AC-DC Power Supplies Bus Converter · Power Module Type















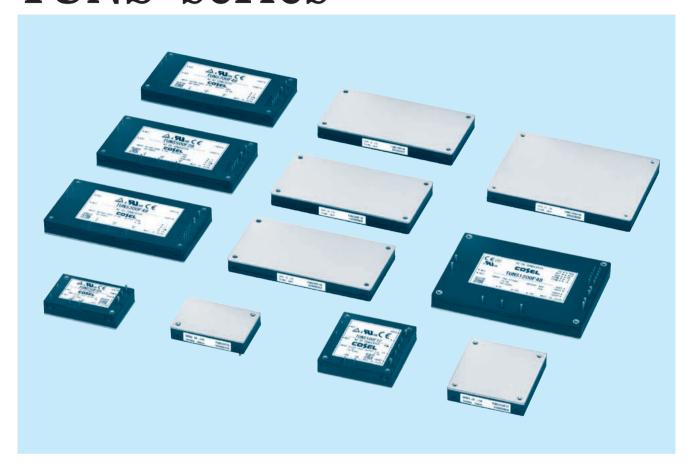








TUNS-series



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

UKCA marking

Electrical Equipment Safety Regulations RoHS Regulations

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

Ordering information

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.

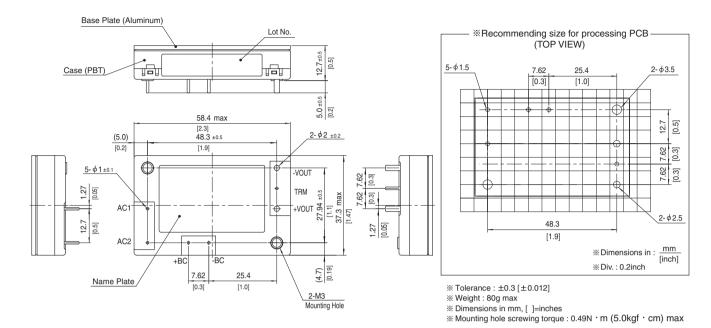
MODEL	TUNS50F05	TUNS50F12	TUNS50F24
MAX OUTPUT WATTAGE[W]	50.0	50.4	50.4
DC OUTPUT	5V 10A	12V 4.2A	24V 2.1A

REMOTE ON/OFF Not provided		MODEL		TUNS50F05	TUNS50F12	TUNS50F24		
CHRENT A		VOLTAGE[V]		AC85 - 264 1 ϕ (Refer to "Derating")				
PREQUENCY IX SO/60 (47 - 63)		CUDDENTIAL	ACIN 100V	0.67typ (lo=100%)				
POWER FACTOR (0=10%) ACM 100V 79typ 83typ 84typ 86typ		CORRENT[A]	ACIN 200V	0.35typ (lo=100%)				
PPICIENCY *S ACM 2009 altyp 84typ 84typ 86typ		FREQUENCY[Hz]		50/60 (47 - 63)				
POWER FACTOR (b=1009) ACN 1009 0.95typ 36typ	INDUT	EFFICIENCY[9/]	ACIN 100V	79typ	83typ	84typ		
POWER FACTOR (Io-100%) ACIN 200V 0.901yp	INFOI	EFFICIENCI[%]	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	21				
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+100C+1 120max 150max 150max 150max A (do 00 0+1) 40 to 00 0+1 200max 200max 250max TEMPERATURE REGULATION[m] 10+460C 360max 460max TEMPERATURE REGULATION[m] 40 to 400C 100max 240max 480max DRIFT[mV] 42 20max 240max 480max JOUTPUT VOLTAGE ADJUSTMENT RANGE[V] 4.50 -6.00 10.80 - 13.20 21.60 - 26.40 OUTPUT VOLTAGE SETTING[V] 4.97 - 5.13 11.91 - 12.29 23.62 - 24.38 WORK CURRENT PROTECTION OVERVOLTAGE PROTECTION[V] 4.97 - 5.13 11.91 - 12.29 23.62 - 24.38 OVER CURRENT PROTECTION OVERVOLTAGE PROTECTION[V] 6.30 - 7.00 13.90 - 16.35 27.60 - 32.40 REMOTE SENSING Not provided REMOTE SENSING Not provided INPUT-FG AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C) OUTPUT FG AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)		RIPPLE[mVp-p]	-40 to 0°C *1	120max		150max		
RIPLE 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 490 max		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		
1.80 - 6.00 10.80 - 13.20 21.60 - 26.40		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) (8.30 - 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) OPERATINGTEMP,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)		. , .		37, -7 (-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				
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.







