

# SMSA Single and Dual DC/DC Converters

## 28 VOLT INPUT – 5 WATT - PENDING REVISION F RELEASE

### FEATURES

Small size, 1.075 inches (27.31 mm) square

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Radiation hardness assurance (RHA) to level R 100 kRad(Si)
- Input voltage range 16 to 40 VDC
- Transient protection 50 V for 120 ms
- Fully Isolated, magnetic feedback
- Fixed high frequency switching
- Inhibit function
- Indefinite short circuit protection
- High power density, 76% efficiency



MODELS	
VDC OUTPUT	
SINGLE	DUAL
3.3	±5
5	±12
5.2	±15
12	
15	

### DESCRIPTION

The SMSA Series™ of high frequency DC/DC converters offers a new standard of performance for low power, space qualified DC/DC converters. SMSA converters provide up to 5 watts output power over the full military temperature range of -55°C to +125°C with up to 76% efficiency. Thick-film hybrid techniques provide military/aerospace reliability levels and optimum miniaturization. The hermetically sealed case is only 1.075 by 1.075 inches — with a height of only 0.270 inches. Power density for the SMSA Series converters is 16 watts per cubic inch. The SMSA Series' small size, light weight, and hermetically sealed metal packages make them ideal for use in space, military, aerospace and other high reliability applications.

### SCREENING

SMSA converters offer the following screening options: Space Prototype (O), Class H, or Class K. Radiation tolerant to Radiation Hardness Assurance (RHA) levels of “-” (O), “P” or “R”, per MIL-STD-38534. Interpoint model numbers use an “O” in the RHA designator position to indicate the “-” (dash) Radiation Hardness Assurance level of MIL-PRF-38534, which is defined as “no RHA”. See “Class H and K, QML Screening” tables for more information.

### CONVERTER DESIGN

The SMSA converters are switching regulators that use a flyback converter design with a constant switching frequency of 500 kHz. They are regulated, isolated units using a pulse width modulated topology and built as high reliability thick-film hybrids. Isolation between input and output circuits is provided with a transformer in the forward power loop and an optical link in the feedback control loop. Excellent input line transient response and audio rejection is achieved by an advanced feed-forward compensation technique.

Negative output regulation is maintained by tightly coupled magnetics. Predictable current limit is accomplished by direct monitoring of the output load current, which results in a constant current output above the overload point. Internal input and output filters eliminate the need for external capacitors.

### WIDE VOLTAGE RANGE

The SMSA converters are designed to provide full power operation over the full 16 to 40 VDC voltage range. An undervoltage lockout feature keeps the converter shutdown below approximately 13 VDC to ensure smooth initialization.

### IMPROVED DYNAMIC RESPONSE

The SMSA feed-forward compensation system provides excellent dynamic response and noise rejection. Audio rejection is typically 50 dB. The minimum to maximum step line transient response is typically less than 1%.

### INHIBIT FUNCTION

SMSA converters provide an inhibit feature that can be used to disable internal switching and inhibit the unit's output. Inhibiting in this manner results in low standby current, and no generation of switching noise.

The converter is inhibited when the active low ( $\leq 0.8V$ ) is applied to the inhibit pin. The unit is enabled when the pin, which is internally connected to a pull-up resistor, is left unconnected or is connected to an open collector gate. The open circuit output voltage associated with the inhibit pin is 9 to 11 VDC. In the inhibit mode, a maximum of 4 mA must be sunk from the inhibit pin at 28 VDC input.

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### OPERATING CONDITIONS AND CHARACTERISTICS

#### Input Voltage Range

- 16 to 40 VDC continuous
- 50 V for up to 50 msec transient

#### Output Power

- 5 watts

#### Lead Soldering Temperature (10 sec per lead)

- 300°C

#### Storage Temperature Range (Case)

- -65°C to +135°C

#### Case Operating Temperature (Tc)

- -55°C to +125°C full power
- -55°C to +135°C absolute

#### Derating Output Power/Current (Tc)

- Linearly from 100% at 125°C to 0% at 135°C

#### Output Voltage Temperature Coefficient

- 100 ppm/°C typical

#### Input to Output Capacitance

- 50 pF typical

#### Isolation

- 100 megohm minimum at 500 VDC
- Any pin to case, except case pin
- Audio Rejection
- 50 dB typical

#### Conversion Frequency

- 500 kHz typical
- 450 kHz min, 600 kHz max

### INHIBIT

- Active low (output disabled)
  - Active low voltage  $\leq 0.8$  V max
  - Inhibit pin current 4 mA max
  - Referenced to input common
- Active high (output enabled)
  - Open collector
  - Open pin voltage, 9 - 11 Volts

