THL 3-WISM Series Application Note

SMD DC/DC Converter with 9 to 36Vdc or 18 to 75 Vdc Input Voltage
3.3 to 24Vdc Single Outputs and ±5 to ±15Vdc Dual Outputs, 3W

226037

Features

- Single output up to 600mA
- Dual output up to ±300mA
- 3 watts maximum output power
- 4:1 ultra wide input voltage range of 9-36Vdc and 18-75Vdc
- Efficiency up to 80%
- Complies with EN 55022 class A
- RoHS directive compliant
- Input to output isolation: 1500Vdc for 1 minute
- Internal SMD construction
- Output short circuit protection
- Remote on/off

Options

- Heat sinks available for extended operation

Applications

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

Complete THL 3WISM datasheet can be downloaded at:
http://www.tracopower.com/products/thl3WI.pdf

General Description

Tracopower new launched THL 3WISM series comprising 16 different models. The THL 3WISM has wide input voltage ranges of 9 – 36Vdc and 18 – 75Vdc and is available in output voltages of 3.3Vdc, 5.0Vdc, 12Vdc, 15Vdc, 24Vdc, ±5Vdc, ±12Vdc and ±15Vdc.
The internal filter which meets EN55022 Class A without external components makes the converter easy to design in. They come with remote On/Off and short circuit protection. THL 3WI converter is an excellent solution for data- and telecom applications and for instrumentation and Industrial electronics.

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Absolute Maximum Rating

Parameter	Model	Min	Max	Unit
Input Voltage				Vdc
Continuous	THL 3-24xxWISM		36	
	THL 3-48xxWISM		75	
Input Voltage				
Transient (for 100ms max.)	THL 3-24xxWISM		50	
	THL 3-48xxWISM		100	
Operating Ambient Temperature	All			
Without derating 3.3V & 5V Models		-40	+55	°C
Load derating above +55°C until +85°C			2.2	%/K
Without derating all other Models		-40	+60	°C
Load derating above +60°C until +85°C			2.5	%/K
With derating		-40	+85	°C
Operating Case Temperature	All	-40	+105	°C
Storage Temperature	All	-40	+125	°C

Output Specification

Parameter	Model	Min	Nominal	Max	Unit
Output Voltage (V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C)	THL 3-xx10WISM	3.234	3.3	3.366	Vdc
	THL 3-xx11WISM	4.90	5.0	5.10	
	THL 3-xx12WISM	11.76	12.0	12.24	
	THL 3-xx13WISM	14.70	15.0	15.30	
	THL 3-xx15WISM	23.52	24.0	24.48	
	THL 3-xx21WISM	±4.90	±5.0	±5.10	
	THL 3-xx22WISM	±11.76	±12.0	±12.24	
	THL 3-xx23WISM	±14.70	±15.0	±15.30	
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) (Measured with a 1µF/50V MLCC)	All		60	100	mV pk-pk
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} = $V_{in\ nom}$; T_A = 25°C) Load step change form 75% to 100% or 100 to 75% of Full Load	All				
Peak Deviation			±3	±5	%
Setting Time (V_{out} < 10% peak deviation)			300	600	µS

Output Specification (Continued)					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Output Current	THL 3-xx10WISM	90		600	mA
	THL 3-xx11WISM	90		600	
	THL 3-xx12WISM	38		250	
	THL 3-xx13WISM	30		200	
	THL 3-xx15WISM	19		125	
	THL 3-xx21WISM	±45		±300	
	THL 3-xx22WISM	±19		±125	
	THL 3-xx23WISM	±15		±100	
Output Over Current Protection	All	110			%FL
Output Short Circuit Protection	All	Continuous			

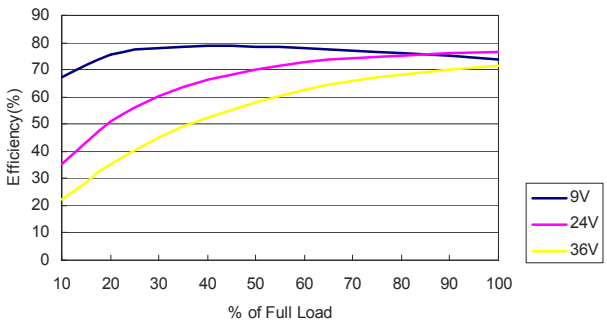
Input Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Operating Input Voltage	THL 3-24xxWISM	9	24	36	Vdc
	THL 3-48xxWISM	18	48	75	
Under Voltage Lockout Turn-on Threshold	THL 3-24xxWISM	4.5	6	8.5	Vdc
	THL 3-48xxWISM	8.5	12	17	
Under Voltage Lockout Turn-off Threshold	THL 3-24xxWISM			8	Vdc
	THL 3-48xxWISM			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 3-2410WISM		110		mA
	THL 3-2411WISM		160		
	THL 3-2412WISM		156		
	THL 3-2413WISM		156		
	THL 3-2415WISM		156		
	THL 3-2421WISM		162		
	THL 3-2422WISM		156		
	THL 3-2423WISM		156		
	THL 3-4810WISM		55		
	THL 3-4811WISM		80		
	THL 3-4812WISM		78		
	THL 3-4813WISM		78		
	THL 3-4815WISM		78		
	THL 3-4821WISM		81		
	THL 3-4822WISM		78		
	THL 3-4823WISM		78		

Input Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Input Standby current (Typical value at $V_{in} = V_{in\ nom}$; No Load)	THL 3-2410WISM			30	mA
	THL 3-2411WISM				
	THL 3-2412WISM				
	THL 3-2413WISM				
	THL 3-2415WISM				
	THL 3-2421WISM				
	THL 3-2422WISM				
	THL 3-2423WISM				
	THL 3-4810WISM			20	
	THL 3-4811WISM				
	THL 3-4812WISM				
	THL 3-4813WISM				
	THL 3-4815WISM				
	THL 3-4821WISM				
	THL 3-4822WISM				
	THL 3-4823WISM				
Remote ON/OFF Control (The On/Off pin voltage is referenced to $-V_{in}$) Positive logic	All				
(Remote ON) Open circuit or On/Off pin High Voltage		2.5		5.5	Vdc
(Remote OFF) Short circuit to -Vin or On/Off pin Low Voltage		-0.7		0.8	Vdc
Remote Off Stand by Input Current	All			5	mA
Input Current of Remote Control Pin	All			-400	µA

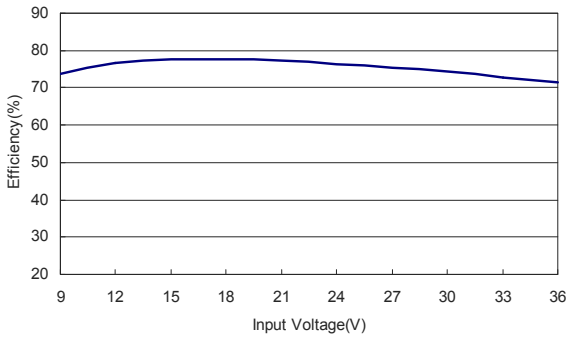
General Specification					
Parameter	**Model**	**Min**	**Nominal**	**Max**	**Unit**
Efficiency (V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C)	THL 3-2410WISM		75		%
	THL 3-2411WISM		78		
	THL 3-2412WISM		80		
	THL 3-2413WISM		80		
	THL 3-2415WISM		80		
	THL 3-2421WISM		77		
	THL 3-2422WISM		80		
	THL 3-2423WISM		80		
	THL 3-4810WISM		75		
	THL 3-4811WISM		78		
	THL 3-4812WISM		80		
	THL 3-4813WISM		80		
	THL 3-4815WISM		80		
	THL 3-4821WISM		77		
	THL 3-4822WISM		80		
	THL 3-4823WISM		80		
Isolation voltage Input to Output (for 60 seconds)	All	1500			Vdc
Isolation resistance	All	1000			MΩ
Isolation capacitance	All		350	500	pF
Switching Frequency	All		350		KHz
Weight	All		5.1		g
MTBF MIL-STD-217F, T_C = 25°C	All				
		300			K Hours

Characteristic Curves

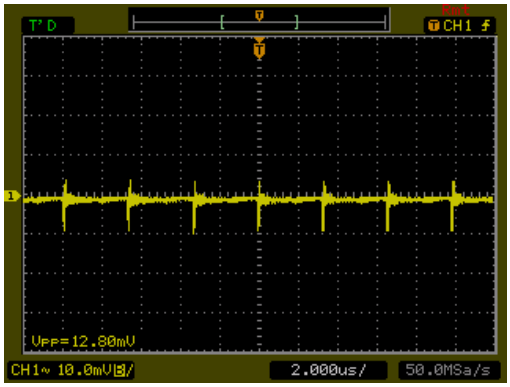
All test conditions are at 25°C. The figures are identical for THL 3-2410WISM



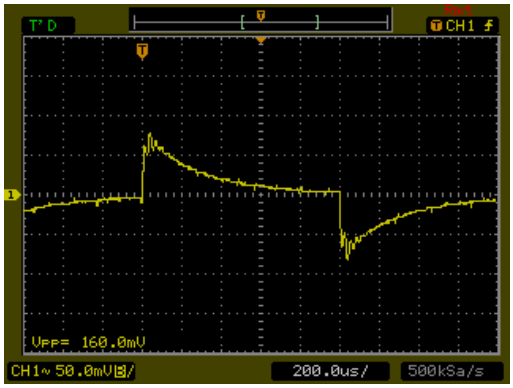
Efficiency Versus Output Current



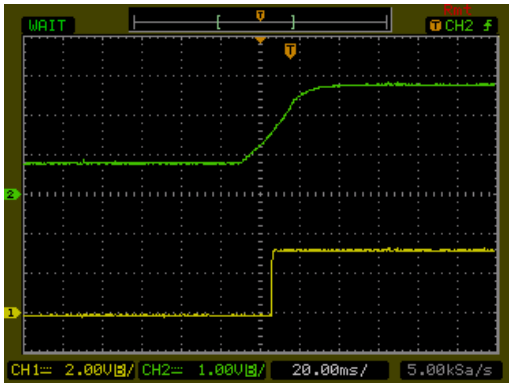
Efficiency Versus Input Voltage. Full Load



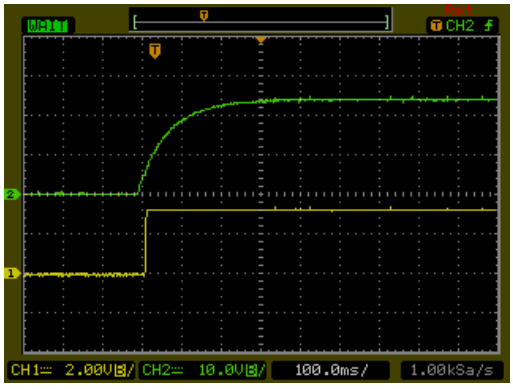
Typical Output Ripple and Noise.
V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C



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



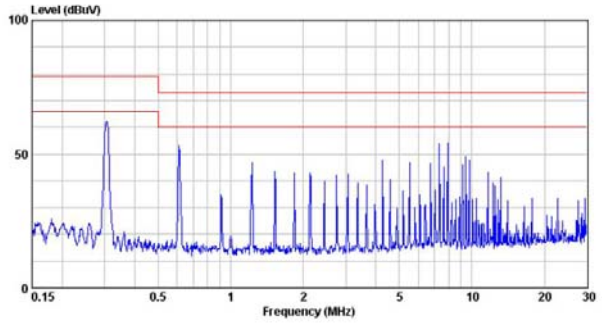
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load



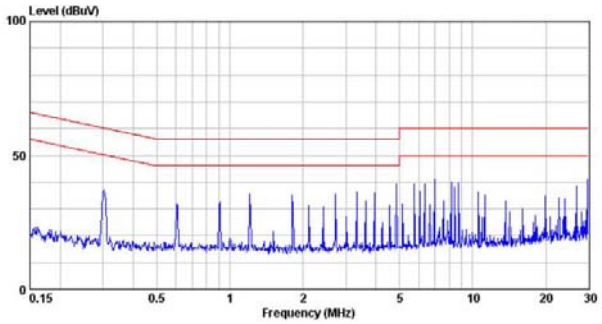
Typical Input Start-Up and Output Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load

Characteristic Curves

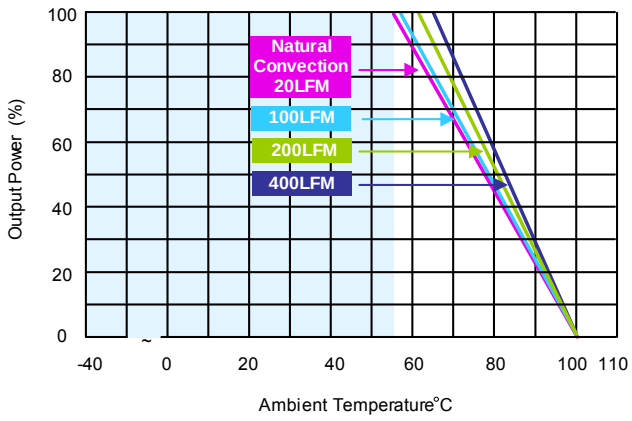
All test conditions are at 25°C. The figures are identical for THL 3-2410WISM (Continued)



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



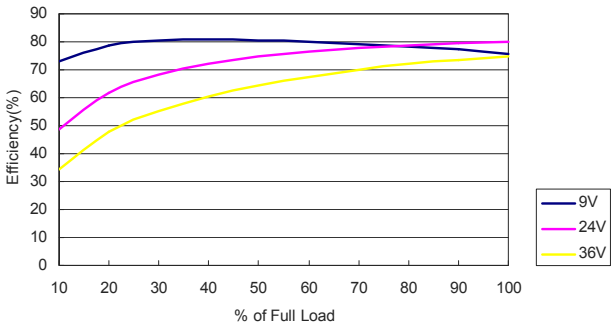
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



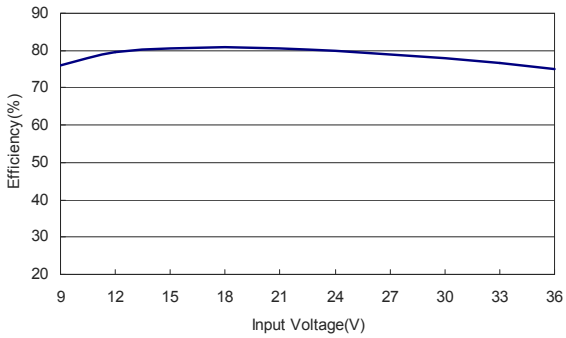
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

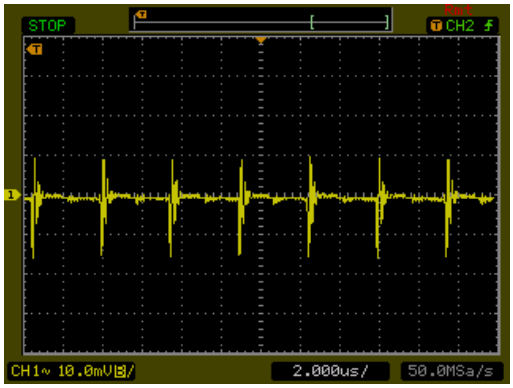
All test conditions are at 25°C. The figures are identical for THL 3-2411WISM