TUNS100F

100 F



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

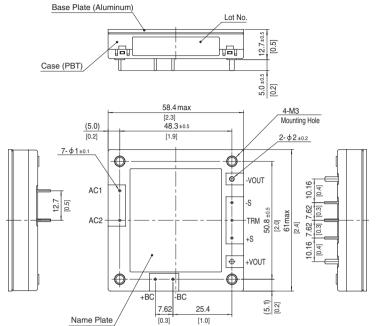
- *Avoid short circuit between +BC and -BC. It may cause the failure of inside components.
- *Keep TRM open, if output voltage adjustment is not necessary.
- *If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

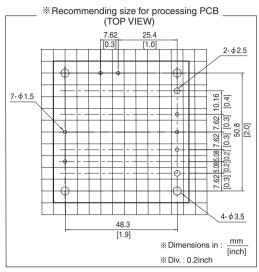
MODEL	TUNS100F05	TUNS100F12	TUNS100F24
MAX OUTPUT WATTAGE[W]	100.0	100.8	100.8
DC OUTPUT	5V 20A	12V 8.4A	24V 4.2A

	MODEL		TUNS100F05	TUNS100F12	TUNS100F24		
	VOLTAGE[V]		AC85 - 264 1 ϕ (Refer to "Derating")				
	CUDDENTIAL	ACIN 100V	1.3typ (lo=100%)				
	CURRENT[A]	ACIN 200V	0.7typ (lo=100%)				
	FREQUENCY[Hz]		50/60 (47 - 63)				
INPUT	EFFICIENCY[0/]	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[I	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°C *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°C	50max	120max	240max		
	TEMPERATURE REQUESTION[IIIV]	-40 to +100℃	100max	240max	480max		
	DRIFT[mV]	*2	20max	40max	90max		
	OUTPUT VOLTAGE ADJUSTMEN	IT RANGE(V)	Fixed (TRM pin open), adjustable by external resistor or external signal				
	OUT OF VOLINGE ADJUSTIMEN	II IIANGE[V]	4.50 - 6.00	10.80 - 13.20	21.60 - 26.40		
	OUTPUT VOLTAGE SET		4.97 - 5.13	11.91 - 12.29	23.62 - 24.38		
PROTECTION	OVERCURRENT PROT		Works over 105% of rating and recove	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				
	REMOTE ON/OFF		Not provided				
	INPUT-OUTPUT		AC3,000V 1minute, Cutoff current = 10mA, DC500V 50M Ω min (20±15 $^{\circ}$ C)				
ISOLATION	INPUT-FG		AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M Ω min (20±15 $^{\circ}$ C)				
	OUTPUT-FG		AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)				
	OPERATING TEMP., HUMID. AND		-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	Z axis		
	IMPACT		196.1m/s² (20G), 11ms, once each al-				
SAFETY AND	AGENCY APPROVALS		UL60950-1, C-UL (CSA60950-1), EN				
NOISE REGULATIONS	HARMONIC ATTENU		Complies with IEC61000-3-2 (Class A	.′			
OTHERS	CASE SIZE/WEIGHT		58.4×12.7×61.0mm [2.3×0.5×2.4	, ,			
	COOLING METHOD		Conduction cooling (e.g. heat radiation	n from the aluminum base plate to the	attached heat sink)		
Pafer to instruction manual for managing method 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.







- % 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 F



- 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.

