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Description

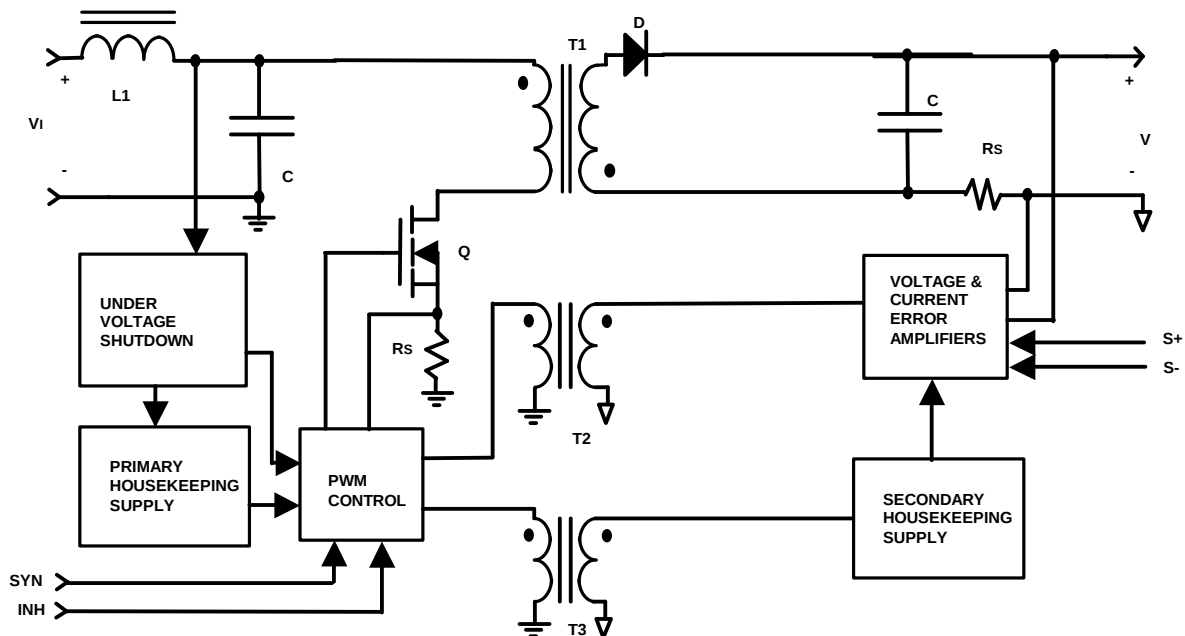
The DVTR series of hybrid DC to DC converters is able to operate at the full military (-55 °C to +125 °C) temperature range with no power derating. Unique to the DVTR series is a PATENTED magnetic feedback circuit that is fault tolerant and radiation immune. Operating at a nominal fixed frequency of 450kHz the regulated, isolated units utilize well controlled undervoltage lock out circuitry to eliminate slow start-up problems.

Features

- Very low output noise
- High Reliability
- Wide input voltage range : 15 to 50 Volts / MIL-STD-704
- Up to 40 Watts output power
- Patented, fault tolerant feedback circuit
- NO optoisolator
- Undervoltage Lockout
- Standard Pinout
- High input transient voltage : 80 Volts for 1 Sec MIL-STD-704A
- Radiation hardened version available
- Precision sealed hermetic package
- High power density, >40 W/in³
- Custom Versions Available
- Environmental Screening Available
- Meets MIL-STD-461C and MIL-STD-461D EMC requirements when used with a DVMC28 EMI filter

Block Diagram

DVTR2800S BLOCK



Specifications

Absolute Maximum Ratings

Input Voltage (Continuous)	50 Vdc
Input Voltage (Transient)	80 V (1sec)
Output Power ¹	40 Watts
Power Dissipation, Full Load, T _{CASE} = +125°C	13 Watts
Junction Temperature rise to case	+15°C
Storage Temperature	-65°C to +150°C
Lead Solder Temperature for 10 seconds	270°C
Weight	50 grams

