### AC-DC Power Supplies Bus Converter · Power Module Type

















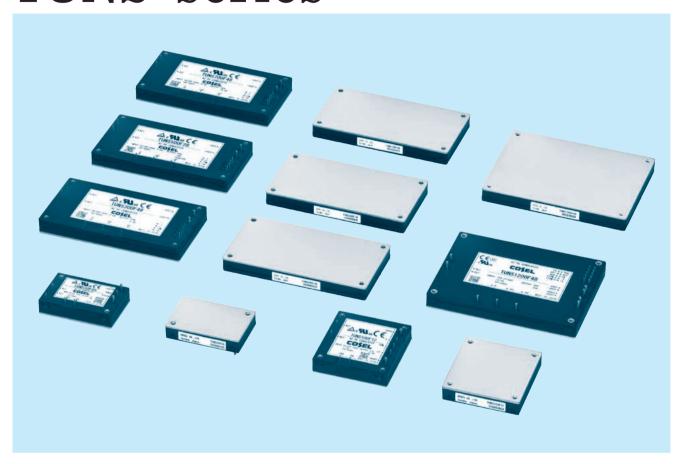








# **TUNS-series**



### Feature

AC-DC Power Module Type Converter

Harmonic attenuator (Complies with IEC61000-3-2 class A)

Thin and small size

Built-in overcurrent, overvoltage and thermal protection circuits Mounting hole (M3 tapped)

<TUNS50F/100F/300F/500F/700F>

Universal input 85 - 264VAC Peak current (TUNS500F)

<TUNS1200F>

Wide input 85 - 305VAC

For medical electric equipment

Constant current regulation

Output voltage can be varied to near 0V

Parallel operation possible

### CE marking

Low voltage directive **RoHS** Directive

### Safety Approval

UL60950-1, C-UL, EN62368-1 (TUNS50F/100F/300F/500F/700F)

UL62368-1, C-UL, EN62368-1 (TUNS1200F) ANSI/AAMI ES60601-1, EN60601-1 3rd (TUNS1200F)

### 5-year warranty

### Optional parts

Heat sink

**50** 



①Series name ②Single output ③Output wattage ④Universal Input

⑤Output voltage

(a) Optional
T: with Mounting hole
(\$\phi 3.4 \text{ thru})

- \*Avoid short circuit between +BC and -BC. It may cause the failure of inside components.
- \*Keep TRM open, if output voltage adjustment is not necessary.