### MECHANICAL AND ENVIRONMENTAL

#### Size (maximum)

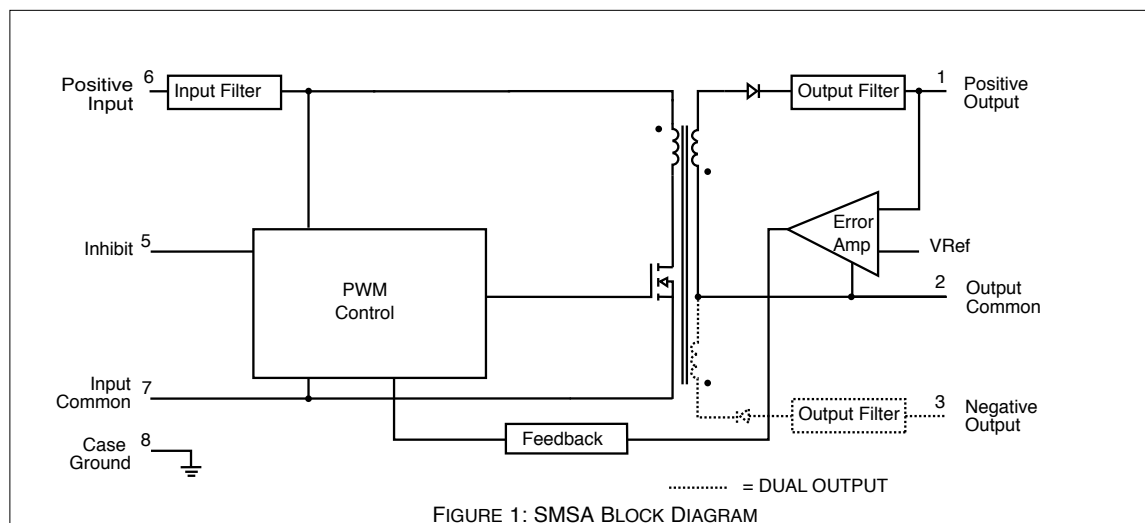
- 1.075 x 1.075 x 0.270 inches (27.31 x 27.31 x 6.86 mm)
- See case C1 for dimensions.

#### Weight (maximum)

- 15 grams typical

#### Screening

Space Prototype (O), Class H, or Class K are radiation tolerant to Radiation Hardness Assurance (RHA) levels of “-” (O) or “R”, per MIL-STD-38534. Interpoint model numbers use an “O” in the RHA designator position to indicate the “-” (dash) Radiation Hardness Assurance level of MIL-PRF-38534, which is defined as “no RHA”. See “Class H and K, MIL-PRF-38534 Screening” tables for more information. Available configurations: OO, HP, KP, HR, KR



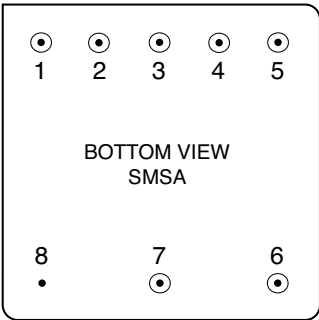
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### PIN OUT

Pin	Single Output	Dual Output
1	Positive Output	Positive Output
2	Output Common	Output Common
3	No connection	Negative Output
4	No connection	No connection
5	Inhibit	Inhibit
6	Positive Input	Positive Input
7	Input Common	Input Common
8	Case Ground	Case Ground

Squared corner on header and dot on top of cover indicate pin one.