T_{case} = -55°C to +125°C, V_{in} = +28V ±5%, Full Load unless otherwise specified

Parameter	Conditions -55 °C ≤T _C ≤125 °C, VIN = 28 VDC ±5%, Full Load Unless otherwise specified	DVTR283R3S			DVTR2805S			DVTR2812S			Units	
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
Static												
INPUT												
Voltage		15	28	50	15	28	50	15	28	50	V	
Current ³	Inhibited		3.5	5		3.5	5		3.5	5	mA	
	No Load		40	65		40	65		40	65	mA	
Ripple Current	Full Load, 20Hz to 10MHz		30	50		30	50		30	50	mAp-p	
Inhibit Pin Input		0		1.5	0		1.5	0		1.5	V	
Inhibit Pin Open Circuit Voltage		9.0	11.0	13.0	9.0	11.0	13.0	9.0	11.0	13.0	V	
UVLO Turn On		11.5		15.0	11.5		15.0	11.5		15.0	V	
UVLO Turn Off		11.0		14.5	11.0		14.5	11.0		14.5	V	
OUTPUT												
Voltage	V _{OUT} Tcase = 25°C	3.27	3.30	3.33	4.95	5.00	5.05	11.88	12.0	12.12	V	
	V _{OUT} -55°C ≤ Tcase ≤ +125°C	3.20	3.30	3.40	4.85	5.00	5.15	11.64	12.0	12.36	V	
Power		0		20	0		30			40	W	
Current	V _{OUT}	0		6.0	0		6.0	0		3.33	A	
Ripple Voltage	V _{OUT} Full Load, 20Hz to 10MHz		10	30		10	30	0	15	40	mVp-p	
Line Regulation	V _{OUT} VIN = 15V to 50V		10	25		10	25		10	25	mV	
Load Regulation	V _{OUT} No Load to Full Load		30	60		30	60		30	60	mV	
EFFICIENCY		64	69		71	75		78	82		%	
LOAD FAULT POWER DISSIPATION				20 15			20 15			20 15	W W	
CAPACITIVE LOAD				1000			1000			500	μF	
SWITCHING FREQUENCY		400	450	525	400	450	525	400	450	525	kHz	
SYNC FREQUENCY RANGE		VH-VL=5V Duty Cycle: 20%-80%	500		700	500		700	500		700 KHz	
ISOLATION			100			100			100		MΩ	
THERMAL RESISTANCE		Case to Ambient (θCA)		19			19			19	°C/W	
MTBF		MIL-HDBK-217F, AIF @ Tc=55°C		413			413			413	kHrs	
Dynamic												
LOAD STEP												
Output Transient Recovery ²	V _{OUT} Half Load to Full Load		300 200	500 400		300 200	500 400		400 200	600 400	mV _{PK} μSec	
LINE STEP												
Output Transient Recovery ²	V _{OUT} VIN = 15V to 50V		300 200	500 400		300 200	500 400		400 200	600 400	mV _{PK} μSec	
TURN ON												
Delay	V _{OUT} VIN = 0V to 28V		10	15		10	15		10	15	mSec	
Overshoot ²			0	33		0	50		0	120	mV _{PK}	

NOTES:

- Dependent on output voltage.
- Time for output voltage to settle within 1% of its nominal value.
- Derate linearly to 0 at 135°C.