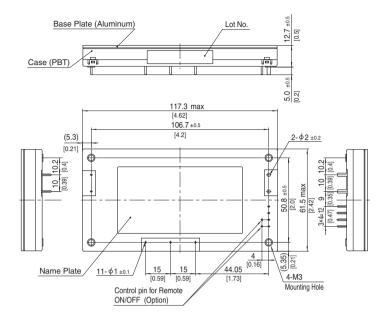
MODEL	TUNS300F12	TUNS300F28	TUNS300F48
MAX OUTPUT WATTAGE[W]	300	308	312
DC OUTPUT	12V 25A	28V 11A	48V 6.5A

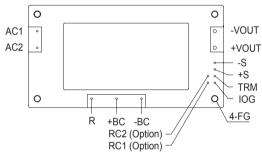
	MODEL		TUNS300F12	TUNS300F28	TUNS300F48				
	VOLTAGE[V]		AC85 - 264 1 φ						
	OUDDENTIAL	ACIN 100V	3.6typ (lo=100%)						
	CURRENT[A] ACIN 200V		1.8typ (lo=100%)						
	FREQUENCY[Hz]		50/60 (47 - 63)						
INPUT	EFFICIENCY[%]	ACIN 100V	84typ	87typ	87typ				
INFOI	EFFICIENCI[/6]	ACIN 200V	86typ	89typ	90typ				
	POWER FACTOR (Io=100%)	ACIN 100V	0.96typ						
	POWER FACTOR (IO=100%)	ACIN 200V	0.93typ	71					
	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[24max	56max	96max				
	LOAD REGULATION	[mV]	24max	56max	96max				
	RIPPLE[mVp-p]	0 to +100°C *1	120max	180max	250max				
	niPPLE[iiivp-p]	-40 to 0°C *1	150max	200max	300max				
ОИТРИТ	RIPPLE NOISE[mVp-p]	0 to +100℃*1	150max	200max	300max				
OUTFUT	HIFFEE NOISE[IIIVP-P]	-40 to 0°C *1	200max	300max	450max				
	TEMPERATURE REGULATION[mV]	0 to +65℃	120max	280max	480max				
	TEMPERATORE REGULATION[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 recovers automatically						
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 re-						
	INPUT-OUTPUT · RO	*4	/100,000 v 1111111ato, Oaton oanont = 1						
ISOLATION	INPUT-FG		AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M Ω min (20±15 $^{\circ}$ C)						
ioo_Aiioii	OUTPUT · RC-FG		AC500V 1minute, Cutoff current = 100mA, DC500V 50M Ω min (20±15 $^{\circ}$ C)						
	OUTPUT-RC		AC100V 1minute, Cutoff current = 100mA, DC100V 10M Ω min (20±15 $^{\circ}$ C)						
	OPERATING TEMP., HUMID. AND		· · · · · · · · · · · · · · · · · · ·	7: 07 1	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	Z axis				
	IMPACT		196.1m/s ² (20G), 11ms, once each al						
SAFETY AND	AGENCY APPROVAL		UL60950-1, C-UL (CSA60950-1), EN						
NOISE REGULATIONS	HARMONIC ATTENU		Complies with IEC61000-3-2 (Class A	,					
OTHERS	CASE SIZE/WEIGHT		117.3×12.7×61.5mm [4.62×0.5×2						
	COOLING METHOD		Conduction cooling (e.g. heat radiatio	n from the aluminum base plate to the	attached heat sink)				

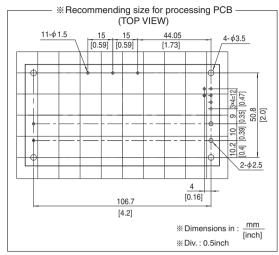
- Refer to instruction manual for measuring method of electric characteristics.
- Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
- Please contact us about another class.
 "RC" is applicable when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









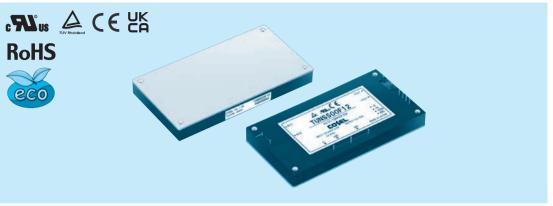


- ** Tolerance : ±0.3 [± 0.012]
- * Weight : 190g max
- ※ Dimensions in mm, []=inches
- Mounting hole screwing torque: 0.49N · m (5.0kgf · cm) max

Ordering information

TUNS500F

500 F §



- 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.

