THL 6 WISM Series

6W, Ultra-Wide Input Range SMD, Single & Dual Output DC/DC Converters

Features

- Ultra compact SMD Package
  22.0 x 20.3 x 10.2 mm (0.87 x 0.80 x 0.40 inches)
- Ultra wide 4:1 Input Range
- Fully regulated Output
- Operating Temp. Range –40°C to +80°C
- Over Load Protection
- Remote On/Off Control
- I/O-isolation 1500 VDC
- Input Filter meets EN 55022,class A and FCC, level A
- Qualified for lead-free Reflow Solder Process according IPC/JEDEC J-STD-020D
- 3 Years Product Warranty

Applications

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

General Description

The TRACO THL 6WISM series is a new range of isolated 6W DC/DC converter modules featuring fully regulated output voltages and ultra-wide 4:1 input voltage ranges. These products are with a very small footprint occupying just 4.5cm2 (0.7 square in.) on PCB.
All models are qualified for lead free reflow solder processes according IPC J-STD-020D.An excellent efficiency allows an operating temperature range of –40° to +80°C. Further features include remote On/Off control and over load protection.
The very compact dimensions of these DC/DC converters make them an ideal solution for many space critical applications in battery-powered equipment and instrumentation.

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Absolute Maximum Rating				
Parameter	**Model**	**Min**	**Max**	**Unit**
Input Voltage				
Input Surge Voltage (1s)	THL 6-24xxWISM	---	50	VDC
	THL 6-48xxWISM	---	100	
Operating Ambient Temperature				
Without Derating	All	-40	+60	℃
With Derating		-40	+80	
Operating Case Temperature	All	-40	+105	℃
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℃)	THL 6-xx10WISM	3.234	3.3	3.366	VDC
	THL 6-xx11WISM	4.9	5	5.1	
	THL 6-xx12WISM	11.76	12	12.24	
	THL 6-xx13WISM	14.7	15	15.3	
	THL 6-xx15WISM	23.52	24	24.48	
	THL 6-xx21WISM	±4.9	±5	±5.1	
	THL 6-xx22WISM	±11.76	±12	±12.24	
	THL 6-xx23WISM	±14.7	±15	±15.3	
Output Regulation					
Line ($V_{in\ min}$ to $V_{in\ max}$ at Full Load)		---	±0.5	±1.0	%
Output Regulation					
Load (15% to 100% of Full Load)		---	±0.5	±1.2	%
Output Ripple & Noise					
Peak-to-Peak (5Hz to 20MHz bandwidth)	All	---	60	100	mV pk-pk
(Measured with a 1µF/50V MLCC)					

Output Specification (Continued)					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Temperature Coefficient	All	---	±0.01	±0.02	%/°C
Output Voltage Overshoot ($V_{in\ min}$ to $V_{in\ max}$; Full Load; T_A = 25°C)	All	---	---	5	%
Dynamic Load Response (V_{in} = $V_{in\ nom}$; TA=25°C) Load step change form 75% to 100% or 100 to 75% of Full Load Peak Deviation	All	---	±3	---	%
Setting Time (V_{out} < 10% peak deviation)		---	300	600	µsec
Output Current	THL 6-xx10WISM	218	---	1450	mA
	THL 6-xx11WISM	180	---	1200	
	THL 6-xx12WISM	75	---	500	
	THL 6-xx13WISM	60	---	400	
	THL 6-xx15WISM	38	---	250	
	THL 6-xx21WISM	±90	---	±600	
	THL 6-xx22WISM	±38	---	±250	
	THL 6-xx23WISM	±30	---	±200	
Output Over Current Protection	All	110	---	---	%FL
Output Short Circuit Protection	All	Continuous			

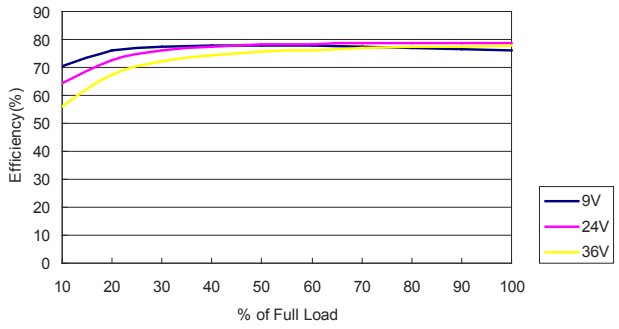
Input Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Operating Input Voltage	THL 6-24xxWISM	9	24	36	VDC
	THL 6-48xxWISM	18	48	75	
Under Voltage Lockout Turn-on Threshold	THL 6-24xxWISM	---	---	9	VDC
	THL 6-48xxWISM	---	---	18	
Under Voltage Lockout Turn-off Threshold	THL 6-24xxWISM	---	8	---	VDC
	THL 6-48xxWISM	---	16	---	
Input reflected ripple current (5 to 20MHz, 12µH source impedance)	All	---	---	5	mA pk-pk
Input Current (Maximum value at V_{in}= $V_{in\ nom}$;Full Load)	THL 6-2410WISM	---	262	---	mA
	THL 6-2411WISM	---	316	---	
	THL 6-2412WISM	---	301	---	
	THL 6-2413WISM	---	301	---	
	THL 6-2415WISM	---	301	---	
	THL 6-2421WISM	---	301	---	
	THL 6-2422WISM	---	301	---	
	THL 6-2423WISM	---	301	---	
	THL 6-4810WISM	---	131	---	
	THL 6-4811WISM	---	158	---	
	THL 6-4812WISM	---	151	---	
	THL 6-4813WISM	---	151	---	
	THL 6-4815WISM	---	151	---	
	THL 6-4821WISM	---	151	---	
	THL 6-4822WISM	---	151	---	
	THL 6-4823WISM	---	151	---	

Input Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Input Standby current (Typical value at V_{in} = $V_{in\ nom}$; No Load)	THL 6-2410WISM THL 6-2411WISM THL 6-2412WISM THL 6-2413WISM THL 6-2415WISM THL 6-2421WISM THL 6-2422WISM THL 6-2423WISM	---	---	30	mA
	THL 6-4810WISM THL 6-4811WISM THL 6-4812WISM THL 6-4813WISM THL 6-4815WISM THL 6-4821WISM THL 6-4822WISM THL 6-4823WISM	---	---	20	
Remote ON/OFF Control (The On/Off pin voltage is referenced to-V_{in}) Positive logic	All				
On/Off pin High Voltage (Remote ON)		2.5	---	50	VDC
On/Off pin Low Voltage (Remote OFF)		-0.7	---	0.8	VDC
Remote Off Stand by Input Current	All	---	---	10	mA
Input Current of Remote Control Pin	All	---	---	-500	µA

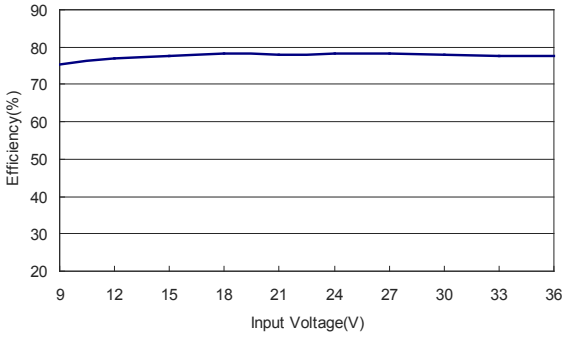
General Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Efficiency (V_{in} =$V_{in\ nom}$; Full Load; T_A T_A =25℃)	THL 6-2410WISM	---	76	---	%
	THL 6-2411WISM	---	79	---	
	THL 6-2412WISM	---	83	---	
	THL 6-2413WISM	---	83	---	
	THL 6-2415WISM	---	83	---	
	THL 6-2421WISM	---	82	---	
	THL 6-2422WISM	---	83	---	
	THL 6-2423WISM	---	83	---	
	THL 6-4810WISM	---	76	---	
	THL 6-4811WISM	---	79	---	
	THL 6-4812WISM	---	83	---	
	THL 6-4813WISM	---	83	---	
	THL 6-4815WISM	---	83	---	
	THL 6-4821WISM	---	82	---	
	THL 6-4822WISM	---	83	---	
	THL 6-4823WISM	---	83	---	
Isolation voltage Input to Output (for 60 seconds)		1500	---	---	VDC
Isolation resistance	All	1000	---	---	MOhm
Isolation capacitance		---	1200	1500	pF
Switching Frequency		---	330	---	KHz
MTBF MIL-STD-217F, TC=25℃		300	---	---	K Hours

Characteristic Curves

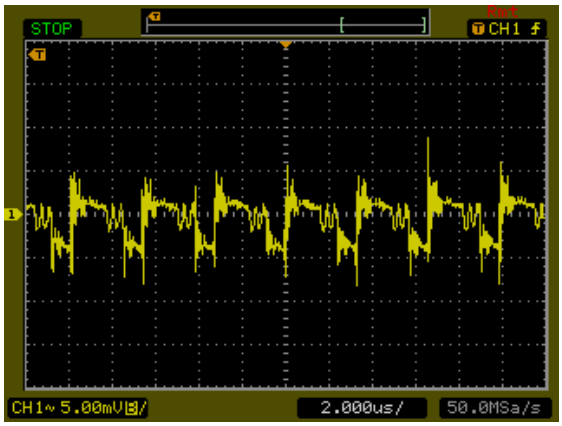
All test conditions are at 25°C The figures are identical for THL 6-2410WISM



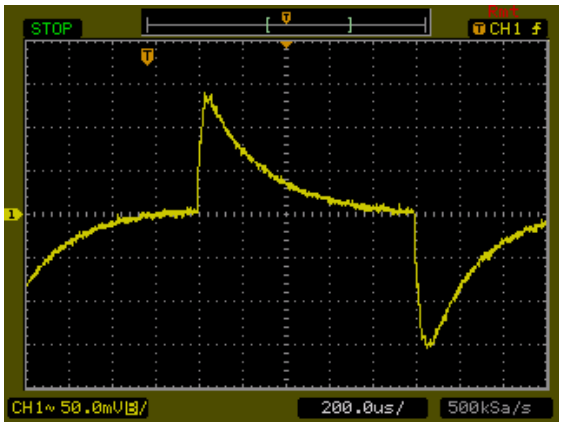
Efficiency Versus Output Current



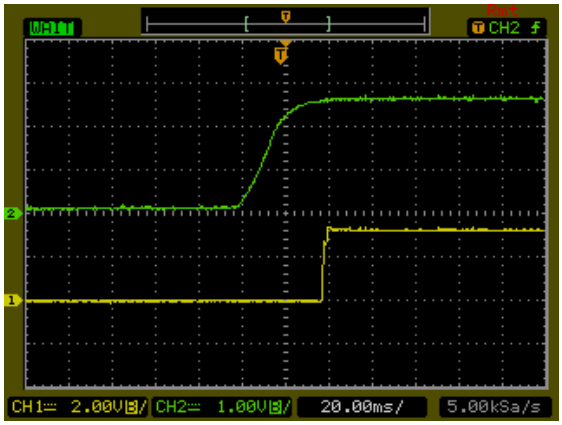
Efficiency Versus Input Voltage. Full Load



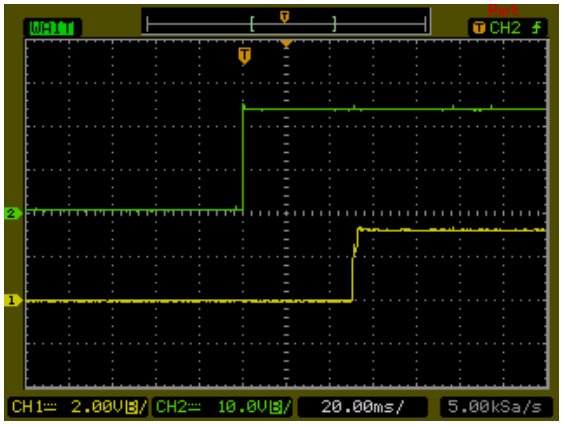
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



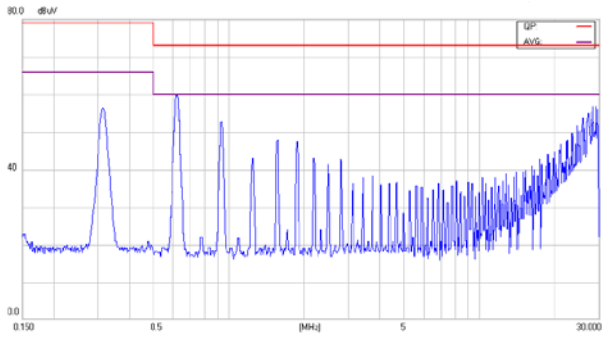
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



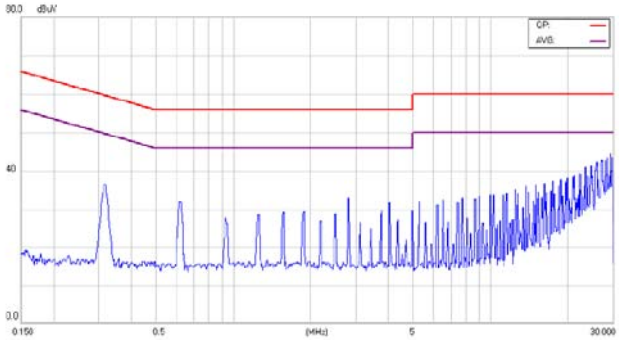
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

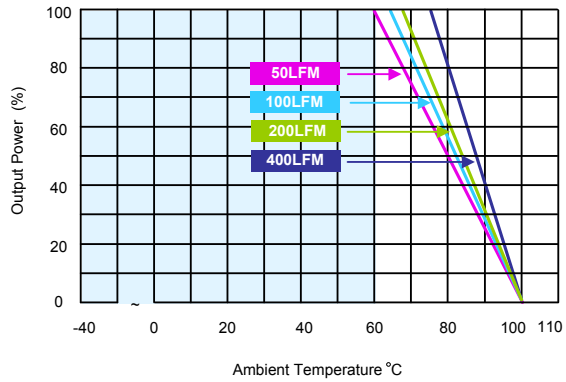
All test conditions are at 25°C The figures are identical for THL 6-2410WISM (Continued)



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



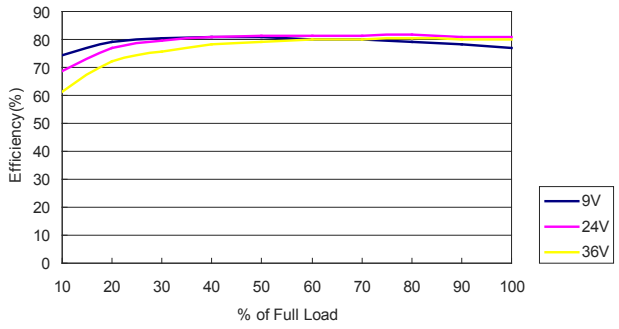
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



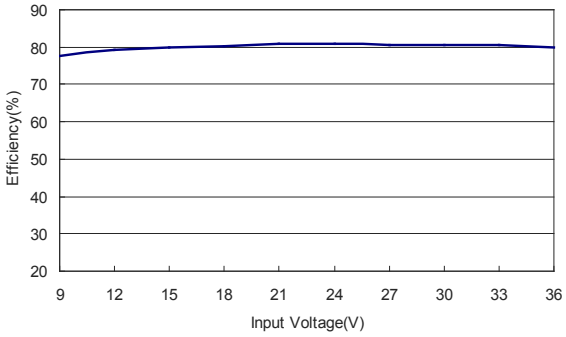
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

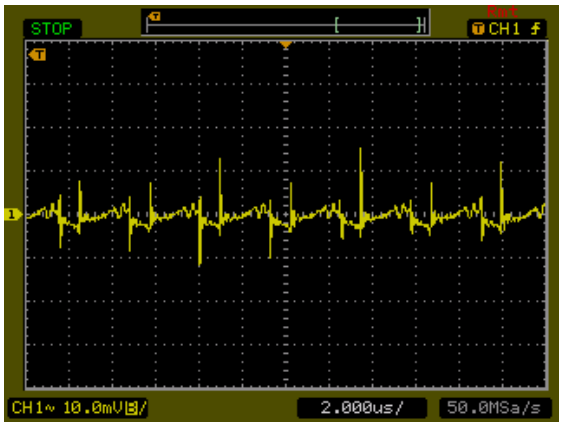
All test conditions are at 25°C The figures are identical for THL 6-2411WISM



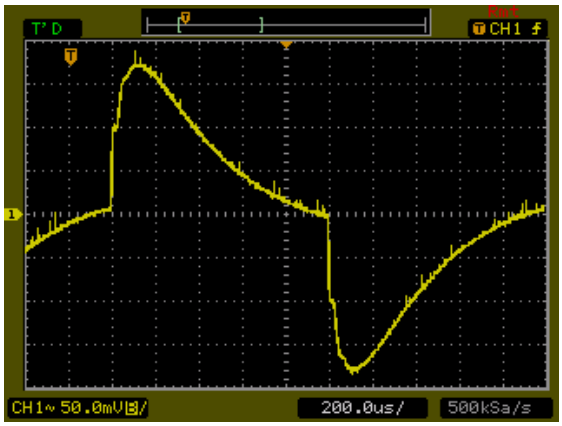
Efficiency Versus Output Current



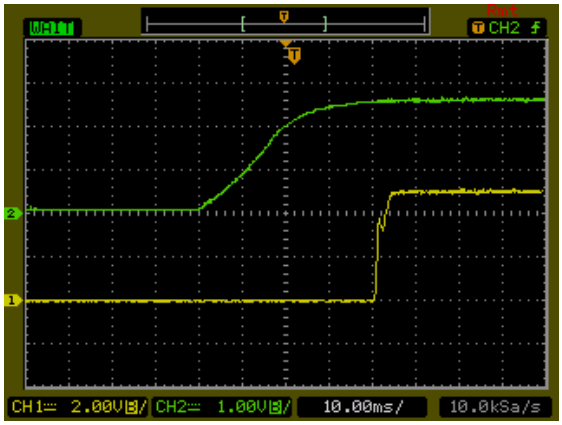
Efficiency Versus Input Voltage. Full Load