Specifications

Absolute Maximum Ratings

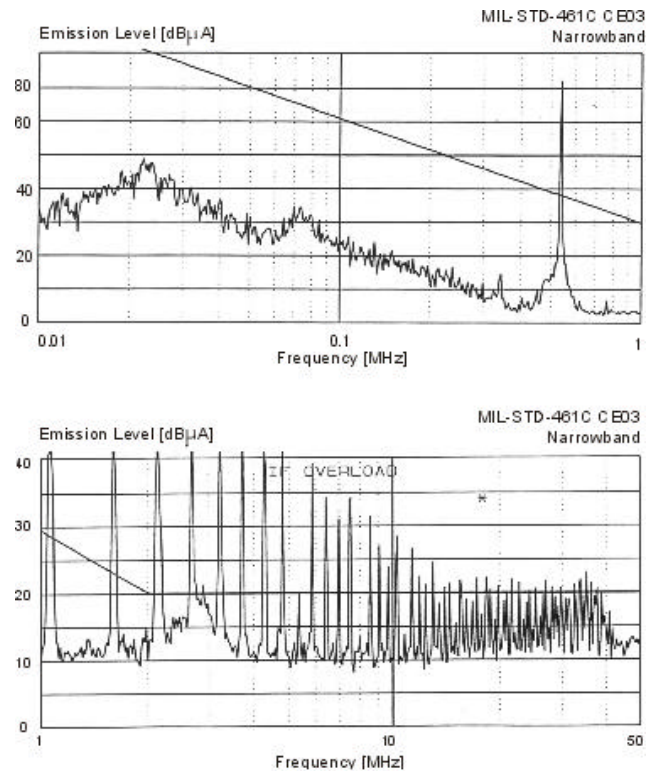
Input Voltage (Continuous)	50 Vdc
Input Voltage (Transient)	80 V (1sec)
Output Power ¹	40 Watts
Power Dissipation, Full Load, T _{CASE} = +125°C	13 Watts
Junction Temperature rise to case	+15°C
Storage Temperature	-65°C to +150°C
Lead Solder Temperature for 10 seconds	270°C
Weight	50 grams

T_{case} = -55°C to +125°C, Vin = +28V ±5%, Full Load unless otherwise specified

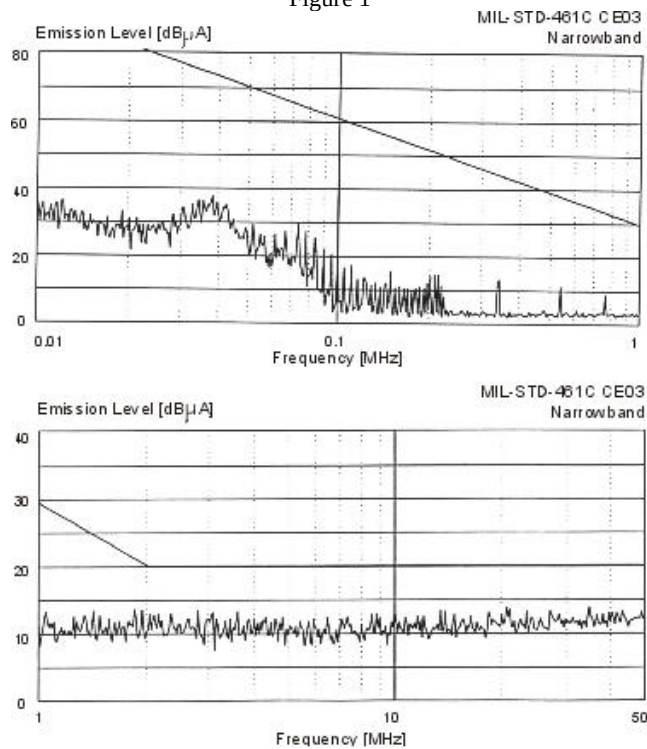
Parameter	Conditions -55 °C ≤T _C ≤125 °C, VIN = 28 VDC ±5%, Full Load1 Unless otherwise specified	DVTR2815S			Units
		Min	Typ	Max	
Static					
INPUT					
Voltage		15	28	50	V
Current ³	Inhibited		3.5	5	mA
	No Load		40	65	mA
Ripple Current	Full Load, 20Hz to 10MHz		30	50	mAp-p
Inhibit Pin Input		0		1.50	V
Inhibit Pin Open Circuit Voltage		9.0	11.0	13.0	V
UVLO Turn On		11.5		15.0	V
UVLO Turn Off		11.0		14.5	V
OUTPUT					
Voltage	V _{OUT} T _{CASE} = 25°C	14.85	15.0	15.15	V
	V _{OUT} -55°C ≤ T _{CASE} ≤ +125°C	14.55	15.0	15.45	V
Power		0		40	W
Current	V _{OUT}	0		2.67	A
Ripple Voltage	V _{OUT} Full Load, 20Hz to 10MHz		15	40	mV _{p-p}
Line Regulation	V _{OUT} Vin = 15V to 50V		10	25	mV
Load Regulation	V _{OUT} No Load to Full Load		30	60	mV
EFFICIENCY		81	85		%
LOAD FAULT POWER	Overload			20	W
DISSIPATION	Short Circuit			15	W
CAPACITIVE LOAD				500	μF
SWITCHING FREQUENCY		400	450	525	kHz
SYNC FREQUENCY RANGE	V _H -V _L =5V Duty Cycle: 20%-80%	500		700	kHz
ISOLATION		100			MΩ
THERMAL RESISTANCE	Case to Ambient (θCA)		19		°C/W
MTBF	MIL-HDBK-217F, AIF @ T _C =55°C		413		kHrs
Dynamic					
LOAD STEP	Half Load to Full Load				
Output Transient Recovery ²	V _{OUT}		400 200	600 400	mV _{PK} μSec
LINE STEP	Vin = 15V to 50V				
Output Transient Recovery ²	V _{OUT}		400 200	600 400	mV _{PK} μSec
TURN ON	Vin = 0V to 28V				
Delay	V _{OUT}		10	15	mSec
Overshoot ²			0	150	mV _{PK}

