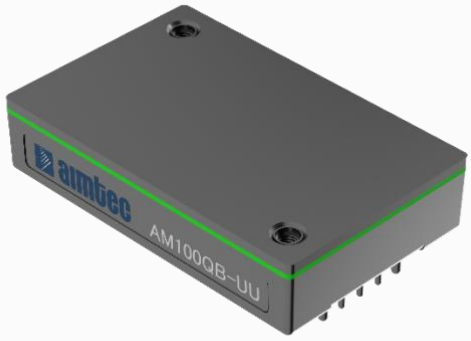
Click to ORDER samples

AM100QB-UU



¼ brick

The AM100QB-UU series is a high-performance quarter brick DC/DC converter specifically designed for a variety of railway applications. It features 100W of output power with no requirement for minimum load, a wide input voltage of 14-160VDC, operating temperature up to 110°C and reinforced I/O isolation of 4000VDC.

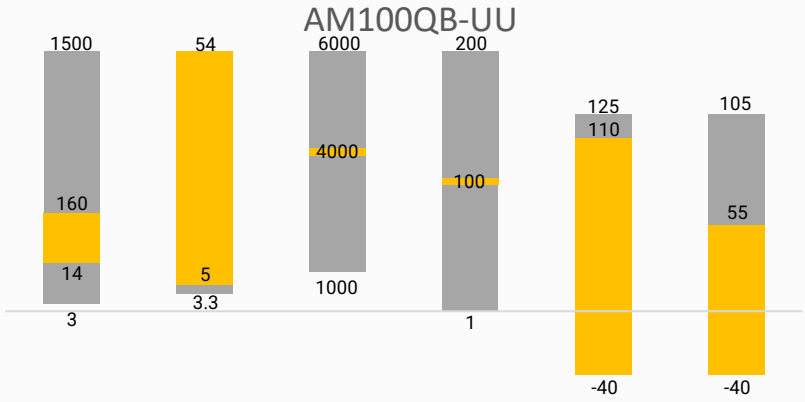
Additionally, this series features include input under-voltage protection, output over-voltage, short-circuit, over-current and over-temperature protection, remote On/Off control, remote sense compensation and output voltage trim adjustment.

The AM100QB-UU meets EN/UL 62368-1, EN50155 railway standards and are widely used in the centralized lighting, air conditioning and related on-board equipment.

Features

- Operating Temp: -40 °C to +110 °C
- Isolation voltage: 4000VDC
- High efficiency: Up to 89% typ.
- Regulated single output
- Output short circuit, over-current, over-voltage, input under-voltage, over temperature protection
- Standard ¼ brick package
- Meets EN/UL 62368-1, EN50155
- Made in Taiwan

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)	Nominal Vin Input Current Max (mA)		Output Current Max (A)	Maximum Capacitive Load (µF)	*Efficiency Full Load Typ (%)
			No Load	Full Load			
AM100QB-7205SH40UU	72 (14-160)	5	15	1615	20	8000	85
AM100QB-7212SH40UU	72 (14-160)	12	15	1560	8.35	8000	88
AM100QB-7214SH40UU	72 (14-160)	13.8	15	1560	7.25	5000	89
AM100QB-7215SH40UU	72 (14-160)	15	15	1560	6.67	4500	89
AM100QB-7224SH40UU	72 (14-160)	24	15	1560	4.2	2000	89
AM100QB-7248SH40UU	72 (14-160)	48	15	1560	2.1	440	89
AM100QB-7254SH40UU	72 (14-160)	54	15	1560	1.86	440	89

Add suffix "-K" for optional heat sink. (ex. AM100QB-7212SH40UU-K is with the heatsink attached version.)
*Vin=72V, T=25°C

Input Specification

Parameters	Conditions	Minimum	Typical	Maximum	Units
Input voltage	Nominal 72V	14	72	160	VDC
Input surge voltage	1s max.		≥-0.3	185	VDC
Start-up voltage	Increasing input voltage	13		14	VDC
Shut down voltage	Decreasing input voltage	12	13		VDC
Input reflected current	Nominal 72V, p-p thru 10µH inductor		40		mA
On/Off control	On	0		5	VDC
	Off	0		5	VDC
	Idle current		5	20	mA
Input filter	Pi filter				

Isolation Specification

Parameters	Conditions	Typical	Maximum	Units
Tested isolation voltage	Input / Output 60 sec, ≤ 5mA		4000	VDC
	Input / Baseplate 60 sec, ≤ 5mA		2250	VDC
	Output / Baseplate 60 sec, ≤ 1mA		1500	VDC
Resistance	500VDC	≥100		MΩ
Capacitance	100KHz / 0.1V	500		pF

Output Specification

Parameters	Conditions	Minimum	Typical	Maximum	Units
Voltage accuracy	Vin=72V, 100% load, T=25°C			±1	%
Line regulation	LL – HL 100% load max I_o			±1	%
Load regulation	Vin= 72V 25-100% of max I_o			±1	%
Short circuit protection	Hiccup, Auto recovery				
Over current protection	5Vout, Hiccup, Auto recovery	20.5		28.6	A
	12Vout, Hiccup, Auto recovery	11.5	12.8	14	A
	13.8Vout, Hiccup, Auto recovery	9.5	10.7	11.3	A
	15Vout, Hiccup, Auto recovery	9		11	A

	24Vout, Hiccup, Auto recovery	5.6	6	6.2	A
	48Vout, Hiccup, Auto recovery	2.5	2.9	3.3	A
	54Vout, Hiccup, Auto recovery	2.2	2.54	4.3	A
Over voltage protection	5Vout, Vin=72V, T=25°C, 0-100% of max IO, Auto recovery	5.75		7.5	V
	12Vout, Vin=72V, T=25°C, 0-100% of max IO, Auto recovery	13.8		18	V
	13.8Vout, Vin=72V, T=25°C, 0-100% of max IO, Auto recovery	15.87		20.7	V
	15Vout, Vin=72V, T=25°C, 0-100% of max IO, Auto recovery	17.25		22.5	V
	24Vout, Vin=72V, T=25°C, 0-100% of max IO, Auto recovery	27.6		36	V
	48Vout, Vin=72V, T=25°C, 0-100% of max IO, Auto recovery	55.2		72	V
	54Vout, Vin=72V, T=25°C, 0-100% of max IO, Auto recovery	62.1		81	V
Transient Recovery Time	Vin=72 V, Load step 50-75-50% of max Io, di/dt = 100mA/µs (within 1% Vout nominal)			500	µs
Transient Response Deviation			±500		mV
Output Ripple and Noise	5V output, 100% load		170	200	mV pk-pk
	12V output, 100% load		180	220	mV pk-pk
	13.8V output, 100% load		140	220	mV pk-pk
	15V output, 100% load		160	250	mV pk-pk
	24V output, 100% load		260	300	mV pk-pk
	48V output, 100% load		260	400	mV pk-pk
	54V output, 100% load		304	400	mV pk-pk
Trim	Typical output voltage			±10	%
Sense compensation				±5	%
* Tested with the ripple & noise circuit.					

