DVST2800T Series

HIGH RELIABILITY DC-DC CONVERTERS

DESCRIPTION

The DVST series of high reliability DC-DC converters contains internal EMI filtering and meets MIL-STD-461C and MIL-STD-461D for conducted emissions, providing a one piece COTS solution for power conversion applications. The DVST series is operable over a wide (-55°C to +100°C) temperature range with no power derating. Unique to the DVST series is a magnetic feedback circuit that is radiation immune. The three low noise outputs are fully isolated from each other, allowing for maximum flexibility in system design.

This product may incorporate one or more of the following U.S. patents:

5,784,266
5,790,389
5,963,438
5,999,433
6,005,780
6,084,792
6,118,673

FEATURES

- Up to 30 Watts Output Power
- Three Fully Isolated Outputs
- Wide Input Voltage Range: 15 to 50 Volts per MIL-STD-704 with 80 Volt Transient for 1 sec
- Internal Filter Meets MIL-STD-461C and MIL-STD-461D Conducted Emissions Requirements
- NO Use of Optoisolators
- Undervoltage Lockout
- Indefinite Short Circuit Protection
- Current Limit Protection
- Low Output Noise
- Custom Versions Available
- Low Profile (0.380 inches) Package
- Military Environmental Screening Available

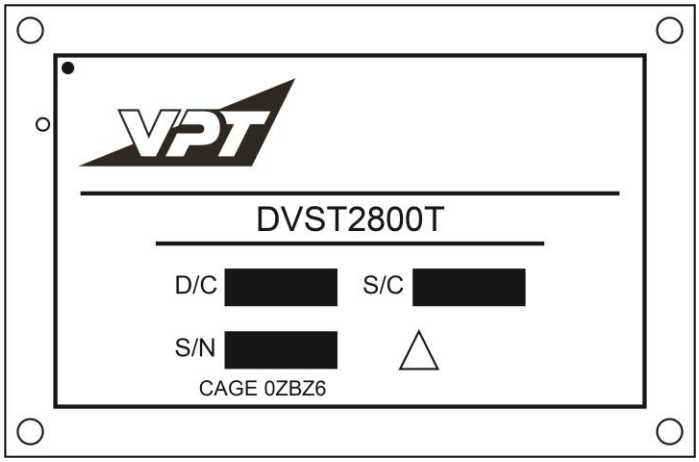


Figure 1 – DVST2800T DC-DC Converter
(Not To Scale)

http://www.vptpower.com
Sales Information:
Phone: (425) 353-3010
Fax: (425) 353-4030
E-mail: vptsales@vptpower.com

SPECIFICATIONS (T_{CASE} = -55°C to +100°C, V_{IN} = +28V ± 5%, Full Load, Unless Otherwise Specified)

ABSOLUTE MAXIMUM RATINGS			
Input Voltage (Continuous)	50 V_{DC}	Operating Case Temperature	-55°C to +100°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-55°C to +125°C
Output Power[1]	30 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T_{CASE} = +100°C)	15 Watts	Weight (Maximum)	100 Grams

INPUT					
Parameter	**Conditions**	**DVST2800T**			**Units**
		Min	**Typ**	**Max**	
STATIC					
INPUT Voltage	Continuous	15	28	50	V
	Transient, 1 sec			80	V
Current	Inhibited		1.6	5.0	mA
	No Load		65	100	mA
Inhibit Pin Input		0		1.5	V
Inhibit Pin Open Circuit Voltage			11.0	14.0	V
UVLO Turn On				14.9	V
UVLO Turn Off		11.8			V
SWITCHING FREQUENCY		225		325	kHz
ISOLATION Input / Output / Case	500 V_{DC}	100			MΩ

MAIN OUTPUT									
Parameter		**Conditions**	**DVST283R3xxyyT**			**DVST285xxyyT**			**Units**
			Min	**Typ**	**Max**	**Min**	**Typ**	**Max**	
STATIC									
OUTPUT Voltage	V_{OUT}	T_{CASE} = 25°C	3.26	3.30	3.34	4.95	5.00	5.05	V
	V_{OUT}	T_{CASE} = -55°C to +100°C	3.23	3.30	3.37	4.90	5.00	5.10	V
Power[2]			0		15	0		20	W
Current[2]	V_{OUT}		0		4.5	0		4.0	A
Ripple Voltage	V_{OUT}	Full Load, 20Hz to 10MHz		20	50		20	50	mV_{p-p}
Line Regulation	V_{OUT}	V_{IN} = 15V to 50V		5	20		5	20	mV
Load Regulation	V_{OUT}	No Load to Full Load		10	30		10	30	mV
EFFICIENCY				73			76		%
CAPACITIVE LOAD					1000			1000	µF
DYNAMIC									
Load Step Output Transient	V_{OUT}	Half Load to Full Load		200	400		200	400	mV_{PK}
Load Step Recovery[3]				200	400		200	400	µSec
Line Step Output Transient	V_{OUT}	V_{IN} = 15V to 50V		400	600		400	600	mV_{PK}
Line Step Recovery[3]				400	600		400	600	µSec
Turn On Delay	V_{OUT}	V_{IN} = 0V to 28V		15	20		15	20	mSec
Turn On Overshoot				0	30		0	50	mV_{PK}

