THB 6 Series

5-6W, Wide Input Range DIP, Single & Dual Output DC/DC Converters

Features

- Efficiency up to 80%
- 3000VAC Isolation
- MTBF > 700,000 Hours
- 2:1 Wide Input Range
- Complies With EN55022 Class A
- Temperature Performance -40℃ to +55℃
- Low Leakage Current
- Low Isolation Capacitance
- UL/CSA 60950-1,UL60601-1Safety Approval
- Industry Standard Pinout
- Short Circuit Protection

Applications

- Distributed power architectures
- Workstations
- Computer equipment
- Communications equipment

General Description

TRACO's THB 6-Series power modules are specially designed to provide ultra-high levels of isolation 3000VAC in a 24-pin DIP package. Operating input voltage ranges of 9-18VDC, 18-36VDC and 36-75VDC which provide precisely regulated output voltages of 5V, 12V, ±12V and ±15VDC.

The -40℃ to +55℃ operating temperature range makes it ideal for data communication equipments, mobile battery driven equipments, distributed power systems, telecommunication equipments, mixed analog/digital subsystems, process/machine control equipments, computer peripheral systems and industrial robot systems.

The modules have a maximum power rating of 6W and a typical full-load efficiency of 80%, continuous short circuit, EN55022 Class A conducted noise compliance minimize design-in time, cost and eliminate the need for external filtering. Conducted and radiated emissions < A with external coupling capacitor Cio=1 nF < B.

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Absolute Maximum Rating				
	Model	**Min**	**Max**	**Unit**
Input Surge Voltage (1 sec.)	12VDC Input Models 24VDC Input Models 48VDC Input Models	-0.7 -0.7 -0.7	25 50 100	VDC
Operating Ambient Temperature Without Derating With Derating	All	 -40 -40	 +60 +85	℃
Operating Case Temperature	All	-40	+95	℃
Storage Temperature	All	-40	+125	℃

Output Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Output Voltage (V_{in}= $V_{in\ nom}$; Full Load; T_A= 25℃)	THB 6-xx11 THB 6-xx12 THB 6-xx22 THB 6-xx23	4.95 11.88 ±11.88 ±14.85	5 12 ±12 ±15	5.05 12.12 ±12.12 ±15.15	VDC
Output Regulation Line ($V_{in\ min}$ to $V_{in\ max}$ at Full Load)		---	±0.3	±0.5	%
Output Regulation Load (25% to 100% of Full Load)		---	±0.5	±1.0	%
Output Ripple & Noise Peak-to-Peak (20MHz bandwidth)	5V Output Models Other Output Models	--- ---	75 100	100 150	mV pk-pk

Output Specification (Continued)					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Temperature Coefficient	All	---	±0.02	±0.05	%/℃
Dynamic Load Response (V_{in} = $V_{in\ nom}$; TA = 25℃ Load step change form form 75% to 100% or 100% to 75% of full Load)	All				
Peak Deviation		---	±3	±6	%
Recovery Time (V_{out} < 10% peak deviation)		---	300	500	µS
Output Current	THB 6-xx11 THB 6-xx12 THB 6-xx22 THB 6-xx23	200 100 ±50 ±40	--- --- --- ---	1000 500 ±250 ±200	mA
Output Over Current Protection	All	120	---	---	%FL
Output Short Circuit Protection	All	Continuous			

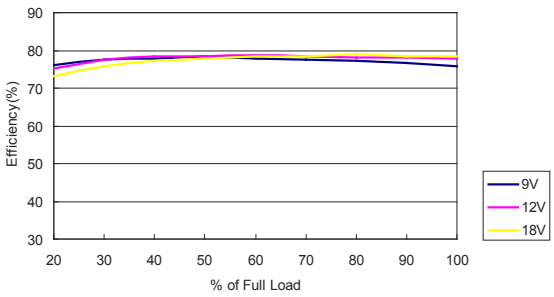
Input Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Operating Input Voltage	12V Input Models	9	12	18	VDC
	24V Input Models	18	24	36	
	48V Input Models	36	48	75	
Under Voltage Lockout Turn-on Threshold	12V Input Models	7	8	9	VDC
	24V Input Models	13	15	18	
	48V Input Models	30	33	36	
Under Voltage Lockout Turn-off Threshold	12V Input Models	---	---	8.5	VDC
	24V Input Models	---	---	16	
	48V Input Models	---	---	34	
Input reflected ripple current (20MHz bandwidth)	12V Input Models	---	60	---	mA pk-pk
(Measured with a inductor 4.7µH and Capacitance	24V Input Models	---	30	---	
220uF,ESR<1.0 ohm at 100KHz to simulated source)	48V Input Models	---	15	---	
Input Current (V_{in} = $V_{in\ nom}$;Full Load)	THB 6-1211	---	570	---	mA
	THB 6-1212	---	641	---	
	THB 6-1222	---	641	---	
	THB 6-1223	---	641	---	
	THB 6-2411	---	278	---	
	THB 6-2412	---	313	---	
	THB 6-2422	---	313	---	
	THB 6-2423	---	313	---	
	THB 6-4811	---	139	---	
	THB 6-4812	---	156	---	
	THB 6-4822	---	156	---	
	THB 6-4823	---	156	---	

Input Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Input No Load current (Typical value at V_{in} = $V_{in\ nom}$; No Load)	THB 6-1211 THB 6-1212 THB 6-1222 THB 6-1223	---	30	---	mA
	THB 6-2411 THB 6-2412 THB 6-2422 THB 6-2423	---	20	---	
	THB 6-4811 THB 6-4812 THB 6-4822 THB 6-4823	---	10	---	

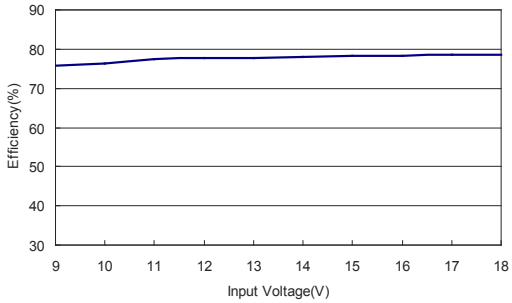
General Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Efficiency (V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C)	THB 6-1211	---	75	---	%
	THB 6-1212	---	78	---	
	THB 6-1222	---	78	---	
	THB 6-1223	---	78	---	
	THB 6-2411	---	77	---	
	THB 6-2412	---	80	---	
	THB 6-2422	---	80	---	
	THB 6-2423	---	80	---	
	THB 6-4811	---	77	---	
	THB 6-4812	---	80	---	
	THB 6-4822	---	80	---	
	THB 6-4823	---	80	---	
Isolation Voltage Input to Output (for 60 seconds)	All	3000	---	---	VAC
Isolation Resistance	All	10	---	---	GOhm
Isolation Capacitance	All	---	7	13	pF
Switching Frequency	All	---	150	---	KHz
MTBF MIL-STD-217F, Ta = 25°C	All	700	---	---	K Hours

Characteristic Curves

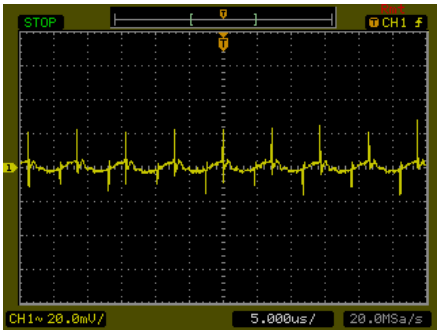
All test conditions are at 25°C The figures are identical for THB 6-1211



Efficiency Versus Output Current

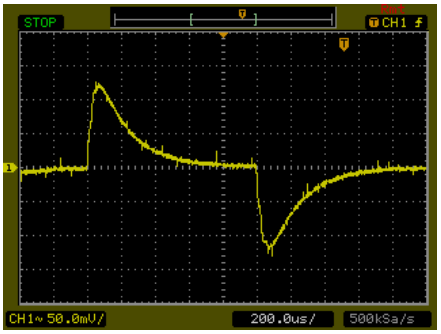


Efficiency Versus Input Voltage. Full Load

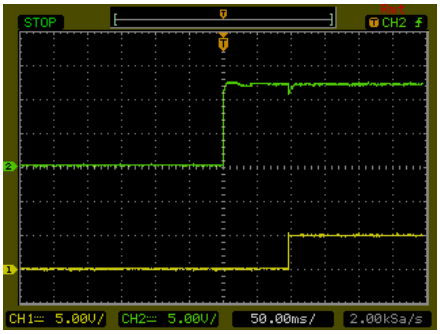


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

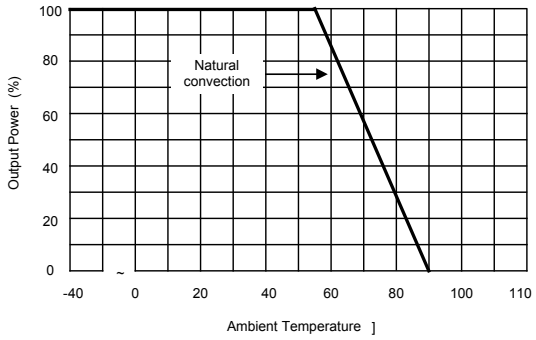


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



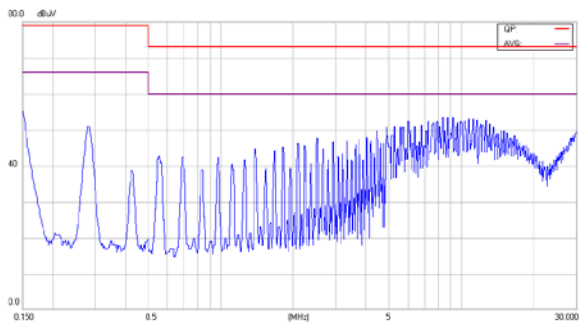
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