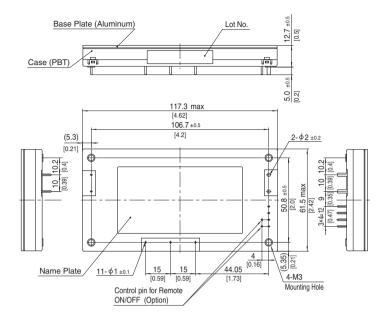
MODEL	TUNS500F12	TUNS500F28	TUNS500F48
MAX OUTPUT WATTAGE[W]	504	504	504
DC OUTPUT	12V 42A (Peak 55A)	28V 18A (Peak 24A)	48V 10.5A (Peak 14A)

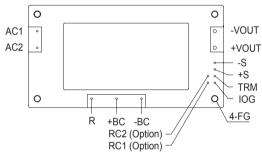
	MODEL		TUNS500F12	TUNS500F28	TUNS500F48	
	VOLTAGE[V]		AC85 - 264 1 φ			
	OUDDENTIAL	ACIN 100V	6.0typ (Io=100%)			
	CURRENT[A]	ACIN 200V	3.0typ (Io=100%)			
	FREQUENCY[Hz]		50/60 (47 - 63)			
INPUT	EFFICIENCY[%]	ACIN 100V	84typ	87typ	88typ	
INPUT	EFFICIENCI[%]	ACIN 200V	86typ	90typ	90.5typ	
	POWER FACTOR (Io=100%)	ACIN 100V	0.96typ			
	POWER FACTOR (IO=100%)	ACIN 200V	0.93typ			
	INRUSH CURRENT		Limited by external resistance			
	LEAKAGE CURREN	Γ[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[I		24max	56max	96max	
	LOAD REGULATION	[mV]	24max	56max	96max	
	RIPPLE[mVp-p]	0 to +100°C * 1	120max	180max	250max	
	HIFFEE[IIIVP-P]	-40 to 0°C * 1	150max	200max	300max	
OUTPUT	RIPPLE NOISE[mVp-p]	0 to +100℃ *1	150max	200max	300max	
001101	mir r LL NOISE[mvp-p]	-40 to 0°C *1	200max	300max	450max	
	TEMPERATURE REGULATION[mV]	0 to +65°C	120max	280max	480max	
		-40 to +100°C	240max	560max	960max	
	DRIFT[mV] *2		40max	90max	180max	
	OUTPUT VOLTAGE ADJUSTMEN	T 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 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 · RO	*5	AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)			
ISOLATION	INPUT-FG		AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M Ω min (20±15 $^{\circ}$ C)			
IOOLATION	OUTPUT · RC-FG		AC500V 1minute, Cutoff current = 100mA, DC500V 50M Ω min (20±15 $^{\circ}$ C)			
	OUTPUT-RC		AC100V 1minute, Cutoff current = 100mA, DC100V 10MΩ min (20±15℃)			
			-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	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			
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 from the aluminum base plate to the attached heat sink)			

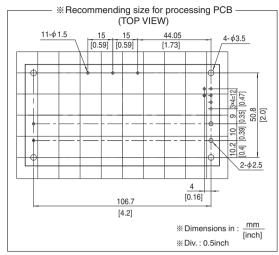
- Refer to instruction manual for measuring method of electric characteristics.
- Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
- () means peak current. Avoid operating with peak current continuously.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

TUNS700F

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	mV]	24max	56max	96max
	LOAD REGULATION	[mV]	24max	56max	96max
	DIDDI E[m\/n_n]	0 to +100℃*1	120max	180max	250max
	RIPPLE[mVp-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	CTION[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		
OTHERS	REMOTE ON/OFF		Optional (External power supply is red	quired)	
MODEL			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	40 V 14.0A