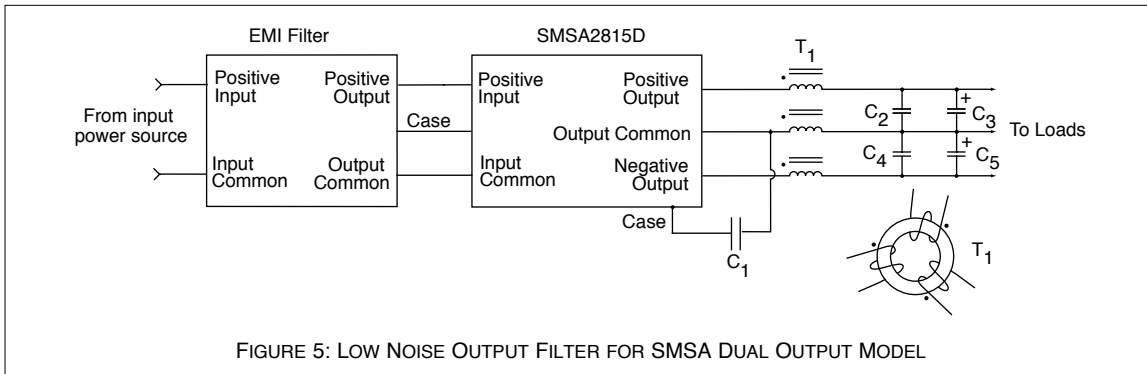
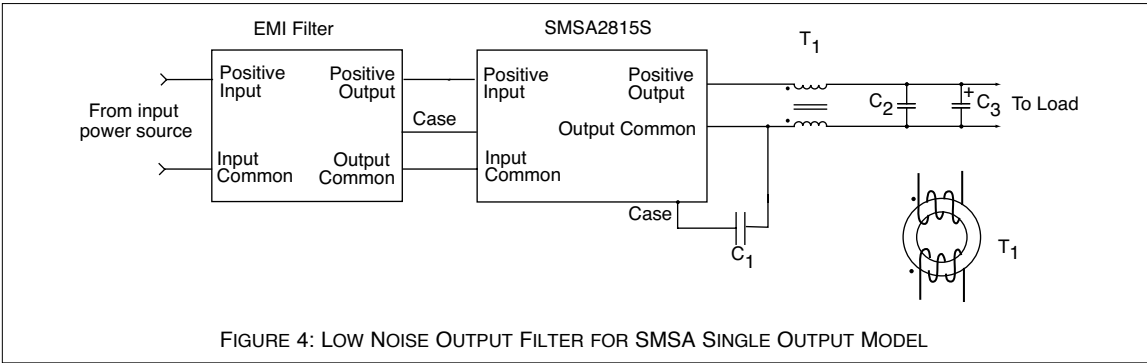
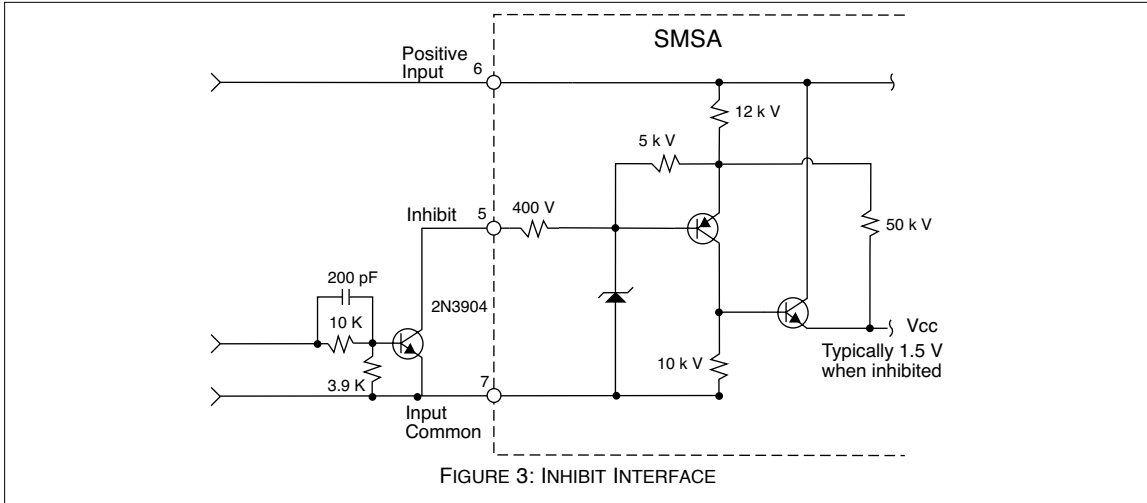


See case C1 for dimensions.

FIGURE 2: PIN OUT BOTTOM VIEW

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The filter suggestions in Figures 4 and 5 will further reduce the output ripple for systems requiring very low output noise.

C1 = 0.27  $\mu$ F ceramic capacitor, 500V

C2 = C4 = 6.8  $\mu$ F tantalum capacitor

C3 = C5 = 0.27  $\mu$ F ceramic capacitor

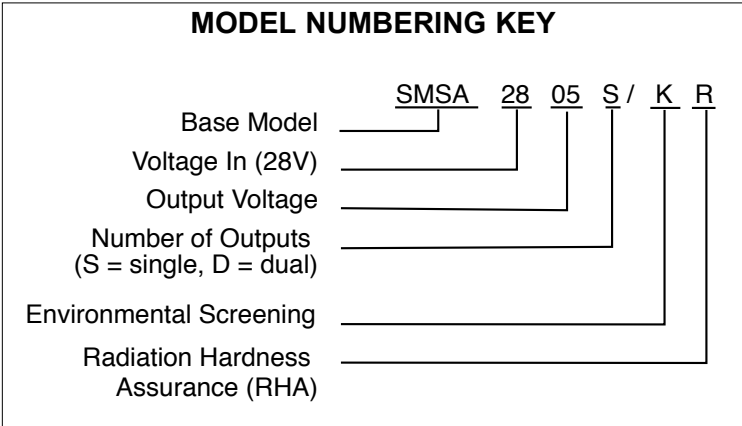
Single output: T1 = 15T #28 AWG winding on toroid,  $\mu_i = 5000$

Dual output: T2 = 10T #28 AWG winding on toroid,  $\mu_i = 5000$

For best results, make interconnections as short as possible.

