Single Output Isolated 25-Watt DC/DC Converters





## **FEATURES**

- Cost effective small footprint DC/DC converter, ideal for high current applications
- Industry standard 0.96" x 1.1" x 0.32" open frame package and pinout
- Input voltage range of 36-75 Vdc
- 3.3V, 5V, or 12Vdc fixed output voltages
- Isolation up to 2250 VDC (basic)
- Up to 25 Watts total output power with extensive self-protection shutdown features
- High efficiency synchronous rectifier forward topology up to 91%
- Stable operation with no required external components
- Usable -40 to 85°C temperature range (with derating)
- Certified to UL 60950-1, CAN/CSA-C22.2 No. 60950-1, IEC60950-1, EN60950-1 safety approvals, 2nd edition

Output (V)	Current (A)	Nominal Input (V)
3.3	7.5	48
5	5	48
12	2.1	48

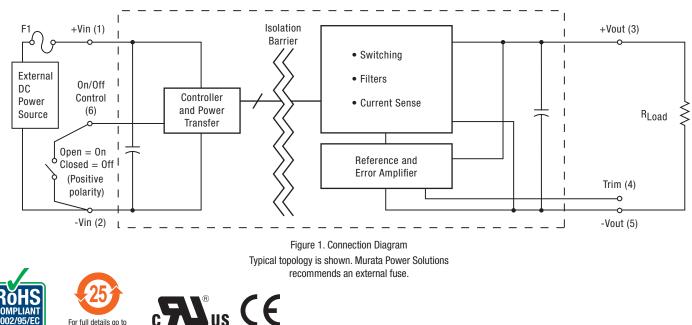
## **PRODUCT OVERVIEW**

Featuring a full 25 Watt output in one square inch of board area, the UEI25 series isolated DC/DC converter family offers efficient regulated DC power for printed circuit board mounting. The 0.96" x 1.1" x 0.32" (24.4 x 27.9 x 8.1 mm) converter accepts a 2:1 input voltage range of 36 to 75 Volts DC, ideal for telecom equipment. The industry-standard pinout fits larger 1" x 2" converters. The fixed output voltage is tightly regulated. Applications include small instruments, area-limited microcontrollers, data communications equipment, remote sensor systems, telephone equipment, vehicle and portable electronics.

The UEI25 series includes full magnetic and optical isolation with Basic protection up to 2250 Volts DC. For powering digital systems, the outputs

offer fast settling to step transients and will accept higher capacitive loads. Excellent ripple and noise specifications assure compatibility to noise-susceptible circuits. For systems requiring controlled startup/shutdown, an external remote On/Off control may use a switch, transistor or digital logic.

A wealth of self-protection features avoid both converter and external circuit faults. These include input undervoltage lockout and overtemperature shutdown. The outputs current limit using the "hiccup" autorestart technique and the outputs are short-circuit protected. Additional features include output overvoltage and reverse conduction elimination. The high efficiency offers minimal heat buildup and "no fan" operation.



For full details go to www.murata-ps.com/rohs

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# **UEI25 Series**

Single Output Isolated 25-Watt DC/DC Converters

PERFORMANCE SPEC	PERFORMANCE SPECIFICATIONS SUMMARY AND ORDERING GUIDE ① ③															
				Outp	out				Inp	out						
				R/N (n	ıVp-p)	Regulation	on (Max.)			lın,	In,	Effic	iency	P	ackage, C75	
	Vout	Iout (A,	Total Power					VIN Nom.	Range	min. Ioad	full load					
Root Models ①	(V)	max)	(W)	Тур.	Max.	Line	Load	(V)	(V)	(mA)	(A)	Min.	Тур.	Case (inches)	Case (mm)	Pinout
UEI25-033-D48 ④	3.3	7.5	25	50	80	±0.1%	±0.2%	48	36-75	75	0.58	87.0%	89.5%	0.96x1.1x0.32	24.4x27.9x8.1	P85
UEI25-050-D48	5	5	25	50	80	±0.1%	±0.2%	48	36-75	30	0.57	89.0%	91%	0.96x1.1x0.32	24.4x27.9x8.1	P85
UEI25-120-D48	12	2.1	25.2	95	120	±0.1%	±0.1%	48	36-75	20	0.6	86.0%	87.5%	0.96x1.1x0.32	24.4x27.9x8.1	P85

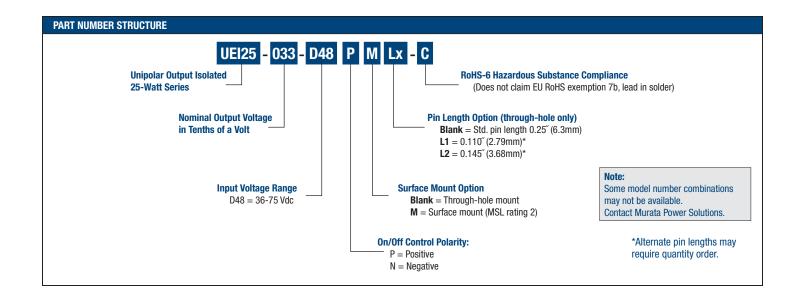
#### Notes:

- ① Please refer to the part number structure for additional options and complete ordering part numbers.
- ② Ripple and Noise is shown at 20 MHz bandwidth.
- ③ All specifications are at nominal line voltage and full load, +25 °C. unless otherwise noted. See detailed specifications for full conditions.

Output capacitors are 1  $\mu F$  ceramic in parallel with 10  $\mu F$  electrolytic. The input cap is 4.7  $\mu F$  ceramic, low ESR.

I/O caps are necessary for our test equipment and may not be needed for your application.

④ Minimum load is 10% for rated specifications.





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# **UEI25 Series**

Single Output Isolated 25-Watt DC/DC Converters

## FUNCTIONAL SPECIFICATIONS - MODEL UEI25-033-D48

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
nput Voltage, Continuous	Full power operation	0		80	Vdc
nput Voltage, Transient	Operating or non-operating, 100 mS max. duration	0		100	Vdc
solation Voltage	Input to output tested 100 mS			2250	Vdc
nput Reverse Polarity	None, install external fuse		None		Vdc
Dn/Off Remote Control	Power on or off, referred to -Vin	0		15	Vdc
Output Power		0		25.25	W
Dutput Current	Current-limited, no damage, short-circuit protected	0		7.5	Α
Storage Temperature Range	Vin = Zero (no power)	-55		125	°C
isted in the Performance/Functional Specificat	rre of devices to greater than any of these conditions ma ions Table is not implied or recommended.	ay adversely affect long	g-term reliability. Proper oper	ation under conditions	other than thos
Dperating voltage range		36	48	75	Vdc
Recommended External Fuse	Fast blow			1.5	A
Start-up threshold	Rising input voltage	34	35.2	36	Vdc
Indervoltage shutdown	Falling input voltage	32	34.0	35.2	Vdc
)vervoltage shutdown			None		Vdc
Reverse Polarity Protection	None, install external fuse		None		Vdc
nternal Filter Type			LC		
nput current					
Full Load Conditions	Vin = nominal		0.58	0.60	A
Low Line	Vin = minimum		0.79	0.81	A
Inrush Transient			0.05		A2-Sec.
Output in Short Circuit			50	100	mA
No Load	lout = minimum, unit=0N		75	100	mA
Standby Mode (Off, UV, OT)			1	2	mA
Reflected (back) ripple current @	Measured at input with specified filter		30		mA, RMS
Pre-biased startup	External output voltage < Vset		Monotonic		
GENERAL and SAFETY					
	Vin=48V, full load	87	89.5		%
Efficiency	Vin=36V, full load	86.5	87.5		%
solation		0010	0.10		,,,
Isolation Voltage	Input to output, continuous	2250			Vdc
Insulation Safety Rating		2200	basic		140
Isolation Resistance		10			Mohm
Isolation Capacitance		10	1000		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1, 2nd edition		Yes		pi
Calculated MTBF	Per MIL-HDBK-217F, ground benign, Tambient=+30°C		TBD		Hours x 10 <sup>6</sup>
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C		2		Hours x 10 <sup>6</sup>
DYNAMIC CHARACTERISTICS		000	000	000	1211
Fixed Switching Frequency		300	330	360	KHz
Startup Time	Power On to Vout regulated			50	mS
Startup Time Dynamic Load Response	Remote ON to Vout regulated 50-75-50% load step, settling time to within		180	50 250	mS µSec
Dynamic load di/dt	±2% of Vout			2	A/µSec
Dynamic Load Peak Deviation	same as above		±30	±100	mV
FEATURES and OPTIONS					
Remote On/Off Control ④					
Negative Logic, ON state	ON = Ground pin or external voltage	-0.7		1.2	V
Negative Logic, OFF state	OFF = Pin open or external voltage	10		15	V
Control Current		iU	1	10	mA
			1		IIIA
P <sup>II</sup> suffix					
"P" suffix Positive Logic ON state	ON - Pin open or external voltage	10		15	V
"P" suffix Positive Logic, ON state Positive Logic, OFF state	ON = Pin open or external voltage OFF = Ground pin or external voltage	10 -0.7		15 1.2	V V



# **UEI25 Series**

Single Output Isolated 25-Watt DC/DC Converters

### FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL UEI25-033-D48

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power	See Derating	0.0	25.0	25.25	W
Voltage					
Nominal Output Voltage	No trim	3.267	3.30	3.333	Vdc
Setting Accuracy	At 50% load	-1		+1	% of Vset.
Output Voltage Range	User-adjustable	-10		+10	% of Vnom.
Overvoltage Protection	Via magnetic feedback	4.2	5	5.7	Vdc
Current					•
Output Current Range		0.7575	7.575	7.575	A
Minimum Load ③			10% minimum load		% of lout
Current Limit Inception	98% of Vnom., after warmup	8.5	10	11	A
Short Circuit	· · · ·				
Short Circuit Current	Hiccup technique, autorecovery			0.3	A
Short Circuit Duration (remove short for	Output shorted to ground, no damage		Continuous		
recovery)			Continuouo		
Short circuit protection method	Current limiting				
Regulation (5)					
Line Regulation	Vin=min. to max., Vout=nom., 50% load			±0.1	% of Vout
Load Regulation	lout=min. to max., Vin=48V			±0.2	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW		50	80	mV pk-pk
Temperature Coefficient	At all outputs		0.02		% of Vnom./°C
Maximum Capacitive Loading (10% ceramic,	Cap. ESR= $<0.02\Omega$ , full resistive load	0		2000	μF
90% Oscon)					
MECHANICAL (Through Hole Models)	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Outline Dimensions (no baseplate)	C75 case		0.9x1.1x0.32		Inches
(Please refer to outline drawing)	WxLxH		22.86x27.9x8.1		mm
Weight			0.32		Ounces
			9.07		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	With derating, 200 LFM	-40		85	°C
Operating Ambient Temperature Range	No derating, 200 LFM	-40		70	°C
Storage Temperature	No derating, 200 LFM Vin = Zero (no power)	-40 -55		70 125	0° 0°
Storage Temperature Thermal Protection/Shutdown	No derating, 200 LFM Vin = Zero (no power) Measured in center	-40	115	70	0°
Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference	No derating, 200 LFM Vin = Zero (no power)	-40 -55		70 125	0° 0° 0°
Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference Conducted, EN55022/CISPR22	No derating, 200 LFM Vin = Zero (no power) Measured in center	-40 -55	В	70 125	°C °C °C Class
Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference Conducted, EN55022/CISPR22 Radiated, EN55022/CISPR22	No derating, 200 LFM Vin = Zero (no power) Measured in center External filter is required	-40 -55 110		70 125 120	°C °C °C Class Class
Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference Conducted, EN55022/CISPR22 Radiated, EN55022/CISPR22 Relative humidity, non-condensing	No derating, 200 LFM Vin = Zero (no power) Measured in center External filter is required To +85°C	-40 -55 110 	В	70 125 120 90	°C °C °C Class Class Class %RH
Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference Conducted, EN55022/CISPR22 Radiated, EN55022/CISPR22	No derating, 200 LFM Vin = Zero (no power) Measured in center External filter is required	-40 -55 110 	В	70 125 120 90 10,000	Class Class Class KRH feet
Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference Conducted, EN55022/CISPR22 Radiated, EN55022/CISPR22 Relative humidity, non-condensing	No derating, 200 LFM Vin = Zero (no power) Measured in center External filter is required To +85°C	-40 -55 110 	В	70 125 120 90	C C C Class Class Class %RH

#### **Notes**

- $\odot$  Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1  $\mu F$  and 10  $\mu F$  multi-layer ceramic output capacitors. The external input capacitor is 4.7  $\mu F$  ceramic. All capacitors are low-ESR types wired close to the converter. These capacitors are necessary for our test equipment and may not be needed in the user's application.
- ② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220 µF, Cin=33 µF and Lbus=12 µH.
- ③ All models are stable and regulate to specification under minimum (10%) load. Operation under no load will not damage the converter but may increase regulation, output ripple, and noise.
- $\circledast\;$  The Remote On/Off Control is referred to -Vin.
- ⑤ Regulation specifications describe the output voltage changes as the line voltage or load current is varied from its nominal or midpoint value to either extreme.



