

Features

- Non-isolated DC-DC converter
- 3-14.4Vdc input voltage range
- Programmable output voltage from 0.6-5.5Vdc
- Power conversion efficiency up to 91%
- Short Circuit protection and remote ON/OFF function
- Operating temperature from -40°C to 90°C
- EN62368 safety approval

Application

- Distributed power architectures
- Intermediate bus voltage applications
- Telecommunications equipment
- Servers and storage applications
- Networking equipment
- Industrial equipment

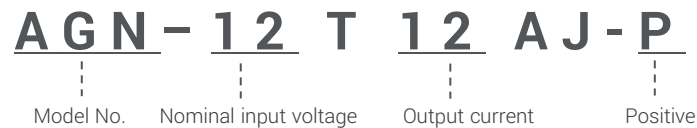


Selection Guide

Part number	Input voltage	Output voltage	Output current @full load	Input current ⁽¹⁾ @no load	Efficiency ⁽²⁾ (typ.)	Capacitive load ⁽³⁾ (max)	ON/OFF Logic
AGN-12T12AJ-P	3 - 14.4 VDC	0.6 - 5.5 VDC	12 A	30mA	91%	200µF	Positive
AGN-12T12AJ-N	3 - 14.4 VDC	0.6 - 5.5 VDC	12 A	30mA	91%	200µF	Negative

1. The no load input current is test by 0.6V output.
2. The efficiency is test by nominal input, 5Vout and full load @25°C.
3. The capacitive load is test by minimum input and constant resistive load.
4. All specifications valid at 12V input, full load and 25°C after warm-up time unless otherwise stated.

Part Number



Specifications

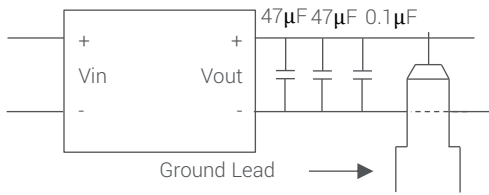
	Parameter	Conditions	Min.	Typ.	Max.	Unit	
Input	Input voltage range		3	12	14.4	VDC	
	Start-up voltage	0%~100% load			3	VDC	
	Remote ON/OFF	Positive DC-DC ON DC-DC OFF Negative DC-DC ON DC-DC OFF		Open or $1.6V \leq V_{on/off} \leq 5.5V$ Short to Gnd or $0V \leq V_{on/off} \leq 0.6V$ Short to Gnd or $0V \leq V_{on/off} \leq 0.6V$ $1V \leq V_{on/off} \leq 5.5V$			
Output	Efficiency	Vo = 5Vdc	89	91	93	%	
		Vo = 3.3Vdc	86	88	90	%	
		Vo = 2.5Vdc	84	86	88	%	
		Vo = 1.8Vdc	80.5	82.5	84.5	%	
		Vo = 1.2Vdc	75	77	79	%	
		Vo = 0.6Vdc	63	65	67	%	
	Output voltage trim ⁽¹⁾		0.6		5.5	VDC	
	Minimum load		0			%	
	Line regulation	LL-HL			±0.4	%	
	Load regulation	10-100% Load			±0.2	%	
	Voltage accuracy		-3		+3	%	
	Operating frequency	100% Load at Nominal Vin			800		KHz
		Ripple & Noise ⁽²⁾	Vo < 1.2Vdc Vo ≥ 1.2Vdc		30 3%Vo	50	mVp-p mVp-p
	Power good	Overvoltage threshold for PGOOD ON			116.5		%Vo
		Overvoltage threshold for PGOOD OFF			120		%Vo
		Undervoltage threshold for PGOOD ON			91		%Vo
Undervoltage threshold for PGOOD OFF				87		%Vo	
PGOOD low sink current @VPGOOD = 0.2 V				100		uA	
Environment	Operating temperature	With derating	-40		+90	°C	
	Storage temperature		-55		+125	°C	
	Relative Humidity				95	%RH	
Function	Vibration			MIL-STD-202G			
	Short circuit protection			Continuous, Automatic recovery			
	Safety			EN 62368-1			
Frequency	MTBF	MIL-HDBK217F	1132			kHrs	
	Synchronization frequency range ⁽³⁾			800	840	kHz	
Synchronization	High-Level Input Voltage		2			V	
	Low-Level Input Voltage				0.8	V	
Physical	Input Current, SYNC			1		uA	
	Dimension		12.19(L) x 12.19(W) x 3.10(H) mm				
	Weight		0.8g				
	Cooling method		Free air convection				

- ⁽¹⁾ The output voltage range is limited by Vin. ($V_{out} \leq V_{in} - 2V_{dc}$)
- ⁽²⁾ The ripple & noise are measured with 47μF+47μF+0.1μF capacitor at 20MHz BW.
- ⁽³⁾ SYNC frequency must be greater than operating frequency, externally tie SYNC to GND if synchronization functionality is not required.
- All specifications valid at nominal input voltage, full load and 25°C after warm-up time unless otherwise stated.
- The product information and specifications are subject to change without prior notice.

