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AM150QB-TT



¼ brick

The AM150QB-TT series is a high-performance quarter brick DC/DC converter specifically designed for a variety of railway applications. It features 150W of output power with no requirement for minimum load, a wide input voltage of 9-75VDC & 60-160VDC & 14-160VDC, operating temperature up to 105°C and reinforced I/O isolation of 1600 & 3000VAC.

Additionally, this series features include input under-voltage protection, output over-voltage, short-circuit, over-current and over-temperature protection, remote On/Off control, remote sense compensation and output voltage trim adjustment.

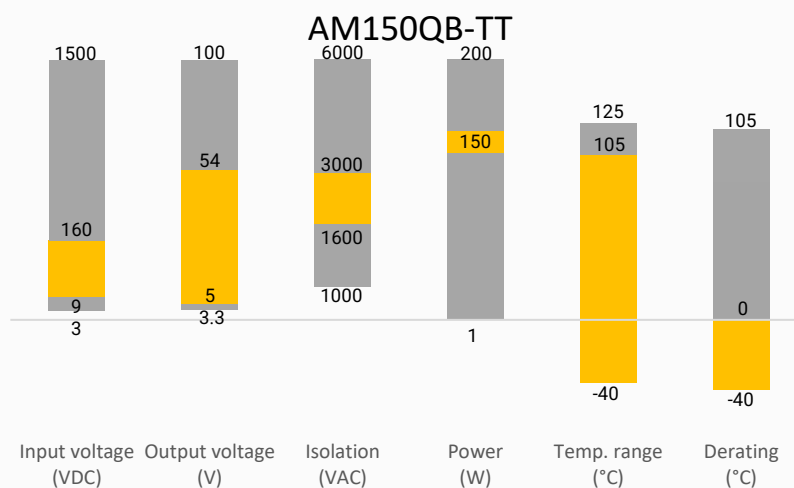
The AM150QB-TT meets EN62368 standards and are widely used in the centralized lighting, air conditioning and related on-board equipment.

Features

- Operating Temp: -40 °C to +105 °C
- Isolation voltage: 1600 & 3000VAC
- High efficiency: Up to 89% typ.
- Wide input voltage 9 ~ 75VDC & 60 ~ 160VDC & 14 ~ 160VDC
- Output short circuit, over-current, over-voltage, input under-voltage, over temperature protection
- Standard ¼ brick package
- Design to meet EN62368



Summary



Training



Product Training Video
(click to open)



Press Release

Coming Soon!

Application Notes

Applications



Railway



Industrial

Models & Specifications

Single Output

Model	Input Voltage (VDC)	Output Voltage (VDC)	Output Current Max (A)	Isolation Voltage (VAC/VDC)	* Ripple & Noise max (mVp-p)	** Maximum Capacitive Load (μF)	Efficiency Full Load Typ (%)
AM150QB-4805SH22TT	48 (9-75)	5	20	1600/2250	120	7000	87
AM150QB-4812SH22TT	48 (9-75)	12	12.5	1600/2250	150	5000	89
AM150QB-4815SH22TT	48 (9-75)	15	10	1600/2250	150	5000	89
AM150QB-4824SH22TT	48 (9-75)	24	6.25	1600/2250	240	2000	86
AM150QB-4848SH22TT	48 (9-75)	48	3.125	1600/2250	480	1000	87
AM150QB-11012SH30TT	110 (60-160)	12	12.5	3000VAC	200	5000	88.5
AM150QB-11024SH30TT	110 (60-160)	24	6.25	3000VAC	240	2000	88
AM150QB-11048SH30TT	110 (60-160)	48	3.125	3000VAC	480	1000	88
AM150QB-11054SH30TT	110 (60-160)	54	2.778	3000VAC	540	1000	88
AM150QB-11012SH30ATT	110 (14-160)	12	12.5	3000VAC	200	5000	88.5
AM150QB-11024SH30ATT	110 (14-160)	24	6.25	3000VAC	240	2000	87.5
AM150QB-11048SH30ATT	110 (14-160)	48	3.125	3000VAC	480	1000	87.5
AM150QB-11054SH30ATT	110 (14-160)	54	2.778	3000VAC	540	1000	87.5

* For the measurement of Ripple and Noise, please refer to Ripple & Noise Circuit.

** The capacitive load is test by minimum input and constant resistive load.

Input Specification

Parameters	Conditions	Typical	Maximum	Units
Input voltage	Nominal 48VDC, 48xx	≥9	75	VDC
	Nominal 110VDC, 110xxSH30TT	≥60	160	VDC
	Nominal 110VDC, 110xxSH30ATT	≥14	160	VDC
Input surge voltage	48xx, 0.1s max.		80	VDC
	110xx, 0.1s max.		200	VDC
Start-up voltage	48xx, 0% - 100% load		9	VDC
	110xxSH30TT, 0% - 100% load		59	VDC
	110xx-SH30ATT, 0% - 100% load		13.2	VDC
Under voltage lockout	48xx, 0% - 100% load	7		VDC
	110xxSH30TT, 0% - 100% load	54		VDC
	110xxSH30ATT, 0% - 100% load	12		VDC
On/Off control	On	open or 3Vdc< Vr <12Vdc		
	Off	short or 0Vdc< Vr <1.2Vdc		
Input filter	Pi type			

