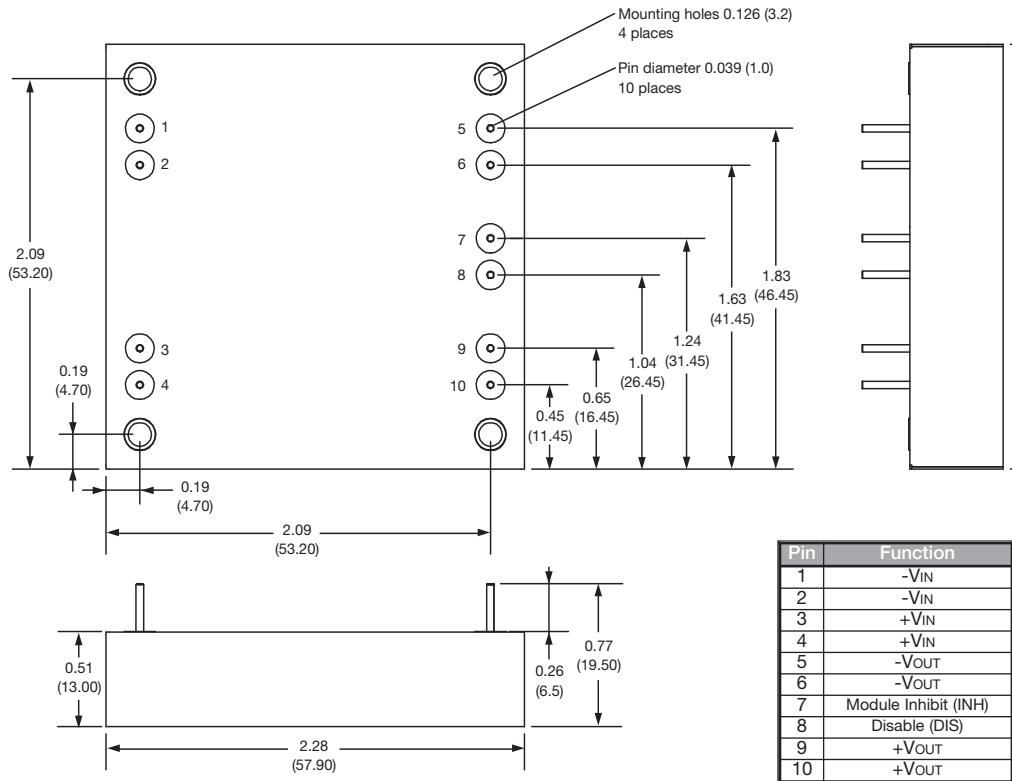
All dimensions in inches (mm).

DSF500

Weight: 0.36 lbs (160 g) approx.

Tolerance: ± 0.008 (± 0.2).

Pin diameter 0.04 (1.0).

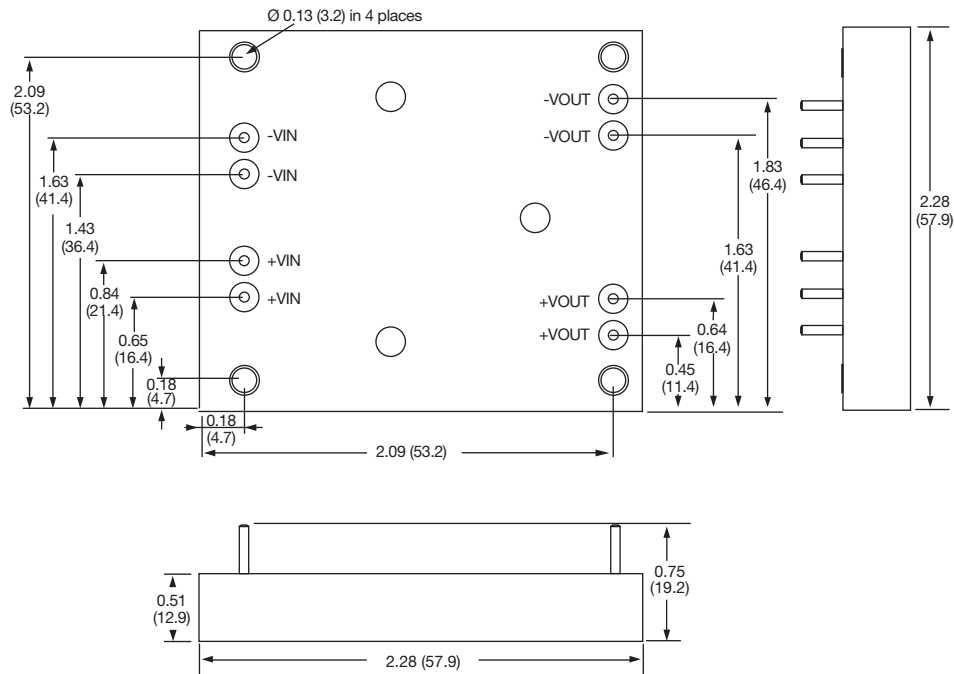


FSO461 - Filter

Weight: 0.36 lbs (160 g).