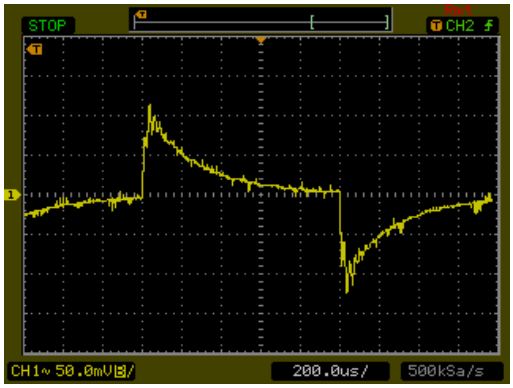
Efficiency Versus Output Current



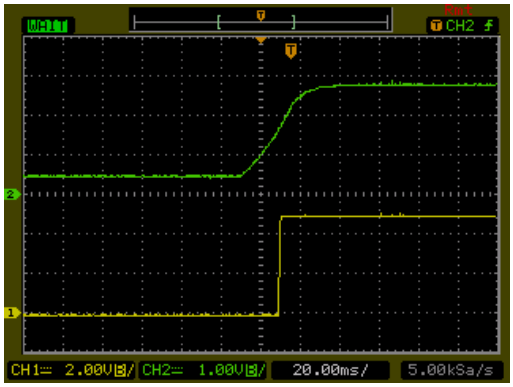
Efficiency Versus Input Voltage. Full Load



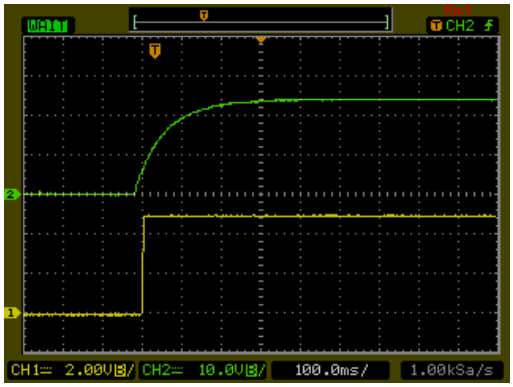
Typical Output Ripple and Noise.
$V_{in} = V_{in\ nom}$; Full Load; $T_A = 25°C$



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



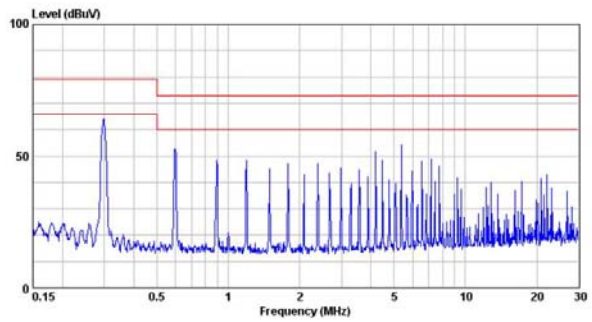
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load



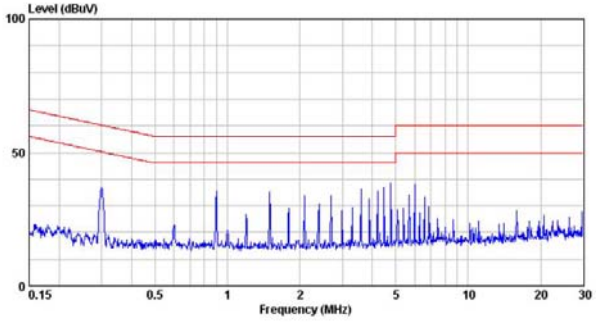
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

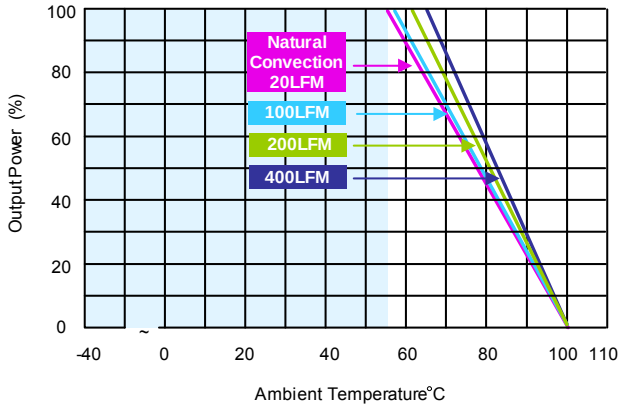
All test conditions are at 25°C. The figures are identical for THL 3-2411WISM (Continued)



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



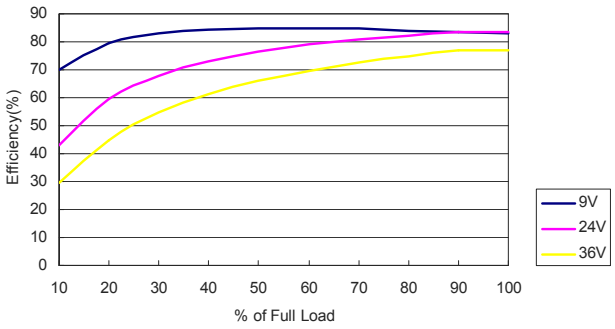
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



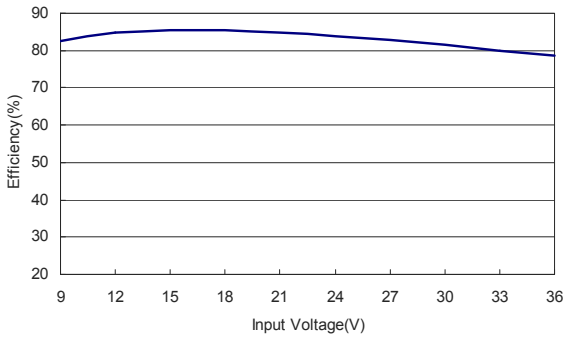
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

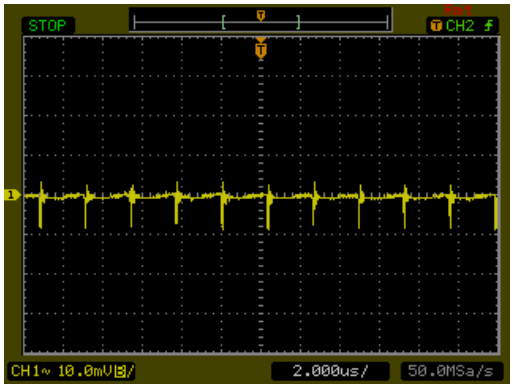
All test conditions are at 25°C. The figures are identical for THL 3-2412WISM



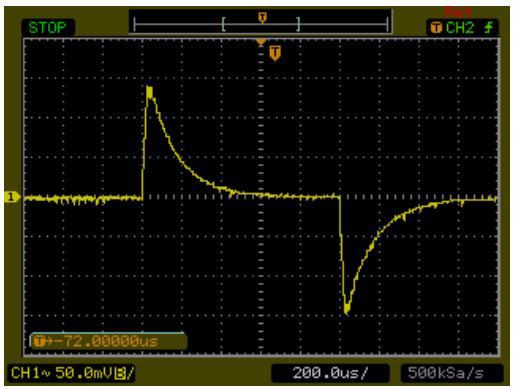
Efficiency Versus Output Current



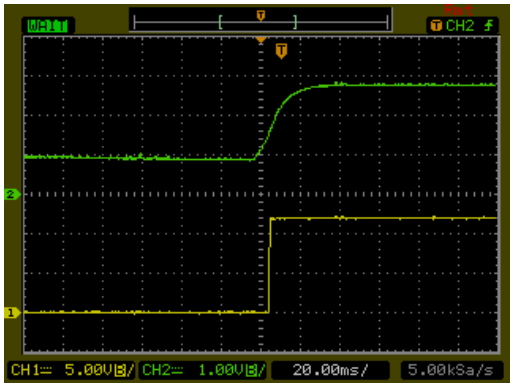
Efficiency Versus Input Voltage. Full Load



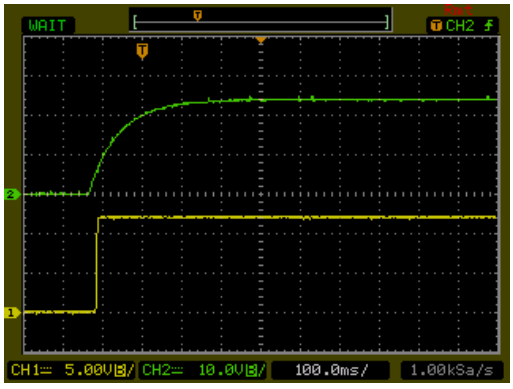
Typical Output Ripple and Noise.
$V_{in} = V_{in\ nom}$; Full Load; $T_A = 25°C$



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



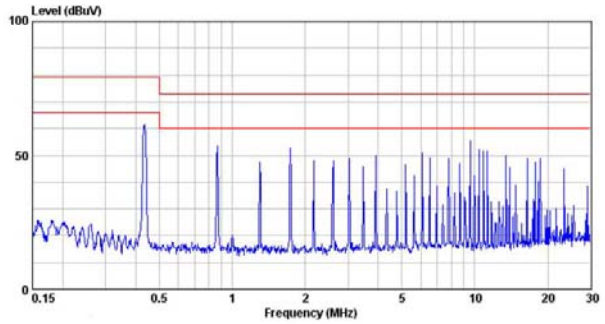
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load



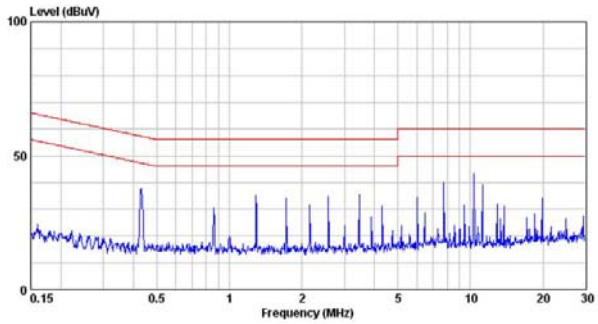
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

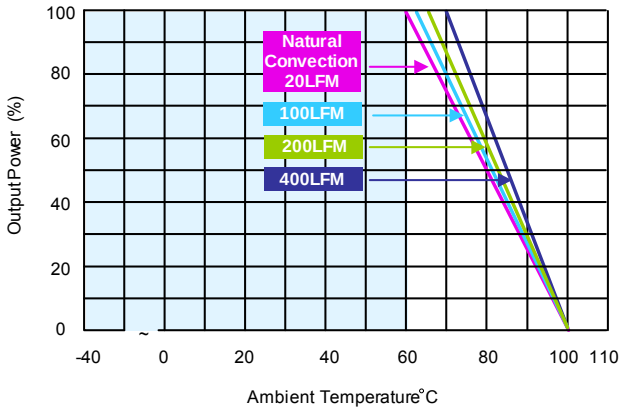
All test conditions are at 25°C. The figures are identical for THL 3-2412WISM (Continued)



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



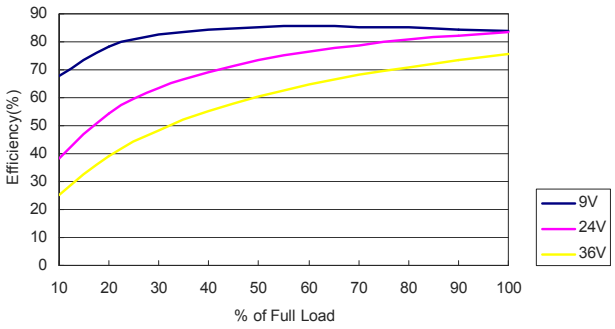
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



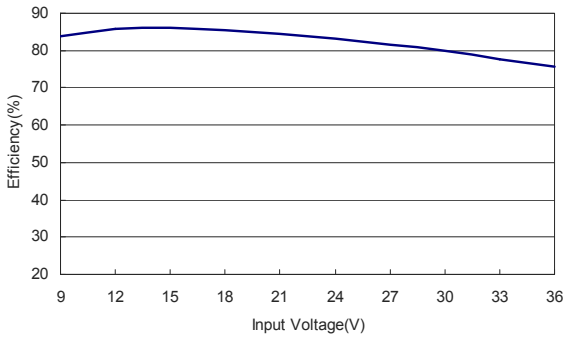
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

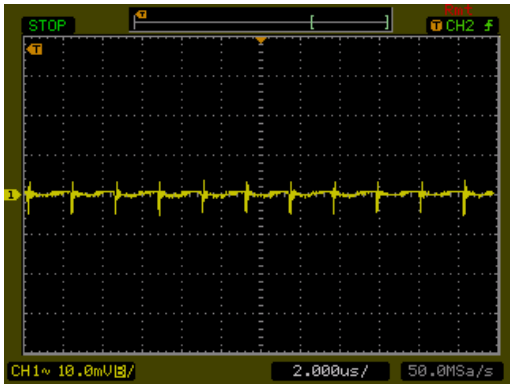
All test conditions are at 25°C. The figures are identical for THL 3-2413WISM



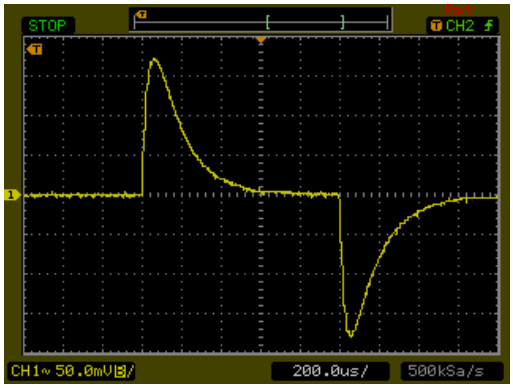
Efficiency Versus Output Current



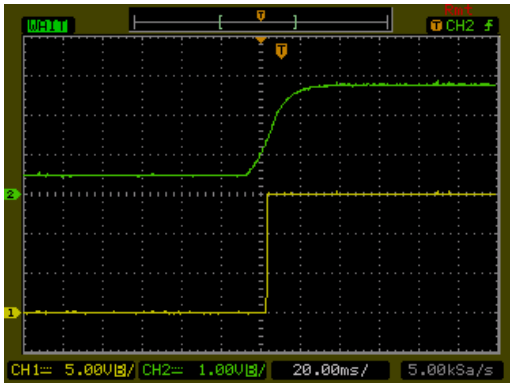
Efficiency Versus Input Voltage. Full Load



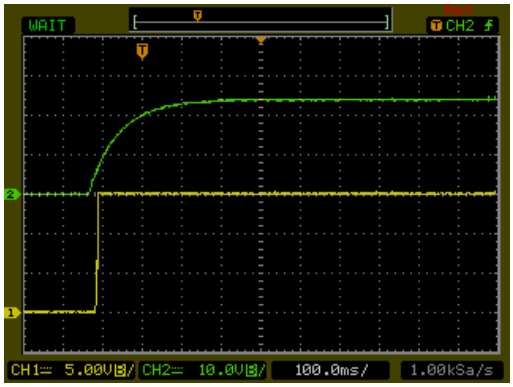
Typical Output Ripple and Noise.
$V_{in} = V_{in\ nom}$; Full Load; $T_A = 25°C$



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



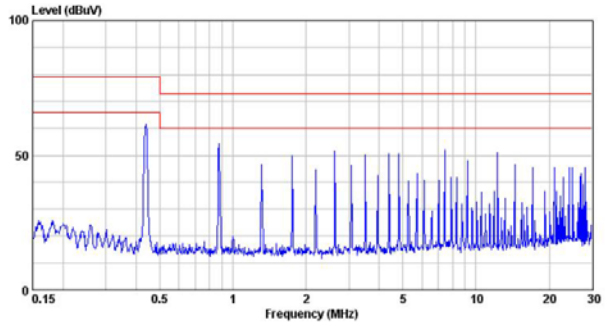
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load