NOTES:

1. Dependent on output voltage.
2. Time for output voltage to settle within 1% of its nominal value.
3. Derate linearly to 0 at 135°C.



DVTR2800S Without EMI filter
Figure 1



DVTR2800S With EMI filter
Figure 2

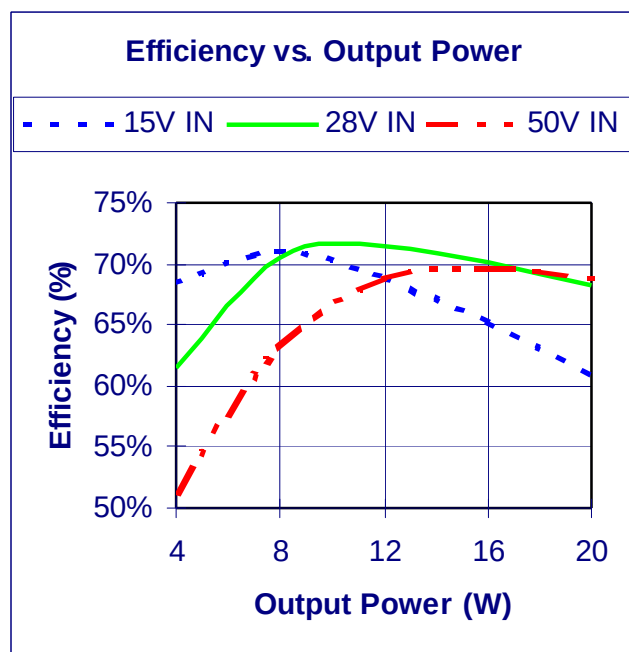


Figure 3
EFFICIENCY vs. LOAD **DVTR283R3S**