SPECIFICATIONS (T_{CASE} = -55°C to +100°C, V_{IN} = +28V ± 5%, Full Load, Unless Otherwise Specified)

ABSOLUTE MAXIMUM RATINGS			
Input Voltage (Continuous)	50 V_{DC}	Operating Case Temperature	-55°C to +100°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-55°C to +125°C
Output Power[1]	30 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T_{CASE} = +100°C)	15 Watts	Weight (Maximum)	100 Grams

MAIN OUTPUT									
Parameter		Conditions	DVST281R8xxyyT			DVST286R25xxyyT			Units
			Min	Typ	Max	Min	Typ	Max	
STATIC									
OUTPUT Voltage	V_{OUT}	T_{CASE} = 25°C	1.78	1.80	1.82	6.19	6.25	6.31	V
	V_{OUT}	T_{CASE} = -55°C to +100°C	1.76	1.80	1.84	6.12	6.25	6.38	V
Power[2]			0		13.5	0		20	W
Current[2]	V_{OUT}		0		7.5	0		3.2	A
Ripple Voltage	V_{OUT}	Full Load, 20Hz to 10MHz		20	75		20	50	mV_{p-p}
Line Regulation	V_{OUT}	V_{IN} = 15V to 50V		5	20		5	20	mV
Load Regulation	V_{OUT}	No Load to Full Load		10	30		10	30	mV
EFFICIENCY				66			76		%
CAPACITIVE LOAD					1000			1000	µF
DYNAMIC									
Load Step Output Transient	V_{OUT}	Half Load to Full Load		200	400		200	400	mV_{PK}
Load Step Recovery[3]				500	750		200	400	µSec
Line Step Output Transient	V_{OUT}	V_{IN} = 15V to 50V		400	600		400	600	mV_{PK}
Line Step Recovery[3]				400	750		400	600	µSec
Turn On Delay	V_{OUT}	V_{IN} = 0V to 28V		15	20		15	20	mSec
Turn On Overshoot				0	20		0	50	mV_{PK}

SPECIFICATIONS (T_{CASE} = -55°C to +100°C, V_{IN} = +28V ± 5%, Full Load, Unless Otherwise Specified)

ABSOLUTE MAXIMUM RATINGS			
Input Voltage (Continuous)	50 V_{DC}	Operating Case Temperature	-55°C to +100°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-55°C to +125°C
Output Power[1]	30 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T_{CASE} = +100°C)	15 Watts	Weight (Maximum)	100 Grams

MAIN OUTPUT						
Parameter		Conditions	DVST2812xxyyT			Units
			Min	Typ	Max	
STATIC						
OUTPUT Voltage	V_{OUT}	T_{CASE} = 25°C	11.88	12.00	12.12	V
	V_{OUT}	T_{CASE} = -55°C to +100°C	11.76	12.00	12.24	V
Power[2]					20	W
Current[2]	V_{OUT}				1.67	A
Ripple Voltage	V_{OUT}	Full Load, 20Hz to 10MHz			50	mV_{p-p}
Line Regulation	V_{OUT}	V_{IN} = 15V to 50V			50	mV
Load Regulation	V_{OUT}	No Load to Full Load			50	mV
EFFICIENCY				76		%
CAPACITIVE LOAD					500	µF
DYNAMIC						
Load Step Output Transient	V_{OUT}	Half Load to Full Load		200	400	mV_{PK}
Load Step Recovery[3]				200	400	µSec
Line Step Output Transient	V_{OUT}	V_{IN} = 15V to 50V		400	600	mV_{PK}
Line Step Recovery[3]				200	600	µSec
Turn On Delay	V_{OUT}	V_{IN} = 0V to 28V		15	20	mSec
Turn On Overshoot				0	50	mV_{PK}