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### SMD NUMBERS

STANDARD MICRO-CIRCUIT DRAWING (SMD)	SMSA SERIES SIMILAR PART
5962R0621001KXC	SMSA283R3S/KR
5962R9309202KXC	SMSA2805S/KR
IN PROCESS	SMSA285R2S/KR
5962R9309302KXC	SMSA2812S/KR
5962R9309402KXC	SMSA2815S/KR
5962R9308902KXC	SMSA2812D/KR
5962R9309002KXC	SMSA2815D/KR

The SMD number shown is for Class H screening and no Radiation Hardness Assurance (RHA) level. See the SMD for the numbers for other screening and radiation levels. For exact specifications for an SMD product, refer to the SMD drawing. Call your Interpoint representative for status on the SMSA SMD releases which are "in process." SMDs can be downloaded from:  
<http://www.dsccl.dla.mil/programs/smcr>

### MODEL SELECTION

SMSA28      \_\_\_\_\_      \_\_\_\_\_      /      \_\_\_\_\_      \_\_\_\_\_  
 Base model      V<sub>out</sub> value      number of outputs      screening      RHA

Choose one from each of the following rows

V <sub>out</sub> value	for singles: 3R3, 5, 5R2, 12, 15    for duals: 5, 12, 15 "R" = decimal point, 3R3 = 3.3VDC
Number of outputs	S (single) or D (dual)
Screening	Q* - Space prototype, H, K
Radiation hardness assurance (RHA)	Q* - Space prototype, P, R

\*Interpoint model numbers use an "O" in the RHA designator position to indicate the "-" (dash) Radiation Hardness Assurance level of MIL-PRF-38534, which is defined as "no RHA"

# SMSA Single and Dual DC/DC Converters

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Electrical Characteristics: 25°C Tc, 28 VDC Vin, 100% load, radiation level O, unless otherwise specified.

SINGLE OUTPUT MODELS		SMSA283R3S			SMSA2805S			SMSA285R2S			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	TC = -55°C TO +125°C	3.25	3.30	3.35	4.95	5.00	5.05	5.15	5.20	5.25	VDC
OUTPUT CURRENT	TC = -55°C TO +125°C VIN = 16 TO 40 VDC	0	—	1200	0	—	1000	0	—	462	mA
OUTPUT POWER	TC = -55°C TO +125°C VIN = 16 TO 40 VDC	—	—	4	—	—	5	—	—	5	W
OUTPUT RIPPLE	10 KHZ - 2 MHZ	—	300	600	—	150	450	—	150	450	mV p-p
LINE REGULATION	VIN = 16 TO 40 VDC TC = -55°C TO +125°C	—	10	50	—	10	50	—	10	50	mV
LOAD REGULATION	NO LOAD TO FULL TC = -55°C TO +125°C	—	10	50	—	10	50	—	10	50	mV
INPUT VOLTAGE	CONTINUOUS NO LOAD TO FULL TC = -55°C TO +125°C	16	28	40	16	28	40	16	28	40	VDC
	TRANSIENT <sup>1</sup> 50 ms	0	—	50	0	—	50	0	—	50	V
INPUT CURRENT	NO LOAD	—	35	60	—	35	60	—	35	60	mA
	FULL LOAD	—	250	—	—	250	—	—	250	—	
	INHIBITED	—	3	5	—	3	5	—	3	5	
INPUT RIPPLE CURRENT <sup>2</sup>	10 KHZ - 10 MHZ TC = -55°C TO +125°C	—	50	200	—	50	200	—	50	200	mA p-p
		—	60	300	—	60	300	—	60	300	
EFFICIENCY		60	—	—	68	74	—	68	74	—	%
LOAD FAULT <sup>1, 2</sup>	SHORT CIRCUIT POWER DISSIPATION	—	1.5	2.4	—	1.5	2.0	—	1.5	2.0	W
	RECOVERY	—	12.5	25	—	12.5	25	—	12.5	25	ms
STEP LOAD RESPONSE	50% - 100% - 50% TRANSIENT	—	200	500	—	200	500	—	200	500	mV pk
	RECOVERY <sup>1, 3</sup>	—	200	500	—	200	500	—	200	500	μs
STEP LINE RESPONSE <sup>1, 3</sup>	TRANSIENT 16 - 40 VDC 40 - 16 VDC	—	200	500	—	200	500	—	200	500	mV pk
		—	200	500	—	200	500	—	200	500	
	RECOVERY 16 - 40 VDC 40 - 16 VDC	—	400	1000	—	400	1000	—	400	1000	μs
		—	400	1000	—	400	1000	—	400	1000	
START-UP <sup>3</sup>	DELAY	—	10	75	—	10	75	—	10	75	ms
	OVERSHOOT <sup>1</sup>										

### Notes

1. Guaranteed by design, not tested.

2. Indefinite short circuit protection not guaranteed above 125°C (case).

3. Recovery time is measured from application of the transient to point at which V<sub>OUT</sub> is within 1% of V<sub>OUT</sub> at final value.

# SMSA Single and Dual DC/DC Converters

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Electrical Characteristics: 25°C Tc, 28 VDC Vin, 100% load, radiation level O, unless otherwise specified.