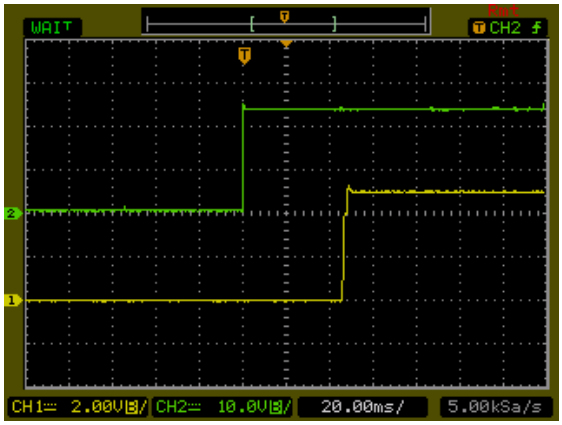
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



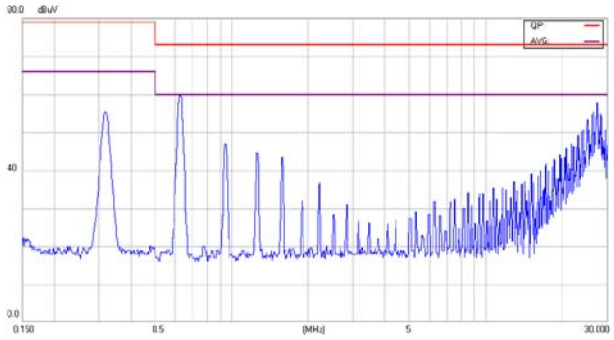
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



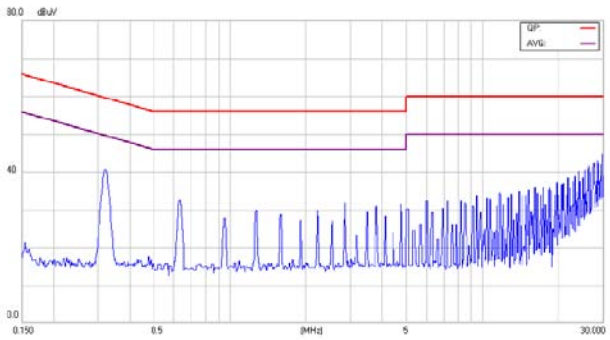
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

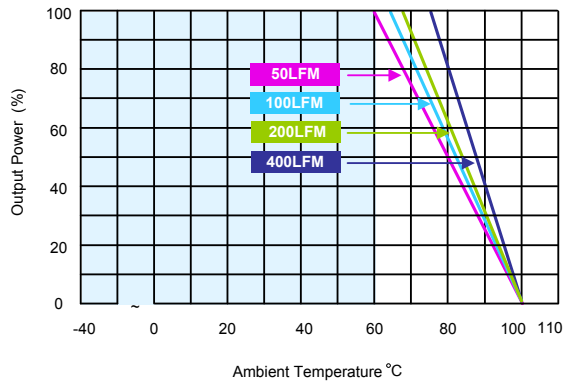
All test conditions are at 25°C The figures are identical for THL 6-2411WISM (Continued)



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



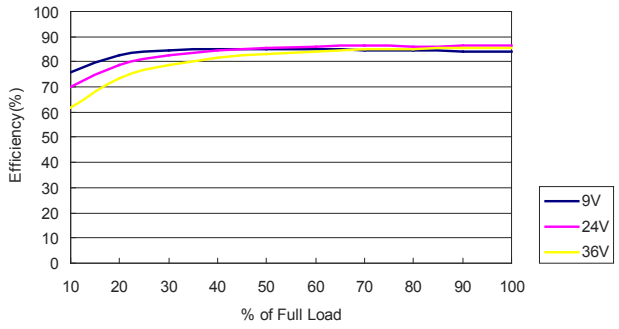
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



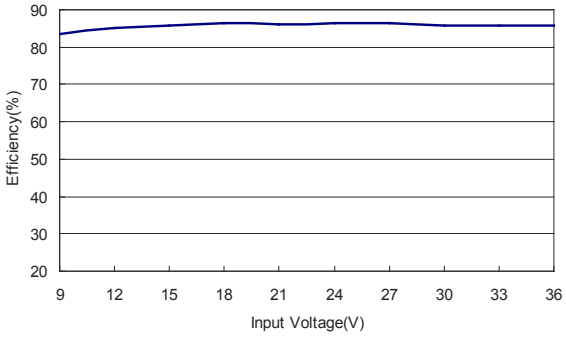
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

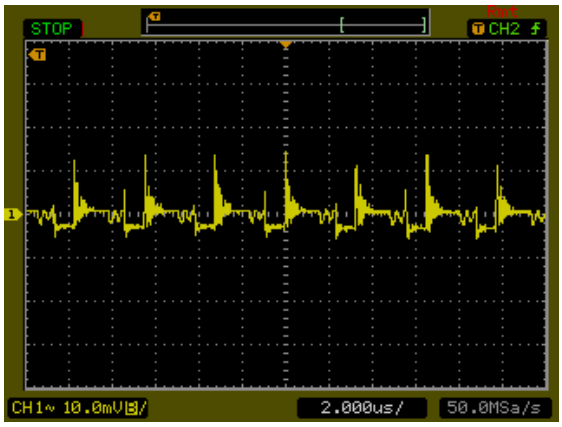
All test conditions are at 25°C The figures are identical for THL 6-2412WISM



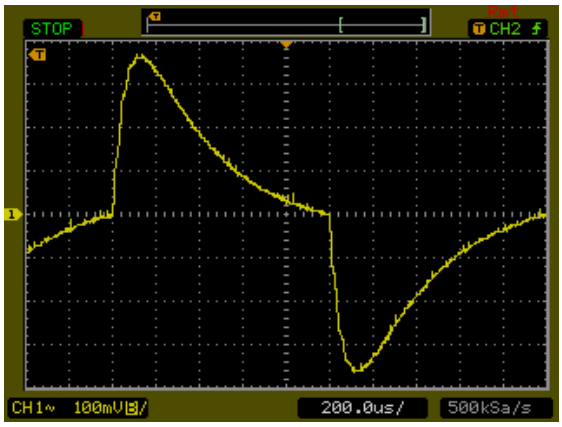
Efficiency Versus Output Current



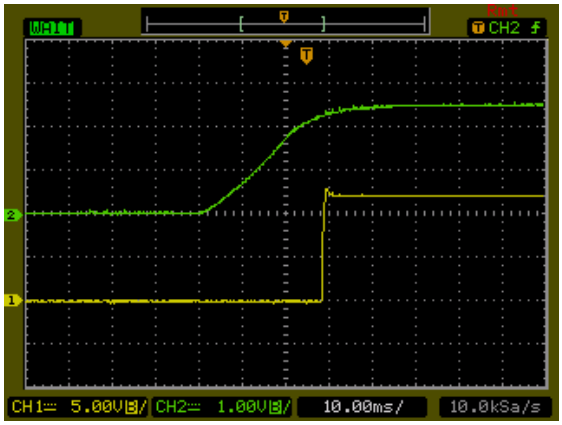
Efficiency Versus Input Voltage. Full Load



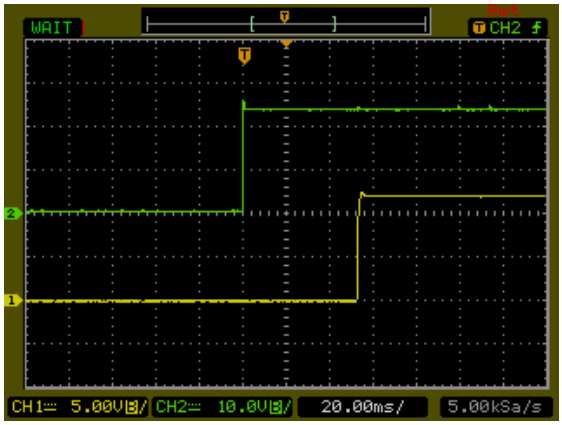
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



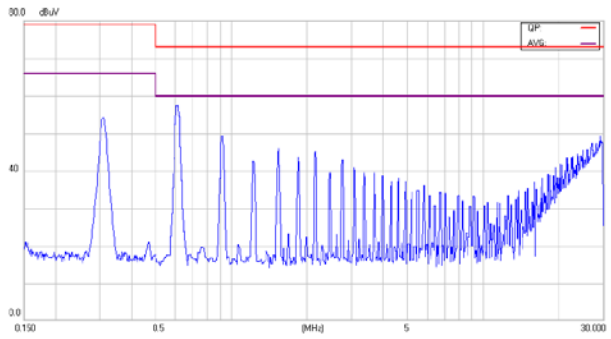
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



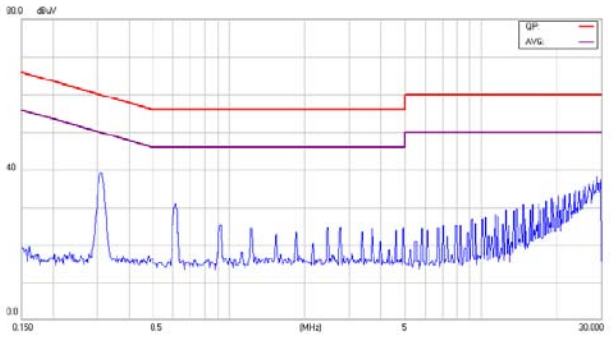
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

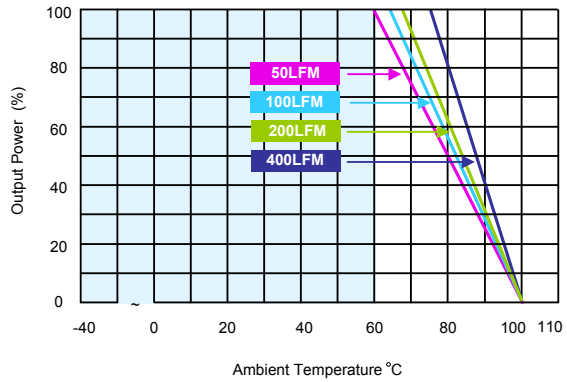
All test conditions are at 25°C The figures are identical for THL 6-2412WISM (Continued)



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



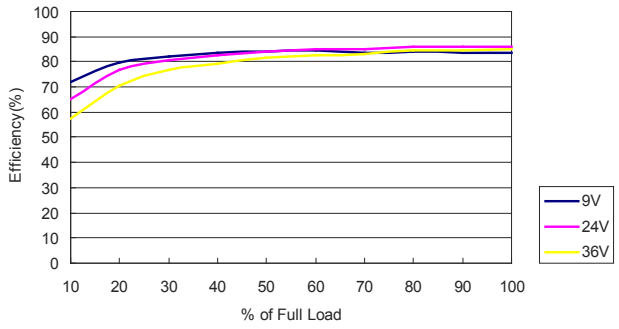
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



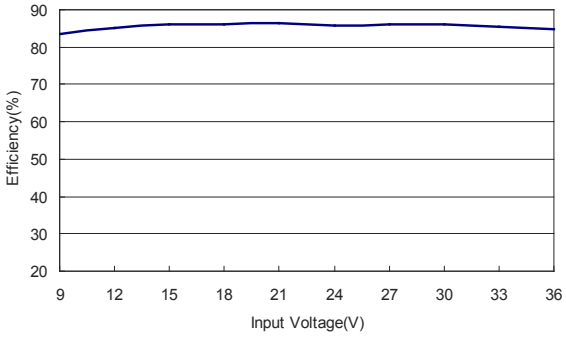
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

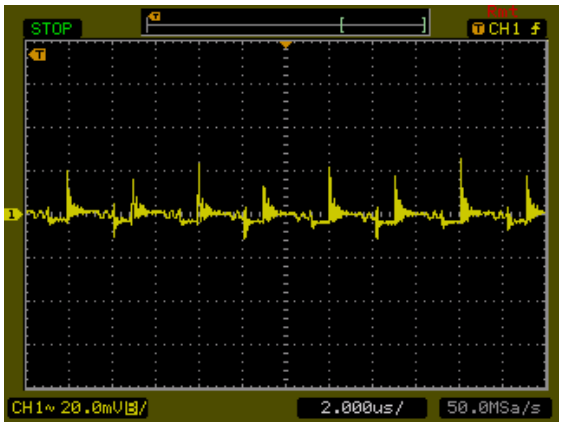
All test conditions are at 25°C The figures are identical for THL 6-2413WISM



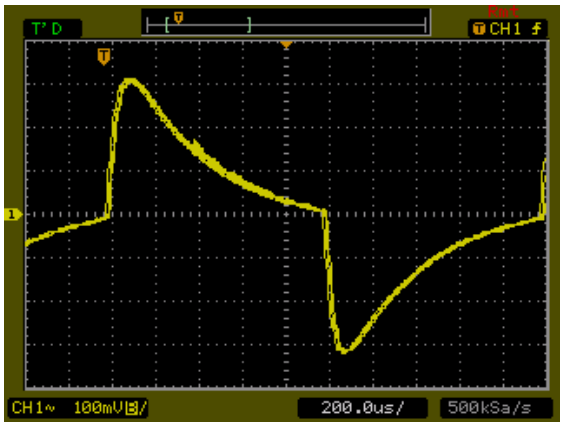
Efficiency Versus Output Current



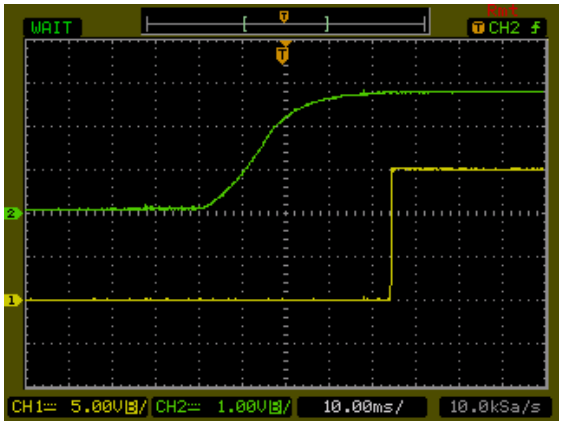
Efficiency Versus Input Voltage. Full Load



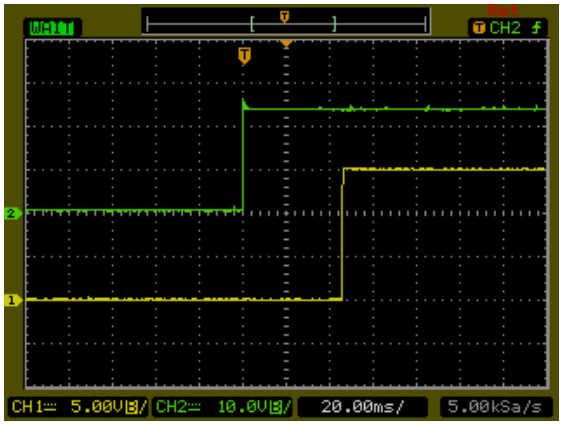
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



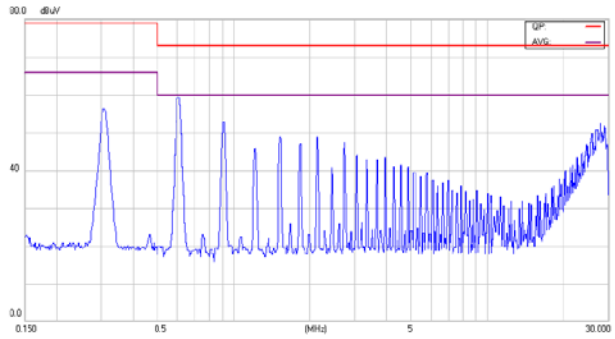
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



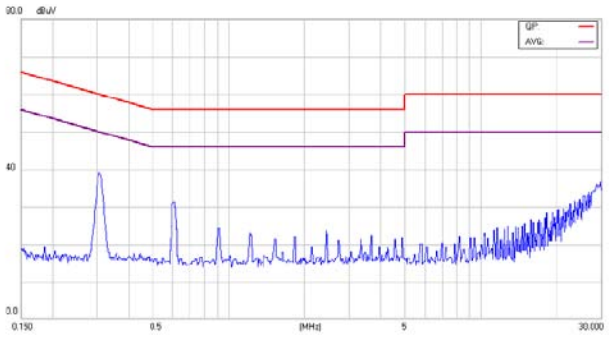
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

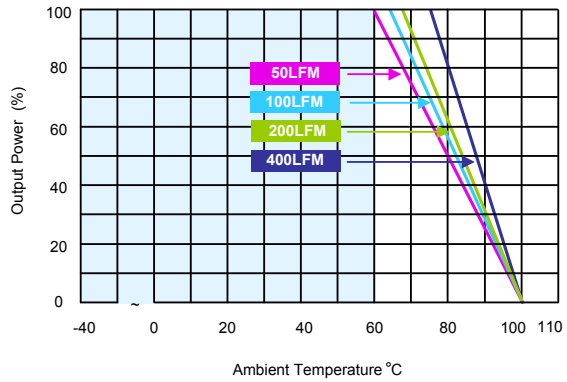
All test conditions are at 25°C The figures are identical for THL 6-2413WISM (Continued)



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



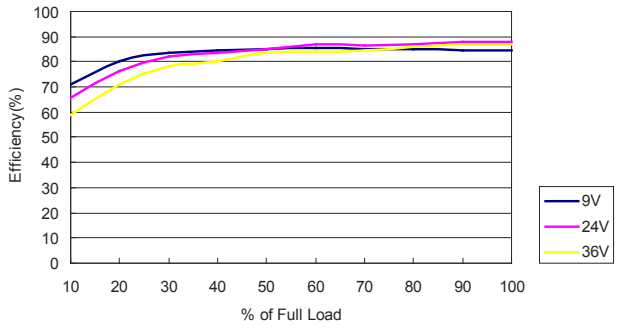
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



