

Transformers for switching power supplies  
Pin terminal type



# ECO2425SEO-D05V014

## FEATURES

- Downsized yet compliant with worldwide safety standards.
- Supports automatic winding.
- Considerably reduced characteristic variations.

## APPLICATION

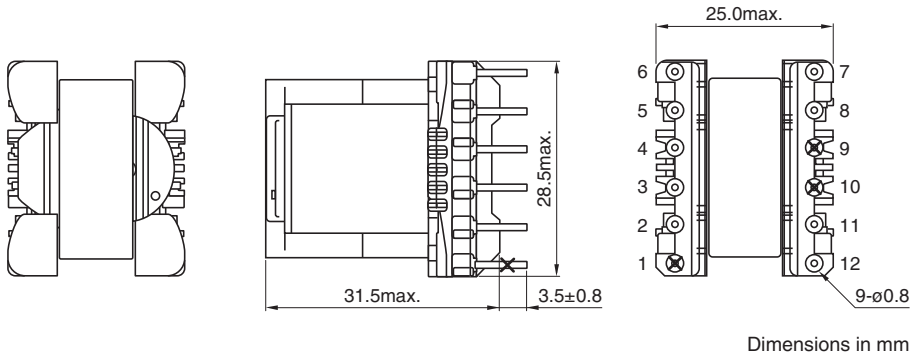
- Isolation type Single-output power supplies
- Input : 90 to 264Vac
- Output : 24V/1.0A
- Circuit type : PWM flyback
- frequency : 100kHz

## REFERENCE TEST BOARD

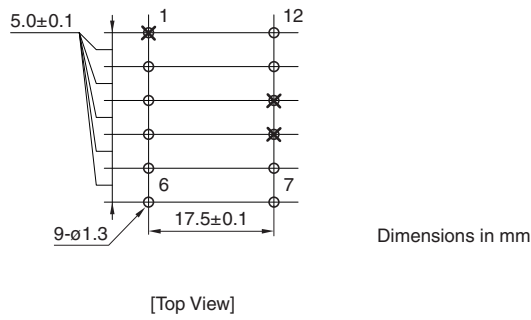
- TEST BOARD ECO30W-24 (TDK)

# ECO2425SEO-D05V014

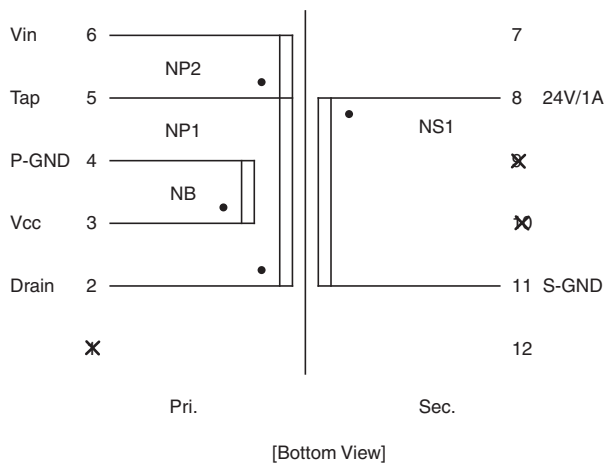
## SHAPE & DIMENSIOS



## RECOMMENDED BASE MATERIAL OPENING SIZE



## SCHEMATICS



# ECO2425SEO-D05V014

## WINDING SPECIFICATIONS

No.	Coil	Terminal	Turns	Wire	Rdc(m $\Omega$ )* <sup>1</sup>	Note* <sup>2</sup>
1	NP1	2 - 5	20	UEW 0.37	133	Clock wise (NP1 + NP2 =57Ts)
2	NS1	8 - 11	20	UEW 0.32 x 2	95.7	Clock wise
3	NP2	5 - 6	37	UEW 0.37	305	Clock wise
4	NB	3 - 4	13	UEW 0.23	309	Clock wise
5						
6						
7						
8						
9						
10						

\*1 Rdc value is a reference.

\*2 Clockwise direction is an order direction when see a transformer from the upper part.

# ECO2425SEO-D05V014

## ELECTRICAL CHARACTERISTICS

Inductance*1 NP ( $\mu\text{H}$ )	Tolerance	Leakage inductance*1 NP(NB,NS all shorted) ( $\mu\text{H}$ )max.	Withstanding voltage*2		Insulation resistance	
			Pri. - Sec.	Coil - Core	Pri. - Sec.	Coil - Core
640	$\pm 10\%$	7.6	AC3.0kVrms 1min or AC 3.6kVrms 1s	AC1.5kVrms 1min or AC 1.8kVrms 1s	DC500V 100M $\Omega$ min.	DC500V 100M $\Omega$ min.