Isolation Specification

Parameters	Conditions	Typical	Maximum	Units
Isolation voltage	48xx, Input to output 60 sec, ≤ 5mA	≥1600		VAC
	48xx, Input to output 60 sec, ≤ 1mA	≥2250		VDC
	110xx, Input to output 60 sec, ≤ 5mA	≥3000		VAC
	48xx, Input or output to case, 60 sec, ≤ 5mA	≥1000		VAC
	48xx, Input or output to case, 60 sec, ≤ 1mA	≥1600		VDC
	110xx, Input or output to case, 60 sec, ≤ 5mA	≥1500		VAC
Resistance	500VDC	≥1000		MΩ
Capacitance	48xx		3500	pF
	110xx		3000	pF

Output Specification

Parameters	Conditions	Typical	Maximum	Units
Voltage accuracy			±1	%
Line regulation	LL – HL 100% load		±0.2	%
Load regulation	0% - 100% load		±0.5	%
Short circuit protection	Continues, Auto recovery			
Over current protection	48xx	170		% Io
	110xx	150		% Io
Over voltage protection	48xx, 5Vout, Zener diode clamp		8.5	V
	48xx, 12Vout, Zener diode clamp		19.2	V
	110xx, 12Vout, shutdown		18	V
	48xx, 15Vout, Zener diode clamp		24	V
	48xx, 24Vout, Zener diode clamp		38.4	V
	110xx, 24Vout, shutdown		36	V
	48xx, 48Vout, Zener diode clamp		76.8	V
	110xx, 48Vout, shutdown		72	V
	110xx, 54Vout, shutdown		81	V
Transient Recovery Time	25% load step change (75% - 100% load)	500		µs
Trim-Voltage adjustability *	48xx, 48Vout		-10, +15	%
	others		±10	%

* 0%~100% load at Vin range Pout ≤ max rated power

General Specifications

Parameters	Conditions	Typical	Maximum	Units
Switching frequency	48xx, 5Vout, 100% Load, Nominal Vin	250		KHz
	48xx, 12/ 15Vout, 100% Load, Nominal Vin	300		KHz
	48xx, 24/ 48Vout, 100% Load, Nominal Vin	200		KHz
	110xx, 100% Load, Nominal Vin	250		KHz
Operating temperature	With derating, Nominal Vin	-40 to +105		°C
Storage temperature		-55 to +125		°C
Over temperature protection	Tc (Case Temperature)	110	115	°C
Temperature coefficient			± 0.05	%/ °C
Cooling	Free air convection			
Humidity	Non-condensing	≥5	95	% RH
Altitude	48xx	2000		m
	110xx	4000		m
Weight	48xx, Pin mountable	75		g
	110xxSH30TT, Pin mountable	70		g
	110xxSH30ATT, Pin mountable	75		g
Dimensions (L x W x H)	Pin mountable	2.28 x 1.45 x 0.50 inches (57.9 x 36.8 x 12.7 mm)		
Case material	Aluminum base plate with plastic case			
Potting material	Silicon			
MTBF	48xx	≥ 1 500 000 hrs (MIL-HDBK -217F, t=+25°C)		
	110xxSH30TT	≥ 200 000 hrs (MIL-HDBK -217F, t=+25°C)		
	110xxSH30ATT	≥ 185 000 hrs (MIL-HDBK -217F, t=+25°C)		
Vibration	48xx	MIL-STD-202G		
	110xx	EN61373		

NOTE: All specifications in this datasheet are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified.

Safety Specifications

Parameters

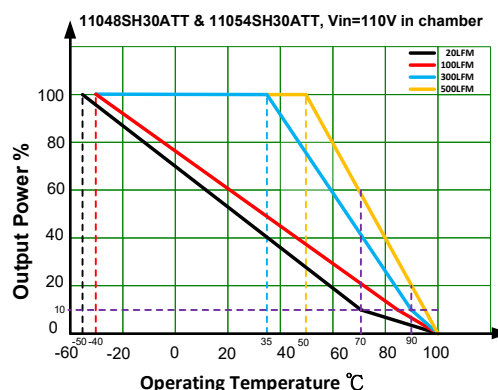
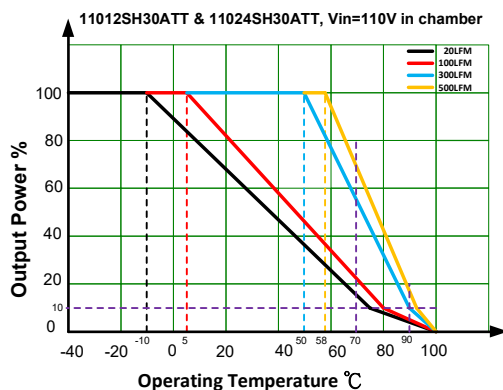
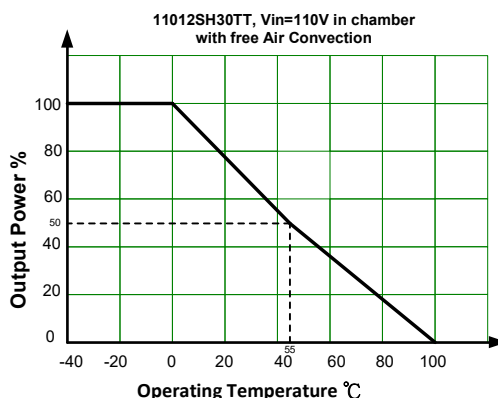
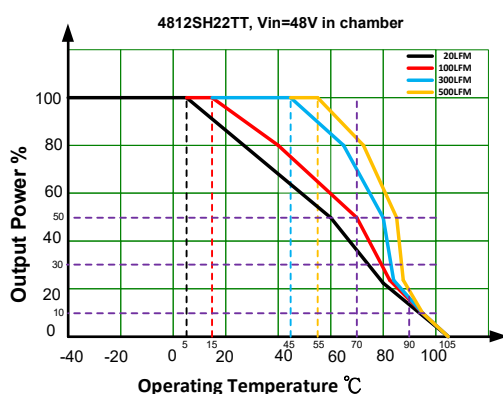
Standards	Design to meet EN62368, basic insulation	
	EMI - Conducted and radiated emission	48xx: EN 55032 See the recommended EMC circuit for class A
		110xxSH30TT: EN50121-3-2/ EN55032 See the recommended EMC circuit 1 for class A See the recommended EMC circuit 2 for class B
		110xxSH30ATT: EN50121-3-2/ EN55032 See the recommended EMC circuit 3 for class A See the recommended EMC circuit 4 for class B
	Electrostatic Discharge Immunity	IEC/EN 61000-4-2, Contact $\pm 6\text{KV}$, Air $\pm 8\text{KV}$, Criteria A
	RF, Electromagnetic Field Immunity	IEC/EN 61000-4-3, 10V/m, Criteria A
	Electrical Fast Transient/Burst Immunity *	IEC/EN 61000-4-4, $\pm 2\text{KV}$, Criteria A
	Surge Immunity *	IEC/EN 61000-4-5, $\pm 2\text{KV}$, Criteria A
	RF, Conducted Disturbance Immunity	IEC/EN 61000-4-6, 10Vrms, Criteria A
	Magnetic field immunity	IEC/EN 61000-4-8, 10A/m, Criteria A