General Specifications

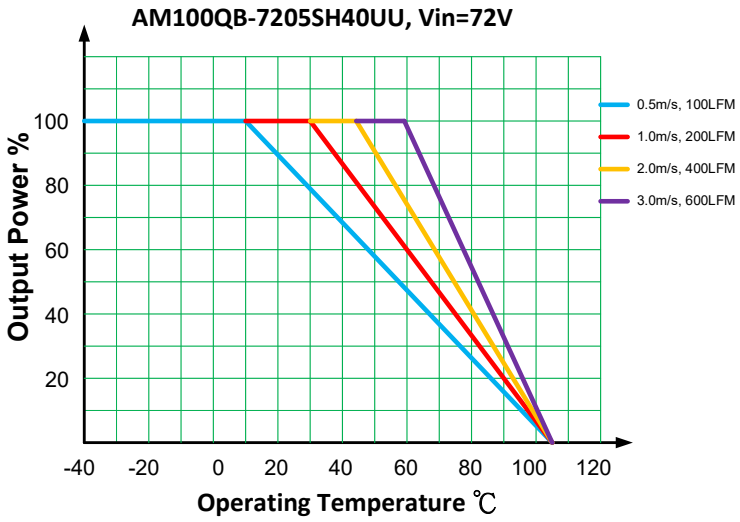
Parameters	Conditions	Typical	Maximum	Units
Switching frequency	0-100 % of max I_O	230		KHz
Operating temperature	With derating	-40 to +110		°C
Storage temperature		-55 to +125		°C
Over temperature protection	Case temperature	115		°C
Cooling	Forced air convection			
Humidity	Non-condensing	≥5	95	% RH
Weight	Pin mountable	70		g
	With optional -K heatsink	110		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)		
	With optional -K heatsink	2.28 x 1.45 x 1.01 inches (57.9 x 36.8 x 25.6 mm)		
Case material	Aluminum base, black plastic case (UL94V-0)			
Potting material	Silicone (UL94V-0)			
MTBF	≥ 700 000 hrs (MIL-HDBK -217F, t=+25°C)			
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.				

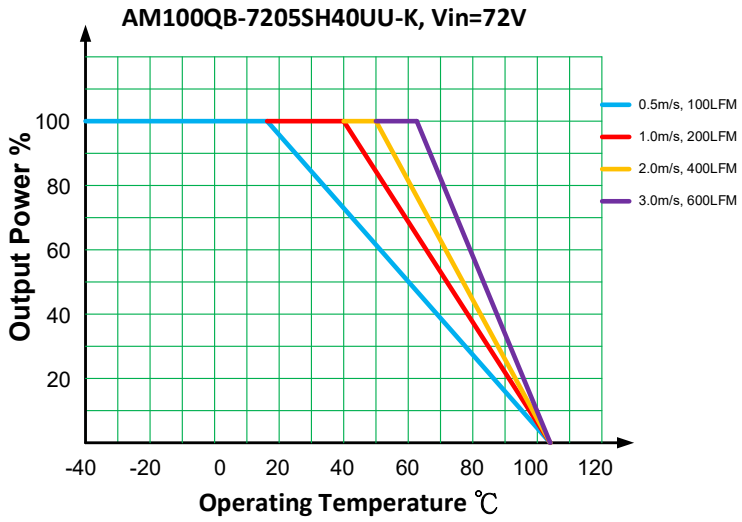
Environment Approval

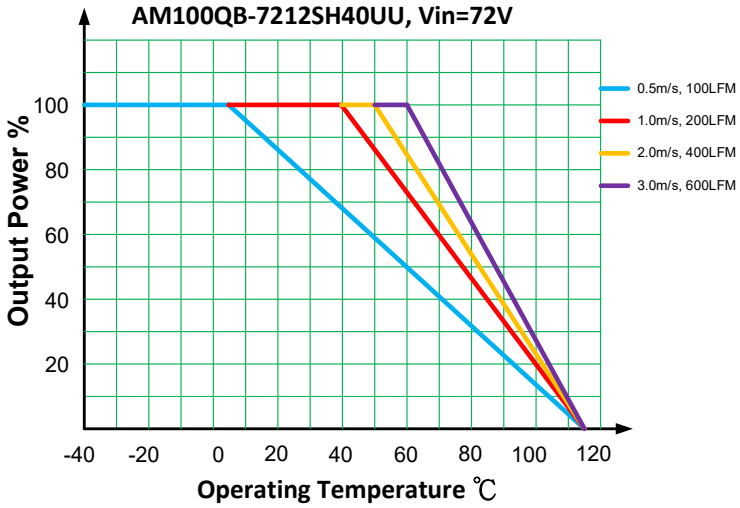
Parameters	Conditions
Cold	EN60068-2-1
Dry heat	EN60068-2-2
Damp heat	EN60068-2-30
Vibration	IEC/EN 61373 Category 1, class B