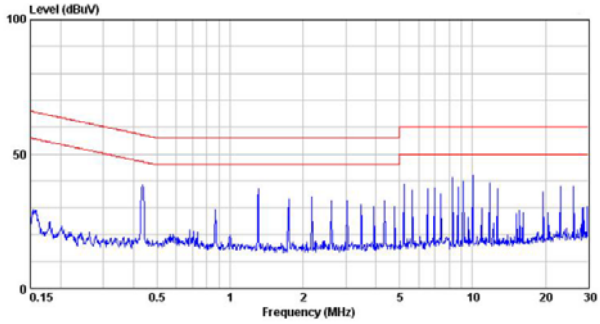
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

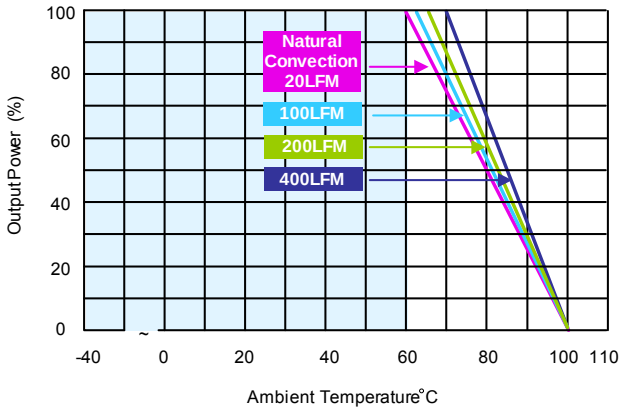
All test conditions are at 25°C. The figures are identical for THL 3-2413WISM (Continued)



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



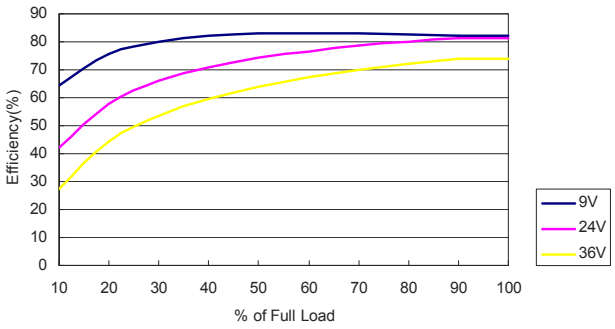
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



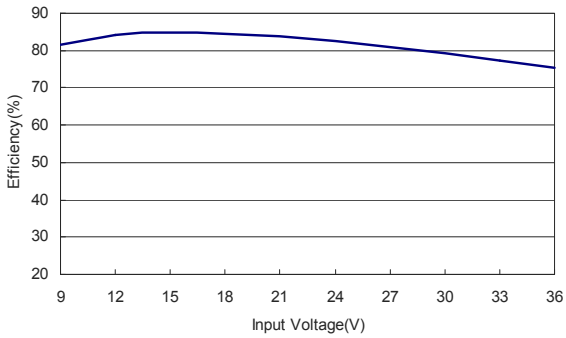
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

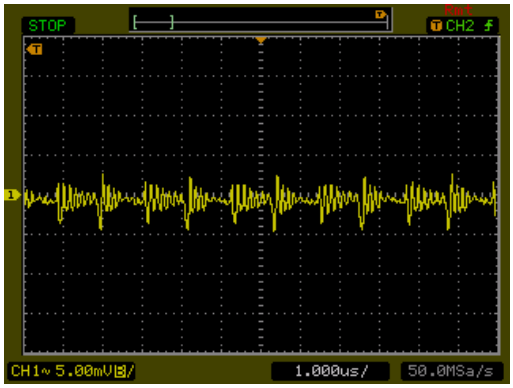
All test conditions are at 25°C. The figures are identical for THL 3-2415WISM



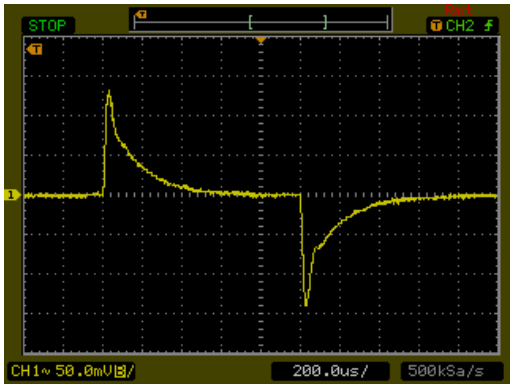
Efficiency Versus Output Current



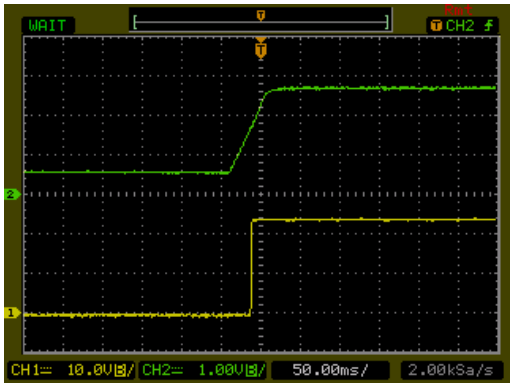
Efficiency Versus Input Voltage. Full Load



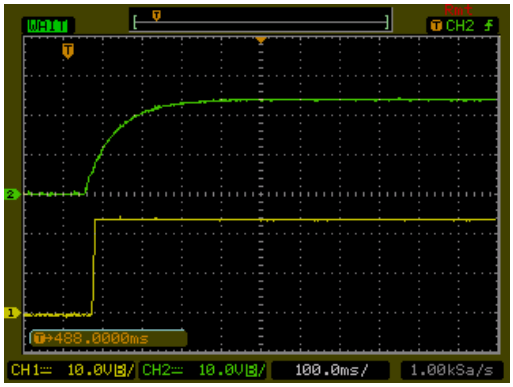
Typical Output Ripple and Noise.
V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C



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



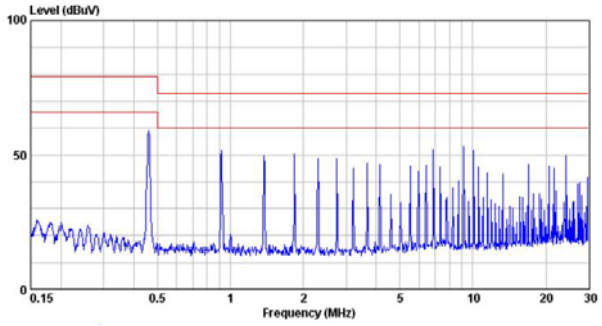
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load



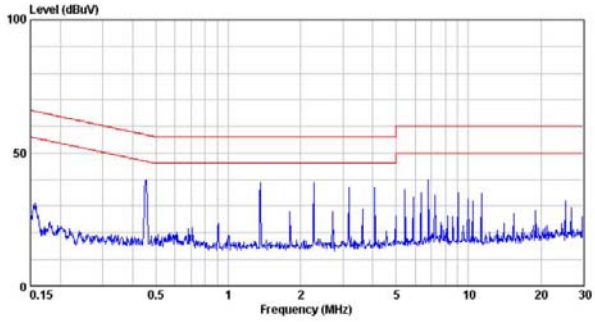
Typical Input Start-Up and Output Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load

Characteristic Curves

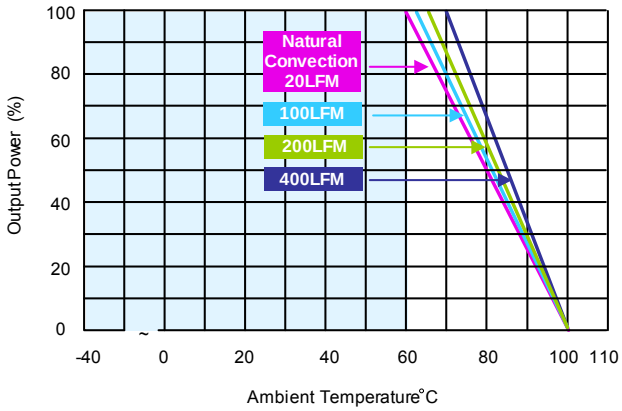
All test conditions are at 25°C. The figures are identical for THL 3-2415WISM (Continued)



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



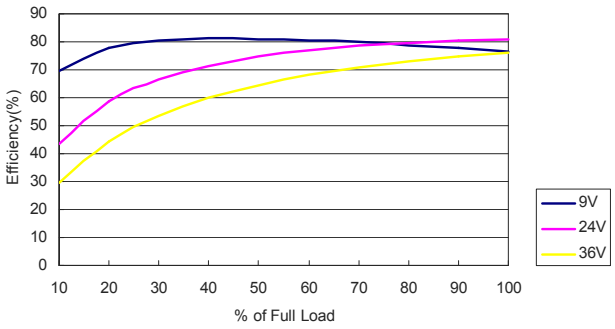
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



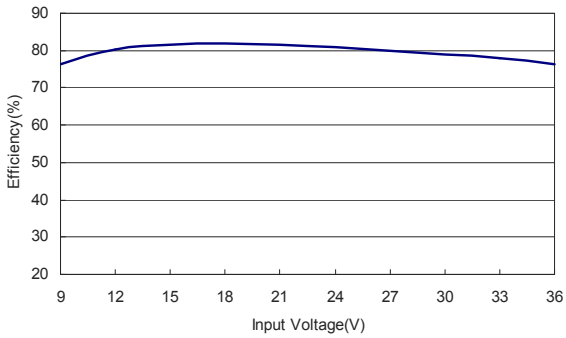
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

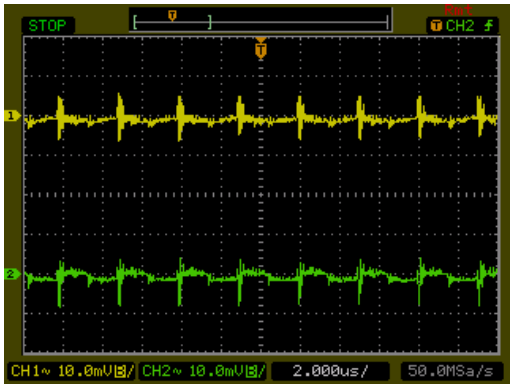
All test conditions are at 25°C. The figures are identical for THL 3-2421WISM



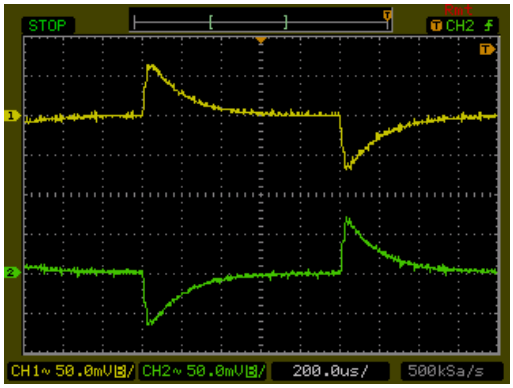
Efficiency Versus Output Current



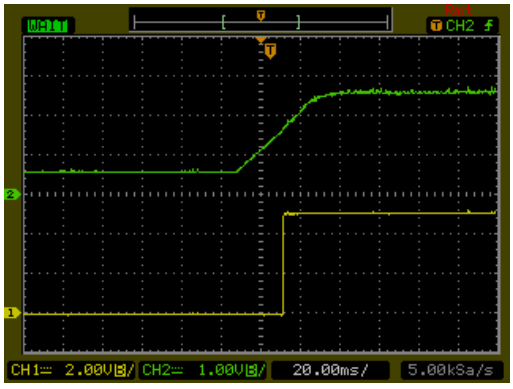
Efficiency Versus Input Voltage. Full Load



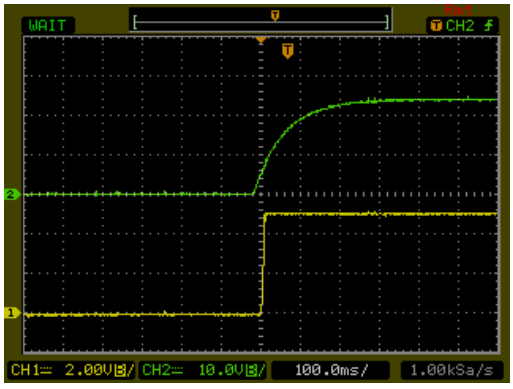
Typical Output Ripple and Noise.
V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C



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



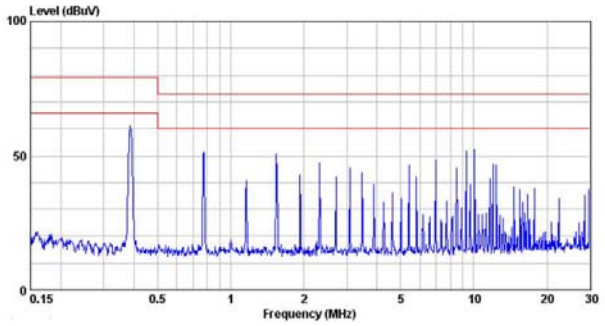
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load



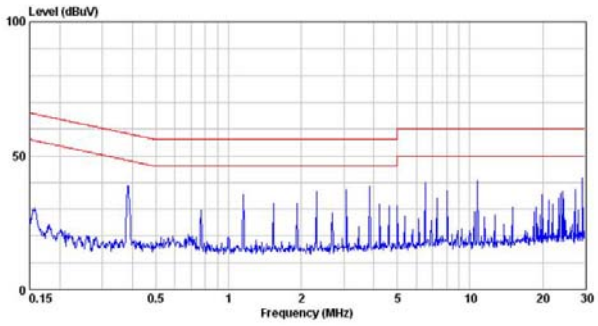
Typical Input Start-Up and Output Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load

Characteristic Curves

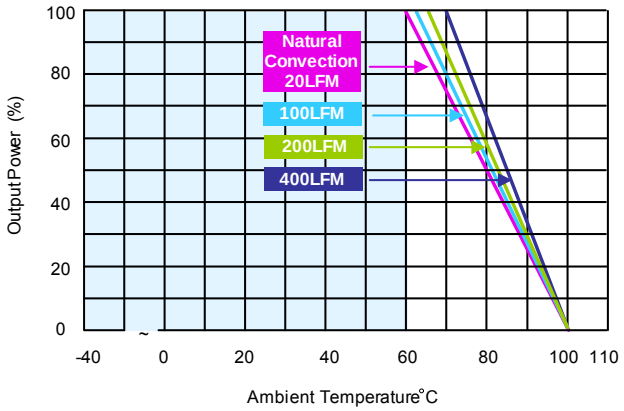
All test conditions are at 25°C. The figures are identical for THL 3-2421WISM (Continued)



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



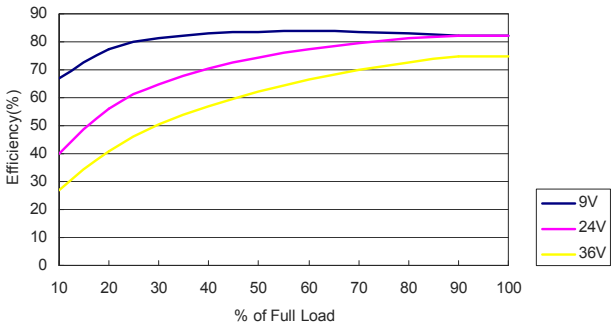
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



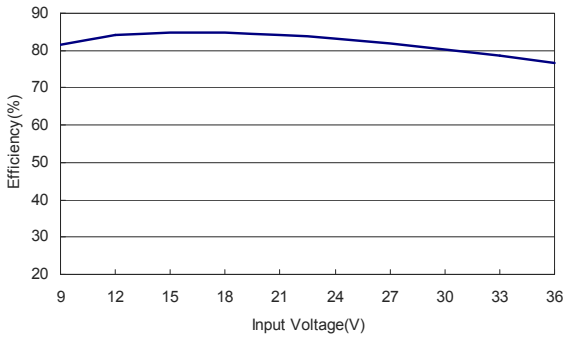
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