SINGLE OUTPUT MODELS		SMSA2812S			SMSA2815S			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	TC = -55°C TO +125°C	11.88	12.00	12.12	14.85	15.00	15.15	VDC
OUTPUT CURRENT	TC = -55°C TO +125°C VIN = 16 TO 40 VDC	—	—	417	—	—	333	mA
OUTPUT POWER	TC = -55°C TO +125°C VIN = 16 TO 40 VDC	—	—	5	—	—	5	W
OUTPUT RIPPLE	10 KHZ - 2 MHZ	—	125	500	—	150	600	mV p-p
LINE REGULATION	VIN = 16 TO 40 VDC TC = -55°C TO +125°C	—	10	50	—	10	50	mV
LOAD REGULATION	NO LOAD TO FULL TC = -55°C TO +125°C	—	10	50	—	10	50	mV
INPUT VOLTAGE	CONTINUOUS NO LOAD TO FULL TC = -55°C TO +125°C	16	28	40	16	28	40	VDC
	TRANSIENT <sup>1</sup> 50 ms	0	—	50	0	—	50	V
INPUT CURRENT	NO LOAD	—	35	60	—	35	60	mA
	FULL LOAD	—	235	—	—	235	—	
	INHIBITED	—	3	5	—	3	5	
INPUT RIPPLE CURRENT	10 KHZ - 10 MHZ TC = -55°C TO +125°C	—	50	200	—	50	200	mA p-p
		—	60	300	—	60	300	
EFFICIENCY		69	74	—	—	74	—	%
LOAD FAULT <sup>1, 2</sup>	SHORT CIRCUIT POWER DISSIPATION	—	1.2	1.9	—	1.2	1.8	W
	RECOVERY	—	1	10	—	1	10	ms
STEP LOAD RESPONSE	50% - 100% - 50% TRANSIENT	—	300	750	—	400	1000	mV pk
	RECOVERY <sup>1, 3</sup>	—	400	1000	—	400	1000	μs
STEP LINE RESPONSE <sup>1, 3</sup>	TRANSIENT 16 - 40 VDC 40 - 16 VDC	—	200	800	—	200	500	mV pk
		—	250	600	—	250	500	
	RECOVERY 16 - 40 VDC 40 - 16 VDC	—	700	1300	—	500	1300	μs
		—	700	1300	—	500	1300	
START-UP <sup>3</sup>	DELAY	—	10	75	—	10	75	ms
	OVERSHOOT <sup>1</sup>	—	0	500	—	0	500	mV pk

Notes

1. **Guaranteed by design, not tested.**

2. Indefinite short circuit protection not guaranteed above 125°C (case).

3. Recovery time is measured from application of the transient to point at which V<sub>out</sub> is within 1% of V<sub>out</sub> at final value.

# SMSA Single and Dual DC/DC Converters

## 28 VOLT INPUT – 5 WATT - PENDING REVISION F RELEASE

Electrical Characteristics: 25°C Tc, 28 VDC Vin, 100% load, radiation level O, unless otherwise specified.

DUAL OUTPUT MODELS		SMSA2805D	SMSA2812D	SMSA2815D	UNITS	
PARAMETER	CONDITIONS	MIN TYP MAX	MIN TYP MAX	MIN TYP MAX		
OUTPUT VOLTAGE	+ V <sub>OUT</sub>	4.95 5.00 5.05	11.88 12.00 12.12	14.85 15.00 15.15	VDC	
	- V <sub>OUT</sub>	4.9 5.0 5.1	11.76 12.00 12.24	14.70 15.00 15.30		
OUTPUT CURRENT <sup>2</sup>	TC = -55°C TO +125°C VIN = 16 TO 40 VDC	- ±500 800	- ±208 333	- ±167 267	mA	
OUTPUT POWER <sup>2</sup>	TC = -55°C TO +125°C VIN = 16 TO 40 VDC	- - 5	- - 5	- - 5	W	
OUTPUT RIPPLE	10 KHZ - 2 MHz	- - 300	- 80 300	- 120 300	mV p-p	
LINE REGULATION	VIN = 16 TO 40 VDC TC = -55°C TO +125°C	+ V <sub>OUT</sub>	- 20 100	- 20 100	- 10 50	mV
		- V <sub>OUT</sub>	- 40 200	- 40 200	- 40 180	
LOAD REGULATION	NO LOAD TO FULL TC = -55°C TO +125°C	+ V <sub>OUT</sub>	- 10 120	- 10 120	- 10 50	
		- V <sub>OUT</sub>	- 100 400	- 100 400	- 50 200	
CROSS REGULATION <sup>3</sup>	+P <sub>O</sub> = 30-70%, -P <sub>O</sub> = 70-30% -P <sub>O</sub> = 30-70%, +P <sub>O</sub> = 70-30%	- 5 8	- 3.7 6	- 3 6	%	
INPUT VOLTAGE	CONTINUOUS NO LOAD TO FULL	16 28 40	16 28 40	16 28 40	VDC	
	TRANSIENT <sup>1</sup> 50 ms	- - 50	- - 50	- - 50	V	
INPUT CURRENT	NO LOAD	- 30 50	- 40 63	- 38 60	mA	
	FULL LOAD	- 248 -	- 235 -	- 235 -		
	INHIBITED	- 3 5	- 3 5	- 3 5		
INPUT RIPPLE CURRENT	10 KHZ - 10 MHz TC = -55°C TO +125°C	- 50 200	- 50 200	- 50 200	mA p-p	
		- 60 300	- 60 300	- 60 300		
EFFICIENCY		65 70 -	67 73 -	68 73 -	%	
LOAD FAULT <sup>1, 4</sup>	SHORT CIRCUIT POWER DISSIPATION	- 1.3 2.1	- 1.3 1.7	- 1.3 1.6	W	
	RECOVERY	- - 50	- 1 30	- 1 30	ms	
STEP LOAD RESPONSE	50% - 100% - 50% TRANSIENT	- ±200 ±550	- ±200 ±550	- ±200 ±600	mV pk	
	RECOVERY <sup>1, 5</sup>	- 200 500	- 200 500	- 200 500	μs	
STEP LINE RESPONSE <sup>1, 5</sup>	TRANSIENT 16 - 40 VDC 40 - 16 VDC	- ±200 ±500	- ±200 ±500	- ±600 ±1500	mV pk	
		- ±200 ±500	- ±200 ±500	- ±600 ±1500		
	RECOVERY 16 - 40 VDC 40 - 16 VDC	- 300 750	- 300 750	- 500 1200	μs	
		- 800 2000	- 800 2000	- 500 1200		
START-UP	DELAY	- 10 30	- 10 30	- 10 25	ms	
	OVERSHOOT <sup>1</sup>	- 0 500	- 0 500	- 0 500	mV pk	