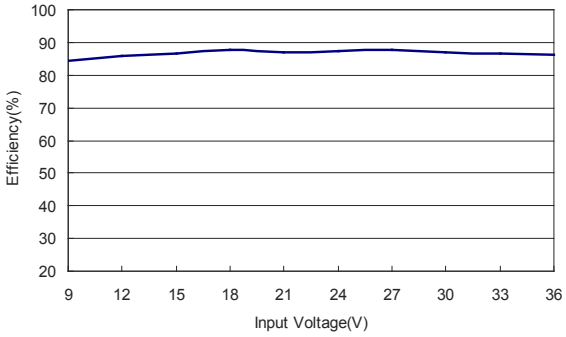
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

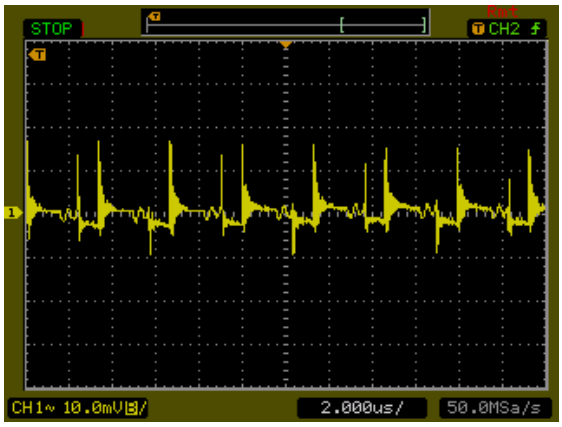
All test conditions are at 25°C The figures are identical for THL 6-2415WISM



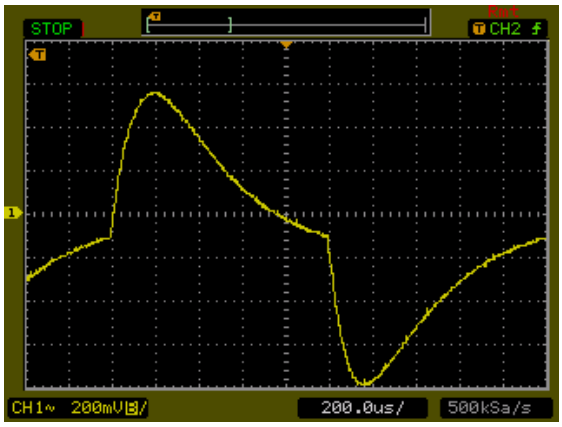
Efficiency Versus Output Current



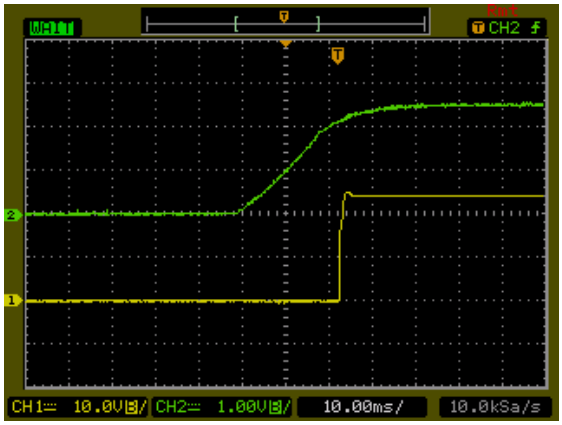
Efficiency Versus Input Voltage. Full Load



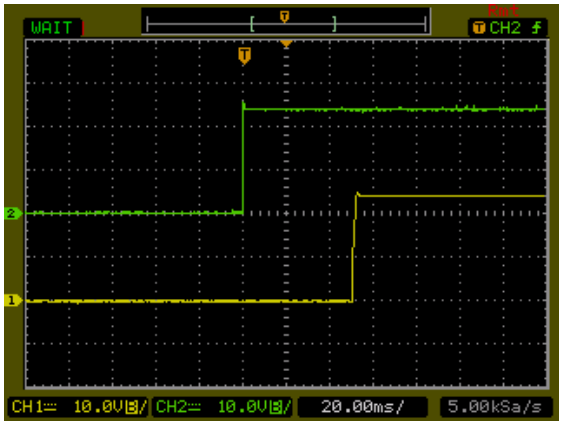
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



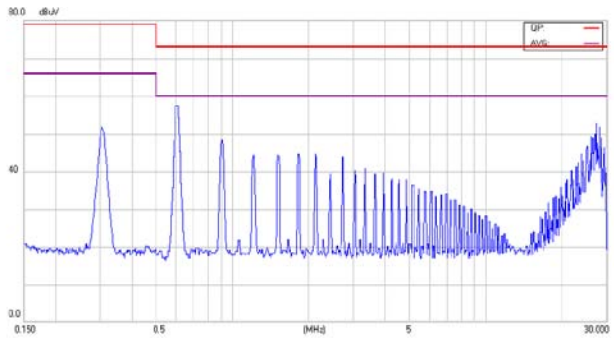
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



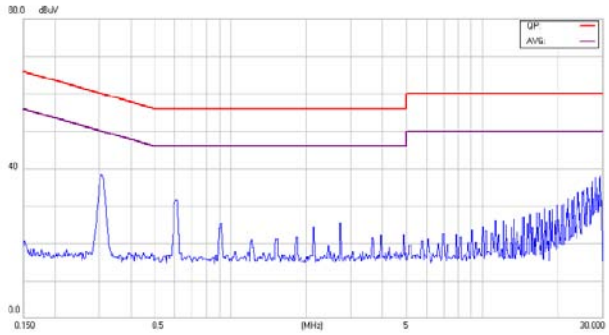
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

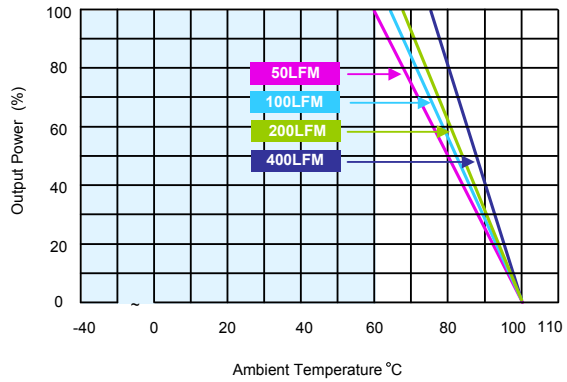
All test conditions are at 25°C The figures are identical for THL 6-2415WISM (Continued)



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



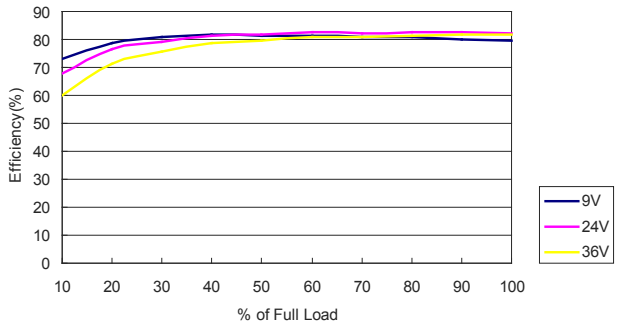
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



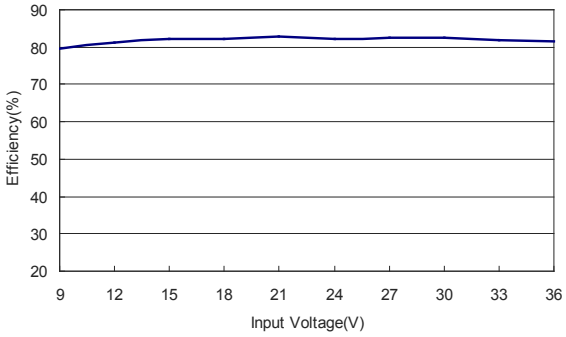
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

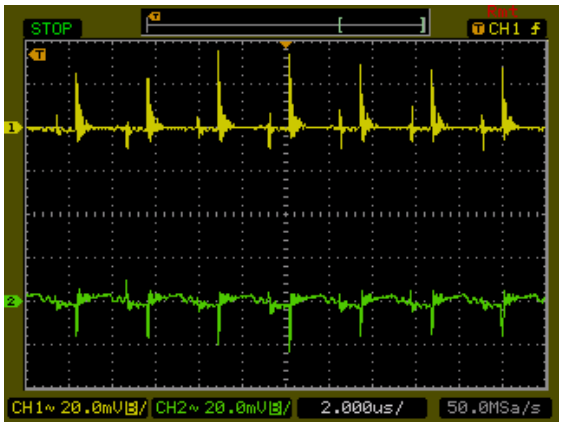
All test conditions are at 25°C The figures are identical for THL 6-2421WISM



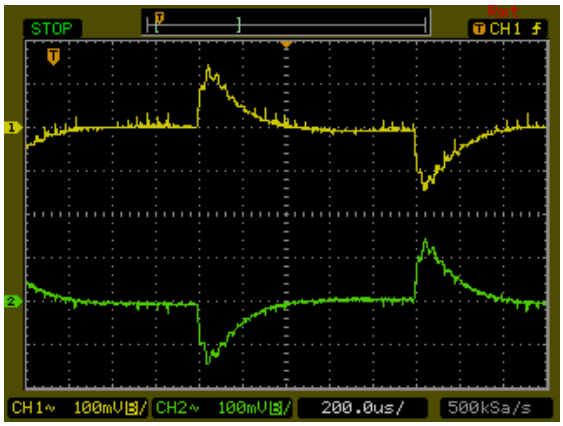
Efficiency Versus Output Current



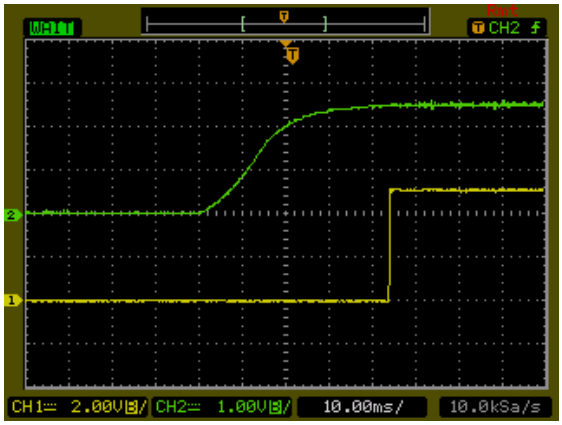
Efficiency Versus Input Voltage. Full Load



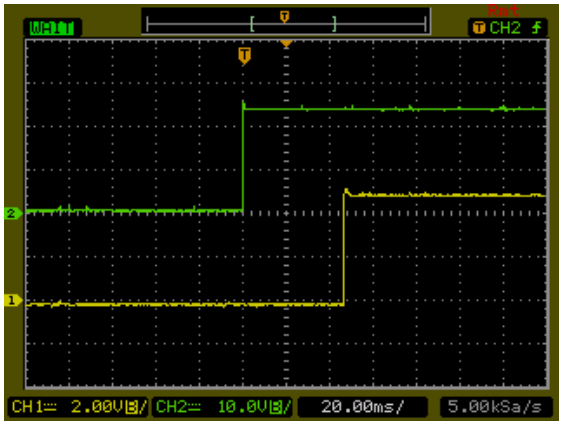
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



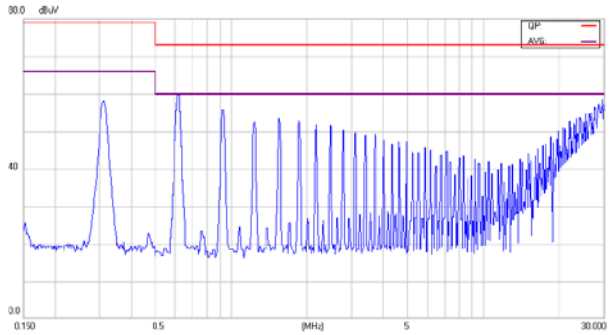
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



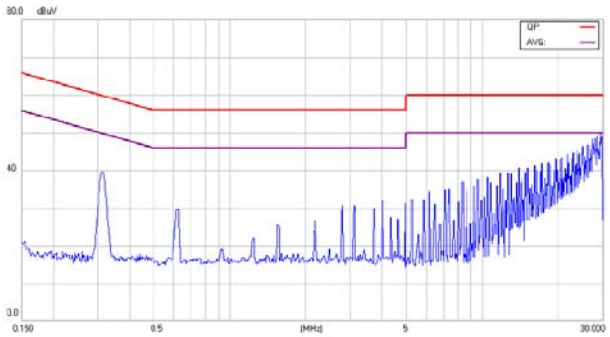
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

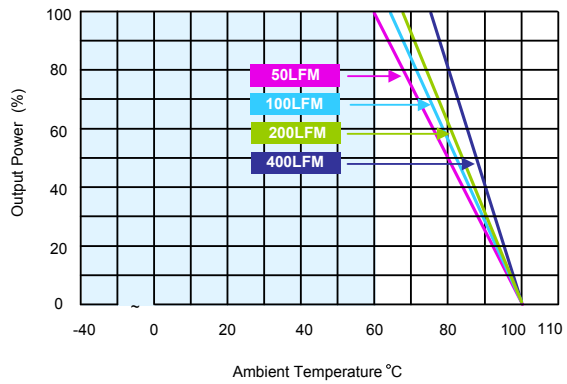
All test conditions are at 25°C The figures are identical for THL 6-2421WISM (Continued)



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



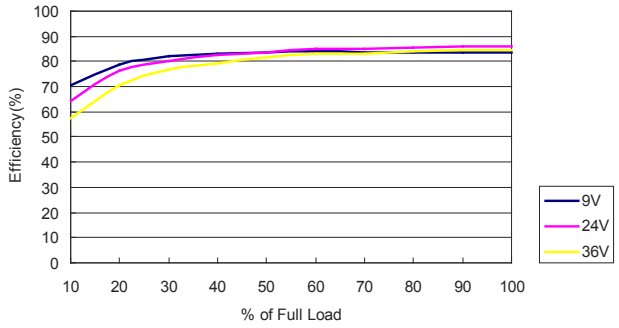
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



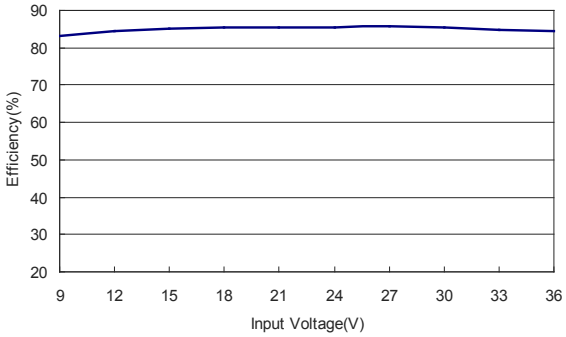
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

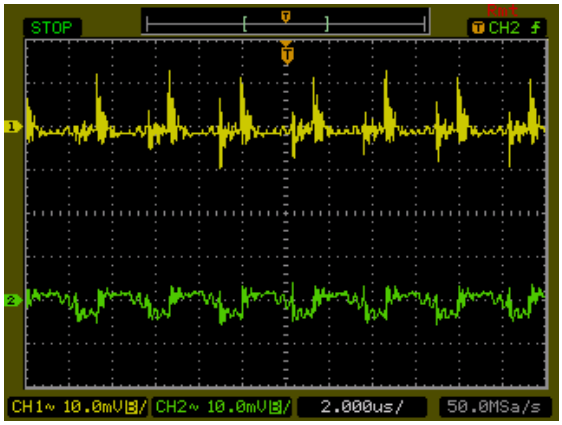
All test conditions are at 25°C The figures are identical for THL 6-2422WISM



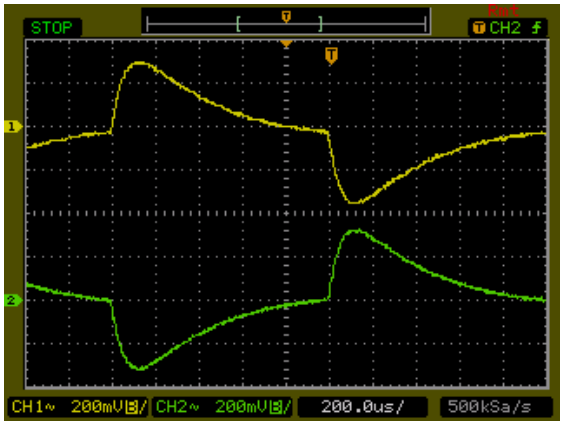
Efficiency Versus Output Current



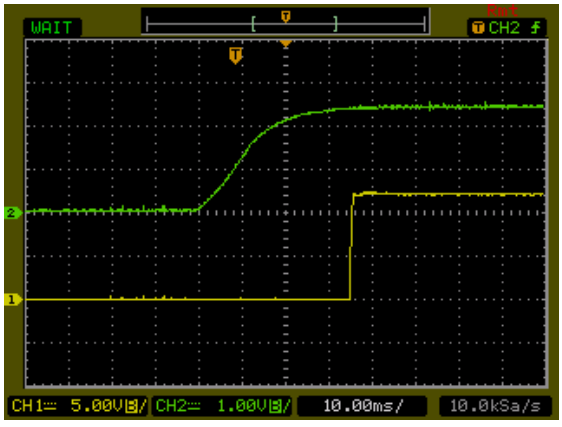
Efficiency Versus Input Voltage. Full Load



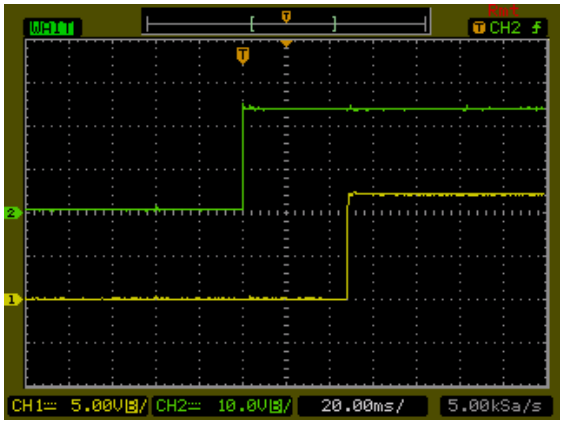
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