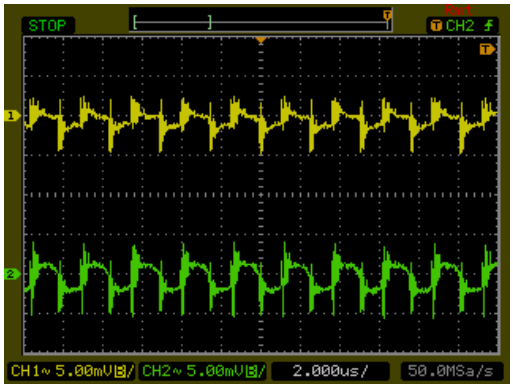
All test conditions are at 25°C. The figures are identical for THL 3-2422WISM



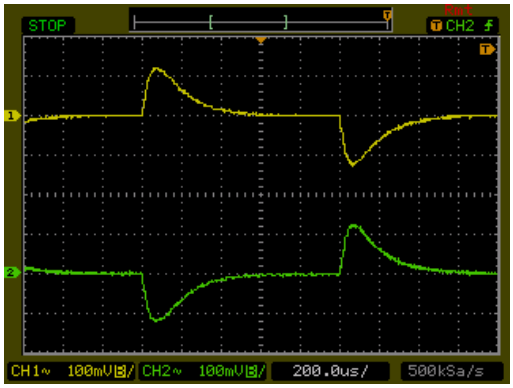
Efficiency Versus Output Current



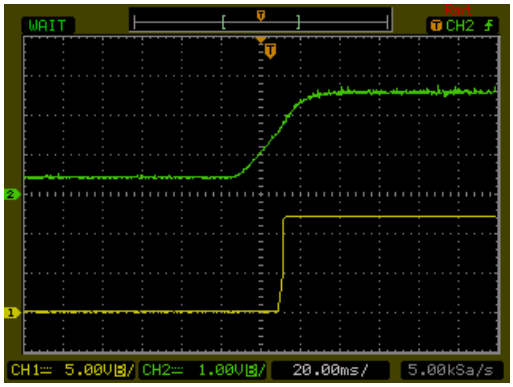
Efficiency Versus Input Voltage. Full Load



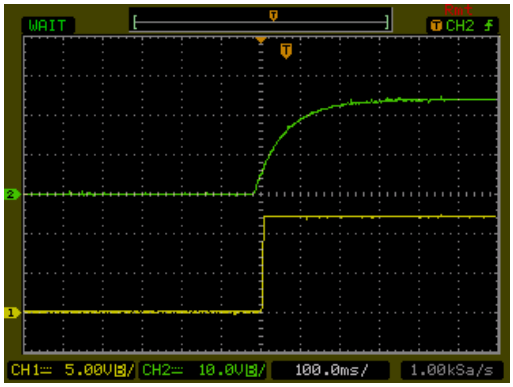
Typical Output Ripple and Noise.
$V_{in} = V_{in\ nom}$; Full Load; $T_A = 25°C$



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



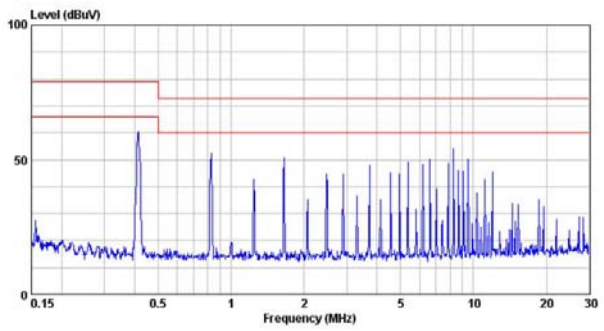
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load



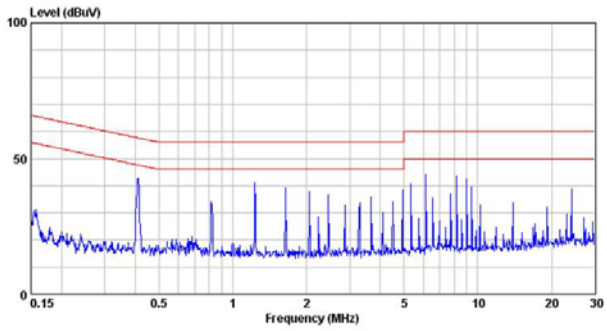
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

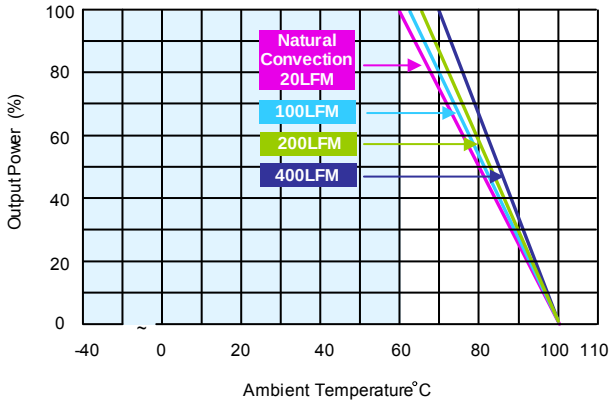
All test conditions are at 25°C. The figures are identical for THL 3-2422WISM (Continued)



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



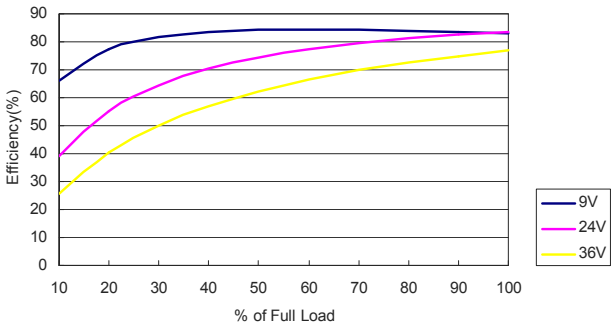
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



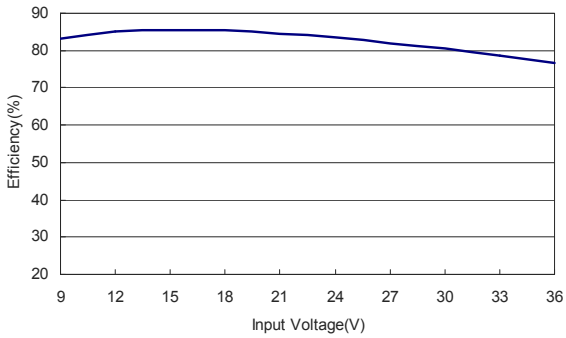
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

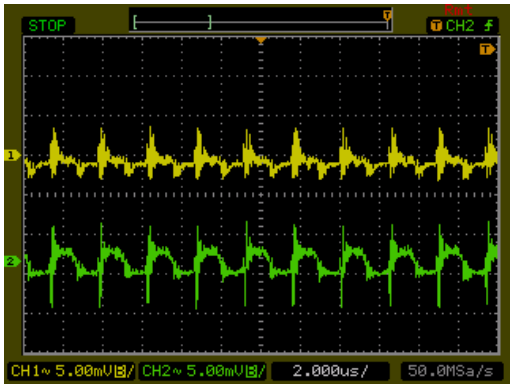
All test conditions are at 25°C. The figures are identical for THL 3-2423WISM



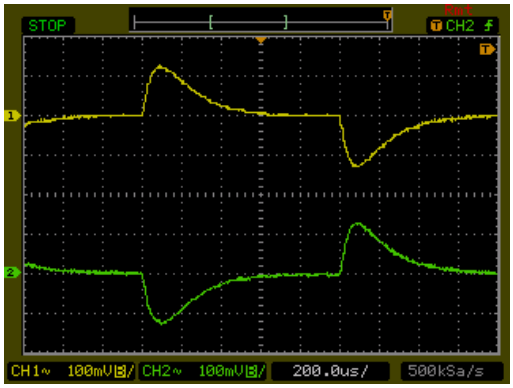
Efficiency Versus Output Current



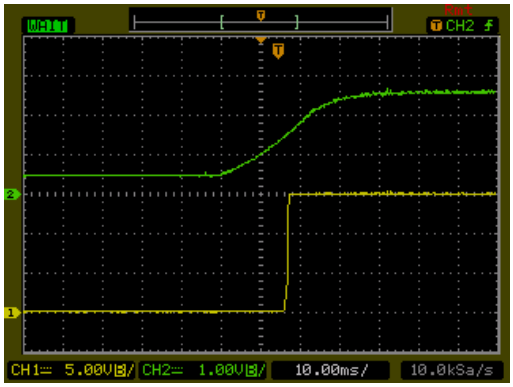
Efficiency Versus Input Voltage. Full Load



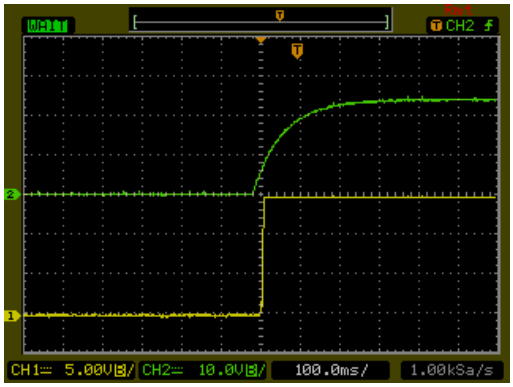
Typical Output Ripple and Noise.
$V_{in} = V_{in\ nom}$; Full Load; $T_A = 25°C$



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



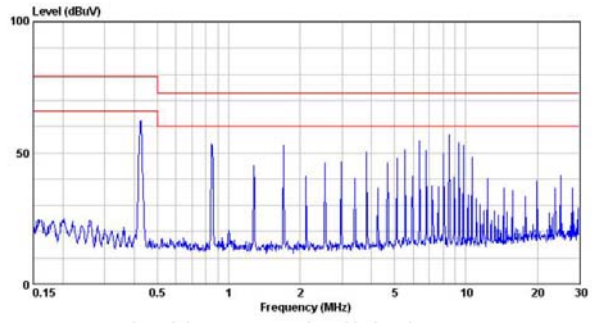
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load



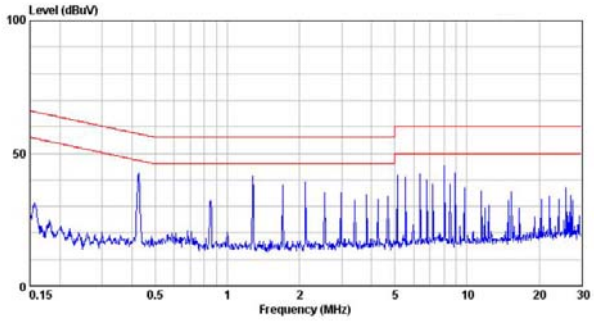
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

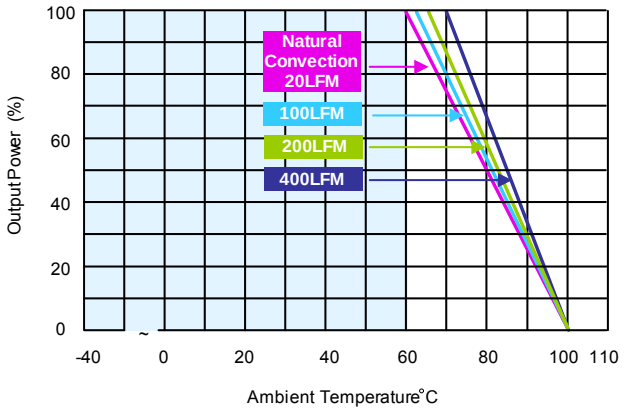
All test conditions are at 25°C. The figures are identical for THL 3-2423WISM (Continued)



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



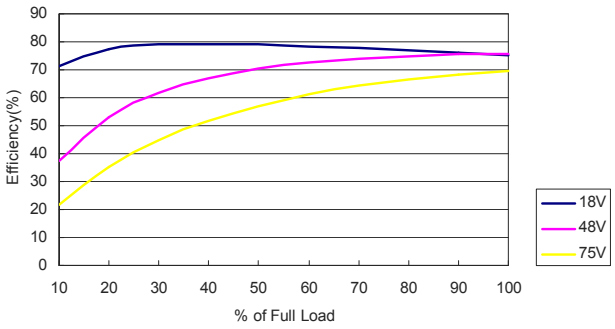
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



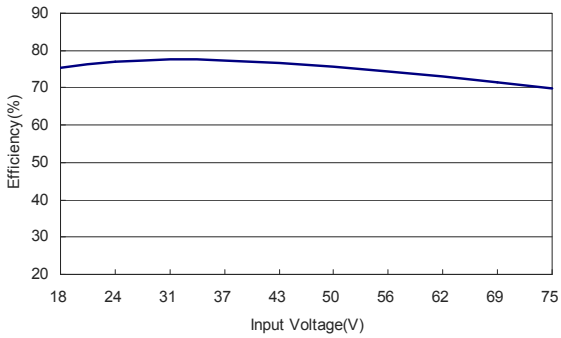
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

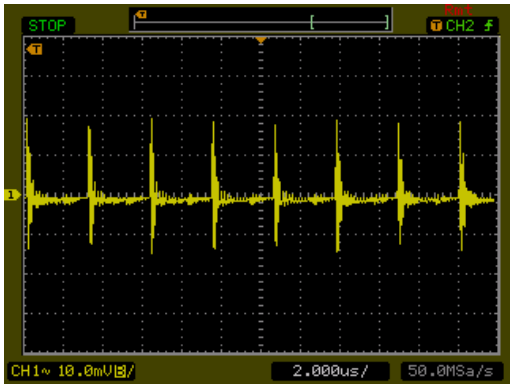
All test conditions are at 25°C. The figures are identical for THL 3-4810WISM



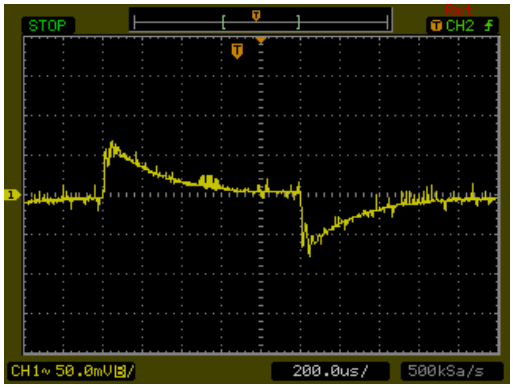
Efficiency Versus Output Current



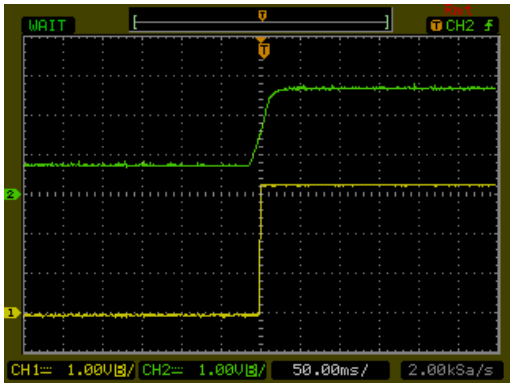
Efficiency Versus Input Voltage. Full Load



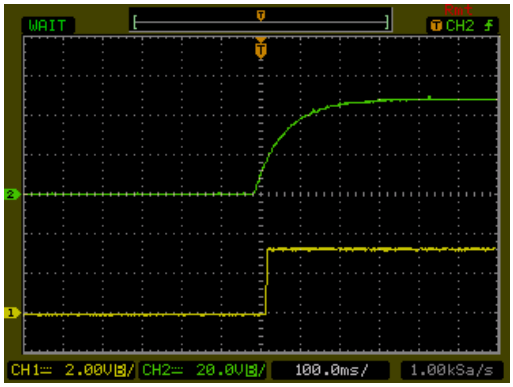
Typical Output Ripple and Noise.
V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C