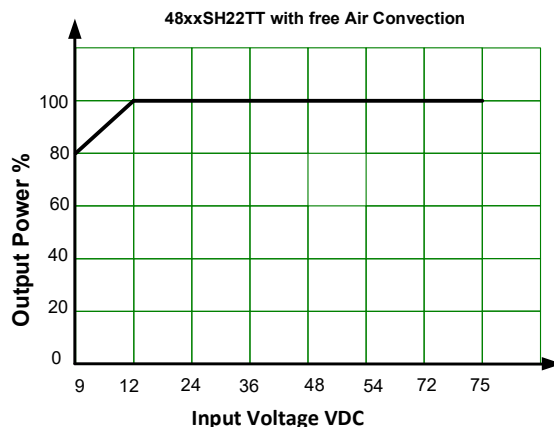
* 48xx, External input capacitor required 1000 μF /100V

* 110xxSH30TT, External input capacitor required 100 μF /200V x3

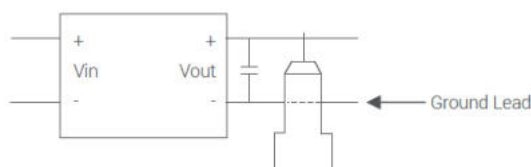
* 110xxSH30ATT, External input capacitor required 2700 μF x2/50V @24Vin, 560 μF /100V @72Vin, 100 μF /200V x3 @110Vin

Derating





Ripple & Noise Circuit

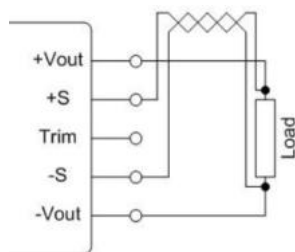


48xx, 5/ 12/ 15Vout: 15% ~ 100% load, 20MHZ BW with X7R MLCC 22 μ F/25V * 6pcs + 1 μ F/25V.

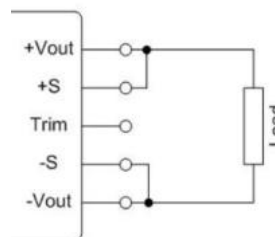
48xx, 24/ 48Vout: 15% ~ 100% load, 20MHZ BW with X7R MLCC 4.7 μ F/100V * 6pcs + 1 μ F/100V.

110xx: 20MHZ BW at nominal with X7R MLCC 4.7 μ F/100V * 6pcs.

Remote Sense Application



With Remote Sense



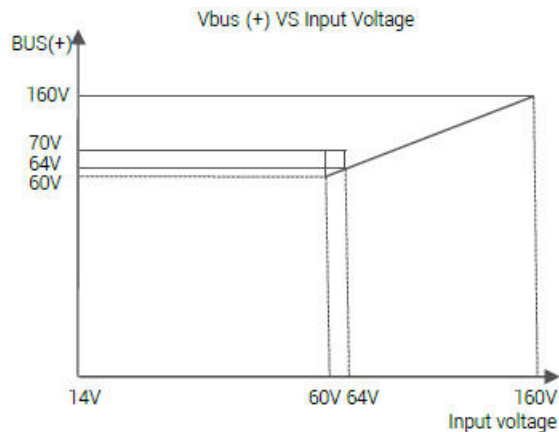
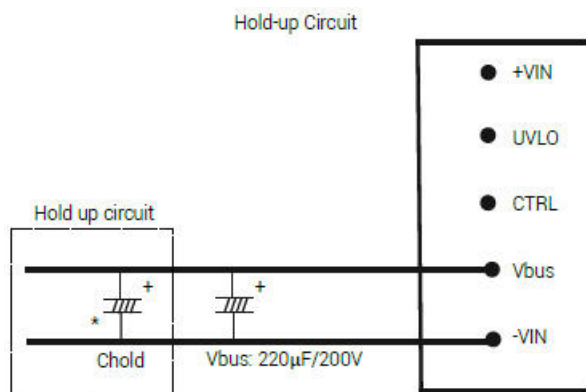
Without Remote Sense

The AM150QB-TT series has Remote Sense feature, it can correct for voltage drops from the converter's output pins to the load. The Sense wire is not the main path of the system and carries very little current. It is recommended to use twisted wires for the +Sense and -Sense wires or shielded cable to avoid noise and unwanted inductance. If the Remote Sense feature is not used, please connect +S and -S pin to +Vout and -Vout.