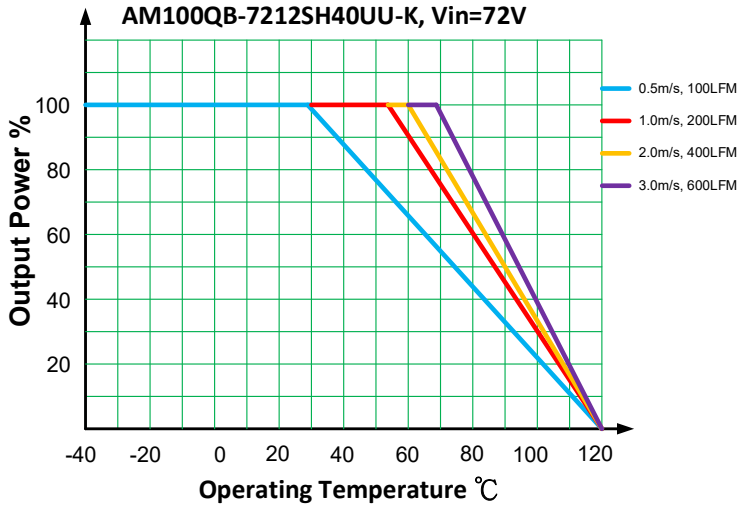
Safety Specifications		
Parameters		
Agency Approvals	UL 62368-1	
Standards	Designed to meet IEC/EN 62368-1 (Basic Insulation), EN50155, EN45545-2, EN50121-3-2	
	EMI - Conducted and radiated emission*	CISPR32/EN55032 Class B with the recommended EMC circuit
		EN50121-3-2 with the recommended EN50155 EMC circuit
		EN55016-2-1 with the recommended EN50155 EMC circuit
	Electrostatic Discharge Immunity	IEC/EN 61000-4-2, Contact ±6KV, Air ±8KV, Criteria A
		EN50121-3-2, Contact ±6KV, Air ±8KV, Criteria A
	RF, Electromagnetic Field Immunity	IEC/EN 61000-4-3, 20V/m, Criteria A
		EN50121-3-2, 20V/m, Criteria A
	Electrical Fast Transient/Burst Immunity	IEC/EN 61000-4-4, ±2KV, Criteria A with the recommended EMC circuit
		EN50121-3-2, ±2KV, Criteria A with the recommended EN50155 EMC circuit
	Surge Immunity	IEC/EN 61000-4-5, L-L ±2KV, Criteria A with the recommended EMC circuit
		EN50121-3-2, L-L ±1KV, Criteria A with the recommended EN50155 EMC circuit
	RF, Conducted Disturbance Immunity	IEC/EN 61000-4-6, 10Vr.m.s, Criteria A
		EN50121-3-2, 10Vr.m.s, Criteria A
*CISPR32/EN55032 radiated emission standard does not apply to models with -K heatsink option.		