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



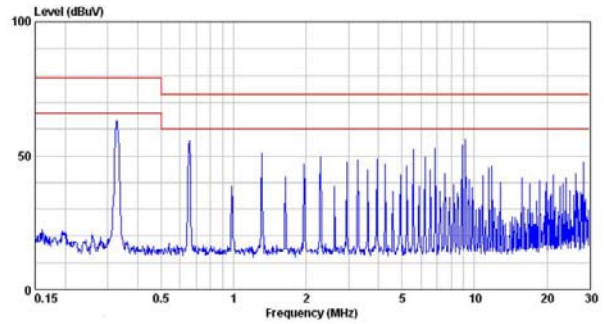
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load



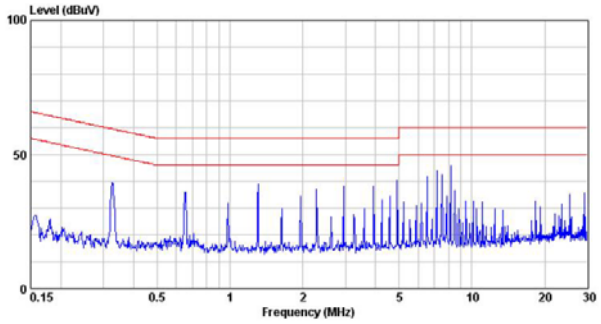
Typical Input Start-Up and Output Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load

Characteristic Curves

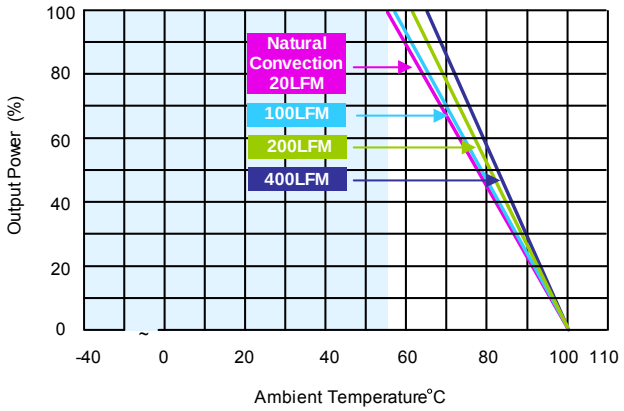
All test conditions are at 25°C. The figures are identical for THL 3-4810WISM (Continued)



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



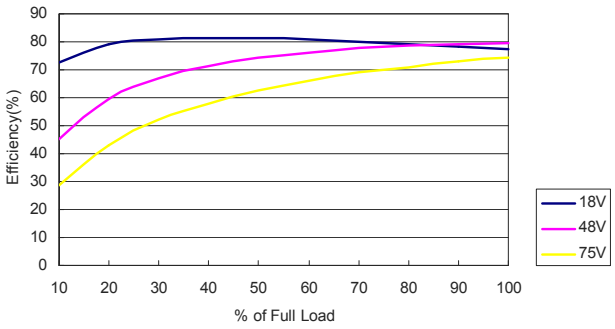
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



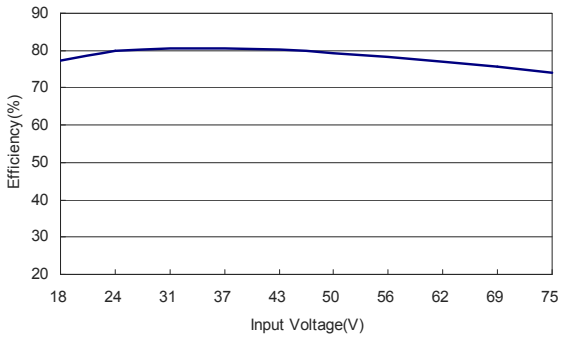
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

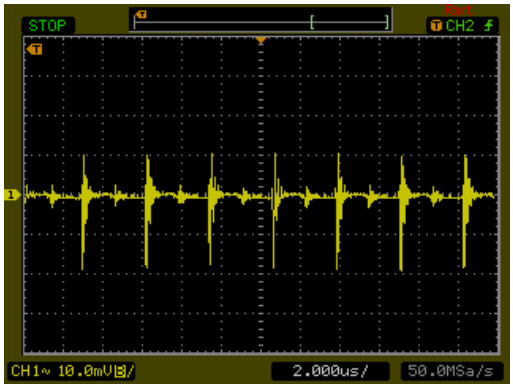
All test conditions are at 25°C. The figures are identical for THL 3-4811WISM



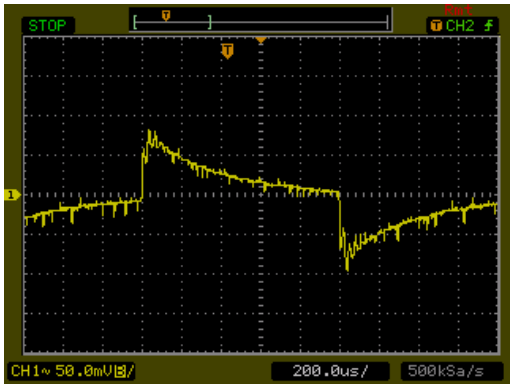
Efficiency Versus Output Current



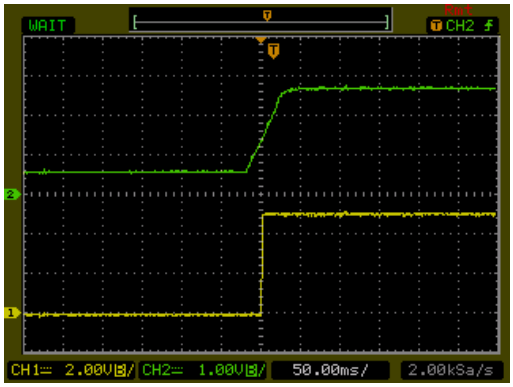
Efficiency Versus Input Voltage. Full Load



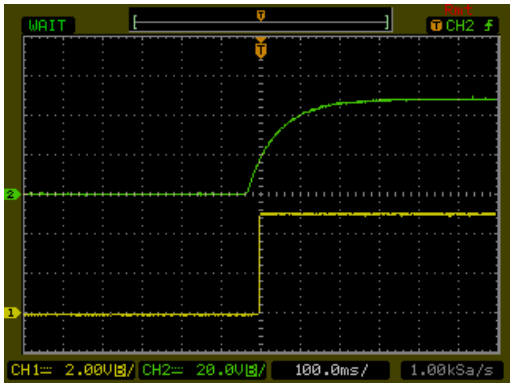
Typical Output Ripple and Noise.
V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C



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



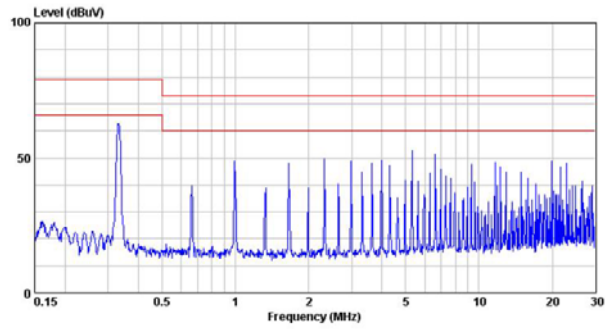
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load



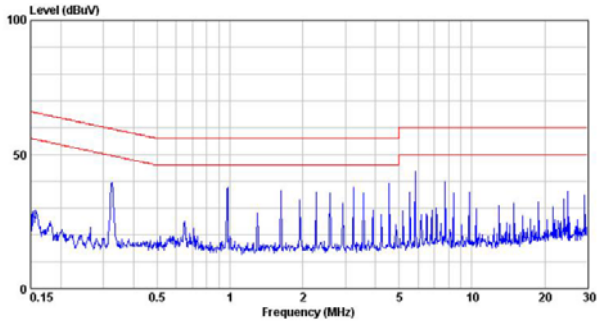
Typical Input Start-Up and Output Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load

Characteristic Curves

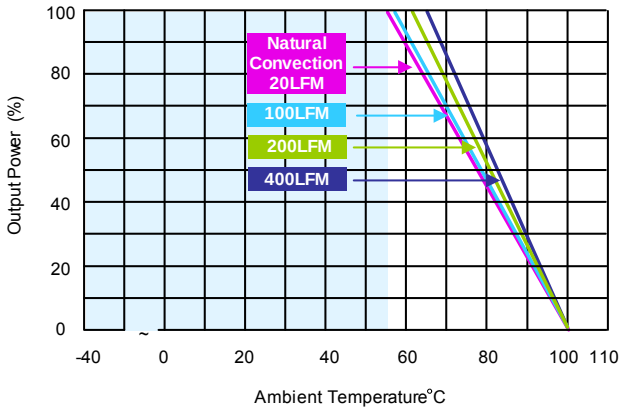
All test conditions are at 25°C. The figures are identical for THL 3-4811WISM (Continued)



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



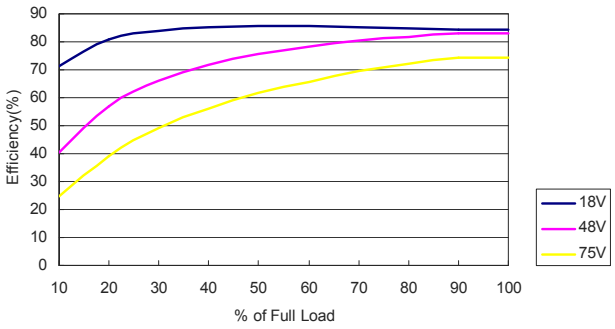
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



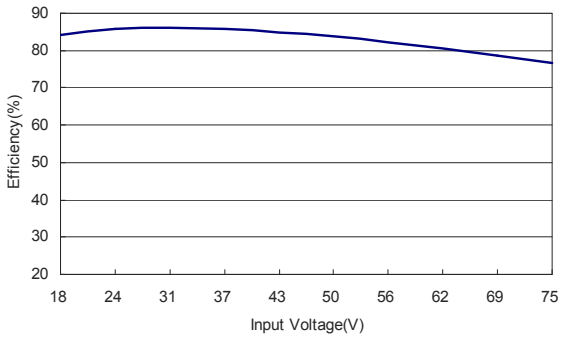
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

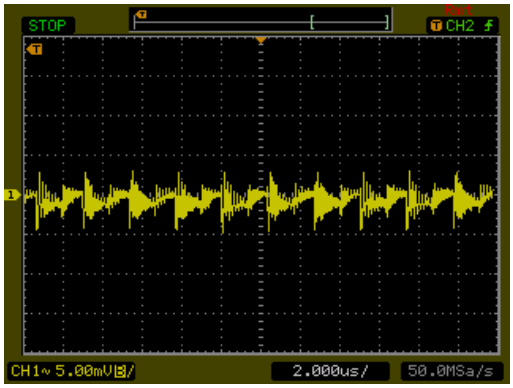
All test conditions are at 25°C. The figures are identical for THL 3-4812WISM



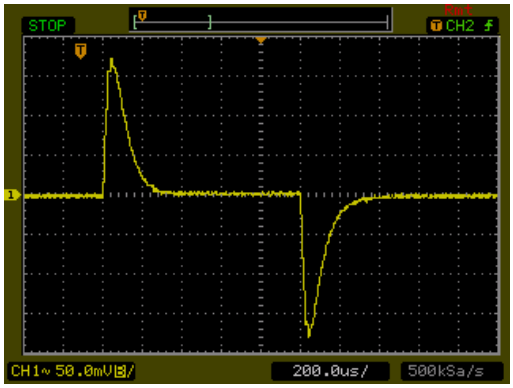
Efficiency Versus Output Current



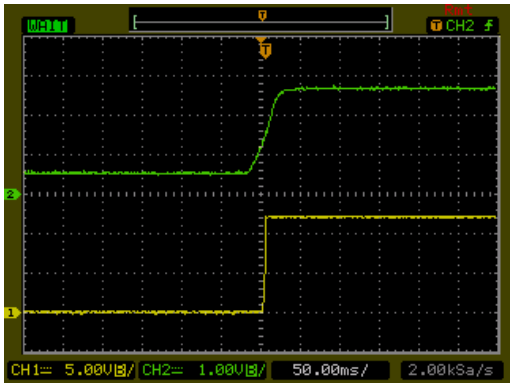
Efficiency Versus Input Voltage. Full Load



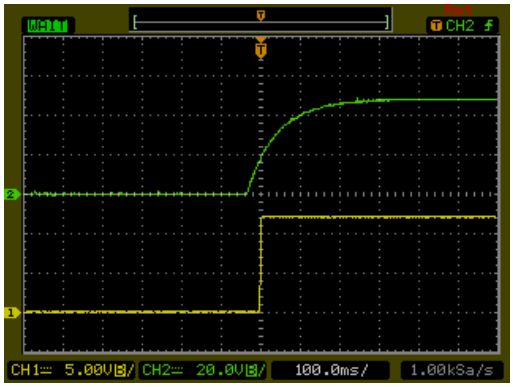
Typical Output Ripple and Noise.
V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C



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



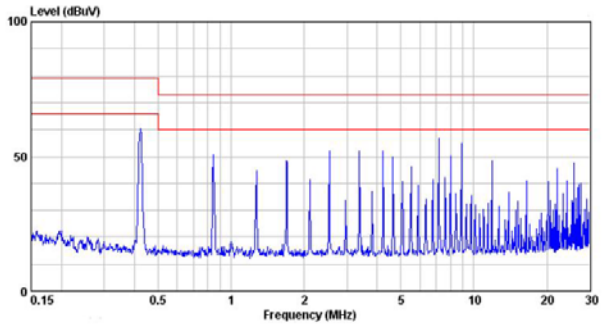
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load



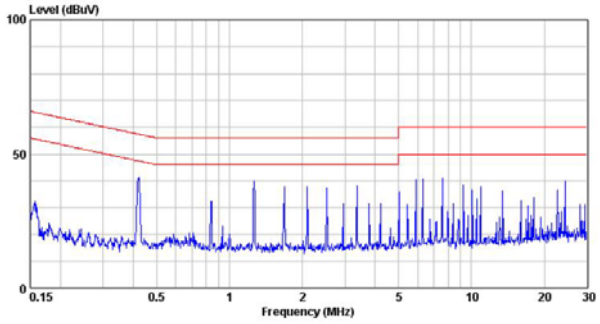
Typical Input Start-Up and Output Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load

Characteristic Curves

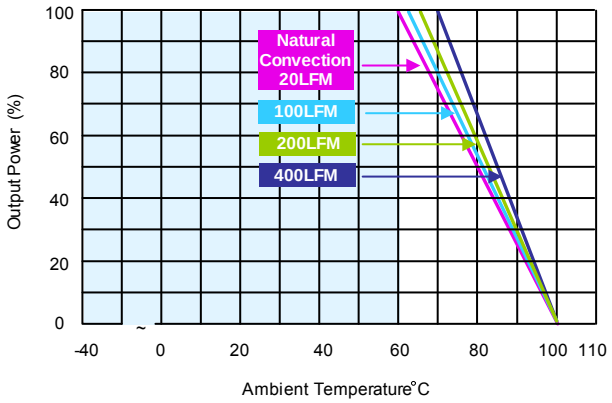
All test conditions are at 25°C. The figures are identical for THL 3-4812WISM (Continued)



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



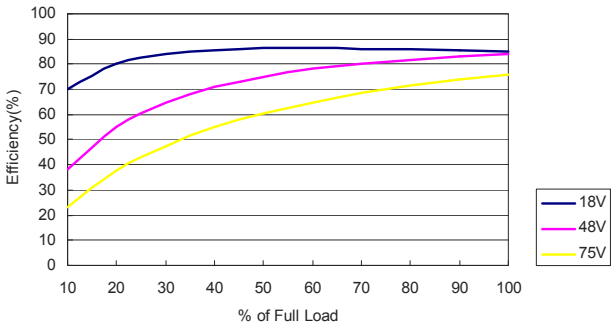
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