MODEL	TUNS50F05	TUNS50F12	TUNS50F24
MAX OUTPUT WATTAGE[W]	50.0	50.4	50.4
DC OUTPUT	5V 10A	12V 4.2A	24V 2.1A

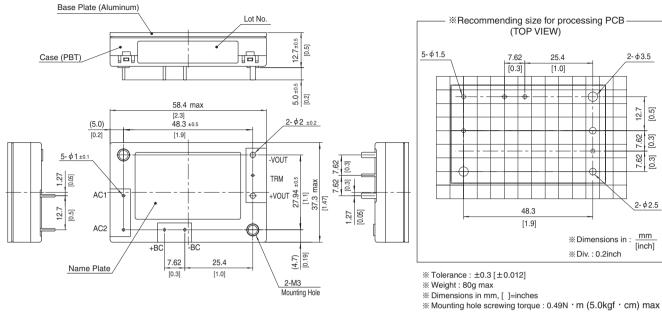
### **SPECIFICATIONS**

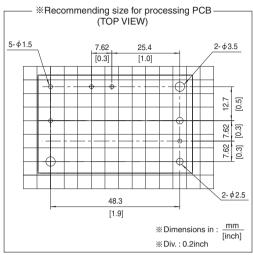
REMOTE ON/OFF   Not provided		MODEL		TUNS50F05	TUNS50F12	TUNS50F24		
CHRENT  A		VOLTAGE[V]		AC85 - 264 1 $\phi$ (Refer to "Derating")				
PREQUENCY IX    SO/60 (47 - 63)		CUDDENTIAL	ACIN 100V	0.67typ (lo=100%)				
POWER FACTOR (0=10%)   ACM 100V   79typ   8.4typ   8.4		CORRENT[A]	ACIN 200V	0.35typ (lo=100%)				
PPICIENCY * s    ACM 2009   altyp   84typ   84typ   86typ		FREQUENCY[Hz]		50/60 (47 - 63)				
POWER FACTOR (0=100%)   ACN 100%   O-95typ	INDUT	EFFICIENCY[9/]	ACIN 100V	79typ	83typ	84typ		
POWER FACTOR (Io-100%)   ACM 200V   D.901yp	INFOI	EFFICIENCT[%]	ACIN 200V	81typ	84typ	86typ		
INRUSH CURRENT   Limited by external components (Thermistor)		DOWED EACTOR (In-100%)	ACIN 100V	0.95typ				
LEAKAGE CURRENT[ma]   0.75max (ACIN 240V 60Hz, Io=100%, According to IEC62368-1)		FOWER PACTOR (10=100 /6)	ACIN 200V	0.90typ				
VOLTAGE[V]   5		INRUSH CURRENT		, , , , , , , , , , , , , , , , , , , ,				
CURRENT[A]			T[mA]	,	;	_		
LINE REGULATION[mV]   10max   24max   48max   48ma		VOLTAGE[V]		5				
COLIFICATION   TOLIFICATION   TOL				10		2.1		
OUTPUT   RIPPLE[mVp-p]				10max	24max	48max		
OUTPUT         40 to 0.0 st. 120 max         150 max         150 max         150 max         380 max           RIPPLE NOISE[mVp-p]         0b st00 st. 120 max         280 max         380 max         150 max           TEMPERATURE REGULATION[m]         0b st00 st. 20 max         200 max         200 max         250 max           TEMPERATURE REGULATION[m]         0b st00 st. 20 max         120 max         480 max         360 max         480 max           DRIFT[mV]         s2         20 max         120 max         240 max         480 max           TEMPERATURE REGULATION[m]         s2         20 max         120 max         240 max         480 max           TEMPERATURE REGULATION[m]         s2         20 max         120 max         240 max         480 max           TEMPERATURE REGULATION[m]         s2         20 max         120 max         240 max         480 max           TEMPERATURE REGULATION[m]         s2         20 max         40 max         90 max           TEMPERATURE REGULATION[m]         s2         20 max         40 max         90 max           TEMPERATURE REGULATION[m]         s6         30 max         11 monax         240 max         240 max		LOAD REGULATION						
OUTPUT HEREBULATION[MI]   10 m/s   120 max   150 max								
OUTPUT         RIPPLE NOISE[mVp-p]         0b+10C = 1 20max 150max 200max 200max 250max 460max		RIPPLE[mVp-p]	-40 to 0°C *1	120max		150max		
RIPPLE NOISE[mVp-p]			0 to 15% Load * 1	200max	280max	380max		
RIPPLE NOISE[mVp-p]	OUTPUT		0 to +100℃*1	120max	150max	150max		
TEMPERATURE REGULATION m V	0011 01	RIPPLE NOISE[mVp-p]	-40 to 0°C *1	200max	200max	250max		
TEMPERATURE REGULATION(INV)   40 to +100°   100 max   240 max   480 max   90 max			0 to 15% Load * 1	280max		460max		
DRIFT[mV]   40 to 100 to 100 max   240 max   480 max   480 max   400 max   240 max   400 max   90 m		TEMPERATURE REGULATION(mV)		50max	120max	240max		
OUTPUT VOLTAGE ADJUSTMENT RANGE[V]		TERRI ETITATORE REGOLETION (IIIT)	-40 to +100℃			480max		
OUTPUT VOLTAGE ADJUSIMENT RANGELY    4.50 - 6.00   10.80 - 13.20   21.60 - 26.40		DRIFT[mV]	*2			90max		
PROTECTION CIRCUIT AND OTHERS   PROTECTION CIRCUIT AND OTHERS		OUTPUT VOLTAGE ADJUSTMEN	IT RANGE[V]					
OVERCURRENT PROTECTION   OVERVOLTAGE PROTEC								
PROTECTION CIRCUIT AND CIRCUIT				1 1 1		23.62 - 24.38		
CIRCUIT AND OTHERS         OVERVOLINGE PROTECTION(V)         6.30 - 7.00         13.90 - 16.35         27.50 - 32.40           REMOTE SENSING         Not provided           INPUT-OUTPUT         AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)           INPUT-FG         AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)           OUTPUT-FG         AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)           OPERATING TEMP, HUMID.AND ALTITUDE         -40 to +100°C (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to "Derating"), 3,000m (10,000 feet) max           STORAGE TEMP, HUMID.AND ALTITUDE         -40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max           VIBRATION         10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis           IMPACT         196.1m/s² (20G), 11ms, once each along X, Y and Z axis           SAFETY AND         AGENCY APPROVALS         UL60950-1, C-UL (CSA60950-1), EN62368-1           NOSE REGULATIONS         HARMONIC ATTENUATOR         Complies with IEC61000-3-2 (Class A) *3           CASE SIZE/WEIGHT         58.4×12.7×37.3mm [2.3×0.5×1.47 inches] (W×H×D) / 80g max      <	DROTECTION			· · · · · · · · · · · · · · · · · · ·	, , , , , , , , , , , , , , , , , , , ,			
Not provided   REMOTE SENSING   Not provided   REMOTE ON/OFF   Not provided			CTION[V]		13.90 - 16.35	27.60 - 32.40		
INPUT-OUTPUT   AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)	OTHERS			·				
INPUT-FG   AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)				· · ·				
OUTPUT-FG AC500V 1minute, Cutoff current = 100mA, DC500V 50M \( \Omega\$ min (20±15°C) \)  PENVIRONMENT  ENVIRONMENT  ENVIR				· · · · · · · · · · · · · · · · · · ·	, ,			
ENVIRONMENT  ENVIR	ISOLATION							
STORAGETEMP,HUMID.AND ALTITUDE -40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max  VIBRATION 10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis  IMPACT 196.1m/s² (20G), 11ms, once each along X, Y and Z axis  SAFETY AND AGENCY APPROVALS UL60950-1, C-UL (CSA60950-1), EN62368-1  NOISE REGULATIONS HARMONIC ATTENUATOR Complies with IEC61000-3-2 (Class A) *3  CASE SIZE/WEIGHT 58.4×12.7×37.3mm [2.3×0.5×1.47 inches] (W×H×D) / 80g max  COOLING METHOD Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)								
VIBRATION  10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis  IMPACT  196.1m/s² (20G), 11ms, once each along X, Y and Z axis  SAFETY AND  AGENCY APPROVALS  UL60950-1, C-UL (CSA60950-1), EN62368-1  NOISE REGULATIONS  HARMONIC ATTENUATOR  Complies with IEC61000-3-2 (Class A) *3  CASE SIZE/WEIGHT  COOLING METHOD  Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)		. , .		3,7,-,				
IMPACT  196.1m/s² (20G), 11ms, once each along X, Y and Z axis  AGENCY APPROVALS  UL60950-1, C-UL (CSA60950-1), EN62368-1  NOISE REGULATIONS  HARMONIC ATTENUATOR  Complies with IEC61000-3-2 (Class A) *3  CASE SIZE/WEIGHT  COOLING METHOD  Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)	ENVIRONMENT	· · · · · · · · · · · · · · · · · · ·	ALTITUDE	9/1 1 1 1				
SAFETY AND AGENCY APPROVALS UL60950-1, C-UL (CSA60950-1), EN62368-1  NOSE REGULATIONS HARMONIC ATTENUATOR COMPlies with IEC61000-3-2 (Class A) *3  CASE SIZE/WEIGHT COOLING METHOD CONDUCTION Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)				, , , , ,		∠ axis		
NOISE REGULATIONS HARMONIC ATTENUATOR Complies with IEC61000-3-2 (Class A) *3  CASE SIZE/WEIGHT 58.4×12.7×37.3mm [2.3×0.5×1.47 inches] (W×H×D) / 80g max  COOLING METHOD Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)								
OTHERS  CASE SIZE/WEIGHT  58.4×12.7×37.3mm [2.3×0.5×1.47 inches] (W×H×D) / 80g max  COOLING METHOD  Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)	-			, , , , , , , , , , , , , , , , , , , ,				
COOLING METHOD Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)	NUISE REGULATIONS			•				
COOLING METHOD Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)	OTHERS			L L	, , ,			
				0,0	n from the aluminum base plate to the	attached heat sink)		

- Refer to instruction manual for measuring method of electric characteristics.
- Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output. Please contact us about another class.

TUNS-2 July 13, 2022







## **TUNS100F**

100 F 05



- ①Series name ②Single output ③Output wattage ④Universal Input
- ⑤Output voltage
- (a) Optional
  T: with Mounting hole
  (\$\phi 3.4 \text{ thru})

- \*Avoid short circuit between +BC and -BC. It may cause the failure of inside components.
- \*Keep TRM open, if output voltage adjustment is not necessary.
- \*If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