\*1 Measurement Condition : 100kHz, 1V

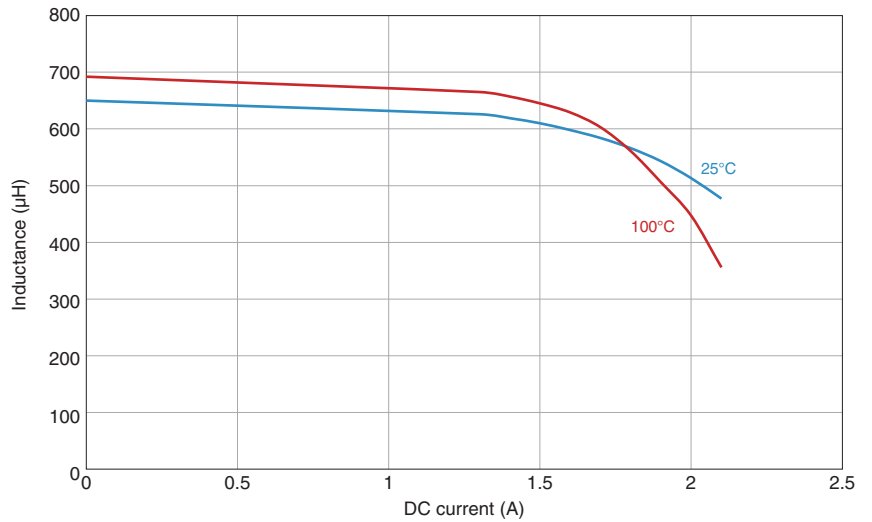
\*2 Measurement Condition : Sense 1.0mA, f=50 or 60Hz

## SAFETY DISTANCE

	Creepage distance	Air clearance
Pri.-Sec.	4.0mm min. (CTI I ) 6.0mm min. (CTI III)	4.0mm min.
Coil-Core	2.0mm min. (CTI I ) 3.0mm min. (CTI III)	2.0mm min.

## INDUCTANCE CHANGE VS. BIAS CHARACTERISTICS

Idc (A)	25°C ( $\mu\text{H}$ )	100°C ( $\mu\text{H}$ )
0	650	692
1.3	626	665
1.4	619	657
1.5	610	645
1.6	598	629
1.7	584	603
1.8	566	561
1.9	543	506
2.0	513	447
2.1	477	356



## ECO2425SEO-D05V014

## RELIABILITY TESTS

Item	Standards	Test methods
Vibration resistance		Sweep 1.5mm amplitude and 10-to-55-to-10Hz in 1min in X, Y, and Z directions for 2h respectively.
Heat resistance		Measure in normal temperature after leaving in 100±2°C for 96h.
Cold resistance	Standard of inductance, insulation resistance, withstand voltage must be satisfied.	Measure in normal temperature after leaving in -40±2°C for 96h.
Humidity resistance		Measure in normal temperature after leaving in 60±2°C and 90 to 95(%)RH for 96h.
Temperature cycle		One cycle is -25°C for 30min, normal temperature for 30min, and 85°C for 30min; measure after 10 cycles of the test have been performed.
Terminal strength	9.8N min.	Apply 9.8N load in the direction of terminal axis for 30±5s. Any terminal must not be pulled out or chatter.
Solderability	Solder covers more than 90%.	Dip in solder with the temperature of 245±2°C for 3±0.5s.

## NOTE

## Operation Range after the assembly

- Temperature : -25°C to +115°C  
(Including self temperature rise.)
- Humidity : 10 to 95%RH  
(Maximum wet-bulb temperature is 38°C, without dewing)

## Storage Range after the assembly

- Temperature : -25°C to +80°C
- Humidity : 10 to 95%RH  
(Maximum wet-bulb temperature is 38°C, without dewing)

## Applicable Safety Standard

- IEC600335-1, IEC61558-1 (Basic Insulation)  
Electrical Appliance and Material Safety Act /Japan (Basic Insulation)  
IEC62368-1 (Reinforced Insulation)

\*Working voltage  $\leq$  300Vrms, Pollution degree 2

\*Product is not approved to the above standard. But construction and materials are designed in accordance with safety considerations.