				T			
	MODEL		TUNS700F12-P	TUNS700F28-P	TUNS700F48-P		
	VOLTAGE[V]		AC85 - 264 1 φ				
	CURRENT[A]	ACIN 100V	8.6typ (lo=100%)				
	CONNENT[A]	ACIN 200V	4.1typ (lo=100%)				
	FREQUENCY[Hz]		50/60 (47 - 63)				
INPUT	EFFICIENCY[%]	ACIN 100V	83typ	86typ	87typ		
INFUI	EFFICIENCI[%]	ACIN 200V	86typ	89typ	90typ		
	POWER FACTOR	ACIN 100V	0.96typ				
	(lo=100%)	ACIN 200V	0.93typ	0.93typ			
	INRUSH CURREN	T	Limited by external resistance				
	LEAKAGE CURRENT[mA]		0.75max (ACIN 240V 60Hz, lo=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		
OUTPUT	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 PR	OTECTION	Works over 105% of rating and recov	vers 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 re	equired)			



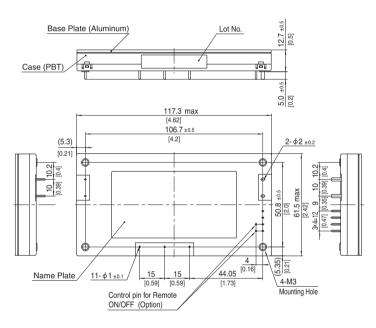


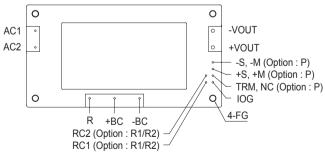
GENERAL SPECIFICATIONS

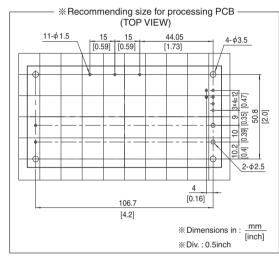
	INPUT-OUTPUT · RC *4	AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)
ISOLATION	INPUT-FG	AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M Ω min (20±15 $^{\circ}$ C)
ISOLATION	OUTPUT · RC-FG *4	AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)
	OUTPUT-RC *4	AC100V 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°C, 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
	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

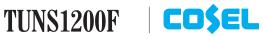
- *Avoid short circuit between +BC/R and -BC. It may cause the failure of inside components.
- *Keep VTRM open, if output voltage adjustment is not necessary.
- \star Keep ITRM open, if output current adjustment is not necessary.
- *If remote sensing is not necessary, connect between +Vout & +S and between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

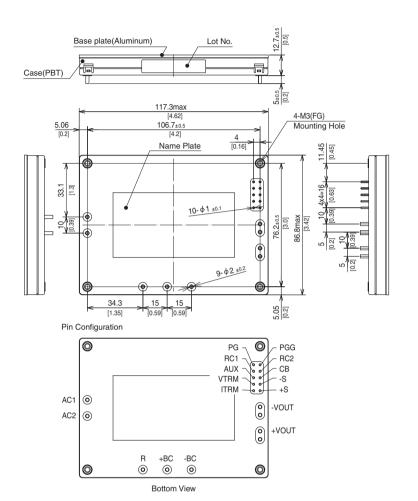
MODEL	TUNS1200F12	TUNS1200F28	TUNS1200F48	TUNS1200F65
MAX OUTPUT WATTAGE[W]	1008	1204	1200	1202.5
DC OUTPUT	12V 84A	28V 43A	48V 25A	65V 18.5A