SPECIFICATIONS (T_{CASE} = -55°C to +100°C, V_{IN} = +28V ± 5%, Full Load, Unless Otherwise Specified)

ABSOLUTE MAXIMUM RATINGS			
Input Voltage (Continuous)	50 V_{DC}	Operating Case Temperature	-55°C to +100°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-55°C to +125°C
Output Power[1]	30 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T_{CASE} = +100°C)	15 Watts	Weight (Maximum)	100 Grams

AUXILIARY OUTPUT										
Parameter		Conditions	DVST28x12yyT			DVST28x15yyT			Units
			Min	Typ	Max	Min	Typ	Max	
STATIC										
OUTPUT Voltage	V_{OUT}	T_{CASE} = 25°C	11.76	12.00	12.24	14.70	15.00	15.30	V
	V_{OUT}	T_{CASE} = -55°C to +100°C	11.64	12.00	12.36	14.55	15.00	15.45	V
Power[2]			0		5	0		5	W
Current[2]	V_{OUT}		0		0.42	0		0.33	A
Ripple Voltage	V_{OUT}	Full Load, 20Hz to 10MHz		25	50		25	50	mV_{p-p}
Line Regulation	V_{OUT}	V_{IN} = 15V to 50V		5	20		5	20	mV
Load Regulation	V_{OUT}	No Load to Full Load		10	50		10	50	mV
CAPACITIVE LOAD					500			500	µF
DYNAMIC										
Load Step Output Transient	V_{OUT}	Half Load to Full Load		200	400		200	400	mV_{PK}
Load Step Recovery[3]				100	200		100	200	µSec
Line Step Output Transient	V_{OUT}	V_{IN} = 15V to 50V		100	400		100	400	mV_{PK}
Line Step Recovery[3]				100	200		100	200	µSec
Turn On Delay	V_{OUT}	V_{IN} = 0V to 28V		2	20		2	20	mSec
Turn On Overshoot				100	250		100	250	mV_{PK}

SPECIFICATIONS (T_{CASE} = -55°C to +100°C, V_{IN} = +28V ± 5%, Full Load, Unless Otherwise Specified)

ABSOLUTE MAXIMUM RATINGS			
Input Voltage (Continuous)	50 V_{DC}	Operating Case Temperature	-55°C to +100°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-55°C to +125°C
Output Power[1]	30 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T_{CASE} = +100°C)	15 Watts	Weight (Maximum)	100 Grams

AUXILIARY OUTPUT										
Parameter		Conditions	DVST28x3R3yyT			DVST28x5yyT			Units
			Min	Typ	Max	Min	Typ	Max	
STATIC										
OUTPUT Voltage	V_{OUT}	T_{CASE} = 25°C	3.23	3.30	3.37	4.90	5.00	5.10	V
	V_{OUT}	T_{CASE} = -55°C to +100°C	3.20	3.30	3.40	4.85	5.00	5.15	V
Power[2]					4			5	W
Current[2]	V_{OUT}				1.2			1.0	A
Ripple Voltage	V_{OUT}	Full Load, 20Hz to 10MHz		25	50		25	50	mV_{p-p}
Line Regulation	V_{OUT}	V_{IN} = 15V to 50V		5	20		5	20	mV
Load Regulation	V_{OUT}	No Load to Full Load		10	30		10	30	mV
CAPACITIVE LOAD					1000			1000	µF
DYNAMIC										
Load Step Output Transient	V_{OUT}	Half Load to Full Load		100	200		100	200	mV_{PK}
Load Step Recovery[3]				100	200		100	200	µSec
Line Step Output Transient	V_{OUT}	V_{IN} = 15V to 50V		100	200		100	200	mV_{PK}
Line Step Recovery[3]				100	200		100	200	µSec
Turn On Delay	V_{OUT}	V_{IN} = 0V to 28V		2	20		2	20	mSec
Turn On Overshoot				0	50		0	50	mV_{PK}

Notes: 1. Dependant on output voltage.
2. Derate linearly from full rating at 100°C to 0 at 110°C.
3. Time for output voltage to settle to within 1% of its nominal value.