Pin diameter 0.04 (1.0)

Tolerance ± 0.008 (± 0.2)



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Lithuania+370 5 2652683	Elgerta
Poland+48 22 8627500	Gamma
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T H E X P E R T S I N P O W E R

FSO461



- MIL-STD-461E Conducted Noise
- 28 A Output Current
- MIL-STD-1275 Transients (With DSF500)
- Up to 99% Efficiency
- -40 ° C to +100 ° C Operating Temperature
- MIL-STD-810F Shock & Vibration

Packaged in a compact half brick format the FSO461 EMC filter enables industrial grade DC-DC converters to be used in military COTS vetronic electrical environments by providing compliance with defence emissions standards such as MIL-STD-461E.

Encapsulated with thermally conductive compound the baseplate cooled FSO461 has a current capability of up to 28 A and when used in conjunction with a DSF500 meets the stringent surge requirements of MIL-STD-1275.



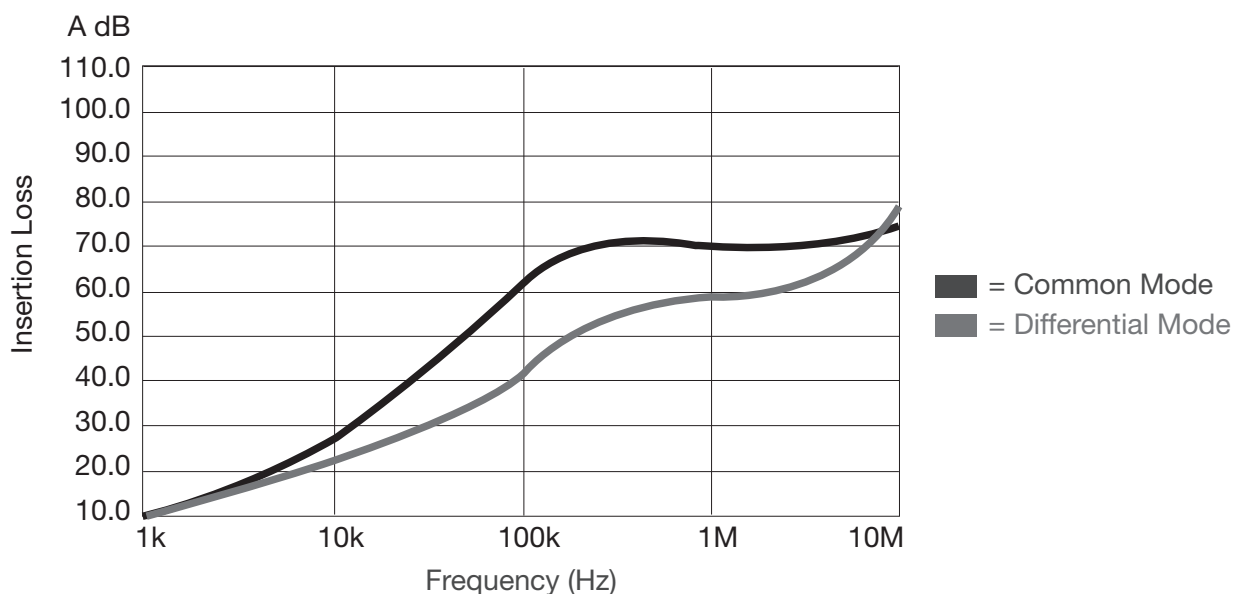
T H E X P E R T S I N P O W E R

Input Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	0	28	100	VDC	
Fusing					None fitted. External slow blow fuse or MCB recommended

Output Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage			100	VDC	Tracks input voltage, $V_o = V_{in} - (I_{in} \times 0.013)$
Output Current			28	A	
Insertion Loss				dB	See fig 1



General Specifications

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	94	97	99	%	
Isolation Voltage			500	VDC	Input and output to case
Series Resistance		0.013		Ohms	
MTBF		8737		kHrs	MIL-STD 217F 40 °C GB
Packaging Style	Photo-etched nickel-silver case and aluminium baseplate				
Weight		0.29 (130)		lbs (g)	

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+100	°C	Baseplate temperature
Storage Temperature	-55		+100	°C	Ambient temperature
Salt Atmosphere			48		MIL-STD-810F, section 509.4
Shock					MIL-STD-810F section 516.5-5 Procedure 1
Vibration					MIL-STD-810F section 514.5C-17

Electromagnetic Compatibility (when used with specified DC-DC converters)

Standard	Test Level	Criteria	Notes & Conditions
MIL-STD-461E	CE102		With external components. See Apps Notes.
DEF-STAN 59-411	DCE01 & 02		External components required. Not land class A.