## ECO2425SEO-D05V014

## INPUT / OUTPUT OVERVIEW

Description	Symbol	Min.	Typ.	Max.	Unit	Condition
Input	Voltage	Vin	90	—	264	Vac
	Frequency	fac	47	50 / 60	63	Hz
	Power Factor	PF	—	0.54	—	90 to 264Vac, Pomax
	No Load Input Power	Pnl	—	—	172	mW 100Vac / 230Vac
Output	Voltage	Vout	22.8	24.0	25.2	Vdc
	Current	Iout	0	1.0	1.0	A
	Ripple Voltage	Vripple	—	—	150	mV 20MHz Bandwidth, 90 to 264Vac, Pomax
	Efficiency	Eff	—	85 / 87	—	% 100Vac / 230Vac, Pomax

## TEMPERATURE RISE

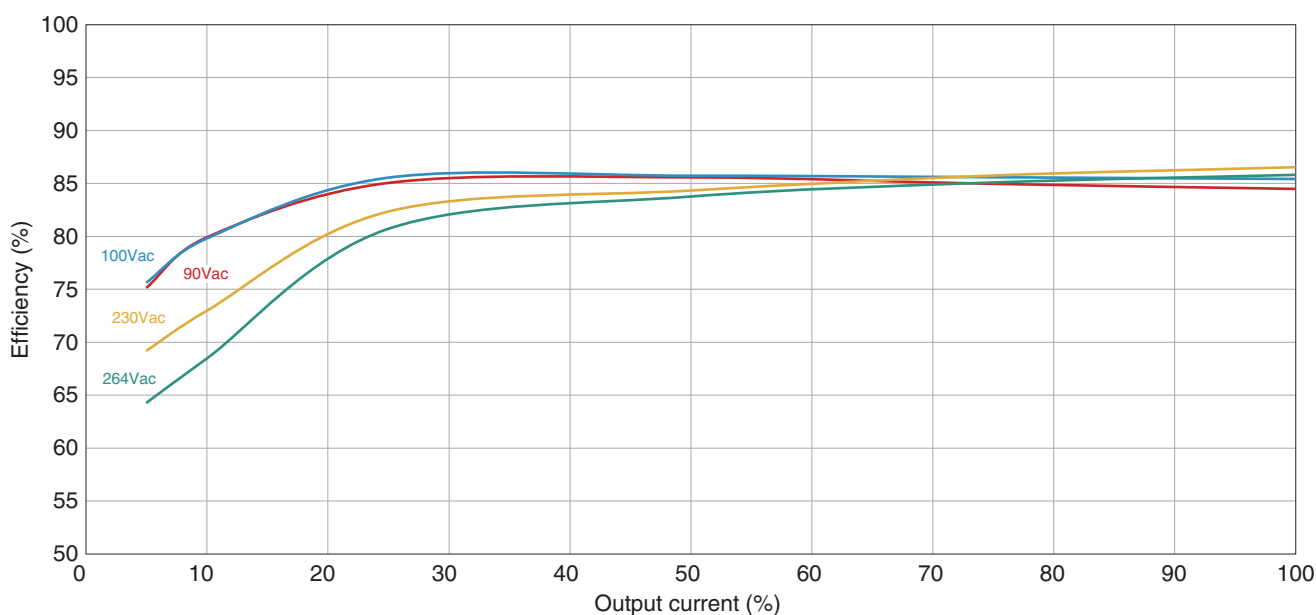
No.	Component	90Vac		100Vac		230Vac		264Vac	
		(°C)	$\Delta T$ (°C)	(°C)	$\Delta T$ (°C)	(°C)	$\Delta T$ (°C)	(°C)	$\Delta T$ (°C)
1	Ambient	25.0	—	25.0	—	25.0	—	25.0	—
2	L1	39.7	14.7	38.3	13.3	33.4	8.4	33.2	8.2
3	D1	34.6	9.6	34.0	9.0	31.8	6.8	31.5	6.5
4	R1	54.8	29.8	51.8	26.8	41.3	16.3	40.3	15.3
5	C5	32.6	7.6	33.1	8.1	34.1	9.1	32.8	7.8
6	IC	41.0	16.0	38.2	13.2	40.2	15.2	40.7	15.7
7	T1 (wire)	43.1	18.1	43.2	18.2	46.3	21.3	46.6	21.6
8	T1 (core)	40.8	15.8	41.6	16.6	45.8	20.8	45.8	20.8
9	D51	38.0	13.0	35.0	10.0	36.0	11.0	33.0	8.0
10	C51	37.7	12.7	37.1	12.1	35.6	10.6	35.1	10.1

Note: Test transformer was away from PWB surface about 3cm.