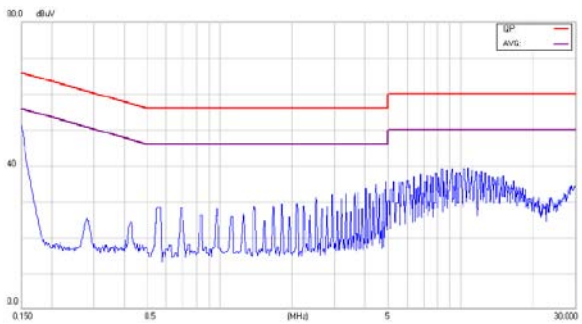
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

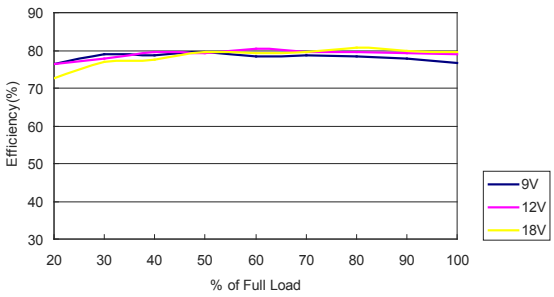


Conduction Emission of EN55022 Class B

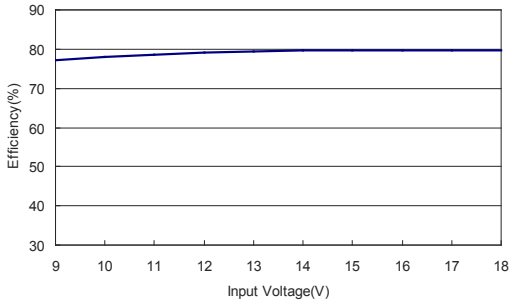
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

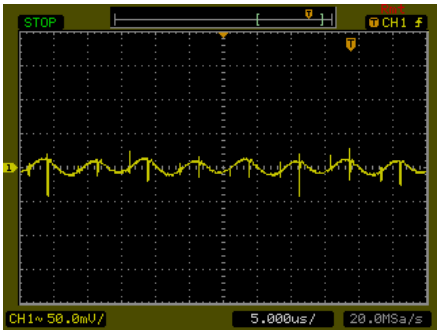
All test conditions are at 25°C The figures are identical for THB 6-1212



Efficiency Versus Output Current

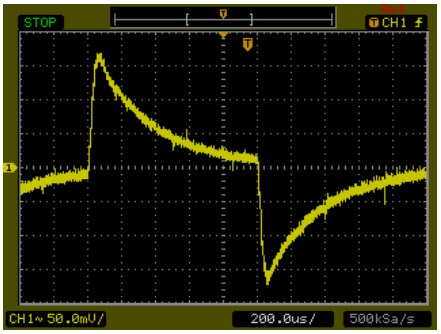


Efficiency Versus Input Voltage. Full Load

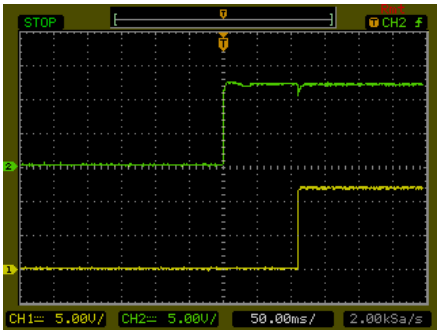


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

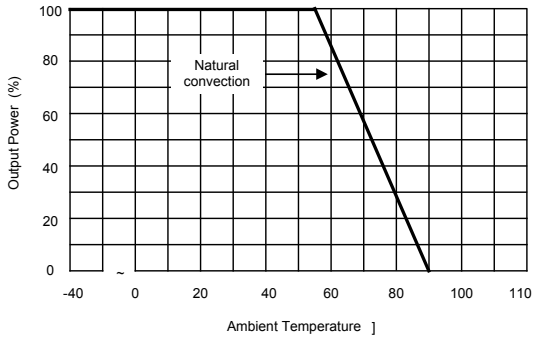


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



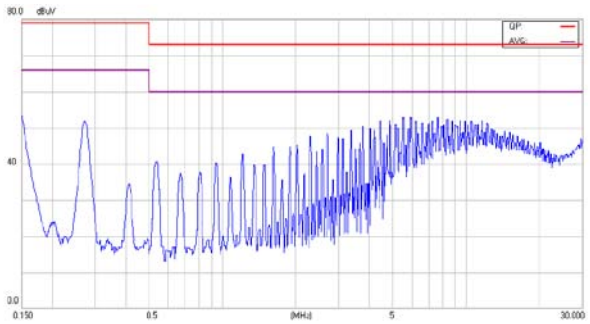
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



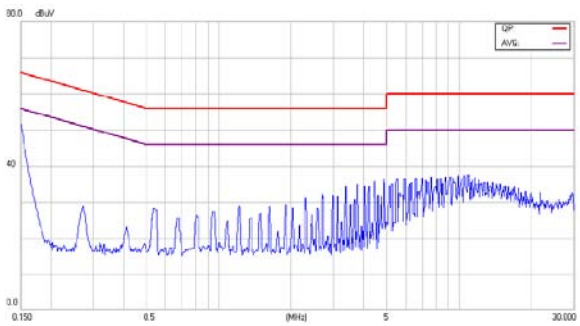
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

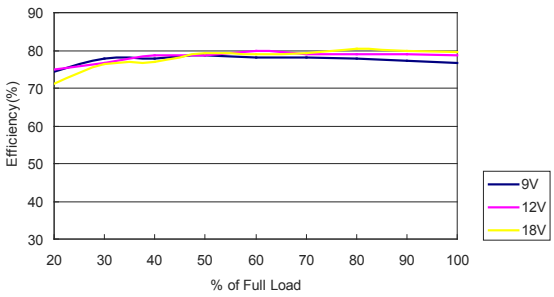


Conduction Emission of EN55022 Class B

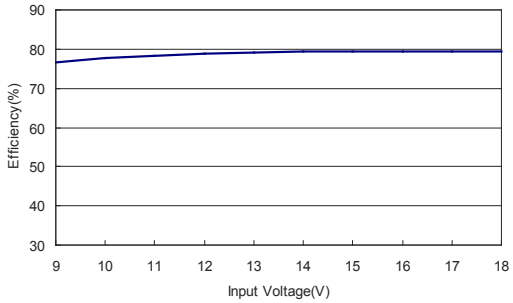
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

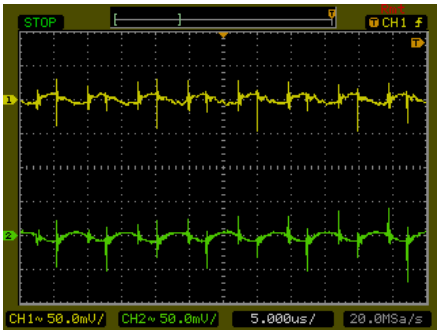
All test conditions are at 25°C The figures are identical for THB 6-1222



Efficiency Versus Output Current

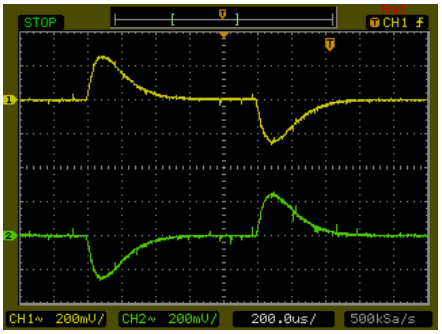


Efficiency Versus Input Voltage. Full Load

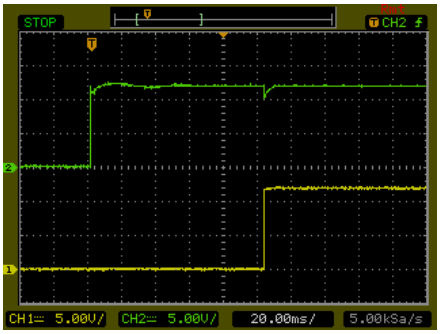


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

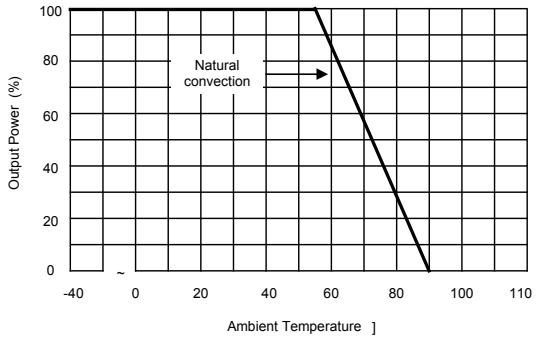


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



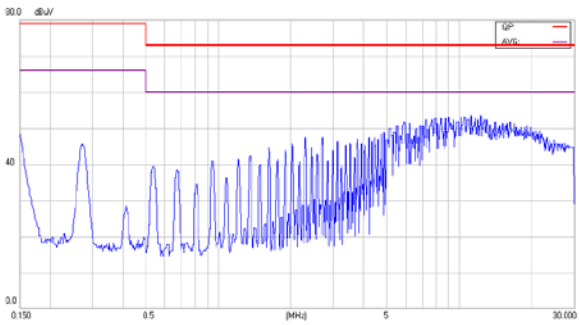
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



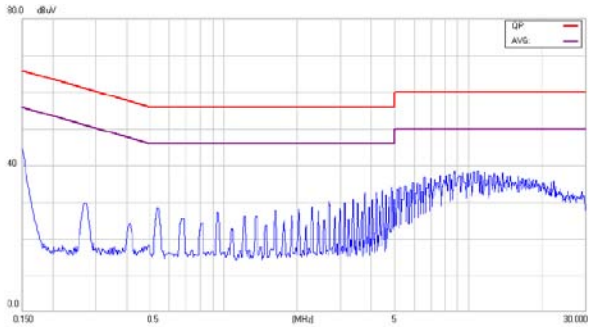
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

