TMR 3-WI Series

Application Note

DC/DC Converter 4.5 to 18Vdc, 9 to 36Vdc or 18 to 75Vdc Input

3.3 to 15Vdc Single Outputs ±5Vdc to ±15Vdc Dual Outputs and 3 Watt Output Power

c UL us

Pending

Complete TMR 3-WI datasheet can be downloaded at:
http://www.tracopower.com/products/tmr3wi.pdf

Features

- Single output current up to 700 mA
- 3 watts maximum output power
- High efficiency up to 82%
- RoHS directive compliant
- Sip package, 21.8 x 11.2 x 9.1mm (0.86 x 0.36x 0.44 inch)
- 4:1 wide input voltage range
- Low ripple & noise
- UL94-V0 case potting materials
- Input to output isolation: 1500Vdc,min for 60 seconds
- Continuous short circuit protection
- Remote ON/OFF
- International safety standard approval

Options

- 3000Vdc isolation for 60 seconds

Applications

- Wireless Network
- Telecom / Datacom
- Industry Control System
- Measurement Equipment
- Semiconductor Equipment

General Description

The TMR 3WI series offer 3 watts of output power from a 21.8 x 11.2 x 9.1mm (0.86 x 0.36 x 0.44 inch) package without derating up to 71°C. The TMR 3WI series have 4:1 wide input voltage range from 4.5-18Vdc, 9-36Vdc or 18-75Vdc and features 1500Vdc of isolation test voltage, short-circuit protection. All models are particularly suited to telecommunications, industrial, mobile telecom and test equipment applications.

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Absolute Maximum Rating				
Parameter	**Model**	**Min**	**Max**	**Unit**
Input Voltage				
Continuous	TMR 3-12xxWI		18	Vdc
	TMR 3-24xxWI		36	
	TMR 3-48xxWI		75	
Transient (100ms)	TMR 3-12xxWI		36	
	TMR 3-24xxWI		50	
	TMR 3-48xxWI		100	
Operating Ambient Temperature (without derating)	All	-40	+71	°C
Storage Temperature	All	-55	+125	°C

Output Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Output Voltage	TMR 3-xx10WI	3.267	3.3	3.333	Vdc
(V_{in} = $V_{in\,nom}$; Full Load; T_A = 25°C)	TMR 3-xx11WI	4.95	5	5.05	
	TMR 3-xx09WI	8.91	9	9.09	
	TMR 3-xx12WI	11.88	12	12.12	
	TMR 3-xx13WI	14.85	15	15.15	
	TMR 3-xx21WI	±4.95	±5	±5.05	
	TMR 3-xx22WI	±11.88	±12	±12.12	
	TMR 3-xx23WI	±14.85	±15	±15.15	
Output Regulation	All				%
Line ($V_{in\,min}$ to $V_{in\,max}$ at Full Load)		-0.2		+0.2	
Load (0% to 100% of Full Load)		-1.0		+1.0	
Load (5% to 100% of Full Load)		-0.5		+0.5	
Output Ripple & Noise Peak-to-Peak (5Hz to 20MHz Bandwidth)	All		30		mV pk-pk
Temperature Coefficient	All	-0.02		+0.02	%/°C
Dynamic Load Response (V_{in} = $V_{in\,nom}$; T_A = 25°C) Load step change from 75% to 100% or 100 to 75% of Full Load Setting Time (V_{out} < 10% peak deviation)	All		250		µS
Output Current	TMR 3-xx10WI	0		700	mA
	TMR 3-xx11WI	0		600	
	TMR 3-xx09WI	0		333	
	TMR 3-xx12WI	0		250	
	TMR 3-xx13WI	0		200	
	TMR 3-xx21WI	0		±300	
	TMR 3-xx22WI	0		±125	
	TMR 3-xx23WI	0		±100	
Max. Capacitive Load on the Output	TMR 3-xx10WI			3300	µF
	TMR 3-xx11WI			1680	
	TMR 3-xx09WI			1000	
	TMR 3-xx12WI			820	
	TMR 3-xx13WI			680	
	TMR 3-xx21WI			±1000	
	TMR 3-xx22WI			±470	
	TMR 3-xx23WI			±330	
Output Short Circuit Protection	All	Continuous, automatics recovery			

Input Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Operating Input Voltage	TMR 3-12xxWI	4.5	12	18	Vdc
	TMR 3-24xxWI	9	24	36	
	TMR 3-48xxWI	18	48	75	
Input Current	TMR 3-1210WI			285	mA
(Maximum Value at $V_{in} = V_{in\,nom}$; Full Load)	TMR 3-1211WI			338	
	TMR 3-1209WI			333	
	TMR 3-1212WI			329	
	TMR 3-1213WI			329	
	TMR 3-1221WI			329	
	TMR 3-1222WI			329	
	TMR 3-1223WI			329	
	TMR 3-2410WI			140	
	TMR 3-2411WI			165	
	TMR 3-2409WI			165	
	TMR 3-2412WI			160	
	TMR 3-2413WI			160	
	TMR 3-2421WI			167	
	TMR 3-2422WI			162	
	TMR 3-2423WI			162	
	TMR 3-4810WI			71	
	TMR 3-4811WI			82	
	TMR 3-4809WI			82	
	TMR 3-4812WI			81	
	TMR 3-4813WI			81	
	TMR 3-4821WI			84	
	TMR 3-4822WI			81	
	TMR 3-4823WI			81	
Input Standby Current	TMR 3-1210WI		35		mA
(Typical Value at $V_{in} = V_{in\,nom}$; No Load)	TMR 3-1211WI		40		
	TMR 3-1209WI		40		
	TMR 3-1212WI		40		
	TMR 3-1213WI		40		
	TMR 3-1221WI		40		
	TMR 3-1222WI		40		
	TMR 3-1223WI		40		
	TMR 3-2410WI		20		
	TMR 3-2411WI		20		
	TMR 3-2409WI		19		
	TMR 3-2412WI		20		
	TMR 3-2413WI		19		
	TMR 3-2421WI		25		
	TMR 3-2422WI		25		
	TMR 3-2423WI		25		
	TMR 3-4810WI		12		
	TMR 3-4811WI		12		
	TMR 3-4809WI		13		
	TMR 3-4812WI		14		
	TMR 3-4813WI		14		
	TMR 3-4821WI		14		
	TMR 3-4822WI		14		
	TMR 3-4823WI		14		

Input Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Input Reflected Ripple Current (See Page 54)	TMR 3-12xxWI TMR 3-24xxWI TMR 3-48xxWI		25 10 8		mA pk-pk
Start Up Time (V_{in} = $V_{in\,nom}$ and constant resistive load) Power up Remote ON/OFF	All		 30 30		mS
Remote ON/OFF Control (See Page 57) DC-DC ON DC-DC OFF	All	2	Open	4	mA
Remote Off Input Current	All			2.5	mA

General Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Efficiency (See Page 60) (V_{in} = $V_{in\,nom}$; Full Load; T_A = 25°C)	TMR 3-1210WI TMR 3-1211WI TMR 3-1209WI TMR 3-1212WI TMR 3-1213WI TMR 3-1221WI TMR 3-1222WI TMR 3-1223WI TMR 3-2410WI TMR 3-2411WI TMR 3-2409WI TMR 3-2412WI TMR 3-2413WI TMR 3-2421WI TMR 3-2422WI TMR 3-2423WI TMR 3-4810WI TMR 3-4811WI TMR 3-4809WI TMR 3-4812WI TMR 3-4813WI TMR 3-4821WI TMR 3-4822WI TMR 3-4823WI		74 78 79 80 80 80 80 80 75 80 80 82 82 79 81 81 74 80 80 81 81 79 81 81		%
Isolation Voltage (for 60 seconds) Input to Output Standard Suffix "H"	All All	1500 3000			Vdc
Isolation Resistance	All	10^9			Ω
Isolation Capacitance Standard Suffix "H"	All			200 40	pF
Switching Frequency	All	100			KHz
Weight	All		4.8		g

General Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
MTBF (See Page 60) Bellcore TR-NWT-000332, T_C = 40°C MIL-HDBK-217F	All		3'963'000 1'707'000		hours
Case Material	Non-conductive black plastic				
Base Material	None				
Potting material	Silicon (UL94-V0)				
Dimensions	21.8 X 9.2 X 11.1 mm (0.86 X 0.36 X 0.44 Inch)				

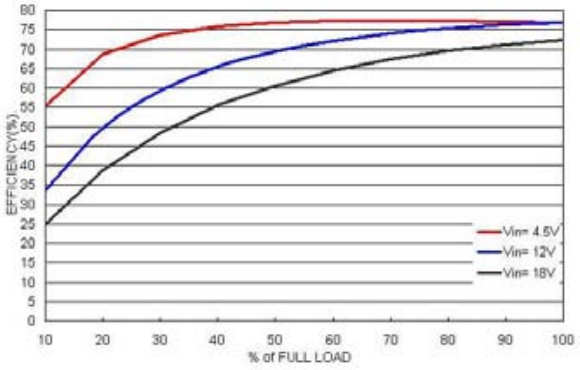
Environmental Specification	
Thermal shock	MIL-STD-810F
Vibration	MIL-STD-810F
Relative humidity	5% to 95% RH

EMC Characteristic			
EMI (See Page 55 & 56)	EN55022		Class A Class B
ESD	EN61000-4-2	Air ±8KV Contact ±6KV	Performance Criteria A
Radiated immunity	EN61000-4-3	10V/m	Performance Criteria A
Fast transient *	EN61000-4-4	±2KV	Performance Criteria A
Surge *	EN61000-4-5	±1KV	Performance Criteria A
Conducted immunity	EN61000-4-6	10Vr.m.s	Performance Criteria A

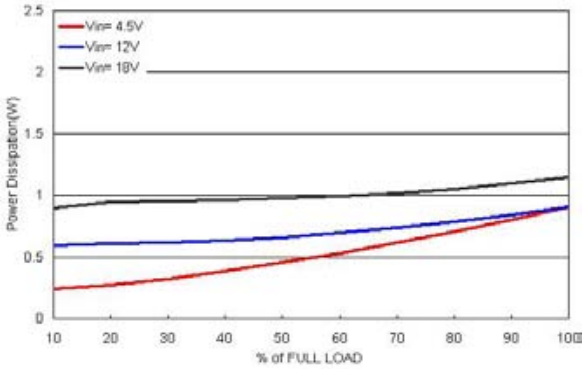
* An external input filter capacitor is required if the module has to comply with EN 61000-4-4, EN 61000-4-5.
The filter capacitor Tracopower suggest: Nippon Chemi-Con KY series, 100µF/100V, ESR = 110mΩ.

Characteristic Curves

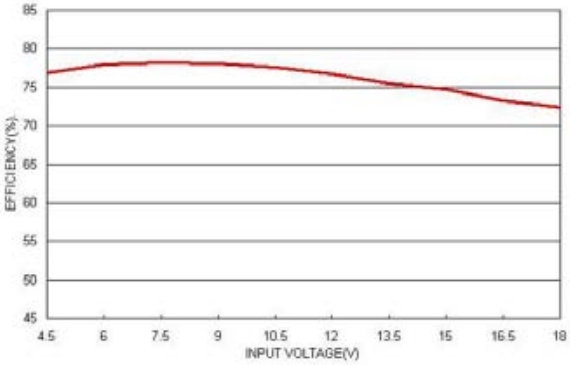
All test conditions are at 25°C. The figures are identical for TMR 3-1210WI



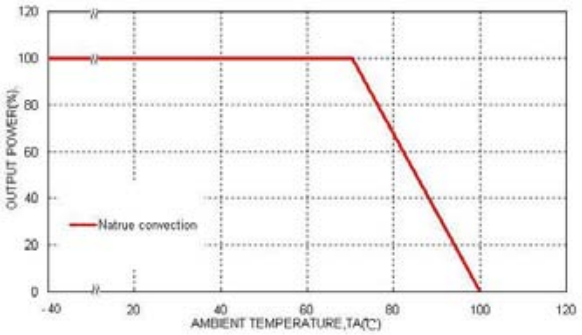
Efficiency versus Output Current



Power Dissipation versus Output Current



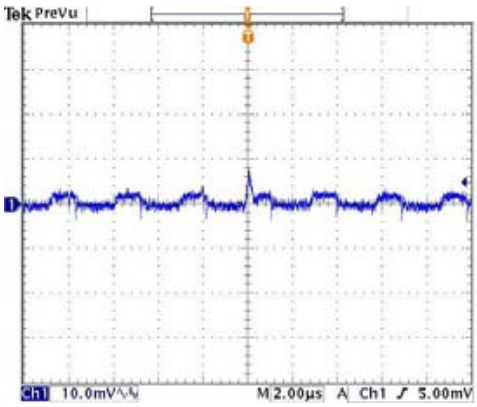
Efficiency versus Input Voltage. Full Load



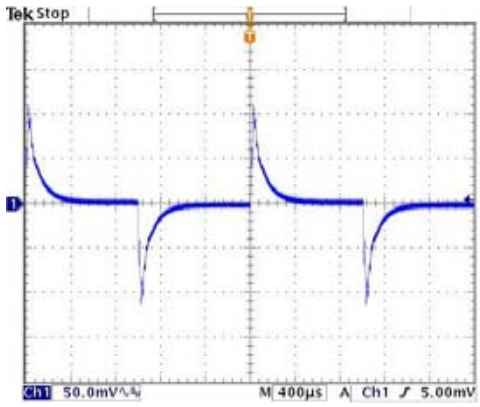
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

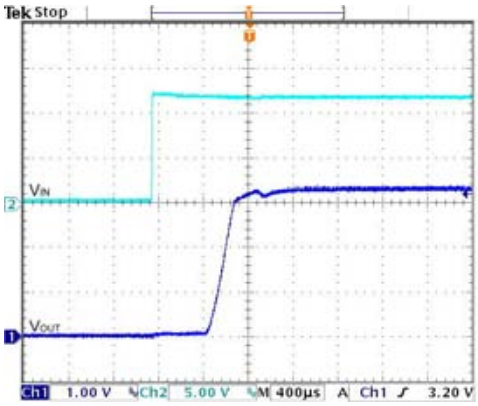
All test conditions are at 25°C. The figures are identical for TMR 3-1210WI



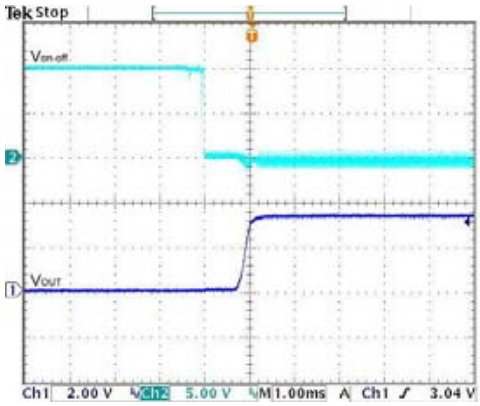
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



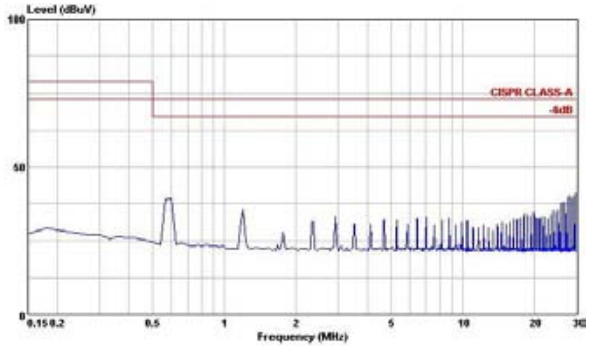
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



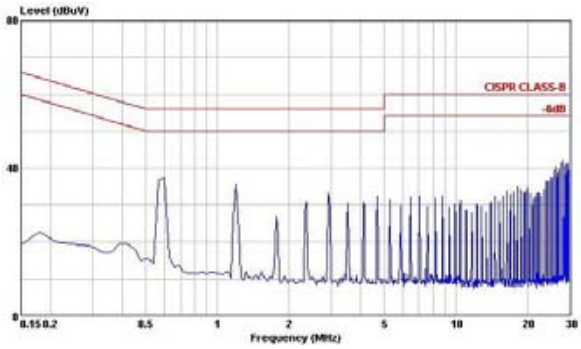
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



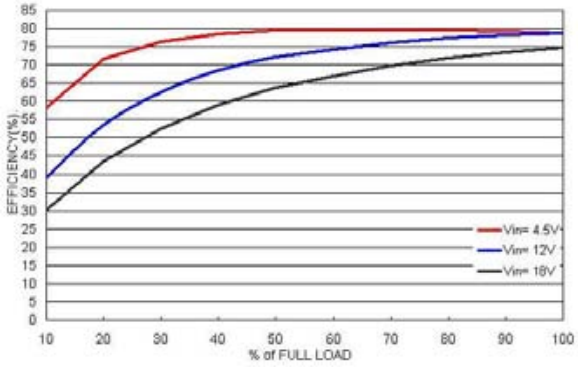
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



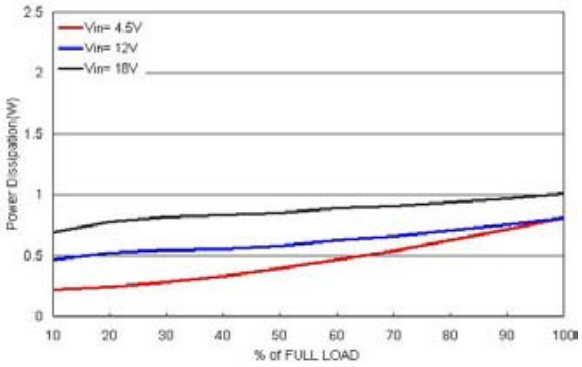
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

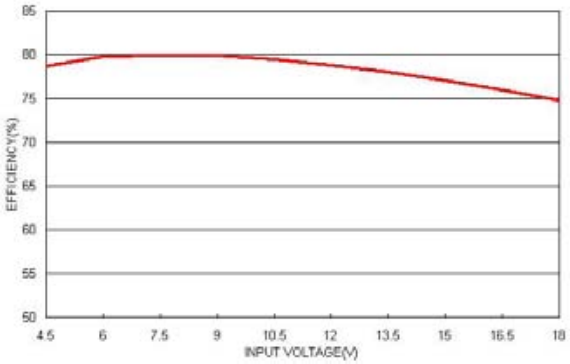
All test conditions are at 25°C. The figures are identical for TMR 3-1211WI



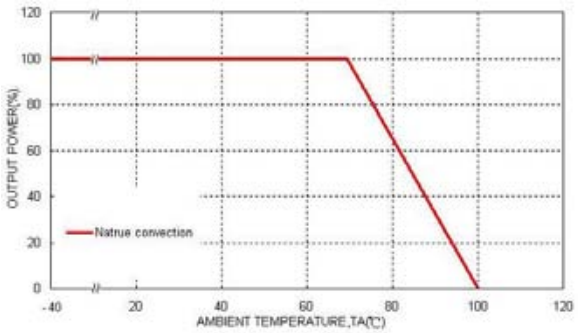
Efficiency versus Output Current



Power Dissipation versus Output Current



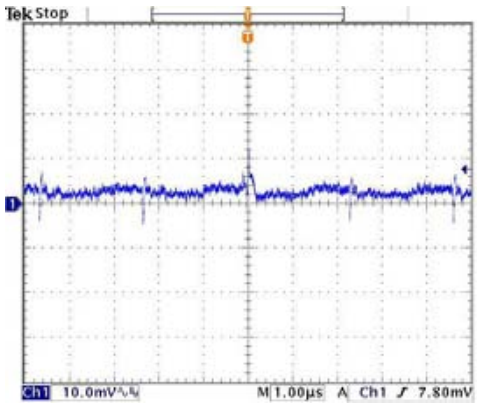
Efficiency versus Input Voltage. Full Load



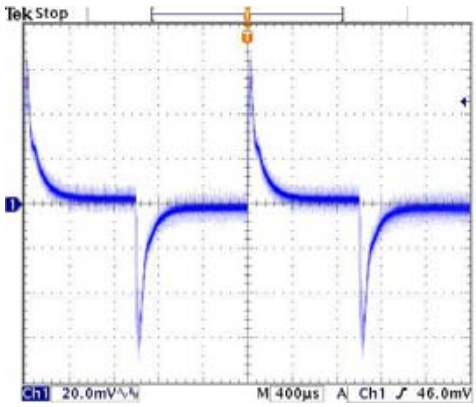
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

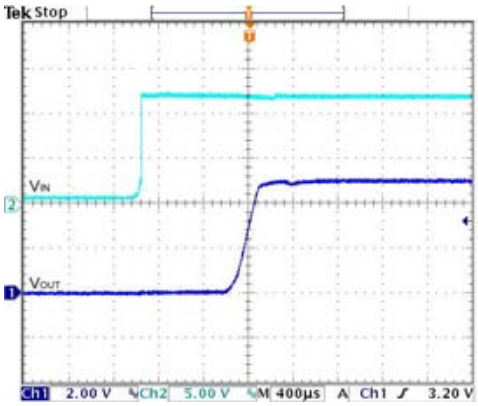
All test conditions are at 25°C. The figures are identical for TMR 3-1211WI



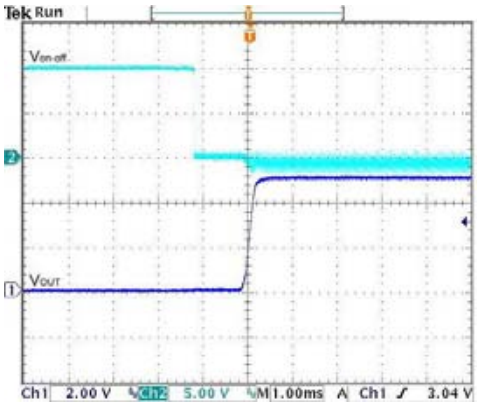
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



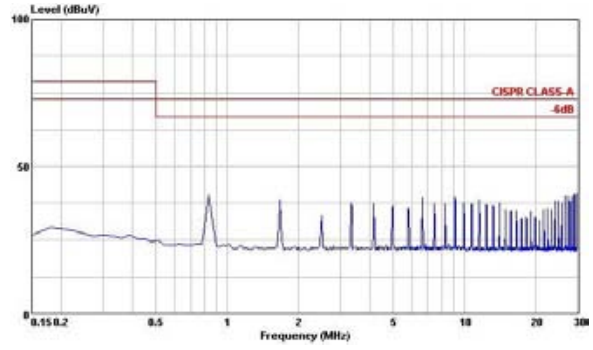
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



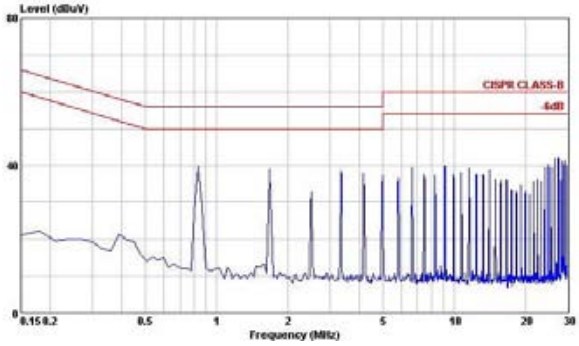
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



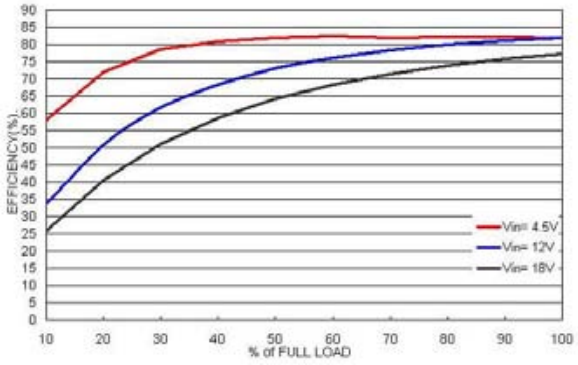
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



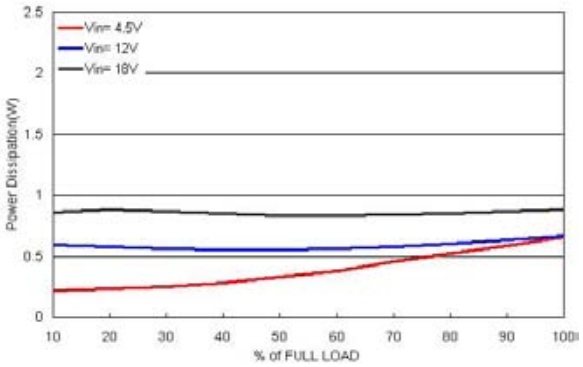
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