### Notes

1. **Guaranteed but not tested.**
2. Up to 4 watts (80% of full power) is available from either output providing the opposite output is carrying 20% of total power.
3. Shows regulation effect on the minus output during the defined cross loading conditions, with 80% and 20% referring to the total output power of the converter. See Figures 15 and 16.
4. Indefinite short circuit protection not guaranteed above 125°C (case).
5. Recovery time is measured from application of the transient to point at which V<sub>out</sub> is within 1% of V<sub>out</sub> at final value.



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Typical Performance Curves: 25°C Tc, 28 VDC Vin, 100% load, unless otherwise specified.

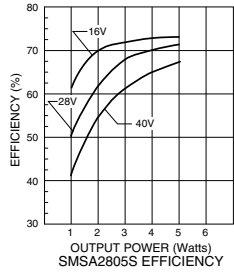


FIGURE 6

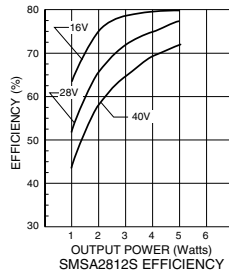


FIGURE 7

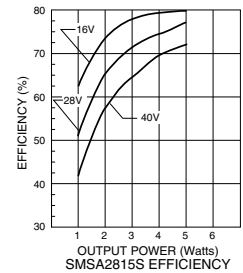


FIGURE 8

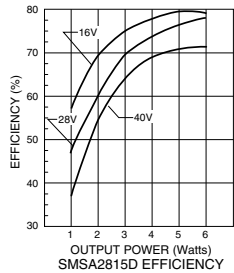


FIGURE 9

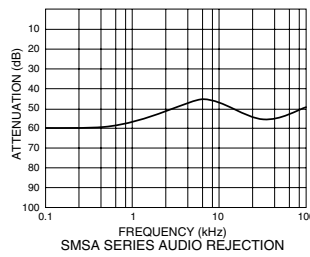


FIGURE 10

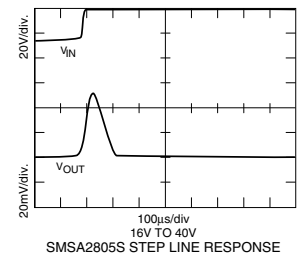


FIGURE 11

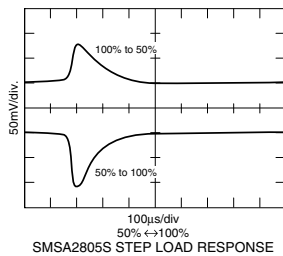


FIGURE 12

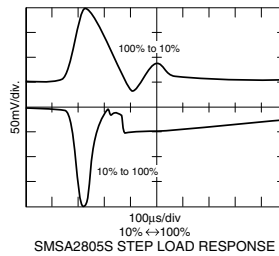


FIGURE 13

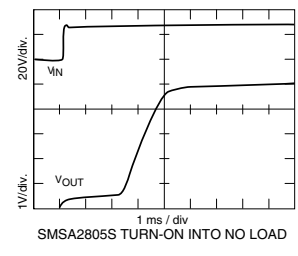
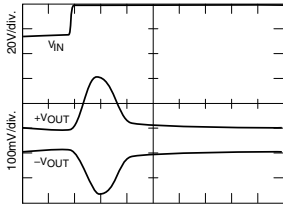