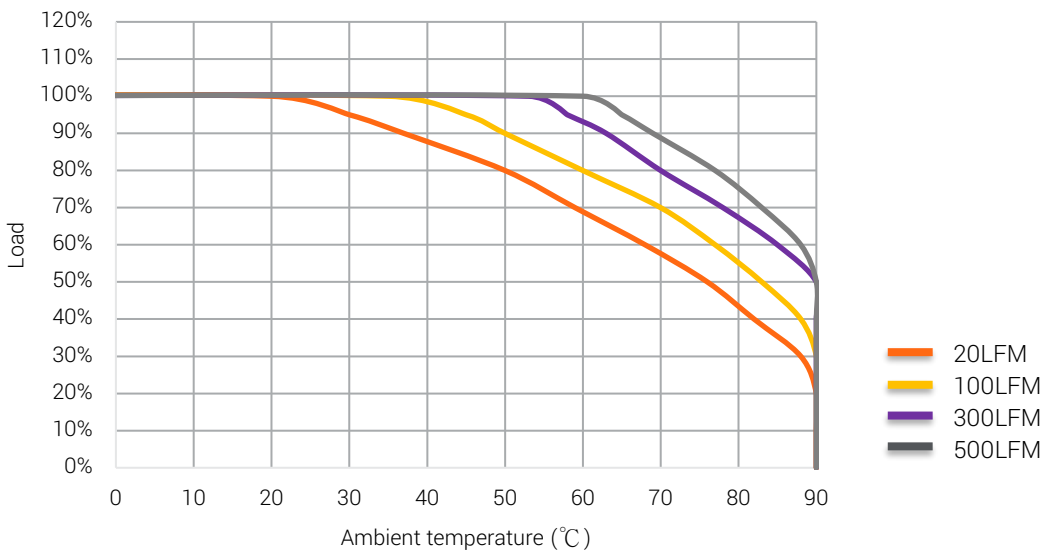
CTC is the professional and one among world's leading manufacturers of DC-DC/ AC-DC converters.

The products were used in Computers, Industrial controls, Medical equipment, Transportation, EV, ECO-power, Aero-space application and communication.

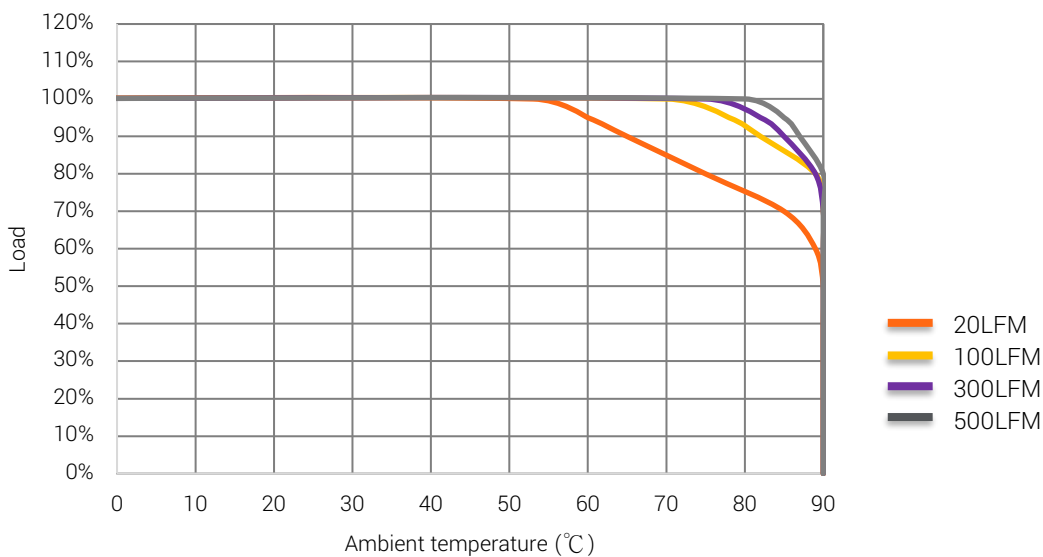
Ripple & Noise Measure Method



Derating Curve



The derating curve was measured at 12V input and 5V output, all of the element can't be higher than 125°C.