CONNECTION DIAGRAM

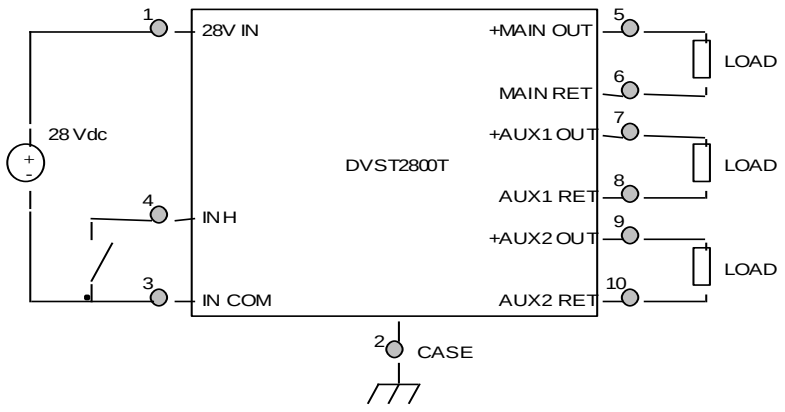


Figure 2

BLOCK DIAGRAM

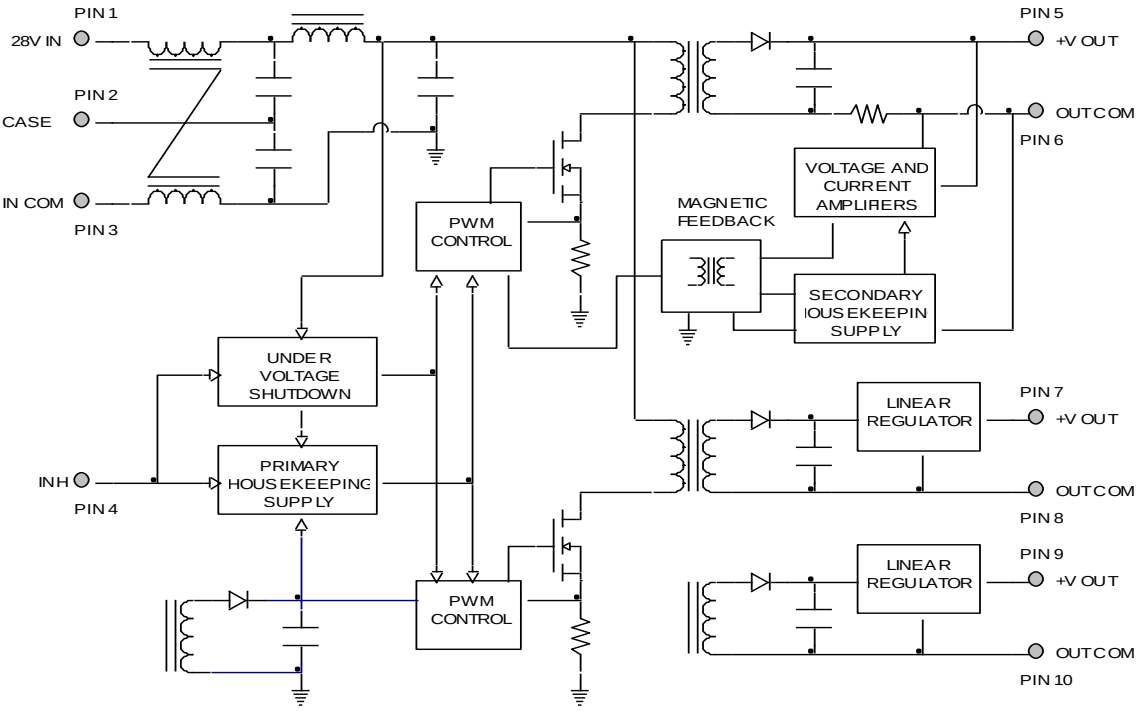


Figure 3

INHIBIT DRIVE CONNECTION DIAGRAMS

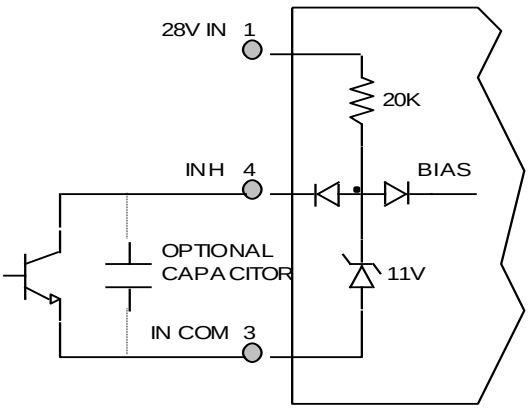


Figure 4 – Internal Inhibit Circuit and Recommended Drive
(Shown with optional capacitor for turn-on delay)