FIGURE 14

# SMSA Single and Dual DC/DC Converters

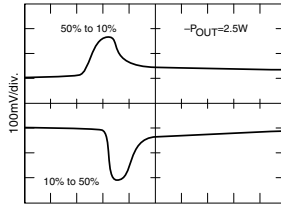
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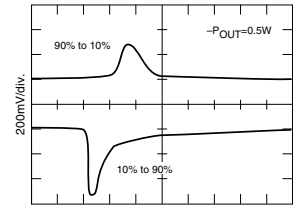
SMSA2815D INPUT STEP LINE RESPONSE

FIGURE 15



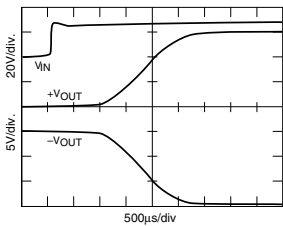
SMSA2815D +V<sub>O</sub> STEP LOAD RESPONSE

FIGURE 16



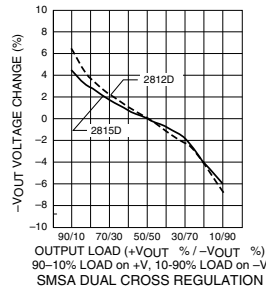
SMSA2815D +V<sub>O</sub> STEP LOAD RESPONSE

FIGURE 17



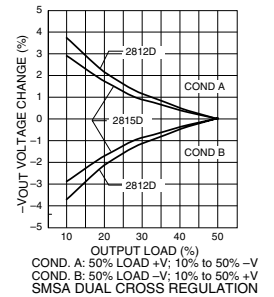
SMSA2815D TURN-ON INTO NO LOAD

FIGURE 18



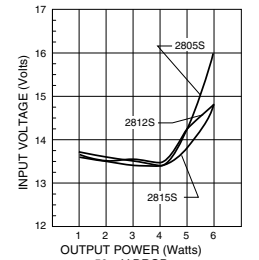
SMSA DUAL CROSS REGULATION

FIGURE 19



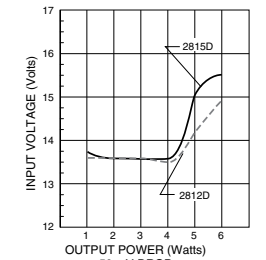
SMSA DUAL CROSS REGULATION

FIGURE 20



SMSA LOW LINE DROPOUT VS. LOAD

FIGURE 21



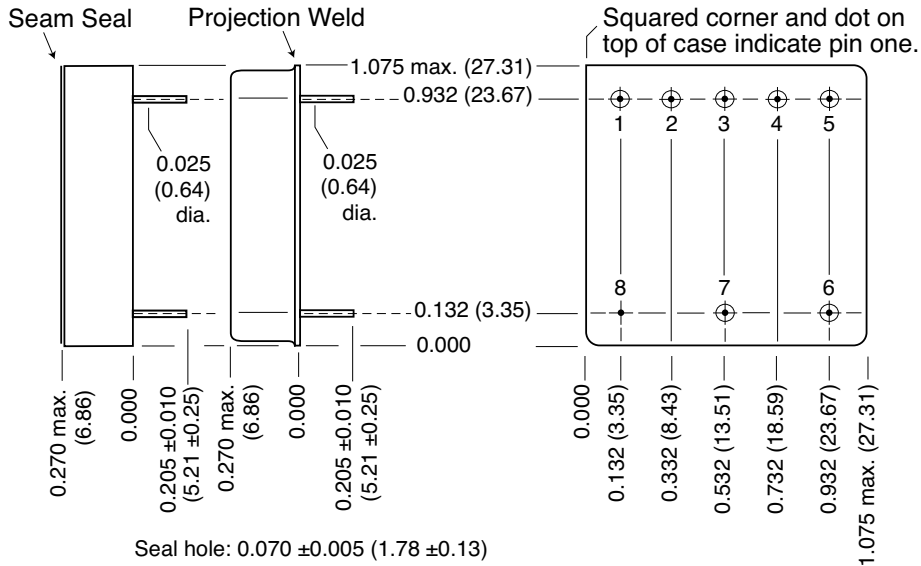
SMSA LOW LINE DROPOUT VS. LOAD

FIGURE 22

# SMSA Single and Dual DC/DC Converter Cases

## 28 VOLT INPUT – 5 WATT - PENDING REVISION F RELEASE

### BOTTOM VIEW CASE C1



#### Case dimensions in inches (mm)

Tolerance ±0.005 (0.13) for three decimal places  
±0.01 (0.3) for two decimal places  
unless otherwise specified

#### 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

#### Materials

Header Cold Rolled Steel/Nickel/Gold  
Cover Cold Rolled Steel/Nickel  
Pins Copper/Nickel/Gold compression glass seal

Case C1, Rev C, 20060116

Please refer to the numerical dimensions for accuracy. All information is believed to be accurate, but no responsibility is assumed for errors or omissions. Interpoint reserves the right to make changes in products or specifications without notice.  
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FIGURE 23: CASE C1