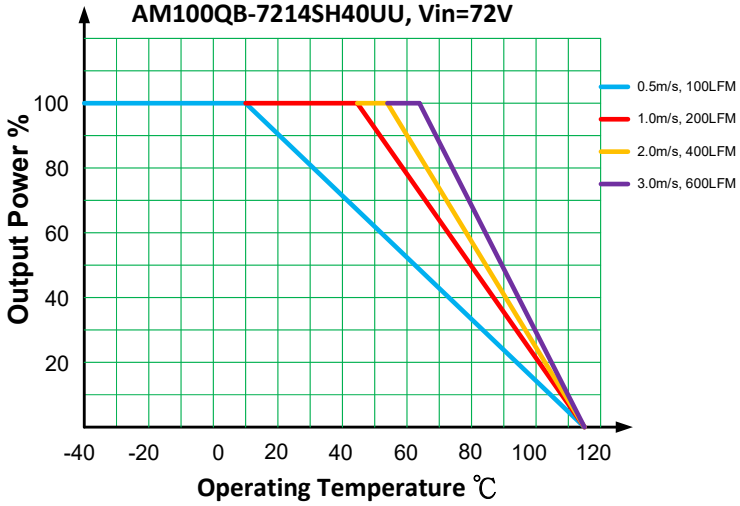
Derating

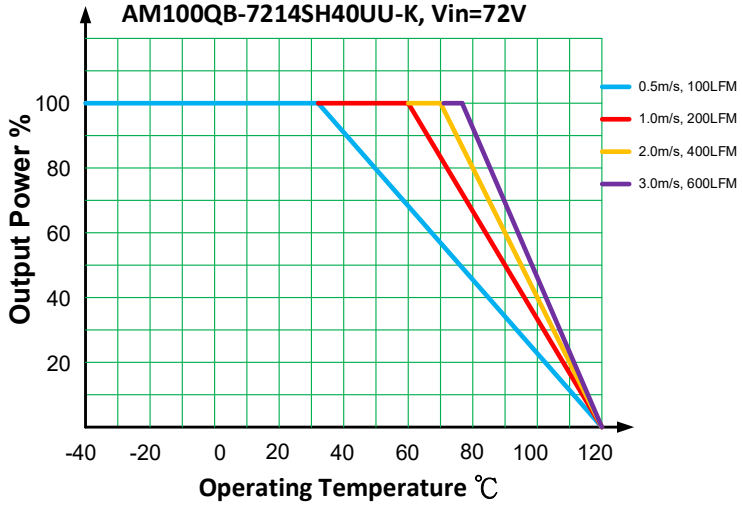


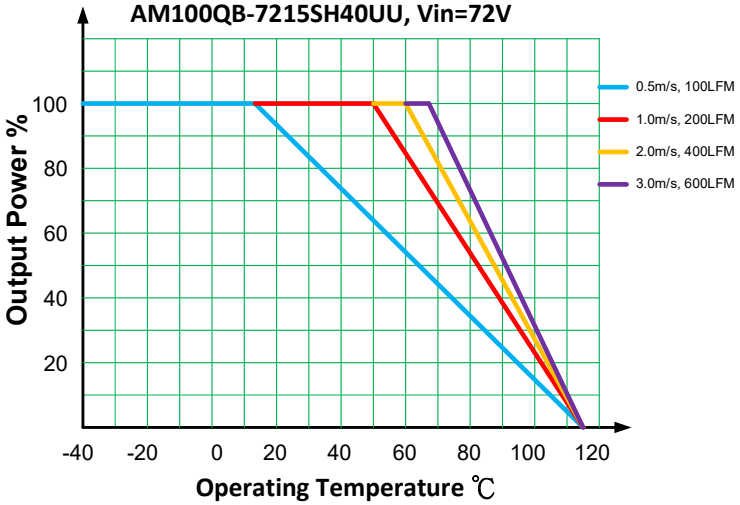


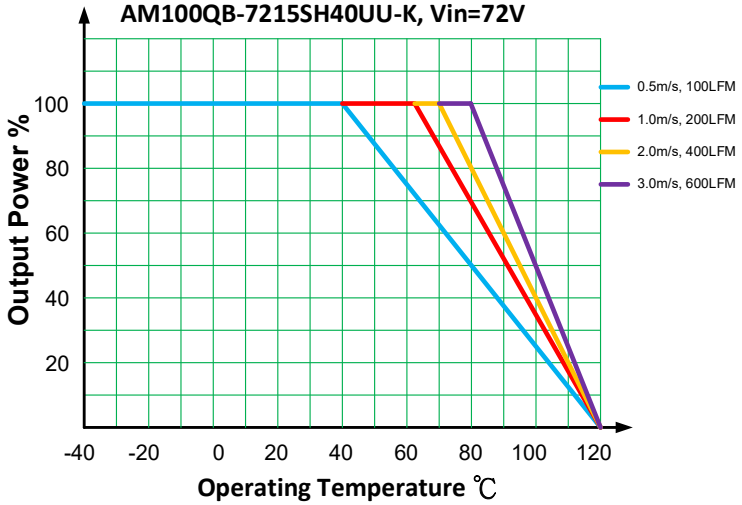

AM100QB-7212SH40UU, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM

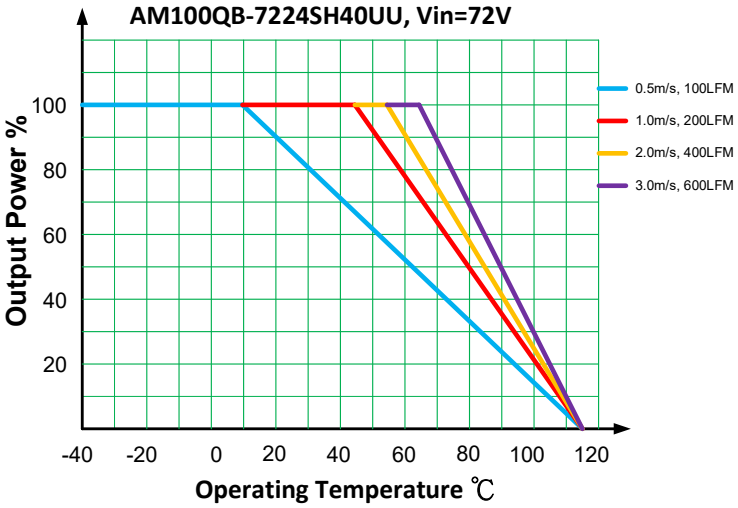

AM100QB-7212SH40UU-K, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM

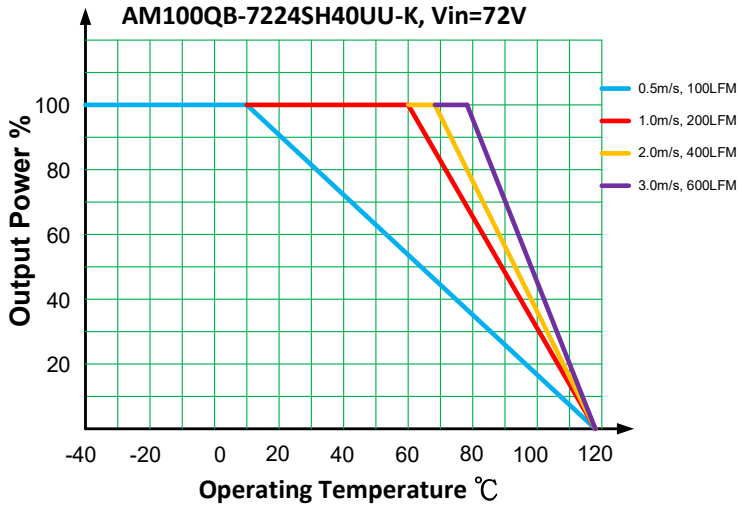

AM100QB-7214SH40UU, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM

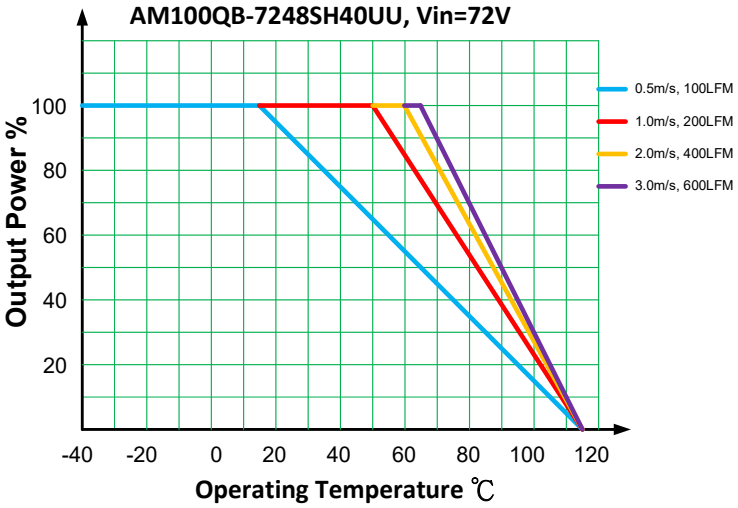

AM100QB-7214SH40UU-K, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM

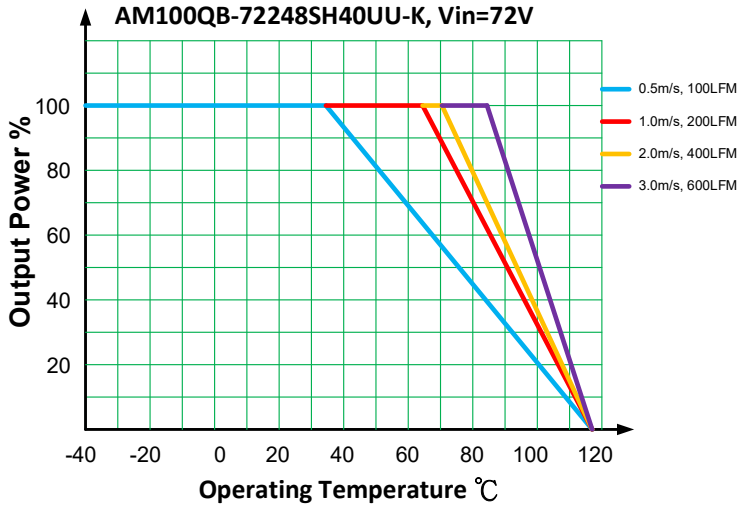

AM100QB-7215SH40UU, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM

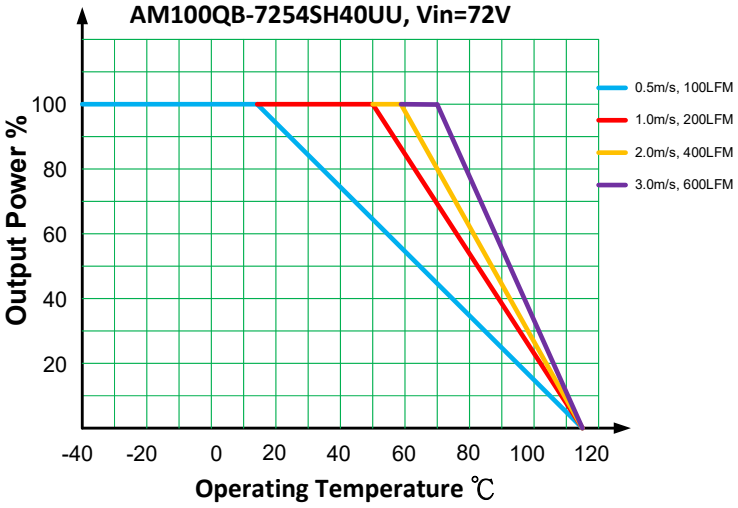

AM100QB-7215SH40UU-K, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM

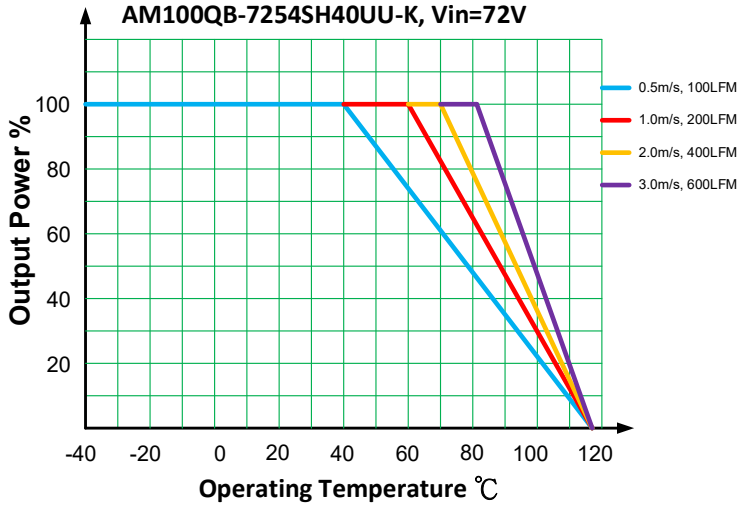

AM100QB-7224SH40UU, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM


AM100QB-7224SH40UU-K, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM

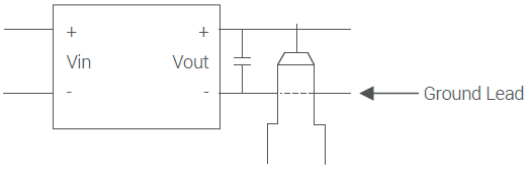

AM100QB-7248SH40UU, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM


AM100QB-72248SH40UU-K, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM


AM100QB-7254SH40UU, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM