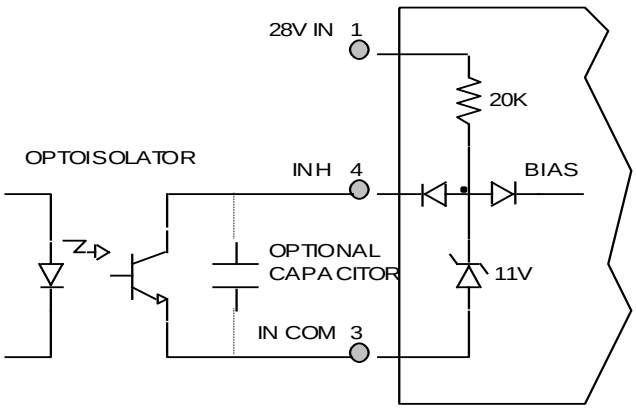


Figure 5 – Isolated Inhibit Drive
(Shown with optional capacitor for turn-on delay)

EFFICIENCY PERFORMANCE CURVES (T_{CASE} = 25°C, Full Load, Unless Otherwise Specified)

------- V_{IN} = 15V	——— V_{IN} = 28V	– – – – – V_{IN} = 50V

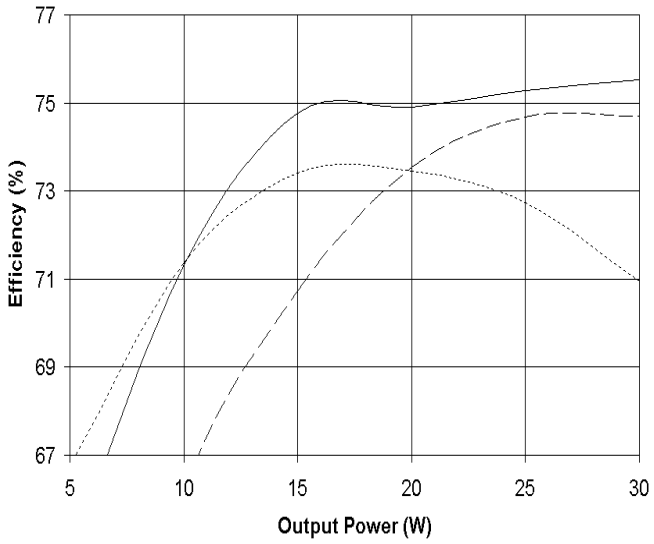


Figure 6 – DVST2851212T
Efficiency (%) vs. Output Power (W)

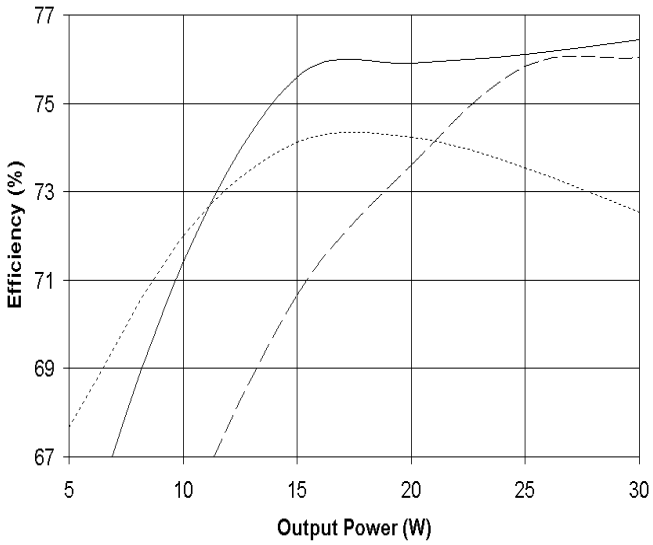


Figure 7 – DVST2851515T
Efficiency (%) vs. Output Power (W)

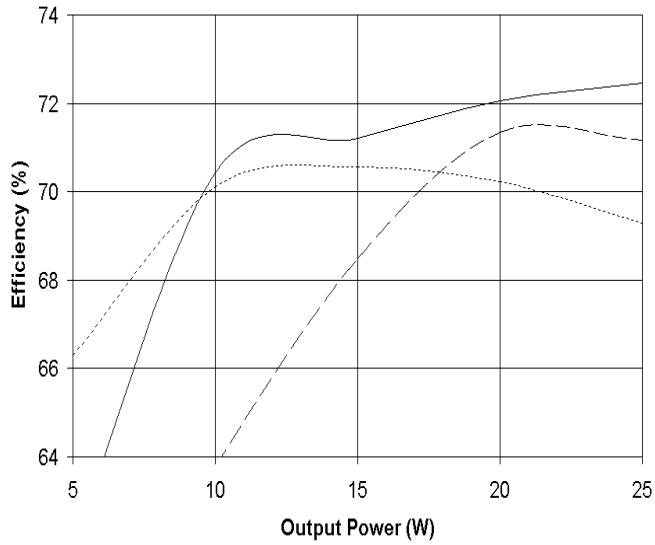


Figure 8 – DVST283R31212T
Efficiency (%) vs. Output Power (W)

