TB65 Family

65W Single Output
Test and Measurement/Industrial Grade

Lighting
Audio Visual
Test & Measurement
Display & Signage
Industrial
ITE & Comms
Automation
Renewable
Broadcast
Military COTS

FEATURES AND BENEFITS

- 2.0 X 3.5" X 1.3" Package
- Up to 65W Convection Cooled Output Power
- Up to 90% Efficiency
- Compliant To High Levels Of EMC Per EN61000-4
  15Kv ESD(Air), 8Kv (Contact)
  4Kv Surge
- Meets Class B Conducted EMI with 6db Margin,
  Class B Radiated EMI with 3db Margin
- >10 Year E-Cap Life
- Universal Input 90-264Vac Input Range
- DC Ok Signal, PSU Temperature Signal
- Class I and II Input Models
- 3 Year Warranty

MODEL SELECTION

Model Number[4]	Output Voltage (Nom)	Output Current	Efficiency[1]	Ripple & Noise[2] (pk-pk)	Total Regulation	OVP Threshold	MTBF[3]
TB65S12K	12V	5.4A	88%	120mV	±3%	14.0 ± 1.1V	500,000
TB65S15K	15V	4.3A	88%	180mV	±3%	21.0 ± 2.0V	500,000
TB65S24K	24V	2.7A	90%	240mV	±3%	28.0 ± 2.5V	500,000
TB65S36K	36V	1.8A	88%	360mV	±3%	46.3 ± 3.0V	500,000
TB65S48K	48V	1.35A	90%	480mV	±3%	55.0 ± 4.0V	500,000

Notes:
1. Efficiency values listed are typical and are measured at 115Vac input, full load output current, at an ambient temperature of 25°C
2. Measured at 25°C ambient with noise probe directly at end of 6" twisted pair terminated with 0.1µF ceramic and 10µF low ESR capacitors. Values will be higher at ambient temperatures below 0°C
3. MTBF values are in hours, per Telcordia 332, Issue 6, 25°C, full rated load (w/airflow) at 110Vac input
4. Change the "K" suffix to "C" for Input Class II (ungrounded) models

INPUT

AC Input	85-264Vac, single phase. (Safety Approved to 90 264Vac)
Input Current	1.5A at 110Vac, 1A at 240Vac
Inrush Current	40Arms Maximum within a half line cycle, cold start at 25C. See application note
Input Fuses	3.15A, 250Vac, line and neutral inputs
Earth Leakage Current	<500µA@264Vac, 60Hz input, NC
Efficiency	88% - 90% typical at 115/230Vac, 25°C. See chart for additional details
I^2T Characteristic	See Table below

OUTPUT

Output Voltage	12V to 48Vdc. See models chart for part numbering
Output Power	65W continuous convection cooled, -20C to 50°C ambient. 85Vac to 264Vac. See chart for derating above 50°C
Turn On Time	<2 Seconds at 110Vac
Hold-up Time	20mS min. from loss of AC input at 110 Vac, full load, 25°C
Total Regulation	±1.0 % for all models
Minimum Load	Not required

ENVIRONMENT

Relative Humidity	5% to 95%, non-condensing
Weight	140g, typical
Dimensions	W: 2.0" x L: 3.5" x H: 1.3" W: 50.8mm x L: 88.9mm x H: 33.02mm
Altitude	Operating: -500m to 5000m Non-operating: -500 to 40,000 feet
Storage Temperature	-40°C to +85°C
Vibration	Operating: Sinusoidal Frequency: 10-500Hz, Impact Acceleration: 1g, Sweep rate: 1 octave/min Cycles: 10 times per axis in X, Y, Z direction Random Vibration: Operating: 0.003g2/Hz, 1.224grms overall, 3 axes, 10 min per axis, 1-500Hz Non-Operating: 0.02g2/Hz, 3.1grms overall, 3 axes, 1 hour per axis, 20-500 Hz
Shock	Operating: Half-sine shock waveform. Impact Acceleration: 20g, Pulse duration: 11mS Cycles: 3 times per axis in X,Y, Z direction Non-Operating: Half-sine shock waveform Impact Acceleration: 100g, Pulse duration: 6mS Cycles: 3 times per direction on 3 axes (X,Y. Z)