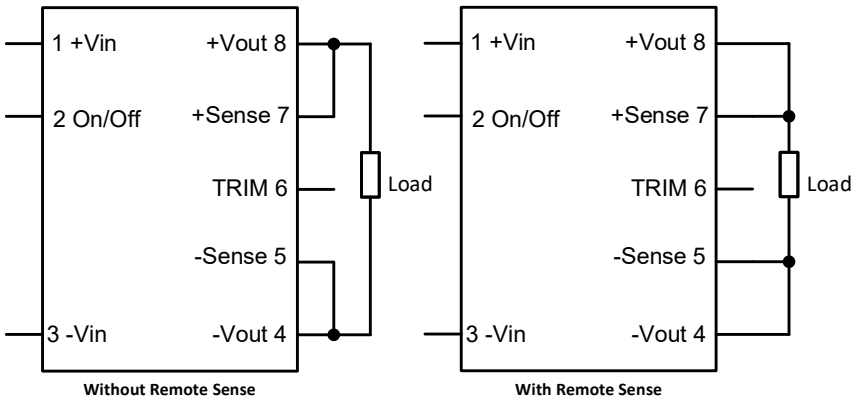

AM100QB-7254SH40UU-K, Vin=72V
Output Power %
100
80
60
40
20
-40
-20
0
20
40
60
80
100
120
Operating Temperature ℃
0.5m/s, 100LFM
1.0m/s, 200LFM
2.0m/s, 400LFM
3.0m/s, 600LFM

Ripple & Noise Circuit



5 Vout: 100% load, 20MHZ BW with a 47uF X7R MLCC and a 47uF/25V POS-CAP.
12 Vout: 100% load, 20MHZ BW with a 22uF X7R MLCC and a 47uF/25V POS-CAP.
13.8 Vout: 100% load, 20MHZ BW with a 22uF X7R MLCC and a 47uF/25V POS-CAP.
15 Vout: 100% load, 20MHZ BW with a 22uF X7R MLCC and a 47uF/25V POS-CAP.
24 Vout: 100% load, 20MHZ BW with a 22uF X7R MLCC and a 22uF/50V POS-CAP.
48 Vout: 100% load, 20MHZ BW with two 2.2uF X7R MLCCs.
54 Vout: 100% load, 20MHZ BW with two 2.2uF X7R MLCCs.

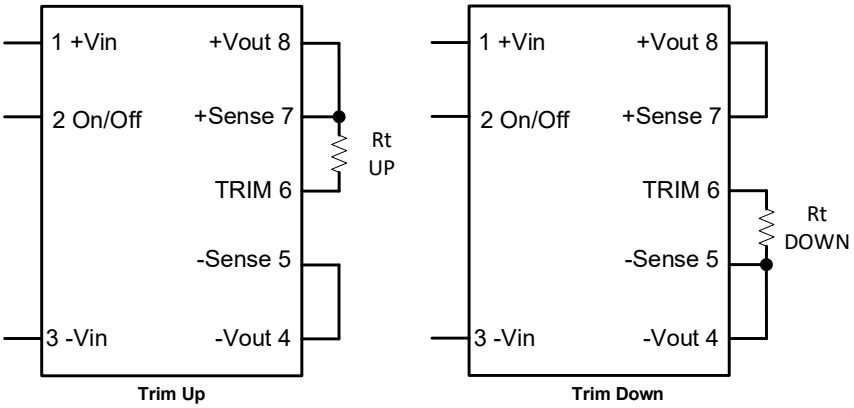
Remote Sense Application



Remote Sense

The products have remote sense that can be used to compensate for voltage drops between the output and the point of load. The sense traces should be located close to the PWB ground layer to reduce noise susceptibility. The remote sense circuitry will compensate for up to 10% voltage drop between output pins and the point of load. If the remote sense is not needed +Sense should be connected to +Out and -Sense should be connected to -Out.