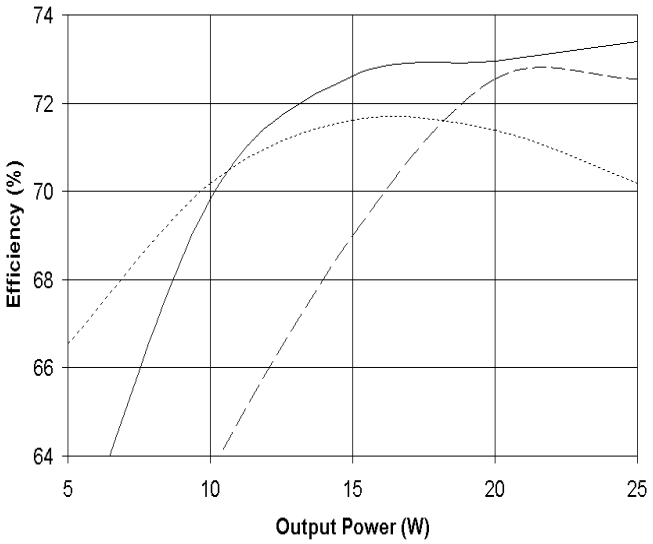
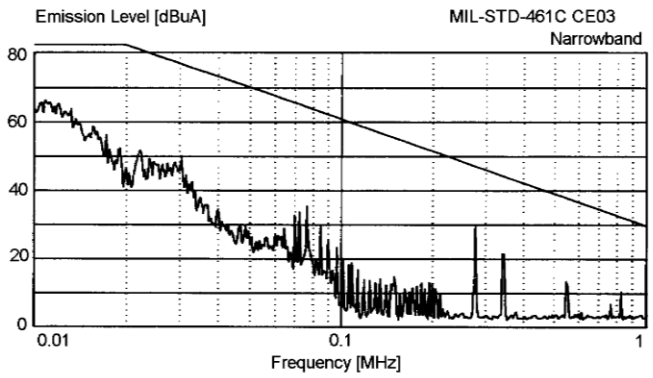


Figure 9 – DVST283R31515T
Efficiency (%) vs. Output Power (W)

EMI PERFORMANCE CURVES

(T_{CASE} = +25°C, V_{IN} = +28V ± 5%, Full Load, Unless Otherwise Specified)



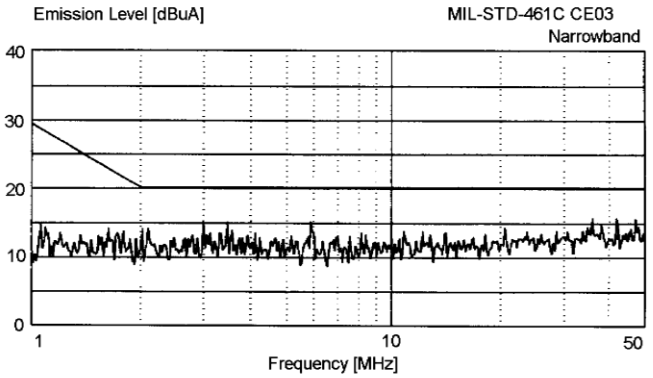
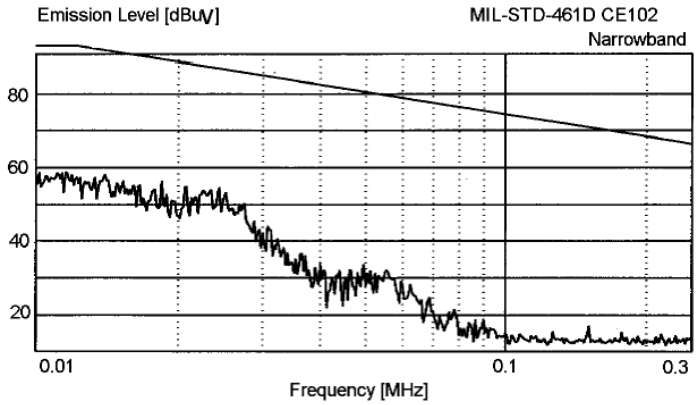