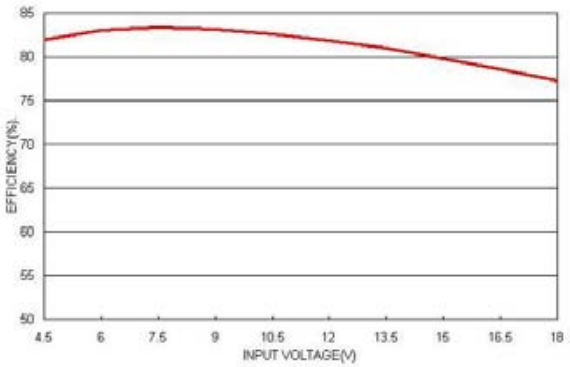
All test conditions are at 25°C. The figures are identical for TMR 3-1209WI



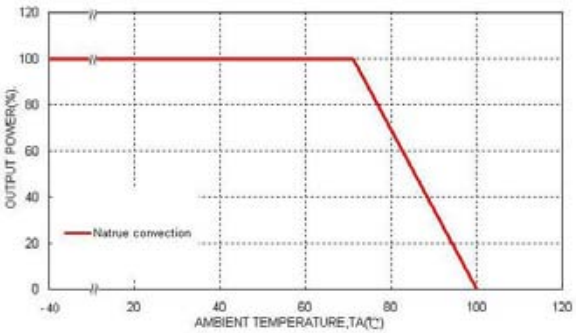
Efficiency versus Output Current



Power Dissipation versus Output Current



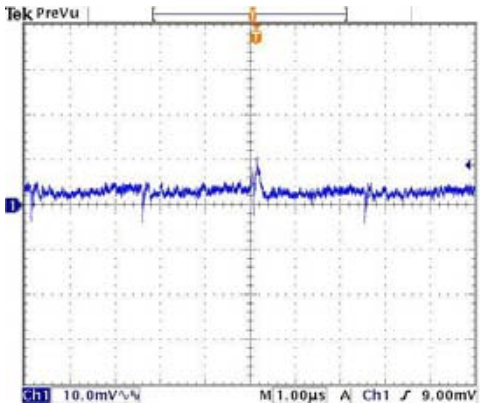
Efficiency versus Input Voltage. Full Load



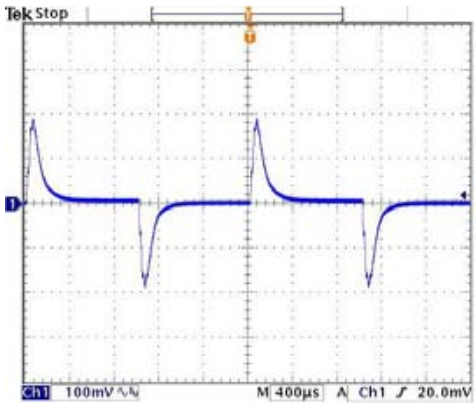
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

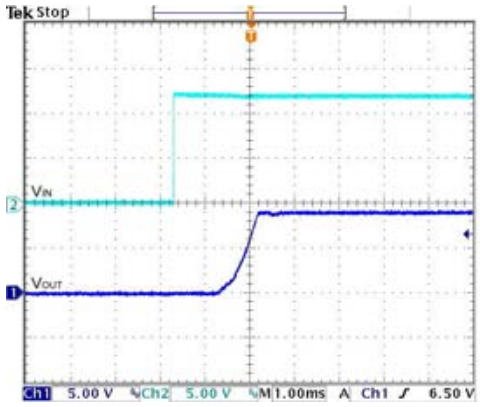
All test conditions are at 25°C. The figures are identical for TMR 3-1209WI



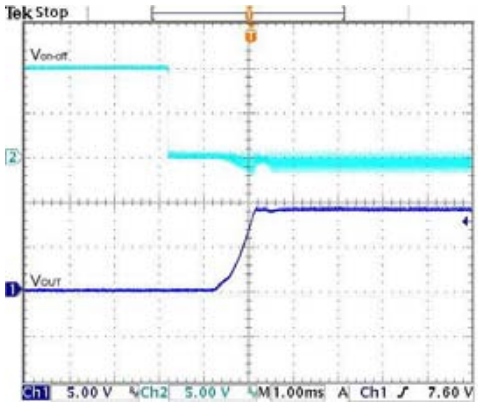
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



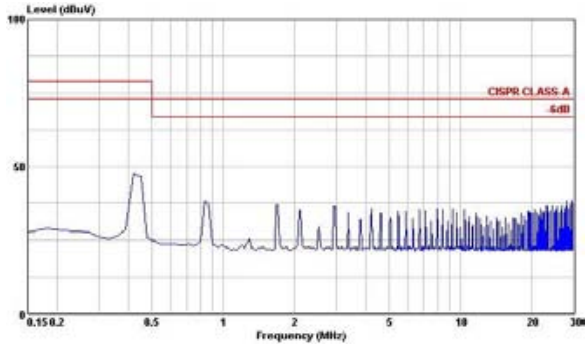
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



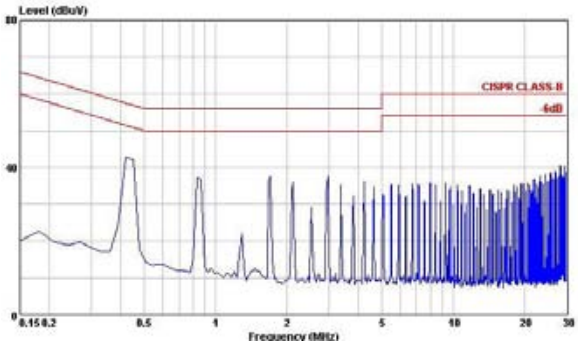
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



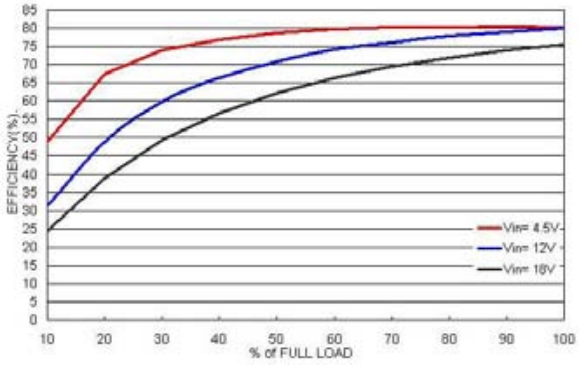
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



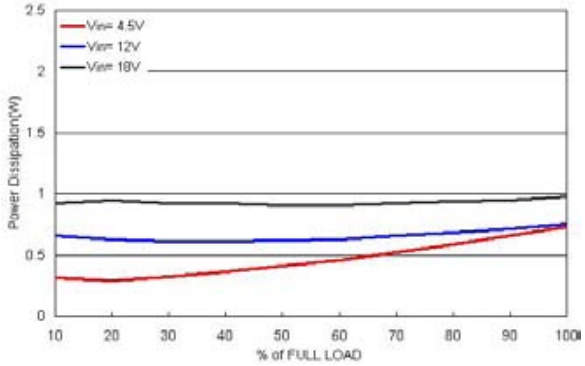
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

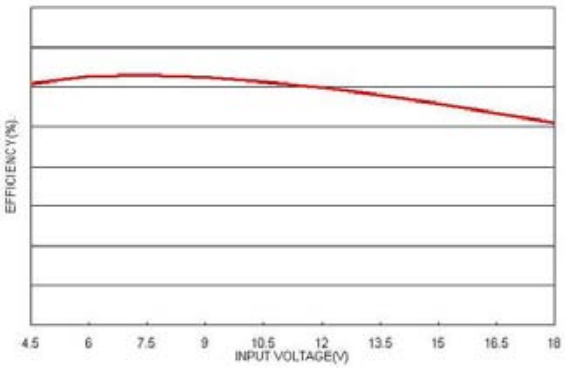
All test conditions are at 25°C. The figures are identical for TMR 3-1212WI



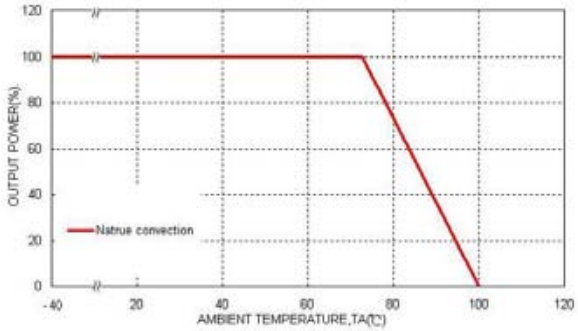
Efficiency versus Output Current



Power Dissipation versus Output Current



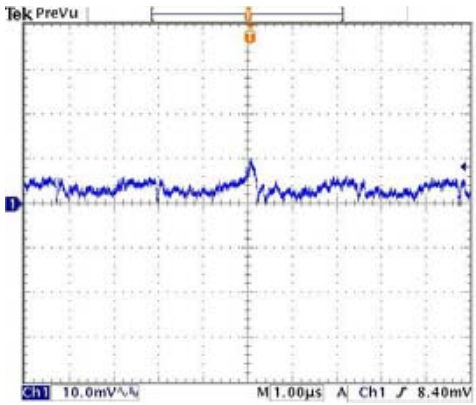
Efficiency versus Input Voltage. Full Load



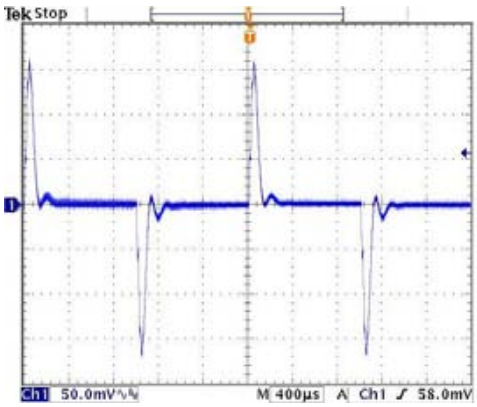
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

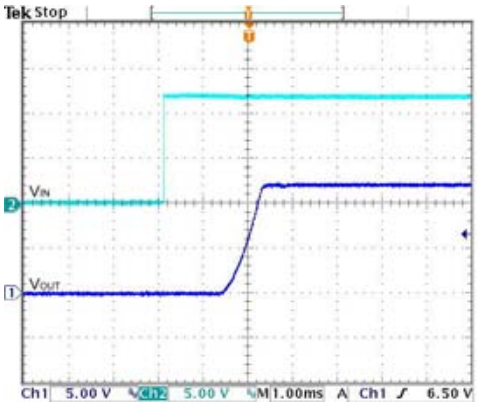
All test conditions are at 25°C. The figures are identical for TMR 3-1212WI



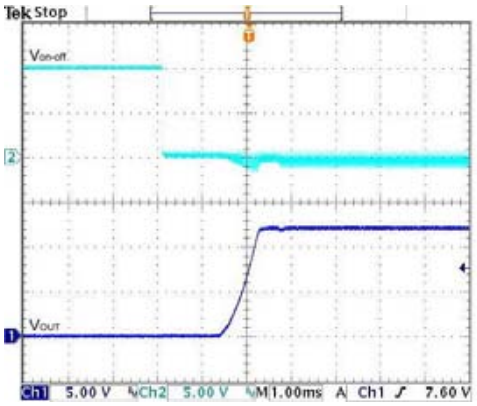
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



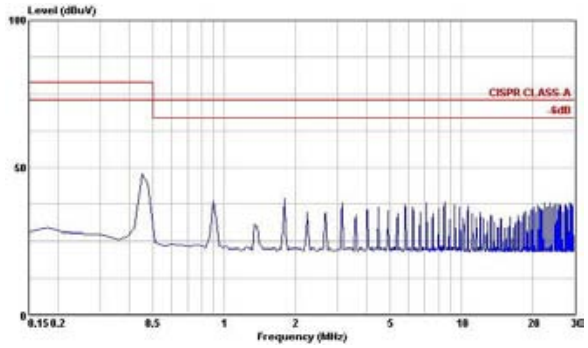
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



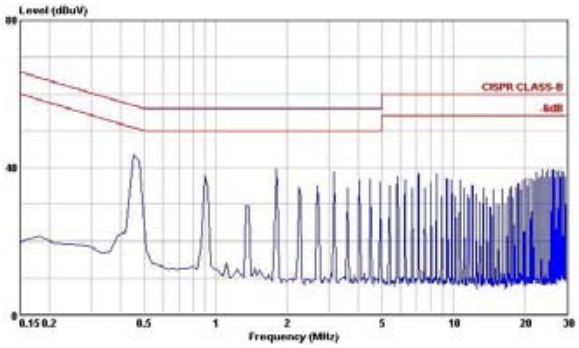
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



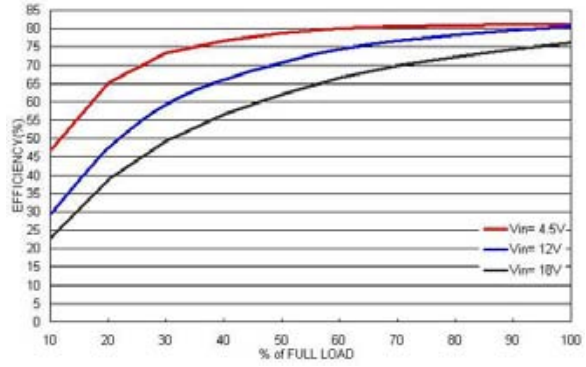
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



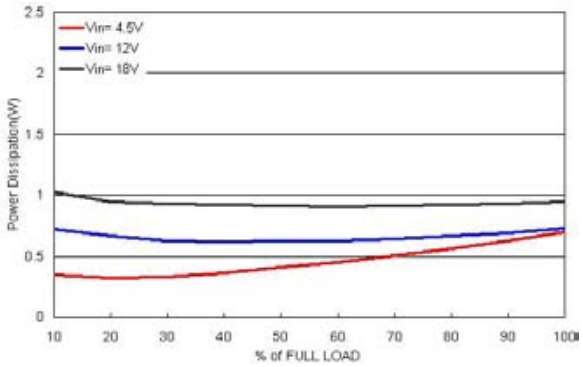
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

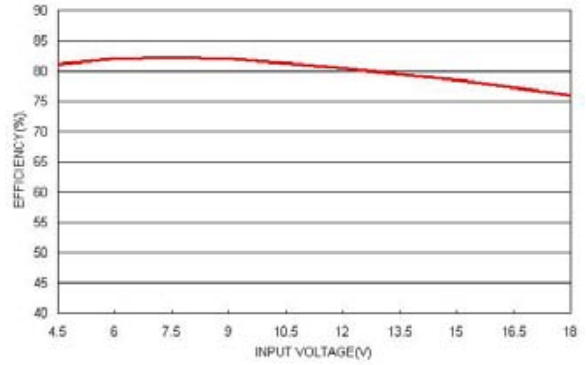
All test conditions are at 25°C. The figures are identical for TMR 3-1213WI



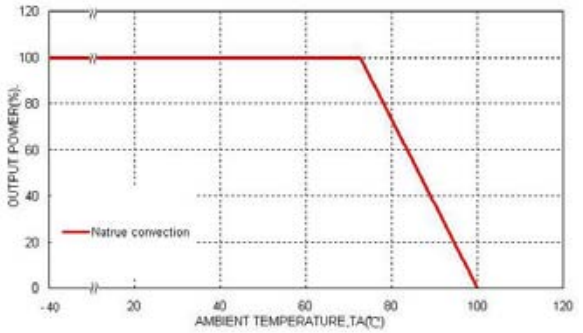
Efficiency versus Output Current



Power Dissipation versus Output Current



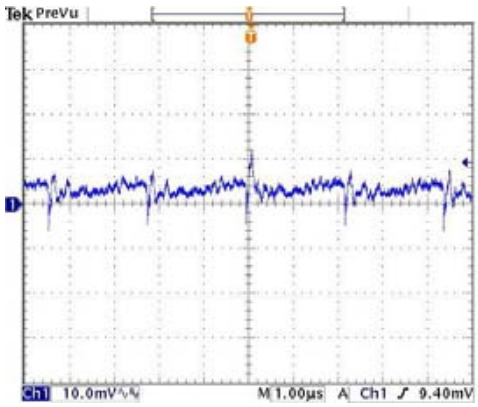
Efficiency versus Input Voltage. Full Load



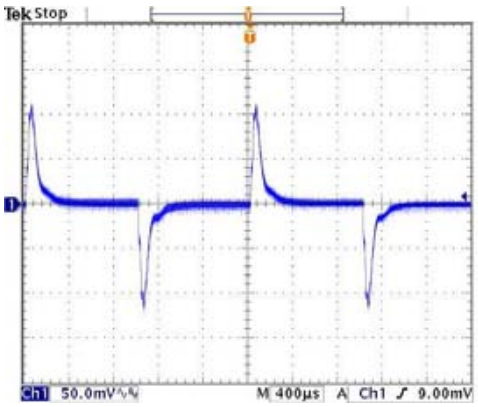
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

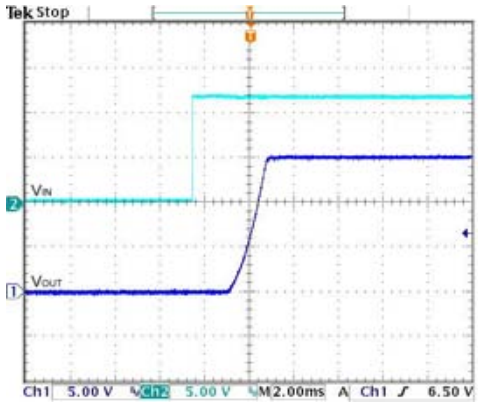
All test conditions are at 25°C. The figures are identical for TMR 3-1213WI



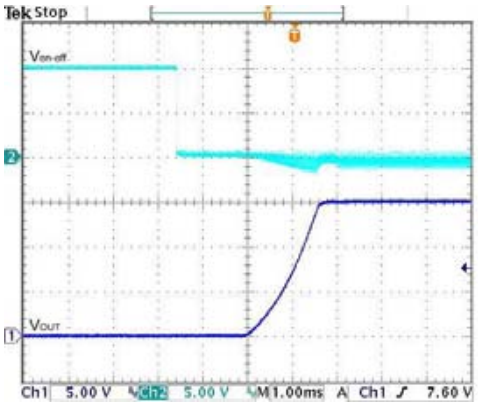
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



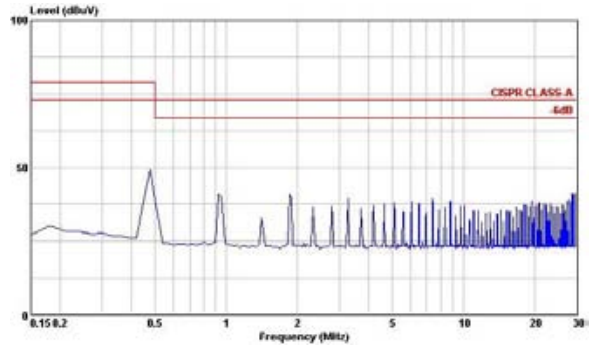
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



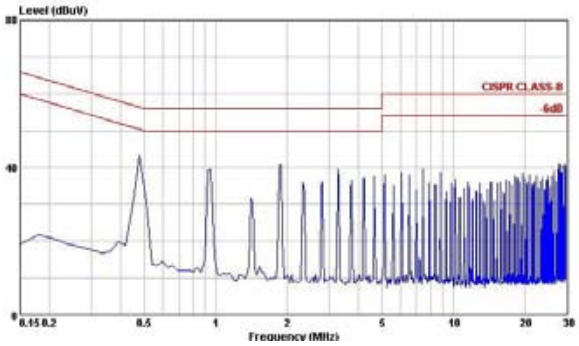
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



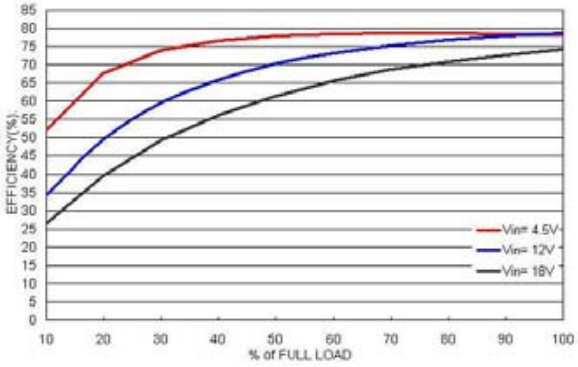
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



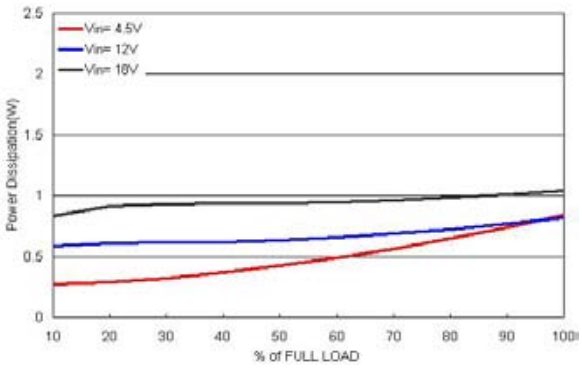
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

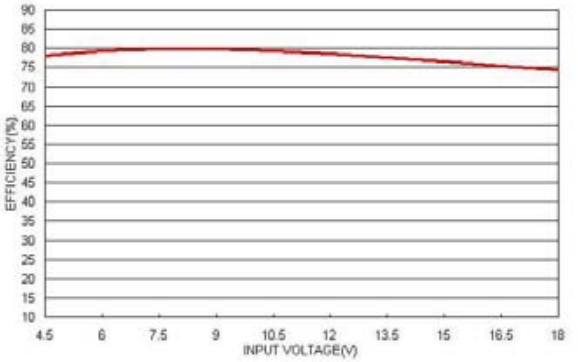
All test conditions are at 25°C. The figures are identical for TMR 3-1221WI



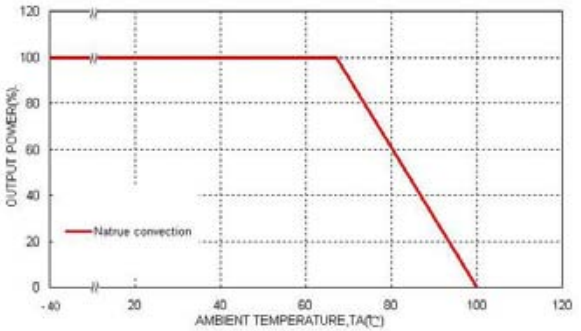
Efficiency versus Output Current



Power Dissipation versus Output Current



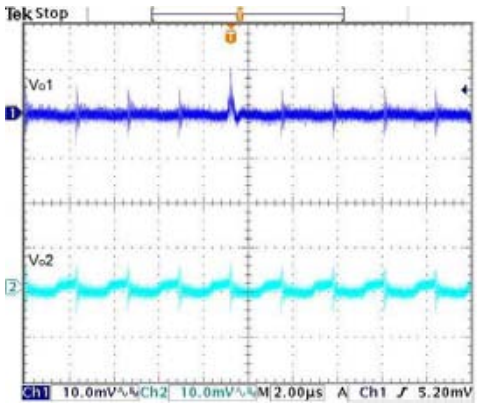
Efficiency versus Input Voltage. Full Load



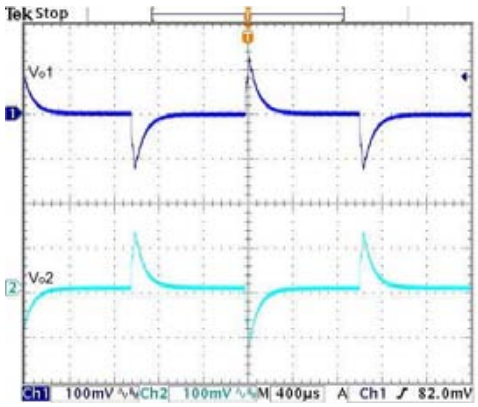
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

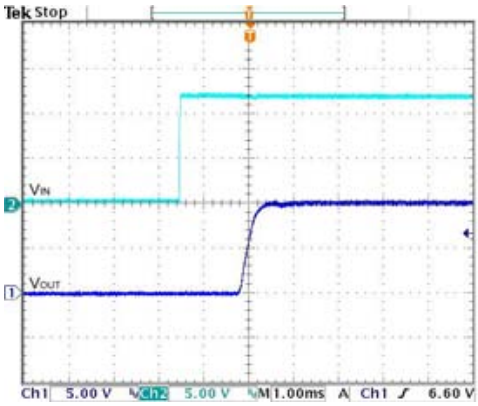
All test conditions are at 25°C. The figures are identical for TMR 3-1221WI