Immunity

Standard	Test Level	Criteria	Notes & Conditions
MIL-STD-1275A/B/C/D			When used with DSF500
DEF-STAN 61-5	Pt 6		
MIL-STD-704A	600 V input transient	Applied for 10 μ s 50 Ohms source impedance	

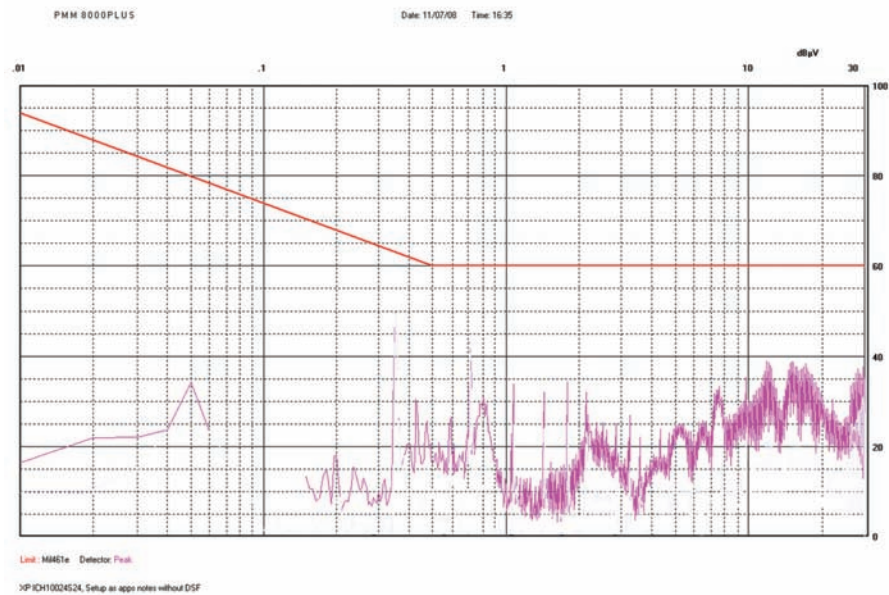
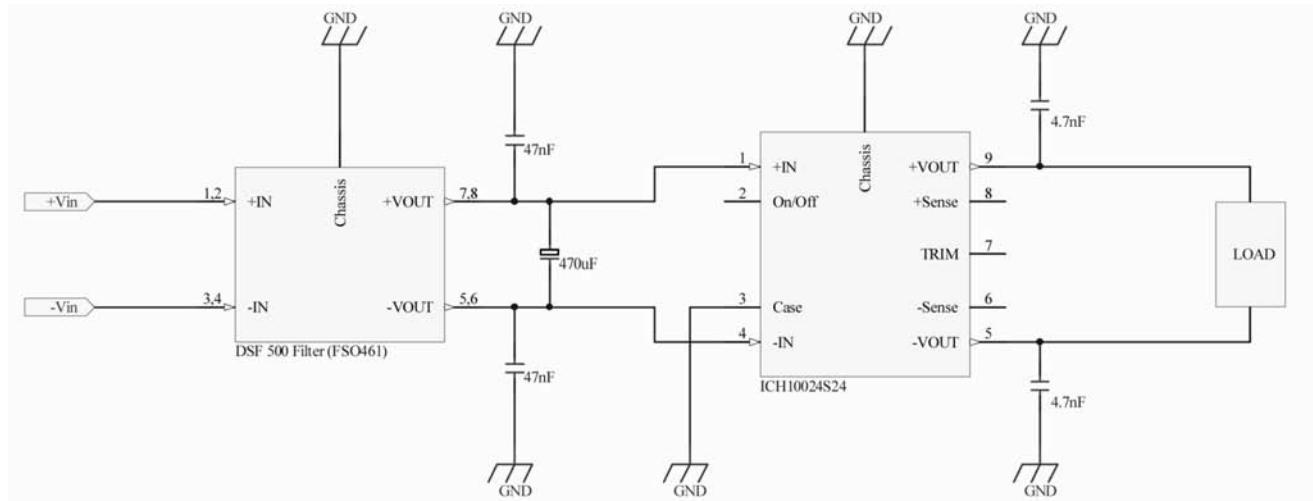
Safety Agency Approvals

Standard	Safety Standard	Category
CE	Low Voltage Directive (LVD)	Low Voltage Directive

Application Notes

MIL-STD-461E CE102 filter circuits.