# ECO2425SEO-D05V014

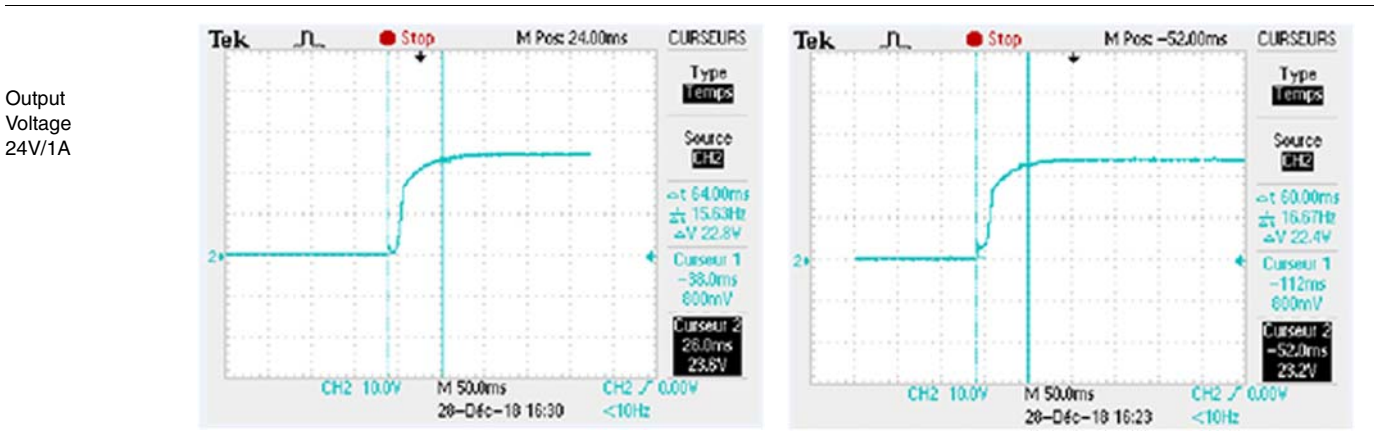
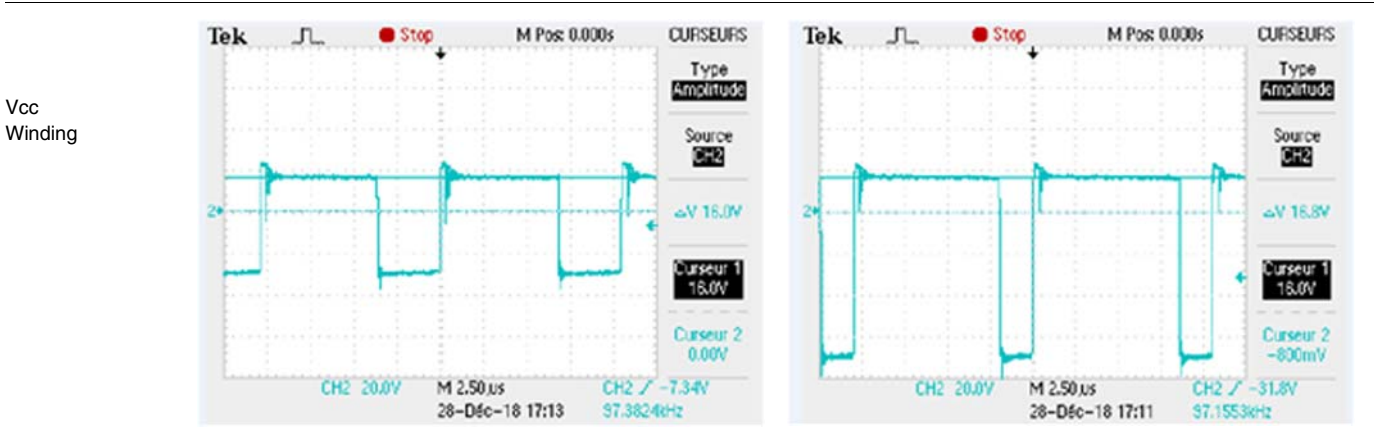
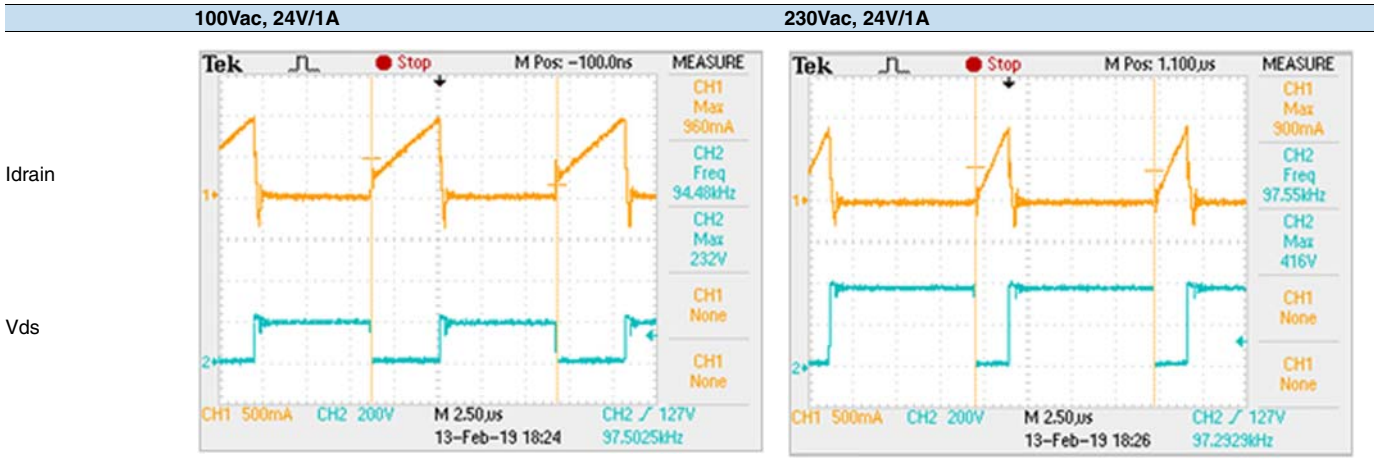
## LOAD REGULATION