## **UEI25 Series**

Single Output Isolated 25-Watt DC/DC Converters

## FUNCTIONAL SPECIFICATIONS - MODEL UEI25-050-D48

Iambient=+30 C Per Telcordia SR332, issue 1, class 3, around	ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Open Verticity         O         0000         000         <	nput Voltage, Continuous		0		80	Vdc
None         Noe         None         Noe         None         None         N	nput Voltage, Transient		0		100	Vdc
Prover or or of referred to -Vin         0         15         VMc           Nutput Prover         0         52.52         W           Nutput Corrent         Current-Inition or danage, stort-cload potebtal         0         5         A           Strage Temperature Range         Win - Zaro (no powe)         -55         125         C           Storage Temperature Range         Win - Zaro (no powe)         -55         A         C           Storage Temperature Range         Win - Zaro (no powe)         -55         A         C           Storage Temperature Range         Fast blow         -55         A         C         C           Storage Temperature Range         Fast blow         -55         A         C	solation Voltage	Input to output tested 100 mS			2250	Vdc
Unique Tover         0         25.25         W           Storage Tomparature Range         Current-Initiated, no damage, activation data protocola         0         5         A           Storage Tomparature Range         Current-Initiated, no damage, activation data protocola         0         5         A           Storage Tomparature Range         Current-Initiates conditions may adversely effect long-term reliability. Proper operation under conditions other than the determinance/Functional Specifications Table is not implied or recommended.         10         7         Vic           Interval         Fest blow         36         48         75         Vic           Start-up threshold         Rising input voltage         34         35         36         Vic           Vine reserve Polarity Protection         None, install external fuse         None         Vic         Vic           Vero Vitage Shutdown         Faill Ladd Conditions         Vin = nonimial         0.57         0.59         A           Fuil Ladd Conditions         Vin = nonimial         0.57         0.59         A           Core Une         Vin = nonimial         0.57         0.59         A           Core Une         Vin = nonimial         0.57         0.59         A           Core Une         Vin = nonimial         0.57 </td <td>nput Reverse Polarity</td> <td>None, install external fuse</td> <td></td> <td>None</td> <td></td> <td>Vdc</td>	nput Reverse Polarity	None, install external fuse		None		Vdc
Drage Temper three Range         Correct-Initiated, no damage, short-circal groated tail         0         5.5         A           Disrage Temper three Range         Vin = 270 (top over)         -5.5         125         °C           Disrage Temper three Range         Vine = 270 (top over)         -5.5         125         °C           Disrage Temper three Range         Vine = 270 (top over)         -5.5         125         °C           Disrage Temper three Range Concer of evelocits to table is not implied or recommended.         None         125         °Vic           Inter-up threshold         Rest tolow         36         48         7.5         °Vic           Inter-up threshold         Rest tolow         34         35         36         Vic         Vic           Inter-up threshold         Rest tolow         34         35         36         Vic         V	Dn/Off Remote Control	Power on or off, referred to -Vin	0		15	Vdc
Strange Demperature Range[Nn = Zen (np opver)]551251257CStrange Demperature Range Mess conditions are arbitrary set were set were arbitrary transmess arbitrary transmess of were set of set of transmess arbitrary transmess ar	Output Power		0		25.25	W
Storage Emperature Range         Nin = Zen (in power)         -55         125         125         C           Storage Emperature Range         Nin = Zen (in power)         -55         125         7         7           Storage Emperature Range Mess conditions rave adverse adverse storage Storage Mess Conditions rave adverse Storage Mess Conditions Conditions rave adverse Conditions rave adverse C	Dutput Current	Current-limited, no damage, short-circuit protected	0		5	A
United         Site         A         T         V/OC           Deparating voltage range         0         36         49         75         V/OC           Deparating voltage range         0         36         49         75         V/OC           Decommended External Fuse         Fast blow         3         35         36         V/OC           Devortage shutdown         Fast blow         3         34.5         V/OC         V/OC           Devortage shutdown         Fast blow         None         V/OC         V/OC         V/OC           Devortage shutdown         Fast blow         LC         V/OC         V/OC         V/OC           Devortage shutdown         None, install external fuse         None         V/OC         V/OC         V/OC         A           Devote Start Conditions         Vin = minimum         0.76         0.79         A           Inrush Transient         0.05         A         A         A         A           No Load         None         1         3         mA         S         MA	Storage Temperature Range		-55		125	°C
INPUT         Solution         Solution <thsolution< th="">         Solution         <th< td=""><td>Absolute maximums are stress ratings. Exposu</td><td>re of devices to greater than any of these conditions ma</td><td>ay adversely affect long</td><td>g-term reliability. Proper oper</td><td>ration under conditions</td><td>other than thos</td></th<></thsolution<>	Absolute maximums are stress ratings. Exposu	re of devices to greater than any of these conditions ma	ay adversely affect long	g-term reliability. Proper oper	ration under conditions	other than thos
Operating voltage range         method         Resonameded External Fuse         75         Vdc           Start-up fiveshold         Resing input voltage         34         35         36         Vdc           Start-up fiveshold         Resing input voltage         32         33.5         34.5         Vdc           Start-up fiveshold         None         S2         33.5         34.5         Vdc           Start-up fiveshold         None         None         Vdc         Vdc         Vdc           Start-up fiveshold         None         None         Vdc         Vdc         Vdc           Start-up fiveshold         None         None         None         Vdc         Vdc           Start-up fiveshold         None         None         Note         Note         Note         Vdc           Start-up fiveshold         None         None         Note	isted in the Performance/Functional Specificat	ions Table is not implied or recommended.				
Becommende External Fuse         Fast blow         1.5         A           Bistrup threshold         Bistrup threshold         Bistrup threshold         33.5         34.5         Véc           Divervitage shutdown         Falling input voltage         32         33.5         34.5         Véc           Reverse Polarity Protection         None         Véc         Véc         Véc         Véc           Internal Filter Type         LC         LC         Véc         Véc         A           Internal Filter Type         LC         LC         Véc         None         Véc           Internal Filter Type         LO         LO         LO         Véc         None         Véc         None         Véc         None         Véc         None         Véc         None         <	INPUT					
Start-up Intershold         Rising input voltage         34         35         36         V/dc           Name         Parling input voltage         32         33.5         34.5         V/dc           Name         None         None         V/dc         V/dc         V/dc           Name         None         LC         V/dc	Dperating voltage range		36	48	75	Vdc
Inderviolage shutdown         Falling input voltage         32         33.5         34.5         V/dc           Nervortage shutdown         None         None         V/dc           Nervortage shutdown         None         V/dc           Nervortage shutdown         None         V/dc           Nervortage shutdown         None         V/dc           Nervortage shutdown         None         V/dc           Part Load Conditions         Vin = nonintal         0.57         0.59         A           Low Line         Vin = nonintal         0.07         0.79         A           Inrush Transient         0.05         10.0         mA         A           Standby Mode (0ft, UV, 07)         Standby Mode (0ft, UV, 07)         N         A         A           Standby Mode (0ft, UV, 07)         Measured at input with specified filter         30         Standby Mode (0ft, UV, 07)         mA           Efficiency         Vin=480, full load         89         91         %           Standby Mode (0ft, UV, 07)         Measured at input with specified filter         30         Montonic         Montonic           Efficiency         Vin=480, full load         89         91         %         %           Standby Mode (0ft, UV, 07)<	Recommended External Fuse	Fast blow			1.5	A
Dervoltage shutdown         None, Install external fuse         None         Vdc           netman Filter Type         None, Install external fuse         None         Vdc           Full Land Conditions         Vin = noninal         0.57         0.59         A           Low Line         0.05         0.76         0.79         A           Insush Transient         0.05         10.0         mA           No Load         Note, install external         0.05         10.0         mA           Standby Mode (0ff, UV, 0T)         Isout = minimum         1         3         mA           Reflected (Dack / Type Leurent (2)         Measured at input with specified filter         30         50         mA           Standby Mode (0ff, UV, 0T)         External output voltage < Vast	Start-up threshold	Rising input voltage	34	35	36	Vdc
Tenerse Filter Type Internal Filter Type Top It currentNone, install external fuseNoneVoleVoleFull Load ConditionsVin = nominal0.570.59ALow LineVin = minimum0.760.79ALow Line0.05	Indervoltage shutdown	Falling input voltage	32	33.5	34.5	Vdc
Internal Filter Type         ILC         IC           Full Load Conditions         Vin = nominal         0.57         0.59         A           Low Line         Vin = nominal         0.76         0.79         A           Invesh Transint         0.05         .42-Sec.         0.78         0.79         A           Nursh Transint         0.05         .42-Sec.         0.05         .42-Sec.         0.05         .42-Sec.           Output in Short Circuit         0.01         nut         .000         mA         No.         So         So         nut         .42-Sec.           Output in Short Circuit         0.01         mA         So         So         mA         NmA           Standay Mode (0ft, UV, 0T)         Measured at input with specified filter         .30         .6         MA         NmA         NmA </td <td>vervoltage shutdown</td> <td></td> <td></td> <td>None</td> <td></td> <td>Vdc</td>	vervoltage shutdown			None		Vdc
Input current         Imput current <thimput current<="" th="">         Imput cur</thimput>	Reverse Polarity Protection	None, install external fuse		None		Vdc
Input current         Input continual         Instruction						
Full Lad Conditions     Vin = nominal     0.57     0.59     A       Low Line     Vin = minimum     0.76     0.79     A       Invash Transient     0.05     0.79     A       Output in Short Circuit     0.05     0.05     A2-Sec.       Output in Short Circuit     0.01     mA     A2-Sec.       No Load     Iout = minimum, unit=0N     30     50     mA       Standby Mode (Off, UV, 07)     Measured at input with specified filter     30     mA, RMS       Tre-biased startup     External output voltage < Vset		- ·				
Inrush Transient         0.05	Full Load Conditions	Vin = nominal		0.57	0.59	A
Inrush Transient     0.05	Low Line	Vin = minimum				-
No Load         lout = minimum, unit=ON         30         50         mA           Standby Mode (OH, UV, OT)         In         1         3         mA           Reflected (back) ripple current ②         Measured at input with specified filter         30         MA, RMS           Ore-biased startup         External output voltage < Vset	Inrush Transient			0.05		A2-Sec.
No Load         lout = minimum, unit=ON         30         50         mA           Standby Mode (OH, UV, OT)         In         1         3         mA           Reflected (back) ripple current ②         Measured at input with specified filter         30         MA, RMS           Ore-biased startup         External output voltage < Vset					100	
Standby Mode (Off, UV, OT)       1       3       mA         Ieffected (back) ripple current (2)       Measured at input with specified filter       30       mA, RMS         reb-based startup       External output voltage < Vset		lout = minimum, unit=ON				-
Reflected (back) ripple current ②         Measured at input with specified filter         30         mA, RMS           Pre-biased startup         External output voltage < Vset						-
Tre-biased startup     External output voltage < Vset     Monotonic       GENERAL and SAFETY     Vin=48V, full load     89     91     %       ifficiency     Vin=48V, full load     89     91     %       solation     solation     89     91     %       isolation Voltage     Input to output, continuous     2250     Vdc     Monotonic       insulation Safety Rating     10     basic     Vdc       Isolation Capacitance     10     Mohm     Mohm       isolation Capacitance     10     2000     pF       cartified to UL-60950-1, 2AC C22 2 No.60950-1, IEC/EN60950-1, 2AC detition     Yes     Hours x 10       isolation RESIStance     Per MIL-HDBK-217 F, ground benign, Tambient=+40° C     TBD     Hours x 10       DYNAMIC CHARACTERISTICS     Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40° C     2     Hours x 10       DYNAMIC CHARACTERISTICS     Startup Time     Power On to Vout regulated     50     mS       Startup Time     Remote ON to Vout regulated     50     mS     mS       Startup Time     Power On to Vout regulated     2     MuSec       tymamic Load Response     50-75-50% load step, setting time to within ±2% of Vout     200     µSec       tymamic Load Response     50-75-0% load step, setting time to within ±2% of Vout <td><b>,</b> , , , ,</td> <td>Measured at input with specified filter</td> <td></td> <td>30</td> <td></td> <td></td>	<b>,</b> , , , ,	Measured at input with specified filter		30		
GENERAL and SAFETY       Vin=48V, full load       89       91       %         ifficiency       Vin=36V, full load       89       91       %         solation       Isolation Voltage       Input to output, continuous       2250       Vdc         Isolation Resistance       10       basic       Wdc         Isolation Resistance       10       Mohm         Isolation Capacitance       Per MiL-NDR-217F, ground benign, Tabient=+30°C       Yes       Wdc         calculated MTBF       Per MiL-NDR-217F, ground benign, Tambient=+40°C       TBD       Hours x 10         2alculated MTBF       Per Telcordia SR32, issue 1, class 3, ground fixed, Tambient=+40°C       2       Hours x 10         2MANIC CHARACTERISTICS       Tambient=+40°C       300       330       360       KHz         Startup Time       Power On to Vout regulated       50       mS       50       mS         Synamic Load Response       50-75-50% load step, setting time to within ±2% of Vout       200       µSec       V/sec         Synamic Load Peak Deviation       same as above       ±150       mV       V/sec         Synamic Load Peak Deviation       same as above       ±150       mV       V         Prestive Logic, OFF state       OFF = Pin open or external voltage						1174, 11010
Vin=48V, full load         89         91         %           solation         89         91         %           Isolation Voltage         Input to output, continuous         2250         Vdc           Insulation Safety Rating         0         basic         Vdc           Isolation Sofety Rating         0         0         Mohm           Isolation Capacitance         10         Mohm           Isolation Capacitance         10         PF           Safety         Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/EN0950-1, 2nd edition         Yes         Mohm           Calculated MTBF         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         TBD         Hours x 10           Calculated MTBF         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         2         Hours x 10           Calculated MTBF         Per Telcordia SR32, issue 1, class 3, ground fixed, Tambient=+40°C         300         330         360         KHz           Startup Time         Power On to Vout regulated         50         ms         S0         ms           Startup Time         Remote ON to Vout regulated         20         MpSec         MpSec           Opnamic Load Response         50-75-50% load step, settling time to within ±2% of Vout         200         1	•	External output voltage < vset		Wohotomic		
Interferency     Vin=36V, full load     89     91     %       isolation	deneral and SAFETT	Vin_49V full load	80	01		0/.
Isolation         Input to output, continuous         2250         Vdc           Isolation Safety Rating         Input to output, continuous         2250         Vdc           Isolation Safety Rating         Input to output, continuous         2250         Vdc           Isolation Safety Rating         Input to output, continuous         2250         Mohm           Isolation Capacitance         Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1, 2nd edition         Yes         PF           Safety         Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1, 2nd edition         Yes         Mohm           Calculated MTBF         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         TBD         Hours x 10           Calculated MTBF         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         2         Hours x 10           DYNAMIC CHARACTERISTICS         Fexed Switching Frequency         300         330         360         KHz           Startup Time         Remote 0N to Vout regulated         50         mS         50         50         mS           Synamic Load Response         50-75-50% load step, settling time to within ±2% of Vout         200         µSec         µSec           Dynamic Load Peak Deviation         same as above         ±150         mV         MV         FEATURES </td <td>Efficiency</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Efficiency					
Isolation Voltage     Input to output, continuous     2250     Vdc       Insulation Safety Rating     basic     basic     Insulation Safety Rating     Mohm       Isolation Resistance     10     Mohm     Mohm       Isolation Capacitance     10     2000     pF       Safety     Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1, 2nd edition     Yes     Mohm       Saleulated MTBF     Per Telcordia SR332, Issue 1, class 3, ground fixed, Tambient=+30°C     TBD     Hours x 10       Catulated MTBF     Per Telcordia SR332, Issue 1, class 3, ground fixed, Tambient=+40°C     2     Hours x 10       DYNAMIC CHARACTERISTICS     Time     Power On to Vout regulated     2     Hours x 10       Startup Time     Power On to Vout regulated     500     mS       Startup Time     Remote ON to Vout regulated     500     mS       Dynamic Load Response     50-75-50% load step, settling time to within ±2% of Vout     200     µSec       Dynamic Load Response     50-75-50% load step, settling time to within ±2% of Vout     200     mV       PEATURES and OPTIONS     Surfus     10     mV       Versitive     Wifts     10     0.7     V       Negative Logic, OF state     OFF = Pin open or external voltage     10     15     V       Control Current     1 <td>colation</td> <td>VIII=30V, Iuli Ioau</td> <td>09</td> <td>91</td> <td></td> <td>70</td>	colation	VIII=30V, Iuli Ioau	09	91		70
Insulation Safety Rating       Image: Control of the second		Input to output, continuous	2250			Vdo
Isolation Resistance10MohmIsolation Capacitance102000pFSafetyCertified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1, 2nd editionYesCalculated MTBFPer MIL-HDBK-217F, ground benign, Tambient=+30°CTBDHours x 10Calculated MTBFPer Telcordia SR332, sisue 1, class 3, ground fixed, Tambient=+40°C2Hours x 10DYNAMIC CHARACTERISTICSPer Telcordia SR322, sisue 1, class 3, ground fixed, Tambient=+40°C2Hours x 10Startup TimePower On to Vout regulated50mSStartup TimePower On to Vout regulated50mSStartup TimeRemote ON to Vout regulated50mSOynamic Load Response50-75-50% load step, setting time to within ±2% of Vout200µSecOynamic Load Peak Deviationsame as above±150mVFEATURES and OPTIONST0.7VNegative Logic, ON stateON = Ground pin or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage1015VPositive Logic, OFF stateOFF = Ground pin or external voltage1015VPositive Logic, OFF stateOFF = Ground pin or external voltage0.70.8V			2230	basio		Vuc
Isolation Capacitance2000pFSafetyCertified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1, CM editionYesCalculated MTBFPer MIL-HDBK-217F, ground benign, Tambient=+30°CTBDHours x 10Calculated MTBFPer Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C2Hours x 10DYNAMIC CHARACTERISTICSFer Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C300330360KHzStartup TimePower On to Vout regulated50mSmSStartup Time50mSDynamic Load Response50-75-50% load step, settling time to within ±2% of Vout200 $\mu$ Sec $\mu$ SecDynamic Load Peak Deviationsame as above±150mVFEATURES and OPTIONSTentopen or external voltage1mAW* suffixNegative Logic, OFF stateOFF = Pin open or external voltage1mAP* suffixPostive Logic, OFF stateON = Pin open or external voltage1mAP* suffixON = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage0.70.8V			10	Dasic		Mohm
Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1, 2nd edition         Yes           Calculated MTBF         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         TBD         Hours x 10           Calculated MTBF         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         2         Hours x 10           DYNAMIC CHARACTERISTICS         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         2         Hours x 10           DYNAMIC CHARACTERISTICS         Fixed Switching Frequency         300         330         360         KHz           Startup Time         Power On to Vout regulated         50         mS         mS           Opnamic Load Response         50-75-50% load step, settling time to within ±2% of Vout         200         µSec           Opnamic Load Peak Deviation         same as above         ±150         mV           FEATURES and OPTIONS         Features         V         V           Negative Logic, ON state         ON = Ground pin or external voltage         -0.7         0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         1         mA         M           P''' suffix         T         Positive Logic, OFF state         ON = Pin open or external voltage         1.0         0.8         V			10	2000		
Safety     IEC/EN60950-1, 2nd edition     Yes       Calculated MTBF     Per MiL-HDBK-217F, ground benign, Tambient=+30°C     TBD     Hours x 10       Calculated MTBF     Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C     2     Hours x 10       DYNAMIC CHARACTERISTICS       Fixed Switching Frequency     300     330     360     KHz       Startup Time       Power On to Vout regulated     50     mS       Startup Time       Startup Time     Power On to Vout regulated     50     mS       Startup Time	Isolation capacitance	Contified to LIL CODED 1 CCA COD 0 No CODED 1		2000		рг
Calculated MTBF     Tambient=+30°C     TBD     Hours X fC       Calculated MTBF     Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C     2     Hours X fC       DYNAMIC CHARACTERISTICS       Fixed Switching Frequency     300     330     360     KHz       Startup Time     Power On to Vout regulated     50     mS       Startup Time     Remote ON to Vout regulated     50     mS       Dynamic Load Response     50-75-50% load step, settling time to within ±2% of Vout     200     µSec       Dynamic Load Peak Deviation     same as above     ±150     mV       FEATURES and OPTIONS       FEATURES and OPTIONS       Startup Control @       Weight Startup Time       Negative Logic, ON state     ON = Ground pin or external voltage       OPT     0.7     V       Negative Logic, OFF state       OFF = Pin open or external voltage       Topen or external voltage       ON       ON = Ground pin or external voltage       ON       OT       OT       OT       OT       Negative Logic, ON state       ON    <	Safety	IEC/EN60950-1, 2nd edition		Yes		
Characterized MTBF       fixed, Tambient=+40°C       2       Hours X for         DYNAMIC CHARACTERISTICS       Fixed, Tambient=+40°C       300       330       360       KHz         Fixed Switching Frequency       Power On to Vout regulated       300       330       360       KHz         Startup Time       Power On to Vout regulated       50       mS       50       mS         Dynamic Load Response       50-75-50% load step, settling time to within ±2% of Vout       200       µSec       µSec         Dynamic Load Peak Deviation       same as above       ±150       mV       mV         FEATURES and OPTIONS       Exerct ON = Ground pin or external voltage       -0.7       0.7       V         Negative Logic, ON state       ON = Ground pin or external voltage       1       mA       mA         'N" suffix       The set on the se	Calculated MTBF	Tambient=+30°C		TBD		Hours x 10 <sup>6</sup>
Fixed Switching Frequency300330360KHzStartup TimePower On to Vout regulated50mSStartup TimeRemote ON to Vout regulated50mSOpnamic Load Response $50$ -75-50% load step, settling time to within ±2% of Vout200 $\mu$ SecOpnamic Load Response $50$ -75-50% load step, settling time to within ±2% of Vout200 $\mu$ SecOpnamic Load Peak Deviationsame as above±150mVFEATURES and OPTIONSmVmVFEATURES and OPTIONS0.7VNegative Logic, ON stateON = Ground pin or external voltage-0.70.7VNegative Logic, OFF stateOFF = Pin open or external voltage1mAPositive Logic, ON stateON = Pin open or external voltage1mAPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, OFF stateOFF = Ground pin or external voltage100.8V	Calculated MTBF			2		Hours x 10 <sup>6</sup>
Startup Time         Power On to Vout regulated         50         mS           Startup Time         Remote ON to Vout regulated         50         mS           Dynamic Load Response         50-75-50% load step, settling time to within ±2% of Vout         200         µSec           Dynamic Load di/dt         200         2         A/µSec           Dynamic Load Peak Deviation         same as above         ±150         mV           FEATURES and OPTIONS         mV         mV         mV           Remote On/Off Control @         'N" suffix         N         mV           Negative Logic, ON state         ON = Ground pin or external voltage         -0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         1         mA           'P" suffix         1         MA         MA           'P" suffix         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Ground pin or external voltage         10         15         V						
Startup Time         Remote ON to Vout regulated         50         mS           Dynamic Load Response         50-75-50% load step, settling time to within ±2% of Vout         200         µSec           Dynamic Load Response         200         µSec         2         A/µSec           Dynamic Load Peak Deviation         same as above         ±150         mV           FEATURES and OPTIONS         #         mV         mV           Remote On/Off Control @         'N" suffix          0.7         V           Negative Logic, ON state         ON = Ground pin or external voltage         -0.7         0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         mA         mA           'P" suffix          0N = Pin open or external voltage         10         0.8         V	*		300	330		
Dynamic Load Response         50-75-50% load step, settling time to within ±2% of Vout         200         μSec           Dynamic Load Response         2         A/μSec           Dynamic Load Peak Deviation         same as above         ±150         mV           FEATURES and OPTIONS         mV         Features         mV           Remote On/Off Control ④         'N" suffix         0N = Ground pin or external voltage         -0.7         0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Positive Logic, ON state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Ground pin or external voltage         10         15         V						
±2% of Vout     200     μsec       Dynamic Load Nesponse     ±2% of Vout     2     A/μsec       Dynamic Load Peak Deviation     same as above     ±150     mV       FEATURES and OPTIONS     #N" suffix     mV     mV       Negative Logic, ON state     ON = Ground pin or external voltage     -0.7     0.7     V       Negative Logic, OFF state     OFF = Pin open or external voltage     10     15     V       Positive Logic, ON state       ON = Pin open or external voltage     10     15     V       Positive Logic, OFF state       ON = Pin open or external voltage     10     15     V       Positive Logic, OFF state       ON = Pin open or external voltage     10     15     V       Positive Logic, OFF state     OFF = Ground pin or external voltage     10     15     V	Startup Time				50	mS
Dynamic Load Peak Deviation     same as above     ±150     mV       FEATURES and OPTIONS       Remote On/Off Control ④       "N" suffix       Negative Logic, ON state     ON = Ground pin or external voltage     -0.7     0.7     V       Negative Logic, OFF state     OFF = Pin open or external voltage     10     15     V       Control Current     1     mA       "P" suffix       Positive Logic, ON state       ON = Pin open or external voltage     10     15     V       Positive Logic, OFF state     ON = Pin open or external voltage     10     15     V       Positive Logic, OFF state       ON = Pin open or external voltage     10     15     V       Positive Logic, OFF state     OFF = Ground pin or external voltage     -0.7     0.8     V	Dynamic Load Response			200		μSec
FEATURES and OPTIONS         Remote On/Off Control ④         "N" suffix         Negative Logic, ON state       ON = Ground pin or external voltage       -0.7       0.7       V         Negative Logic, OFF state       OFF = Pin open or external voltage       10       15       V         Control Current       1       mA         "P" suffix       ON = Pin open or external voltage       10       15       V         Positive Logic, ON state       ON = Pin open or external voltage       10       15       V         Positive Logic, OFF state       OFF = Ground pin or external voltage       10       15       V	Dynamic load di/dt				2	A/µSec
FEATURES and OPTIONS         Remote On/Off Control ④         'N" suffix         Negative Logic, ON state       ON = Ground pin or external voltage       -0.7       V         Negative Logic, OFF state       OFF = Pin open or external voltage       10       15       V         Control Current       1       mA       'P" suffix         Positive Logic, ON state       ON = Pin open or external voltage       10       15       V         Positive Logic, OFF state       ON = Pin open or external voltage       10       15       V         Positive Logic, OFF state       OFF = Ground pin or external voltage       10       15       V	Dynamic Load Peak Deviation	same as above		±150		· · ·
Remote On/Off Control ④           'N" suffix           Negative Logic, ON state         ON = Ground pin or external voltage         -0.7         0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Control Current         0N = Pin open or external voltage         10         1         mA           'P" suffix         Positive Logic, ON state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Ground pin or external voltage         10         15         V		· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		·
Negative Logic, ON state         ON = Ground pin or external voltage         -0.7         0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Control Current         1         mA           'P" suffix         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Ground pin or external voltage         10         15         V	Remote On/Off Control ④					
Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Control Current         1         mA         mA           'P" suffix		ON = Ground pin or external voltage	-0 7		0.7	V
Control Current         1         mA           'P" suffix         'P" suffix         Image: Control Current voltage         10         15         V           Positive Logic, ON state         OFF = Ground pin or external voltage         -0.7         0.8         V						
"P" suffix         ON = Pin open or external voltage         10         15         V           Positive Logic, ON state         OFF = Ground pin or external voltage         -0.7         0.8         V			IU	1	IJ	-
Positive Logic, ON state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Ground pin or external voltage         -0.7         0.8         V				1		IIIA
Positive Logic, OFF state         OFF = Ground pin or external voltage         -0.7         0.8         V	D" cuffix					
		ON - Din open or external valtage	10		15	M
	Positive Logic, ON state					