RELIABILITY

MTBF	572,500 hours@ 110/220Vac, 25°C Bellcore issue 6

ISOLATION

Isolation	Input-Output: 3000Vac Input-Ground: 1900Vac Output-Ground: 500Vac

PROTECTION

Short Circuit Protection	Short across the output terminals will not cause damage to the unit. Hiccup Mode, Auto-recovery

EMI/EMC COMPLIANCE

Conducted Emissions	EN55022/CISPR22 Class B, FCC Part 15.107, Class B, 6db margin, typical
Radiated Emissions	EN55022/CISPR22 Class B, FCC Part 15.109, Class B, 3db margin, typical
Static Discharge Immunity	EN55024/IEC61000-4-2, Level 4, 8kV Contact Discharge, 15kV air discharge, Criteria A
Radiated RF Immunity	EN55022/IEC61000-4-3, Level 3, 10V/m, Criteria A
EFT/Burst Immunity	EN55024/IEC61000-4-4, Level 3, 4kV (PS Output), Criteria A; 2kV (signal outputs), Criteria B
Line Surge Immunity	EN55024/IEC61000-4-5, Level 4, 2kV diff., 4kV Common-mode, Criteria A
Conducted RF Immunity	EN55022/IEC61000-4-6, Level 3, 10V/m, Criteria A
Power Frequency Magnetic Field Immunity	EN55024/IEC61000-4-8, Level 4, 30A/m, Criteria A
Voltage Dip Immunity	EN55024/IEC61000-4-11, Dips: 100%, 10ms; 30%, 500ms; 60%, 100ms; Interruptions: 100%, 5000mS; Performance Criteria A, A, B & B
Line Harmonic Emissions	EN55024/IEC61000-3-2, Class A
Flicker Test	EN55024/IEC61000-3-3

Notes:
Performance criteria are based on EN55024. According to the standards, performance criteria are defined as following:
A – Normal performance during and after the test
B – Temporary degradation, self-recoverable
C – Temporary degradation, operator intervention required to recover the operation
D – Permanent damage

SAFETY

Safety Standards	IEC 60950-1, 2nd Edition CAN/CSA – C22.2 No 60950-1 DEMKO EN60950-1