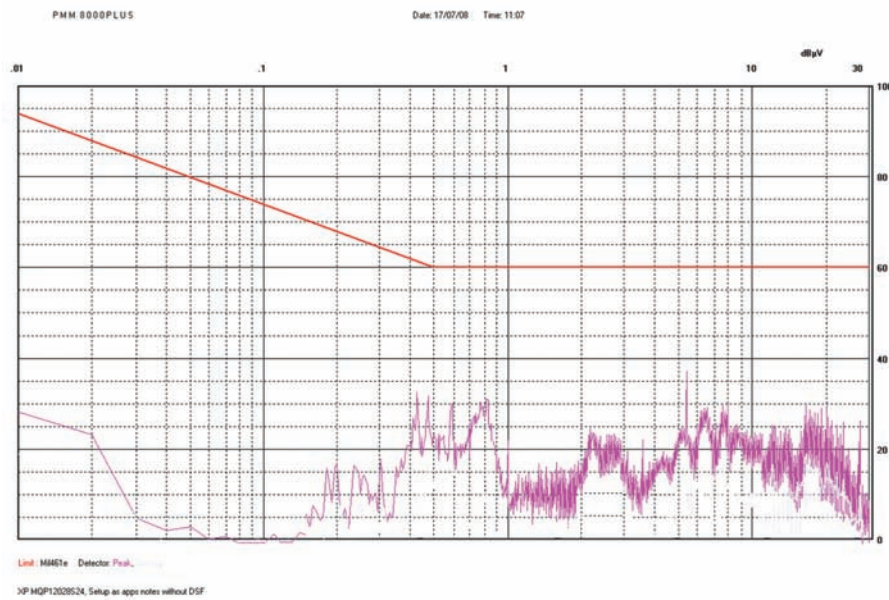
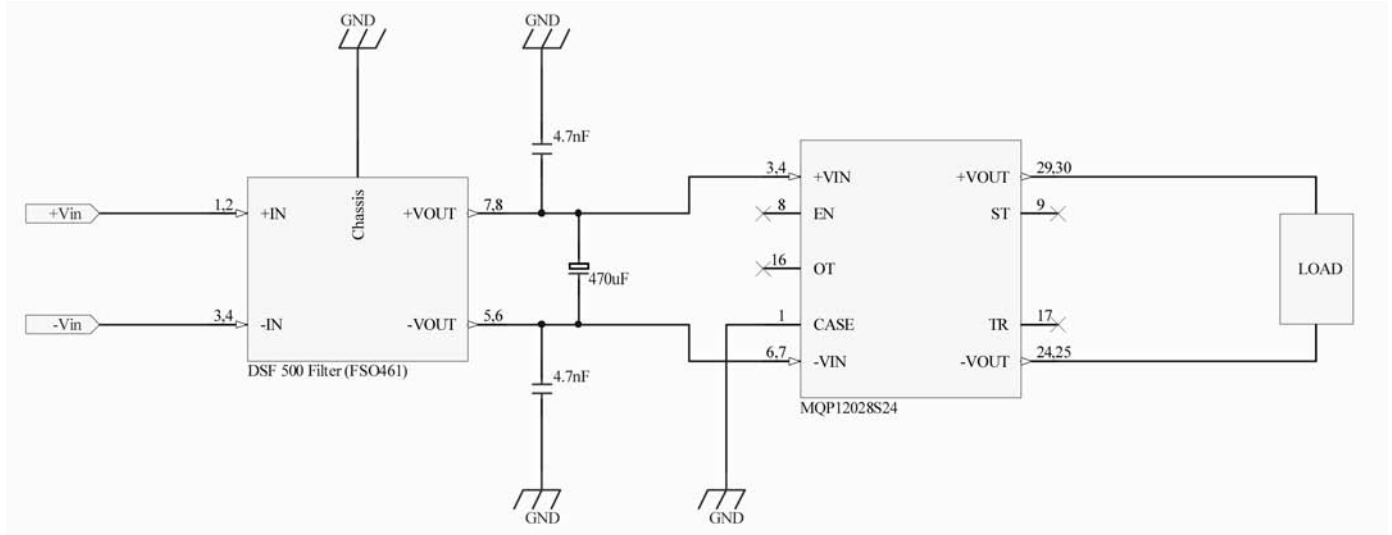
ICH100



Application Notes

MIL-STD-461E CE102 filter circuits.