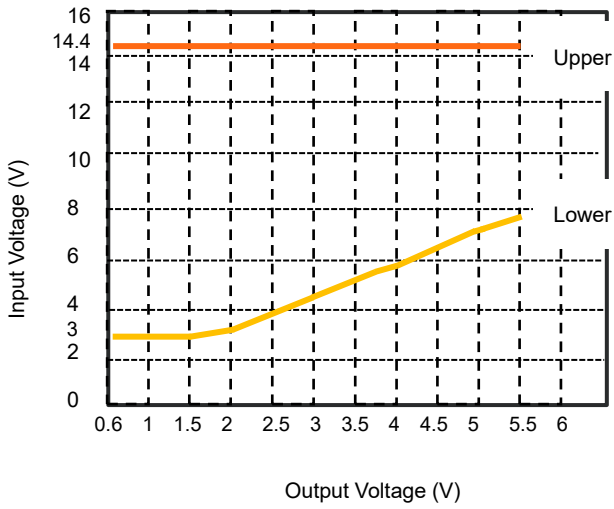


The derating curve was measured at 7V input and 5V output, all of the element can't be higher than 125°C.

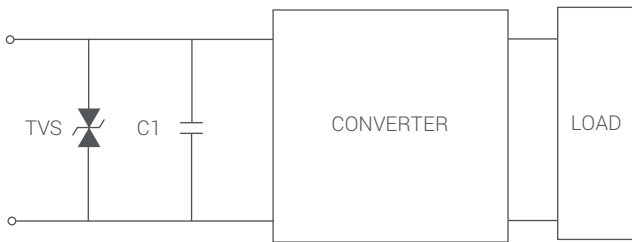
CTC is the professional and one among world's leading manufacturers of DC-DC/ AC-DC converters.

The products were used in Computers, Industrial controls, Medical equipment, Transportation, EV, ECO-power, Aero-space application and communication.

Output Voltage vs. Input Voltage Set Point Area Plot



EFT and surge external input capacitor required



TVS	C1
P4SMAJ13CA	10000 μ F/ 25V

CTC is the professional and one among world's leading manufacturers of DC-DC/ AC-DC converters.

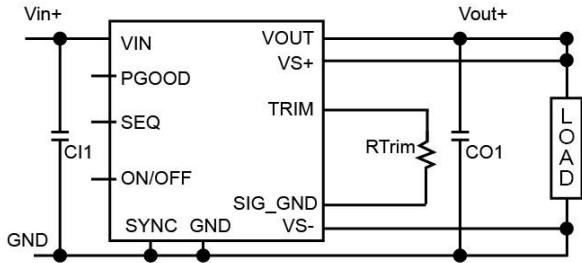
The products were used in Computers, Industrial controls, Medical equipment, Transportation, EV, ECO-power, Aero-space application and communication.

Example Application Circuit

Output Voltage Trim

The Formula for Output Voltage Trim

$$R_{trim} (k\Omega) = \frac{12K}{V_o - 0.6}$$



Output voltage	Calculated Rtrim (kΩ)
5V	2.727
3.3V	4.444
2.5V	6.316
1.8V	10
1.5V	13.33
1.2V	20
0.6V	∞(Open)

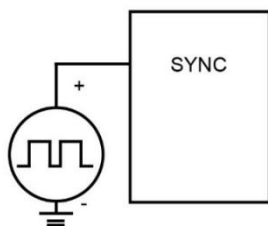
Power Good

Power Good monitor output. This open-drain output goes low during overcurrent, short-circuit, UVLO, overvoltage and undervoltage, overtemperature, or when the output is not regulated (such as an prebias output). An external pullup resistor to VDD or to an external rail is required. Included is a 20-μs deglitch filter. PGOOD pin can be connected through a pullup resistor suggested value 100kΩ) to a source of 5VDC or lower.

Synchronization

The module switching frequency can be synchronized to a signal with an external frequency within a specified range.