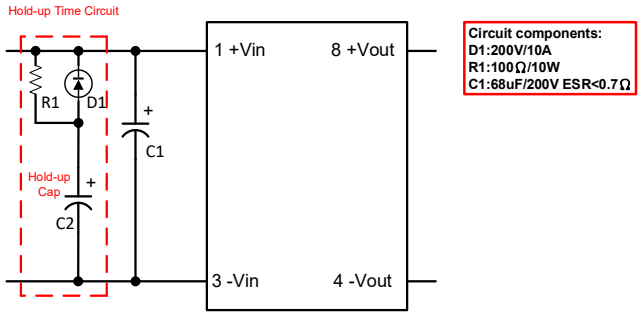
Trim



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)	289.025	129.385	76.172	49.565	33.601	22.958	15.356	9.655	5.221	1.673
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)	282.250	129.125	78.083	52.563	37.250	27.042	19.750	14.281	10.028	6.625
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)	834.129	377.879	225.796	149.754	104.129	73.712	51.986	35.692	23.018	12.879

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)	662.600	300.300	179.533	119.150	82.920	58.767	41.514	28.575	18.511	10.460
Vout=	**13.8**									
Trim down %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Vout (VDC)	13.662	13.524	13.386	13.248	13.11	12.972	12.834	12.696	12.558	12.42
Rt down (KΩ)	748.881	338.131	201.214	132.756	91.681	64.298	44.738	30.069	18.659	9.531
Trim up %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Vout (VDC)	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.2
Rt up (KΩ)	784.3	364.15	224.1	154.075	112.06	84.05	64.043	49.038	37.367	28.03
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)	870.620	391.930	232.367	152.585	104.716	72.803	50.009	32.913	19.616	8.978
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)	850.600	391.300	238.200	161.650	115.720	85.100	63.229	46.825	34.067	23.860
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)	1569.511	708.846	421.958	278.514	192.447	135.069	94.085	63.347	39.440	20.314
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)	1340.610	610.305	366.870	245.153	172.122	123.435	88.659	62.576	42.290	26.061
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)	3142.388	1419.353	845.008	557.836	385.532	270.663	188.614	127.077	79.215	40.925
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)	2682.140	1221.070	734.047	490.535	344.428	247.023	177.449	125.268	84.682	52.214
Vout=	**54**									
Trim down %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Vout (VDC)	53.460	52.920	52.380	51.840	51.30	50.760	50.220	49.680	49.140	48.600
Rt down (KΩ)	3709.209	1683.009	1007.609	669.909	467.289	332.209	235.7232857	163.359	107.0756667	62.049
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)	2996.7	1363.35	818.9	546.675	383.34	274.45	196.6714286	138.3375	92.96666667	56.67

Hold up Time Circuit



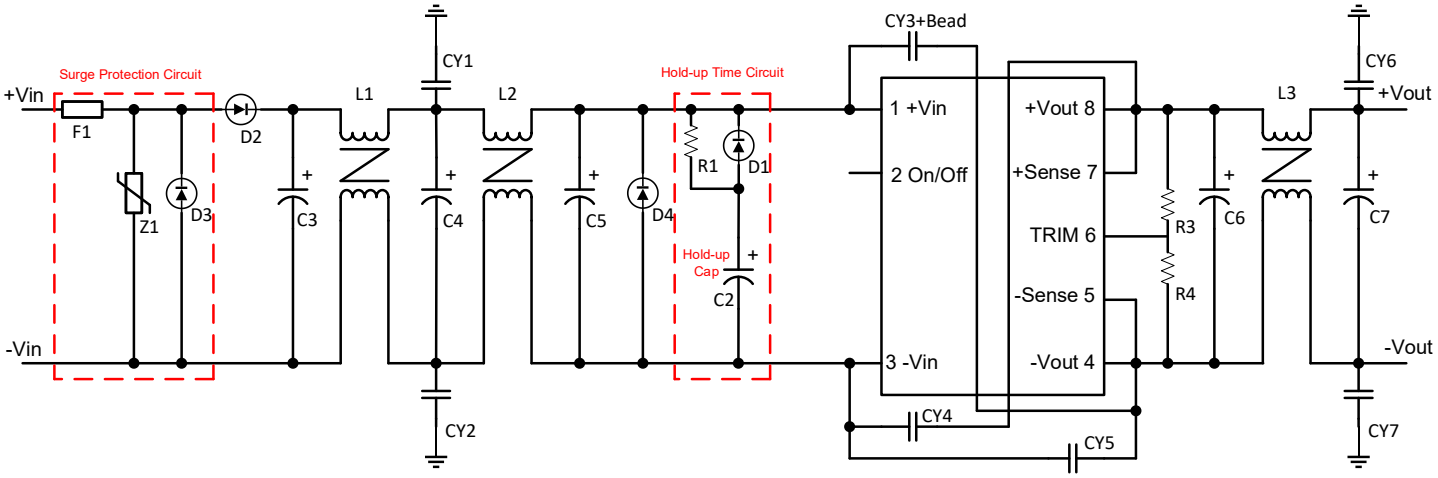
1. The resistor (R1) is used to limit in-rush current during hold-up capacitor charging.
2. The diode (D1) in parallel with the resistor permits the power module to draw whatever energy they need from C2 without being hindered by the resistor (R1).
3. The capacity of C2 decides the hold-up time during interruption of input power. When choosing a hold-up time capacitor (C2), it is recommended to use capacitors with low Equivalent Series Resistance (ESR) as well as high rated for high ripple current.
(When higher voltage is involved, it will be likely necessary to use two or more capacitors in series and/or series parallel configurations to achieve the required total capacitance)
4. The relationship is showed in below table.

$$C_2 = \frac{200 \cdot P_{out} \cdot t_{hold-up}}{1000 \cdot E_{ff} \cdot (Vin_N^2 - Vin_m^2)}$$

- C_2: total hold-up capacitance (F)
- P_{out}: Output power (W)
- $t_{hold-up}$: requied hold-up time (ms)
- E_{ff}: efficiency of module(from datasheet) (%)
- Vin_N:nom. input voltage (V)
- Vin_m: min. operating input voltage of module (V)
  (from datasheet)

Model	Vin / Hold-up Time	24V	36V	48V	72V	96V	110V
AM100QB-7205SH40UU	10ms	6000 uF	2200 uF	1200 uF	560 uF	280 uF	220 uF
	30ms	18000 uF	6600 uF	3600 uF	1680 uF	840 uF	660 uF
AM100QB-7212SH40UU AM100QB-7214SH40UU AM100QB-7215SH40UU	10ms	5800 uF	2100 uF	1100 uF	500 uF	260 uF	200 uF
AM100QB-7224SH40UU AM100QB-7248SH40UU AM100QB-7254SH40UU	30ms	17400 uF	6300 uF	3300 uF	1500 uF	780 uF	600 uF