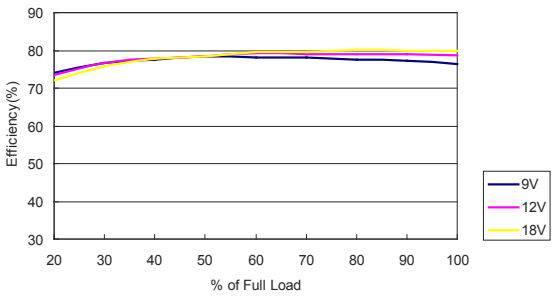


Conduction Emission of EN55022 Class B

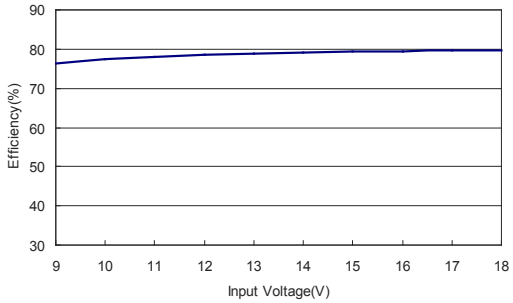
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

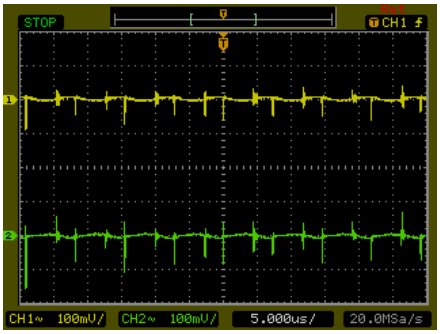
All test conditions are at 25°C The figures are identical for THB 6-1223



Efficiency Versus Output Current

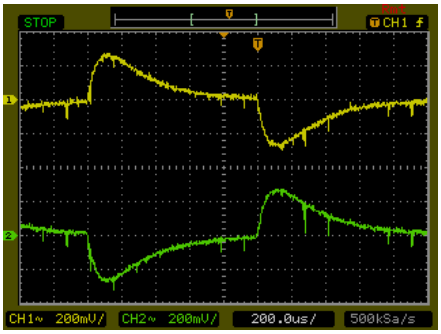


Efficiency Versus Input Voltage. Full Load

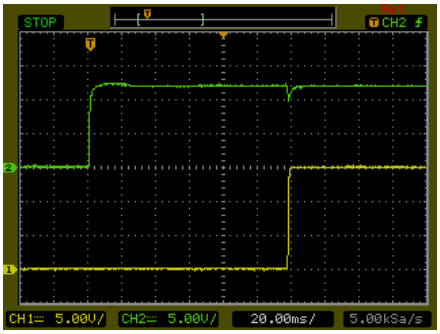


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

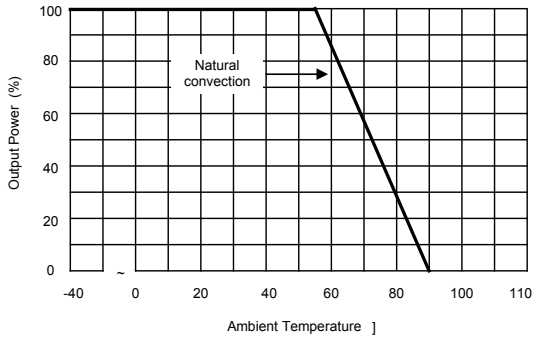


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



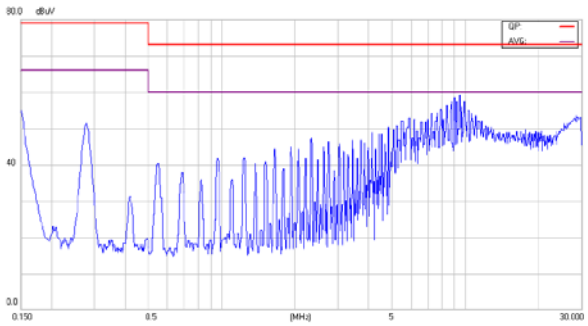
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



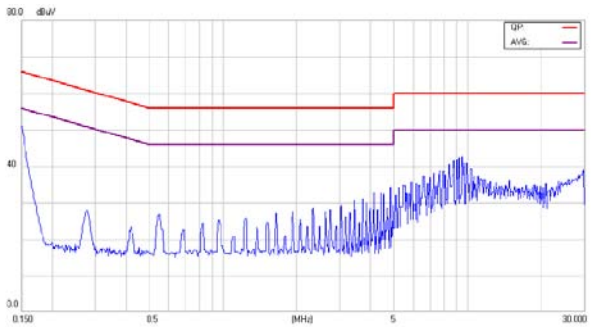
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

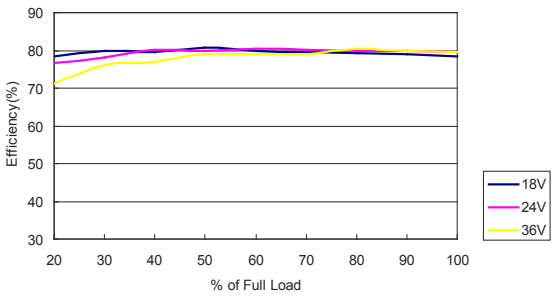


Conduction Emission of EN55022 Class B

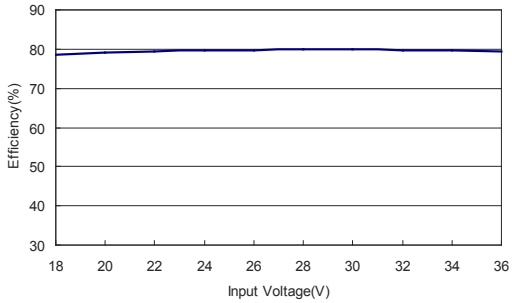
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

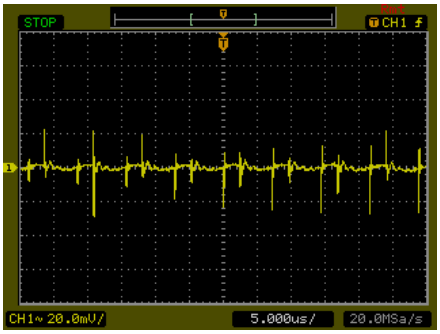
All test conditions are at 25°C The figures are identical for THB 6-2411



Efficiency Versus Output Current

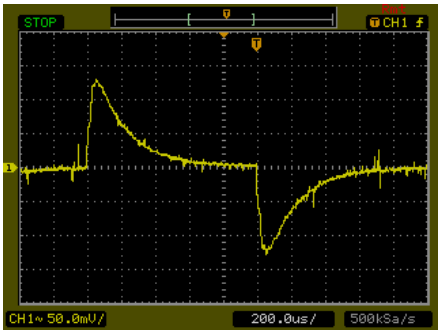


Efficiency Versus Input Voltage. Full Load

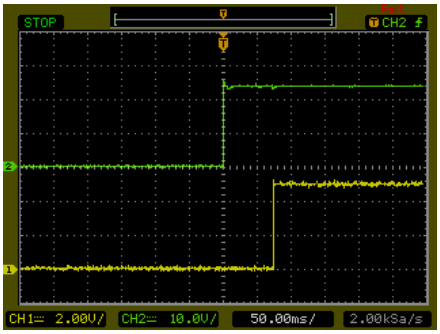


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

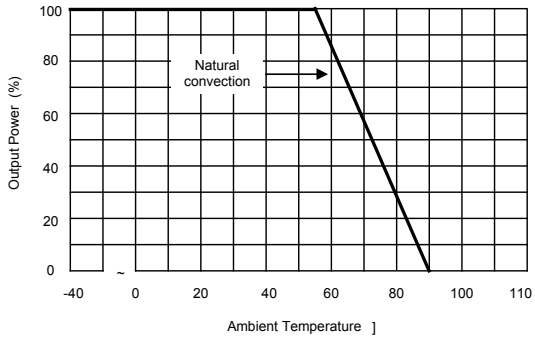


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



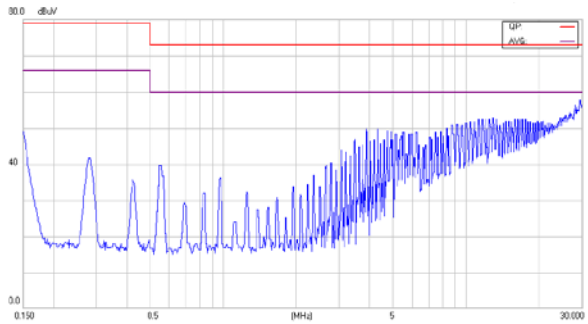
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



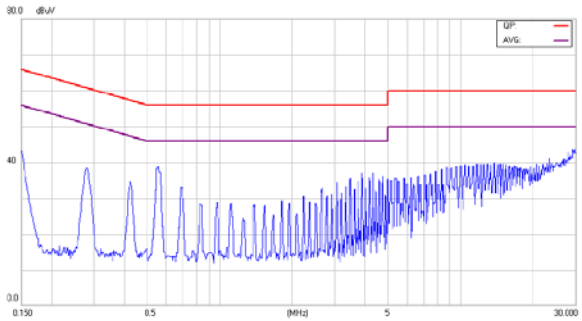
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

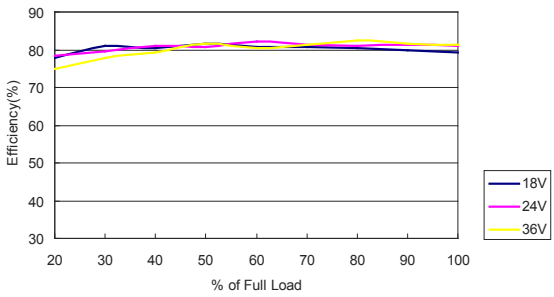


Conduction Emission of EN55022 Class B

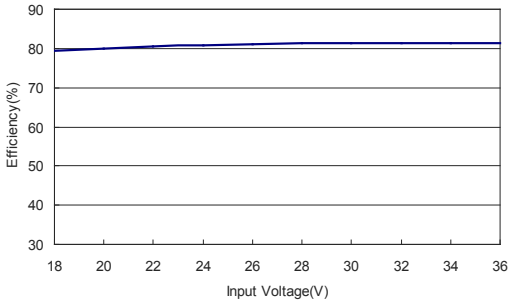
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