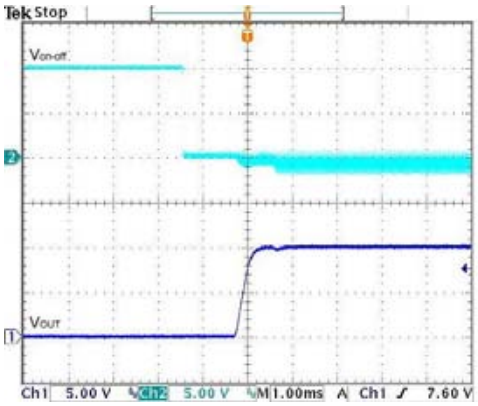
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



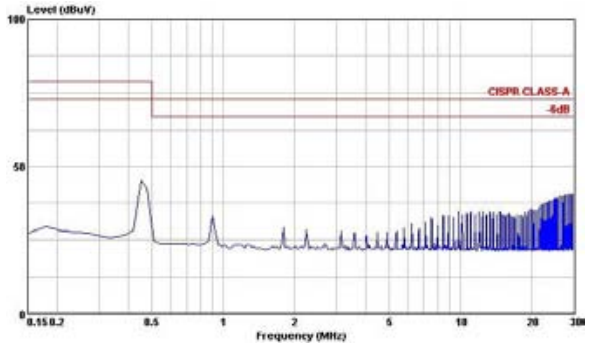
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



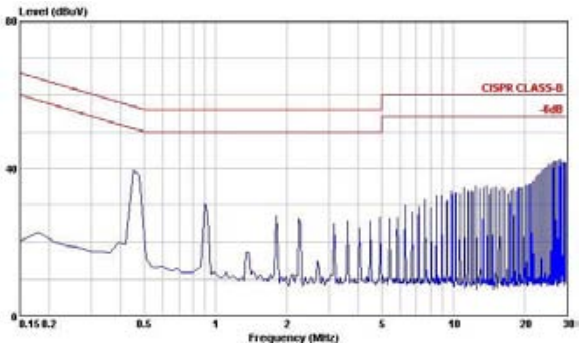
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



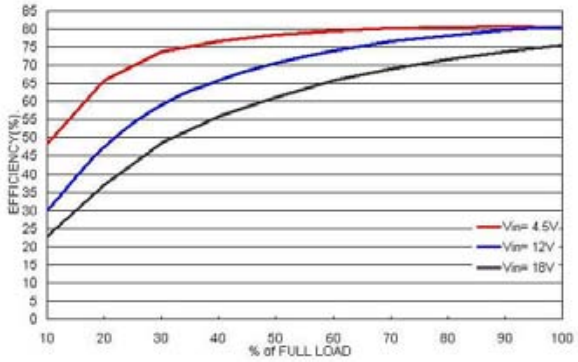
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



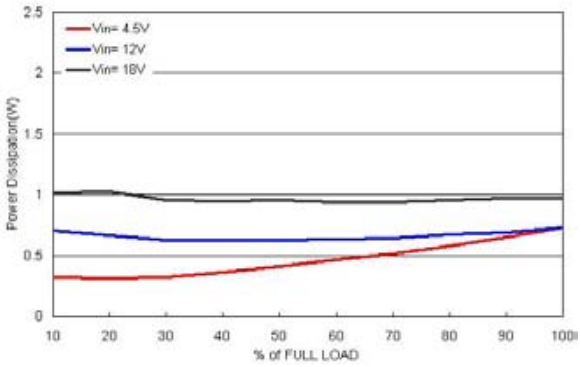
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

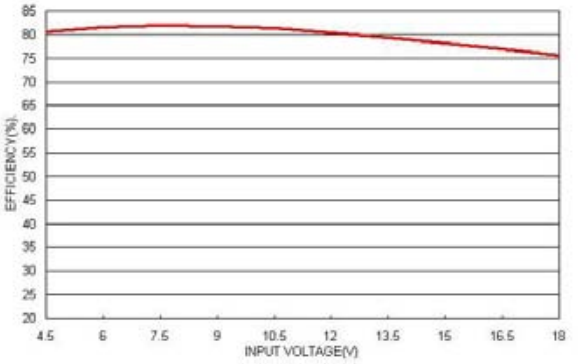
All test conditions are at 25°C. The figures are identical for TMR 3-1222WI



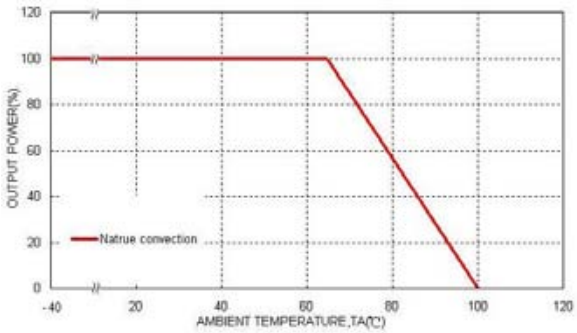
Efficiency versus Output Current



Power Dissipation versus Output Current



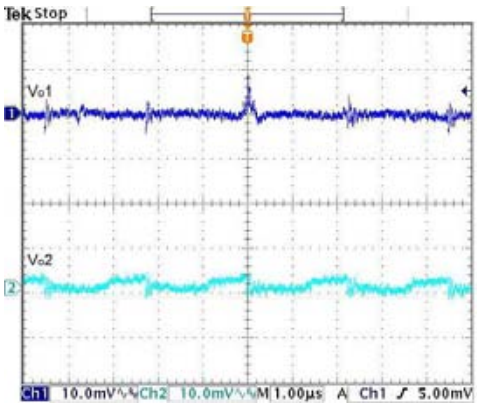
Efficiency versus Input Voltage. Full Load



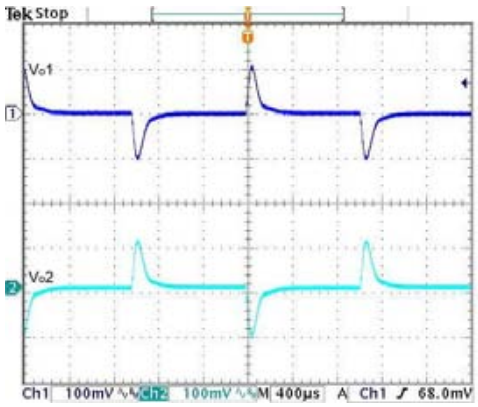
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

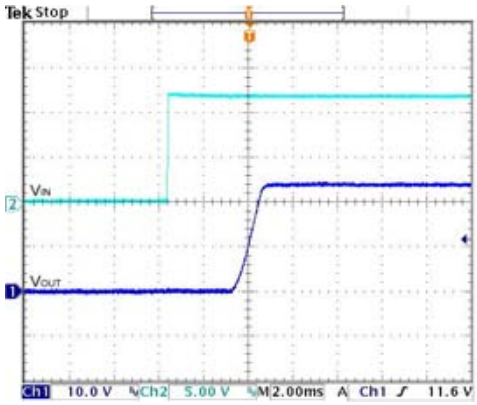
All test conditions are at 25°C. The figures are identical for TMR 3-1222WI



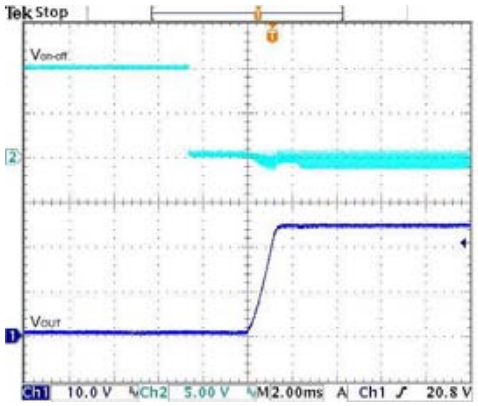
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



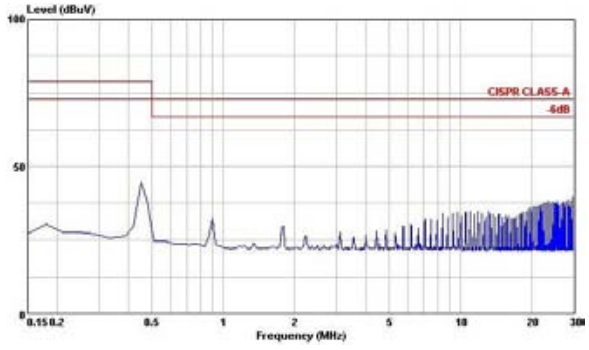
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



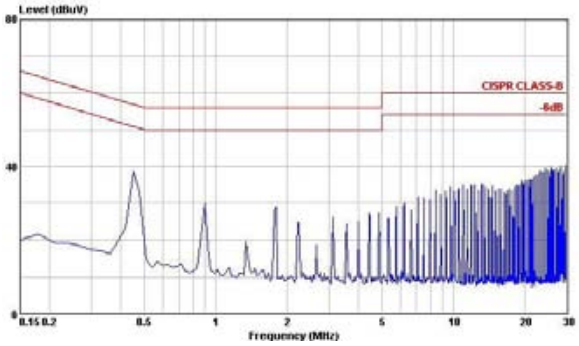
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



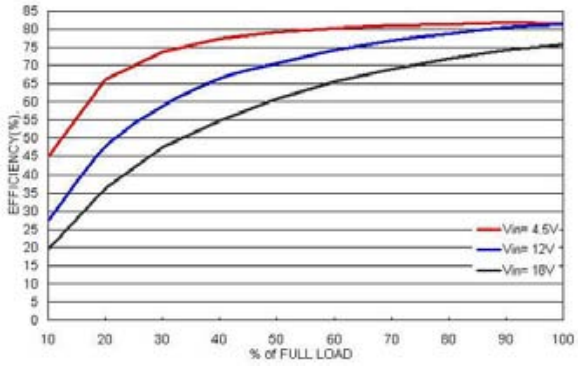
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



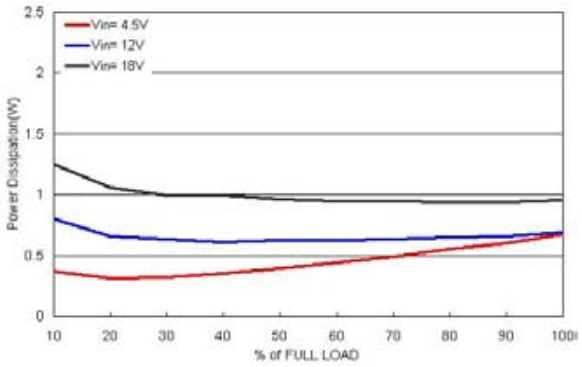
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

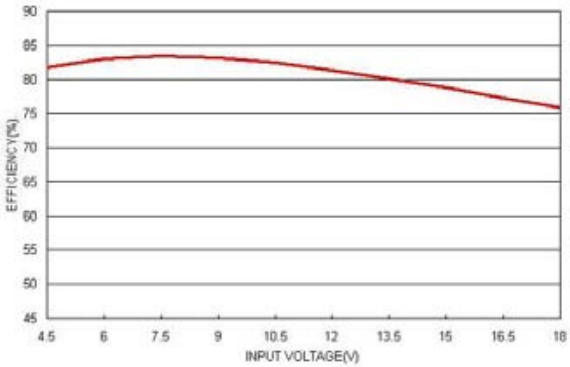
All test conditions are at 25°C. The figures are identical for TMR 3-1223WI



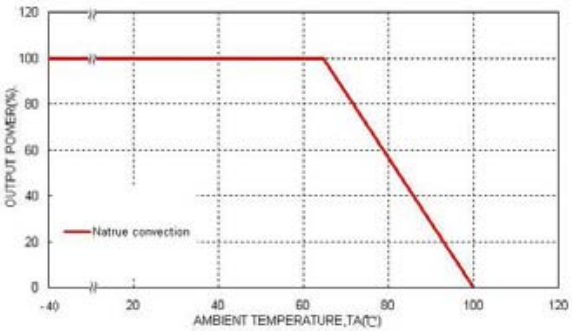
Efficiency versus Output Current



Power Dissipation versus Output Current



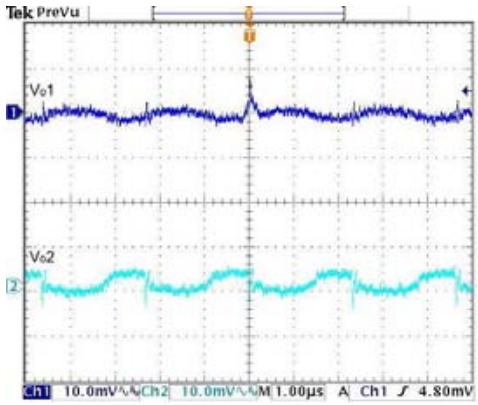
Efficiency versus Input Voltage. Full Load



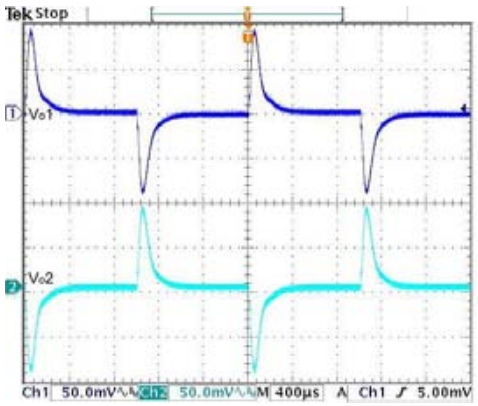
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

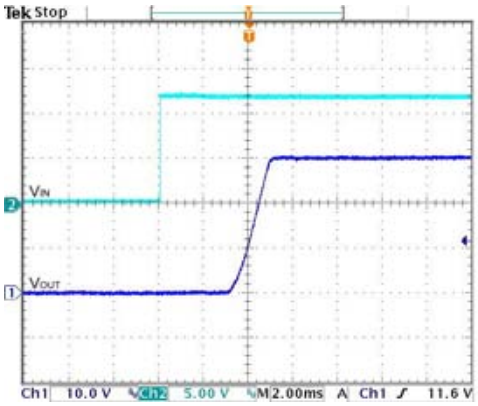
All test conditions are at 25°C. The figures are identical for TMR 3-1223WI



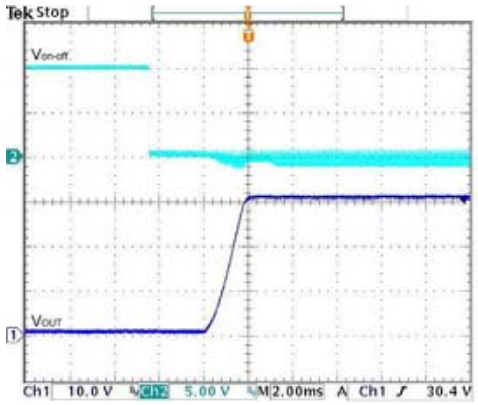
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



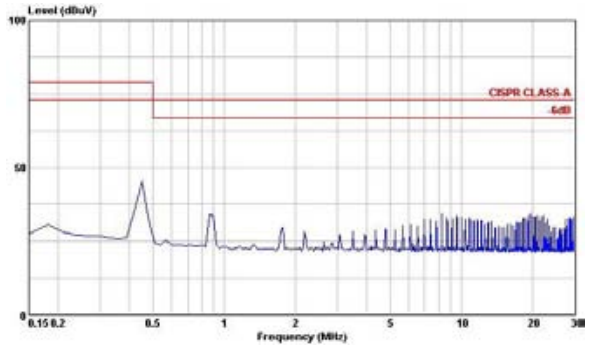
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



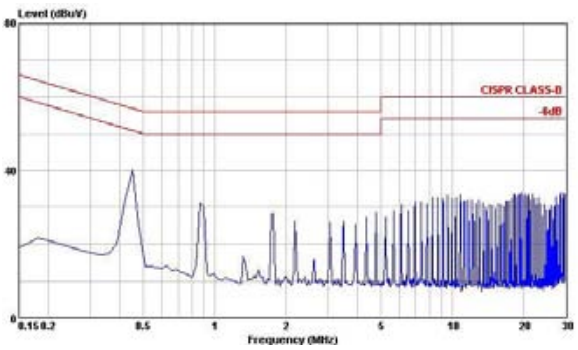
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



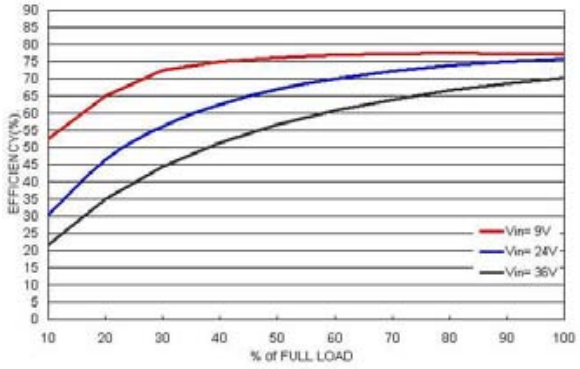
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



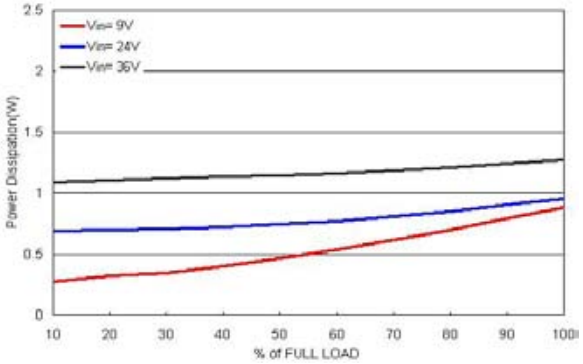
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

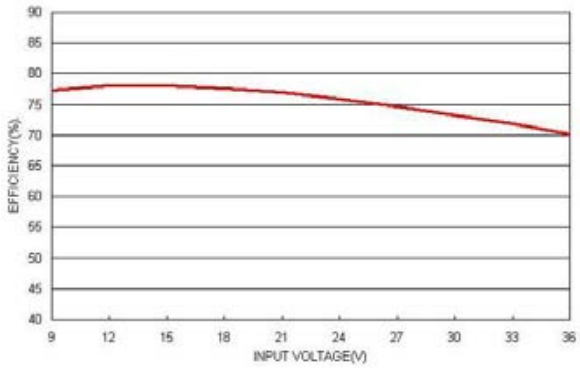
All test conditions are at 25°C. The figures are identical for TMR 3-2410WI



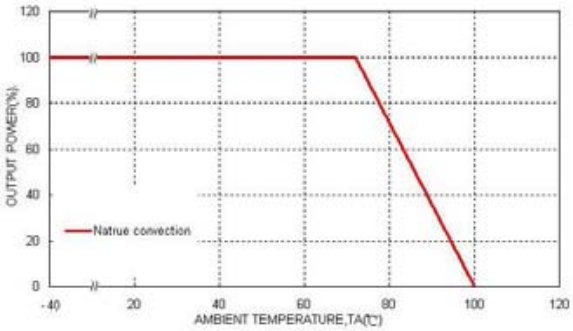
Efficiency versus Output Current



Power Dissipation versus Output Current



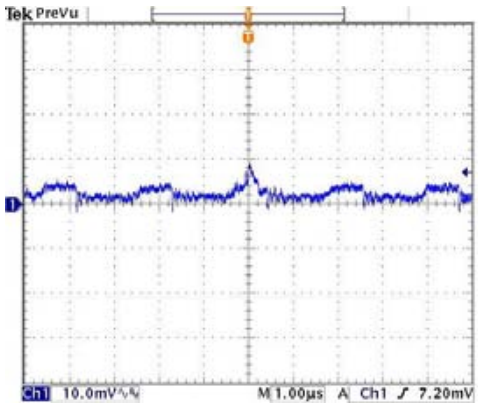
Efficiency versus Input Voltage. Full Load



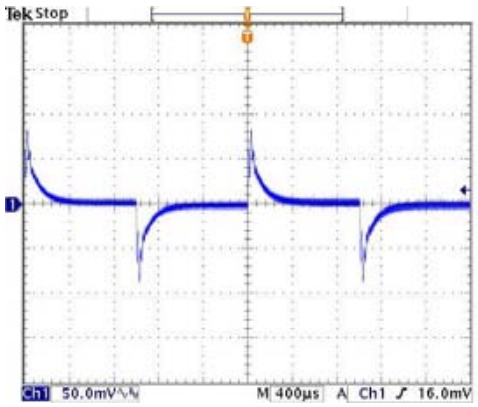
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

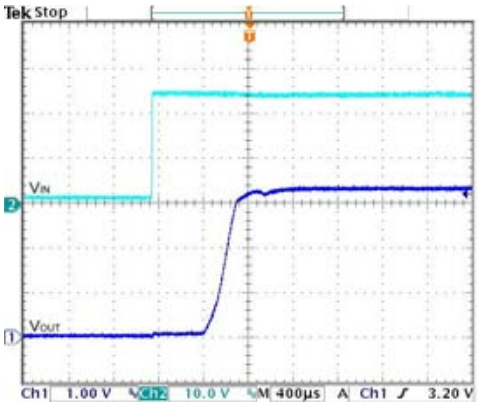
All test conditions are at 25°C. The figures are identical for TMR 3-2410WI



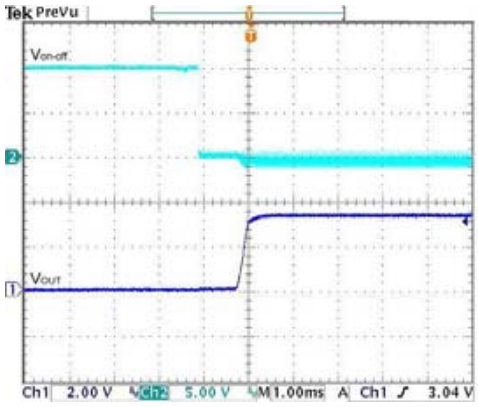
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



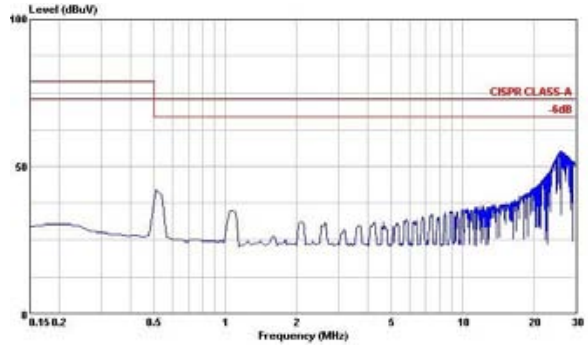
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



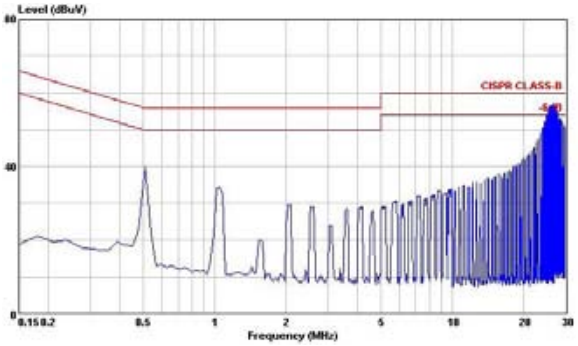
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



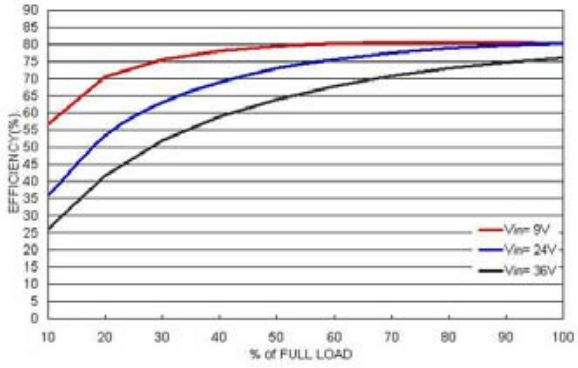
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



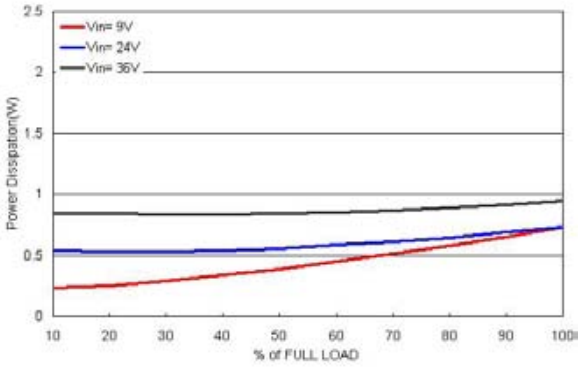
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