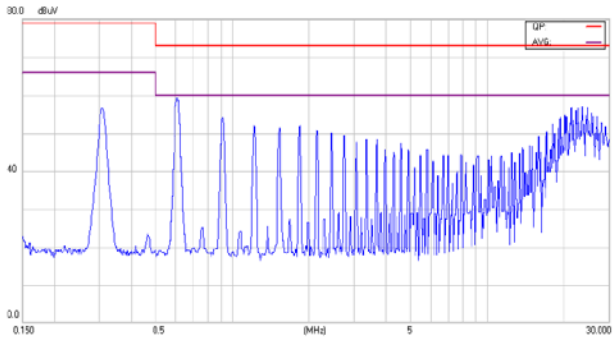
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



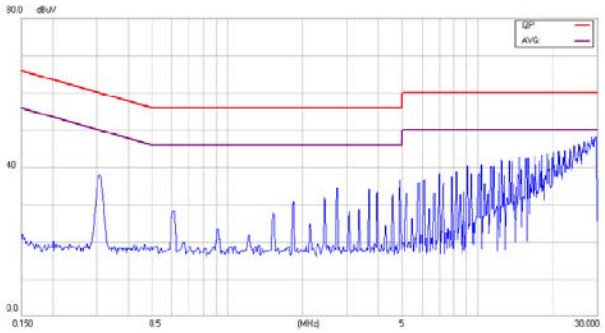
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

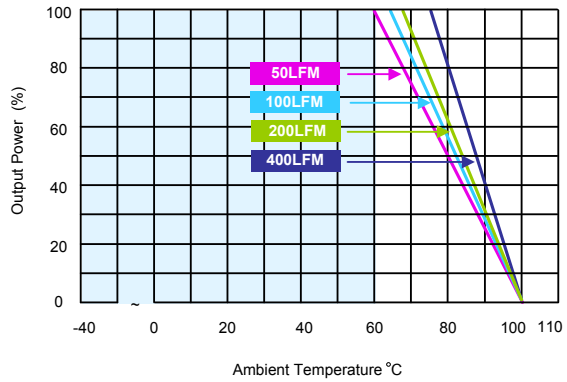
All test conditions are at 25°C The figures are identical for THL 6-2422WISM (Continued)



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



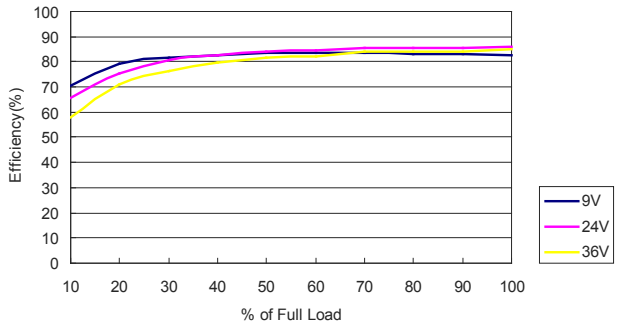
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



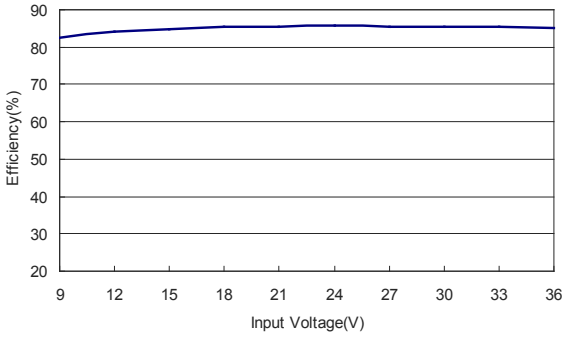
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

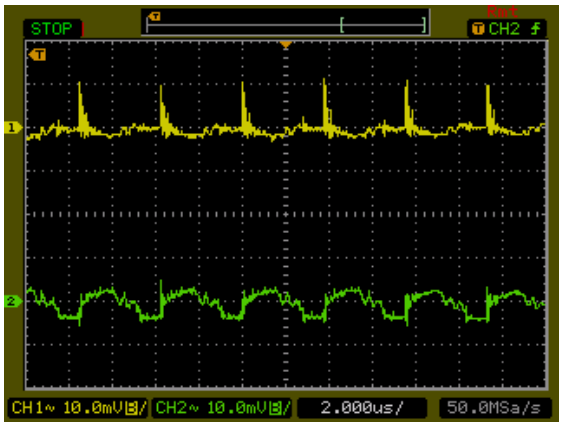
All test conditions are at 25°C The figures are identical for THL 6-2423WISM



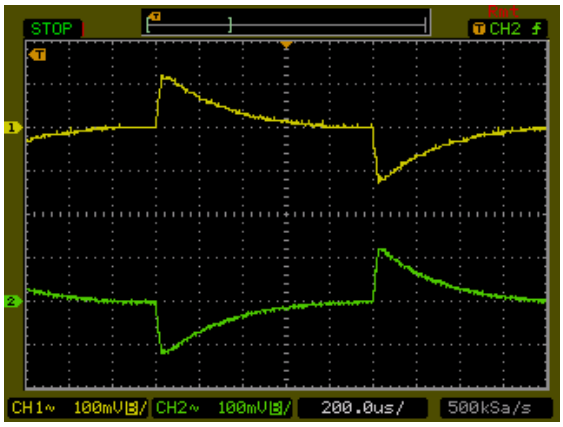
Efficiency Versus Output Current



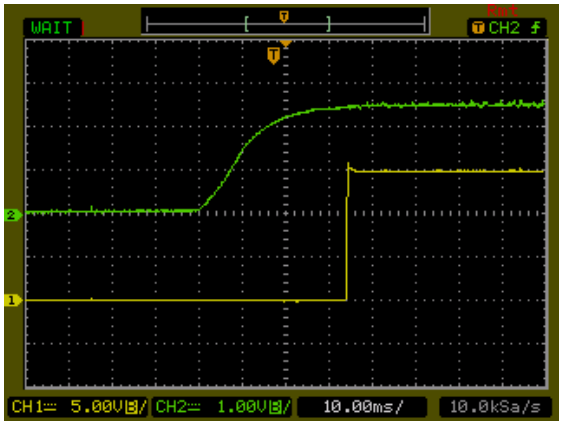
Efficiency Versus Input Voltage. Full Load



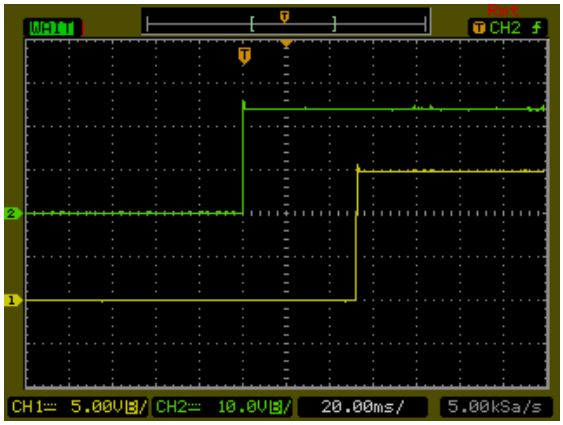
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



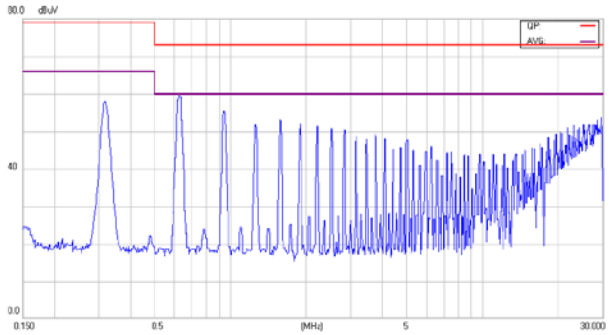
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



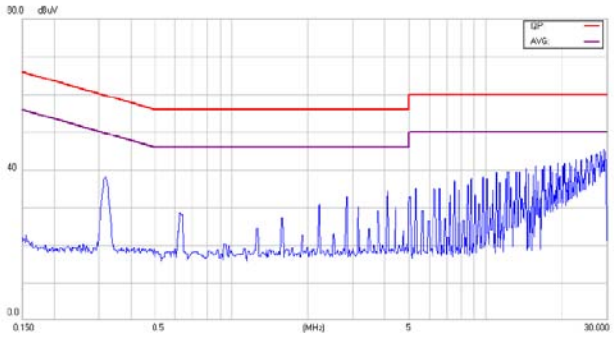
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

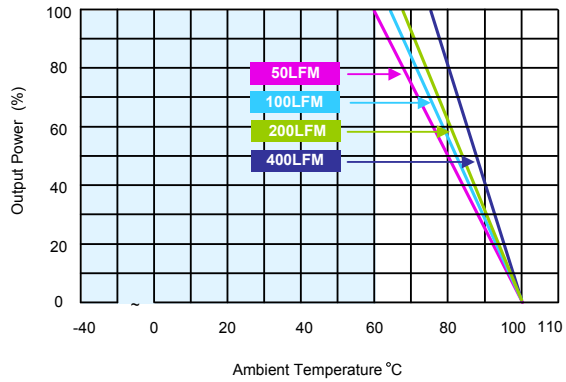
All test conditions are at 25°C The figures are identical for THL 6-2423WISM (Continued)



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



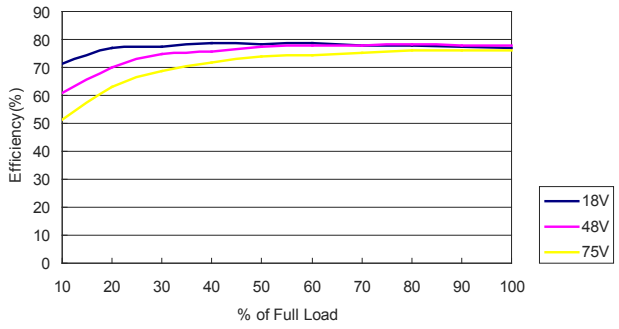
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



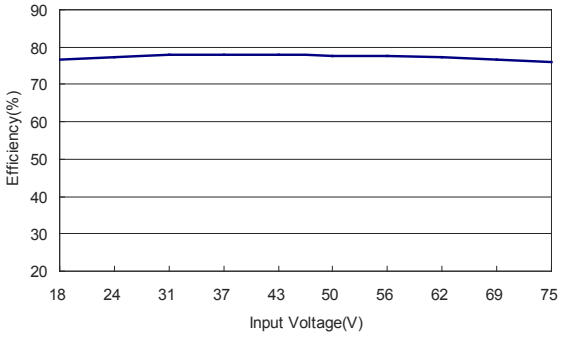
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

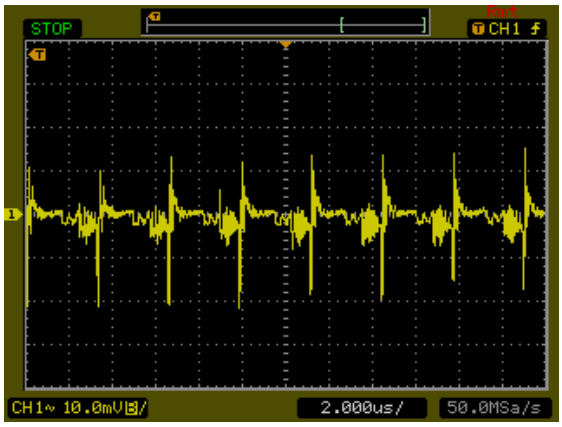
All test conditions are at 25°C The figures are identical for THL 6-4810WISM



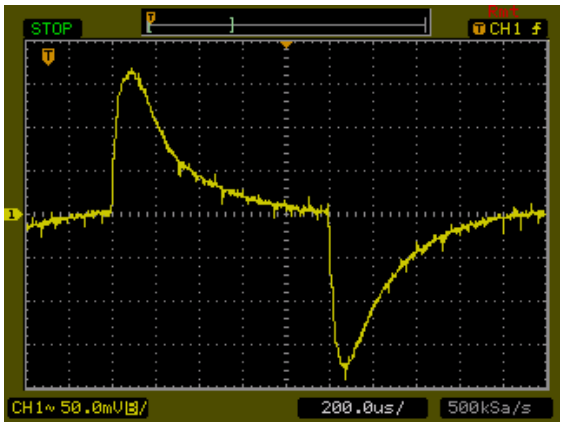
Efficiency Versus Output Current



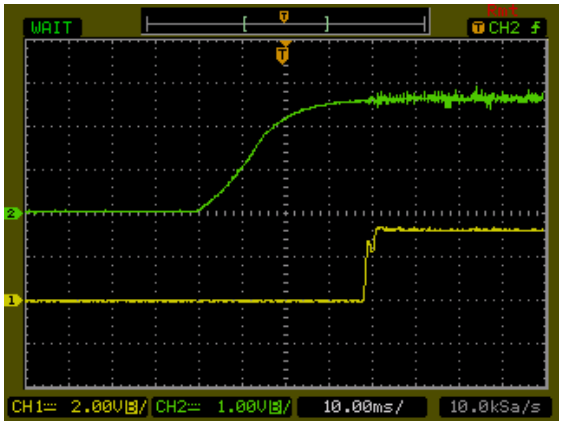
Efficiency Versus Input Voltage. Full Load



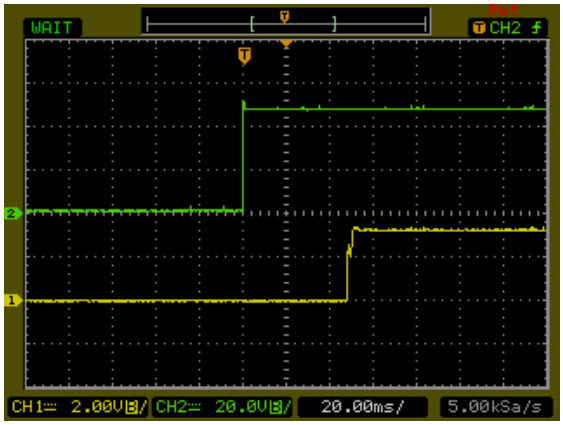
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



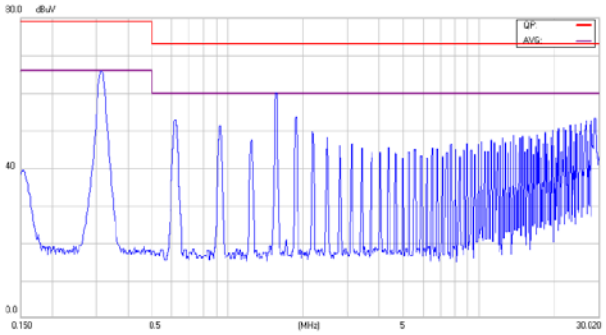
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



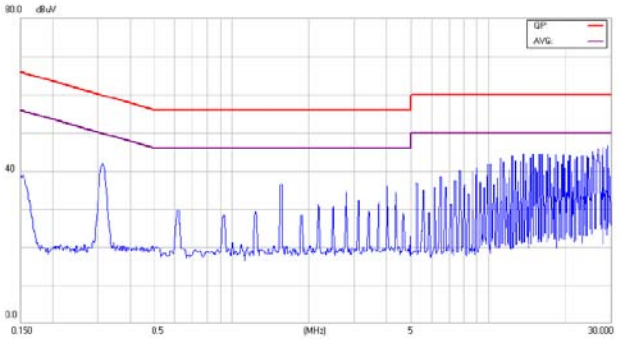
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

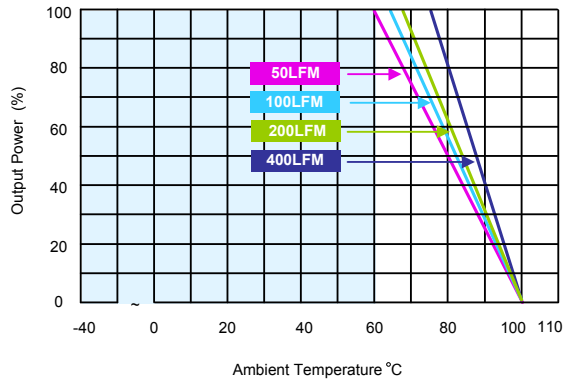
All test conditions are at 25°C The figures are identical for THL 6-4810WISM (Continued)



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



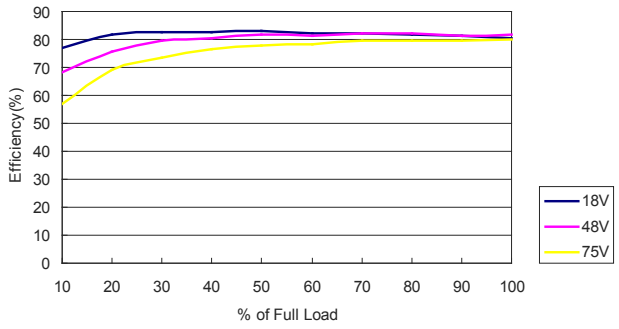
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



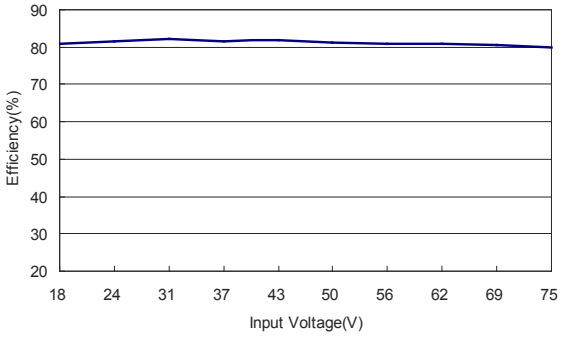
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

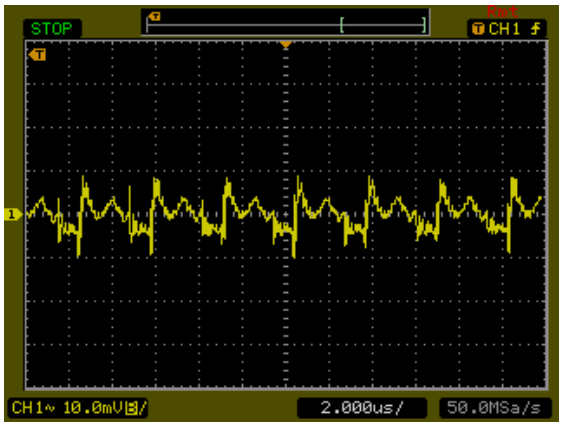
All test conditions are at 25°C The figures are identical for THL 6-4811WISM