MODEL	TUNS100F05	TUNS100F12	TUNS100F24
MAX OUTPUT WATTAGE[W]	100.0	100.8	100.8
DC OUTPUT	5V 20A	12V 8.4A	24V 4.2A

### **SPECIFICATIONS**

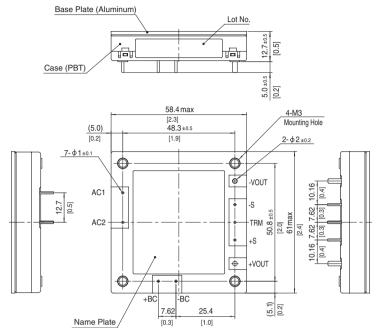
	MODEL		TUNS100F05	TUNS100F12	TUNS100F24		
	VOLTAGE[V]		AC85 - 264 1 φ (Refer to "Derating")				
	OUDDENTIAL	ACIN 100V	1.3typ (lo=100%)				
	CURRENT[A]	ACIN 200V	V 0.7typ (lo=100%)				
	FREQUENCY[Hz]		50/60 (47 - 63)				
INDUT	EFFICIENCY[0/1	ACIN 100V	82typ	83typ	84typ		
INPUT	EFFICIENCY[%]	ACIN 200V	85typ	85typ	86typ		
	DOWED FACTOR (In 1000/)	ACIN 100V	0.95typ				
	POWER FACTOR (Io=100%)	ACIN 200V	0.90typ				
	INRUSH CURRENT		Limited by external components (The	rmistor)			
	LEAKAGE CURREN	T[mA]	0.75max (ACIN 240V 60Hz, lo=100%	, According to IEC62368-1)			
	VOLTAGE[V]		5	12	24		
	CURRENT[A]		20	8.4	4.2		
	LINE REGULATION[	mV]	10max	24max	48max		
	LOAD REGULATION	[mV]	10max	24max	48max		
		0 to +100℃*1	80max	120max	120max		
	RIPPLE[mVp-p]	-40 to 0°C *1	120max	150max	150max		
		0 to 15% Load * 1	160max	240max	240max		
OUTPUT		0 to +100℃*1	120max	150max	150max		
OUIFUI	RIPPLE NOISE[mVp-p]	-40 to 0°C *1	200max	200max	250max		
		0 to 15% Load * 1	240max	300max	300max		
	TEMPERATURE REGULATION[mV]	0 to +65℃	50max	120max	240max		
	TEMPERATURE REGULATION[IIIV]	-40 to +100℃	100max	240max	480max		
	DRIFT[mV]	*2	20max	40max	90max		
	OUTPUT VOLTAGE ADJUSTMEN	IT DANCEIVI	Fixed (TRM pin open), adjustable by	external resistor or external signal			
	OUTPUT VOLIAGE ADJUSTMEN	II NANGE[V]	4.50 - 6.00	10.80 - 13.20	21.60 - 26.40		
	OUTPUT VOLTAGE SET	TING[V]	4.97 - 5.13	11.91 - 12.29	23.62 - 24.38		
	OVERCURRENT PROT	ECTION	Works over 105% of rating and recover	ers automatically			
PROTECTION CIRCUIT AND	OVERVOLTAGE PROTEC	CTION[V]	6.30 - 7.00	13.90 - 16.35	27.60 - 32.40		
OTHERS	REMOTE SENSING		Provided				
01112110	REMOTE ON/OFF		Not provided				
	INPUT-OUTPUT		AC3,000V 1minute, Cutoff current = 1	0mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C)			
ISOLATION	INPUT-FG			0mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C)			
	OUTPUT-FG		AC500V 1minute, Cutoff current = 100mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C)				
	OPERATING TEMP., HUMID. AND	ALTITUDE	-40 to +100℃ (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to "Derating"), 3,000m (10,000 feet) max				
ENVIRONMENT	STORAGE TEMP., HUMID. AND	ALTITUDE	-40 to +100°C, 20 - 95%RH (Non con				
LITY IN CIVINE IN I	VIBRATION		10 - 55Hz, 49.0m/s² (5G), 3minutes p	eriod, 60minutes each along X, Y and	Z axis		
	IMPACT		196.1m/s² (20G), 11ms, once each along X, Y and Z axis				
SAFETY AND	AGENCY APPROVALS		UL60950-1, C-UL (CSA60950-1), EN	62368-1			
NOISE REGULATIONS	HARMONIC ATTENUATOR		Complies with IEC61000-3-2 (Class A				
OTHERS	CASE SIZE/WEIGHT		58.4×12.7×61.0mm [2.3×0.5×2.4	, ,			
OTTIENS	COOLING METHOD		Conduction cooling (e.g. heat radiatio	n from the aluminum base plate to the	attached heat sink)		
*1 Defeate	instruction manual for mass	uring moth	od of electric characteristics	·			

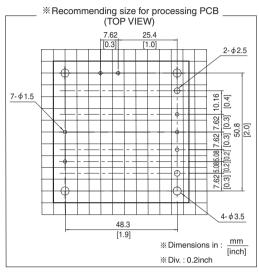
- Refer to instruction manual for measuring method of electric characteristics.
- Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.

Please contact us about another class.

TUNS-4 July 13, 2022







- % Tolerance : ±0.3 [±0.012]
  % Weight : 120g max
- \* Dimensions in mm, [ ]=inches
- \*\* Mounting hole screwing torque : 0.49N · m (5.0kgf · cm) max

## **TUNS300F**

300



- Series name
   Single output
   Output wattage
- 4 Universal Input
- ⑤Output voltage
- (a) Optional
  T: with Mounting hole
  (\$\phi 3.4 \text{ thru})
- Y1: Outputvoltage adjustment
- range ±20% (Only 48V) R1: with Remote ON/OFF
- (Negative logic control)
  R2: with Remote ON/OFF (Negative logic and Low
- standby power)
  R3: with Remote ON/OFF (Positive logic control)
- N1: Auto restart from thermal protection

- \*Avoid short circuit between +BC/R and -BC. It may cause the failure of inside components.
- \*Keep TRM open, if output voltage adjustment is not necessary.
- \*If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