Hold up time



For 110xxSH30ATT series

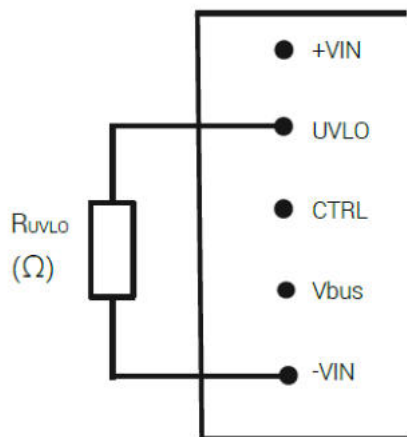


Chold table	Nominal Vin	24V	36V	48V	72V	96V	110V
	10ms	1800uF	1800uF	1800uF	1800uF	600uF	500uF
	30ms	4800µF	4800µF	4800µF	4800uF	1800uF	1200uF

UVLO External Resistor

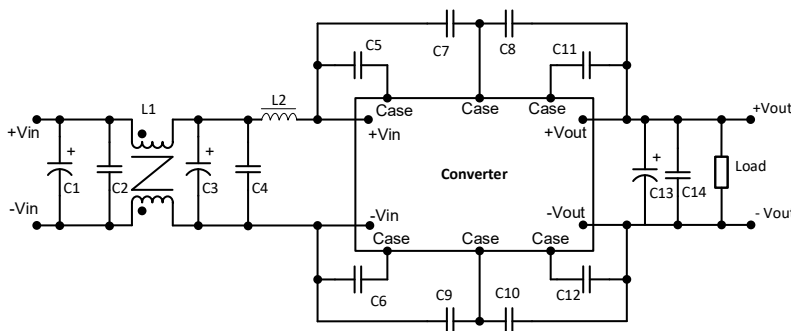


For 110xxSH30ATT series



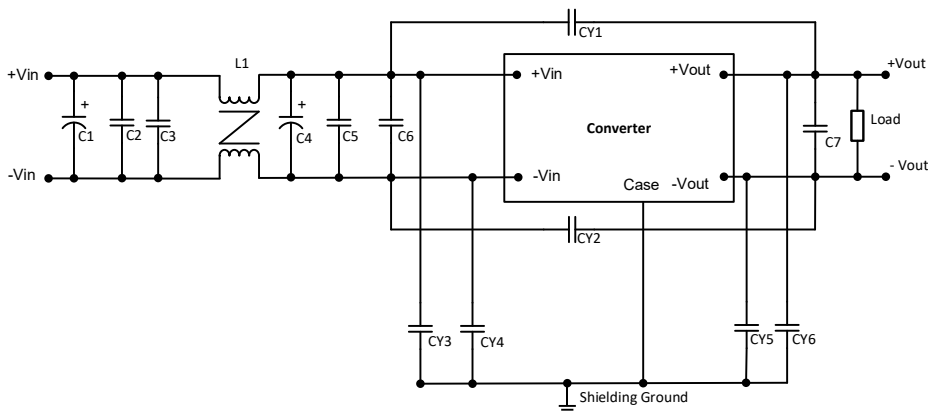
UVLO External Resistor (Ω)	OPEN	125K	62K	27K
Turn-off Threshold	12V	19.9V	26.3V	39.8V
Turn-on Threshold	13.1V	20.9V	27.9V	42V

Recommended EMC circuit



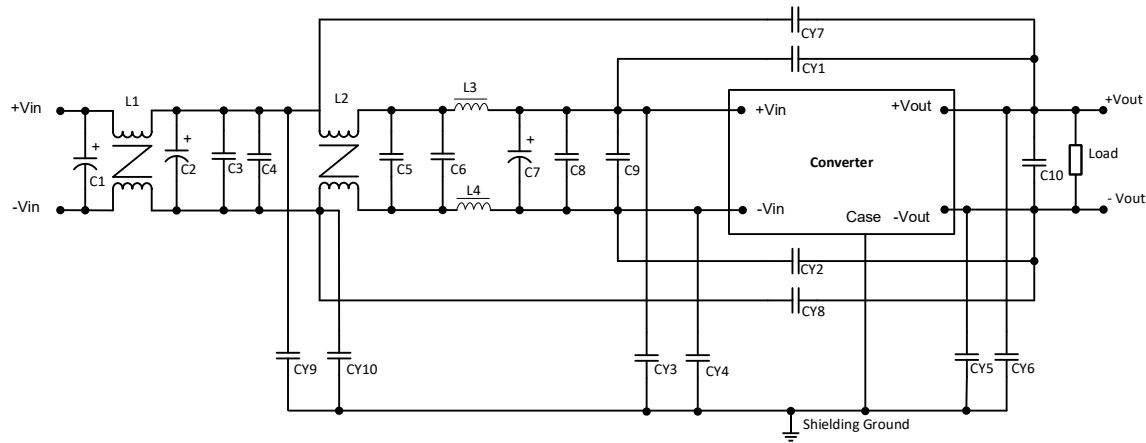
Vout	C1, C3	C2, C4	C5, C6, C11, C12	C7, C8, C9, C10	C13	C14	L1	L2
5V 12V 15V	220uF	2.2uF	2200pF x 5	2200pF x 2	22uF/25V x 6	1uF	2.2mH	2.2uH
24V 48V	220uF	2.2uF	2200pF x 5	2200pF x 2	4.7uF/100V x 2	1uF	2.2mH	2.2uH