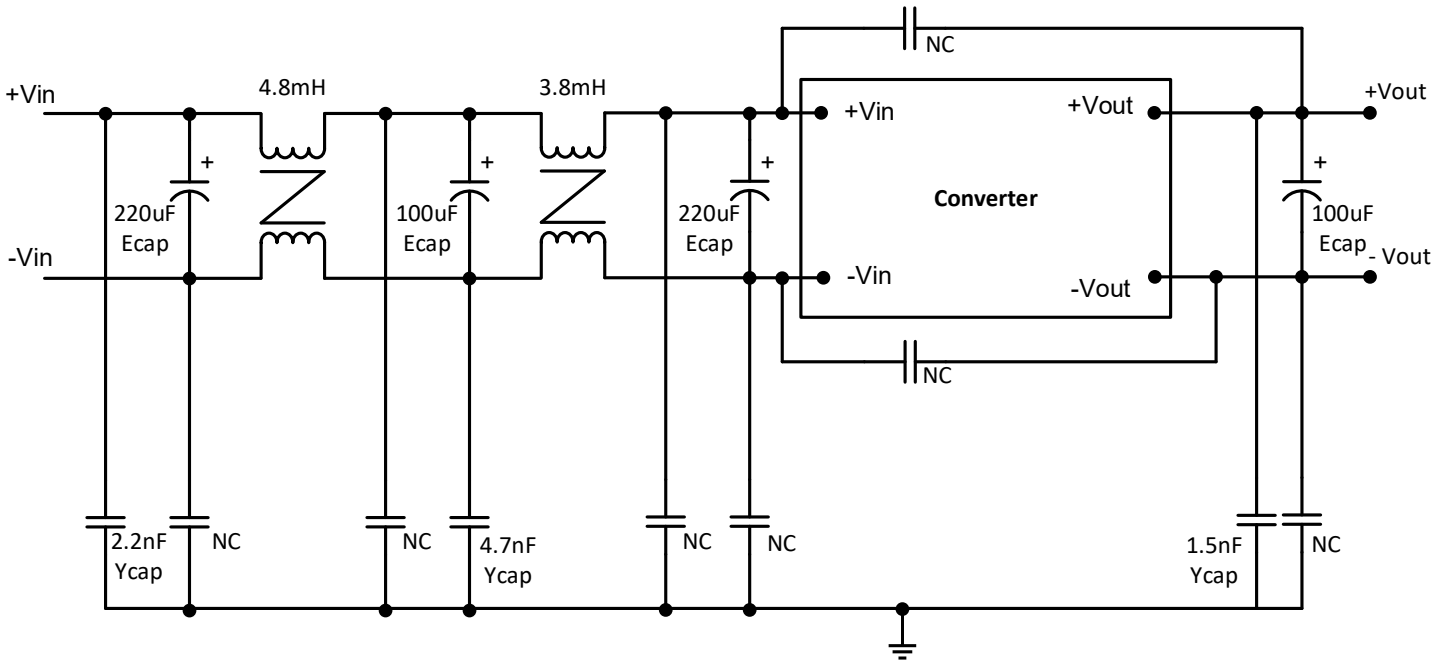
Recommended EN50155 EMC circuit



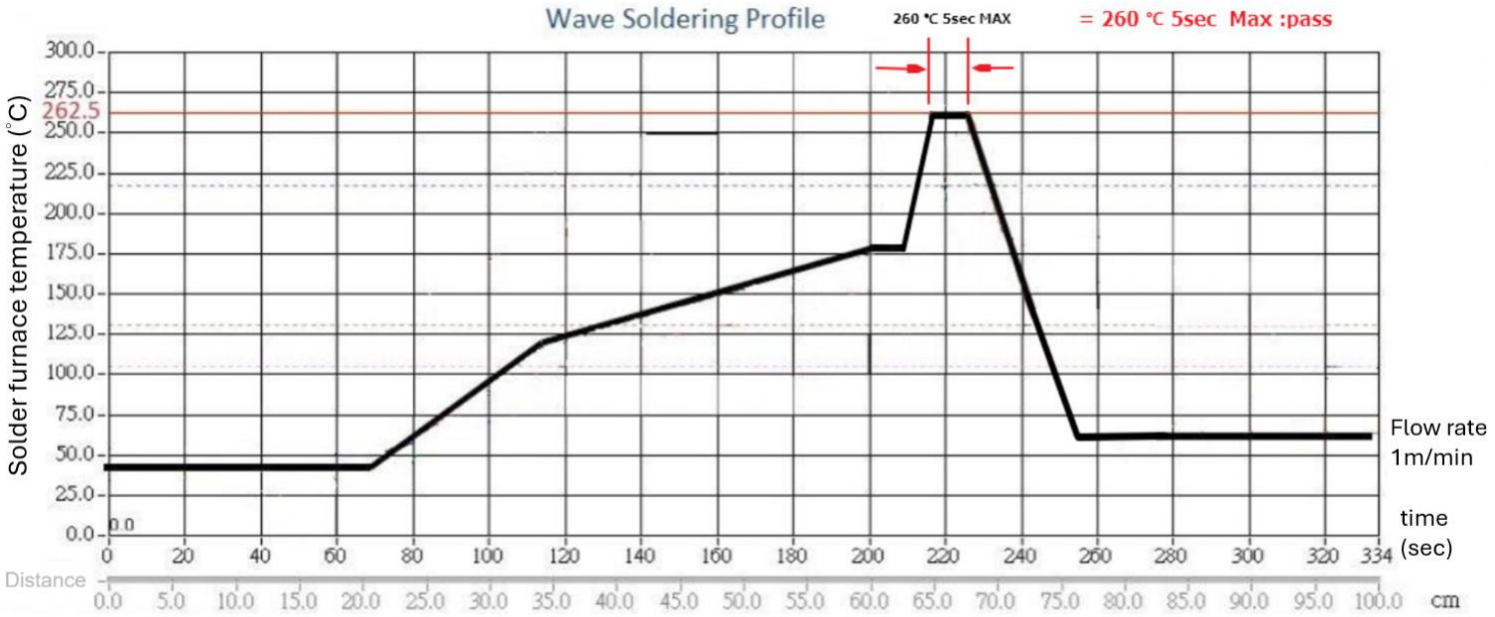
Part No	F1 Fuse	D2 Schottky Diode	D3, D4 TVS	L1 Common mode choke	L2 Common mode choke	L3 Common mode choke	C3 Ecap	C4 Ecap
Value	12.5A slow	200V/30A	SMDJ180CAY	4.8mH	3.8mH	0.6mH	220uF/200V +1uF/250V SMD	100uF/200V +1uF/250V SMD
Part No	**C5 Ecap**	**C6 Ecap**	**C7 Ecap**	**CY1, CY2 Ycap**	**CY6, CY7 Ycap**	**CY3 Ycap+Bead Core**	**CY4 Ycap**	**CY5 Ycap**
Value	220uF/200V +1uF/250V SMD	100uF/100V	100uF/100V	2.2nF/250VAC	3.3nF/250VAC	2.2nF/250VAC +1pcs Bead core	4.7nF/250VAC	1nF/250VAC

EN 50155		
Phenomenon	**EN50155 Reference Clause(s)**	**Reference Standard**
Characteristic Test	12.2.1, 12.2.2, 5.1.1.1, 5.1.3, 12.2.9, 12.2.6	-
EMC	12.2.7, 12.2.8	EN 50121-3-2 EN 61000-4 EN 55011
Environmental Tests	12.2.3, 12.2.4, 12.2.5, 12.2.11	EN 60068-2 EN 61373