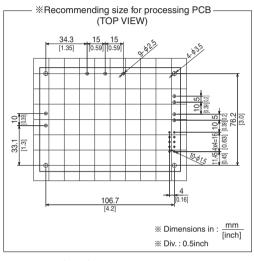
	MODEL		TUNS1200F12	TUNS1200F28	TUNS1200F48	TUNS1200F65				
	VOLTAGE[V]		AC85 - 305V 1 φ							
	OUDDENTIAL	ACIN 100V	12typ	14typ	14typ	14typ				
	CURRENT[A]	ACIN 200V	5.9typ	6.7typ	6.6typ	6.7typ				
	FREQUENCY[Hz]		50/60 (47 - 63)							
NIDUT	EEEIOJENOVIO/1	ACIN 100V	85typ	89typ	90typ	89typ				
NPUT	EFFICIENCY[%]	ACIN 200V	87typ	91typ	92typ	91typ				
	DOWER	ACIN 100V	0.98typ							
	POWER FACTOR (Io=100%)	ACIN 200V	0.95typ							
	INRUSH CURRENT		Limited by external resistance							
	LEAKAGE CURREN	T[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[mV]	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				
	DIDD! = 11010=1 1/ 1	0 to +100℃*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℃ *1	240max	560max	960max	1300max				
	DRIFT[mV]	*2	40max	90max	180max	240max				
	OUTPUT VOLTAGE ADJUSTMENT RANGE[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				
	OUTPUT VOLTAGE SETTING[V]		11.91 - 12.29	27.56 - 28.44	47.24 - 48.76	63.96 - 66.04				
	OVERCURRENT PROT	ECTION								
ROTECTION	OVERVOLTAGE PROTECTION[V]		15.00 - 16.80	35.00 - 39.20	55.20 - 60.00 (Y1:60.0 - 67.2)	81.25 - 91.00				
THERS	REMOTE SENSING		Provided							
ITERS	REMOTE ON/OFF		Provided							
	INPUT-OUTPUT		AC3,000V 1minute, Cutoff current = 10mA, DC500V 50M Ω min (20±15 $^{\circ}$ C) 2MOOP							
	INPUT-FG		AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M Ω min (20±15 $^{\circ}$ C) 1MOOP							
SOLATION	OUTPUT-FG		TUNS1200F12/28/48 : AC500V 1minute, Cutoff current = 100mA, DC500V 50M Ω min (20±15°C) TUNS1200F65 : AC1,200V 1minute, Cutoff current = 10mA, DC500V 50M Ω min (20±15°C) 1MOOP							
	OUTPUT-RC, PG		AC100V 1minute, Cutoff current = 100mA, DC100V 10M Ω min (20±15 $^{\circ}$ C)							
	OPERATING TEMP., HUMID. AND	ALTITUDE								
	STORAGE TEMP., HUMID. AND	ALTITUDE	-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,							
OISE REGULATIONS	HARMONIC ATTENU	IATOR	C-UL (equivalent to CAN/CSA-C22.2 No.60601-1), Complies with IEC60601-1-2 4th Complies with IEC61000-3-2 (Class A) *3							
	CASE SIZE/WEIGHT		117.3×12.7×86.8mm [4.62×0.5×3.42 inches] (W×H×D) / 280g max							
THERS	COOLING METHOD		1 7 9							
	COCLING 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.





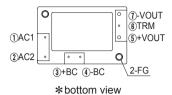




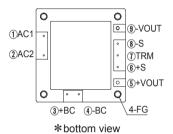
- % Tolerance : ±0.3 [±0.012]
- * Weight: 280g max
- Dimensions in mm, []=inches
- Mounting hole screwing torque: 0.49N · m (5.0kgf · cm) max

Pin Configuration

TUNS50F

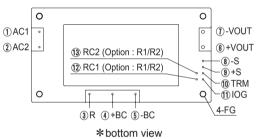


TUNS100F

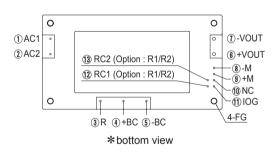


No. Pin Connection Function AC1 AC input 2 (2) AC2 3 3 +BC +BC output 4 -BC -BC output 4 +VOUT +DC output (5) (5) -DC output 7 9 -VOUT -S Remote sensing (-) 8 Remote sensing (+) **(6)** +S **6** 7 TRM Adjustment of output voltage FG Mounting hole (FG)

TUNS300F/TUNS500F/TUNS700F



■ TUNS700F□□-P (OPTION)

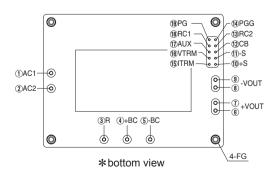


No.	Pin Connection	Function				
1	AC1	AC input				
2	AC2	AC IIIput				
3	R	External resistor for inrush current protection				
4	+BC	+BC output				
(5)	-BC	-BC output				
6	+VOUT	+DC output				
1	-VOUT	-DC output				
8	-S	Remote sensing (-)				
9	+S	Remote sensing (+)				
10	TRM	Adjustment of output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

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

Other than the above are the same as standard products.