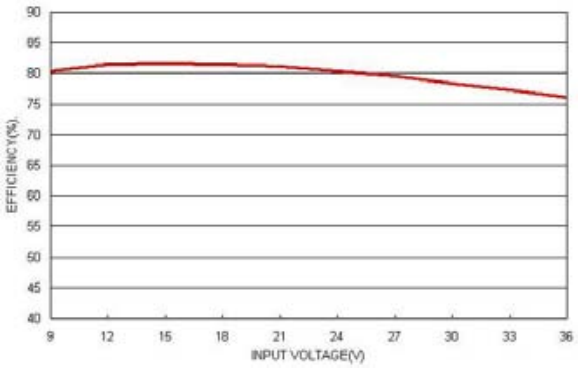
All test conditions are at 25°C. The figures are identical for TMR 3-2411WI



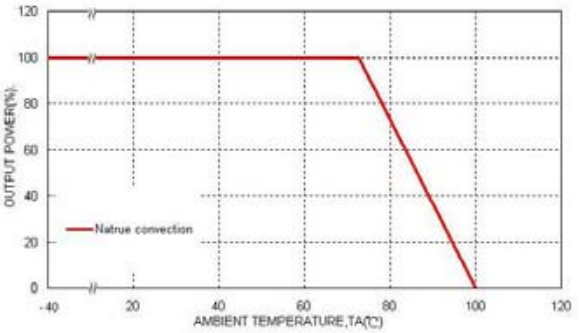
Efficiency versus Output Current



Power Dissipation versus Output Current



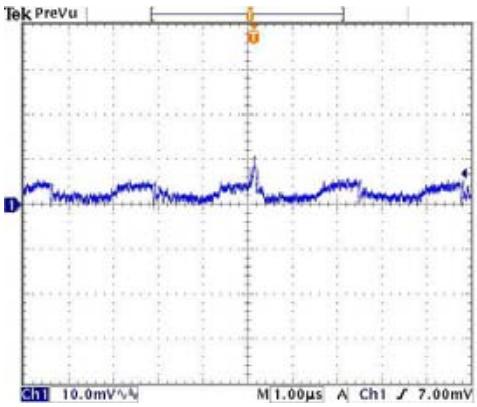
Efficiency versus Input Voltage. Full Load



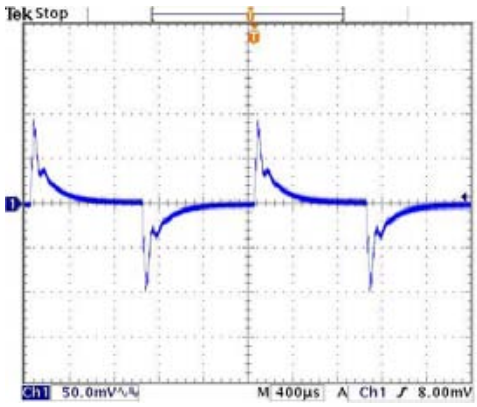
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

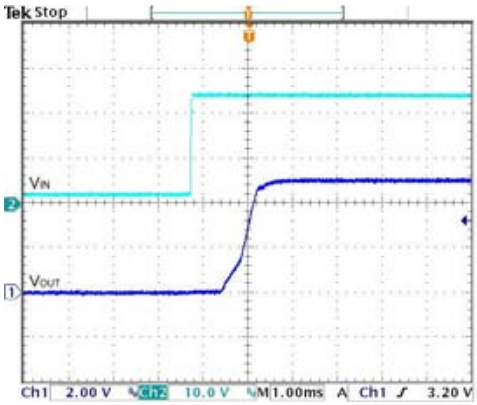
All test conditions are at 25°C. The figures are identical for TMR 3-2411WI



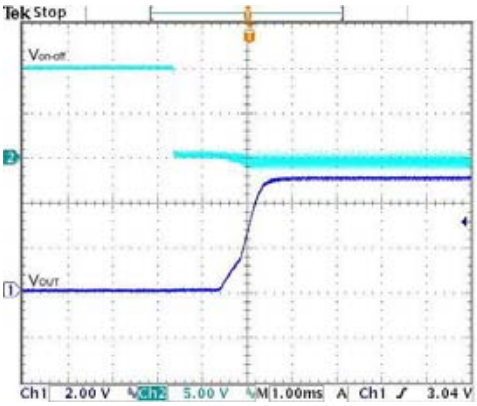
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



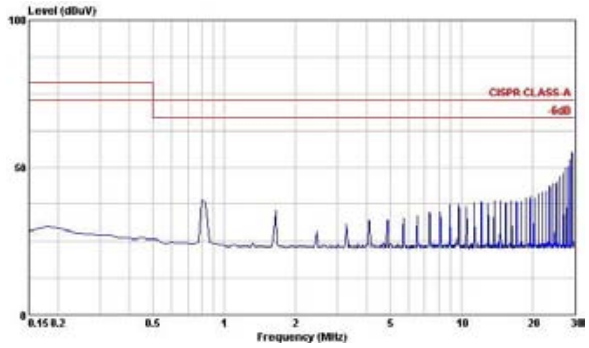
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



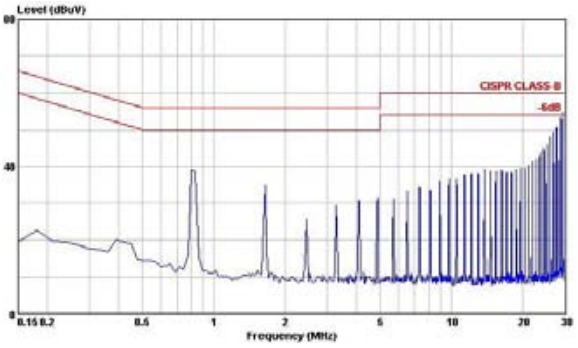
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



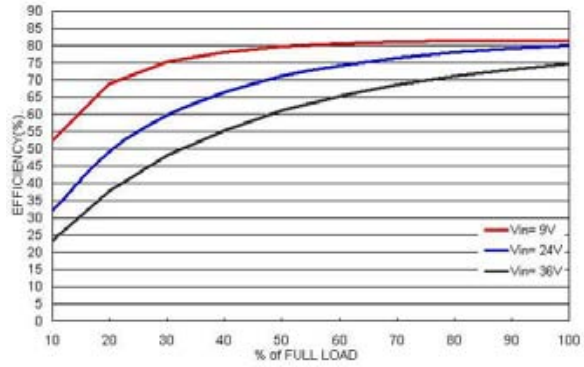
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



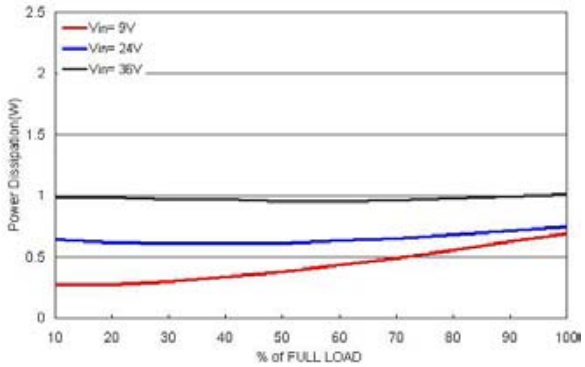
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

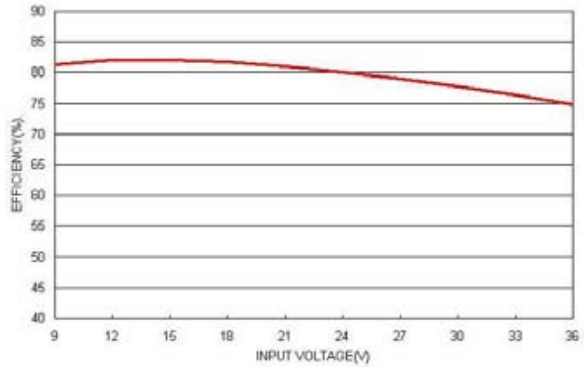
All test conditions are at 25°C. The figures are identical for TMR 3-2409WI



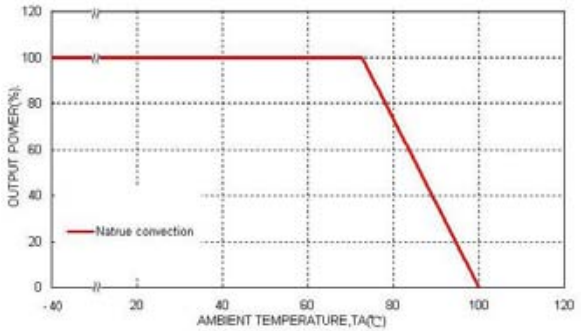
Efficiency versus Output Current



Power Dissipation versus Output Current



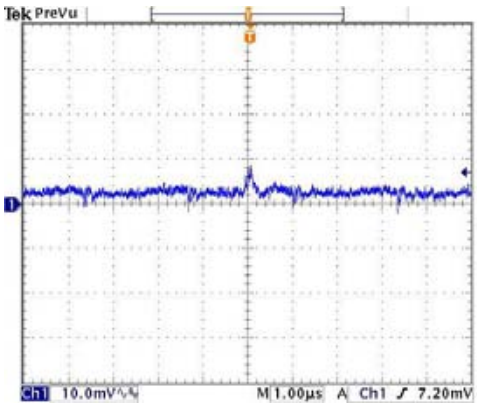
Efficiency versus Input Voltage. Full Load



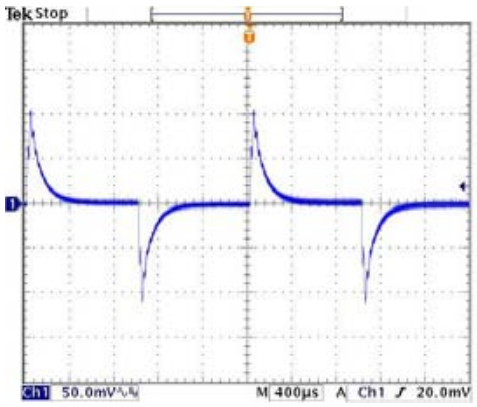
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

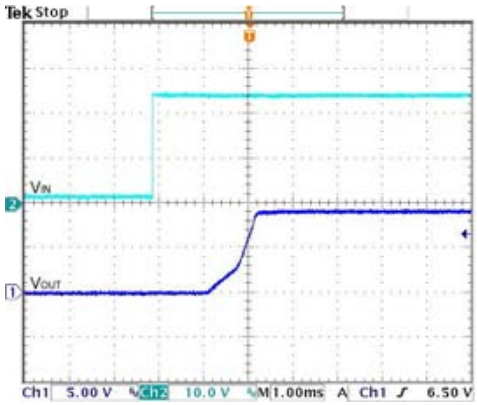
All test conditions are at 25°C. The figures are identical for TMR 3-2409WI



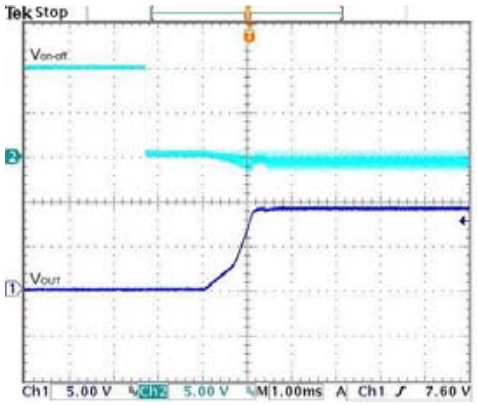
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



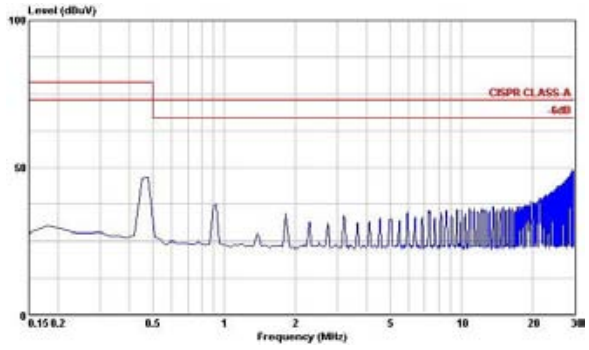
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



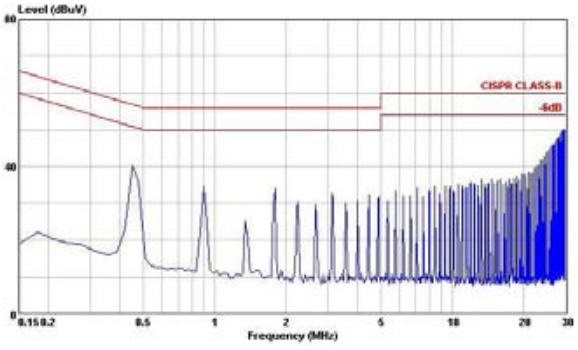
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



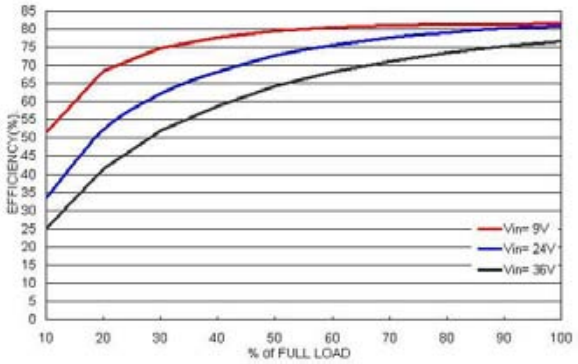
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



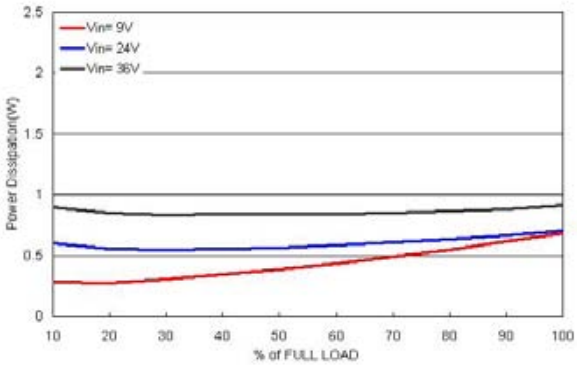
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

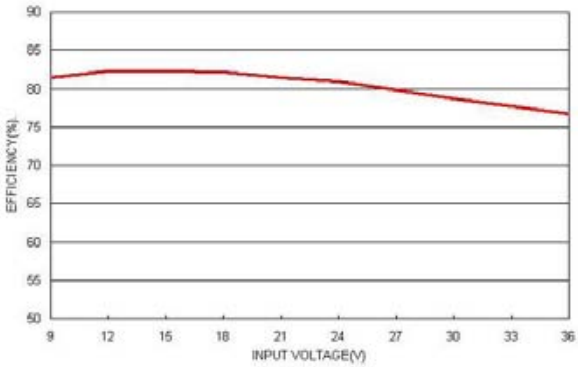
All test conditions are at 25°C. The figures are identical for TMR 3-2412WI



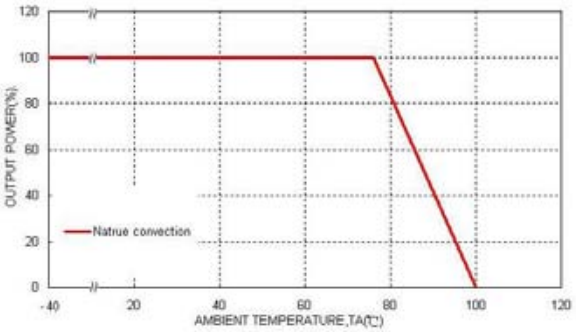
Efficiency versus Output Current



Power Dissipation versus Output Current



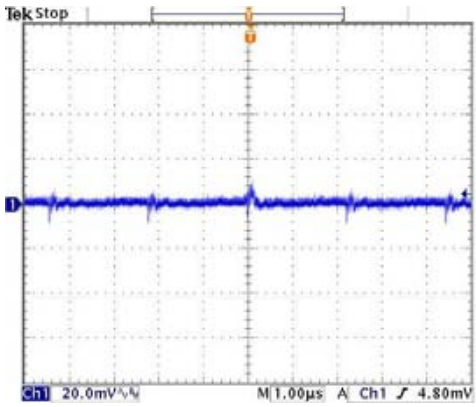
Efficiency versus Input Voltage. Full Load



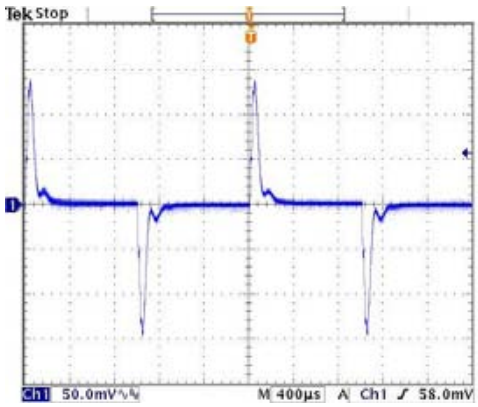
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

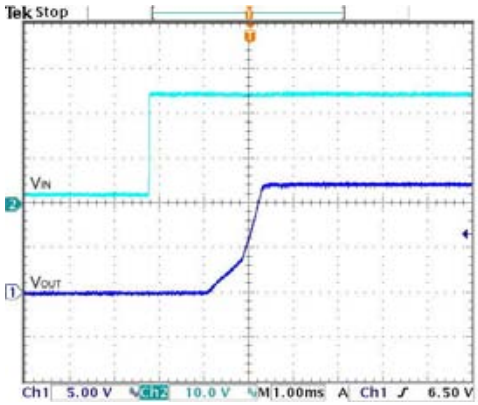
All test conditions are at 25°C. The figures are identical for TMR 3-2412WI



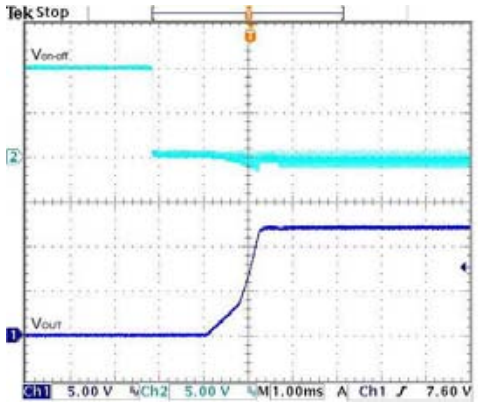
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



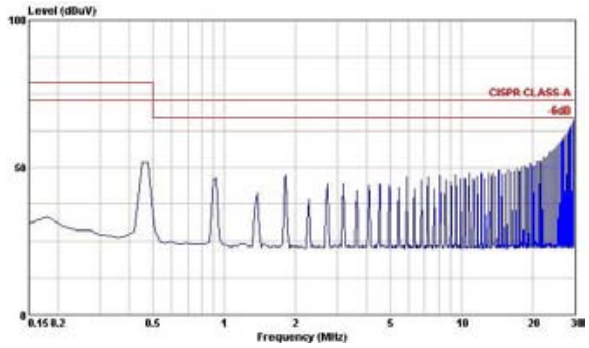
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



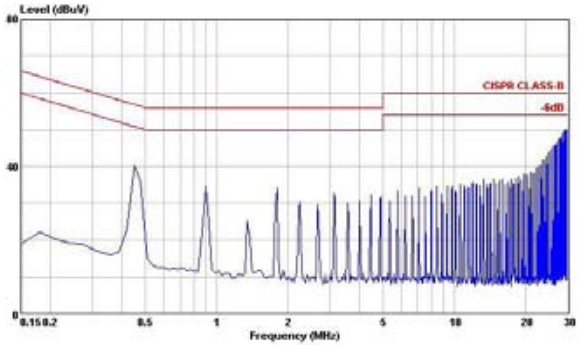
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



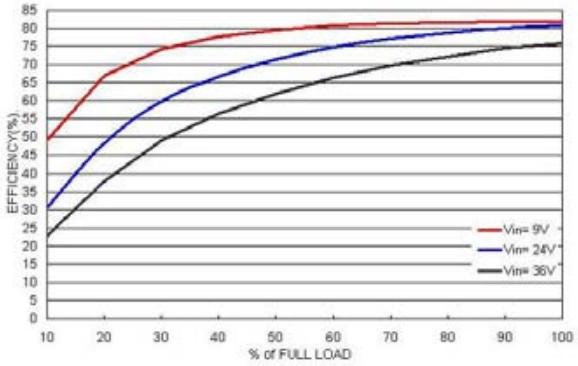
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



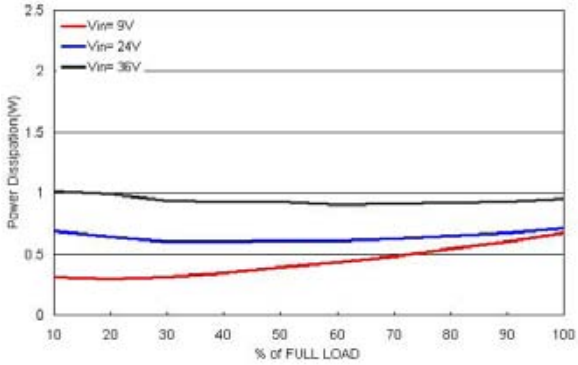
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

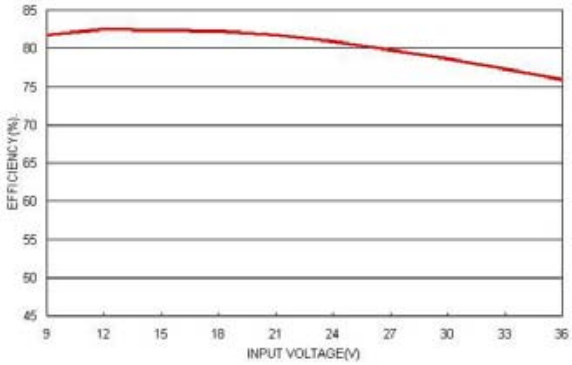
All test conditions are at 25°C. The figures are identical for TMR 3-2413WI



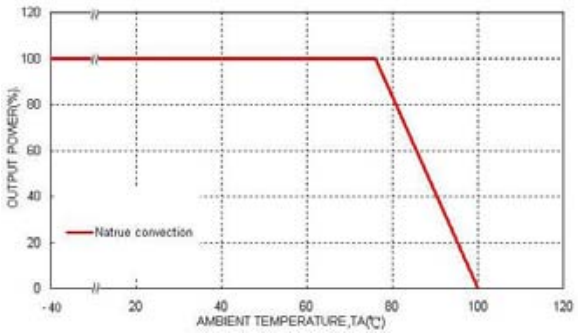
Efficiency versus Output Current



Power Dissipation versus Output Current



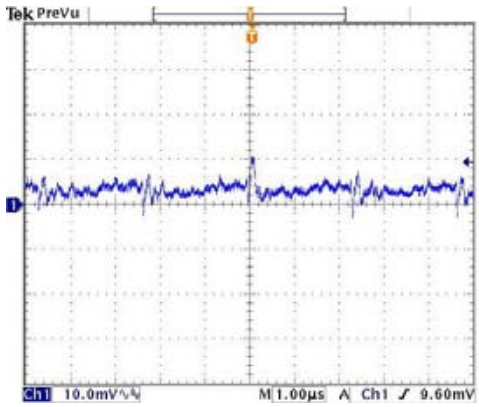
Efficiency versus Input Voltage. Full Load



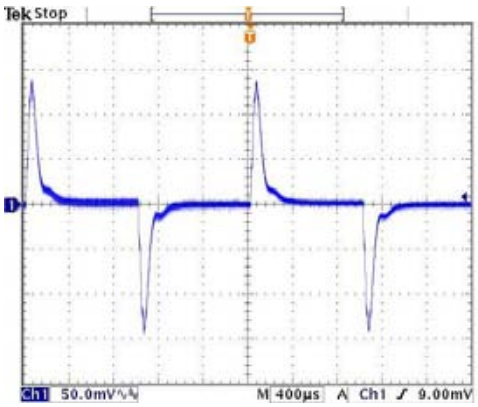
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

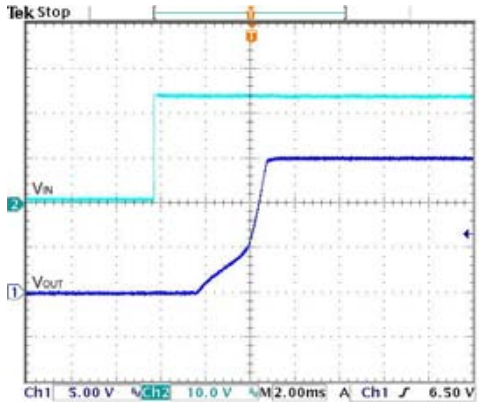
All test conditions are at 25°C. The figures are identical for TMR 3-2413WI