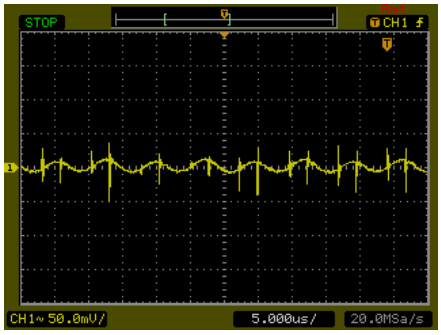
All test conditions are at 25°C The figures are identical for THB 6-2412



Efficiency Versus Output Current

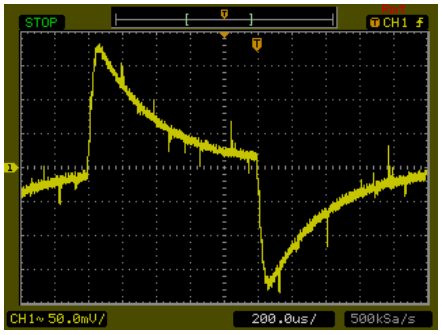


Efficiency Versus Input Voltage. Full Load

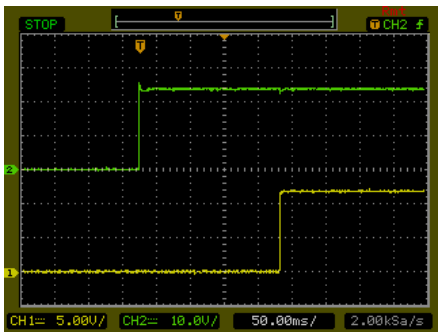


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

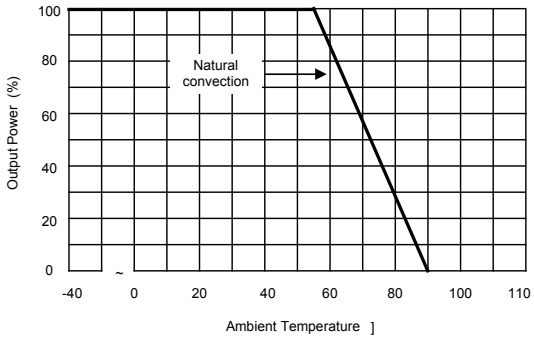


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



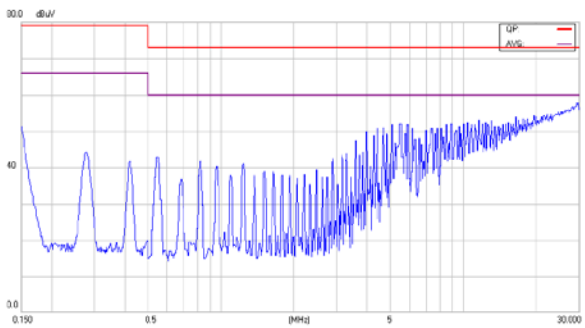
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



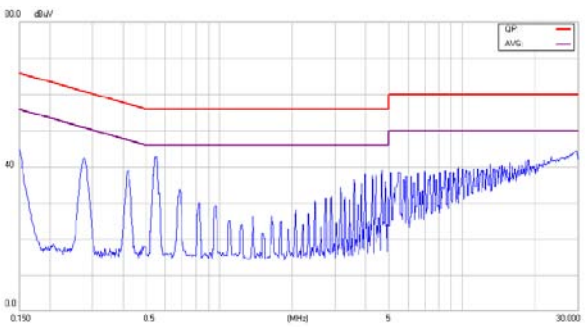
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

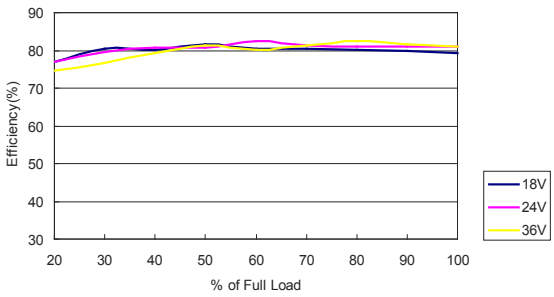


Conduction Emission of EN55022 Class B

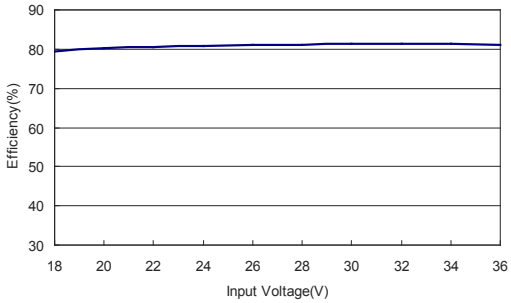
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

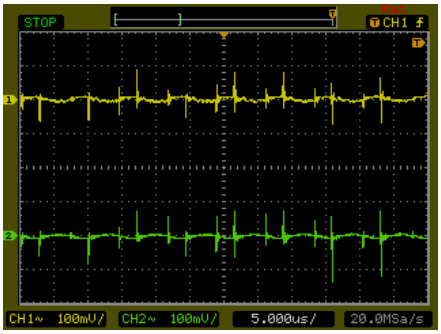
All test conditions are at 25°C The figures are identical for THB 6-2422



Efficiency Versus Output Current

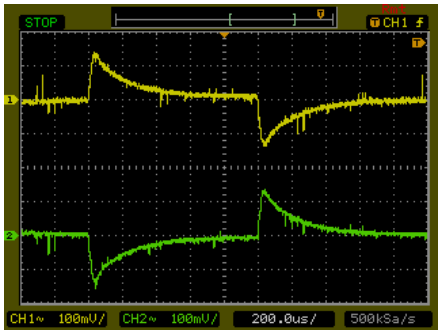


Efficiency Versus Input Voltage. Full Load

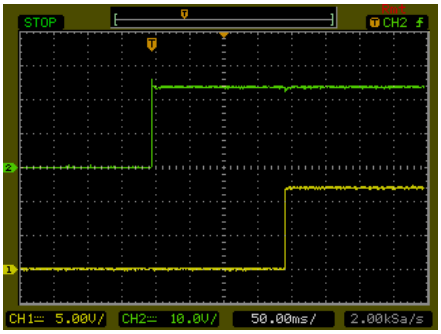


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

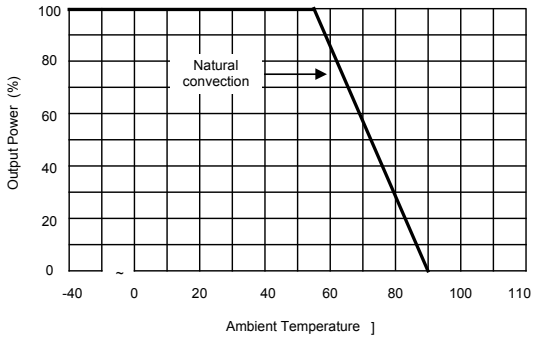


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



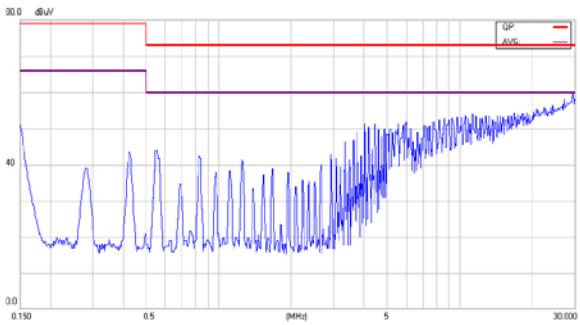
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



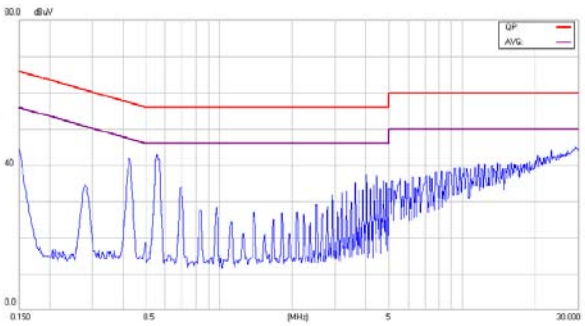
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

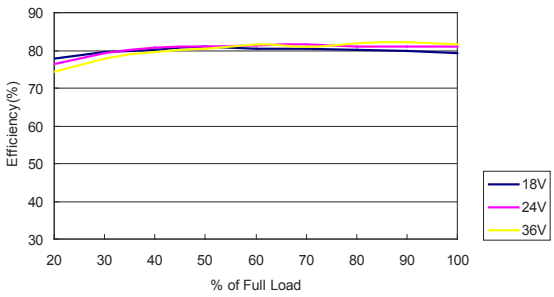


Conduction Emission of EN55022 Class B

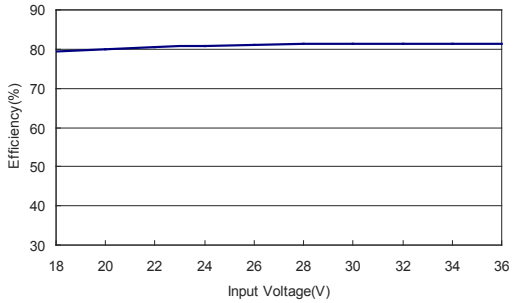
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

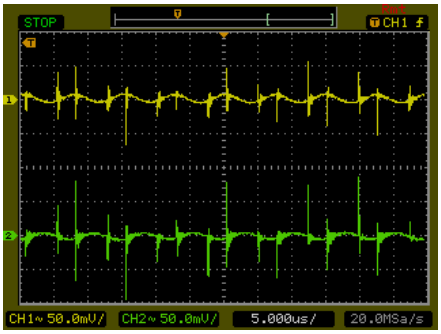
All test conditions are at 25°C The figures are identical for THB 6-2423