# **UEI25 Series**

Single Output Isolated 25-Watt DC/DC Converters

### FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL UEI25-050-D48

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power	See Derating	0.0	25.0	25.25	W
Voltage					
Nominal Output Voltage	No trim	4.95	5.00	5.05	Vdc
Setting Accuracy	At 50% load	-1		+1	% of Vset.
Output Voltage Range	User-adjustable	-10		+10	% of Vnom.
Overvoltage Protection	Via magnetic feedback	6	6.5	7.5	Vdc
Current	Ŭ		1		
Output Current Range		0	5.0	5.0	А
Minimum Load 3			No minimum load		% of lout
Current Limit Inception	98% of Vnom., after warmup	5.3	6.8	7.3	A
Short Circuit		010	0.0		
Short Circuit Current	Hiccup technique, autorecovery			0.3	А
Short Circuit Duration (remove short for	Output shorted to ground, no damage		Continuous	0.0	
recovery) Short circuit protection method	Current limiting				_
	Guirent inniting				
Regulation 5			1	0.4	0/ ()/ 1
Line Regulation	Vin=min. to max., Vout=nom., 50% load			±0.1	% of Vout
Load Regulation	lout=min. to max., Vin=48V		50	±0.2	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW		50	80	mV pk-pk
Temperature Coefficient	At all outputs		0.02		% of Vnom./°C
Maximum Capacitive Loading (10% ceramic, 90% Oscon)	Cap. ESR=<0.02 $\Omega$ , full resistive load	0		2000	μF
MECHANICAL (Through Hole Models)	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Outline Dimensions (no baseplate)	C75 case		0.96x1.1x0.32		Inches
(Please refer to outline drawing)	WxLxH		24.4x27.9x8.1		mm
Weight			0.32		Ounces
			9.07		Grams
					Inches
Through Hole Pin Diameter			0.04		1101103
Through Hole Pin Diameter			0.04		mm
Through Hole Pin Diameter Through Hole Pin Material					
	Nickel subplate		1.016		
Through Hole Pin Material	Nickel subplate Gold overplate		1.016 Copper alloy		mm
Through Hole Pin Material			1.016 Copper alloy 50		mm µ-inches
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL	Gold overplate	-40	1.016 Copper alloy 50	85	mm µ-inches
Through Hole Pin Material TH Pin Plating Metal and Thickness		-40 -40	1.016 Copper alloy 50	<u>85</u> 82	mm µ-inches µ-inches
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL	Gold overplate With derating, 200 LFM No derating, 200 LFM, full power		1.016 Copper alloy 50		mm µ-inches µ-inches °C
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL Operating Ambient Temperature Range	Gold overplate With derating, 200 LFM No derating, 200 LFM, full power No derating	-40	1.016 Copper alloy 50	82	mm μ-inches μ-inches °C °C
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL Operating Ambient Temperature Range Operating Case Temperature Range	Gold overplate With derating, 200 LFM No derating, 200 LFM, full power	-40 -40	1.016 Copper alloy 50	82 105	mm μ-inches μ-inches °C °C °C °C
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL Operating Ambient Temperature Range Operating Case Temperature Range Storage Temperature	Gold overplate With derating, 200 LFM No derating, 200 LFM, full power No derating Vin = Zero (no power)	-40 -40 -55	1.016 Copper alloy 50 5	82 105 125	mm µ-inches µ-inches °C °C °C °C °C
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL Operating Ambient Temperature Range Operating Case Temperature Range Storage Temperature Thermal Protection/Shutdown	Gold overplate With derating, 200 LFM No derating, 200 LFM, full power No derating Vin = Zero (no power) Measured in center	-40 -40 -55	1.016 Copper alloy 50 5	82 105 125	mm µ-inches µ-inches °C °C °C °C °C
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL Operating Ambient Temperature Range Operating Case Temperature Range Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference Conducted, EN55022/CISPR22	Gold overplate With derating, 200 LFM No derating, 200 LFM, full power No derating Vin = Zero (no power) Measured in center	-40 -40 -55	1.016 Copper alloy 50 5	82 105 125	mm µ-inches µ-inches °C °C °C °C °C °C °C °C °C °C
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL Operating Ambient Temperature Range Operating Case Temperature Range Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference	Gold overplate With derating, 200 LFM No derating, 200 LFM, full power No derating Vin = Zero (no power) Measured in center	-40 -40 -55	1.016 Copper alloy 50 5	82 105 125	mm µ-inches µ-inches °C °C °C °C °C °C °C
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL Operating Ambient Temperature Range Operating Case Temperature Range Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference Conducted, EN55022/CISPR22 Radiated, EN55022/CISPR22	Gold overplate With derating, 200 LFM No derating, 200 LFM, full power No derating Vin = Zero (no power) Measured in center External filter is required To +85°C	-40 -40 -55 110	1.016 Copper alloy 50 5	82 105 125 120	mm μ-inches μ-inches °C °C °C °C °C °C °C °C °C °C
Through Hole Pin Material TH Pin Plating Metal and Thickness ENVIRONMENTAL Operating Ambient Temperature Range Operating Case Temperature Range Storage Temperature Thermal Protection/Shutdown Electromagnetic Interference Conducted, EN55022/CISPR22 Radiated, EN55022/CISPR22 Relative humidity, non-condensing	Gold overplate With derating, 200 LFM No derating, 200 LFM, full power No derating Vin = Zero (no power) Measured in center External filter is required	-40 -40 -55 110 	1.016 Copper alloy 50 5	82 105 125 120 90	mm μ-inches μ-inches °C °C °C °C °C °C °C °C °C °C

#### **Notes**

- $\odot$  Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1  $\mu F$  and 10  $\mu F$  multi-layer ceramic output capacitors. The external input capacitor is 4.7  $\mu F$  ceramic. All capacitors are low-ESR types wired close to the converter. These capacitors are necessary for our test equipment and may not be needed in the user's application.
- @ Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220  $\mu F,$  Cin=33  $\mu F$  and Lbus=12  $\mu H.$
- ③ All models are stable and regulate to specification under no load.
- ④ The Remote On/Off Control is referred to -Vin.
- ⑤ Regulation specifications describe the output voltage changes as the line voltage or load current is varied from its nominal or midpoint value to either extreme.