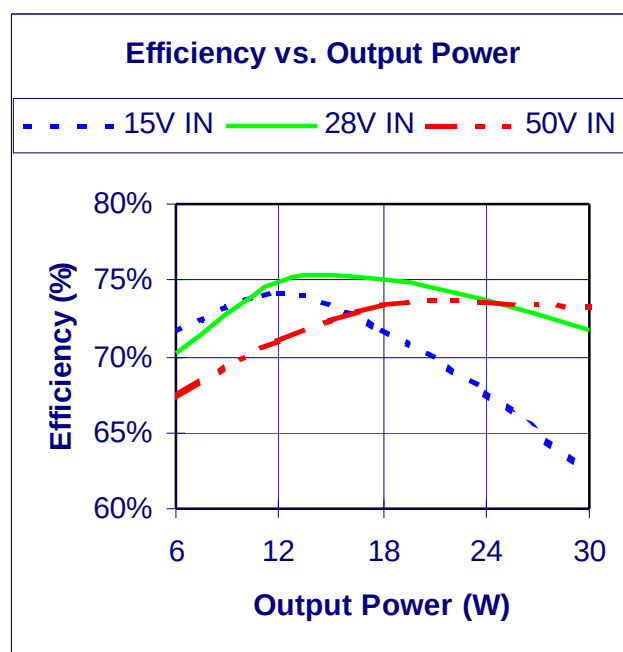


Figure 4
EFFICIENCY vs. LOAD **DVTR2805S**

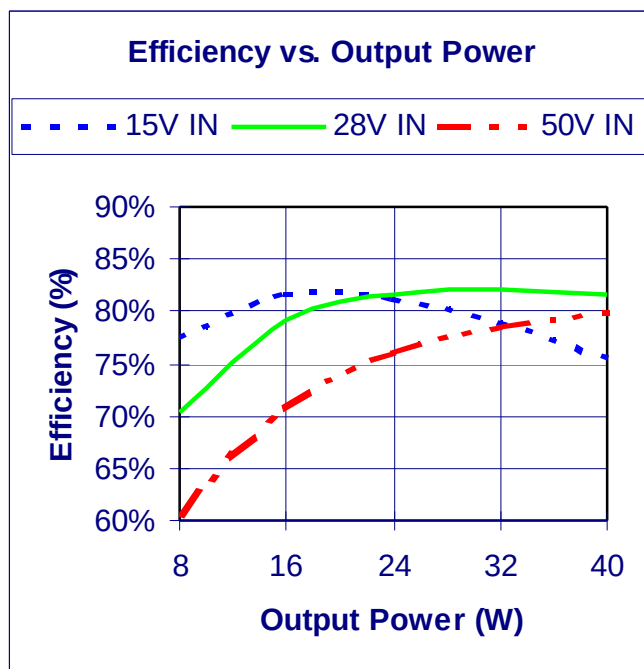


Figure 5
EFFICIENCY vs. LOAD **DVTR2812S**

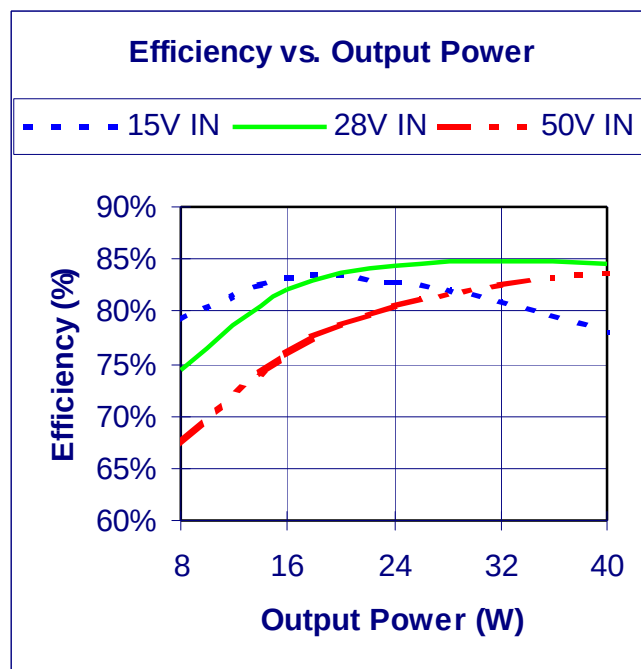
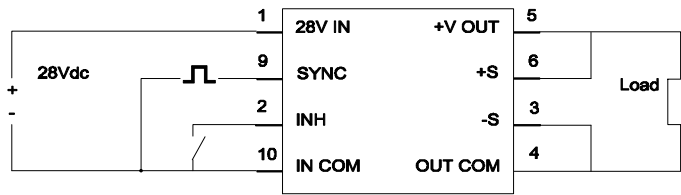
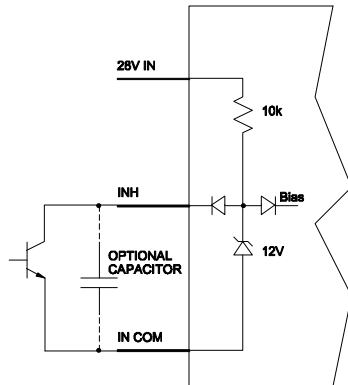