Synchronization can be done by using the external signal applied to the SYNC pin of the module, with the converter being synchronized by the rising edge of the external signal. The Electrical Specifications table specifies the requirements of the external SYNC signal. If the SYNC pin is not used, the module should free run at the default switching frequency. If synchronization is not being used, connect the SYNC pin to GND.



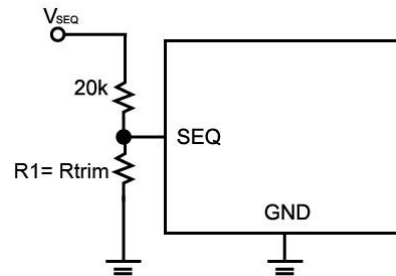
Output Voltage Sequencing

The SEQ pin can be used when master-slave power-supply tracking is required.

The voltage applied to the SEQ pin should be scaled down by the same ratio as used to scale the output voltage down to the reference voltage of the module. This is accomplished by an external resistive divider connected across the sequencing voltage before it is fed to the SEQ pin. The minimum recommended delay between the ON/OFF signal and the sequencing signal is 10ms to ensure that the module output is ramped up according to the sequencing signal. This ensures that the module soft-start routine is completed before the sequencing signal is allowed to ramp up.

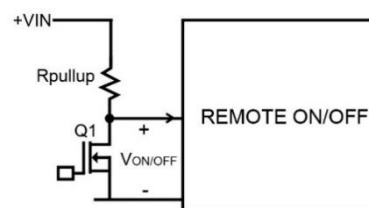
When an analog voltage is applied to the SEQ pin, the output voltage tracks this voltage until the output reaches the set-point voltage. The final value of the SEQ voltage must be set higher than the set-point voltage of the module. The output voltage follows the voltage on the SEQ pin on a one-to-one basis. By connecting multiple modules together, multiple modules can track their output voltages to the voltage applied on the SEQ pin.

To initiate simultaneous shutdown of the modules, the SEQ pin voltage is lowered in a controlled manner. The output voltage of the modules tracks the voltages below their setpoint voltages on a one-to-one basis. A valid input voltage must be maintained until the tracking and output voltages reach ground potential.



The SEQ pin can be used when master-slave power-supply tracking is required.

Remote ON/OFF



The circuit configuration for using the Remote On/Off pin is shown in figure.

And the logic type active mode as the description below.

- Positive Logic
 - DC/DC ON : Q1 OFF
 - DC/DC OFF : Q1 ON
- Negative Logic
 - DC/DC ON : Q1 ON
 - DC/DC OFF : Q1 OFF

Surface Mount Information

Pick and Place

The 12A Open Frame modules use an open frame construction and are designed for a fully automated assembly process. We suggest the pick and place operations is inductor.

MSL Rating

The 12A Open Frame modules have a MSL rating of 3.

Storage and Handling

The recommended storage environment and handling procedures for moisture-sensitive surface mount packages is detailed in J-STD-033 (Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices).

Moisture barrier bags (MBB) with desiccant are required for MSL ratings of 3 or greater. These sealed packages should not be broken until time of use. Once the original package is broken, the floor life of the product at conditions of $\leq 30^{\circ}\text{C}$ and 60% relative humidity 168 hours varies according to the MSL rating (see J-STD-033). The shelf life for dry packed SMT packages will be a maximum of 12 months from the bag seal date, when stored at the following conditions: $< 40^{\circ}\text{C}$, $< 90\%$ relative humidity.

Post Solder Cleaning and Drying Considerations

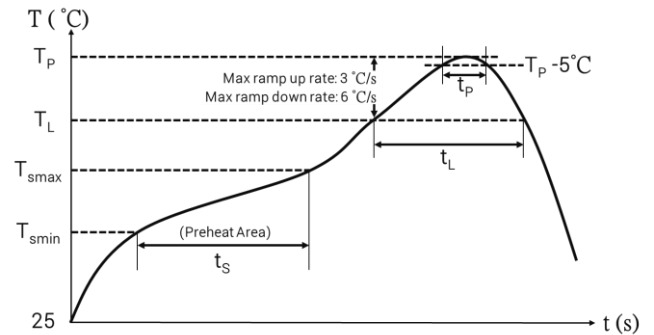
To avoid contamination on the soldering pads extra care has to be taken when handling the boards. Clean soldering surfaces don not generate as much gases when the flux reduce the metal oxides or react with contaminants during the soldering process.