MODEL	TUNS300F12	TUNS300F28	TUNS300F48
MAX OUTPUT WATTAGE[W]	300	308	312
DC OUTPUT	12V 25A	28V 11A	48V 6.5A

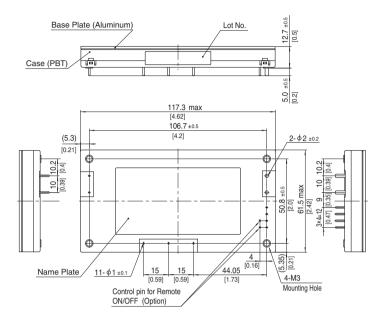
### **SPECIFICATIONS**

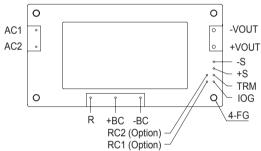
	MODEL		TUNS300F12	TUNS300F28	TUNS300F48	
	VOLTAGE[V]		AC85 - 264 1 φ		•	
	OUDDENTIAL	ACIN 100V	3.6typ (lo=100%)			
	CURRENT[A]	ACIN 200V	1.8typ (lo=100%)			
	FREQUENCY[Hz]		50/60 (47 - 63)			
INPUT	EEEIOIENOVIO/1	ACIN 100V	84typ	87typ	87typ	
INPUI	EFFICIENCY[%]	ACIN 200V	86typ	89typ	90typ	
	POWER FACTOR (Io=100%)	ACIN 100V	0.96typ			
	POWER FACTOR (10=100%)	ACIN 200V	0.93typ			
	INRUSH CURRENT		Limited by external resistance			
	LEAKAGE CURREN	T[mA]	0.75max (ACIN 240V 60Hz, lo=100%	, According to IEC62368-1)		
	VOLTAGE[V]		12	28	48	
	CURRENT[A]		25	11	6.5	
	LINE REGULATION[I	mV]	24max	56max	96max	
	LOAD REGULATION	[mV]	24max	56max	96max	
	RIPPLE[mVp-p]	0 to +100℃*1	120max	180max	250max	
	MIPPLE[IIIVP-P]	-40 to 0°C *1	150max	200max	300max	
OUTPUT	RIPPLE NOISE[mVp-p]	0 to +100℃*1	150max	200max	300max	
OUIFUI	HIFFEE NOISE[IIIVP-P]	-40 to 0°C *1	200max	300max	450max	
	TEMPERATURE REGULATION[mV]	0 to +65℃	120max	280max	480max	
	TEMPERATURE REQUESTION[IIIV]	-40 to +100℃	240max	560max	960max	
	DRIFT[mV] *2		40max	90max	180max	
	OUTPUT VOLTAGE ADJUSTMEN	IT RANGE[V]	Fixed (TRM pin open), adjustable by external resistor or external signal			
			9.60 - 14.40	22.40 - 33.60	38.40 - 52.80 (-Y1 Option : 38.4 - 57.6)	
	OUTPUT VOLTAGE SET		11.91 - 12.29	27.56 - 28.44	47.24 - 48.76	
PROTECTION	OVERCURRENT PROT		Works over 105% of rating and recove			
CIRCUIT AND	OVERVOLTAGE PROTEC	CTION[V]	15.00 - 16.80	35.00 - 39.20	55.20 - 64.80 (-Y1 Option : 60.0 - 67.2)	
OTHERS	REMOTE SENSING		Provided			
	REMOTE ON/OFF		Optional (External power supply is red			
	INPUT-OUTPUT · RC	*4	7100,000 Trimitate, Gatem Garrette Tomit, Boodev Gain-1 min (Eo ± 10 0)			
ISOLATION	INPUT-FG		AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C)			
	OUTPUT · RC-FG		1			
	OUTPUT-RC		AC100V 1minute, Cutoff current = 100mA, DC100V 10M $\Omega$ min (20±15 $^{\circ}$ C)			
			-40 to +100°C (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to "Derating"), 3,000m (10,000 feet) max			
ENVIRONMENT	STORAGE TEMP., HUMID. AND	ALTITUDE	-40 to +100℃, 20 - 95%RH (Non con-			
	VIBRATION		, , , , ,	eriod, 60minutes each along X, Y and	Zaxis	
	IMPACT		196.1m/s² (20G), 11ms, once each along X, Y and Z axis			
SAFETY AND	AGENCY APPROVALS		UL60950-1, C-UL (CSA60950-1), EN			
NOISE REGULATIONS	HARMONIC ATTENU		Complies with IEC61000-3-2 (Class A	· <u>'</u>		
OTHERS	CASE SIZE/WEIGHT		117.3×12.7×61.5mm [4.62×0.5×2			
	COOLING METHOD		Conduction cooling (e.g. heat radiation	n from the aluminum base plate to the	attached heat sink)	

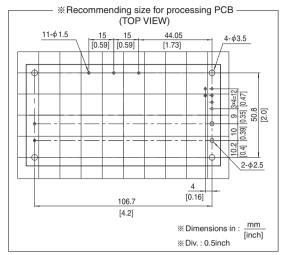
- Refer to instruction manual for measuring method of electric characteristics.
- Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
- Please contact us about another class.
  "RC" is applicable when remote control (optional) is added.

**TUNS-6** July 13, 2022





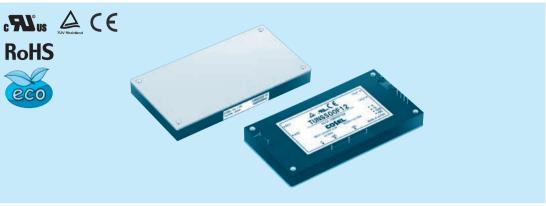




- \*\* Tolerance : ±0.3 [± 0.012]
- \* Weight : 190g max
- ※ Dimensions in mm, [ ]=inches
- Mounting hole screwing torque: 0.49N · m (5.0kgf · cm) max

## **TUNS500F**

500 <sub>4</sub>



- Series name
   Single output
   Output wattage
- 4 Universal Input
- ⑤Output voltage
- Optional
   T : with Mounting hole  $(\phi 3.4 \text{ thru})$
- Y1: Outputvoltage adjustment
- range ±20% (Only 48V) R1: with Remote ON/OFF
- (Negative logic control) R2: with Remote ON/OFF (Negative logic and Low standby power)
- R3: with Remote ON/OFF (Positive logic control)
- N1: Auto restart from thermal protection

- \*Avoid short circuit between +BC/R and -BC. It may cause the failure of inside components.
- \*Keep TRM open, if output voltage adjustment is not necessary.
- \*If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

MODEL	TUNS500F12	TUNS500F28	TUNS500F48
MAX OUTPUT WATTAGE[W]	504	504	504
DC OUTPUT	12V 42A (Peak 55A)	28V 18A (Peak 24A)	48V 10.5A (Peak 14A)