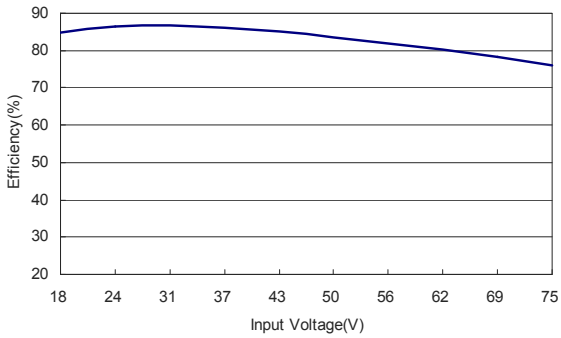
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

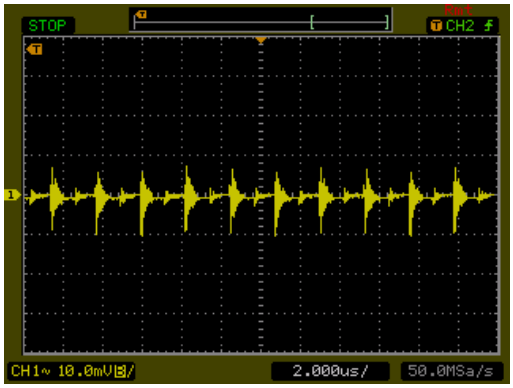
All test conditions are at 25°C. The figures are identical for THL 3-4813WISM



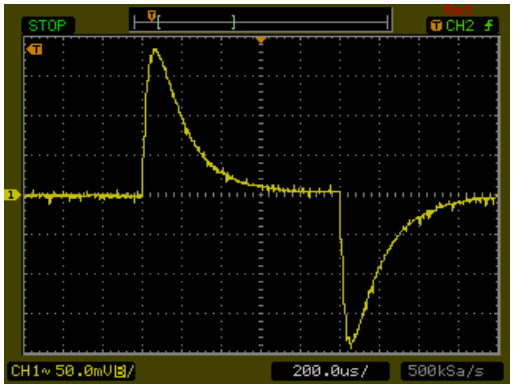
Efficiency Versus Output Current



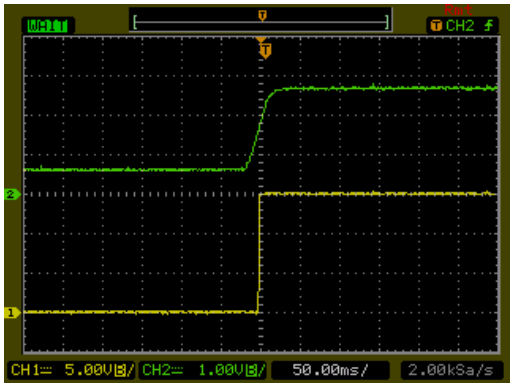
Efficiency Versus Input Voltage. Full Load



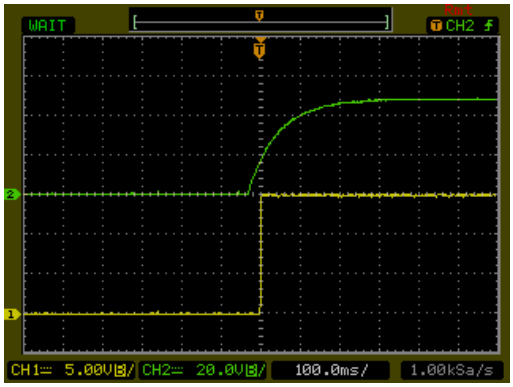
Typical Output Ripple and Noise.
V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C



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



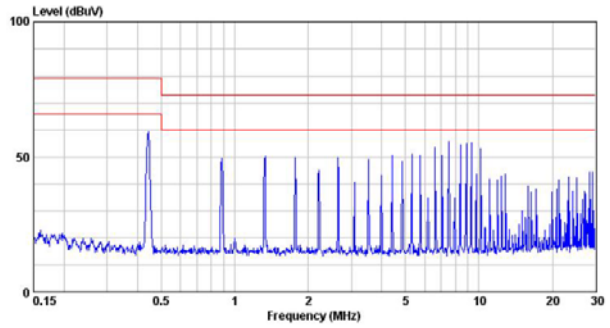
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load



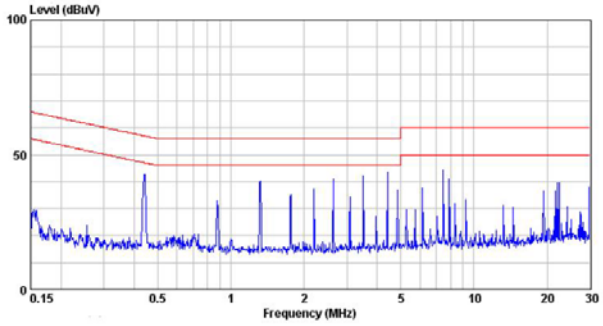
Typical Input Start-Up and Output Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load

Characteristic Curves

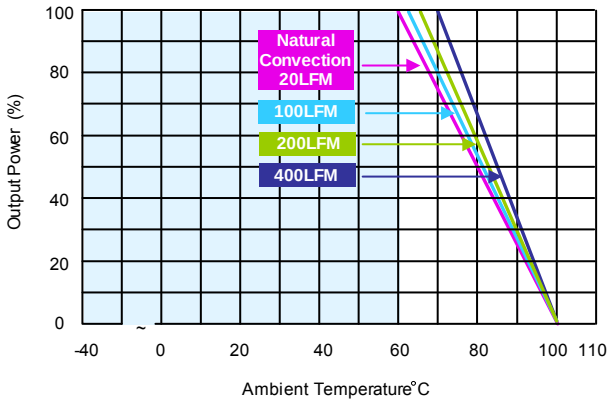
All test conditions are at 25°C. The figures are identical for THL 3-4813WISM (Continued)



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



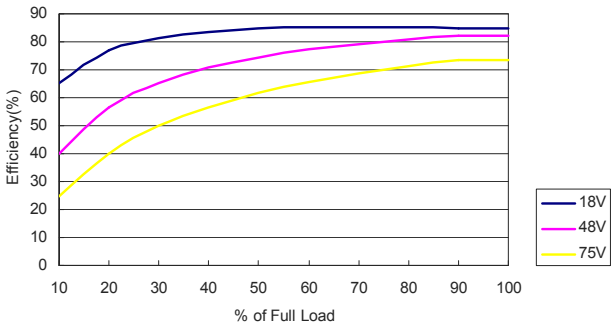
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



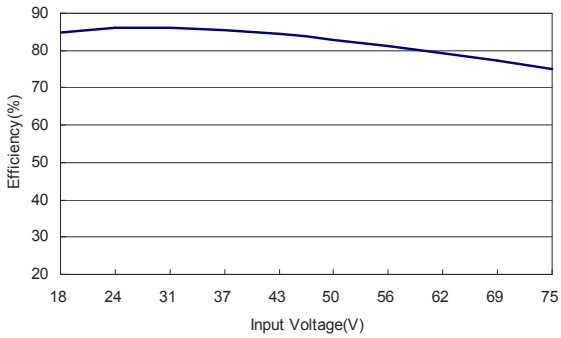
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

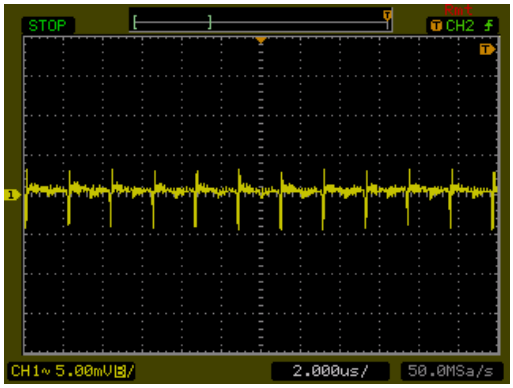
All test conditions are at 25°C. The figures are identical for THL 3-4815WISM



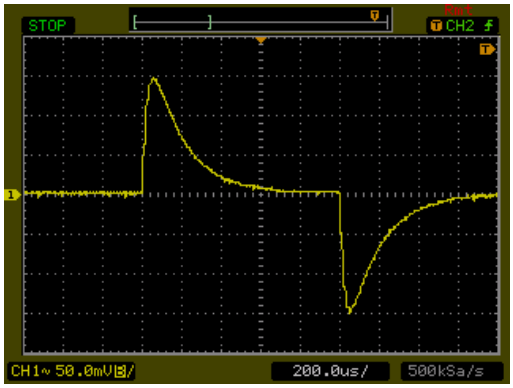
Efficiency Versus Output Current



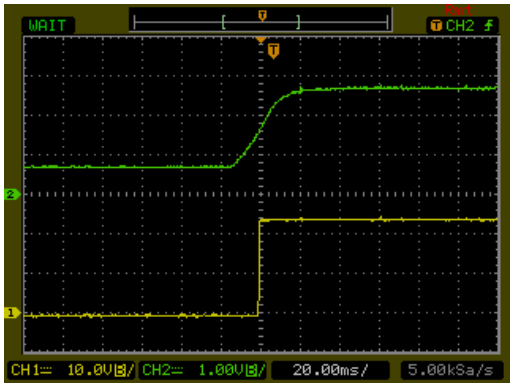
Efficiency Versus Input Voltage. Full Load



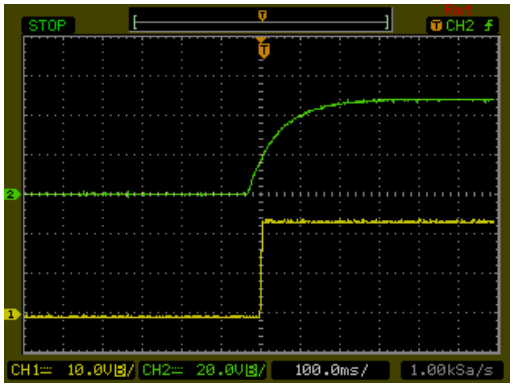
Typical Output Ripple and Noise.
V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C



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



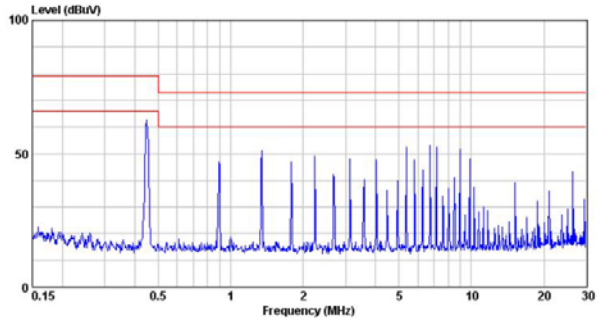
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load



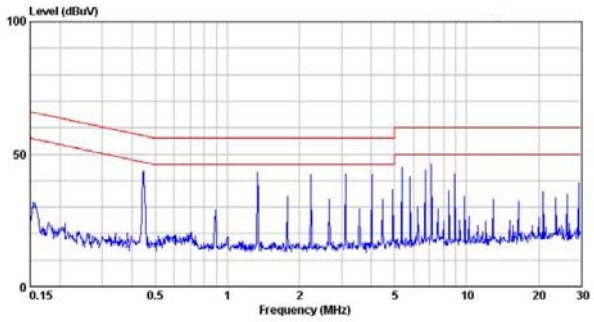
Typical Input Start-Up and Output Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load

Characteristic Curves

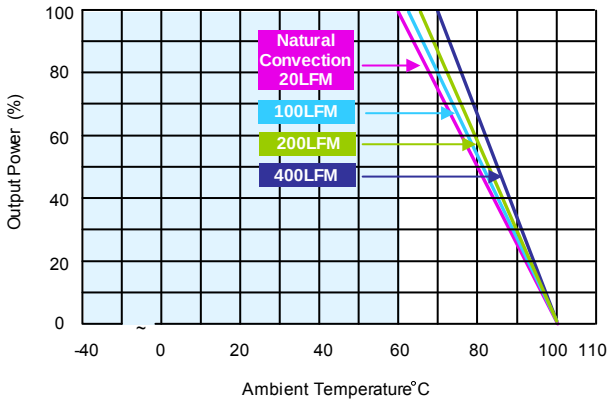
All test conditions are at 25°C. The figures are identical for THL 3-4815WISM (Continued)



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



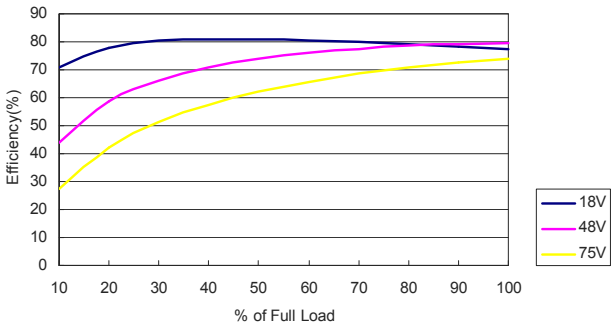
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



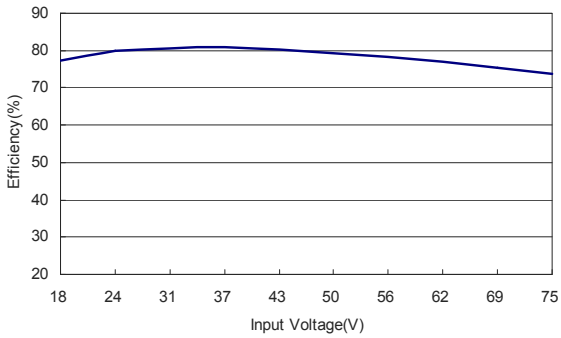
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

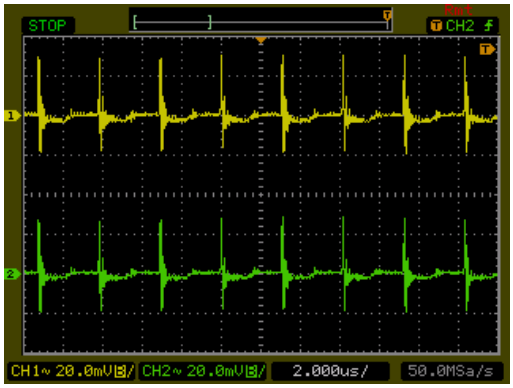
All test conditions are at 25°C. The figures are identical for THL 3-4821WISM



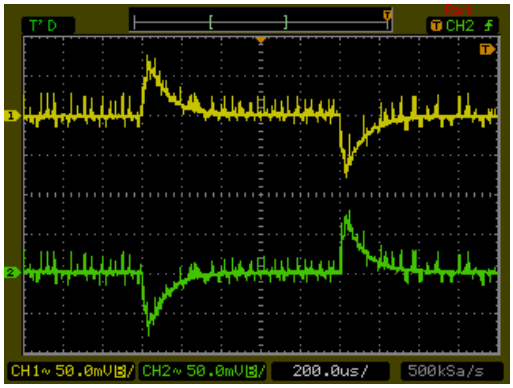
Efficiency Versus Output Current



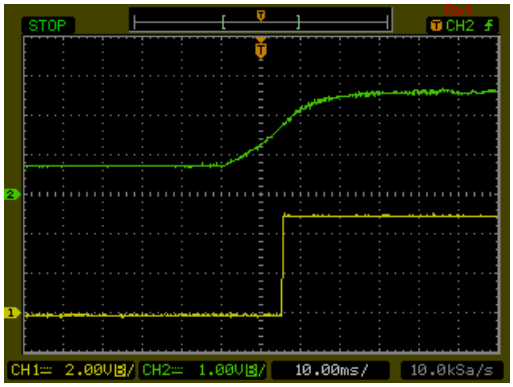
Efficiency Versus Input Voltage. Full Load