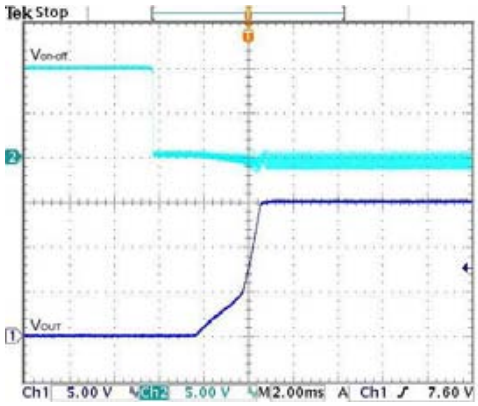
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



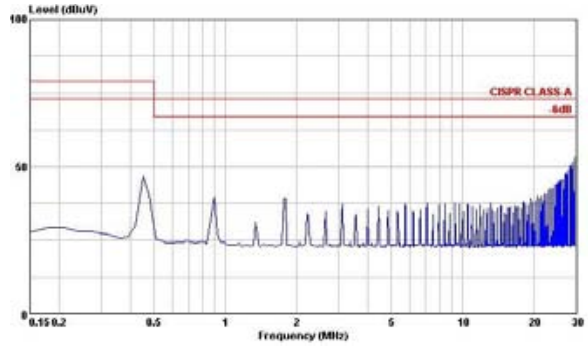
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



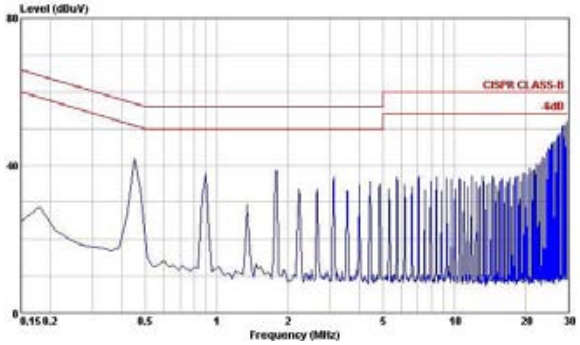
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



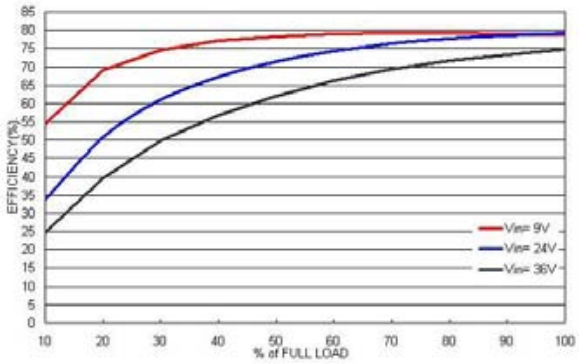
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



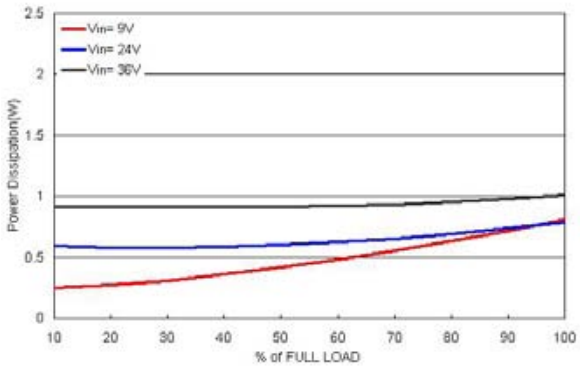
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

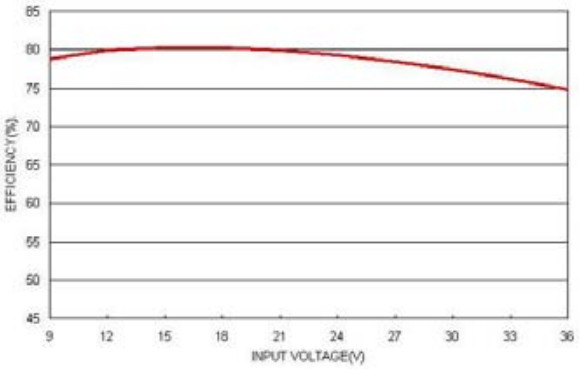
All test conditions are at 25°C. The figures are identical for TMR 3-2421WI



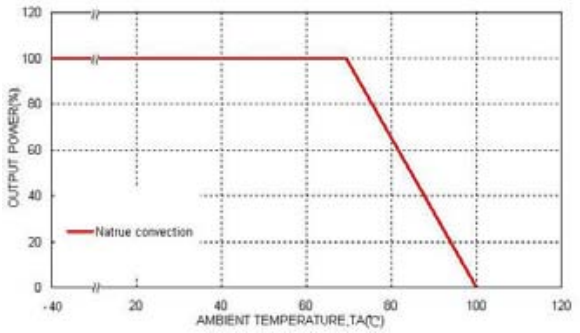
Efficiency versus Output Current



Power Dissipation versus Output Current



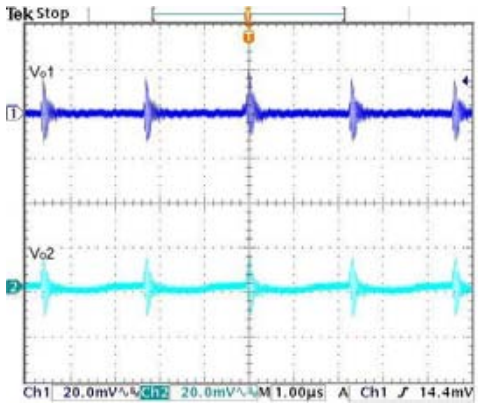
Efficiency versus Input Voltage. Full Load



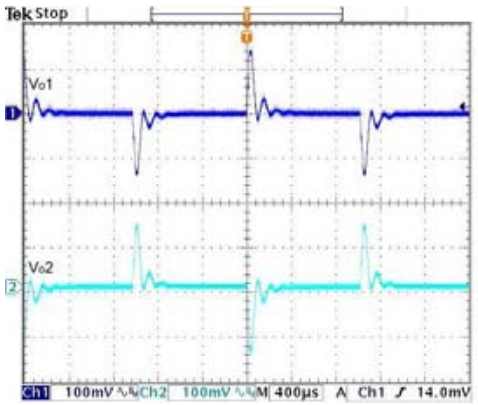
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

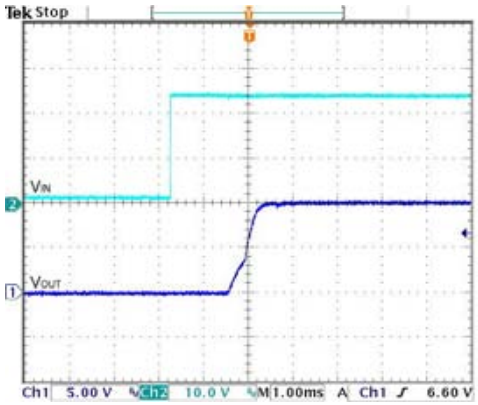
All test conditions are at 25°C. The figures are identical for TMR 3-2421WI



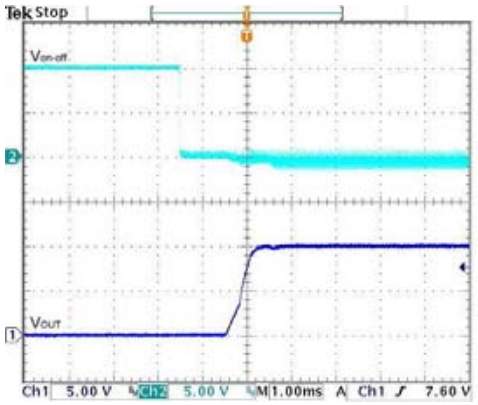
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



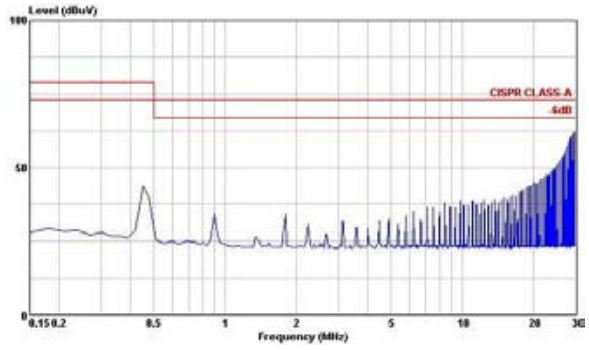
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



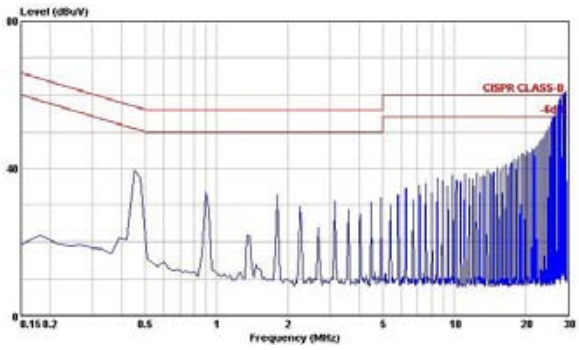
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



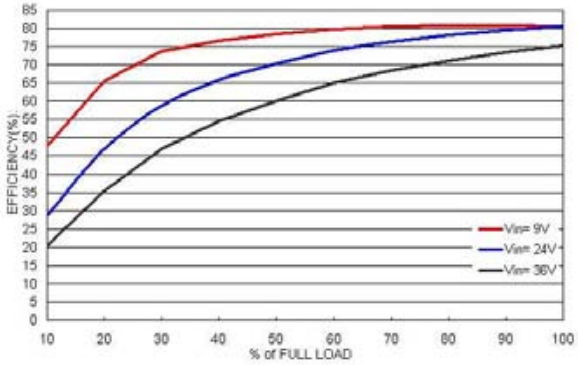
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



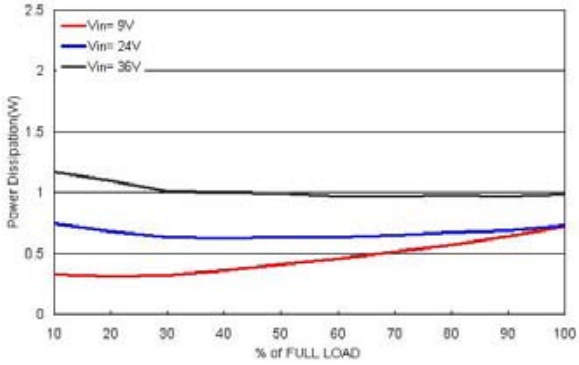
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

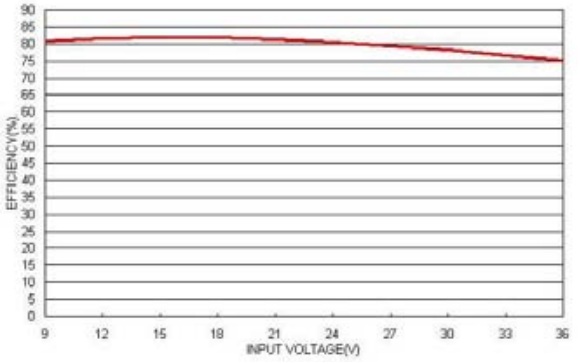
All test conditions are at 25°C. The figures are identical for TMR 3-2422WI



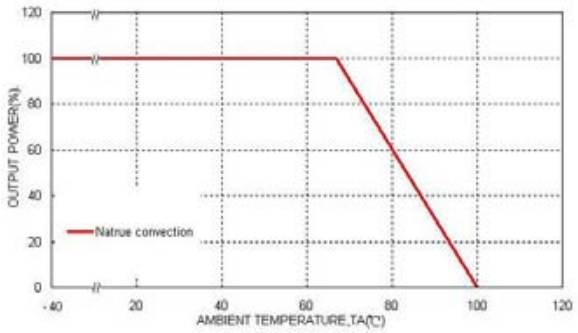
Efficiency versus Output Current



Power Dissipation versus Output Current



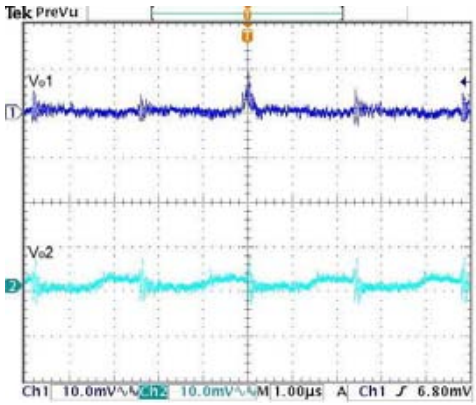
Efficiency versus Input Voltage. Full Load



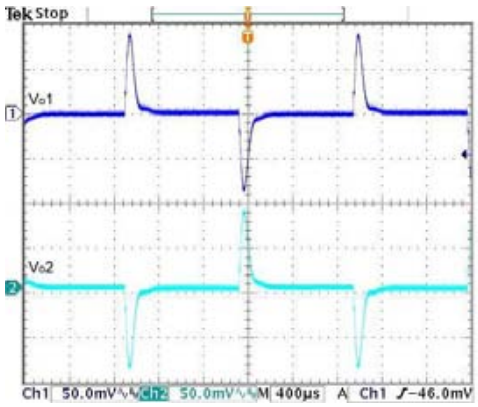
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

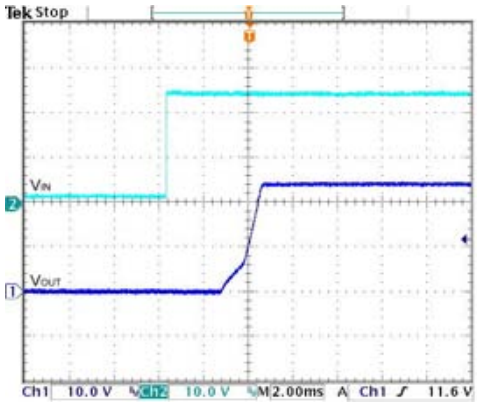
All test conditions are at 25°C. The figures are identical for TMR 3-2422WI



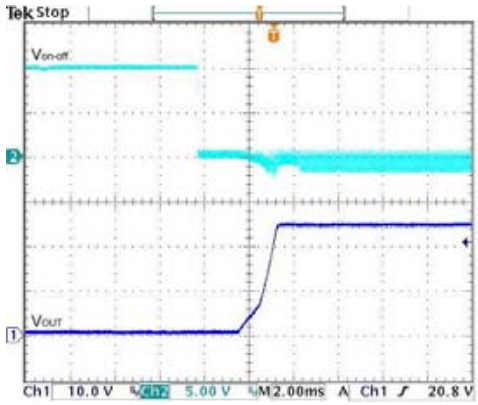
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



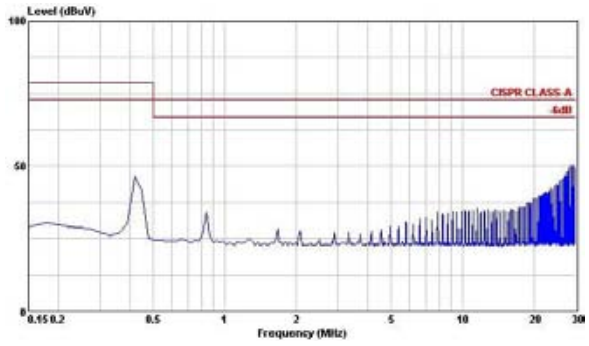
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



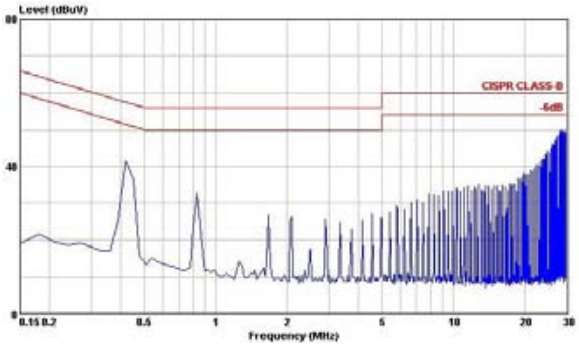
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



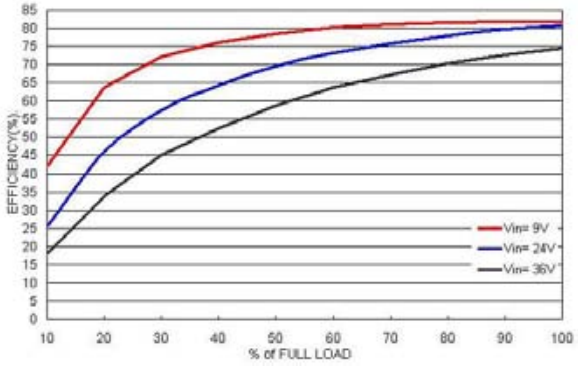
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



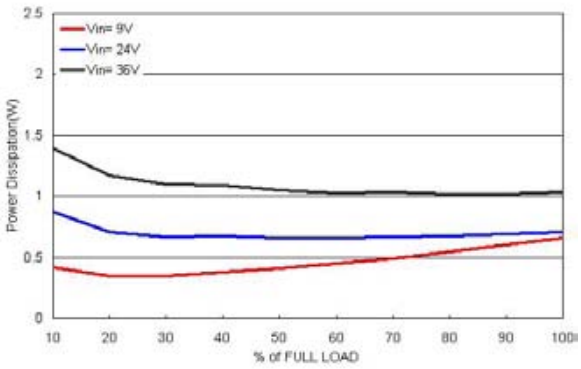
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

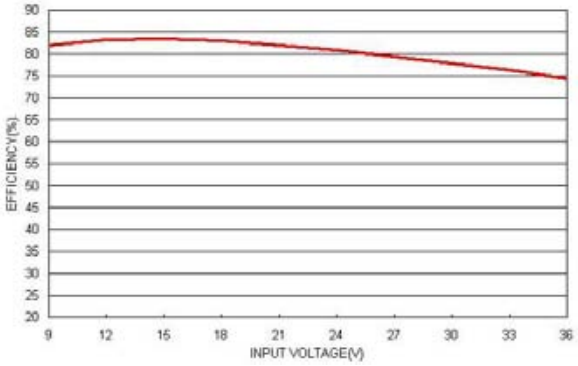
All test conditions are at 25°C. The figures are identical for TMR 3-2423WI



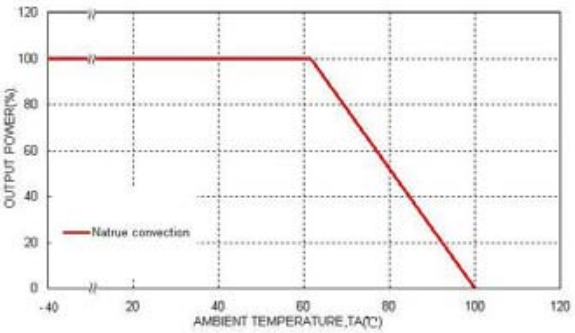
Efficiency versus Output Current



Power Dissipation versus Output Current



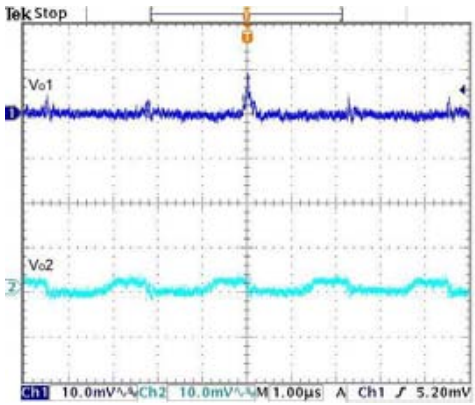
Efficiency versus Input Voltage. Full Load



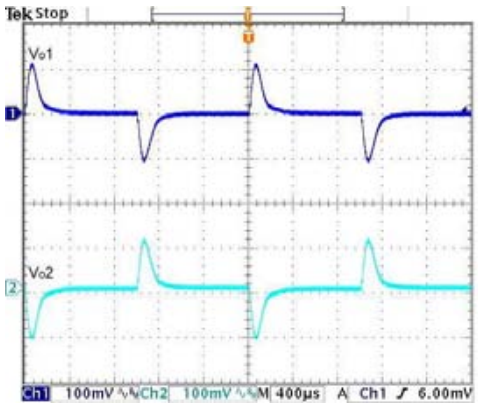
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

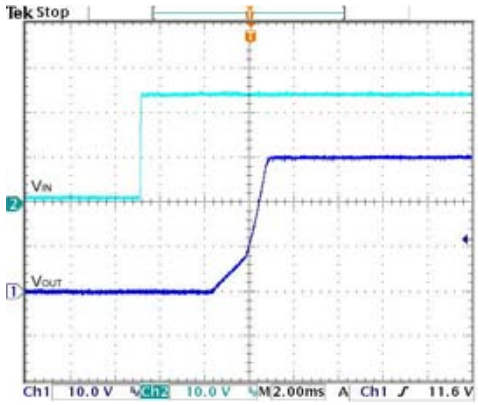
All test conditions are at 25°C. The figures are identical for TMR 3-2423WI



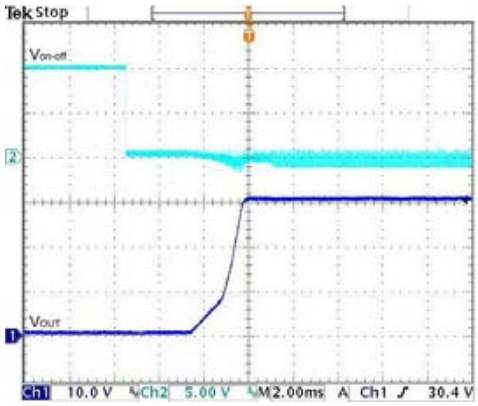
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



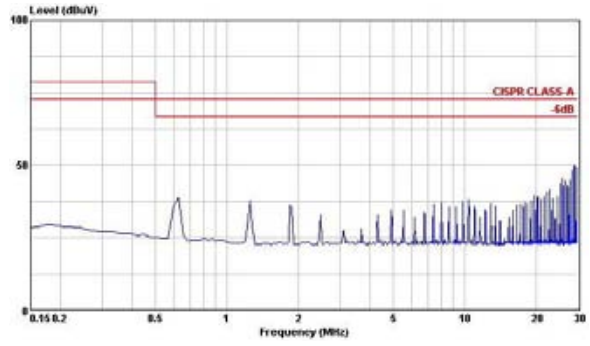
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



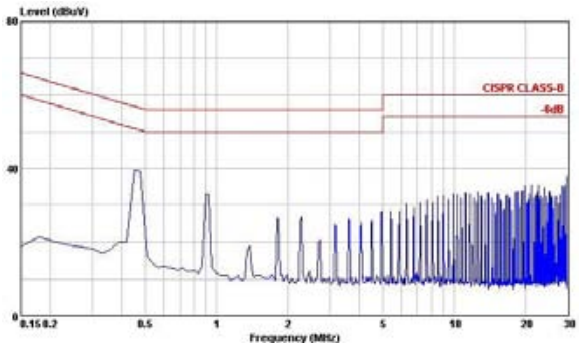
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



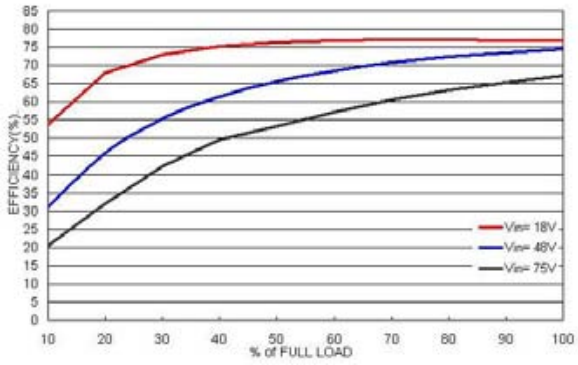
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



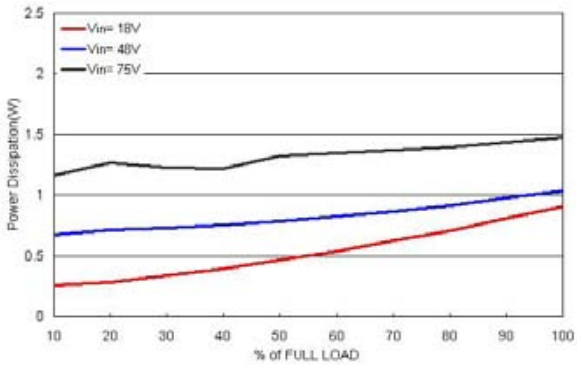
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