Recommended EMC circuit 1



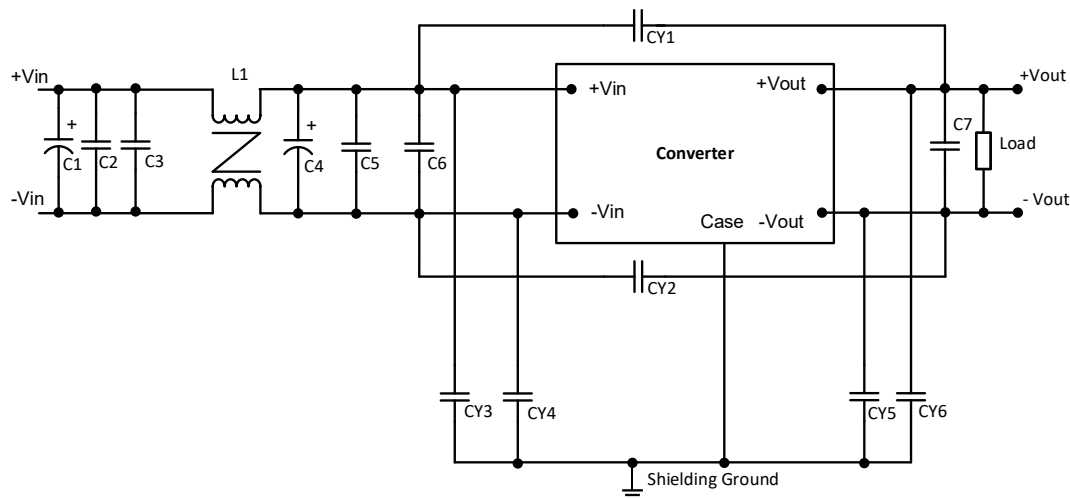
Vout	C1, C4	C2, C3, C5, C6	C7	CY1, CY2	CY3, CY4, CY5, CY6	L1
12V	100uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic, 1210	4.7uF/100V x 6 parallel Ceramic, 1210	1000pF/5KV Ceramic, 2211	1200oF/3KV x 4 parallel Ceramic, 2211	CommonChoke A10 T18X12X8C 2.0mH±35%
24V	220uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic, 1210	4.7uF/100V x 6 parallel Ceramic, 1210	1000pF/5KV Ceramic, 2211	1200oF/3KV x 4 parallel Ceramic, 2211	CommonChoke A10 T18X12X8C 2.0mH±35%
48V 54V	220uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic, 1210	4.7uF/100V x 6 parallel Ceramic, 1210	1000pF/5KV Ceramic, 2211	1200oF/3KV x 5 parallel Ceramic, 2211	CommonChoke A10 T18X12X8C 2.0mH±35%

Recommended EMC circuit 2



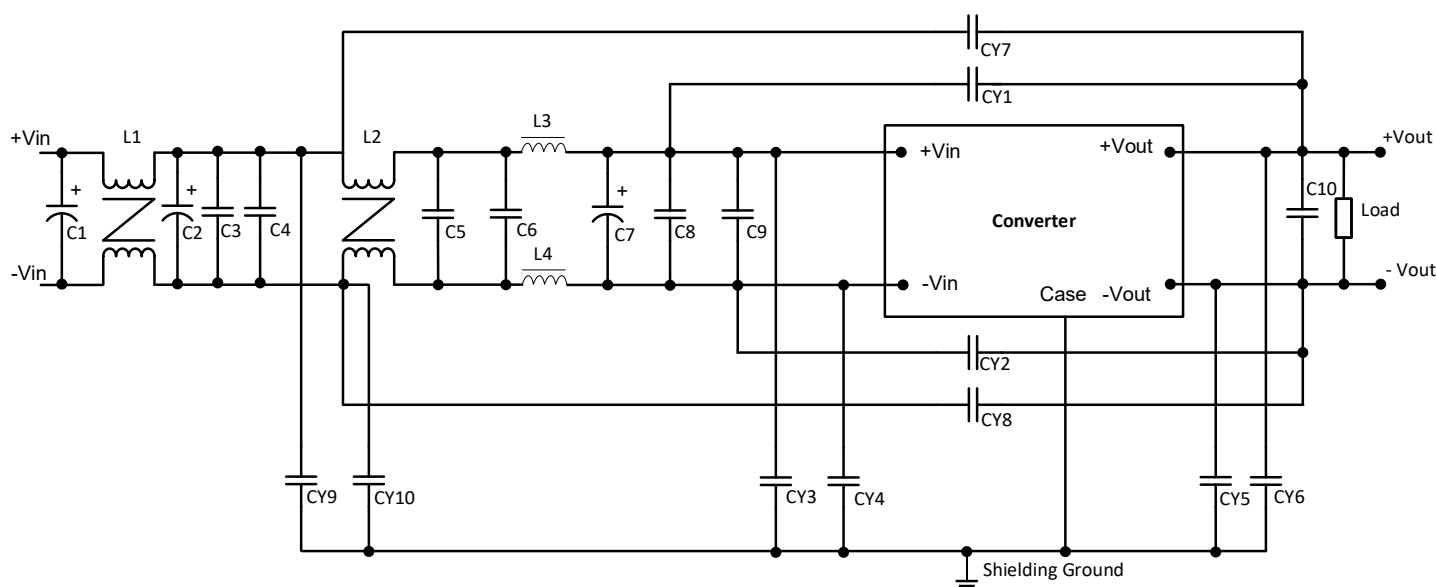
Vout	C1, C2, C7	C3, C4, C5 C6, C8, C9	C10	CY1	CY2	CY3, CY4 CY5, CY6	CY7, CY8	CY9, CY10	L1, L2	L3, L4
12V	100uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic, 1210	4.7uF/100V x 6 parallel Ceramic, 1210	2200pF/5KV Ceramic, 2211	1000pF/5KV Ceramic, 2211	2200pF/3KV x 4 parallel Ceramic, 2211	470pF/5KV Ceramic, 2211	NA	CommonChoke A10 T18X12X8C 2.0mH±35%	4.7uF GSTD1265PE- 4R7M
24V	100uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic, 1210	4.7uF/100V x 6 parallel Ceramic, 1210	2200pF/5KV Ceramic, 2211	1000pF/5KV Ceramic, 2211	2200pF/3KV x 6 parallel Ceramic, 2211	NA	330pF/3KV Ceramic, 2211	CommonChoke A10 T18X12X8C 2.0mH±35%	4.7uF GSTD1265PE- 4R7M
48V 54V	100uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic, 1210	4.7uF/100V x 6 parallel Ceramic, 1210	2200pF/5KV Ceramic, 2211	1000pF/5KV Ceramic, 2211	2200pF/3KV x 6 parallel Ceramic, 2211	100pF/5KV Ceramic, 2211	330pF/3KV Ceramic, 2211	CommonChoke A10 T18X12X8C 2.0mH±35%	4.7uF GSTD1265PE- 4R7M