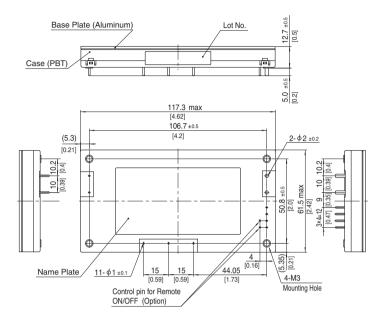
### **SPECIFICATIONS**

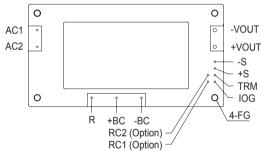
	MODEL		TUNS500F12	TUNS500F28	TUNS500F48
	VOLTAGE[V]		AC85 - 264 1 φ		
	OUDDENTIAL	ACIN 100V	6.0typ (lo=100%)		
	CURRENT[A]	ACIN 200V	3.0typ (lo=100%)		
	FREQUENCY[Hz]		50/60 (47 - 63)		
INPUT	EFFICIENCY[%]	ACIN 100V	84typ	87typ	88typ
INFOI	EFFICIENCI[%]	ACIN 200V	86typ	90typ	90.5typ
	POWER FACTOR (Io=100%)	ACIN 100V	0.96typ		
	POWER FACTOR (IO=100%)	ACIN 200V	0.93typ		
	INRUSH CURRENT		Limited by external resistance		
	LEAKAGE CURREN	T[mA]	0.75max (ACIN 240V 60Hz, lo=100%	, According to IEC62368-1)	
	VOLTAGE[V]		12	28	48
	CURRENT[A]	*3	42 (Peak 55)	18 (Peak 24)	10.5 (Peak 14)
	LINE REGULATION[	mV]	24max	56max	96max
	LOAD REGULATION	[mV]	24max	56max	96max
	RIPPLE[mVp-p]	0 to +100℃*1	120max	180max	250max
	THE P EE[IIIV P-P]	-40 to 0°C *1	150max	200max	300max
OUTPUT	RIPPLE NOISE[mVp-p]	0 to +100℃*1	150max	200max	300max
0011 01	TILL TEL HOIOE[IIIVP P]	-40 to 0°C *1	200max	300max	450max
	TEMPERATURE REGULATION[mV]	0 to +65°C	120max	280max	480max
		-40 to +100℃	240max	560max	960max
	DRIFT[mV] *2		TOTTICAL	90max	180max
	OUTPUT VOLTAGE ADJUSTMEN	IT RANGE(V)	Fixed (TRM pin open), adjustable by external resistor or external signal		
			9.60 - 14.40	22.40 - 33.60	38.40 - 52.80 (-Y1 Option : 38.4 - 57.6)
	OUTPUT VOLTAGE SET		11.91 - 12.29	27.56 - 28.44	47.24 - 48.76
PROTECTION	OVERCURRENT PROT		Works over 101% of peak current and	· · · · · · · · · · · · · · · · · · ·	
CIRCUIT AND	OVERVOLTAGE PROTE	CTION[V]	15.00 - 16.80	35.00 - 39.20	55.20 - 64.80 (-Y1 Option : 60.0 - 67.2)
OTHERS	REMOTE SENSING		Provided		
	REMOTE ON/OFF		Optional (External power supply is red		
	INPUT-OUTPUT · RO	*5	AC3,000V 1minute, Cutoff current = 1		
ISOLATION	INPUT-FG		AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C)		
	OUTPUT · RC-FG		AC500V 1minute, Cutoff current = 100mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C)		
	OUTPUT-RC		AC100V 1minute, Cutoff current = 100mA, DC100V 10M $\Omega$ min (20±15 $^{\circ}$ C)		
	OPERATING TEMP., HUMID. AND				
ENVIRONMENT	STORAGE TEMP.,HUMID.AND	ALTITUDE	-40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max		
	VIBRATION			eriod, 60minutes each along X, Y and	∠ axis
	IMPACT		196.1m/s² (20G), 11ms, once each along X, Y and Z axis		
SAFETY AND	AGENCY APPROVAL		UL60950-1, C-UL (CSA60950-1), EN		
NOISE REGULATIONS			Complies with IEC61000-3-2 (Class A		
OTHERS	CASE SIZE/WEIGHT		117.3×12.7×61.5mm [4.62×0.5×2		- ## - ol
alid Defende	COOLING METHOD		Conduction cooling (e.g. neat radiatio	n from the aluminum base plate to the	attached neat sink)

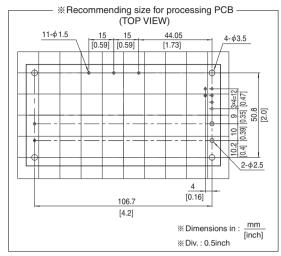
- Refer to instruction manual for measuring method of electric characteristics.
- Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
- ( ) means peak current. Avoid operating with peak current continuously. It may cause failure of the components inside the product. There are limitation of available condition of the peak current, such as peak time, duty etc. (Refer to the instruction manual in detail.)
- Please contact us about another class.
- **\***5 "RC" is applicable when remote control (optional) is added.











- \*\* Tolerance : ±0.3 [± 0.012]
- \* Weight : 190g max
- ※ Dimensions in mm, [ ]=inches
- Mounting hole screwing torque: 0.49N · m (5.0kgf · cm) max

700



- \*Avoid short circuit between +BC/R and -BC. It may cause the failure of inside components.
- \*Keep TRM open, if output voltage adjustment is not necessary.
- \*If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

- ①Series name
  ②Single output
  ③Output wattage
  ④Universal Input
  ⑤Output voltage
  ⑥Optional
  T: with Mounting hole
  (\$\phi 3.4\text{ thru})
  Y1: Outputvoltage adjustment
  range ±20% (Only 48V)
  R1: with Remote ON/OFF
  (Negative logic control)

  - (Negative logic control)
    R2: with Remote ON/OFF
    (Negative logic and Low standby power)
    R3: with Remote ON/OFF

  - (Positive logic control)
    P: Parallel operation
    (Output voltage trimming disabled,
    Remote sensing disabled)

MODEL	TUNS700F12	TUNS700F28	TUNS700F48
MAX OUTPUT WATTAGE[W]	700.8	700.0	700.8
DC OUTPUT	12V 58.4A	28V 25A	48V 14.6A

### **SPECIFICATIONS**

	MODEL		TUNS700F12	TUNS700F28	TUNS700F48		
	VOLTAGE[V]		AC85 - 264 1 φ				
	CUDDENTIAL	ACIN 100V	/ 8.6typ (lo=100%)				
	CURRENT[A]	ACIN 200V	4.1typ (lo=100%)				
	FREQUENCY[Hz]		50/60 (47 - 63)				
INPUT	EFFICIENCY[%]	ACIN 100V	83typ	86typ	87typ		
INPUT	EFFICIENCY[%]	ACIN 200V	86typ	89typ	90typ		
	POWER FACTOR	ACIN 100V					
	(lo=100%)	ACIN 200V	0.93typ				
	INRUSH CURRENT		Limited by external resistance				
	LEAKAGE CURREN	T[mA]	0.75max (ACIN 240V 60Hz, lo=100%	, According to IEC62368-1)			
	VOLTAGE[V]		12	28	48		
	CURRENT[A]		58.4	25	14.6		
	LINE REGULATION[I		24max	56max	96max		
	LOAD REGULATION	[mV]	24max	56max	96max		
	RIPPLE[mVp-p]	0 to +100°C *1	120max	180max	250max		
	nirrcc[iiivp-p]	-40 to 0°C *1	150max	200max	300max		
ОИТРИТ	RIPPLE NOISE[mVp-p]	0 to +100℃*1	150max	200max	300max		
OUTPUT	HIPPLE NOISE[IIIVP-P]	-40 to 0°C *1	200max	300max	450max		
	TEMPERATURE REGULATION[mV]	0 to +65℃	120max	280max	480max		
		-40 to +100℃	240max	560max	960max		
	DRIFT[mV]	*2	40max	90max	180max		
	OUTPUT VOLTAGE ADJUSTMEN	IT	Fixed (TRM pin open), adjustable by external resistor or external signal				
	RANGE[V]		9.60 - 14.40	22.40 - 33.60	38.40 - 52.80 (-Y1 Option : 38.4 - 57.6)		
	OUTPUT VOLTAGE SET		11.91 - 12.29	27.56 - 28.44	47.24 - 48.76		
DDOTECTION	OVERCURRENT PROT		Works over 105% of rating and recove				
PROTECTION	OVERVOLTAGE PROTEC	TION[V]	15.00 - 16.80	35.00 - 39.20	55.20 - 64.80 (-Y1 Option : 60.0 - 67.2)		
CIRCUIT AND OTHERS	REMOTE SENSING		Provided				
UTHERS	REMOTE ON/OFF		Optional (External power supply is red	quired)			
MODEL	<u> </u>		TUNS700F12-P	TUNS700F28-P	TUNS700F48-P		
	JT WATTAGE[W]		700.8	700.0	700.8		
DC OUTPUT			12V 58.4A	28V 25A	48V 14.6A		
טט טטורטו			12 V 30.4A	20 V 23A	40V 14.0A		