Figure 10 –
MIL-STD-461C CE03 Conducted Emissions



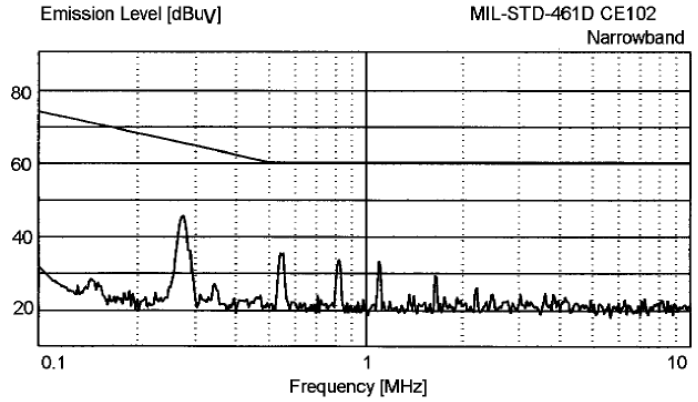
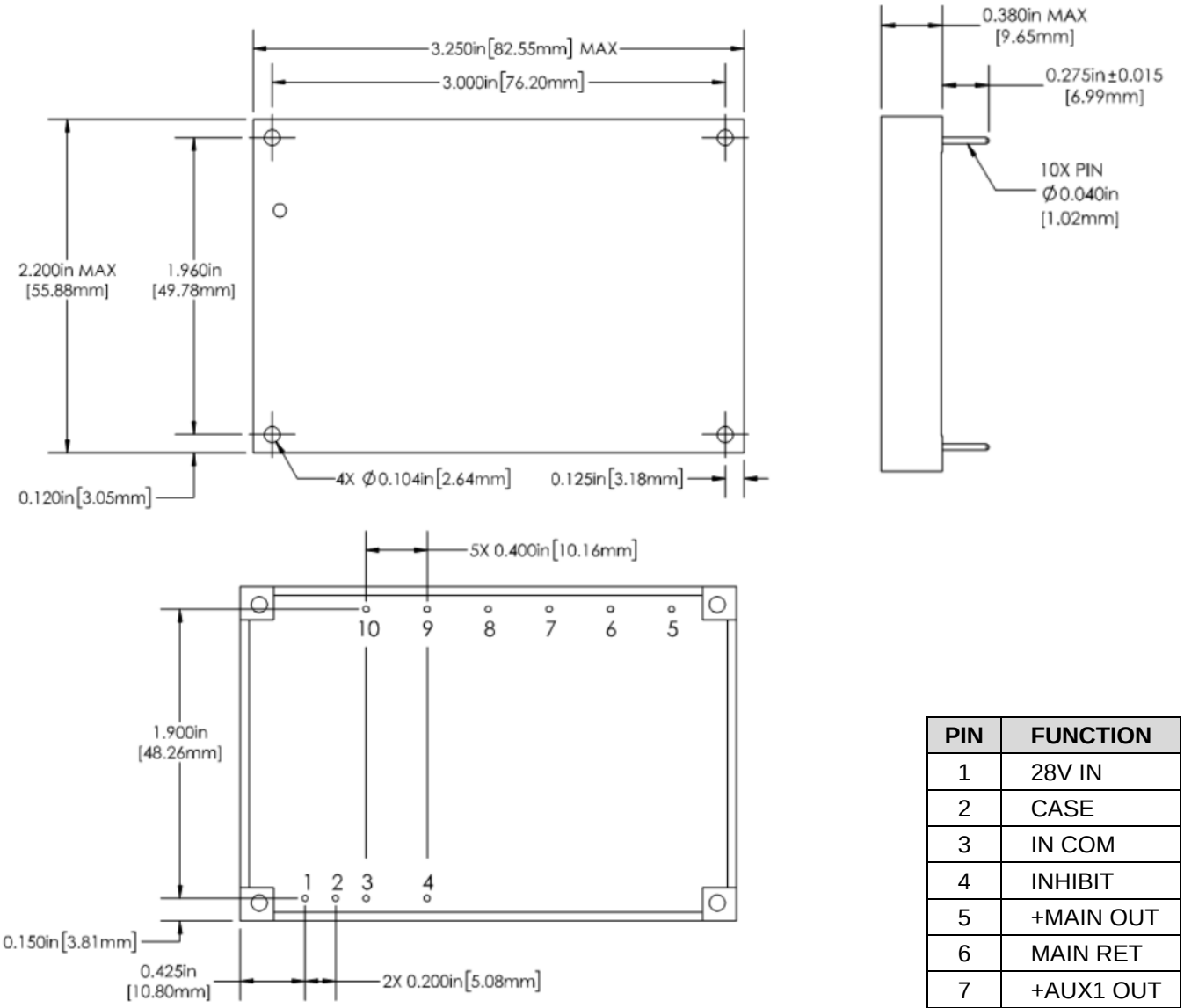