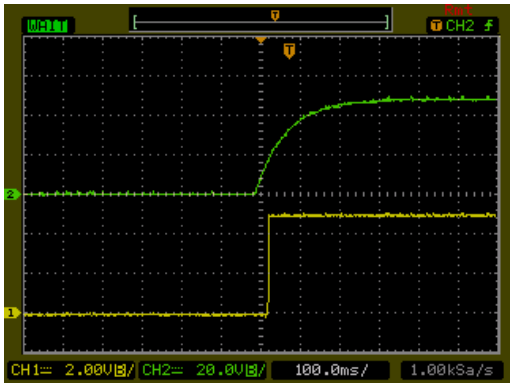
Typical Output Ripple and Noise.
V_{in} = $V_{in\ nom}$; Full Load; T_A = 25°C



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



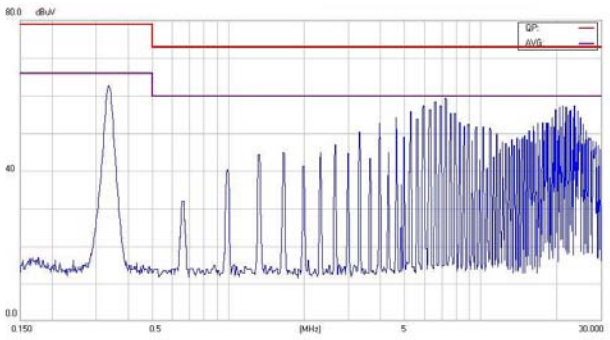
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load



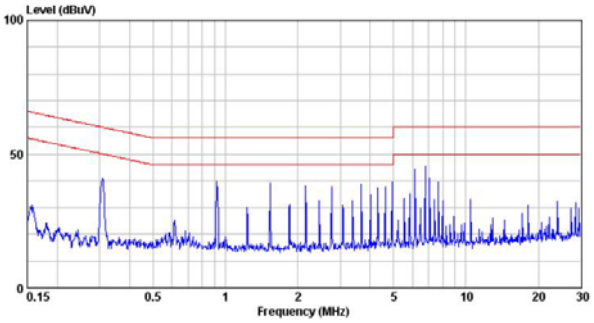
Typical Input Start-Up and Output Rise Characteristic
V_{in} = $V_{in\ nom}$; Full Load

Characteristic Curves

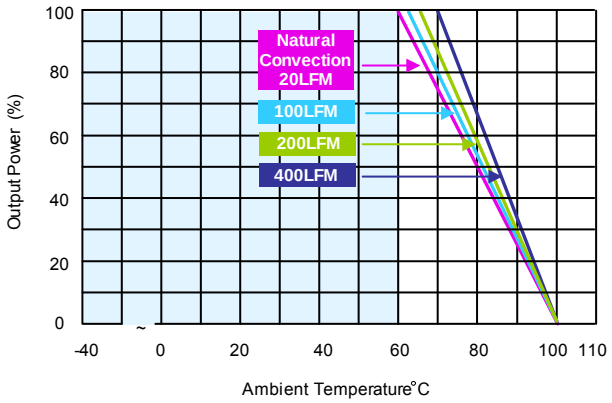
All test conditions are at 25°C. The figures are identical for THL 3-4821WISM (Continued)



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



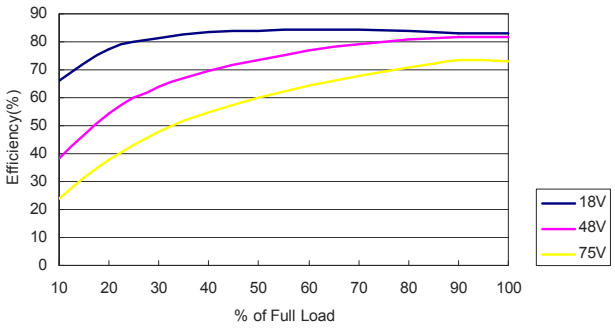
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



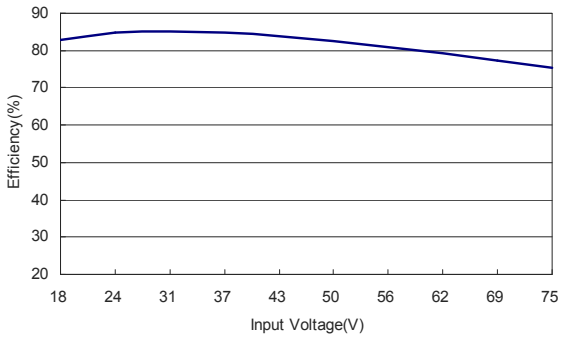
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

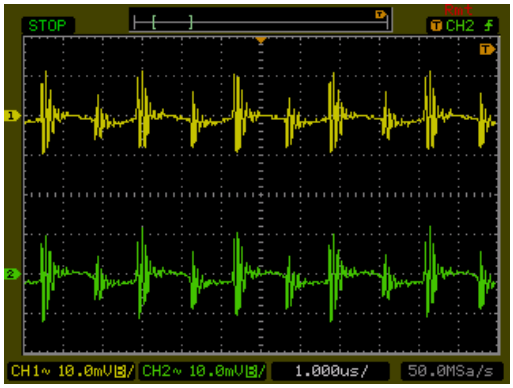
All test conditions are at 25°C. The figures are identical for THL 3-4822WISM



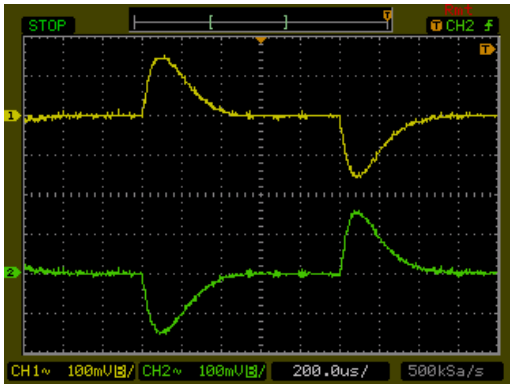
Efficiency Versus Output Current



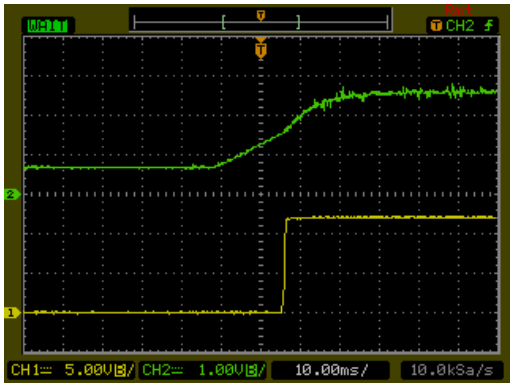
Efficiency Versus Input Voltage. Full Load



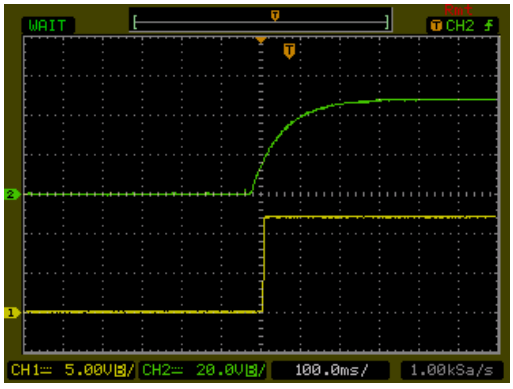
Typical Output Ripple and Noise.
$V_{in} = V_{in\ nom}$; Full Load; $T_A = 25°C$



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



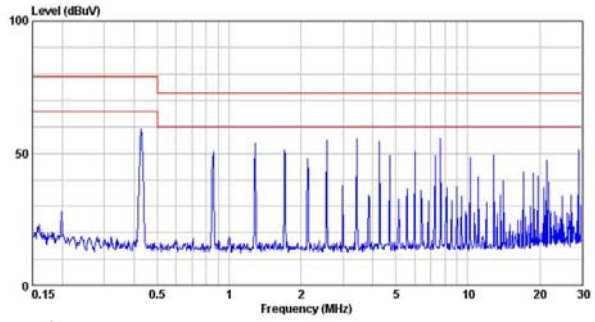
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load



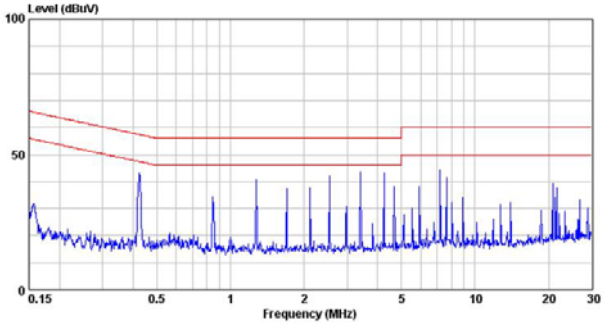
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

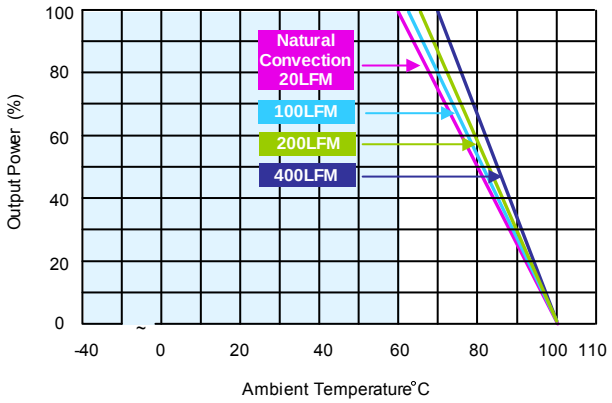
All test conditions are at 25°C. The figures are identical for THL 3-4822WISM (Continued)



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



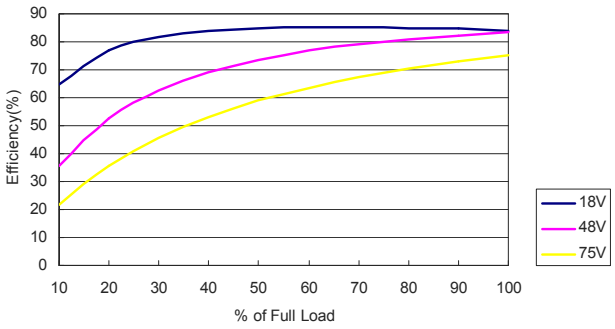
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



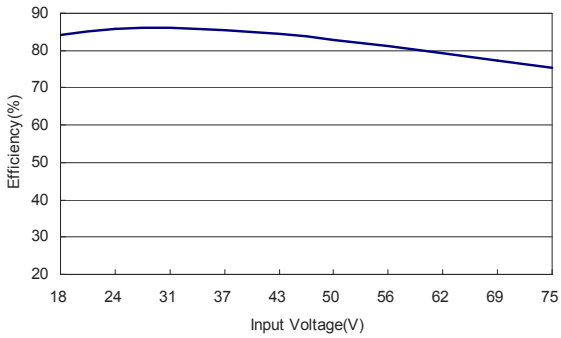
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Characteristic Curves

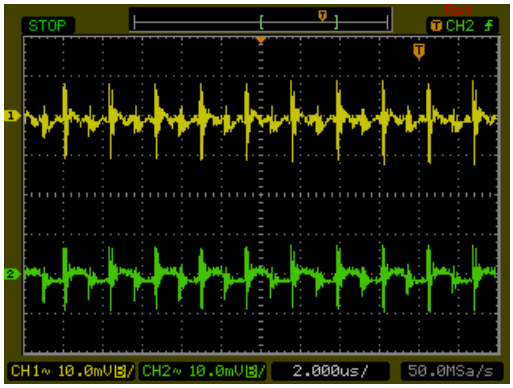
All test conditions are at 25°C. The figures are identical for THL 3-4823WISM



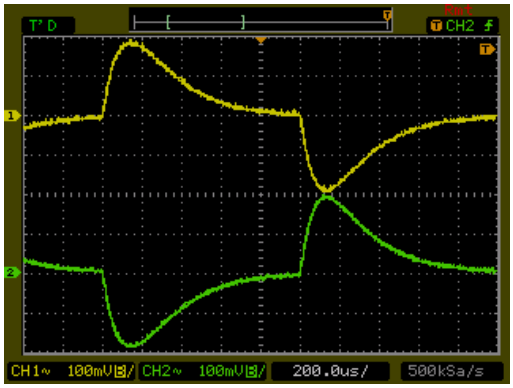
Efficiency Versus Output Current



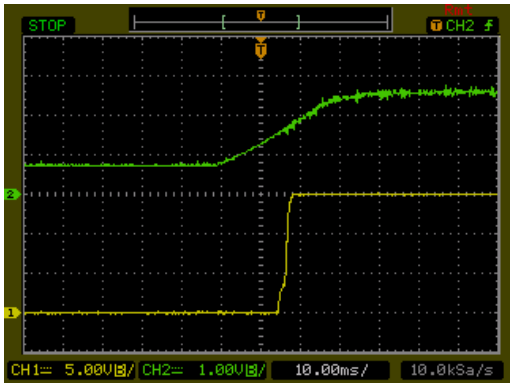
Efficiency Versus Input Voltage. Full Load



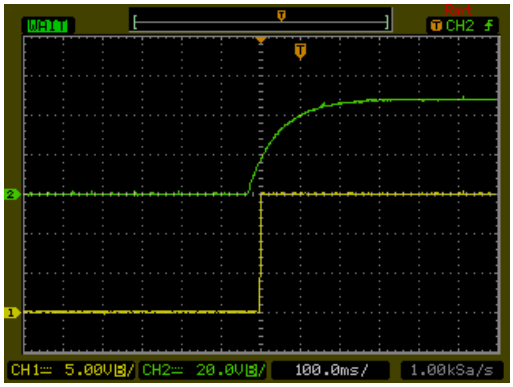
Typical Output Ripple and Noise.
$V_{in} = V_{in\ nom}$; Full Load; $T_A = 25°C$



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



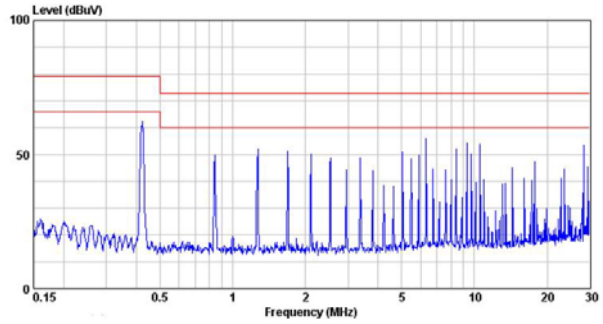
Using ON/OFF Voltage Start-Up and V_{out} Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load



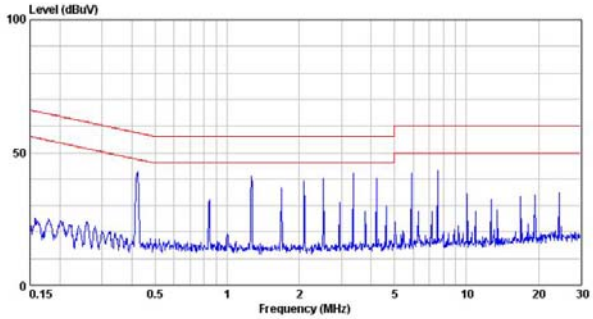
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\ nom}$; Full Load