TUNS1200F



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				
67	+VOUT	+DC output				
89	-VOUT	-DC output				
10	+S	Remote sensing (+)				
11)	-S	Remote sensing (-)				
12	СВ	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)				



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	φ3.4 thru				

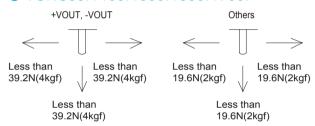
Stress onto the pins

- ■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.

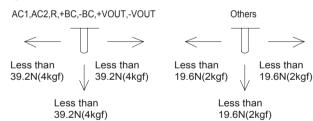
Soldering temperature

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

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



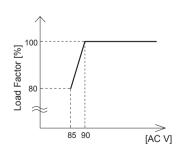
TUNS1200F



Derating

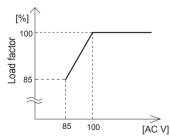
Input voltage derating curve

TUNS50F/100F



TUNS700F/1200F

*TUNS1200F12 has no input voltage derating.



TUNS300F/500F

*TUNS300F/500F has no input voltage derating.

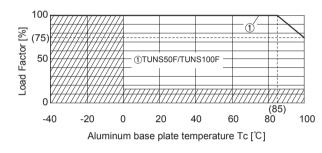
Derating

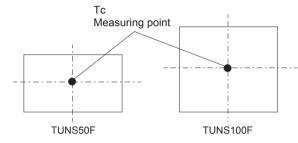
Output voltage derating curve

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

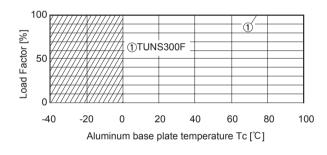
 Below shows the derating curves with respect to the aluminum base plate temperature. Note that operation within the hatched areas will cause a significant level of ripple and ripple noise.
- ■Please measure the temperature on the aluminum base plate edge side when you cannot measure the temperature of 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

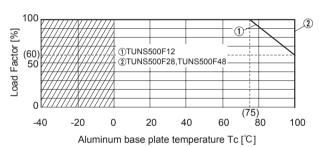




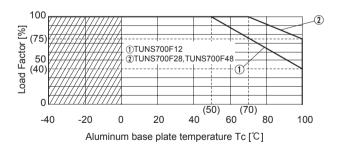
TUNS300F

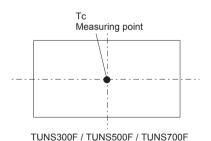


TUNS500F

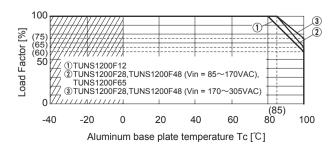


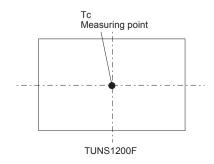
TUNS700F





TUNS1200F







Instruction Manual

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

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





Basic Characteristics Data

Model	Circuit method	Switching Input frequency current [kHz] [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
	Flyback converter	100-300	0.67						
TUNS100F	Active filter	80-600	1.3	Thermistor	Aluminum	Yes		Yes	*2
10113100F	Forward converter	300							
TUNS300F	Active filter	100	3.6	SCR	Aluminum	Yes		Yes	*2
	Half-bridge converter	400							
TUNS500F	Active filter	100	6.0	SCR	Aluminum	Yes		Yes	*2
	Half-bridge converter	400							
TUNS700F	Active filter	100	8.6	SCR	Aluminum	Yes		Yes	*2
	Half-bridge converter	400							
TUNS1200F	Active filter	100	14	SCR	Aluminum	Yes		Yes	Yes
	Full-bridge converter	400							

^{*1} The value of input current is at ACIN 100V and rated load.

^{*2} Refer to instruction manual.