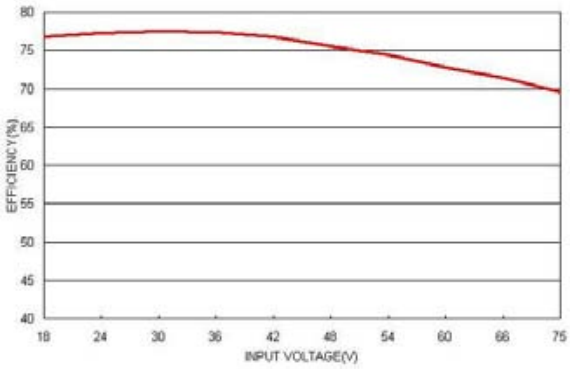
All test conditions are at 25°C. The figures are identical for TMR 3-4810WI



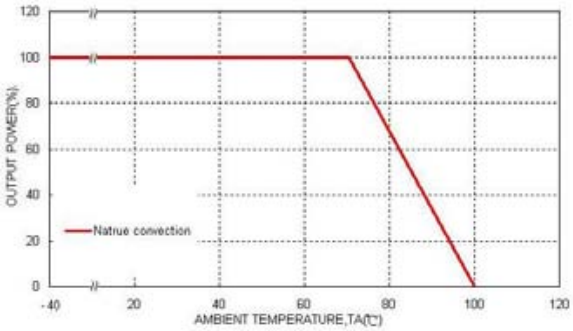
Efficiency versus Output Current



Power Dissipation versus Output Current



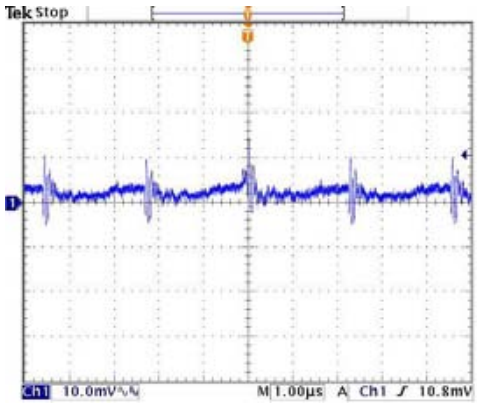
Efficiency versus Input Voltage. Full Load



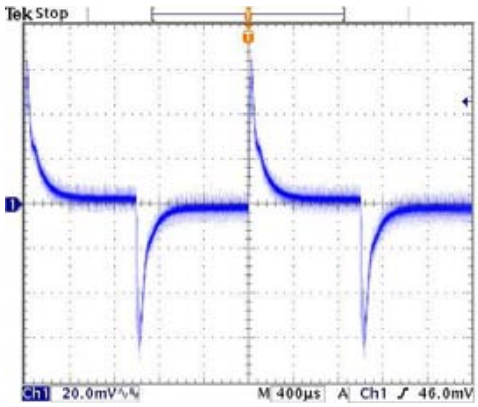
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

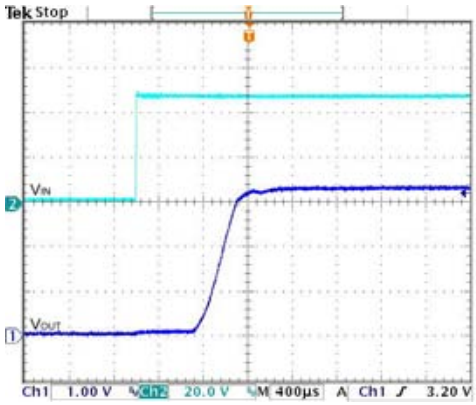
All test conditions are at 25°C. The figures are identical for TMR 3-4810WI



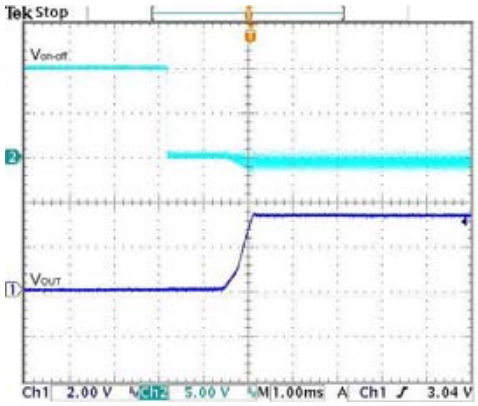
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



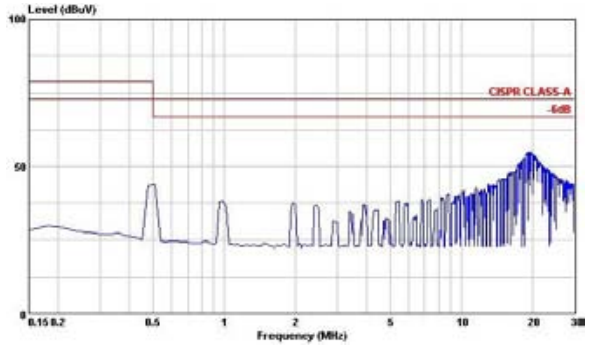
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



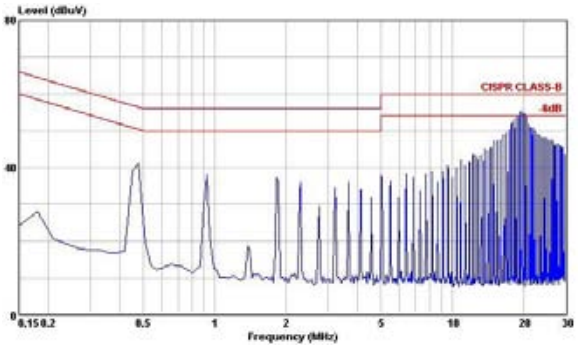
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



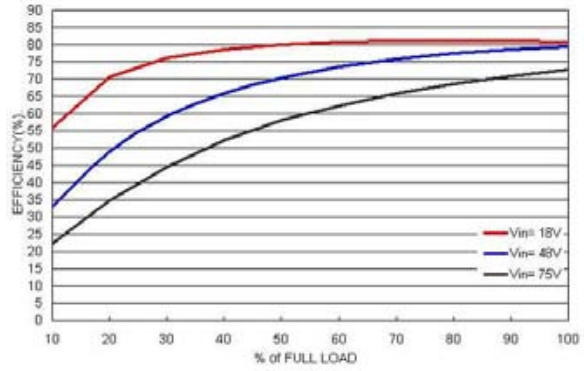
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



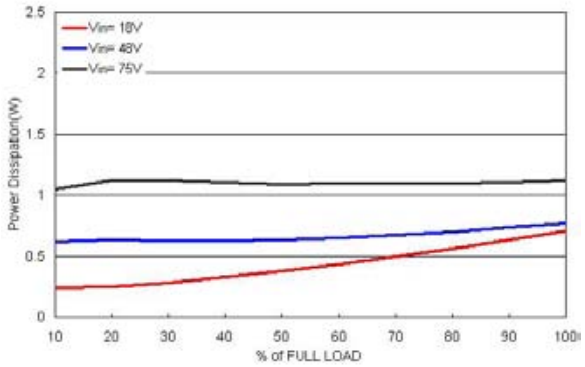
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

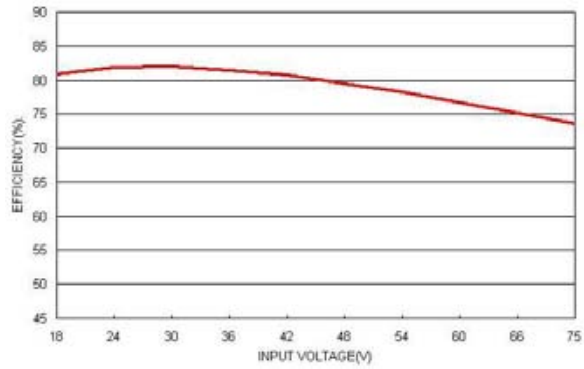
All test conditions are at 25°C. The figures are identical for TMR 3-4811WI



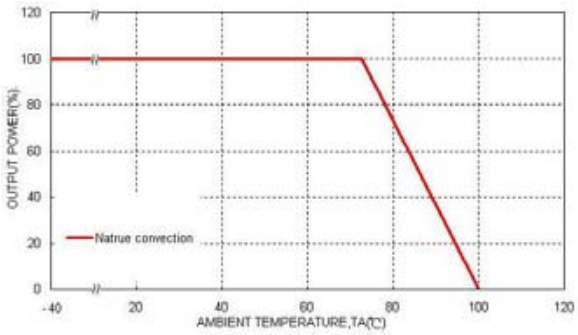
Efficiency versus Output Current



Power Dissipation versus Output Current



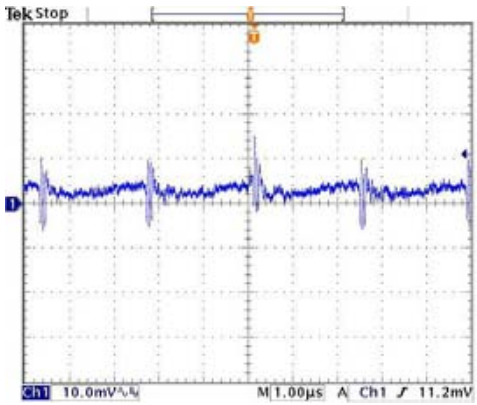
Efficiency versus Input Voltage. Full Load



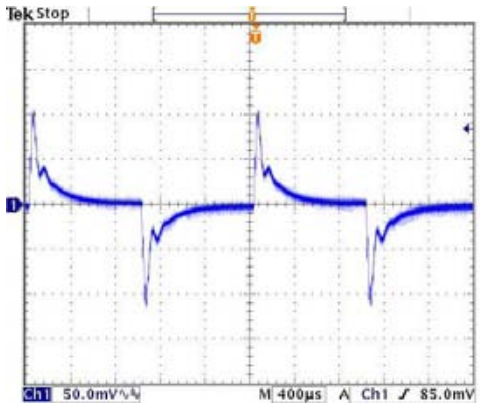
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

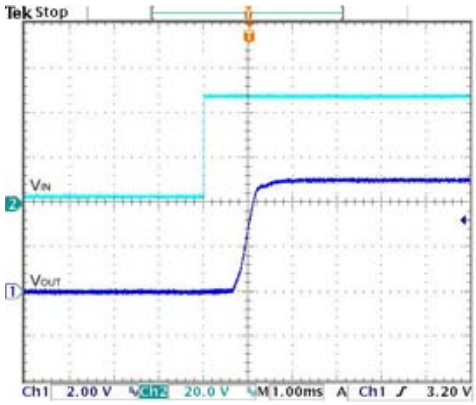
All test conditions are at 25°C. The figures are identical for TMR 3-4811WI



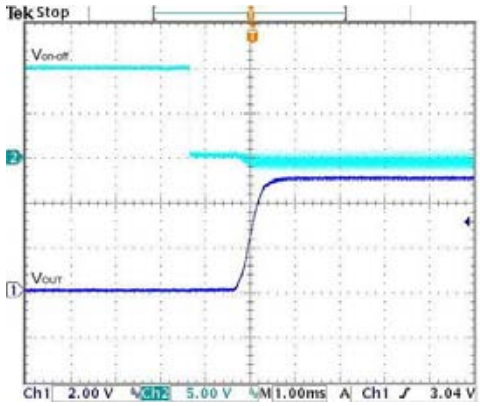
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



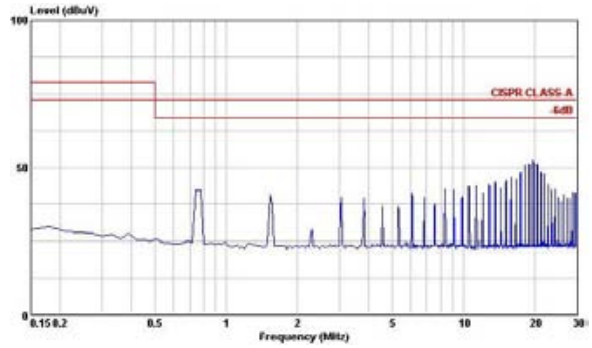
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



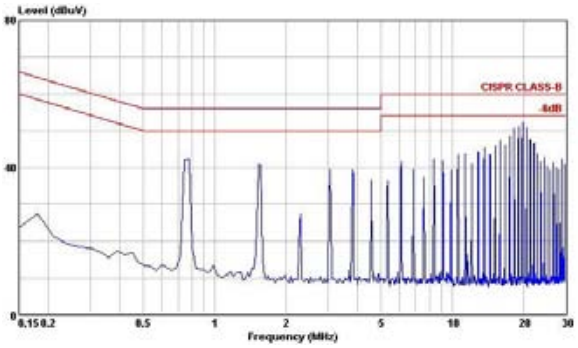
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



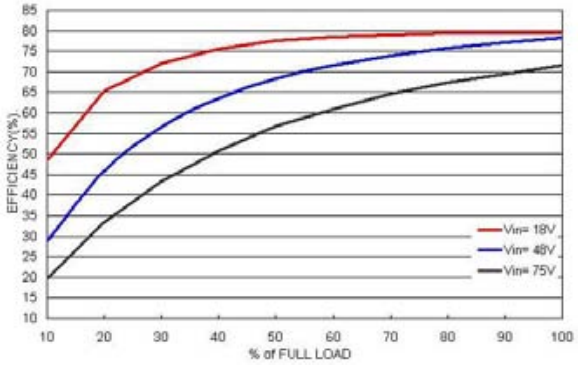
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



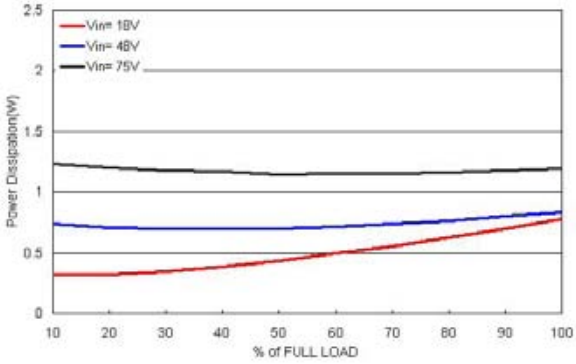
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

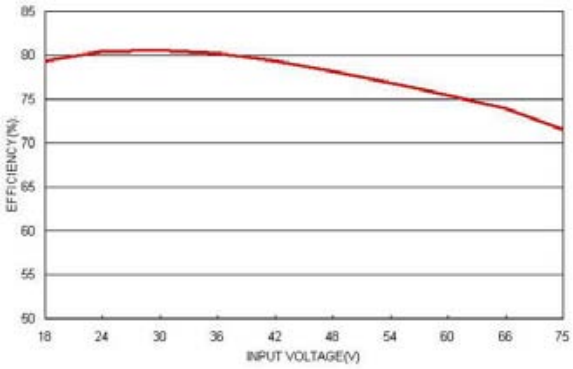
All test conditions are at 25°C. The figures are identical for TMR 3-4809WI



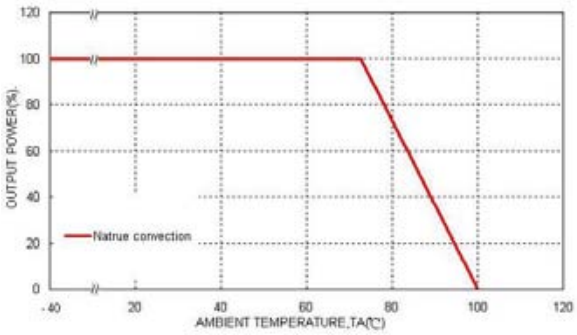
Efficiency versus Output Current



Power Dissipation versus Output Current



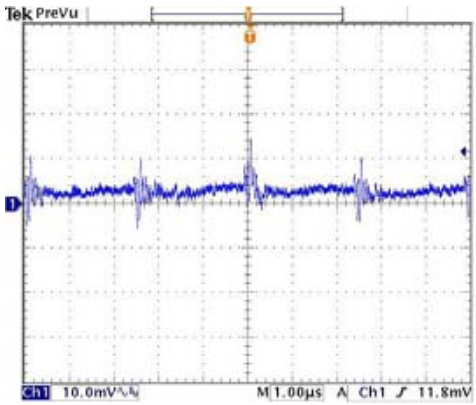
Efficiency versus Input Voltage. Full Load



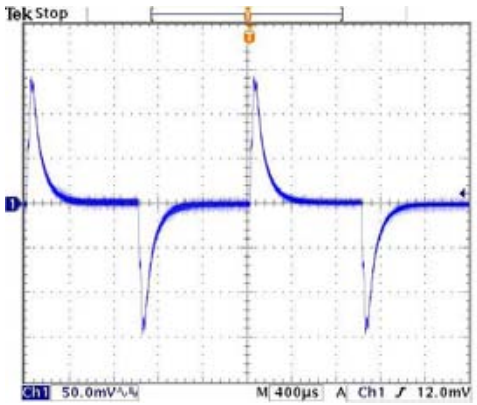
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

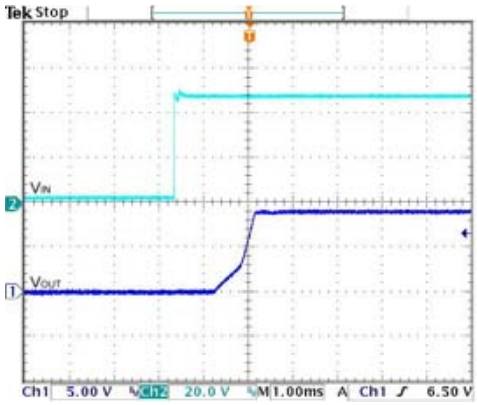
All test conditions are at 25°C. The figures are identical for TMR 3-4809WI



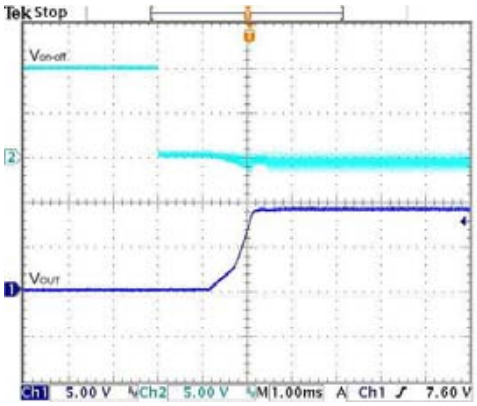
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



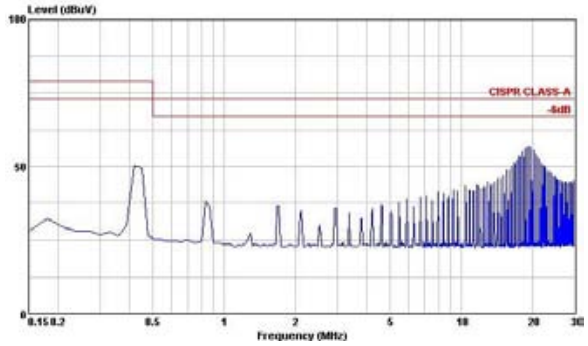
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



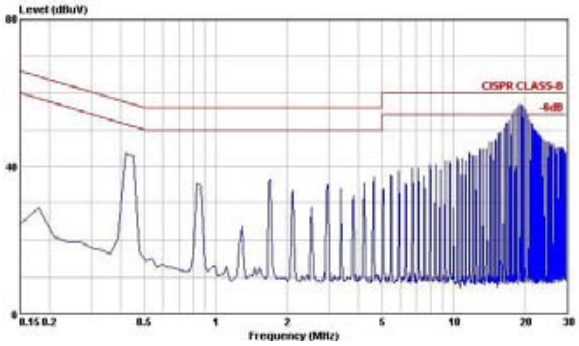
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



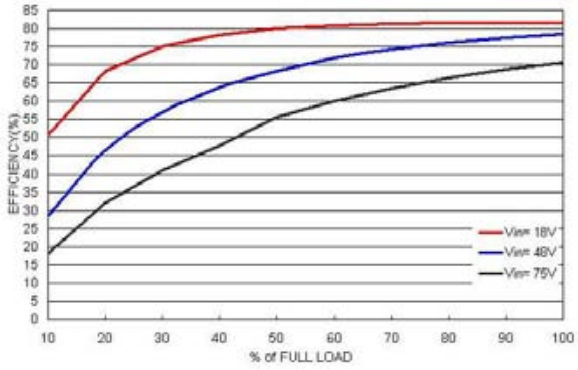
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



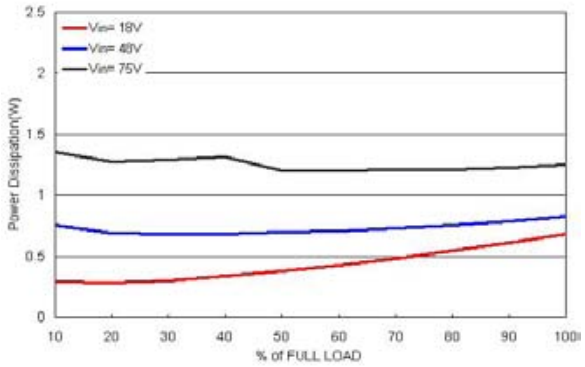
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

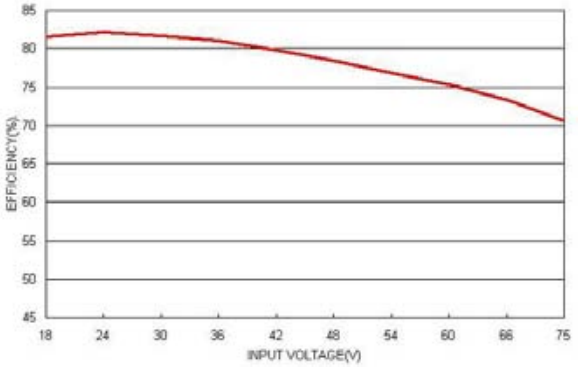
All test conditions are at 25°C. The figures are identical for TMR 3-4812WI



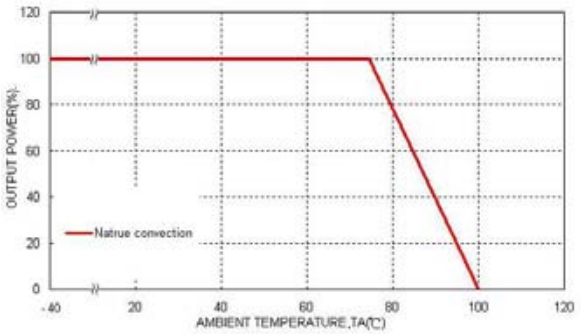
Efficiency versus Output Current



Power Dissipation versus Output Current



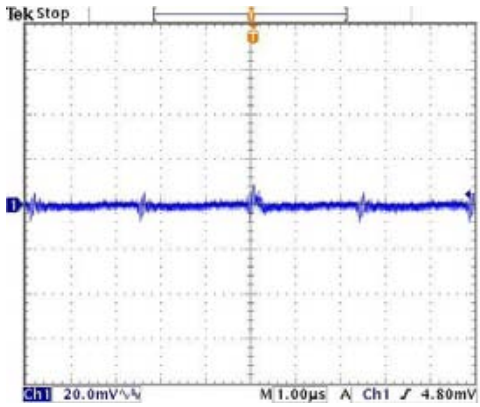
Efficiency versus Input Voltage. Full Load



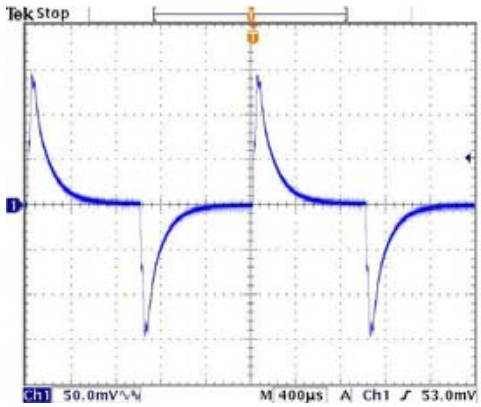
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

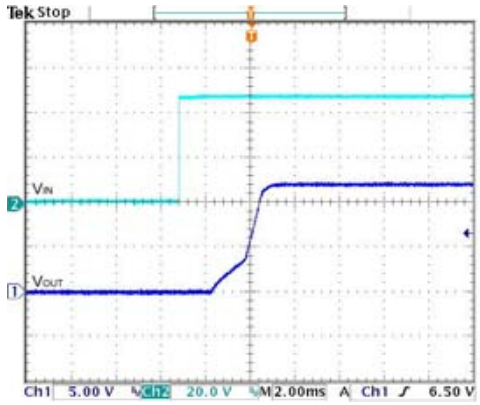
All test conditions are at 25°C. The figures are identical for TMR 3-4812WI



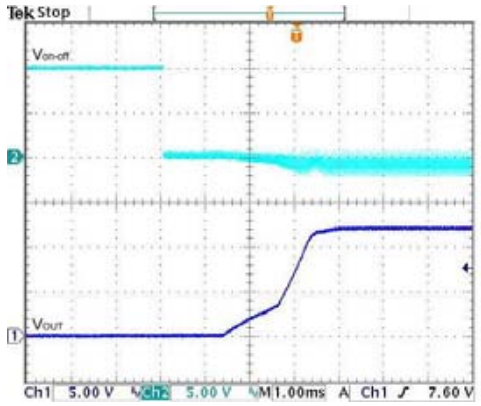
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