### **SPECIFICATIONS**

	MODEL		TUNS700F12-P	TUNS700F28-P	TUNS700F48-P
	VOLTAGE[V]		AC85 - 264 1 φ		
	CUDDENTIAL	ACIN 100V	8.6typ (lo=100%)		
	CURRENT[A]	ACIN 200V	4.1typ (lo=100%)		
	FREQUENCY[Hz]		50/60 (47 - 63)		
INPUT	EFFICIENCY[9/1	ACIN 100V	83typ	86typ	87typ
NPUI	EFFICIENCY[%]	ACIN 200V	86typ	89typ	90typ
	POWER FACTOR	ACIN 100V	0.96typ		
	(lo=100%)	ACIN 200V	0.93typ		
	INRUSH CURREN	Т	Limited by external resistance		
	LEAKAGE CURRENT[mA]		0.75max (ACIN 240V 60Hz, Io=100%, According to IEC62368-1)		
	VOLTAGE[V]		12	28	48
	CURRENT[A]		58.4	25	14.6
	VOLTAGE ACCUR	ACY[%]	+5, -3	+5, -3	+5, -3
		0 to +100°C *1	240max	360max	600max
DUTPUT	RIPPLE[mVp-p]	-40 to 0°C *1	300max	400max	700max
		0 to +30% Load *1	360max	540max	900max
		0 to +100°C *1	300max	400max	700max
	RIPPLE NOISE[mVp-p]	-40 to 0°C *1	400max	600max	1000max
		0 to +30% Load *1	450max	600max	1000max
PROTECTION	OVERCURRENT PROTECTION		Works over 105% of rating and recover	ers automatically	
CIRCUIT AND	OVERVOLTAGE PROT	ECTION[V]	15.00 - 16.80	35.00 - 39.20	55.20 - 64.80
OTHERS	REMOTE ON/OFF		Optional (External power supply is red	guired)	

**TUNS-10** July 13, 2022



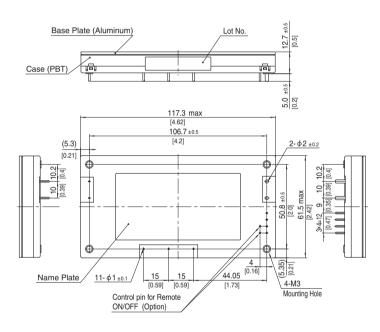


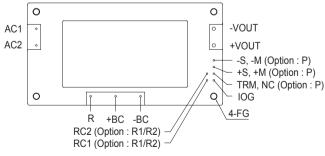
### **GENERAL SPECIFICATIONS**

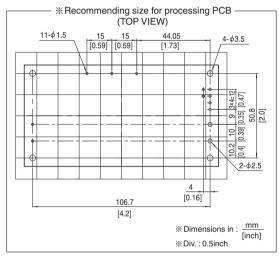
	INPUT-OUTPUT · RC *4	AC3,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C)
ISOLATION	INPUT-FG	AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C)
ISOLATION	OUTPUT · RC-FG *4	AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)
	OUTPUT-RC *4	AC100V 1minute, Cutoff current = 100mA, DC100V 10MΩ min (20±15°C)
OPERATING TEMP.,HUMID.AND ALTITUDE		-40 to +100℃ (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to "Derating"), 3,000m (10,000 feet) max
ENVIRONMENT	STORAGE TEMP., HUMID. AND ALTITUDE	-40 to +100℃, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max
ENVIRONMENT	VIBRATION	10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis
	IMPACT	196.1m/s² (20G), 11ms, once each along X, Y and Z axis
SAFETY AND	AGENCY APPROVALS	UL60950-1, C-UL (CSA60950-1), EN62368-1
NOISE REGULATIONS	HARMONIC ATTENUATOR	Complies with IEC61000-3-2 (Class A) *3
OTHERS	CASE SIZE/WEIGHT	117.3×12.7×61.5mm [4.62×0.5×2.42 inches] (W×H×D) / 190g max
OTHERS	COOLING METHOD	Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)

- Refer to instruction manual for measuring method of electric characteristics.

  Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
- Please contact us about another class
- "RC" is applicable when remote control (optional) is added.







- % Tolerance : ±0.3 [±0.012]
- \* Weight: 190g max
- ※ Dimensions in mm, [ ]=inches
- Mounting hole screwing torque: 0.49N · m (5.0kgf · cm) max

## **TUNS1200F**

1200 F



- Series name
   Single output
   Output wattage
- 4 Universal Input
- ⑤Output voltage

- (a) Optional
  T: with Mounting hole
  (\$\phi 3.4 \text{ thru})
- Y1: Outputvoltage adjustment
- range ±20% (Only 48V)
  R3: with Remote ON/OFF
- (Positive logic control) N1: Auto restart from thermal protection

- \*Avoid short circuit between +BC/R and -BC. It may cause the failure of inside components.
- \*Keep VTRM open, if output voltage adjustment is not necessary.
- $\star$ Keep ITRM open, if output current adjustment is not necessary.
- \*If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

MODEL	TUNS1200F12	TUNS1200F28	TUNS1200F48	TUNS1200F65	
MAX OUTPUT WATTAGE[W]	1008	1204	1200	1202.5	
DC OUTPUT	12V 84A	28V 43A	48V 25A	65V 18.5A	