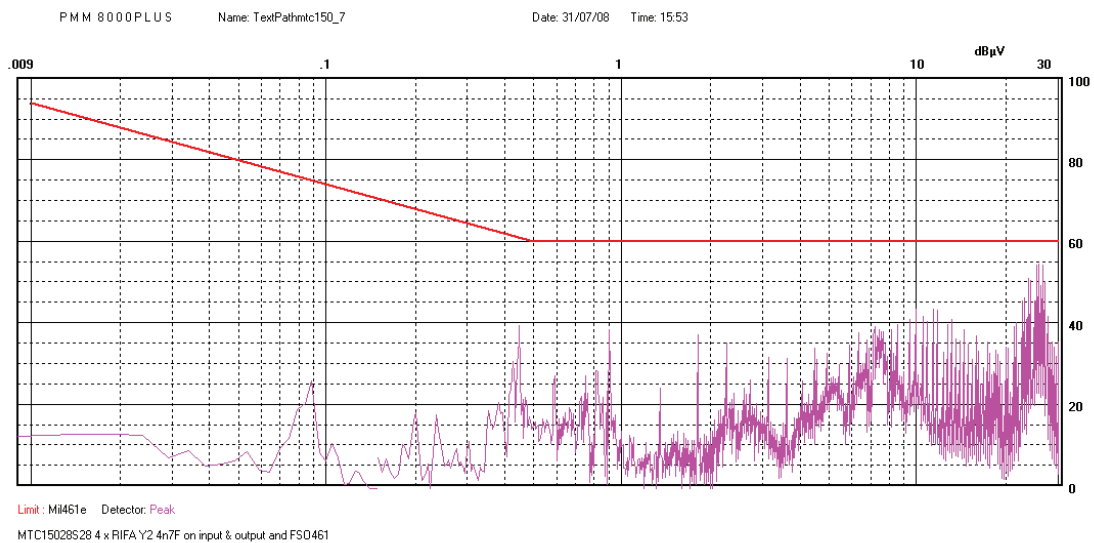
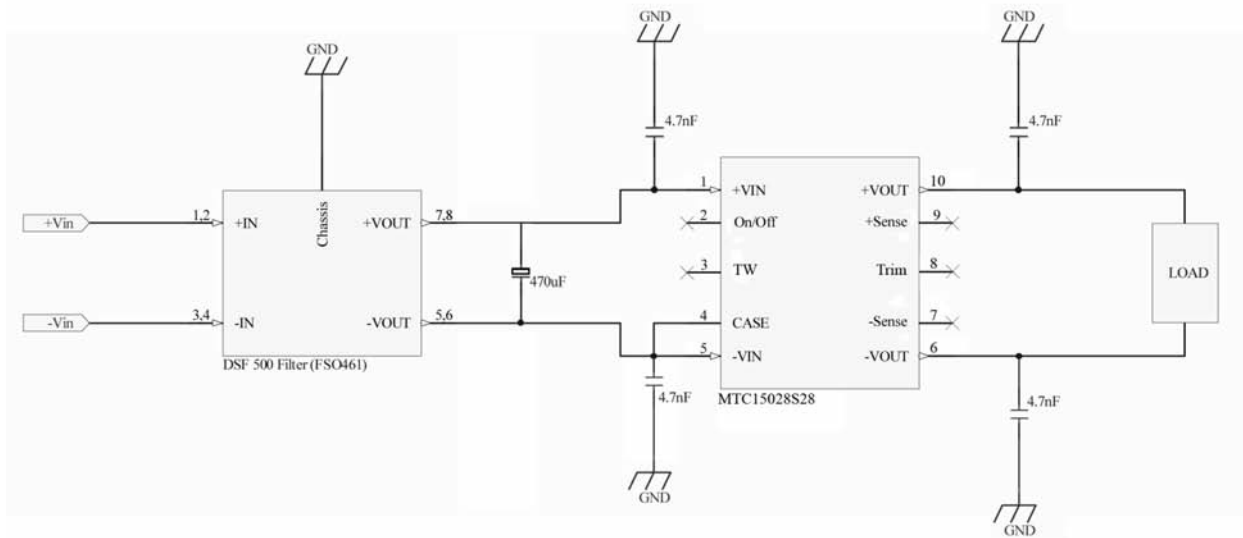
MQP120



Application Notes

MIL-STD-461E CE102 filter circuits.