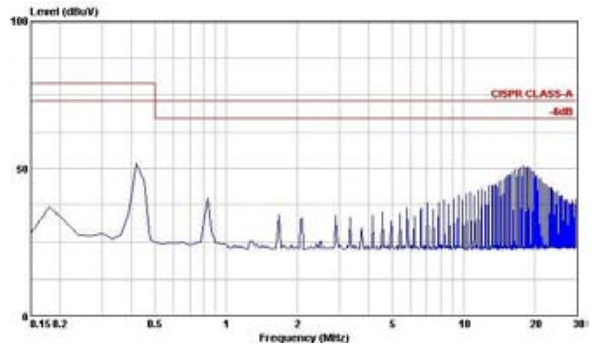
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



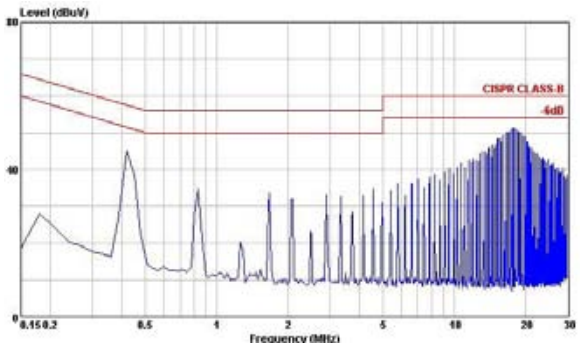
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



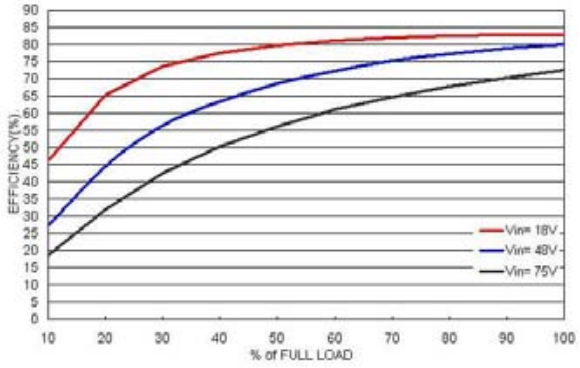
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



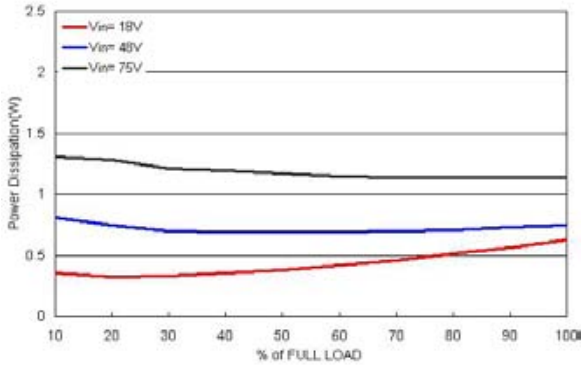
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

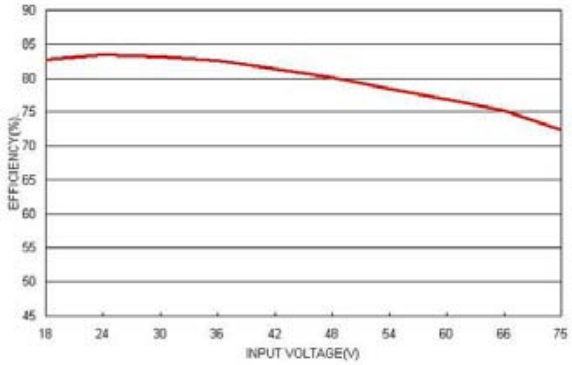
All test conditions are at 25°C. The figures are identical for TMR 3-4813WI



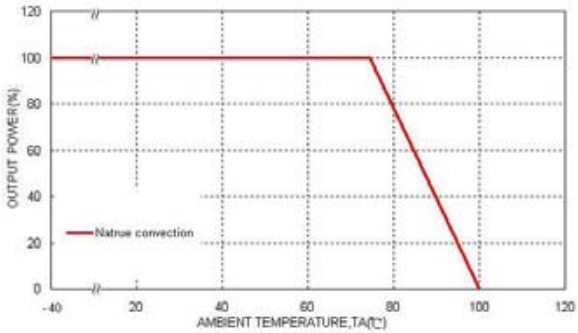
Efficiency versus Output Current



Power Dissipation versus Output Current



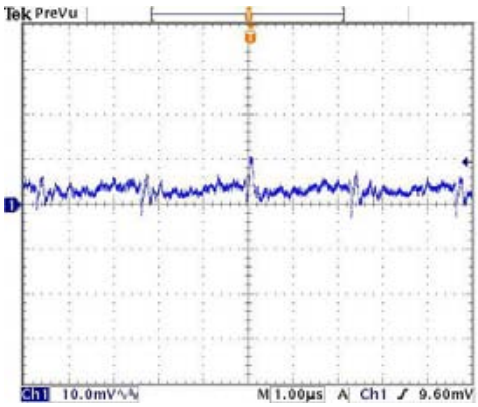
Efficiency versus Input Voltage. Full Load



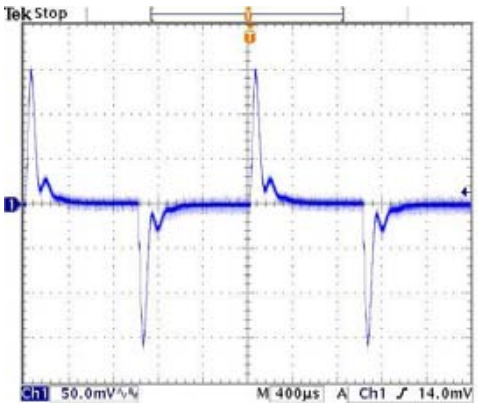
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

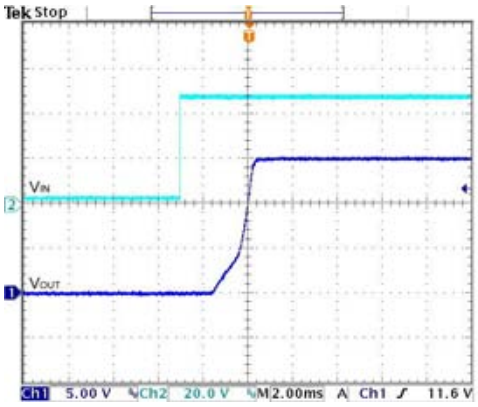
All test conditions are at 25°C. The figures are identical for TMR 3-4813WI



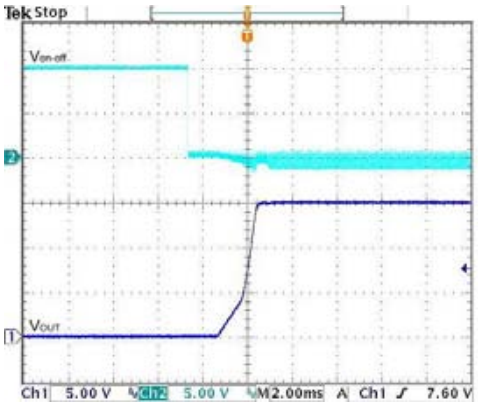
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



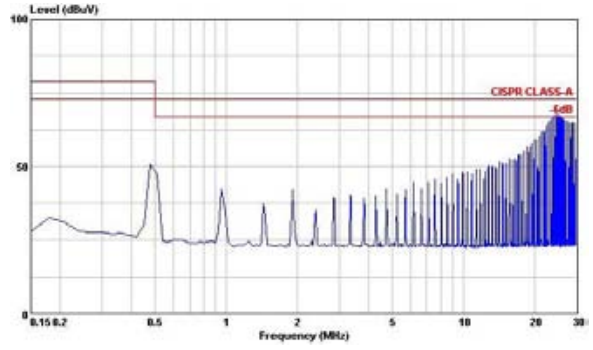
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



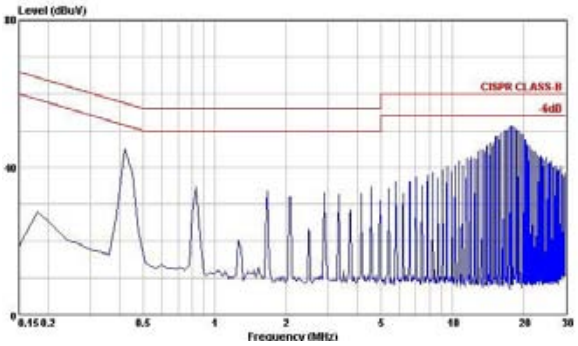
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



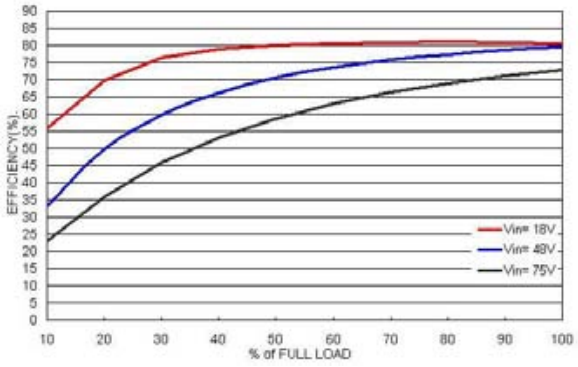
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



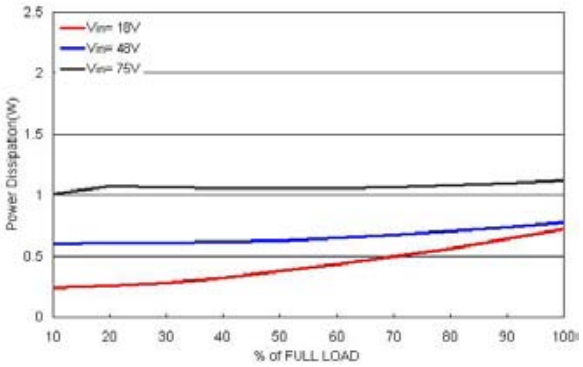
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

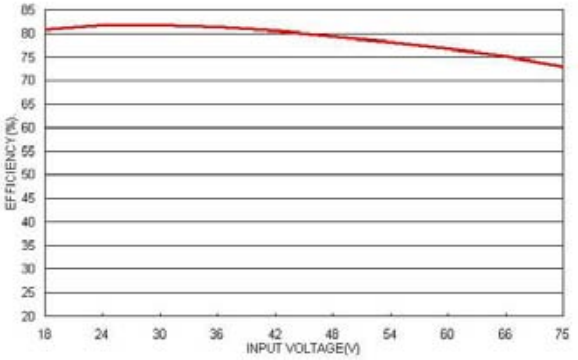
All test conditions are at 25°C. The figures are identical for TMR 3-4821WI



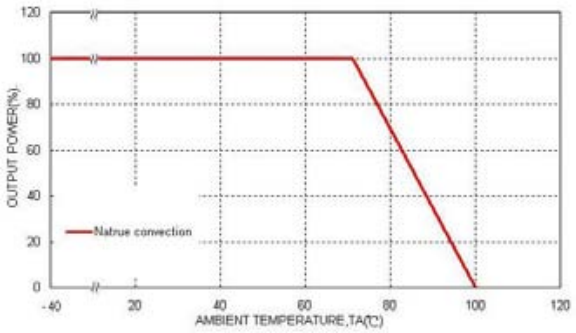
Efficiency versus Output Current



Power Dissipation versus Output Current



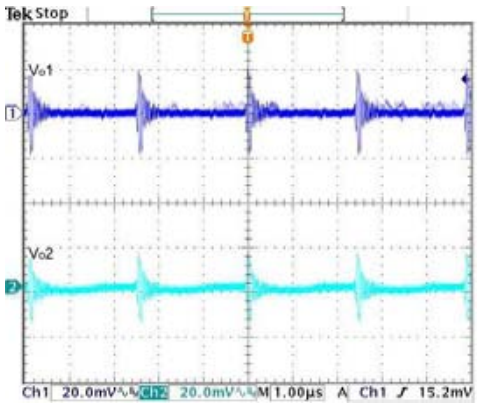
Efficiency versus Input Voltage. Full Load



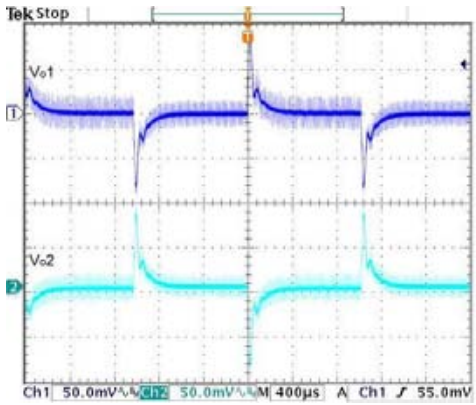
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

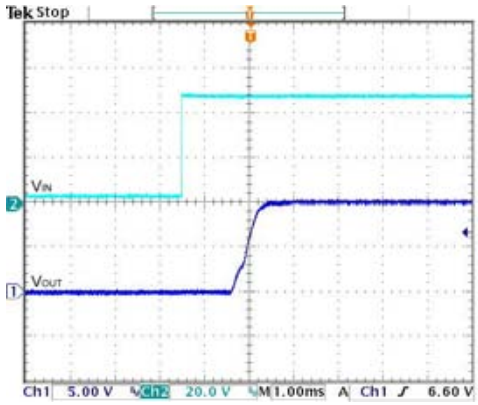
All test conditions are at 25°C. The figures are identical for TMR 3-4821WI



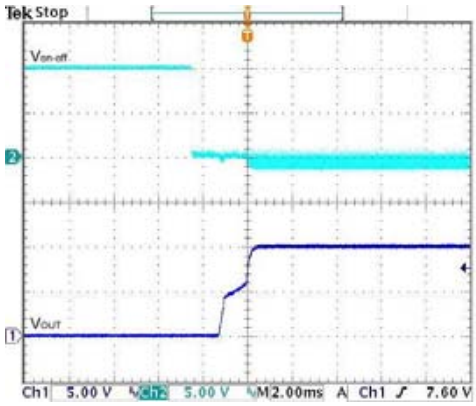
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



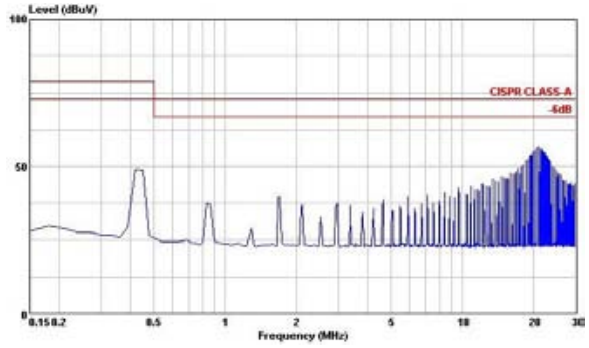
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



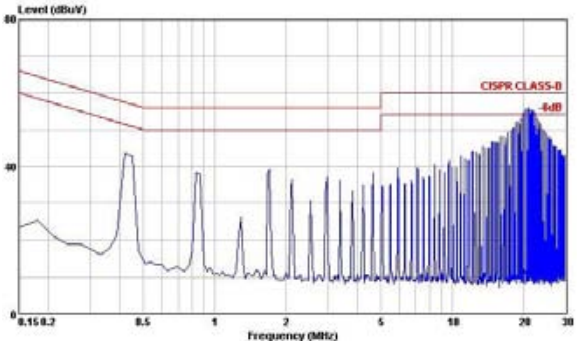
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



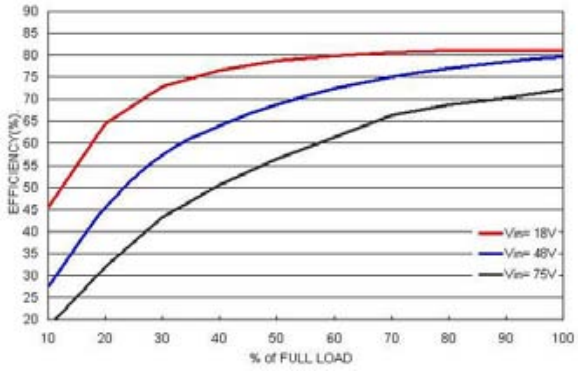
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



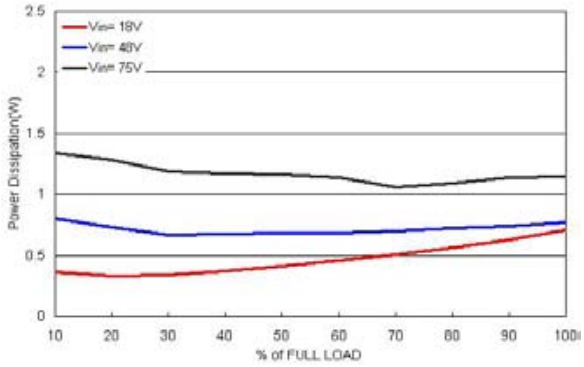
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

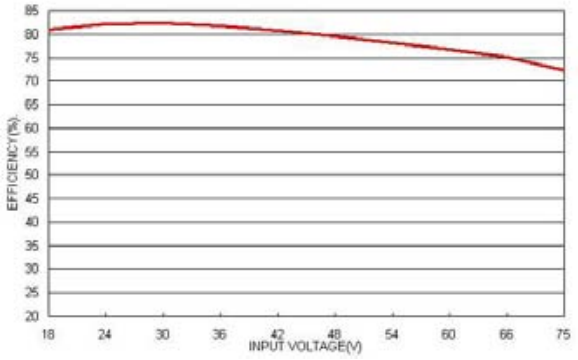
All test conditions are at 25°C. The figures are identical for TMR 3-4822WI



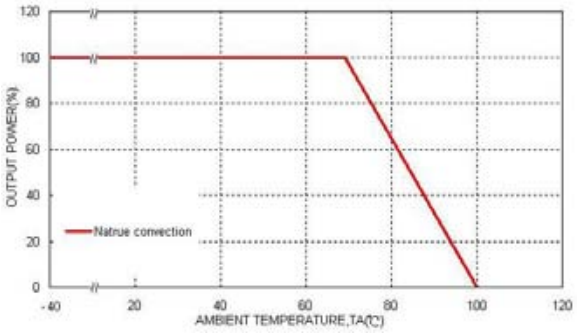
Efficiency versus Output Current



Power Dissipation versus Output Current



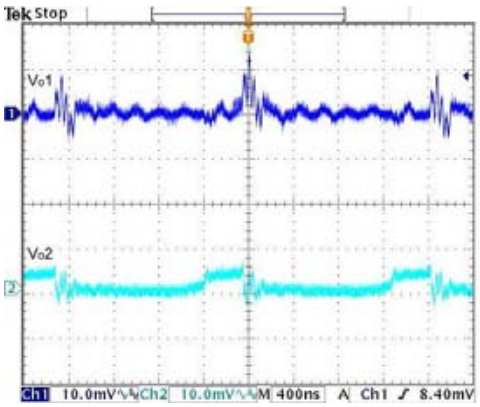
Efficiency versus Input Voltage. Full Load



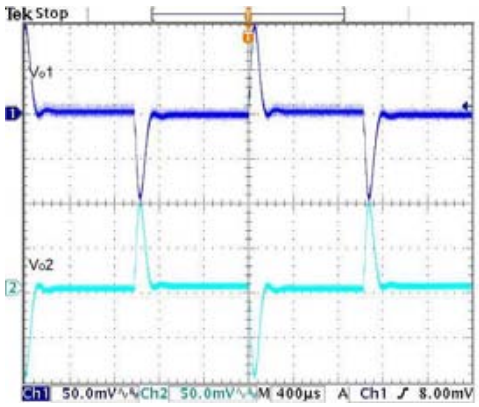
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

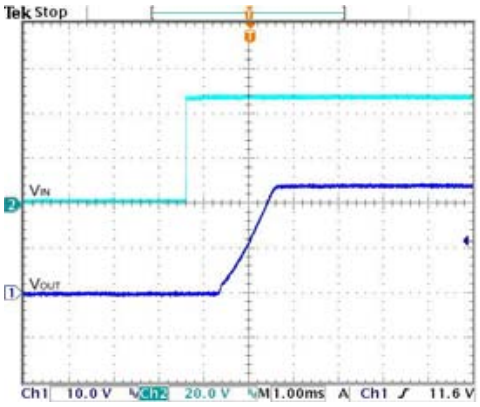
All test conditions are at 25°C. The figures are identical for TMR 3-4822WI



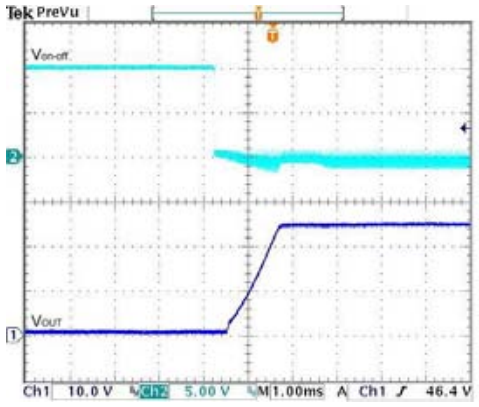
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



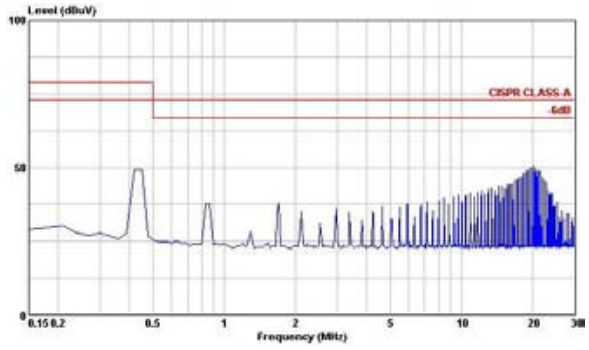
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



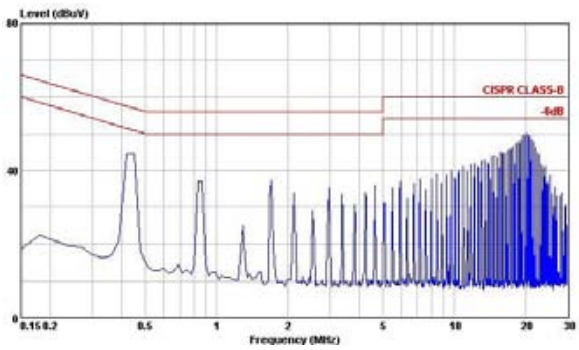
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



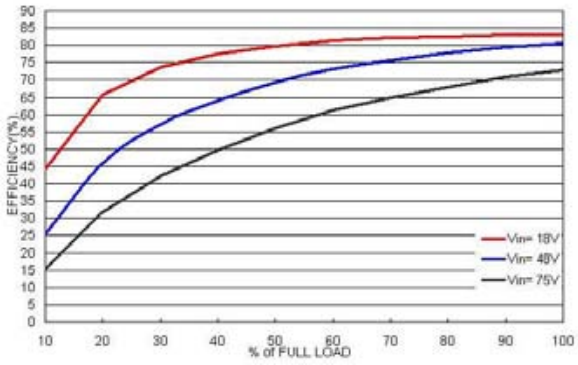
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



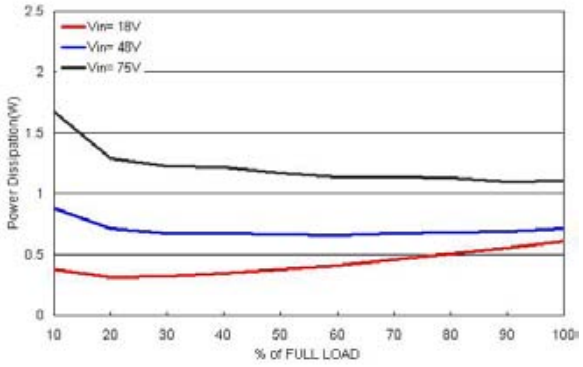
Conduction Emission of EN55022 Class B
$V_{in} = V_{in\,nom}$, Full Load

Characteristic Curves (Continued)