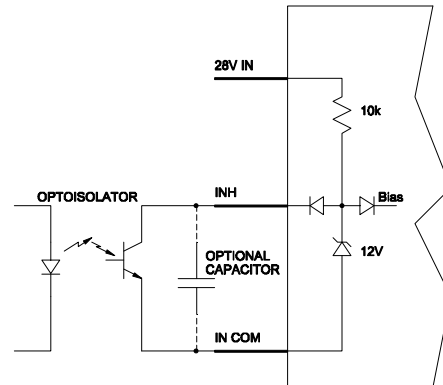
Figure 6
EFFICIENCY vs. LOAD **DVTR2815S**



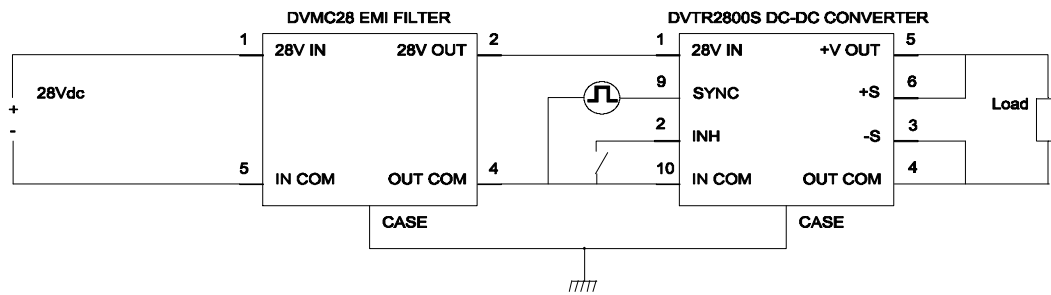
Connection Diagram
Figure 7



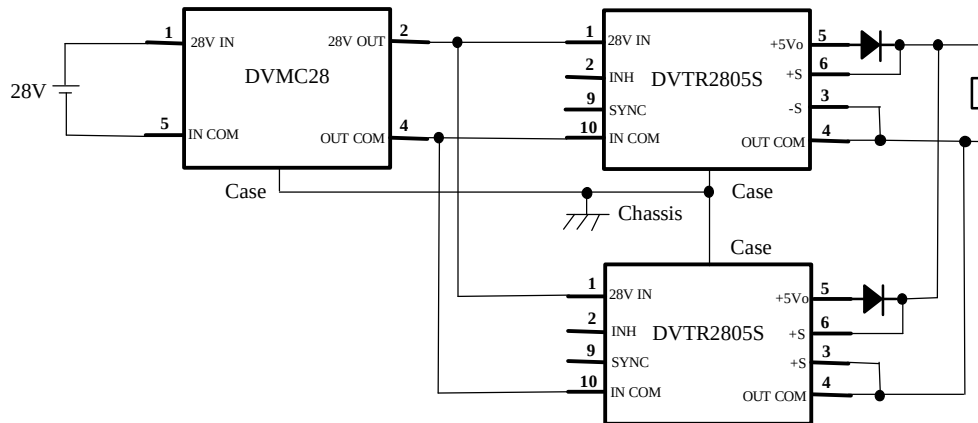
Internal Inhibit Circuit and Recommended Drive
(Shown with optional capacitor for turn on delay) Figure 8