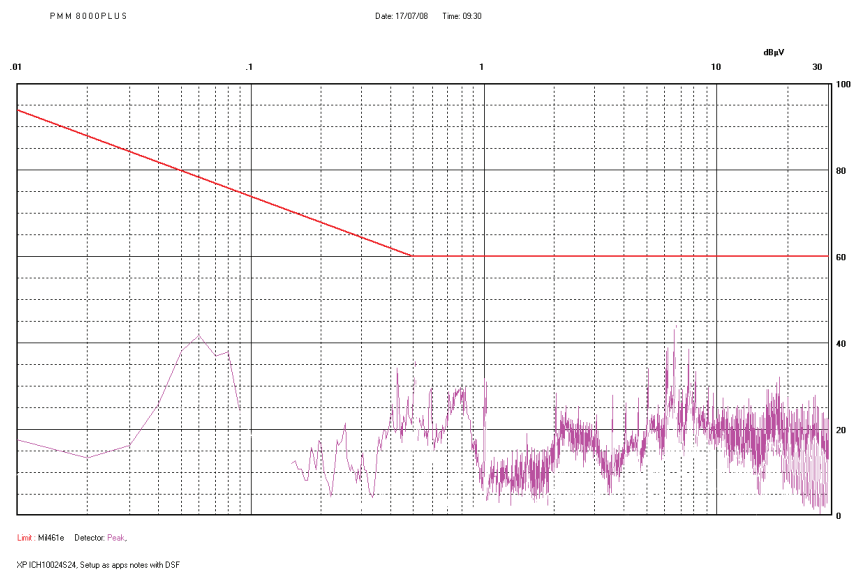
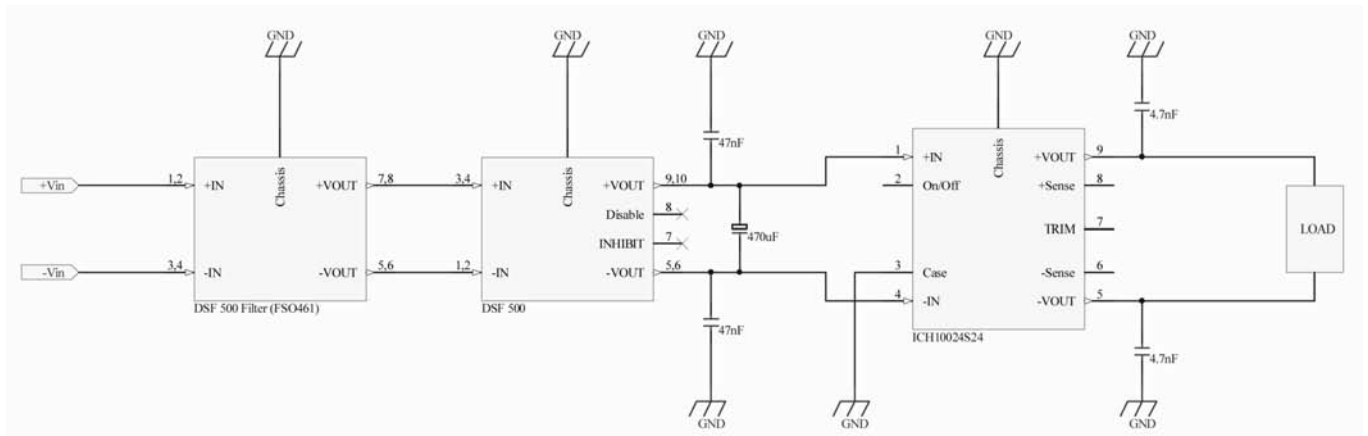
MTC150



Application Notes

MIL-STD-461E CE102 filter circuits.

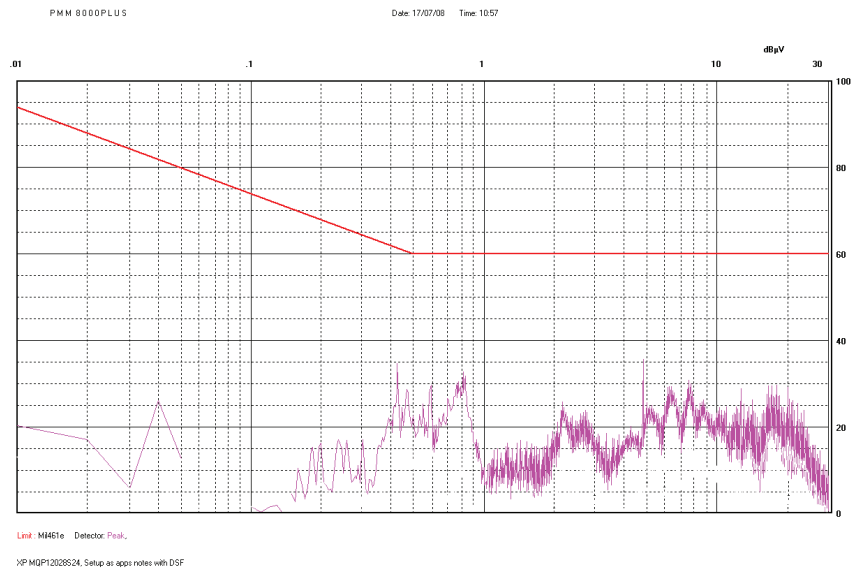
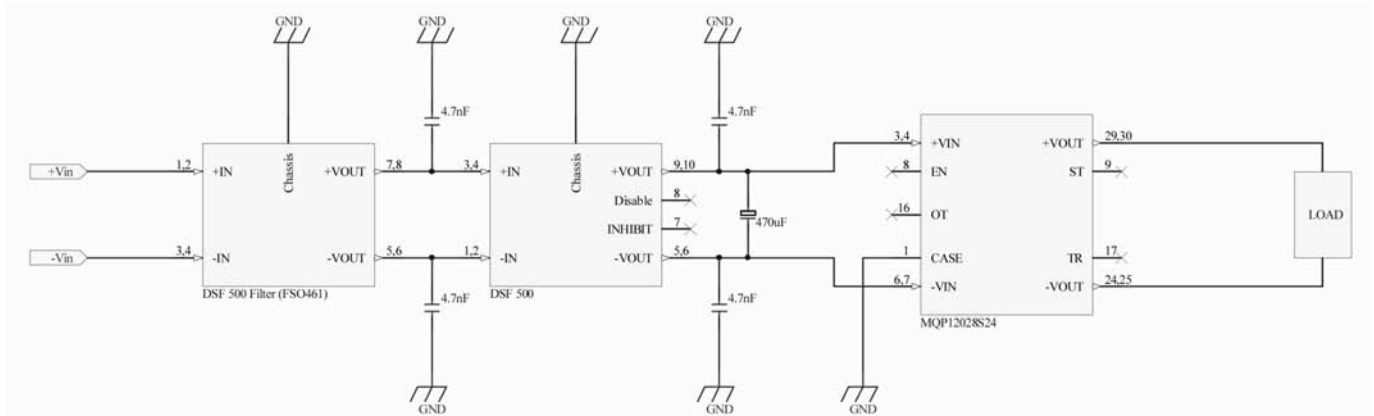
ICH100 With DSF500