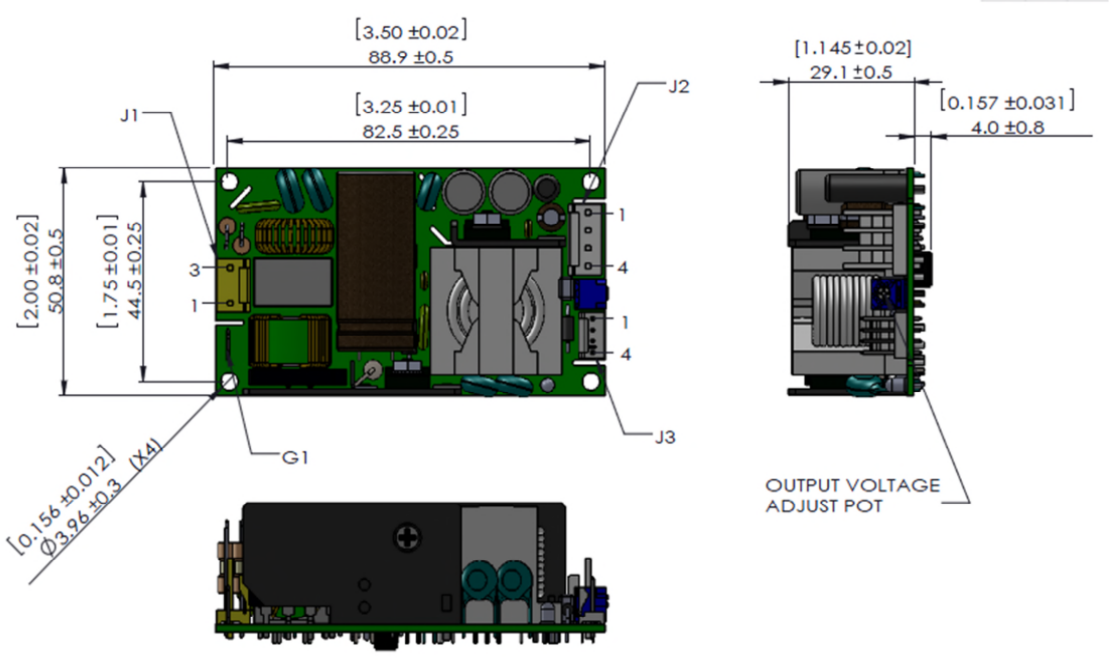
ISOLATION SPECIFICATIONS

Parameter	Conditions/Description	Min	Nom	Max	Units
Insulation Safety Rating	Electric Strength Test Voltage		1900Vac 3000Vac 500Vac		-
Electric Strength Test Voltage	Input/Ground Input/Output Output/Ground	1900 3000 500	-	-	Vac Vac Vac

CONNECTOR INFORMATION

Input Connector J1	DC Output Connector J2	Ground Connector G1	Signal Connector J3	
PIN 1) AC Line PIN 2) Empty (removed) PIN 3) AC Neutral	Pin 1) (+V) Pin 3) (-V) Pin 2) (+V) Pin 4) (-V)	FG 0.187" Quick-connect tab	PIN 1) RTN PIN 2) DC_OK	Pin 3) TEMP SEMSOR (+) Pin 4) TEMP SEMSOR (-)
Mating Connector: Tyco/AMP 640250-3 Pins: 640252-2	Mating Connector: Tyco/AMP 640250-4 Pins: 640252-2	Mating Connector: Molex 01-90020005	Mating Connector: Tyco/AMP 1375820-4 Pins: 1375819	

DERATING CHART



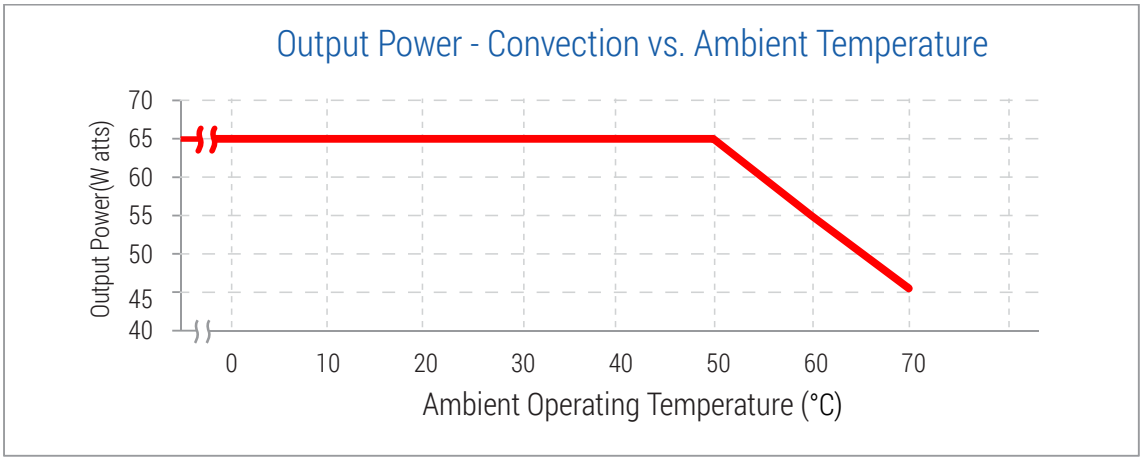
Notes:

1. Overall Dimensions are 2.0:W x 3.5"L x 1.3"H
2. Height is measured from top of highest component to longest lead protrusion on bottom of PCB
3. Input & Output Connectors on opposite ends
4. Mounting hole pattern: 1.75" x 3.25". 4 holes
5. Mounting holes isolated from ground for Class II designs. Mounting standoff height to be >/= xx mm