Recommended EMC circuit 3



Vout	C1, C4	C2, C3, C5, C6	C7	CY1, CY2	CY3, CY4, CY5, CY6	L1
12V	100uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic Cap, 1210	4.7uF/100V x 6 parallel Ceramic Cap, 1210	1000pF/5KV Ceramic Cap, 2211	1200pF/3KV x 4 parallel Ceramic Cap, 2211	CommonChoke A10 T18X12X8C 2.0mH±35%
24V	220uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic Cap, 1210	4.7uF/100V x 6 parallel Ceramic Cap, 1210	1000pF/5KV Ceramic Cap, 2211	1200pF/3KV x 4 parallel Ceramic Cap, 2211	CommonChoke A10 T18X12X8C 2.0mH±35%
48V 54V	220uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic Cap, 1210	4.7uF/100V x 6 parallel Ceramic Cap, 1210	1000pF/5KV Ceramic Cap, 2211	1200pF/3KV x 5 parallel Ceramic Cap, 2211	CommonChoke A10 T18X12X8C 2.0mH±35%

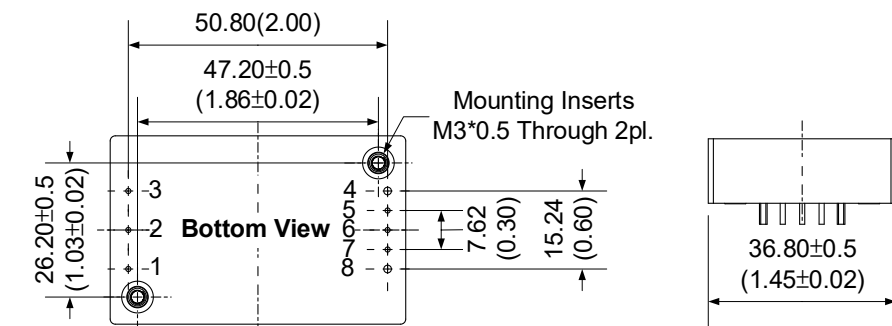
Recommended EMC circuit 4



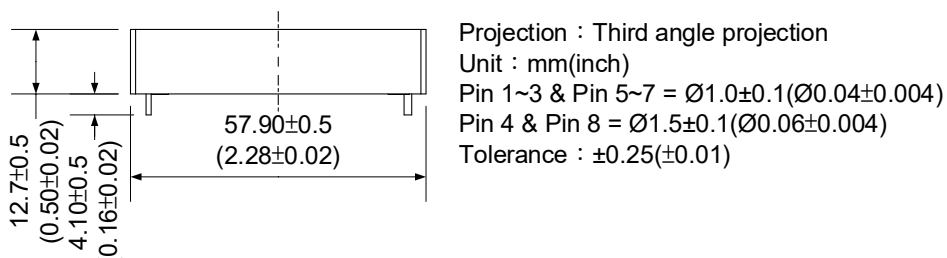
Vout	C1, C2, C7	C3, C4, C5, C6, C8, C9	C10	CY1	CY2	CY3, CY4, CY5, CY6	CY7, CY8	L1, L2	L3, L4
12V	100uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic 1210	4.7uF/100V x 6 parallel Ceramic 1210	2200pF/5KV Ceramic 2211	1000pF/5KV Ceramic 2211	2200pF/3KV x 4 parallel Ceramic 2211	470pF/5KV Ceramic 2211	CommonChoke A10 T18X12X8C 2.0mH±35%	4.7uF GSTD1265PE- 4R7M
24V 48V 54V	100uF/200V E-Cap KXJ Series	0.68uF/250V Ceramic 1210	4.7uF/100V x 6 parallel Ceramic 1210	3300pF/5KV Ceramic 2211	2200pF/5KV Ceramic 2211	2200pF/3KV x 6 parallel Ceramic 2211	470pF/5KV Ceramic 2211	CommonChoke A10 T18X12X8C 2.0mH±35%	4.7uF GSTD1265PE- 4R7M