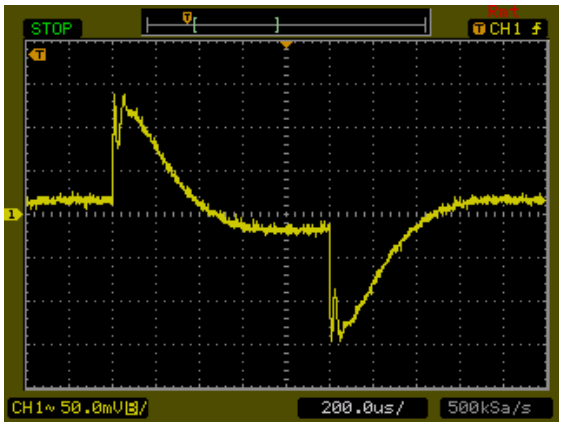
Efficiency Versus Output Current



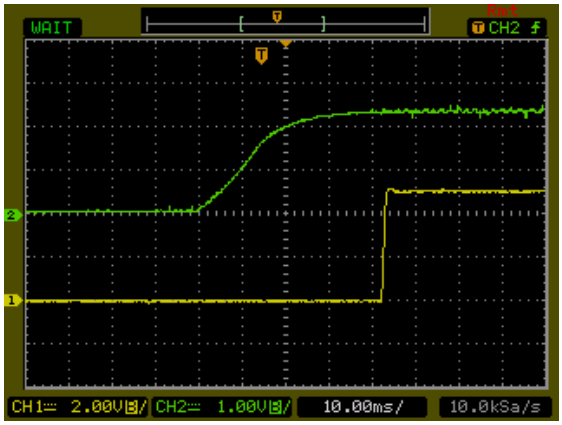
Efficiency Versus Input Voltage. Full Load



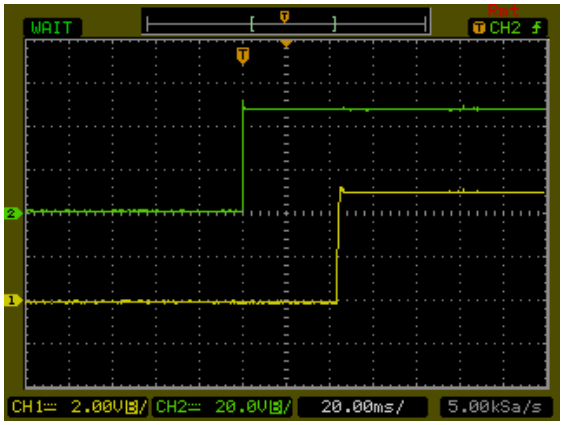
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



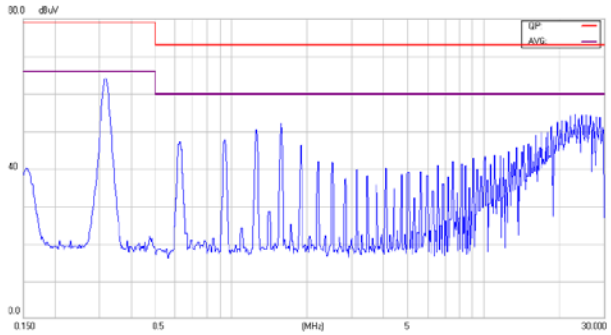
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



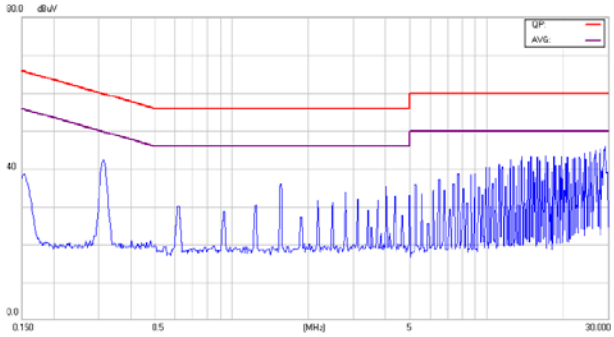
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

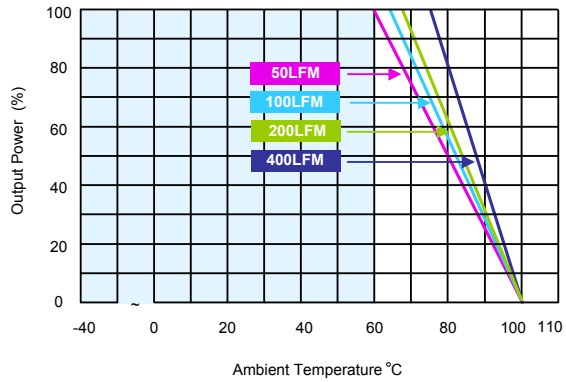
All test conditions are at 25°C The figures are identical for THL 6-4811WISM (Continued)



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



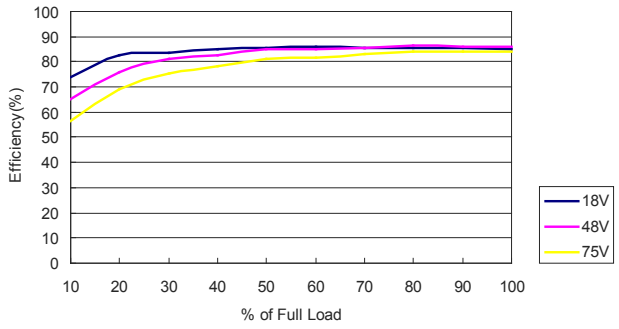
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



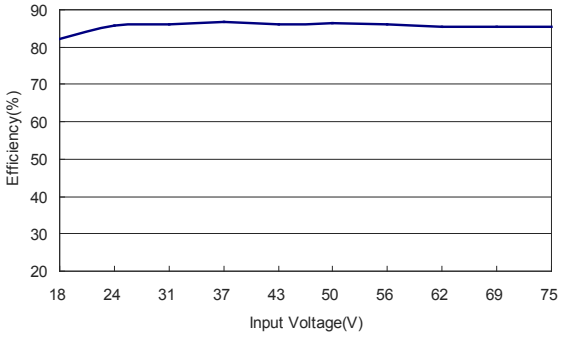
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

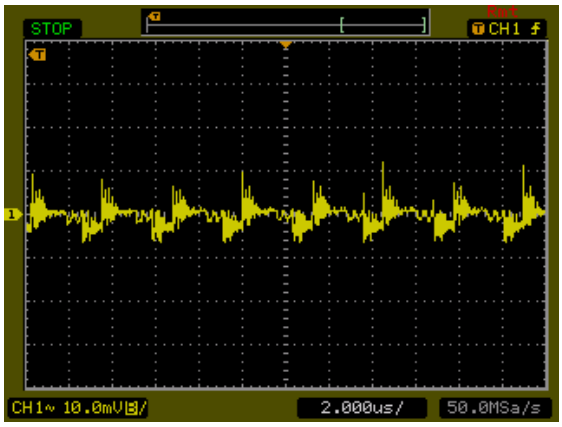
All test conditions are at 25°C The figures are identical for THL 6-4812WISM



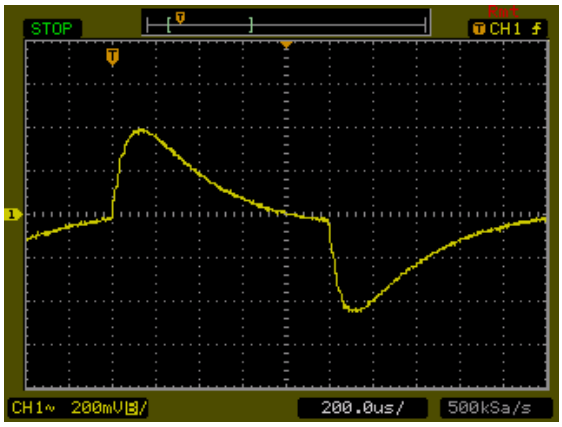
Efficiency Versus Output Current



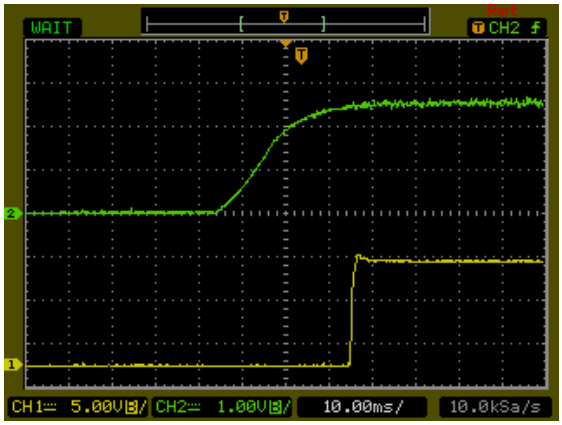
Efficiency Versus Input Voltage. Full Load



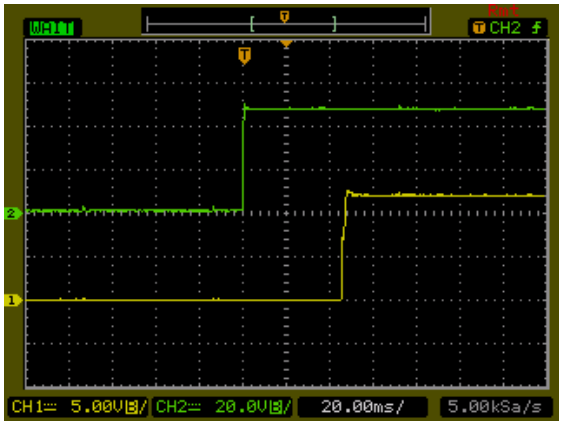
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



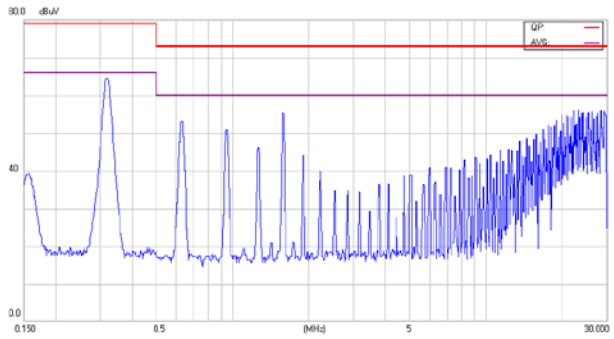
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



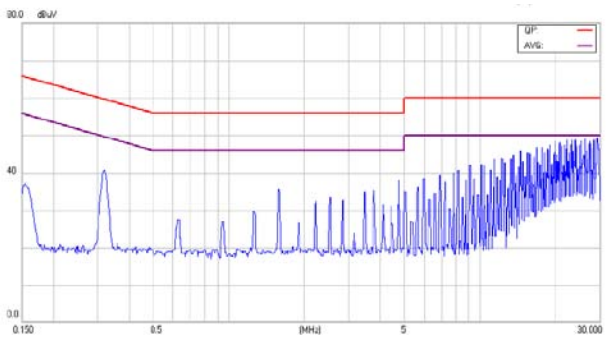
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

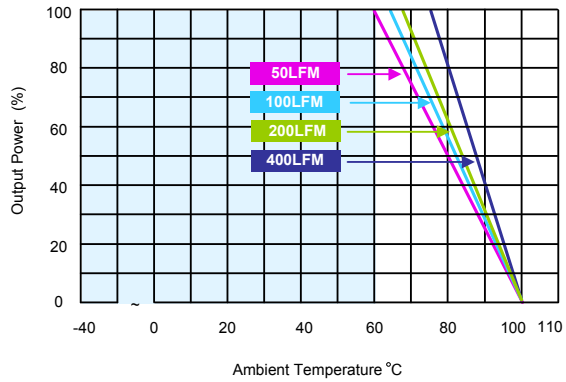
All test conditions are at 25°C The figures are identical for THL 6-4812WISM (Continued)



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



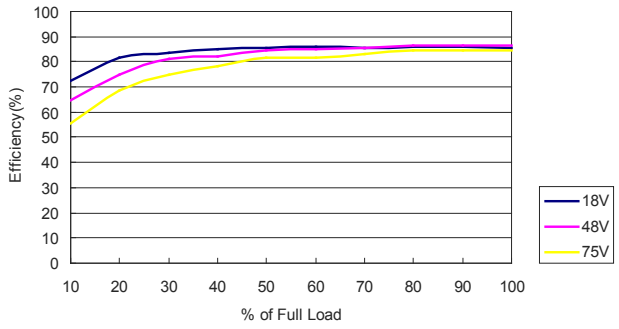
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



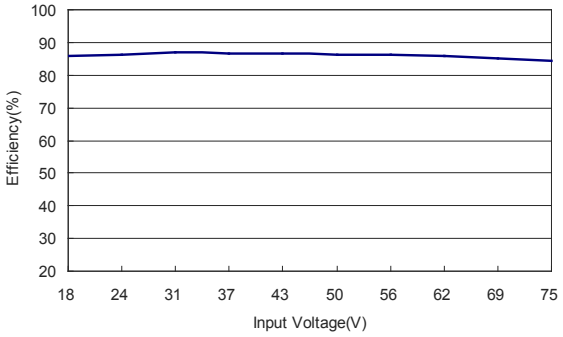
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

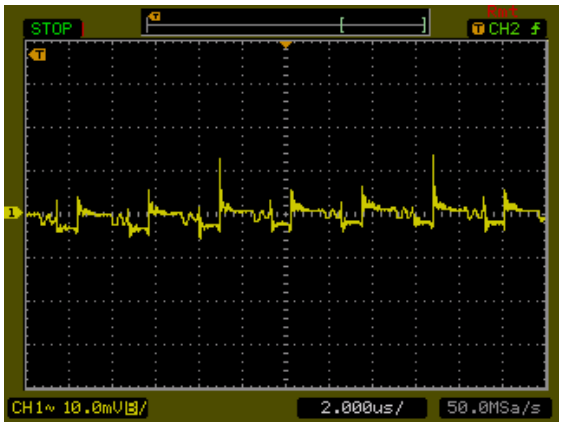
All test conditions are at 25°C The figures are identical for THL 6-4813WISM



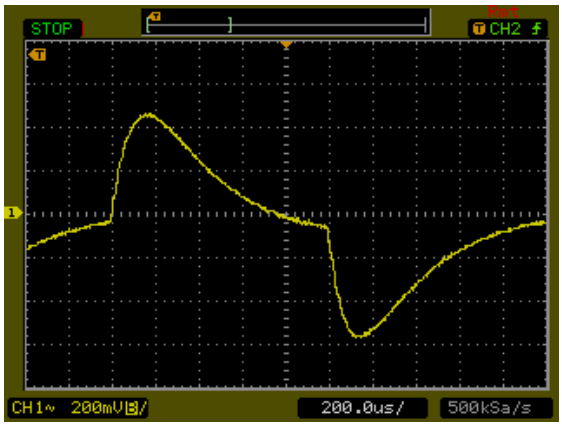
Efficiency Versus Output Current



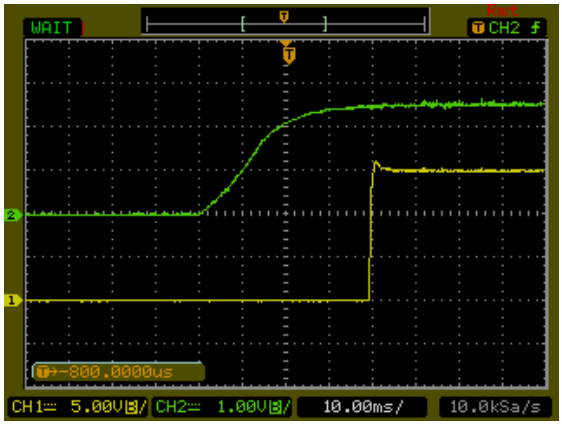
Efficiency Versus Input Voltage. Full Load



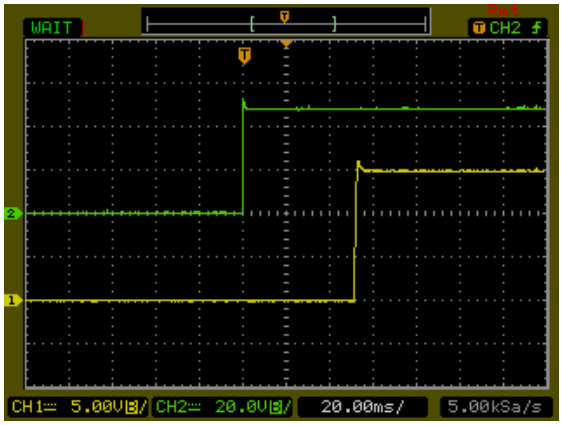
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



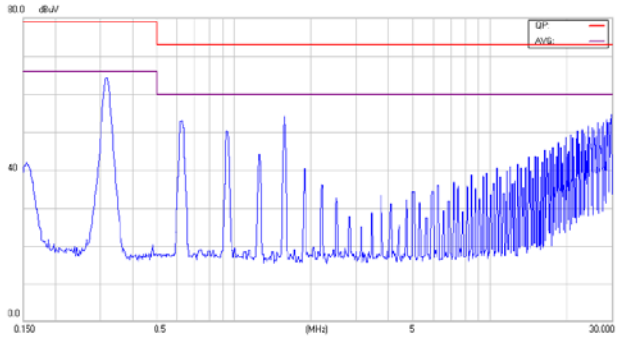
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