# **UEI25 Series**

Single Output Isolated 25-Watt DC/DC Converters

## FUNCTIONAL SPECIFICATIONS - MODEL UEI25-120-D48

Isolation Voltage     Input to output, continuous     2250     Vdc       Insulation Safety Rating     basic     Vdc       Isolation Resistance     10     Mohm       Isolation Capacitance     10     PF       Safety     Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1     Yes     PF       Calculated MTBF     Per MIL-HDBK-217F, ground benign, Tambient=+30°C     TBD     Hours x 10       Calculated MTBF     Per Teleorida R532, Issue 1, class 3, ground fixed, Tambient=+40°C     2     Hours x 10       DVNAMIC CHARACTERISTICS     Per Teleorida R532, Issue 1, class 3, ground fixed, Tambient=+40°C     10     50     mS       Startup Time     Power On to Vout regulated     10     50     mS       Startup Time     Power On to Vout regulated     10     50     mS       Dynamic Load Response     50-75-50% load step, settling time to within ±1% of Vout     100     200     µSec       Dynamic Load Peak Deviation     same as above     ±250     ±350     mV       FEATURES       Function Of Pions       Startup Time       Dynamic Load Response     50-75-50% load step, settling time to within ±1% of Vout     100     200     µSec       Dynamic Load Peak Deviation     same as above     ±250     ±350     mV    <	ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Unit         U	nput Voltage, Continuous	Full power operation	0		80	Vdc
Calculation Voltage (and voltage)         Intrust in output iteded 100 mG (move), incluit convent from (move), incluit convent from (move), incluit convent from (move), incluit convent from (move)         None         Vite (move)           None         0         2230         Vite (move)         Vite (move)         Vite (move)         0         223         Vite (move)           None         0         223         Vite (move)         0         223         Vite (move)           Stringer Temperature (move)         Comment from (move)         25         123         C           Stringer Temperature (move)         Stringer Temperature (move)         255         123         C           Stringer Temperature (move)         Stringer Temperature (move)         Stringer Temperature (move)         26         48         75         Vite (move)           None         None         None         None         Vite (move)         Vite (move)         Vite (move)         None         Vite (move)         Vite (move)         Vite (move)         None         Vite (move)         Vite (move)         Vite (move)         Vite (move)         None         Vite (move)         Vite	nput Voltage, Transient		0		100	Vdc
None, install acternal faseNone<					0050	) (sla
Direct Control         Power on contrivered to -Vin         0         15         Wok           Dirput Power         Carnet Initiate, no danage, stort-forcial protected         0         2.1         A           Strange Temperature Range         Vin a 2 arto (no power)         -55         125         °C           Biosolite maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than tho as device the protein maximum are stress rating to the protei				News	2250	
Dupper Power         mm		,	0	None	15	
Uniput Current         Current initial, no danaga, short-forcial proteided         0         2.1         A           Visionage Temperature Range         Vin = 2 aro (no powe)         -55         125         °C           boolute maximums are stress ratings. Exposure of evices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than the deal in the Proference-PurceIonal Specifications Table is not implied or recommended.         76         Vioi           INPUT         Economended External Fuse         Fast blow         36         48         75         Moto fast fast fast fast fast fast fast fast		Power on or off, referred to -vin			-	
Storage Emperature Range   Wn – Zero (no power) -55   125   7C Storage Emperature Range   Wn – Zero (no power) -55   125   1						
Usualize maintainums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than tho stead in the PerformanceFunctional Specifications Table is not implied or recommended.         V           INPUT         V						
United         Section         Section <t< td=""><td></td><td></td><td></td><td></td><td>-</td><td>-</td></t<>					-	-
INPUT         36         48         75         Vdc           Becommendel External Fuse         Fast blow         4         35.2         36.         Vdc           Bard-up threshold         Rising input voltage         32         33.0         35.2         Vdc           Inder-voltage shutdown         Failing input voltage         32         34.0         35.2         Vdc           Inverse Planting Protection         None         None         Vdc         Vdc         Vdc           Inverse Planting Protection         None, install external fuse         None         Vdc         Vdc           Put Load Conditions         Vin = minimum         0.050         0.642         A.           No Load         None         0.051         A2-Sec.         Output in Short Circuit         0.051         A2-Sec.           No Load         Lout L= minimum, unit=0N         20         35         mA           Standty Mode (0ft, UV, 07)         1         2         mA         RMS           Effected (back) ripple current ②         Measured at input voltage          86.0         87.5         %           Standty Mode (0ft, UV, 07)         Effected (back) ripple current ③         10         mA         RMS           Stadato Notage         <			y adversely affect long	g-term reliability. Proper opei	ration under conditions	other than tho
Becommende External Fuso         Fast blow         1.5         A           Nart-up threshold         Rising input voltage         34         35.2         36.0         Vice           Nart-up threshold         Rising input voltage         32         34.0         35.2         Vice           None         None         None         Vice         Vice <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td></td<>						
Becommende External Fuso         Fast blow         1.5         A           Nart-up threshold         Rising input voltage         34         35.2         36.0         Vice           Nart-up threshold         Rising input voltage         32         34.0         35.2         Vice           None         None         None         Vice         Vice <td< td=""><td>Operating voltage range</td><td></td><td>36</td><td>48</td><td>75</td><td>Vdc</td></td<>	Operating voltage range		36	48	75	Vdc
Shart-up Investedid         Rising input voltage         34         35.2         36         Work           Name-up Restriction         Falling input voltage         32         34.0         35.2         Wdc           beervoltage shutdown         None, install external fuse         None         Wdc         Wdc           beervoltage shutdown         None, install external fuse         None         Wdc         Wdc           part current         capacitive         capacitive         Wdc         Wdc         None         Wdc           Full Load Conditions         Vin = nominal         0.600         0.617         A           Low Une         Vin = nominal         0.600         0.617         A           Low Une         Vin = nominal         0.600         0.617         A           No Load         Dut = minimum, unit=0N         2.00         35.0         mA           Standby Mode (0ft, UV, 07)         Itest = minimum, unit=0N         2.0         30         mA ABNS           reclead startup         External output voltage          30         mA ABNS         Macasstartup           reclead startup         External output voltage          2250         Montonic         Macasstartup           Istaltion Ortage         Input to outpu		Fast blow				_
Indervoltage shutdown         Falling input voltage         32         34.0         35.2         Vdc           Inversite polarity Protection         None         None         Vdc           Inversite Filter Type         Incention         None         Vdc           input current         0.600         0.617         A           Daw Line         Vin = nominal         0.600         0.617         A           Daw Line         Vin = nominal         0.600         0.617         A           Daw Line         0.016         0.62         A         2-Sec.           Output in Short Circuit         0.01         1         2         mA           No Load         lout = minimum, unit=ON         20         35         mA           Standby Mode (Mr, UV, OT)         External output voltage < Vset			34	35.2	-	-
Neverolage shufdown None None None None None None None Non						
Interest Pitter Type papt currentNone, install external fuseNoneVdcFull Load ConditionsVin = nominal0.6000.617ALow LineVin = minimum0.6090.042ADrugtur in Short Circuit0.05.422-Sec.Output in Short Circuit100mANo LoadIout = minimum, unit=0N2035mAShandby Mode (Off, UV, OT)			02		00.2	
Internal Filter Type         Image         Image<		None install external fuse				
Unit of the information of t						vuc
Full Laad Conditions         Vin = nominal         0.600         0.617         A           Low Line         Vin = minimum         0.809         0.842         A           Insush Transient         0.05         A2-Sec.         0.05         MA           Output in Short Circuit         0.06         100         mA           Standby Mode (Off, UV, OT)         Measured at input with specified filter         30         mA           Standby Mode (Off, UV, OT)         Measured at input with specified filter         30         mA           Relected (back) ripple current @         Measured at input with specified filter         30         mA           Relected for Ask program         Ketrial output voltage < Vset				υαμασιτίνο		
Low Line         Vin = minimum         0.899         0.842         A           Inrush Transient         0.05         0.05         A2-Sec.           Output in Short Circuit         50         100         mA           No Load         kut = minimum, unt=0N         20         35         mA           Standby Mode (Off, UV, OT)         1         2         mA           Ieffected (back) ripple current ©         Measured at input with specified filter         30         mA, RMS           Standby Mode (Off, UV, OT)         External output voltage < Vset		Vin – pominal		0.600	0.617	Δ
Inrush Transient0.05A2-Sec.Output in Short Circuit50100mANo Loadlout = minimum, unit=0N2035mAStandby Mode (Off, UV, OT)12mAReflected (back) ripple current ②Measured at input with specified filter30mA, RMsReflected (back) ripple current ③Measured at input with specified filter30mA, RMsReflected (back) ripple current ③Measured at input with specified filter30mA, RMsReflected (back) ripple current ③Nim=48V, full load86.087.5%SolationSolation2250VideVideInsultation Safety RatingInput to output, continuous2250VideMohmIsolation VidtageInput to output, continuous2250VideMohmIsolation Capacitance10MohmPFSilationIsolation Capacitance101700PFPFIsolation KapacitanceYes1Hours x 10Isolation KapacitancePer Mil-HDBK-217F, ground bengin, Tambient=+30°CYesHours x 10Mather HTFPer Telecordia SR332, Issue 1, class 3, ground fartup TimePower On to Vout regulated1050mSStartup TimePower On to Vout regulated1050mSMsSStartup TimeRometo IN to Vout regulated1050mSMsSStartup TimeRometo IN to Vout regulated1050mSMsSSMs <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td></td<>						
Output in Short Circuit         Intermixed         50         100         mA           No Load         lout = minimum, unit=0N         20         35         mA           Standby Mode (Off, UW, OT)         1         2         mA           Ieffected (back) ripple current ©         Measured at input with specified filter         30         mA, RMS           Tre-biased startup         External output voltage < Vset		VIII = IIIIIIIIIIII			0.042	
No Load         lout = minimum, unit=ON         20         35         mA           Standby Mode (OH, UV, OT)         1         2         mA           Reflected (back) ripple current ②         Measured at input with specified filter         30         mA, RMS           re-biased startup         External output voltage < Vset					100	-
Standby Mode (Off, UV, OT)     n     n     1     2     mA       Ideflected (back) ripple current @)     Measured at input with specified filter     30     mA, RMS       Central output voltage < Vset     Monotonic     max       GENERAL and SAFETY     Input to output voltage < Vset	•	laut minimum unit ON				
Instruction         Measured at input with specified filter         30         mA, RMS           GeNERAL and SAFETY         Monotonic         Monotonic         Monotonic           Edition         Second         86.0         87.5         %           Solation         Solation         Vin=48V, full load         86.0         87.5         %           Solation         Distribution         2250         Vdc         Vdc           Insulation Safety Rating         Input to output, continuous         2250         Monotonic         Monotonic           Isolation Capacitance         10         Monotonic         Monotonic         Monotonic           Isolation Resistance         10         Press         Monotonic         Monotonic           Acculated MTBF         Per MIL-HOBK-217, ground benign, Tambient=+40°C         TBD         Hours x 10           DYNAMIC CHARACTERISTICS         Vec         2         Hours x 10           DYNAMIC Characteristics         10         50         mS           startup Time         Remote ON to Vout regulated         10         50         mS           tartup Time         Remote ON to Vout regulated         10         50         mS           tartup Time         Remote ON to Vout regulated         10 <td></td> <td>iout = minimum, unit=UN</td> <td></td> <td></td> <td></td> <td></td>		iout = minimum, unit=UN				
Tre-biased startup     External output voltage < Vset     Monotonic       GENERAL and SAFETY     Input to utput, continuous     86.0     87.5     %       Isolation     Input to output, continuous     2250     Vdc       Isolation Netisetance     10     Mohm       Isolation Resistance     10     Mohm       Isolation Resistance     10     Mohm       Isolation Capacitance     110     Mohm       Isolation Resistance     10     PF       iadety     Certified to UL-60950-1, CSA-C22.2 No.60950-1     Yes       1, IEC/EN00950-1     Yes     Per       1, IEC/EN00950-1     TBD     Hours x 10       iadulated MTBF     Per fictoridia SR32, issue 1, class 3, ground fixed, Tambient=+40°C     2       DYMANIC CHARACTERISTICS     Itaurup Time     Power On to Vout regulated     10     50       ixatup Time     Power On to Vout regulated     10     50     mS       ynamic Load Response     50-75-50% load step, settling time to within ±1% of Vout     100     200     µSec       ynamic Load Response     50-75-50% load step, settling time to within ±1% of Vout     10     1     A/µSec       ynamic Load Response     ±1% of Vout     10     1     A/µSec       ynamic Load Pask Deviation     same as above     ±250     ±35					2	
CENERAL and SAFETY         Vin=48V, full load         86.0         87.5         %           Station         Input to output, continuous         2250         Vdc         Vdc           Isolation Voltage         Input to output, continuous         2250         Vdc         Vdc           Isolation Safety Rating         basic         Vdc         Vdc         Vdc           Isolation Capacitance         10         Mohm         Mohm         Safety         Certified to UL-60950-1, CSA-C22.2 No.60950-1, IECKNE0050-1         Yes         Mohr         PF           Statuty         Certified to UL-60950-1, CSA-C22.2 No.60950-1, IECKNE0050-1         Yes         Mohr         Mohr           Statuded MTBF         Per MIL-HDBK-217F, ground benign, Iambient=+30°C         TBD         Hours x 10           DYNAMIC CHARACTERISTICS         Vec         2         Hours x 10           Startup Time         Power On to Vout regulated         10         50         mS           Startup Time         Power On to Vout regulated         10         50         mS           Startup Time         Remote ON to Vout regulated         10         50         mS           Synamic Load Response         ±1% of Vout         ±1% of Vout         1         A/LScc           Tynamic Load Peak Devia	. ,			30		mA, RMS
EfficiencyVin=48V, full load86.087.5%solationsolationIsolation VoltageInput to output, continuous2250VdcInsulation Safety Rating0basicVdcIsolation Resistance10basicMohmIsolation Capacitance11700%MohmSafetyCertified to UL-60950-1, CSA-C22.2 No.60950- 1, EC/EN06950-1YesMointSaleulated MTBFPer MIL-HDBK-217F, ground benign, Tambient=+30°CTBDHours x 10Catculated MTBFPer felcordia SR32, Issue 1, class 3, ground fixed, Tambient=+40°C2Hours x 10OVNAMIC CHARACTERISTICSPer felcordia SR32, Issue 1, class 3, ground fixed, Tambient=+40°C25325355KHzStartup TimePower On to Vout regulated1050mSSafetyOynamic Load Response50-75-50% load step, setting time to within ±1% of Vout1050mSOynamic Load Response±1% of Vout±250±350mVPrestive Logic, OF stateON = Ground pin or external voltage-0.70.7VNegative Logic, OF stateON = Pin open or external voltage1015VPositive Logic, OF stateON = Pin open or external voltage-0.70.8.8V	•	External output voltage < Vset		Monotonic		
solation       view       view       view         Isolation Voltage       Input to output, continuous       2250       Vidc         Isolation Safety Rating       2250       basic       Vidc         Isolation Resistance       10       basic       Mohm         Isolation Capacitance       10       PF       Mohm         Safety       Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1       Yes       Pf         Saleulated MTBF       Per MIL-HDBK-217F, ground benign, Tambient=-40°C       TBD       Hours x 10         Calculated MTBF       Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=-40°C       2       Hours x 10         DYNAMIC CHARACTERISTICS       TED       Hours x 10       50       mS         Startup Time       Power On to Vout regulated       10       50       mS         Startup Time       Remote ON to Vout regulated       10       50       mS         Dynamic Load Response       50-755-50% load step, settling time to within ±1% of Vout       100       200       µSec         Dynamic Load Peak Deviation       same as above       ±250       ±350       mV         FEADUELS and OPTIONS       Same sabove       ±250       ±350       mV         Vietties and OPTIONES       Con						
Isolation Voltage     Input to output, continuous     2250     Vdc       Insulation Safety Rating     0     basic     0       Isolation Resistance     10     10     Mohm       Isolation Capacitance     10     1700     pF       Safety     Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1     Yes     PF       Calculated MTBF     Per MIL-HDBK-217F, ground benign, Tambient=+30°C     TBD     Hours x 10       DYNAMIC CHARACTERISTICS     Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C     2     Hours x 10       DYNAMIC CHARACTERISTICS     Time     Power On to Vout regulated     10     50     mS       Startup Time     Power On to Vout regulated     10     50     mS       Dynamic Load Response     50-75-50% load step, settling time to within ±1% of Vout     100     200     µSec       Dynamic Load Peak Deviation     same as above     ±250     ±350     mV       FEATURES and OPTIONS       Ferture of FF = Pin open or external voltage       N° suffix     0     1     mA       Negative Logic, ON state     ON = Ground pin or external voltage     -0.7     0.7     V       Negative Logic, OFF state     OFF = Pin open or external voltage     10     15     V       Positive Logic, OFF		Vin=48V, full load	86.0	87.5		%
Insulation Safety Rating       Image: Control of the second						
Isolation Resistance10MohmIsolation Capacitance1700pFSafetyCertified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1YesPFCalculated MTBFPer MIL-HDBK-217F, ground benign, Tambient=+30°CTBDHours x 10Calculated MTBFPer Telcordia SR332, ground fixed, Tambient=+40°C2Hours x 10DYNAMIC CHARACTERISTICSPer Telcordia SR322, sisue 1, class 3, ground fixed, Tambient=+40°C2Hours x 10DYNAMIC CHARACTERISTICSPer Telcordia SR322, sisue 1, class 3, ground fixed, Tambient=+40°C295325355KHzStartup TimePower On to Vout regulated1050mSStartup TimePower On to Vout regulated1050mSDynamic Load Response50-75-50% load step, settling time to within ±1% of Vout100200µSecDynamic Load Peak Deviationsame as above±250±350mVFEATURERSStarteuON = Ground pin or external voltage100.7VNegative Logic, ON stateON = Ground pin or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
Isolation Capacitance       Interview       Interview       Interview       pF         Safety       Certified to UL-60950-1, CSA-C22.2 No.60950-1 1, IEC/EN60950-1       Yes       Interview       Per         Salculated MTBF       Per MIL-HDBK-217F, ground benign, Tambient=+30°C       TBD       Hours x 10         Calculated MTBF       Per Teloordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C       2       Hours x 10         DYNAMIC CHABACTERISTICS       Time       Per Teloordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C       2       Hours x 10         DYNAMIC CHABACTERISTICS       Time       Power On to Vout regulated       10       50       mS         Startup Time       Power On to Vout regulated       10       50       mS         Dynamic Load Response       \$0-75-50% load step, settling time to within ±1% of Vout       100       200       µSec         Upnamic Load Peak Deviation       same as above       ±250       ±350       mV         FEATURES and OPTIONS       Emote 0/Oft Control ③       Time       V       Negative Logic, ON state       0N = Ground pin or external voltage       10       0.7       V         Negative Logic, ON state       ON = Ground pin or external voltage       10       15       V         Nortific Logic, ON state       ON = Pin open o	Isolation Voltage	Input to output, continuous	2250			Vdc