Dimension

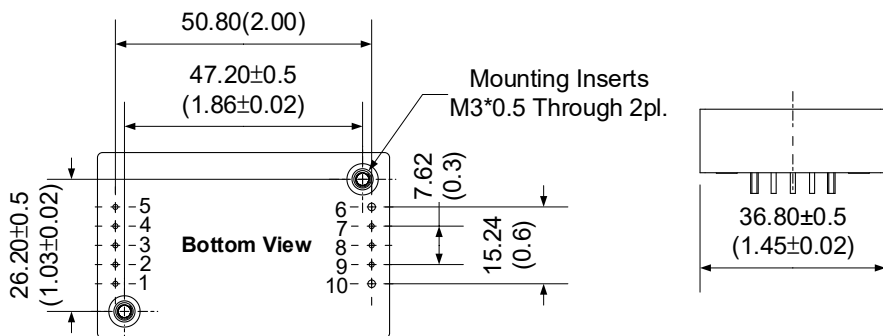
For 48xx & 110xxSH30TT series



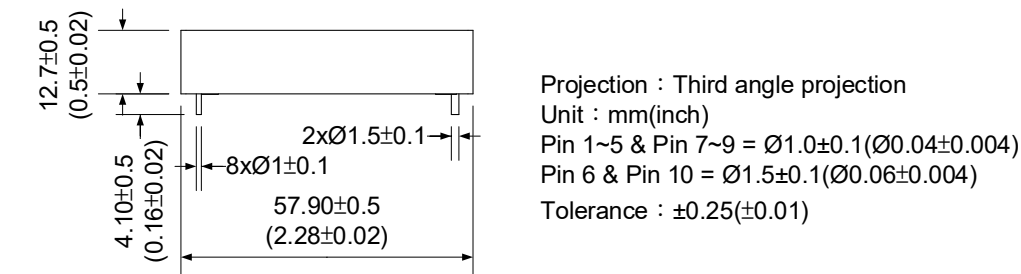
Pin Out Specifications	
Pin	Single
1	+Vin
2	On/Off Ctrl
3	-Vin
4	-Vout
5	-S
6	Trim
7	+S
8	+Vout



For 110xxSH30ATT series



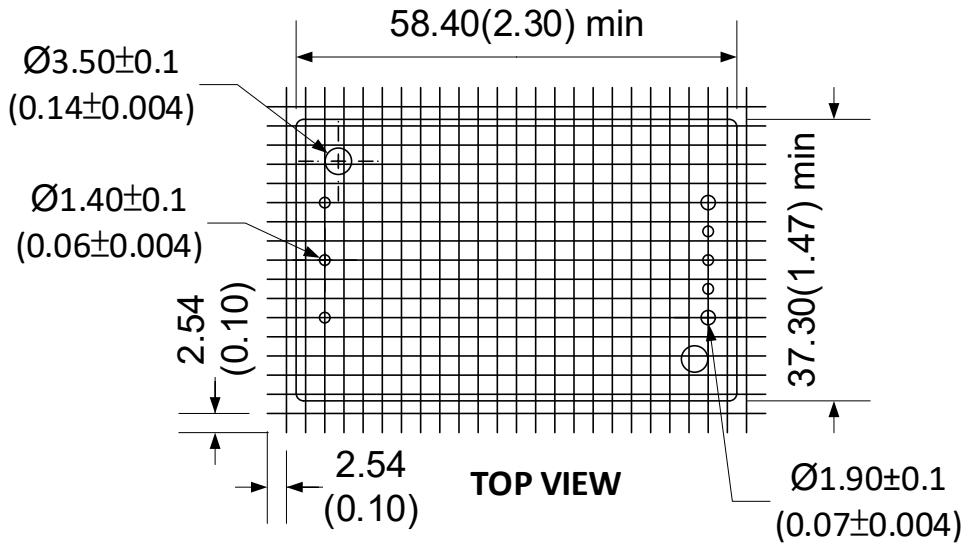
Pin Out Specifications	
Pin	Single
1	+Vin
2	UVLO
3	On/Off Ctrl
4	Vbus
5	-Vin
6	-Vout
7	-S
8	Trim
9	+S
10	+Vout