Figure 11 –
MIL-STD-461D CE102 Conducted Emissions

ENVIRONMENTAL QUALIFICATION

Description	MIL-STD-883	MIL-STD-202	Test Condition
Temperature Cycling	1010	102A	-55°C to +100°C, 100 cycles
Constant Acceleration	2001	212A	500g, 1min.
Mechanical Shock	2002 Cond. A	213B Cond. D	500g, 1ms
Random Vibration	2026 Cond. D	214A Cond. D	11.6G RMS, operating
Moisture Resistance	1004	106F	10 days
Barometric Pressure	1001 Cond. D	105C Cond. C	70,000 ft, operating
Salt Atmosphere	1009 Cond. B	101D Cond. B	48 hrs.
Resistance to Solvents	2015	215J	
Solderability	2003	208H	

PACKAGE SPECIFICATIONS



PIN	FUNCTION
1	28V IN
2	CASE
3	IN COM
4	INHIBIT
5	+MAIN OUT
6	MAIN RET
7	+AUX1 OUT
8	AUX1 RET
9	+AUX2 OUT
10	AUX2 RET

Note: Additional mounting options are available. Consult the factory for details.

Figure 12 – Package and Pinout
(Dimensional Limits are ±0.005" Unless Otherwise Stated)

PACKAGE PIN DESCRIPTION

Pin	Function	Description
1	28V IN	Positive Input voltage Connection
2	CASE	Case Connection
3	IN COM	Input Common Connection
4	INHIBIT	Logic Low = Disabled Output. Connecting the inhibit pin to input common (PIN 7) causes converter shutdown. Logic High = Enabled Output. Unconnected or open collector TTL.
5	+MAIN OUT	Main Positive Output Voltage Connection
6	MAIN RET	Main Output Return Connection
7	+AUX1 OUT	Auxiliary Positive Output Voltage Connection
8	AUX1 RET	Auxiliary Output Return Connection
9	+AUX2 OUT	Auxiliary Positive Output Voltage Connection
10	AUX2 RET	Auxiliary Output Return Connection

ENVIRONMENTAL SCREENING

Screening	Condition	Standard (No Suffix)	Military /ML
Pre-Cap Inspection	IPC-A-610 Class II	•	•
Temperature Cycling	-55°C, 100°C, 10 Cycles		•
Burn-In	96 hours at +100°C 12 hours at +100°C	•	•
Final Electrical	100% at -55°C, 25°C, 100°C[1] 100% at 25°C	•	•
Final Inspection	MIL-STD-883, Test Method 2009	•	•

ORDERING INFORMATION

DVST	28	5	15	15	T		/ML	-	XXX
1	2	3	4	5	6	7	8		9

(1)	(2)		(3)		(4)		(5)	
Product Series	**Nominal Input Voltage**		**Main Output**		**Auxiliary Output 1**		**Auxiliary Output 2**	
DVST	**28**	28 Volts	**1R8** **3R3** **5** **6R25** **12**	1.8 Volts 3.3 Volts 5 Volts 6.25 Volts 12 Volts	**3R3** **5** **12** **15**	3.3 Volts 5 Volts 12 Volts 15 Volts	**5** **12** **15**	5 Volts 12 Volts 15 Volts

(6)		(7)		(8)		(9)
Number of Outputs		**Package Option**		**Screening Code[1]**		**Additional Screening Code**
T	Triple	**None**	Standard	**None** **/ML**	Standard Military	Contact Sales

Notes: 1. VPT Inc. reserves the right to ship higher screened products to meet lower screened orders at our sole discretion unless specifically forbidden by customer contract.

Please contact your sales representative or the VPT Inc. Sales Department for more information concerning additional environmental screening and testing, different input voltage, output voltage, power, or packaging requirements.

CONTACT INFORMATION

To request a quotation or place orders please contact your sales representative or the VPT Inc. Sales Department at:

Phone: (425) 353-3010
Fax: (425) 353-4030
E-mail: vptsales@vptpower.com