# SMSA Single and Dual DC/DC Converters

## 28 VOLT INPUT – 5 WATT - PENDING REVISION F RELEASE

### CLASS H AND K, MIL-PRF-38534 ELEMENT EVALUATION

COMPONENT-LEVEL TEST PERFORMED	SPACE PROTOTYPE (O) NON-QML <sup>1</sup>		CLASS H QML		CLASS K QML	
	M/S <sup>2</sup>	P <sup>3</sup>	M/S <sup>2</sup>	P <sup>3</sup>	M/S <sup>2</sup>	P <sup>3</sup>
Element Electrical	yes	no	yes	yes	yes	yes
Element Visual	no	no	yes	yes	yes	yes
Internal Visual	no	N/A	yes	N/A	yes	N/A
Temperature Cycling	no	no	no	no	yes	yes
Constant Acceleration	no	no	no	no	yes	yes
Interim Electrical	no	N/A	no	N/A	yes	N/A
Burn-in	no	N/A	no	N/A	yes	N/A
Post Burn-in Electrical	no	N/A	no	N/A	yes	N/A
Steady State Life	no	N/A	no	N/A	yes	N/A
Voltage Conditioning Aging	N/A	no	N/A	no	N/A	yes
Visual Inspection	no	no	N/A	no	N/A	yes
Final Electrical	no	no	yes	yes	yes	yes
Wire Bond Evaluation <sup>4</sup>	no	no	yes	yes	yes	yes
SEM	no	N/A	no	N/A	yes	N/A
SLAM™/C-SAM: Input capacitors only (Add'l test, not req. by H or K)	no	no	no	yes	no	yes

Notes:

1. Non-QML products do not meet all of the requirements of MIL-PRF-38534.
2. M/S = Active components (Microcircuit and Semiconductor Die)
3. P = Passive components
4. Not applicable to EMI filters that have no wirebonds.

Definitions:

Element Evaluation: Component testing/screening per MIL-STD-883 as determined by MIL-PRF-38534

SEM: Scanning Electron Microscopy

SLAM™: Scanning Laser Acoustic Microscopy

C-SAM: C - Mode Scanning Acoustic Microscopy

# SMSA Single and Dual DC/DC Converters

## 28 VOLT INPUT – 5 WATT - PENDING REVISION F RELEASE

### CLASS H AND K, MIL-PRF-38534 ENVIRONMENTAL SCREENING

END ITEM-LEVEL TEST PERFORMED	SPACE PROTOTYPE (O) NON-QML <sup>1</sup>	CLASS H QML	CLASS K QML
Non-destruct bond pull <sup>2</sup> Method 2023	no	yes <sup>3</sup>	yes
Pre-cap Inspection Method 2017, 2032	yes	yes	yes
Temperature Cycle (10 times) Method 1010, Cond. C, -65°C to 150°C, ambient	yes	yes	yes
Constant Acceleration Method 2001, 3000 g	yes	yes	yes
PIND Test Method 2020, Cond. A	no	yes <sup>3</sup>	yes
Pre burn-in test	yes	yes	yes
Burn-in Method 1015, 125°C case, typical			
96 hours	yes	no	no
160 hours	no	yes	no
2 x 160 hours (includes mid-BI test)	no	no	yes
Final Electrical Test MIL-PRF-38534 Group A, Subgroups 1 through 6 -55°C, +25°C, +125°C case	yes	yes	yes
Radiography Method 2012	N/A	N/A	yes
Post Radiography Electrical Test Room temperature	N/A	N/A	yes <sup>3</sup>
Hermeticity Test Fine Leak, Method 1014, Cond. A Gross Leak, Method 1014, Cond. C	yes yes	yes yes	yes yes
Final visual inspection Method 2009	yes	yes	yes

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

Notes:

1. Space Prototype (O), non-QML products, do not meet all of the requirements of MIL-PRF-38534.
2. Not applicable to EMI filters that have no wirebonds.
3. Not required by DSCC but performed to assure product quality.

# SMSA Single and Dual DC/DC Converters

28 VOLT INPUT – 5 WATT - PENDING REVISION F RELEASE

## CLASS H AND K, MIL-PRF-38534 RADIATION ASSURANCE

RADIATION HARDNESS ASSURANCE LEVELS	ENVIRONMENTAL SCREENING LEVELS		
	SPACE PROTOTYPE (O) NON-QML <sup>2</sup>	CLASS H QML	CLASS K QML
O <sup>1</sup> : Standard, no radiation guarantee	OO	HO	N/A
P <sup>3</sup> : Radiation tolerant–Tested lots up to 30 K Rads (Si) total dose SEU guarantee up to 40 MeV	N/A	HP	KP
R <sup>3</sup> : Radiation tolerant–Tested lots up to 100 K Rads (Si) total dose SEU guarantee up to 40 MeV	N/A	HR	KR

Notes:

- Interpoint model numbers use an "O" in the RHA designator position to indicate the "-" (dash) Radiation Hardness Assurance level of MIL-PRF-38534, which is defined as "no RHA".
- Space Prototype (O), non-QML, products do not meet all of the requirements of MIL-PRF-38534.
- Redmond site, Interpoint, has a Radiation Hardness assurance plan on file with DSCC.