Efficiency Versus Output Current

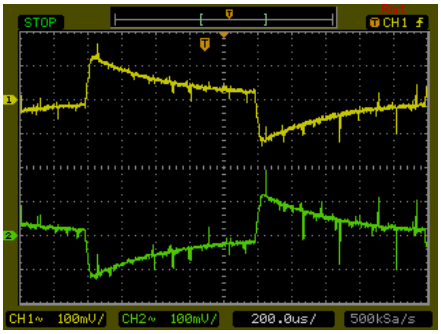


Efficiency Versus Input Voltage. Full Load

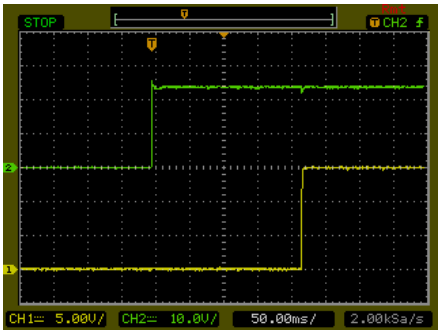


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

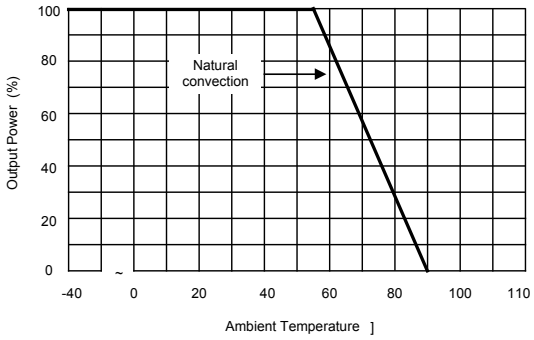


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



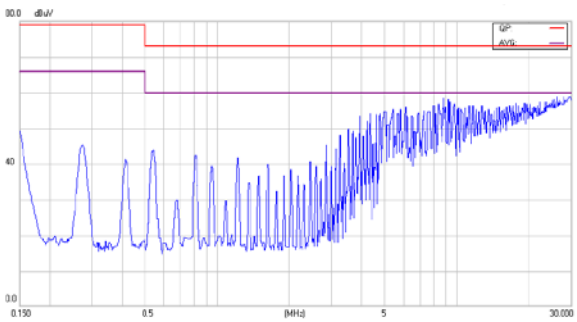
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



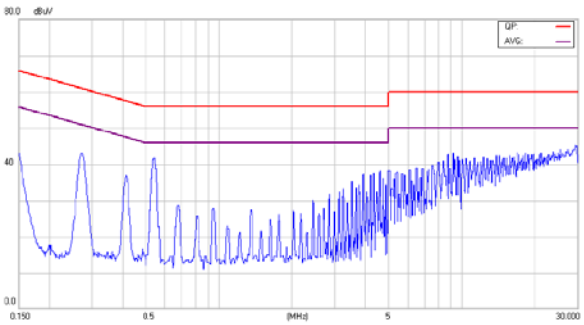
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

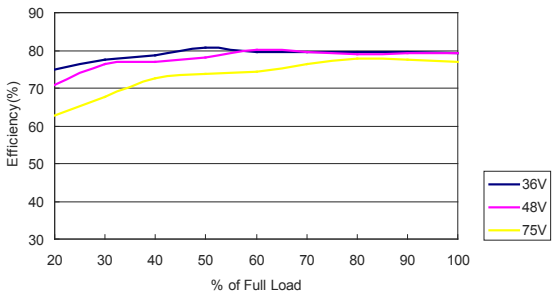


Conduction Emission of EN55022 Class B

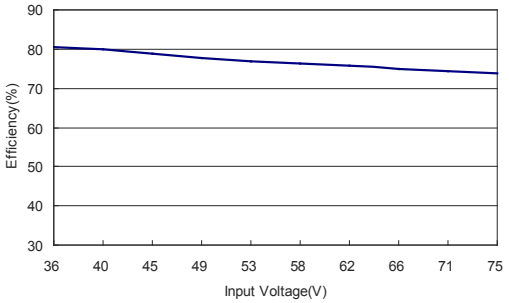
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

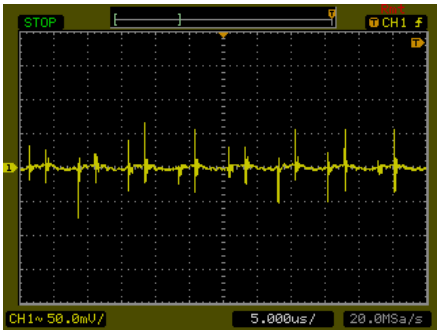
All test conditions are at 25°C The figures are identical for THB 6-4811



Efficiency Versus Output Current

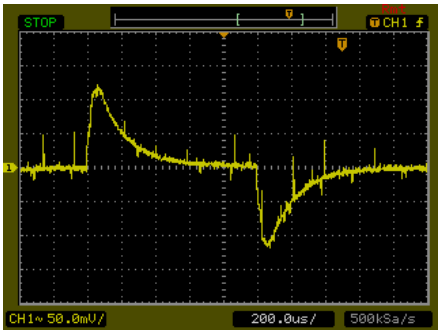


Efficiency Versus Input Voltage. Full Load

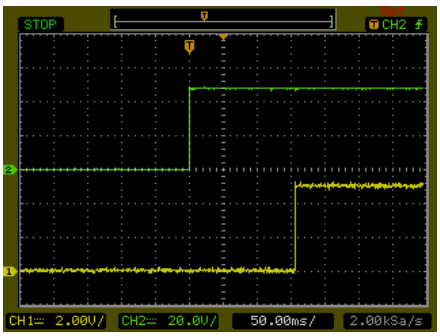


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

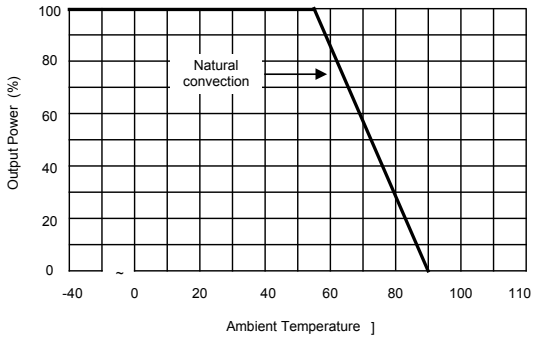


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



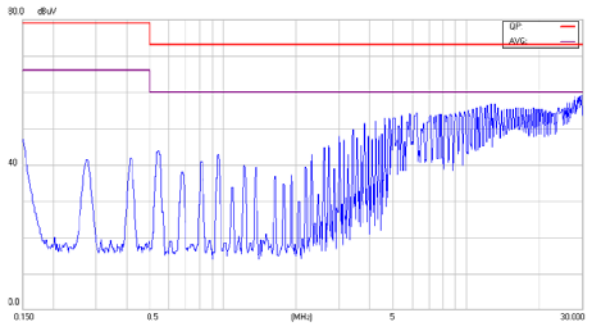
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



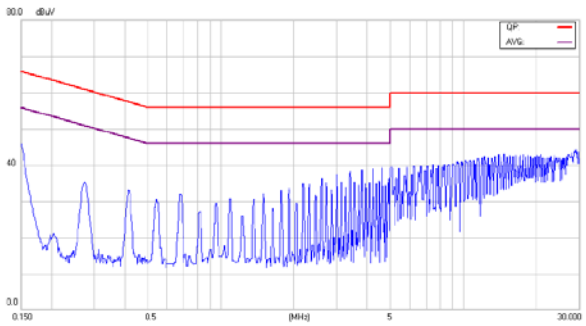
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

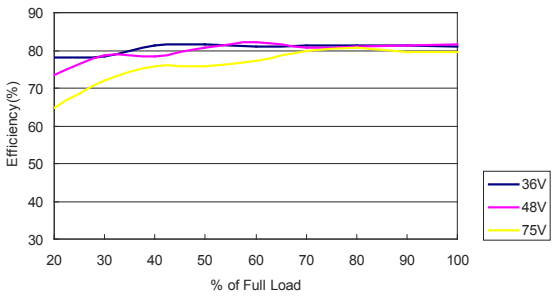


Conduction Emission of EN55022 Class B

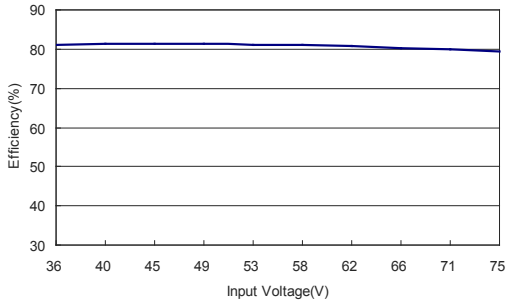
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

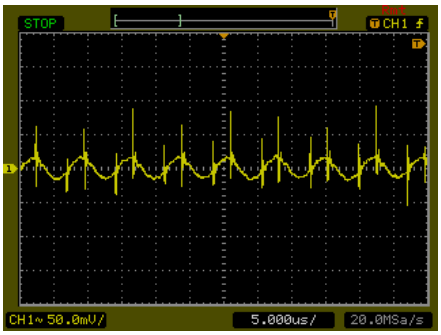
All test conditions are at 25°C The figures are identical for THB 6-4812