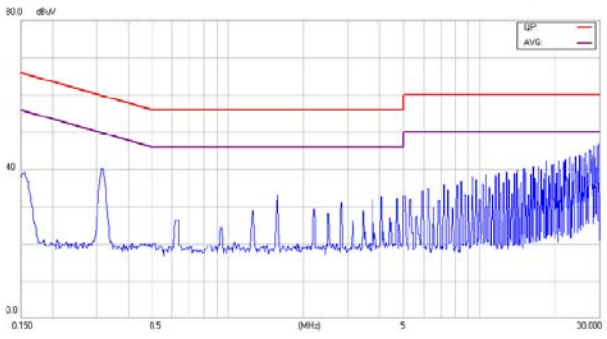
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

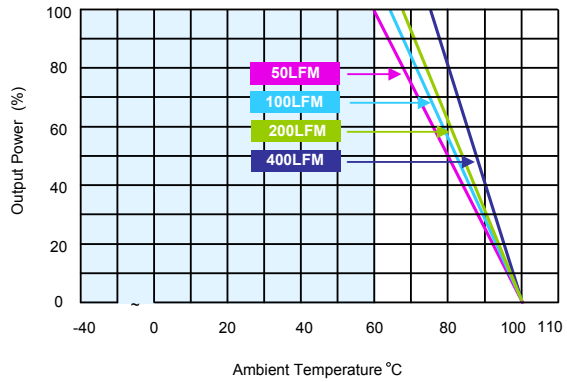
All test conditions are at 25°C The figures are identical for THL 6-4813WISM (Continued)



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



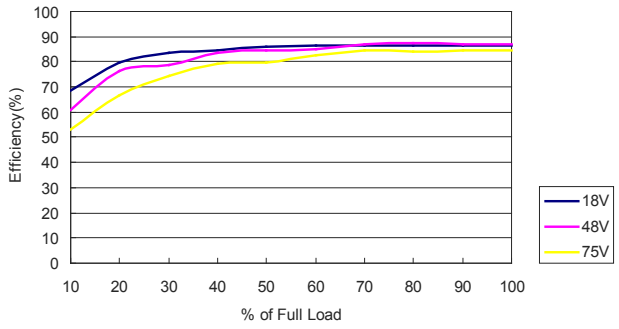
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



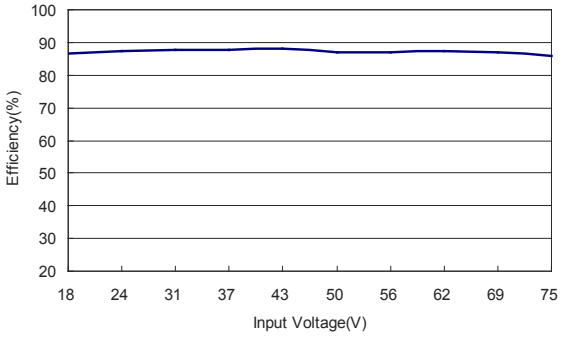
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

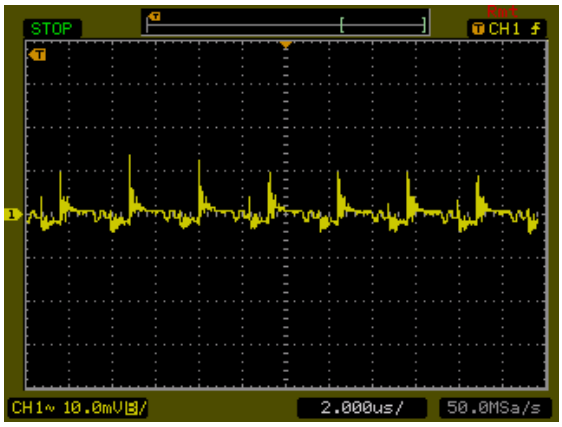
All test conditions are at 25°C The figures are identical for THL 6-4815WISM



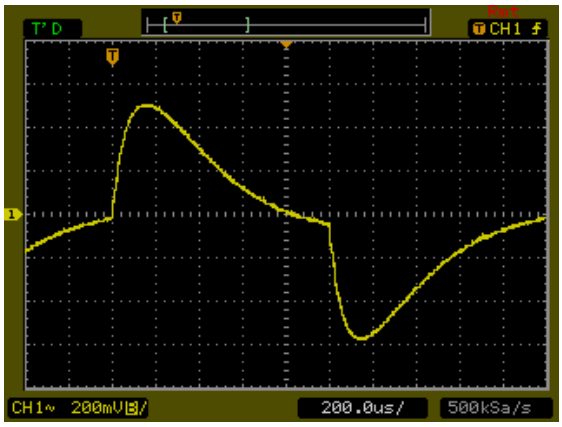
Efficiency Versus Output Current



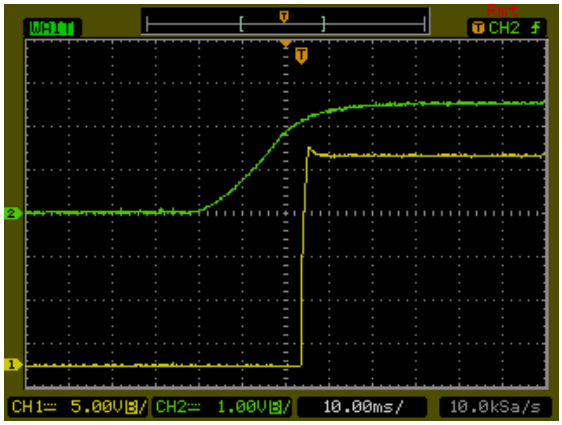
Efficiency Versus Input Voltage. Full Load



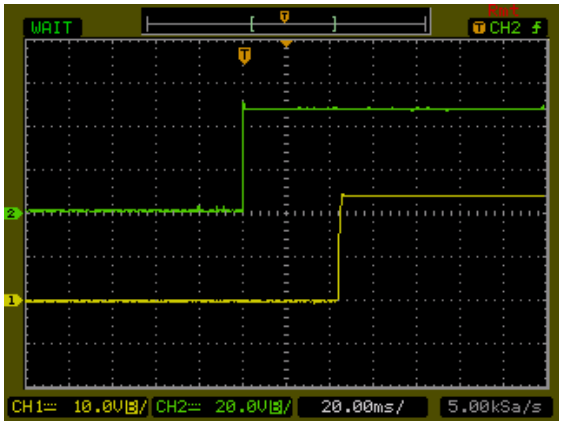
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



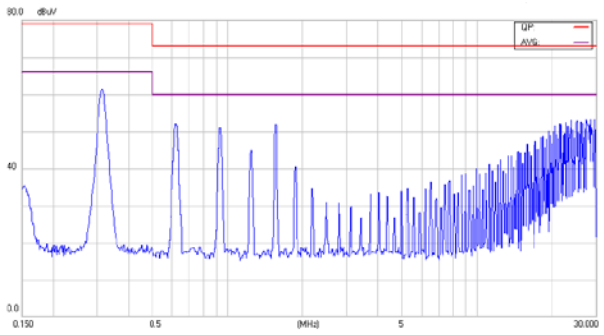
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



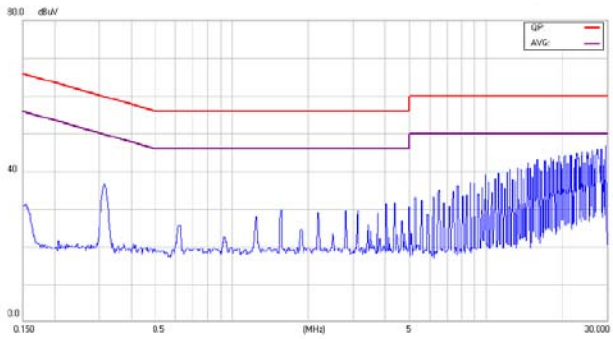
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

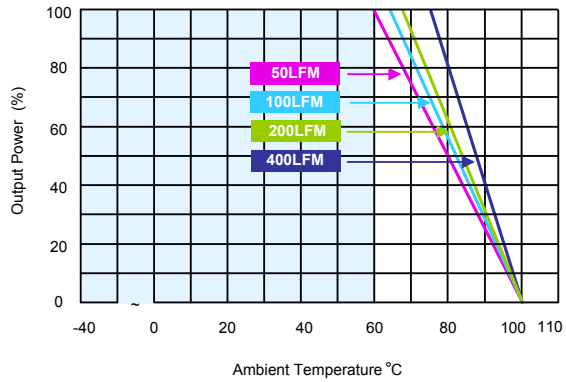
All test conditions are at 25°C The figures are identical for THL 6-4815WISM (Continued)



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



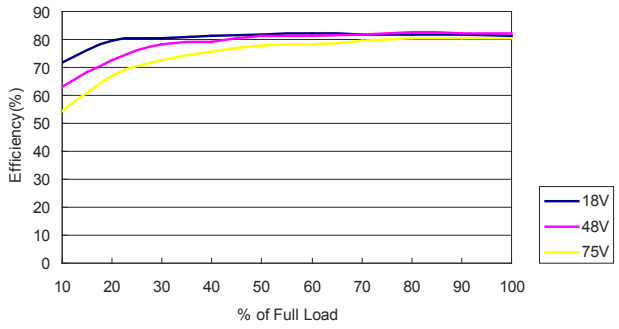
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



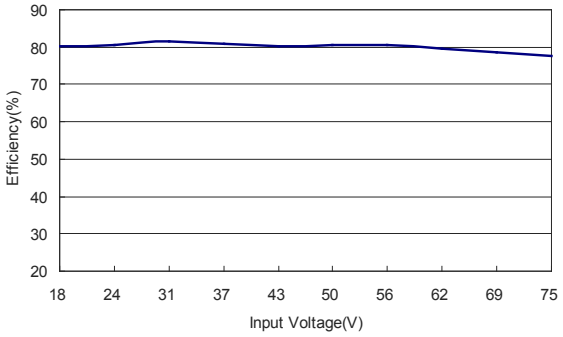
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

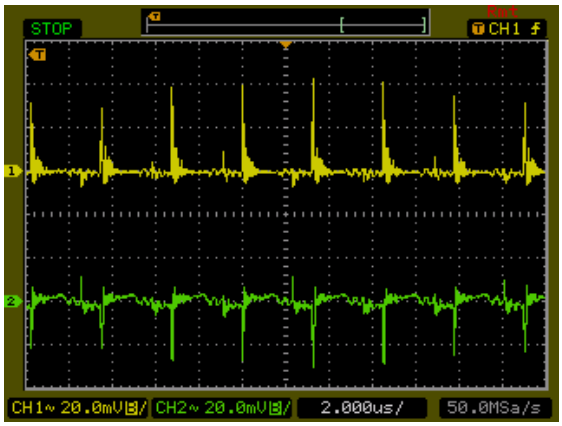
All test conditions are at 25°C The figures are identical for THL 6-4821WISM



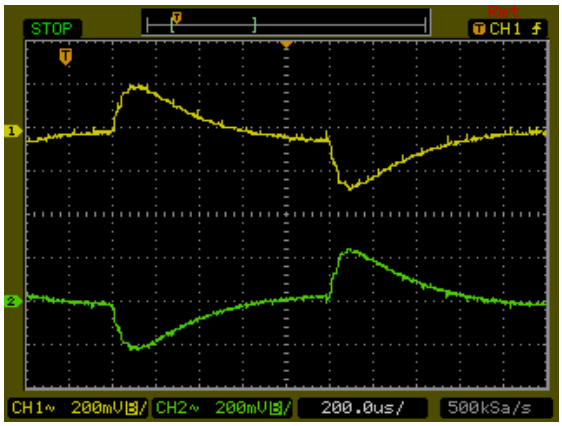
Efficiency Versus Output Current



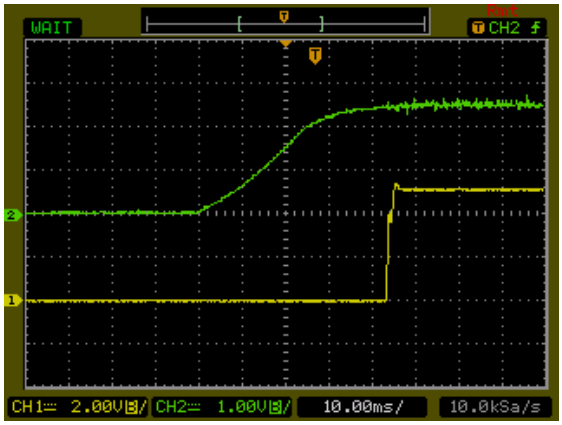
Efficiency Versus Input Voltage. Full Load



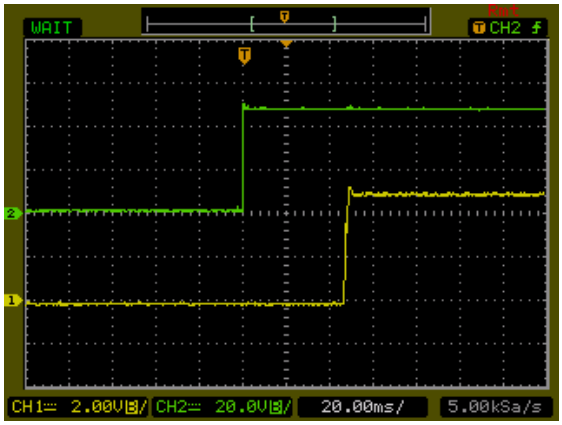
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



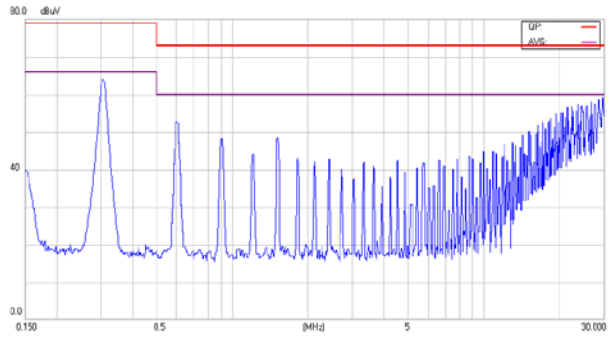
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



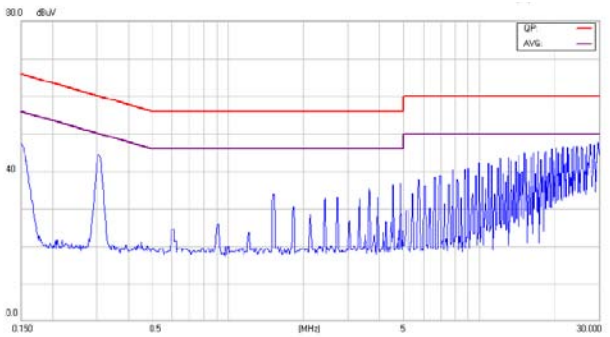
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

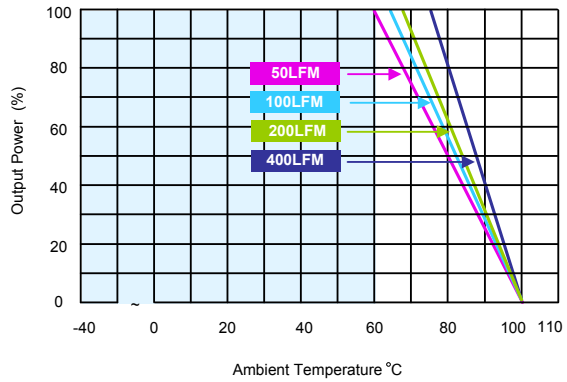
All test conditions are at 25°C The figures are identical for THL 6-4821WISM (Continued)



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



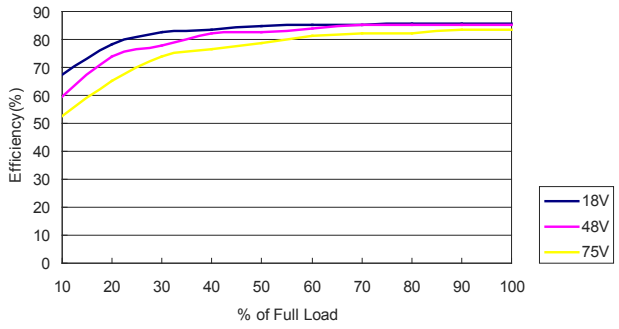
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



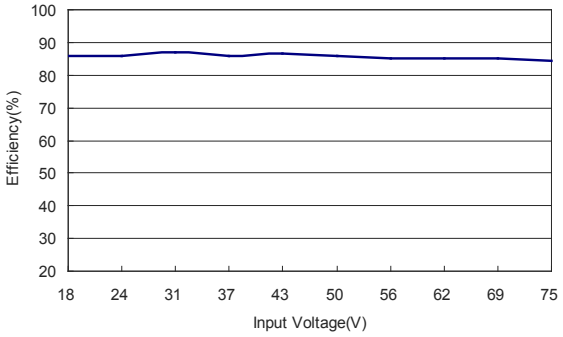
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

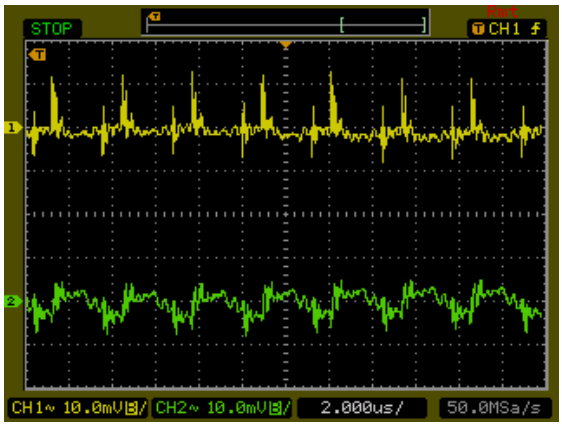
All test conditions are at 25°C The figures are identical for THL 6-4822WISM