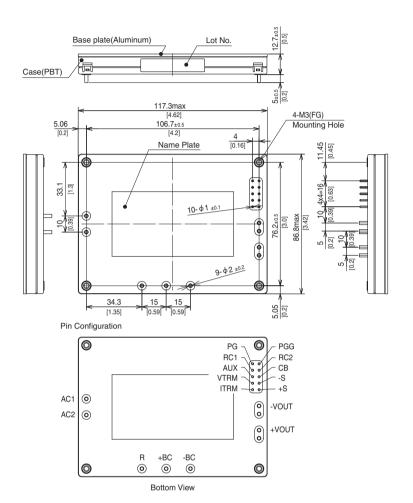
### **SPECIFICATIONS**

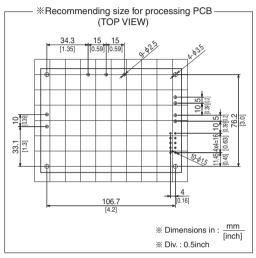
l l	MODEL		TUNS1200F12	TUNS1200F28	TUNS1200F48	TUNS1200F65			
	VOLTAGE[V]		AC85 - 305V 1 φ						
	ACIN 10		12typ	14typ	14typ	14typ			
	CURRENT[A]	ACIN 200V	5.9typ	6.7typ	6.6typ	6.7typ			
	FREQUENCY[Hz]		50/60 (47 - 63)						
	EEEIOJENOVIO/1	ACIN 100V	85typ	89typ	90typ	89typ			
NPUT	EFFICIENCY[%]	ACIN 200V	87typ	91typ	92typ	91typ			
	DOWED ELOTOD (L. 4000()	ACIN 100V	0.98typ						
	POWER FACTOR (lo=100%)	ACIN 200V	0.95typ						
	INRUSH CURRENT		Limited by external resistance						
	LEAKAGE CURRENT	Γ[mA]	0.5max (ACIN 240V 60Hz, Io=100%, According to IEC60601-1)						
	VOLTAGE[V]		12	28	48	65			
	CURRENT[A]		84	43	25	18.5			
	LINE REGULATION[1	nV]	24max	56max	96max	130max			
	LOAD REGULATION		24max	56max	96max	130max			
		0 to +100℃*1	150max	180max	250max	350max			
	RIPPLE[mVp-p]	-40 to 0°C *1	180max	200max	300max	400max			
		0 to +100°C *1	180max	200max	300max	400max			
UTPUT	RIPPLE NOISE[mVp-p]	-40 to 0°C *1	200max	300max	450max	450max			
		0 to +80°C *1	120max	280max	480max	650max			
	TEMPERATURE REGULATION[mV]	-40 to +100°C <b>*</b> 1	240max	560max	960max	1300max			
•	1		40max	90max	180max	240max			
•	OUTPUT VOLTAGE ADJUSTMENT RANGE[V] OUTPUT VOLTAGE SETTING[V]		Fixed (VTRM pin open), adjustable by external resistor or external signal						
			9.60 - 14.40	22.40 - 33.60	38.40 - 52.80 (Y1:38.4 - 57.6)	52.00 - 78.00			
			11.91 - 12.29	27.56 - 28.44	47.24 - 48.76	63.96 - 66.04			
	OVERCURRENT PROT	ECTION	Works over 105% of rating and recovers automatically						
ROTECTION	OVERVOLTAGE PROTEC	TION[V]	15.00 - 16.80	35.00 - 39.20	55.20 - 60.00 (Y1:60.0 - 67.2)	81.25 - 91.00			
IRCUIT AND	REMOTE SENSING		Provided						
IHEKS	REMOTE ON/OFF		Provided						
	INPUT-OUTPUT		AC3,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C) 2MOOP						
	INPUT-FG		AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (20±15 $^{\circ}$ C) 1MOOP						
SOLATION	OUTPUT-FG		TUNS1200F12/28/48 : AC500V 1minute, Cutoff current = 100mA, DC500V 50M $\Omega$ min (20±15°C) TUNS1200F65 : AC1,200V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (20±15°C) 1MOOP						
	OUTPUT-RC, PG		AC100V 1minute, Cutoff current = 100mA, DC100V 10M $\Omega$ min (20±15 $^{\circ}$ C)						
	OPERATING TEMP., HUMID. AND	ALTITUDE							
	STORAGE TEMP., HUMID. AND		-40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max						
NVIRONMENT	VIBRATION		10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis						
•	IMPACT		196.1m/s² (20G), 11ms, once each along X, Y and Z axis						
AFETY AND	AGENCY APPROVAL	.s	UL62368-1, EN62368-1, C-UL (equivalent to CAN/CSA-C22.2 No.62368-1), ANSI/AAMI ES60601-1, EN60601-1 3rd, C-UL (equivalent to CAN/CSA-C22.2 No.60601-1, Complies with IEC60601-1-2 4th						
DISE REGULATIONS	HARMONIC ATTENU	ATOR	Complies with IEC61000-3-						
	CASE SIZE/WEIGHT		117.3×12.7×86.8mm [4.62×0.5×3.42 inches] (W×H×D) / 280g max						
THERS			Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)						

- Refer to instruction manual for measuring method of electric characteristics.
- \*2 \*3 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
- Please contact us about another class.

**TUNS-12** July 13, 2022





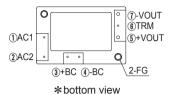


- % Tolerance : ±0.3 [±0.012]
- \* Weight: 280g max
- Dimensions in mm, [ ]=inches
- Mounting hole screwing torque: 0.49N · m (5.0kgf · cm) max

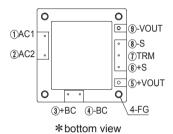
## **COSEL** | TUNS-series

### Pin Configuration

### TUNS50F

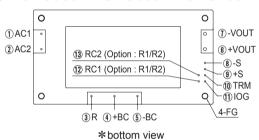


### TUNS100F

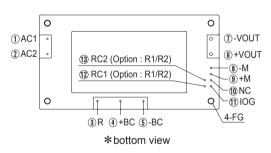


### No. Pin Connection Function AC1 AC input 2 (2) AC2 3 3 +BC +BC output 4 -BC -BC output 4 +VOUT +DC output (5) (5) -DC output 7 9 -VOUT -S Remote sensing (-) 8 Remote sensing (+) **(6)** +S **6** 7 TRM Adjustment of output voltage FG Mounting hole (FG)

### TUNS300F/TUNS500F/TUNS700F



### ■ TUNS700F□□-P (OPTION)

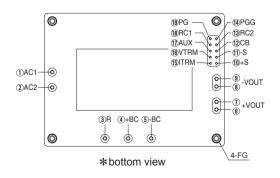


No.	Pin Connection	Function			
1	AC1	AC input			
2	AC2	AC Input			
3	R	External resistor for inrush current protection			
4	+BC	+BC output			
(5)	-BC	-BC output			
6	+VOUT	+DC output			
1	-VOUT	-DC output			
8	-S	Remote sensing (-)			
9	+S	Remote sensing (+)			
10	TRM	Adjustment of output voltage			
11)	IOG	Inverter operation monitor			
12	RC1	Remote ON/OFF (Option)			
13	RC2	Remote ON/OFF (Option)			
_	FG	Mounting hole (FG)			

No.	Pin Connection	Function	
8	-M	Output valtage maniter terminal	
9	+M	Output voltage monitor terminal	
10	NC	No connection	

Other than the above are the same as standard products.