Efficiency Versus Output Current

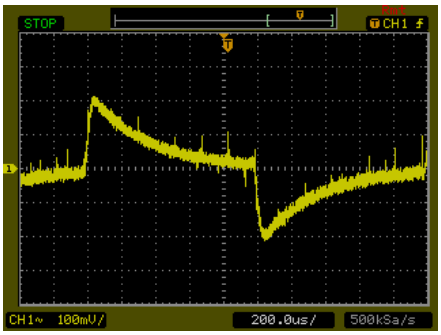


Efficiency Versus Input Voltage. Full Load

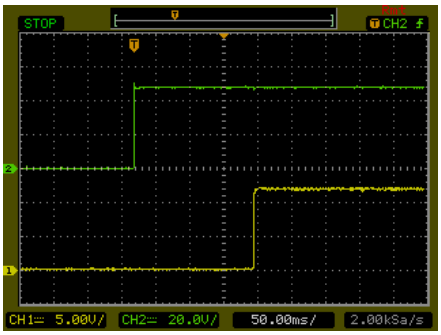


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

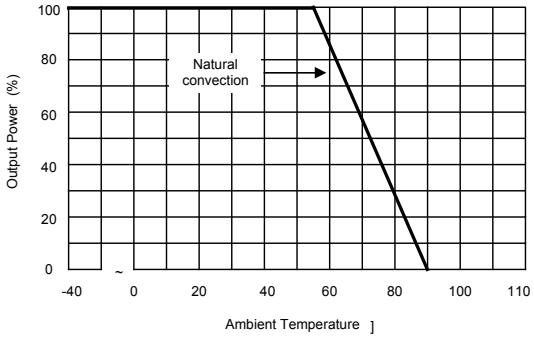


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



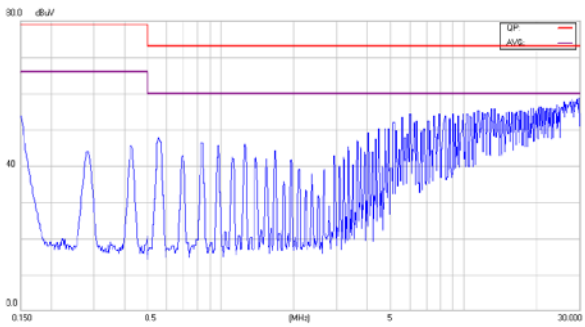
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



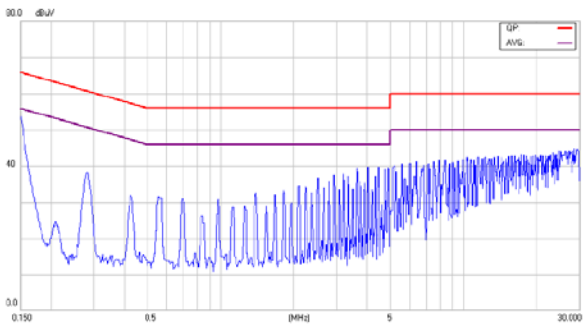
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

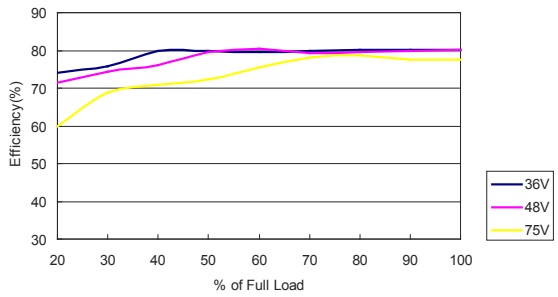


Conduction Emission of EN55022 Class B

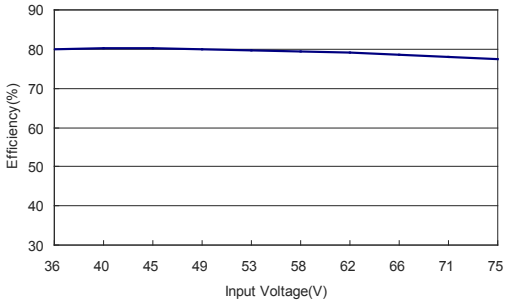
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

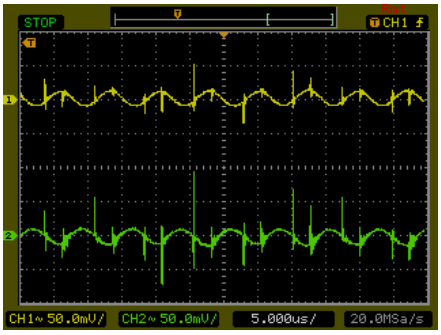
All test conditions are at 25°C The figures are identical for THB 6-4822



Efficiency Versus Output Current

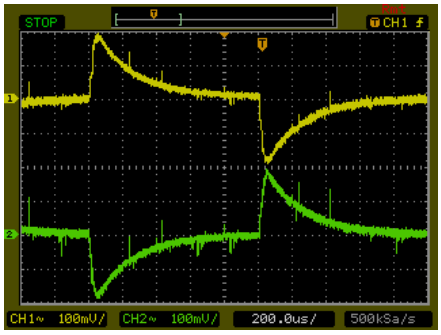


Efficiency Versus Input Voltage. Full Load

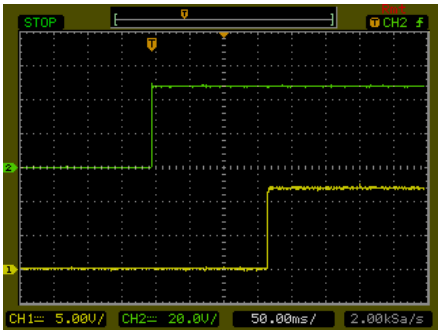


Typical Output Ripple and Noise.

$V_{in} = V_{in\ nom}$; Full Load; T_A

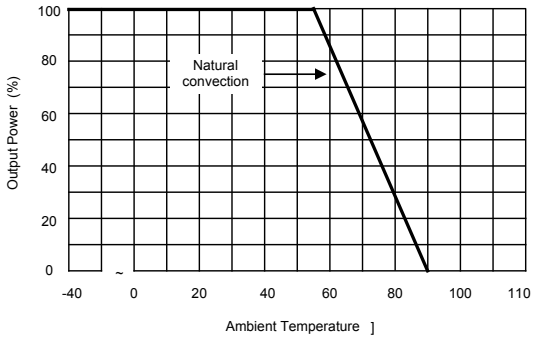


Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



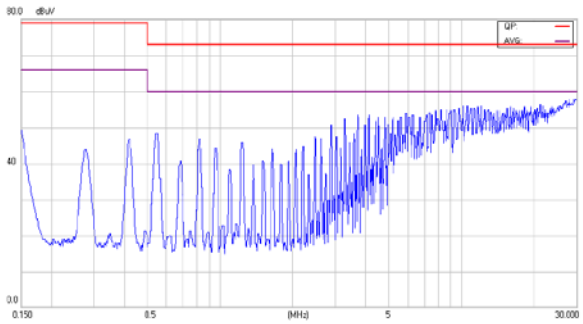
Typical Input Start-Up and Output Rise Characteristic

$V_{in} = V_{in\ nom}$; Full Load



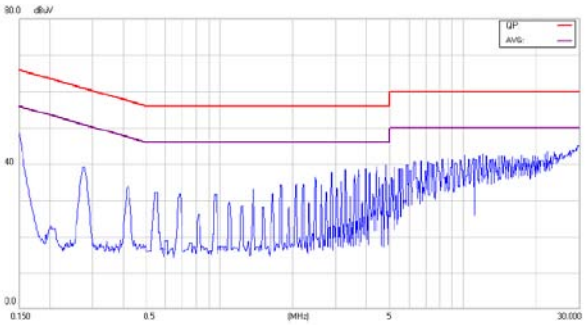
Derating Output Current Versus Ambient Temperature and Airflow

$V_{in} = V_{in\ nom}$



Conduction Emission of EN55022 Class A

$V_{in} = V_{in\ nom}$; Full Load

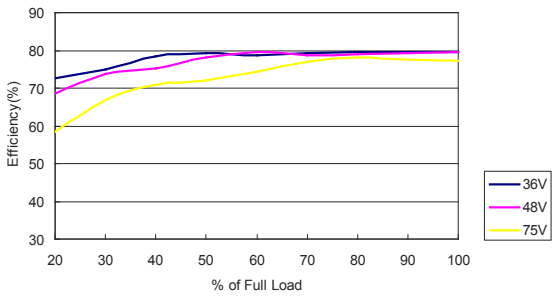


Conduction Emission of EN55022 Class B

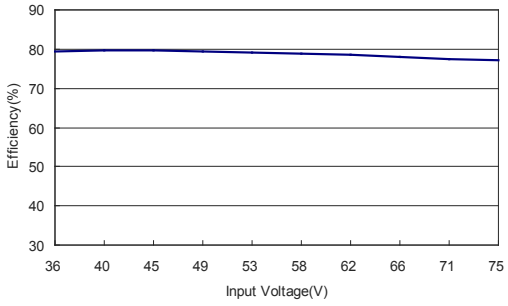
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

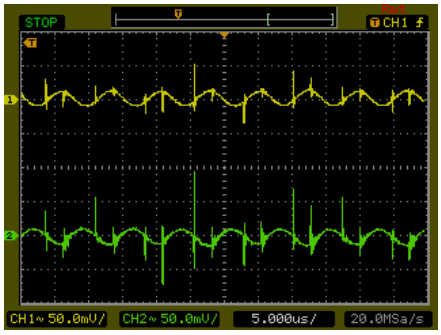
All test conditions are at 25°C The figures are identical for THB 6-4823



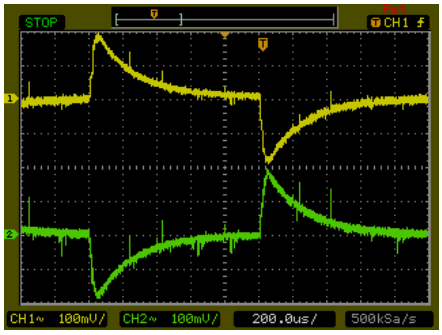
Efficiency Versus Output Current



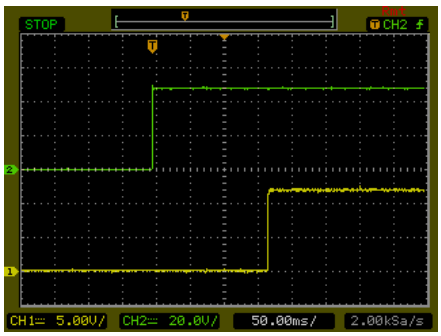
Efficiency Versus Input Voltage. Full Load