Application Notes

MIL-STD-461E CE102 filter circuits.

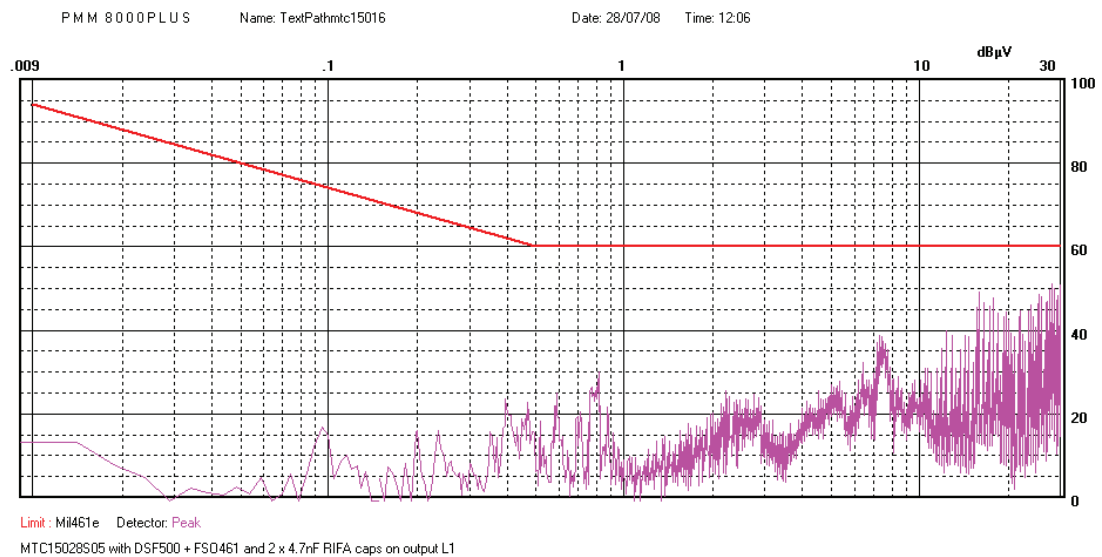
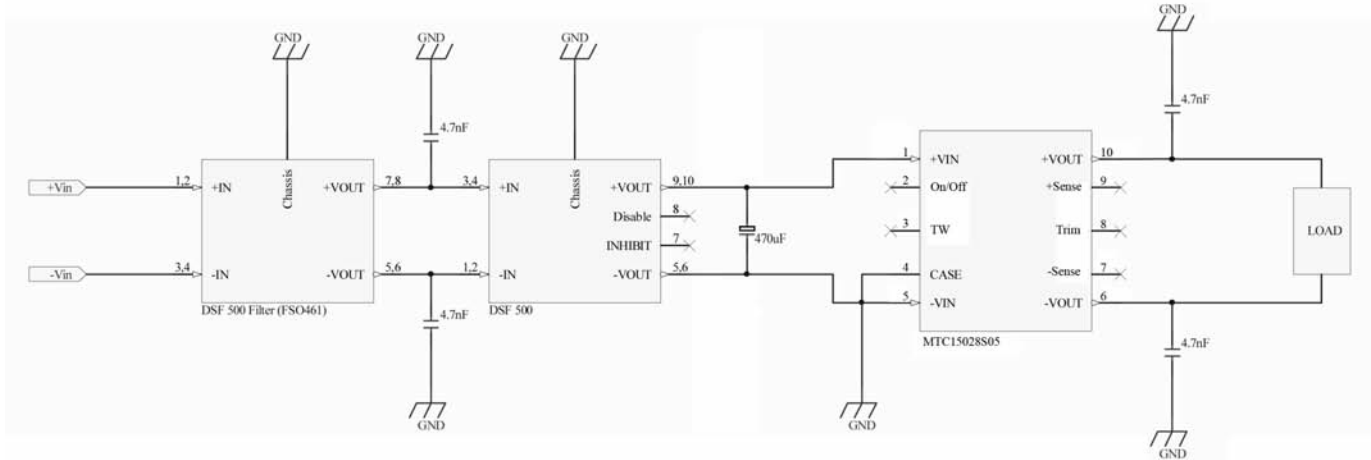
MQP120 With DSF500