Characteristic Curves

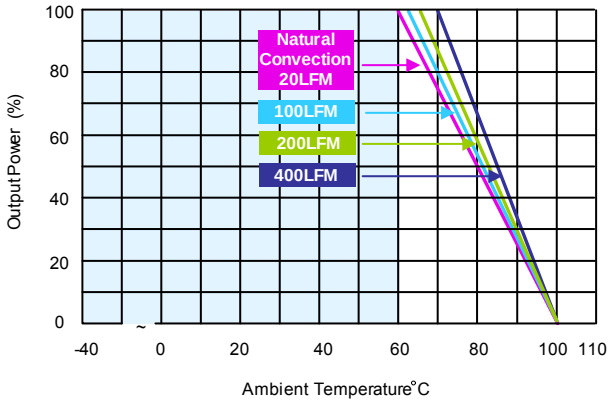
All test conditions are at 25°C. The figures are identical for THL 3-4823WISM (Continued)



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



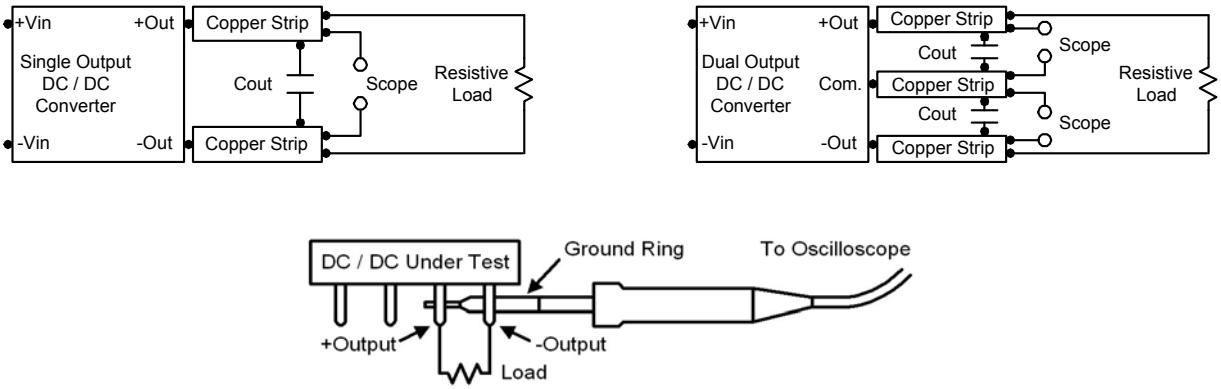
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\ nom}$; Full Load



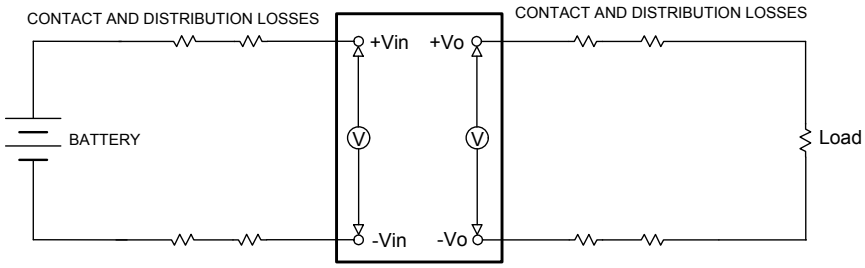
Derating Output Current Versus Ambient Temperature and Airflow; $V_{in} = V_{in\ nom}$

Testing Configurations

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

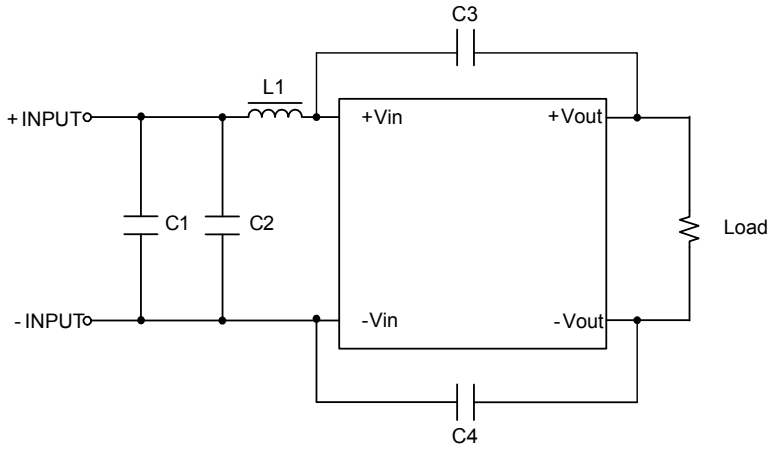


Output voltage and efficiency measurement test up

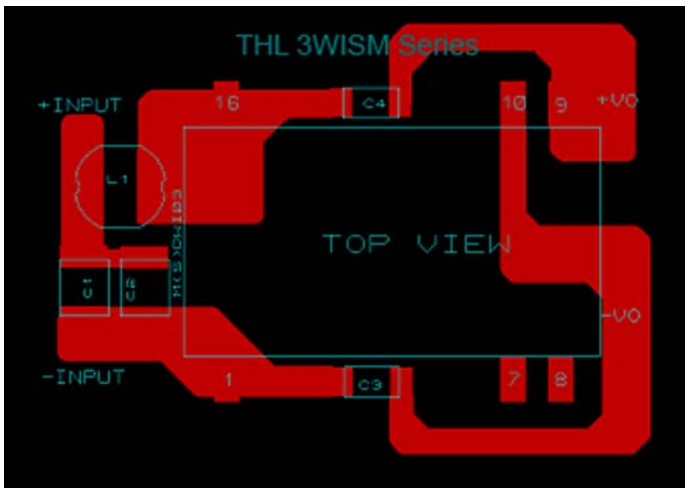


$$Efficiency = \left(\frac{V_{out} \times I_{out}}{V_{in} \times I_{in}} \right) \times 100\% = [\%]$$

EMC considerations



Recommended circuit to comply EN55022 Class B Limits



Recommended PCB Layout with Input Filter

To comply with EN55022 CLASS B following components are recommended:

For THL 3-24xxWISM

Component	Value	Voltage	Reference
C1 & C2	10µF	50V	1812/Y5V
C3 & C4	470pF	2KV	1808/X7R
L1	27µH		SCD0403T / 0.71A

For THL 3-48xxWISM

Component	Value	Voltage	Reference
C1 & C2	1µF	100V	1812/X7R
C3 & C4	2200pF	2KV	1808/X7R
L1	88µH		SCD0403T / 1.42A

Output Over Current Protection

To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current-limit inception, the unit shifts from voltage control to current control. The unit operates normally once the output current is brought back into its specified range.

Short Circuitry Protection

Continuous 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

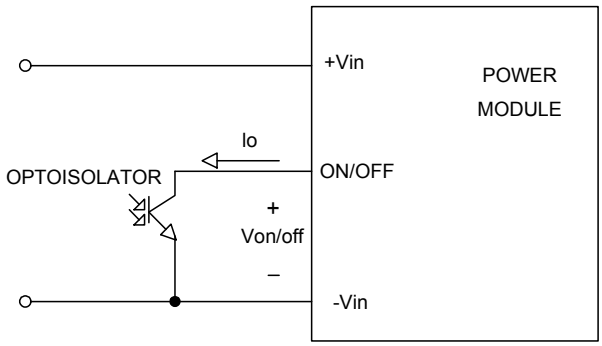
The positive logic remote ON/OFF control circuit is included.

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.

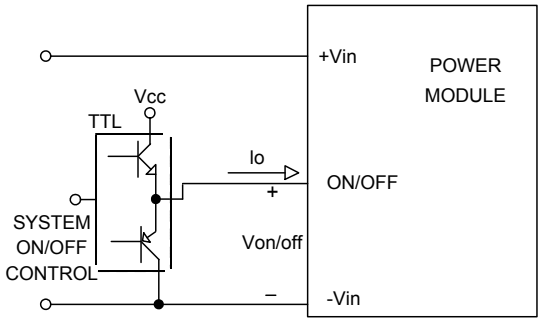
The negative logic remote ON/OFF control circuit is included.

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

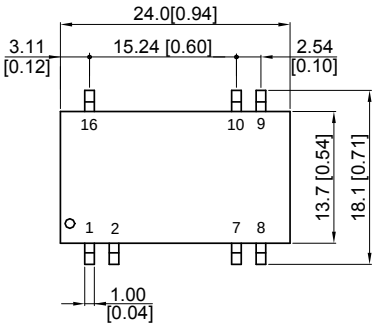


Isolated-Closure Remote ON/OFF

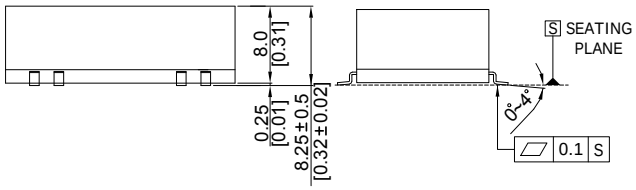


Level Control Using TTL Output

Mechanical Dimensions

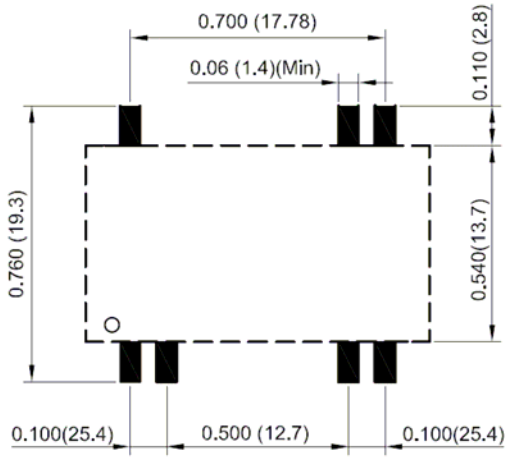


Pin Connections		
Pin	Single	Dual
1	-Vin	-Vin
2	Remote On/Off	Remote On/Off
7	NC	NC
8	NC	Common
9	+Vout	+Vout
10	-Vout	-Vout
16	+Vin	+Vin



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



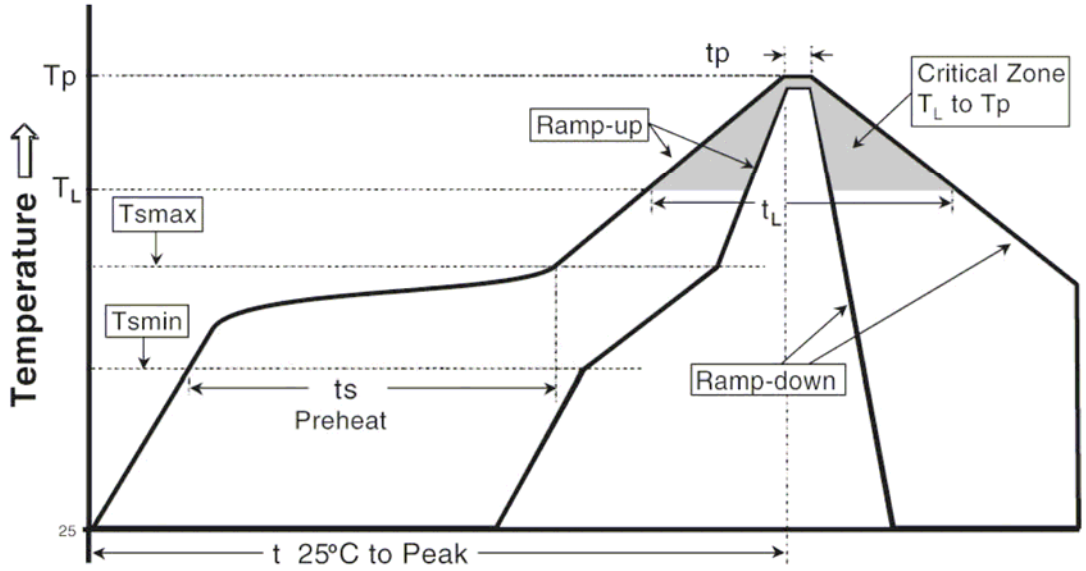
1. All dimensions in Inches (mm)
   Tolerance: X.XX±0.02" (X.X±0.5)
   X.XXX±0.01" (X.XX±0.25mm)
2. Pin pitch tolerance:±0.01" (±0.25mm)
3. Pin dimension tolerance:±0.004" (±0.1mm)

Soldering and Reflow Considerations

Lead free wave solder profile for THL 3WISM Series

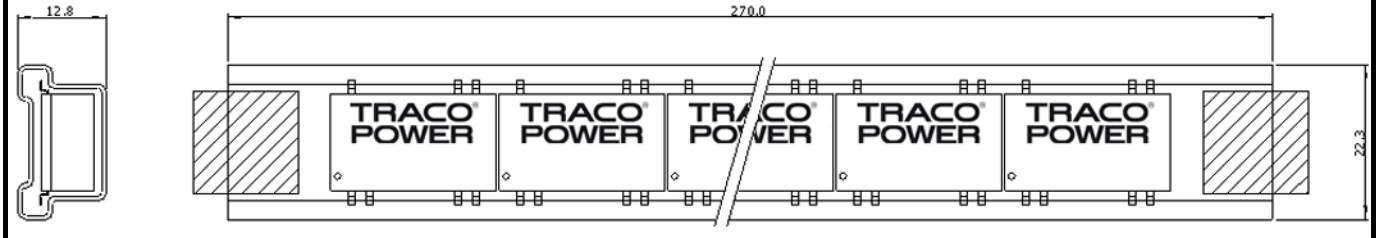
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3° C/second max.	3° C/second max.
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (Ts_{min} to Ts_{max}) (ts)	 100 °C 150 °C 60-120 seconds	 150 °C 200 °C 60-180 seconds
Time maintained 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 3-2410WISM	9 – 36	3.3	600	110	75
THL 3-2411WISM	9 – 36	5	600	160	78
THL 3-2412WISM	9 – 36	12	250	156	80
THL 3-2413WISM	9 – 36	15	200	156	80
THL 3-2415WISM	9 – 36	24	125	156	80
THL 3-2421WISM	9 – 36	±5	±300	162	77
THL 3-2422WISM	9 – 36	±12	±125	156	80
THL 3-2423WISM	9 – 36	±15	±100	156	80
THL 3-4810WISM	18 – 75	3.3	600	55	75
THL 3-4811WISM	18 – 75	5	600	80	78
THL 3-4812WISM	18 – 75	12	250	78	80
THL 3-4813WISM	18 – 75	15	200	78	80
THL 3-4815WISM	18 – 75	24	125	78	80
THL 3-4821WISM	18 – 75	±5	±300	81	77
THL 3-4822WISM	18 – 75	±12	±125	78	80
THL 3-4823WISM	18 – 75	±15	±100	78	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 24Vin with maximum rating of 1500mA and in 48Vin with maximum rating of 800mA. 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 3WISM series of DC/DC converters has been calculated using MIL-HDBK 217F NOTICE2,

Operating Temperature = 25°C, Ground Benign.

THL 3-2410WISM → MTBF = 839,842 Hours

THL 3-2411WISM → MTBF = 837,942 Hours

THL 3-2412WISM → MTBF = 846,238 Hours

THL 3-2413WISM → MTBF = 854,847 Hours

THL 3-2415WISM → MTBF = 860,437 Hours

THL 3-2421WISM → MTBF = 836,750 Hours

THL 3-2422WISM → MTBF = 850,051 Hours

THL 3-2423WISM → MTBF = 850,051 Hours

THL 3-4810WISM → MTBF = 839,842 Hours

THL 3-4811WISM → MTBF = 841,468 Hours

THL 3-4812WISM → MTBF = 846,668 Hours

THL 3-4813WISM → MTBF = 852,660 Hours

THL 3-4815WISM → MTBF = 858,516 Hours

THL 3-4821WISM → MTBF = 841,538 Hours

THL 3-4822WISM → MTBF = 851,499 Hours

THL 3-4823WISM → MTBF = 848,320 Hours