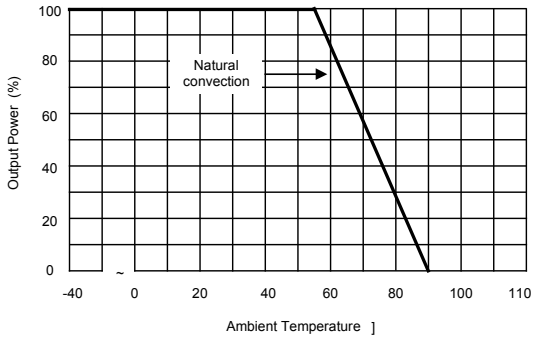
Typical Output Ripple and Noise.
$V_{in} = V_{in\ nom}$; Full Load; T_A



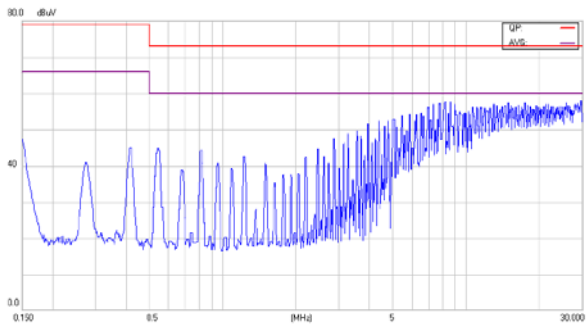
Transient Response to Dynamic Load Change from 100% to 75% of Full Load ; $V_{in} = V_{in\ nom}$



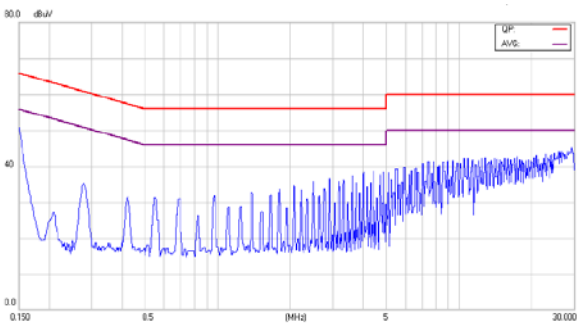
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load



Derating Output Current Versus Ambient Temperature and Airflow
$V_{in} = V_{in\ nom}$

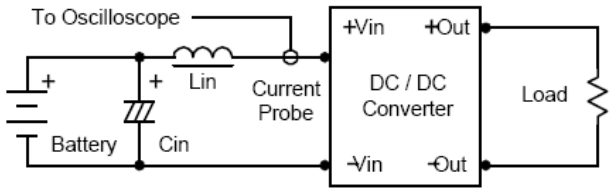


Conduction Emission of EN55022 Class A
$V_{in} = V_{in\ nom}$; Full Load



Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load

Part Number Structure

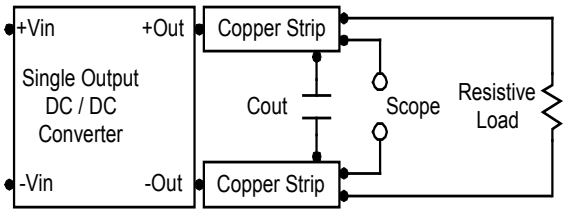


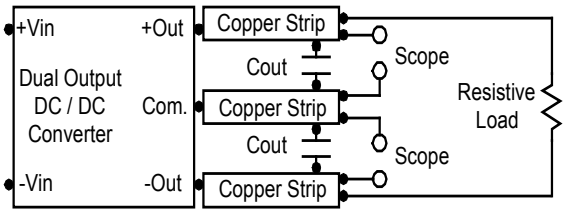
Input reflected-ripple current measurement test set up

Component	Value	Reference	Component	Value	Reference
L	4.7µH	-----	L	4.7µH	-----
C	220µF (ESR<1.0Ω at 100KHz)	Aluminum Electrolytic Capacitor	C	220µF (ESR<1.0Ω at 100KHz)	Aluminum Electrolytic Capacitor

Peak-to-peak output ripple & noise measurement test set up

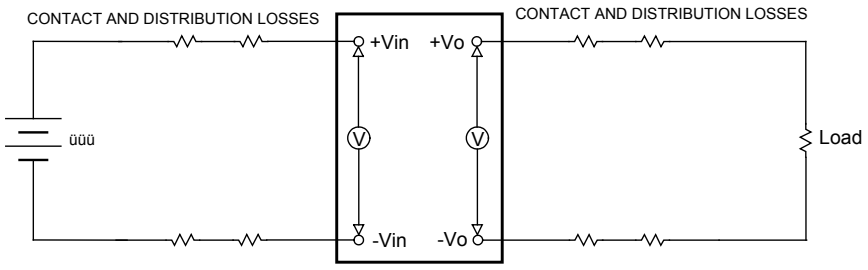
Use a Cout 0.47 µF ceramic capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20 MHz. Position the load between 50 mm and 75 mm from the DC/DC Converter.



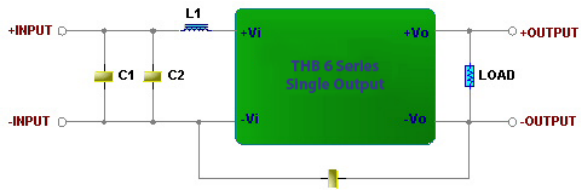


Output voltage and efficiency measurement test set up

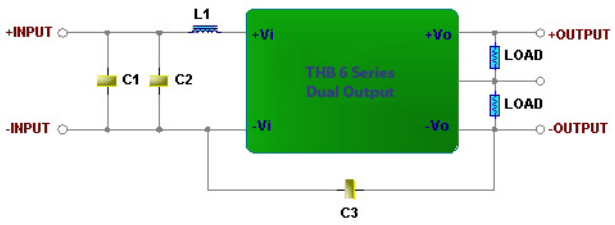
$$Efficiency = \left(\frac{V_{out} \times I_{out}}{V_{in} \times I_{in}} \right) \times 100\% = [\%]$$



EMC considerations

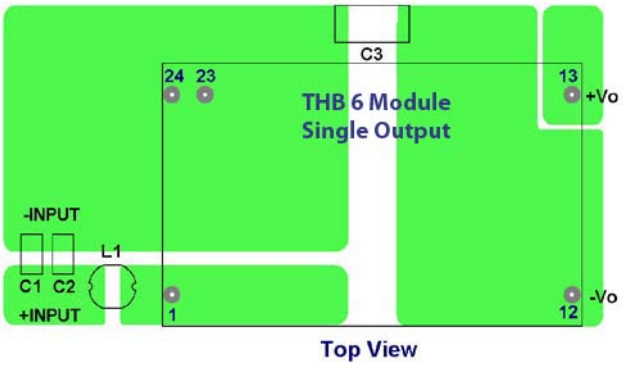


Single Output

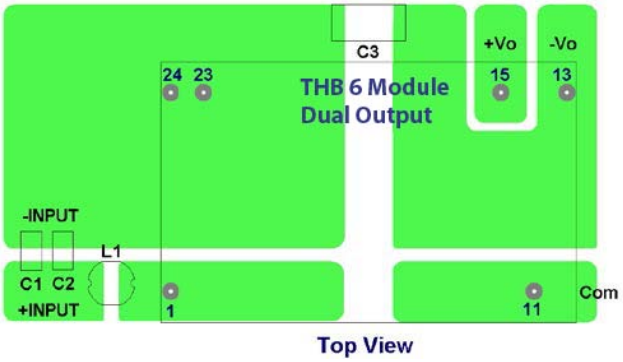


Dual Output

Recommended circuit to comply EN55022 Class B Limits



Single Output



Dual Output

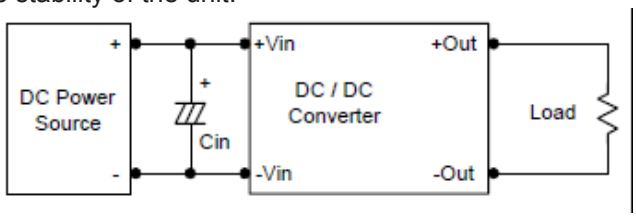
Recommended PCB Layout with Input Filter

To: comply with EN55022 CLASS B following components are needed:

Model	Component	Value
THB 6-12xx	C1	4.7µF/25V 1206 MLCC
	C3	100pF/6KV 2211 MLCC
	L1	1µH SCD03021T/2.08A
THB 6-24xx	C1,C2	2.2uF/50V 1206 MLCC
	C3	100pF/6KV 2211 MLCC
	L1	1µH SCD03021T/2.08A
THB 6-48xx	C1,C2	1µF/100V 1206 MLCC
	C3	100pF/6KV 2211 MLCC
	L1	1µH SCD03021T/2.08A

Input Source Impedance

The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor on the input to insure startup.
By using a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 kHz) capacitor of a 10µF for the 12V input devices and a 4.7µF for the 24V input devices and a 2.2µF for the 48V devices, capacitor mounted close to the power module helps ensure stability of the unit.

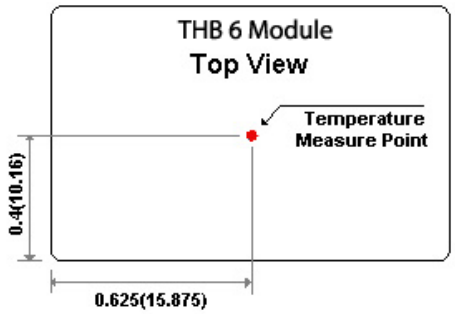


Short Circuitry Protection

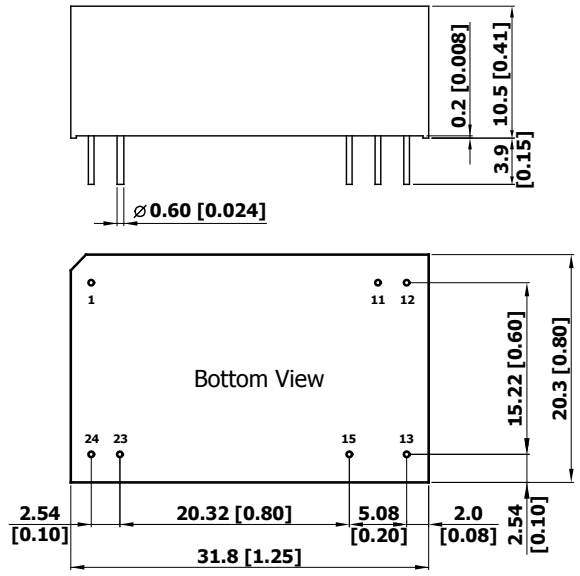
Continuous, hiccup and auto-recovery mode.
During short circuit, converter still shut down, The average current during this condition will be very low and the device will be safe in this condition.