Safety         Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1         Yes           Calculated MTBF         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         TBD         Hours x 10           Calculated MTBF         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         2         Hours x 10           DYNAMIC CHARACTERISTICS         Title         9         325         355         KHz           Startup Time         Power On to Vout regulated         10         50         mS           Startup Time         Remote ON to Vout regulated         10         50         mS           Oynamic Load Response         50-75-50% load step, settling time to within ±1% of Vout         100         200         µSec           Oynamic Load Peak Deviation         same as above         ±250         ±350         mV           FEATURES and OPTIONS         Title         0N = Ground pin or external voltage         -0.7         0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Fin open or external voltage         10         15         V	Isolation Voltage	Input to output, continuous	2250	basic		Vdc
startery1, IEC/EN60950-1YesCalculated MTBFPer MIL-HDBK-217F, ground benign, Tambient=+30°CTBDHours x 10Calculated MTBFPer Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C2Hours x 10DYNAMIC CHARACTERISTICSTixed Switching Frequency295325355KHzStartup TimePower On to Vout regulated1050mSStartup TimePower On to Vout regulated1050mSOrynamic Load Response50-75-50% load step, settling time to within ±1% of Vout100200µSecOrynamic Load Peak Deviation50-75-50% load step, settling time to within ±1% of Vout100200µSecOrynamic Load Peak Deviationsame as above±250±350mVFEATURES and OPTIONSVersume to On/Off Control @Versume to On/Off StateOFF = Pin open or external voltage-0.70.7VNegative Logic, OFF stateOPT = Pin open or external voltage1015VControl CurrentIP" suffix Positive Logic, OFF state0N = Pin open or external voltage1015VPositive Logic, OFF state0N = Pin open or external voltage1015VPositive Logic, OFF state0N = Pin open or external voltage0.70.8V <td>Isolation Voltage Insulation Safety Rating</td> <td>Input to output, continuous</td> <td></td> <td>basic</td> <td></td> <td></td>	Isolation Voltage Insulation Safety Rating	Input to output, continuous		basic		
Per MIL-HDBK-217F, ground benign, Tambient=+30°C         TBD         Hours x 10           Calculated MTBF         Per Telocordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         2         Hours x 10           DYNAMIC CHARACTERISTICS         2         Hours x 10           Exercised Switching Frequency         295         325         355         KHz           Startup Time         Power On to Vout regulated         10         50         mS           Dynamic Load Response         50-75-50% load step, settling time to within ±1% of Vout         100         200         µSec           Dynamic Load Peak Deviation         same as above         ±250         ±350         mV           FEATURES and OPTIONS         same as above         ±250         ±350         mV           Vir suffix         Negative Logic, ON state         ON = Ground pin or external voltage         -0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Positive Logic, OFF state         ON = Pin open or external voltage         10         15         V	Isolation Voltage Insulation Safety Rating Isolation Resistance	Input to output, continuous				Mohm
Lamblent=+30 CImage: Calculated MTBFImage: Calculated MTBFImage: Calculated MTBFPer Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C2Hours x 10DYNAMIC CHARACTERISTICSFixed Switching Frequency295325355KHzStartup TimePower On to Vout regulated1050mSStartup TimeRemote ON to Vout regulated1050mSDynamic Load Response50-75-50% load step, settling time to within ±1% of Vout100200µSecDynamic Load Response50-75-50% load step, settling time to within ±1% of Vout100200µSecDynamic Load Response50-75-50% load step, settling time to within ±1% of Vout100200µSecDynamic Load Peak Deviationsame as above±250±350mVFEATURES and OPTIONS Remote On/Off Control @"W suffix"W suffix"WNegative Logic, ON state0N = Ground pin or external voltage-0.70.7VNegative Logic, OFF state0FF = Pin open or external voltage1015VPositive Logic, ON state0N = Pin open or external voltage1015VPositive Logic, OFF state0FF = Ground pin or external voltage1015VPositive Logic, OFF state0FF = Ground pin or external voltage-0.70.8V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance	Certified to UL-60950-1, CSA-C22.2 No.60950-		1700		Mohm
Calculated MTBP     fixed, Tambient=+40°C     2     Hours x to       DYNAMIC CHARACTERISTICS     5     KHz       Fixed Switching Frequency     295     325     355     KHz       Startup Time     Power On to Vout regulated     10     50     mS       Startup Time     Remote ON to Vout regulated     10     50     mS       Dynamic Load Response     50-75-50% load step, settling time to within ±1% of Vout     100     200     µSec       Dynamic Load Peak Deviation     same as above     ±250     ±350     mV       FEATURES and OPTIONS     FEATURES and OPTIONS     #W     #W     MV       Remote On/Off Control ④     V     0N = Ground pin or external voltage     -0.7     0.7     V       Negative Logic, ON state     ON = Ground pin or external voltage     10     15     V       Control Current     1     mA     mA       P* suffix     Positive Logic, ON state     0N = Pin open or external voltage     10     15     V       Positive Logic, OFF state     ON = Pin open or external voltage     10     15     V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign,		1700 Yes		Mohm pF
Fixed Switching Frequency295325355KHzStartup TimePower On to Vout regulated1050mSStartup TimeRemote ON to Vout regulated1050mSOynamic Load Response50-75-50% load step, settling time to within ±1% of Vout100200µSecOynamic Load Response50-75-50% load step, settling time to within ±1% of Vout100200µSecOynamic Load Peak Deviationsame as above±250±350mVFEATURES and OPTIONS±1% of Vout±250±350mVRemote On/Off Control ④N" suffixNegative Logic, OFF stateON = Ground pin or external voltage-0.70.7VNegative Logic, OFF state0FF = Pin open or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage101mAPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, ON stateOFF = Ground pin or external voltage1015VPositive Logic, ON stateOFF = Ground pin or external voltage-0.70.8V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C		1700 Yes		Mohm pF
Startup TimePower On to Vout regulated1050mSStartup TimeRemote ON to Vout regulated1050mSDynamic Load Response50-75-50% load step, settling time to within ±1% of Vout100200µSecDynamic Load di/dt100200µSec101A/µSecDynamic Load Peak Deviationsame as above±250±350mVFEATURES and OPTIONSRemote On/Off Control @'N" suffixNegative Logic, ON stateON = Ground pin or external voltage-0.70.7VNegative Logic, OFF stateOFF = Pin open or external voltage101mA'P" suffixPositive Logic, ON state0N = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage1015V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground		1700 Yes TBD		Mohm pF Hours x 10
Remote ON to Vour regulated         10         50         mS           Dynamic Load Response         50-75-50% load step, settling time to within ±1% of Vout         100         200         µSec           Dynamic Load Response         ±1% of Vout         100         200         µSec           Dynamic Load Response         ±1% of Vout         1         A/µSec           Dynamic Load Peak Deviation         same as above         ±250         ±350         mV           FEATURES and OPTIONS         ####################################	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground		1700 Yes TBD		Mohm pF Hours x 10
Dynamic Load Response         50-75-50% load step, settling time to within ±1% of Vout         100         200         µSec           Dynamic Load Response         1         A/µSec         1         A/µSec           Dynamic Load Peak Deviation         same as above         ±250         ±350         mV           FEATURES and OPTIONS         ±250         ±350         mV           Remote On/Off Control ④           ''N" suffix           Negative Logic, OFF state         ON = Ground pin or external voltage         -0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         1         mA           'P" suffix         1         M         M         M         P           Positive Logic, OFF state         ON = Pin open or external voltage         10         1         mA           Positive Logic, OFF state         ON = Pin open or external voltage         10         1         M           Positive Logic, OFF state         ON = Pin open or external voltage         10         0.8         V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C	10	1700 Yes TBD 2 325		Mohm pF Hours x 10 Hours x 10 KHz
Aprilamic Load Response±1% of Vout100200µsecDynamic Load Response1A/µSecDynamic Load Peak Deviationsame as above±250±350mVFEATURES and OPTIONSRemote On/Off Control ④'N" suffixNegative Logic, ON stateON = Ground pin or external voltage-0.70.7VNegative Logic, OFF stateOFF = Pin open or external voltage1015VControl Current1mA'P" suffixPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage1015VON = Pin open or external voltage100.8V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C Power On to Vout regulated	10	1700 Yes TBD 2 325	50	Mohm pF Hours x 10 Hours x 10 KHz
Dynamic load di/dt1A/μSecDynamic Load Peak Deviationsame as above±250±350mVFEATURES and OPTIONSRemote On/Off Control @'N" suffixNegative Logic, ON stateON = Ground pin or external voltage-0.70.7VNegative Logic, OFF stateOFF = Pin open or external voltage1015VOn Pin open or external voltage10mA'P" suffixPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, ON stateON = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage1015VPositive Logic, OFF stateON = Pin open or external voltage1015VPositive Logic, OFF stateOFF = Ground pin or external voltage-0.70.8V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF EVANIC CHARACTERISTICS Fixed Switching Frequency Startup Time	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C Power On to Vout regulated	10	1700 Yes TBD 2 325 10	50	Mohm pF Hours x 10 Hours x 10 KHz mS
Dynamic Load Peak Deviation         same as above         ±250         ±350         mV           FEATURES and OPTIONS           Remote On/Off Control @           'N" suffix           Negative Logic, ON state         ON = Ground pin or external voltage         -0.7         0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Control Current         1         mA           'P" suffix         Positive Logic, ON state         0N = Pin open or external voltage         10         15         V           Positive Logic, ON state         0N = Pin open or external voltage         10         15         V           Positive Logic, OFF state         0FF = Ground pin or external voltage         10         15         V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C Power On to Vout regulated Remote ON to Vout regulated 50-75-50% load step, settling time to within	10	1700 Yes TBD 2 325 10 10	50 50	Mohm pF Hours x 10 Hours x 10 KHz mS mS
FEATURES and OPTIONS         Remote On/Off Control ④         N" suffix         Negative Logic, ON state       ON = Ground pin or external voltage       -0.7       0.7       V         Negative Logic, OFF state       OFF = Pin open or external voltage       10       15       V         Control Current       1       mA         'P" suffix         Positive Logic, ON state       ON = Pin open or external voltage       10       15       V         Positive Logic, ON state       ON = Pin open or external voltage       10       15       V         Positive Logic, OFF state       OFF = Ground pin or external voltage       10       15       V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time Dynamic Load Response	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C Power On to Vout regulated Remote ON to Vout regulated 50-75-50% load step, settling time to within	10	1700 Yes TBD 2 325 10 10	50 50 200	Mohm pF Hours x 10 Hours x 10 KHz mS mS µSec
Atemote On/Off Control ④         N" suffix         Negative Logic, ON state       ON = Ground pin or external voltage       -0.7       0.7       V         Negative Logic, OFF state       OFF = Pin open or external voltage       10       15       V         Control Current       1       mA         'P" suffix         Positive Logic, ON state       ON = Pin open or external voltage       10       15       V         Positive Logic, OFF state       ON = Pin open or external voltage       10       15       V         Positive Logic, OFF state       OFF = Ground pin or external voltage       10       15       V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Dynamic Load Response Dynamic Load di/dt	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C Per Telcordia SR322, issue 1, class 3, ground fixed, Tambient=+40°C Power On to Vout regulated So-75-50% load step, settling time to within ±1% of Vout	10	1700 Yes TBD 2 325 10 10 10 100	50 50 200 1	Mohm pF Hours x 10 Hours x 10 KHz mS mS µSec A/µSec
N" suffix           Negative Logic, ON state         ON = Ground pin or external voltage         -0.7         0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Control Current         1         mA           P" suffix         ON = Pin open or external voltage         10         15         V           Positive Logic, ON state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Ground pin or external voltage         10         15         V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time Dynamic Load Response Dynamic Load Peak Deviation	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C Per Telcordia SR322, issue 1, class 3, ground fixed, Tambient=+40°C Power On to Vout regulated So-75-50% load step, settling time to within ±1% of Vout	10	1700 Yes TBD 2 325 10 10 10 100	50 50 200 1	Mohm pF Hours x 10 Hours x 10 KHz mS mS µSec A/µSec
Negative Logic, ON state         ON = Ground pin or external voltage         -0.7         0.7         V           Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Control Current         1         mA           'P" suffix           Positive Logic, OFF state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Ground pin or external voltage         -0.7         0.8         V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF CAIculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time Dynamic Load Response Dynamic Load Peak Deviation FEATURES and OPTIONS	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C Per Telcordia SR322, issue 1, class 3, ground fixed, Tambient=+40°C Power On to Vout regulated So-75-50% load step, settling time to within ±1% of Vout	10	1700 Yes TBD 2 325 10 10 10 100	50 50 200 1	Mohm pF Hours x 10 Hours x 10 KHz mS mS µSec A/µSec
Negative Logic, OFF state         OFF = Pin open or external voltage         10         15         V           Control Current         1         mA         mA           'P" suffix	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time Oynamic Load Response Oynamic Load Peak Deviation FEATURES and OPTIONS Remote On/Off Control ④	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C Per Telcordia SR322, issue 1, class 3, ground fixed, Tambient=+40°C Power On to Vout regulated So-75-50% load step, settling time to within ±1% of Vout	10	1700 Yes TBD 2 325 10 10 10 100	50 50 200 1	Mohm pF Hours x 10 Hours x 10 KHz mS mS µSec A/µSec
Control Current         1         mA           'P" suffix         'P" suffix         'P" suffix         'DN = Pin open or external voltage         10         15         V           Positive Logic, ON state         OFF = Ground pin or external voltage         -0.7         0.8         V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time Oynamic Load Response Oynamic Load Peak Deviation FEATURES and OPTIONS Remote On/Off Control @	Certified to UL-60950-1, CSA-C22.2 No.60950- 1, IEC/EN60950-1 Per MIL-HDBK-217F, ground benign, Tambient=+30°C Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C Power On to Vout regulated Remote ON to Vout regulated 50-75-50% load step, settling time to within ±1% of Vout same as above	10	1700 Yes TBD 2 325 10 10 10 100	50 50 200 1 ±350	Mohm pF Hours x 10 Hours x 10 KHz mS mS μSec A/μSec mV
P" suffix           Positive Logic, ON state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Ground pin or external voltage         -0.7         0.8         V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time Oynamic Load Response Oynamic Load Peak Deviation FEATURES and OPTIONS Remote On/Off Control @ IN" suffix Negative Logic, ON state	Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         Power On to Vout regulated         Remote ON to Vout regulated         50-75-50% load step, settling time to within ±1% of Vout         same as above         ON = Ground pin or external voltage	10	1700 Yes TBD 2 325 10 10 10 100	50 50 200 1 ±350 0.7	Mohm pF Hours x 10 Hours x 10 KHz mS mS µSec A/µSec MV
Positive Logic, ON state         ON = Pin open or external voltage         10         15         V           Positive Logic, OFF state         OFF = Ground pin or external voltage         -0.7         0.8         V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time Dynamic Load Response Dynamic Load Peak Deviation FEATURES and OPTIONS Remote On/Off Control ④ N" suffix Negative Logic, ON state Negative Logic, OFF state	Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         Power On to Vout regulated         Remote ON to Vout regulated         50-75-50% load step, settling time to within ±1% of Vout         same as above         ON = Ground pin or external voltage	10	1700 Yes TBD 2 325 10 10 100 ±250	50 50 200 1 ±350 0.7	Mohm pF Hours x 10 Hours x 10 KHz mS mS µSec A/µSec MV W V
Positive Logic, OFF state         OFF = Ground pin or external voltage         -0.7         0.8         V	Isolation Voltage Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF CALCULATER STICS Fixed Switching Frequency Startup Time Startup Time Oynamic Load Response Oynamic Load Peak Deviation FEATURES and OPTIONS Remote On/Off Control @ N <sup>III</sup> suffix Negative Logic, OF state Control Current	Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         Power On to Vout regulated         Remote ON to Vout regulated         50-75-50% load step, settling time to within ±1% of Vout         same as above         ON = Ground pin or external voltage	10	1700 Yes TBD 2 325 10 10 100 ±250	50 50 200 1 ±350 0.7	Mohm pF Hours x 10 Hours x 10 KHz mS mS µSec A/µSec MV W V
	Isolation Voltage Insulation Safety Rating Isolation Capacitance Isolation Capacitance Safety Calculated MTBF	Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         Power On to Vout regulated         Remote ON to Vout regulated         50-75-50% load step, settling time to within ±1% of Vout         same as above         ON = Ground pin or external voltage         OFF = Pin open or external voltage	10 295 -0.7 10	1700 Yes TBD 2 325 10 10 100 ±250	$     \begin{array}{r}       50 \\       50 \\       200 \\       1 \\       \pm 350 \\       \hline       0.7 \\       15 \\       \end{array} $	Mohm pF Hours x 10 Hours x 10 Hours x 10 KHz mS MS μSec A/μSec mV V V V
	Isolation Voltage Insulation Safety Rating Isolation Capacitance Isolation Capacitance Safety Calculated MTBF Calculated MTBF Calculated MTBF Calculated MTBF Calculated MTBF DynAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time Oynamic Load Response Oynamic Load Peak Deviation FEATURES and OPTIONS Remote On/Off Control @ 'N" suffix Negative Logic, OFF state Control Current 'P" suffix Positive Logic, ON state	Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         Power On to Vout regulated         Remote ON to Vout regulated         50-75-50% load step, settling time to within ±1% of Vout         Same as above         ON = Ground pin or external voltage         ON = Pin open or external voltage	10 295 -0.7 10 10	1700 Yes TBD 2 325 10 10 100 ±250	50 50 200 1 ±350 0.7 15 15	Mohm pF Hours x 10 Hours x 10 Hours x 10 KHz mS mS μSec A/μSec mV V V V V
	Insulation Safety Rating Isolation Resistance Isolation Capacitance Safety Calculated MTBF Calculated MTBF DYNAMIC CHARACTERISTICS Fixed Switching Frequency Startup Time Startup Time Dynamic Load Response Dynamic Load Response Dynamic Load Peak Deviation FEATURES and OPTIONS Remote On/Off Control ④ "N" suffix Negative Logic, ON state Control Current "P" suffix Positive Logic, ON state	Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/EN60950-1         Per MIL-HDBK-217F, ground benign, Tambient=+30°C         Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient=+40°C         Power On to Vout regulated         Remote ON to Vout regulated         50-75-50% load step, settling time to within ±1% of Vout         Same as above         ON = Ground pin or external voltage         ON = Pin open or external voltage	10 295 -0.7 10 10	1700 Yes TBD 2 325 10 10 100 ±250	50 50 200 1 ±350 0.7 15 15	Mohm pF Hours x 10 Hours x 10 KHz mS mS μSec A/μSec mV V V V V