Nozzle

The module weight has been kept to a minimum by using open frame construction. Variables such as nozzle size, tip style, vacuum pressure and placement speed should be considered to optimize this process.

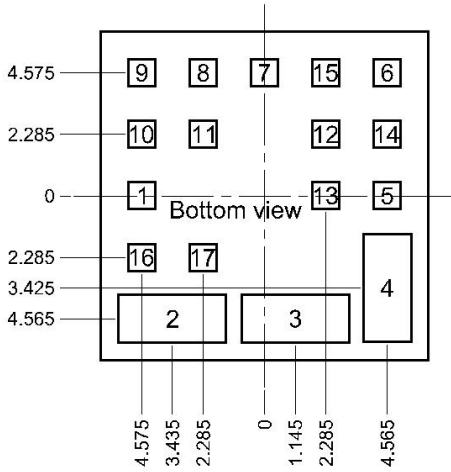
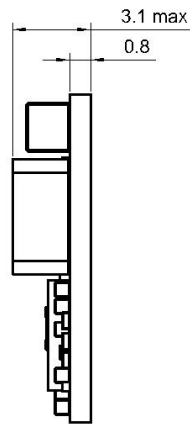
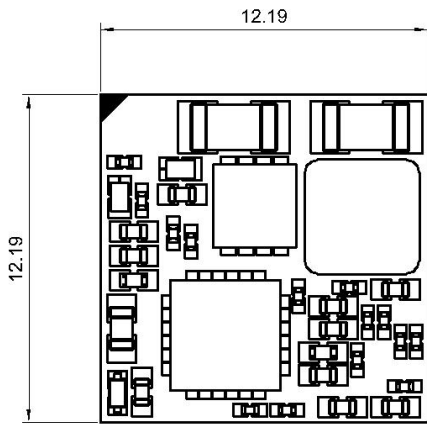
Lead-free Reflow Profile

Power Systems will comply with J-STD-020 (Moisture/Reflow Sensitivity Classification for non-hermetic Solid State Surface Mount Devices) for both Pb-free solder profiles and MSL classification procedures. This standard provides a recommended forced-air-convection reflow profile based on the volume and thickness of the package. The suggested Pb-free solder paste is Sn/Ag/Cu (SAC). The recommended linear reflow profile using Sn/Ag/Cu solder is shown. Soldering outside of the recommended profile requires testing to verify results and performance.



Profile	Pb-Free Assembly
Average ramp-up rate (Tsmax to TP)	3°C/s max.
Preheat	
Temperature Min. (Tsmmin)	150°C
Temperature Max. (Tsmmax)	200°C
Ts (Tsmmin to Tsmmax)	60-120s
Temperature (TP)	245°C
Time maintained above Temperature (TL)	217°C
Time (tl)	60-150s
Time within 5°C of the specified Peak temperature (TP)	20-40s
Ramp down rate (TP to TL)	6°C/s max
Time 25°C to peak temperature	8 minutes max.

Mechanical Dimension & Pinning



Pad2~4 Dimension = 4x1.78
 Pad1 & Pad5~17 Dimension = 1x1

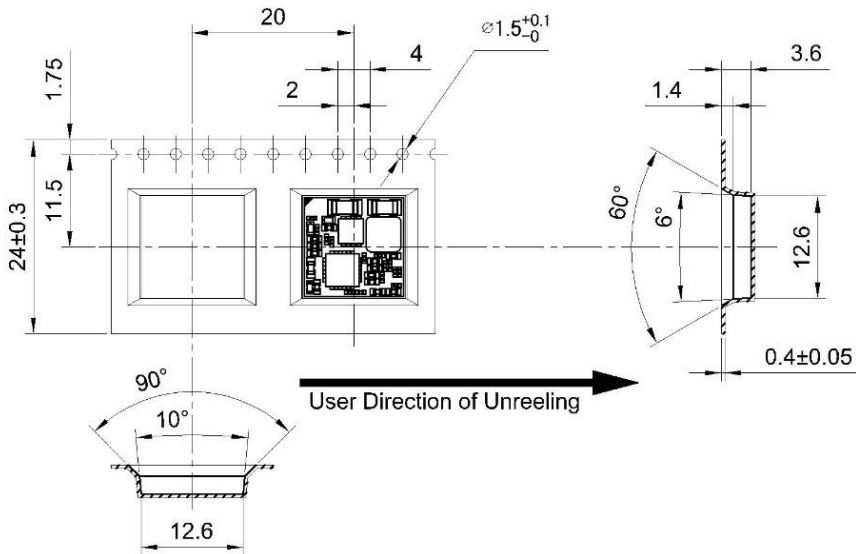
Projection : Third angle projection
 Unit : mm
 Tolerance : ±0.25mm