Thermal Consideration

The converter is designed to operate in a variety of thermal environments and sufficient cooling must be provided to ensure reliable operation. Heat is removed by conduction from the pins to the PCB board, and by convection through airflow across the converter. Proper cooling can be verified by measuring the point as the figure below. The temperature at this location should not exceed 95°C. When operating, adequate cooling must be provided to maintain the test point temperature at or below 95°C. Although the maximum point temperature of the power module is 95°C, you can limit this temperature to a lower value for extremely high reliability.



Mechanical Dimensions

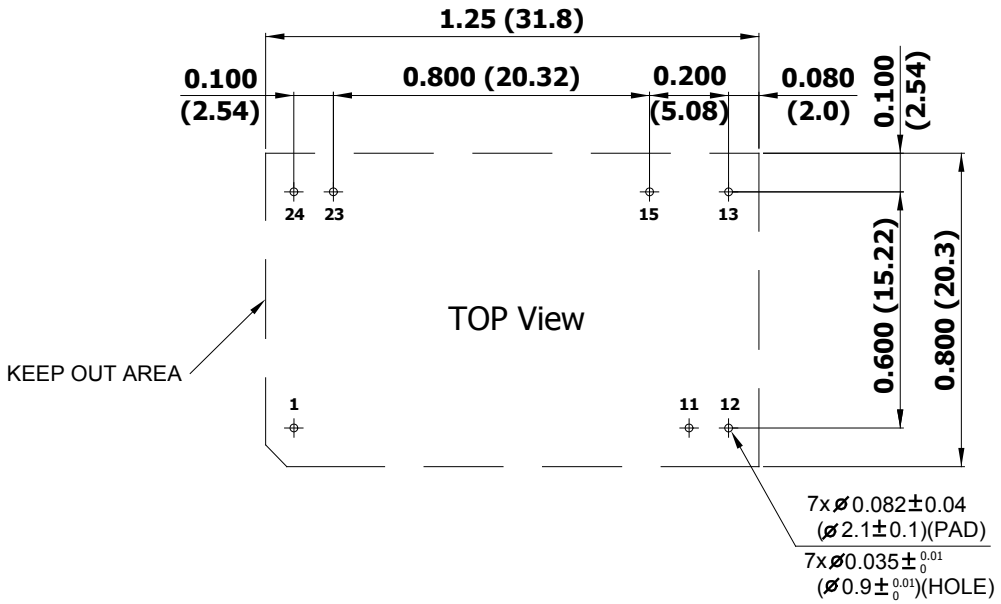


Weight:18g

Pin Connections		
Pin	Single Output	Dual Output
1	+Vin	+Vin
11	No Pin	Common
12	-Vout	No Pin
13	+Vout	-Vout
15	No Pin	+Vout
23	-Vin	-Vin
24	-Vin	-Vin

1. All dimensions in mm (inches)
Tolerance: X.X±0.25 (X.XX±0.01")
X.XX±0.13 (X.XXX±0.005")
2.Pin pitch tolerance:±0.25 (±0.01")
3.Pin dimension tolerance:±0.1 (±0.004")

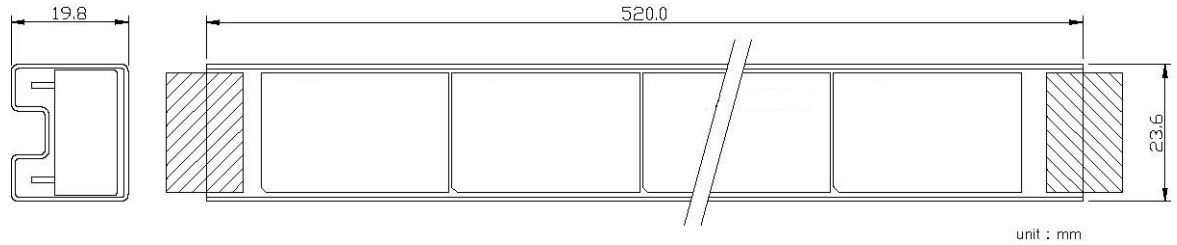
Recommended Pad Layout for Single & Dual Output Converter



1.All dimensions in Inches (mm)
Tolerance: x.xx±0.02" (x.x ±0.5mm)
x.xxx±0.01" (x.xx ±0.25mm)
2. Pin pitch tolerance: ±0.01" (±0.25mm)

Packaging Information

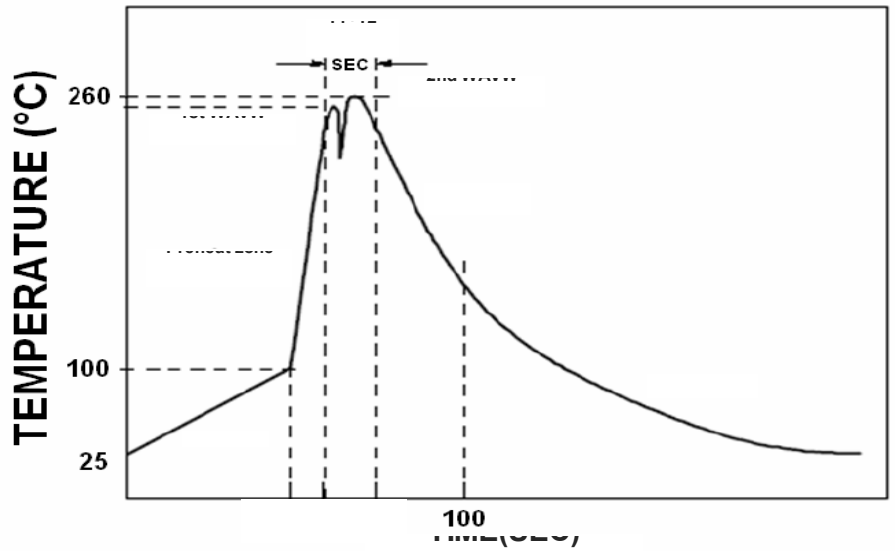
TUBE



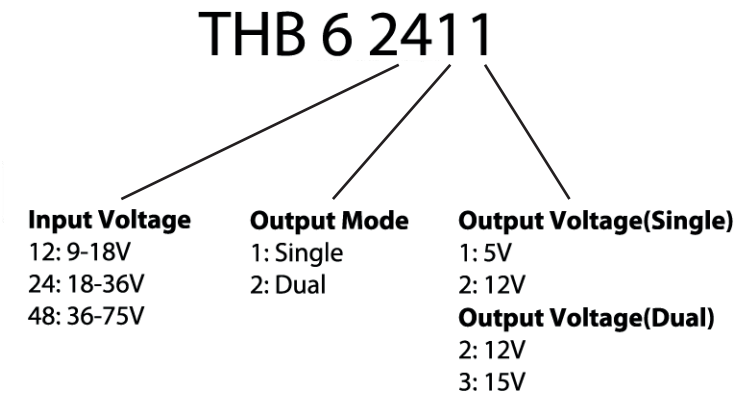
15 PCS per TUBE

Soldering and Reflow Considerations

Lead free wave solder profile for THB 6 Series



Testing Configurations



Model Number	Input Range (VDC)	Output Voltage (VDC)	Max. Output Current (mA)	Input Current at Full Load(1) (mA)	Efficiency(2) (%)
THB 6-1211	9-18	5	1000	570	75
THB 6-1212	9-18	12	500	641	78
THB 6-1222	9-18	±12	±250	641	78
THB 6-1223	9-18	±15	±200	641	78
THB 6-2411	18-36	5	1000	278	77
THB 6-2412	18-36	12	500	313	80
THB 6-2422	18-36	±12	±250	313	80
THB 6-2423	18-36	±15	±200	313	80
THB 6-4811	36-75	5	1000	139	77
THB 6-4812	36-75	12	500	156	80
THB 6-4822	36-75	±12	±250	156	80
THB 6-4823	36-75	±15	±200	156	80

Note 1. Maximum value at nominal input voltage and full load of standard type.
Note 2. Typical value at nominal input voltage and full load.

Safety and Installation Instruction

Fusing Consideration

Caution: This power module is not internally fused. An input line fuse must always be used. This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture. To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse. The safety agencies require a normal-blow fuse in 12Vin, 24Vin, 48Vin with maximum rating of 1200mA, 600mA, 300mA. Based on the information provided in this data sheet on Inrush energy and maximum dc input current; the same type of fuse with lower rating can be used. Refer to the fuse manufacturer's data for further information.

MTBF and Reliability

The MTBF of THB 6 series of DC/DC converters has been calculated using MIL-HDBK 217F Operating Temperature 25°C, Ground Benign.

Model	MTBF	Unit
THB 6-1211	1,056,971	Hours
THB 6-1212	1,065,303	Hours
THB 6-1222	1,070,778	Hours
THB 6-1223	1,077,122	Hours
THB 6-2411	1,045,697	Hours
THB 6-2412	1,040,583	Hours
THB 6-2422	1,053,741	Hours
THB 6-2423	1,058,985	Hours
THB 6-4811	1,033,699	Hours
THB 6-4812	1,056,189	Hours
THB 6-4822	1,040,583	Hours
THB 6-4823	1,051,746	Hours

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