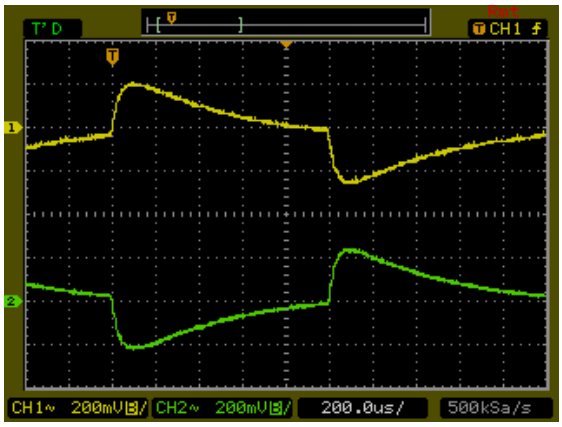
Efficiency Versus Output Current



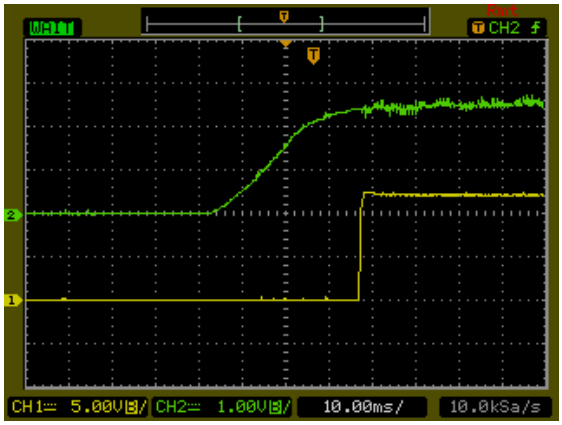
Efficiency Versus Input Voltage. Full Load



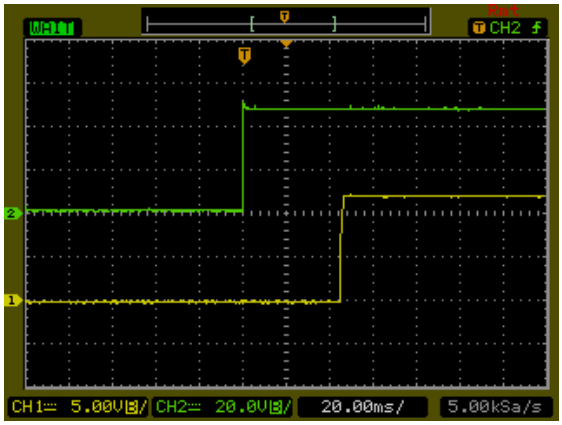
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



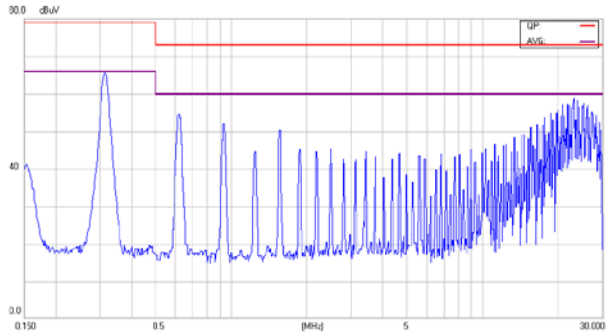
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



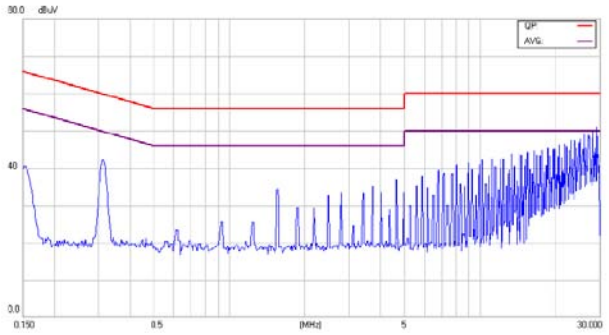
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

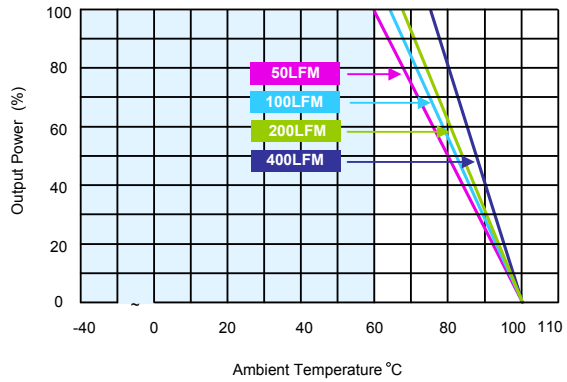
All test conditions are at 25°C The figures are identical for THL 6-4822WISM (Continued)



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



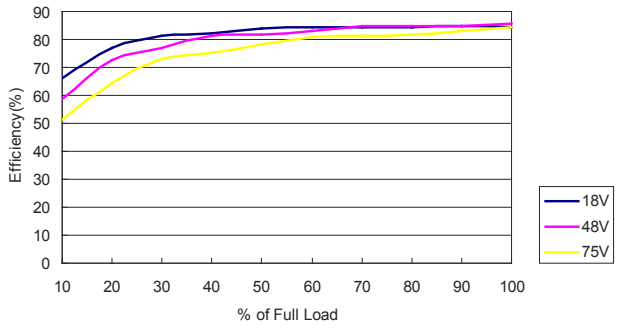
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



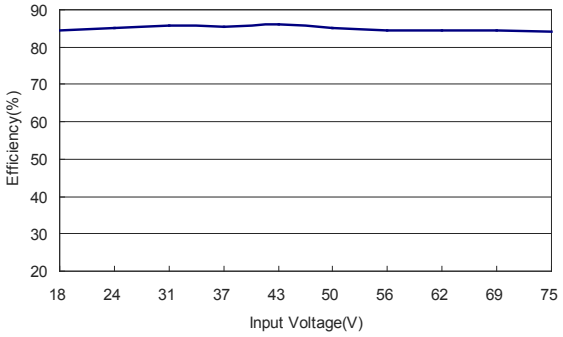
Derating Output Current Versus Ambient Temperature and Airflow
V_{in} =$V_{in\ nom}$

Characteristic Curves

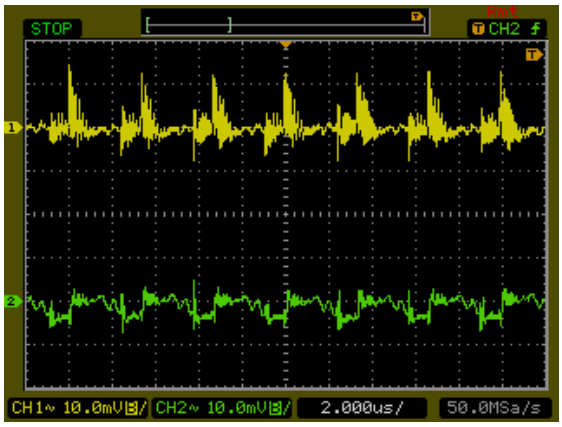
All test conditions are at 25°C The figures are identical for THL 6-4823WISM



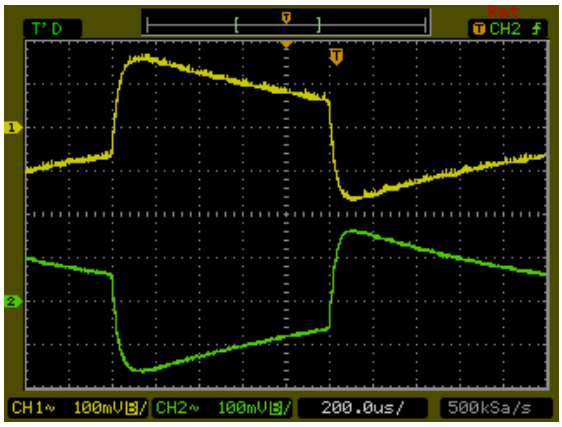
Efficiency Versus Output Current



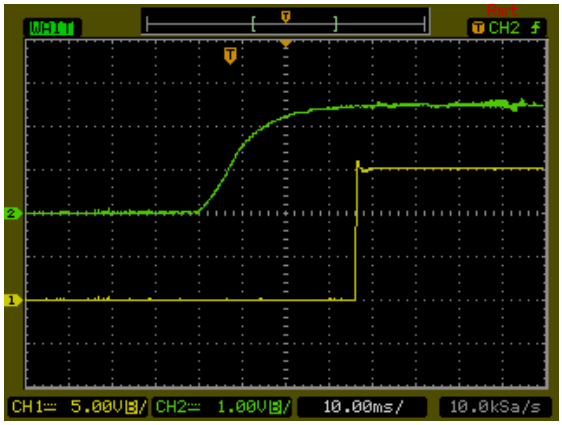
Efficiency Versus Input Voltage. Full Load



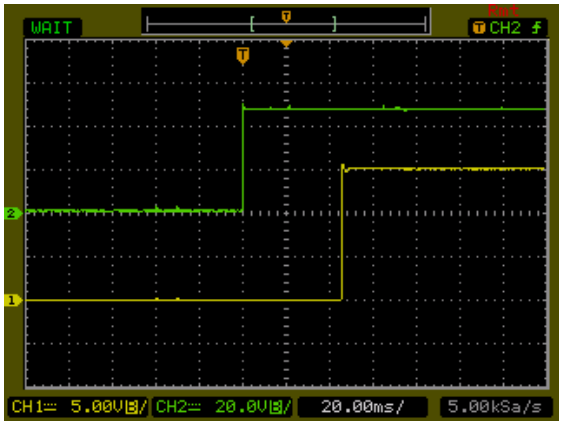
Typical Output Ripple and Noise.
V_{in} =$V_{in\ nom}$; Full Load; T_A



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



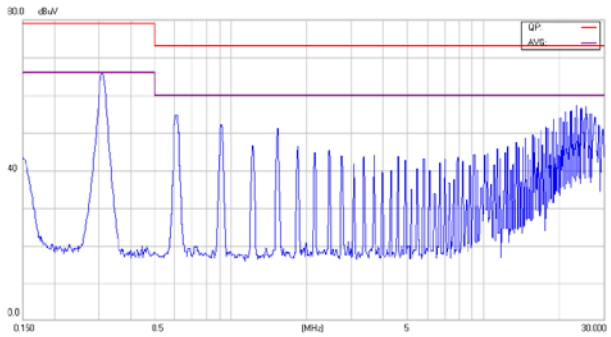
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load



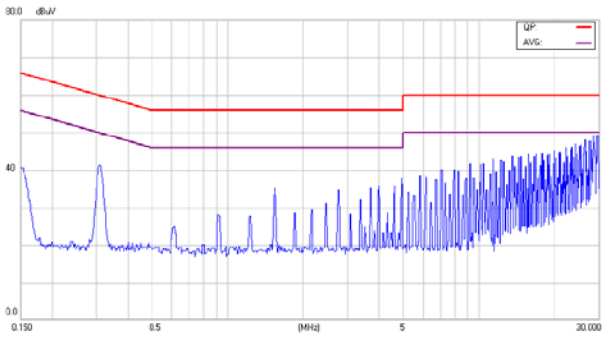
Typical Input Start-Up and Output Rise Characteristic
V_{in} =$V_{in\ nom}$; Full Load

Characteristic Curves

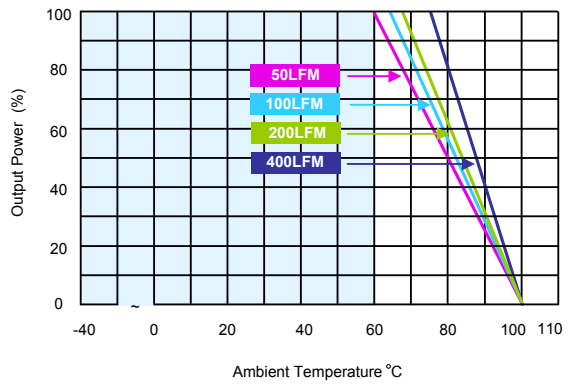
All test conditions are at 25°C The figures are identical for THL 6-4823WISM (Continued)



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



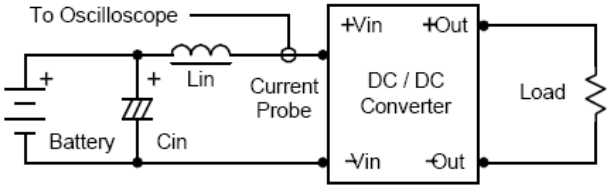
Conduction Emission of EN55022 Class B
V_{in} =$V_{in\ nom}$; Full Load



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

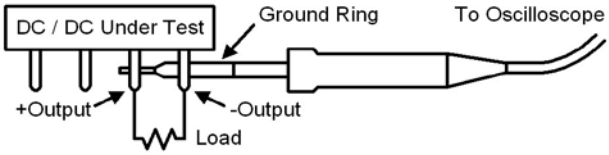
Testing Configurations

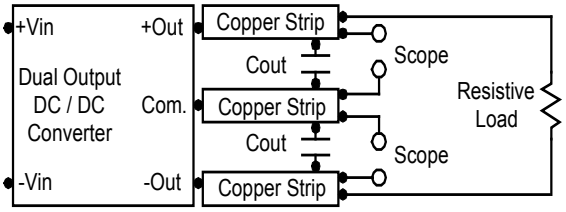
Input reflected-ripple current measurement test up

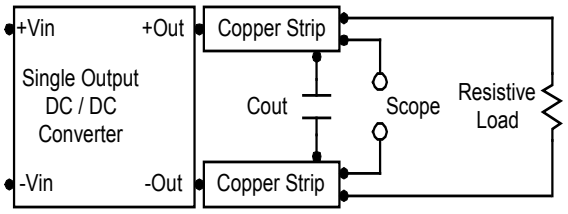


Component	Value	Reference
L	4.7µH	-----
C	220µF (ESR<1.0Ω at 100KHz)	Aluminum Electrolytic Capacitor

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

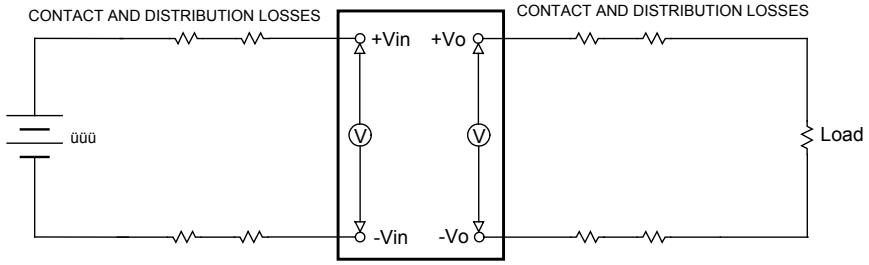




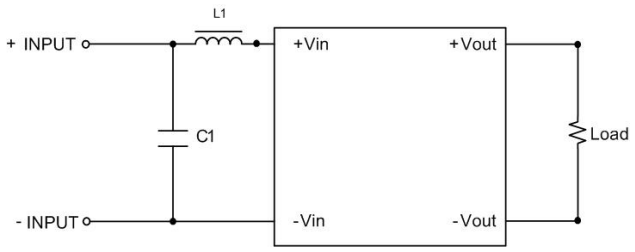


Output voltage and efficiency measurement test up

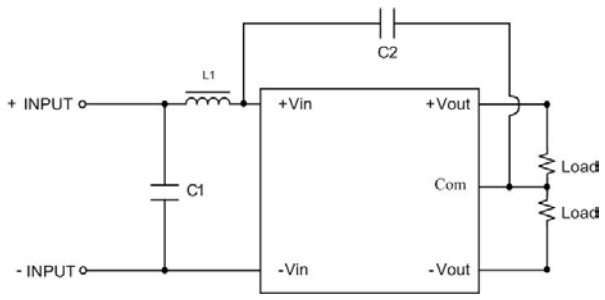
$$Efficiency = \left(\frac{V_{out} \times I_{out}}{V_{in} \times I_{in}} \right) \times 100\% = [\%]$$



EMC considerations

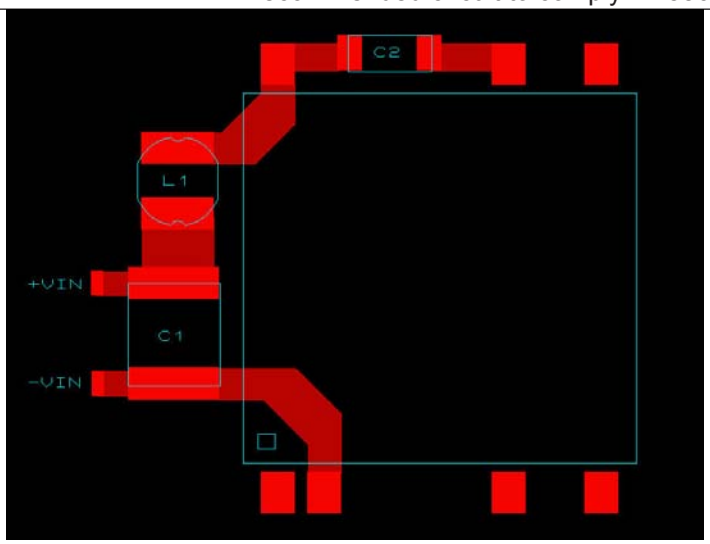


For THL 6-241(2)xWISM & THL 6-481xWISM



For THL 6-482xWISM

Recommended circuit to comply EN55022 Class B Limits



Recommended PCB Layout with Input Filter

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

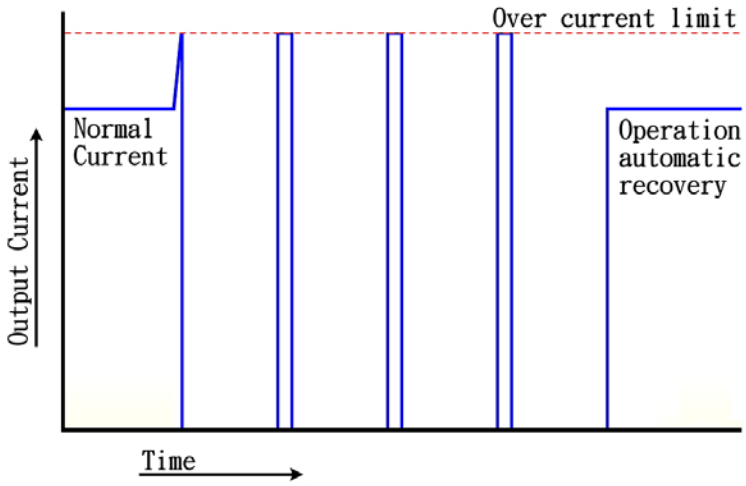
Model	Component	Value
THL 6-24xxWISM	C1,C2	4.7µF/50V 1206 X7R
	L1	2.2µH SCD03021T/1.39A
THL 6-481xWISM	C1	4.7µF/100V 2220 X7R
	L1	4.7µH SCD03021T/1.13A
THL 6-482xWISM	C1	4.7µF/100V 2220 X7R
	C2	330pF/2KV 1808 X7R
	L1	4.7µH SCD03021T/1.13A

Input Source Impedance

The power module should be connected to a low impedance input source. Highly inductive source impedance can affect the stability of the power module. Input external L-C filter is recommended to minimize input reflected ripple current. The inductor is simulated source impedance of 12μH and capacitor is Nippon chemi-con 47 μF/100V. The capacitor must as close as possible to the input terminals of the power module for lower impedance.