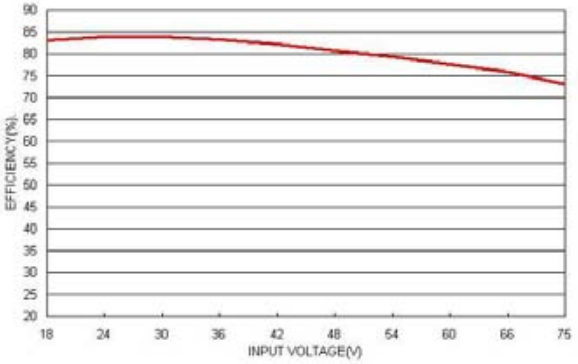
All test conditions are at 25°C. The figures are identical for TMR 3-4823WI



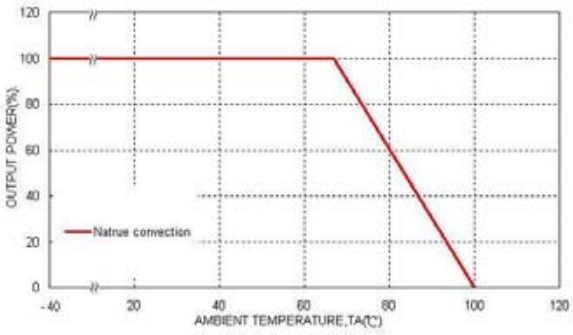
Efficiency versus Output Current



Power Dissipation versus Output Current



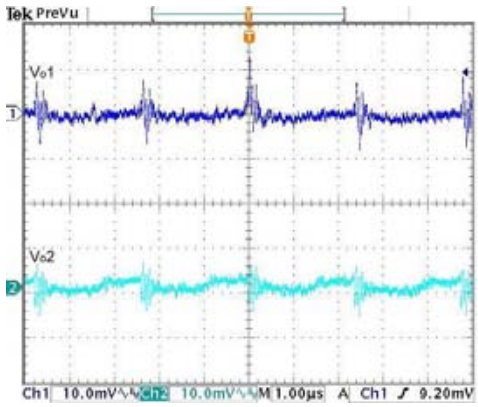
Efficiency versus Input Voltage. Full Load



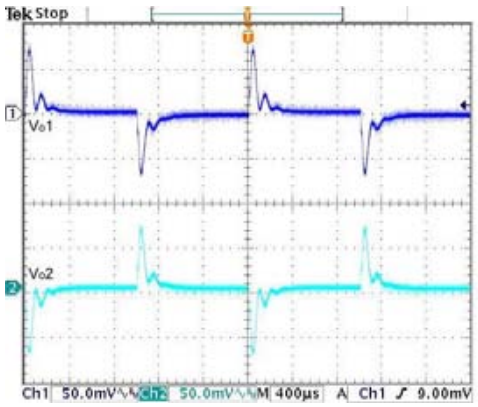
Derating Output Current versus Ambient Temperature and Airflow $V_{in} = V_{in\,nom}$

Characteristic Curves (Continued)

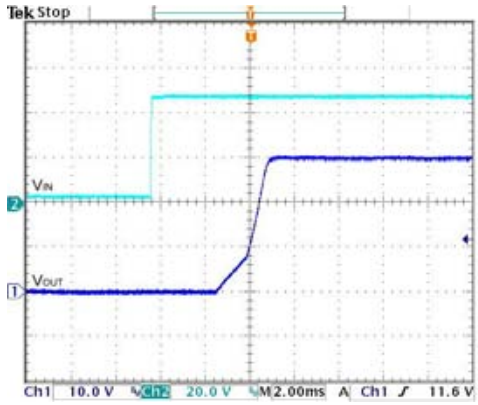
All test conditions are at 25°C. The figures are identical for TMR 3-4823WI



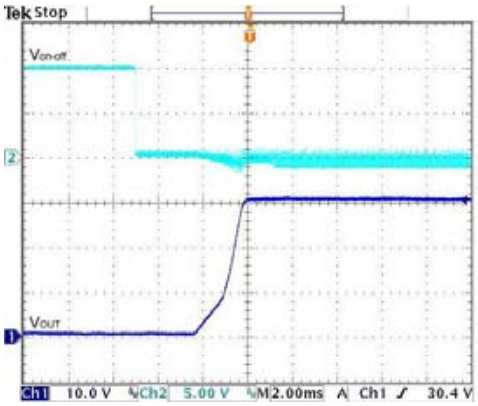
Typical Output Ripple and Noise.
$V_{in} = V_{in\,nom}$, Full Load



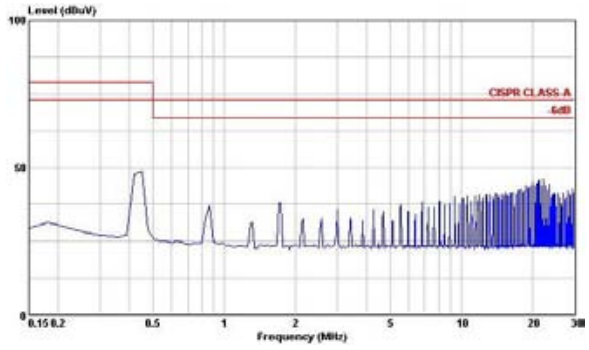
Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load ; $V_{in} = V_{in\,nom}$



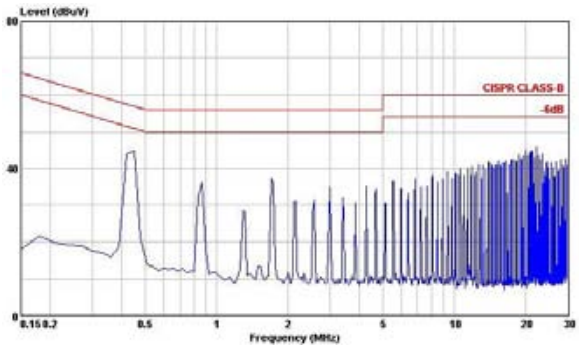
Typical Input Start-Up and Output Rise Characteristic
$V_{in} = V_{in\,nom}$, Full Load



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



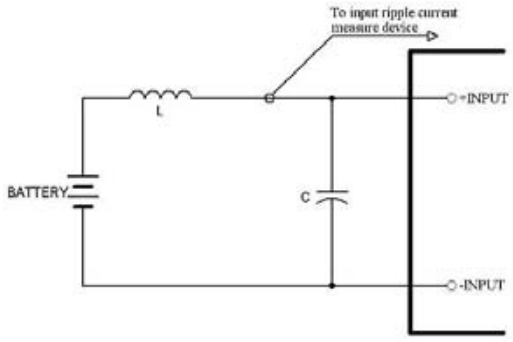
Conduction Emission of EN55022 Class A
$V_{in} = V_{in\,nom}$, Full Load



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

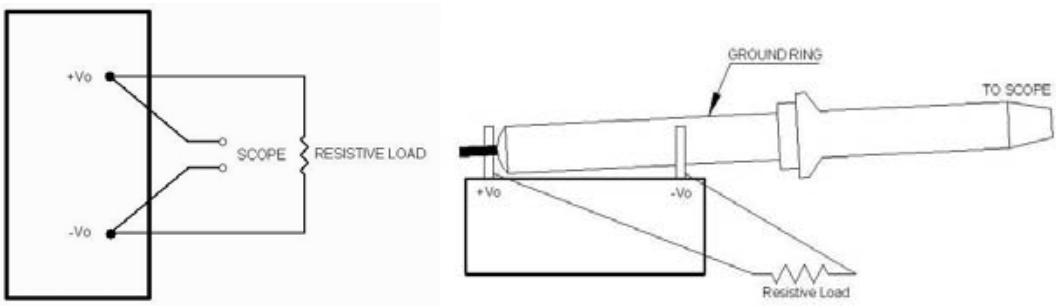
Testing Configurations

Input reflected-ripple current measurement test up

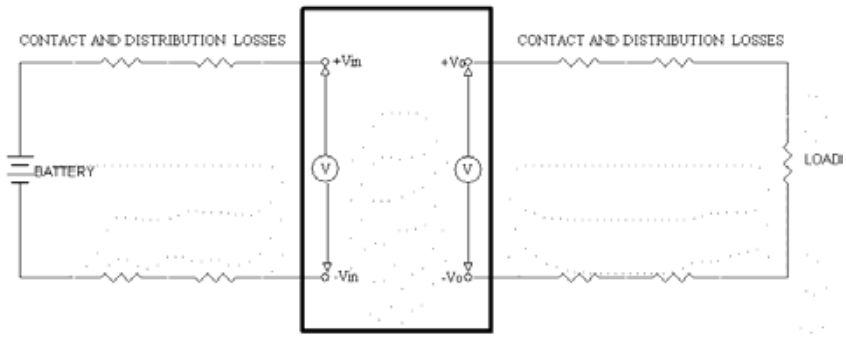


Component	Value	Voltage	Reference
L	2u2H	----	SMD Inductor
C	1µF	100V	1210 MLCC

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



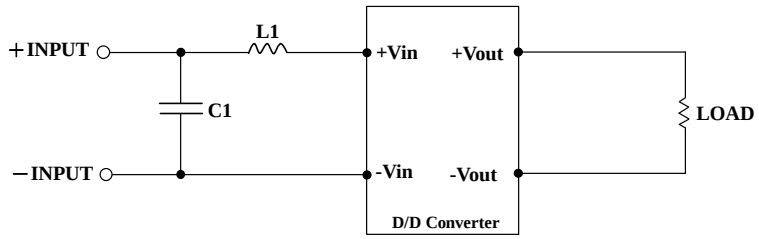
Output voltage and efficiency measurement test up



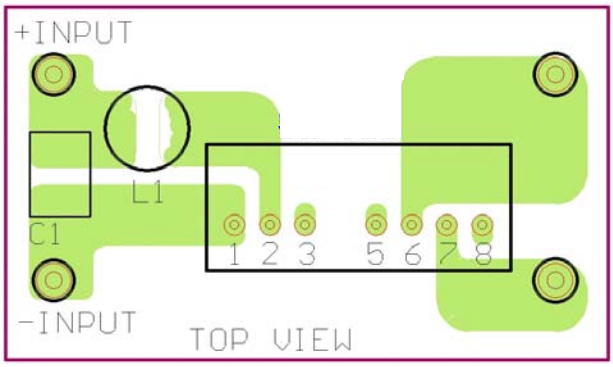
Note: All measurements are taken at the module terminals.

$$Efficiency = \left(\frac{V_o \times I_o}{V_{in} \times I_{in}} \right) \times 100\%$$

EMI considerations



Suggested Schematic to comply with EN55022 Conducted Noise Class A



recommended PCB Layout with Input Filter

To comply with conducted noise according to EN55022 CLASS A following components are recommended:

TMR 3-12xxWI

Component	Value	Voltage	Reference
C1	4.7µF	25V	1210 MLCC
L1	2.2µH	----	SMD Inductor, P/N: TCK-059

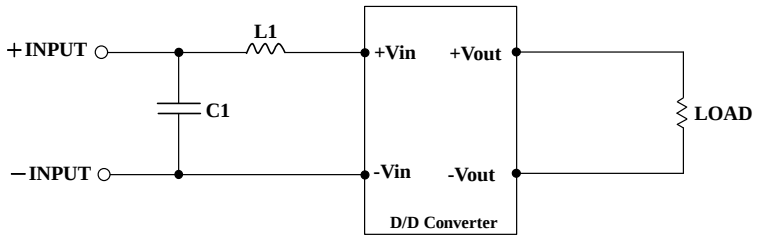
TMR 3-24xxWI

Component	Value	Voltage	Reference
C1	2.2µF	50V	1210 MLCC
L1	10µH	----	SMD Inductor, P/N: TCK-047

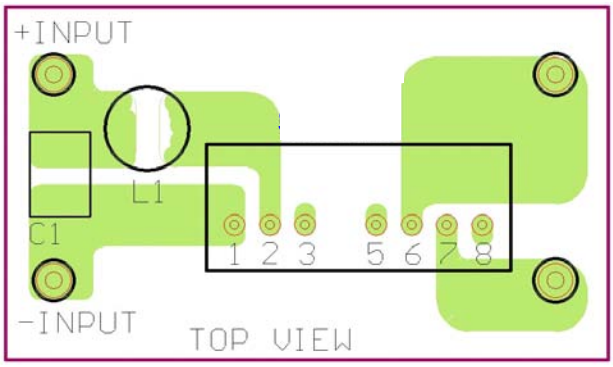
TMR 3-48xxWI

Component	Value	Voltage	**Reference**
C1	2.2µF	100V	1210 MLCC
L1	10µH	----	SMD Inductor, P/N: TCK-047

EMI considerations (Continued)



Suggested Schematic to comply with EN55022 Conducted Noise Class B



recommended PCB Layout with Input Filter

To comply with conducted noise according to EN55022 CLASS B following components are recommended:

TMR 3-12xxWI

Component	Value	Voltage	Reference
C1	10µF	25V	1812 MLCC
L1	2.2µH	----	SMD Inductor, P/N: TCK-059

TMR 3-24xxWI

Component	Value	Voltage	Reference
C1	6.8µF	50V	1812 MLCC
L1	18µH	----	SMD Inductor, P/N: TCK-046

TMR 3-48xxWI

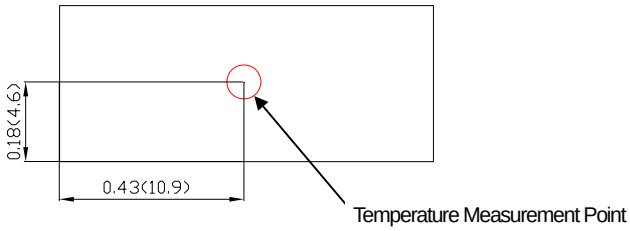
Component	Value	Voltage	Reference
C1	2.2µF	100V	1812 MLCC
L1	18µH	----	SMD Inductor, P/N: TCK-046

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 capacitor must as close as possible to the input terminals of the power module for lower impedance.

Thermal Consideration

The power module operates in a variety of thermal environments. However, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding Environment. Proper cooling can be verified by measuring the point as the figure below. The temperature at this location should not exceed 100°C. When Operating, adequate cooling must be provided to maintain the test point temperature at or below 100°C. Although the maximum point Temperature of the power modules is 100°C, you can limit this Temperature to a lower value for extremely high reliability.



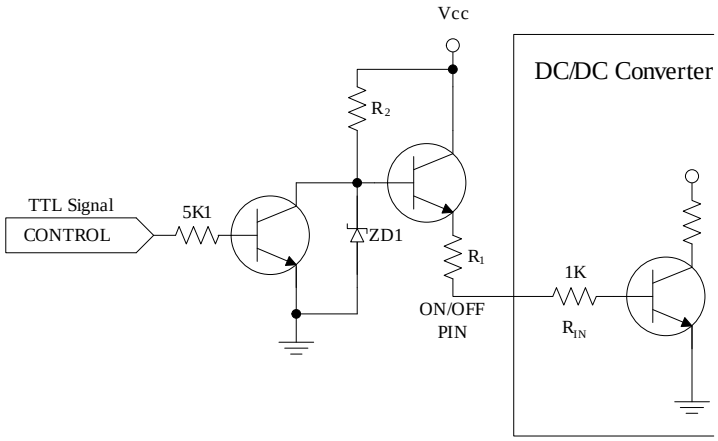
Measurement shown in inches and (millimeters)

TOP VIEW

Remote ON/OFF Control

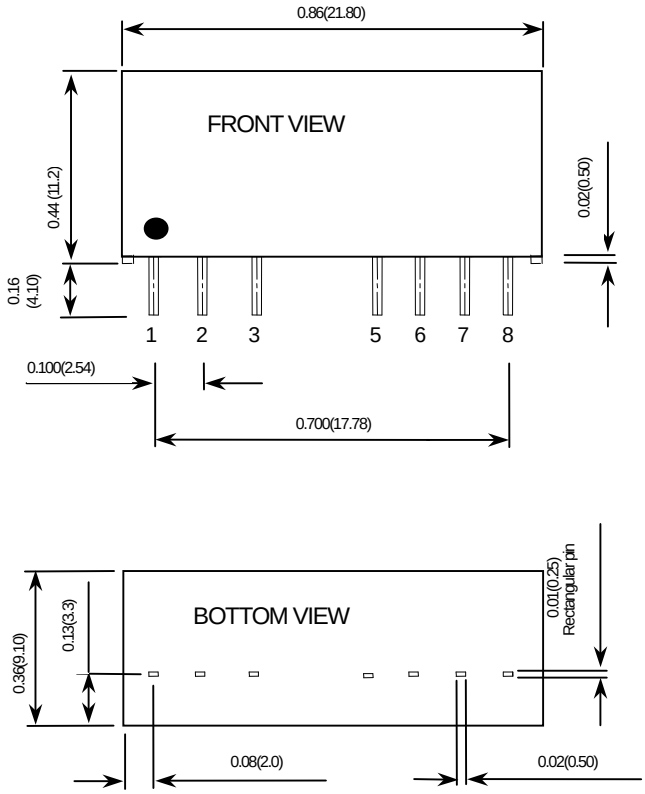
The positive logic remote ON/OFF control circuit is included.
Turns the module ON during a logic High on the On/Off pin and turns OFF during a logic Low.
The On/Off pin is an open collector/drain logic input signal (Von/off) that referenced to GND.
If not using the remote on/off feature, please open circuit between on/off pin and input pin to turn the module on.

Recommended external ON/OFF Ctrl circuit and components



Logic Positive	R1(KΩ)	R2(KΩ)	ZD1
Vcc = 4.5~18Vdc	0	7.5	10V, 5mA
Vcc = 9~36Vdc	2.2	16	18V, 5mA
Vcc = 18~75Vdc	6.8	33	36V, 5mA

Mechanical Data



All Dimensions in Inches (mm)
Tolerance: X.XX ±0.02 (X.X ±0.5)
X.XXX ±0.01 (X.XX ±0.25)
Pin Pitch Tolerance: ±0.01 (±0.25)
Pin Dimension Tolerance: ±0.004 (±0.1)

Pin Connection		
Pin	Single	Dual
1	-Input (GND)	-Input (GND)
2	+Input (Vcc)	+Input (Vcc)
3	Remote on/off	Remote on/off
5	NC* / No Pin**	NC* / No Pin**
6	+Output (+Vout)	+Output (+Vout)
7	-Output (-Vout)	Com
8	NC	-Output (-Vout)

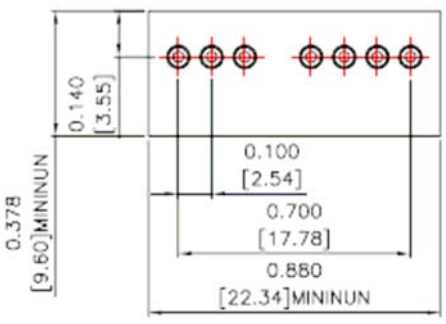
* NC pin for standard.
** No pin for 3KV isolation. (P/N suffix "H")

Recommended Pad Layout

Recommeded Pad Layout

ALL Dimensions in inches (millimeters)
Tolerances:xx.xxx in ±0.010 in (xx.xx mm±0.25mm)

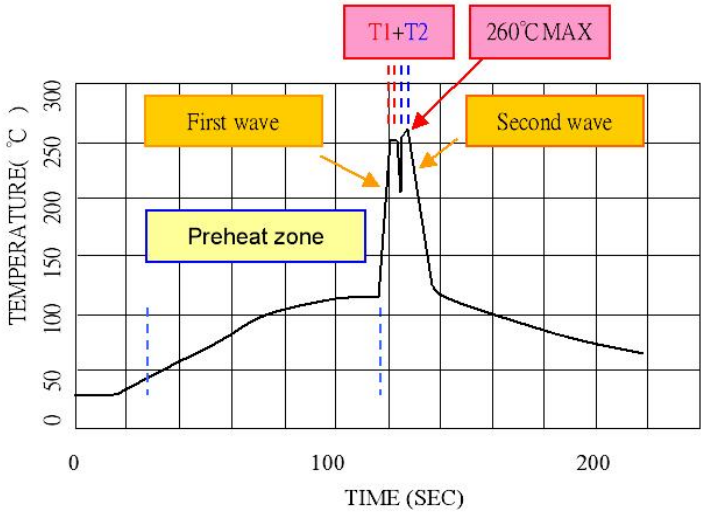
TOP VIEW



PAD SIZE (LEAD FREE RECOMMENDED)
PIN THROUGH HOLE: ø 0.031in(0.8mm)
TOP VIEW PAD: ø 0.059in(1.5mm)
BOTTOM VIEW PAD: ø 0.071in(1.8mm)

Soldering Considerations

Lead free wave solder profile for TMR 3WI SIP type



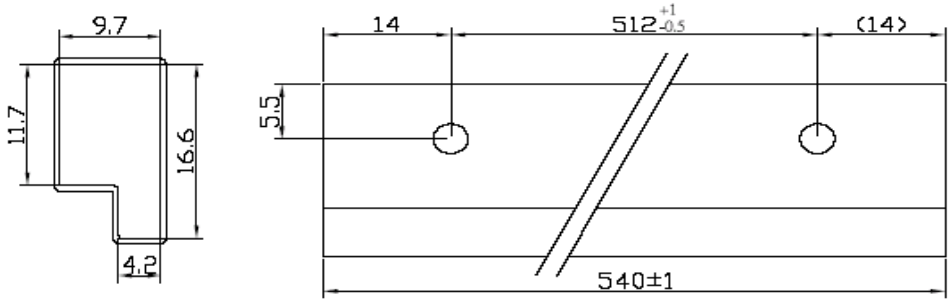
Zone	Reference Parameter
Preheat zone	Rise temp. speed: 3°C/ sec max. Preheat temperature: 100~130°C
Actual heating	Peak temperature: 250~260°C Peak time (T1+T2 time): 4~6 sec

Reference Solder: Sn-Ag-Cu; Sn-Cu

Hand Welding:

Soldering iron: Power 90W
Welding Time: 2~4 sec
Temperature: 380~400°C

Packaging Information



10 pc's per TUBE

Order Code

Model Number	Input Range	Output Voltage	Output Current Full Load	Input Current Full Load[1]	Eff [2] (%)
TMR 3-1210WI	4.5 – 18Vdc	3.3Vdc	700mA	285mA	74
TMR 3-1211WI	4.5– 18Vdc	5.0Vdc	600mA	338mA	78
TMR 3-1209WI	4.5– 18Vdc	9.0Vdc	333mA	333mA	79
TMR 3-1212WI	4.5– 18Vdc	12.0Vdc	250mA	329mA	80
TMR 3-1213WI	4.5– 18Vdc	15.0Vdc	200mA	329mA	80
TMR 3-1221WI	4.5– 18Vdc	±5.0Vdc	±300mA	329mA	80
TMR 3-1222WI	4.5– 18Vdc	±12.0Vdc	±125mA	329mA	80
TMR 3-1223WI	4.5– 18Vdc	±15.0Vdc	±100mA	329mA	80
TMR 3-2410WI	9– 36Vdc	3.3Vdc	700mA	140mA	75
TMR 3-2411WI	9 – 36Vdc	5.0Vdc	600mA	165mA	80
TMR 3-2409WI	9 – 36Vdc	9.0Vdc	333mA	165mA	80
TMR 3-2412WI	9 – 36Vdc	12.0Vdc	250mA	160mA	82
TMR 3-2413WI	9 – 36Vdc	15.0Vdc	200mA	160mA	82
TMR 3-2421WI	9 – 36Vdc	±5.0Vdc	±300mA	167mA	79
TMR 3-2422WI	9 – 36Vdc	±12.0Vdc	±125mA	162mA	81
TMR 3-2423WI	9 – 36Vdc	±15.0Vdc	±100mA	162mA	81
TMR 3-4810WI	18 – 75Vdc	3.3Vdc	700mA	71mA	74
TMR 3-4811WI	18 – 75Vdc	5.0Vdc	600mA	82mA	80
TMR 3-4809WI	18 – 75Vdc	9.0Vdc	333mA	82mA	80
TMR 3-4812WI	18 – 75Vdc	12.0Vdc	250mA	81mA	81
TMR 3-4813WI	18 – 75Vdc	15.0Vdc	200mA	81mA	81
TMR 3-4821WI	18 – 75Vdc	±5.0Vdc	±300mA	84mA	79
TMR 3-4822WI	18 – 75Vdc	±12.0Vdc	±125mA	81mA	81
TMR 3-4823WI	18 – 75Vdc	±15.0Vdc	±100mA	81mA	81

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 1.6A for TMR 3-12xxWI modules, 1A for TMR 3-24xxWI and TMR 3-48xxWI modules. 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 TMR 3WI-SERIES of DC/DC converters has been calculated using

Bellcore TR-NWT-000332 Case I: 50% stress, operating temperature at 40°C (Ground fixed and controlled environment).
The resulting figure for MTBF is 3'963'000 hours.

MIL-HDBK 217F NOTICE2 FULL LOAD, operating temperature at 25°C. The resulting figure for MTBF is 1'707'000 hours.