### TUNS1200F



	1				
No.	Pin	Function			
	Connection	1 200			
1	AC1	AC input			
2	AC2	Ao Iliput			
3	R	External resistor for inrush current protection			
4	+BC	+BC output			
5	-BC	-BC output			
67	+VOUT	+DC output			
89	-VOUT	-DC output			
10	+S	Remote sensing (+)			
11)	-S	Remote sensing (-)			
12	CB	Current balance			
13	RC2	Remote ON/OFF ground			
14)	PGG	Power good output ground			
15	ITRM	Adjustment of output current			
16	VTRM	Adjustment of output voltage			
17)	AUX	Auxiliary output			
18	RC1	Remote ON/OFF			
19	PG	Power good output			
_	FG	Mounting hole (FG)			

TUNS-14 July 13, 2022



### Implementation • Mounting Method

### Mounting method

- ■Use with the conduction cooling (e.g. heat dissipation from the aluminum base plate to the attached heat sink).
- ■Use a heat sink that larger than the power supply and has a large thickness so that the alminum base plate can be cooled uniformly.
- ■The unit can be mounted in any direction. When two or more power supplies are used side by side, position them with proper intervals to allow enough air ventilation. Aluminum base plate temperature of each power supply should not exceed the temperature range shown in
- ■Avoid placing the AC input line pattern layout underneath the unit. It will increase the line conducted noise. Make sure to leave an ample distance between the line pattern layout and the unit. Also avoid placing the DC output line pattern underneath the unit because it may increase the output noise. Lay out the pattern away from the unit.
- ■Avoid placing the signal line pattern layout underneath the unit because the power supply might become unstable. Lay out the pattern away from the unit.
- ■High-frequency noise radiates directly from the unit to the atmosphere. Therefore, design the shield pattern on the printed circuit board and connect it to FG or -BC. The shield pattern prevents noise radiation.
- ■When a heat sink cannot be fixed on the base plate side, order the power module with "-T"option. A heat sink can be mounted by affixing a M3 tap on the heat sink. Please make sure a mounting hole will be connected to a grounding capacitor CY.

	Mounting hole			
Standard	M3 tapped			
Optional : -T	φ 3.4 thru			

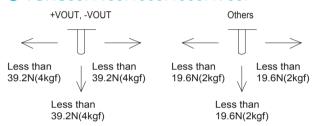
### Stress onto the pins

- ■When too much stress is applied to the pins may damage internal connections. Avoid applying stress in excess of that shown in right figure.
- ■The pins are soldered onto the internal PCB. Therefore, Do not bend or pull the leads with excessive force.
- ■Mounting hole diameter of PCB should be 3.5mm to reduce the stress to the pins.
- ■Fix the unit on PCB (fixing fittings) by screws to reduce the stress to the pins. Be sure to mount the unit first, then solder the unit.

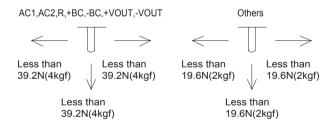
### Soldering temperature

■Flow soldering : 260°C for up to 15 seconds. ■Soldering iron (26W) : 450°C for up to 5 seconds.

### TUNS50F/100F/300F/500F/700F



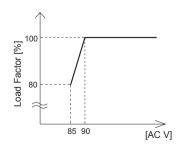
### TUNS1200F



### **Derating**

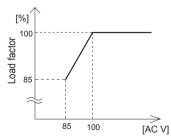
### Input voltage derating curve

### TUNS50F/100F



### TUNS700F/1200F

\*TUNS1200F12 has no input voltage derating.



### TUNS300F/500F

\*TUNS300F/500F has no input voltage derating

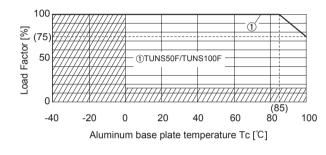
### Derating

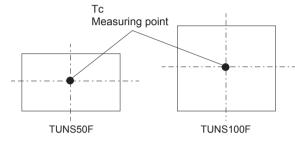
### Output voltage derating curve

- ■Use the power modules with conduction cooling (e.g. heat dissipation from the aluminum base plate to the attached heat sink).

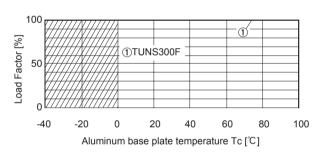
  Below shows the derating curves with respect to the aluminum base plate temperature. Note that operation within the hatched areas will cause a significant level of ripple and ripple noise.
- ■Please measure the temperature on the aluminum base plate edge side when you cannot measure the temperature of the center part of the aluminum base plate. In this case, please take 5deg temperature margin from the derating characteristics shown in below. Please reduce the temperature fluctuation range as much as possible when the up and down of the temperature are frequently generated. Contact us for more information on cooling methods.

### TUNS50F/100F

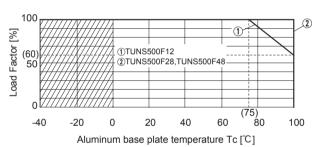




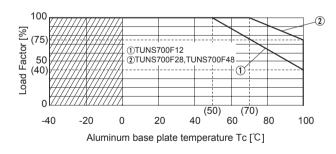
### TUNS300F

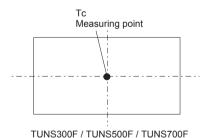


### TUNS500F

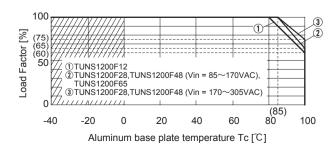


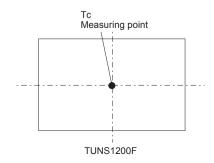
### TUNS700F





### TUNS1200F









### **Instruction Manual**

◆ It is neccessary to read the "Instruction Manual" and "Before using our product" before you use our product.

https://en.cosel.co.jp/product/powersupply/TUNS/ Instruction Manual Before using our product https://en.cosel.co.jp/technical/caution/index.html





### **Basic Characteristics Data**

Model	Circuit method	Switching Input current [A] *1	•	Inrush current	PCB/Pattern			Series/Parallel operation availability	
			protection circuit	Material	Single sided	Double sided	Series operation	Parallel operation	
TUNS50F	Active filter	80-600	0.67	Thermistor	Aluminum	Yes		Yes	*2
10113301	Flyback converter	100-300							
TUNS100F	Active filter	80-600	1.3	Thermistor	Aluminum	Yes		Yes	<b>*</b> 2
10113100F	Forward converter	300	1.3						
TUNS300F	Active filter	100	3.6	SCR	Aluminum	Yes		Yes	<b>*</b> 2
10115300F	Half-bridge converter	400						162	
TUNS500F	Active filter	100	6.0	SCR	Aluminum	Aluminum Yes		Yes	*2
101/22001	Half-bridge converter	400		SUR	Alullillulli				
TUNCZOOF	Active filter	100	8.6	SCR	Aluminum	Yes		Yes	*2
TUNS700F	Half-bridge converter	400							
TUNC1200F	Active filter	100	14	SCR	Aluminum	Yes		Voo	Yes
TUNS1200F	Full-bridge converter	400						Yes	

<sup>\*1</sup> The value of input current is at ACIN 100V and rated load.

<sup>\*2</sup> Refer to instruction manual.