Pin	Single
1	ON/OFF
2	VIN
3	GND
4	VOUT
5	VS+ (SENSE)
6	TRIM
7	GND
8	NC
9	SEQ
10	PGOOD
11	SYNC
12	VS-
13	SIG_GND
14	NC
15	NC
16	NC
17	NC

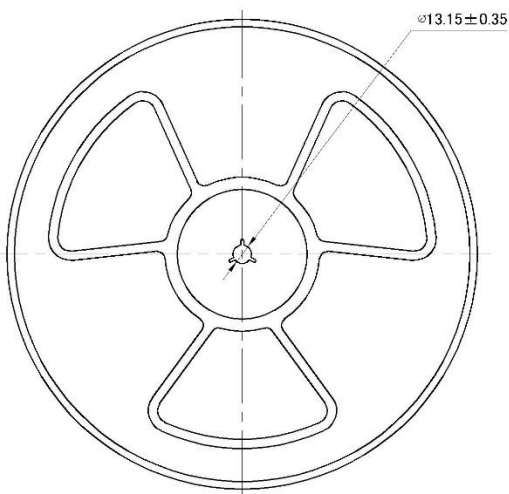
If Pin11 is not being used,
 connect the SYNC pin to GND.

NC= No Connection

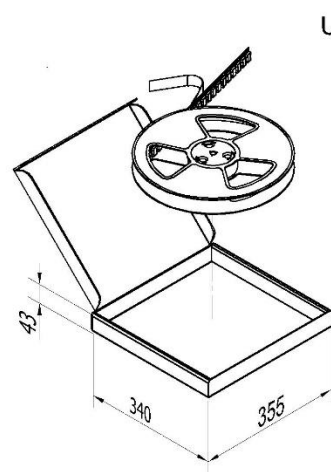
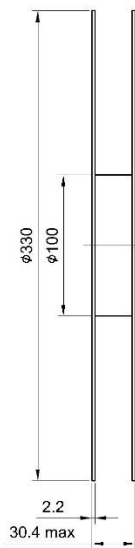
Package



- 1). 10 sprocket hole pitch cumulative tolerance ± 0.2 mm.
- 2). All dimensions meet EIA-481-2A requirements.
- 3). Component loader per 13" reel : 850 pcs.
- 4). All dimensions = ± 0.1 mm.

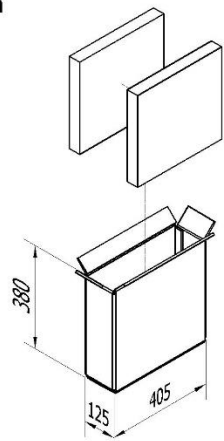


Unit : mm
Package : 1 Tape Reel = 850 pcs



1 Tape Reel = 850 converters

Unit:mm

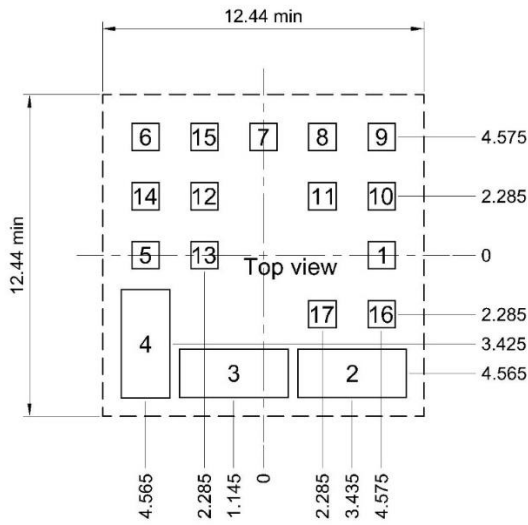


Carton accommodates
2 boxes 1700 converters per carton

CTC is the professional and one among world's leading manufacturers of DC-DC/ AC-DC converters.

The products were used in Computers, Industrial controls, Medical equipment, Transportation, EV, ECO-power, Aero-space application and communication.

Footprint



PIN2~PIN4 Dimension = 4.2x1.87 mm
 PIN1 & PIN5~PIN17 Dimension = 1.05x1.05 mm