# **UEI25 Series**

Single Output Isolated 25-Watt DC/DC Converters

### FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL UEI25-120-D48

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power	See Derating	0.0	25.2	25.45	W
Voltage	Ŭ Ŭ		- I I		
Nominal Output Voltage	No trim	11.88	12.00	12.12	Vdc
Setting Accuracy	At 50% load	-1		+1	% of Vset.
Output Voltage Range	User-adjustable	-10		+10	% of Vnom.
Overvoltage Protection	Via magnetic feedback	14	19	22	Vdc
Current	· · · · · ·				
Output Current Range		0.0	2.1	2.1	A
Minimum Load ③			No minimum load		
Current Limit Inception	97% of Vnom., after warmup	2.3	3	3.4	Α
Short Circuit				-	
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.1	А
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation (5)					
Line Regulation	Vin=min. to max., Vout=nom., 50% load			±0.075	% of Vout
Load Regulation	lout=min. to max., Vin=48V			±0.05	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW		95	120	mV pk-pk
Temperature Coefficient	At all outputs		0.02		% of Vnom./°C
Maximum Capacitive Loading (10% ceramic,	Cap. ESR= $<0.02\Omega$ , full resistive load	0		470	
90% Oscon)	$Gap. ESR = < 0.02\Omega$ , full resistive load	0		470	μF
MECHANICAL (Through Hole Models)	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Outline Dimensions (no baseplate)	C75 case		0.96x1.1x0.32		Inches
(Please refer to outline drawing)	WxLxH		24.38x27.94x8.13		mm
Weight			0.32		Ounces
			9.07		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	With derating, 200 LFM	-40		85	°C
Storage Temperature	Vin = Zero (no power)	-55		125	٥C
Thermal Protection/Shutdown	Measured at hotspot	130	135	150	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			В		Class
Radiated, EN55022/CISPR22			В		Class
Relative humidity, non-condensing	To +85°C	10		90	%RH
Altitude	must derate -1%/1000 feet	-500		10,000	feet
		-152		3048	meters
RoHS rating			RoHS-6		

#### Notes

 $\odot$  Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1  $\mu F$  and 10  $\mu F$  multi-layer ceramic output capacitors. The external input capacitor is 4.7  $\mu F$  ceramic. All capacitors are low-ESR types wired close to the converter. These capacitors are necessary for our test equipment and may not be needed in the user's application.

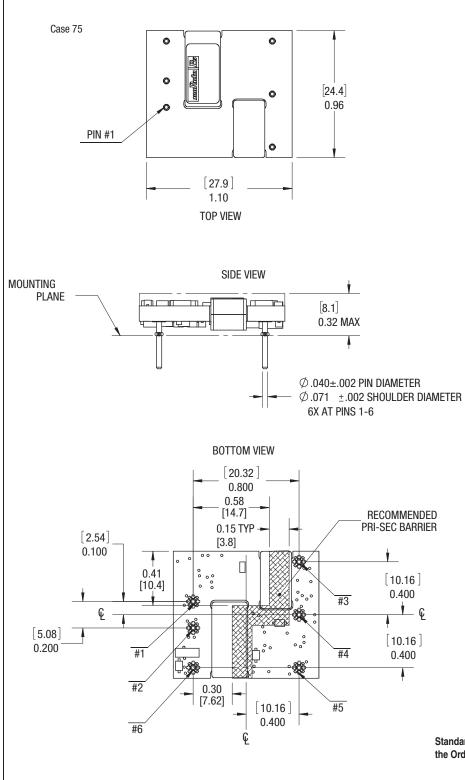
- @ Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220  $\mu F,$  Cin=33  $\mu F$  and Lbus=12  $\mu H.$
- ③ All models are stable and regulate to specification under no load.
- ④ The Remote On/Off Control is referred to -Vin.
- ⑤ Regulation specifications describe the output voltage changes as the line voltage or load current is varied from its nominal or midpoint value to either extreme.



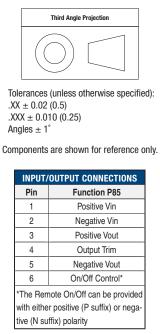


Single Output Isolated 25-Watt DC/DC Converters

### MECHANICAL SPECIFICATIONS, OPEN FRAME THROUGH-HOLE MOUNT



Dimensions are in inches (mm shown for ref. only).



These converters are plug-compatible to competitive units. In case of pinout numbering inconsistency, follow the pin FUNCTION, not the pin number when laying out your PC board.

END VIEW 0.475 [12.07] REF [6.3]

Standard pin length is shown. Please refer to the Ordering Guide for alternate pin lengths.

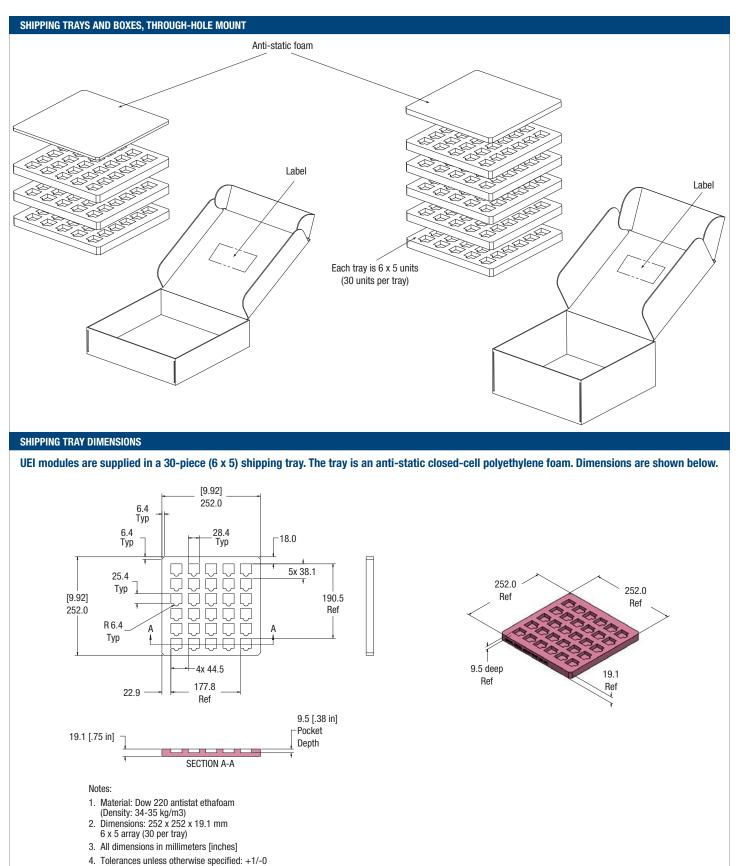
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Single Output Isolated 25-Watt DC/DC Converters



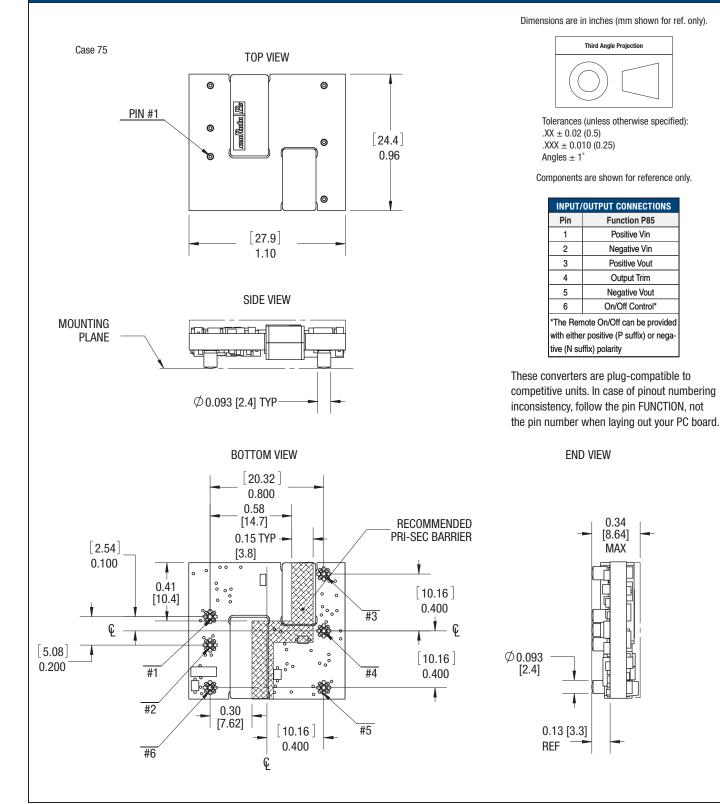
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Single Output Isolated 25-Watt DC/DC Converters

### MECHANICAL SPECIFICATIONS, SURFACE MOUNT (MSL RATING 2)

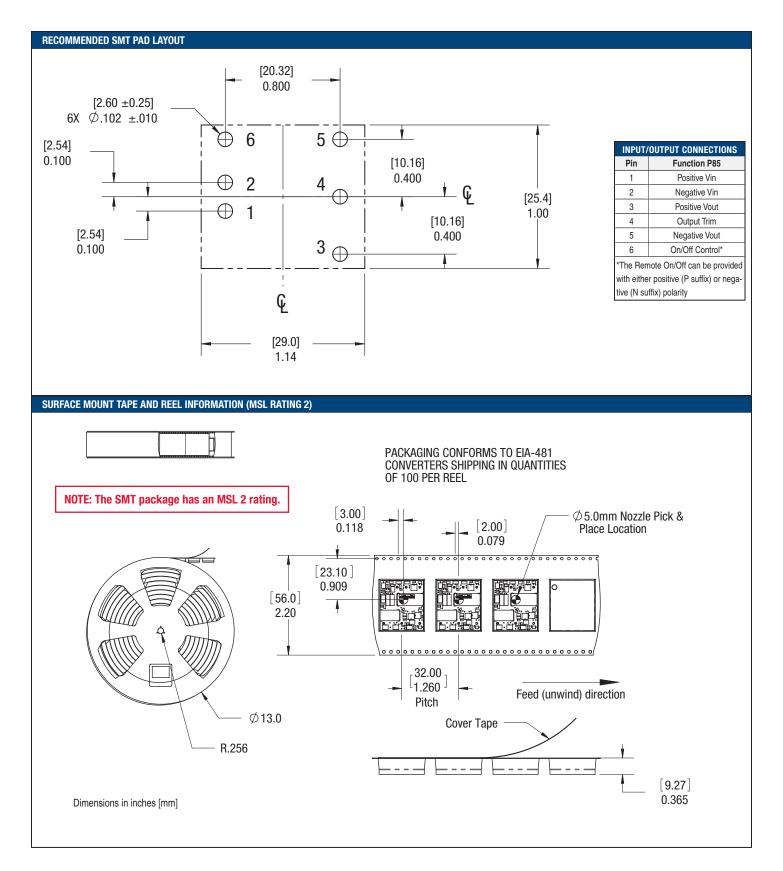
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# **UEI25 Series**