Output Over Current Protection

THL 6WISM series converters contain hiccup mode output over current protection that prevents damage to the product in the event of an overload or a short circuit. Normally, over current is above 110% of the rated current for THL 6WISM series. Depending upon the converter design, there are other ways of protecting the converter against over current conditions such as the constant current limiting or current foldback methods.
With “hiccup” over current protection, the converter shuts off upon an occurrence of an over current condition. After a brief time interval, it automatically tries to restart the converter. If the restart is successful, normal operation continues. If the over current condition still exists, the converter will shut off again. With a sustained over current condition, such as a short circuit on the output, this automatic retry behavior will result in periodic pulses of current and voltage on the output. The output current waveform with hiccup over current protection is shown in figure below.



Hiccup operation has none of the drawbacks of the other two protection methods, although its circuit is more complicated because it requires a timing circuit. The excess heat due to overload lasts for only a short duration in the hiccup cycle, hence the junction temperature of the power devices is much lower.
The hiccup operation can be done in various ways. For example, one can start hiccup operation any time once an over-current event is detected; or prohibit hiccup during a designated start-up is usually larger than normal operation and it is easier for an over-current event is detected; or prohibit hiccup during a designated start-up interval (usually a few milliseconds). The reason for the latter operation is that during start-up, the converter needs to provide extra current to charge up the output capacitor. Thus the current demand during start-up is usually larger than during normal operation and it is easier for an over-current event to occur. If the converter starts to hiccup once there is an over-current, it might never start up successfully. Hiccup mode protection will give the best protection for a converter against over current situations, since it will limit the average current to the load at a low level, so reducing power dissipation and case temperature in the power devices.

Output Over Voltage Protection

The output over-voltage protection consists of output Zener diode that monitors the voltage on the output terminals. If the voltage on the output terminals exceeds the over-voltage protection threshold, then the Zener diode clamps the output voltage.

Short Circuitry Protection

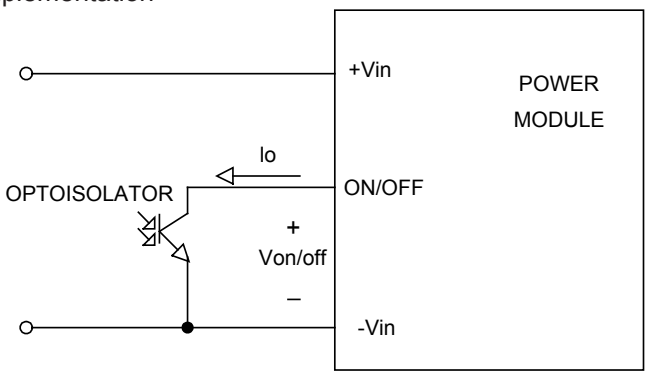
Continuous, hiccup and auto-recovery mode.
During short circuit, converter still shut down, The average current during this condition will be very low and the device will be safe in this condition.

Remote ON/OFF Control

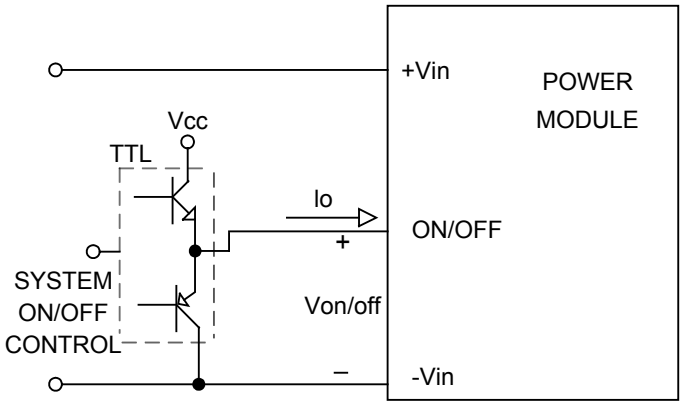
With no suffix, the positive logic remote ON/OFF control circuit is included. Turns the module ON during logic High on the ON/Off pin and turns OFF during logic Low. The ON/OFF input signal (Von/off) that referenced to GND. If not using the remote on/off feature, please open circuit between on/off pin and -Vin pin to turn the module on.

With suffix-N, the negative logic remote ON/OFF control circuit is included.
Turns the module ON during logic Low on the On/Off pin and turns OFF during logic High. The On/Off pin is an open collector/drain logic input signal (Von/off) that referenced to GND. If not using the remote on/off feature. Please short circuit between on/off pin and –Vin pin to turn the module on.

Remote ON/OFF implementation

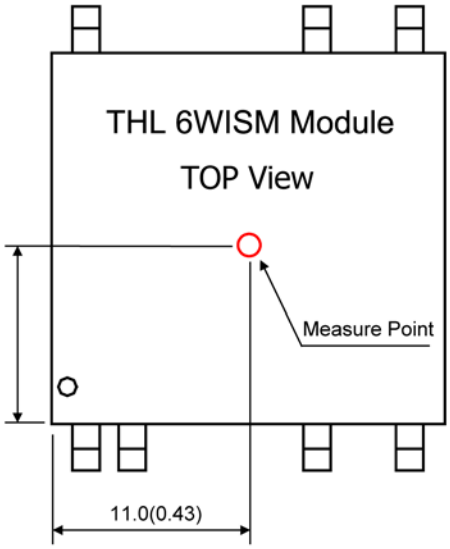


Isolated-Closure Remote ON/OFF



Level Control Using TTL Output

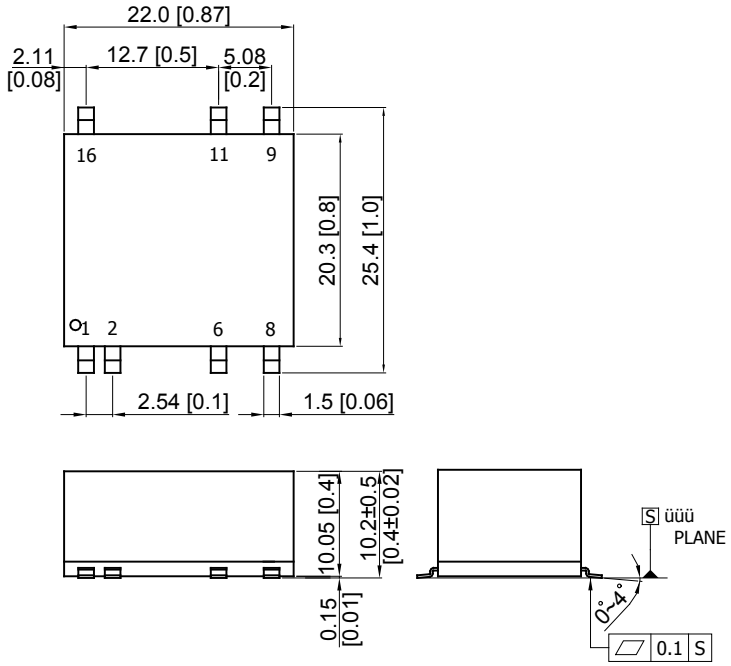
Thermal Consideration



Measurement shown in mm(inches)

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 105°C. When operating, adequate cooling must be provided to maintain the test point temperature at or below 105°C. Although the maximum point temperature of the power module is 105°C, you can limit this temperature to a lower value for extremely high reliability.

Mechanical Dimensions

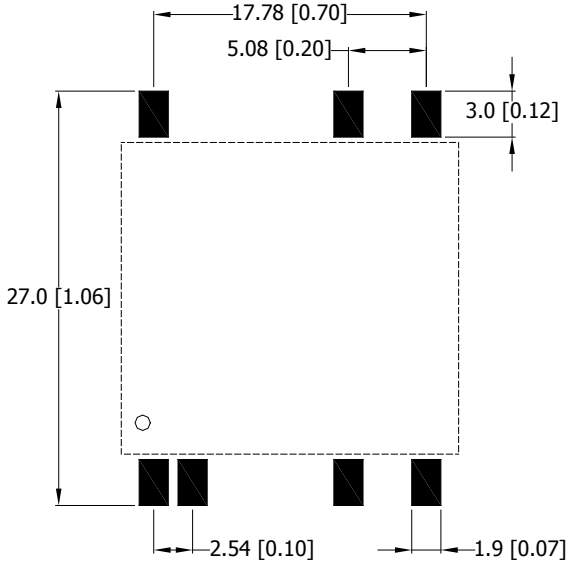


Weight:7.8g

Pin Connections		
Pin	Single	Dual
1	Remote On/Off	Remote On/Off
2	-Vin	-Vin
6	NC	Common
8	NC	-Vout
9	+Vout	+Vout
11	-Vout	Common
16	+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



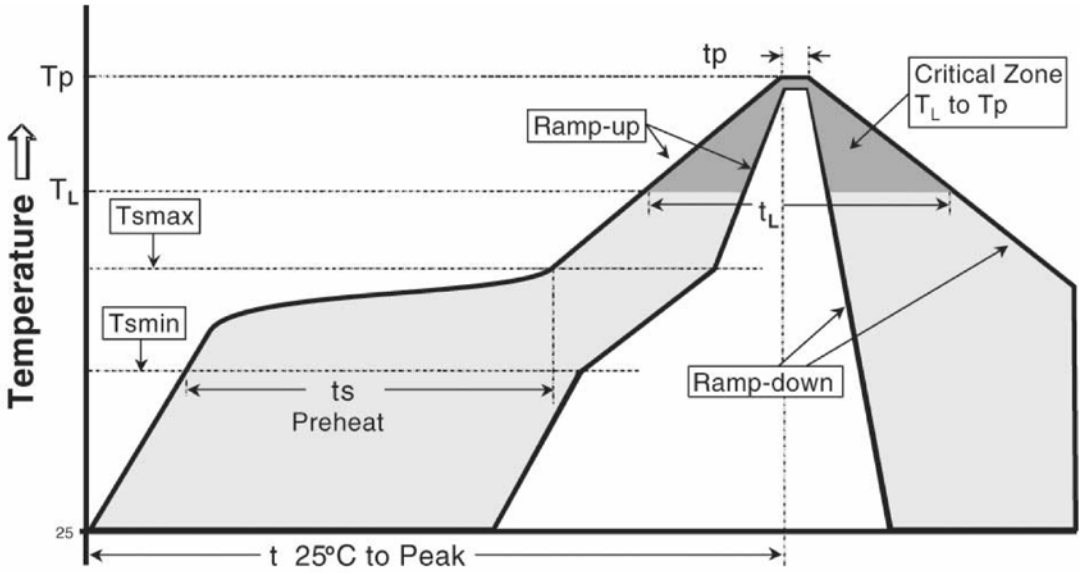
1.All dimensions in mm (inches)
Tolerance: x.x ±0.5mm (x.xx ±0.02")
x.xx ±0.25mm (x.xxx ±0.01")
2. Pin pitch tolerance: ±0.25mm (±0.01")
3. Pin dimension tolerance: ±0.1mm (±0.004")

Soldering and Reflow Considerations

Lead free wave solder profile for THL 6WISM Series

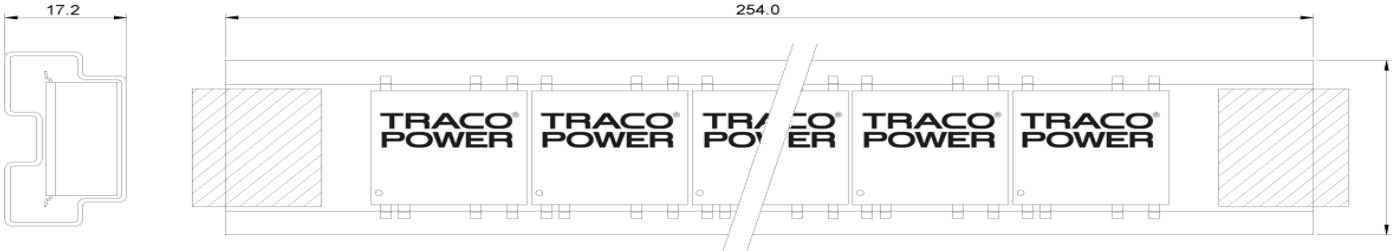
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3° C/second max.	3° C/second max.
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (Ts_{min} to Ts_{max}) (ts)	 100 °C 150 °C 60-120 seconds	 150 °C 200 °C 60-180 seconds
Time maintained above: - Temperature (T_L) - Time (t_L)	 183 °C 60-150 seconds	 217 °C 60-150 seconds
Peak Temperature (Tp)	See Table 4.1	See Table 4.2
Time within 5°C of actual Peak Temperature $(tp)^2$	10-30 seconds	20-40 seconds
Ramp-down Rate	6 °C/second max.	6 °C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

Note 1: All temperatures refer to topside of the package, measured on the package body surface.
Note 2: Time within 5 °C of actual peak temperature (tp) specified for the reflow profiles is a "supplier" minimum and "user" maximum.



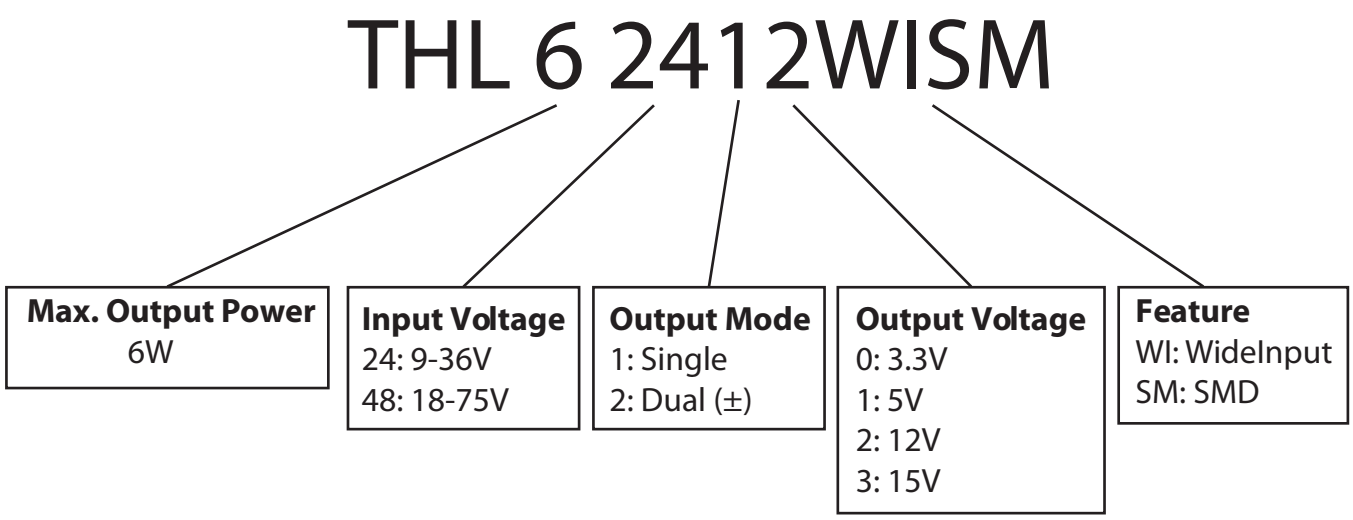
Packaging Information

TUBE



Unit : mm
10 PCS per Tube

Part Number Structure



Model Number	Input Range (VDC)	Output Voltage (VDC)	Max. Output Current (mA)	Input Current at Full Load[1] (mA)	Efficiency[2] (%)
THL 6-2410WISM	9-36	3.3	1450	262	76
THL 6-2411WISM	9-36	5	1200	316	79
THL 6-2412WISM	9-36	12	500	301	83
THL 6-2413WISM	9-36	15	400	301	83
THL 6-2415WISM	9-36	24	250	301	83
THL 6-2421WISM	9-36	±5	±600	301	82
THL 6-2422WISM	9-36	±12	±250	301	83
THL 6-2423WISM	9-36	±15	±200	301	83
THL 6-4810WISM	18-75	3.3	1450	131	76
THL 6-4811WISM	18-75	5	1200	158	79
THL 6-4812WISM	18-75	12	500	151	83
THL 6-4813WISM	18-75	15	400	151	83
THL 6-4815WISM	18-75	24	250	151	83
THL 6-4821WISM	18-75	±5	±600	151	82
THL 6-4822WISM	18-75	±12	±250	151	83
THL 6-4823WISM	18-75	±15	±200	151	83

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 slow-blow fuse with maximum rating of 1.5A. 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 THL 6WISM series of DC/DC converters has been calculated using MIL-HDBK 217F NOTICE2, Operating Temperature 25C, Ground Benign.

Model	MTBF	Unit
THL 6-2410WISM	314,292	Hours
THL 6-2411WISM	320,927	
THL 6-2412WISM	318,645	
THL 6-2413WISM	322,349	
THL 6-2415WISM	335,717	
THL 6-2421WISM	315,724	
THL 6-2422WISM	317,580	
THL 6-2423WISM	308,650	
THL 6-4810WISM	358,239	
THL 6-4811WISM	364,323	
THL 6-4812WISM	319,157	
THL 6-4813WISM	317,454	
THL 6-4815WISM	367,241	
THL 6-4821WISM	301,992	
THL 6-4822WISM	338,362	
THL 6-4823WISM	336,448	

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