Application Notes

MIL-STD-461E CE102 filter circuits.

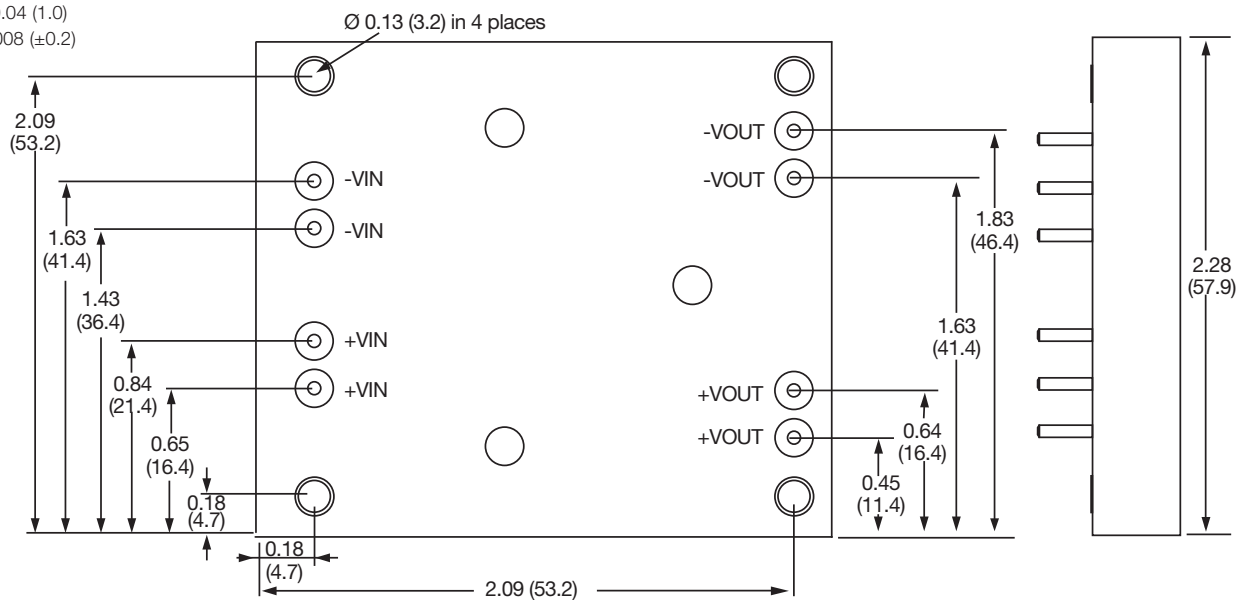
MTC150 With DSF500



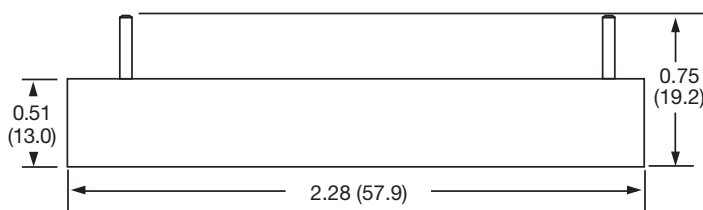
All dimensions in inches (mm).

Weight: 0.36 lbs (160 g).
Pin diameter 0.04 (1.0)
Tolerance ± 0.008 (± 0.2)

Weight: 0.36 lbs (160 g).
Pin diameter 0.04 (1.0)
Tolerance ± 0.008 (± 0.2)



Pin	Function
1	-VIN
2	-VIN
3	+VIN
4	+VIN
5	-VOUT
6	-VOUT
7	+VOUT
8	+VOUT



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