Input voltage (Vac)	24V Output current (%)	Output current (A)	Input power (W)	Input current (A)	Power factor	24V Voltage (Vdc)	Efficiency (%)
90	0%	0.00	0.110	0.008	0.16	23.89	0.0
	5%	0.05	1.590	0.041	0.43	23.89	75.1
	10%	0.10	2.990	0.071	0.47	23.89	79.9
	25%	0.25	7.023	0.149	0.53	23.89	85.0
	50%	0.50	13.960	0.273	0.57	23.89	85.6
	75%	0.75	21.090	0.397	0.59	23.89	85.0
	100%	1.00	28.280	0.513	0.62	23.89	84.5
100	0%	0.00	0.114	0.008	0.14	23.89	0.0
	5%	0.05	1.579	0.038	0.41	23.89	75.6
	10%	0.10	2.993	0.066	0.45	23.89	79.8
	25%	0.25	6.980	0.137	0.51	23.89	85.6
	50%	0.50	13.930	0.253	0.55	23.89	85.8
	75%	0.75	20.930	0.368	0.57	23.89	85.6
	100%	1.00	27.960	0.479	0.59	23.89	85.4
230	0%	0.00	0.172	0.016	0.05	23.89	0.0
	5%	0.05	1.726	0.028	0.27	23.89	69.2
	10%	0.10	3.273	0.042	0.33	23.89	73.0
	25%	0.25	7.251	0.080	0.40	23.89	82.4
	50%	0.50	14.160	0.143	0.43	23.89	84.4
	75%	0.75	20.890	0.201	0.46	23.89	85.8
	100%	1.00	27.600	0.253	0.48	23.89	86.6
264	0%	0.00	0.196	0.018	0.04	23.89	0.0
	5%	0.05	1.859	0.029	0.24	23.89	64.3
	10%	0.10	3.490	0.041	0.31	23.89	68.5
	25%	0.25	7.398	0.073	0.38	23.89	80.7
	50%	0.50	14.256	0.128	0.42	23.89	83.8
	75%	0.75	21.050	0.181	0.44	23.89	85.1
	100%	1.00	27.830	0.223	0.45	23.89	85.8



# ECO2425SEO-D05V014

## REFERENCE WAVEFORM



⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. (8/10)  
Please note that the contents may change without any prior notice due to reasons such as upgrading.