Single Output Isolated 25-Watt DC/DC Converters

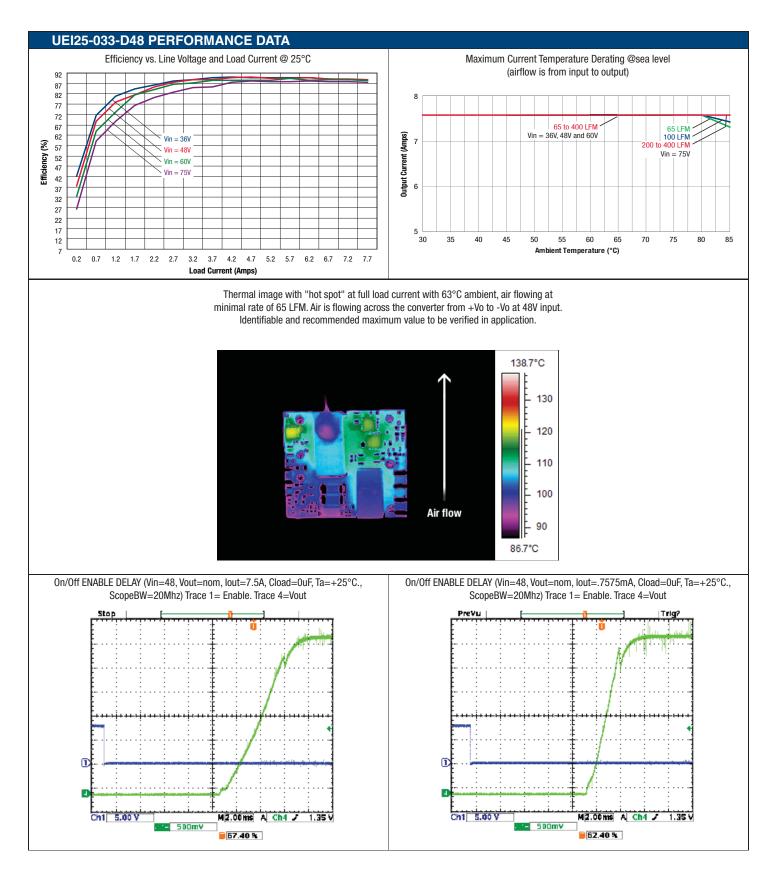




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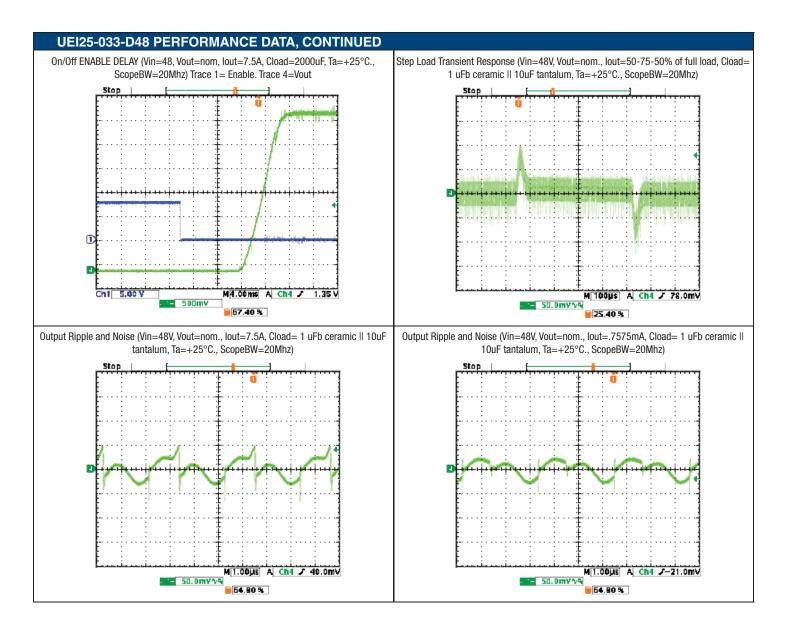
Single Output Isolated 25-Watt DC/DC Converters



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Single Output Isolated 25-Watt DC/DC Converters

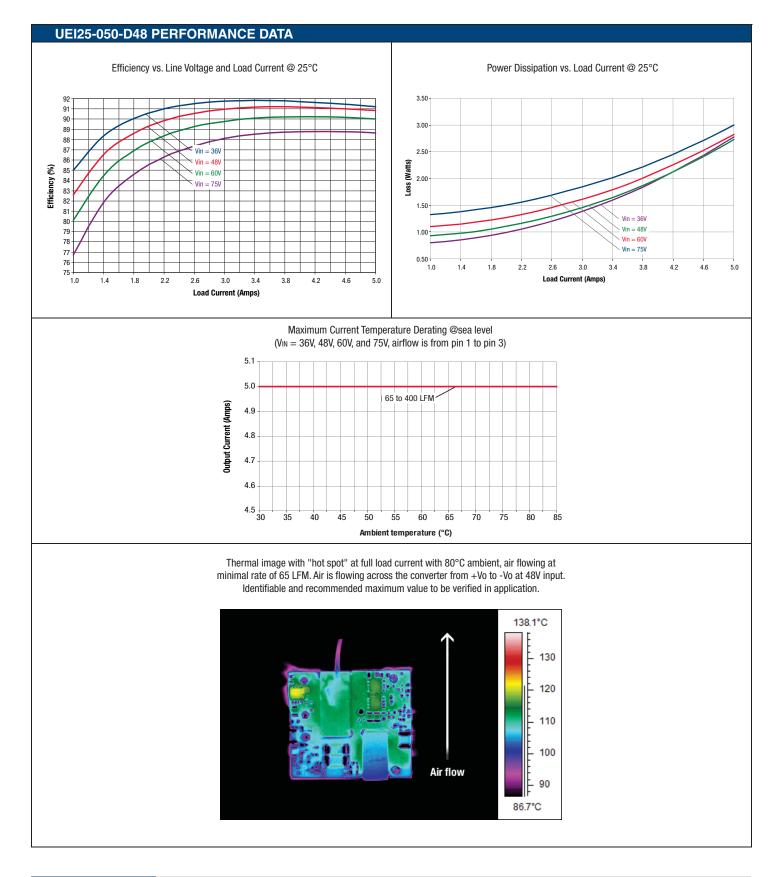




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## Single Output Isolated 25-Watt DC/DC Converters

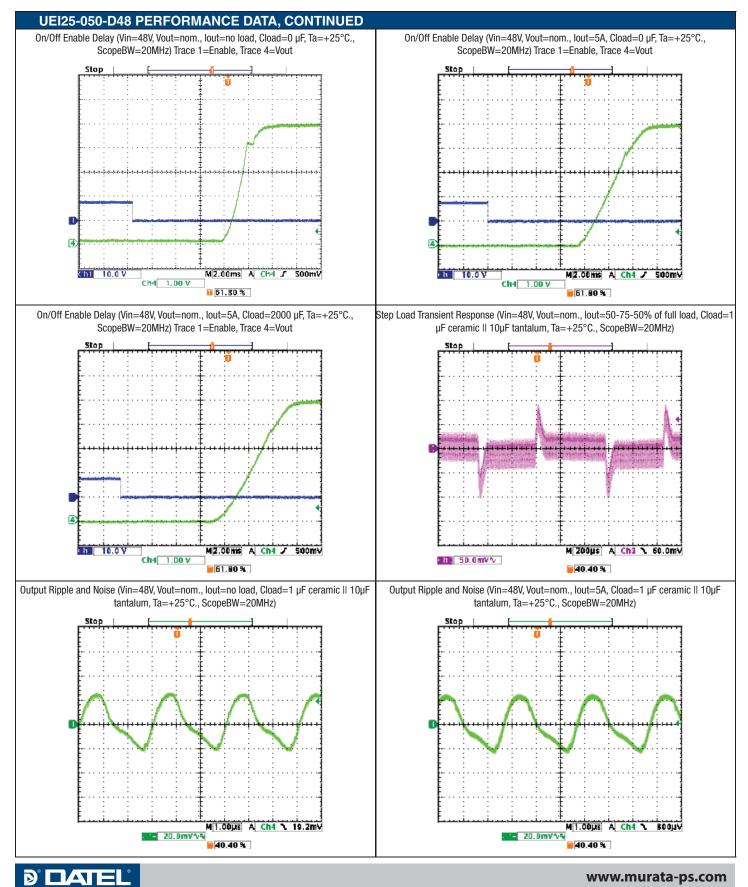
**UEI25 Series** 



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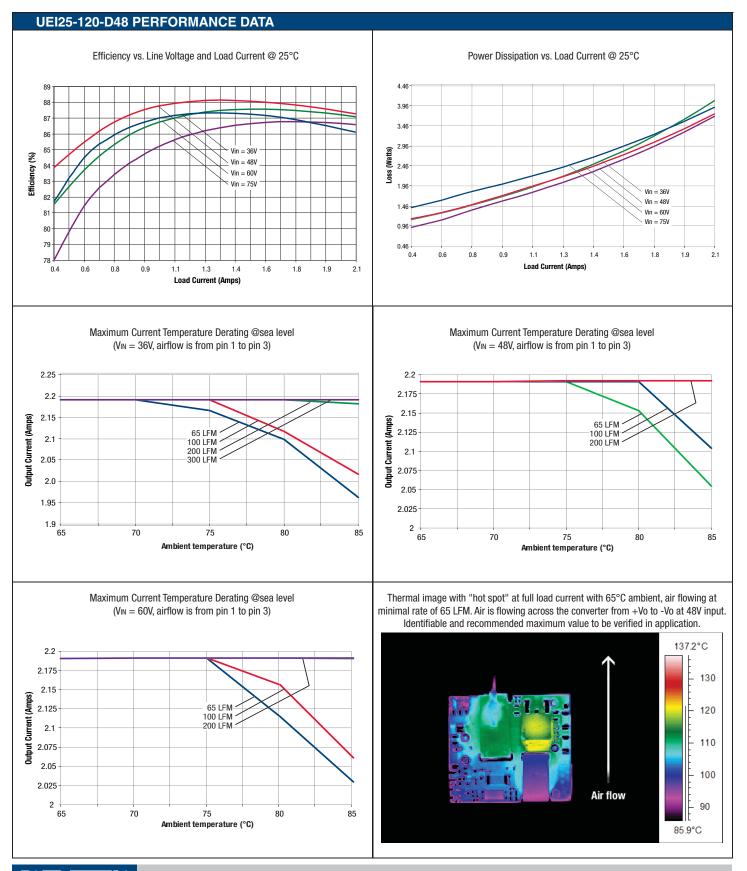
Single Output Isolated 25-Watt DC/DC Converters



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## Single Output Isolated 25-Watt DC/DC Converters

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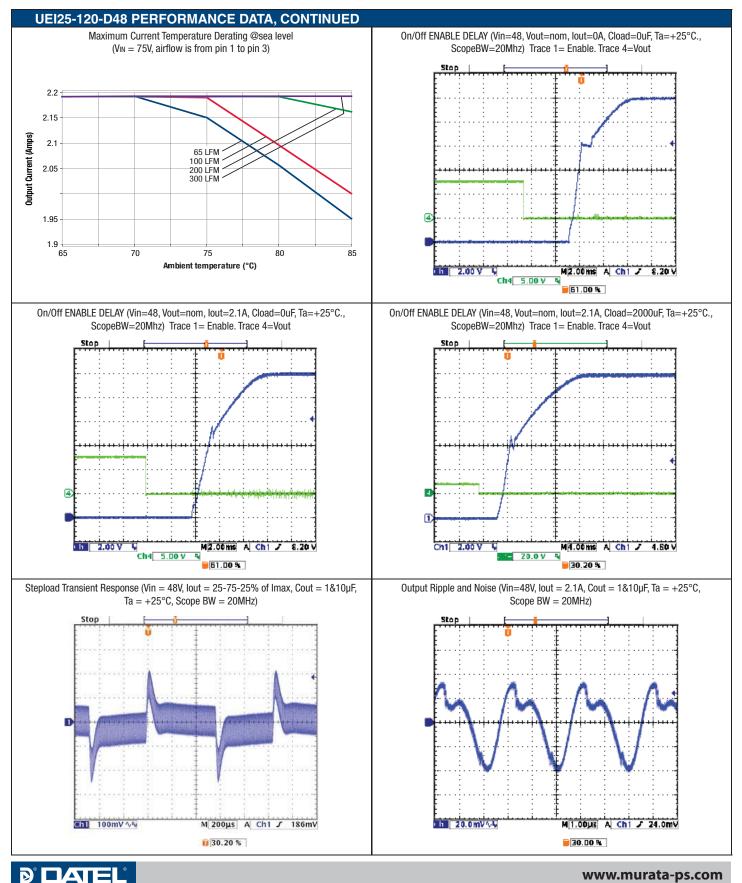


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## **UEI25 Series**

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### TECHNICAL NOTES

### **Input Fusing**

Certain applications and/or safety agencies may require fuses at the inputs of power conversion components. Fuses should also be used when there is the possibility of sustained input voltage reversal which is not current-limited. For greatest safety, we recommend a fast blow fuse installed in the ungrounded input supply line.

The installer must observe all relevant safety standards and regulations. For safety agency approvals, install the converter in compliance with the end-user safety standard.

### **Input Reverse-Polarity Protection**

If the input voltage polarity is reversed, an internal diode will become forward biased and likely draw excessive current from the power source. If this source is not current-limited or the circuit appropriately fused, it could cause permanent damage to the converter.

#### Input Under-Voltage Shutdown and Start-Up Threshold

Under normal start-up conditions, converters will not begin to regulate properly until the rising input voltage exceeds and remains at the Start-Up Threshold Voltage (see Specifications). Once operating, converters will not turn off until the input voltage drops below the Under-Voltage Shutdown Limit. Subsequent restart will not occur until the input voltage rises again above the Start-Up Threshold. This built-in hysteresis prevents any unstable on/off operation at a single input voltage.

Users should be aware however of input sources near the Under-Voltage Shutdown whose voltage decays as input current is consumed (such as capacitor inputs), the converter shuts off and then restarts as the external capacitor recharges. Such situations could oscillate. To prevent this, make sure the operating input voltage is well above the UV Shutdown voltage AT ALL TIMES.

#### Start-Up Delay

Assuming that the output current is set at the rated maximum, the Vin to Vout Start-Up Delay (see Specifications) is the time interval between the point when the rising input voltage crosses the Start-Up Threshold and the fully loaded regulated output voltage enters and remains within its specified regulation band. Actual measured times will vary with input source impedance, external input capacitance, input voltage slew rate and final value of the input voltage as it appears at the converter.

These converters include a soft start circuit to moderate the duty cycle of the PWM controller at power up, thereby limiting the input inrush current.

The On/Off Remote Control interval from inception to Vout regulated assumes that the converter already has its input voltage stabilized above the Start-Up Threshold before the On command. The interval is measured from the On command until the output enters and remains within its specified regulation band. The specification assumes that the output is fully loaded at maximum rated current.

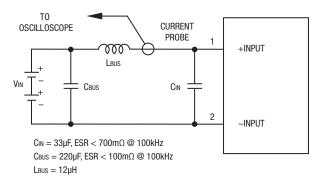
### **Input Source Impedance**

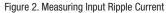
These converters will operate to specifications without external components, assuming that the source voltage has very low impedance and reasonable input voltage regulation. Since real-world voltage sources have finite impedance, performance is improved by adding external filter components. Sometimes only a small ceramic capacitor is sufficient. Since it is difficult to totally characterize all applications, some experimentation may be needed. Note that external input capacitors must accept high speed switching currents.

Because of the switching nature of DC/DC converters, the input of these converters must be driven from a source with both low AC impedance and adequate DC input regulation. Performance will degrade with increasing input inductance. Excessive input inductance may inhibit operation. The DC input regulation specifies that the input voltage, once operating, must never degrade below the Shut-Down Threshold under all load conditions. Be sure to use adequate trace sizes and mount components close to the converter.

#### I/O Filtering, Input Ripple Current and Output Noise

All models in this converter series are tested and specified for input reflected ripple current and output noise using designated external input/output components, circuits and layout as shown in the figures below. External input capacitors (CIN in the figure) serve primarily as energy storage elements, minimizing line voltage variations caused by transient IR drops in the input conductors. Users should select input capacitors for bulk capacitance (at appropriate frequencies), low ESR and high RMS ripple current ratings. In the figure below, the CBUS and LBUS components simulate a typical DC voltage bus. Your specific system configuration may require additional considerations. Please note that the values of CIN, LBUS and CBUS may vary according to the specific converter model.





In critical applications, output ripple and noise (also referred to as periodic and random deviations or PARD) may be reduced by adding filter elements such as multiple external capacitors. Be sure to calculate component temperature rise from reflected AC current dissipated inside capacitor ESR. In figure 3, the two copper strips simulate real-world printed circuit impedances between the power supply and its load. In order to minimize circuit errors and standardize tests between units, scope measurements should be made using BNC connectors or the probe ground should not exceed one half inch and soldered directly to the fixture.