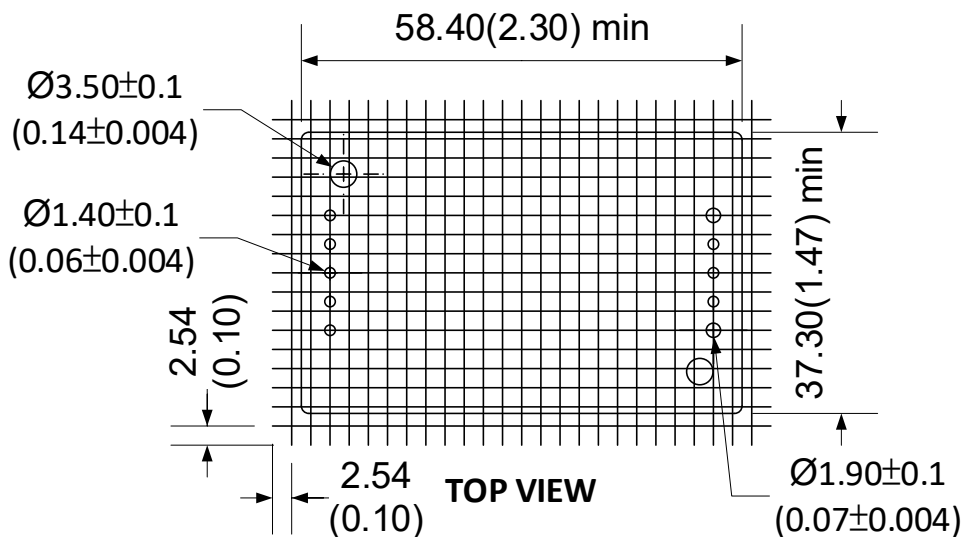
Recommended Footprint



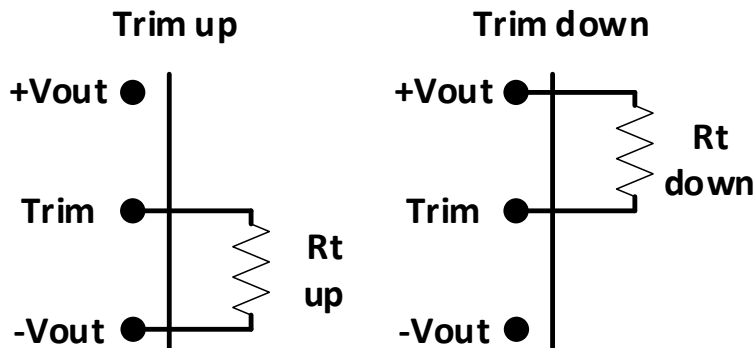
For 48xx & 110xxSH30TT series



For 110xxSH30ATT series



Trim



For 48xx

Vout= 5										
Trim down %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500
Rt down (KΩ)	1085.059	525.752	336.031	240.542	183.047	144.631	117.150	96.516	80.454	67.596
Trim up %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500
Rt up (KΩ)	361.167	161.420	96.032	63.558	44.143	31.228	22.018	15.117	9.755	5.468
Vout= 12										
Trim down %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
Rt down (KΩ)	2902.333	1398.167	896.778	646.083	495.667	395.389	323.762	270.042	228.259	194.833
Trim up %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200
Rt up (KΩ)	723.667	327.833	195.889	129.917	90.333	63.944	45.095	30.958	19.963	11.167
Vout= 15										
Trim down %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500
Rt down (KΩ)	4043.467	1960.133	1265.689	918.467	710.133	571.244	472.038	397.633	339.763	293.467
Trim up %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500
Rt up (KΩ)	760.133	343.467	204.578	135.133	93.467	65.689	45.848	30.967	19.393	10.133
Vout= 24										
Trim down %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	23.760	23.520	23.280	23.040	22.800	22.560	22.320	22.080	21.840	21.600
Rt down (KΩ)	7541.367	3689.283	2405.256	1763.242	1378.033	1121.228	937.795	800.221	693.219	607.617
Trim up %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	24.240	24.480	24.720	24.960	25.200	25.440	25.680	25.920	26.160	26.400
Rt up (KΩ)	819.033	371.117	221.811	147.158	102.367	72.506	51.176	35.179	22.737	12.783

Vout= 48										
Trim down %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	47.520	47.040	46.560	46.080	45.600	45.120	44.640	44.160	43.680	43.200
Rt down (KΩ)	17014.083	8388.042	5512.694	4075.021	3212.417	2637.347	2226.583	1918.510	1678.898	1487.208
Trim up %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	48.480	48.960	49.440	49.920	50.400	50.880	51.360	51.840	52.320	52.800
Rt up (KΩ)	891.917	417.958	259.972	180.979	133.583	101.986	79.417	62.490	49.324	38.792

For 110xx

Vout= 12										
Trim down %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
Rt down (KΩ)	2902.333	1398.167	896.778	646.083	495.667	395.389	323.762	270.042	228.259	194.833
Trim up %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200
Rt up (KΩ)	723.667	327.833	195.889	129.917	90.333	63.944	45.095	30.958	19.963	11.167

Vout= 24										
Trim down %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	23.760	23.520	23.280	23.040	22.800	22.560	22.320	22.080	21.840	21.600
Rt down (KΩ)	7541.367	3689.283	2405.256	1763.242	1378.033	1121.228	937.795	800.221	693.219	607.617
Trim up %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	24.240	24.480	24.720	24.960	25.200	25.440	25.680	25.920	26.160	26.400
Rt up (KΩ)	819.033	371.117	221.811	147.158	102.367	72.506	51.176	35.179	22.737	12.783

Vout= 48										
Trim down %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	47.520	47.040	46.560	46.080	45.600	45.120	44.640	44.160	43.680	43.200
Rt down (KΩ)	16989.483	8363.442	5488.094	4050.421	3187.817	2612.747	2201.983	1893.910	1654.298	1462.608
Trim up %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	48.480	48.960	49.440	49.920	50.400	50.880	51.360	51.840	52.320	52.800
Rt up (KΩ)	867.317	393.358	235.372	156.379	108.983	77.386	54.817	37.890	24.724	14.192

Vout= 54										
Trim down %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	53.460	52.920	52.380	51.840	51.300	50.760	50.220	49.680	49.140	48.600
Rt down (KΩ)	18507.126	9322.129	6167.403	4571.993	3608.892	2964.366	2502.781	2155.928	1885.759	1669.375
Trim up %	1	2	3	4	5	6	7	8	9	10
Vout (VDC)	54.540	55.080	55.620	56.160	56.700	57.240	57.780	58.320	58.860	59.400
Rt up (KΩ)	918.485	406.389	241.041	159.335	110.617	78.264	55.217	37.965	24.567	13.860

NOTE: 1. Datasheets are updated as needed and as such, specifications are subject to change without notice. Once printed or downloaded, datasheets are no longer controlled by Aimtec; refer to www.aimtec.com for the most current product specifications. **2.** Product labels shown, including safety agency certifications on labels, may vary based on the date manufactured. **3.** Mechanical drawings and specifications are for reference only. **4.** All specifications are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified. **5.** Aimtec may not have conducted destructive testing or chemical analysis on all internal components and chemicals at the time of publishing this document. CAS numbers and other limited information are considered proprietary and may not be available for release. **6.** This product is not designed for use in critical life support systems, equipment used in hazardous environments, nuclear control systems or other such applications which necessitate specific safety and regulatory standards other the ones listed in this datasheet. **7.** Warranty is in accordance with Aimtec's standard Terms of Sale available at www.aimtec.com.