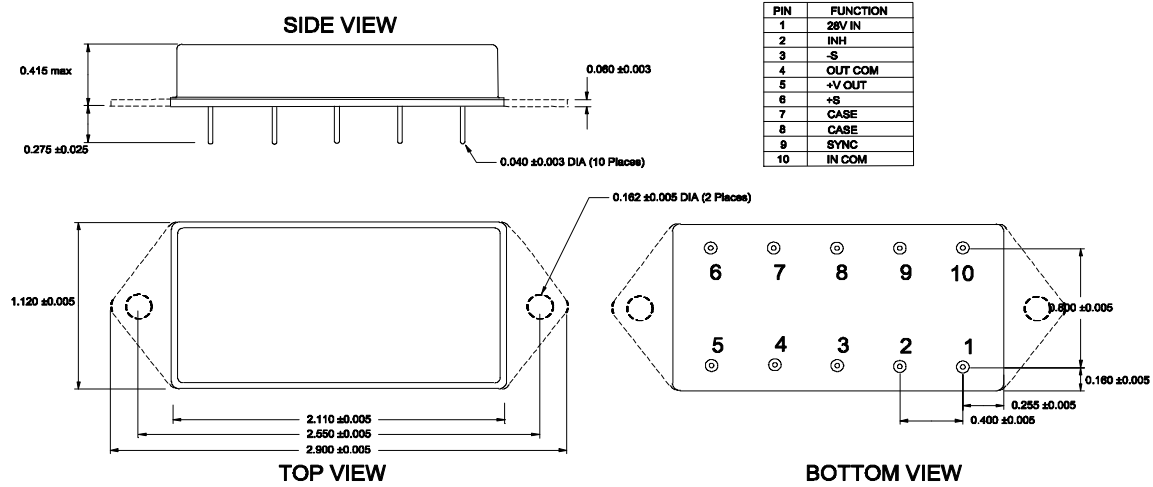
Isolated Inhibit Drive
(Shown with optional capacitor for turn on delay) Figure 9



Converter with EMI Filter Hookup Diagram
Figure 10



Parallel Connection
Figure 11



Package Drawing and Pinout
Figure 12

Screening Action	MIL-STD-883	Standard (No Suffix)	Extended /ES Suffix	(H) /HB Suffix
Pre-cap Inspection	Method 2017, 203	•	•	•
Temperature Cycling	Method 1010, Condition C Method 1010, -55°C to +125°C		•	•
Constant Acceleration	Method 2001, 3000g Method 2001, 500g		•	•
Burn-In	Method 1015, 160 hours at 125°C 96 hours at 125°C 24 hours at 125°C	•	•	•
Hermeticity	Fine Leak, Method 1014, Condition A Gross Leak, Method 1014, Condition C	•	•	•
Final Electrical	MIL-PRF-38534, Group A 100% at 25°C	•	•	•
Final Inspection	Method 2009	•	•	•

Screening Information
Table 1

Ordering Information

Example Part Number: DVTR2805DR/ES										
DVTR	28		05		S		F		R	
Product Series	Nominal Input Voltage		Output Voltage		No. Outputs		Package Style		Rad Hard Opt.	
DVTR	28	28 Volts	03R3	3.3 Volts	S	Single	None	No Flange	None	Standard
			05	5 Volts			F	Flanged	R	100kRad
			12	12 Volts					/ES	Extended
			15	15 Volts					/HB	HB Screening