CHARACTERISTIC CURVES

Output vs. Temperature

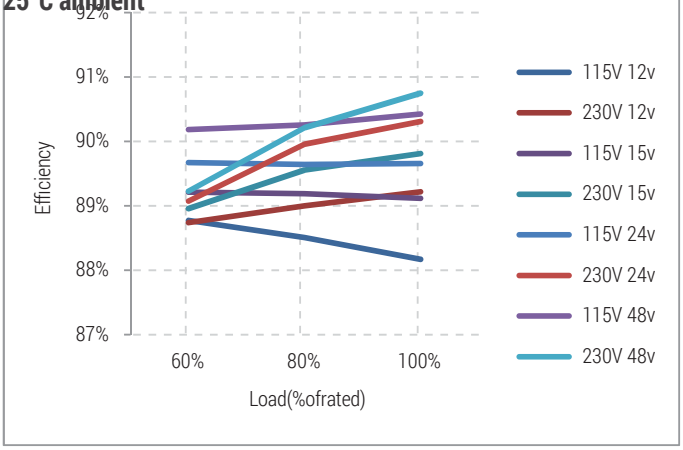
65W convection cooled at -20°C to 50°C operating ambient temperature. De-rate output power to 45.5W at 70°C



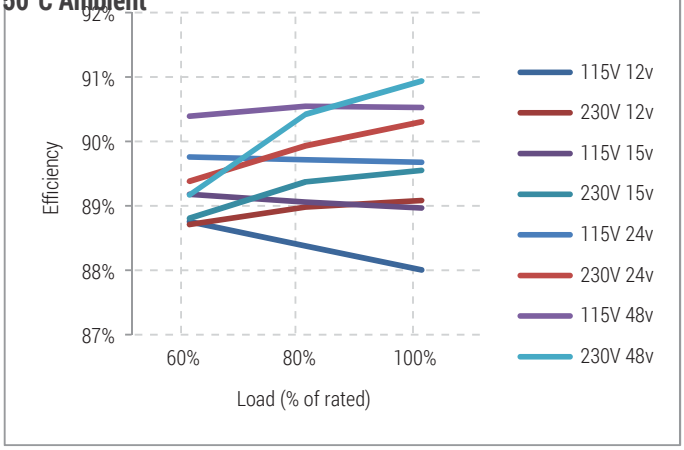
Efficiency vs. Loading

The charts below detail the TB65 efficiency vs input voltage and output loading conditions at 25°C, 50°C and 70°C under de-rated power

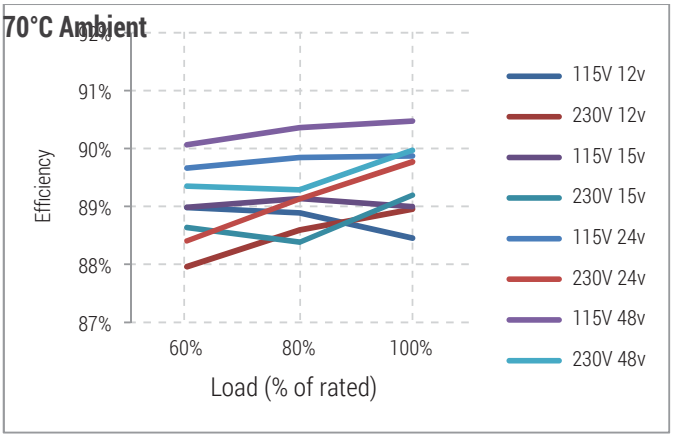
25°C ambient



50°C Ambient



70°C Ambient



INRUSH CURRENT, PEAK (I^2T RATING)

Measured at 264Vac, 50°C at 100% loading, 70°C at de-rated load condition

Model	50°C - I^2T rating (A^2Seconds,Typical)	70°C - I^2T rating (A^2Seconds,Typical)
12V Model	8.5	11.0
15V Model	6.5	13.2
24V Model	10.9	11.7
48V Model	10.4	11.1

Internal Temperature Sensor Conversion Table - Resistance

Value across connector J3, pins 3-4	Internal Temperature
6,040K ohms	-20°C
3,227K ohms	-10°C
1,788K ohms	0°C
1,025K ohms	10°C
605.1K ohms	20°C
367.6K ohms	30°C
229.2K ohms	40°C
146.4K ohms	50°C
95.62K ohms	60°C
63.80K ohms	70°C
43.40K ohms	80°C
30.07K ohms	90°C
21.19K ohms	100°C

Notes: 1. Tolerances: -20°C to 60°C: +/- 4°C; 70°C to 80°C: +/- 5°C; 90°C to 100°C: +/- 6°C