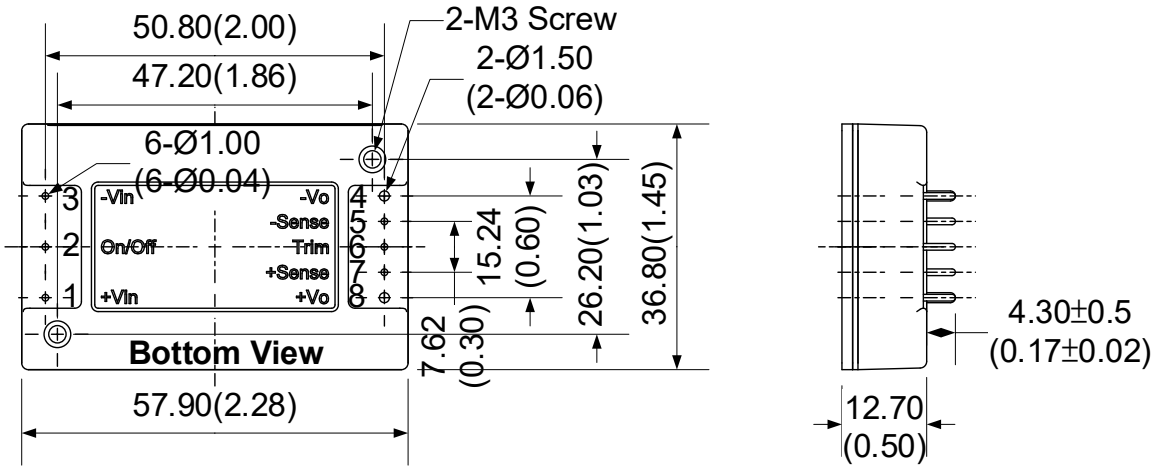
Recommended EMC circuit



Soldering Information (Wave Soldering Profile)



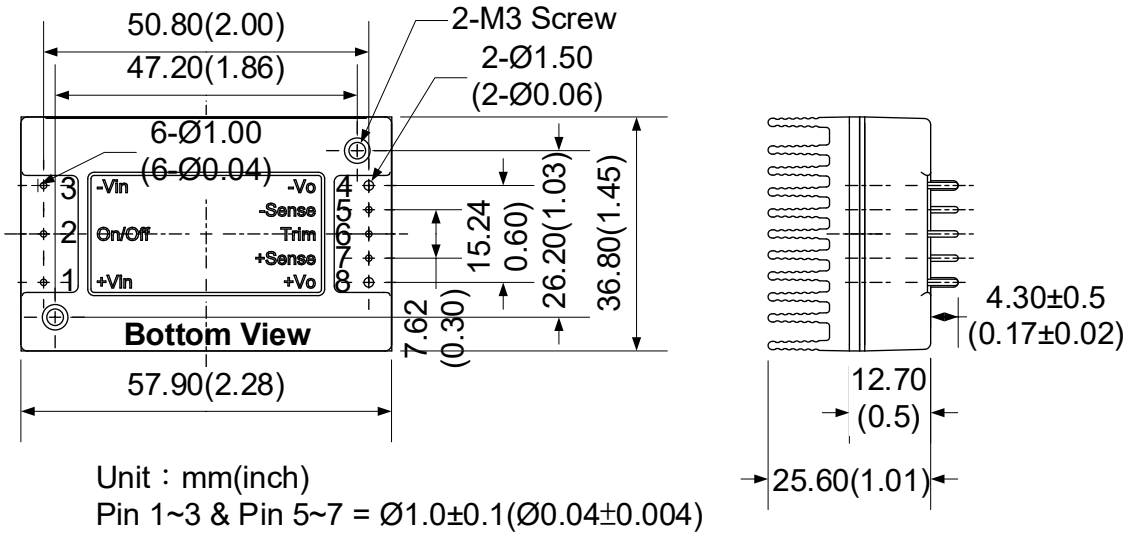
Dimension



Unit：mm(inch)
Pin 1~3 & Pin 5~7 = Ø1.0±0.1(Ø0.04±0.004)
Pin 4 & Pin 8 = Ø1.5±0.1(Ø0.06±0.004)
Tolerance：±0.25(±0.01)

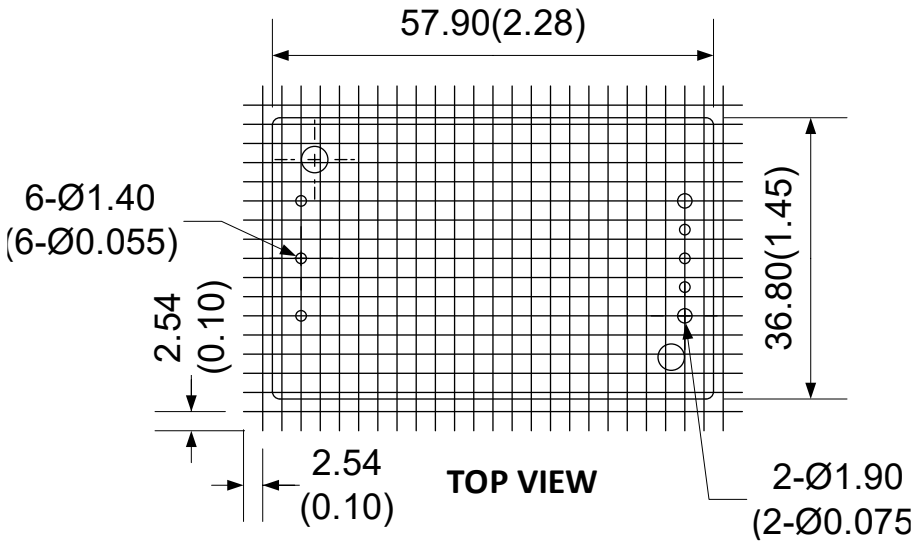
Pin Out Specifications	
Pin	Single
1	+Vin
2	On/Off Control
3	-Vin
4	-Vout
5	-Sense
6	Trim
7	+Sense
8	+Vout

Dimension for models with -K option



Unit：mm(inch)
Pin 1~3 & Pin 5~7 = Ø1.0±0.1(Ø0.04±0.004)
Pin 4 & Pin 8 = Ø1.5±0.1(Ø0.06±0.004)
Tolerance：±0.25(±0.01)

Recommended Footprint



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 than the ones listed in this datasheet. **7.** Warranty is in accordance with Aimtec's standard Terms of Sale available at www.aimtec.com.