### **Floating Outputs**

Since these are isolated DC/DC converters, their outputs are "floating" with respect to their input. The essential feature of such isolation is ideal ZERO CURRENT FLOW between input and output. Real-world converters however do exhibit tiny leakage currents between input and output (see Specifications). These leakages consist of both an AC stray capacitance coupling component and a DC leakage resistance. When using the isolation feature, do not allow the isolation voltage to exceed specifications. Otherwise the converter may be damaged. Designers will normally use the negative output (-Output) as



#### +OUTPUT -OUTPUT C1 C1 C2 C3 C3 C2 C3 C3 C3 C3 C2 C3 C4 C2 C3 C4 C3 C4 C2 C3 C2 C2C2

#### Figure 3. Measuring Output Ripple and Noise (PARD)

the ground return of the load circuit. You can however use the positive output (+Output) as the ground return to effectively reverse the output polarity.

### **Minimum Output Loading Requirements**

These converters employ a synchronous rectifier design topology. All models regulate within specification and are stable from 0% load to full load conditions, unless otherwise specified. Operation under no load will not damage the converter but might, however, slightly increase regulation, output ripple, and noise.

### **Thermal Shutdown**

To protect against thermal over-stress, these converters include thermal shutdown circuitry. If environmental conditions cause the temperature of the DC/ DC's to rise above the Operating Temperature Range up to the shutdown temperature, an on-board electronic temperature sensor will power down the unit. When the temperature decreases below the turn-on threshold, the converter will automatically restart. There is a small amount of hysteresis to prevent rapid on/off cycling. CAUTION: If you operate too close to the thermal limits, the converter may shut down suddenly without warning. Be sure to thoroughly test your application to avoid unplanned thermal shutdown.

### **Temperature Derating Curves**

The graphs in the performance data section illustrate typical operation under a variety of conditions. The Derating curves show the maximum continuous ambient air temperature and decreasing maximum output current which is acceptable under increasing forced airflow measured in Linear Feet per Minute ("LFM"). Note that these are AVERAGE measurements. The converter will accept brief increases in temperature and/or current or reduced airflow as long as the average is not exceeded.

Note that the temperatures are of the ambient airflow, not the converter itself which is obviously running at higher temperature than the outside air. Also note that "natural convection" is defined as very low flow rates which are not using fan-forced airflow. Depending on the application, "natural convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).

Murata Power Solutions makes Characterization measurements in a closed cycle wind tunnel with calibrated airflow. We use both thermocouples and an infrared camera system to observe thermal performance. As a practical matter, it is quite difficult to insert an anemometer to precisely measure airflow in most applications. Sometimes it is possible to estimate the effective airflow if you thoroughly understand the enclosure geometry, entry/exit orifice areas and the fan flowrate specifications.

CAUTION: If you exceed these Derating guidelines, the converter may have an unplanned Over Temperature shut down. Also, these graphs are all collected near Sea Level altitude. Be sure to reduce the derating for higher altitude.

Single Output Isolated 25-Watt DC/DC Converters

### **Output Overvoltage Protection (OVP)**

This converter monitors its output voltage for an over-voltage condition using an on-board electronic comparator. The signal is optically coupled to the primary side PWM controller. If the output exceeds OVP limits, the sensing circuit will power down the unit, and the output voltage will decrease. After a time-out period, the PWM will automatically attempt to restart, causing the output voltage to ramp up to its rated value. It is not necessary to power down and reset the converter for this automatic OVP-recovery restart.

If the fault condition persists and the output voltage climbs to excessive levels, the OVP circuitry will initiate another shutdown cycle. This on/off cycling is referred to as "hiccup" mode.

### **Output Fusing**

The converter is extensively protected against current, voltage and temperature extremes. However, your application circuit may need additional protection. In the extremely unlikely event of output circuit failure, excessive voltage could be applied to your circuit. Consider using an appropriate external protection.

### **Output Current Limiting**

As soon as the output current increases to approximately its overcurrent limit, the DC/DC converter will enter a current-limiting mode. The output voltage will decrease proportionally with increases in output current, thereby maintaining a somewhat constant power output. This is commonly referred to as power limiting.

Current limiting inception is defined as the point at which full power falls below the rated tolerance. See the Performance/Functional Specifications. Note particularly that the output current may briefly rise above its rated value. This enhances reliability and continued operation of your application. If the output current is too high, the converter will enter the short circuit condition.

### **Output Short Circuit Condition**

When a converter is in current-limit mode, the output voltage will drop as the output current demand increases. If the output voltage drops too low, the magnetically coupled voltage used to develop PWM bias voltage will also drop, thereby shutting down the PWM controller. Following a time-out period, the PWM will restart, causing the output voltage to begin rising to its appropriate value. If the short-circuit condition persists, another shutdown cycle will initiate. This on/off cycling is called "hiccup mode." The hiccup cycling reduces the average output current, thereby preventing excessive internal temperatures.

### **Trimming the Output Voltage**

The Trim input to the converter allows the user to adjust the output voltage over the rated trim range (please refer to the Specifications). In the trim equations and circuit diagrams that follow, trim adjustments use a single fixed resistor connected between the Trim input and either Vout pin. Trimming resistors should have a low temperature coefficient ( $\pm 100$  ppm/°C or less) and be mounted close to the converter. Keep leads short. If the trim function is not used, leave the trim unconnected. With no trim, the converter will exhibit its specified output voltage accuracy.

There are two CAUTIONs to observe for the Trim input:

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<u>CAUTION</u>: To avoid unplanned power down cycles, do not exceed EITHER the maximum output voltage OR the maximum output power when setting the trim. If the output voltage is excessive, the OVP circuit may inadvertantly shut down the converter. If the maximum power is exceeded, the converter may enter current limiting. If the power is exceeded for an extended period, the converter may overheat and encounter overtemperature shut down.

<u>CAUTION</u>: Be careful of external electrical noise. The Trim input is a sensitive input to the converter's feedback control loop. Excessive electrical noise may cause instability or oscillation. Keep external connections short to the Trim input. Use shielding if needed.

### **Trim Equations**

 Trim Up
 Trim Down

 <Connect trim resistor</td>
 <Connect trim resistor</td>

 between Trim and –Vout>
 between Trim and +Vout>

0EI25-033-D48							
$R_{T_{UP}}(\Omega) = \frac{12775}{V_0 - 3.3} - 2050$	$R_{T_{DOWN}}(\Omega) = \frac{5110 \text{ x (Vo} -2.5)}{3.3 - V_0} - 2050$						
UEI25-050-D48							
$R_{T_{UP}}(\Omega) = \frac{12775}{V_0 - 5} - 2050$	$R_{T_{DOWN}}(\Omega) = \frac{5110 \text{ x (Vo } -2.5)}{5 - V_0} - 2050$						
UEI25-1	120-D48						
$R_{T_{UP}}(\Omega) = \frac{25000}{V_0 - 12} - 5110$	$R_{T_{\text{DOWN}}}(\Omega) = \frac{10000 \text{ (Vo-2.5)}}{12 - V_0} - 5110$						

Where Vo = Desired output voltage. Adjustment accuracy is subject to resistor tolerances and factory-adjusted output accuracy. Mount trim resistor close to converter. Use short leads.

### **Remote On/Off Control**

On the input side, a remote On/Off Control can be specified with either positive or negative logic as follows:

<u>Positive</u>: Models equipped with Positive Logic are enabled when the On/ Off pin is left open or is pulled high to +15V<sub>DC</sub> with respect to  $-V_{IN}$ . An internal bias current causes the open pin to rise to +V<sub>IN</sub>. Positive-polarity devices are disabled when the On/Off is grounded or brought to within a low voltage (see Specifications) with respect to  $-V_{IN}$ .

<u>Negative:</u> Models with negative polarity are on (enabled) when the On/Off is grounded or brought to within a low voltage (see Specifications) with respect to  $-V_{IN}$ . The device is off (disabled) when the On/Off is left open or is pulled high to  $+15V_{DC}$  Max. with respect to  $-V_{IN}$ .

Dynamic control of the On/Off function should be able to sink the specified signal current when brought low and withstand specified voltage when brought high. Be aware too that there is a finite time in milliseconds (see Specifications) between the time of On/Off Control activation and stable, regulated output. This time will vary slightly with output load type and current and input conditions.

There are two CAUTIONs for the On/Off Control:

<u>CAUTION:</u> While it is possible to control the On/Off with external logic if you carefully observe the voltage levels, the preferred circuit is either an open drain/open collector transistor or a relay (which can thereupon be controlled by logic). The On/Off prefers to be set at approx. +15V (open pin) for the ON state, assuming positive logic.

<u>CAUTION</u>: Do not apply voltages to the On/Off pin when there is no input power voltage. Otherwise the converter may be permanently damaged.

### **On/Off Enable Control Ground Bounce Protection**

To improve reliability, if you use a small signal transistor or other external circuit to select the Remote On/Off control, make sure to return the LO side directly to the –Vin power input on the DC/DC converter. To avoid ground bounce errors, do not connect the On/Off return to a distant ground plane or current-carrying bus. If necessary, run a separate small return wire directly to the –Vin terminal. There is very little current (typically 1-5 mA) on the On/Off control however, large current changes on a return ground plane or ground bus can accidentally trigger the converter on or off. If possible, mount the On/Off transistor or other control circuit adjacent to the converter.

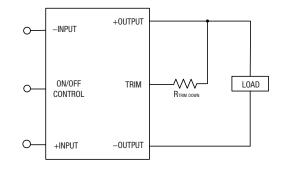
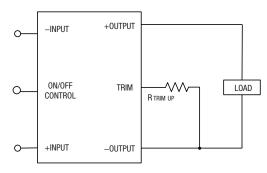
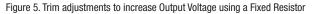


Figure 4. Trim adjustments to decrease Output Voltage using a Fixed Resistor





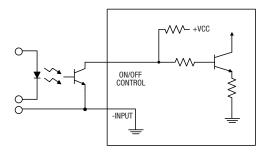


Figure 6. Driving the On/Off Control Pin (suggested circuit)

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### **Emissions Performance**

Murata Power Solutions measures its products for radio frequency emissions against the EN 55022 and CISPR 22 standards. Passive resistance loads are employed and the output is set to the maximum voltage. If you set up your own emissions testing, make sure the output load is rated at continuous power while doing the tests.

The recommended external input and output capacitors (if required) are included. Please refer to the fundamental switching frequency. All of this information is listed in the Product Specifications. An external discrete filter is installed and the circuit diagram is shown below.

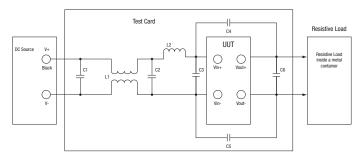


Figure 7. Conducted Emissions Test Circuit

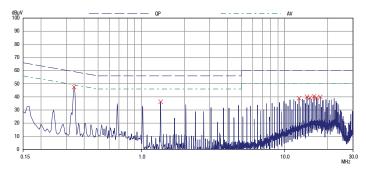
#### [1] Conducted Emissions Parts List

Reference	Part Number	Description	Vendor
L1	PE-62913	1mH, 6A	Pulse
L2	NC	4.7uH, 3.6A	Murata
C1, C2	VZ Series	Electrolytic Capacitor 22ufd, 100V	Panasonic
C3	VZ Series	Qty 2 - Electrolytic Capacitor 22ufd, 100V	Panasonic
C4, C5	Unknown	3.3nF, 1500V	Unknown
C6	VZ Series	Electrolytic Capacitor 22ufd, 100V	Panasonic

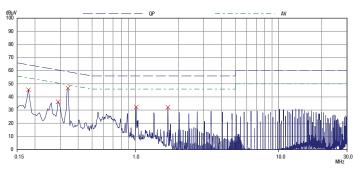
#### [2] Conducted Emissions Test Equipment Used

- Rohde & Schwarz EMI Test Receiver (9KHz 1000MHz) ESPC
- Rohde & Schwarz Software ESPC-1 Ver. 2.20
- OHMITE 25W 1 Ohm resistor combinations
- DC Source Programmable DC Power Supply Model 62012P-100-50

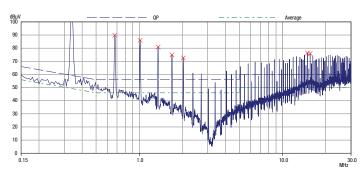
### [3] Conducted Emissions Test Results



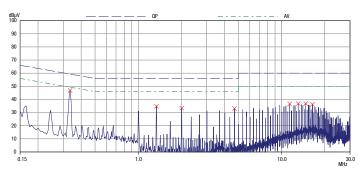
Graph 1. Conducted emissions performance with filter, Negative Line, CISPR 22, Class B, full load, for UEI25-033-D48PM-C



Graph 2. Conducted emissions performance with filter, Negative Line, CISPR 22, Class B, full load, for UEI25-050-D48NM-C



Graph 3. Conducted emissions performance without filter, Negative Line, CISPR 22, Class B, full load, for UEI25-050-D48NM-C



Graph 4. Conducted emissions performance with filter, Negative Line, CISPR 22, Class B, full load, for UEI25-120-D48P-C

### [4] Layout Recommendations

Most applications can use the filtering which is already installed inside the converter or with the addition of the recommended external capacitors. For greater emissions suppression, consider additional filter components and/or shielding. Emissions performance will depend on the user's PC board layout, the chassis shielding environment and choice of external components. Please refer to Application Note for further discussion.

Since many factors affect both the amplitude and spectra of emissions, we recommend using an engineer who is experienced at emissions suppression.



## UEI25 Series

## Single Output Isolated 25-Watt DC/DC Converters

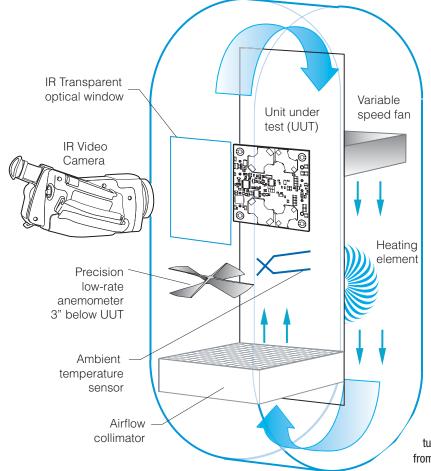


Figure 7. Vertical Wind Tunnel

### **Vertical Wind Tunnel**

Murata Power Solutions employs a custom-designed enclosed vertical wind tunnel, infrared video camera system and test instrumentation for accurate airflow and heat dissipation analysis of power products. The system includes a precision low flow-rate anemometer, variable speed fan, power supply input and load controls, temperature gauges and adjustable heating element.

The IR camera can watch thermal characteristics of the Unit Under Test (UUT) with both dynamic loads and static steadystate conditions. A special optical port is used which is transparent to infrared wavelengths. The computer files from the IR camera can be studied for later analysis.

Both through-hole and surface mount converters are soldered down to a host carrier board for realistic heat absorption and spreading. Both longitudinal and transverse airflow studies are possible by rotation of this carrier board since there are often significant differences in the heat dissipation in the two airflow directions. The combination of both adjustable airflow, adjustable ambient heat and adjustable Input/Output currents and voltages mean that a very wide range of measurement conditions can be studied.

The airflow collimator mixes the heat from the heating element to make uniform temperature distribution. The collimator also reduces the amount of turbulence adjacent to the UUT by restoring laminar airflow. Such turbulence can change the effective heat transfer characteristics and give false readings. Excess turbulence removes more heat from some surfaces and less heat from others, possibly causing uneven overheating.

Both sides of the UUT are studied since there are different thermal gradients on each side. The adjustable heating element and fan, built-in temperature gauges and no-contact IR camera mean that power supplies are tested in real-world conditions.

Murata Power Solutions, Inc. 11 Cabot Boulevard, Mansfield, MA 02048-1151 U.S.A. ISO 9001 and 14001 REGISTERED



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